TK Series

High function/High performance PID control

▣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)
- ●Allows parameter setting and monitoring by USB port of PC
  : only for using DAQMaster or USB to Serial converter
    (SCM-US, sold separately)
- ●SSR output/Current output selectable
- ●SSRP output (standard/phase/cycle control selectable)
- ●Heater burn-out alarm (C.T input) (except TK4SP)
  (※CT, purchase separately)
- ●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.**

CE c𝐑𝐔us

(To be certified soon)

▣User manual

- ●Visit our web site (www.autonics.com) to download user manual and communication manual.
- ●User manual describes for specifications and function, and communication manual describes for RS485 communication (Modbus RTU protocol) and parameter address map data.

▣Integrated device management program(DAQMaster)

- ●DAQMaster is a integrated 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 integrated device management 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 / 7
RAM	Over 256MB
Hard disk	Over 1GB of available space
VGA	Over 1024×768
Others	RS232 serial port, USB port

〈 DAQMaster screen 〉

Autonics

High Function/High Performance PID Control

■Ordering information

```
TK 4 S − 1 4 R R
```

(A)
Photo electric sensor

(B)
Fiber optic sensor

(C)
Door/Area sensor

(D)
Proximity sensor

(E)
Pressure sensor

(F)
Rotary encoder

(G)
Connector/ Socket

(H)
Temp. controller

(I)
SSR/ Power controller

(J)
Counter

(K)
Timer

(L)
Panel meter

(M)
Tacho/ Speed/ Pulse meter

(N)
Display unit

(O)
Sensor controller

(P)
Switching power supply

(Q)
Stepping motor & Driver & Controller

(R)
Graphic/ Logic panel

(S)
Field network device

(T)
Production stoppage models & replacement

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

Sub output(※1)

SP	1	ALARM1 output
S M W H L	1	ALARM1 output
	2	ALARM1+ALARM2 output
	R	ALARM1+Transmission output
	T	ALARM1+RS485 Communication output
	A	ALARM1+ALARM2+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)

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(Heating or Cooling) 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 to 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)					
	Thermocouple	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					
	Thermocouple	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.					
	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.

TK Series

■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.）					
Sub output	Relay	AL1, AL2 relay：250VAC 3A 1a（TK4SP：AL1 only）					
	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 ・Outflow current：Approx. 0.5mA ※ 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 to 100℃/℉（0.1 to 100.0℃/℉）variable ・Analog：1 to 100Digit					
Proportional band(P)		0.1 to 999.9℃（0.1 to 999.9%）					
Integral time(I)		0 to 9999 sec.					
Derivative time(D)		0 to 9999 sec.					
Control period(T)		0.1 to 120.0 sec.（※Relay output and SSR drive output only）					
Manual reset value		0.0 to 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 to 55Hz（for 1min.）in each X, Y, Z direction for 2 hours					
Relay life cycle	Mechanical	OUT1/2: Min. 5,000,000 times, AL1/2: Min. 20,000,000 times（TK4H/W/L: Min. 5,000,000 times）					
	Electrical	OUT1/2: Min. 200,000 times, AL1/2: Min. 100,000 times（TK4H/W/L: Min. 200,000 times）					
Insulation resistance		Min. 100MΩ（500VDC megger）					
Noise resistance		Square shaped noise by noise simulator（pulse width 1μs）±2kV R−phase, S−phase					
Memory retention		Approx. 10years（When using non−volatile semiconductor memory type）					
Ambient temperature		−10 to 50℃（at non−freezing status）					
Storage temperature		−20 to 60℃（at non−freezing status）					
Ambient humidity		35 to 85%RH（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) "□" Mark indicated that equipment protected throughout by double insulation or reinforced insulation.

■Connections

※Please check the polarity when connecting temperature sensor or analog input.
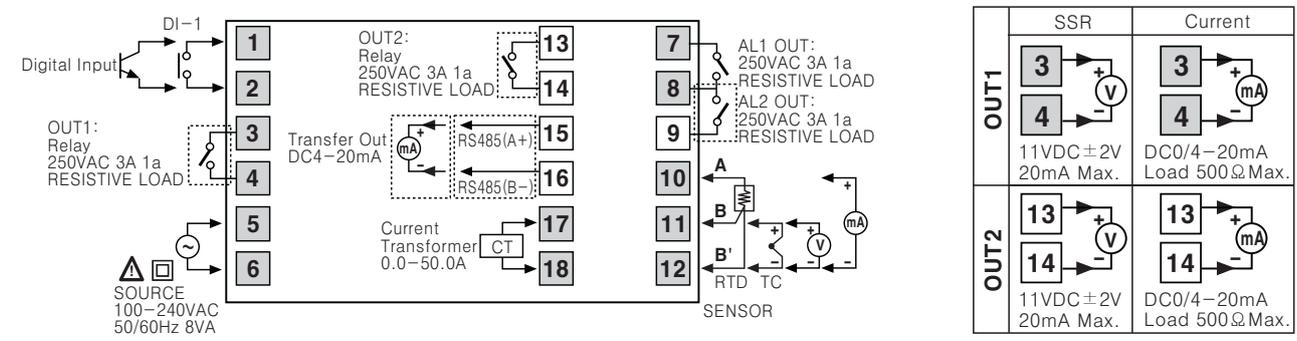
●**TK4S**

High Function/High Performance PID Control

■Connections

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

●TK4SP

OUT2: Relay 250VAC 3A 1a RESISTIVE LOAD

OUT1: Relay 250VAC 3A 1a RESISTIVE LOAD

AL1: Relay 250VAC 3A 1a RESISTIVE LOAD

TC
RTD SENSOR
B' B A

SOURCE 100−240VAC 50/60Hz 8VA

	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

AL1 OUT: 250VAC 3A 1a RESISTIVE LOAD
AL2 OUT: 250VAC 3A 1a RESISTIVE LOAD
OUT2: Relay 250VAC 3A 1a RESISTIVE LOAD
OUT1: Relay 250VAC 3A 1a RESISTIVE LOAD

SOURCE 100−240VAC 50/60Hz 8VA

DI−1 Digital Input
RS485(A+)
RS485(B−)
Transfer Out DC4−20mA
CT Current Transformer 0.0−50.0A
A B B'
RTD TC SENSOR

	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

AL1 OUT: 250VAC 3A 1a RESISTIVE LOAD
AL2 OUT: 250VAC 3A 1a RESISTIVE LOAD
OUT2: Relay 250VAC 3A 1a RESISTIVE LOAD
OUT1: Relay 250VAC 3A 1a RESISTIVE LOAD

SOURCE 100−240VAC 50/60Hz 8VA

Digital Input DI−1 DI−2
RS485(A+)
RS485(B−)
Transfer Out DC4−20mA
CT Current Transformer 0.0−50.0A
A B B'
RTD TC SENSOR

	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)

TK Series

■Dimensions

● TK4S

● Bracket
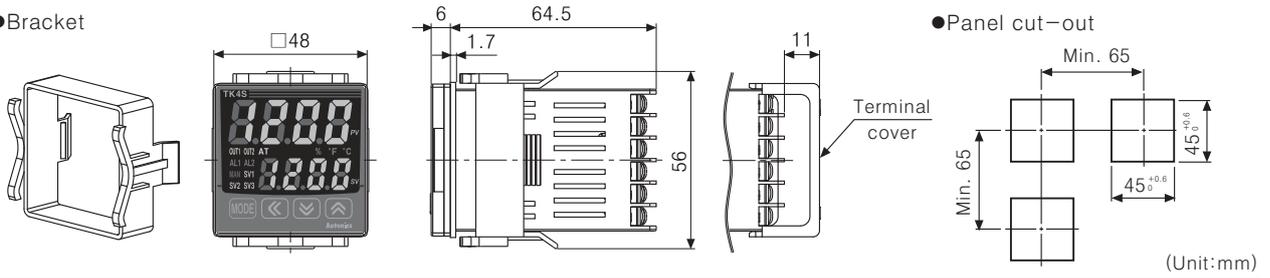
● Panel cut-out

□48   6   64.5   1.7   56   11

Terminal cover

Min. 65   Min. 65 $45_0^{+0.6}$ $45_0^{+0.6}$

(Unit:mm)

● TK4SP

● Bracket

● Panel cut-out

□48   6   72.2   56

Min. 65   Min. 65 $45_0^{+0.6}$ $45_0^{+0.6}$

(Unit:mm)

● TK4M

● Bracket

● Panel cut-out

□72   6   64.5   1.5   77.5   6

Terminal cover

Min. 90   Min. 90 $68_0^{+0.7}$ $68_0^{+0.7}$

(Unit:mm)

● TK4H

● Bracket

● Panel cut-out

48   6   64.5   1.5   6   96   101.5

Terminal cover

Min. 65   Min. 115 $92_0^{+0.8}$ $45_0^{+0.6}$

(Unit:mm)

● TK4W

● Bracket

Terminal cover

6   96   6   64.5   1.5   48

● Panel cut-out

Min. 115   Min. 65 $45_0^{+0.6}$ $92_0^{+0.8}$

(Unit:mm)

