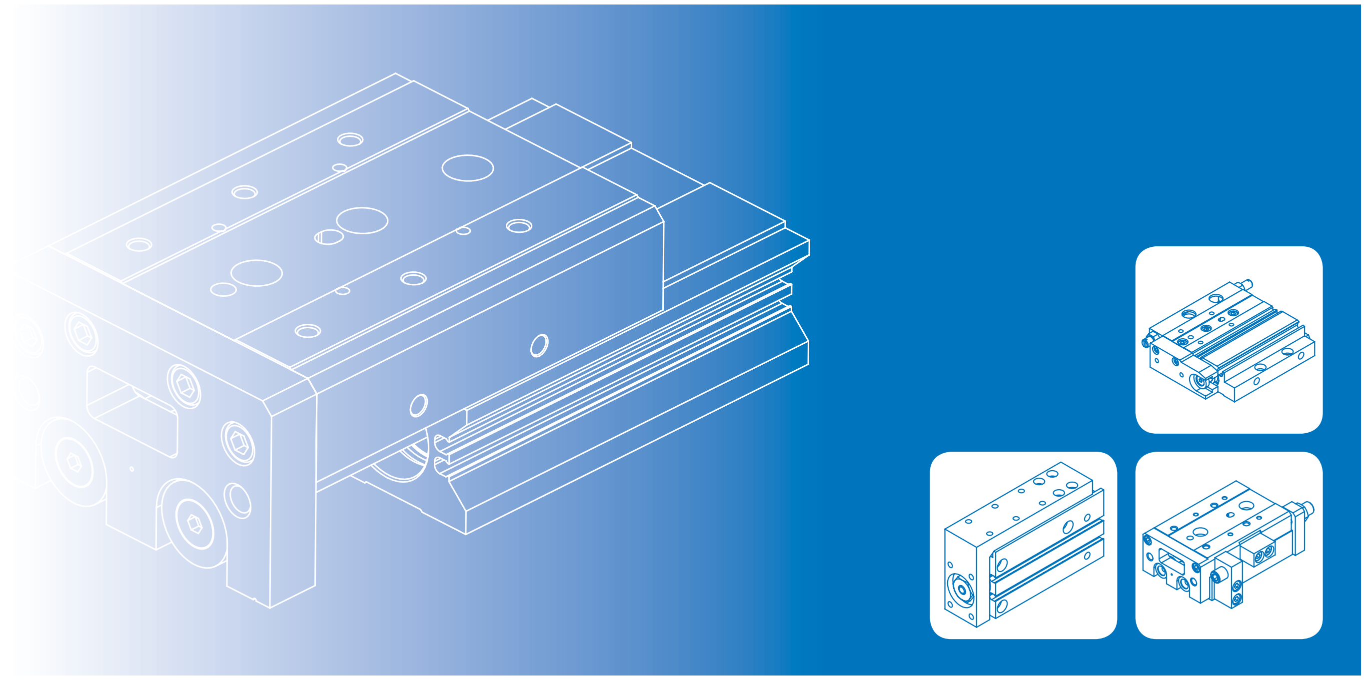
# TABLE





F **Fast delivery**

Our goal is to achieve 3-day lead time, if there is stock of component set. For more information, please go to our MINDMAN website (www.mindman.com.tw) and click on the "Component Set Inventory" button.

## Features

- High precision combination of cylinder and linear rail.
- Flush fitting sensor groove.
- Magnetic as standard.

## Specification

| Model | MCSS | | |
|---|---|---|---|
| Acting type | Double acting | | |
| Tube I.D. (mm) | 6 | 8, 12, 16 | 20, 25 |
| Port size | M3×0.5 | M5×0.8 | Rc1/8 |
| Medium | Air | | |
| Operating pressure range | 0.15~0.7 MPa | | |
| Proof pressure | 1 MPa | | |
| Ambient temperature | -5~+60°C (No freezing) | | |
| Lubricator | Not required | | |
| Available speed range | 50~500 mm/sec | | |
| Cushion | Rubber bumper (Standard) Shock absorber (Option) | | |
| Sensor switch (*) | RCE, RCE1, RDEP | | |

* RCE, RCE1, RDEP specification, please refer to page 8-12, 13, 18.

## Table for standard stroke

| Tube I.D. | Stroke (mm) |
|---|---|
| ø6 | 10, 20, 30, 40, 50 |
| ø8 | 10, 20, 30, 40, 50, 75 |
| ø12 | 10, 20, 30, 40, 50, 75, 100 |
| ø16 | 10, 20, 30, 40, 50, 75, 100, 125 |
| ø 20, 25 | 10, 20, 30, 40, 50, 75, 100, 125, 150 |

## Order example

**MCSS — 20 L — 50 — AS — X12 — □**

MODEL

TUBE I.D.

Blank: Standard
**L**: Symmetric style

STROKE

STROKE ADJUSTER
Blank: Without adjuster
**AS**: Adjuster at extension end
**AT**: Adjuster at retraction end
**A**: Adjuster at both ends
**BS**: Absorber at extension end
**BT**: Absorber at retraction end
**B**: Absorber at both ends
**AB**: Adjuster at extension end+Absorber at retraction end
**BA**: Absorber at extension end+Adjuster at retraction end

ADJUSTABLE RANGE
Blank: 5mm
**X11**: 15mm
**X12**: 25mm
(Only for stroke adjuster)

PORT THREAD
Blank: M thread
(for ø6~ø16)
Blank: Rc thread
**G**: G thread
**NPT**: NPT thread
(for ø20,ø25)

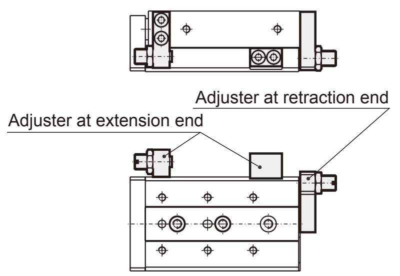
*X12 (adjustable range: 25mm) is not available for MCSS-6.
*X11 and X12 are not available for shock absorber type.
*Shock absorber is not available on series MCSS-6.

## Stroke adjuster option

### Stroke adjuster

- Adjustable stroke range: 0~5mm (Standard)

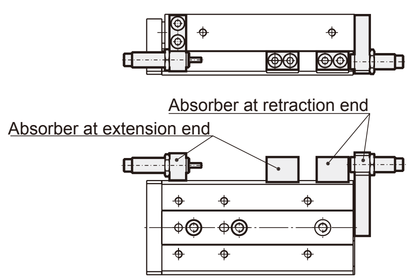
**AS**: Adjuster at extension end
**AT**: Adjuster at retraction end
**A**: Adjuster at both ends



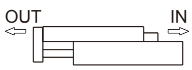

### With shock absorber

- Enables adjustment of stroke.
- Absorbs the collision at stroke end and stops smoothly.

**BS**: Absorber at extension end
**BT**: Absorber at retraction end
**B**: Absorber at both ends




## Theoretical force

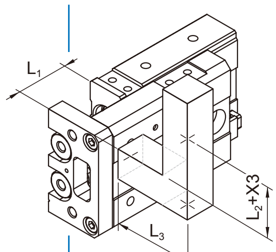



Unit: N

| Tube I.D. (mm) | Piston rod (mm) | Operating direction | Piston area ($mm^2$) | Operating pressure (MPa) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| 6 | 3 | OUT | 57 | 11 | 17 | 23 | 29 | 34 | 40 |
| | | IN | 42 | 8 | 13 | 17 | 21 | 25 | 29 |
| 8 | 4 | OUT | 101 | 20 | 30 | 40 | 51 | 61 | 71 |
| | | IN | 75 | 15 | 23 | 30 | 38 | 45 | 53 |
| 12 | 6 | OUT | 226 | 45 | 68 | 90 | 113 | 136 | 158 |
| | | IN | 170 | 34 | 51 | 68 | 85 | 102 | 119 |
| 16 | 8 | OUT | 402 | 80 | 121 | 161 | 201 | 241 | 281 |
| | | IN | 302 | 60 | 91 | 121 | 151 | 181 | 211 |
| 20 | 10 | OUT | 628 | 126 | 188 | 251 | 314 | 377 | 400 |
| | | IN | 471 | 94 | 141 | 188 | 236 | 283 | 330 |
| 25 | 12 | OUT | 982 | 196 | 295 | 393 | 491 | 589 | 687 |
| | | IN | 756 | 151 | 227 | 302 | 378 | 454 | 529 |

# MCSS Model selection

## SLIDE CYLINDER

| Model selection steps | Formula / Data | Selection example |
|---|---|---|
| **1. Operating conditions**<br>List the operating conditions considering the mounting position and workpiece configuration.<br>Check that the load weight does not exceed the max. allowable load weight and that the average operating speed does not exceed the operating speed range. | • Model to be used.<br>• Type of cushion.<br>• Workpiece mounting position.<br>• Average operating speed Va (mm/s)<br>• Load mass W (kg): Fig 1, Table 2<br>• Overhang Ln(mm): Fig 2 | <br>Cylinder: MCSS-6-10<br>Cushion: Rubber bumper<br>Workpiece table mounting<br>Mounting: Horizontal wall mounting<br>Average operating speed: Va = 150 mm/s<br>Load mass: W = 0.3 kg<br>$L_1$ = 4mm<br>$L_2$ = 4mm<br>$L_3$ = 5mm |
| **2. Kinetic energy**<br>Find the kinetic energy E (J) of the load.<br>Find the allowable kinetic energy Ea (J).<br>Confirm that the kinetic energy of the load does not exceed the allowable kinetic energy. | $E = \frac{1}{2} \cdot W \left(\frac{V}{1000}\right)^2$<br>Collision speed V = 1.4* • Va<br>* Correction factor (Reference values)<br>Ea = K • Emax<br>Workpiece mounting coefficient K: Fig 3<br>Max. allowable kinetic energy Emax: Table 1<br>Kinetic energy (E) ≤ Allowable kinetic energy (Ea) | $E = \frac{1}{2} \cdot 0.3 \left(\frac{210}{1000}\right)^2 = 0.0066$<br>V = 1.4 • 150 = 210<br>Ea = 1 • 0.015 = 0.015<br>Can be used based on E = 0.0066 ≤ Ea = 0.015 |

(Continued)

Table 1: Max. allowable kinetic energy: Emax (J)

| Tube I.D. (mm) | Allowable kinetic energy | |
|---|---|---|
| | Rubber bumper | Shock absorber |
| ø6 | 0.015 | – |
| ø8 | 0.023 | 0.041 |
| ø12 | 0.05 | 0.105 |
| ø16 | 0.104 | 0.214 |
| ø20 | 0.153 | 0.313 |
| ø25 | 0.232 | 0.472 |

Fig 1: Load mass: W (kg)

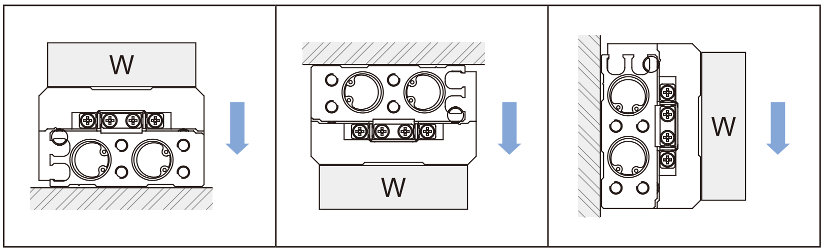



Table 2: Max. allowable load mass: Wmax (kg)

| Tube I.D. (mm) | Max. allowable load mass |
|---|---|
| ø6 | 0.6 |
| ø8 | 0.8 |
| ø12 | 2 |
| ø16 | 3.7 |
| ø20 | 6 |
| ø25 | 8.5 |

Fig 2: Overhang: Ln (mm), Correction value of moment center position distance: An (mm)

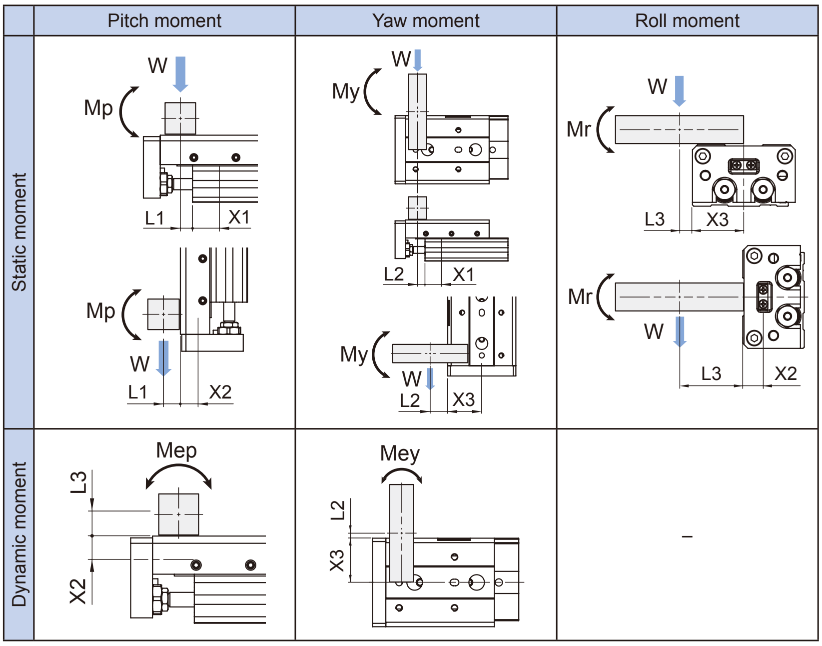
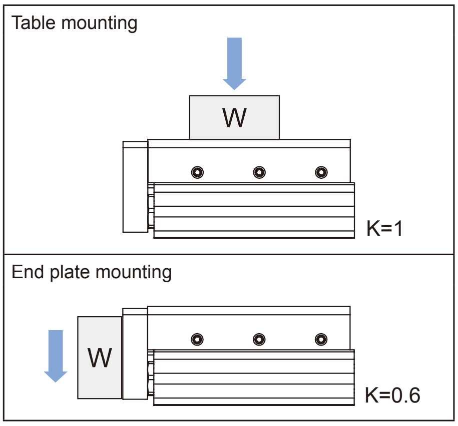



Fig 3: Workpiece mounting coefficient: K




Note.

Static moment: Moment generated by gravity.
Dynamic moment: Moment generated by impact when colliding with stopper.

| Model selection steps | Formula / Data | Selection example |
|---|---|---|

## 3. Load factor

### 3-1 Load factor of load mass

Find the allowable load mass Wa (kg). Note: There is no need to consider this load factor in the case of using perpendicularly in a vertical position. (Define $\alpha_1$ = 0.)

$Wa = K \cdot \beta \cdot Wmax$
Workpiece mounting coefficient K: Fig 3
Allowable load mass coefficient β: Fig 4
Max. allowable load mass Wmax: Table 2

$Wa = 1 \cdot 1 \cdot 0.6 = 0.6$
K = 1
β = 1
Wmax = 0.6

Find the load factor of the load mass $\alpha_1$.

$\alpha_1 = W/Wa$

$\alpha_1 = 0.3/0.6 = 0.5$

### 3-2 Load factor of static moment

Find the static moment M (N·m).

$M = W \cdot 9.8(Ln+Xn) / 1000$
Correction value of moment center position distance Xn: Table 3

Yawing
Examine My.
$My = 0.3 \cdot 9.8(4+14.5)/1000 = 0.05$
$X_1 = 14.5$

Rolling
Examine Mr.
$Mr = 0.3 \cdot 9.8(5+6)/1000 = 0.033$
$X_2 = 6$

Find the allowable static moment Ma (N·m).

$Ma = K \cdot \gamma \cdot Mmax$
Workpiece mounting coefficient K: Fig 3
Allow load mounting coefficient γ: Fig 4
Max. allowable moment Mmax: Table 4

$May = 1 \cdot 1 \cdot 0.7 = 0.7$
Mymax = 0.7
K = 1
γ = 1

Mar = 0.7
(Same value as May)

Find the load factor $\alpha_2$ of the static moment.

$\alpha_2 = M/Ma$

$\alpha_2 = 0.05/0.7 = 0.072$

$\alpha'_2 = 0.033/0.7 = 0.047$

### 3-3 Load factor of dynamic moment

Find the dynamic moment Me (N·m).

$Me = 1/3 \cdot We \cdot 9.8 \frac{(Ln+Xn)}{1000}$
Correction equivalent to impact $We = \delta \cdot W \cdot V$
δ: Bumper coefficient
With urethane bumper (Standard) = 4/100
With shock absorber = 1/100
Correction value of moment center position distance Xn: Table 3

Pitching
Examine Mep.
$Mep = 1/3 \cdot 2.52 \cdot 9.8 \cdot \frac{(5+6)}{1000} = 0.09$
$We = 4/100 \cdot 0.3 \cdot 210 = 2.52$
$X_2 = 6$
$Meap = 1 \cdot 1 \cdot 0.7 = 0.7$
K = 1
γ = 1
Mpmax = 0.7
$\alpha_3 = 0.09/0.7 = 0.128$

Find the allowable dynamic moment Mea (N·m).

$Mea = K \cdot \gamma \cdot Mmax$
Workpiece mounting coefficient K: Fig 3
Allowable mounting coefficient γ: Fig 4
Max. allowable moment Mmax: Table 4

Yawing
Examine Mey.
$Mey = 1/3 \cdot 2.52 \cdot 9.8 \cdot \frac{(4+16)}{1000} = 0.165$
We = 2.52
$X_3 = 16$
Meay = 0.7 (Same value as Meap)
$\alpha'_3 = 0.165/0.7 = 0.235$

Find the load factor $\alpha_3$ of the dynamic moment.

$\alpha_3 = Me/Mea$

### 3-4 Sum of load factors

Possible to use if the sum of the load factors does not exceed 1.

$\Sigma\alpha_n = \alpha_1 + \alpha_2 + \alpha_3 \leq 1$

$\Sigma\alpha_n = \alpha_1 + \alpha_2 + \alpha'_2 + \alpha_3 + \alpha'_3 \leq 1$
$\Sigma\alpha_n = 0.5 + 0.072 + 0.047 + 0.128 + 0.235 = 0.982 \leq 1$
Add it is possible to use.

