

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 fire or 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.
- 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.
- 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

Specifications

Series	TCN4S-24R	
Power supply	100 - 240 VAC~ 50/60 Hz	
Permissible voltage range	90 to 110 % of rated voltage	
Power consumption	≤ 5 VA	
Sampling period	100 ms	
Input specification	Refer to 'Input Type and Using Range.'	
Control output	Relay	250 VAC~ 3A, 30 VDC~ 3A, 1a
Alarm output	250 VAC~ 1 A 1a	
Display type	7 Segment (red, green), 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	≥ 5,000,000 operations
	Electrical	OUT1/2: ≥ 200,000 operations (load resistance: 250 VAC~ 3 A) AL1/2: ≥ 300,000 operations (load resistance: 250 VAC~ 1 A)
Dielectric strength	Between the charging part and the case: 2,000 VAC~ 50/60 Hz for 1 min	
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 (pulse width: 1 μs) by noise simulator 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: 2 kV)	
Certification	CE UK CA c SA us EAC	
Unit weight (packaged)	TCN4S: ≈ 100 g (≈ 147 g)	

Input Type and Using Range

The setting range of some parameters is limited when using the decimal point display.

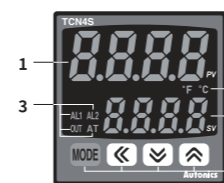
Input type	Decimal point	Display	Using range (°C)	Using range (°F)	
Thermo-couple	K (CA)	1	ℓ ℓ R.H	-50 to 1,200	-58 to 2,192
		0.1	ℓ ℓ R.L	-50.0 to 999.9	-58.0 to 999.9
	J (IC)	1	J I ℓ .H	-30 to 800	-22 to 1,472
		0.1	J I ℓ .L	-30.0 to 800.0	-22.0 to 999.9
	L (IC)	1	L I ℓ .H	-40 to 800	-40 to 1,472
		0.1	L I ℓ .L	-40.0 to 800.0	-40.0 to 999.9
T (CC)	1	ℓ ℓ ℓ .H	-50 to 400	-58 to 752	
0.1	ℓ ℓ ℓ .L	-50.0 to 400.0	-58.0 to 752.0		
R (PR)	1	r P r	0 to 1,700	32 to 3,092	
	0.1	r P r	0 to 1,700	32 to 3,092	
RTD	Cu50 Ω	1	ℓ U S.H	-50 to 200	-58 to 392
		0.1	ℓ U S.L	-50.0 to 200.0	-58.0 to 392.0
	DP100 Ω	1	d P ℓ .H	-100 to 400	-148 to 752
		0.1	d P ℓ .L	-100.0 to 400.0	-148.0 to 752.0

Display accuracy

Input type	Using temperature	Display accuracy
Thermocouple RTD	At room temperature (23°C ±5 °C)	(PV ±0.5% or ±1 °C higher one) ±1-digit <ul style="list-style-type: none"> Thermocouple R, S below 200 °C: (PV ±0.5% or ±3 °C higher one) ±1-digit Over 200 °C: (PV ±0.5% or ±2 °C higher one) ±1digit Thermocouple L, RTD Cu50 Ω: (PV ±0.5% or ±2 °C higher one) ±1-digit
	Out of room temperature range	(PV ±0.5% or ±2 °C higher one) ±1-digit <ul style="list-style-type: none"> Thermocouple R, S below 200 °C: (PV ±1.0% or ±6 °C higher one) ±1digit Over 200 °C: (PV ±0.5% or ±5 °C higher one) ±1digit Thermocouple L, RTD Cu50 Ω: (PV ±0.5% or ±3 °C higher one) ±1digit

- If the input specification is set to 'decimal point 0.1' display, add ±1°C by accuracy standard.

