P Series PID Temperature Controller

- PID & Self-tuning function with 16bit microprocessor operation core.
- Various input signals for option (thermocouples, platinum resistance, analog signals, etc.).
- Main control output can be selected from relay, pulse voltage, linear analog signals so as to drive all types of contactors, SSR's, SCR's, motor valves, etc.
- Can set reverse / forward control (heating or cooling procedure).
- Dual output model can do heating / cooling two-way PID control.
- Set Value (SV) can do remote setting function (RSV) through analog signal input.
- 26 alarm modes for option. Heater break alarm function (HBA) attachable.
- Re-transmitting function can convert PV or controlling output into analog signal output for recorder or other application.
- Provides manual output mode.
- Serial communication support RTU and ASCII formats of ModBus. The maximum speed can reach 38,400bps.
- Procedure control provides 16 temperature levels. Users can plan operating blocks and repeating times.

■Product Index Code Explanation

P10	-	1	0	1	0	-	0	0	0	A	P
Model		Output 1	Output 2	Alarm	Input Type		Remote SV	Transmitting Output	Communication	Power Supply	Water Proof

Model

P10	48X48mm
P20	48X96mm
P30	96X48mm
P50	72X72mm
P60	96X96mm
Procedure Control	
P11	48X48mm
P21	48X96mm
P31	96X48mm
P51	72X72mm
P61	96X96mm

Output 1

0	Null
1	RELAY
2	Logic Voltage (SSR Control)
3	4~20mA
4	0~5V
5	1~5V
6	0~10V
7	2~10V
8	3-line proportional motor controlling

Output 2

0	Null
1	RELAY
2	Logic Voltage (SSR Control)
3	4~20mA
4	0~5V
5	1~5V
6	0~10V
7	2~10V

Alarm

0	Null
1	1 set
2	2 sets
3	3 sets
A	HBA(50A)*1
B	HBA+AL2
C	HBA+AL2,3
D	HBA(100A)
E	HBA+AL2
F	HBA+AL2,3

Input Type

0	Thermocouple
1	RTD
	-
3	4~20mA
4	0~5V
5	1~5V
6	0~10V
7	2~10V

Remote SV

0	Null
	-
	-
3	4~20mA
4	0~5V
5	1~5V
6	0~10V
7	2~10V

Transmitting Output

0	Null
	-
	-
3	4~20mA
4	0~5V
5	1~5V
6	0~10V
7	2~10V

Communication

0	Null
1	RS232
2	RS485

Power Supply

A	90~240 VAC
D	24~40V DC/AC

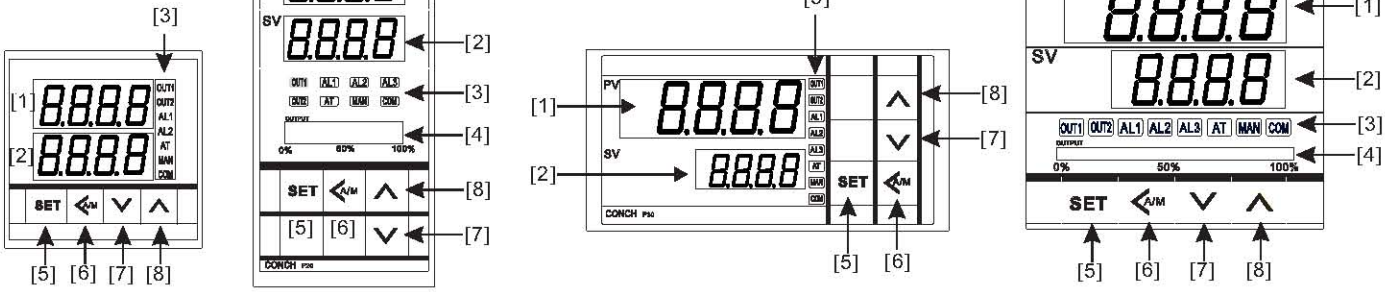
Water Proof

P	Yes
	(Blank) No

***1. If HBA function is available, AI1 function will be disabled. Select suitable amperage (50 or 100A) according to the load current magnitude.**
***2. HBA and RSV cannot be allocated together.**

■ Panel Explanation for All Types

P10 P20 P30 (P50,P60)



[1]. PV(Process Variable): Displays metered value or menu in setting mode.
[2]. SV(Set Value): Displays target value or values of parameters in setting mode.
[3]. Status Index Lamp
OUT1(Green)=Output 1; OUT2(Green) =Output 2;
AL1~AL3(Red)=Alarm; AT(Yellow)=Auto-tuning;
MAN(Yellow) =Manual Mode; COM(Yellow)=Communication.
[4].OUT1: Output amount indicator (%). Shown with 10 LED .
[5]. [SET] Key: Activates or ends parameter setting.
[6]. [Left] Key (A/M): To move the cursor in the setting mode to change the parameter values, switch between Auto/Manual mode in display mode, or cancel Auto-Tuning operation.
[7]. [Down] Key: To decreases parameter value at setting.
[8]. [Up] Key: To increase parameter value at setting.

■ Product Specifications / Features

Model		P10	P20	P30	P50	P60
Dimension (W*D)		48X48mm	48X96mm	96X48mm	72X72mm	96X96mm
Power Supply		AC90~240V(60/50Hz), DC24V(optional)				
Power Consumption (Approx.)		4 VA	4 VA	4 VA	5 VA	5 VA
Net Weight (Approx.)		130g	200g	200g	200g	280g
Storage / Operating Environment		0~65°C/0~50°C, 20~90%RH				
Data Backup Memory		EEPROM,10 years				
Accuracy		0.2%FS±1DIG (except thermocouple type B & S)				
Digit Height (mm)	PV (Red)	8	8	13	14	14
	SV (Green)	8	8	10	10	10
Alarm Output		Relay contact 8A,250VAC				
Controlling Method		Controlling selection of ON/OFF, P, PI, PD, PID				
Controlling Output	Relay	A contact 5A/250V	A, B contact 8A/250V			
	Logic Voltage	PWM Pulse voltage (to drive SSR): On=24V; Off=0V(20mA Max.)				
	Linear Analog	Current: 0~20mA,4~20mA (Input impedance: 600Ω Max.) Voltage: 0~5V,1~5V,0~10V,2~10V (Input Impedance: 1KΩ Min.) Resolution: Approx. 1,000 scales				
Input Type	Thermocouple	K, J, R, S, B, E, N, T, W3, W5, PL-II(Input impedance: Approx. 1MΩ)				
	RTD	PT-100(DIN),JPT-100(JIS)				
	Linear Analog	0~10mV,0~20mV,0~50mV,4~20mA,0~10V... Please refer to Input Type List.				

