

TCN Series

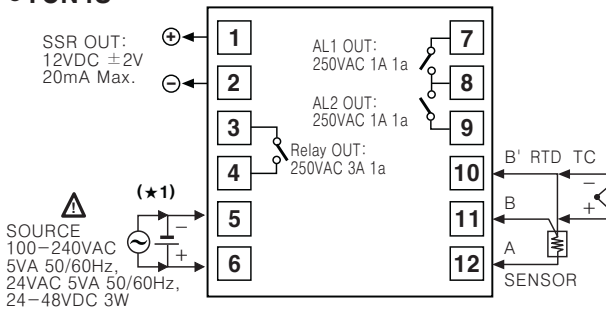
Specifications

Series	TCN4S	TCN4M	TCN4H	TCN4L
Proportional band(P)	0.1 to 999.9℃			
Integral time(I)	0 to 9999 sec.			
Derivative time(D)	0 to 9999 sec.			
Control period(T)	0.5 to 120.0 sec.			
Manual reset	0.0 to 100.0%			
Sampling period	100ms			
Dielectric strength	AC Power	2000VAC 50/60Hz 1min.(Between input terminal and power terminal)		
	AC/DC power	1000VAC 50/60Hz 1min.(Between input terminal and power terminal)		
Vibration	0.75mm amplitude at frequency of 5 to 55Hz in each X, Y, Z directions for 2 hours			
Relay life cycle	Control output	Mechanical: Min. 5,000,000 operations, Electrical: Min. 200,000 operations(250VAC 3A resistive load)		
	Alarm output	Mechanical: Min. 5,000,000 operations, Electrical: Min. 300,000 operations(250VAC 1A resistive load)		
Insulation resistance	Min. 100MΩ (at 500VDC megger)			
Noise immunity	Square-wave noise by noise simulator(pulse width 1μs) ±2KV R-phase and S-phase			
Memory retention	Approx. 10 years (When using non-volatile semiconductor memory type)			
Ambient temperature	-10 to 50℃ (at non-freezing status)			
Storage temperature	-20 to 60℃ (at non-freezing status)			
Ambient humidity	35 to 85%RH, Storage : 35 to 85%RH			
Unit weight	Approx. 100g	Approx. 133g	Approx. 124g	Approx. 179g

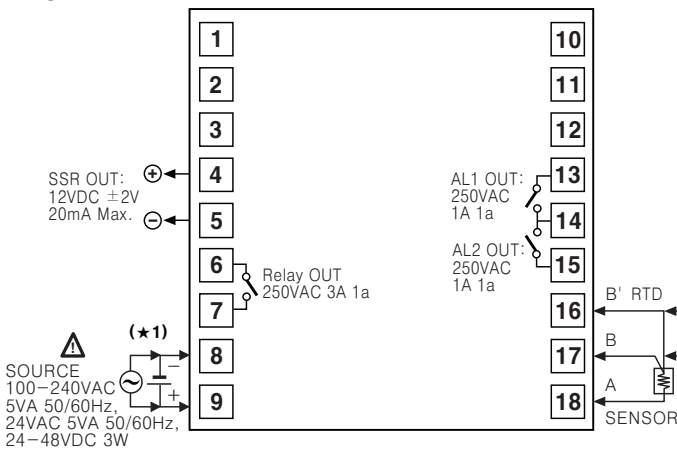
Connections

※TCN4 series has selectable control output; Relay output, and SSRP output. AC/DC voltage type has Relay output and SSR output and it is selectable.

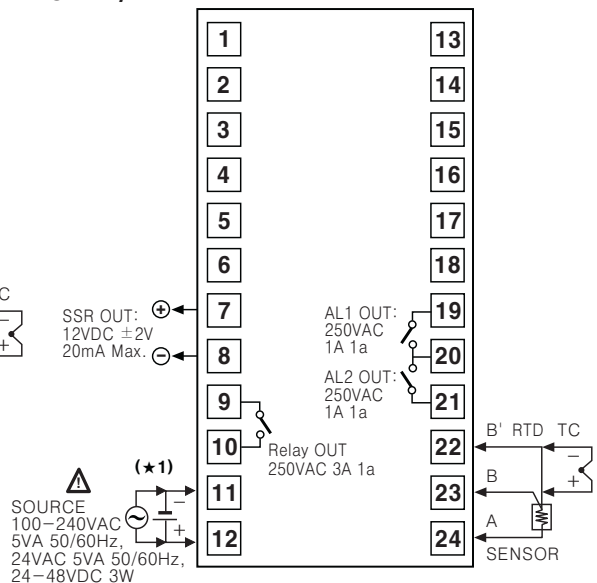
TCN4S



TCN4M



TCN4H/L



※ (★1) Power supply

-AC power : 100-240VAC 5VA 50/60Hz

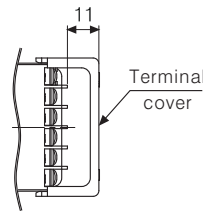
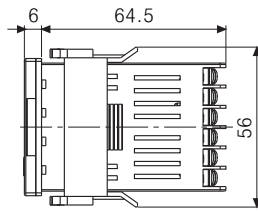
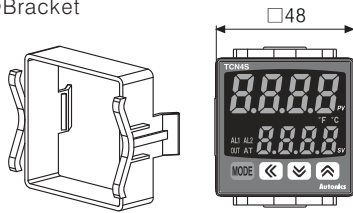
-Low voltage 24VAC 5VA 50/60Hz, 24-48VDC 3W

Economical Dual Display Type, PID Control

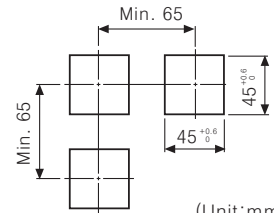
■ Dimensions

● TCN4S

● Bracket



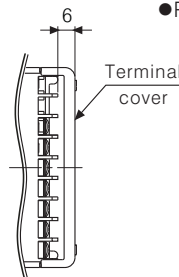
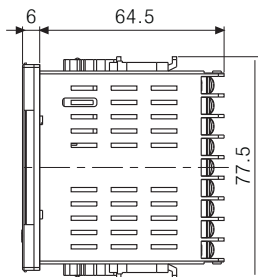
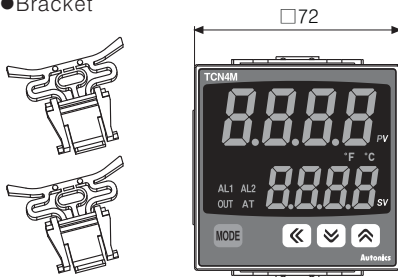
● Panel cut-out



