



Stroke Reading Cylinder and Counter

Series CE

CEP1/CEU5

Resolution: 0.01 mm (Accuracy ± 0.02 mm)

Output function: RS-232C BCD

Output: 5 points (Bank switching: 20 points)

31 points (Binary output)

23045



RE^A_B

REC

C□X

C□Y

MQ^Q_M

RHC

MK(2)

RS^Q_G

RS^H_A

RZQ

MI^W_S

CEP1

CE1

CE2

ML2B

C¹_G5-S

CV

MVGQ

CC

RB

J

D-

-X

20-

Data

High Precision Stroke Reading Cylinder Series CEP1

ø12, ø20



P. 10-12-8

Stroke Reading Cylinder Series CE1

ø12, ø20, ø32, ø40
ø50, ø63



P. 10-12-18

Multi-counter Series CEU5



P. 10-12-27

3-point Preset Counter Series CEU1



P. 10-12-30

Achieve rationalization

Stroke reading cylinder



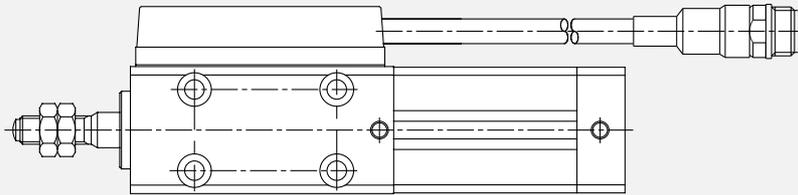
Measurement is possible throughout the full stroke range.

The home position can be anywhere within the cylinder stroke.

→ When the counter is reset by pressing the cylinder rod to the reference plane, that point becomes the home position.

High Precision Stroke Reading Cylinder (CEP1)

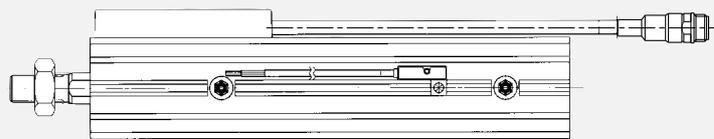
- Resolution: 0.01 mm (Accuracy ± 0.02 mm)
- Special scraper now standard (IP-67)
- 2 types of seal material available (Made to Order)
- Power supply voltage 12 to 24 VDC



- Auto switch mounting orientation can be freely selected (3 mounting surfaces)

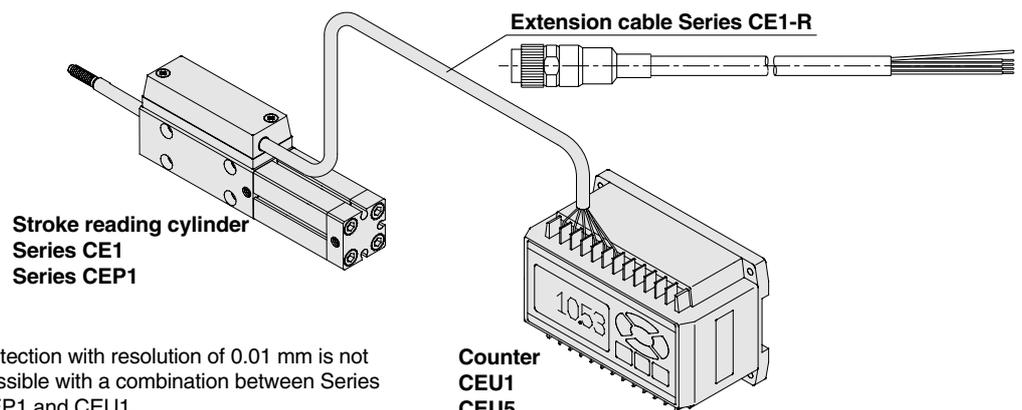
Stroke Reading Cylinder (CE1)

- Resolution: 0.1 mm (Accuracy ± 0.2 mm)
- Water resistance improved by changing the sensor unit filler.



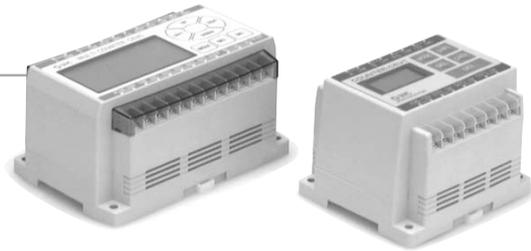
- Power supply voltage 12 to 24 VDC
- Abundant stroke variations
- Improved noise resistance

System Configuration



Note) Detection with resolution of 0.01 mm is not possible with a combination between Series CEP1 and CEU1.

of production lines with position feedback



Tolerances of preset values can be set. (CEU1, CEU5)

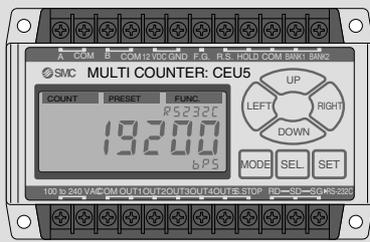
Tolerances can be set for preset values.

CEU1: ± set tolerance

CEU5: + set tolerance, – set tolerance (separate settings)

Simple operation

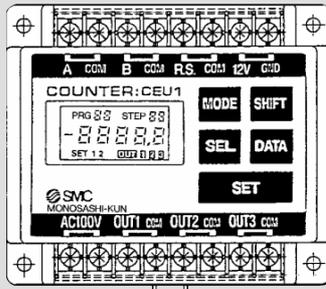
Multi-counter (CEU5)



Includes all functions of the CEU1.

- Output terminal: 5 points
- Number of output settings:
20 points (Bank switching)
31 points (Binary output)
- Communication function with RS-232C
- With BCD output (Option)
- Maximum counting speed 100 kHz
- Prescale function
- With multiplication switching
(1, 2, 4 multiplication)
- DIN rail mountable
- 6 digits count display

3-point Preset Counter (CEU1)



- Output terminal: 3 points
- DIN rail mountable
- Hold output, Comparison output,
One shot output

Series Variations

Series CE1

| Bore size (mm) | Standard stroke (mm) | | | | | | | | | | | Manufacturable stroke range | |
|----------------|----------------------|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------------------|-----------|
| | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 400 | | 500 |
| 12 | ● | ● | ● | ● | ● | ● | | | | | | | 25 to 150 |
| 20 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | 25 to 300 |
| 32 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | 25 to 400 |
| 40 | | | | ● | ● | ● | ● | ● | | ● | | ● | 25 to 600 |
| 50 | | | | | | | | ● | | ● | | ● | 25 to 600 |
| 63 | | | | | | | | ● | | | | | 25 to 600 |

CEU1

| Power supply voltage | Output transistor mode | |
|----------------------|------------------------|-----|
| | NPN | PNP |
| 100 VAC | ● | ● |
| 24 VDC | ● | ● |

CEU5

| Power supply voltage | Count data output | | RS-232C+BCD | | RS-232C | |
|----------------------|-------------------|-----|-------------|-----|---------|-----|
| | NPN | PNP | NPN | PNP | NPN | PNP |
| 100 to 240 VAC | ● | ● | ● | ● | ● | ● |
| 24 VDC | ● | ● | ● | ● | ● | ● |

Series CEP1

| Bore size (mm) | Standard stroke (mm) | | | |
|----------------|----------------------|----|----|-----|
| | 25 | 50 | 75 | 100 |
| 12 equivalent | ● | ● | ● | ● |
| 20 equivalent | ● | ● | ● | ● |

Extension Cable

| Cable length (m) | | | |
|------------------|----|----|----|
| 5 | 10 | 15 | 20 |
| ● | ● | ● | ● |

RE^A_B

REC

C□X

C□Y

MQ^Q_M

RHC

MK(2)

RS^Q_G

RS^H_A

RZQ

MI^W_S

CEP1

CE1

CE2

ML2B

C¹/₅-S

CV

MVGQ

CC

RB

J

D-

-X

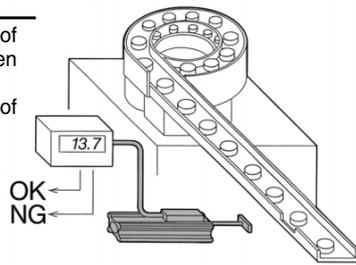
20-

Data

Application Example

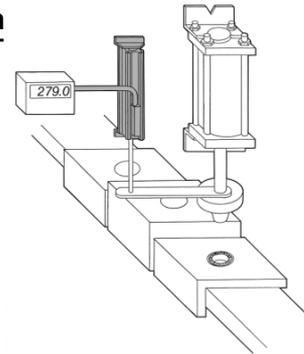
Parts inspection

Measures the dimensions of parts, discriminates between good and defective articles, and prevents the mingling of different parts, etc.



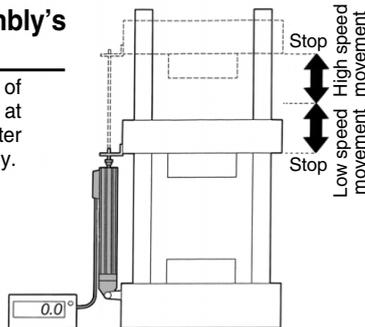
Confirmation of press-in

Can confirm the press-in of a hydraulic cylinder by detecting its stroke. Even if the size of the workpiece changes, the point of press-in completion can be easily changed.



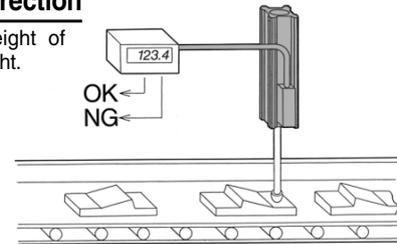
Detection of die assembly's deceleration point

Since the deceleration point of the die assembly can be set at will, it can be easily changed after replacement of the die assembly.



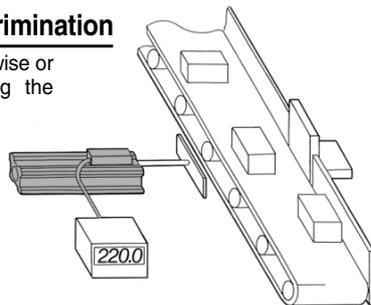
Discrimination of direction

Maintains a constant height of measuring workpiece height.



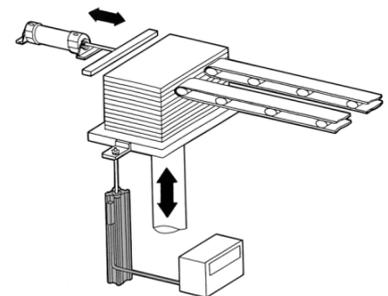
Length/breadth discrimination

Distinguishes either lengthwise or crosswise while correcting the position of a workpiece.



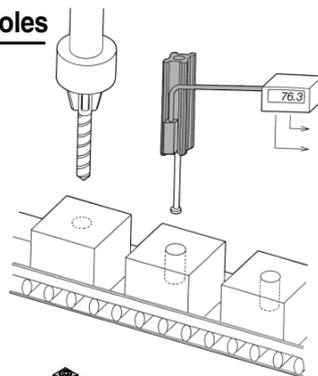
Detection of lifter position

Can continuously monitor a lifter's stroke.



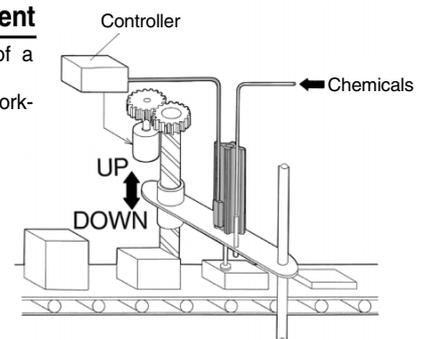
Inspection of machined holes

Can detect machined hole depth, burrs and foreign matter, etc.



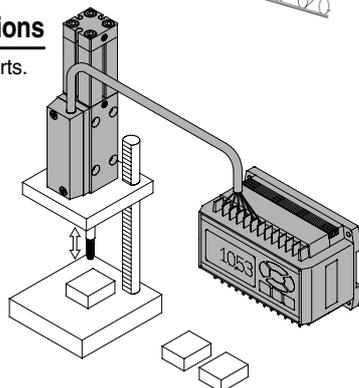
Nozzle height adjustment

Maintains a certain height of a workpiece and a nozzle by measuring the height of a workpiece.



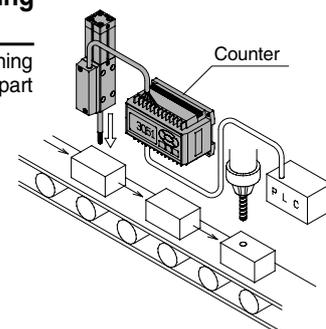
Measurement of dimensions

Can measure dimensions of parts.



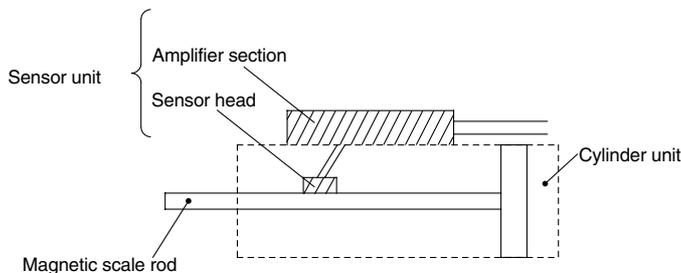
Measurement of machining dimensions

Performs adjustment of machining depth, etc. by measuring the part dimensions before machining.

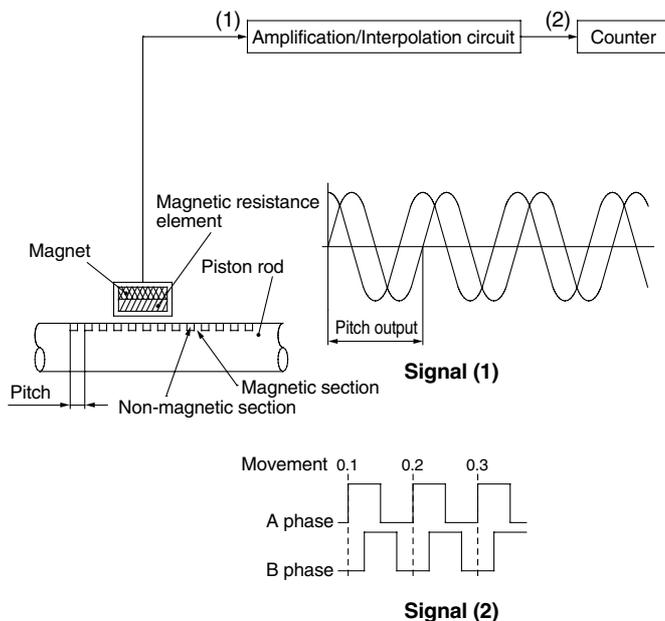


Measurement Principle

The amount of rod movement in the stroke reading cylinder is detected using an MR element (magnetic resistance element) whose resistance value changes due to magnetic force. The detection unit containing this MR element is called the sensor head. An amplifying circuit and a dividing circuit are required to produce output which can be read by the counter, and these are attached to the cylinder case. The sensor head and amplifier section together are referred to as the sensor unit.



The stroke reading cylinder is equipped with the capability of outputting the piston stroke movement as a pulse signal. The measurement principle is as shown in the drawing below.

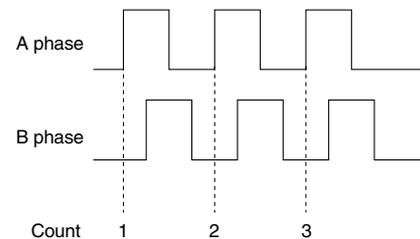


1. Scales of magnetic layers and non-magnetic layers are etched at a certain pitch on the piston rod.
2. With movement of the piston rod, a sin, cos 2-phase signal (Signal (1)) is received by the magnetic resistance element. For this wave form, 1 pitch (0.8 mm) becomes exactly 1 cycle.
3. This is amplified and divided into 1/8 parts. As a result, a 90° phase difference pulse signal of 0.1 mm/pulse (Signal (2)) is output.
4. By measuring this pulse signal with the counter, it is possible to detect the piston position with a resolution of 0.1 mm.
5. In the case of the high precision stroke reading cylinder, the sin, cos 2-phase signal obtained in 2 is amplified and divided into 1/20 parts. As a result, a 90° phase difference pulse signal of 0.04 mm/pulse (Signal (2)) is output.
6. By multiplying this pulse signal by 4 with the counter, it is possible to detect the piston position with a resolution of 0.01 mm.

A/B Phase Difference Output (90° phase difference output)

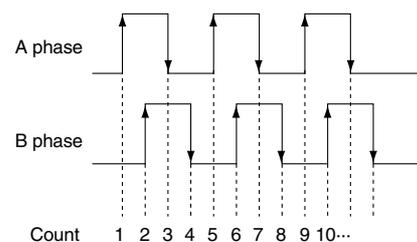
When movement is expressed by a single line of pulses, it is impossible to accurately identify the current position, because pulse waves appear in both upward and downward directions. Accordingly, in A/B phase difference output, two lines of pulses are provided, wherein one line detects the movement and the other distinguishes the direction.

The CE1 also employs this system.



4 Times Multiplication Function

This function increases resolution 4 times by counting 4 for each cycle of pulses, instead of counting 1 for each cycle as is normally the case. In principle, this function counts each time there is a rise or fall in either of the A or B phase pulses.



Counting Speed (kHz, kcps)

Counting speed indicates the number of pulses that can be counted per second. If the stroke reading cylinder is operated at high speeds, pulse waves are output in shorter cycles. The counting speed of the counter must be higher than the pulse speed for the maximum piston speed when operating. Since the stroke reading cylinder outputs one pulse for each 0.1 mm of movement, 5,000 pulses will be output for each 500 mm of movement. Therefore, a speed of 500 mm/s is equivalent to 5 kcps (kHz), but a counting speed 2 to 3 times greater is recommended for actual operation.

