

TC Series

Economical single display type, PID control

■ Features

- Realizes ideal temp. controlling with newly developed PID control algorithm and 100ms high speed sampling
- **Built-in relay output or SSR output selectable**
: Enables to phase control and cycle control with SSR drive output(SSRP function)
- Dramatically increased visibility using wide display part
- Mounting space saving with compact design
: Approx. 38% reduced size compared with existing model(depth-based)
- SV/PV deviation indicatable

NEW



Please read "Caution for your safety" in operation manual before using.



■ Ordering information

T	C	4	S	—	1	4	R
							Control output
							Power supply
							Alarm output
							Size
							Digit
							Setting type
							Item
							N Indicator - Without control output
							R Relay output+SSRP output(AC power) Relay output+SSR output(AC/DC power)
							2 24-48VDC, 24VAC 50/60Hz
							4 100-240VAC 50/60Hz
							N No alarm output
							1 Alarm1 output
							2 Alarm1 output+Alarm2 output※1
							S DIN W48×H48mm(Terminal block type)
							SP DIN W48×H48mm(11pin plug type)※2
							Y DIN W72×H36mm
							M DIN W72×H72mm
							H DIN W48×H96mm
							W DIN W96×H48mm
							L DIN W96×H96mm
							4 9999(4digit)
							C Set by touch switch
							T Temperature controller

※1. It is unavailable for TC4SP, TC4Y.

※2. 11pin socket(PG-11, PS-11) for TC4SP : sold separately.

■ Specifications

Series		TC4S	TC4SP	TC4Y	TC4M	TC4H	TC4W	TC4L
Power supply	AC power	100-240VAC 50/60Hz						
	AC/DC power	24VAC 50/60Hz, 24-48VDC						
Allowable voltage range		90 to 110% of rated voltage						
Power consumption	AC power	Max. 5VA(100-240VAC 50/60Hz, 24VAC 50/60Hz)						
	AC/DC power	Max. 3W(24-48VDC)						
Display method		7Segment(Red), Other display(Green, Yellow, Red) LED						
Character size		W7×H15mm	W7.4×H15mm	W9.5×H20mm	W7×H14.6mm	W9.5×H20mm	W11×H22mm	
Input type	RTD	DPT100Ω(Allowable line resistance max. 5Ω per a wire)						
	TC	K(CA), J(IC), L(IC)						
Display accuracy	RTD, TC	(PV ±0.5% or ±1°C higher one) rdg ±1digit※1						
		※TC4SP (Plug type) is (PV ±0.5% or ±2°C higher one) rdg ±1digit※2 e Based on room temperature(23°C ±5°C)						

※1. In case of out of room temperature range: (PV ±0.5% or ±2°C higher one)rdg ±1digit
L(IC) and RTD Cu50: (PV ±0.5% or ±3°C higher one)rdg ±1digit

※2. In case of out of room temperature range for TC4SP: (PV ±0.5% or ±3°C higher one)rdg ±1digit
L(IC) and RTD Cu50: (PV ±0.5% or ±4°C higher one)rdg ±1digit

Economical PID Control

Specifications

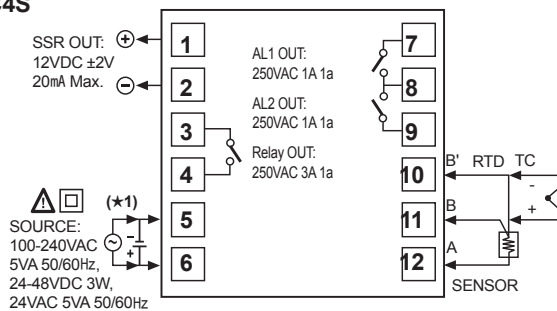
Series		TC4S	TC4SP	TC4Y	TC4M	TC4H	TC4W	TC4L
Control output	Relay	250VAC 3A 1a						
	SSR	12VDC $\pm 2V$ 20mA Max.						
Sub output		AL1, AL2 relay output : 250VAC 1A 1a(※TC4SP, TC4Y have AL1 only.)						
Control method		ON/OFF and P, PI, PD, PID control						
Hysteresis		1 to 100°C/°F [$\frac{1}{100} \sim 100$] / 0.1 to 50.0°C/°F [$\frac{1}{100} \sim 100$]						
Proportional band		0.1 to 999.9°C/°F						
Integral time(I)		9999sec.						
Derivative time(D)		9999sec.						
Control period		0.5 to 120.0sec.						
Manual reset		0.0 to 100.0%						
Sampling period		100ms						
Dielectric strength	AC power	2000VAC 50/60Hz for 1min.(Between input terminal and power terminal)						
	AC/DC power	1000VAC 50/60Hz for 1min.(Between input terminal and power terminal)						
Vibration		0.75mm amplitude at frequency of 5 to 55Hz(for 1 min.) in each of 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. 100M Ω (at 500VDC megger)						
Noise resistance		Square shaped noise by noise simulator(pulse width 1 μ s) ± 2 kV R-phase and S-phase						
Memory retention		Approx. 10 years (When using non-volatile semiconductor memory type)						
Environ-ment	Ambient temperature	-10 to 50°C, storage: -20 to 60°C						
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH						
Insulation type		Double insulation or reinforced insulation (Mark: $\square$), Dielectric strength between the measuring input part and the power part : AC power 2kV, AC/DC Power 1kV)						
Approval		CE, RoHS (Except for AC/DC power type)						
Unit weight		Approx. 97g	Approx. 84g	Approx. 127g	Approx. 127g	Approx. 118g	Approx. 118g	Approx. 172g

※Environment resistance is rated at no freezing or condensation.