Unit Descriptions



3. Indicator

Display	Name	Description
AL1/2	Alarm output	Turns ON when the alarm output is ON.
OUT	Control output	Turns ON when control output is ON <ul style="list-style-type: none"> CYCLE/PHASE control of SSR drive output: Turns ON when MV is over 3.0% [AC power model]
AT	Auto tuning	Flashes during auto tuning every 1 sec
°C, °F	Unit	Displays selected unit (parameter).

4. Input key

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

1. PV Display part (red)

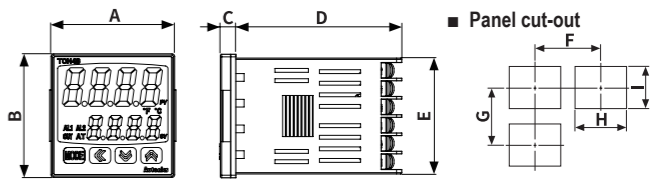
- RUN mode: Displays PV (Present value)
- Setting mode: Displays parameter name

2. SV Display part (green)

- RUN mode: Displays SV (Setting value)
- Setting mode: Displays parameter setting value

Dimensions

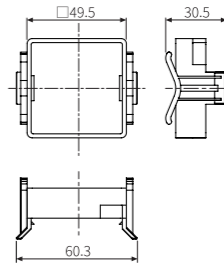
- Unit: mm



	Body					Panel cut-out			
	A	B	C	D	E	F	G	H	I
TCN4S	48	48	6	64.5	44.8	≥ 65	≥ 65	45 ^{+0.4}	45 ^{+0.4}

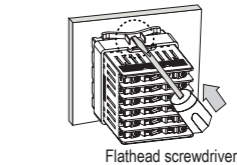
Bracket

TCN4S



Installation Method

TCN4S



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

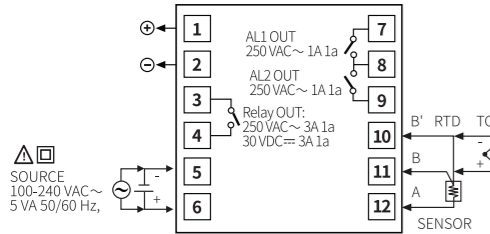
Errors

Display	Description	Troubleshooting
o P E n	Flashes when input sensor is disconnected or sensor is not connected.	Check input sensor status.
H H H H	Flashes when PV is higher than input range. ⁰¹⁾	When input is within the rated input range, this display disappears.
L L L L	Flashes when PV is lower than input range. ⁰¹⁾	

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.

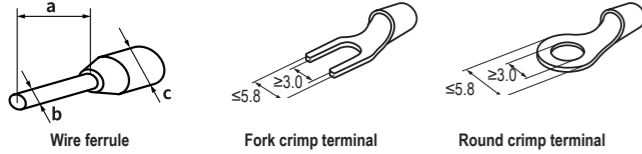
Connections

TCN4S



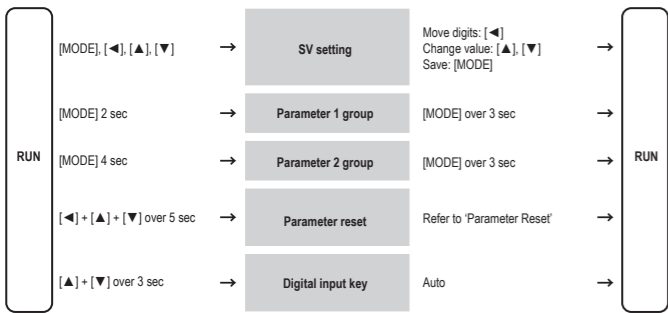
Crimp Terminal Specifications

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



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

Mode Setting



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. 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: Checks the fixed item / Moves the row 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

