Stroke Reading Cylinder and Counter

Series CE

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 J G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data

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)

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

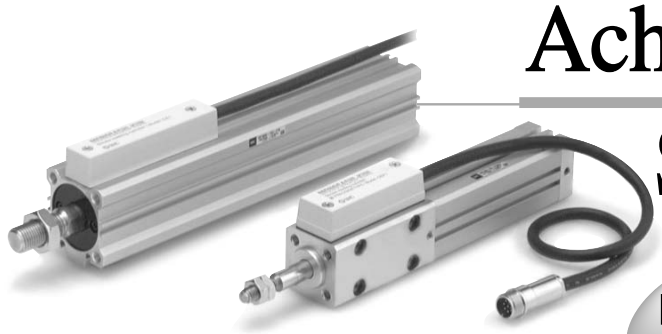
P. 10-12-27

3-point Preset Counter
Series CEU1

P. 10-12-30

Achieve rationalization

Stroke reading cylinder

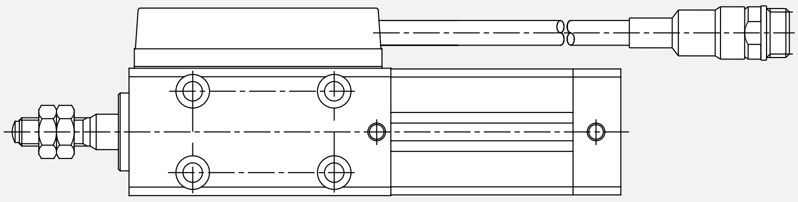


Measurement is possible throughout the full stroke range.

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)

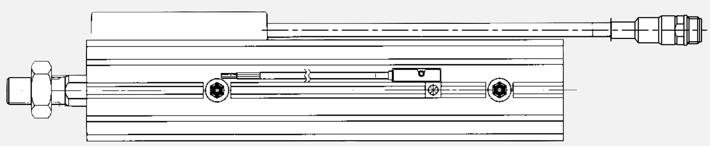
- Resolution: 0.01 mm (Accuracy ±0.02 mm)
- Special scraper now standard (IP-67)
- 2 types of seal material available (Made to Order)
- Power supply voltage 12 to 24 VDC



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

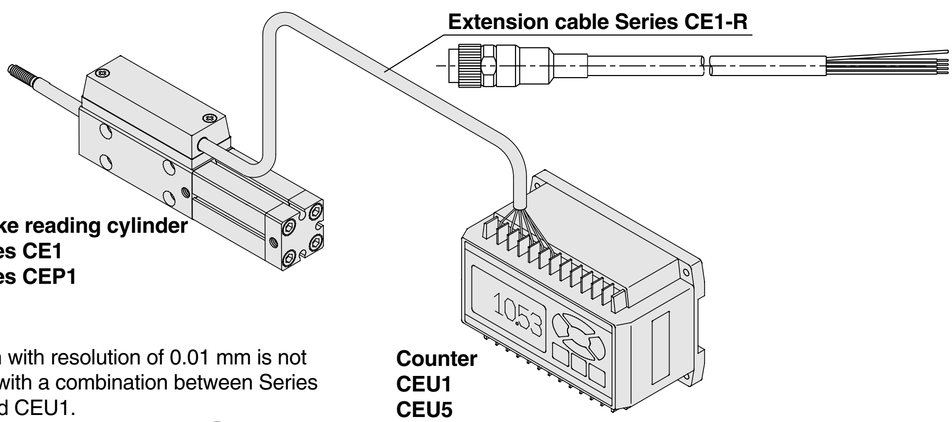
Stroke Reading Cylinder (CE1)

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



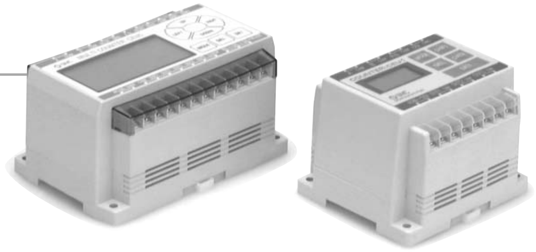
- Power supply voltage 12 to 24 VDC
- Abundant stroke variations
- Improved noise resistance

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

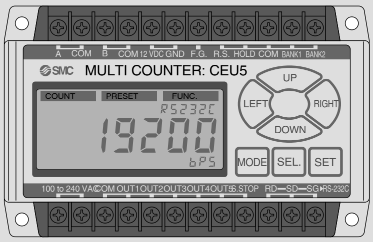


Tolerances of preset values can be set. (CEU1, CEU5)

Tolerances can be set for preset values.
CEU1: ± set tolerance
CEU5: + set tolerance, – set tolerance (separate settings)

Simple operation

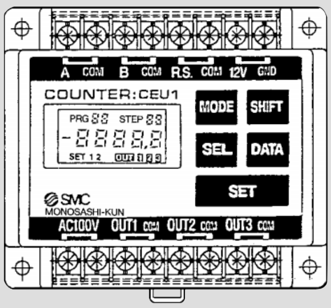
Multi-counter (CEU5)



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) 25	50	75	100	125	150	175	200	250	300	400	500	Manufacturable stroke range
12	●	●	●	●	●	●							25 to 150
20	●	●	●	●	●	●	●	●	●	●			25 to 300
32		●	●	●	●	●	●	●	●	●	●	●	25 to 400
40				●	●	●	●	●		●		●	25 to 600
50								●		●		●	25 to 600
63								●					25 to 600

Series CEP1

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

CEU1

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

CEU5

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

Extension Cable

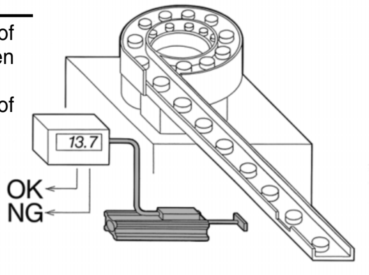
Cable length (m) 5	10	15	20
●	●	●	●

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
C J G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data

Application Example

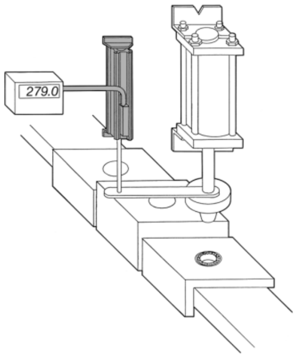
Parts inspection

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



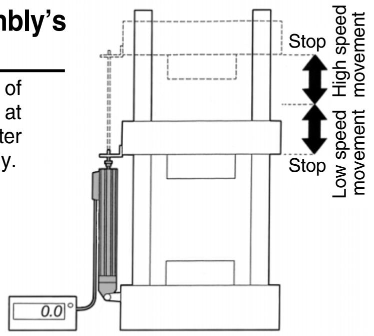
Confirmation of press-in

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.



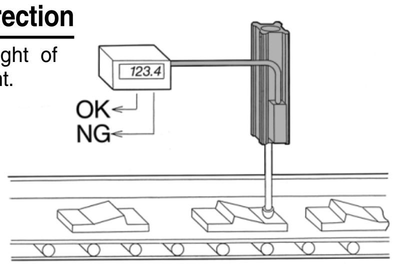
Detection of die assembly's deceleration point

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



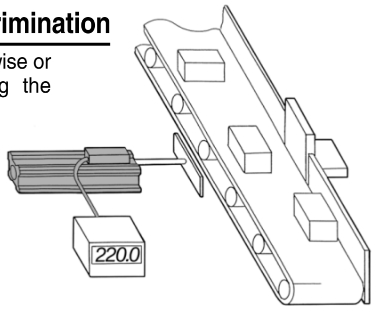
Discrimination of direction

Maintains a constant height of measuring workpiece height.



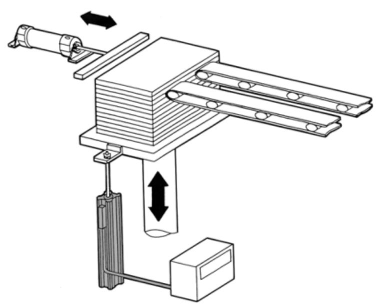
Length/breadth discrimination

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



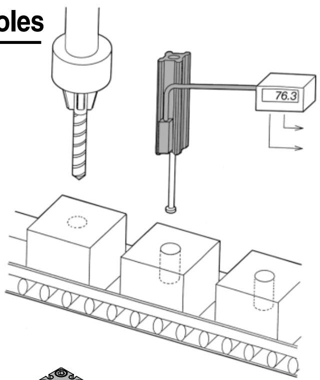
Detection of lifter position

Can continuously monitor a lifter's stroke.



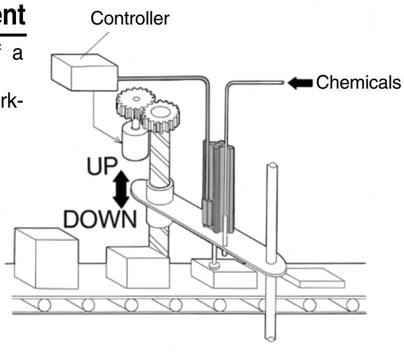
Inspection of machined holes

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



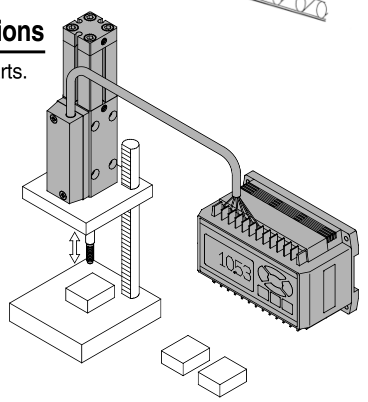
Nozzle height adjustment

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



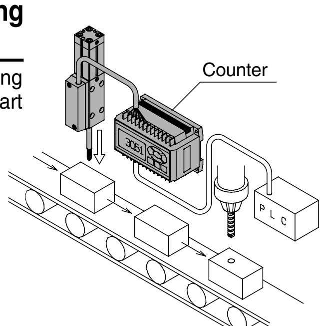
Measurement of dimensions

Can measure dimensions of parts.



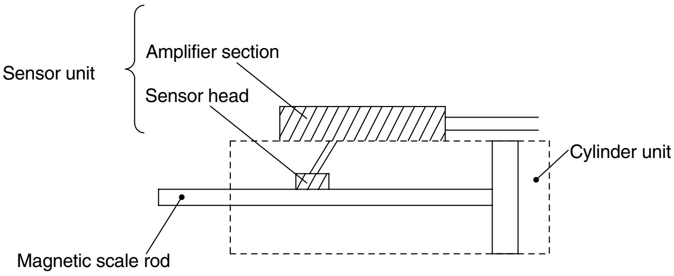
Measurement of machining dimensions

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

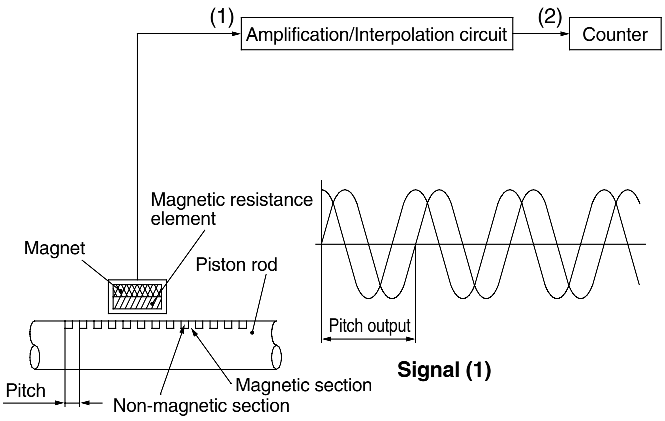


Measurement Principle

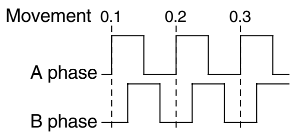
The amount of rod movement in the stroke reading cylinder is detected using an MR element (magnetic resistance element) whose resistance value changes due to magnetic force. The detection unit containing this MR element is called the sensor head. An amplifying circuit and a dividing circuit are required 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.



Signal (1)

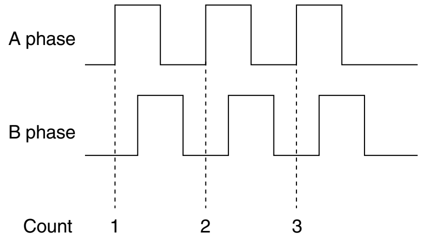


Signal (2)

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.

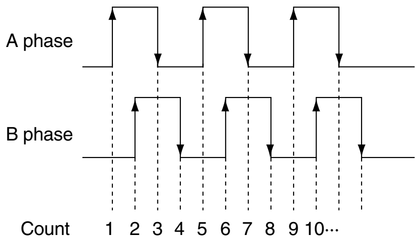
A/B Phase Difference Output (90° phase difference output)

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.

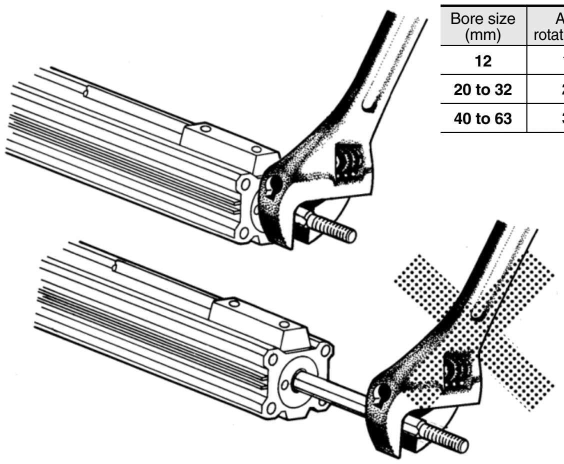
Series CE
Specific Product Precautions
Be sure to read before handling.

Mounting

⚠ Caution

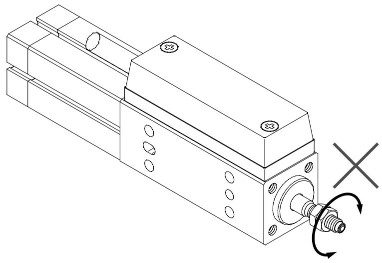
1. When screwing a nut or fitting, etc. onto the threaded section at the end of the piston rod, return the piston rod to its fully retracted position, and grasp the exposed portion of the rod across two parallel sides with a wrench. In the case of the high precision stroke reading cylinder, there are no parallel sides. Secure the workpiece with a double nut.
Note) Do not apply rotational torque to the piston rod.

Bore size (mm)	Allowable rotational torque
12	10 N·m
20 to 32	20 N·m
40 to 63	30 N·m



2. 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.

3. Avoid using the air cylinder in such a way that rotational torque would be applied to the piston rod.



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

Sensor Unit

1. The sensor unit is adjusted to an appropriate position at the time of shipment. Therefore, never detach the sensor unit from the body.
2. The cylinder should be protected from contact with liquids such as coolants or coolant water. (CE1)
3. The sensor cable should not be pulled with a strong force.
4. 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.

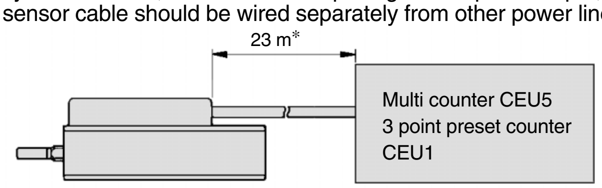
5. Switches or relays, etc. should not be installed in the power supply line (12 to 24 VDC).

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.

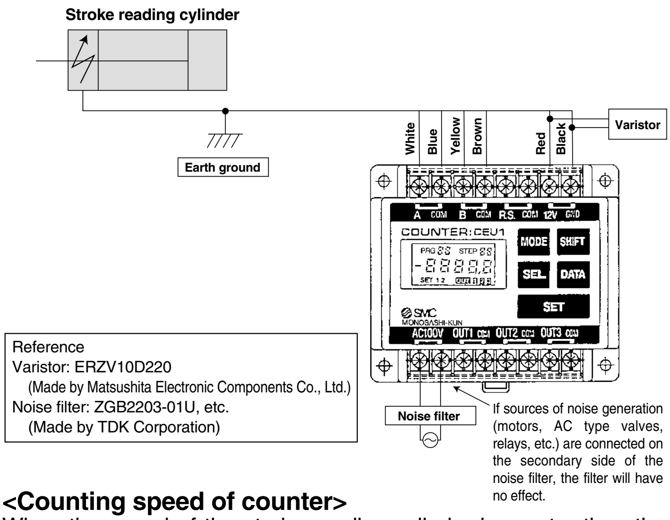
1. Connect the shield wire to FG (flame ground).
2. The maximum transmission distance for the stroke reading cylinder is 23 m, but since the output signal is a pulse output, the sensor cable should be wired separately from other power lines.



∗When using SMC extension cable and counter.

Noise Counter Measures

Methods of dealing with noise are given below.
1. Connect only the shield wire to FG (frame ground).
2. Use a power source separate from large motors and AC valves, etc.
3. Run the stroke reading cylinder's cable away from other power lines.
4. 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)

<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

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

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

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	“n” pcs.

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

<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

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.

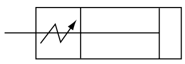
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length (m) 0.5 (Nil)	3 (L)	5 (Z)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96V**	**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		12 V		**M9BV**	**M9B**	●	●	○	○	—	
	Diagnostic indication (2-color indication)			3-wire (NPN)		5 V, 12 V		**F9NWV**	**F9NW**	●	●	○	○	IC circuit	
				3-wire (PNP)				**F9PWV**	**F9PW**	●	●	○	○		
				2-wire		12 V		**F9BWV**	**F9BW**	●	●	○	○	—	
	Water resistant (2-color indication)							—	**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.

JIS Symbol



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

Symbol	Specifications
-XC22	Fluoro rubber seals

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	

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 Q M
RHC
MK(2)
RS Q G
RS H A
RZQ
MI W S
CEP1
CE1
CE2
ML2B
C J G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data

Weight (Without mounting bracket/connector)

(kg)

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

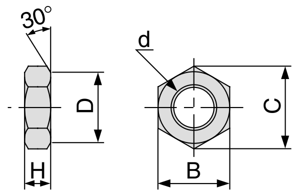
Proper Auto Switch Mounting Position

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 **ø12, 20:** Steel

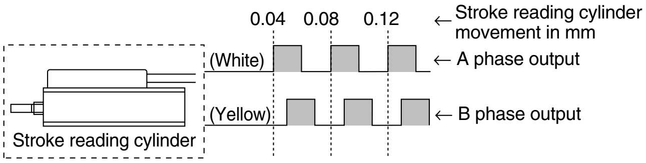


Applicable bore size (mm)	d	H	B	C	D
12	M5 x 0.8	3	8	9.2	7.8
20	M8 x 1.25	5	13	15.0	12.5

Electrical Wiring

Output type

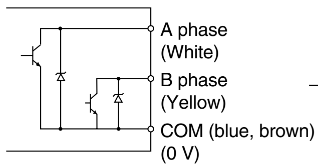
The output signal of the high precision stroke reading cylinder is A/B phase difference output (open collector output) as shown in the figure below.
The relation between the movement distance and the signal output of the high precision stroke reading cylinder is that for each 0.04 mm of movement a one 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.

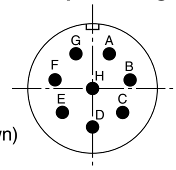


Input/Output

The input/output of the stroke reading cylinder is performed by a ø7 shielded twisted pair wire from the sensor section plus a connector.

