Standard PID temperature controller

NEW

▣Features

- ●Super high-speed sampling cycle (10 times faster compared to existing models : 50ms sampling cycle and ±0.3% display-accuracy.
- ●Improved visibility with wide display part and high luminance LED
- ●High performance controlling with heating/cooling control and automatic/manual control modes
- ●Communication function supported : RS485 (Modbus RTU type)
- ●PC parameter setting via USB cable and RS485 communication (Modbus RTU) : DAQMaster - PC loader program supported : Dedicated USB cable - sold separately (SCM-US)
- ●SSR output/Current output selectable
- ●SSRP output (standard/phase/cycle/control selectable)
- ●Heater burn-out alarm (C.T input) (except TK4SP)
- ●Multi SV setting fuction (Max. 4) - selectable via digital input terminals
- ●Mounting space saving with compact design : downsized by approx. 38%(60mm) in depth compared to existing models
- ●Multi input / Multi range

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

▣User manual

- ●Please refer to TK series user manual for more detailed information and instructions.
- ●Visit our website (www.autonics.com) to download user manual and PC loader program.
- ●Function setting, Control method, parameter group and PC loader program explanations available.

▣S/W - PC Loader Program(DAQ Master)

- ●DAQ Master is a comprehensive device management program for Autonics TK series providing GUI control for easy and convenient management of parameters and multiple device data monitoring.
- ●Visit our website (www.autonics.com) to download user manual and PC loader program.

〈 Computer specification for using software 〉

Item	Recommended specification
Processor	IBM PC compatible computer with Intel Pentium Ⅲ or above
Operating system	Windows 98/NT/XP/Vista/Windows 7
RAM	Over 256MB
Hard disk	Over 1GB of available space
VGA	Over 1024×768
Others	RS-232 serial port, USB to 232

〈 DAQ master screen 〉

▣Ordering information

TK 4 S – 1 4 R R

OUT2 Control output (※3)	Standard	N	None ※Select in case of standard control(Heating or Cooling)
	Heating, Cooling	R	Relay output
		C	Current output+SSR drive output
OUT1 Control output(※2)	R		Relay output
	S		SSRP output
	C		Current output+SSR drive output
Power supply	4		100-240VAC 50/60Hz
Option output(※1)	SP	1	ALARM1 output
	S M W H L	1	ALARM1 output
		2	ALARM1+ALARM2 output
		R	ALARM1+PV transmission output
		T	ALARM1+RS485 Communication output
		A	ALARM1+ALARM2+PV transmission output
		B	ALARM1+ALARM2+RS485 Communication output
Size	SP		DIN W48×H48mm(plug type)(※4)
	S		DIN W48×H48mm(Terminal block type)
	M		DIN W72×H72mm
	W		DIN W96×H48mm
	H		DIN W48×H96mm
	L		DIN W96×H96mm
Digit	4		9999(4 Digit Type)
Item	TK		Temperature / Process Controller

(※1) In case of SP series, option control output selection and digital input will be limited due to number of terminals.
(※2) "S" represents SSRP drive voltage output support model which SSR standard/cycle/phase control are available.
"C" represents both current and SSR(standard) output support model.
(※3) Select "R" or "C" type in case of using heating&cooling control. Select "N" type in case of using standard control.
(※4) 11 Pin Socket(PG-11,PS-11): Sold separately.

▣Specifications

Series		TK4S	TK4SP	TK4M	TK4W	TK4H	TK4L
Power supply		100-240VAC 50/60Hz					
Allowable voltage range		90 ~ 110% of rated voltage					
Power consumption		Max. 8VA					
Display method		7 Segment(Red), Other display part(Green, Yellow, Red) LED					
Character size	PV(W×H)	7.0×14.0mm		9.5×20.0mm	8.5×17.0mm	7.0×14.6mm	11.0×22.0mm
	SV(W×H)	5.0×10.0mm		7.5×15.0mm	6.0×12.0mm	6.0×12.0mm	7.0×14.0mm
Input type	RTD	JPT 100Ω, DPT 100Ω, DPT 50Ω, CU 100Ω, CU 50Ω, Nikel 120Ω(6types)					
	Thermcouples	K, J, E, T, L, N, U, R, S, B, C, G, PLII(13types)					
	Analog	Voltage: 0~100mV, 0~5V, 1~5V, 0~10V(4types) / Current: 0~20mA, 4~20mA(2types)					
Display accuracy	RTD	**(※1)** At room temperature(23℃±5℃): (PV ±0.3% or ±1℃, select the bigger one) ± 1Digit Out of range of room temperature: (PV ±0.5% or ±2℃, select the bigger one) ± 1Digit In case of TK4SP series, ±1℃ will be added.					
	Thermcouples						
	Analog	At room temperature(23℃±5℃): ±0.3% F · S ± 1Digit, Out of range of room temperature: ±0.5℃% F · S ± 1Digit					
	CT input	±5% F · S ± 1Digit					

(※1) ◎ At room temperature(23℃±5℃)
☞ TC K, J, T, N, E type, below -100℃ / TC L, U, PLⅡ type: (PV ±0.3% or ±2℃, select the bigger one) ±1Digit
☞ TC C, G type/TC R, S type, below 200℃: (PV ±0.3% or ±3℃, select the bigger one)±1Digit
☞ TC B type, below 400℃: There is no accuracy standards.
◎ Out of range of room temperature
☞ TC R, S, B, C, G: (PV ±0.5% or ±5℃, select the bigger one) ±1Digit
☞ Others: Below -100℃: Within ±5℃
◎ In case of TK4SP series, ±1℃ will be added.

▣Specifications

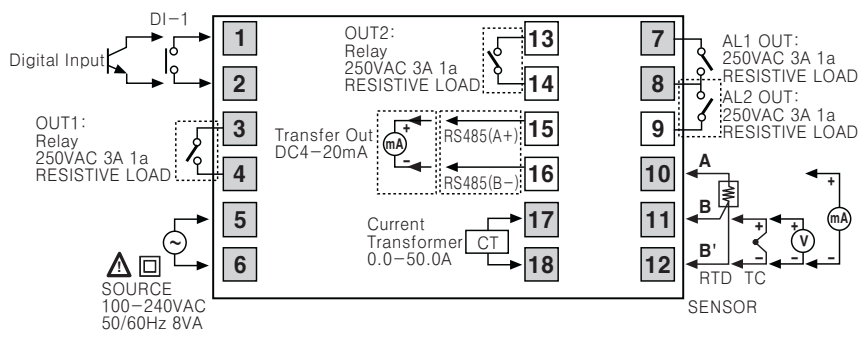
Series		TK4S	TK4SP	TK4M	TK4W	TK4H	TK4L
Control output	Relay	250VAC 3A 1a					
	SSR	11VDC±2V 20mA Max.					
	Current	DC4−20mA or DC0−20mA (Load 500Ω Max.)					
Alarm output	Relay	AL1, AL2 Relay: 250VAC 3A 1a (TK4SP: AL1 only)					
Option output	Transmission	DC4−20mA (Load 500Ω Max., Accuracy: ±0.3% F・S)					
	Communication	RS485 communication output (Modbus RTU)					
Option input	CT	0.0−50.0A(Primary heater current value measuring range) ※CT ratio = 1000:1(except TK4SP)					
	Digital input	• Contact Input: ON−Max. 2kΩ, OFF−Min. 90kΩ • Non−contact Input: ON−Residual votage max. 1.0V, OFF−leakage current max. 0.1mA ※ TK4S/M−1EA(due to limited terminals), TK4H/W/L−2EA(except TK4SP)					
Control type	heating,cooling	ON/OFF, P, PI, PD, PID control mode					
	heating&cooling						
Hysteresis		• Thermcouples / RTD: 1 ~ 100℃/℉(0.1 ~ 100.0℃/℉) variable • Analog: 1 ~ 100Digit					
Proportional band(P)		0.1 ~ 999.9℃(0.1 ~ 999.9%)					
Integral time(I)		0 ~ 9999 sec.					
Derivative time(D)		0 ~ 9999 sec.					
Control period(T)		0.1 ~ 120.0 sec(※Relay output and SSR drive output only)					
Manual reset value		0.0 ~ 100.0%					
Sampling period		50ms					
Dielectric strength		2000VAC 50/60Hz for 1min.(between power source terminal and input terminal)					
Vibration resistance		0.75mm amplitude at frequency of 5 ~ 55Hz (for 1min.) in each X, Y, Z direction for 2 hours					
Relay life cycle	Mechanical	OUT1/2: Over 5,000,000 times, AL1/2: Over 20,000,000 times(TK4H/W/L: Over 5,000,000 times)					
	Electrical	OUT1/2: Over 200,000 times, AL1/2: Over 100,000 times(TK4H/W/L: Over 200,000 times)					
Insulation resistance		Over 100MΩ(500VDC megger)					
Noise resistance		Square shaped noise by noise simulator (pulse width 1㎲)±2kV R−phase, S−phase					
Memory retention		Approx. 10years(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(at non−dew status)					
Protection		IP65(Front panel) ※TK4SP: IP50(Front panel)					
Insulation type		(※2) ▣					
Unit weight		Approx. 105g	Approx. 85g	Approx. 140g	Approx. 141g	Approx. 141g	Approx. 198g

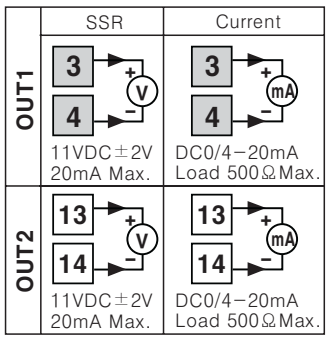
(※2) "▣" represents that this unit is double or reinforced insulated.

▣Connections

※Please check the polarity when connecting temperature sensor or analog input properly.

●TK4S

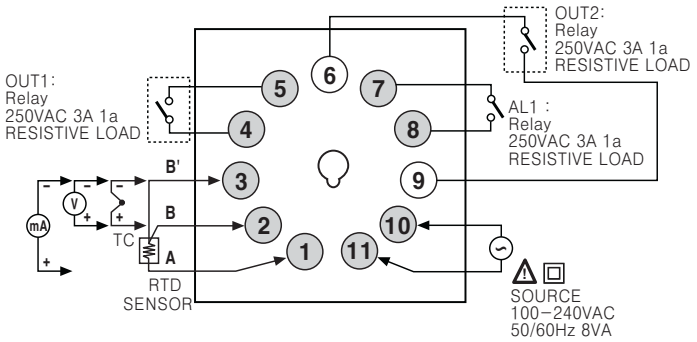




▣Connections

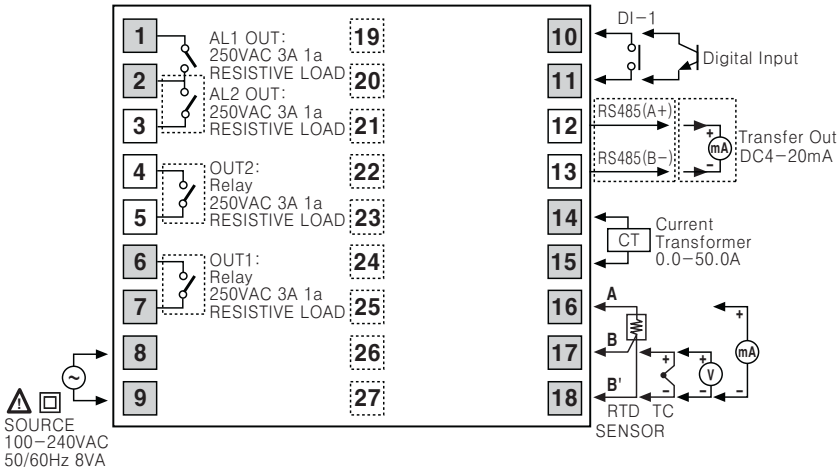
※Please check the polarity when connecting temperature sensor or analog input properly.

