CEU Series   CE Series
Counter/Extension Cable

Note) CE-compliant: When connecting to a stroke reading cylinder (CE1), a high precision stroke reading cylinder (CEP1) and a stroke reading cylinder with brake (CE2). (CEU5□□-D type) Refer to the operation manual for details.
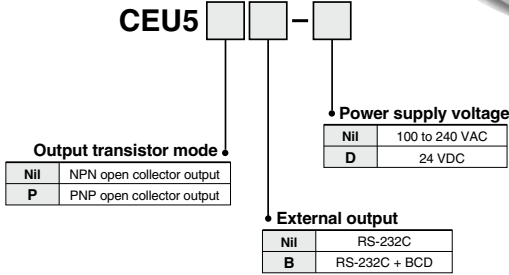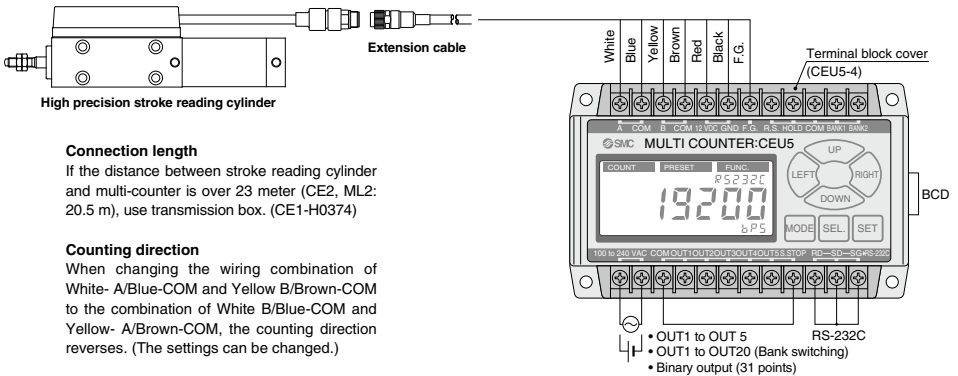
■ Multi-counter

RoHS

How to Order

CEU5 ☐☐ – ☐

CEP1
CE1
CE2
ML2B

Power supply voltage

Nil	100 to 240 VAC
D	24 VDC

Output transistor mode

Nil	NPN open collector output
P	PNP open collector output

External output

Nil	RS-232C
B	RS-232C + BCD

Connection Method

High precision stroke reading cylinder

Extension cable

White
Blue
Yellow
Brown
Red
Black
F.G.

Terminal block cover (CEU5-4)

BCD

Connection length
If the distance between stroke reading cylinder and multi-counter is over 23 meter (CE2, ML2: 20.5 m), use transmission box. (CE1-H0374)

Counting direction
When changing the wiring combination of White- A/Blue-COM and Yellow B/Brown-COM to the combination of White B/Blue-COM and Yellow- A/Brown-COM, the counting direction reverses. (The settings can be changed.)

• OUT1 to OUT 5
• OUT1 to OUT20 (Bank switching)
• Binary output (31 points)

RS-232C

BCD output (Refer to page 676.) function is available only for CEU5□B-□.
(1) BCD output connector: D-Sub half pitch connector
    D x 10M-36S (Made by HIROSE ELECTRIC CO., LTD.)
(2) Applicable connectors: D x 30AM-36P (Plug: Made by HIROSE ELECTRIC CO., LTD.) *
    D x 30M-36-CV (Cover: Made by HIROSE ELECTRIC CO., LTD.)*
    Other interchangeable commercial cables with connectors can be also used.
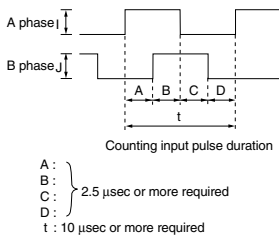 * Pressure welding tools are required to connect the connector (plug, cover) models listed above and cables (order separately). The following products, including pre-assembled connectors and cables, are also available. Contact the manufacturer (Misumi Corporation) directly.
SHPT-H-A-36-*: Male connector on one end, cable cut off on one end
SHPT-HH-A-36-*: Male connectors on both ends
 * 0.2 to 50 (This shows the cable length. Unit: m)

