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# KOGANEI

## ACTUATORS GENERAL CATALOG

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SLIT TYPE RODLESS CYLINDERS ORCA, ORGA SERIES

# Slit Type Rodless Cylinders ORCA, ORGA

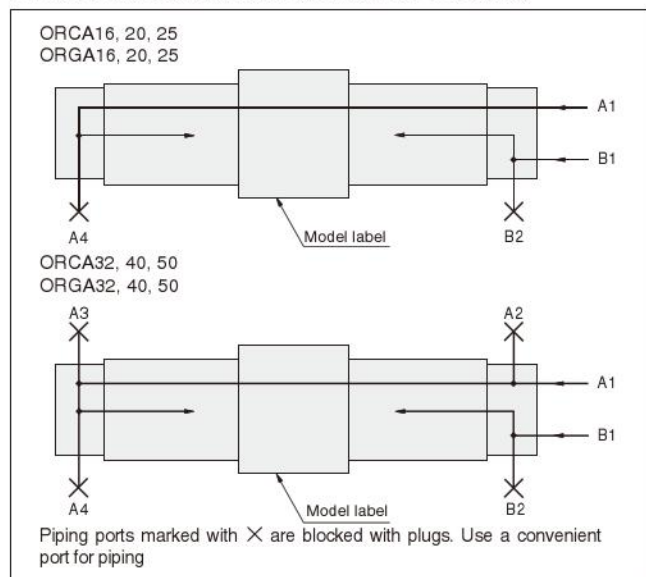
A bend-resistant and wear-resistant stainless chrome steel seal band is used, which enables high performance and long life.



## ORCA <Basic type>

### 1. Space-saving design

Almost the total length of the cylinder body is equal to a cylinder stroke, and the installation space is 1/2 of conventional cylinders. Also, multiple piping ports are arranged. This port arrangement allows versatile plumbing applications including one side piping.

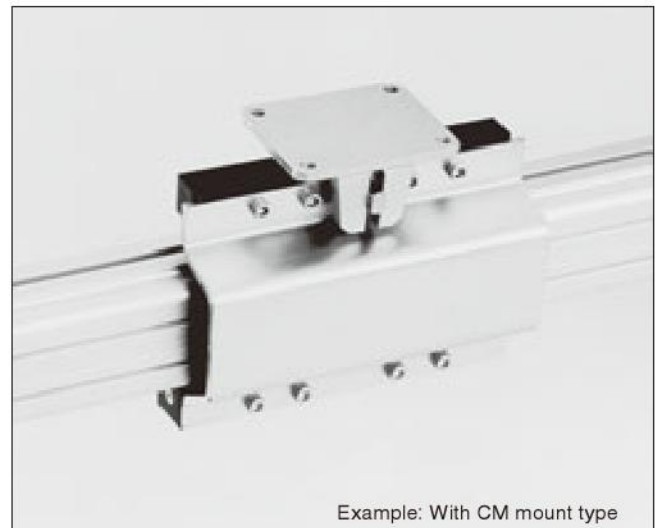


### 2. High-speed operation

High-speed operation of 3000mm/s [118in./sec.] is also possible. (ORCA16, 20 and ORGA have maximum speeds of 1500mm/s [59in./sec.] )

### 3. Various options

Various piston mounts and mounting brackets, many types of easily mounted small sensor switches, and fluoro rubber specification are available.



Example: With CM mount type



Wide range of products strongly supports space-saving and simplicity in design.  
 Bore size:  $\phi 16$  [0.630in.],  $\phi 20$  [0.787in.],  $\phi 25$  [0.984in.],  
 $\phi 32$  [1.260in.],  $\phi 40$  [1.575in.], and  $\phi 50$  [1.969in.]

SLIT TYPE RODLESS CYLINDERS ORCA, ORGA SERIES

## ORGA <With guide>

1. Installed with a guide for greater accuracy and durability.

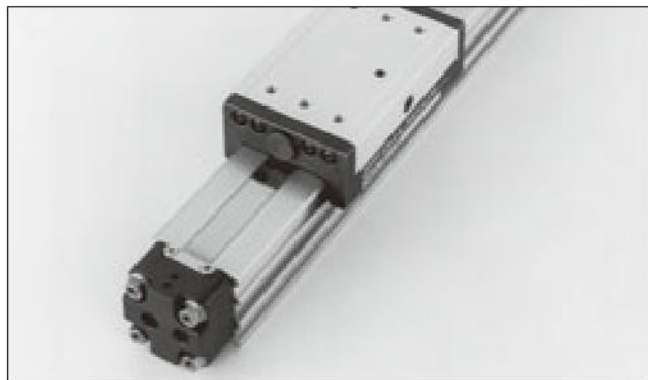
The guide mechanism is composed of a slider and cylinder body. The high rigid body enables a heavy load and highly accurate operation.

**Maximum load capacity:**

**784.5N [176lbf.] ( $\phi 50$  [1.969in.])**

**Maximum bending moment:**

**112.8N·m [83.2ft·lbf] ( $\phi 50$  [1.969in.])**



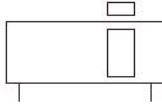
2. The variety of options enables stroke adjustment and high-speed operation.

It is possible to select as an option either a stroke adjusting bolt which enables fine adjustment of the position at the end of the stroke, or a shock absorber that will absorb the impact of shocks at the end of the stroke under high speed operation. It ensures high-speed operation and highly accurate stops.

## Basic Type



### Symbol



### Specifications

| Item                        | Bore size<br>mm [in.] | 16 [0.630]                          | 20 [0.787]    | 25 [0.984]    | 32 [1.260]                           | 40 [1.575] | 50 [1.969] |       |
|-----------------------------|-----------------------|-------------------------------------|---------------|---------------|--------------------------------------|------------|------------|-------|
| Media                       |                       | Air                                 |               |               |                                      |            |            |       |
| Operation type              |                       | Double acting type                  |               |               |                                      |            |            |       |
| Operating pressure range    | MPa [psi.]            | 0.1~0.8 [15~116]                    |               |               |                                      |            |            |       |
| Proof pressure              | MPa [psi.]            | 1.2 [174]                           |               |               |                                      |            |            |       |
| Operating temperature range | °C [°F]               | 0~60 [32~140]                       |               |               |                                      |            |            |       |
| Operating speed range       | mm/s [in./sec.]       | 100~1500 [3.9~59.1] <sup>Note</sup> |               |               | 100~3000 [3.9~118.1] <sup>Note</sup> |            |            |       |
| Cushioning stroke           | mm [in.]              | Variable cushion                    |               |               |                                      |            |            |       |
|                             |                       | 15 [0.591]                          | 18 [0.709]    | 21 [0.827]    | 26 [1.024]                           | 40 [1.575] |            |       |
| Lubrication                 |                       | Not required                        |               |               |                                      |            |            |       |
| Stroke tolerance            | mm [in.]              | 1000 [39.37] or less                | +1.5 [+0.059] |               |                                      |            |            | 0 [0] |
|                             |                       | 1001~3000 [39.41~118.11]            | +2.0 [+0.079] |               |                                      |            |            | 0 [0] |
|                             |                       | 3001~5000 [118.15~196.85]           | —             | +2.5 [+0.098] |                                      |            |            | 0 [0] |
| Port size                   |                       | M5×0.8                              | Rc1/8         |               | Rc1/4                                |            | Rc3/8      |       |

Note: The operating speed range is "100~1000mm/s [3.9~39.4in./sec.]" when using it with one side piping.  
 Remark: For details of sensor switches, see p.1544.

### Bore Size and Stroke

| Bore | Standard strokes   | Available strokes |
|------|--|-------------------|
| 16   | 100, 200, 300, 400, 500, 600, 700, 800   | 0~3000            |
| 20   | 200, 300, 400, 500, 600, 700, 800,<br>1000, 1200, 1400, 1600, 2000             | 0~5000            |
| 25   | 200, 300, 400, 500, 600, 700, 800,<br>1000, 1200, 1400, 1600, 2000             |                   |
| 32   | 300, 400, 500, 600, 700, 800,<br>1000, 1200, 1400, 1600, 2000                  |                   |
| 40   | 300, 400, 500, 600, 700, 800,<br>900, 1000, 1100, 1200, 1300, 1400, 1600, 2000 |                   |
| 50   | 500, 600, 700, 800, 900<br>1000, 1100, 1200, 1400, 1600, 2000                  |                   |

Remark: Non-standard strokes are available at 1mm pitch intervals.  
 For delivery, consult us.

### Cylinder Thrust

| Bore size<br>mm [in.] | Pressure area<br>mm <sup>2</sup> [in. <sup>2</sup> ] | Air pressure MPa [psi.] |            |             |             |             |              | N [lbf.]     |              |
|-----------------------|--|-------------------------|------------|-------------|-------------|-------------|--------------|--------------|--------------|
|                       |  | 0.1 [15]                | 0.2 [29]   | 0.3 [44]    | 0.4 [58]    | 0.5 [73]    | 0.6 [87]     | 0.7 [102]    | 0.8 [116]    |
| 16 [0.630]            | 200 [0.310]  | 20 [4.5]                | 40 [9.0]   | 60 [13.5]   | 80 [18.0]   | 100 [22.5]  | 120 [27.0]   | 140 [31.5]   | 160 [36.0]   |
| 20 [0.787]            | 314 [0.487]  | 31 [7.0]                | 63 [14.2]  | 94 [21.1]   | 126 [28.3]  | 157 [35.3]  | 188 [42.3]   | 220 [49.5]   | 251 [56.4]   |
| 25 [0.984]            | 490 [0.760]  | 49 [11.0]               | 98 [22.0]  | 147 [33.0]  | 196 [44.1]  | 245 [55.1]  | 294 [66.1]   | 343 [77.1]   | 392 [88.1]   |
| 32 [1.260]            | 804 [1.246]  | 80 [18.0]               | 161 [36.2] | 241 [54.2]  | 322 [72.4]  | 402 [90.4]  | 482 [108.4]  | 563 [126.6]  | 643 [144.5]  |
| 40 [1.575]            | 1256 [1.947]   | 126 [28.3]              | 251 [56.4] | 377 [84.7]  | 502 [112.8] | 628 [141.2] | 754 [169.5]  | 879 [197.6]  | 1005 [225.9] |
| 50 [1.969]            | 1963 [3.043]   | 196 [44.1]              | 393 [88.3] | 589 [132.4] | 785 [176.5] | 982 [220.8] | 1178 [264.8] | 1374 [308.9] | 1570 [352.9] |

### Mass

| Bore size<br>mm [in.] | Zero stroke mass                             |  | Additional mass of each 1mm [0.0394in.] stroke | Additional mass of piston mount |               |           |           |           | Additional mass of mounting bracket |                |                | Additional mass of 1 sensor switch (with sensor holder) |
|-----------------------|--|--|--|---------------------------------|---------------|-----------|-----------|-----------|-------------------------------------|----------------|----------------|---|
|                       | Standard specification (with standard mount) | Dual piston specification (with 2 standard mounts) |  | C mount                         | M mount       | T mount   | CM mount  | CT mount  | L-type bracket                      | F-type support | G-type support |   |
| 16 [0.630]            | 0.21 [0.46]                                  | 0.35 [0.77]  | 0.0010 [0.0022]                                | 0.07 [0.15]                     | 0.026 [0.057] | —         | 0.1 [0.2] | —         | 0.014 [0.031]                       | 0.03 [0.07]    | 0.03 [0.07]    | A : 0.05 [0.11]<br>B : 0.09 [0.20]                      |
| 20 [0.787]            | 0.47 [1.04]                                  | 0.78 [1.72]  | 0.0017 [0.0037]                                | 0.13 [0.29]                     | 0.055 [0.121] | —         | 0.2 [0.4] | —         | 0.03 [0.07]                         | 0.08 [0.18]    | 0.05 [0.11]    |   |
| 25 [0.984]            | 0.7 [1.5]                                    | 1.2 [2.6]  | 0.0022 [0.0049]                                | 0.23 [0.51]                     | 0.10 [0.22]   | —         | 0.4 [0.9] | —         | 0.05 [0.11]                         | 0.13 [0.29]    | 0.1 [0.22]     |   |
| 32 [1.260]            | 1.7 [3.7]                                    | 3.2 [7.1]  | 0.0038 [0.0084]                                | 0.9 [2.0]                       | 0.17 [0.37]   | —         | 1.1 [2.4] | —         | 0.1 [0.22]                          | 0.2 [0.44]     | 0.2 [0.44]     |   |
| 40 [1.575]            | 2.7 [6.0]                                    | 4.5 [9.9]  | 0.0052 [0.0115]                                | 1.2 [2.6]                       | 0.45 [0.99]   | 0.2 [0.4] | 1.7 [3.7] | 1.4 [3.1] | 0.15 [0.33]                         | 0.2 [0.44]     | 0.3 [0.66]     |   |
| 50 [1.969]            | 4.0 [8.8]                                    | 6.6 [14.6]   | 0.0073 [0.0161]                                | 1.8 [4.0]                       | 0.45 [0.99]   | 0.2 [0.4] | 2.4 [5.3] | 2.1 [4.6] | 0.2 [0.44]                          | 0.4 [0.88]     | 0.8 [1.76]     |   |

# Order Codes

● Options (dual piston specification and fluoro rubber specification are excluded) are included at shipping.

**ORCA** [ ] [ ] **40X1000** [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

**Slit type rodless cylinder basic type**

**Piston specification**  
**Blank** : Standard specification (1 piston)  
**D** : Dual piston specification (2 pistons)

**Fluoro rubber specification**  
**Blank** : Standard specification  
**F** : Fluoro rubber specification

**Bore size X Stroke**  
 ● See bore size and stroke table on the previous page.

**Number of sensor switches**  
**1** : With 1 sensor switch  
**2** : With 2 sensor switches  
 ⋮

**Lead wire length**  
 (With sensor switch)  
**A** : 1000mm [39in.]  
**B** : 3000mm [118in.]

**Mounting brackets**  
**Blank** : No mounting bracket  
**L** : With L-type bracket (1 set with 2 brackets)

**Supporting bracket** Note  
**Blank** : No supporting bracket  
**F** : With F-type support  
**G** : With G-type support

**Number of supporting bracket sets** Note  
**1** : With 1 set  
**2** : With 2 sets  
 ⋮

**Piston mount**  
**Blank** : Standard mount  
**C** : With C mount  
**M** : With M mount  
**T** : With T mount  
**CM** : With CM mount  
**CT** : With CT mount

**Number of piston mount sets**  
**1** : With 1 set  
**2** : With 2 sets

**Sensor switch**  
**Blank** : No sensor switch  
**ZG530** : Solid state type with indicator lamp DC10~28V  
**ZG553** : 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

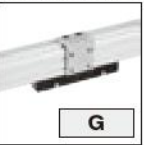

● For details of sensor switches, see p.1544.

Note: The supporting brackets are not the brackets used to mount the body. Select after referring to p.1098.

● The T mount and CT mount are only available in  $\phi$  40 [1.575in.], and  $\phi$  50 [1.969in.].

SLIT TYPE RODLESS CYLINDERS ORCA, ORGA SERIES

## Options

|  |   |  |  |  |  |   |   |
|--|---|--|--|--|--|---|---|
| Dual piston specification<br><br><b>D</b> | Fluoro rubber specification<br><b>FPM</b><br>(Fluoro rubber)<br><b>F</b>  | With L-type bracket<br><br><b>L</b> | With F-type support<br><br><b>F</b> | With G-type support<br><br><b>G</b> | With C mount<br><br><b>C</b> | With M mount<br><br><b>M</b> | With T mount<br><br><b>T</b> |
| With CM mount<br><br><b>CM</b>            | With CT mount<br><br><b>CT</b> | With ZG530<br><br><b>ZG530</b>      | With ZG553<br><br><b>ZG553</b>      | With CS3M<br><br><b>CS3M</b>        | With CS4M<br><br><b>CS4M</b> | With CS5M<br><br><b>CS5M</b> |   |

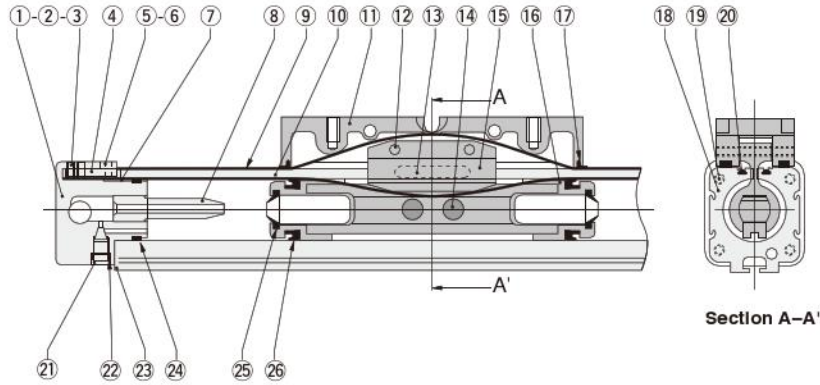
## Additional Parts

|   |   |   |
|---|---|---|
| <p>● Order codes for L-type bracket only</p> <p><b>L</b> - <b>ORCA</b> [ ]</p> <p><b>Bore size</b><br/> <b>16</b> : For <math>\phi</math> 16 [0.630in.]<br/> <b>20</b> : For <math>\phi</math> 20 [0.787in.]<br/> <b>25</b> : For <math>\phi</math> 25 [0.984in.]<br/> <b>32</b> : For <math>\phi</math> 32 [1.260in.]<br/> <b>40</b> : For <math>\phi</math> 40 [1.575in.]<br/> <b>50</b> : For <math>\phi</math> 50 [1.969in.]</p> <p><b>Cylinder basic type</b></p> <p><b>L</b> : L-type bracket</p> | <p>● Order codes for supporting bracket only</p> <p>[ ] - <b>ORCA</b> [ ]</p> <p><b>Bore size</b><br/> <b>16</b> : For <math>\phi</math> 16 [0.630in.]<br/> <b>20</b> : For <math>\phi</math> 20 [0.787in.]<br/> <b>25</b> : For <math>\phi</math> 25 [0.984in.]<br/> <b>32</b> : For <math>\phi</math> 32 [1.260in.]<br/> <b>40</b> : For <math>\phi</math> 40 [1.575in.]<br/> <b>50</b> : For <math>\phi</math> 50 [1.969in.]</p> <p><b>Cylinder basic type</b></p> <p><b>F</b> : F-type support<br/> <b>G</b> : G-type support</p> | <p>● Order codes for piston mount only</p> <p>[ ] - <b>ORCA</b> [ ]</p> <p><b>Bore size</b><br/> <b>16</b> : For <math>\phi</math> 16 [0.630in.]<br/> <b>20</b> : For <math>\phi</math> 20 [0.787in.]<br/> <b>25</b> : For <math>\phi</math> 25 [0.984in.]<br/> <b>32</b> : For <math>\phi</math> 32 [1.260in.]<br/> <b>40</b> : For <math>\phi</math> 40 [1.575in.]<br/> <b>50</b> : For <math>\phi</math> 50 [1.969in.]</p> <p><b>Cylinder basic type</b></p> <p><b>C</b> : C mount<br/> <b>M</b> : M mount<br/> <b>T</b> : T mount (For <math>\phi</math> 40 [1.575in.] and <math>\phi</math> 50 [1.969in.] only)<br/> <b>CM</b> : CM mount<br/> <b>CT</b> : CT mount (For <math>\phi</math> 40 [1.575in.] and <math>\phi</math> 50 [1.969in.] only)</p> |
|---|---|---|

## Inner Construction

### ORCA16, 20, 25

Diagrams show ORCA25.