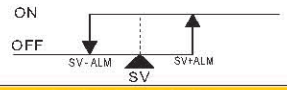
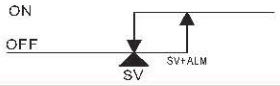
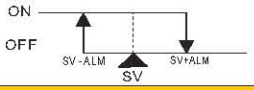
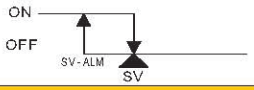
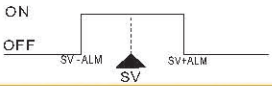
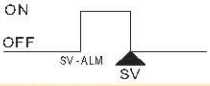
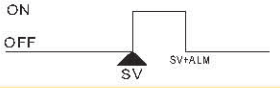
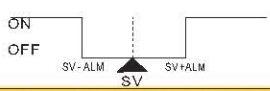
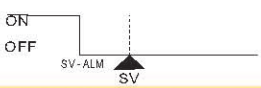
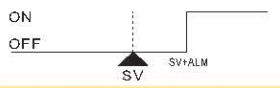
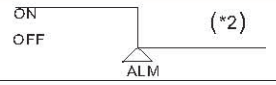
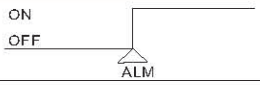
■ List of Input Type

Input Type		Code	Metering Range	Code	Metering Range	Code	Metering Range
Thermocouple	K	K1	0.0~200.0°C/0.0~392.0°F	K2	0.0~400.0°C/0.0~752.0°F	K3	0~600°C/0~1112°F
		K4	0~800°C/0~1472°F	K5	0~1000°C/0~1832°F	K6	0~1200°C/0~2192°F
	J	J1	0.0~200.0°C/0.0~392.0°F	J2	0.0~400.0°C/0.0~752.0°F	J3	0~600°C/0~1112°F
		J4	0~800°C/0~1472°F	J5	0~1000°C/0~1832°F		
	R	R1	0~1700°C/0~3092°F				
	S	S1	0~1700°C/0~3092°F				
	B	B1	0~1820°C/0~3308°F				
	E	E1	0~800°C/0~1472°F				
	N	N1	0~1300°C/0~2372°F				
	T	T1	0.0~200.0°C/0.0~392.0°F	T2	0.0~400.0°C/0.0~752.0°F		
	W	W3	0~2300°C/0~4172°F	W5	0~2000°C/0~3632°F		
	PL-II	PL2	0~1390°C/0~2534°F				
RTD	Pt100 DIN	PT1	-199.9~200.0°C/-199.9~392.0°F	PT2	-199.9~400.0°C/-199.9~752.0°F	PT3	-199.9~600.0°C/-199.9~1112.0°F
		PT4	0~200°C/0~392°F	PT5	0~400°C/0~752°F	PT6	0~600°C/0~1112°F
	Pt100 JIS	JP1	-199.9~200.0°C/-199.9~392.0°F	JP2	-199.9~400.0°C/-199.9~752.0°F	JP3	-199.9~600.0°C/-199.9~1112.0°F
		JP4	0~200°C/0~392°F	JP5	0~400°C/0~752°F	JP6	0~600°C/0~1112°F
Analog Signal	10mV	An10	-1999~9999/10mV				
	20mV	An20	-1999~9999/20mV				
	50mV	An50	-1999~9999/50mV				
	Other	USER	-1999~9999/(4~20mA,1~5V,0~10V,....) (Optional)				

Notes: 1. [Code] means changing different detecting range with the same sensor signal can be done by selecting via the panel.
2. The range of "Analog Signal" must be selected according to the input specification to avoid damaging the controller. The display range can be planned freely.
3. "USER": The type of analog input is determined at placing of order; users cannot change it.

■Alarm Output Types

There are 26 types of alarm outputs, represented with codes 00~26. 00 represents alarm disabled; odd numbers represents that the first output after start up is disabled. 25 & 26 are exclusive alarm output for process control.*1

Code 01,02: Relative high alarm		Code 03, 04: Relative deviation high
		
Code 05,06: Deviation low alarm	Code 07, 08: Relative deviation low	
		
Code 09,10: Band alarm	Code 11, 12: Low alarm	Code 13, 14: High alarm
		
Code 15,16: Deviation high/low	Code 17,18: Deviation low alarm	Code 19, 20: Deviation high alarm
		
Code 21, 22: Process low alarm	Code 23, 24: Process high alarm	Code 25, 26: Process Control
		(*3)

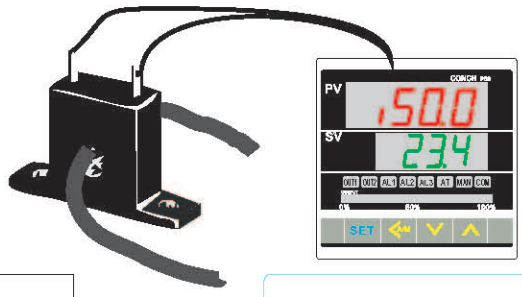
*1.
The control can provide at most 2~3 alarms. Each alarm has settable parameters of alarm modes and output time.
The operations of alarm of High & Low are as follows: (taking function 02 with ALM set as 0 as example)
High (Right) condition: (SV+ALM) > PV
Low (Left) condition: (SV-ALM) <=PV

*2.
If the controller is equipped with HBA (broken-line alarm) function, then AL1 is HBA output, and function code is forced as 22. Users can not change. Only delay time (A1Tr) is reserved for setting. Range: - 5 ~ -1999 sec.

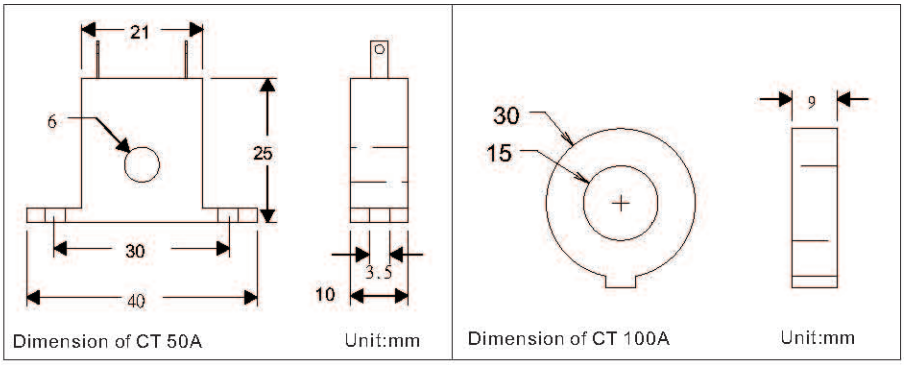
*3. For models with process control, if AL1~AL3 need to be assigned to make alarm output when the program completes each level, the alarm parameter can be set as 25, and set the value of AL1~AL3 to designate level numbers (0~15).

Note: For non-process-control models, if the function code is set as 25 & 26, the alarm will be invalid.

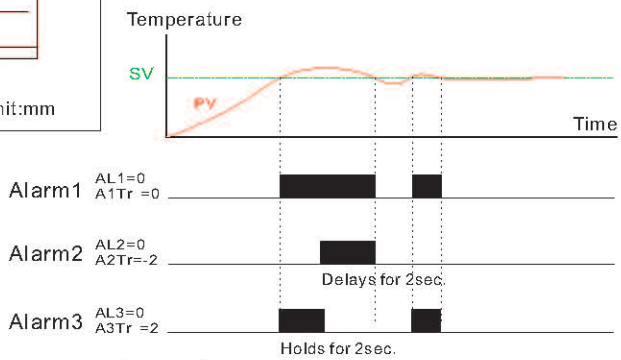
- Heater Break Alarm (HBA):
  Detects the working current of heating lines with CT and the controller judges if the heating line breaks and make alarm output. The output conditions are as below:
  1. Output is at ON status.
  2. Current value is lower than the set value of HBA.
  3. Continues for more than (A1Tr) time. Range:-5 ~ -1999.
  4. Controlling signal of Out1 must be relay or logic voltage.



