

Up/Down Counting Meter

K3NC

An Ideal Interface for High-speed Up/Down Counting and Serial Communications

- 50-kHz input range for high-speed signal processing.
- A wide selection of outputs: relay, transistor, BCD, linear, or communications.
- Prescale function available, which displays in units of actual physical parameters (length, volume, etc.).
- Built-in sensor power supply (12 VDC, 80 mA).
- Banks with four set values and four prescale values.
- Five-stage comparative outputs available.
- Compact 1/8 DIN size.
- Conforms to EMC standards, EN61010-1 (IEC1010-1).
- UL/CSA approved.



Ordering Information

■ Base Unit

Input type		NPN/Voltage pulse		PNP	
Supply voltage		100 to 240 VAC	12 to 24 VDC	100 to 240 VAC	12 to 24 VDC
Basic Models These models provide a present value LED and front-panel control keys. Can be connected to any Output Board, or can be used for display only without an Output Board. 		K3NC-NB1A	K3NC-NB2A	K3NC-PB1A	K3NC-PB2A
Set Value LED Models These models provide a present value LED, set value LED, and front-panel control keys. Can be connected to Relay, Transistor, or Combination Output Boards. 		K3NC-NB1C	K3NC-NB2C	K3NC-PB1C	K3NC-PB2C

■ Available Output Board Combinations

Output type	Output configuration	Output boards	Base units	
			Basic	Set Value LED Display
Transistor	5 outputs: OUT1, 2, 4, 5 (SPST-NO), and OUT3 (SPDT)	K31-C2	Yes	Yes
	5 outputs: OUT1, 2, 4, 5 (SPST-NC), and OUT3 (SPDT)	K31-C5	Yes	Yes
	5 outputs (NPN open collector)	K31-T1	Yes	Yes
	5 outputs (PNP open collector)	K31-T2	Yes	Yes
BCD (see note)	5-digit output (NPN open collector)	K31-B2	Yes	---
Linear	4 to 20 mA DC	K31-L1	Yes	---
	1 to 5 VDC	K31-L2	Yes	---
	1 mV/10 digits	K31-L3	Yes	---
	0 to 5 VDC	K31-L7	Yes	---
	0 to 10 VDC	K31-L8	Yes	---
Communication boards (see note)	RS-232C	K31-FLK1	Yes	---
	RS-485	K31-FLK2	Yes	---
	RS-422	K31-FLK3	Yes	---
Combination output and communication boards	BCD output + 5 transistor outputs (NPN open collector)	K31-B4	Yes	Yes
	4 to 20 mA + 5 transistor outputs (NPN open collector)	K31-L4	Yes	Yes
	1 to 5 V + 5 transistor outputs (NPN open collector)	K31-L5	Yes	Yes
	1 mV/10 digits + 5 transistor outputs (NPN open collector)	K31-L6	Yes	Yes
	0 to 5 VDC + 5 transistor outputs (NPN open collector)	K31-L9	Yes	Yes
	0 to 10 VDC + 5 transistor outputs (NPN open collector)	K31-L10	Yes	Yes
	RS-232C + 5 transistor outputs (NPN open collector)	K31-FLK4	Yes	Yes
	RS-485 + 5 transistor outputs (NPN open collector)	K31-FLK5	Yes	Yes
	RS-422 + 5 transistor outputs (NPN open collector)	K31-FLK6	Yes	Yes

Note: For details, refer to the *Communication Operation Manual*.

Model Number Legend:

Base Units and Output Boards can be ordered individually or as sets. Refer to the *Output Board Combinations* table on page 2.

Base Units

K3NC -
 1 2 3 4

Output Boards

K31 -
 5 6 7 8

Base Units with Output Boards

K3NC - -
 1 2 3 4 5 6 7 8

1, 2. Input Sensors Codes

NB: NPN inputs

PB: PNP inputs

3. Supply Voltage

1: 100 to 240 VAC

2: 12 to 24 VDC

4. Display

A: Basic

C: Set Value LED Display

5, 6, 7, 8. Output Type Codes

C2: 5 comparative relay contact outputs (OUT1, 2, 4, 5: SPST-NO; OUT3: SPDT)

C5: 5 comparative relay contact outputs (OUT1, 2, 4, 5: SPST-NC; OUT3: SPDT)

T1: 5 comparative transistor outputs (NPN open collector)

T2: 5 comparative transistor outputs (PNP open collector)

B2: BCD output (NPN open collector) (see note)

B4: BCD output + 5 transistor outputs (NPN open collector)

L1: Linear output (4 to 20 mA) (see note)

L2: Linear output (1 to 5 VDC) (see note)

L3: Linear output (1 mV/10 digits) (see note)

L4: Linear output, 4 to 20 mA + 5 transistor outputs (NPN open collector)

L5: Linear output, 1 to 5 V + 5 transistor outputs (NPN open collector)

L6: Linear output, 1 mV/10 digits + 5 transistor outputs (NPN open collector)

L7: Linear output, 0 to 5 VDC (see note)

L8: Linear output, 0 to 10 VDC (see note)

L9: Linear output, 0 to 5 VDC + 5 transistor outputs (NPN open collector)

L10: Linear output, 0 to 10 VDC + 5 transistor outputs (NPN open collector)

FLK1: Communication RS-232C (see note)

FLK2: Communication RS-485 (see note)

FLK3: Communication RS-422 (see note)

FLK4: RS-232C + 5 transistor outputs (NPN open collector)

FLK5: RS-485 + 5 transistor outputs (NPN open collector)

FLK6: RS-422 + 5 transistor outputs (NPN open collector)

Note: These output types are available on Basic Models only.

