PX Series

Process Controller

INSTRUCTION MANUAL

Thank you for the purchase of HANYOUNG product.
Please read this manual carefully.





HANYOUNG
ELECTRONIC CO., LTD.

PX Series

◆ High Accuracy 0.1 class 250ms



Features

- Fuzzy
- Auto Tuning
- Alarm Output
- Retransmission Output
- Multi Input • Output
- External Contact Input
- Ramp soak function
- Heating / Cooling
- Zone PID
- Group PID
- Power supply for sensor
- Output Limits
- Interface (RS485 / 422)
- 3 Set points
- Heater break alarms (HBA1, HBA2)
- IP65 Front facia

HANYOUNG ELECTRONIC CO., LTD.

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1 SAFETY INFORMATION

Before using, please read this (SAFETY INFORMATION) and then use this controller.
It is important that the instructions in this manual are followed when using this instrument.
Please keep this manual for future reference.
Precautions are classified in WARNING and CAUTION.

⚠ WARNING	There is a possibility of death or heavy injury when handling in wrong way.
⚠ CAUTION	There is a possibility of injury or physical damage when handling in wrong way.

⚠ WARNING

① Caution on wiring

- Use an external protection circuit if a fault in the control loop could possibly lead to a serious problem.
- This instrument do not have a switch for power and a fuse, so please set them if it is needed. (Fuse rating 250V, 0.5A)

② Power supply

- Use a rated voltage to prevent damage or trouble.
- To avoid electrical shock or damage, do not turn ON the power until the wiring is completed.

③ Prohibit use in gas atmosphere

Do not use it at a place exposed to combustible or explosive gas.

④ Handling of unit

- To avoid malfunction, electrical shock or fire, this unit must not be disassembled or repaired.
- Do not touch the terminals to avoid electrical shock or malfunction.

⑤ Caution on maintenance

- Turn OFF the power before mounting or removing the instrument.
- To ensure continuous and safe operation of the instrument, periodical maintenance is recommended. Some parts are limited in life.
- The warranty period is 1 year only if using in the correct way.

⚠ CAUTION

① Caution on handling

◎ Do not install the instrument under any of the following conditions.

- The ambient temperature exceeds 0 ~ 50℃
- The ambient humidity exceeds 45 ~ 85% RH.
- A place where temperature changes suddenly or icing occurs.
- A place exposed to corrosive gas or combustible gas.
- Vibration or shock is likely to be transmitted to the instrument.
- A place exposed to water, oil, chemicals, steam, sunlight.
- A place exposed to much dust, salt or iron.
- A place with much inductive disturbance, static electricity, magnetism noise.
- A place where heat such as radiant heat stays.

② Installation

- Attach the brackets (2 units) on the fixed halls and tighten with a screwdriver.
  Fixing torque is about 147N. cm (1.5kg.cm)
  (Care should be taken not to tighten forcedly)

③ Caution on terminal connections

- To avoid induction noise to input wires seperate from the power and output wires.
- Keep input wires away from output wires and use shielded wires to earth.
- Use a compensating cable with thermocouple.
- For R.T.D input use a cable which is a small lead wire resistance and without resistance difference to 3 wires.
- If the wiring has noise, use the following step: connect a surge absorber to the conductor coil side if the conductors are connected to the load output, such as the relay contact output.
  (EX. For AC 220V ENC 471D-05A)
- Use an insulating transformer with a noise filter when the power suppy has much noise.
  (EX. TDK brand ZMB 22R5-11 noise filter)
- Noise filter should be mounted on a panel which has been earthed and the wiring between the noise filter output and the instrument power terminals should be shorten.
- It is effective to use a twisted cable for power supply against noise.
- The heater power supply and the instrument power supply should be connected using the same power suppy when a heater break alarm.
- Time for preparation of contact output is required at power ON. When the output signal is used for an extenal interlock circuit, connect a delay relay.

④ For load circuit connection

- Use an extra relay when the frequency of operation is rather high.
  SSR output type is recommended.
  - Electromagnetic switch : Proportional cycle time is Min. 30sec
  - SSR : Proportional cycle time is Min. 1 sec
  - Contact output life : Mechanical : 10 million times (no load)
    Electrical : 100 thousand times (rated load)
  - SSR drive pulse voltage, DC 4~20mA are not insulated with internal circuit.
    Use non-grounded sensor to R.T.D and thermocouple.

⑤ For waterproof (Waterproof type)

The instrument has IP65. Use rubber packing when installing the instrument to panel.
Please attach the rubber in correct way.

⑥ Caution on key operation / trouble

- If alarm function is not set correctly, alarm output can not be operated at a trouble point.
  Be sure to check the alarm operation.
- If the input cable is disconnected, the display shows " bOUt ".
  When replacing the sensor, please turn OFF the power suppy.

⑦ Other

Do not use organic solvents such as alcohol, benzine when cleaning. (Use neutral detergent)

2 INSTRUCTION

This instrument has process-value (PV) and set-value (SV) each 4 digits with 7 segment FND. This instrument is available in 2 versions: Universal Type and Heating / Cooling Type. Each has 12 Setting groups (refer pages 9 & 10)

Function and feature : Group P.I.D, Multi-input (19 types), Multi-output (Relay, SSR, Current), Local input, Remote input, External contact input, Program Control (Ramp / Soak) with 10 steps, Auto-tuning 2 types (standard type, low PV type), Manual output, Retransmission, Communication (RS485 /422), Power supply for sensor, 22 types of alarm, Sampling cycle 250ms, 0.1% FS high accuracy.

3 ORDERING INFORMATION

PX2 - □

- Model PX2 : 48×96 mm Process controller
- Control type 0 : Universal
  1 : Heating / Cooling

PX9 - □ □

- Model PX9 : 96×96 mm Process controller
- Control type 0 : Universal
  1 : Heating / Cooling
- Optional 0 : None
  1 : RS422 / 485, HBA 2contacts, REM

PX3 - □

- Model PX3 : 96×48 mm Process controller
- Control type 0 : Universal
  1 : Heating / Cooling

PX7 - □ □

- Model PX7 : 72×72 mm Process controller
- Control type 0 : Universal
  1 : Heating / Cooling
- Optional 0 : None
  1 : RS485, OUT2 (SSR/SCR/RET), REM
  2 : RS485, OUT2 (SSR/SCR/RET), HBA 1 contact
  3 : DI-1, DI-2, OUT2 (SSR/SCR/RET), HBA 1 contact