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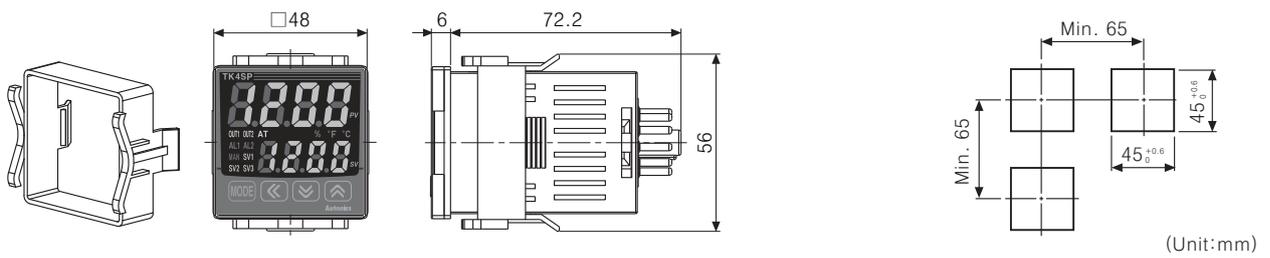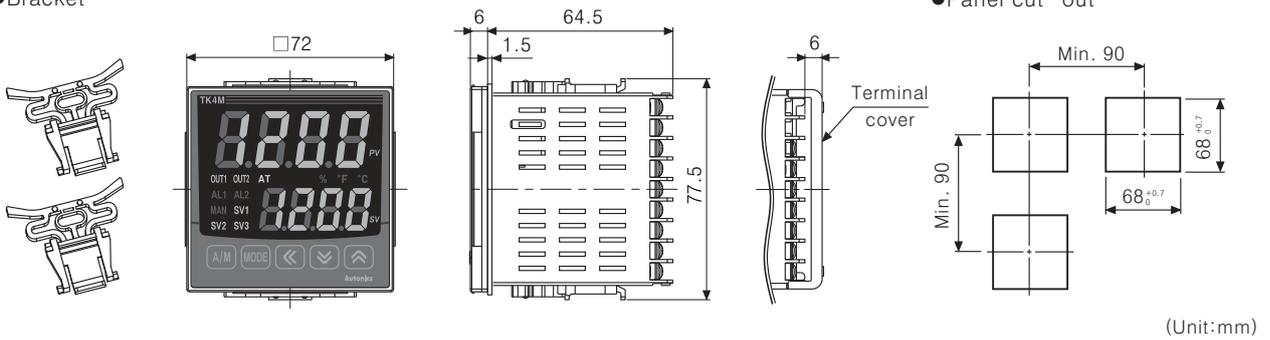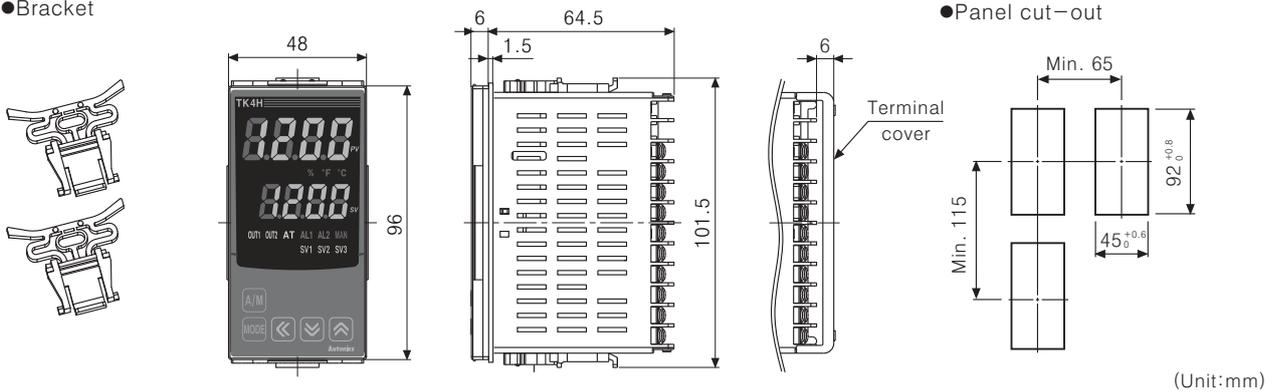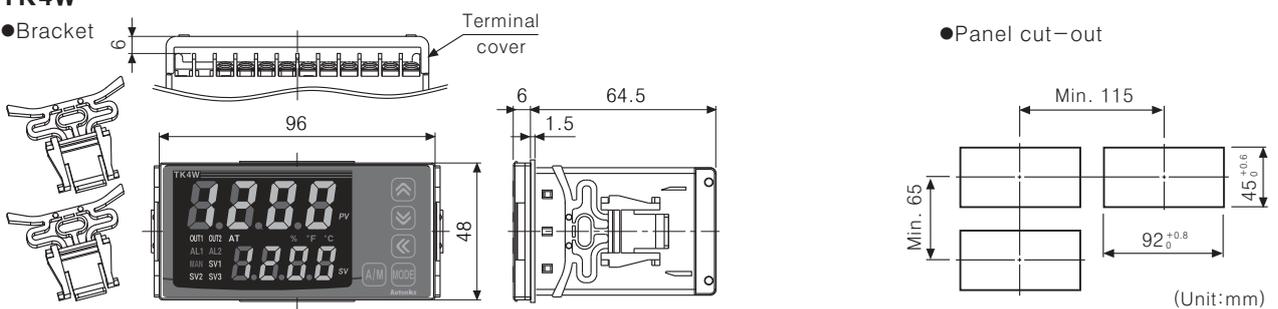
High Function/High Performance PID Control

● **TK4L**
●Bracket

●Panel cut−out

□96

6 64.5
1.5

6

Terminal cover

101.5

TK4L

PV

OUT1 OUT2 AT   % °F °C
AL1 AL2
MAN SV1
SV2 SV3   SV

A/M MODE

Autonics

Min. 115

Min. 115

$92^{+0.8}_{0}$

$92^{+0.8}_{0}$
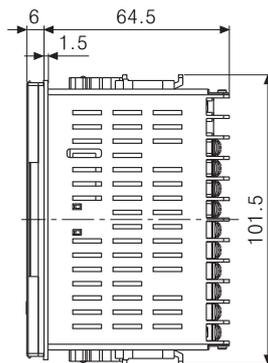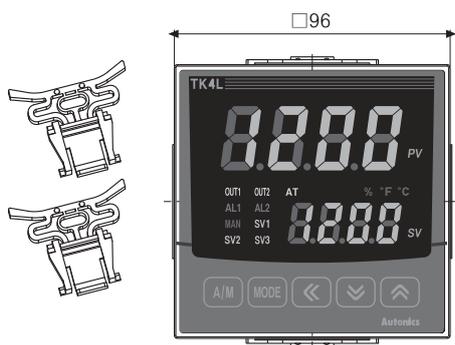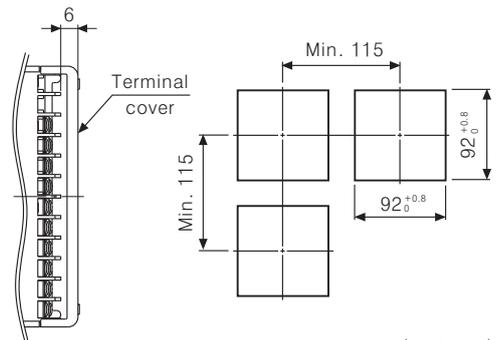
(Unit:mm)

● **Terminal cover(Sold separately)**

●RSA−Cover
(48×48mm size)
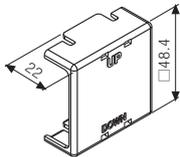
●RMA−Cover
(72×72mm size)
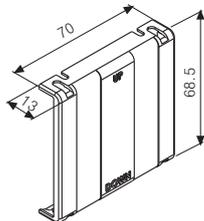
●RHA−Cover
(48×96mm, 96×48mm size)

●RLA−Cover
(96×96mm size)

22

□48.4

70

43

68.5

47.2

43

91.5

94

43

91.5
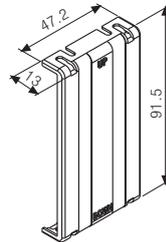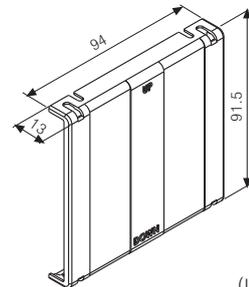
(Unit:mm)

▣Product mounting

●TK4S/SP(48×48mm) series
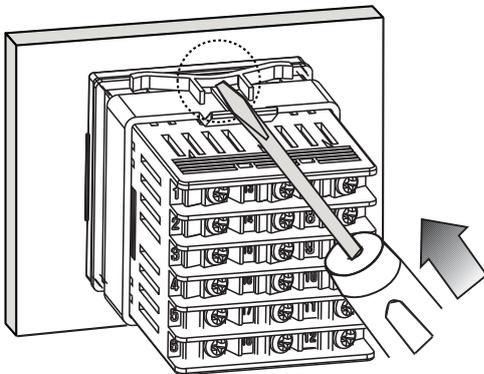
●Other series
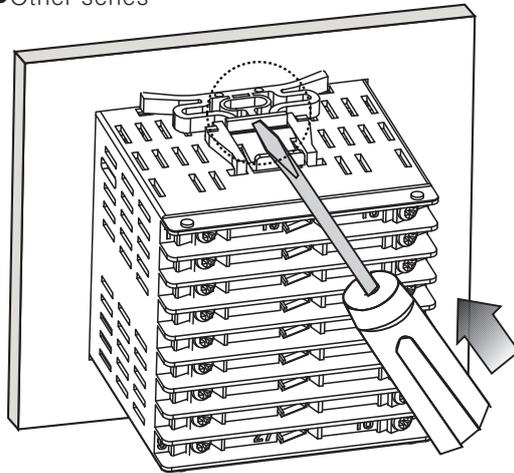
※Insert product into a panel, fasten bracket by pushing with tools as shown above.

TK Series

▣Accessories [Sold separately]

●SCM−38I
(RS232C to RS485 converter)

●SCM−US48I
(USB to RS485 converter)

●SCM−US
(USB to Serial converter)

●Current transformer(CT) [CSTC−E80LN]

Current measuring range	100mA to 80A (Rb=10Ω)	Current ratio	1000 : 1
Wire wounded resistance	31Ω±10%	Accuracy	2.0 grade (5A to 80A)

※Rb: Burden resistor

φ23.3
φ7
K(Black)
L(White)
3
3.8
7
26.5
150
10.5
(Unit:mm)

F=50Hz
Ta=25℃
100Ω
10Ω
OUTPUT IN VOLTS RMS(V)
10
1
0.1
0.01
0.001
0.1 1 10 100 1000
SENSED CURRENT IN AMPS RMS(Io)
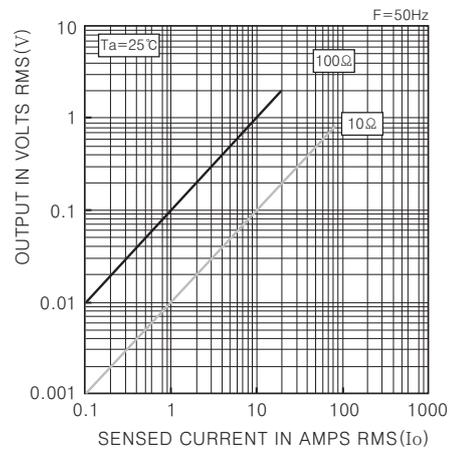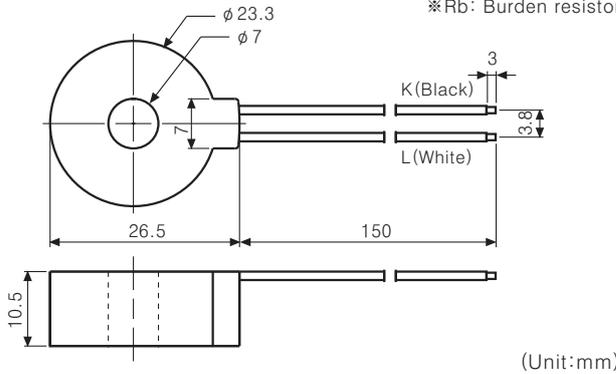
●Current transformer(CT) [CSTC−E200LN]

Current measuring range	100mA to 200A (Rb=10Ω)	Current ratio	1000 : 1
Wire wounded resistance	20Ω±10%	Accuracy	2.0 grade (5A to 200A)

※Rb: Burden resistor

φ37.1
φ13
K(Black)
L(White)
3
4.5
10
40.8
150
13.5
(Unit:mm)

F=50Hz
Ta=25℃
100Ω
10Ω
OUTPUT IN VOLTS RMS(V)
10
1
0.1
0.01
0.001
0.1 1 10 100 1000
SENSED CURRENT IN AMPS RMS(Io)

※Do not supply primary current in case that CT output is open. High voltage will be generated in CT output.

