HANYOUNGNUX

KXA SERIES

USER MANUAL

HANYOUNG nuX

Warranty policy

The standard warranty period for new products is 1 year(12 months), Hanyoungnux will repair free of charge only in the case of a failure that occurs under normal use as specified in this operation manual.

Except as stipulated in our warranty terms, we do not accept any warranty or responsibility for this product.

In using the product, due to unforeseen defects or natural disasters,
In the event of damage to a third party, the Company shall not be held responsible for any damage or indirect damage, etc. in any case.

Repairs due to failure that occur after the warranty period of the product has expired will be handled at actual cost (paid) in accordance with the standards set by HANYOUNGNUX.

In the following cases, even failures occurring within the warranty repair period will be handled at actual cost.

- Failure due to user error
- Failure due to natural disaster
- Failure due to movement after product installation
- Failure due to arbitrarily replacement (change or damage)
- Failure due to power problem such as unstable power supply
- If warranty service is required due to failures, etc., please contact the place of purchase or HANYOUNGNUX sales department
- Intended use of the equipment:

This device is used in various industrial environments to receive input from a temperature sensor, detect the difference between the set temperature and the actual temperature, and adjust it to reach the target temperature.

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Safety informaiton

Please read the safety information carefully before 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.
	The device is designed with double insulation to prevent the enclosure from becoming energized if the required insulation fails.
	The rated voltage indicates the AC touch voltage.
	The rated voltage indicates the DC touch voltage.
	The CE mark is a certification that ensures the safety of products manufactured and distributed within the EU member states. It must be affixed to products related to consumer health, safety, and the environment that are sold in the EU.
	It means that the product complies with the safety requirements for electrical and electronic products in the Republic of Korea, and it is issued by a Korean Certification Body approved by the Korean Standards Association.
	The mark for the separate collection and recycling of waste electrical and electronic equipment.
	Check the electrical safety manual.
	Indicates the correct upward direction of the cargo. A marking to prevent the cargo from being flipped, with designated "top" and "bottom" sides.
	Cargo that should not be exposed to rain.
	Handle with care (fragile item).

DANGER

• The input/output terminals pose a risk of electric shock. Please ensure that your body and any conductive materials do not come into contact with them.

WARNING

- Use of the product in ways other than those specified by the manufacturer may result in injury or property damage.
- If the malfunction or failure of this product may lead to a serious accident in the system, please install an appropriate protection circuit externally.
- This device does not have a power switch or fuse attached, so please install them separately (fuse rating: 250V, 500mA).
- To prevent damage or malfunction of the device, ensure that the rated power supply voltage is provided.
- To prevent electric shock and device failure, do not apply power until all wiring is completed.
- This device is not explosion-proof, so do not use it in locations with flammable or explosive gases.
- Never disassemble, modify, improve, or repair this device. There is a risk of malfunction, electric shock, or fire.
- When removing or installing this device, ensure that the product's power is turned off first. Failing to do so may cause electric shock, malfunction, or damage.
- To avoid the risk of electric shock, use this device only when it is installed on the panel.

⚠ CAUTION

- The contents of the user manual may be subject to change without prior notice.
- Please verify that the specifications match your order.
- Check for any damage during transportation and ensure the product is in good condition.
- Use the product within the temperature range of 0 ~ 50°C (maximum 40°C if mounted), and humidity range of 35 ~ 85% RH (in a non-condensing state).
- Use the product in areas where no corrosive gases (especially harmful gases, ammonia, etc.) or flammable gases are present.
- Use the product in locations where it will not be subjected to direct vibration or impact.
- Use the product in areas free from water, oil, chemicals, steam, dust, salt, iron particles, etc. (contamination levels 1 or 2).
- Do not use the product outdoors.
- Do not clean the device with organic solvents like alcohol or benzene. (Clean with a neutral detergent.)
- Avoid using the product in locations with significant induction interference, static electricity, or magnetic noise.
- Avoid locations where heat accumulation occurs due to direct sunlight or radiant heat.
- Use the product at altitudes of 2,000 meters or lower.
- If water enters the device, it may pose a risk of leakage or fire, so please perform a thorough inspection.
- When using thermocouple inputs, ensure proper compensation wires are used. (Using standard wires may cause temperature errors.)
- When using resistance temperature detector (RTD) inputs, ensure that the lead wire resistance is low and that there is no resistance difference between the three wires. (Temperature errors can occur if the resistance difference exists.)
- To avoid the influence of induced noise, keep input signal lines away from power lines, motor lines, and load lines.
- Keep input signal lines separate from output signal lines. If separation is not possible, use shielded cables for the input signal lines.
- Use ungrounded thermocouples. (Using grounded thermocouples may cause malfunctions due to leakage current.)
- If there is significant noise from the power supply, it is recommended to use an isolation transformer and noise filter. The noise filter should be mounted on a properly grounded panel, and the wiring between the noise filter output and instrument power terminals should be as short as possible.
- For instrument power supply lines, twisting the wires tightly can be effective in reducing noise.
- If the alarm function is not properly set, it will not output during abnormal operation. Please check the alarm operation before running the device.
- Always turn off the power when replacing sensors.
- When using proportional operation with a load that has no margin for the output relay rating and is used with short cycles, the lifespan may be reduced. It is recommended to use an auxiliary relay or SSR output.

  *When using an electronic switch: Set the proportional cycle to at least 20 seconds.
  *When using an SSR: Set the proportional cycle to at least 1 second.
  *Contact output lifespan: Mechanical life: Over 1 million cycles (without load).
  Electrical life: Over 100,000 cycles (250 V AC, 3A: rated load).

- Do not connect anything to unused terminals.
- After confirming the polarity of the terminals, ensure the wiring is connected properly.
- When installing the device in a panel, use an approved switch or circuit breaker according to IEC60947-1 or IEC60947-3 standards.
- Install switches or circuit breakers close to the operator for easy access.
- Regular maintenance is recommended to ensure continuous safe operation of the device.
- Ensure that the panel indicates that turning the switch or circuit breaker off will cut off the power supply.
- Some of the components in the device have a limited lifespan or are subject to aging.
- The warranty period for the device, including accessories, is one year under normal usage conditions.
- When power is applied, there may be a delay in the contact output preparation. If the signal is used in an interlock circuit, please use a delay relay in combination.
- When replacing the product due to a malfunction, even if the model number is the same, settings and parameters may differ. Please verify compatibility before replacing the device.
- Before operation, check for any temperature deviation. If deviation is found, use the device's input correction function "SL-5" to calibrate the temperature deviation.

