# 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.$^2$]

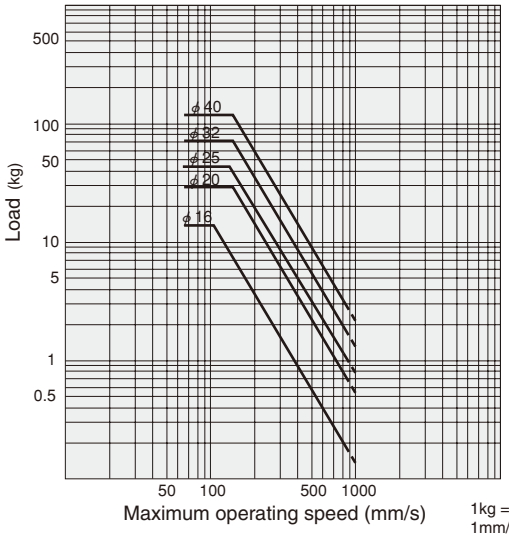
### Operating speed range

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

J [ft·lbf]

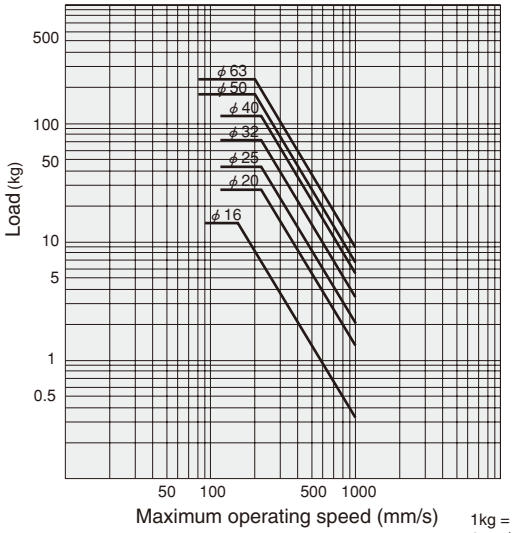
| Bore size mm [in.] | Allowable kinetic energy | |
|---|---|---|
| | With rubber bumpers | With variable cushion |
| **16 [0.630]** | 0.07 [0.052] | 0.18 [0.13] |
| **20 [0.787]** | 0.27 [0.20] | 0.7 [0.52] |
| **25 [0.984]** | 0.40 [0.30] | 1.05 [0.77] |
| **32 [1.260]** | 0.65 [0.48] | 1.8 [1.33] |
| **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)

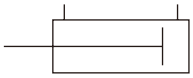


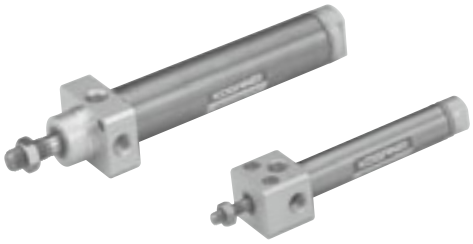

1kg = 2.205 lb.
1mm/s = 0.0394 in./sec.

**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 BLOCK CYLINDERS

## Symbol





## Specifications

| Item \ Bore size mm [in.] | 16 [0.630] | 20～40 [0.787～1.575] | 50, 63 [1.969, 2.480] |
|---|---|---|---|
| Operation type | Double acting type | | |
| Media | Air | | |
| Mounting type | Side mount, Front mount | | |
| Operating pressure range MPa [psi.] | 0.04～0.9 [6～131] | | 0.04～0.7 [6～102] |
| 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.] | 30～700 [1.2～27.6] | | 30～500 [1.2～19.7] |
| Cushion | Fixed type (Rubber bumper) | | Variable type (Stroke15mm [0.59in.]) |
| Lubrication | Not required | | |
| Port size Rc | 1/8 | | 1/4 |

## Bore Size and Stroke

mm

| Bore size | Standard strokes | Maximum stroke | Maximum available stroke |
|---|---|---|---|
| **16** | 15 25 50 75 100 | 100 | 300 |
| **20** | 25 50 75 100 125 150 | 150 | 500 |
| **25** | 25 50 75 100 125 150 200 | 200 | |
| **32** | 25 50 75 100 125 150 200 | 200 | |
| **40** | 25 50 75 100 125 150 200 250 300 | 300 | |
| **50** | 25 50 75 100 150 200 250 300 | 300 | |
| **63** | 25 50 75 100 150 200 250 300 | 300 | |

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

## Order Codes

**DA** **B** □ **50×100** – □ – □ – □ – □ □ □

**Slim double acting cylinder**

**Block cylinder**

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

**Bore size**
×
**Stroke**

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

**Mounting type**
**2** ——— Side mount
**4** ——— Front mount

**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<br>AC85～230V |
| **CS4M** | Reed switch type | with indicator lamp | DC10～30V<br>AC85～115V |
| **CS5M** | Reed switch type | without indicator lamp | DC3～30V<br>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 |

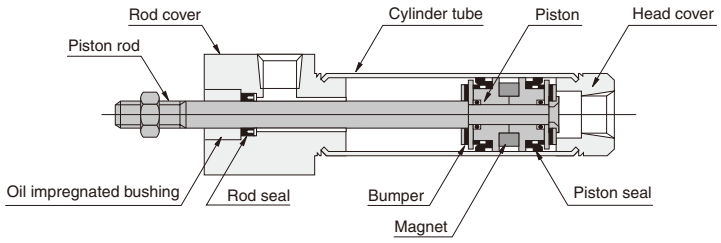
● For details of sensor switches, see p.1544.
● **CS□F** comes with DIN connector. (It is not possible to install on ϕ16.) All others are grommet type.