D-☐

-X☐

⊙SMC

CEU Series

Multi-counter/Specifications

Model	CEU5	CEU5-D	CEU5P	CEU5P-D	CEU5B	CEU5B-D	CEU5PB	CEU5PB-D
Type	Multi-counter							
Mounting	Surface mounting (DIN rail or Screw stop)							
Operating system	Adding - subtracting type							
Operation mode	Operating mode, Data setting mode, Function setting mode							
Reset system	External reset terminal							
Display system	LCD (With back light)							
Number of digits	6 digits							
Memory holding {Storage medium}	Setting value (always held), Count value (Hold/Non-hold switching), {E²ROM (Warning display after writing approx. 800,000 times: E2FUL)}							
Input signal type	Count input, Control signal input (Reset, Hold, Bank selection)							
Count input	No-voltage pulse input							
Pulse signal system	90° phase difference input *1/ UP/DOWN separate input *2							
Counting speed	100 kHz *1							
Control signal input	Voltage input (12 VDC or 24 VDC)							
Sensor power supply	10.8 to 13.2 VDC, 60 mA							
Output signal type	Preset output, Cylinder stop output				Preset output, Cylinder stop output, BCD output			
Preset output configuration	Compare/Hold/One-shot (100 ms fixed pulse)							
Output type	Separate 5 point output/Binary code output							
Output delay time	5 ms or less (for normal output)/60 ms or less (Binary output)							
Communication system	RS-232C							
Output transistor mode	NPN open collector Max 30 VDC, 50 mA		PNP open collector Max 30 VDC, 50 mA		NPN open collector Max 30 VDC, 50 mA *3		PNP open collector Max 30 VDC, 50 mA *3	
Power supply voltage	90 to 264 VAC	21.6 to 26.4 VDC	90 to 264 VAC	21.6 to 26.4 VDC	90 to 264 VAC	21.6 to 26.4 VDC	90 to 264 VAC	21.6 to 26.4 VDC
Power consumption	20 VA or less	10 W or less	20 VA or less	10 W or less	20 VA or less	10 W or less	20 VA or less	10 W or less
Withstand voltage	Between case and AC line: 1500 VAC for 1 min. Between case and signal ground: 500 VAC for 1 min.							
Insulation resistance	Between case and AC line: 50 MΩ or more (500 VDC measured via megohmmeter)							
Ambient temperature	0 to +50°C (No freezing)							
Ambient humidity	35 to 85% RH (No condensation)							
Noise resistance	Square wave noise from a noise simulator (pulse duration 1 μs) between power supply terminals ±2000 V, I/O line ±600 V							
Shock resistance	Endurance 10 to 55 Hz; Amplitude 0.75 mm; X, Y, Z for 2 hours each							
Impact resistance	Endurance 10 G; X, Y, Z directions, 3 times each							
Weight	350 g or less							

∗1) 90° phase difference input

Counting input pulse duration

A :
B :
C : 2.5 μsec or more required
D :
t : 10 μsec or more required

Counting speed $f = \dfrac{1}{t} = \dfrac{1}{10 \times 10^{-6}} = 100000 \text{ Hz} \cong 100 \text{ kHz}$
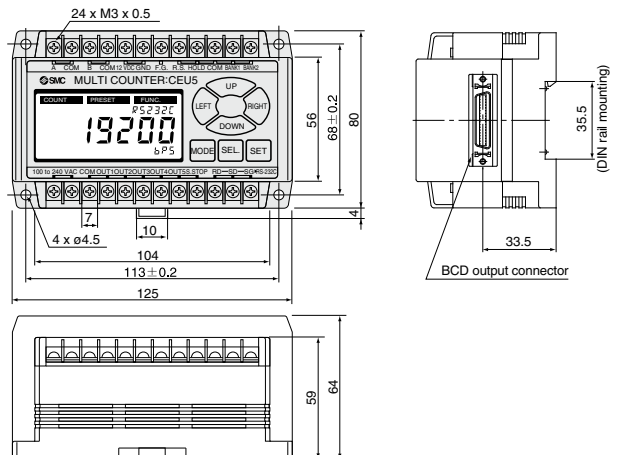
∗ 2) UP/DOWN input
Input wave form conditions: At a maximum of 100 kHz, the UP/DOWN wave form should be as shown below.
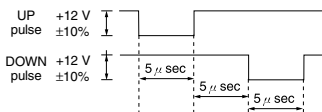
∗ 3) 15 mA when BCD is output (Refer to page 676.)

Multi-counter/Dimensions

Wiring with External Equipment

<Wiring with multi-counter CEU5>

**1. Wiring of power source for driving counter**
For power source for driving counter, use the one with 90 to 264 VAC, 50/60 Hz or 21.6 to 26.4 VDC, 0.4 A or more.