## Major Parts and Materials

| No. | Parts                      | Materials              | Q'ty | Remark   |
|-----|----------------------------|------------------------|------|--|
| ①   | End cap R <sup>Note1</sup> | Aluminum alloy         | 1    | Anodized                                       |
| ②   | End cap L <sup>Note2</sup> | Aluminum alloy         | 1    | Anodized                                       |
| ③   | Inner seal band setscrew   | Alloy steel            | 4    | Hexagon socket setscrew                        |
| ④   | Inner seal band lock       | Steel                  | 2    | Nickel plated                                  |
| ⑤   | Outer seal band lock       | Steel                  | 2    | Nickel plated                                  |
| ⑥   | Outer seal band setscrew   | Steel                  | 4    | Cross recessed countersunk head screw          |
| ⑦   | Rivet                      | Polyacetal             | 2    |  |
| ⑧   | Cushion pipe               | Polyacetal             | 2    | Aluminum alloy for fluoro rubber specification |
| ⑨   | Outer seal band            | Stainless chrome steel | 1    |  |
| ⑩   | Inner seal band            | Stainless chrome steel | 1    |  |
| ⑪   | Piston mount               | Aluminum alloy         | 1    | Anodized                                       |
| ⑫   | Roll pin                   | Alloy steel            | 2    |  |
| ⑬   | Bearing strip              | Polyethylene           | 2    |  |
| ⑭★  | Magnet                     | Alnico magnet          | 2    |  |

★: Available as a seal repair kit.

Notes: 1. The side where concentrated piping cannot be done.

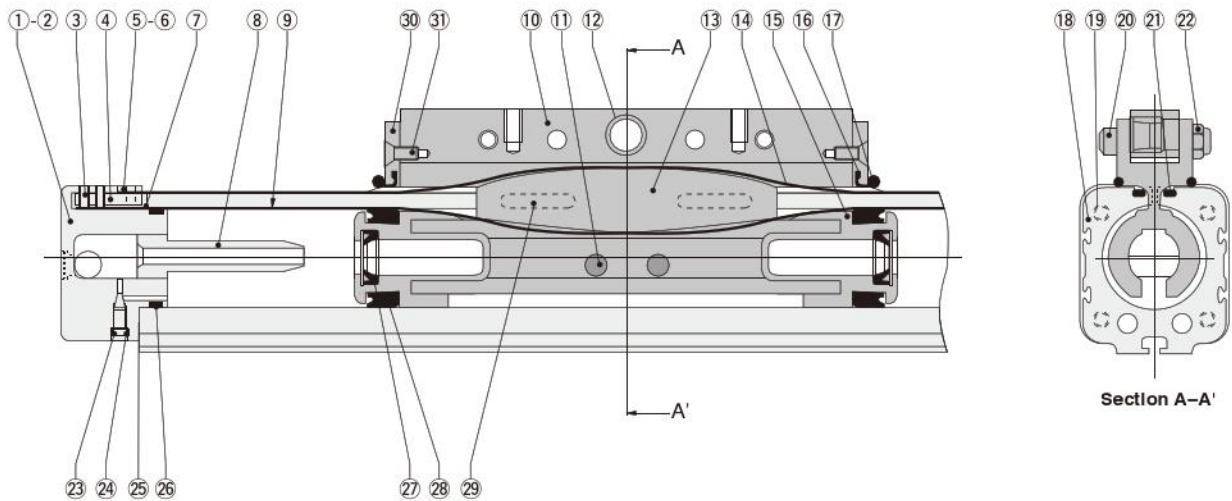
2. The side where concentrated piping can be done.

| No. | Parts           | Materials              | Q'ty | Remark                              |
|-----|-----------------|------------------------|------|-------------------------------------|
| ⑮   | Piston yoke     | Aluminum alloy         | 1    | Anodized                            |
| ⑯   | Piston          | Polyacetal             | 2    |                                     |
| ⑰★  | Scraper         | Nylon                  | 1    |                                     |
| ⑱   | Cylinder barrel | Aluminum alloy         | 1    | Anodized                            |
| ⑲   | End cap screw   | Alloy steel            | 8    | Zinc plated                         |
| ⑳   | Magnet strip    | Rubber magnet          | 2    |                                     |
| ㉑   | Cushion needle  | Brass                  | 2    |                                     |
| ㉒★  | Cushion gasket  | Synthetic rubber (NBR) | 2    | FPM for fluoro rubber specification |
| ㉓★  | Cylinder gasket | Aluminum alloy sheet   | 2    | Synthetic rubber (NBR) is baked.    |
| ㉔★  | Cap gasket      | Synthetic rubber (NBR) | 2    | FPM for fluoro rubber specification |
| ㉕★  | Cushion seal    | Synthetic rubber (NBR) | 2    | FPM for fluoro rubber specification |
| ㉖★  | Piston seal     | Synthetic rubber (NBR) | 2    | FPM for fluoro rubber specification |

## Inner Construction

### ORCA32, 40, 50

Diagrams show ORCA40.



## Major Parts and Materials

| No. | Parts                      | Materials              | Q'ty | Remark   |
|-----|----------------------------|------------------------|------|--|
| ①   | End cap R <sup>Note1</sup> | Aluminum alloy         | 1    | Anodized                                       |
| ②   | End cap L <sup>Note2</sup> | Aluminum alloy         | 1    | Anodized                                       |
| ③   | Inner seal band setscrew   | Alloy steel            | 4    | Hexagon socket setscrew                        |
| ④   | Inner seal band lock       | Steel                  | 2    | Nickel plated                                  |
| ⑤   | Outer seal band lock       | Steel                  | 2    | Nickel plated                                  |
| ⑥   | Outer seal band setscrew   | Steel                  | 4    | Cross recessed countersunk head screw          |
| ⑦   | Rivet                      | Polyacetal             | 2    |  |
| ⑧   | Cushion pipe               | Polyacetal             | 2    | Aluminum alloy for fluoro rubber specification |
| ⑨   | Inner seal band            | Stainless chrome steel | 1    |  |
| ⑩   | Piston mount               | Aluminum alloy         | 1    | Anodized                                       |
| ⑪   | Magnet                     | Alnico magnet          | 2    |  |
| ⑫   | Bushing                    | Steel                  | 1    |  |
| ⑬   | Piston yoke                | Aluminum alloy         | 1    | Anodized                                       |
| ⑭   | Outer seal band            | Stainless chrome steel | 1    |  |
| ⑮   | Piston                     | Polyacetal             | 2    |  |
| ⑯*  | Scraper                    | Polyacetal             | 2    |  |
| ⑰   | Scraper holding O-ring     | Synthetic rubber (CR)  | 1    | FPM for fluoro rubber specification            |

★: Available as a seal repair kit.

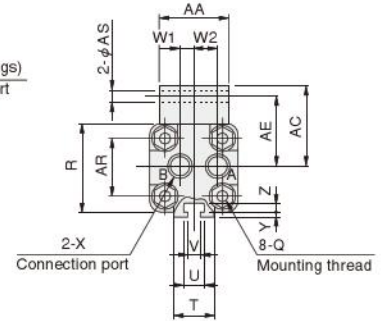
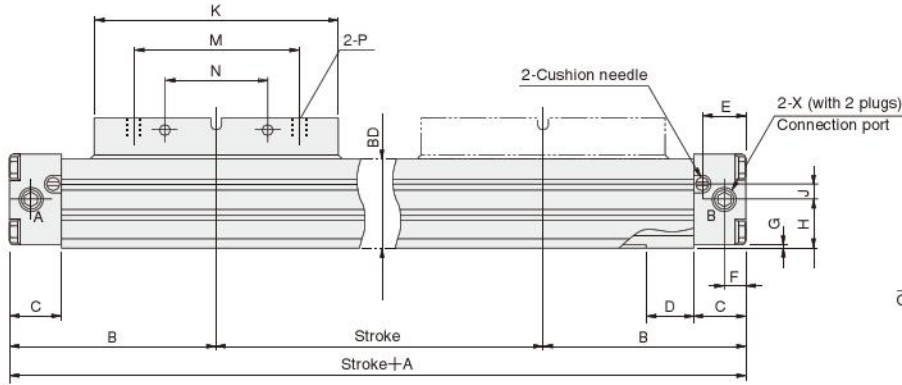
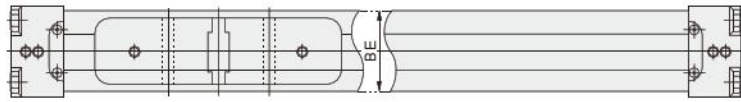
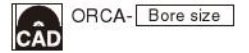
Notes: 1. The side where concentrated piping cannot be done.  
2. The side where concentrated piping can be done.

| No. | Parts                    | Materials              | Q'ty | Remark                              |
|-----|--------------------------|------------------------|------|-------------------------------------|
| ⑱   | Cylinder barrel          | Aluminum alloy         | 1    | Anodized                            |
| ⑲   | End cap screw            | Alloy steel            | 8    | Zinc plated                         |
| ⑳   | Mount set bolt           | Alloy steel            | 2    | Hexagon socket head bolt            |
| ㉑   | Magnet strip             | Rubber magnet          | 2    |                                     |
| ㉒   | Mounting nut             | Steel                  | 2    | With nylon insert lock              |
| ㉓   | Cushion needle           | Brass                  | 2    |                                     |
| ㉔*  | Cushion gasket           | Synthetic rubber (NBR) | 2    | FPM for fluoro rubber specification |
| ㉕*  | Cylinder gasket          | Aluminum alloy sheet   | 2    | Synthetic rubber (NBR) is baked     |
| ㉖*  | Cap gasket               | Synthetic rubber (NBR) | 2    | FPM for fluoro rubber specification |
| ㉗*  | Cushion seal             | Synthetic rubber (NBR) | 2    | FPM for fluoro rubber specification |
| ㉘*  | Piston seal              | Synthetic rubber (NBR) | 2    | FPM for fluoro rubber specification |
| ㉙*  | Bearing strip            | Polyethylene           | 4    |                                     |
| ⑳   | End plate                | Aluminum alloy         | 2    | Anodized                            |
| ㉑   | End plate mounting screw | Steel                  | 2    | Zinc plated                         |

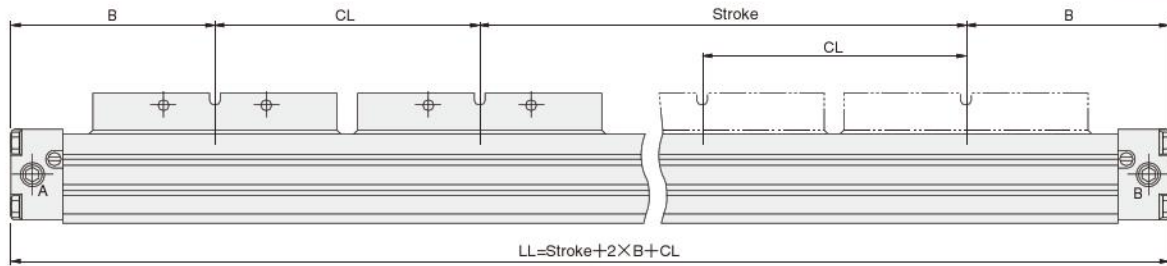
# Dimensions of ORCA16, 20, 25 (mm)

Basic type **ORCA**  ×

Drawings show **ORCA20**.



Dual piston specification **ORCAD**  ×



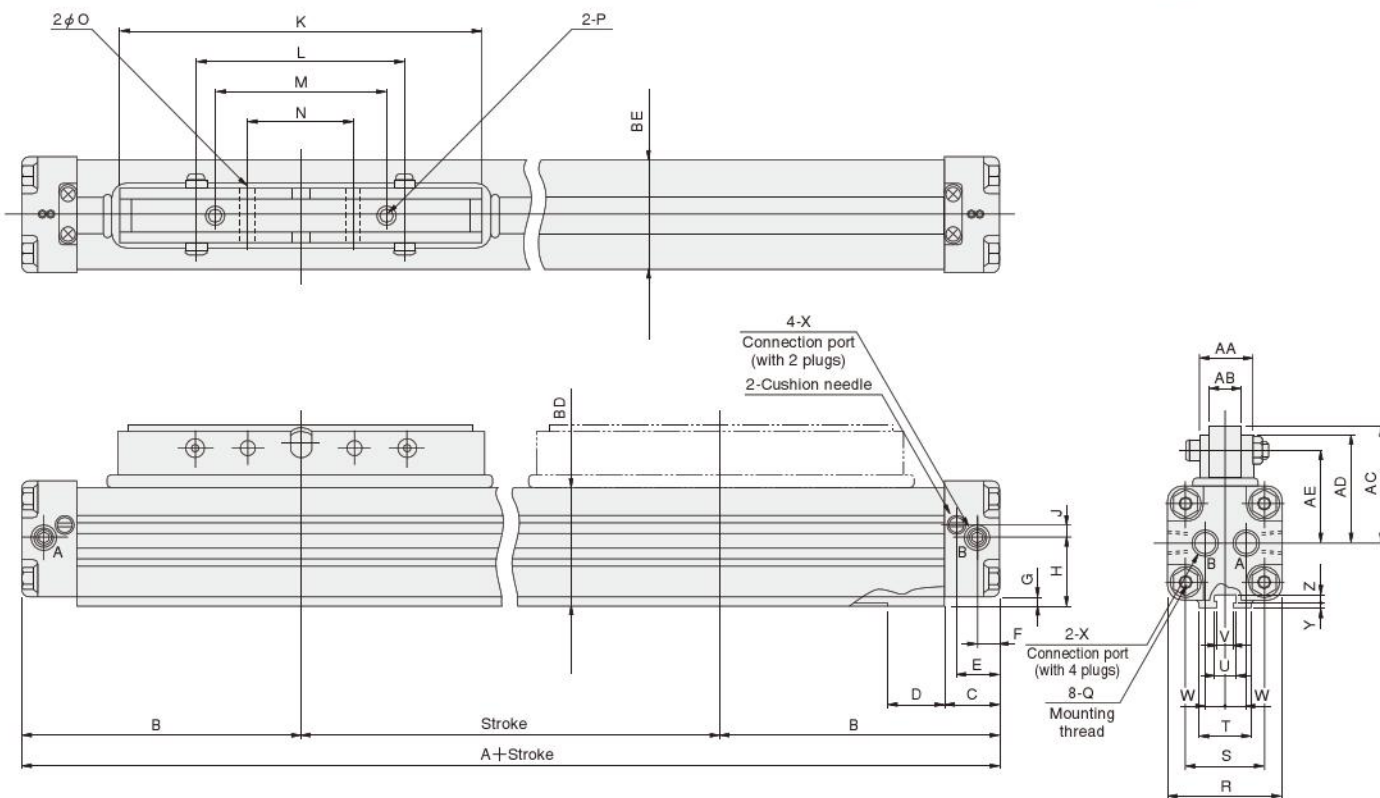
| Bore mm [in.] | Code    | A   | B   | C  | D  | E  | F   | G   | H  | J   | K   | M  | N  | P                  | Q                | R  | T  | U   | V   |
|---------------|---------|-----|-----|----|----|----|-----|-----|----|-----|-----|----|----|--------------------|------------------|----|----|-----|-----|
| 16            | [0.630] | 130 | 65  | 15 | 16 | 12 | 5.5 | 1.5 | 15 | 4   | 76  | 52 | 32 | M3 X 0.5 Depth 5.5 | M3 X 0.5 Depth 5 | 27 | 12 | 6   | 3.4 |
| 20            | [0.787] | 160 | 80  | 19 | 20 | 16 | 7.5 | 2   | 19 | 6.5 | 96  | 65 | 40 | M4 X 0.7 Depth 7   | M4 X 0.7 Depth 7 | 34 | 16 | 7.5 | 4.4 |
| 25            | [0.984] | 200 | 100 | 23 | 20 | 18 | 8.5 | 2   | 22 | 6.5 | 120 | 80 | 50 | M5 X 0.8 Depth 9   | M5 X 0.8 Depth 9 | 40 | 18 | 7.5 | 4.4 |

| Bore mm [in.] | Code    | W <sub>1</sub> | W <sub>2</sub> | X                | Y | Z   | AA | AC | AE | AR | AS  | BD   | CL <sup>Note</sup> | BE |
|---------------|---------|----------------|----------------|------------------|---|-----|----|----|----|----|-----|------|--------------------|----|
| 16            | [0.630] | 7              | 7              | M5 X 0.8 Depth 4 | 1 | 2.5 | 18 | 25 | 22 | 18 | 3.4 | 27   | 85                 | 24 |
| 20            | [0.787] | 5.5            | 9.5            | Rc1/8            | 1 | 3.5 | 26 | 32 | 28 | 24 | 4.5 | 34.5 | 105                | 31 |
| 25            | [0.984] | 6              | 10             | Rc1/8            | 1 | 3.5 | 26 | 38 | 33 | 27 | 5.5 | 40   | 135                | 36 |

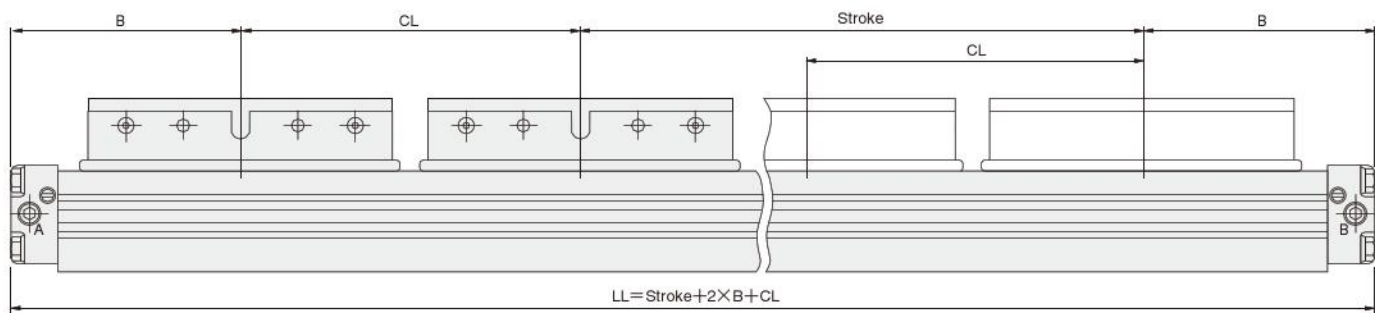
Note: The dimension CL shows the minimum case value.