- Intended Use: This device is used in various industrial environments to receive input from temperature sensors and detect the difference between the set temperature and the actual temperature, adjusting it to reach the target temperature.
- Overvoltage Category II (OVC II).
- Use copper wires with a heat resistance of 75 °C or higher, conforming to 18 AWG to 24 AWG, and keep the wiring length of the power input and relay output within 5 m.

Digital

Temperature Controller

A-1. KXA series

Heating
/ Cooling Control

PID Control

Socket
Specifications

- 2-step step function by external contact (KX4P)
- Multi-input
- Decimal point position selection
- Output action reverse/direct action selection
- PID Auto-tuning
- Terminal protection cover applied to enhance electrical safety (optional item/sold separately)

KXA series

Multi input digital temperature controller

Selection Guide

KX2A

Control output	Alarm output	Retransmission	Power voltage	Model
Relay [M]	ALH(1c), ALL(1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX2A-MEA□
		None [N]		KX2A-MEN□
	ALH(1c), ALL(1a), LBA(1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX2A-MKA□
		None [N]		KX2A-MKN□
SSR voltage pulse: 12 V d.c. [S]	ALH(1c), ALL(1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX2A-SEA□
		None [N]		KX2A-SEN□
	ALH(1c), ALL(1a), LBA(1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX2A-SKA□
		None [N]		KX2A-SKN□
SCR current: 4-20 mA d.c. [C]	ALH(1c), ALL(1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX2A-CEA□
		None [N]		KX2A-CEN□
	ALH(1c), ALL(1a), LBA(1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX2A-CKA□
		None [N]		KX2A-CKN□

KX3A

Control output	Alarm output	Retransmission	Power voltage	Model
Relay [M]	ALH(1c), ALL(1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX3A-MEA□
		None [N]		KX3A-MEN□
	ALH(1c), ALL(1a), LBA(1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX3A-MKA□
		None [N]		KX3A-MKN□
SSR voltage pulse: 12 V d.c. [S]	ALH(1c), ALL(1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX3A-SEA□
		None [N]		KX3A-SEN□
	ALH(1c), ALL(1a), LBA(1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX3A-SKA□
		None [N]		KX3A-SKN□
SCR current: 4-20 mA d.c. [C]	ALH(1c), ALL(1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX3A-CEA□
		None [N]		KX3A-CEN□
	ALH(1c), ALL(1a), LBA(1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX3A-CKA□
		None [N]		KX3A-CKN□

KX4A

Control output	Alarm output	Retransmission	Power voltage	Model
Relay [M]	ALH, ALL, LBA (1a relay contact, common output) [C]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX4A-MCA□
		None [N]		KX4A-MCN□
	ALH (1a), ALL (1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX4A-MEA□
		None [N]		KX4A-MEN□
SSR voltage pulse: 12 V d.c. [S]	ALH, ALL, LBA (1a relay contact, common output) [C]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX4A-SCA□
		None [N]		KX4A-SCN□
	ALH (1a), ALL (1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX4A-SEA□
		None [N]		KX4A-SEN□
SCR current: 4-20 mA d.c. [C]	ALH, ALL, LBA (1a relay contact, common output) [C]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX4A-CCA□
		None [N]		KX4A-CCN□
	ALH (1a), ALL (1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX4A-CEA□
		None [N]		KX4A-CEN□

KX4P (11-Pin General-Purpose Socket)

Control output	Alarm output	Retransmission	Power voltage	Model
Relay [M]	ALH, ALL, LBA (1a relay contact, common output) [C]	None [N]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX4A-MCN□
	ALH (1a), ALL (1a) [E]			KX4A-MEN□
SSR voltage pulse: 12 V d.c. [S]	ALH, ALL, LBA (1a relay contact, common output) [C]			KX4A-SCN□
	ALH (1a), ALL (1a) [E]			KX4A-SCN□
SCR current: 4-20 mA d.c. [C]	ALH, ALL, LBA (1a relay contact, common output) [C]			KX4A-CCN□
	ALH (1a), ALL (1a) [E]			KX4A-CEN□

KX7A

Control output	Alarm output	Retransmission	Power voltage	Model
Relay [M]	ALH (1a), ALL (1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX7A-MEA□
		None [N]		KX7A-MEN□
	ALH (1a), ALL (1a), LBA (1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX7A-MKA□
		None [N]		KX7A-MKN□
SSR voltage pulse: 12 V d.c. [S]	ALH (1a), ALL (1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX7A-SEA□
		None [N]		KX7A-SEN□
	ALH (1a), ALL (1a), LBA (1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX7A-SKA□
		None [N]		KX7A-SKN□
SCR current: 4-20 mA d.c. [C]	ALH (1a), ALL (1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX7A-CEA□
		None [N]		KX7A-CEN□
	ALH (1a), ALL (1a), LBA (1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX7A-CKA□
		None [N]		KX7A-CKN□

KX9A

Control output	Alarm output	Retransmission	Power voltage	Model
Relay [M]	ALH(1c), ALL(1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX9A-MEA□
		None [N]		KX9A-MEN□
	ALH (1c), ALL (1a), LBA (1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX9A-MKA□
		None [N]		KX9A-MKN□
SSR voltage pulse: 12 V d.c. [S]	ALH(1c), ALL(1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX9A-SEA□
		None [N]		KX9A-SEN□
	ALH (1c), ALL (1a), LBA (1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX9A-SKA□
		None [N]		KX9A-SKN□
SCR current: 4-20 mA d.c. [C]	ALH(1c), ALL(1a) [E]	Retransmission(RET) 4 - 20 mA d.c. [A]	100 - 240 V a.c. 50 - 60 Hz [A] 24 V d.c. [D]	KX9A-CEA□
		None [N]		KX9A-CEN□
	ALH (1c), ALL (1a), LBA (1a) [K]	Retransmission(RET) 4 - 20 mA d.c. [A]		KX9A-CKA□
		None [N]		KX9A-CKN□

Suffix Code

Model	Code						Description	
KX	□-	□	□	□	□		Multi input digital temperature controller	
Dimension	2A						48(W) × 96(H) mm	
	3A						96(W) × 48(H) mm	
	4A						48(W) × 48(H) mm	
	7A						72(W) × 72(H) mm	
	9A						96(W) × 96(H) mm	
	4P						48(W) × 48(H) mm	11pin socket type
Control output		M					Relay	
		S					Voltage Pulse Output (for SSR Drive)	
		C					Current Output (4-20 mA Current Output for SCR Drive)	
Alarm output			C				※ Applicable to KX4A and KX4P	
							KX4A, KX4P	ALH, ALL, LBA (1a Common Output) *1
			E				KX2A, KX3A, KX9A	ALH (1c), ALL (1a)
							KX4A, KX4P, KX7A	ALH (1a), ALL (1a)
			K				※Not Available for KX4A and KX4P	
							KX2A, KX3A, KX9A	ALH (1c), ALL (1a), LBA (1a)
							KX7A	ALH (1a), ALL (1a), LBA (1a)
Retransmission output (Optional)				A			※ Not Available for KX4P	
							Retransmission output (4 - 20 mA d.c)	
				N			None	
Power supply voltage					A		100 - 240 V a.c. 50/60 Hz	
					D		24 V d.c. Class2	

※ When using 4 - 20 mA input, connect a 250 Ω (0.1%) resistor across the terminals of the 1 - 5 V DC input.
※ *1) Common output for ALH, ALL, and LBA at the ALH terminal.