●TK4SP



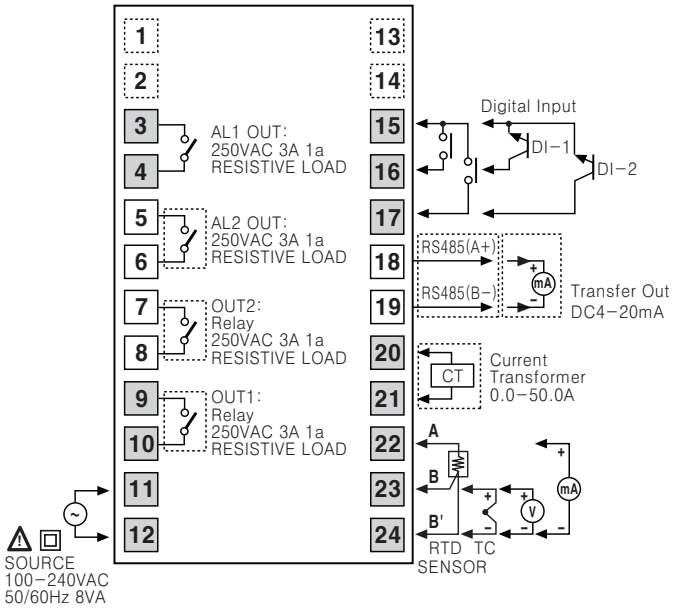
	SSR	Current
OUT1	5, 4 (+ V −) 11VDC±2V 20mA Max.	5, 4 (+ mA −) DC0/4−20mA Load 500Ω Max.
OUT2	9, 6 (+ V −) 11VDC±2V 20mA Max.	9, 6 (+ mA −) DC0/4−20mA Load 500Ω Max.

●TK4M



	SSR	Current
OUT1	6, 7 (+ V −) 11VDC±2V 20mA Max.	6, 7 (+ mA −) DC0/4−20mA Load 500Ω Max.
OUT2	4, 5 (+ V −) 11VDC±2V 20mA Max.	4, 5 (+ mA −) DC0/4−20mA Load 500Ω Max.

●TK4H / TK4W / TK4L



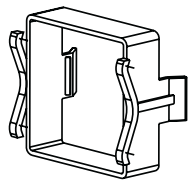
	SSR	Current
OUT1	9, 10 (+ V −) 11VDC±2V 20mA Max.	9, 10 (+ mA −) DC0/4−20mA Load 500Ω Max.
OUT2	7, 8 (+ V −) 11VDC±2V 20mA Max.	7, 8 (+ mA −) DC0/4−20mA Load 500Ω Max.

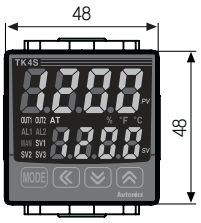
※Digital input is not electrically insulated from internal circuits, so it should be insulated when connecting other circuits.
(Photocoupler ,Relay, Indenpendent switch)

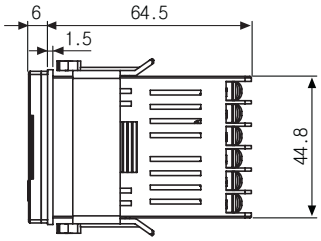
▣Dimensions

●TK4S

●Bracket







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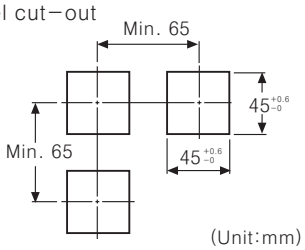
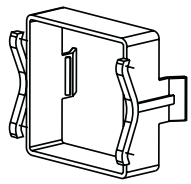
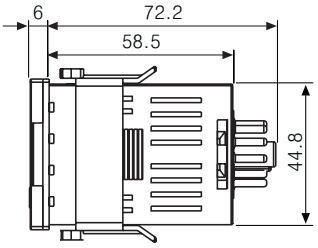


(Unit:mm)

●TK4SP

●Bracket





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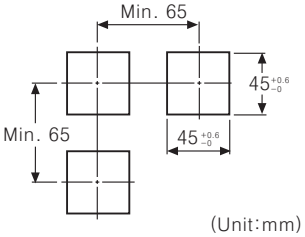
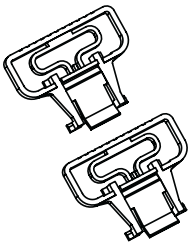
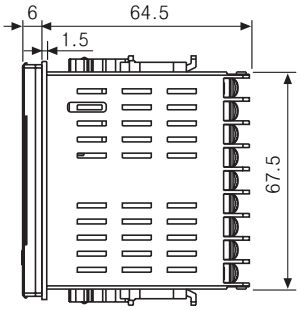


(Unit:mm)

●TK4M

●Bracket





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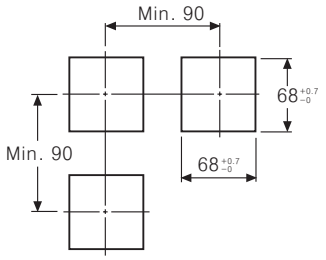
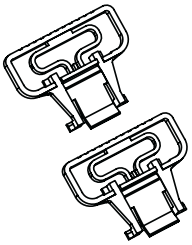
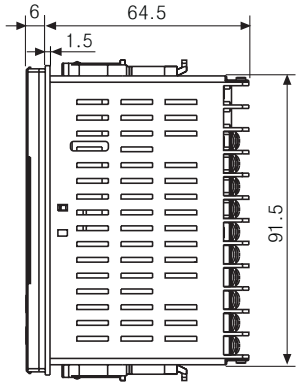


(Unit:mm)

●TK4H

●Bracket





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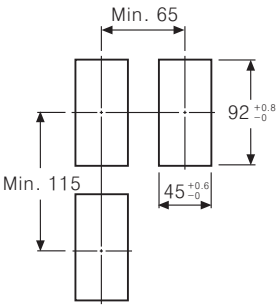

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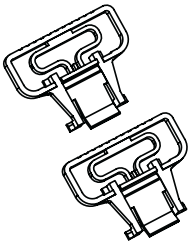
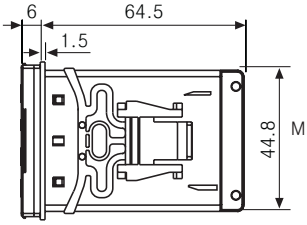
●TK4W

●Bracket





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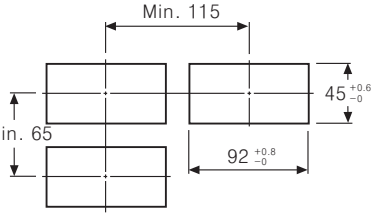
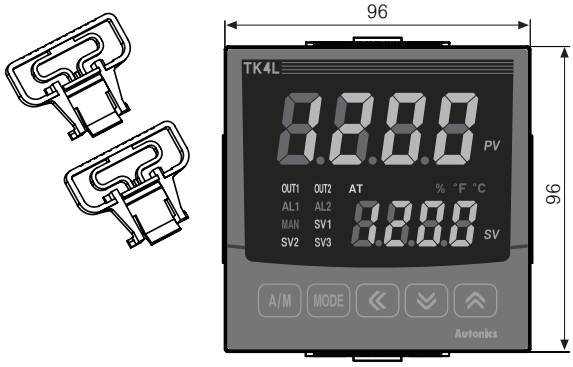


(Unit:mm)

●**TK4L**

●Bracket



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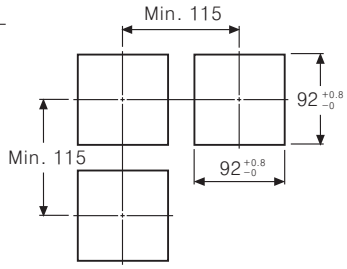
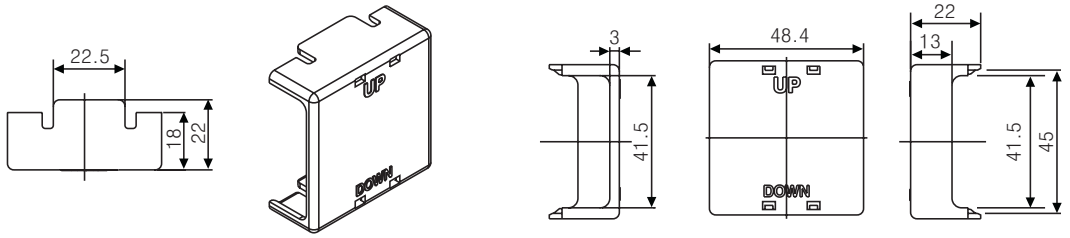


(Unit:mm)

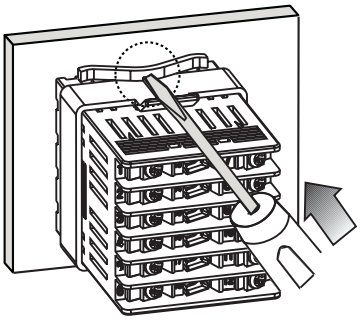
●Terminal cover(Sold separately) : RSA-COVER(48×48mm size)



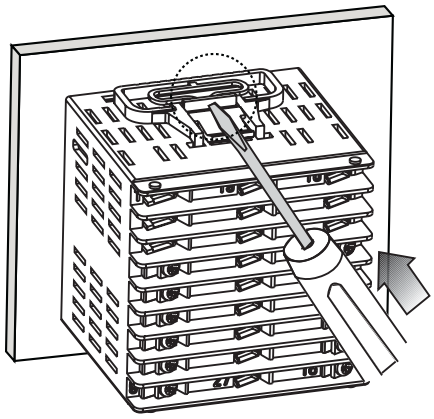
(Unit:mm)

▣Product mounting

●TK4S/SP(48×48mm) series



●Other series



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

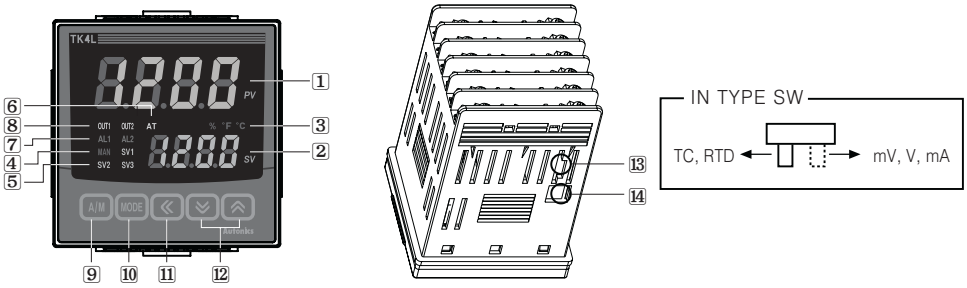
▣Accessories [Sold separately]

●Communication converter
[SCM-38I(RS485 TO RS232)]

