CAD drawing data catalog
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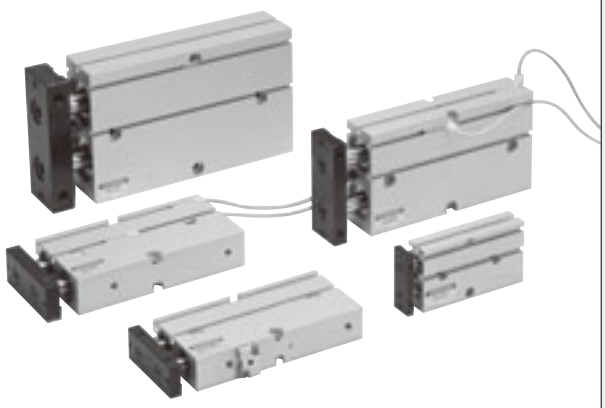
ACTUATORS GENERAL CATALOG

TWIN ROD CYLINDERS ϕ6

CAD drawing data catalog
is available.



NPT Threaded port
TWIN ROD CYLINDERS

⚠ Caution Before use, be sure to read the “Safety Precautions” on p. 57.

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ACTUATORS GENERAL CATALOG

TWIN ROD CYLINDERS ϕ6

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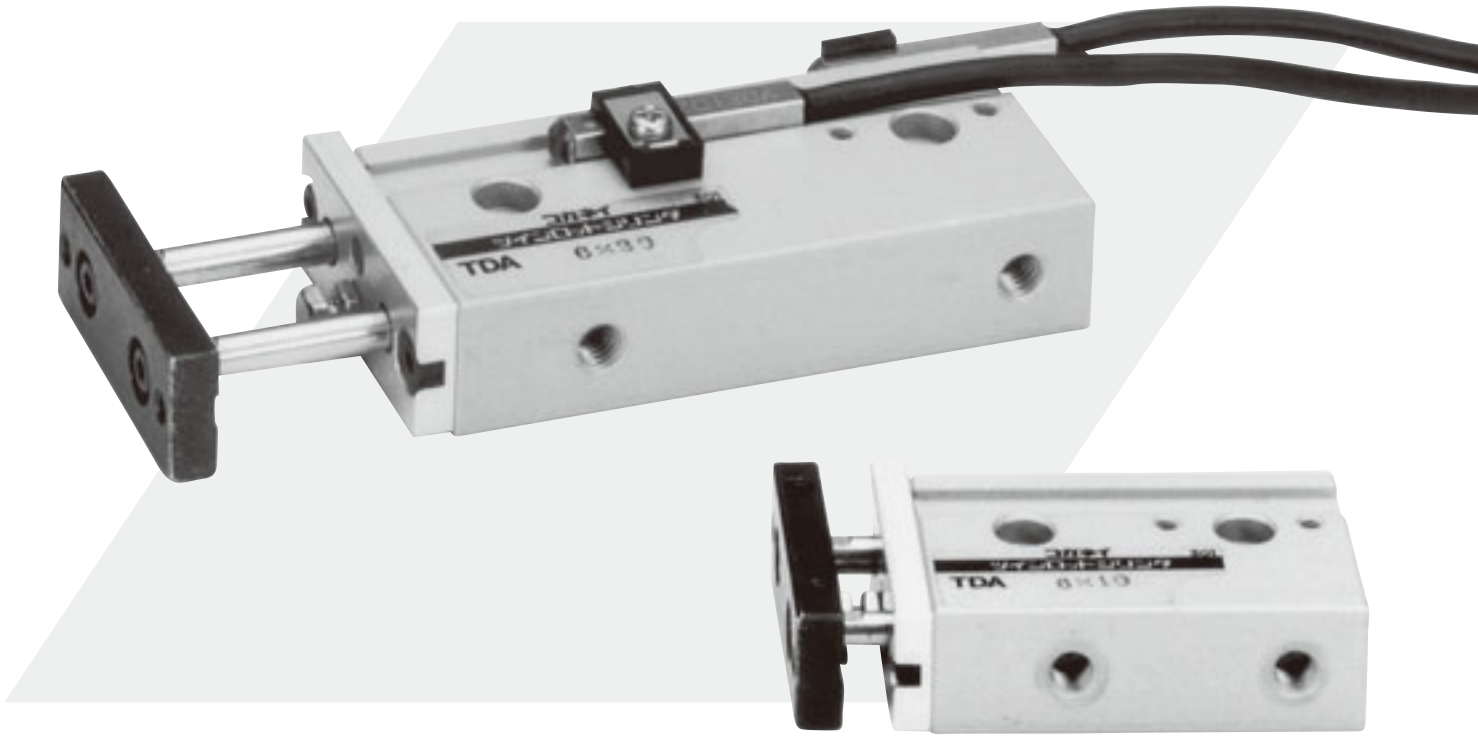
TWIN ROD CYLINDERS ϕ 6

A square style, a compact design that needs no guides, and direct mounting makes the mechanical devices more compact!

Non-rotating accuracy is ±0.45°.

Moreover, cylinder thrust is twice that of conventional cylinders.



Selection Chart

Item / Operation type	Bore size mm	Strokes inch	Sensor switches		Non-ion specification
			Solid state type	Reed switch type	
Double acting type	**6**	1/2, 3/4, 1, 1 1/2, 2	**ZC130** **ZC153**	**CS5T** **CS11T**	None

Cylinder Thrust

Select a suitable cylinder 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.]	Rod size mm [in.]	Operation		Pressure area mm² [in.²]	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]
6 [0.236]	**4 [0.157]**	Double acting type	Push side	56 [0.087]	—	11.2 [2.52]	16.8 [3.78]	22.4 [5.04]	28 [6.29]	33.6 [7.55]	39.2 [8.81]
			Pull side	31 [0.048]	—	6.2 [1.39]	9.3 [2.09]	12.4 [2.79]	15.5 [3.48]	18.6 [4.18]	21.7 [4.88]

Note: Minimum operating pressure is 0.2MPa.

Air Flow Rate and Air Consumption

While the twin rod cylinder's air flow rate and air consumption can be found through the following calculations, the quick reference chart below provides the answers more conveniently.

Air flow rate $Q_1=\frac{\pi D^2}{4}\times L\times\frac{60}{t}\times\frac{P+0.1013}{0.1013}\times10^{-6}\times2$

Air consumption $Q_2=\frac{\pi D^2}{4}\times L\times2\times n\times\frac{P+0.1013}{0.1013}\times10^{-6}\times2$

Q_1: Required air flow rate for cylinder	ℓ/min (ANR)
Q_2: Air consumption of cylinder	ℓ/min (ANR)
D: Cylinder bore diameter	mm
L: Cylinder stroke	mm
t: Time required for cylinder to travel one stroke	s
n: Number of cylinder reciprocations per minute	times/min
P: Air pressure	MPa

Air flow rate $Q_1'=\frac{\pi D'^2}{4}\times L'\times\frac{60}{t}\times\frac{P'+14.696}{14.696}\times\frac{1}{1728}\times2$

Air consumption $Q_2'=\frac{\pi D'^2}{4}\times L'\times2\times n\times\frac{P'+14.696}{14.696}\times\frac{1}{1728}\times2$

Q_1': Required air flow rate for cylinder	ft³/min. (ANR)※
Q_2': Air consumption of cylinder	ft³/min. (ANR)※
D′: Cylinder bore diameter	in.
L′: Cylinder stroke	in.
t: Time required for cylinder to travel one stroke	sec.
n: Number of cylinder reciprocations per minute	times/min.
P′: Air pressure	psi.

※Refer to p.54 for an explanation of ANR.

Air consumption for each 1mm [0.0394in.] stroke

cm³ [in.³]/Reciprocation (ANR)

Bore size mm [in.]	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]
6 [0.236]	(0.22 [0.0134])	0.34 [0.0207]	0.45 [0.0275]	0.56 [0.0342]	0.67 [0.0409]	0.78 [0.0476]	0.89 [0.0543]

The figures in the table show the air flow rate and air consumption when a Twin Rod cylinder makes 1 reciprocation with stroke of 1mm [0.0394in.].

The air flow rate and air consumption actually required is found by the following calculations.

● Finding the air flow rate (for selecting F.R.L., valves, etc.)

Example 1. When operating a Twin Rod cylinder with bore size of 6mm [0.236in.] at speed of 300mm/s [11.8in./sec.], under air pressure of 0.5MPa [73psi.]

$0.67\times\frac{1}{2}\times300\times10^{-3}=0.1$ ℓ/s [0.00353ft³/sec.] (ANR)※

(At this time, the flow rate per minute is $0.67\times\frac{1}{2}\times300\times60\times10^{-3}=6.03$ ℓ/min [0.213ft³/sec.] (ANR))

● Finding the air consumption

Example 1. When operating a Twin Rod cylinder with bore size of 6mm [0.236in.] and stroke of 50mm [1.97in.], under air pressure of 0.5MPa [73psi.], for 1 reciprocation

$0.67\times50\times10^{-3}=0.0335$ ℓ [0.00118ft³]/Reciprocation (ANR)

Example 2. When operating a twin rod cylinder with bore size of 6mm [0.236in.] and stroke of 50mm [1.97in.], under air pressure of 0.5MPa [73psi.], for 10 reciprocations per minute

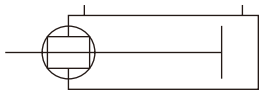
$0.67\times50\times10\times10^{-3}=0.335$ ℓ/min [0.0118ft³/min.] (ANR)

※Refer to p.54 for an explanation of ANR.

TWIN ROD CYLINDERS ϕ 6

ϕ 6 Double Acting Type

Symbol



Specifications

Item \ Bore size mm [in.]	6 [0.236]
Operation type	Double acting type
Media	Air
Mounting type	Side mount
Operating pressure range MPa [psi.]	0.2～0.7 [29～102]
Proof pressure MPa [psi.]	1.03 [149]
Operating temperature range °C [°F]	0～60 [32～140]
Operating speed range mm/s [in./sec.]	100～500 [3.9～19.7]
Cushion	None
Lubrication	Not required
Non-rotating accuracy	±0.45°
Stroke adjusting range mm [in.]	−5～0 [−0.197～0] (To the specification stroke)
Port size	10-32 UNF

Bore Size and Stroke

mm

Bore size	Standard strokes inch	Pull side stroke adjusting range
6	1/2, 3/4, 1, 1 1/2, 2	−5～0

Order Codes

HTDA **6×** □ − □ □ □

Twin rod cylinder double acting type Note

Bore size
6 —— ϕ 6

Stroke

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

Number of sensor switches
1 ——— With 1 sensor switch
2 ——— With 2 sensor switches

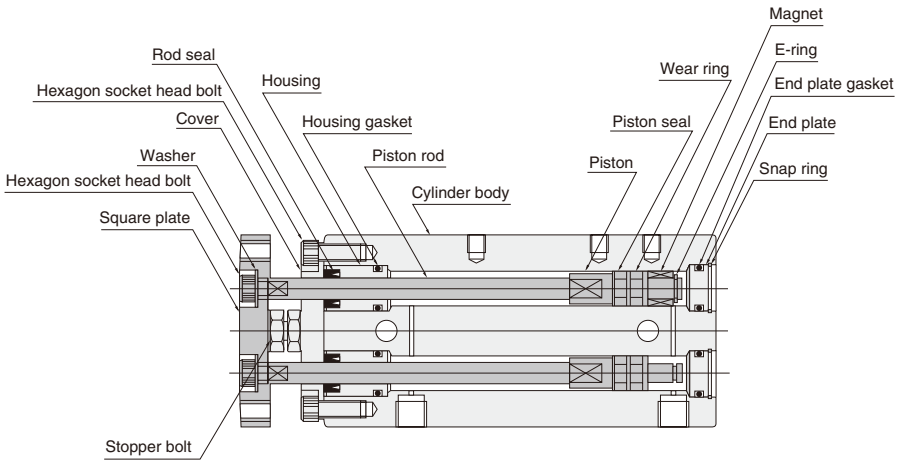
Sensor switch

Blank	No sensor switch		
ZC130	2-lead wire Solid state type	with indicator lamp	DC10～28V
ZC153	3-lead wire Solid state type	with indicator lamp	DC4.5～28V
CS5T	2-lead wire Reed switch type	without indicator lamp	DC5～28V AC85～115V
CS11T	2-lead wire Reed switch type	with indicator lamp	DC10～28V

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

Note: In the standard cylinder, a magnet for sensor switch is built-in.

Inner Construction and Major Parts



Major Parts and Materials

Parts	Materials
Cylinder body	Aluminum alloy (anodized)
Piston	Aluminum alloy (anodized)
Cover	Steel (nickel plated)
Wear ring	Plastic
Piston rod	Stainless steel
Gasket	Synthetic rubber (NBR)
Housing	Aluminum alloy (special wear-resistant treatment)
End plate	Plastic
Seal	Synthetic rubber (NBR)
Snap ring	Steel (nickel plated)
Magnet	Sintered alloy magnet
E-ring	Stainless steel
Washer	Steel (nickel plated)
Square plate	Mild steel (special surface treatment)
Stopper bolt	Mild steel (zinc plated)

Remark: Non-ion specification is not available.

Seals

Parts / Quantity / Bore	Rod seal	Piston seal	End plate gasket	Housing gasket
	2	2	2	2
6	MYR-4	COP-6L	1×6	1×6

Mass

g [oz.]

Bore size mm [in.]		Zero stroke mass Note1	Additional mass	
			Additional mass of each 10mm [0.394in.] stroke	Mass of 1 sensor switch Note2 **CS5T□,CS11T□,ZC130□,ZC153□**
6 [0.236]	Standard specification	55 [1.94]	12 [0.42]	20 [0.71]

Notes: 1. The above table is for the standard strokes.
2. There are 2 types of sensor switch lead wire lengths.
A: 1000mm [39in.], B: 3000mm [118in.]
The sensor switch mass in the table above is for Type A.

