

Cat. No. N95-E1-1

K3NC

Up/Down Counting Meter

OMRON

K3NC Up/Down Counting Meter

Operation Manual

Produced January 1998

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to the product.

 **DANGER** Indicates information that, if not heeded, is likely to result in loss of life or serious injury.

 **WARNING** Indicates information that, if not heeded, could possibly result in loss of life or serious injury.

 **Caution** Indicates information that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

OMRON Product References

All OMRON products are capitalized in this manual. The word "Unit" is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation "Ch," which appears in some displays and on some OMRON products, often means "word" and is abbreviated "Wd" in documentation in this sense.

The abbreviation "PC" means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

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About this Manual:

This manual describes the installation and operation of the K3NC Up/Down Counting Meter and includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate the K3NC.

Section 1 describes the functions of the K3NC. The main components are also described.

Section 2 provides instructions required for mounting and wiring the K3NC.

Section 3 provides instructions for setting the parameters of the K3NC.

Section 4 provides instructions for operating the K3NC in RUN mode.

Section 5 provides information on the teaching function, output test, and maintenance mode.

Section 6 provides information on the use of the K3NC with the BCD Output Board.

Section 7 provides information for troubleshooting the K3NC

The **Appendices** provide specifications, a list of settings, a list of standard models, and a list of available menu items.

| |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p> WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



PRECAUTIONS

This section provides precautions for using the K3NC Up/Down Counting Meter and related devices.

The information contained in this section is important for the safe and reliable application of the K3NC. You must read this section and understand the information contained before attempting to set up or operate the K3NC.

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1 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Be sure to read this manual before attempting to use the product and keep this manual close at hand for reference during operation.

2 Safety Precautions

 **WARNING** Never attempt to disassemble any Units while power is being supplied. Doing so may result in serious electrical shock or electrocution.

 **WARNING** Never touch any of the terminals while power is being supplied. Doing so may result in serious electrical shock or electrocution.

3 Application Precautions

Observe the following precautions when using the product.

- Always use the power supply voltage specified in the specifications.
- Do not use the product in locations subject to flammable gases or combustible objects.
- Be sure to confirm terminal names when wiring.
- Be sure to tighten the screws on the terminal blocks.

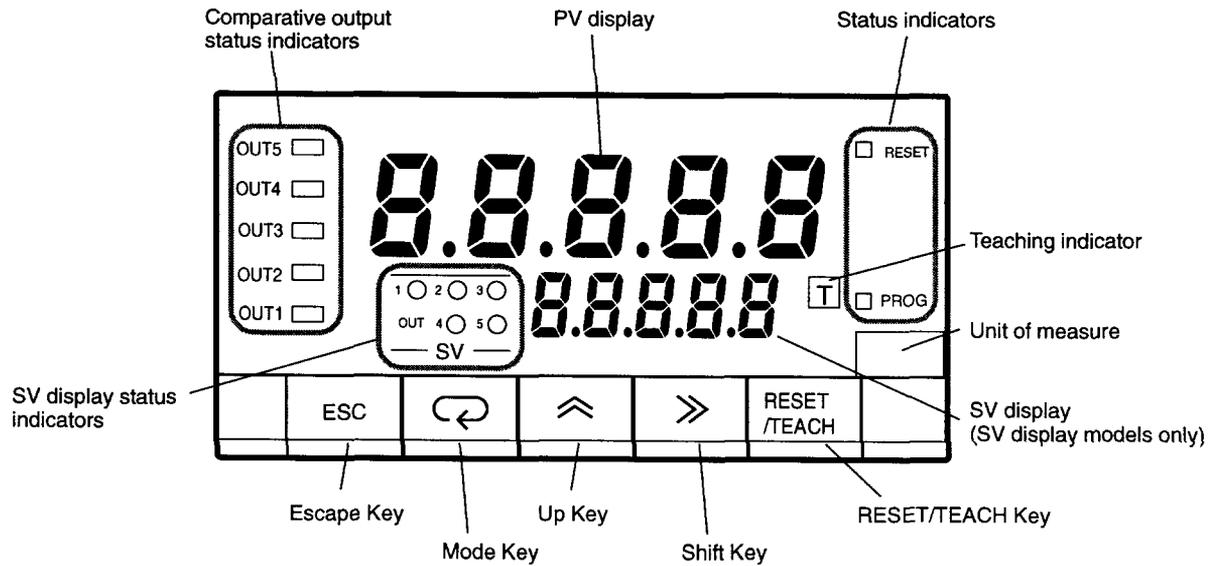
Observe the following precautions when mounting the product.

- Mount the product on level surfaces.
- Mount the product on a panel which has a thickness of 1 to 3.2 mm.

Do not mount the product in the following places.

- Locations subject to strong shock or vibration.
- Locations subject to temperature or humidity exceeding the rated levels or where icing is liable to occur.
- Locations subject to dust.
- Locations subject to corrosive gases (particularly sulfuric gases or ammonium gases).
- Locations subject to direct sunlight or outdoor conditions.
- Locations near devices (high-frequency welders or high-frequency sewing machines) that produce high-frequency noise.

1-2 Front of the Meter



Five-digit (-19999 to 99999), seven-segment, 14.2-mm-high LED display with a programmable decimal point. The displays show the process value, operations/parameters when setting, and error messages.

PV Display

K3NC-□□□A Basic Model

RUN Mode: Displays the process values. Also displays setting values while the SV indicator is lit. When changing a value, all digits other than those that can be set become dimmer.

Setting Mode: Displays the menu, parameter, or setting value. When changing a value, all digits other than those that can be set become dimmer.

K3NC-□□□C Set Value LED Display Model

RUN Mode: Displays the process values.

Setting Mode: Displays the menu and parameters.

SV Display (Setting value LED Display Models Only)

RUN Mode: Displays setting values. When changing a value, all digits other than those that can be set become dimmer.

Setting Mode: Displays setting values. When changing a value, all digits other than those that can be set become dimmer.

Comparative Output Status Indicators

Indicates the status of the output.

Status Indicators

RESET Indicator

Lit when the RESET input signal is ON.

PROG Indicator

Lit when the setting mode menu is displayed. The indicator flashes while parameters are displayed.

Teaching Indicator

Lit when displayed parameters can be set in teaching operation. The indicator flashes when the process value is indicated as a setting value.

SV Display Status Indicators

Indicates which set value is on the PV or SV display.

Unit of Measure

Attach the appropriate label showing the unit of measure (enclosed).

Escape Key

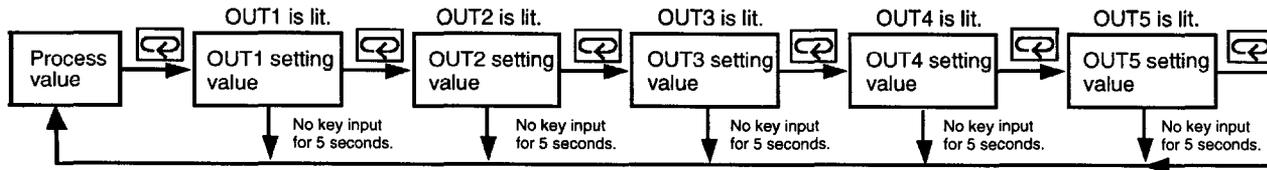


Used to return from the setting, protect, or maintenance mode to the RUN mode. This key is also used to return to the previous operation during the setting, protect, or maintenance mode.

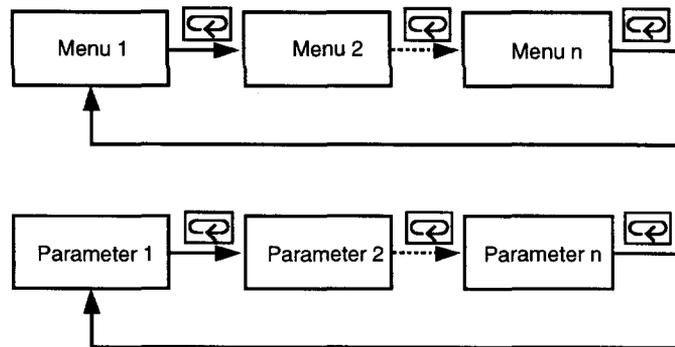
Mode Key



Displays a setting value (out of OUT1, 2, 3, 4 and 5 setting values in this order) on the PV display in RUN mode when this key is pressed. Unless another operation key is pressed within five seconds after this key has been pressed, the display automatically changes to the one for process values.



In the RUN mode, this button terminates the measurement process and allows you to enter the setting mode, advancing through the menus and parameters.

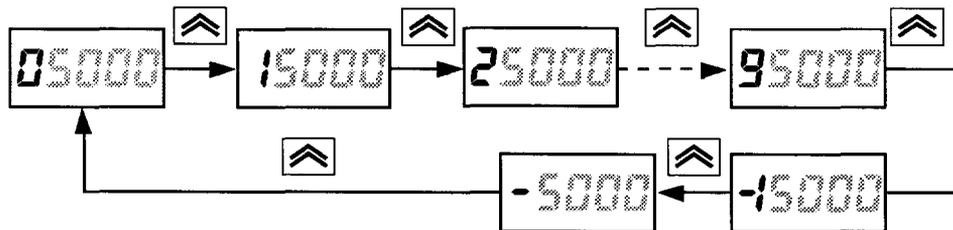


In the setting mode, this button will store changes in the non-volatile memory while at the same time advancing the display to the next menu item.

Up Key



Used to select a parameter to be displayed for setting value change.
Used to increment the current digit in the setting value by one.

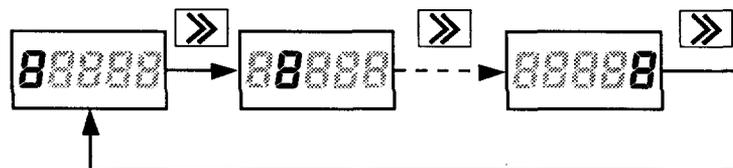


The value increases in the following order:
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, (-1), and (-)
Only the leftmost digit will be displayed if the value is set to "-1" or "-."
The value will be set to 0 if this key is pressed when "9" or "-" is displayed.

Shift Key



Used to change the parameter displayed in setting mode.
Used to scroll the digit to the right of the presently displayed digit.



RESET/TEACH Key



Used to set the counting value forcibly to "0" in RUN mode.

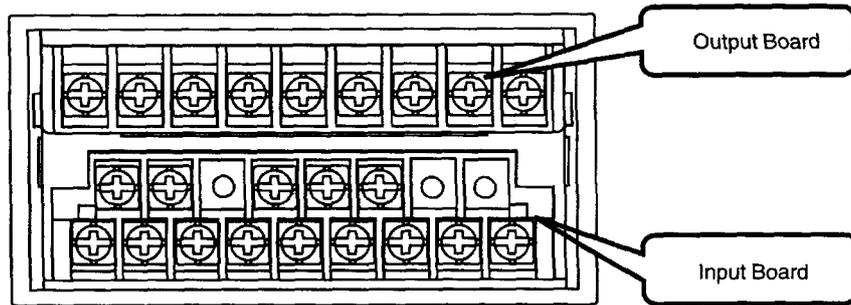
Used to select the teaching function. Refer to 5-1 Teaching Function for details.

1-3 Rear of the Meter

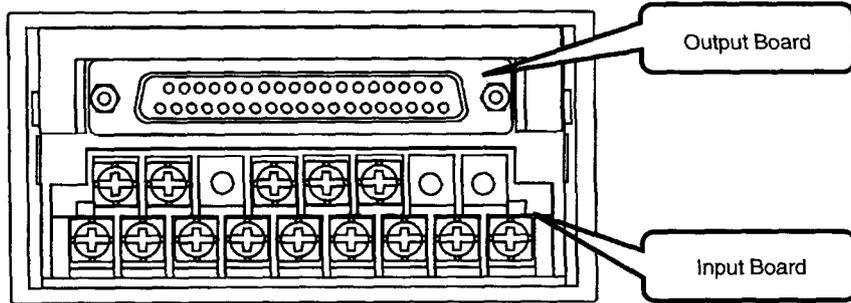
Terminal arrangement varies depending on the selected Output Board.

For wiring, refer to Section 2 Setup.

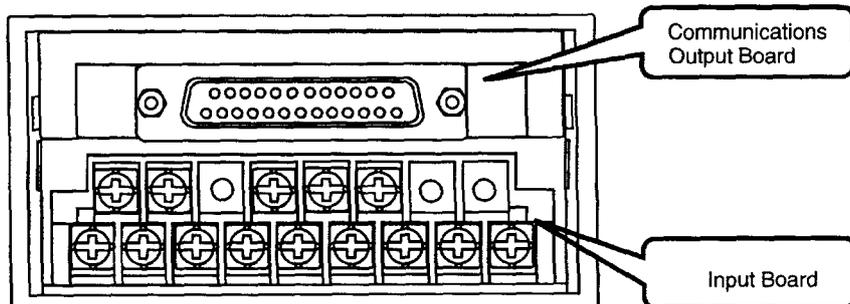
- K3NC with Relay Output Board, K31-C2, -C5
- K3NC with Transistor Output Board, K31-T1, -T2
- K3NC with Linear Output Board, K31-L1, -L2, -L3, -L4, -L5, -L6, -L7, -L8, -L9, -L10
- K3NC with RS-485 Output Board, K31-FLK2, -FLK5



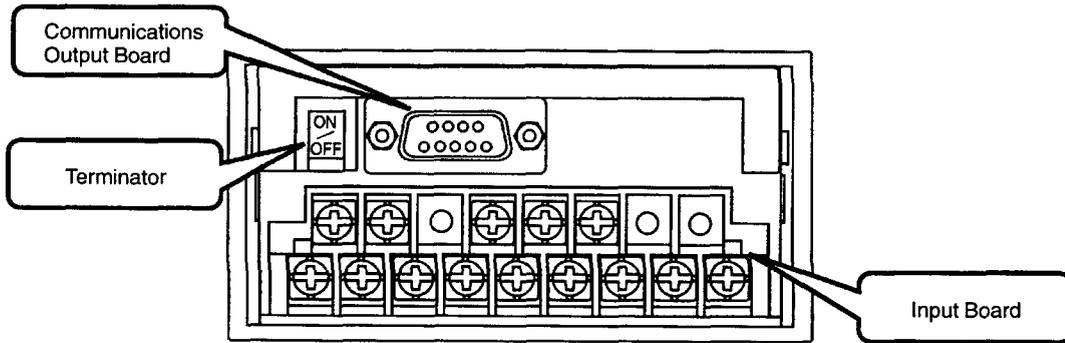
K3NC with BCD Output Board, K31-B2, -B4



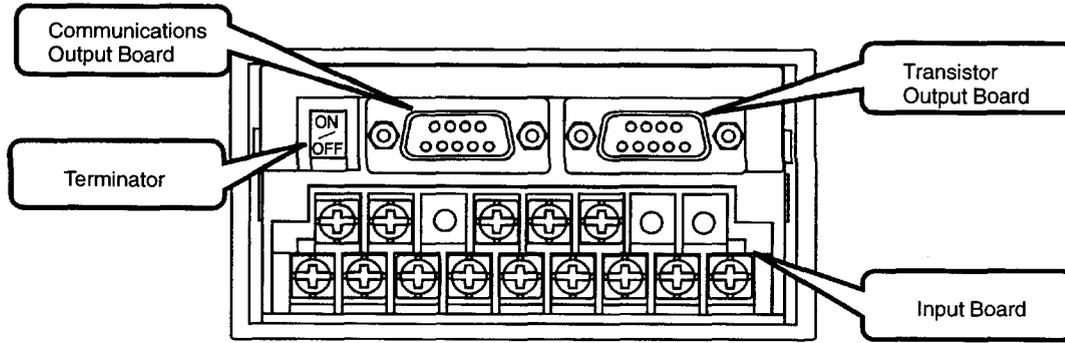
K3NC with RS-232C Output Board, K31-FLK1



K3NC with RS-422 Output Board, K31-FLK3



K3NC with RS232C + Transistor Output Board, K31-FLK4
K3NC with RS-422 + Transistor Output Board, K31-FLK6

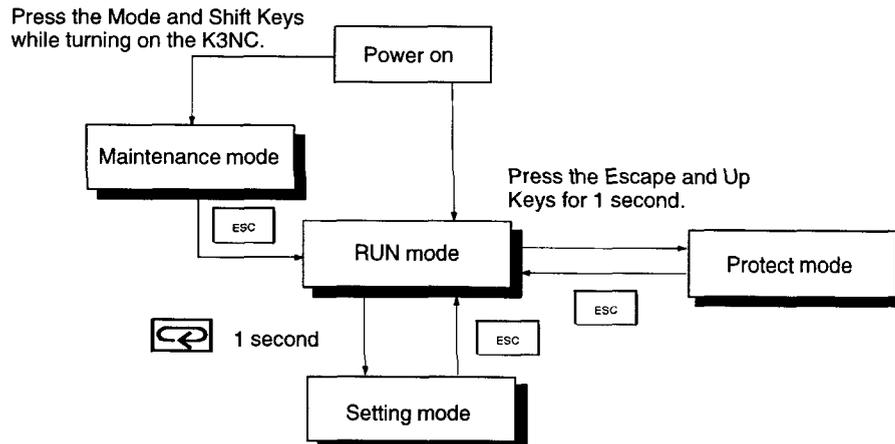


1-4 Modes

The following four modes are available.

- RUN mode for normal operations (see *Section 4 Operations in RUN Mode*)
- Setting mode for initializing parameter input (see *Section 3 Parameter Setting*)
- Protect mode for lock-out configuration (see *3-1 Protect Mode*)
- Maintenance mode for initialization (see *5-3-2 Initialization*)

Refer to the following for the relationship among these modes and selection of the modes.



RUN Mode

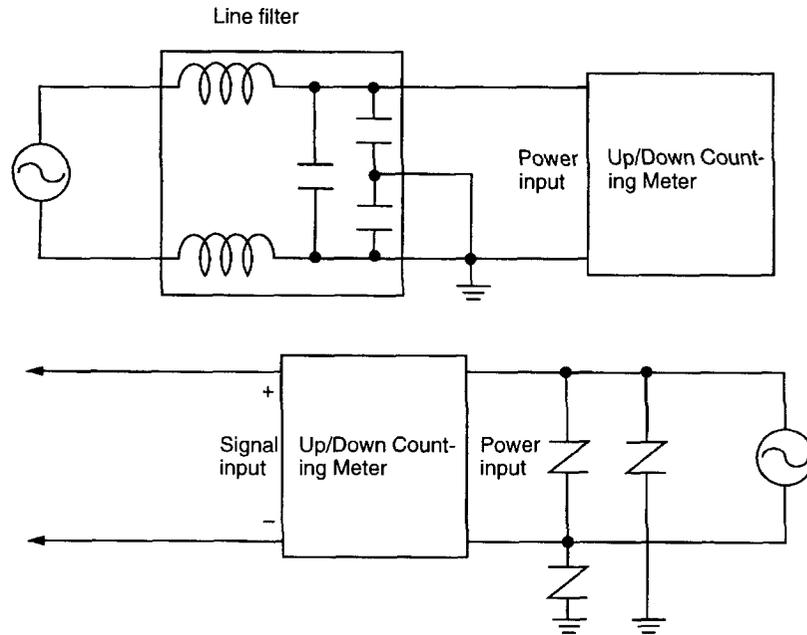
K3NC is in RUN when the K3NC is turned ON.

The K3NC in this mode provides an output signal as a result of the comparison of the measured and setting values.

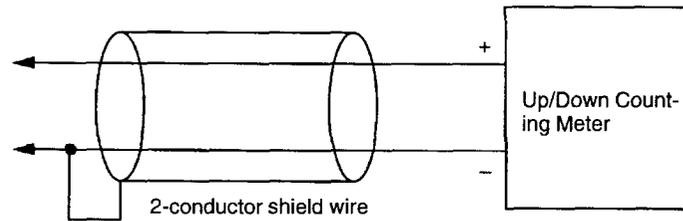
4 Noise Prevention

Provide the following countermeasures when using the product in an environment where the product is exposed to noise.

- Countermeasures for protecting the product against high-frequency noise or abnormal voltages.



- Countermeasures for protecting the product against inductive noise produced from the input line.





SECTION 1

Introduction

This section describes the functions of the K3NC. The main components are also described. Refer to the remaining sections of this manual for the operation of the K3NC and its menus in detail.