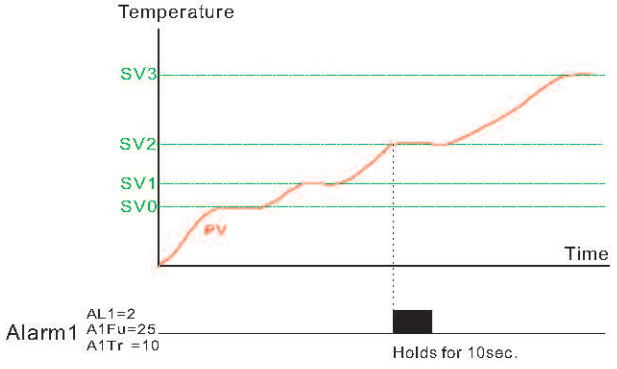
Set Current of HBA:
The upper row displays present current value at CT (50.0A); the lower row displays set alarm value.



•Alarm Output Hold/Delay Time:
A1Tr~A3Tr parameters process output time controlling in accordance with each alarm. Range: -1999sec. ~ 9999sec.(except HBA). The meanings are as follows:
1. Negative value: when alarm condition is reached, delays output and self-hold.
2. Zero: when the alarm condition is reached, outputs immediately output and self-hold.
3. Positive value: outputs immediately when alarm condition is reached, and hold as long as the set time.



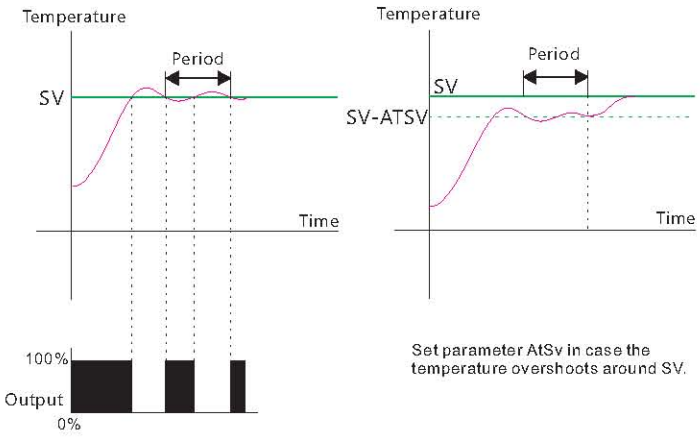
•Process Control Alarm Output: (Optional)
Except for being used as over-heat alarm, if function code (A1Fu~A3Fu) is set at 25, AL1~AL3 will output when the level is reached. By using this operation, the controller can do other applications, such as opening the furnace gate or charging process controlling, etc.
AL1~AL3 define after which level ALM outputs, and then use A1Tr~A3Tr to control the output time.



■Auto-tuning (AT) of PID

AT adopts Relay ON/OFF to detect the dynamic characteristics of the Process, and calculate the best parameter combination of P, I, & D according to the data.
During AT, the operation must be kept under the condition where the process is not interfered.
After AT is completed (AT lamp goes off), the three parameters of P, I, & D will renew themselves, and then enter a new PID auto-control mode.
If any one of the following situations occurs, AT will stop and enter manual mode without changing values of PID:

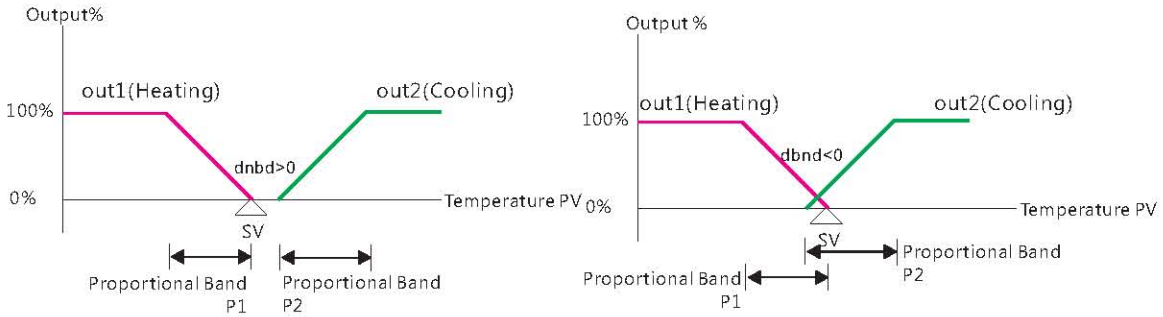
- Any exception occurs (including power failure).
- The On or Off period of output exceeds 2 hours.
- A/M is held for over 2 seconds. (forcing to manual mode).



Set parameter AtSv in case the temperature overshoots around SV.

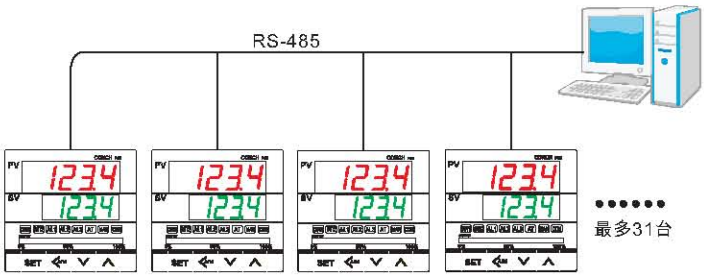
■Heating / Cooling Control (Optional)

Out1(heating terminal) and Out2(cooling terminal) can set gap or output overlapping via parameter "dbnd".



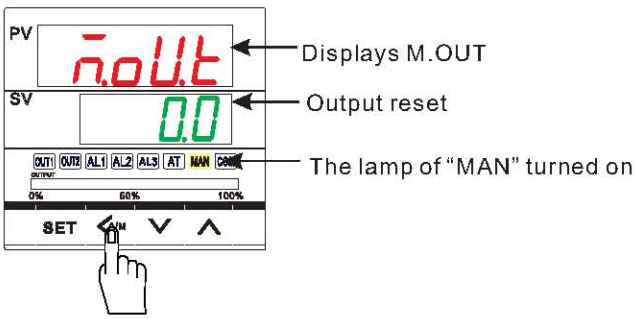
■Serial Communication (Optional)

Users can opt for RS-232 or RS-485 serial communication interface to connect the control with PC, PLC or HMI. Connections can be as many as 31 controllers with RS-485.



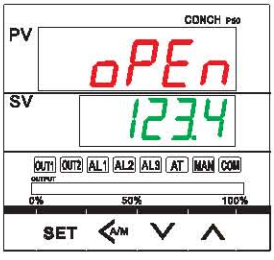
■Auto / Manual Shifting

In PV & SV display mode, hold A/M key for 2 sec. to switch Auto / Manual mode. In manual mode, the yellow lamp of "MAN" is alighted. Press left key to set OUT1. Range: 0.0~100.0%; OUT2 Range: -0.1~ -100.0%.
To end manual mode, just hold A/M key for 2 sec. to return to auto mode.