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	Setting range	Condition
1-1 AL1 alarm temperature	RL 1	125.0	Deviation alarm: -F.S. to F.S. °C/°F Absolute value alarm: Within input range	2-12/14 alarm operation: AM1 to AM6
1-2 AL2 alarm temperature	RL 2	125.0		
1-3 Auto tuning	RE	OFF	OFF: Stop, ON: Execution	
1-4 Proportional band	P	0.100	0.1 to 999.9 °C/°F	2-8 Control type: PID
1-5 Integral time	I	0.000	0 (OFF) to 9999 sec	
1-6 Derivative time	D	0.000	0 (OFF) to 9999 sec	
1-7 Manual reset	rES	0.500	0.0 to 100.0%	2-8 Control type: PID & 1-5 Integral time: 0
1-8 Hysteresis	HYS	0.02	1 to 100 (0.1 to 50.0) °C/°F	2-8 Control type: ONOF

Parameter 2 group

Parameter	Display	Default	Setting range	Condition
2-1 Input specification ⁰¹⁾	in-t	LCRH	Refer to 'Input Type and Using Range'.	-
2-2 Temperature unit ⁰¹⁾	Unit	°C	°C, °F	-
2-3 Input correction	in-b	0.000	-999 to 999 (-199.9 to 999.9) °C/°F	-
2-4 Input digital filter	in-f	0.001	0.1 to 120.0 sec	-
2-5 SV low limit ⁰²⁾	L-Sv	-5.0	Within 2-1 Input specification Input range, L-SV ≤ H-SV - 1-digit °C/°F	-
2-6 SV high limit ⁰²⁾	H-Sv	120.0	H-SV ≥ L-SV + 1-digit °C/°F	-
2-7 Control output mode ⁰³⁾	o-F	HEAL	HEAT: Heating, COOL: Cooling	-
2-8 Control type ⁰⁴⁾	E-nd	PID	PID, ONOF: ON/OFF	-
2-9 Control output	oUt	rLY	RLY: relay	-
2-11 Control cycle	t	2.00	0.5 to 120.0 sec	2-9 Control output: RLY
2-12 AL1 alarm operation	RL-1	RLA	<ul style="list-style-type: none"> AM0: Off AM1: Deviation high limit alarm AM2: Deviation low limit alarm AM3: 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 alarm LBA: Loop break alarm (LBA) 	-
2-13 AL1 alarm option	RL-1	RLA	<ul style="list-style-type: none"> A: Standard alarm B: Alarm latch C: Standby sequence 1 D: Alarm latch and standby sequence 1 E: Standby sequence 2 F: Alarm latch and standby sequence 2 <ul style="list-style-type: none"> Enter to option setting: Press [◀] key in 2-12 AL-1 alarm operation. 	-
2-14 AL2 alarm operation	RL-2	RLA	Same as 2-12/13 AL1 alarm operation/option	-
2-15 AL2 alarm option	RL-2	RLA		-
2-16 Alarm output hysteresis	HYS	0.01	1 to 100 (0.1 to 50.0) °C/°F	2-12/14 AL1/2 alarm operation: AM1 to 6
2-17 LBA time	LbRt	0.000	0 (OFF) to 9999 sec or auto (auto tuning)	2-12/14 AL1/2 alarm operation: LBA
2-18 LBA band	LbRb	0.002	0 (OFF) to 999 (0.0 to 999.9) °C/°F or auto (auto tuning)	2-12/14 AL1/2 alarm operation: LBA & 2-18 LBA time: > 0
2-19 Digital input key	dI-t	5toP	STOP: Stop control output, AL.RE: Alarm reset, AT*: Auto tuning execution, OFF	*2-8 Control type: PID
2-20 Sensor error MV	Er-nu	0.000	0.0: OFF, 100.0: ON 0.0 to 100.0%	2-8 Control type: ONOF 2-8 Control type: PID
2-21 Lock	LoC	OFF	OFF LOC1: Parameter 2 group lock LOC2: Parameter 1/2 group lock LOC3: Parameter 1/2 group, SV setting lock	-

01) 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, LBA time, LBA band
- SV setting mode: SV

02) If SV is lower than low limit or higher than 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.

03) When the setting value is changed, setting value of 2-20 Sensor error MV is initialized to 0.0 (OFF).

04) 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)