Table 3: Correction value of moment center position distance: Xn (mm)

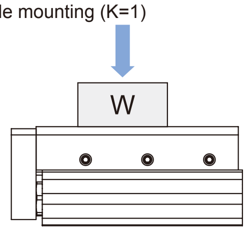
| Tube I.D. (mm) | X1, Stroke (mm) | | | | | | | | | X2 | X3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 75 | 100 | 125 | 150 | | |
| ø6 | 14.5 | 14.5 | 19 | 26.5 | 35.5 | – | – | – | – | 6 | 16 |
| ø8 | 14.5 | 14.5 | 19 | 28.5 | 35.5 | 49 | – | – | – | 8 | 20 |
| ø12 | 23.5 | 23.5 | 23.5 | 27.5 | 33 | 50.5 | 68.5 | – | – | 9.5 | 25 |
| ø16 | 22.5 | 22.5 | 22.5 | 26.5 | 32 | 51.5 | 67.5 | 85 | – | 10.5 | 31 |
| ø20 | 25 | 25 | 25 | 25 | 32.5 | 49.5 | 68.5 | 88.5 | 88.5 | 15.5 | 38 |
| ø25 | 24 | 24 | 24 | 24 | 31.5 | 51.5 | 66.5 | 86.5 | 91.5 | 20.5 | 46 |

Table 4: Max. allowable moment: Mmax (N·m)

| Tube I.D. (mm) | Stroke (mm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 75 | 100 | 125 | 150 |
| ø6 | 0.7 | 1 | 1.1 | 1.1 | 1.1 | – | – | – | – |
| ø8 | 2 | 2 | 2.6 | 3.5 | 3.9 | 3.9 | – | – | – |
| ø12 | 3.9 | 3.9 | 3.9 | 5.5 | 6.8 | 9.6 | 9.6 | – | – |
| ø16 | 9.8 | 9.8 | 9.8 | 9.8 | 12 | 21 | 30 | 30 | – |
| ø20 | 16.4 | 16.4 | 16.4 | 16.4 | 24.2 | 31.4 | 45.5 | 45.5 | 45.5 |
| ø25 | 26.5 | 26.5 | 26.5 | 26.5 | 37.8 | 49.8 | 62.2 | 62.2 | 62.2 |

Fig 3: Workpiece mounting coefficient: K

Table mounting (K=1)




End plate mounting (K=0.6)

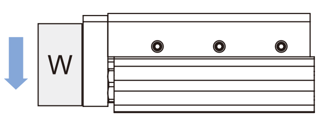
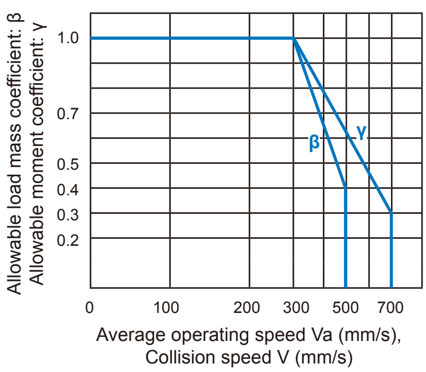



Fig.4: Allowable load mass coefficient: β
Allowable moment coefficient: γ




γ note: Use the average operating speed when calculating static moment. Use the collision speed when calculating dynamic moment.

## Table deflection (Reference values)

**Table displacement due to roll moment load**

Table displacement of section A when loads are applied to the section F with theslide table retracted.

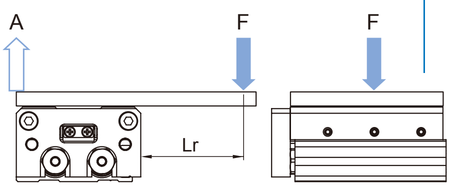



**Table displacement due to yaw moment load**

Table displacement when loads are applied to the section marked with the arrow at the full stroke.

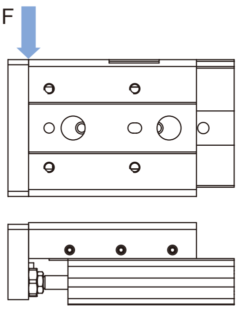
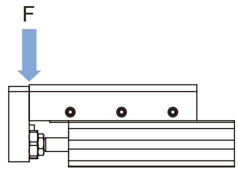
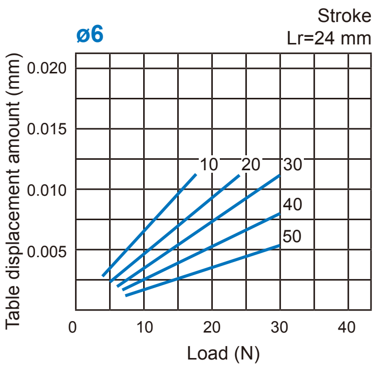
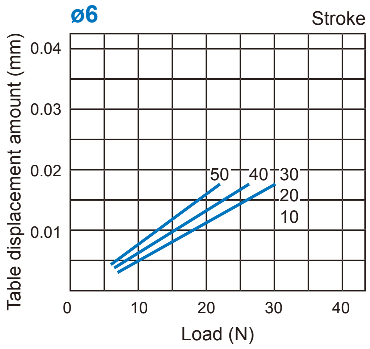


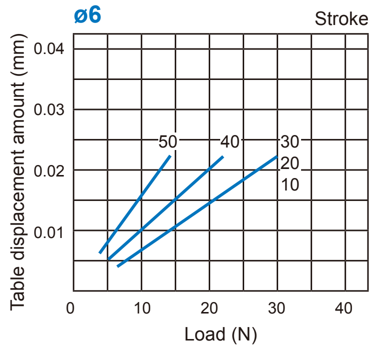

**Table displacement due to pitch moment load**

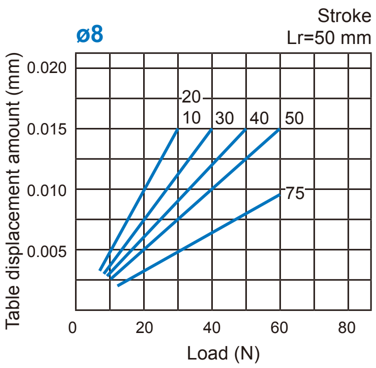
Table displacement when loads are applied to the section marked with the arrow at the full stroke.

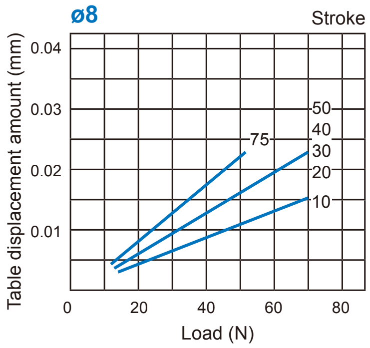


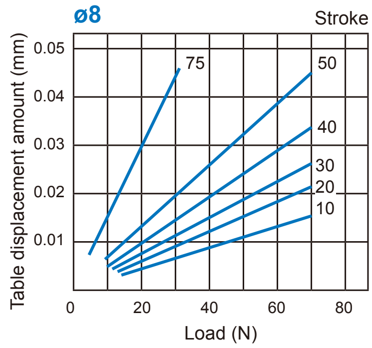



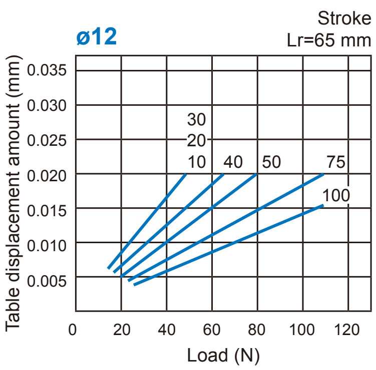



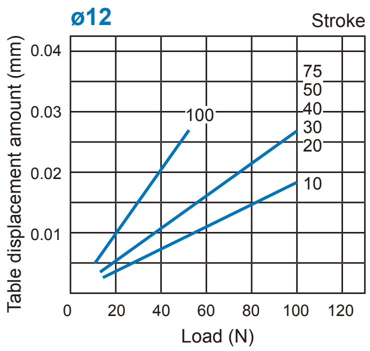



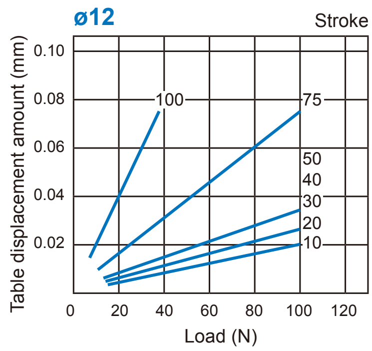



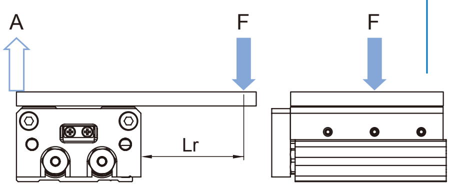



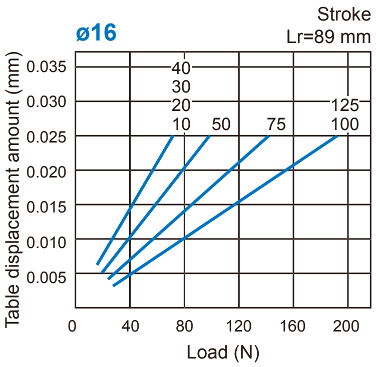



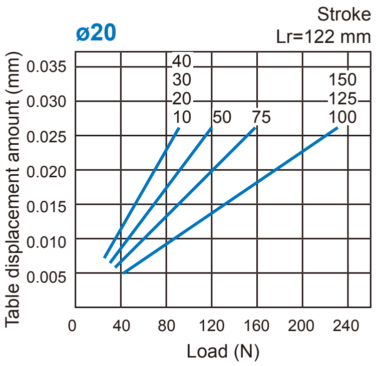
## Table deflection (Reference values)

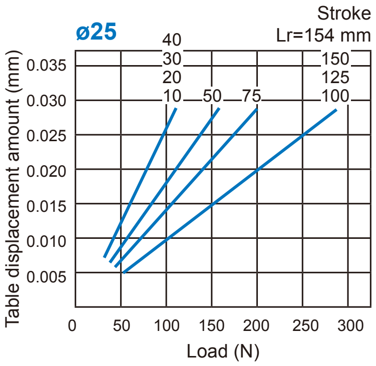
### Table displacement due to roll moment load

Table displacement of section A when loads are applied to the section F with theslide table retracted.



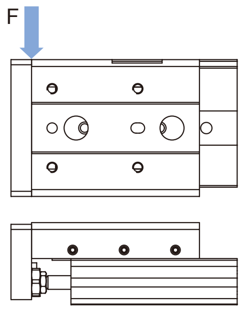



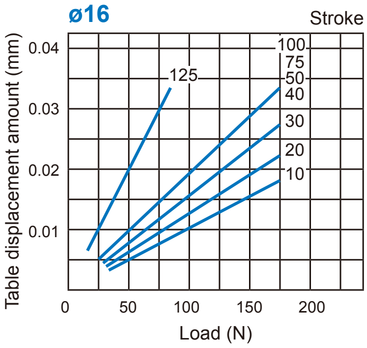



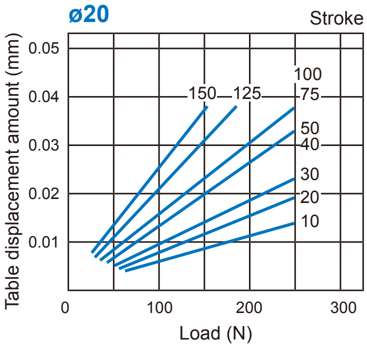



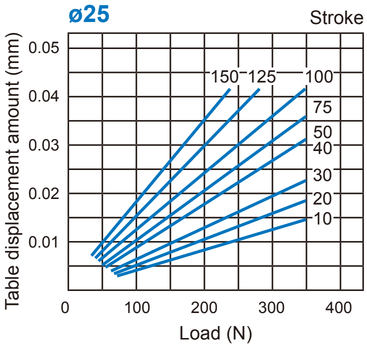

### Table displacement due to yaw moment load

Table displacement when loads are applied to the section marked with the arrow at the full stroke.



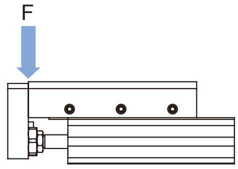



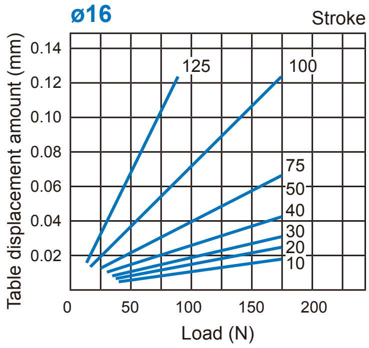



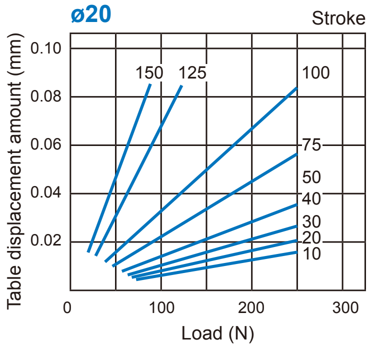



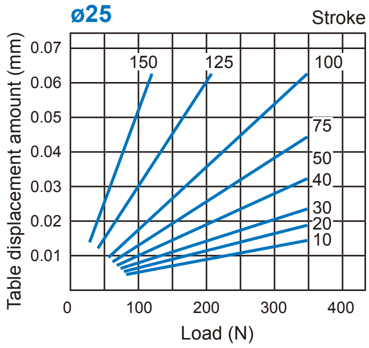

### Table displacement due to pitch moment load

Table displacement when loads are applied to the section marked with the arrow at the full stroke.



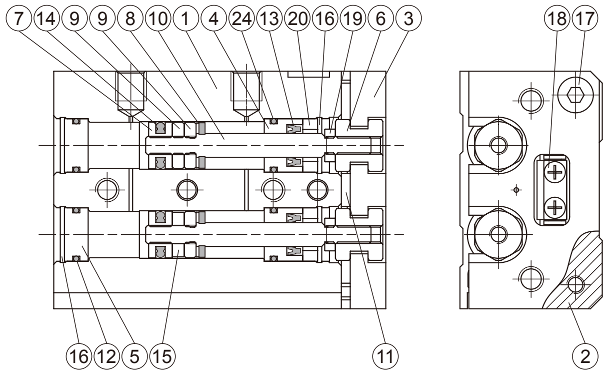



# MCSS Inside structure & Parts list

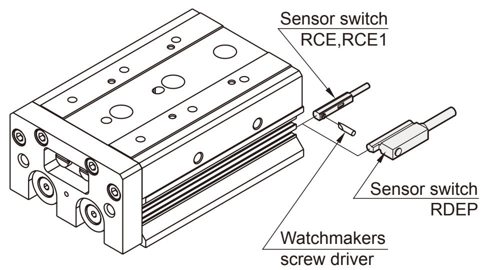
## SLIDE CYLINDER

mindman

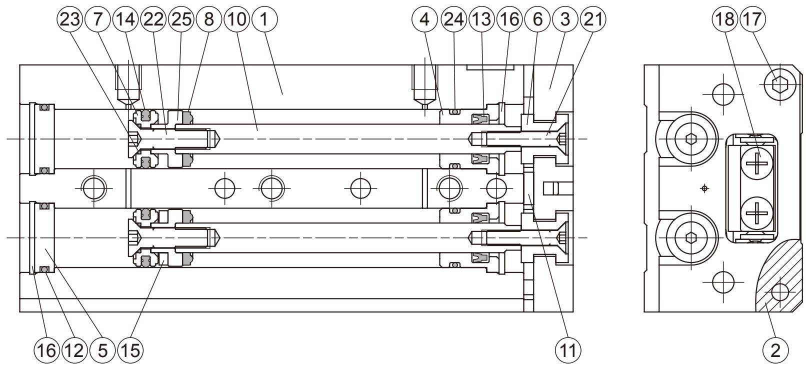
### ø6, ø8




### Installation of sensor switch




### ø12~ø25




### Order example of repair kits

| Tube I.D. | Repair kits |
|---|---|
| ø6 | **PS-MCSS-6** |
| ø8 | **PS-MCSS-8** |
| ø12 | **PS-MCSS-12** |
| ø16 | **PS-MCSS-16** |
| ø20 | **PS-MCSS-20** |
| ø25 | **PS-MCSS-25** |

