Digital Switch PID Temperature Controller

NEW

▣Features

●Digital switch application to PID control temperature controller

●Realizes ideal temp. controlling with newly developed PID control algorithm and 100ms high speed sampling

●SSR drive output / relay output and SSR drive output / current output selecatable(TD4H / TD4L)

●Dramatically increased visibility using wide display part

●Mounting space saving with compact design
: Approx. 38% reduced size compared with existing model(depth-based)

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

▣Ordering information

T D 4 M — 1 4 R

Control output (※1)	TD4SP/TD4M	R: Relay contact output
		S: SSR drive output
		C: Current output
	TD4H/TD4L	R: Relay contact output + SSR drive output
		C: Current output + SSR drive output
Power supply		4: 100-240VAC 50/60Hz
Alarm output		N: No alarm output
		1: Alarm1 output
		2: Alarm1 output+Alarm2 output
Size		SP: DIN W48×H48mm(8 pin plug type)(※2)
		M: DIN W72×H72mm
		H: DIN W48×H96mm
		L: DIN W96×H96mm
Digit		4: 4 Digit
Setting type		D: Set by digital switch
Item		T: Temperature Controller

(※1) Control output type is different depending on model size.
(※2) 8 Pin Socket(PG-08, PS-08) : Sold separately

▣Specifications

Series		TD4 series			
		TD4SP	TD4M	TD4H	TD4L
Power supply		100-240VAC 50/60Hz			
Allowable voltage range		90 ~ 110% of rated voltage			
Power consumption		Max. 5VA			
Display method		7 Segment(Red), Other display part(Green, Yellow, Red LED)			
Character size		H15×W7mm	H18×W9mm	H15×W7mm	H22×W11mm
Input type	RTD	DIN Pt100Ω(Allowable line resistance max. 5Ω per a wire)			
	TC	K(CA), J(IC)			
Display accuracy	RTD	(PV ±0.5% or ±1℃ higher one) rdg ±1Digit ※TD4SP (Plug type) is (PV ±0.5% or ±2℃ higher one) rdg ±1Digit			
	TC				
Control output	Relay	250VAC 3A 1c	250VAC 3A 1a	RELAY(250VAC 3A 1a) + SSR(24VDC±3V 20mA)	
	SSR	24VDC±3V 20mA Max			
	Current	DC4-20mA (Load resistance Max. 600Ω)			
Sub output		———	ALM relay output : 250VAC 1A 1a	ALM relay output : 250VAC 1A 1a	
Control method		ON/OFF and P, PI, PD, PID control			
Hysteresis		1 ~ 100℃/℉			
Proportional band(P)		0.1 ~ 999.9℃/℉			

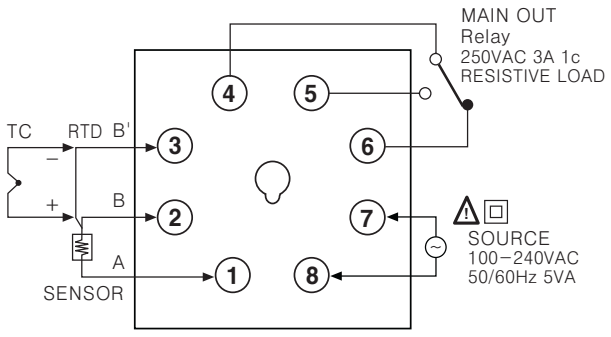
▣Specifications

Series		TD4 series			
		TD4SP	TD4M	TD4H	TD4L
Integral time(I)		9999sec.			
Derivative time(D)		9999sec.			
Control period(T)		0.5 ~ 120.0sec.			
Manual reset		0.0 ~ 100.0%			
Sampling period		100ms			
Dielectric strength		2000VAC 50/60Hz for 1min.(Between input terminal and power terminal)			
Vibration		0.75mm amplitude at frequency of 5~55Hz in each X, Y, Z directions for 2 hours			
Relay life cycle	Control output	Mechanical : Min. 10,000,000 operations, Electrical : Min. 100,000 operations			
	Alarm output	Mechanical : Min. 5,000,000 operations, Electrical : Min. 100,000 operations			
Insulation resistance		Min. 100MΩ (at 500VDC mega)			
Noise strength		Square shaped 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 ~ 50℃(at non−freezing status)			
Storage temperature		−20 ~ 60℃(at non−freezing status)			
Ambient humidity		35~85%RH			
Insulation type(*1)		(★1) ⧈			
Unit weight		Approx. 76g	Approx. 126g	Approx. 131g	Approx. 193g
Approval		CE cULus			

※(★1) "⧈" Mark indicates that equipment protected throughout by double insulation or reinforced insulation.