High Function/High Performance 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
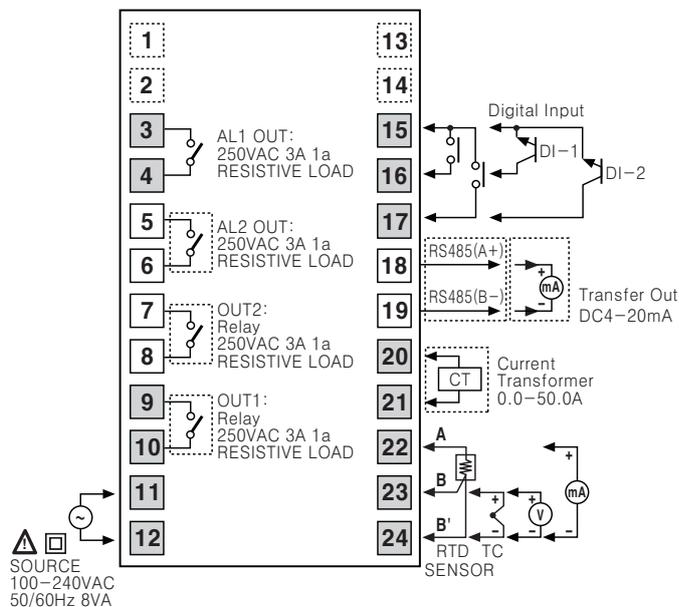
(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/ Logic panel

(S) Field network device

(T) Production stoppage models & replacement

▣ Parts description

— IN TYPE SW —

TC, RTD (Front direction) ← → mV, V, mA (Back direction)

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 Unit(℃ / ℉ / %) Indicator : It shows PV unit.
4 Manual dontrol indicator : It will be ON in case of selecting manual control mode.
5 Multi SV indicator : One of SV1 to 3 lamp will be ON in case of selecting multi SV function.
6 Auto−Tuning indicator : It will be flashing 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 that SSRP output type is control/phase mode, it will be ON when MV is over 3.0%.
　※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(W48×H48mm), 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 movuing.
12 ∨,∧ key : Used when entering itnto set value change mode and changing set value(Digit).
13 Input selection switch : Used when switching sensor(TC, RTD) input ↔ 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 USB to Serial converter(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 flashing.

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.

TK Series

▪Flow chart for setting group

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

```
                              ┌──────────────┐
                   ┌─────────►│   Run mode   │◄──────────────────────────────┐
                   │          └──────────────┘                               │
         ┌─────────┴────────┬──────────┬──────────────┐                      │
    Press any key among    MODE 2 sec.  A/M (※2)                            │
    ≪ , ∨ , ∧ once.                                                         │
         │                  │          │                                     │
      ┌──────┐          ┌──────┐   ┌──────┐                                   │
      │ PASS │(※1)      │ PASS │(※1)│ PASS │(※1) ──────────────────────────►│
      └──────┘          └──────┘   └──────┘                                   │
       MODE              MODE       MODE                                      │
                                                                             ∧
                    When PW                                                   ┊
                    is valid,                                                 ∧
                                 ┌────────┐        ∧     ┌────────┐          ∧
                                 │ PAr 1  │◄────────────►│ PAr 2  │◄────────  ┊
                                 └────────┘        ∨     └────────┘        ∨  
    When PW is valid,              MODE                    MODE               ┊
                                                                             ∨
     ┌──────┐  Set the setting value
     │  Su  │         ┌─────────────────────────┐   ┌───────────────────────────┐
     └──────┘         │Control Output RUN/STOP(r-5)│  │ Auto-Tuning execute(At)    │
  MODE or SV will be  └─────────────────────────┘   └───────────────────────────┘
  automatically saved   MODE   MODE                    MODE   MODE
  after 3sec.          1.5 sec.                        1.5 sec.
                       ┌─────────────────────────┐   ┌───────────────────────────┐
                       │ Multi SV Number(Su-n)   │   │Heating Proportional Band(H-P)│
                       ├─────────────────────────┤   ├───────────────────────────┤
                       │Heater Current Monitoring(Ct-A)│ │Cooling Proportional Band(C-P)│
                       ├─────────────────────────┤   ├───────────────────────────┤
                       │Alarm output1 low-limit set value(AL 1L)│ │Heating Integral Time(H-i)│
                       ├─────────────────────────┤   ├───────────────────────────┤
                       │Alarm output1 high-limit set value(AL 1H)│ │Cooling Integral Time(C-i)│
                       ├─────────────────────────┤   ├───────────────────────────┤
                       │Alarm output2 low-limit set value(AL 2L)│ │Heating derivative Time(H-d)│
                       ├─────────────────────────┤   ├───────────────────────────┤
                       │Alarm output2 high-limit set value(AL 2H)│ │Cooling derivative Time(C-d)│
                       ├─────────────────────────┤   ├───────────────────────────┤
                       │ SV-0 set value(Su-0)    │   │ Dead/Overlab Band(db)      │
                       ├─────────────────────────┤   ├───────────────────────────┤
                       │ SV-1 set value(Su-1)    │   │ Manual Reset(rESt)         │
                       ├─────────────────────────┤   ├───────────────────────────┤
                       │ SV-2 set value(Su-2)    │   │ Heating ON Hysteresis(H.HYS)│
                       ├─────────────────────────┤   ├───────────────────────────┤
                       │ SV-3 set value(Su-3)    │   │ Heating OFF Offset(H.oSt)  │
                       └─────────────────────────┘   ├───────────────────────────┤
                              MODE                    │ Cooling ON Hysteresis(C.HYS)│
                                                      ├───────────────────────────┤
                                                      │ Cooling OFF Offset(C.oSt)  │
                                                      ├───────────────────────────┤
                                                      │ MV Low Limit(L-mu)         │
                                                      ├───────────────────────────┤
                                                      │ MV High Limit(H-mu)        │
                                                      ├───────────────────────────┤
                                                      │ RAMP-Up Change Rate(rAmu)  │
                                                      ├───────────────────────────┤
                                                      │ RAMP-Down Change Rate(rAmd)│
                                                      ├───────────────────────────┤
                                                      │ RAMP Time Unit(r.Unt)      │
                                                      └───────────────────────────┘
                                                             MODE
```

(※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.   MODE 3 sec.

High Function/High Performance 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

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/ Logic panel

(S) Field network device

(T) Production stoppage models & replacement

[MODE] 3 sec.

(※2) [A/M] H-ᵐ̄u Heating MV monitoring

(※2) [A/M] C-ᵐ̄u Cooliing MV monitoring

PAr3

[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-5C) |
| High Scaling(H-5C) |
| Display Unit(d.Unt) |
| Input Bias(In-b) |
| Input Digital Filter(ᵐ̄Au.F) |
| SV Low Limit(L-5u) |
| SV High Limit(H-5u) |
| Control output operation mode(o-Ft) |
| Temperature control type(C-ᵐ̄d) |
| Auto−tuning mode(Att) |
| OUT1 Control output selection(oUt1) |
| OUT1 SSR output type(o1.5r) |
| OUT1 Current output range(o1.ᵐ̄A) |
| OUT2 Control output selection(oUt2) |
| OUT2 Current output range(o2.ᵐ̄A) |
| Heating Control Time(H-t) |
| Cooling Control Time(C-t) |

[MODE]

[MODE] 3 sec.

PAr4

[MODE]

