Digital temperature controller

HX series

INSTRUCTION MANUAL

Thank you for purchasing HANYOUNG product.
Please check whether the product is the exactly same as you ordered.
Before using the product, please read this instruction manual carefully.
Please keep this manual where you can view at any time

HANYOUNG NUX

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Safety information

Alerts declared in the manual are classified to Danger, Warning and Caution by their criticality

⚠ DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury
⚠ WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury
⚠ CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury

⚠ Danger

Do not touch or connect any undesirable conductive part to input-output terminal since there is a possibility of electric shock.

⚠ Warning

- Please install an appropriate protective circuit on the outside if malfunction or an incorrect operation may be a cause of leading to a serious accident.
- Since this product does not have the power switch or a fuse, please install those separately on the outside. (Fuse rating : 250 V 0.5 A)
- To prevent damage or failure of this product, please supply the rated power voltage.
- To prevent electric shock or equipment failure, please do not turn on the power until completing wiring.
- Since this is not explosion-proof structure, please do not use in a place where combustible or explosive gas is around.
- Never disassemble, modify, or repair the product. There is a possibility of malfunction, electric shock, or a risk of fire.
- Please turn off the power when mounting/dismounting of the product. This is a cause of electric shock, malfunction, or failure.
- If the product is used with methods other than specified by the manufacturer, then it may lead to injury or property damage.
- Since there is a possibility of electric shock, please use the product as mounted on a panel while the power is being supplied.
- If it is used with systems, machines and equipment that could lead to a risk of life or property damage, please implement safety devices and protections for both lives and the applications and plan for preventing accidents.

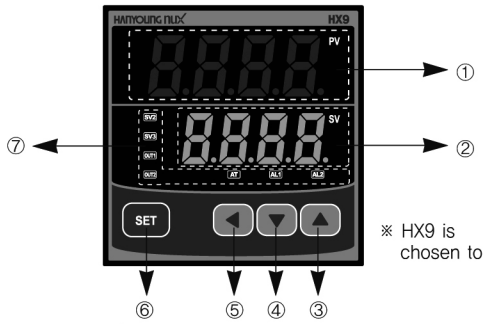
⚠ Caution

- The contents of the instruction manual are subjective to change without prior notice.
- Please make sure that the specification is the same as what you have ordered.
- Please make sure that the product is not damaged during shipping.
- Please use this product in a place where the ambient operating temperature is 0 ~ 50 ℃ (40 ℃ max, closely installed) and the ambient operating humidity is 35 ~ 85 % R.H (without condensation).
- Please use this product in a place where corrosive gas (such as harmful gas, ammonia, etc.) and flammable gas do not occur.
- Please use this product in a place where there is no direct vibration and a large physical impact to the product.
- Please use this product in a place where there is no water, oil, chemicals, steam, dust, salt, iron or others (Contamination class 1 or 2).
- Please do not wipe this product with organic solvents such as alcohol, benzene and others. (Please use mild detergent)
- Please avoid places where excessive amounts of inductive interference and electrostatic and magnetic noise occur.
- Please avoid places where heat accumulation occurs due to direct sunlight or radiant heat.
- Please use this product in a place where the elevation is below 2,000 m.
- Please make sure to inspect the product if exposed to water since there is a possibility of electric leakage or a risk of fire.
- For thermocouple (TC) input, please use a prescribed compensation lead wire. (There is a temperature error if a general lead is used.)
- For resistance temperature detector (RTD) input, please use a small resistance of lead wire and the 3 lead wires should have the same resistance. (There is a temperature error if the 3 lead wires do not have the same resistance.)
- Please put the input signal wire away from the power lines and load lines to avoid the effect of inductive noise.
- The input signal wires and output signal wires should be separated from each other. If it is not possible, please use shielded wires for the input signal wires.
- For thermocouple (TC), please use ungrounded sensors. (There is a possibility of malfunction of product by electric leakage if a grounded sensor is used.)
- If there is a lot of noise from the power line, installing an insulated transformer or a noise filter is recommended. The noise filter should be grounded on the panel and the wire between the output of the noise filter and the power of the instrument should be as short as possible.
- It is effective against noise if making the power lines of the product the twisted pair wiring.
- Please make sure the operation of the product before using since the product may not operate as it intends if the alarm function is not properly set.
- When replacing the sensor, please turn off the power.
- In case of the high frequent operation such as proportional operation, please use an auxiliary relay since the life span of the output relay will be shortened if it connects to the load without the rated margin. In this case, SSR output is recommended.
  * Electromagnetic switch: proportion cycle: set min. 20 sec
  * SSR : proportion cycle: set min.1 sec
- Please do not connect anything to the unused terminals.
- Please connect wires properly after making sure the polarity of terminal.
- Please use a switch or breaker (IEC60947-1 or IEC60947-3 approved) when the product is mounted on a panel.
- Please install a switch or break near the operator to facilitate its operation.
- If a switch or breaker is installed, please put a name plate that the power is off when the switch or breaker is activated.
- In order to use this product properly and safely, we recommend periodic maintenance.
- Some parts of this product have limited expected life span and aged deterioration.
- The warranty of this product (including accessories) is 1 year only when it is used for the purpose it was intended under normal condition.
- When the power is being supplied there should be a preparation time for the contact output. Please use a delay relay together when it is used as a signal on the outside of interlock circuit or others.
- When the user replaces with a spare unit due to product failure or other reason, please check the compatibility since the operation can be varied by the difference of setting parameters even though the model name and code are the same.
- Before using a temperature controller, there could be a temperature difference between PV of the temperature controller and the actual temperature so please operate the temperature controller after correcting the temperature difference appropriately.