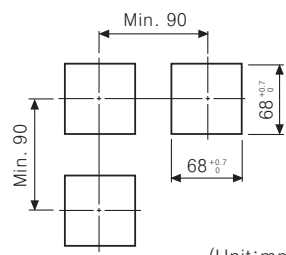
(Unit:mm)

● TCN4M

● Bracket



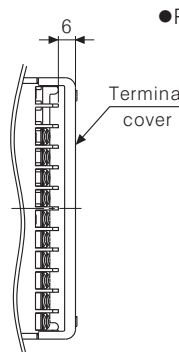
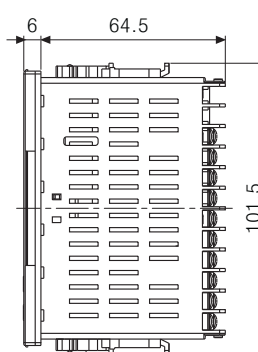
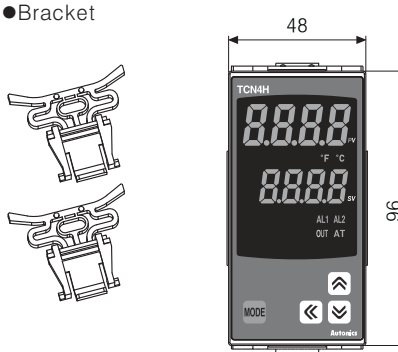
● Panel cut-out



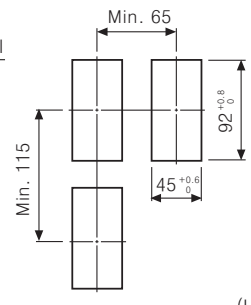
(Unit:mm)

● TCN4H

● Bracket



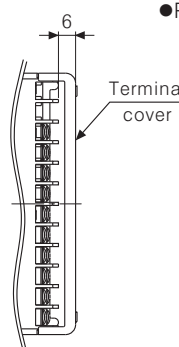
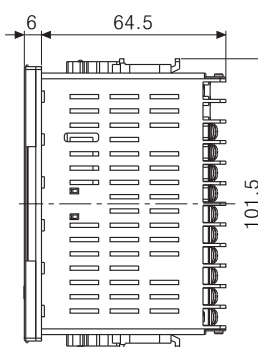
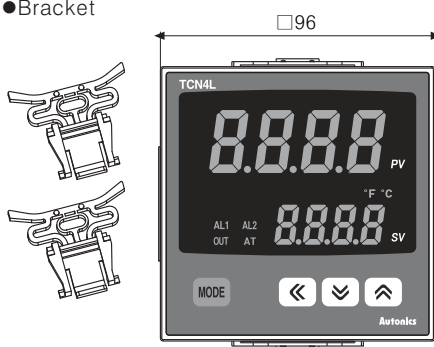
● Panel cut-out



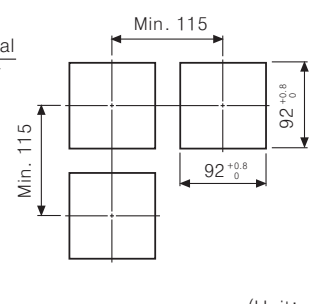
(Unit:mm)

● TCN4L

● Bracket



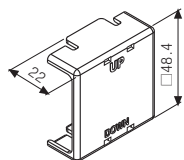
● Panel cut-out



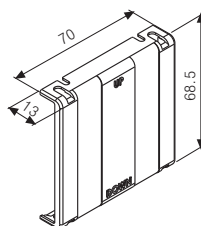
(Unit:mm)

● Terminal cover(Sold separately)

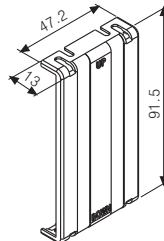
● RSA-COVER (48×48mm series)



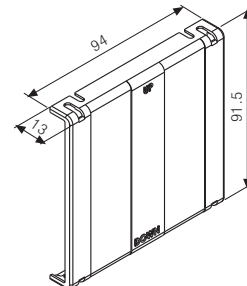
● RMA-COVER (72×72mm series)



● RHA-COVER (48×96mm series)



● RLA-COVER (96×96mm series)



(Unit:mm)

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

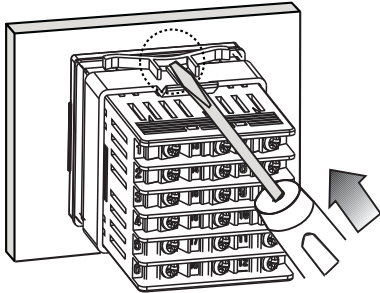
(S) Field network device

(T) Production stoppage models & replacement

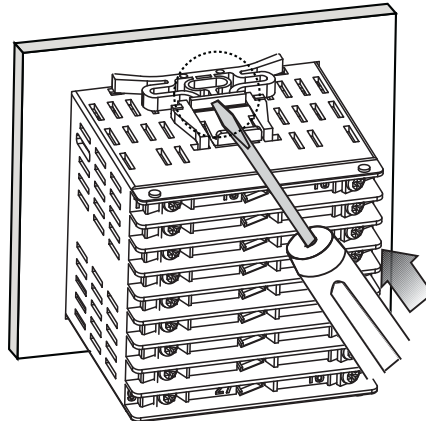
TCN Series

■ Product mounting

- TCN4S(48×48mm) series

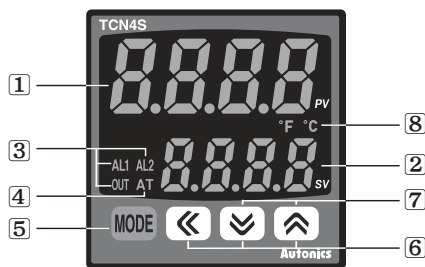


- Other series



※Mount the product on the panel, fasten bracket by pushing with tools as shown above.