Connector pin arrangement





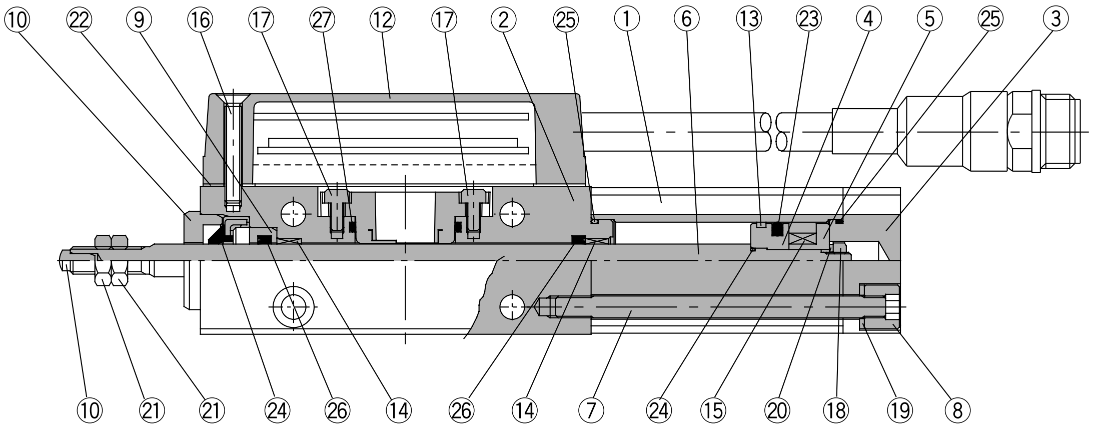
Output circuit of stroke reading cylinder

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



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	

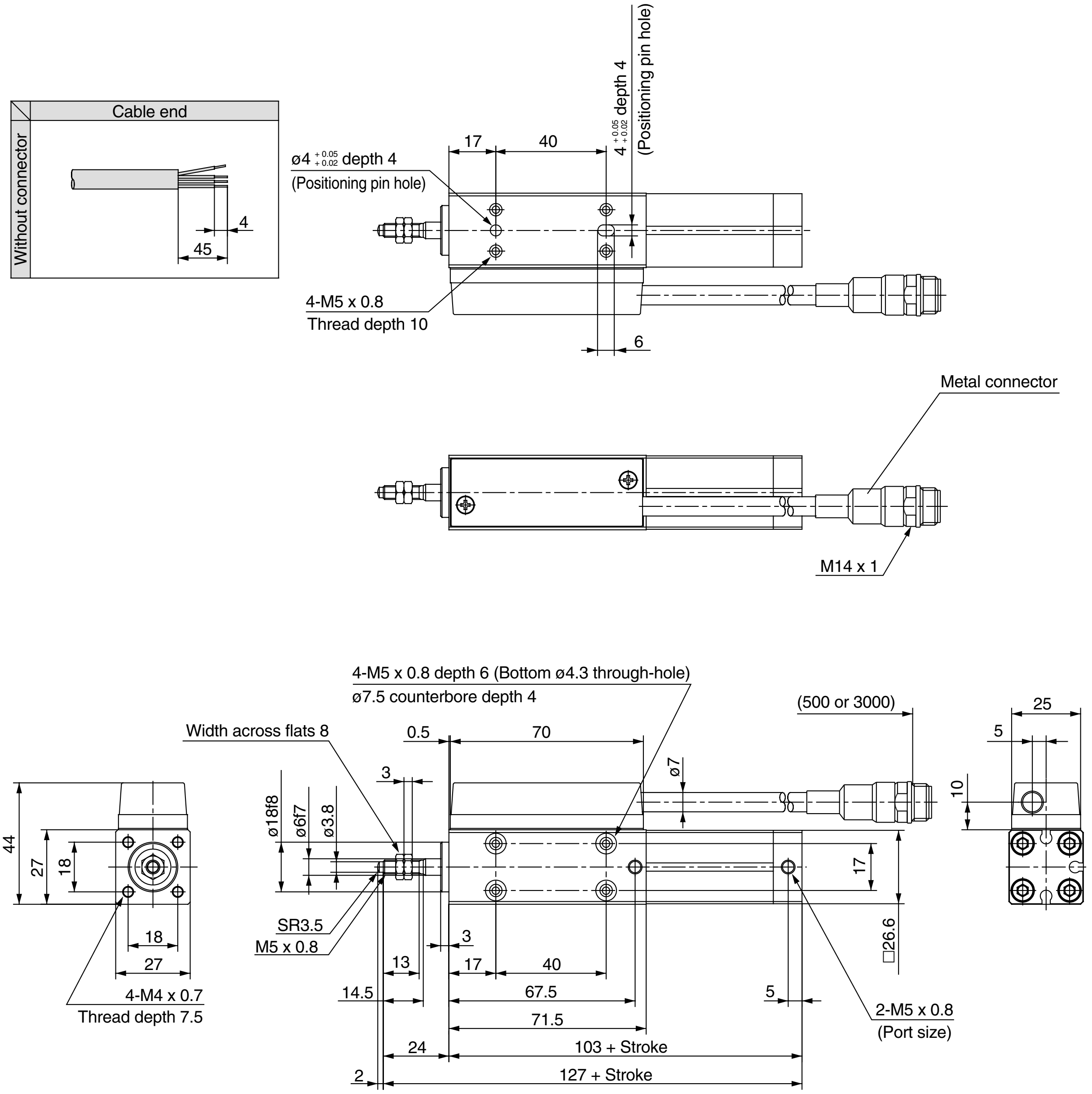
No.	Description	Material	Note
15	Magnet	Rare earth	
16	Cross recessed countersunk head screw	Chromium molybdenum steel	Nickel plated
17	Hexagon socket head cap screw	Stainless steel	
18	Hexagon nut	Carbon steel	Nickel plated
19	Spring washer	Steel wire	Nickel plated
20	Spring washer	Steel wire	Nickel 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.

Dimensions: ø12

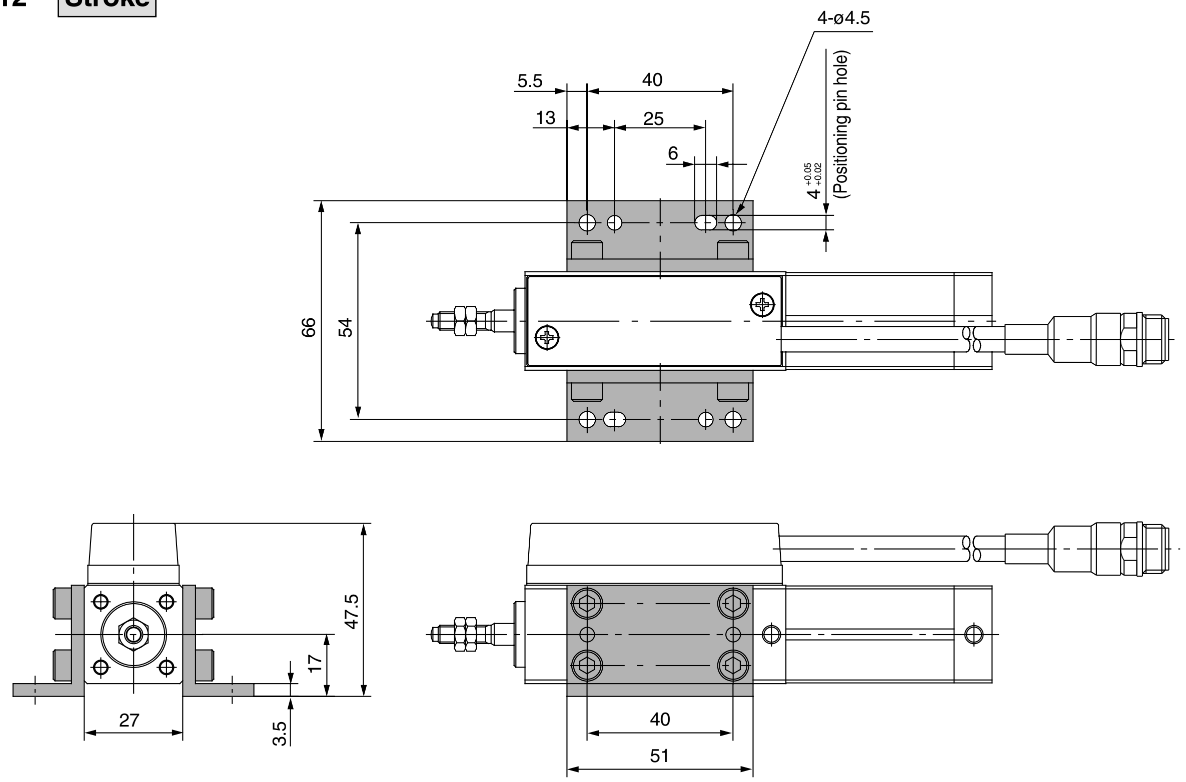
Direct mounting, rod side tapped style:

CEP1B12 — Stroke



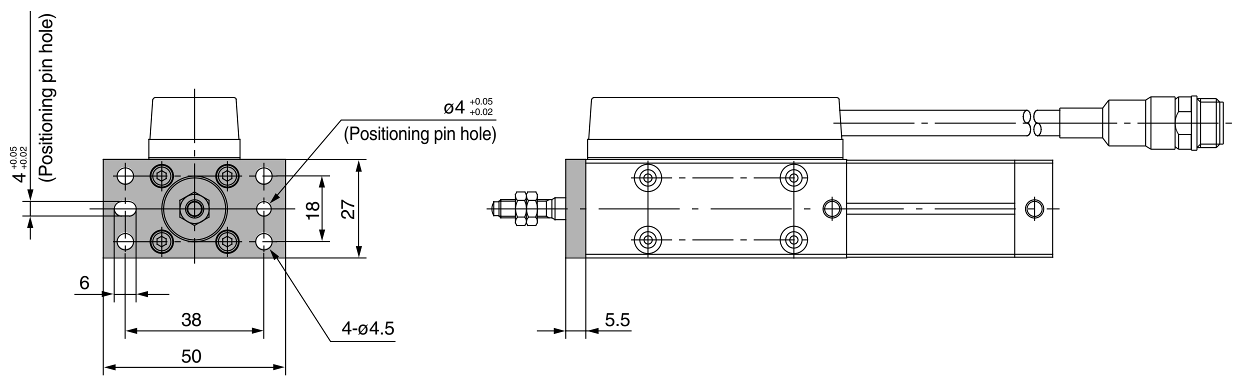
Foot style:

CEP1L12 — Stroke



Rod side flange style:

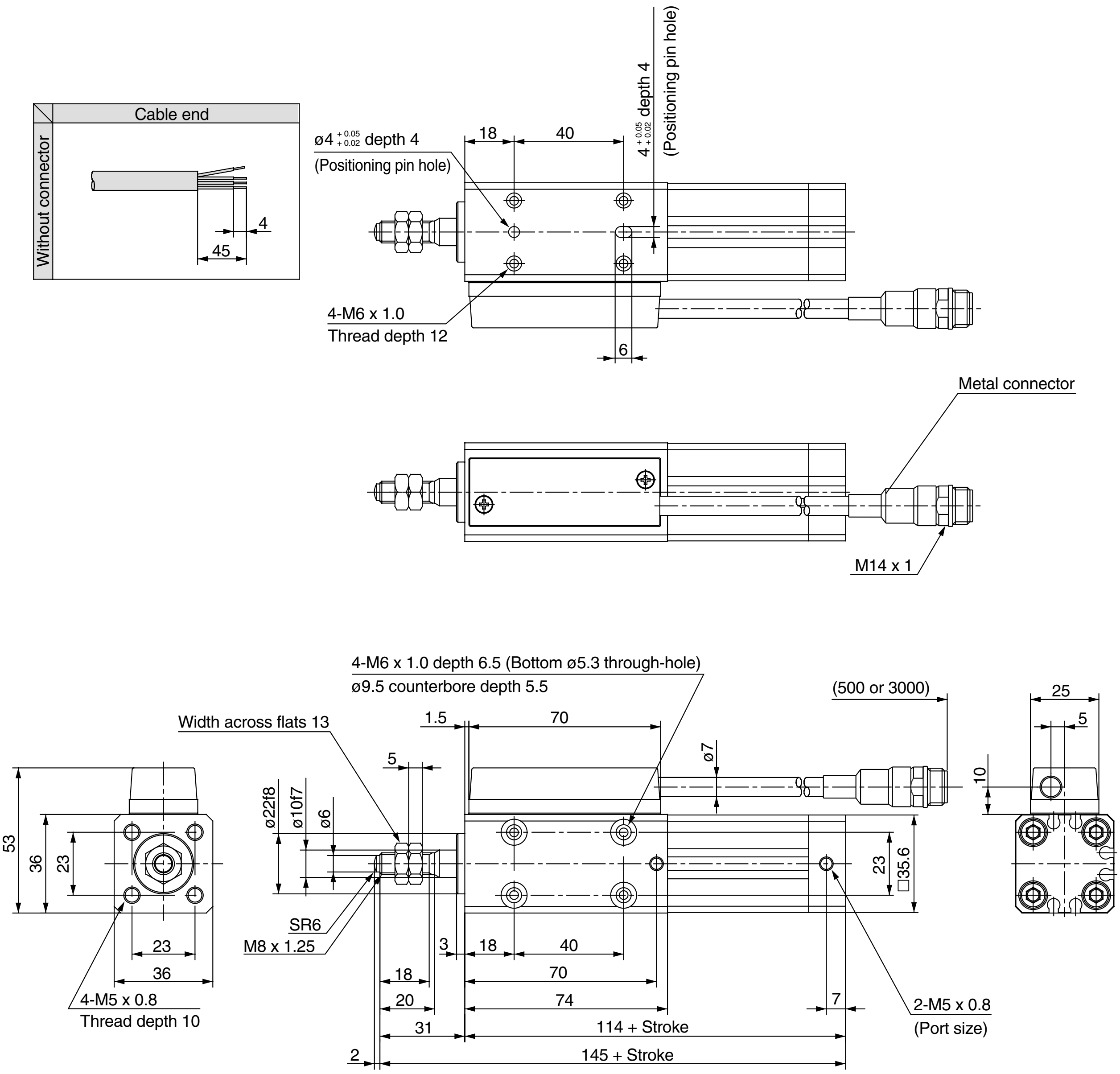
CEP1F12 — Stroke



Dimensions: ø20

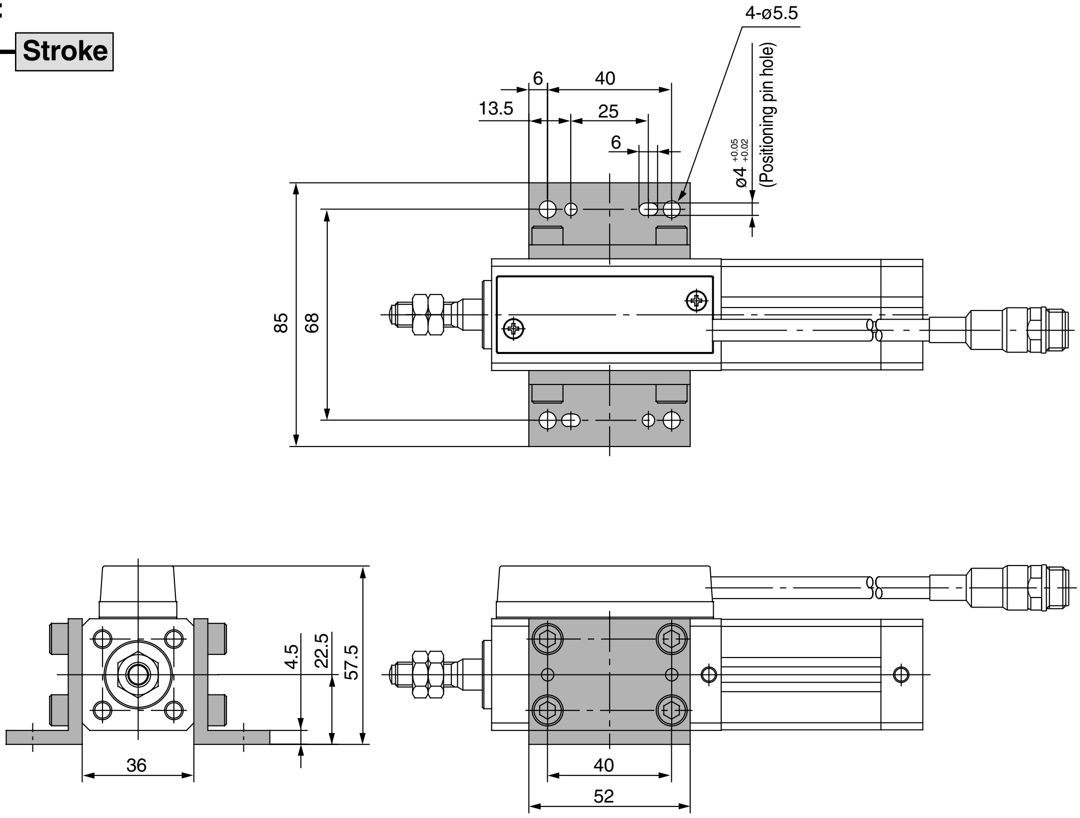
Direct mounting, rod side tapped style:

CEP1B20 – Stroke



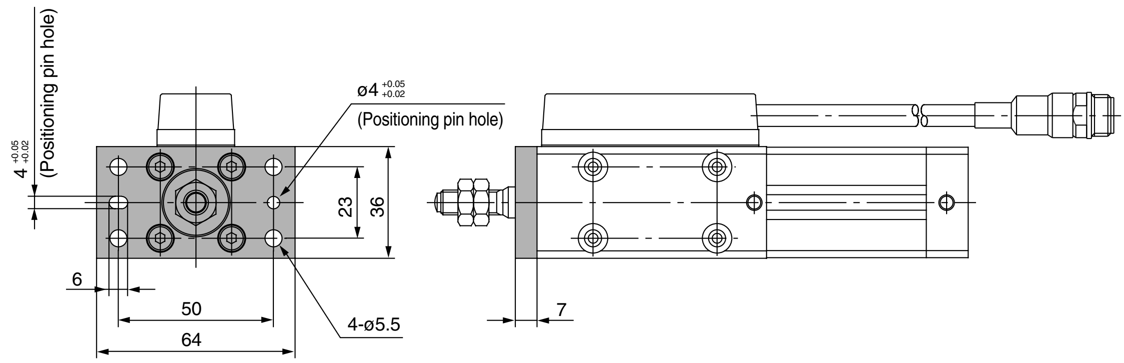
Foot style:

CEP1L20 — Stroke



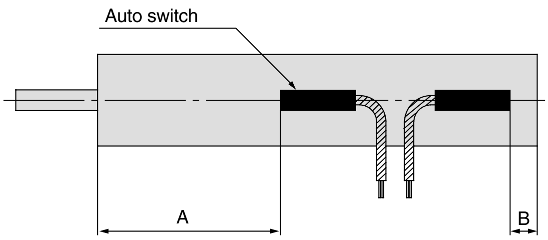
Rod side flange style:

CEP1F20 — 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 J G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data

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



Proper Auto Switch Mounting Position

Auto switch model / Bore size (mm)	D-A9□ D-A9□V		D-M9□ D-M9□V D-F9□W D-F9□WV		D-F9BAL	
	A	B	A	B	A	B
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 ±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.

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.

Connector

Nil	With connector
Z	Without connector

Cable length

Nil	0.5 m
L	3 m

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.

Applicable counter
Series CEU1 Series CEU5

<Option>

Exension 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 DC		Load voltage AC	Rail mounting ø12 to ø63 Perpendicular	Rail mounting ø12 to ø63 In-line	Direct mounting ø32 to ø63 Perpendicular	Direct mounting ø32 to ø63 In-line	Lead wire length (m)∗ 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	—	**A76H**	**A96V**	**A96**	●	●	—	—	—	IC circuit	—
Reed switch	—	Grommet	Yes	2-wire	—	—	200 V	**A72**	**A72H**	—	—	●	●	—	—	—	—	Relay, PLC
Reed switch	—	Grommet	Yes	2-wire	24 V	12 V	100 V	**A73**	**A73H**	—	—	●	●	●	—	—	—	Relay, PLC
Reed switch	—	Grommet	Yes	2-wire	24 V	12 V	100 V	—	—	**A93V**	**A93**	●	●	—	—	—	—	Relay, PLC
Reed switch	—	Connector	Yes	2-wire	24 V	12 V	—	**A73C**	—	—	—	●	●	●	●	—	—	Relay, PLC
Reed switch	Diagnostic indication (2-color indication)	Grommet	Yes	2-wire	24 V	—	—	**A79W**	—	—	—	●	●	—	—	—	—	Relay, PLC
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**F7NV**	**F79**	**M9NV**	**M9N**	●	●	○	—	○	IC circuit	Relay, PLC
Solid state switch	—	Grommet	Yes	3-wire (PNP)	24 V	5 V, 12 V	—	**F7PV**	**F7P**	**M9PV**	**M9P**	●	●	○	—	○	IC circuit	Relay, PLC
Solid state switch	—	Grommet	Yes	2-wire	24 V	12 V	—	**F7BV**	**J79**	**M9BV**	**M9B**	●	●	○	—	○	—	Relay, PLC
Solid state switch	—	Connector	Yes	2-wire	24 V	12 V	—	**J79C**	—	—	—	●	●	●	●	—	—	Relay, PLC
Solid state switch	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**F7NWV**	**F79W**	**F9NWV**	**F9NW**	●	●	○	—	○	IC circuit	Relay, PLC
Solid state switch	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (PNP)	24 V	5 V, 12 V	—	—	**F7PW**	**F9PWV**	**F9PW**	●	●	○	—	○	IC circuit	Relay, PLC
Solid state switch	Diagnostic indication (2-color indication)	Grommet	Yes	2-wire	24 V	12 V	—	**F7BWV**	**J79W**	**F9BWV**	**F9BW**	●	●	○	—	○	—	Relay, PLC
Solid state switch	Water resistant (2-color indication)	Grommet	Yes	2-wire	24 V	12 V	—	—	**F7BA**	—	**F9BA**	—	●	○	—	○	—	Relay, PLC
Solid state switch	Water resistant (2-color indication)	Grommet	Yes	2-wire	24 V	12 V	—	**F7BAV**	—	—	—	—	●	○	—	—	—	Relay, PLC
Solid state switch	Diagnostic indication (2-color indication)	Grommet	Yes	4-wire(NPN)	24 V	5 V, 12 V	—	—	**F79F**	—	—	●	●	○	—	○	IC circuit	Relay, PLC

∗ 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.