4 SPECIFICATION

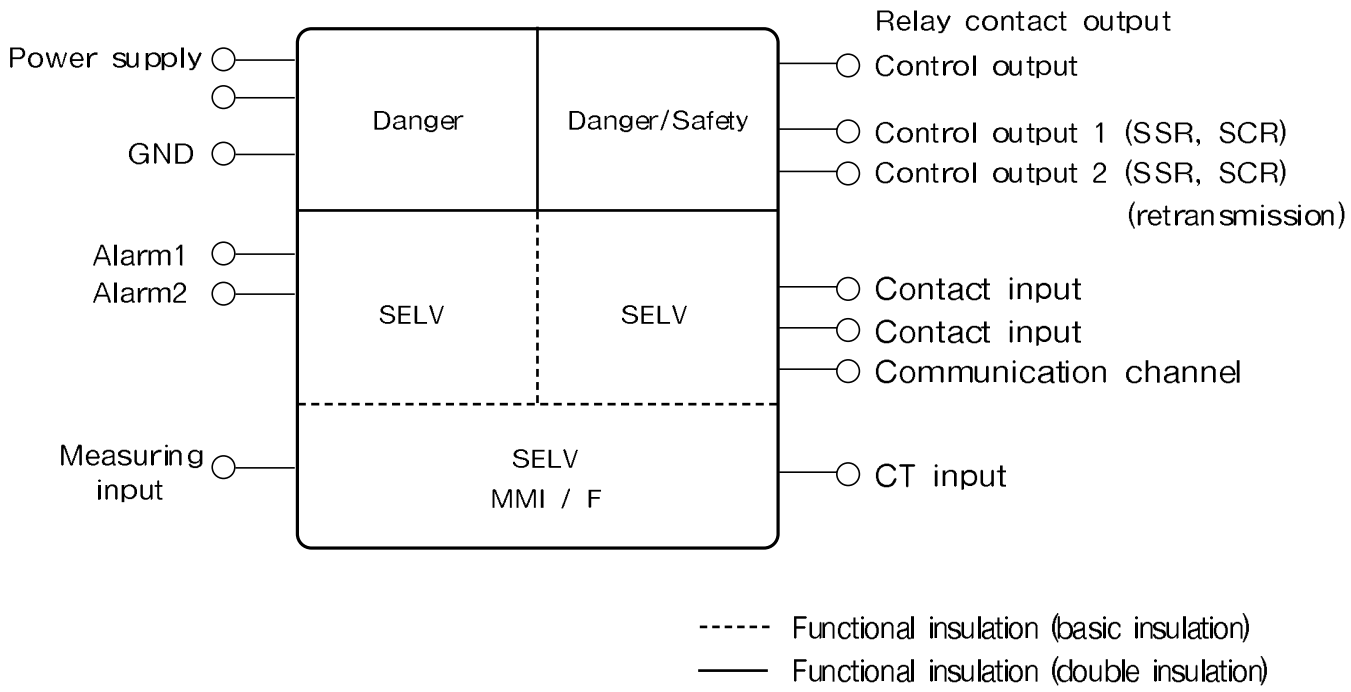
- Input : Thermocouple, R.T.D, Direct voltage
  (refer to the input signal and measurement range on page 18)
- Sampling cycle time : 250 ms
- Input resolution : Below decimal point of range
- Input impedance
  Thermocouple / Voltage (mV) input : 1MΩ or above
  Voltage input (V) : Approx. 1MΩ
- Allowable signal source resistance
  Thermocouple : 250Ω or below
  Voltage input : 2kΩ or below
- Allowable wiring resistance
  R.T.D : 150Ω or below / 1 wire
- Allowable input voltage
  Thermocouple, R.T.D, Direct voltage (mV) : ±10V
  Direct voltage (V) : ±20V
- Noise ratio
  NMRR :40dB or above
  CMRR :120dB or above (50/60Hz ±1%)
- Standard : Thermocouple / R.T.D (KS / IEC / DIN)
- Standard junction temperature compensation tolerance : ±1.5℃ (15 ~ 35℃)
  ±2.0℃ (15 ~ 50℃)
- Burn-out detection : OFF, Up / Down scale selectable
  Thermocouple burn-out : Up / Down scale
  R.T.D burn-out : Up scale
  (TC / R.T.D burn-out detection current : Approx. 50㎁)
- Accuracy : 0.1% of F.S

● Power supply
  Power supply voltage : 100-240V~, 24V ⎓
  Frequency : 50/60Hz
  Voltage variation : -10% +10%
  Power consumption : Max. 6.0W, 10VA or below
  Power supply for sensor : 27V - 20mA
  (but, it is not available when using retransmission output)

● Insulation resistance : 20㏁ min. (at 500VDC)
  Between primary terminal and secondary terminal
  Between primary terminal and ground
  Between ground and secondary terminal

● Dielectric strength : 2300V AC 50/60Hz for 1 minute
  Between primary terminal and secondary terminal
  Between primary terminal and ground
  Between F.G and secondary terminal : 1500V AC 50/60Hz for 1 minute

● Divison of insulation



● Output

① Relay contact output

Contact capacity : 240V AC 3A, 30VDC 3A (Resistance load)
Contact structure : 1c
Output action : Propotional or ON / OFF action
Proportion cycle time : 1 ~ 1000 sec.
Output limit : Higher (OH) or lower limit (OL) selectable within 0.0 ~100.0% range
It is also available in Auto tuning
ON / OFF hysteresis : 0~100%
Time resolution : 0.1% or 10ms

② SSR output

ON voltage : 12V DC min. (Resistance load : 600 Ω min, 30mA limit when short)
OFF voltage : 0.1V DC max.
Output action : Proportional action
Proportion cycle time : 1 ~ 1000 sec.
Output limit : Higher (OH) or lower limit (OL) selectable within 0.0 ~100.0% range
It is also available in AT and MAN.
Time resolution : 0.1% or 10ms (whichever is larger)

③ Current output

Output current range : 4 ~ 20mA DC
Resistance load : 600 Ω max.
Accuracy : ±0.3% of F. S (4 ~ 20mA) Resolution : Approx. 3000
Output ripple : 0.1% of F. S (p-p) 150Hz
Output update cycle time : 250m sec.
Output action : P.I.D control
Output limit : Higher (OH) or lower limit (OL) selectable within -0.5 ~ 105.0% range
It is also available in AT and MAN.

④ Manual operation

It is changeable by A/M key, external contact and communication.

AT → MAN : TRACKING

MAN → AT : BUMPLESS CONVERSION

- Retransmission output

① Current output

Output current range : 4 ~ 20mA DC

Resistance load : 600Ω max.

Accuracy : ±0.3% of F. S (4~20mA)

Resolution : Approx. 3000

Output ripple : 0.1% of F. S (p-p), 150Hz

Output update cycle time : 500msec (When remote option)

- Alarm output (HBA common)

Output : Relay contact

Output contact : 3 points

Contact capacity : 240V AC 1A , 30V DC 1A (Resistance load)

Contact structure : 1a

- Communication Interface

Standard : EIA RS485

Number of devices (Max.) : 31, Address setting : 1~99 range

Communication type : 2-wire or 4-wire half-duplex

Synchronization : Asynchronous

Communication order : None

Communication distance : Max. 1200m

Communication rate : 600, 1200, 2400, 4800, 9600

Start Bit : 1Bit

Data length : 7 or 8 Bit

Parity : None, Even, Odd

Stop Bit : 1 or 2 Bit

Protocol : PC LINK

Response time : Handling time + (RP.T × 10ms)

- Heater break alarm

Output contact : 2 points

Current measurement range : 1~50A AC (Resolution 0.5A, ±5% of F.S ± 1Digit)

Alarm output : AL1, 2 output

It is available to use in ON / OFF or proportional action. (not available in current or cooling output)

Minimum detection time : 0.2 sec

Dead Band : 0 ~ 100%

- SAFETY AND EMC STANDARDS

Safety standards: IEC1010-1-1990 and EN61010-1-1992; CSA1010 CAT II (IEC1010-1); and UL508.

EMC Standards: EN55011 Class A, Group 1, for emission (EMS); and EN50082-2-1995 for immunity(EMI).
The indicator continuously operates within a measuring accuracy of ±20% of the range.
EN61000-3-2, EN61000-3-3

- Ambience

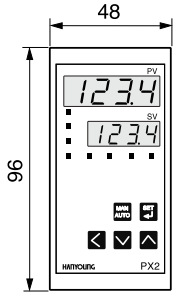
[Installation Conditions (for normal operation)]
Ambient temperature : 0 ~ 50℃
Ambient humidity : 20 ~ 90%RH (No condensation)
Installation place : Indoors
Magnetic effect : 400 AT/m max.
Vibration : 5 ~ 14Hz, forth width 1.2mm max.
4 ~ 150Hz, 4.9m/s^2 (0.5G) max.
Shock : 147m/s^2(15G), 11msec max.
Height : 2000m max.
Installation category : II (EN61010-1)
Pollution degree : II (EN61010-1)
Storage temperature : -25℃ ~ 70℃
Storage humidity : 5 ~ 95%RH
Case : Plastic
Weight :

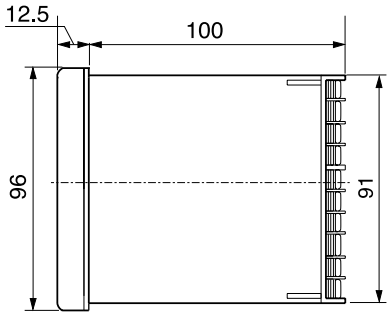
PX 2	PX 3	PX 7	PX 9
342 g	340 g	344 g	472 g

※ Including brackets (Brackets 40g)

