Autonics

Bar Graphic Temperature Indicators
KN-1000B SERIES
INSTRUCTION MANUAL

CE

Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

■ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.

※⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ **Warning** Failure to follow these instructions may result in serious injury or death.

⚠ **Caution** Failure to follow these instructions may result in personal injury or product damage.

⚠Warning

1. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, economic loss or fire.
2. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.
Failure to follow this instruction may result in explosion or fire.
3. Install on a device panel to use.
Failure to follow this instruction may result in fire or electric shock.
4. Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire or electric shock.
5. Do not disassemble or modify the unit.
Failure to follow this instruction may result in fire or electric shock.
6. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.

⚠Caution

1. Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage.
2. Use a dry cloth to clean the unit, and do not use water or organic solvent.
Failure to follow this instruction may result in fire or electric shock.
3. Keep the product away from metal chip, dust, and wire residue which flow into the unit.
Failure to follow this instruction may result in fire or product damage.
4. Check the polarity of the measurement input before wiring.
Failure to follow this instruction may result in explosion or fire.
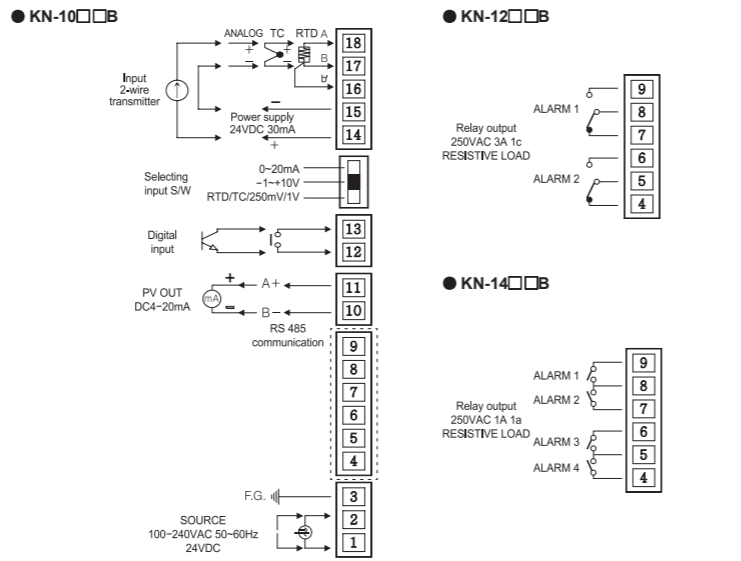
■ Ordering Information

KN	-	1	0	0	0	B

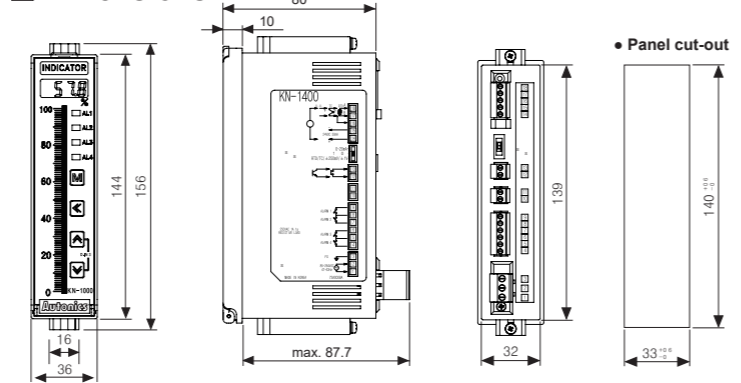|		
Size	B	DIN W36×H144mm
Power supply	0	100-240VAC 50 to 60Hz
	1	24VDC
Option output	0	No option
	1	Transmission output (4-20mA)
	4	RS485 communication output
Alarm output	0	No alarm output
	2	Alarm output: 2
	4	Alarm output: 4
Item	KN-1	Bar Graphic Temperature Indicator

■ Unit Description

1. Display part(red)
   ● Run mode: Displays current measurement value.
   ● Parameter set mode: Displays parameter and SV.
2. Unit sticker part (unit sticker is an accessory)
3. Alarm output indicator: Turns ON when the alarm is ON.
4. Ⓜ key: Used to enter parameter set mode, move to parameters, save SV and return to RUN mode.
5. ≪, ⋀, ⋁ key: Used to enter and change parameter SV.
6. D.IN3: Press the ⋀ and ⋁ keys for 3 sec at the same time, it operates the set function (alarm clear, display hold, zero-point adjustment) at dІ t at program mode.
7. Bar Graph(with 101 bar LEDs, green)
   : Displays measured value as bar graph.
8. Space for recognizing device by user

※**The above specifications are subject to change and some models may be discontinued without notice.**
※**Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).**

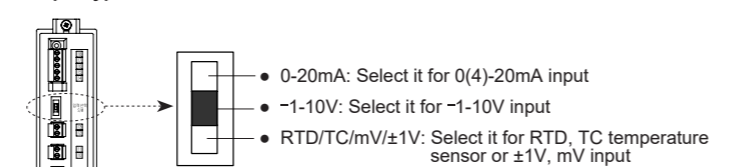## ■ Connections

● KN-10□□B

● KN-12□□B

● KN-14□□B

■ Dimensions

(unit: mm)

● Panel cut-out

■ Input Type and Range

◎ Input type selection switch

● 0-20mA: Select it for 0(4)-20mA input
● −1-10V: Select it for −1-10V input
● RTD/TC/mV/±1V: Select it for RTD, TC temperature sensor or ±1V, mV input

This unit is multi input product. Select the proper input with the input type selection switch and select this input type in Iո-P in program mode. The setting of input type selection switch and the input type Iո-P parameter should be same and it can display the proper measurement value. Factory default is 0-20mA.