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
	±2°	±1°	±0.8°
Mounting	Both ends tapped (Standard), Foot style, Flange style, Double clevis style		
Auto switch	Reed type, Solid state type		

JIS Symbol

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>
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.

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 D-F7□/J79 D-J79C D-F7□WV D-F7□W/J79W D-F7BAL/F7BAVL D-F79F/F7NTL
32 **40** **50** **63**	**BQ-2**	• Switch mounting screw (M3 x 0.5 x 10ℓ) • Switch spacer • Switch mounting nut	

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.

Weight (Without mounting bracket/connector)

(kg)

Bore size (mm)	Cylinder stroke (mm)											
	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

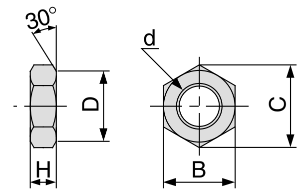
Proper Auto Switch Mounting Position

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 **ø12**, **20**: Steel
ø32 to **ø63**: Rolled steel

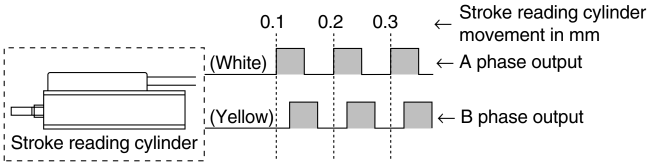


Part no.	Applicable bore size (mm)	d	H	B	C	D
NTJ-015A	**12**	M5 x 0.8	4	8	9.2	7.8
NT-02	**20**	M8 x 1.25	5	13	15.0	12.5
NT-04	**32**, **40**	M14 x 1.5	8	22	25.4	21.0
NT-05	**50**, **63**	M18 x 1.5	11	27	31.2	26

Electrical Wiring

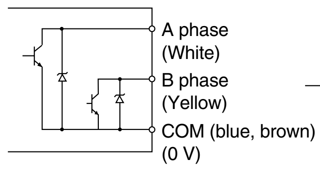
Output type

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).

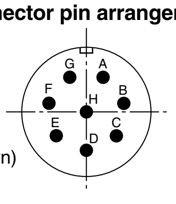


Input/Output

The input/output of the stroke reading cylinder is performed by a ø7 shielded twisted pair wire from the sensor section plus a connector.



Connector pin arrangement



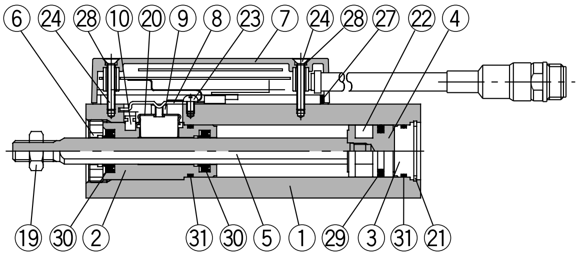
Output circuit of stroke reading cylinder

Signal

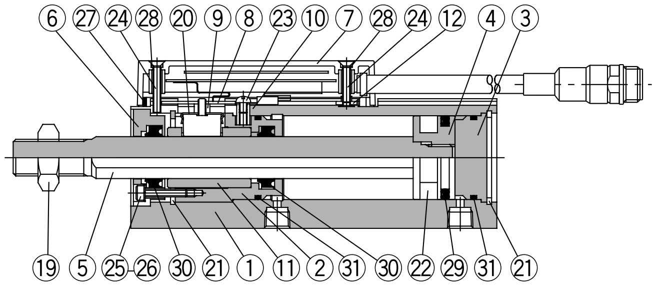
Contact signal	Wire color	Signal name
A	White	A phase
B	Yellow	B phase
C	Brown	COM (0 V)
D	Blue	COM (0 V)
E	Red	+12 to 24 V
F	Black	0 V
G	—	Shield

Construction

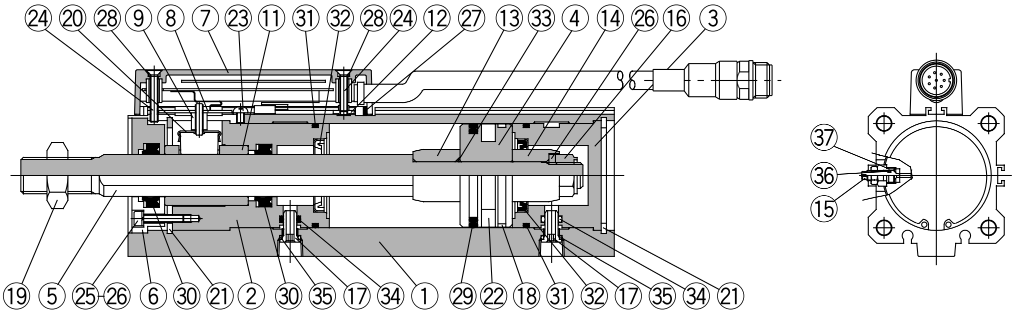
ø12, ø20



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
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	

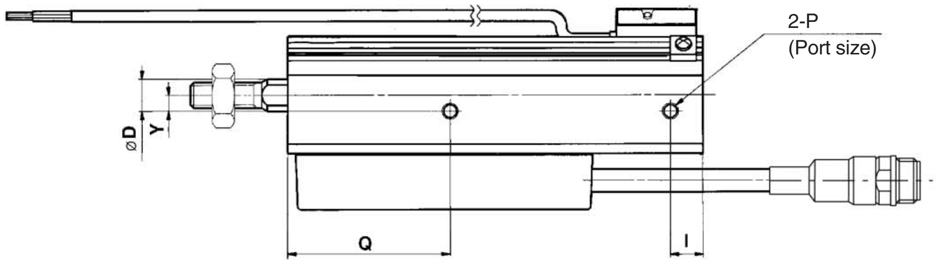
∗ Since there is a possibility of improper operation, please contact SMC regarding the replacement of seals.

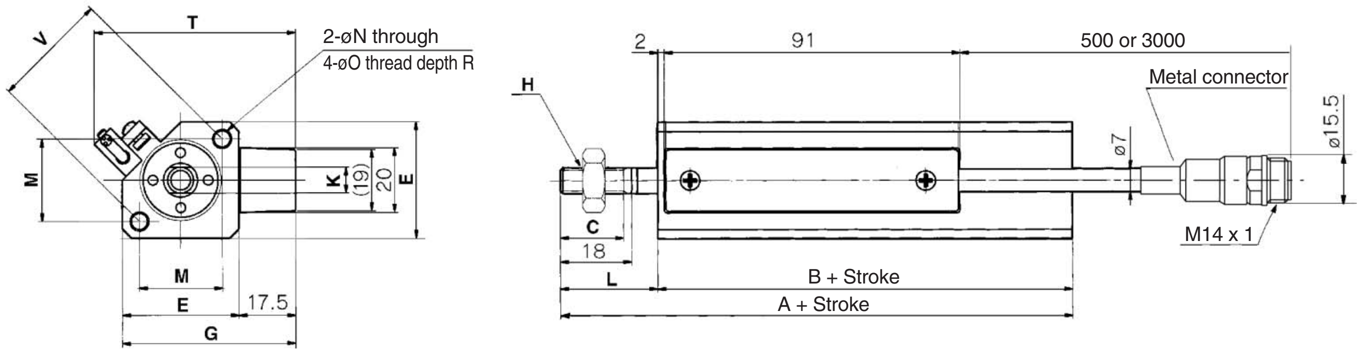
RE A B
REC
C□X
C□Y
MQ Q M
RHC
MK(2)
RS Q G
RS H A
RZQ
MI W S
CEP1
CE1
CE2
ML2B
C J G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data

Dimensions: ø12, ø20

Both ends tapped style:

CE1B Bore size – Stroke





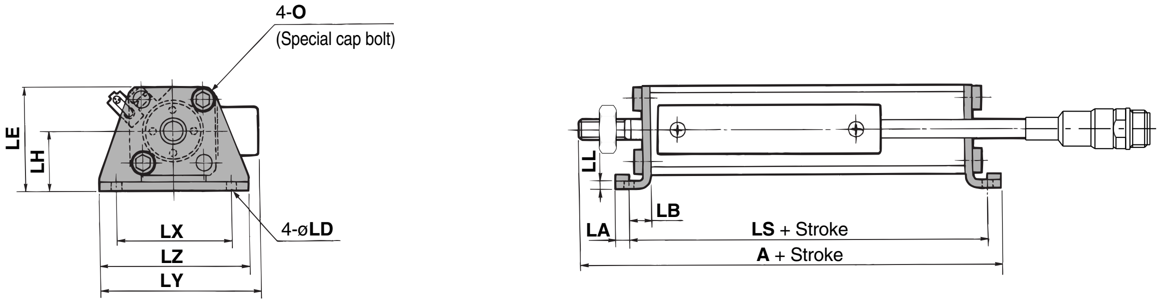
Bore size (mm)	Standard stroke	A	B	C	D	E	G	H	I	K	L	M
12	25, 50, 75, 100, 125, 150	94	69	15	6	25	42.5	M5 x 0.8	16	5.2	25	15.5
20	25, 50, 75, 100, 125, 150, 175, 200	106	78	15.5	10	36	53.5	M8 x 1.25	10	8	28	25.5

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.

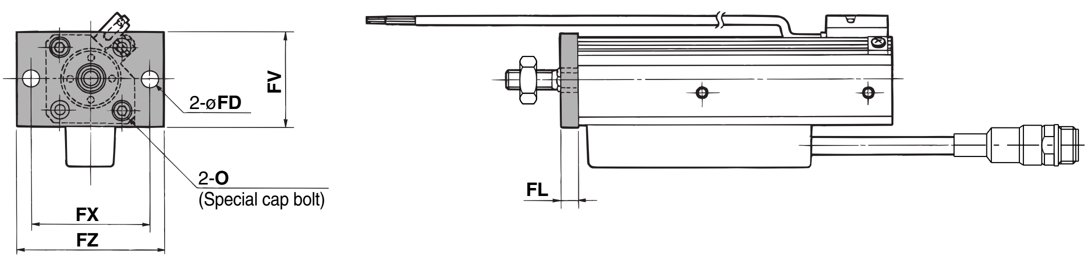
Foot style:

CE1L Bore size – Stroke



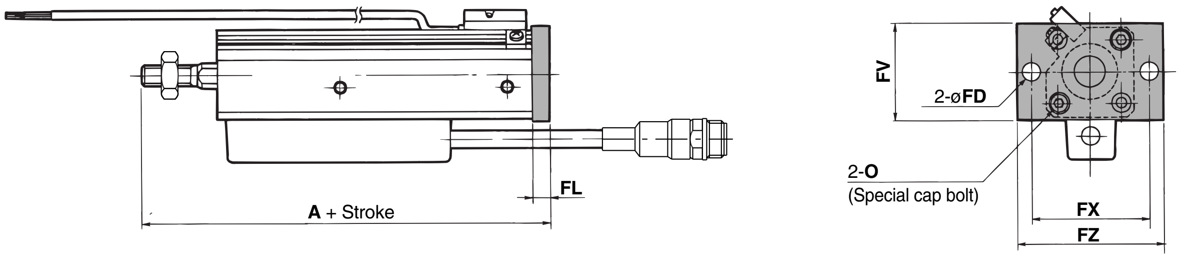
Rod side flange style:

CE1F Bore size – Stroke



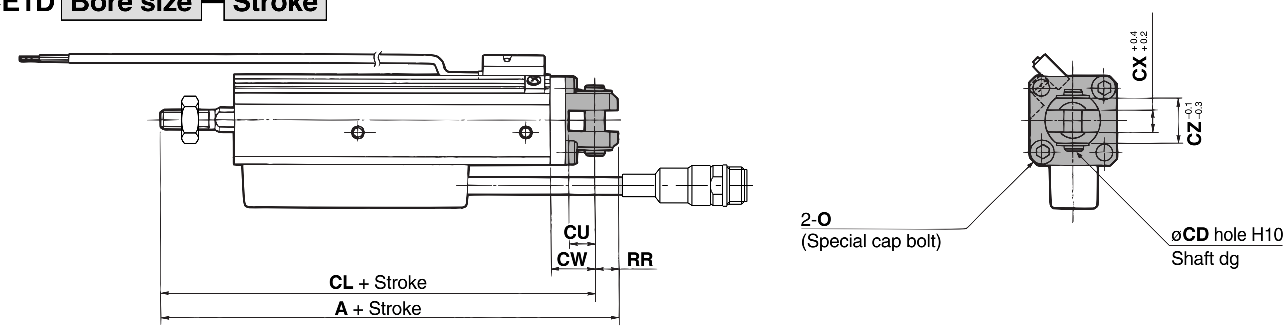
Head side flange style:

CE1G Bore size – Stroke



Double clevis style:

CE1D Bore size – Stroke

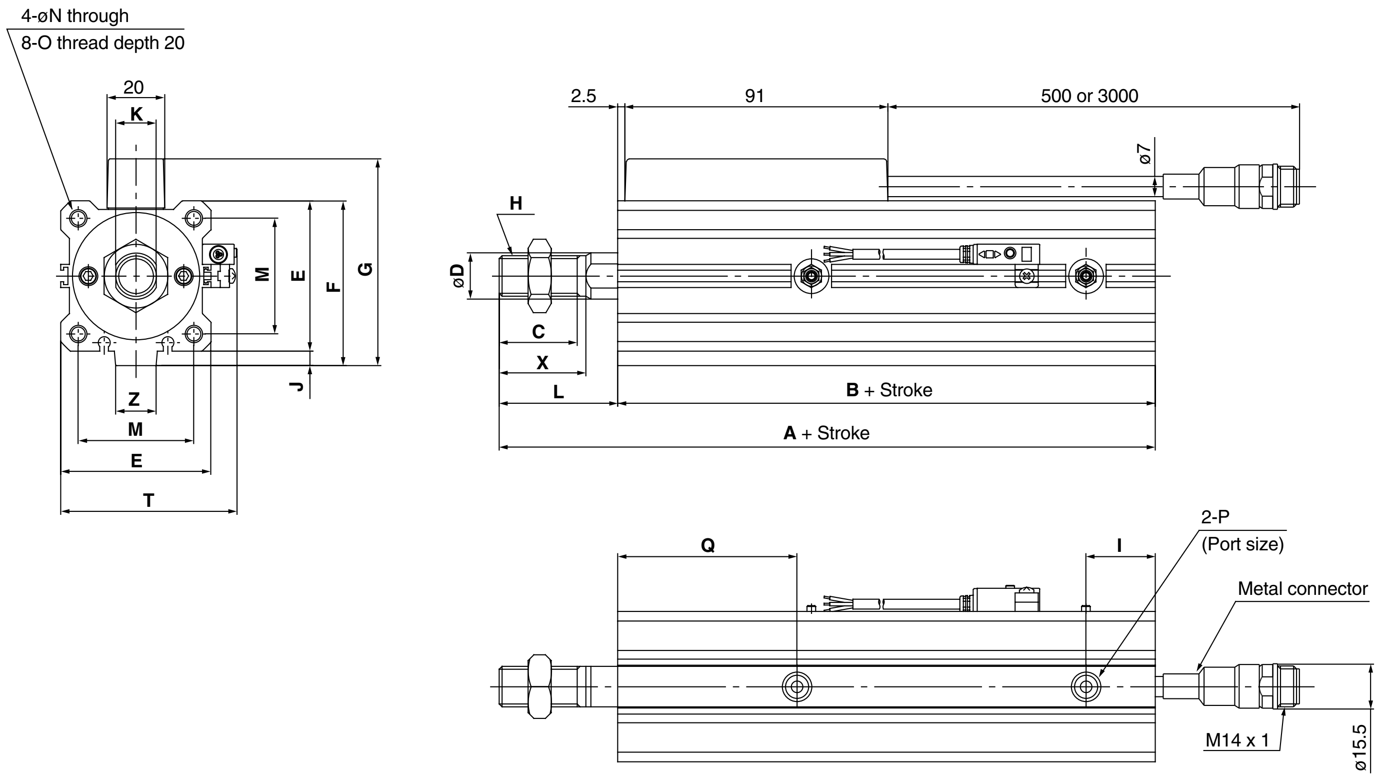


Bore size (mm)	Foot style											Rod side flange, Head side flange					Head side flange	Double clevis style							
	A	**LA**	**LB**	**LD**	**LE**	**LH**	**LL**	**LS**	**LX**	**LY**	**LZ**	**FG**	**FL**	**FV**	**FX**	**FZ**	**A**	**A**	**CD**	**CL**	**CU**	**CW**	**CX**	**CZ**	**RR**
12	106.5	4.5	8	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

Dimensions: ø32, ø40, ø50, ø63

Both ends tapped style:

CE1B Bore size – Stroke



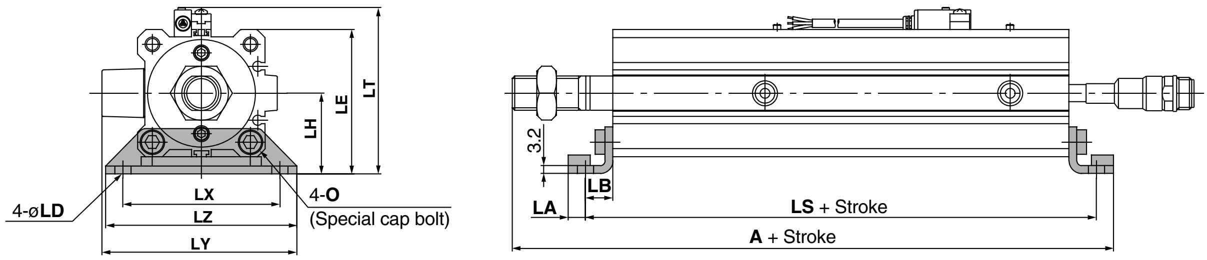
Bore size (mm)	Standard stroke	A	B	C	D	E	F	G	H	I	J	K
32	50, 75, 100, 125, 150, 175, 200, 250, 300	131	90	27	16	45	49.5	64	M14 x 1.5	14	4.5	14
40	100, 125, 150, 175, 200, 250, 300, 400, 500	177	136	27	16	52	57	71.5	M14 x 1.5	24	5	14
50	200, 300, 500	193	144	32	20	64	71	85.5	M18 x 1.5	25.5	7	18
63	200,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

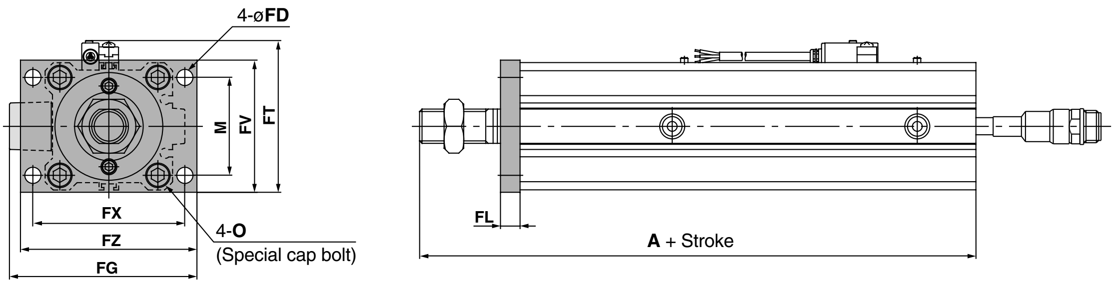
Foot style:

