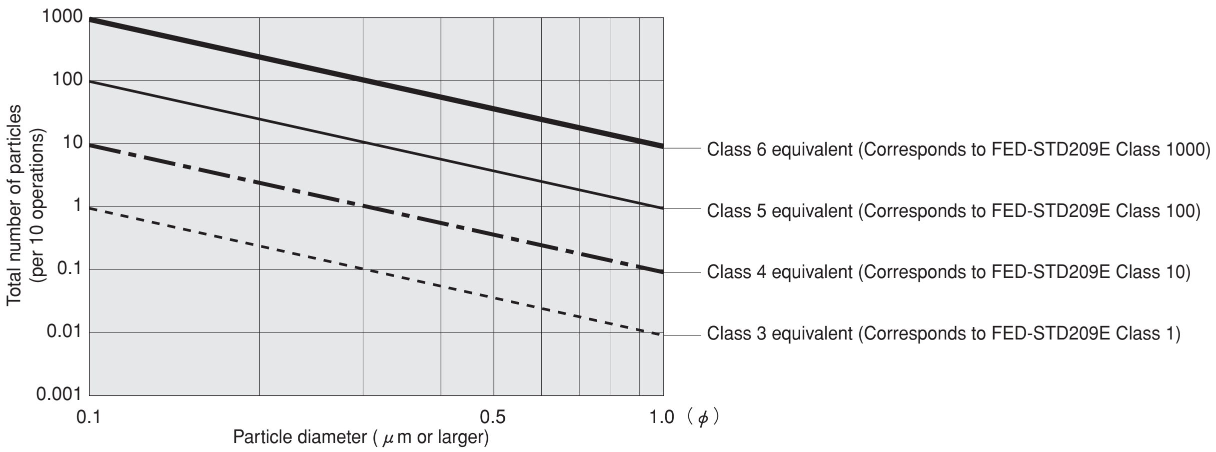
Koganei Clean System products provide complete support for the maintenance of a clean environment inside the cleanroom.

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)

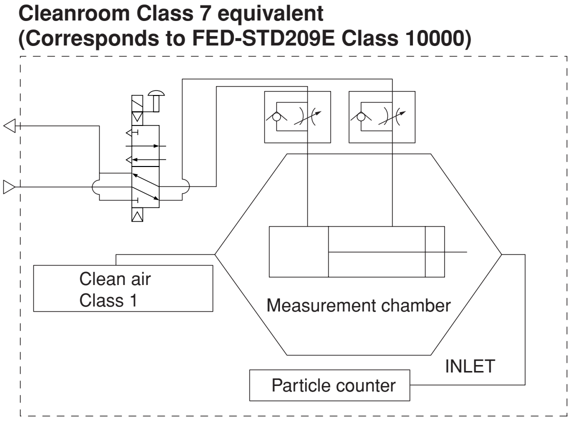


Figure 1 (no suction from dust collection port)

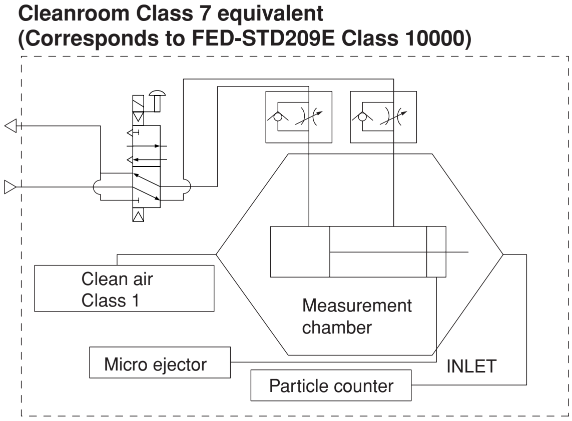


Figure 2 (with suction from dust collection port)

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.

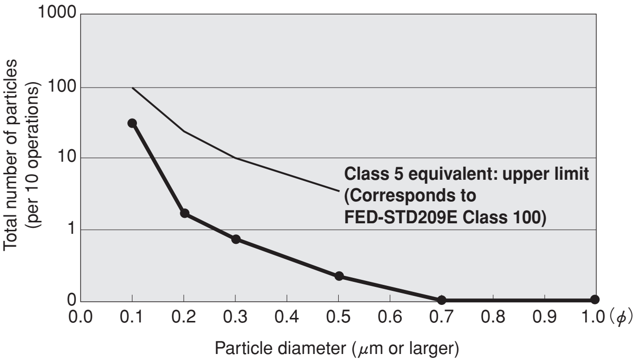
3-2 Measurement under operation
Under the conditions in the above1 and 2, operating the measurement sample for 36 minutes, and measured the total values in the latter half of 18 minutes test.

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

4. Measurement results

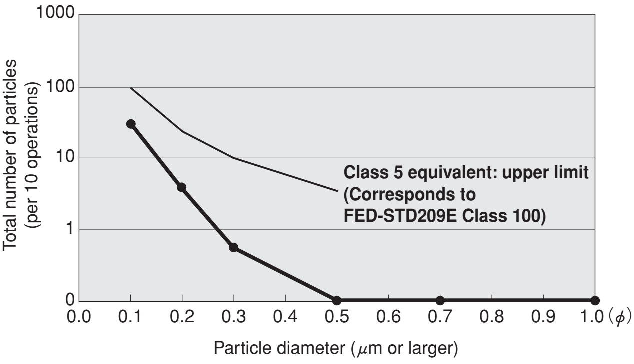
● **Cleanroom specification**
Jig Cylinder (no suction from dust collection port)

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.

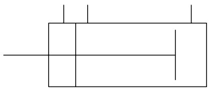
- For actuators, see “Safety Precautions” on p. 45 of the Actuators General Catalog .
- For valves, see “Safety Precautions” on p. 31 of the Valves General Catalog.
- For air treatment and auxiliary equipment, see “Safety Precautions” on p.31 of the General Catalog of Air Treatment, Auxiliary, Vacuum.

KOGANEI CLEAN SYSTEM

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

mm [in.]

Operating type	Bore size	Standard strokes: Standard cylinder	Standard strokes: Cylinder with magnet
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 $^{+1}_{0}$ $[^{+0.039}_{0}]$

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 ϕ 12 [0.472]～ϕ 40 [1.575], and strokes of 10mm [0.394in.] or less for ϕ 50 [1.969]. The collar packed is used for these cases.

Order Codes

CS – CDA □ 20×30 – □ – □ – □ – □ – □ □ □

- **Clean system product**: CS
- **Jig cylinder double acting type**: CDA
- **Cylinder specification** Note1
  - **Blank** : Standard cylinder
  - **S** : Cylinder with magnet
- **Bore size** Note3 × **Stroke**
- **Rod end specification**
  - **Blank** : Female rod thread
  - **B** : Male rod thread
- **Bumper**
  - **Blank** : Without bumper
  - **R** : With bumper
- **Centering location**
  - **Blank** : Without centering location
  - **G** : With centering location
- **Mounting type** Note4
  - **Blank** : Basic type
  - **1** : Foot mounting type
  - **3** : Flange mounting type Note2
- **Sensor switch** (For cylinder with magnet)
  - **Blank** : Without 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 sensor switches, see p.111~121.
- **Lead wire length**
  - **A** : 1000mm [39in.]
  - **B** : 3000mm [118in.]
- **Number of sensor switches** (For cylinder with magnet)
  - **Blank** : Without sensor switch
  - **1** : With 1 sensor switch
  - **2** : With 2 sensor switches

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.

Order Codes of Additional Parts (To be ordered separately)

●Mounting Brackets Only

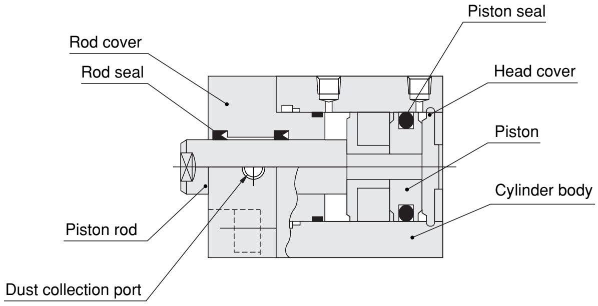
CS – □ – CDA □

- **Clean system product**: CS
- **Mounting bracket**
  - **1** : Foot mounting bracket (1 set: 2 pcs.)
  - **3** : Flange mounting bracket
- **Bore size** ϕ 12~50

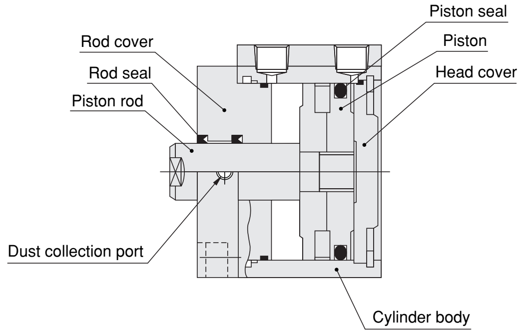
Inner Construction and Major Parts

●Double acting type

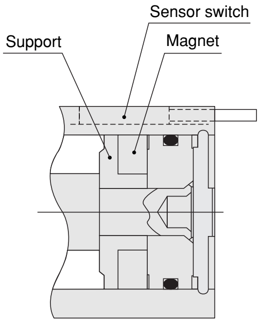
●φ12 [0.472in.]～φ25 [0.984in.]



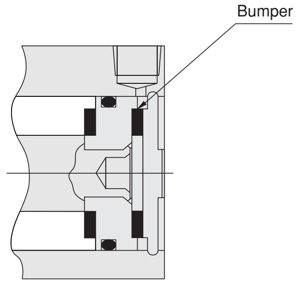
●φ32 [1.260in.]～φ50 [1.969in.]



●Cylinder with magnet



●With bumper



Major Parts and Materials

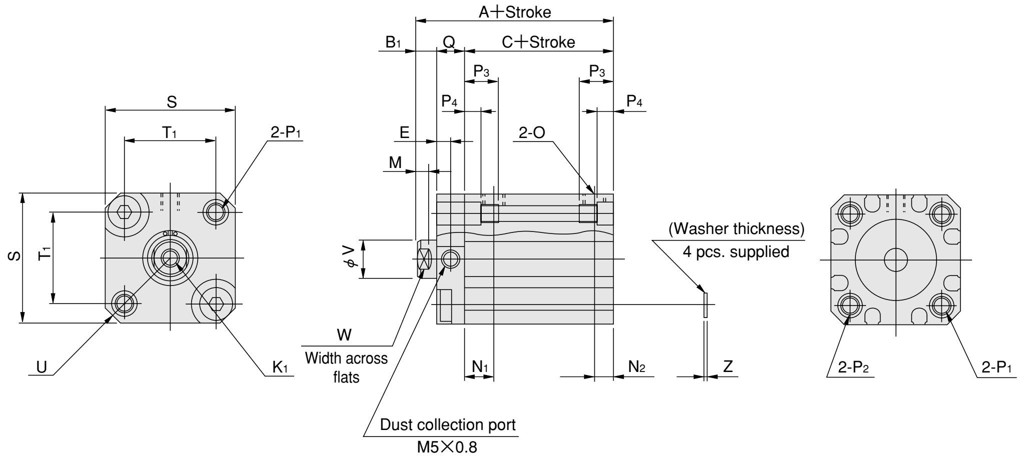
Parts	Materials
Cylinder body	Aluminum alloy (anodized)
Piston	Aluminum alloy (special rust prevention treatment)
Piston rod	Stainless steel (chrome plated)
Seal	Synthetic rubber (NBR)
Rod cover	Aluminum alloy (special wear-resistant treatment)
Head cover	Aluminum alloy (anodized)
Snap ring	Steel (nickel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

Seals

Parts / Bore mm	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.]