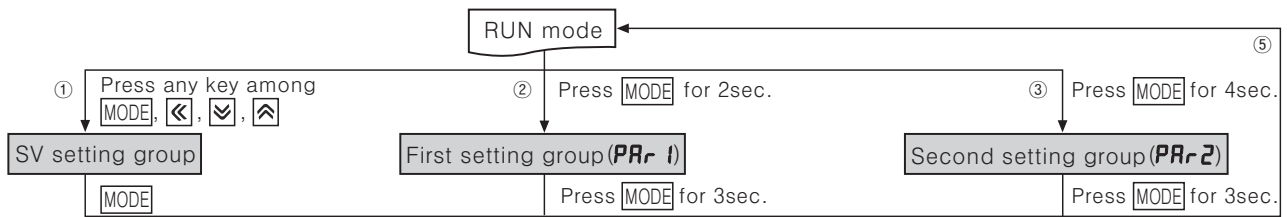
■ Parts description



- ① Present temperature (PV) display (Red)
 - RUN mode: Present temperature (PV) display
 - Parameter setting mode: Parameter display
- ② Set temperature (SV) display (Green)
 - RUN mode: Set temperature (SV) display
 - Parameter setting mode: Parameter setting value display
- ③ Control/Alarm output display lamp
 - OUT : When control output ON, this lamp turns ON.
 - ※During SSRP control output type in CYCLE/PHASE control, this lamp turns ON when MV is over 3.0%.
 - AL1/AL2: When AL1, AL2 alarm output ON, this lamp turns ON.
- ④ Auto tuning lamp
 - AT lamp flashes by every 1 sec during operating auto tuning.
- ⑤ **MODE** key
 - Used when entering into parameter setting group, returning to RUN mode, moving parameter, and saving setting values.
- ⑥ Adjustment
 - Used when entering into set value change mode, digit moving and digit up/down.
- ⑦ Digital input key
 - Press + keys for 3 sec. to operate the set function (RUN/STOP, alarm output reset, auto tuning) in digital input key [d/-].
- ⑧ Temperature unit (°C/°F) indicator
 - It shows current temperature unit.

Economical Dual Display Type, PID Control

Flow chart for setting group



(※1): It is not displayed for AC/DC power type. (TCN4□-22R)
 ※If no key touched for 30sec., it will return to RUN mode automatically and the set value of parameter will not be changed.

AL1	AL1 alarm temperature
AL2	AL2 alarm temperature
At	Auto-tuning execute
P	Proportional band
I	Integral time
d	Derivation time
r-ES	Manual reset
HYS	Hysteresis

In-t	Input type
Unit	Temperature unit
In-b	Input correction
nRwF	Input digital filter
L-Su	SV low-limit value
H-Su	SV high-limit value
o-Ft	Control output operation
C-nd	Control type
oUt	Control output type
SSr-n	SSRP output method (※1)
t	Control cycle
AL-1	AL1 alarm operation mode
AL-2	AL2 alarm operation mode
ALHYS	Alarm output hysteresis
LbAt	LBA monitoring time
LbAb	LBA detection range
di-U	Digital input key
Er-nw	Control output MV in case of input break error
LoL	Lock setting

※Parameter marked in [] might not be displayed depending on other parameter settings.

- Press any key once in RUN mode, it advances to set value setting group.
- Press **MODE** key over 2sec. in RUN mode, it advances to setting group 1.
- Press **MODE** key over 4sec. in RUN mode, it advances to setting group 2.
- First parameter will be displayed on viewer when it advances to the setting group.
- Press **MODE** key over 3sec. in the setting group, it returns to RUN mode.

[※Exception : Press **MODE** key once in SV setting group it returns to RUN mode.]

※Press **MODE** key again within a sec after return to RUN mode by press **MODE** key over 3sec., it advances to the first parameter of previous setting group.

※Parameter setup

Setting group 2 → Setting group 1 → Setting group of set value

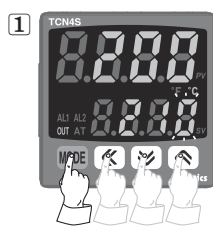
- Set parameter as the above considering parameter relation of each setting group.
- Check parameter set value after change parameter of setting group 2.

※Indicator type displays shaded parameter of setting group 2.

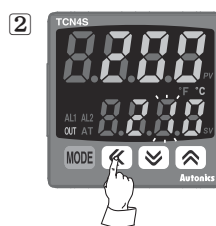
※Alarm operation mode (AL-1, AL-2) of setting group2 is decided whether to display according by alarm output type.

※If alarm operation mode (AL-1, AL-2) of setting group2 is set to [\overline{RnQ} / $5bA$ / \overline{LbAL}], [\overline{ALHYS}] parameter is not displayed.

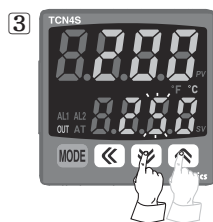
SV setting Ex) In case of changing set temperature from 210°C to 250°C



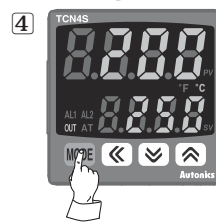
Press any key among **MODE**, **←**, **↓**, **↑** key in RUN mode, the right digit at SV display flashes and it enters to SV setting group.



Press **←** key to move the desired digit. ($10^0 \rightarrow 10^1 \rightarrow 10^2 \rightarrow 10^3 \rightarrow 10^0$)



Press **↓** or **↑** key to move the desired number (1 → 5).