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1-1 Features

| | |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>The K3NC used in combination with an incremental rotary encoder calculates and outputs the amount of forward or reverse revolutions.</p> |
| Input and Output Modes | <p>The K3NC is equipped with two input modes, for individual inputs and phase-difference inputs, and two output modes, ALL-H mode and ALL-L mode.</p> |
| Linear Output | <p>Refer to page 48.</p> |
| BCD Output | <p>A digital data output format where every four binary bits is numerically equivalent to one decimal digit. Refer to <i>Section 6 BCD Output</i>.</p> |
| Communications Output | <p>Refer to the <i>Communications Manual</i>.</p> |
| Prescaling | <p>The number of counts is converted into a value within a specified range. Refer to the following for the relationship of the number of output counts versus the number of input counts and the prescaling value. Count value = Number of input counts x Prescaling value For example, if the prescaling value is 0.01, 100 counts will be counted as a single unit (i.e., count value = 100 x 0.01 = 1).</p> |
| Bank Function | <p>Four prescaling values and four set values are stored in the banks of the K3NC and can be selected with bank selection input.</p> |
| Compensation Function | <p>The compensation signal forcibly resets the value to the preset compensation value.</p> |
| RESET Function | <p>When the RESET signal turns ON, the present counting value will be set to zero.</p> |
| Power Failure Memory | <p>This function keeps the process value at the time of power failure. This function is enabled or disabled with K3NC setting.</p> |
| Teaching | <p>The K3NC is provided with a teaching function that can set an actual measured value as a setting value without key input. This function is useful for setting parameters while checking the operating status of the K3NC. The teaching function can be used to set the set and scaling values. It can be also used to set the linear output range of the K3NC with a Linear Output Board. Refer to <i>5-1 Teaching Function</i> for details.</p> |
| Output Test | <p>This function is convenient for checking a system to which the K3NC is connected, especially when some inputs cannot be operated. The K3NC simulates an input to check the output conditions. Refer to <i>5-2 Output Test</i> for details.</p> |

| | |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>The basic model in this mode usually displays the process value. The parameters and setting values are displayed by pressing the Mode Key. Refer to <i>Section 4 Operations in RUN Mode</i> for RUN mode in detail.</p> |
| Setting Mode | <p>Values are set in the K3NC in this mode by key input or using the teaching function. Refer to <i>Section 3 Parameter Setting</i> for value setting by key input and <i>5-1 Teaching Function</i> for the teaching function in detail.</p> |
| Protect Mode | <p>Use this mode to prohibit some operations in order to lock out the setting values. Refer to <i>3-1 Protect Mode</i> for details.</p> |
| Maintenance Mode | <p>The setting values are reset to factory-set values in this mode. Refer to <i>5-3-2 Initialization</i> for details.</p> |

1-5 Communications Function

The communications function of the K3NC makes it possible for the host computer to perform the following operations.

- Confirmation and change of setting values. Communications conditions cannot be changed.
- Reset of the process value
- Confirmation of model data.

Use a model with the Communications Board if the communications function is required.

Refer to the *Communications Manual* for the communications function in detail.

| | |
|----------------|-------------------------------------------------------------------------|
| RS-232C | Use the K31-FLK1 or K31-FLK4 Output Board to use the RS-232C interface. |
| RS-422 | Use the K31-FLK3 or K31-FLK6 Output Board to use the RS-422 interface. |
| RS-485 | Use the K31-FLK2 or K31-FLK5 Output Board to use the RS-485 interface. |

SECTION 2

Setup

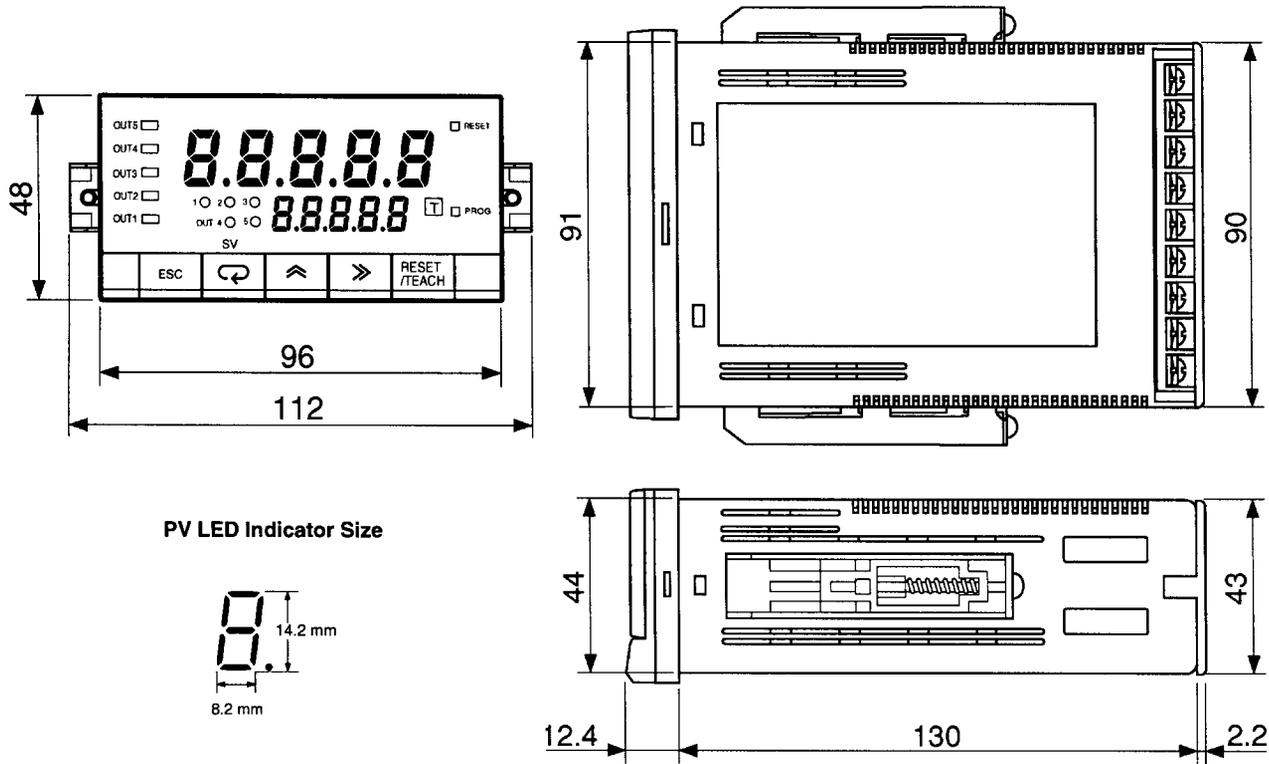
This section provides instructions required for mounting and wiring the K3NC.

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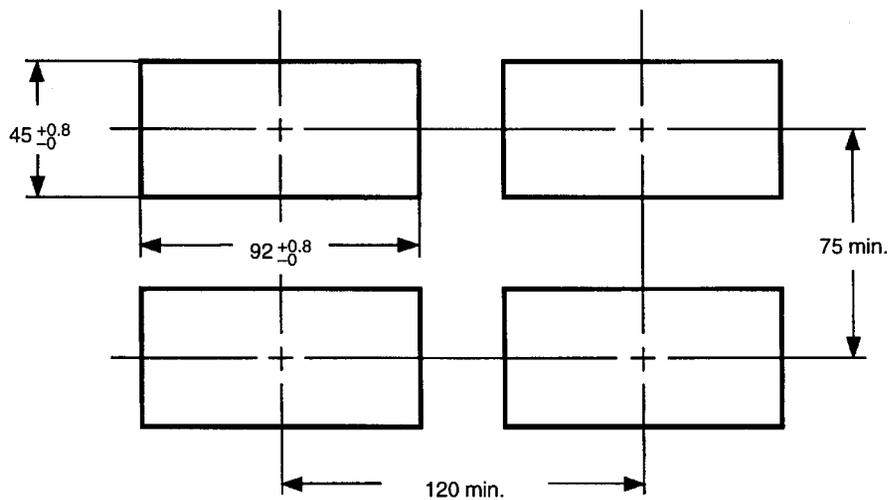
2-1 Mounting

Dimensions

All dimensions are in millimeters.



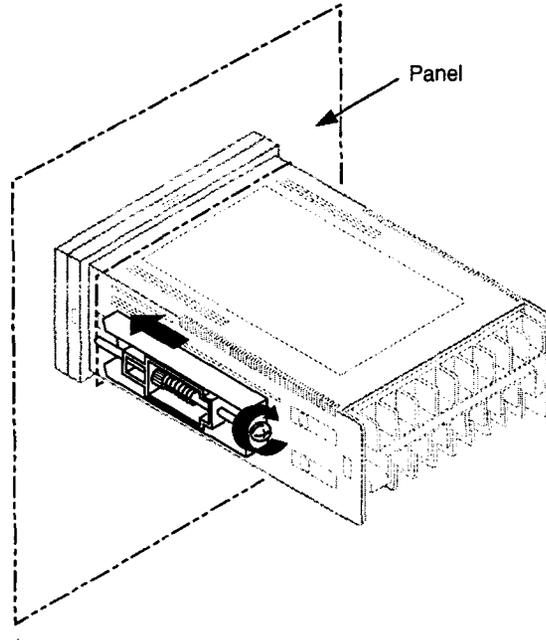
Panel Cutouts



Recommended panel thickness is 1 to 3.2 mm.

Do not mount more than one Unit closely in the horizontal or vertical direction. Be sure to keep the distance between adjacent Units.

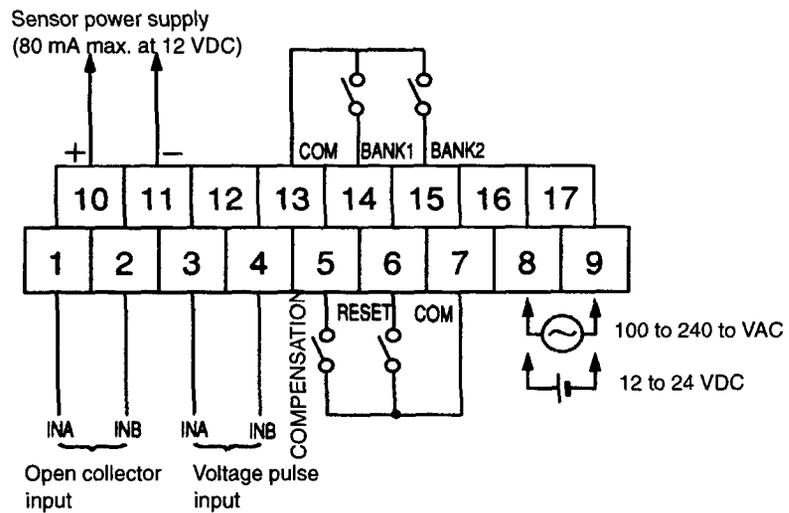
Mounting Method



- 1, 2, 3...
1. Insert the K3NC into the mounting hole on the panel.
 2. Hook the fixture claws onto the side holes.
 3. Mount a fixing metal to the right and left sides as shown above and while keeping them in balance, alternately tighten each screw until the ratchet becomes idle.

2-2 Input Block

2-2-1 Terminal Arrangement



Note Voltage pulse input is available for the K3NC-NB□□-□□.

2-2-2 Wiring Precautions

- Do not make any mistake in polarity when supply DC power to the K3NC.
- Do not wire power lines alongside the signal lines of the K3NC in order to prevent the K3NC from noise interference.
- Wire the terminal block with crimp terminals.
- Tighten each screw to a torque of 0.78 N • m (8 kgf • cm).

2-2-3 Wiring

Power Supply

Apply 100 to 240 VAC or 12 to 24 VDC to terminals 8 and 9.

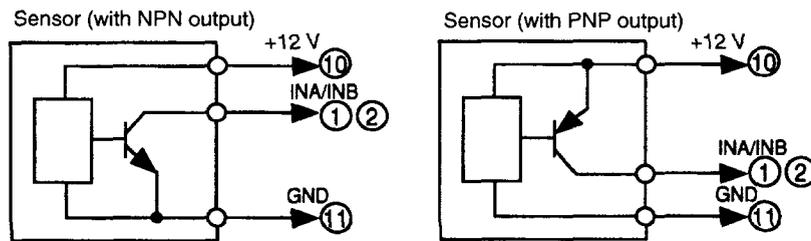
Open Collector Input

Connect the pulse output from sensor A to terminal 1.

Connect the pulse output from sensor B to terminal 2.

Terminals 10 and 11 are exclusively used for power supply with an output of 80 mA at 12 VDC to sensors A and B. If power is supplied to the sensors A or B from a different power source, do not use terminal 10. Do not connect a sensor with open collector output to terminal 10.

Refer to the following for sensor connections.



- Residual voltage with sensor turned on: 3 V max.
- Current leakage with sensor turned off: 1.5 mA max.
- Switching load current: 20 mA or greater. Must be able to dependably switch a load current of 5 mA max.

Photoelectric sensors, proximity sensors, rotary encoders, and relays can be connected as sensors to the K3NC.

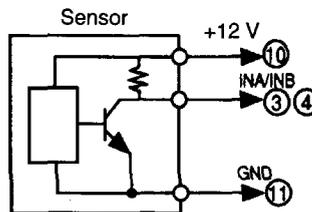
Voltage Pulse Input

Connect the pulse output of sensor A to terminal 3.

Connect the pulse output of sensor B to terminal 4.

Terminals 10 and 11 are exclusively used for power supply with an output of 80 mA at 12 VDC to sensors A and B. If power is supplied to the sensors A and B from a different power source, do not use terminal 10. Do not connect a sensor with voltage pulse output to terminal 10.

Refer to the following for sensor connections.



- H level (sensor output ON): 4.5 to 30 VDC
- L level (sensor output OFF): -30 to 2 VDC

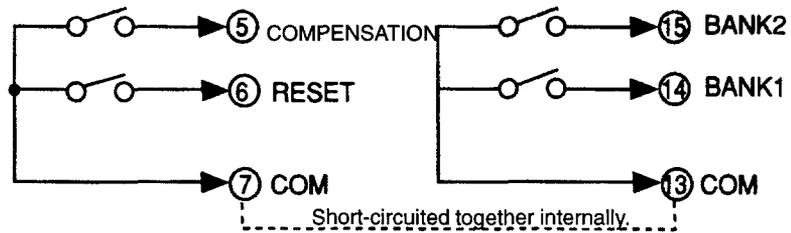
Auxiliary Power Supply

Terminals 10 and 11 are exclusively used for power supply to sensors with an output of 80 mA at 12 VDC ± 10%.

External Signal Input

COMPENSATION Input
RESET Input
BANK Input

Connect external signal inputs to terminals 5 through 7 and 13 through 15. Terminals 7 and 13 are connected to each other internally.



Connect COMPENSATION input to terminal 5.

Connect RESET input to terminal 6.

Connect BANK inputs to terminals 14 and 15 for BANK1 and BANK2.

If open collector input is used as external signal input, the transistor must satisfy the following conditions.

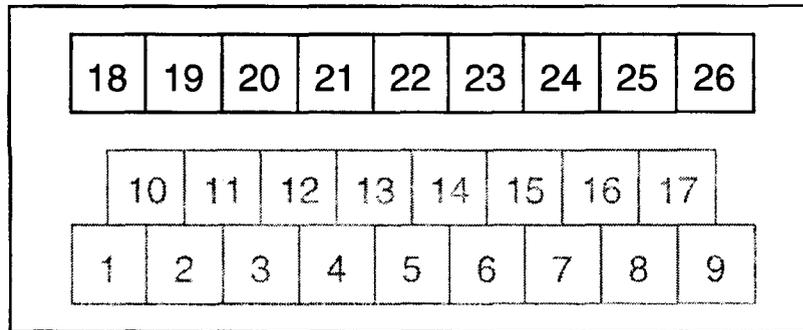
- Residual voltage with transistor turned on: 3 V max.
- Current leakage with transistor turned off: 1.5 mA max.
- Switching load current: 20 mA or greater

Approximately 5 V is imposed between COM and terminals 5 to 7 with a current flow of approximately 18 mA (a nominal value) at the time of external input short-circuiting.

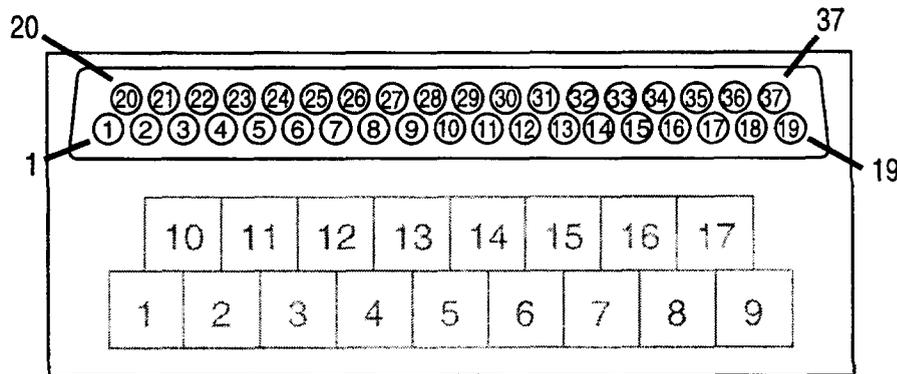
2-3 Output Board

2-3-1 Terminal Arrangement

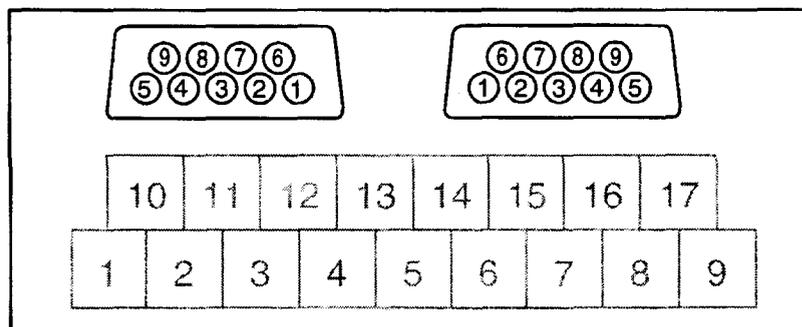
K3NC with Relay Output Board, K31-C2, -C5
 K3NC with Transistor Output Board, K31-T1, -T2
 K3NC with Linear Output Board, K31-L1, -L2, -L3, -L4, -L5, -L6, -L7, -L8, -L9, -L10
 K3NC with RS-485 Output Board, K31-FLK2, -FLK5



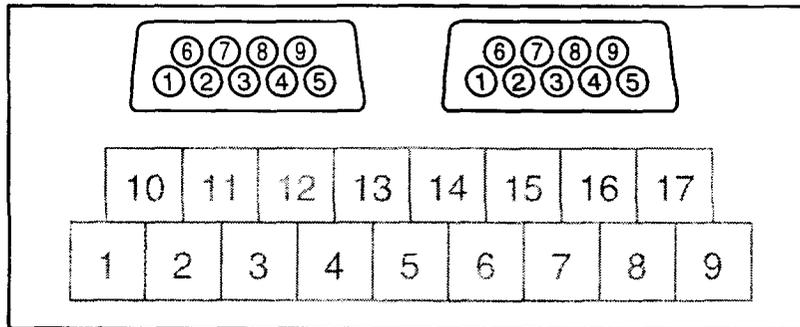
K3NC with BCD Output Board, K31-B2, -B4



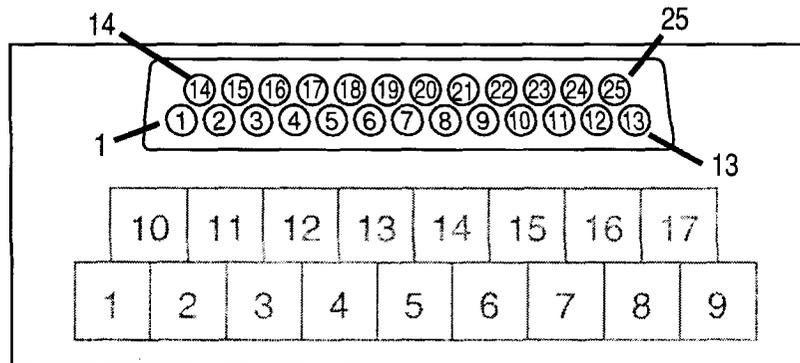
K3NC with RS-232C + Transistor Output Board, K31-FLK4



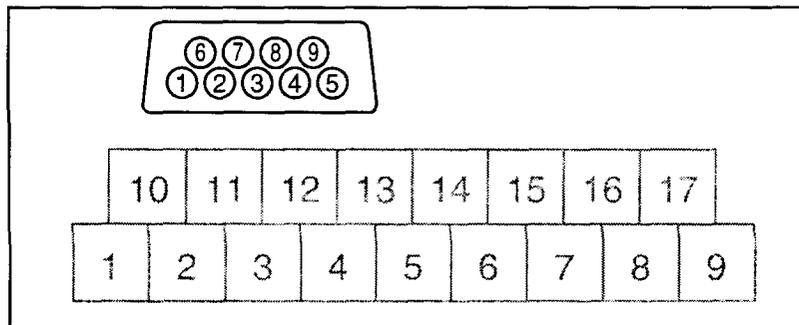
K3NC with RS-422 + Transistor Output Board, K31-FLK6



K3NC with RS-232C Output Board, K31-FLK1

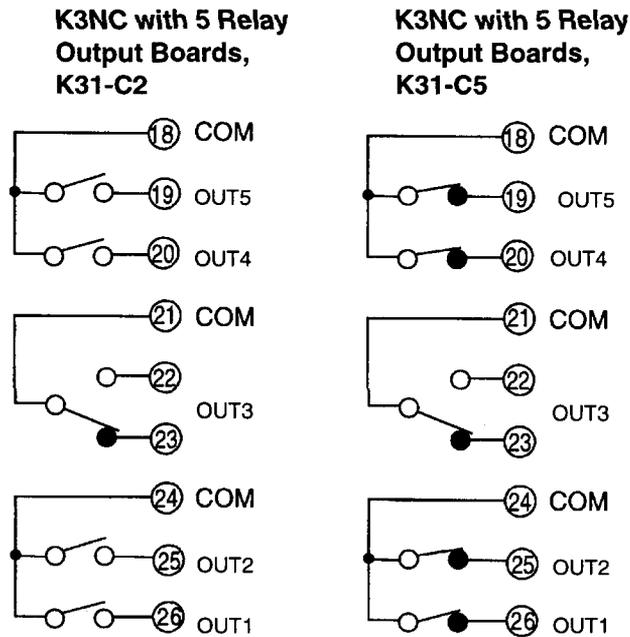


K3NC with RS-422 Output Board, K31-FLK3



2-3-2 Relay Output Board

The following figures show the connections for relay output.



