

# Autonics

## TEMPERATURE CONTROLLER

### TC4 Series

#### INSTRUCTION MANUAL



Thank you for choosing our Autonics product.  
Please read the following safety considerations before use.

### Safety Considerations

- ⚠ Please observe all safety considerations for safe and proper product operation to avoid hazards.
- ⚠ Safety considerations are categorized as follows.
- Warning** Failure to follow these instructions may result in serious injury or death.
- Caution** Failure to follow these instructions may result in personal injury or product damage.
- ⚠ The symbols used on the product and instruction manual represent the following
- ⚠ symbol represents caution due to special circumstances in which hazards may occur.

### Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.) Failure to follow this instruction may result in fire, personal injury, or economic loss.
- Install on a device panel to use.** Failure to follow this instruction may result in electric shock or fire.
- Do not connect, repair, or inspect the unit while connected to a power source.** Failure to follow this instruction may result in electric shock or fire.
- Check 'Connections' before wiring.** Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.** Failure to follow this instruction may result in electric shock or fire.

### Caution

- When connecting the power input and relay output, use AWG 20(0.50mm<sup>2</sup>) cable or over and tighten the terminal screw with a tightening torque of 0.74~0.90N·m.** When connecting the sensor input and communication cable without dedicated cable, use AWG 28~16 cable and tighten the terminal screw with a tightening torque of 0.74~0.90N·m. Failure to follow this instruction may result in fire or malfunction due to contact failure.
- Use the unit within the rated specifications.** Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent.** Failure to follow this instruction may result in electric shock or fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.** Failure to follow this instruction may result in fire or explosion.
- Keep metal chip, dust, and wire residue from flowing into the unit.** Failure to follow this instruction may result in fire or product damage.

### Ordering Information

T	C	4	S	-	1	4	R
Control output	N	Indicator - Without control output					
Power supply	R	Relay output+SSR drive output <sup>※1</sup>					
Sub output	2	24VAC 50/60Hz, 24-48VDC					
	4	100-240VAC 50/60Hz					
	N	No alarm output					
	1	Alarm1 output					
	2	Alarm1 + Alarm2 output <sup>※2</sup>					
	S	DIN W48 × H48mm (terminal block type)					
	SP	DIN W48 × H48mm (11pin plug type) <sup>※3</sup>					
	Y	DIN W72 × H36mm					
	M	DIN W72 × H72mm					
	H	DIN W48 × H96mm					
	W	DIN W96 × H48mm					
	L	DIN W96 × H96mm					
Digit	4	9999 (4 Digit)					
Setting type	C	Set by touch switch					
Item	T	Temperature controller					

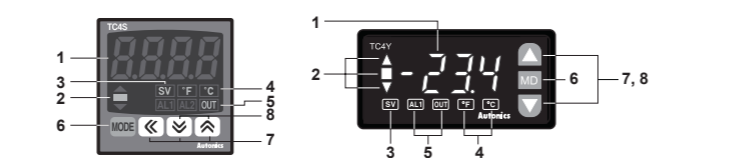
※1: In case of the AC voltage model, SSR drive output method (standard ON/OFF control, cycle control, phase control) is available to select.  
 ※2: It is unavailable for TC4SP, TC4Y.  
 ※3: Sockets for TC4SP (PG-11, PS-11(N)) are sold separately.  
 ※The above specifications are subject to change and some models may be discontinued without notice.  
 ※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

