SLIM CYLINDERS

Use durable piston seals.

The two piston seals are the durable PPY type. This prevents inner air leakage, and achieves smooth operation from low-speed to high-speed ranges.

Sensor switches can be installed anytime after cylinder installation.

Magnets as standard equipment across the entire series allow sensor switches to be installed anytime after the cylinder has been installed.

High installation accuracy and simple mounting operations.

A centering location on the rod cover improves mounting precision. Moreover, the mounting nut's improved thread precision means that holding the cylinder body in place by hand is sufficient for mounting nut tightening operations. Mounting in hard-to-reach places is easy.

Criteria for Selection: Slim Cylinder Allowable Kinetic Energy

Slim cylinders (with the exception of heat resistant specifications) include a cushioning mechanism.
This mechanism is intended to reduce as much as possible the impact of pistons with high kinetic energy when they stop at the end of the stroke. There are two types of cushions, as shown below.

●Rubber bumpers (Standard equipment)

Rubber bumpers installed on both sides of the piston soften the impact at the end of the stroke, and absorb the impact noise during stopping, in response to high-frequency and high-speed operations. They are standard equipment across the whole series, with the exception of heat resistant specifications.
Note that a certain amount of rebound will occur at the end of the stroke on the cylinder with the rubber bumpers.

●Variable cushions

Use variable cushions for large load or high-speed operations that rubber bumpers cannot adequately absorb. The impact is absorbed by compressing air, when the piston stops at the end of the stroke.
Since the cushioning stroke is included within the cylinder stroke, be careful to ensure that the cushion is not excessively performed during cylinder applications of 25mm strokes or less. An excessively performed cushion can result in too much time for each stroke, reducing efficiency. When operated at or below the absorbable kinetic energy shown in the table below, the cushion seal life is 1 million operations or more.

The load kinetic energy can be obtained through the formulas shown below.

$$Ex = \frac{m}{2} v^2$$

Ex: Kinetic energy (J)
m: Load mass (kg)
v: Piston speed (m/s)

$$E'x = \frac{W}{2g} v'^2$$

E'x: Kinetic energy [ft·lbf]
W: Load [lbf.]
v': Piston speed [ft./sec.]
g: Acceleration of gravity 32.2 [ft./sec.^{2}]

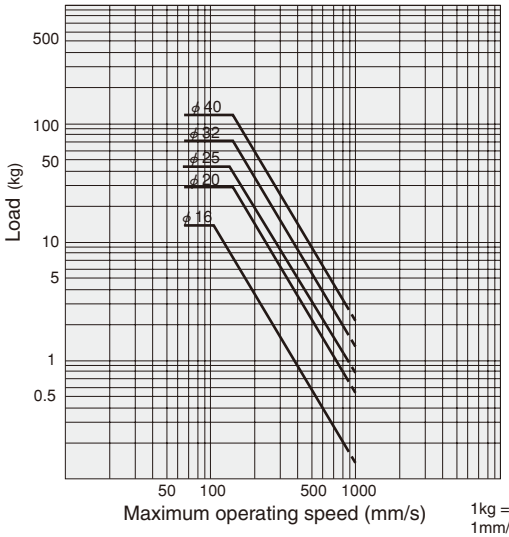
Operating speed range

●Rubber bumper ····· 30～800mm/s [1.2～31.5in./sec.]
●Variable cushion ····· 30～1000mm/s [1.2～39.4in./sec.]

J [ft·lbf]

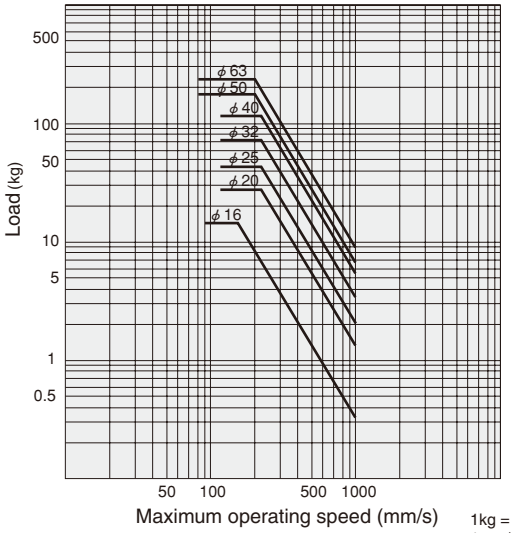
Bore size mm [in.]	Allowable kinetic energy	
	With rubber bumpers	With variable cushion
16 [0.630]	0.07 [0.052]	0.18 [0.13]
20 [0.787]	0.27 [0.20]	0.7 [0.52]
25 [0.984]	0.40 [0.30]	1.05 [0.77]
32 [1.260]	0.65 [0.48]	1.8 [1.33]
40 [1.575]	1.2 [0.89]	2.8 [2.07]
50 [1.969]	—	3.5 [2.58]
63 [2.480]	—	4.5 [3.32]

Rubber bumper (Graph 1)



1kg = 2.205 lb.
1mm/s = 0.0394 in./sec.

Variable cushion (Graph 2)

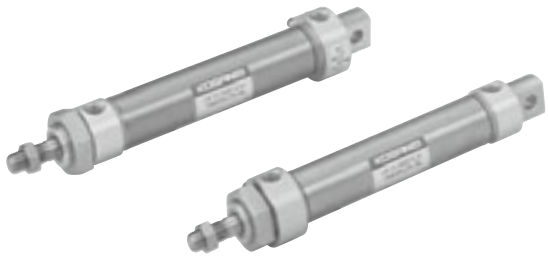


1kg = 2.205 lb.
1mm/s = 0.0394 in./sec.

How to read the graphs
From Graph 1, the capacity of the rubber bumpers limits the maximum speed to 500mm/s [19.7in./sec.] or less when a φ32 Slim Cylinder is used to carry a load of 5kg [11.0lb.].
From Graph 2, a φ32 cylinder with variable cushion can be selected to carry a load of 8kg [17.6lb.] at a maximum speed of 600mm/s [23.6in./sec.].

SLIM END KEEP CYLINDERS

Head Side End Keep, Rod Side End Keep



Symbols

●Head side end keep **●Rod side end keep**

Specifications

Item \ Bore size mm [in.]	20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]	50 [1.969]	63 [2.480]
Operation type	Double acting type, with head side or rod side end keep mechanism					
Media	Air					
Mounting type	Basic type, Foot type, Flange type, Pivot type					
Operating pressure range MPa [psi.]	0.1～0.9 [15～131]				0.1～0.7 [15～102]	
Proof pressure MPa [psi.]	1.32 [191]				1.03 [149]	
Operating temperature range °C [°F]	0～70 [32～158]					
Operating speed range mm/s [in./sec.]	50～700 [2.0～27.6]				50～500 [2.0～19.7]	
Cushion	Fixed type (Rubber bumper)				Variable type (Stroke 15mm [0.591in.])	
Lubrication	Not required					
Maximum holding force (at end keep) N [lbf.]	194.2 [43.7]	303 [68.1]	496.2 [111.5]	775.7 [174.4]	943.4 [212.1]	1497 [336.5]
Backlash (at end keep) mm [in.]	1.4 [0.055] MAX.		1.6 [0.063] MAX.			
Port size Rc	1/8				1/4	

Bore Size and Stroke

mm

Bore size	Standard strokes	Maximum stroke		Maximum available stroke	
		No bellows	With bellows	No bellows	With bellows
20	25 50 75 100 125 150	200		1050	740
25	25 50 75 100 125 150 200	250			
32	25 50 75 100 125 150 200	300			
40	25 50 75 100 125 150 200 250 300	400	300		
50	25 50 75 100 150 200 [250 300 350 400]	300[500]	300	900	
63	25 50 75 100 150 200 [250 300 350 400 500]	300[600]	300		

Remarks: 1. Stroke tolerance $^{+1}_{0}$ [$^{+0.039in.}_{0}$]
2. For non-standard strokes, consult us.
3. Figures in parentheses [ ] are for cases when foot mounting brackets are used for mounting.
4. The minimum operating pressure when the stroke is over the maximum stroke at bore size of φ20～φ40 is 0.2MPa [29psi.].