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

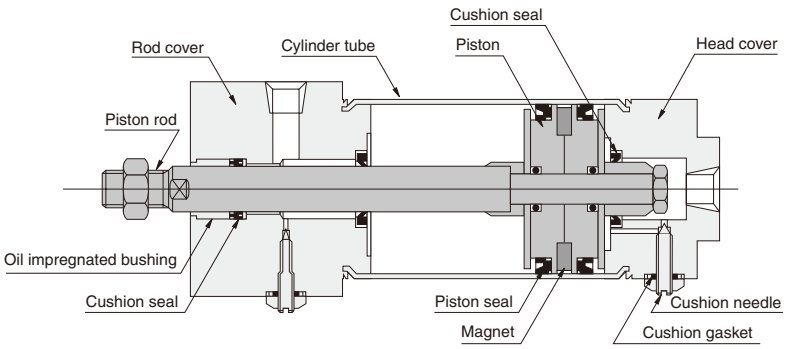
**Number of sensor switches**
**1** ——— With 1 sensor switch
**2** ——— With 2 sensor switches
**3** ——— With 3 sensor switches
⋮ ⋮

## Inner Construction and Major Parts (cannot be disassembled)

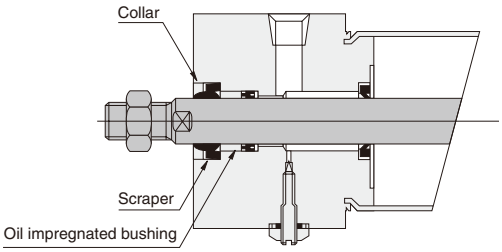
● $\phi$ 16～$\phi$ 40




● $\phi$ 50, $\phi$ 63




●With scraper




## Major Parts and Materials

| Parts \ Bore size | 16 | 20～40 | 50, 63 |
|---|---|---|---|
| Cylinder tube | Stainless steel | | |
| Piston | Plastic | | |
| Piston rod | Stainless steel (hard chrome plated) | Steel (hard chrome plated) | |
| Rod cover | Aluminum (anodized) | | |
| Head cover | | | |
| Seal | Synthetic rubber (NBR) | | |
| Bumper | Synthetic rubber (NBR) | | — |
| Scraper | — | | Synthetic rubber (NBR) |
| Collar | — | | Aluminum (anodized) |
| Magnet | Plastic magnet | | |
| I type knuckle<br>Y type knuckle | Mild steel (nickel plated) | Mild steel (zinc plated) | |

## Seals

Note: Seals cannot be replaced.

| Parts | Rod seal | Piston seal | Cushion seal | Cushion gasket | Scraper |
|---|---|---|---|---|---|
| Bore mm \ Quantity | 1 | 2 | 2 | 2 | 1 |
| **16** | NY-3-6 | PPY-16 | — | — | — |
| **20** | NY-12×8×3.5 | PPY-20 | — | — | — |
| **25** | NY-14×10×3.5 | PPY-25 | — | — | — |
| **32** | NY-17×12×4 | PPY-32 | — | — | — |
| **40** | NY-22×16×5 | PPY-40 | — | — | — |
| **50** | NY-22×16×5 | PGY-50 | PCS-20 | DT-1-5 | SCB-16 |
| **63** | NY-22×16×5 | PGY-63 | PCS-20 | DT-1-5 | SCB-16 |

## Mass

kg [lb.]

| Bore size mm [in.] | Zero stroke mass | | Additional mass for each 1mm [0.0394in.] stroke | Mass of knuckle | |
|---|---|---|---|---|---|
| | Side mount | Front mount | | Y type knuckle | I type knuckle |
| **16 [0.630]** | 0.09 [0.20] | 0.08 [0.18] | 0.0005 [0.0011] | 0.017 [0.037] | 0.020 [0.044] |
| **20 [0.787]** | 0.15 [0.33] | 0.14 [0.31] | 0.0008 [0.0018] | 0.041 [0.090] | 0.036 [0.079] |
| **25 [0.984]** | 0.22 [0.49] | 0.19 [0.42] | 0.0011 [0.0024] | 0.075 [0.165] | 0.070 [0.154] |
| **32 [1.260]** | 0.37 [0.82] | 0.30 [0.66] | 0.0015 [0.0033] | 0.075 [0.165] | 0.070 [0.154] |
| **40 [1.575]** | 0.66 [1.46] | 0.49 [1.08] | 0.0024 [0.0053] | 0.120 [0.265] | 0.132 [0.291] |
| **50 [1.969]** | 1.15 [2.54] | 0.90 [1.98] | 0.0028 [0.0062] | 0.120 [0.265] | 0.132 [0.291] |
| **63 [2.480]** | 1.62 [3.57] | 1.26 [2.78] | 0.0033 [0.0073] | 0.120 [0.265] | 0.132 [0.291] |

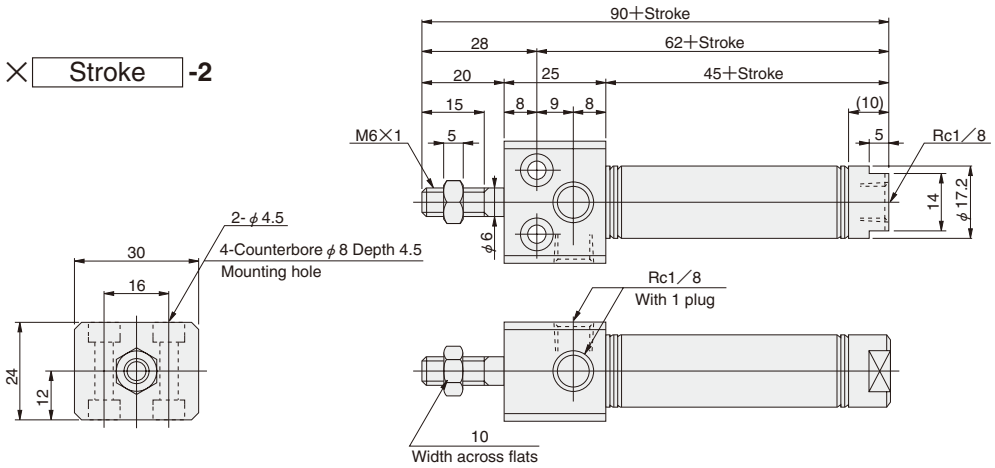
Calculation example: For the mass of side mount type of 32mm bore size and 100mm stroke
0.037＋(0.0015×100)＝0.52kg [1.15lb.]

