

Digital Temperature Controller-2nd Edition

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.

MA0202KE201014

HANYOUNG NUX

Safety information

	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: 250Va.c. 0.5Aa.c.).
 - When changing the input sensor (default: K type), first set the input group (C.in), then set the output group (G.out), then set the other groups.
 - Failure to do so may result in electric shocks, product abnormal operations or malfunctions.
 - Any use of the product other than those specified by the manufacturer may result in personal injury or property damage.
 - Please use this product after installing it to a panel, because there is a risk of electric shock.
- CAUTION**
- The contents of this manual may be changed without prior notification.
 - Make sure that the product specifications are the same as you ordered.
 - Make sure that there are no damages or product abnormalities occurred during shipment.
 - Use the product within the temperature range from 0 to 50 °C (max. 40 °C for close installation/ humidity range from 35 to 85% RH (without condensation)).
 - Use the product in places with no 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.
 - Use the product in places without liquids, oils, chemicals, steam, dust, salt, iron, etc. (pollution degree 1 or 2).
 - Do not mix the product with organic solvents such as alcohol, benzene, etc. (wipe it with neutral detergents).
 - Avoid places where large inductive interference, static electricity, magnetic noise are generated.
 - Avoid places with heat accumulation caused by direct sunlight, radiant heat, etc.
 - 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 living torque is about 14.7 N · cm (1.5 kg · cm).
 - When water enters, short circuit or fire may occur, so please inspect 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.

- CAUTION**
- When replacing the sensor, be sure to turn off the power.
 - Use an extra relay when the frequency of operation (such as proportional operation, etc.) is high, because connecting the load to the output relay without any room shortens the service life. In this case, SSR drive output type is recommended.
 - ※ When using electromagnetic switch: set the proportional cycle to at least 20 sec.
 - ※ When using SSR: set the proportional cycle to at least 1 sec.
 - ※ Contact output life: Mechanical life min. 10 million times (no load), electrical life min. 100,000 times (250Va.c. 3 A at rated load).
 - Although the front part of this product has a IP65 degree of protection, waterproof packing between the product and the panel must be used, make sure the packing between the panel and the product does not collapse. (Except for NX1)
 - Do not wire unused terminals.
 - Avoid places where large inductive interference, static electricity, magnetic noise are generated.
 - When you install this product to a panel, please use switches or circuit breakers compliant with IEC60947-1 or IEC60947-3.
 - Install switches or circuit breakers at close distance for user convenience.
 - Specify on the panel that, switches or circuit breakers are installed, if the switches or circuit breakers are activated, the power will be cut off.
 - Regular maintenance is recommended for the continuous safe use.
 - Some components of this product may have a lifespan or deteriorate over time.
 - The warranty period of this product, is 1 year, including its accessories, under normal conditions of use.
 - When using the heater break alarm, connect the heater power supply and the controller power supply to the same power line.
 - The preparation period of the contact output is required during power supply. If used as a signal to external interlock circuit, etc. please use a delay relay together.
 - If the user changes the product in case of malfunctions, the operation may be different due to set parameters differences even if the model name is the same. So, please check the compatibility.
 - Before using the temperature controller, there may be a temperature deviation between the PV value of the temperature controller and the actual temperature, so please use the product after calibrating the temperature deviation.
 - The write life of non-volatile memory (EEPROM) is one million times. When configuring the system, please make sure that the number of times that data are written to non-volatile memory does not exceed one million times.

Model code

NX1 model 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		Options	Terminal number (4,5)	Terminal number (6,7)
	0	RET	RET	OUT1(RLY)
	1	-	OUT1(SSR/SCR)	-
	2	RS485/RET	RET	OUT1(RLY)
	3	RS485	OUT1(SSR/SCR)	-
	4	ALM	OUT1(SSR/SCR)	ALM
Heating / cooling type	0	-	OUT2(SSR/SCR)	OUT1(RLY)
	1	-	OUT1(SSR/SCR)	OUT2(RLY)

※ OUT1: Heating output, OUT2: Cooling output

NX2, 3, 7, 9 model code				
Model	Code	Content		Default
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
	1	Heating/cooling (simultaneous) control		4
NX9 option	0	None		
	1	RS485, HBA		
NX7 option	0	None		
	1	RS485, 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 model code				
Model	Code	Content		Remarks
NX4	☐ - ☐ ☐	Multi Input/Output Temperature Controller 48(W) X 48(H) mm		
Control method	0	Normal type (heating control)		
	1	Heating/cooling control (simultaneous control)		Default = 1
	2	Heating/cooling control (NX4-20 only)		Default = 4
	0	None		
	1	HBA, AL2		OUT1 (terminals ①-②-③) applied as AL1 (when selecting SSR / SCR control output)
	2	SV2, SV3		
NX4-0	3	RET, RS485		
	4	RS485		
	5	AL1, AL2		
	6	AL1, AL2, SV2		OUT1 (terminals ⑥-⑦) applied as SV2 (when selecting RELAY control output)
NX4-1	0	None		
	4	RS485		OUT2 (terminals ⑩-⑫) applied as SSR/SCR.
NX4-2	0	AL1		OUT2 (terminals ⑩-⑫) applied as RLY.