The following contact output conditions are required.

- 5 A (resistive load) at 250 VAC
- 1.5 A (inductive load) at 250 VAC
- 5 A (resistive load) at 30 VDC
- 1.5 A (inductive load) at 30 VDC

2-3-3 Transistor and Combination Output Board

K3NC with Transistor Output Board, K31-T1 or K31-T2

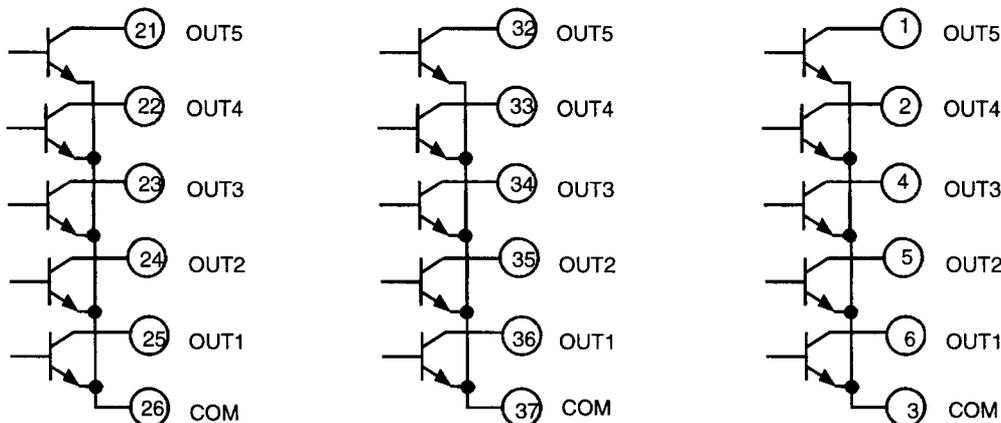
K3NC with Linear Output Board, K31-L4, -L5, -L6, -L9, -L10

K3NC with RS-485 + 5 Relay Output Boards, K31-FLK5

K3NC with BCD Output Board, K31-B2 or K31-B4

K3NC with RS232C + 5 Transistor Output Boards, K31-FLK4

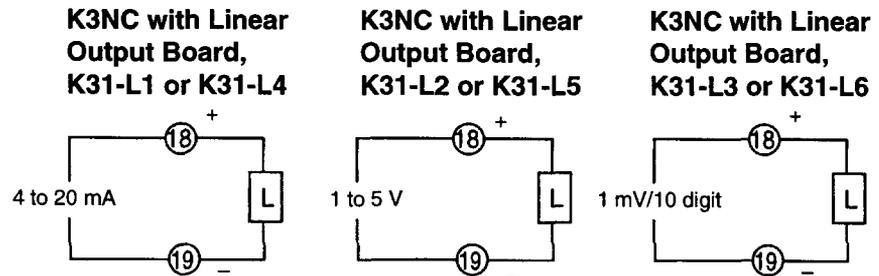
K3NC with RS-422 + 5 Transistor Output Boards, K31-FLK6



The following transistor output conditions are required.
 Maximum rated voltage: 24 VDC
 Load current: 50 mA
 Current leakage with transistor turned off: 100 μ A.

2-3-4 Linear Output Board

The following figures show connections for linear output.



The following linear output conditions are required.

| Linear output | Permissible load resistance | Resolution | Output error |
|---------------|-----------------------------|------------|----------------|
| 4 to 20 mA | 600 Ω max. | 4096 | $\pm 0.5\%$ FS |
| 1 to 5 V | 500 Ω min. | 4096 | $\pm 0.5\%$ FS |
| 1 mV/10 digit | 1 k Ω min. | 4096 | $\pm 1.5\%$ FS |

2-3-5 BCD Output Board

Refer to *Section 6 BCD Output* for the terminal arrangement and interface.



SECTION 3

Parameter Setting

This section provides instructions for setting the parameters of the K3NC. Be sure to read this section before using the K3NC Up/Down Counting Meter for the first time.

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3-1 Overview

3-1-1 Heading Symbols

The following symbols are used for headings in this section.



FUNCTION

This symbol precedes an explanation of the parameter's meaning and function.



SETTING

This symbol precedes a description of the settings, setting range, and default value.



PROCEDURE

This symbol precedes an explanation of procedures for parameters that specify operations.



REFERENCE

This symbol precedes a listing of references and related parameters.



MODELS

This symbol precedes a listing of the models in which this parameter can be used.

3-1-2 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 *Appendix D Available Parameters*.
- The K3NC is in RUN mode when the K3NC is turned on. Parameter settings in protect or setting mode are described below on the basis that the parameters are set for the first time.

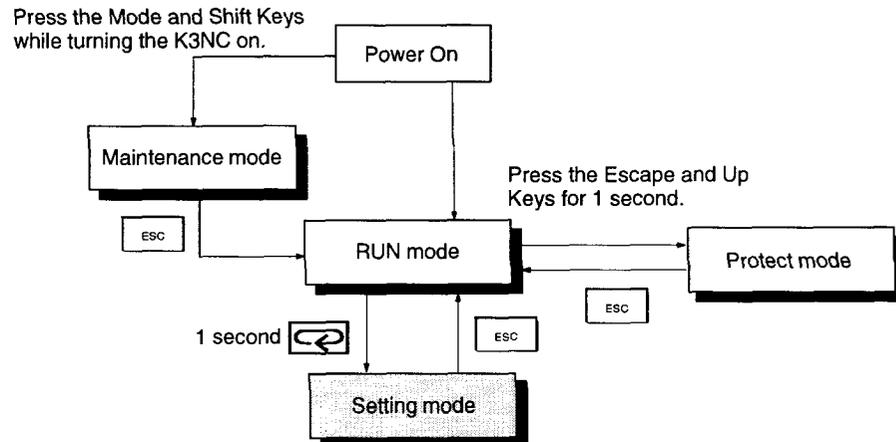
For the operation in RUN mode, refer to *Section 4 Operations in RUN Mode*.

- The setting examples are provided on condition that the factory-set values of the K3NC have not been changed.

3-2 Setting Mode

3-2-1 Selecting Setting Mode

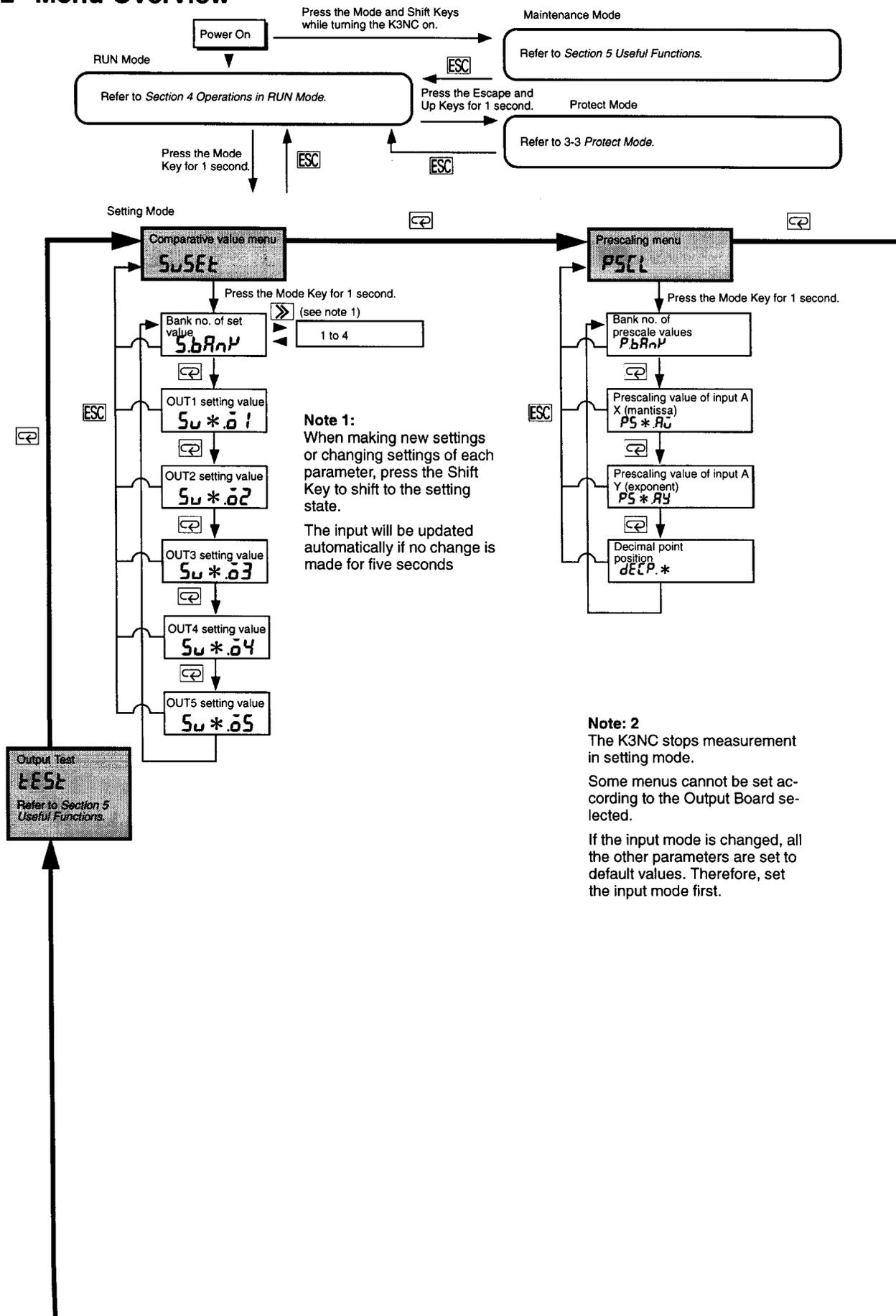
- The K3NC in RUN mode will go into setting mode if the Mode Key is pressed for 1 s minimum.
- The K3NC in setting mode will go into RUN mode if the Escape Key is pressed.

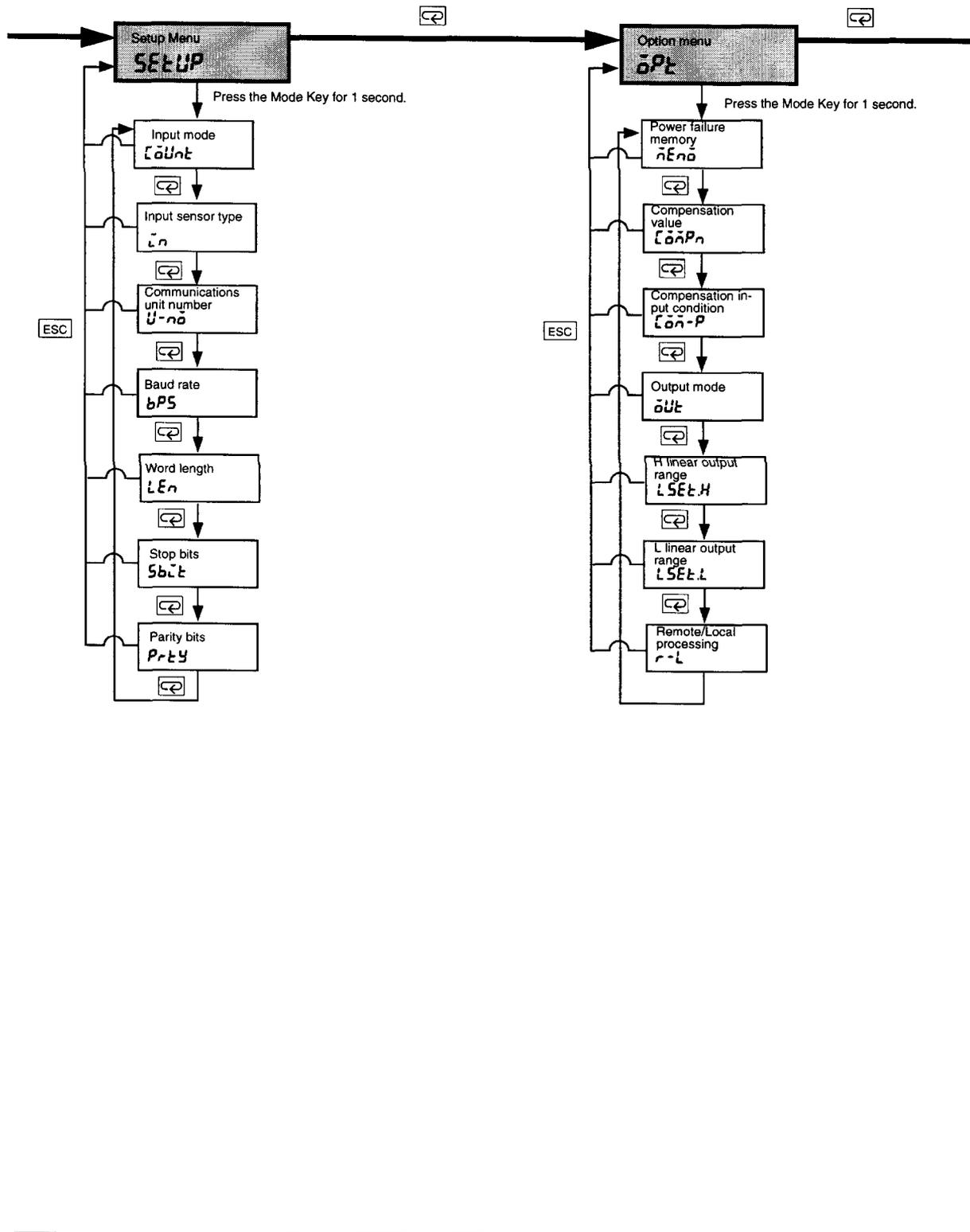


- The menu in each mode changes whenever the Mode Key is pressed.
- If the Mode Key is pressed for more than one second while a menu is displayed, a parameter will be displayed.
- The parameter changes whenever the Mode Key is pressed.
- If the Shift Key is pressed while a parameter is displayed, the parameter will be ready to change.
- Press the Up Key to change parameters.
- The digit of a set value is selected with the Shift Key and changed with the Up Key.
- The PROG indicator is lit while a menu or parameter is displayed.
- The PROG indicator flashes during a set value change.

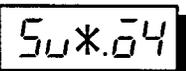
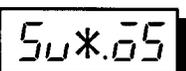
Note If the input mode is changed, all the other parameters will be set to default values. Therefore, set the input mode first.

3-2-2 Menu Overview





3-2-3 Setting Value Menu (SuSEt)

| | |
|-----------------------------------------------------------------------------------|------------------------------|
|  | <u>Bank No. of Set Value</u> |
|  | <u>OUT1 Set Value</u> |
|  | <u>OUT2 Set Value</u> |
|  | <u>OUT3 Set Value</u> |
|  | <u>OUT4 Set Value</u> |
|  | <u>OUT5 Set Value</u> |



FUNCTION

- Sets the set value banks.
- The setting value menu can be used for setting set values OUT1, OUT2, OUT3, OUT4, and OUT5.



SETTING

| Setting | Default |
|----------------|---------|
| Set value bank | 1 |
| OUT1 set value | 0 |
| OUT2 set value | 0 |
| OUT3 set value | 0 |
| OUT4 set value | 0 |
| OUT5 set value | 0 |



REFERENCE

Refer to 5-1 Teaching Function.



MODELS

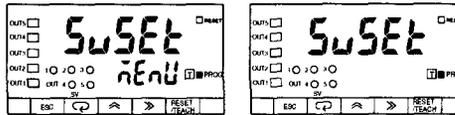
- The setting value menu is only available for the K3NC with Comparative Output Board.

SETTING EXAMPLE

Follow the steps described below to input the following.

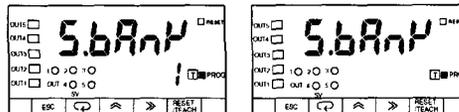
- Setting value bank = "2"
- OUT1 Setting value = "2000"
- OUT2 Setting value = "4000"
- OUT3 Setting value = "5000"
- OUT4 Setting value = "6000"
- OUT5 Setting value = "7000"

Set Value LED Display Model Basic Model



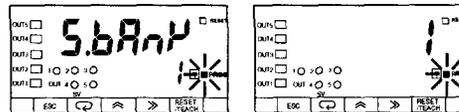
- 1, 2, 3... 1. Press the Mode Key for more than one second while the 5uSEt setting value menu is displayed. The 5.bAnK setting value bank setting will be displayed.

Set Value LED Display Model Basic Model



2. Press the Shift Key to display the set value ! for changing. The PROG indicator will flash.

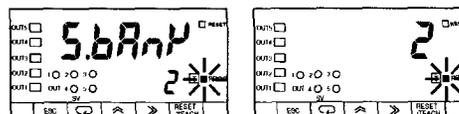
Set Value LED Display Model Basic Model



3. Press the Up Key to set the value to 2. The input will be validated automatically if no change is made for five seconds. The 5.bAnK setting value bank setting will be displayed again.

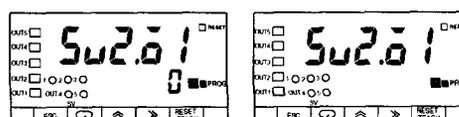
Note Press the Mode Key to enter the set value immediately. The 5u2.0 ! OUT1 setting value of Bank 2 setting will be displayed for setting the next parameter.

Set Value LED Display Model Basic Model



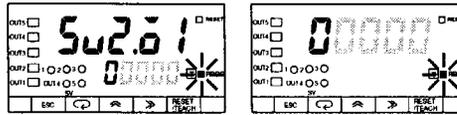
4. Press the Mode Key to display the 5u2.0 ! OUT1 setting value of Bank 2 setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the set value 0 for changing. The PROG indicator will flash.

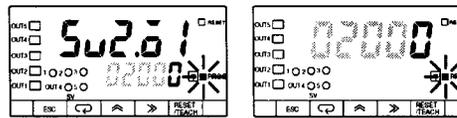
Set Value LED Display Model Basic Model



- Press the Up and Shift Keys to set the value to 2000. The input will be validated automatically if no change is made for five seconds. The Su2.01 OUT1 setting value of Bank 2 will be displayed again.

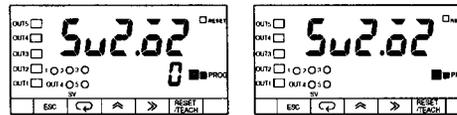
Note Press the Mode Key to enter the set value immediately. The Su2.02 OUT2 setting value of Bank 2 will be displayed for setting the next parameter.

Set Value LED Display Model Basic Model



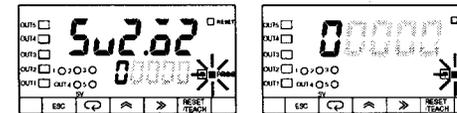
- Press the Mode Key to display the Su2.02 OUT2 setting value of Bank 2 setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the set value 0 for changing. The PROG indicator will flash.

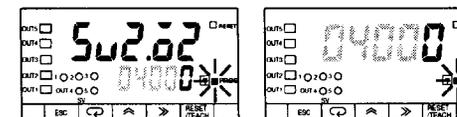
Set Value LED Display Model Basic Model



- Press the Up and Shift Keys to set the value to 4000. The input will be validated automatically if no change is made for five seconds. The Su2.02 OUT2 setting value of Bank 2 setting will be displayed again.

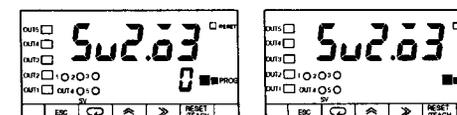
Note Press the Mode Key to enter the set value immediately. The Su2.03 OUT3 setting value of Bank 2 setting will be displayed for setting the next parameter.

Set Value LED Display Model Basic Model



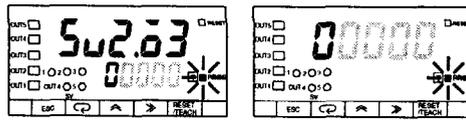
- Press the Mode Key to display the Su2.03 OUT3 setting value of Bank 3 OUT3 setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the set value $\bar{0}$ for changing. The PROG indicator will flash.

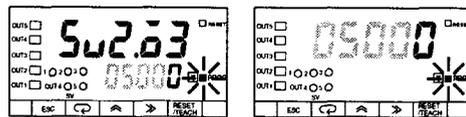
Set Value LED Display Model Basic Model



- Press the Up and Shift Keys to set the value to 5000. The input will be validated automatically if no change is made for five seconds. The Su2.03 OUT3 setting value of Bank 2 setting will be displayed again.

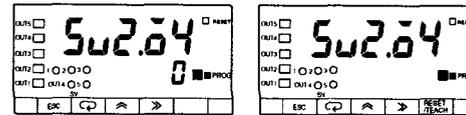
Note Press the Mode Key to enter the input immediately. The Su2.04 OUT4 setting value of Bank 2 setting will be displayed for setting the next parameter.