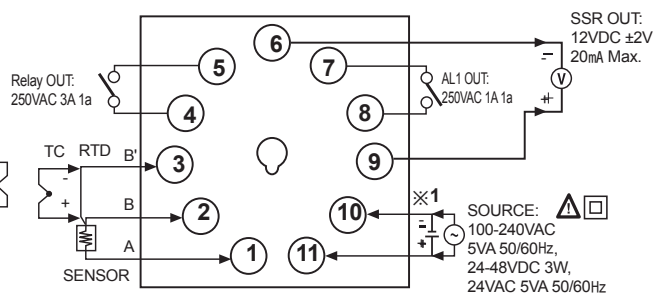
Connections

※TC4 series has selectable control output; Relay output, and SSRP output. AC/DC voltage type has Relay output and SSR output and it is selectable.

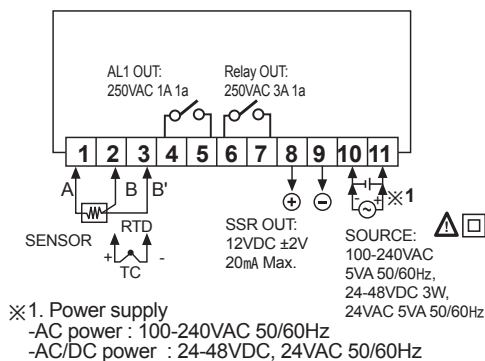
•TC4S



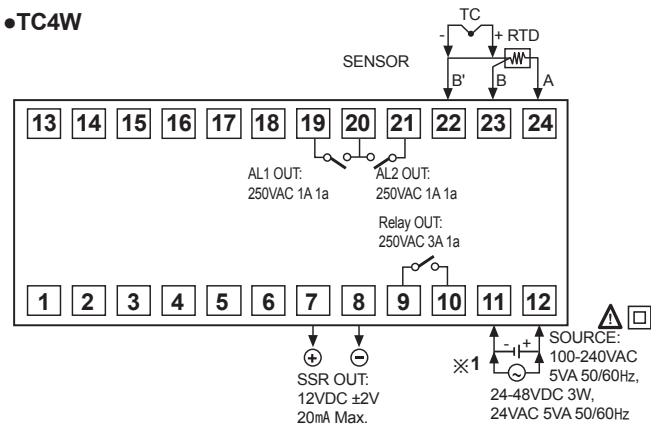
•TC4SP



•TC4Y



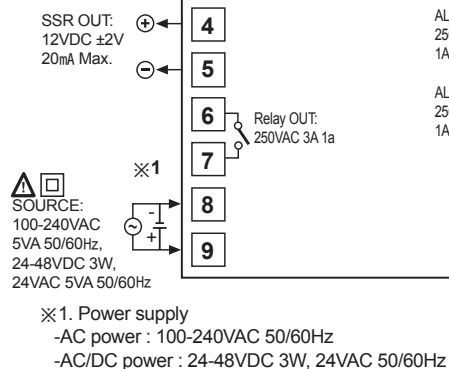
•TC4W



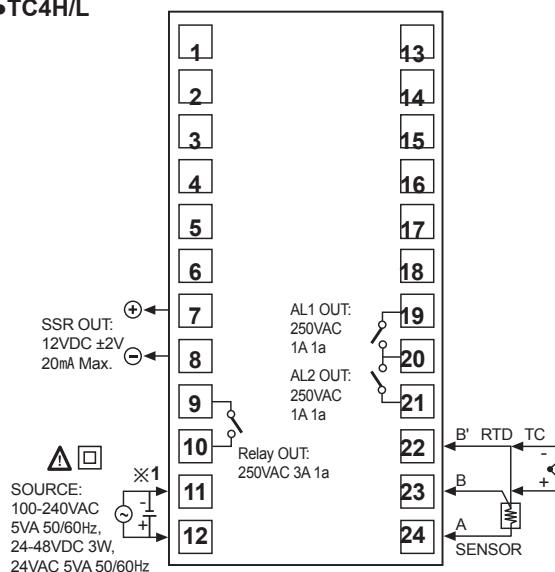
TC Series

Connections

•TC4M



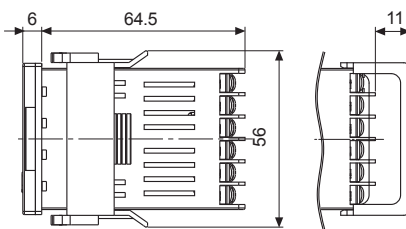
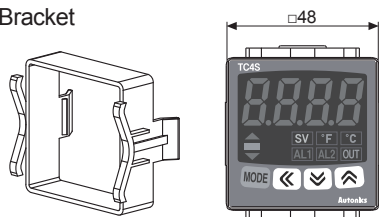
•TC4H/L