Repeatability

The accuracy is the difference between the dimensions based upon the signals of the stroke reading cylinder and the absolute dimensions.

The maximum display error that will appear on the counter's digital display is equal to twice (± 1 count) the resolution when the home position is reset and when dimensions are measured.

RE^A_B

REC

C□X

C□Y

MQ^Q_M

RHC

MK(2)

RS^Q_G

RS^H_A

RZQ

MI^W_S

CEP1

CE1

CE2

ML2B

C¹/₅-S

CV

MVGQ

CC

RB

J

D-

-X

20-

Data



Series CE

Specific Product Precautions

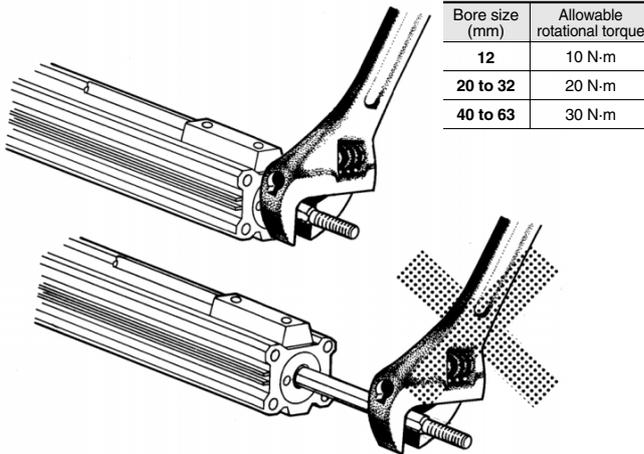
Be sure to read before handling.

Mounting

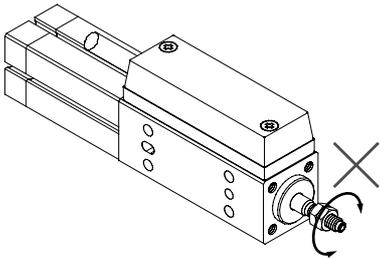
⚠ Caution

- When screwing a nut or fitting, etc. onto the threaded section at the end of the piston rod, return the piston rod to its fully retracted position, and grasp the exposed portion of the rod across two parallel sides with a wrench. In the case of the high precision stroke reading cylinder, there are no parallel sides. Secure the workpiece with a double nut.

Note) Do not apply rotational torque to the piston rod.



- Operate the cylinder in such a way that the load is always applied in the axial direction.
 - In case the load is applied in a direction other than the axial direction of the cylinder, provide a guide to constrain the load itself.
 - When mounting a cylinder, centering should be done carefully.
- Avoid using the air cylinder in such a way that rotational torque would be applied to the piston rod.



- Be careful to avoid scratches or dents, etc. on the sliding sections of the piston rod.

Sensor Unit

- The sensor unit is adjusted to an appropriate position at the time of shipment. Therefore, never detach the sensor unit from the body.
- The cylinder should be protected from contact with liquids such as coolants or coolant water. (CE1)
- The sensor cable should not be pulled with a strong force.
- Since the sensor for stroke reading cylinder adopts the magnetic method, it may result in malfunction if there is a strong magnetic field around the sensor. Use it under the external magnetic field with 14.5 mT or less.

This is equivalent to a magnetic field of approximately 18 cm in radius from a welding area using a welding amperage of almost 15,000 amperes. To use the system in a magnetic field that exceeds this value, use a magnetic material to shield the sensor unit.

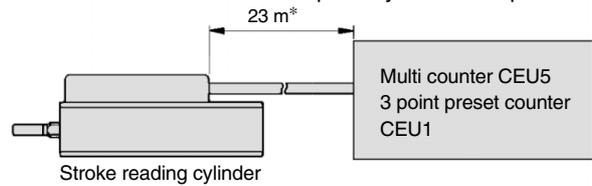
- Switches or relays, etc. should not be installed in the power supply line (12 to 24 VDC).

Effects of Noise

⚠ Caution

When the stroke reading cylinder is used near a motor, welding machine or other source of noise generation, there is a possibility of miscounting. In this case, noise should be suppressed as much as possible and the following countermeasure should be taken.

- Connect the shield wire to FG (frame ground).
- The maximum transmission distance for the stroke reading cylinder is 23 m, but since the output signal is a pulse output, the sensor cable should be wired separately from other power lines.

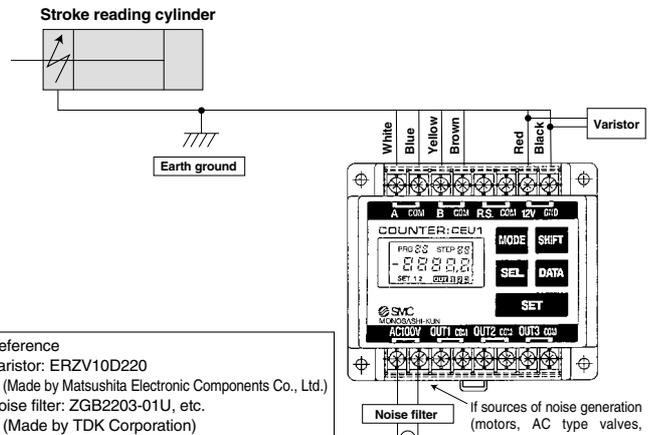


* When using SMC extension cable and counter.

Noise Counter Measures

Methods of dealing with noise are given below.

- Connect only the shield wire to FG (frame ground).
- Use a power source separate from large motors and AC valves, etc.
- Run the stroke reading cylinder's cable away from other power lines.
- Install a noise filter in the 100 VAC power line, and install a varistor in the DC power supply of the sensor cable.



Reference
 Varistor: ERZV10D220
 (Made by Matsushita Electronic Components Co., Ltd.)
 Noise filter: ZGB2203-01U, etc.
 (Made by TDK Corporation)

If sources of noise generation (motors, AC type valves, relays, etc.) are connected on the secondary side of the noise filter, the filter will have no effect.

<Counting speed of counter>

When the speed of the stroke reading cylinder is greater than the counting speed of the counter, the counter will miscount. For CE1 (when measuring to 0.1 mm), a counter should be used with a counting speed of 10 kHz (kcps) or more. And for CEP1 (when measuring to 0.01 mm), use a counter with a counting speed of 50 kHz (kcps) or more when 4 times multiplication is input.

<Malfunction due to lurching and bounding>

When lurching or bounding occurs at the beginning or end of stroke reading cylinder, or due to other causes, the cylinder speed momentarily increases, and there is a possibility of exceeding the counting speed of the counter or the response speed of the sensor, thereby causing a miscount.

Handling of Technical Material

The instruction manuals should be read before using the Series CEP1 high precision stroke reading cylinder, CEU5 multi counter, CE1 scale cylinder and CEU1 3 point preset counter.

High Precision Stroke Reading Cylinder Non-rotating Piston Type Series CEP1

ø12, ø20

CE CAD For details about certified products conforming to international standards, visit us at www.smcworld.com.

How to Order

CEP1 **B** **12** **50** **F9BW**

Mounting style

| | |
|----------|---------------------------------|
| B | Direct mounting rod side tapped |
| L | Foot style |
| F | Rod side flange style |

Bore size

| | |
|-----------|------------------|
| 12 | 12 mm equivalent |
| 20 | 20 mm equivalent |

Standard cylinder stroke (mm)
Refer to "Standard Stroke" on page 10-12-9.

Connector

| | |
|------------|-------------------|
| Nil | With connector |
| Z | Without connector |

Sensor cable length

| | |
|------------|-------|
| Nil | 0.5 m |
| L | 3 m |

Number of auto switches

| | |
|------------|----------|
| Nil | 2 pcs. |
| S | 1 pc. |
| n | "n" pcs. |

Auto switch

| | |
|------------|---------------------|
| Nil | Without auto switch |
|------------|---------------------|

* For the applicable auto switch model, refer to the table below.
* Auto switches are shipped together, (but not assembled).

Applicable counter

| |
|-------------|
| Series CEU5 |
|-------------|

<Made-to-order>
Fluoro rubber seals: -XC22
(Example) CEP1B12-100-M9N-XC22

<Option>

Extension cable CE1-R **05**

| | | | |
|-----------|------|------------|-----------------------------|
| 05 | 5 m | Nil | Extension cable |
| 10 | 10 m | C | Extension cable & connector |
| 15 | 15 m | | |
| 20 | 20 m | | |

Mounting Bracket Part No.

| Cylinder part no. | Foot | Rod side flange |
|-------------------|----------|-----------------|
| CEP1□12 | CEP1-L12 | CEP1-F12 |
| CEP1□20 | CEP1-L20 | CEP1-F20 |

Applicable Auto Switch/Refer to page 10-20-1 for further information on auto switches.

| Type | Special function | Electrical entry | indicator/light | Wiring (Output) | Load voltage | | | Auto switch model | | Lead wire length (m) | | | Pre-wire connector | Applicable load | |
|--------------------|--|------------------|-----------------|-------------------------|--------------|-----------|--------------|-------------------|------------|----------------------|-------|-------|--------------------|-----------------|------------|
| | | | | | DC | AC | | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | | | |
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | A93V | A93 | ● | ● | — | — | — | Relay, PLC |
| Solid state switch | — | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | M9NV | M9N | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | | | M9BV | M9B | ● | ● | ○ | ○ | | |
| | Diagnostic indication (2-color indication) | | | 3-wire (NPN) | 24 V | 5 V, 12 V | F9NWV | F9NW | ● | ● | ○ | ○ | IC circuit | | |
| | | | | 3-wire (PNP) | | | F9PWV | F9PW | ● | ● | ○ | ○ | | | |
| | Water resistant (2-color indication) | | | 2-wire | 24 V | 12 V | F9BWV | F9BW | ● | ● | ○ | ○ | — | | |
| | | | | — | | | F9BA | — | ● | ○ | ○ | | | | |

* Lead wire length symbols: 0.5 m..... Nil (Example) M9N
3 m..... L (Example) M9NL
5 m..... Z (Example) M9NZ

* Solid state switches marked with "○" are produced upon receipt of order.

- Refer to page 10-12-16 for details on other applicable auto switches than listed above.
- For details about auto switches with pre-wire connector, refer to page 10-20-66.

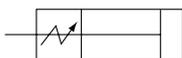
High Precision Stroke Reading Cylinder Non-rotating Piston Type **Series CEP1**

Cylinder Specifications



| | | |
|-------------------------------|---|---------|
| Action | Double acting, Single rod (Non-rotating piston) | |
| Fluid | Air | |
| Proof pressure | 1.5 MPa | |
| Maximum operating pressure | 1.0 MPa | |
| Minimum operating pressure | ø12 | ø20 |
| | 0.15 MPa | 0.1 MPa |
| Piston speed | 50 to 300 mm/s | |
| Ambient and fluid temperature | 0 to 60°C (No freezing) | |
| Lubrication | Non-lube | |
| Stroke length tolerance range | 0 to 1.0 mm | |
| Cushion | Without | |
| Rod non-rotating accuracy | ø12 | ø20 |
| | ±2° | ±3° |
| Mounting | Direct mounting rod side tapped (Standard), Foot style, Rod side flange style | |
| Thread tolerance | JIS Class 2 | |

JIS Symbol



Made to Order Specifications
(For details, refer to page 10-21-1.)

| Symbol | Specifications |
|--------|---------------------|
| -XC22 | Fluoro rubber seals |

Sensor Specifications

| | |
|-------------------------------|--|
| Cable | ø7, 6 core twisted pair shielded wire (Oil, Heat & Flame resistant) |
| Maximum transmission distance | 23 m (when using SMC cable and counter) |
| Position detection method | Magnetic scale rod, sensor head <Incremental type> |
| Magnetic field resistance | 14.5 mT |
| Power supply | 10.8 to 26.4 VDC (Power supply ripple: 1% or less) |
| Current consumption | 50 mA |
| Resolution | 0.01 mm (With 4 times multiplication) |
| Accuracy | ±0.02 mm ⁽¹⁾ (at 20°C) |
| Output type | Open collector (24 VDC, 40 mA) |
| Output signal | A/B phase difference output |
| Insulation resistance | 500 VDC, 50 MΩ or more (between case and 12E) |
| Vibration resistance | 33.3 Hz 6.8 G 2 hrs. each in X, Y directions 4 hrs. in Z direction based upon JIS D 1601 |
| Impact resistance | 30 G 3 times each in X, Y, Z directions |
| Enclosure | IP-67 (IEC Standard) ⁽²⁾ |
| Extension Cable (Option) | CE1-R* 5 m, 10 m, 15 m, 20 m |

Note 1) This includes the digital display error of the counter (CEU5).

Moreover, the overall accuracy after mounting on equipment will vary depending on mounting conditions and the environment. Therefore, the customer should calibrate the equipment as a whole.

Note 2) Except for the connector, the cylinder section is the equivalent of an SMC water resistant cylinder.

Cylinder Stroke

| Model | Standard stroke (mm) | | | | Manufacturable stroke range |
|---------|----------------------|----|----|-----|-----------------------------|
| | 25 | 50 | 75 | 100 | |
| CEP1B12 | ● | ● | ● | ● | 0 to 150 |
| CEP1B20 | ● | ● | ● | ● | 0 to 300 |

But, as for stroke over 100 mm, its accuracy will be ±0.05 mm. (at 20°C)

RE_A
B

REC

C□X

C□Y

MQ_M^Q

RHC

MK(2)

RS_G^QRS_A^H

RZQ

MI_S^W

CEP1

CE1

CE2

ML2B

C_G¹/₅-S

CV

MVGQ

CC

RB

J

D-

-X

20-

Data

Series CEP1

Weight (Without mounting bracket/connector)

| Bore size (mm) | Cylinder stroke (mm) | | | | (kg) |
|----------------|----------------------|------|------|------|------|
| | 25 | 50 | 75 | 100 | |
| 12 | 0.29 | 0.33 | 0.37 | 0.41 | |
| 20 | 0.62 | 0.68 | 0.74 | 0.80 | |

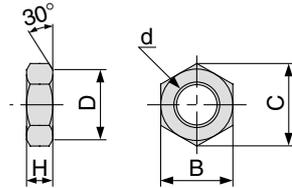
Proper Auto Switch Mounting Position

Regarding dimensions for the proper auto switch mounting position (at stroke end), refer to page 10-12-16.

Rod End Nut Dimensions

(2 pcs. are attached as standard.)

Material $\phi 12, 20$: Steel

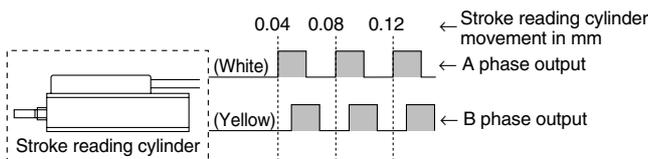


| Applicable bore size (mm) | d | H | B | C | D |
|---------------------------|-----------|---|----|------|------|
| 12 | M5 x 0.8 | 3 | 8 | 9.2 | 7.8 |
| 20 | M8 x 1.25 | 5 | 13 | 15.0 | 12.5 |

Electrical Wiring

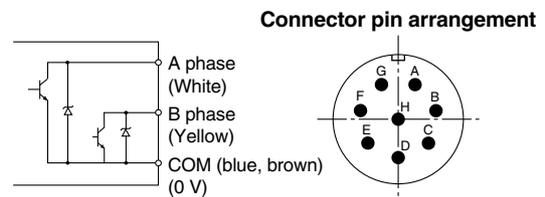
Output type

The output signal of the high precision stroke reading cylinder is A/B phase difference output (open collector output) as shown in the figure below. The relation between the movement distance and the signal output of the high precision stroke reading cylinder is that for each 0.04 mm of movement a one pulse signal is output to both output terminals A and B. In order to measure with a discrimination of 0.01 mm, a counter with a 4 times multiplication function (CEU5) is required.



Input/Output

The input/output of the stroke reading cylinder is performed by a $\phi 7$ shielded twisted pair wire from the sensor section plus a connector.