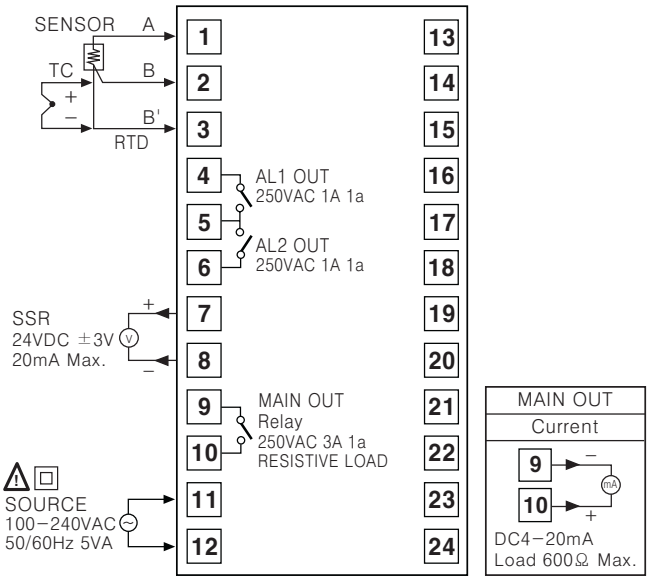
▣Connections

●TD4SP-N4□ (Indicator only, no alarm output model)