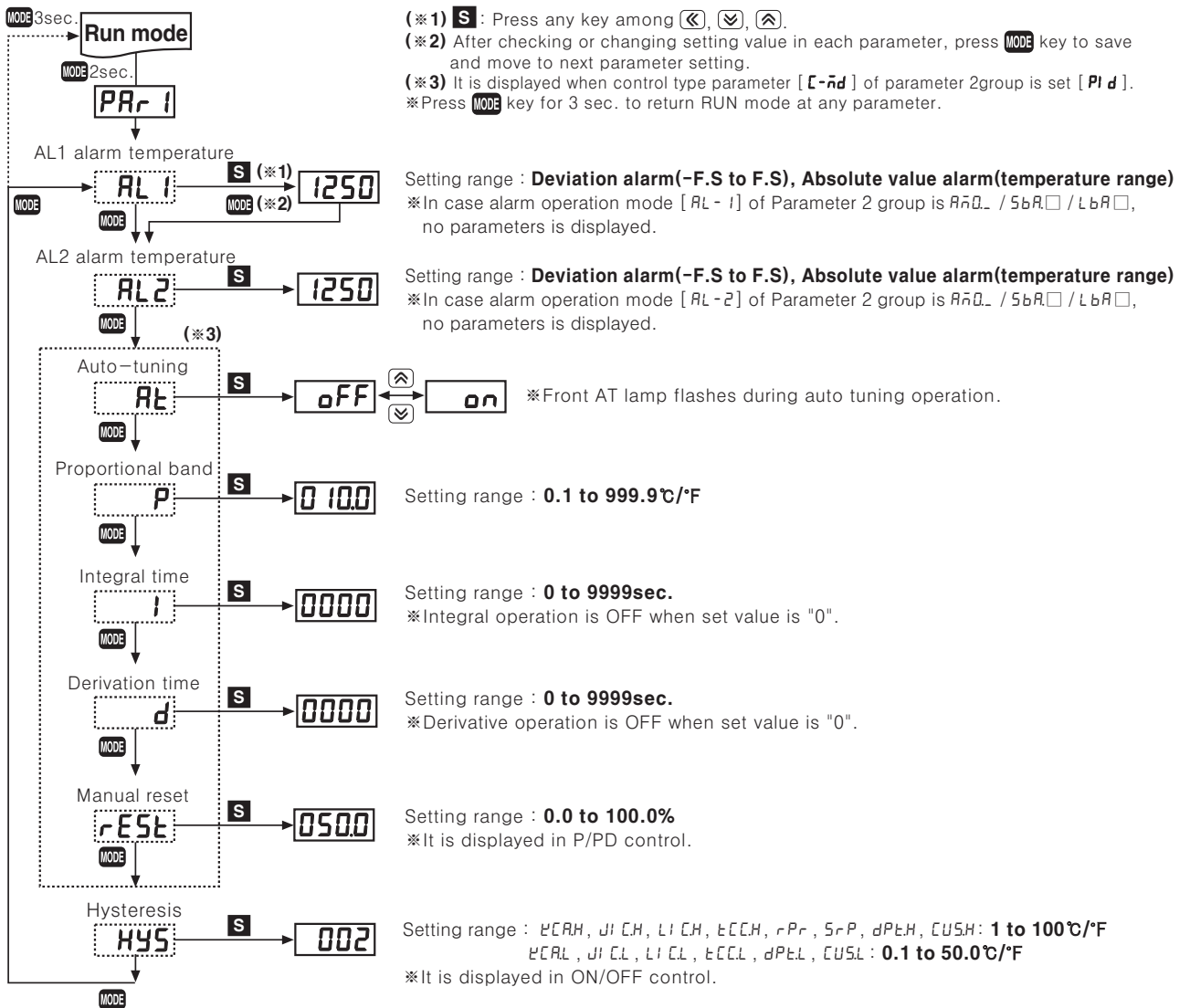


Press **MODE** key to save the value and it controls with this set value. (Even though there is no key input for over 3 sec., it saves automatically.)

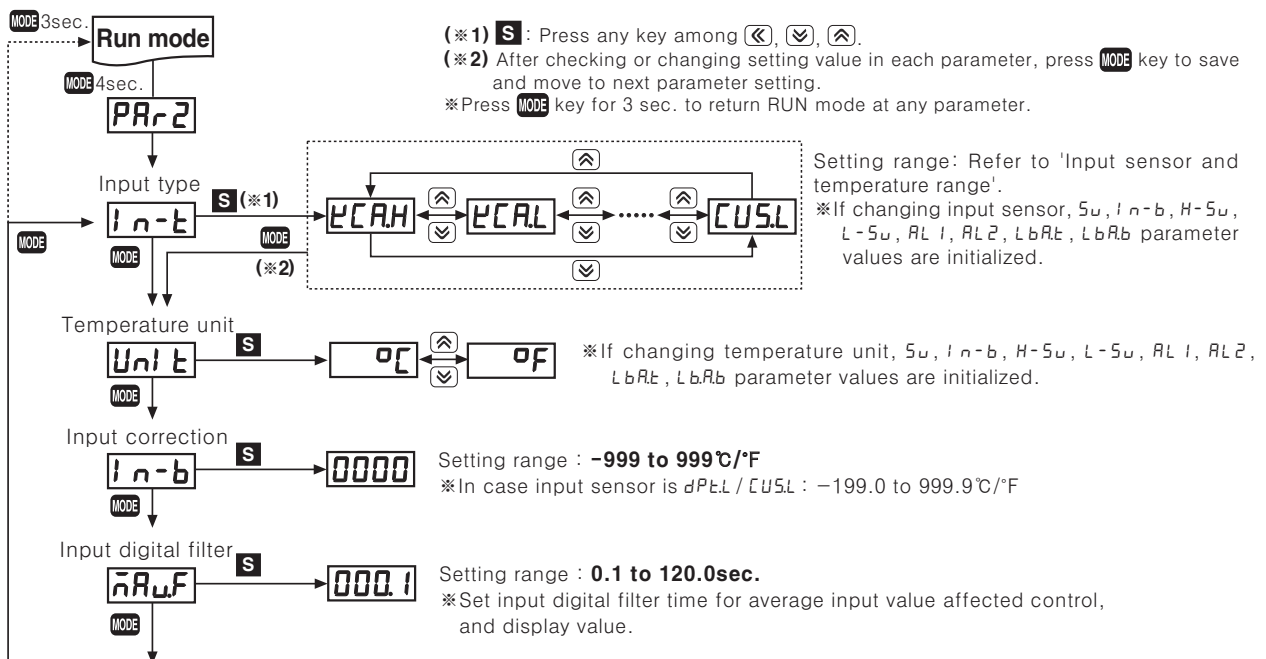
(A)	Photo electric sensor
(B)	Fiber optic sensor
(C)	Door/Area sensor
(D)	Proximity sensor
(E)	Pressure sensor
(F)	Rotary encoder
(G)	Connector/Socket
(H)	Temp. controller
(I)	SSR/Power controller
(J)	Counter
(K)	Timer
(L)	Panel meter
(M)	Tacho/Speed/Pulse meter
(N)	Display unit
(O)	Sensor controller
(P)	Switching power supply
(Q)	Stepping motor & Driver & Controller
(R)	Graphic/Logic panel
(S)	Field network device
(T)	Production stoppage models & replacement