Order Codes

DA □ **K** □ **20×50** – □ – □ – □ – □ – □ – □ □ □

Slim cylinder

Bellows
Blank — No bellows
J —— With bellows (Made to order)

End keep cylinder

Scraper
Blank — No scraper
Y —— With scraper (Made to order; available at φ50 and φ63 only)

Bore size × Stroke

Non-ion specification
Blank — Standard
NCU — Non-ion specification

Head cover specification
Blank — Standard head
A —— Short head

End keep position
HL —— Head side end keep
RL —— Rod side end keep

Mounting type
Blank — Basic type
1 —— Double foot mounting type
3 —— Flange mounting type
8B —— Pivot mounting type with bushing (Available at φ50 and φ63 only)
8E —— Pivot mounting type with supporting bracket (with pin) (Available at φ20～40 only)
8B-8E — Pivot mounting type with bushing and supporting bracket (Available at φ50 and φ63 only)
● Mounting brackets are included at shipping. (Except for pivot mounting type and pivot mounting type with bushing)

Rod end accessory
Blank — No rod end accessory
I —— I type knuckle
Y —— Y type knuckle (with pin)
● For the cylinder joint and cylinder rod end, see p.1568.

Sensor switch (for cylinders with sensor switches)

Blank	No 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	Reed switch type	with indicator lamp	DC10～30V AC85～230V
CS4M	Reed switch type	with indicator lamp	DC10～30V AC85～115V
CS5M	Reed switch type	without indicator lamp	DC3～30V AC85～115V
CS2F	Reed switch type	with indicator lamp	AC85～230V
CS3F	Reed switch type	with indicator lamp	DC10～30V
CS4F	Reed switch type	with indicator lamp	DC10～30V
CS5F	Reed switch type	without indicator lamp	DC3～30V

● For details of sensor switches, see p.1544.
● **CS□F** comes with DIN connector. All others are grommet type.

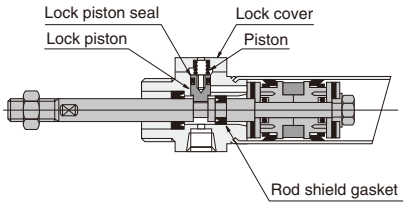
Lead wire length
(Applies to all except **CS□F**)
A ——1000mm [39in.]
B ——3000mm [118in.]

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

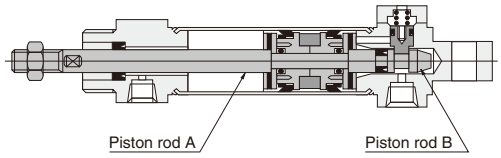
Inner Construction and Major Parts (cannot be disassembled)

● ϕ 20, ϕ 25

●Rod side end keep

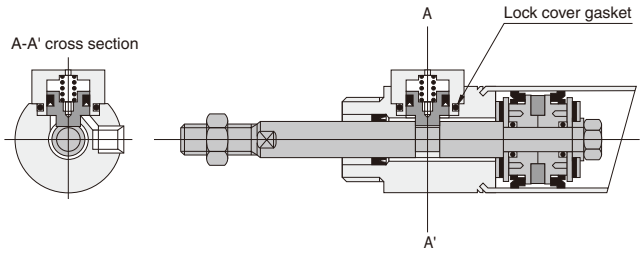


●Head side end keep

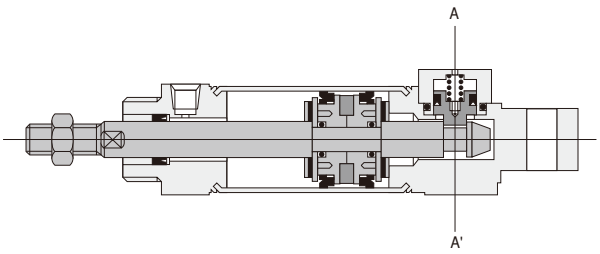


● ϕ 32, ϕ 40

●Rod side end keep

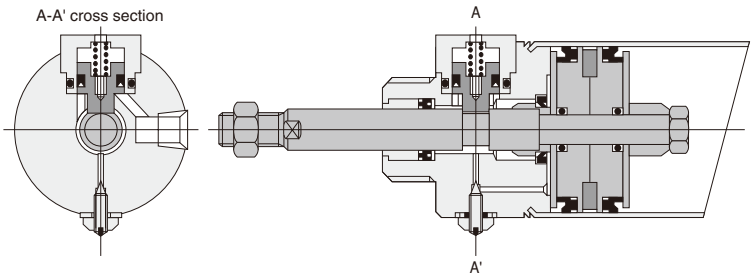


●Head side end keep

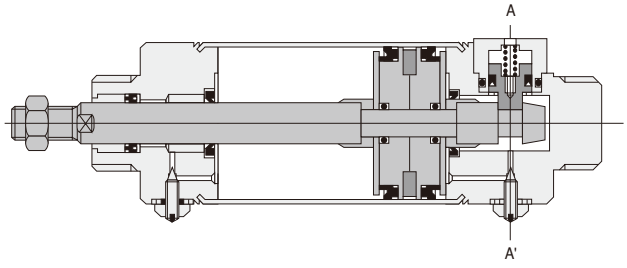


● ϕ 50, ϕ 63

●Rod side end keep



●Head side end keep



Major Parts and Materials

Parts	20, 25	32, 40, 50, 63
Piston rod A	Steel (hard chrome plated)	
Piston rod B	Steel (zinc plated)	
Spring	Stainless steel	Piano wire
Lock piston	Stainless steel	
Rod cover	Aluminum alloy (anodized)	
Y type knuckle, I type knuckle Pivot mounting with supporting bracket	Mild steel (zinc plated)	

Other than the items listed above, they are the same as for the standard Slim Cylinder.

Seals Note: Seals cannot be replaced.

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	—	MYN-10A	S18
50	—	MYN-16	S22.4
63	—	MYN-16	S22.4

Other than the items listed above, they are the same as for the standard Slim Cylinder.

Mass

kg [lb.]

Bore size mm [in.]	Zero stroke mass						Additional mass for each 1mm [0.0394in.] stroke	Mass of mounting bracket				
	-HL: Head side end keep			-RL: Rod side end keep				Foot bracket	Flange bracket	Pivot bracket	Y type knuckle	I type knuckle
	Basic type	Short head type	Pivot mounting type	Basic type	Short head type	Pivot mounting type						
20 [0.787]	0.16 [0.35]	0.15 [0.33]	—	0.15 [0.33]	0.14 [0.31]	—	0.0008 [0.0018]	0.14 [0.31]	0.08 [0.18]	0.06 [0.13]	0.042 [0.093]	0.035 [0.077]
25 [0.984]	0.21 [0.46]	0.20 [0.44]	—	1.20 [2.65]	0.19 [0.42]	—	0.0011 [0.0024]	0.16 [0.35]	0.08 [0.18]	0.06 [0.13]	0.075 [0.165]	0.070 [0.154]
32 [1.260]	0.35 [0.77]	0.33 [0.73]	—	0.34 [0.75]	0.32 [0.71]	—	0.0015 [0.0033]	0.19 [0.42]	0.10 [0.22]	0.14 [0.31]		
40 [1.575]	0.53 [1.17]	0.51 [1.12]	—	0.52 [1.15]	0.50 [1.10]	—	0.0024 [0.0053]	0.29 [0.64]	0.13 [0.29]	0.14 [0.31]	0.122 [0.269]	0.132 [0.291]
50 [1.969]	0.99 [2.18]	0.91 [2.01]	0.94 [2.07]	0.96 [2.12]	0.88 [1.94]	0.91 [2.01]	0.0028 [0.0062]	0.55 [1.21]	0.28 [0.62]	0.24 [0.53]		
63 [2.480]	1.32 [2.91]	1.26 [2.78]	1.28 [2.82]	1.29 [2.84]	1.22 [2.69]	1.25 [2.76]	0.0035 [0.0077]	0.73 [1.61]	0.37 [0.82]	0.24 [0.53]		