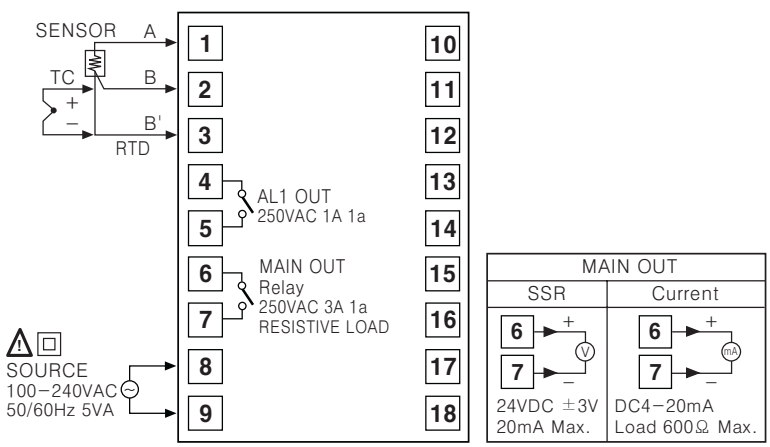


※8 Pin Socket(PG−08, PS−08) : Sold separately

●TD4H/TD4L



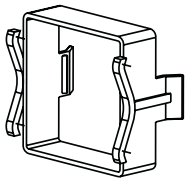
●TD4M

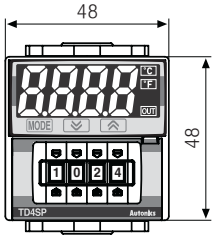


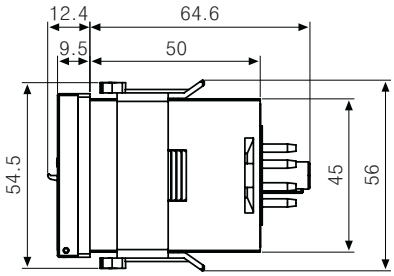
▣Dimensions

●TD4SP

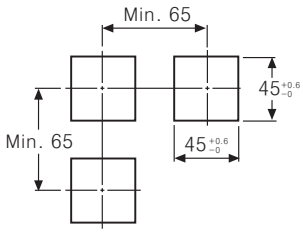
●Bracket







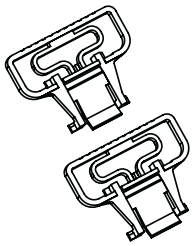
●Panel cut-out

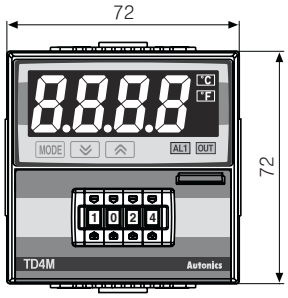


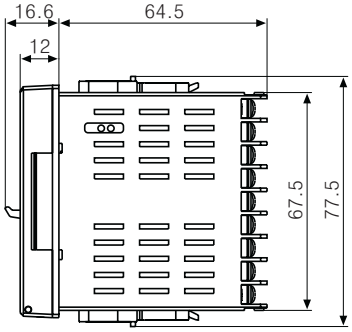
(Unit:mm)

●TD4M

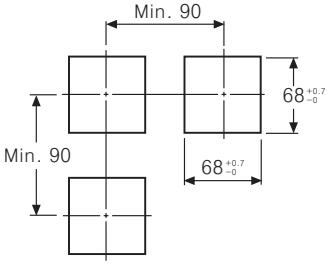
●Bracket







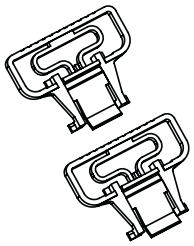
●Panel cut-out

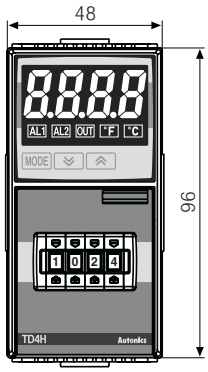


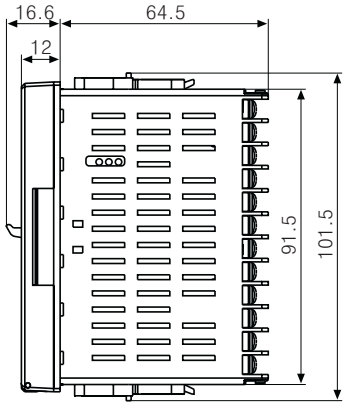
(Unit:mm)

●TD4H

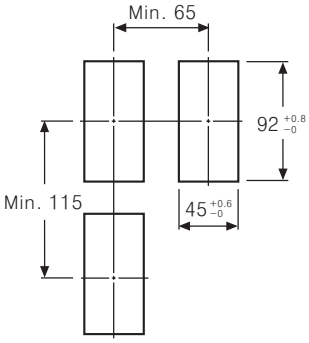
●Bracket







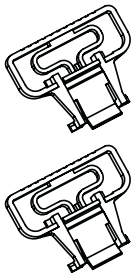
●Panel cut-out

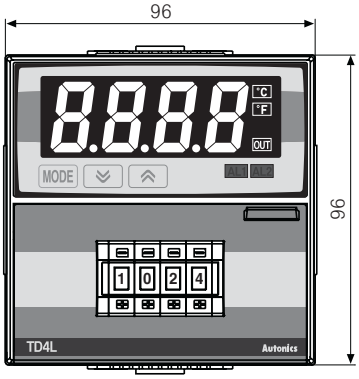


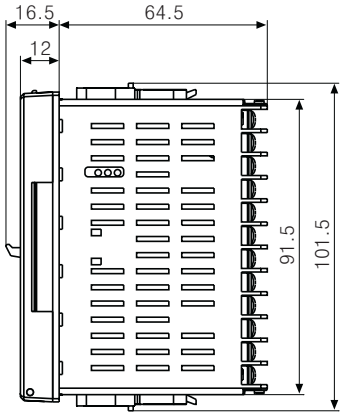
(Unit:mm)