●Communication converter
[SCM-US48I(USB TO RS485)]

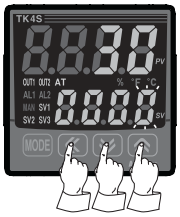
●Converter Cable
[SCM-US(Serial TO USB)]

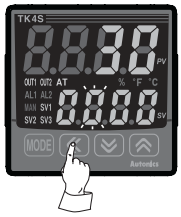
▣Parts description

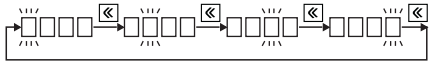


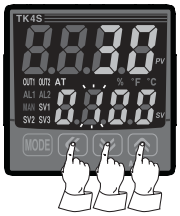
1 PV display part : It shows current temperature (PV) in RUN mode and parameters in Setting mode.
2 SV display part : It shows setting temperature value (SV) to control in RUN mode and each parameter setting value in Setting mode.
3 Temperature Unit(℃/°F/%) Indicator : It shows current temperature unit.
4 Manual Control Indicator : It will be ON in case of selecting manual control mode.
5 Multi SV Indicator : One of SV1~3 lamp will be ON in case of selecting multi SV function.
6 Auto-Tuning Indicator : It will be flickering every 1 sec during Auto-tuning.
7 Alarm output indicator : It will be ON when each alarm output is ON.
8 Control output(Heating, Cooling) Indicator : It will be ON when control output is ON.
※ In case of SSRP output support model, It will be on when MV is over 5.0%
※In case of selecting current output (4-20mA DC, 0-20mA DC),
- Manual control mode: It will be always ON except MV is 0.0%.
- Auto control mode: It will be ON when MV is over 3.0%, and OFF when MV is below 2.0%.
9 A/M key : Used when switching auto control mode ↔ manual control mode
※ In case of TK4S/SP model(48X48), MODE key will be used for the same function (auto control mode ↔ manual control mode switching).
10 MODE key : Used when entering into parameter setting mode and moving parameters.
11 ≪ key : Used when entering into set value change mode and Digit moviong.
12 ≫,≪ key : Used when entering itnto set value change mode and changing set value(Digit).
13 Input selection switch : Used when switching sensor input (TC, RTD) ↔ analog input (mV, V, mA).
14 PC loader port : It is serial communication PC loader port for PC parameter setting and monitoring used when connecting dedicated loader cable(SCM-US).

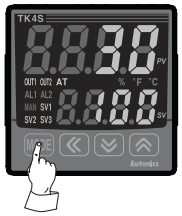
▣Flow chart for SV setting

1 
Press any key among ≪, ≫, ≪ in RUN mode to enter into SV setting mode. Last DIGIT(10^0 DIGIT) on SV display part will be flickering.

2 
Press ≪ key to move DIGIT.
(10^0→10^1→10^2→10^3→10^0)

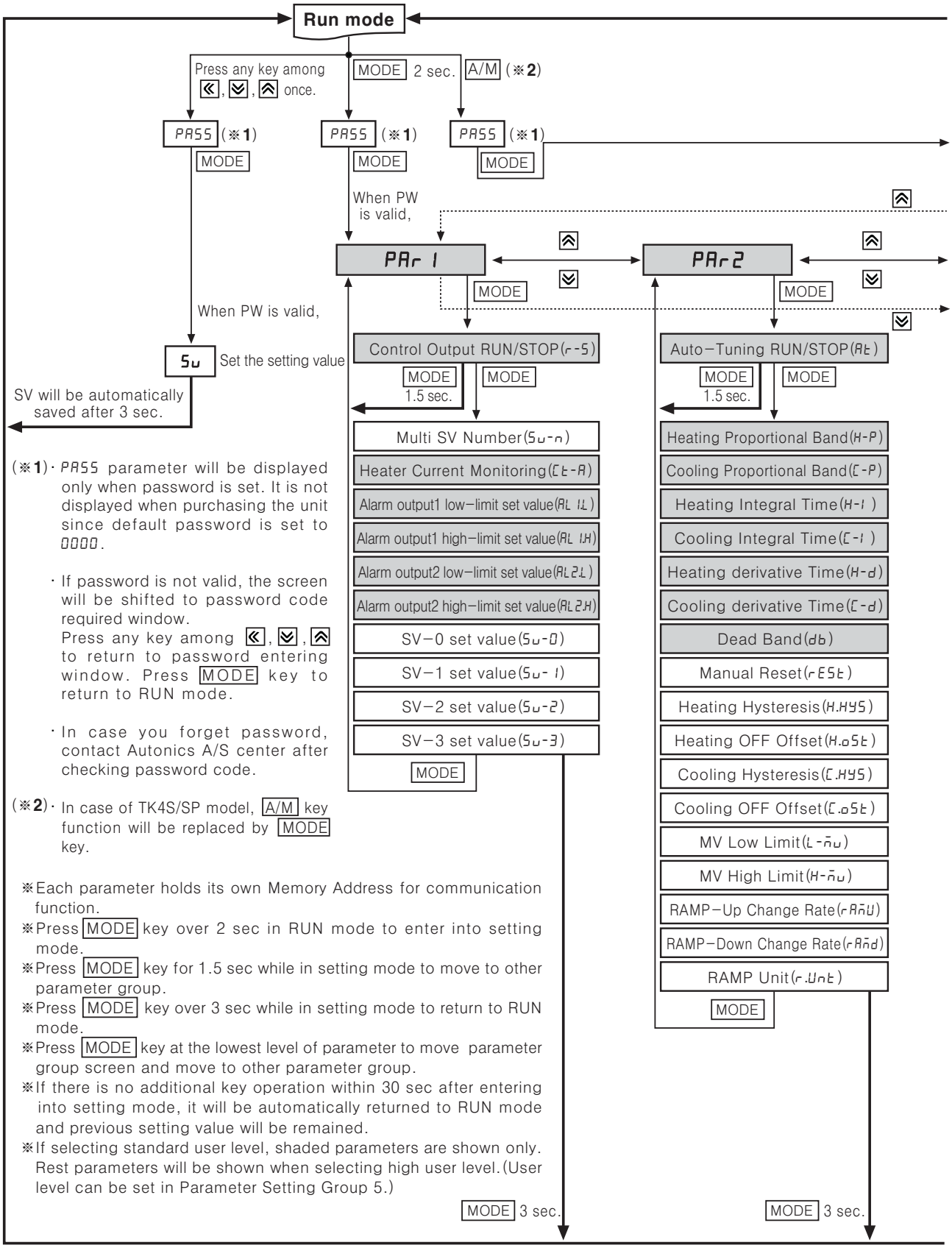


3 
Set the number 0↔1↔2↔3↔4↔5↔6↔7↔8↔9↔0 for each digit with ≫, ≪ key and set the SV using ≪, ≫, ≪ keys.

4 
Press MODE key to save the setting value. If there is no additional key operations in 3 sec., changed SV will be automatically saved.

▣Flow chart for setting group

※Set Parameter 3 group [PAr 3] → Set Parameter 4 group[PAr 4] → Set Parameter 5 group[PAr 5] → Set Parameter 2 group[PAr 2] → Set Parameter 1 group[PAr 1] → Set SV group [Su] in order.



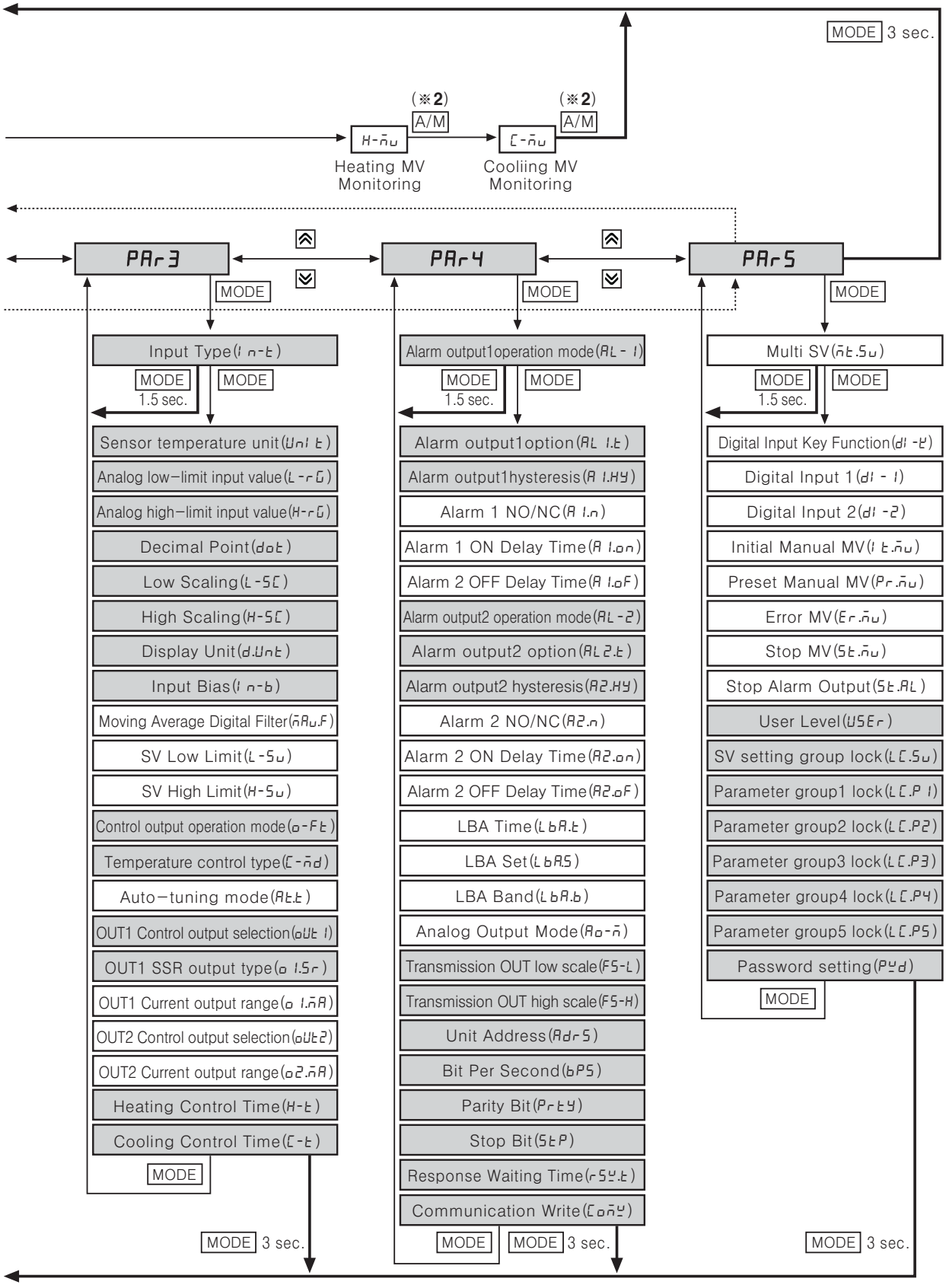
(※1) · PASS parameter will be displayed only when password is set. It is not displayed when purchasing the unit since default password is set to 0000.

· If password is not valid, the screen will be shifted to password code required window. Press any key among ≪, ≫, ≪ to return to password entering window. Press MODE key to return to RUN mode.

