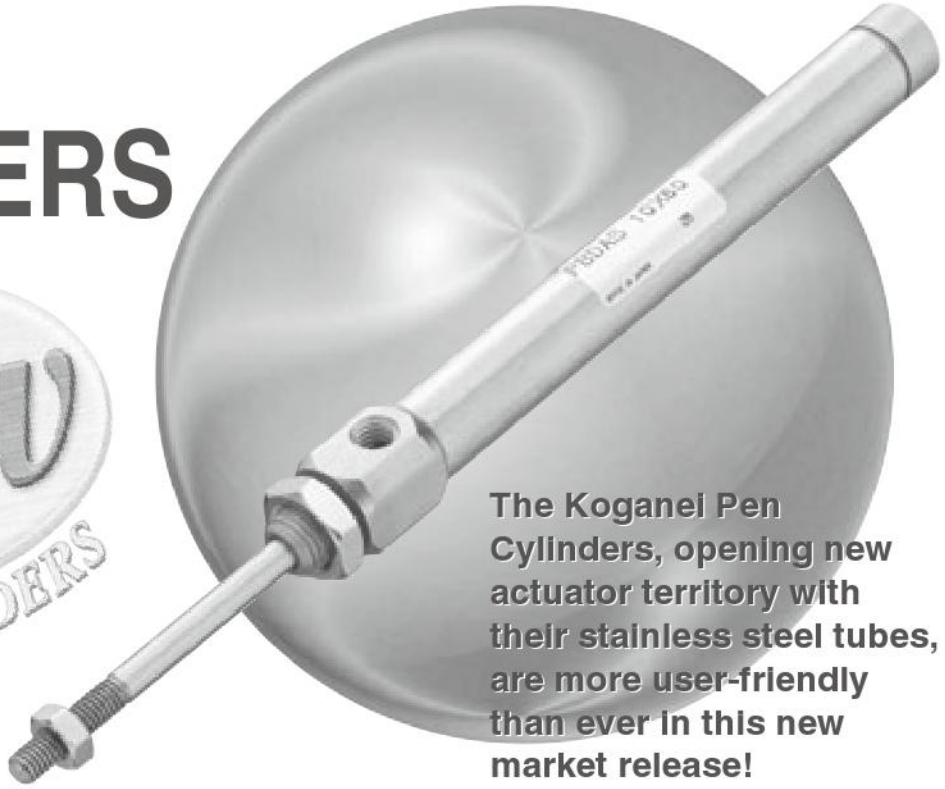
The Pen Cylinder's compactness and easy handling make production lines in a broad range of industries.

A new release with even lighter weight and more

PEN CYLINDERS



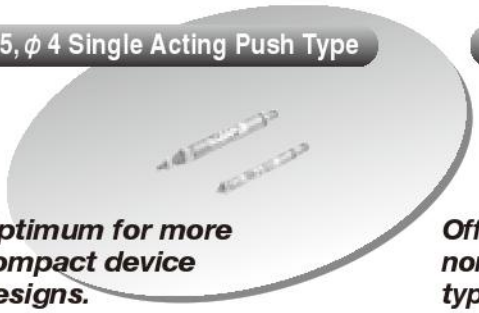
New

PEN CYLINDERS

The Koganei Pen Cylinders, opening new actuator territory with their stainless steel tubes, are more user-friendly than ever in this new market release!

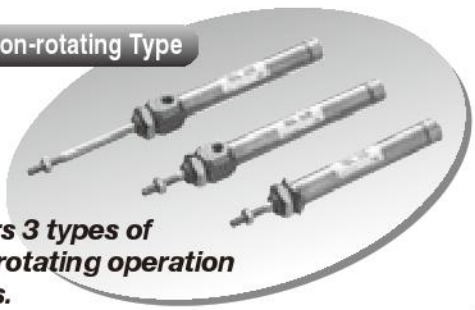
Product series extended even more!

φ 2.5, φ 4 Single Acting Push Type



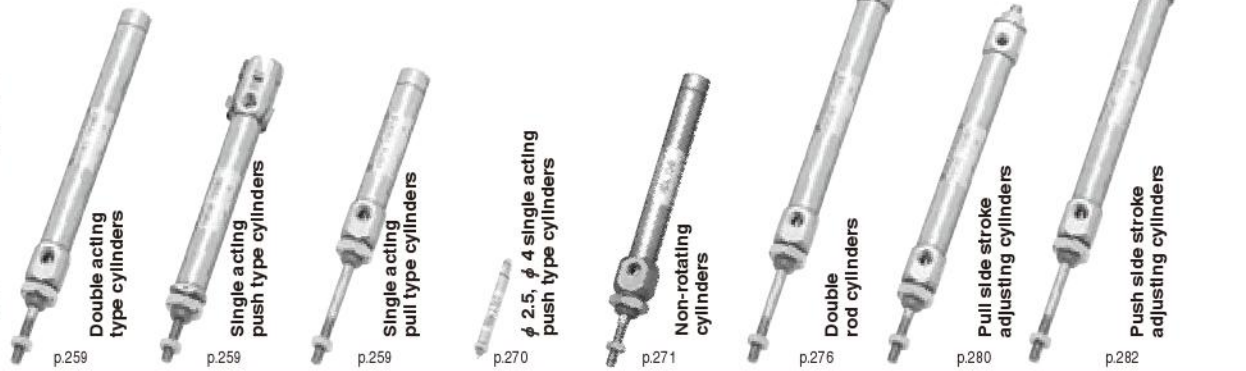
Optimum for more compact device designs.

Non-rotating Type



Offers 3 types of non-rotating operation types.