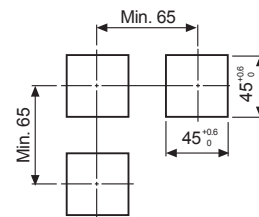
Dimensions

•TC4S

•Bracket



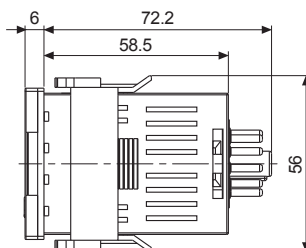
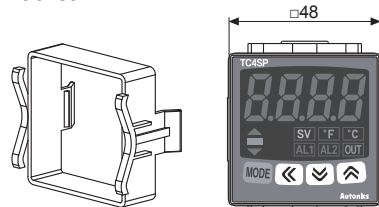
•Panel cut-out



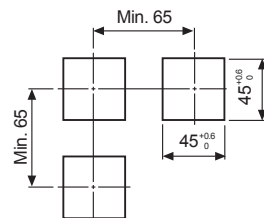
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•TC4SP

•Bracket

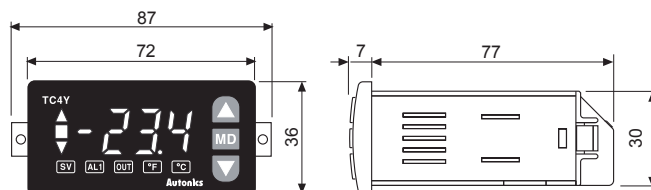


•Panel cut-out

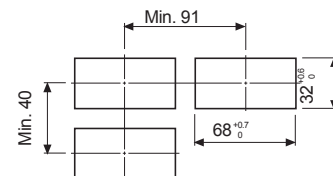


(unit: mm)

•TC4Y



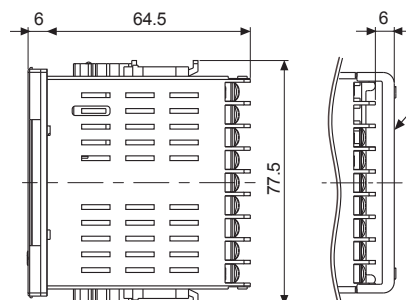
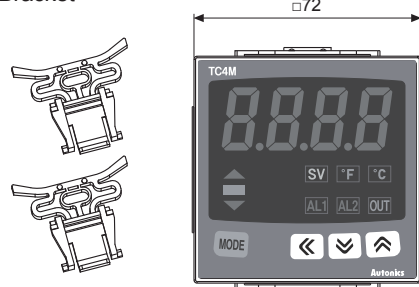
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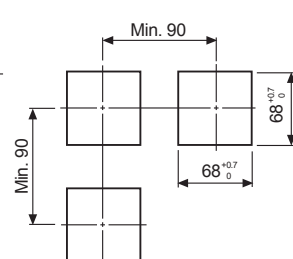
(unit: mm)

•TC4M

•Bracket



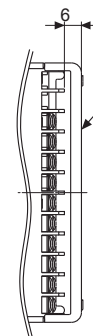
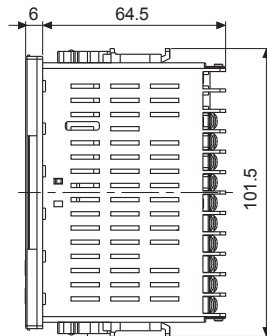
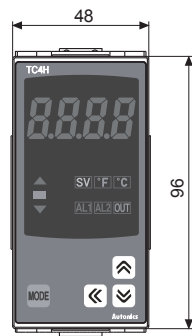
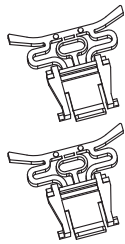
•Panel cut-out



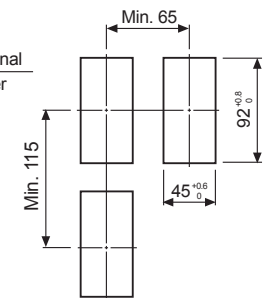
(unit: mm)

Economical PID Control

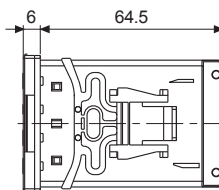
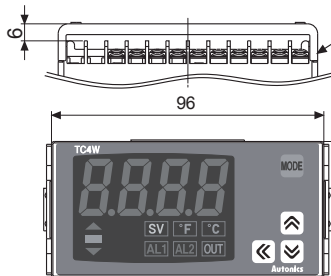
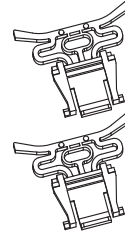
•TC4H •Bracket



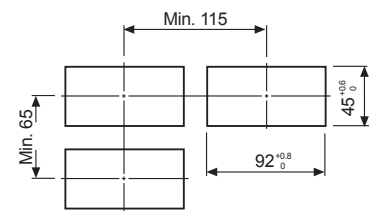
•Panel cut-out (unit: mm)



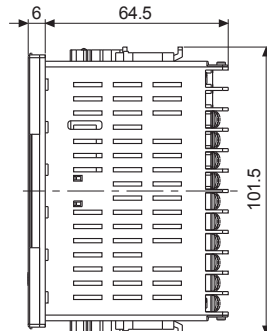
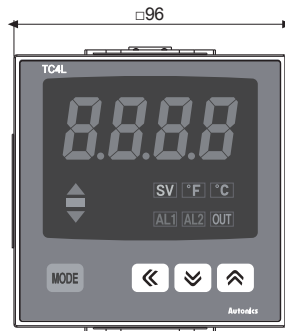
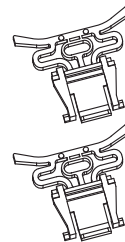
•TC4W •Bracket