TCN Series

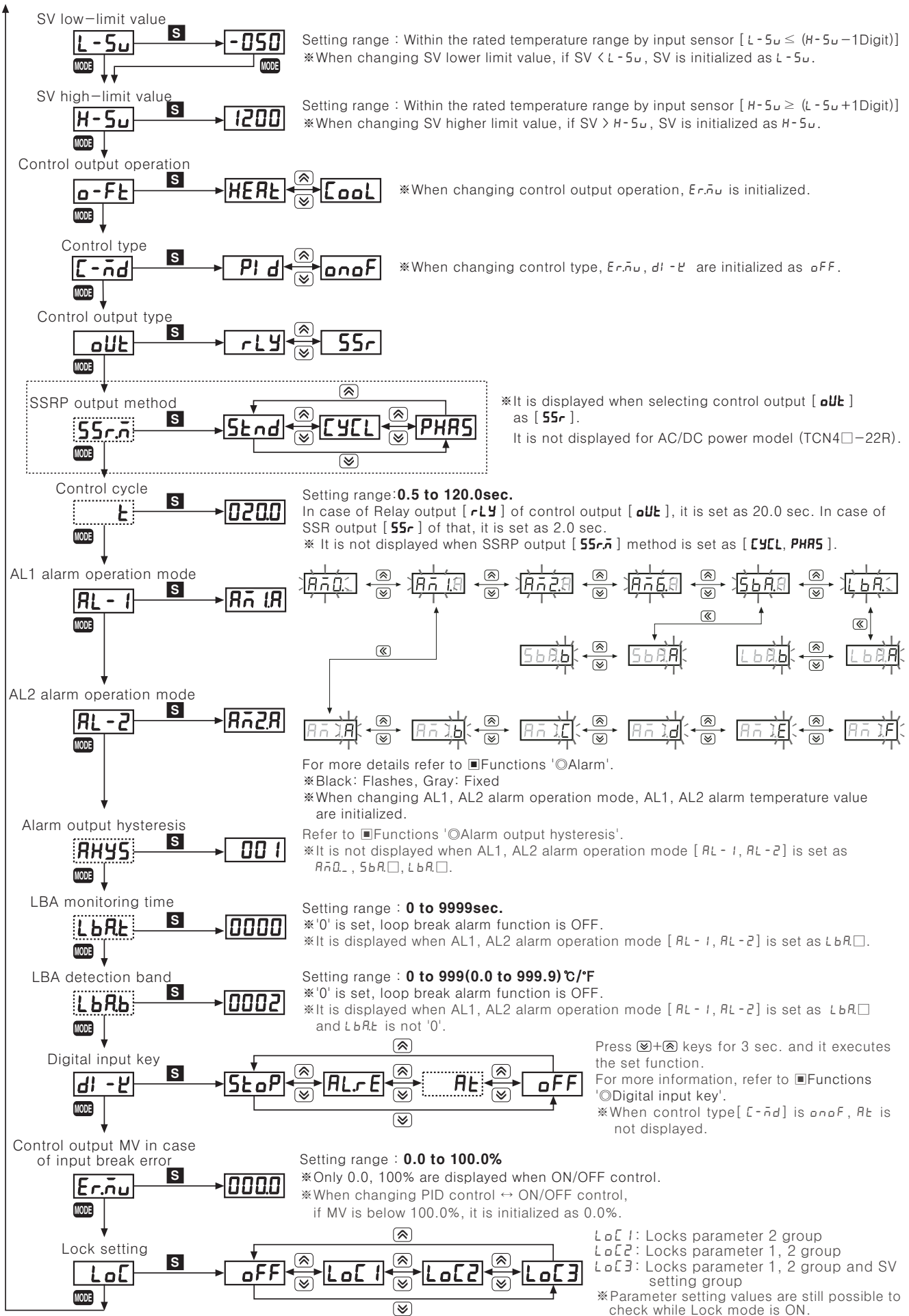
Parameter 1 group



Parameter 2 group



Economical Dual Display Type, PID Control



- (A) Photo electric sensor
- (B) Fiber optic sensor
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TCN Series

Input type and temperature range

Input type		Display	Temperature range(°C)	Temperature range(°F)
ThermoCouple	K(CA)	℄℄RH	-50 to 1200	-58 to 2192
		℄℄RL	-50.0 to 999.9	-58.0 to 999.9
	J(IC)	℄℄CH	-30 to 800	-22 to 1472
		℄℄CL	-30.0 to 800.0	-22.0 to 999.9
	L(IC)	℄℄CH	-40 to 800	-40 to 1472
		℄℄CL	-40.0 to 800.0	-40 to 999.9
	T(CC)	℄℄CH	-50 to 400	-58 to 752
		℄℄CL	-50.0 to 400.0	-58.0 to 752.0
R(PR)	r Pr	0 to 1700	32 to 3092	
S(PR)	S Pr	0 to 1700	32 to 3092	
RTD	DPT100Ω	dP℄H	-100 to 400	-148 to 752
		dP℄L	-100.0 to 400.0	-148.0 to 752.0
	Cu50Ω	℄℄SH	-50 to 200	-58 to 392
		℄℄SL	-50.0 to 200.0	-58.0 to 392.0

Factory default

Parameter 1 group

Parameter		Factory default
SV setting	-	0
AL1 alarm temperature	AL 1	1250
AL2 alarm temperature	AL 2	1250
Auto tuning	At	oFF
Proportional band	P	0 100
Integral time	i	0000
Derivative time	d	0000
Manual reset	rES℄	0500
Hysteresis	HYS	002

Parameter 2 group

Parameter		Factory default
Input type	℄n-℄	℄℄RH
Temperature unit	℄n℄℄	°℄
Input correction	℄n-b	0000
Input digital filter	℄nA℄F	000.1
SV low-limit value	L-S℄	-050
SV high-limit value	H-S℄	1200
Control output operation	o-F℄	HEAt
Control type	℄-℄d	P℄d
Control output type	oU℄	rLY
SSRP output method	SSr.℄	S℄nd
Control cycle	℄	0200
AL1 alarm operation mode	AL-1	A℄1A
AL2 alarm operation mode	AL-2	A℄2A
Alarm output hysteresis	AHYS	001
LBA monitoring time	LbAt	0000
LBA detection band	LbAb	0002
Digital input key	d℄-℄	S℄oP
Control output MV in case of input break error	Er.℄u	0000
Lock setting	L℄℄	oFF

