KOGANEI CLEAN SYSTEM

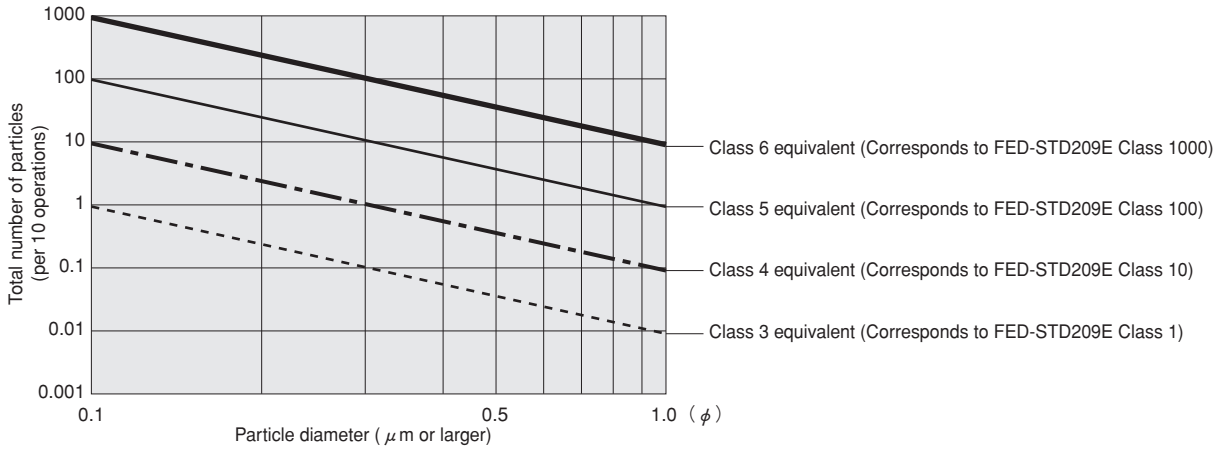
Koganei Clean System products provide complete support for the maintenance of a clean environment inside the cleanroom.

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)

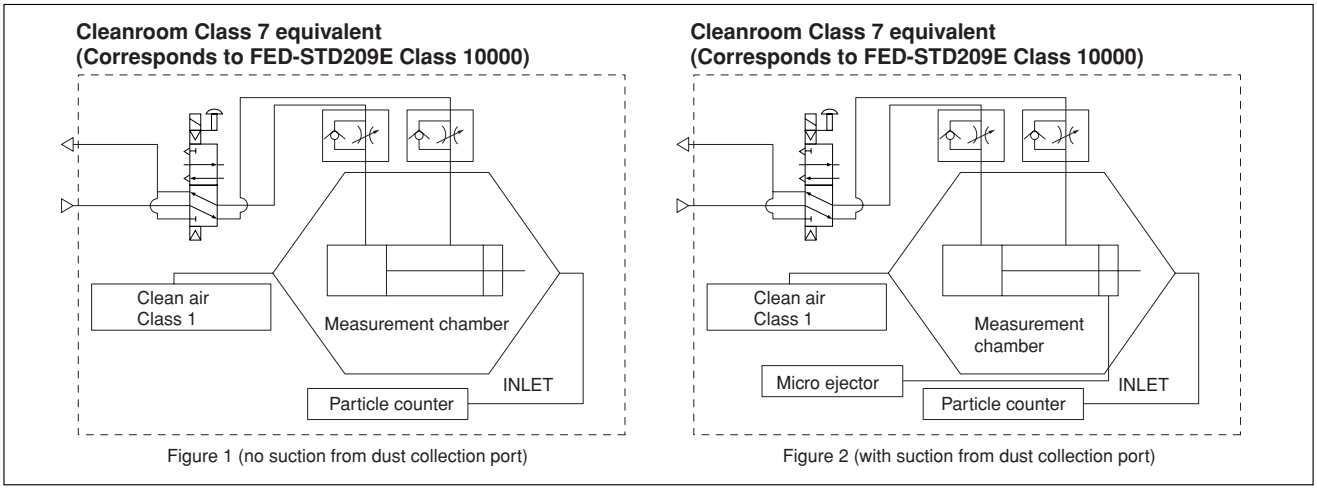


Figure 1 (no suction from dust collection port)

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.

