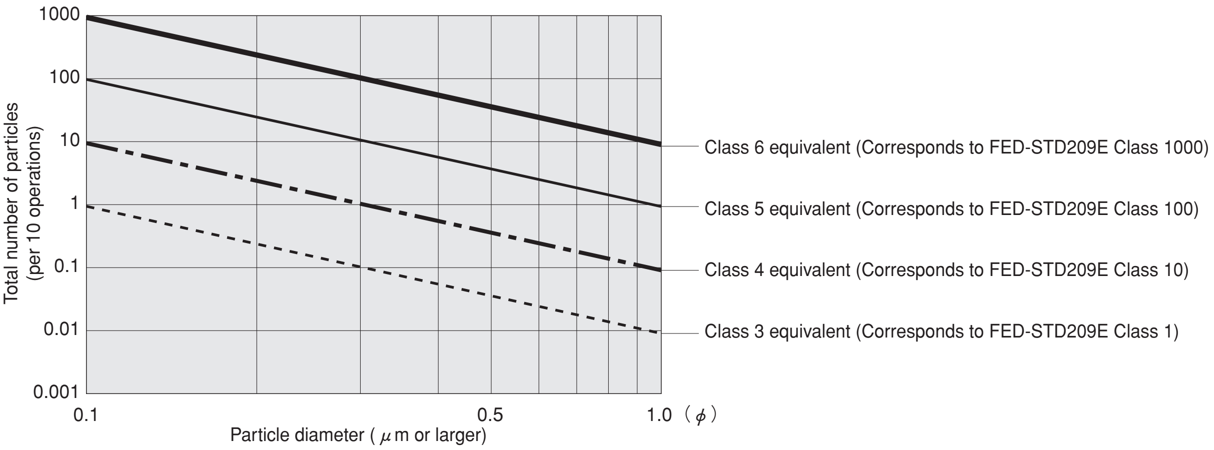
Koganei Clean System products provide complete support for the maintenance of a clean environment inside the cleanroom.

Koganei Clean System products meet the needs of the ultra-clean production environment. In everything from actuators and valves to air preparation and auxiliary equipment, anti-corrosion materials processing and other Koganei-developed design concepts serve to prevent particle contamination within the cleanroom. These perfectly designed mechanisms, which resolve even the slightest leaks to the outside during operations, have already won a high level of reliability.

Koganei Cleanliness

There is currently no standard in JIS or elsewhere for methods of evaluating cleanliness for pneumatic equipment in the cleanroom specifications. Therefore, to measure the effects of cleanroom contamination by pneumatic equipment, Koganei has decided to use "number of particles generated per 10 operations," rather than particle density. Koganei has also developed classifications for application classes in cleanroom, based on JIS and other upper limit density tables, and on the company's own experience.

Particle generation classification of Koganei pneumatic equipment



Remarks:
1. In the above table, product performance in terms of the number of particles generated per 10 operations is expressed as the upper limit of particles corresponding to the equivalent JIS or ISO class.
2. In the above table, values in the JIS, ISO, and FED-STD upper limit density tables are calculated as upper density per liter.
3. The classes shown are clean levels as classified in JIS and ISO.

From the above definitions, the Koganei clean level classes can be viewed as the level of average contamination per liter of surrounding air over a period of 10 operations in cleanroom. Air ventilation in cleanrooms is usually faster than 1 cycle per minute, and clean volumetric capacity is usually larger than 1 liter, which should provide a sufficient safety margin in practice.

Caution: The above conclusions are based on an ideal situation in which air ventilation is being implemented. For specific cases where air ventilation is not ensured, caution is needed since the clean classes cannot be maintained.

The clean system diagrams shown here are for Class 5 equivalent products.
For Class 4 or Class 3 equivalent products, consult us.

Evaluations of Cleanliness

Koganei has therefore specified its in-house measurement methods, to conduct evaluations on the cleanroom rating.

The number of particles of the Air Cylinder Cleanroom Specification is measured as shown in the method below.

1. Measurement conditions

1-1 Test circuit: Figure 1 (no suction), Figure 2 (with suction)

Cleanroom Class 7 equivalent
(Corresponds to FED-STD209E Class 10000)

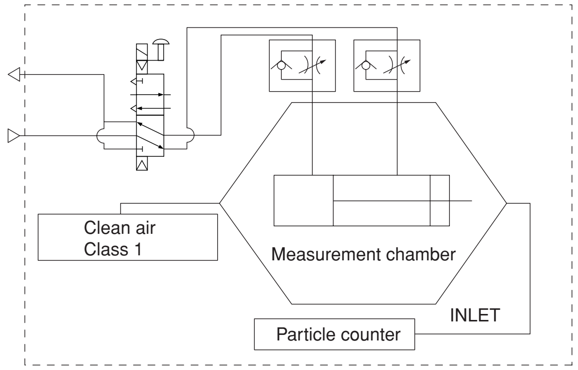


Figure 1 (no suction from dust collection port)