Suffix code

Model	Code			Description	
HX	□-	□	□	Multi-input and output digital temperature controller	
Dimension	2			48(W) × 96(H) ㎜	P.I.D Auto-tuning
	3			96(W) × 48(H) ㎜	
	4			48(W) × 48(H) ㎜	
	7			72(W) × 72(H) ㎜	
	9			96(W) × 96(H) ㎜	
Control output		0		Normal (heating control)	
		1		Heating/cooling control (simultaneous control)	
HX2/3/9 option			0	None	
			1	RS485 communication + Heater break alarm (H.B.A)	
HX7 option			0	None	
			1	RS485 communication + D.I 2 contacts (SV2, SV3)	
			2	RS485 communication + Heater break alarm (H.B.A)	
HX4 option			0	None	
			1	RS485 communication + D.I 1 contact (SV2)	
			2	RS485 communication + Heater break alarm (H.B.A)	

Part name and function



※ HX9 is chosen to explain

Number	Name		Description
①	Process value (PV)		Displays the process value in the operation mode.
②	Set value (SV)		Displays the set value in the operation mode
③	▲	Up key	Increases the set value or used to move between groups and to change an option in a parameter in setting mode
④	▼	Down key	Decreases the set value or used to move between groups and to change an option in a parameter in setting mode
⑤	◀	Shift key	Used to move the position of the digit
⑥	SET	Set key	Sets (confirm) the set value, displays the output amount, or set an option in a parameter in setting mode and moves between the parameters in a group. By pressing for 3 seconds, it enters the display setting mode (setting mode) or returns to the operation mode
⑦	SV2	Operation Indicator	Lights when SV2 is displayed
	SV3		Lights when SV3 is displayed
	OUT1		OUT1 indicator
	OUT2		OUT2 indicator
	AT		Auto-tuning indicator
	AL1		Alarm 1 operation indicator
	AL2		Alarm 2 operation indicator

■ External Contact Input (D.I) Selection

3 predetermined set values (temperature values) could be changed with using ON/OFF of the external 2 contact inputs.

External input contact selection (dI 5)	OFF (contact input is not used)	ON (contact input is used)		
	No display	External contact input	SV2	SV3
		Set value 1 display (SV1)	OFF	OFF
		Set value 2 display (SV2)	ON	OFF
		Set value 3 display (SV3)	OFF	ON

■ Control Output Composition

HX series is a multi-control-output temperature controller. It can have relay ON/OFF, SSR voltage pulse output, 4 - 20 mA current output as a control output by selecting an option in the parameter.

If the option is chosen like the below in the output parameter (oUt) in the output group (GoUt) of the normal temperature controller

0 : Relay ON/OFF control is as a control output.

1 : SSR output is as a control output.

2 : 4 - 20 mA d.c current output is as a control output.

3 : Relay PID control is as a control output.

(1) Normal type (heating control)

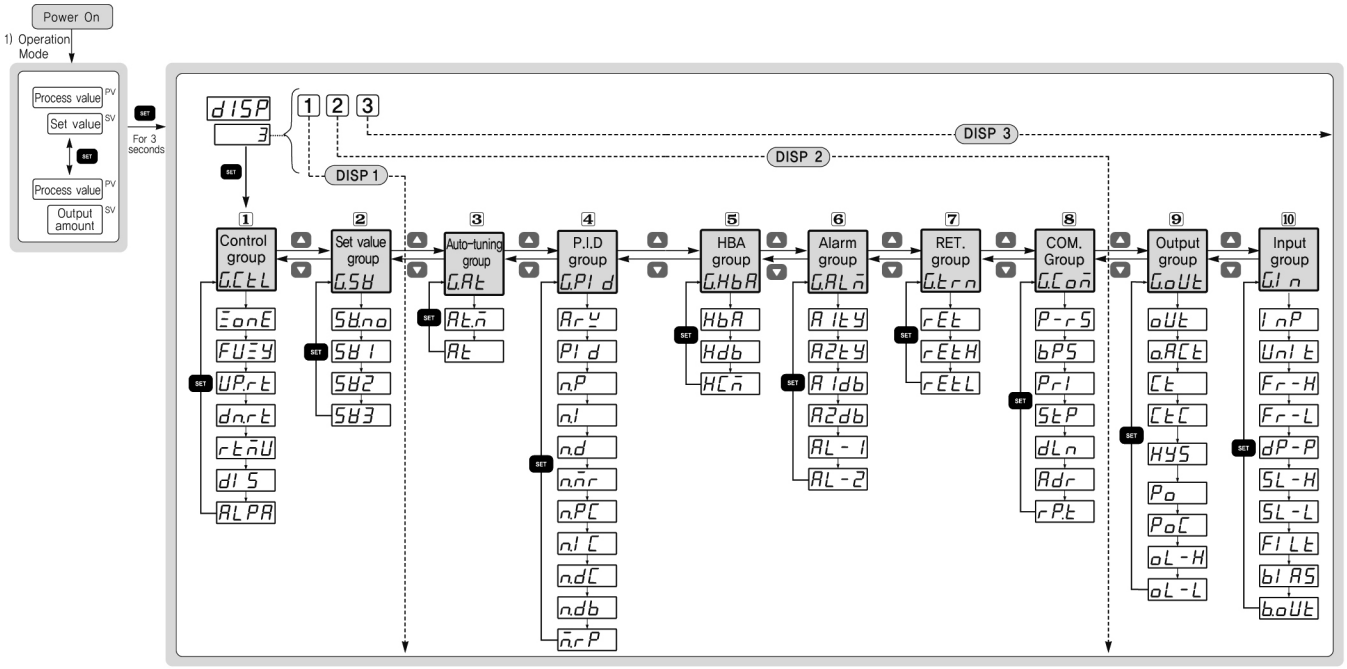
Output code oUt		OUT1(Heating)		OUT2		Default
		Relay	SSR/SCR/RET	Relay	SSR/SCR/RET	
Normal	0	Relay(ON/OFF)	–	AL2 (Alarm 2 output)	RET (retransmission output)	1
	1	–	SSR			
	2		SCR(4 - 20 mA)			
	3	Relay(PID)	–			