## Material

*1. Aluminum alloy *2. Stainless steel *3. Spring steel

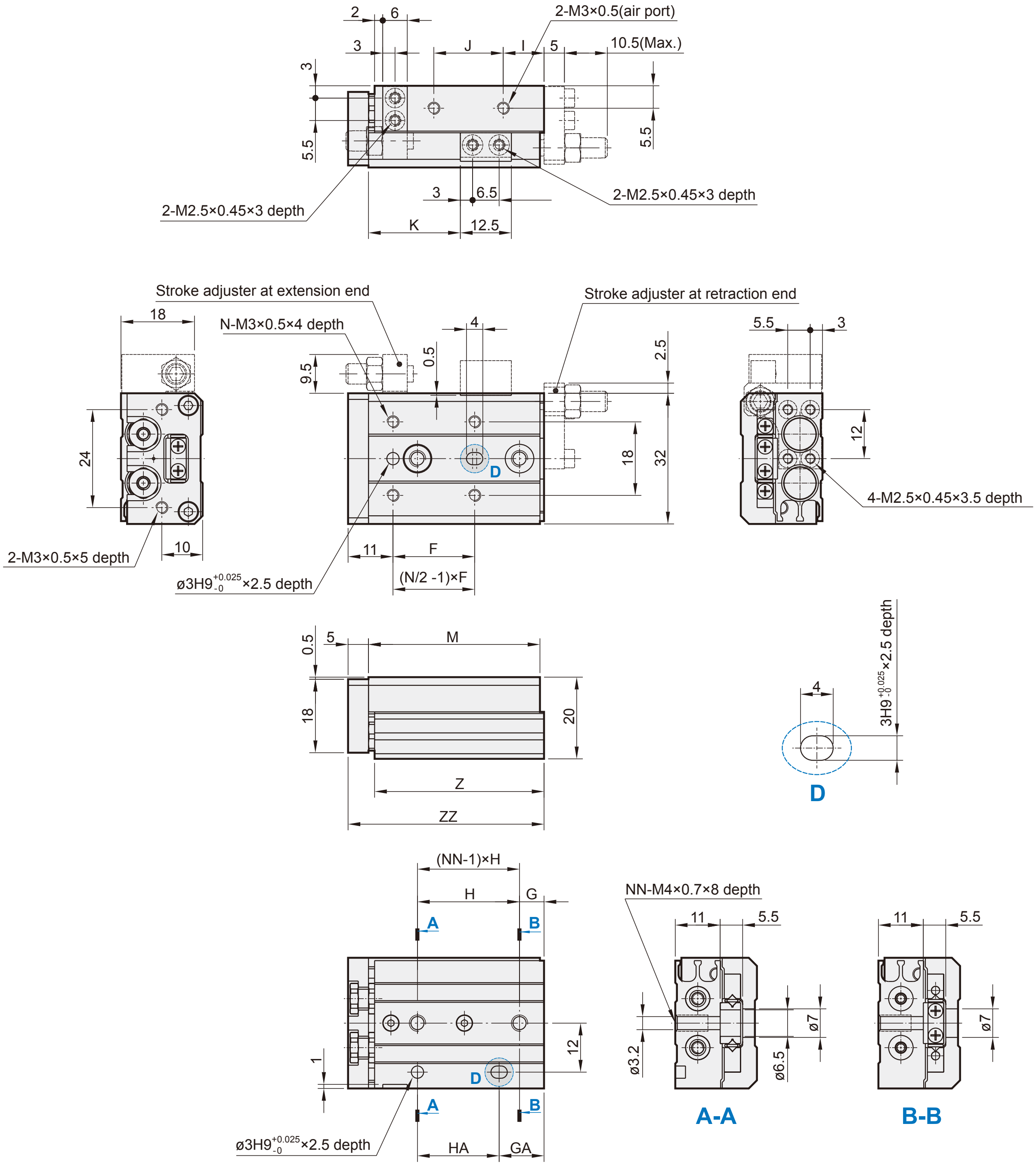
| No. | Tube I.D. / Part name | 6 | 8 | 12~25 | Q'y | Repair kits (inclusion) |
|---|---|---|---|---|---|---|
| **1** | Body | Aluminum alloy | | | 1 | |
| **2** | Table | Aluminum alloy | | | 1 | |
| **3** | Plate | Aluminum alloy | | | 1 | |
| **4** | Rod cover | Aluminum alloy | | | 2 | |
| **5** | Head cover | Aluminum alloy | | | 2 | |
| **6** | Floating connector | Stainless steel | | | 2 | |
| **7** | Piston | Stainless steel | | *1 | 2 | |
| **8** | Cushion pad | NBR | | | 2 | ● |
| **9** | Spacer ring | *1 | *2 | — | 3 | |
| **10** | Piston rod | Stainless steel | | | 2 | |
| **11** | End cushion | PU | | | 1 | ● |
| **12** | Cover ring | NBR | | | 2 | ● |
| **13** | Rod packing | NBR | | | 2 | ● |
| **14** | Piston packing | NBR | | | 2 | ● |
| **15** | Magnet ring | Magnet material | | | 1 | |
| **16** | Snap ring | *3 | Stainless steel | | 4 | |
| **17** | Bolt | Stainless steel | | | 2 or 4 | |
| **18** | Slide way | Bearing steel | | | 1 | |
| **19** | Nut | Stainless steel | | — | 2 | |
| **20** | Rod cover washer | Stainless steel | | — | 2 | |
| **21** | Floating connector bolt | — | | *2 | 2 | |
| **22** | Piston screw | — | | *2 | 2 | |
| **23** | Piston gasket | — | | NBR | 2 | ● |
| **24** | Cover ring | NBR | | | 2 | ● |
| **25** | Piston for magnet ring | — | | *1 | 2 | |

* Item 17. Tube I.D. ø6~16 (Q'y: 2pcs); Tube I.D. ø20, 25 (Q'y: 4pcs).

## Cylinder weight

Unit: g

| Stroke (mm) | Tube I.D. ø6 | ø8 | ø12 | ø16 | ø20 | ø25 |
|---|---|---|---|---|---|---|
| **10** | 89 | 155 | 360 | 576 | 1050 | 1636 |
| **20** | 110 | 166 | 362 | 604 | 1060 | 1650 |
| **30** | 122 | 201 | 369 | 602 | 1092 | 1673 |
| **40** | 161 | 246 | 425 | 674 | 1145 | 1797 |
| **50** | 199 | 281 | 529 | 762 | 1320 | 1989 |
| **75** | – | 394 | 722 | 1095 | 1815 | 2713 |
| **100** | – | – | 960 | 1410 | 2365 | 3260 |
| **125** | – | – | – | 1702 | 2880 | 4260 |
| **150** | – | – | – | – | 3368 | 4530 |

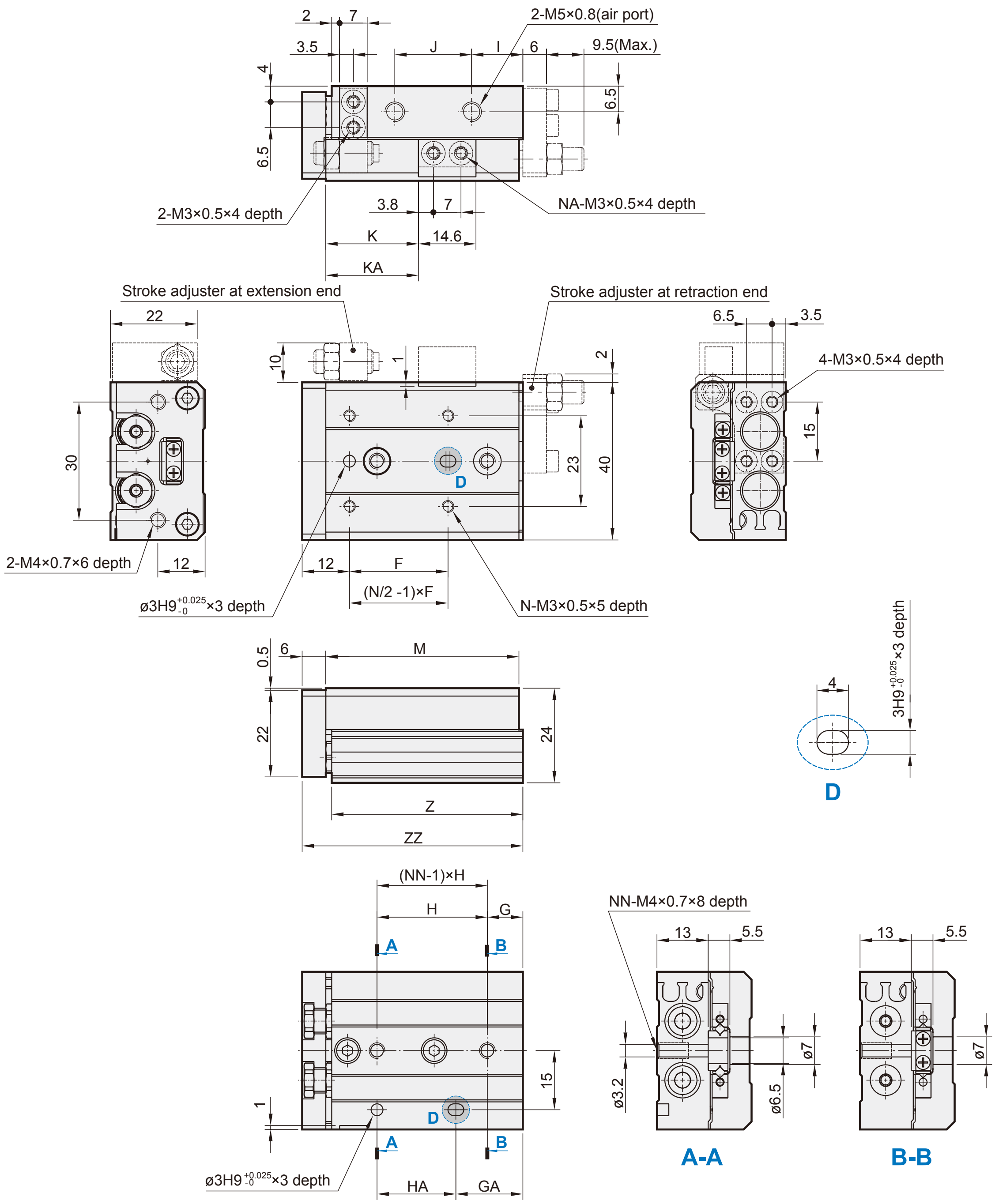



| Code / Stroke | F | G | GA | H | HA | I | J | K | M | N | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 20 | 6 | 11 | 25 | 20 | 10 | 17 | 22.5 | 42 | 4 | 2 | 41.5 | 48 |
| 20 | 30 | 6 | 21 | 35 | 20 | 10 | 27 | 32.5 | 52 | 4 | 2 | 51.5 | 58 |
| 30 | 20 | 11 | 31 | 20 | 20 | 7 | 40 | 42.5 | 62 | 6 | 3 | 61.5 | 68 |
| 40 | 28 | 13 | 43 | 30 | 30 | 19 | 50 | 52.5 | 84 | 6 | 3 | 83.5 | 90 |
| 50 | 38 | 17 | 41 | 24 | 48 | 25 | 60 | 62.5 | 100 | 6 | 4 | 99.5 | 106 |

# MCSS Dimensions ø8

## SLIDE CYLINDER

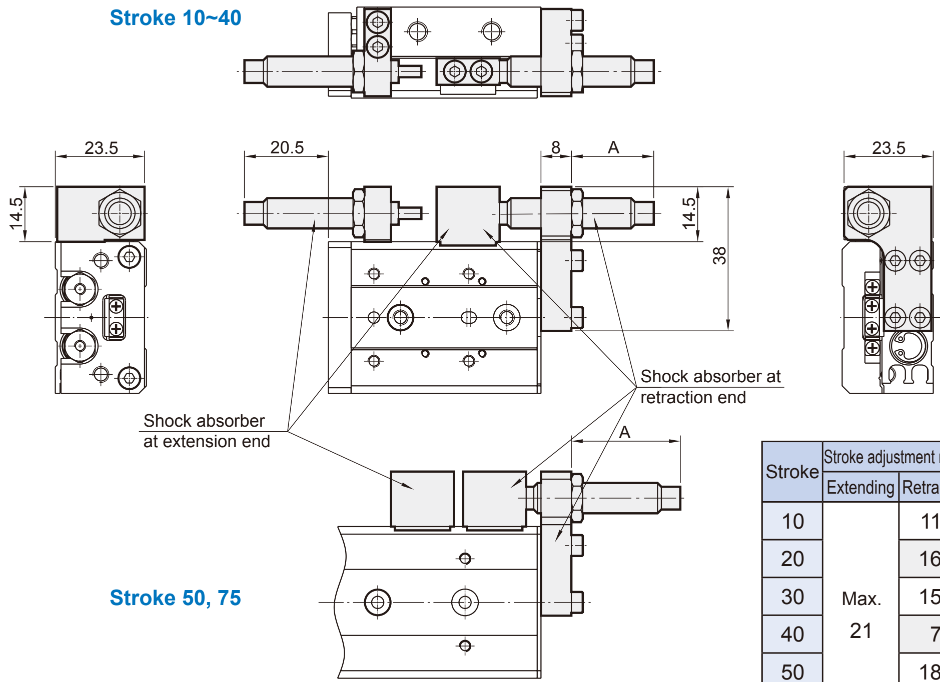
Mindman




| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 25 | 9 | 17 | 28 | 20 | 13 | 19.5 | 23.5 | - | 49 | 4 | 2 | 2 | 48.5 | 56 |
| 20 | 25 | 12 | 12 | 30 | 30 | 8.5 | 29 | 33.5 | - | 54 | 4 | 2 | 2 | 53.5 | 61 |
| 30 | 40 | 13 | 33 | 20 | 20 | 9.5 | 39 | 43.5 | - | 65 | 4 | 2 | 3 | 64.5 | 72 |
| 40 | 50 | 15 | 43 | 28 | 28 | 10.5 | 56 | 53.5 | - | 83 | 4 | 2 | 3 | 82.5 | 90 |
| 50 | 38 | 20 | 43 | 23 | 46 | 24.5 | 60 | 63.5 | 82.5 | 101 | 6 | 4 | 4 | 100.5 | 108 |
| 75 | 50 | 27 | 83 | 28 | 56 | 38.5 | 96 | 88.5 | 132.5 | 151 | 6 | 4 | 5 | 150.5 | 158 |

## ø8

Stroke 10~40



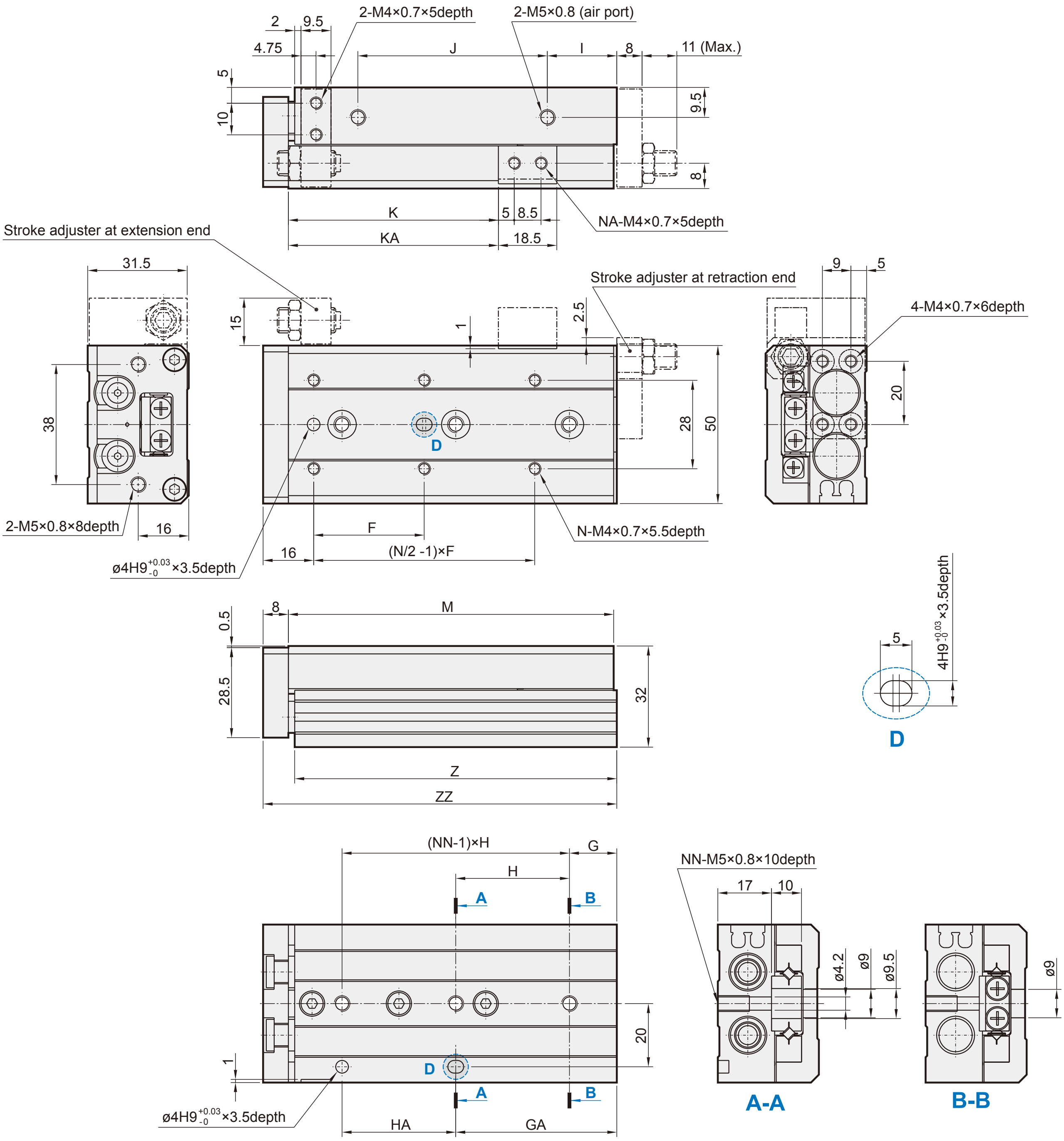

Stroke 50, 75

| Stroke | Stroke adjustment range | | A dimension (Retracted side mounting) |
|---|---|---|---|
| | Extending | Retracting | |
| 10 | Max. 21 | 11.5 | 20.1 |
| 20 | | 16.1 | 25.1 |
| 30 | | 15.1 | 24.1 |
| 40 | | 7.1 | 16.1 |
| 50 | | 18.1 | 27.1 |
| 75 | | 18.1 | 27.1 |

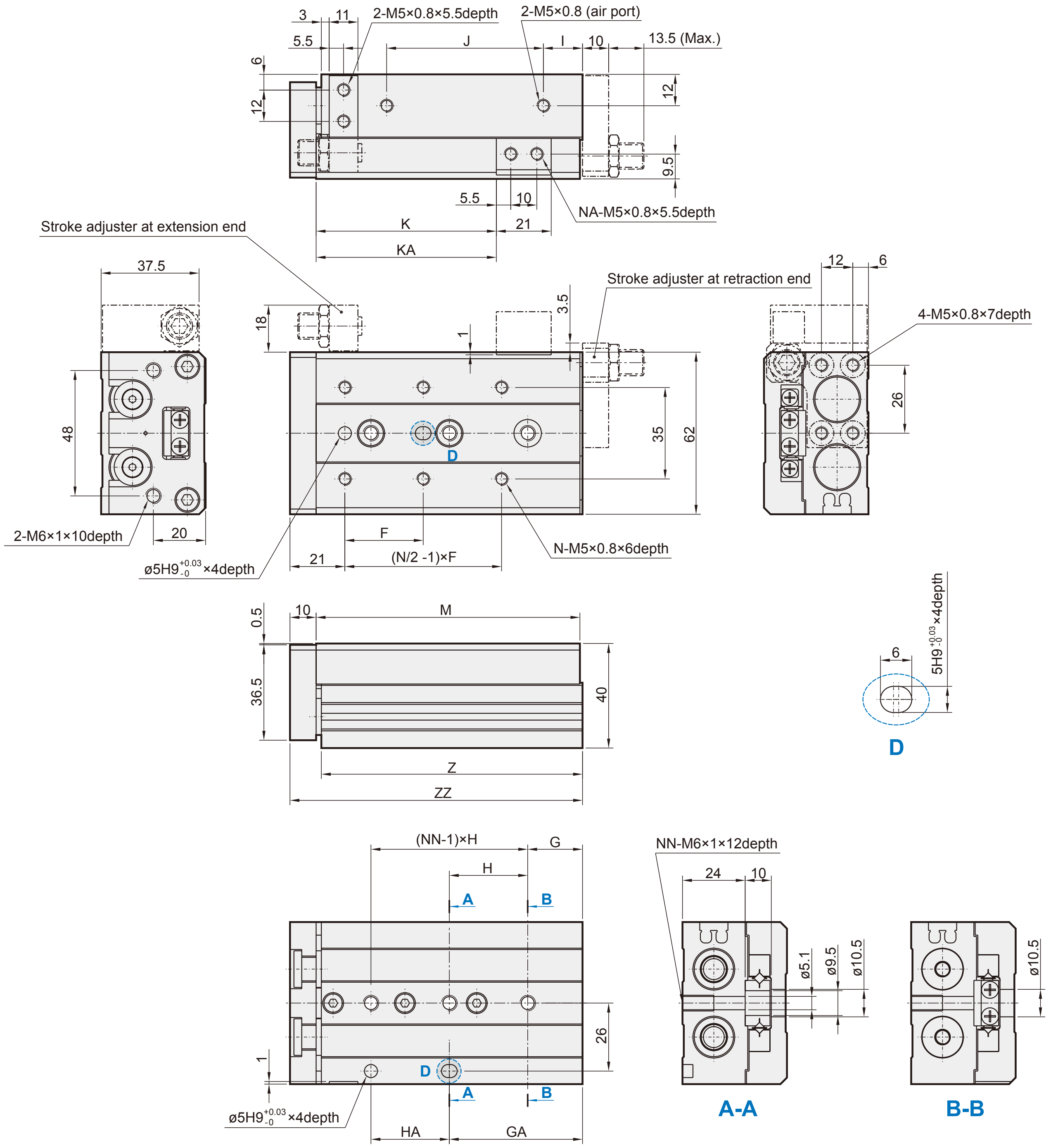
* Other dimensions not indicated are the same as the basic style.