Specifications

■ Ratings

Supply voltage	100 to 240 VAC (50/60 Hz); 12 to 24 VDC
Operating voltage range	85% to 110% of supply voltage
Power consumption (see note)	15 VA max. (max. AC load with all indicators lit) 10 W max. (max. DC load with all indicators lit)
Sensor power supply	80 mA at 12 VDC $\pm$ 10%
Insulation resistance	20 M Ω min. (at 500 VDC) between external terminal and case. Insulation provided between inputs, outputs, and power supply.
Dielectric withstand voltage	2,000 VAC for 1 min between external terminal and case. Insulation provided between inputs, outputs, and power supply.
Noise immunity	$\pm$ 1,500 V on power supply terminals in normal or common mode $\pm$ 1 μ s, 100 ns for square-wave noise with 1 ns
Vibration resistance	Malfunction: 10 to 55 Hz, 0.5-mm for 10 min each in X, Y, and Z directions Destruction: 10 to 55 Hz, 0.75-mm for 2 hrs each in X, Y, and Z directions
Shock resistance	Malfunction: 98 m/s ² (10G) for 3 times each in X, Y, and Z directions Destruction: 294 m/s ² (30G) for 3 times each in X, Y, and Z directions
Ambient temperature	Operating: -10°C to 55°C (with no icing) Storage: -20°C to 65°C (with no icing)
Ambient humidity	Operating: 25% to 85% (with no condensation)
Ambient atmosphere	Must be free of corrosive gas
EMC	Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A Immunity ESD: EN61000-4-2: 4-kV contact discharge (level 2) 8-kV air discharge (level 3) Immunity-RF-interference: ENV50140: 10 V/m (amplitude modulated, 80 MHz to 1 GHz) (level 3) 10 V/m (pulse modulated, 900 MHz) Immunity Conducted Disturbance: ENV50141: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: EN61000-4-4: 2-kV power-line (level 3) 2-kV I/O signal-line (level 4)
Approved standards	UL508, CSA22.2; conforms to EN50081-2, EN50082-2, EN61010-1 (IEC1010-1); conforms to VDE106/part 100 (Finger Protection) when the terminal cover is mounted.
Weight	Approx. 400 g

Note: An Intelligent Signal Processor with DC supply voltage requires approximately 1 A DC as control power supply current the moment the Intelligent Signal Processor is turned on. Do not forget to take this into consideration when using several Intelligent Signal Processors. When the Intelligent Signal Processor is not in measuring operation (e.g., the Intelligent Signal Processor has been just turned on or is operating for startup compensation time), the display will read "00000" and all outputs will be OFF.

Input/Output Ratings

Relay Contact Output

(Incorporating a G6B Relay)

Item	Resistive load ($\cos\phi = 1$)	Inductive load ($\cos\phi = 0.4$, L/R = 7 ms)
Rated load	5 A at 250 VAC; 5 A at 30 VDC	1.5 A at 250 VAC, 1.5 A at 30 VDC
Rated carry current	5 A max. (at COM terminal)	
Max. contact voltage	380 VAC, 125 VDC	
Max. contact current	5 A max. (at COM terminal)	
Max. switching capacity	1,250 VA, 150 W	375 VA, 80 W
Min. permissible load (P level, reference value)	10 mA at 5 VDC	
Mechanical life	50,000,000 times min. (at a switching frequency of 18,000 times/hr)	
Electrical life (at an ambient temperature of 23°C)	100,000 times min. (at a rated load switching frequency of 1,800 times/hr)	

Transistor Output

Rated load voltage	12 to 24 VDC $+10\%$ / -15%
Max. load current	50 mA
Leakage current	100 μ A max.

BCD Output

I/O signal name		Item	Rating
Inputs	REQUEST, COMPENSATION, RESET	Input signal	No-voltage contact input
		Input current with no-voltage input	10 mA
		Signal level	ON voltage: 1.5 V max. OFF voltage: 3 V min.
Outputs	DATA, POLARITY, OVERFLOW, DATA VALID, RUN	Rated load voltage	12 to 24 VDC $+10\%/-15\%$
		Max. load current	10 mA
		Leakage current	100 μ A max.

Note: Logic method: negative logic

Linear Output

Item	4 to 20 mA	1 to 5 V	1 mV/10 digits (see note)
Resolution	4,096		
Output error	$\pm 0.5\%$ FS		$\pm 1.5\%$ FS
Permissible load resistance	600 Ω max.	500 Ω min.	1 K Ω min.

Note: For the 1 mV/10-digit output, the output voltage changes for every 40 to 50 increment in the display value.

■ Communications

Item		RS-232C, RS-422	RS-485
Transmission method		4-wire, half-duplex	2-wire, half-duplex
Synchronization method		Start-stop synchronization	
Baud rate		1,200/2,400/4,800/9,600/19,200/38,400 bps	
Transmission code		ASCII (7-bit)	
Communications	Write to K3NC	Comparative set value, prescaling value, remote/local programming, reset control, and other setting mode items excluding communications conditions.	
	Read from K3NC	Process value, comparative set value, model data, error code, and others	

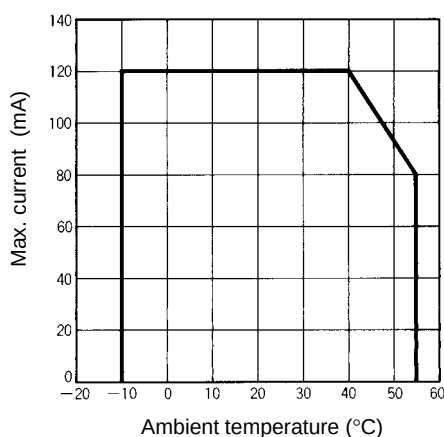
For details, refer to *Communication Operation Manual*.

■ Characteristics

Input signal	No-voltage contact (30 Hz max., ON/OFF pulse width: 15 ms min.) Voltage pulse (50 kHz max., ON/OFF pulse width: 9 μ s min., ON voltage: 4.5 to 30 V/OFF voltage: –30 to 2 V) Open collector (50 kHz max., ON/OFF pulse width: 9 μ s min.) Connectable Sensors ON residual voltage: 3 V max. OFF leakage current: 1.5 mA max. Load current: Must have switching capacity of 20 mA min. Must be able to dependably switch a load current of 5 mA max.
Input mode	Up/Down B (individual inputs), Up/Down C (phase difference inputs)
Output mode	ALL-H/ALL-L
Max. displayed digits	5 digits (–19999 to 99999)
Display	7-segment LED
Polarity display	“–” is displayed automatically with a negative input signal.
Zero display	Leading zeros are not displayed.
Prescale function	Programming via front-panel key inputs. (0.0001×10^{-9} to 9.9999×10^9 , decimal point can be set freely) Can be set using prescale value teaching.
External control	RESET: 16 ms max. (external reset signal) COMPENSATION: 16 ms max. (external compensation signal) BANK 1, 2: 100 ms max. (bank switching time) Up to 4 set value or prescale value banks available
Other functions	Variable linear output range (for models with linear outputs only) Remote/Local processing (available for communications output models only) Counting value reset with front panel keys Security Memory power failure
Output configuration	Relay contact output (5 outputs) Transistor output (NPN and PNP open collector), BCD (NPN open collector) Parallel BCD (NPN open collector) + transistor output (NPN open collector) Linear output (4 to 20 mA, 1 to 5 V) + transistor output (NPN open collector) Communication functions (RS-232C, RS-485, RS-422) Communication functions (RS-232C, RS-485, RS-422) + transistor output (NPN open collector)
Delay in comparative outputs	1 ms max. (at transistor output), 10 ms max. (at relay output)
Enclosure rating	Front panel: NEMA4 for indoor use (equivalent to IP66) Rear case: IEC standard IP20 Terminals: IEC standard IP00
Memory protection	Non-volatile memory (EEPROM) (possible to rewrite 100,000 times)