※ In normal type, retransmission output (RET.) is not available.

(2) Heating/cooling Type

Type	Output code	OUT1(Heating)		OUT2		Default
		Relay	SSR/SCR/RET	Relay	SSR/SCR/RET	
Heating / Cooling type	4		SSR	AL2 (Alarm 2 output)	SSR	4
	5		SCR (4 - 20 mA)			
	6	Relay	RET (retransmission output)		SCR (4 - 20 mA)	
	7		SSR			
	8		SCR (4 - 20 mA)			
	9	Relay	RET (retransmission output)			
	10		SSR	Relay (control output)	RET (Retransmission output)	
	11		SCR(4 - 20 mA)			
	12	Relay				

Setting Mode



Input code for input type and range

Input signal	Input code	Input type	Range (℃)	Accuracy	Note
Thermocouple (T.C)	1	K *2	-200 ~ 1370	±0.5 % of F.S ±1digit	• F.S is the measurable range from the maximum to the minimum for each range. • Digit is the minimum display value *1 0 ~ 400℃ range : ±10 % of F.S ± 1 digit *2 below 0 ℃ : ±1.0 % of F.S ± 1 digit *3 -150.0 ~ 150.0 ℃ range : ±1.0 % of F.S ± 1 digit ※20 → kPt 100 Ω ※21 → Pt 100 Ω (IEC751)
	2	K *2	-199.9 ~ 999.9		
	3	J *2	-199.9 ~ 999.9		
	4	E *2	-199.9 ~ 999.9		
	5	T *2	-199.9 ~ 400.0		
	6	R *2	0 ~ 1700		
	7	B *1	0 ~ 1800	±0.5 % of F.S ±1digit	
	8	S	0 ~ 1700		
	9	L *2	-199.9 ~ 900.0	±0.5 % of F.S ±1digit	
	10	N	-200 ~ 1300	±1.0 % of F.S ±1digit	
	11	U *2	-199.9 ~ 400.0		
	12	W	0 ~ 2300		
	13	Platinel II	0 ~ 1390		
Resistance temperature detector (RTD)	20 ※	KPt100 Ω *3	-199.9 ~ 500.0		
	21 ※	Pt100 Ω *3	-199.9 ~ 640.0		
	22	Pt100 Ω	-200 ~ 640		
DC voltage (VDC/㎷DC)	30	1 ~ 5 V d.c	1 ~ 5 V d.c		
	31	0 ~ 100 ㎷ d.c	0 ~ 100 ㎷ d.c	±0.5 % of F.S ±1digit	
DC current	30 ※	4 - 20 ㎃ d.c	※ When current input is used, please connect a 250 Ω 0.1% resistor to the input terminal.		

Operation Method

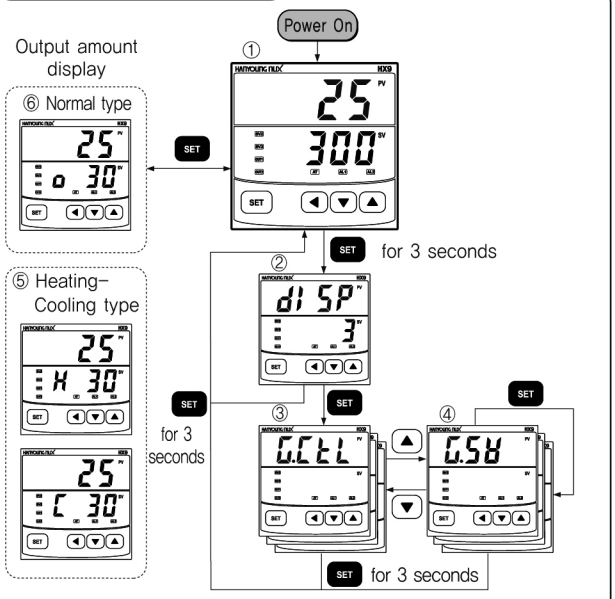
■ When turn the power on after completing wiring

(1) After the firmware version of the temperature controller appears for a short period of time, the operation mode is running like the number ① that process value (current temperature) and the set value are displayed.

(2) In the number ①, if SET button is pressed for 3 seconds, it enters dI SP display setting mode. It can be selected as DISP 1, DISP 2 and DISP 3 to limit displaying setting groups.

(3) In the operation mode, if SET button is pressed, the output amount is displayed like the picture ⑤ – ⑥ below.

