# **Autonics**

DUAL INDICATOR TEMPERATURE CONTROLLER

# **TCN4 SERIES**

MANUA









Thank you very much for selecting Autonics products. For your safety, please read the following before using.

# ■ Caution for your safety

\* Please keep these instructions and review them before using this unit.

\*Please observe the cautions that follow;

▲ Warning Serious injury may result if instructions are not followed. ▲ Caution Product may be damaged, or injury may result if instructions are not

\*The following is an explanation of the symbols used in the operation manual. ▲ Caution: Injury or danger may occur under special conditions.

#### **⚠** Warning

- 1. In case of using this unit with machinery (Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install
- fail-safe device.
  It may cause a fire, human injury or damage to property.
- 2. Install the unit on a panel.
- It may cause electric shock
- 3. Do not connect, inspect or repair this unit when power is on.
- It may cause electric shock.
- 4. Wire properly after checking terminal number It may cause a fire.
- 5. Do not disassemble the case. Please contact us if it is required. It may cause electric shock or a fire.

# **▲** Caution

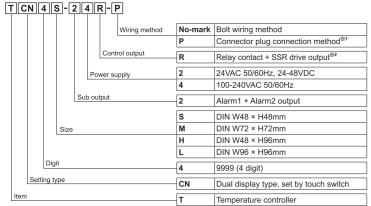
- 1. This unit shall not be used outdoors.
- It may shorten the life cycle of the product or cause electric shock.
- 2. When connect wire, AWG 20(0.50mm<sup>2</sup>) should be used and screw bolt on terminal block with 0.74N.m to 0.90N·m strength.
- It may cause a malfunction or fire due to contact failure 3. Please observe the rated specifications.
- It may shorten the life cycle of the product and cause a fire.

  4. Do not use beyond of the rated switching capacity of relay contact.
- It may cause insulation failure, contact melt, contact failure, relay broken and fire etc.

  5. In cleaning unit, do not use water or organic solvent. And use dry cloth.
- It may cause electric shock or a fire.

  6. Do not use this unit in place where there are flammable or explosive gas, humidity, direct ray of the light, radiant heat, vibration and impact etc. It may cause a fire or an explosion
- 7. Do not inflow dust or wire dregs into the unit.
- It may cause a fire or a malfunction.
- 8. Please wire properly after checking the terminal polarity when connecting temperature sensor It may cause a fire or an explosion.
- 9. In order to install the units with reinforced insulation, use the power supply unit which basic

# Ordering information



- \*1: Only for TCN4S model.
- \*2: In case of the AC voltage model, SSR drive output method (standard ON/OFF control, cycle control, phase control) is available to select.
- \*The above specifications are subject to change without notice.

