

Digital Temperature Controller

NX series

INSTRUCTION MANUAL

Thank you for purchasing Hanyoung Nux products. Please read the instruction manual carefully before using this product, and use the product correctly. Also, please keep this instruction manual where you can view it any time.

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HANYOUNG NUX

HANYOUNGNUX CO.,LTD

28, Gilpa-ro 71beon-gil,
Michuhol-gu, Incheon, Korea
TEL : +82-32-876-4697
http://www.hynux.com

Safety information

Please read the safety information carefully before the use, and use the product correctly. The alerts declared in the manual are classified into **Danger**, **Warning** and **Caution** according to their importance

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

DANGER

- The input/output terminals are subject to electric shock risk. Never let the input/output terminals come in contact with your body or conductive substances.

WARNING

- If there is a possibility of a serious accident due to malfunction or abnormality of this product, install an appropriate protection circuit on the outside.
- Since this product is not equipped with a power switch and fuse, install them separately on the outside (fuse rating: 250 V, 0.5 A).
- When changing the input sensor (default K type), first set the input group (G.in), then set the output group (G.out), then set the other groups. If you change the data of the input group or the output group after setting other groups, the data of other groups that have already been set will be initialized.
- Please supply the rated power voltage, in order to prevent product breakdowns or malfunctions.
- To prevent electric shocks and malfunctions, do not supply power until the wiring is completed.

CAUTION

- The contents of this manual may be changed without prior notification.
- Please make sure that the product specifications are the same as you ordered.
- Please make sure that there are no damages or product abnormalities occurred during shipment.
- Use the product in a temperature range from 0 to 50 °C (max. 40 °C for close installation) / humidity range from 35 to 85% RH (without condensation)
- Please use the product in places where corrosive gases (especially harmful gases, ammonia, etc.) and flammable gases are not generated.
- Use the product in places where vibrations and impacts are not applied directly to product body.
- Please use the product in places without liquids, oils, chemicals, steam, dust, salt, iron, etc. (pollution degree 1 or 2).
- Please do not wipe the product with organic solvents such as alcohol, benzene, etc. (wipe it with neutral detergents).
- Please avoid places with large inductive change in the difference, static electricity, magnetic noise are generated.
- Please avoid places with heat accumulation caused by direct sunlight, radiant heat, etc.
- Please use the product in places with elevation below 2000 m.
- When fixing the product to a panel, attach the two brackets on the fixing holes and tighten them with a screwdriver. The fixing torque is about 14.7 N · cm (1.5 kg · cm).
- When water enters, short circuit or fire may occur, so please install the product carefully.
- For thermocouple input, use the predetermined compensating cable (temperature errors occur when using ordinary cable).
- For RTD input, use a cable with small lead wire resistance and without resistance difference among 3 wires (temperature errors occur if the resistance value among 3 wires is different).
- Use the input signal line away from power line and load line to avoid the influence of inductive noise.
- Input signal line and output signal line should be separated from each other. If separation is not possible, use shield wires for input signal line.
- Use a non-grounded sensor for thermocouple (using a grounded sensor may cause malfunctions to the device due to short circuits). When there is a lot of noise from the power, we recommend to use insulation transformer and noise filter. Please install the noise filter to a grounded panel or structure, etc. and make the wiring of noise filter output and product power supply terminal as short as possible.
- Tightly twisting the power cables is effective against noise.
- If the alarm function is not set correctly, it will not be output in case of abnormal operation, so please check it before operation.

Suffix code

NX1 suffix code

Model	Code	Content
NX1 -	☐ ☐ ☐	Multi Input/Output Temperature Controller. 48(W) X 24(H) mm
Control type	0	Normal type
	1	Heating/cooling control (simultaneous control)
Normal type option		Options Heating output Cooling output
	0	RET Relay -
	1	None SSR/SCR -
	2	RS485/RET Relay -
	3	RS485 SSR/SCR -
Heating / cooling type option	4	ALM SSR/SCR -
	5	ALM/RS485 SSR/SCR -
	0	None Relay SSR/SCR
	1	None SSR/SCR Relay SSR/SCR
	2	RS485 Relay SSR/SCR

(Note) In NX1-1 □ control output can be selected among 6, 9, 10, and 11.

