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.

HATIYOUTG NUX

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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 <code>Danger</code>, <code>Warning</code> and <code>Caution</code> 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

Do not touch or contact the input/output terminals because they may cause electric shock.

⚠ WARNING

- If the product is used with methods other than specified by the manufacturer, then it may lead to injury or property damage.

 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: 250V Loss rating: 250V
- rated power voltage.
 To prevent electric shock or equipment failure, please do not turn

A CAUTION

- The contents of the instruction manual are subjective to change without prior notice. It is effective against noise if making the power lines of the product the Please make sure that the specification is the same as what you have ordered. twisted pair wiring.
- 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 °C (40 °C 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.
 Please do not wipe this product with organic solvents such as alcohol, benzne 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.

- wire. (There is a temperature error if a general lead is used.)

 For resistance temperature detector (RTD) input, please use a small
- 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 on the same resistance.) The input signal wire away from the power lines and load lines to avoid the effect of inductive noise.

 The input signal wire same of use of the propose it was intended under normal condition.

 The input signal wire same of use of the propose it was intended 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 intended, circuit or others.

 For thermocouple (TC), please use unigrounded 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 commended. The noise filter should be grounded on the panel and the lead wire between the output of the noise filter should be as short as possible.

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.

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.

Since there is a possibility of electric shock, please use the product as mounted on a panel while the power is being supplied.

- When replacing the sensor, please turn of 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 20 sec min.

 *SSR proportion cycle: set min. 1 sec

 *Contact output life expectancy:
 Mechanical 1 million times min. (without load)
 Electrical 100 thousand times min. (250 V a.c. 3A: with rated load)

 •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 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 makes use this product in a place where the elevation is below 2,000 m.
 Please makes use this product in a place where the elevation is below 2,000 m.
 Please makes use 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.)
 In order to use this product propely and safely, we recommend periodic maintenance.
 Some parts of this product have limited expected life span and aged deterioration.

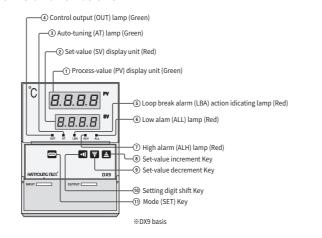
Suffix code

Model	Code Description		Description					
DX				Digital temperature controller				
	2							$48(W) \times 96(H) \text{ mm}$
	3							96(W) × 48(H) mm
Dimension	4							48(W) × 48(H) mm
	7							$72(W) \times 72(H) \text{ mm}$
	9							96(W) × 96(H) mm
		K						K themocouple
	ĺ	J			J themocouple			
	ĺ	R			R themocouple			
In	Ì	D			RTD: KPt 100 Ω			
Input	Ì	P			RTD: Pt 100 Ω			
	Ì	V			1 - 5 V d.c.			
	Ì	С						4 - 20 mA d.c.
		F			0 - 10 V d.c.			
Control output			М					Relay contact output
			С					Current output (4 - 20 mA d.c.)
			S					S.S.R (voltage pulse output, 12 V d.c.)
A1				S				Alarm output: 1 contact (model: DX4)
Alarm output			W				Alarm output: 2 contacts(all model except DX4)	
Option A N			Retransmission output (4 - 20 mA d.c.)					
				None (no retransmission output for DX4, DX7)				
Control operation *1 R			R		Reverse operation control(heating control) / Direct operation control(cooling control			
Δ				Α	100 - 240 V a.c.			
Power supply D		D	24 V d.c./a.c.					
*1: The contr	ol op	erat	ion c	an b	e ch	ange	d in	the parameter, SL9, and the default is "reverse operation control (0)".

