

# Multi functional support for small movements, MULTI MOUNT CYLINDERS

In addition to the directly installed side mounting type, 3 types of mounting brackets provide appropriate responses for various mounting requirements.

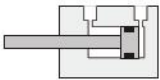
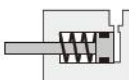
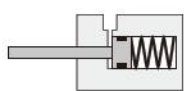
Moreover, this is a design that secures a high degree of parallel and perpendicular accuracy in relation to the piston rod axial center and mounting surface in any mounting type.

This combination of a square and compact body with mounting brackets has further broadened the degree of freedom for equipment design.

- Even while preserving the basic design of previous types, we have made overall improvements through the addition of a built-in rubber bumper and other changes.  
We have not only expanded the series but have also boosted reliability and utility.
- Even the non-rotating type is now available in the double acting type, the single acting push/pull types, and the double acting double rod type, to respond to diversified needs with high non-rotating precision by the guide pin.
- Although the 3 types of sensor switches are all compact with cross section dimensions of □4mm [0.157in.], mounting to the cylinder and adjusting the position are easy.  
Comes with a movement indicator lamp that makes it possible to monitor movement from 4 directions, providing multi functional support for small movements.

## Basic Type and Configuration

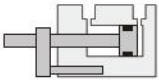
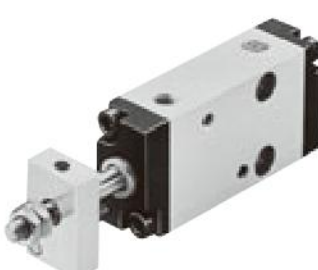
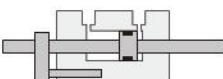
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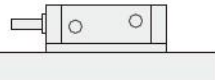
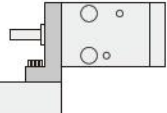
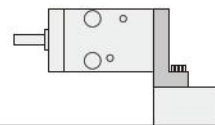
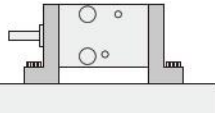
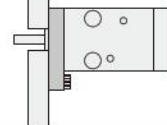
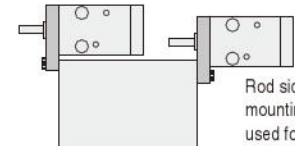
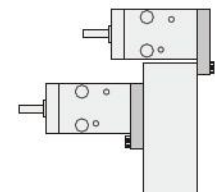
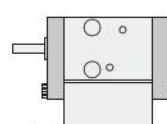
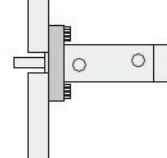
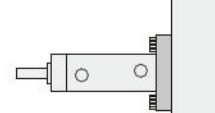
|                                                                                       |                                                                                       |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Double acting type<br>BDA                                                             |    |
|    |                                                                                       |
| Single acting push type<br>BSA                                                        |    |
|   |                                                                                       |
| Single acting pull type<br>BTA                                                        |  |
|  |                                                                                       |
| Double acting double rod type<br>BDAD                                                 |  |
|  |                                                                                       |

## Mounting Bracket Configuration and Application:

For the order codes of mounting brackets only, see p.125.

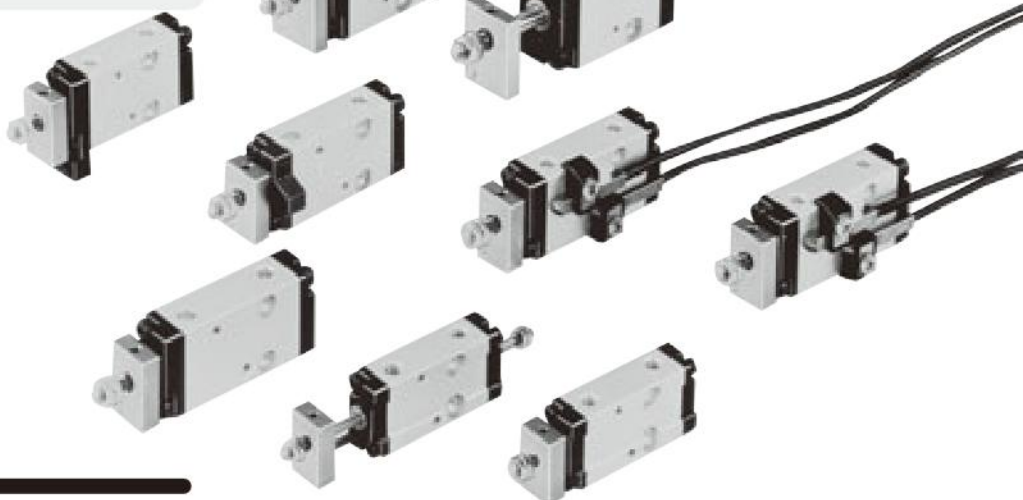
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|                                                                                     |                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Non-rotating<br>double acting type<br><b>BDAL</b>                                   |    |
|    |                                                                                     |
| Non-rotating single<br>acting push type<br><b>BSAL</b>                              |    |
|   |                                                                                     |
| Non-rotating single<br>acting pull type<br><b>BTAL</b>                              |  |
|  |                                                                                     |
| Non-rotating<br>double acting<br>double rod type<br><b>BDADL</b>                    |  |
|  |                                                                                     |

|                                                                                                                                         |                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Side mount (Standard)</b><br><br>                   | <br>Side mounting thru hole used for direct installation.                                              |
|                                                                                                                                         | <br>Plate-like spacer used for easy piston rod center adjustment.                                      |
|                                                                                                                                         | <br>Collar and counter-bore of the cylinder body used for easy piston rod center adjustment.           |
| <b>Foot A mount</b><br>Foot mounting brackets are not available for the rod sides of the non-rotating and non-rotating double rod type. | <br>Rod side foot mounting bracket used for one-side support.                                          |
|                                                        | <br>Head side foot mounting bracket used for one-side support.                                         |
|                                                                                                                                         | <br>Foot mounting bracket on both sides used for rigid mounting.                                      |
| <b>Flange A mount</b>                                                                                                                   | <br>Rod side flange mounting brackets used for panel mount.                                          |
|                                                      | <br>Rod side flange mounting brackets used for wall mount.                                           |
|                                                                                                                                         | <br>Head side flange mounting brackets used for wall mount.                                          |
|                                                                                                                                         | <br>Flange mounting brackets at both sides used for sandwich mount. (Should be adjusted at a field.) |
| <b>Flange B mount</b>                                                                                                                   | <br>Rod side flange mounting bracket used for panel mount.                                           |
|                                                      | <br>Head side flange mounting bracket used for panel mount.                                          |

# MULTI MOUNT CYLINDERS

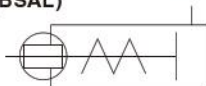
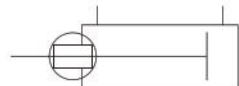
## Non-rotating Cylinders



## Symbols

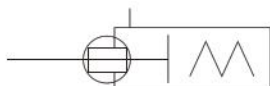
● Double acting type (BDAL)

● Single acting push type (BSAL)



● Single acting pull type (BTAL)

● Double acting double rod type (BDADL)



## Cylinder Thrust

|                       |                                    |                       |           |                                                            |                         |                |                 |                 |                  |                  | N [lbf.]         |  |
|-----------------------|------------------------------------|-----------------------|-----------|------------------------------------------------------------|-------------------------|----------------|-----------------|-----------------|------------------|------------------|------------------|--|
| Bore size<br>mm [in.] | Piston rod<br>diameter<br>mm [in.] | Operation<br>type     |           | Pressure<br>area<br>mm <sup>2</sup><br>[in. <sup>2</sup> ] | Air pressure MPa [psi.] |                |                 |                 |                  |                  |                  |  |
|                       |                                    |                       |           |                                                            | 0.1<br>[15]             | 0.2<br>[29]    | 0.3<br>[44]     | 0.4<br>[58]     | 0.5<br>[73]      | 0.6<br>[87]      | 0.7<br>[102]     |  |
| 6<br>[0.236]          | 3<br>[0.118]                       | Double<br>acting type | Push side | 28.2<br>[0.0437]                                           | —                       | 5.6<br>[1.26]  | 8.5<br>[1.91]   | 11.3<br>[2.54]  | 14.1<br>[3.17]   | 16.9<br>[3.80]   | 19.7<br>[4.43]   |  |
|                       |                                    |                       | Pull side | 21.2<br>[0.0329]                                           | —                       | 4.2<br>[0.94]  | 6.4<br>[1.44]   | 8.5<br>[1.91]   | 10.6<br>[2.38]   | 12.7<br>[2.85]   | 14.8<br>[3.33]   |  |
|                       |                                    | Single acting         | push type | 28.2<br>[0.0437]                                           | —                       | 5.6<br>[1.26]  | 8.5<br>[1.91]   | 11.3<br>[2.54]  | 14.1<br>[3.17]   | 16.9<br>[3.80]   | 19.7<br>[4.43]   |  |
|                       |                                    |                       | pull type | 21.2<br>[0.0329]                                           | —                       | —              | 6.4<br>[1.44]   | 8.5<br>[1.91]   | 10.6<br>[2.38]   | 12.7<br>[2.85]   | 14.8<br>[3.33]   |  |
| 10<br>[0.394]         | 5<br>[0.197]                       | Double<br>acting type | Push side | 78.5<br>[0.1217]                                           | 7.9<br>[1.78]           | 15.7<br>[3.53] | 23.6<br>[5.31]  | 31.4<br>[7.06]  | 39.3<br>[8.83]   | 47.1<br>[10.59]  | 55<br>[12.36]    |  |
|                       |                                    |                       | Pull side | 58.9<br>[0.0913]                                           | 5.9<br>[1.33]           | 11.8<br>[2.65] | 17.7<br>[3.98]  | 23.6<br>[5.31]  | 29.5<br>[6.63]   | 35.3<br>[7.94]   | 41.2<br>[9.26]   |  |
|                       |                                    | Single acting         | push type | 78.5<br>[0.1217]                                           | —                       | 15.7<br>[3.53] | 23.6<br>[5.31]  | 31.4<br>[7.06]  | 39.3<br>[8.83]   | 47.1<br>[10.59]  | 55<br>[12.36]    |  |
|                       |                                    |                       | pull type | 58.9<br>[0.0913]                                           | —                       | 11.8<br>[2.65] | 17.7<br>[3.98]  | 23.6<br>[5.31]  | 29.5<br>[6.63]   | 35.3<br>[7.94]   | 41.2<br>[9.26]   |  |
| 16<br>[0.630]         | 6<br>[0.236]                       | Double<br>acting type | Push side | 201<br>[0.312]                                             | 20.1<br>[4.52]          | 40.2<br>[9.04] | 60.3<br>[13.56] | 80.4<br>[18.07] | 100.5<br>[22.59] | 120.6<br>[27.11] | 140.7<br>[31.63] |  |
|                       |                                    |                       | Pull side | 172<br>[0.267]                                             | 17.2<br>[3.87]          | 34.4<br>[7.73] | 51.6<br>[11.60] | 68.8<br>[15.47] | 86<br>[19.33]    | 103.2<br>[23.20] | 120.4<br>[27.07] |  |
|                       |                                    | Single acting         | push type | 201<br>[0.312]                                             | —                       | 40.2<br>[9.04] | 60.3<br>[13.56] | 80.4<br>[18.07] | 100.5<br>[22.59] | 120.6<br>[27.11] | 140.7<br>[31.63] |  |
|                       |                                    |                       | pull type | 172<br>[0.267]                                             | —                       | 34.4<br>[7.73] | 51.6<br>[11.60] | 68.8<br>[15.47] | 86<br>[19.33]    | 103.2<br>[23.20] | 120.4<br>[27.07] |  |

Note: For the double acting double rod type, see the double acting type pull side.