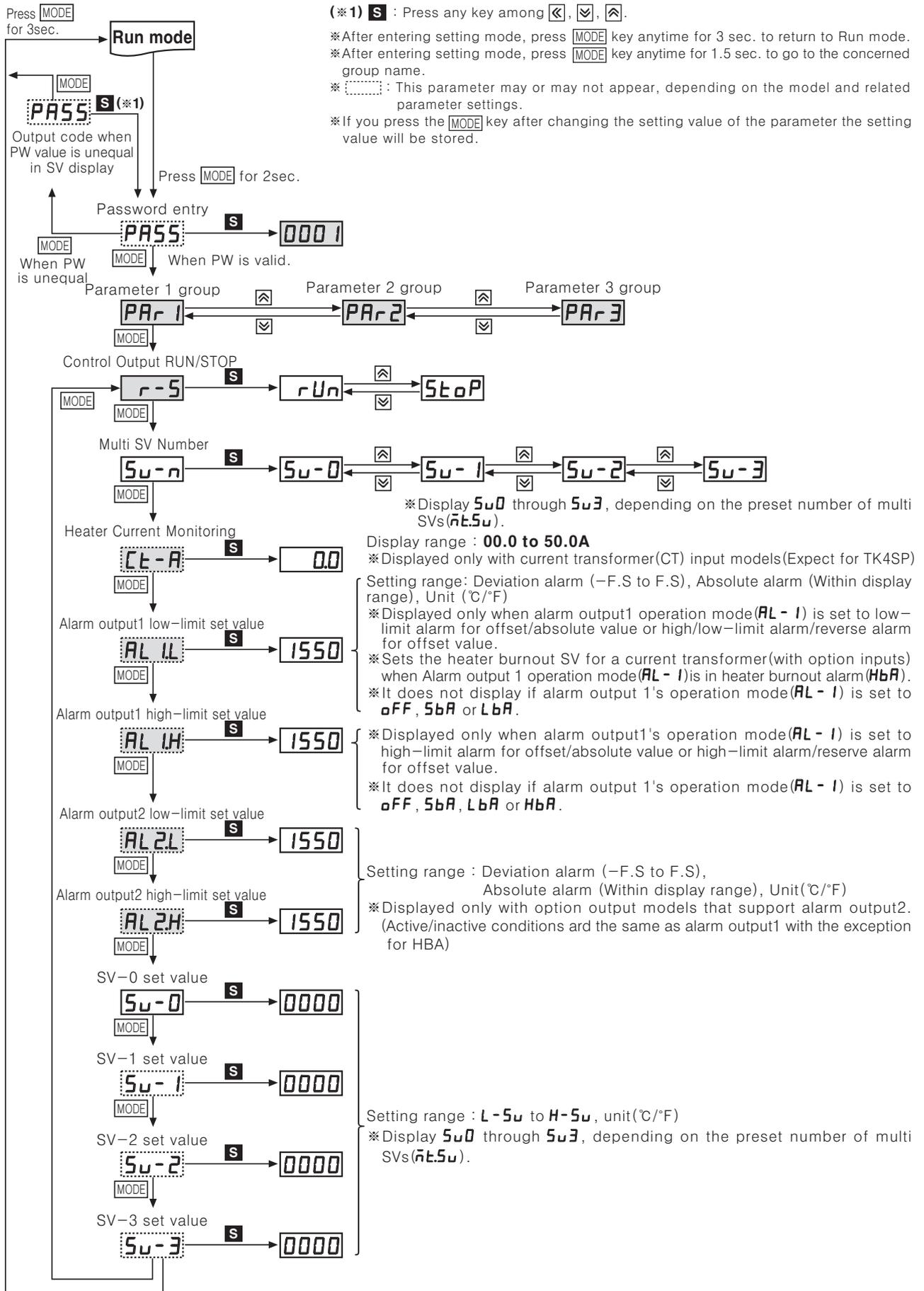| Alarm output1operation mode(AL-1) |
| --- |

[MODE] 1.5 sec.   [MODE]

| Alarm output1type(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 type(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(LbA5) |
| LBA Band(LbA.b) |
| Analog Output Mode(Ao-ᵐ̄) |
| Transmission OUT low scale(F5-L) |
| Transmission OUT high scale(F5-H) |
| Unit Address(Adr5) |
| Bit Per Second(bP5) |
| Parity Bit(PrtY) |
| Stop Bit(5tP) |
| Response Waiting Time(r5⸬t) |
| Communication Write(Coᵐ̄⸬) |

[MODE]   [MODE] 3 sec.

PAr5

[MODE]

Multi SV(ᵐ̄t.5u)

[MODE] 1.5 sec.   [MODE]

| Digital Input Key Function(di-t) |
| Digital Input 1(di-1) |
| Digital Input 2(di-2) |
| Initial Manual MV(It.ᵐ̄u) |
| Preset Manual MV(Pr.ᵐ̄u) |
| Error MV(Er.ᵐ̄u) |
| Stop MV(5t.ᵐ̄u) |
| Stop Alarm Output(5t.AL) |
| User Level(U5Er) |
| SV setting group lock(LC.5u) |
| 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.

TK Series

▣ Flow chart for setting group 1

Press MODE for 3sec.

Run mode

MODE

`PASS` **S** (※1)

Output code when PW value is unequal in SV display

MODE
When PW is unequal

Press MODE for 2sec.

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

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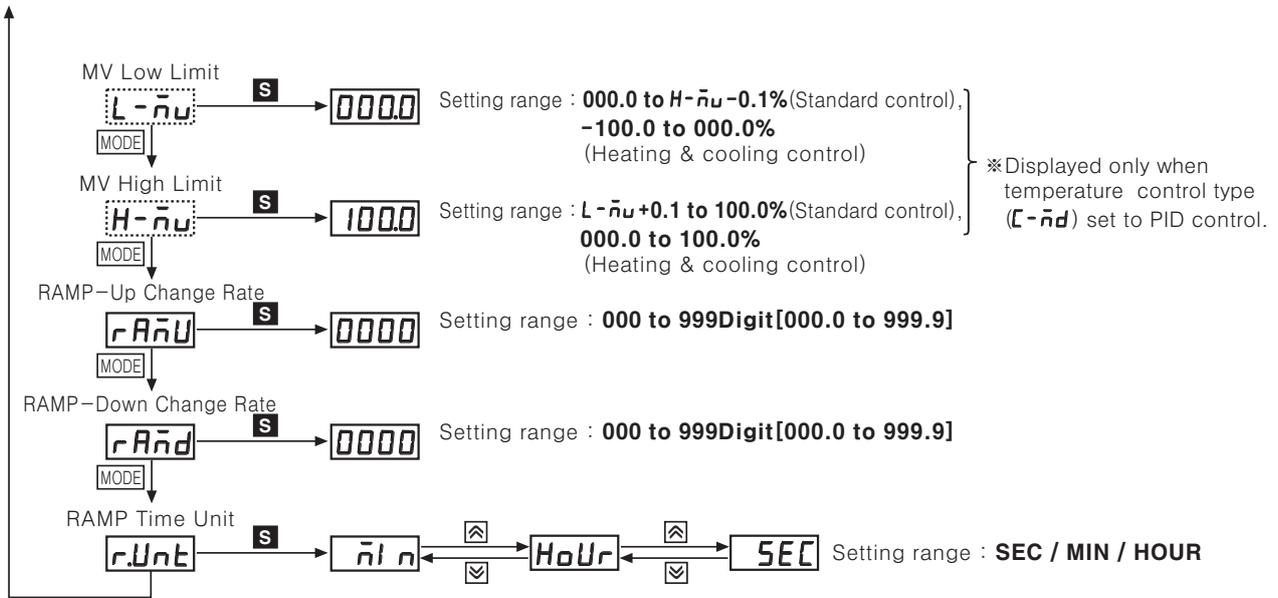※ After entering setting mode, press MODE key anytime for 1.5 sec. to go to the concerned group name.
※ ⌐ ⌐ : This parameter may or may not appear, depending on the model and related parameter settings.
※ If you press the MODE key after changing the setting value of the parameter the setting value will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

Password entry

`PASS` **S** → `0001`

MODE When PW is valid.

Parameter 1 group   **Parameter 2 group**   **Parameter 3 group**

`PAr 1` ⌃ ⌄ `PAr2` ⌃ ⌄ `PAr3`

MODE

Control Output RUN/STOP

`r-S` **S** → `rUn` ⌃ ⌄ `StoP`

MODE

Multi SV Number

`Su-n` **S** → `Su-0` ⌃⌄ `Su-1` ⌃⌄ `Su-2` ⌃⌄ `Su-3`

MODE

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

Heater Current Monitoring

`Ct-A` **S** → `0.0`

MODE

Display range : **00.0 to 50.0A**
※ Displayed only with current transformer(CT) input models(Expect for TK4SP)

Alarm output1 low−limit set value

`AL 1L` **S** → `1550`

MODE

Setting range: Deviation alarm (−F.S to F.S), Absolute alarm (Within display range), Unit (℃/℉)
※ 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`).
※ It does not display if alarm output 1's operation mode(`AL-1`) is set to `oFF`, `SbA` or `LbA`.

Alarm output1 high−limit set value

`AL 1H` **S** → `1550`

MODE

※ Displayed only when alarm output1's operation mode(`AL-1`) is set to high−limit alarm for offset/absolute value or high−limit alarm/reserve alarm for offset value.
※ It does not display if alarm output 1's operation mode(`AL-1`) is set to `oFF`, `SbA`, `LbA` or `HbA`.

Alarm output2 low−limit set value

`AL 2L` **S** → `1550`

MODE

Alarm output2 high−limit set value

`AL 2H` **S** → `1550`

MODE

Setting range : Deviation alarm (−F.S to F.S),
Absolute alarm (Within display range), Unit(℃/℉)
※ Displayed only with option output models that support alarm output2. (Active/inactive conditions ard the same as alarm output1 with the exception for HBA)

SV−0 set value

`Su-0` **S** → `0000`

MODE

SV−1 set value

`Su-1` **S** → `0000`

MODE

SV−2 set value

`Su-2` **S** → `0000`

MODE

Setting range : `L-Su` to `H-Su`, unit(℃/℉)
※ Display `Su0` through `Su3`, depending on the preset number of multi SVs(`nt.Su`).