Calculation example: The mass for bore size of 6mm and stroke of 2inch with 2 sensor switches (**CS5TA**),

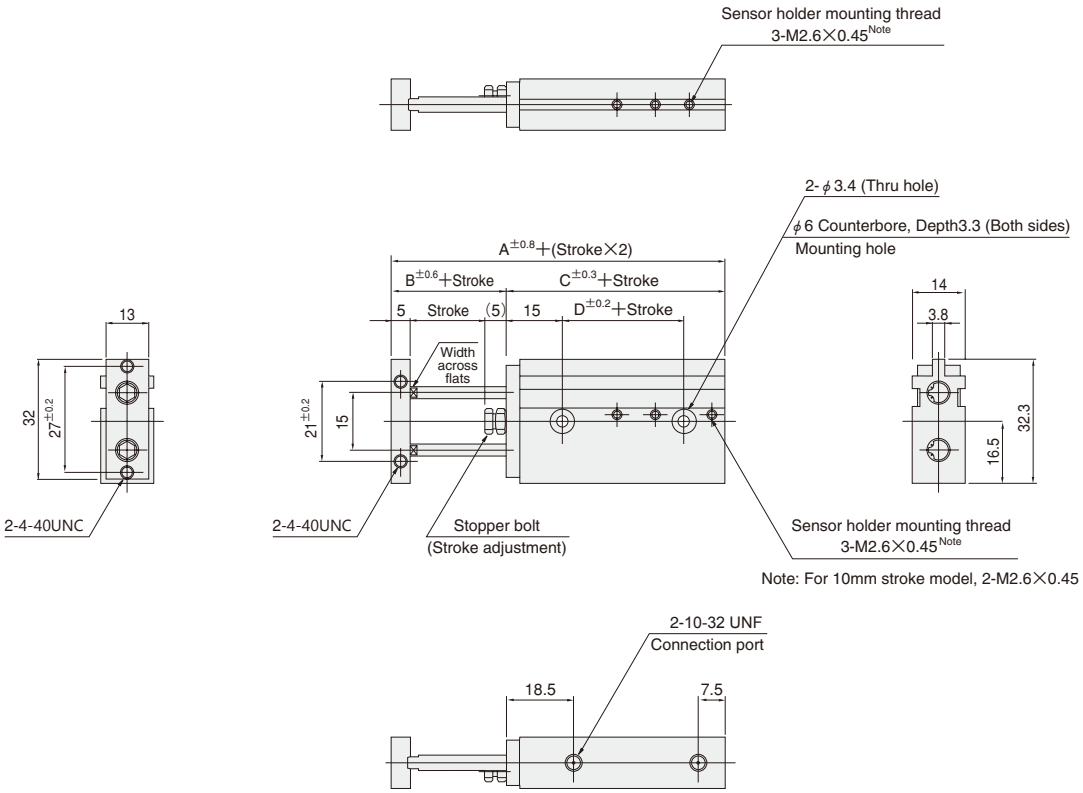
$$55+(12\times5.08)+(20\times2)=156\text{g [5.50oz.]}$$

$$12\times\frac{\text{Stroke}\times25.4}{10}$$

Dimensions of Double Acting Type (mm)

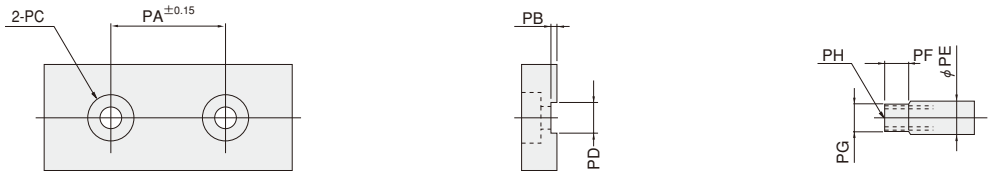
HTDA 6× Stroke

CAD TDA06



Bore mm [in.] \ Code	A	B	C	D
6 [0.236]	49	10	39	13

Dimensions of Rod End Portion (mm)



Bore mm [in.] \ Code	PA	PB	PC	PD	PE	PF	PG	PH
6 [0.236]	15	0.5	φ3 Counterbore φ5 Depth 3.2	$3.5^{+0.15}_{+0.03}$	4	3	$3.5^{0}_{-0.15}$	M2.6×0.45 Depth5

Order Codes

□ — □ **TDA6**

With holder for twin rod cylinder ϕ6 [0.236in.] Note1

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

Sensor switch

ZC130	Solid state type	with indicator lamp	DC10～28V
ZC153	Solid state type	with indicator lamp	DC4.5～28V
CS5T	Reed switch type	without indicator lamp	DC5～28V AC85～115V
CS11T	Reed switch type	with indicator lamp	DC10～28V

●**Order code of sensor holder only**

C1-TDA6 Note2

Notes: 1. Two sensor holders (one for the A, C surface and one for the B surface) come with 1 sensor switch.
2. One set consists of 2 sensor holders (1 each for the A, C surface and for the B surface).

Remark : For the mounting surfaces, see p.751.

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

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

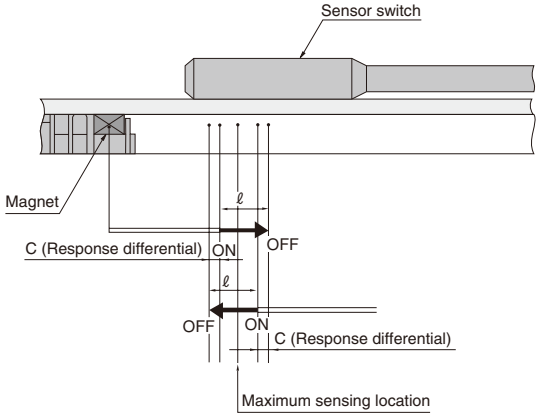
●Operating range: ℓ
The distance the piston travels in one direction, while the switch is in the ON position.

●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.]

CS5T□			CS11T□			ZC130□, ZC153□		
Operating range	Response differential	Maximum sensing location	Operating range	Response differential	Maximum sensing location	Operating range	Response differential	Maximum sensing location
5～7 [0.197～0.276]	1.3 [0.051] or less	7 [0.276]	5～7 [0.197～0.276]	1.3 [0.051] or less	10.5 [0.413]	2～3 [0.079～0.118]	0.3 [0.012] or less	8.5 [0.335]

Note: The maximum sensing location is the length measured from the switch's opposite end side to the lead wire.
Remark: The above table shows reference values.



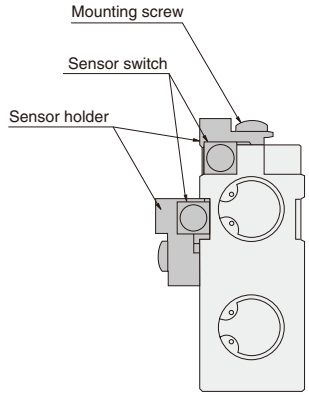
Minimum Cylinder Strokes When Using Sensor Switches

mm

Type of sensor switch	2 pcs. mounting			1 pc. mounting
	1-surface mounting		2-surface mounting	
	One groove on each A surface and B surface	Two grooves on B surface		
CS□T□	40	10	10	10
ZC□□	40	10	10	10

Remark : For the mounting surfaces, see p.751.

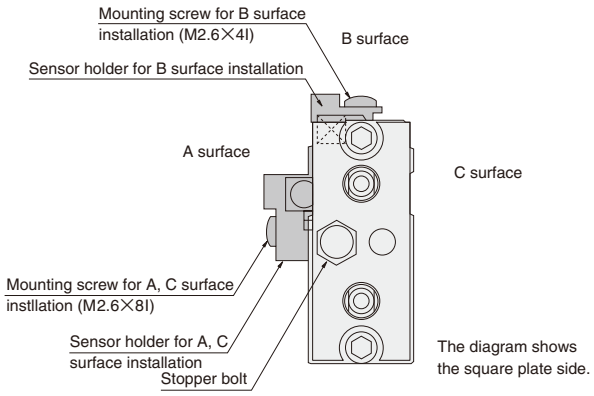
Moving Sensor Switch



The diagram shows a view of the end plate side.

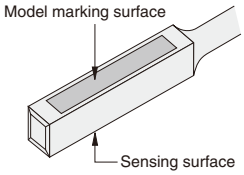
● Loosening mounting screw allows the sensor switch to be moved freely in the cylinder's axial direction.
● Tighten the mounting screw with a tightening torque of 0.3N·m [2.7in·lbf] or less.

Sensor Switch Mounting Surface



- Mounting on either 1 or 2 surfaces of the A, B, or C surfaces allows detection of the rod side and head side stroke end.
- Since 2 sensor holders and 2 mounting screws (one for the A, C surface and one for the B surface) are provided for each sensor switch, use in accordance with the required mounting surface.

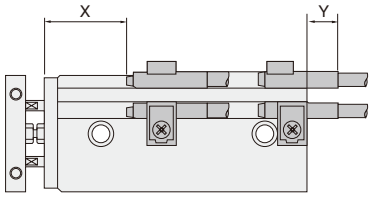
●Caution at mounting



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.

Mounting Location of End of Stroke Detection Sensor Switch

- When the sensor switch is mounted in the locations shown below (the figures in the tables are reference values), the magnet comes to the maximum sensing location of the sensor switch at the end of the stroke.

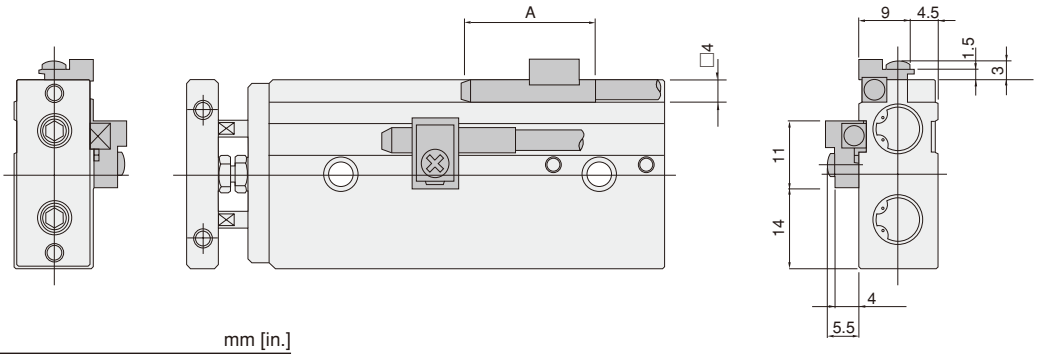


mm [in.]

Mounting location	Sensor switch type		
	CS5T□	**CS11T□**	**ZC130□, ZC153□**
X	23 [0.906]	19.5 [0.768]	22 [0.866]
Y	6 [0.236]	6.5 [0.256]	8 [0.315]

Remark: Mount the sensor switch so that the surface showing the model faces up.

Dimensions of Sensor Switch



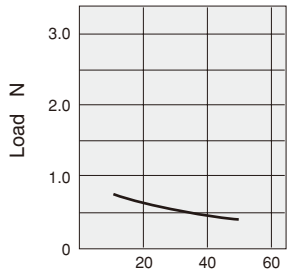
mm [in.]

Code \ Sensor switch	**CS5T□**	**CS11T□**	**ZC130□**	**ZC153□**
A	22 [0.866]	26 [1.024]	25 [0.984]	

Mounting and adjustment

Allowable lateral load

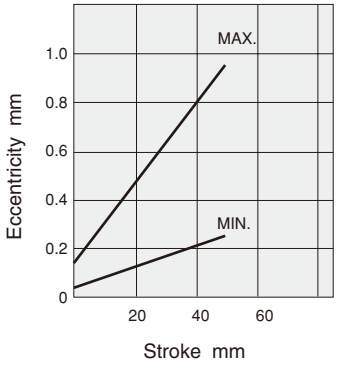
The lateral (side) load on the rod bearing should be at or below the graph values shown below.



1mm = 0.0394in.
1N = 0.2248lbf.

Plate eccentricity

For the eccentricity of the plate without load, use the graph values shown below as guides.



1mm = 0.0394in.

Mounting

1. While any mounting direction is allowed, the mounting surface should always be flat. Twisting or bending during mounting may disturb the accuracy and may also result in air leaks or improper operation.
2. Care should be taken that scratches or dents on the cylinder's mounting surface may damage its flatness.
3. The hexagon socket head bolt on the rod end square plate has been mounted with a conical washer. Always confirm that the rod end square plate and hexagon socket head bolts are secured before using the cylinder.

Stroke adjustment

On the Twin Rod cylinder, stroke adjusting is easy within a range of –5～0mm [–0.197～0 in.]. Turn the stopper to the left (counter-clockwise) to shorten the stroke.
Use a lock nut to tighten and secure the stopper in place after adjustment. Do not tighten the bolt to the right (clockwise) beyond the standard position. The stroke at shipping is set to the standard stroke. Do not adjust it to larger than the standard stroke.

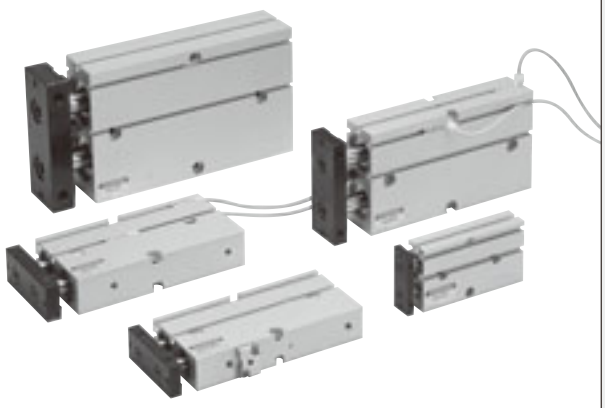
Cylinder speed

Use the cylinder at or below a speed of 500mm/s [19.7in./sec.] (use a speed controller for adjustment). For high speeds (500mm/s [19.7in./sec.]), install an external stopper, etc., to prevent direct shocks to the cylinder. Consult us if the situation will not permit installation of an external stopper, etc.