●φ12～φ25

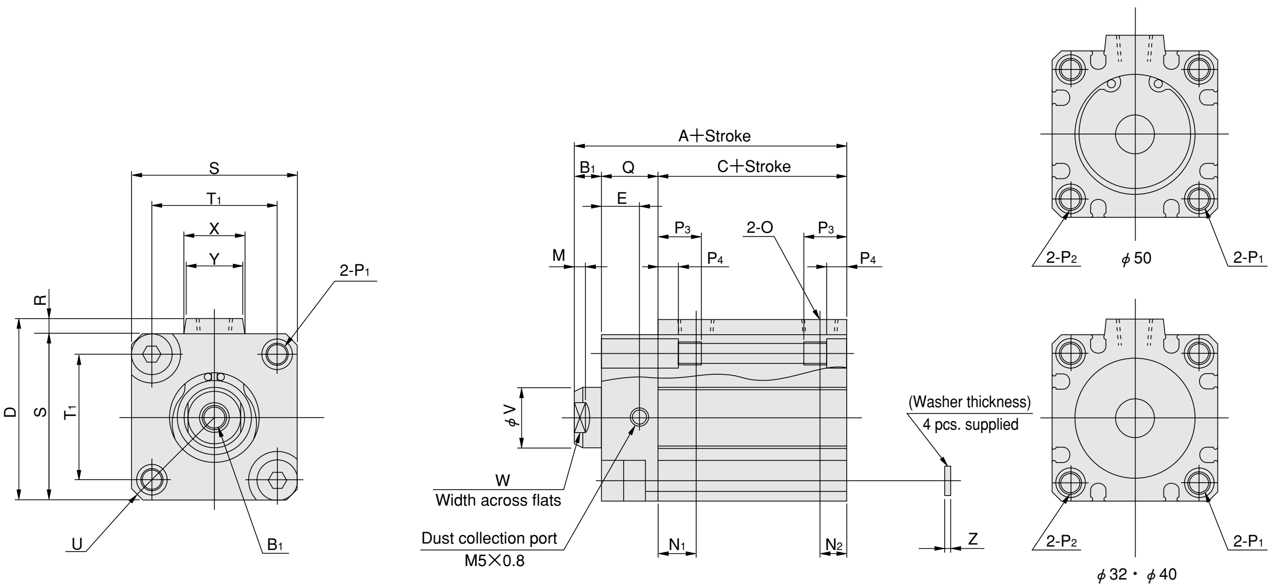


Bore size \ Type / Code	Standard cylinder **(CDA)**			Cylinder with magnet **(CDAS)**			Standard cylinder with bumper **(CDA-R)**			Cylinder with magnet and bumper **(CDAS-R)**			E	K_1	M	N_1	N_2	O
	A	B_1	C	A	B_1	C	A	B_1	C	A	B_1	C						
12 [0.472]	32 [1.260]	5 [0.197]	17 [0.669]	37 [1.457]	5 [0.197]	22 [0.866]	37 [1.457]	5 [0.197]	22 [0.866]	42 [1.654]	5 [0.197]	27 [1.063]	5 [0.197]	M3×0.5 Depth 6 [0.236]	3 [0.118]	8 [0.315]	5 [0.197]	M5×0.8
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]	M4×0.7 Depth8 [0.315]	3 [0.118]	8 [0.315]	5 [0.197]	M5×0.8
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]	M5×0.8 Depth10 [0.394]	3 [0.118]	10.5 [0.413]	5 [0.197]	M5×0.8
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]	M6×1 Depth10 [0.394]	3 [0.118]	10.5 [0.413]	5 [0.197]	M5×0.8

Bore size \ Code	P_1	P_2	P_3	P_4	Q	S	T_1	U	V	W	Z
12 [0.472]	φ 4.3 [0.169] (Thru hole) Counterbore φ 6.5 [0.256] (Both sides) and M5×0.8 (Both sides)	Counterbore φ 6.5 [0.256] and M5×0.8	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]	φ 4.3 [0.169] (Thru hole) Counterbore φ 6.5 [0.256] (Both sides) and M5×0.8 (Both sides)	Counterbore φ 6.5 [0.256] and M5×0.8	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]	φ 4.3 [0.169] (Thru hole) Counterbore φ 6.5 [0.256] (Both sides) and M5×0.8 (Both sides)	Counterbore φ 6.5 [0.256] and M5×0.8	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]	φ 5.1 [0.201] (Thru hole) Counterbore φ 8 [0.315] (Both sides) and M6×1 (Both sides)	Counterbore φ 8 [0.315] and M6×1	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.]

●φ32～φ50



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_1	M	N_1	N_2
	A	B_1	C	A	B_1	C	A	B_1	C	A	B_1	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_1	P_2	P_3	P_4	Q	R	S	T_1	U	V
32 [1.260]	Rc1/8	φ5.1 [0.201] (Thru hole) Counterbore φ8 [0.315] (Both sides) and M6×1 (Both sides)	Counterbore φ8 [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	φ6.9 [0.272] (Thru hole) Counterbore φ9.5 [0.374] (Both sides) and M5×1.25 (Both sides)	Counterbore φ9.5 [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	φ6.9 [0.272] (Thru hole) Counterbore φ11 [0.433] (Both sides) and M5×1.25 (Both sides)	Counterbore φ11 [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]

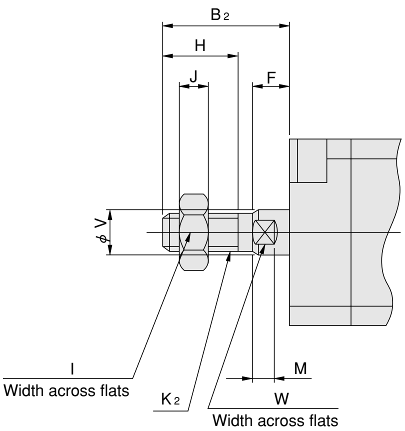
Bore size \ Code	W	X	Y	Z
32 [1.260]	14 [0.551]	15 [0.591]	13.6 [0.535]	1 [0.039]
40 [1.575]	14 [0.551]	15 [0.591]	13.6 [0.535]	1.6 [0.063]
50 [1.969]	17 [0.669]	21.6 [0.850]	19 [0.748]	1.6 [0.063]

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

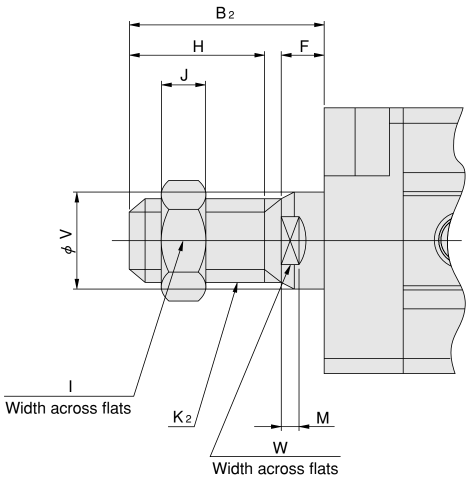
Dimensions of Male Rod End Thread Specification mm [in.]

● Double acting type

● φ12 [0.472]～φ25 [0.984]

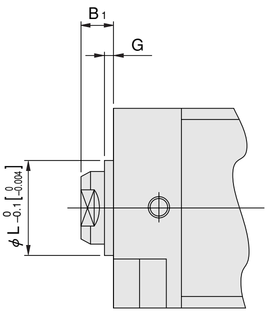


● φ32 [1.260]～φ50 [1.969]



Bore size \ Code	B_2	F	H	I	J	K_2	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 φ 12 [0.472].

Bore size \ Code	B_1	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]

Order Codes (for Sensor Switches Only)

CS – [ ] [ ] – **CDAS**

Clean system product

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

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

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

Minimum Cylinder Strokes When Mounting Sensor Switches

●Solid state type

mm [in.]

Bore size	2 pcs. mounting Note		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.

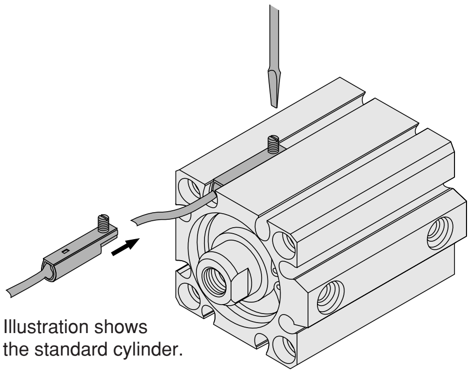
●Reed switch type

mm [in.]

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]		

Moving Sensor Switch

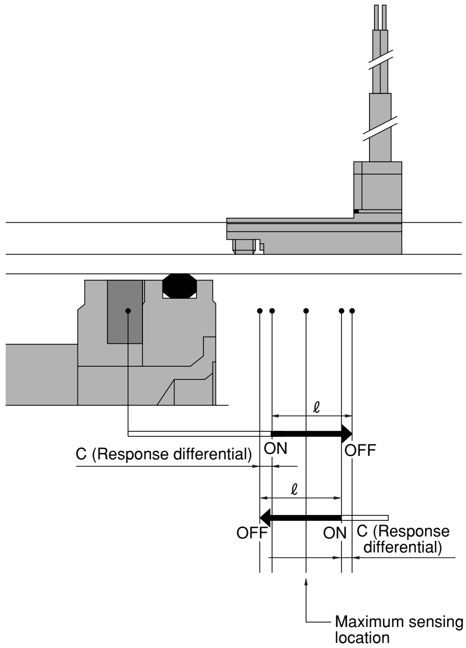
- ● Loosening the mounting screw allows the sensor switch to be moved along the switch mounting groove on the cylinder body.
- ● Tighten the mounting screw with a tightening torque of 0.1～0.2N·m [0.9～1.8in·lbf].



Note: Illustration shows the standard cylinder.

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

● Operating range : 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.



●Solid state type

mm [in.]

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 : ℓ	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 [0.118～0.276]	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

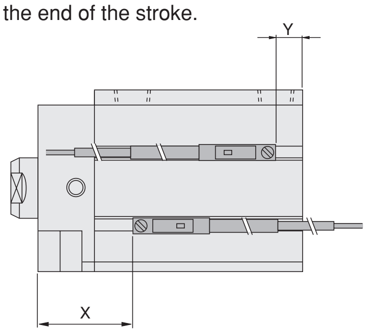
mm [in.]

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 : ℓ	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]

KOGANEI

ACTUATORS GENERAL CATALOG

JIG CYLINDERS C SERIES
LOW-FRICTION CYLINDER

Low friction cylinders

INDEX

RoHS directive compliant products

⚠CAUTION **Before use, be sure to read the safety precautions at the front of the general personal catalog.**

JIG CYLINDERS C SERIES
Low friction cylinders

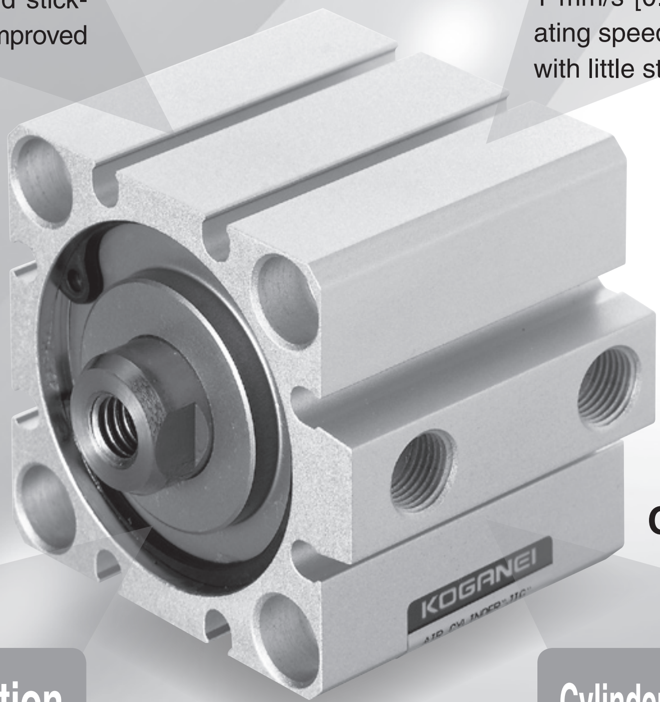
New C Series jig cylinders that provide both low pressure operation and low speed operation.
Minimum operating pressure from 0.01 MPa [1 psi], minimum operating speed of 1 mm/s [0.039 in/sec].

Low friction

Low sliding friction and reduced stick-slip following non-operation for improved response delay.
Support for pressing pressure control, tension control, etc.

Low-speed operation

1 mm/s [0.039 in/sec] minimum operating speed provides smooth operation with little stick-slip.



CDAZ □

Low-pressure operation

Minimum operating pressure from 0.01 ～0.1 MPa [1～15 psi].