# Dimensions of ORCA32, 40, 50 (mm)

Basic type ORCA Bore size × Stroke



Dual piston specification ORCAD Bore size × Stroke



| Bore mm [in.] | Code | A   | B   | C  | D  | E    | F    | G | H  | J  | K   | L   | M   | N  | O | P             | Q                | R  | S  |
|---------------|------|-----|-----|----|----|------|------|---|----|----|-----|-----|-----|----|---|---------------|------------------|----|----|
| 32 [1.260]    |      | 250 | 125 | 27 | 30 | 21   | 10.5 | 4 | 30 | 9  | 160 | 120 | 90  | 60 | 7 | M6 X1 Depth15 | M6 X1 Depth15    | 52 | 36 |
| 40 [1.575]    |      | 300 | 150 | 30 | 30 | 23.5 | 12   | 5 | 35 | 9  | 190 | 110 | 90  | 55 | 7 | M6 X1 Depth12 | M6 X1 Depth15    | 60 | 42 |
| 50 [1.969]    |      | 320 | 160 | 32 | 40 | 24   | 13   | 3 | 40 | 14 | 200 | 160 | 120 | 80 | 7 | M6 X1 Depth12 | M8 X1.25 Depth15 | 74 | 52 |

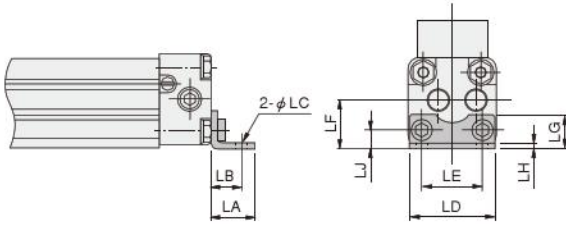
| Bore mm [in.] | Code | T  | U    | V   | W  | X     | Y | Z   | AA | AB | AC | AD | AE | BD | CL <sup>Note</sup> | BE |
|---------------|------|----|------|-----|----|-------|---|-----|----|----|----|----|----|----|--------------------|----|
| 32 [1.260]    |      | 26 | 10.5 | 6.5 | 11 | Rc1/4 | 2 | 4.3 | 27 | 18 | 60 | 54 | 46 | 54 | 180                | 48 |
| 40 [1.575]    |      | 30 | 10.5 | 6.5 | 11 | Rc1/4 | 2 | 4.3 | 28 | 18 | 61 | 57 | 49 | 63 | 220                | 58 |
| 50 [1.969]    |      | 40 | 13.5 | 8.5 | 14 | Rc3/8 | 2 | 5.3 | 28 | 18 | 69 | 65 | 57 | 75 | 240                | 70 |

Note: The dimension CL shows the minimum case value.

SLIT TYPE RODLESS CYLINDERS ORCA, ORGA SERIES

L-type bracket: -L

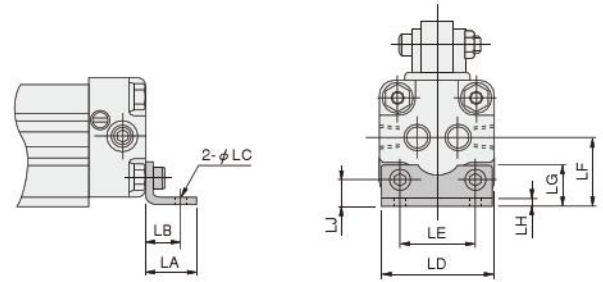
● ORCA16, 20, 25



| Bore mm [in.] | Code | LA | LB | LC  | LD | LE | LF | LG | LH  | LJ  |
|---------------|------|----|----|-----|----|----|----|----|-----|-----|
| 16 [0.630]    |      | 14 | 10 | 3.6 | 26 | 18 | 15 | 10 | 1.6 | 6   |
| 20 [0.787]    |      | 18 | 13 | 4.6 | 33 | 24 | 19 | 13 | 2   | 7   |
| 25 [0.984]    |      | 22 | 16 | 5.8 | 39 | 27 | 22 | 16 | 2.6 | 8.5 |

Note: When L-type brackets are installed together with F-type supports, change the direction of the L-type bracket in order to mount the F-type support.

● ORCA32, 40, 50

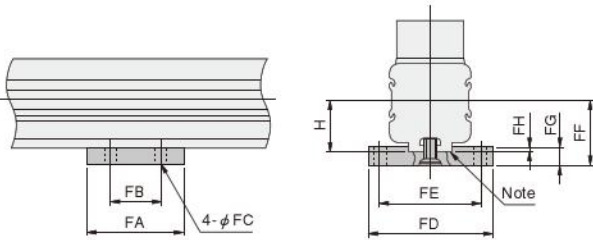


| Bore mm [in.] | Code | LA | LB | LC  | LD | LE | LF | LG | LH  | LJ |
|---------------|------|----|----|-----|----|----|----|----|-----|----|
| 32 [1.260]    |      | 26 | 18 | 6.6 | 50 | 36 | 30 | 20 | 3.2 | 12 |
| 40 [1.575]    |      | 26 | 18 | 6.6 | 58 | 42 | 35 | 22 | 4   | 14 |
| 50 [1.969]    |      | 32 | 22 | 9   | 72 | 52 | 40 | 24 | 4   | 14 |

Note: When L-type brackets are installed together with F-type supports, change the direction of the L-type bracket in order to mount the F-type support.

F-type support: -F

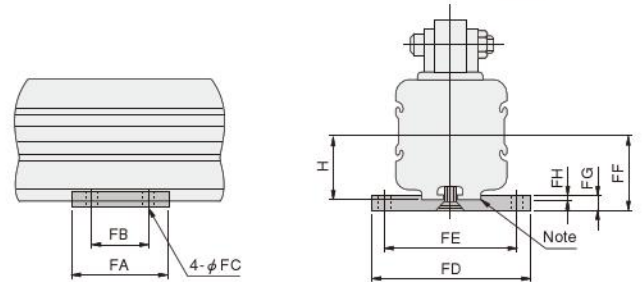
● ORCA16, 20, 25



Note: This concave portion is not on φ 20.

| Bore mm [in.] | Code | FA | FB | FC  | FD | FE | FF   | FG  | FH  | H  |
|---------------|------|----|----|-----|----|----|------|-----|-----|----|
| 16 [0.630]    |      | 25 | 15 | 3.5 | 40 | 32 | 19   | 4.5 | 0.5 | 15 |
| 20 [0.787]    |      | 38 | 20 | 4.5 | 49 | 40 | 25   | 6   | —   | 19 |
| 25 [0.984]    |      | 38 | 25 | 5.5 | 56 | 46 | 29.5 | 9   | 1.5 | 22 |

● ORCA32, 40, 50

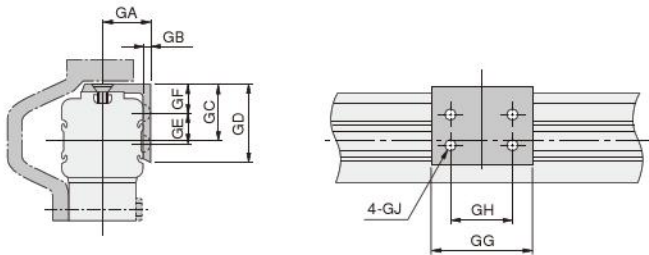


Note: This concave portion is not on φ 32.

| Bore mm [in.] | Code | FA | FB | FC  | FD  | FE | FF | FG | FH | H  |
|---------------|------|----|----|-----|-----|----|----|----|----|----|
| 32 [1.260]    |      | 50 | 30 | 6.6 | 72  | 60 | 36 | 6  | —  | 30 |
| 40 [1.575]    |      | 50 | 30 | 6.6 | 82  | 70 | 39 | 6  | 2  | 35 |
| 50 [1.969]    |      | 65 | 40 | 9   | 100 | 85 | 48 | 9  | 1  | 40 |

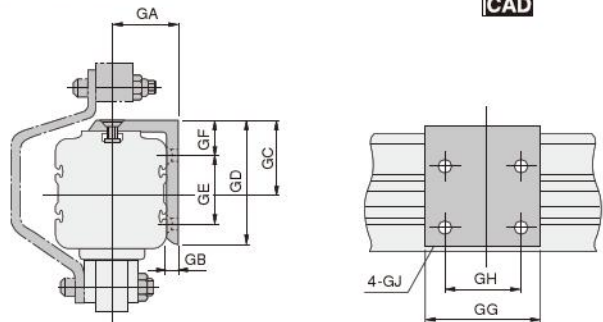
G-type support: -G

● ORCA16, 20, 25



| Bore mm [in.] | Code | GA | GB | GC   | GD | GE | GF | GG | GH | GJ                  |
|---------------|------|----|----|------|----|----|----|----|----|---------------------|
| 16 [0.630]    |      | 15 | 3  | 17   | 25 | 8  | 11 | 30 | 20 | φ3.5 Countersinking |
| 20 [0.787]    |      | 19 | 3  | 21.5 | 30 | 12 | 11 | 40 | 25 | φ4.5 Countersinking |
| 25 [0.984]    |      | 22 | 4  | 25   | 45 | 20 | 15 | 50 | 35 | φ5.6 Countersinking |

● ORCA32, 40, 50

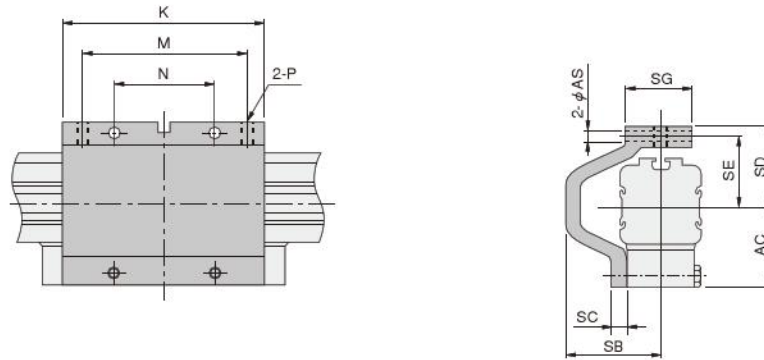


| Bore mm [in.] | Code | GA | GB | GC | GD | GE | GF | GG | GH | GJ                             |
|---------------|------|----|----|----|----|----|----|----|----|--------------------------------|
| 32 [1.260]    |      | 30 | 5  | 34 | 50 | 22 | 18 | 60 | 40 | φ 6.8 Countersinking           |
| 40 [1.575]    |      | 35 | 6  | 40 | 65 | 33 | 22 | 60 | 40 | φ 6.8 Countersinking           |
| 50 [1.969]    |      | 48 | 12 | 50 | 75 | 36 | 27 | 80 | 50 | φ 9, φ 14 Counterbore, Depth 8 |

Option (mm)

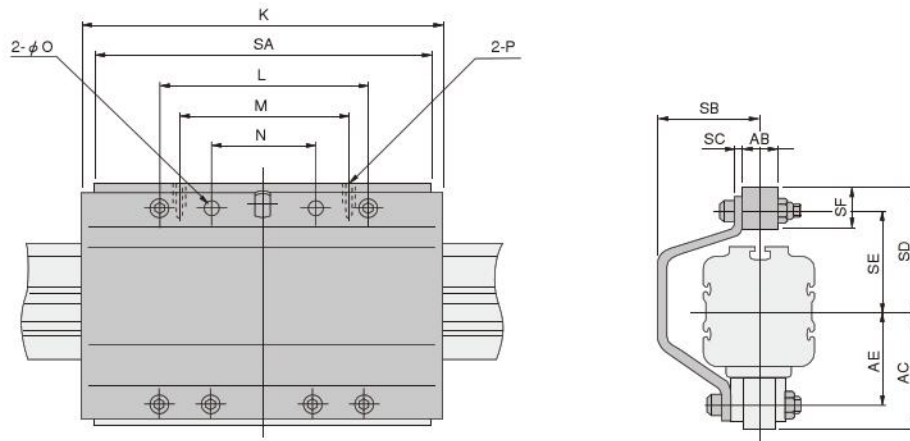
C mount: -C

● ORCA16, 20, 25



| Bore mm [in.] | Code | K   | M  | N  | P              | AC | AS  | SB   | SC | SD | SE | SG |
|---------------|------|-----|----|----|----------------|----|-----|------|----|----|----|----|
| 16 [0.630]    |      | 65  | 52 | 32 | M3×0.5 Depth6  | 25 | 3.4 | 31   | 5  | 25 | 22 | 18 |
| 20 [0.787]    |      | 80  | 65 | 40 | M4×0.7 Depth8  | 32 | 4.5 | 36.5 | 6  | 32 | 28 | 26 |
| 25 [0.984]    |      | 100 | 80 | 50 | M5×0.8 Depth10 | 38 | 5.5 | 40   | 7  | 38 | 33 | 26 |

● ORCA32, 40, 50

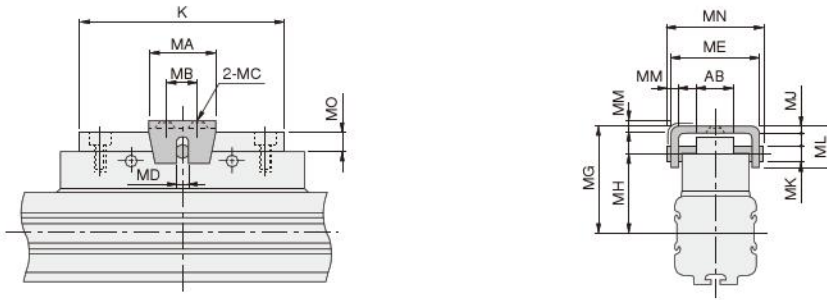


| Bore mm [in.] | Code | K   | L   | M   | N  | O | P            | AB | AC | AE | SA  | SB | SC  | SD | SE | SF |
|---------------|------|-----|-----|-----|----|---|--------------|----|----|----|-----|----|-----|----|----|----|
| 32 [1.260]    |      | 160 | 120 | 90  | 60 | 7 | M6×1 Depth15 | 18 | 60 | 46 | —   | 42 | 4   | 60 | 46 | 23 |
| 40 [1.575]    |      | 190 | 110 | 90  | 55 | 7 | M6×1 Depth12 | 18 | 61 | 49 | 178 | 47 | 4.5 | 71 | 59 | 20 |
| 50 [1.969]    |      | 200 | 160 | 120 | 80 | 7 | M6×1 Depth12 | 18 | 69 | 57 | 188 | 55 | 6   | 79 | 67 | 20 |