### Specifications

Series	TC4 Series							
	TC4S	TC4SP	TC4Y	TC4M	TC4W	TC4H	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)	AC/DC Power	Max. 5VA (24VAC 50/60Hz), Max. 3W (24-48VDC)				
Display method	7Segment (Red), Other display (Green, Yellow, Red LED)							
Character size (W×H)	7.0×15.0mm		7.4×15.0mm		9.5×20.0mm		7.0×14.6mm	11.0×22.0mm
Input type	RTD	DPT100Ω, Cu50Ω (Allowable line resistance max.5Ω per a wire)						
	TC	K (CA), J (IC), L (IC)						
Display accuracy <sup>※1</sup>	RTD	At room temperature (23°C±5°C): (PV ±0.5% or ±1°C, select the higher one) ±1digit						
	TC	Out of room temperature range: (PV ±0.5% or ±2°C, select the higher one) ±1digit						
	TC	※ For TC4SP, add ±1°C by accuracy standard.						
Control	Relay	250VAC ~ 3A 1a						
output	SSR	12VDC ± 2V 20mA Max.						
Alarm output	AL1, AL2 Relay; 250VAC ~ 1A 1a (※TC4SP, TC4Y have AL1 only.)							
Control method	ON/OFF and P, PI, PD, PID control							
Hysteresis	1 to 100°C/°F (0.1 to 50.0°C/°F) variable							
Proportional band (P)	0.1 to 999.9°C/°F							
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	2,000VAC 50/60Hz for 1min. (between input terminal and power terminal)						
	AC/DC Power	1,000VAC 50/60Hz for 1min. (between input terminal and power terminal)						
Vibration	0.75mm amplitude at frequency of 5 to 55Hz in each X, Y, Z direction for 2 hours							
Relay life cycle	Mechanical	OUT: Min. 5,000,000 operations, AL1/2: Min. 5,000,000 operations						
	Electrical	OUT: Min. 200,000 operations (250VAC 3A resistive load), AL1/2: Min. 300,000 operations (250VAC 1A resistive load)						
Insulation resistance	Min. 100MΩ (at 50VDC 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)							
Environment	Ambient temp.	-10 to 50°C, Storage: -20 to 60°C						
-ment	Ambient humi.	35 to 85%RH, Storage: 35 to 85%RH						
Insulation type	Double insulation or reinforced insulation (mark: □), Dielectric strength between the measuring input part and the power part: AC power 2kV, AC/DC Power 1kV							
Approval	CE, RU, US							
Weight <sup>※2</sup>	Approx. 141g (approx. 94g)	Approx. 123g (approx. 76g)	Approx. 174g (approx. 85g)	Approx. 204g (approx. 133g)	Approx. 194g (approx. 122g)	Approx. 194g (approx. 122g)	Approx. 254g (approx. 155g)	

- ※1: Thermocouple L (IC) type, RTD Cu50Ω
- At room temperature (23°C ±5°C): (PV ±0.5% or ±2°C, select the higher one) ±1digit
- Out of room temperature range: (PV ±0.5% or ±3°C, select the higher one) ±1digit
- In case of TC4SP Series, ±1°C will be added.
- ※2: The weight includes packaging. The weight in parentheses is for unit only.
- ※ Environment resistance is rated at no freezing or condensation.

### Unit Description



- Present temperature (PV) display**
  - RUN mode: Present temperature (PV) display.
  - Parameter setting mode: Parameter or parameter setting values display.
- 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	▲ indicator ON
2	Below ±2°C	■ indicator ON
3	Under -2°C	▼ indicator ON

The deviation indicators (▲, ■, ▼) flash by every 1 sec. when operating auto tuning.
- Set temperature (SV) indicator**

Press any front key once to check or change current set temperature (SV), the set temperature (SV) indicator is ON and preset set value is flashed.
- Temperature unit (°C/°F) indicator**

It shows current temperature unit.
- 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 power type)
  - AL1/AL2: It will light up when alarm output Alarm1/Alarm2 are on.
- MODE key**

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

Used when entering into set value change mode, digit moving and digit up/down.
- FUNCTION key**

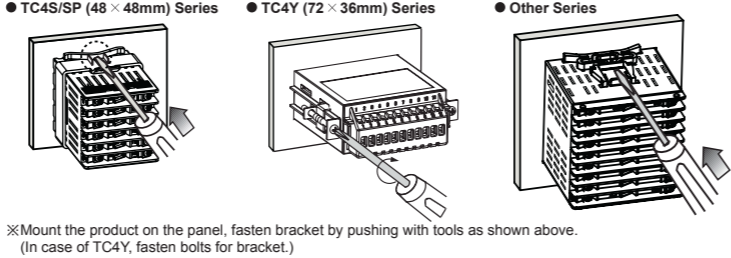
Press  $\left[ \text{FUNCTION} \right]$  keys for 3 sec. to operate function (RUN/STOP, alarm output cancel, auto-tuning) set in inner parameter [j - 2].