※ OUT1(①-②-③) can be used for AL1 when AL1 is not selected.
※ OUT1: Heating control, OUT2 : Cooling control

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	
		Relay ①-②-③	SSR / SCR ⑥-⑦	③-⑭	⑩-⑫	Relay ③-⑭	Transformer ⑩-⑫	External input (DI) ③-⑭	⑩-⑫	Communication and retransmission ③-⑭	⑩-⑫
Normal type (heating)	0	RLY(ON/OFF)	-	-	-	-	-	-	-	-	-
	1	AL1	SSR	-	-	CT	-	SV2	SV3	RS485	RET
	2	AL1	SCR	-	-	-	-	-	-	RS485	-
	3	RLY	-	-	-	CT	-	-	-	RS485	CT

※ 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)		Alarm 1 & 2		Default		NX4-06		Default	
		Relay ①-②-③	SSR / SCR ⑥-⑦	③-⑭	⑩-⑫			Relay ①-②-③	SSR / SCR ⑥-⑦	③-⑭	⑩-⑫
Normal type (heating)	0	RLY(ON/OFF)	-	-	-			RLY(ON/OFF)	SV2	-	-
	1	-	SSR	AL1	AL2			-	-	AL1	AL2
	2	-	SCR	-	-			-	-	-	-
	3	RLY	-	-	-			RLY	SV2	-	-

NX4-10,14,20											
Heating type	Output	Heating side (OUT1)		NX4-10		NX4-14		NX4-20		default	
		Relay ①-②-③	SSR / SCR ⑥-⑦	③-⑭	⑩-⑫	③-⑭	⑩-⑫	③-⑭	⑩-⑫		
Heating type	0	RLY(ON/OFF)	-	-	-	-	-	-	-		
	1	AL1	SSR	-	-	-	-	-	-		
	2	AL1	SCR	-	-	-	-	-	-		
	3	RLY	-	-	-	-	-	-	-		
Heating / Cooling type	4	AL1	SSR	-	-	-	-	-	-		
	5	AL1	SCR	-	-	-	-	-	-		
	6	RLY	-	-	-	-	-	-	-		
	7	AL1	SSR	-	-	-	-	-	-		
Heating / Cooling type	8	AL1	SCR	-	-	-	-	-	-		
	9	RLY	-	-	-	-	-	-	-		
	10	-	SSR	-	-	-	-	-	-		
	11	-	SCR	-	-	-	-	-	-		
Heating / Cooling type	12	RLY	-	-	-	-	-	-	-		

※ RLY (Relay output), SSR (Voltage pulse output), SCR (Current output, 4-20mA d.c.)

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 100Ω, KPt 100Ω DC voltage input : 1-5Vd.c., -10-20mV, 0-100mV d.c., 4-20mA d.c. (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: Vd.c.)
Noise reduction rate	NMRR (normal mode): min. 40 dB (50/60Hz ±1 %) CMRR (common mode) : min. 120 dB (50/60Hz ±1 %)
Standard	Thermocouple / RTD (KS/IEC/DIN)
RJ 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) Refer to "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	

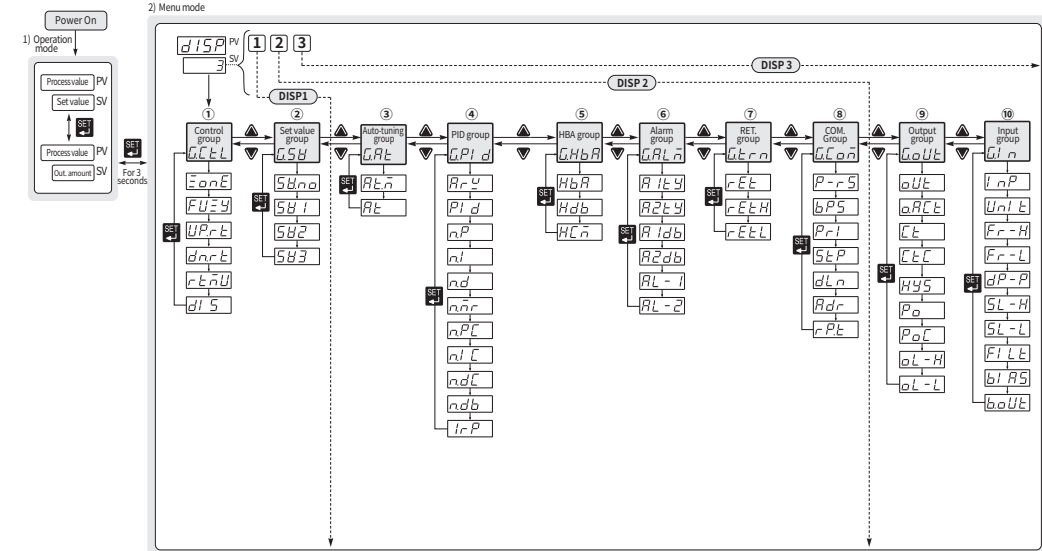
Operating environment	
Installation environment	Continuous vibration (5 ~ 14Hz): peak-to-peak max. 1.2 mm Continuous vibration (4 ~ 150Hz): max. 4.9 m/s² Short-time vibration: 14.7 m/s², max. 15 seconds (each 3 directions) Shock: 14.7 m/s², max. 11 ms (6 directions each 3 times) Panel cutout: refer to "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	100-240Va.c. (voltage fluctuation rate: ±10 %)
Power frequency	50/60Hz
Power consumption	Max. to 6.0 W, max. 10 VA, 8 VA (NX1)
Insulation resistance	1st terminal - 2nd terminal : min. 500Vd.c. 20 MΩ 1st terminal - ground : min. 500Vd.c. 20 MΩ 2nd terminal - ground : min. 50Vd.c. 20 MΩ
Dielectric strength	1st terminal - 2nd terminal : 2,300Va.c. 50/60Hz for 1 min. 1st terminal - ground : 2,300Va.c. 50/60Hz for 1 min. 2nd terminal - FG : 1,500Va.c. 50/60Hz for 1 min.
Sensor power supply	12Vd.c. (20mA d.c., cannot be used with retransmission output)
Transport and storage conditions	
Storage temperature	-25 ~ 70 °C
Storage humidity	5 ~ 95 % RH (without condensation)
Shock	Max. 1 min packaging