## Spring Return Force (Only for Single Acting Type)

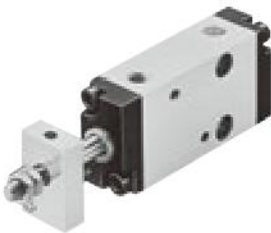
|                    |           | N [lbf.]    |             |            |               |
|--------------------|-----------|-------------|-------------|------------|---------------|
| Bore size mm [in.] | Item      | Zero stroke |             |            | End of stroke |
|                    | Stroke mm | 5           | 10          | 15         | 5, 10, 15     |
| 6 [0.236]          |           | 3.9 [0.88]  | 2.9 [0.65]  | 2.0 [0.45] | 4.9 [1.10]    |
| 10 [0.394]         |           | 6.9 [1.55]  | 4.9 [1.10]  | 2.9 [0.65] | 9.8 [2.20]    |
| 16 [0.630]         |           | 17.7 [3.98] | 13.7 [3.08] | 9.8 [2.20] | 21.6 [4.86]   |

## Specifications

|                                       |                               | Bore size mm [in.]                                                                              |                   |                   |
|---------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------|-------------------|-------------------|
| Item                                  |                               | 6 [0.236]                                                                                       | 10 [0.394]        | 16 [0.630]        |
| Media                                 |                               | Air                                                                                             |                   |                   |
| Operating pressure range MPa [psi.]   | Double acting type            | 0.2~0.7 [29~102]                                                                                | 0.15~0.7 [22~102] | 0.1~0.7 [15~102]  |
|                                       | Single acting push type       | 0.25~0.7 [36~102]                                                                               | 0.2~0.7 [29~102]  | 0.15~0.7 [22~102] |
|                                       | Single acting pull type       | 0.35~0.7 [51~102]                                                                               | 0.25~0.7 [36~102] | 0.2~0.7 [29~102]  |
|                                       | Double acting double rod type | 0.2~0.7 [29~102]                                                                                | 0.15~0.7 [22~102] | 0.1~0.7 [15~102]  |
| Proof pressure MPa [psi.]             |                               | 1.03 [149]                                                                                      |                   |                   |
| Operating temperature range °C [°F]   |                               | 0~60 [32~140]                                                                                   |                   |                   |
| Operating speed range mm/s [in./sec.] |                               | 50~500 [2.0~19.7]                                                                               |                   |                   |
| Cushion                               |                               | Rubber bumper                                                                                   |                   |                   |
| Lubrication                           |                               | Not required<br>(If lubrication is required, use Turbine Oil Class 1 [ISO VG32] or equivalent.) |                   |                   |
| Non-rotating accuracy                 |                               | ±2°                                                                                             | ±1.5°             | ±1°               |
| Port size                             |                               | M5×0.8                                                                                          |                   |                   |
| Stroke tolerance mm [in.]             |                               | +1 <sup>+</sup> <sub>0</sub> [0.039 <sup>+</sup> <sub>0</sub> ]                                 |                   |                   |

## Operation Type, Bore Size, and Stroke

|                                                    |           |                       | mm |
|----------------------------------------------------|-----------|-----------------------|----|
| Operation type                                     | Bore size | Standard strokes      |    |
| Double acting type                                 | 6         | 5, 10, 15, 20, 25, 30 |    |
|                                                    | 10        |                       |    |
|                                                    | 16        |                       |    |
| Single acting push type<br>Single acting pull type | 6         | 5, 10, 15             |    |
|                                                    | 10        |                       |    |
|                                                    | 16        |                       |    |
| Double acting double rod type                      | 6         | 5, 10, 15, 20, 25, 30 |    |
|                                                    | 10        |                       |    |
|                                                    | 16        |                       |    |

| Double acting type                                                                | Single acting push type                                                           | Single acting pull type                                                            | Double acting double rod type                                                       |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Page where dimensions are shown — 117                                             | Page where dimensions are shown — 119                                             | Page where dimensions are shown — 121                                              | Page where dimensions are shown — 123                                               |
|  |  |  |  |
| <b>BDAL</b>                                                                       | <b>BSAL</b>                                                                       | <b>BTAL</b>                                                                        | <b>BDADL</b>                                                                        |

## Mass

| g [oz.]                 |                    |           |                    |                      |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|-------------------------|--------------------|-----------|--------------------|----------------------|-----------------|---------------------------------------------------|--------|-------|--------|------------------------------|----------------|----------------|----------------------------|----------------|----------------|
| Operation type          | Bore size mm [in.] | Stroke mm | Mass of side mount |                      | Additional mass |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    |           | Standard cylinder  | Cylinder with magnet | Double rod      | With 1 sensor switch (including mounting bracket) |        |       |        | Rod side mounting bracket    |                |                | Head side mounting bracket |                |                |
|                         |                    |           |                    |                      |                 | ZC130□                                            | ZC153□ | CS5T□ | CS11T□ | Foot A <sup>Note</sup> mount | Flange A mount | Flange B mount | Foot A mount               | Flange A mount | Flange B mount |
| Double acting type      | 6<br>[0.236]       | 5         | 31 [1.09]          | 34 [1.20]            | 4 [0.14]        | 20 [0.71]                                         |        |       |        | 10 [0.35]                    | 1 [0.04]       | 1 [0.04]       | 15 [0.53]                  | 5 [0.18]       | 5 [0.18]       |
|                         |                    | 10        | 34 [1.20]          | 37 [1.31]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 15        | 37 [1.31]          | 40 [1.41]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 20        | 40 [1.41]          | 43 [1.52]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 25        | 43 [1.52]          | 46 [1.62]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 30        | 46 [1.62]          | 49 [1.73]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         | 10<br>[0.394]      | 5         | 51 [1.80]          | 57 [2.01]            | 8 [0.28]        | 20 [0.71]                                         |        |       |        | 16 [0.56]                    | 2 [0.07]       | 2 [0.07]       | 24 [0.85]                  | 8 [0.28]       | 8 [0.28]       |
|                         |                    | 10        | 55 [1.94]          | 61 [2.15]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 15        | 59 [2.08]          | 65 [2.29]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 20        | 63 [2.22]          | 69 [2.43]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 25        | 67 [2.36]          | 73 [2.57]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 30        | 71 [2.50]          | 77 [2.72]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         | 16<br>[0.630]      | 5         | 104 [3.67]         | 117 [4.13]           | 16 [0.56]       | 20 [0.71]                                         |        |       |        | 33 [1.16]                    | 4 [0.14]       | 4 [0.14]       | 53 [1.87]                  | 17 [0.60]      | 17 [0.60]      |
|                         |                    | 10        | 111 [3.92]         | 124 [4.37]           |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 15        | 118 [4.16]         | 131 [4.62]           |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 20        | 125 [4.41]         | 138 [4.87]           |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 25        | 132 [4.66]         | 145 [5.11]           |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 30        | 139 [4.90]         | 152 [5.36]           |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
| Single acting push type | 6<br>[0.236]       | 5         | 35 [1.23]          | 38 [1.34]            | —               | 20 [0.71]                                         |        |       |        | —                            | 1 [0.04]       | 1 [0.04]       | 15 [0.53]                  | 5 [0.18]       | 5 [0.18]       |
|                         |                    | 10        | 38 [1.34]          | 41 [1.45]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 15        | 41 [1.45]          | 44 [1.55]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         | 10<br>[0.394]      | 5         | 57 [2.01]          | 63 [2.22]            | —               | 20 [0.71]                                         |        |       |        | —                            | 2 [0.07]       | 2 [0.07]       | 24 [0.85]                  | 8 [0.28]       | 8 [0.28]       |
|                         |                    | 10        | 61 [2.15]          | 67 [2.36]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 15        | 65 [2.29]          | 71 [2.50]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         | 16<br>[0.630]      | 5         | 115 [4.06]         | 128 [4.51]           | —               | 20 [0.71]                                         |        |       |        | —                            | 4 [0.14]       | 4 [0.14]       | 53 [1.87]                  | 17 [0.60]      | 17 [0.60]      |
|                         |                    | 10        | 122 [4.30]         | 135 [4.76]           |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 15        | 129 [4.55]         | 142 [5.01]           |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
| Single acting pull type | 6<br>[0.236]       | 5         | 37 [1.31]          | 40 [1.41]            | —               | 20 [0.71]                                         |        |       |        | —                            | 1 [0.04]       | 1 [0.04]       | 15 [0.53]                  | 5 [0.18]       | 5 [0.18]       |
|                         |                    | 10        | 40 [1.41]          | 43 [1.52]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 15        | 43 [1.52]          | 46 [1.62]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         | 10<br>[0.394]      | 5         | 60 [2.12]          | 66 [2.33]            | —               | 20 [0.71]                                         |        |       |        | —                            | 2 [0.07]       | 2 [0.07]       | 24 [0.85]                  | 8 [0.28]       | 8 [0.28]       |
|                         |                    | 10        | 64 [2.26]          | 70 [2.47]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 15        | 68 [2.40]          | 74 [2.61]            |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         | 16<br>[0.630]      | 5         | 125 [4.41]         | 138 [4.87]           | —               | 20 [0.71]                                         |        |       |        | —                            | 4 [0.14]       | 4 [0.14]       | 53 [1.87]                  | 17 [0.60]      | 17 [0.60]      |
|                         |                    | 10        | 132 [4.66]         | 145 [5.11]           |                 |                                                   |        |       |        |                              |                |                |                            |                |                |
|                         |                    | 15        | 139 [4.90]         | 152 [5.36]           |                 |                                                   |        |       |        |                              |                |                |                            |                |                |

Note: Can be installed only on the opposite the rod side with the non-rotation plate of a double rod cylinder.

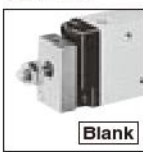
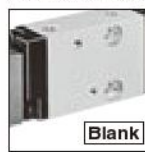
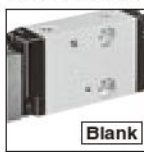
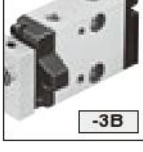
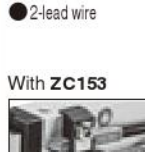
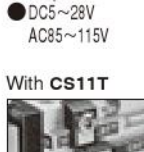
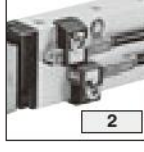
Calculation example: To add 2 sensor switches to the cylinder with magnet, double acting type BDALS10×20,

$$69 + (20 \times 2) = 109 \text{ g [3.84 oz.]}$$

Remark: There are 2 types of sensor switch lead wire lengths.

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

## Order Codes for Non-rotating Cylinders

| Cylinder specification                                                                | System (Made to order)                                                                                                                                     | Mounting type (Rod side)                                                                                                               | Sensor switch                                                                                                                                                                                       | Lead wire length                                                                                                                                                                                  | Number of Sensor switches                                                                                                     |
|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Blank:</b><br>Standard cylinder <sup>Note1</sup><br><b>S:</b> Cylinder with magnet | <b>Blank:</b><br>Standard specifications<br><b>NCU:</b><br>Non-ion specification<br>● With countermeasure for non generating copper ion<br>● Made to order | <b>Side mount</b><br> <b>Blank</b>                    | <b>No sensor switch</b><br> <b>Blank</b>                                                                           | <b>A:</b> 1000mm [39in.]<br><b>B:</b> 3000mm [118in.]                                                                                                                                             | <b>No sensor switch</b><br> <b>Blank</b>   |
|                                                                                       |                                                                                                                                                            | <b>Flange A mount</b><br> <b>-3A</b>                  | <b>With ZC130</b><br> <b>-ZC130</b><br>● Solid state type<br>● With indicator lamp<br>● DC10~28V<br>● 2-lead wire  | <b>With CS5T</b><br> <b>-CS5T</b><br>● Reed switch type<br>● Without indicator lamp<br>● DC5~28V<br>● AC85~115V | <b>With 1 sensor switch</b><br> <b>1</b>   |
|                                                                                       |                                                                                                                                                            | <b>Flange B mount</b> <sup>Note2</sup><br> <b>-3B</b> | <b>With ZC153</b><br> <b>-ZC153</b><br>● Solid state type<br>● With indicator lamp<br>● DC4.5~28V<br>● 3-lead wire | <b>With CS11T</b><br> <b>-CS11T</b><br>● Reed switch type<br>● With indicator lamp<br>● DC10~28V                | <b>With 2 sensor switches</b><br> <b>2</b> |

| Basic type                    | Bore size × Stroke | Mounting type | Sensor switch | Lead wire length                    | Number of Sensor switches |
|-------------------------------|--------------------|---------------|---------------|-------------------------------------|---------------------------|
| Double acting type            | S ×                | -NCU          | -3A<br>-3B    | -ZC130<br>-ZC153<br>-CS5T<br>-CS11T | A<br>B<br>1<br>2          |
| Single acting push type       |                    |               |               |                                     |                           |
| Single acting pull type       |                    |               |               |                                     |                           |
| Double acting double rod type |                    |               |               |                                     |                           |

Notes: 1. The magnet for the sensor switch is not built in. Always use the cylinder with magnet when using the sensor switch.  
 2. Two sensor switches cannot be mounted on a cylinder with flange B mount. Mount 1 sensor switch on the head side when the flange B mount is used on the rod side, and mount 1 sensor switch on the rod side when the flange B mount is used on the head side.