SV−3 set value

`Su-3` **S** → `0000`

High Function/High Performance PID Control

■**Flow chart for setting group 2**
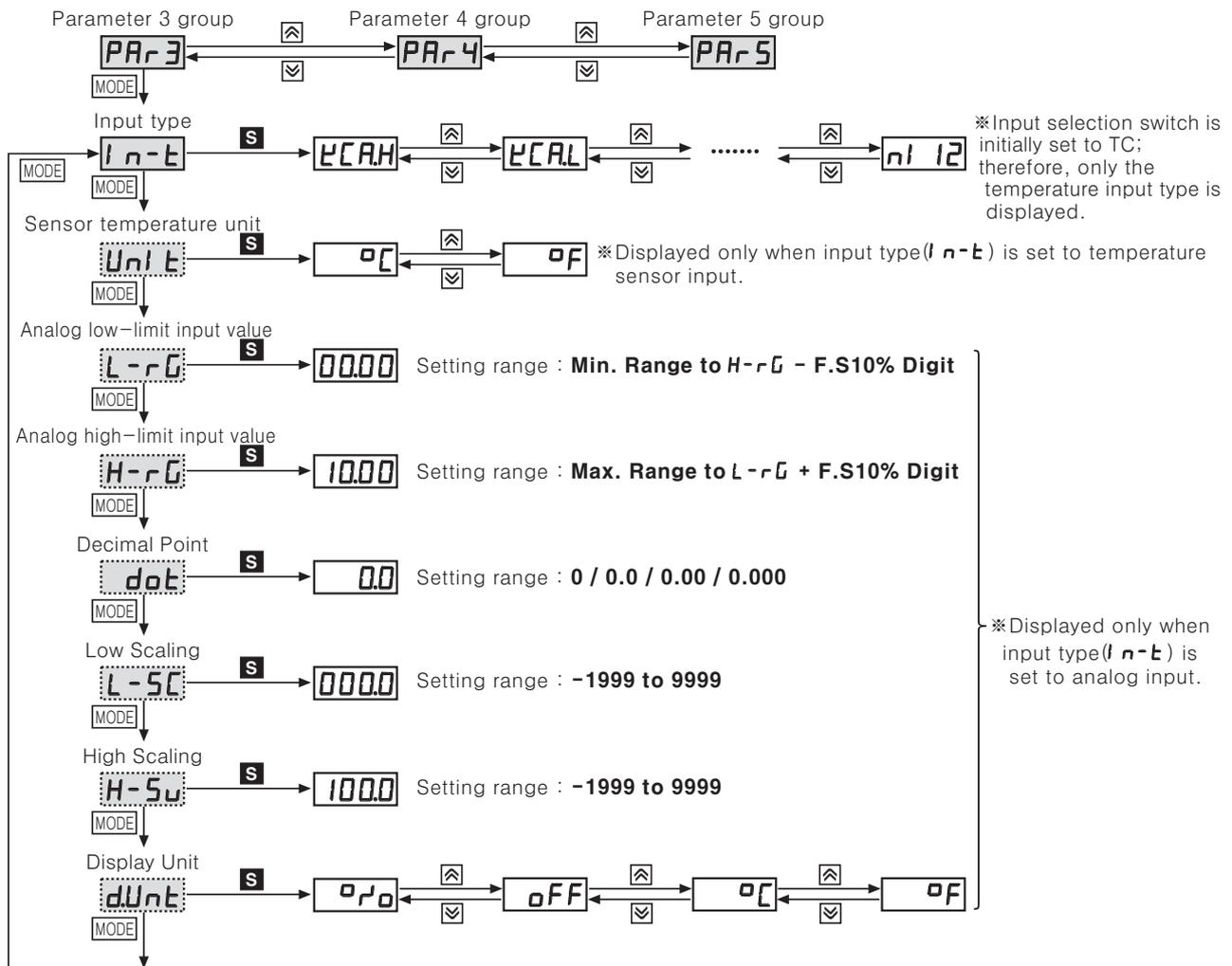
(※1) **S** : Press any key among ≪, ∨, ∧.

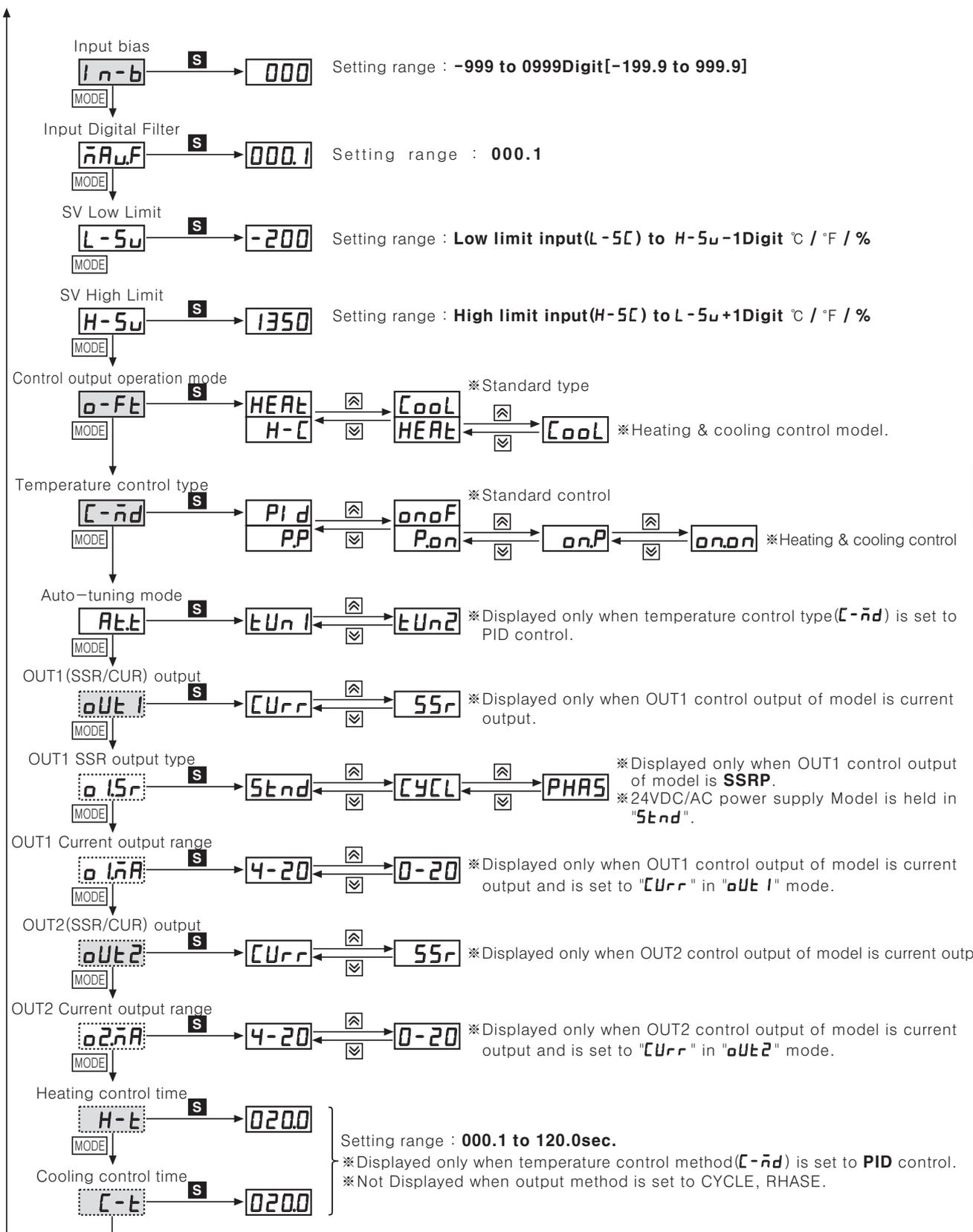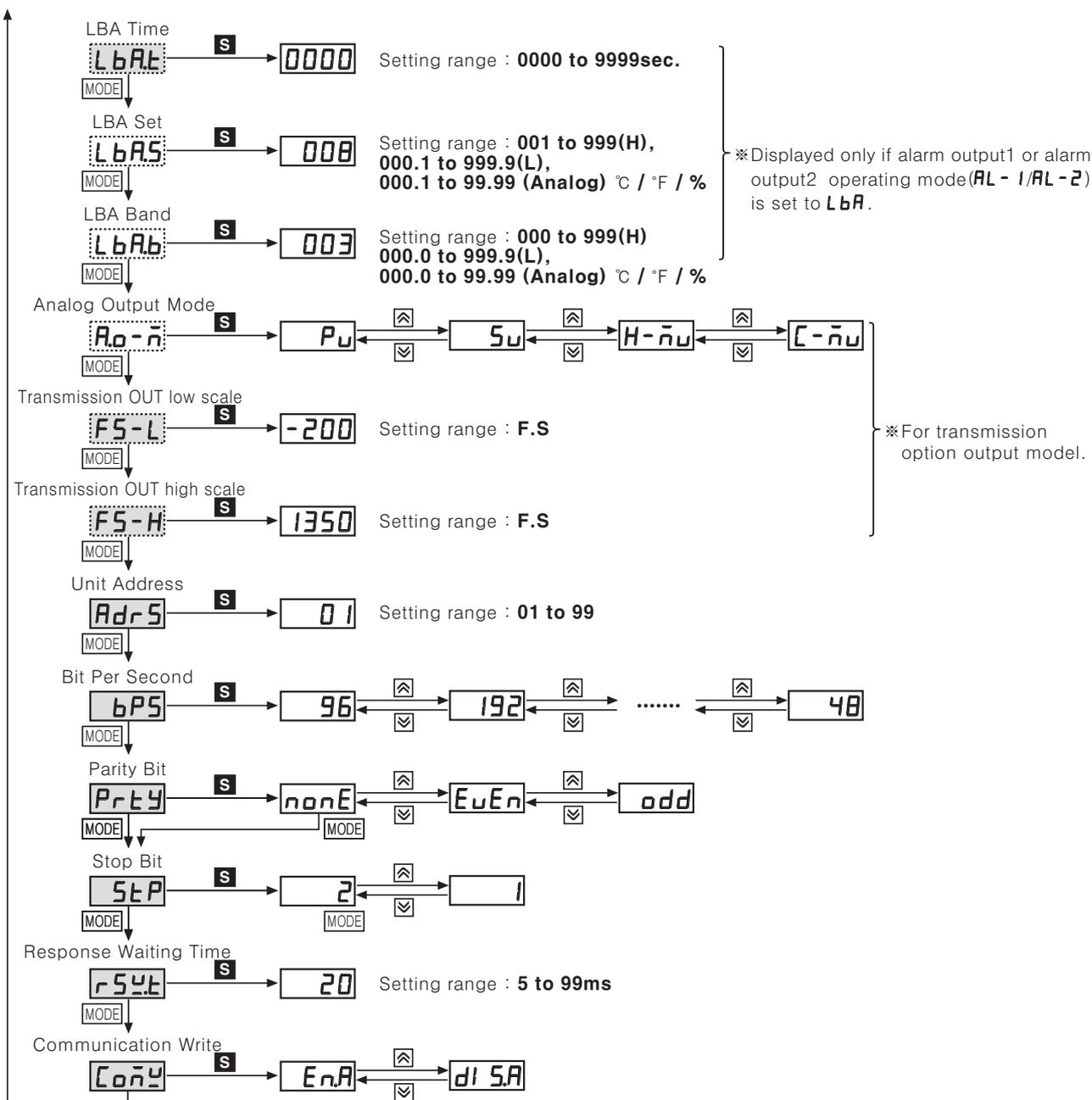※After entering setting mode, press MODE key anytime for 3 sec. to return to Run mode.
※After entering setting mode, press MODE key anytime for 1.5 sec. to go to the concerned group name.
※ ⬚ : This parameter may or may not appear, depending on the model and related parameter settings.
※If you press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

Parameter 2 group   Parameter 3 group   Parameter 4 group

PAr2 ⬅️ ∧/∨ ➡️ **PAr3** ⬅️ ∧/∨ ➡️ **PAr4**

Auto−Tuning execute
At **S** → **oFF** ⬅️∧/∨➡️ **on**

Heating Proportional Band
H-P **S** → **010.0**
Setting range : **000.1 to 999.9**℃ / ℉**, %**
※Displayed only when control output operation mode(**o-Ft**) is set to heating(**HEAt**) or heating and cooling(**H-C**).