Sensor switch

1. In the standard cylinder, the magnet for sensor switch is built-in. Mounting a sensor switch will enable use in sensor switch applications
2. When placing cylinders with 2 or more sensors in close for installation, the proximity of the magnetic fields may interfere with each other resulting in erratic operation.
   For this type of mounting configuration, consult us.

CAD drawing data catalog is available.



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NPT Threaded port
TWIN ROD CYLINDERS

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KOGANEI

TWIN ROD CYLINDERS

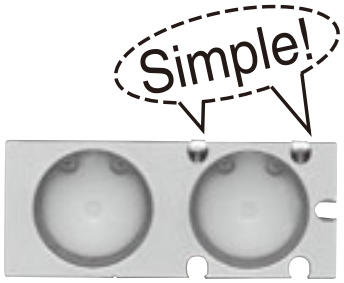
B SERIES

SQUARE

A slender, square form offering direct mounting, a compact design that eliminates the need for guides, and a sensor switch magnet as standard!

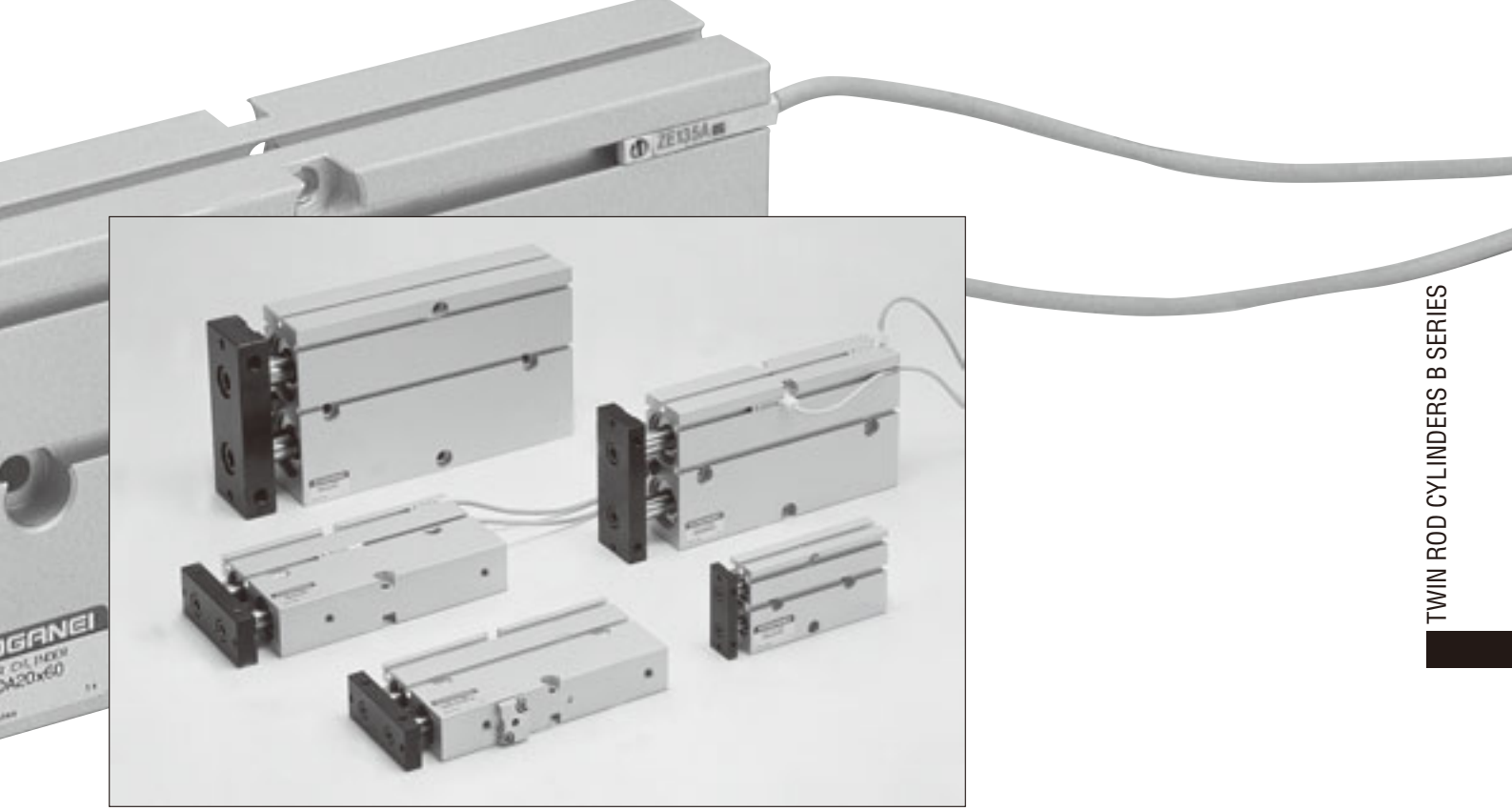
FLAT

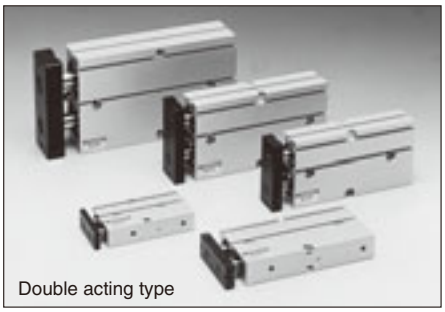
This horizontal lead wire type compact sensor switch does not protrude from the body, promoting further space-saving of the mechanical device. In addition, 5 mounting locations on 3 different surfaces facilitate detection of various applications.

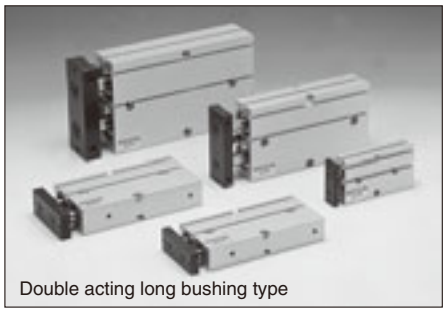


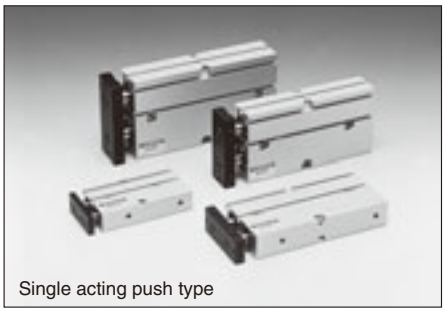
POWERFUL

Excellent non-rotating accuracy, while a double piston structure doubles the cylinder's thrust.
In addition, the Twin Rod cylinder B series helps save space and man-hours, plus it lowers costs.




Double acting type


Double acting long bushing type


Single acting push type

Selection chart

	Cylinder bore size mm	Strokes mm	Sensor switch: Solid state type	Sensor switch: Reed switch type
Double acting type	10 16 20 25 32	10 20 30 40 50 60 70 80 90 100 (ϕ10 — ϕ16, ϕ20, ϕ25, ϕ32)	ZE135 ZE235 ZE155 ZE255 ZE175 ZE275	ZE101 ZE102 ZE201 ZE202
Doble acting long bushing type	10 16 20 25 32	10 20 30 40 50 60 70 80 90 100 (ϕ10 — ϕ16, ϕ20, ϕ25, ϕ32)	ZE135 ZE235 ZE155 ZE255 ZE175 ZE275	ZE101 ZE102 ZE201 ZE202
Single acting push type	10 16 20 25	10 20 30 40 50 60 (ϕ10, ϕ16, ϕ20, ϕ25)	ZE135 ZE235 ZE155 ZE255 ZE175 ZE275	ZE101 ZE102 ZE201 ZE202

Cylinder Thrust

Select a suitable cylinder 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.]	Rod dia. mm [in.]	Operation		Pressure area mm^2 [$in.^2$]	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]
10 [0.394]	**6 [0.236]**	Double acting type	Push side	157 [0.243]	——	31.4 [7.06]	47.1 [10.59]	62.8 [14.12]	78.5 [17.65]	94.2 [21.18]	109.9 [24.71]
			Pull side	100 [0.155]	——	20 [4.5]	30 [6.7]	40 [9.0]	50 [11.2]	60 [13.5]	70 [15.7]
		Single Acting Push Type		157 [0.243]	——	——	5.5 [1.24]	21.2 [4.77]	36.9 [8.30]	52.6 [11.82]	68.3 [15.35]
16 [0.630]	**8 [0.315]**	Double acting type	Push side	402 [0.623]	40.2 [9.04]	80.4 [18.07]	120.6 [27.11]	160.8 [36.15]	201 [45.18]	241.2 [54.22]	281.4 [63.26]
			Pull side	301 [0.467]	30.1 [6.77]	60.2 [13.53]	90.3 [20.30]	120.4 [27.07]	150.5 [33.83]	180.6 [40.60]	210.7 [47.37]
		Single Acting Push Type		402 [0.623]	——	39.3 [8.83]	79.5 [17.87]	119.7 [26.91]	159.9 [35.95]	200.1 [44.98]	240.3 [54.02]
20 [0.787]	**10 [0.394]**	Double acting type	Push side	628 [0.973]	62.8 [14.12]	125.6 [28.23]	188.4 [42.35]	251.2 [56.47]	314 [70.59]	376.8 [84.70]	439.6 [98.82]
			Pull side	471 [0.730]	47.1 [10.59]	94.2 [21.18]	141.3 [31.76]	188.4 [42.35]	235.5 [52.94]	282.6 [63.53]	329.7 [74.12]
		Single Acting Push Type		628 [0.973]	——	78.2 [17.58]	141 [31.70]	203.8 [45.81]	266.6 [59.93]	329.4 [74.05]	392.2 [88.17]
25 [0.984]	**12 [0.472]**	Double acting type	Push side	981 [1.521]	98.1 [22.05]	196.2 [44.11]	294.3 [66.16]	392.4 [88.21]	490.5 [110.26]	588.6 [132.32]	686.7 [154.37]
			Pull side	755 [1.170]	75.5 [16.97]	151 [33.94]	226.5 [50.92]	302 [67.89]	377.5 [84.86]	453 [101.83]	528.5 [118.81]
		Single Acting Push Type		981 [1.521]	——	115.8 [26.03]	213.9 [48.08]	312 [70.14]	410.1 [92.19]	508.2 [114.24]	606.3 [136.30]
32 [1.260]	**16 [0.630]**	Double acting type	Push side	1607 [2.491]	160.7 [36.13]	321.4 [72.25]	482.1 [108.38]	642.8 [144.50]	803.5 [180.63]	964.2 [216.75]	1124.9 [252.88]
			Pull side	1205 [1.868]	120.5 [27.09]	241 [54.18]	361.5 [81.27]	482 [108.35]	602.5 [135.44]	723 [162.53]	843.5 [189.62]

Note: The values of the single acting push type show the thrust at the end of the 60mm stroke.

The Spring Return Force (Only for the Single Acting Type)

N [lbf.]

Bore size mm [in.]	Stroke mm	At zero stroke	At the end of stroke
10 [0.394]	10	16.5 [3.71]	20.6 [4.63]
	20	12.4 [2.79]	
	30	8.2 [1.84]	
	40	25.1 [5.64]	41.6 [9.35]
	50	21.0 [4.72]	
	60	16.9 [3.80]	
16 [0.630]	10	15.9 [3.57]	20.4 [4.59]
	20	11.1 [2.50]	
	30	6.3 [1.42]	
	40	22.3 [5.01]	41.1 [9.24]
	50	17.6 [3.96]	
	60	12.8 [2.88]	
20 [0.787]	10	19.6 [4.41]	23.5 [5.28]
	20	15.7 [3.53]	
	30	11.8 [2.65]	
	40	31.7 [7.13]	47.4 [10.66]
	50	27.8 [6.25]	
	60	23.8 [5.35]	
25 [0.984]	10	32.9 [7.40]	39.5 [8.88]
	20	26.2 [5.89]	
	30	19.5 [4.38]	
	40	53.7 [12.07]	80.4 [18.07]
	50	47.1 [10.59]	
	60	40.4 [9.08]	

Notes: 1. The values are for 2 springs.
2. Avoid application that applies a load on the spring return side.

Air Flow Rate and Air Consumption

While the Twin Rod cylinder's air flow rate and air consumption can be found through the following calculations, the quick reference chart to the right provides the answers more conveniently.

Air flow rate $Q_1 = \frac{\pi D^2}{4} \times L \times \frac{60}{t} \times \frac{P+0.101}{0.101} \times 10^{-6} \times 2$

Air consumption $Q_2 = \frac{\pi D^2}{4} \times L \times 2 \times n \times \frac{P+0.101}{0.101} \times 10^{-6} \times 2$

Q_1: Required air flow rate for cylinder	ℓ/min (ANR)
Q_2: Air consumption of cylinder	ℓ/min (ANR)
D: Cylinder bore diameter	mm
L: Cylinder stroke	mm
t: Time required for cylinder to travel 1 stroke	s
n: Number of cylinder reciprocations per minute	times/min
P: Air pressure	MPa

Air flow rate $Q_1' = \frac{\pi D'^2}{4} \times L' \times \frac{60}{t} \times \frac{P'+14.7}{14.7} \times \frac{1}{1728} \times 2$

Air consumption $Q_2' = \frac{\pi D'^2}{4} \times L' \times 2 \times n \times \frac{P'+14.7}{14.7} \times \frac{1}{1728} \times 2$

Q_1': Required air flow rate for cylinder	ft³/min. (ANR)※
Q_2': Air consumption of cylinder	ft³/min. (ANR)※
D′: Cylinder bore diameter	in.
L′: Cylinder stroke	in.
t: Time required for cylinder to travel 1 stroke	sec.
n: Number of cylinder reciprocations per minute	times/min.
P′: Air pressure	psi.