LINE UP PRODUCTS



Bore size	Double acting type cylinders p.259	Single acting push type cylinders p.259	Single acting pull type cylinders p.259	φ 2.5, φ 4 single acting push type cylinders p.270	Non-rotating cylinders p.271	Double rod cylinders p.276	Pull side stroke adjusting cylinders p.280	Push side stroke adjusting cylinders p.282
2.5mm [0.098in.]				●				
4mm [0.157in.]				●				
6mm [0.236in.]	●	●	●					
10mm [0.394in.]	●	●	●		●	●	●	●
16mm [0.630in.]	●	●	●		●	●	●	●

it useful on

durability in response to needs

A Further 30% Weight Reduction

The brass parts for the both end covers and elsewhere have been changed to an aluminum alloy, achieving a 30% weight reduction from the earlier product.

(Double acting type, ϕ10, 60mm stroke: Previous product weighs 55g [1.94oz.], current Pen Cylinder weighs 33g [1.16oz.])

Mounting is Straight-forward and Easy

The shape of the end covers has been changed from round to square, allowing easy mounting with a wrench.

4mm Square Sensor Switch

Uses a 4mm [0.157in.] square sensor switch, optimum for saving space in the overall device.

Note: Not available with the ϕ2.5, ϕ4 single acting push types.

10% More Compact

Reduced body dimensions achieves space savings overall, and greater compactness in the user's device.

(For double acting type at ϕ10, and with 60mm stroke of cylinder with magnet)

Current Pen Cylinders

Previous Pen Cylinders

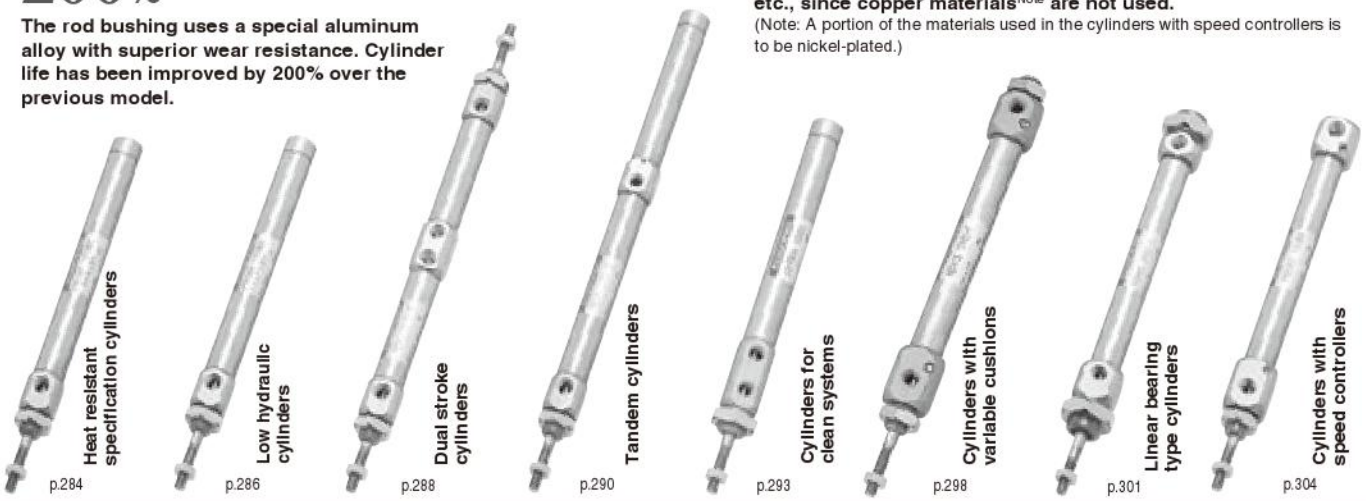
Wear Resistance Up 200%

The rod bushing uses a special aluminum alloy with superior wear resistance. Cylinder life has been improved by 200% over the previous model.

Conforms to Non-ion as Standard

Can be used on cathode-ray tube (CRT) manufacturing lines, etc., since copper materials[Note] are not used.

(Note: A portion of the materials used in the cylinders with speed controllers is to be nickel-plated.)



Heat resistant specification cylinders p.284

Low hydraulic cylinders p.286

Dual stroke cylinders p.288

Tandem cylinders p.290

Cylinders for clean systems p.293

Cylinders with variable cushions p.298

Linear bearing type cylinders p.301

Cylinders with speed controllers p.304

●	●			●			
●	●	●	●	●	○	○	○
●	●	●	●	●	○	○	○

White circle mark shows products on order.

General precautions

Mounting

Tighten the mounting nuts to the recommended tightening torques shown below.

Thread size mm	Recommended tightening torque N·cm [in·lbf]
M6×1	240 [21]
M8×1	600 [53]
M10×1	1200 [106]

Piping to single acting type cylinders

Piping directly to single acting type cylinders for air supply can cause the unit to exceed the speed range, and damage the cylinder. Always use a speed controller with meter-in control to ensure that the speed range can ensure the allowable kinetic energy or less.

Media

1. Always thoroughly blow off (use compressed air) the tubing before piping. Entering chips, sealing tape, rust, etc., generated during piping work could result in air leaks or other defective operation.
2. Use air for the media. For the use of any other media, consult us.
3. Air used for the cylinder should be clean air that contains no deteriorated compressor oil, etc. Install an air filter (filtration of a minimum 40 µm) near the cylinder or valve to remove collected liquid or dust. In addition, drain the air filter periodically.
   Collected liquid or dust entering the cylinder may cause improper operation.