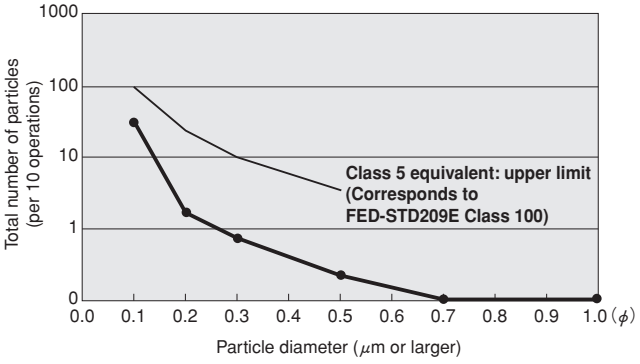
3-2 Measurement under operation
Under the conditions in the above1 and 2, operating the measurement sample for 36 minutes, and measured the total values in the latter half of 18 minutes test.

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

4. Measurement results

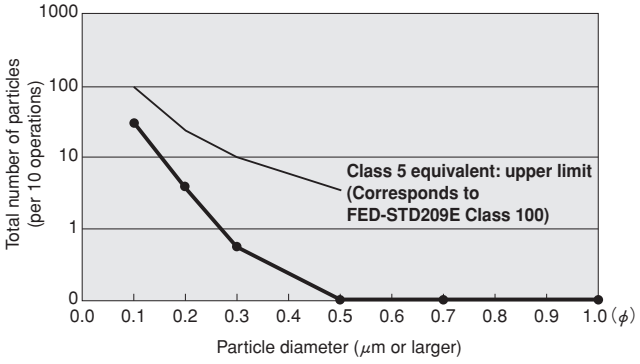
● **Cleanroom specification**
Jig Cylinder (no suction from dust collection port)

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)



Safety Precautions

Always read these precautions carefully before use.

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

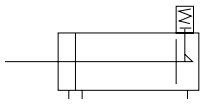
- For actuators, see “Safety Precautions” on p. 45 of the Actuators General Catalog .
- For valves, see “Safety Precautions” on p. 31 of the Valves General Catalog.
- For air treatment and auxiliary equipment, see “Safety Precautions” on p.31 of the General Catalog of Air Treatment, Auxiliary, Vacuum.

KOGANEI CLEAN SYSTEM

SLIM BLOCK END KEEP CYLINDERS

Head Side End Keep Double Acting Type

Symbols



Specifications

Item \ Bore size mm [in.]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
Operating type	Double acting type, with head side stroke end keep mechanism			
Media	Air			
Mounting type	Side mount			
Operating pressure range MPa [psi.]	0.1～0.9 [15～131]			
Proof pressure MPa [psi.]	1.32 [191]			
Operating temperature range °C [°F]	0～60 [32～140]			
Operating speed range mm/s [in./sec.]	50～300 [2.0～11.8]			
Cushion	Fixed type (Rubber bumper)			
Lubrication	Not required			
Maximum holding force (at end keep) N [lbf.]	194.2 [43.66]	303 [68.11]	496.2 [111.5]	775.7 [174.4]
Backlash (at end keep) mm [in.]	1.4 [0.055] MAX.		1.6 [0.063] MAX.	
Port size Rc	1/8			

Bore Size and Stroke

mm [in.]

Bore size	Standard strokes	Maximum stroke	Maximum available stroke
20 [0.787]	25 50 75 100 125 150	150	500
25 [0.984]	25 50 75 100 125 150 200	200	
32 [1.260]	25 50 75 100 125 150 200	200	
40 [1.575]	25 50 75 100 125 150 200 250 300	300	

Remarks: 1. Stroke tolerance $^{+1}_{0}$ [$^{+0.039}_{0}$]
2. For non-standard strokes, consult us.