●TD4L

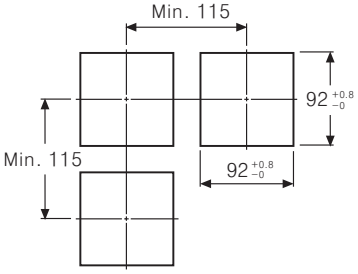
●Bracket







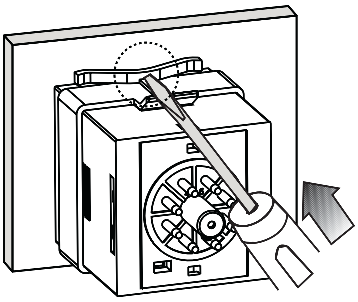
●Panel cut-out



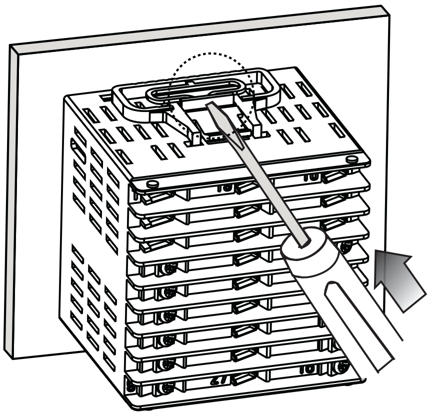
(Unit:mm)

▣Product mounting

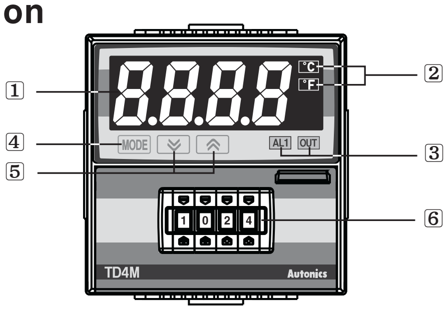
●TD4SP(48×48) series



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



▣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 Temperature unit indicator(℃/°F)
-It shows current temperature unit.
-Temperature unit(℃ or °F) display lamp will be flickering during AT function.

3 Control/sub output indicator
-OUT : It will be ON when control output is ON.
※In case of current output type, it will be OFF when output level is under 2%, and ON when output level is over 3%.
-ALM : It will light up when ALARM output is on.

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

5 Adjustment : Used when entering into set value change mode, Digit moving and Digit Up/down.
Press ⩔+⩓ key at the same time to perform setting functions in Function Key setting mode(dI-K) and to make Digit movement.

6 Digital Switch : Used to set SV to control

▣Factory default

●First setting group

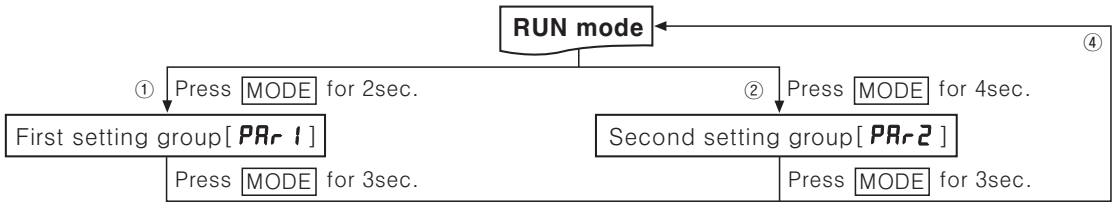
Parameter		Factory default
AL1	Alarm1 setting value	1250
AL2	Alarm2 setting value	
At	Auto-tuning execute	oFF
P	Proportional band	10.0
I	Intergral time	0
d	Derivation time	
rESt	Manual reset	50.0
HYS	Hysteresis	2

●Second setting group

Parameter		Factory default	Parameter		Factory default
In-t	Input type	KCA	AL-1	Alarm1 mode	Am1.A
UnIt	Temperature unit	°C	AL-2	Alarm2 mode	Am2.A
In-b	Input bias	0	AHYS	Alarm hysteresis	1
mAvF	Input digital filter	0.1	LbAt	LBA monitoring time	0
L-Su	SV low limit	-50	LbAS	LBA detection setting value	8
H-Su	SV high limit	1200			
o-Ft	Control operating type	HEAt	LbAb	LBA detection band	3
C-md	Control method	PId	dI-K	Function key operation	StoP
oUt	(*1)Control output type	rLY	Er.mv	Input error MV	0.0
t	Control time	20.0	LoC	Lock	oFF
		2.0	—	—	—

※(*1) is available with only TD4H/TD4L model.
※Default for [t] ☞ Relay contact output[rLY] : 20.0 sec / SSR output[SSr] : 2.0 sec.
(In case of current output[CUr], no factory default is displayed.)