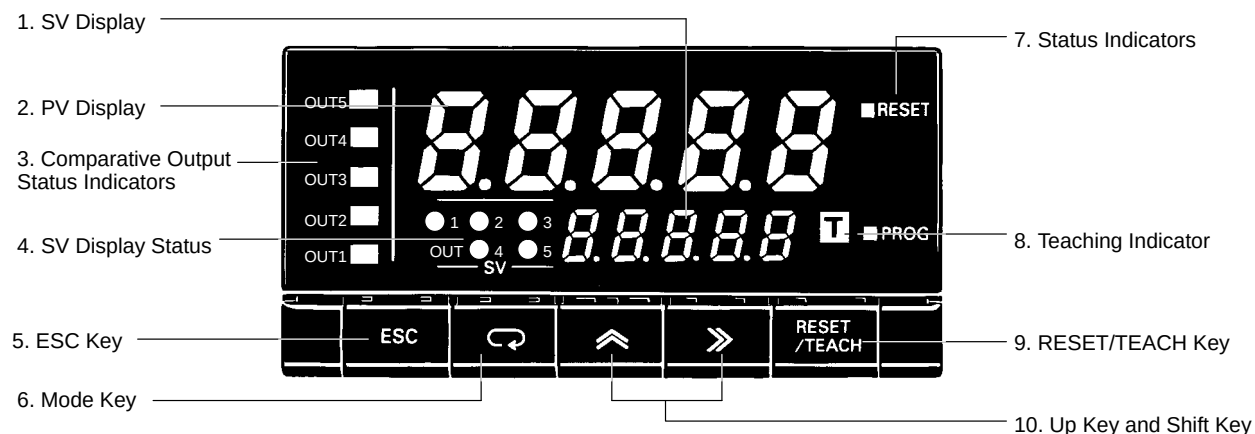
Engineering Data

Derating Curve for Sensor Power Supply



Note: The derating curve shown is for standard installation.
The derating curve depends on the mounting direction.

Nomenclature



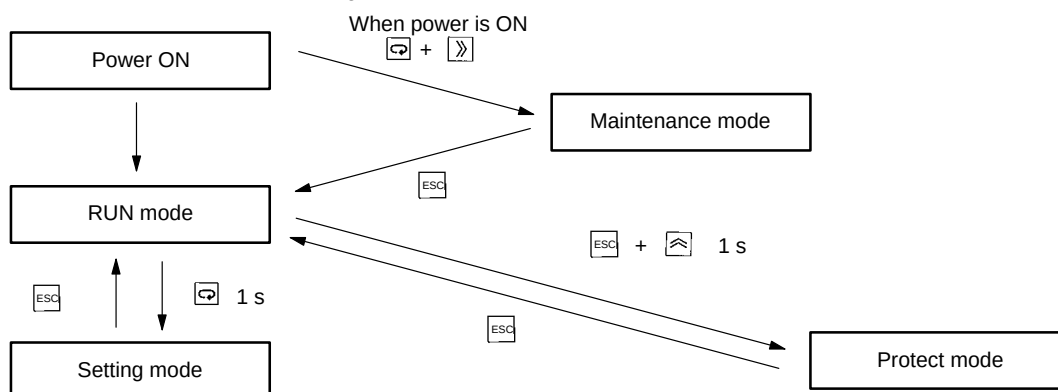
Name	Functions
1. SV display	Displays the set value or parameter. Available for Set Value LED Models only.
2. PV display	Displays the process value or parameter.
3. Comparative output status indicators	Displays the status of comparative output.
4. SV display status	Indicates which comparative set value is currently on the SV display.
5. ESC Key	Used to return to the RUN mode from the Setting, Protect or Maintenance mode.
6. Mode Key	Used to enter the Setting mode. Used to allow the PV display to indicate set values sequentially. Available for Basic Models only. Used to indicate set values sequentially on the SV display. Available for Set Value LED Models only.
7. Status indicator	RESET: Lit when the RESET input is ON. PROG: Lit or flashes while parameters are being set.
8. Teaching indicator	Lit when the teaching function is enabled and flashes when the Intelligent Signal Processor is in teaching operation.
9. RESET/TEACH Key	The counting value is reset by pressing this key. Teaching is available when the teaching function is enabled.
10. Up Key and Shift Key	The digit being set is scrolled by pressing the Shift Key. The set value increases by one whenever the Up Key is pressed.

Operation

■ Setting Procedures

The K3NC has four modes: RUN mode for normal operations, Setting mode for initial parameter input, Protect mode for lock-out configuration, and Maintenance mode for initializing set values. The parameters that are accessible on any individual K3NC will vary depending on the Output Board installed. Refer to the *K3NC Operation Manual* for details.

RUN Mode:	Remains in this mode under normal operation. The process value can be monitored. Using the front panel keys, the comparative set value can be changed and counting value reset can be performed.
Setting Mode:	Used for making initial settings. Includes settings for four menus (Set value (<i>Set</i>), prescaling (<i>PSEL</i>), setup (<i>SETUP</i>), option (<i>OPT</i>)) and the output test.
Protect Mode:	Used for locking the front key operation or parameter changes.
Maintenance Mode:	Used for initializing set values.



Set - Program set values

- bank* Select bank no. of set values
- IO1* Enter set value OUT1 of bank 1
- IO2* Enter set value OUT2 of bank 1
- IO3* Enter set value OUT3 of bank 1
- IO4* Enter set value OUT4 of bank 1
- IO5* Enter set value OUT5 of bank 1

Note: The above is an example when the bank number is set to 1.