NX2, 3, 7, 9 suffix code

Model	Code	Content
NX	☐ ☐ ☐	Multi Input/Output Temperature Controller
Size	2	48(W) X 96(H) mm
	3	96(W) X 48(H) mm
	7	72(W) X 72(H) mm
	9	96(W) X 96(H) mm
Control method	0	Normal type (heating control)
	1	Heating/cooling (simultaneous) control
NX9 option	0	None
	1	RS485, HBA
NX7 option	1	RS485, HBA
	2	SV2, SV3, HBA
NX2, NX3 option	0	SV2, SV3
	1	HBA
	2	RS485

CAUTION

Control output wiring

When wiring or removing the control output, shut off the controller and external power supply, because there is a risk of electric shock. Use shielded wires for voltage pulse output (SSR) and current output (SCR) wiring.

NX4 suffix code

Model	Code	Content
NX4	☐ ☐ ☐	Multi Input/Output Temperature Controller 48(W) X 48(H) mm
Size	0	Normal type (heating control)
	1	Heating/cooling control (simultaneous control)
	2	Heating/cooling control (NX4-20 only)
NX4 option	0	None
	1	HBA, AL2
	2	SV2, SV3
	3	RET, RS485
	4	RS485, SSR/SCR
	5	AL1, AL2
	6	AL1, AL2, SV2
	7	RS485, HBA

(Note)
option 1 : OUT1 (terminals ①~②~③) applied as AL1 (when selecting SSR / SCR control output).
option 3 : OUT2 (terminals ⑩~⑪) applied as RET.
option 4 : OUT2 (terminals ⑩~⑪) applied as SSR/SCR.
option 5 : OUT1 (terminals ⑥~⑦) cannot be applied as SV2.
option 6 : OUT1 (terminals ⑥~⑦) applied as SV2 (with relay control output).

NX4 control output configuration (if the control output is SCR, the HBA can not be used)

Normal type (heating)	Output	Heating side (OUT1)		NX4-00	NX4-01	NX4-02	NX4-03	NX4-04	Default
		Relay ①~②~③	SSR / SCR ⑥~⑦	-	Alarms and transformers ⑬~⑭	External input (DI) ⑬~⑭	Communication and retransmission ⑬~⑭	Communication ⑬~⑭	
		Relay ①~②~③	SSR / SCR ⑥~⑦	⑬~⑭	Relay ⑬~⑭	Transformer ⑬~⑭	⑬~⑭	⑬~⑭	
	0	Relay (ON/OFF)	-	-	AL2	-	SV2	SV3	1
	1	AL1	SSR	-	AL2	CT	-	-	
	2	AL1	SCR (4 ~ 20 mA d.c.)	-	AL2	-	Communication function (RS485)	Retransmission output (RET)	
	3	Relay (PID)	-	-	AL2	CT	Communication (RS485)	Communication (RS485)	

※ NX4-01: HBA output is designated as 1-2-3 or 13-14 when selecting 21 for alarm type

NX4-05

Normal type (heating)	Output	Heating side (OUT1) Relay ①~②~③ SSR / SCR ⑥~⑦	Alarm output Relay ⑬~⑭	Default
NX4-05 (AL1) (AL2)	0	Relay (ON/OFF)	-	1
	1	-	SSR	
	2	-	SCR (4 ~ 20 mA d.c.)	
	3	Relay (PID)	-	

NX4-07

Normal type (heating)	Output	OUT1 (Heating side) Relay ①~②~③ SSR / SCR ⑥~⑦	Communication and transformers ⑬~⑭	Default
NX4-07 (RS485) (HBA)	0	Relay (ON/OFF)	-	1
	1	AL1	SSR	
	2	AL1	SCR (4 ~ 20 mA d.c.)	
	3	Relay	-	