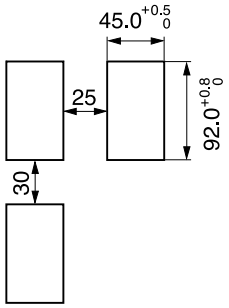
5 DIMENSIONS & PANEL CUTOUT

1) PX2 (48×96mm)



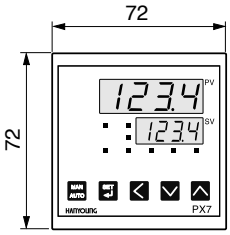


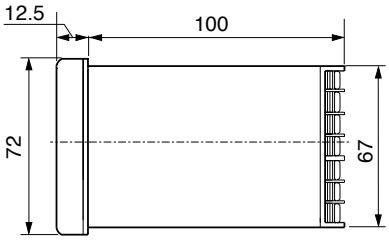
● Panel cutout



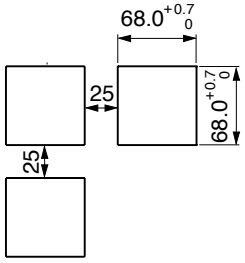
(Unit : mm)

2) PX7 (72×72mm)



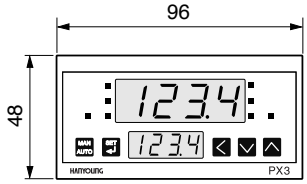


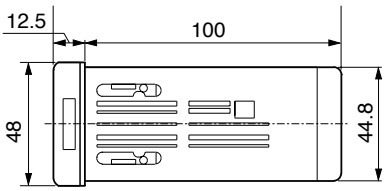
● Panel cutout



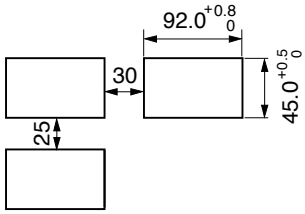
(Unit : mm)

3) PX3 (96×48mm)



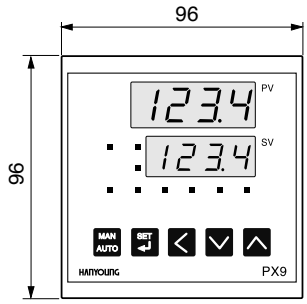


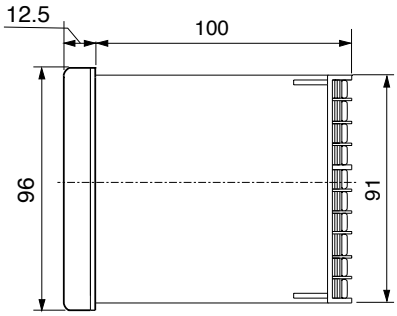
● Panel cutout



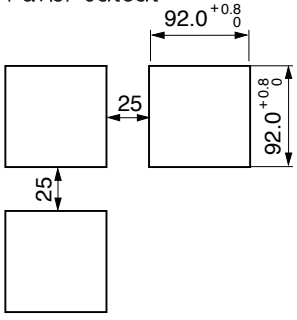
(Unit : mm)

4) PX9 (96×96mm)





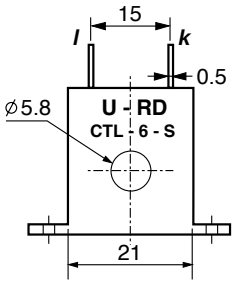
● Panel cutout

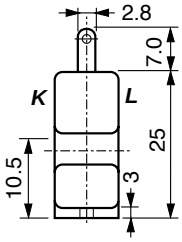


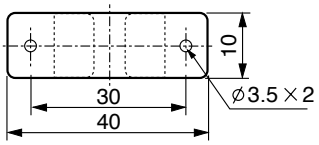
(Unit : mm)

5) CURRENT TRANSFORMER (Model: CTL-6-S)

● Panel cutout



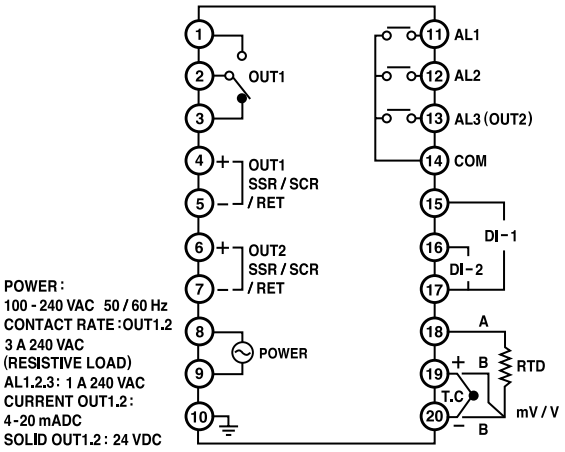




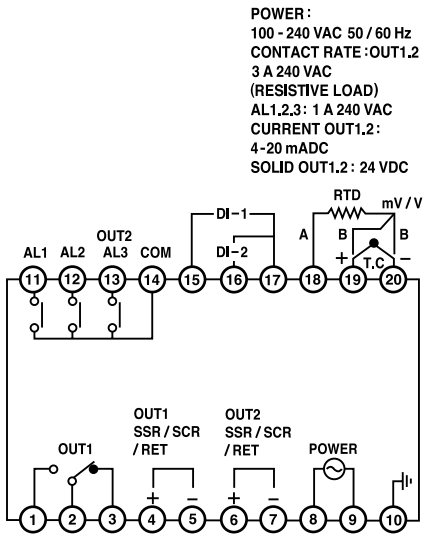
(Unit : mm)

6 TERMINAL ARRANGEMENT

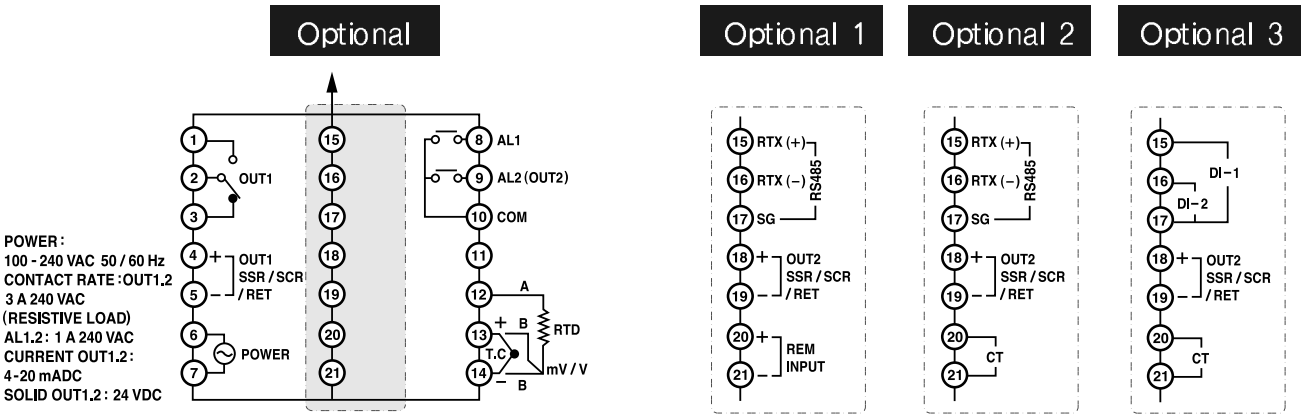
1) PX2 (48×96mm)



2) PX3 (96×48mm)

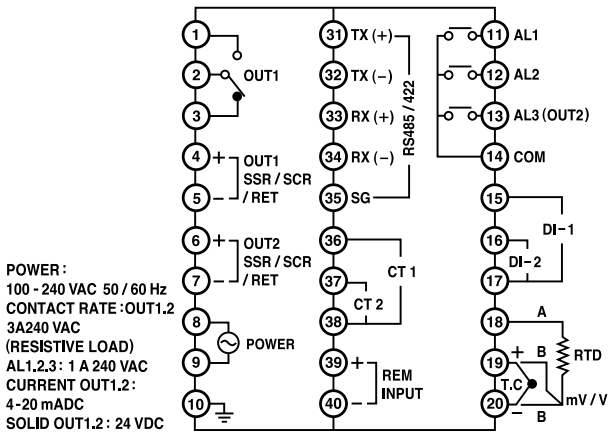


3) PX7 (72×72mm)