Output circuit of stroke reading cylinder

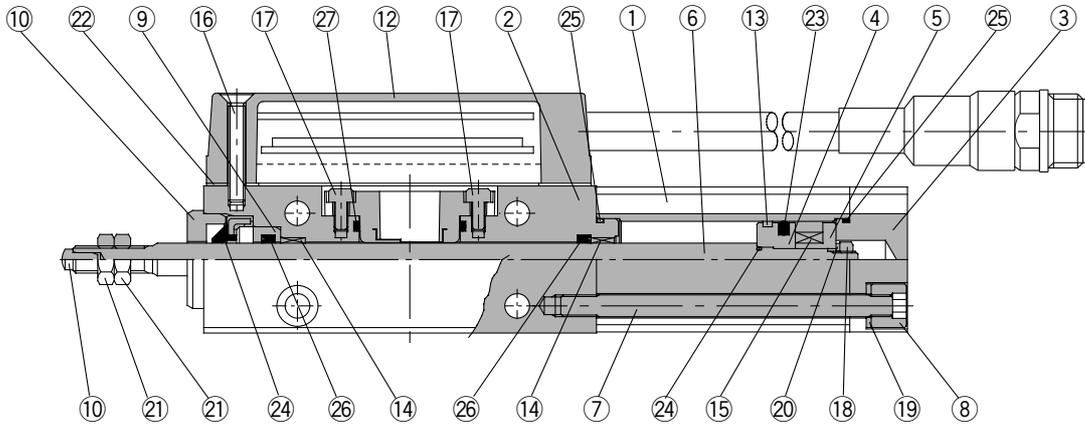
Signal

| Contact signal | Wire color | Signal name |
|----------------|------------|-------------|
| A | White | A phase |
| B | Yellow | B phase |
| C | Brown | COM (0 V) |
| D | Blue | COM (0 V) |
| E | Red | +12 to 24 V |
| F | Black | 0 V |
| G | — | Shield |

High Precision Stroke Reading Cylinder Non-rotating Piston Type **Series CEP1**

Construction

ø12, ø20



Component Parts

| No. | Description | Material | Note |
|-----|-------------------------|-----------------|---------------------------|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Rod cover | Aluminum alloy | Hard chrome plated |
| ③ | Head cover | Aluminum alloy | Hard anodized |
| ④ | Piston A | Aluminum alloy | Hard anodized |
| ⑤ | Piston B | Aluminum alloy | Hard anodized |
| ⑥ | Piston rod | Carbon steel | Hard chrome plated |
| ⑦ | Tie-rod | Carbon steel | Chromated |
| ⑧ | Tie-rod nut | Carbon steel | Nickel plated |
| ⑨ | Seal ring | Aluminum alloy | White anodized |
| ⑩ | Centering location ring | Aluminum alloy | White anodized |
| ⑪ | Rod end pin | Stainless steel | Quenched |
| ⑫ | Sensor unit | — | With or without connector |
| ⑬ | Wear ring | Special resin | |
| ⑭ | Bushing | Cast iron | |

| No. | Description | Material | Note |
|-----|---------------------------------------|---------------------------|---------------|
| ⑮ | Magnet | Rare earth | |
| ⑯ | Cross recessed countersunk head screw | Chromium molybdenum steel | Nickel plated |
| ⑰ | Hexagon socket head cap screw | Stainless steel | |
| ⑱ | Hexagon nut | Carbon steel | Nickel plated |
| ⑲ | Spring washer | Steel wire | Nickel plated |
| ⑳ | Spring washer | Steel wire | Nickel plated |
| ㉑ | Hexagon nut | Carbon steel | Rod end nut |
| ㉒ | Sensor case gasket | NBR | |
| ㉓ | Piston seal | NBR | |
| ㉔ | Scraper | NBR | |
| ㉕ | Tube gasket | NBR | |
| ㉖ | Rod seal | NBR | |
| ㉗ | O-ring | NBR | |
| ㉘ | O-ring | NBR | |

* Since there is a possibility of improper operation, please contact SMC regarding the replacement of seals.

RE_B^A

REC

C□X

C□Y

MQ_M^Q

RHC

MK(2)

RS_G^Q

RS_A^H

RZQ

MI_S^W

CEP1

CE1

CE2

ML2B

C₆¹5-S

CV

MVGQ

CC

RB

J

D-

-X

20-

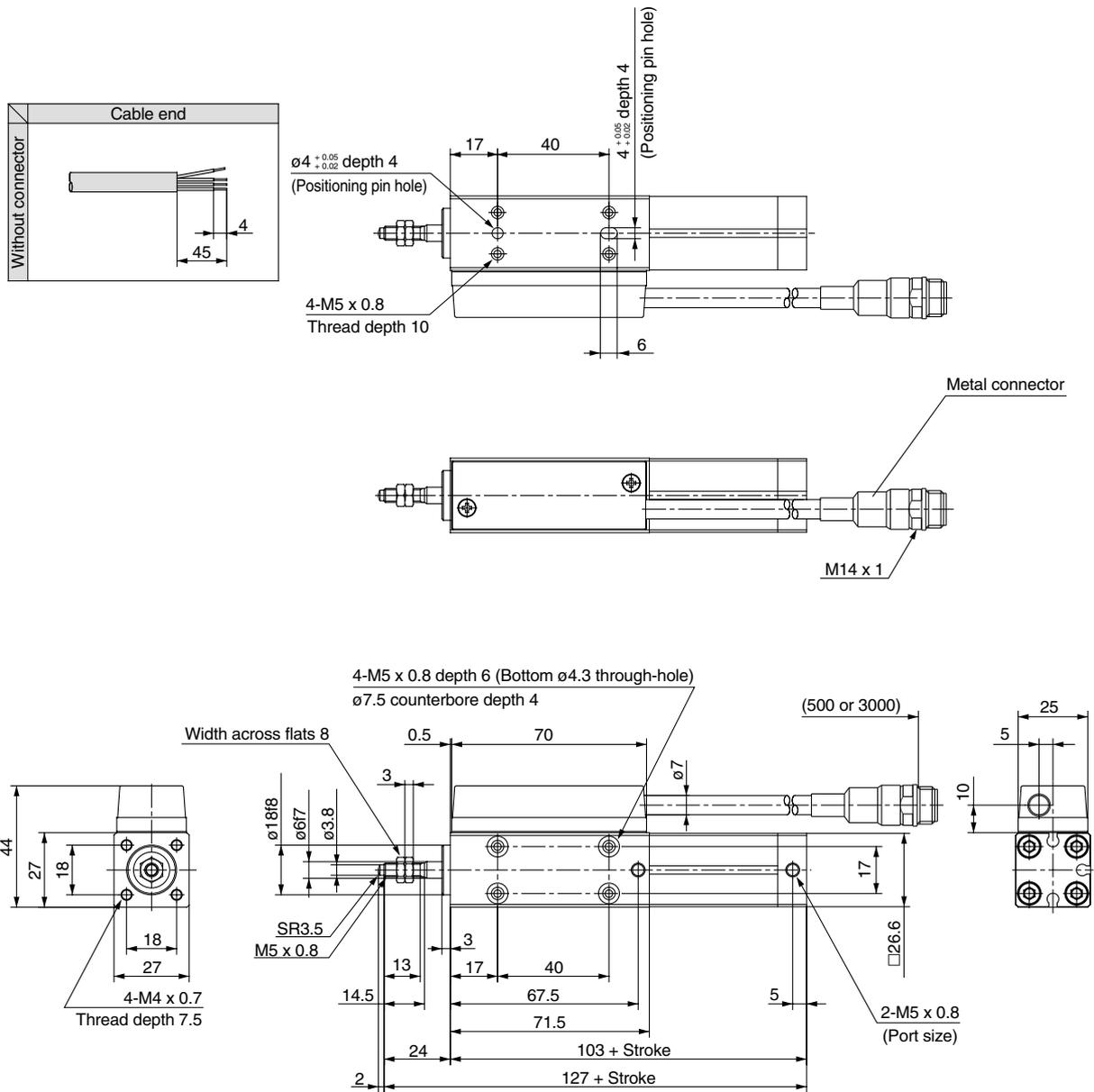
Data

Series CEP1

Dimensions: $\phi 12$

Direct mounting, rod side tapped style:

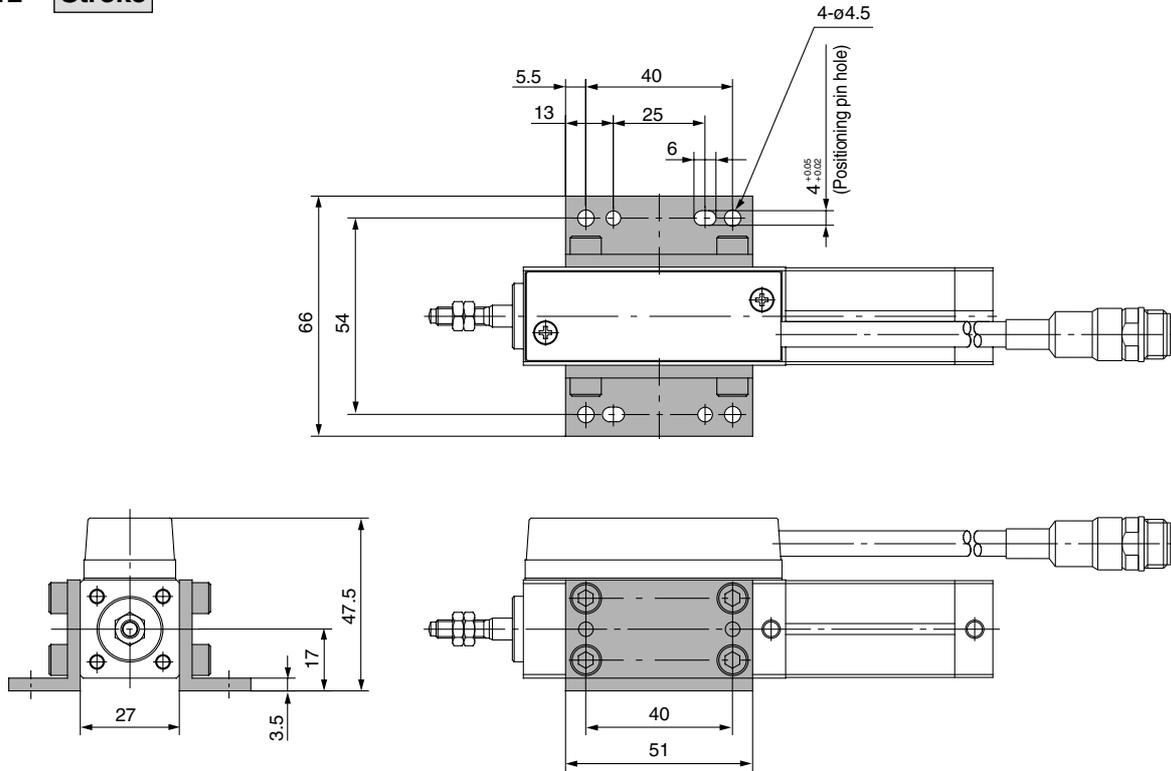
CEP1B12 — Stroke



High Precision Stroke Reading Cylinder Non-rotating Piston Type **Series CEP1**

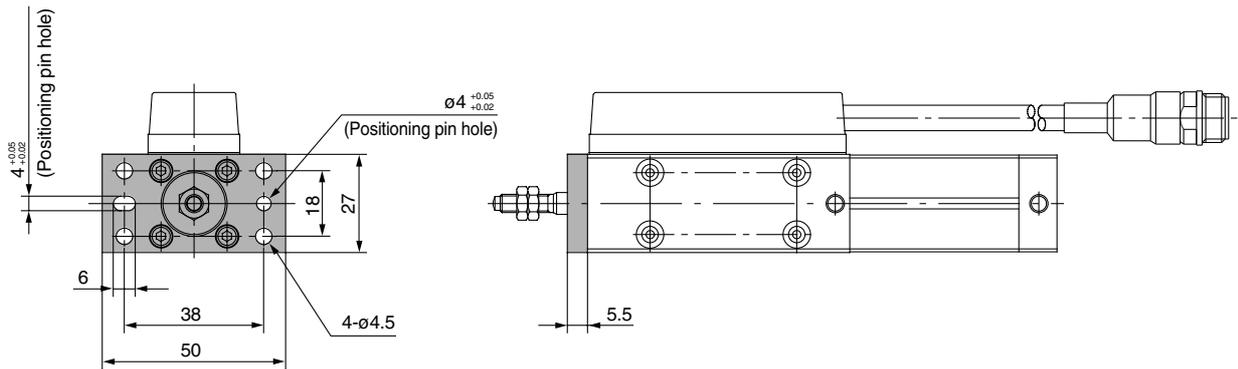
Foot style:

CEP1L12 — **Stroke**



Rod side flange style:

CEP1F12 — **Stroke**

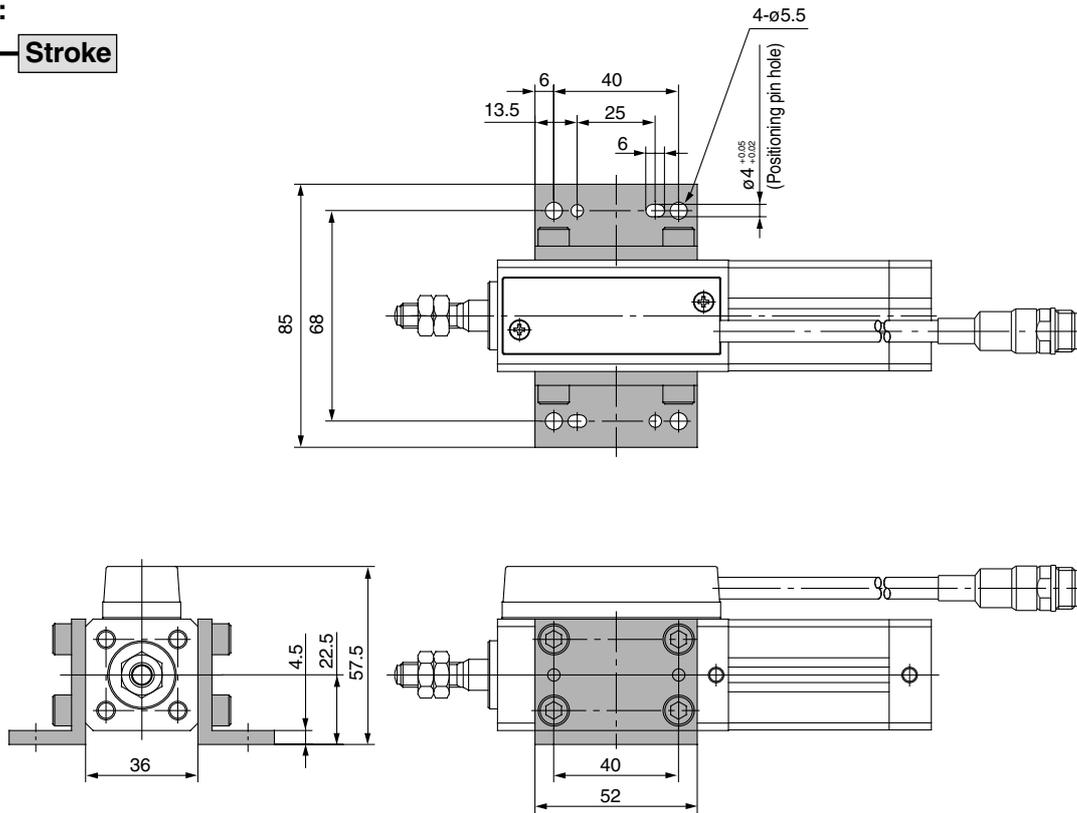


| |
|----------------------------------|
| RE ^A _B |
| REC |
| C□X |
| C□Y |
| MQ ^Q _M |
| RHC |
| MK(2) |
| RS ^Q _G |
| RS ^H _A |
| RZQ |
| MI ^W _S |
| CEP1 |
| CE1 |
| CE2 |
| ML2B |
| C ¹ / ₅ -S |
| CV |
| MVGQ |
| CC |
| RB |
| J |
| D- |
| -X |
| 20- |
| Data |

High Precision Stroke Reading Cylinder Non-rotating Piston Type **Series CEP1**

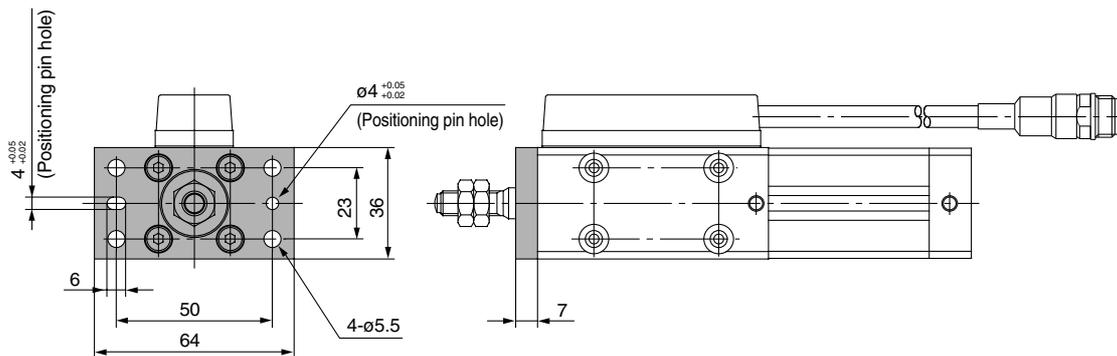
Foot style:

CEP1L20 — **Stroke**



Rod side flange style:

CEP1F20 — **Stroke**



RE_B^A

REC

C□X

C□Y

MQ_M^Q

RHC

MK(2)

RS_G^Q

RS_A^H

RZQ

MI_S^W

CEP1

CE1

CE2

ML2B

C₅-S

CV

MVGQ

CC

RB

J

D-

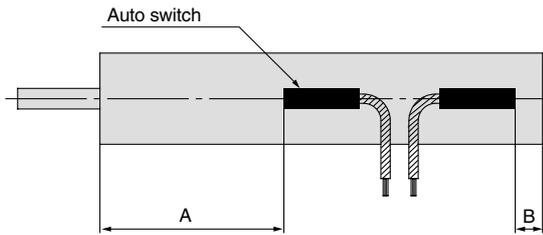
-X

20-

Data

Series CEP1

Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height



Proper Auto Switch Mounting Position

| Auto switch model | D-A9□ D-A9□V | | D-M9□ D-M9□V D-F9□W D-F9□WV | | D-F9BAL | |
|----------------------|-----------------|----|--------------------------------------|----|---------|----|
| | A | B | A | B | A | B |
| Bore size (mm) 12 | 75 | 8 | 79 | 12 | 78 | 11 |
| 20 | 82 | 12 | 86 | 16 | 85 | 15 |

Operating Range

| Auto switch model | Bore size (mm) | |
|-------------------------|----------------|----|
| | 12 | 20 |
| D-A9□/A9□V | 6 | 10 |
| D-M9□/M9□V | 2.5 | 3 |
| D-F9□W/F9□WV D-F9BAL | 3 | 5 |

* Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately $\pm 30\%$ dispersion)
There may be the case it will vary substantially depending on an ambient environment.

Other than the models listed in "How to Order", the following auto switches are applicable.
For detailed specifications, refer to page 10-20-1.

| Type | Model | Electrical entry | Features |
|-------------|--------|-------------------------|-------------------------|
| Reed switch | D-A90 | Grommet (In-line) | Without indicator light |
| | D-A90V | Grommet (Perpendicular) | |

* Normally closed (NC = b contact), solid state switch (D-F9G/F9H type) are also available.
For details, refer to page 10-20-40.