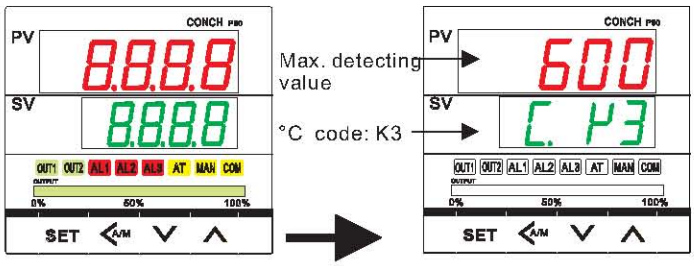
■Broken-line Detecting of Input Signal

When signals from the sensor of the controller fail, the temperature value will rise to the maximum value and then the controller will display "oL", then "open". ALM will adopt the highest temperature as the comparing



■Startup Screen

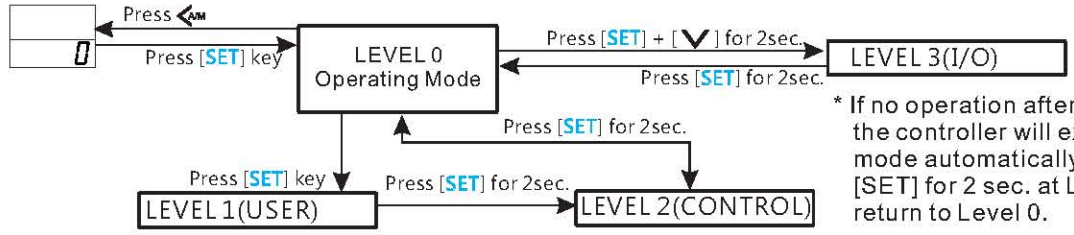
After the power supply is connected, the controller will turn on all the LED for 3 seconds to check missing segment, and then displays the maximum detecting value, code of input signal type, unit, and then enters display mode of PV & SV, and controls the value in automatic mode.



■ Parameter Groups

The interior parameters of the controller can be divided into 3 groups (LEVEL1 ~ LEVEL3) according to their properties so as to make settings more convenient. The setting authorities of groups are restricted with the parameter LOCK. LEVEL1 is User's Parameter Group, the group of parameters that are changed most often. LEVEL2 is Controlling Parameter Group, which gathers parameters about auto controlling. LEVEL3 is I/O Group (input/output), which gathers such parameters as the change of sensor, adjustment of analog output, and communication. (Note: Changeable parameter series are opened or filtered according to model types or optional items.)

SV(Set Value):
Setting of target value.
Range: Sv L~ Sv H



* If no operation after 60 seconds, the controller will exit the setting mode automatically. Or, press [SET] for 2 sec. at Level 2 or 3 to return to Level 0.

Parameters of Level 1

Display	Text	Description	Default
AL 1 / 0	AL1	Setting of Alarm 1. Range: -1999~9999	0
i 0.0 / 0.0	i 0.0	HBA function (optional). Alarm current is set through the lower display. AL1 is unavailable if this function is chosen. The upper display is actual current value. Range: 0~99.9	0.0 (Ampere)
AL 2 / 0	AL1	Setting of Alarm 2 (optional). Range: -1999~9999	0
AL 3 / 0	AL1	Setting of Alarm 3 (optional.) Range: -1999~9999	0
At / no	At	Auto-tuning Range: No / Yes	No
The following parameters are exclusively for process control (optional)			
Strt / 0	Strt	Setting of initiation of levels. Process starts here. Range: 0~15	0
End / 15	End	Setting of end of level. The last level of the process. Range: Strt~15 Executing intervals are defined by Strt and End.	0
rEPt / 0	rept	Setting of repeating times of the process. Range: 0~9999(times) 0 means infinite looping.	0
PF / no	PF	Handling measure at power failure. Range: No / Yes Yes= Continues after power reconnected. No =Stops after power reconnected.	No
uAit / 0	Wait	Waiting temperature. When temperature reaches the deviation area, the unit will execute next process. 0 means no waiting. Range: 0~1000	0
Su 0 / 0	Sv0	Target value of SV of Level 0. Range: Subject to specification.	0
tr 0 / 0	tr0	Heating time of Level 0 Range: 0~6000(minutes)	10
Ho 0 / 100.0	Ho 0	Output high limit of Level 0 Range: 0~100.0%	100.0%
Parameters of Level 1 ~ 15 are the same with the above and skipped here. Level parameters (strt ~ end) outside the area can be filtered at setting to save plan time.			

Parameters of Level 2

Display	Text	Description	Default
P 1 / 6	P 1	Proportion band 1. Range: 0~2000 (°C,°F) or 0.0~200.0(°C,°F). 0 means controlled via ON-OFF.	6.0
i / 240	I	Integral time. Range: 0~3600sec. 0 means integration disabled and doing P-D contolling.	240
d / 60	d	Differential time. Range: 0~90sec. 0 mean differentiation disabled and doing P-I controlling.	60
CYC 1 / 10	CYC 1	Cycle time of Out 1. Range: 0~120sec.	10
Cy t / 20	Cy t	Setting of 3-line proportional valve processing time (optional) Range: 5~200sec.	20
P2 / 6	P 2	Proportion band 2 (optional). Range: same with P1.	6.0
CYC2 / 10	CYC2	Cycle time of Out 2 (optional). Range: 0~120sec.	10
dbnd / 0	End	Dead band of out2 (optional): for dual output models. Range: -999~999	0
AtSu / 0	rept	AT Offset The offset of SV at Auto-tuning. Range: 0~999 (0.0~99.9)	0
HYS / 0	HYS	Width of hysteresis. The hysteresis of output when P=0 (ON-OFF). PV>SV: Off; PV<(SV-HYS): On. Range: 0~900(0.0~90.0)	0
o1Lo / 0.0	o1Lo	Low limit of Out1. Range: 0.0~30.0%	0.0%
o1Hi / 100.0	o1Hi	High limit of Out1. Range: 50.0~100.0%	100.0%
o2Lo / 0.0	o2Lo	Low limit of Out2 (optional). Range: 0.0~30.0%	0.0%
o2Hi / 100.0	o2Hi	High limit of Out2(optional). Range: 50.0~100.0%	100.0%
SoFt / 0	Soft	Setting of output softening. The higher the value is, the slower the output reaches 100%. Range: 0~20	0
Aru / 100	ARW	Anti-reset windup: To reduce the integral area to lower overshoot. Range: 0~100%	100%
SELF / no	Self	Self-tuning of OUT 1. Range: Yes / No	No