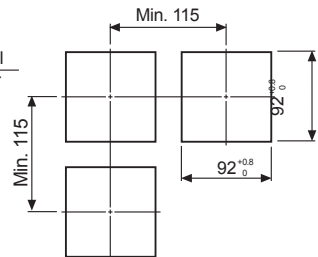
•Panel cut-out (unit: mm)



•TC4L •Bracket

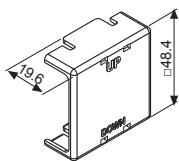


•Panel cut-out (unit: mm)

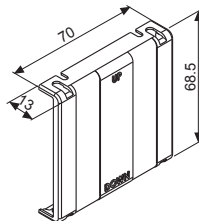


•Terminal cover(sold separately)

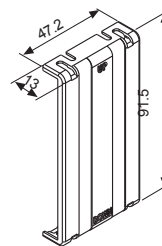
•RSA-COVER (48×48mm)



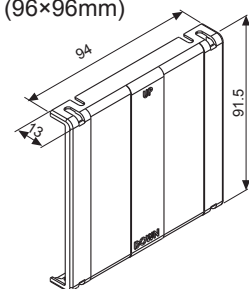
•RMA-COVER (72×72mm)



•RHA-COVER (48×96mm, 96×48mm)

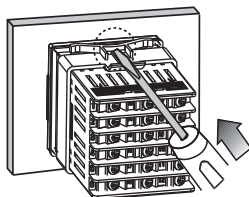


•RLA-COVER (96×96mm)

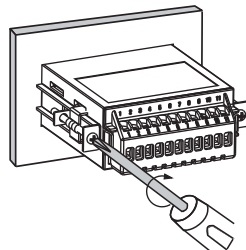


■ Product mounting

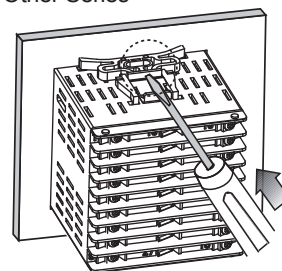
•TC4S/SP(48×48mm) Series



•TC4Y(72×36mm) Series



•Other Series

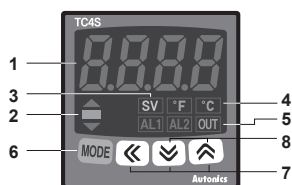


※Mount the product on the panel, fasten bracket by pushing with tools as shown above.
(In case of TC4Y, fasten bolts for bracket.)

(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) Software
(U) Other

TC Series

Parts description



1. Temperature display

It shows current temperature(PV) in RUN mode and parameter and set value for each setting group in parameter change mode.

2. Deviation indicator, Auto-tuning indicator

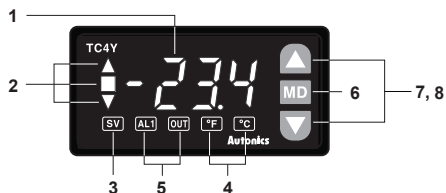
-It shows current temperature(PV) deviation based on set temperature(SV) by LED.

No	PV deviation temp.	Deviation display
1	Over 2°C	▲ lamp on
2	Below ±2°C	■ lamp on
3	Under -2°C	▼ lamp on

-Deviation indicator (▲, ■, ▼) is flashed by every 1sec when operating auto tuning.

3. Set temperature(SV) indicator

Press any front key once to check or change current set temperature(SV), set temperature(SV) indicator is on and preset set value is flashed.



4. Temperature unit(°C/°F) indicator

: It shows current temperature unit.

5. Control/alarm output indicator

-OUT: It will turn ON when control output(Main Control Output) is ON.

※In case of CYCLE/PHASE control of SSR drive output, it will turn ON when MV is over 3.0%. (only for AC voltage type)

-Alarm1/Alarm2 : It will light up when alarm output Alarm1/Alarm2 are on.

6. MODE Key

: Used when entering into parameter setting group, returning to RUN mode, moving parameter and saving setting values.

7. Adjustment

: Used when entering into set value change mode, Digit moving and Digit Up/down.

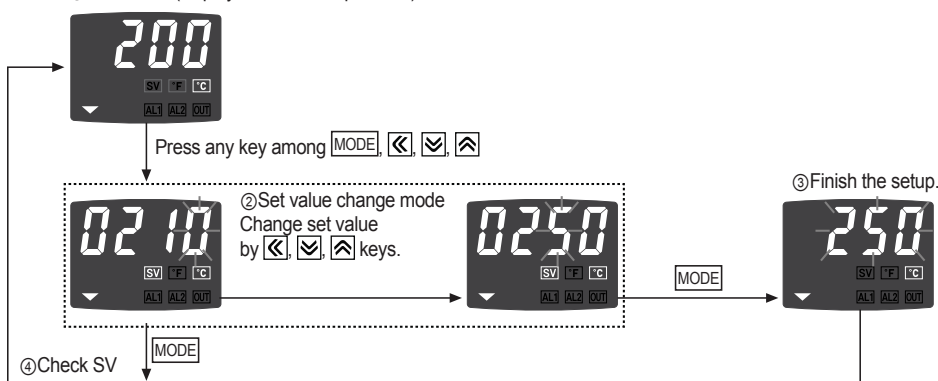
8. FUNCTION key

: Press [F] + [F] keys for 3 sec. to operate function(RUN/STOP, alarm output cancel) set in inner parameter [d1 - E].