Stroke Reading Cylinder

Series CE1

ø12, ø20, ø32, ø40, ø50, ø63

How to Order

CE1 L 32 200 J79W

Mounting style

| | |
|---|-----------------------------------|
| B | Both ends tapped style (Standard) |
| L | Foot style |
| F | Rod side flange style |
| G | Head side flange style |
| D | Double clevis style |

Bore size

| | |
|----|-------|
| 12 | 12 mm |
| 20 | 20 mm |
| 32 | 32 mm |
| 40 | 40 mm |
| 50 | 50 mm |
| 63 | 63 mm |

Standard cylinder stroke (mm)
Refer to "Standard Stroke" on page 10-12-19.

Auto switch

| | |
|-----|---------------------|
| Nil | Without auto switch |
|-----|---------------------|

* For the applicable auto switch model, refer to the table below.
* Auto switches are shipped together, (but not assembled).

Number of auto switches

| | |
|-----|----------|
| Nil | 2 pcs. |
| S | 1 pc. |
| 3 | 3 pcs. |
| n | "n" pcs. |

Cable length

| | |
|-----|-------|
| Nil | 0.5 m |
| L | 3 m |

Connector

| | |
|-----|-------------------|
| Nil | With connector |
| Z | Without connector |

Suffix for cylinder
(Applicable bore size ø40 to ø63)

| | |
|-----|---------------------------|
| Nil | With cushion on both ends |
| N | Without cushion |
| R | With cushion on rod end |
| H | With cushion on head end |

* ø12, ø20, ø32: Without cushion only.
But, symbol N is not necessary.

Applicable counter

| |
|-------------|
| Series CEU1 |
| Series CEU5 |

<Option>

Extension cable CE1-R 05

Cable length

| | |
|----|------|
| 05 | 5 m |
| 10 | 10 m |
| 15 | 15 m |
| 20 | 20 m |

Suffix

| | |
|-----|-----------------------------|
| Nil | Extension cable |
| C | Extension cable & connector |

Applicable Auto Switch/Refer to page 10-20-1 for further information on auto switches.

| Type | Special function | Electrical entry | Indicator/light | Wiring (Output) | Load voltage | | Rail mounting | | Direct mounting | | Lead wire length (m)* | | | | Pre-wire connector | Applicable load | | | | |
|--|--|------------------|-----------------|-------------------------|--------------|-------|---------------|---------|-----------------|---------|-----------------------|-------|-------|----------|--------------------|-----------------|------------|---|---|---|
| | | | | | DC | AC | ø12 to ø63 | | ø32 to ø63 | | 0.5 (Nil) | 3 (L) | 5 (Z) | None (N) | | IC circuit | Relay, PLC | | | |
| | | | | | | | Perpendicular | In-line | Perpendicular | In-line | | | | | | | | | | |
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | 5 V | — | — | A76H | A96V | A96 | ● | ● | — | — | — | — | — | | | |
| | | | | — | — | 200 V | A72 | A72H | — | — | ● | ● | — | — | — | — | — | | | |
| | | Connector | | 24 V | 12 V | 100 V | — | — | A73 | A73H | — | — | ● | ● | ● | — | — | — | | |
| | | | | | | | — | — | A93V | A93 | ● | ● | — | — | — | — | — | — | | |
| Diagnostic indication (2-color indication) | Grommet | — | — | — | — | — | A73C | — | — | ● | ● | ● | ● | — | — | — | | | | |
| | | | | | | | A79W | — | — | ● | ● | — | — | — | — | — | — | — | | |
| Solid state switch | — | Grommet | Yes | 3-wire (NPN) | 5 V, 12 V | — | F7NV | F79 | M9NV | M9N | ● | ● | ○ | — | ○ | — | — | | | |
| | | | | 3-wire (PNP) | | | F7PV | F7P | M9PV | M9P | ● | ● | ○ | — | ○ | — | — | | | |
| | | Connector | | 24 V | 12 V | — | — | — | — | — | — | — | ● | ● | ○ | — | ○ | — | — | |
| | | | | | | F7BV | J79 | M9BV | M9B | ● | ● | ○ | — | ○ | — | — | — | | | |
| | Diagnostic indication (2-color indication) | Grommet | | — | — | — | — | — | J79C | — | — | — | ● | ● | ● | ● | — | — | — | |
| | | | | | | | | | F7NwV | F79W | F9NwV | F9Nw | ● | ● | ○ | — | ○ | — | — | — |
| | | | | | | | | | — | F7PW | F9PWV | F9PW | ● | ● | ○ | — | ○ | — | — | — |
| | | | | | | | | | F7BwV | J79W | F9BwV | F9Bw | ● | ● | ○ | — | ○ | — | — | — |
| Water resistant (2-color indication) | Grommet | — | — | — | — | — | — | F7BA | — | F9BA | — | ● | ○ | — | ○ | — | — | | | |
| | | | | | | | F7BAV | — | — | — | — | — | ○ | — | ○ | — | — | — | | |
| Diagnostic indication (2-color indication) | Grommet | — | — | — | — | — | — | F79F | — | — | ● | ● | ○ | — | ○ | — | — | | | |
| | | | | | | | — | — | — | — | — | — | — | — | — | — | — | — | | |

* Lead wire length symbols: 0.5 m..... Nil (Example) F73C
3 m..... L (Example) F73CL
5 m..... Z (Example) F73CZ
None..... N (Example) A73CN

* Solid state switches marked with "○" are produced upon receipt of order.

- Refer to page 10-12-26 for details on other applicable auto switches than listed above.
- For details about auto switches with pre-wire connector, refer to page 10-20-66.

Stroke Reading Cylinder Series CE1

Cylinder Specifications



| | | | |
|-------------------------------|--|------------------------------|----------------------|
| Fluid | Air | | |
| Proof pressure | 1.5 MPa | | |
| Maximum operating pressure | 1.0 MPa | | |
| Minimum operating pressure | ø12 | ø20 to ø63 | |
| | 0.07 MPa | 0.05 MPa | |
| Piston speed | 70 to 500 mm/s | | |
| Ambient and fluid temperature | 0 to 60°C (No freezing) | | |
| Humidity | 25 to 85% RH (No condensation) | | |
| Lubrication | Non-lube | | |
| Stroke length tolerance range | ø12, ø20: $+1.0_0$ | ø32, ø40, ø50, ø63: $+1.6_0$ | |
| | With Air cushion | ø12, ø20, ø32...None | ø40, ø50, ø63...With |
| Thread tolerance | JIS Class 2 | | |
| Rod non-rotating accuracy | ø12 | ø20 | ø32, ø40, ø50, ø63 |
| | $\pm 2^\circ$ | $\pm 1^\circ$ | $\pm 0.8^\circ$ |
| Mounting | Both ends tapped (Standard), Foot style, Flange style, Double clevis style | | |
| Auto switch | Reed type, Solid state type | | |

JIS Symbol



Mounting Bracket Part No.

| Bore size (mm) | Foot * | Flange | Double clevis |
|----------------|---------|---------|---------------|
| 12 | CQ-L012 | CQ-F012 | CQ-D012 |
| 20 | CQ-L020 | CQ-F020 | CQ-D020 |
| 32 | CQ-L032 | CQ-F032 | CQ-D032 |
| 40 | CQ-L040 | CQ-F040 | CQ-D040 |
| 50 | CQ-L050 | CQ-F050 | CQ-D050 |
| 63 | CQ-L063 | CQ-F063 | CQ-D063 |

Note 1) When ordering the foot bracket., order 2 pcs. per cylinder.

Note 2) Parts belonging to each bracket are as follows.

Foot, Flange/Body mounting bolts
Double clevis/Clevis pin, type C snap ring for shaft, Body mounting bolts

Auto Switch Mounting Bracket Part No.

| Bore size (mm) | Mounting bracket part no. | Note | Applicable auto switch |
|----------------------|---------------------------|--|---|
| 12 20 | BQ-1 | • Switch mounting screw (M3 x 0.5 x 8ℓ) • Square nut | D-A7□/A80 D-A7□H/A80H D-A73C/A80C D-A79W D-F7□V |
| 32 40 50 63 | BQ-2 | • Switch mounting screw (M3 x 0.5 x 10ℓ) • Switch spacer • Switch mounting nut | D-F7□/J79 D-J79C D-F7□WV D-F7□W/J79W D-F7BAL/F7BAVL D-F79F/F7NTL |

Sensor Specifications

| | | |
|-------------------------------|---|-----------------------------------|
| Cable | ø7, 6 core twisted pair shielded wire (Oil, Heat & Flame resistant cable) | |
| Maximum transmission distance | 23 m (when using SMC cable and counter) | |
| Position detection method | Magnetic scale rod <Non-rotating> | Sensor head <Incremental type> |
| | 14.5 mT | |
| Magnetic field resistance | 14.5 mT | |
| Power supply | 10.8 to 26.4 VDC (Power supply ripple: 1% or less) | |
| Current consumption | 40 mA | |
| Resolution | 0.1 mm/pulse | |
| Accuracy | ± 0.2 mm (at 20°C) (1) | |
| Output type | Open collector (24 VDC, 40 mA) | |
| Output signal | A/B phase difference output | |
| Insulation resistance | 500 VDC, 50 MΩ or more (between case and 12E) | |
| Vibration resistance | 33.3 Hz, 6.8 G 2 hrs. each in X, Y directions 4 hrs. in Z direction based upon JIS D 1601 | |
| Impact resistance | 30 G 3 times each in X, Y, Z directions | |
| Enclosure | IP65 (IEC Standard) (2) Except connector tor part | |
| Extension cable (Option) | 5 m, 10 m, 15 m, 20 m | |

Note 1) This includes the digital display error of the counter (CEU1, CEU5).

Moreover, the overall accuracy after mounting on equipment will vary depending on the mounting conditions and the environment. Therefore, the customer should calibrate the equipment as a whole.

Note 2) The cylinder section does not have a water resistant enclosure.

Standard Stroke

| Bore size (mm) | Stroke (mm) | | | | | | | | | | | Manufacturable stroke range | |
|----------------|-------------|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------------------|-----------|
| | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 400 | | 500 |
| 12 | ● | ● | ● | ● | ● | ● | — | — | — | — | — | — | 25 to 150 |
| 20 | ● | ● | ● | ● | ● | ● | ● | ● | — | — | — | — | 25 to 300 |
| 32 | — | ● | ● | ● | ● | ● | ● | ● | ● | ● | — | — | 25 to 400 |
| 40 | — | — | — | ● | ● | ● | ● | ● | ● | ● | ● | ● | 25 to 600 |
| 50 | — | — | — | — | — | — | — | ● | — | ● | — | ● | 25 to 600 |
| 63 | — | — | — | — | — | — | — | ● | — | ● | — | ● | 25 to 600 |

* Please contact SMC regarding non-standard strokes.

When the bore size is 12 mm and the stroke length is 100 mm or more, particular care should be taken regarding an offset load on the rod.

RE^A_B

REC

C□X

C□Y

MQ^Q_M

RHC

MK(2)

RS^Q_G

RS^H_A

RZQ

MI^W_S

CEP1

CE1

CE2

ML2B

C¹/₅-S

CV

MVGQ

CC

RB

J

D-

-X

20-

Data

Series CE1

Weight (Without mounting bracket/connector)

| Bore size (mm) | Cylinder stroke (mm) | | | | | | | | | | | | (kg) |
|----------------|----------------------|------|------|------|------|------|------|------|------|-----|-----|-----|------|
| | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 400 | 500 | |
| 12 | 0.29 | 0.33 | 0.36 | 0.4 | 0.43 | 0.47 | — | — | — | — | — | — | — |
| 20 | 0.51 | 0.58 | 0.65 | 0.72 | 0.79 | 0.86 | 0.93 | 1.0 | — | — | — | — | — |
| 32 | — | 0.94 | 1.05 | 1.15 | 1.26 | 1.36 | 1.47 | 1.58 | 1.79 | 2.0 | — | — | — |
| 40 | — | — | — | 1.7 | 1.83 | 1.95 | 2.08 | 2.2 | 2.45 | 2.7 | 3.2 | 3.7 | — |
| 50 | — | — | — | — | — | — | — | 3.4 | — | 4.1 | — | 5.5 | — |
| 63 | — | — | — | — | — | — | — | 4.2 | — | 5.0 | — | 6.6 | — |

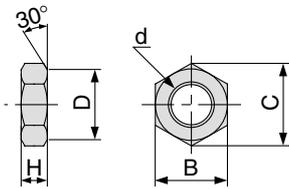
Proper Auto Switch Mounting Position

Regarding dimensions for the proper auto switch mounting position (at stroke end), refer to page 10-12-26.

Rod End Nut Dimensions

(1 pc. is attached as standard.)

Material $\phi 12, 20$: Steel
 $\phi 32$ to $\phi 63$: Rolled steel



| Part no. | Applicable bore size (mm) | d | H | B | C | D |
|----------|---------------------------|-----------|----|----|------|------|
| NTJ-015A | 12 | M5 x 0.8 | 4 | 8 | 9.2 | 7.8 |
| NT-02 | 20 | M8 x 1.25 | 5 | 13 | 15.0 | 12.5 |
| NT-04 | 32, 40 | M14 x 1.5 | 8 | 22 | 25.4 | 21.0 |
| NT-05 | 50, 63 | M18 x 1.5 | 11 | 27 | 31.2 | 26 |

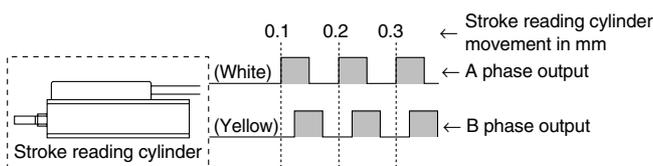
Electrical Wiring

Output type

The output signal of the stroke reading cylinder is A/B phase difference output (open collector output) as shown in the figure below.

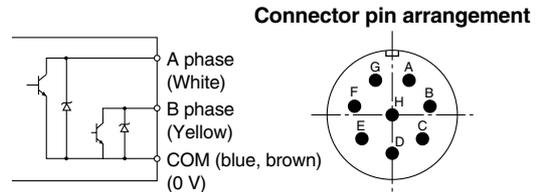
The relation between the movement distance and the signal output of the stroke reading cylinder is that for each 0.1 mm of movement a one pulse signal is output to both output terminals A and B.

Furthermore, the maximum response speed of the sensor for the stroke reading cylinder is at a maximum cylinder speed of 1500 mm/s (15 kcps).



Input/Output

The input/output of the stroke reading cylinder is performed by a $\phi 7$ shielded twisted pair wire from the sensor section plus a connector.



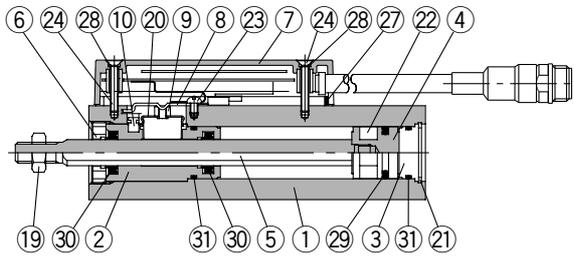
Output circuit of stroke reading cylinder

Signal

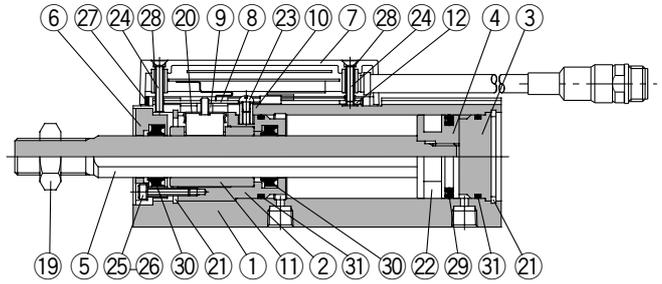
| Contact signal | Wire color | Signal name |
|----------------|------------|-------------|
| A | White | A phase |
| B | Yellow | B phase |
| C | Brown | COM (0 V) |
| D | Blue | COM (0 V) |
| E | Red | +12 to 24 V |
| F | Black | 0 V |
| G | — | Shield |

Construction

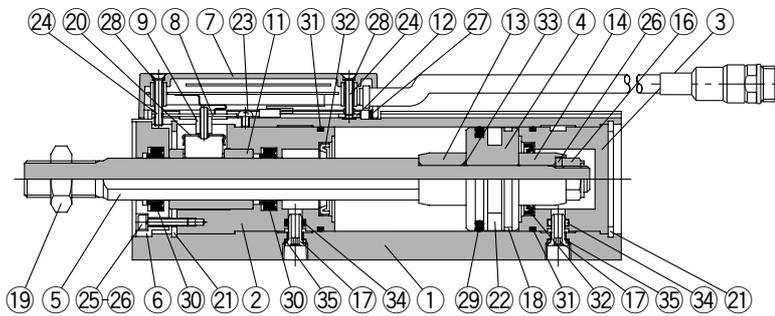
ø12, ø20



ø32



ø40 to ø63



Component Parts

| No. | Description | Material | Note |
|-----|-------------------------------|--------------------|------------------------------|
| ① | Cylinder body | Aluminum alloy | |
| ② | Rod cover | Brass | ø12 to ø20 |
| | | Aluminum alloy | ø32 to ø63 |
| ③ | Head cover | Aluminum alloy | |
| ④ | Piston | Magnetic material | ø12 |
| | | Aluminum alloy | ø20 to ø63 (Built-in magnet) |
| ⑤ | Piston rod | Stainless steel | |
| ⑥ | Rod cover disk | Aluminum alloy | |
| ⑦ | Sensor unit | — | |
| ⑧ | Sensor setting bracket | Stainless steel | |
| ⑨ | Sensor setting piece assembly | — | ø20 to ø63 |
| ⑩ | Pin | Stainless steel | ø12 to ø32 |
| ⑪ | Sensor guide | Lead-bronze casted | ø32 to ø63 |
| ⑫ | Case setting nut | Carbon steel | ø32 to ø63 |
| ⑬ | Cushion ring A | Rolled steel | ø40 to ø63 |
| ⑭ | Cushion ring B | Rolled steel | ø40 to ø63 |
| ⑮ | Cushion valve | — | ø40 to ø63 |
| ⑯ | Piston nut | Rolled steel | ø40 to ø63 |
| ⑰ | Port joint | Stainless steel | ø40 to ø63 |

| No. | Description | Material | Note |
|-----|---------------------------------------|---------------------------------|------------|
| ⑱ | Wear ring | Resin | ø40 to ø63 |
| ⑲ | Rod end nut | Carbon steel | |
| ⑳ | Sensor setting plate | Cold rolled special steel strip | |
| ㉑ | Type C snap ring | Carbon steel | |
| ㉒ | Magnet | — | |
| ㉓ | Round head Phillips screw | Carbon steel wire | |
| ㉔ | Cross recessed countersunk head screw | Carbon steel wire | |
| ㉕ | Hexagon socket head cap screw | Chromium molybdenum steel | |
| ㉖ | Spring washer | Steel wire | |
| ㉗ | Case gasket | NBR | |
| ㉘ | Case screw gasket | NBR | |
| ㉙ | Piston seal | NBR | |
| ㉚ | Rod seal | NBR | |
| ㉛ | Gasket | NBR | |
| ㉜ | Cushion seal | NBR | |
| ㉝ | Piston gasket | NBR | |
| ㉞ | Port seal | NBR | |
| ㉟ | Joint seal | NBR | |
| ㊱ | Valve seal | NBR | |
| ㊲ | Valve retainer seal | NBR | |

* Since there is a possibility of improper operation, please contact SMC regarding the replacement of seals.