Input type		Parameter	Input range(℃)	Input range(℉)
Thermocouple	K(CA)	tℂ.℘1	−200 to 1350	−328 to 2462
	K(CA)	tℂ.℘2	−199.9 to 999 9	−328 to 1832
	J(IC)	tℂ-J	−199.9 to 800 0	−328 to 1472
	E(CR)	tℂ-E	−199.9 to 800 0	−328 to 1472
	T(CC)	tℂ-t	−199.9 to 400 0	−199.9 to 752.0
	B(PR)*	tℂ-b	100 to 1800	212 to 3272
	R(PR)*	tℂ-r	0 to 1750	32 to 3182
	S(PR)*	tℂ-5	0 to 1750	32 to 3182
	N(NN)*	tℂ-ո	−200 to 1300	−328 to 2372
	C(W5)*	tℂ-ℂ	0 to 2300	32 to 4172
	L(IC)*	tℂ-L	−199.9 to 900 0	−328 to 1652
	U(CC)*	tℂ-U	−199.9 to 400 0	−199.9 to 752.0
	Platinel II*	tℂ-P	0 to 1390	32 to 2534
RTD	Cu50Ω*	ℂu50	−199.9 to 200 0	−199.9 to 392.0
	Cu100Ω*	ℂu 10	−199.9 to 200 0	−199.9 to 392.0
	JPt100Ω	JPt.1	−199.9 to 600 0	−328 to 1112
	Cu100Ω*	dPt.5	−199.9 to 600 0	−328 to 1112
	DPt50Ω	dPt.5	−199.9 to 600 0	−328 to 1112
	DPt100Ω	dPt.1	−199.9 to 850 0	−328 to 1530
Analog	Current	0.00 - 20.00mA	Ȧ.ȧȦ1	
		4.00 - 20.00mA	Ȧ.ȧȦ2	−1999 to 9999 (Display range is variable according to decimal point position.)
	Voltage	−50.0 - 50.00mV	ȧΰo1	
		−199.9 - 200.0mV	ȧΰo2	
		−1 000 - 1.000V	Ȧ-u1	
		−1.00 - 10.00V	Ȧ-u2	

※Above input types which have the * mark are not displayed.
To display the above input types, supply the power with pressing the Ⓜ key.

■ Specifications

Series		**KN-1000B**
Power supply	AC voltage	100-240VAC∼ 50/60Hz
	DC voltage	24VDC⎓
Allowable voltage range		90 to 110% of rated voltage
Power consumption	AC voltage	Max. 6VA
	DC voltage	Max. 4W
Display method		7-segment (red), graphic bar (green) LED method
Input type	RTD	JPt100Ω, DPt100Ω, DPt50Ω, Cu50Ω, Cu100Ω (5 types)
	Thermocouple	K, J, E, T, R, B, S, N, C (W5), L, U, PLII (12 types)
	Analog	●Voltage: ±1.000V, ±50.00mV, −199.9-200.0mV, −1.00-10.00V (4 types) ●Current: 4.00-20.00mA, 0.00-20.00mA (2 types)
Digital input		●Contact input: max. 2kΩ in ON, max. 90kΩ in OFF ●Non-contact input: residual voltage max. 1.0V in ON, leakage current max. 0.03mA in OFF ●Outflow current: approx. 0.2mA
Sub output	Alarm output	●2-point: relay contact capacity 250VAC∼ 3A 1c ●4-point: relay contact capacity 250VAC∼ 1A 1a
	Trans. output	ISOLATED DC4-20mA (PV transmission) load resistance max. 600Ω
	Com. output	RS485 (Modbus RTU)
Display accuracy		±0.2% F.S. ±1-digit (25℃±5℃) ±0.3% F.S. ±1-digit (−10℃ to 20℃, 30℃ to 50℃) In case of thermocouple and below -100°C input, [±0.4%F.S.]±1-digit ※TC-T, TC-U is min. ±2.0℃
Setting method		Set by front keys, or RS485 communication
Alarm output hysteresis		Set ON/OFF interval (1 to 999-digit)
Sampling cycle		Analog input: 100ms, temperature sensor input: 250ms
Dielectric voltage		2000VAC 50/60 Hz for 1 min (between input terminal and power terminal)
Vibration		0.75 mm amplitude at frequency of 5 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours
Relay life cycle	2-point	Mechanical: min. 10,000,000, electrical: min. 100,000 (250VAC 3A resistance load)
	4-point	Mechanical: min. 20,000,000, electrical: min. 500,000 (250VAC 1A resistance load)
Insulation resistance		Over 100MΩ (at 500VDC megger)
Noise immunity		±2kV the square wave noise (pulse width 1μs) by noise simulator
Memory retention		Approx. 10 years (non-volatile semiconductor memory type)
Environment	Ambient temperature	−10 to 50℃, storage: −20 to 60℃
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH
Approval		CE
Weight※1		Approx. 304g (approx. 182g)