Lubrication

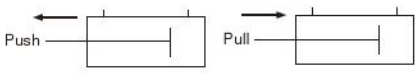
The product can be used without lubrication, if lubrication is required, use Turbine Oil Class 1 (ISO VG32) or equivalent.
Avoid using spindle oil or machine oil.

Atmosphere

If using in locations subject to dripping water, dripping oil, etc., or to large amounts of dust, use a cover to protect the unit.

Cylinder Thrust

Select a suitable bore size considering the load and air pressure to obtain the required thrust.
Since the figures in the table are calculated values, select a bore size that results in a load ratio (load ratio = $\frac{\text{Load}}{\text{Calculated value}}$) of 70% or less (50% or less for high speed application).



N [lbf.]

Bore size mm [in.]	Piston rod diameter mm [in.]	Operation type		Pressure area mm² [in²]	Air pressure MPa [psi.] 0.1 [15]	0.2 [29]	0.3 [44]	0.4 [58]	0.5 [73]	0.6 [87]	0.7 [102]
2.5 [0.098]	1 [0.039]	Single acting push type		4.9 [0.0076]	—	—	—	0.8 [0.18]	1.3 [0.29]	1.7 [0.38]	2.2 [0.49]
4 [0.157]	2 [0.079]	Single acting push type		12.6 [0.0195]	—	—	—	2.2 [0.49]	3.5 [0.79]	4.8 [1.08]	6.0 [1.35]
6 [0.236]	3 [0.118]	Single acting push type		28.3 [0.0439]	—	—	5.0 [1.12]	7.8 [1.75]	10.7 [2.41]	13.5 [3.03]	16.3 [3.66]
		Single acting pull type		21.2 [0.0329]	—	—	2.9 [0.65]	5.0 [1.12]	7.1 [1.60]	9.2 [2.07]	11.3 [2.54]
		Double acting type	Push side	28.3 [0.0439]	—	5.7 [1.28]	8.5 [1.91]	11.3 [2.54]	14.2 [3.19]	17.0 [3.82]	19.8 [4.45]
			Pull side	21.2 [0.0329]	—	4.2 [0.94]	6.4 [1.44]	8.5 [1.91]	10.6 [2.38]	12.7 [2.85]	14.8 [3.33]
10 [0.394]	4 [0.157]	Single acting push type		78.5 [0.1217]	—	9.8 [2.20]	17.7 [3.98]	25.5 [5.73]	33.4 [7.51]	41.2 [9.26]	49.1 [11.04]
		Single acting pull type		66 [0.102]	—	7.3 [1.64]	13.9 [3.12]	20.5 [4.61]	27.1 [6.09]	33.7 [7.58]	40.3 [9.06]
		Double acting type	Push side	78.5 [0.1217]	7.9 [1.78]	15.7 [3.53]	23.6 [5.31]	31.4 [7.06]	39.3 [8.83]	47.1 [10.59]	55.0 [12.36]
			Pull side	66 [0.102]	6.6 [1.48]	13.2 [2.97]	19.8 [4.45]	26.4 [5.93]	33.0 [7.42]	39.6 [8.90]	46.2 [10.39]
16 [0.630]	5 [0.197]	Single acting push type		201 [0.312]	—	30.4 [6.83]	50.5 [11.35]	70.6 [15.87]	90.7 [20.39]	110.8 [24.91]	130.9 [29.43]
		Single acting pull type		181 [0.281]	—	26.4 [5.93]	44.5 [10.00]	62.6 [14.07]	80.7 [18.14]	98.8 [22.21]	116.9 [26.28]
		Double acting type	Push side	201 [0.312]	20.1 [4.52]	40.2 [9.03]	60.3 [13.56]	80.4 [18.07]	100.5 [22.59]	120.6 [27.11]	140.7 [31.63]
			Pull side	181 [0.281]	18.1 [4.07]	36.3 [8.16]	54.3 [12.21]	72.4 [16.28]	90.5 [20.34]	108.6 [24.41]	126.7 [28.48]

Allowable Kinetic Energy

Pen cylinders include a cushioning mechanism.
This mechanism is intended to reduce as much as possible the impact of pistons with high kinetic energy when they stop at the end of the stroke. There are 2 types of cushions, as shown below.

●Rubber bumpers (Standard equipment)

Rubber bumpers installed on both sides of the piston soften the impact at the end of the stroke, and absorb the impact noise during stopping, in response to high-frequency and high-speed operations.
Note that a certain amount of rebound will occur at the end of the stroke on the cylinder with the rubber bumpers.

●Variable cushions

Use variable cushions for large load or high-speed operations that rubber bumpers cannot adequately absorb. The impact is absorbed by compressing air, when the piston stops at the end of the stroke.
Since the cushioning stroke is included within the cylinder stroke, be careful to ensure that the cushioning is not performed excessively during cylinder applications of 25mm strokes or less. An excessive cushioning can result in too much time for each stroke, reducing efficiency. When operated at or below the absorbable kinetic energy shown in the table below, the cushion seal life is 1 million operations or more.

The kinetic energy of load can be obtained through the formulas shown below.