Order Codes

CS – **DABK** **20×50** □ – **2** – □ – □ □ □

Clean system product

Slim block
End keep double acting cylinder

Bore size
×
Stroke

End keep position
HL — Head side end keep

Mounting type
2 — Side mount

Rod end accessory
Blank — Without rod end accessory
Y — Y type knuckle
I — I type knuckle

Sensor switch

Blank	Without sensor switch	
ZG530	2-lead wire Solid state type with indicator lamp	DC10～28V
ZG553	3-lead wire Solid state type with indicator lamp	DC4.5～28V
CS3M	2-lead wire Reed switch type with indicator lamp	DC10～30V, AC85～230V
CS4M	2-lead wire Reed switch type with indicator lamp	DC10～30V, AC85～115V
CS5M	2-lead wire Reed switch type without indicator lamp	DC3～30V, AC85～115V
CS2F	2-lead wire Reed switch type with indicator lamp	AC85～230V
CS3F	2-lead wire Reed switch type with indicator lamp	DC10～30V
CS4F	2-lead wire Reed switch type with indicator lamp	DC10～30V
CS5F	2-lead wire Reed switch type without indicator lamp	DC3～30V

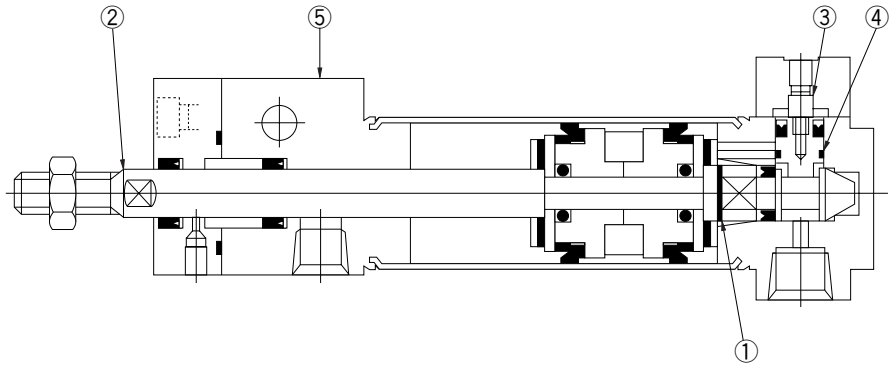
● For details of sensor switches, see p.111～121.

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

Number of sensor switches
1 — With 1 sensor switch
2 — With 2 sensor switches
3 — With 3 sensor switches

●For the order codes of additional parts, see p. 64.

Inner Construction and Major Parts



Major Parts and Materials

Parts / Bore size mm		20, 25	32, 40
①	Piston rod A	Steel (chrome plated)	
②	Piston rod B	Stainless steel	
③	Spring	Stainless steel	Piano wire
④	Lock piston	Stainless steel	
⑤	Lock cover	Aluminum (anodized)	
	Y type knuckle, I type knuckle	Mild steel (nickel plated)	

Other than the items listed above, it is the same as for the standard Slim Cylinder.

Seals

Parts / Quantity / Bore mm	Rod seal	Lock piston seal	Lock cover gasket
	1	1	1
20	GYH-9	MYN-5	—
25	GYH-11	MYN-5	—
32	—	MYN-10A	S18
40	—	MYN10-A	S18

Other than the items listed above, it is the same as for the standard Slim Cylinder.