※ Press  $\left[ \text{FUNCTION} \right]$  keys at the same time in set value operation to move digit.

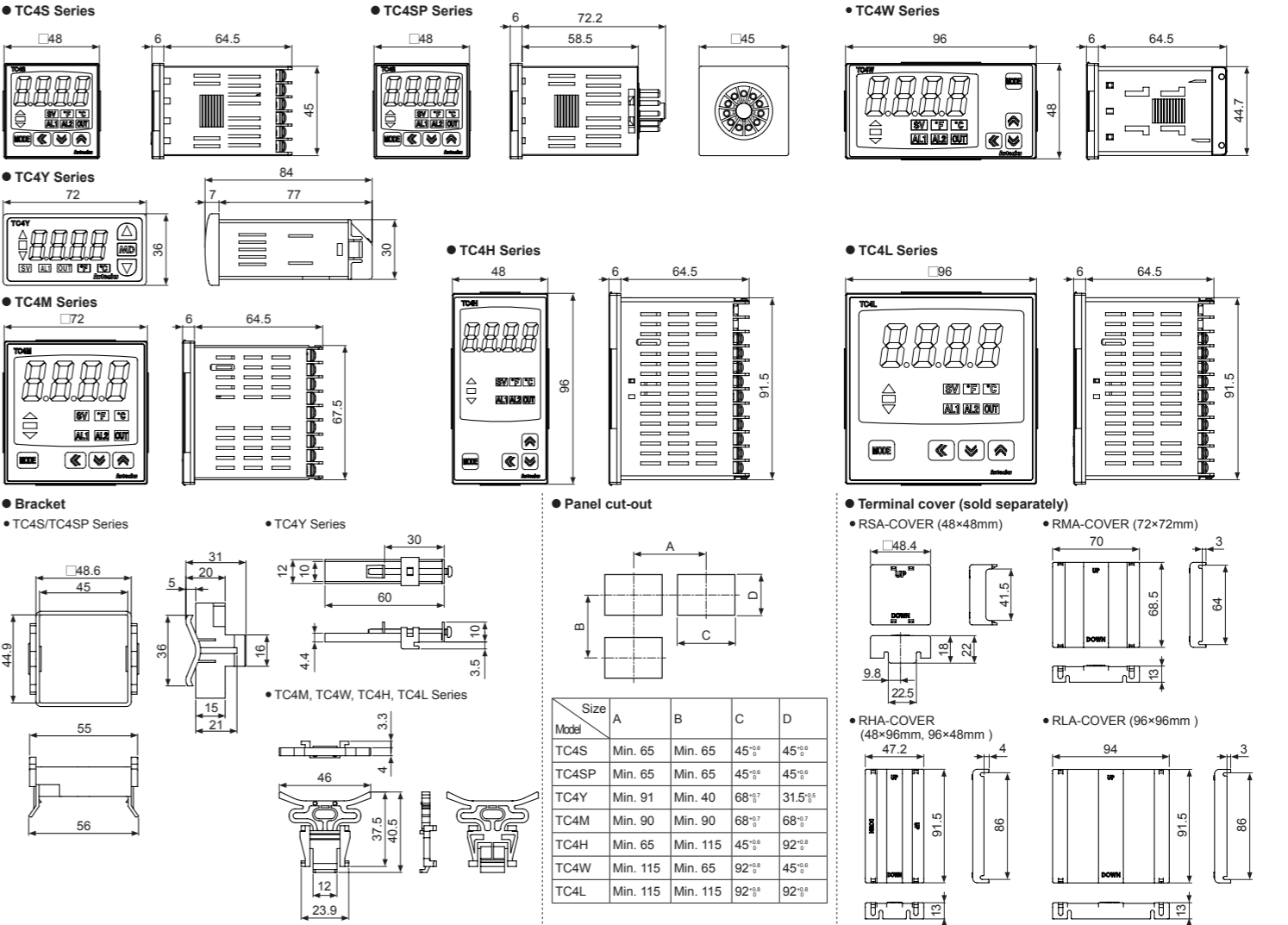
### Input Sensor and Temperature Range [i n - t ]