SLIT TYPE RODLESS CYLINDERS ORCA, ORGA SERIES

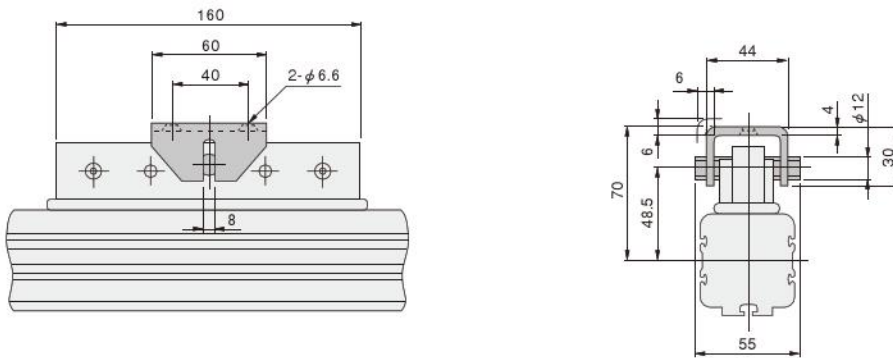
M mount: -M

● ORCA16, 20, 25

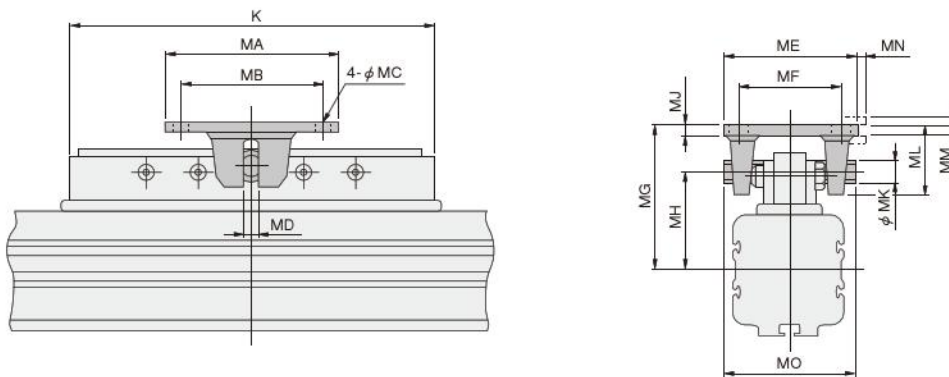


| Bore mm [In.] | Code | K   | AB | MA | MB | MC  | MD | ME   | MG   | MH | MJ  | MK  | ML | MM | MN   | MO  |
|---------------|------|-----|----|----|----|-----|----|------|------|----|-----|-----|----|----|------|-----|
| 16 [0.630]    |      | 65  | 10 | 20 | 10 | 3.5 | 3  | 25   | 34   | 25 | 2   | 5   | 13 | 3  | 28   | 5   |
| 20 [0.787]    |      | 80  | 15 | 26 | 13 | 4.5 | 4  | 34.6 | 43.5 | 32 | 2.3 | 6.5 | 16 | 4  | 38.6 | 6.5 |
| 25 [0.984]    |      | 100 | 15 | 32 | 16 | 5.5 | 5  | 37   | 52   | 38 | 3.2 | 8   | 20 | 5  | 42   | 8   |

● ORCA32



● ORCA40, 50

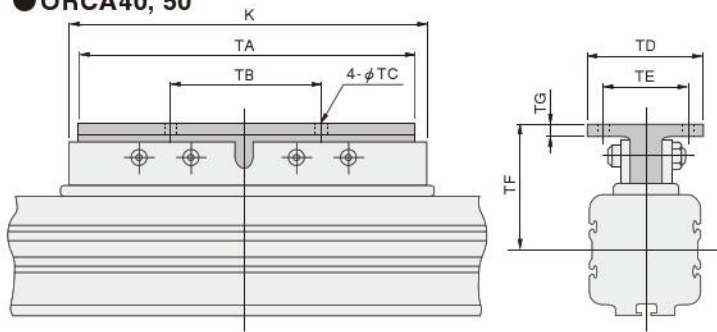


| Bore mm [In.] | Code | K   | MA | MB | MC | MD | ME | MF | MG | MH | MJ | MK | ML | MM | MN | MO |
|---------------|------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 40 [1.575]    |      | 190 | 90 | 75 | 7  | 8  | 70 | 55 | 75 | 51 | 5  | 12 | 35 | 5  | 5  | 70 |
| 50 [1.969]    |      | 200 | 90 | 75 | 7  | 8  | 70 | 55 | 83 | 59 | 5  | 12 | 35 | 5  | 5  | 70 |

Option (mm)

T mount: -T

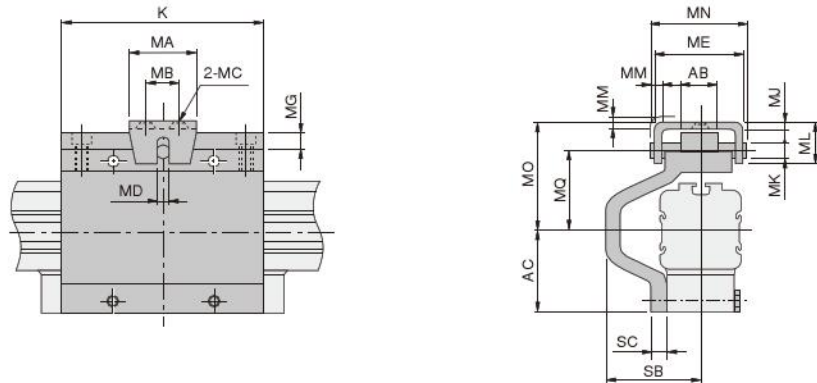
● ORCA40, 50



| Code       | K   | TA  | TB  | TC | TD | TE | TF | TG |
|------------|-----|-----|-----|----|----|----|----|----|
| 40 [1.575] | 190 | 178 | 80  | 7  | 60 | 45 | 66 | 6  |
| 50 [1.969] | 200 | 188 | 120 | 7  | 60 | 45 | 74 | 6  |

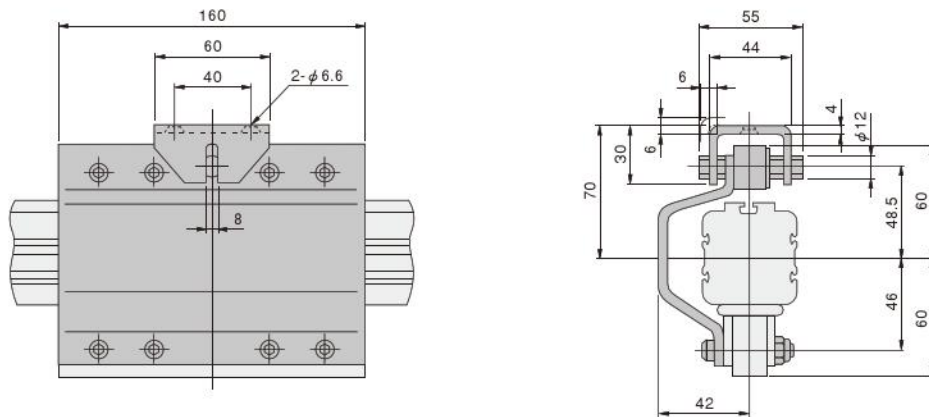
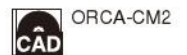
CM mount: -CM

● ORCA16, 20, 25

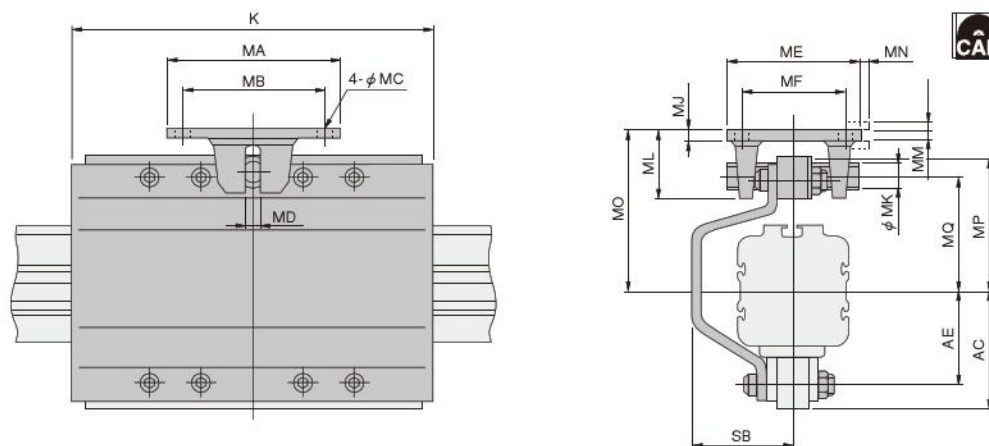
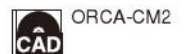


| Code       | K   | AB | AC | MA | MB | MC  | MD | ME   | MG  | MJ  | MK  | ML | MM | MN   | MO   | MQ | SB   | SC |
|------------|-----|----|----|----|----|-----|----|------|-----|-----|-----|----|----|------|------|----|------|----|
| 16 [0.630] | 65  | 10 | 25 | 20 | 10 | 3.5 | 3  | 25   | 5   | 2   | 5   | 13 | 3  | 28   | 34   | 25 | 31   | 5  |
| 20 [0.787] | 80  | 15 | 32 | 26 | 13 | 4.5 | 4  | 34.6 | 6.5 | 2.3 | 6.5 | 16 | 4  | 38.6 | 43.5 | 32 | 36.5 | 6  |
| 25 [0.984] | 100 | 15 | 38 | 32 | 16 | 5.5 | 5  | 37   | 8   | 3.2 | 8   | 20 | 5  | 42   | 52   | 38 | 40   | 7  |

● ORCA32



● ORCA40, 50

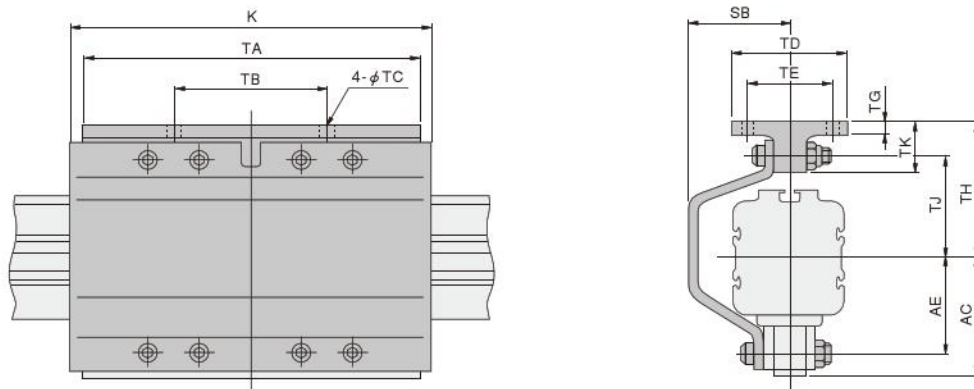


| Code       | K   | AC | AE | MA | MB | MC | MD | ME | MF | MJ | MK | ML | MM | MN | MO | MP | MQ | SB |
|------------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 40 [1.575] | 190 | 61 | 49 | 90 | 75 | 7  | 8  | 70 | 55 | 5  | 12 | 35 | 5  | 5  | 85 | 71 | 61 | 47 |
| 50 [1.969] | 200 | 69 | 57 | 90 | 75 | 7  | 8  | 70 | 55 | 5  | 12 | 35 | 5  | 5  | 93 | 79 | 69 | 55 |

Option (mm)

CT mount: -CT

● ORCA40, 50



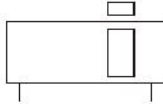
| Code       | K   | AC | AE | SB | TA  | TB  | TC | TD | TE | TG | TH | TJ | TK |
|------------|-----|----|----|----|-----|-----|----|----|----|----|----|----|----|
| 40 [1.575] | 190 | 61 | 49 | 47 | 178 | 80  | 7  | 60 | 45 | 6  | 76 | 59 | 25 |
| 50 [1.969] | 200 | 69 | 57 | 55 | 188 | 120 | 7  | 60 | 45 | 6  | 84 | 67 | 25 |

# ORGA

## With Guide



### Symbol



### Specifications

| Bore size<br>mm [in.]  |                                       | 16 [0.630]  | 20 [0.787]  | 25 [0.984]  | 32 [1.260]  | 40 [1.575]   | 50 [1.969] |
|--|---------------------------------------|---|---|---|---|--|------------|
| Media  |                                       | Air   |   |   |   |  |            |
| Operation type   |                                       | Double acting type  |   |   |   |  |            |
| Operating pressure range MPa [psi.]  |                                       | 0.15~0.8 [22~116]   |   |   |   |  |            |
| Proof pressure MPa [psi.]  |                                       | 1.2 [174]   |   |   |   |  |            |
| Operating temperature range °C [°F]  |                                       | 0~60 [32~140]   |   |   |   |  |            |
| Operating speed range mm/s [in./sec.]  |                                       | 100~1000 [3.9~39.4]   |   |   |   |  |            |
| Cushion  | Standard specification                | Variable cushion  |   |   |   |  |            |
|  | Cushioning stroke (one side) mm [in.] | 15 [0.591]  | 18 [0.709]  | 21 [0.827]  | 26 [1.024]  | 40 [1.575]   |            |
|  | Option                                | With shock absorber   |   |   |   |  |            |
| Lubrication  |                                       | Not required <sup>Note 1</sup>                              |   |   |   |  |            |
| Stroke adjusting range <sup>Note 2</sup><br>(One side to the specification stroke)<br>mm [in.] | With shock absorber (optional)        | Up to the full stroke and fine adjustment 0~-15 [0~-0.591]  | Up to the full stroke and fine adjustment 0~-20 [0~-0.787]  | Up to the full stroke and fine adjustment 0~-30 [0~-1.181]  |   |  |            |
|  | Stroke adjusting bolt (optional)      | 0~-4 [0~-0.157]<br>(Fine adjustment only at the stroke end) | 0~-5 [0~-0.197]<br>(Fine adjustment only at the stroke end) | 0~-6 [0~-0.236]<br>(Fine adjustment only at the stroke end) | 0~-8 [0~-0.315]<br>(Fine adjustment only at the stroke end) | 0~-10 [0~-0.394]<br>(Fine adjustment only at the stroke end) |            |
| Stroke tolerance<br>mm [in.]   | 1000 [39.37] or less                  | +1.5 [+0.059]<br>0 [0]                                      |   |   |   |  |            |
|  | 1001~3000 [39.41~118.11]              | +2.0 [+0.079]<br>0 [0]                                      |   |   |   |  |            |
|  | 3001~5000 [118.15~196.85]             | +2.5 [+0.098]<br>0 [0]                                      |   |   |   |  |            |
| Port size  |                                       | M5×0.8  | Rc1/8   |   | Rc1/4   |  | Rc3/8      |

Notes: 1. These models can be used without lubrication, if lubrication is required, use Turbine Oil Class 1 (ISO VG32) or equivalent.

2. For details, see p.1099.

Remark: For details of sensor switches, see p.1544.

### Specifications of Shock Absorber

| Item  | Model | KSHJ10×10-01  | KSHJ12×10-01 | KSHJ14×12-01 | KSHJ18×16-01 | KSHJ20×16-01 | KSHJ22×25-01 |
|---|-------|---------------|--------------|--------------|--------------|--------------|--------------|
| Applicable cylinder                               |       | ORGA16        | ORGA20       | ORGA25       | ORGA32       | ORGA40       | ORGA50       |
| Maximum absorption J [ft.lbf]                     |       | 3 [2.2]       | 6 [4.4]      | 10 [7.4]     | 20 [14.8]    | 30 [22.1]    | 50 [36.9]    |
| Absorbing stroke mm [in.]                         |       | 10 [0.394]    |              | 12 [0.472]   | 16 [0.630]   |              | 25 [0.984]   |
| Maximum impact speed mm/s [in./sec.]              |       | 1000 [39.4]   |              |              |              |              |              |
| Maximum operating frequency cycle/min             |       | 60            |              | 40           |              | 30           |              |
| Maximum absorption per minute J/min [ft.lbf/min.] |       | 120 [88.5]    | 220 [162]    | 240 [177]    | 320 [236]    | 450 [332]    | 500 [369]    |
| Spring return force <sup>Note</sup> N [lbf.]      |       | 8.0 [1.80]    | 7.6 [1.71]   | 9.2 [2.07]   | 22.0 [4.95]  | 22.0 [4.95]  | 28.5 [6.41]  |
| Angle variation                                   |       | 1° or less    |              |              |              | 3° or less   |              |
| Operating temperature range °C [°F]               |       | 0~60 [32~140] |              |              |              |              |              |

Note: Values at retracted position.

**Caution:** The life of the shock absorber may vary from the Slit Type Rodless Cylinder, depending on its operating conditions.

SLIT TYPE RODLESS CYLINDERS ORCA, ORGA SERIES

## Cylinder Thrust

| Bore size<br>mm [in.] | Pressure area<br>mm <sup>2</sup> [in. <sup>2</sup> ] | Air pressure MPa [psi.] |            |             |             |             |              |              |              |
|-----------------------|--|-------------------------|------------|-------------|-------------|-------------|--------------|--------------|--------------|
|                       |  | 0.15 [22]               | 0.2 [29]   | 0.3 [44]    | 0.4 [58]    | 0.5 [73]    | 0.6 [87]     | 0.7 [102]    | 0.8 [116]    |
| <b>16 [0.630]</b>     | 200 [0.310]  | 30 [6.7]                | 40 [9.0]   | 60 [13.5]   | 80 [18.0]   | 100 [22.5]  | 120 [27.0]   | 140 [31.5]   | 160 [36.0]   |
| <b>20 [0.787]</b>     | 314 [0.487]  | 47 [10.6]               | 63 [14.2]  | 94 [21.1]   | 126 [28.3]  | 157 [35.3]  | 188 [42.3]   | 220 [49.5]   | 251 [56.4]   |
| <b>25 [0.984]</b>     | 490 [0.760]  | 49 [11.0]               | 98 [22.0]  | 147 [33.0]  | 196 [44.1]  | 245 [55.1]  | 294 [66.1]   | 343 [77.1]   | 392 [88.1]   |
| <b>32 [1.260]</b>     | 804 [1.246]  | 80 [18.0]               | 161 [36.2] | 241 [54.2]  | 322 [72.4]  | 402 [90.4]  | 482 [108.4]  | 563 [126.6]  | 643 [144.5]  |
| <b>40 [1.575]</b>     | 1256 [1.947]   | 126 [28.3]              | 251 [56.4] | 377 [84.7]  | 502 [112.8] | 628 [141.2] | 754 [169.5]  | 879 [197.6]  | 1005 [225.9] |
| <b>50 [1.969]</b>     | 1963 [3.043]   | 196 [44.1]              | 393 [88.3] | 589 [132.4] | 785 [176.5] | 982 [220.8] | 1178 [264.8] | 1374 [308.9] | 1570 [352.9] |

## Bore Size and Stroke

| Bore size | Standard strokes  | Available strokes |
|-----------|---|-------------------|
|           |   |                   |
| <b>16</b> | 100, 200, 300, 400, 500, 600, 700, 800                                      | 0~3000            |
| <b>20</b> | 200, 300, 400, 500, 600, 700, 800, 1000, 1200, 1400, 1600, 2000             | 0~5000            |
| <b>25</b> | 200, 300, 400, 500, 600, 700, 800, 1000, 1200, 1400, 1600, 2000             |                   |
| <b>32</b> | 200, 300, 400, 500, 600, 700, 800, 1000, 1100, 1200, 1400, 1600, 2000       |                   |
| <b>40</b> | 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1400, 1600, 1800, 2000 |                   |
| <b>50</b> | 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1400, 1600, 1800, 2000 |                   |

Remark: Non-standard strokes are available at 1mm pitch intervals. For delivery, consult us.