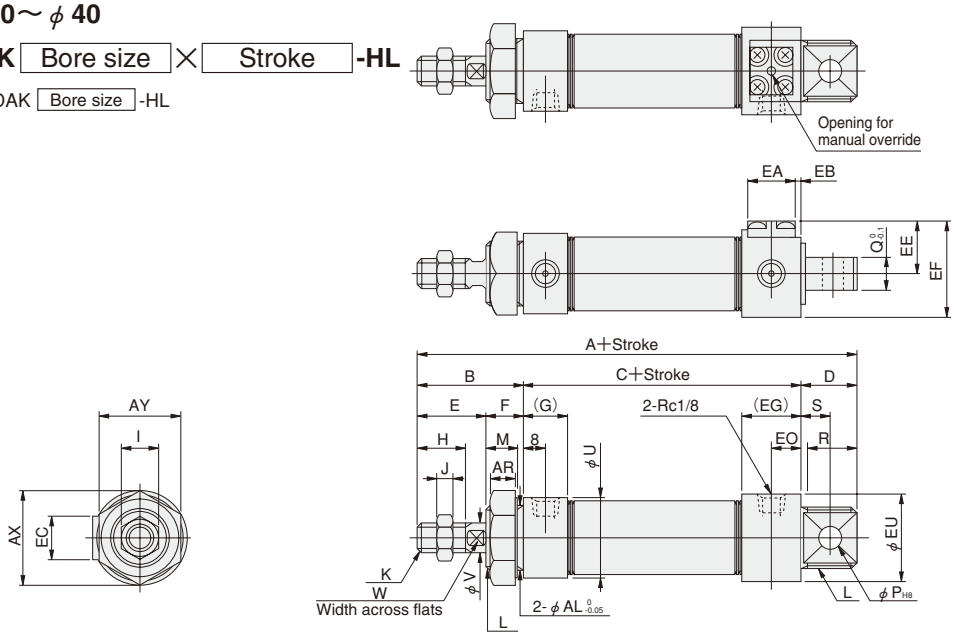
Calculation example: For head side end keep foot mounting type of 32mm bore size and 100mm stroke
0.35+0.19+(0.0015×100)=0.69kg [1.52lb.]

-HL Dimensions of Head Side End Keep Basic Type (mm)

● φ 20～φ 40

DAK Bore size × Stroke **-HL**

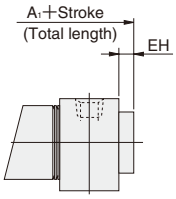
CAD DAK Bore size -HL



● Short head

DAK Bore size × Stroke **-A-HL**

CAD SLIM-A

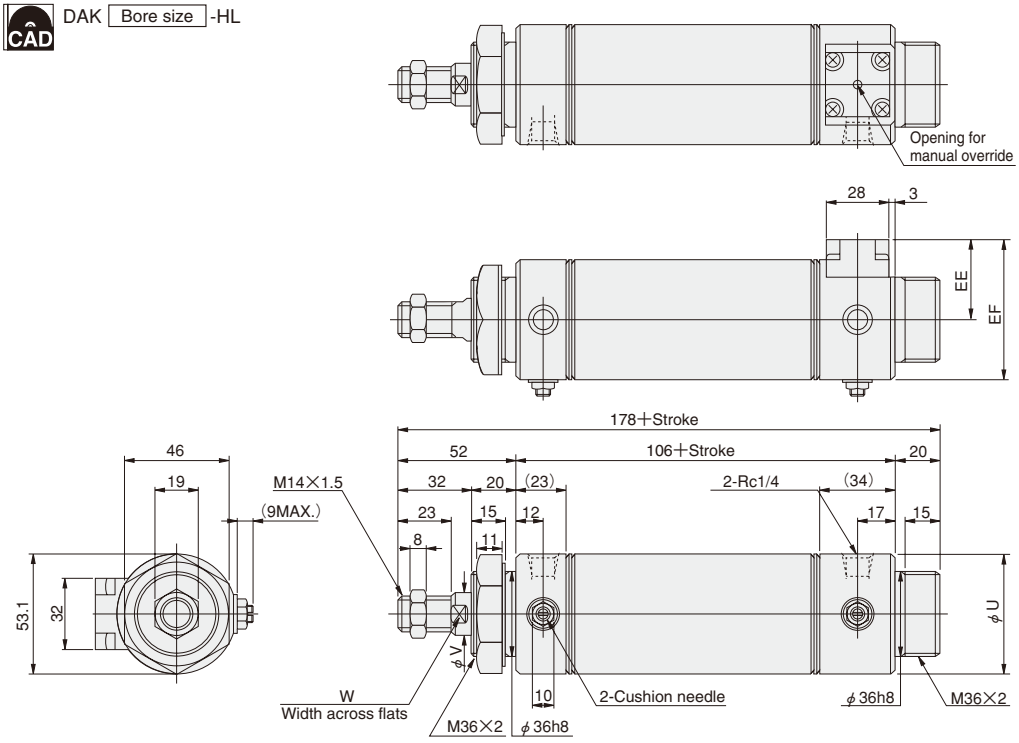


Bore mm [in.] / Code	A	A1	B	C	D	E	F	G	H	I	J	K	L	M	P	Q	R	S	U	V	W
20 [0.787]	132	117	35	76	21	23	12	16	15	12	5	M8×1	M20×1.5	10	8	12	19	12	27	8	6
25 [0.984]	137	122	40	76	21	26	14	16	18	14	6	M10×1.25	M22×1.5	12	8	12	19	12	29	10	8
32 [1.260]	160	134	45	88	27	31	14	16	23	14	6	M10×1.25	M27×2	12	10	20	25	15	35	12	10
40 [1.575]	165	139	45	93	27	31	14	15	23	19	8	M14×1.5	M33×2	12	10	20	25	15	41.6	16	14

Bore mm [in.] / Code	AR	AX	AY	AL	EA	EB	EC	EE	EF	EG	EH	EO	EU
20 [0.787]	7.5	31.2	27	20	16	—	16	17.5	32	16	6	8	29
25 [0.984]	9.5	34.6	30	22	16	—	16	18.5	36	16	6	8	35
32 [1.260]	9.5	41.6	36	27	24	2	25	22.5	40.5	26	1	14	35
40 [1.575]	9.5	47.3	41	33	24	4	25	25.5	46	31	1	16	41.6

● φ 50, φ 63 DAK Bore size × Stroke -HL

CAD DAK Bore size -HL

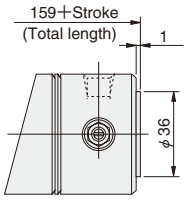


Bore mm [in.] / Code	U	V	W	EE	EF
50 [1.969]	52	16	14	35.5	61.5
63 [2.480]	65.4	16	14	35.5	68.5