※Refer to p.54 for an explanation of ANR.

Air consumption for each 1mm [0.0394in.] stroke cm³ [in.³]/Reciprocation (ANR)

Bore size mm	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]
10	(0.620 [0.03783])	0.924 [0.05639]	1.228 [0.07494]	1.534 [0.09361]	1.838 [0.11216]	2.146 [0.13096]	2.450 [0.14951]
16	1.584 [0.09666]	2.364 [0.14426]	3.146 [0.19198]	3.926 [0.23958]	4.704 [0.28706]	5.486 [0.33478]	6.266 [0.38238]
20	2.48 [0.1513]	3.72 [0.2270]	4.90 [0.2990]	6.14 [0.3747]	7.36 [0.4491]	8.58 [0.5236]	9.80 [0.5980]
25	3.88 [0.2368]	5.78 [0.3527]	7.66 [0.4674]	9.58 [0.5846]	11.50 [0.7018]	13.42 [0.8189]	15.34 [0.9361]
32	6.36 [0.3881]	9.46 [0.5773]	12.56 [0.7665]	15.70 [0.9581]	18.82 [1.1485]	21.96 [1.3401]	25.10 [1.5317]

The figures in the table show the air flow rate and air consumption when an air cylinder makes 1 reciprocation with stroke of 1mm [0.0394in.].
The air flow rate and air consumption actually required is found by the following calculations.

● Finding the air flow rate (for selecting F.R.L., valves, etc.)

Example 1. When operating a Twin Rod cylinder with bore size of 20mm [0.787in.] at speed of 300mm/s [11.8in./sec.] and under air pressure of 0.5MPa [73psi.]

$7.36 \times \frac{1}{2} \times 300 \times 10^{-3} \fallingdotseq 1.10$ ℓ/s [0.0388ft.³/sec.] (ANR)

(At this time, the flow rate per minute is $7.36 \times \frac{1}{2} \times 300 \times 60 \times 10^{-3} = 66.24$ ℓ/min [2.338ft.³/min.] (ANR))

● Finding the air consumption

Example 1. When operating a Twin Rod cylinder with bore size of 20mm [0.787in.], stroke of 50mm [1.97in.], and under air pressure of 0.5Mpa [73psi.], for 1 reciprocation.

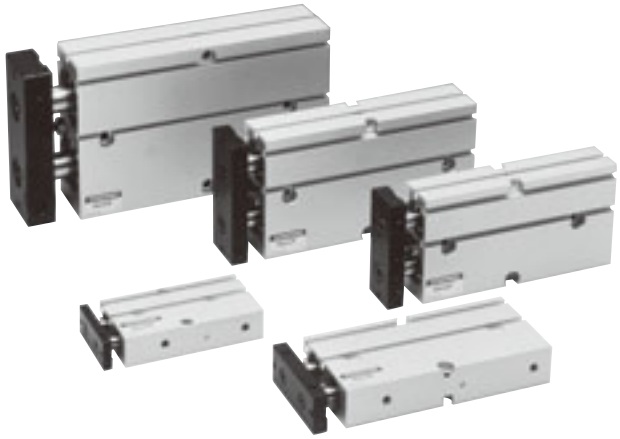
$7.36 \times 50 \times 10^{-3} = 0.368$ ℓ/Reciprocation [0.0130ft.³/Reciprocation] (ANR)

Example 2. When operating a Twin Rod cylinder with a bore size of 20mm [0.787in.], a stroke of 50mm [1.97in.], and under air pressure of 0.5MPa [73psi], for 10 reciprocations per minute.

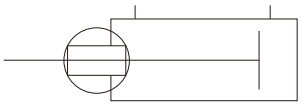
$7.36 \times 50 \times 10 \times 10^{-3} = 3.68$ ℓ/min [0.130ft.³/min.] (ANR)

TWIN ROD CYLINDERS
B SERIES

Double Acting Type



Symbol



Specifications

Item \ Bore size mm [in.]	10 [0.394]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]
Operation type	Double acting type				
Media	Air				
Mounting type	Side mount				
Operating pressure range MPa [psi.]	0.15～0.7 [22～102]	0.1～0.7 [15～102]			
Proof pressure MPa [psi.]	1.05 [152]				
Operating temperature range ℃ [°F]	0～60 [32～140]				
Operating speed range mm/s [in./sec.]	100～500 [3.9～19.7]				
Cushion	Rubber bumper				
Lubrication	Not required (If lubrication is required, use Turbine Oil Class 1 [ISO VG32] or equivalent.)				
Non-rotating accuracy	±0.4°	±0.3°			
Stroke adjusting range mm [in.]	–5～0 [–0.197～0] (To the specification stroke)				
Port size	10-32 UNF				NPT1/8

Bore Size and Stroke

Inch

Bore size	Standard strokes	Pull side stroke adjusting range
10	1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3	−0.2～0
16	1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4	
20	1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4	
25	1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4	
32	1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4	

Note: Consult us for delivery of strokes that exceed the standard strokes.

Order Codes

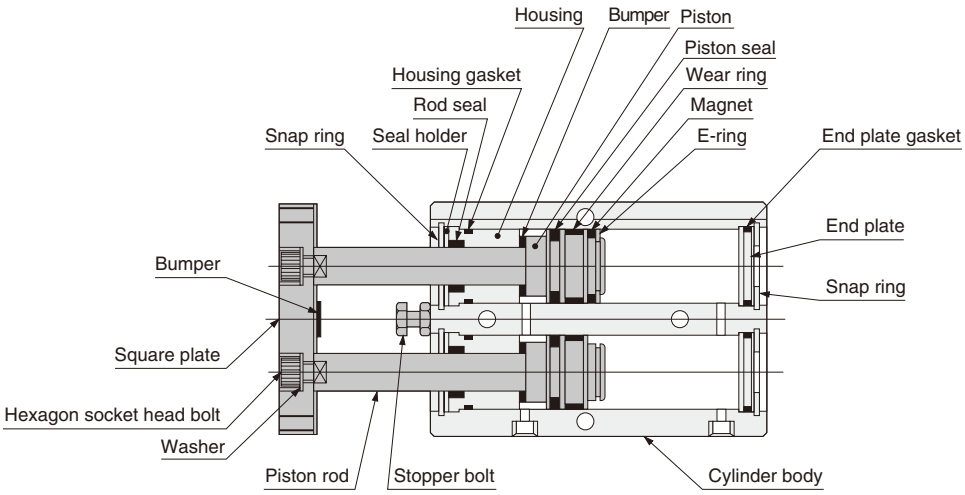
HTBDA **16×1**

Bore size
×
Stroke [Inch]

Twin rod cylinder
B series
double acting type[Note1]

Notes: 1. In the standard cylinder, the magnet for sensor switch is built-in.

Inner Construction and Major Parts



Major Parts and Materials

Parts	Materials
	For standard specification
Cylinder body	Aluminum alloy (anodized)
Piston	Aluminum alloy (chromic acid anodic oxide coating)
Wear ring	Plastic (non-teflon type[Note])
Piston rod	Steel (chrome plated)
Gasket	Synthetic rubber (NBR)
Seal holder	Mild steel (nickel plated)
Housing	Aluminum alloy (special wear-resistant treatment)
End plate	Plastic (aluminum (anodized) for only ϕ 32 [1.260in.])
Seal	Synthetic rubber (NBR)
Snap ring	Steel (nickel plated)
Magnet	Plastic magnet
E-ring	Stainless steel
Washer	Steel (nickel plated)
Square plate	Mild steel (nickel plated)
Bumper	Synthetic rubber (NBR)
Stopper bolt	Mild steel (zinc plated)

Note: For ϕ 25 [0.984in.] and ϕ 32 [1.260in.] non-ion specification.
Remark: The standard specification for ϕ 10 [0.394in.], ϕ 16 [0.630in.], and ϕ 20 [0.787in.] can also be used as non-ion specification.
Non-ion specification of ϕ 25 [0.984in.] and ϕ 32 [1.260in.] are made to order.

Seals

Item / Bore mm \ Quantity	Rod seal	Piston seal	End plate gasket	Housing gasket
	2	2	2	2
10	PIU-6	COP-10L	1.5×9	1.5×9
16	PIU-8	COP-16L	1.5×14.5	1.5×13
20	PIU-10	COP-20	1.5×18	1.5×17
25	PIU-12	COP-25	1.5×23	1.5×22
32	PIU-16	COP-32	2×31.5	2×28.5

Mass

g [oz.]

Bore size mm [in.]		Zero stroke mass [Note1]	Additional mass		
			Additional mass for each 10mm [0.394in.] stroke	Mass of 1 sensor switch [Note2]	
				ZE□□□A	ZE□□□B
10 [0.394]	Standard specification	100 [3.53]	18 [0.63]	15 [0.53]	35 [1.23]
16 [0.630]	Standard specification	204 [7.20]	27 [0.95]		
20 [0.787]	Standard specification	335 [11.82]	36 [1.27]		
25 [0.984]	Standard specification	495 [17.46]	51 [1.80]		
32 [1.260]	Standard specification	1230 [43.39]	93 [3.28]		

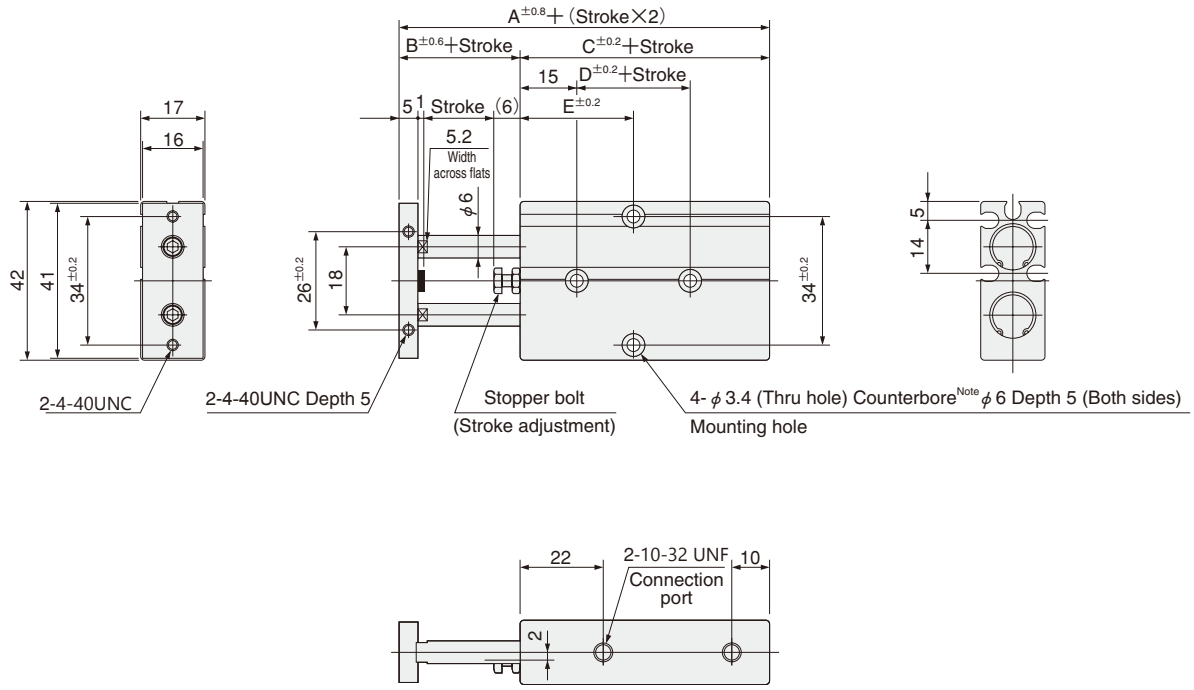
Notes: 1. The above table is for the standard strokes.
2. There are 2 types of sensor switch lead wire lengths.
A : 1000mm [39in.], B : 3000mm [118in.]