## Specification

Series		TCN4S	TCN4M	TCN4H	TCN4L		
Power	AC Power	100-240VAC 50/6	0Hz				
supply	AC/DC Power	24VAC 50/60Hz, 2	24-48VDC				
Allowabl	le voltage range	90 to 110% of rate	d voltage				
Power	AC Power	Max. 5VA(100-240	VAC 50/60Hz)				
consumpti	on AC/DC Power	Max. 5V(24VAC 5	0/60Hz), Max. 3W(2	24-48VDC)			
Display	method	7 segment (PV: re	d, SV: green), other	display part(green,	red) LED method		
Characte	er PV(W×H)	7.0 × 15.0mm	9.5 × 20.0mm	7.0 × 14.6mm	11.0 × 22.0mm		
size	SV(W×H)	5.0 × 9.5mm	7.5 × 15.0mm	6.0 × 12.0mm	7.0 × 14.0mm		
Input	RTD	DIN Pt100Ω, Cu50	Ω (Allowable line re	esistance max.5Ω p	er a wire)		
type	TC	K(CA), J(IC), L(IC	), T(CC), R(PR), S(F	PR)			
Display	RTD				he higher one) ± 1 digi		
accurac	тс	Out of room tempe	rature range: (PV± 0.	.5% or ±2°C, select to	he higher one)± 1digit		
<u>∓</u> 1	I C	For TCN4S-□-P, a	dd ±1°C by accurac	y standard.			
Control	Relay	250VAC 3A 1a					
output	SSR	12VDC±2V 20mA	Max.				
Alarm or	utput	AL1, AL2 Relay: 2	50VAC 1A 1a				
Control	method	ON/OFF control, F	P, PI, PD, PID contro	ol			
Hysteres	sis	1 to 100°C/°F (0.1 to 50.0°C/°F)					
Proportio	onal band(P)	0.1 to 999.9°C/°F					
Integral	time(I)	0 to 9999 sec.					
Derivativ	ve time(D)	0 to 9999 sec.					
Control	period(T)	0.5 to 120.0 sec.					
Manual	reset	0.0 to 100.0%					
Samplin	g period	100ms					
Dielectri	ic AC power	2000VAC 50/60Hz 1min.(between input terminal and power terminal)					
strength	AC/DC power	1000VAC 50/60Hz 1min.(between input terminal and power terminal)					
Vibration	n	0.75mm amplitude at frequency of 5 to 55Hz in each X, Y, Z directions for 2 hours					
	Mechanical	OUT: Over 5,000,0	000 times, AL1/2: O	ver 5,000,000 times	S		
Relay lif	Electrical	OUT: Over 200,000 times(250VAC 3A resistive load)					
		AL1/2: Over 300,000 times(250VAC 1A resistive load)					
	n resistance	Min. 100MΩ(at 500VDC megger)					
Noise		Square-wave noise by noise simulator(pulse width 1µs) ±2KV R-phase and S-phase					
<b>─</b>	retention	Approx. 10 years (when using non-volatile semiconductor memory type)					
	Ambient temp.	-10 to 50°C, Storage: -20 to 60°C					
-ment	Ambient humi.	35 to 85%RH, Storage: 35 to 85%RH  Double insulation or reinforced insulation (mark: □, dielectric strength between					
Insulatio	on type				c strength between /, AC/DC power 1kV)		
Approva	al	CE PLus (except	TCN4S-□-P)	•	. ,		
Weight *		Approx. 147g (approx. 100g)	Approx. 203g (approx. 133g)	Approx. 194g (approx. 124g)	Approx. 275g (approx. 179g)		
		(0000 - 500)	11 10	11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1. 1.2		

- Below 200°C of thermocouple R(PR), S(PR) is (PV ±0.5% or ±3°C, select the higher one) ±1 digit
   Over 200°C of thermocouple R(PR), S(PR) is (PV ±0.5% or ±2°C, select the higher one) ±1 digit mocouple L (IC), RTD Cu50Ω is (PV ±0.5% or ±2°C, select the higher one) ±1 digit
- Out of room temperature range
- Out of from temperature range
   Below 200°C of thermocouple R(PR), S(PR) is (PV ±1.0% or ±6°C, select the higher one) ±1 digit
   Over 200°C of thermocouple R(PR), S(PR) is (PV ±0.5% or ±5°C, select the higher one) ±1 digit

Thermocouple L(IC), RTD Cu50Ω is (PV ±0.5% or ±3°C, select the higher one) ±1 digit

- For TCN4S-Q-P, add ±1°C by accuracy standard.
- \*2: The weight in parentheses is only unit weight.\* Environment resistance is rated at no freezing or condensation.

# Parts description



- 1. Present temperature (PV) display (Red)
- RUN mode: Present temperature (PV) display
   Parameter setting mode: Parameter display
- 2. Set temperature (SV) display (Green)
- 1) RUN mode: Set temperature (SV) display
- 2) Parameter setting mode : Parameter setting value display 3. Control/Alarm output display indicator OUT: It turns ON when the control output is ON.
   During SSR drive output type in CYCLE/ PHASE control, this indicator turns ON when
- MV is over 3.0%. 2) AL1/AL2: It turns ON when the alarm output is ON.
- 4. Auto tuning indicator
- AT indicator flashes by every 1 sec during operating

#### 5. MODE key Used when entering into parameter groups,

returning to RUN mode, moving parameter, and saving Used when entering into set value change mode, digit moving and digit up/down.

6. Adjustment

7. Digital input key

Press ☑ + ☒ keys for 3 sec. to operate the set function

The subset auto tuning in digital in (RUN/STOP, alarm output reset, auto tuning) in digital input key [d! - E].