# MCSS Dimensions ø12

## SLIDE CYLINDER

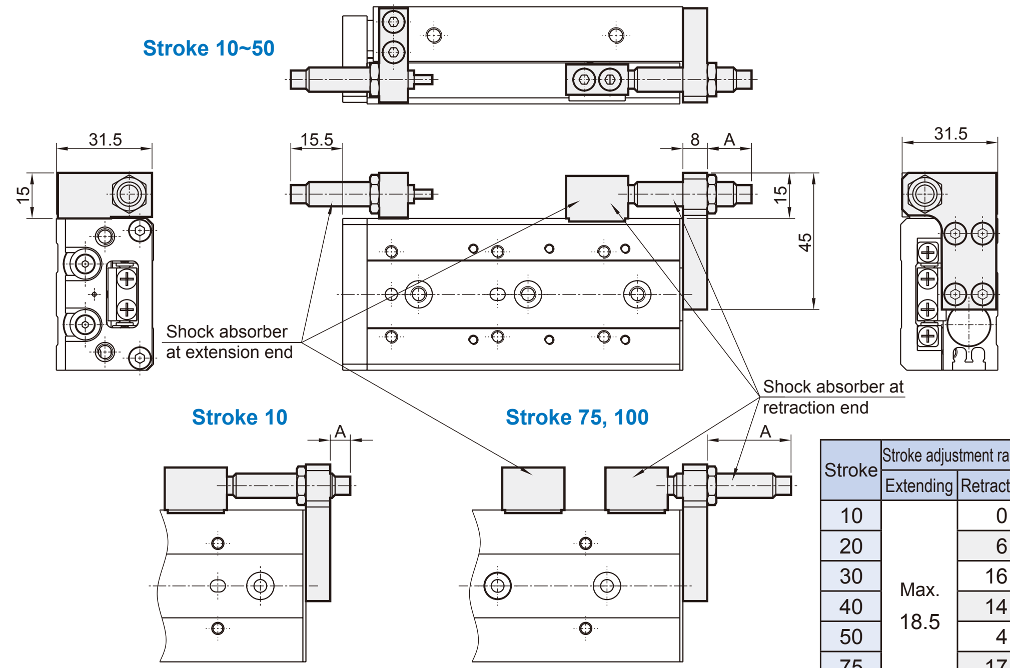



| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 35 | 15 | 15 | 40 | 40 | 10 | 40 | 26.5 | - | 71 | 4 | 2 | 2 | 70 | 80 |
| 20 | 35 | 15 | 15 | 40 | 40 | 10 | 40 | 36.5 | - | 71 | 4 | 2 | 2 | 70 | 80 |
| 30 | 35 | 15 | 15 | 40 | 40 | 10 | 40 | 46.5 | - | 71 | 4 | 2 | 2 | 70 | 80 |
| 40 | 50 | 17 | 42 | 25 | 25 | 10 | 52 | 56.5 | - | 83 | 4 | 2 | 3 | 82 | 92 |
| 50 | 35 | 15 | 51 | 36 | 36 | 22 | 60 | 66.5 | - | 103 | 6 | 2 | 3 | 102 | 112 |
| 75 | 55 | 25 | 61 | 36 | 72 | 43 | 85 | 91.5 | 125.5 | 149 | 6 | 4 | 4 | 148 | 158 |
| 100 | 65 | 35 | 111 | 38 | 76 | 52 | 130 | 116.5 | 179.5 | 203 | 6 | 4 | 5 | 202 | 212 |




| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 35 | 16 | 16 | 40 | 40 | 10 | 40 | 29 | - | 76 | 4 | 2 | 2 | 75 | 87 |
| 20 | 35 | 16 | 16 | 40 | 40 | 10 | 40 | 39 | - | 76 | 4 | 2 | 2 | 75 | 87 |
| 30 | 35 | 16 | 16 | 40 | 40 | 10 | 40 | 49 | - | 76 | 4 | 2 | 2 | 75 | 87 |
| 40 | 40 | 16 | 16 | 50 | 50 | 10 | 50 | 59 | - | 86 | 4 | 2 | 2 | 85 | 97 |
| 50 | 30 | 21 | 51 | 30 | 30 | 15 | 60 | 69 | - | 101 | 6 | 2 | 3 | 100 | 112 |
| 75 | 55 | 26 | 61 | 35 | 70 | 40 | 85 | 94 | 125 | 151 | 6 | 4 | 4 | 150 | 162 |
| 100 | 65 | 39 | 109 | 35 | 70 | 55 | 118 | 119 | 173 | 199 | 6 | 4 | 5 | 198 | 210 |
| 125 | 70 | 19 | 159 | 35 | 70 | 68 | 155 | 144 | 223 | 249 | 8 | 4 | 7 | 248 | 260 |

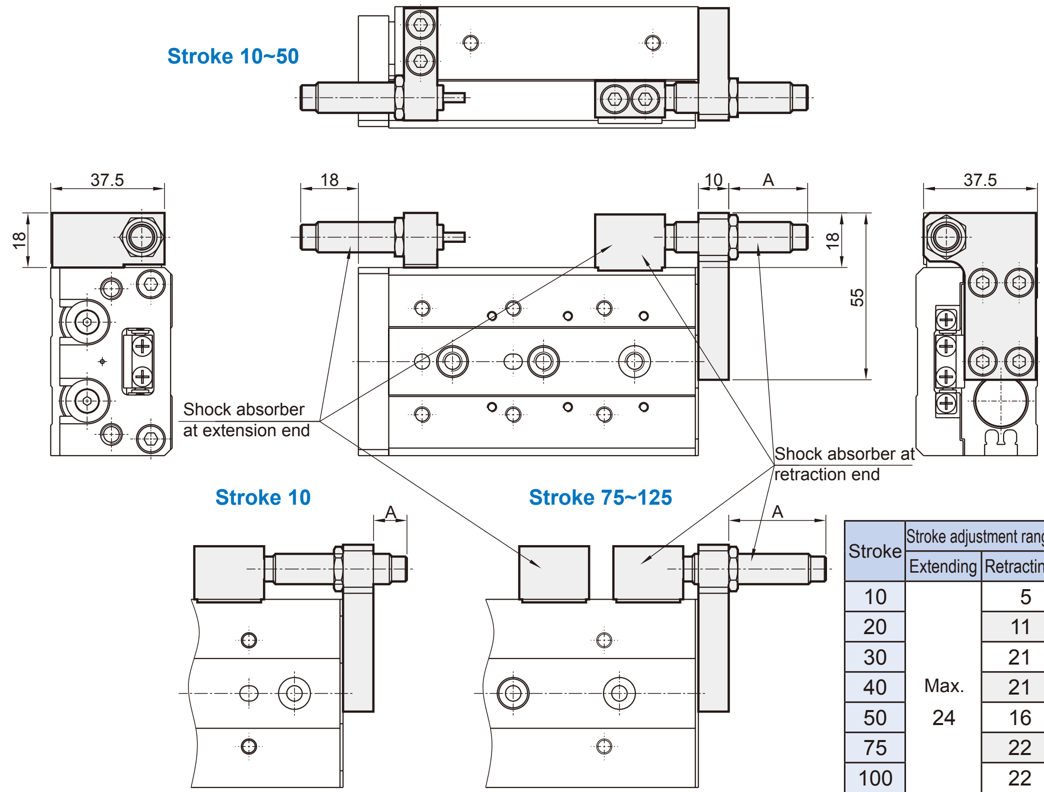
## ø12




| Stroke | Stroke adjustment range | | A dimension (Retracted side mounting) |
|---|---|---|---|
| | Extending | Retracting | |
| 10 | Max. 18.5 | 0 | 5 |
| 20 | | 6 | 15 |
| 30 | | 16 | 25 |
| 40 | | 14 | 23 |
| 50 | | 4 | 13 |
| 75 | | 17 | 26 |
| 100 | | 17 | 26 |

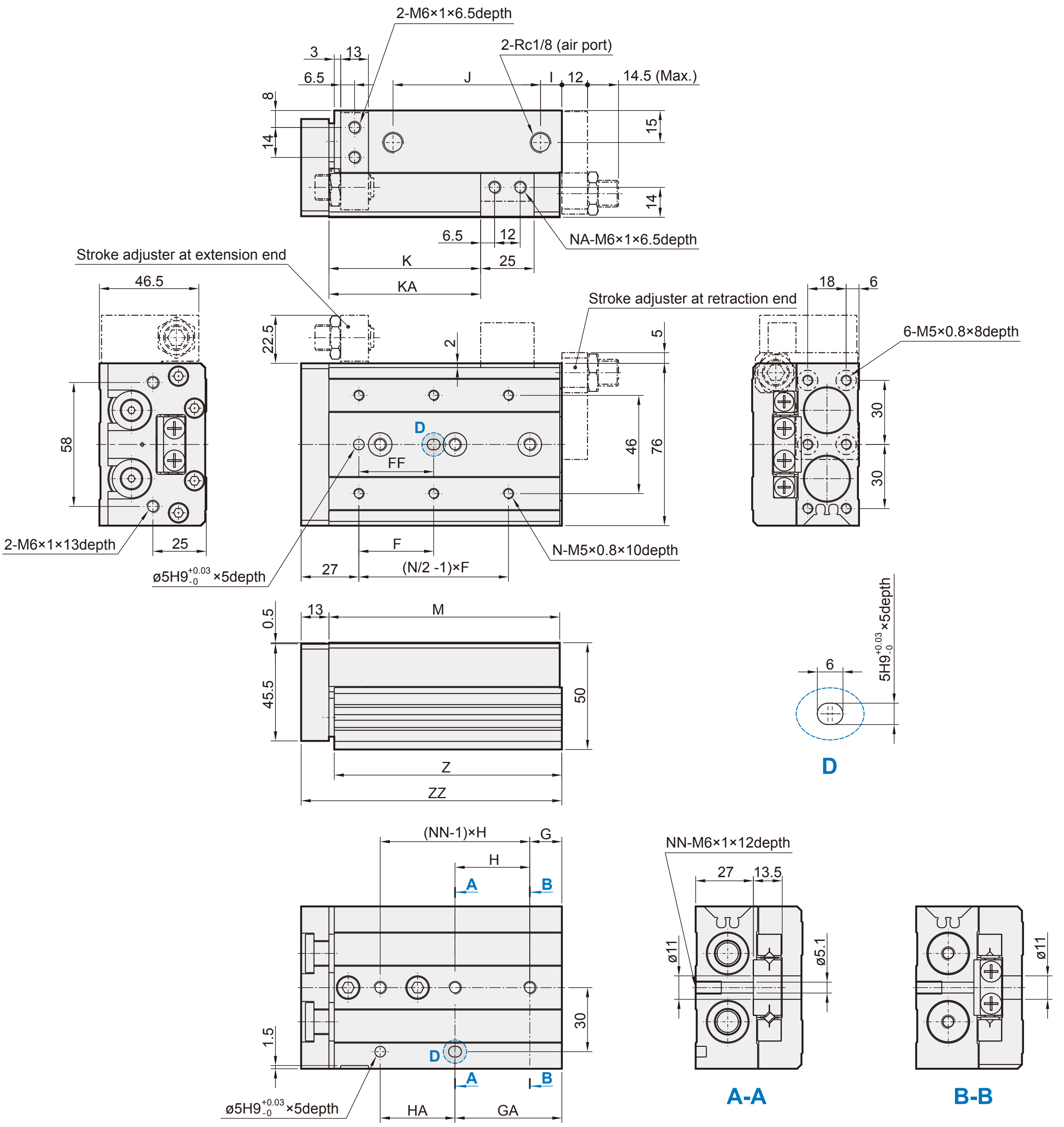
* Other dimensions not indicated are the same as the basic style.

## ø16




| Stroke | Stroke adjustment range | | A dimension (Retracted side mounting) |
|---|---|---|---|
| | Extending | Retracting | |
| 10 | Max. 24 | 5 | 10 |
| 20 | | 11 | 20 |
| 30 | | 21 | 30 |
| 40 | | 21 | 30 |
| 50 | | 16 | 25 |
| 75 | | 22 | 31 |
| 100 | | 22 | 31 |
| 125 | | 22 | 31 |

* Other dimensions not indicated are the same as the basic style.

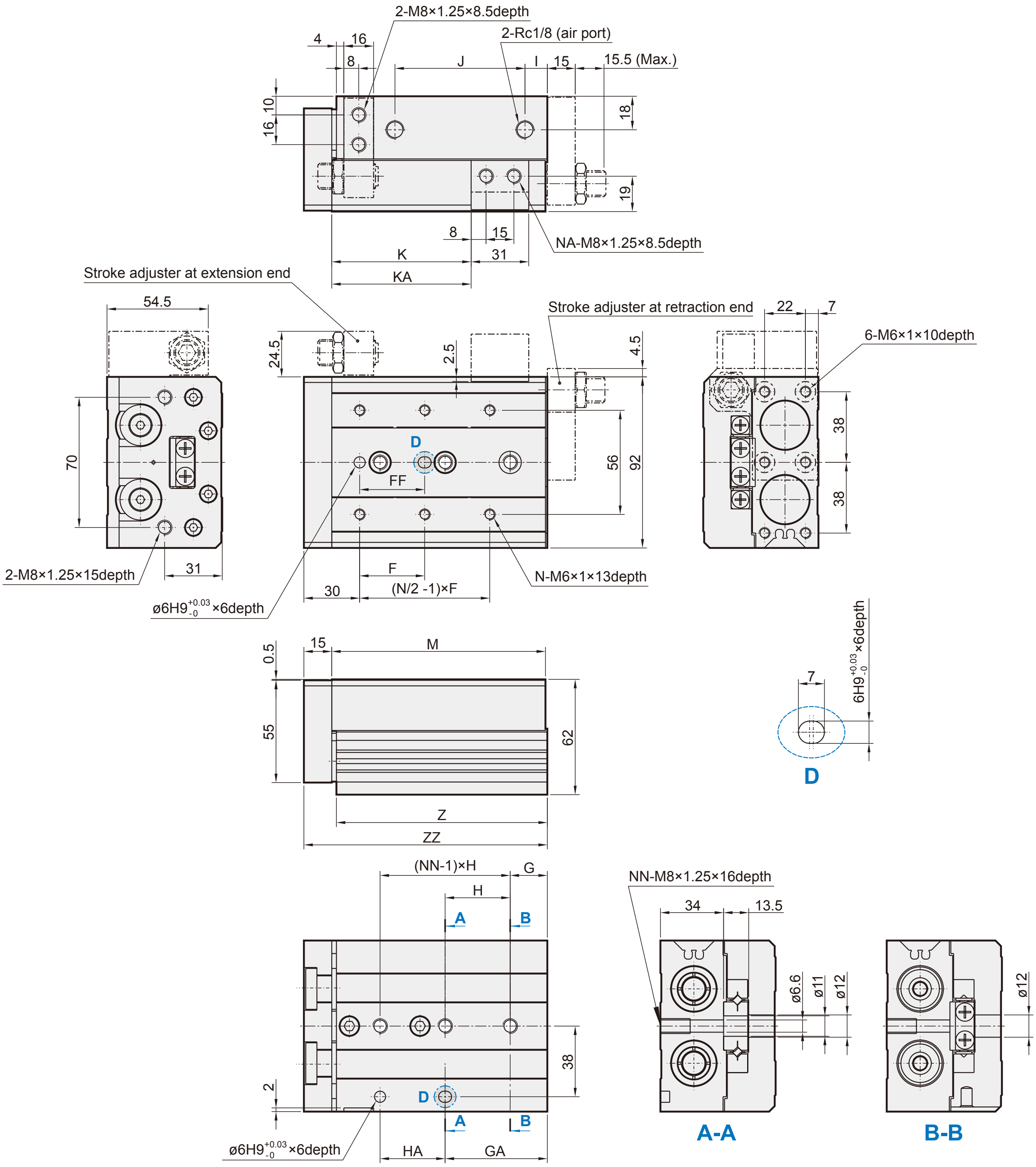



| Code / Stroke | F | FF | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 50 | 40 | 15 | 25 | 45 | 35 | 10 | 44 | 31 | - | 83 | 4 | 2 | 2 | 81.5 | 97 |
| 20 | 50 | 40 | 15 | 25 | 45 | 35 | 10 | 44 | 41 | - | 83 | 4 | 2 | 2 | 81.5 | 97 |
| 30 | 50 | 40 | 15 | 25 | 45 | 35 | 10 | 44 | 51 | - | 83 | 4 | 2 | 2 | 81.5 | 97 |
| 40 | 60 | 50 | 15 | 35 | 55 | 35 | 10 | 54 | 61 | - | 93 | 4 | 2 | 2 | 91.5 | 107 |
| 50 | 35 | 35 | 15 | 50 | 35 | 35 | 10 | 69 | 71 | - | 108 | 6 | 2 | 3 | 106.5 | 122 |
| 75 | 60 | 60 | 19 | 54 | 35 | 70 | 10 | 108 | 96 | - | 147 | 6 | 2 | 4 | 145.5 | 161 |
| 100 | 70 | 70 | 37 | 107 | 35 | 70 | 58 | 113 | 121 | 169 | 200 | 6 | 4 | 5 | 198.5 | 214 |
| 125 | 70 | 70 | 41 | 155 | 38 | 76 | 70 | 155 | 146 | 223 | 254 | 8 | 4 | 6 | 252.5 | 268 |
| 150 | 80 | 80 | 19 | 195 | 44 | 88 | 87 | 190 | 171 | 275 | 306 | 8 | 4 | 7 | 304.5 | 320 |