Parameters of Level 3

Display	Text	Description	Default
inty / K3	inty	To change the type of input sensor. Range: K1~User	K3 (subject to model type)
Pnt / 0	Pnt	Decimal Point: To set the decimal place for analog input type. Range: 0~3 (unavailable to thermocouple and PT100).	N/A
SSEL / rSu	SSEL	(Optional) To choose SV of the panel or RSV as target value.	RSV
SuCm / 0	SvCm	QSV Compensation Quantity: Range: -999~999 (or -99.9~99.9).	0
PuCm / 0	PvCm	PV Compensation Quantity: Range: -999~999 (or -99.9~99.9).	0
A1Fu / 2	A1Fu	Function of Alarm 1: Refer to Alarm Output. Range: 00~25	2
A1tr / 0	A1Tr	Time of Alarm 1. Range: -1999~9999sec.	0
For models with multiple alarm outputs, there are still settings for A2Fu,A2Tr,A3Fu,A3Tr, whose functions are the same with the above and are omitted here.			
AHYS / 0000	AHYS	Alarm Hysteresis: Functions are at single side 17 ~ 24 of alarm function (off delay). Range: 0 ~ 1000.	0000
in1L / 0	in1L	Setting of low display for analog input. (Optional) Range: -1999~9999.	0
in1H / 1000	in1H	Setting of high display for analog input. (Optional) Range: -1999~9999 •	1000
Su L / 0	Sv L	Setting of Low SV. Range: subject to input signal.	0
Su H / 600	Sv H	Setting of High SV. Range: subject to input signal.	600
in2L / 0	in2L	Setting of low display for Input 2 (RSV, optional): Range: -1999~9999.	0
in2H / 1000	in2H	Setting of high display for Input 2 (RSV, optional): Range: -1999~9999.	600
Co1L / 2	Co1L	Calibration of Low of Analog Output 1: Range: 2~9000	N/A
Co1H / 4000	Co1H	Calibration of High of Analog Output 1: Range: 0~4000.	N/A
Co2L / 2	Co2L	Calibration of Low of Analog Output 2: Range:0~9000 •	N/A

Continuing left column:

Display	Text	Description	Default
Co2H / 4000	Co2H	Calibration of High of Analog Output 2: Range: 0~4000	N/A
o3ty / Pu	o3ty	Target of retransmission (optional): Range: PV, OUT1, OUT2	PV
Co3L / 0	Co3L	Calibration of Low of retransmission (optional): Range: 0~9000	60
Co3H / 4000	Co3H	Calibration of High of retransmission (optional): Range:0~4000	10
o3 L / 0	O3 L	Setting of Low display of retransmission target (optional): Range: -1999~9999	6.0
o3 H / 1000	O3 H	Setting of High display of retransmission target (optional): Range: -1999~9999 •	10
Unit / C	Unit	Unit setting: Range: C or F	C
dir / HEAt	dir	Direction controlling: Range: heat / cool Unavailable to dual output model.	Heat
P Hz / 60	P Hz	Power Frequency: Range: 50 / 60 (Hz)	60Hz
FiLr / 200	FiLr	Parameter of digital filter: Range: 0.01~9.99 The greater the value is, the slower the PV changes.	2.00
id / 1	Id	Communication ID (optional): Range: 0~99	1
bAUd / 96	baud	Baud rate: Range: 2.4, 4.8, 9.6, 19.2, 38.4 (KB/s)	9.6
dAtA / 8n1	data	Serial communication data format: Range: 8n1, 8n2, 8e1, 8o1	8n1
nodE / rtU	Mode	ModBus communication format: Range: RTU / ASCII	rtu
toUt / 10	tout	Communication time-out: Range: 5~99sec.	5

Parameter Lock Setting

Press[SET] + [∧] for 2 sec.

LoCP / 4

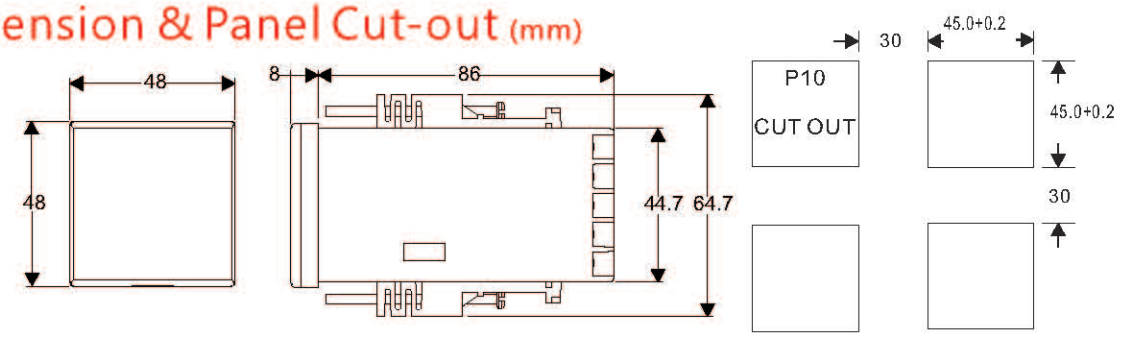
0: To disable settings of all parameters.
1: Only setting of SV is available.
2: Only Level 1 and Manual/Auto function are available.
3: Level 1 & 2 are available.
4: Settings of all parameters are available.

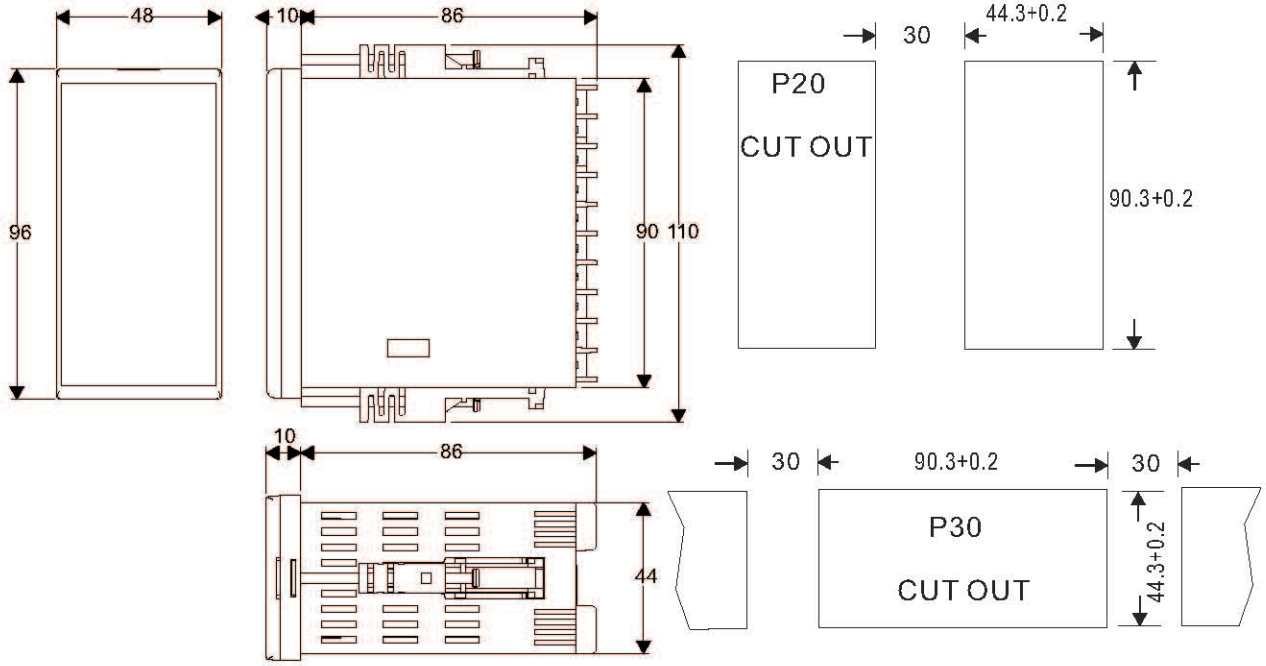
End. Returns to display mode.