CE1L Bore size – Stroke



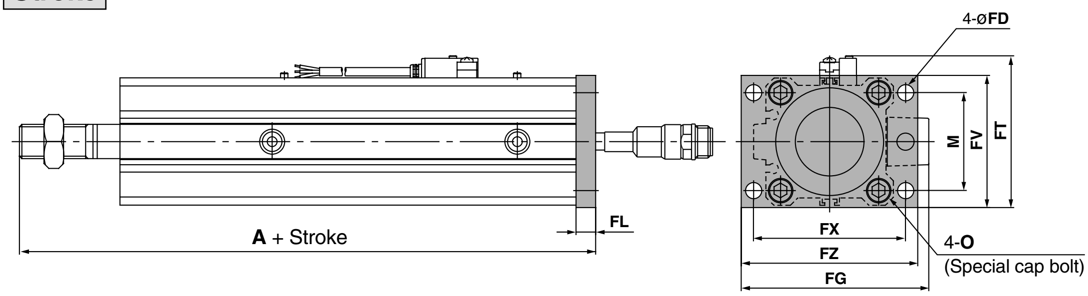
Rod side flange style:

CE1F Bore size – Stroke



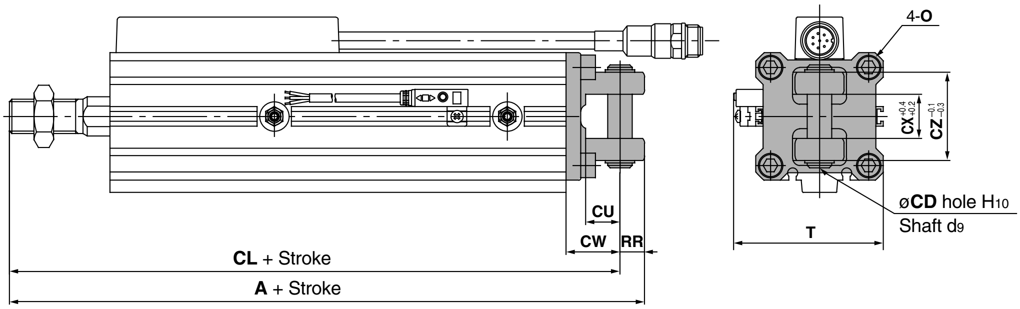
Head side flange style:

CE1G Bore size – Stroke



Double clevis style:

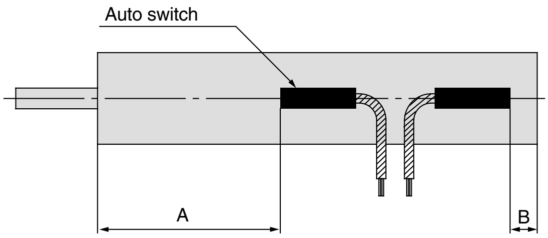
CE1D Bore size – Stroke



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	T
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.

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/F7NTL** **D-F7BAL/F7BAVL/F79F**	5.5	5.5	6	6	6	6.5
D-M9□/M9□V	—	—	4.5	4.5	4.5	4.5
D-F9□W/F9□WV **D-F9BAL**	—	—	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.

Counter/Extension Cable

■ Multi-counter

How to Order

CEU5 □ □ – □

Output transistor mode

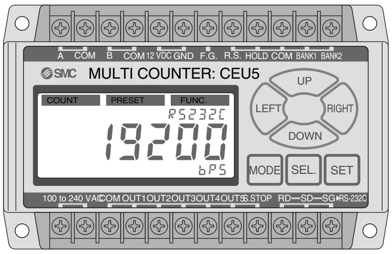
Nil	NPN open collector output
P	PNP open collector output

External output

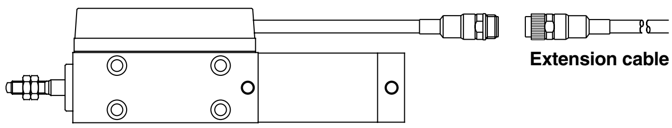
Nil	RS-232C
B	RS-232C + BCD

Power supply voltage

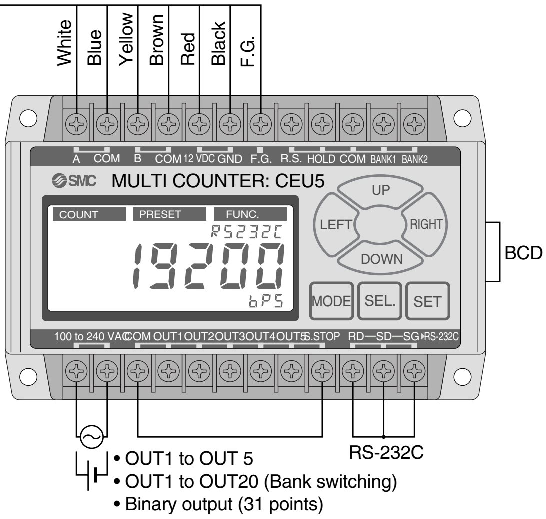
Nil	100 to 240 VAC
D	24 VDC



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)

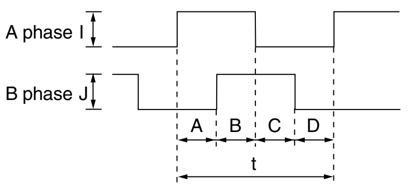
BCD Connector Specifications
Model (counter side):
DX10M-36S (made by Hirose Electric Co., Ltd.)
Connector model:
DX30AM-36P (made by Hirose Electric Co., Ltd.)

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

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^2ROM (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



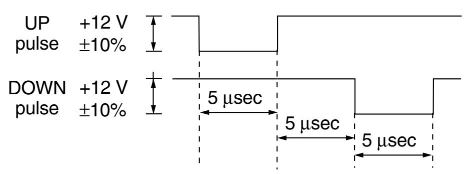
Counting input pulse duration

A:
B:
C:
D: } 2.5 µsec or more required

t : 10 µsec or more required

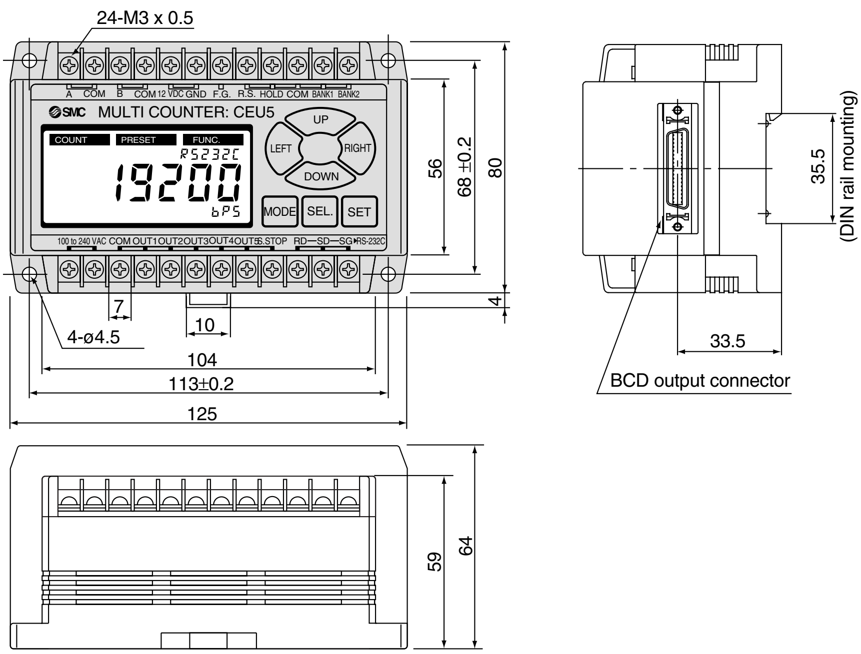
Counting speed $f = \frac{1}{t} = \frac{1}{10 \times 10^{-6}} = 100000$ Hz $\cong$ 100 kHz

∗ 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>

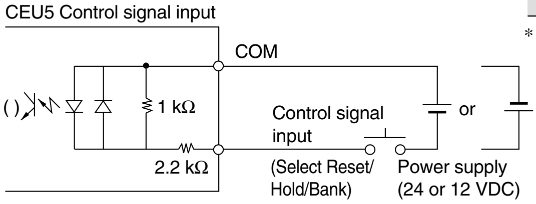
1. Wiring of power source for driving counter

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)

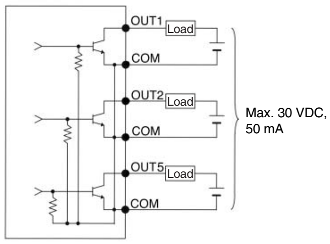
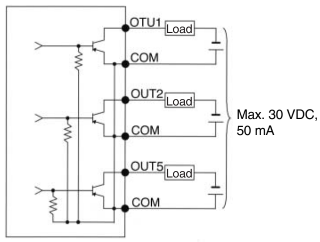
Make each control signal to be the transistor which can run more than 15 mA or the contact output. Input time for reset signal should be more than 10 ms. Bank selection and hold will function only when the input signal is applied.
COM is common to each signal input. Applicable to NPN and PNP input. Use 24 VDC or 12 VDC for the power source of COM. Connect DC– when PNP is applied, and DC+ when NPN is applied.

CEU5 Control signal input



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	NPN transistor output 	PNP transistor output 

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

■ 3-point Preset Counter

How to Order

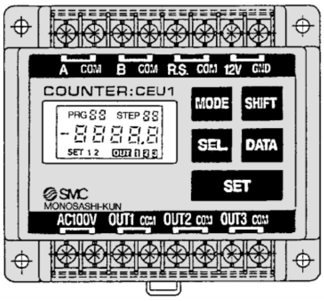
CEU1 [ ] – [ ]

• Counter drive power supply

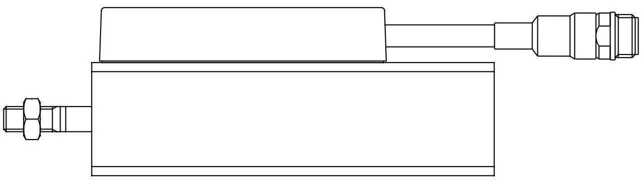
Nil	100 VAC
D	24 VDC

• Output mode selection

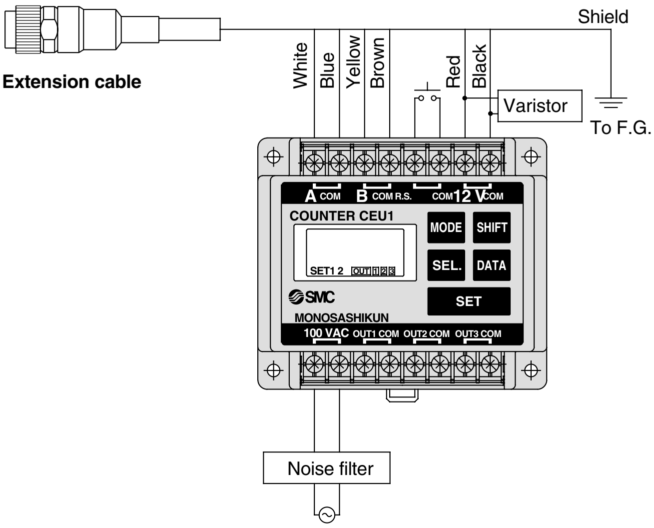
Nil	NPN open collector output
P	PNP open collector output



Connection Method



Stroke reading cylinder



Extension cable

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

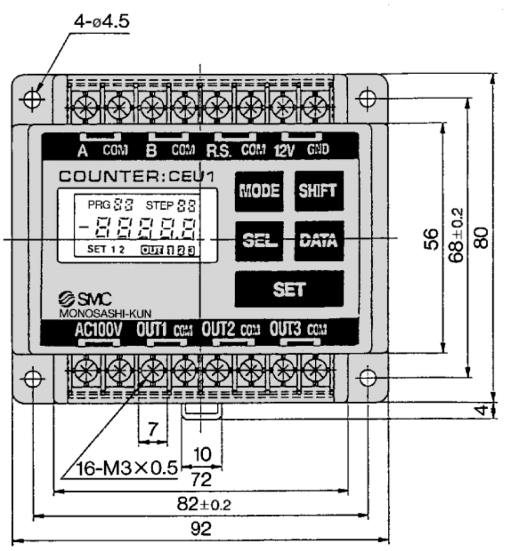
Shielding should be connected to FG (frame ground).
If sources of noise generation (motors, AC type valves, relays, etc.) are connected on the secondary side of the noise filter, the filter will have no effect.

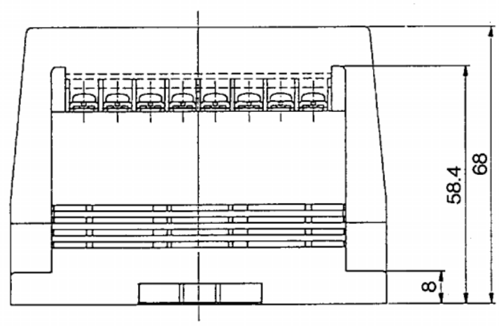
When the distance between stroke reading cylinder and counter is over 23 m, use a transmission box (CE1-H0374).

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^2ROM (Warning display after writing approx. 65,000 times: FL)}			
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





■ Extension Cable

How to Order

CE1-R □ □

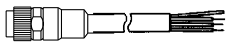
Cable length

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

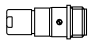
Suffix

Nil	Extension cable
C	Extension cable & connector

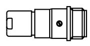
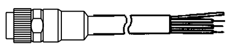
Extension cable

CE1–R□ 

Stroke reading cylinder side connector (unit)

CE1–R00C 

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

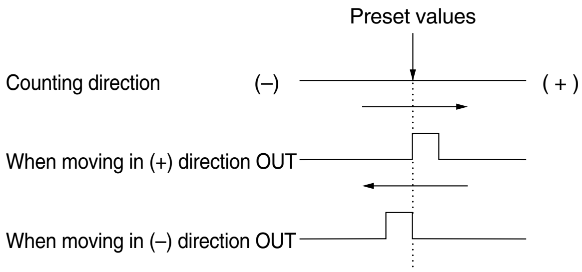
CE1–R□C  

Operating Condition of each Output Mode

One-shot Output

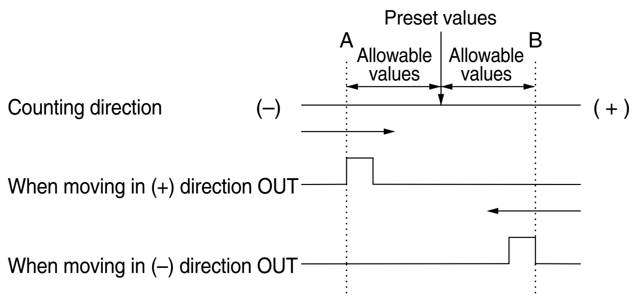
Without allowable values

When the counter value passes the preset value, output is turned ON for 100 ms.



With allowable values

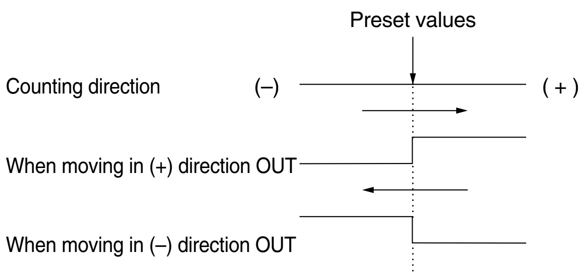
When the counter value passes the sum of the preset value + the allowed value, output is turned ON for 100 ms.



Hold Output

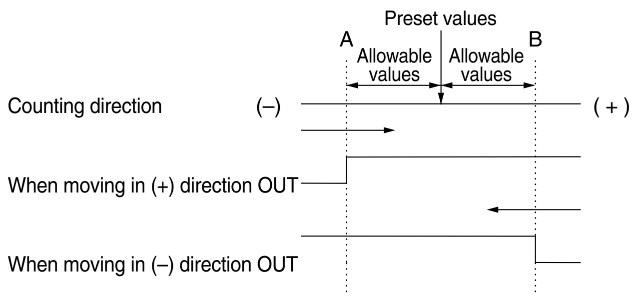
Without allowable values

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.



With allowable values

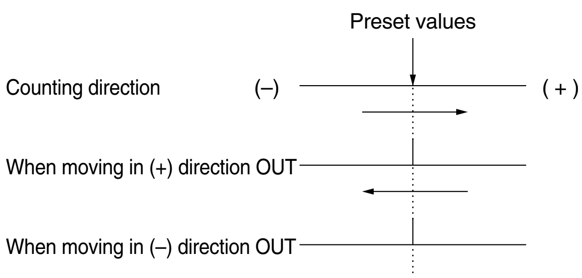
When the counter value passes the sum of the preset value + the allowed value, output is turned ON.
Output is cancelled when the power is turned off, the reset signal is input or when the setting value is changed.



Compare Output

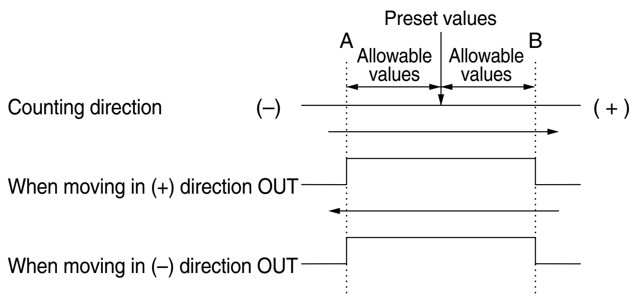
Without allowable values

Output is turned ON only when the counter value coincides with the preset value.



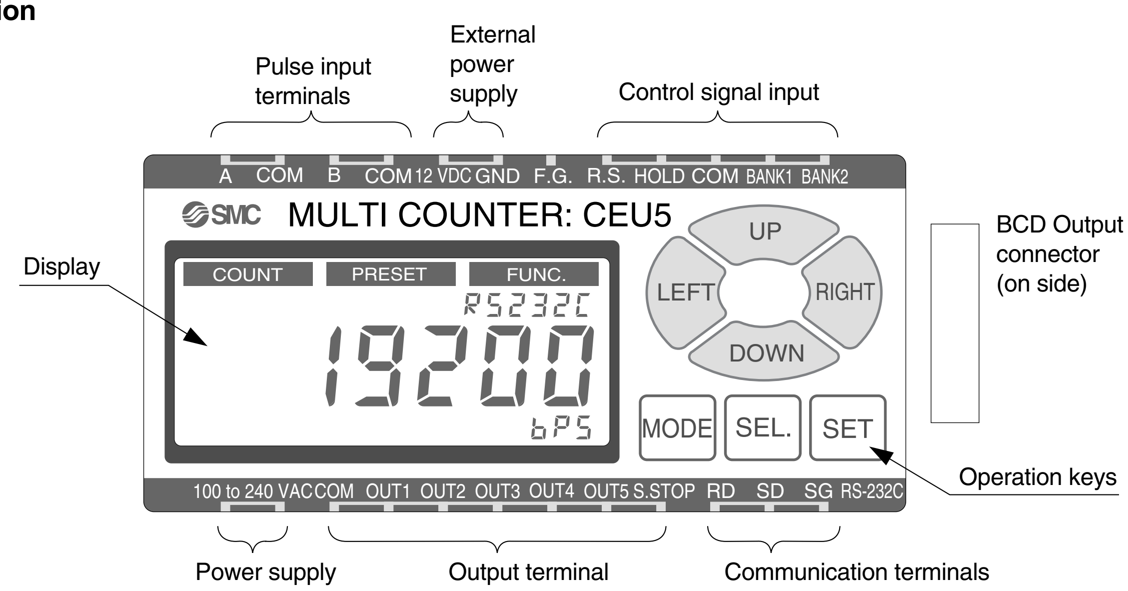
With allowable values

When the counter value passes the sum of the preset value + the allowed value, output is turned ON.