● Short head

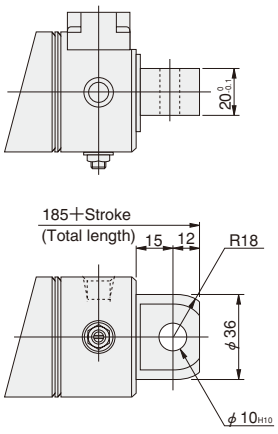
DAK Bore size × Stroke **-A-HL**

CAD SLIM-A



● Pivot mounting type head

DAK Bore size × Stroke **-HL-8B**

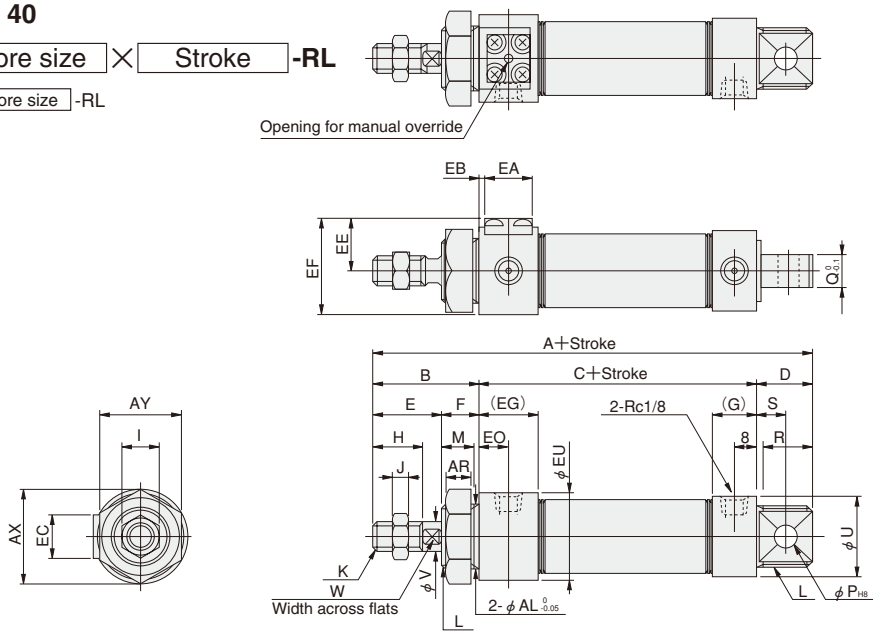


-RL Dimensions of Rod Side End Keep Basic Type (mm)

● ϕ 20～ϕ 40

DAK Bore size × Stroke **-RL**

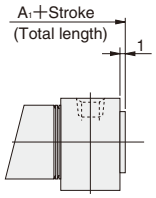
CAD DAK Bore size -RL



● Short head

DAK Bore size × Stroke **-A-RL**

CAD SLIM-A

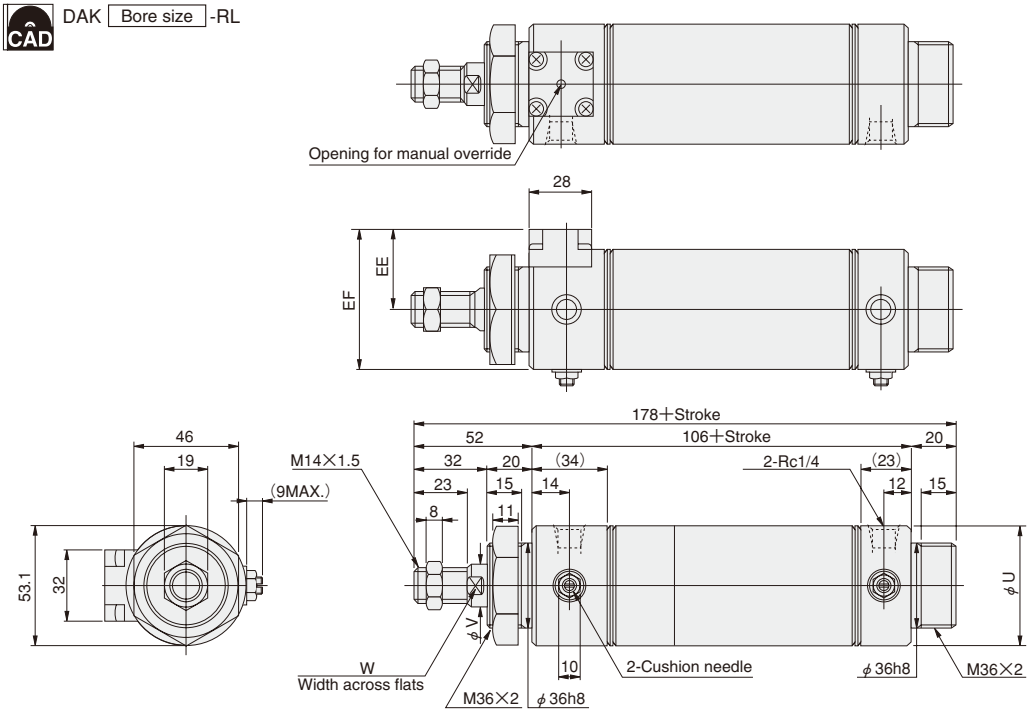


Bore mm [in.] / Code	A	A1	B	C	D	E	F	G	H	I	J	K	L	M	P	Q	R	S	U	V	W
20 [0.787]	132	112	35	76	21	23	12	16	15	12	5	M8×1	M20×1.5	10	8	12	19	12	27	8	6
25 [0.984]	137	117	40	76	21	26	14	16	18	14	6	M10×1.25	M22×1.5	12	8	12	19	12	29	10	8
32 [1.260]	160	134	45	88	27	31	14	16	23	14	6	M10×1.25	M27×2	12	10	20	25	15	35	12	10
40 [1.575]	165	139	45	93	27	31	14	15	23	19	8	M14×1.5	M33×2	12	10	20	25	15	41.6	16	14

Bore mm [in.] / Code	AR	AX	AY	AL	EA	EB	EC	EE	EF	EG	EO	EU
20 [0.787]	7.5	31.2	27	20	16	—	16	17.5	32	16	8	29
25 [0.984]	9.5	34.6	30	22	16	—	16	18.5	36	16	8	35
32 [1.260]	9.5	41.6	36	27	24	2	25	22.5	40.5	26	14	35
40 [1.575]	9.5	47.3	41	33	24	4	25	25.5	46	31	16	41.6

● ϕ 50, ϕ 63 **DAK** Bore size × Stroke **-RL**

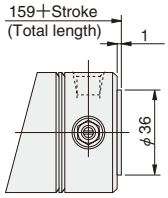
CAD DAK Bore size -RL



● Short head

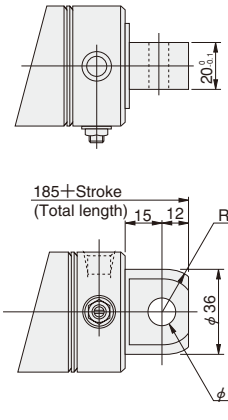
DAK Bore size × Stroke **-A-RL**

CAD SLIM-A



● Pivot mounting type head

DAK Bore size × Stroke **-RL-8B**



Bore mm [in.] / Code	U	V	W	EE	EF
50 [1.969]	52	16	14	35.5	61.5
63 [2.480]	65.4	16	14	35.5	68.5

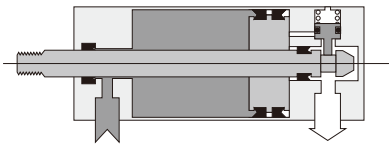
Operating Principle

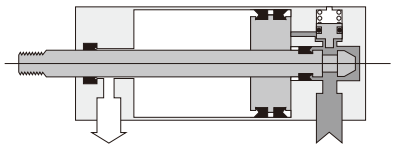
Keep

When the piston reaches the end of the stroke, and the head side is completely exhausted, spring force causes the lock piston to engage, and automatically keep the end of stroke position.

Release

Supplying compressed air to the port on the locking mechanism side pushes up the lock piston and releases the lock. When the lock is released, the by-pass air passage opens to supply compressed air to the piston side.

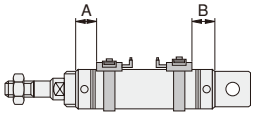




Mounting Location of Sensor Switch

When the sensor switch is mounted in the location shown in the diagram (figures in the table are reference values), the magnet comes to the sensor switch's maximum sensing location at the end of the stroke.

● Air cylinder



●-HL: Head side end keep

mm [in.]

Sensor switch model	Code	Bore size: Air cylinder 20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]	50 [1.969]	63 [2.480]
ZG530□	A	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]	36 [1.417]	36 [1.417]
ZG553□	B	27 [1.063]	27 [1.063]	39 [1.535]	44 [1.732]	47 [1.850]	47 [1.850]
CS□M	A	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]	36 [1.417]	36 [1.417]
	B	27 [1.063]	27 [1.063]	39 [1.535]	44 [1.732]	47 [1.850]	47 [1.850]
CS□F	A	24 [0.945]	24 [0.945]	24 [0.945]	24 [0.945]	34 [1.339]	34 [1.339]
	B	24 [0.945]	24 [0.945]	38 [1.496]	41 [1.614]	46 [1.811]	46 [1.811]

●-RL: Rod side end keep

mm [in.]