# MCSS Dimensions ø25

## SLIDE CYLINDER

Mindman

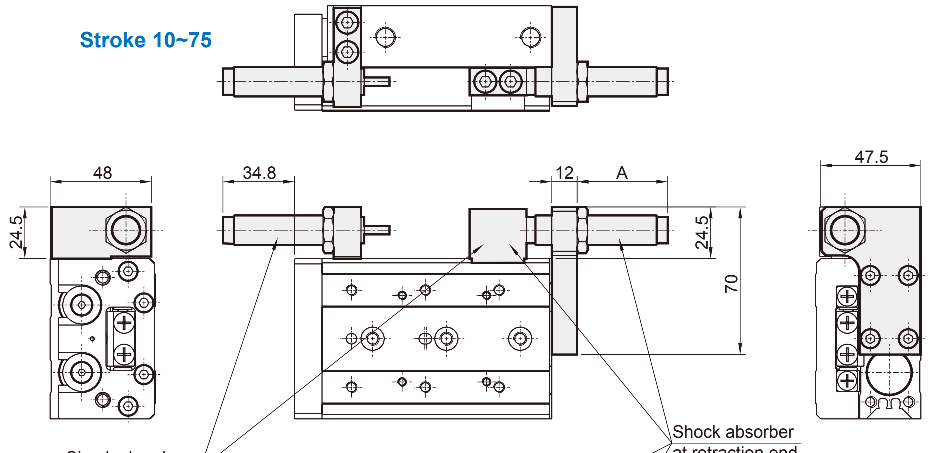


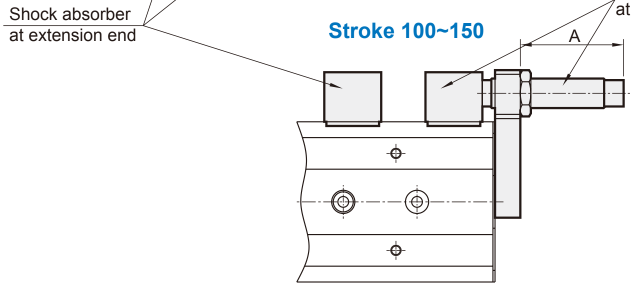

| Code / Stroke | F | FF | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 50 | 40 | 22 | 22 | 45 | 45 | 12 | 47 | 35 | - | 92 | 4 | 2 | 2 | 90.5 | 108 |
| 20 | 50 | 40 | 22 | 22 | 45 | 45 | 12 | 47 | 45 | - | 92 | 4 | 2 | 2 | 90.5 | 108 |
| 30 | 50 | 40 | 22 | 22 | 45 | 45 | 12 | 47 | 55 | - | 92 | 4 | 2 | 2 | 90.5 | 108 |
| 40 | 60 | 50 | 22 | 22 | 55 | 55 | 12 | 57 | 65 | - | 102 | 4 | 2 | 2 | 100.5 | 118 |
| 50 | 35 | 35 | 20 | 55 | 35 | 35 | 12 | 70 | 75 | - | 115 | 6 | 2 | 3 | 113.5 | 131 |
| 75 | 60 | 60 | 26 | 61 | 35 | 70 | 33 | 90 | 100 | - | 156 | 6 | 2 | 4 | 154.5 | 172 |
| 100 | 70 | 70 | 32 | 102 | 35 | 70 | 50 | 114 | 125 | 162 | 197 | 6 | 4 | 5 | 195.5 | 213 |
| 125 | 75 | 75 | 40 | 154 | 38 | 76 | 67 | 155 | 150 | 218 | 255 | 8 | 4 | 6 | 253.5 | 271 |
| 150 | 80 | 80 | 30 | 190 | 40 | 80 | 82 | 180 | 175 | 258 | 295 | 8 | 4 | 7 | 293.5 | 311 |

# MCSS Dimensions – With shock absorber ø20, ø25

## SLIDE CYLINDER

### ø20

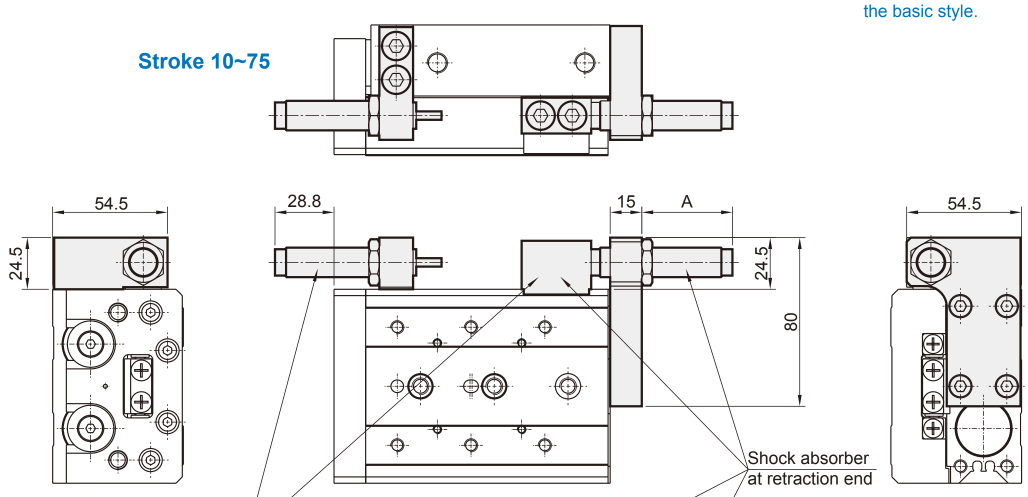


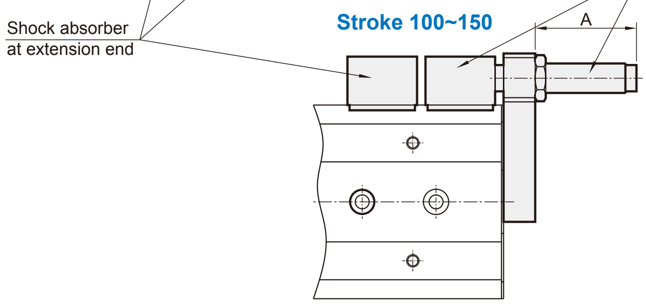




| Stroke | Stroke adjustment range | | A dimension |
|---|---|---|---|
| | Extending | Retracting | (Retracted side mounting) |
| 10 | Max. 40.3 | 15.8 | 28.8 |
| 20 | | 25.8 | 38.8 |
| 30 | | 35.8 | 48.8 |
| 40 | | 35.8 | 48.8 |
| 50 | | 30.8 | 43.8 |
| 75 | | 16.8 | 29.8 |
| 100 | | 36.8 | 49.8 |
| 125 | | 36.8 | 49.8 |
| 150 | | 36.8 | 49.8 |

* Other dimensions not indicated are the same as the basic style.

### ø25




| Stroke | Stroke adjustment range | | A dimension |
|---|---|---|---|
| | Extending | Retracting | (Retracted side mounting) |
| 10 | Max. 36.3 | 12.8 | 26.8 |
| 20 | | 22.8 | 36.8 |
| 30 | | 32.8 | 46.8 |
| 40 | | 32.8 | 46.8 |
| 50 | | 29.8 | 43.8 |
| 75 | | 13.8 | 27.8 |
| 100 | | 34.8 | 48.8 |
| 125 | | 32.8 | 46.8 |
| 150 | | 32.8 | 46.8 |

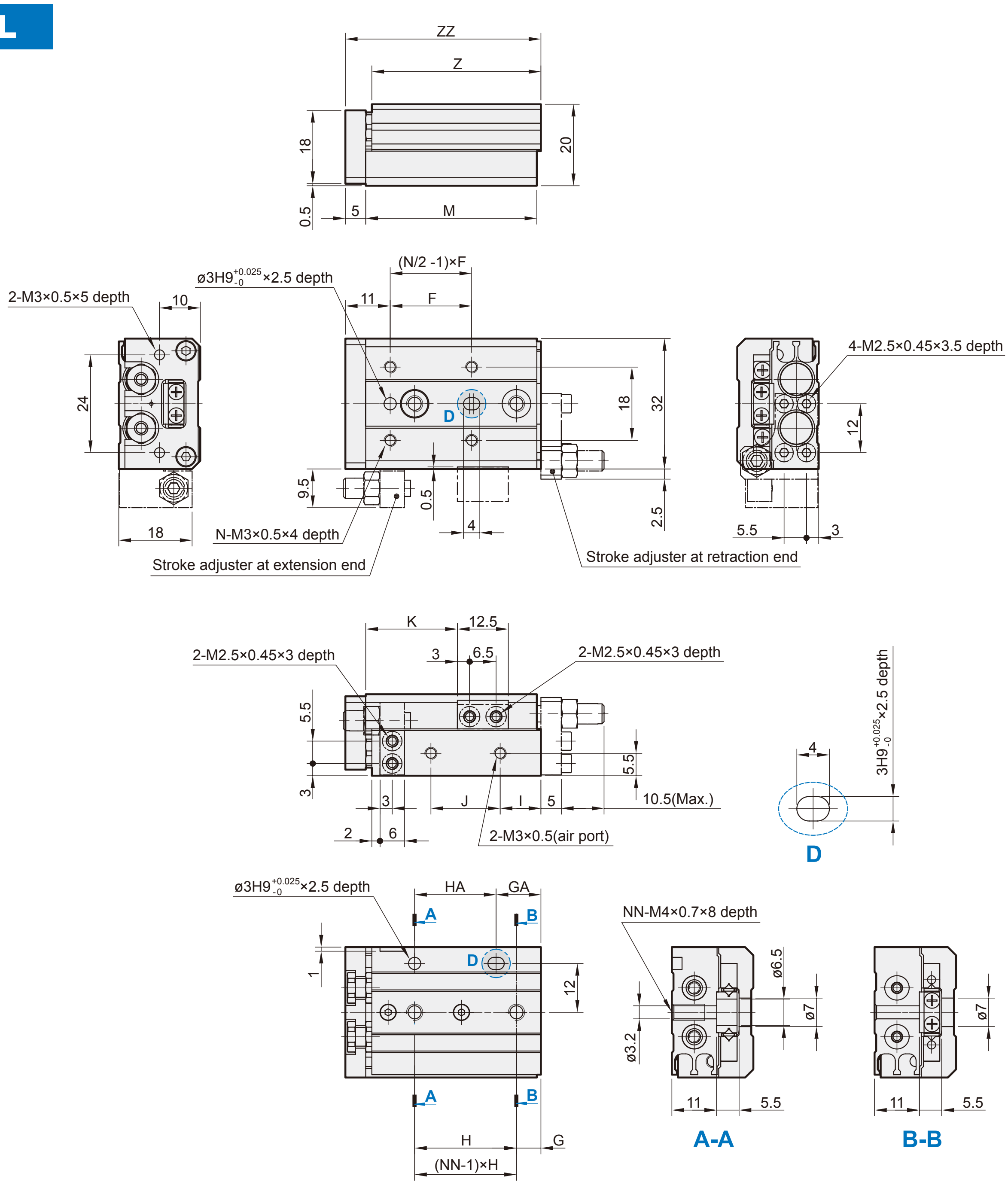
* Other dimensions not indicated are the same as the basic style.

# MCSS Dimensions – Symmetric style ø6

## SLIDE CYLINDER

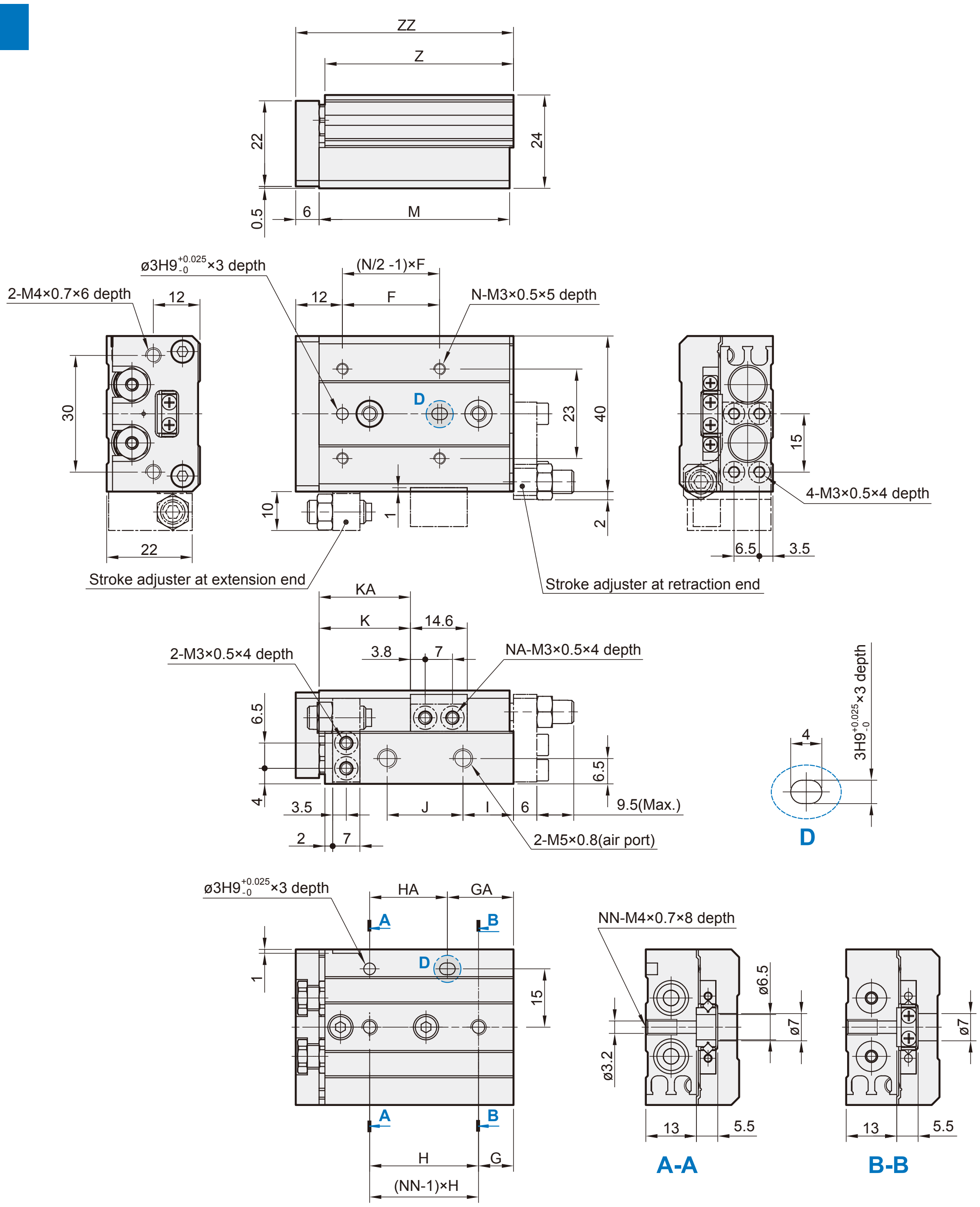
mindman

**L**




| Code / Stroke | F | G | GA | H | HA | I | J | K | M | N | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 20 | 6 | 11 | 25 | 20 | 10 | 17 | 22.5 | 42 | 4 | 2 | 41.5 | 48 |
| 20 | 30 | 6 | 21 | 35 | 20 | 10 | 27 | 32.5 | 52 | 4 | 2 | 51.5 | 58 |
| 30 | 20 | 11 | 31 | 20 | 20 | 7 | 40 | 42.5 | 62 | 6 | 3 | 61.5 | 68 |
| 40 | 28 | 13 | 43 | 30 | 30 | 19 | 50 | 52.5 | 84 | 6 | 3 | 83.5 | 90 |
| 50 | 38 | 17 | 41 | 24 | 48 | 25 | 60 | 62.5 | 100 | 6 | 4 | 99.5 | 106 |