Set Value LED Display Model Basic Model



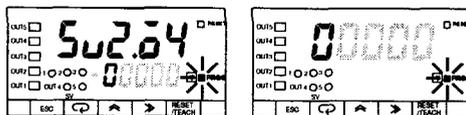
- Press the Mode Key to display the Su2.04 OUT4 setting value of Bank 2 setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the set value $\bar{0}$ for changing. The PROG indicator will flash.

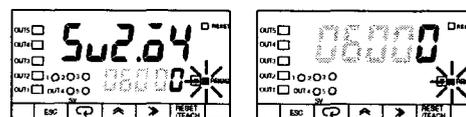
Set Value LED Display Model Basic Model



- Press the Up and Shift Keys to set the value to 5000. The input will be validated automatically if no change is made for five seconds. The Su2.04 OUT4 setting value of Bank 2 setting will be displayed again.

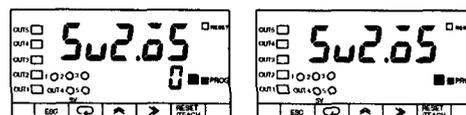
Note Press the Mode Key to enter the set value immediately. The Su2.05 OUT5 setting value of Bank 2 setting will be displayed for setting the next parameter.

Set Value LED Display Model Basic Model



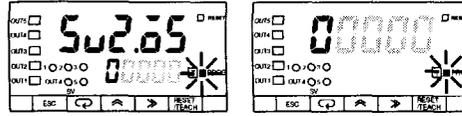
- Press the Mode Key to display the Su2.05 OUT5 setting value of Bank 2 setting.

Set Value LED Display Model Basic Model



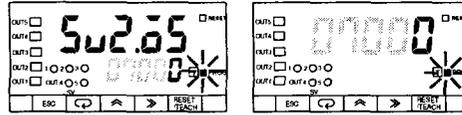
17. Press the Shift Key to display the set value 0 for changing. The PROG indicator will flash.

Set Value LED Display Model Basic Model



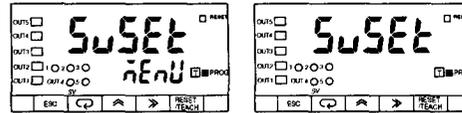
18. Press the Up and Shift Keys to set the value to 7000. The input will be validated automatically if no change is made for five seconds. The 5u2.05 OUT5 setting value of Bank 2 setting will be displayed again.

Set Value LED Display Model Basic Model

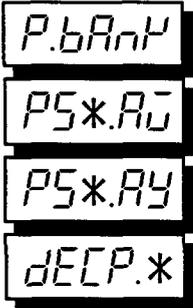


19. Press the Escape Key to display the 5u5Et setting value menu.

Set Value LED Display Model Basic Model



3-2-4 Prescaling Menu (PSCL)



Prescaling Bank

Prescaling Value X (Mantissa) of Input A

Prescaling Value Y (Exponent) of Input A

Decimal Point Position



FUNCTION

The measured data is displayed after being multiplied by a preset value (i.e., prescaling value).

Display value = Measured data x prescaling value

| Input type | Setting | Default |
|--------------------------------------------------|---------------------------------------------|-----------------------------------|
| P.bAnP: Prescaling bank | 0FF/1 to 4 | 0FF |
| PS*.R0: Prescaling value X (mantissa) of input A | 0.0001 to 9.9999 | 1.0000 |
| PS*.RY: Prescaling value Y (exponent) of input A | -9 to 9 | 0 |
| dECP.*: Decimal point position | One of the 1st to 4th digits from the right | No decimal point position setting |

SETTING EXAMPLE

Follow the steps described below to input the following.

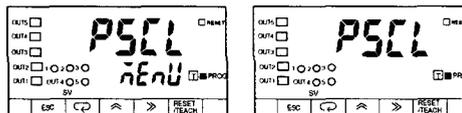
Prescaling bank = 1

Prescaling value X (mantissa) of input A = 0.5000

Prescaling value Y (exponent) of input A = -1

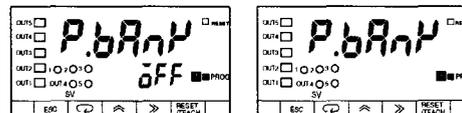
Decimal point = □□□□.□

Set Value LED Display Model Basic Model



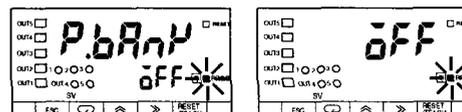
- 1, 2, 3... 1. Press the Mode Key for more than one second while the PSCL prescaling menu is displayed. The P.bAnP prescaling bank setting will be displayed.

Set Value LED Display Model Basic Model



2. Press the Shift Key to display 0FF for changing. The PROG indicator will flash.

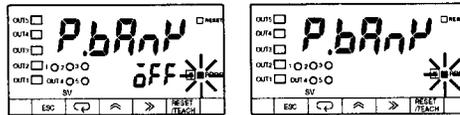
Set Value LED Display Model Basic Model



- Press the Up Key to change the prescaling bank setting. The input will be validated automatically if no change is made for five seconds. The $P.bRnV$ prescaling bank setting will be displayed again.

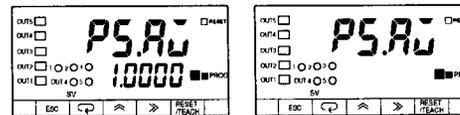
Note Press the Mode Key to enter the set value immediately. The $P5.R\bar{U}$ prescaling value X (mantissa) of input A setting will be displayed for setting the next parameter.

Set Value LED Display Model Basic Model



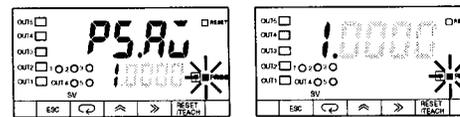
- Press the Mode Key to display the $P5.R\bar{U}$ prescaling value X (mantissa) of input A setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the set value 1.0000 for changing. The PROG indicator will flash.

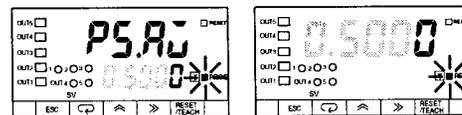
Set Value LED Display Model Basic Model



- Press the Up and Shift Keys to set the value to 0.5000 . The input will be validated automatically if no change is made for five seconds. The $P5.R\bar{U}$ prescaling value X (mantissa) of input A setting will be displayed again.

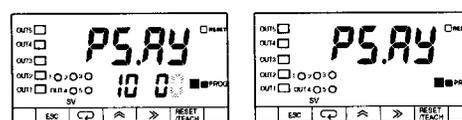
Note Press the Mode Key to enter the set value immediately. The $P5.R\bar{U}$ prescaling value X (mantissa) of input A setting will be displayed for setting the next parameter.

Set Value LED Display Model Basic Model



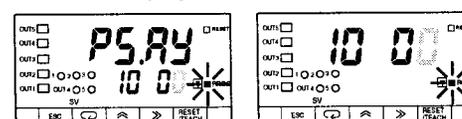
- Press the Mode Key to display the $P5.R\bar{Y}$ prescaling value Y (exponent) of input A setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the set value $10 00$ for changing.

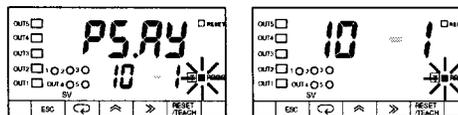
Set Value LED Display Model Basic Model



- Press the Up and Shift Keys to set the value to 10^{-1} . The input will be validated automatically if no change is made for five seconds. The *PS.AY* prescaling value Y (exponent) of input A setting will be displayed again.

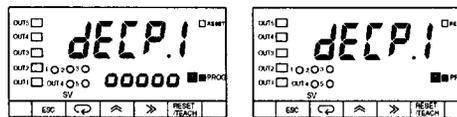
Note Press the Mode Key to enter the set value immediately. The *dECP* decimal point position setting will be displayed for setting the next parameter.

Set Value LED Display Model Basic Model



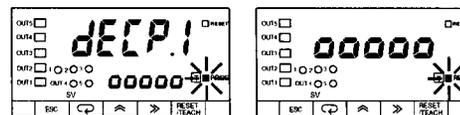
- Press the Mode Key to display the *dECP* decimal point position setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display *00000* for changing.

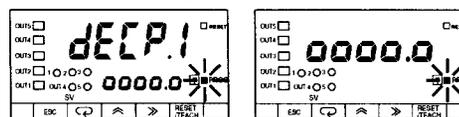
Set Value LED Display Model Basic Model



- Press the Shift Key to set *0000.0*. The input will be validated automatically if no change is made for five seconds. The *dECP* decimal point position setting will be displayed again.

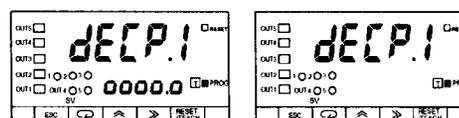
Note Press the Mode Key to enter the set value immediately. The *P.bANK* prescaling bank setting will be displayed for setting the next parameter.

Set Value LED Display Model Basic Model



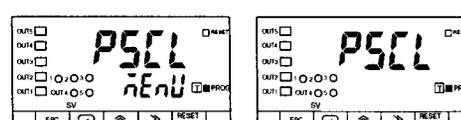
When no operation is executed for five seconds

Set Value LED Display Model Basic Model



- Press the Escape Key to display the *PSCL* prescaling menu.

Set Value LED Display Model Basic Model



3-2-5 Setup Menu (SETUP)



Input Mode



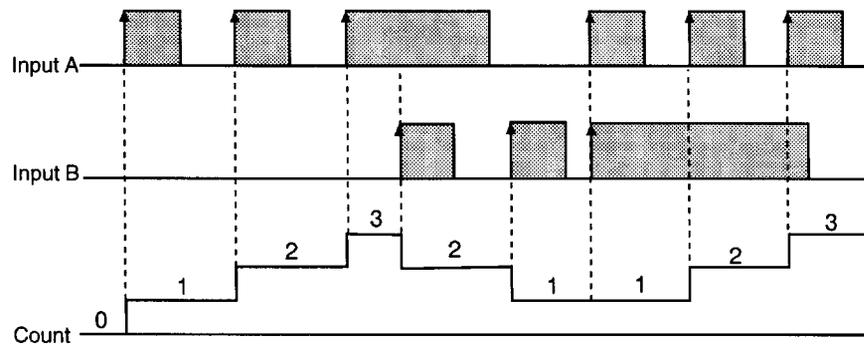
FUNCTION

- All parameters will be set to default values if any change is made in this menu.
- Selects the individual or phase-difference input.

The counting mode can be set to either individual input or phase-difference input. Pulses of up to 50 kHz can be input. The minimum pulse width is 9 μs for both the ON and OFF sides.

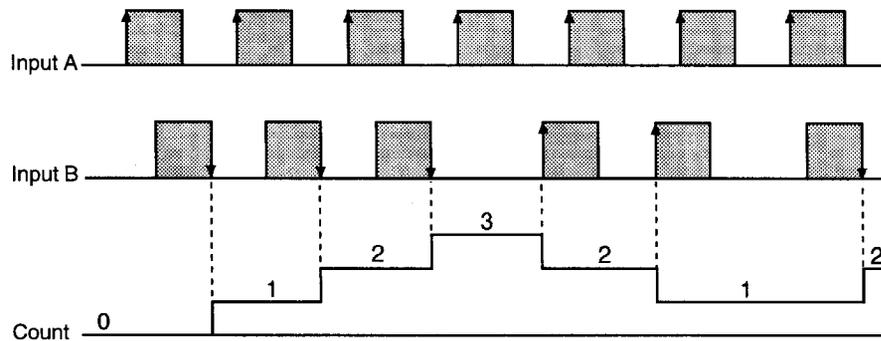
Individual Inputs

This input mode counts by using input A as the increment input and input B as the decrement input. The count is incremented at the rising edge of input A and decremented at the rising edge of input B. The count is left unchanged if the inputs are simultaneous.



Phase-difference Inputs

This input mode increments the count when input A precedes input B and decrements the count when input B precedes input A. The count is incremented at the rising edge of input B and decremented at the rising edge of input A.



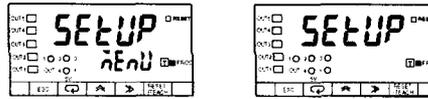
SETTING

| Setting | Default |
|-------------------------------|---------|
| U-d b: Individual input | U-d C |
| U-d C: Phase-difference input | |

SETTING EXAMPLE

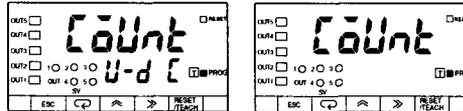
Follow the steps described below to select the *U-d b* individual input setting.

Set Value LED Display Model Basic Model



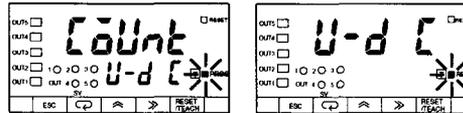
- 1, 2, 3... 1. Press the Mode Key for more than one second while the *SETUP* setup menu is displayed. The *Count* input mode setting will appear.

Set Value LED Display Model Basic Model



2. Press the Shift Key to display the set value *U-d E* for changing. The PROG indicator will flash.

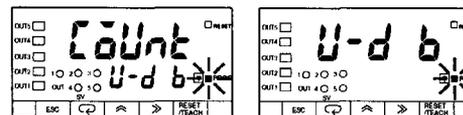
Set Value LED Display Model Basic Model



3. Repeatedly press the Up Key until *U-d b* is displayed. The displayed setting will be validated automatically if no change is made for five seconds. The *Count* counting mode setting will be displayed again.

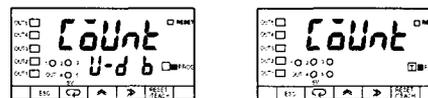
Note Press the Mode Key to enter the displayed setting immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model

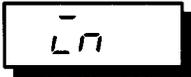


When no operation is executed for five seconds

Set Value LED Display Model Basic Model



4. Repeatedly press the Escape Key until the *SETUP* setup menu is displayed.



Sensor Type



FUNCTION



SETTING

- Specifies the type of sensors for input A and input B.

- Open Collector Input

| Sensor type | Normally open | Normally closed | Default |
|------------------|---------------|-----------------|---------|
| Transistor input | 00 | 01 | 00 |
| Relay input | 10 | 11 | |

Normally Open Model: The sensor output is OFF (open) when the sensor is not sensing an object.

Normally Closed Model: The sensor output is ON (closed) when the sensor is not sensing an object.

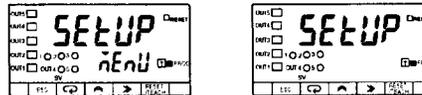
- Voltage Pulse Input

| Sensor type | Normally open | Normally closed | Default |
|---------------------|---------------|-----------------|---------|
| Voltage pulse input | 10 | 11 | 00 |

SETTING EXAMPLE

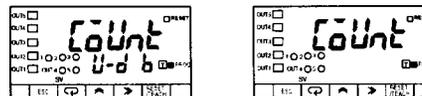
Follow the steps described below to set the sensor type to 11 when setting *U-d b* (individual input) of *Count* (input mode).

Set Value LED Display Model Basic Model



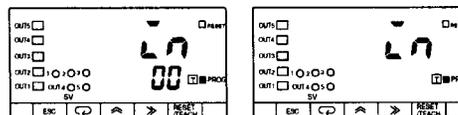
- 1, 2, 3... 1. Press the Mode Key for more than one second while the *SETUP* setup menu is displayed. The *Count* input mode setting will appear.

Set Value LED Display Model Basic Model



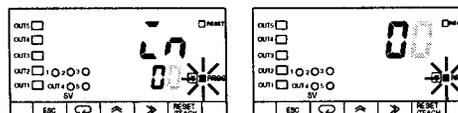
2. Press the Mode Key to display *Ln* sensor type setting.

Set Value LED Display Model Basic Model



3. Press the Shift Key to display *00* for changing. The PROG indicator will flash.

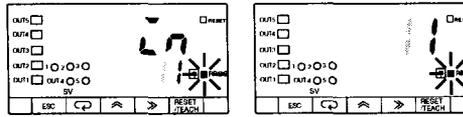
Set Value LED Display Model Basic Model



- Press the Up and Shift Keys to display $!!$. The displayed setting will be validated automatically if no change is made for five seconds. The $\bar{L}n$ sensor type setting will be displayed again.

Note Press the Mode Key to enter the displayed setting immediately. The next parameter will be displayed.

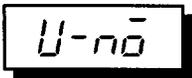
Set Value LED Display Model Basic Model



- Press the Escape Key to display the *SELU*P setup menu.

Set Value LED Display Model Basic Model





Communications Unit Number



Baud Rate



FUNCTION

- Set a communications unit number as an identification number by which the host computer is connected to the K3NC.
- If more than one K3NC is connected in parallel, make sure that each communications unit number is unique.
- The baud rate should be set to the baud rate of the host computer.



SETTING

- Communications Unit Number

| Setting range | Unit | Default |
|---------------|------|---------|
| 00 to 99 | --- | 00 |

- Baud Rate

| Setting range | Default |
|-------------------------------------------------------------------------------------------------------------|---------|
| 1200: 1,200 bps / 2400: 2,400 bps / 4800: 4,800 bps / 9600: 9,600 bps / 19200: 19.2 Kbps / 38400: 38.4 Kbps | 9600 |



MODELS

This setting is available for the K3NC with the Communications Output Board.

SETTING EXAMPLE

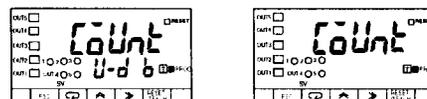
Follow the steps described below to set the communications unit number to 15 and the baud rate to 19,200 bps.

Set Value LED Display Model Basic Model



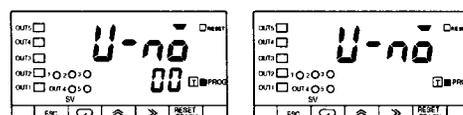
- 1, 2, 3... 1. Press the Mode Key for more than one second while the *SETUP* setup menu is displayed. The *Count* input mode setting will appear.

Set Value LED Display Model Basic Model



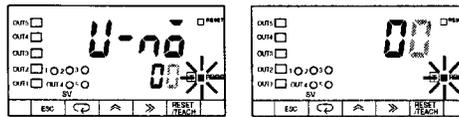
2. Repeatedly press the Mode Key until the *U-nō* communications unit number setting is displayed.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the prior set value *00* for changing. The PROG indicator will flash.

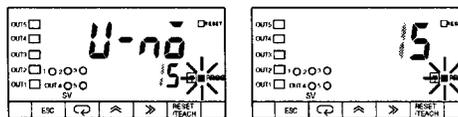
Set Value LED Display Model Basic Model



- Press the Up and Shift Keys to set the value to *15*. The input value will be validated automatically if no change is made for five seconds. The *U-nō* communications unit number setting will be displayed again.

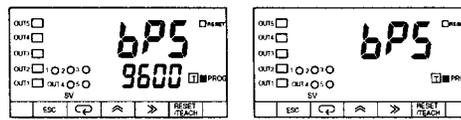
Note Press the Mode Key to enter the set value immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model



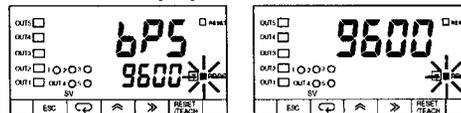
- Press the Mode Key to display the *bPS* baud rate setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the prior set value *9600* for changing. The PROG indicator will flash.

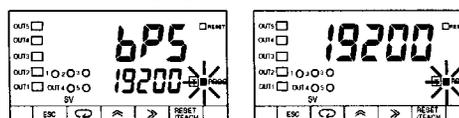
Set Value LED Display Model Basic Model



- Press the Up Key to set the value to *19200*. The input will be validated automatically if no change is made for five seconds. The *bPS* baud rate setting will be displayed again.

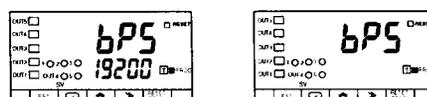
Note Press the Mode Key to enter the set value immediately. The next parameter will be displayed again for setting.

Set Value LED Display Model Basic Model



- Press the Up Key to enter the set value for setting the next parameter. The input value will be validated automatically if no change is made for five seconds. The *bPS* baud rate setting will be displayed again.

Set Value LED Display Model Basic Model





Word Length

Stop Bits

Parity Bits



FUNCTION



SETTING

- The communications format used for communicating with the host computer is set in the setup menu.
- Refer to the *Communications Manual* for the communications format in detail.

- Word Length

| Setting | Unit | Default |
|---------|------|---------|
| 7/8 | bit | 7 |

- Stop Bits

| Setting | Unit | Default |
|---------|------|---------|
| 1/2 | bit | 2 |

- Parity Bit

| Setting | Default |
|--------------------------------------|---------|
| nōnĒ: None EuĒn: Even ōdd: Odd | EuĒn |

This setting is available for the K3NC with the Communications Output Board.



MODELS

SETTING EXAMPLE

Follow the steps described below to set the following.