Remark: For the cylinder joint and cylinder rod end mounted on the piston rod end, see p.1568.

● See table for operation type, bore size and stroke.  
 ● Order the head side mounting bracket separately. Cannot be ordered as already assembled the mount on the cylinder.  
 ● For the order codes of mounting brackets only, see p.125.

● For the order codes of sensor switches only, see p.126.  
 ● In the 5mm [0.197in.] cylinder strokes, 1 sensor switch installation is standard for CS5T and CS11T. When mounting 2 units, use the solid state type.  
 ● For details, see p.1544.

● In the 5mm [0.197in.] cylinder strokes, 1 sensor switch is standard for the reed switch type (CS5T, CS11T).

### Additional Parts (To be ordered separately)

#### Mounting brackets



- Side mount (Head cover)
- Foot A mount
- Flange A mount
- Flange B mount
- The photographs above show head side mounting brackets.
- For the order codes, see p.125.
- Comes with 2 mounting screws.

#### Shield plate



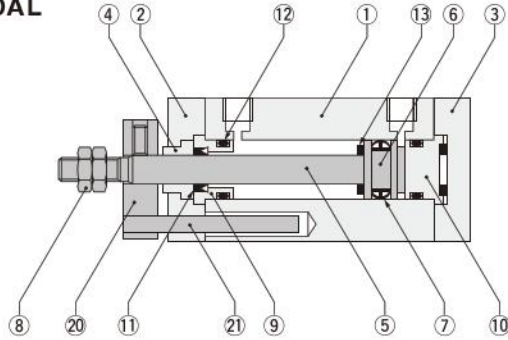
- For cylinder with magnet.
- For the order code, see p.128.
- Comes with 2 mounting screws.

### Operation Type, Bore Size, and Stroke mm

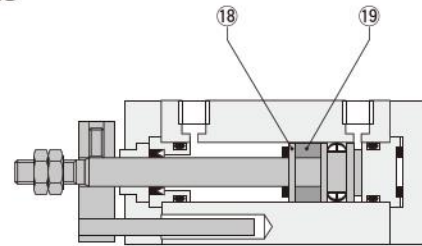
| Operation type                                     | Bore size | Standard strokes      |
|----------------------------------------------------|-----------|-----------------------|
| Double acting type                                 | 6         | 5, 10, 15, 20, 25, 30 |
|                                                    | 10        |                       |
|                                                    | 16        |                       |
| Single acting push type<br>Single acting pull type | 6         | 5, 10, 15             |
|                                                    | 10        |                       |
|                                                    | 16        |                       |
| Double acting double rod type                      | 6         | 5, 10, 15, 20, 25, 30 |
|                                                    | 10        |                       |
|                                                    | 16        |                       |

## Inner Construction and Major Parts

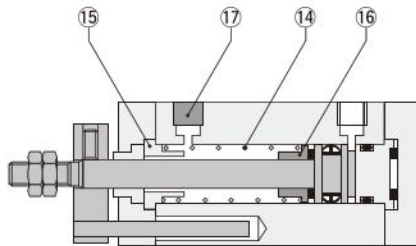
### ● Double acting type BDAL



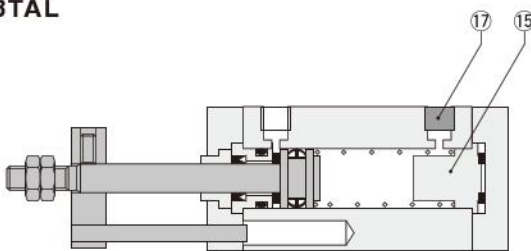
### ● Cylinder with magnet double acting type BDALS



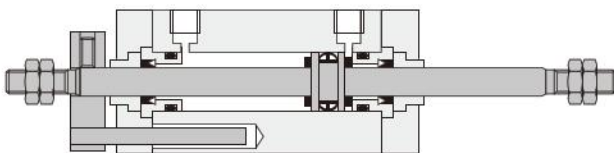
### ● Single acting push type BSAL



### ● Single acting pull type BTAL



### ● Double acting double rod type BDADL



## Major Parts and Materials

| No. | Parts                          | Materials                                                |                                 |
|-----|--------------------------------|----------------------------------------------------------|---------------------------------|
|     |                                | Standard specification                                   | Non-ion specification           |
| ①   | Body                           | Aluminum alloy (anodized)                                | ←                               |
| ②   | Rod cover <small>Note</small>  | Aluminum alloy (black anodized)                          | ←                               |
| ③   | Head cover <small>Note</small> | PBT                                                      | Aluminum alloy (black anodized) |
| ④   | Rod bushing                    | Oil impregnated bronze                                   | Special steel                   |
| ⑤   | Piston rod                     | Stainless steel                                          | ←                               |
| ⑥   | Piston                         | Brass                                                    | Aluminum                        |
| ⑦   | Piston seal                    | Synthetic rubber(NBR)                                    | ←                               |
| ⑧   | Rod end nut                    | Steel (electric nickel plated)                           | ←                               |
| ⑨   | Seal case                      | Brass                                                    | Special steel                   |
| ⑩   | Cap                            | Polyacetal                                               | ←                               |
| ⑪   | Rod seal                       | Synthetic rubber (NBR)                                   | ←                               |
| ⑫   | O-ring                         | Synthetic rubber (NBR)                                   | ←                               |
| ⑬   | Bumper                         | Urethane rubber                                          | ←                               |
| ⑭   | Spring                         | Steel (zinc plated)                                      | ←                               |
| ⑮   | Spring holder                  | Brass                                                    | Aluminum                        |
| ⑯   | Collar                         | Brass                                                    | Aluminum                        |
| ⑰   | Filter                         | Foamed metal                                             | ←                               |
| ⑱   | Support                        | Brass                                                    | Aluminum                        |
| ⑲   | Magnet                         | φ 6: Sintered alloy magnet<br>φ 10, φ 16: Plastic magnet | ←                               |
| ⑳   | Plate                          | Brass (electric nickel plated)                           | Steel (nickel plated)           |
| ㉑   | Guide pin                      | Stainless steel                                          | ←                               |

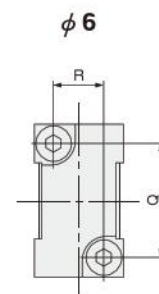
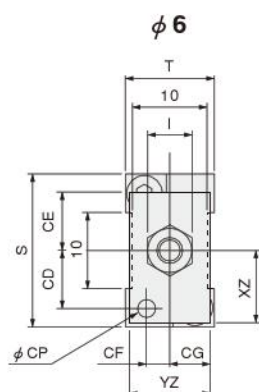
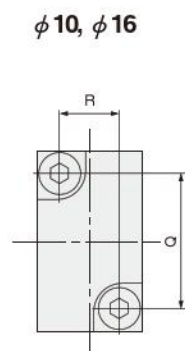
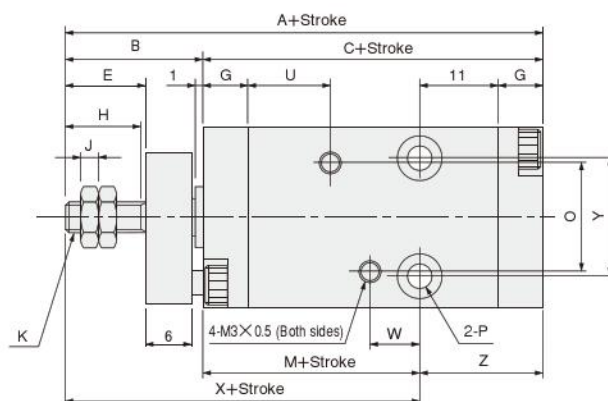
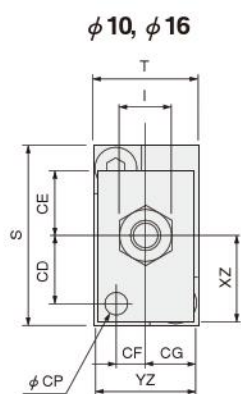
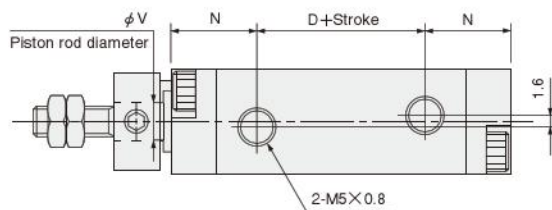
Note: Only the foot A mount is steel (black zinc plated).

## Seals

| Parts<br>Bore size<br>mm [in.] | Rod seal | Piston seal | O-ring     |
|--------------------------------|----------|-------------|------------|
| <b>6 [0.236]</b>               | NY-6×3×2 | COP-6L      | 8.4×6×1.2  |
| <b>10 [0.394]</b>              | NY-8×5×2 | COP-10L     | 10×7.6×1.2 |
| <b>16 [0.630]</b>              | NY-9×6×2 | COP-16L     | 16×13×1.5  |

## Dimensions of Non-rotating Double Acting Type (mm)

● Side mount BDAL  Bore size  ×  Stroke



| Type                     | Standard cylinder |    |   |    |    | Cylinder with magnet |    |    |    |    |    |      |   |    |     |     |        |                                  |      |    |                                                |    |    |    |    |      |   |     |    |    |
|--------------------------|-------------------|----|---|----|----|----------------------|----|----|----|----|----|------|---|----|-----|-----|--------|----------------------------------|------|----|------------------------------------------------|----|----|----|----|------|---|-----|----|----|
| Code<br>Bore<br>mm [in.] | A                 | C  | D | M  | X  | A                    | C  | D  | M  | X  | B  | E    | G | H  | I   | J   | K      | L                                | N    | O  | P                                              | Q  | R  | S  | T  | U    | V | W   | Y  | Z  |
| 6 [0.236]                | 43                | 28 | 8 | 12 | 27 | 48                   | 33 | 13 | 17 | 32 | 15 | 7.5  | 5 | 7  | 5.5 | 1.8 | M3×0.5 | 6 <sup>0</sup> <sub>-0.05</sub>  | 10   | 14 | φ 3.5 Counterbore φ 6 Depth 4.2 (Both sides)   | 15 | 7  | 20 | 12 |      | 3 |     | 12 | 16 |
| 10 [0.394]               | 48                | 30 | 7 | 13 | 31 | 53                   | 35 | 12 | 18 | 36 | 18 | 10.5 | 6 | 10 | 7   | 2.4 | M4×0.7 | 8 <sup>0</sup> <sub>-0.05</sub>  | 11.5 | 15 | φ 3.5 Counterbore φ 6 Depth 3.2 (Both sides)   | 18 | 8  | 24 | 14 | 10.5 | 5 | 6.5 | 16 | 17 |
| 16 [0.630]               | 53                | 33 | 8 | 15 | 35 | 58                   | 38 | 13 | 20 | 40 | 20 | 12.5 | 7 | 12 | 8   | 3.2 | M5×0.8 | 10 <sup>0</sup> <sub>-0.05</sub> | 12.5 | 19 | φ 4.5 Counterbore φ 7.6 Depth 4.2 (Both sides) | 25 | 12 | 33 | 20 |      | 6 | 7.5 | 24 | 18 |

| Code<br>Bore<br>mm [in.] | CD   | CE  | CF  | CG  | CP  | XZ   | YZ |
|--------------------------|------|-----|-----|-----|-----|------|----|
| 6 [0.236]                | 7.5  | 7.5 | 3.5 | 5.5 | 2.5 | 9.5  | 11 |
| 10 [0.394]               | 9    | 8.5 | 4   | 6.5 | 3   | 11.5 | 13 |
| 16 [0.630]               | 12.5 | 9   | 6   | 9.5 | 4   | 16   | 19 |