▣Flow chart for setting group



③

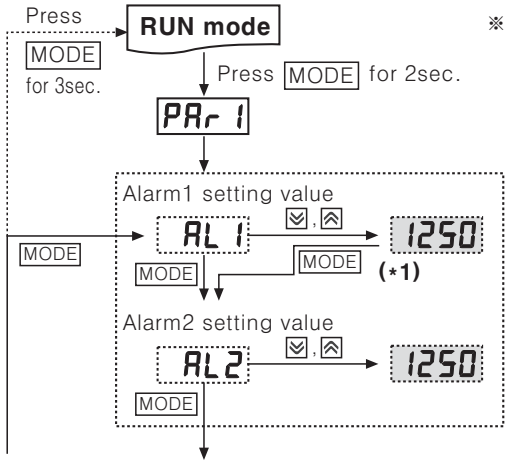
AL 1	Alarm1 setting value
AL2	Alarm2 setting value
At	Auto-tuning execute
P	Proportional band
I	Integral time
d	Derivation time
rESt	Manual reset
HYS	Hysteresis

In-t	Input type
Unit	Temperature unit
In-b	Input bias
nAuF	Input digital filter
L-Su	SV low limit
H-Su	SV high limit
o-Ft	Control operating type
C-nd	Control method
oUt	(※)Control output type (Available with only TD4H/L model)
t	(※)Control time
AL-1	(※)Alarm1 mode
AL-2	(※)Alarm2 mode
AHYS	Alarm hysteresis
LbAt	LBA monitoring time
LbAS	LBA detection setting value
LbAb	LBA detection band
dI-F	Function key operation
Er.nu	Input error MV
LoC	Lock

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

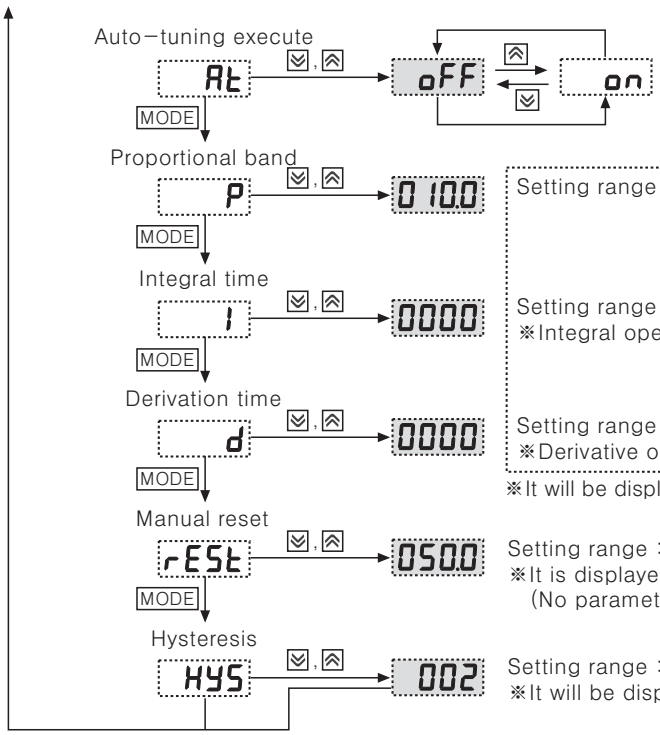
●If no key touched for 30sec, it will return to RUN mode automatically and the set value of parameter will not be changed.
●Press MODE key again within a sec after return to RUN mode by press MODE key over 3sec, it advances to the first parameter of previous setting group.
●Parameter setup
Setting group 2 → Setting group 1
• Set parameter as the above considering parameter relation of each setting group.
• Check parameter set value after change parameter of setting group 2.
• Setting group description above is for 24R models.
• ⬚ The part shown in dotted line is displayed depending on setting in setting group 2.
●(※) is displayed depending on the model type.