Cleanroom Class 7 equivalent
(Corresponds to FED-STD209E Class 10000)

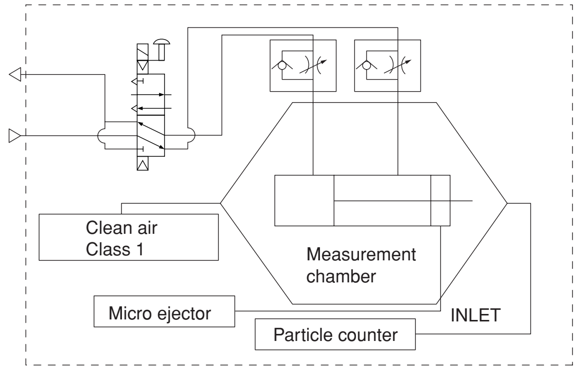


Figure 2 (with suction from dust collection port)

1-2 Operating conditions of tested cylinder

Operating frequency: 1Hz
Average speed: 500mm/s [20in./sec.]
Applied pressure: 0.5MPa [73psi.]
Suction condition: Microejector ME05, Primary side: 0.5MPa [73psi.] applied, Tube: ϕ6 [0.236in.]
Mounting direction: Vertical
Chamber volume: 8.3 ℓ [0.293ft^3]

2. Particle counter

Manufacturer/model: RION/KM20
Suction flow rate: 28.3 ℓ /min [1ft^3/min.]
Particle diameter: 0.1 μm, 0.2 μm, 0.3 μm, 0.5 μm, 0.7 μm, 1.0 μm

3. Measurement method

3-1 Confirmation of number of particles in the measurement system

Under the conditions in the above 1 and 2, using a particle counter to measure the sample for 9 minutes without operating the measurement sample, and confirmed the measured number of particle is 1 piece or less.

3-2 Measurement under operation

Under the conditions in the above1 and 2, operating the measurement sample for 36 minutes, and measured the total values in the latter half of 18 minutes test.

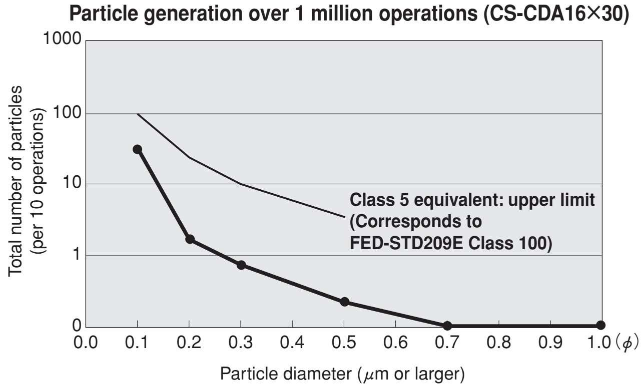
3-3 Reconfirmation

Performed the measurement in 3-1 again, to reconfirm the number of particles in the measurement system.

4. Measurement results

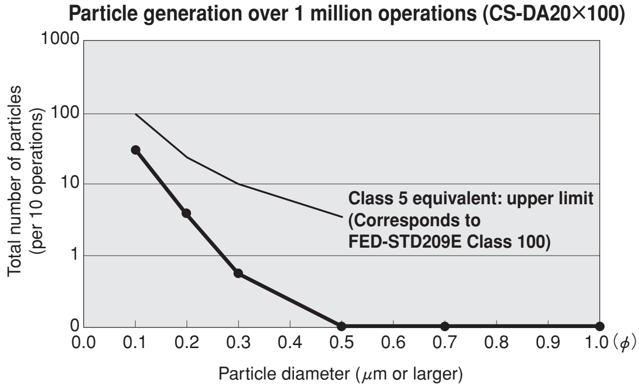
● **Cleanroom specification**
Jig Cylinder (no suction from dust collection port)

Particle generation over 1 million operations (CS-CDA16×30)



● **Cleanroom specification**
Slim Cylinder (with suction from dust collection port)

Particle generation over 1 million operations (CS-DA20×100)



For “safety precautions” listed in the Clean System Product Drawings, see the materials below.

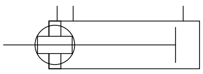
- For actuators, see “Safety Precautions” on p. 45 of the Actuators General Catalog .
- For valves, see “Safety Precautions” on p. 31 of the Valves General Catalog.
- For air treatment and auxiliary equipment, see “Safety Precautions” on p.31 of the General Catalog of Air Treatment, Auxiliary, Vacuum.