Sensor switch model	Code	Bore size: Air cylinder 20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]	50 [1.969]	63 [2.480]
ZG530□	A	27 [1.063]	27 [1.063]	39 [1.535]	44 [1.732]	47 [1.850]	47 [1.850]
ZG553□	B	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]	36 [1.417]	36 [1.417]
CS□M	A	27 [1.063]	27 [1.063]	39 [1.535]	44 [1.732]	47 [1.850]	47 [1.850]
	B	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]	36 [1.417]	36 [1.417]
CS□F	A	24 [0.945]	24 [0.945]	38 [1.496]	41 [1.614]	46 [1.811]	46 [1.811]
	B	24 [0.945]	24 [0.945]	24 [0.945]	24 [0.945]	34 [1.339]	34 [1.339]

Control circuit

For control of Slim End Keep Cylinders, we recommend the use of 2-position, 4-, 5-port valves. Avoid the use of a control circuit of exhaust centers with 3-position valves or other control circuits that exhaust air from 2 delivery ports.

Notes: 1. It is dangerous to supply air to a connection port on a side with a locking mechanism while already exhausted, because the piston rod could suddenly extend (or retract). In addition, since it could also cause galling of the lock piston and piston rod, resulting in defective operation. Always supply air to the connection port on the opposite side to ensure that back pressure is applied.
2. When restarting operations after air has been exhausted from the cylinder due to completion of operations or to an emergency stop, always start by supplying air to the connection port on the opposite side of the locking mechanism.

Manual operation

While the locking mechanism is normally released automatically through cylinder operations, it can also be released manually. For manual release, insert an M3 × 0.5 (M2.5×0.45 for ϕ16) screw that has 30mm [1.18in.] below head length into the opening for manual override, thread it in about 3 turns into the internal lock piston, and then pull up the screw. To maintain the manual override for adjustment, etc., thread the locknut onto the screw and, with the locking mechanism in a released state, tighten the locknut against the cylinder.

Notes: 1. It is dangerous to release the lock when a load (weight) is present on the piston rod, because it may cause a sudden fall or cause the unintended piston rod's extension (or retraction). In this case, always supply air to the connection port opposite the one adjacent to the locking mechanism before releasing the locking mechanism.
2. If the locking mechanism cannot easily be released even with manual override, it could be the result of galling of the lock piston and piston rod. In this case, supply air to the connection port opposite the one adjacent to the locking mechanism before releasing the locking mechanism.

General precautions

Media

1. Use air for the media. For the use of any other media, consult us.
2. Air used for the cylinder should be clean air that contains no deteriorated compressor oil, etc. Install an air filter (filtration of a minimum 40 μm) near the cylinder or valve to remove collected liquid or dust. In addition, drain the air filter periodically.
   Collected liquid or dust entering the cylinder may cause improper operation.

Lubrication

The product can be used without lubrication, if lubrication is required, use Turbine Oil Class 1 (ISO VG32) or equivalent.
Avoid using spindle oil or machine oil.

Atmosphere

1. Because water, oil, dust, etc., entering the opening for manual override may cause defective locks or other erratic operation. If using in locations subject to dripping water, dripping oil etc., or to large amounts of dust, use a cover to protect the unit.
2. The product cannot be used when the media or ambient atmosphere contains any of the substances listed below.
   Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, or acids, etc.

OPTIONAL ROD END SHAPE PATTERNS

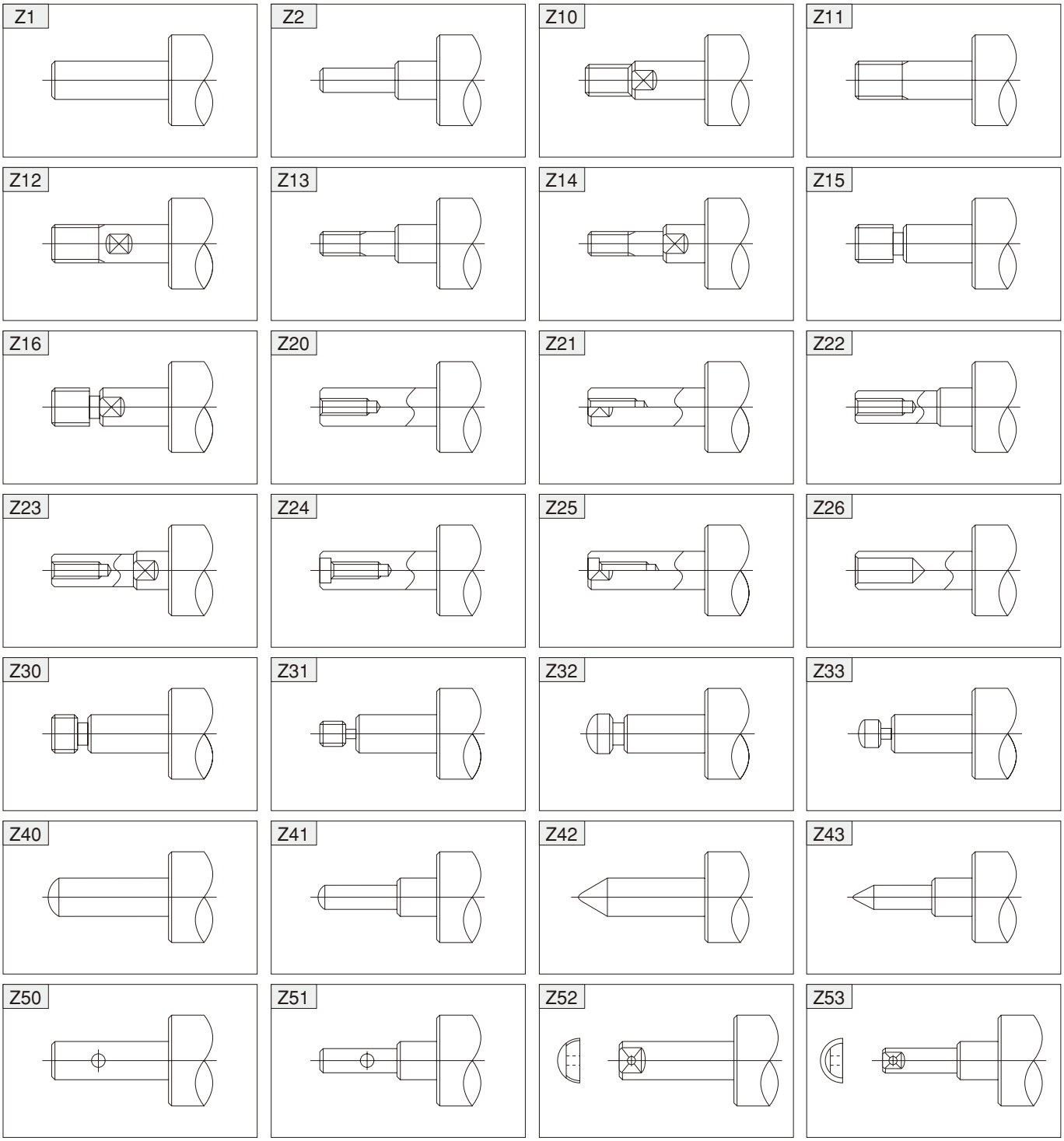
Use an order form of rod end pattern and fill the items on the selected one from among 28 types of optional patterned shapes to obtain made-to-order cylinders of non-standard rod end shapes.
The shapes can be applied to the entire Slim cylinders series with the exception of square rod cylinders and cylinders with bellows. For the order form containing the optional patterned shapes, consult us.

Order Codes

D □ □ – □ – □ – W □

- D □: Cylinder type
- □: Bore size × Stroke
- □: Mounting type
- □: Sensor switch model and quantity
- W □: Rod end shape pattern code

Piston Rod End Shape Pattern Diagram (28 Types)



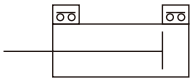
SENSOR SWITCHES

Solid State Type, Reed Switch Type

● Since a magnet is already standard on the Slim cylinders series[Note], mounting a sensor switch will enable use in sensor switch applications.