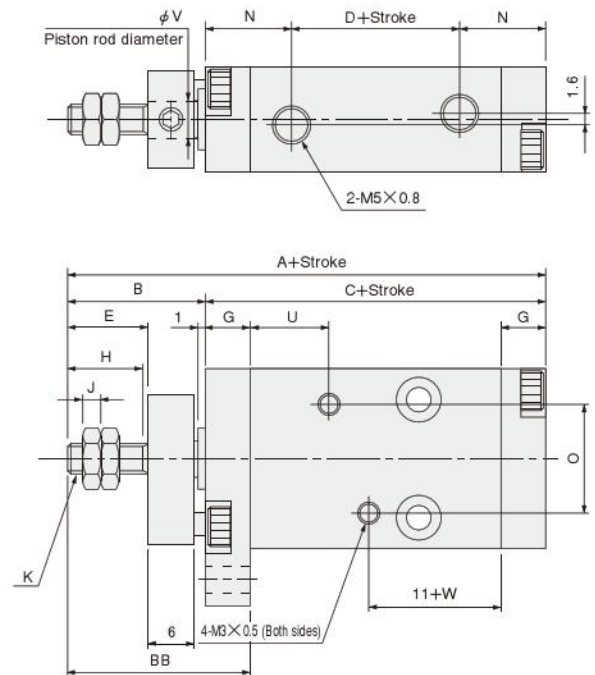
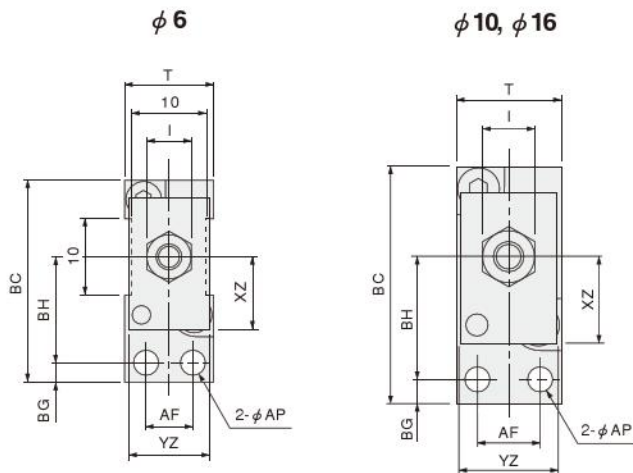
Note: The 4-M3 × 0.5 female thread (for sensor switch mounting) in the drawing should not be used for mounting the cylinder. Moreover, it is not available in the cylinder body of a standard 5mm [0.197in.] stroke cylinder.

## Dimensions of Non-rotating Double Acting Type (mm)

● Flange A mount BDAL  Bore size  × Stroke  -3A

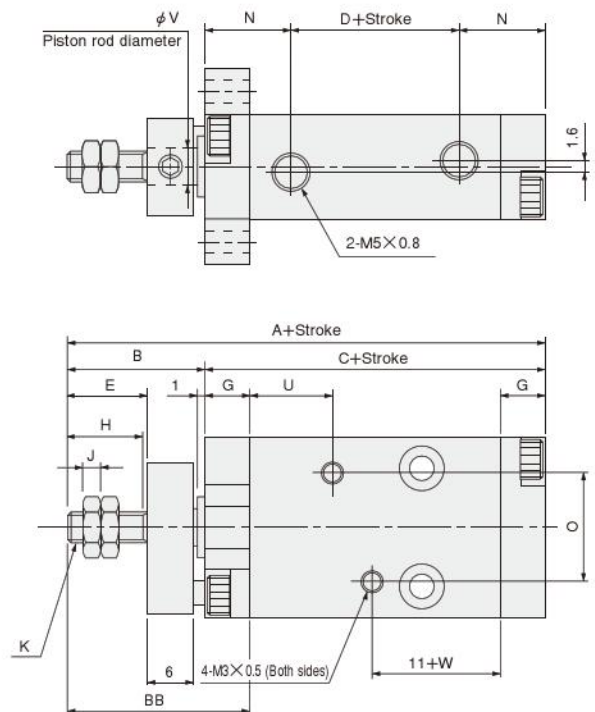
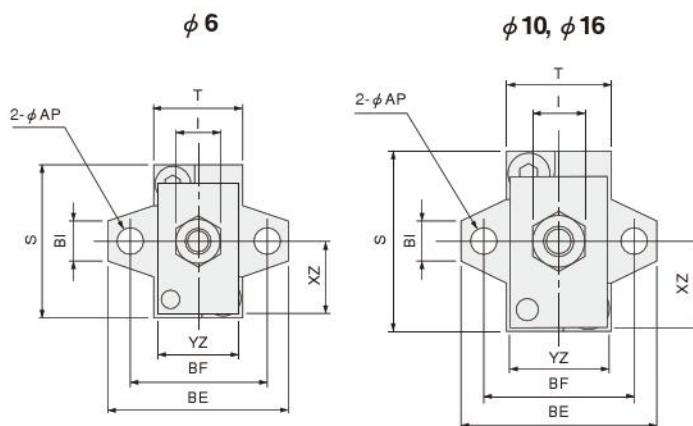
CAD BDAL-  Bore size   
MULTI-3A

MULTI MOUNT CYLINDERS



● Flange B mount BDAL  Bore size  × Stroke  -3B

CAD BDAL-  Bore size   
MULTI-3B



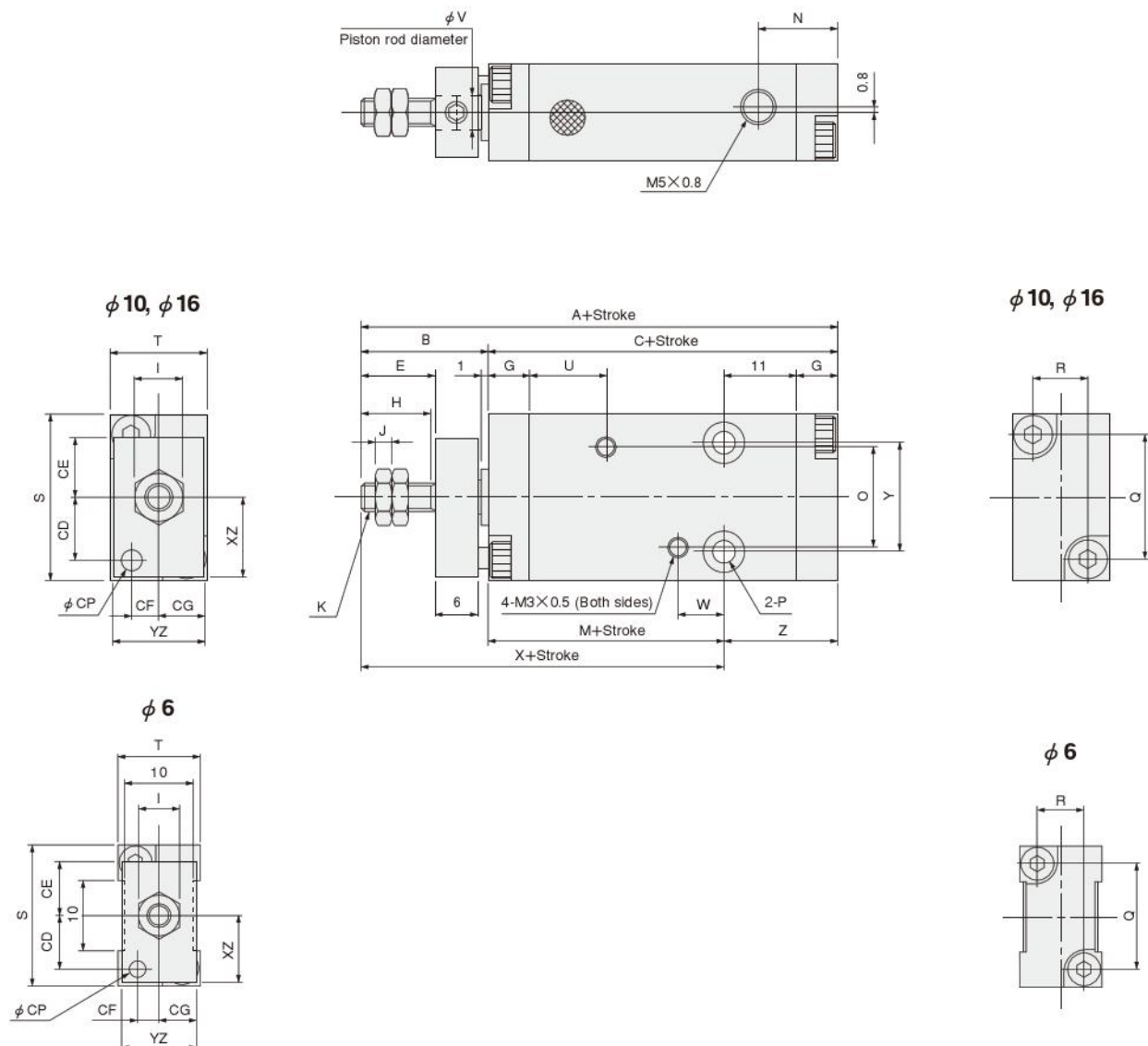
| Type             | Standard cylinder |    |   | Cylinder with magnet |    |    |    |      |   |    |     |     |        |                                  |      |    |    |    |      |   |     |    |     |    |      |    |    |     |    |    |      |    |
|------------------|-------------------|----|---|----------------------|----|----|----|------|---|----|-----|-----|--------|----------------------------------|------|----|----|----|------|---|-----|----|-----|----|------|----|----|-----|----|----|------|----|
| Code             | A                 | C  | D | A                    | C  | D  | B  | E    | G | H  | I   | J   | K      | L                                | N    | O  | S  | T  | U    | V | W   | AF | AP  | BB | BC   | BE | BF | BG  | BH | BI | XZ   | YZ |
| Bore<br>mm [in.] |                   |    |   |                      |    |    |    |      |   |    |     |     |        |                                  |      |    |    |    |      |   |     |    |     |    |      |    |    |     |    |    |      |    |
| 6 [0.236]        | 43                | 28 | 8 | 48                   | 33 | 13 | 15 | 7.5  | 5 | 7  | 5.5 | 1.8 | M3×0.5 | 6 <sup>0</sup> <sub>-0.05</sub>  | 10   | 14 | 20 | 12 | 10.5 | 3 | 6.5 | 6  | 3.5 | 20 | 27.5 | 24 | 18 | 3.5 | 14 | 5  | 9.5  | 11 |
| 10 [0.394]       | 48                | 30 | 7 | 53                   | 35 | 12 | 18 | 10.5 | 6 | 10 | 7   | 2.4 | M4×0.7 | 8 <sup>0</sup> <sub>-0.05</sub>  | 11.5 | 15 | 24 | 14 |      | 5 |     | 8  |     | 24 | 31.5 | 26 | 20 |     | 16 |    | 11.5 | 13 |
| 16 [0.630]       | 53                | 33 | 8 | 58                   | 38 | 13 | 20 | 12.5 | 7 | 12 | 8   | 3.2 | M5×0.8 | 10 <sup>0</sup> <sub>-0.05</sub> | 12.5 | 19 | 33 | 20 |      | 6 | 7.5 | 12 | 4.5 | 27 | 42   | 36 | 28 | 4.5 | 21 | 6  | 16   | 19 |

Note: The 4-M3 × 0.5 female thread (for sensor switch mounting) in the drawing should not be used for mounting the cylinder. Moreover, it is not available in the cylinder body of a standard 5mm [0.197in.] stroke cylinder.