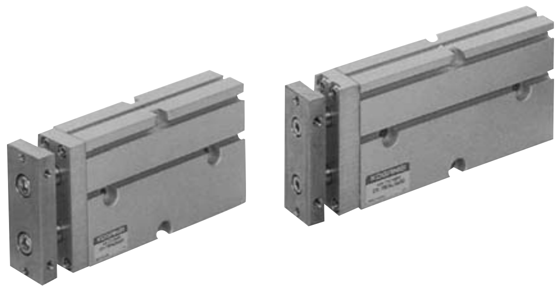
KOGANEI CLEAN SYSTEM

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]
Operating type		Air				
Media		Side mount				
Operating pressure range MPa [psi.]		0.15～0.7 [22～102]	0.1～0.7 [15～102]			
Proof pressure MPa [psi.]		1.03 [149]				
Operating temperature range °C [°F]		0～60 [32～140]				
Operating speed range mm/s [in./sec.]		100～300 [3.9～11.8]				
Cushion		None	Rubber bumper			
Lubrication		Not required				
Non-rotating accuracy		±0.4°	±0.3°			
Port size	Supply port	M5×0.8				Rc1/8
	Dust collection port	M5×0.8				

Bore Size and Stroke

mm [in.]

Bore size	Standard strokes	Maximum available stroke
10 [0.394]	10, 20, 30, 40, 50, 60, 70	140
16 [0.630]	10, 20, 30, 40, 50, 60, 70, 80, 90, 100	200
20 [0.787]	10, 20, 30, 40, 50, 60, 70, 80, 90, 100	200
25 [0.984]	10, 20, 30, 40, 50, 60, 70, 80, 90, 100	200
32 [1.260]	10, 20, 30, 40, 50, 60, 70, 80, 90, 100	200

Remark: Consult us for delivery of cylinders with strokes exceeding the standard.

Order Codes

CS – TBDA 10×50 – ☐ ☐ ☐

Clean system product

Twin rod cylinder
B series
double acting type

Bore size × Stroke

Sensor switch
Blank: Without sensor switch
ZE135: 2-lead wire, Solid state type with indicator lamp DC10～28V Horizontal lead wire
ZE235: 2-lead wire, Solid state type with indicator lamp DC10～28V Vertical lead wire
ZE155: 3-lead wire, Solid state type with indicator lamp DC4.5～28V Horizontal lead wire
ZE255: 3-lead wire, Solid state type with indicator lamp DC4.5～28V Vertical lead wire
ZE101: 2-lead wire, Reed switch type without indicator lamp DC5～28V, AC85～115 Horizontal lead wire
ZE201: 2-lead wire, Reed switch type without indicator lamp DC5～28V, AC85～115 Vertical lead wire
ZE102: 2-lead wire, Reed switch type with indicator lamp DC10～28V, AC85～115V Horizontal lead wire
ZE202: 2-lead wire, Reed switch type with indicator lamp DC10～28V, AC85～115V Vertical lead wire

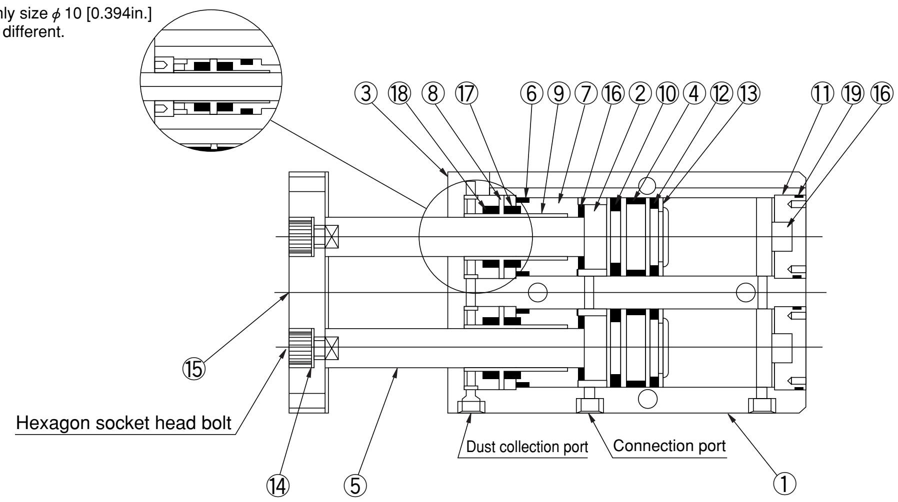
●For details of sensor switches, see p.111～121.