Mass

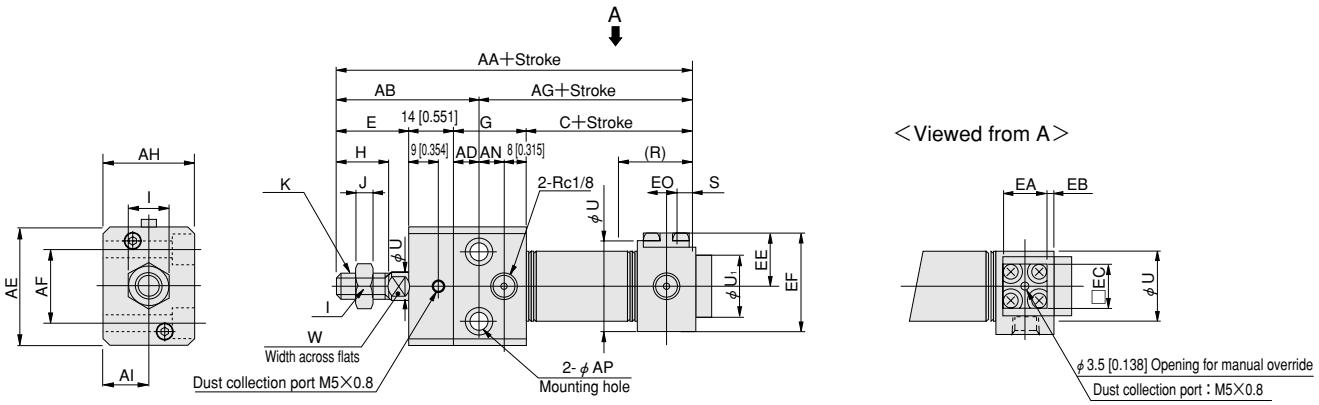
g [oz.]

Bore size mm [in.]	Zero stroke mass	Additional mass for each 1mm [0.0394in.] stroke	Mass of knuckle	
	-HL : Head side end keep Side mount		Y type knuckle	I type knuckle
20 [0.787]	210 [7.41]	0.8 [0.028]	41 [1.45]	36 [1.27]
25 [0.984]	310 [10.93]	1.1 [0.039]	75 [2.65]	70 [2.47]
32 [1.260]	500 [17.64]	1.5 [0.053]		
40 [1.575]	900 [31.75]	2.4 [0.085]	120 [4.23]	132 [4.66]

Calculation example: For head side end keep side mount type of 32mm bore size and 100mm stroke, 500＋(1.5×100)＝650g [22.93 oz.]

-HL Dimensions of Head Side End Keep, Side Mounting Type mm [in.]

●φ20～φ40



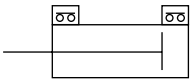
●The drawings for sizes φ32 and φ40 (The outward shape of the size φ20 and φ25 head covers is larger than the block portion.)

Bore \ Code	C	E	G	H	I	J	K	R	S	U	U_1	V	W
20 [0.787]	60 [2.362]	23 [0.906]	28 [1.102]	15 [0.591]	12 [0.472]	5 [0.197]	M8×1	16 [0.630]	6 [0.236]	29 [1.142]	20 [0.787]	8 [0.315]	6 [0.236]
25 [0.984]	60 [2.362]	26 [1.024]	30 [1.181]	18 [0.709]	14 [0.551]	6 [0.236]	M10×1.25	16 [0.630]	6 [0.236]	35 [1.378]	22 [0.866]	10 [0.394]	8 [0.315]
32 [1.260]	72 [2.835]	31 [1.220]	36 [1.417]	23 [0.906]	14 [0.551]	6 [0.236]	M10×1.25	26 [1.024]	1 [0.039]	35 [1.378]	27 [1.063]	12 [0.472]	10 [0.394]
40 [1.575]	79 [3.110]	31 [1.220]	44 [1.732]	23 [0.906]	19 [0.748]	8 [0.315]	M14×1.5	32 [1.260]	1 [0.039]	41.6 [1.638]	33 [1.299]	16 [0.630]	14 [0.551]