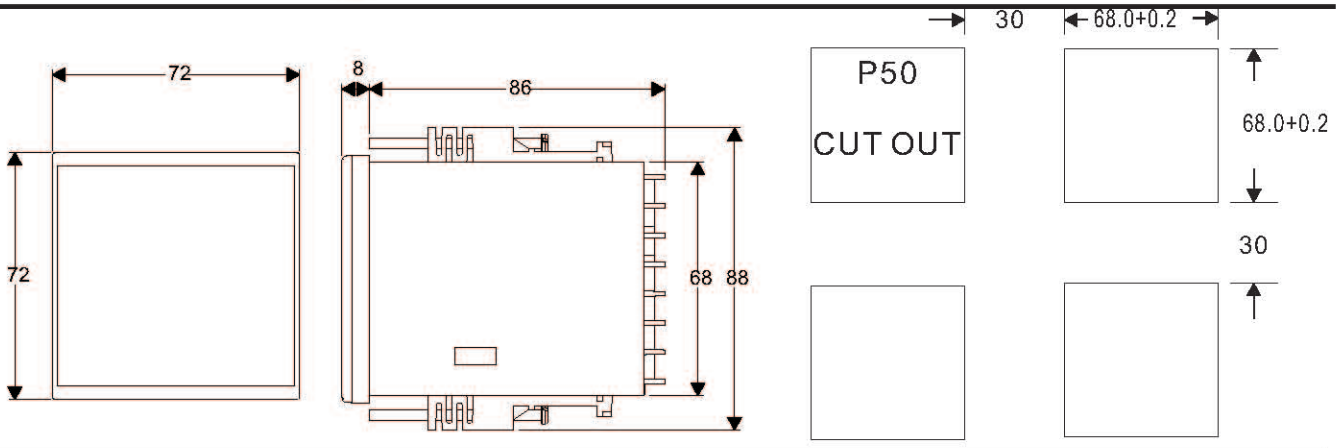
■Panel Operation for Process Control (Optional)

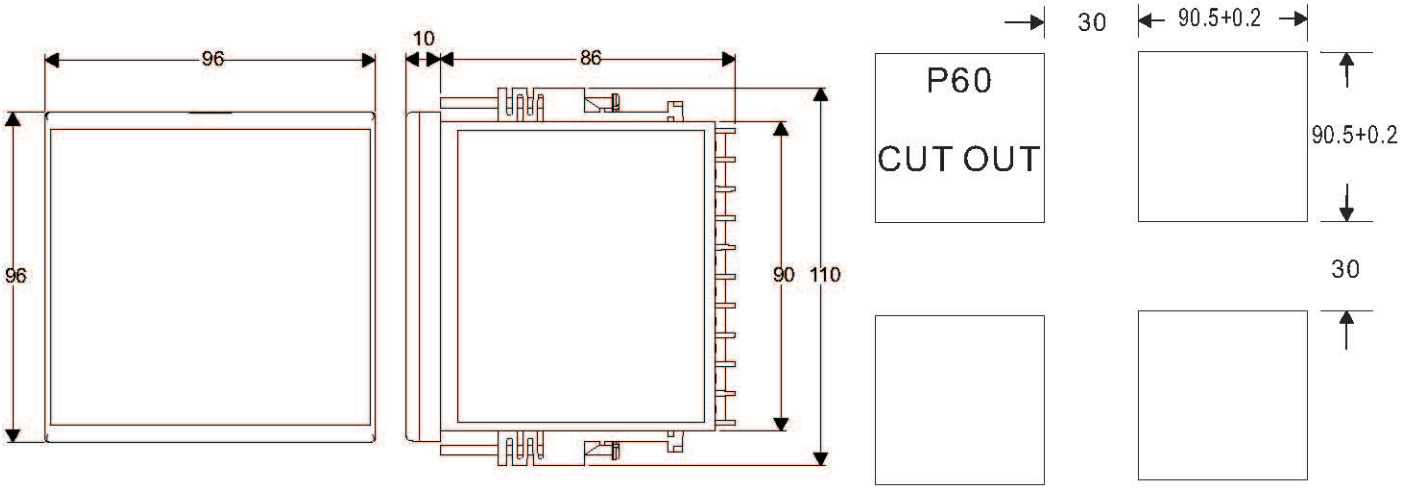
Press ∧ key to start the process.
Press ∨ key to pause.
Hold ∨ + [SET] to stop.
Hold ∧ + [SET] to skip to next level.

■ Dimension & Panel Cut-out (mm)



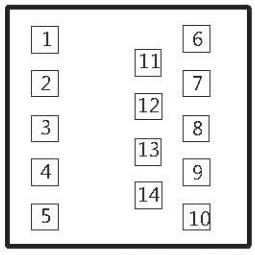






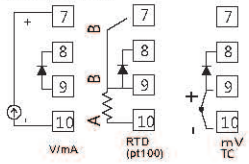
■ Wiring Diagram

Note: If defined terminal repeats terminals of other functions. Only one function can be selected.
If power supply is 24V AC/DC, polarity can be disregarded at input terminal.



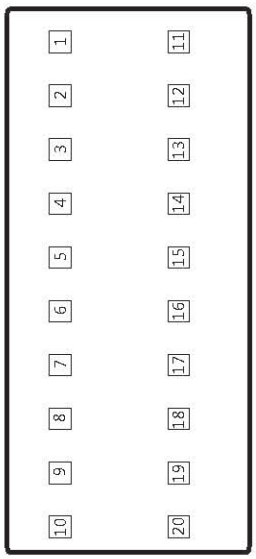
Power Supply 1 6
90~240V AC
24~32V(DC/AC)

Measuring Input



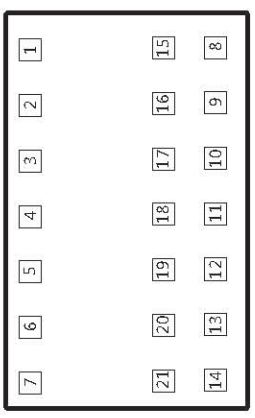
P10 Terminals

OUT1	OUT2	AL1	AL2	AL3	RSV Input	CT Input	Retransmission Output	Communication
4 Relay SSR V/mA 5		2 3	13 14		11 12 V/mA	11 12 CT	11 12 V/mA	11 Rx Dx- 12 Tx Dx+ 13 SG RS232 RS485
3 CLOSE 4 OPEN 5 COM	2 3 Relay SSR V/mA	13 14						11 Dx- 12 Dx+ RS485