Calculation example: The mass for standard cylinder, bore size of 20mm, and stroke of 60mm, with 2 sensor switches (ZE135A),
335+(36×6)+(15×2)=581g [20.49oz.]

$$\text{Stroke} \rightarrow \frac{\text{Stroke}}{10}$$

Dimensions of Double Acting Type (mm)

● ϕ 10



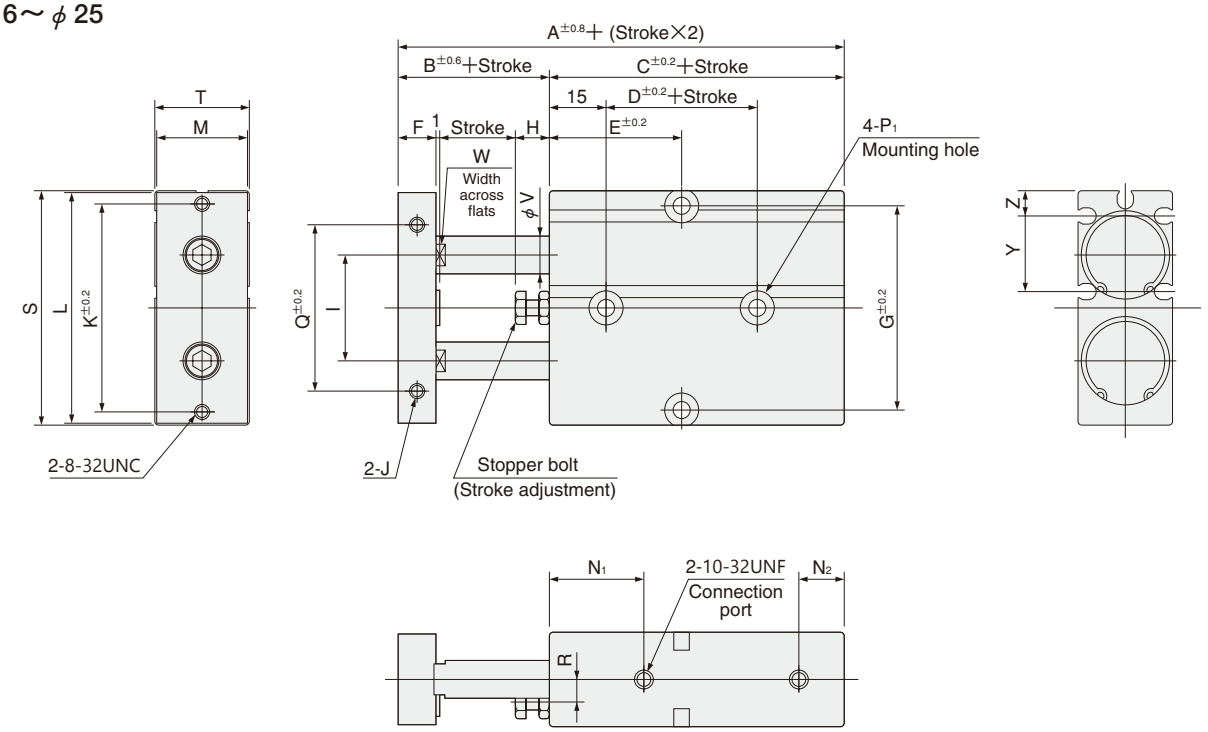
Code / Stroke / Bore mm [in.]	A	B	C	D	E						
					10	20	30	40	50	60	70
10 [0.394]	58	12	46	10	30	30	35	40	45	50	55

Note: The counterbore depth is measured from the upper surface of the body.

Dimensions of Rod End (mm)

Dimensions of Double Acting Type (mm)

● ϕ 16～ ϕ 25

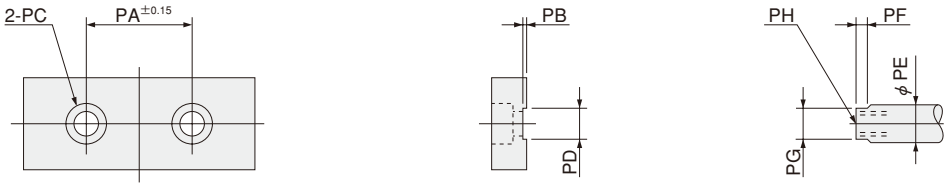


Code / Stroke / Bore mm [in.]	A	B	C	D	E										F	G	H	I	J	K	L	M
					10	20	30	40	50	60	70	80	90	100								
16 [0.630]	68	15	53	20	30	35	40	45	50	55	60	65	70	75	8	47	6	24	8-32UNC Depth 5	47	53	20
20 [0.787]	78	20	58	20	35	35	40	45	50	55	60	65	70	75	10	55	9	28	8-32UNC Depth 5	55	61	24
25 [0.984]	81	19	62	30	40	40	45	50	55	60	65	70	75	80	10	66	8	34	10-32UNF Depth 6	66	72	29

Code / Bore mm [in.]	N_1	N_2	P_1 Note	Q	R	S	T	V	W	Y	Z
16 [0.630]	22	10	ϕ 4.5 (Thru hole) Counterbore ϕ 8 Depth 5.5 (Both sides)	34	4	54	21	8	6.2	18.5	5.7
20 [0.787]	25	12	ϕ 4.5 (Thru hole) Counterbore ϕ 8 Depth 5.5 (Both sides)	44	6	62	25	10	8.2	20	6.8
25 [0.984]	30	12	ϕ 4.5 (Thru hole) Counterbore ϕ 9 Depth 6 (Both sides)	56	7	73	30	12	10.2	22.5	8.3

Note: The counterbore depth is measured from the upper surface of the body.

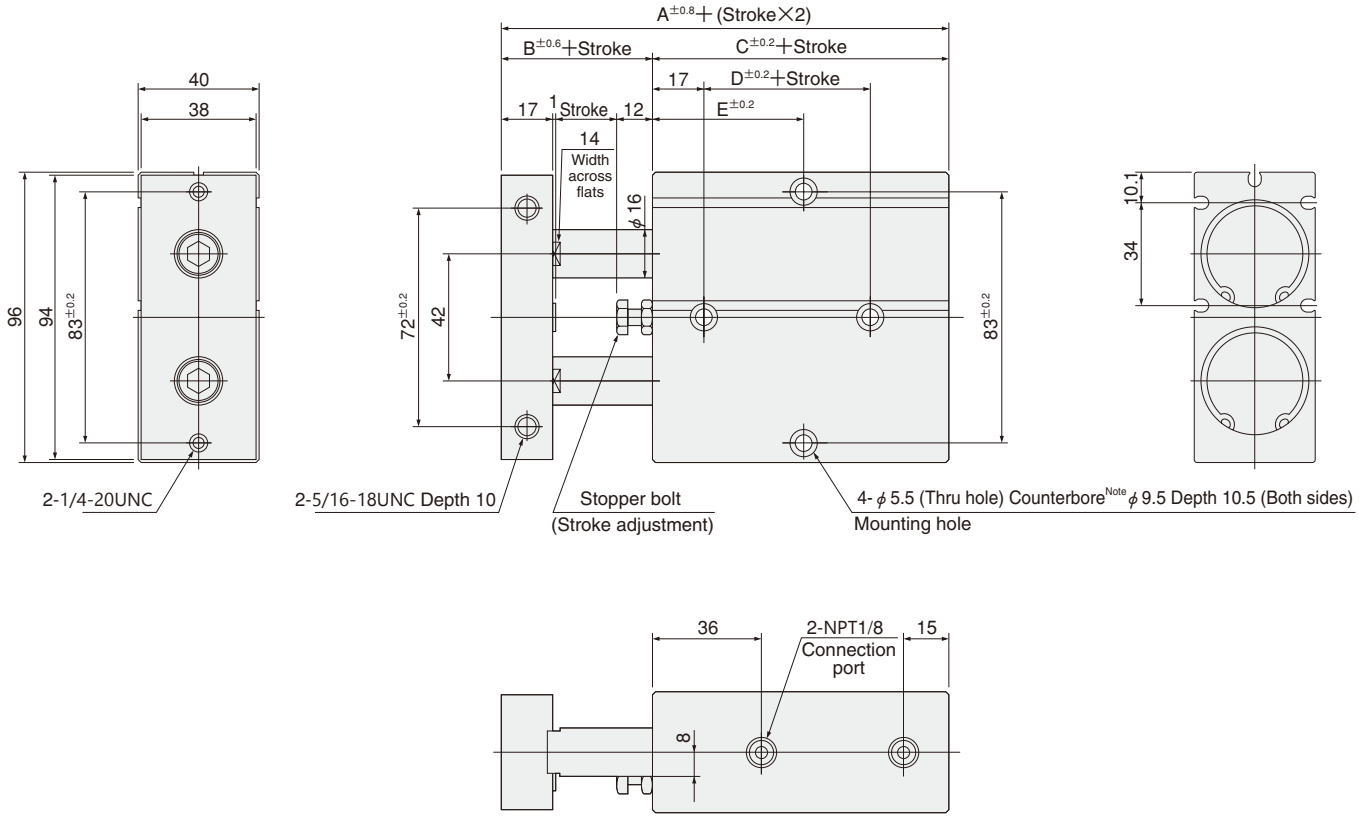
Dimensions of Rod End (mm)



Code / Bore mm [in.]	PA	PB	PC	PD	PE	PF	PG	PH
16 [0.630]	24	1	ϕ 4.3 Counterbore ϕ 7.8 Depth 4.6	6.2 $^{+0.1}_{0}$	8	3	6.2 $^{-0.05}_{-0.15}$	M4 ×0.7 Depth 6
20 [0.787]	28	1	ϕ 6.5 Counterbore ϕ 11 Depth 6.8	8.2 $^{+0.1}_{0}$	10	3	8.2 $^{-0.05}_{-0.15}$	M6 ×1 Depth 8
25 [0.984]	34	1	ϕ 6.5 Counterbore ϕ 11 Depth 6.8	10.2 $^{+0.1}_{0}$	12	3	10.2 $^{-0.05}_{-0.15}$	M6 ×1 Depth 8

Dimensions of Double Acting Type (mm)

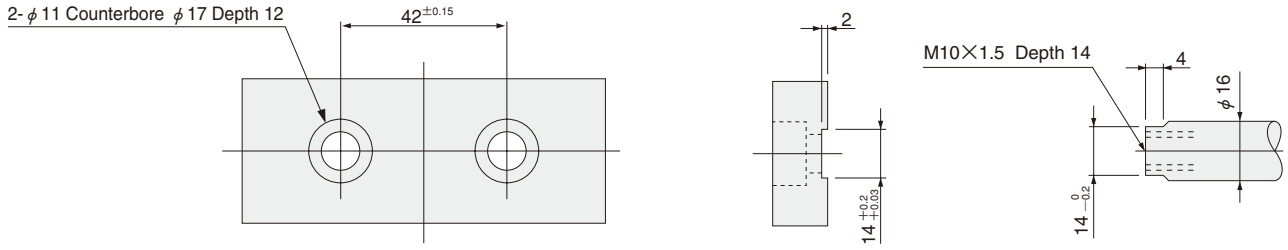
● ϕ 32



Code / Stroke / Bore mm [in.]	A	B	C	D	E									
					10	20	30	40	50	60	70	80	90	100
32 [1.260]	108	30	78	35	45	50	55	60	65	70	75	80	85	90

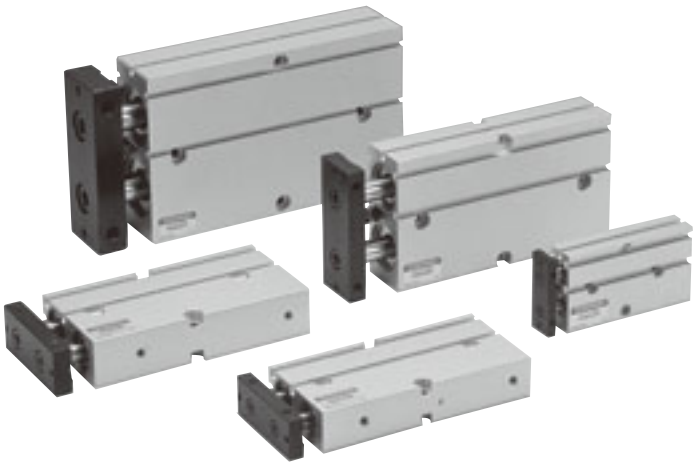
Note: The counterbore depth is measured from the upper surface of the body.

Dimensions of Rod End (mm)

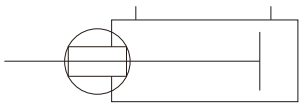


TWIN ROD CYLINDERS B SERIES

Double Acting Long Bushing Type



Symbol



Specifications

Item \ Bore size mm [in.]	10 [0.394]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]
Operation type	Double acting type				
Media	Air				
Mounting type	Side mount				
Operating pressure range MPa [psi.]	0.2～0.7 [29～102]	0.15～0.7 [22～102]			
Proof pressure MPa [psi.]	1.05 [152]				
Operating temperature range °C [°F]	0～60 [32～140]				
Operating speed range mm/s [in./sec.]	100～500 [3.9～19.7]				
Cushion	Rubber bumper				
Lubrication	Not required (If lubrication is required, use Turbine Oil Class 1 [ISO VG32] or equivalent.)				
Non-rotating accuracy	±0.4°	±0.3°			
Stroke adjusting range mm [in.]	−5～0 [−0.197～0] (To the specification stroke)				
Port size	10-32UNF				NPT1/8

Bore Size and Stroke

Inch

Bore size	Standard strokes	Pull side stroke adjusting range
10	1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3	−0.2～0
16	1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4	
20	1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4	
25	1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4	
32	1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4	

Note: Consult us for delivery of strokes that exceed the standard strokes.

Order Codes

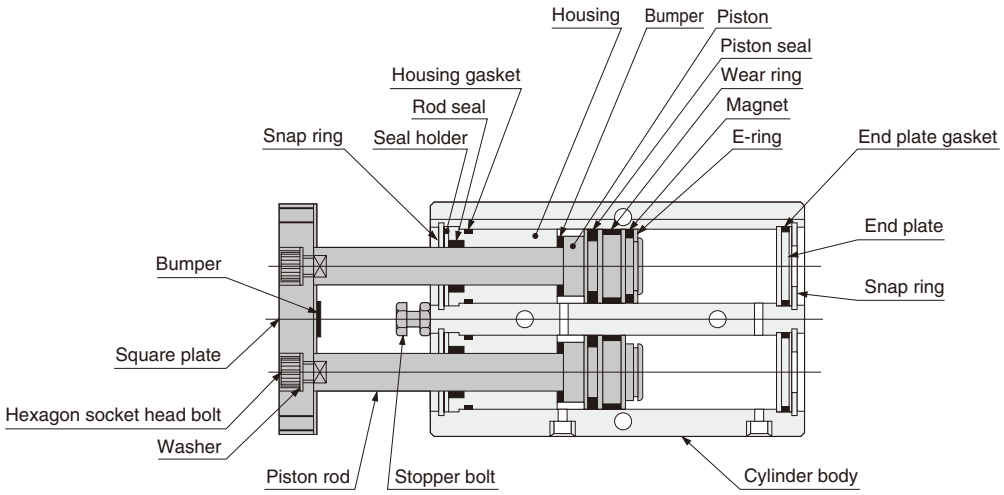
HTBDAM **16×1**

Bore size
×
Stroke[Inch]

Twin rod cylinder
B series
double acting
long bushing type Note

Note: In the double acting long bushing type, the magnet for sensor switch is built-in.