PSEL - Display prescaling

- bank* Select bank no. of prescale values
- MA* Set the mantissa (X) of the prescale value
- EX* Set the exponent (Y) of the prescale value
- DECP* Select decimal point

Note: The above is an example when the bank number is set to 1.

SETUP - Program input mode/input sensor/serial communications

- Unit* Specify input mode
- Sn* Select a sensor type
- UnitNo* Enter the unit no. for the host
- bPS* Select the baud rate
- LEN* Select the word bit length
- StBt* Select the stop bits
- Prty* Select the parity bits

OPT - Supplementary settings related to display or control

- MEMO* Select power failure memory function
- COMP* Set compensation value
- COND* Select conditions that allow compensation input
- OUT* Select output mode
- LSLH* Enter the upper limit (H) of linear output range
- LSLL* Enter the lower limit (L) of linear output range
- RL* Select the remote/local programming

TEST - Generating simulated input for testing the output function

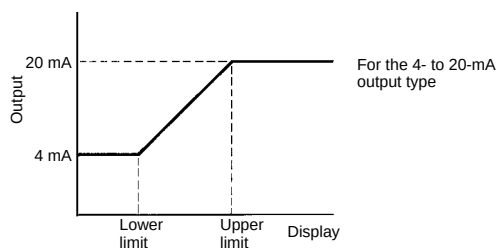
Prct - Program lock-out configuration

- ALL* Enable all key protection
- Set* Enable set value change prohibition
- rESEt* Enable prohibition of counting value reset using the front panel keys
- SECr* Specify the menus to be protected against setting in the setting mode

■ Parameters

Linear Output Range *LSEL*

A linear output range can be set as required. A value corresponding to the maximum output value and that corresponding to the minimum output value can be set.



Remote/Local Selection *rL*

Select remote programming when performing all settings through the host devices and select local programming when performing settings through key operation.

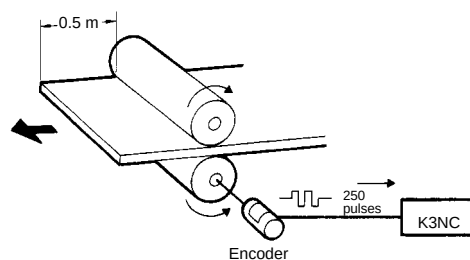
Prescaling

The prescale function makes it possible to convert the counting value of the K3NC into an appropriate value.

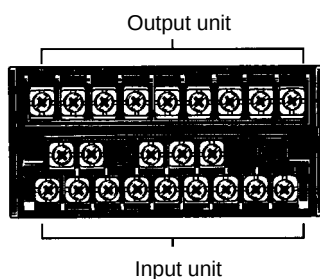
For example, the system shown in the illustration outputs 250 pulses when the object is advanced 0.5 m. To enable the K3NC to display $\square\square\square\square.\square$ (mm), obtain the advanced length of the object per pulse from the following formula.

$$500 \text{ mm (0.5 m)} / 250 = 2$$

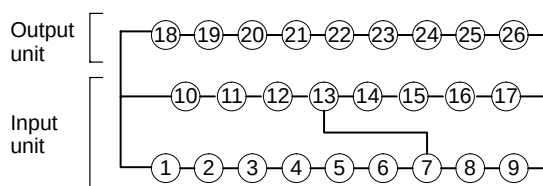
1. The prescale value is set by the mantissa X multiplied by the exponent Y as follows:
Prescale value = 2.0000×10^0
 $X = 2.0000$, $Y = 00$
2. Set the decimal point to the left of the rightmost digit.



■ Terminal Arrangement

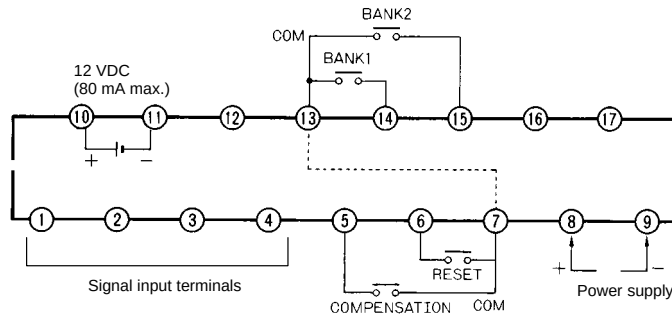


Terminal Numbers



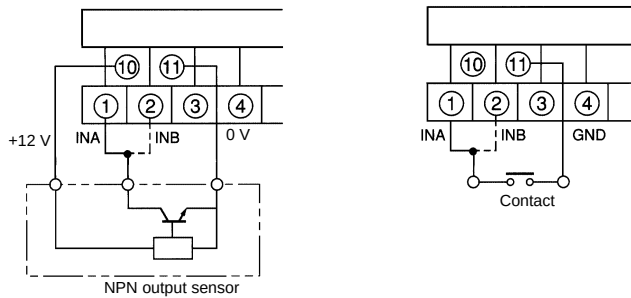
Note: Terminals 7 to 13 are connected internally.

■ Input Board

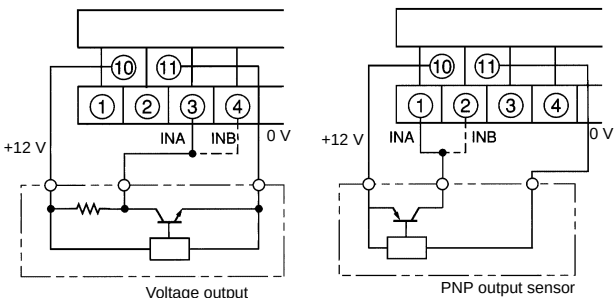


Note: Terminals 7 and 13 are insulated from each other.

