

Digital Temperature Controller

KXN Series

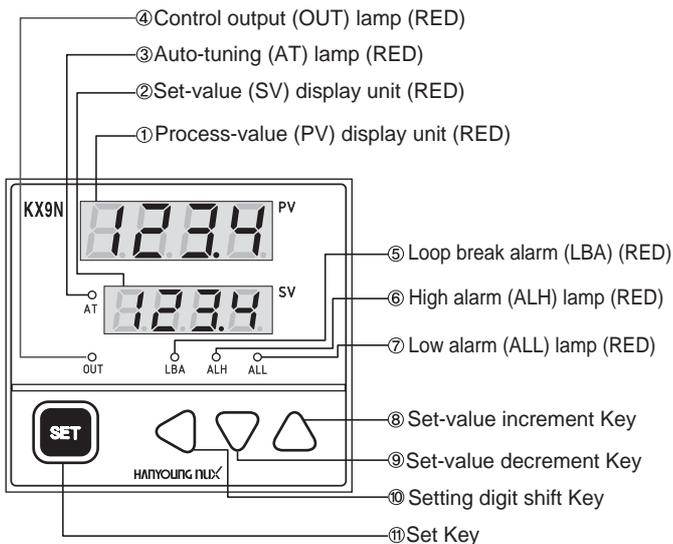


HANYOUNG nux

FEATURES

- Multi input
- Set SV value by Digital input (Only for KX4S)
- P. I. D Auto-tuning
- Absolute / Deviation alarm (High/Low/Alarm within range)
- User can select decimal point
- Select control direction (Reverse / Forward action)
- Loop Break Alarm (LBA) function
- Input correction

Functional Description



Main Functions

Control Loop Break Alarm (LBA function)

How to set

Usually set the Set-Value of LBA more two times than the Integral Time (I). Also LBA can also be set by Auto-Tuning function. In this case, the Set-Value is more two times than Integral Time (I) automatically.

Description of Operation

LBA function starts to measure time from the moment when PID computed value (Output On time/cycle) becomes 0% or 100%. LBA On/Off will be determined according to the changes of Process Value under LBA setup time.

- When 100% P.I.D computed value continues more than LBA setup time, LBA will be ON if Process Value(PV) does not rise more than 2°C. (In case of forward action, LBA will be ON if PV does not drop more than 2°C.)

- When 0% P.I.D computed value continues more than LBA setup time, LBA will be ON if Process Value(PV) does not drop more than 2°C. (In case of forward action, LBA will be ON if PV does not rise more than 2°C.)

When LBA Works

LBA function works under the following conditions

- Trouble of controlled objects : Heater Break, No Power Supply, Incorrect Wiring, etc.
 - Sensor trouble : Sensor disconnected, shorted, etc.
 - Actuator trouble: Burnt relay contact, incorrect wiring, relay contact not open or closed etc.
 - Output circuit trouble: Internally burnt relay contact in the unit, relay contact not on or off, etc.
 - Input circuit trouble: PV does not changed even though input is changed.
- ※ But causes of the above troubles cannot be identified, check the

control system in consecutive order.

Cautions for LBA Function

- LBA function will be activated when PID computed value is 0% or 100%. Therefore the time (from trouble occurrence to LBA activation) equals to the time PID computed value becomes 0% or 100% plus LBA setup time.
- LBA function is not activated while AutoTuning function is being operated.
- LBA function might be operated even though there are no troubles in the control system because LBA is influenced by disturbances (other heat sources, etc)
- In case LBA setup time is short or control object does not match, LBA might be ON/OFF or LBA might be not ON. In this case, please set LBA setup time slightly longer.

Auto-Tuning(AT) Function

Auto-Tuning function measures, computes and sets the optimum P.I.D or ARW Constant automatically. It can be used anytime after power is on, while temperature is rising or when control is stabilized.

- After finishing setup of P.I.D, ARW and others, perform Auto-Tuning.
- Press **SET** key and **△** key at the same time. Then Auto-Tuning begins to function and AT indication lamp flashes.
- When Auto-Tuning ends, AT indication lamp stops flashing automatically. Press **SET** key in consecutive order if you want to check the auto-tuned values.
- When changing the constants set by Auto-Tuning automatically, change each constant according to each parameter setup method.
- If you want to stop Auto-Tuning while Auto-Tuning is being operated, press again **SET** key and **△** key at the same time. Then Auto-Tuning will be finished and AT indication lamp stops flashing. In this case each constant of P.I.D and ARW are not changed. (Maintaining the values before starting Auto-Tuning)
- When changing SV(Set Value) during Auto-Tuning, Auto-Tuning will be finished and P.I.D control before Auto-Tuning will be started.