Bore \ Code	AA	AB	AD	AE	AF	AG	AH	AI	AN	AP	EA	EB	EC	EE	EF	EO
20 [0.787]	131 [5.157]	48 [1.890]	11 [0.433]	38 [1.496]	22 [0.866]	83 [3.268]	28 [1.102]	14 [0.551]	9 [0.354]	φ6.6 [0.260] Counterbore φ11 [0.433] Depth 6.5 [0.256]	16 [0.630]	—	16 [0.630]	24 [0.945]	38.5 [1.516]	8 [0.315]
25 [0.984]	136 [5.354]	52 [2.047]	12 [0.472]	42 [1.654]	26 [1.024]	84 [3.307]	30 [1.181]	15 [0.591]	10 [0.394]	φ6.6 [0.260] Counterbore φ11 [0.433] Depth 6.5 [0.256]	16 [0.630]	—	16 [0.630]	25 [0.984]	42.5 [1.673]	8 [0.315]
32 [1.260]	154 [6.063]	59 [2.323]	14 [0.551]	54 [2.126]	34 [1.339]	95 [3.740]	36 [1.417]	18 [0.709]	14 [0.551]	φ9 [0.354] Counterbore φ14 [0.551] Depth 8.6 [0.339]	24 [0.945]	2 [0.079]	25 [0.984]	30 [1.181]	(40.5) ([1.594])	14 [0.551]
40 [1.575]	169 [6.654]	62 [2.441]	17 [0.669]	68 [2.677]	46 [1.811]	107 [4.213]	44 [1.732]	22 [0.866]	19 [0.748]	φ11 [0.433] Counterbore φ17.5 [0.689] Depth 10.8 [0.425]	24 [0.945]	4 [0.157]	25 [0.984]	32.5 [1.280]	(46) ([1.811])	16 [0.630]

●Since a magnet comes standard in the Slim cylinders series, mounting a sensor switch will enable use in sensor switch applications.

Symbol



Order Codes

●Order codes for sensor switch with mounting strap

CS — □ □ — □ □

Sensor switch

ZG530	2-lead wire Solid state type with indicator lamp	DC10～28V
ZG553	3-lead wire Solid state type with indicator lamp	DC4.5～28V
CS3M	2-lead wire Reed switch type with indicator lamp	DC10～30V, AC85～230V
CS4M	2-lead wire Reed switch type with indicator lamp	DC10～30V, AC85～115V
CS5M	2-lead wire Reed switch type without indicator lamp	DC3～30V, AC85～115V
CS2F	2-lead wire Reed switch type with indicator lamp	AC85～230V
CS3F	2-lead wire Reed switch type with indicator lamp	DC10～30V
CS4F	2-lead wire Reed switch type with indicator lamp	DC10～30V
CS5F	2-lead wire Reed switch type without indicator lamp	DC3～30V

Lead wire length
(Applies to all except **CS□F**)
A — 1000mm [39in.]
B — 3000mm [118in.]

Cylinder basic type
DA — Excluding **DAB** ϕ16 and **DABK** ϕ16
DAB — For block cylinder ϕ16
DABK — For block type end keep cylinder ϕ16
S — For sensor switch type **CS□F**

Bore size Note
16 — ϕ16 [0.630in.]
20 — ϕ20 [0.787in.]
25 — ϕ25 [0.984in.]
32 — ϕ32 [1.260in.]
40 — ϕ40 [1.575in.]
50 — ϕ50 [1.969in.]
63 — ϕ63 [2.480in.]
Note: ϕ50 and ϕ63 are DA type only.

Clean system product

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

●Order codes for sensor switch only

CS — □ □

Sensor switch

ZG530	2-lead wire Solid state type with indicator lamp	DC10～28V
ZG553	3-lead wire Solid state type with indicator lamp	DC4.5～28V
CS3M	2-lead wire Reed switch type with indicator lamp	DC10～30V, AC85～230V
CS4M	2-lead wire Reed switch type with indicator lamp	DC10～30V, AC85～115V
CS5M	2-lead wire Reed switch type without indicator lamp	DC3～30V, AC85～115V
CS2F	2-lead wire Reed switch type with indicator lamp	AC85～230V
CS3F	2-lead wire Reed switch type with indicator lamp	DC10～30V
CS4F	2-lead wire Reed switch type with indicator lamp	DC10～30V
CS5F	2-lead wire Reed switch type without indicator lamp	DC3～30V

Lead wire length
(Applies to all except **CS□F**)
A — 1000mm [39in.]
B — 3000mm [118in.]