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

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

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

Inner Construction and Major Parts



Major Parts and Materials

No.	Parts	Materials
①	Cylinder body	Aluminum alloy (anodized)
②	Piston	Aluminum alloy (chromic acid anodic oxide coating)
③	Cover	Aluminum alloy (anodized)
④	Wear ring	Plastic
⑤	Piston rod	Steel (chrome plated)
⑥	Housing gasket	Synthetic rubber (NBR)
⑦	Housing	Aluminum alloy (chromic acid anodic oxide coating)
⑧	Seal holder	Mild steel (nickel plated)
⑨	Rod bushing	Plastic
⑩	Piston seal	Synthetic rubber (NBR)
⑪	Plug	Aluminum alloy (anodized)
⑫	Magnet	Plastic magnet
⑬	E-ring	Stainless steel
⑭	Washer	Steel (nickel plated)
⑮	End plate	Mild steel (nickel plated)
⑯	Bumper	ϕ 10, 16, 20, 25 : Synthetic rubber, ϕ 32 : Urethane
⑰	Rod seal	Synthetic rubber (NBR)
⑱	Dust leak prevention seal	
⑲	Plug gasket	

Seals

Parts	Rod seal	Piston seal	Plug gasket	Housing gasket	Dust leak prevention seal
Q'ty / Bore mm	2	2	2	2	2
10	PIU-6	PWP-10	1.5×9	1.5×9	PIU-6
16	PIU-8	PWP-16	1.5×15	1.5×13	PIU-8
20	PIU-10	PWP-20	1.5×19.5	1.5×17	PIU-10
25	PIU-12	PWP-25	1.5×23	1.5×22	PIU-12
32	PIU-16	PWP-32	2×31.5	2×28.5	PIU-16

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	
				ZE□□□A	**ZE□□□B**
10 [0.394]	Standard specification	124 [4.37]	18 [0.63]	15 [0.53]	35 [1.23]
16 [0.630]		235 [8.29]	27 [0.95]		
20 [0.787]		393 [13.86]	36 [1.27]		
25 [0.984]		584 [20.60]	51 [1.80]		
32 [1.260]		1329 [46.88]	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.]

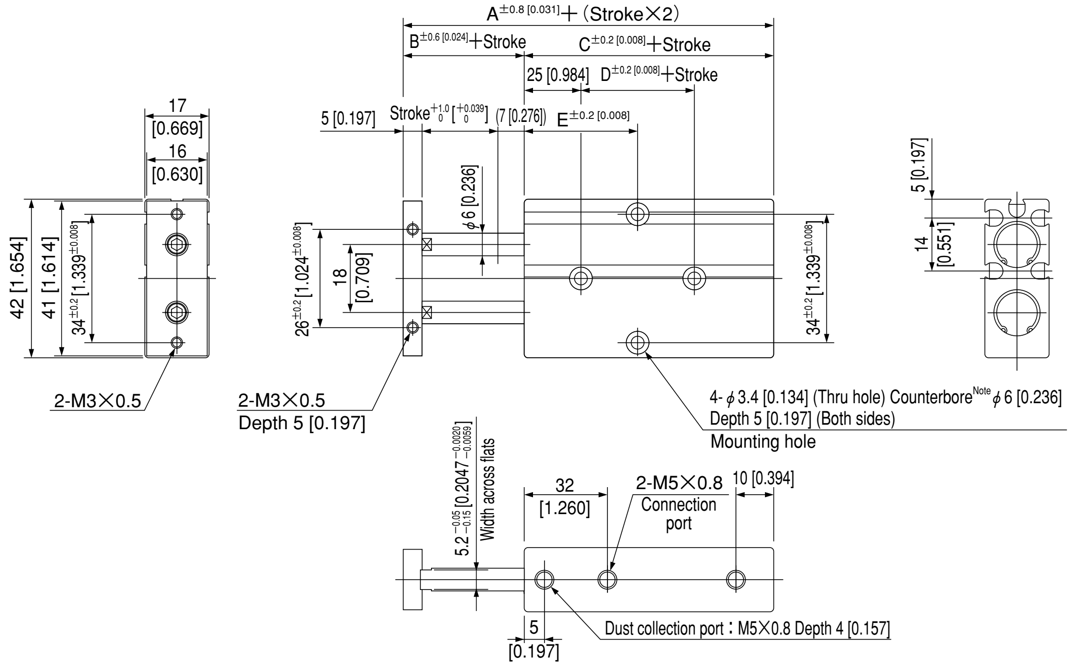
Calculation example: The mass for bore size of 20mm and stroke of 60mm with 2 sensor switches (**ZC135A**),

393＋(36×6)＋(15×2)＝639g [22.54oz.]

(6 = Stroke / 10)

Dimensions mm [in.]