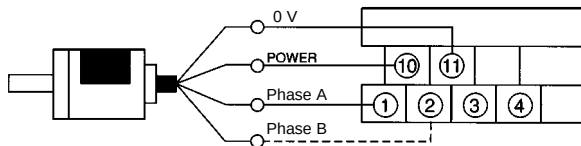
K3NC-NB (NPN input/voltage pulse input)



K3NC-PB (PNP input)



■ Rotary Encoder Connection Example

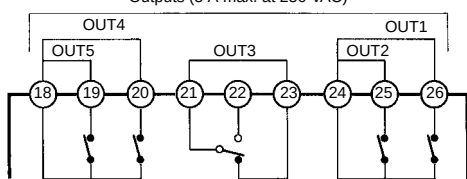


INA/INB	Counts input signals. Accepts Up/Down (individual or phase difference) inputs.																	
RESET	Resets the present value to zero. No counting inputs are accepted when a RESET input is ON. RESET is lit when a RESET input is ON. Note: External reset minimum signal width: 16 ms																	
COMPENSATION	Resets the present counting value to the compensation value at the rising edge of a compensation input. In the compensation value setting parameter, it is possible to set to “Effective during incrementing and decrementing a count” or to “Effective only during incrementing a count.” Note: External compensation input minimum signal width: 16 ms																	
BANK 1, 2	Selects one of the four banks. <table><tr><th rowspan="2">Bank no.</th><th colspan="2">Control input</th></tr><tr><th>Bank 1</th><th>Bank 2</th></tr><tr><td>1</td><td>OFF</td><td>OFF</td></tr><tr><td>2</td><td>ON</td><td>OFF</td></tr><tr><td>3</td><td>OFF</td><td>ON</td></tr><tr><td>4</td><td>ON</td><td>ON</td></tr></table> Note: Bank switching minimum signal width: 100 ms max.	Bank no.	Control input		Bank 1	Bank 2	1	OFF	OFF	2	ON	OFF	3	OFF	ON	4	ON	ON
Bank no.	Control input																	
	Bank 1	Bank 2																
1	OFF	OFF																
2	ON	OFF																
3	OFF	ON																
4	ON	ON																

■ Output Board

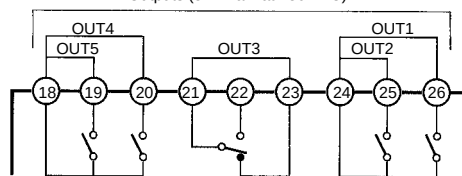
K31-C5: Relay (5 Outputs)

Outputs (5 A max. at 250 VAC)



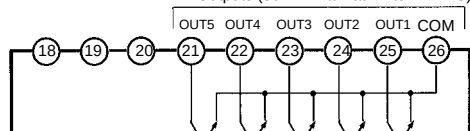
K31-C2: Relay (5 Outputs)

Outputs (5 A max. at 250 VAC)



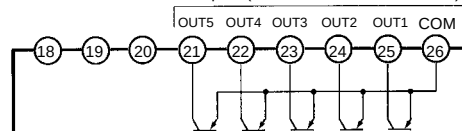
K31-T1: Transistor (NPN Open Collector)

Outputs (50 mA max. at 12 to 24 VDC)



K31-T2: Transistor (PNP Open Collector)

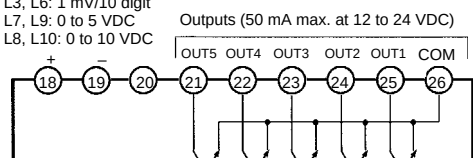
Outputs (50 mA max. at 12 to 24 VDC)



K31-L1, L2, L3, -L4, -L5, -L6, -L7, -L8, -L9, -L10: Linear

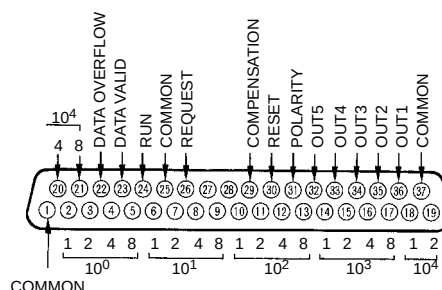
(Terminals 21 to 26 are provided only on K31-L4, -L5, -L6, -L9, -L10.)

L1, L4: 4 to 20 mA
L2, L5: 1 to 5 V
L3, L6: 1 mV/10 digit
L7, L9: 0 to 5 VDC
L8, L10: 0 to 10 VDC

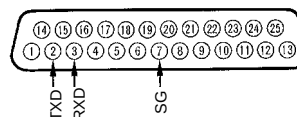


K31-B2, -B4: BCD (NPN Open Collector)

(Terminals 32 to 36 are provided only on K31-B4.)

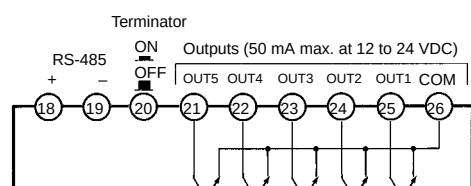


K31-FLK1: RS-232C



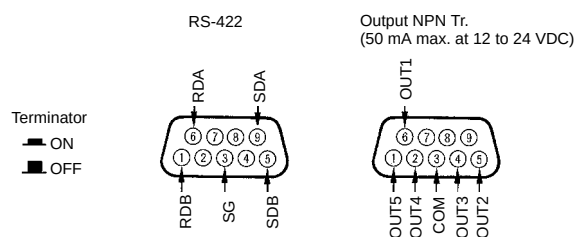
K31-FLK2, -FLK5: RS-485

(Terminals 21 to 26 are provided only on K31-FLK5.)



K31-FLK3, -FLK6: RS-422

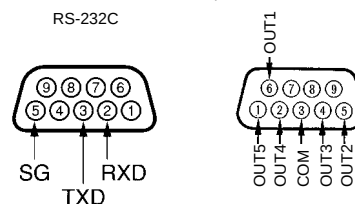
(The right connector is provided only on K31-FLK6)



- D-sub 37P Connectors for BCD output (attachment)
Plug: XM2A-3701
Hood: XM2S-3711
- D-sub 25P connectors for RS-232C output (K31-FLK1) (order separately)
Plug: XM2A-2501
Hood: XM2S-2511
- D-sub 9P connectors for RS-422 output (K31-FLK3 and K31-FLK6) (order separately)
Plug: XM2A-0901
Hood: XM2S-0911
- D-sub 9P connectors for RS-232C output (K31-FLK4) (order separately)
Plug: XM2D-0901
Hood: XM2D-0911

K31-FLK4: RS-232C + Transistor (NPN Open Collector)

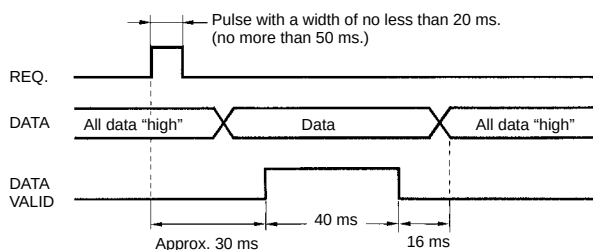
Output NPN Tr.
(50 mA max. at 12 to 24 VDC)



■ BCD Output Timing Chart

A request signal from an external device (such as a Programmable Controller) is required to read BCD data.

