



**TCN4S-24R Dual  
Display PID  
Temperature  
Controllers**



# TRU COMPONENTS TCN4S-24R Dual Display PID Temperature Controllers Instruction Manual

[Home](#) » [TRU COMPONENTS](#) » TRU COMPONENTS TCN4S-24R Dual Display PID Temperature Controllers Instruction Manual 

## Contents

- [1 TRU COMPONENTS TCN4S-24R Dual Display PID Temperature Controllers](#)
- [2 Product Usage Instructions](#)
- [3 Cautions during Use:](#)
- [4 Frequently Asked Questions](#)
- [5 Product Information](#)
- [6 Safety Considerations](#)
- [7 Specifications](#)
- [8 Input Type and Using Range](#)
- [9 Unit Descriptions](#)
- [10 Errors](#)
- [11 Dimensions](#)
- [12 Connections](#)
- [13 Documents / Resources](#)
  - [13.1 References](#)
- [14 Related Posts](#)



## TRU COMPONENTS TCN4S-24R Dual Display PID Temperature Controllers



### Specifications:

- Series: TCN4S-24R
- Power supply: AC 100-240V
- Permissible voltage range: 85-264V AC/DC
- Power consumption: Less than 5W
- Sampling period: 250ms
- Input specification: Thermocouple, RTD, linear voltage, or linear current
- Control output: Relay output
- Relay: SPST-NO (1c) / SPST-NC (1c)
- Alarm output: Relay output
- Display type: Dual display LED

- Control type: Heating/Cooling
- Hysteresis: 0.1 to 50°C or °F
- Proportional band (P): 0 to 999.9%
- Integral time (I): 0 to 3600s
- Derivative time (D): 0 to 3600s
- Control cycle (T): 1 to 120s
- Manual reset: Available
- Relay life cycle: Mechanical – 10 million operations,  
Electrical – 100,000 operations
- Dielectric strength: 2000V AC for 1 minute
- Vibration: 10-55Hz, amplitude 0.35mm
- Insulation resistance: More than 100MΩ with 500V DC
- Noise immunity: ±2kV (between power terminal and input terminal)
- Memory retention: Non-volatile memory retains data even when power is off
- Ambient temperature: -10 to 55°C (14 to 131°F)
- Ambient humidity: 25 to 85% RH (non-condensing)

## **Product Usage Instructions**

### **Safety Considerations:**

#### **Warning:**

1. Install fail-safe devices when using the unit with machinery that may cause serious injury or substantial economic loss.
2. Avoid using the unit in places with flammable/explosive/corrosive gas, high humidity, direct sunlight, vibration, impact, or salinity.
3. Always install on a device panel before use.
4. Avoid connecting, repairing, or inspecting the unit while connected to a power source.
5. Check connections before wiring.
6. Do not disassemble or modify the unit.

#### **Caution:**

1. Use appropriate cables for power input and relay output connections to prevent fire or malfunction.
2. Operate the unit within the rated specifications.
3. Clean the unit with a dry cloth only; avoid water or organic solvents.
4. Keep the product away from metal chips, dust, and wire residue

to prevent damage.

## Cautions during Use:

- Ensure proper installation and connection of the unit as per the manual.
- Regularly check for any signs of damage or wear on cables and connectors.
- Maintain a clean environment around the unit to prevent interference.


## Frequently Asked Questions

- **Q: Can this temperature controller be used with both heating and cooling systems**
  - **A:** Yes, this temperature controller supports both heating and cooling control.
- **Q: What is the recommended ambient temperature range for optimal performance?**
  - **A:** The recommended ambient temperature range is -10 to 55°C (14 to 131°F).
- **Q: How do I reset the controller manually?**
  - **A:** The controller features a manual reset option that can be accessed through the settings menu. Refer to the instruction manual for detailed steps on manual reset.