Economical Dual Display Type, PID Control

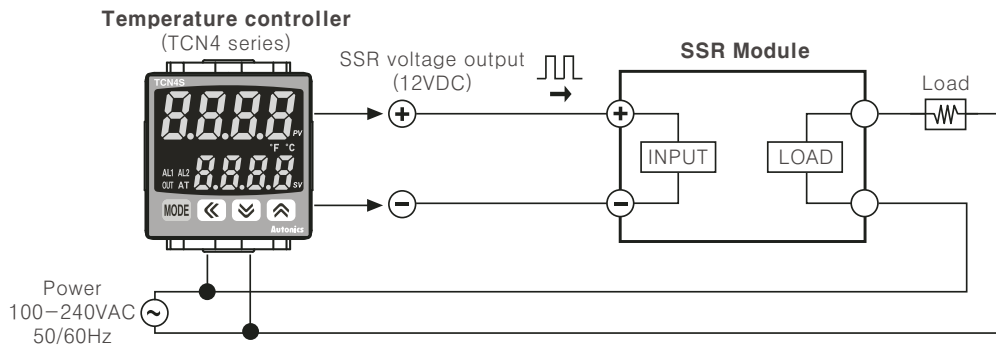
Functions

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.)
- If error [*oPEn*] occurs during auto tuning, it stops this operation automatically.
- To stop auto tuning, change the set as [*oFF*]. (It maintains P, I, D values of before auto tuning.)

SSRP voltage output function [*55r.n*]

- This SSRP output is a user selectable output type which phase control and cycle control are added to standard SSR drive output.
- It is available to standard SSR drive by inner parameter set, Cycle control by connected Zero Cross Turn-on type SSR, and Phase control by connected Random Turn-on type SSR.
- Realizing high accuracy and cost effective temperature control with both current output (4–20mA) and linear output (cycle control and phase control)



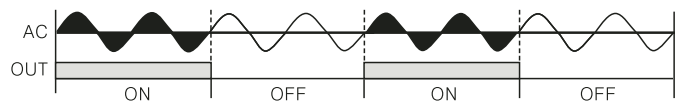
※ When selecting phase or cycle control mode, **the power supply for load and temperature controller must be the same.**

※ In case of selecting PID control type and phase [*PHAS*] / cycle [*CYCL*] control output modes, control cycle [*t*] is not allowed to set.

※ For AC/DC power model (TCN4□-22R), this parameter is not displayed and it is available only standard control by relay or SSR.

Standard control mode [*5tnd*]

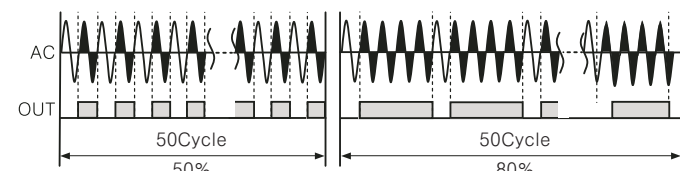
A mode to control the load in the same way as Relay output type. (ON: output level 100%, OFF: output level 0%)



Cycle control mode [*CYCL*]

A mode to control the load by repeating output ON / OFF according to the rate of output within setting cycle.

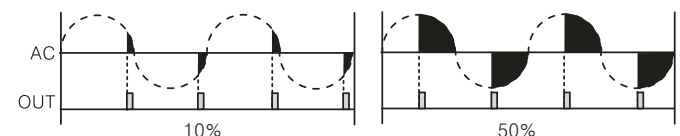
Having improved ON / OFF noise feature by Zero Cross type.



Phase control mode [*PHAS*]

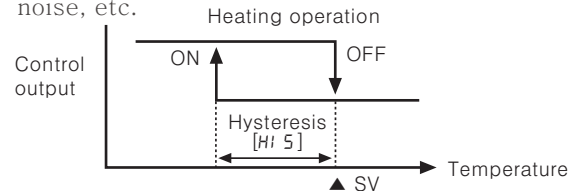
A mode to control the load by controlling the phase within AC half cycle. Serial control is available.

RANDOM Turn-on type SSR must be used for this mode.



Hysteresis [*HYS*]

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



(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

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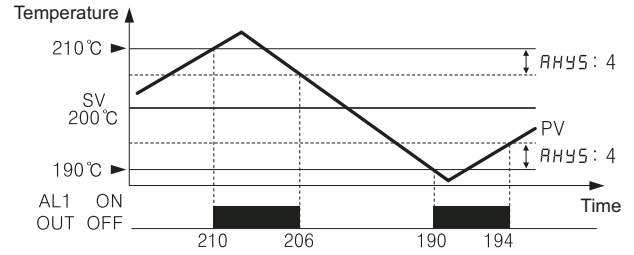
TCN Series

Alarm output hysteresis [AHY5]

It displays alarm output ON and OFF interval and hysteresis is applied to both AL1 OUT and AL2 OUT.

- $\text{PCH}, \text{LCH}, \text{LCL}, \text{ECH}, \text{rPr}, \text{SPr}, \text{dPEH}, \text{CUSH}: 1 \text{ to } 100$
- $\text{PCL}, \text{LCL}, \text{LCL}, \text{ECL}, \text{dPEL}, \text{CUSL}: 0.1 \text{ to } 50.0$

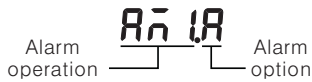
Ex) AL1 alarm operation [AL - 1]: $\text{R}\bar{\text{A}}\bar{\text{3}}.$, AL1 alarm operation [AL 1]: 10°C , Alarm output hysteresis [AHY5]: 4



Digital input key ($\text{V} + \text{A}$ 3sec.) [dI - E]

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 tuning	At Auto tuning function, it is same as auto tuning function [At] of parameter 1group. (You can execute auto tuning from parameter 1group, and finish it by digital input key.) *When control type [Cnd] is set as Pid , At is displayed. When it is set as onof , digital input key [dI - E] is changed as oFF .