## L



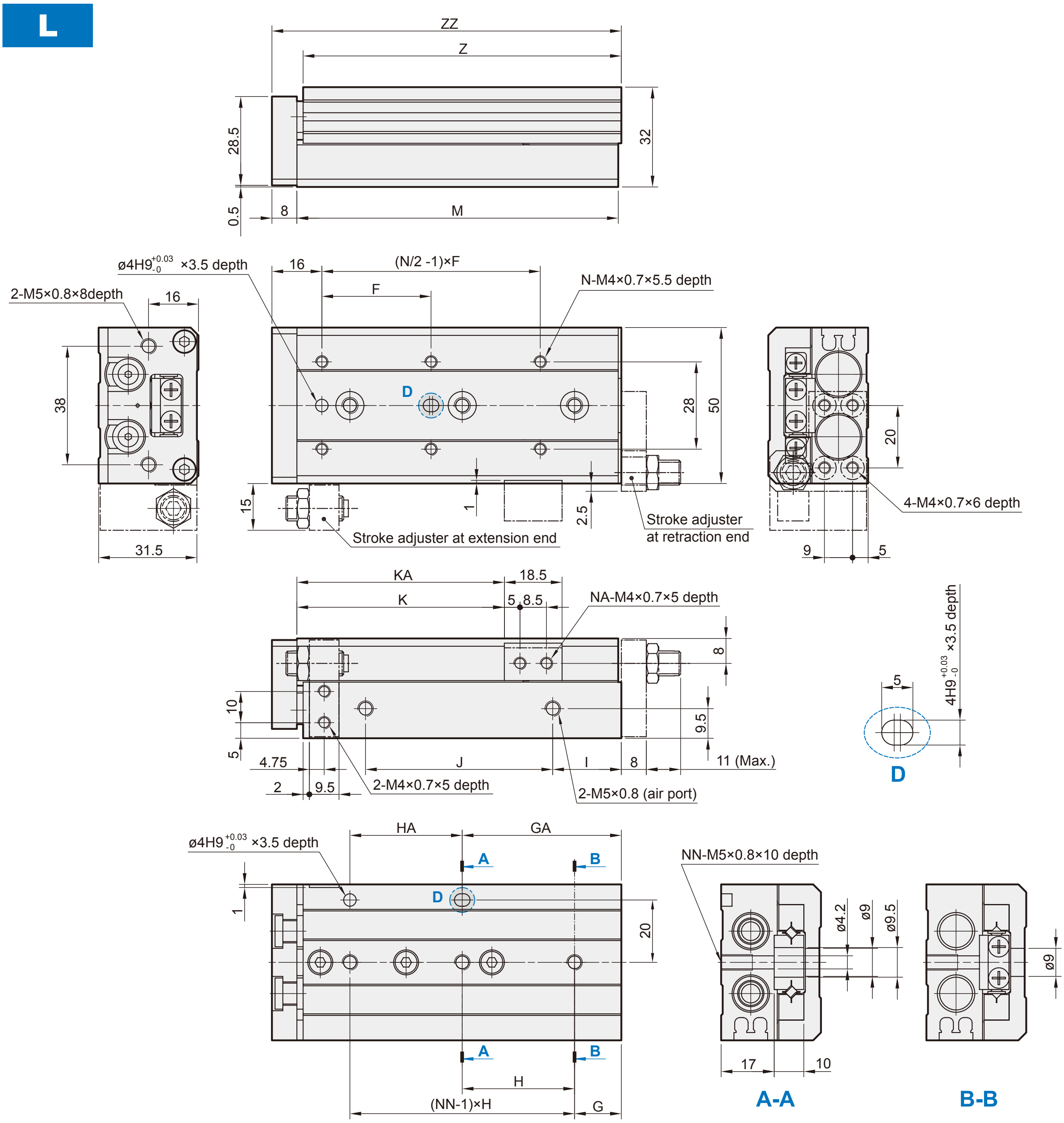

| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 25 | 9 | 17 | 28 | 20 | 13 | 19.5 | 23.5 | – | 49 | 4 | 2 | 2 | 48.5 | 56 |
| 20 | 25 | 12 | 12 | 30 | 30 | 8.5 | 29 | 33.5 | – | 54 | 4 | 2 | 2 | 53.5 | 61 |
| 30 | 40 | 13 | 33 | 20 | 20 | 9.5 | 39 | 43.5 | – | 65 | 4 | 2 | 3 | 64.5 | 72 |
| 40 | 50 | 15 | 43 | 28 | 28 | 10.5 | 56 | 53.5 | – | 83 | 4 | 2 | 3 | 82.5 | 90 |
| 50 | 38 | 20 | 43 | 23 | 46 | 24.5 | 60 | 63.5 | 82.5 | 101 | 6 | 4 | 4 | 100.5 | 108 |
| 75 | 50 | 27 | 83 | 28 | 56 | 38.5 | 96 | 88.5 | 132.5 | 151 | 6 | 4 | 5 | 150.5 | 158 |

Standard cylinder
Compact cylinder
Mini cylinder
Guide cylinder
Table
Rodless cylinder
Stopper cylinder
Auxiliary Equipment

# MCSS Dimensions – Symmetric style ø12

## SLIDE CYLINDER

**L**

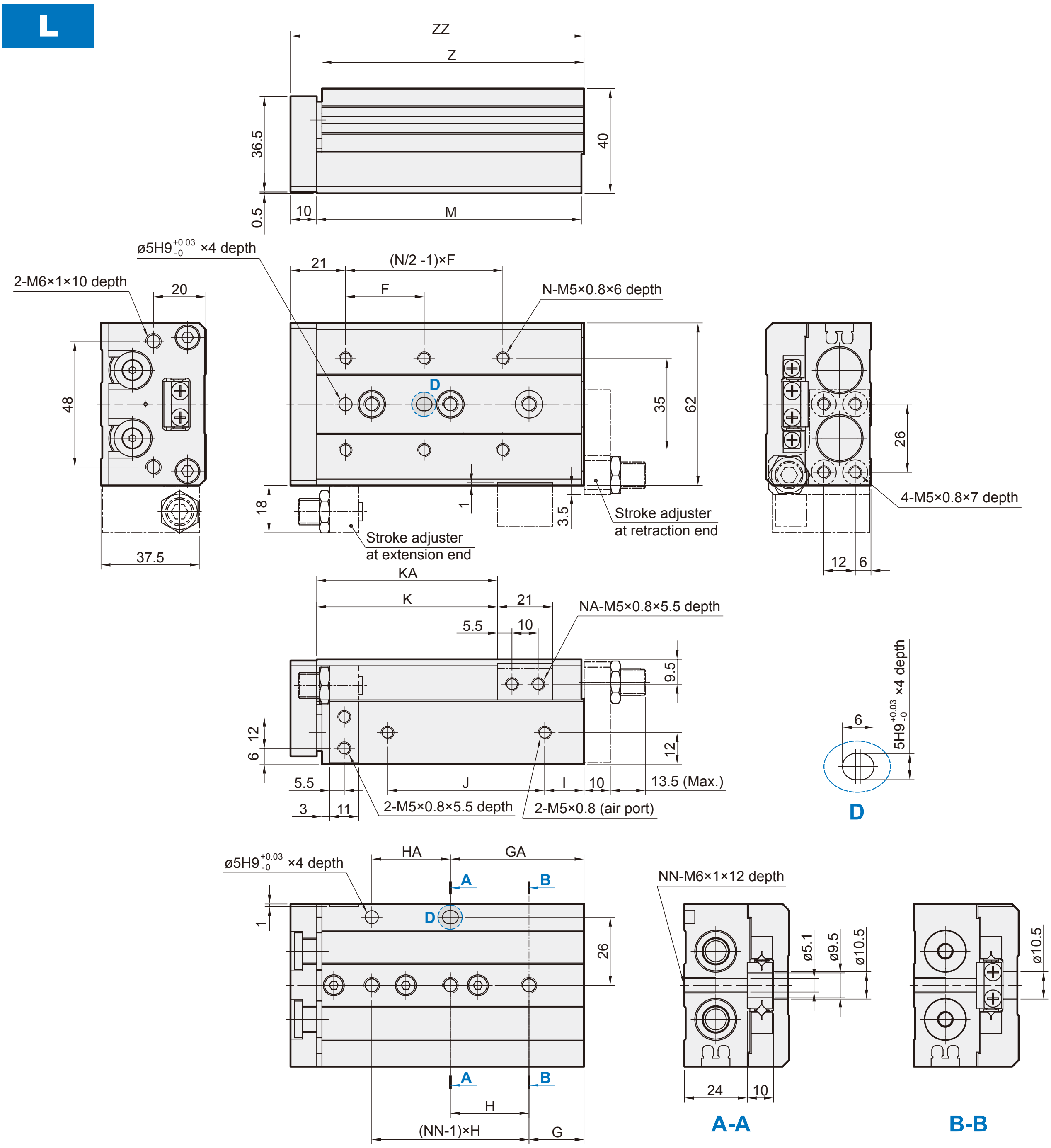



| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 35 | 15 | 15 | 40 | 40 | 10 | 40 | 26.5 | – | 71 | 4 | 2 | 2 | 70 | 80 |
| 20 | 35 | 15 | 15 | 40 | 40 | 10 | 40 | 36.5 | – | 71 | 4 | 2 | 2 | 70 | 80 |
| 30 | 35 | 15 | 15 | 40 | 40 | 10 | 40 | 46.5 | – | 71 | 4 | 2 | 2 | 70 | 80 |
| 40 | 50 | 17 | 42 | 25 | 25 | 10 | 52 | 56.5 | – | 83 | 4 | 2 | 3 | 82 | 92 |
| 50 | 35 | 15 | 51 | 36 | 36 | 22 | 60 | 66.5 | – | 103 | 6 | 2 | 3 | 102 | 112 |
| 75 | 55 | 25 | 61 | 36 | 72 | 43 | 85 | 91.5 | 125.5 | 149 | 6 | 4 | 4 | 148 | 158 |
| 100 | 65 | 35 | 111 | 38 | 76 | 52 | 130 | 116.5 | 179.5 | 203 | 6 | 4 | 5 | 202 | 212 |

# MCSS Dimensions – Symmetric style ø16

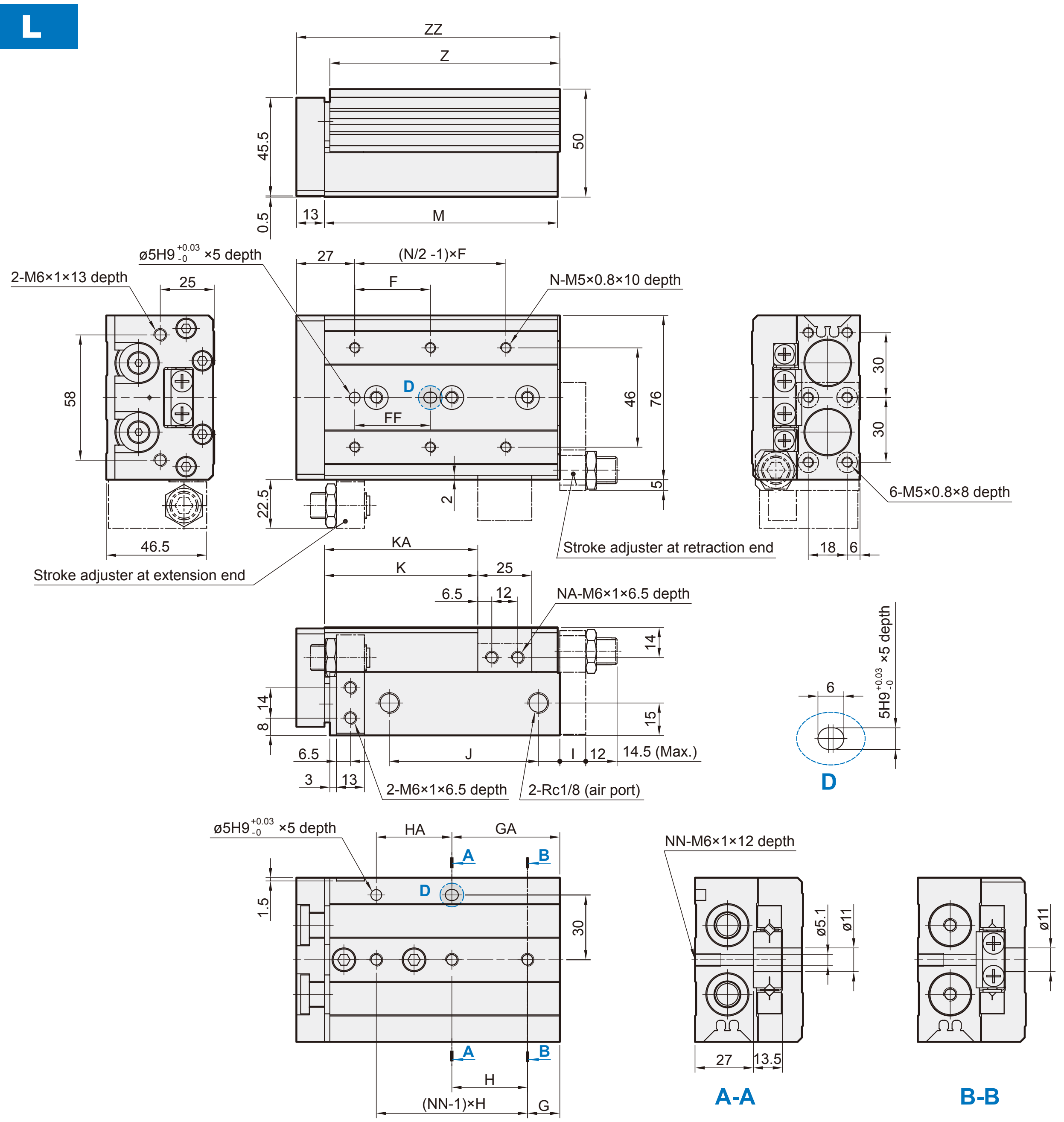
## SLIDE CYLINDER

**L**



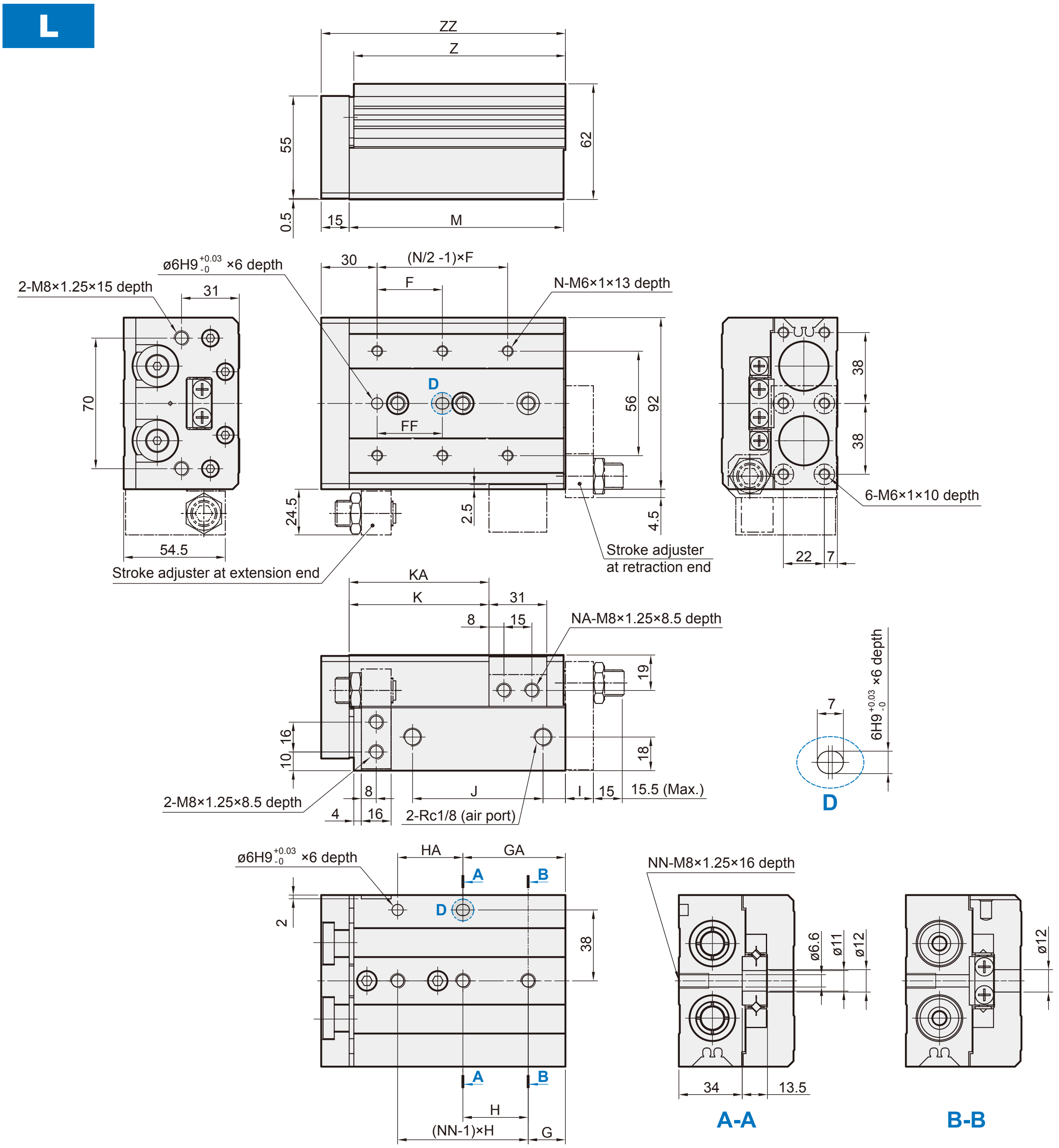

| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 35 | 16 | 16 | 40 | 40 | 10 | 40 | 29 | – | 76 | 4 | 2 | 2 | 75 | 87 |
| 20 | 35 | 16 | 16 | 40 | 40 | 10 | 40 | 39 | – | 76 | 4 | 2 | 2 | 75 | 87 |
| 30 | 35 | 16 | 16 | 40 | 40 | 10 | 40 | 49 | – | 76 | 4 | 2 | 2 | 75 | 87 |
| 40 | 40 | 16 | 16 | 50 | 50 | 10 | 50 | 59 | – | 86 | 4 | 2 | 2 | 85 | 97 |
| 50 | 30 | 21 | 51 | 30 | 30 | 15 | 60 | 69 | – | 101 | 6 | 2 | 3 | 100 | 112 |
| 75 | 55 | 26 | 61 | 35 | 70 | 40 | 85 | 94 | 125 | 151 | 6 | 4 | 4 | 150 | 162 |
| 100 | 65 | 39 | 109 | 35 | 70 | 55 | 118 | 119 | 173 | 199 | 6 | 4 | 5 | 198 | 210 |
| 125 | 70 | 19 | 159 | 35 | 70 | 68 | 155 | 144 | 223 | 249 | 8 | 4 | 7 | 248 | 260 |