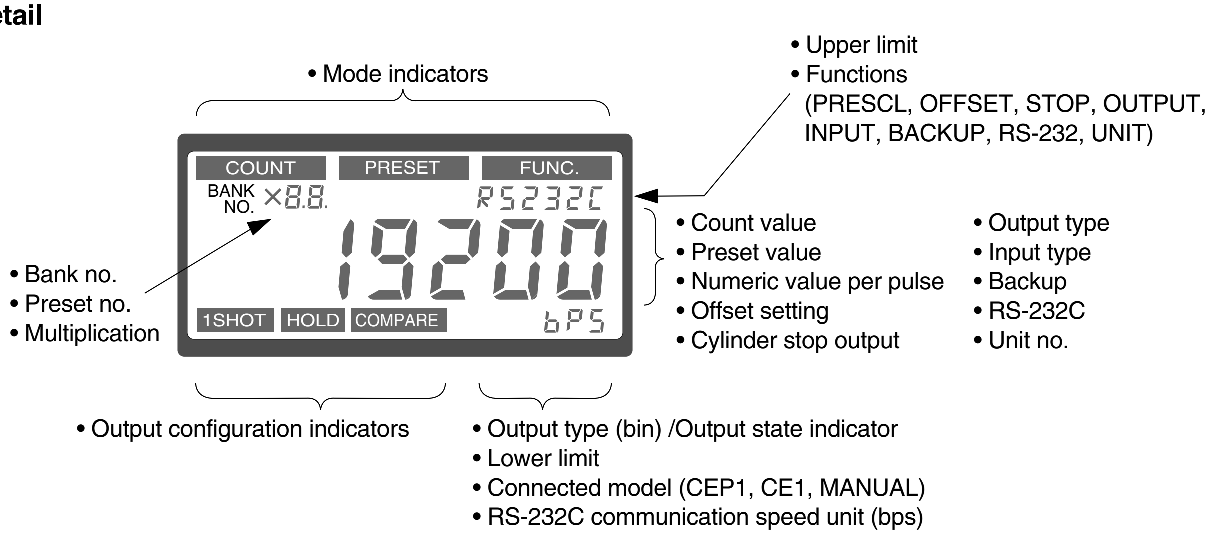


CEU5 Operation

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

1. Count mode

MODE key

2. Preset mode

MODE key

MODE key

3. Function mode

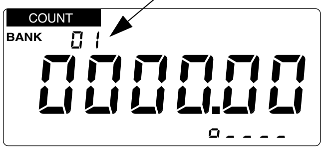
Basic Operation

- 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.

1. Explanation of display in count mode

Normal output display

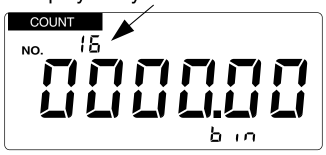
Displays current output bank



Displays output state of each OUT terminal

Binary output display

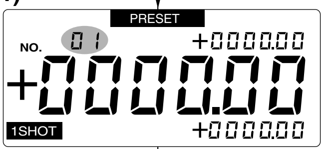
Displays only when matched with preset



Display of binary output selection.

2. Setting of preset mode

(1)

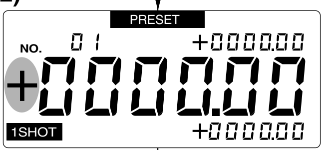


Selection of preset No.

- 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)

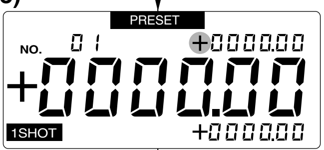


Setting the preset values

- 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)



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

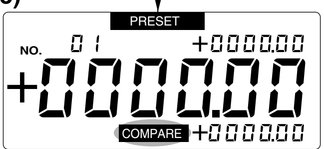
(4)

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)



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

CEU5 Operation

3. Explanation of settings in the function mode

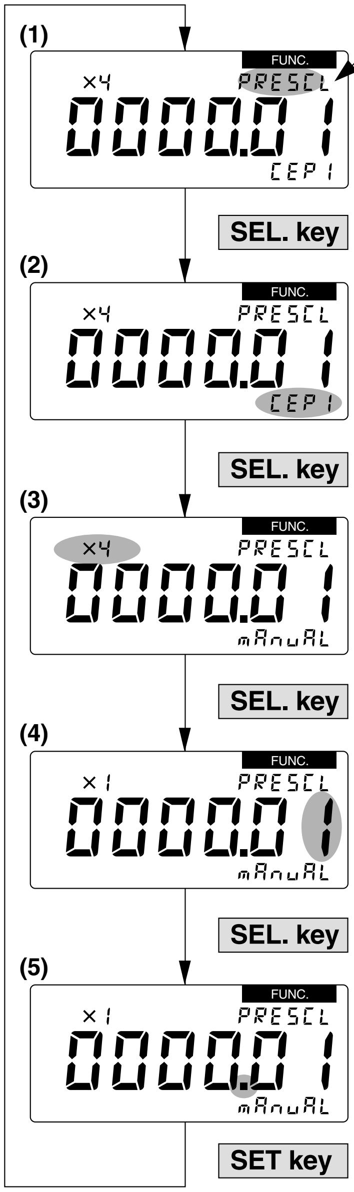
If the UP/DOWN keys are pressed when an item name is flashing , it shifts to another setting item. When the SEL. key is pressed, the cursor shifts and it is possible to change the content of the setting for the item which is being displayed.

3-1

Prescale

UP

DOWN



Item name

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

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.

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.

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.

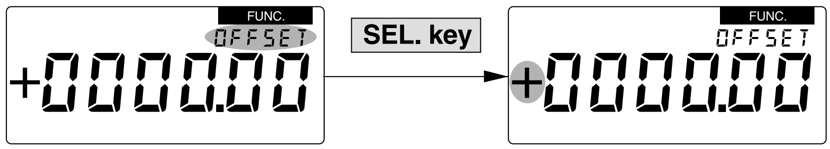
Setting the decimal point position

- 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.

3-2

Offset

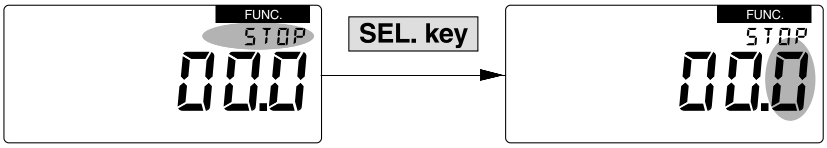
UP



- 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.

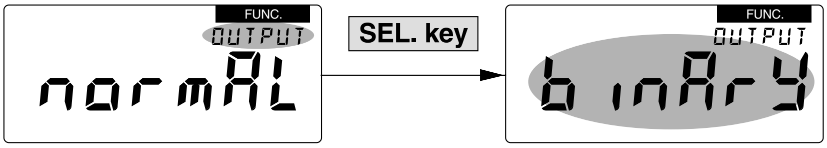
3-3 DOWN / **Stop output** / UP



- 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.

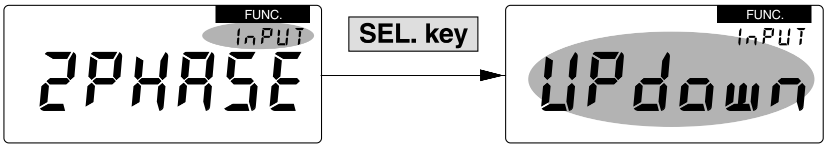
3-4 DOWN / **Output type** / UP



- 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.

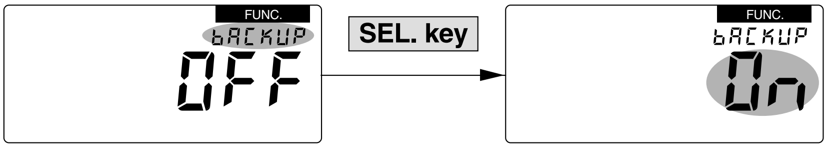
3-5 DOWN / **Input type** / UP



- 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.

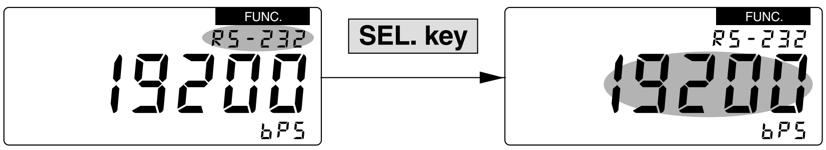
3-6 DOWN / **Count value backup** / UP



- 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.

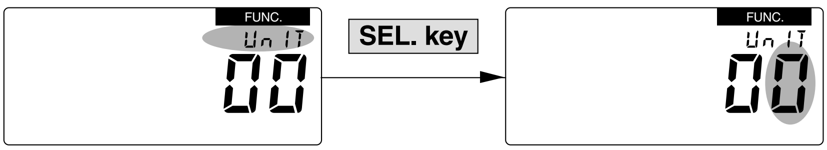
3-7 DOWN / **RS-232C** / UP



- 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.

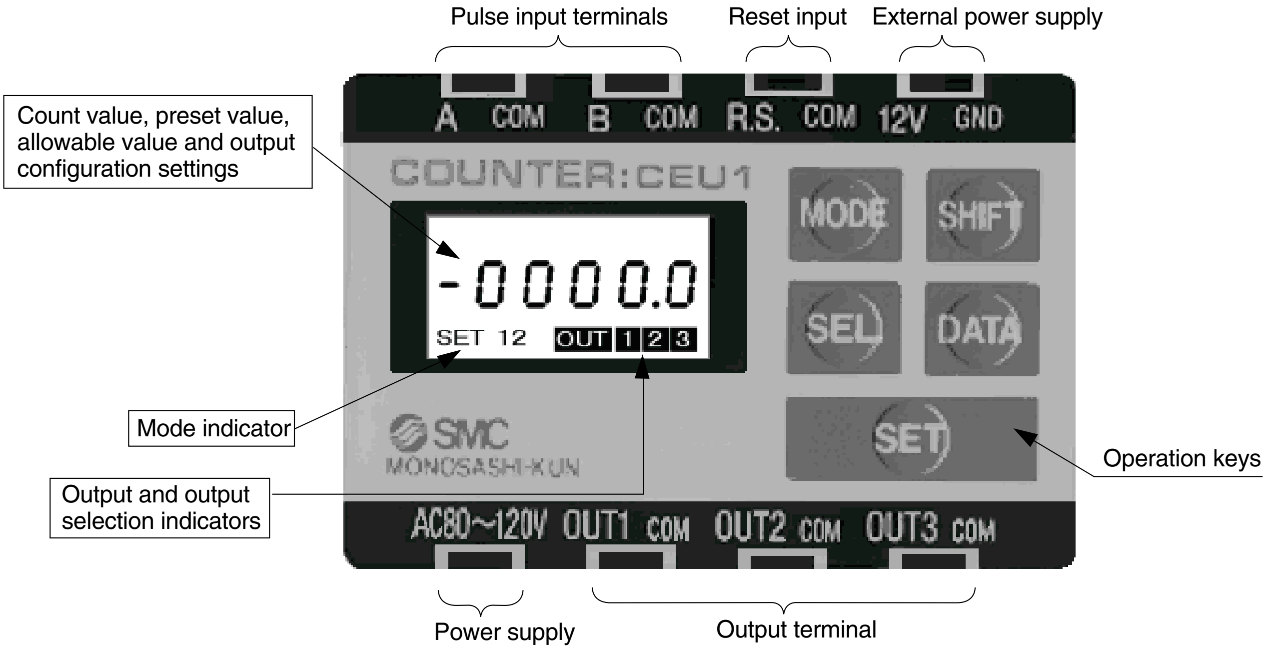
3-8 DOWN / **Unit no.**



- 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.

CEU1 Operation

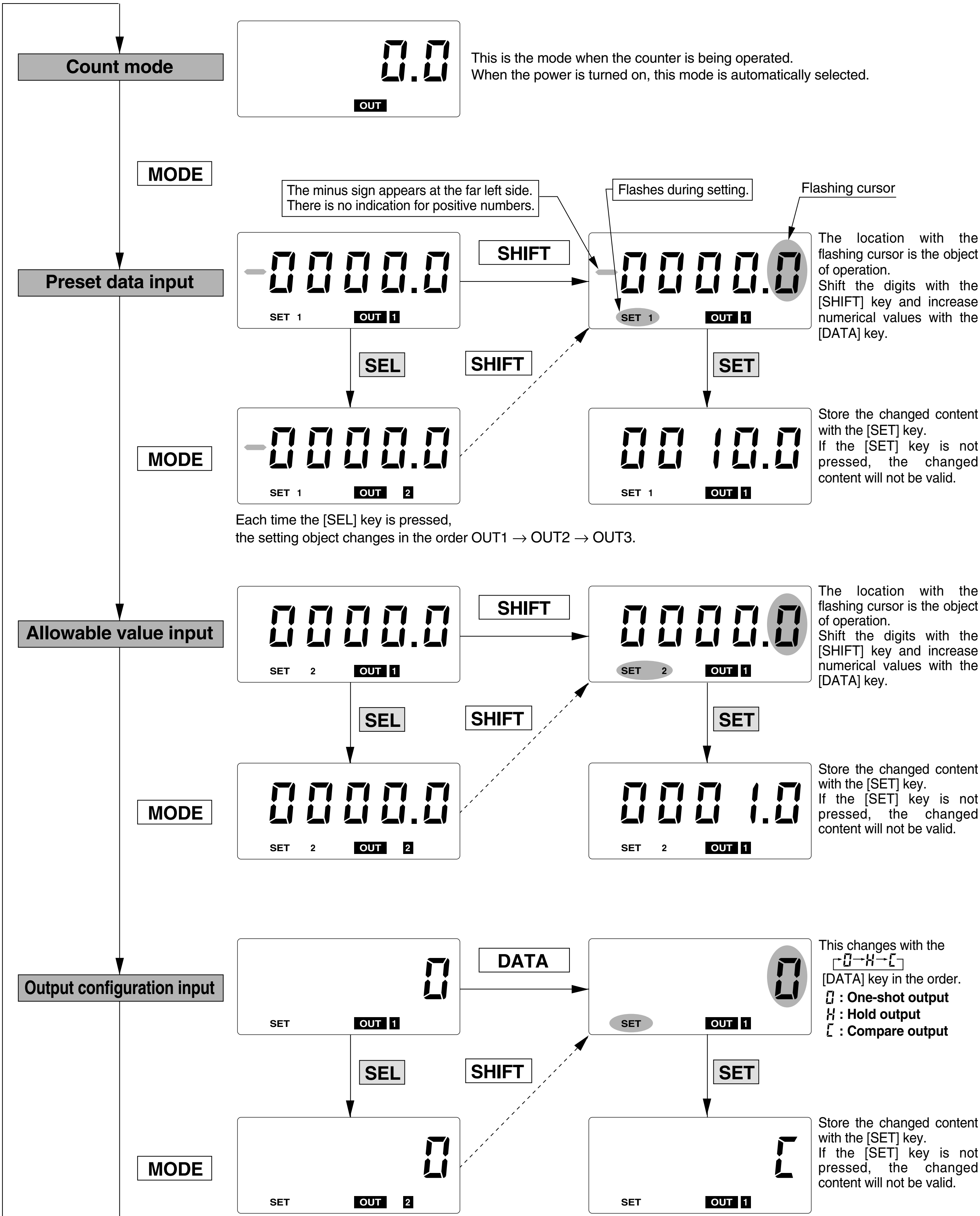


Key and Functions

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.

	LCD display
Count mode	SET 12 is not displayed.
Preset data input	SET 1
Allowable value input	SET 2
Input of output configuration	SET



- 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.)

REAB
REC
C□X
C□Y
MQQM
RHC
MK(2)
RSQG
RSHA
RZQ
MIWS
CEP1
CE1
CE2
ML2B
CJG5-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

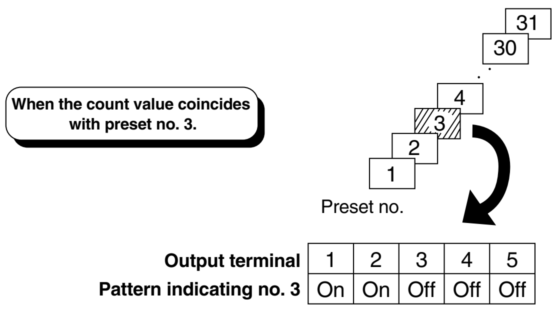
This is the interface standard for the serial transmission method, which is standard equipment on a personal computer.

Prescale Function

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

Binary Output

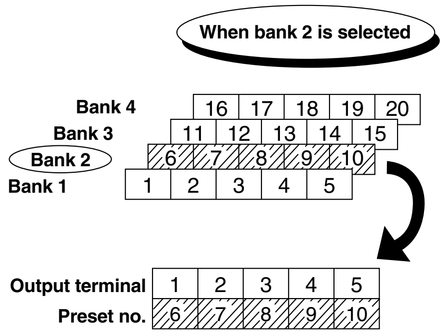
31 point preset output is possible without bank switching, by means of binary system output from a 5 point output terminal. Cylinder stop output is used as the readout release signal.



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.



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

Bank no. \ Input terminal	BANK2	BANK1
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.

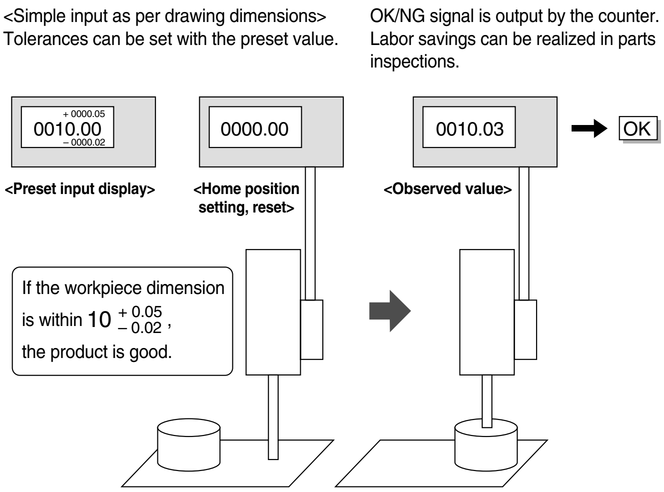
Hold Function

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 ±, but now it has become possible to set an upper and lower limit of + ○ mm and – △ 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.



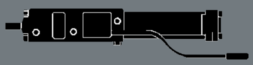
Count Value Protection

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 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 J G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data

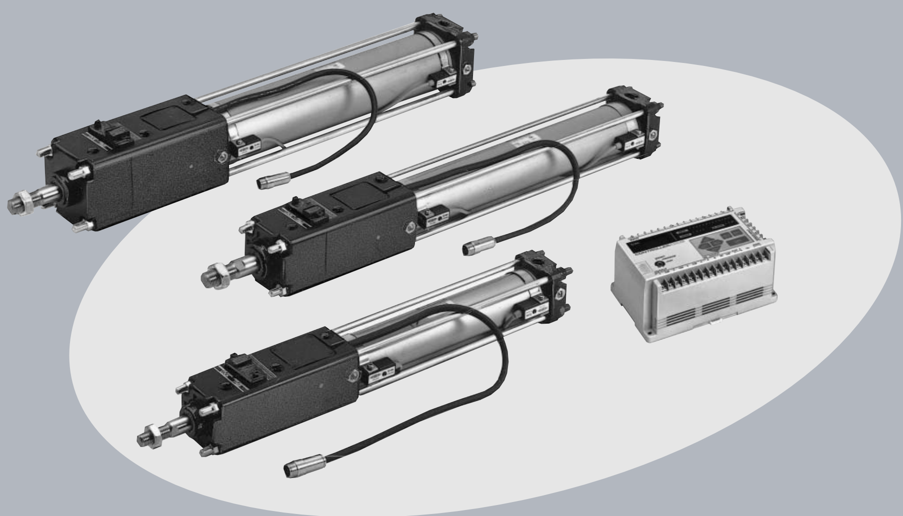


Stroke Reading Cylinder with Brake

Series CE2

ø40, ø50, ø63, ø80, ø100

Brake mechanism added to a stroke reading cylinder which can measure stroke length.



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 J/G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data

Stroke Reading Cylinder with Brake/*CE2*
Controller/*CEU2*

A cylinder capable of highly reproducible positioning (stopping accuracy of ±0.5 mm) has been created by adding a brake mechanism to a stroke reading cylinder which can measure stroke length.

