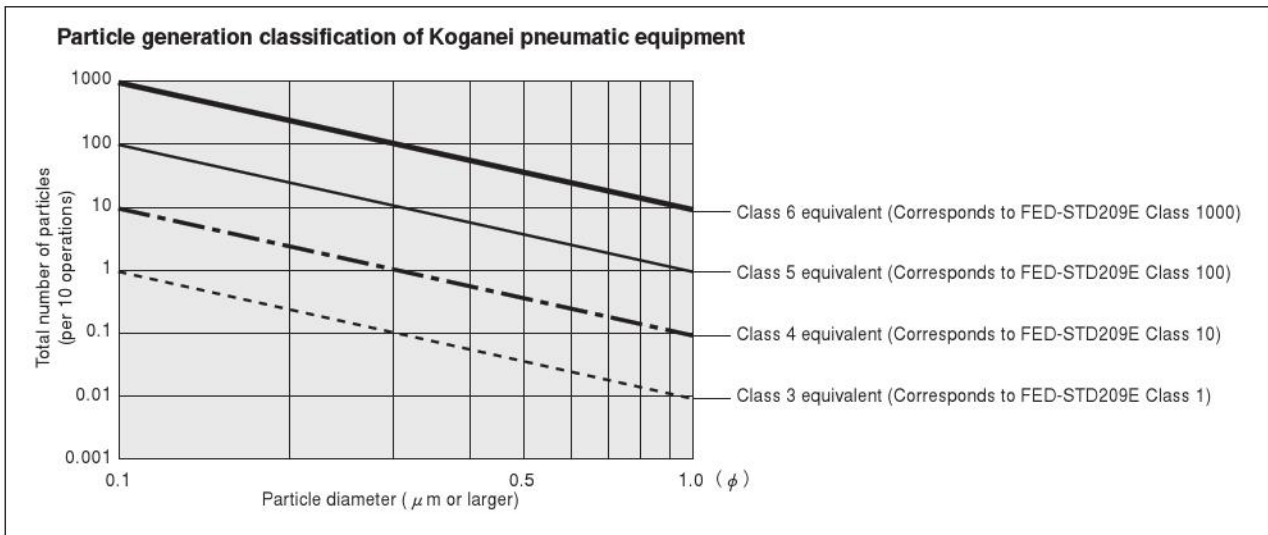


# Koganei Clean System products provide complete support for the maintenance of a clean environment inside the cleanroom.

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.



- 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.**

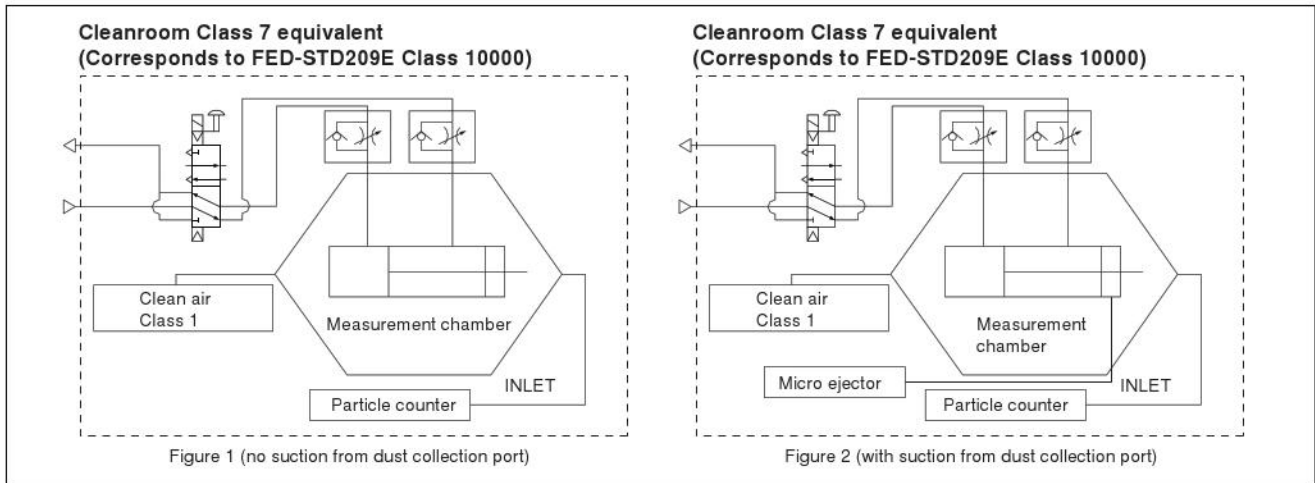
# Evaluations of Cleanliness

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)



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:  $\phi 6$  [0.236in.]

Mounting direction: Vertical

Chamber volume: 8.3  $\ell$  [0.293ft<sup>3</sup>]

## 2. Particle counter

Manufacturer/model: RION/KM20

Suction flow rate: 28.3  $\ell$  /min [1ft<sup>3</sup>/min.]