## Product Information

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

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 result in 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 mm<sup>2</sup>) 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 the same thickness and length. For the 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 equipment that generates strong magnetic force or high-frequency noise.
- Install a power switch or circuit breaker in an easily accessible place for supplying or disconnecting the power.
- Do not use the unit for another purpose (e.g. voltmeter, ammeter), but for temperature controller.
- When changing the input sensor, turn off the power first before changing it. After changing the input sensor, modify the value of the corresponding parameter.
- Make a required space around the unit for the 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 that 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		    
Unit weight (packaged)		TCN4S: ≈ 100 g (≈ 147 g)

## Input Type and Using Range

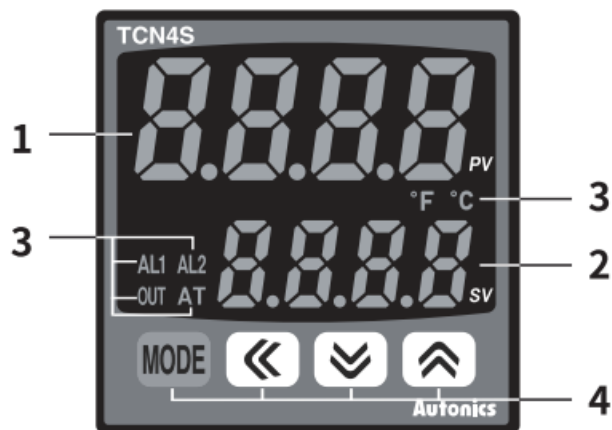
The setting range of some parameters is limited when using the decimal point display.

Input type		Decimal point	Display	Using range (°C)	Using range (°F)
Thermo-couple	K (CA)	1	℄℄℄.℄	-50 to 1,200	-58 to 2,192
		0.1	℄℄℄.℄	-50.0 to 999.9	-58.0 to 999.9
	J (IC)	1	℄℄℄.℄	-30 to 800	-22 to 1,472
		0.1	℄℄℄.℄	-30.0 to 800.0	-22.0 to 999.9
	L (IC)	1	℄℄℄.℄	-40 to 800	-40 to 1,472
		0.1	℄℄℄.℄	-40.0 to 800.0	-40.0 to 999.9
	T (CC)	1	℄℄℄.℄	-50 to 400	-58 to 752
		0.1	℄℄℄.℄	-50.0 to 400.0	-58.0 to 752.0
RTD	R (PR)	1	℄℄℄	0 to 1,700	32 to 3,092
		0.1	℄℄℄	0 to 1,700	32 to 3,092
	S (PR)	1	℄℄℄	0 to 1,700	32 to 3,092
		0.1	℄℄℄	0 to 1,700	32 to 3,092
	Cu50 Ω	1	℄℄℄.℄	-50 to 200	-58 to 392
		0.1	℄℄℄.℄	-50.0 to 200.0	-58.0 to 392.0
	DPT100 Ω	1	℄℄℄.℄	-100 to 400	-148 to 752
		0.1	℄℄℄.℄	-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 • 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 • 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

## 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

#### 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"> <li>• CYCLE/PHASE control of SSR drive output: Turns ON when MV is over 3.0% [AC power model]</li> </ul>
AT	Auto tuning	Flashes during auto tuning every 1 sec
°C, °F	Unit	Displays selected unit (parameter).