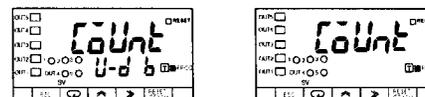
- Word length: 8 bits
- Number of stop bits: 1
- Parity bits: nōnĒ

Set Value LED Display Model Basic Model



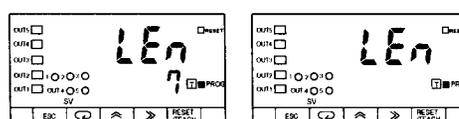
- 1, 2, 3... 1. Press the Mode Key for more than one second while the *SETUP* setup menu is displayed. The *COUNT* counting mode setting will appear.

Set Value LED Display Model Basic Model



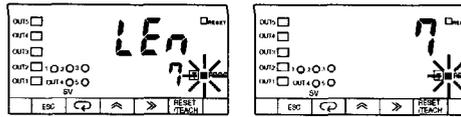
2. Repeatedly press the Mode Key until the *LEn* word length setting is displayed.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the prior set value 7 for changing. The PROG indicator will flash.

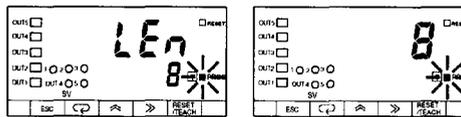
Set Value LED Display Model Basic Model



- Press the Up Key to set the value to 8. The input value will be validated automatically if no change is made for five seconds. The LEN word length setting will be displayed again.

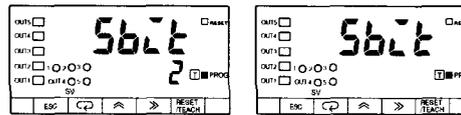
Note Press the Mode Key to enter the set value immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model



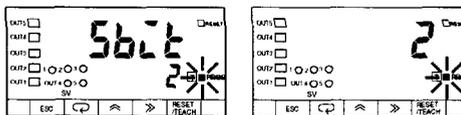
- Press the Mode Key to display the Sblt stop bit setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the set value 2 for changing.

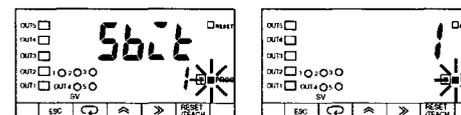
Set Value LED Display Model Basic Model



- Press the Up Key to set the value to 1. The input will be validated automatically if no change is made for five seconds. The Sblt stop bit setting will be displayed again.

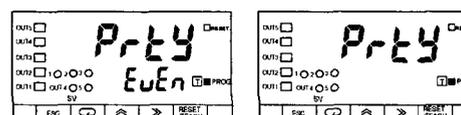
Note Press the Mode Key to enter the set value immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model



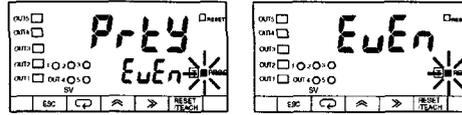
- Press the Mode Key to display the Prty parity bit setting.

Set Value LED Display Model Basic Model



9. Press the Shift Key to display $E\bar{U}E\bar{n}$ for changing.

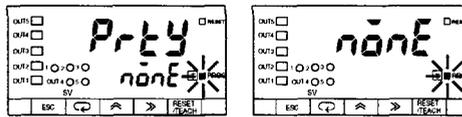
Set Value LED Display Model Basic Model



10. Press the Up Key to display $n\bar{o}n\bar{E}$. The setting will be validated automatically if no change is made for five seconds. The $Prty$ parity bit setting will be displayed again.

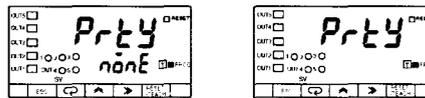
Note Press the Mode Key to enter the setting immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model

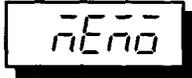


When no operation is executed for five seconds

Set Value LED Display Model Basic Model



3-2-6 Option Menu ($\bar{o}P\bar{t}$)



Power Failure Memory



FUNCTION



SETTING

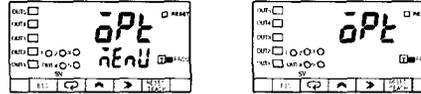
Keeps the process value at the time of power failure.

| Setting | Default |
|--------------------------|-------------|
| $\bar{o}n$: Stored | $\bar{o}FF$ |
| $\bar{o}FF$: Not stored | |

SETTING EXAMPLE

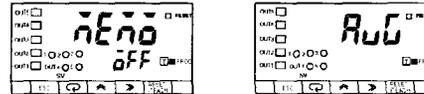
Follow the steps described below to set $\bar{o}n$ to enable power failure memory.

Set Value LED Display Model Basic Model



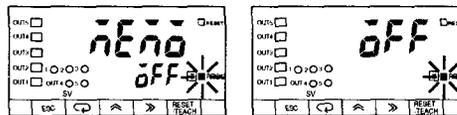
- 1, 2, 3... 1. Press the Mode Key for more than one second while the $\bar{o}P\bar{t}$ option menu is displayed. The $\bar{n}E\bar{n}\bar{o}$ power failure memory setting will appear.

Set Value LED Display Model Basic Model



2. Press the Shift Key to display the set data $\bar{o}FF$ for changing. The PROG indicator will flash.

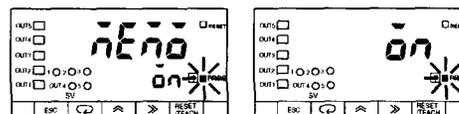
Set Value LED Display Model Basic Model



3. Press the Up Key to display $\bar{o}n$. The displayed setting will be validated automatically if no change is made for five seconds. The $\bar{n}E\bar{n}\bar{o}$ power failure backup memory setting will be displayed again.

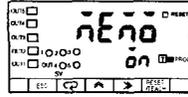
Note Press the Mode Key to enter the displayed setting immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model



When no operation is executed for five seconds

Set Value LED Display Model Basic Model



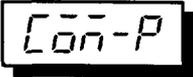
4. Press the Escape Key to display the $\bar{o}P\bar{t}$ option menu.

Set Value LED Display Model Basic Model





Compensation Value



Compensation Input Condition



FUNCTION

- The value set in this menu is used as the compensation value of the K3NC. The present value is forcibly reset to the compensation value if the COMPENSATION input is ON, and the counting operation of the K3NC begins with the compensation value.
- The conditions can be sent for when the compensation function is to be enabled. The compensation function is always enabled (i.e., enabled during both incrementation and decrementation) when set to *RLL* ; it is enabled only during incrementation when set to *PLUS*.



SETTING

| | Setting | Default |
|--------------------|-----------------------------------------------------------------------------|------------|
| Compensation value | -19999 to 99,999 | 00000 |
| Condition setting | <i>RLL</i> : Incrementing and decremting <i>PLUS</i> : Incrementing only | <i>RLL</i> |



REFERENCE

Refer to 4-2 External Input Signals.

SETTING EXAMPLE

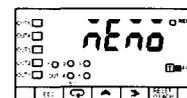
Follow the steps described below to set the compensation value to 70.
Set the compensation input condition to *PLUS*.

Set Value LED Display Model Basic Model



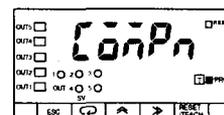
- 1, 2, 3... 1. Press the Mode Key for more than one second while the *opt* option menu is displayed. The *nEno* power failure memory setting will appear.

Set Value LED Display Model Basic Model



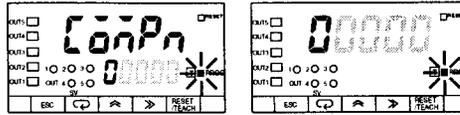
2. Repeatedly press the Mode Key until the *ConPn* compensation value setting is displayed.

Set Value LED Display Model Basic Model



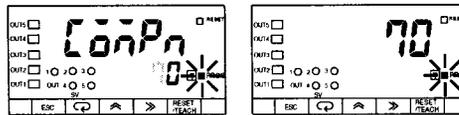
- Press the Shift Key to display the set value 00000 for changing. The PROG indicator will flash.

Set Value LED Display Model Basic Model



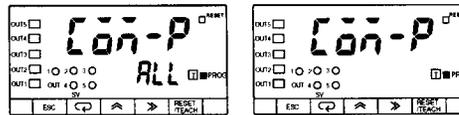
- Press the Up and Shift Keys to set the value to 70. The input will be validated automatically if no change is made for five seconds. The C0n-Pn compensation value setting will be displayed again.

Set Value LED Display Model Basic Model



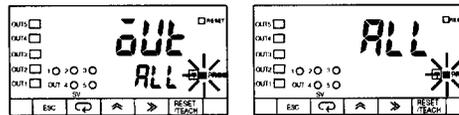
- Press the Mode Key to display the C0n-P compensation input condition setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display ALL for changing. The PROG indicator will flash.

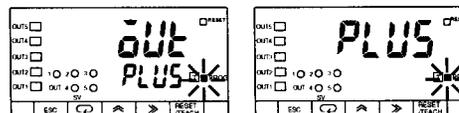
Set Value LED Display Model Basic Model



- Press the Up Key to display PLUS. The input will be validated automatically if no change is made for five seconds. The C0n-P compensation input condition setting will be displayed again.

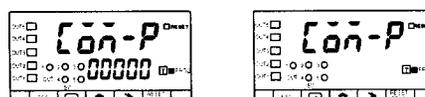
Note Press the Mode Key to enter the set value immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model



When no operation is executed for five seconds

Set Value LED Display Model Basic Model





Output Modes



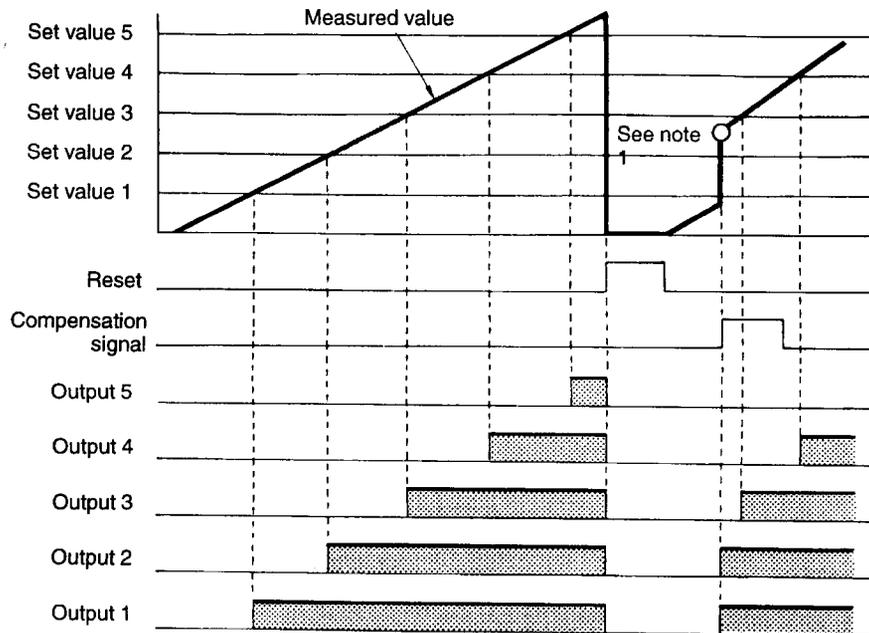
FUNCTION

Specifies the output mode of the comparative outputs OUT1, OUT2, OUT3, OUT4, or OUT5.

The K3NC is equipped with two output modes, ALL-H mode and ALL-L mode. The measured value is compared to set values 1 through 5 and the corresponding output (1 through 5) is turned ON if the measured value is above (ALL-H mode) or below (ALL-L mode) the set value.

ALL-H Mode

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





Output Modes



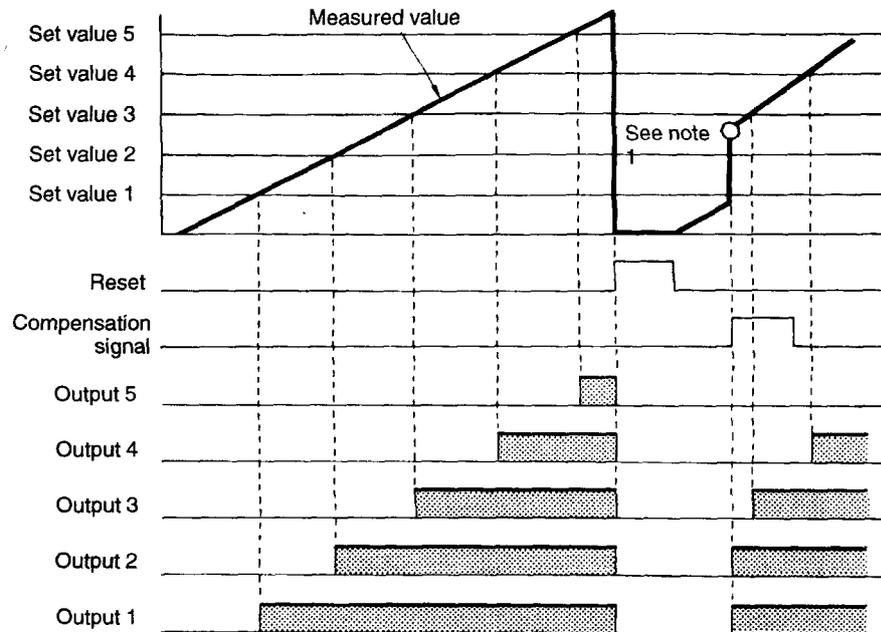
FUNCTION

Specifies the output mode of the comparative outputs OUT1, OUT2, OUT3, OUT4, or OUT5.

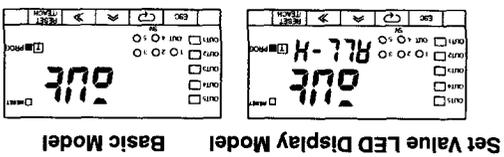
The K3NC is equipped with two output modes, ALL-H mode and ALL-L mode. The measured value is compared to set values 1 through 5 and the corresponding output (1 through 5) is turned ON if the measured value is above (ALL-H mode) or below (ALL-L mode) the set value.

ALL-H Mode

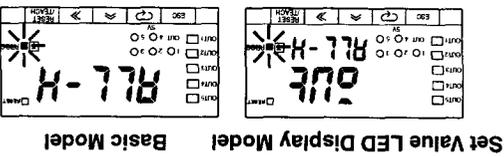
If ALL-H output mode is selected, outputs 1 to 5 will be ON when the measured value exceeds set values 1 to 5.



2. Repeatedly press the Mode Key until the *oUL* output mode setting is displayed.

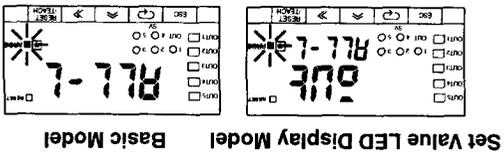


3. Press the Shift Key to display *RLL-H* for changing. The PROG indicator will flash.

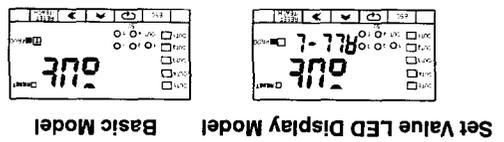


4. Press the Up Key to set the value to *RLL-L*. The input will be validated automatically if no change is made for five seconds. The *oUL* output mode setting will be displayed again.

Note Press the Mode Key to enter the displayed setting immediately. The next parameter will be displayed for setting.



When no operation is executed for five seconds



L5Et.H

Upper Limit (H) of Linear Output Range

L5Et.L

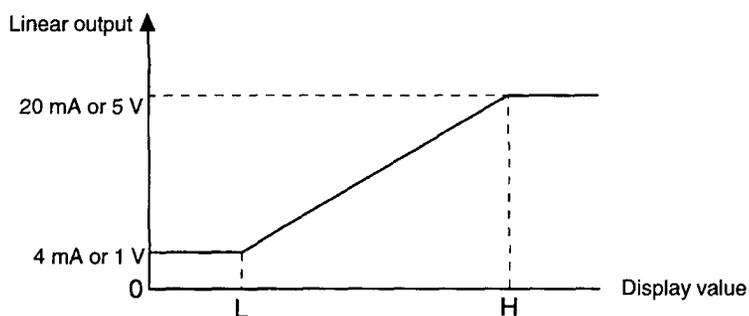
Lower Limit (L) of Linear Output Range



FUNCTION

Linear output setting is made in the option menu to enable the K3NC to have voltage or current output in proportion to the change in display value.

- The maximum and minimum values of linear output are set in this parameter.



- L can be greater or less than H.
- L cannot be the same as H, otherwise H will be automatically set to a value obtained by adding 1 to L.
- The teaching function can be used for setting linear output ranges.



SETTING

| Setting range | Default | |
|-----------------|-----------------------|--------|
| -19999 to 99999 | H linear output range | 99999 |
| | L linear output range | -19999 |



REFERENCE

Refer to 5-1 Teaching Function.



MODELS

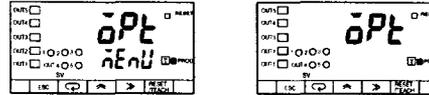
This setting is available for the K3NC with the Linear Output Board.

SETTING EXAMPLE

Follow the steps described below to set the following. (Assume that the decimal point is set between the second and third digits from the right in the prescale menu.)

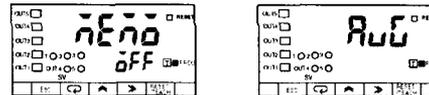
H: 100.00
L: 0.00

Set Value LED Display Model Basic Model



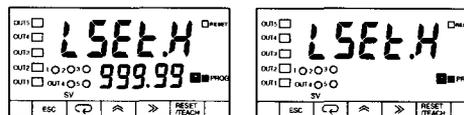
- 1, 2, 3... 1. Press the Mode Key for more than one second while the δPŁ option menu is displayed. The nEñU power failure memory setting will appear.

Set Value LED Display Model Basic Model



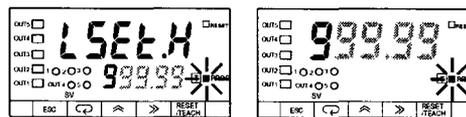
2. Repeatedly press the Mode Key until the LSEŁ.H H linear output range setting is displayed.

Set Value LED Display Model Basic Model



3. Press the Shift Key to display the prior set value 999.99 for changing. The PROG indicator will flash.

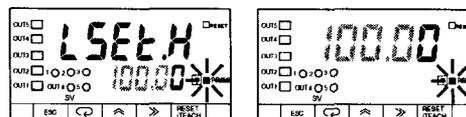
Set Value LED Display Model Basic Model



4. Press the Up and Shift Keys to set the value to 100.00. The setting will be validated automatically if no change is made for five seconds. The LSEŁ.H H linear output range setting will be displayed again.

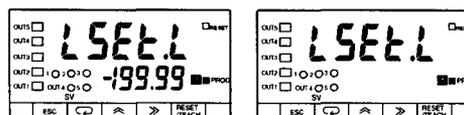
Note Press the Mode Key to enter the set value immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model



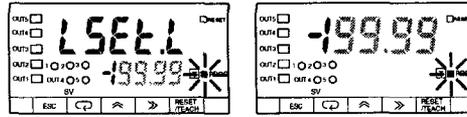
5. Press the Mode Key to display the LSEŁ.L L linear output range setting.

Set Value LED Display Model Basic Model



- Press the Shift Key to display the prior set value - 199.99 for changing. The PROG indicator will flash.

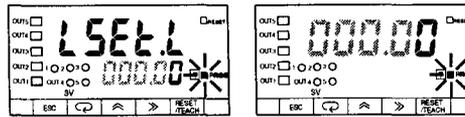
Set Value LED Display Model Basic Model



- Press the Up and Shift Keys to set the value to 000.00. The setting will be validated automatically if no change is made for five seconds. The LSEt.L L linear output range setting will be displayed again.

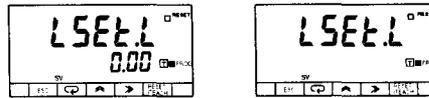
Note Press the Mode Key to enter the set value immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model



When no operation is executed for five seconds

Set Value LED Display Model Basic Model



r-L

Remote/Local Programming



FUNCTION



SETTING



MODELS

- The K3NC can be set to remote or local mode in the option menu. The K3NC in remote mode is operated through the host computer and the K3NC in local mode is operated through the front panel key input.

| Setting | Default |
|-------------------------------------|---------|
| Remote: r \bar{n} l Local: LLL | LLL |

This setting is available for the K3NC with the Communications Output Board.

SETTING EXAMPLE

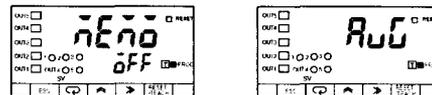
Follow the steps described below to set the K3NC to remote programming.

Set Value LED Display Model Basic Model



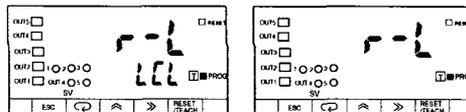
- 1, 2, 3... 1. Press the Mode Key for more than one second while the oPl option menu is displayed. The nEnU power failure memory setting will appear.

Set Value LED Display Model Basic Model



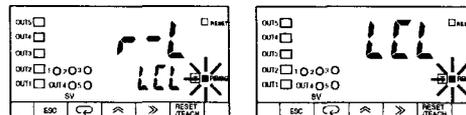
2. Repeatedly press the Mode Key until the r-L remote/local setting is displayed.