## Dimensions of Block Cylinder Side Mounting Type (mm)

● $\phi$ 16

**DAB 16 ×** Stroke **-2**

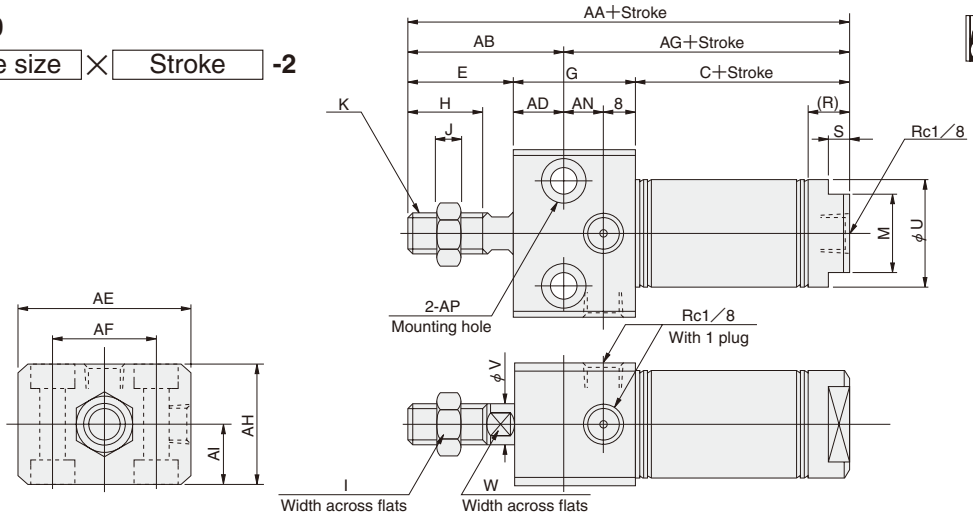
DAB-16-2




● $\phi$ 20～ $\phi$ 40

**DAB** Bore size **×** Stroke **-2**

DAB- Bore size -2

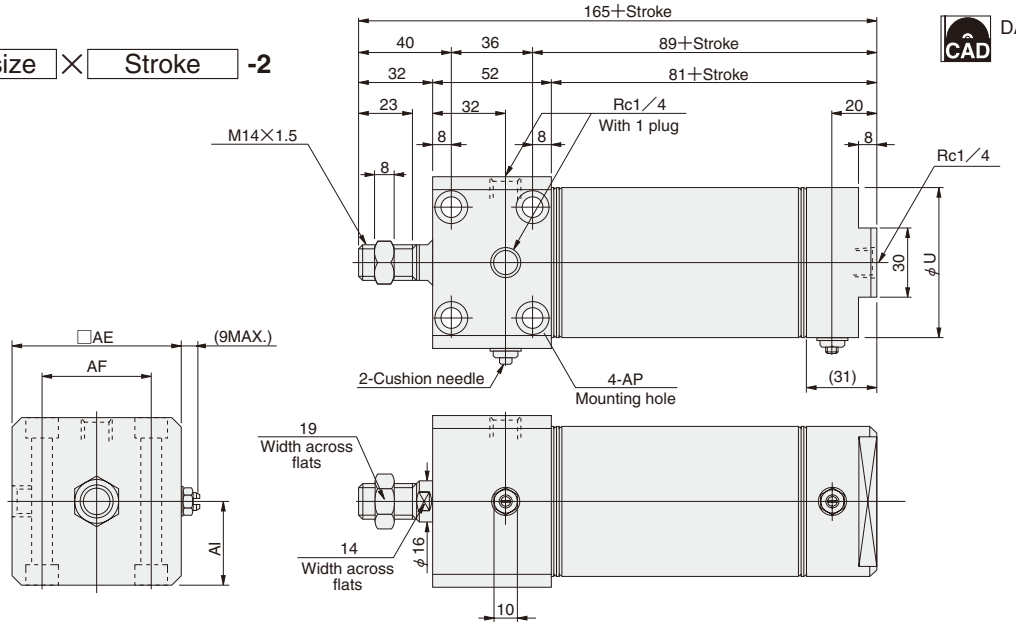



| Bore mm [in.] / Code | C | E | G | H | I | J | K | M | R | S | U | V | W | AA | AB | AD | AE | AF | AG | AH | AI | AN | AP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **20 [0.787]** | 53 | 23 | 28 | 15 | 12 | 5 | M8×1 | 17 | 10 | 5 | 21.4 | 8 | 6 | 104 | 34 | 11 | 38 | 22 | 70 | 28 | 14 | 9 | φ6.6 2-Counterbore φ11 Depth6.5 |
| **25 [0.984]** | 53 | 26 | 30 | 18 | 14 | 6 | M10×1.25 | 19 | 10 | 5 | 26.4 | 10 | 8 | 109 | 38 | 12 | 42 | 26 | 71 | 30 | 15 | 10 | φ6.6 2-Counterbore φ11 Depth6.5 |
| **32 [1.260]** | 54 | 31 | 36 | 23 | 14 | 6 | M10×1.25 | 22 | 11 | 6 | 33.6 | 12 | 10 | 121 | 45 | 14 | 54 | 34 | 76 | 36 | 18 | 14 | φ9 2-Counterbore φ14 Depth8.6 |
| **40 [1.575]** | 60 | 31 | 44 | 23 | 19 | 8 | M14×1.5 | 22 | 13 | 6 | 41.6 | 16 | 14 | 135 | 48 | 17 | 68 | 46 | 87 | 44 | 22 | 19 | φ11 2-Counterbore φ17.5 Depth10.8 |