●φ10 **CS-TBDA10×Stroke**

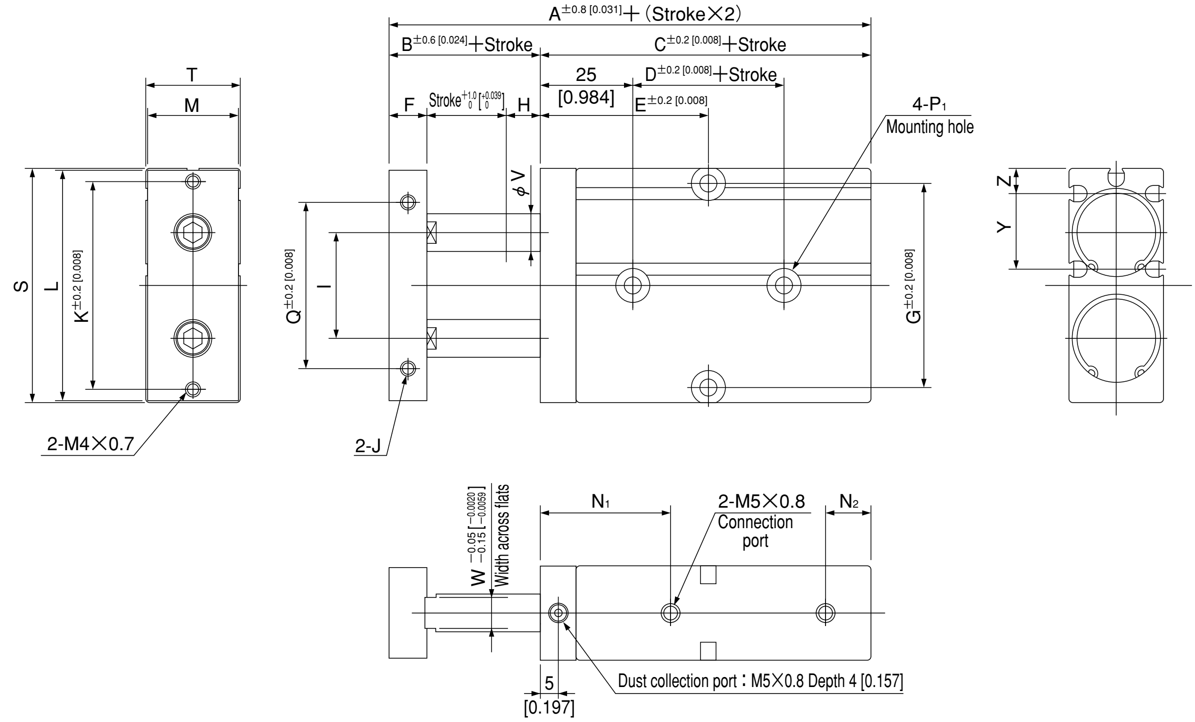


Bore \ Stroke \ Code	A	B	C	D	E 10	E 20	E 30	E 40	E 50	E 60	E 70
10 [0.394]	68 [2.677]	12 [0.472]	56 [2.205]	10 [0.394]	40 [1.575]	40 [1.575]	45 [1.772]	50 [1.969]	55 [2.165]	60 [2.362]	65 [2.559]

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

Dimensions mm [in.]