Input sensor	Display	Temperature range (°C)	Temperature range (°F)	
Thermocouple	K (CA)	E C R	-50 to 1200	-58 to 2192
	J (IC)	J I C	-30 to 500	-22 to 932
	L (IC)	L I C	-40 to 800	-40 to 1472
RTD	DPT100Ω	d P E L H	-100 to 400	-148 to 752
	Cu50Ω	C U S L	-100.0 to 400.0	-148.0 to 752.0
		C U S	-50 to 200	-58 to 392
	C U S L	-50.0 to 200.0	-58.0 to 392.0	

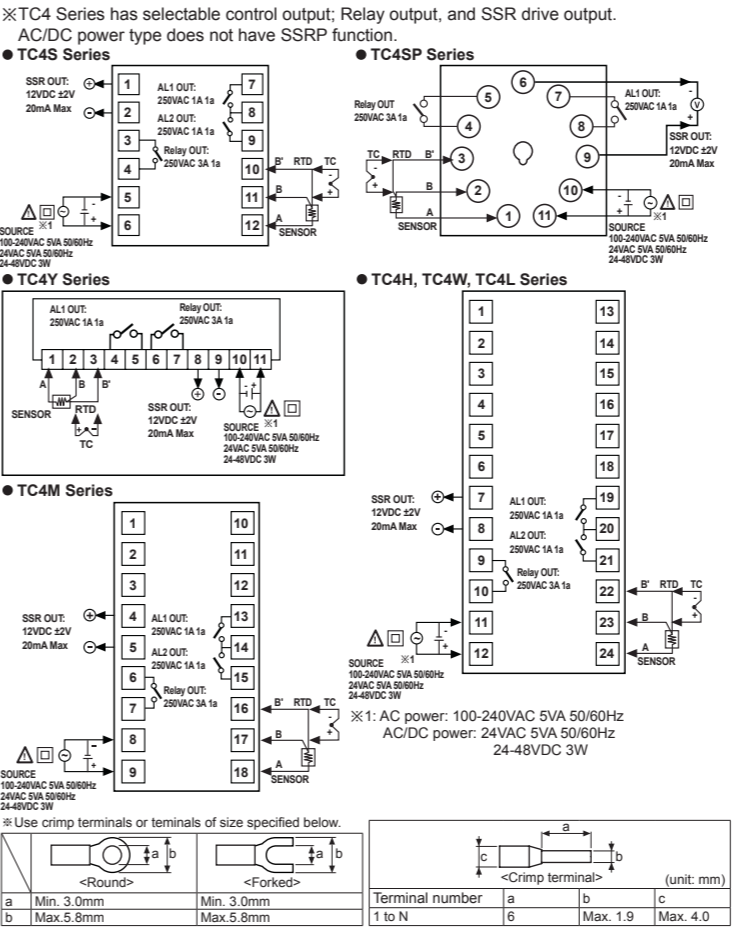
### Installation



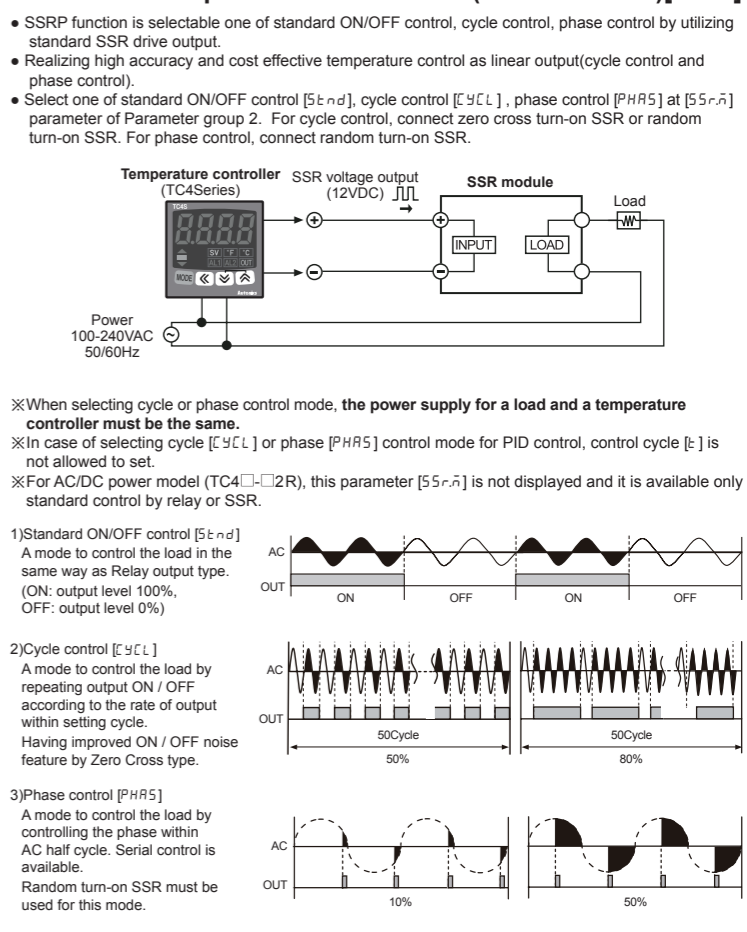
### Dimensions



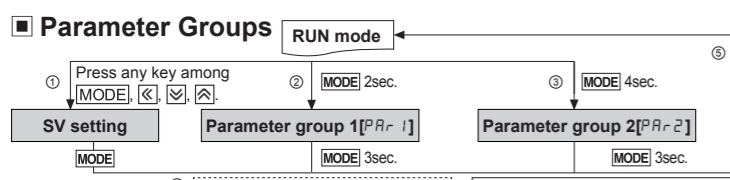
### Connections



### SSR Drive Output Selection Function (SSRP Function) [5 5 r n ]







AL1	AL1 alarm temperature
AL2	AL2 alarm temperature
At	Auto tuning
P	Proportional band
i	Integral time
d	Derivative time
rESt	Manual reset (Normal deviation correction)
H55	ON/OFF control hysteresis
Input type	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-rd	Control type
oUt	Control output