※Press [F] + [F] keys at the same time in set value operation to move digit.
(only for TC4Y Series)

Flow chart for SV setting(※In case of changing set temperature from 210°C to 250°C.)

①RUN mode(display a current temperature)



Factory default

•SV setting group

Parameter	Factory default
-	0

•Setting group 1

Parameter	Factory default
AL1	1250
AL2	
Alt	OFF
P	010.0
I	0000
d	
RES	050.0
HYS	002

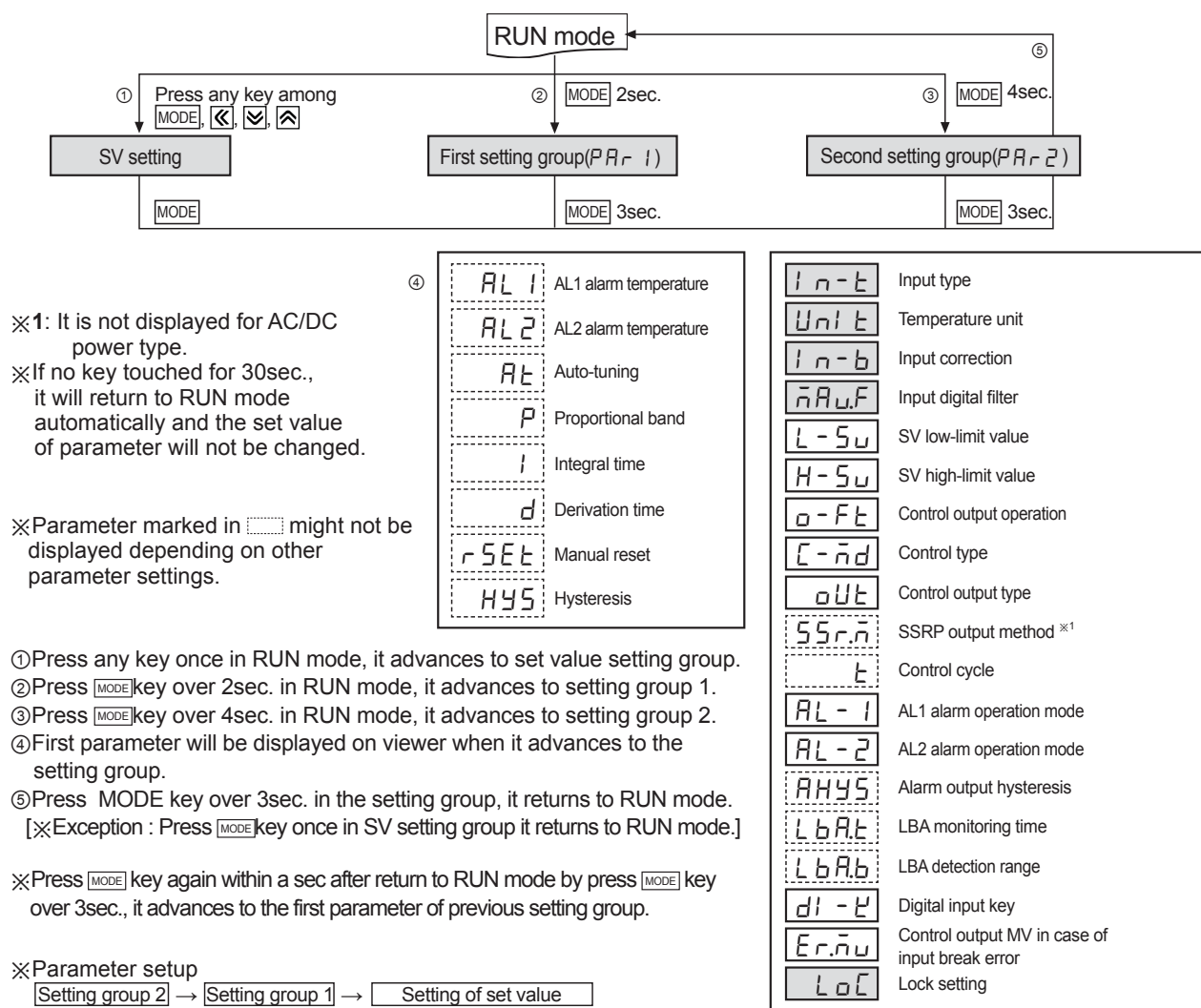
•Setting group 2

Parameter	Factory default	Parameter	Factory default
In-t	ECR	t	020.0
Unit	°C	AL-1	AN1.A
In-b	0000		AN2.A
hAuF	000.1	AL-2	000.1
L-Su	-050	ALYS	0000
H-Su	1200	LbAb	0002
o-Fu	HEAt	d1-E	StoP
C-nd	PI d	Erru	0000
oUt	rLY	LoC	OFF
SSr.n	Stnd		

※AC/DC power type has no SSR drive output method selection [SSr.n] function and supports only ON/OFF output when selecting [SSr] in control output setting function [oUt].