Input Type and Range

Input Type	Code (SL1)	Input Type	Range	
			1 °C (SL2 : X1XX)	0.1 °C (SL2 : X0XX)
Thermocouple (T.C)	0001	K	- 200 ~ 1370	- 100.0 ~ 500.0
	0101	J	- 200 ~ 1000	- 100.0 ~ 500.0
	1100	E	- 200 ~ 700	- 199.9 ~ 700.0
	1101	T	- 100 ~ 400	- 100.0 ~ 400.0
	0100	R	0 ~ 1700	-
	0110	B *1	100 ~ 1800	-
	0111	S	0 ~ 1700	-
	1000	L	- 200 ~ 900	- 199.9 ~ 900.0
	1001	N	- 200 ~ 1300	- 100.0 ~ 800.0
	1010	U	- 100 ~ 400	- 100.0 ~ 400.0
	1011	W (Re5 - Re25)	0 ~ 2300	0.0 ~ 800.0
	1110	PL2	0 ~ 1300	0.0 ~ 700.0
RTD	0010	KPt100 Ω (old)	- 200 ~ 500	- 199.0 ~ 500.0
	0011	Pt100 Ω (IEC)	- 200 ~ 640	- 199.9 ~ 640.0
DCV	0000	1 - 5 V d.c.	- 1999 ~ 9999	Decimal Point Selection (SL4)
	1111	0 - 10 V d.c.		

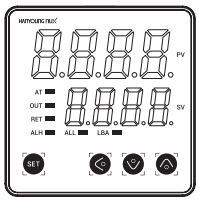
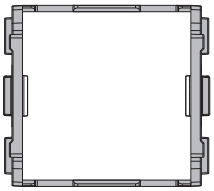
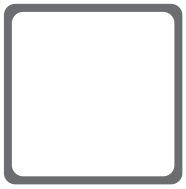
※ K, J, E, T, R, B, S, N : IEC 584 L, U : DIN 43710 W(Re5-Re25) : Hoskins Mfg.Co.USA
Pt100 Ω : IEC 751, KS C1603 (Kpt100 Ω : Rt = 139.16 Ω ※ Rt: Resistance value at 100°C)
※ When using 4 - 20 mA current input, select both 1 - 5 V DC input, and connect a 250 Ω 0.1% shunt resistor across the input terminals.
※ Error: ±0.3% of F.S ±1 digit
*1: Outside guaranteed range ~ 400 °C

Specification

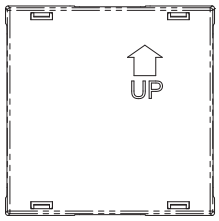
Model			KX2A	KX3A	KX4A	KX7A	KX9A	KX4P
Input	Thermocouple Types		K, J, E, T, R, B, S, L, N, U, W, PLII					
	Reference Junction Compensation Accuracy		±1.5 °C (within 0 ~ 50°C)					
	Temperature Resistance Types		JPT100, PT100					
	Allowable Wire Resistance		Each of the 3 wires should have a resistance of 10 Ω or less (Note: Resistance between the 3 wires must be the same)					
	DC Voltage		1 ~ 5 V, 0 ~ 10 V					
	Display Accuracy		±0.5 % (Refer to the input table)					
	Input Open Circuit		Up Scale					
	Sampling Cycle		250 ms					
Output	Relay output		(KX2A, KX3A, KX4A, KX7A, KX9A): N.O: 5 A 250 V a.c., 5 A 30 V d.c. (resistive load), N.C: 2 A 250 V a.c., 1 A 30 V d.c. (resistive load); Switching life: 1,000,000 cycles (no load)					
			(KX4P): 3 A 240 V a.c., 3 A 30 V d.c. (resistive load); Switching life: 1,000,000 cycles (no load)					
	Voltage output		ON Voltage: 12 V d.c. or higher, OFF Voltage: 0.1 V d.c. or lower, Load Resistance: 600 Ω or higher					
	Current output		4 ~ 20 mA: ±0.2% of FS ±1 digit, Load Resistance: 600 Ω or lower					
Control	Type		ON/OFF, PID control					
	Output operation		Reverse action, Direct action					
	Anti-reset wind-up		Auto(A=0), 0.1 ~ 100%					
Option	Alarm output	ALH	(KX2A, KX3A, KX9A): N.O: 5 A 250 V a.c., 5 A 30 V d.c. (resistive load), N.V: 2 A 250 V a.c., 1 A 30 V d.c. (resistive load); Switching life: 1,000,000 cycles (no load)					
			(KX4A, KX7A, KX4P): 3 A 240 V a.c., 3 A 30 V d.c. (resistive load); Switching life: 1,000,000 cycles (no load)					
		ALL	3 A 240 V a.c., 3 A 30 V d.c. (resistive load); Switching life: 1,000,000 cycles (no load)					
		LBA	(KX2A, KX3A, KX7A, KX9A): 3 A 240 V a.c., 3 A 30 V d.c. (resistive load); Switching life: 1,000,000 cycles (no load)					
	Retransmission output		4 ~ 20 mA: ±0.2% of FS ±1 digit, Load Resistance: 600 Ω or less.					
Power	Power supply		100 - 240 V a.c. (±10 %), 50 - 60 Hz, 24 V d.c. (±10 %)					
	AC Power Type Power Consumption		8.5 VA or less	8.5 VA or less	7 VA or less	8.5 VA or less	9.0 VA or less	7 VA or less
	DC Power Type Power Consumption		3.5 W or less	3.5 W or less	3.2 W or less	3.5 W or less	3.5 W or less	3.0 W or less
	Insulation Resistance		20 MΩ or more (Primary terminal - Secondary terminal)					
	Dielectric Strength		3,000 V a.c., for 1 minute (Primary terminal - Secondary terminal)					
Installation environment	Temperature and humidity		0 ~ 50 °C, 35 ~ 85 % RH (No condensation)					
	Environment		Refer to Environmental Safety Precautions					
Certification			KC CE					
Weight			170 g	170 g	110 g	170 g	240 g	110 g