55r-n	SSR drive output method
t	Control cycle
AL-1	AL1 alarm operation mode
AL-2	AL2 alarm operation mode
AH55	Alarm output hysteresis
LbRt	LBA monitoring time
LbRb	LBA detection range
di-lt	Digital input key
Er-nu	Control output MV in case of input break error
LoC	Parameter lock

※1: It is not displayed for AC/DC power model (TC4□□2R).  
 ※If no key entered for 30 sec., it returns to RUN mode automatically and the set value of parameter is not saved.  
 ※This parameter might not be displayed depending on other parameter settings.

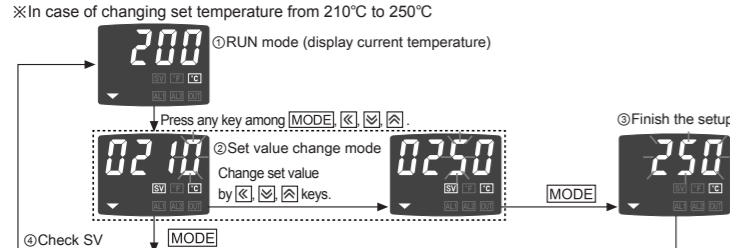
- Press any key once in RUN mode, it advances to set value setting group.
  - Press [MODE] key over 2sec. in RUN mode, it advances to parameter group 1.
  - Press [MODE] key over 4sec. in RUN mode, it advances to Parameter group 2.
  - First parameter will be displayed on viewer when it advances to the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