Economical PID Control

■ Flow chart for setting group



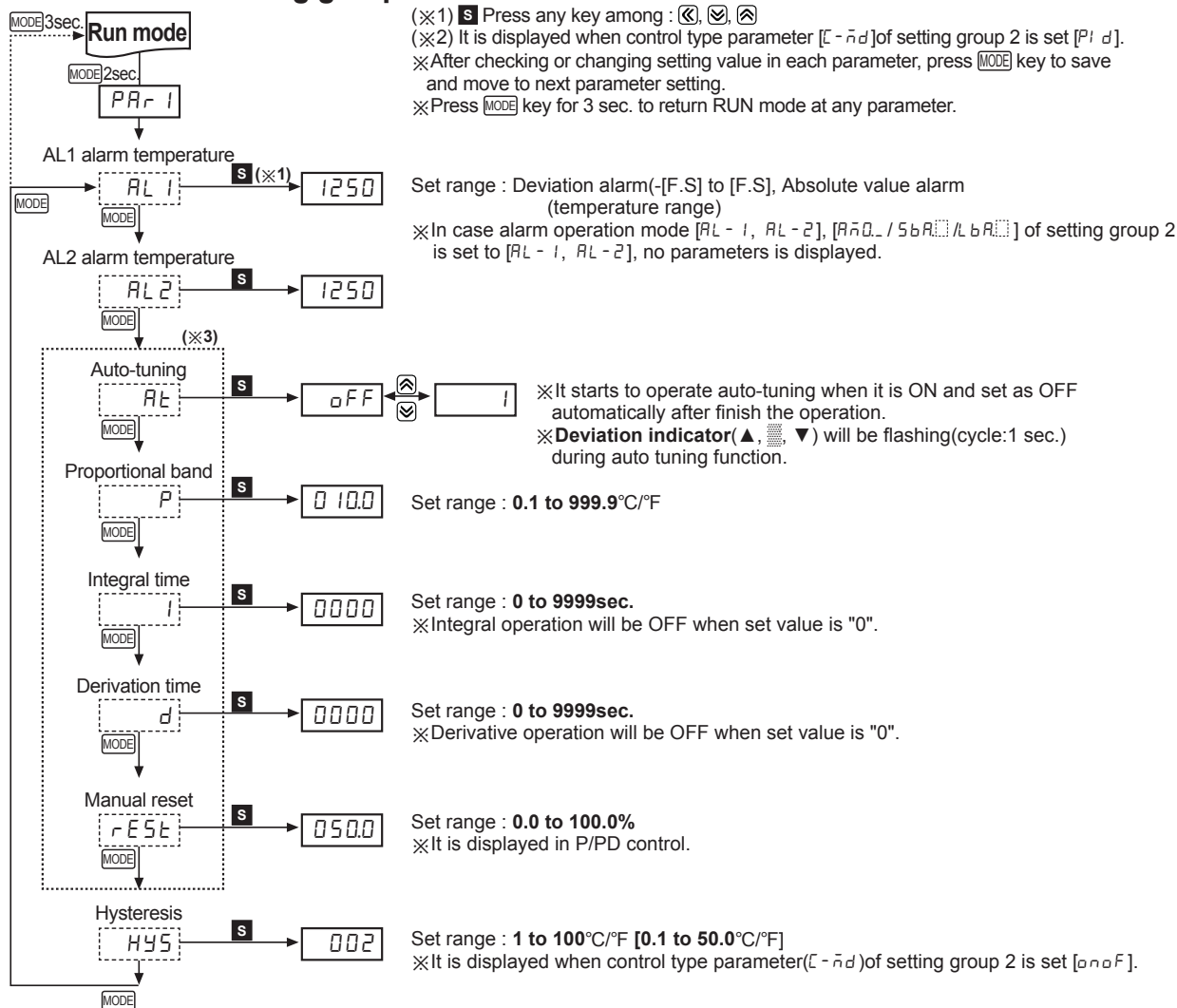
■ Input type and range[Input type]

Input sensor		Display	Input range (°C)	Input range (°F)
Thermocouple	K(CA)	ECR	-50 to 1200	-58 to 2192
	J(IC)	JIC	-30 to 500	-22 to 932
	L(IC)	LIC	-40 to 800	-40 to 1472
RTD	DPT100Ω	PE1	-100 to 400	-148 to 752
		PE2	-100.0 to 400.0	-148.0 to 752.0
	Cu50Ω	CUS.H	-50 to 200	-58 to 392
		CUS.L	-50.0 to 200.0	-58.0 to 392.0