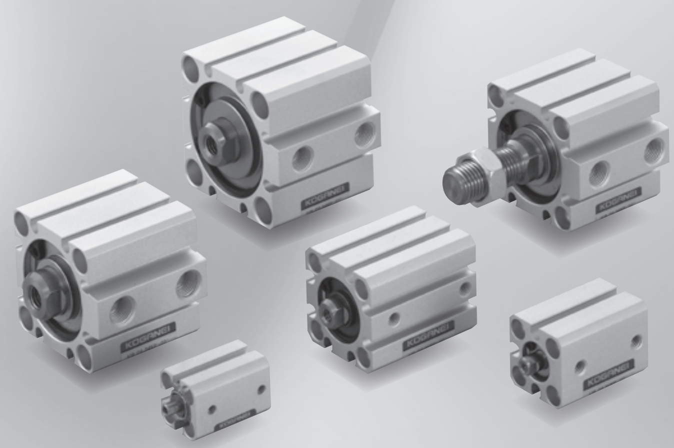
Cylinder bore mm [in]	Minimum operating pressure (MPa [psi])
6 [0.236]	0.1 [15]
8 [0.315]	0.06 [9]
10 [0.394]	0.03 [4]
12 [0.472]	0.03 [4]
16 [0.630]	0.02 [3]
20 [0.787]	0.02 [3]
25 [0.984]	0.02 [3]
32 [1.260]	0.01 [1]
40 [1.575]	0.01 [1]

(Measurement method: JIS B8377-1 standard)

The same applies to the clean specification.

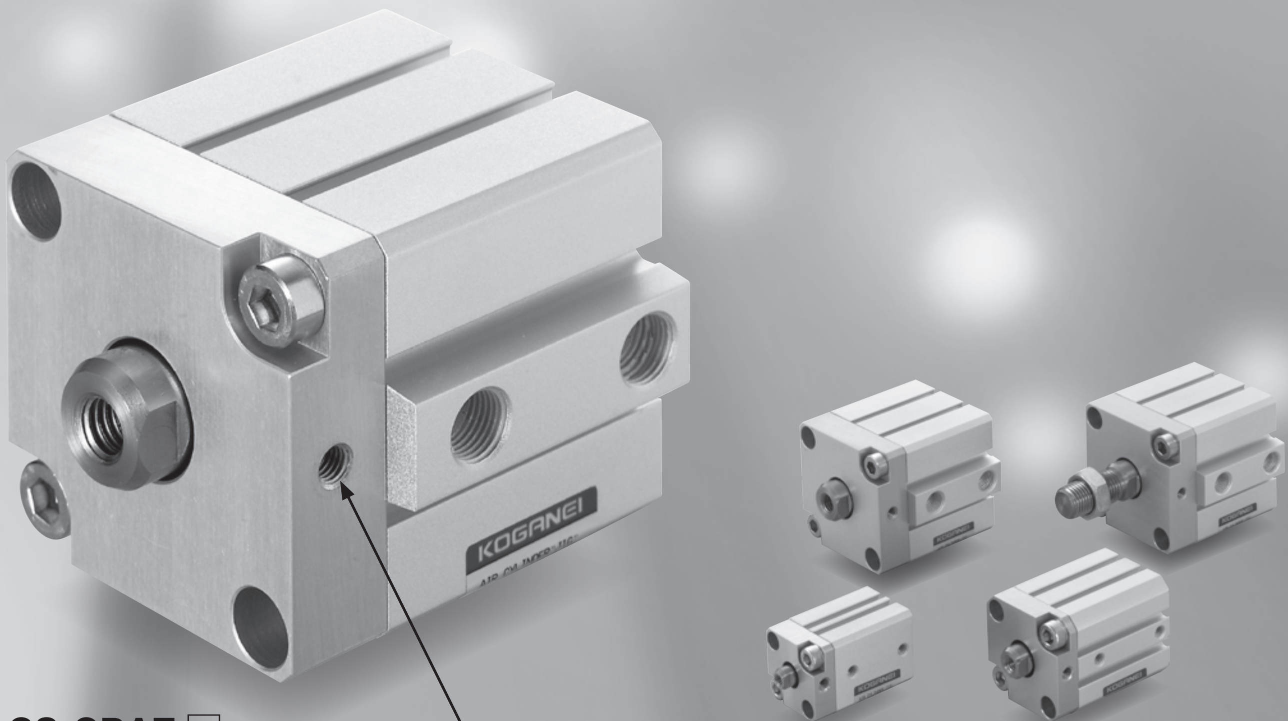
Cylinder bores from φ 6 [0.236]

Bores from φ6 [0.236] to φ40 [1.575] meet a wide range of needs.



Clean specification low friction cylinders

JIS/ISO Class 4 equivalent cleanliness (FED-STD Class 10 equivalent) clean specification also available (based on Koganei standards).



CS-CDAZ □

Dust collection port

Low friction cylinders, clean specification low-friction cylinders

Bore size and stroke (mm [in])

Cylinder bore	Standard stroke											
6 [0.236]	5 [0.197]	10 [0.394]	15 [0.591]	20 [0.787]	—	—	—	—	—	—	—	—
8 [0.315]	5 [0.197]	10 [0.394]	15 [0.591]	20 [0.787]	—	—	—	—	—	—	—	—
10 [0.394]	5 [0.197]	10 [0.394]	15 [0.591]	20 [0.787]	—	—	—	—	—	—	—	—
12 [0.472]	5 [0.197]	10 [0.394]	15 [0.591]	20 [0.787]	25 [0.984]	30 [1.181]	—	—	—	—	—	—
16 [0.630]	5 [0.197]	10 [0.394]	15 [0.591]	20 [0.787]	25 [0.984]	30 [1.181]	—	—	—	—	—	—
20 [0.787]	5 [0.197]	10 [0.394]	15 [0.591]	20 [0.787]	25 [0.984]	30 [1.181]	35 [1.378]	40 [1.575]	45 [1.772]	50 [1.969]	—	—
25 [0.984]	5 [0.197]	10 [0.394]	15 [0.591]	20 [0.787]	25 [0.984]	30 [1.181]	35 [1.378]	40 [1.575]	45 [1.772]	50 [1.969]	—	—
32 [1.260]	5 [0.197]	10 [0.394]	15 [0.591]	20 [0.787]	25 [0.984]	30 [1.181]	35 [1.378]	40 [1.575]	45 [1.772]	50 [1.969]	75 [2.953]	100 [3.9]
40 [1.575]	5 [0.197]	10 [0.394]	15 [0.591]	20 [0.787]	25 [0.984]	30 [1.181]	35 [1.378]	40 [1.575]	45 [1.772]	50 [1.969]	75 [2.953]	100 [3.9]

⚠ CAUTION

- Be sure to thoroughly wash your hands following contact with the grease used for low friction cylinders and clean specification low friction cylinders. Grease on the hands can become heated when smoking and can cause grease to adhere to the cigarette, which creates the risk of noxious gas being emitted when the grease burns. Grease that is used on the outside is chemically very stable at normal temperatures, but generates noxious gas at temperatures above 260℃ [500 ˚F].
  Before use, be sure to read the safety precautions at the front of the general personal catalog.
- Low friction cylinders, clean specification low-friction cylinders are not non-ion specification.

General precautions

Air supply

1. Use air as the media. For the use of any other medium, consult your nearest Koganei sales office.
2. Air to operate the cylinder should be clean air that contains no degraded compressor oil, etc. Install an air filter (filtration of 40 μm or less) near the cylinder or valve to remove dust and accumulated liquid. Also drain the air filter periodically. If liquid or dust gets into the cylinder, it may cause defective operation.

Piping

Before installing piping to the cylinder, thoroughly flush the inside of the pipes (with compressed air). Machining chips, sealing tape, rust and other debris remaining from the piping work may result in air leaks and malfunctions.

Atmosphere

1. Cover the unit when using it in locations where it might be subject to excessive dust, dripping water, dripping oil, etc.
2. This product cannot be used if the medium or ambient atmosphere includes any of the substances below. Organic solvents, phosphate type hydraulic oil, sulfur dioxide gas, chlorine gas, acids, or ozone.

Lubrication

Do not supply oil.

Bracket mounting

1. A foot bracket cannot be mounted on a low friction cylinder with spigot joint that has a cylinder bore of ϕ 40 [1.575] (**-G**). Cannot be mounted on a clean specification low friction cylinder with spigot joint (**-G**), of any cylinder bore.
2. A flange bracket cannot be mounted on the rod side of a low friction cylinder with spigot joint that has a cylinder bore of ϕ 40 [1.575] (**-G**). Cannot be mounted on the rod side of a clean specification low friction cylinder with spigot joint (**-G**), of any cylinder bore.
3. A clevis bracket cannot be mounted on a clean specification low friction cylinder.

Disassembly and assembly

Note the following before replacing a seal. Be sure to cut off all air supply completely, and confirm that residual pressure inside the product or in piping connected to the product is zero. To disassemble, remove the snap ring and then pull out the rod. The snap ring can fly off when it is being removed, so caution is required. Doing so creates the risk of injury.
The snap ring can fly off when it is being removed, so caution is required. A snap ring flying off creates the risk of material damage. When assembling, check to make sure that the snap ring is engaged securely. Incomplete assembly results in a dangerous situation that creates the risk of material damage and life-threatening injury.

Mid-stroke

● The mid-stroke manufacturing method basically uses tube cutting.
However, strokes up to 5 mm [0.197 in] with cylinder bores of ϕ12 [0.472] to ϕ 40 [1.575] use collar stoppers.
ϕ6 [0.236], ϕ 8 [0.315], and ϕ 10 [0.394] cylinder bore mid-strokes are special handling (collar stoppers). Contact your nearest Koganei sales office for information about availability.

● Dimensions

1. In the case of tube cutting, the add stroke is the mid-stroke.
2. For the add stroke in the case of a collar stopper, the longer stroke becomes the standard stroke.

Sensor switch

Standard cylinders do not have a sensor switch magnet built in. To mount a sensor switch, a sensor cylinder with a built-in sensor switch magnet is required.

Note 1. For information about the sensor switch mounting position and movement range, refer to page ㉕.
2. Contact protection measures are required for connections that result in an inductive load on a reed sensor switch, or when capacitance surge is generated. For details about contact protection measures, refer to the sensor switch page of the general personal catalog.

Other

1. Avoid use that subjects the piston rod to lateral load.
2. Minimum operating pressure is measured based on JIS B8377-1.
Measurement Method Summary: With no load, horizontal mounting, a minimum operating pressure is applied to each size cylinder and then stopped. A full stroke is performed to check for vibration or any other abnormality.

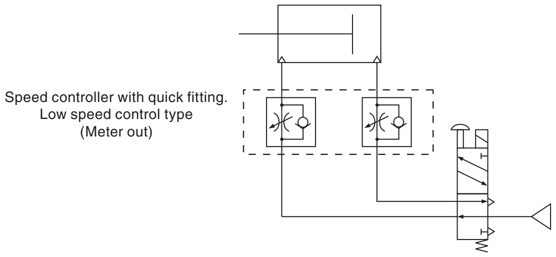
Piping and mounting

Piping

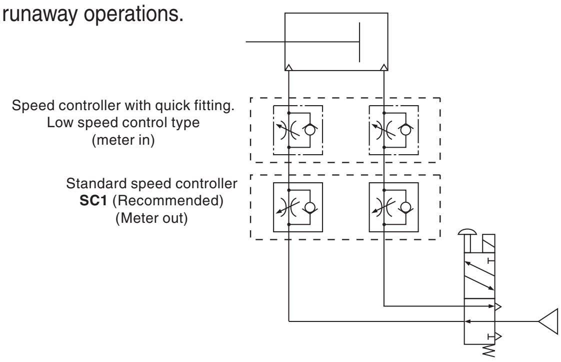
Refer to the diagrams below in the case of low-speed operation of a low friction cylinder.

Recommended circuit

1. Basic circuit
Uses meter out speed controller.



2. Rod pop-out prevention circuit
Using the cylinder in combination with the speed controller shown in the following diagram is effective for controlling speed and preventing runaway operations.



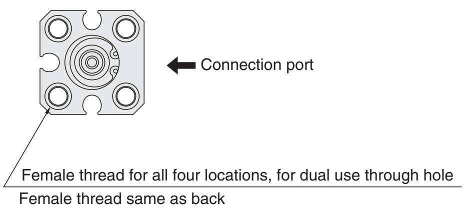
Note: Install the speed controller as close as possible to the cylinder.