Cooling Proportional Band
C-P **S** → **010.0**
Setting range : **000.1 to 999.9**℃ / ℉**, %**
※Displayed only when control output operation mode(**o-Ft**) is set to cooling(**CooL**) or heating and cooling(**H-C**).

Heating Integral Time
H-I **S** → **0000**
Setting range : **0001 to 9999sec.**
※Displayed only when control output operation mode(**o-Ft**) is set to heating(**HEAt**) or heating and cooling(**H-C**).

Cooling Integral Time
C-I **S** → **0000**
Setting range : **0001 to 9999sec.**
※Displayed only when control output operation mode(**o-Ft**) is set to cooling(**CooL**) or heating and cooling(**H-C**).

Heating derivative Time
H-d **S** → **0000**
Setting range : **0001 to 9999sec.**
※Displayed only when control output operation mode(**o-Ft**) is set to heating(**HEAt**) or heating and cooling(**H-C**).

Cooling derivative Time
C-d **S** → **0000**
Setting range : **0001 to 9999sec.**
※Displayed only when control output operation mode(**o-Ft**) is set to cooling(**CooL**) or heating and cooling(**H-C**).

※Displayed only when temperature control type(**C-n̄d**) is set to PID control.

Dead/Overlab Band
db **S** → **0000**
Setting range : P/P, P/ONOFF, ONOFF/P control : −significant proportion to 0.0 to +significant proportion
ONOFF/ONOFF control :**−999 to 0999Digit**(Temp. H),**−199.9 to 999.9Digit**(Temp. L), **−99.9 to 099.9% F.S**(Analog)
※Displayed only when control output operation mode(**o-Ft**) is set to heating and cooling(**H-C**).

Manual Reset
rESt **S** → **050.0**
Setting range : **000.0 to 100.0%**
※Displayed only under proportional control(**H-P** or **C-P** = **0.0**).
※Does not display if control output operation mode(**o-Ft**) is set to heating and cooling(**H-C**).

Heating ON Hysteresis
HHYS **S** → **002**
Setting range : **001 to 100Digit [000.1 to 100.0]**

Heating OFF Offset
H.oSt **S** → **000**
Setting range : **000 to 100Digit [000.0 to 100.0]**

※Displayed only when control output operation mode(**o-Ft**) is set to heating(**HEAt**) or heating and cooling(**H-C**).

Cooling ON Hysteresis
C.HYS **S** → **002**
Setting range : **001 to 100Digit [000.1 to 100.0]**

※Displayed only when temperature control type (**C-n̄d**) is set to ON/OFF control.

Cooling OFF Offset
C.oSt **S** → **000**
Setting range : **000 to 100Digit [000.0 to 100.0]**

※Displayed only when control output operation mode(**o-Ft**) is set to cooling(**CooL**) or heating and cooling(**H-C**).

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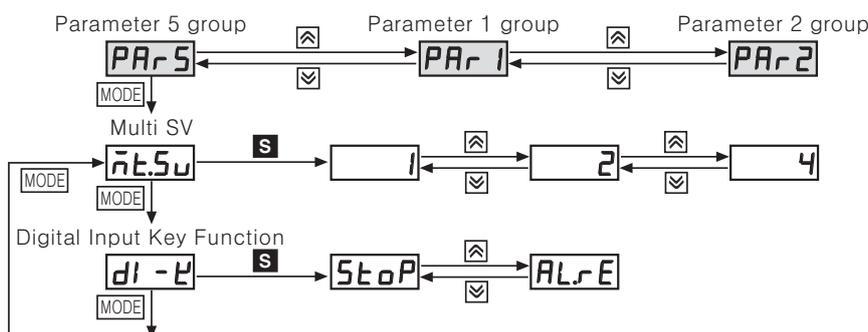(S) Field network device
(T) Production stoppage models & replacement

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MV Low Limit

`L-n̄u` → `000.0` Setting range : **000.0 to H-n̄u −0.1%**(Standard control),
−100.0 to 000.0%
(Heating & cooling control)

MV High Limit

`H-n̄u` → `100.0` Setting range : **L-n̄u +0.1 to 100.0%**(Standard control),
000.0 to 100.0%
(Heating & cooling control)

※Displayed only when temperature control type (C-n̄d) set to PID control.

RAMP−Up Change Rate

`rAn̄U` → `0000` Setting range : **000 to 999Digit[000.0 to 999.9]**

RAMP−Down Change Rate

`rAn̄d` → `0000` Setting range : **000 to 999Digit[000.0 to 999.9]**

RAMP Time Unit

`r.Unt` → `n̄ln` ⇄ `HoUr` ⇄ `SEC` Setting range : **SEC / MIN / HOUR**

▣ Flow chart for setting group 3

(※1) **S** : Press any key among ⟪, ⟱, ⟰.
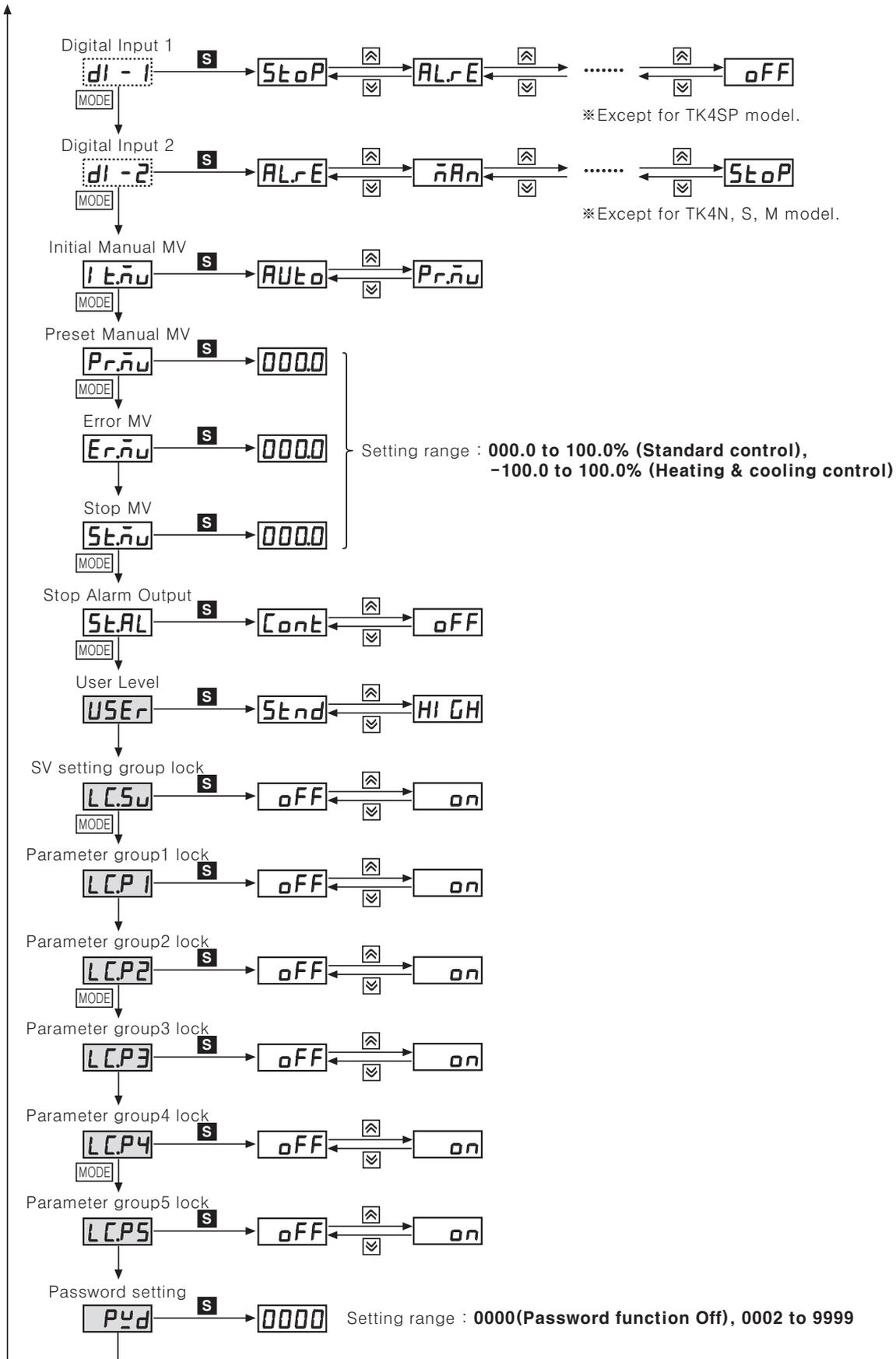※After entering setting mode, press MODE key anytime for 3 sec. to return to Run mode.
※After entering setting mode, press MODE key anytime for 1.5 sec. to go to the concerned group name.
※ [⋯⋯] : This parameter may or may not appear, depending on the model and related parameter settings.
※If you press the MODE key after changing the setting value of the parameter the setting value will be stored.

Parameter 3 group   **Parameter 4 group**   **Parameter 5 group**

`PAr3` ⇄ `PAr4` ⇄ `PAr5`

Input type

`In-t` → `ヒCA.H` ⇄ `ヒCAL` ⋯⋯ ⇄ `nl 12`

※Input selection switch is initially set to TC; therefore, only the temperature input type is displayed.

Sensor temperature unit

`Unlt` → `°C` ⇄ `°F` ※Displayed only when input type(In-t) is set to temperature sensor input.

Analog low−limit input value

`L-rG` → `00.00` Setting range : **Min. Range to H-rG − F.S10% Digit**

Analog high−limit input value

`H-rG` → `10.00` Setting range : **Max. Range to L-rG + F.S10% Digit**

Decimal Point

`dot` → `0.0` Setting range : **0 / 0.0 / 0.00 / 0.000**

Low Scaling

`L-SC` → `000.0` Setting range : **−1999 to 9999**

High Scaling

`H-Su` → `100.0` Setting range : **−1999 to 9999**

※Displayed only when input type(In-t) is set to analog input.