Alarm [AL - 1 / AL - 2]



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

Alarm operation

Operation	Name	Alarm operation	Description
$\text{R}\bar{\text{A}}\bar{\text{0}}.$	—	—	No alarm output
$\text{R}\bar{\text{A}}\bar{\text{1}}.$	Deviation high-limit alarm	Alarm (Deviation) temperature: 10°C OFF \downarrow H \uparrow ON SV 100°C PV 110°C	If deviation between PV and SV as high-limit is higher than set value of deviation temperature, the alarm output will be ON.
$\text{R}\bar{\text{A}}\bar{\text{2}}.$	Deviation low-limit alarm	Alarm (Deviation) temperature: 10°C ON \uparrow H \downarrow OFF PV 90°C SV 100°C	If deviation between PV and SV as low-limit is higher than set value of deviation temperature, the alarm output will be ON.
$\text{R}\bar{\text{A}}\bar{\text{3}}.$	Deviation high/low-limit alarm	Alarm (Deviation) temperature: 10°C ON \uparrow H \downarrow OFF \downarrow H \uparrow ON PV 90°C SV 100°C PV 110°C	If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be ON.
$\text{R}\bar{\text{A}}\bar{\text{4}}.$	Deviation high/low-limit reverse alarm	Alarm (Deviation) temperature: -10°C OFF \downarrow H \uparrow ON \uparrow H \downarrow OFF PV 90°C SV 100°C PV 110°C	If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be OFF.
$\text{R}\bar{\text{A}}\bar{\text{5}}.$	Absolute value high-limit alarm	Alarm (Absolute) temperature: 90°C OFF \downarrow H \uparrow ON PV 90°C SV 100°C	If PV is equal to or higher than the absolute value of alarm temperature, the output will be ON.
$\text{R}\bar{\text{A}}\bar{\text{6}}.$	Absolute value low-limit alarm	Alarm (Absolute) temperature: 90°C ON \uparrow H \downarrow OFF PV 90°C SV 100°C	If PV is equal to or lower than the absolute value of alarm temperature, the output will be ON.
SbA	Sensor break alarm	—	It will be ON when it detects sensor disconnection.
LbA	Loop break alarm	—	It will be ON when it detects loop break.

*H: Alarm output hysteresis [AHY5]

Economical Dual Display Type, PID Control

◎ Alarm option

Option	Name	Description
$R\bar{n} \square .A$	Standard alarm	If it is an alarm condition, alarm output is ON. If it is a clear alarm condition, alarm output is OFF.
$R\bar{n} \square .b$	Alarm latch	If it is an alarm condition, alarm output is ON and maintains ON status. (Alarm output HOLD)
$R\bar{n} \square .c$	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.
$R\bar{n} \square .d$	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.
$R\bar{n} \square .E$	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.
$R\bar{n} \square .F$	Alarm latch and standby sequence 2	Basic operation is same as alarm latch and standby sequence 1. 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.

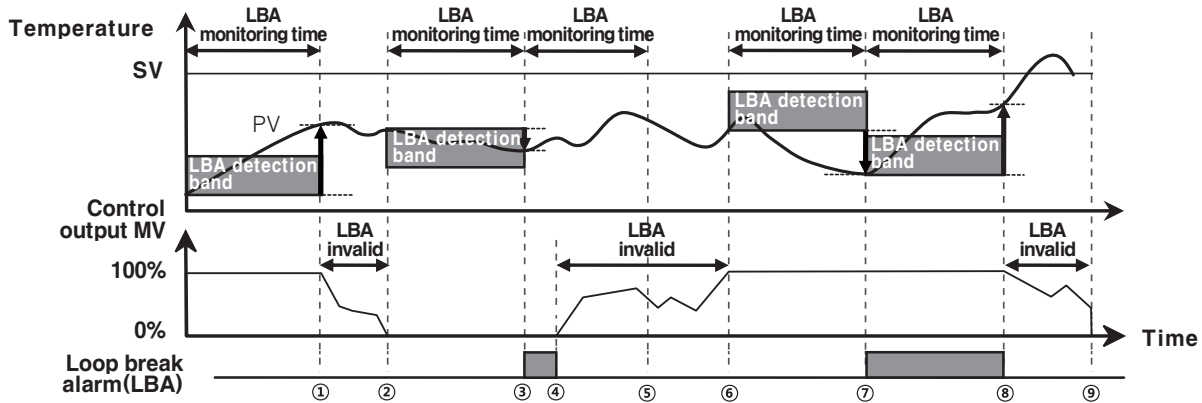
※Condition of re-applied standby sequence for standby sequence 1, alarm latch and standby sequence 1: Power ON
 Condition of re-applied standby sequence for standby sequence 2, alarm latch and standby sequence 2: Power ON, changing set temperature, alarm temperature[$RL-1$], [$RL-2$] or alarm operation [$RL-1$], [$RL-2$], switching STOP mode to RUN mode.

◎ 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 [$5bRA$] or alarm latch [$5bRb$].

◎ 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 [$LbRb$] during LBA monitoring time [$LbRt$], or when control output MV is 0% (100% for cooling control) and PV is not decreased below than LBA detection band [$LbRb$] during LBA monitoring time [$LbRt$], alarm output turns ON.



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

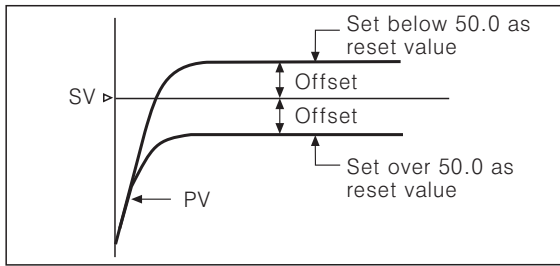
※When executing auto-tuning, LBA detection band [$LbRb$] and LBA monitoring time are automatically set based on auto tuning value. When alarm operation mode [$RL-1$, $RL-2$] is set as loop break alarm (LBA) [$LbR□$], LBA detection band [$LbRb$] and LBA monitoring time [$LbRt$] parameter is displayed.