Installing the main unit

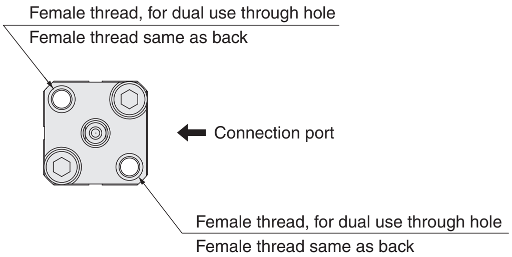
To allow for a variety of possible mounting methods, the jig cylinder mounting holes are available as a combination of female threaded holes and as through holes, or as female threaded holes only.
For details, refer to the diagrams below. The mounting method is the same regardless of the cylinder bore.

Note: When fixing the main unit with direct through bolts, be sure to use the attached special washers (not included with ϕ 6 [0.236], ϕ 8 [0.315], ϕ 10 [0.394] cylinder bores).

● **Low friction cylinders**



● **Clean specification low friction cylinders**

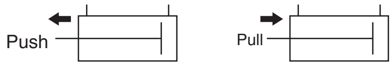


* The head side (back surface) has dual use female thread/ through holes at two locations. The other two locations are female thread only.

Thrust

Determine the thrust required by the load and working air pressure, then select the appropriate cylinder bore.
The table shows calculated values, so select a cylinder bore whose load factor (Load Factor = $\frac{\text{Load}}{\text{Calculated value}}$) that is 70% or lower (50% or lower in the case of high speed).

● **Double acting type**



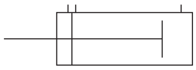
N [lbf]

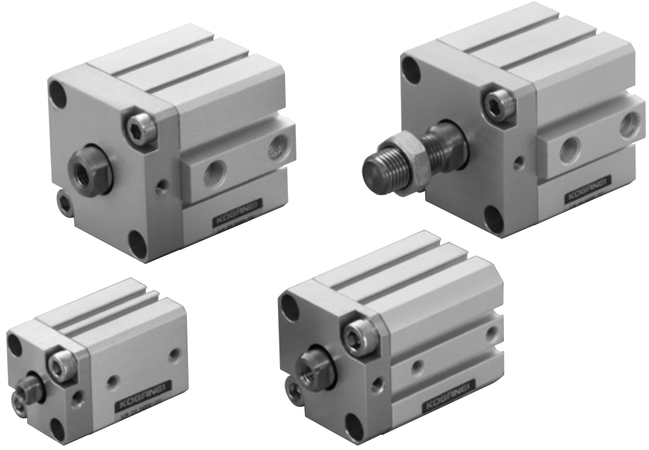
Cylinder bore mm [in]	Piston Rod diameter mm [in]	Operation	Pressure area mm²	Air pressure MPa [psi]						
				0.1 [15]	0.2 [29]	0.3 [44]	0.4 [58]	0.5 [73]	0.6 [87]	0.7 [102]
6 [0.236]	4 [0.157]	Push side	28.3 [0.044]	2.8 [0.629]	5.7 [1.281]	8.5 [1.911]	11.3 [2.540]	14.1 [3.170]	17.0 [3.822]	19.8 [4.451]
		Pull side	15.7 [0.024]	1.6 [0.360]	3.1 [0.697]	4.7 [1.057]	6.3 [1.416]	7.9 [1.776]	9.4 [2.113]	11.0 [2.473]
8 [0.315]	5 [0.197]	Push side	50.3 [0.078]	5.0 [1.124]	10.1 [2.271]	15.1 [3.395]	20.1 [4.519]	25.1 [5.643]	30.2 [6.789]	35.2 [7.913]
		Pull side	30.6 [0.047]	3.1 [0.697]	6.1 [1.371]	9.2 [2.068]	12.3 [2.765]	15.3 [3.440]	18.4 [4.136]	21.4 [4.811]
10 [0.394]	5 [0.197]	Push side	78.5 [0.122]	7.9 [1.776]	15.7 [3.530]	23.6 [5.305]	31.4 [7.059]	39.3 [8.835]	47.1 [10.589]	55.0 [12.364]
		Pull side	58.9 [0.091]	5.9 [1.326]	11.8 [2.653]	17.7 [3.979]	23.6 [5.305]	29.5 [6.632]	35.3 [7.936]	41.2 [9.262]
12 [0.472]	6 [0.236]	Push side	113.0 [0.2]	11.3 [2.540]	22.6 [5.081]	33.9 [7.621]	45.2 [10.161]	56.5 [12.702]	67.8 [15.242]	79.1 [17.782]
		Pull side	84.8 [0.131]	8.5 [1.911]	17.0 [3.822]	25.4 [5.71]	33.9 [7.621]	42.4 [9.532]	50.9 [11.443]	59.3 [13.331]
16 [0.630]	8 [0.315]	Push side	201.0 [0.3]	20.1 [4.519]	40.2 [9.037]	60.3 [13.556]	80.4 [18.075]	100.5 [22.6]	120.6 [27.1]	140.7 [31.6]
		Pull side	150.0 [0.2]	15.1 [3.395]	30.1 [6.767]	45.2 [10.161]	60.3 [13.556]	75.4 [16.951]	90.4 [20.323]	105.5 [23.7]
20 [0.787]	10 [0.394]	Push side	314.0 [0.5]	31.4 [7.059]	62.8 [14.118]	94.2 [21.177]	125.6 [28.2]	157.0 [35.3]	188.4 [42.4]	219.8 [49.4]
		Pull side	235.5 [0.4]	23.6 [5.305]	47.1 [10.589]	70.7 [15.894]	94.2 [21.177]	117.8 [26.5]	141.3 [31.8]	164.9 [37.1]
25 [0.984]	12 [0.472]	Push side	490.6 [0.8]	49.1 [11.038]	98.1 [22.054]	147.2 [33.1]	196.3 [44.1]	245.3 [55.1]	294.4 [66.2]	343.4 [77.2]
		Pull side	377.6 [0.6]	37.8 [8.498]	75.5 [16.973]	113.3 [25.5]	151.0 [33.9]	188.8 [42.4]	226.6 [50.9]	264.3 [59.4]
32 [1.260]	16 [0.630]	Push side	803.8 [1.2]	80.4 [18.075]	160.8 [36.1]	241.2 [54.2]	321.5 [72.3]	401.9 [90.4]	482.3 [108.4]	562.7 [126.5]
		Pull side	602.9 [0.9]	60.3 [13.556]	120.6 [27.1]	180.9 [40.7]	241.2 [54.2]	301.4 [67.8]	361.7 [81.3]	422.0 [94.9]
40 [1.575]	16 [0.630]	Push side	1256.0 [2]	125.6 [28.2]	251.2 [56.5]	376.8 [84.7]	502.4 [112.9]	628.0 [141.2]	753.6 [169.4]	879.2 [197.7]
		Pull side	1055.0 [2]	105.5 [23.7]	211.0 [47.4]	316.5 [71.2]	422.0 [94.9]	527.5 [118.6]	633.0 [142.3]	738.5 [166.0]

JIG CYLINDERS C SERIES
CLEAN SPECIFICATION LOW FRICTION CYLINDERS

Double Acting Type

Symbol





Specifications

Item / Cylinder bore mm [in]	6 [0.236]	8 [0.315]	10 [0.394]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
Operating type	Double acting type								
Media	Air								
Maximum operating pressure MPa [psi]	0.7 [102]								
Proof pressure MPa [psi]	1.05 [152]								
Operating temperature range ℃ [°F]	0 ～ 60 [32 ～ 140]								
Cushion	None			Rubber bumper type					
Lubrication	No								
Port size	M3×0.5			M5×0.8				Rc1/8	
Dust collection port	M3×0.5			M5×0.8					
Cleanliness	Class 4 equivalent (FED-STD Class 10 equivalent) (Vacuum suction from dust collection port. Based on Koganei standards. For details, refer to page 44.)								

Minimum Operation Pressure

Item / Cylinder bore mm [in]	6 [0.236]	8 [0.315]	10 [0.394]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
Minimum operating pressure MPa [psi]	0.1 [15]	0.06 [9]	0.03 [4]		0.02 [3]			0.01 [1]	

Operating Speed Range

Item / Cylinder bore mm [in]	6 [0.236]	8 [0.315]	10 [0.394]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
Operating speed range mm/s [in/sec]	1 Note ～ 500 [0.039 ～ 19.7]								

Note: When using ϕ6 [0.236] at 1 mm/s [0.039 in/sec], apply air pressure of at least 0.3 MPa [44 psi].
When using ϕ8 [0.315] to ϕ40 [1.575] at 1 mm/s [0.039 in/sec], apply air pressure of at least 0.15 MPa [22 psi].
When using reed switch type sensor switches, operates at cylinder speed of 30 mm/s [1.181 in/sec] or higher.

Bore Size and Stroke

For information about mid-stroke, refer to page 34.

mm [in]

Operating type	Bore	Standard stroke: Standard cylinders	Standard stroke: Cylinder with magnet
Double acting type	6 [0.236]	5 [0.197], 10 [0.394], 15 [0.591], 20 [0.787]	5 [0.197], 10 [0.394], 15 [0.591], 20 [0.787]
	8 [0.315]		
	10 [0.394]		
	12 [0.472]	5 [0.197], 10 [0.394], 15 [0.591], 20 [0.787], 25 [0.984], 30 [1.181]	5 [0.197], 10 [0.394], 15 [0.591], 20 [0.787], 25 [0.984], 30 [1.181]
	16 [0.630]		
	20 [0.787]	5 [0.197], 10 [0.394], 15 [0.591], 20 [0.787], 25 [0.984], 30 [1.181], 35 [1.378], 40 [1.575], 45 [1.772], 50 [1.969]	5 [0.197], 10 [0.394], 15 [0.591], 20 [0.787], 25 [0.984], 30 [1.181], 35 [1.378], 40 [1.575], 45 [1.772], 50 [1.969]
	25 [0.984]		
	32 [1.260]	5 [0.197], 10 [0.394], 15 [0.591], 20 [0.787], 25 [0.984], 30 [1.181], 35 [1.378], 40 [1.575], 45 [1.772], 50 [1.969], 75 [2.953], 100 [3.9]	5 [0.197], 10 [0.394], 15 [0.591], 20 [0.787], 25 [0.984], 30 [1.181], 35 [1.378], 40 [1.575], 45 [1.772], 50 [1.969], 75 [2.953], 100 [3.9]
	40 [1.575]		

Reference 1: Stroke tolerance $^{+1}_{0}$ [0.039]
2: ϕ6 [0.236], ϕ8 [0.315], and ϕ10 [0.394] cylinder bore mid-strokes are special handling (collar stoppers).
3: ϕ12 [0.472] to ϕ40 [1.575] cylinder bore mid-strokes basically are tube cut.
However, strokes up to 5 mm [0.197 in] with cylinder bores of ϕ12 [0.472] to ϕ40 [1.575] are not tube cut.
In this case, a collar stopper is used.