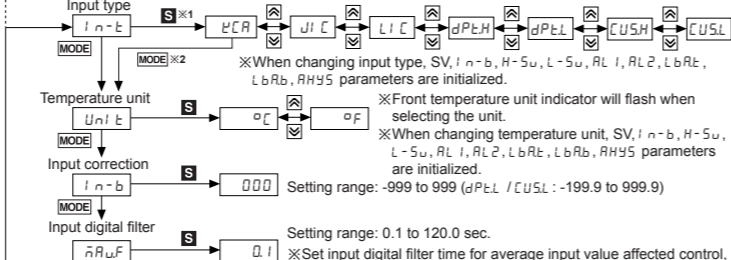
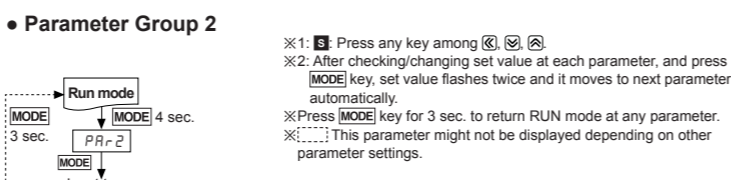
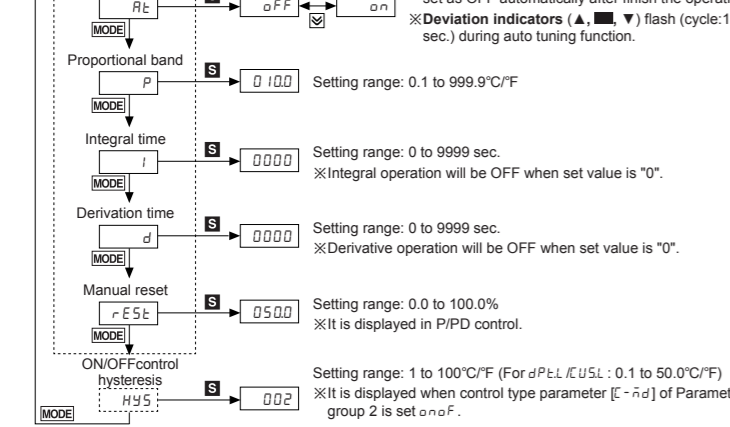
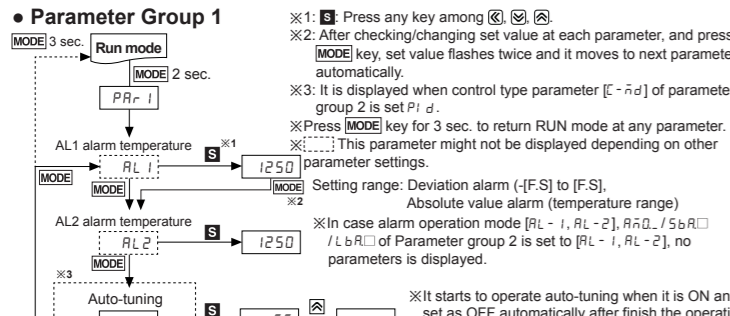
- Set parameter as the above considering parameter relation of each setting group.
- Check parameter set value after change parameter of Parameter group 2.
- Indicator model (TC4□□N□) displays shaded parameter ( ) of Parameter group 2.
- AL-1, AL-2 parameters of Parameter group 2 is decided whether to display according by alarm output type.
- If alarm operation mode [AL-1, AL-2] of Parameter group 2 is set to Rn1, Sbr□, Lbr□, AH55 parameter is not displayed.

#### Flow Chart For SV Setting Group



#### Parameter Reset

Reset all parameters as factory default. Hold the front [←], [→], [F1], [F2], [F3], [F4], [F5], [F6], [F7], [F8], [F9], [F10], [F11], [F12], [↵], [↶], [↷], [↸], [↹], [↺], [↻], [↼], [↽], [↾], [↿], [⇀], [⇁], [⇂], [⇃], [⇄], [⇅], [⇆], [⇇], [⇈], [⇉], [⇊], [⇋], [⇌], [⇍], [⇎], [⇏], [⇐], [⇑], [⇒], [⇓], [⇔], [⇕], [⇖], [⇗], [⇘], [⇙], [⇚], [⇛], [⇜], [⇝], [⇞], [⇟], [⇠], [⇡], [⇢], [⇣], [⇤], [⇥], [⇦], [⇧], [⇨], [⇩], [⇪], [⇫], [⇬], [⇭], [⇮], [⇯], [⇰], [⇱], [⇲], [⇳], [⇴], [⇵], [⇶], [⇷], [⇸], [⇹], [⇺], [⇻], [⇼], [⇽], [⇾], [⇿], [⏪], [⏩], [⏴], [⏵], [⏶], [⏷], [⏸], [⏹], [⏺], [⏻], [⏼], [⏽], [⏾], [⏿], [⏰], [⏱], [⏲], [⏳]