RE_B^A

REC

C□X

C□Y

MQ_M^Q

RHC

MK(2)

RS_G^Q

RS_A^H

RZQ

MI_S^W

CEP1

CE1

CE2

ML2B

C_G¹5-S

CV

MVGQ

CC

RB

J

D-

-X

20-

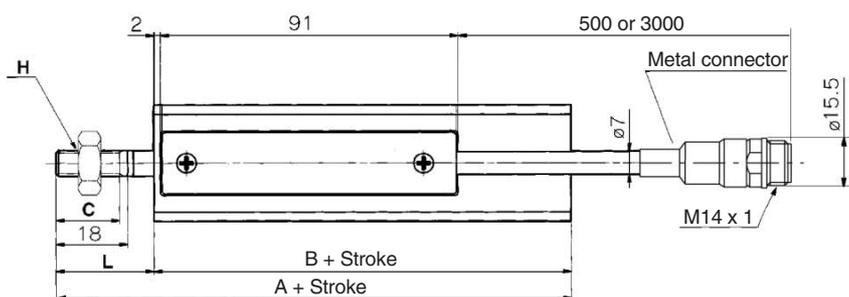
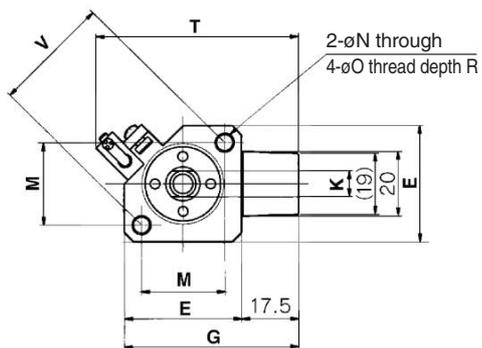
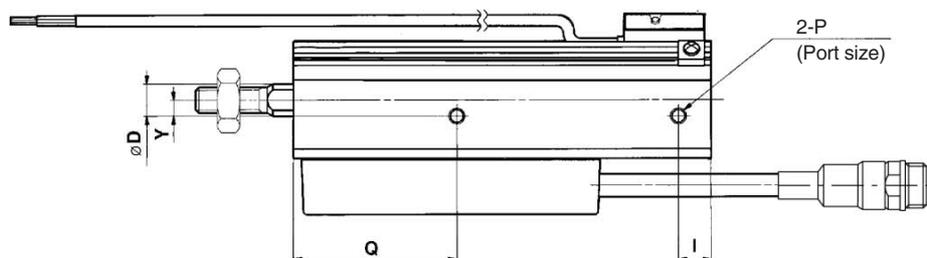
Data

Series CE1

Dimensions: $\phi 12, \phi 20$

Both ends tapped style:

CE1B Bore size — Stroke



| Bore size (mm) | Standard stroke | A | B | C | D | E | G | H | I | K | L | M |
|----------------|-------------------------------------|-----|----|------|----|----|------|-----------|----|-----|----|------|
| 12 | 25, 50, 75, 100, 125, 150 | 94 | 69 | 15 | 6 | 25 | 42.5 | M5 x 0.8 | 16 | 5.2 | 25 | 15.5 |
| 20 | 25, 50, 75, 100, 125, 150, 175, 200 | 106 | 78 | 15.5 | 10 | 36 | 53.5 | M8 x 1.25 | 10 | 8 | 28 | 25.5 |

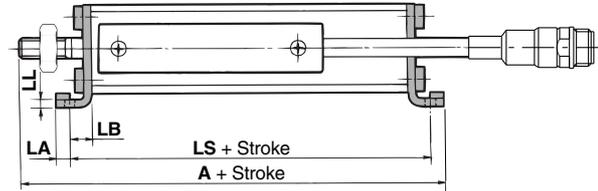
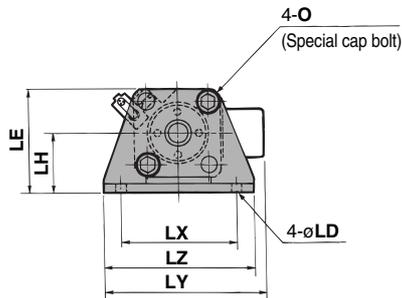
| Bore size (mm) | N | O | P | Q | R | T* | V | Y |
|----------------|-----|----------|----------|----|----|------|----|---|
| 12 | — | M4 x 0.7 | M5 x 0.8 | 47 | 7 | 53.5 | 22 | 7 |
| 20 | 5.5 | M6 x 1 | M5 x 0.8 | 50 | 15 | 62.5 | 36 | 5 |

* For rod nut and accessory bracket, refer to page 10-12-20. * Dimensions for auto switch model D-F79W.

Stroke Reading Cylinder Series CE1

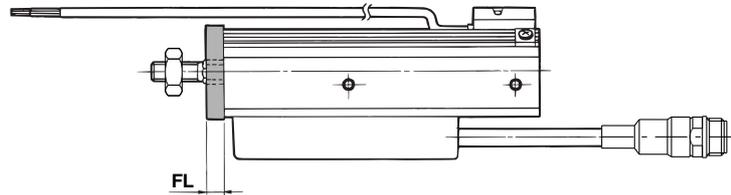
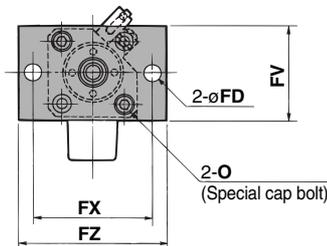
Foot style:

CE1L Bore size — Stroke



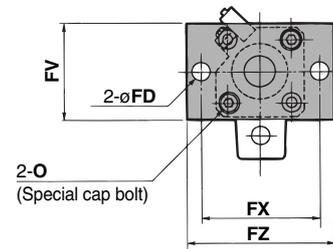
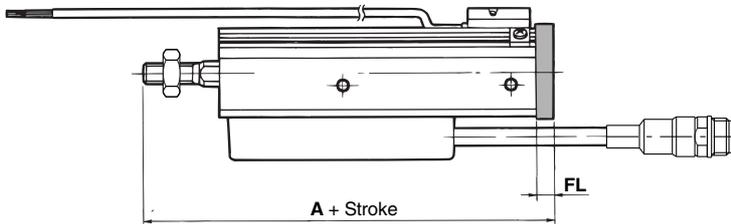
Rod side flange style:

CE1F Bore size — Stroke



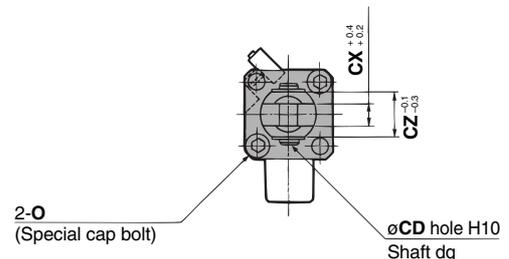
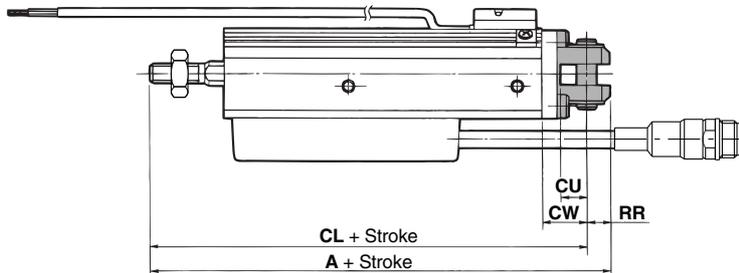
Head side flange style:

CE1G Bore size — Stroke



Double clevis style:

CE1D Bore size — Stroke



| Bore size (mm) | Foot style | | | | | | | | | | | | Rod side flange, Head side flange | | | | | Head side flange | Double clevis style | | | | | | | |
|----------------|------------|-----|-----|-----|------|----|-----|------|----|------|----|-----|-----------------------------------|----|----|----|------|------------------|---------------------|-----|----|----|----|----|----|--|
| | A | LA | LB | LD | LE | LH | LL | LS | LX | LY | LZ | FG | FL | FV | FX | FZ | A | A | CD | CL | CU | CW | CX | CZ | RR | |
| 12 | 106.5 | 4.5 | 8 | 4.5 | 29.5 | 17 | 2 | 85 | 34 | 52 | 44 | 4.5 | 5.5 | 25 | 45 | 55 | 99.5 | 114 | 5 | 108 | 7 | 14 | 5 | 10 | 6 | |
| 20 | 121 | 5.8 | 9.2 | 6.6 | 42 | 24 | 3.2 | 96.4 | 48 | 66.5 | 62 | 6.6 | 8 | 39 | 48 | 60 | 114 | 133 | 8 | 124 | 12 | 18 | 8 | 16 | 9 | |

RE^A_B

REC

C□X

C□Y

MQ^Q_M

RHC

MK(2)

RS^Q_G

RS^H_A

RZQ

MI^W_S

CEP1

CE1

CE2

ML2B

C_G5-S

CV

MVGQ

CC

RB

J

D-

-X

20-

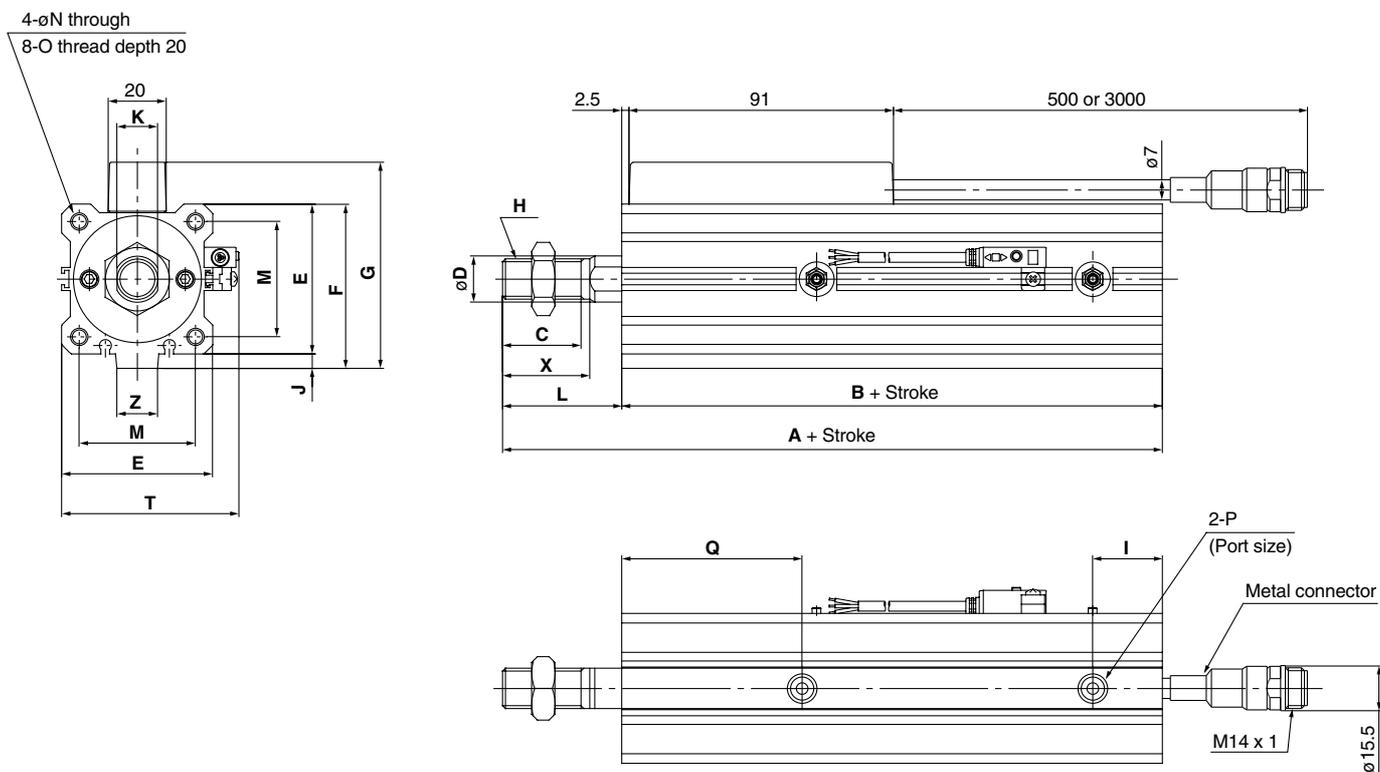
Data

Series CE1

Dimensions: $\varnothing 32$, $\varnothing 40$, $\varnothing 50$, $\varnothing 63$

Both ends tapped style:

CE1B Bore size — Stroke



| Bore size (mm) | Standard stroke | A | B | C | D | E | F | G | H | I | J | K |
|----------------|---|-----|-----|----|----|----|------|------|-----------|------|-----|----|
| 32 | 50, 75, 100, 125, 150, 175, 200, 250, 300 | 131 | 90 | 27 | 16 | 45 | 49.5 | 64 | M14 x 1.5 | 14 | 4.5 | 14 |
| 40 | 100, 125, 150, 175, 200, 250, 300, 400, 500 | 177 | 136 | 27 | 16 | 52 | 57 | 71.5 | M14 x 1.5 | 24 | 5 | 14 |
| 50 | 200, 300, 500 | 193 | 144 | 32 | 20 | 64 | 71 | 85.5 | M18 x 1.5 | 25.5 | 7 | 18 |
| 63 | 200, 300, 500 | 194 | 145 | 32 | 20 | 77 | 84 | 98.5 | M18 x 1.5 | 21 | 7 | 18 |

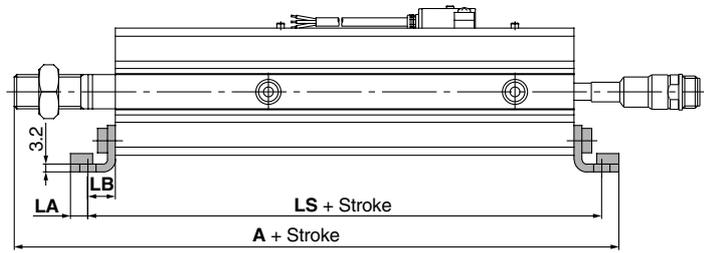
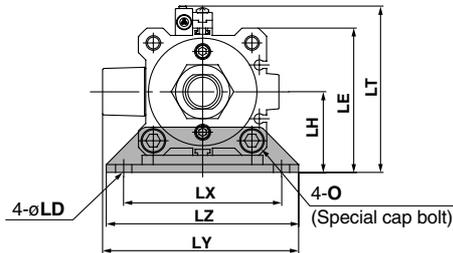
| Bore size (mm) | L | M | N | O | P | Q | T* | X | Z |
|----------------|----|----|-----|-----------|--------|------|------|----|----|
| 32 | 41 | 34 | 5.5 | M6 x 1 | Rc 1/8 | 56 | 57.5 | 30 | 14 |
| 40 | 41 | 40 | 5.5 | M6 x 1 | Rc 1/8 | 62 | 64.5 | 30 | 14 |
| 50 | 49 | 50 | 6.6 | M8 x 1.25 | Rc 1/4 | 61.5 | 76.5 | 35 | 19 |
| 63 | 49 | 60 | 9 | M10 x 1.5 | Rc 1/4 | 64 | 89.5 | 35 | 19 |

* For rod nut and accessory bracket, refer to page 10-12-20. * Dimensions for auto switch model D-F79W.