2. Wiring for control signal input
(Selection among Reset, Hold, Bank (Refer to page 676.))
Make each control signal to be the transistor which can run more than 15 mA or the contact output. Input time for reset signal should be more than 10 ms. Bank (Refer to page 676.) selection and hold will function only when the input signal is applied.
COM is common to each signal input. Applicable to NPN and PNP input. Use 24 VDC or 12 VDC for the power source of COM. Connect DC– when PNP is applied, and DC+ when NPN is applied.
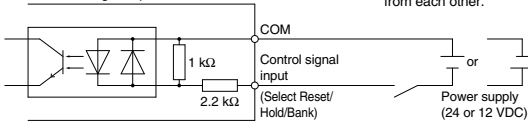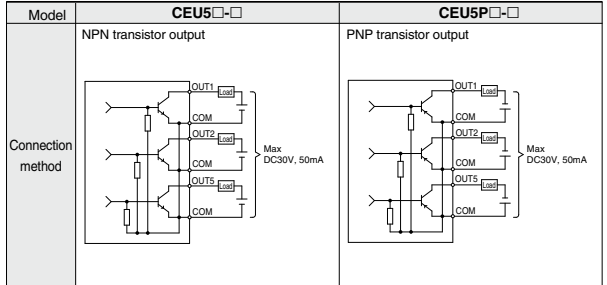
3. Output circuit
There are two outputs, the NPN open collector and the PNP open collector.
The maximum rating is 30 VDC, 50 mA. Operating the controller by exceeding this voltage and amperage could damage the electric circuit.
Therefore, the equipment to be connected must be below this rating.

Model	**CEU5□-□**	**CEU5P□-□**
	NPN transistor output	PNP transistor output
Connection method	OUT1 Load / COM / OUT2 Load / COM / OUT5 Load / COM — Max DC30V, 50mA	OUT1 Load / COM / OUT2 Load / COM / OUT5 Load / COM — Max DC30V, 50mA

∗ However, the COM of the input circuit and the COM of the output circuit are electrically insulated from each other.

CEU5 Control signal input

COM
1 kΩ
Control signal input
2.2 kΩ (Select Reset/Hold/Bank)
or
Power supply (24 or 12 VDC)

CEP1
CE1
CE2
ML2B

■ Extension Cable

How to Order

CE1-R □ □

Cable length

05	5 m
10	10 m
15	15 m
20	20 m

Suffix

Nil	Extension cable
C	Extension cable & connector

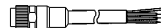**Extension cable**

CE1−R□

Stroke reading cylinder side connector (unit)

CE1−R00C   R04-J8M7.3 (Made by Tajimi Electronics Co., Ltd.)

CE1−R□C

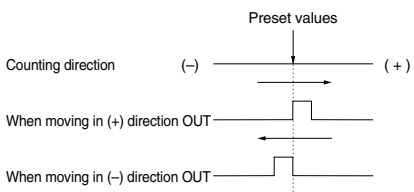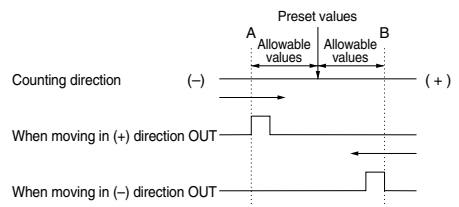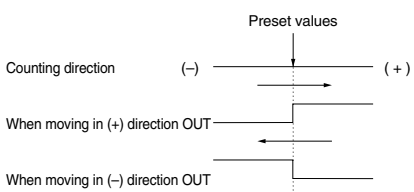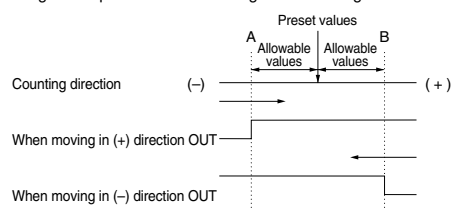D-□
-X□

CEU Series

Operating Condition of each Output Mode

One-shot Output
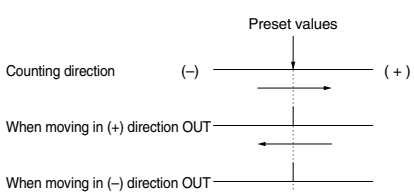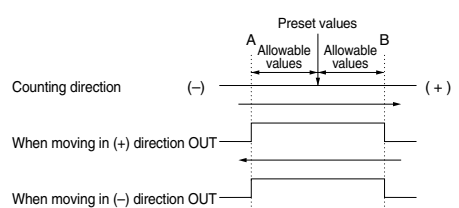
Without allowable values	With allowable values
When the counter value passes the preset value, output is turned ON for 100 ms.	When the counter value passes the sum of the preset value + the allowed value, output is turned ON for 100 ms.