## L




| Code / Stroke | F | FF | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 50 | 40 | 15 | 25 | 45 | 35 | 10 | 44 | 31 | – | 83 | 4 | 2 | 2 | 81.5 | 97 |
| 20 | 50 | 40 | 15 | 25 | 45 | 35 | 10 | 44 | 41 | – | 83 | 4 | 2 | 2 | 81.5 | 97 |
| 30 | 50 | 40 | 15 | 25 | 45 | 35 | 10 | 44 | 51 | – | 83 | 4 | 2 | 2 | 81.5 | 97 |
| 40 | 60 | 50 | 15 | 35 | 55 | 35 | 10 | 54 | 61 | – | 93 | 4 | 2 | 2 | 91.5 | 107 |
| 50 | 35 | 35 | 15 | 50 | 35 | 35 | 10 | 69 | 71 | – | 108 | 6 | 2 | 3 | 106.5 | 122 |
| 75 | 60 | 60 | 19 | 54 | 35 | 70 | 10 | 108 | 96 | – | 147 | 6 | 2 | 4 | 145.5 | 161 |
| 100 | 70 | 70 | 37 | 107 | 35 | 70 | 58 | 113 | 121 | 169 | 200 | 6 | 4 | 5 | 198.5 | 214 |
| 125 | 70 | 70 | 41 | 155 | 38 | 76 | 70 | 155 | 146 | 223 | 254 | 8 | 4 | 6 | 252.5 | 268 |
| 150 | 80 | 80 | 19 | 195 | 44 | 88 | 87 | 190 | 171 | 275 | 306 | 8 | 4 | 7 | 304.5 | 320 |

**L**




| Code / Stroke | F | FF | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 50 | 40 | 22 | 22 | 45 | 45 | 12 | 47 | 35 | – | 92 | 4 | 2 | 2 | 90.5 | 108 |
| 20 | 50 | 40 | 22 | 22 | 45 | 45 | 12 | 47 | 45 | – | 92 | 4 | 2 | 2 | 90.5 | 108 |
| 30 | 50 | 40 | 22 | 22 | 45 | 45 | 12 | 47 | 55 | – | 92 | 4 | 2 | 2 | 90.5 | 108 |
| 40 | 60 | 50 | 22 | 22 | 55 | 55 | 12 | 57 | 65 | – | 102 | 4 | 2 | 2 | 100.5 | 118 |
| 50 | 35 | 35 | 20 | 55 | 35 | 35 | 12 | 70 | 75 | – | 115 | 6 | 2 | 3 | 113.5 | 131 |
| 75 | 60 | 60 | 26 | 61 | 35 | 70 | 33 | 90 | 100 | – | 156 | 6 | 2 | 4 | 154.5 | 172 |
| 100 | 70 | 70 | 32 | 102 | 35 | 70 | 50 | 114 | 125 | 162 | 197 | 6 | 4 | 5 | 195.5 | 213 |
| 125 | 75 | 75 | 40 | 154 | 38 | 76 | 67 | 155 | 150 | 218 | 255 | 8 | 4 | 6 | 253.5 | 271 |
| 150 | 80 | 80 | 30 | 190 | 40 | 80 | 82 | 180 | 175 | 258 | 295 | 8 | 4 | 7 | 293.5 | 311 |

## Order example of stroke adjuster

MCSS — 20 L — AS — X12

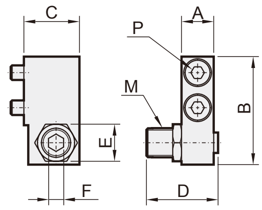
- MODEL
- TUBE I.D.
- Blank: Standard
  **L**: Symmetric style
- STROKE ADJUSTER
  - **AS**: Adjuster at extension end
  - **AT**: Adjuster at retraction end
  - **A**: Adjuster at both ends
  - **A2**: Adjusting bolt
- ADJUSTABLE RANGE
  - Blank: 5mm
  - **X11**: 15mm
  - **X12**: 25mm

* **X12** (adjustable range: 25mm) is not available for MCSS-6.

## AS Stroke adjuster at extension end

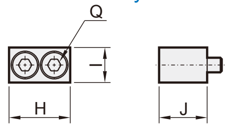
### Mounted to body

Material: Aluminum alloy




### Mounted to table

Material: Aluminum alloy



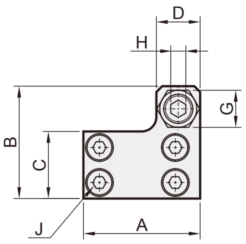

| Tube I.D. | Order code | Adjustable stroke range (mm) | Mounted to body | | | | | | | | Mounted to table | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | E | F | M | P* | H | I | J | Q* |
| 6 | MCSS-6-AS | 5 | 6 | 17.8 | 10.5 | 16.5 | 7 | 2.5 | M5×0.8 | M2.5×10 | 12.5 | 6 | 8.5 | M2.5×8 |
| | MCSS-6-AS-X11 | 15 | | | | 26.5 | | | | | | | | |
| 8 | MCSS-8-AS | 5 | | | | 16.5 | | | | | | | | |
| | MCSS-8-AS-X11 | 15 | 7 | 21.5 | 11 | 26.5 | 8 | 3 | M6×1 | M3×10 | 14.6 | 7 | 10 | M3×10 |
| | MCSS-8-AS-X12 | 25 | | | | 36.5 | | | | | | | | |
| 12 | MCSS-12-AS | 5 | | | | 20 | | | | | | | | |
| | MCSS-12-AS-X11 | 15 | 9.5 | 31 | 16 | 30 | 11 | 4 | M8×1 | M4×16 | 18.5 | 10 | 13 | M4×12 |
| | MCSS-12-AS-X12 | 25 | | | | 40 | | | | | | | | |
| 16 | MCSS-16-AS | 5 | | | | 24.5 | | | | | | | | |
| | MCSS-16-AS-X11 | 15 | 11 | 37 | 19 | 34.5 | 14 | 5 | M10×1 | M5×16 | 21 | 12 | 16.5 | M5×16 |
| | MCSS-16-AS-X12 | 25 | | | | 44.5 | | | | | | | | |
| 20 | MCSS-20-AS | 5 | | | | 27.5 | | | | | | | | |
| | MCSS-20-AS-X11 | 15 | 13 | 45.5 | 24 | 37.5 | 17 | 6 | M12×1.25 | M6×20 | 25 | 13 | 21 | M6×20 |
| | MCSS-20-AS-X12 | 25 | | | | 47.5 | | | | | | | | |
| 25 | MCSS-25-AS | 5 | | | | 32.5 | | | | | | | | |
| | MCSS-25-AS-X11 | 15 | 16 | 53.5 | 26.5 | 42.5 | 19 | 6 | M14×1.5 | M8×25 | 31 | 17 | 25.5 | M8×25 |
| | MCSS-25-AS-X12 | 25 | | | | 52.5 | | | | | | | | |

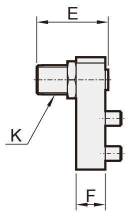
* Size of hexagon socket head cap screws.

## AT Stroke adjuster at retraction end

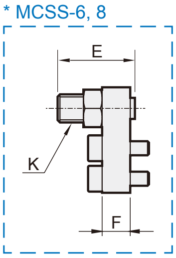
### Mounted to body

Material: Aluminum alloy




* MCSS-6, 8

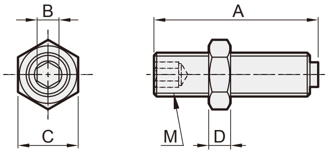



| Tube I.D. | Order code | Adjustable stroke range (mm) | A | B | C | D | E | F | G | H | J* | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | MCSS-6-AT | 5 | 21 | 19 | 10.5 | 8 | 16.5 | 5 | 7 | 2.5 | M2.5×8 | M5×0.8 |
| | MCSS-6-AT-X11 | 15 | | | | | 26.5 | | | | | |
| 8 | MCSS-8-AT | 5 | | | | | 16.5 | | | | | |
| | MCSS-8-AT-X11 | 15 | 25 | 22.5 | 12.5 | 9 | 26.5 | 6 | 8 | 3 | M3×10 | M6×1 |
| | MCSS-8-AT-X12 | 25 | | | | | 36.5 | | | | | |
| 12 | MCSS-12-AT | 5 | | | | | 20 | | | | | |
| | MCSS-12-AT-X11 | 15 | 32 | 31 | 18.5 | 13 | 30 | 8 | 12 | 4 | M4×8 | M8×1 |
| | MCSS-12-AT-X12 | 25 | | | | | 40 | | | | | |
| 16 | MCSS-16-AT | 5 | | | | | 24.5 | | | | | |
| | MCSS-16-AT-X11 | 15 | 40 | 38.5 | 23 | 15 | 34.5 | 10 | 14 | 5 | M5×10 | M10×1 |
| | MCSS-16-AT-X12 | 25 | | | | | 44.5 | | | | | |
| 20 | MCSS-20-AT | 5 | | | | | 27.5 | | | | | |
| | MCSS-20-AT-X11 | 15 | 50 | 48 | 29 | 21 | 37.5 | 12 | 17 | 6 | M5×12 | M12×1.25 |
| | MCSS-20-AT-X12 | 25 | | | | | 47.5 | | | | | |
| 25 | MCSS-25-AT | 5 | | | | | 32.5 | | | | | |
| | MCSS-25-AT-X11 | 15 | 60 | 58 | 35 | 23 | 42.5 | 15 | 19 | 6 | M6×16 | M14×1.5 |
| | MCSS-25-AT-X12 | 25 | | | | | 52.5 | | | | | |

* Size of hexagon socket head cap screws.

## A2 Adjusting bolt

Material: Stainless steel




| Tube I.D. | Order code | Adjustable stroke range (mm) | A | B | C | D | M |
|---|---|---|---|---|---|---|---|
| 6 | **MCSS-6-A2** | 5 | 16.5 | 2.5 | 7 | 4 | M5×0.8 |
| | **MCSS-6-A2-X11** | 15 | 26.5 | | | | |
| 8 | **MCSS-8-A2** | 5 | 16.5 | 3 | 8 | 4 | M6×1 |
| | **MCSS-8-A2-X11** | 15 | 26.5 | | | | |
| | **MCSS-8-A2-X12** | 25 | 36.5 | | | | |
| 12 | **MCSS-12-A2** | 5 | 20 | 4 | 11 | 4 | M8×1 |
| | **MCSS-12-A2-X11** | 15 | 30 | | | | |
| | **MCSS-12-A2-X12** | 25 | 40 | | | | |
| 16 | **MCSS-16-A2** | 5 | 24.5 | 5 | 14 | 4 | M10×1 |
| | **MCSS-16-A2-X11** | 15 | 34.5 | | | | |
| | **MCSS-16-A2-X12** | 25 | 44.5 | | | | |
| 20 | **MCSS-20-A2** | 5 | 27.5 | 6 | 17 | 5 | M12×1.25 |
| | **MCSS-20-A2-X11** | 15 | 37.5 | | | | |
| | **MCSS-20-A2-X12** | 25 | 47.5 | | | | |
| 25 | **MCSS-25-A2** | 5 | 32.5 | 6 | 19 | 6 | M14×1.5 |
| | **MCSS-25-A2-X11** | 15 | 42.5 | | | | |
| | **MCSS-25-A2-X12** | 25 | 52.5 | | | | |

## Order example of absorber

MCSS — 20 L — B — S11

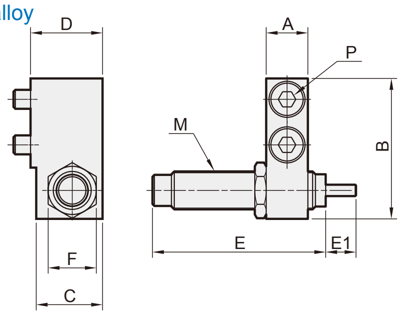
- MODEL
- TUBE I.D.
- Blank: Standard
  **L**: Symmetric style
- ABSORBER
  **BS**: Absorber at extension end
  **BT**: Absorber at retraction end
  **B**: Absorber at both ends
  * Shock absorber is not available on series MCSS-6.
- APPLICABLE RANGE (Only for absorber code B)

| Tube I.D. | Stroke | |
|---|---|---|
| | Blank: Mounted to table × 1 | **S11**: Mounted to table × 2 |
| 8 | 10~40 | 50,75 |
| 12 | 10~50 | 75,100 |
| 16 | 10~50 | 75~125 |
| 20 | 10~75 | 100~150 |
| 25 | 10~75 | 100~150 |

## BS Stroke adjuster at extension end

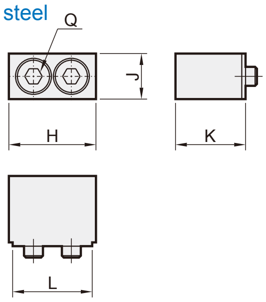
### Mounted to body

Material: Aluminum alloy




### Mounted to table

Material: Carbon steel



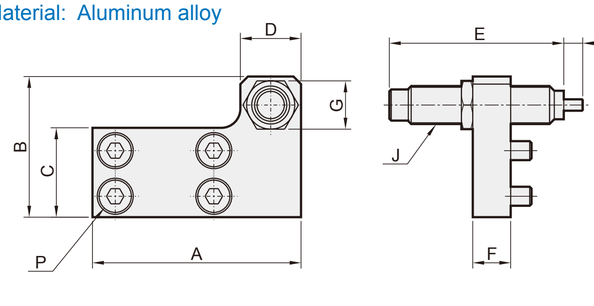

| Tube I.D. | Order code | Mounted to body | | | | | | | | | | Mounted to table | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | E1 | F | M | | P* | H | J | K | L | Q* |
| 8 | **MCSS-8-BS** | 7 | 23 | 14 | 15.5 | 38.5 | 6 | 11 | M8×1 | MDSC-0806-3-N | M3×16 | 16.6 | 7 | 15.5 | 14.6 | M3×16 |
| 12 | **MCSS-12-BS** | 9.5 | 31 | 14.5 | 16 | 38.5 | 6 | 11 | M8×1 | MDSC-0806-3-N | M4×16 | 20.5 | 10 | 15 | 18.5 | M4×12 |
| 16 | **MCSS-16-BS** | 11 | 37 | 17.5 | 19 | 45.5 | 8 | 12.7 | M10×1 | MDSC-1008-3-N | M5×16 | 23 | 12 | 18.5 | 21 | M5×16 |
| 20 | **MCSS-20-BS** | 13 | 47 | 23.5 | 26 | 67.5 | 12 | 19 | M14×1.5 | MDSC-1412-3-N | M6×25 | 27 | 13 | 25.5 | 25 | M6×25 |
| 25 | **MCSS-25-BS** | 16 | 53.5 | 23.5 | 26.5 | 67.5 | 12 | 19 | M14×1.5 | MDSC-1412-3-N | M8×25 | 33 | 17 | 25.5 | 31 | M8×25 |

* Size of hexagon socket head cap screws.

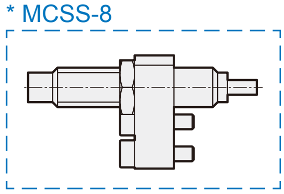
## BT Stroke adjuster at retraction end

### Mounted to body

Material: Aluminum alloy

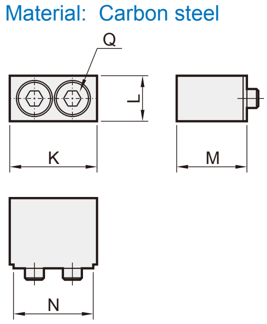



* MCSS-8



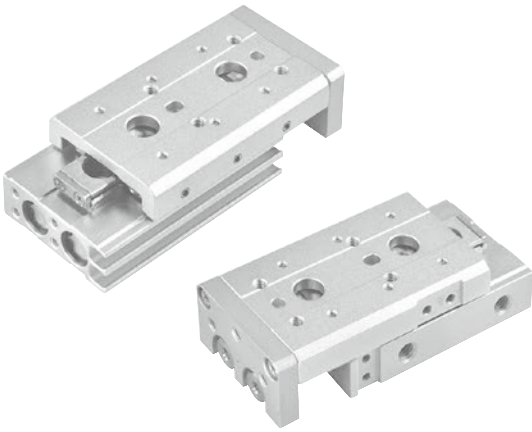
### Mounted to table

Material: Carbon steel




| Tube I.D. | Order code | Mounted to body | | | | | | | | | | | Mounted to table | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | E1 | F | G | J | | P* | K | L | M | N | Q* |
| 8 | **MCSS-8-BT** | 38 | 23 | 12.5 | 14 | 38.5 | 6 | 8 | 12 | M8×1 | MDSC-0806-3-N | M3×12 | 16.6 | 7 | 15.5 | 14.6 | M3×16 |
| 12 | **MCSS-12-BT** | 45 | 31 | 18 | 14 | 38.5 | 6 | 8 | 11 | M8×1 | MDSC-0806-3-N | M4×8 | 20.5 | 10 | 15 | 18.5 | M4×12 |
| 16 | **MCSS-16-BT** | 55 | 37 | 23.5 | 16 | 45.5 | 8 | 10 | 12.7 | M10×1 | MDSC-1008-3-N | M5×10 | 23 | 12 | 18.5 | 21 | M5×16 |
| 20 | **MCSS-20-BT** | 70 | 47 | 29 | 23 | 67.5 | 12 | 12 | 19 | M14×1.5 | MDSC-1412-3-N | M5×12 | 27 | 13 | 25.5 | 25 | M6×25 |
| 25 | **MCSS-25-BT** | 80 | 54 | 35 | 23 | 67.5 | 12 | 15 | 19 | M14×1.5 | MDSC-1412-3-N | M6×16 | 33 | 17 | 25.5 | 31 | M8×25 |

* Size of hexagon socket head cap screws.



## Features

- High precision combination of cylinder and linear rail.
- Flush fitting sensor groove.
- Magnetic as standard.

## Specification

| Model | MCSQ | |
|---|---|---|
| Acting type | Double acting | |
| Tube I.D. (mm) | 6 | 8 |
| Port size | M3×0.5 | M5×0.8 |
| Medium | Air | |
| Operating pressure range | 0.15~0.7 MPa | |
| Proof pressure | 1 MPa | |
| Ambient temperature | -5~+60°C (No freezing) | |
| Lubricator | Not required | |
| Available speed range | 50~500 mm/sec | |
| Cushion | Rubber bumper (Standard) Shock absorber (Option) | |
| Sensor switch (*) | RCE, RCE1, RDEP | |

* RCE, RCE1, RDEP specification, please refer to page 8-12, 13, 18.