8. Temperature unit (°C/°F) indicator

#### Input sensor and temperature range

Input sensor		Display	Temperature range(°C)	Temperature range(°F)
	K(CA)	FEWH	-50 to 1200	-58 to 2192
	K(CA)	FEUT	-50.0 to 999.9	-58.0 to 999.9
	I(IC)	JI C.H	-30 to 800	-22 to 1472
	J(IC)	JI C.L	-30.0 to 800.0	-22.0 to 999.9
Thermocouple	L(IC)	LI C.H	-40 to 800	-40 to 1472
Thermocouple	L(IC)	LI C.L	-40.0 to 800.0	-40 to 999.9
	T(CC)	E € € €.H	-50 to 400	-58 to 752
	1(00)	E C C.L	-50.0 to 400.0	-58.0 to 752.0
	R(PR)	rPr	0 to 1700	32 to 3092
	S(PR)	5Pr	0 to 1700	32 to 3092
	DPt1000	dPt.H	-100 to 400	-148 to 752
RTD	DE(1007)	dPt.L	-100.0 to 400.0	-148.0 to 752.0
KID	Cu50Ω	E U S.H	-50 to 200	-58 to 392
	Cuous	C U S.L	-50.0 to 200.0	-58.0 to 392.0

# Dimensions

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Connections

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AL2 OUT 250VAC 1A 1a

1)TCN4S Series

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2)TCN4S-□-P

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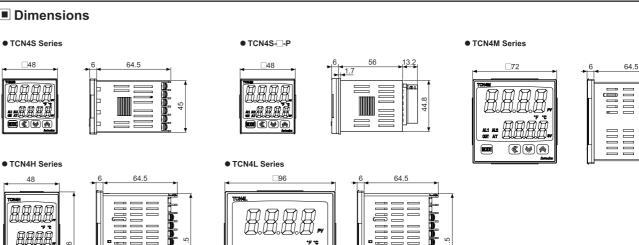
Relay OUT 3 1 250VAC 4 1

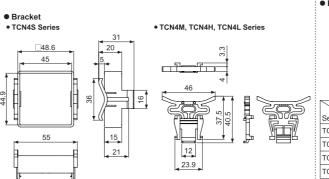
%1:12VDC±2V 20mA Max.

X2:AC voltage type: 100-240VAC 5VA 50/60Hz

AC/DC voltage type: 24VAC 5VA 50/60Hz

 $\Lambda\Box$ 





3)TCN4M Series

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4)TCN4H/L Series

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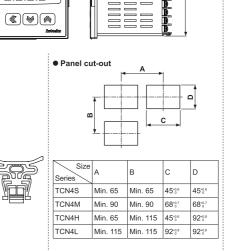
<sup>B</sup>→23

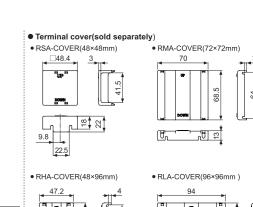
→RTD B'→22

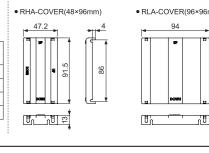
AL2 OUT 250VAC 1A 1a

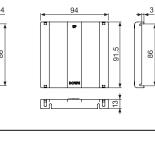
250VAC 250VAC 1A 1a 14

250VAC 1A 1a

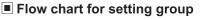


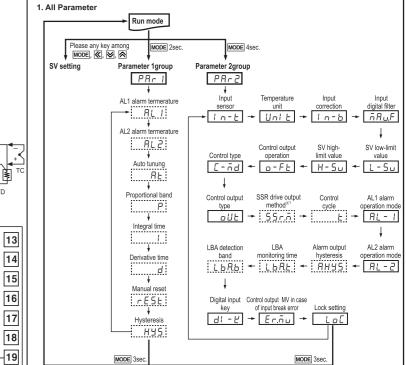






(unit: mm)





- ★ Press MODE key over 3 sec in any parameter group, it saves the set value and returns to RUN mode. (Exception: Press MODE key once in SV setting group, it returns to RUN mode).
- If no key entered for 30 sec., it returns to RUN mode automatically and the set value of parameter is not be saved.
- ※ Press MODE key again within 1 sec. after returning to RUN mode, it advances of the first parameter of previous parameter group.
- ※ Press MODE key to move next parameter.
- \* Parameter marked in :::: might not be displayed depending on other parameter settings.
- ★ Set parameter as 'Parameter 2 group → Parameter 1 group → Setting group of set value' order considering parameter relation of each setting group.
- ※1: It is not displayed for AC/DC power model (TCN4□-22R).