Specification

Powe	er supply voltage	100 – 240 V a.c. (±10 %), 50/60 Hz, 24 V d.c./a.c.			
Power consumption		4.5 W max			
Type		Refer to input table			
	Sampling cycle	250 ms			
Input	Indication accuracy	± 0.5 % (refer to input type table)			
	Allowable voltage	20 V d.c. for 1 minute			
	Reference junction compensation accuracy	±3.5°C (0 ~ 50 °C)			
Operation after input break		Up Scale			
Control Relay output Voltage output		NO: 5 A 250 V a.c., 5 A 30 V d.c. (resistive load), NC: 3 A 250 V a.c., 1A 30 V d.c. (resistive load) Switching Life: 100 thousand times (without load)			
		ON voltage: 12 V d.c. min, OFF voltage: 0.1 V d.c. max, Load resistance 600 Ω min			
	Current output	range: $3.2 \sim 20.8$ mA, Accuracy: ± 0.2 mA, Load resistance 600Ω max			
Retransmission output		range: 3.2 ~ 20.8 mA, Accuracy: ± 0.2 mA, Load resistance 600Ω max			
Alarm output		5 A 250 V a.c., 5 A 30 V d.c. (resistive load), Switching Life: 100 thousand times (without load)			
	method	ON/OFF, PID control			
Control	Output operation	Reverse operation, Direct operation			
	Anti-reset windup	Auto(A=0), 0.1 ~ 100%			
Insulation resistance		20 MΩ min (primary terminal – secondary terminal)			
Dielectric strength		2,300 V a.c., for 1 minute (primary terminal – secondary terminal)			
Operating	Temper. & humidity	0 ~ 50°C, 35 ~ 85% R.H (with no condensation)			
environment	Environment	Refer to safety information			

■ Part name and functions



Operation

■ PV/SV display and SV setting modes

Process value (PV) display unit	Set-value (SV) display unit	Description
Process value (PV)	Set-value (SV)	Displays process-value. Set-value (SV) can be set *1

*1: Set-value (SV) is a control target. It is settable within the input range.

■ Normal setting mode

% Press the key continuously for 3 sec.

Process value (PV) display unit	Name	Description
*1 ALH	High alarm (ALH)	Displays high alarm set-value.
*1 RLL	Low alarm(ALL)	Displays low alarm set-value.
P	Proportional band (P)	Set when proportional control is performed. Control becomes ON/OFF action with P set to "0".
R	Anti-reset windup (ARW)	Prevents overshoot and/or undershoot caused by integral action effect. It operates automatically (AUTO) if ARW is set to "0".
1	Integral time (I)	Eliminates offset occurring in proportional control. Integral action is OFF with this action set to "0".
	Derivative time (D)	Prevents ripples by predicting output change thereby improving control stability. Derivative action is OFF with this action set to "0".
LbA	Control loop break alarm (LBA)	Indicates control loop break alarm setting. LBA is off if "0" is set.
Ε	Proportioning cycle (C)	Displays control output cycle (sec.).
HY5	Hysteresis (HYS)	Displays hysteresis of set-value for main output. (ON/OFF control)
*2 F-,-	Full scale limit	This limits the maximum of retransmission output.
*3 11	Under scale limit	This limits the minimum of retransmission output.
LoE	Set data lock (LOC)	Turns the set data lock ON/OFF

* 1 ALH and ALL are initialized if SL3 is changed

51.1 ----- PV display unit

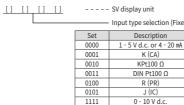
* 2 or * 3 is an option. (The parameters are not shown if retransmission output is unavailable) (The retransmission output option is not available for DX4, DX7.)

■ Initial set mode

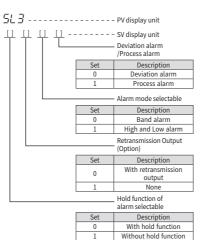
(1) Press A key and key simultaneously for 3 seconds to enter the setting mode. (2) Press key for 3 seconds to enter the PV / SV setting mode.

!\Caution

The value in the parameter SL1 (input selection) cannot be changed. The SL1 is set according to the suffix code when ordering a product.