Input signal and measuring range

- CAUTION**
- Measuring input wiring
 - When wiring the measuring input line, disconnect the controller body and external power supply to avoid 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.

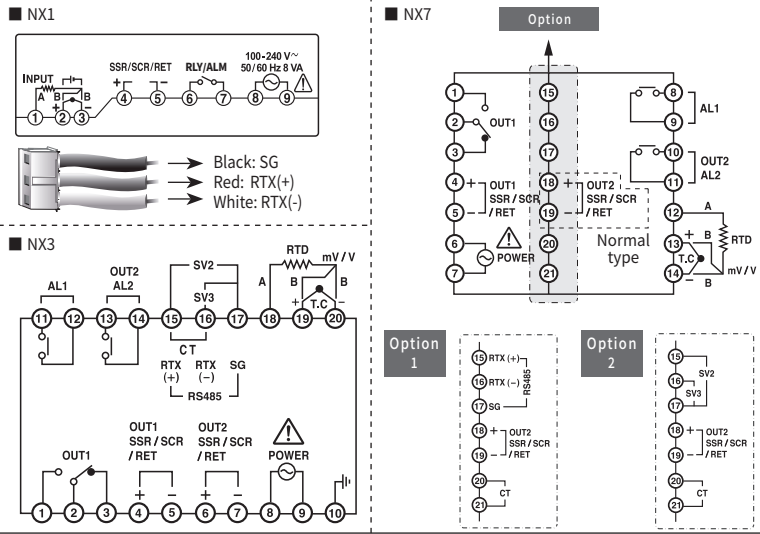
Input signal	Selection number	Input type	Range (°C)	Accuracy	Remarks
Thermocouple (TC)	1	K	*2	-200 ~ 1370	±0.5 % of FS ±1 digit
	2	K	*2	-199.9 ~ 999.9	
	3	J	*2	-199.9 ~ 999.9	
	4	E	*2	-199.9 ~ 999.9	
	5	T	*2	-199.9 ~ 400.0	
	6	R		0 ~ 1700	±1.0 % of FS ±1 digit
	7	B	*1	0 ~ 1800	
	8	S		0 ~ 1700	
	9	L	*2	-199.9 ~ 900.0	
	10	N		-200 ~ 1300	±0.5 % of FS ±1 digit
	11	U	*2	-199.9 ~ 400.0	
	12	W		0 ~ 2300	
RTD (RTD)	13	Platinel II		0 ~ 1390	±0.5 % of FS ±1 digit
	20	KSP100 Ω	*3	-199.9 ~ 500.0	
	21	Pt100 Ω	*3	-199.9 ~ 640.0	
	22	Pt100 Ω	*3	-200 ~ 640	
	30	1-5Vd.c.			
DC voltage (Vd.c./mVd.c.)	31	0-10Vd.c.			±0.5 % of FS ±1 digit
	32	-10-20 mV d.c.			
	33	0-100 mV d.c.			
	30	4-20mA d.c.	*4		
	30	4-20mA d.c.	*4		

Parameter configuration



Dimensions and panel cutout

Dimensions	
	※ Model: NX4
※1) *+0.5 mm tolerance applied	
Classification	Type
Product dimensions	W 48.0
	H 25.5
	H2 22.0
	D 100.0
	D1 5.8
	D1 12.5
Panel cutout	W1 45.0
	H1 22.4
	A 65.0
	B 42.4
	122.0
	70.0



Part names and functions

Front part

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

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