Components

Basic Components

Main Unit	Bracket	Instruction Manual	Rubber Packing	Resistor 250Ω 1EA
				

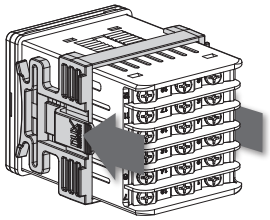
Optional

Protective Cover		11-Pin General-Purpose Socket	
	For KX2A : TC2A-COV For KX3A : TC2A-COV For KX4A : TC4A-COV For KX7A : TC7A-COV For KX9A : TC9A-COV		For KX4P : HS-G-E11

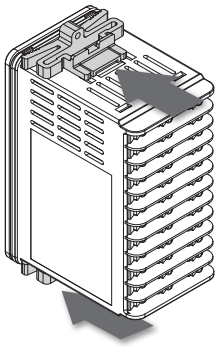
Bracket Assembly Diagram

※ Brackets provided as standard: KX4A, KX4P (1pc), KX2A, KX3A, KX7A, KX9A (2 pcs)

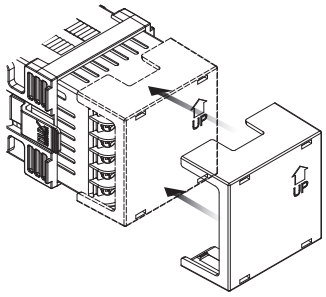
- **KX4A, KX4P**



- **KX2A, KX3A, KX7A, KX9A**

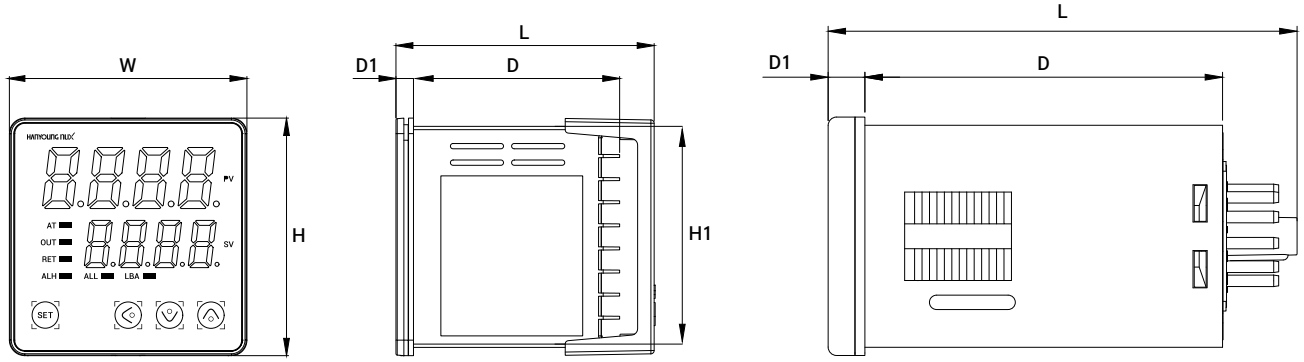


- **Protective Cover**

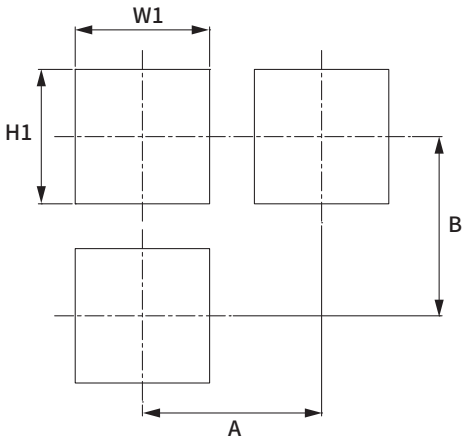


External and Panel Cutout Dimensions

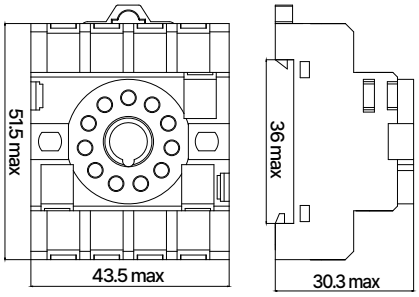
External



Panel Cutout Dimensions

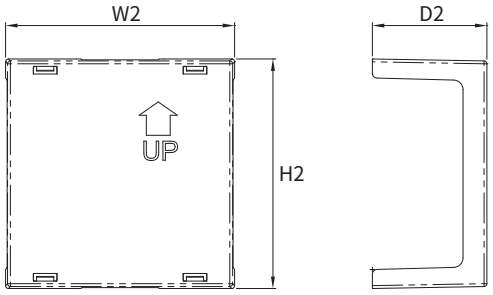


● **11-Pin General-Purpose Socket** (Option)



● **Protective Cover** (Option)

• KX2A, KX3A, KX4A, KX7A, KX9A



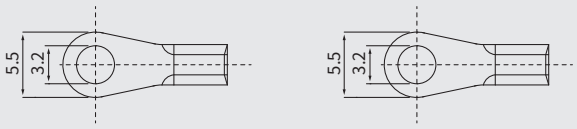
[Unit: mm]

Classification	Symbol	KX2A	KX3A	KX4A	KX4P	KX7A	KX9A
External dimension	W	48.0	96.0	48.0	48.0	72.0	96.0
	H	96.0	48.0	48.0	48.0	72.0	96.0
	H1	90.0	44.6	44.6	44.7	67.0	91.6
	D	62.5	62.5	63.0	72.0	62.5	62.5
	D1	5.4	5.1	4.3	7.4	5.3	5.2
	L	78.3	78	77.8	94.0	78.2	78.1
Panel cutout	W1 *1	45.0	90.5	45.0	45.0	67.5	92.0
	H1 *1	90.5	45.0	45.0	45.0	67.5	92.0
	A	70.0	122.0	60.0	60.0	83.0	117.0
	B	122.0	70.0	60.0	60.0	100.0	117.0
Protective Cover (sold separately)	W2	48.4	94.4	48.0	X	71.8	96.0
	H2	94.4	48.4	48.1		71.8	96.0
	D2	26.9	26.9	24.0		26.9	26.9

Connection diagram

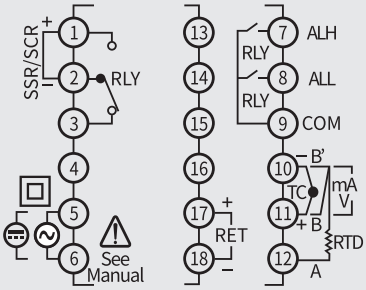
[Unit : mm]

※ Use the following type of terminal.
※ Connect wires and terminals using UL-certified products.