## Mass

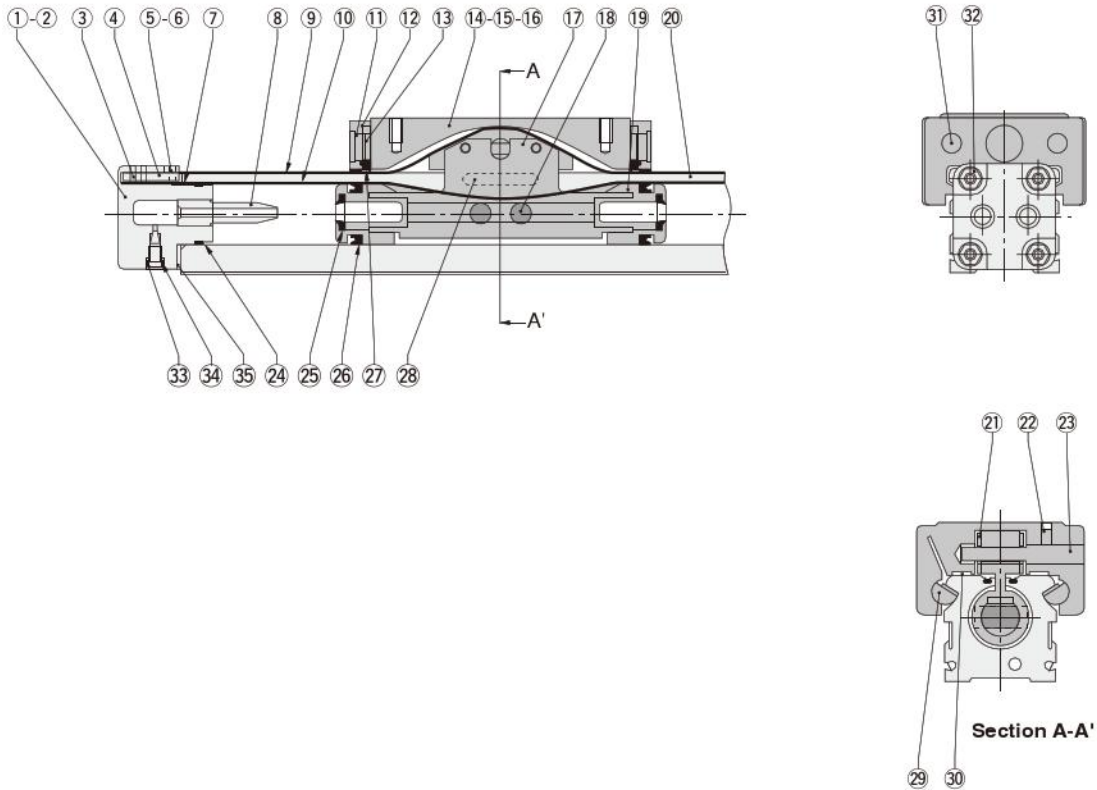
| Bore size<br>mm [in.] | Zero stroke<br>mass | Additional mass<br>of each 1mm<br>[0.0394in.]<br>stroke | Additional mass of option       |  |                |                | Additional mass of<br>1 sensor switch<br>(with sensor holder) |
|-----------------------|---------------------|---|---------------------------------|--|----------------|----------------|---|
|                       |                     |   | Shock absorber<br>(with holder) | Stroke adjusting<br>bolt (with holder) | L-type bracket | F-type support |   |
| <b>16 [0.630]</b>     | 0.37 [0.82]         | 0.0013 [0.0029]   | 0.042 [0.093]                   | 0.034 [0.075]                          | 0.014 [0.031]  | 0.008 [0.018]  | A : 0.05 [0.11]<br>B : 0.09 [0.20]                            |
| <b>20 [0.787]</b>     | 0.71 [1.57]         | 0.0022 [0.0049]   | 0.07 [0.15]                     | 0.056 [0.123]                          | 0.03 [0.07]    | 0.015 [0.033]  |   |
| <b>25 [0.984]</b>     | 1.15 [2.54]         | 0.0027 [0.0060]   | 0.12 [0.26]                     | 0.10 [0.22]                            | 0.05 [0.11]    | 0.06 [0.13]    |   |
| <b>32 [1.260]</b>     | 2.45 [5.40]         | 0.0045 [0.0099]   | 0.22 [0.49]                     | 0.17 [0.37]                            | 0.10 [0.22]    | 0.08 [0.18]    |   |
| <b>40 [1.575]</b>     | 3.75 [8.27]         | 0.0054 [0.0119]   | 0.40 [0.88]                     | 0.35 [0.77]                            | 0.08 [0.18]    | 0.12 [0.26]    |   |
| <b>50 [1.969]</b>     | 5.80 [12.79]        | 0.0083 [0.0183]   | 0.62 [1.37]                     | 0.52 [1.15]                            | 0.22 [0.49]    | 0.12 [0.26]    |   |



# Inner Construction

## ORGA16, 20, 25

Diagrams show ORGA20.



## Major Parts and Materials

| No. | Parts                      | Materials              | Q'ty | Remark                                |
|-----|----------------------------|------------------------|------|---------------------------------------|
| ①   | End cap R <sup>Note1</sup> | Aluminum alloy         | 1    | Anodized                              |
| ②   | End cap L <sup>Note2</sup> | Aluminum alloy         | 1    | Anodized                              |
| ③   | Inner seal band setscrew   | Alloy steel            | 4    | Hexagon socket setscrew               |
| ④   | Inner seal band lock       | Steel                  | 2    | Nickel plated                         |
| ⑤   | Outer seal band lock       | Steel                  | 2    | Nickel plated                         |
| ⑥   | Outer seal band setscrew   | Steel                  | 4    | Cross recessed countersunk head screw |
| ⑦   | Rivet                      | Polyacetal             | 2    |                                       |
| ⑧   | Cushion pipe               | Polyacetal             | 2    |                                       |
| ⑨   | Outer seal band            | Stainless chrome steel | 1    |                                       |
| ⑩   | Inner seal band            | Stainless chrome steel | 1    |                                       |
| ⑪   | Striker                    | Steel                  | 2    |                                       |
| ⑫   | End plate                  | Aluminum alloy         | 2    | Anodized                              |
| ⑬   | Scraper holder             | Polyacetal             | 2    |                                       |
| ⑭   | Slider                     | Aluminum alloy         | 1    | Anodized                              |
| ⑮   | Slider adjusting bolt      | Alloy steel            | 4    | Hexagon socket button head screw      |
| ⑯   | Slider fixing setscrew     | Alloy steel            | 4    | Hexagon socket setscrew               |
| ⑰   | Piston yoke                | Aluminum alloy         | 1    | Anodized                              |

★: Available as a seal repair kit.

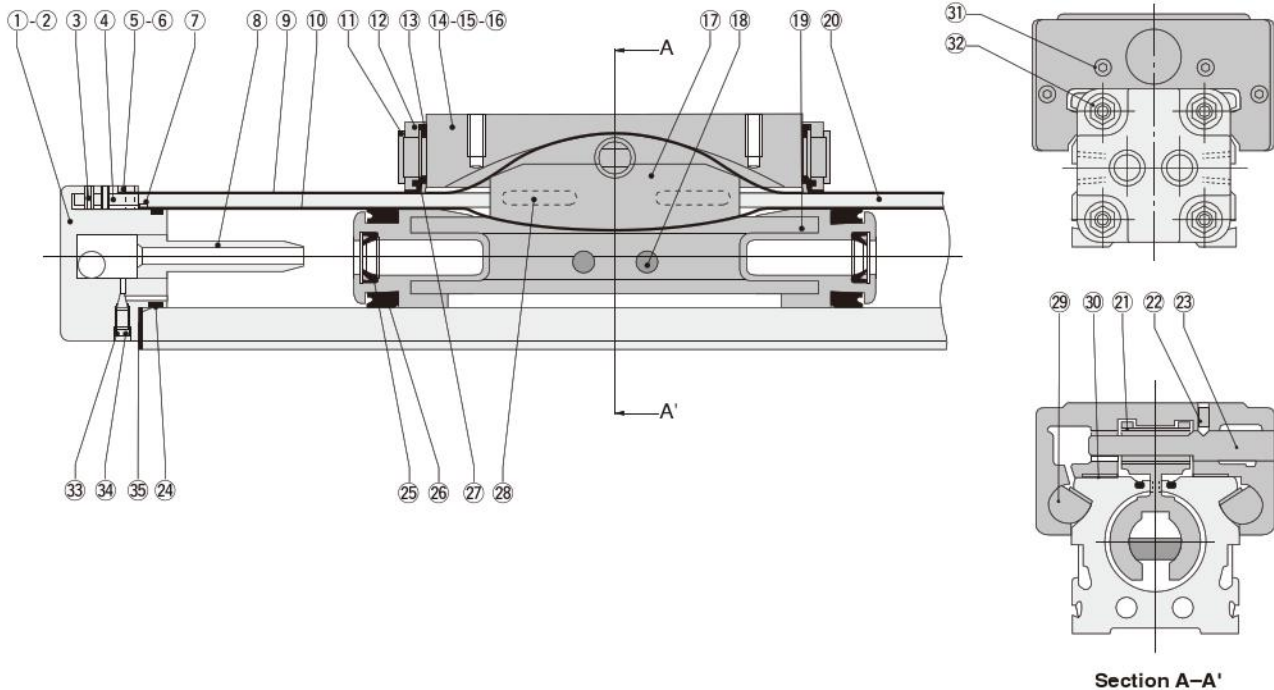
Notes: 1. The side where concentrated piping cannot be done.  
2. The side where concentrated piping can be done.

| No. | Parts                   | Materials                        | Q'ty | Remark                        |
|-----|-------------------------|----------------------------------|------|-------------------------------|
| ⑱   | Magnet                  | Alnico magnet                    | 2    |                               |
| ⑲   | Piston                  | Polyacetal                       | 2    |                               |
| ⑳   | Cylinder barrel         | Aluminum alloy                   | 1    | Anodized                      |
| ㉑   | Yoke mount              | Steel                            | 1    |                               |
| ㉒   | Carrier pin setscrew    | Alloy steel                      | 1    | Hexagon socket setscrew       |
| ㉓   | Carrier pin             | Alloy steel                      | 1    | Black oxide                   |
| ㉔★  | Cap gasket              | Synthetic rubber (NBR)           | 2    |                               |
| ㉕★  | Cushion seal            | Synthetic rubber (NBR)           | 2    |                               |
| ㉖★  | Piston seal             | Synthetic rubber (NBR)           | 2    |                               |
| ㉗★  | Scraper                 | Synthetic rubber (NBR)           | 2    |                               |
| ㉘★  | Bearing strip           | Polyethylene                     | 2    |                               |
| ㉙   | Guide shaft             | Zinc alloy                       | 2    | φ25 [0.984in.] is polyacetal. |
| ㉚   | Guide plate             | PTFE layer with filling material | 4    |                               |
| ㉛   | End plate mounting bolt | Alloy steel                      | 4    |                               |
| ㉜   | End cap screw           | Alloy steel                      | 8    | Zinc plated                   |
| ㉝★  | Cushion gasket          | Synthetic rubber (NBR)           | 2    |                               |
| ㉞   | Cushion needle          | Brass                            | 2    |                               |
| ㉟★  | Cylinder gasket         | Aluminum alloy sheet             | 2    | Synthetic rubber (NBR) baked  |

## Inner Construction

### ORGA32, 40, 50

Diagrams show ORGA40.



SLIT TYPE RODLESS CYLINDERS ORCA, ORGA SERIES

## Major Parts and Materials

| No. | Parts                      | Materials              | Q'ty | Remarks                               |
|-----|----------------------------|------------------------|------|---------------------------------------|
| ①   | End cap R <sup>Note1</sup> | Aluminum alloy         | 1    | Anodized                              |
| ②   | End cap L <sup>Note2</sup> | Aluminum alloy         | 1    | Anodized                              |
| ③   | Inner seal band setscrew   | Alloy steel            | 4    | Hexagon socket setscrew               |
| ④   | Inner seal band lock       | Steel                  | 2    | Nickel plated                         |
| ⑤   | Outer seal band lock       | Steel                  | 2    | Nickel plated                         |
| ⑥   | Outer seal band setscrew   | Steel                  | 4    | Cross recessed countersunk head screw |
| ⑦   | Rivet                      | Polyacetal             | 2    |                                       |
| ⑧   | Cushion pipe               | Polyacetal             | 2    |                                       |
| ⑨   | Outer seal band            | Stainless chrome steel | 1    |                                       |
| ⑩   | Inner seal band            | Stainless chrome steel | 1    |                                       |
| ⑪   | Striker                    | Steel                  | 2    |                                       |
| ⑫   | End plate                  | Aluminum alloy         | 2    | Anodized                              |
| ⑬   | Scraper holder             | Polyacetal             | 2    |                                       |
| ⑭   | Slider                     | Aluminum alloy         | 1    | Anodized                              |
| ⑮   | Slider adjusting bolt      | Alloy steel            | 4    | Hexagon socket button head screw      |
| ⑯   | Slider fixing screw        | Alloy steel            | 4    | Hexagon socket setscrew               |
| ⑰   | Piston yoke                | Aluminum alloy         | 1    | Anodized                              |

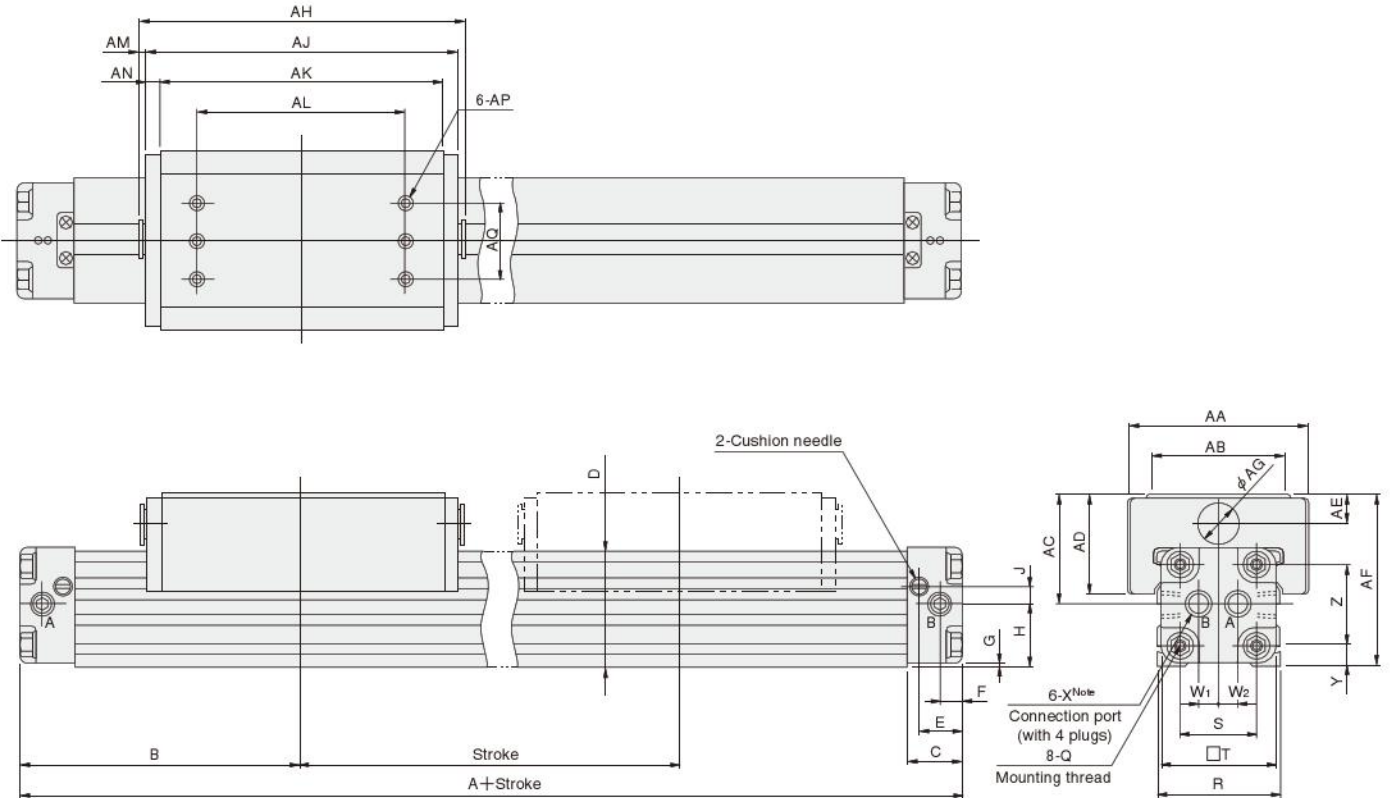
★: Available as a seal repair kit.