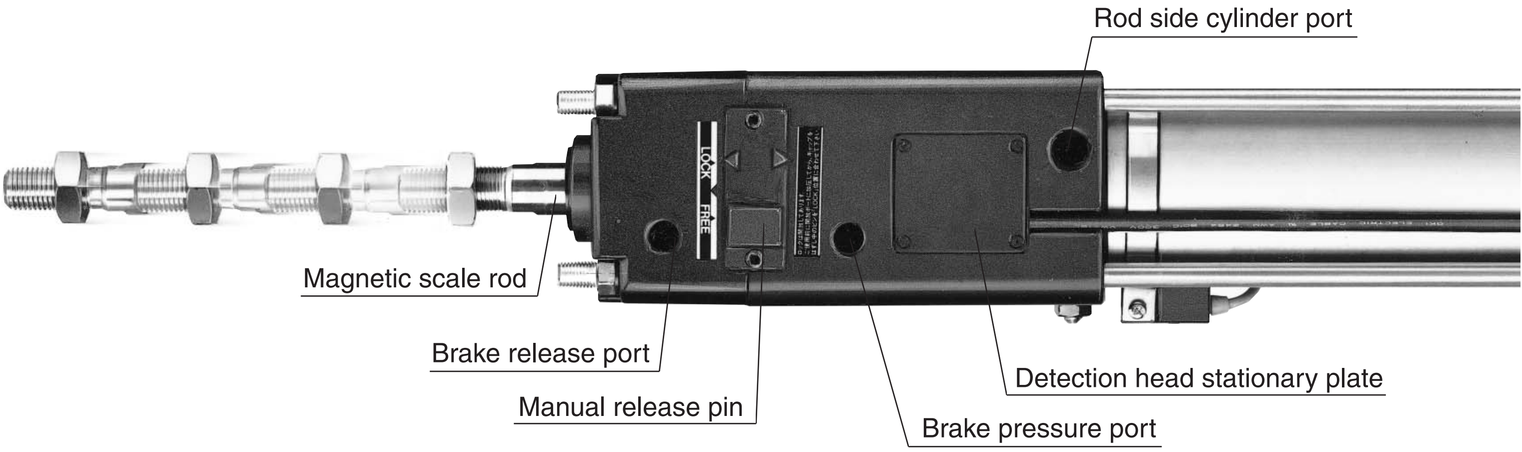
Brake mechanism

Employs a combination spring and pneumatic lock type.

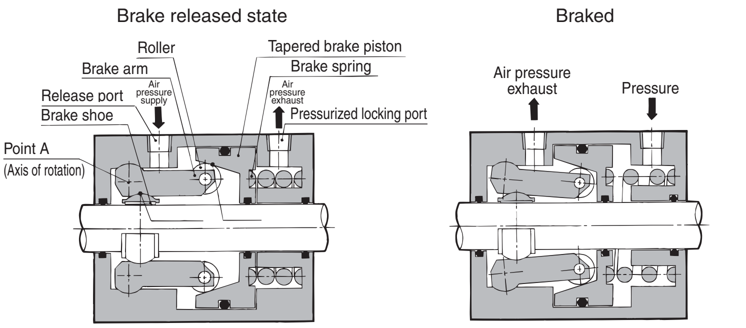
When there is a drop in air pressure, the workpiece is held by a spring lock.

Locking in both directions is possible.

Locking in either side of cylinder stroke is possible, too.



Working Principle of Brake Mechanism



The brake is disengaged by supplying air pressure through the open port and discharging air from the pressure port, thus pushing the brake piston in the opposite direction.

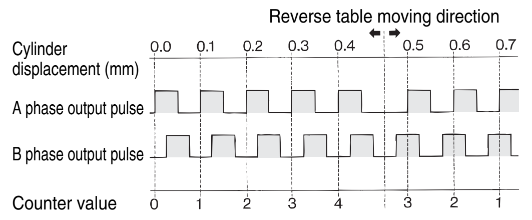
To apply the brake, the air pressure from the pressure port and the spring force push the brake piston, and the perpendicular force that is created by the taper of the piston is amplified by the brake arm to push the brake shoe against the rod.

Measuring

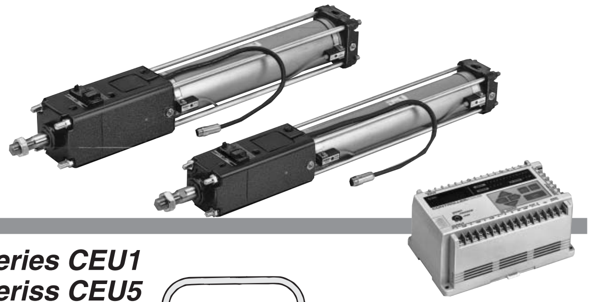
Smallest measuring unit 0.1 mm

Magnetic scale rod and built-in detection head

Relation between displacement and output pulse on stroke reading cylinder



SMC



ø40, ø50, ø63, ø80, ø100

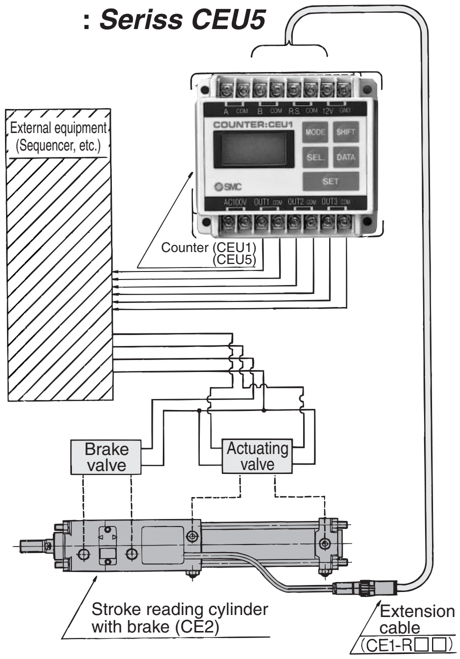
System configuration

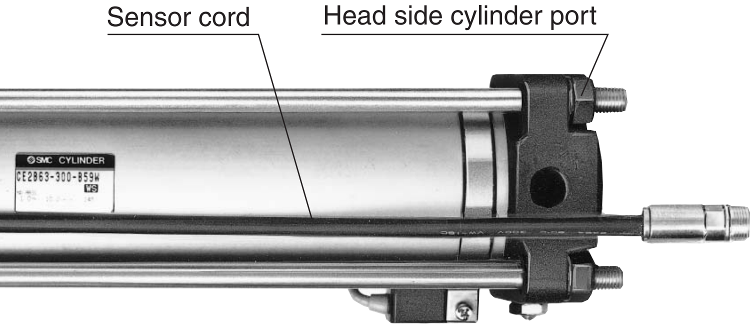
For safety measures

Stroke reading cylinder with brake + Counter

- Prevents dropping from raised positions during intermediate stops.

3 point preset counter: *Series CEU1*
Multi-counter : *Seriss CEU5*



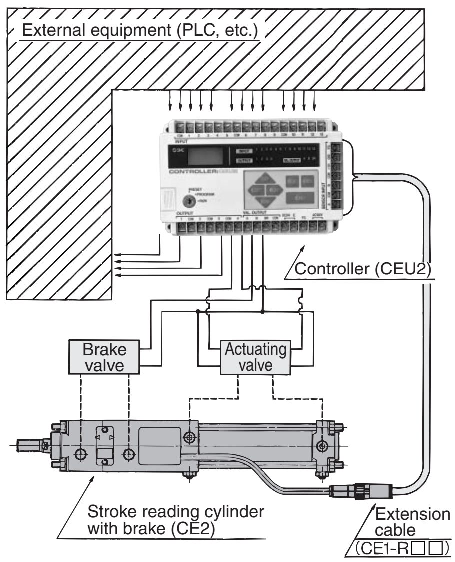


For precision positioning
(Stopping accuracy ±0.5 mm)

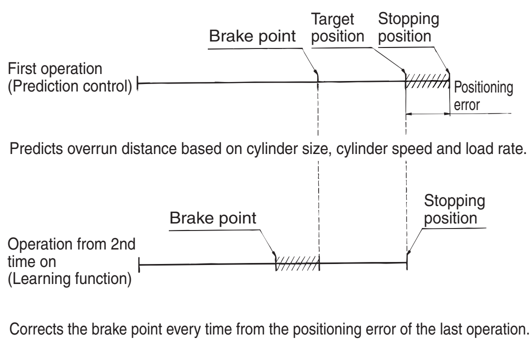
Stroke reading cylinder with brake + Controller (Brake positioning system)

- Positioning with high reproducibility has been achieved by prediction control and learning function.
- The stop position will be automatically redressed by re-try function.

Controller: *Series CEU2*

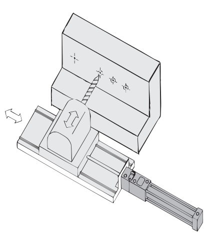


Prediction control and learning function

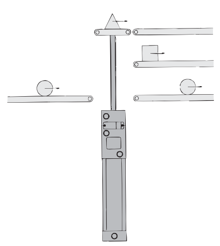


Application example

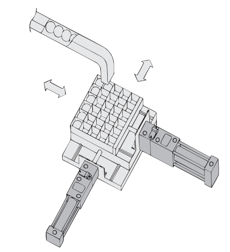
1. For positioning of hole drilling
This system can position the drill at the location in which a hole is to be drilled.



2. For sorting workpieces
Sorts workpieces by positioning the cylinder according to the workpiece.

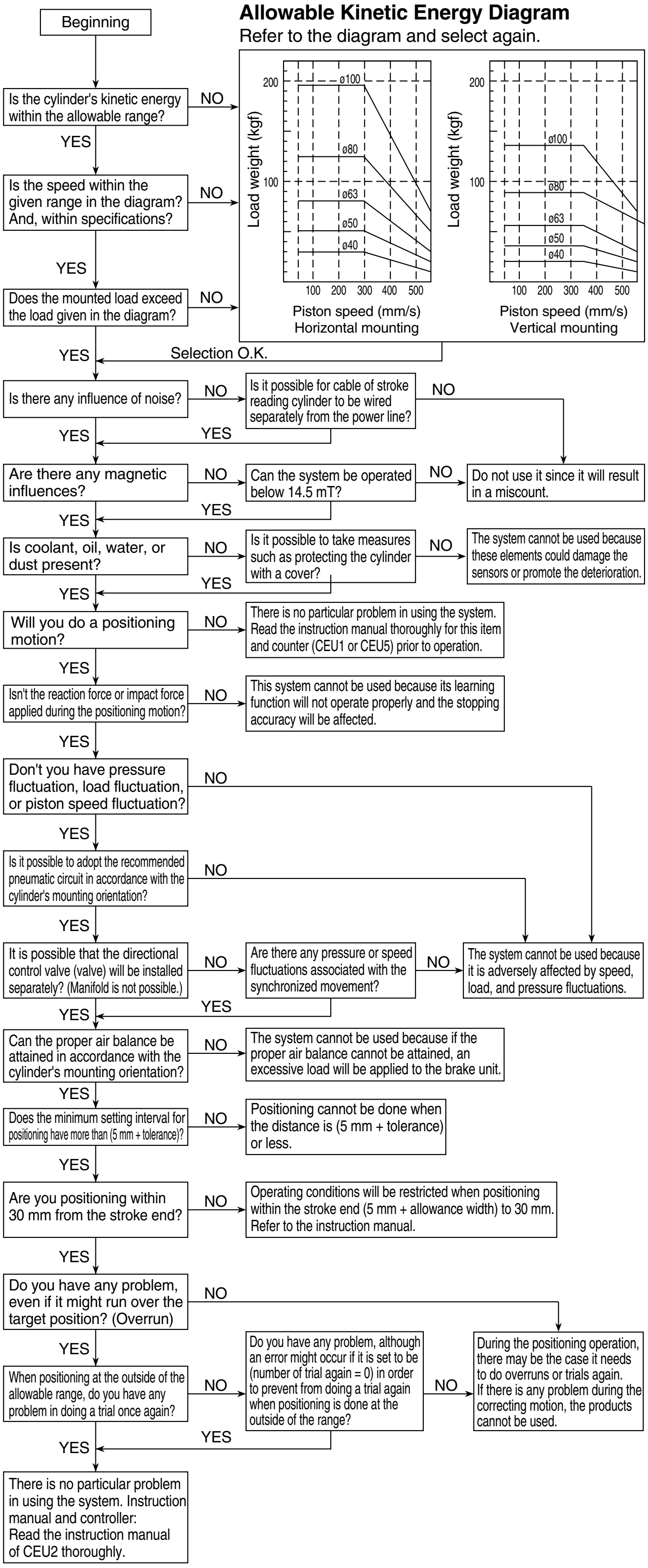


3. For placing workpieces in boxes
By adopting an X-Y table configuration, the cylinder can position workpieces in boxes.



Flow Chart to Confirm Utility of Stroke Reading Cylinder with Brake

Depending on the operating conditions, stable stopping accuracy may not be obtained. Therefore, make sure to follow the flow chart shown below.



Handling Technical Material

Be sure to read before handling brake positioning system (CE2+CEU2).

⚠ Precautions

Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to page 10-24-3 to 10-24-6.

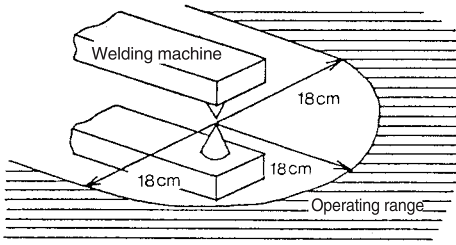
⚠ Caution

Sensor

Because a magnetic system is adopted in the sensor unit of the stroke reading cylinder with brake, the presence of a strong magnetic fields in the vicinity of the sensor could lead to a malfunction.

Operate the system with an external magnetic field of 14.5 mT.

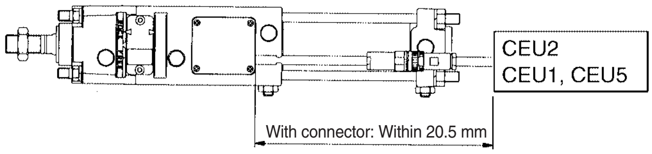
This is equivalent to a magnetic field of approximately 18 cm in radius from a welding area using a welding amperage of almost 15,000 amperes. To use the system in a magnetic field that exceeds this value, use a magnetic material to shield the sensor unit.



The sensor unit is adjusted to an appropriate position at the time of shipment. Therefore, never detach the sensor unit from the body.
Make sure that water does not splash on the sensor unit (enclosure IP65).
Do not pull on the sensor cord.

Noise

Operating the stroke reading cylinder with brake in the vicinity of equipment that generates noise, such as a motor or a welder, could result in miscounting. Therefore, minimize the generation of noise as much as possible, and keep the wiring separate.
Also, the maximum transmission distance of the stroke reading cylinder with brake is 20.5 m. Make sure that the wiring does not exceed this distance.
Besides, when the transmission distance is over 20.5 m, use the dedicated transmission box (Part no. CE1-H0374).



How to Manually Disengage the Lock and Change from the Unlocked to the Locked State

Manual unlocking

To manually disengage the lock, perform the following steps:

1. Loosen the two hexagon socket head cap bolts and remove the pin guide.
2. As viewed from the end of the rod, the pin is tilted 15° to the left of the center. Using a wooden mallet so as not to scratch the pin, rotate it 30° clockwise.
3. Rotating the pin 30° while moving it towards the rod end enables the lock to disengage.
4. To re-engage the lock, perform the following steps.

How to manually change from an unlocked state to a locked state

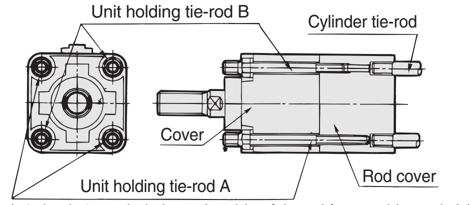
To change from an unlocked state to a locked state: Unlike the procedure for manually disengaging the lock, never rotate the pin by striking it, as it could bend or damage the pin. The lock is disengaged at the time of shipment. Therefore, after performing the mounting and centering adjustments, make sure to perform these steps before operating the unit:

1. Loosen the two hexagon socket head cap bolts and remove the pin guide.
2. As viewed from the end of the rod, the pin is tilted 15° to the right of the center.
3. Supply air pressure of 0.3 MPa to the unlocking port.
4. Using a wooden or plastic rod, such as the handle of a wooden mallet, push the pin and rotate it 30° counterclockwise.
5. Inside the pin guide, there is a slotted hole that is slightly larger than the pin. Align the pin with the slotted hole and secure them to the cover, using the hexagon socket bolts that were removed in step 1. The protruding portion of the pin guide will then align with the LOCK mark on the nameplate that is attached to the cover surface.

Caution on Handling

⚠ Caution

1. 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. In such a case, take precautions to prevent off-centering. If the piston rod and the load are off-centered, the speed of the movement of the piston could fluctuate, which could affect the piston's stopping accuracy and shorten the life of the brake unit.
2. If there is a large amount of dust in the operating environment, use a cylinder with a bellows to prevent the intrusion of dust.
   Also, be aware that the operating temperature range is between 0 and 60°C.
3. The brake unit and the cylinder rod cover area are assembled as shown in the diagram on the right. For this reason, unlike ordinary cylinders, it is not possible to use the standard style mounted directly onto a machine by screwing in the cylinder tie-rods.
   Furthermore, when replacing mounting brackets, the unit holding tie-rods may get loosen. Tighten them once again in such a case.
   Use a socket wrench when replacing mounting brackets or retightening the unit holding tie-rods.



(ø2 depth 1 mm hole is on the side of tie-rod for attaching unit A.)

Bore size (mm)	Mounting bracket nut			Unit holding tie-rod	
	Nut	Width across flats	Socket	Width across flats	Socket
40	JIS B 1181 Class 3 M8 x 1.25	13	JIS B 4636 2 point angle socket 13	10	JIS B 4636 2 point angle socket 10
50				13	JIS B 4636 2 point angle socket 13
63	JIS B 1181 Class 3 M10 x 1.25	17	JIS B 4636 2 point angle socket 17	13	JIS B 4636 2 point angle socket 13
80 100	JIS B 1181 Class 3 M12 x 1.75	19	JIS B 4636 2 point angle socket 19	17	JIS B 4636 2 point angle socket 17

Operating Cautions

Counting speed of the counter

Be aware that if the speed of the stroke reading cylinder with brake is faster than the counting speed of the counter, the counter will miscount.

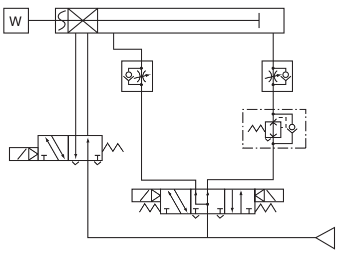
Use CEU1, CEU2, CEU5.
Cylinder speed < Counting speed of the counter
(Cylinder speed 500 mm/sec = Counting speed of the counter 5 kcps)

Miscounting by lurching or bounding

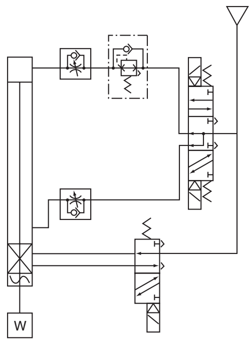
If the stroke reading cylinder with brake lurches or bounds during an IN or OUT movement, or due to other factors, be aware that the cylinder speed could increase momentarily, possibly exceeding the counter's counting speed or the sensor's response speed, which could lead to miscounting.

Example of Recommended Pneumatic

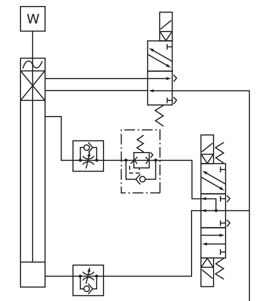
Horizontal mounting



Vertical flat mounting



Vertical overhead mounting



Note) In the case of light load, regulate head side supply pressure.