Stroke Reading Cylinder Series CE1

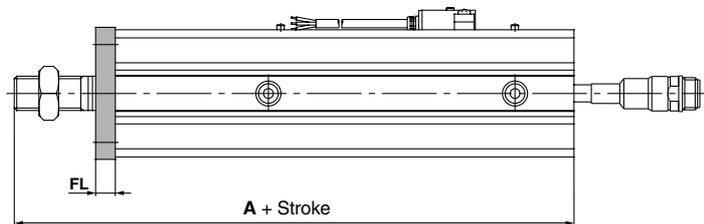
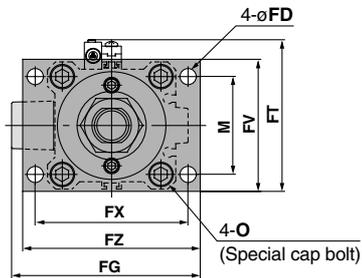
Foot style:

CE1L **Bore size** — **Stroke**



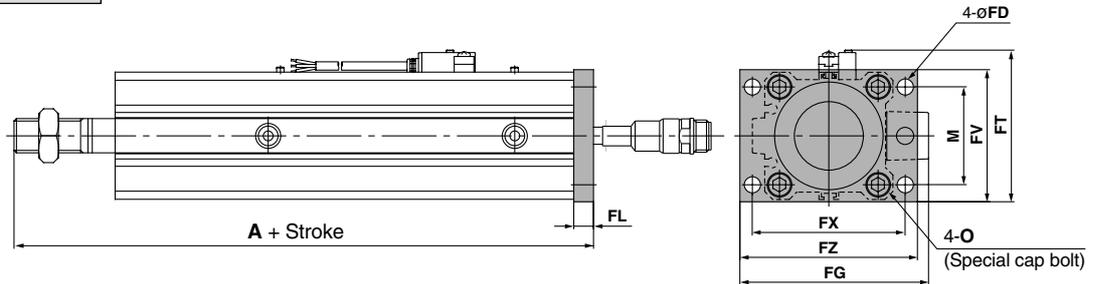
Rod side flange style:

CE1F **Bore size** — **Stroke**



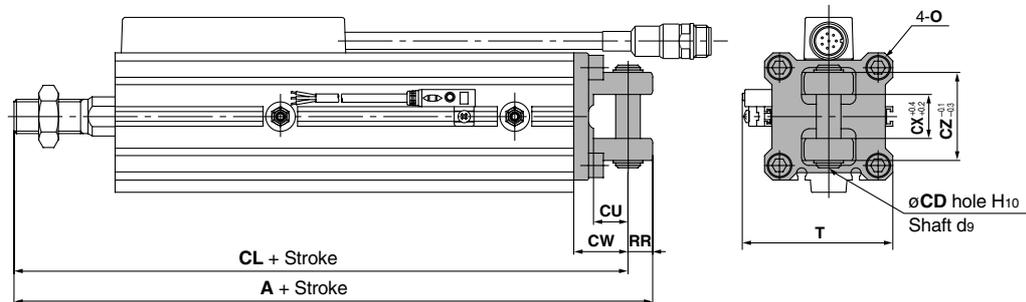
Head side flange style:

CE1G **Bore size** — **Stroke**



Double clevis style:

CE1D **Bore size** — **Stroke**



| Bore size (mm) | Foot style | | | | | | | | | | | Rod side flange, Head side flange | | | | | | | Head side flange | Double clevis style | | | | | | | | | |
|----------------|------------|-----|------|-----|------|----|-------|------|----|-------|-----|-----------------------------------|------|----|------|----|----|-----|------------------|---------------------|-----|----|-----|----|----|----|----|----|------|
| | A | LA | LB | LD | LE | LH | LS | LT* | LX | LY | LZ | FD | FG | FL | FT* | FV | FX | FZ | | M | A | A | CD | CL | CU | CW | CX | CZ | RR |
| 32 | 148 | 5.8 | 11.2 | 6.6 | 52.5 | 30 | 112.4 | 65 | 57 | 72.5 | 71 | 5.5 | 69.5 | 8 | 59 | 48 | 56 | 65 | 34 | 139 | 161 | 10 | 151 | 14 | 20 | 18 | 36 | 10 | 57.5 |
| 40 | 195.2 | 7 | 11.2 | 6.6 | 59 | 33 | 158.4 | 71.5 | 64 | 79.5 | 78 | 5.5 | 76.5 | 8 | 65.5 | 54 | 62 | 72 | 40 | 185 | 209 | 10 | 199 | 14 | 22 | 18 | 36 | 10 | 64.5 |
| 50 | 215.7 | 8 | 14.7 | 9 | 71 | 39 | 173.4 | 83.5 | 79 | 94 | 95 | 6.6 | 91 | 9 | 78 | 67 | 76 | 89 | 50 | 202 | 235 | 14 | 221 | 20 | 28 | 22 | 44 | 14 | 76.5 |
| 63 | 219.2 | 9 | 16.2 | 11 | 84.5 | 46 | 177.4 | 97 | 95 | 109.5 | 113 | 9 | 107 | 9 | 91 | 80 | 92 | 108 | 60 | 203 | 238 | 14 | 224 | 20 | 30 | 22 | 44 | 14 | 89.5 |

* Dimensions for auto switch model D-F79W.

RE^A_B

REC

C□X

C□Y

MQ^Q_M

RHC

MK(2)

RS^Q_G

RS^H_A

RZQ

MI^W_S

CEP1

CE1

CE2

ML2B

C¹_G5-S

CV

MVGQ

CC

RB

J

D-

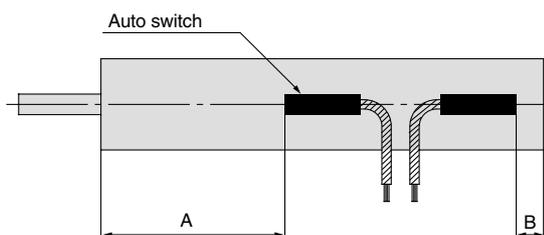
-X

20-

Data

Series CE1

Proper Auto Switch Mounting Position (Detection at stroke end)



Proper Auto Switch Mounting Position

| Auto switch model Bore size (mm) | D-A7□ D-A80 | | D-A7□H/A80H D-A73C/A80C D-F7□/J79 D-F7□V/J79C D-F7□W/J79W D-F7□WV D-F7BAL D-F7BAVL/F79F | | D-A79W | | D-F7NTL | | D-A9□ D-A9□V | | D-M9□ D-M9□V D-F9□W D-F9□WV | | D-F9BAL | |
|-------------------------------------|----------------|------|--|------|--------|------|---------|------|-----------------|------|--------------------------------------|------|---------|------|
| | A | B | A | B | A | B | A | B | A | B | A | B | A | B |
| 12 | 40.5 | 4 | 41 | 4.5 | 38 | 2 | 46 | 9.5 | 39.5 | 3 | 43.5 | 7 | 42.5 | 6 |
| 20 | 47 | 13 | 47.5 | 13.5 | 44.5 | 10.5 | 52.5 | 18.5 | 46 | 12 | 50 | 16 | 49 | 15 |
| 32 | 55 | 17 | 5.5 | 17.5 | 52.5 | 14.5 | 60.5 | 22.5 | 54 | 16 | 58 | 20 | 57 | 19 |
| 40 | 79 | 39 | 79.5 | 39.5 | 76.5 | 36.5 | 84.5 | 44.5 | 78 | 38 | 82 | 42 | 81 | 41 |
| 50 | 82 | 44 | 82.5 | 44.5 | 79.5 | 41.5 | 87.5 | 49.5 | 81 | 43 | 85 | 47 | 84 | 46 |
| 63 | 85.5 | 41.5 | 86 | 42 | 83 | 39 | 91 | 47 | 84.5 | 40.5 | 88.5 | 44.5 | 87.5 | 43.5 |

Operating Range

| Auto switch model | Bore size (mm) | | | | | |
|--|----------------|-----|-----|-----|-----|------|
| | 12 | 20 | 32 | 40 | 50 | 63 |
| D-A7□/A80 D-A7H/A80H D-A73C/A80C | 10 | 12 | 12 | 11 | 10 | 12 |
| D-A79W | 13 | 13 | 13 | 14 | 14 | 16 |
| D-A9□/A9□V | — | — | 9.5 | 9.5 | 9.5 | 11.5 |
| D-F7□/J79 D-F7□V/J79C D-F7□W/F7□WV D-J79W/F7NNTL D-F7BAL/F7BAVL/F79F | 5.5 | 5.5 | 6 | 6 | 6 | 6.5 |
| D-M9□/M9□V D-F9□W/F9□WV D-F9BAL | — | — | 4.5 | 4.5 | 4.5 | 4.5 |
| | — | — | 5.5 | 5.5 | 5.5 | 6 |

* Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion)

There may be the case it will vary substantially depending on an ambient environment.

Other than the applicable auto switches listed in “How to Order”, the following auto switches can be mounted. For detailed specifications, refer to page 10-20-1.

| Type | Model | Electrical entry (Fetching direction) | Features | Applicable bore size (mm) |
|--------------------|---------|---------------------------------------|-------------------------|---------------------------|
| Reed switch | D-A80 | Grommet (Perpendicular) | Without indicator light | 12 to 63 |
| | D-A80H | Grommet (In-line) | | |
| | D-A80C | Connector (Perpendicular) | | |
| | D-A90 | Grommet (In-line) | | 32 to 63 |
| | D-A90V | Grommet (Perpendicular) | | |
| Solid state switch | D-F7NTL | Grommet (In-line) | With timer | 12 to 63 |

* With pre-wire connector is available for D-F7NTL type, too. For details, refer to page 10-20-66.

* Normally closed (NC = b contact), solid state switch (D-F9G/F9H type) are also available. For details, refer to page 10-20-40.

Series CEU/Series CE Counter/Extension Cable

Multi-counter

How to Order



CEU5

Output transistor mode

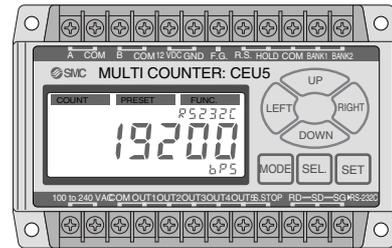
| | |
|-----|---------------------------|
| Nil | NPN open collector output |
| P | PNP open collector output |

Power supply voltage

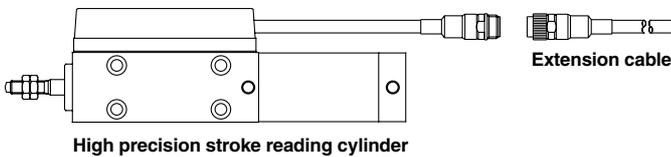
| | |
|-----|----------------|
| Nil | 100 to 240 VAC |
| D | 24 VDC |

External output

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



Connection Method



High precision stroke reading cylinder

If the distance between high precision stroke reading cylinder and multi-counter is over 23 meter, use transmission box. (CE1-H0374)

BCD Connector Specifications

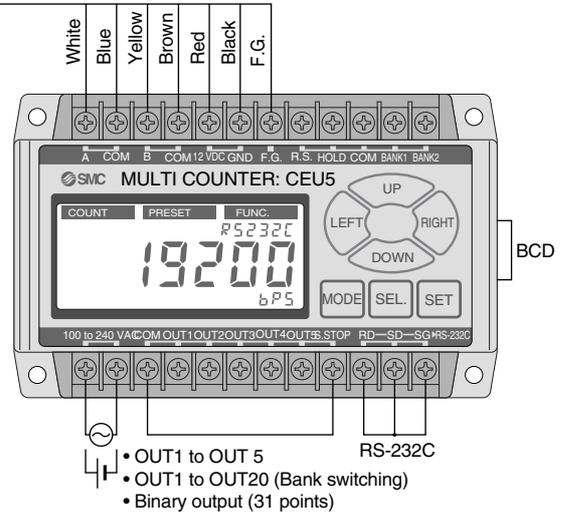
Model (counter side):

DX10M-36S (made by Hirose Electric Co., Ltd.)

Connector model:

DX30AM-36P (made by Hirose Electric Co., Ltd.)

Please consult with SMC separately for a BCD cable with connector.



RE_A
B

REC

C□X

C□Y

MQ_M^Q

RHC

MK(2)

RS_G^Q

RS_A^H

RZQ

MI_S^W

CEP1

CE1

CE2

ML2B

C₆¹/5-S

CV

MVGQ

CC

RB

J

D-

-X

20-

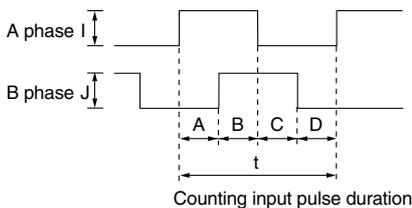
Data

Series CEU5

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), {E ² ROM (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) | | | | | | | |
| 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: 500 VDC, 50 MΩ or more | | | | | | | |
| 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



A:
B:
C:
D:

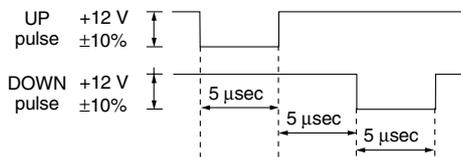
2.5 μsec or more required

t: 10 μsec or more required

$$\text{Counting speed } f = \frac{1}{t} = \frac{1}{10 \times 10^{-6}} = 100000 \text{ Hz} \approx 100 \text{ kHz}$$

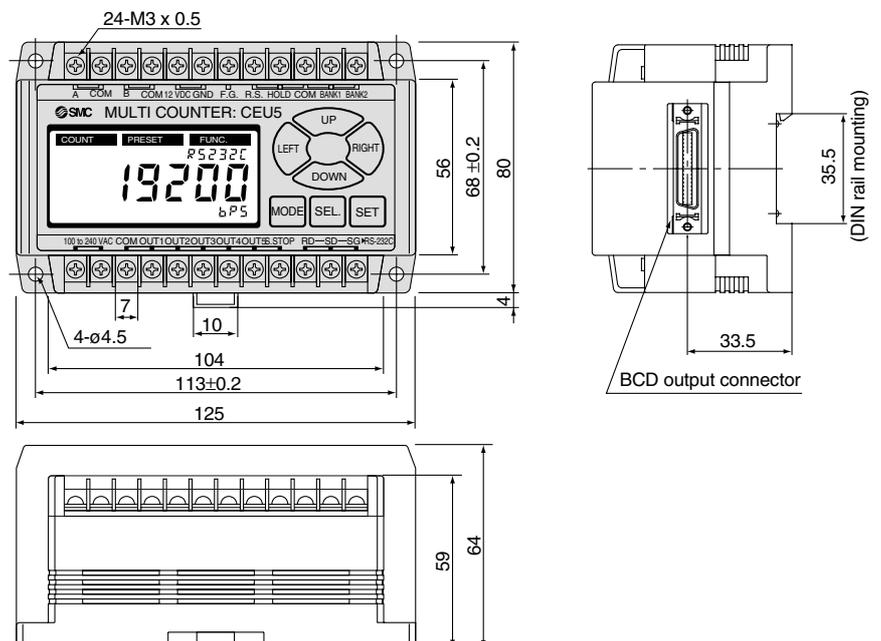
*2) UP/DOWN input

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.

Multi-counter/Dimensions



Wiring with External Equipment

<Wiring with multi counter CEU5>

1. Wiring of power source for driving counter

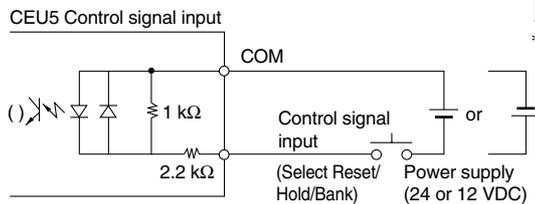
For power source for driving counter, use the one with 90 to 264 VAC, 50/60 Hz or 21.6 to 264 VDC, 0.4 A or more.

2. Wiring for control signal input

(Selection among Reset, Hold, Bank)

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 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□-□ |
|-------------------|------------------------------|------------------------------|
| Connection method | <p>NPN transistor output</p> | <p>PNP transistor output</p> |

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

RE_B^A

REC

C□X

C□Y

MQ_M^Q

RHC

MK(2)

RS_G^QRS_A^H

RZQ

MI_S^W

CEP1

CE1

CE2

ML2B

C_G¹5-S

CV

MVGQ

CC

RB

J

D-

-X

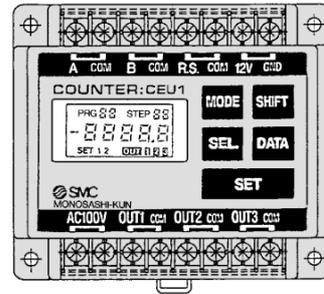
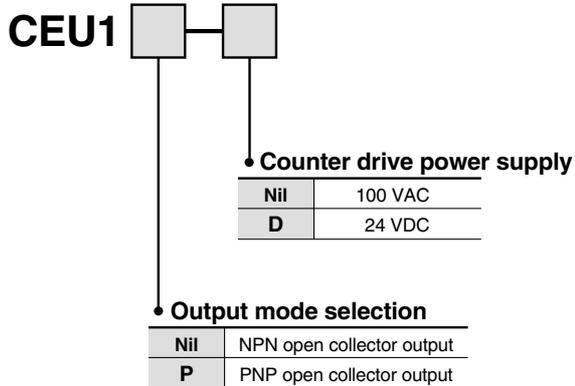
20-

Data

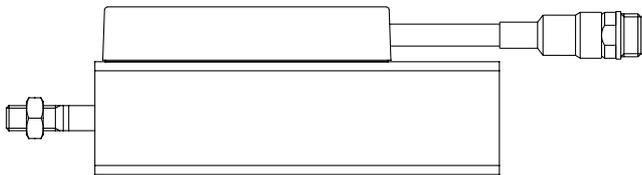
Series CEU1

■ 3-point Preset Counter

How to Order



Connection Method

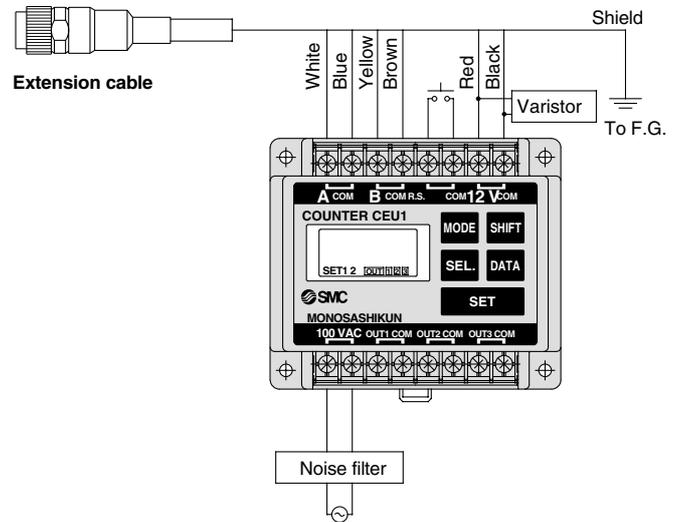


Stroke reading cylinder

Anti-noise performance will be improved by placing varistor, noise filter as a figure at right.