● Switching between modes



⚠ Caution

In the operation mode, if SET and ◀ button are pressed simultaneously for 3 seconds, it enters LEVL (LEVEL) setting mode which prevents an operator to change parameter setting as limiting access to the group. The default is 3rd level. The level setting mode limits the display setting mode. If the level setting mode is 2nd then DISP 3 cannot be set in the display setting mode. Only DISP 1 and DISP 2 can be set in the display setting mode.

※ In order to return the operation mode, turn off the temperature controller when tEST is displayed and then turn on it again.

1 Control group

Symbol	Parameter	Option	Available condition	Default
G.CtL	Control group	Options for control mode	–	–
ZonE	Zone setting	OFF / ON	Always on	OFF
FUZY	Fuzzy function setting	OFF / ON	PID control	OFF
UPrt	Initial temperature increase setting	OFF / EUS (0 ~ 100 %)	Always on	OFF
dnrt	Initial temperature decrease setting	OFF / EUS (0 ~ 100 %)	Always on	OFF
rtnU	Time for slope in ramp function	HOUR / MIN	Always on	HOUR
dI S	External contact input setting	OFF / ON	Always on	OFF
ALPA	2 degrees of freedom gain setting	1 ~ 100 %	Always on	85

2 Set value (SV) setting group

Symbol	Parameter	Option	Available condition	Default
G.SV	Set value setting group	Options for set values	–	–
SVno	Set value Number setting	1~3 (the chosen set value is displayed and controlled)	Always on	1
SV 1	Set value 1 (SV1) setting	EU (0.0 ~ 100.0 %)		EU(0.0 %)
SV2	Set value 2 (SV2) setting	EU (0.0 ~ 100.0 %)		EU(0.0 %)
SV3	Set value 3 (SV3) setting	EU (0.0 ~ 100.0 %)		EU(0.0 %)

3 Auto-tuning (AT) group

Symbol	Parameter	Option	Available condition	Default
G.AT	Auto-tuning group	Options for auto-tuning (AT) group	–	–
AT.n	Auto-tuning type setting	Standard (STD) : Std/ Low PV (LOW) : Lou	ABS	STD
AT	Auto-tuning start setting	OFF / 1 ~ 3 /AUTo (AUTO)	ABS	OFF

4 P.I.D group

Symbol	Parameter	Option	Available condition	Default
G.PId	PID group	Options for P.I.D mode	–	–
Ar-U	ANTI RESET WIND-UP setting	Auto / 50.0 ~ 200.0 %	P.I.D control	100 %
PId	PID group setting	0 / 1 ~ 3	Always on	0
n.P	n. Proportional band (P)	0.1(H/C TYPE : 0.0) ~ 999.9 %	Selecting one of P.I.D group	5.0 %
n.I	n. Integral time (I)	OFF / 1 ~ 6000 s	Always on	240 s
n.d	n. Derivative time (D)	OFF / 1 ~ 6000 s	Always on	60 s
n.mr	n. Manual reset	–5.0 ~ 105.0 %	Integral time: OFF	50.0 %
n.PC	n. Proportional band (P) for cooling	0.0(ON/OFF control) / 0.1 ~ 999.9 %	heating · cooling	5.0 %
n.I C	n. Integral time (I) for cooling	OFF / 1 ~ 6000 s	heating · cooling	240 s
n.dC	n. Derivative time (D) for cooling	OFF / 1 ~ 6000 s	heating · cooling	60 s
n.db	n. hysteresis (dead band)	–100.0 ~ 50.0 %	heating · cooling	3.0 %
I.rP	n. Zone position setting	EU(0) 〈 1.RP 〈 2.RP 〈 EU(100.0 %)	P.I.D group 1 or P.I.D group 2	EU (100.0 %)

5 Heater Break Alarm (HBA) group

Symbol	Parameter	Option	Available condition	Default
G.HbA	Heater break alarm group	Options for HBA mode.	–	–
HbA	Current setting of HBA output	OFF / 1 ~ 50 A	HBA Option (Refer to "model name and code" table)	OFF
Hdb	Hysteresis setting of HBA output	EUS (0.0 ~ 100.0 %)		EUS(0.5 %)
HCn	Current measurement value of HBA output	Only indicates current measurement value (0 ~ 50 A)		

6 Alarm group

Symbol	Parameter	Option	Available condition	Default
G.ALn	Alarm group	Options for alarm mode	–	–
A1tY	Alarm 1 type setting	OFF / 1 ~ 22 Refer to "Alarm type and code"	Always on	1
A2tY*	Alarm 2 type setting			2
A1db	Hysteresis (dead band) of alarm 1	EUS(0.0 ~ 100.0 %)	Always on	EUS (0.5 %)
A2db*	Hysteresis (dead band) of alarm 2			
AL-1	Set value of alarm 1	PV alarm, deviation alarm: EU(–100.0 ~ 100.0 %)	Always on	EU(100.0 %)
AL-2*	Set value of alarm 2			EU(0.0 %)

7 Retransmission (RET) group

Symbol	Parameter	Option	Available condition	Default
G.trn	RET. Group	Options for RET. Group	–	–
rEt	Retransmission type or power for sensor	Process value(PV) / set value (SV) / output amount (MV) / power for sensor (SPS)	RET. option	PV
rEtH	High limit of retransmission	T.C / RTD: FR-H ~ FR-L DC voltage: SL-H ~ SL-L But, RET.H 〉 RET.L	PV / SV	EU(100.0 %)
rEtL	Low limit of retransmission			EU (0.0 %)