$Ex = \frac{m}{2} v^2$
Ex: Kinetic energy (J)
m : Load mass (kg)
v : Piston speed (m/s)

$E'x = \frac{W}{2g} v'^2$
E'x: Kinetic energy [ft·lbf]
W: Load [lbf.]
v': Piston speed [ft./sec.]
g : Acceleration of gravity 32.2 [ft./sec²]

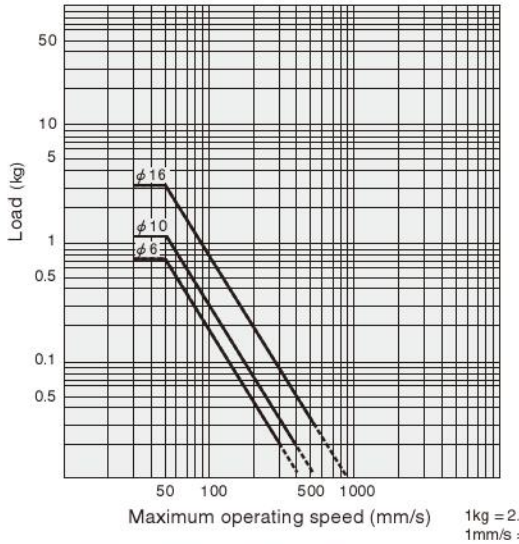
Operating speed range

●Rubber bumper ·····50～750mm/s [2.0～29.5in./sec.]
●Variable cushion ·····100～1000mm/s [3.9～39.4in./sec.]

J [ft·lbf]

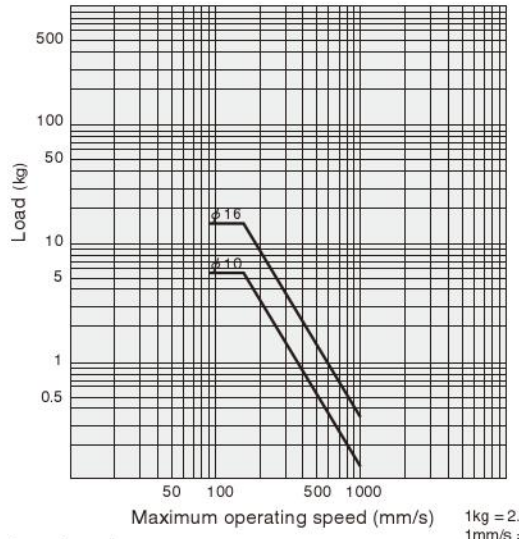
Bore size mm [in.]	Allowable kinetic energy	
	With rubber bumpers	With variable cushion
6 [0.236]	0.009 [0.0066]	—
10 [0.394]	0.015 [0.011]	0.07 [0.052]
16 [0.630]	0.04 [0.030]	0.18 [0.133]

Rubber bumper (Graph 1)



1kg = 2.205 lb.
1mm/s = 0.0394 in./sec.

Variable cushion (Graph 2)



1kg = 2.205 lb.
1mm/s = 0.0394 in./sec.

How to read graphs
From Graph 1, φ16 [0.630in.] with rubber bumpers is selected where the load is 1kg [2.2lb.] and the maximum operating speed is 90mm/s [3.54in./sec.].
From Graph 2, φ16 [0.630in.] with variable cushion is selected where the load is 2kg [4.4lb.] and the maximum operating speed is 400mm/s [15.7in./sec.].

PEN CYLINDERS

ϕ 2.5, ϕ 4 Single Acting Push Type

Symbol

●Single acting push type

Specifications

Item \ Bore size mm [in.]	2.5 [0.098]	4 [0.157]
Operation type	Single acting push type	
Media	Air	
Mounting type	Basic type	
Operating pressure range MPa [psi.]	0.34～0.7 [49～102]	
Proof pressure MPa [psi.]	1.05 [152]	
Operating temperature range °C [°F]	0～60 [32～140]	
Operating speed range mm/s [in./sec.]	50～300 [2.0～11.8] (In applications with high load ratio or high speed, use externally mounted stoppers.)	
Cushion	None	
Lubrication	Not required	
Minimum operating pressure MPa [psi.]	0.34 [49]	
Port size	ϕ4×ϕ2.5 Barb fitting for nylon and urethane tubes is equipped with the head cover.	

Remark: Cylinders with bore size ϕ2.5 are sold in packs of 5.

Order Code

PB SA □

Bore size
×
Stroke

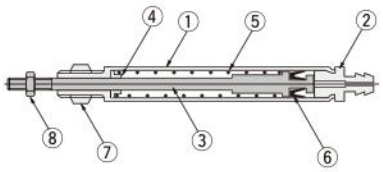
Single acting push type

Pen cylinder series

Inner Construction (cannot be disassembled)

●Single acting push type

ϕ 2.5, ϕ 4



Major Parts and Materials

No.	Parts	Materials
①	Rod cover	Brass (nickel plated)
②	Head cover	Brass (nickel plated)
③	Piston rod	Stainless steel
④	Spring holder	Stainless steel
⑤	Spring	Steel
⑥	Piston seal	Synthetic rubber (NBR)
⑦	Mounting nut	Brass (nickel plated)
⑧	Rod end nut Note	Brass (nickel plated)

Note: For bore size ϕ4 only. Not available for bore size ϕ2.5.

Bore Size and Stroke

mm [in.]

Operation type	Bore size	Standard strokes Note	Maximum available stroke	Stroke tolerance
Single acting push type	2.5	5, 10	10	+1.2 [+0.047] −0.2 [−0.008]
	4	5, 10, 15, 20	20	

Note: Because collars are used for non-standard strokes, use the figures for the length one size up from the non-standard stroke.

Single Acting Type Spring Return Force

N [lbf.]

Bore size mm [in.]	Spring return force				End of stroke
	5St	10St	15St	20St	
2.5 [0.098]	0.6 [0.13]	0.6 [0.13]	—	—	1.2 [0.27]
4 [0.157]	1.5 [0.34]	1.5 [0.34]	1.5 [0.34]	1.5 [0.34]	2.8 [0.63]

Mass

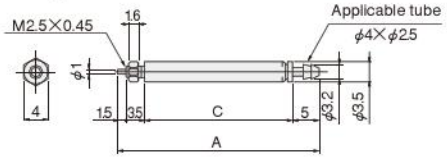
g [oz.]