# Dimensions of Non-rotating Single Acting Push Type (mm)

● Side mount BSAL ☐ Bore size ☐ Stroke ☐

 BSAL - ☐ Bore size

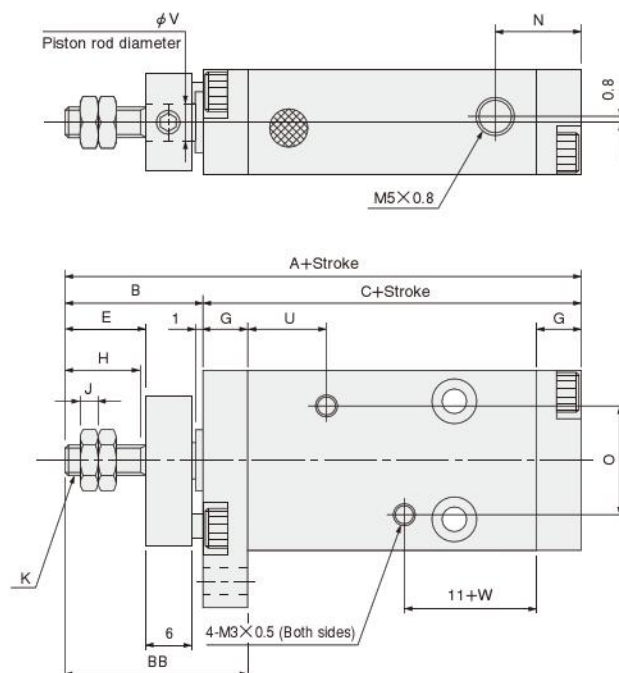


| Type             | Standard cylinder |    |    |    | Cylinder with magnet |    |    |    |    |      |   |    |     |     |        |      |    |                                               |    |    |    |    |      |   |     |    |    |
|------------------|-------------------|----|----|----|----------------------|----|----|----|----|------|---|----|-----|-----|--------|------|----|-----------------------------------------------|----|----|----|----|------|---|-----|----|----|
| Code             | A                 | C  | M  | X  | A                    | C  | M  | X  | B  | E    | G | H  | I   | J   | K      | N    | O  | P                                             | Q  | R  | S  | T  | U    | V | W   | Y  | Z  |
| Bore<br>mm [in.] |                   |    |    |    |                      |    |    |    |    |      |   |    |     |     |        |      |    |                                               |    |    |    |    |      |   |     |    |    |
| 6 [0.236]        | 48                | 33 | 17 | 32 | 53                   | 38 | 22 | 37 | 15 | 7.5  | 5 | 7  | 5.5 | 1.8 | M3×0.5 | 10   | 14 | φ 3.5 Counterbore φ 6 Depth4.2 (Both sides)   | 15 | 7  | 20 | 12 | 10.5 | 3 | 6.5 | 12 | 16 |
| 10 [0.394]       | 53                | 35 | 18 | 36 | 58                   | 40 | 23 | 41 | 18 | 10.5 | 6 | 10 | 7   | 2.4 | M4×0.7 | 11.5 | 15 | φ 3.5 Counterbore φ 6 Depth3.2 (Both sides)   | 18 | 8  | 24 | 14 |      | 5 |     | 16 | 17 |
| 16 [0.630]       | 58                | 38 | 20 | 40 | 63                   | 43 | 25 | 45 | 20 | 12.5 | 7 | 12 | 8   | 3.2 | M5×0.8 | 12.5 | 19 | φ 4.5 Counterbore φ 7.6 Depth4.2 (Both sides) | 25 | 12 | 33 | 20 |      | 6 | 7.5 | 24 | 18 |

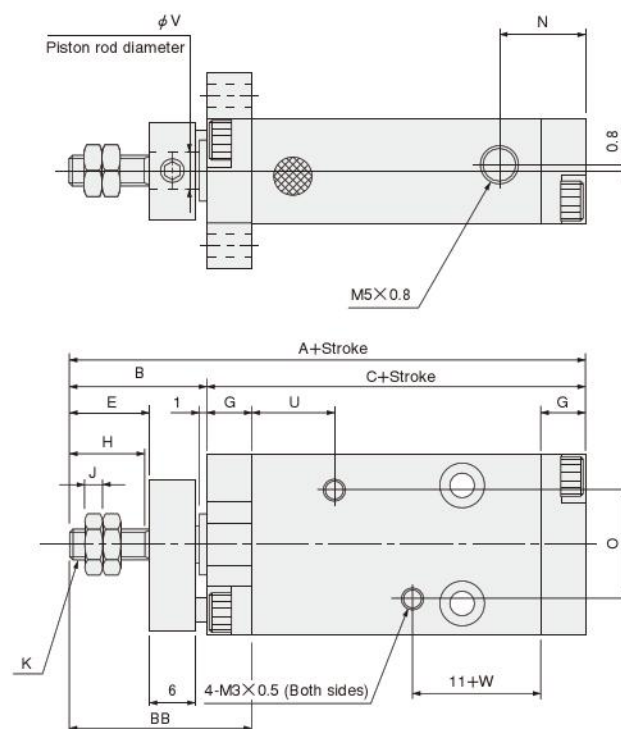
| Code       | CD   | CE  | CF  | CG  | CP  | XZ   | YZ |
|------------|------|-----|-----|-----|-----|------|----|
| 6 [0.236]  | 7.5  | 7.5 | 3.5 | 5.5 | 2.5 | 9.5  | 11 |
| 10 [0.394] | 9    | 8.5 | 4   | 6.5 | 3   | 11.5 | 13 |
| 16 [0.630] | 12.5 | 9   | 6   | 9.5 | 4   | 16   | 19 |

Note: The 4-M3 × 0.5 female thread (for sensor switch mounting) in the drawing should not be used for mounting the cylinder. Moreover, it is not available in the cylinder body of a standard 5mm [0.197in.] stroke cylinder.

## MULTI MOUNT CYLINDERS

 BSAL-   
MULTI-3A

 BSAL- Bore size  
MULTI-3B

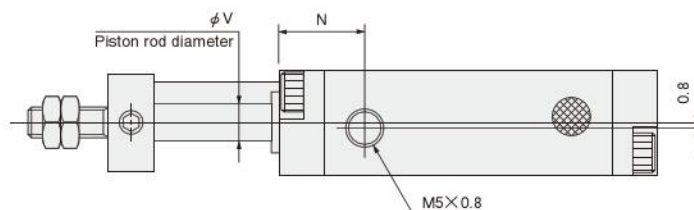


Note: The 4-M3  $\times$  0.5 female thread (for sensor switch mounting) in the drawing should not be used for mounting the cylinder. Moreover, it is not available in the cylinder body of a standard 5mm [0.197in.] stroke cylinder.

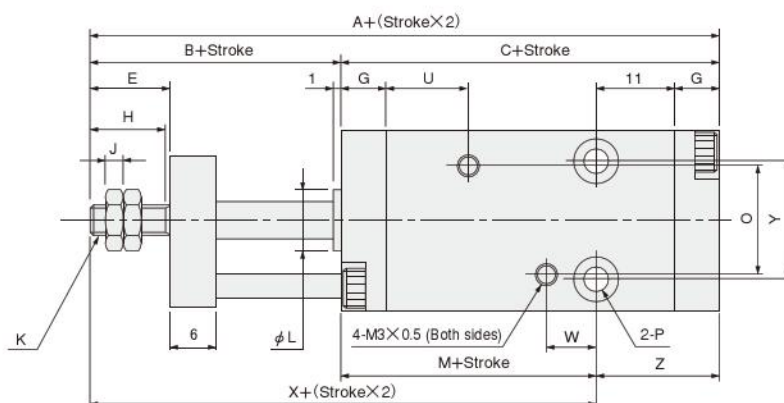
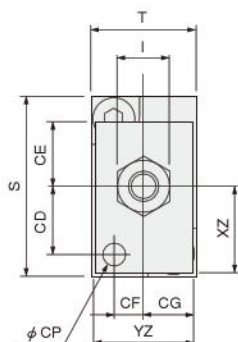
## Dimensions of Non-rotating Single Acting Pull Type (mm)

● Side mount BTAL  Bore size  ×  Stroke

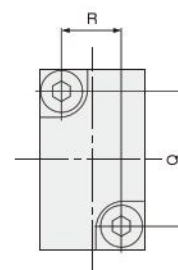
 BTAL -  Bore size



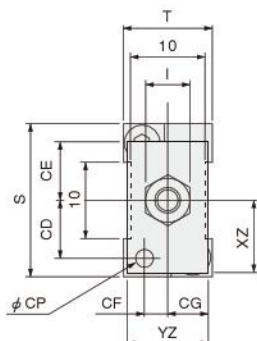
φ10, φ16



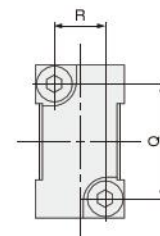
φ10, φ16



φ6



φ6

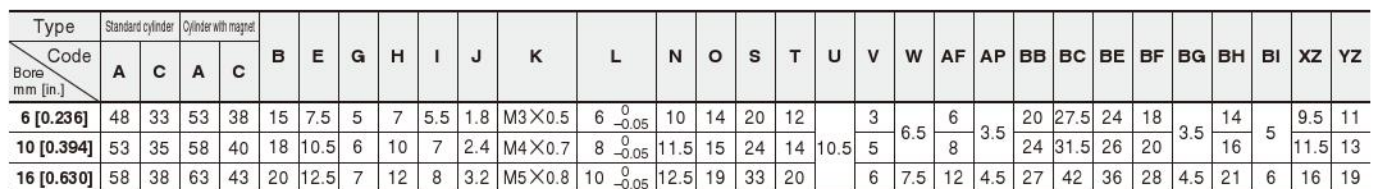
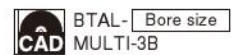


| Type             | Standard cylinder |    |    |    | Cylinder with magnet |    |    |    |    |      |   |    |     |     |        |                                  |      |    |                                               |    |    |    |    |      |   |     |     |    |
|------------------|-------------------|----|----|----|----------------------|----|----|----|----|------|---|----|-----|-----|--------|----------------------------------|------|----|-----------------------------------------------|----|----|----|----|------|---|-----|-----|----|
| Code             | A                 | C  | M  | X  | A                    | C  | M  | X  | B  | E    | G | H  | I   | J   | K      | L                                | N    | O  | P                                             | Q  | R  | S  | T  | U    | V | W   | Y   | Z  |
| Bore<br>mm [in.] | A                 | C  | M  | X  | A                    | C  | M  | X  | B  | E    | G | H  | I   | J   | K      | L                                | N    | O  | P                                             | Q  | R  | S  | T  | U    | V | W   | Y   | Z  |
| 6 [0.236]        | 48                | 33 | 17 | 32 | 53                   | 38 | 22 | 37 | 15 | 7.5  | 5 | 7  | 5.5 | 1.8 | M3×0.5 | 6 <sup>0</sup> <sub>-0.05</sub>  | 10   | 14 | φ 3.5 Counterbore φ 6 Depth4.2 (Both sides)   | 15 | 7  | 20 | 12 | 10.5 | 3 | 6.5 | 12  | 16 |
| 10 [0.394]       | 53                | 35 | 18 | 36 | 58                   | 40 | 23 | 41 | 18 | 10.5 | 6 | 10 | 7   | 2.4 | M4×0.7 | 8 <sup>0</sup> <sub>-0.05</sub>  | 11.5 | 15 | φ 3.5 Counterbore φ 6 Depth2.2 (Both sides)   | 18 | 8  | 24 | 14 |      | 5 |     | 16  | 17 |
| 16 [0.630]       | 58                | 38 | 20 | 40 | 63                   | 43 | 25 | 45 | 20 | 12.5 | 7 | 12 | 8   | 3.2 | M5×0.8 | 10 <sup>0</sup> <sub>-0.05</sub> | 12.5 | 19 | φ 4.5 Counterbore φ 7.6 Depth4.2 (Both sides) | 25 | 12 | 33 | 20 |      | 6 |     | 7.5 | 24 |

| Code<br>Bore<br>mm [in.] | CD   | CE  | CF  | CG  | CP  | XZ   | YZ |
|--------------------------|------|-----|-----|-----|-----|------|----|
| 6 [0.236]                | 7.5  | 7.5 | 3.5 | 5.5 | 2.5 | 9.5  | 11 |
| 10 [0.394]               | 9    | 8.5 | 4   | 6.5 | 3   | 11.5 | 13 |
| 16 [0.630]               | 12.5 | 9   | 6   | 9.5 | 4   | 16   | 19 |

Note: The 4-M3 × 0.5 female thread (for sensor switch mounting) in the drawing should not be used for mounting the cylinder. Moreover, it is not available in the cylinder body of a standard 5mm [0.197in.] stroke cylinder.