Shielding should be connected to FG (frame ground).
If sources of noise generation (motors, AC type valves, relays, etc.) are connected on the secondary side of the noise filter, the filter will have no effect.

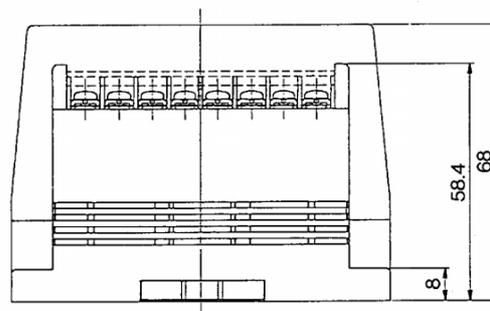
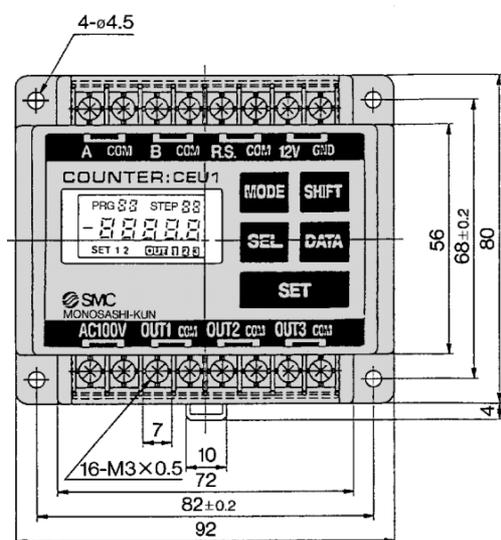
When the distance between stroke reading cylinder and counter is over 23 m, use a transmission box (CE1-H0374).



3-point Preset Counter/Specifications

| Model | CEU1 | CEU1P | CEU1-D | CEU1P-D |
|---------------------------------|--|--|--|--|
| Type | 3-point preset counter | | | |
| Mounting | Surface mounting (DIN rail or Screw stop) | | | |
| Operating system | Adding - subtracting type | | | |
| Operation modes | Operating mode, Data setting mode | | | |
| Reset system | External reset terminal | | | |
| Display system | LCD (With back light) | | | |
| Number of digits | 5 digits display (-9999.9 to 9999.9) | | | |
| Memory holding {Storage medium} | Preset data (always held) (E ² ROM (Warning display after writing approx. 65,000 times: <i>F_L</i>)) | | | |
| Input signal type | Count input, Reset input | | | |
| Count input | No-voltage pulse input | | | |
| Pulse signal system | 90° phase difference input | | | |
| Counting speed | 20 kHz | | | |
| Reset input | R.S. and COM terminals are shorted for 10 ms or more (Pulse input) | | | |
| Sensor power supply | 10.8 to 13.2 VDC, 60 mA | | | |
| Output signal type | Preset output | | | |
| Preset output configuration | Compare/Hold/One-shot (100 ms fixed pulse) | | | |
| Output delay time | 5 ms or less | | | |
| 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 | PNP open collector Max. 30 VDC, 50 mA |
| Power supply voltage | 80 to 120 VAC 50/60 Hz | | 21.6 to 26.4 VDC | |
| Power consumption | 10 VA or less | | 5 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: 500 VDC, 50 MΩ or more | | | |
| Ambient temperature | 0 to 50°C (without 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 ±1500 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 | 250 g or less | | | |

3-point Preset Counter/Dimensions

RE_B^A

REC

C□X

C□Y

MQ_M^Q

RHC

MK(2)

RS_G^QRS_A^H

RZQ

MI_S^W

CEP1

CE1

CE2

ML2B

C_G¹5-S

CV

MVGQ

CC

RB

J

D-

-X

20-

Data

Series CEU

■ Extension Cable

How to Order

CE1-R

Cable length

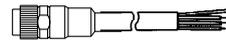
| | |
|----|------|
| 05 | 5 m |
| 10 | 10 m |
| 15 | 15 m |
| 20 | 20 m |

Suffix

| | |
|-----|-----------------------------|
| Nil | Extension cable |
| C | Extension cable & connector |

Extension cable

CE1-R



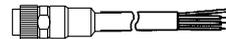
Stroke reading cylinder side connector (unit)

CE1-R00C



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

CE1-RC



Operating Condition of each Output Mode

One-shot Output

| Without allowable values | With allowable values |
|--|---|
| <p>When the counter value passes the preset value, output is turned ON for 100 ms.</p> | <p>When the counter value passes the sum of the preset value + the allowed value, output is turned ON for 100 ms.</p> |

Hold Output

| Without allowable values | With allowable values |
|--|--|
| <p>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.</p> | <p>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.</p> |

Compare Output

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

RE_B^A

REC

C_X

C_Y

MQ_M^Q

RHC

MK(2)

RS_G^Q

RS_A^H

RZQ

MI_S^W

CEP1

CE1

CE2

ML2B

C_{5-S}^J

CV

MVGQ

CC

RB

J

D-

-X

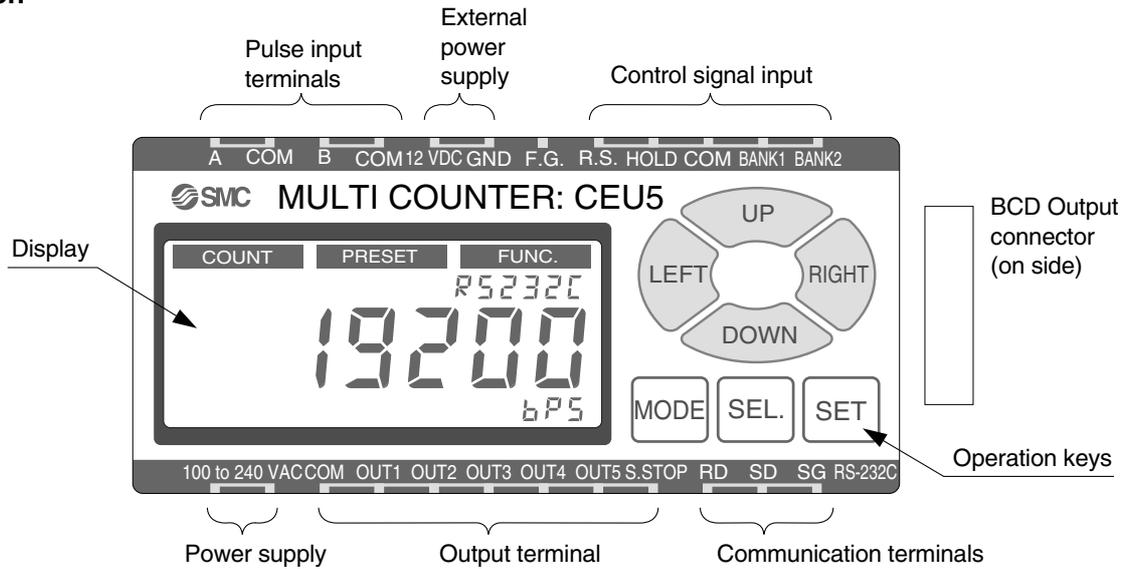
20-

Data

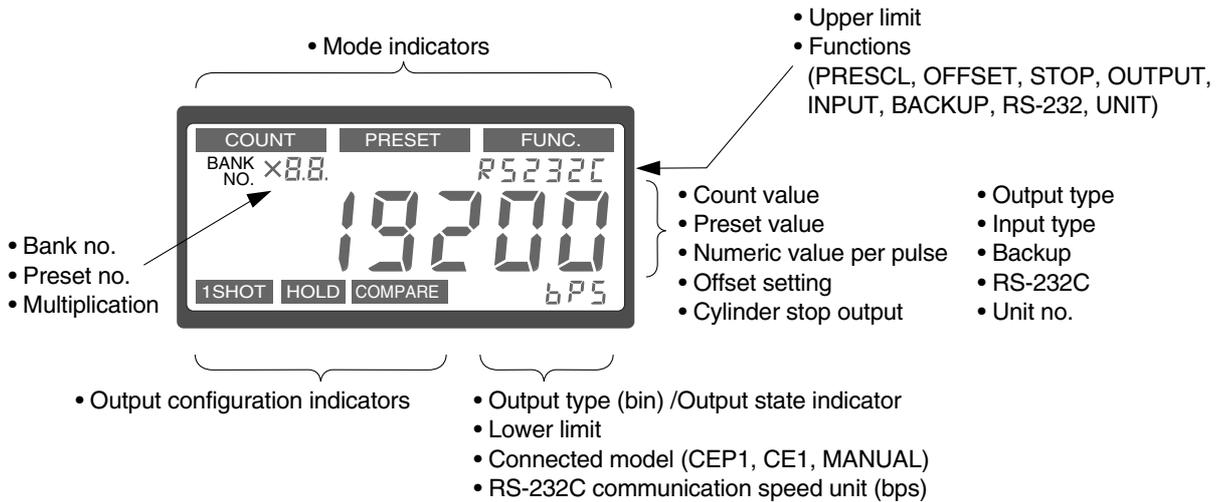
Series CEU

CEU5 Operation

Parts description



Display detail

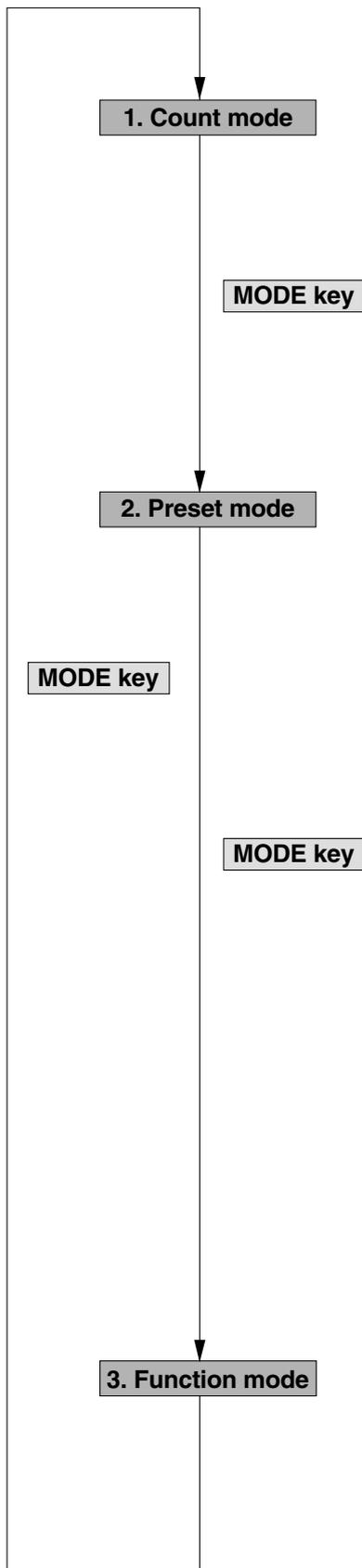


Key and Functions

| 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.

Mode cycle using mode key

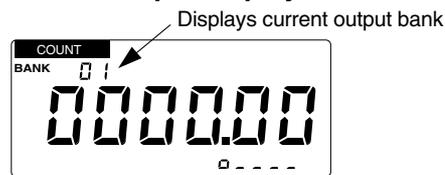


Basic Operation

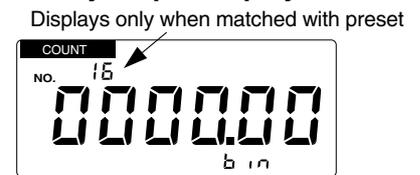
- **SET key** : In any of the conditions (1) through (5), this writes the display data into the memory and shifts to (1).
- **SEL. key** : Shifts to the next item, but does not write data.
- **MODE key** : In any given condition, this shifts to the next mode, but does not write data.
- **Direction keys**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

1. Explanation of display in count mode

Normal output display



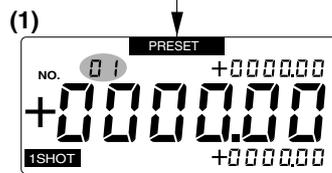
Binary output display



Displays output state of each OUT terminal

Display of binary output selection.

2. Setting of preset mode



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



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



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.

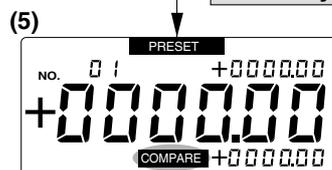
SEL. key



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



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

RE_B^A

REC

C□X

C□Y

MQ_M^Q

RHC

MK(2)

RS_G^Q

RS_A^H

RZQ

MI_S^W

CEP1

CE1

CE2

ML2B

C_{5-S}¹

CV

MVGQ

CC

RB

J

D-

-X

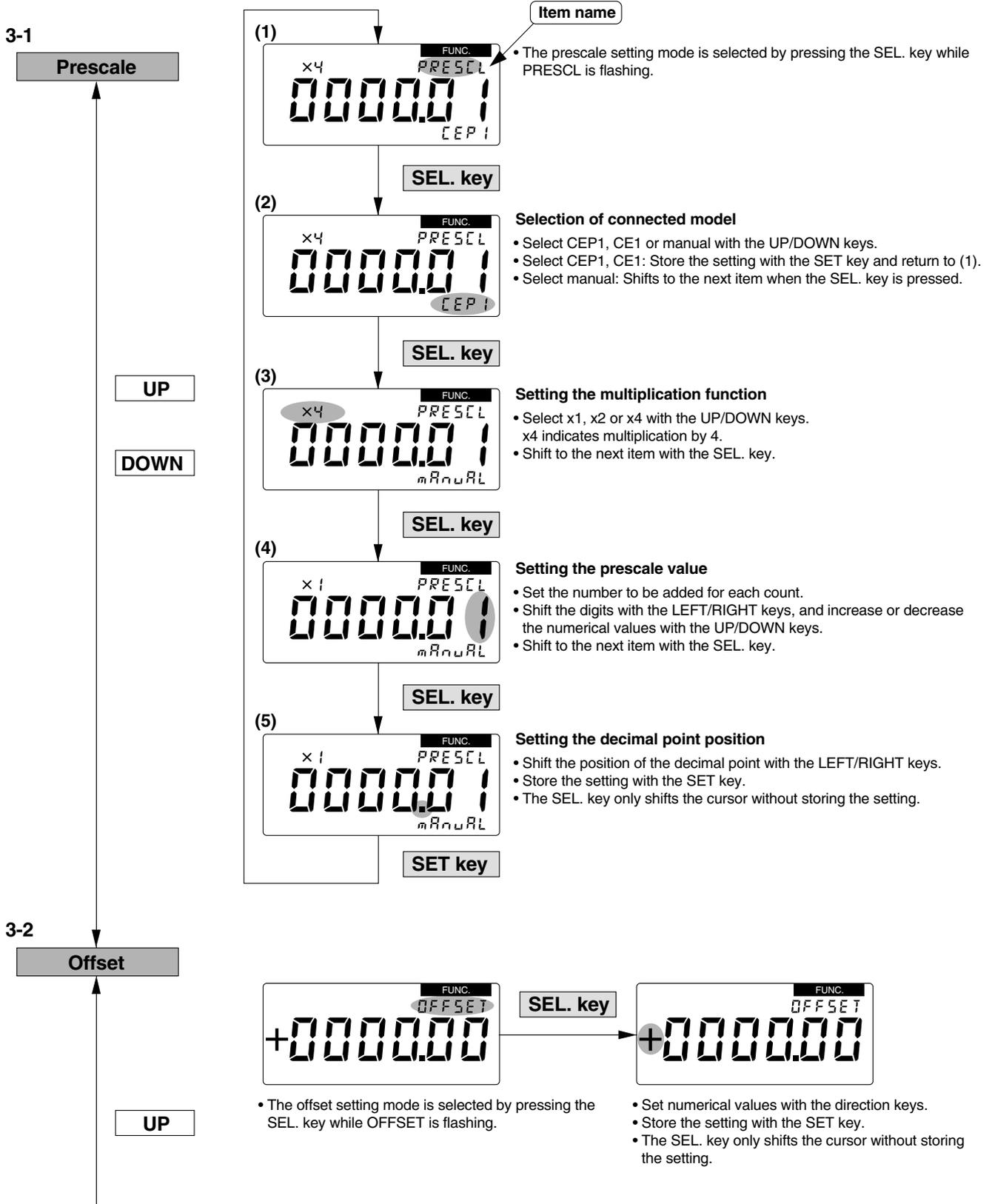
20-

Data

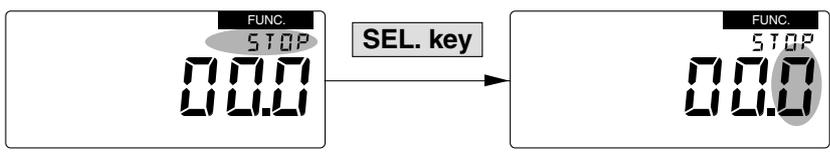
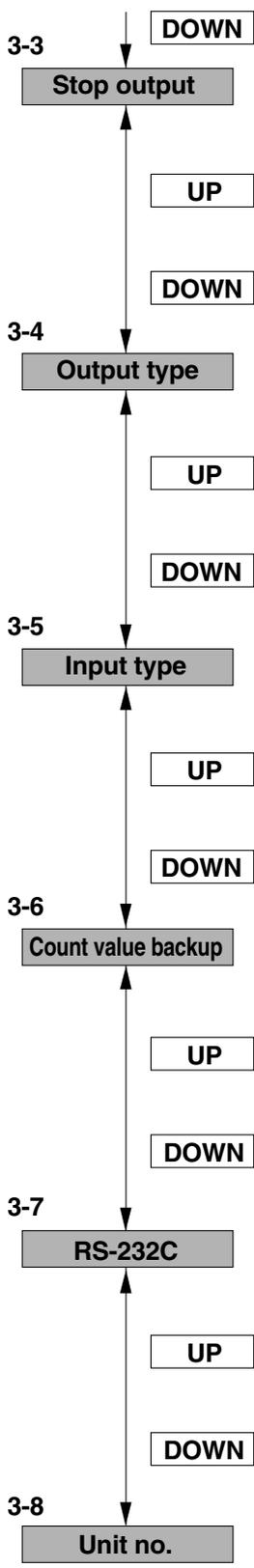
CEU5 Operation

3. Explanation of settings in the function mode

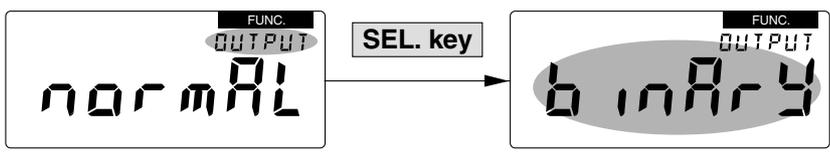
If the UP/DOWN keys are pressed when an item name is flashing, it shifts to another setting item. When the SEL. key is pressed, the cursor shifts and it is possible to change the content of the setting for the item which is being displayed.