#### MODE key: Moves parameter and saves the set, K key: Moves digit, 2. Parameter 2group or key: Changes the set Display Description Parameter Set range: Refer to 'Input sensor and temperature range ※ If changing input sensor, SV, I n-b, H-5u, L-5u, RL I, RL2, LbRL, nput sensor L ь Я.ь., Я н ч 5 parameter values are initialized. ※ If changing temperature unit, SV, I n - b, H - 5 u, L - 5 u, AL I, AL ≥, Temperature unit L b R.E., L b R.b., R H y 5 parameter values are initialized. Input correction ● ĽCRH, JI C.H, LI C.H, ŁCC.H, rPr, 5rP, dPŁ.H, CU5.H:-999 to 999°C/°F ● EERL, JI EL, LI EL, EEEL, dPLL, EUSL: -199.9 to 999.9°C/°F Set range: 0.1 to 120.0 sec. Input digital filter 58u.F et range: Within the rated temperature range by input sensor[ ∠ - 5 □ ≤(H - 5 □ -1digit)] \*When changing SV lower limit value, if SV < 1 - 5 ... SV is initialized as 1 - 5 ... SV low-limit value ※In case of changing input sensor type[ n- E], it changes automatically as min. value of the changed input sensor. Set range: Within the rated temperature range by input sensor(H-5µ≥(L-5µ+1digit)) SV high-limit ※When changing SV higher limit value, if SV > H - 5 □, SV is initialized as H - 5 □ ※In case of changing input sensor type [ n - E ], it changes automatically as max. value of the changed input sensor. Control output HERL \*\* Cool o-FE ※When changing control output operation, € r.กิษ is initialized. operation 'I d ↔ onof \*When changing control type, בּהַבּם is initialized (control output MV is below 100%) and און ב turns OFF automatically. Control type hā-7 Control output type oUt Stad \*\* CYCL \*\* PHRS SSR drive output ※ It is displayed when selecting control output [□□□□] as [55 - ]. method It is not displayed for AC/DC power model (TCN4□-22R). Set range: 0.5 to120.0 sec. ※ In case of Relay drive output [r L ∃] of control output [a ∐ L], it is set as Control cycle 20.0 sec. In case of SSR drive output [55r] of that, it is set as 2.0 sec. \*E is not displayed when SSR drive output [55r] method is set as [YLL, PHR5. भेर्नेट + भेर्न् क + भेर्न्क +-- भेर्न्क + भेर्न्क + भेर्न्क Al 1 alarm operation mode 56AÅ(→56AÅ( L6AÅ(↔L6AÅ( AL2 alarm AL - 2 For more details refer to Functions 6. Alarm. operation mode \* Black: Flashes, Gray: Fixed When changing AL1, AL2 alarm operation mode, AL1, AL2 alarm temperature value are initialized. Set range: Refer to Functions 4. Alarm output hysteresis Alarm output AH45 ₩ ЯНЧ5 is not displayed when AL1, AL2 alarm operation mode [AL - 1. AL - 2] is set as [AñO.\_ , 5bA□, LbA□]. Set range: 0 to 9999 sec. ※ '0' is set, loop break alarm function is OFF. LBA monitoring LABE ж ∟ ь Я.ь is displayed when AL1, AL2 alarm operation mode [Яь - т, AL-2] is set as LbA.□. Set range: 0 to 999(0.0 to 999.9)°C/°F, '0' is set, loop break alarm function is OFF. LBA monitoring ж L b R.b is displayed when AL1, AL2 alarm operation mode [ЯL - I, range RL-2] is set as LbR□ and LbRŁ is not '0'. ← ALrE ← At ← off Press ☑ + ☒ keys for 3 sec. and it executes the set function. For more information, refer to ■ Functions 5. Digital input key. Digital input key ※ When control type [[-nd] is anaF, At is not displayed. Set range 0.0 to 100.0% Control output ※ Only 0.0, 100% are displayed when control type [[ - nd] is set as one F MV in case of \* When changing PID control to ON/OFF control, if MV is below input break erro 100.0%, it is initialized as 0.0%. FF ↔ Lo[1 ↔ Lo[2 ↔ Lo[3 □ [ ]: Locks parameter 2 group, L □ [ 2 : Locks parameter 1, 2 group Lock setting □ E∃: Locks parameter 1, 2 group and SV setting \* Parameter setting values are still possible to check while Lock mode is ON. MODE key: Moves parameter and saves the set, ⟨ key: Moves digit, ⟨ or ⟨ key: Changes the | 3 Parameter 1 group