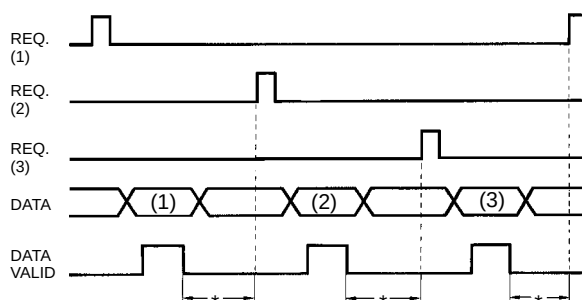
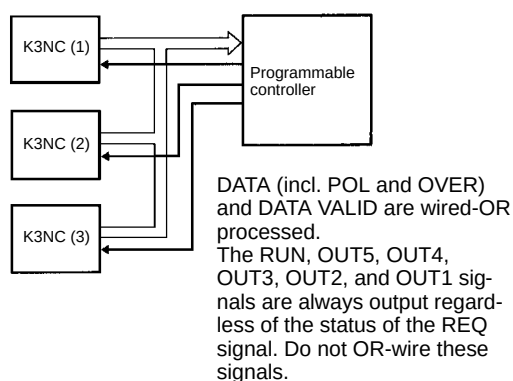
Single Sampling Data Output



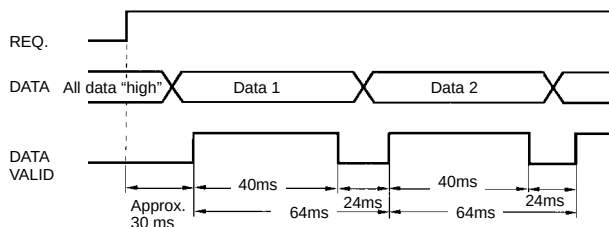
Approximately 30 ms after the REQ signal rises, a sample is taken and the DATA VALID signal is output. Read the data when the DATA VALID signal is ON.

The DATA VALID signal will turn OFF in 40 ms, and then in 16 ms, the data will go OFF.

Models with a BCD output have an open collector output configuration so that wired-OR connection is possible.



Continuous Data Output



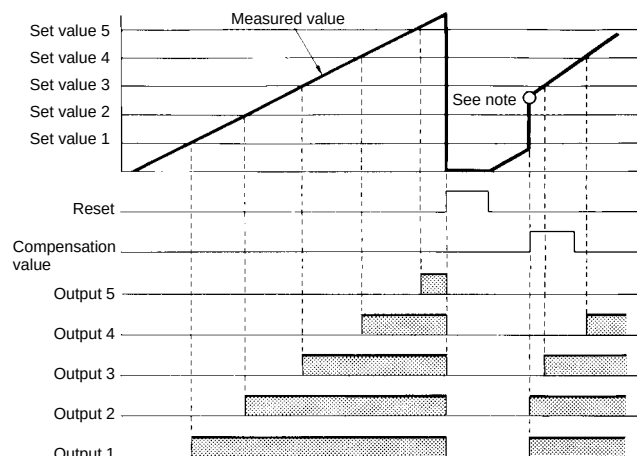
The K3NC outputs each measurement at an interval of 64 ms when a REQ signal is ON continuously.

■ Output Operation Timing in RUN Mode (Relay and Transistor Outputs)

The K3NC can output the results of Up/Down counting as comparative outputs.
The output mode can be set to the ALL-H mode or the ALL-L mode.

ALL-H

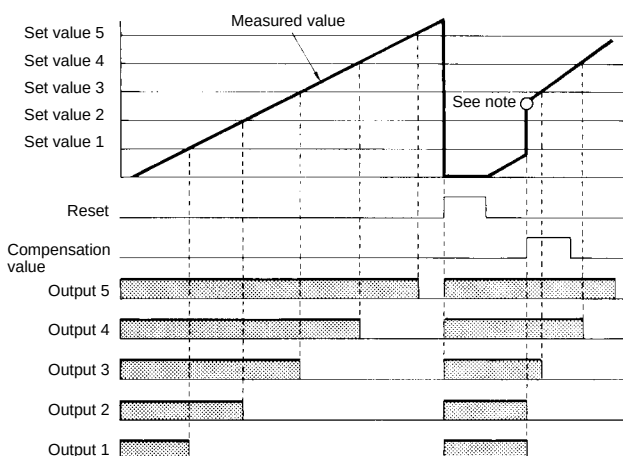
If the ALL-H output mode is selected, outputs 1 to 5 will be ON when the measured value exceeds set values 1 to 5.



Note: Set value 2 < compensation value < set value 3

ALL-L

If the ALL-L output mode is selected, outputs 1 to 5 will be ON when the measured value is less than set values 1 to 5.



Note: Set value 2 < compensation value < set value 3

While the reset signal is ON, the counting value will return to zero.

When the compensation signal is ON, the K3NC will be in counting operation starting with the preset compensation value. Depending on the setting conditions, the compensation value will be effective only for the incrementing operation.

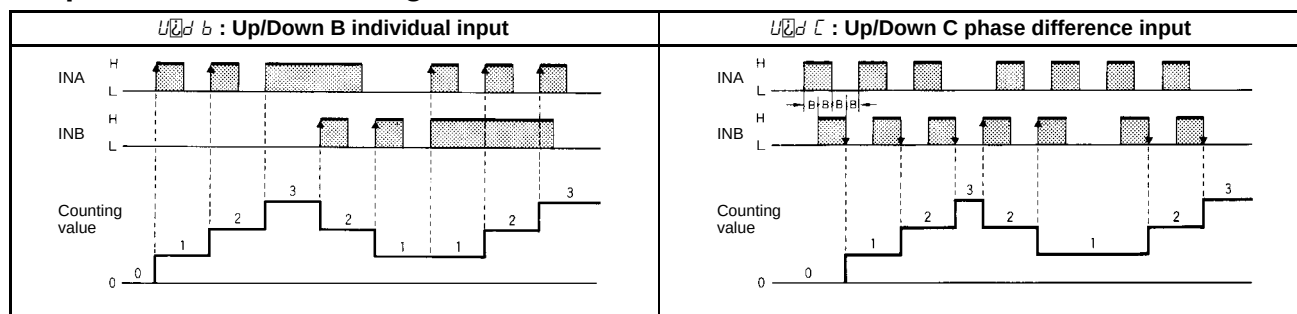
■ Output Delay (Reference Value)

The following table shows the time required for a K3NC in a system to go into reverse output operation after the counting value reaches the value preset with the K3NC, and is due to the output processing time of the K3NC, signal transmission time of the system, and the relay connected to the K3NC.