Order Codes for Clean Specification Low Friction Cylinders

Clean specification	Basic type	Operating type	Low friction cylinder	Cylinder specification	Bore size × stroke	Rod end specification	Centering location	Mounting type	Sensor switch type	Lead wire length	Number of sensor switches
CS-	C	DA	Z	S	×	-B	-G	-1 -3	-ZE135 -ZE155 -ZE175 -ZE235 -ZE255 -ZE275 -ZE101 -ZE102 -ZE201 -ZE202	A B G	1 2 ⋮ n

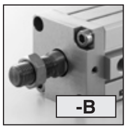
■ Operating type

DA: Double acting type

■ Rod end specification

Female thread

Male thread

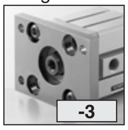


■ Mounting type

Basic mounting type

Foot mounting type[Note2]

Flange mounting type[Note 3]



■ Sensor switch type[Note6] (For cylinder with magnet)

Blank : No sensor switch

-ZE135: With ZE135
- 2-lead wire, solid state type
- With indicator lamp
- 10～28 VDC
- Horizontal lead wire

-ZE155: With ZE155
- 3-lead wire, solid state NPN output type
- With indicator lamp
- 4.5～28 VDC
- Horizontal lead wire

-ZE175: With ZE175
- 3-lead wire, solid state PNP output type
- With indicator lamp
- 4.5～28 VDC
- Horizontal lead wire

-ZE235: With ZE235
- 2-lead wire, solid state type
- With indicator lamp
- 10～28 VDC
- Vertical lead wire

-ZE255: With ZE255
- 3-lead wire, solid state NPN output type
- With indicator lamp
- 4.5～28 VDC
- Vertical lead wire

-ZE275: With ZE275
- 3-lead wire, solid state PNP output type
- With indicator lamp
- 4.5～28 VDC
- Vertical lead wire

-ZE101: With ZE101[Note 4]
- 2-lead wire, contact type
- No indicator lamp
- 5～28 VDC 85～115 VAC
- Horizontal lead wire

-ZE102: With ZE102[Note 4]
- 2-lead wire, contact type
- With indicator lamp
- 10～28 VDC 85～115 VAC
- Horizontal lead wire

-ZE201: With ZE201[Note 4]
- 2-lead wire, contact type
- No indicator lamp
- 5～28 VDC 85～115 VAC
- Vertical lead wire

-ZE202: With ZE202[Note 4]
- 2-lead wire, contact type
- With indicator lamp
- 10～28 VDC 85～115 VAC
- Vertical lead wire

■ Lead wire length

A: 1000 mm [39 in]
B: 3000 mm [118 in]
G: 300 mm [11.8 in] with M8 connector (ZE175, ZE275 only)

■ Number of sensor switches (For cylinder with magnet)

Blank: No sensor switch
1: With 1 sensor switch
2: With 2 sensor switches

■ Low friction cylinder

■ Cylinder specification

Blank: Standard cylinder[Note 1]
S: Cylinder with magnet

■ Centering location[Note 5]

Blank: No centering location
-G: With centering location

● See table of bore and stroke.

● For details about cylinder joints for male thread and cylinder rod ends, refer to the general personal catalog.

● For the order number of a sensor switch only, see page 49.

● Mounting brackets are attached when shipped.

● When the stroke of a ϕ12 [0.472] or ϕ16 [0.630] foot bracket is less than 10 mm [0.394 in], it may be impossible to mount two sensor switches due to interference between the foot bracket and sensor switch. For details, contact your nearest Koganei sales office.

Note 1: Clean specification low friction standard cylinders do not have a sensor switch magnet built in.
2: Cannot be mounted on a cylinder with spigot joint (**-G**). Not available for cylinder bores ϕ6 [0.236], ϕ8 [0.315], or ϕ10 [0.394].
3: Cannot be mounted on the rod side a cylinder with spigot joint (**-G**). Not available for cylinder bores ϕ6 [0.236], ϕ8 [0.315], or ϕ10 [0.394].
4: Not available for cylinder bores ϕ6 [0.236], ϕ8 [0.315], or ϕ10 [0.394].
5: Not available for cylinder bores ϕ6 [0.236] to ϕ12 [0.472].
6: For details about sensor switches, see the general personal catalog.

Additional Parts (To be ordered separately)

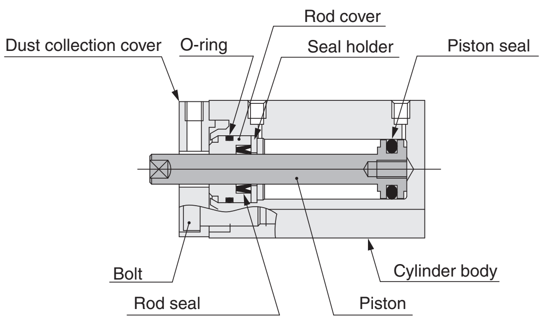
Foot mounting bracket (page 47)

Flange mounting bracket (page 48)

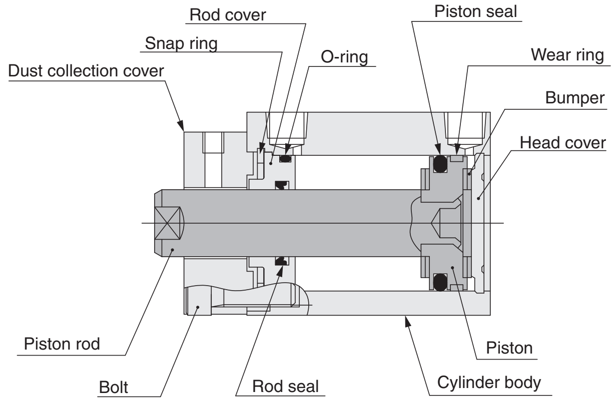
Inner Construction and Major Parts

● **Double acting type (CS-CDAZ)**

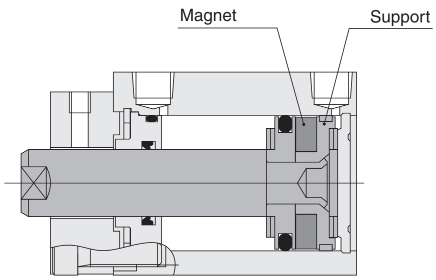
● **φ6 [0.236] ～φ 10 [0.394]**



● **φ12 [0.472] ～φ 40 [1.575]**



● **Cylinder with magnet**



Major Parts and Materials

Article \ Cylinder bore mm [in]	6 [0.236]	8 [0.315]	10 [0.394]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
Cylinder body	Aluminum alloy (anodized)								
Piston	Stainless steel			Aluminum alloy (special anti-rust treated)					
Piston rod	—			Stainless steel (with chrome plating)				Hard steel (with chrome plating)	
Gasket	Synthetic rubber (NBR)								
Rod cover	Aluminum alloy (special anti-abrasion treated)								
Bumper	—			Synthetic rubber (NBR)					
Magnet	Neodymium magnet			Plastic magnet					
Support	Copper alloy			Aluminum alloy (special anti-rust treated)					
Snap ring	—			Steel (nickel plated)					
Wear ring	—			Synthetic resin					
Dust collection cover	Aluminum alloy (anodized)								
Bolt	Stainless steel			Steel (nickel plated)					Stainless steel

Seal Repair Kit

Bore mm [in]	Model	Set contents
12 [0.472]	SRK-CDAZ12	Piston seal: 1 Rod seal: 1 O-ring: 1
16 [0.630]	SRK-CDAZ16	
20 [0.787]	SRK-CDAZ20	
25 [0.984]	SRK-CDAZ25	
32 [1.260]	SRK-CDAZ32	
40 [1.575]	SRK-CDAZ40	

Note 1: There is no seal repair kit available for cylinder bores φ6 [0.236], φ8 [0.315], or φ10 [0.394].
2: Use special grease. For information about grease, contact Koganei.

Mass

g [oz]

Bore size mm [in]	Zero stroke Mass	Additional mass for each 1 mm stroke	Additional mass of cylinder with magnet	Mass of mounting brackets		Additional mass of sensor switch[Note]	
				Foot bracket	Flange bracket	ZE□□□A ZE□□□G	ZE□□□B
6 [0.236]	17.2 [0.607]	0.74 [0.026]	3.9 [0.138]	—	—	15 [0.529]	35 [1.235]
8 [0.315]	22.7 [0.801]	0.95 [0.034]	5.4 [0.190]	—	—		
10 [0.394]	29.3 [1.034]	1.12 [0.040]	6.8 [0.240]	—	—		
12 [0.472]	49.3 [1.739]	1.28 [0.045]	8 [0.282]	50 [1.764]	55 [1.940]		
16 [0.630]	67.9 [2.395]	1.62 [0.057]	11 [0.388]	62 [2.187]	71 [2.504]		
20 [0.787]	100.2 [3.5]	2.26 [0.080]	27 [0.952]	84 [2.963]	101 [3.6]		
25 [0.984]	146.1 [5.2]	3.11 [0.110]	39 [1.376]	104 [3.7]	160 [5.6]		
32 [1.260]	235.7 [8.3]	4.11 [0.145]	28 [0.988]	126 [4.4]	186 [6.6]		
40 [1.575]	347.0 [12.2]	4.47 [0.158]	37 [1.305]	160 [5.6]	335 [11.8]		

Note: Sensor switch types A, B, and G are lead wire lengths. A: 1000 mm [39 in], B: 3000 mm [118 in], G: 300 mm [11.8 in], with M8 connector

Cleanliness Evaluation (Clean Specification Low Friction Cylinders)

Cleanliness evaluation methods for current clean specification pneumatic equipment are not defined by JIS or other standards. Because of this, Koganei devises its own independent measurement methods for cleanliness and carries out evaluation accordingly.

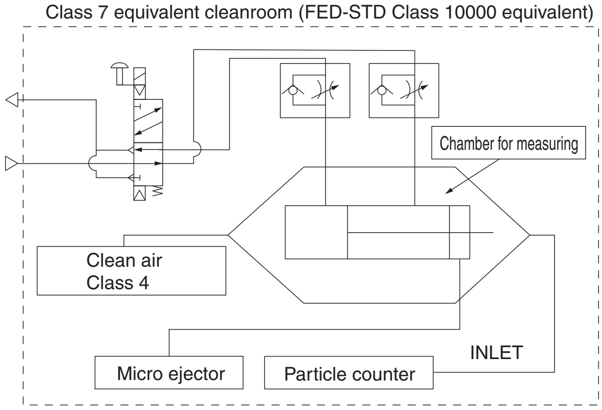
Jig cylinder C series clean specification low friction cylinder dust volume is measured using the method described below.

1. Samples being measured

CS-CDAZ40×100 (Load: 288 g [10.2 oz])

2. Measurement conditions

2-1 Test circuit: With suction from dust collection port



2-2 Sample operation conditions

Operating frequency:	0.5 Hz
Average operating speed:	300 mm/s [11.8 in/sec]
Applied pressure:	0.5 MPa [73 psi]
Suction conditions:	Micro ejector: ME05; Primary: 0.5 MPa [73 psi] application; Tubing used: ϕ6 [0.236]
Mounting direction:	Horizontal
Chamber volume used:	8.3 ℓ

3. Particle counter used

Manufacturer/Model:	RION Co., Ltd./KM20
Suction flow:	28.3 ℓ/min (ANR) [1.000 ft^3/min (SCFM)]
Passable particle sizes:	0.1 μm, 0.2 μm, 0.3 μm, 0.5 μm, 0.7 μm, 1.0 μm

4. Measurement methodology

4-1 Measurement system dust emission volume check

Measurement for nine minutes with the particle counter without operation of the test sample in accordance with conditions 1 and 2 to confirm a count value no greater than 1.

4-2 Actual measurement

Operation of the test sample in accordance with conditions 1 and 2 for 36 minutes, total value measurement for the latter 18 minutes.

4-3 Re-confirmation

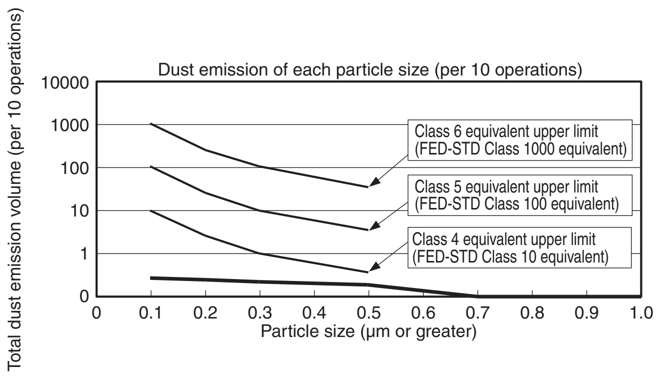
Performance of check 4-1 again to re-check measurement system dust emission.

4-4 Measurement value conversion

Conversion of the total value obtained during the latter 18 minutes of 4-2 to a value per 10 operations of the cylinder.

5. Measurement result precautions Note

● Suction from dust collection port



Note: The individual particle size graphs are for measurements following one million product operations.