Display Unit

`d.Unt` → `°ro` ⇄ `oFF` ⇄ `°C` ⇄ `°F`

High Function/High Performance 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

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/ Logic panel

(S) Field network device

(T) Production stoppage models & replacement

Input bias
`In-b` [S] → `000` Setting range : **-999 to 0999Digit[-199.9 to 999.9]**
[MODE]

Input Digital Filter
`ōAu.F` [S] → `000.1` Setting range : **000.1**
[MODE]

SV Low Limit
`L-5u` [S] → `-200` Setting range : **Low limit input(L-5C) to H-5u-1Digit** ℃ / ℉ / %
[MODE]

SV High Limit
`H-5u` [S] → `1350` Setting range : **High limit input(H-5C) to L-5u+1Digit** ℃ / ℉ / %
[MODE]

Control output operation mode
`o-Ft` [S] → `HEAt H-C` ⇄ `Cool HEAt` ⇄ `Cool`   ※Standard type
[MODE]   ※Heating & cooling control model.

Temperature control type
`C-ōd` [S] → `PId P.P` ⇄ `onoF P.on` ⇄ `on.P` ⇄ `on.on`   ※Standard control
[MODE]   ※Heating & cooling control

Auto-tuning mode
`At.t` [S] → `tUn1` ⇄ `tUn2` ※Displayed only when temperature control type(C-ōd) is set to PID control.
[MODE]

OUT1(SSR/CUR) output
`oUt1` [S] → `CUrr` ⇄ `55r` ※Displayed only when OUT1 control output of model is current output.
[MODE]

OUT1 SSR output type
`o15r` [S] → `Stnd` ⇄ `CYCL` ⇄ `PHAS` ※Displayed only when OUT1 control output of model is **SSRP**.
[MODE]   ※24VDC/AC power supply Model is held in "**Stnd**".

OUT1 Current output range
`o1ōA` [S] → `4-20` ⇄ `0-20` ※Displayed only when OUT1 control output of model is current output and is set to "**CUrr**" in "**oUt1**" mode.
[MODE]

OUT2(SSR/CUR) output
`oUt2` [S] → `CUrr` ⇄ `55r` ※Displayed only when OUT2 control output of model is current output.
[MODE]

OUT2 Current output range
`o2ōA` [S] → `4-20` ⇄ `0-20` ※Displayed only when OUT2 control output of model is current output and is set to "**CUrr**" in "**oUt2**" mode.
[MODE]

Heating control time
`H-t` [S] → `020.0`
[MODE]

Cooling control time
`C-t` [S] → `020.0`

Setting range : **000.1 to 120.0sec.**
※Displayed only when temperature control method(C-ōd) is set to **PID** control.
※Not Displayed when output method is set to CYCLE, RHASE.

※OUT1, OUT2 output :
① In case that OUT1,OUT2 output is relay output type , `oUt1`,`o15r`,`o1ōA`,`oUt2`,`o25r`,`o2ōA` 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 `o15r`,`o25r` 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`,`o1ōA` are not displayed.
  - `o15r` can set to `Stnd`,`CYCL`,`PHAS`.
  - When `o25r` is set to `55r` it is held in `Stnd` and parameter is not displayed.

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TK Series

■Flow chart for setting group 4

Parameter 4 group — **PAr4**
Parameter 5 group — **PAr5**
Parameter 1 group — **PAr1**

Alarm output1 operation mode — **AL - 1** → **duCC** ↔ **JJdu** ↔ ⋯⋯ ↔ **oFF**

Alarm output1 type — **AL 1.t** → **AL - A** ↔ **AL - b** ↔ **AL - C** ↔ **AL - d**
※Displayed only if alarm output1's operating mode(**AL - 1**) is not set to **oFF**.

Alarm output1 hysteresis — **A 1.HY** → **001**
Setting range : **001 to 100Digit (000.1 to 100.0)**
※Displayed if alarm output1's operating mode(**AL - 1**) is set to high−limit, low−limit high/low−limit or reverse alarm for offset/absolute value.

Alarm 1 NO/NC — **A 1.n** → **no** ↔ **nC**

Alarm 1 ON Delay Time — **A 1.on** → **0000**
Setting range : **0000 to 3600sec.** ※Displayed only when alarm output1's operating mode (**AL - 1**) is not set to **oFF**.

Alarm 2 OFF Delay Time — **A 1.oF** → **0000**
Setting range : **0000 to 3600sec.**

Alarm output2 operation mode — **AL - 2** → **JJdu** ↔ **JduC** ↔ ⋯⋯ ↔ **duCC**

Alarm output2 type — **AL 2.t** → **AL - A** ↔ **AL - b** ↔ **AL - C** ↔ **AL - d**
※Displayed only if alarm output2's operating mode (**AL - 2**) is not set to **oFF**.

Alarm output2 hysteresis — **A2.HY** → **001**
Setting range : **001 to 100Digit[000.1 to 100.0]**
※Displayed if alarm output2's operating mode(**AL - 2**) is set to high−limit, low−limit, high/low−limit or reverse alarm for offset/absolute value.

Alarm 2 NO/NC — **A2.n** → **no** ↔ **nC**

Alarm 2 ON Delay Time — **A2.on** → **0000**
Setting range : **0000 to 3600sec.** ※Displayed only if alarm output2's operating mode(**AL - 2**) is not set to **oFF**.

Alarm 2 OFF Delay Time — **A2.oF** → **0000**
Setting range : **0000 to 3600sec.**

※Displayed only with option output models that support alarm output2.

High Function/High Performance 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

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/ Logic panel

(S) Field network device

(T) Production stoppage models & replacement

LBA Time
`L bA.t` — `S` → `0000`   Setting range : **0000 to 9999sec.**

LBA Set
`L bA.S` — `S` → `008`   Setting range : **001 to 999(H), 000.1 to 999.9(L), 000.1 to 99.99 (Analog)** ℃ / ℉ / **%**

LBA Band
`L bA.b` — `S` → `003`   Setting range : **000 to 999(H) 000.0 to 999.9(L) 000.0 to 99.99 (Analog)** ℃ / ℉ / **%**

※Displayed only if alarm output1 or alarm output2 operating mode(`AL - 1`/`AL -2`) is set to `L bA`.

Analog Output Mode
`Ao - n` — `S` → `Pu` ⇄ `Su` ⇄ `H- nu` ⇄ `C -nu`

Transmission OUT low scale
`FS-L` — `S` → `-200`   Setting range : **F.S**

Transmission OUT high scale
`FS-H` — `S` → `1350`   Setting range : **F.S**

※For transmission option output model.

Unit Address
`AdrS` — `S` → `01`   Setting range : **01 to 99**

Bit Per Second
`bPS` — `S` → `96` ⇄ `192` ⇄ .... ⇄ `48`

Parity Bit
`Prty` — `S` → `nonE` ⇄ `EuEn` ⇄ `odd`

Stop Bit
`StP` — `S` → `2` ⇄ `1`

Response Waiting Time
`rSt.t` — `S` → `20`   Setting range : **5 to 99ms**

Communication Write
`CoñY` — `S` → `En.A` ⇄ `di S.A`

■Flow chart for setting group 5

(※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.

Parameter 5 group `PArS` ⇄ **Parameter 1 group** `PAr 1` ⇄ **Parameter 2 group** `PAr2`

Multi SV
`ñt.Su` — `S` → `1` ⇄ `2` ⇄ `4`

Digital Input Key Function
`di - t` — `S` → `StoP` ⇄ `ALrE`

TK Series

Digital Input 1
`dI - 1` **S** → `StoP` ⇄ `AL.rE` ⇄ .... ⇄ `oFF`
MODE ↓
※Except for TK4SP model.

Digital Input 2
`dI -2` **S** → `AL.rE` ⇄ `mAn` ⇄ .... ⇄ `StoP`
MODE ↓
※Except for TK4N, S, M model.

Initial Manual MV
`I t.mu` **S** → `AUto` ⇄ `Pr.mu`
MODE ↓

Preset Manual MV
`Pr.mu` **S** → `000.0`
MODE ↓

Error MV
`Er.mu` **S** → `000.0`
Setting range : **000.0 to 100.0% (Standard control),**
−100.0 to 100.0% (Heating & cooling control)

Stop MV
`St.mu` **S** → `000.0`
MODE ↓

Stop Alarm Output
`St.AL` **S** → `Cont` ⇄ `oFF`
MODE ↓

User Level
`USEr` **S** → `Stnd` ⇄ `HIGH`
MODE ↓

SV setting group lock
`LC.Su` **S** → `oFF` ⇄ `on`
MODE ↓

Parameter group1 lock
`LC.P1` **S** → `oFF` ⇄ `on`

Parameter group2 lock
`LC.P2` **S** → `oFF` ⇄ `on`
MODE ↓

Parameter group3 lock
`LC.P3` **S** → `oFF` ⇄ `on`

Parameter group4 lock
`LC.P4` **S** → `oFF` ⇄ `on`
MODE ↓

Parameter group5 lock
`LC.P5` **S** → `oFF` ⇄ `on`

Password setting
`Pᵁd` **S** → `0000`   Setting range : **0000(Password function Off), 0002 to 9999**

High Function/High Performance PID Control

■Input sensor and range

Input sensor		Dot	Display	Input range(℃)	Input range(℉)
Thermocouple	K(CA)	1	�	−200 to 1350	−328 to 2463
		0.1	ㅏℂRL	−199.9 to 999.9	−199.9 to 999.9
	J(IC)	1	JI ℂH	−200 to 800	−328 to 1472
		0.1	JI ℂL	−199.9 to 800.0	−199.9 to 999.9
	E(CR)	1	EℂrH	−200 to 800	−328 to 1472
		0.1	EℂrL	−199.9 to 800.0	−199.9 to 999.9
	T(CC)	1	ℂℂℂH	−200 to 400	−328 to 752
		0.1	ℂℂℂL	−199.9 to 400.0	−199.9 to 752.0
	B(PR)	1	b Pr	0 to 1800	32 to 3272
	R(PR)	1	r Pr	0 to 1750	32 to 3182
	S(PR)	1	S Pr	0 to 1750	32 to 3182
	N(NN)	1	n nn	−200 to 1300	−328 to 2372
	C(TT)(※1)	1	ℂ ㅌㅌ	0 to 2300	32 to 4172
	G(TT)(※2)	1	ℂ ㅌㅌ	0 to 2300	32 to 4172
	L(IC)	1	LI ℂH	−200 to 900	−328 to 1652
		0.1	LI ℂL	−199.9 to 900.0	−199.9 to 999.9
	U(CC)	1	UℂℂH	−200 to 400	−328 to 752
		0.1	UℂℂL	−199.9 to 400.0	−199.9 to 752.0
	Platinel II	1	PLII	0 to 1390	32 to 2534
RTD	CU 50Ω	0.1	ℂU 5	−199.9 to 200.0	−199.9 to 392.0
	CU 100Ω	0.1	ℂU 10	−199.9 to 200.0	−199.9 to 392.0
	JIS Standard JPt 100Ω	1	JPℂH	−200 to 650	−328 to 1202
	JPt 100Ω	0.1	JPℂL	−199.9 to 650.0	−199.9 to 999.9
	DIN Standard DPt 50Ω	0.1	dPℂ5	−199.9 to 600.0	−199.9 to 999.9
	DPt 100Ω	1	dPℂH	−200 to 650	−328 to 1202
	DPt 100Ω	0.1	dPℂL	−199.9 to 650.0	−199.9 to 999.9
	Nickel 120Ω	1	nI 12	−80 to 200	−112 to 392
Analog	Voltage 0 to 10V		Au 1	−1999 to 9999 (Display point will be changed according to decimal point position.)	
	0 to 5V		Au2		
	1 to 5V		Au3		
	0 to 100mV		Añu 1		
	Current 0 to 20mA		AñA 1		
	4 to 20mA		AñA2		