▣Flow chart for first setting group



※(*1)Press MODE key to save setting values in each setting mode and move to next parameter setting.

Setting range : Deviation alarm(−[F.S] ~ [F.S]), Absolute value alarm(Input range)
※In case alarm operation mode(AL-1, AL-2) is set as [AnO_/SbA. ⬚/LbA_], parameter will not be displayed.



※It starts to operate auto tuning when it is ON and set as OFF automatically after finish the operation.
※Front temperature unit display lamp will be flickering during auto tuning.

Setting range : 0.1 ~ 999.9℃/℉

Setting range : 0 ~ 9999sec.
※Integral operation will be OFF when set value is "0".

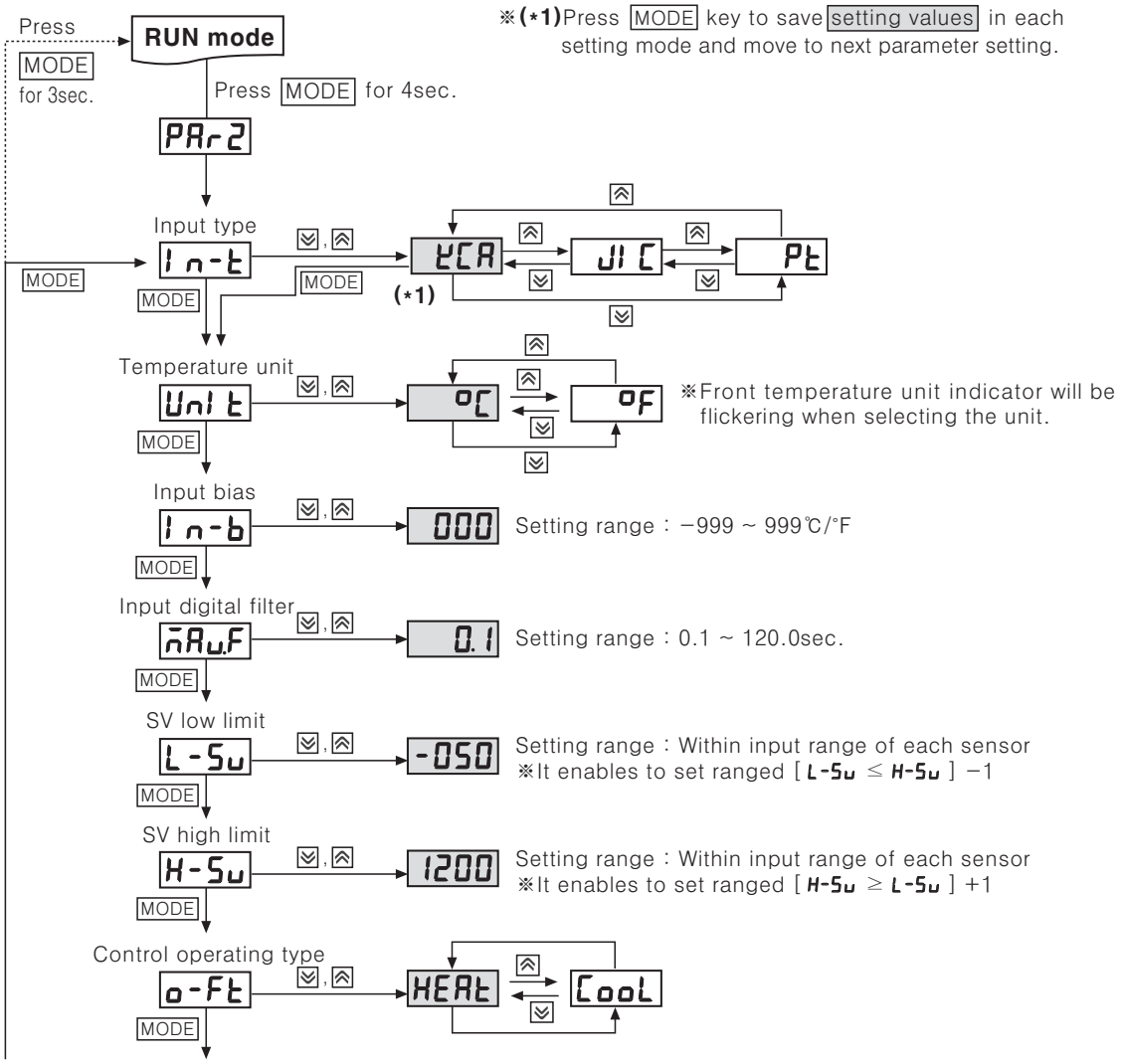
Setting range : 0 ~ 9999sec.
※Derivative operation will be OFF when set value is "0".