Bore size mm [in.]	Stroke mm			
	5	10	15	20
2.5 [0.098]	1.5 [0.053]	1.9 [0.067]	—	—
4 [0.157]	3.4 [0.120]	4.4 [0.155]	5.2 [0.183]	6.1 [0.215]

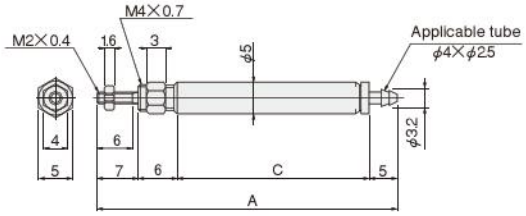
Remark: Includes a mounting nut and rod end nut (ϕ4 only).

Dimensions of Single Acting Push Type (mm)

●Basic type ϕ 2.5 PBSA2.5 × Stroke



●Basic type ϕ 4 PBSA4 × Stroke



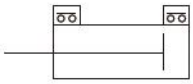
Bore mm [in.] \ Code	A				C			
	5	10	15	20	5	10	15	20
2.5 [0.098]	26.5	35.5	—	—	16.5	25.5	—	—
4 [0.157]	37	46	55	64	19	28	37	46

Note: Because collars are used for non-standard strokes, use the figures for the length one size up from the non-standard stroke.

SENSOR SWITCHES

Solid State Type, Reed Switch Type

Symbol



Order Codes for Sensor Switches

● Sensor switches (with mounting band)

□ – □ – **PBDAS** □

Bore size
6 —— ϕ 6 [0.236in.]
10 —— ϕ 10 [0.394in.]
16 —— ϕ 16 [0.630in.]

Cylinder type
PBDAS

Lead wire length
A — 1000mm [39in.]
B — 3000mm [118in.]

Sensor switch

ZC230 ——	Solid state type with indicator lamp	DC10～28V
ZC253 ——	Solid state type with indicator lamp	DC4.5～28V
ZC201 ——	Reed switch type without indicator lamp	DC5～28V AC85～115V
ZC205 ——	Reed switch type with indicator lamp	DC10～28V

For clean systems
Blank — For standard cylinders
CS —— For clean systems

●For details of sensor switches, see p.1544.

● Mounting band only

□ – **C1** – **PBDAS** □

Bore size
6 —— ϕ 6 [0.236in.]
10 —— ϕ 10 [0.394in.]
16 —— ϕ 16 [0.630in.]

Cylinder type
PBDAS

Mounting bracket type

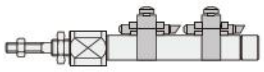
For clean systems
Blank — For standard cylinders
CS —— For clean systems

Minimum Cylinder Strokes When Mounting Sensor Switches

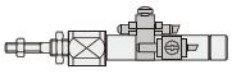
Depending on the sensor switch type and quantity, as well as on the mounting position, the minimum cylinder strokes that allow sensor switch mounting are shown below.

● Two pieces mounting

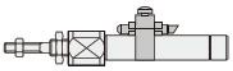
● When mounted in-line



● When mounted in staggered positions



● One piece mounting



mm

Sensor switch model	2 pcs. mounting		1 pc. mounting
	Along a straight line	In staggered positions	
ZC230□, ZC253□	30	5	5
ZC201□, ZC205□		10	

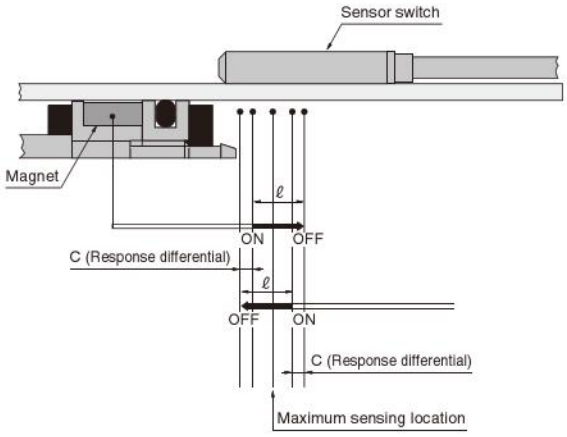
Sensor Switch Operating Range, Response Differential, and Maximum Sensing Location

●Operating range: ℓ

The distance the piston travels in one direction, while the switch is in the ON position.

●Response differential: C

The distance between the point where the piston turns the switch ON and the point where the switch is turned OFF as the piston travels in the opposite direction.



mm [in.]

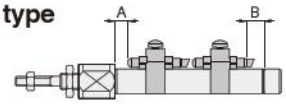
Bore size	ZC230□, ZC253□		ZC201□, ZC205□	
	Operating range	Response differential	Operating range	Response differential
6 [0.236]	1.5~2.5 [0.059~0.098]	0.3 [0.012] or less	4~6 [0.157~0.236]	1.4 [0.055] or less
10 [0.394]	2.0~3.0 [0.079~0.118]	0.3 [0.012] or less	4~6 [0.157~0.236]	1.5 [0.059] or less
16 [0.630]	2.5~3.5 [0.098~0.138]	0.3 [0.012] or less	5~7 [0.197~0.276]	1.8 [0.071] or less

Note: The operating range and response differential are to be used as reference values.

Mounting Location of End of Stroke Detection Sensor Switch

When the sensor switch is mounted in the location shown in the diagram (figures in the table are reference values), the magnet comes to the sensor switch's maximum sensing location at the end of the stroke.