※1: The weight includes packaging. The weight in parenthesis is for unit only.
※Environment resistance is rated at no freezing or condensation.
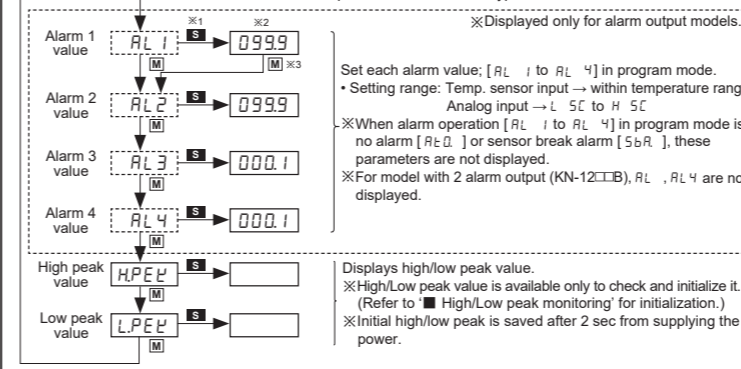
■ Factory Default

■ Monitoring mode

Parameter	Default	Parameter	Default	Parameter	Default
ȦL 1	099.9	ȦL 3	000.1	H.PEℓ	
ȦL 2	099.9	ȦL 4	000.1	L.PEℓ	

■ Program mode

Parameter	Default	Parameter	Default	Parameter	Default	Parameter	Default
Iո P	ȦȧȦ1	Iո b	0000	ȦL 1	Ȧt.1Ȧ	dІ t	Hold
Uni t	℃	L b5	000.0	ȦL 2	Ȧt.1Ȧ	dІ ℓ	Hold
L rℊ	00.00	H b5	100.0	ȦL 3	Ȧt.2Ȧ	bUrn	o℉℉
H rℊ	20.00	bȦr	℉.bȦr	ȦL 4	Ȧt.2Ȧ	Ȧddr	01
dP	0.0	L.oUt	000.0	Ȧ HY	001	bȦUd	9600
L 5ℂ	000.0	H.oUt	100.0	Iո5℉	Liո	Loℂ℘	o℉℉
H 5ℂ	100.0	Eℓ.I0	5P	ȧȦU℉	04		

■ Monitoring Mode

※1. Ⓢ Press any key among the ≪, ⋀, ⋁.
※2. ≪: Moves digits / ⋁, ⋀: Changes SV.
※3. Press the Ⓜ key after checking/changing SV in each parameter. The value flashes twice and is saved. It moves to next parameter.
※After entering setting group, press the Ⓜ key for 3 sec or there is no additional key operation in 30 sec, it returns to RUN mode.
※........: This parameter may or may not appear, depending on the other parameter set or model type.

RUN mode
Press Ⓜ key.

※Displayed only for alarm output models.

Alarm 1 value — ȦL 1 Ⓢ → 099.9
Alarm 2 value — ȦL 2 Ⓢ → 099.9
Alarm 3 value — ȦL 3 Ⓢ → 000.1
Alarm 4 value — ȦL 4 Ⓢ → 000.1

Set each alarm value; [ȦL 1 to ȦL 4] in program mode.
• Setting range: Temp. sensor input → within temperature range
  Analog input → L 5ℂ to H 5ℂ
※When alarm operation [ȦL 1 to ȦL 4] in program mode is no alarm [Ȧt.o] or sensor break alarm [5bȦ], these parameters are not displayed.
※For model with 2 alarm output (KN-12□□B), ȦL , ȦL 4 are not displayed.