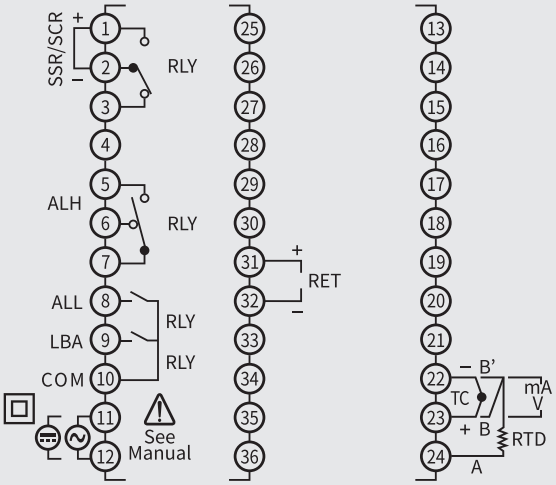


Ring Terminal　　Spade Terminal

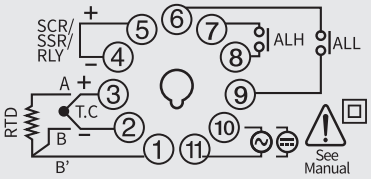
KX4A



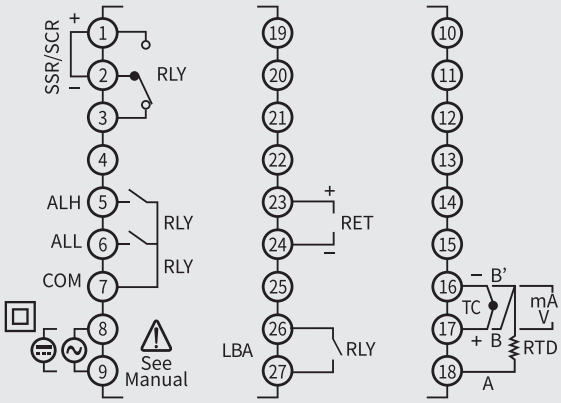
KX2A, KX3A



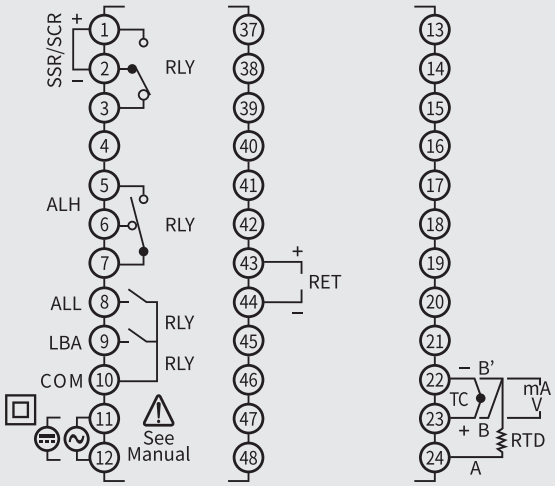
KX4P



KX7A

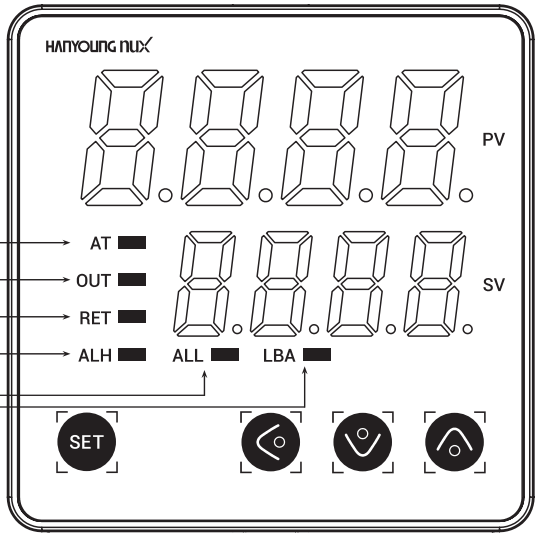


KX9A



Part name and Function

- AT : Auto Tuning (Flashing - In Progress)
- OUT : Control output (Output Range 0 ~ 100% Proportional Flashing)
- RET : Retransmission output (Indicator lights up when RET is applied)
- ALH : High Limit Alarm (Indicator lights up when output state is 'ON')
- ALL : Low Limit Alarm (Indicator lights up when output state is 'ON')
- LBA : Look Break Alarm (Indicator lights up when output state is 'ON'



- PV : Present Value (Operating Mode: Displays current temperature, Menu Mode:Displays parameters)
- SV : Set Value (Operating Mode: Set desired temperature, Menu Mode:Set parameters)