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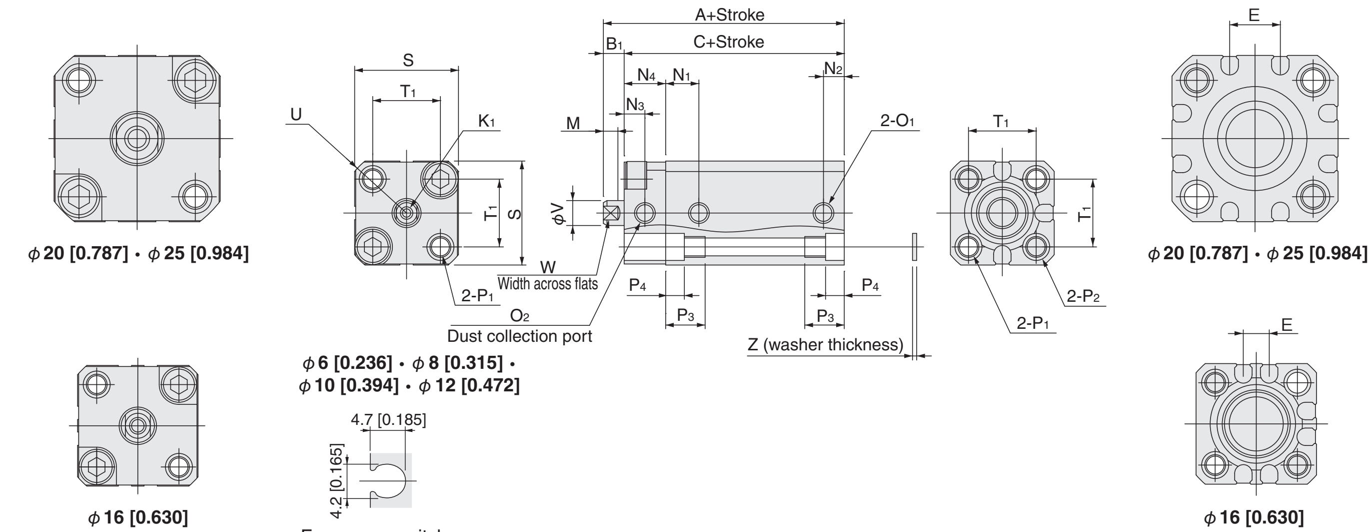
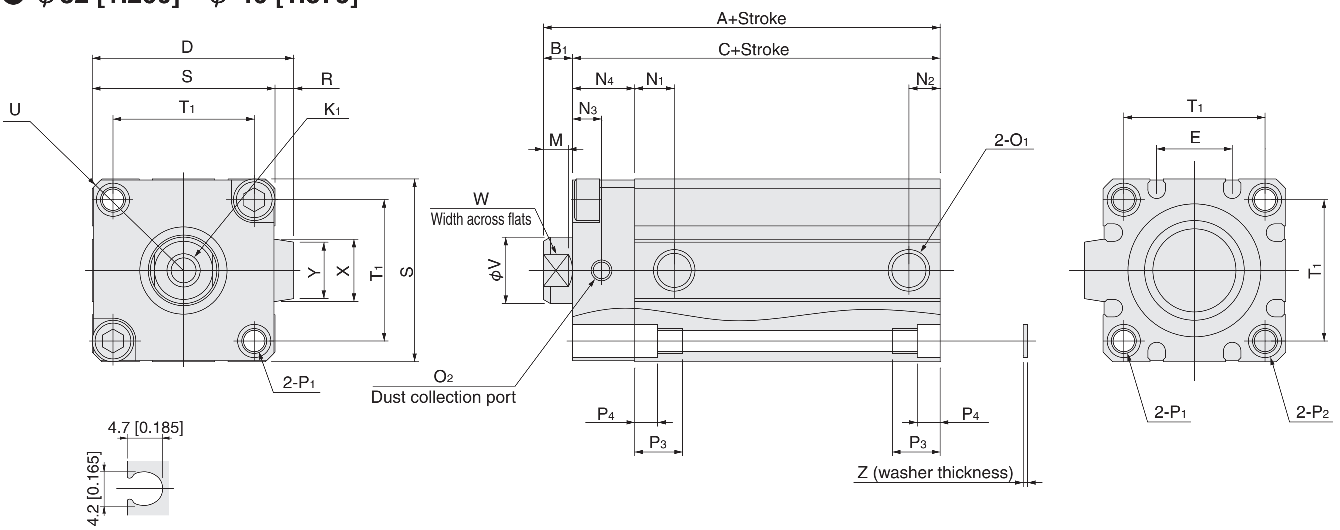
Dimensions of Clean Specification Double Acting Low Friction Cylinders (mm [in])

● φ6 [0.236] ～ φ 25 [0.984]



For sensor switch
Groove dimensions

● φ32 [1.260] • φ 40 [1.575]



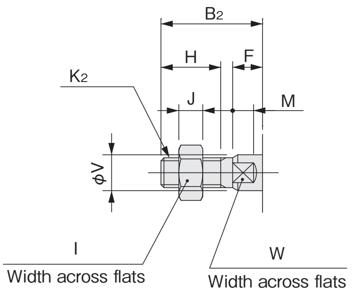
For sensor switch
Groove dimensions

Bore \ Code / Model	Standard cylinder (**CS-CDAZ**)			Cylinder with magnet (**CS-CDAZS**)			D	E	K_1	M	N_1	N_2	N_3	N_4	O_1	O_2
	A	B_1	C	A	B_1	C										
6 [0.236]	24 [0.945]	5 [0.197]	19 [0.748]	29 [1.142]	5 [0.197]	24 [0.945]	—	—	M2.5×0.45, depth 5 [0.197]	3 [0.118]	6.5 [0.256]	3.5 [0.138]	2.5 [0.098]	5 [0.197]	M3×0.5	M3×0.5
8 [0.315]	25 [0.984]	5 [0.197]	20 [0.787]	30 [1.181]	5 [0.197]	25 [0.984]	—	—	M3×0.5, depth 5 [0.197]	3 [0.118]	7.5 [0.295]	3.5 [0.138]	2.5 [0.098]	5 [0.197]	M3×0.5	M3×0.5
10 [0.394]	26 [1.024]	5 [0.197]	21 [0.827]	31 [1.220]	5 [0.197]	26 [1.024]	—	—	M3×0.5, depth 5 [0.197]	3 [0.118]	8 [0.315]	4 [0.157]	2.5 [0.098]	5 [0.197]	M3×0.5	M3×0.5
12 [0.472]	37 [1.457]	5 [0.197]	32 [1.260]	42 [1.654]	5 [0.197]	37 [1.457]	—	—	M3×0.5, depth 6 [0.236]	3.5 [0.138]	8 [0.315]	5 [0.197]	5 [0.197]	10 [0.394]	M5×0.8	M5×0.8
16 [0.630]	37.5 [1.476]	5.5 [0.217]	32 [1.260]	42.5 [1.673]	5.5 [0.217]	37 [1.457]	—	6.2 [0.244]	M4×0.7, depth 8 [0.315]	3.5 [0.138]	8 [0.315]	5 [0.197]	5 [0.197]	10 [0.394]	M5×0.8	M5×0.8
20 [0.787]	40 [1.575]	5.5 [0.217]	34.5 [1.358]	50 [1.969]	5.5 [0.217]	44.5 [1.752]	—	12.2 [0.480]	M5×0.8, depth 10 [0.394]	4.5 [0.177]	9.5 [0.374]	5 [0.197]	5 [0.197]	10 [0.394]	M5×0.8	M5×0.8
25 [0.984]	42 [1.654]	6 [0.236]	36 [1.417]	52 [2.047]	6 [0.236]	46 [1.811]	–	12.2 [0.480]	M6×1, depth 10 [0.394]	5 [0.197]	10.5 [0.413]	5 [0.197]	5 [0.197]	10 [0.394]	M5×0.8	M5×0.8
32 [1.260]	50 [1.969]	7 [0.276]	43 [1.693]	55 [2.165]	7 [0.276]	48 [1.890]	48.5 [1.909]	18.2 [0.717]	M8×1.25, depth 12 [0.472]	6 [0.236]	9.5 [0.374]	7.5 [0.295]	7 [0.276]	15 [0.591]	Rc1/8	M5×0.8
40 [1.575]	53 [2.087]	7 [0.276]	46 [1.811]	58 [2.283]	7 [0.276]	51 [2.008]	56.5 [2.224]	18.2 [0.717]	M8×1.25, depth 12 [0.472]	6 [0.236]	10.5 [0.413]	7.5 [0.295]	7 [0.276]	15 [0.591]	Rc1/8	M5×0.8

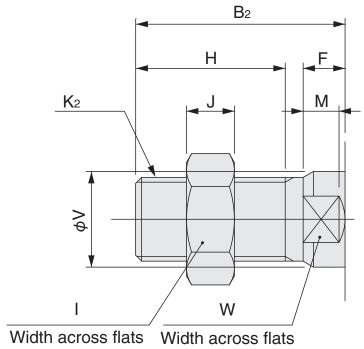
Bore \ Code	P_1	P_2	P_3	P_4	R	S	T_1	U	V	W	X	Y	Z	Applicable through bolt
6 [0.236]	φ3.3 [0.13] (through hole) counter bore φ6 [0.236] (both sides) and M4×0.7 (both sides)	Counter bore φ6 [0.236] and M4×0.7	9.5 [0.374]	3.5 [0.138]	—	19 [0.748]	11 [0.433]	R12	4 [0.157]	3.5 [0.138]	—	—	—	M3
8 [0.315]	φ3.3 [0.13] (through hole) counter bore φ6.2 [0.244] (both sides) and M4×0.7 (both sides)	Counter bore φ6.2 [0.244] and M4×0.7	9.5 [0.374]	3.5 [0.138]	—	21 [0.827]	13 [0.512]	R13.5	5 [0.197]	4 [0.157]	—	—	—	M3
10 [0.394]	φ3.3 [0.13] (through hole) counter bore φ6.2 [0.244] (both sides) and M4×0.7 (both sides)	Counter bore φ6.2 [0.244] and M4×0.7	9.5 [0.374]	3.5 [0.138]	—	23 [0.906]	15 [0.591]	R15	5 [0.197]	4 [0.157]	—	—	—	M3
12 [0.472]	φ4.3 [0.169] (through hole) counter bore φ6.5 [0.256] (both sides) and M5×0.8 (both sides)	Counter bore φ6.5 [0.256] and M5×0.8	9.5 [0.374]	4.5 [0.177]	—	25 [0.984]	16.3 [0.642]	R16	6 [0.236]	5 [0.197]	—	—	1 [0.039]	M3
16 [0.630]	φ4.3 [0.169] (through hole) counter bore φ6.5 [0.256] (both sides) and M5×0.8 (both sides)	Counter bore φ6.5 [0.256] and M5×0.8	9.5 [0.374]	4.5 [0.177]	—	29 [1.142]	19.8 [0.780]	R19	8 [0.315]	6 [0.236]	—	—	1 [0.039]	M3
20 [0.787]	φ4.3 [0.169] (through hole) counter bore φ6.5 [0.256] (both sides) and M5×0.8 (both sides)	Counter bore φ6.5 [0.256] and M5×0.8	9.5 [0.374]	4.5 [0.177]	—	34 [1.339]	24 [0.945]	R22	10 [0.394]	8 [0.315]	—	—	1 [0.039]	M3
25 [0.984]	φ5.1 [0.201] (through hole) counter bore φ8 [0.315] (both sides) and M6×1 (both sides)	Counter bore φ8 [0.315] and M6×1	11.5 [0.453]	5.5 [0.217]	—	40 [1.575]	28 [1.102]	R25	12 [0.472]	10 [0.394]	—	—	1 [0.039]	M4
32 [1.260]	φ5.1 [0.201] (through hole) counter bore φ8 [0.315] (both sides) and M6×1 (both sides)	Counter bore φ8 [0.315] and M6×1	11.5 [0.453]	5.5 [0.217]	4.5 [0.177]	44 [1.732]	34 [1.339]	R29.5	16 [0.630]	14 [0.551]	15 [0.591]	13.6 [0.535]	1 [0.039]	M4
40 [1.575]	φ6.9 [0.272] (through hole) counter bore φ9.5 [0.374] (both sides) and M8×1.25 (both sides)	Counter bore φ9.5 [0.374] and M8×1.25	15.5 [0.610]	7.5 [0.295]	4.5 [0.177]	52 [2.047]	40 [1.575]	R35	16 [0.630]	14 [0.551]	15 [0.591]	13.6 [0.535]	1.6 [0.063]	M5

Dimensions of Male Thread Rod End Thread Specification (mm [in])

● φ6 [0.236] ～ φ 25 [0.984]



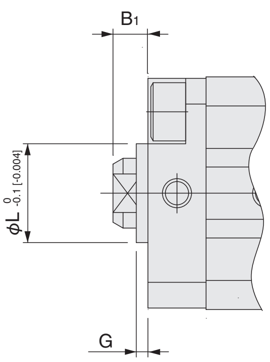
● φ32 [1.260] · φ 40 [1.575]



Bore \ Code	B_2	F	H	I	J	K_2	M	V	W
6 [0.236]	15 [0.591]	5 [0.197]	8 [0.315]	5.5 [0.217]	1.8 [0.071]	M3×0.5	3 [0.118]	4 [0.157]	3.5 [0.138]
8 [0.315]	15 [0.591]	5 [0.197]	8 [0.315]	7 [0.276]	2.4 [0.094]	M4×0.7	3 [0.118]	5 [0.197]	4 [0.157]
10 [0.394]	15 [0.591]	5 [0.197]	8 [0.315]	7 [0.276]	2.4 [0.094]	M4×0.7	3 [0.118]	5 [0.197]	4 [0.157]
12 [0.472]	17 [0.669]	5 [0.197]	10 [0.394]	8 [0.315]	4 [0.157]	M5×0.8	3.5 [0.138]	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	3.5 [0.138]	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	4.5 [0.177]	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	5 [0.197]	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	6 [0.236]	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	6 [0.236]	16 [0.630]	14 [0.551]

Remark: Cylinder joints and cylinder rod ends for mounting on a male thread rod end specification are also available. For details, see the general personal catalog.