Set Data Lock Function

Set date lock function prevents the changes of setup values by front key or Auto-Tuning activation. It can be used to prevent malfunction after setup is finished. Set Data Lock is displaying LoC by pressing **SET** key and Lock function can be ON/OFF according to the below parameter setup method.

0000: Set Data Lock function is OFF

0001: Set Date Lock function is ON, SV (Set Value) can be changed only.

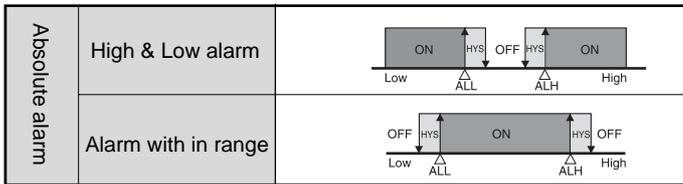
Others: All set data and Auto-Tuning function will be locked.

※ Checking each setting is possible during data lock.

Alarm Function

※ Each alarm could be set as below table
 (▲: Set-value (SV) △: alarm set-value)

Deviation alarm	High & Low alarm	
	Band alarm	

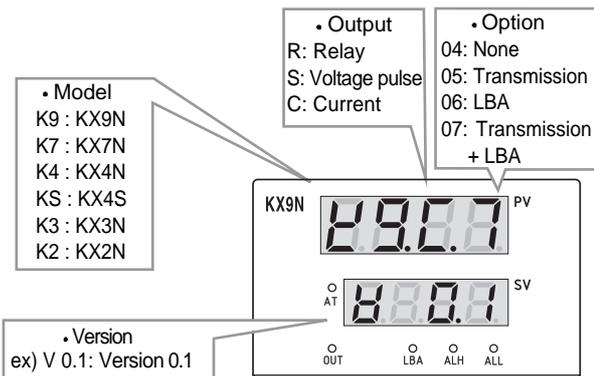


※Alarm within range : It operates in ALH Relay only

■ Up Scale and Down Scale

- If a measured value exceeds the high setting range limit due to upscale, etc., measured-value display starts flashing. Further, if it exceeds the high input display range limit, the measured-value(PV) display unit flashes overscale display 「"0000"」
- If a measured-value becomes below the low setting range limit due to downscale, etc., measured-value display starts flashing. Further, if it becomes below the low input display range limit, the measured-value(PV) display unit flashes under-scale display 「"UUUU"」

■ Model Number when Power is On



■ Control Direction

Control action can select from SL9
 0 : Reverse action for heating control
 1 : Forward action for cooling control

■ Input Filter

Input filter time can select from SL11. When PV value becomes unstable due to effects of noise, the filter helps to eliminate the unstable status (If select [0], Input filter is off)

■ Input Scale

In case of DCV input, it's a setup range of input range
 Example, SL1=0000 (1 - 5V DCV), SL12=100.0, SL13=0.0, Input scale is as follows.

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

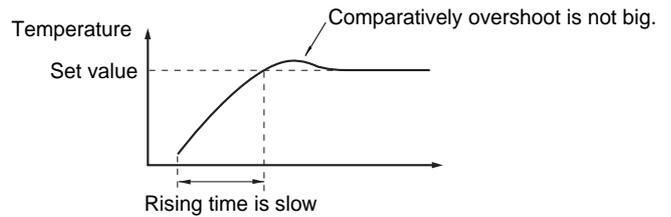
■ Alarm Delay Time

Delay time of High alarm and low alarm can set from SL14 and SL15. If user set it, alarm will be available after passing delay time. (Cancellation of alarm has nothing to do with delay time)

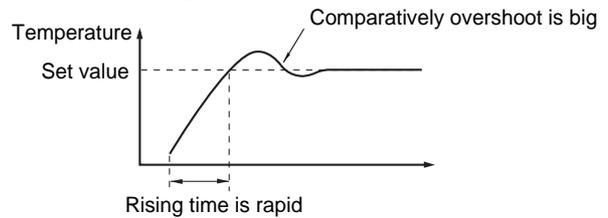
■ Anti-Reset Windup (ARW)

Set anti-reset windup from "A" parameter to prevent over - integral.

① A = In case of Auto (0) control.