Particle diameter: 0.1  $\mu\text{m}$ , 0.2  $\mu\text{m}$ , 0.3  $\mu\text{m}$ , 0.5  $\mu\text{m}$ , 0.7  $\mu\text{m}$ , 1.0  $\mu\text{m}$

## 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 above 1 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

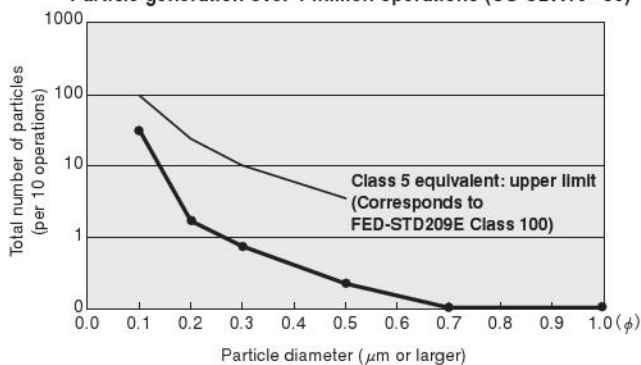
Performed the measurement in 3-1 again, to reconfirm the number of particles in the measurement system.

## 4. Measurement results

### ● Cleanroom specification

Jig Cylinder (no suction from dust collection port)

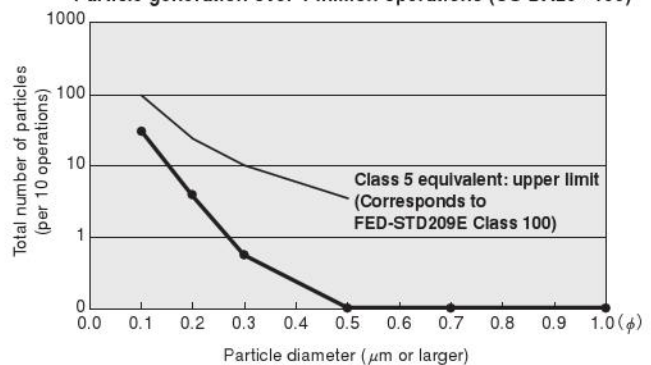
Particle generation over 1 million operations (CS-CDA16 $\times$ 30)



### ● Cleanroom specification

Slim Cylinder (with suction from dust collection port)

Particle generation over 1 million operations (CS-DA20 $\times$ 100)



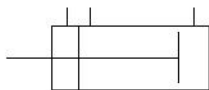
For "safety precautions" listed in the Clean System Product Drawings, see the materials below.

- 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.

# JIG CYLINDERS C SERIES

Double Acting Type

## Symbol



## Specifications

Item	Bore size mm [in.]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]	50 [1.969]	
		Operating type	Double acting type						
Media	Air								
Operating pressure range	MPa [psi.]	0.1~1.0 [15~145]						0.05~1.0 [7~145]	
Proof pressure	MPa [psi.]	1.5 [218]							
Operating temperature range	°C [°F]	0~60 [32~140]							
Operating speed range	mm/s [in./sec.]	30~500 [1.2~19.7]						30~300 [1.2~11.8]	
Cushion	Rubber bumper (Optional)								
Lubrication	Not required								
Port size	M5×0.8				Rc1/8		Rc1/4		