8 Communication group

Symbol	Parameter	Option	Available condition	Default
G.Com	Communication group	Options for communication mode.	–	–
P-rS	RS 485 / RS 422 Protocol	PC.LINK (code : 0) PC.LINK SUM (code : 1) MODBUS-ASCII(code : 2) MODBUS-RTU (code : 3)	Comm. Option	0
bPS	Communication speed (B.P.S)	2400(code : 2), 4800(code : 3), 9600(code : 4), 14400(code : 5), 19600(code : 6)		4
Pri	Parity Bit	NONE(code : 0), EVEN(code : 1), ODD(code : 2)		1
StP	Stop Bit	1bit (code : 1), 2bit (code : 2)		1
dLn	Data length	7bit (code : 7), 8bit (code : 8) (code 8 is not available for PC LINK)		8
Adr	Address	1 ~ 99 but, max 31 units		1
rPt	Response time	0 ~ 10. Response time = (processing time + response time) X 10 ms		0

⑨ Output group

Caution Please make sure to choose "input code" in "input code setting" of the input group first and then select "output code" in "output type setting" and other options in other groups. If other options are selected first and then input code is changed to other input code, the options in the other groups will be changed.

Symbol	Parameter	Option	Available condition	Default
GoUt	Output group	Options for output type and mode	–	–
oUt	Output type setting	Refer to "control output composition"	Always on	(0 / 3)
oACt	Output operation	REV: reverse, DIR: direct	Output code 0~3	REV
Ct	Cycle time	1 ~ 1000 s	relay / S.S.R	30 s
CtC	Cycle time for cooling	1 ~ 1000 s	Output code 4~12	30 s
HYS	Hysteresis for normal type	EUS (0.0 ~ 100.0 %)	ON/OFF control	EUS(0.5 %)
SET	Hysteresis for heating-cooling type	0.0 ~ 10.0 %	Heating-cooling	0.5 %
Po	Output amount of OUT1 when input break	Normal : -5.0 ~ 105.0 % Heating-cooling: 0.0 ~ 105.0 %	Always on	0.0 %
PoC	Output amount of OUT2 when input break	0.0 ~ 105.0 %	Heating-cooling	0.0 %
oL-H	High limit of output amount	Normal : OL-L + 1Digit~ 105.0 % Heating-cooling : 0.0 ~ 105.0 %	PID control	100.0 %
oL-L	Low limit of output amount	Normal : -0.5 % ~ OL-H-1Digit Heating-cooling : 0.0 ~ 105.0 %	PID control	0.0 % 100.0 %

⑩ Input group

Symbol	Parameter	Option	Available condition	Default
GIn	Input group	Options for input type and input mode	–	–
InP	Input code setting	Input signal and measurable range code	Always on	Code : 1
Unit	Temperature unit setting	℃ / ℉	T.C or R.T.D	℃
Fr-H	High limit setting	Within range (refer to "input code for input type and range") but, FR-H 〉 FR-L	Always on	1370
Fr-L	Low limit setting		Always on	-200
SET	Decimal point position (voltage input)	Fixed for T.C or RTD / DC voltage: 0~3 setting for decimal point position	Voltage input (mV,V)	1
SL-H	High limit of scale (voltage input)	-1999 ~ 9999 but, SL-H 〉 SL-L decimal point according to DP-P	Voltage input (mV,V)	100.0
SL-L	Low limit of scale (voltage input)			0.0
FILt	Process value filter	OFF / 1 ~ 120 sec	Always on	OFF
biAS	Process value bias (compensation)	EUS(-100.0 ~ 100.0 %)	Always on	EUS(0.0 %)
bAUt	Operation after input break (burn-out)	OFF / UP / DOWN	Always on	UP

Alarm type and code

(Caution) : In case of connecting in an inverse direction such as connecting a normally closed relay, the output is not delivered to the actuator even though the indicator is ON.

Hysteresis (△ : set value, -▲ : - alarm set value, ▲ : alarm set value)

Code	Alarm type	Operation
1	High absolute value (NO)	
2	Low absolute value (NO)	
3	High deviation value (NO)	
4	Low deviation value (NO)	
5	High deviation value (NC)	
6	Low deviation value (NC)	
7	High-Low deviation value	
8	High-Low deviation range	
9	High absolute value (NC)	
10	Low absolute value (NC)	
11	High absolute (NO, Hold)	
12	Low absolute (NO, Hold)	
13	High deviation (NO, Hold)	
14	Low deviation (NO, Hold)	
15	High deviation (NC, Hold)	
16	Low deviation (NC, Hold)	
17	High-Low deviation value (Hold)	
18	High-Low deviation range (Hold)	
19	High absolute value (NC, Hold)	
20	Low absolute value (NC, Hold)	
21	Heater break alarm 1 (HBA1)	

Function

■ Function Description

Function 1) Auto-tuning

Auto-tuning is a function that the controller automatically measures the characteristic of the target system and calculates the optimal values for proportional band (P), integral time (I), and derivative time (D) and then set the optimal value for each P.I.D parameter.

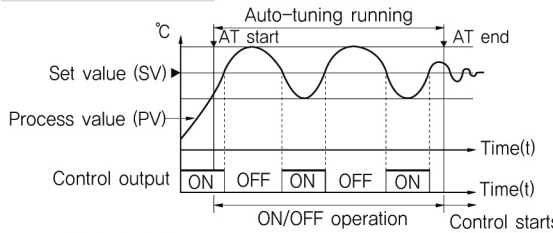
During auto-tuning, the control output is changed to ON/OFF control to get response from the target system. From the response, the most appropriate P.I.D values are obtained for the system. This is called Limit Cycle.