Inner Construction and Major Parts



Major Parts and Materials

Parts	Materials
	For standard specification
Cylinder body	Aluminum alloy (anodized)
Piston	Aluminum alloy (chromic acid anodic oxide coating)
Wear ring	Plastic
Piston rod	Steel (chrome plated)
Gasket	Synthetic rubber (NBR)
Seal holder	Mild steel (nickel plated)
Housing	Aluminum alloy (chromic acid anodic oxide coating)
End plate	Plastic (alumlnum alloy (anodized) for only ϕ 32 [1.260in.])
Seal	Synthetic rubber (NBR)
Snap ring	Steel (nickel plated)
Magnet	Plastic magnet
E-ring	Stainless steel
Washer	Steel (nickel plated)
Square plate	Mild steel (nickel plated)
Bumper Note	Synthetic rubber (NBR)
Stopper bolt	Mild steel (zinc plated)

Note: Not available in a bore size of 10mm [0.394in.].

Seals

Item / Bore mm \ Quantity	Rod seal	Piston seal	End plate gasket	Housing gasket
	2	2	2	2
10	PIU-6	COP-10L	1.5×9	1.5×9
16	PIU-8	PWP-16	1.5×14.5	1.5×13
20	PIU-10	PWP-20	1.5×18	1.5×17
25	PIU-12	PWP-25	1.5×23	1.5×22
32	PIU-16	PWP-32	2×31.5	2×28.5

Mass

g [oz.]

Bore size mm [in.]	Zero stroke mass Note 1	Additional mass		
		Additional mass for each 10mm [0.394in.] stroke	Mass of 1 sensor switch Note2	
			ZE□□□A	**ZE□□□B**
10 [0.394]	119 [4.20]	18 [0.63]	15 [0.53]	35 [1.23]
16 [0.630]	244 [8.61]	27 [0.95]		
20 [0.787]	388 [13.69]	36 [1.27]		
25 [0.984]	568 [20.04]	51 [1.80]		
32 [1.260]	1354 [47.76]	93 [3.28]		

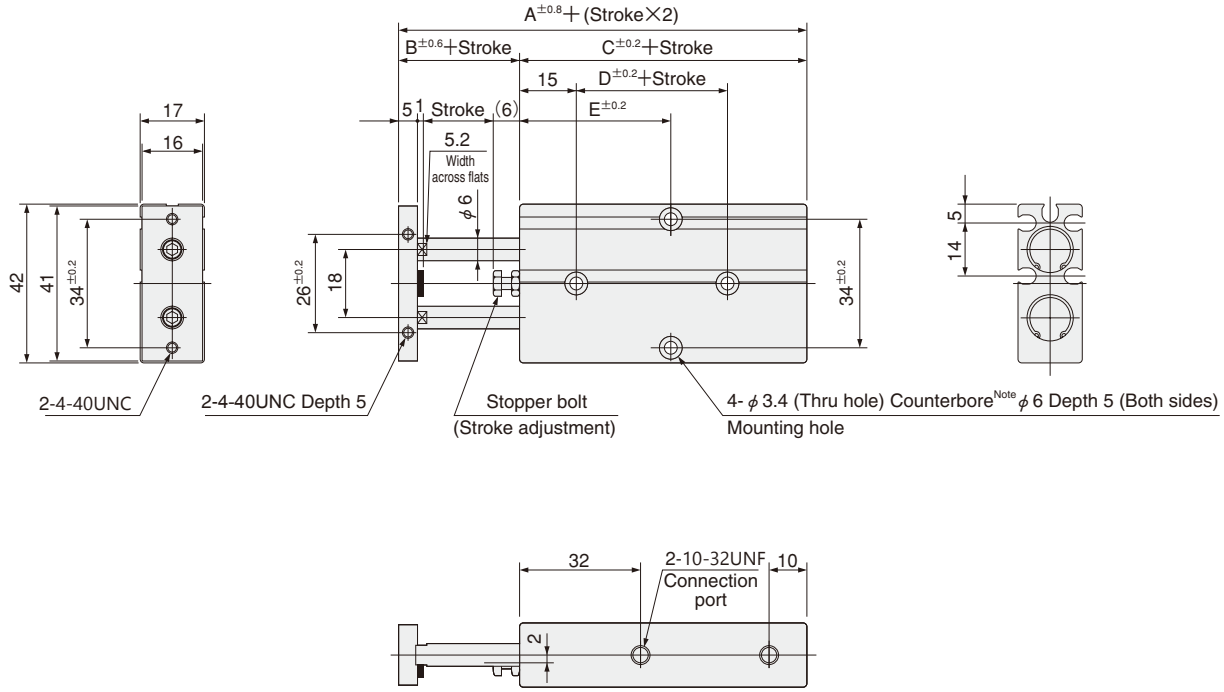
Notes: 1. The above table is for the standard strokes.
2. There are 2 types of sensor switch lead wire lengths.
A : 1000mm [39in.], B : 3000mm [118in.]

Calculation example: The mass of bore size of 20mm, and stroke of 60mm, with 2 sensor switches (ZE135A),
388+(36×6)+(15×2)=634g [22.36oz.]

$\frac{\text{Stroke}}{10}$

Dimensions of Double Acting Long Bushing Type (mm)

● ϕ 10



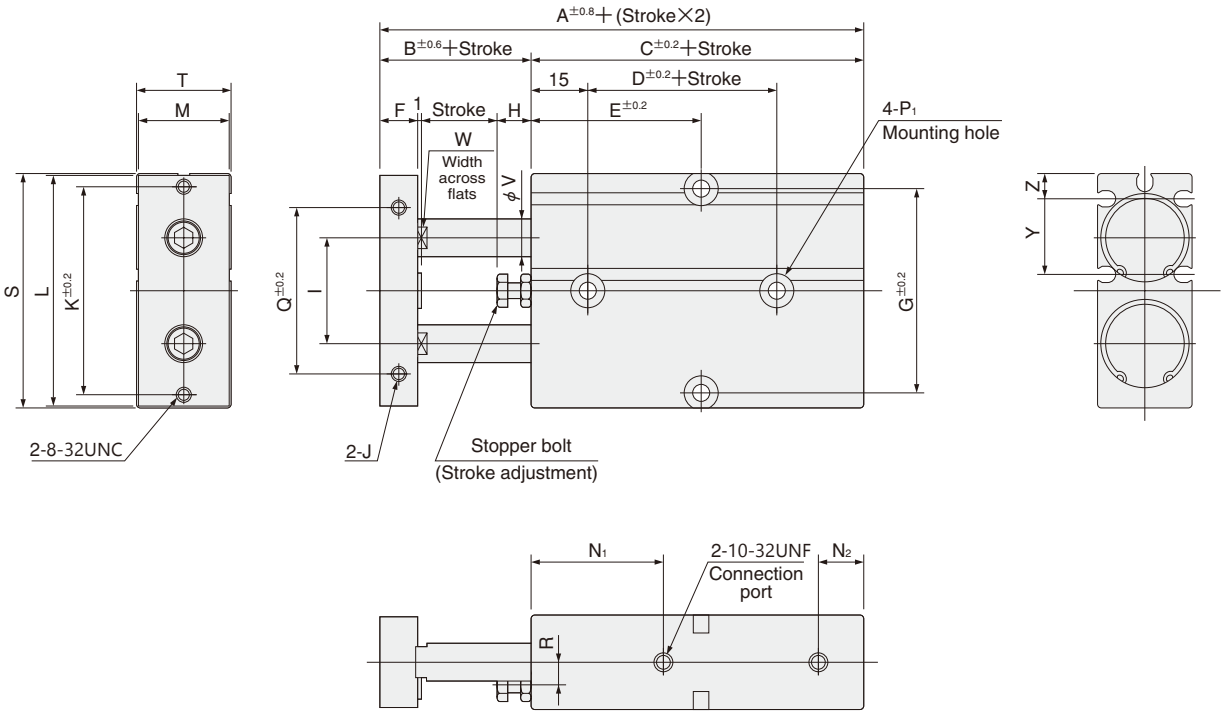
Code / Stroke / Bore mm [in.]	A	B	C	D	E						
					10	20	30	40	50	60	70
10 [0.394]	68	12	56	25	25	40	45	50	55	60	65

Note: The counterbore depth is measured from the upper surface of the body.

Dimensions of Rod End (mm)

Dimensions of Double Acting Long Bushing Type (mm)

● ϕ 16～ϕ 25

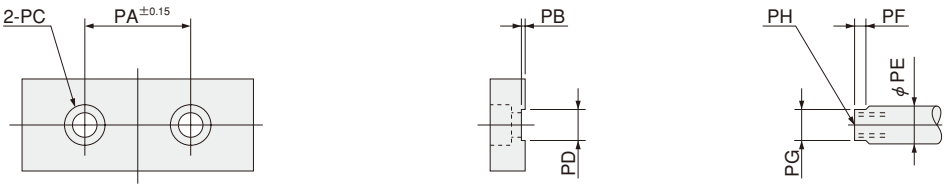


Code / Stroke / Bore mm [in.]	A	B	C	D	E										F	G	H	I	J	K	L	M
					10	20	30	40	50	60	70	80	90	100								
16 [0.630]	78	15	63	30	40	45	50	55	60	65	70	75	80	85	8	47	6	24	8-32UNC Depth 5	47	53	20
20 [0.787]	88	20	68	30	45	45	45	50	55	60	65	70	75	80	10	55	9	28	8-32UNC Depth 5	55	61	24
25 [0.984]	91	19	72	40	50	50	50	55	60	65	70	75	80	85	10	66	8	34	10-32UNF Depth 6	66	72	29

Code / Bore mm [in.]	N_1	N_2	P_1 Note	Q	R	S	T	V	W	Y	Z
16 [0.630]	32	10	ϕ4.5 (Thru hole) Counterbore ϕ8 Depth 5.5 (Both sides)	34	4	54	21	8	6.2	18.5	5.7
20 [0.787]	35	12	ϕ4.5 (Thru hole) Counterbore ϕ8 Depth 5.5 (Both sides)	44	6	62	25	10	8.2	20	6.8
25 [0.984]	40	12	ϕ4.5 (Thru hole) Counterbore ϕ9 Depth 6 (Both sides)	56	7	73	30	12	10.2	22.5	8.3

Note: The counterbore depth is measured from the upper surface of the body.

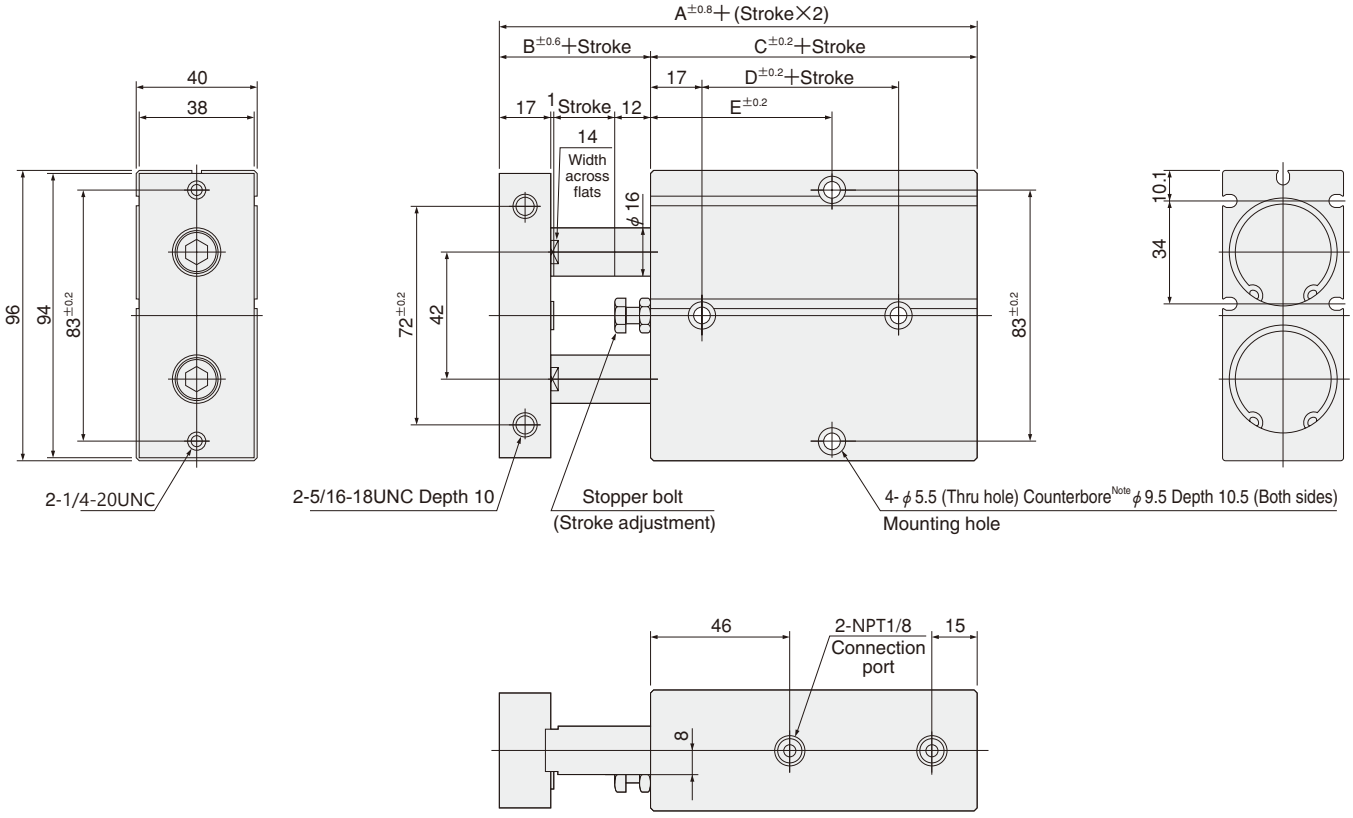
Dimensions of Rod End (mm)