Dimensions of Centering Location (mm [in])



Bore \ Code	B_1	G	L
16 [0.630]	5.5 [0.217]	1.5 [0.059]	12 [0.472]
20 [0.787]	5.5 [0.217]	1.5 [0.059]	15 [0.591]
25 [0.984]	6 [0.236]	2 [0.079]	17 [0.669]
32 [1.260]	7 [0.276]	2 [0.079]	21 [0.827]
40 [1.575]	7 [0.276]	2 [0.079]	29 [1.142]

●Not available for φ**6 [0.236]**, φ**8 [0.315]**, φ**10 [0.394]** , and φ**12 [0.472]**

Foot Mounting Bracket, Flange Mounting Bracket, Clevis Mounting Bracket

Order Codes of Mounting Bracket Only

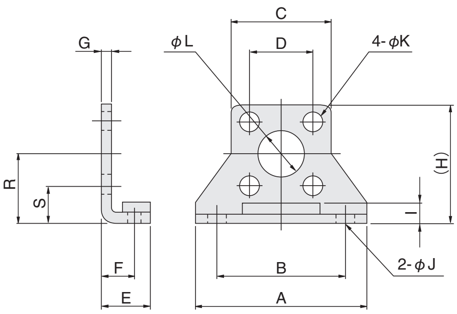
CS – ☐ – **CDAZ** ☐

- Bore size ϕ **12 [0.472]** to ϕ **40 [1.575]**[Note4]
- Cylinder type
  - **CDAZ** —— For low friction cylinders
- Mounting brackets
  - **1** —— Foot bracket[Note1]
    - ● Two per set.
  - **3** —— Flange bracket[Note2]
  - **7** —— Clevis bracket[Note3]
- Clean specification

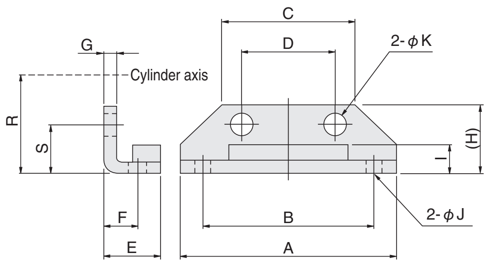
Note 1: Cannot be mounted on a low friction cylinder with a cylinder with spigot joint, which has a ϕ40 [1.575] cylinder bore (**-G**).
Cannot be mounted on a clean specification low friction cylinder with spigot joint, of any cylinder bore (**-G**).
2: Cannot be mounted on the rod side of a low friction cylinder with spigot joint, which has a ϕ40 [1.575] cylinder bore (**-G**).
Cannot be mounted on the rod side of a clean specification low friction cylinder with spigot joint (**-G**), of any cylinder bore.
3: Cannot be mounted on a clean specification low friction cylinder.
4: Not available for cylinder bores ϕ6 [0.236], ϕ8 [0.315], or ϕ10 [0.394].

Dimensions of Foot Mounting Bracket (mm [in])

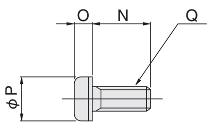
● ϕ12 [0.472] · ϕ 16 [0.630]



● ϕ20 [0.787] ～ ϕ 40 [1.575]



● Mounting screw (4 attached)
● For ϕ 12 [0.472] ～ ϕ 40 [1.575]



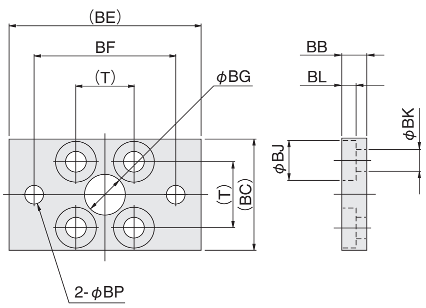
Material: Steel

Bore \ Code	A	B	C	D	E	F	G	H	I	J	K	L	N [lbf]	O	P	Q	R	S	Weight g
12 [0.472]	44 [1.732]	34 [1.339]	25 [0.984]	16.3 [0.642]	12.5 [0.492]	8 [0.315]	2 [0.079]	29.5 [1.161]	4.5 [0.177]	4.5 [0.177]	5.5 [0.217]	11 [0.433]	12 (12, 22) [0.472 (0.472, 0.866)]	2.7 [0.106]	9.5 [0.374]	M5	17 [0.669]	8.9 [0.350]	50 (54) [1.764 (1.905)]
16 [0.630]	48 [1.890]	38 [1.496]	29 [1.142]	19.8 [0.780]	13 [0.512]	8 [0.315]	2 [0.079]	33.5 [1.319]	4.5 [0.177]	4.5 [0.177]	5.5 [0.217]	11 [0.433]	12 (12, 22) [0.472 (0.472, 0.866)]	2.7 [0.106]	9.5 [0.374]	M5	19 [0.748]	9.1 [0.358]	62 (66) [2.187 (2.328)]
20 [0.787]	54 [2.126]	44 [1.732]	34 [1.339]	24 [0.945]	15 [0.591]	9.2 [0.362]	3.2 [0.126]	16.5 [0.650]	7 [0.276]	4.5 [0.177]	5.5 [0.217]	–	12 (12, 22) [0.472 (0.472, 0.866)]	2.7 [0.106]	9.5 [0.374]	M5	24 [0.945]	12 [0.472]	84 (88) [2.963 (3.104)]
25 [0.984]	64 [2.520]	52 [2.047]	40 [1.575]	28 [1.102]	16.5 [0.650]	10.7 [0.421]	3.2 [0.126]	17.5 [0.689]	6 [0.236]	5.5 [0.217]	6.6 [0.260]	–	14 (14, 25) [0.551 (0.551, 0.984)]	3.3 [0.130]	10.5 [0.413]	M6	26 [1.024]	12 [0.472]	104 (109) [3.7 (3.8)]
32 [1.260]	68 [2.677]	56 [2.205]	44 [1.732]	34 [1.339]	17 [0.669]	11.2 [0.441]	3.2 [0.126]	19 [0.748]	8 [0.315]	5.5 [0.217]	6.6 [0.260]	–	14 (14, 30) [0.551 (0.551, 1.181)]	3.3 [0.130]	10.5 [0.413]	M6	30 [1.181]	13 [0.512]	126 (134) [4.4 (4.7)]
40 [1.575]	78 [3.071]	64 [2.520]	52 [2.047]	40 [1.575]	18.2 [0.717]	11.2 [0.441]	3.2 [0.126]	19 [0.748]	7 [0.276]	6.6 [0.260]	9 [0.354]	–	20 (20, 35) [0.787 (0.787, 1.378)]	4.4 [0.173]	14 [0.551]	M8	33 [1.299]	13 [0.512]	160 (172) [5.6 (6.1)]

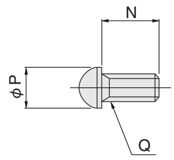
Remarks: Values in parentheses are clean specification.
When there are two values in parentheses, the left value is for the head side while the right value is for the rod side.
Note: When mounting for clean specification, remove the dust collection cover fixing bolt (1), and secure with the mounting screw that comes with the bracket.

Dimensions of Flange Mounting Bracket (mm [in])

● φ12 [0.472] • φ 16 [0.630]

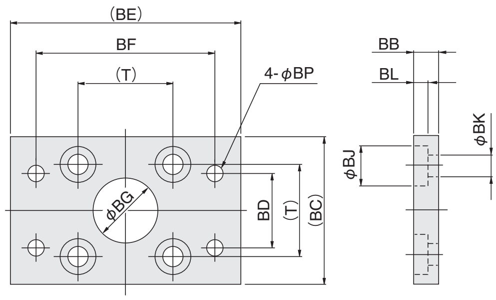


● Mounting screwNote
For φ 12 [0.472] ～ φ 40 [1.575]



Note: Low friction cylinders are those below.
φ12 [0.472], φ16 [0.630]: Two screws attached
φ20 [0.787] to φ40 [1.575]: Four screws attached
For clean specification low friction cylinders, two screws for the rod side (all sizes) are attached, and two screws for the head side.

● φ20 [0.787] ～ φ 40 [1.575]



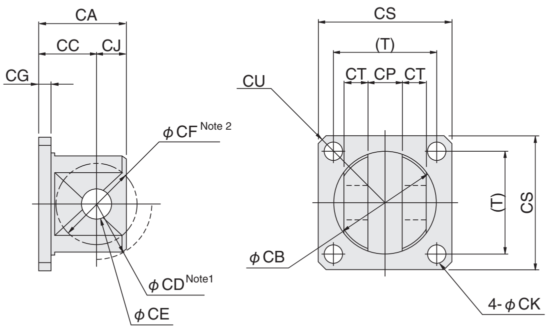
Material: Steel

Bore \ Code	N	P	Q	T	BB	BC	BD	BE	BF	BG	BJ	BK	BL	BP	Weight g
12 [0.472]	12 (12, 22) [0.472 (0.472, 0.866)]	9.5 [0.374]	M5	16.3 [0.642]	6 [0.236]	28 [1.102]	—	50 [1.969]	38 [1.496]	11 [0.433]	10 [0.394]	5.5 [0.217]	3.6 [0.142]	4.5 [0.177]	55 (60) [1.940 (2.116)]
16 [0.630]	12 (12, 22) [0.472 (0.472, 0.866)]	9.5 [0.374]	M5	19.8 [0.780]	6 [0.236]	32 [1.260]	—	54 [2.126]	42 [1.654]	11 [0.433]	10 [0.394]	5.5 [0.217]	3.6 [0.142]	4.5 [0.177]	71 (76) [2.504 (2.681)]
20 [0.787]	12 (12, 22) [0.472 (0.472, 0.866)]	9.5 [0.374]	M5	24 [0.945]	6 [0.236]	36 [1.417]	24 [0.945]	58 [2.283]	46 [1.811]	15 [0.591]	10 [0.394]	5.5 [0.217]	3.6 [0.142]	4.5 [0.177]	101 (106) [3.6 (3.7)]
25 [0.984]	14 (14, 25) [0.551 (0.551, 0.984)]	10.5 [0.413]	M6	28 [1.102]	8 [0.315]	42 [1.654]	28 [1.102]	68 [2.677]	54 [2.126]	17 [0.669]	11 [0.433]	6.6 [0.260]	4.3 [0.169]	5.5 [0.217]	160 (170) [5.6 (6.0)]
32 [1.260]	14 (14, 30) [0.551 (0.551, 1.181)]	10.5 [0.413]	M6	34 [1.339]	8 [0.315]	48 [1.890]	34 [1.339]	72 [2.835]	58 [2.283]	22 [0.866]	11 [0.433]	6.6 [0.260]	4.3 [0.169]	5.5 [0.217]	186 (200) [6.6 (7.1)]
40 [1.575]	20 (20, 35) [0.787 (0.787, 1.378)]	14 [0.551]	M8	40 [1.575]	8 [0.315]	58 [2.283]	40 [1.575]	84 [3.307]	68 [2.677]	28 [1.102]	15 [0.591]	9 [0.354]	5.3 [0.209]	6.6 [0.260]	335 (359) [11.8 (12.7)]

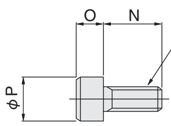
Remarks: Values in parentheses are clean specification.
When there are two values in parentheses, the left value is for the head side while the right value is for the rod side.