Notes: 1. The side where concentrated piping cannot be done.  
2. The side where concentrated piping can be done.

| No. | Parts                   | Materials                        | Q'ty | Remarks                              |
|-----|-------------------------|----------------------------------|------|--------------------------------------|
| ⑱   | Magnet                  | Alnico magnet                    | 2    |                                      |
| ⑲   | Piston                  | Polyacetal                       | 2    |                                      |
| ⑳   | Cylinder barrel         | Aluminum alloy                   | 1    | Anodized                             |
| ㉑   | Yoke mount              | Steel                            | 1    |                                      |
| ㉒   | Carrier pin setscrew    | Alloy steel                      | 1    | Hexagon socket button head screw     |
| ㉓   | Carrier pin             | Alloy steel                      | 1    | Black oxide                          |
| ㉔★  | Cap gasket              | Synthetic rubber (NBR)           | 2    |                                      |
| ㉕★  | Cushion seal            | Synthetic rubber (NBR)           | 2    |                                      |
| ㉖★  | Piston seal             | Synthetic rubber (NBR)           | 2    |                                      |
| ㉗★  | Scraper                 | Synthetic rubber (NBR)           | 2    |                                      |
| ㉘★  | Bearing strip           | Polyethylene                     | 4    |                                      |
| ㉙   | Guide shaft             | Aluminum alloy                   | 2    | Anodized; Polyacetal for ORGA40 only |
| ㉚   | Guide plate             | PTFE layer with filling material | 4    |                                      |
| ㉛   | End plate mounting bolt | Alloy steel                      | 8    |                                      |
| ㉜   | End cap screw           | Alloy steel                      | 8    | Zinc plated                          |
| ㉝★  | Cushion gasket          | Synthetic rubber (NBR)           | 2    |                                      |
| ㉞   | Cushion needle          | Brass                            | 2    |                                      |
| ㉟★  | Cylinder gasket         | Aluminum alloy sheet             | 2    | Synthetic rubber (NBR) baked         |

# Dimensions of ORGA (mm)

ORGA Bore size × Stroke



Note: ORGA16, 20, and 25 have 4 places.

| Bore mm [in.] | Code    | A   | B   | C  | D    | E    | F    | G   | H  | J   | Q               | R  | S  | T  | W <sub>1</sub> | W <sub>2</sub> | X             |
|---------------|---------|-----|-----|----|------|------|------|-----|----|-----|-----------------|----|----|----|----------------|----------------|---------------|
| 16            | [0.630] | 130 | 65  | 15 | 27   | 12   | 5.5  | 1.5 | 15 | 4   | M3×0.5 Depth5   | 31 | 18 | 27 | 7              | 7              | M5×0.8 Depth4 |
| 20            | [0.787] | 160 | 80  | 19 | 34.5 | 16   | 7.5  | 2   | 19 | 6.5 | M4×0.7 Depth7   | 39 | 24 | 34 | 5.5            | 9.5            | Rc1/8         |
| 25            | [0.984] | 200 | 100 | 23 | 40   | 18   | 8.5  | 2   | 22 | 6.5 | M5×0.8 Depth9   | 44 | 27 | 40 | 6              | 10             | Rc1/8         |
| 32            | [1.260] | 250 | 125 | 27 | 54   | 21.5 | 10.5 | 4   | 30 | 8.5 | M6×1 Depth15    | 56 | 36 | 52 | 11             | 11             | Rc1/4         |
| 40            | [1.575] | 300 | 150 | 30 | 60   | 23.5 | 12   | 2   | 32 | 9   | M6×1 Depth15    | 64 | 42 | 60 | 11             | 11             | Rc1/4         |
| 50            | [1.969] | 320 | 160 | 32 | 75   | 24   | 13   | 3   | 40 | 14  | M8×1.25 Depth15 | 78 | 52 | 74 | 14             | 14             | Rc3/8         |

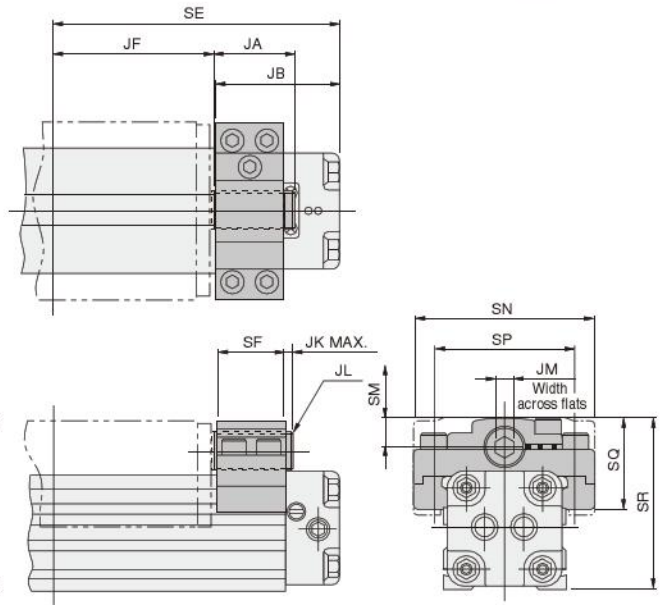
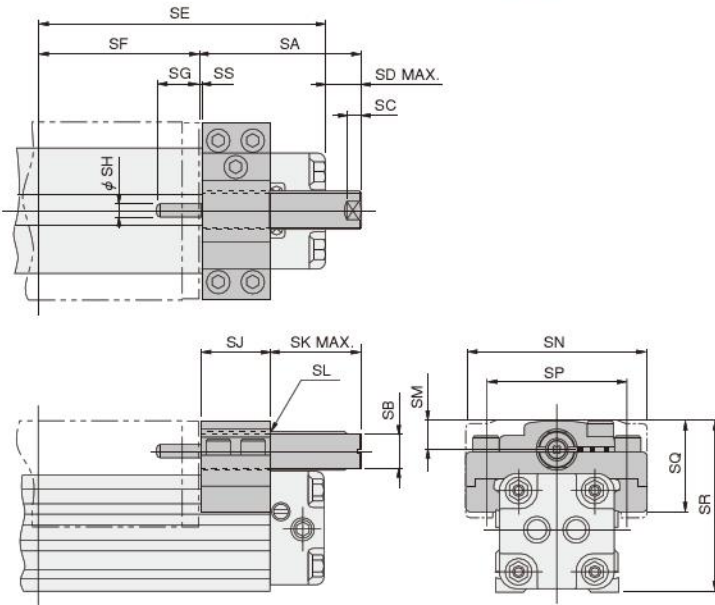
| Bore mm [in.] | Code    | Y   | Z  | AA  | AB | AC | AD   | AE  | AF  | AG | AH  | AJ  | AK  | AL  | AM  | AN  | AP              | AQ |
|---------------|---------|-----|----|-----|----|----|------|-----|-----|----|-----|-----|-----|-----|-----|-----|-----------------|----|
| 16            | [0.630] | 6   | 18 | 45  | 35 | 27 | 23.5 | 7.5 | 42  | 10 | 70  | —   | 56  | 45  | —   | 7   | M3×0.5 Depth7   | 22 |
| 20            | [0.787] | 7   | 24 | 56  | 46 | 33 | 28.5 | 8.5 | 52  | 12 | 88  | —   | 74  | 55  | —   | 7   | M4×0.7 Depth8   | 30 |
| 25            | [0.984] | 8.5 | 27 | 65  | 50 | 38 | 34   | 10  | 60  | 14 | 110 | 105 | 90  | 70  | 2.5 | 7.5 | M5×0.8 Depth9   | 35 |
| 32            | [1.260] | 12  | 36 | 80  | 60 | 48 | 42   | 12  | 78  | 18 | 145 | 140 | 125 | 90  | 2.5 | 7.5 | M6×1 Depth13    | 38 |
| 40            | [1.575] | 11  | 42 | 95  | 70 | 58 | 52   | 16  | 90  | 20 | 170 | 165 | 150 | 110 | 2.5 | 7.5 | M6×1 Depth15    | 40 |
| 50            | [1.969] | 14  | 52 | 120 | 90 | 67 | 60   | 18  | 107 | 22 | 180 | —   | 162 | 120 | —   | 9   | M8×1.25 Depth17 | 50 |

Option (mm)

Shock absorber: -K



Stroke adjusting bolt: -S



| Bore mm [in.] | Code | SA  | SB   | SC | SD   | SE  | SF   | SG | SH | SJ   | SK   |
|---------------|------|-----|------|----|------|-----|------|----|----|------|------|
| 16 [0.630]    |      | 50  | 8.5  | 5  | 20   | 65  | 35   | 10 | 3  | 14.5 | 35   |
| 20 [0.787]    |      | 56  | 10.5 | 5  | 20   | 80  | 44   | 10 | 3  | 16.5 | 39   |
| 25 [0.984]    |      | 60  | 12   | 5  | 15   | 100 | 55   | 12 | 4  | 21   | 38   |
| 32 [1.260]    |      | 72  | 15   | 7  | 19.5 | 125 | 72.5 | 16 | 5  | 24.5 | 46.5 |
| 40 [1.575]    |      | 77  | 17   | 7  | 12   | 150 | 85   | 16 | 5  | 34   | 42   |
| 50 [1.969]    |      | 100 | 19   | 10 | 30   | 160 | 90   | 25 | 6  | 37   | 63   |

| Bore mm [in.] | Code | JA | JB   | SE  | SF   | JF   | JK   | JL      | SM   | SN  |
|---------------|------|----|------|-----|------|------|------|---------|------|-----|
| 16 [0.630]    |      | 21 | 29.5 | 65  | 14.5 | 35   | 6    | M10×1   | 7    | 44  |
| 20 [0.787]    |      | 24 | 35.5 | 80  | 16.5 | 44   | 7    | M12×1   | 8    | 55  |
| 25 [0.984]    |      | 31 | 44   | 100 | 21   | 55   | 9    | M14×1.5 | 9.5  | 64  |
| 32 [1.260]    |      | 36 | 51.5 | 125 | 24.5 | 72.5 | 10.5 | M18×1.5 | 11.5 | 79  |
| 40 [1.575]    |      | 41 | 64   | 150 | 34   | 85   | 6    | M20×1.5 | 15.5 | 94  |
| 50 [1.969]    |      | 46 | 69   | 160 | 37   | 90   | 8    | M22×1.5 | 17   | 118 |

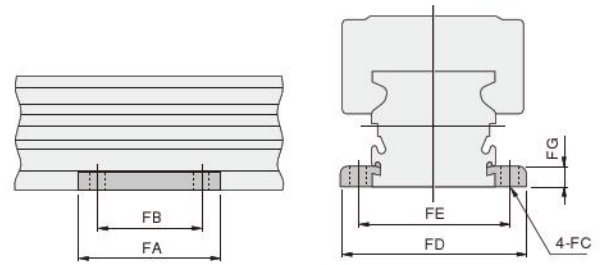
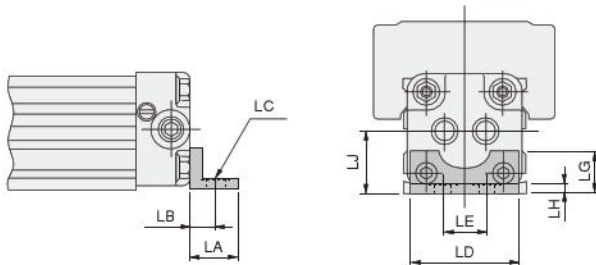
| Bore mm [in.] | Code | SL      | SM   | SN  | SP | SQ   | SR   | SS  |
|---------------|------|---------|------|-----|----|------|------|-----|
| 16 [0.630]    |      | M10×1   | 7    | 44  | 36 | 22   | 41.5 | 0.5 |
| 20 [0.787]    |      | M12×1   | 8    | 55  | 45 | 26.5 | 51.5 | 0.5 |
| 25 [0.984]    |      | M14×1.5 | 9.5  | 64  | 51 | 31.5 | 59.5 | 1   |
| 32 [1.260]    |      | M18×1.5 | 11.5 | 79  | 64 | 39   | 77.5 | 1   |
| 40 [1.575]    |      | M20×1.5 | 15.5 | 94  | 76 | 48   | 89.5 | 1   |
| 50 [1.969]    |      | M22×1.5 | 17   | 118 | 92 | 53.5 | 106  | 1   |

| Bore mm [in.] | Code | SP | SQ   | SR   | JM |
|---------------|------|----|------|------|----|
| 16 [0.630]    |      | 36 | 22   | 41.5 | 5  |
| 20 [0.787]    |      | 45 | 26.5 | 51.5 | 6  |
| 25 [0.984]    |      | 51 | 31.5 | 59.5 | 6  |
| 32 [1.260]    |      | 64 | 39   | 77.5 | 8  |
| 40 [1.575]    |      | 76 | 48   | 89.5 | 10 |
| 50 [1.969]    |      | 92 | 53.5 | 106  | 12 |

L-type bracket: -L



F-type support: -F



| Bore mm [in.] | Code | LA | LB   | LC                              | LD | LE | LG | LH  | LJ |
|---------------|------|----|------|---------------------------------|----|----|----|-----|----|
| 16 [0.630]    |      | 14 | 10   | 4-φ 3.6                         | 26 | 18 | 10 | 1.6 | 15 |
| 20 [0.787]    |      | 18 | 13   | 4-φ 4.6                         | 33 | 24 | 13 | 2   | 19 |
| 25 [0.984]    |      | 22 | 16   | 4-φ 5.8                         | 39 | 27 | 16 | 2.6 | 22 |
| 32 [1.260]    |      | 26 | 18   | 4-φ 6.6                         | 50 | 36 | 20 | 3.2 | 30 |
| 40 [1.575]    |      | 24 | 12.5 | 4-φ 9, φ 14 Counterbore Depth 1 | 58 | 24 | 21 | 5   | 32 |
| 50 [1.969]    |      | 32 | 22   | 4-φ 9                           | 72 | 52 | 24 | 4   | 40 |

| Bore mm [in.] | Code | FA | FB | FC  | FD  | FE | FG  |
|---------------|------|----|----|-----|-----|----|-----|
| 16 [0.630]    |      | 40 | 28 | 3.4 | 45  | 38 | 5   |
| 20 [0.787]    |      | 50 | 35 | 4.5 | 57  | 48 | 6.3 |
| 25 [0.984]    |      | 50 | 35 | 5.5 | 70  | 58 | 8   |
| 32 [1.260]    |      | 65 | 45 | 6.6 | 82  | 70 | 8   |
| 40 [1.575]    |      | 75 | 55 | 9   | 96  | 80 | 10  |
| 50 [1.969]    |      | 75 | 55 | 9   | 110 | 94 | 10  |

Note: Do not install sensor switches in place on the cylinder that will interfere with the F-type support.

SLIT TYPE RODLESS CYLINDERS ORCA, ORGA SERIES

# SENSOR SWITCHES

Solid State Type, Reed Switch Type

## Order Codes for Sensor Switch

### ● Sensor switch (with mounting bracket)

|                  |                                    | Sensor switch model   | Lead wire length | Cylinder basic type | Bore size      |
|------------------|------------------------------------|-----------------------|------------------|---------------------|----------------|
| Solid state type | 2-lead wire with indicator lamp    | DC10~28V              | ZG530            | A<br>B              | -ORCA<br>-ORGA |
| Solid state type | 3-lead wire with indicator lamp    | DC4.5~28V             | ZG553            |                     |                |
| Reed switch type | 2-lead wire with indicator lamp    | DC10~30V<br>AC85~230V | CS3M             |                     |                |
| Reed switch type | 2-lead wire with indicator lamp    | DC10~30V<br>AC85~115V | CS4M             |                     |                |
| Reed switch type | 2-lead wire without indicator lamp | DC3~30V<br>AC85~115V  | CS5M             |                     |                |

● For details of sensor switches, see p.1544.

● A : 1000mm [39in.]  
● B : 3000mm [118in.]

● ORCA : For ORCA  
● ORGA : For ORGA

### ● Order codes for mounting bracket only

G5 —

Cylinder basic type  
ORCA : For ORCA  
ORGA : For ORGA

Bore size  
16 : For  $\phi$  16 [0.630in.]  
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.]

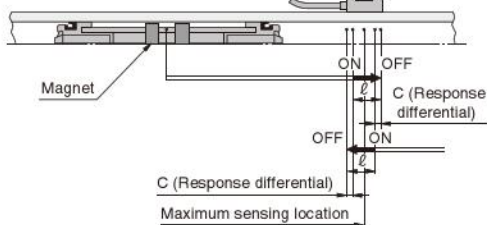
## Sensor Switch Operating Range, Response Differential, and Maximum Sensing Location

### ● Operating range: $\ell$

The distance the piston travels in one direction, while the switch is in the ON position.

### ● Response differential: C

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



| Bore size<br>mm [in.] | ZG530□, ZG553□            |                        |                           | CS□M□                  |                        |                           |
|-----------------------|---------------------------|------------------------|---------------------------|------------------------|------------------------|---------------------------|
|                       | Operating range           | Response differential  | Maximum sensing location* | Operating range        | Response differential  | Maximum sensing location* |
| 16 [0.630]            | 3.3~5.5<br>[0.130~0.217]  | 0.6 [0.024]<br>or less | 11<br>[0.433]             | 9~11<br>[0.35~0.43]    | 1.5 [0.059]<br>or less | 11<br>[0.433]             |
| 20 [0.787]            | 3.8~6.4<br>[0.150~0.252]  | 0.7 [0.028]<br>or less |                           | 10~14<br>[0.39~0.55]   | 1.5 [0.059]<br>or less |                           |
| 25 [0.984]            | 4.1~6.9<br>[0.161~0.272]  | 0.7 [0.028]<br>or less |                           | 13~15<br>[0.51~0.59]   | 1.5 [0.059]<br>or less |                           |
| 32 [1.260]            | 5.0~8.3<br>[0.197~0.327]  | 0.8 [0.031]<br>or less |                           | 15~21<br>[0.59~0.83]   | 2 [0.079]<br>or less   |                           |
| 40 [1.575]            | 6.5~10.9<br>[0.256~0.429] | 0.8 [0.031]<br>or less |                           | 15~24<br>[0.59~0.94]   | 2.5 [0.098]<br>or less |                           |
| 50 [1.969]            | 8.2~13.6<br>[0.323~0.535] | 1.0 [0.039]<br>or less | 20~28<br>[0.79~1.10]      | 2.5 [0.098]<br>or less |                        |                           |

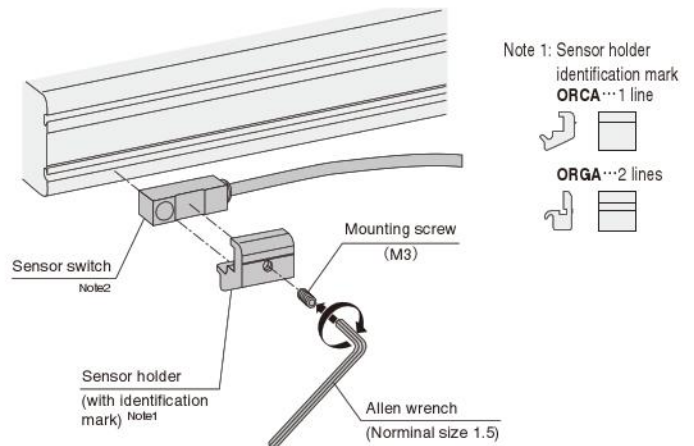
Remark: Values in the above table are reference values.