Note: Except the heat resistant specification cylinder.

Symbol



Order Codes

● Order codes for sensor switches mounted on the Slim cylinders

Order codes for Slim cylinder — □ □ □

Sensor switch

Lead wire length
(Applies to all except **CS□F**)
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
⋮ ⋮

Sensor switch

ZG530	Solid state type	For ϕ16～ϕ63	with indicator lamp	DC10～30V
ZG553	Solid state type	For ϕ16～ϕ63	with indicator lamp	DC4.5～28V
CS3M	Reed switch type	For ϕ16～ϕ63	with indicator lamp	DC10～30V AC85～230V
CS4M	Reed switch type	For ϕ16～ϕ63	with indicator lamp	DC10～30V AC85～115V
CS5M	Reed switch type	For ϕ16～ϕ63	without indicator lamp	DC3～30V AC85～115V
CS2F	Reed switch type	For ϕ20～ϕ63	with indicator lamp	AC85～230V
CS3F	Reed switch type	For ϕ20～ϕ63	with indicator lamp	DC10～30V
CS4F	Reed switch type	For ϕ20～ϕ63	with indicator lamp	DC10～30V
CS5F	Reed switch type	For ϕ20～ϕ63	without indicator lamp	DC3～30V

● Order codes for sensor switch only

Without mounting strap ····· □ □

With mounting strap ····· □ □ — □ □

Sensor switch

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

Bore size

Cylinder basic type
DA : Excluding **DAB** ϕ 16 and **DABK** ϕ 16
DAB : For block cylinder ϕ 16
DABK : For end keep cylinder ϕ 16
S : For sensor switch model **CS□F**

● Order codes for mounting strap only

□ — □ □

Sensor Switch type
G5 : Solid state type
For **ZG5□□**
Reed switch type
For **CS□M**
F : Reed switch type
For **CS□F**

Cylinder basic type
DA : Excluding **DAB** ϕ 16 and **DABK** ϕ 16
DAB : For block cylinder ϕ 16
DABK : For end keep cylinder ϕ 16
S : For sensor model **CS□F**

Bore size
16 : For ϕ 16 [0.630in.] Note
20 : For ϕ 20 [0.787in.]
25 : For ϕ 25 [0.984in.]
32 : For ϕ 32 [1.260in.]
40 : For ϕ 40 [1.575in.]
50 : For ϕ 50 [1.969in.]
63 : For ϕ 63 [2.480in.]
Note: Not available for **CS□F**

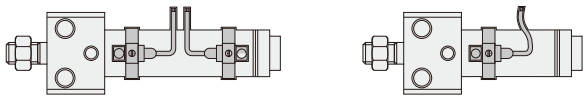
Minimum Cylinder Strokes When Using Sensor Switches

mm

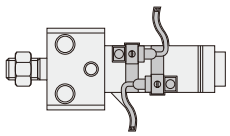
Sensor switch model	Bore size	2 pcs. mounting		1 pc. mounting
		Along a straight line	In staggered positions	
ZG530 ZG553	**16**	20	10	10
	20～63	20	10	10
CS□M	**16～63**	20	15	15
CS□F	**20～63**	40	21	15

●Two pieces mounting ●One piece mounting

●When mounted in-line



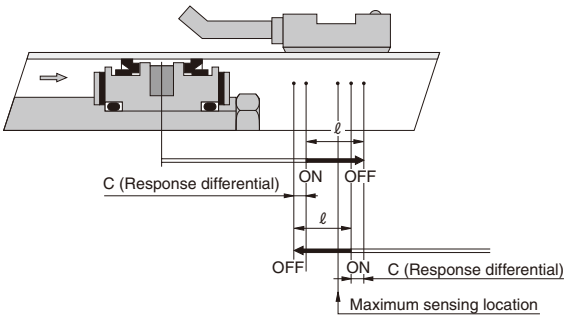
●When mounted in staggered positions



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 [0.031] or less	0.7 [0.028] or less	0.8 [0.031] or less	0.8 [0.031] or less	0.8 [0.031] or less
	ZG533	0.7 [0.028] or less	0.7 [0.028] or less	0.8 [0.031] or less	0.7 [0.028] or less	0.8 [0.031] or less	0.8 [0.031] or less	0.8 [0.031] 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]

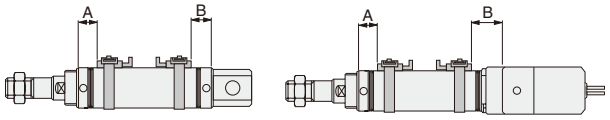
Remark: Figures in the table above are reference values.
Notes: 1. Figures are lengths measured from the switch's opposite end side to the lead wire.
2. Figures are lengths measured from the connector side's end surface to the lead wire.

Mounting Location of End of Stroke Detection Sensor Switch

When the sensor switch is mounted in the location shown in the diagram (figures in the table are reference values), the magnet comes to the sensor switch's maximum sensing location at the end of the stroke.

●Air cylinder, Low hydraulic cylinder, Valpack cylinder

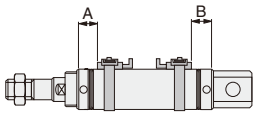
●Air cylinder, Low hydraulic cylinder ●Valpack cylinder



mm [in.]

Sensor switch model	Code	Bore size	Air cylinder, Low hydraulic cylinder						Valpack cylinder			
			20	25	32	40	50	63	20	25	32	40
ZG530□ ZG553□	A		27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]	36 [1.417]	36 [1.417]	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]
	B		27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]	36 [1.417]	36 [1.417]	39 [1.535]	39 [1.535]	39 [1.535]	44 [1.732]
CS□M	A		27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]	36 [1.417]	36 [1.417]	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]
	B		27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]	36 [1.417]	36 [1.417]	39 [1.535]	39 [1.535]	39 [1.535]	44 [1.732]
CS□F	A		22 [0.866]	22 [0.866]	22 [0.866]	22 [0.866]	32 [1.260]	32 [1.260]	22 [0.866]	22 [0.866]	22 [0.866]	22 [0.866]
	B		22 [0.866]	22 [0.866]	22 [0.866]	22 [0.866]	32 [1.260]	32 [1.260]	34 [1.339]	34 [1.339]	34 [1.339]	39 [1.535]

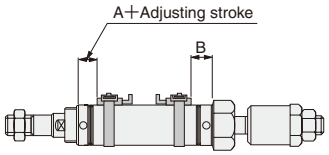
●Single acting cylinder



mm [in.]

Sensor switch model	Code	Stroke	Bore size 20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
ZG530□ ZG553□ CS□M	A	0～25	35 [1.378]	36 [1.417]	35 [1.378]	37 [1.457]
		26～50	52 [2.047]	49 [1.929]	49 [1.929]	53 [2.087]
		51～75	72 [2.835]	71 [2.795]	72 [2.835]	68 [2.677]
		76～100	—	84 [3.307]	86 [3.386]	95 [3.740]
		101～125	—	—	—	110 [4.331]
		126～150	—	—	—	125 [4.921]
	B	—	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]
CS□F	A	0～25	30 [1.181]	31 [1.220]	30 [1.181]	32 [1.260]
		26～50	47 [1.850]	44 [1.732]	44 [1.732]	48 [1.890]
		51～75	67 [2.638]	66 [2.598]	67 [2.638]	63 [2.480]
		76～100	—	79 [3.110]	81 [3.189]	90 [3.543]
		101～125	—	—	—	105 [4.134]
		126～150	—	—	—	120 [4.724]
	B	—	22 [0.866]	22 [0.866]	22 [0.866]	22 [0.866]

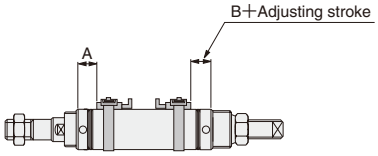
●Push side stroke adjusting cylinder



mm [in.]