Set Value LED Display Model Basic Model



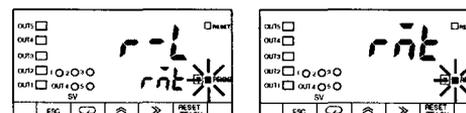
3. Press the Shift Key to display the prior setting LLL for changing. The PROG indicator will flash.

Set Value LED Display Model Basic Model



4. Press the Up Key to display r \bar{n} l.

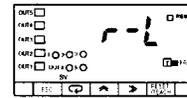
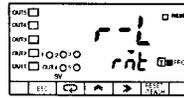
Set Value LED Display Model Basic Model



- 5. The setting will be validated automatically if no change is made for five seconds. The $\overline{\text{r-n-l}}$ power failure memory setting will appear.

Note Press the Mode Key to enter the setting immediately. The r-l remote/local setting will be displayed again.

Set Value LED Display Model Basic Model

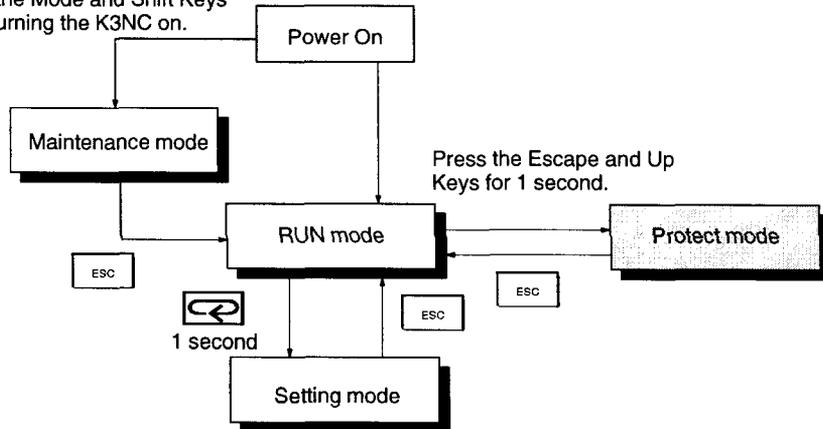


3-3 Protect Mode

3-3-1 Selecting Protect Mode

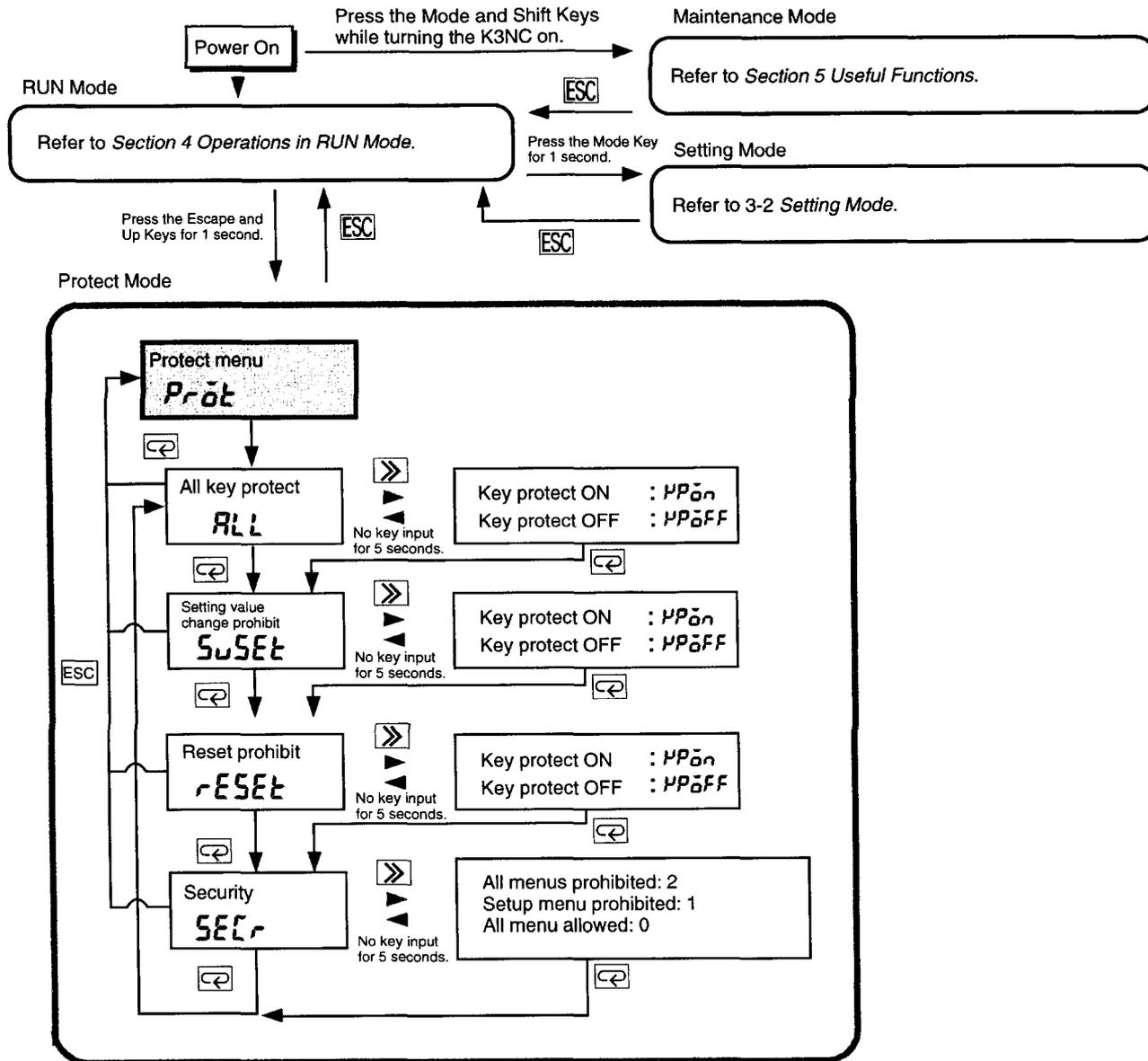
- The K3NC in RUN mode will go into protect mode if the Escape and Up Keys are pressed for more than 1 second.
- The K3NC in protect mode will go into RUN mode if the Escape Key is pressed.

Press the Mode and Shift Keys while turning the K3NC on.



- If the Mode Key is pressed for more than one second while a menu is displayed, a parameter will be displayed.
- The parameter changes whenever the Mode Key is pressed.
- If the Shift Key is pressed while a parameter is displayed, the parameter will be ready to change.
- Press the Up Key to change parameters.

3-3-2 Menu Overview



- Note**
1. The K3NC stops measurement in setting mode.
 2. Some menus cannot be set due to the display type or output type selected.

3-3-3 Protect Menu (Pr $\bar{o}t$)

ALL

All Key Protect



FUNCTION

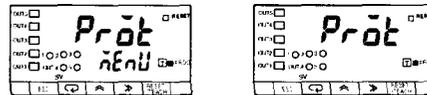
- The operation of all keys can be prohibited in the protect menu.

| Setting | Default |
|----------------------------------|----------------|
| Pr $\bar{o}n$: Key protect ON | Pr $\bar{o}FF$ |
| Pr $\bar{o}FF$: Key protect OFF | |

SETTING EXAMPLE

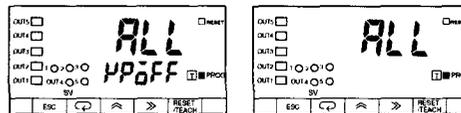
Follow the steps described below to set the key protect to ON.

Set Value LED Display Model Basic Model



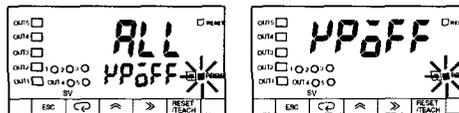
- 1, 2, 3... 1. Press the Mode Key for more than one second while the Pr $\bar{o}t$ protect menu is displayed. The ALL all key protect setting will appear.

Set Value LED Display Model Basic Model



2. Press the Shift Key to display the prior setting Pr $\bar{o}FF$ for changing. The PROG indicator will flash.

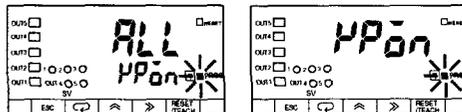
Set Value LED Display Model Basic Model



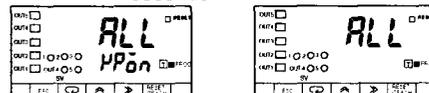
3. Press the Up Key to display Pr $\bar{o}n$. The setting will be validated automatically if no change is made for five seconds. The ALL all key protect setting will be displayed again.

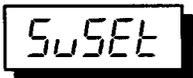
Note Press the Mode Key to enter the setting immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model



When no operation is executed for five seconds





Setting Value Change Prohibit



FUNCTION

- The setting value change of the K3NC in RUN mode with the front-panel key inputs can be prohibited in the protect menu.

| Setting | Default |
|-------------------------------------|-------------------|
| PP _{on} : Key protect ON | PP _{OFF} |
| PP _{OFF} : Key protect OFF | |



REFERENCE

Refer to 4-1 Checking and Changing Setting Values.



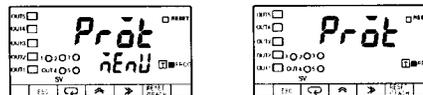
MODELS

This setting is only available for the K3NC with the Comparative Output Unit.

SETTING EXAMPLE

Follow the steps described below to set the setting value change prohibit to ON.

Set Value LED Display Model Basic Model



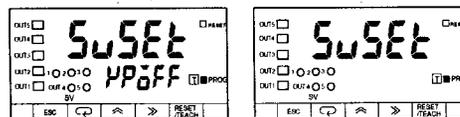
- 1, 2, 3... 1. Press the Mode Key for more than one second while the *Pröt* protect menu is displayed. The *ALL* all key protect setting will appear.

Set Value LED Display Model Basic Model



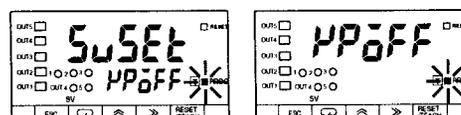
2. Press the Mode Key to display the *SuSEt* setting value prohibit setting.

Set Value LED Display Model Basic Model



3. Press the Shift Key to display the prior setting *PPOFF* for changing. The PROG indicator will flash.

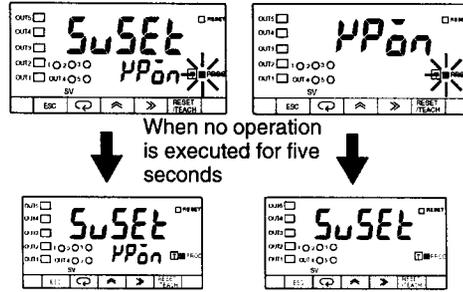
Set Value LED Display Model Basic Model



- 4. Press the Up Key to display $HP\bar{O}n$. The setting will be validated automatically if no change is made for five seconds. The $SuSEt$ setting value prohibit setting will be displayed again.

Note Press the Mode Key to enter the setting immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model



rESEt

Reset Prohibit



FUNCTION

- Prohibits the resetting of the counting value of the K3NC with key input.
- This function does not prohibit the resetting of the K3NC with external signal input.

| Setting | Default |
|----------------------------------|-----------------|
| HP \bar{o} n: Key protect ON | HP \bar{o} FF |
| HP \bar{o} FF: Key protect OFF | |



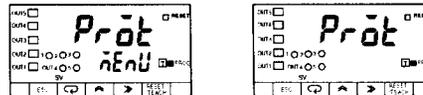
MODELS

Refer to 4-2 External Input Signals.

SETTING EXAMPLE

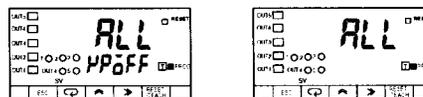
Follow the steps described below to set key protect ON.

Set Value LED Display Model Basic Model



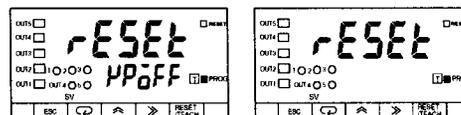
- 1, 2, 3... 1. Press the Mode Key for more than one second while the *Pröt* protect menu is displayed. The *ALL* all key protect setting will appear.

Set Value LED Display Model Basic Model



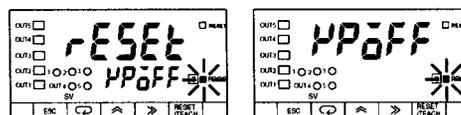
2. Press the Mode Key to display *rESEt* Reset prohibit setting.

Set Value LED Display Model Basic Model



3. Press the Shift Key to display *HPoFF* for changing. The PROG indicator will flash.

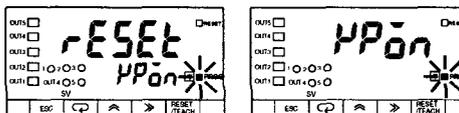
Set Value LED Display Model Basic Model



- Press the Up Key to display $HP\bar{0}n$. The displayed setting will be validated automatically if no change is made for five seconds. The $rESEt$ compensation setting will be displayed again.

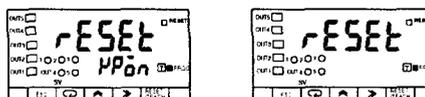
Note Press the Mode Key to enter the displayed setting immediately. The next parameter will be displayed for setting.

Set Value LED Display Model Basic Model



When no operation is executed for five seconds

Set Value LED Display Model Basic Model





Security



FUNCTION

- Settings in setting mode can be prohibited in the protect menu.
- The following table shows what set values for menus can be prohibited. The default is 0.

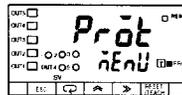
| Menu | Set value | | |
|---------------|-----------|------------|------------|
| | 0 | 1 | 2 |
| Setting value | | | Prohibited |
| Prescaling | | | Prohibited |
| Setup | | Prohibited | Prohibited |
| Option | | | Prohibited |

- The value changes in the following order with the Up Key: 0, 1, 2, and 0

SETTING EXAMPLE

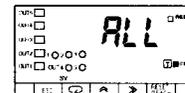
Follow the steps described below to set the security setting to 1.

Set Value LED Display Model Basic Model



- 1, 2, 3... 1. Press the Mode Key for more than one second while the *Pröt* protect menu is displayed. The *ALL* all key protect setting will appear.

Set Value LED Display Model Basic Model



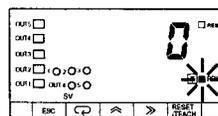
2. Repeatedly press the Mode Key until the *SECr* security setting is displayed.

Set Value LED Display Model Basic Model



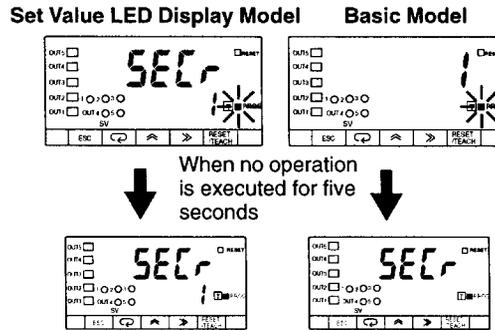
3. Press the Shift Key to display the prior set value *0* for changing. The PROG indicator will flash.

Set Value LED Display Model Basic Model



- 4. Press the Up Key to display *!*. The setting will be validated automatically if no change is made for five seconds. The *SEC* security setting will be displayed again.

Note Press the Mode Key to enter the setting immediately. The next parameter will be displayed for setting.





SECTION 4

Operations in RUN Mode

This section provides instructions for operating the K3NC in RUN mode.

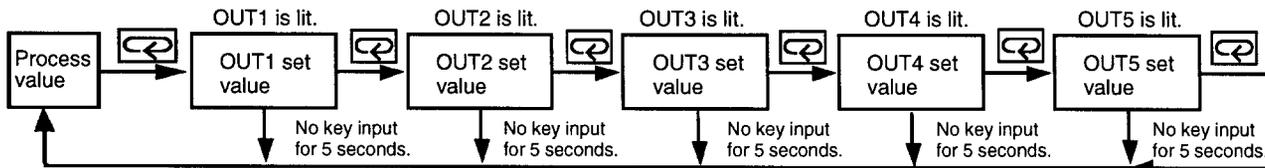
| | | |
|-------|----------------------------------------------|----|
| 4-1 | Displaying and Changing Setting Values | 64 |
| 4-1-1 | Displaying Setting Values | 64 |
| 4-1-2 | Changing Setting Values | 64 |
| 4-2 | External Input Signals | 66 |
| 4-2-1 | Bank Selection | 66 |
| 4-2-2 | RESET/COMPENSATION | 67 |

4-1 Displaying and Changing Setting Values

4-1-1 Displaying Setting Values

Basic Model

- When the Mode Key is pressed in RUN mode, the K3NC displays a setting value on the PV display (in the order of OUT1, OUT2, OUT3, OUT4 and OUT5).
- While the setting value is displayed, the corresponding SV display status indicator is lit.
- Unless another operation key is pressed within five seconds after the setting value is displayed, the process value is displayed again.



Set Value LED Display Model

- The setting value appears on the SV display and the corresponding SV display status indicator is lit while the process value is displayed on the PV display.
- When the Mode Key is pressed, the K3NC displays a setting value (in the order of OUT1, OUT2, OUT3, OUT4, and OUT5) on the SV display.

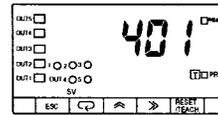
4-1-2 Changing Setting Values

- Setting values can be prohibited against change when key protect or setting value change prohibit is ON in protect mode.
- Select the setting value to be changed with the Mode Key.
- All digits will be displayed and ready for changing if the Shift Key is pressed.
- Press the Up and Shift Keys to change the displayed setting value. The input will be entered if nothing else is input within five seconds. The input is entered immediately by pressing the Mode Key.
- The next setting value will be displayed and ready for changing if the Mode Key is pressed. If nothing else is input within five seconds, the setting value will be entered and the previous setting value will be displayed.
- The setting value can be changed through communications if the K3NC is a model with a communications function.

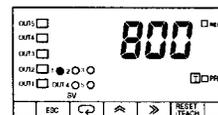
SETTING EXAMPLE

Basic Model

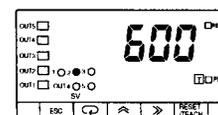
Follow the steps below to change the OUT2 setting value from 600 to 700 while the process value is displayed in RUN mode.



- 1, 2, 3... 1. Press the Mode Key to display the OUT1 setting value and to light the OUT1 indicator of the SV display status indicators.



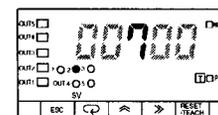
2. Press the Mode Key again to display the OUT2 setting value OUT2 and light the OUT2 indicator.



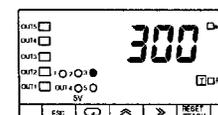
3. Press the Shift Key to display all the digits of the prior setting value 600 for changing.



4. Press the Up and Shift Keys to set the value to 00700.



5. The input will be entered if nothing else is input within five seconds.
or Press the Mode Key to display the OUT3 setting value for changing. The OUT2 setting value will appear again if nothing else is input within five seconds.



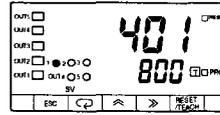
6. To return to the process value display, perform one of the following.
- Repeatedly press the Mode Key until the process value appears.
 - Leave the K3NC with no key input for five seconds.



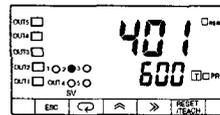
SETTING EXAMPLE

Set Value LED Display Model

Follow the steps below to change the OUT2 setting value from 600 to 700 while the process value is displayed in RUN mode, provided that the OUT1 setting value is already displayed on the SV display.



- 1, 2, 3... 1. Press the Mode Key to display the OUT2 setting value and to light the OUT2 indicator of the SV display status indicators.



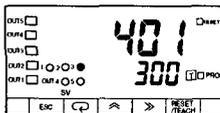
2. Press the Shift Key to display all the digits of the setting value 600 for changing.



3. Press the Up and Shift Keys to set the value to 00700.



4. The input will be entered if nothing else is input within five seconds.
 or Press the Mode Key to display the OUT3 setting value for changing. The OUT2 setting value will appear again if nothing else is input within five seconds.



4-2 External Input Signals

4-2-1 Bank Selection

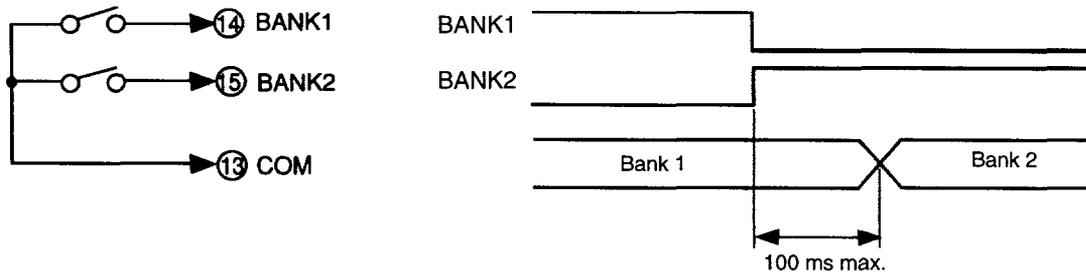
- The K3NC uses BANK1 and BANK2 signals to select the set value, prescaling value, and decimal point position of the bank 1, 2, 3, or 4.