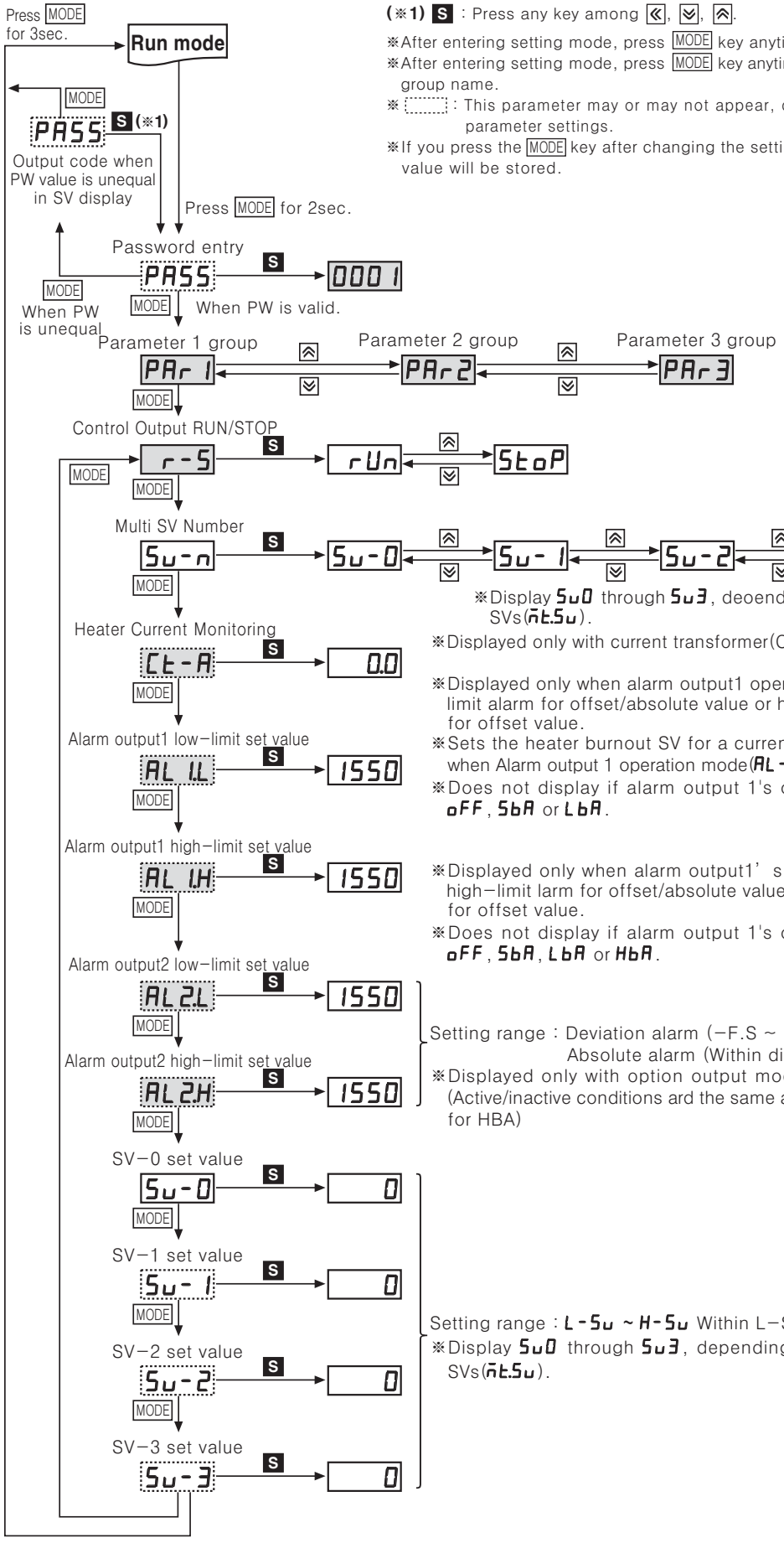
· In case you forget password, contact Autonics A/S center after checking password code.

(※2) · In case of TK4S/SP model, A/M key function will be replaced by MODE key.

※Each parameter holds its own Memory Address for communication function.
※Press MODE key over 2 sec in RUN mode to enter into setting mode.
※Press MODE key for 1.5 sec while in setting mode to move to other parameter group.
※Press MODE key over 3 sec while in setting mode to return to RUN mode.
※Press MODE key at the lowest level of parameter to move parameter group screen and move to other parameter group.
※If there is no additional key operation within 30 sec after entering into setting mode, it will be automatically returned to RUN mode and previous setting value will be remained.
※If selecting standard user level, shaded parameters are shown only. Rest parameters will be shown when selecting high user level.(User level can be set in Parameter Setting Group 5.)


MODE 3 sec.
(※2)
A/M
H-ou
Heating MV Monitoring
(※2)
A/M
C-ou
Cooliing MV Monitoring
PAr3
PAr4
PAr5
MODE
MODE
MODE
Input Type(In-t)
MODE 1.5 sec.
MODE
Sensor temperature unit(Unit)
Analog low-limit input value(L-rG)
Analog high-limit input value(H-rG)
Decimal Point(dot)
Low Scaling(L-SC)
High Scaling(H-SC)
Display Unit(d.Unt)
Input Bias(In-b)
Moving Average Digital Filter(oAu.F)
SV Low Limit(L-Su)
SV High Limit(H-Su)
Control output operation mode(o-Ft)
Temperature control type(C-od)
Auto-tuning mode(AtE)
OUT1 Control output selection(oUt1)
OUT1 SSR output type(o1.Sr)
OUT1 Current output range(o1.oA)
OUT2 Control output selection(oUt2)
OUT2 Current output range(o2.oA)
Heating Control Time(H-t)
Cooling Control Time(C-t)
MODE
MODE 3 sec.
Alarm output1operation mode(AL-1)
MODE 1.5 sec.
MODE
Alarm output1option(AL1.t)
Alarm output1hysteresis(A1.HY)
Alarm 1 NO/NC(A1.n)
Alarm 1 ON Delay Time(A1.on)
Alarm 2 OFF Delay Time(A1.oF)
Alarm output2 operation mode(AL-2)
Alarm output2 option(AL2.t)
Alarm output2 hysteresis(A2.HY)
Alarm 2 NO/NC(A2.n)
Alarm 2 ON Delay Time(A2.on)
Alarm 2 OFF Delay Time(A2.oF)
LBA Time(LbA.t)
LBA Set(LbAS)
LBA Band(LbA.b)
Analog Output Mode(Ao-o)
Transmission OUT low scale(FS-L)
Transmission OUT high scale(FS-H)
Unit Address(Adrs)
Bit Per Second(bPS)
Parity Bit(PrtY)
Stop Bit(StP)
Response Waiting Time(rSY.t)
Communication Write(CoMY)
MODE
MODE 3 sec.
Multi SV(mt.Su)
MODE 1.5 sec.
MODE
Digital Input Key Function(di-F)
Digital Input 1(di-1)
Digital Input 2(di-2)
Initial Manual MV(it.ou)
Preset Manual MV(Pr.ou)
Error MV(Er.ou)
Stop MV(St.ou)
Stop Alarm Output(St.AL)
User Level(USEr)
SV setting group lock(LC.Su)
Parameter group1 lock(LC.P1)
Parameter group2 lock(LC.P2)
Parameter group3 lock(LC.P3)
Parameter group4 lock(LC.P4)
Parameter group5 lock(LC.P5)
Password setting(PYd)
MODE
MODE 3 sec.

▣Flow chart for 1 setting group



(※1) S : Press any key among ≪, ≫, ≪.

※After entering setting mode, press MODE key anytime for 3 sec. to return to Run mode.

※After entering setting mode, press MODE key anytime for 1.5 sec. to go to the concerned group name.

※ ⬚ : This parameter may or may not appear, depending on the model and related parameter settings.

※If you press the MODE key after changing the setting value of the parameter the setting value will be stored.

※Display Su0 through Su3, deoending on the preset number of multi SVs(nt.Su).

※Displayed only with current transformer(CT) input models(Expect for TK4SP)

※Displayed only when alarm output1 operation mode(AL - 1) is set to low-limit alarm for offset/absolute value or high/low-limit alarm/reverse alarm for offset value.

※Sets the heater burnout SV for a current transformer(with option inputs) when Alarm output 1 operation mode(AL - 1)is in heater burnout alarm(HbA).

※Does not display if alarm output 1's operation mode(AL - 1) is set to oFF, SbA or LbA.

※Displayed only when alarm output1' s operation mode(AL - 1) is set to high-limit larm for offset/absolute value or high-limit alarm/reserve alarm for offset value.

※Does not display if alarm output 1's operation mode(AL - 1) is set to oFF, SbA, LbA or HbA.

Setting range : Deviation alarm (-F.S ~ F.S),
Absolute alarm (Within display range), Unit(℃/°F)

※Displayed only with option output models that support alarm output2. (Active/inactive conditions ard the same as alarm output1 with the exception for HBA)

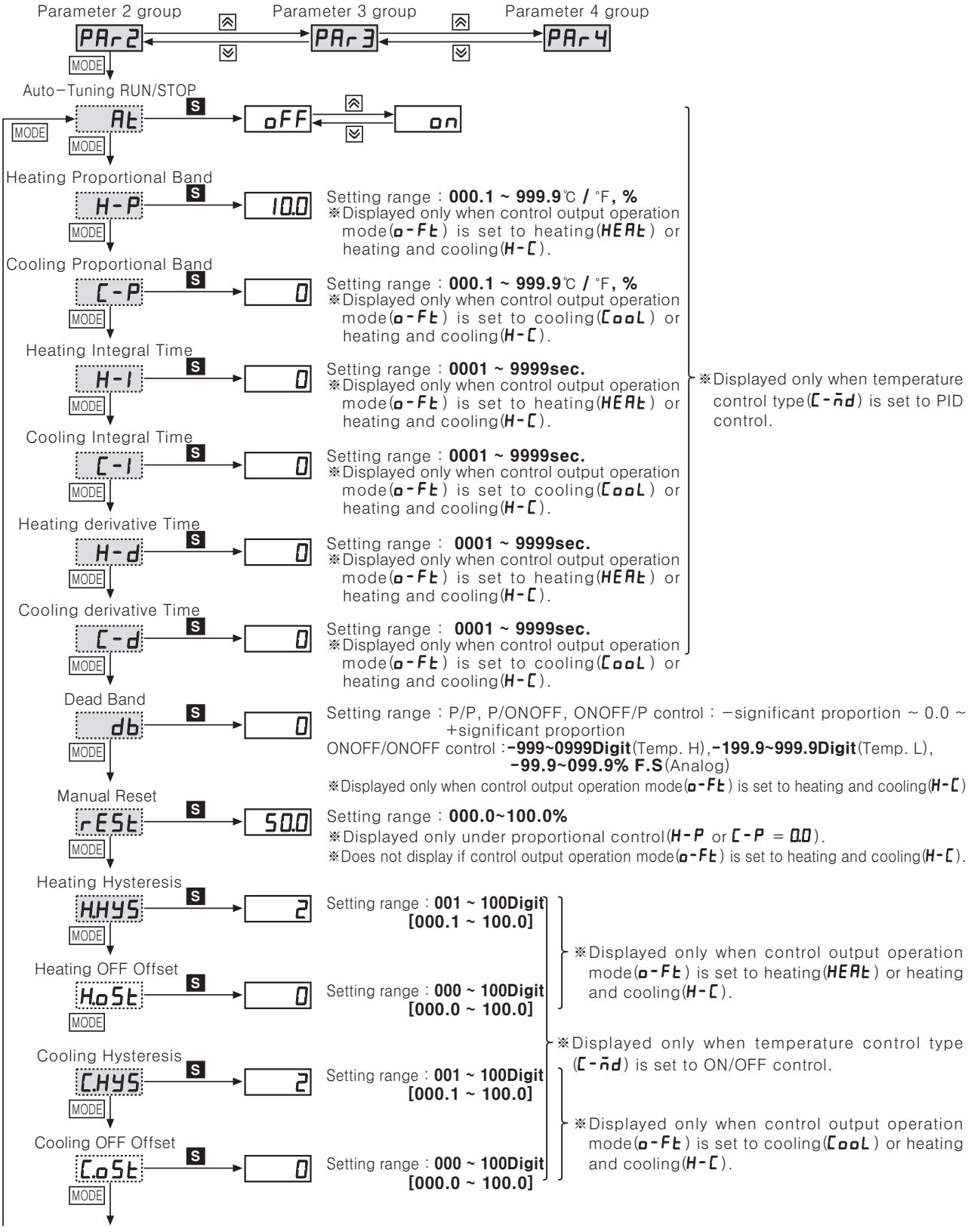
Setting range : L-Su ~ H-Su Within L-SC~H-SC, unit(℃/°F)