High peak value — H.PEℓ Ⓢ
Low peak value — L.PEℓ Ⓢ

Displays high/low peak value.
※High/Low peak value is available only to check and initialize it. (Refer to '■ High/Low peak monitoring' for initialization.)
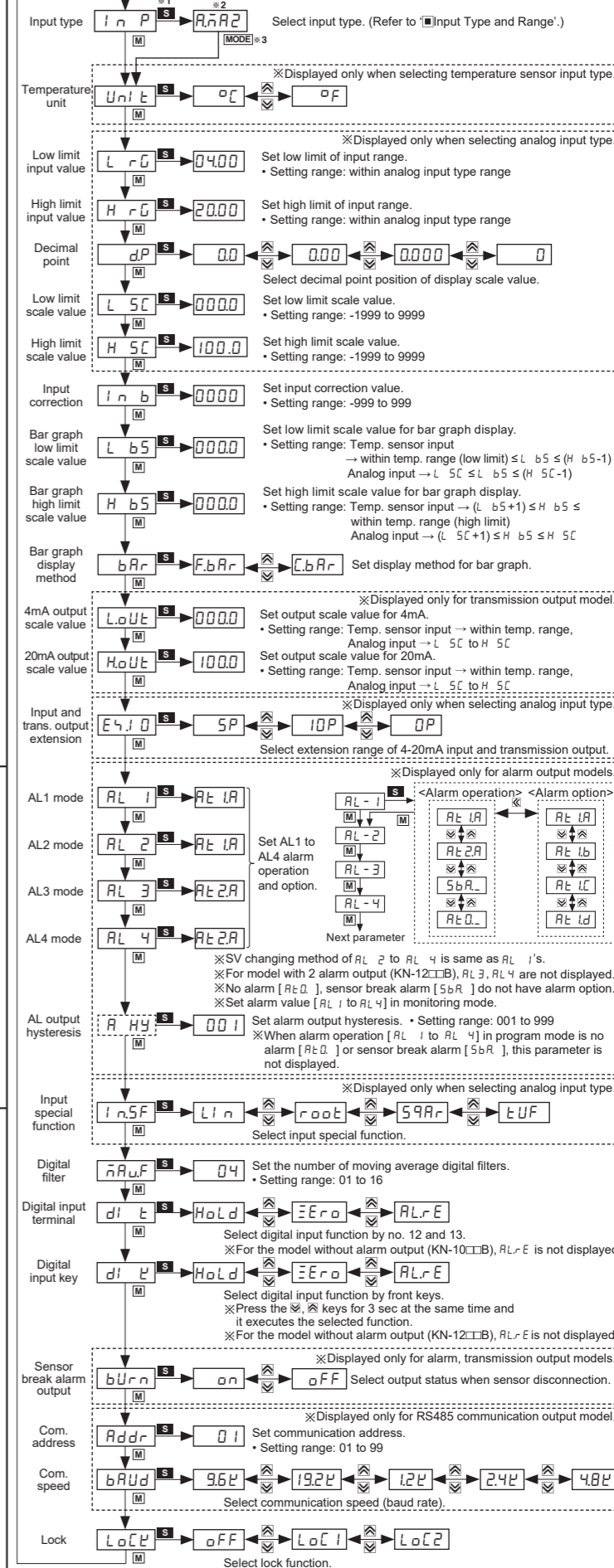※Initial high/low peak is saved after 2 sec from supplying the power.

■ Program Mode

※1. Ⓢ: Press any key among the ≪, ⋀, ⋁.
※2. ≪: Moves digits / ⋁, ⋀: Changes SV.
※3. Press the Ⓜ key after checking/changing SV in each parameter. The value flashes twice and is saved. It moves to next parameter.
※After entering setting group, press the Ⓜ key for 3 sec or there is no additional key operation in 30 sec, it returns to RUN mode.
※........: This parameter may or may not appear, depending on the other parameter set or model type.
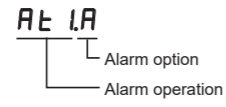
RUN mode
Press Ⓜ key for 3 sec

Input type — Iո P Ⓢ → Ȧ.ȧȦ2 Select input type. (Refer to '■ Input Type and Range'.)
※Displayed only when selecting temperature sensor input type.

Temperature unit — Uni t Ⓢ → ℃ / ℉

※Displayed only when selecting analog input type.
Low limit input value — L rℊ Ⓢ → 04.00 Set low limit of input range. • Setting range: within analog input type range
High limit input value — H rℊ Ⓢ → 20.00 Set high limit of input range. • Setting range: within analog input type range

Decimal point — dP Ⓢ → 0.0 / 0.00 / 0.000 / 0 Select decimal point position of display scale value.

Low limit scale value — L 5ℂ Ⓢ → 000.0 Set low limit scale value. • Setting range: -1999 to 9999

High limit scale value — H 5ℂ Ⓢ → 100.0 Set high limit scale value. • Setting range: -1999 to 9999

Input correction — Iո b Ⓢ → 000.0 Set input correction value. • Setting range: -999 to 999

Bar graph low limit scale value — L b5 Ⓢ → 000.0 Set low limit scale value for bar graph display. • Setting range: Temp. sensor input → within temp. range (low limit) ≤ L b5 ≤ (H b5-1) Analog input → L 5ℂ ≤ L b5 ≤ (H 5ℂ-1)

Bar graph high limit scale value — H b5 Ⓢ → 000.0 Set high limit scale value for bar graph display. • Setting range: Temp. sensor input → (L b5+1) ≤ H b5 ≤ within temp. range (high limit) Analog input → (L 5ℂ+1) ≤ H b5 ≤ H 5ℂ

Bar graph display method — bȦr Ⓢ → ℉.bȦr / ℂ.bȦr Set display method for bar graph.

※Displayed only for transmission output model.
4mA output scale value — L.oUt Ⓢ → 000.0 Set output scale value for 4mA. • Setting range: Temp. sensor input → within temp. range, Analog input → L 5ℂ to H 5ℂ
20mA output scale value — H.oUt Ⓢ → 100.0 Set output scale value for 20mA. • Setting range: Temp. sensor input → within temp. range, Analog input → L 5ℂ to H 5ℂ

※Displayed only when selecting analog input type.
Input and trans. output extension — Eℓ.I0 Ⓢ → 5P / I0P / oP Select extension range of 4-20mA input and transmission output.