② A = User setting (Set value manually)



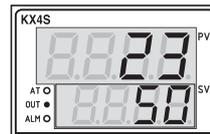
※If ARW value is too small or too big, overshoot or undershoot will happen. Please use same value as P (Proportional band)

■ Select Set Value (Only for KX4S)

- Set SV1 or SV2 by Digital input

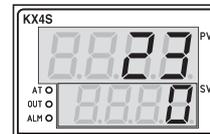
① Digital input is OFF (SV2=OFF)

- Display SV1, start control according to the SV1.



② Digital input is ON (SV2=ON)

- Display SV2, start control according to the SV2.



Operation

PV / SV Set Mode

PV display unit	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.

Parameter Setting Mode

*press the **SET** key continuously for 3 sec.

Process value (PV) display unit	Name	Initial value	Set value	Description
*1 58.1	Set-value 1	-50 °C	Within Input range	Control target value.
*1 58.2	Set-value 2	-50 °C	Within Input range	Control target value 2
ALH	High alarm	1,300 °C	Within Input range	Displays high alarm set-value
ALL	Low alarm	-50 °C	Within Input range	Displays Low alarm set-value
P	Proportional band	20 °C	0~100 % of F.S	Set when proportional control is performed. Control becomes ON/OFF action with P set to "0" or "0.0".
A	Anti-reset windup	20 °C	0~100 % of F.S	Prevents overshoot and/or undershoot caused by integral action effect. Integral action is turned OFF with ARW set to "0"
I	Integral time	240 sec	0~3600 sec	Eliminates offset occurring in Proportional control. Integral action is turns OFF with this action set to "0"
D	Derivative time	60 sec	0~3600 sec	Prevents ripples by predicting output change and Improves control stability. Derivative action turns OFF with this action set to "0"
LBA	Control loop break alarm	480 sec	0~7200 sec	Indicates control loop break alarm setting.
CC	Proportioning cycle	*3	1~100 sec	Displays manipulated output cycle (sec.)
HYS	Hysteresis (ON/OFF action)	1 °C	0~100 % of F.S	Displays hysteresis Set-Value for main output
*2 F-r	Full scale limit	1,300 °C	Within Input range	Transmitting output signal corresponds to the full scale limit.
*2 U-r	Under scale limit	-50 °C	Within Input range	Transmitting output signal corresponds to the under scale limit.
LoL	Set data lock	0	0~3	Turns the set data lock ON/OFF

* 1 is only for the KX4S (It is not displayed in other models)

* 2 is an option (If the model does not have transmitting output, 2 is not displayed)(KX4S and KX7N can not select transmitting output)

* 3 : Initial value will be changed according to control output (Relay output : 20 sec, SSR : 2 sec)

Model and Suffix Code

Model	Suffix code	Contents
KX□□N	□ □ □ □ □	Digital Temperature Controller
Size	KX2N	W)48 × (H)96 × (D)100 mm
	KX3N	(W)96 × (H)48 × (D)100 mm
	KX4N	(W)48 × (H)48 × (D)100 mm
	KX4S	(W)48 × (H)48 × (D)72 mm (11pin socket type)
	KX7N	(W)72 × (H)72 × (D)100 mm
	KX9N	(W)96 × (H)96 × (D)100 mm
Control output	M	Relay Output
	S	Voltage pulse output (12 V d.c)
	C	Current output (4 - 20 mA d.c)
Alarm output	C	Alarm 1 contact (ALM) * Only for KX4N, KX4S
	E	Alarm 2 contacts (ALL+ALH) * Exception: KX4S
	K	Alarm 3 contacts(ALL+ALH+LBA) * Exception: KX4N, KX4S
Option	A	transmission output (4 - 20 mA d.c) * Exception : KX4S, KX7N
	N	None
Power supply	A	100 - 240 V a.c
	D	24 V d.c * Exception KX4S