NX4-06

Normal type (heating)	Output	OUT1 (Heating side) Relay ①~②~③ ⑥~⑦	Alarm output Relay ⑬~⑭	Default
NX4-06 (AL1) (AL2) (SV2)	0	Relay (ON/OFF)	SV2	1
	1	-	-	
	2	-	-	
	3	Relay (PID)	SV2	

Specifications

Input specification

Input type	Thermocouple: K, J, E, T, R, B, S, L, N, U, W, PL2 (refer to input signal and measurement range) RTD : Pt 1000, KP1 1000 DC voltage input : 1 ~ 5 V d.c., -10 ~ 20 mV, 0 ~ 100 mV, 4 ~ 20 mA (250 Ω with external resistor)
Input sampling cycle	250 ms
Input display resolution	Basically, below the decimal point of the range
Input impedance	Thermocouple and DC voltage input (mV): min. 1 MΩ, DC voltage input (V): approx. 1 MΩ
Allowable signal source resistance	Thermocouple: max. 250 Ω, DC voltage: max. 2 kΩ
Allowable wiring resistance	RTD: max. 10 Ω/wire (conductor resistance among 3 wires should be same)
Allowable input voltage	Within ±10 V (thermocouple, RTD, DC voltage: mV d.c.) Within ±20 V (DC voltage: V d.c.)
Noise reduction rate	NMRR (normal mode): min. 40 dB (50/60 Hz ±1 %) CMRR (common mode): min. 120 dB (50/60 Hz ±1 %)
Standard	Thermocouple / RTD (KS/IEC/DIN)
J.R error	±1.5 °C (15 ~ 35 °C), ±2.0 °C (0 ~ 50 °C)
Input break detection (BURN-OUT)	Thermocouple: OFF, UP/DOWN Scale selection RTD : UP Scale (detection current at thermocouple and RTD BURN-OUT: approx. 50 nA)
Measurement accuracy	±0.5 % (FULL SCALE) See "Input Signal and Measurement Range". Thermocouple, RTD: can be changed within the range of input signal and measurement range table. DC voltage: min. and max. voltages can be changed within each range. Scaling possible within the range of the measurement range
Input range	

Operating environment

Installation environment	Continuous vibration : 5 ~ 14 Hz: peak-to-peak max. 1.2 mm, Continuous vibration (4 ~ 150 Hz): max. 4.9 m/s Short-time vibration: 14.7 m/s, max. 15 seconds (each 3 directions) Shock: 147 m/s, max. 11 ms (6 directions each 3 times) Panel cutout: refer to "panel cutout"
Normal operating conditions	Ambient temperature: 0 ~ 50 °C Ambient humidity: 35 ~ 85% RH (without condensation) Magnetic field effect: max. 400 AT / m Warm-up time: min. 30 minutes
Ambient temperature influence	Thermocouple, voltage input: ±1 μV / °C or ±0.01% / °C of max. range RTD input: max. ±0.05 Ω / °C Analog output: max. ±0.05% / °C of max. range (continuous output)

Power specifications

Power voltage	100 ~ 240 V a.c. (voltage fluctuation rate : ±10 %)	24 V a.c. / V d.c.
Power frequency	50 ~ 60 Hz	
Power consumption	Max. to 6.0 W, max. 10 VA, 8 VA (NX1)	
Insulation resistance	1st terminal - 2nd terminal : min. 500 V d.c. 20 MΩ 1st terminal - ground : min. 500 V d.c. 20 MΩ 2nd terminal - ground : min. 500 V d.c. 20 MΩ	
Dielectric strength	1st terminal - 2nd terminal : 2,300 V a.c. 50/60 Hz for 1 min. 1st terminal - ground : 2,300 V a.c. 50/60 Hz for 1 min. 2nd terminal - FG : 1,500 V a.c. 50/60 Hz for 1 min.	
Sensor power supply	12 V d.c. (20 mA d.c., cannot be used with retransmission output)	