#### Input key

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



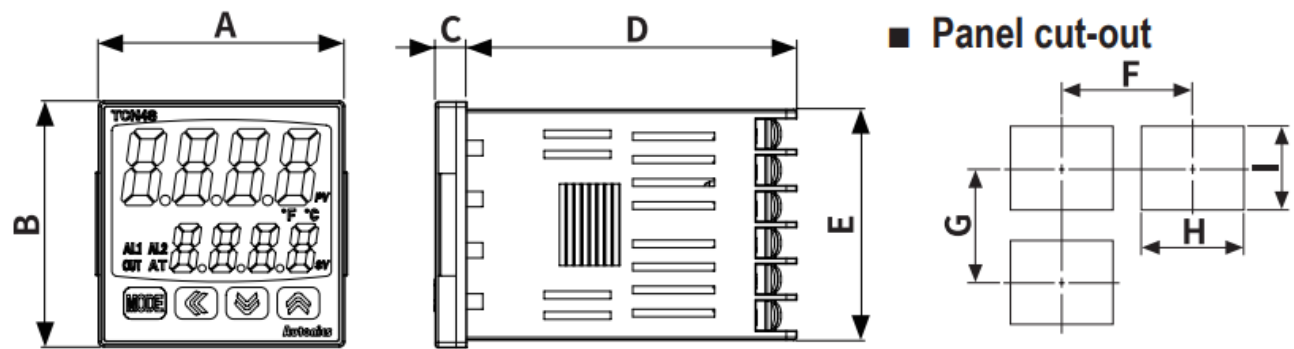
Errors

Display	Description	Troubleshooting
□PE□	Flashes when input sensor is disconnected or sensor is not connected.	Check input sensor status.
HHHH	Flashes when PV is higher than input range. <sup>01)</sup>	When input is within the rated input range, this display disappears.
LLLL	Flashes when PV is lower than input range. <sup>01)</sup>	

Be careful that when HHHH/ LLLL error occurs, the control output may occur by recognizing the maximum or minimum input depending on the control type.

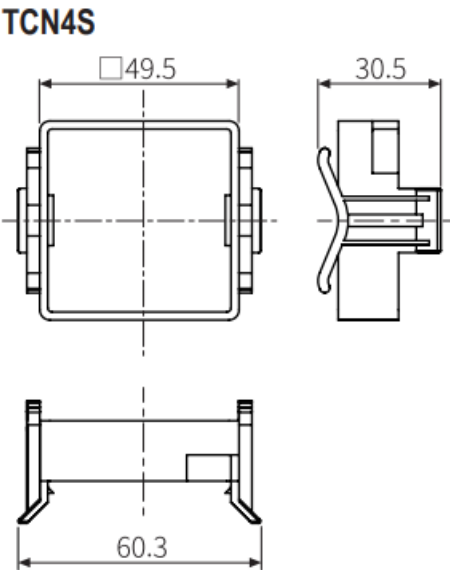
Dimensions

- Unit: mm



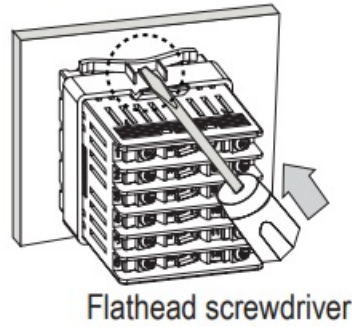
	Body					Panel cut-out			
	A	B	C	D	E	F	G	H	I
TCN4S	48	48	6	64.5	44.8	≥ 65	≥ 65	45 <sup>+0.6</sup> <sub>0</sub>	45 <sup>+0.6</sup> <sub>0</sub>