● $\phi$ 50, $\phi$ 63

**DAB** Bore size **×** Stroke **-2**

DAB- Bore size -2



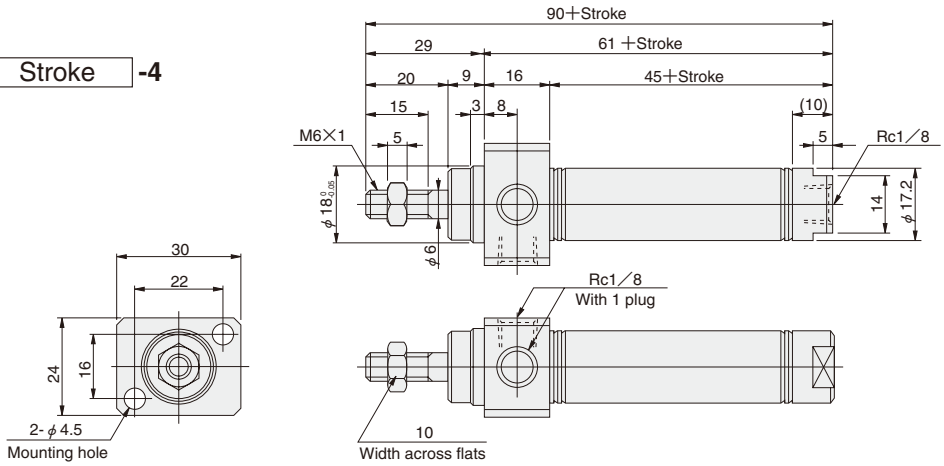

| Bore mm [in.] / Code | U | AE | AF | AI | AP |
|---|---|---|---|---|---|
| **50 [1.969]** | 52 | 62 | 44 | 31 | φ6.6 2-Counterbore φ11 Depth6.5 |
| **63 [2.480]** | 65.4 | 74 | 48 | 37 | φ9 2-Counterbore φ14 Depth8.6 |