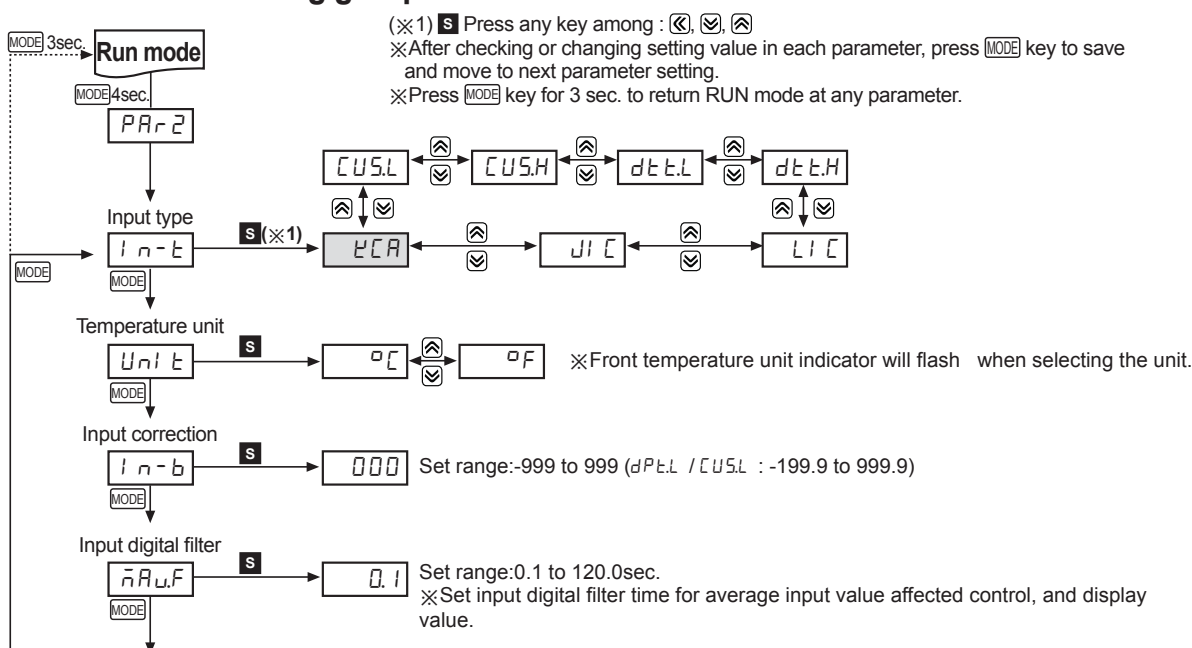
(A)	Photo electric sensor
(B)	Fiber optic sensor
(C)	Door/Area sensor
(D)	Proximity sensor
(E)	Pressure sensor
(F)	Rotary encoder
(G)	Connector/Socket
(H)	Temp. controller
(I)	SSR/Power controller
(J)	Counter
(K)	Timer
(L)	Panel meter
(M)	Tacho/Speed/Pulse meter
(N)	Display unit
(O)	Sensor controller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

TC Series

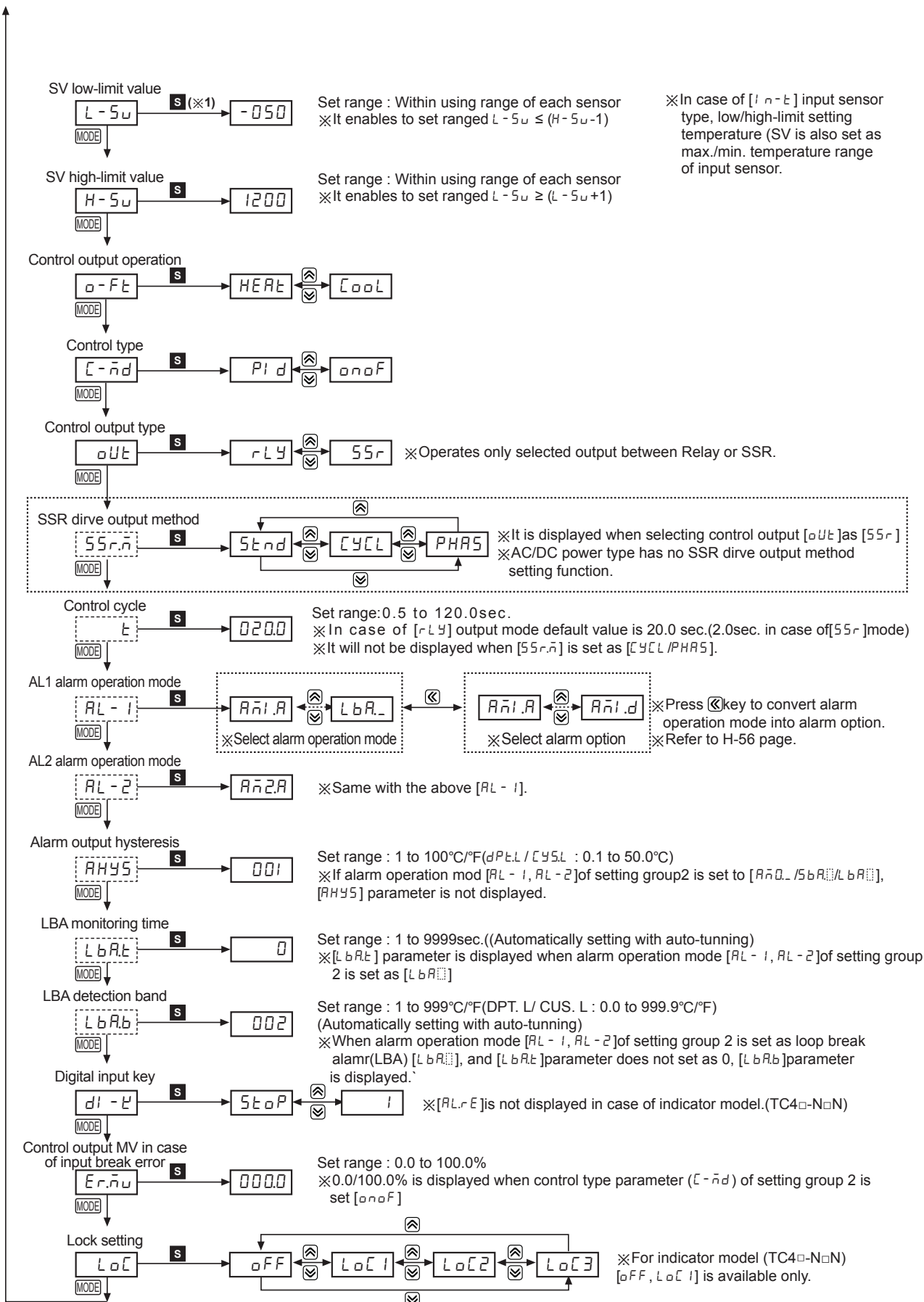
■ Flow chart for setting group 1



■ Flow chart for setting group 2



Economical PID Control



(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
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(P)	Switching power supply
(Q)	Stepping motor& Driver&Controller
(R)	Graphic/Logic panel
(S)	Field network device
(T)	Software
(U)	Other