o. r arameter r g	TOUP	toy. Moved digit, or Fig. 169. Sharinged the de
Parameter	Display	Description
AL1 alarm temp.	ALI	Set range: Deviation alarm(-F.S to F.S), Absolute value alarm(temperature range) In case alarm operation mode [AL - I, AL - 2] of Parameter 2 group And/
AL2 alarm temp.	AL2	568_/L68_, no parameters is displayed.
Auto tuning	RĿ	□FF ↔ □n Front AT indicator flashes during auto tuning operation.
Proportional band	ρ	Set range: 0.1 to 999.9°C/°F
Integral time	1	Set range: 0 to 9999 sec. Integral operation is OFF when set value is "0".
Derivative time	d	Set range: 0 to 9999 sec. Derivative operation is OFF when set value is "0".
Manual reset	rESt	Set range: 0.0 to 100.0%/ It is displayed in P/PD control.
Hysteresis	нч5	Set range  • ECRH, JI EH, LI EH, EEEH, FPF, SFP, JPEH, EUSH: 1 to 100°C/°F  • EERH, JI EL, LI EL, EEEL, JPEL, EUSL: 0.1 to 50.0°C/°F  * It is displayed when control type [[-ād] of parameter 2 group is set anof.

# 4. SV setting

You can set the temperature to control with MODE, €, ₺, keys.

Set range is within SV lower limit value [L - 5 u] to SV higher limit value [H - 5 u]. Ex) In case of changing set temperature from 210°C to 250°C

Press any key among MODE, ♥, key in RUN mode, the right digit at SV display flashes and it enters to SV setting group.

ress 🛭 or 🕿 key o move the desired 8888 DE W XX

ress Kev to move the desired digit. ( $10^0 \rightarrow 10^1 \rightarrow 10^2 \rightarrow 10^3 \rightarrow 10^0$ )

ess MODE key to save he value and it controls Even though there is no key input for over 3 sec., saves automatically.)

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## Functions

#### I. Auto tuning [At]

Auto tuning measures the control subject's thermal characteristics and thermal response rate, and then determines the necessary PID time constant. (When control type[[-nd] is set as Pid, it is displayed.) Application of the PID time constant realizes fast response and high precision temperature control. If error [aPEn] occurs during auto tuning, it stops this operation automatically. To stop auto tuning, change the set as [aFF]. (It maintains P, I, D values of before auto tuning.)

2. Hysteresis [HY5]
In case of ON/OFF control, set between ON and OFF intervals | as hysteresis. (When control type [[-nd] is set as anaF, it is displayed.) If hysteresis is too small, it may cause control output hunting (takeoff, chattering) by external noise, etc.

Heating operation ON A [HY5] \_

# 3. SSR drive output selection(SSRP function) [55 r.ň.]

- Realizing high accuracy and cost effective temperature control with both current output (4-20mA) and linear output(cycle control and phase control)
- SSRP function is selectable one of standard ON/OFF control, cycle control, phase control by utilizing standard SSR drive voltage output.
- Select one of standard ON/OFF control [5½ a.d.], cycle control[£4£1.], phase control[£461] at SSR drive output method 55 c of parameter 2 group. For cycle control, connect zero cross turn-on SSR (random turn-on SSR is also available). For phase control, connect random turn-on SSR.

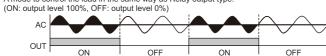
Temperature controller SSR drive output (12VDC) 8886 INPUT LOAD 8888 **(()** 100-240VAC 🕤

#### When selecting phase or cycle control mode, the power supply for load and temperature controller must be the same.

- ※ In case of selecting PID control type and phase [PHR5] / cycle [PHR5] control output modes, control
- ※ For AC/DC power model (TCN□-22R), this parameter is not displayed and it is available only standard control by relay or SSR.