Control I/O	Output or response delay time
Relay contact output	3.0 to 10.0 ms
NPN/PNP transistor output	0.1 to 0.6 ms
Reset input	12.0 to 16.0 ms
Compensation input	12.0 to 16.0 ms
Bank switch	60.0 to 100.0 ms

Note: Output delay time varies with the operating environment. If the output delay time will possibly have a serious influence on your system, check the actual output delay time before applying the K3NC to the system.

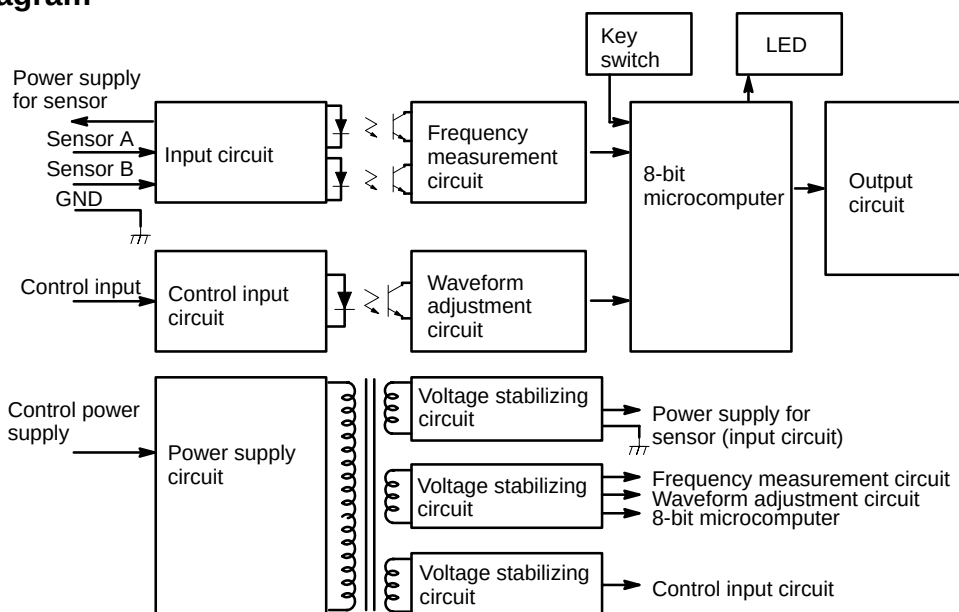
■ Input Mode and Counting Values



Note: 1. "B" must be larger than half the minimum signal width. If it is smaller, an error of ± 1 count may occur.
2. Refer to the following for the meanings of the H and L characters in the above timing charts.

Signal	No-voltage input
H	Short-circuit
L	Open

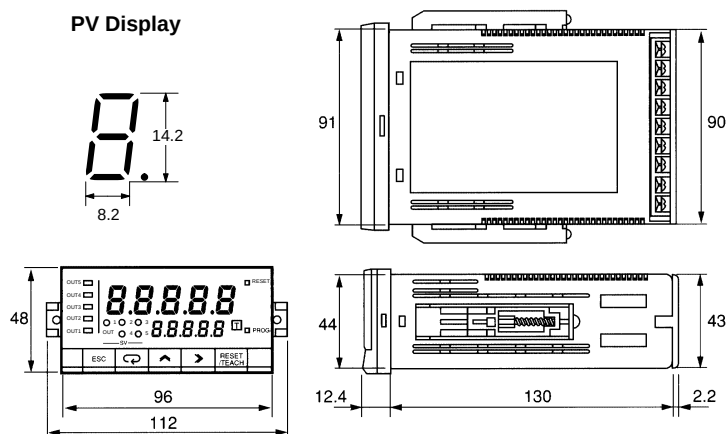
■ Block Diagram



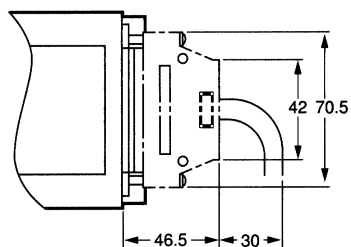
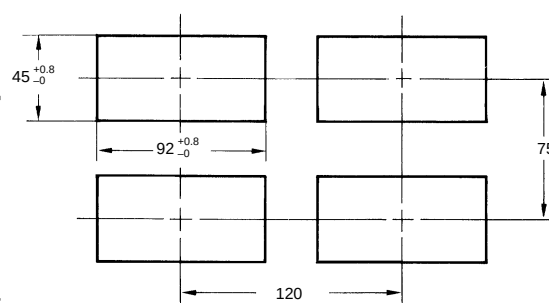
Dimensions

Note: All units are in millimeters unless otherwise indicated.