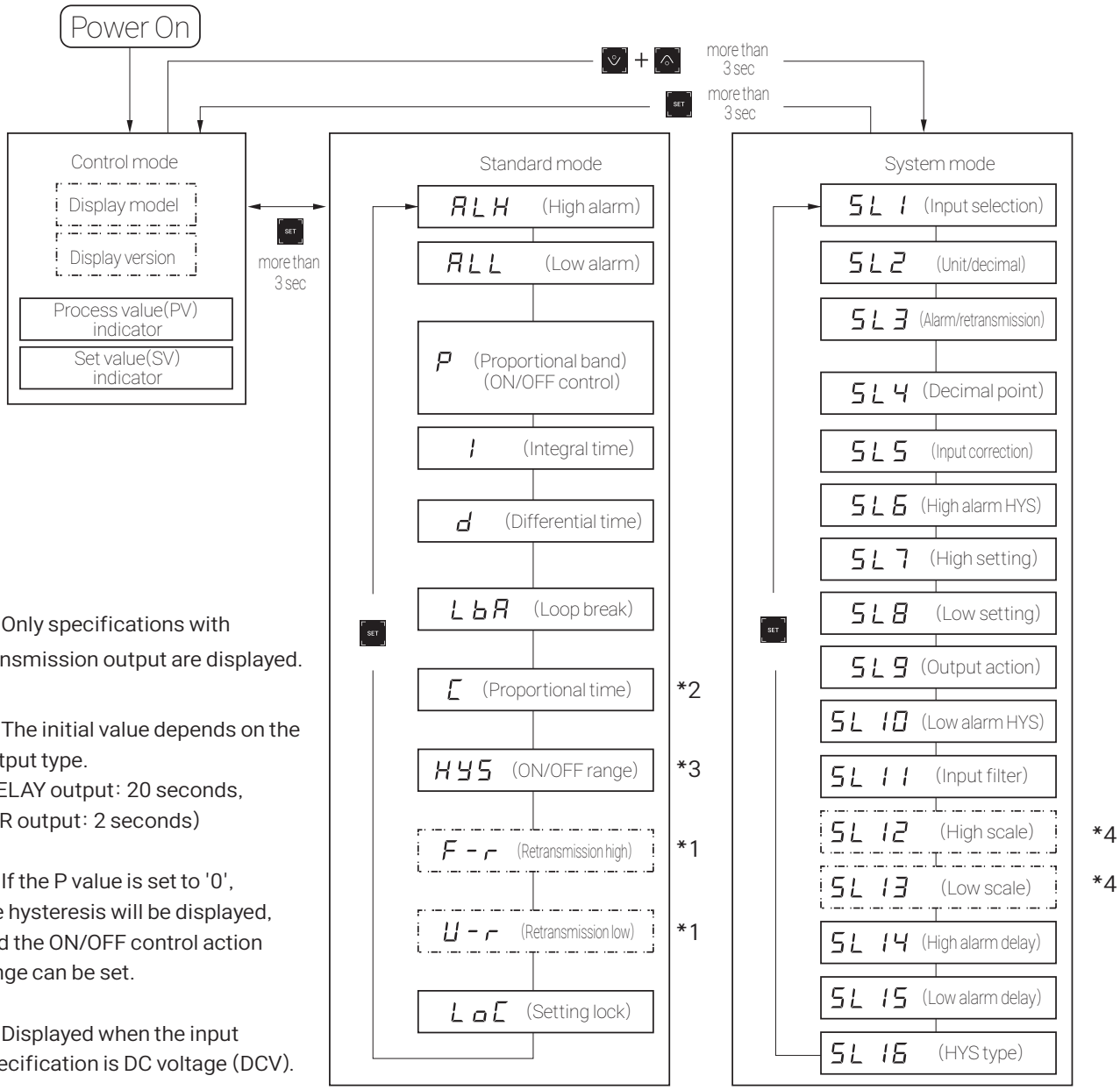
Basic key description

Name	Key	Operation Mode		Menu Mode	
		Control / Monitoring	SV edit	General / Initial	Parameter edit
Set	SET	Move to SV Edit Mode	saves SV	refer to Parameter Configuration	saves value and moves to next parameter
Shift		-	moves Digit Position	edits Parameter	-
Down			decreases Value	moves Parameter / moves group	decreases / changes value
Up			increases Value		increases / changes value

FUNCTION KEY DESCRIPTION (OPERATING MODE USE)

No.	Key Combination	Details
1	SET Press for 3 secs	Enter General Settings Mode, Return to Operating Mode
2	+ Press for 3 secs	Enter Initial Settings Mode
3	SET + Press for 1 secs	Execute/Disable Auto Tuning (AT)

Parameter Composition



*1 Only specifications with transmission output are displayed.

*2 The initial value depends on the output type.
(RELAY output: 20 seconds,
SSR output: 2 seconds)

*3 If the P value is set to '0', the hysteresis will be displayed, and the ON/OFF control action range can be set.

*4 Displayed when the input specification is DC voltage (DCV).

Normal Setting Mode

*(Press and hold SET key for 3 seconds.)

Present Value (PV) Display		Name		Setting range	Initial value	Description
*1	ALH	Higher limit alarm	ALH	Within the input range (ALL < ALH)	1370 ℃	Displays the higher limit alarm set value.
*1	ALL	Lower limit alarm	ALL		-200 ℃	Displays the lower limit alarm set value
	P	Proportional gain	P	0 ~ 100 % of F.S	20 ℃	Set when using proportional control. Setting「0」switches to ON/OFF control.
	A	Anti-Reset Windup	A	0 ~ 100 % of F.S	20 ℃	Prevents overshoot and undershoot caused by the integral effect. Setting「0」switches to ON/OFF control.
	I	Integral Time	I	0 ~ 3600 sec	240 sec	Eliminates residual deviation (OFFSET) and helps reach the target faster. Setting「0」disables integral action.
	d	Derivative Time	d	0 ~ 3600 sec	60 sec	Predicts output changes to prevent ripple and improve control stability. Setting「0」disables derivative action.
	LbA	Control loop break alarm	LBA	0 ~ 7200 sec	0 sec	Displays the control loop open circuit alarm set value. Setting「0」disables the control loop open circuit alarm.
	C	Proportional cycle	C	1 ~ 100 sec	20 sec (RLY) 2 sec (SSR)	Displays the control output cycle (in seconds).
	HYS	Hysteresis	HYS	0 ~ 10 % of F.S	1 ℃	Sets the control output sensitivity (for ON/OFF control).
*2	F-r	Transmission Higher Limit Output	F - r	Within the input range (U - r < F - r)	1370 ℃	Limits the maximum value of the transmission output.
*2	U-r	Transmission Lower Limit Output	U - r		-200 ℃	Limits the minimum value of the transmission output.
	LoC	Lock data setting	LoC	0 ~ 3	0000	Turns the setting data lock function ON/OFF.

(Press SET key.)

*1. ALH and ALL will be reset when SL3 is changed.
*2 Optional features. (They will not be displayed if there is no transmission output.)

Initial Setting Mode

(1) This is the mode for setting the temperature controller specifications during product operation.

(2)Press and hold both the ∧ and ∨ for more than 3 seconds to enter the initial setting mode.

(Press SET Key.)