## Dimensions of Block Cylinder Front Mounting Type (mm)

### ● $\phi$ 16

**DAB 16 × Stroke -4**

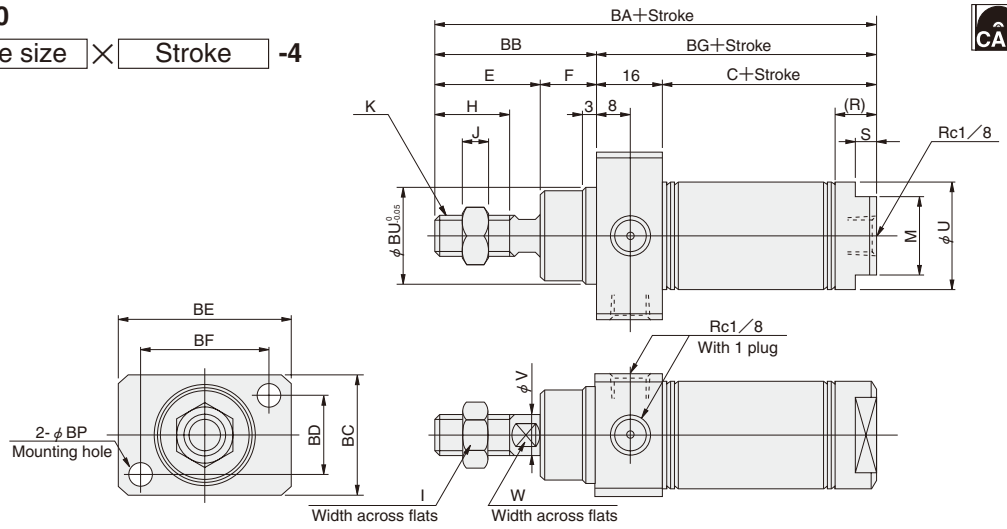
DAB-16-4




### ● $\phi$ 20 ~ $\phi$ 40

**DAB Bore size × Stroke -4**

DAB- Bore size -4

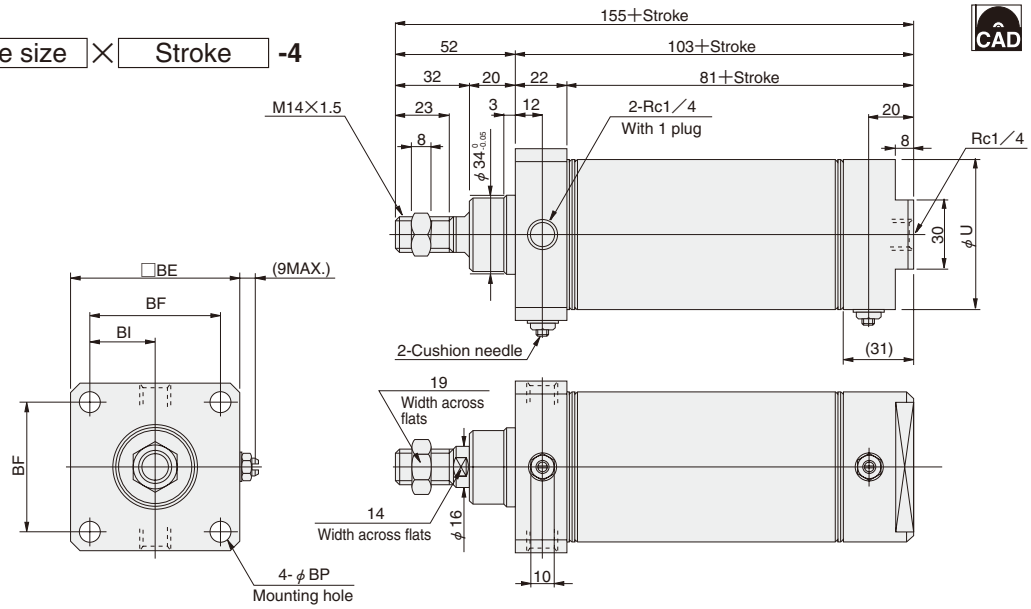



| Bore mm [in.] \ Code | C | E | F | H | I | J | K | M | R | S | U | V | W | BA | BB | BC | BD | BE | BF | BG | BP | BU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **20 [0.787]** | 53 | 23 | 12 | 15 | 12 | 5 | M8×1 | 17 | 10 | 5 | 21.4 | 8 | 6 | 104 | 35 | 28 | 18 | 38 | 28 | 69 | 5.5 | 22 |
| **25 [0.984]** | 53 | 26 | 14 | 18 | 14 | 6 | M10×1.25 | 19 | 10 | 5 | 26.4 | 10 | 8 | 109 | 40 | 30 | 20 | 42 | 32 | 69 | 5.5 | 24 |
| **32 [1.260]** | 54 | 31 | 14 | 23 | 14 | 6 | M10×1.25 | 22 | 11 | 6 | 33.6 | 12 | 10 | 115 | 45 | 36 | 24 | 54 | 42 | 70 | 6.6 | 28 |
| **40 [1.575]** | 60 | 31 | 14 | 23 | 19 | 8 | M14×1.5 | 22 | 13 | 6 | 41.6 | 16 | 14 | 121 | 45 | 44 | 28 | 68 | 52 | 76 | 9 | 34 |

### ● $\phi$ 50, $\phi$ 63

**DAB Bore size × Stroke -4**

DAB- Bore size -4




| Bore mm [in.] \ Code | U | BE | BF | BI | BP |
|---|---|---|---|---|---|
| **50 [1.969]** | 52 | 62 | 48 | 24 | 6.6 |
| **63 [2.480]** | 65.4 | 74 | 58 | 29 | 9 |

# OPTIONAL ROD END SHAPE PATTERNS

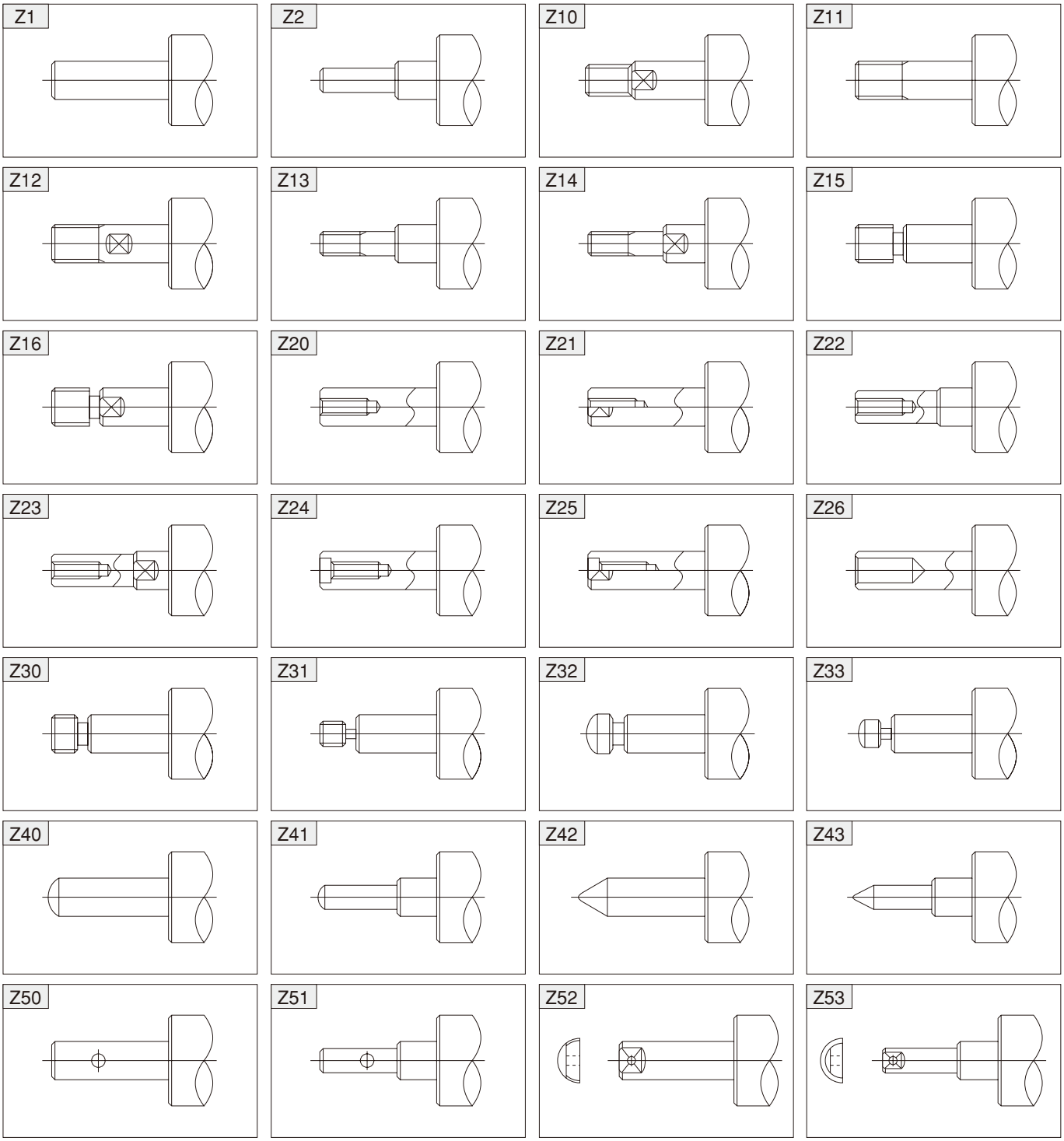
Use an order form of rod end pattern and fill the items on the selected one from among 28 types of optional patterned shapes to obtain made-to-order cylinders of non-standard rod end shapes.
The shapes can be applied to the entire Slim cylinders series with the exception of square rod cylinders and cylinders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