Refer to the following for the relationship between bank signals and bank numbers.

| Bank no. | BANK 1 | BANK 2 | Comparative set value | Prescaling value |
|----------|--------|--------|-----------------------|------------------|
| 1 | OFF | OFF | SV1.** | PS1.** |
| 2 | ON | OFF | SV2.** | PS2.** |
| 3 | OFF | ON | SV3.** | PS3.** |
| 4 | ON | ON | SV4.** | PS4.** |

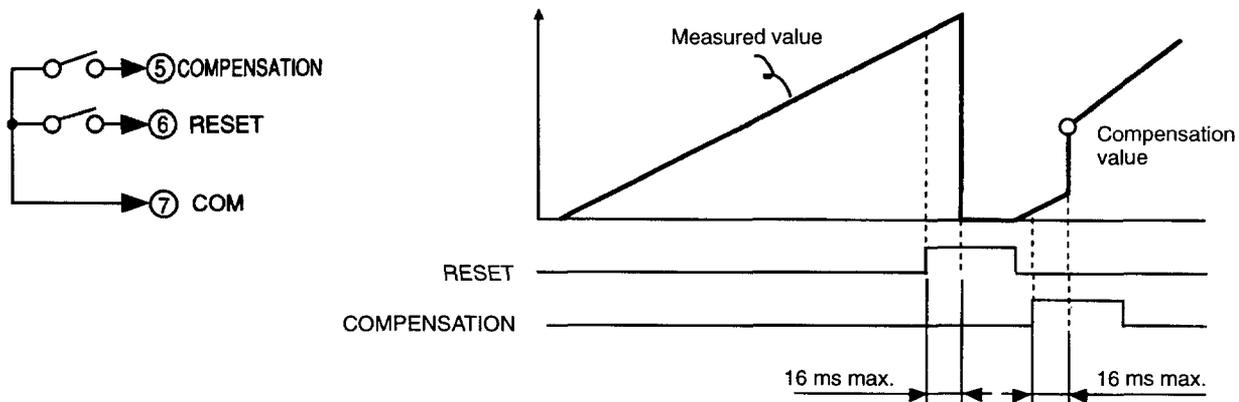
Note If the prescaling bank is set to OFF, the *P5CL* prescaling value for each bank will be fixed.

- When a bank is selected, the corresponding BANK indicator 1, 2, 3, or 4 will be lit.
- It takes a maximum of 100 ms to for a bank switching after BANK1 and BANK2 signals are input.



4-2-2 RESET/COMPENSATION

- When the RESET signal is ON, the measured value will be forced to zero and the RESET indicator will be lit.
- When the COMPENSATION signal is ON, the measured value will be forced to a value set in the compensation menu.
- It takes a maximum of 16 ms from the time when the RESET signal is input to the time when the measured value is reset.
- It takes a maximum of 16 ms from the time when the COMPENSATION signal is input to the time when the measured value is reset to the compensation value.





SECTION 5

Useful Functions

This section provides information on the teaching, output test, and maintenance mode functions of the K3NC.

| | | |
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| 5-1 | Teaching Function | 70 |
| 5-1-1 | Set Value | 70 |
| 5-1-2 | Prescaling Value | 71 |
| 5-1-3 | Linear Output Range | 73 |
| 5-2 | Output Test | 74 |
| 5-3 | Maintenance Mode | 75 |
| 5-3-1 | Maintenance Mode | 75 |
| 5-3-2 | Initialization | 75 |

5-1 Teaching Function

5-1-1 Set Value

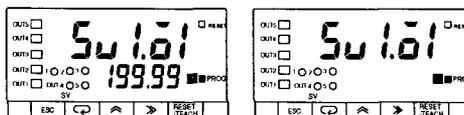
- A setting value can be set with the actual input instead of key input in the setting mode.
- Follow the steps below to teach the setting value.

- 1, 2, 3...**
1. Press the RESET/TEACH Key for more than one second while the parameter is displayed. The process value will be displayed and the teaching indicator will flash.
 2. Press the RESET/TEACH Key again to retrieve the process value immediately before the key was pressed as a set value. The teaching indicator will be lit and the parameter will be displayed. Press the Escape Key to interrupt teaching.

SETTING EXAMPLE

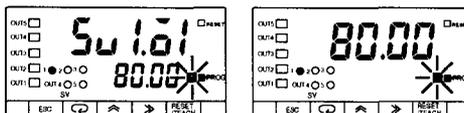
Follow the steps described below to set the OUT1 set value by using the teaching function.

Set Value LED Display Model Basic Model



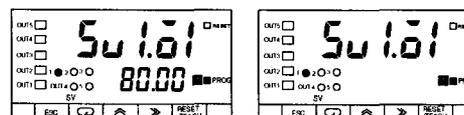
- 1, 2, 3...**
1. Press the RESET/TEACH Key for more than one second while the parameter is displayed. The process value will be displayed and the teaching indicator will flash.

Set Value LED Display Model Basic Model



2. Press the RESET/TEACH Key again to retrieve the process value immediately before the key was pressed as a set value for changing. The teaching indicator will be lit and the parameter is displayed.

Set Value LED Display Model Basic Model



5-1-2 Prescaling Value

- A scaling input value can be set using the actual measured value instead of key input in the prescaling menu.
- Input the process value as a reference value at the time of teaching.
- The prescaling value is calculated automatically by setting the present value displayed by the RESET/TEACH Key to an appropriate value.
 If the process value is 50 at the time of teaching and the target value is 1, the prescaling value is obtainable from the following.

$$\text{Value to be displayed/Process value} = 1/50 = 0.02$$
 Therefore, the X (mantissa) and Y (exponent) in the *P5CL* prescaling menu are set to 2 and -2 respectively

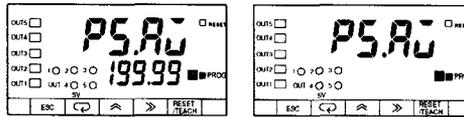
- Take the following steps for teaching.
 - 1, 2, 3... 1. Press the RESET/TEACH Key for more than one second while the K3NC is in the state of parameter display. The teaching indicator will flash and the process value will be displayed.
 2. Press the RESET/TEACH Key again to change the present setting. Press the Up and Shift Keys to set the value to be displayed. Press the Escape Key to interrupt teaching.
 3. Press the RESET/TEACH Key again to set the prescaling value.

SETTING EXAMPLE

Follow the steps described below to use the teaching function to make the K3NC display 60 as 100.00.

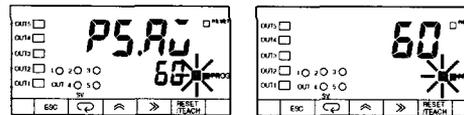
Note In this example, all bank settings are disabled.

Set Value LED Display Model Basic Model



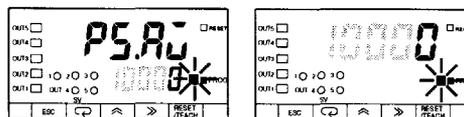
- 1, 2, 3... 1. Press the RESET/TEACH Key for more than one second while the K3NC is in the state of parameter display. The teaching indicator will flash.

Set Value LED Display Model Basic Model



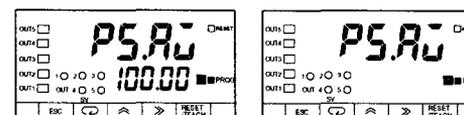
2. Press the RESET/TEACH Key again to change the present setting. Press the Up and Shift Keys to set the value to be displayed.

Set Value LED Display Model Basic Model



3. Press the RESET/TEACH Key again to set the prescaling value.

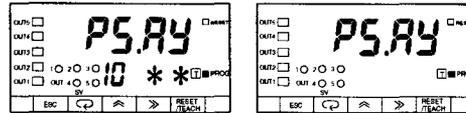
Set Value LED Display Model Basic Model



- Press the Mode Key to display *PS.RY* input prescaling value Y (exponent) setting.

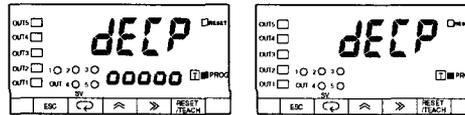
Note The asterisks indicate appropriate values.

Set Value LED Display Model Basic Model



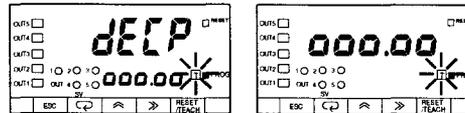
- Press the Mode Key to display the *dECP* decimal point position setting.

Set Value LED Display Model Basic Model



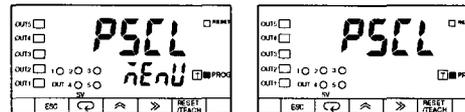
- Press the Shift Key to set *000.00*. The displayed setting will be validated automatically if no change is made for five seconds. The *dECP* decimal point position setting will be displayed again.

Set Value LED Display Model Basic Model



- Press the Escape Key to display the *PSCL* prescaling menu.

Set Value LED Display Model Basic Model



5-1-3 Linear Output Range

The teaching function can be also used to set the linear output range of the K3NC with the Linear Output Board.

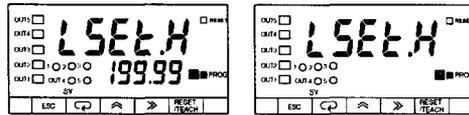
- The H and L linear output ranges can be set using the actual measured value instead of key input in the option menu.
- Follow the steps below to teach the setting value.

- 1, 2, 3...
1. Press the RESET/TEACH Key for more than one second while the parameter is displayed. The process value will be displayed and the teaching indicator will flash.
 2. Press the RESET/TEACH Key again to retrieve the process value immediately before the key was pressed as a set value. The teaching indicator will be lit and the parameter will be displayed. Press the Escape Key to interrupt teaching.

SETTING EXAMPLE

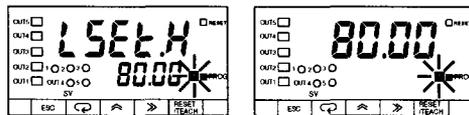
Follow the steps described below to set the H linear output range by using the teaching function.

Set Value LED Display Model Basic Model



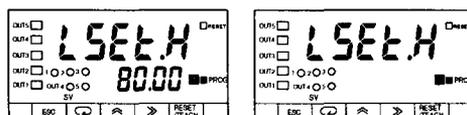
- 1, 2, 3...
1. Press the RESET/TEACH Key for more than one second while the parameter is displayed. The process value will be displayed and the teaching indicator will flash.

Set Value LED Display Model Basic Model



2. Press the RESET/TEACH Key again to retrieve the process value immediately before the key was pressed as a set value for changing. The teaching indicator will be lit and the parameter will be displayed. Press the Escape Key to interrupt teaching.

Set Value LED Display Model Basic Model



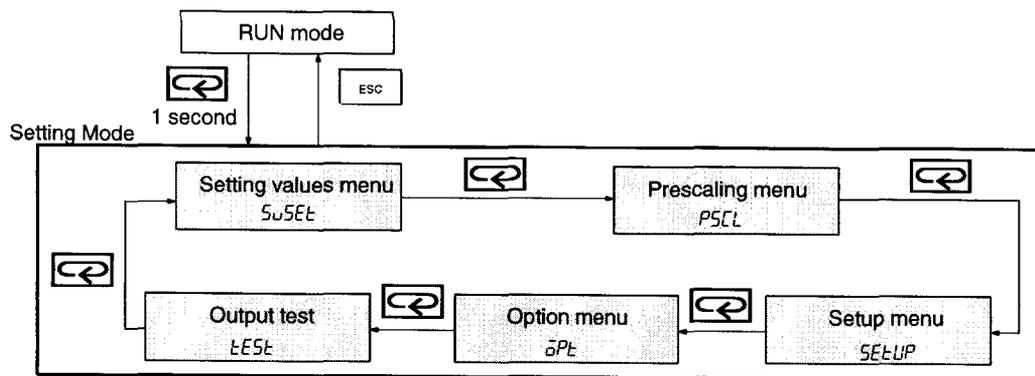
5-2 Output Test

This function is convenient for checking a system to which the K3NC is connected, especially when some inputs cannot be operated. The K3NC simulates an input signal to check the output conditions.

Note The K3NC has output according to the simulated input in this menu. If there is any device connected to the output of the K3NC, be sure that the output will not have a negative influence on the device before testing the system.

- Follow the steps described below to perform the test.

- 1, 2, 3...
1. While the K3NC is in RUN mode, press the Escape Key for more than one second to set the K3NC to the setting mode.
 2. Repeatedly press the Mode Key until the *EESE* output test setting is displayed.



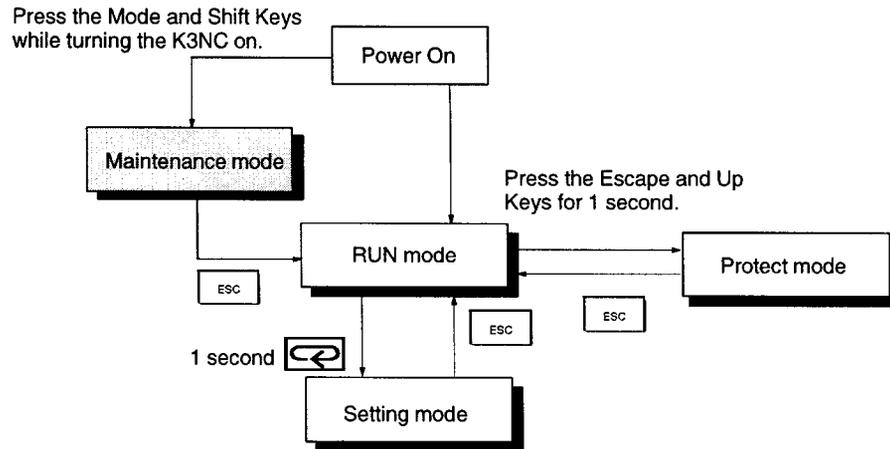
3. Press the Mode Key for more than one second to display 0, which is a simulated input value.
 4. The simulated input value increases when the Up Key is pressed. Output 1 through 5 are output according to the output pattern that has been preset.
 5. The simulated input value decreases when the Shift Key is pressed. Output 1 through 5 are output according to the output pattern that has been preset.
 6. Press the Escape Key after testing. The *EESE* output test setting will be displayed again.
 7. Press the Escape Key to return to the RUN mode.
- To change the simulated input value continuously, keep pressing the Up or Shift Key.

5-3 Maintenance Mode

The set values of the K3NC can be initialized in maintenance mode. The operations of the K3NC in this mode are described below.

5-3-1 Maintenance Mode

- The K3NC will be in maintenance mode if the Mode and Shift Keys are pressed simultaneously while the K3NC is turned on.
- The K3NC in maintenance mode will go into RUN mode if the Escape Key is pressed.

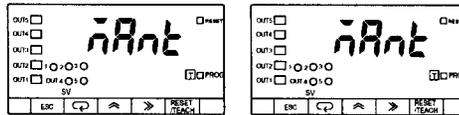


5-3-2 Initialization

Follow the steps described below to reset the set values of the K3NC to factory-set values.

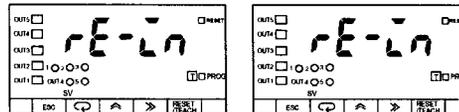
- 1, 2, 3... 1. Press the Mode and Shift Keys simultaneously while turning the K3NC on. The $\bar{n}A\bar{n}t$ maintenance mode setting will be displayed.

Set Value LED Display Model Basic Model



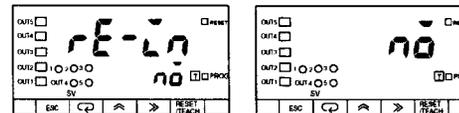
2. Press the Mode Key for more than one second. The $rE-\bar{L}n$ initialization setting will be displayed.

Set Value LED Display Model Basic Model

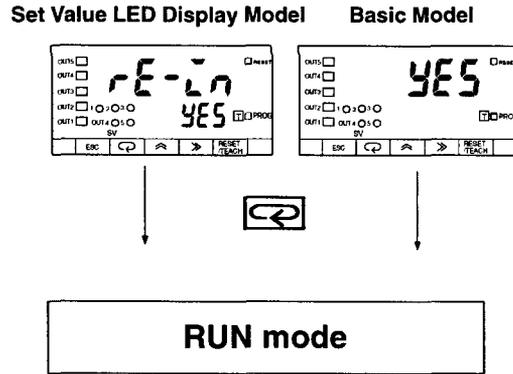


3. Press the Up Key to display $n\bar{o}$.

Set Value LED Display Model Basic Model



- 4. Press the Up Key to display *YES*. Press the Mode Key to initialize all set values. The K3NC will go into RUN mode.



SECTION 6

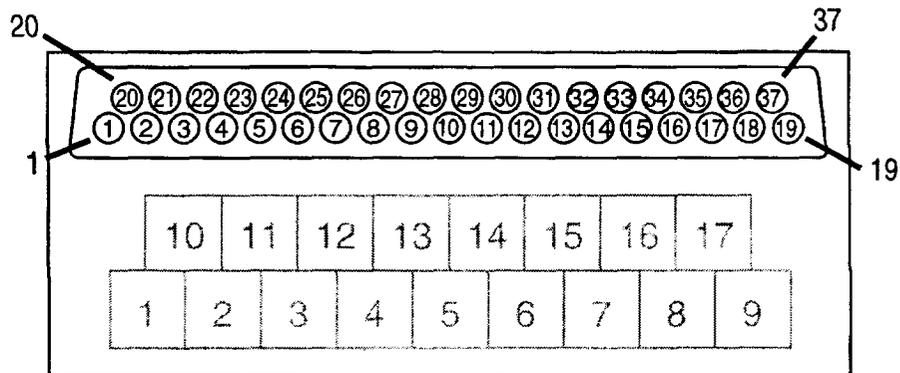
BCD Output

This section provides information on the use of the K3NC with the BCD Output Board.

| | | |
|-----|---------------------|----|
| 6-1 | Connectors | 78 |
| 6-2 | Timing Charts | 81 |

6-1 Connectors

Terminal Arrangement



| Terminal number | Signal name | Signal direction | Use |
|-----------------|--------------|------------------|----------------------------------------------------------|
| 1 | COM | --- | GND:VO (See note 1.) |
| 2 | RD1-1 | Output | 1: Read data 10^0 digit |
| 3 | RD1-2 | Output | 2: Read data 10^0 digit |
| 4 | RD1-4 | Output | 4: Read data 10^0 digit |
| 5 | RD1-8 | Output | 8: Read data 10^0 digit |
| 6 | RD2-1 | Output | 1: Read data 10^1 digit |
| 7 | RD2-2 | Output | 2: Read data 10^1 digit |
| 8 | RD2-4 | Output | 4: Read data 10^1 digit |
| 9 | RD2-8 | Output | 8: Read data 10^1 digit |
| 10 | RD3-1 | Output | 1: Read data 10^2 digit |
| 11 | RD3-2 | Output | 2: Read data 10^2 digit |
| 12 | RD3-4 | Output | 4: Read data 10^2 digit |
| 13 | RD3-8 | Output | 8: Read data 10^2 digit |
| 14 | RD4-1 | Output | 1: Read data 10^3 digit |
| 15 | RD4-2 | Output | 2: Read data 10^3 digit |
| 16 | RD4-4 | Output | 4: Read data 10^3 digit |
| 17 | RD4-8 | Output | 8: Read data 10^3 digit |
| 18 | RD5-1 | Output | 1: Read data 10^4 digit |
| 19 | RD5-2 | Output | 2: Read data 10^4 digit |
| 20 | RD5-4 | Output | 4: Read data 10^4 digit |
| 21 | RD5-8 | Output | 8: Read data 10^4 digit |
| 22 | OVER | Output | Output when input value is not within the display range. |
| 23 | D - V | Output | Data confirmation signal |
| 24 | RUN | Output | Operation signal |
| 25 | COM | --- | GND:VO (See note 1.) |
| 26 | REQ | Input | PV output request |
| 27 | NC | --- | Not used |
| 28 | NC | --- | Not used |
| 29 | Compensation | Input | Compensation input |
| 30 | RESET | Input | Reset input |
| 31 | POL | Output | Positive/Negative polarity signal |
| 32 | OUT5 | Output | Output 5 (See note 2.) |
| 33 | OUT4 | Output | Output 4 (See note 2.) |
| 34 | OUT3 | Output | Output 3 (See note 2.) |
| 35 | OUT2 | Output | Output 2 (See note 2.) |

| Terminal number | Signal name | Signal direction | Use |
|-----------------|-------------|------------------|------------------------|
| 36 | OUT1 | Output | Output 1 (See note 2.) |
| 37 | COM | Output | GND:VO (See note 1.) |

- Note**
1. Terminals 1, 25, and 37 have the same COM.
 2. Refer to *2-3 Output Board* for comparative outputs.

Applicable Connectors

Use the connector provided with the K3NC or an equivalent connector for the cable connecting to the BCD output connector.

The following connectors are provided with the K3NC.