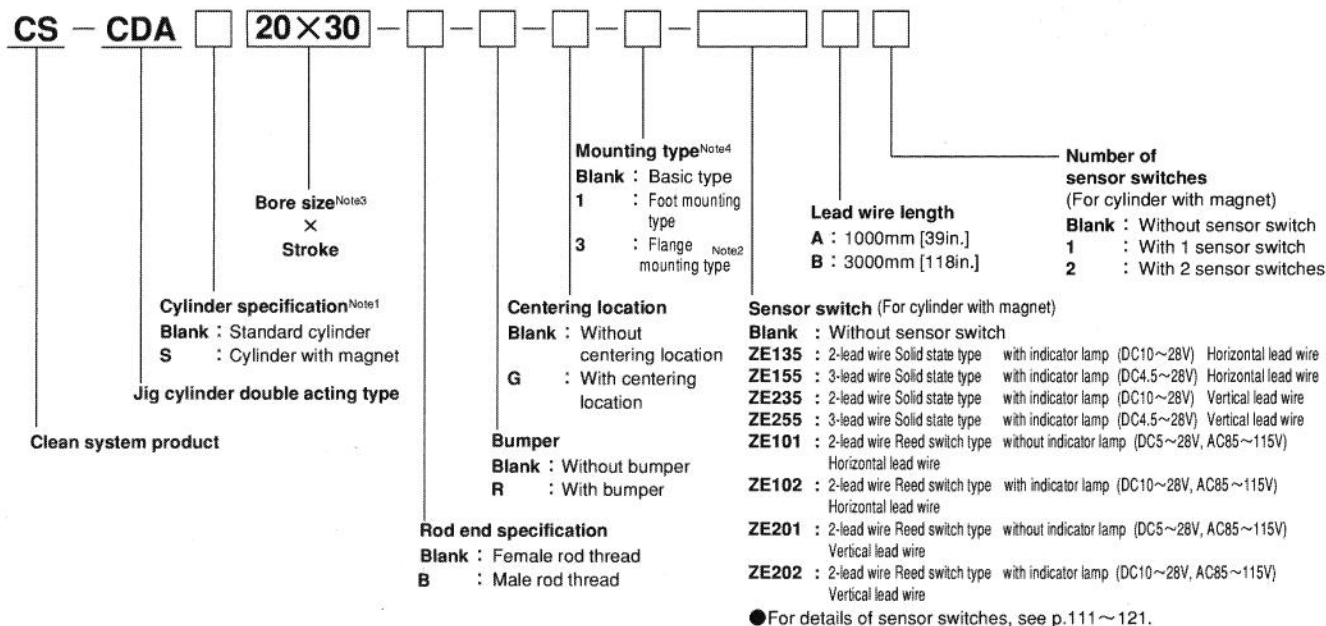
## Bore Size and Stroke

Operating type	Bore size	Standard strokes	
		Standard cylinder	Cylinder with magnet
		mm [in.]	
Double acting type	12 [0.472]	5, 10, 15, 20, 25, 30	5, 10, 15, 20, 25, 30
	16 [0.630]		
	20 [0.787]	5, 10, 15, 20, 25, 30, 35, 40, 45, 50	5, 10, 15, 20, 25, 30, 35, 40, 45, 50
	25 [0.984]		
	32 [1.260]	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
	40 [1.575]		
50 [1.969]	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	

Remarks: 1. Stroke tolerance  ${}_{0}^{+1} [{}_{0}^{+0.039}]$

2. In most cases, body cutting is used for the non-standard strokes. However, body cutting is not used for strokes of 5mm [0.197in.] or less for  $\phi$  12 [0.472]~ $\phi$  40 [1.575], and strokes of 10mm [0.394in.] or less for  $\phi$  50 [1.969]. The collar packed is used for these cases.

## Order Codes

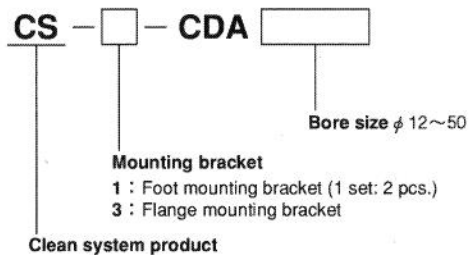


Notes: 1. In the standard cylinder, a magnet for the sensor switch is not built-in.  
 2. Cannot be mounted on rod side, with centering location (-G) option.  
 3. See table for bore size and stroke.  
 4. Mounting brackets are included at shipping.

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

## Order Codes of Additional Parts (To be ordered separately)

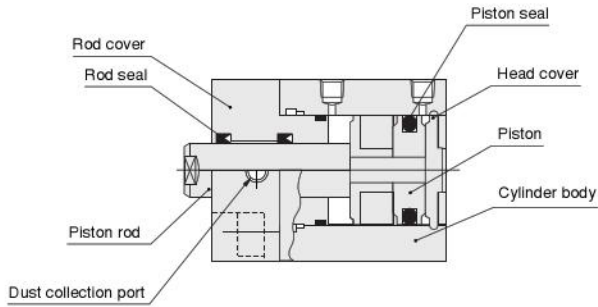
### ● Mounting Brackets Only



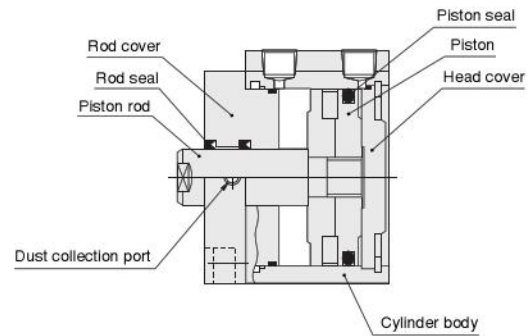
## Inner Construction and Major Parts

### ● Double acting type

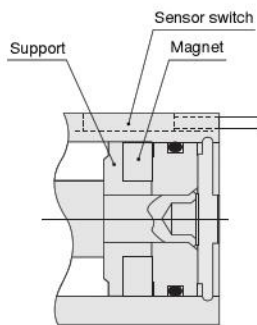
●  $\phi 12$  [0.472in.]~ $\phi 25$  [0.984in.]



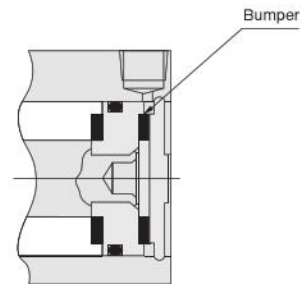
●  $\phi 32$  [1.260in.]~ $\phi 50$  [1.969in.]