Recommended Pneumatic Equipment

Bore size (mm)	Directional control valve	Brake valve	Regulator	Piping	Silencer	Speed controller
40	VFS24□OR	VFS21□O	AR425	Nylon ø8/6 or larger	AN200-02	AS4000-02
50	VFS24□OR	VFS21□O	AR425	Nylon ø10/7.5 or larger	AN200-02	AS4000-02
63	VFS34□OR	VFS21□O	AR425	Nylon ø12/9 or larger	AN300-03	AS4000-03
80	VFS44□OR	VFS31□O	AR425	Nylon ø12/9 or larger	AN300-03	AS420-03
100	VFS44□OR	VFS31□O	AR425	Nylon ø12/9 or larger	AN400-04	AS420-04

Caution on Pneumatic Circuit Design

Air balance

Unlike the conventional pneumatic cylinder that performs a simple reciprocal movement, the stroke reading cylinder with a brake also makes intermediate stops. Thus, it must maintain the proper air balance in a stopped state.
Therefore, the proper air balance must be established in accordance with the mounting orientation of the cylinder.
Use caution the piston rod may be lurched when the next motion gets started after the intermediate stops or commence the operation after the reverse motion gets done, unless the air balance is taken. It may result in degrading its accuracy.

Supply pressure

If line pressure is used directly as supply pressure, any fluctuation in pressure will appear in the form of changes in cylinder characteristics. Therefore, make sure to use a pressure regulator to convert line pressure into supply pressure for the actuating valve and the brake valve. In order to actuate multiple cylinders at once, use a pressure regulator that can handle a large air flow volume and also consider installing a surge tank.

Stroke Reading Cylinder with Brake

Series CE2

ø40, ø50, ø63, ø80, ø100

How to Order

CE2 [B] [40] – [100] [ ] – [Y7BW] [ ]

Mounting style

B	Basic style
L	Foot style
F	Rod side flange style
G	Head side flange style
C	Single clevis style
D	Double clevis style
T	Center trunnion style

Bore size

40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Cylinder stroke (mm)

Refer to"Standard Stroke" on page 10-12-49.

Number of auto switches

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

Applicable counter/Controller
Series CEU1
Series CEU5
Series CEU2

Auto switch

Nil	Without auto switch

∗ For the applicable auto switch model, refer to the table below.
∗ D-Z7□/Z80/Y59□/Y69□/Y7□ types are shipped together, (not assembled).
(But, only the mounting bracket for the above models is assembled when shipping.)

Suffix for cylinder

Rod boot	**J**	Nylon tarpaulin
	K	Neoprene cross
Cushion	**Nil**	With cushion on both ends
	N	Without cushion
	R	With on rod end bumper
	H	With on head end cushion
Connector	**Nil**	With connector
	Z	Without connector

Applicable Auto Switch

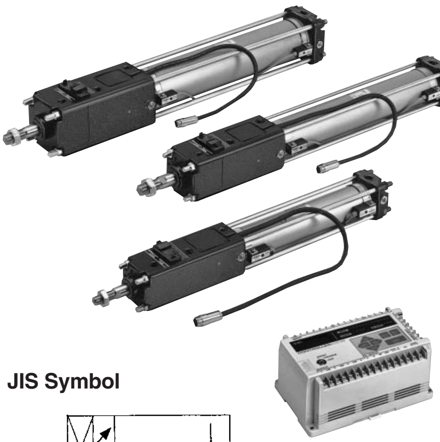
/Refer to page 10-20-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model Tie-rod mounting	Auto switch model Band mounting	Lead wire length (m)∗ 0.5 (Nil)	3 (L)	5 (Z)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**Z76**	**—**	●	●	—	—	IC circuit	—
				2-wire	24 V	12 V	100 V	**Z73**	**—**	●	●	●	—	—	Relay, PLC
							—	**—**	**B53**	●	●	●	—		PLC
							100 V, 200 V	**A54**	**B54**	●	●	●	—		Relay, PLC
		Terminal conduit					—	**A33C**	**A33**	—	—	—	—		PLC
							100 V, 200 V	**A34C**	**A34**	—	—	—	—		Relay, PLC
		DIN terminal						**A44C**	**A44**	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet				—	—	**A59W**	**B59W**	●	●	—	—		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**Y59A**	**G59**	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**Y7P**	**G5P**	●	●	○	○		
				2-wire	—	—	100 V, 200 V	**J51**	**—**	●	●	○	—	—	
					24 V	12 V	—	**Y59B**	**K59**	●	●	○	○		
		Terminal conduit		3-wire (NPN)		5 V, 12 V		**G39C**	**G39**	—	—	—	—	IC circuit	
				2-wire		12 V		**K39C**	**K39**	—	—	—	—	—	
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		**Y7NW**	**G59W**	●	●	○	○	IC circuit	
				3-wire (PNP)				**Y7PW**	**G5PW**	●	●	○	○		
				2-wire		12 V		**Y7BW**	**K59W**	●	●	○	○	—	
	Water resistant (2-color indication)							**Y7BA**	**G5BA**	—	●	○	○		
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		**F59F**	**G59F**	●	●	○	○	IC circuit	

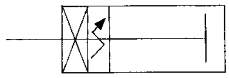
∗ Lead wire length symbols: 0.5 m·········· Nil (Example) A54
3 m·········· L (Example) A54L
5 m·········· Z (Example) A54Z

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

- Since there are other applicable auto switches than listed, refer to page 10-12-53 for details.
- For details about auto switches with pre-wire connector, refer to page 10-20-66.



JIS Symbol



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

Symbol	Specifications
-XC18	NPT finish piping port

Model

Series	Type	Action	Bore size (mm)	Rod Action
CE2	Non-lube	Double acting	40, 50, 63 80, 100	Spring and pneumatic lock

Rod Boot Material

Symbol	Rod boot material	Maximum ambient temperature
J	Nylon tarpaulin	60°C
K	Neoprene cross	110°C*

* Maximum ambient temperature for the rod boot itself.

Cylinder Specifications

Bore size (mm)	40	50	63	80	100
Fluid	Air (Non-lube)				
Proof pressure	1.5 MPa				
Maximum operating pressure	Driving pressure 1 MPa; Brake pressure 0.5 MPa				
Minimum operating pressure	Driving pressure 0.1 MPa; Brake pressure 0.3 MPa				
Piston speed	50 to 500 mm/s*				
Ambient temperature	0 to 60°C (No freezing)				
Brake system	Spring and pneumatic lock type				
Sensor cord length	ø7-500 mm Oil-resistant				
Thread tolerance	JIS Class 2				
Stroke length tolerance	Up to 250 mm: $^{+1.0}_{0}$, 251 mm to 1000 mm $^{+1.4}_{0}$				

* Be aware of the constraints in the allowable kinetic energy.

Sensor Specifications

Cable	ø7, 6 core twisted pair shielded wire (Oil, Heat & Flame resistant cable)
Maximum transmission distance	20.5 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 13.2 VDC (Power supply ripple: 1% or less)
Current consumption	40 mA
Resolution	0.1 mm/pulse
Accuracy	±0.2 mm Note)
Output type	Open collector (Max. 35 VDC, 80 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 at X, Y, Z
Enclosure	IP65 (IEC standard) Except connector part
Extension cable (Option)	5 m, 10 m, 15 m, 20 m

Note) Digital error under Controller (CEU2), Counter (CEU1 or CEU5) is included. Besides, the whole accuracy after mounting on an equipment may be varied depending on the mounting condition and surroundings. As an equipment, calibration should be done by customer.

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm) 40	50	63	80	100
D-A5□/A6□ D-A59W D-F5□/J5□ D-F5□W/J59W D-F5NTL D-F5BAL/F59F	BT-04	BT-04	BT-06	BT-08	BT-08
D-A3□/A44 D-G39/K39	BD1-04M	BD1-05M	BD1-06M	BD1-08M	BD1-10M
D-B5□/B64 D-B59W D-G5□/K59 D-G5□W/K59W D-G5BAL D-G59F/G5NTL	BA-04	BA-05	BA-06	BA-08	BA-10
D-A3□C/A44C D-G39C/K39C	BA3-040	BA3-050	BA3-063	BA3-080	BA3-100
D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W D-Y7□WV D-Y7BAL	BA4-040	BA4-040	BA4-063	BA4-080	BA4-080

* Mounting bolt is attached to D-A3□C, A44C, G39C, and K39C.
* To order, indicate as shown below, according to the cylinder size.
(Example) ø40······D-A3□C-4, ø63······D-A3□C-6, ø100······D-A3□C-10
ø50······D-A3□C-5, ø80······D-A3□C-8

Standard Stroke

Bore size (mm)	Standard stroke (mm)		Range of manufacturable stroke	
	Without rod boot	With rod boot	Without rod boot	With rod boot
40	25 to 850	25 to 700	Up to 1200	Up to 950
50	25 to 800	25 to 650	Up to 1150	Up to 900
63	25 to 800	25 to 650	Up to 1150	Up to 900
80	25 to 750	25 to 600	Up to 1100	Up to 900
100	25 to 750	25 to 600	Up to 1100	Up to 850

Weight

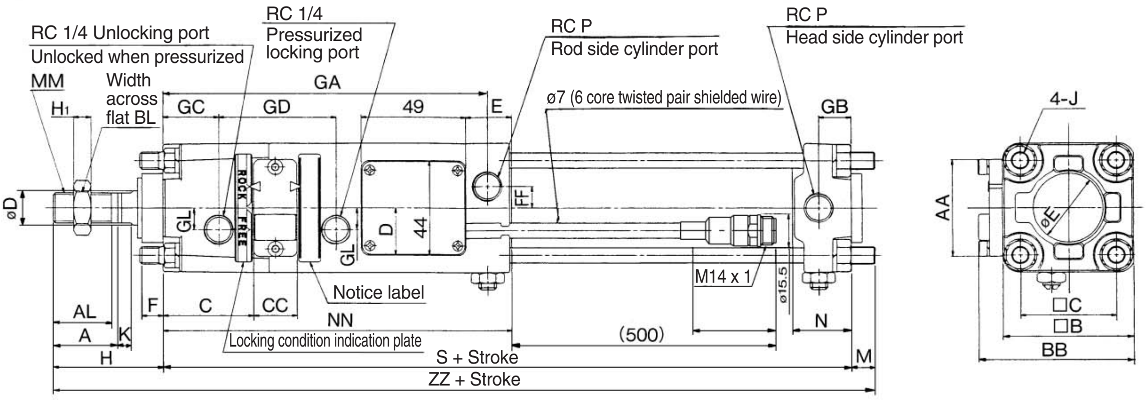
(kg)

Bore size (mm)			40	50	63	80	100
Basic weight	Basic style		2.18	3.39	5.29	8.66	12.09
	Foot style		2.37	3.61	5.63	9.33	13.08
	Flange style		2.55	3.84	6.08	10.11	14.01
	Single clevis style		2.41	3.73	5.92	9.77	13.87
	Double clevis style		2.45	3.82	6.08	10.06	14.39
	Trunnion style		3.63	3.92	6.18	10.36	14.49
Additional weight per each 20 mm of stroke	Aluminum tube	Mounting bracket	0.22	0.28	0.37	0.52	0.65
Accessory bracket	Single knuckle		0.23	0.26	0.26	0.60	0.83
	Double knuckle		0.32	0.38	0.38	0.73	1.08
	Knuckle pin		0.05	0.05	0.05	0.14	0.19

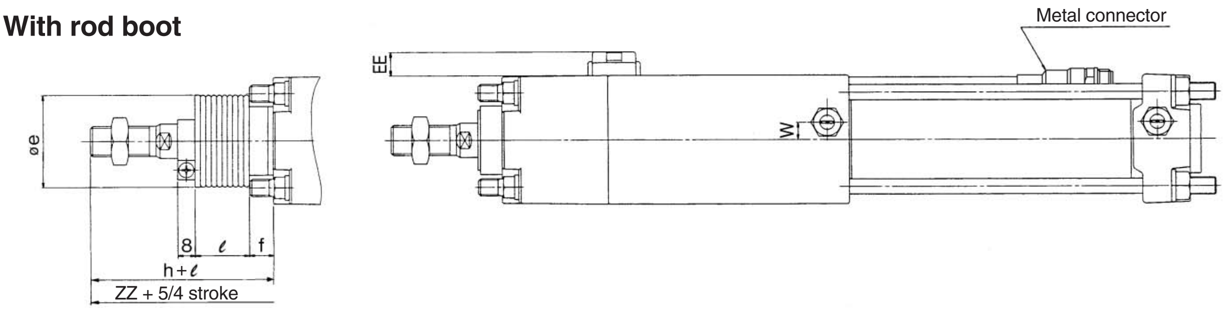
RE A B
REC
C□X
C□Y
MQ Q M
RHC
MK(2)
RS Q G
RS H A
RZQ
MI W S
CEP1
CE1
CE2
ML2B
C J G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data

Dimensions: ø40 to ø100

Basic style



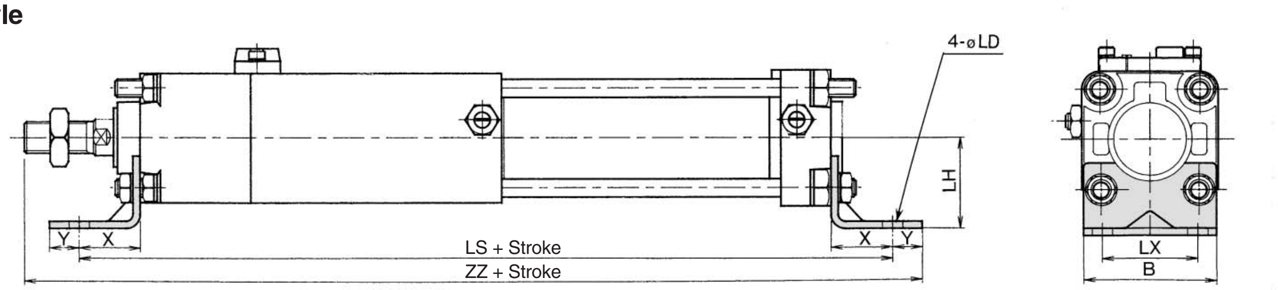
With rod boot



Bore size (mm)	Stroke range		A	AA	AL	BB	BL	□B	C	CC	□C	D	D	E	EE	E	F	FF	GA	GB	GC	GD	GL	H_1	J	K	M
	Without rod boot	With rod boot																									
40	25 to 850	25 to 700	30	45	27	71.5	22	60	42	20	44	22	16	21	11	32	10	10	150.5	15	26	54	10	8	M8 x 1.25	6	11
50	25 to 800	25 to 650	35	50	32	80.5	27	70	46	21	52	24	20	28.5	10	40	10	12	162.5	17	27	59	13	11	M8 x 1.25	9	11
63	25 to 800	25 to 650	35	60	32	98.5	27	85	48.5	23	64	24	20	28.5	13	40	10	15	174	17	26	67	18	11	M10 x 1.25	9	13.5
80	25 to 750	25 to 600	40	70	37	117.5	32	102	55	23	78	26.5	25	36	15	52	14	17	189	21	30	72	23	13	M12 x 1.75	11	16.5
100	25 to 750	25 to 600	40	80	37	131.5	41	116	56.5	25	92	35.5	30	36	15	52	14	19	198	21	31	76	25	16	M12 x 1.75	11	16.5

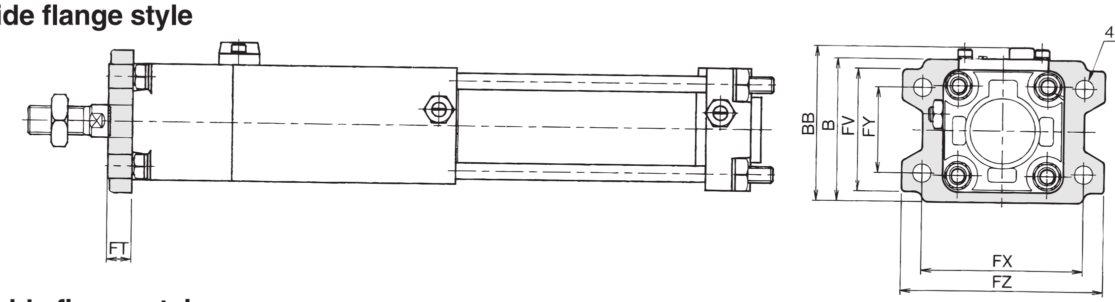
Bore size (mm)	MM	N	NN	P	S	W	Without rod boot		With rod boot				
							H	ZZ	e	f	h	ℓ	ZZ
40	M14 x 1.5	27	161.5	1/4	218.5	8	51	280.5	43	11.2	59	1/4 stroke	288.5
50	M18 x 1.5	30	175.5	3/8	235.5	0	58	304.5	52	11.2	66		312.5
63	M18 x 1.5	31	187	3/8	254	0	58	326	52	11.2	66		334
80	M22 x 1.5	37	205	1/2	284	0	71	372	65	12.5	80		381
100	M26 x 1.5	40	214	1/2	300	0	72	389	65	14	81		398

Foot style

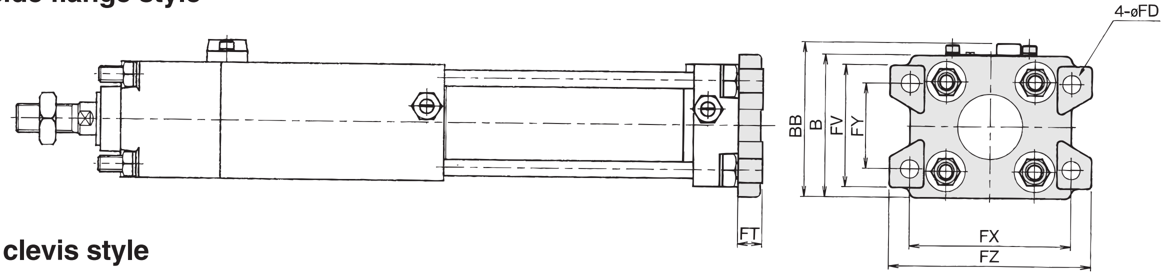


Bore size (mm)	B	LH	LS	LX	X	Y	ZZ	LD
40	58.5	40	272.5	42	27	13	309.5	9
50	68.5	45	289.5	50	27	13	333.5	9
63	83	50	322	59	34	16	362	11.5
80	100	65	372	76	44	16	415	13.5
100	114	75	386	92	43	17	432	13.5