※1: Press any key among [←], [→], [F1], [F2], [F3], [F4], [F5], [F6], [F7], [F8], [F9], [F10], [F11], [F12], [↵], [↶], [↷], [↸], [↹], [↺], [↻], [↼], [↽], [↾], [↿], [⇀], [⇁], [⇂], [⇃], [⇄], [⇅], [⇆], [⇇], [⇈], [⇉], [⇊], [⇋], [⇌], [⇍], [⇎], [⇏], [⇐], [⇑], [⇒], [⇓], [⇔], [⇕], [⇖], [⇗], [⇘], [⇙], [⇚], [⇛], [⇜], [⇝], [⇞], [⇟], [⇠], [⇡], [⇢], [⇣], [⇤], [⇥], [⇦], [⇧], [⇨], [⇩], [⇪], [⇫], [⇬], [⇭], [⇮], [⇯], [⇰], [⇱], [⇲], [⇳], [⇴], [⇵], [⇶], [⇷], [⇸], [⇹], [⇺], [⇻], [⇼], [⇽], [⇾], [⇿], [⏪], [⏩], [⏴], [⏵], [⏶], [⏷], [⏸], [⏹], [⏺], [⏻], [⏼], [⏽], [⏾], [⏿], [⏰], [⏱], [⏲], [⏳]

※2: After checking/changing set value at each parameter, and press [MODE] key, set value flashes twice and it moves to next parameter automatically.

※3: Press [MODE] key for 3 sec. to return RUN mode at any parameter.

※This parameter might not be displayed depending on other parameter settings.

※When changing input type, SV, In-b, H-Su, L-Su, AL-1, AL-2, LbRt, LbRb, AH55 parameters are initialized.

※Front temperature unit indicator will flash when selecting the unit.

※When changing temperature unit, SV, In-b, H-Su, L-Su, AL-1, AL-2, LbRt, LbRb, AH55 parameters are initialized.

Setting range: -999 to 999 (dPtL / CUSL: -199.9 to 999.9)

Setting range: Within the rated temperature range by input sensor [-5u ≤ (H-Su-1digit)]  
 When changing SV low-limit value, if SV < L-Su, SV is initialized as L-Su.

Setting range: Within the rated temperature range by input sensor [H-Su ≥ (L-Su+1digit)]  
 When changing SV high-limit value, if SV > H-Su, SV is initialized as H-Su.

※In case of [In-t] input sensor type, low/high-limit setting temperature (SV) is also set as max./min. temperature range of input sensor.

Setting range: 0.1 to 120.0 sec.  
 ※Set input digital filter time for average input value affected control, and display value.

Setting range: 0 to 9999sec. (Automatically setting with Auto-tuning)  
 ※LbRt parameter is displayed when alarm operation mode [AL-1, AL-2] is set as Rn1, Sbr□, Lbr□, AH55 parameter is not displayed.

Setting range: 0 to 9999sec. (Automatically setting with Auto-tuning)  
 ※When alarm operation mode [AL-1, AL-2] is set as loop break alarm (LBA) [LbR□], and LbRb parameter does not set as 0, LbRb parameter is displayed.

Setting range: 0 to 9999sec. (Automatically setting with Auto-tuning)  
 ※When alarm operation mode [AL-1, AL-2] is set as loop break alarm (LBA) [LbR□], and LbRb parameter does not set as 0, LbRb parameter is displayed.

Setting range: 0.0 to 100.0%  
 ※0.0/100.0% is displayed when control type parameter [C-rd] is set oFF.

※When changing PID control to ON/OFF control, if MV is below 100.0%, it is initialized as 0.0%.

※For indicator model (TC4□□N□), only oFF, LoC1 are available.