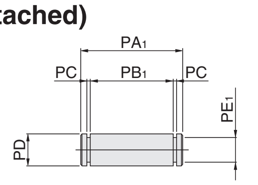
Dimensions of Clevis Mounting Bracket (mm [in])

● φ12 [0.472] ～ φ 40 [1.575]



● Mounting screw (2 attached)
For φ 12 [0.472] ～ φ 40 [1.575]





(Two snap rings attached)

Material: Steel

Bore \ Code	N	O	P	Q	T	CA	CB	CC	CD	CE	CF	CG	CJ	CK	CP	CS	CT	CU	PA1	PB1	PC	PD	PE1	Weight g
12 [0.472]	12 [0.472]	5 [0.197]	8.5 [0.335]	M5	16.3 [0.642]	15 [0.591]	12 [0.472]	11 [0.433]	R7.5	4 [0.157] $^{+0.03}_{0}$	R 5	4 [0.157]	4 [0.157]	5.5 [0.217]	4 [0.157] $^{+0.2}_{+0.1}$	25 [0.984]	3 [0.118]	R16	15 [0.591]	10.6 [0.417]	0.7 [0.028]	4 [0.157]f8	2.5 [0.098]	30 [1.058]
16 [0.630]	12 [0.472]	5 [0.197]	8.5 [0.335]	M5	19.8 [0.780]	17 [0.669]	16 [0.630]	12 [0.472]	R10	5 [0.197] $^{+0.03}_{0}$	R 6	4 [0.157]	5 [0.197]	5.5 [0.217]	5 [0.197] $^{+0.2}_{+0.1}$	29 [1.142]	3.5 [0.138]	R19	17 [0.669]	12.6 [0.496]	0.7 [0.028]	5 [0.197]f8	3 [0.118]	40 [1.411]
20 [0.787]	12 [0.472]	5 [0.197]	8.5 [0.335]	M5	24 [0.945]	25 [0.984]	22 [0.866]	17 [0.669]	R14	8 [0.315] $^{+0.04}_{0}$	R11	4 [0.157]	8 [0.315]	5.5 [0.217]	8 [0.315] $^{+0.4}_{+0.2}$	34 [1.339]	5.2 [0.205]	R22	24.4 [0.961]	19.6 [0.772]	0.9 [0.035]	8 [0.315]f8	6 [0.236]	75 [2.646]
25 [0.984]	16 [0.630]	6 [0.236]	10 [0.394]	M6	28 [1.102]	25 [0.984]	26 [1.024]	17 [0.669]	R16	8 [0.315] $^{+0.04}_{0}$	R11	4 [0.157]	8 [0.315]	6.6 [0.260]	8 [0.315] $^{+0.4}_{+0.2}$	40 [1.575]	5.2 [0.205]	R25	24.4 [0.961]	19.6 [0.772]	0.9 [0.035]	8 [0.315]f8	6 [0.236]	100 [3.5]
32 [1.260]	16 [0.630]	6 [0.236]	10 [0.394]	M6	34 [1.339]	29 [1.142]	34 [1.339]	19 [0.748]	R20	10 [0.394] $^{+0.04}_{0}$	R12.5	4 [0.157]	10 [0.394]	6.6 [0.260]	12 [0.472] $^{+0.4}_{+0.2}$	44 [1.732]	8 [0.315]	R29.5	34 [1.339]	29.2 [1.150]	0.9 [0.035]	10 [0.394]f8	8 [0.315]	165 [5.8]
40 [1.575]	20 [0.787]	8 [0.315]	13 [0.512]	M8	40 [1.575]	29 [1.142]	34 [1.339]	19 [0.748]	R20	10 [0.394] $^{+0.04}_{0}$	R12.5	4 [0.157]	10 [0.394]	9 [0.354]	12 [0.472] $^{+0.4}_{+0.2}$	52 [2.047]	8 [0.315]	R35	34 [1.339]	29.2 [1.150]	0.9 [0.035]	10 [0.394]f8	8 [0.315]	200 [7.1]

Note 1: CD = Swing range of the clevis itself.
2: CF = Maximum allowable swing radius of the opposing bracket.
Remark: Installation is by two bolts.

Solid State Type, Reed Switch Type

Order Codes

☐ ☐ - CDAS

Lead wire length
A: 1000 mm [39 in]
B: 3000 mm [118 in]
G: 300 mm [11.8 in] with M8 connector (ZE175, ZE275 only)

Sensor switch model

ZE135: Solid state type	2 lead wires	With indicator	10 ～ 28 VDC	Horizontal lead wire
ZE155: Solid state type	3 lead wires NPN output type	With indicator	4.5 ～ 28 VDC	Horizontal lead wire
ZE175: Solid state type	3 lead wires PNP output type	With indicator	4.5 ～ 28 VDC	Horizontal lead wire
ZE235: Solid state type	2 lead wires	With indicator	10 ～ 28 VDC	Vertical lead wire
ZE255: Solid state type	3 lead wires NPN output type	With indicator	4.5 ～ 28 VDC	Vertical lead wire
ZE275: Solid state type	3 lead wires PNP output type	With indicator	4.5 ～ 28 VDC	Vertical lead wire

ZE101: Contact type	Without indicator	5 ～ 28 VDC 85 ～ 115 VAC	Horizontal lead wire
ZE102: Contact type	With indicator	10 ～ 28 VDC 85 ～ 115 VAC	Horizontal lead wire
ZE201: Contact type	Without indicator	5 ～ 28 VDC 85 ～ 115 VAC	Vertical lead wire
ZE202: Contact type	With indicator	10 ～ 28 VDC 85 ～ 115 VAC	Vertical lead wire

Minimum Allowable Cylinder Stroke for Sensor Switch Use

● Solid State Type

mm [in]

Cylinder bore	Two mounted[Note]		One mounted
	One surface mounting	Two surface mounting	
6~12 [0.236~0.472]	30 [1.181]	10 [0.394]	5 [0.197]
16~40 [0.63~1.575]	10 [0.394]		

Note: Two can be mounted with a 5 mm [0.197 in] stroke.
However, care should be taken because overlap may occur.

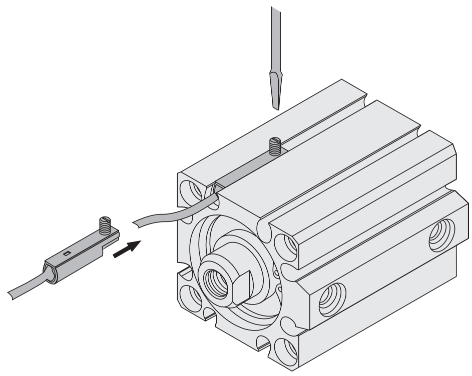
● Reed Switch Type

mm [in]

Cylinder bore	Two mounted		One mounted
	One surface mounting	Two surface mounting	
12 [0.472]	30 [1.181]	10 [0.394]	10 [0.394]
16~40 [0.63~1.575]	10 [0.394]		

Moving Sensor Switch

- ●Loosening the screw allows the sensor switch to be moved along the switch mounting groove of the cylinder tube.
- ●The tightening torque for the screws is 0.1 to 0.2 N•m [0.885 to 1.770 in•lbf].



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

●Operating range: ℓ
The range from where the piston turns the switch on and the point where the switch is turned off as the piston travels in the same direction.
●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

mm [in]

Item \ Bore	6 [0.236]	8 [0.315]	10 [0.394]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
Operating range: ℓ	1.8~3.0 [0.071~0.118]	1.8~3.0 [0.071~0.118]	2.0~3.2 [0.079~0.126]	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 [0.118~0.276]	3.5~7.5 [0.138~0.295]
Response differential: C	0.2 [0.008] or less			0.5 [0.020] or less					
Maximum sensing location	6 [0.236]								

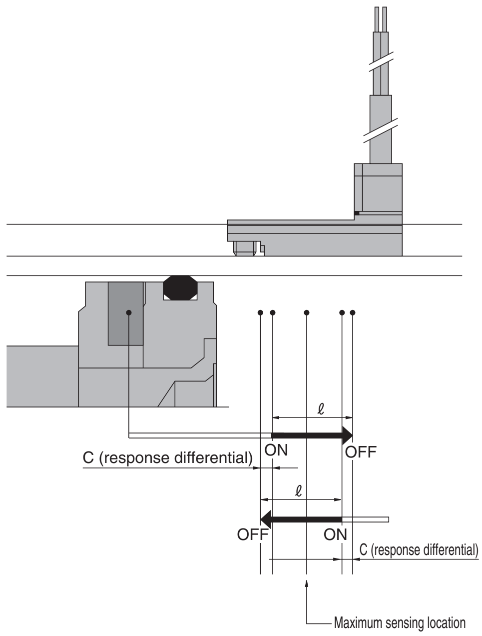
Remark: The values in the table above are reference values.

● Reed Switch Type

mm [in]

Item \ Bore	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
Operating range: ℓ	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 [0.394~0.61]	8~12 [0.315~0.472]	8.5~14 [0.335~0.551]
Response differential: C	1.0 [0.039] or less	2.0 [0.079] or less				
Maximum sensing location	10 [0.394]					

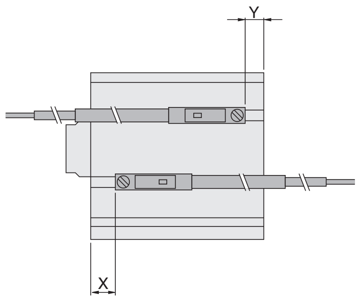
Remark: The values in the table above are reference values.



Mounting Position of the End of Stroke Detection Sensor Switch

Mounting the sensor switch in the locations shown (values in diagram are reference values), the sensor magnet comes to the maximum sensing location of the sensor switch at the end of the stroke.

● Low friction cylinders



■ Solid State Type

● Double acting type

mm [in]

Code \ Bore	6 [0.236]	8 [0.315]	10 [0.394]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
X	6.5 [0.256]	7.5 [0.295]	8 [0.315]	10 [0.394]	10 [0.394]	15 [0.591]	15 [0.591]	15 [0.591]	16 [0.630]
Y	0.4 [0.016]	0.5 [0.020]	1 [0.039]	6 [0.236]	5 [0.197]	8 [0.315]	9 [0.354]	6 [0.236]	8 [0.315]

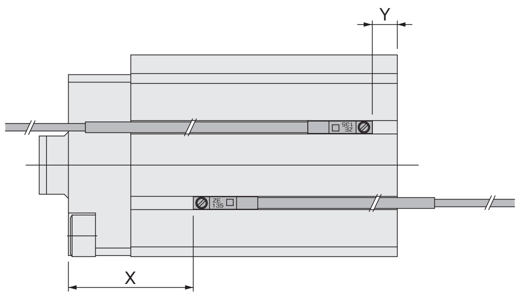
■ Reed Switch Type

● Double acting type

mm [in]

Code \ Bore	6 [0.236]	8 [0.315]	10 [0.394]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
X	—	—	—	5.5 [0.217]	6 [0.236]	10.5 [0.413]	11 [0.433]	11 [0.433]	12 [0.472]
Y	—	—	—	1.5 [0.059]	1 [0.039]	4 [0.157]	5 [0.197]	2 [0.079]	4 [0.157]

● Clean specification low friction cylinders



■ Solid State Type

● Double acting type

mm [in]

Code \ Bore	6 [0.236]	8 [0.315]	10 [0.394]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
X	11.5 [0.453]	12.5 [0.492]	13 [0.512]	20 [0.787]	20 [0.787]	25 [0.984]	25 [0.984]	30 [1.181]	31 [1.220]
Y	0.4 [0.016]	0.5 [0.020]	1 [0.039]	6 [0.236]	5 [0.197]	8 [0.315]	9 [0.354]	6 [0.236]	8 [0.315]

■ Reed Switch Type

● Double acting type

mm [in]

Code \ Bore	6 [0.236]	8 [0.315]	10 [0.394]	12 [0.472]	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
X	—	—	—	15.5 [0.610]	16 [0.630]	20.5 [0.807]	21 [0.827]	26 [1.024]	27 [1.063]
Y	—	—	—	1.5 [0.059]	1 [0.039]	4 [0.157]	5 [0.197]	2 [0.079]	4 [0.157]