※Displayed only for alarm output models.
AL1 mode — ȦL 1 Ⓢ → Ȧt.1Ȧ
AL2 mode — ȦL 2 Ⓢ → Ȧt.1Ȧ Set AL1 to AL4 alarm operation and option.
AL3 mode — ȦL 3 Ⓢ → Ȧt.2Ȧ
AL4 mode — ȦL 4 Ⓢ → Ȧt.2Ȧ

<Alarm operation> <Alarm option>
ȦL 1 → Ȧt.1Ȧ → Ȧt.1Ȧ
ȦL 2 → Ȧt.2Ȧ → Ȧt.1b
ȦL 3 → Ȧt.2Ȧ → Ȧt.1ℂ
ȦL 4 → 5bȦ. → Ȧt.1ℂ
Next parameter → Ȧt.o. → Ȧt.1d

※SV changing method of ȦL 2 to ȦL 4 is same as ȦL 1's.
※For model with 2 alarm output (KN-12□□B), ȦL 3, ȦL 4 are not displayed.
※No alarm [Ȧt.o], sensor break alarm [5bȦ] do not have alarm option.
※Set alarm value [ȦL 1 to ȦL 4] in monitoring mode.

AL output hysteresis — Ȧ HY Ⓢ → 001 Set alarm output hysteresis. • Setting range: 001 to 999
※When alarm operation [ȦL 1 to ȦL 4] in program mode is no alarm [Ȧt.o] or sensor break alarm [5bȦ], this parameter is not displayed.

※Displayed only when selecting analog input type.
Input special function — Iո5℉ Ⓢ → Liո / root / 59Ȧr / ℓU℉ Select input special function.

Digital filter — ȧȦU℉ Ⓢ → 04 Set the number of moving average digital filters. • Setting range: 01 to 16

Digital input terminal — dІ t Ⓢ → Hold / EEro / ȦLℛE Select digital input function by no. 12 and 13. ※For the model without alarm output (KN-10□□B), ȦLℛE is not displayed.

Digital input key — dІ ℓ Ⓢ → Hold / EEro / ȦLℛE Select digital input function by front keys. ※Press the ⋁, ⋀ keys for 3 sec at the same time and it executes the selected function. ※For the model without alarm output (KN-12□□B), ȦLℛE is not displayed.

Sensor break alarm output — bUrn Ⓢ → on / o℉℉ Select output status when sensor disconnection. ※Displayed only for alarm, transmission output models.

Com. address — Ȧddr Ⓢ → 01 Set communication address. • Setting range: 01 to 99 ※Displayed only for RS485 communication output model.

Com. speed — bȦUd Ⓢ → 9.6℘ / 19.2℘ / 12℘ / 2.4℘ / 4.8℘ Select communication speed (baud rate).

Lock — Loℂ℘ Ⓢ → o℉℉ / LoℂҐ / LoℂҐ Select lock function.

■ Functions

■ Alarm [AL-1, AL-2, AL-3, AL-4]

This product has 2 or 4 alarms to operate individually when the value is too high or low. Alarm function is set by the combination of alarm operation and alarm option.
To clear alarm, use digital input function (setting dI-t, dI-t' as AL.rE) or turn the power OFF and ON.
※For the model (KN-10□□B) without alarm output, these parameters are not displayed.

`At 1.A`
└ Alarm option
└ Alarm operation

◎ Alarm operation

Mode	Name	Operation	Descriptions
AtO_	—		No alarm operation
At 1	High limit alarm	OFF / H / ON, High limit alarm value: 800℃	PV ≥ alarm temperature, alarm is ON
At2_	Low limit alarm	ON / H / OFF, Low limit alarm value:200℃	PV ≤ alarm temperature, alarm is ON
SbA_	Sensor break alarm	—	It will be ON when it detects sensor disconnection. Sensor break alarm does not have alarm option.

※ H: Alarm output hysteresis

◎ Alarm option

Option	Name	Descriptions
At□.A	Standard alarm	If it is an alarm condition, alarm output is ON. Unless an alarm condition, alarm output is OFF.
At□.b	Alarm latch	If it is an alarm condition, alarm output is ON. Before clearing the alarm, an ON condition is latched. (Holding the alarm output)
At□.C	Standby sequence	First alarm condition is ignored. From the second alarm condition, standard alarm operates. When power is ON and it is an alarm condition, it is ignored. From the second alarm condition, standard alarm operates.
At□.d	Alarm latch and standby sequence	If it is an alarm condition, it operates both alarm latch and standby sequence. When power is ON and it is an alarm condition, it is ignored. From the second alarm condition, standard alarm operates.