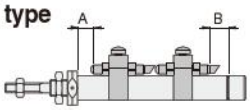
● Double acting type



mm [in.]

Sensor switch model \ Bore size / Code	6 [0.236]	10 [0.394]	16 [0.630]
ZC230□ ZC253□ A	3 [0.118]	3.5 [0.138]	4.5 [0.177]
ZC230□ ZC253□ B	0.5 [0.020]	−4.5 [−0.177]	−3.5 [−0.138]
ZC201□ A	4.5 [0.177]	5 [0.197]	6 [0.236]
ZC201□ B	1 [0.039]	−3 [−0.118]	−2 [−0.079]
ZC205□ A	1 [0.039]	1.5 [0.059]	2.5 [0.098]
ZC205□ B	1.5 [0.059]	−3.5 [−0.138]	−2.5 [−0.098]

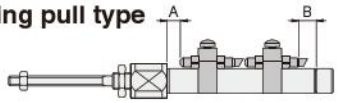
● Single acting push type



mm [in.]

Sensor switch model	Code	Bore size / Stroke	6 [0.236]	10 [0.394]	16 [0.630]
ZC230□ ZC253□	A	0~15	3 [0.118]	8.5 [0.335]	9.5 [0.374]
		16~30	8 [0.315]	13.5 [0.531]	14.5 [0.571]
		31~60	23 [0.906]	23.5 [0.925]	24.5 [0.965]
	B	—	0.5 [0.020]	−4.5 [−0.177]	−3.5 [−0.138]
ZC201□	A	0~15	4.5 [0.177]	10 [0.394]	11 [0.433]
		16~30	9.5 [0.374]	15 [0.591]	16 [0.630]
		31~60	24.5 [0.965]	25 [0.984]	26 [1.024]
	B	—	2 [0.079]	−3 [−0.118]	−2 [−0.079]
ZC205□	A	0~15	1 [0.039]	6.5 [0.256]	7.5 [0.295]
		16~30	6 [0.236]	11.5 [0.453]	12.5 [0.492]
		31~60	21 [0.827]	21.5 [0.846]	22.5 [0.886]
	B	—	1.5 [0.059]	−3.5 [−0.138]	−2.5 [−0.098]

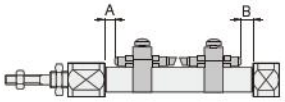
● Single acting pull type



mm [in.]

Sensor switch model	Code	Bore size / Stroke	6 [0.236]	10 [0.394]	16 [0.630]
ZC230□ ZC253□	A	—	3 [0.118]	3.5 [0.138]	4.5 [0.177]
	B	0~15	0.5 [0.020]	0.5 [0.020]	1.5 [0.059]
		16~30	5.5 [0.217]	5.5 [0.217]	6.5 [0.256]
ZC201□	A	—	4.5 [0.177]	5 [0.197]	6 [0.236]
	B	0~15	2 [0.079]	2 [0.079]	3 [0.118]
		16~30	7 [0.276]	7 [0.276]	8 [0.315]
ZC205□	A	—	1 [0.039]	1.5 [0.059]	2.5 [0.098]
	B	0~15	1.5 [0.059]	1.5 [0.059]	2.5 [0.098]
		16~30	6.5 [0.256]	6.5 [0.256]	7.5 [0.295]

● Variable cushion type, linear bearing type, and with speed controller type



(Illustration shows "with speed controller type.")

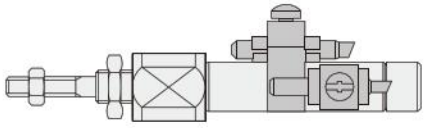
mm [in.]

Sensor switch model	Code	Bore size	10 [0.394] Note	16 [0.630]
ZC230□ ZC253□	A		2 [0.079]	3 [0.118]
	B		5 [0.197]	6 [0.236]
ZC201□	A		3.5 [0.138]	4.5 [0.177]
	B		6.5 [0.256]	7.5 [0.295]
ZC205□	A		0	1 [0.039]
	B		3 [0.118]	4 [0.157]

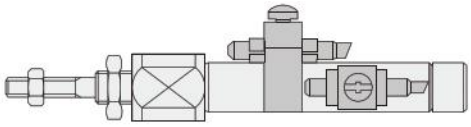
Note: For ϕ10, always mount so that the indicator lamp is on the cover side and the lead wires are on the inner side, as shown in the diagram.

Mounting Sensor Switch by Strokes

● 5mm stroke



● 10mm stroke

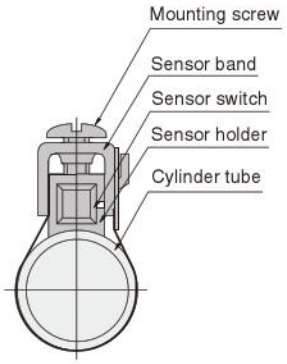


Position of sensor holder, and how to adjust it

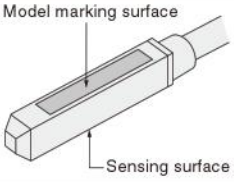
- The sensor holder cannot be installed at the center of the sensor switch when mounting 2 sensor switches on a 5mm stroke cylinder.
- When mounting 2 sensor switches on a 5mm stroke cylinder, loosen the mounting screw and move the sensor switch until the sensor holder is in the position shown in the diagram, and install it in the specified position.
- For 10mm strokes or more, install the sensor holder so that it is approximately in the center of the sensor switch, as shown in the diagram.