*KX4N with Alarm1 contact supports transmission output



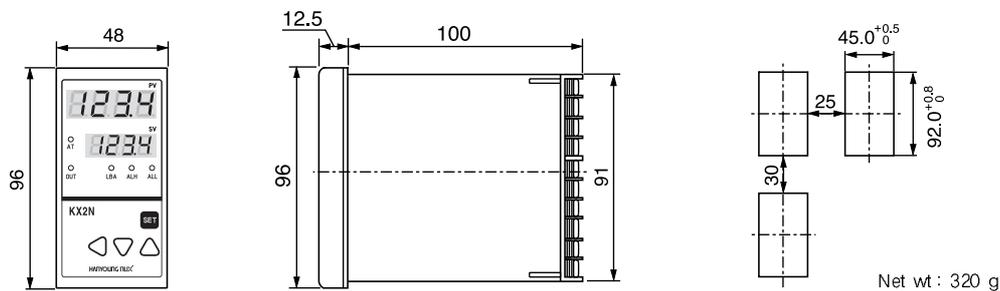
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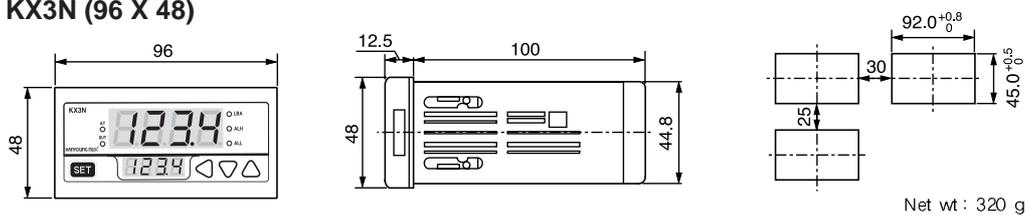
Dimension & Panel Cutout

Unit : (mm)

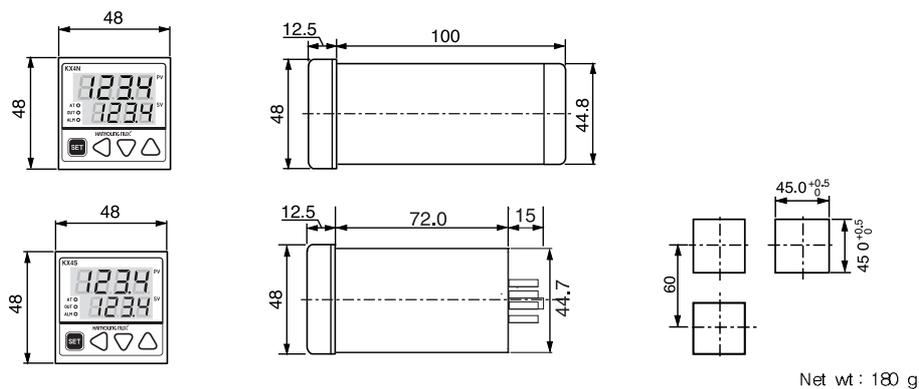
■ KX2N (48 X 96)



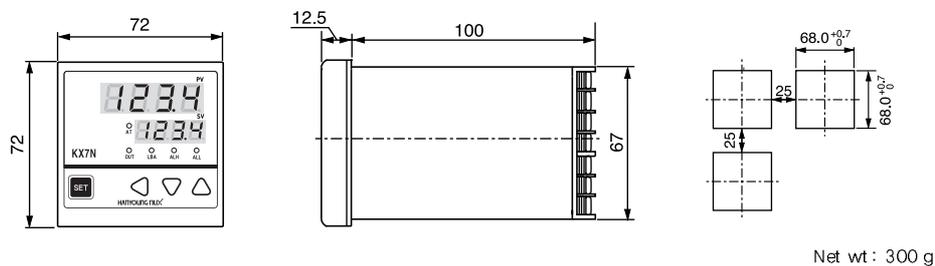
■ KX3N (96 X 48)



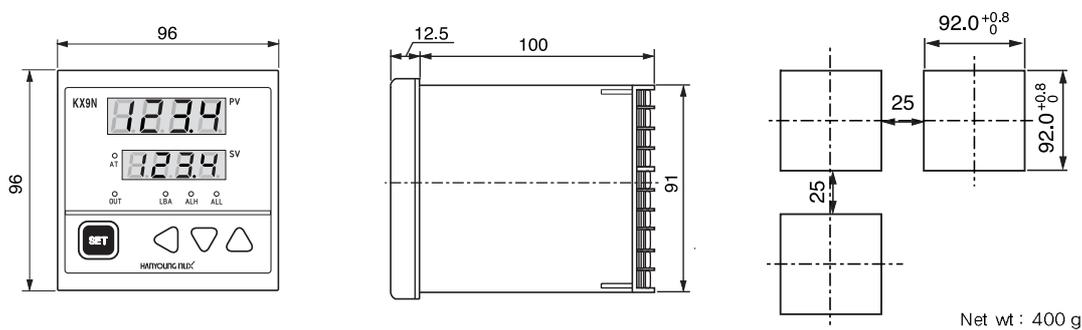
■ KX4N / KX4S (48 X 48)



■ KX7N (72 X 72)



■ KX9N (96 X 96)



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