■ Alarm output hysteresis [Program mode: A-HY]

Set the interval of ON/OFF alarm output.
The set hysteresis is applied to AL1 to AL4 and it is as below.
※E.g.) A-HY: 4, high limit alarm value: 800, low limit alarm value: 200

High limit alarm value 800 — A-HY:4 — 800 ON / 796 OFF
Low limit alarm value 200 — A-HY:4 — 200 ON / 204 OFF
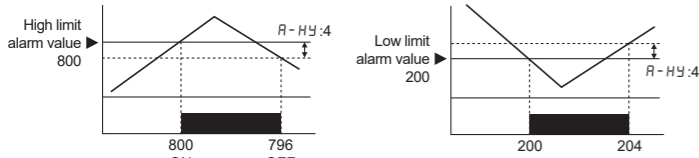
■ High/Low peak monitoring [Monitoring mode: H.PEt, L.PEt]

This function is to save high/low peak to check the invisible abnormal condition of system at [H.PEt] or [L.PEt] in monitoring mode.
When the high/low peak is out of the temperature range, it displays HHHH or LLLL.
To initialize high/low peak, press the ⍓, ⍌ keys at the same time for 3 sec at [H.PEt] or [L.PEt]. In this case, peak value is the present input value.

■ Error

Display	Descriptions	Troubleshooting
LLLL	Flashes when measured sensor input is lower than the temperature range.	When input is moved within the temperature range, it is cleared.
HHHH	Flashes when measured sensor input is higher than the temperature range.	
bUrn	Flashes when the sensor is break or not connected.	Check temperature sensor connection.
Err	Flashes when there is error to SV	Check set conditions and re-set it.

■ Parameter initialization

To initialize all parameter as factory default, supply the power to the product with pressing the Ⓜ and Ⓚ keys at the same time and it enters initialization parameter.

Press the Ⓜ + Ⓚ keys at the same time. Supply the power.
`CLr`
`no` ⇄ `YES`
Ⓜ
Completes initialization.
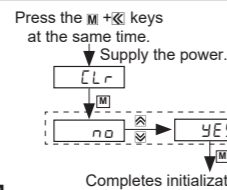
■ Decimal point [Program mode: d.P]

It is able to change decimal point position for high/low limit scale value.
It changes decimal point position of display value.

■ Transmission output scale [Program mode: LoUt, HoUt]

For 4-20mA current output, this function is to set the display value for 4mA [LoUt] and the display value for 20mA [HoUt].
The interval between LoUt and HoUt is 10% F.S. If it is below 10%, it is fixed as 10% of SV.

Output 20mA / 4mA → Display (LoUt, HoUt)
Output 20mA / 4mA → Display (LoUt, HoUt)
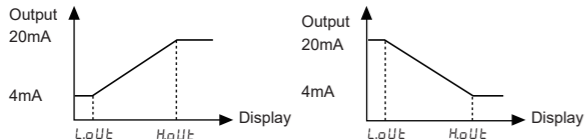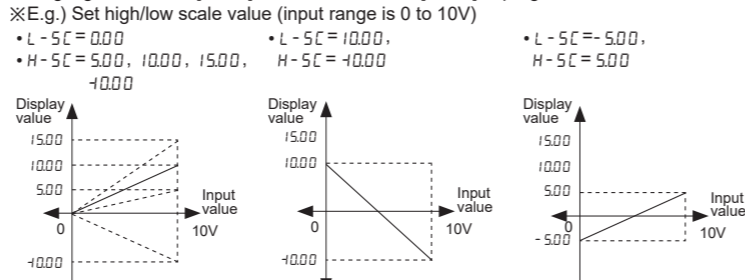
■ User input range [Program mode: L-rG, H-rG]

When selecting analog input, you can set the input range for your purpose. Set low limit input value [L-rG] and high limit input value [H-rG] to limit the input range.
• Set conditions: Low limit input value [L-rG] +20%F.S. < High limit input value [H-rG]

■ Display scale [Program mode: L-SC, H-SC]

For analog input, this function is to set (-1999 to 9999) for particular high/low limit value in order to display high/low limit value of measurement input. If measurement inputs are 'a' and 'b' and particular values are 'A' and 'B', it will display a=A, b=B as below graphs.
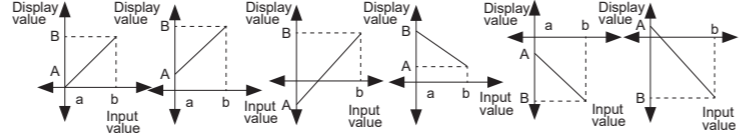
Display scale function is able to change display value for max./min. measured input by setting high limit scale [H-SC] and low limit scale [L-SC] in program mode.
※E.g.) Set high/low scale value (input range is 0 to 10V)
• L-SC = 0.00, • L-SC = 10.00, • L-SC = -5.00,
• H-SC = 5.00, 10.00, 15.00, H-SC = -10.00 H-SC = 5.00
  -10.00

※When changing input type, high/low scale is changed as factory default.

■ Input correction [Program mode: I n-b]

This function is to correct the error occurring from a thermocouple, a RTD or analog input out of allowable error range of this unit.
This is also available to correct error when a sensor cannot contact the subject position by calculating the error temperature.
Variable temperature sensors have accuracy level. Because high accuracy type is expansive, standard thermocouples are generally used.
In this case, temperature sensor may occur error. By executing this function, you can get more accurate temperature.
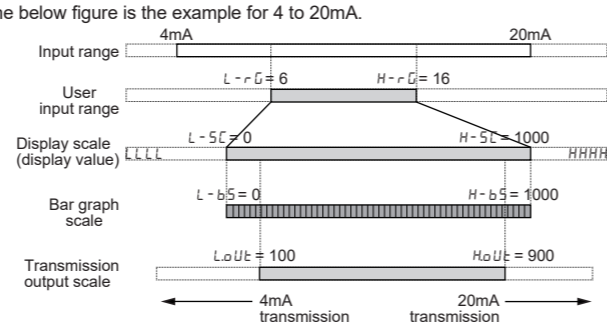When executing input correction function, you should measure the error from a sensor accurately. If the measured error is not correct, error may be greater.
(If I nSF = tUF, I n-b as atmospheric pressure input value not as input correction function. Refer to '■ Two unit function'.)
E.g.)When measured temperature is 4℃ and actual temperature is 0℃. Set I n-b as -4, and display value is 0℃.