(A)	Photo electric sensor
(B)	Fiber optic sensor
(C)	Door/Area sensor
(D)	Proximity sensor
(E)	Pressure sensor
(F)	Rotary encoder
(G)	Connector/Socket
(H)	Temp. controller
(I)	SSR/Power controller
(J)	Counter
(K)	Timer
(L)	Panel meter
(M)	Tacho/Speed/Pulse meter
(N)	Display unit
(O)	Sensor controller
(P)	Switching power supply
(Q)	Stepping motor & Driver & Controller
(R)	Graphic/Logic panel
(S)	Field network device
(T)	Production stoppage models & replacement

Manual reset [rE5t]

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, heater capacity. This temperature difference is called offset and manual reset [rE5t] function is to set/correct offset.

- When PV and SV are equal, reset value is 50.0%. After control is stable, PV is lower than SV, reset value is over 50.0% or PV is higher than SV, reset value is below 50.0%.
- Manual reset [rE5t] by control result



Input correction [i n-b]

Controller itself does not have errors but there may be error by external input temperature sensor. 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'.

Input digital filter [nAμF]

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.

Control output type selection [oUt]

It is selectable output type ; relay output [rLϒ], SSR drive output [55r].

Control method selection [C-nδ]

It is selectable PID, ON/OFF control.

- In case of ON / OFF [onoF] mode, Hysteresis [Hϒ5] parameter is displayed.
- In case of PID [PId] mode, Proportional band [P], Integral time [I] and Derivative time [t] parameters are displayed.

Temperature unit selection [U n t]

- A function to select display temperature unit
- Unit display lamp will be ON when converting temperature unit

Cool / Heat function [o-Ft]

There are two temperature controlling applications, one is heating and the other is cooling.

- Heating: When PV is lower than SV, control output will be ON to supply power to the load (heater) and vice versa.
- Cooling: When PV is higher than SV, control output will be ON to supply power to the load (cooler) and vice versa.
- In case of ON / OFF control, or P control mode, Control output for Cooling / Heating is opposite to each other.
- In case of PID mode, PID time constants for Cooling / Heating are different from each other because PID time constants are determined depending on each control object.

- Cool-function [CooL] and heat-function [HEAt] must be set correctly according to the application, if set as opposite function, it may cause a fire. (If set cool-function [CooL] at heater, it will be maintained ON and it may cause a fire.)
- Avoid changing heat-function to cool-function or cool-function to heat-function when the unit is operating.
- It is impossible to operate both function at once in this unit. Therefore, only one function should be selected only.

SV High/Low limit [L-Su / H-Su]

- It sets SV high/low limit Limit range of using temperature within temperature range for each sensor, user can set/change set temperature (SV) within SV high limit [H-Su] ~ SV low limit [L-Su]. (* L-Su > H-Su cannot be set.)
- When changing input type [i n-t], SV high limit [H-Su] and SV low limit [L-Su] of using temperature will be initialized as max./min. value of sensor temperature range automatically.

Control output MV [Er.nu] when input sensor line is broken [oPE n] / setting error [Er5u] occur

When input sensor line is broken or setting value error occurs, this function is to set control output. You can set ON/OFF setting for ON/OFF control, MV setting for PID control.

Lock setting [LoL]

A function to prevent changing SV and parameters of each setting group. Parameter setting values are still possible to check while Lock mode is ON.

Display	Description
oFF	Lock off
LoL 1	Lock setting group 2
LoL 2	Lock setting group 1, 2
LoL 3	Lock setting group 1, 2, SV setting group

Error

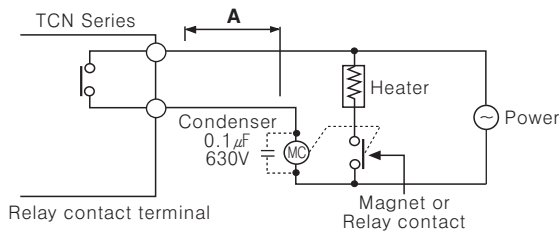
Display	Description	Troubleshooting
oPE n	Flashes if input sensor is disconnected or sensor is not connected.	Check input sensor state.
HHHH	Flashes if measured sensor input is higher than temperature range.	When input is within the rated temperature range, this display disappears.
LLLL	Flashes if measured sensor input is lower than temperature range.	

Economical Dual Display Type, PID Control

◎Output connections

See H-151 page for output.

●Application of relay output type



Keep **A** length as long as possible when wiring the temperature controller and the load. If wire length of **A** is short, counter electromotive force which occurs from a coil of magnet switch & power relay may flow in power line of the unit, and it may cause malfunction. If wire length of **A** is short, please connect mylar condensers 104(630V) on the both ends of "MC" (magnet coil) to protect electromotive force.

■Proper usage

◎Simple "Error" diagnosis

●When the load (Heater etc) is not operated

Please check operation of the OUT lamp located in front panel of the unit. If the OUT lamp does not operate, please check the parameter of all programmed mode. If lamp is operating, please check the output (Relay, SSR drive voltage) after separating output line from the unit.

●When it displays "oPEr" during operation

This is a warning that external sensor is open. Please turn off the power and check the wire state of the sensor.

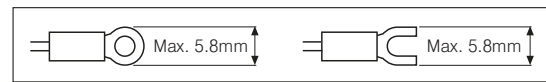
If sensor is not open disconnect sensor line from the unit and short the input +, - terminal. Turn on the power of the unit and check the controller displays room temperature.

If this unit cannot display room temperature, this unit is broken. Please remove this unit and contact our service center.

(When the input mode is thermocouple, it is available to display room temperature.)

◎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.
- For crimp terminal, select following shaped terminal (M3).



- 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.
- Do not use this product as Volt-meter or Ampere-meter, this is a temperature controller.
- 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.
- Keep away from the high frequency instruments. (High frequency welding machine & sewing machine, large capacity SCR controller)
- When supplying measured input, if 'HHHH' or 'LLLL' is displayed, measured input may have problem.
Turn off the power and check the line.
- Installation environment
 - ① It shall be used indoor.
 - ② Pollution Degree 2
 - ③ Altitude Max. 2000m.
 - ④ Installation Category II.

(A)	Photo electric sensor
(B)	Fiber optic sensor
(C)	Door/Area sensor
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(F)	Rotary encoder
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(H)	Temp. controller
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(J)	Counter
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(L)	Panel meter
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(R)	Graphic/Logic panel
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(T)	Production stoppage models & replacement