Output specifications

Relay contact output	Contact capacity : 240 V a.c. 1 A, 30 V d.c. 1 A (resistive load). Contact configuration : 1A Current measurement range: AC 1 ~ 50 A (resolution: 0.5 A, ± 5% of maximum scale ± 1 digit). Alarm output: set and use alarm output. Deadband: 0 ~ 100% of max. range setting. Others: available for ON / OFF control or time proportional output (but not for current output and cooling output). When output is ON, the break can not be detected in less than 0.2 sec.
Heater break alarm	
Current output	② Retransmission output Current output range : 0 ~ 20 mA d.c., 4 ~ 20 mA d.c. Load resistance : max. 600 Ω CMRR : ±0.5% of max 0 mA or 4~20 mA range) Resolution : approx. 3,000 Output ripple : max. 0.3% (P-P) of the max. scale (150 Hz) Output update cycle : 250 ms
Relay contact output	③ Control output (output type can be selected from relay, current, SSR, heating / cooling type can be set individually. Contact capacity: 240 V a.c. 3A, 30 V d.c. 3A (resistive load) Contact configuration: 1C Output operation: time proportion, ON / OFF Proportional period: 1 to 1000 s Output limit: high limit (OH) and low limit (OL) can be set in the range from 0.0 to 100.0%. Valid also for auto-tuning (AT). ON / OFF Hysteresis: 0 to 100% (full scale) Time resolution: smaller between 0.1% or 10 ms
SSR output (voltage pulse output)	ON voltage: NX2, 3, 4, 7, 9 approx. min. 12 V d.c. (load resistance min. 600 Ω, limited to 30 mA in short circuit) OFF voltage: max. 0.1 V d.c. Proportional period: 1 ~ 1000 s Output operation: time proportional Output limit: high limit (OH) and low limit (OL) can be set in the range from 0.0 to 100.0%. Valid also for auto-tuning (AT). Time resolution: smaller between 0.1% or 10 ms
Current output (4 ~ 20 mA)	Current output range : 4 ~ 20 mA d.c. Load resistance : max. 600 Ω Accuracy : ±0.5% of max. scale (4 ~ 20 mA range), Resolution : approx. 3,000 Output ripple : 0.3% (P-P) or less of the maximum scale (150 Hz) Output update cycle : 250 ms Output operation: continuous PID Output limit: high limit (OH) and low limit (OL) can be set in the range from 0.0 to 105.0%. Valid also for auto-tuning (AT).

Transport and storage conditions

Storage temperature	-25 ~ 70 °C
Storage humidity	5 ~ 95 % RH (without condensation)
Shock	Max. 1 m in packaging