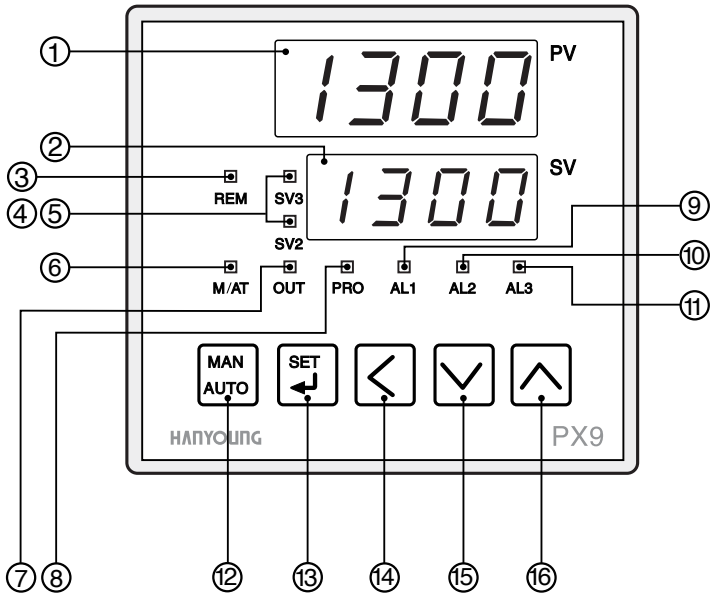
【 Note 】Heater break alarm is used in option 2,3 by setting alarm outputs (AL1,AL2)

4) PX9 (96×96mm)



【 Note 】Heater break alarm is used by setting alarm outputs (AL1,AL2,AL3)

7 NAME & FUNCTION



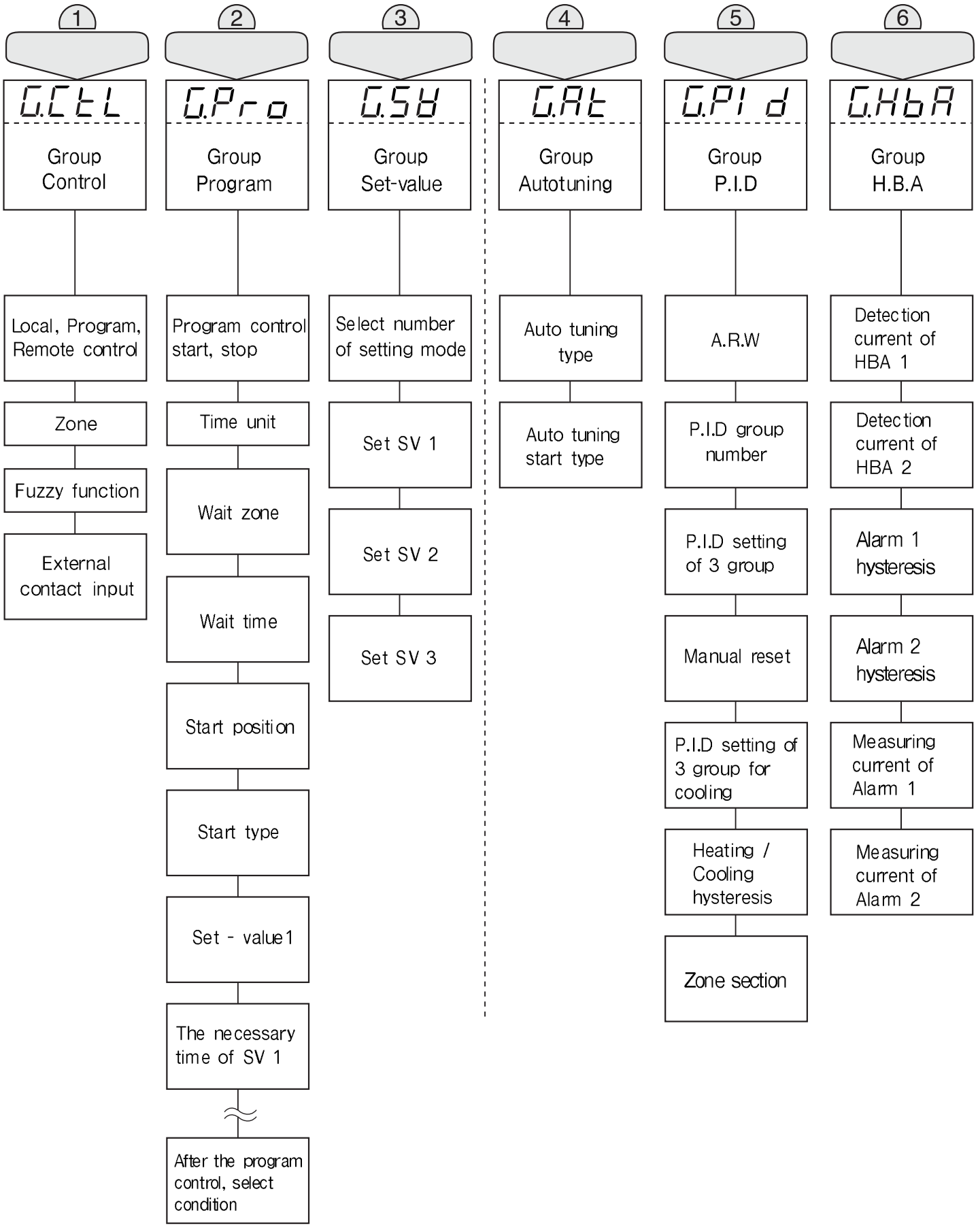
● Displays

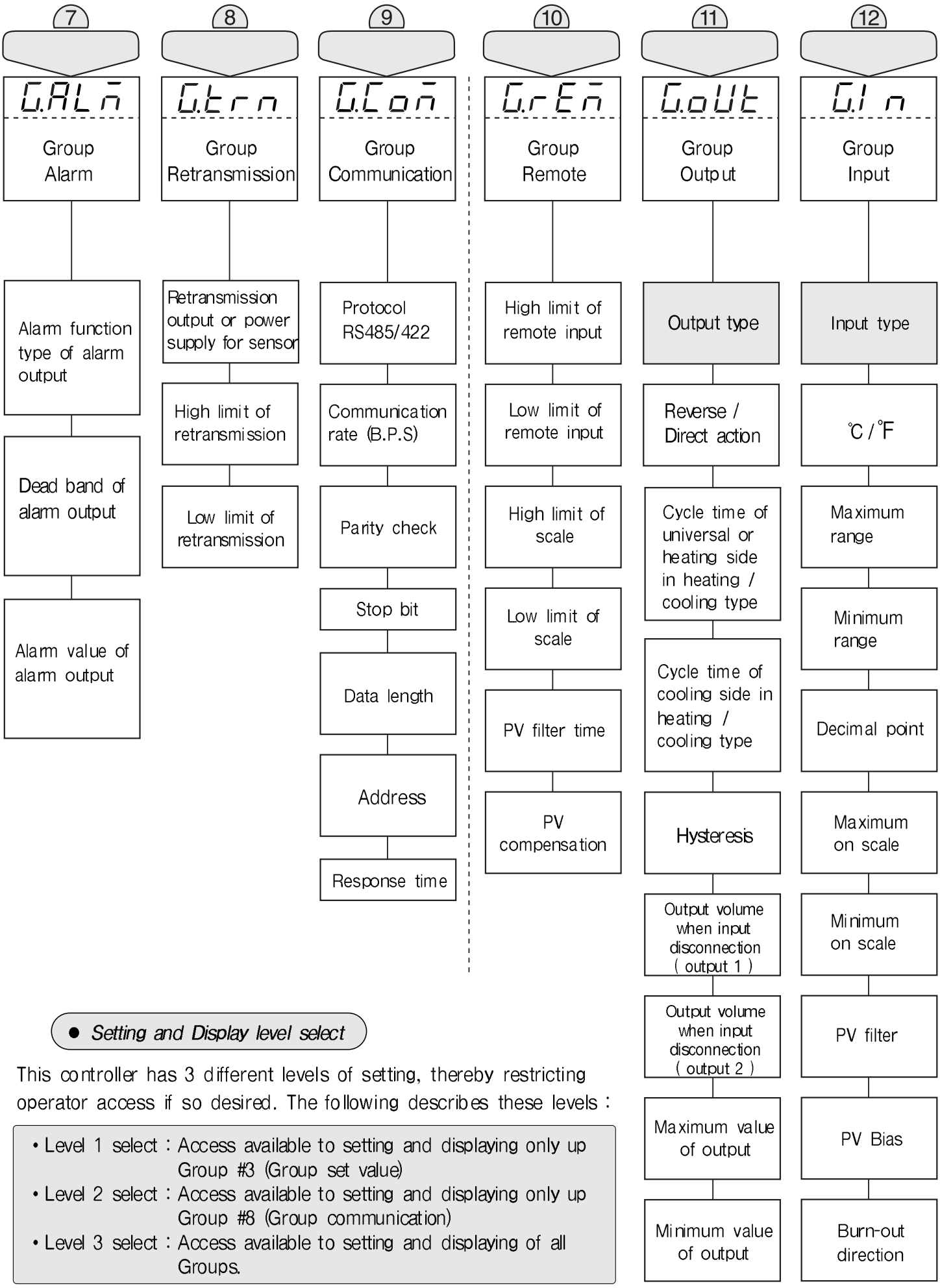
Name of respective parts	Functions
① Process-value (PV)	Displays the process temperature value.
② Set-value (SV)	Displays various set - value, message, and parameter.
③ Remote indicator	Lights when the remote operation.
④ ⑤ Set-value display indicator	Lights when the SV2 or SV3 is displayed.
⑥ Manual /Auto tuning indicator	This lamp lights when Manual control.(It does not light for AT)
⑦ Output indicator	Lights when the control output is ON.
⑧ Program display indicator	Lights during program operation.
⑨ Alarm 1 indicator	Lights when the alarm 1 operates.
⑩ Alarm 2 indicator	Lights when the alarm 2 operates.
⑪ Alarm 3 indicator	Lights when the alarm 3 operates.