——— input type selection (Fixed)					
	Set	Description			
	0000	1 - 5 V d.c. or 4 - 20 mA			
	0001	K (CA)			
	0010	KPt100 Ω			
	0011	DIN Pt100 Ω			
	0100	R (PR)			
	0101	J (IC)			
	1111	0 - 10 V d.c.			
		- PV display unit			



* ALH & ALL will be initialized if you change the deviation alarm

or process alarm at the SL3

	Set 0	Indicator / Controller Description Indicator Controller
	1	°C
	Set	Description
	1	°C
	Set	Decimal point selectable Description
1 F	0	Decimal point
I +		
-	1	None
		Output confirmation (% operation impossible)
	Set	Description
Γ	0	Current output
	1	Relay or voltage pulse output

5L2 ----- PV display unit

PV display unit	Description	SV display unit (Setting range)	Remark
SLY	Decimal point position selection	0 ~ 4	If you want 000.0, set 0002 on SV display unit.
5L5	51.5 Input correction		
Hysteresis of high alarm (ALH)		0 ~ 10 % of FS	
5L 7	Max. value of temperature setting range	Within input range	Refer to input type table
5L8	Min. value of temperature setting range	Within input range	Refer to input type table
5L9	Control operation direction	0, 1	0 : Reverse operation 1 : Direct operation
5L ID	Hysteresis of low alarm (ALL)	0 ~ 10 % of FS	
5L / /	Input filter	0 ~ 100 second	
SL 12	Max. input scale setting	9999	Only for voltage input
5L 13	Min. input scale setting	-1999	Only for voltage input
SL 14	Delay time of high alarm (ALH)	0 ~ 100 second	
SL 15	Delay time of low alarm (ALL)	0 ~ 100 second	

* For DCV input, if SL12 and SL13 are changed, the parameters related to temperature are initialize

Main functions

Control loop break alarm (LBA) function

(1) Setting procedure

Usually set the set-value of the LBA to a value of twice the integral time (I). The LBA can also be set by the auto-tuning (AT) function. In this case, the set-value is automatically set to a value of twice the integral time (I).

(2) Description of operation

LBA function starts to measure the time from the moment when the control output becomes 0% or 100%, and it detects the variation of the process value in LBA setting time and ther it determines that LBA is ON or OFF by the variation.

- ① The LBA is ON if the process value is not increasing more ○ The LBA IS ON If the process value is not increasing more than 2°C within the LBA set-vale when the control output is 100%. (In direct operation, the LBA is ON if the process value is not decreasing more than 2°C.)
 ② The LBA is ON if the process value is not decreasing more than 2°C within the LBA set-vale when the control output is 100 for the contro
- 0%. (In direct operation, the LBA is ON if the process value is not increasing more than 2 °C.)

(3) Causes of action

Alarm function

High & Low

Band alarn

The LBA is activated under the following conditions.

- ① Controlled object trouble : Heater break, no power supply, incorrect wiring, etc.
 ② Sensor trouble : Sensor disconnected, shorted, etc.
- 3 Actuator trouble : Burnt relay contact, incorrect wiring. relay contact not closed, etc.
- @ Output circuit trouble: Burnt internal relay contact, relay contact not open or closed, etc.
 @ Input circuit trouble: The process-value does not change even if input changes, etc.

 # If causes of the above trouble cannot be identified,
- check the control system.

(4) Cautions for control loop break alarm (LBA) function

- ① The LBA function is activated only when the control output is 0 % or 100 %. Therefore, the time from trouble occurrenece till the activation of the LBA function equals the time of when the control output becomes 0 % or 100 % plus

 Overscale and underscale the LBA setting time.
 ② No LBA function is activated while the auto-tuning (AT)
- function is activated.

 3 The LBA function is influenced by disturbances (heat sources, etc) and as a result may be activated even if there is no trouble in the control system.
- (4) If LBA setting time is too short or does not match the controlled object, the LBA may be turned ON/OFF or not be turned ON. In such case, set the setting time of LBA to be slightly longer.

OFF

ALL ALH

ON

OFF

ON

ON

ON

Auto-tuning (AT) function

The Auto-tuning function automatically measures, compute

- (1) After finishing settings other than PID and ARW, perform the
- (2) Press the key and key at the same time then, A. T indication lamp flashes to start the Auto-tuning
- (3) If Auto-tuning function ends, the A. T indication lamp stops flashing automatically. When checking the auto-tuned
- press the key and key simultaneously, then the A. T indication lamp stops flashing to release Auto-tuning function. In this case P. I. D and ARW values are not changed (Maintain the value before the Autotuning started)

Set data lock function

changing of each setvalue by the front key and the activation of the auto-tuning function, i.e., prevent misoperation after setting

- For set data lock, display LoC by pressing the key, then set the following value in accordance with setting pro
- 0000 : No set data locked.