Code / Bore mm [in.]	PA	PB	PC	PD	PE	PF	PG	PH
16 [0.630]	24	1	ϕ4.3 Counterbore ϕ7.8 Depth 4.6	$6.2^{+0.1}_{0}$	8	3	$6.2^{-0.05}_{-0.15}$	M4 ×0.7 Depth 6
20 [0.787]	28	1	ϕ6.5 Counterbore ϕ11 Depth 6.8	$8.2^{+0.1}_{0}$	10	3	$8.2^{-0.05}_{-0.15}$	M6 ×1 Depth 8
25 [0.984]	34	1	ϕ6.5 Counterbore ϕ11 Depth 6.8	$10.2^{+0.1}_{0}$	12	3	$10.2^{-0.05}_{-0.15}$	M6 ×1 Depth 8

Dimensions of Double Acting Long Bushing Type (mm)

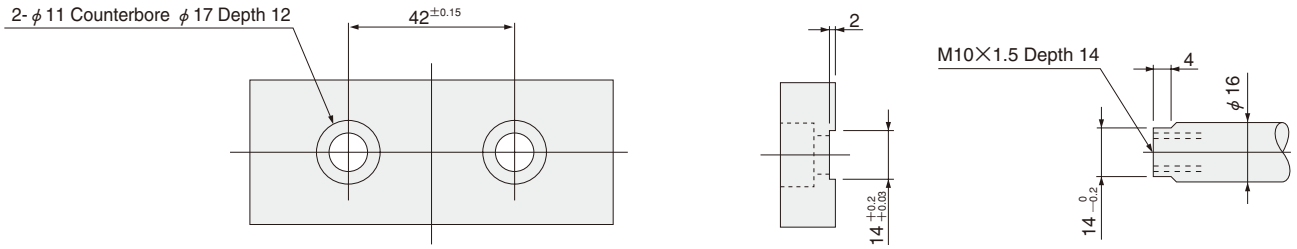
● ϕ 32



Code / Stroke / Bore mm [in.]	A	B	C	D	E									
					10	20	30	40	50	60	70	80	90	100
32 [1.260]	118	30	88	45	55	60	65	70	75	80	85	90	95	100

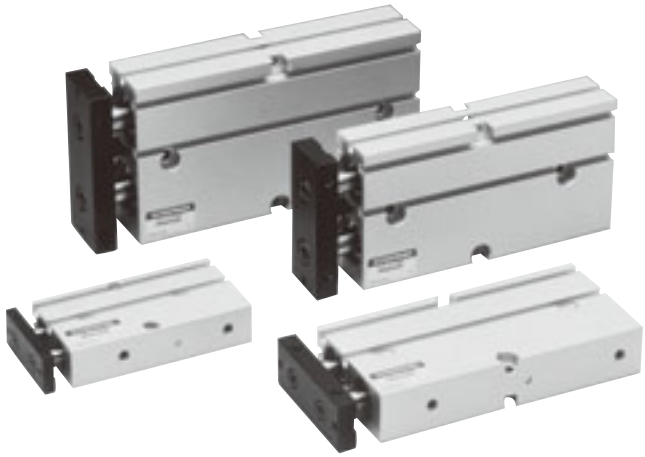
Note: The counterbore depth is measured from the upper surface of the body.

Dimensions of Rod End (mm)

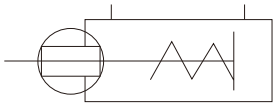


TWIN ROD CYLINDERS
B SERIES

Single Acting Push Type



Symbol



Specifications

Item \ Bore size mm [in.]	10 [0.394]	16 [0.630]	20 [0.787]	25 [0.984]
Operation type	Single acting push type			
Media	Air			
Mounting type	Side mount			
Operating pressure range MPa [psi.]	0.25～0.7 [36～102]	0.2～0.7 [29～102]		
Proof pressure MPa [psi.]	1.05 [152]			
Operating temperature range °C [°F]	0～60 [32～140]			
Operating speed range mm/s [in./sec.]	100～500 [3.9～19.7]			
Cushion	Rubber bumper Note			
Lubrication	Not required (If lubrication is required, use Turbine Oil Class 1 [ISO VG32] or equivalent.)			
Non-rotating accuracy	±0.4°	±0.3°		
Stroke adjusting range mm [in.]	−5～0 [−0.197～0] (To the specification stroke)			
Port size	10-32 UNF			

Note: For the 10mm [0.394in.] bore size, rubber bumper is only installed at the pull side. Piston side bumper is not available.

Bore Size and Stroke

Inch

Bore size	Standard strokes	Pull side stroke adjusting range
10	1/2, 3/4, 1, 1 1/2, 2, 2 1/2	−0.2～0
16	1/2, 3/4, 1, 1 1/2, 2, 2 1/2	
20	1/2, 3/4, 1, 1 1/2, 2, 2 1/2	
25	1/2, 3/4, 1, 1 1/2, 2, 2 1/2	

Order Codes

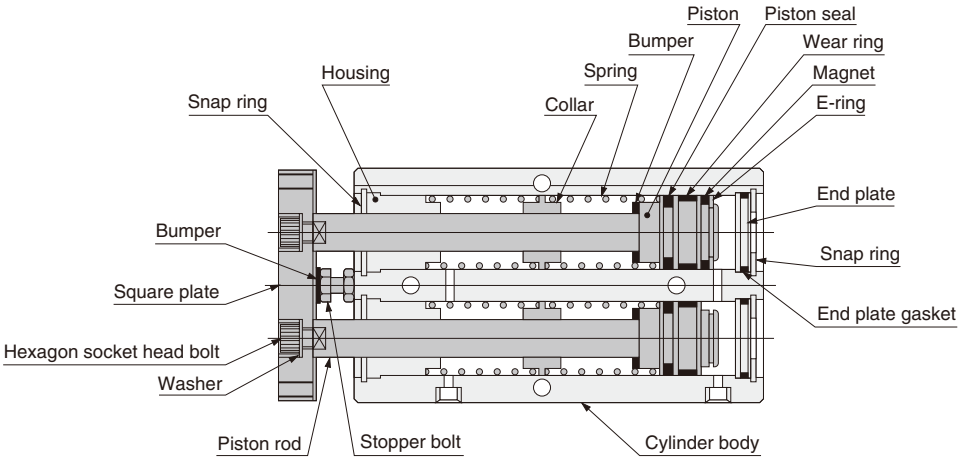
HTBSA **16×1**

Bore size
×
Stroke[Inch]

Twin rod cylinder
B series
single acting push type Note

Note: In the single acting push type, the magnet for sensor switch is built-in.

Inner Construction and Major Parts



Major Parts and Materials

Parts	Materials
Cylinder body	Aluminum alloy (anodized)
Piston	Aluminum alloy (chromic acid anodic oxide coating)
Wear ring	Plastic
Piston rod	Steel (chrome plated)
Gasket	Synthetic rubber (NBR)
Housing	Aluminum alloy (special wear-resistant treatment)
End plate	Plastic
Seal	Synthetic rubber (NBR)
Snap ring	Steel (nickel plated)
Magnet	Plastic magnet
Spring	Piano wire
Collar	Plastic
E-ring	Stainless steel
Washer	Steel (nickel plated)
Square plate	Mild steel (nickel plated)
Bumper Note	Synthetic rubber (NBR)
Stopper bolt	Mild steel (zinc plated)

Note: For the 10mm [0.394in.] bore size, piston side bumper is not available.

Seals

Item / Quantity / Bore mm	Piston seal	End plate gasket
	2	2
10	COP-10L	1.5×9
16	PWP-16	1.5×14.5
20	PWP-20	1.5×18
25	PWP-25	1.5×23

Mass

g [oz.]

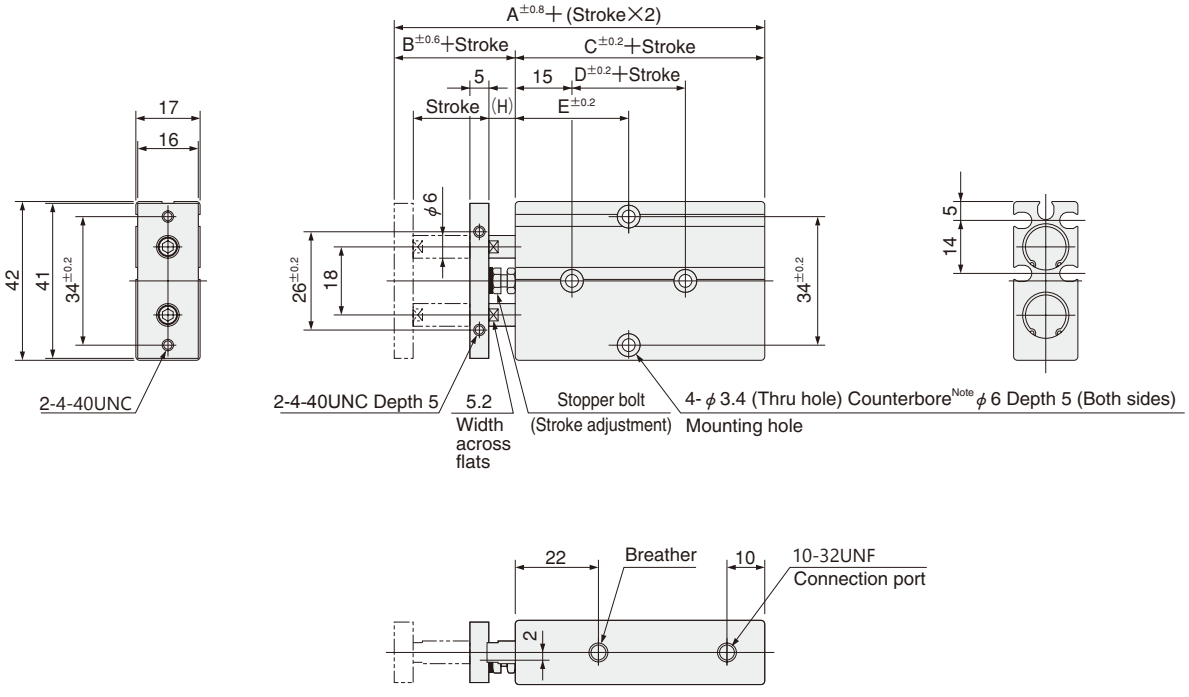
Bore size mm [in.]	Basic mass Note1						Additional mass	
	Stroke mm						Mass of 1 sensor switch Note2	
	10	**20**	**30**	**40**	**50**	**60**	**ZE□□□A**	**ZE□□□B**
10 [0.394]	117 [4.13]	137 [4.83]	157 [5.54]	197 [6.95]	217 [7.65]	237 [8.36]	15 [0.53]	35 [1.23]
16 [0.630]	230 [8.11]	257 [9.07]	288 [10.16]	344 [12.13]	369 [13.02]	394 [13.90]		
20 [0.787]	372 [13.12]	407 [14.36]	442 [15.59]	521 [18.38]	556 [19.61]	591 [20.85]		
25 [0.984]	557 [19.65]	603 [21.27]	649 [22.89]	760 [26.81]	814 [28.71]	868 [30.62]		

Notes: 1. The above table is for the standard strokes.
2. There are 2 types of sensor switch lead wire lengths.
A：1000mm [39in.], B：3000mm [118in.]

Calculation example: The mass for bore size of 20mm, and stroke of 60mm, with 2 sensor switches (ZE135A),
591＋(15×2)＝621g [21.90oz.]

Dimensions of Single Acting Push Type (mm)

● ϕ 10



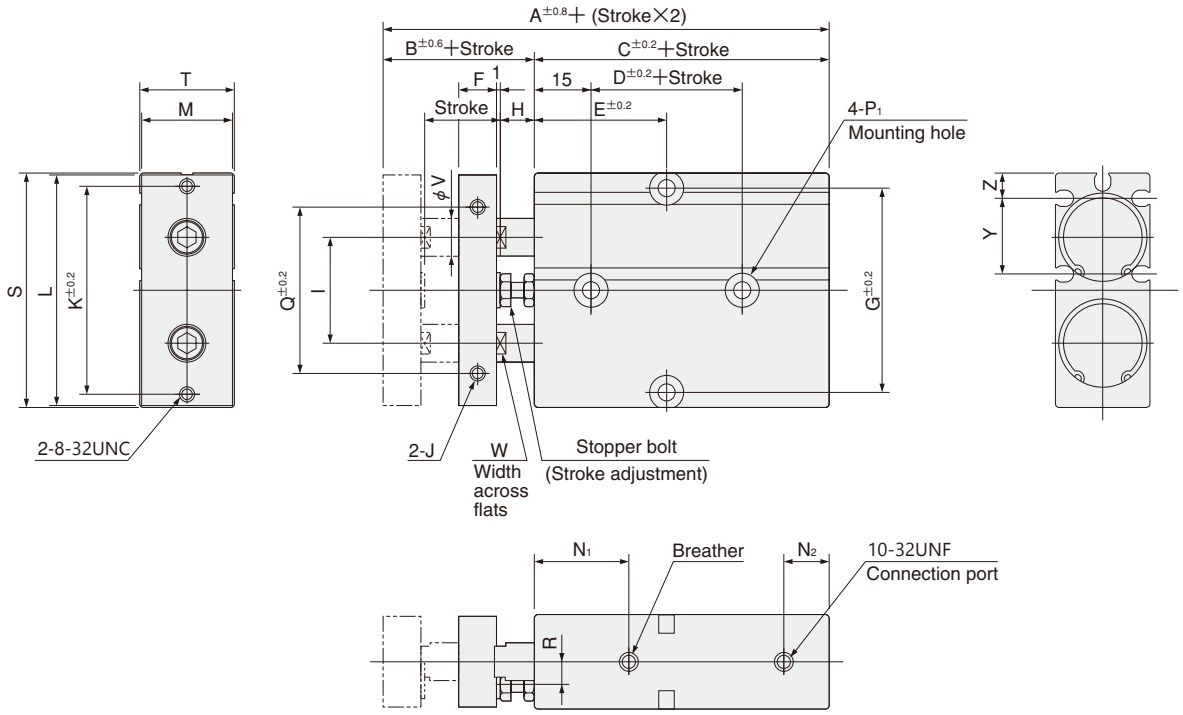
Code / Stroke / Bore mm [in.]	A		B		C		D		E						H	
	10～30	40～60	10～30	40～60	10～30	40～60	10～30	40～60	10	20	30	40	50	60	10～30	40～60
10 [0.394]	58	66	12	10	46	56	10	20	30	30	35	45	50	55	7	5

Note: The counterbore depth is measured from the upper surface of the body.