### ● Cylinder with magnet



### ● With bumper



## Major Parts and Materials

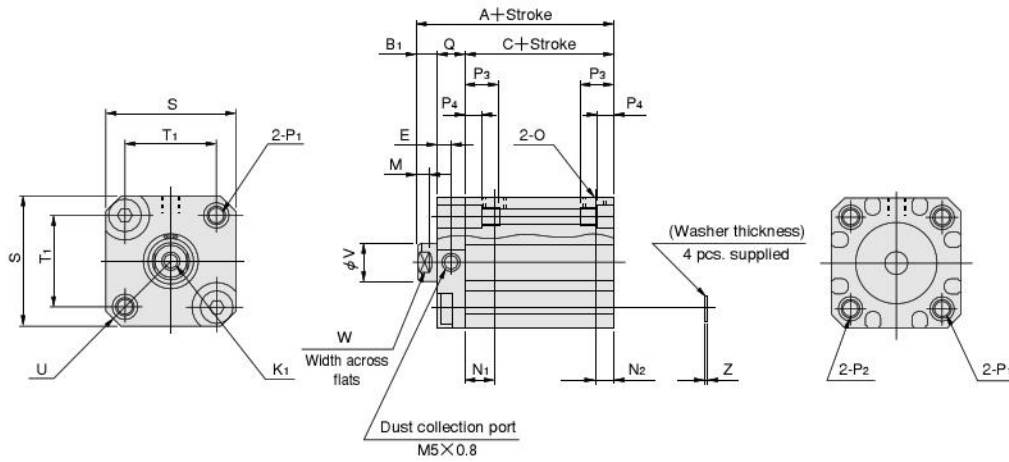
Parts	Materials
Cylinder body	Aluminum alloy (anodized)
Piston	Aluminum alloy (special rust prevention treatment)
Piston rod	Stainless steel (chrome plated)
Seal	Synthetic rubber (NBR)
Rod cover	Aluminum alloy (special wear-resistant treatment)
Head cover	Aluminum alloy (anodized)
Snap ring	Steel (nickel plated)
Spacer	Aluminum alloy (special rust prevention treatment)
Bumper	Synthetic rubber (NBR)
Magnet	Plastic magnet
Support	Aluminum alloy (special rust prevention treatment)

## Seals

Bore mm	Parts	Rod seal (2 pcs.)	Piston seal	Tube gasket	
				Rod side	Head side
12		MYR-6	PSD-12	Y090260	None
16		MYR-8	PSD-16	Y090207	None
20		MYR-10	PSD-20	Y090216	None
25		MYR-12	PSD-25	Y090210	None
32		MYR-16	PSD-32	L090084	None
40		MYR-16	PSD-40	L090151	None
50		MYR-20	PSD-50	L090174	L090106