PV Display

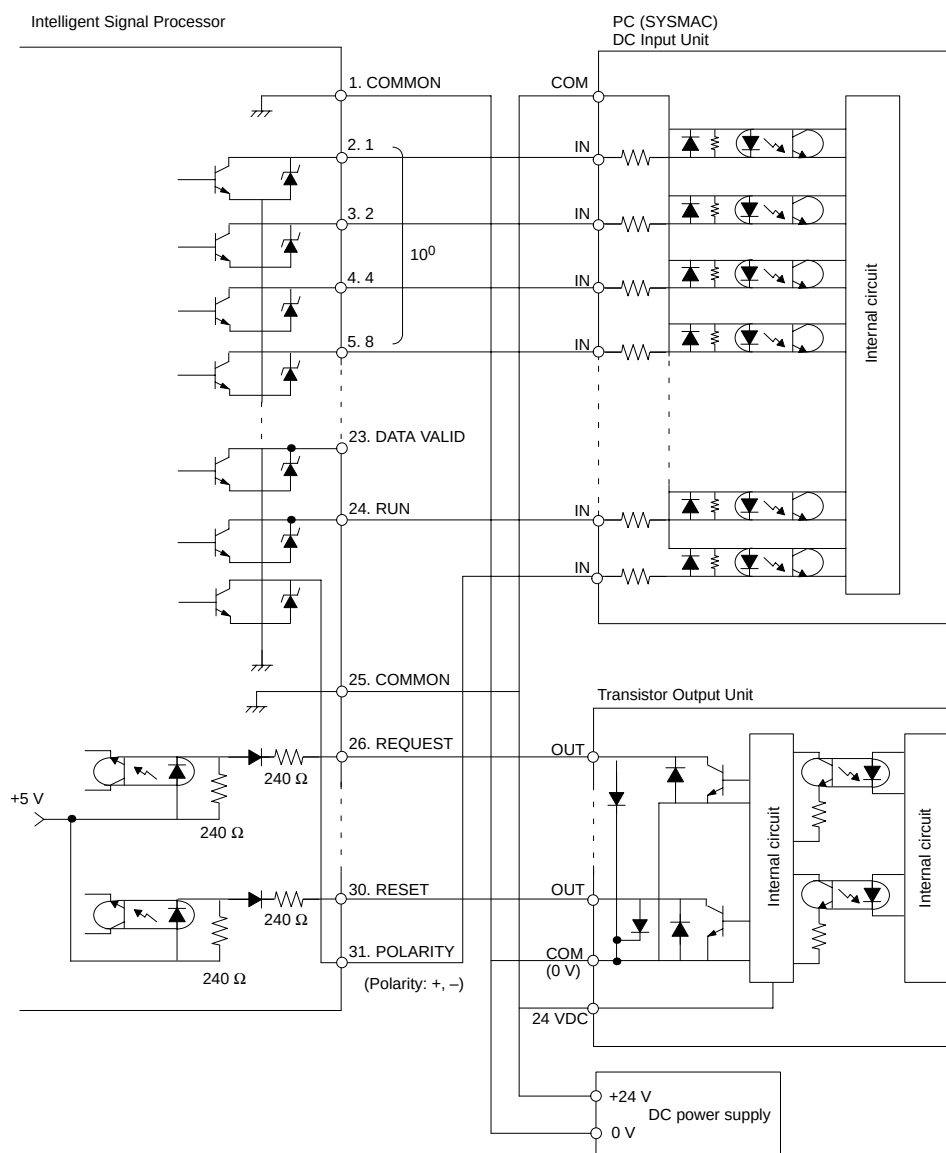


Panel Cutouts



Installation

■ Example of Connection to Programmable Controller

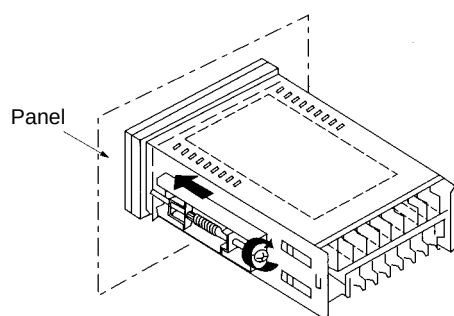


Precautions

- Be careful not to touch any terminals, otherwise you may receive an electric shock.
- Please do not disassemble the product nor touch the internal components of the product, otherwise you may receive an electric shock.
- Be sure that the power supply voltage is within the rated range.
- Do not use the Intelligent Signal Processor in locations with flammable gas or combustible substances.
- Be sure to wire the terminals correctly by checking the terminal names.
- Be sure that the terminal screws are tightened securely when wiring.

Mounting

Recommended panel thickness is 1 to 3.2 mm.



Attach the mounting bracket on the left and right sides of the Intelligent Signal Processor as shown in the illustration above and gradually tighten each screw evenly in turn by considering the balance of the tightening force until the ratchets start slipping without being further tightened.

Mount the Processor as horizontally as possible.

Never use the Processor in locations where corrosive gas (particularly sulfur or ammonia gas) is generated.

As much as possible avoid use of the Processor in a location subject to severe shock or vibration, excessive dust, or excessive moisture. Select an indoor mounting location where the Intelligent Signal Processor is at the rated temperature and humidity and free from direct sunlight.

Separate the Processor from machines generating high-frequency noise, such as high-frequency welding machines and high-frequency sewing machines.

Operation

A Processor model with a Relay Contact or Transistor Output Board may not output any alarm signal normally if the model has an error. It is recommended that an independent alarm device be connected to the model.

The parameters are factory-set so that the Processor will operate normally. The settings of the parameters may be changed according to the application.

Unit Label (Attached)

No product is shipped with the unit label attached. Select a unit label from the sheet provided and attach it to the Processor.

$\bar{A}$	$\bar{A}$	$\bar{mA}$	$\bar{mA}$	$\bar{V}$
$\bar{V}$	$\bar{mV}$	$\bar{mV}$	$\bar{W}$	$\bar{KW}$
$\bar{VA}$	$\bar{KVA}$	$\bar{var}$	$\bar{Kvar}$	$\bar{\Omega}$
$^{\circ}C$	$^{\circ}F$	K	Hz	rpm
m	mm	cm	μm	Km
l	Kl	t	TON	lx
m^3	cm^3	mm^3	Kg	g
mg	Kg/m^3	g/cm^3	m^3/Kg	m/s^2
G	N	$mmHg$	mmH_2O	Kgf/cm^2
Kgf/mm^2	J	KJ	$Kgf\cdot cm$	$gf\cdot cm$
PS	hp	cal	$Kcal$	Kg/h
t/h	Kg/s	m^3/min	m^3/h	m^3/s
l/s	l/min	l/h	m/min	mm/s
m/s	$\%$	dB	$\phi\text{-}mm$	$SCCM$
sec	ms	min	$counts$	$\times 10$
$\times 100$	$\times 1000$	pH	ppm	pcs
deg	cP	cSt	$K\Omega$	$M\Omega$
KHz	rps			
kV	s	m°	cm°	rad
S	S	L	kL	L/s
L/min	L/h	kN	mN	Pa
kPa	mPa	$N\cdot m$	$kN\cdot m$	$mN\cdot m$
$kg\cdot m^{\circ}$	lx	cps	$^{\circ}$	rph
r/s	r/min	r/h	min^{-1}	h^{-1}
				$h\cdot min\cdot s$
$min\cdot s\cdot 10s$			OMRON	

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N089-E1-1A In the interest of product improvement, specifications are subject to change without notice.

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