※: This is the length measured from the switch's opposite end side to the lead wire.

Note: Take note when installing a sensor switch in the middle of a stroke, because when the piston speed is fast, the switch is ON for a short time, and such as relays may not respond.

$$\text{ON time [ms]} = (\text{operating range [mm]} / \text{piston speed [mm/s]}) \times 10^3$$

## Moving Sensor Switch

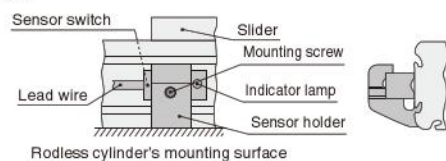


The sensor switch can be moved in the direction of the stroke by loosening the mounting screw of the sensor holder with an Allen wrench.

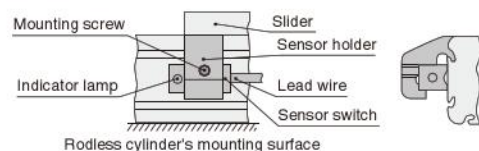
(Tightening torque 0.2N·m [1.8in·lbf])

Note 2: Pull out the lead wire as follows when you install a solid state type sensor switch on ORCA16, 20, 25.

- Install the sensor holder upward when you pull out the lead wire to the left.



- Install the sensor holder downward when you pull out the lead wire to the right.

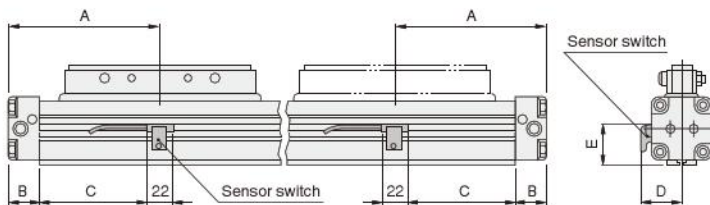


## Dimensions and Mounting Location of Sensor Switch

When the sensor switch is mounted in the locations shown below, the magnet comes to the maximum sensing location of the sensor switch at the end of the stroke.

 ORCA-SW1  
ORCA-SW2  
ORGA-SW1  
ORGA-SW2

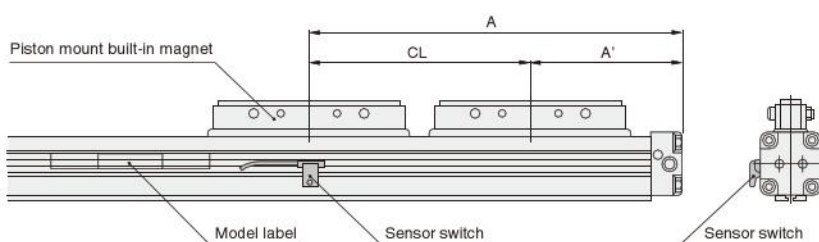
### ● ORCA basic type, ORGA



|               |             | mm [in.]   |             |              |            |   |
|---------------|-------------|------------|-------------|--------------|------------|---|
| Bore mm [in.] | Code        | A          | B           | C            | D          | E |
| 16 [0.630]    | 65 [2.560]  | 15 [0.591] | 39 [1.535]  | 24.5 [0.965] | 20 [0.787] |   |
| 20 [0.787]    | 80 [3.150]  | 19 [0.748] | 50 [1.969]  | 28 [1.102]   | 24 [0.945] |   |
| 25 [0.984]    | 100 [3.937] | 23 [0.906] | 66 [2.598]  | 30 [1.181]   | 28 [1.102] |   |
| 32 [1.260]    | 125 [4.921] | 27 [1.063] | 87 [3.425]  | 34 [1.339]   | 36 [1.417] |   |
| 40 [1.575]    | 150 [5.906] | 30 [1.181] | 109 [4.291] | 39 [1.535]   | 41 [1.614] |   |
| 50 [1.969]    | 160 [6.299] | 32 [1.260] | 117 [4.606] | 45 [1.772]   | 46 [1.811] |   |

|               |             | mm [in.]   |             |              |              |   |
|---------------|-------------|------------|-------------|--------------|--------------|---|
| Bore mm [in.] | Code        | A          | B           | C            | D            | E |
| 16 [0.630]    | 65 [2.560]  | 15 [0.591] | 39 [1.535]  | 22 [0.866]   | 17.5 [0.689] |   |
| 20 [0.787]    | 80 [3.150]  | 19 [0.748] | 50 [1.969]  | 25.5 [1.004] | 22.5 [0.886] |   |
| 25 [0.984]    | 100 [3.937] | 23 [0.906] | 66 [2.598]  | 29 [1.142]   | 24.5 [0.965] |   |
| 32 [1.260]    | 125 [4.921] | 27 [1.063] | 87 [3.425]  | 35 [1.378]   | 33.5 [1.319] |   |
| 40 [1.575]    | 150 [5.906] | 30 [1.181] | 109 [4.291] | 39 [1.535]   | 35.5 [1.398] |   |
| 50 [1.969]    | 160 [6.299] | 32 [1.260] | 117 [4.606] | 45 [1.772]   | 43.5 [1.713] |   |

### ● ORCA dual piston type



|               |            | mm [in.]           |    |
|---------------|------------|--------------------|----|
| Bore mm [in.] | Code       | CL <sup>Note</sup> | A' |
| 32 [1.260]    | 180 [7.09] | 305 [12.01]        |    |
| 40 [1.575]    | 220 [8.66] | 370 [14.57]        |    |
| 50 [1.969]    | 240 [9.45] | 400 [15.75]        |    |

Note: The dimension CL shows the minimum case value.

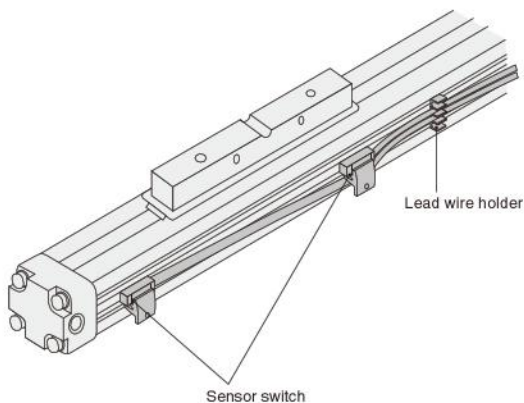
### ● Lead wire holder

One lead wire holder for ORCA is included.

Use it as shown below.

It can also be ordered separately.

Order code: **LH-ORCA**  (5 pcs./set)



# Handling Instructions and Precautions

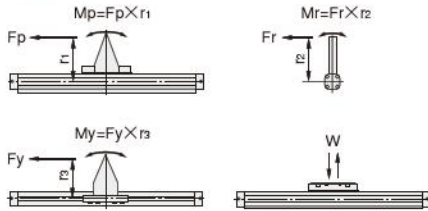


## Selection and Mounting

### Allowable load and moment

Although the slit type rodless cylinders ORCA, ORGA series can be used with directly applying loads, make sure that the load and moment do not exceed the values in the table below.

#### ● ORCA



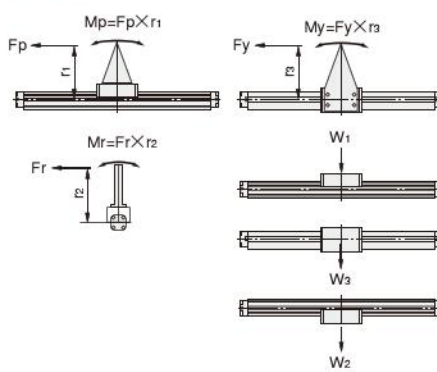
**Pitching moment :**  $M_p = F_p \times r_1$  [N·m]  
**Rolling moment :**  $M_r = F_r \times r_2$  [N·m]  
**Yawing moment :**  $M_y = F_y \times r_3$  [N·m]  
**Maximum load capacity :**  $W$  [N]

| Bore size<br>mm [in.] | Standard specification |                       |                       |                   |
|-----------------------|------------------------|-----------------------|-----------------------|-------------------|
|                       | $M_p$<br>N·m [ft·lbf]  | $M_r$<br>N·m [ft·lbf] | $M_y$<br>N·m [ft·lbf] | $W$<br>N [lbf.]   |
| 16 [0.630]            | 3.9<br>[2.9]           | 0.3<br>[0.2]          | 0.5<br>[0.4]          | 117<br>[26.3]     |
| 20 [0.787]            | 7.8<br>[5.8]           | 0.8<br>[0.6]          | 1.2<br>[0.9]          | 196.1<br>[44.1]   |
| 25 [0.984]            | 14.7<br>[10.8]         | 1.0<br>[0.7]          | 2.0<br>[1.5]          | 294.2<br>[66.1]   |
| 32 [1.260]            | 29.4<br>[21.7]         | 2.0<br>[1.5]          | 4.9<br>[3.6]          | 490.3<br>[110.2]  |
| 40 [1.575]            | 58.8<br>[43.4]         | 3.9<br>[2.9]          | 7.8<br>[5.8]          | 735.5<br>[165.3]  |
| 50 [1.969]            | 112.8<br>[83.2]        | 6.9<br>[5.1]          | 14.7<br>[10.8]        | 1176.8<br>[264.5] |

| Bore size<br>mm [in.] | Dual piston specification |                       |                       |                 |
|-----------------------|---------------------------|-----------------------|-----------------------|-----------------|
|                       | $M_p$<br>N·m [ft·lbf]     | $M_r$<br>N·m [ft·lbf] | $M_y$<br>N·m [ft·lbf] | $W$<br>N [lbf.] |
| 16 [0.630]            | 7.8<br>[5.8]              | 0.6<br>[0.4]          | 1.5<br>[1.1]          | 235<br>[52.8]   |
| 20 [0.787]            | 15.7<br>[11.6]            | 1.6<br>[1.2]          | 3.5<br>[2.6]          | 392<br>[88.1]   |
| 25 [0.984]            | 29.4<br>[21.7]            | 2.0<br>[1.5]          | 5.9<br>[4.4]          | 588<br>[132.2]  |
| 32 [1.260]            | 58.8<br>[43.4]            | 3.9<br>[2.9]          | 14.7<br>[10.8]        | 981<br>[220.5]  |
| 40 [1.575]            | 117.7<br>[86.8]           | 7.8<br>[5.8]          | 23.5<br>[17.3]        | 1471<br>[330.7] |
| 50 [1.969]            | 225.6<br>[166.4]          | 13.7<br>[10.1]        | 44.1<br>[32.5]        | 2354<br>[529.2] |

**Remark :** The rolling angle (inclined angle) of the piston mount, when the allowable rolling moment is applied, is as follows, for both sides together.  $\phi$  16 [0.630in.]: within about 3°,  $\phi$  20 [0.787in.]: within about 3°,  $\phi$  25, 32 [0.984, 1.260in.]: within about 1.5°,  $\phi$  40 [1.575in.]: within about 1°,  $\phi$  50 [1.969in.]: within about 1°

#### ● ORGA



**Pitching moment :**  $M_p = F_p \times r_1$  [N·m]  
**Rolling moment :**  $M_r = F_r \times r_2$  [N·m]  
**Yawing moment :**  $M_y = F_y \times r_3$  [N·m]  
**Maximum load capacity :**  $W_1, W_2, W_3$  [N]

| Bore size<br>mm [in.] | $M_p$<br>N·m [ft·lbf] | $M_r$<br>N·m [ft·lbf] | $M_y$<br>N·m [ft·lbf] | $W_1$<br>N [lbf.] | $W_2$<br>N [lbf.] | $W_3$<br>N [lbf.] |
|-----------------------|-----------------------|-----------------------|-----------------------|-------------------|-------------------|-------------------|
| 16 [0.630]            | 3.9<br>[2.9]          | 1.5<br>[1.1]          | 0.5<br>[0.4]          | 78.5<br>[17.6]    | 39.2<br>[8.8]     | 11.8<br>[2.7]     |
| 20 [0.787]            | 7.8<br>[5.8]          | 3.9<br>[2.9]          | 1.2<br>[0.9]          | 137.3<br>[30.9]   | 68.6<br>[15.4]    | 19.6<br>[4.4]     |
| 25 [0.984]            | 14.7<br>[10.8]        | 4.9<br>[3.6]          | 2.0<br>[1.5]          | 196.1<br>[44.1]   | 98.1<br>[22.1]    | 29.4<br>[6.6]     |
| 32 [1.260]            | 29.4<br>[21.7]        | 9.8<br>[7.2]          | 4.9<br>[3.6]          | 313.8<br>[70.5]   | 156.9<br>[35.3]   | 47.1<br>[10.6]    |
| 40 [1.575]            | 58.8<br>[43.4]        | 19.6<br>[14.5]        | 7.8<br>[5.8]          | 490.3<br>[110.2]  | 245.2<br>[55.1]   | 73.5<br>[16.5]    |
| 50 [1.969]            | 112.8<br>[83.2]       | 34.3<br>[25.3]        | 14.7<br>[10.8]        | 784.5<br>[176.4]  | 392.3<br>[88.2]   | 117.7<br>[26.5]   |

**Remark :** The rolling angle (inclined angle) of the slider, when the allowable rolling moment is applied, is as follows, for both sides together.  $\phi$  16 [0.630in.]: within about 3°,  $\phi$  20 [0.787in.]: within about 3°,  $\phi$  25, 32 [0.984, 1.260in.]: within about 1.5°,  $\phi$  40 [1.575in.]: within about 1°,  $\phi$  50 [1.969in.]: within about 1°

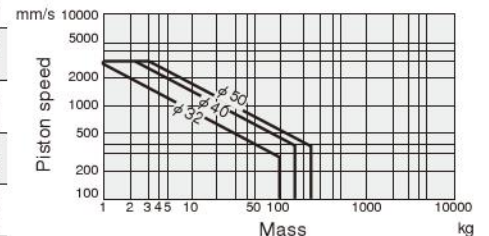
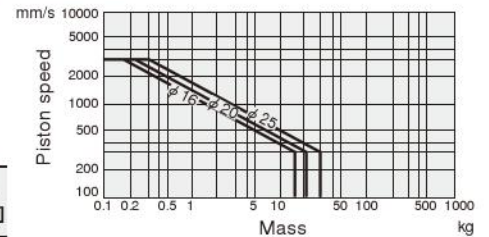
- Cautions:**
- The moment including the inertial force generated when the load is moved or stopped must not exceed the values in the above table. For the mass and the piston speed, see the [Cushioning capacity].
  - Rolling moment:  $M_r$  should not be applied as much as possible.

### Cushioning capacity

While variable cushions are standard equipment on all slit type rodless cylinders, keep the maximum mass and speed within the ranges shown in the graph below. If load and speed exceed the ranges, install an external shock absorber, etc., to absorb the shock.

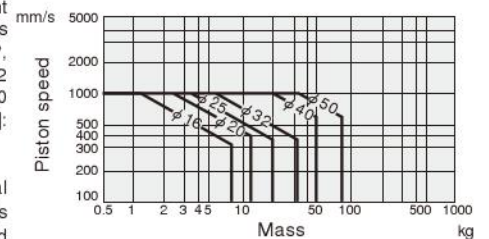
| Cushion stroke |                | mm [in.] |
|----------------|----------------|----------|
| Bore size      | Cushion stroke |          |
| 16 [0.630]     | 15 [0.591]     |          |
| 20 [0.787]     | 18 [0.709]     |          |
| 25 [0.984]     | 21 [0.827]     |          |
| 32 [1.260]     | 26 [1.024]     |          |
| 40 [1.575]     | 40 [1.575]     |          |
| 50 [1.969]     | 40 [1.575]     |          |

#### ● ORCA



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

#### ● ORGA



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

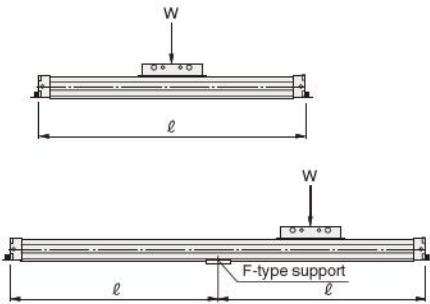
- Cautions:**
- For the maximum operating speed, see the specifications table. (ORCA series: p.1077; ORGA series: p.1088). Consult us when you exceed the values indicated in the specification tables.
  - The mass shown in the graph is the total mass carried by the rodless cylinder.
  - Adjust cushions according to the piston speed and the mass, and absorb the impacts effectively.

**Support**

A long stroke and large load may cause deflection in the cylinder body. In this case, it is also necessary to support the intermediate position so that the support span:  $\ell$  is below the graph, as shown in the tables below. The intermediate portion can be easily supported by installing the necessary number of F- or G-type supports to the cylinder body.