● φ16～φ25 CS-TBDA Bore size × Stroke



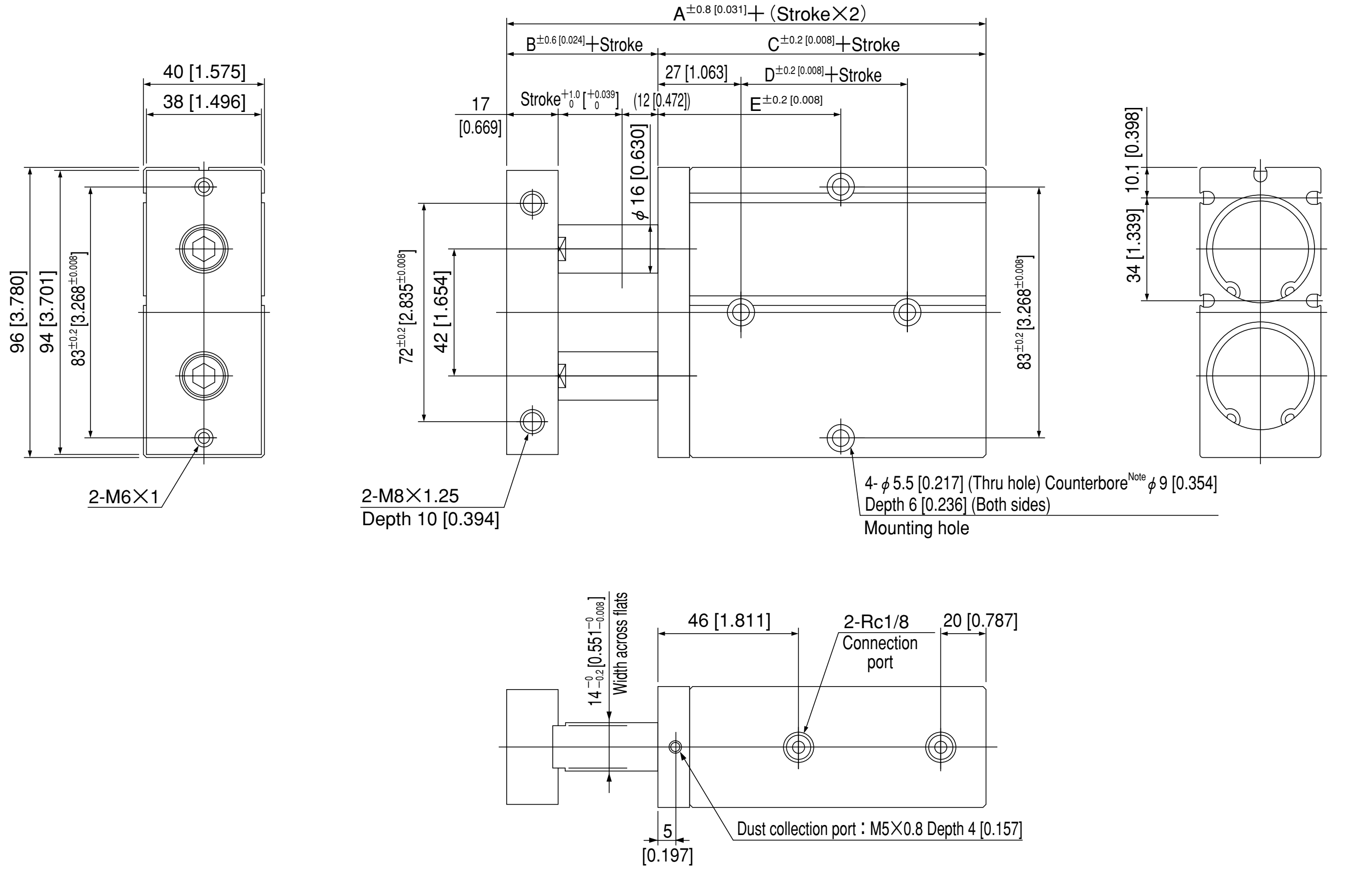
Code / Stroke / Bore	A	B	C	D	E										F	G	H	I	J	K	L	M	N1	N2
					10	20	30	40	50	60	70	80	90	100										
16 [0.630]	78 [3.071]	15 [0.591]	63 [2.480]	20 [0.787]	40 [1.575]	45 [1.772]	50 [1.969]	55 [2.165]	60 [2.362]	65 [2.559]	70 [2.756]	75 [2.953]	80 [3.150]	85 [3.346]	8 [0.315]	47 [1.850]	7 [0.276]	24 [0.945]	M4×0.7 Depth 5 [0.197]	47 [1.850]	53 [2.087]	20 [0.787]	32 [1.260]	10 [0.394]
20 [0.787]	88 [3.465]	20 [0.787]	68 [2.677]	20 [0.787]	45 [1.772]	45 [1.772]	50 [1.969]	55 [2.165]	60 [2.362]	65 [2.559]	70 [2.756]	75 [2.953]	80 [3.150]	85 [3.346]	10 [0.394]	55 [2.165]	10 [0.394]	28 [1.102]	M4×0.7 Depth 5 [0.197]	55 [2.165]	61 [2.402]	24 [0.945]	35 [1.378]	12 [0.472]
25 [0.984]	91 [3.583]	19 [0.748]	72 [2.835]	30 [1.181]	50 [1.969]	50 [1.969]	55 [2.165]	60 [2.362]	65 [2.559]	70 [2.756]	75 [2.953]	80 [3.150]	85 [3.346]	90 [3.543]	10 [0.394]	66 [2.598]	9 [0.354]	34 [1.339]	M4×0.8 Depth 6 [0.236]	66 [2.598]	72 [2.835]	29 [1.142]	40 [1.575]	12 [0.472]

Code / Bore	P_1 Note	Q	S	T	V	W	Y	Z
16 [0.630]	φ 4.5 [0.177] (Thru hole) Counterbore φ 8 [0.315] Depth 5.5 [0.217] (Both sides)	34 [1.339]	54 [2.126]	21 [0.827]	8 [0.315]	6.2 [0.244]	18.5 [0.728]	5.7 [0.224]
20 [0.787]	φ 4.5 [0.177] (Thru hole) Counterbore φ 8 [0.315] Depth 5.5 [0.217] (Both sides)	44 [1.732]	62 [2.441]	25 [0.984]	10 [0.394]	8.2 [0.323]	20 [0.787]	6.8 [0.268]
25 [0.984]	φ 4.5 [0.177] (Thru hole) Counterbore φ 9 [0.354] Depth 6 [0.236] (Both sides)	56 [2.205]	73 [2.874]	30 [1.181]	12 [0.472]	10.2 [0.402]	22.5 [0.886]	8.3 [0.327]

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

Dimensions mm [in.]