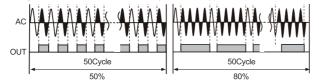
#### 1)Standard ON/OFF control mode [5 End]

A mode to control the load in the same way as Relay output type.

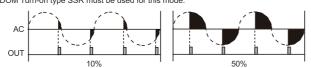


#### 2)Cycle control mode [EYEL]

A mode to control the load by repeating output ON / OFF according to the rate of output within setting cycle. Having improved ON / OFF noise feature by Zero Cross type

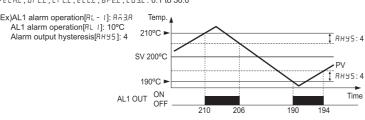


A mode to control the load by controlling the phase within AC half cycle. Serial control is available RANDOM Turn-on type SSR must be used for this mode



#### 4. Alarm output hysteresis [AHY5]

It displays alarm output ON and OFF interval and hysteresis is applied to both AL1 OUT and AL2 OUT. ECRH, JI CH, LI CH, ECCH, -P-, 5P-, 4PEH, CUSH: 1 to 100 ECRL. JI C.L. LI C.L. ECCL. JPEL. CUSL: 0.1 to 50.0



## 5. Digital input key (☑+♠ 3sec.) [d/ - 년]

Parameter		Operation					
OFF	oFF	It does not use digital input key function.					
RUN/STOP	StoP	It is available to pause on control output and auxiliary output (except loop break alarm, sensor break alarm) except control output operates normally as set. Press digital input key for 3sec to re-start the operation.  Digital input key (t. Over 3 sec.)					
Clear alarm output function	ALrE	It is available to clear alarm output by force. (It is only when alarm option is alarm latch, standby sequence.) Clear alarm is able to only for out of alarm operation range. Alarm operates normally right after clear alarm.					
Auto tunning	ЯĿ	Auto tuning function, it is same as auto tuning function [Rt ] of parameter 1 group. (You can execute auto tuning from parameter 1 group, and finish it by digital input key.)  * When control type [[-ā] is set as Pt d, R is displayed. When it is set as anof, digital input key [dt -t] is changed as off.					

1)Alarm operation

<u> Rā I,R</u>

There are two alarms which operate individually. You can set combined alarm operation and alarm option Use digital input key(set as RL.r.E) or turn OFF power and re-start this

unit to release alarm operation

Mode	Name	Alarm operation		Description
8 ñ O	_	_		No alarm output
A⊻ r□	Deviation high-limit alarm	OFF H ON  SV PV  100°C 110°C  High deviation: Set as 10°C	OFF H ON  DV SV 90°C 100°C  High deviation: Set as -10°C	If deviation between PV and SV as high-limit is higher than set value of deviation temperature, the alarm output will be ON.
8ñ2.□	Deviation low-limit alarm	ON H OFF  A  PV SV 90°C 100°C  Lower deviation: Set as 10°C	ON ↑H → OFF  SV PV  100°C 110°C  Lower deviation: Set as -10°C	If deviation between PV and SV as low-limit is higher than set value of deviation temperature, the alarm output will be ON.
8ñ3.□	Deviation high/low- limit alarm	ON H OF  DV S 90°C 100  High/Lower devia	V PV	If deviation between PV and SV as high/low-limit is higher than se value of deviation temperature, the alarm output will be ON.
A v.□	Deviation high/low- limit reserve alarm	△ A PV S 90°C 100	V PV	If deviation between PV and SV as high/low-limit is higher than se value of deviation temperature, the alarm output will be OFF.
R ō 5.□	Absolute value high limit alarm	OFF H ON  PV SV  90°C 100°C  Absolute-value Alarm: Set as 90°C	OFF H ON  SV PV  100°C 110°C  Absolute-value Alarm: Set as 110°C	If PV is higher than the absolute value, the output will be ON.
R⊼6.□	Absolute value low limit alarm	ON TH OFF  A PV SV 90°C 100°C  Absolute-value Alarm: Set as 90°C	ON H OFF  SV PV  100°C 110°C  Absolute-value Alarm: Set as 110°C	If PV is lower than the absolute value, the output will be ON.
56R□	Sensor break alarm	_		It will be ON when it detects sensor disconnection.
LBRD	Loop break alarm	_		It will be ON when it detects loop break.