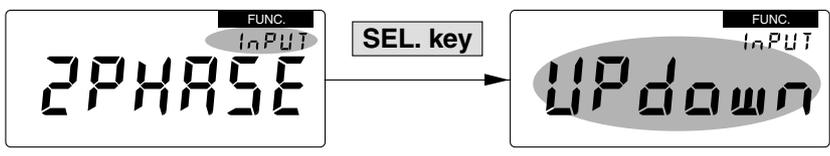
| |
|-------------------------------|
| RE _B ^A |
| REC |
| C _X |
| C _Y |
| MQ _M ^Q |
| RHC |
| MK(2) |
| RS _G ^Q |
| RS _A ^H |
| RZQ |
| MI _S ^W |
| CEP1 |
| CE1 |
| CE2 |
| ML2B |
| C _{5-S} ¹ |
| CV |
| MVGQ |
| CC |
| RB |
| J |
| D- |
| -X |
| 20- |
| Data |



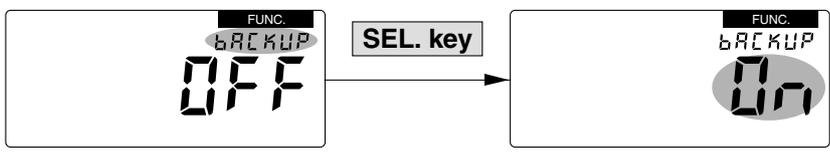
- The setting mode for stand-by time until stop output is commanded is selected by pressing the SEL. key while STOP is flashing.
- Set numerical values with the direction keys.
- The unit is 0.1 sec.
- Store the setting with the SET key.
- The SEL. key only shifts the cursor without storing the setting.



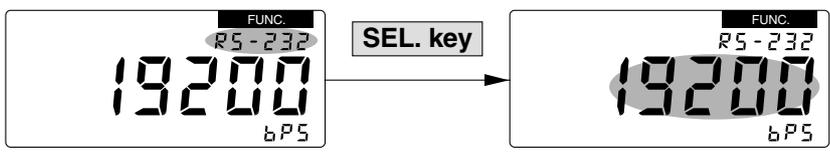
- The output system setting mode is selected by pressing the SEL. key while OUTPUT is flashing.
- Select normal output or binary output with the UP/DOWN keys.
- Store the setting with the SET key.
- The SEL. key only shifts the cursor without storing the setting.



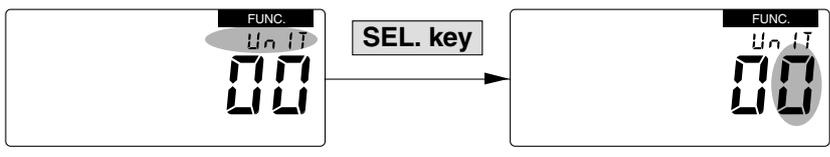
- The input type setting mode is selected by pressing the SEL. key while INPUT is flashing.
- Select phase difference input with the UP/DOWN keys. (2PHASE) or separate input (UP/DOWN) with the UP/DOWN keys.
- Store the setting with the SET key.
- The SEL. key only shifts the cursor without storing the setting.



- 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.



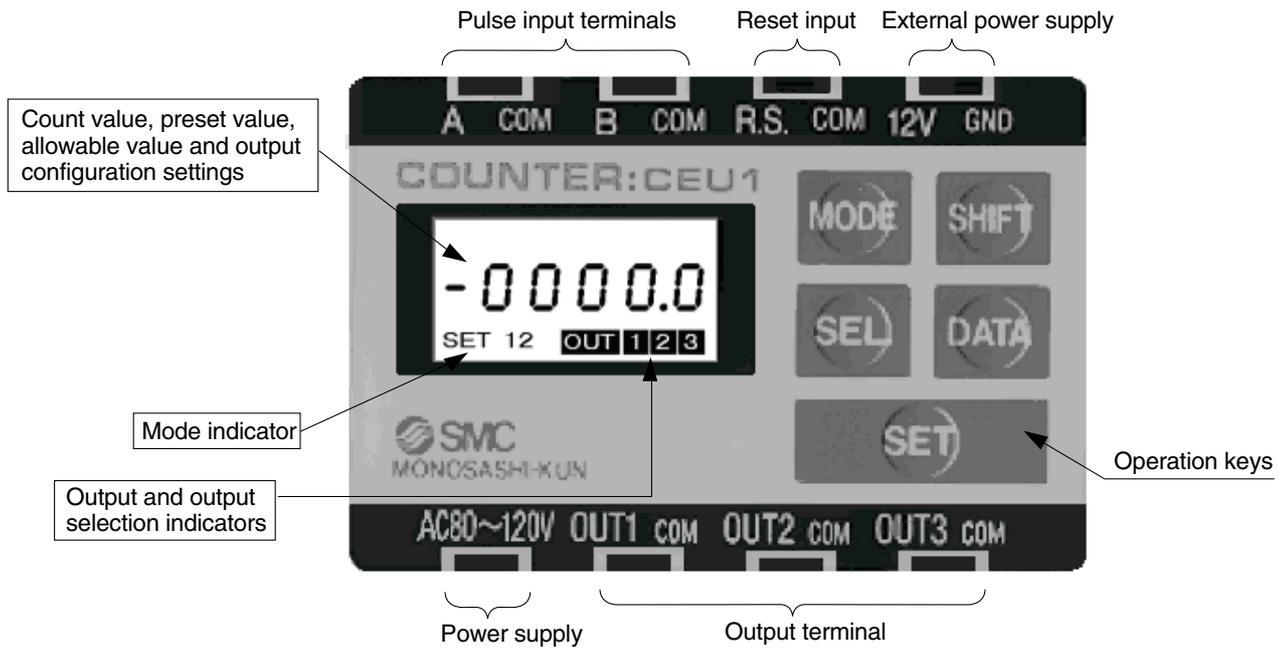
- The RS-232C communication speed setting mode is selected by pressing the SEL. key while RS-232 is flashing.
- Select the communication speed from 1200, 2400, 4800, 9600 or 19200 with the UP/DOWN keys.
- Store the setting with the SET key.
- The SEL. key only shifts the cursor without storing the setting.



- 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.

Series CEU

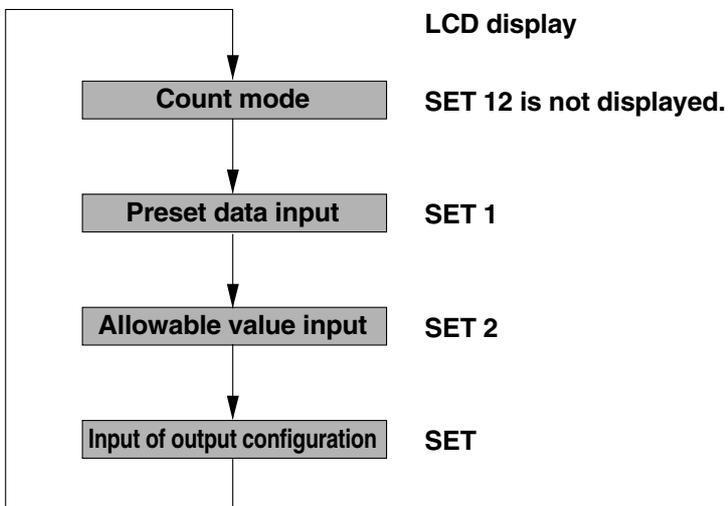
CEU1 Operation

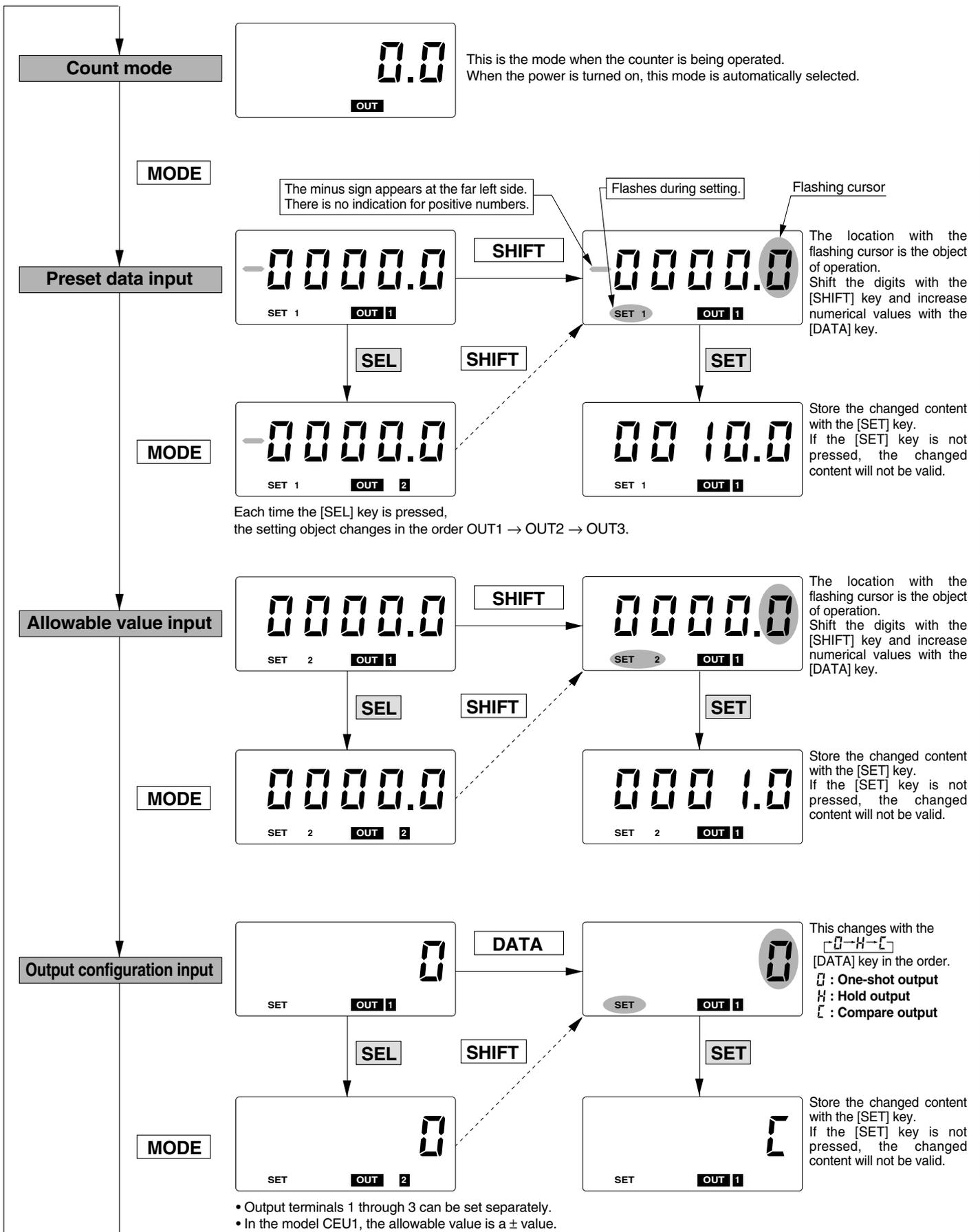


Key and Functions

| Key | Functions |
|-------|---|
| MODE | Switches between the count mode and the setting mode. |
| SHIFT | Switches digits for preset data input and allowable value input. Shifts the flashing cursor to the left each time it is pressed. |
| SEL | In the setting mode, this switches the output terminal number which is to be set. Switches in the order OUT1 → OUT2 → OUT3 each time it is pressed. |
| DATA | In the setting mode, this changes numerical values, or codes and symbols. Numerical values increase by 1 each time it is pressed. For positive and negative codes, a minus sign turns on or off. |
| SET | Registers the setting contents in the setting mode. Press this key to perform registration after making setting changes. The setting will not be registered if the screen is changed by pressing the [MODE] or [SEL] keys without pressing the [SET] key. |

The counter mode changes in the order shown below each time the [MODE] key is pressed.





- Output terminals 1 through 3 can be set separately.
- In the model CEU1, the allowable value is a ± value. (Only the model CEU5 is equipped with a function to set different values for the upper and lower limits.)

| |
|------------------------------|
| RE ^A _B |
| REC |
| C ^X |
| C ^Y |
| MQ ^Q _M |
| RHC |
| MK(2) |
| RS ^Q _G |
| RS ^H _A |
| RZQ |
| MI ^W _S |
| CEP1 |
| CE1 |
| CE2 |
| ML2B |
| C ⁵ _S |
| CV |
| MVGQ |
| CC |
| RB |
| J |
| D- |
| -X |
| 20- |
| Data |

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

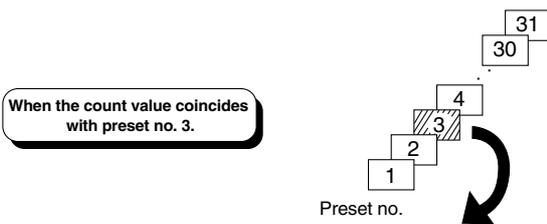
This is the interface standard for the serial transmission method, which is standard equipment on a personal computer.

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.

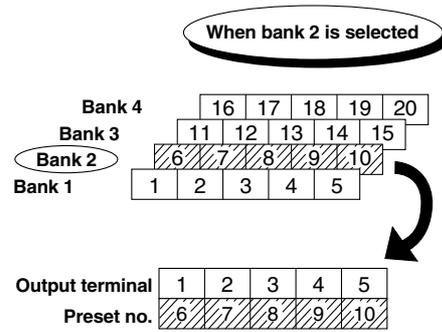


| Output terminal | 1 | 2 | 3 | 4 | 5 |
|--------------------------|----|----|-----|-----|-----|
| Pattern indicating no. 3 | On | On | Off | Off | Off |

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.



| 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 | BANK2 | BANK1 |
|----------------|-------|-------|
| Bank no. | | |
| 1 | OFF | OFF |
| 2 | OFF | ON |
| 3 | ON | OFF |
| 4 | ON | ON |

Glossary (Functions of CEU5)

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.

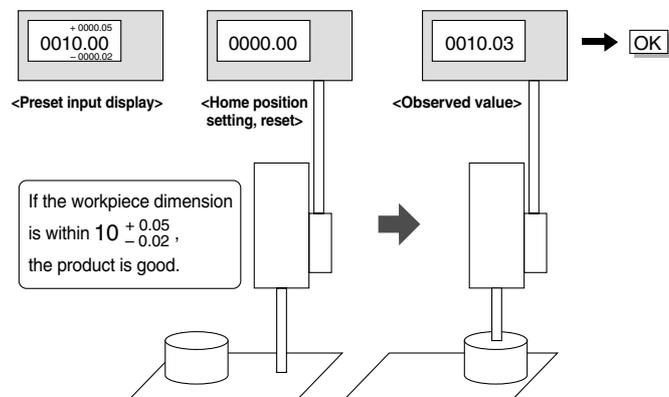
Setting the Tolerances of Preset Values

In the current model CEU1, the preset value tolerances could only be set as \pm , but now it has become possible to set an upper and lower limit of $+ \bigcirc$ mm and $- \triangle$ mm.

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.

On the other hand, in ordinary counters, no. 1 is set to 9.98 and no. 2 is set to 10.06, and if no. 1 is ON and no. 2 is OFF, an acceptance decision is made. 2 points of output are used in order to check whether or not the product is within dimension tolerances. In this example, one preset of the CEU5 performs the same function as two presets of an ordinary counter.

<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.



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.

RE_B^A

REC

C□X

C□Y

MQ_M^Q

RHC

MK(2)

RS_G^Q

RS_A^H

RZQ

MI_S^W

CEP1

CE1

CE2

ML2B

C_G¹5-S

CV

MVGQ

CC

RB

J

D-

-X

20-

Data