● φ32　　CS-TBDA32 × Stroke



Bore / Stroke / Code	A	B	C	D	E									
					10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
32 [1.260]	118 [4.646]	30 [1.181]	88 [3.465]	35 [1.378]	55 [2.165]	60 [2.362]	65 [2.559]	70 [2.756]	75 [2.953]	80 [3.150]	85 [3.346]	90 [3.543]	95 [3.740]	100 [3.937]

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

Order Codes

CS — [ ] [ ] **-TBDA**

- **CS**: Clean system product
- **Sensor switch** (first box)
- **Lead wire length** (second box)
  - **A**: 1000mm [39in.]
  - **B**: 3000mm [118in.]
- **TBDA**: **Twin rod cylinder B series** with sensor switch mounting screw for ϕ10 [0.394in.]～ϕ32 [1.260in.]

Sensor switch

ZE135	2-lead wire, Solid state type with indicator lamp	DC10～28V	Horizontal lead wire	**ZE155**	3-lead wire, Solid state type with indicator lamp	DC4.5～28V	Horizontal lead wire
ZE235	2-lead wire, Solid state type with indicator lamp	DC10～28V	Vertical lead wire	**ZE255**	3-lead wire, Solid state type with indicator lamp	DC4.5～28V	Vertical lead wire
ZE101	2-lead wire, Reed switch type without indicator lamp	DC5～28V AC85～115V	Horizontal lead wire	**ZE102**	2-lead wire, Reed switch type with indicator lamp	DC10～28V AC85～115V	Horizontal lead wire
ZE201	2-lead wire, Reed switch type without indicator lamp	DC5～28V AC85～115V	Vertical lead wire	**ZE202**	2-lead wire, Reed switch type with indicator lamp	DC10～28V AC85～115V	Vertical lead wire

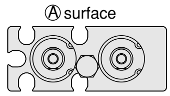
● For details of the sensor switches, see p.111～121.

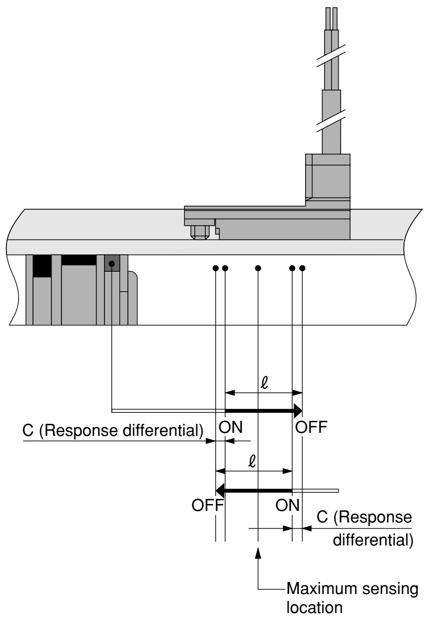
Sensor Switch Operating Range, Response Differential, and Maximum Sensing Location

●**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.

●**Sensor switch mounting surface**





●Solid state type

mm [in.]

Item	Bore size / Mounting surface	10 [0.394]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]
Operating range : ℓ	A and C surface	2.5～6 [0.098～0.236]			2.5～6.5 [0.098～0.256]	5～12 [0.197～0.472]
	B surface	2.5～4 [0.098～0.157]	2～4.5 [0.079～0.177]		2.5～5.5 [0.098～0.217]	4～9 [0.157～0.354]
Response differential : C	—	1.0 [0.039] or less	1.2 [0.047] or less		1.5 [0.059] or less	2.0 [0.079] or less
Maximum sensing location Note	—	6 [0.236]				

Remark: The above table shows reference values.
Note: The maximum sensing location is the distance from the end of the switch opposite to the lead wire.

●Reed switch type

mm [in.]

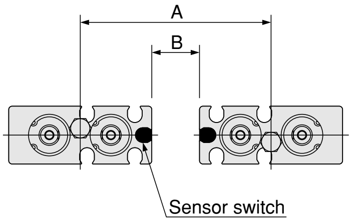
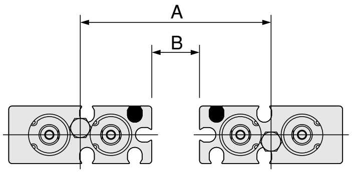
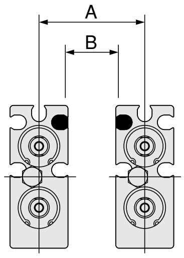
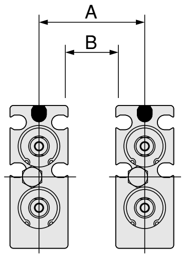
Item / Bore size	10 [0.394]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]
Operating range : ℓ	6～8.5 [0.236～0.335]		6～8 [0.236～0.315]	7～9.5 [0.276～0.374]	12～16.5 [0.472～0.650]
Response differential : C	1.5 [0.059] or less				2.5 [0.098] or less
Maximum sensing location Note	10 [0.394]				

Remark: The above table shows reference values.
Note: The maximum sensing location is the distance from the end of the switch opposite to the lead wire.