# Dimensions mm [in.]

●  $\phi 12 \sim \phi 25$

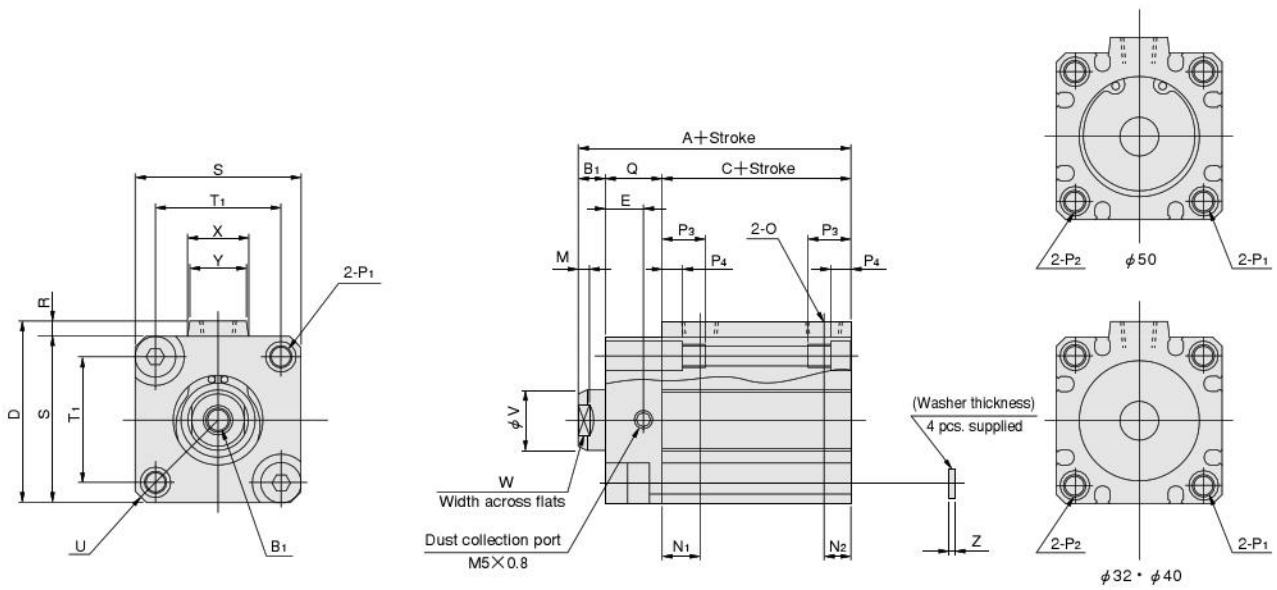


Bore size	Type Code	Standard cylinder (CDA)			Cylinder with magnet (CDAS)			Standard cylinder with bumper (CDA-R)			Cylinder with magnet and bumper (CDAS-R)			E	K <sub>1</sub>	M	N <sub>1</sub>	N <sub>2</sub>	O
		A	B <sub>1</sub>	C	A	B <sub>1</sub>	C	A	B <sub>1</sub>	C	A	B <sub>1</sub>	C						
12 [0.472]		32 [1.260]	5 [0.197]	17 [0.669]	37 [1.457]	5 [0.197]	22 [0.866]	37 [1.457]	5 [0.197]	22 [0.866]	42 [1.654]	5 [0.197]	27 [1.063]	5 [0.197]	M3 x 0.5 Depth 6 [0.236]	3 [0.118]	8 [0.315]	5 [0.197]	M5 x 0.8
16 [0.630]		32.5 [1.280]	5.5 [0.217]	17 [0.669]	37.5 [1.476]	5.5 [0.217]	22 [0.866]	37.5 [1.476]	5.5 [0.217]	22 [0.866]	42.5 [1.673]	5.5 [0.217]	27 [1.063]	5 [0.197]	M4 x 0.7 Depth 8 [0.315]	3 [0.118]	8 [0.315]	5 [0.197]	M5 x 0.8
20 [0.787]		35 [1.378]	5.5 [0.217]	19.5 [0.768]	45 [1.772]	5.5 [0.217]	29.5 [1.161]	40 [1.575]	5.5 [0.217]	24.5 [0.965]	50 [1.969]	5.5 [0.217]	34.5 [1.358]	5 [0.197]	M5 x 0.8 Depth 10 [0.394]	3 [0.118]	10.5 [0.413]	5 [0.197]	M5 x 0.8
25 [0.984]		42 [1.654]	6 [0.236]	21 [0.827]	52 [2.047]	6 [0.236]	31 [1.220]	47 [1.850]	6 [0.236]	26 [1.024]	57 [2.244]	6 [0.236]	36 [1.417]	10 [0.394]	M6 x 1 Depth 10 [0.394]	3 [0.118]	10.5 [0.413]	5 [0.197]	M5 x 0.8

Bore size	Code	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	Q	S	T <sub>1</sub>	U	V	W	Z
12 [0.472]		$\phi 4.3$ [0.169] (Thru hole) Counterbore $\phi 6.5$ [0.256] (Both sides) and M5 x 0.8 (Both sides)	Counterbore $\phi 6.5$ [0.256] and M5 x 0.8	9.5 [0.374]	4.5 [0.177]	10 [0.394]	25 [0.984]	16.3 [0.642]	R16 [0.630]	6 [0.236]	5 [0.197]	1 [0.039]
16 [0.630]		$\phi 4.3$ [0.169] (Thru hole) Counterbore $\phi 6.5$ [0.256] (Both sides) and M5 x 0.8 (Both sides)	Counterbore $\phi 6.5$ [0.256] and M5 x 0.8	9.5 [0.374]	4.5 [0.177]	10 [0.394]	29 [1.142]	19.8 [0.780]	R19 [0.748]	8 [0.315]	6 [0.236]	1 [0.039]
20 [0.787]		$\phi 4.3$ [0.169] (Thru hole) Counterbore $\phi 6.5$ [0.256] (Both sides) and M5 x 0.8 (Both sides)	Counterbore $\phi 6.5$ [0.256] and M5 x 0.8	9.5 [0.374]	4.5 [0.177]	10 [0.394]	34 [1.339]	24 [0.945]	R22 [0.866]	10 [0.394]	8 [0.315]	1 [0.039]
25 [0.984]		$\phi 5.1$ [0.201] (Thru hole) Counterbore $\phi 8$ [0.315] (Both sides) and M6 x 1 (Both sides)	Counterbore $\phi 8$ [0.315] and M6 x 1	11.5 [0.453]	5.5 [0.217]	15 [0.591]	40 [1.575]	28 [1.102]	R25 [0.984]	12 [0.472]	10 [0.394]	1 [0.039]