## MULTI MOUNT CYLINDERS

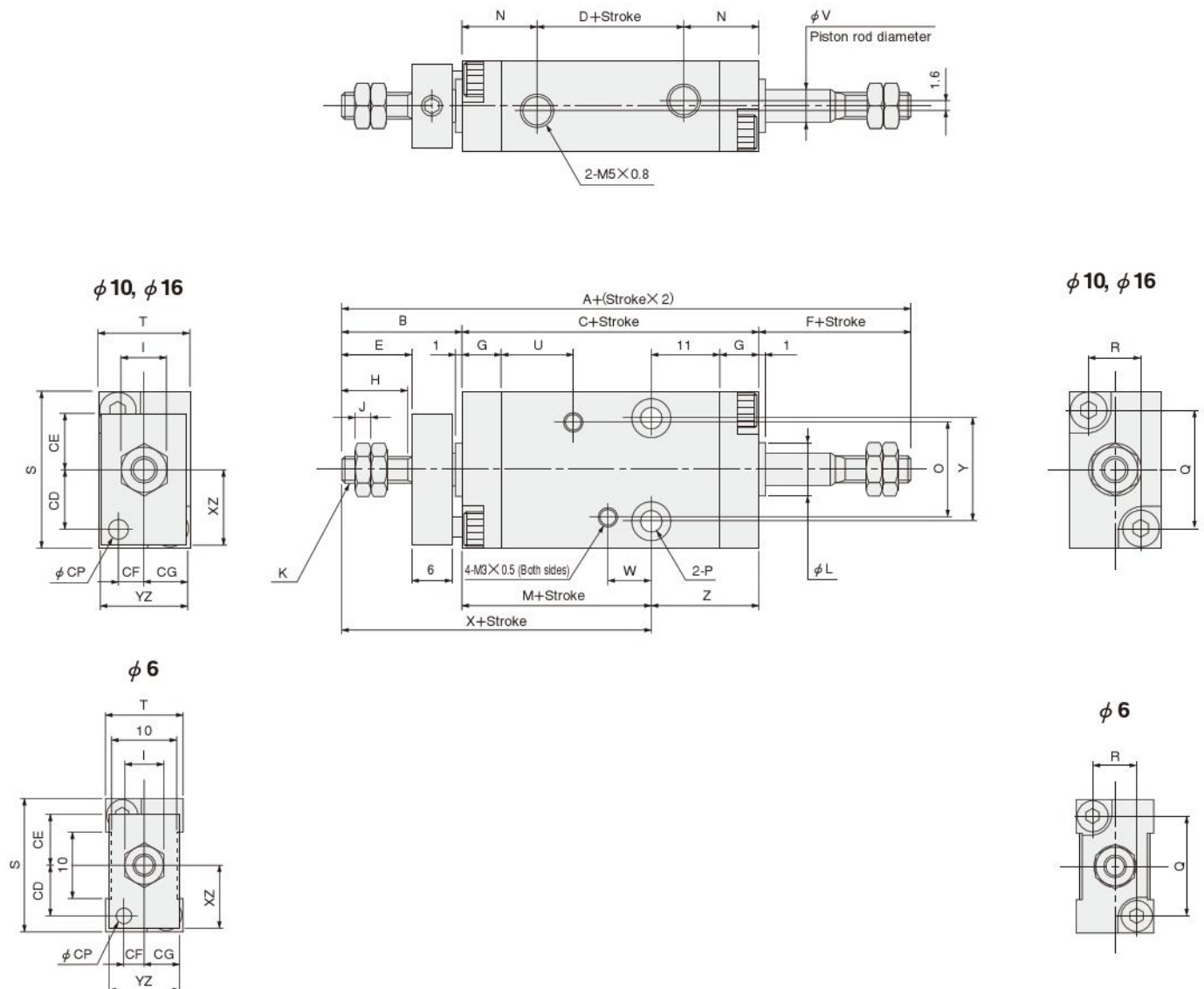
 BTAL- Bore size  
MULTI-3A

122

## Dimensions of Non-rotating Double Acting Double Rod Type (mm)

● Side mount BDADL ☐ Bore size ☐ Stroke ☐

 BDAL- ☐ Bore size ☐

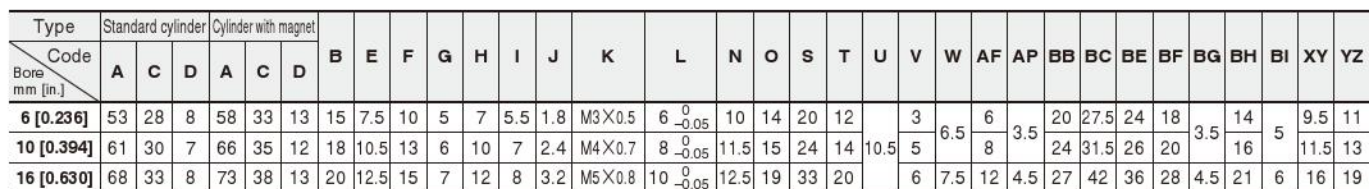


| Type          | Standard cylinder |    |   |    |    | Cylinder with magnet |    |    |    |    |    |      |    |   |    |     |     |        |                                  |      |    |                                             |    |    |    |    |      |   |     |    |    |  |
|---------------|-------------------|----|---|----|----|----------------------|----|----|----|----|----|------|----|---|----|-----|-----|--------|----------------------------------|------|----|---------------------------------------------|----|----|----|----|------|---|-----|----|----|--|
| Code          | A                 | C  | D | M  | X  | A                    | C  | D  | M  | X  | B  | E    | F  | G | H  | I   | J   | K      | L                                | N    | O  | P                                           | Q  | R  | S  | T  | U    | V | W   | Y  | Z  |  |
| Bore mm [in.] |                   |    |   |    |    |                      |    |    |    |    |    |      |    |   |    |     |     |        |                                  |      |    |                                             |    |    |    |    |      |   |     |    |    |  |
| 6 [0.236]     | 53                | 28 | 8 | 12 | 27 | 58                   | 33 | 13 | 17 | 32 | 15 | 7.5  | 10 | 5 | 7  | 5.5 | 1.8 | M3×0.5 | 6 <sup>0</sup> <sub>-0.05</sub>  | 10   | 14 | φ3.5 Counterbore φ6 Depth4.2 (Both sides)   | 15 | 7  | 20 | 12 |      | 3 |     | 12 | 16 |  |
| 10 [0.394]    | 61                | 30 | 7 | 13 | 31 | 66                   | 35 | 12 | 18 | 36 | 18 | 10.5 | 13 | 6 | 10 | 7   | 2.4 | M4×0.7 | 8 <sup>0</sup> <sub>-0.05</sub>  | 11.5 | 15 | φ3.5 Counterbore φ6 Depth3.2 (Both sides)   | 18 | 8  | 24 | 14 | 10.5 | 5 | 6.5 | 16 | 17 |  |
| 16 [0.630]    | 68                | 33 | 8 | 15 | 35 | 73                   | 38 | 13 | 20 | 40 | 20 | 12.5 | 15 | 7 | 12 | 8   | 3.2 | M5×0.8 | 10 <sup>0</sup> <sub>-0.05</sub> | 12.5 | 19 | φ4.5 Counterbore φ7.6 Depth4.2 (Both sides) | 25 | 12 | 33 | 20 |      | 6 | 7.5 | 24 | 18 |  |

| Code          | CD   | CE  | CF  | CG  | CP  | XZ   | YZ |
|---------------|------|-----|-----|-----|-----|------|----|
| Bore mm [in.] |      |     |     |     |     |      |    |
| 6 [0.236]     | 7.5  | 7.5 | 3.5 | 5.5 | 2.5 | 9.5  | 11 |
| 10 [0.394]    | 9    | 8.5 | 4   | 6.5 | 3   | 11.5 | 13 |
| 16 [0.630]    | 12.5 | 9   | 6   | 9.5 | 4   | 16   | 19 |

Note: The 4-M3 $\times$ 0.5 female thread (for sensor switch mounting) in the drawing should not be used for mounting the cylinder. Moreover, it is not available in the cylinder body of a standard 5mm [0.197in.] stroke cylinder.

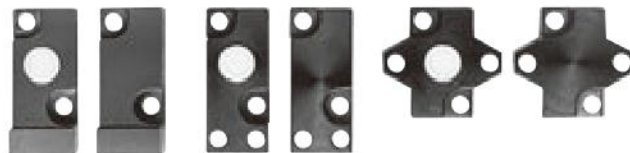
## MULTI MOUNT CYLINDERS

 BDADL-   
MULTI-3A

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# MOUNTING BRACKETS

Rod Side Mounting Bracket,  
Head Side Mounting Bracket

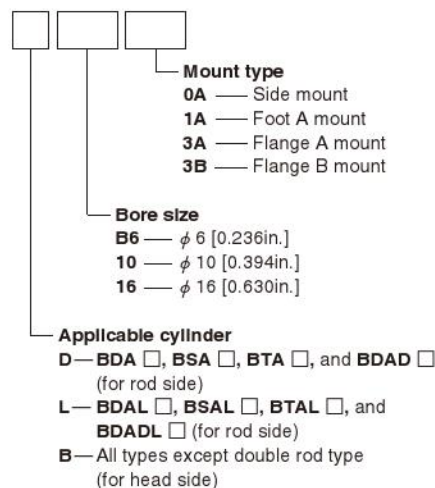


## Mounting Bracket Model (Order Codes)

| Mounting location | Bore size mm [in.] | Mounting brackets | Side mount | Foot A mount | Flange A mount | Flange B mount |
|-------------------|--------------------|-------------------|------------|--------------|----------------|----------------|
| Rod side          | 6 [0.236]          | BDA □             | DB60A      | DB61A        | DB63A          | DB63B          |
|                   |                    | BSA □             | D100A      | D101A        | D103A          | D103B          |
|                   |                    | BTAL □            | D160A      | D161A        | D163A          | D163B          |
|                   | 10 [0.394]         | BDAD □            | LB60A      | —            | LB63A          | LB63B          |
|                   |                    | BDAL □            | L100A      | —            | L103A          | L103B          |
|                   |                    | BSAL □            | L160A      | —            | L163A          | L163B          |
| Head side         | 6 [0.236]          | BDADL □           | BB60A      | BB61A        | BB63A          | BB63B          |
|                   | 10 [0.394]         |                   | B100A      | B101A        | B103A          | B103B          |
|                   | 16 [0.630]         |                   | B160A      | B161A        | B163A          | B163B          |

Remarks: 1. All mounting brackets come with 2 mounting screws.  
2. Order separately for all head side mounting brackets.  
3. For the order codes of rod side mounting brackets assembled with cylinders, see p.99 and 115.  
4. No rod side foot A mount for the non-rotating cylinder is available. For non-rotating double rod cylinders, however, a separately ordered foot A mount can be installed on the rod side opposite the non-rotation plate.  
5. A rod bushing is assembled into the rod side mounting bracket.