Input signal and measuring range

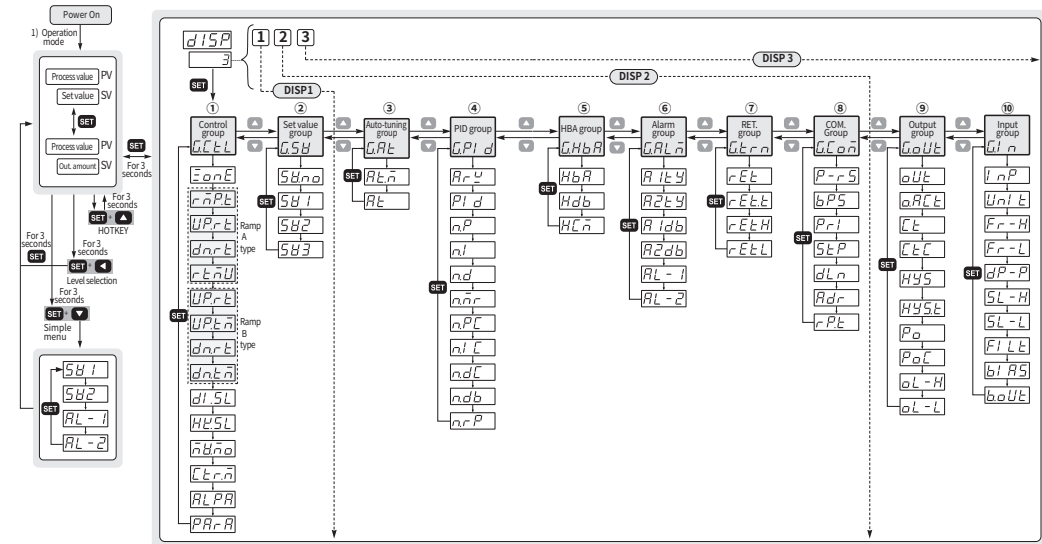
CAUTION

Measuring input wiring

- When wiring the measuring input line, disconnect the controller body and external power supply, as there is a danger of electric shock.
- Pay attention to the polarity of the input before connecting. Wrong connection may result in malfunction.
- Use shielded wires for input wiring. The shield must be grounded at single-point.
- For measuring input signal, wire after leaving room between the power supply circuit and the ground circuit, if possible.

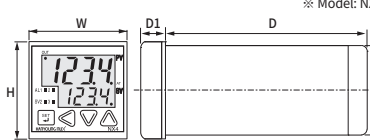
Input signal	Section number	Input type	Range (°C)	Accuracy	Remarks
Thermocouple (TC)	1	K	*2	-200 ~ 1370	±0.5 % of FS ±1 digit * FS is from the minimum to the maximum value of each measurable range. * Digit is the minimum display value ※ 1 0 ~ 400 ° C range: ±10.0% of FS ±1 digit ※ 2 Max. 0 °C: ±1.0% of FS ±1 digit ※ 3 20 → KP100 Ω (C1603) ※ 3 21, 22 → Pt100 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		0 ~ 1700	
	7	B	*1	0 ~ 1800	
	8	S		0 ~ 1700	
	9	L	*2	-199.9 ~ 900.0	
	10	N		-200 ~ 1300	
RTD (RTD)	11	U	*2	-199.9 ~ 400.0	±0.5 % of FS ±1 digit
	12	W		0 ~ 2300	
	13	Platinel II		0 ~ 1390	
	20	KSP100 Ω	*3	-199.9 ~ 500.0	
	21	Pt100 Ω	*3	-199.9 ~ 640.0	
	22	Pt100 Ω	*3	-200 ~ 640	
	30	1 ~ 5 V d.c.		-1999 ~ 9999 (Using the scaling function (SL-H / SL-L))	
DC voltage (VDC/VDC)	31	0 ~ 10 V d.c.		±0.5 % of FS ±1 digit	When current input is used, attach a 250Ω 0.1% resistor to the input signal terminal. "
	32	-10 ~ 20 mV d.c.			
	33	0 ~ 100 mV d.c.			
	30	4 ~ 20 mA d.c.	*4		

Parameter configuration



Dimensions and panel cutout

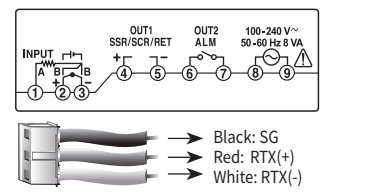
Dimensions



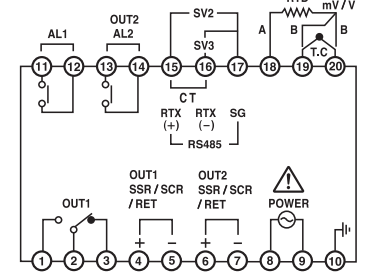
*1) *+0.5 mm tolerance applied

Classification	Type	NX1	NX2	NX3	NX4	NX7	NX9
Product dimensions	W	48.0	48.0	96.0	48.0	72.0	96.0
	H	25.5	96.0	48.0	48.0	72.0	96.0
	H2	22.0	91.0	44.8	44.8	66.0	91.0
	D	100.0	100.0	100.0	100.0	100.0	100.0
	D1	5.8	12.5	12.5	7.4	12.5	12.5
Panel cutout	W1	45.0	45.0	92.0	45.0	68.0	92.0
	H1	22.4	92.0	45.0	45.0	68.0	92.0
	A	65.0	70.0	122.0	60.0	93.0	117.0
	B	42.4	122.0	70.0	60.0	93.0	117.0