#### ※ H: Alarm output hysteresis[₽HIJ5]

Alarm	opetion

Option	Name	Description
R⊼□R	Standard alarm	If it is an alarm condition, alarm output is ON. If it is a clear alarm condition, alarm output is OFF.
Я⊼ДЬ	Alarm latch	If it is an alarm condition, alarm output is ON and maintains ON status. (Alarm output HOLD)
A∵⊡E	Standby sequence 1	First alarm condition is ignored and from second alarm condition, standard alarm operates. When power is supplied and it is an alarm condition, this first alarm condition is ignored and from the second alarm condition, standard alarm operates.
Aŭ□d	Alarm latch and standby sequence 1	If it is an alarm condition, it operates both alarm latch and standby sequence. When power is supplied and it is an alarm condition, this first alarm condition is ignored and from the second alarm condition, alarm latch operates.
Aĕ□E	Standby sequence 2	First alarm condition is ignored and from second alarm condition, standard alarm operates. When re-applied standby sequence and if it is alarm condition, alarm output does not turn ON. After clearing alarm condition, standard alarm operates.
Aÿ⊡£	Alarm latch and standby sequence 2	Basic operation is same as alarm latch and standby sequence1. It operates not only by power ON/OFF, but also alarm setting value, or alarm option changing. When re-applied standby sequence and if it is alarm condition, alarm output does not turn ON. After clearing alarm condition, alarm latch operates.

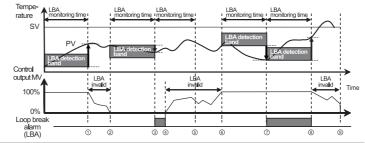
Condition of re-applied standby sequence for standby sequence 1, alarm latch and standby sequence 1: Power Of Condition of re-applied standby sequence for standby sequence 2, alarm latch and standby sequence 2. Power ON changing set temperature, alarm temperature (AL 1, AL 2) or alarm operation (AL - 1, AL - 2), switching STOP mode

#### 3)Sensor break alarm

The function that alarm output will be ON when sensor is not connected or when sensor's disconnection is detected during temperature controlling. You can check whether the sensor is connected with buzzer or other units using alarm output contact. It is selectable between standard alarm [56RR] or alarm latch [5*bRb*].

# 4)Loop break alarm(LBA)

It checks control loop and outputs alarm by temperature change of the subject. For heating control(cooling control), when control output MV is 100%(0% for cooling control) and PV is not increased over than LBA detection band [L bAb] during LBA monitoring time [L bAb], or when control output MV is 0%(100% for cooling control) and PV is not decreased below than LBA detection band [L bRb] during LBA monitoring time [L bRb], alarm output turns ON.



Start control to ①	When control output MV is 100%, PV is increased over than LBA detection band [L b R b ] during LBA monitoring time [L b R b ].
1) to 2	The status of changing control output MV (LBA monitoring time is reset.)
2 to 3	When control output MV is 0% and PV is not decreased below than LBA detection band [L b Rb] during LBA monitoring time [L b Rb.], loop break alarm (LBA) turns ON after LBA monitoring time.
3 to 4	Control output MV is 0% and loop break alarm (LBA) turns and maintains ON.
4 to 6	The status of changing control output MV (LBA monitoring time is reset.)
6 to 7	When control output MV is 100% and PV is not increased over than LBA detection band [L bRb] during LBA monitoring time [L bRb], loop break alarm (LBA) turns ON after LBA monitoring time.
7 to 8	When control output MV is 100% and PV is increased over than LBA detection band [L bRb] during LBA monitoring time [L bRb], loop break alarm (LBA) turns OFF after LBA monitoring time.
® to (9)	The status of changing control output MV (LBA monitoring time is reset.)

\*When executing auto-tuning, LBA detection band[L bRb] and LBA monitoring time are automatically set based on auto tuning value. When alarm operation mode [RL - I, RL - 2] is set as loop break alarm(LBA) [L bR ], LBA detection band [L bRb] and LBA monitoring time [L bRb] parameter is displayed.