Plug: XM2A-3701 (OMRON)

Hood: XM2S-3711 (OMRON)

The depth required for the installation of the K3NC is 200 mm min. in consideration of the space required by the cable.

Connecting Conditions

Refer to the following for the connecting conditions of each I/O. Refer to *2-3 Output Block* for output signals OUT5 through OUT1.

- Input

Input current with no voltage input: 10 mA

Signal level

ON voltage: 1.5 V max.

OFF voltage: 3 V min.

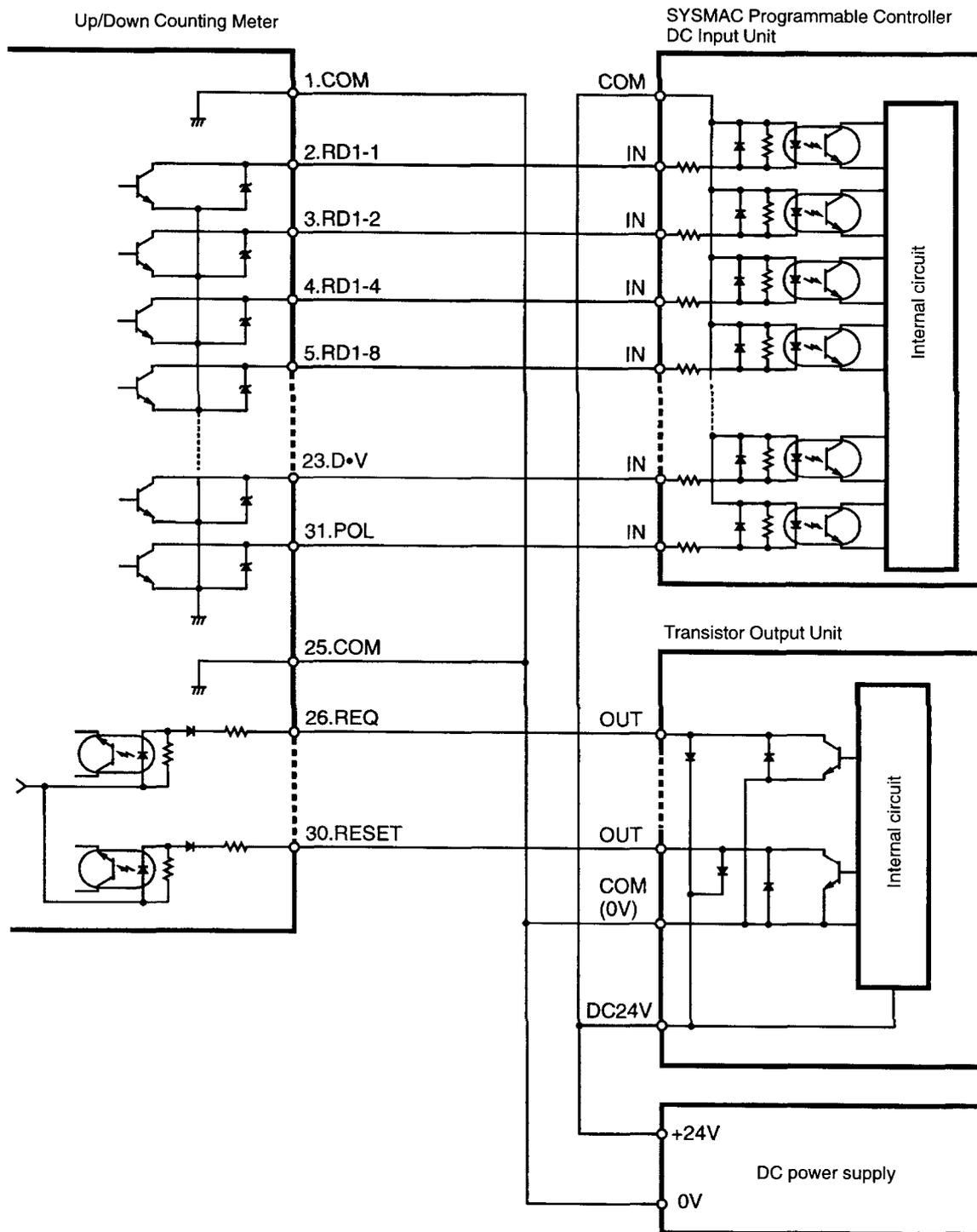
- Output

Rated load voltage: 24 VDC

Rated load current: 10 mA

Current leakage: 10 μ A max.

Connection Example



Note 1. Connect RD2-1 through RD2-4, RS3-1 through RS3-4, RD4-1 through RD4-4, and RD5-1 through RD5-4 in the same way as RD1-1 through RD1-4.

2. Connect the RUN and OVER signals if they are used as status data.

Signals

When the COMPENSATION signal is ON, the measurement operation stops and the process value input effective immediately before the COMPENSATION signal is retained.

When the RESET signal is ON, the counting value is reset to 0.

The OVER signal is ON when the input value is not within the display range.

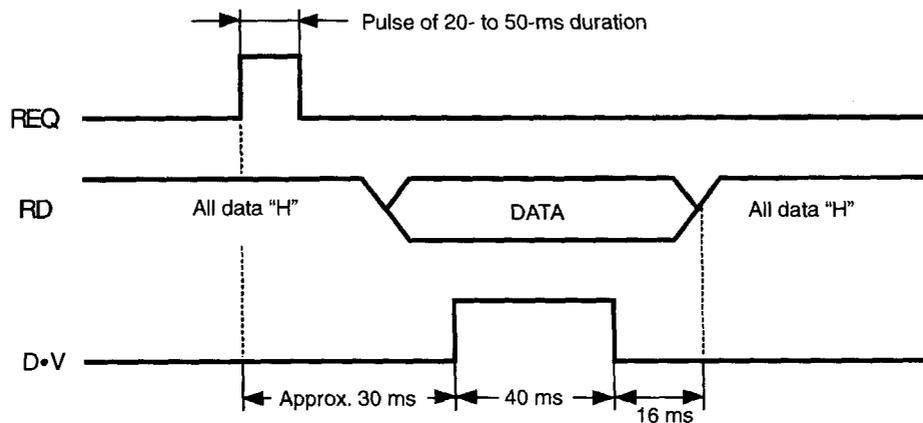
The process value is output when the REQ signal is ON at the time the output is tested in output test.

Multiple input signals must not turn ON. If multiple input signals turn ON or a single signal input is combined with another signal input, all output data will be turned OFF except for the COMPENSATION and RESET signals.

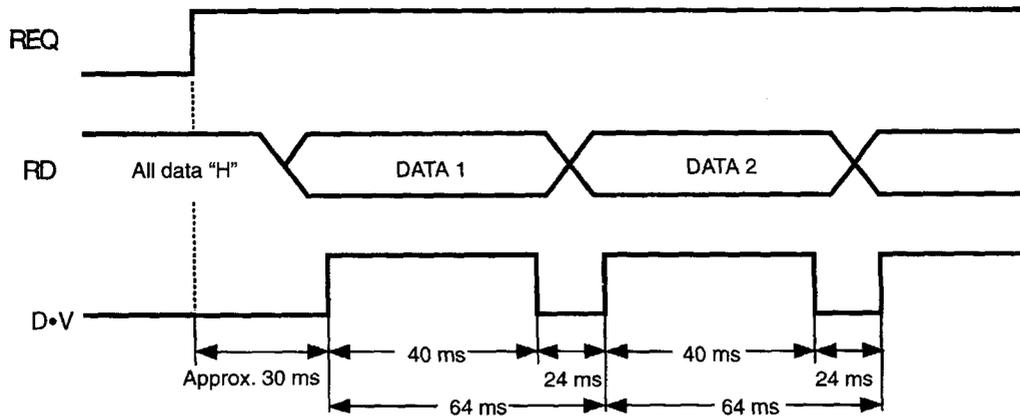
6-2 Timing Charts

When a REQ signal is input from a Programmable Controller to the K3NC in RUN or output test, the K3NC outputs a DATA VALID (D•V) signal. In other cases, the K3NC has All Signals OFF (H) output.

Refer to the following for the timing of each signal.



The REQ signal must be kept ON as shown below if the K3NC has continuous data output.



The polarity of the data must be checked with a POLARITY signal. The polarity is positive when the POLARITY signal is OFF and negative when the POLARITY signal is ON.

The K3NC in output test has test data output regardless of the type of REQ signal.

Operating Conditions

The RUN signal is turned ON in RUN or output test. The RUN signal is, however, turned OFF when an error other than overflow results.

Do not input multiple signals, otherwise all output data will be turned OFF.



SECTION 7

Troubleshooting

This section provides information for troubleshooting the K3NC.

| | | |
|-------|---------------------------------|----|
| 7-1 | Items to Be Checked First | 84 |
| 7-2 | Display | 84 |
| 7-2-1 | Flashing | 84 |
| 7-2-2 | Error Message | 84 |

7-1 Items to Be Checked First

First, check the following three items if the K3NC has any problems during operation.

- 1, 2, 3...
1. **Power Supply**
Be sure that power supplied to the K3NC is within the rated voltage range.
 2. **Wiring**
Be sure that the K3NC is wired correctly.
 3. **Communications Conditions**
If the model is a K3NC with the Communications Output Board, be sure that the baud rate and unit numbers are correct.

After checking and remedying the above items, if the K3NC still has problems during operation, check the error message.

7-2 Display

7-2-1 Flashing

The display will flash in the following cases.

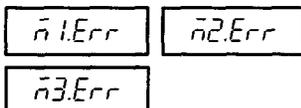
- The input or process value is not within the display range.
If the display flashes the output status will be as follows:
Models with BCD Output Board: The OVER signal will be ON.
Models with Communications Output Board: The OVER or UNDER signal will be ON and other output signals will be retained.
- The display will flash for three seconds if an attempt is made to change a setting on the K3NC. Set to remote programming to accept key input.

7-2-2 Error Message

The error condition can be checked with the error message.

The K3NC will have the following output statuses when an error message is displayed.

- OUT5, 4, 3, 2 and 1 will all be OFF.
- Linear output will be limited to the minimum value.
- The type of BCD output will be All Outputs OFF (H).
- The Unit error response will be returned from the model with a communications function.



Memory Error

Meaning of Error

The internal memory has an error.

Remedy

Turn the K3NC off and on. If the memory error still exists, the K3NC will need to be repaired. If the K3NC returns to normal operation, the K3NC may have been affected by noise. Check if there is any source of noise generation near the K3NC.



Output Error

Meaning of Error

The internal circuit has an error.

Remedy

Turn the K3NC off and on. If the output error still exists, the K3NC will need to be repaired.

Appendix A 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±10% (Use a power supply of less than 50 VAC or 70 VDC for input signals.) |
| Insulation resistance | 20 MΩ 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 | ±1,500 V on power supply terminals in normal or common mode ±1 μs, 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 start-up compensation time), the display will read "00000" and all outputs will be OFF.

Input/Output Ratings

Relay Contact Output

(Incorporating a G6B Relay)

| | | |
|--------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------|
| 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) | |
| Communica- tions | Write to K3NC | Comparative set value, prescaling value, remote/local programming, reset control of maximum/minimum values, and other setting mode items excluding communications conditions. | |
| | Read from K3NC | Process value, comparative set value, maximum value, minimum 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 (3 or 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) |

Appendix B List of Settings

Use this sheet to keep a record of set values.

| Menu | Parameter | Setting range | Set value |
|------------------------------------------|--------------------------------|---------------------------------------------------|-----------|
| S _U SEt Setting value menu | S _b Rn ^P | Bank no. (1 to 4) of set values | |
| | S _U *ō1 | OUT1 set value (- 19999 to 99999) | |
| | S _U *ō2 | OUT2 set value (- 19999 to 99999) | |
| | S _U *ō3 | OUT3 set value (- 19999 to 99999) | |
| | S _U *ō4 | OUT4 set value (- 19999 to 99999) | |
| | S _U *ō5 | OUT5 set value (- 19999 to 99999) | |
| P5CL Prescaling menu | P _b Rn ^P | Bank no. (ōFF/ 1 to 4) of prescale values | |
| | P5* _R ō | Prescaling value X (mantissa) (0.000 1 to 9.9999) | |
| | P5* _R Y | Prescaling value Y (exponent) (-9 to 09) | |
| | dECP.* | Decimal point position | |
| SEtUP Setup menu | EōUn ^t | Input modes (U-db/U-dC) | |
| | ō _n | Sensor type (00, 0 1, 10, 1 1) | |
| | U-nō | Communications unit no. (00 to 99) | |
| | bP5 | Baud rate (1200/2400/4800/9600/ 19200/38400) | |
| | LE _n | Word length (7/8) | |
| | Sbōt | Stop bits (1/2) | |
| | P _r tY | Parity bits (nōnE: None; EōEn: Even; ōdd: Odd) | |
| ōP _t Option menu | nE _n ō | Power failure memory (ōn/ōFF) | |
| | Eō _n P _n | Compensation value (- 19999 to 99999) | |
| | Eō _n -P | Compensation input status (ALL/PLUS) | |
| | ōU _t | Output modes (ALL-H/ALL-L) | |
| | LSEt.H | H linear output range (- 19999 to 99999) | |
| | LSEt.L | L linear output range (- 19999 to 99999) | |
| | r-L | Remote/Local processing (rōt: Remote; LCL: Local) | |

Note The selected bank number will be displayed where an asterisk (*) appears.

Appendix C Available Models

Base Units

| Input type Supply voltage | NPN/Voltage pulse | | PNP | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|----------------|--------------|
| | 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 |
| Relay contact | 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 |
| Transistor | 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 91.

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.

Appendix D Available Parameters

Available parameters vary with the output board of the K3NC and are indicated as "YES" in the following table.

Setting Mode

| Menu | Parameter | Output board | | | | | | | |
|-----------------------------|-------------------------------------------------|--------------|--------------|-----|-----|------------------|-------------------|------------------|------------------|
| | | No output | C2/C5 /T1/T2 | B2 | B4 | L1/L2/ L3/L7/ L8 | L4/L5/ L6/L9/ L10 | FLK1/ FLK2/ FLK3 | FLK4/ FLK5/ FLK6 |
| SvSEt Setting value menu | S.brn# Set value bank no. | | YES | | YES | | YES | | YES |
| | Sv*.o1 OUT1 set value | | YES | | YES | | YES | | YES |
| | Sv*.o2 OUT2 set value | | YES | | YES | | YES | | YES |
| | Sv*.o3 OUT3 set value | | YES | | YES | | YES | | YES |
| | Sv*.o4 OUT4 set value | | YES | | YES | | YES | | YES |
| | Sv*.o5 OUT5 set value | | YES | | YES | | YES | | YES |
| PScL Prescaling menu | P.brn# Prescaling bank no. | YES | YES | YES | YES | YES | YES | YES | YES |
| | P5*.R0 Prescaling value X (mantissa) of input A | YES | YES | YES | YES | YES | YES | YES | YES |
| | P5*.R4 Prescaling value Y (exponent) of input A | YES | YES | YES | YES | YES | YES | YES | YES |
| | dEEP.* Decimal point position | YES | YES | YES | YES | YES | YES | YES | YES |
| SEtUP Setup menu | COunt Input modes | YES | YES | YES | YES | YES | YES | YES | YES |
| | cn Sensor type | YES | YES | YES | YES | YES | YES | YES | YES |
| | U.no Unit no. | | | | | | | YES | YES |
| | bP5 Baud rate | | | | | | | YES | YES |
| | LEn Word length | | | | | | | YES | YES |
| | SbLt Stop bits | | | | | | | YES | YES |
| | PrLY Parity bits | | | | | | | YES | YES |
| oPt Option menu | nEno Power failure memory | YES | YES | YES | YES | YES | YES | YES | YES |
| | CO.nPn Compensation value | YES | YES | YES | YES | YES | YES | YES | YES |
| | CO.n-P Compensation input status | YES | YES | YES | YES | YES | YES | YES | YES |
| | oUt Output modes | | YES | | YES | | YES | | YES |
| | LSEt.H H linear output range | | | | | YES (note 1) | YES (note 1) | | |
| | LSEt.L L linear output range | | | | | YES (note 1) | YES (note 1) | | |
| | r-L Remote/Local processing | | | | | | | YES | YES |

Protect Mode

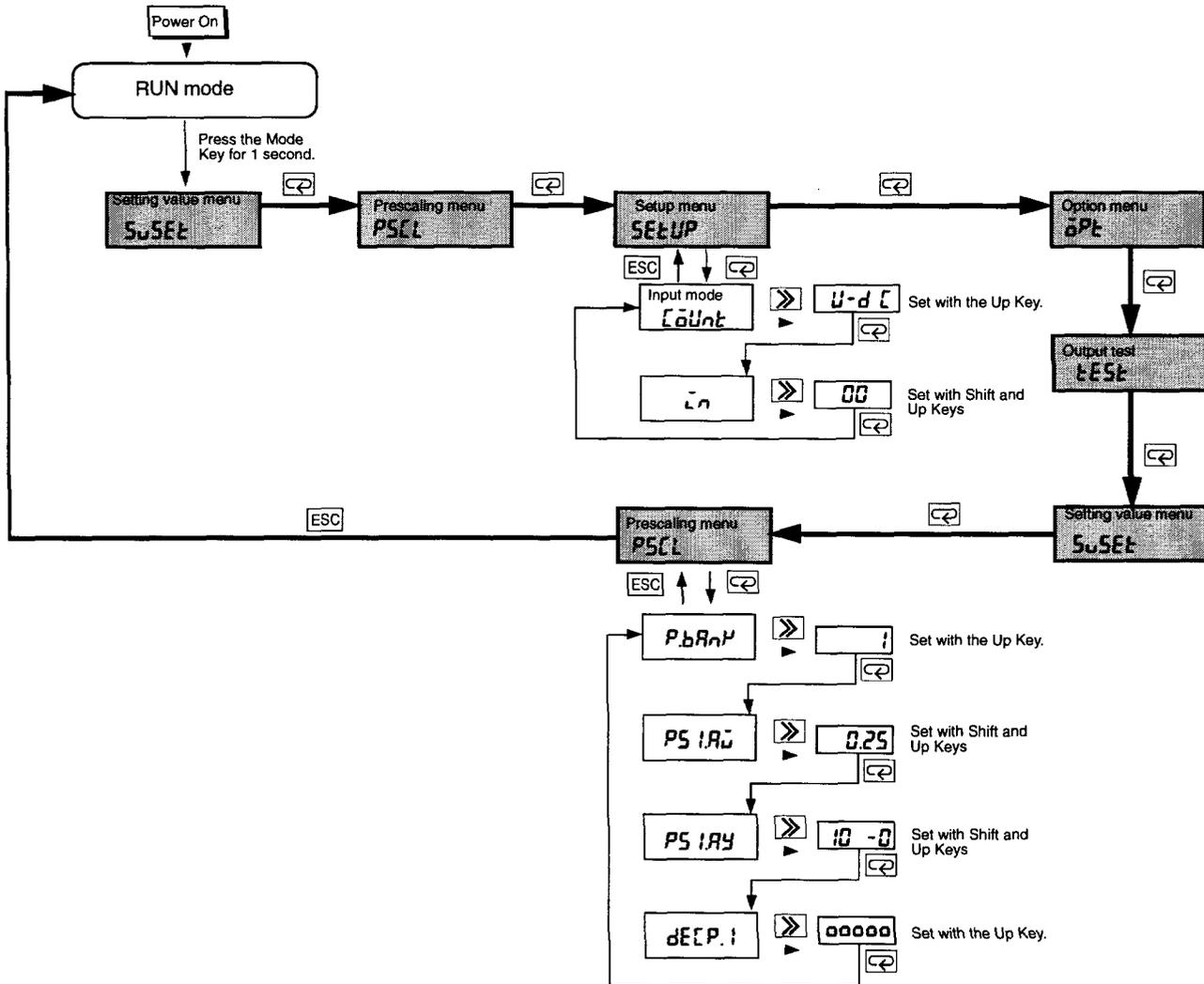
| Menu | Parameter | Output board | | | | | | | |
|----------------------|---------------------------------|--------------|--------------|-----|-----|------------------|-------------------|------------------|------------------|
| | | No output | C2/C5 /T1/T2 | B2 | B4 | L1/L2/ L3/L7/ L8 | L4/L5/ L6/L9/ L10 | FLK1/ FLK2/ FLK3 | FLK4/ FLK5/ FLK6 |
| Prōt Protect menu | RLL All key protect | | YES | YES | YES | YES | YES | YES | YES |
| | SvSEt Set value change prohibit | | YES | | YES | | YES | | YES |
| | rESEt Reset prohibit | YES | YES | YES | YES | YES | YES | YES | YES |
| | SECr Security | YES | YES | YES | YES | YES | YES | YES | YES |

- Note**
1. The linear output range cannot be set with the K31-L3 and K31-L6 Output Boards.
 2. The selected bank number will be displayed where an asterisk (*) appears.



Appendix E Setting Examples

In the following example, the K3NC counts four pulses as one unit on condition that the prescaling bank is set to 1, a sensor with transistor output is in use, and the prescaling value is set to 1/4 (0.25) with phase-differential input.



- Note**
1. If the input mode setting is changed, all the other parameters are set to default values except those for the communications and protect settings. Therefore, set the input mode first.
 2. The displayed setting will be validated automatically if no change is made for five seconds and the next parameter will be displayed.



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