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

Clean system product

●Order codes for mounting strap only

CS — □ — □ □

Bore size Note
16 — ϕ16 [0.630in.]
20 — ϕ20 [0.787in.]
25 — ϕ25 [0.984in.]
32 — ϕ32 [1.260in.]
40 — ϕ40 [1.575in.]
50 — ϕ50 [1.969in.]
63 — ϕ63 [2.480in.]
Note: ϕ50 and ϕ63 are DA type only.

Cylinder basic type
DA — Excluding **DAB** ϕ16 and **DABK** ϕ16
DAB — For block cylinder **DAB** ϕ16
DABK — For block end keep cylinder **DABK** ϕ16
S — For sensor switch type **CS□F**

Mounting strap type
G5 — Solid state type
For **ZG5□□**
Reed switch type
For **CS□M**
F — Reed switch type
For **CS□F**

Clean system product

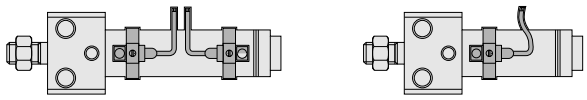
Minimum Cylinder Strokes When Using Sensor Switches

mm [in.]

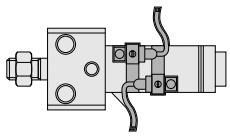
Sensor switch model	Bore size	2 pcs. mounting		1 pc. mounting
		In-line	In staggered positions	
ZG530 **ZG553**	16 [0.630]	20 [0.787]	10 [0.394]	10 [0.394]
	20~63 [0.787~2.480]	20 [0.787]	10 [0.394]	10 [0.394]
CS□M	16~63 [0.630~2.480]	20 [0.787]	15 [0.591]	15 [0.591]
CS□F	20~63 [0.787~2.480]	40 [1.575]	21 [0.827]	15 [0.591]

●Two pieces mounting ●One piece mounting

●When mounted in-line



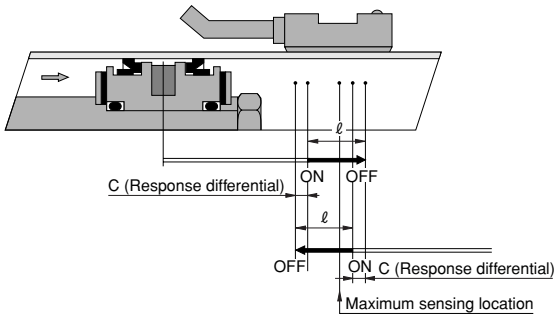
●When mounted in staggered positions



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

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

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



mm [in.]

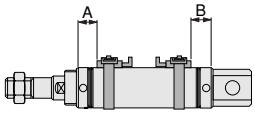
Item	Bore size	16 [0.630]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]	50 [1.969]	63 [2.480]
Operating range : ℓ	**ZG530□**	2.5～4.1 [0.098～0.161]	2.5～4.2 [0.098～0.165]	2.6～4.3 [0.102～0.169]	3.0～4.8 [0.118～0.189]	3.1～5.0 [0.122～0.197]	3.3～5.4 [0.130～0.213]	3.5～5.7 [0.138～0.224]
	ZG533□							
	CS□M	6.7～7 [0.264～0.276]	7～8.5 [0.276～0.335]	7～8.5 [0.276～0.335]	8～9 [0.315～0.354]	9～10.5 [0.354～0.413]	7～8 [0.276～0.315]	8～9.5 [0.315～0.374]
	CS□F	—	7～8.5 [0.276～0.335]	8.5～10 [0.335～0.394]	9～10.5 [0.354～0.413]	10.5～12 [0.413～0.472]	9～10 [0.354～0.394]	9～10.5 [0.354～0.413]
Response differential : C	**ZG530**	0.7 [0.028] or less	0.7 [0.028] or less	0.8 [0.032] or less	0.7 [0.028] or less	0.8 [0.032] or less	0.8 [0.032] or less	0.8 [0.032] or less
	ZG533	0.7 [0.028] or less	0.7 [0.028] or less	0.8 [0.032] or less	0.7 [0.028] or less	0.8 [0.032] or less	0.8 [0.032] or less	0.8 [0.032] or less
	CS□M	1 [0.039] or less	1 [0.039] or less	1 [0.039] or less	1 [0.039] or less	1 [0.039] or less	1.2 [0.047] or less	1.2 [0.047] or less
	CS□F	—	1.5 [0.059] or less	1.5 [0.059] or less	1.5 [0.059] or less	1.5 [0.059] or less	2 [0.079] or less	1.5 [0.059] or less
Maximum sensing location	**ZG530, ZG553** Note 1	11 [0.433]	11 [0.433]	11 [0.433]	11 [0.433]	11 [0.433]	11 [0.433]	11 [0.433]
	CS□M Note 1	11 [0.433]	11 [0.433]	11 [0.433]	11 [0.433]	11 [0.433]	11 [0.433]	11 [0.433]
	CS□F Note 2	—	16 [0.630]	16 [0.630]	16 [0.630]	16 [0.630]	16 [0.630]	16 [0.630]