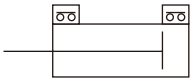
## Solid State Type, Reed Switch Type



**● 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 $\phi$16～$\phi$63 | with indicator lamp | DC10～30V |
| **ZG553** | Solid state type | For $\phi$16～$\phi$63 | with indicator lamp | DC4.5～28V |
| **CS3M** | Reed switch type | For $\phi$16～$\phi$63 | with indicator lamp | DC10～30V<br>AC85～230V |
| **CS4M** | Reed switch type | For $\phi$16～$\phi$63 | with indicator lamp | DC10～30V<br>AC85～115V |
| **CS5M** | Reed switch type | For $\phi$16～$\phi$63 | without indicator lamp | DC3～30V<br>AC85～115V |
| **CS2F** | Reed switch type | For $\phi$20～$\phi$63 | with indicator lamp | AC85～230V |
| **CS3F** | Reed switch type | For $\phi$20～$\phi$63 | with indicator lamp | DC10～30V |
| **CS4F** | Reed switch type | For $\phi$20～$\phi$63 | with indicator lamp | DC10～30V |
| **CS5F** | Reed switch type | For $\phi$20～$\phi$63 | 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** $\phi$ 16 and **DABK** $\phi$ 16
**DAB** : For block cylinder $\phi$ 16
**DABK** : For end keep cylinder $\phi$ 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** $\phi$ 16 and **DABK** $\phi$ 16
**DAB** : For block cylinder $\phi$ 16
**DABK** : For end keep cylinder $\phi$ 16
**S** : For sensor model **CS□F**

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

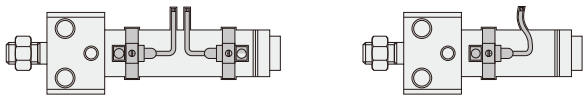
## Minimum Cylinder Strokes When Using Sensor Switches

mm

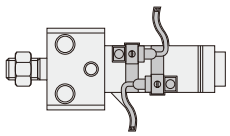
| Sensor switch model | Bore size | 2 pcs. mounting | | 1 pc. mounting |
|---|---|---|---|---|
| | | Along a straight line | In staggered positions | |
| **ZG530 ZG553** | **16** | 20 | 10 | 10 |
| | **20～63** | 20 | 10 | 10 |
| **CS□M** | **16～63** | 20 | 15 | 15 |
| **CS□F** | **20～63** | 40 | 21 |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

### ●Two pieces mounting ●One piece mounting

●When mounted in-line



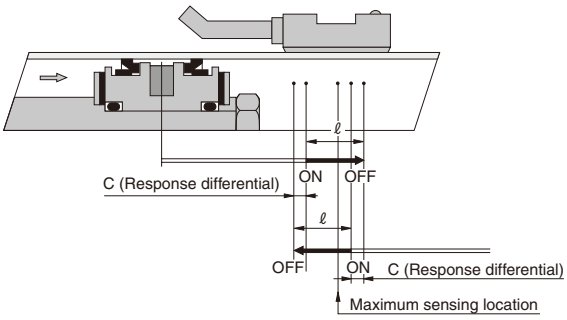
●When mounted in staggered positions



## 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] |

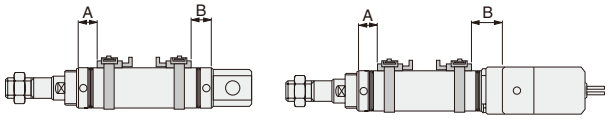
Remark: Figures in the table above are reference values.
Notes: 1. Figures are lengths measured from the switch's opposite end side to the lead wire.
2. Figures are lengths measured from the connector side's end surface to the lead wire.

## 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

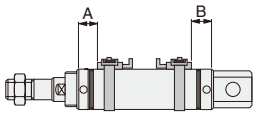
●Air cylinder, Low hydraulic cylinder ●Valpack cylinder




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□<br>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] |

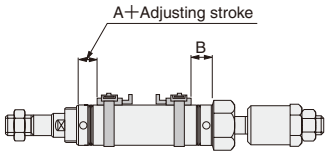
### ●Single acting cylinder




mm [in.]

| Sensor switch model | Code | Stroke | Bore size 20 [0.787] | 25 [0.984] | 32 [1.260] | 40 [1.575] |
|---|---|---|---|---|---|---|
| ZG530□<br>ZG553□<br>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] |

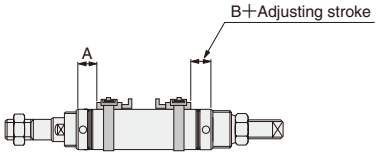
### ●Push side stroke adjusting cylinder




mm [in.]

| Sensor switch model | Code | Bore size 20 [0.787] | 25 [0.984] | 32 [1.260] | 40 [1.575] |
|---|---|---|---|---|---|
| ZG530□<br>ZG553□<br>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

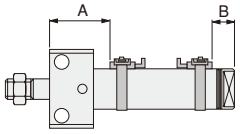



mm [in.]

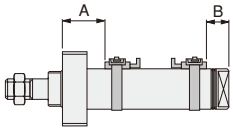
| Sensor switch model | Code | Bore size 20 [0.787] | 25 [0.984] | 32 [1.260] | 40 [1.575] |
|---|---|---|---|---|---|
| ZG530□<br>ZG553□<br>CS□M | A | 27 [1.063] | 27 [1.063] | 27 [1.063] | 27 [1.063] |
| | B | 37 [1.457] | 37 [1.457] | 42 [1.654] | 42 [1.654] |
| CS□F | A | 22 [0.866] | 22 [0.866]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

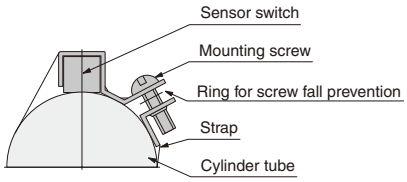



mm [in.]

| Mounting type | | Side mount | | | | | | | Front mount | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bore size | | 16 | 20 | 25 | 32 | 40 | 50 | 63 | 16 | 20 | 25 | 32 | 40 | 50 | 63 |
| ZG530□<br>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] |