### How to read the codes

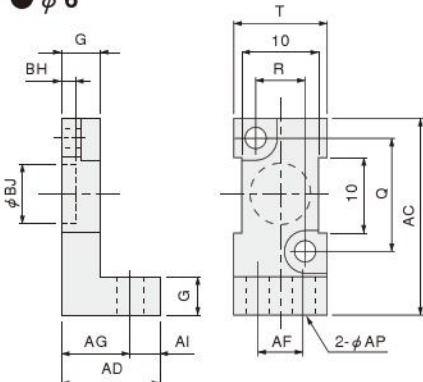


## Dimensions of Head Side Mounting Bracket (mm)

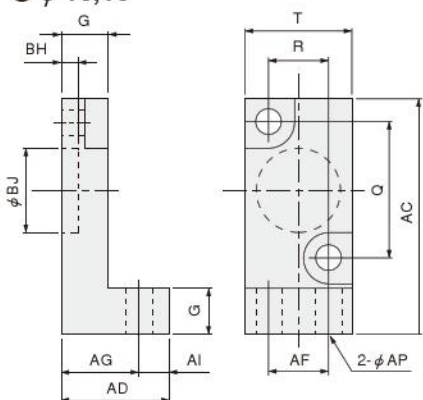
### Foot A mount: -1A



● φ 6



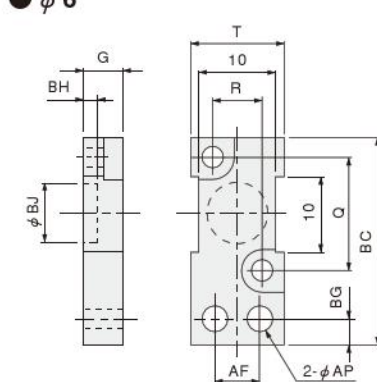
● φ 10,16



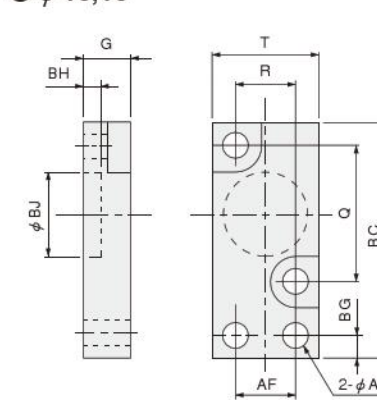
### Flange A mount: -3A



● φ 6



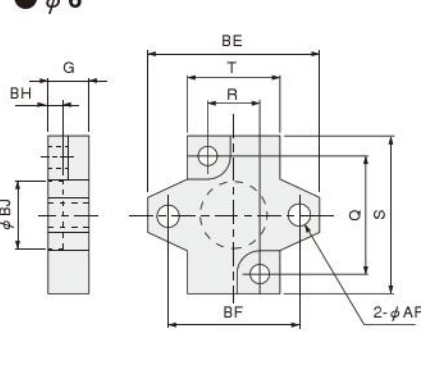
● φ 10,16



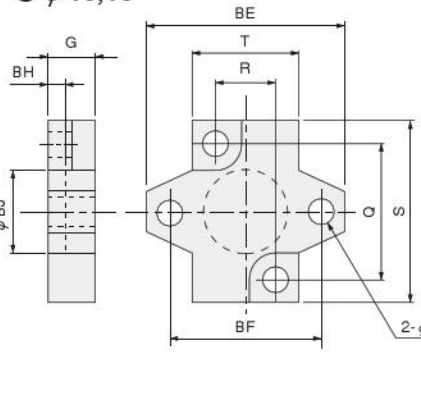
### Flange B mount: -3B



● φ 6



● φ 10,16



| Bore size mm [in.] | Code | G | Q  | R  | S  | T  | AC   | AD | AF | AG | AI | AP  | BC   | BE | BF | BG  | BH                              | BJ                              |
|--------------------|------|---|----|----|----|----|------|----|----|----|----|-----|------|----|----|-----|---------------------------------|---------------------------------|
| 6 [0.236]          |      | 5 | 15 | 7  | 20 | 12 | 26   | 13 | 6  | 9  | 4  | 3.5 | 27.5 | 24 | 18 | 3.5 | 2 <sup>+0.05</sup> <sub>0</sub> | 8 <sup>+0.1</sup> <sub>0</sub>  |
| 10 [0.394]         |      | 6 | 18 | 8  | 24 | 14 | 31   | 14 | 8  | 10 | 4  | 3.5 | 31.5 | 26 | 20 | 3.5 | 2 <sup>+0.05</sup> <sub>0</sub> | 12 <sup>+0.1</sup> <sub>0</sub> |
| 16 [0.630]         |      | 7 | 25 | 12 | 33 | 20 | 41.5 | 17 | 12 | 12 | 5  | 4.5 | 42   | 36 | 28 | 4.5 | 2 <sup>+0.05</sup> <sub>0</sub> | 18 <sup>+0.1</sup> <sub>0</sub> |

Remark: For the side mount (head cover), see the cylinder dimensions.

# SENSOR SWITCHES

Solid State Type, Reed Switch Type

## Order Codes (for Sensor Switches Only)

|                                         |           | Sensor switches | Option | Lead wire length | With sensor holder           |
|-----------------------------------------|-----------|-----------------|--------|------------------|------------------------------|
| Solid state type with indicator lamp    | DC10~28V  | ZC130           | A<br>B |                  | -BDAS6<br>-BDAS10<br>-BDAS16 |
| Solid state type with indicator lamp    | DC4.5~28V | ZC153           |        |                  |                              |
| Reed switch type without indicator lamp | DC5~28V   | CS5T            |        |                  |                              |
| Reed switch type with indicator lamp    | AC85~115V | CS11T           |        |                  |                              |

● A : 1000mm [39in.]

● B : 3000mm [118in.]

★ Order codes of sensor holders only

For  $\phi$  6 cylinder — C1-BDAS6

For  $\phi$  10 cylinder — C1-BDAS10

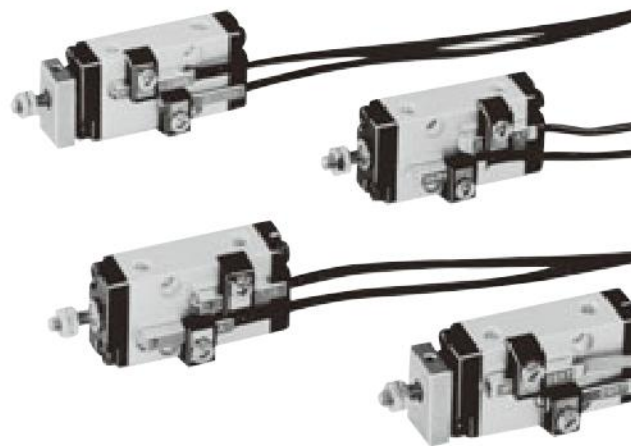
For  $\phi$  16 cylinder — C1-BDAS16

● -BDAS6 : For  $\phi$  6 cylinder

● -BDAS10 : For  $\phi$  10 cylinder

● -BDAS16 : For  $\phi$  16 cylinder

● For sensor switch details, see p.1544.

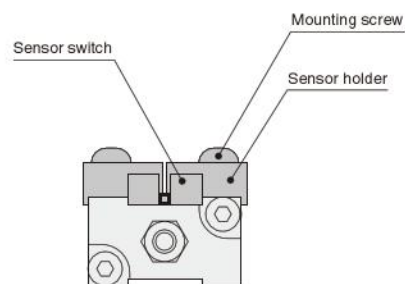


MULTI MOUNT CYLINDERS

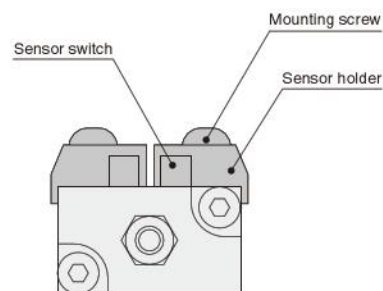
## Moving Sensor Switch

- Loosening mounting screw allows the sensor switch to be moved freely in the cylinder's axial direction.
- Tighten the mounting screw with a tightening torque of 19.6N·cm [1.73in·lbf] or less.

●  $\phi$  6



●  $\phi$  10,16



## Minimum Cylinder Strokes When Using Sensor Switches

| Bore size  | mm [in.]                       |                |                                |                |
|------------|--------------------------------|----------------|--------------------------------|----------------|
|            | Solid state type sensor switch |                | Reed switch type sensor switch |                |
|            | Mounting 2 pcs.                | Mounting 1 pc. | Mounting 2 pcs.                | Mounting 1 pc. |
| 6 [0.236]  | 5                              | 5              | 10                             | 5              |
| 10 [0.394] |                                |                |                                |                |
| 16 [0.630] |                                |                |                                |                |

Remark: Two sensor switches cannot be mounted on a cylinder with flange B mount.

Mount 1 sensor switch on the head side when the flange B mount is used on the rod side, and mount 1 sensor switch on the rod side when the flange B mount is used on the head side.

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

### ● Operating range: $\ell$

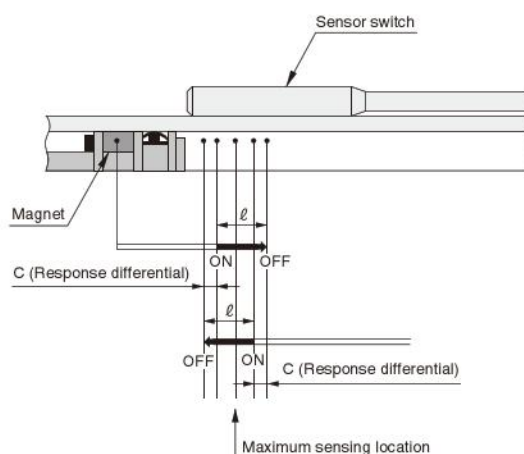
The distance the piston travels in one direction, while the switch is in the ON position.

### ● 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  | ZC130□, ZC153□           |                        | CS5T□, CS11T□            |                        |
|------------|--------------------------|------------------------|--------------------------|------------------------|
|            | Operating range          | Response differential  | Operating range          | Response differential  |
| 6 [0.236]  | 2.0~3.0<br>[0.079~0.118] | 0.3 [0.012]<br>or less | 4.8~7.2<br>[0.189~0.283] | 1.3 [0.051]<br>or less |
| 10 [0.394] | 2.0~3.0<br>[0.079~0.118] | 0.3 [0.012]<br>or less | 5.8~8.3<br>[0.228~0.327] | 2.0 [0.079]<br>or less |
| 16 [0.630] | 2.5~4.0<br>[0.098~0.157] | 0.3 [0.012]<br>or less | 7.5~9.4<br>[0.295~0.370] | 2.5 [0.098]<br>or less |

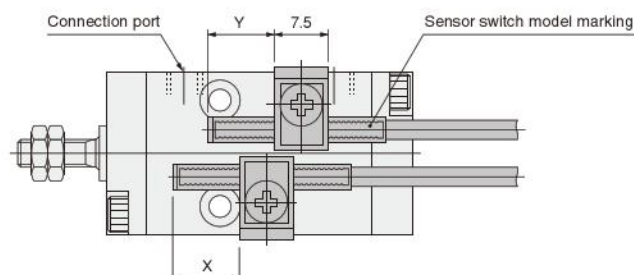
Remark: The above table shows reference values.



## Mounting Location of End of Stroke Detection Sensor Switch

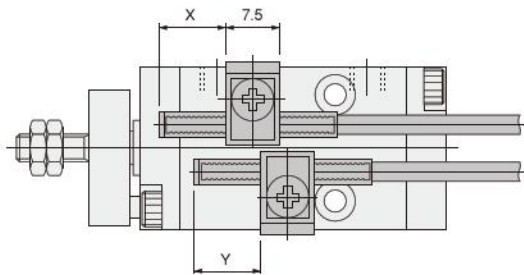
### ● Cylinder with magnet

### ● Double rod cylinder with magnet



### ● Non-rotating cylinder with magnet

### ● Non-rotating double rod cylinder



### ■ Double acting type (Including double rod cylinders) mm [in.]

| Bore size  | Mounting location | Sensor switch model |              |            |
|------------|-------------------|---------------------|--------------|------------|
|            |                   | ZC130□, ZC153□      | CS5T□        | CS11T□     |
| 6 [0.236]  | X                 | 13.0 [0.512]        | 11.5 [0.453] | 15 [0.591] |
| 10 [0.394] | Y                 | 8.0 [0.315]         | 6.5 [0.256]  | 10 [0.394] |
| 16 [0.630] | X                 | 14.0 [0.551]        | 12.5 [0.492] | 16 [0.630] |
|            | Y                 | 9.0 [0.354]         | 7.5 [0.295]  | 11 [0.433] |

### ■ Double acting type (Including double rod cylinders) mm [in.]

| Bore size  | Mounting location | Sensor switch model |               |           |
|------------|-------------------|---------------------|---------------|-----------|
|            |                   | ZC130□, ZC153□      | CS5T□         | CS11T□    |
| 6 [0.236]  | X                 | 6.0 [0.236]         | 4.5 [0.177]   | 8 [0.315] |
| 10 [0.394] | Y                 | 1.0 [0.039]         | -0.5 [-0.020] | 3 [0.118] |
| 16 [0.630] | X                 | 7.0 [0.276]         | 5.5 [0.217]   | 9 [0.354] |
|            | Y                 | 2.0 [0.079]         | 0.5 [0.020]   | 4 [0.157] |

### ■ Single acting push type mm [in.]

| Bore size  | Mounting location | Sensor switch model |             |            |
|------------|-------------------|---------------------|-------------|------------|
|            |                   | ZC130□, ZC153□      | CS5T□       | CS11T□     |
| 6 [0.236]  | X                 | 8.0 [0.315]         | 6.5 [0.256] | 10 [0.394] |
| 10 [0.394] | Y                 | 8.0 [0.315]         | 6.5 [0.256] | 10 [0.394] |
| 16 [0.630] | X                 | 9.0 [0.354]         | 7.5 [0.295] | 11 [0.433] |
|            | Y                 | 9.0 [0.354]         | 7.5 [0.295] | 11 [0.433] |