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

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/ Socket

(H) Temp. controller

(I) SSR/ Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/ Speed/ Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/ Logic panel

(S) Field network device

(T) Production stoppage models & replacement

■Alarm output operation mode

Mode	Alarm output operation	Description(Default Deviation)
oFF	———————	■ No alarm output
duCC	OFF | H | ON ... SV 100℃ PV 110℃ / High deviation : Set as 10℃ — OFF|H| ON ... PV 90℃ SV 100℃ / 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 AL1.H / AL2.H.
ככdu	ON | H | OFF ... PV 90℃ SV 100℃ / Lower deviation : Set as 10℃ — ON|H|OFF ... SV 100℃ PV 110℃ / 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 AL1.L / AL2.L.
כduC	ON | H | OFF ... PV 90℃ SV 100℃ H| ON ... PV 120℃ / 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 AL1.H / AL2.H. Low−limit deviation temperature is set in AL1.L / AL2.L.
Cduכ	OFF|H| ON |H|OFF ... PV 90℃ SV 100℃ PV 120℃ / 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 AL1.H / AL2. H. Low−limit deviationtemperature is set in AL1.L / AL2.L.
PuCC	OFF|H| ON ... PV 90℃ SV 100℃ / Absolute−value Alarm : Set as 90℃ — OFF | H | ON ... SV 100℃ PV 110℃ / 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 AL1.H / AL2.H.
ככPu	ON | H | OFF ... PV 90℃ SV 100℃ / Absolute−value Alarm : Set as 90℃ — ON|H|OFF ... SV 100℃ PV 110℃ / 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 AL1.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	Mode	Description
AL-A	Standard alarm	If it is an alarm condition, alarm output is ON. Unless an alarm condition, alarm output is OFF.
AL-b	Alarm latch	If it is an alarm condition, alarm output is ON. Before reset the alarm, an ON condition is latched. (Holding the alarm output)
AL-C	Standby sequence1	When power is supplied and it is an alarm condition, alarm output does not act. From the second alarm conditions, standard alarm acts. Conditions of repeated stanby sequence : Power ON
AL-d	Alarm latch and standby sequence1	When power is supplied and it is an alarm condition, alarm output does not act. From the second alarm conditions, alarm latch acts. Conditions of repeated stanby sequence : Power ON
AL-E	Standby sequence2	When Standby sequence and it is an alarm condition, alarm output does not act. After deactivate the alarm condition, standard alarm acts. Conditions of repeated Standby sequence : Power ON, Changing SV, Related alarm(operation mode, option, setting value), Changing parameter, Changing STOP mode to RUN mode.
AL-F	Alarm latch and standby sequence2	When Standby sequence is repeated and it is an alarm condition, alarm output does not act. After deactivate the alarm condition, alarm latch acts. Conditions of repeated Standby sequence : Power ON, Changing SV, Related alarm(operation mode, option, setting value), Changing parameter, Changing STOP mode to RUN mode.

High Function/High Performance PID Control
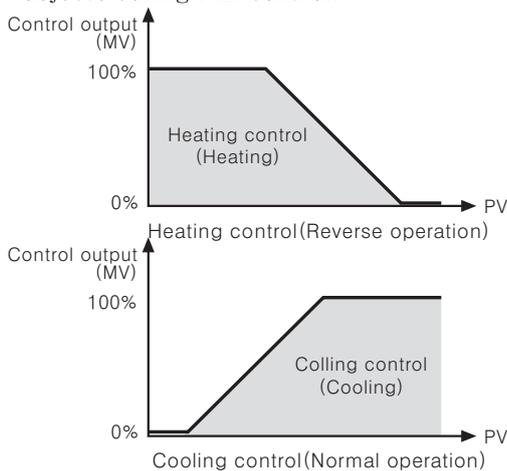
(A) Photo electric sensor

(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

(O) Sensor controller

(P) Switching power supply

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(R) Graphic/ Logic panel

(S) Field network device

(T) Production stoppage models & replacement

▣ Front panel display when power is ON

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

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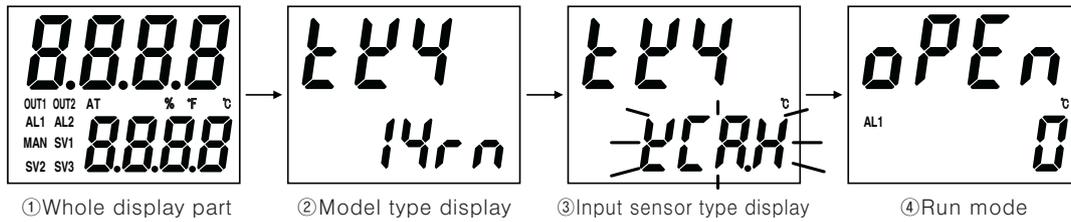
▣ Factory default

● SV setting group [5υ]

Mode	Factory Default
5υ	0

● Password input Parameter

Mode	Factory default
PA55	0001

● Parameter setting group 1 [PAr1]

Mode	Factory default	Mode	Factory default	Mode	Factory default	Mode	Factory Default
r-5	rUn	AL1.L	1550	AL2.H	1550	5υ-2	0000
5υ-n	5υ-0	AL1.H	1550	5υ-0	0000	5υ-3	0000
Ct-A		AL2.L	1550	5υ-1	0000		

● Parameter setting group 2 [PAr2]

Mode	Factory default	Mode	Factory default	Mode	Factory default	Mode	Factory default
At	oFF	H-d	0000	H.oSt	000	rAmU	000
H-P	0 10.0	C-d	0000	C.HY5	002	rAmd	000
C-P	0 10.0	db	0000	C.oSt	000	r.Unt	mln
H-I	0000	rESt	050.0	L-mυ	100.0 (Standard type)		
C-I	0000	H.HY5	002	H-mυ	100.0 (Heating & Cooling type)		

● Parameter setting group 3 [PAr3]

Mode	Factory default	Mode	Factory default	Mode	Factory default	Mode	Factory default
In-t	YCA.H	H-5C	100.0	o-Ft	HEAt (Standard type)	o1.5r	5tnd
Unit	°C	dUnt	°ro		H-C (Heating & Cooling type)	o1.mA	4-20
L-rG	00.00	In-b	0000	C-md	PI d (Standard type)	oUt2	CUrr
H-rG	10.00	mAυF	000.1		P.P (Heating & Cooling type)	o2.mA	4-20
dot	0.0	L-5υ	-200	At.t	tUn1	H-t	020.0 (Relay)
L-5C	000.0	H-5υ	1350	oUt1	CUrr	C-t	002.0 (SSR drive)

● Parameter setting group 4 [PAr4]

Mode	Factory default	Mode	Factory default	Mode	Factory default	Mode	Factory default
AL-1	dυCC	AL-2	JJdυ	LbA.t	0000	Adr5	01
AL1.t	AL-A	AL2.t	AL-A	LbA.5	008	bP5	96
A1.HY	001	A2.HY	001	LbA.b	003	PrtY	nonE
A1.n	no	A2.n	no	Ao-m	Pυ	5tP	2
A1.on	0000	A2.on	0000	F5-L	-200	r5Yt	20
A1.oF	0000	A2.oF	0000	F5-H	1350	ComY	En.A

● Parameter setting group 5 [PAr5]

Mode	Factory default	Mode	Factory default	Mode	Factory default	Mode	Factory default
mt.5υ	1	Pr.mυ	000.0	LC.5υ	oFF	LC.P5	oFF
di-t	5toP	Er.mυ	000.0	LC.P1	oFF	PYd	0000
di-1	5toP	5t.mυ	000.0	LC.P2	oFF		
di-2	AL.rE	5t.AL	Cont	LC.P3	oFF		
It.mυ	AUto	U5Er	5tnd	LC.P4	oFF		

▣Functions

◎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.

Control output (MV)

100%

Heating control (Heating)

0% ————————————→ PV

Heating control(Reverse operation)

Control output (MV)

100%

Colling control (Cooling)

0% ————————————→ PV

Cooling control(Normal operation)

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 chosen according to your application environment. (Note that only standard SSR control is available for SSR output in OUT2.)

Cooling load

Temperature drop

Temperature sensor Input(feedback)

Temperature rise

Heating load

Cooling control output

Temperature controller

Cooling control

Heating control

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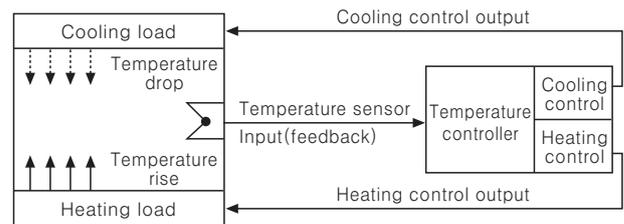
※For heating and cooling control, OUT1 control output is dedicated to heating control and OUT2 control output to cooling control.

◎Auto-tuning[At]

In PID control, auto-tuning determines 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 [oUt1 / 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	oUt1	SSr / CUrr	SSr	–
	oUt2			

◎For more information, refer to user manual.

High Function/High Performance PID Control

▣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, Max. 5.8mm) 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 CategoryⅡ.

● 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.