When Mounting Cylinders with Sensor Switches in Close Proximity

When mounting cylinders in close proximity,
install the cylinder so that it should exceed the values in the table below.

mm [in.]

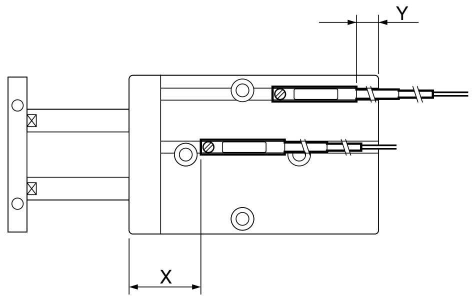
Status of mounting in close proximity	Code	Type \ Bore size	10 [0.394]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]
	**A**	Solid state type	53 [2.087]	66 [2.598]	73 [2.874]	87 [3.425]	119 [4.685]
		Reed switch type	48 [1.890]	60 [2.362]	68 [2.677]	81 [3.189]	109 [4.291]
	B	Solid state type	11 [0.433]	12 [0.472]	11 [0.433]	14 [0.551]	23 [0.906]
		Reed switch type	6 [0.236]			8 [0.315]	13 [0.512]
	**A**	Solid state type	47 [1.850]	59 [2.323]	65 [2.559]	77 [3.031]	107 [4.213]
		Reed switch type	42 [1.654]	54 [2.126]	62 [2.441]	73 [2.874]	96 [3.780]
	B	Solid state type	5 [0.197]		3 [0.118]	4 [0.157]	11 [0.433]
		Reed switch type	0 [0]				
	**A**	Solid state type	28 [1.102]	33 [1.299]	36 [1.417]	44 [1.732]	65 [2.559]
		Reed switch type	22 [0.866]	27 [1.063]	30 [1.181]	37 [1.457]	53 [2.087]
	B	Solid state type	11 [0.433]	12 [0.472]	11 [0.433]	14 [0.551]	25 [0.984]
		Reed switch type	5 [0.197]	6 [0.236]	5 [0.197]	7 [0.276]	13 [0.512]
	**A**	Solid state type	21 [0.827]	24 [0.945]	25 [0.984]	30 [1.181]	44 [1.732]
		Reed switch type	17 [0.669]	21 [0.827]	25 [0.984]	30 [1.181]	40 [1.575]
	B	Solid state type	4 [0.157]	3 [0.118]	0 [0]		4 [0.157]
		Reed switch type	0 [0]				

Remark: For mounting in configurations other than the above, consult us.

Mounting Location of End of Stroke Detection Sensor Switch

When the sensor switch is mounted in the locations shown below (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.

■ When the lead wire is pulled from the head side.



● **Solid state type**

mm [in.]

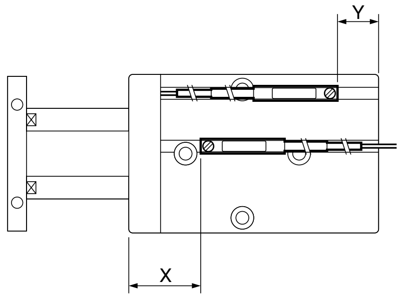
Code \ Bore	10 [0.394]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]
X	37.5 [1.476]	43.5 [1.713]	47.5 [1.870]	52.5 [2.067]	62 [2.441]
Y	−3.5 [−0.138]	−2.5 [−0.098]	−1.5 [−0.059]	−2.5 [−0.098]	4 [0.157]

● **Reed switch type**

mm [in.]

Code \ Bore	10 [0.394]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]
X	33.5 [1.319]	39.5 [1.555]	43.5 [1.713]	48.5 [1.909]	58 [2.283]
Y	0.5 [0.020]	1.5 [0.059]	2.5 [0.098]	1.5 [0.059]	8 [0.315]

■ When the lead wire of the head side detection sensor switch only is pulled from the rod side.



● **Solid state type**

mm [in.]

Code \ Bore	10 [0.394]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]
X	37.5 [1.476]	43.5 [1.713]	47.5 [1.870]	52.5 [2.067]	62 [2.441]
Y	6.5 [0.256]	7.5 [0.295]	8.5 [0.335]	7.5 [0.295]	14 [0.551]

● **Reed switch type**

mm [in.]

Code \ Bore	10 [0.394]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]
X	33.5 [1.319]	39.5 [1.555]	43.5 [1.713]	48.5 [1.909]	58 [2.283]
Y	2.5 [0.098]	3.5 [0.138]	4.5 [0.177]	3.5 [0.138]	10 [0.394]