Moving Sensor Switch

- Loosening the mounting screw allows the sensor switch to be moved either along the axial or circumference direction of the cylinder.
- When making fine adjustments of the sensor switch along the axial direction, a very slight loosening of the mounting screw (about one-half turn) is enough to allow the sensor switch to be moved.
- Tighten the mounting screw with a tightening torque of 0.3N·m [2.7in·lbf] or less.

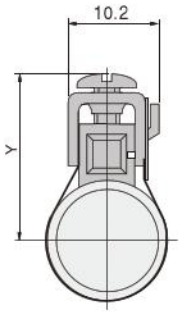


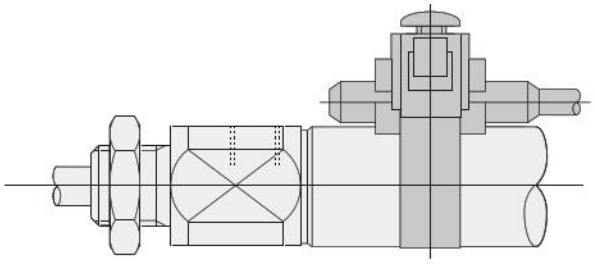
● Caution when installing cylinder with sensor switch



In the ZC type sensor switches, the opposite side from the model marking surface is the sensing surface side. Mount it so that the cylinder magnet comes to the sensing surface side.

Dimensions of Sensor Switch Mounting (mm)

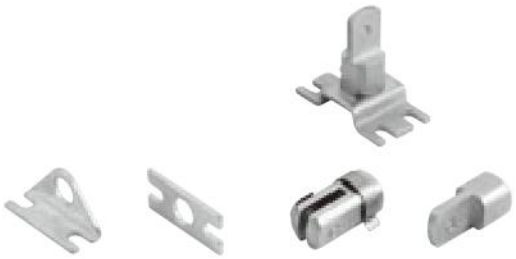




mm [in.]

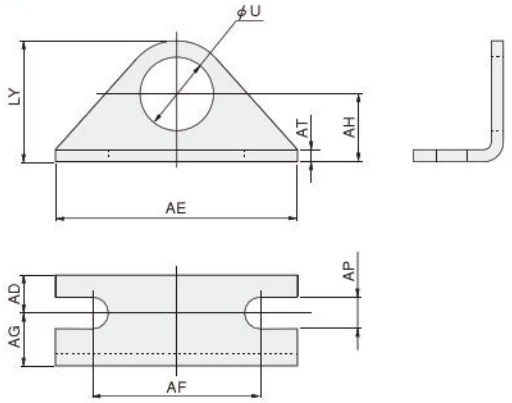
Bore \ Code	Y
6 [0.236]	(16 [0.630])
10 [0.394]	(18 [0.709])
16 [0.630]	(21 [0.827])

MOUNTING BRACKETS, ROD END ACCESSORIES



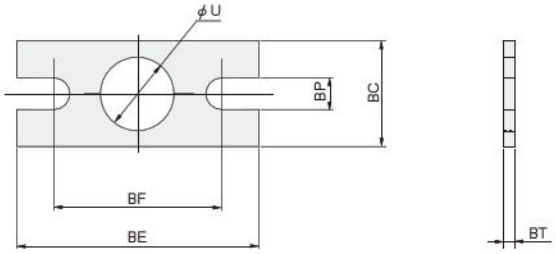
Dimensions of Mounting Bracket (mm)

● Single foot bracket (For the order code, see p. 311.)



Type	Code / Bore mm [in.]	U	AD	AE	AF	AG	AH	AP	AT	LY
Standard	6 [0.236]	6	5	32	22.2	7	9	4.2	1.6	16
	10 [0.394]	8	5	32	22.2	7	9	4.2	1.6	16
	16 [0.630]	10	6	42	29.2	9	14	5.2	2.3	24
Non-rotating	10 [0.394]	10	6	42	29.2	9	14	5.2	2.3	24
	16 [0.630]	12	6	42	29.2	9	14	5.2	2.3	24
Linear bearing	10 [0.394]	12	5	35	25	13	16	4.5	2.3	26
	16 [0.630]	16	6	44	32	13	20	5.5	3.2	33
Clean systems	6 [0.236]	8	5	32	22.2	7	9	4.2	1.6	16
	10 [0.394]	10	6	42	29.2	9	14	5.2	2.3	24
	16 [0.630]	12	6	42	29.2	9	14	5.2	2.3	24

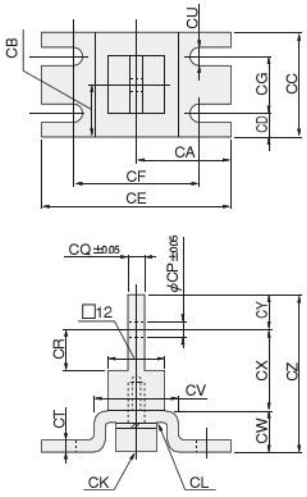
● Flange bracket (For the order code, see p. 311.)