HX series has two types of auto-tuning : standard type and low PV type.

① Standard auto-tuning : This auto-tuning is based on the set value (SV).

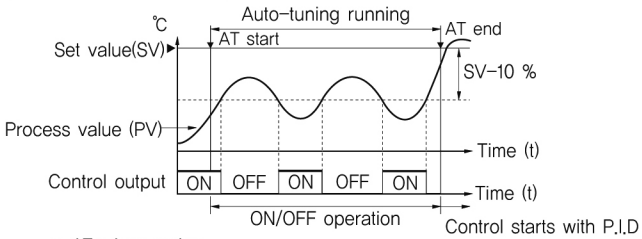
② Low PV auto-tuning : This auto-tuning is based on the value 10 % lower than the set value (SV).

a) Standard auto-tuning



※ AT : Auto-tuning

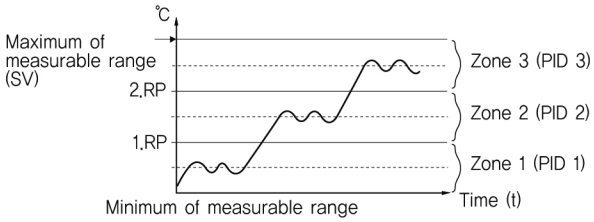
b) Low PV auto-tuning



※ AT : Auto-tuning

Function 2) P.I.D auto-tuning in Zone

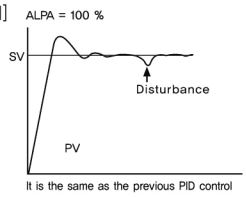
Within the input range, 3 different P.I.D groups can be applied to each zone of 3. Since some systems have a wide range of temperature to control and the optimal P.I.D values are different for their temperature ranges, this function can be used to apply different optimal P.I.D values to their temperature ranges.



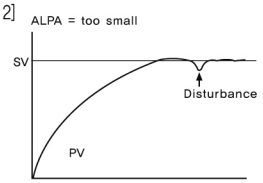
Function 3) 2 degrees of freedom P.I.D

In order to get better response against disturbance in the steady state, there is usually a large overshoot in the transient state. To reduce this overshoot in the transient state, 2 degrees of freedom P.I.D control is used while obtaining good disturbance response in the steady state. The parameter "ALPA" is used to control the amount of overshoot.

[Picture 1]



[Picture 2]

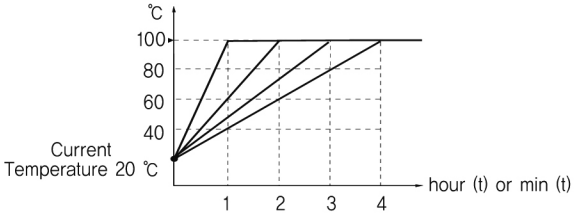


※ Note 1 : If ALPA = 100 %, it is the same as the previous P.I.D control

※ Note 2 : If ALPA is too small, it might take some time to reach to the steady state.

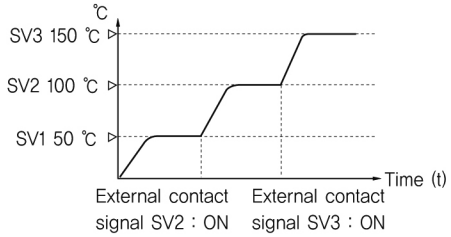
Function 4) Ramp function

This is the slope used to reach the set value (SV). The ramp function can be set in "control group" with setting the set value in "initial temperature increase" or "initial temperature decrease" and setting hour or min in "time for slope in ramp function. With this slope (= the desired value/ time) the current temperature reaches to the set value (SV).



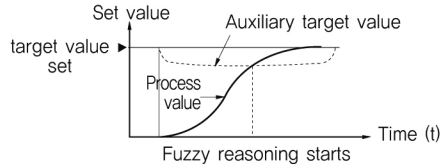
Function 5) External contact input

This function is used to select one of set values (SV1, SV2, SV3) by the external contact input signal and it is used as the step control.



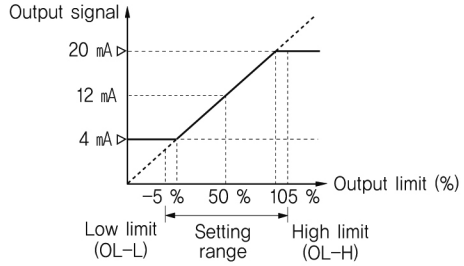
Function 6) Fuzzy calculation

Fuzzy calculation suppresses the overshoot.



Function 7) Output limit

This function is used to set the high limit and low limit as the operating range of the control output.The output limit (the high limit and low limit) can be set -5 ~ 105 % of the output amount.



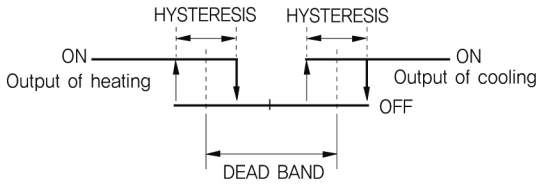
Function 8) Heater break alarm

① This detects heater break and immediately turn on alarm.
② Please use the current transformer (CT) designed by Hanyoung NUX.
③ The electric current value and alarm operating point (hysteresis) are set in "HBA group".
④ This cannot be used if phase control method (SCR output) is used by thyristor.