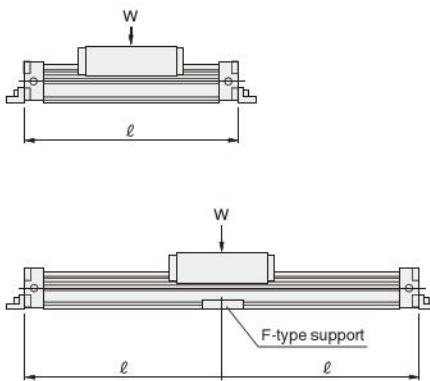
**●ORCA** mm [in.]

| Bore size         | Support span: $\ell$   |                           |
|-------------------|------------------------|---------------------------|
|                   | Standard specification | Dual piston specification |
| <b>16 [0.630]</b> | Stroke+130 [5.12]      | Stroke+215 [8.46]         |
| <b>20 [0.787]</b> | Stroke+160 [6.30]      | Stroke+265 [10.43]        |
| <b>25 [0.984]</b> | Stroke+200 [7.87]      | Stroke+335 [13.19]        |
| <b>32 [1.260]</b> | Stroke+250 [9.84]      | Stroke+430 [16.93]        |
| <b>40 [1.575]</b> | Stroke+300 [11.81]     | Stroke+520 [20.47]        |
| <b>50 [1.969]</b> | Stroke+320 [12.60]     | Stroke+560 [22.05]        |



**●ORGA** mm [in.]

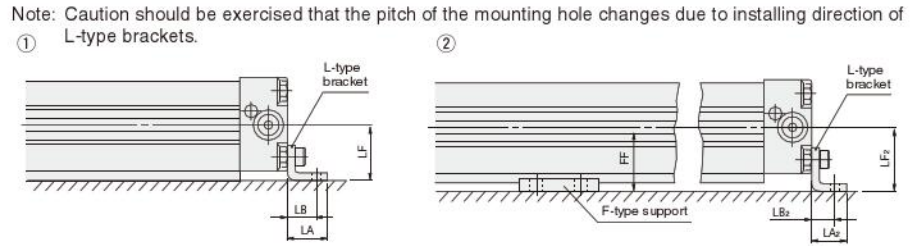
| Bore size         | Support span: $\ell$ |
|-------------------|----------------------|
| <b>16 [0.630]</b> | Stroke+130 [5.12]    |
| <b>20 [0.787]</b> | Stroke+160 [6.30]    |
| <b>25 [0.984]</b> | Stroke+200 [7.87]    |
| <b>32 [1.260]</b> | Stroke+250 [9.84]    |
| <b>40 [1.575]</b> | Stroke+300 [11.81]   |
| <b>50 [1.969]</b> | Stroke+320 [12.60]   |



Note: Do not install sensor switches in place on the cylinder that will interfere with the F-type support in the ORGA series.

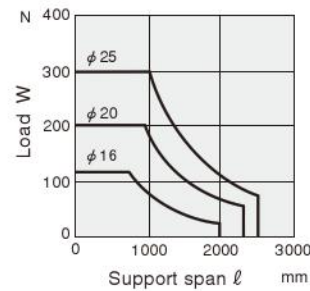
**Precaution when using F-type support and L-type bracket for ORCA simultaneously**

When L-type brackets are installed together with F-type supports, and the L-type brackets are used as shown in the diagram ① below, the cylinder installation position becomes low, and the F-type supports cannot go in. L-type brackets should be used as shown in the diagram ② below so the distance becomes  $FF=LF_2$ .

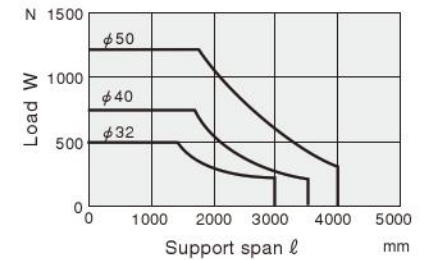


| Bore size [mm]    | Code | FF          | LF        | LF <sub>2</sub> | LA        | LA <sub>2</sub> | LB        | LB <sub>2</sub> |
|-------------------|------|-------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|
| <b>16 [0.630]</b> |      | 19 [0.75]   | 15 [0.59] | 19 [0.75]       | 14 [0.55] | 10 [0.39]       | 10 [0.39] | 6 [0.24]        |
| <b>20 [0.787]</b> |      | 25 [0.98]   | 19 [0.75] | 25 [0.98]       | 18 [0.71] | 13 [0.51]       | 13 [0.51] | 7 [0.28]        |
| <b>25 [0.984]</b> |      | 29.5 [1.16] | 22 [0.87] | 29.5 [1.16]     | 22 [0.87] | 16 [0.63]       | 16 [0.63] | 8.5 [0.33]      |
| <b>32 [1.260]</b> |      | 36 [1.42]   | 30 [1.18] | 36 [1.42]       | 26 [1.02] | 20 [0.79]       | 18 [0.71] | 12 [0.47]       |
| <b>40 [1.575]</b> |      | 39 [1.54]   | 35 [1.38] | 39 [1.54]       | 26 [1.02] | 22 [0.87]       | 18 [0.71] | 14 [0.55]       |
| <b>50 [1.969]</b> |      | 48 [1.89]   | 40 [1.57] | 48 [1.89]       | 32 [1.26] | 24 [0.94]       | 22 [0.87] | 14 [0.55]       |

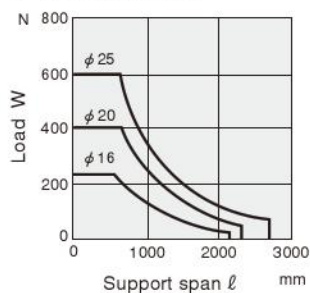
**●ORCA16, 20, 25**



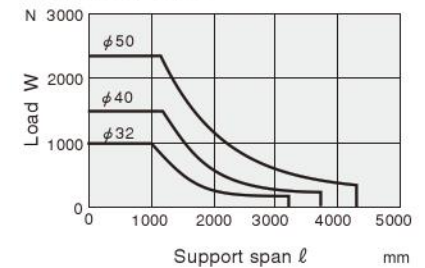
**●ORCA32, 40, 50**



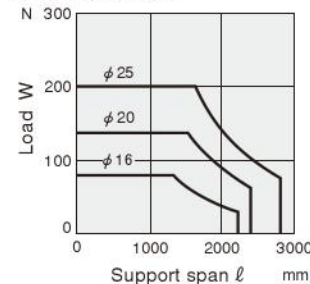
**●ORCAD16, 20, 25**



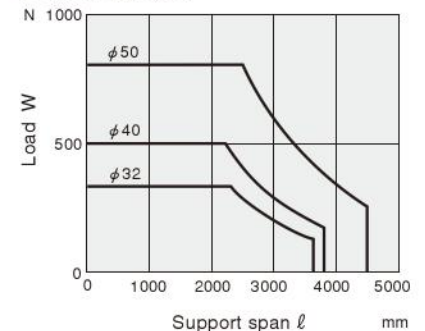
**●ORCAD32, 40, 50**



**●ORGA16, 20, 25**



**●ORGA32, 40, 50**



1N = 0.2248lbf. 1mm = 0.0394in.

# Handling Instructions and Precautions

## Mounting

1. While any mounting direction is allowed, mount the piston yoke so that it faces downward, or protect the seal band with a cover, etc., when mounting in locations subject to dripping water or oil, etc., or to large amounts of dust.
2. Avoid any electric welding either during or after mounting the rodless cylinder. Flows of welding current to the cylinder could generate arcs that result in damage or depositions.

**Caution:** Avoid applying strong shocks to the cylinder body's slit portion.

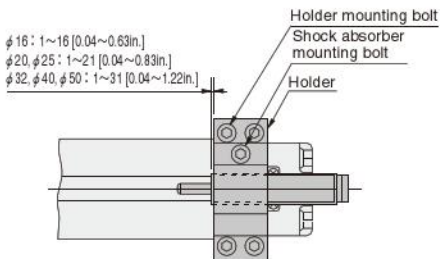
## Intermediate stop control

Since for structural reasons external air leakage is inevitable for the slit type rodless cylinders, use of all port block 3-position valves, etc., for intermediate stop control could result in failure to maintain the stopping position, and the piston speed could not be controlled when restarting. We recommend, therefore, double-sided pressure control circuits that use PAB-connection 3-position valves, etc. For intermediate stopping control under constant loads, such as vertical mountings, consult us.

## Stroke adjustment

### ● When using with a shock absorber

When using with a shock absorber, the stroke can be easily adjusted over entire cylinder strokes. First, all 4 holder mounting bolts should be loosened and move the holder so that the stroke should be roughly determined. Then tighten the holder mounting bolts to secure the holder. Next, loosen the shock absorber mounting bolt, then finely adjust the shock absorber mounting location by rotating the shock absorber body by hand or with a wrench. After adjustment, tighten the shock absorber mounting bolt and secure the shock absorber. The stroke can be adjusted in the range of  $\phi 16$  [0.630in.]: 15mm [0.59in.] on one side,  $\phi 20$  [0.787in.],  $\phi 25$  [0.984in.]: 20mm [0.79in.] on one side,  $\phi 32$  [1.260in.],  $\phi 40$  [1.575in.],  $\phi 50$  [1.969in.]: 30mm [1.18in.] on one side. When adjustments are required for over this range, the holder should be moved. If a shock absorber is used with an variable cushion, it might rebound. When it is required to stop at the end of the stroke using a shock absorber, the adjusting cushion needle should be fully opened.



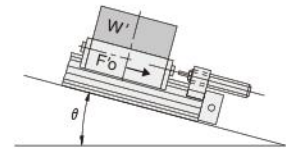
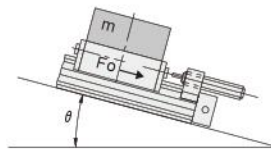
## Calculation of impact energy

| Horizontal Impact                                       |  |
|---|--|
|   |  |
| $E = E_1 + E_2$ $= \frac{m \cdot v^2}{2} + F_0 \cdot L$ | $E' = E'_1 + E'_2$ $= \frac{W' \cdot v'^2}{2g'} + F'_0 \cdot L'$ |

| Vertical Impact <sup>Note 1</sup>   |   |   |   |
|---|---|---|---|
| When descending <sup>Note 2</sup>   |   | When ascending  |   |
|   |   |   |   |
| $E = E_1 + E_2 + E_3$ $= \frac{m \cdot v^2}{2} + F_0 \cdot L + m \cdot g \cdot L$ | $E' = E'_1 + E'_2 + E'_3$ $= \frac{W' \cdot v'^2}{2g'} + F'_0 \cdot L' + W' \cdot L'$ | $E = E_1 + E_2 - E_3$ $= \frac{m \cdot v^2}{2} + F_0 \cdot L - m \cdot g \cdot L$ | $E' = E'_1 + E'_2 - E'_3$ $= \frac{W' \cdot v'^2}{2g'} + F'_0 \cdot L' - W' \cdot L'$ |

Note 1: For impact on incline,  $E_3$  becomes  $E'_3 = m \cdot g \cdot L \cdot \sin \theta$ .

Note 1: For impact on incline,  $E'_3$  becomes  $E''_3 = W' \cdot L' \cdot \sin \theta$ .



Note 2: When descending, the operating air pressure: P, should be lower than when ascending, because heavier loads can be carried.

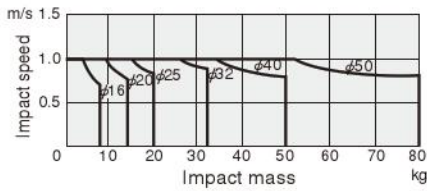
- E : Total impact energy ... [J]
- $E_1$  : Kinetic energy ...  $\frac{m \cdot v^2}{2}$  [J]
- $E_2$  : Additional energy by cylinder thrust ...  $F_0 \cdot L$  [J]
- $E_3$  : Additional energy by load mass ...  $m \cdot g \cdot L$  [J]
- m : Load mass [kg]
- v : Impact speed [m/s]
- g : Gravity acceleration 9.8 [m/s<sup>2</sup>]
- $F_0$  : Cylinder thrust ...  $= \frac{\pi}{4} \cdot D^2 \cdot P$  [N]
- [D: Cylinder bore (mm) P: Operating air pressure (MPa)]
- L : Absorbing stroke of shock absorber [m]

Note 2: When descending, the operating air pressure: P', should be lower than when ascending, because heavier loads can be carried.

- E' : Total impact energy ... [ft·lbf]
- $E'_1$  : Kinetic energy ...  $\frac{W' \cdot v'^2}{2g'}$  [ft·lbf]
- $E'_2$  : Additional energy by cylinder thrust ...  $F'_0 \cdot L'$  [ft·lbf]
- $E'_3$  : Additional energy by load weight ...  $W' \cdot L'$  [ft·lbf]
- W' : Load weight [lbf]
- v' : Impact speed [ft./sec.]
- g' : Gravity acceleration 32.2 [ft./sec.]
- $F'_0$  : Cylinder thrust ...  $= \frac{\pi}{4} \cdot D'^2 \cdot P'$  [lbf]
- [D': Cylinder bore [in.] P': Operating air pressure [psi.]]
- L' : Absorbing stroke of shock absorber [ft.]

## Impact speed and mass of impact object

Graph of the impact speed and mass of impact object



Remark: Horizontal impact

The air pressure is 0.5MPa [73psi.], and a shock absorber is used.

1m/s = 3.28ft./sec. 1kg = 2.205lb.

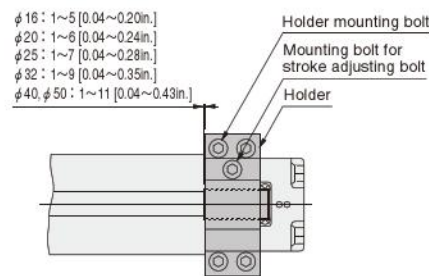
- Cautions:**
1. Tighten the 4 holder mounting bolts equally so that the striker evenly hits the front surface of the shock absorber.
  2. Use the shock absorber within the range of the specifications.
  3. Set the load so that the impact energy does not exceed the maximum absorption of the shock absorber.
  4. The maximum impact speed to the optional shock absorber is 1000mm/s [39.4in./sec.].
  5. The speed at the moment of impact with the shock absorber should not exceed 1000mm/s [39.4in./sec.]. Care should be taken that this is likely to greatly differ from the average speed of the cylinder.
  6. If using in locations subject to dripping water, dripping oil, etc., or to large amounts of dust, use a cover to protect the unit. Oil, water or dust on the shock absorber rod can reduce the life of the shock absorber.
  7. Do not loosen or remove the screw on the rear end of the shock absorber. Oil sealed inside will leak, damaging the shock absorber function.

## When using with a stroke adjusting bolt

When using with a stroke adjusting bolt, fine adjustment of the stroke can be made at the end of the stroke. Loosen the mounting bolt for stroke adjusting bolt, then finely adjust the stroke by rotating the stroke adjusting bolt, and after adjustment, tighten the mounting bolt for stroke adjusting bolt and secure the stroke adjusting bolt.

### Stroke adjusting range of stroke adjusting bolt

| Bore size             | Stroke adjusting range (one side) mm [in.] |
|-----------------------|--|
| 16 [0.630]            | 4 [0.16]                                   |
| 20 [0.787]            | 5 [0.20]                                   |
| 25 [0.984]            | 6 [0.24]                                   |
| 32 [1.260]            | 8 [0.32]                                   |
| 40, 50 [1.575, 1.969] | 10 [0.39]                                  |



### Tightening torque of the holder mounting bolt

| Bore size mm [in.] | Tightening torque N-cm [in.-lbf] |
|--------------------|----------------------------------|
| 16 [0.630]         | 117.7 [10.4]                     |
| 20 [0.787]         | 274.6 [24.3]                     |
| 25 [0.984]         | 588.4 [52.1]                     |
| 32 [1.260]         | 980.7 [86.8]                     |
| 40 [1.575]         | 1961.3 [173.6]                   |
| 50 [1.969]         | 3922.7 [347.2]                   |

- Cautions:**
1. Stroke adjustment should not be done by moving the holder. Use the holder with a shock absorber when over a wide range stroke adjustment is required.
  2. The cushion stroke is shortened when finely adjust the stroke, and the shock absorption of the variable cushion decreases. The cushion capacity decreases by about 30% when the stroke adjustment is maximized.



## General precautions

### Piping

Always thoroughly blow off (use compressed air) the tubing before connecting it to the slit type rodless cylinder. Entering chips, sealing tape, rust, etc., generated during piping work could result in air leaks or other defective operation.

### Atmosphere

1. If using in locations subject to dripping water, dripping oil, etc., or to large amounts of dust, the band may break or the life of the seals could be shortened. Use a cover to protect the unit or mount with the piston yoke facing downward.
2. Do not engage in electric welding close to the rodless cylinder. The welding spatters could damage the outer seal band.
3. 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.

### Lubrication

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

### Media

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

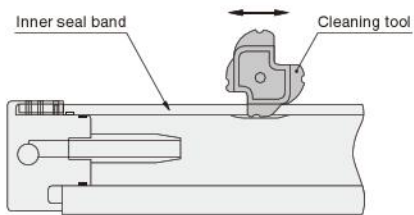
## Handling Instructions and Precautions

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### Maintenance

The rodless cylinders **ORCA**, **ORGA** series are structurally incapable of completely preventing air leakage to the outside. Nevertheless, particles adhering to the inner seal band are the most common cause of initial-staged air leakages, and this type of failure is easily remedied.

First, loosen the outer seal band setscrews, remove the outer seal band, and apply approx. 0.1MPa [15psi.] of air pressure to the rodless cylinder. Next, insert a cleaning tool inside the cylinder barrel slit and then, while pressing down the inner seal band and moving it along the slit, use air to blow off the particles.



- Cautions:**
1. Always use protective glasses during working.
  2. When performing maintenance, use the special cleaning tool. Use of a screwdriver or other tool could damage the inner seal band or cylinder barrel.
  3. If the above maintenance fails to stop the air leakage, follow instructions in the user's manual to perform a cylinder overhaul.