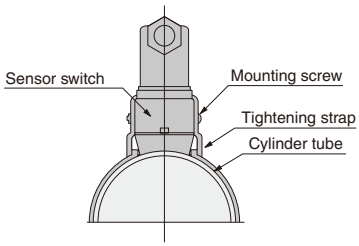
## Moving Sensor Switch

**●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**

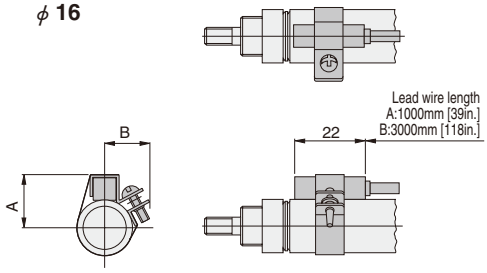



- Loosening the mounting screw allows the sensor switch to be moved freely in the axial and circumferential direction.
- Slightly loosening the mounting screw allows fine adjustment of the lead switch only, up to 5mm [0.2in.] in the axial direction.
  Tighten the mounting screw with a tightening torque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

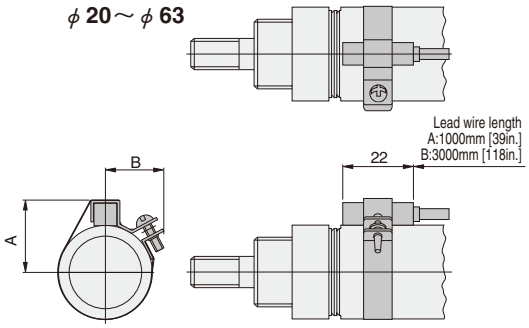
## Dimensions of Sensor Switch (mm)

**●ZG530□**
**ZG553□**
**CS□M**

**$\phi$ 16**




**$\phi$ 20～$\phi$ 63**

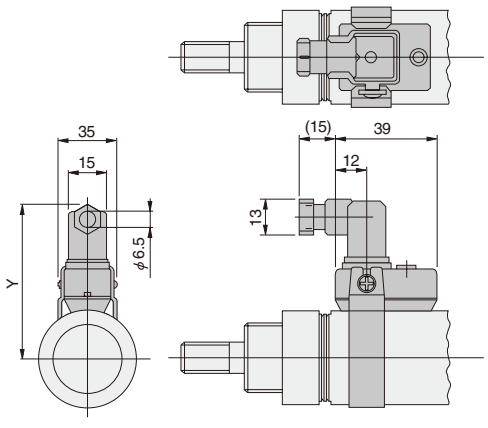



mm [in.]

| 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 $\phi$ 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.]

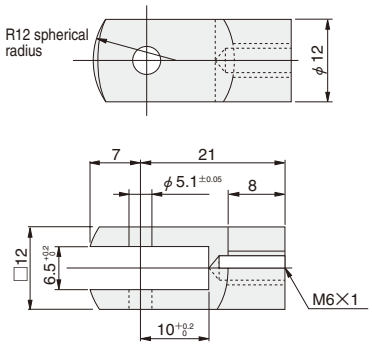
| Bore \ Code | Y |
|---|---|
| **20 [0.787]** | 59 [2.323] |
| **25 [0.984]** | 61.5 [2.421] |
| **32 [1.260]** | 65 [2.559] |
| **40 [1.575]** | 69 [2.717] |
| **50 [1.969]** | 76 [2.992] |
| **63 [2.480]** | 83 [3.268] |

## Dimensions

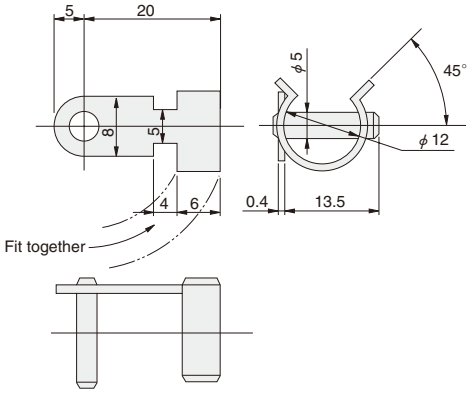
### ● $\phi$ 16

#### ●Y type

SLIM-Y

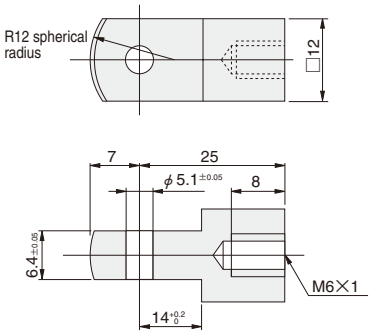



#### Pin for Y type knuckle




#### ●I type

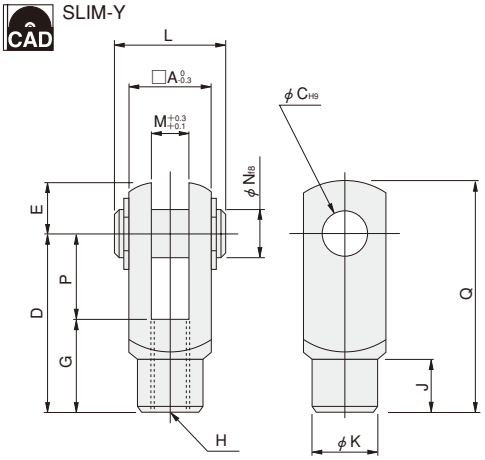
SLIM-I




### ● $\phi$ 20～$\phi$ 63

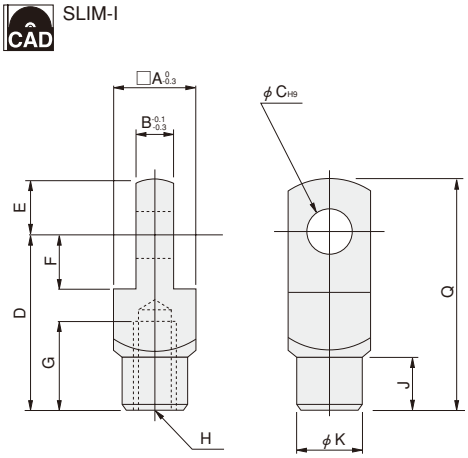
#### ●Y type

SLIM-Y




#### ●I type

SLIM-I




mm [in.]