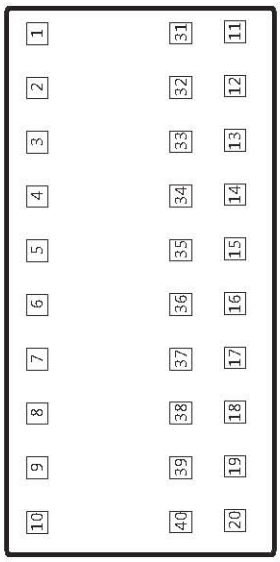
P20,P30 Terminal

OUT1	OUT2	AL1	AL2	AL3	RSV Input	CT Input	Retransmission Output	Communication
8 9 10 Relay NO NC COM SSR V/mA		3 NC 4 NO 5 COM	11 NC 12 NO 13 COM	6 7	14 15 V/mA	14 15 CT	12 13 V/mA	14 Rx Dx- 15 Tx Dx+ 16 SG RS232 RS485
7 CLOSE 8 OPEN 10 COM	6 7 Relay SSR V/mA	3 NC 4 NO 5 COM	11 NC 12 NO 13 COM	Measuring Input V/mA RTD (pt100) mV TC; Power Supply 1 2 90~240V AC 24~32V(DC/AC)				11 Rx Dx- 12 Tx Dx+ 13 SG RS232 RS485



P50 Terminal

OUT1	OUT2	AL1	AL2	AL3	RSV Input	CT Input	Retransmission Output	Communication
5 6 7 Relay NO COM NC SSR V/mA		3 4	8 COM 9 NO 10 NC	20 21	9 10 V/mA	15 16 CT	18 19 V/mA	15 Rx Dx- 16 Tx Dx+ 17 SG RS232 RS485
4 CLOSE 5 OPEN 7 COM	3 4 Relay SSR V/mA	20 21	8 COM 9 NO 10 NC		Measuring Input V/mA RTD (pt100) mV TC; Power Supply 1 2 90~240V AC 24~32V(DC/AC)			



P60 Terminals

OUT1	OUT2	AL1	AL2	AL3	RSV Input	CT Input	Transmission Output	Communication
Relay 8 NO, 9 NC, 10 COM; SSR V/mA		3 NC, 4 NO, 5 COM	11 NC, 12 NO, 13 COM	6, 7	14 V/mA +, 15	14 CT, 15	39 V/mA +, 40	31 Rx Dx-, 32 Tx Dx+, 33 SG; RS232 RS485
					Power Supply 1, 2: 90~240V AC, 24~32V(DC/AC)			14 Rx Dx-, 15 Tx Dx+, 16 SG; RS232 RS485
7 CLOSE, 8 OPEN, 10 COM	6, 7 Relay SSR V/mA	3 NC, 4 NO, 5 COM	11 NC, 12 NO, 13 COM	39, 40	Measuring Input: 17, 18, 19, 20; B, B, A; V/mA; RTD (pt100); 17, 18, 19, 20 mV TC			

■ Error Message

oL "Overload." PV is above the high input display range limit. Please check if the input signal is correct.

-oL "Underload." PV is below the low input display range limit. Please check if the input signal is correct.

oPEn Input signal broken. Please check if the wiring is loosed or the polarity is reversed.

CJEr Error to the temperature sensing diode for cold-junction compensation of the thermocouple. Please check if the diode is loosed. If it is broken, please send it back for repairing.

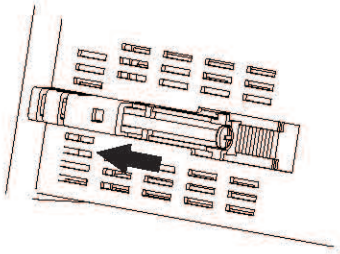
AdEr Interior circuit error. Please send it back for repairing.

■ Mounting Diagram

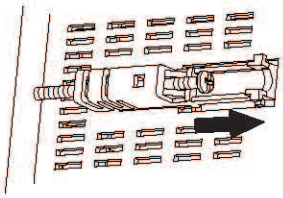
There are 2 methods to mount the controller.

1. (Figure Mount-1) First, mount the controller to the read-cut panel. Then, insert the fixing racks to the side gaps of the controller. Last, push the rack forward until it is fixed. (Or, rotate the screw until it reaches the panel. Then, use the screwdriver to tighten it.)
2. (Figure Mount-2) Push the fixing rack backward, and then tighten it forward with screwdriver.

Mount-1



Mount-2



■ Temperature Sensor Specification

Note:

1. When extending the temperature sensor, please use compensating wire of the same specification for the thermocouple. For RTD, please use low-impedance wire.
2. If possible, do not wire the temperature sensor with the power line.

KP 1 - 2 3 4 5 6 7 8 9

1 Appearance	2 Sensor Type	3 Fixing Thread	4 Diameter of Shielding Tube	5 Tube Length	6 Tube Type	7 Wire Length	8 Wire Type	9 Insulation Type
	K: Thermocouple Type K	0: N/A	N: N/A	000: N/A	N: N/A	00: N/A	N: No compensating wire	N: Grounding type
1: Thread Type	J: Thermocouple Type J	1:1/4"-20NC thread	**A: 1.6Φ**	**050: 50mm**	**A: SU304**	**01: 0.1M**	A: Metal lattice 1/0.65	Y: Non-grounding type
2: Clinching type	P: PT100 (DIN)	2: M6 thread	**B: 2.3Φ**	**100: 100mm**	**B: SU316**	**05: 0.5M**	B: Metal lattice 4/0.32	
3: Clinching type with 90° turning	B: Thermocouple Type B	**3:5/16"-24NF**	**C: 3.2Φ**	**200: 200mm**	C: Teflon tube	**10: 1.0M**	C: Fiberglass 4/0.32	
4: Inserting type	R: Thermocouple Type R	4: PT 1/8" inclined thread	**D: 4.0Φ**	**300: 300mm**	D: Ceramic tube	**20: 2.0M**	D: Fiberglass 4/0.65	
5: Small round head	S: Thermocouple Type S	5: PT 1/4" inclined thread	**E: 5.0Φ**	**400: 400mm**	E: Sheathed *2 (SU316)	**30: 3.0M**	E: PVC line 4/0.32	
6: Large round head	T: Thermocouple Type T	6: PT 3/8" inclined thread	**F: 6.4Φ**	**500: 500mm**		**50: 5.0M**	F: PVC line 4/0.65	
7: Large round head with dual output		7: PT 1/2" inclined thread	**G: 8.0Φ**				G: Teflon 1/0.65	
8: Small T head		8: PT 3/4" inclined thread	**H: 9.5Φ**				H: Teflon 7/0.32	
8: Large T head		9: Pressure-resistant adaptor *1	**I: 12.7Φ**				I: 3-core PVC cable for PT100	
			J: 15.0Φ				J: 3-core Teflon cable for PT100	
			K: 17.3Φ					
			L: 20.4Φ					

(*1): Pressure-resistant adaptor can work with the temperature sensor of inserting type so as to adjust inserted length and then be fixed.