Remark : Figures in the table above are reference values.
Notes: 1. Figures are from the end surface that is opposite to the lead wires.
2. Figures are from the end surface of the connector side.

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 table are reference values), the magnet comes to the maximum sensing location of the sensor switch at the end of the stroke.

●Double acting cylinder

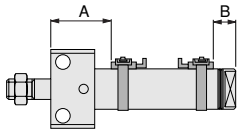


mm [in.]

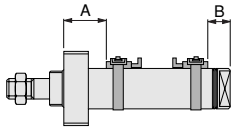
Sensor switch model	Bore size / Code	Double acting cylinder					
		20	**32**	**32**	**40**	**50**	**63**
ZG530□ ZG553□	**A**	37 [1.456]	37 [1.456]	37 [1.456]	38.5 [1.516]	45 [1.772]	45 [1.772]
	B	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]	36 [1.417]	36 [1.417]
CS□M	**A**	37 [1.456]	37 [1.456]	37 [1.456]	38.5 [1.516]	45 [1.772]	45 [1.772]
	B	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]	36 [1.417]	36 [1.417]
CS□F	**A**	32 [1.260]	32 [1.260]	32 [1.260]	32 [1.260]	41 [1.614]	41 [1.614]
	B	22 [0.866]	22 [0.866]	22 [0.866]	22 [0.866]	32 [1.260]	32 [1.260]

●Block cylinder

●Side mount



●Front mount

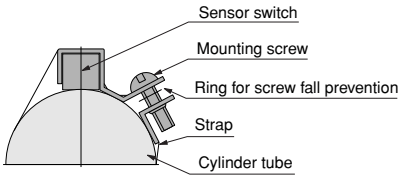


mm [in.]

Mounting type		Side mount							Front mount						
Bore size		**16**	**20**	**25**	**32**	**40**	**50**	**63**	**16**	**20**	**25**	**32**	**40**	**50**	**63**
ZG530□ ZG553□	**A** Rod side	42 [1.654]	53 [2.087]	55 [2.165]	61 [2.402]	71 [2.795]	81 [3.189]	81 [3.189]	33 [1.299]	37 [1.457]	37 [1.457]	37 [1.457]	39 [1.535]	47 [1.850]	47 [1.850]
	B Rod side	16 [0.630]	20 [0.787]	20 [0.787]	21 [0.827]	25 [0.984]	45 [1.772]	45 [1.772]	16 [0.630]	20 [0.787]	20 [0.787]	21 [0.827]	25 [0.984]	45 [1.772]	45 [1.772]
CS□M	**A** Rod side	42 [1.654]	53 [2.087]	55 [2.165]	61 [2.402]	71 [2.795]	80 [3.150]	80 [3.150]	33 [1.299]	37 [1.457]	37 [1.457]	37 [1.457]	39 [1.535]	46 [1.811]	46 [1.811]
	B Rod side	16 [0.630]	20 [0.787]	20 [0.787]	21 [0.827]	25 [0.984]	44 [1.732]	44 [1.732]	16 [0.630]	20 [0.787]	20 [0.787]	21 [0.827]	25 [0.984]	44 [1.732]	44 [1.732]
CS□F	**A** Rod side	—	50 [1.969]	52 [2.047]	58 [2.283]	66 [2.598]	78 [3.071]	78 [3.071]	—	34 [1.339]	34 [1.339]	34 [1.339]	34 [1.339]	44 [1.732]	44 [1.732]
	B Rod side	—	17 [0.669]	17 [0.669]	18 [0.709]	20 [0.787]	42 [1.654]	42 [1.654]	—	17 [0.669]	17 [0.669]	18 [0.709]	22 [0.866]	42 [1.654]	42 [1.654]