Function 9) Heating/cooling control

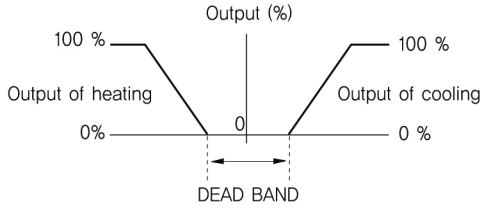
In heating/cooling control, it divides the PID computation result into two control signals and it outputs to each heating and cooling.The control method for each heating and cooling can be selected either PID control or ON/OFF control. Also, it is possible to choose one of the control outputs: relay output, SSR, and current output as the heating output and cooling output.

If both heating and cooling are controlled by ON/OFF control, the dead band (hysteresis) is shown as below.



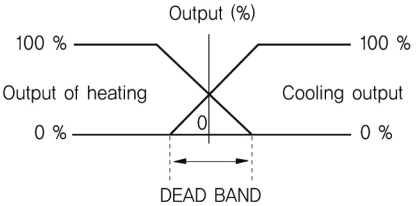
〈ON/OFF control for heating/cooling〉

The dead band of PID control for heating/cooling is shown as below.



〈PID control for heating/cooling: Dead band of "+" set value〉

Also, the dead band of "-" set value and the dead band of PID control for both heating and cooling are shown as below. At this time, there is an overlapped output from the both.



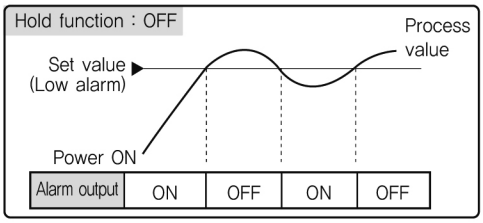
〈PID control for heating/cooling: Dead band of "-" set value〉

Function 10) Output during emergency

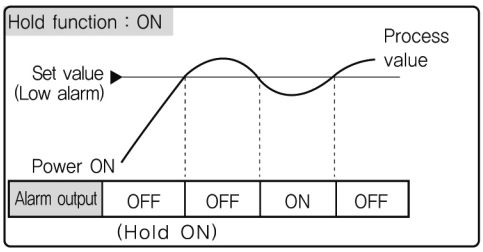
When there is A/D Error or input break (Burn-out), it stops the PID control output and then it outputs the preset value of output. (P_o parameter in output group)

Function 11) Hold function

Without hold function, Low limit alarm will be ON when increasing temperature after turning on the power. (Refer to picture 1) In order to not turn on the low limit alarm while the temperature is increasing, the hold function is used to not activate the low limit alarm from the point where the power is on to the point where goes over the low limit set value.



[Picture 1]



[Picture 2]

Specification

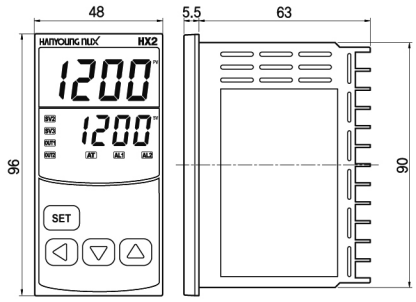
Power supply		100 – 240 V a.c (±10 %), 50/60 Hz
Power consumption		6 W max, 10 VA max
Input	Type	Refer to "input code for input type and range"
	Sampling cycle	62.5 ms
	Accuracy	±0.5 % of F.S (refer to "input code for input type and range")
	Allowable voltage	Within ±20 V d.c (VDC), within ±10 V d.c (TC, RTD)
	Reference junction compensation accuracy	±3.5 ℃ (0 ~ 50 ℃)
	Operation after input break	T.C: OFF, UP/DOWN RTD: UP
Control output	Relay	NO : 5 A 250 V a.c, 5 A 30 V d.c (resistive load) NC : 3 A 250 V a.c, 1 A 30 V d.c (resistive load)
	S.S.R (voltage pulse)	ON voltage : 12 V d.c min, OFF voltage : 0.1 V d.c max Load resistance 600 Ω min
	S.C.R (current)	range : 4 – 20 mA (±5%), accuracy : ±0.2 mA Load resistance 600 Ω max
Retransmission output		range : 4 – 20 mA (±5%), accuracy : ±0.2 mA Load resistance 600 Ω max
Alarm output		5 A 250 V a.c, 5 A 30 V d.c (resistive load)
Contact input		OFF resistance : 10 kΩ min, ON resistance : 1 kΩ max
Control	Method	ON/OFF, P.I.D control
	Output operation	Reverse operation, Direct operation
	Anti-reset windup	Auto(A=0), 0.1 ~ 100.0 %
Interface	Standard	EIA RS485
	Max connection unit	31 units (but, ADDRESS setting : 1 ~ 99)
	Communication method	2 wire half duplex
	Data transmission	asynchronous
	Communication sequence	None
	Communication distance	1.2 km max
	Communication Speed	2400, 4800, 9600, 14400, 19600 BPS (selectable by parameter)
	Start bit	1 BIT
	Data length	7 or 8 BIT
	Parity bit	NONE, EVEN, ODD
	Stop bit	1 or 2 BIT
	Protocol	PC.LINK, PC.LINK SUM, MODBUS-ASCII, MODBUS-RTU
	Response time	Processing time in receiving + (response time x 10 ms)
2 degrees of freedom P.I.D		1 ~ 100% of proportional band
Insulation resistance		20 MΩ min (primary terminal – secondary terminal)
Dielectric strength		2,300 V a.c, for 1 minute (primary terminal – secondary terminal)
Operating ambient temperature		0 ~ 50 ℃, (without condensation)
Operating ambient humidity		35 ~ 85 % R.H (without condensation)