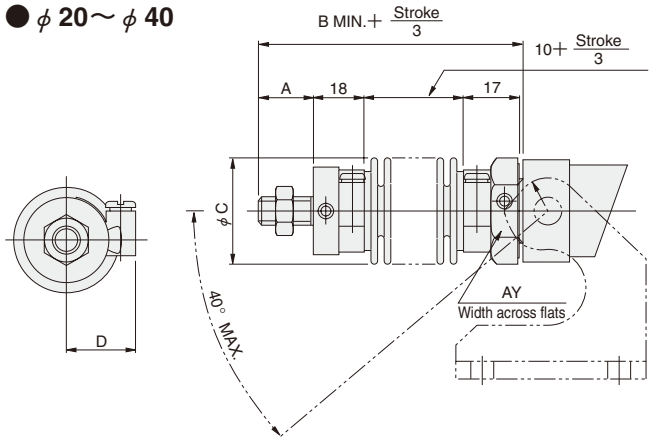
| Bore \ Code | A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 [0.787], 25 [0.984]※ | 16 | 8 | 8 | 30 | 10 | 11 | 15 | M8×1 | 10 | 14 | 21 | 8 | 8 | 15 | 40 |
| 25 [0.984], 32 [1.260] | 19 | 10 | 10 | 40 | 12 | 13 | 20 | 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

● $\phi$ 20～$\phi$ 40

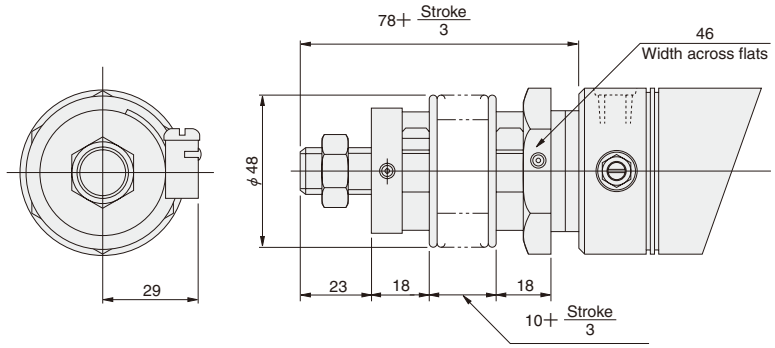



mm [in.]

| 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.

● $\phi$ 50, $\phi$ 63




## Mass of Slim Cylinder with Bellows

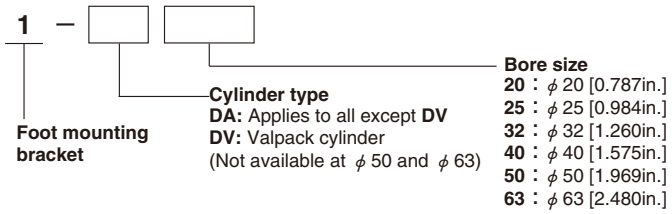
kg [lb.]

| 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] |

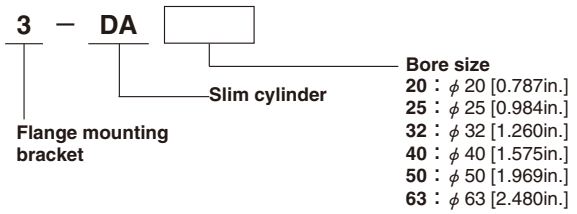
Note: Figures in parentheses ( ) are for the cylinder with variable cushion.

## Order Codes for Mounting Bracket

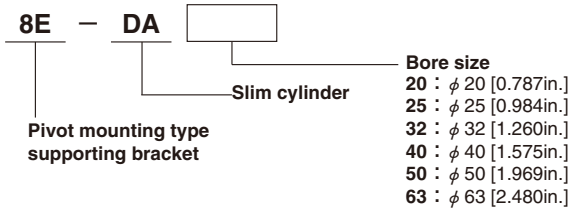
### (1) Foot mounting bracket



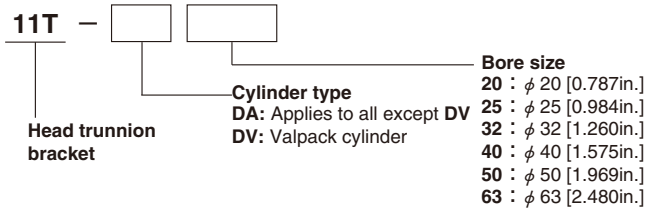

### (2) Flange mounting bracket



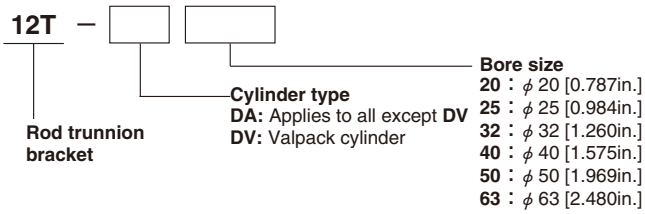

### (3) Pivot mounting type supporting bracket



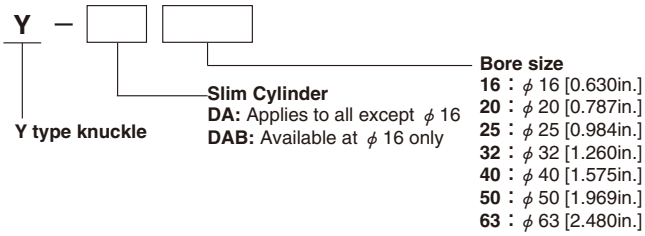

### (4) Head trunnion bracket




### (5) Rod trunnion bracket




### (6) Y type knuckle




### (7) I type knuckle