Preset values

Counting direction   (–) ———————— (+)

When moving in (+) direction OUT

When moving in (–) direction OUT

Preset values

A   Allowable values   B   Allowable values

Counting direction   (–) ———————— (+)

When moving in (+) direction OUT

When moving in (–) direction OUT

Hold Output

Without allowable values	With allowable values
When the counter value passes the preset value, output is turned ON and that state is maintained. Output is cancelled when the power is turned off, the reset signal is input or when the setting value is changed.	When the counter value passes the sum of the preset value + the allowed value, output is turned ON. Output is cancelled when the power is turned off, the reset signal is input or when the setting value is changed.

Preset values

Counting direction   (–) ———————— (+)

When moving in (+) direction OUT

When moving in (–) direction OUT

Preset values

A   Allowable values   B   Allowable values

Counting direction   (–) ———————— (+)

When moving in (+) direction OUT

When moving in (–) direction OUT

Compare Output

Without allowable values	With allowable values
Output is turned ON only when the counter value coincides with the preset value.	When the counter value passes the sum of the preset value + the allowed value, output is turned ON.

Preset values

Counting direction   (–) ———————— (+)

When moving in (+) direction OUT

When moving in (–) direction OUT

Preset values

A   Allowable values   B   Allowable values

Counting direction   (–) ———————— (+)

When moving in (+) direction OUT

When moving in (–) direction OUT

SMC

CEU Series

CEU5 Operation

Parts description

External power supply — Pulse input terminals — Control signal input

A COM B COM 12 VDC GND F.G. R.S. HOLD COM BANK1 BANK2

SMC MULTI COUNTER:CEU5

Display

COUNT   PRESET   FUNC.

R5232C

19200

bPS

UP
LEFT   RIGHT
DOWN

MODE SEL. SET

BCD Output
(Refer to page 676.)
connector
(on side)

Operation keys

100 to 240 VAC COM OUT1 OUT2 OUT3 OUT4 OUT5 S.STOP RD SD SG RS-232C

Power supply — Output terminal — Communication terminals

Display detail

• Upper limit
• Functions
(PRESCL, OFFSET, STOP, OUTPUT,
INPUT, BACKUP, RS-232, UNIT)

COUNT   PRESET   FUNC.
BANK NO. ×8.8.   *R5232C*

19200

1SHOT HOLD COMPARE   *bPS*

• Mode indicators

• Bank no.
(Refer to page 676.)
• Preset no.
• Multiplication

• Output configuration indicators

• Count value
• Preset value
• Numeric value per pulse
• Offset setting
• Cylinder stop output

• Output type
• Input type
• Backup
• RS-232C
• Unit no.

• Output type (bin) /Output state indicator
• Cylinder stop output display (*5*)
• Lower limit
• Connected model (CEP1, CE1, MANUAL)
• RS-232C (Refer to page 676.) communication speed unit (bps)

Key and Functions

Key	Functions
MODE	Changes the mode. In any given condition, it shifts to the next mode. Does not write data.
SEL.	Shifts the cursor to the next item. Does not write data.
SET	Writes displayed data into the memory when setting.
RIGHT	Shifts the cursor to the right when setting numerical values.
LEFT	Shifts the cursor to the left when setting numerical values.
UP	Changes the contents of a setting. Increases the value when setting numerical values.
DOWN	Changes the contents of a setting. Decreases the value when setting numerical values.

In the explanations of the operating method, references to "Direction keys" indicate the 4 keys RIGHT, LEFT, UP and DOWN.