Sensor switch model	Code	Bore size 20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
ZG530□ ZG553□ CS□M	A	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]
	B	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]
CS□F	A	22 [0.866]	22 [0.866]	22 [0.866]	22 [0.866]
	B	22 [0.866]	22 [0.866]	22 [0.866]	22 [0.866]

●Pull side stroke adjusting cylinder

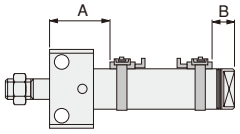


mm [in.]

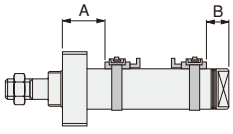
Sensor switch model	Code	Bore size 20 [0.787]	25 [0.984]	32 [1.260]	40 [1.575]
ZG530□ ZG553□ CS□M	A	27 [1.063]	27 [1.063]	27 [1.063]	27 [1.063]
	B	37 [1.457]	37 [1.457]	42 [1.654]	42 [1.654]
CS□F	A	22 [0.866]	22 [0.866]	22 [0.866]	22 [0.866]
	B	32 [1.260]	32 [1.260]	37 [1.457]	37 [1.457]

●Block cylinder

●Side mount



●Front mount

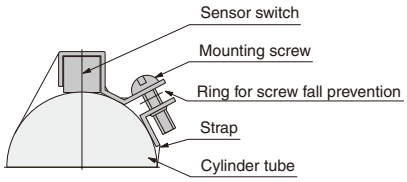


mm [in.]

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	32 [1.260]	39 [1.535]	41 [1.614]	47 [1.850]	57 [2.244]	67 [2.638]	67 [2.638]	23 [0.906]	27 [1.063]	27 [1.063]	27 [1.063]	29 [1.142]	37 [1.457]	37 [1.457]
	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	32 [1.260]	39 [1.535]	41 [1.614]	47 [1.850]	57 [2.244]	66 [2.598]	66 [2.598]	23 [0.906]	27 [1.063]	27 [1.063]	27 [1.063]	29 [1.142]	36 [1.417]	36 [1.417]
	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	—	36 [1.417]	38 [1.496]	44 [1.732]	52 [2.047]	64 [2.520]	64 [2.520]	—	24 [0.945]	24 [0.945]	24 [0.945]	24 [0.945]	34 [1.339]	34 [1.339]
	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]

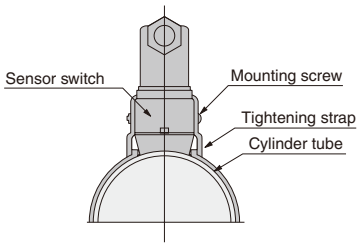
Moving Sensor Switch

●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].

●CS□F

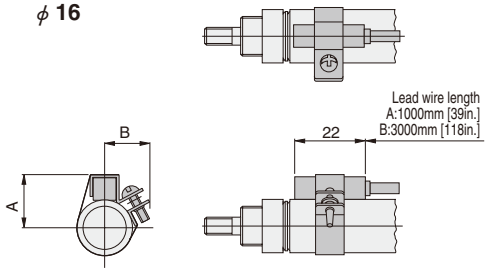


- Loosening the mounting screw allows the sensor switch to be moved freely in the axial and circumferential direction.
- Slightly loosening the mounting screw allows fine adjustment of the lead switch only, up to 5mm [0.2in.] in the axial direction.
  Tighten the mounting screw with a tightening torque of 68.6N·cm [6.1in·lbf].

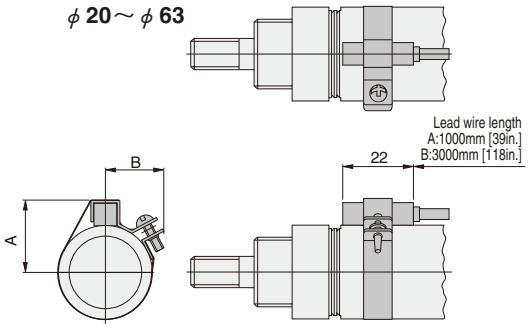
Dimensions of Sensor Switch (mm)

●ZG530□
ZG553□
CS□M

ϕ 16



ϕ 20～ϕ 63

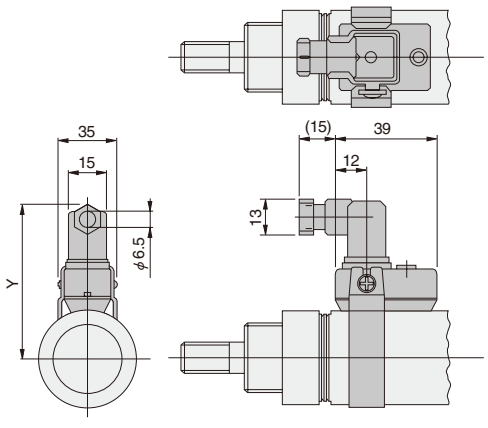


mm [in.]

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 ϕ 40 or larger, dimension B is the radius of the cylinder tube. Therefore, the protrusion in the B direction of the mounting section disappears.

●CS□F



mm [in.]

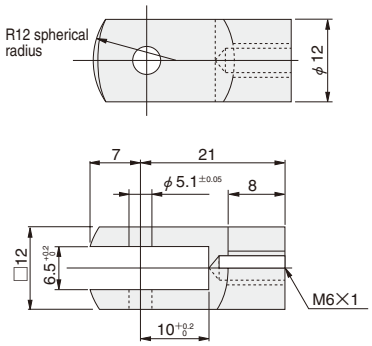
Bore \ Code	Y
20 [0.787]	59 [2.323]
25 [0.984]	61.5 [2.421]
32 [1.260]	65 [2.559]
40 [1.575]	69 [2.717]
50 [1.969]	76 [2.992]
63 [2.480]	83 [3.268]

Dimensions

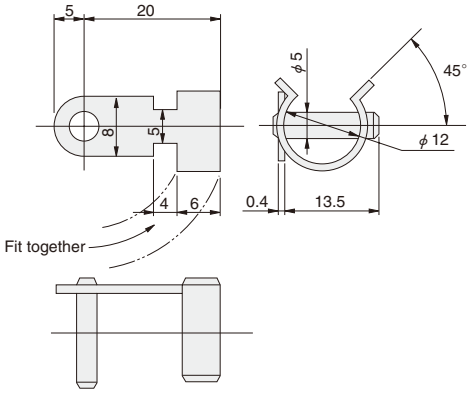
● ϕ 16

●Y type

SLIM-Y

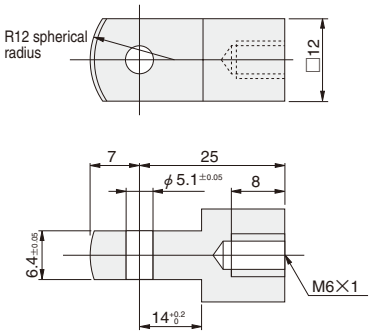


Pin for Y type knuckle



●I type

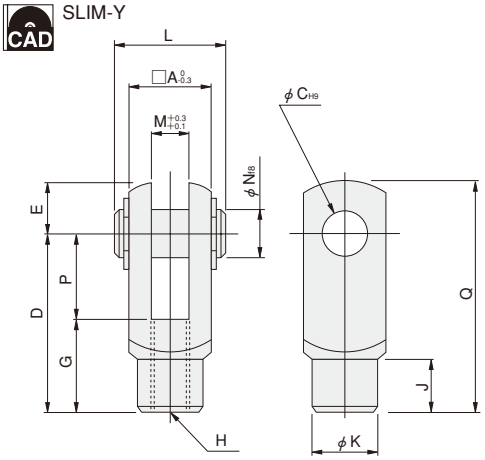
SLIM-I



● ϕ 20～ϕ 63

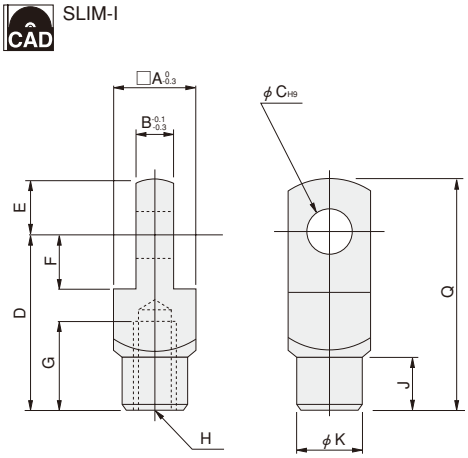
●Y type

SLIM-Y



●I type

SLIM-I



mm [in.]