■ Bar graph scale [Program mode: L-bS, H-bS]

This is to set display range for bar graph. Display range is as below.

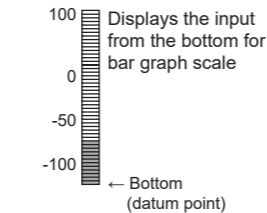| Parameter	Input	Display range	
L-bS	Temp. sensor input	Input range (low limit)	≤ L-bS ≤ (H-bS-1)
	Analog input	L-SC	≤ L-bS ≤ (H-SC-1)
H-bS	Temp. sensor input	(L-bS+1)	≤ H-bS ≤ Input range (high limit)
	Analog input	(L-SC+1)	≤ H-bS ≤ H-SC

※Relation among input range, user input range, display scale, bar graph scale, and transmission scale.
The below figure is the example for 4 to 20mA.

Input range: 4mA — 20mA
User input range: L-rG = 6 — H-rG = 16
Display scale (display value): L-SC = 0 — H-SC = 1000, LLLL — HHHH
Bar graph scale: L-bS = 0 — H-bS = 1000
Transmission output scale: LoUt = 100 — HoUt = 900
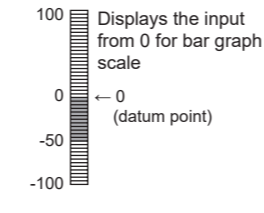4mA transmission — 20mA transmission

■ Bar graph display method [Program mode: bAr]

There are two methods for bar graph display; full bar and center bar.
Full bar [F.bAr] displays input from the bottom, and center bar method [C.bAr] displays input from '0' as below figures.
※E.g.)When L-bS = -100, H-bS = 100, PV = -50,

◎ Full Bar: F.bAr
100 / 0 / -50 / -100 ← Bottom (datum point)
Displays the input from the bottom for bar graph scale

◎ Center Bar: C.bAr
100 / 0 ← 0 (datum point) / -50 / -100
Displays the input from 0 for bar graph scale

■ Input and transmission output extension[Program mode: EↃ o]

This is to extend analog input and 4 to 20mA transmission output to 5% or 10% range.

Mode	Operation
OP	Outputs 4 to 20mA within analog input range.
5P	Outputs 3.2 to 20.8mA for 5% out of the analog input range.
10P	Outputs 2.4 to 21.6mA for 10% out of the analog input range.

※This parameter is displayed only for transmission output (4-20mA) model. But it is not displayed when selecting temperature sensor input.
※The below of 0mA, 0V cannot be extended.
※±1V, 10V inputs are only available for 5% extension.

■ Alarm display in bar graph

When setting or occurring the alarm, it displays the status by the bar graph.
You can check the alarm status. When setting alarm value, the bar LED for this alarm value turns ON. When alarm occurs, the bar LED for this alarm value flashes.
① When setting alarm value,
The bar LED for alarm SV flashes. When alarm set is complete, the bar LED for this alarm value turns ON.
② RUN mode
• All set alarm values are displays in RUN mode.
• When it is alarm value, the bar LED for this alarm value flashes.
If alarm set value is out of bar graph scale when setting the value or in RUN mode, this value does not display in bar graph.

◎ When setting alarm value in monitoring mode,
When all alarms are OFF,
H-bS=1350 / AL4 / AL3 / AL2 / AL1 / PV / L-bS=-200

◎ Alarm display in RUN mode
When AL1 and AL2 are low limit alarm, and AL3 and AL4 are high limit alarm.
H-bS=1350 / AL4 / AL3 / PV / AL2 / AL1 / L-bS=-200
H-bS=1350 PV / AL4 / AL3 / AL2 / AL1 / L-bS=-200
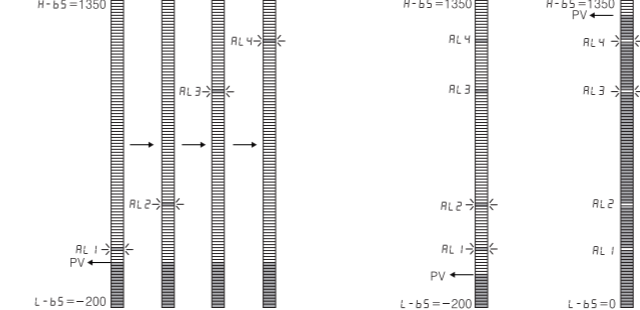
※The bar LED for the alarm value flashes.