SMC

Mode cycle using mode key

1. Count mode

MODE key

2. Preset mode

MODE key

MODE key

3. Function mode
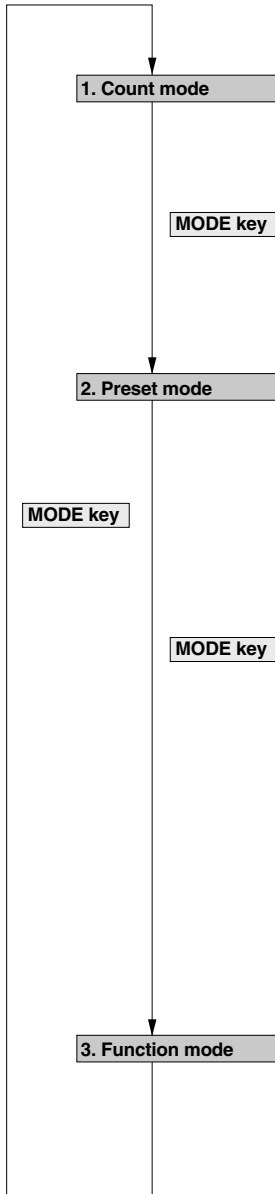
Basic Operation

- SET key : In any of the conditions (1) through (5), this writes the display data into the memory and shifts to (1).
- SEL. key : Shifts to the next item, but does not write data.
- MODE key : In any given condition, this shifts to the next mode, but does not write data.
- Direction keys : LEFT/RIGHT keys shift the digits, and UP/DOWN keys increase or decrease numerical values.

CEP1
CE1
CE2
ML2B

1. Explanation of display in count mode

Normal output display
Displays current output bank (Refer to page 676.)

```
COUNT
BANK  01
0000.00
      o----
```

Displays output state of each OUT terminal

Binary output display
Displays only when matched with preset

```
COUNT
NO.  16
0000.00
      b in
```

Display of binary output selection.

2. Setting of preset mode

(1)
```
PRESET
NO.  01      +0000.00
+0000.00
1SHOT         +0000.00
```

Selection of preset No.
- Select a preset number from 1 to 31 with the UP/DOWN keys.
- Shift to the next item with the SEL. key.

SEL. key

(2)
```
PRESET
NO.  01      +0000.00
+0000.00
1SHOT         +0000.00
```

Setting the preset values
- Shift the digits with the LEFT/RIGHT keys, and increase or decrease the numerical values with the UP/DOWN keys.
- Shift to the next item with the SEL. key.

SEL. key

(3)
```
PRESET
NO.  01      +0000.00
+0000.00
1SHOT         +0000.00
```

Setting the upper limit tolerance
- Set numerical values in the same way with the direction keys.
- When ± is selected, the lower limit display is cleared and ± setting is possible.
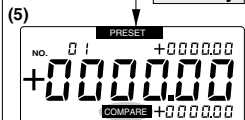- Shift to the next item with the SEL. key.

SEL. key

(4)
```
PRESET
NO.  01      +0000.00
+0000.00
1SHOT         +0000.00
```

Setting the lower limit tolerance
- Set numerical values in the same way with the direction keys.
- When ± is selected in the upper limit setting , this item is not displayed.
- Shift to the next item with the SEL. key.