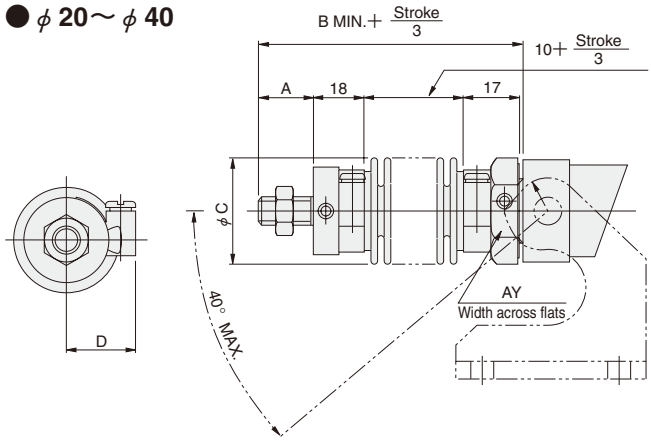
Bore \ Code	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
20 [0.787], 25 [0.984]※	16	8	8	30	10	11	15	M8×1	10	14	21	8	8	15	40
25 [0.984], 32 [1.260]	19	10	10	40	12	13	20	M10×1.25	12	16	25	10	10	20	52
40 [1.575], 50 [1.969], 63 [2.480]	24	14	10	45	12	13	25	M14×1.5	15	22	30	14	10	20	57

Note: Items marked with ※ are for the square rod cylinders.

Dimensions (For brake cylinders with bellows, see p.367.)

SLIM-J CAD

● ϕ 20～ϕ 40

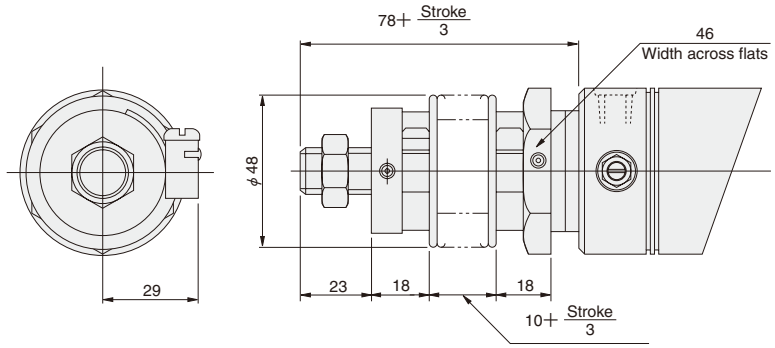


mm [in.]

Bore \ Code	A	B	C	D	AY
20 [0.787]	15 [0.591]	63 [2.480]	35 [1.378]	23 [0.906]	27 [1.063]
25 [0.984]	18 [0.709]	66 [2.598]	35 [1.378]	23 [0.906]	30 [1.181]
32 [1.260]	23 [0.906]	71 [2.795]	40 [1.575]	26 [1.024]	36 [1.417]
40 [1.575]	23 [0.906]	71 [2.795]	48 [1.890]	29 [1.142]	41 [1.614]

Note: Supporting brackets for the rod trunnion type with bellows should be mounted in the direction opposite to the case of no bellows shown in the diagram.

● ϕ 50, ϕ 63



Mass of Slim Cylinder with Bellows

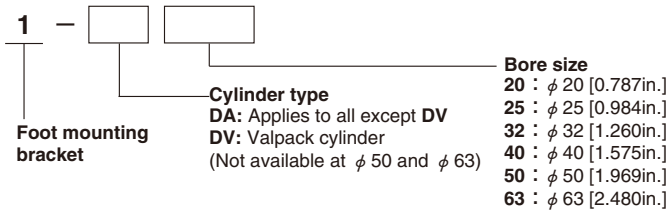
kg [lb.]

Bore size mm [in.]	Zero stroke mass				Additional mass for each 1mm [0.0394in.] stroke
	Standard head	Short head	Pivot mounting type	Trunnion type	
20 [0.787]	0.25 [0.55] (0.23 [0.51])	0.24 [0.53] (0.22 [0.49])	—	0.44 [0.97]	0.0009 [0.0020]
25 [0.984]	0.29 [0.64] (0.27 [0.60])	0.28 [0.62] (0.26 [0.57])	—	0.47 [1.04]	0.0013 [0.0029]
32 [1.260]	0.43 [0.95] (0.40 [0.88])	0.41 [0.90] (0.38 [0.84])	—	0.60 [1.32]	0.0018 [0.0040]
40 [1.575]	0.62 [1.37] (0.56 [1.23])	0.58 [1.28] (0.52 [1.15])	—	0.78 [1.72]	0.0029 [0.0064]
50 [1.969]	1.03 [2.27]	0.98 [2.16]	0.95 [2.09]	—	0.0033 [0.0073]
63 [2.480]	1.36 [3.00]	1.32 [2.91]	1.29 [2.84]	—	0.0038 [0.0084]

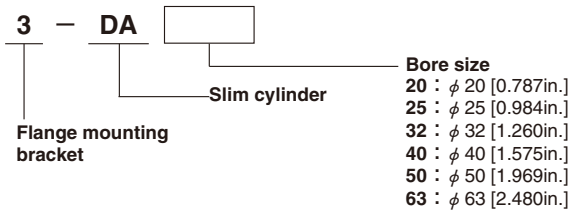
Note: Figures in parentheses ( ) are for the cylinder with variable cushion.

Order Codes for Mounting Bracket

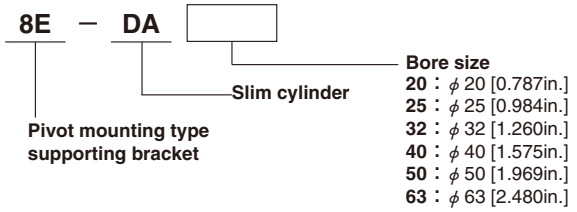
(1) Foot mounting bracket



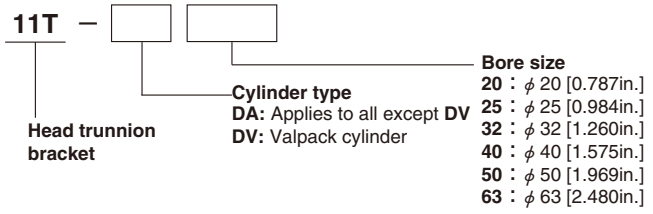
(2) Flange mounting bracket



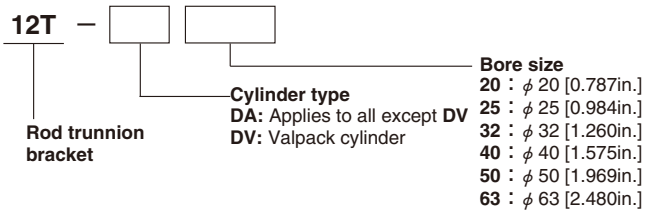
(3) Pivot mounting type supporting bracket



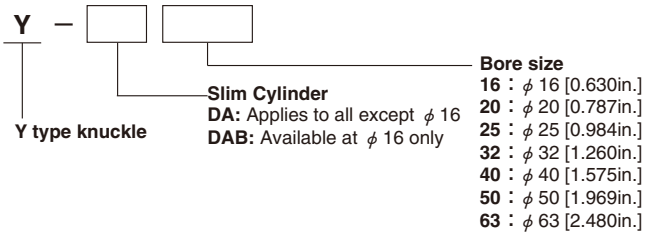
(4) Head trunnion bracket



(5) Rod trunnion bracket



(6) Y type knuckle



(7) I type knuckle