※It will be displayed only if control method parameter (C-ñd) is set as [PId].

Setting range : 0.0 ~ 100.0%
※It is displayed when selecting P/PD control modes.
(No parameters are displayed when selecting PID, or ON/OFF mode.)

Setting range : 1 ~ 100℃/℉
※It will be displayed in ON/OFF control.

▣Flow chart for second setting group



※(*1)Press MODE key to save setting values in each setting mode and move to next parameter setting.

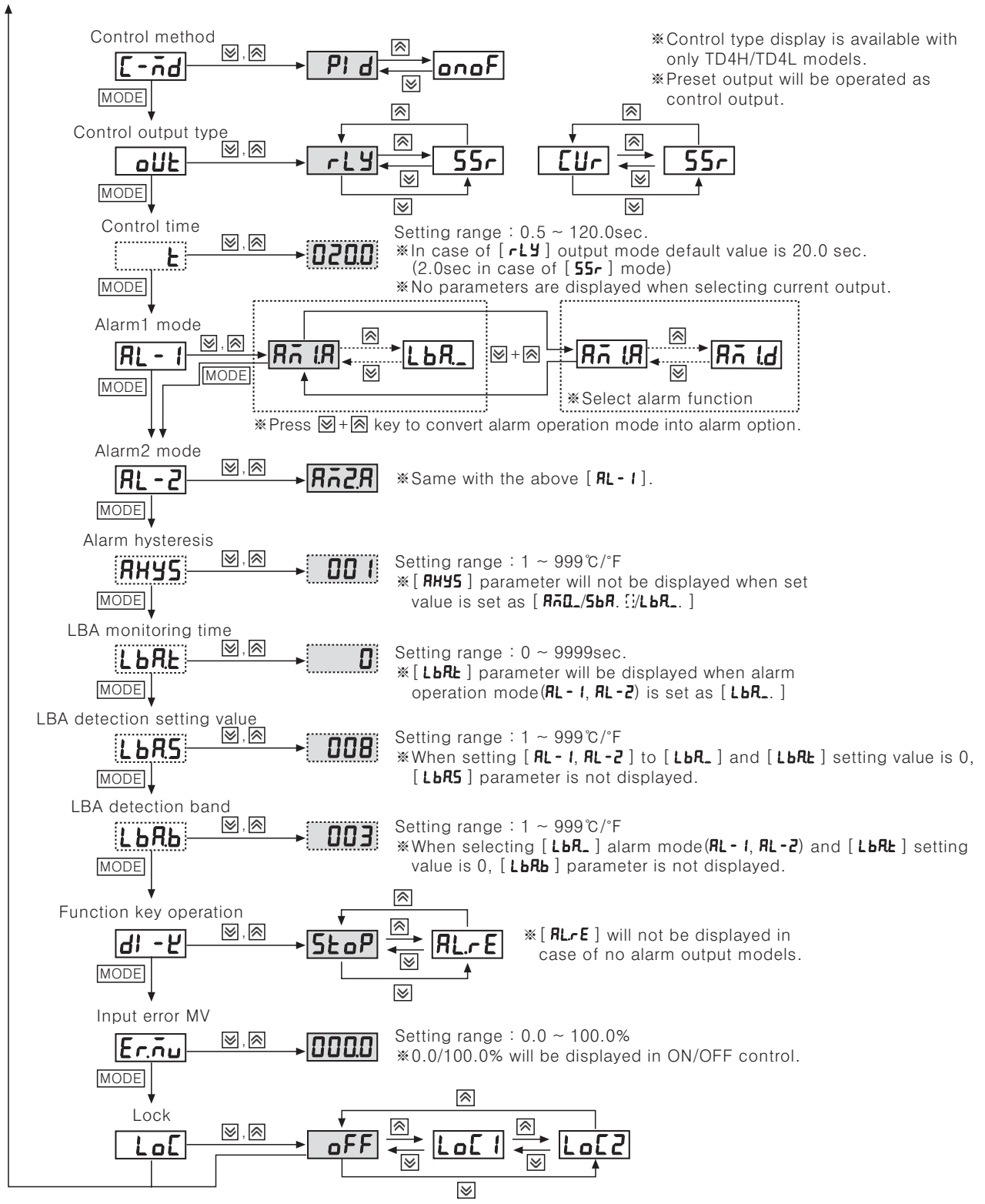
※Front temperature unit indicator will be flickering when selecting the unit.