SEL. key

(5)
```
PRESET
NO.  01      +0000.00
+0000.00
COMPARE        +0000.00
```

Setting the output configuration
- Switch to 1SHOT, HOLD or COMPARE with the UP/DOWN keys.
- Store the setting with the SET key.
- The SEL. key only shifts to another item without storing the setting.
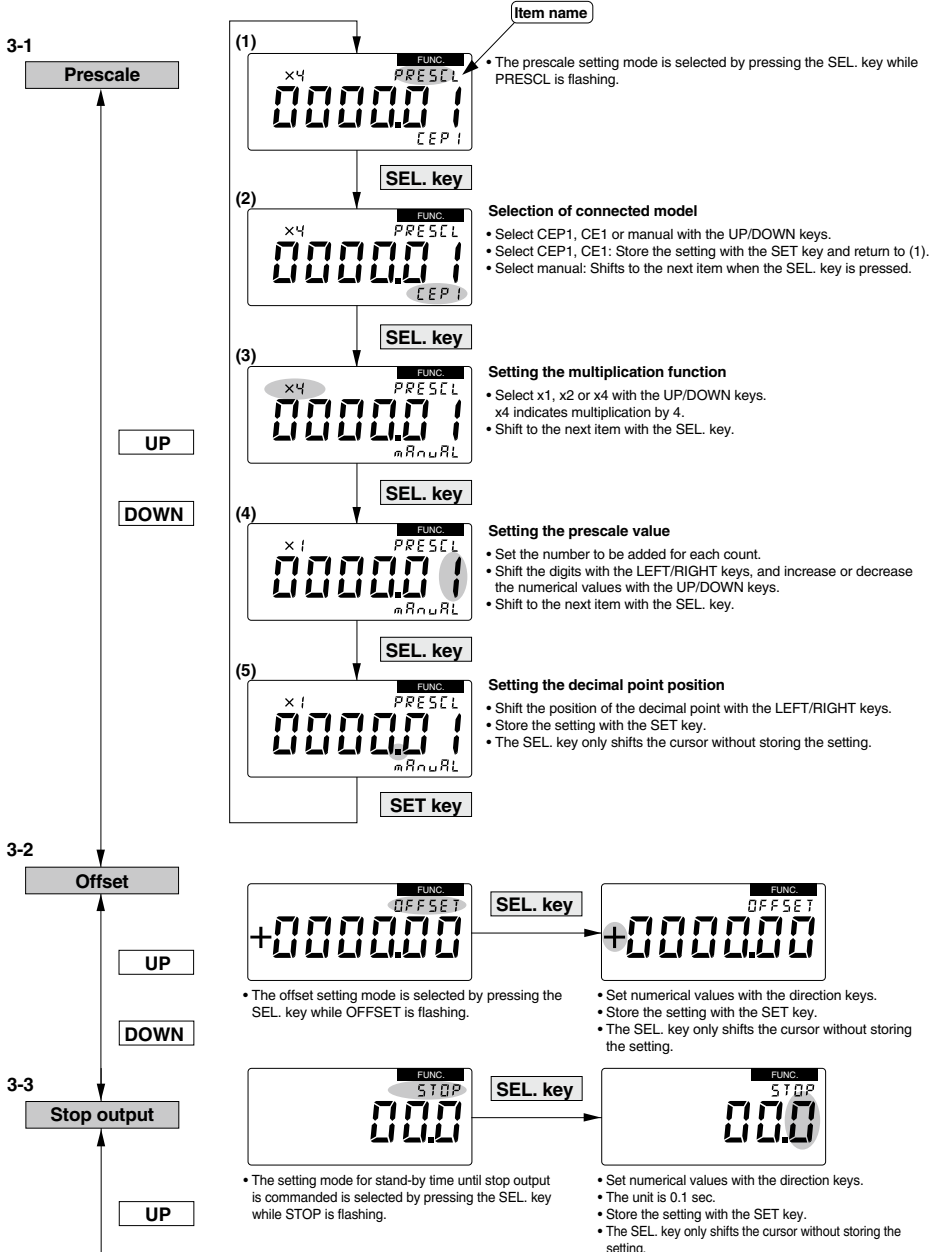
SET. key

D-□

-X□

CEU Series

CEU5 Operation

3. Explanation of settings in the function mode

If the UP/DOWN keys are pressed when an item name is flashing , it shifts to another setting item. When the SEL. key is pressed, the cursor shifts and it is possible to change the content of the setting for the item which is being displayed.
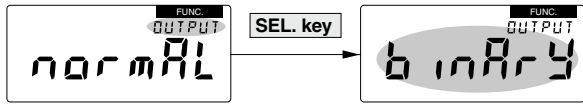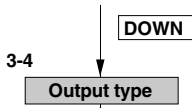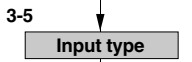
3-1 Prescale

(1)

FUNC.
PRESCL
×4
0000.01
CEP1

| Item name |

• The prescale setting mode is selected by pressing the SEL. key while PRESCL is flashing.

SEL. key

(2)

FUNC.
PRESCL
×4
0000.01
CEP1

Selection of connected model
• Select CEP1, CE1 or manual with the UP/DOWN keys.
• Select CEP1, CE1: Store the setting with the SET key and return to (1).
• Select manual: Shifts to the next item when the SEL. key is pressed.

SEL. key

(3)

FUNC.
PRESCL
×4
0000.01
mAnuAL

Setting the multiplication function
• Select x1, x2 or x4 with the UP/DOWN keys.
  x4 indicates multiplication by 4.
• Shift to the next item with the SEL. key.

UP

DOWN

SEL. key

(4)

FUNC.
PRESCL
×1
0000.01
mAnuAL

Setting the prescale value
• Set the number to be added for each count.
• Shift the digits with the LEFT/RIGHT keys, and increase or decrease the numerical values with the UP/DOWN keys.
• Shift to the next item with the SEL. key.

SEL. key

(5)

FUNC.
PRESCL
×1
0000.01
mAnuAL

Setting the decimal point position
• Shift the position of the decimal point with the LEFT/RIGHT keys.
• Store the setting with the SET key.
• The SEL. key only shifts the cursor without storing the setting.

SET key

3-2 Offset

FUNC.
OFFSET
+000000

SEL. key

FUNC.
OFFSET
+000000

UP

DOWN

• The offset setting mode is selected by pressing the SEL. key while OFFSET is flashing.

• Set numerical values with the direction keys.
• Store the setting with the SET key.
• The SEL. key only shifts the cursor without storing the setting.