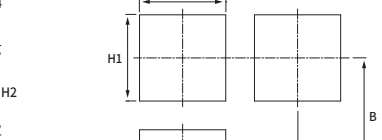
NX1



NX3



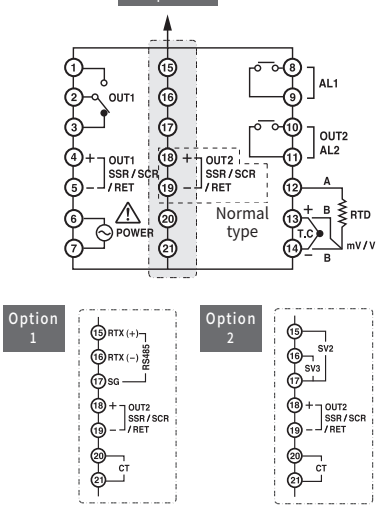
Panel cutout



Current detector (Model name: CT-50N)

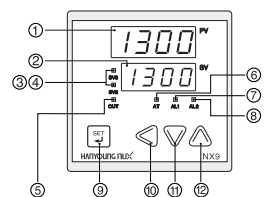
※ Sold separately

NX7



Part names and functions

Front part



Control part

No.	Name	Content
⑨	Set Key	Move among parameters and data settings, select automatic output amount display. Press and hold for more than 3 sec. to enter simple menu
⑩	Shift Key	Change the digit position to be set
⑪	Down Key	Decrease set value, select data of each setting mode
⑫	Up Key	Increase set value, select data of each setting mode

Display part

Display part name	Function
① Present value (PV) display	Displays present value (PV)
② Set value (SV) / Parameter display	Displays set values, various setting parts, setting modes and codes
③ ④ Set value (SV) indicator	Turns on when set value 2 or 3 is displayed
⑤ Output (OUT) lamp	Turns on during output operation
⑥ Auto-tuning display lamp	Blinks during auto-tuning / lights up during manual output
⑦ Alarm 1 indicator	Turns on during alarm 1 operation
⑧ Alarm 2 indicator	Turns on during alarm 2 operation

Combination keys

Name	Content
+	Run / Stop Hot key The hot keys can be selected by selecting one between auto-tuning (AT) or manual output (Manu. MV) functions in hot key (Hk.SL) of G.Ctl. (control group)
+	Enter setting mode DISP and setting mode

Alarm types and codes

(Note) In case of reverse selection, the output will be OFF when the indicator lamp is ON.

Code	Alarm type	Operation
1	High absolute (NO)	
2	Low absolute (NO)	
3	High deviation (NO)	
4	Low deviation (NO)	
5	High deviation (NC)	
6	Low deviation (NC)	
7	High-Low deviation	
8	High-Low deviation range	
9	High absolute (NC)	
10	Low absolute (NC)	
11	High absolute (NO, hold function)	
12	Low absolute (NO, hold function)	
13	High deviation (NO, hold function)	
14	Low deviation (NO, hold function)	
15	High deviation (NC, hold function)	
16	Low deviation (NC, hold function)	
17	High-Low deviation (hold function)	
18	High-Low deviat. range (hold function)	
19	High absolute (NC, hold function)	
20	Low absolute (NC, hold function)	
ns	Master break alarm 1	

구분	경보종류	동작도
1	상한절대 (정점)	
2	하한절대 (정점)	
3	상한편자 (정점)	
4	하한편자 (정점)	
5	상한편자 (역점)	
6	하한편자 (역점)	
7	상-하한편자	
8	상-하한편자 범위내	
9	상한절대 (역점)	
10	하한절대 (역점)	
11	상한절대 (정점, 홀드기능)	
12	하한절대 (정점, 홀드기능)	
13	상한편자 (정점, 홀드기능)	
14	하한편자 (정점, 홀드기능)	
15	상한편자 (역점, 홀드기능)	
16	하한편자 (역점, 홀드기능)	
17	상-하한편자 (홀드기능)	
18	상-하한편자 범위내 (홀드기능)	
19	상한절대 (역점, 홀드기능)	
20	하한절대 (역점, 홀드기능)	
21	히타단선경보 1 (HBA1)	