Appearance, Panel cutout and Connection Diagram

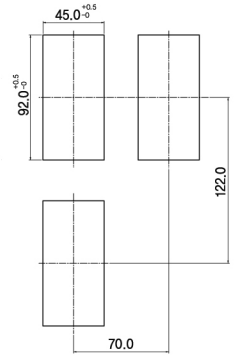
(unit : mm)

HX2

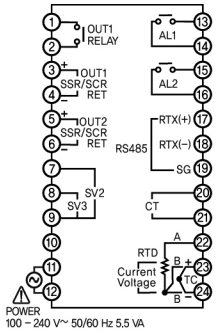
● Appearance



● Panel cutout

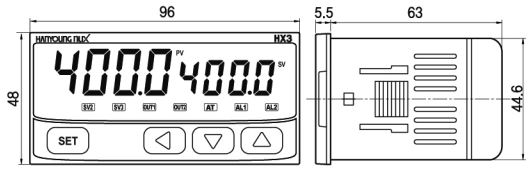


● Connection Diagram

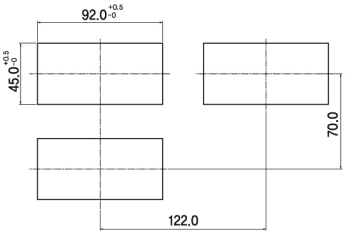


HX3

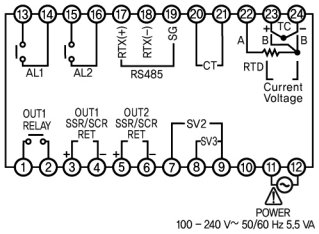
● Appearance



● Panel cutout

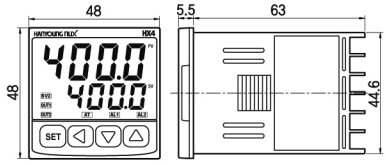


● Connection Diagram

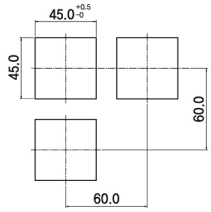


HX4

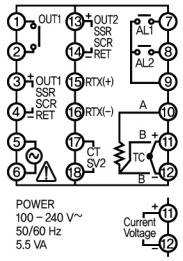
● Appearance



● Panel cutout

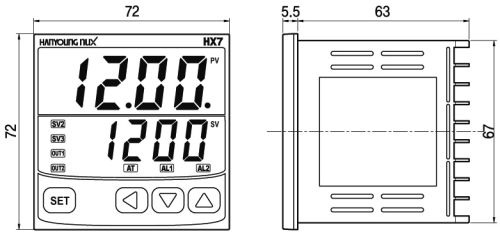


● Connection Diagram

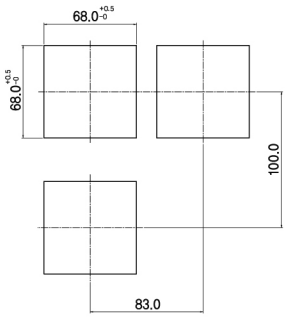


HX7

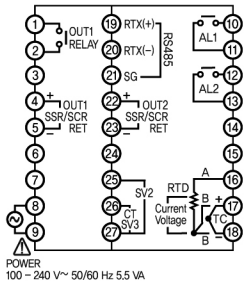
● Appearance



● Panel cutout

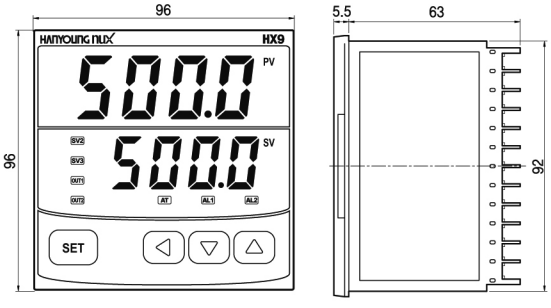


● Connection Diagram

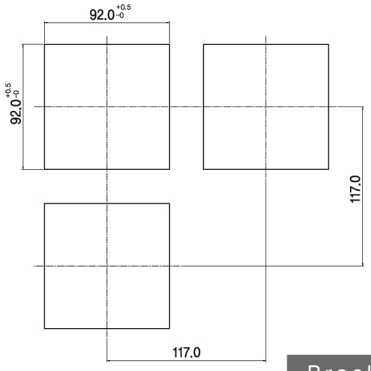


HX9

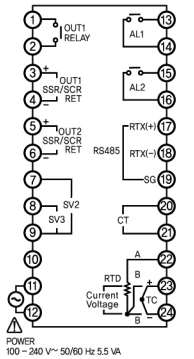
● Appearance



● Panel cutout

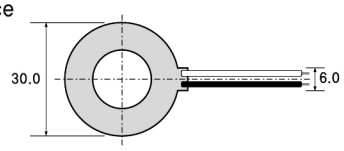


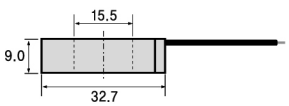
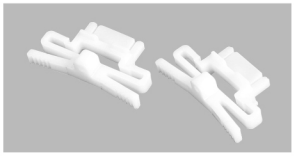
● Connection Diagram



CT-50N

● Appearance

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