3-3 Stop output

FUNC.
STOP
00.0

SEL. key

FUNC.
STOP
00.0

UP

• The setting mode for stand-by time until stop output is commanded is selected by pressing the SEL. key while STOP is flashing.

• Set numerical values with the direction keys.
• The unit is 0.1 sec.
• Store the setting with the SET key.
• The SEL. key only shifts the cursor without storing the setting.

674

SMC

DOWN

3-4

Output type

UP

DOWN

3-5

Input type

UP

DOWN

3-6

Count value backup

UP

DOWN

3-7

RS-232C

UP

DOWN

3-8

Unit No.

UP

DOWN

3-9

Digital filter

CEP1
CE1
CE2
ML2B

FUNC. OUTPUT

normAL → **SEL. key** → FUNC. OUTPUT **b inArY**

• The output system setting mode is selected by pressing the SEL. key while OUTPUT is flashing.

• Select normal output or binary output with the UP/DOWN keys.
• Store the setting with the SET key.
• The SEL. key only shifts the cursor without storing the setting.

FUNC. InPUT

2PHASE → **SEL. key** → FUNC. InPUT **UPdown**

• The input type setting mode is selected by pressing the SEL. key while INPUT is flashing.

• Select phase difference input with the UP/DOWN keys. (±2PHASE) or separate input (±UP/DOWN) with the UP/ DOWN keys.
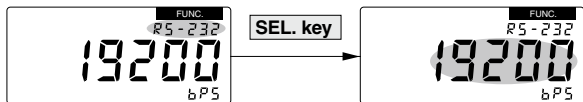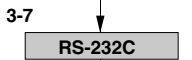• If the polarity changes, the count direction reverses.
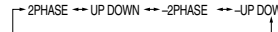
2PHASE ↔ UP DOWN ↔ –2PHASE ↔ –UP DOWN

• Store the setting with the SET key.
• The SEL. key only shifts the cursor without storing the setting.

FUNC. bACKUP

**OFF** → **SEL. key** → FUNC. bACKUP **On**
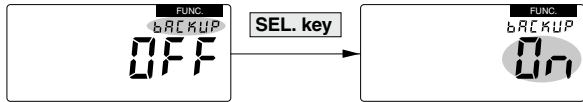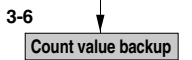
• The count value backup setting mode is selected by pressing the SEL. key while BACKUP is flashing.

• Select ON or OFF with the UP/DOWN keys.
• Store the setting with the SET key.
• The SEL. key only shifts the cursor without storing the setting.

FUNC. RS-232

**19200** bPS → **SEL. key** → FUNC. RS-232 **19200** bPS

• The RS-232C (Refer to page 676.) communication speed setting mode is selected by pressing the SEL. key while RS-232 is flashing.

• Select the communication speed from 1200, 2400, 4800, 9600 or 19200 with the UP/DOWN keys.
• Store the setting with the SET key.
• The SEL. key only shifts the cursor without storing the setting.

FUNC. Un IT

00 → **SEL. key** → FUNC. Un IT **00**
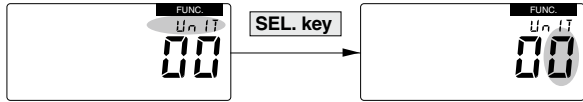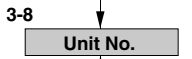
• The unit number registration mode is selected by pressing the SEL. key while UNIT is flashing.

• Set numerical values with the direction keys.
• Settings can be made from 00 to 99.
• Store the setting with the SET key.

FUNC. d-F ILT

OFF → **SEL. key** → FUNC. d-F ILT **On**
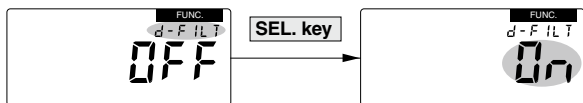
• Select ON or OFF with the UP/DOWN key.
• Store the setting with the SET key.

Note) When the digital filter setting (ON/OFF) is changed, an error count will occur. Reset the count value.

D-□

-X□

SMC

CEU Series
Glossary (Functions of CEU5)

BCD Output

This is a system which expresses one digit of a decimal number with a 4 digit binary number.
The count value is expressed by the ON/OFF state of each BCD output terminal. In the case of 6 digits, 24 terminals are required.

The relation between decimal numbers and BCD codes is shown in the table below.