Setting range : −999 ~ 999℃/℉

Setting range : 0.1 ~ 120.0sec.

Setting range : Within input range of each sensor
※It enables to set ranged [L-SU ≤ H-SU] −1

Setting range : Within input range of each sensor
※It enables to set ranged [H-SU ≥ L-SU] +1



▣Input sensor and range[In-t]

●Select proper input sensor type by user' application.

Input sensor			Display	Input range ℃	Input range °F
ThermoCouple	K(CA)		KCA	−50 ~ 1200℃	−58 ~ 2192°F
	J(IC)		JIC	−30 ~ 500℃	−22 ~ 932°F
RTD	DIN rated	Pt	Pt	−100 ~ 400℃	−148 ~ 752°F

●Setting range : [KCA / JIC / Pt] (Default : [KCA])

▣Function

See C-25 page for TC / TD common features.

◎Control output type selection[oUt] (※Available with only TD4H/L model)

- In case of relay output type model, relay output and SSR output supported. In case of current output type model, current output (DC4~20mA) and SSR output supported.
- A function to select control output type.

◎Lock setting[LoC]

- 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
LoC 1	Lock setting group 2
LoC2	Lock setting group 1, 2

◎Error

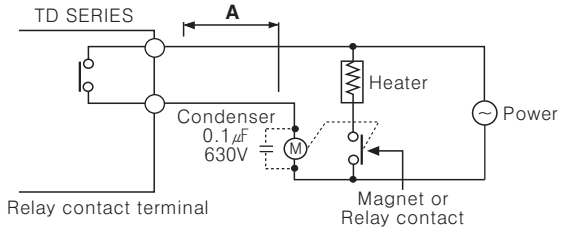
- Error mark will flash(every 1sec) in PV viewer when error is occurred during the control operation.

Display	Description
Er.Su	Setting error (When SV is out of SV range)
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.

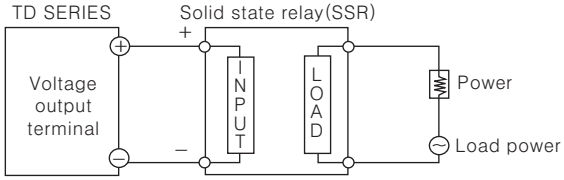
◎Output connections

- Application of relay output type



Keep power relay as far away as possible from temperature controller. If wires length of **A** is short, electromotive force occurred from a coil of magnet switch & power relay may flow in power line of the unit, it may cause malfunction. If wires length of **A** is short, please connect a mylar condenser 104(630V) across coil of the power relay "Ⓜ" to protect electromotive force.

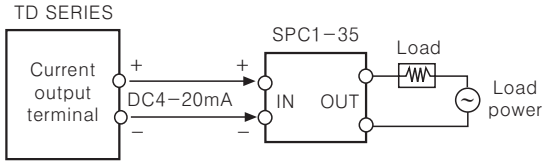
- Application of SSR output type



※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.

※Heat sink integrated SSR must be used. Unless it may cause 70~80% of performance degrades or it may cause SSR failure in case of long term use.

- Application of current output(DC4-20mA)



※It is important to select SCR unit after checking the capacity of the load.

※If the capacity is exceeded, it may cause a fire.