Dimensions of Rod End (mm)

Dimensions of Single Acting Push Type (mm)

● ϕ 16～ϕ 25

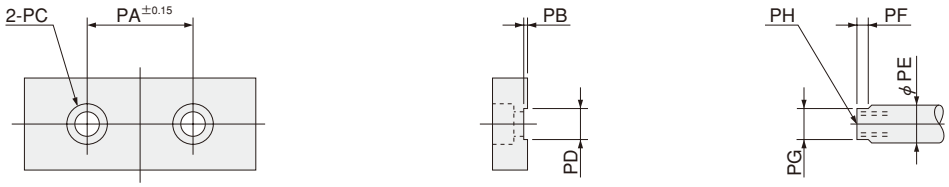


Code / Stroke / Bore mm [in.]	A		B	C		D		E						F	G	H	I	J
	10～30	40～60		10～30	40～60	10～30	40～60	10	20	30	40	50	60					
16 [0.630]	68	78	15	53	63	20	30	30	35	40	50	55	60	8	47	6	24	8-32UNC Depth 5
20 [0.787]	78	88	20	58	68	20	30	35	35	40	50	55	60	10	55	9	28	8-32UNC Depth 5
25 [0.984]	81	91	19	62	72	30	40	40	40	45	55	60	65	10	66	8	34	10-32UNF Depth 6

Bore mm [in.] / Code	K	L	M	N_1	N_2	P_1 Note	Q	R	S	T	V	W	Y	Z
16 [0.630]	47	53	20	22	10	ϕ4.5 (Thru hole) Counterbore ϕ8 Depth 5.5 (Both sides)	34	4	54	21	8	6.2	18.5	5.7
20 [0.787]	55	61	24	25	12	ϕ4.5 (Thru hole) Counterbore ϕ8 Depth 5.5 (Both sides)	44	6	62	25	10	8.2	20	6.8
25 [0.984]	66	72	29	30	12	ϕ4.5 (Thru hole) Counterbore ϕ9 Depth 6 (Both sides)	56	7	73	30	12	10.2	22.5	8.3

Note: The counterbore depth is measured from the upper surface of the body.

Dimensions of Rod End (mm)



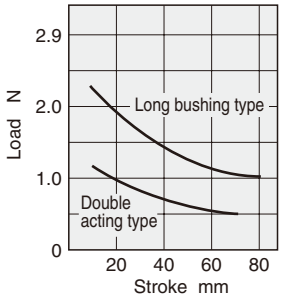
Bore mm [in.] / Code	PA	PB	PC	PD	PE	PF	PG	PH
16 [0.630]	24	1	ϕ4.3 Counterbore ϕ7.8 Depth 4.6	6.2 $^{+0.1}_{0}$	8	3	6.2 $^{-0.05}_{-0.15}$	M4 ×0.7 Depth 6
20 [0.787]	28	1	ϕ6.5 Counterbore ϕ11 Depth 6.8	8.2 $^{+0.1}_{0}$	10	3	8.2 $^{-0.05}_{-0.15}$	M6 ×1 Depth 8
25 [0.984]	34	1	ϕ6.5 Counterbore ϕ11 Depth 6.8	10.2 $^{+0.1}_{0}$	12	3	10.2 $^{-0.05}_{-0.15}$	M6 ×1 Depth 8

Mounting and adjustment

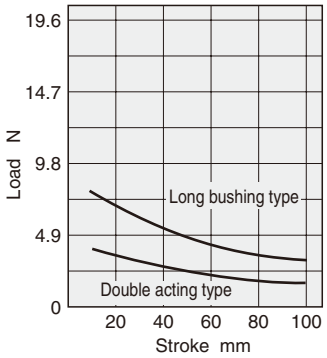
Allowable lateral load

The lateral (side) load on the rod end should be at or below the graph values listed below.

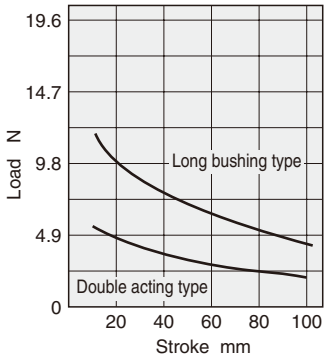
ϕ 10 [0.394in.]



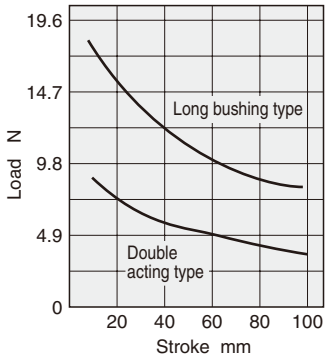
ϕ 16 [0.630in.]



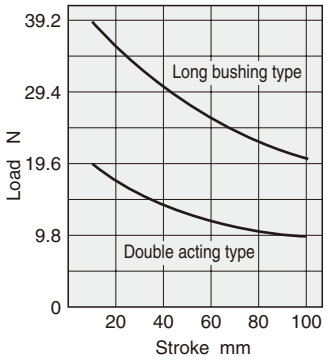
ϕ 20 [0.787in.]



ϕ 25 [0.984in.]



ϕ 32 [1.260in.]



Remark: The ϕ 16~ϕ 25 double acting standard types also include end keep cylinders.

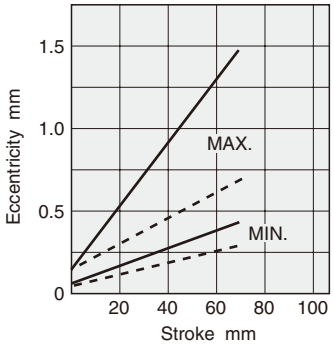
1N = 0.2248lbf.
1mm = 0.0394in.

Square plate eccentricity

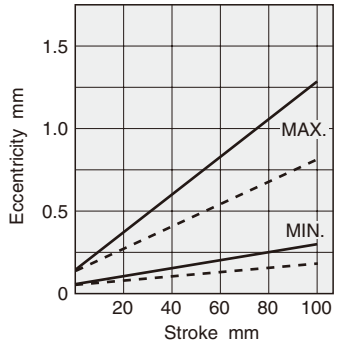
For the eccentricity of the square plate without load, use the graph values listed below as guides.

Double acting type - - - - - - Long bushing type

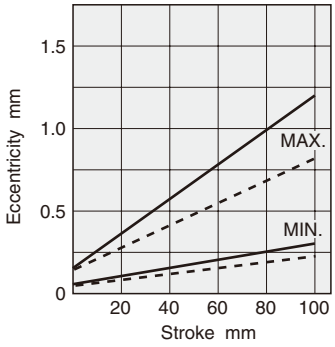
ϕ 10 [0.394in.]



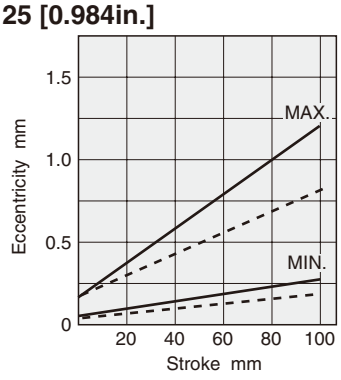
ϕ 16 [0.630in.]



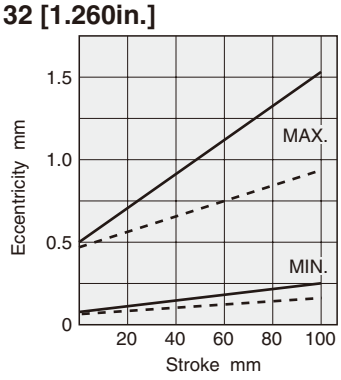
ϕ 20 [0.787in.]



ϕ 25 [0.984in.]



ϕ 32 [1.260in.]



Remark: The ϕ 16~ϕ 25 double acting standard types also include end keep cylinders.

1mm = 0.0394in.

Mounting and adjustment

Mounting

1. While any mounting direction is allowed, the mounting surface should always be flat. Twisting or bending during mounting may disturb the accuracy and may also result in air leaks or improper operation.
2. Care should be taken that scratches or dents on the cylinder's mounting surface may damage its flatness.
3. The hexagon socket head bolt on the rod end square plate has been mounted with a conical washer. Always confirm that the rod end square plate and hexagon socket head bolts are secured before using the cylinder.

Stroke adjustment

On the cylinder, stroke adjust-ing is easy within a range of –5～0mm [–0.197～0in.]. Turn the stopper bolt to the left (counterclockwise) to shorten the stroke. Use a lock nut to tighten and secure the stopper in place after adjustment. Do not tighten the bolt to the right (clockwise) beyond the standard position. The stroke at shipping is set to the standard stroke. Do not adjust it to larger than the standard stroke.

Cylinder speed

Use the cylinder at a speed of 500mm/s [19.7in./sec.] or less (use a speed controller for adjustment). For high speeds (500mm/s [19.7in./sec.]), install an external stopper, etc., to prevent direct shocks to the cylinder. Consult us if the situation will not permit installation of an external stopper, etc.

Sensor switch

1. In the standard cylinder, the magnet for sensor switch is built-in. Mounting a sensor switch will enable use in sensor switch applications.
2. Do not use a sensor switch mounting screw to secure the sensor switch into the body mounting hole. The sensor switch mounting screw could fall out.

General precautions

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

1. If using in locations subject to dripping water, dripping oil, etc., or to large amounts of dust, use a cover to protect the unit.
2. The product cannot be used when the media or ambient atmosphere contains any of the substances listed below.
   Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, or acids, etc.

Criteria for selection

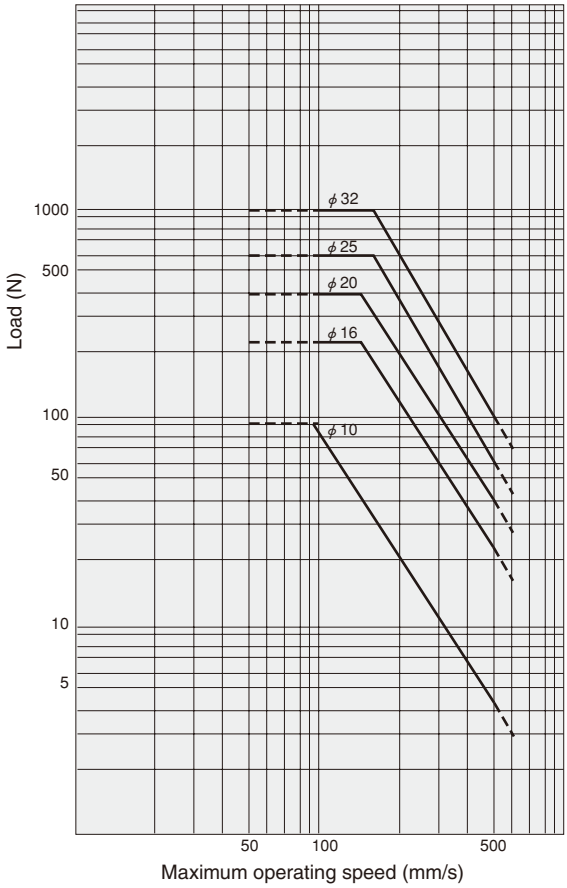
Select the cylinder bore according to the allowable load at the maximum cylinder operating speed.

<Precautions>
① Always use a speed controller for the cylinder, and control the speed to within a range of 100～500mm/s [3.9～19.7in./sec.].
② When a lateral (side) load is applied to the piston rod, select a bore size within the allowable lateral load range (see the graphs on p.821).

When the load has exceeded the allowable value during use, always install an external stopper (shock absorber, etc.) to prevent direct shocks to the cylinder.

<Precautions>
① For the external stopper (shock absorber, etc.), select a stopper with sufficient absorbing capacity.
② Consult us if the situation will not permit the installation of an external stopper.
③ When a lateral (side) load is applied to the piston rod, limit within the allowable lateral load range (see the graphs on p.821).

<Allowable load>



<How to read the graph>
When a 59N [13.2lb.] load is carried with φ20 [0.787in.], the maximum operating speed must be set to 400mm/s [15.7in./sec.] or less.

※ The maximum load in the graph is when air pressure of 0.7MPa [102psi.] is applied to the cylinder push side. The load will decrease in applications such as retracted side operations and lower air pressure applications.

1N = 0.2248lbf.
1mm/s = 0.0394in./sec.