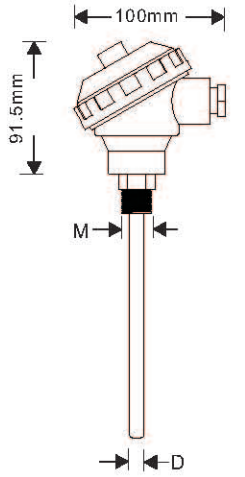
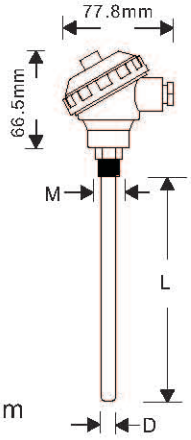
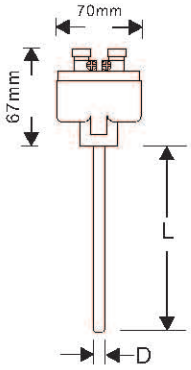
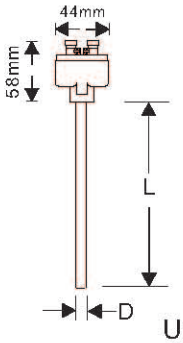
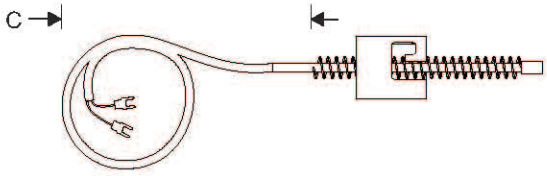
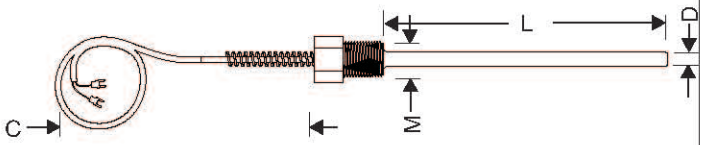
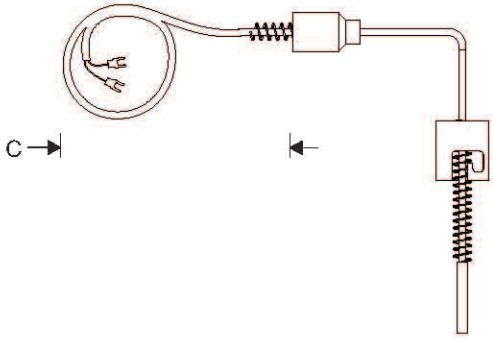
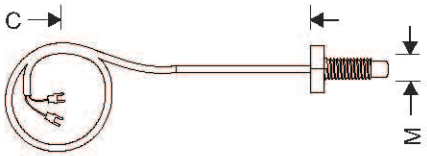
(*2): The tube diameters(Φ) applicable to Sheathed type are:1.6, 2.3, 3.2, 4.8, 6.4, 8.0

Note 1: PVC cable has heat tolerance up to 80°C and moisture resistence; the tolerance of fiberglass can reach as high as 200°C, but it is not moisture resistant; Teflon is heat-resistant as high as 200°C, anti-erode, and moisture resistant, with better advantages in every aspect.

Note 2: Non-grounding type has better ability of interference resistence, but is slow in responding; the ground type is exactly the reverse instead.
Sheathed type has such advantages like fast response, high insulation, bendability, and pressure tolerance.

Note3: In addition to the type above, customized design is accepted.

■ Temperature Sensor Dimension

Large round head	Small round head	Large T head	Small T head
	 Unit: mm		 Unit: mm
Clinching type		Inserting Type	
			
Clinching type with 90° turning		Threaded type	
			

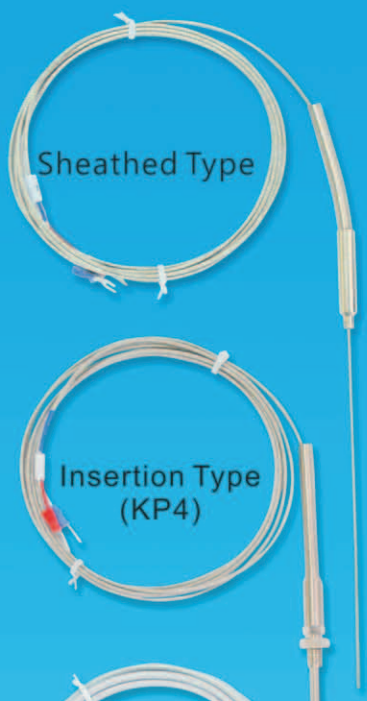
Size Code:

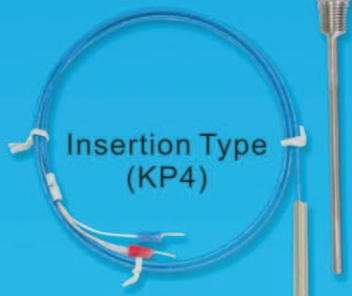
C: Length of line. Refer to Specification Column [7] of Pg. 10.

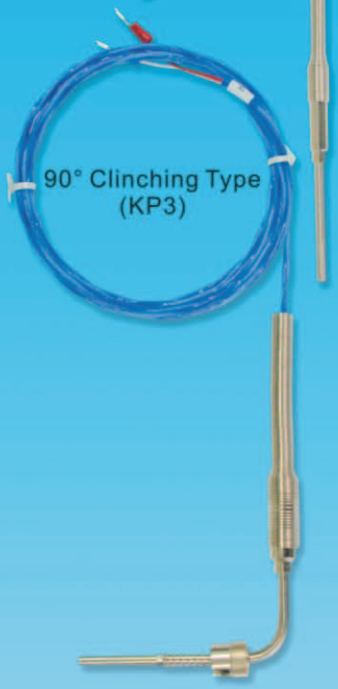
L: Length of shielding tube. Refer to Specification Column [5] of Pg. 10.

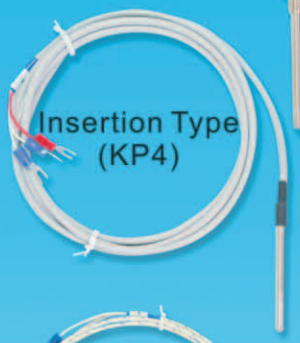
M: Fixing thread. Refer to Specification Column [3] of Pg. 10.

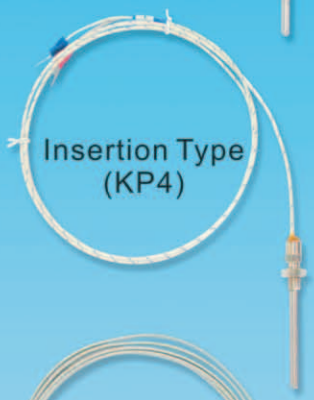
D: Diameter of shielding tube. Refer to Specification Column [4] of Pg. 10.





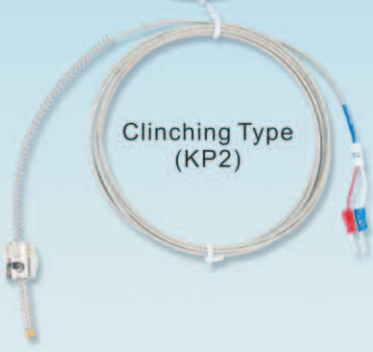






Fastening copper base
for clinching type

Pressure Adaptor



K
(Male &
Female -
Large)

K
(Male &
Female -
Small)