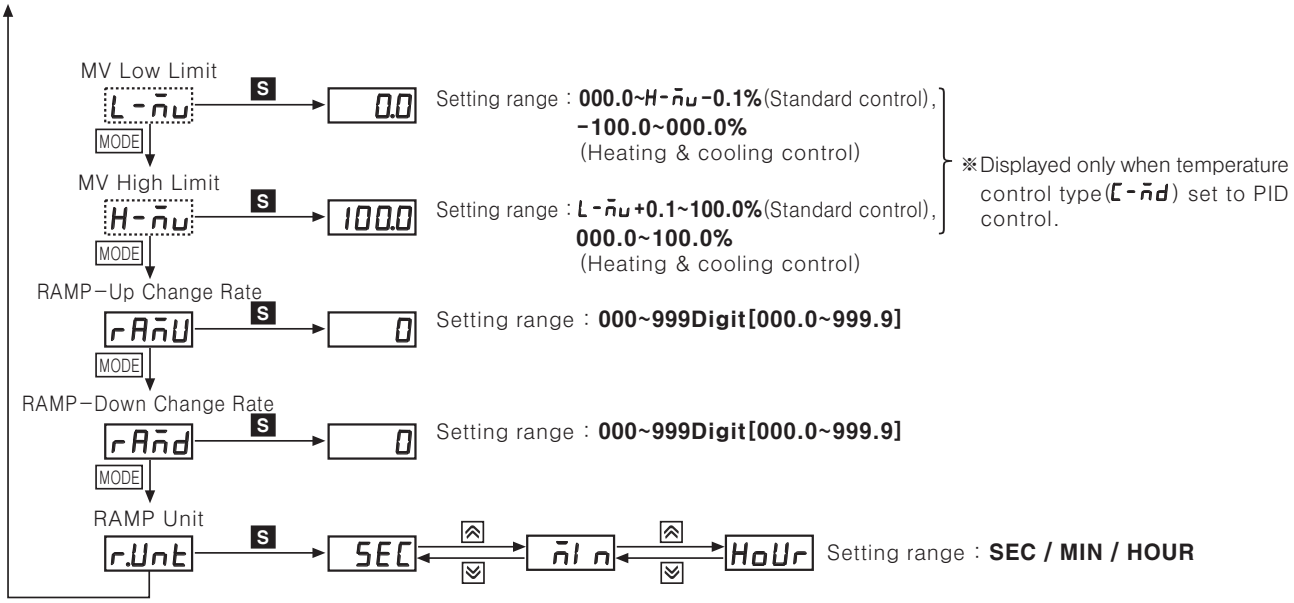
※Display Su0 through Su3, depending on the preset number of multi SVs(nt.Su).

▣Flow chart for 2 setting group

(※1) S : Press any key among ≪, ≫, ≪.

※After entering setting mode, press MODE key anytime for 3 sec. to return to Run mode.
※After entering setting mode, press MODE key anytime for 1.5 sec. to go to the concerned group name.
※ [ ] : This parameter may or may not appear, depending on the model and related parameter settings.
※If you press the MODE key after changing the setting value of the parameter the setting value will be stored.





▣Flow chart for 3 setting group

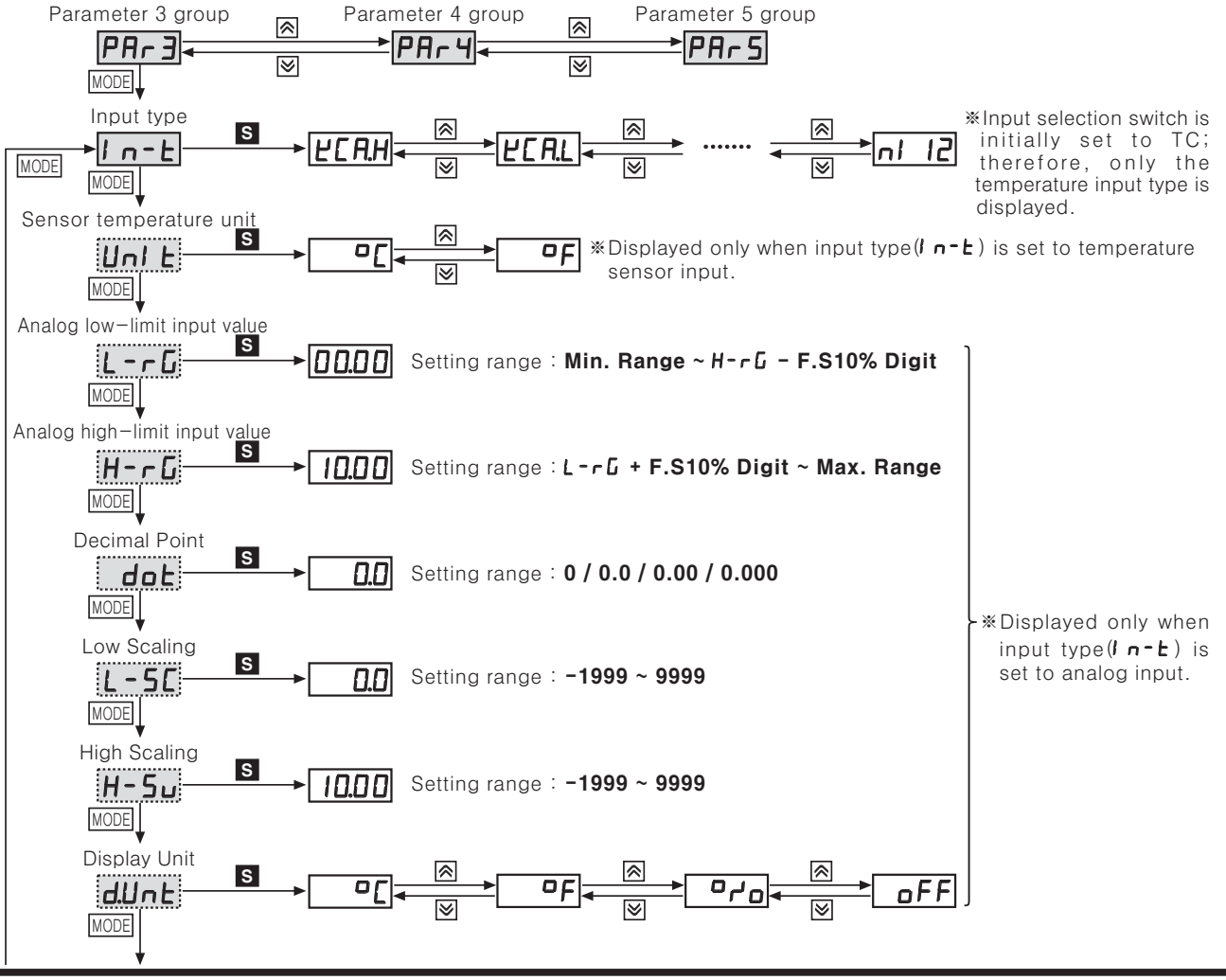
(※1) **S** : Press any key among ≪, ≫, ≪.

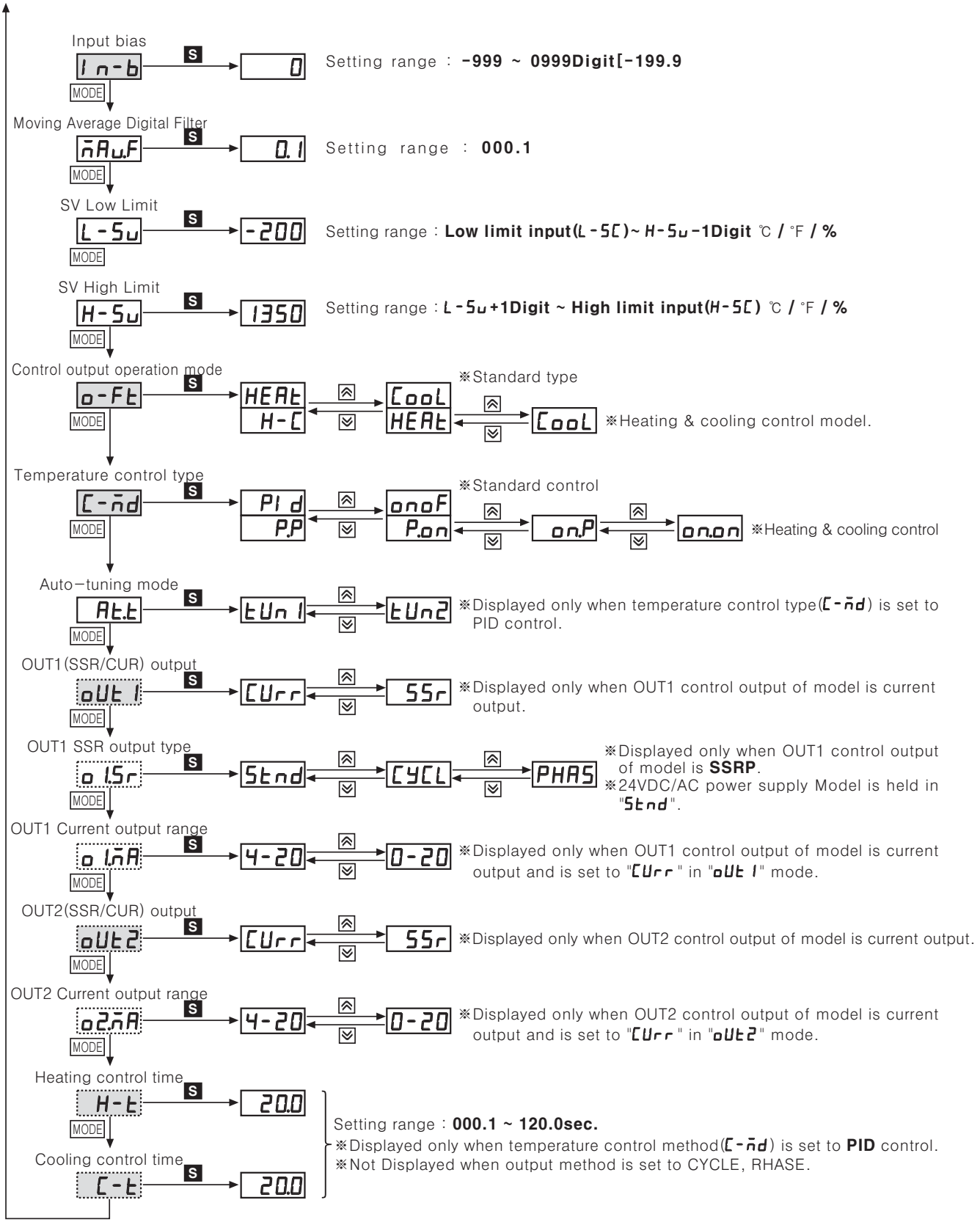
※After entering setting mode, press MODE key anytime for 3 sec. to return to Run mode.