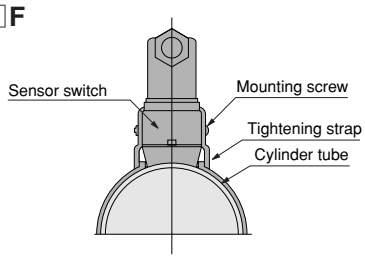
Moving Sensor Switch

●ZG530□ ZG553□ CS□M



- Loosening the mounting screw allows the sensor switch to be moved freely along with the strap in the axial and circumferential direction. The sensor switch alone cannot be moved.
- To remove the sensor switch from the strap, first detach the strap from the cylinder tube and then remove the sensor switch from the strap.
- Tighten the mounting screw with a tightening torque of 49N·cm [4.3in·lbf] or less.

●CS□F



- Loosening the mounting screw allows the sensor switch to be moved freely in the axial and circumferential direction.
- Slightly loosening the mounting screw allows fine adjustment of the lead switch only, up to 5mm [0.197in.] in the axial direction.
  Tighten the mounting screw with a tightening torque of 68.6N·cm [6.1in·lbf] or less.

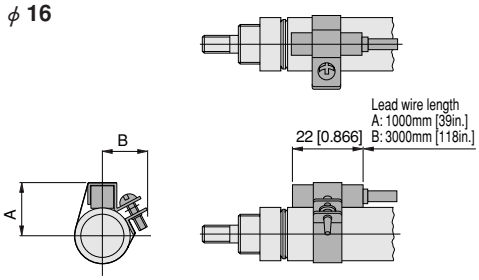
Dimensions of Sensor Switch mm [in.]

●ZG530□ ZG553□ CS□M

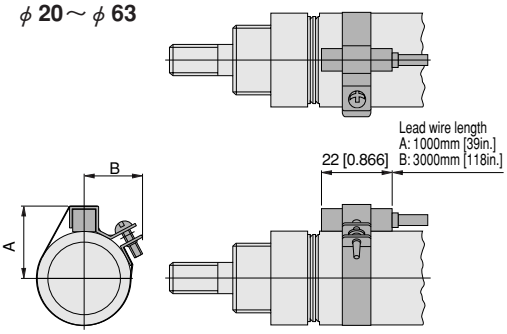
Bore \ Code	A	B
16 [0.630]	16 [0.630]	15 [0.591]
20 [0.787]	19 [0.748]	17 [0.669]
25 [0.984]	20.5 [0.807]	17.5 [0.689]
32 [1.260]	25 [0.984]	19 [0.748]
40 [1.575]	29 [1.142]	—※
50 [1.969]	34 [1.339]	—※
63 [2.480]	41 [1.614]	—※

※At φ40 [1.575in.] or more, dimension B is the radius of the cylinder tube. Therefore, the protrusion in the B direction of the mounting section disappears.

φ16



φ20～φ63



●CS□F

Bore \ Code	Y
20 [0.787]	59 [2.323]
25 [0.984]	61.5 [2.421]
32 [1.260]	65 [2.559]
40 [1.575]	69 [2.717]
50 [1.969]	76 [2.992]
63 [2.480]	83 [3.268]