- ① If a process value exceeds the maximum temperature range due to upscale (input break) or etc., the process value (PV display unit flashes overscale display 「" ロロロロ
- display 「" 【」【】【】 "」

and set the optimum P. I. D and ARW constants, The Auto-tuning function is activated any time from any process states after power-on, while temperature is rising and or when control is stabilized.

- value, press the key .
- (4) When changing the constants automatically set by the Auto-tuning, changes each constant according to each parameter setting
 (5) When you want Auto-tuning function to be suspended,

has ended.

- enabling data lock ON or OFF.
- If a process value reaches below the minimum temperation range, the process value (PV) display unit flashes underscale

- (6) When you want to changes the SV (set-value) during Auto-tuning, suspend it and perform PID control usin values before Autotuning started.

Set data lock function The set data lock function is used to prevent

 Reference : CURRENT : 4 - 20 mA d.c., There is no earth terminal for DX4 and DX7

- 0001: Only set-value (SV) can be changed with the set data locked Setting other than the above locks all set date and A.T function.

※ Each alarm operation can be set as shown below. (▲: Set-value (SV) △: Alarm set-value)

Control operation direction

1 0: Reverse operation for heating control

② 1 : Direct operation for cooling control

Set a range of input voltage for DCV input.

For instance, SL1 = 0000 (1~5 V d.c.) input,

SL12 = 100.0. SL13 = 0.0 will be displayed as below

Rising time is slow

SL1

1111

8.8.8.8

8.8.8.8

∞ 4₹≜

Dimension & Panel cutout

SOLID STATE · 12 V d c Min

Be careful this matter when you use.

Set the anti reset wind-up with "A" parameter ① Control in case of A = Auto (0)

small.

Input type

KPt100

HATFOURGRUE DX9
TEMPERATURE
CONTROLLER

Set a control operation at the SL9.

■ Input scale

Target value

Input type

Classification

(T.C)

Anti reset wind-up

Input filter

Target value

 $\label{eq:continuous} \%\ \ \text{If "A" is too small, large overshoot or undershoot occurs. Set the value the same as the proportional value.}$

- 50 ~ 1300 °C

0 ~ 1700 °C

- 199 ~ 640 °C

- 1999 ~ 9999

Alarm delay time

Select the input filter calculation time in SL11. The input signal may

This function eliminates the fluctuation by displaying the calculated

value in preset time. When [0] is set, the input filter is turned OFF.

Set high and low alarm delay time at SL14 and SL15 respectively

Even when alarm condition is met, if delay is set at SL14 and SL15,

② In case of a set value for temperature on "A" paramete

Rising time is fas

-50.0 ~ 999.9 °C

-50.0 ~ 600.0 °C

0.0 ~ 999.9 °C

-199.0 ~ 640.0 °C

1°C (SL2 : X1XX) 0.1°C (SL2 : X0XX)

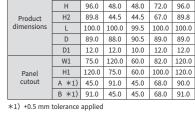
large.

Overshoot is relatively

*1: ± 1% of FS

the alarm is triggered after those settings are exceeded. How alarm off is not related to the delay setting.

have noise that can be a cause of fluctuation of the process value

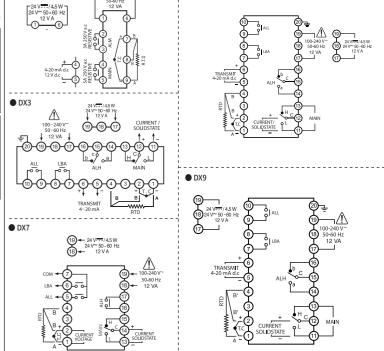


Classification Type DX2 DX3 DX4 DX7 DX9

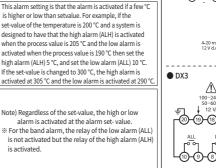
W 48.0 96.0 48.0 72.0 96.0

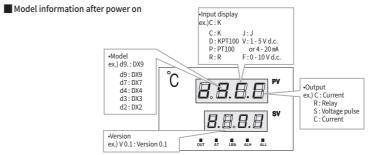
Connections

DX4



DX2





is activated.