Bracket



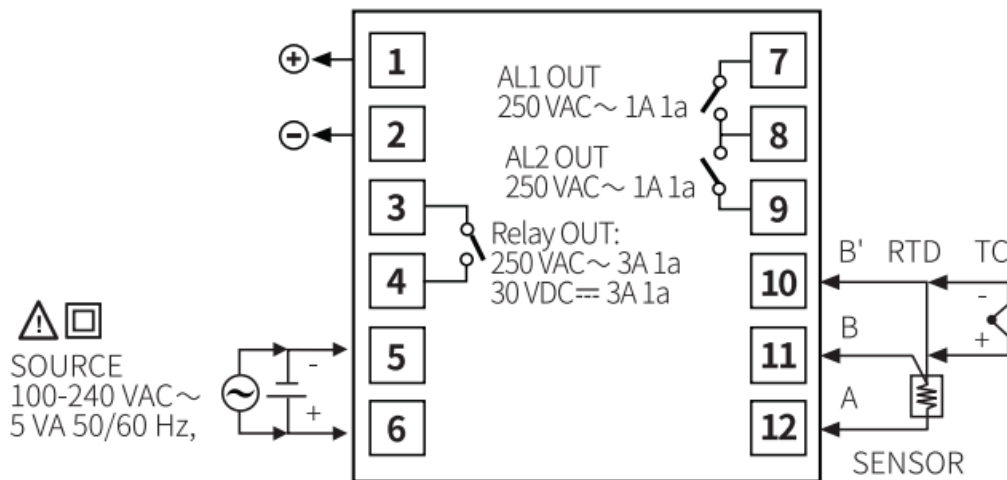
Installation Method

## ■ TCN4S



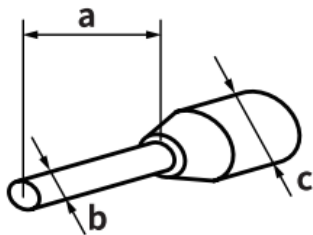
After mounting the product to panel with bracket, insert the unit into a panel, fasten the bracket by pushing with a flathead screwdriver.

## Connections

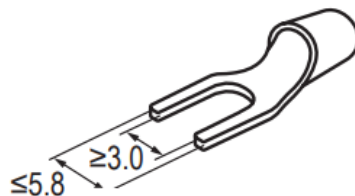


## Crimp Terminal Specifications

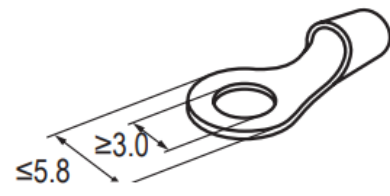
Unit: mm, use the crimp terminal of the following shape.