※After entering setting mode, press MODE key anytime for 1.5 sec. to go to the concerned group name.

※ [ ] : This parameter may or may not appear, depending on the model and related parameter settings.

※If you press the MODE key after changing the setting value of the parameter the setting value will be stored.





※OUT1, OUT2 output :

① In case that OUT1,OUT2 output is relay output type , oUt1, o1Sr, o1mA, oUt2, o2Sr, o2mA parameter are not displayed.

② In case that OUT1,OUT2 output is SUR + SSR output type, when OUT1,OUT2 output is set to SSR . output method of o1Sr, o2Sr is held in Stnd and parameter is not displayed.

③ In case that OUT1, output is SSRP output type and OUT2 output is SUR + SSR

- oUt1, o1mA are not displayed.
- o1Sr can set to Stnd, CYCL, PHAS.
- When o2Sr is set to SSr it is held in Stnd and parameter is not displayed.

▣Flow chart for 4 setting group

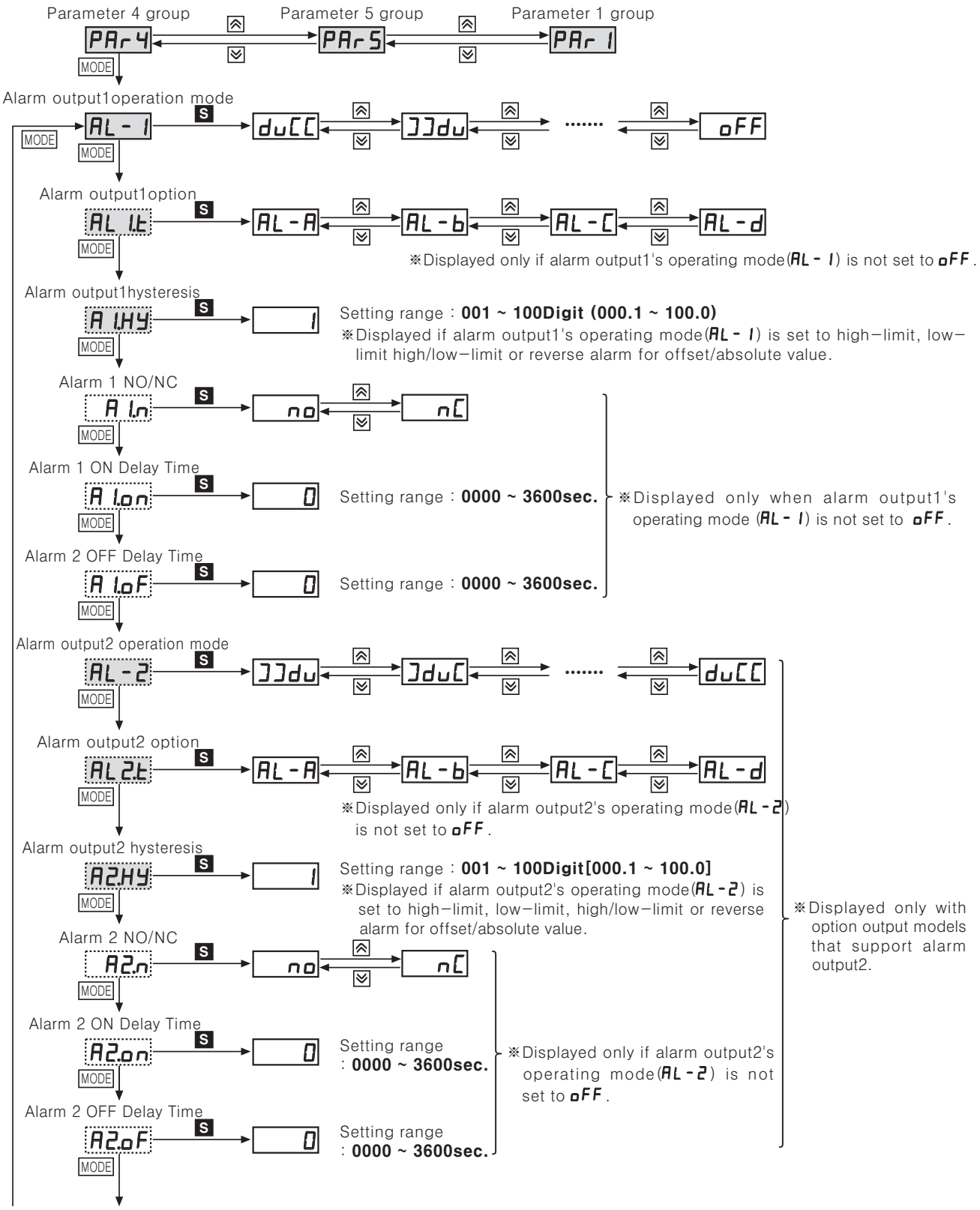
(※1) S : Press any key among ≪, ≫, ≪.

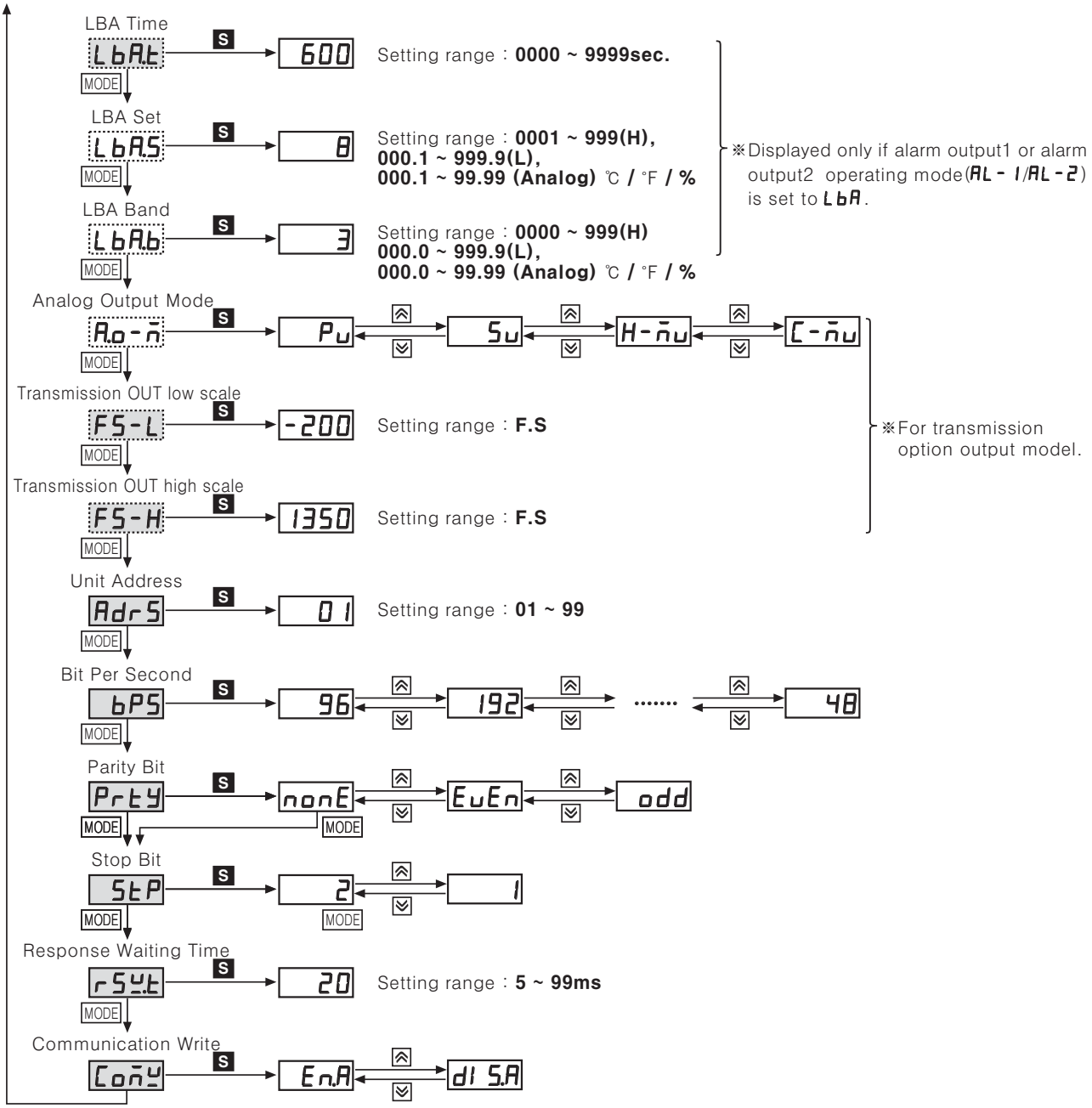
※After entering setting mode, press MODE key anytime for 3 sec. to return to Run mode.

※After entering setting mode, press MODE key anytime for 1.5 sec. to go to the concerned group name.

※ ⋯⋯ : This parameter may or may not appear, depending on the model and related parameter settings.

※If you press the MODE key after changing the setting value of the parameter the setting value will be stored.





▣Flow chart for 5 setting group

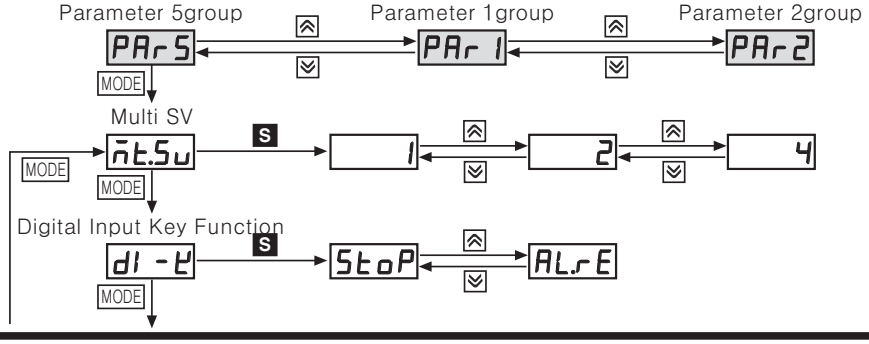
(※1) **S** : Press any key among ≪, ≫, ≪.