Type	Code / Bore mm [in.]	U	BC	BE	BF	BP	BT
Standard	6 [0.236]	6	14	32	22.2	4.2	1.6
	10 [0.394]	8	14	32	22.2	4.2	1.6
	16 [0.630]	10	20	42	29.2	5.2	2.3
Non-rotating	10 [0.394]	10	20	42	29.2	5.2	2.3
	16 [0.630]	12	20	42	29.2	5.2	2.3
Linear bearing	10 [0.394]	12	20	40	30	4.5	2.3
	16 [0.630]	16	26	52	40	5.5	3.2
Clean systems	6 [0.236]	8	14	32	22.2	4.2	1.6
	10 [0.394]	10	20	42	29.2	5.2	2.3
	16 [0.630]	12	20	42	29.2	5.2	2.3

● Clevis mount supporting bracket

Order code: 7C-PBDA Bore size



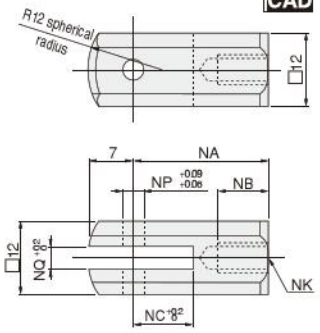
Code / Bore mm [in.]	CA	CB	CC	CD	CE	CF	CG	CK (Hexagon socket head bolt)
10 [0.394]	20	11	22	5	40	30.2	12	M4×0.7×10
16 [0.630]	24	14	28	6	48	35.2	16	M5×0.8×10

Code / Bore mm [in.]	CL (Spring washer)	CP	CQ	CR	CT	CU	CV	CW	CX	CY	CZ
10 [0.394]	Nominal 4	3.3	3.1	9	2	4.2	18	8	21	7	36
16 [0.630]	Nominal 5	5.1	6.4	14	2.3	5.2	20	10	25	7	42

Dimensions of Rod End Accessories (mm)

● Y type knuckle

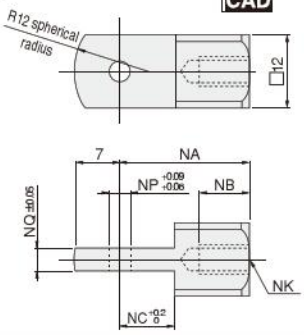
PBDAY



Code / Bore mm [in.]	NA	NB	NC	NK	NP	NQ	Mass g [oz.] (with pin)
10 [0.394]	21	8	10	M4×0.7	3.2	3.2	21 [0.74]
16 [0.630]	21	11	10	M5×0.8	5	6.5	15 [0.53]

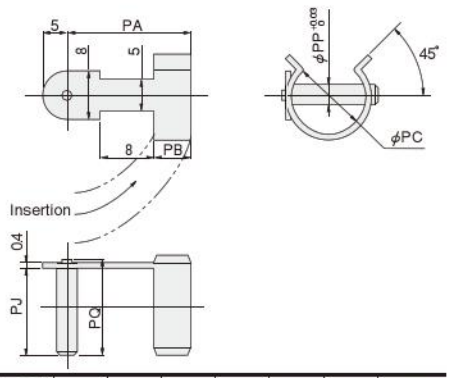
● I type knuckle

PBDAI



Code / Bore mm [in.]	NA	NB	NC	NK	NP	NQ	Mass g [oz.]
10 [0.394]	21	8	9	M4×0.7	3.2	3.1	16 [0.56]
16 [0.630]	25	8	14	M5×0.8	5	6.4	22 [0.78]

Dimensions of Pin Bracket (mm)



Code / Bore mm [in.]	PA	PB	PC	PJ	PP	PQ	Mass g [oz.]
10 [0.394]	17	5	14	13.5	3.2	(15)	2 [0.07]
16 [0.630]	17	5	14	13.5	5	(15)	3 [0.11]
16 [0.630]※	19	6	19	19		(20.5)	

Note: ※ shows for clevis mounting bracket use.

Order Codes for Mounting Brackets and Rod End Accessories

Note: Rod end accessories are not available for clean systems.

(1) Single foot bracket

□ – 1A – □ □

- 1A: Single foot bracket
- Bore size: 6 - φ 6 (PBDA only); 10 - φ 10; 16 - φ 16
- Applicable type: PBDA (Except for linear bearing, non-rotating types); PBDAA (Linear bearing type)Note; PBDAL (Non-rotating type)Note
- For clean systems: Blank — For standard cylinders; CS — For clean systems

Note: Not available for clean systems.

(2) Double foot bracket (2 foot brackets in 1 set)

□ – 1 – □ □

- 1: Double foot bracket
- Bore size: 10 - φ 10; 16 - φ 16
- Applicable type: PBDA (Except for linear bearing, non-rotating types); PBDAA (Linear bearing type)Note; PBDAL (Non-rotating type)Note
- For clean systems: Blank — For standard cylinders; CS — For clean systems

Note: Not available for clean systems.

(3) Flange bracket

□ – 3 – □ □

- 3: Flange bracket
- Bore size: 6 - φ 6 (PBDA only); 10 - φ 10; 16 - φ 16
- Applicable type: PBDA (Except for linear bearing type); PBDAA (Linear bearing type)
- For clean systems: Blank — For standard cylinders; CS — For clean systems

(4) Clevis mount supporting bracket

□ – 7C – PBDA □

- 7C: Clevis mount supporting bracket
- PBDA: Pen cylinder series
- Bore size: 10 - φ 10; 16 - φ 16
- For clean systems: Blank — For standard cylinders; CS — For clean systems

(5) Y type knuckle

Y – PBDA □

- Y: Y type knuckle
- PBDA: Pen cylinder series
- Bore size: 10 - φ 10; 16 - φ 16

(6) I type knuckle

I – PBDA □

- I: I type knuckle
- PBDA: Pen cylinder series
- Bore size: 10 - φ 10; 16 - φ 16

(7) Pin bracket

PK □ – PBDA

- PK: Pin bracket
- Pin bracket type: 3: For φ 10 Y type knuckle, φ 10 clevis mounting bracket; 5: For φ 16 Y type knuckle; 6: For φ 16 clevis mounting bracket
- PBDA: Pen cylinder series