Wire ferrule



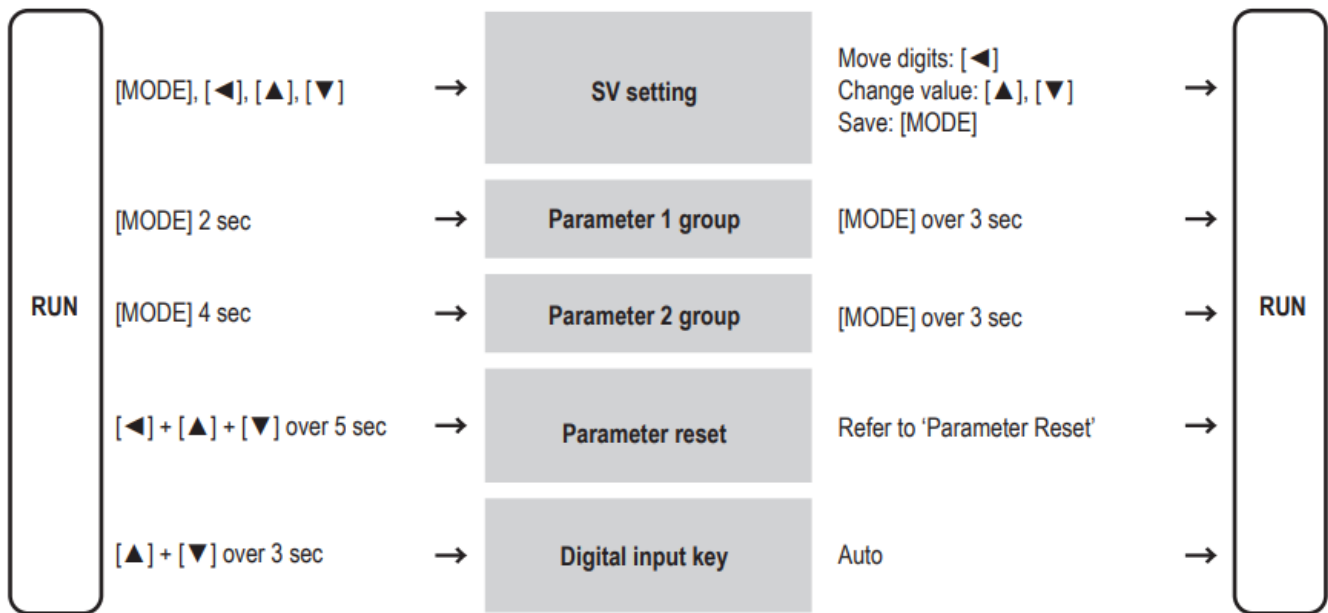
Fork crimp terminal



Round crimp terminal

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

## Mode Setting



## Parameter Reset

1. Press the [◀] + [▲] + [▼] keys for over 5 sec. in run mode, INIT turns ON.
2. Change the setting value as YES by pressing the [▲], [▼] keys.
3. 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

## Disposal

This 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	AL 1	1250	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	AL 2	1250		
1-3 Auto tuning	At	OFF	OFF: Stop, ON: Execution	2-8 Control type: PID
1-4 Proportional band	P	010.0	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	RESET	050.0	0.0 to 100.0%	2-8 Control type: PID & 1-5 Integral time: 0
1-8 Hysteresis	HYS	002	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 <sup>01)</sup>	Input	ECTRH	Refer to 'Input Type and Using Range'.	-
2-2 Temperature unit <sup>01)</sup>	Unit	°C	°C, °F	-
2-3 Input correction	Input	0000	-999 to 999 (-199.9 to 999.9) °C/°F	-
2-4 Input digital filter	Filter	000.1	0.1 to 120.0 sec	-
2-5 SV low limit <sup>02)</sup>	L-SV	-50	Within 2-1 Input specification Input range, L-SV ≤ H-SV - 1-digit °C/°F H-SV ≥ L-SV + 1-digit °C/°F	-
2-6 SV high limit <sup>02)</sup>	H-SV	1200		-
2-7 Control output mode <sup>03)</sup>	Mode	HEAT	HEAT: Heating, COOL: Cooling	-
2-8 Control type <sup>04)</sup>	Type	PID	PID, ONOF: ON/OFF	-
2-9 Control output	Output	RLY	RLY: relay	-
2-11 Control cycle	Cycle	20.0	0.5 to 120.0 sec	2-9 Control output: RLY

2-12	AL1 alarm operation	AL - 1	AL1A □□□.■	□□□ 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			■ 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 • Enter to option setting: Press [◀] key in 2-12 AL-1 alarm operation.	-
2-14	AL2 alarm operation	AL - 2	AL2A	Same as 2-12/13 AL1 alarm operation/option	-
2-15	AL2 alarm option				
2-16	Alarm output hysteresis	ALHYS	001	1 to 100 (0.1 to 50.0) °C/°F	2-12/14 AL1/2 alarm operation: AM1 to 6
2-17	LBA time	LbA.t	0000	0 (OFF) to 9999 sec or auto (auto tuning)	2-12/14 AL1/2 alarm operation: LBA
2-18	LBA band	LbA.b	0002	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 - 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	Err.MV	000.0	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	OFF LOC1: Parameter 2 group lock LOC2: Parameter 1/2 group lock LOC3: Parameter 1/2 group, SV setting lock	-

1. The 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
2. 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.
3. When the setting value is changed, the setting value of 2-20 Sensor error MV is initialized to 0.0 (OFF).
4. When changing the value from PID to ONOF, each value of the 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)

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## Documents / Resources

	<p><a href="#">TRU COMPONENTS TCN4S-24R Dual Display PID Temperature Controllers</a> [pdf] Instruction Manual</p> <p>TCN4S-24R Dual Display PID Temperature Controllers, TCN4S-24R, Dual Display PID Temperature Controllers, Display PID Temperature Controllers, PID Temperature Controllers, Temperature Controllers, Controllers</p>
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## References

- [Conrad Electronic » All parts of success](#)
- [User Manual](#)

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