● Control key

Key	Functions
⑫ MAN AUTO	Used to select Auto or Manual control.
⑬ SET	Used to change from the operation mode to the setting mode, to select parameters, and to register set-value. Press this key for 3 sec to display setting mode, set-value, and process value.
⑭ <	Used to select digit for changing.
⑮ ∨	Used to decrease set-values and to select setting mode.
⑯ ∧	Used to increase set-values and to select setting mode.

8 TABLE OF SETTING ITEMS





● *Setting and Display level select*

This controller has 3 different levels of setting, thereby restricting operator access if so desired. The following describes these levels :

- Level 1 select : Access available to setting and displaying only up Group #3 (Group set value)
- Level 2 select : Access available to setting and displaying only up Group #8 (Group communication)
- Level 3 select : Access available to setting and displaying of all Groups.

● AFTER COMPLETION OF WIRING, APPLY POWER ON

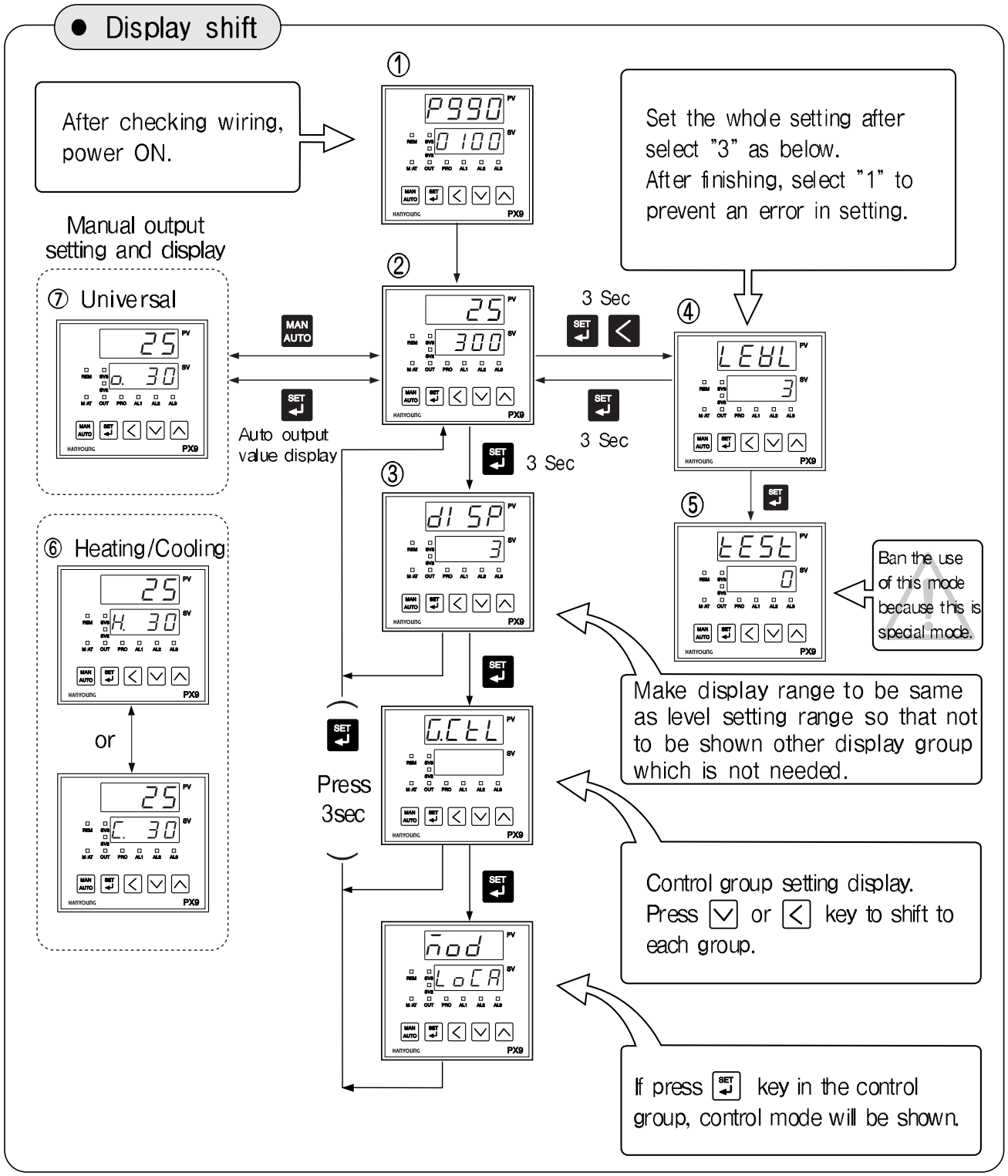
(1) Production Model Code will be indicated as in ① below, followed by current PV and SV values, as in ② below.

(2) For setting a level, press [SET] and [<] at a time for 3 sec. to enter LEVL (LEVEL) setting mode. (Level 3 is set at the factory)

(3) In the ② condition, press [SET] for 3 sec to enter dISP (display) selection mode. (This mode is limited by level setting mode ④)

(4) In the ② conditon, press [MAN AUTO] to set manual output value regardless auto operation data and press [SET] to indicate an auto output value.

● Display shift



10 CONTROL GROUP

- Local, Program or Remote is selected in the control group mode using ∨ or < key.
- When selecting LOCAL mode, control zone selection and fuzzy function selection are available.
- Control zone selection is not available when selecting program mode or remote mode.
- Fuzzy function is operating in the P.I.D control. (not operating in the ON/OFF control)
- Using two external contact input (DI) as ON/OFF, it is possible to control 3 kinds setting values and Auto operation or Manual operation is selectable in the start, reset, local mode.