Symbol (PV 표시창)	Category	Details	Initial value (SV display)
SL 1 □□□□	Select input	Multi-Input Refer to Range and Input Code	0001
SL2 □□□□	Output Confirmation ※ Operation not allowed	0 : Current Output 1 : Relay, Voltage Output	1111
	Decimal Point Function Selection *1	0 : Display Decimal Point 1 : No Decimal Point Display	
	Temperature Unit Selection	0 : None 1 : Celsius Display (℃)	
	Indicator/Controller Selection	0 : Temperature Indicator 1 : Temperature Controller	
SL3 □□□□	Alarm Waiting Action Selection	0 : Waiting Action Enabled 1 : Waiting Action Disabled	1111
	Transmission Output (Optional)	0 : Transmission Output Enabled 1 : Transmission Output Disabled	
	Alarm Type Selection	0 : Range Alarm 1 : Upper and Lower Limit Alarm	
	Deviation/Absolute Alarm Selection	0 : Deviation Alarm 1 : Absolute Alarm	
SL 4	Decimal Point Position Selection	0→0000(None) 1→000.0(1 decimal) 2→00.00(2 decimal) 3→0.000(3 decimal)	0
SL 5	Input Offset Setting	±100 % of F.S	0
SL 6	Higher Limit Alarm (ALH) Hysteresis Setting	0 ~ 10 % of F.S	1
SL 7	Maximum Temperature Setting	Within Temperature Setting Range (However, SL7 > SL8)	1370 ℃
SL 8	Minimum Temperature Setting		-200 ℃
SL 9	Control Output Operation	0 : Reverse Operation (Heating) 1 : Direct Operation (Cooling)	0
SL 10	Lower Limit Alarm (ALH) Hysteresis setting	0 ~ 10 % of F.S	1 ℃
SL 11	Input filter	0 ~ 100 secs	0
SL 12	Maximum Input Scale Setting	Applicable when Voltage Input (DCV)	1000
SL 13	Minimum Input Scale Setting	Applicable when Voltage Input (DCV)	0
SL 14	Higher Limit Alarm (ALH) Delay Time Setting	0 ~ 100 secs	0 secs
SL 15	Lower Limit Alarm (ALH) Delay Time Setting	0 ~ 100 secs	0 secs
SL 16	Hysteresis Type Selection	0 : Hysteresis 1 : Hysteresis X 2	0

⚠ Caution

When selecting the input type, ensure it is compatible with the sensor being used.

※Changing SL 1, SL2 will reset temperature-related parameters.

Therefore, set SL 1, SL2 first before configuring the remaining parameters.

※ If DCV input is selected,

Changing SL 12, SL 13 will reset SL 7, SL 8

※Changing the alarm type in SL3 will reset alarm values (ALH, ALL)

*1 : Decimal points are not allowed for R, S, B TYPE

※ If DCV input is selected, changing the values of SL12 and SL13 will reset the temperature-related parameter values.

Key Function Description

Control Loop Open Circuit Alarm (LBA)

(1) Setting Method

The setting value for the Control Loop Open Circuit Alarm (LBA) should typically be set to twice the integral time (I). Additionally, the Control Loop Open Circuit Alarm can also be set via the Auto Tuning (AT) function. In this case, it is automatically set to twice the integral time (I).

(2) Operation Description

The Control Loop Open Circuit Alarm (LBA) function determines whether to turn ON or OFF under specific conditions based on the set time when the control output is at 0% or 100%.The conditions for activating the Control Loop Open Circuit Alarm (LBA) are as follows:

① Control Output 100%

- Reverse Action: If the measured value does not increase by 2°C or more after the set time has passed.
- Direct Action: If the measured value does not decrease by 2°C or more after the set time has passed.

② Control Output 0%

- Reverse Action: If the measured value does not decrease by 2°C or more after the set time has passed.
- Direct Action: If the measured value does not increase by 2°C or more after the set time has passed.

The controller automatically measures and calculates the characteristics of the controlled object to ensure proper temperature control at the set temperature by automatically setting values for Proportional (P), Integral time (I), Derivative time (D), and Anti-reset Windup (ARW).

When Auto Tuning starts, the control temporarily operates in an ON/OFF mode, and using the received response data, the appropriate PID constants and ARW values are calculated and set.

(3) Cause of Operation

The Control Loop Open Circuit Alarm (LBA) function is triggered by the following causes:

① Fault in the Control Target: Heater disconnection, power supply failure, wiring issues, etc.

② Sensor Fault: Sensor disconnection, short circuit, etc.

③ Operator Device Fault: Relay fusion, wiring issues, operator device malfunction, etc.

④ Output Circuit Fault: Internal relay fusion, abnormal ON/OFF operation.

⑤ Input Circuit Fault: No change in measured values despite changes in input conditions.

* As the exact cause cannot be determined, please check the issues sequentially.

(4) Caution

① The Control Loop Open Circuit Alarm (LBA) will only be triggered after the set time has passed when the control output reaches 0% or 100%.

② The function will not be performed when Auto Tuning (AT) is used.

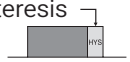
③ Even if there is no issue with the product, external disturbances may affect the function.

④ If the set time is too short or the control target is not suitable, the function may not be implemented. Please adjust the set time to a longer duration.

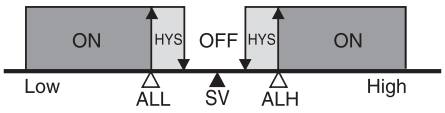
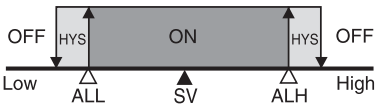
Alarm Function

(1) Deviation Alarm Setting

Hysteresis

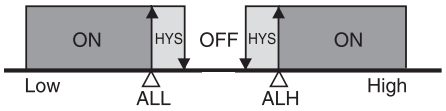


※ Alarm operation can be set as follows:
(▲ : Set Value (SV) △ : Alarm Set Value)

Deviation Alarm Setting	Higher and Lower Limit Alarms	
	In-Range Alarm	

This is the setting method to trigger an alarm based on the temperature difference relative to the set value (SV).
(Example) SV : 200 ℃, AlH : 5 ℃, AlL : 10 ℃
- Higher Limit Alarm: Above 205℃ , Lower Limit Alarm: Below 190 ℃
- In-Range Alarm: Between 190°C and 205°C

(2) Absolute Alarm Setting

Deviation Alarm Setting	Higher and Lower Limit Alarms	
	In-Range Alarm	

This is the setting method to trigger an alarm based on the temperature difference relative to the set value (SV).
(Example) AlH : 205 ℃, AlL : 190 ℃
- Higher Limit Alarm: Above 205℃ , Lower Limit Alarm: Below 190 ℃
- In-Range Alarm: Between 190°C and 205°C

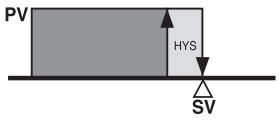
※ When the In-Range Alarm is active, the lower limit alarm will not trigger, and only the higher limit alarm will be activated.
※ Changing the alarm type in SL3 will reset all alarm set values to their defaults.