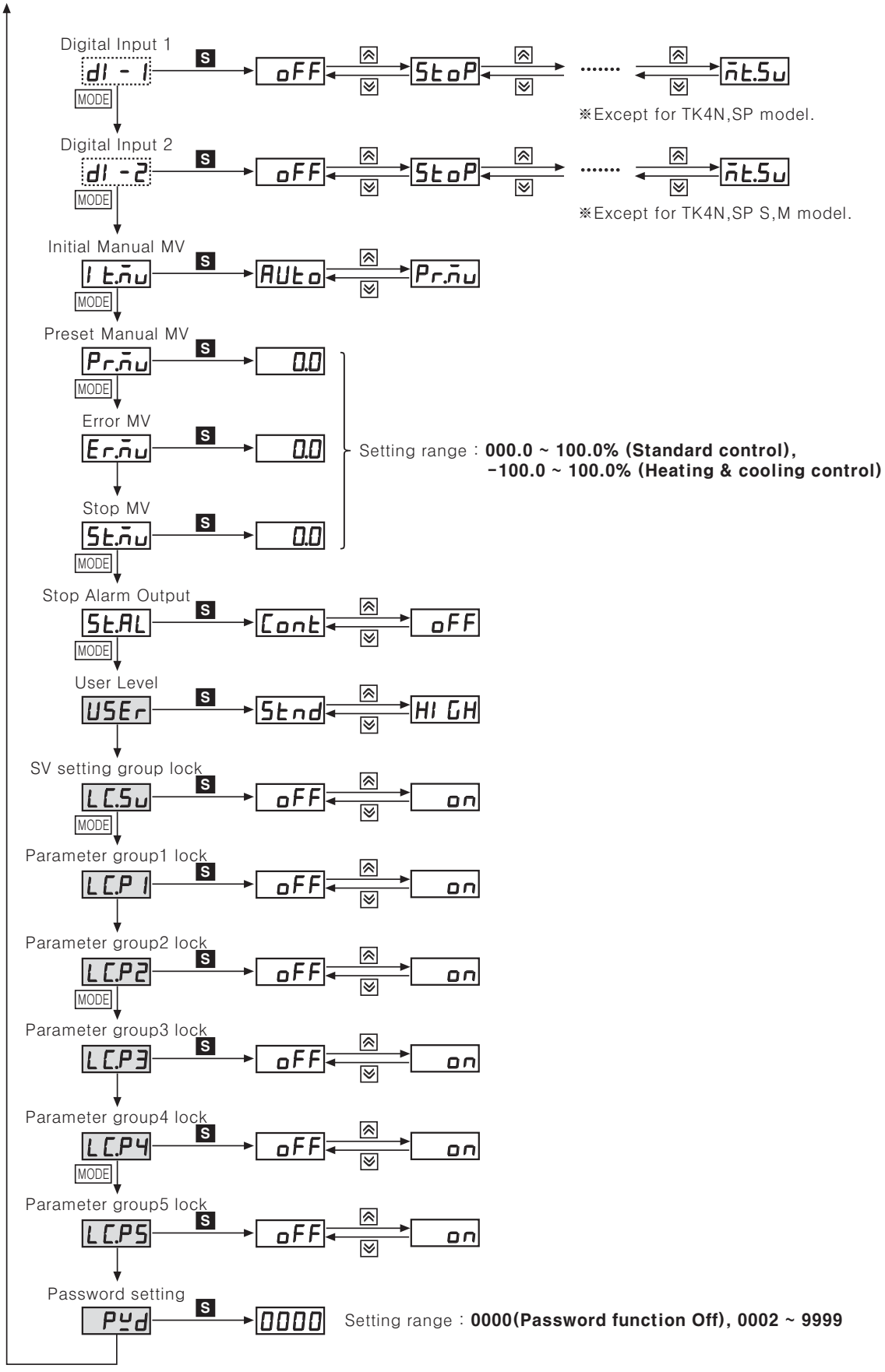
※After entering setting mode, press MODE key anytime for 3 sec. to return to Run mode.

※After entering setting mode, press MODE key anytime for 1.5 sec. to go to the concerned group name.

※ ⋯⋯ : This parameter may or may not appear, depending on the model and related parameter settings.

※If you press the MODE key after changing the setting value of the parameter the setting value will be stored.



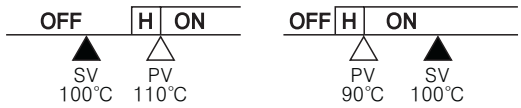
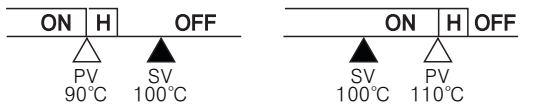
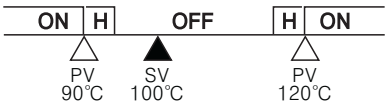
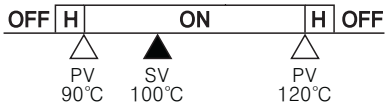
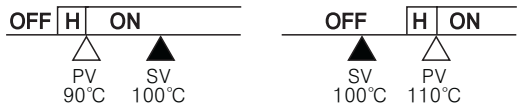
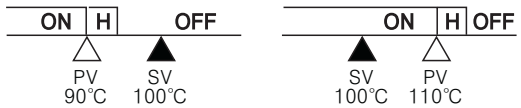

Digital Input 1
dI - 1
MODE
S
oFF
StoP
rnt.Su
※Except for TK4N,SP model.
Digital Input 2
dI - 2
※Except for TK4N,SP S,M model.
Initial Manual MV
It.nu
AUto
Pr.nu
Preset Manual MV
Error MV
Stop MV
0.0
Setting range : 000.0 ~ 100.0% (Standard control),
-100.0 ~ 100.0% (Heating & cooling control)
Stop Alarm Output
St.AL
Cont
oFF
User Level
USEr
Stnd
HI GH
SV setting group lock
LC.Su
on
Parameter group1 lock
LC.P1
Parameter group2 lock
LC.P2
Parameter group3 lock
LC.P3
Parameter group4 lock
LC.P4
Parameter group5 lock
LC.P5
Password setting
PUd
0000
Setting range : 0000(Password function Off), 0002 ~ 9999

▣Input sensor and range

Input sensor			Dot	Display	Input range(℃)	Input range(°F)
ThermoCouple	K(CA)		1	KCA.H	−200 ~ 1350	−328 ~ 2463
			0.1	KCA.L	−199.9 ~ 999.9	−199.9 ~ 999.9
	J(IC)		1	JIC.H	−200 ~ 800	−328 ~ 1472
			0.1	JIC.L	−199.9 ~ 800.0	−199.9 ~ 999.9
	E(CR)		1	ECr.H	−200 ~ 800	−328 ~ 1472
			0.1	ECr.L	−199.9 ~ 800.0	−199.9 ~ 999.9
	T(CC)		1	tCC.H	−200 ~ 400	−328 ~ 752
			0.1	tCC.L	−199.9 ~ 400.0	−199.9 ~ 752.0
	B(PR)		1	b Pr	0 ~ 1800	32 ~ 3272
	R(PR)		1	r Pr	0 ~ 1750	32 ~ 3182
	S(PR)		1	S Pr	0 ~ 1750	32 ~ 3182
	N(NN)		1	n nn	−200 ~ 1300	−328 ~ 2372
	C(TT)**(※1)**		1	C tt	0 ~ 2300	32 ~ 4172
	G(TT)**(※2)**		1	G tt	0 ~ 2300	32 ~ 4172
	L(IC)		1	LIC.H	−200 ~ 900	−328 ~ 1652
			0.1	LIC.L	−199.9 ~ 900.0	−199.9 ~ 999.9
	U(CC)		1	UCC.H	−200 ~ 400	−328 ~ 752
			0.1	UCC.L	−199.9 ~ 400.0	−199.9 ~ 752.0
	Platinel II		1	PLII	0 ~ 1390	32 ~ 2534
RTD	CU 50Ω		0.1	CU 5	−199.9 ~ 200.0	−199.9 ~ 392.0
	CU 100Ω		0.1	CU 10	−199.9 ~ 200.0	−199.9 ~ 392.0
	JIS Standards	JPt 100Ω	1	JPt.H	−200 ~ 650	−328 ~ 1202
		JPt 100Ω	0.1	JPt.L	−199.9 ~ 650.0	−199.9 ~ 999.9
	DIN Standards	DPt 50Ω	0.1	dPt5	−199.9 ~ 600.0	−199.9 ~ 999.9
		DPt 100Ω	1	dPt.H	−200 ~ 650	−328 ~ 1202
		DPt 100Ω	0.1	dPt.L	−199.9 ~ 650.0	−199.9 ~ 999.9
	Nickel 120Ω		1	nI 12	−80 ~ 200	−112 ~ 392
Analog	Voltage	0 ~ 10V		Au 1	−1999 ~ 9999 (Display point will be changed according to decimal point position.)	
		0 ~ 5V		Au2		
		1 ~ 5V		Au3		
		0 ~ 100mV		Amu 1		
	Current	0 ~ 20mA		AmA 1		
		4 ~ 20mA		AmA2		

(※1) Same as existing W5 (TT) type sensor **(※2)** Same as existing W(TT) type sensor

▣Alarm output operation mode

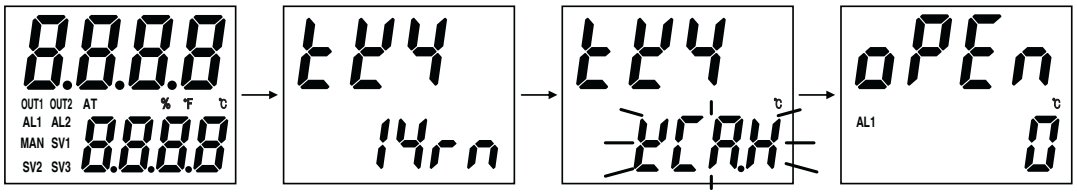
Mode	Alarm output operation	Description(Default Deviation)
oFF	————	■ No alarm output
duCC	 High deviation : Set as 10℃ High deviation : Set as −10℃	■ Deviation high−limit alarm (Temperature, analog : +F · S) If PV/SV deviation is occurring higher than set value of deviation temperature, alarm output will be ON. Deviation temperature is set in AL 1.H / AL2.H.
]]du	 Lower deviation : Set as 10℃ Lower deviation : Set as −10℃	■ Deviation low−limit alarm (Temperature, analog : +F · S) If PV/SV deviation is occurring lower than set value of deviation temperature, alarm output will be ON. Deviation temperature is set in AL 1.L / AL2.L.
]duC	 Lower deviation : Set as 10℃ , High deviation : Set as 20℃	■ Deviation high / low−limit alarm (Temperature, analog : +F · S) If PV/SV deviation is occurring higher or lower than set value of deviation temperature, alarm output will be ON. High−limit deviation temperature is set in AL 1.H / AL2.H. Low−limit deviation temperature is set in AL 1.L / AL2.L.
[duJ	 Lower deviation : Set as 10℃, High deviation : Set as 20℃	■ Deviation high / low−limit reverse alarm (Temperature : 0, analog : 0) If PV/SV deviation is occurring higher or lower than set value of deviation temperature, alarm output will be ON. High−limit deviation temperature is set in AL 1.H / AL2. H. Low−limit deviationtemperature is set in AL 1.L / AL2.L.
PuCC	 Absolute−value Alarm : Set as 90℃ Absolute−value Alarm : Set as 110℃	■ Absolute value high−limit alarm (Temperature : High−limit value, analog : H-SC or L-SC, Select the higher one.) If PV is higher than absolute value of alarm temperature, alarm output will be ON. Absolute alarm value is set in AL 1.H / AL2.H.
]]Pu	 Absolute−value Alarm : Set as 90℃ Absolute−value Alarm : Set as 110℃	■ Absolute value low−limit alarm (Temperature: Low−limit value, Analog: H−SC or L−SC, Select the lower one.) If PV is lower than absolute value of alarm temperature, alarm output will be ON. Absolute alarm value is set in AL 1.L / AL2.L.
LbA	It will be ON when it detects loop break.	■ Loop Break Alarm
SbA	It will be ON when it detects sensor disconnection.	■ Sensor Break Alarm
HbA	It will be ON when it detects heater break using CT.	■ Heater Break Alarm

▣Optional alarm output selection[AL□.t]

Display	Alam mode	Description
AL-A	General alarm	When PV reaches alarm temp.(deviation), Aux output will be ON.
AL-b	Latch	When PV reaches alarm temp.(deviation), Aux output will be ON and retained.
AL-C	Standby	When PV reaches alarm temp.(deviation) for the second time, Aux output will be ON.(No output will be on for initial operation.)
AL-d	Latch & Standby	Latch and Standby mode applied together.