DIS selection	External input signal		Functions
OFF	Initial value is OFF (None)		
1	DI-1	OFF	SV 1 display and selection
		ON	SV 2 display and selection
	DI-2	OFF	Auto control
		ON	Manual control
2	DI-1	ON	Start (Program control)
		OFF	Reset (Program control)
3	DI-1	OFF	SV 1 display and selection
	DI-2	OFF	
	DI-1	OFF	SV 2 display and selection
	DI-2	ON	
	DI-1	ON	SV 3 display and selection (When DI-1 and , DI-2 are ON, it is same)
	DI-2	OFF	

(Chart1)

Signal	Name	Operation	Display condition	Initial Value
G.CTL	Control group display	Set a control mode	—	—
mod	control mode selection	LOCA / PROG / REM	Always display	LOCA
SET ZonE	Zone selection ＊1	OFF / ON	When local mode selection	OFF
FUZY	Fuzzy function selection	OFF / ON	When P.I.D control	OFF
dI S	External contact input selection	(Refer to chart 1) OFF / 1 / 2 / 3	Always display	OFF

＊1 : This signal is not indicated in Program or Remote operation.
Zone P.I.D will be operated.

11 INPUT GROUP SETTING

● Input type selection

After power ON and when PV is indicating, press [SET] key for 3 sec to be displayed dI SP at PV and 3 at SV. (If it is not indicated 3, set again in the level setting mode)
① Control group is indicated when press [SET] key once more. At the time, ⑫ input group is indicated when press [∨] key and then "Input type and range selection" is shown at SV when press [SET] . At this time the input and range is selected by [∨] or [SET] key.

> ⚠ CAUTION
>
> When setting, "**Input type selection number**" must be selected in the input type selection mode and also "**Output type selection number**" must be selected in the output type selection mode before moving to other mode.
> If not, data of other group will be changed to prior value.

● Display unit (℃/℉)

After selecting input type and range, press [SET] key to select display unit. Press [∧] key to choose ℃ or ℉ and press [SET] key when finishing selection.

● Maximum and Minimum range

After selecting display unit, press [SET] key to set Maximum and Minimum range using [∨] or [∧] key. Press [SET] key once more to finish.

● Decimal point

Parameter is not indicated in T.C and R.T.D input, but when selecting voltage input (code 30,32,33), "**Decimal point**" mode is indicated. (set 1 : 0.0, set 2 : 0.00, set 3 : 0.000)

● Maximum and Minimum on scale

It is the same function as Maximum and Minimum range setting when R.T.D or thermocouple input. This mode is indicated when voltage input (30, 32, 33)

● PV filter

When PV value becomes unstable due to effects of noise, the filter helps suppress the unstable status. (Range: OFF or 1~120sec. Initial value: OFF)

● PV bias

Use this function to adjust PV value in cases where it is necessary for PV value to agree with another recorder or indicator, or when the sensor cannot be mounted in correct location.
(Range : -100.0~100.0% of SPAN, Initial value : 0.0%)
Setting a value using [∨] or [∧] key and press [SET] key to finish.

Signal	Name	Description	Condition	Initial value
G.I n	Input group	Input type and mode selection	—	—
I nP	Input signal selection	Refer to input signal and range	Always	Selection NO.1
Unl t	Measurement range unit	℃/℉	Thermocouple or R.T.D	℃
Fr-H	High limit	Refer to input signal and range (Notice : FR-H > FR-L)	Always	1370
Fr-L	Low limit		Always	-200
SET dP-P	Decimal point	Thermocouple or R.T.D : decimal point of instrument / DC Voltage : 0~3	On voltage input (mV,V)	1
SL-H	Maximum on scale (on voltage input)	-1999~9999 Notice : SL-H > SL-L Deimal point : according to DP-P	On voltage input (mV,V)	100.0
SL-L	Minimum on scale (on voltage input)			0.0
FI Lt	PV filter	OFF/1~120sec	Always	OFF
bI AS	PV bias	EUS (-100.0~100.0%)	Always	EUS(0.0%)
b.oUt	Burn-out	OFF / UP / DOWN	Always	UP

INPUT SIGNAL AND MEASUREMENT RANGE

Input code	Input signal	Range (℃)	Range (℉)	Accuracy	Remarks
1	K *2	-200~1370	-300~2500	±0.10% of F.S ±1digit	F.S is maximum value of each RANGE
2	K *2	-199.9~999.9	0~2300		
3	J *2	-199.9~999.9	-300~2300		
4	E *2	-199.9~999.9	-300~1800		
5	T *2	-199.9~400.0	-300~750		
6	R *2	0~1700	32~3100	±0.15% of F.S ±1digit	
7	B *1	0~1800	32~3300		
8	S	0~1700	32~3100		
9	L *2	-199.9~900.0	-300~1300	±0.10% of F.S ±1digit	
10	N	-200~1300	-300~2400	±0.20% of F.S ±1digit	
11	U *2	-199.9~400.0	-300~750	±0.10% of F.S ±1digit	
12	W	0~2300	32~4200		
13	Platinel II	0~1390	32~2500		
20	JPt100 *3	-199.9~500.0	-199.9~999.9	±0.10% of F.S ±1digit	
21	Pt100 *3	-199.9~640.0	-300~1180		
30	1.000~5.000V	1.000~5.000V		±0.10% of F.S ±1digit	
32	-10.00~20.00mV	-10.00~20.00mV			
33	0.0~100.0mV	0.0~100.0mV			

*1 0~400℃ : ±5% of F.S±1digit
*2 0℃ and below : ±0.2% of F.S±1digit
*3 -150.0~150.0℃ : ±0.2% of F.S±1digit

※Current input : The current input (DC4~20mA) is available with input code 30.
You must use the resistance 250Ω (0.5W / 0.1%) on input terminals.

12 OUTPUT GROUP SETTING

This process controller is divided into 2 types: UNIVERSAL TYPE AND HEATING / COOLING TYPE. Output is selectable from Relay, SSR, and Current (4~20mA DC).
Output type range (output code) is ⓪~③ for universal type and ④~⑫ for Heating /Cooling type. Sometimes retransmission output and alarm output are not available according to control output (EX. When you choose output code (OT) 2, it is current output of Universal type. In this case, retransmission output and alarm output are available. But, In Heating / Cooling control type with SSR on Heating side and Relay output on Cooling side (output code ⑩), the retransmission output is avalable but alarm output 3 is not available.

⚠ CAUTION

When setting, **"Input type selection number"** must be selected in the input type selection mode and also **"Output type selection number"** must be selected in the output type selection mode before moving to other mode.
If not, data of other group will be changed to prior value.

Signal	Name	Description	Condition	Initial value
G.oUt	Output group	Output type and mode selection	—	—
oUt	Output signal	Refor to type of control output	Always	(3 / 12)
o.ACt	Output operation	REV: Reverse DIR: Direct action	Output code 1~3	REV
Ct	Cycle time	1~1000 sec	Relay / SSR	30 sec
SET CtC	Cycle time of cooling output	1~1000 sec	Output code 4~12	30 sec
HYS	Hysteresis of univesal type	EUS(0.0~100.0%)	ON/OFF Control	EUS(0.5%)
	Hysterecis of Heating/Cooling type	0.0~10.0%	Heating/Cooling	0.5%
Po	Output volume when input disconnection Output 1 (Out1)	Universal : -5.0~105.0% Heating / Cooling : 0.0~105.0%	Always	0.0%
PoC	Output volume when input disconnection Output 2 (Out2)	0.0~105.0%	Heating / Cooling	0.0%
oL-H	Maximum value	Universal : OL-L + 1Digit~ 105.0% Heating / Cooling : 0.0~ 105.0%	PID Control	100.0%
oL-L	Minimum value	Universal : -0.5%~ OL-H-1Digit	PID Control	0.0 %
		Heating / Cooling : 0.0~ 105.0%		100.0%

● Type of control output (Universal type)

Model	Output code (O T)	OUT1		OUT2
		Relay	SSR / Current	SSR / Current / Retransmission
PX9-0 □ PX7-0 □ PX3-0 □ PX2-0 □	0	Relay ON / OFF		Retransmission
	1		SSR	Retransmission
	2		Current	Retransmission
	3	Relay		Retransmission