# Dimensions mm [in.]

●  $\phi 32 \sim \phi 50$



Bore size	Type Code	Standard cylinder (CDA)			Cylinder with magnet (CDAS)			Standard cylinder with bumper (CDA-R)			Cylinder with magnet and bumper (CDAS-R)			D	E	K <sub>1</sub>	M	N <sub>1</sub>	N <sub>2</sub>
		A	B <sub>1</sub>	C	A	B <sub>1</sub>	C	A	B <sub>1</sub>	C	A	B <sub>1</sub>	C						
32 [1.260]		45 [1.772]	7 [0.276]	23 [0.906]	55 [2.165]	7 [0.276]	33 [1.299]	50 [1.969]	7 [0.276]	28 [1.102]	55 [2.165]	7 [0.276]	33 [1.299]	48.5 [1.909]	10 [0.394]	M8×1.25 Depth12 [0.472]	3 [0.118]	10 [0.394] 9.5 [0.374]	7 [0.276] 6 [0.236]
40 [1.575]		48 [1.890]	7 [0.276]	26 [1.024]	58 [2.283]	7 [0.276]	36 [1.417]	48 [1.890]	7 [0.276]	26 [1.024]	58 [2.283]	7 [0.276]	36 [1.417]	56.5 [2.224]	10 [0.394]	M8×1.25 Depth12 [0.472]	3 [0.118]	10.5 [0.413]	7 [0.276]
50 [1.969]		52 [2.047]	9 [0.354]	28 [1.102]	62 [2.441]	9 [0.354]	38 [1.496]	52 [2.047]	9 [0.354]	28 [1.102]	62 [2.441]	9 [0.354]	38 [1.496]	70 [2.756]	10 [0.394]	M10×1.5 Depth15 [0.591]	3 [0.118]	11 [0.433]	9.5 [0.374]

Bore size	Code	O	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	Q	R	S	T <sub>1</sub>	U	V
32 [1.260]		Rc1/8	$\phi 5.1$ [0.201] (Thru hole) Counterbore $\phi 8$ [0.315] (Both sides) and M6×1 (Both sides)	Counterbore $\phi 8$ [0.315] and M6×1	11.5 [0.453]	5.5 [0.217]	15 [0.591]	4.5 [0.177]	44 [1.732]	34 [1.339]	R29.5 [1.161]	16 [0.630]
40 [1.575]		Rc1/8	$\phi 6.9$ [0.272] (Thru hole) Counterbore $\phi 9.5$ [0.374] (Both sides) and M5×1.25 (Both sides)	Counterbore $\phi 9.5$ [0.374] and M5×1.25	15.5 [0.610]	7.5 [0.295]	15 [0.591]	4.5 [0.177]	52 [2.047]	40 [1.575]	R35 [1.378]	16 [0.630]
50 [1.969]		Rc1/4	$\phi 6.9$ [0.272] (Thru hole) Counterbore $\phi 11$ [0.433] (Both sides) and M5×1.25 (Both sides)	Counterbore $\phi 11$ [0.433] and M5×1.25	16.5 [0.650]	8.5 [0.335]	15 [0.591]	8 [0.315]	62 [2.441]	48 [1.890]	R41 [1.614]	20 [0.787]

Bore size	Code	W	X	Y	Z
32 [1.260]		14 [0.551]	15 [0.591]	13.6 [0.535]	1 [0.039]
40 [1.575]		14 [0.551]	15 [0.591]	13.6 [0.535]	1.6 [0.063]
50 [1.969]		17 [0.669]	21.6 [0.850]	19 [0.748]	1.6 [0.063]

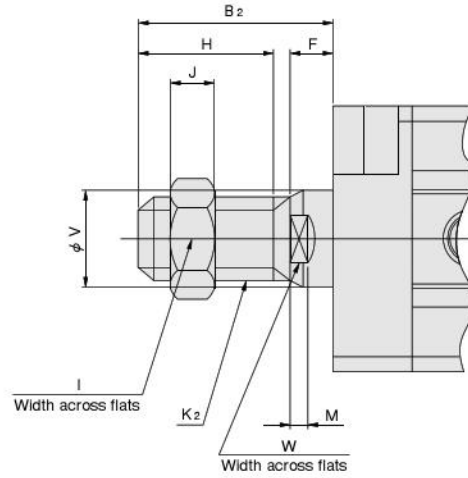
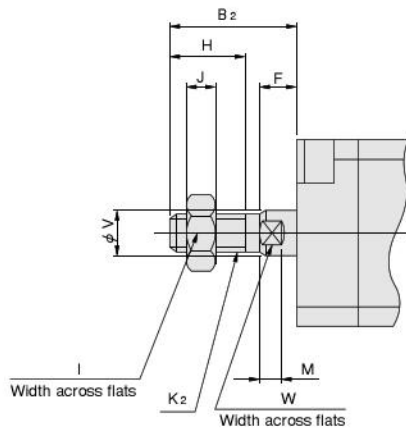
Note: Figures in parentheses ( ) are for the cylinder with 5mm [0.197in.] stroke.