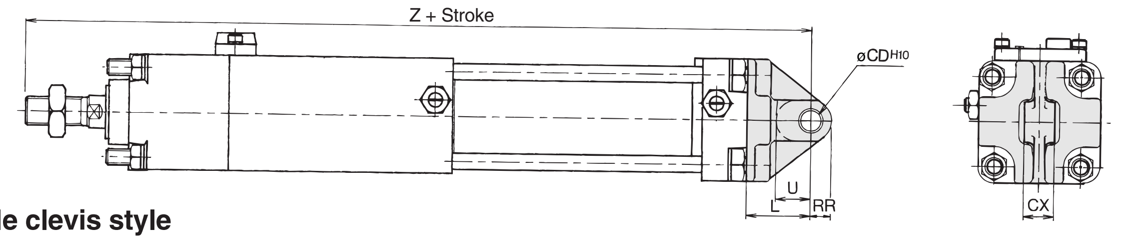
Rod side flange style



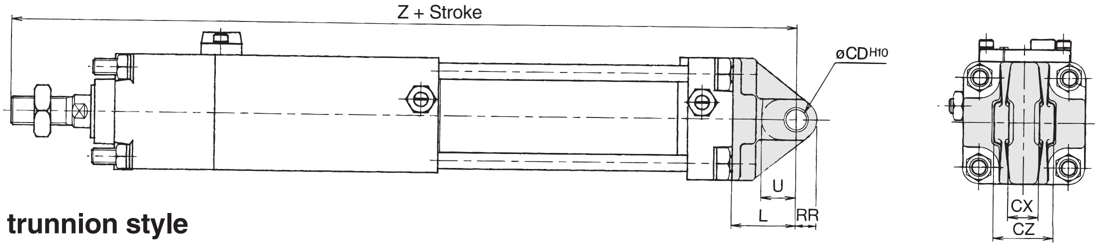
Head side flange style



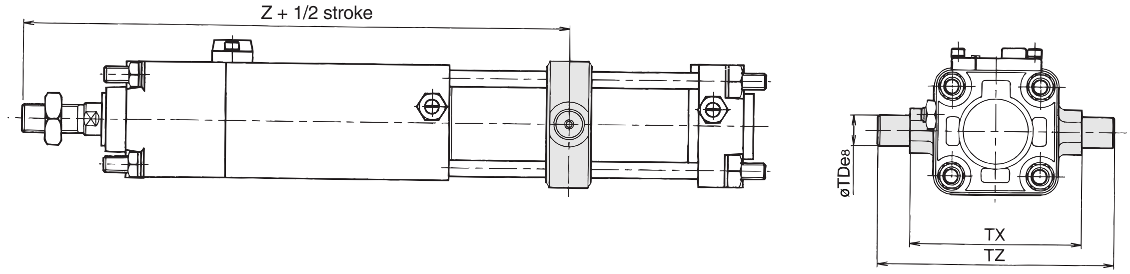
Single clevis style



Double clevis style



Center trunnion style



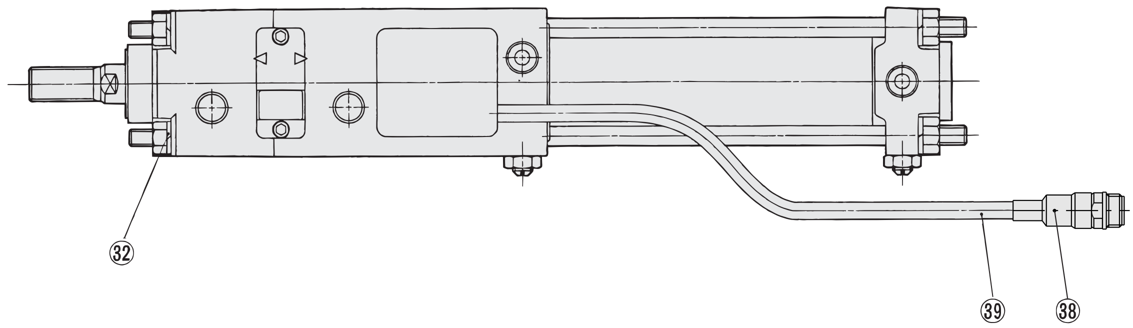
Bore size (mm)	Rod side flange, Head side flange						Rod side flange		Single clevis, Double clevis						Double clevis	Center trunnion			
	FT	FV	FX	FY	FZ	FD	B	BB	CD H10	CX	L	RR	U	Z	CZ	TDe8	TX	TZ	Z
40	12	60	80	42	100	9	71	76.5	$10^{+0.058}_{0}$	$15^{+0.3}_{+0.1}$	30	10	16	299.5	29.5	$15^{-0.032}_{-0.059}$	85	117	224.5
50	12	70	90	50	110	9	81	88.5	$12^{+0.070}_{0}$	$18^{+0.3}_{+0.1}$	35	12	19	328.5	38	$15^{-0.032}_{-0.059}$	95	127	248.5
63	15	86	105	59	130	11.5	101	106	$16^{+0.070}_{0}$	$25^{+0.3}_{+0.1}$	40	16	23	352	49	$18^{-0.032}_{-0.059}$	110	148	263
80	18	102	130	76	160	13.5	119	112.5	$20^{+0.084}_{0}$	$31.5^{+0.3}_{+0.1}$	48	20	28	403	61	$25^{-0.040}_{-0.073}$	140	192	297
100	18	116	150	92	180	13.5	133	139.5	$25^{+0.084}_{0}$	$35.5^{+0.3}_{+0.1}$	58	25	36	430	64	$25^{-0.040}_{-0.073}$	162	214	309

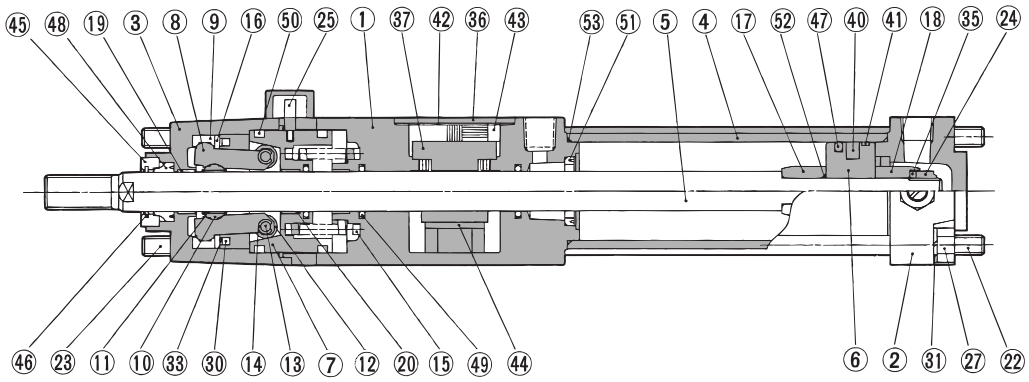
Mounting Bracket Part No.

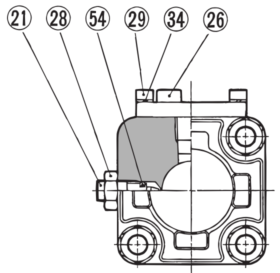
Bore size (mm)	40	50	63	80	100
Axial foot *	CA1-L04	CA1-L05	CA1-L06	CA1-L08	CA1-L10
Flange	CA1-F04	CA1-F05	CA1-F06	CA1-F08	CA1-F10
Single clevis	CA1-C04	CA1-C05	CA1-C06	CA1-C08	CA1-C10
Double clevis **	CA1-D04	CA1-D05	CA1-D06	CA1-D08	CA1-D10

* When ordering axial foot style brackets, 2 pcs. Should be ordered for each cylinder.
** Clevis pin, flat washer and cotter pin are shipped together with double clevis style.

Construction







Component Parts

No.	Description	Material	Note
1	Rod cover	Aluminum alloy	Black painted after hard anodized
2	Head cover	Aluminum alloy	Black painted
3	Cover	Aluminum alloy	Black painted after hard anodized
4	Cylinder tube	Aluminum alloy	Hard anodized
5	Piston rod	Free-cutting steel	Hard chrome plated
6	Piston	Aluminum alloy	Chromated
7	Brake piston	Carbon steel	Nitrided
8	Brake arm	Carbon steel	Nitrided
9	Arm holder	Carbon steel	Nitrided
10	Brake shoe holder	Carbon steel	Nitrided
11	Brake shoe	Special friction material	
12	Roller	Chromium molybdenum steel	Nitrided
13	Pin	Chrome bearing steel	Heat treated
14	Snap ring	Stainless steel	JIS B 2805E
15	Brake spring	Steel wire	Dacrodized
16	Retaining plate	Rolled steel plate	Zinc chromated
17	Cushion ring A	Rolled steel	Electroless nickel plated
18	Cushion spear B	Rolled steel	Electroless nickel plated
19	Bushing	Lead-bronze casted	
20	Bushing	Lead-bronze casted	
21	Cushion valve	Rolled steel plate	Electroless nickel plated
22	Tie-rod	Carbon steel	Chromated
23	Unit holding tie-rod	Carbon steel	Chromated

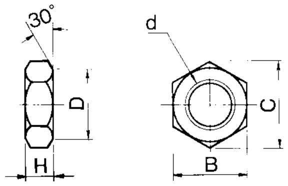
No.	Description	Material	Note
24	Piston nut	Rolled steel plate	Zinc chromated
25	Non-rotating pin	Carbon steel	High frequency quenched
26	Pin guide	Carbon steel	Black painted after hard anodized
27	Tie-rod nut	Carbon steel	Black zinc chromated
28	Lock nut	Carbon steel	Nickel plated
29	Hexagon socket head cap screw	Chromium molybdenum steel	Black zinc chromated
30	Hexagon socket head cap screw	Stainless steel	
31	Spring washer	Steel wire	Black zinc chromated
32	Spring washer	Steel wire	Black zinc chromated
33	Spring washer	Steel wire	Black zinc chromated
34	Spring washer	Steel wire	Black zinc chromated
35	Spring washer	Steel wire	Zinc chromated
36	Bracket assembly	Carbon steel	
37	Detection head assembly	—	
38	Connector	—	
39	Cable	—	
40	Rubber magnet	NBR	
41	Wear ring	Resin	
42	Gasket	NBR	
43	Bushing	NBR	
44	Amp cushion	NBR	
45	Seal retainer	Aluminum alloy	
46	Coil scraper	Phosphor bronze	

Seal List

No.	Description	Material	Part no.				
			Bore size (mm)				
			40	50	63	80	100
47	Piston seal	NBR	NLP-40A	NLP-50A	NLP-63A	NLP-80A	NLP-100A
48	Rod seal A	NBR	PDU-16Z	PDU-20Z	PDU-20Z	PDU-25Z	PDU-30Z
49	Rod seal B	NBR	PSD-22 x 16	PSD-27 x 20	PSD-27 x 20	PSD-33 x 25	PSD-38 x 30
50	Brake piston seal	NBR	P44	P50	P60	P75	P90
51	Cushion seal	NBR	DSM-20	DSM-25	DSM-25	DSM-30	DSM-35
52	Piston gasket	NBR	CA40-1606	CA63-1608	CA63-1608	CA80-1609	CA100-1610
53	Tube gasket	NBR	CA40-1601	CA50-1602	CA63-1603	CA80-1604	CA100-1605
54	Cushion valve seal	NBR	P3	P3	P3	P5	P5

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

Accessory Dimensions: Rod End Nut

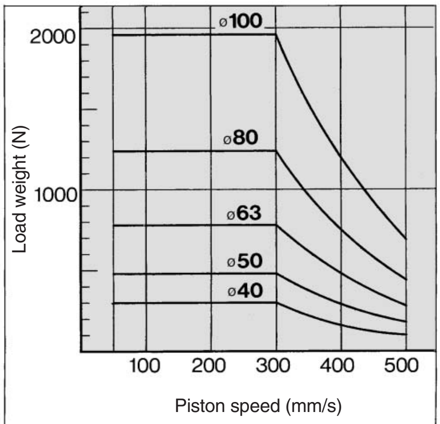


Material: Rolled steel

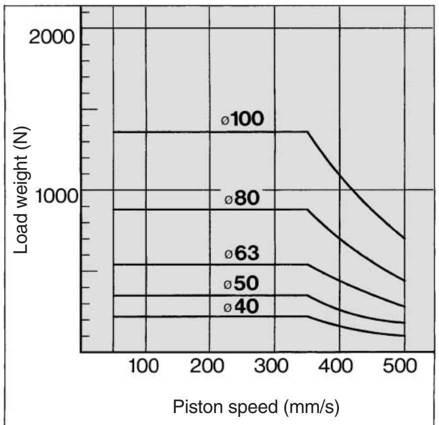
Part no.	Applicable bore size (mm)	d	H	B	C	D
NT-04	**40**	M14 x 1.5	8	22	25.4	21
NT-05	**50, 63**	M18 x 1.5	11	27	31.2	26
NT-08	**80**	M22 x 1.5	13	32	37.0	31
NT-10	**100**	M26 x 1.5	16	41	47.3	39

Allowable Kinetic Energy

Operate the stroke reading cylinder with brake within the proper allowable kinetic energy. It must not be operated out of the allowable range, which is shown in the graph on the right. All sizes must be operated within this range. (Supply pressure 0.5 MPa)



Horizontal mounting



Vertical mounting

Operating Range

Auto switch model	Bore size (mm)				
	40	50	63	80	100
D-Z7□/Z80	8	7	9	9.5	10.5
D-A3□/A44 **D-A3□C, D-A44C** **D-A5□/A6□** **D-B5□/B64**	9	10	11	11	11
D-A59W	13	13	14	14	15
D-B59W	14	14	17	16	18
D-Y5□/Y6□ **D-Y7P/Y7PV** **D-Y7□W/Y7□WV**	8	7	5.5	6.5	6.5
D-Y7BAL	3.5	3.5	5	5	5
D-F5□/J5□ **D-F5□W/J59W** **D-F5BAL/F5NTL** **D-F59F**	4	4	4.5	4.5	4.5
D-G5□/K59 **D-G5□W/K59W** **D-G5NTL/G5BAL**	5	6	6.5	6.5	7
D-G59F	6	7	7.5	7.5	8
D-G39/K39 **D-G39C, D-K39C**	9	9	10	10	11

∗ 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 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 (Fetching direction)	Features
Reed switch	D-A53/A56	Grommet (In-line)	—
	D-A64/A67		Without indicator light
	D-B64		
	D-Z80		
Solid state switch	D-F59/F5P/J59	Grommet (In-line)	—
	D-F59W/F5PW/J59W		2-color indication
	D-F5BAL		2-color indication Water resistant
	D-F5NTL		With timer
	D-G5NTL		
	D-Y69A/Y7PV/Y69B	Grommet (Perpendicular)	—
	D-Y7NWV/Y7PWV/Y7BWV		2-color indication

∗ With pre-wire connector is also available in solid state auto switches. For specifications, refer to page 10-20-66.
∗ Normally closed (NC = b contact), solid state switch (D-Y7G/Y7H type) are also available. For details, refer to page 10-20-41.

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 J G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data

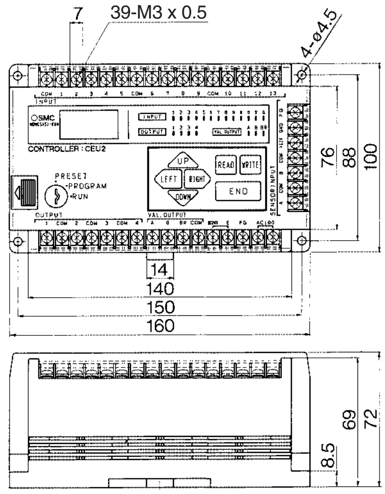
Controller/*CEU2*

Controller CEU2/Specifications

Model	CEU2	CEU2P
Type	Controller	
Mounting	Surface mounting (DIN rail or screw stop)	
Operation mode	PRESET mode, PROGRAM mode, RUN mode	
Display system	LCD (with back light)	
No. of digits	Program 1 to 16, Step 1 to 32	
Position control system	Key input (on front face)	
No. of control shaft	1 axis	
Positioning system	Key input (on front face)	
Positioning range	9999.9 mm	
Min. setting range	0.1 mm	
Memory system	Static RAM 8 K bite (Battery back up: life 5 years)	
Min. interval	5 mm or more	
Input signal	● Start ● Return to origin ● Program selection (4 bit) ● Hold ● Emergency stop ● Input origin ● Automatic/Manual ● Manual: extended, retracted (2 bit) ● Reset	
Output signal	● Completion of positioning signal ● Completion to figure out origin signal ● Program END signal ● Abnormal signal	
Control output	NPN open collector (30 VDC, 50 mA)	PNP open collector (30 VDC, 50 mA)
Counting speed	20 kHz (kcps)	
Power supply	90 to 110 VAC, 50/60 Hz and 21.6 to 26.4 VDC, 0.4 A	
Operating temperature range	0 to 50°C (No freezing)	
Humidity range	25 to 85% (No condensation)	
Shock resistance	Endurance 10 to 55 Hz, Amplitude 0.75 mm, X, Y, Z for 2 hours each	
Noise resistance	Square wave noise from a noise simulator (Pulse duration 1 µs) Between 100 VAC line ±1500 V, I/O line ±600 V	
Impact resistance	Endurance 10 G; X, Y, Z directions, 3 times each	
Withstand voltage	Between case and AC line: 1500 VAC for 1 min. (3 mA or less) Between case and 12 VDC line: 500 VAC for 1 min. (3 mA or less)	
Power consumption	100 VA or less	
Insulation resistance	Between case and AC line: 500 VDC, 50 MΩ or more	
Weight	690 g	

∗ Refer to operation manual of CEU2 regarding detailed positioning system.

Dimensions



As for 3 point preset counter and multi counter, it will be common to CEP1 and CE1 series. For details, refer to 3 point preset counter/CEU1 on page 10-12-30, and Multi counter/CEU5 on page 10-12-27 respectively.

Wiring with External Equipment

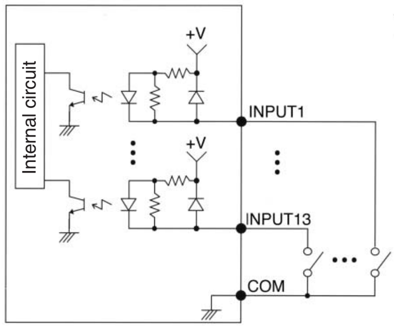
<Wiring with controller CEU2>

1. Wiring of driving power of controller

To operate the controller, use a power supply with the following specifications: 90 to 110 VAC, 50/60 Hz, and 21.6 to 26.4 VDC, 0.4 A or higher.

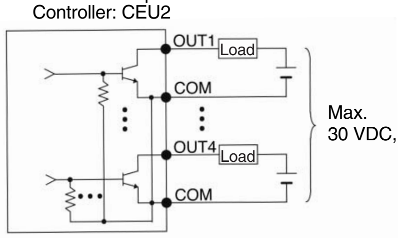
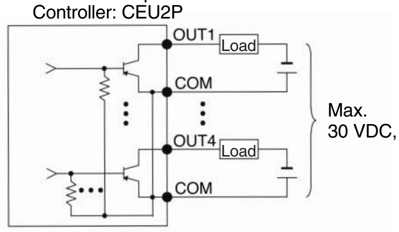
2. Input circuit

The voltage and the amperage capacity of the switch or the PLC to be connected are 24 VDC, 10 mA or higher.



3. Output circuit

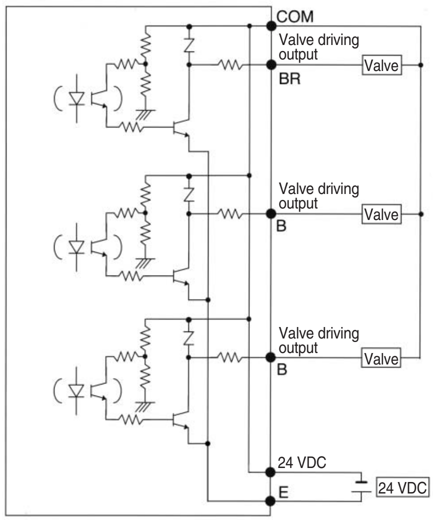
There are two outputs, the NPN open collector and the PNP open collector. The maximum rating is 30 VDC, 50 mA. Operating the controller by exceeding this voltage and amperage could damage the electric circuit. Therefore, the equipment to be connected must be below this rating.

Model	Connection method
CEU2	NPN transistor output Controller: CEU2  Max. 30 VDC, 50 mA
CEU2P	PNP transistor output Controller: CEU2P  Max. 30 VDC, 50 mA

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

4. Valve output circuit

The maximum rating is 24 VDC, 80 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.



Electrical Wiring

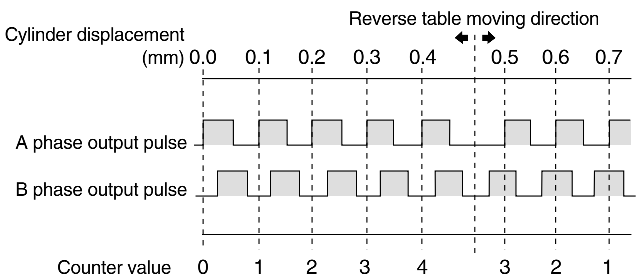
<Output system of positioning detection sensor>

The position detection sensor of the stroke reading cylinder outputs an A/B phase difference (open collector output) as shown in the diagram below.

The relation between the moving distance and the output signal of the stroke reading cylinder with brake is as follows: Every 0.1 mm of movement of the stroke reading cylinder with brake outputs 1 pulse signal to both output terminals A and B.

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

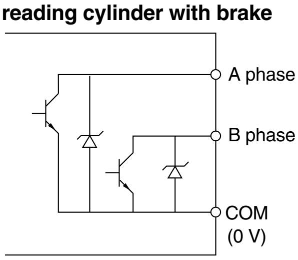
The relationship between the displacement of the stroke reading cylinder with brake and the output pulse



<Input, Output>

The connection of the input/output signals of the position detection sensor of the stroke reading cylinder is effected through the connector that extends from the cylinder. The output circuit and the connection of the connectors are described in the diagram below.

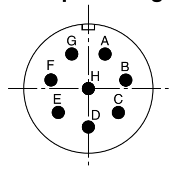
Output circuit of stroke reading cylinder with brake



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 V
F	Black	0 V
G	—	Shield

Connector pin arrangement



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 J G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data