● **Type of control output (Heating / Cooling type)**

Model	Output code (O T)	Heating (OUT1)		Cooling (OUT2)	
		Relay	SSR / Current	Relay	SSR / Current / Retransmission
PX9-0 □ PX7-0 □ PX3-0 □ PX2-0 □	4		SSR		SSR
	5		Current		SSR
	6	Relay	Retransmission		SSR
	7		SSR		Current
	8		Current		Current
	9	Relay	Retransmission		Current
	10		SSR	Relay(AL3)	Retransmission
	11		Current	Relay(AL3)	Retransmission
	12	Relay		Relay(AL3)	Retransmission

13 SET VALUE GROUP SETTING

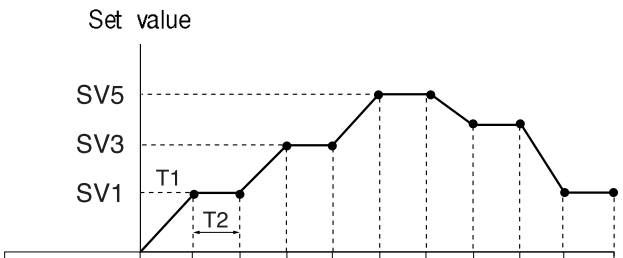
Set value group is indicated with selecting Local mode or Remote mode in GROUP CONTROL (Not Program mode). " Select number of SV " is after setting 3 type of set value in Local mode, select each set value from external contact input to operate. After selecting number of set value, press [MAN AUTO] key, you could set set-value of SV1, SV2, and SV3.

Signal	Name	Description	Condition	Initial value
G.SV	Set value group	Set value setting	—	—
SV.no	Select number of set value	1~3	REM / LOCA	1
SET SV 1	Set SV 1	EU(0.0~100.0%)	REM / LOCA	EU(0.0%)
SV2	Set SV 2	EU(0.0~100.0%)	REM / LOCA	EU(0.0%)
SV3	Set SV 3	EU(0.0~100.0%)	REM / LOCA	EU(0.0%)

* EU : Value at an engineering unit in compliance with the range of an instrument.

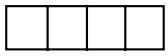
14 PROGRAM GROUP SETTING (RAMP / SOAK)

If Program mode is selected in Group Control, the controller becomes a programmable (ramp/ soak) controller with 1 pattern of 10 step. After setting time and set value, this controller controls automatically.



Step NO.		1	2	3	4	5	6	7	8	9	10
Pattern	SV	SV1	SV2	SV3	SV4	SV5	SV6	SV7	SV8	SV9	SV10
	TIM	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10

TIM



TIM(min) MIN(sec.)

- A pattern is a series of steps. Each step consists of a SV and time setting.
  An Increasing or decreasing SV is set for time period, and each time setting is in hours/ minutes or minutes/ seconds.
- After wiring, check and power ON. PV and SV will be indicated.
  At this time, press [SET] key 3sec. to enter dI SP (display) in PV and then press [SET] key once more to get Group Control (SV is off).
- At this condition, press [SET] key to get control mode(Mod) in PV and select program (PROG) in SV using [∧] or [∨] .
- Press [SET] key once more to set program and then press [SET] key 3 times to get group control (G: CTL) in PV (SV is off). And then press [∧] key to be indicated program group as below.

Signal	Name	Description	Condition	Initial value
G.Pro	Program group	—	—	—
ProG	start / Reset selection	OFF: Reset / ON: Start	PROG	OFF
tmU	Time unit	H.MIN: 99H 59min. M.SEC: 99M 59sec.	PROG	M.SEC
WZ	Wait Zone	OFF / EUS(1~10%)	PROG	OFF
WTm	Wait Time	OFF(0.00)~99.59 (Refer to time unit)	PROG	OFF(0.00)
SSV	Start set value	0.0~100.0% of input range	PROG	EU(0.0%)
StC	Standard of start	SSV:Start set value / PV1:Process value PV2:time prior set value	PROG	SSV
SV1	Set SV1	EU(0.0~100.0%)	PROG	EU(0.0%)
tm1	Time setting of fist step	OFF / 0.00~9959	PROG	OFF
SV10	Set SV10	0.0~100.0%	PROG	EU(0.0%)
tm10	Time setting of tenth step	OFF / 0.00~99.59	PROG	OFF
UC	Condition select after finishing program control	Reset / Repeat / Local / Hold	PROG	RST

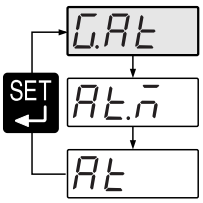
SET

15 AUTO TUNING

This controller has two types of auto-tuning as STD (Standard type) and LOW(Low PV type). Low PV type is the value 10% lower than the set value. Use this type where overshoot is to be suppressed.

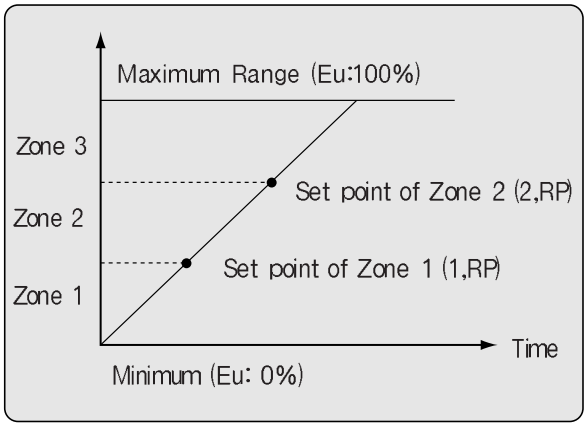
※Auto-tuning: The Auto-tuning function automatically measures, computes and set the optimum P.I.D and ARW contants. The Auto-tuning function can be activated at any time during the process after power ON; while temperature is rising or when control has stabilized.

Auto tuning is not operated when selecting "OFF" in selection mode of auto tuning start.

Signal	Name	Description	Condition	Initial value
	Auto tuning group	Indicates Auto tuning	—	—
	Auto tuning type	STD / LOW	ABS	STD
	Auto tuning start	OFF / 1~3 / AUTO	ABS	OFF

16 P.I.D GROUP

When checking P.I.D. values or setting SV in manual mode, this can be done in P.I.D. Group.
Press [SET] key to get Anti Reset Wind value by auto or manual and then press [SET] once more to be indicated P.I.D mode which is selectable 3 types of P.I.D group (0~3). Example, "0" is no P.I.D mode and after Auto tuning "1" using [∧] or [∨] and pressing [SET] , it is available to change P.I.D value in zone "1" ("2"and "3"are same as "1")
When integral time is 0, manual reset mode is indicated and then you could set reset value to remove off set (range: -5%~105.0% of proportional band). You could set 3 zones by selecting zone mode ON.



※ In diagram, "n" is available to set 1~3 and proportional band of cooling side, integral time of cooling side, hysteresis are indicated in Heating / Cooling type.

Signal	Name	Description	Condition	Initial value
G.PId	P.I.D group	Set P.I.D mode	—	—
Ar U	Anti Reset Wind-Up	Auto / 50.0~200.0%	P.I.D control	Auto
PId	P.I.D group selection	0 / 1~3	Always	0
n.P	n. Proportional band(P)	0.1 (H/C TYPE:0.0)~999.9%	P.I.D group	5.0%
n.I	n. Integal time (I)	OFF / 1~600 sec.	Always	240 sec.
n.d	n. Derivative time (D)	OFF / 1~6000sec.	Always	60 sec.
n.nr	n. Manual reset	-5.0~105.0%	Integral time: OFF	50.0%
n.PC	n. Proportional band of cooling side (P)	0.0 (ON/OFF control) / 0.1~999.9	Heating • Cooling type	5.0%
n.I C	n. Integral time of cooling side (I)	OFF / 1~6000 sec.	Heating • Cooling type	240 sec.
n.dC	n. Derivative time of cooling side (D)	OFF / 1~6000 sec.	Heating • Cooling type	60 sec.
n.db	n. Hysteresis	-100.0~50.0%	Heating • Cooling type	3.0%
1r P	n. Zone point	EU (0) < 1.RP < 2.RP < EU (100.0%)	ZONE = ON	EU(100.0%)

SET

17 ALARM GROUP SETTING

There are 3 alarm outputs available per conrtoller. In Alarm Group, setting are made for mode, dead band, and value of each alarm. Refer to the next page for the 19 different types of alarm functions.