### ■ Single acting push type mm [in.]

| Bore size  | Mounting location | Sensor switch model |               |           |
|------------|-------------------|---------------------|---------------|-----------|
|            |                   | ZC130□, ZC153□      | CS5T□         | CS11T□    |
| 6 [0.236]  | X                 | 1.0 [0.039]         | -0.5 [-0.020] | 3 [0.118] |
| 10 [0.394] | Y                 | 1.0 [0.039]         | -0.5 [-0.020] | 3 [0.118] |
| 16 [0.630] | X                 | 2.0 [0.079]         | 0.5 [0.020]   | 4 [0.157] |
|            | Y                 | 2.0 [0.079]         | 0.5 [0.020]   | 4 [0.157] |

### ■ Single acting pull type mm [in.]

| Bore size  | Mounting location | Sensor switch model |              |            |
|------------|-------------------|---------------------|--------------|------------|
|            |                   | ZC130□, ZC153□      | CS5T□        | CS11T□     |
| 6 [0.236]  | X                 | 13.0 [0.512]        | 11.5 [0.453] | 15 [0.591] |
| 10 [0.394] | Y                 | 13.0 [0.512]        | 11.5 [0.453] | 15 [0.591] |
| 16 [0.630] | X                 | 14.0 [0.551]        | 12.5 [0.492] | 16 [0.630] |
|            | Y                 | 14.0 [0.551]        | 12.5 [0.492] | 16 [0.630] |

### ■ Single acting pull type mm [in.]

| Bore size  | Mounting location | Sensor switch model |              |           |
|------------|-------------------|---------------------|--------------|-----------|
|            |                   | ZC130□, ZC153□      | CS5T□        | CS11T□    |
| 6 [0.236]  | X                 | 6.0 [0.236]         | 11.5 [0.453] | 8 [0.315] |
| 10 [0.394] | Y                 | 6.0 [0.236]         | 11.5 [0.453] | 8 [0.315] |
| 16 [0.630] | X                 | 7.0 [0.276]         | 12.5 [0.492] | 9 [0.354] |
|            | Y                 | 7.0 [0.276]         | 12.5 [0.492] | 9 [0.354] |

Remarks: 1. The above tables give reference values for the standard strokes. For the procedure to find-out the best position, see p. 129.

2. The above figures show the piping connection port when it has been turned to face upward.

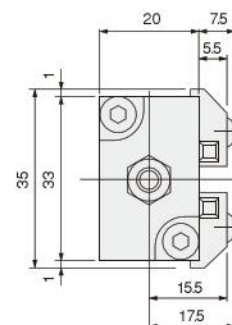
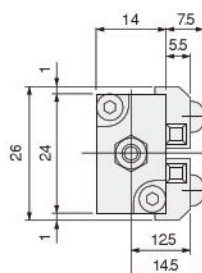
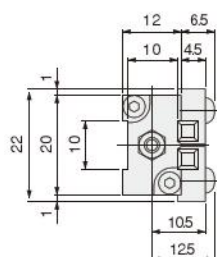
3. Use the distance between the cylinder mounting hole and the rod cover to confirm the mounting location of the double rod cylinder's end of stroke detection sensor switch.

4. Mount the sensor switch so that the surface showing the sensor switch model marking faces up.

●  $\phi 6$

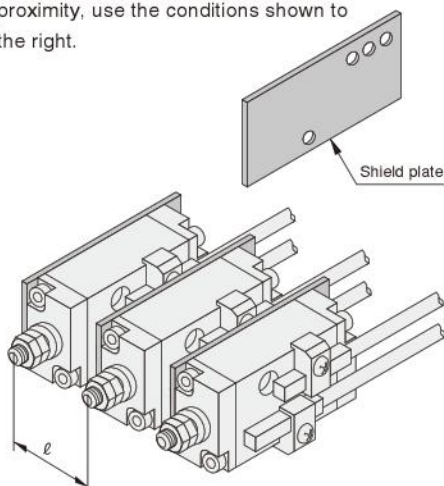
●  $\phi 10$

●  $\phi 16$



## Precautions for Mounting Cylinders with Magnet

When mounting 2 or more Multi Mount Cylinders with sensor switches in close proximity, use the conditions shown to the right.



| Bore size<br>mm [in.] | Without shield plate   |                        | With shield plate      |
|-----------------------|------------------------|------------------------|------------------------|
|                       |                        |                        |                        |
| <b>6 [0.236]</b>      | 25mm [0.984] or longer | 23mm [0.906] or longer | 22mm [0.866] or longer |
| <b>10 [0.394]</b>     | 29mm [1.142] or longer | 31mm [1.220] or longer | 25mm [0.984] or longer |
| <b>16 [0.630]</b>     | 35mm [1.378] or longer | 39mm [1.535] or longer | 31mm [1.220] or longer |

Remark: Aside from the above, there are no particular restrictions on mounting.

## Shield Plate Type (Order Codes)

| Operation type<br>Stroke mm<br>Bore size mm [in.] | Applicable shield plate type                      |              |                              |              |
|---------------------------------------------------|---------------------------------------------------|--------------|------------------------------|--------------|
|                                                   | Double acting type, Double acting double rod type |              | Single acting push/pull type |              |
|                                                   | 5, 10, 15                                         | 20, 25, 30   | 5, 10                        | 15           |
| <b>6 [0.236]</b>                                  | <b>BS061</b>                                      | <b>BS062</b> | <b>BS061</b>                 | <b>BS062</b> |
| <b>10 [0.394]</b>                                 | <b>BS101</b>                                      | <b>BS102</b> | <b>BS101</b>                 | <b>BS102</b> |
| <b>16 [0.630]</b>                                 | <b>BS161</b>                                      | <b>BS162</b> | <b>BS161</b>                 | <b>BS162</b> |

Remarks: 1. All shield plates come with 2 mounting screws.  
2. Order all shield plates separately.



MULTI-SE

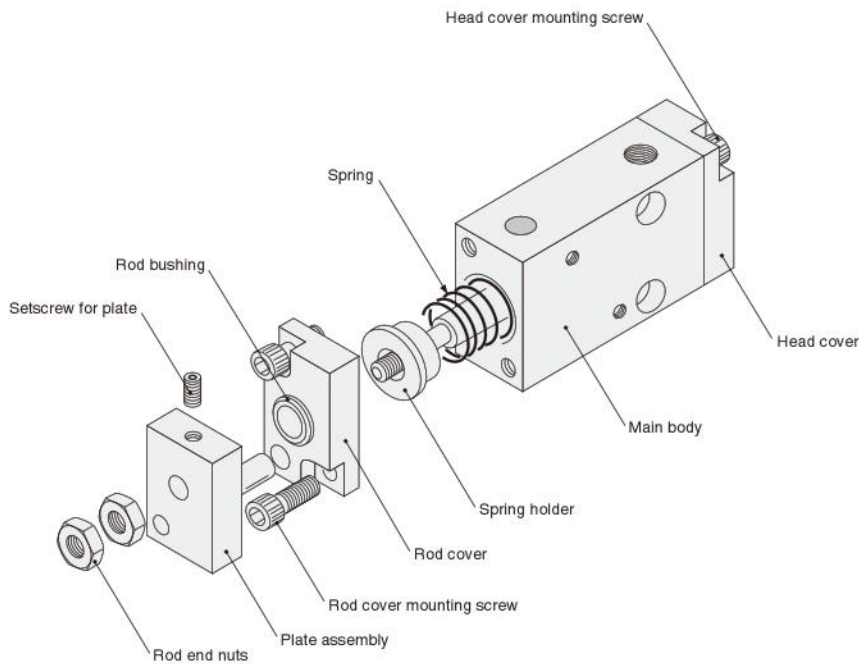


## Replacement of mounting brackets

### ● Rod side mounting bracket

Remove the rod end nut, loosen the rod cover (mounting bracket) mounting screws, and remove the rod cover (mounting bracket). Assemble the replacement mounting bracket by reversing the order of procedures for removal.

For non-rotating cylinders, loosen the setscrew for plate and remove the plate assembly, and remove the rod cover (mounting bracket). For assembly, align and assemble the guide pin holes of the mounting bracket and the cylinder body, insert the plate assembly, and tighten and secure the setscrew for plate against the piston rod. In this case, retract the piston rod in the fully retracted position at the head side stroke end, maintain a clearance of about 0.5mm [0.020in.] between the plate and rod bushing, and secure the plate assembly in place.



The diagram shows a non-rotating single acting push type cylinder.

### ● Head side mounting bracket

Loosen the head cover (mounting bracket) mounting screws and remove the head cover (mounting bracket). Assemble the replacement mounting bracket by reversing the order of procedures for removal.

- Cautions:**
1. To increase the mounting accuracy of the side mounting, assemble so that the rod cover and head cover do not protrude from the cylinder body, and mount so that the cylinder body contacts tightly to the device.
  2. Use the supplied mounting screws, or when using commercial screws, use the sizes shown in the table below to secure mounting brackets in place.

| Bore size mm [in.] | Screw size | Length of below head mm [in.] |
|--------------------|------------|-------------------------------|
| 6 [0.236]          | M2.6×0.45  | 6 [0.236]                     |
| 10 [0.394]         | M3×0.5     | 8 [0.315]                     |
| 16 [0.630]         | M4×0.7     | 8 [0.315]                     |

3. Refer to the figures in the table below for the tightening torque of the non-rotating cylinder's setscrew for plate, and for the size of the Allen wrench used.

| Bore size mm [in.] | Tightening torque N·cm [in·lbf] | Hexagonal bar spanner nominal size mm [in.] |
|--------------------|---------------------------------|---------------------------------------------|
| 6 [0.236]          | 49 [4.37]                       | 1.27 [0.050]                                |
| 10 [0.394]         | 98.1 [8.68]                     | 1.5 [0.059]                                 |
| 16 [0.630]         | 137.3 [12.2]                    | 2 [0.079]                                   |

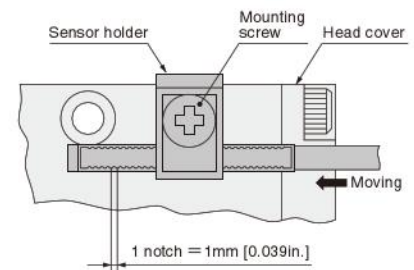


## Sensor switches

### Procedure for finding the best sensing position

#### ● Setting the head side stroke end

1. Push piston rod to the fully retracted position.
2. Install a sensor switch in a holder without tightening a mounting screw all the way, move the switch from head side to rod side until it turns ON (for ZC130□, ZC153□ and CS11T□, when the LED lights up), then move the switch 1 notch (= 1mm [0.039in.]) for ZC130□ and ZC153□, or 2 notches (= 2mm [0.079in.]) for CS5T□ and CS11T□ toward the rod side, and tighten the mounting screw.

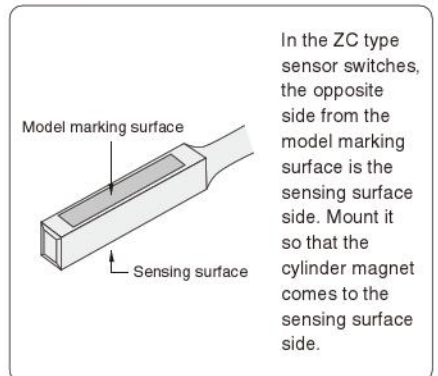


#### ● Setting the rod side stroke end

Conduct the same procedure as the head side, but on the reversed way.

1. Pull piston rod to the fully extended position.
2. Install a sensor switch in a holder without tightening a mounting screw all the way, move the switch from rod side to head side until it turns ON, then move the switch 1 notch (= 1mm [0.039in.]) for ZC130□ and ZC153□, or 2 notches (= 2mm [0.079in.]) for CS5T□ and CS11T□ toward head side, and tighten the mounting screw.

#### ● Caution when installing cylinder with sensor switch





## General precautions

### Piping

1. In applications with high load ratio or high speed, use an externally mounted stopper to prevent direct shock to the cylinder.
2. Use the cylinder body's 4-M3 × 0.5 female thread only for mounting a sensor switch or shield plate.

### Piping

Always thoroughly blow off (use compressed air) the tubing before connecting it to the 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, use a cover to protect the unit.
2. The product cannot be used when the media or ambient atmosphere contains any of the substances listed below.  
Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, or acids, etc.

### Lubrication

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

Avoid using spindle oil or machine oil.

### Media

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