(3) ON/OFF Control Output Hysteresis(HYS) Type Selection

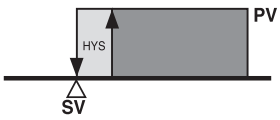
- Select the HYS range when using ON/OFF control.

① When SL 16 = 0 ,
· Set the HYS range according to the HYS parameter value, depending on the control direction.

· Reverse Action (SL9 = 0)

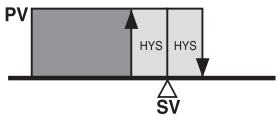


· Direct Action(SL9 = 1)

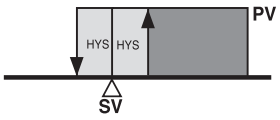


② When SL 16 = 1,
· Set the range to twice the HYS parameter value, regardless of the control direction

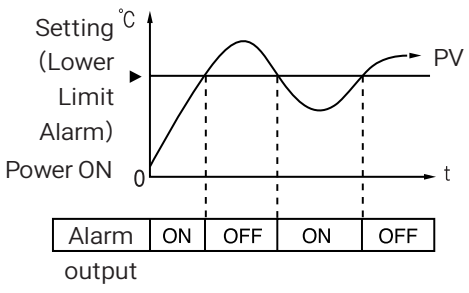
· Reverse Action (SL9 = 0)

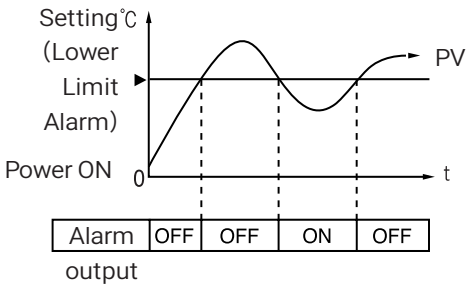


· Direct Action(SL9 = 1)



(4) When power is applied to the product, the alarm will not trigger immediately within the alarm range. The alarm will be triggered after the value moves outside the alarm range and then returns back within the range.





Auto Tuning (AT)

The controller automatically measures and calculates the characteristics of the controlled object to ensure appropriate temperature control at the set temperature by automatically setting values for Proportional (P), Integral time (I), Derivative time (D), and Anti-reset Windup (ARW).When Auto Tuning starts, the system temporarily switches to an ON/OFF control mode, and using the received response data, the appropriate PID constants and ARW values are calculated and set.

(1) Complete the setting of parameters other than P.I.D and ARW values before starting Auto Tuning.
(2)Press both SET key and key simultaneously to make the AT indicator blink and start the Auto Tuning process.
(3) Once Auto Tuning is complete, the AT indicator will automatically turn off.
(4) Press and hold SET key for 3 seconds to view the automatically set PID values. If you wish to change them, refer to the parameter setting method.
(5) During Auto Tuning, if you press both SET key and key simultaneously again, the AT indicator will turn off, and the Auto Tuning function will be canceled. (In this case, the PID and ARW values will not be changed.)
(6) If the set value (SV) is changed during Auto Tuning, the process will stop, and the control will return to the PID values prior to Auto Tuning.

Setting Data Lock Function

The setting data lock function prevents changes to the set values and disables Auto Tuning through the front keys.This function is used after settings are complete, for example, to prevent accidental operation.To activate the setting data lock function, press SET key to display LOC, and then set the following integer according to the parameter setting method to turn the lock function ON or OFF.

- 0000：Disable the setting data lock function.
- 0001：Enable the setting data lock function, allowing only the set value (SV) to be changed.
- Other values：Lock all data and the AT function.- 0000：Disable the setting data lock function.

Control Output Operation Selection

The output can be selected by the internal parameter to either reverse action (heating control) or direct action (cooling control).
① Reverse Action：measured value < set value, output ON
② Direct Action：measured value > set value, output ON

Input Filter

Select the input filter operation time in SL 11 . This function calculates and displays the value over the set time, which helps eliminate the fluctuation of the reading caused by noise in the input signal.Setting「0」will turn off the input filter function.

Input Scale

For DCV input, this sets the range in which the input voltage is displayed.
(Example) SL 1 = 0000 (1 ~ 5 V DCV), SL 12 = 100.0, SL 13 = 0.0

Input voltage	1 V	3 V	5 V
Display	0.0	50.0	100.0

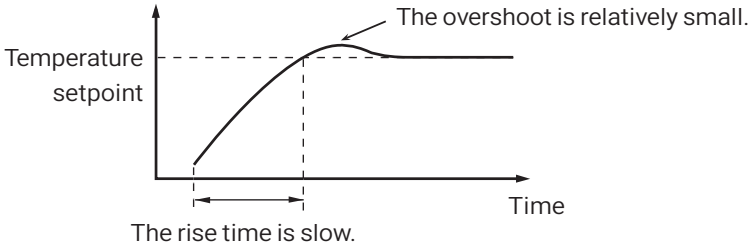
Alarm Delay Time

The Higher limit alarm delay time and the lower limit alarm delay time are set separately at SL 14 , SL 15 Even if the conditions for the alarm are met, if a delay time is set a SL 14 , SL 15 the alarm will only trigger after the set time has passed.The alarm deactivation is not affected by the delay time.

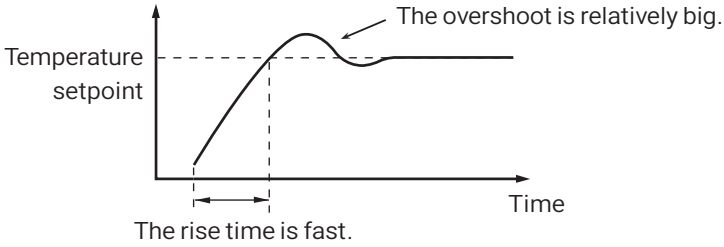
Anti-Reset Windup (ARW)

The function is set in the 'A' parameter.

① When A = Auto (0)



② When a temperature value is set in A



※ If the A value is too small, a large overshoot or undershoot may occur.

Set the same value as the P (proportional gain).

ON/OFF Control Function

In the case of controlling refrigeration units, fans (FAN), solenoid valves, etc., ON/OFF control is mainly used. If the 'Proportional gain (P)' value is set to '0' in the 'Normal setting mode,' the system can operate in ON/OFF control mode. At this point, the 'Hysteresis (HYS)' parameter is displayed, allowing the desired ON/OFF action range to be set.

Parameter Symbol	Name	Setting Range	Initial Value
P (ON/OFF)	Proportional Gain	0 ~ 100 % of F.S	20 ℃
HYS	Hysteresis	0 ~ 0 % of F.S	1 ℃

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