#### 7. Manual reset[- £5 b]

When selecting P/PD control mode, certain temperature difference exists even after PV reaches stable status because heater's rising and falling time is inconsistent due to thermal characteristics of controlled objects, such as heat capacity, neater capacity. This temperature difference is called offse and manual reset [r E5 t ] function is to set/correct offset. When PV and SV are equal, reset value is 50.0%. After control

is higher than SV, reset value is below 50.0%.

Offset Offset Set over 50.0 as reset value is stable, PV is lower than SV, reset value is over 50.0% or PV

·Manual reset [r E 5 E ] by control result

Set below 50.0 as reset value

8. Input correction[/ n-b]

Controller itself does not have errors but there may be error by external input temperature sensor. This function is for correcting this error.

Ex) If actual temperature is 80°C but controller displays 78°C, set input correction value [i n-b] as '002' and controller displays 80°C.

\*\* As the result of input correction, if current temperature value (PV) is over each temperature range of input sensor, it displays 'HHHH' or 'LLLL'.

#### 9. Input digital filter[nRuF]

If current temperature (PV) is fluctuating repeatedly by rapid change of input signal, it reflects to MV and stable control is impossible. Therefore, digital filter function stabilizes current temperature value. For example, set input digital filter value as 0.4 sec, and it applies digital filter to input values during 0.4 sec and displays this values. Current temperature may be different by actual input value.

Display	Description	Troubleshooting	
oPEn	Flashes if input sensor is disconnected or sensor is not connected.	Check input sensor state.	
нннн		When input is within the rated temperature range, this display	
LLLL	Fig. 1	disappears.	

#### Factory default

#### 1. SV setting

Parameter	Default
_	0

#### 2. Parameter 1 group

Parameter	Default	Parameter	Default	Parameter	Default	Parameter	Default	
AL I	1250	ЯĿ	oFF	1	0000	rESt	050.0	
AL 2	1250	Ρ	0 10.0	d	0000	H95	002	

# 3. Parameter 2 group

Parameter	Default	Parameter	Default	Parameter	Default	Parameter	Default
In-E	LC UH	H-5u	1500	Ł	0.050	L 6 R.6	0002
Uni E	٥٢	o-FŁ	HERL	AL-I	AUT.B	41 - F.	StoP
1 n-b	0000	[-ñd	PId	LR-2	R.S.A R	Erñu	0 0 0 0
ñRu.F	000.1	oUt	rLY	AH42	001	LoC	oFF
L-5u	-050	55r.ñ	Stnd	LЬЯ.E	0000		

\* The AC/DC voltage models do not have SSR drive output method[55r.ñ]. In case of control output [out], if set as 55r, it supports only ON/OFF output.

#### Installation

TCN4S(48X48mm) Series

Other Series

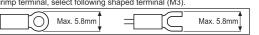


★ Insert product into a panel, fasten bracket by pushing with tools as shown above

#### Caution for using

. The connection wire of this unit should be separated from the power line and high voltage line in order to prevent from inductive noise

2. For crimp terminal, select following shaped terminal (M3).



3. Please install power switch or circuit-breaker in order to cut power supply of

4. Install power switch or circuit-breaker to supply or cut off the power. Switch or circuit-breaker should be installed near by users for convenient control. 5. Do not use this product as Volt-meter or Ampere-meter, this is a temperature controlle

6. In case of using RTD sensor, 3 wire type must be used. If you need to extend the line, 3 wires must be used with the same thickness as the line. It might cause the deviation of temperature if the resistance of line is different.

. In case of making power line and input signal line closely, line filter for noise protection should be installed at power line and input signal line should be shielded.

8. Keep away from the high frequency instruments.(High frequency welding machine & sewing machine, large capacity SCR controller)

9. When supplying measuring input, if "HHHH' or "LLLL' is displayed, measuring input may have problem. Turn off the power and check the line.

10. Installation environment ①It shall be used indoor.

②Altitude Max. 2000m ③Pollution Degree 2. ④Installation Category II.

It may cause malfunction if above instructions are not followed.

## ■ Major product

Photoelectric sensors

Fiber optic sensors

Door sensors

Temperature/Humidity transducers
SSR/Power controllers

I/O Terminal Blocks & Cables
Stepper motors/drivers/motion

■ W0 Terrin■ Stepper motors/drives ....
■ Graphic/Logic panels
■ Field network devices
■ Laser marking system
■ Laser welding/soldering system

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EP-KE-03-0350C