## Dimensions of Male Rod End Thread Specification mm [in.]

● Double acting type

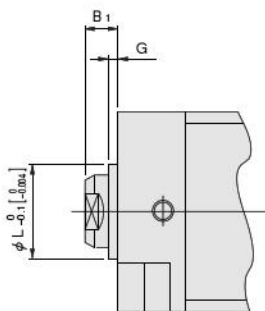
●  $\phi 12$  [0.472]~ $\phi 25$  [0.984]

●  $\phi 32$  [1.260]~ $\phi 50$  [1.969]



Bore size	Code	B <sub>2</sub>	F	H	I	J	K <sub>2</sub>	M	V	W
12	[0.472]	17 [0.669]	5 [0.197]	10 [0.394]	8 [0.315]	4 [0.157]	M5×0.8	3 [0.118]	6 [0.236]	5 [0.197]
16	[0.630]	20.5 [0.807]	5.5 [0.217]	13 [0.512]	10 [0.394]	5 [0.197]	M6×1	3 [0.118]	8 [0.315]	6 [0.236]
20	[0.787]	22.5 [0.886]	5.5 [0.217]	15 [0.591]	12 [0.472]	5 [0.197]	M8×1	3 [0.118]	10 [0.394]	8 [0.315]
25	[0.984]	24 [0.945]	6 [0.236]	15 [0.591]	14 [0.551]	6 [0.236]	M10×1.25	3 [0.118]	12 [0.472]	10 [0.394]
32	[1.260]	35 [1.378]	7 [0.276]	25 [0.984]	19 [0.748]	8 [0.315]	M14×1.5	3 [0.118]	16 [0.630]	14 [0.551]
40	[1.575]	35 [1.378]	7 [0.276]	25 [0.984]	19 [0.748]	8 [0.315]	M14×1.5	3 [0.118]	16 [0.630]	14 [0.551]
50	[1.969]	37 [1.457]	9 [0.354]	25 [0.984]	27 [1.063]	11 [0.433]	M18×1.5	3 [0.118]	20 [0.787]	17 [0.669]

## Dimensions of Centering Location mm [in.]



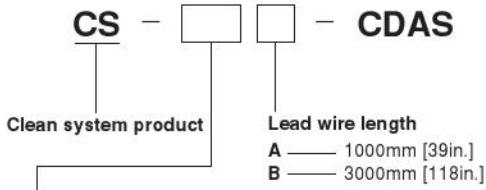
● Not available for bore size  $\phi 12$  [0.472].

Bore size	Code	B <sub>1</sub>	G	L
16	[0.630]	5.5 [0.217]	1.5 [0.059]	9.4 [0.370]
20	[0.787]	5.5 [0.217]	1.5 [0.059]	12 [0.472]
25	[0.984]	6 [0.236]	2 [0.079]	15 [0.591]
32	[1.260]	7 [0.276]	2 [0.079]	21 [0.827]
40	[1.575]	7 [0.276]	2 [0.079]	29 [1.142]
50	[1.969]	9 [0.354]	2 [0.079]	38 [1.496]

# JIG CYLINDERS C SERIES

## Sensor Switches

### Order Codes (for Sensor Switches Only)



#### Sensor switch

ZE135	Solid state type	with indicator lamp	DC10V~28V	Horizontal lead wire
ZE235	Solid state type	with indicator lamp	DC10V~28V	Vertical lead wire
ZE101	Reed switch type	without indicator lamp	DC5V~28V AC85~115V	Horizontal lead wire
ZE201	Reed switch type	without indicator lamp	DC5V~28V AC85~115V	Vertical lead wire

ZE155	Solid state type	with indicator lamp	DC4.5V~28V	Horizontal lead wire
ZE255	Solid state type	with indicator lamp	DC4.5V~28V	Vertical lead wire
ZE102	Reed switch type	with indicator lamp	DC10V~28V AC85~115V	Horizontal lead wire
ZE202	Reed switch type	with indicator lamp	DC10V~28V AC85~115V	Vertical lead wire

### Minimum Cylinder Strokes When Mounting Sensor Switches

#### ● Solid state type

Bore size	2 pcs. mounting <sup>Note</sup>		1 pc. mounting
	1-surface mounting	2-surface mounting	
12 [0.472]	30 [1.181]	10 [0.394]	5 [0.197]
16~100 [0.630~3.937]	10 [0.394]		

Note: Two pieces can be mounted with 5mm [0.197in.] stroke.  
 Take note that overlapping may occur, however.

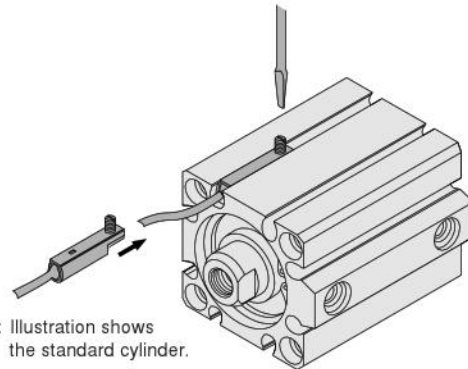
#### ● Reed switch type

Bore size	2 pcs. mounting		1 pc. mounting
	1-surface mounting	2-surface mounting	
12 [0.472]	30 [1.181]	10 [0.394]	10 [0.394]
16~100 [0.630~3.937]	10 [0.394]		

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

### Moving Sensor Switch

- Loosening the mounting screw allows the sensor switch to be moved along the switch mounting groove on the cylinder body.
- Tighten the mounting screw with a tightening torque of 0.1~0.2N·m [0.9~1.8in·lbf].