■ Input special function [Program mode: I nSF]

When selecting analog input, this function is to display the calculated actual value by square, root (√), or two unit function (TUF) as display value.

Parameter	Functions	Graph	Applications
LIn	Outputs as input value	Y = AX + B	Standard characteristics. Input for linearity.
root	Outputs the rooted (√) input value	Y = A(√X) + B (X ≥ 0), Y=0(X < 0)	Used for measuring flows by pressure signal.
SЧAr	Outputs the squared input value	Y = A(X)² + B (X > 0), Y = -A(X)² + B (X < 0)	Used for outputting differential pressure by flow signal.
tUF	Refer to '■ Two unit function'		

※Display value and mA output value for SЧAr:
Display value (output value) = {((Input value - L-rG) / (H-rG - L-rG))²×(H-SC - L-SC)}+L-SC

※Display value and mA output value for root:
Display value = {(√((Input value - L-rG)/(H-rG - L-rG)))×(H-SC-L-SC)}+L-SC

■ Two unit function [Program mode: tUF]

When connecting a pressure sensor, compound pressure which is below atmospheric pressure (0) is for vacuum as mmHg and which is atmospheric pressure or over it is for positive pressure as kg/cm².
Atmospheric pressure is 0 kg/cm². When this unit does not display 0 kg/cm², you can correct zero-point adjustment function.
When using two unit function, L-SC is fixed as -760.
L-SC is displayed but you cannot set this. You can set H-SC within 0 to 9999 range.

3.000kg/cm² / 2.000kg/cm² / 1.000kg/cm² — kg/cm² UNIT
4mA / 12mA 16mA 20mA — Input
mmHg UNIT / -760mmHg

E.g.) When pressure range is -760.0 mmHg to 3.000 kg/cm², and pressure transmitter outputs 4-20mA, set the scale as H-SC: 3000, dP: 0.000. This unit displays for 4mA input as -760.0, and for 20mA input as 3.000.
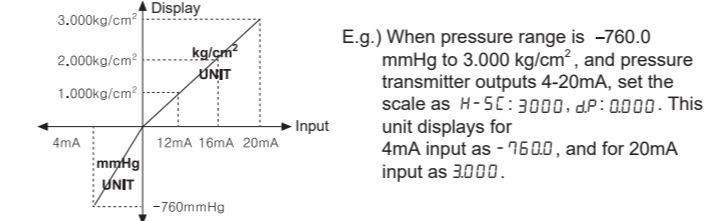
■ Digital filter [Program mode: ▔AuF]

Moving average digital filter is able to stably display and output the noise from input line and irregular signals as software.
• Filter setting range: 01 to 16
(When setting as 01, digital filter function does not run.)
※ Display cycle is same when executing moving average digital filter.

■ Burn out [Program mode: bUrn]

When disconnecting input sensor, you can set the status of transmission output.
• When setting bUrn as on, 4-20mA transmission output is fixed as 20mA.
• When setting bUrn as oFF, 4-20mA transmission output is fixed as 4mA.
※It is available only for temperature sensor input and 4-20mA transmission output.

■ Digital input [Program mode: dI-t, dI-t']

By digital input terminal [dI-t] (no. 12, 13 terminals) or digital input key [dI-t'] (D.IN3: ☑+� for 3 sec), one of three functions executes as the below table.

Function		Operation
AL.rE	Alarm clear	When alarm is ON in RUN mode, it clears alarm forcibly. (It applies only for alarm latch, alarm latch and standby sequence options.) Alarm clear operates only when the value is out of the alarm value range. After clearing alarm, alarm operates its option normally. ※ For the model without alarm output (KN-10□□B), this parameter is not displayed.
HoLd	Display HOLD	Temporarily indicated value is stopped in order to check indicated value in unstable input.
EEro	Zero-point adjustment	Set preset display value as 0. This function is related with input correction [I n-b]. When executing zero adjustment function in display value as 4, input correction value [I n-b] is set as -4 automatically.

■ Lock [Program mode: LoCt]

It limits to check parameter set value and to change it.

	oFF	LoC1	LoC2
Program mode	●	◐	○
Monitoring mode	●	●	◐

●: Enable to check/set, ◐: Enable to check, disable to set, ○: Disable to check
※ In LoC2, only LoCt parameter displays in program mode.

■ Communications

■ Communication manual
Refer to communication manual for RS485 communication.

■ Communication specifications

Item	Specifications
Com. method	RS485 2-wire half duplex
Com. speed (BPS)	9600, 4800, 2400, 1200
Converter	Converter built in RS232
Max. connections	32 units
Com. distance	Max. 1200m (within 700m recommended)
Protocol	Modbus 1.1 RTU
Parity	None
Stop Bit	1-bit
Data length	8-bit
—	

■ Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
2. For connecting the power, use the crimp terminal (M3.5, max. 7.2 mm)
3. 24 VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
4. Keep away from high voltage lines or power lines to prevent inductive noise. Do not use near the equipment which generates strong magnetic force or high frequency noise.
5. Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
6. This unit may be used in the following environments.
   ① Indoors (in the environment condition rated in 'Specifications')
   ② Altitude max. 2,000 m
   ③ Pollution degree 2
   ④ Installation category II

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