▣Front Panel Display when power is ON

When power is supplied, whole display part will be flickering for 1 sec. Afterwards, model name and input sensor type will be flickering twice and then enter into RUN mode.



①Whole display part ②Model type display ③Input sensor type display ④Run mode

▣Factory Default

- **SV setting group [Su]**

Mode	Factory Default
Su	0

- **Password input Parameter**

Mode	Factory Default
PASS	0001

- **Parameter 1 setting group [PAr 1]**

Mode	Factory Default	Mode	Factory Default	Mode	Factory Default	Mode	Factory Default
r-S	rUn	AL 1L	1550	AL2H	1550	Su-2	0000
Su-n	Su-0	AL 1H	1550	Su-0	0000	Su-3	0000
Ct-A		AL2L	1550	Su-1	0000		

- **Parameter 2 setting group [PAr2]**

Mode	Factory Default	Mode	Factory Default	Mode	Factory Default	Mode	Factory Default
At	oFF	H-d	0000	H.oSt	000	rAnU	000
H-P	0 10.0	C-d	0000	C.HYS	002	rAnd	000
C-P	0 10.0	db	0000	C.oSt	000	r.Unt	nIn
H-I	0000	rESt	050.0	L-nu	-100.0		
C-I	0000	H.HYS	002	H-nu	100.0		

- **Parameter 3 setting group [PAr3]**

Mode	Factory Default	Mode	Factory Default	Mode	Factory Default	Mode	Factory Default
In-t	ECA.H	H-SC	100.0	o-Ft	HEAt (Standard type)	o 1.Sr	Stnd
Unit	°C	dUnt	°Fo		H-C (Heating,Cooling type)	o 1.nA	4-20
L-rG	00.00	In-b	0000	C-nd	PId (Standard type)	oUt2	CUrr
H-rG	10.00	nAuF	000.1		P.P (Heating,Cooling type)	o2.nA	4-20
dot	0.0	L-Su	-200	At.t	tUn 1	H-t	020.0 (RELAY)
L-SC	000.0	H-Su	1350	oUt 1	CUrr	C-t	002.0 (SSR drive)

- **Parameter 4 setting group [PAr4]**

Mode	Factory Default	Mode	Factory Default	Mode	Factory Default	Mode	Factory Default
AL-1	duCC	AL-2	du	LbA.t	0000	AdrS	01
AL 1.t	AL-A	AL2.t	AL-A	LbA.S	008	bPS	96
A 1.HY	001	A2.HY	001	LbA.b	003	PrtY	nonE
A 1.n	no	A2.n	no	Ao-n	Pu	StP	2
A 1.on	0000	A2.on	0000	FS-L	-200	rSYt	20
A 1.oF	0000	A2.oF	0000	FS-H	1350	ConY	En.A

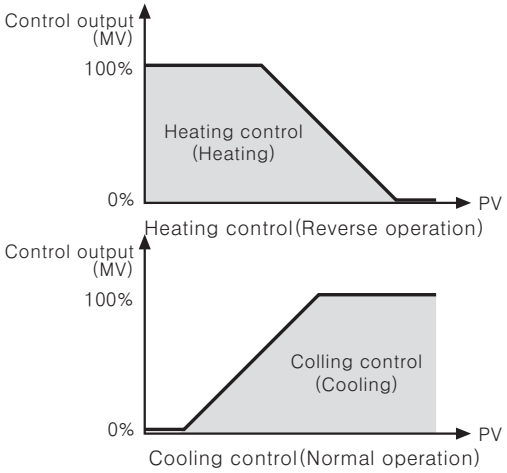
- **Parameter 5 setting group [PAr5]**

Mode	Factory Default	Mode	Factory Default	Mode	Factory Default	Mode	Factory Default
nt.Su	1	Pr.nu	000.0	LC.Su	oFF	LC.PS	oFF
dI-t	StoP	Er.nu	000.0	LC.P1	oFF	PYd	0000
dI-1	StoP	St.nu	000.0	LC.P2	oFF		
dI-2	AL.rE	St.AL	Cont	LC.P3	oFF		
It.nu	AUto	USEr	Stnd	LC.P4	oFF		

▣Function

◎Control output operation mode[o-Ft]

●Control output modes for general temperature control include heating, cooling, and heating and cooling.
●Heating control and cooling control are mutually opposing operations with inverse outputs.
●The PID time constant varies based on the controlled objects during PID control.



Setting group	Parameter	Setting range	Factory default	Unit
PAr3	o-Ft	Standard Model HEAt / CooL	HEAt	–
		Heating/Cooling Model HEAt / CooL / L-C	L-C	–

◎Heating control[HEAt]

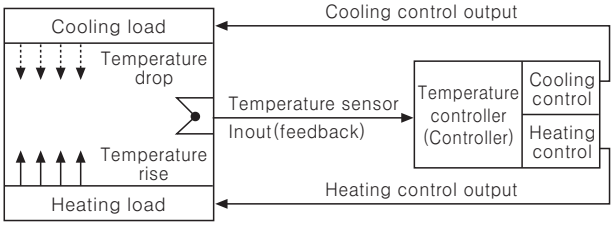
Heating control mode: the output will be provided in order to supply power to the load (heater) if PV (Present Value) falls below SV (Setting Value).

◎Cooling Control[CooL]

Cooling control mode: the output will be provided in order to supply power to the load (cooler) if PV (Present Value) rises above SV (Setting Value).

◎Heating and Cooling Control[H-C]

Heating and cooling control mode: heating and cooling with a single temperature controller when it is difficult to control subject temperature with only heating or cooling.
Heating and cooling control mode controls the object using different PID time constants for each heating and cooling.
It is also possible to set heating and cooling control in both PID control or ON/OFF control mode. Heating/cooling output can be selected among Relay output, SSR output and current output depending on model types choosen according to your application environment. ((Note that only standard SSR control is available for SSR output in OUT2.)



※For heating and cooling control, OUT1 control output is dedicated to heating control and OUT2 control output to cooling control.

◎Auto-tuning[At]

In PID control, auto-tuning processes the control subject's thermal characteristics and thermal response rate, and then determines the necessary PID time constant. Application of the PID time constant realizes fast response and high precision temperature control.
●Auto-tuning automatically stores PID time constants upon termination. These PID time constants can then be modified by the user to suit their usage environment.
●When auto-tuning is in progress, the AT lamp located on the front of the controller flashes in 1-second intervals. When auto-tuning finishes, the AT lamp automatically goes off and the auto-tuning parameter will return to OFF.

Setting value	Description
oFF	Auto-tuning complete.
on	Auto-tuning in progress.

Setting group	Parameter	Setting range	Factory default	Unit
PAr2	At	oFF / on	oFF	–

※Manual interruption or a sensor disconnection error when auto-tuning is in progress restores the PID time constant to the value used prior to the auto-tuning session.
※Auto-tuning continues to run even if the temperature reading exceeds or falls below the input range.
※When auto-turning is in progress, parameters can only be referenced and not altered.
※Auto-tuning is not available in manual control.

◎Control Output (OUT1/OUT2) Selection [oUt 1/ oUt2]

●In case of selecting the Models with current control output, both current and SSR outputs are available. You can therefore choose the right output type depending on application environments.
●OUT1 : Selects OUT1 control output.
●OUT2 : Selects OUT2 control output.

Setting group	Parameter	Setting range	Factory default	Unit
PAr3	oUt 1 oUt2	SSr / CUrr	SSr	–

◎For more information, refer to user manual.

▣Proper usage

◎Simple "error" diagnosis

- In case, the load (Heater etc) is not operated, please check operation of the out lamp located in front panel of the unit. If lamp does not operate, please check the parameter of all programmed mode. If lamp is operating, please check the output (Relay, Driving voltage of SSR, DC4−20mA current) after separating output line from the unit.
- When it displays "oPEn" during operation.
  This is a warning that external sensor is cut off. Please turn off power and check the state of sensor. If sensor is not cut off, disconnect sensor line from terminal block and +, − together. When you turn on power it can check room temperature.
  If this unit cannot indicate room temperature, this unit itself is faulty. Please remove this unit from equipment and service or replace.
  (When the input mode is thermocouple, it is available to indicate room temperature.)
- In case of indicating "Error" in display
  This Error message is indicated in case of damaging inner chip program data by outer strong noise.
  In this case, please send the unit to our after service center after removing the unit from system.
  Noise protection is designed in this unit, but it does not stand up strong noise continuously.
  If bigger noise than specified(Max. 2kV) flows in the unit, it can be damaged.

◎Caution for using

- Please use the terminal(M3.5, Max. 7.2mm) when connecting the AC power source.
- "⚠" mark indicated on the diagram of this unit means caution−refer to accompanying documents.
- In case of cleaning the unit, please keep as following Cautions;
  ①Clean dust with a dry tissue.
  ②Be sure to use alcohol to clean the unit, do not use acid, chromic acid, solvent, etc.
  ③Be sure to clean the unit after turning off the power and then turn on the power after passing 30minute after cleaning.
- If this unit is used in a manner not to be specified by the manufacture, it can be injury to a person or damage to property.
- Be sure that metal dust and wire−dregs do not flow in the unit, because of malfunction damage of the unit or the cause of a fire.
- Service life for the relay of the unit is indicated in this manual, life cycle is different according to the load capacity and switching times, therfore please use the unit after checking the load capacity and switching times.
- Connect wires correctly after checking polarity of terminals.
- Do not use this unit as following place.
  ①A place where dust, corrosive gas, oil, moisture are occurred.
  ②A place where there are high humidity or freezing place.
  ③A place where sunshine, radiant heat is occurred.
  ④A place where vibration, shock is occurred.
- If the equipment is used in a manner not specified by the manufacture the protection provided by the equipment may be impaired.
- Please install power switch or circuit−breaker in order to cut power supply off.
- A switch or circuit−breaker meeting the relevant requirements of IEC947−1 and IEC947−3 shall be included in equipment when the temperature controller.
- The switch or circuit−breaker should be installed near by users.
- Installation environment
  ①It shall be used indoor
  ②Altitude Max. 2000m
  ③Pollution Degree 2
  ④Installation Category Ⅱ.
- Be sure to power turn off when changing thermocouple to analog signal and change DIN switch setting. Then, power turn ON and change 2 setting group.
- This SSRP of this controller are insulate from internal power.
- Do not connect power line to sensor connecting part. The inner circuit may be damaged.