Note: Illustration shows the standard cylinder.

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

#### ● Operating range : $\ell$

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.

#### ● Solid state type

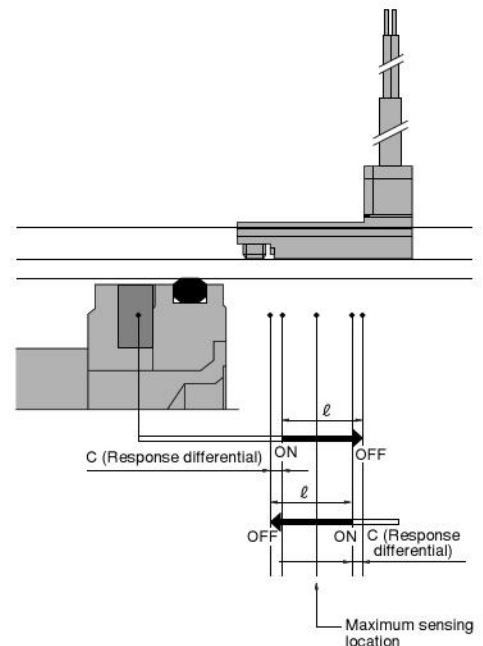
Item	Bore	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]	50 [1.969]	63 [2.480]	80 [3.150]	100 [3.937]
Operating range : $\ell$		2~4 [0.079~0.157]	2~5 [0.079~0.197]	3.5~7.5 [0.138~0.295]	4~8 [0.157~0.315]	3~7 [0.118~0.278]	3.5~7.5 [0.138~0.295]	3.5~7.5 [0.138~0.295]	4~8.5 [0.157~0.335]	4.5~9.5 [0.177~0.374]	4.5~9.0 [0.177~0.354]
Response differential : C		1.0 [0.039] or less								1.5 [0.059] or less	
Maximum sensing location		6 [0.236]									

Remark: The above table shows reference values.

#### ● Reed switch type

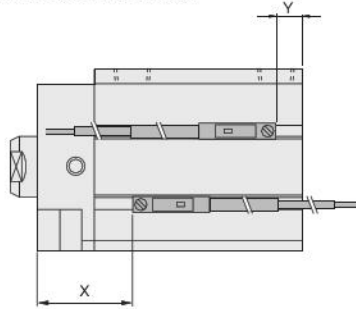
Item	Bore	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]	50 [1.969]	63 [2.480]	80 [3.150]	100 [3.937]	
Operating range : $\ell$		4.5~8.5 [0.177~0.335]	5.5~9.5 [0.217~0.374]	9~13.5 [0.354~0.531]	10~15.5 [0.394~0.610]	8~12 [0.315~0.472]	8.5~14 [0.335~0.551]	9~15 [0.354~0.591]	10~16 [0.394~0.630]	11~16 [0.433~0.630]	11~16.5 [0.433~0.650]	
Response differential : C		1.0 [0.039] or less	2.0 [0.079] or less								3.0 [0.118] or less	2.5 [0.098] or less
Maximum sensing location		10 [0.394]										

Remark: The above table shows reference values.



## Mounting Location of End of Stroke Detection Sensor Switch

When the sensor switch is mounted in the location shown in the diagram 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.



### ■ Solid state type

#### ● Double acting type

mm [in.]

Code	Bore	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]	50 [1.969]
X	Standard type	17 [0.669]	17 [0.669]	21 [0.827]	26 [1.024]	28.5 [1.122]	29.5 [1.161]	27.5 [1.083]
	With bumper (-R)	20 [0.787]	20 [0.787]	25 [0.984]	31 [1.220]	30.5 [1.201]	31.5 [1.240]	30.5 [1.201]
Y	Standard type	4 [0.157]	4 [0.157]	7.5 [0.295]	9 [0.354]	8.5 [0.335]	10.5 [0.413]	14.5 [0.571]
	With bumper (-R)	6 [0.236]	6 [0.236]	8.5 [0.335]	9 [0.354]	6.5 [0.256]	8.5 [0.335]	11.5 [0.453]

### ■ Reed switch type

#### ● Double acting type

mm [in.]

Code	Bore	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]	50 [1.969]
X	Standard type	12.5 [0.492]	12.5 [0.492]	16.5 [0.650]	21.5 [0.846]	24 [0.945]	25 [0.984]	23 [0.906]
	With bumper (-R)	15.5 [0.610]	15.5 [0.610]	20.5 [0.807]	26.5 [1.043]	26 [1.024]	27 [1.063]	26 [1.024]
Y	Standard type	-0.5 [-0.020]	-0.5 [-0.020]	3 [0.118]	4.5 [0.177]	4 [0.157]	6 [0.236]	10 [0.394]
	With bumper (-R)	1.5 [0.059]	1.5 [0.059]	4 [0.157]	4.5 [0.177]	2 [0.079]	4 [0.157]	7 [0.276]