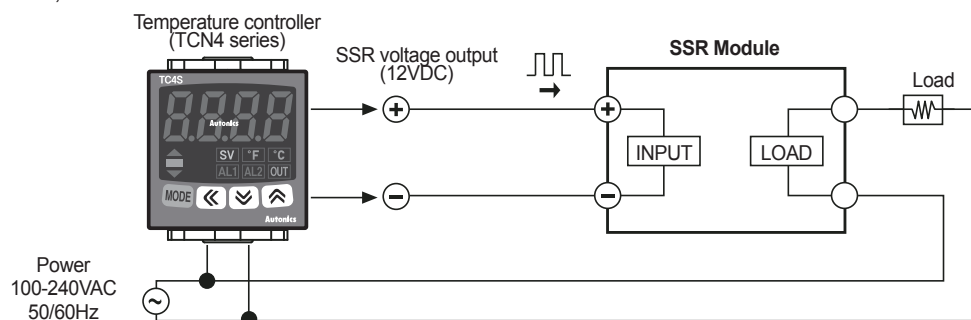
TC Series

■ Functions

Refer to the H-66 to 69 page for TC / TD common features.

◎ SSR drive output selection(SSRP function) [SSr.n]

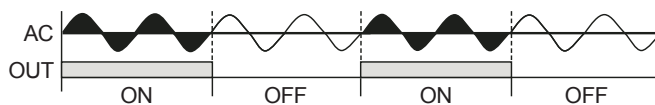
- Realizing high accuracy and cost effective temperature control with both current output (4-20mA) and linear output (cycle control and phase control)
- SSRP output is selectable one of standard ON/OFF control, cycle control, phase control by utilizing standard SSR drive voltage output.
- Select one of standard ON/OFF control [SOn.d], cycle control[CyCL], phase control[PHAS] at SSr.n parameter of setting 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.



- ※ 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 [PHAS] control output modes control cycle [C] is not allowed to set.
- ※ For AC/DC power model (TC4□□2R), this parameter is not displayed and it is available only standard control by relay or SSR.

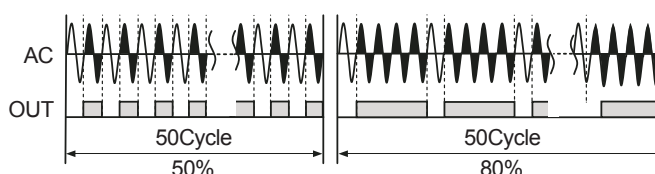
●Standard ON/OFF control mode[SOn.d]

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



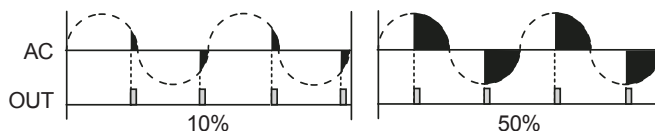
●Cycle control mode[CyCL]

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.



◎ Lock setting[LdC]

- 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
LdC1	Lock setting group 2
LdC2	Lock setting group 1, 2
LdC3	Lock setting group 1, 2, SV setting group

※OFF, LdC1 are available only for indicator(TC4□-N□N).

◎ Error

- Error mark will flash (every 1sec.) in PV viewer when error occurs during the control operation.

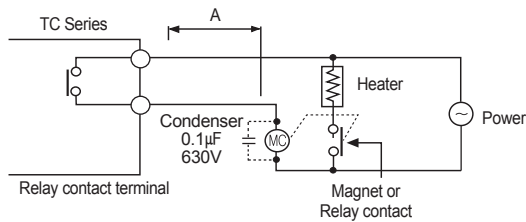
Display	Description
oPEN	If input sensor is disconnected or sensor is not connected.
HHHH	If measured sensor input is higher than temperature range.
LLLL	If measured sensor input is lower than temperature range.

- It will operate normally, if input sensor is connected or returned to normal range under error oPEN/HHHH/LLLL status.

◎ Output connections

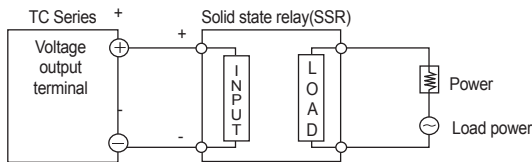
For more information about output, refer to the H-156 page.

●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.

●Application of SSRP output method



- ※ SSR should be selected by the capacity of load, otherwise, it may short-circuit and result in a fire. Indirect heated should be used with SSR for efficient working.
- ※ Please use a cooling plate or it may cause the capability deterioration, breakdown of SSR for a long usage.
- ※ Refer to the H-43 page for phase / cycle control connections.

(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)	Software
(U)	Other