Decimal no.	0	1	2	3	4	5	6	7	8	9
BCD	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001

Ex.) 1294.53 is expressed as follows.
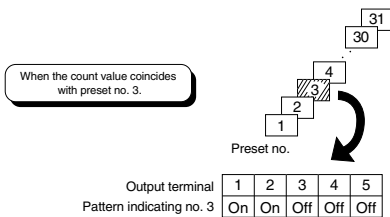   0001 0010 1001 0100 0101 0011

RS-232C

This is the interface standard for the serial transmission method, which is standard equipment on a personal computer.

Prescale Function

This function allows free setting of how many millimeters will indicate one pulse.
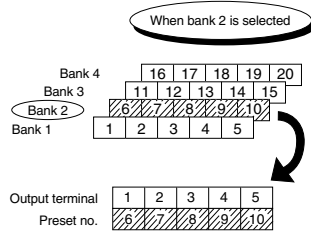
Binary Output

31 point preset output is possible without bank switching, by means of binary system output from a 5 point output terminal. Cylinder stop output is used as the readout release signal.

When the count value coincides with preset no. 3.

Preset no.

Output terminal	1	2	3	4	5
Pattern indicating no. 3	On	On	Off	Off	Off

The coincident preset number is expressed as a 5 digit binary number.

Bank Function

5 points of preset output are possible simultaneously, however, a maximum of 20 types of work discrimination, etc. can be performed by using the 5 points of preset values as one of a maximum of four quadrats, and switching its use during operation.

When bank 2 is selected

Bank 4	16	17	18	19	20
Bank 3	11	12	13	14	15
Bank 2	6	7	8	9	10
Bank 1	1	2	3	4	5

Output terminal	1	2	3	4	5
Preset no.	6	7	8	9	10

For example, when bank 2 is selected, presets 6 through 10 are valid and when the count value coincides with the setting value of 6 through 10, the respective output terminals 1 through 5 are turned ON.

Bank Switching Correspondence

Input terminal / Bank no.	BANK2	BANK1
1	OFF	OFF
2	OFF	ON
3	ON	OFF
4	ON	ON

SMC

Display Offset Function

Normally the count value returns to "0" after resetting, but with this function, the initial value can be set to any desired value.
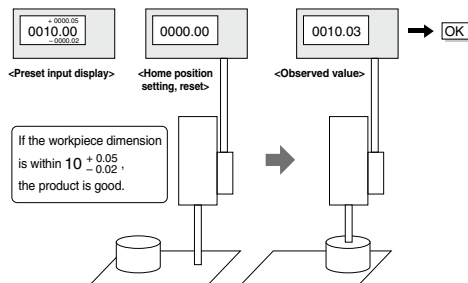
Hold Function

When "hold" is input, the counter holds the current count value in memory. Next, when the count value is read into a PLC which uses serial or BCD output, etc., the count value that was held can be read in, even if there is a time lag.

Setting the Tolerances of Preset Values

The tolerance can be set as $+ \bigcirc$ mm and $- \blacktriangle$ mm. Additionally, the setting of $+ \bigcirc$ mm and $+ \triangle$ mm, or $- \bullet$ mm and $- \blacktriangle$ mm is also possible. (However, $\bigcirc > \triangle$ and $\blacktriangle > \bullet$ should be satisfied.)

By including preset tolerance setting, superior performance is exhibited in parts inspections, etc. In a workpiece to be measured, there are tolerances which assure a good product. For example, in the case of $10^{+0.05}_{-0.02}$, the CEU5 allows these tolerances to be input as they stand. If the workpiece is within tolerances the OK signal is sent.

<Simple input as per drawing dimensions>
Tolerances can be set with the preset value.

OK/NG signal is output by the counter. Labor savings can be realized in parts inspections.

| + 0000.05 |
| 0010.00 |
| – 0000.02 |

<Preset input display>

0000.00

<Home position setting, reset>

0010.03

<Observed value>

→ OK

If the workpiece dimension is within $10^{+0.05}_{-0.02}$, the product is good.

Count Value Protection

In the past, the count value returned to "0" when the power supply was cut off, but this function holds the previous value even after a power failure. This function can be switched between active and inactive settings.

Cylinder Stop Output

When workpiece discrimination is performed using a preset counter, it has been common to estimate the amount of time from the cylinder's start of operation until it touches the workpiece and stops, using a timer to read the output after a fixed amount of time. Since cylinder stop output is now output when there is no cylinder movement for a fixed amount of time, timing of preset output and external output, etc. is simplified.

CEP1

CE1

CE2

ML2B

D-☐

-X☐

SMC