∗ : ① In Heating · Cooling type of PX7, ∗ is not indicated when selecting 10,11,12

∗∗ : ② In PX7, ∗∗ is not indicated because of no third alarm output.
In Heating · Cooling type of PX3, PX2, PX9, ∗∗ is not indicated when selecting 10, 11, 12

Signal	Name	Description	Condition	Initial value
G.ALn	Alarm group	Set alarm mode	—	—
A1Ty	Type of Alarm 1	OFF / 1~22 Refer to "Alarm type and code"	Always	1
∗A2Ty	Type of Alarm 2			2
∗∗A3Ty	Type of Alarm 3			1
A1db	Dead band of Alarm 1	EUS (0.0~100.0%)	Always	EUS(0.5%)
∗A2db	Dead band of Alarm 2			
∗∗A3db	Dead band of Alarm 3			
AL-1	Set value of Alarm 1	PV alarm, Deviation alarm EU (-100.0~100.0%)	Always	EU(100.0%)
∗AL-2	Set value of Alarm 2			EU(0.0%)
∗∗AL-3	Set value of Alarm 3			EU(100.0%)

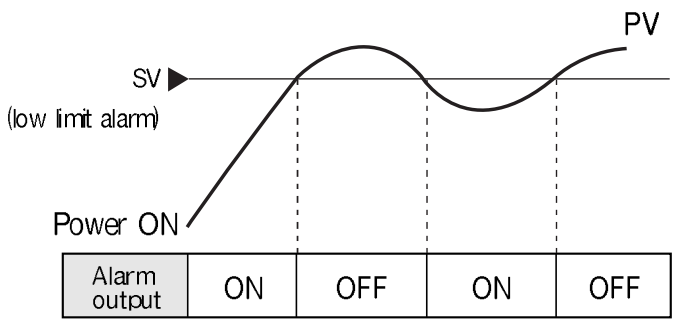
SET

※ Reference : Display lamp will be OFF when output ON in inverted type.

● Hold function

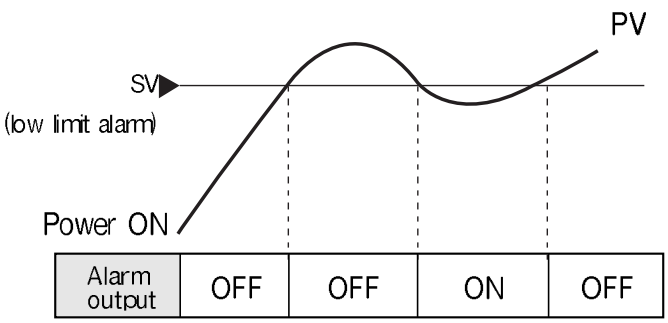
Without hold function, Low limit alarm will be ON when increasing temperature. (Picture 1)

Hold function : None



(Picture 1)

Hold function



(Picture 2)

ALARM TYPE AND CODE

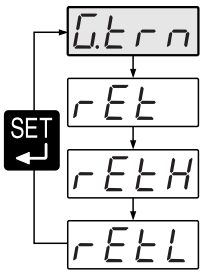
(Notice) : Display lamp will be ON when output OFF in inverted type.

Hysteresis  (△ : Set point , -▲ : Minus Alarm set point , ▲ : Alarm set point)

Code NO.	Alarm type	Function
1	High absolute value	
2	Low absolute value	
3	High deviation value	
4	Low deviation value	
5	High deviation value (inverted)	
6	Low deviation value (inverted)	
7	High · Low deviation value	
8	High · Low band	
9	High absolute (inverted)	
10	Low absolute (inverted)	
11	High absolute with hold function	
12	Low absolute with hold function	
13	High deviation with hold function	
14	Low deviation with hold function	
15	High deviation with hold function (inverted)	
16	Low deviation with hold function (inverted)	
17	High · Low deviation with hold function	
18	High · Low band with hold function	
19	High absolute value with hold function (inverted)	
20	Low absolute value with hold function (inverted)	
21	Heater break alarm 1 (HBA 1)	
22	Heater break alarm 2 (HBA 2)	

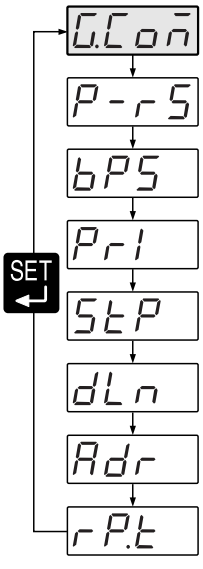
18 RETRANSMISSION GROUP

※Reference : Retransmission group will be indicated when selecting retransmisson in output group.
If selecting code 4,5,7 or 8 in output group, retransmisson will not be indicated.

Signal	Name	Description	Condition	Initial value
	Retransmission group	Set retransmission mode	※Reference	—
	Retransmission type or Power for sensor	PV / SV / Output volume (MV) Power for sensor (SPS)	Optional	PV
	Hight limit of retransmission	Thermocouple / R.T.D : FR -H ~ FR- L DC voltage : SL -H ~ SL-L but, RET. H > RET.L	PV / SV	
	Low limit of retransmission			

19 COMMUNICATION

PX series are equipped with 4 wire /2 wire half-duplex the RS485 / RS422 communication interfaces.
Using the interfaces, communications are available with maximum 31 devices.

Signal	Name	Description	Condition	Initial value
	Communication group	Set communication mode	—	—
	RS485 / RS 422 Protocol	PC.LINK(Set value:0) / PC.LINK SUM (Set value:1)	Optional	0
	Communication rate (B.P.S)	600(SV:0) / 1200(SV:1) / 2400(SV:2) 4800(SV:3) / 9600(SV:4)		4
	Parity check	NONE(SV:0)/EVEN(SV:1)/ODD(SV:2)		1
	Stop bit	1bit (SV:1) / 2bit (SV:2)		1
	Data length	7bit (SV:7) / 8bit (SV:8) (Except PC LINK :8)		8
	Address	1~99 , maximum 31 devices		1
	Response time	0~10. response time = (handling time + response time) X 10ms		0

20 HEATER BREAK ALARM GROUP

Heater break alarm group consist of output dead band and current detection display mode and detects 2 spots (to be ordered seperately: current transformer model CTL-6-S. measurement range : 1~50A).

Signal	Name	Description	Condition	Initial value
G.HbA	Heater break alarm group	Set HBA mode	—	—
HbA1	Current setting mode of HBA 1	OFF / 1~50A	Optional	OFF
*HbA2	Current setting mode of HBA 2	OFF / 1~50A		OFF
SET H1db	Hysteresis setting mode HBA 1	EUS (0.0~100.0%)		EUS(0.5%)
*H2db	Hysteresis setting mode HBA 2	EUS (0.0~100.0%)		EUS(0.5%)
H1Cn	Current measurement value of HBA 1	Only display (0~50A)		
*H2Cn	Current measurement value of HBA 2	Only display (0~50A)		

*: It is not indicated in PX7. (There is no HBA function in PX2, PX3)

21 REMOTE INPUT GROUP

If selecting REMOTE in Control group, set value will be set by remote set.
In remote condition, SV is changeable by front keys, but the controller is controlled by external set value. Do not change set value by remote in auto tuning.

Signal	Name	Description	Condition	Initial value
G.rEn	Remote group	Set remote mode	—	—
r.InH	High limit voltage of remote input	1,000~5,000V but, R. INH > R. INL	Optional	5.000
r.InL	Low limit voltage of remote input			1.000
SET r.SH	High limit on scale	Thermocouple : FR-H ~ FR-L DC voltage : SL-H ~ SL-L Decimal point is set by DP-P.		*1
r.SL	Low limit on scale			*2
r.FL	PV Filter	OFF / 1~120		OFF
r.bS	PV Bias	EUS (-100.0~100.0%)		EUS(0.0%)

*1 : Thermocouple, R.T.D input (FR-H), DC voltage (SL-H)
*2 : Thermocouple, R.T.D input (FR-L), DC voltage (SL-L)
*EUS : Range at an engineering unit in compliance with the span of an instrument.

MEMO