## Table for standard stroke

| Tube I.D. | Stroke (mm) |
|---|---|
| ø6 | 10, 20, 30, 40, 50 |
| ø8 | 10, 20, 30, 40, 50, 75 |

* Produce after received your orders.

## Order example

MCSQ — 8L — 50 — AS — X12

MODEL

TUBE I.D.

Blank: Standard
L: Symmetric style

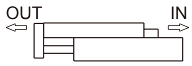
STROKE

STROKE ADJUSTER
Blank: Without adjuster
**AS**: Adjuster at extension end
**AT**: Adjuster at retraction end
**A**: Adjuster at both ends
**BS**: Absorber at extension end
**BT**: Absorber at retraction end
**B**: Absorber at both ends
**AB**: Adjuster at extension end+Absorber at retraction end
**BA**: Absorber at extension end+Adjuster at retraction end

ADJUSTABLE RANGE
(Only for stroke adjuster)
Blank: 5mm
**X11**: 15mm
**X12**: 25mm

*__X12__ (adjustable range: 25mm) is not available for MCSQ-6.
*__X11__ and __X12__ are not available for shock absorber type.
*Shock absorber is not available on series MCSQ-6.
*Use the same stroke adjuster with MCSS, specification please refer to page 5-23.

## Theoretical force




Unit: N

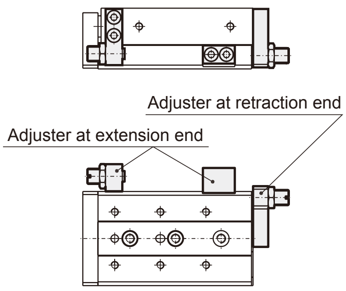
| Tube I.D. (mm) | Piston rod (mm) | Operating direction | Piston area ($mm^2$) | Operating pressure (MPa) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| 6 | 3 | OUT | 57 | 11 | 17 | 23 | 29 | 34 | 40 |
| | | IN | 42 | 8 | 13 | 17 | 21 | 25 | 29 |
| 8 | 4 | OUT | 101 | 20 | 30 | 40 | 51 | 61 | 71 |
| | | IN | 75 | 15 | 23 | 30 | 38 | 45 | 53 |

## Stroke adjuster option

### Stroke adjuster

- Adjustable stroke range: 0~5mm (Standard)

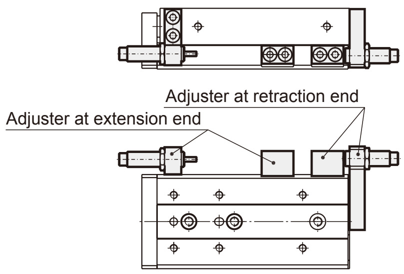
**AS**: Adjuster at extension end
**AT**: Adjuster at retraction end
**A**: Adjuster at both ends



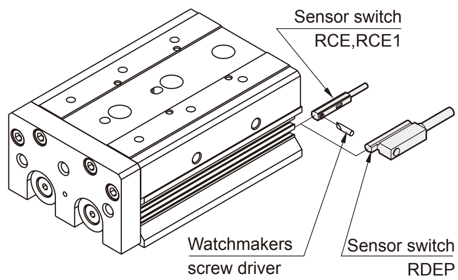

### With shock absorber

- Enables adjustment of stroke.
- Absorbs the collision at stroke end and stops smoothly.

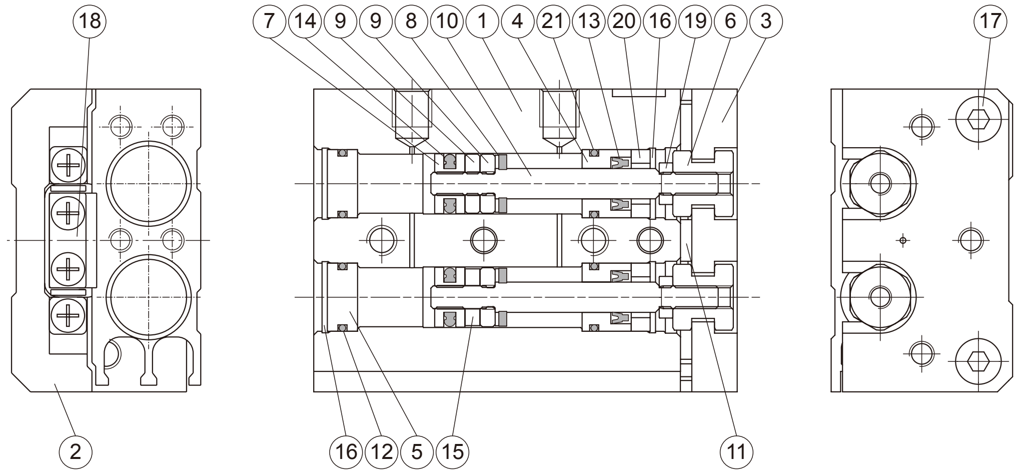
**BS**: Absorber at extension end
**BT**: Absorber at retraction end
**B**: Absorber at both ends




## Installation of sensor switch



ø6, ø8



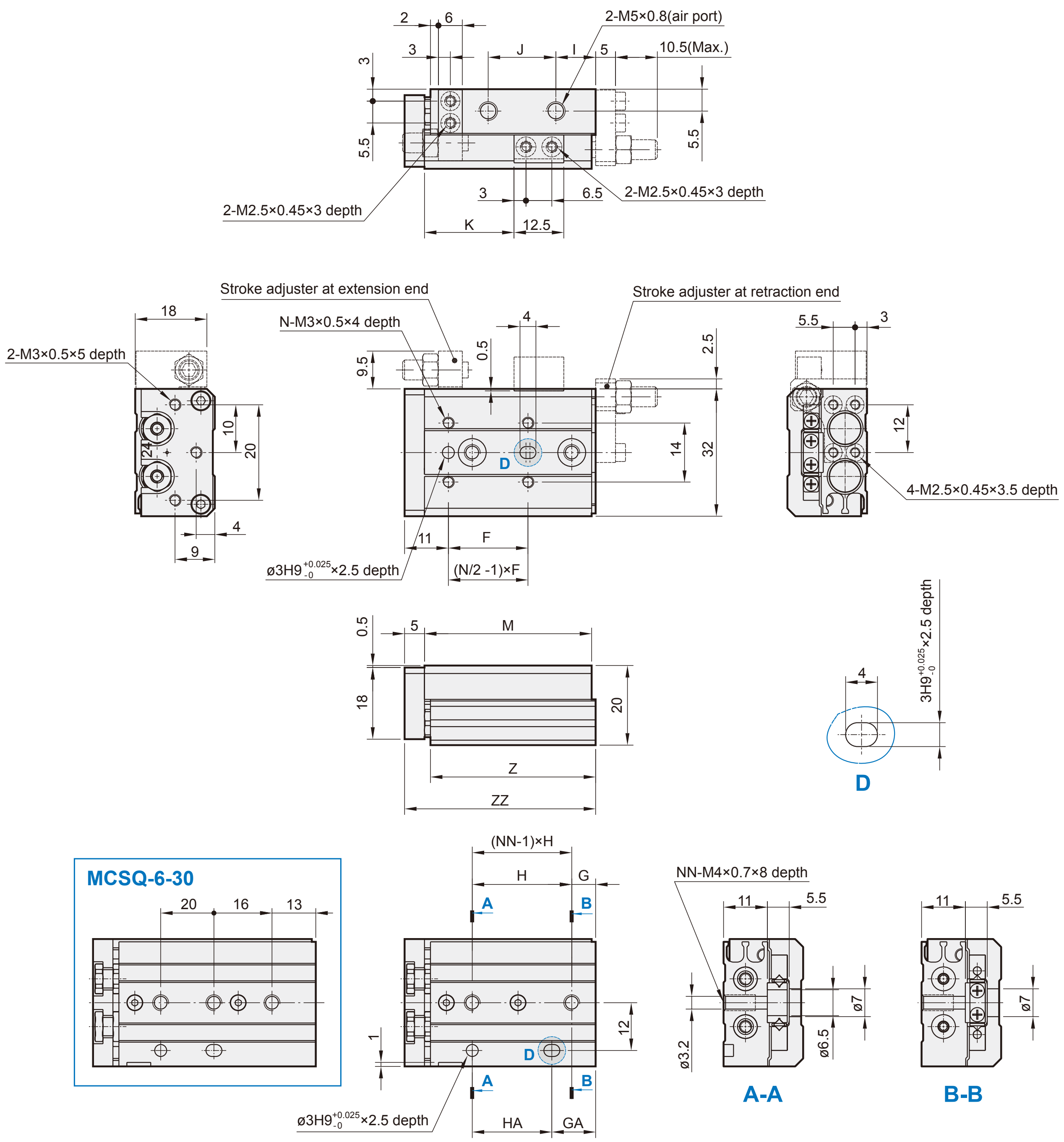

## Material

| No. | Tube I.D. / Part name | 6 | 8 | Q'y | Repair kits (inclusion) |
|---|---|---|---|---|---|
| 1 | Body | Aluminum alloy | | 1 | |
| 2 | Table | Aluminum alloy | | 1 | |
| 3 | Plate | Aluminum alloy | | 1 | |
| 4 | Rod cover | Aluminum alloy | | 2 | |
| 5 | Head cover | Aluminum alloy | | 2 | |
| 6 | Floating connector | Stainless steel | | 2 | |
| 7 | Piston | Stainless steel | | 2 | |
| 8 | Cushion pad | NBR | | 2 | ● |
| 9 | Spacer ring | Stainless steel | Aluminum alloy | 3 | |
| 10 | Piston rod | Stainless steel | | 2 | |
| 11 | End cushion | PU | | 1 | ● |
| 12 | Cover ring | NBR | | 2 | ● |
| 13 | Rod packing | NBR | | 2 | ● |
| 14 | Piston packing | NBR | | * | ● |
| 15 | Magnet ring | Magnet material | | 1 | |
| 16 | Snap ring | Spring steel | Stainless steel | 4 | |
| 17 | Bolt | Stainless steel | | 2 | |
| 18 | Slide way | Bearing steel | | 1 | |
| 19 | Nut | Copper | | 2 | |
| 20 | Rod cover washer | Stainless steel | | 2 | |
| 21 | Cover ring | NBR | | 2 | |

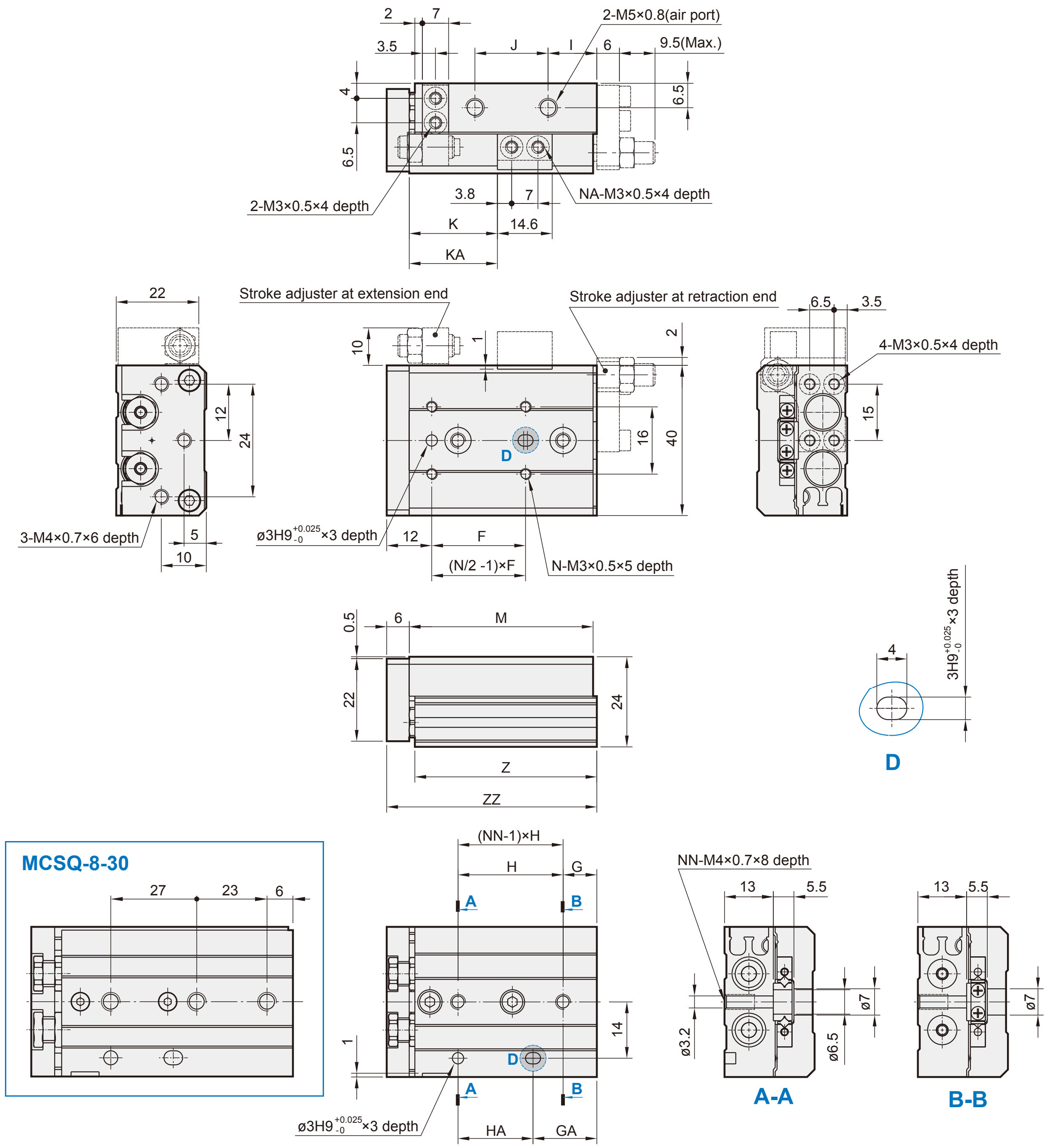
* Q'y: ø6=2, ø8=4

## Order example of repair kits

| Tube I.D. | Repair kits |
|---|---|
| ø6 | **PS-MCSQ-6** |
| ø8 | **PS-MCSQ-8** |

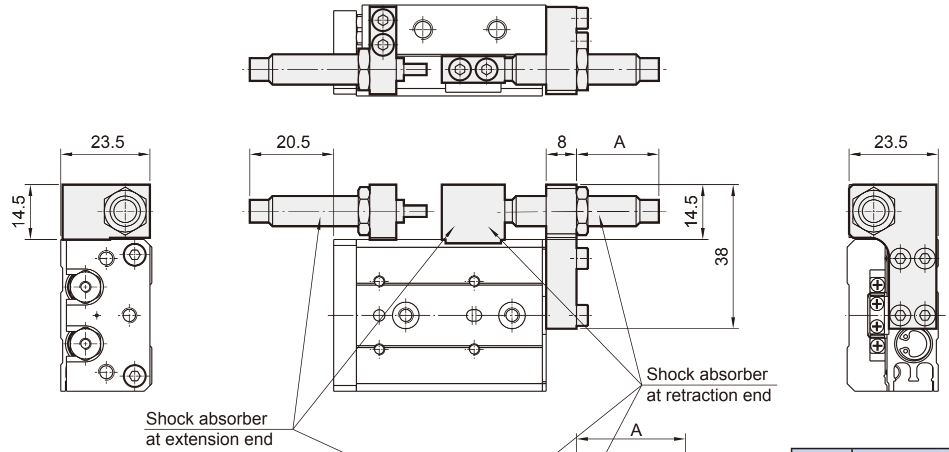



| Code / Stroke | F | G | GA | H | HA | I | J | K | M | N | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 22 | 6 | 13 | 23 | 16 | 9 | 17 | 21.5 | 42 | 4 | 2 | 41.5 | 48 |
| 20 | 25 | 13 | 13 | 26 | 26 | 9 | 27 | 31.5 | 52 | 4 | 2 | 51.5 | 58 |
| 30 | 21 | – | 29 | – | 20 | 9 | 37 | 41.5 | 62 | 6 | 3 | 61.5 | 68 |
| 40 | 26 | 11 | 39 | 28 | 28 | 16 | 48 | 51.5 | 80 | 6 | 3 | 79.5 | 86 |
| 50 | 27 | 21 | 49 | 28 | 28 | 9 | 65 | 61.5 | 90 | 6 | 3 | 89.5 | 96 |

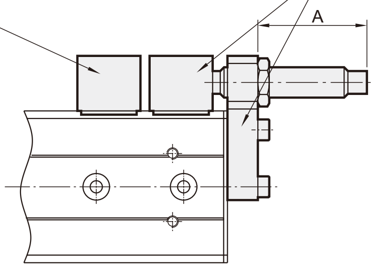



| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 25 | 7 | 13 | 25 | 19 | 11 | 17 | 23.5 | – | 46 | 4 | 2 | 2 | 45.5 | 53 |
| 20 | 25 | 14 | 14 | 28 | 28 | 10 | 28 | 33.5 | – | 56 | 4 | 2 | 2 | 55.5 | 63 |
| 30 | 26 | – | 29 | – | 27 | 12 | 40 | 43.5 | – | 70 | 6 | 2 | 3 | 69.5 | 77 |
| 40 | 32 | 8 | 39 | 31 | 31 | 14 | 52 | 53.5 | – | 84 | 6 | 2 | 3 | 83.5 | 91 |
| 50 | 46 | 8 | 37 | 29 | 58 | 13 | 78 | 63.5 | 82.5 | 109 | 6 | 4 | 4 | 108.5 | 116 |
| 75 | 50 | 31 | 61 | 30 | 60 | 12 | 105 | 88.5 | 112.5 | 135 | 6 | 4 | 4 | 134.5 | 142 |

ø8




Stroke 50, 75




| Stroke | Stroke adjustment range | | A dimension (Retracted side mounting) |
|---|---|---|---|
| | Extending | Retracting | |
| 10 | Max. 21 | 13.9 | 22.9 |
| 20 | | 13.9 | 22.9 |
| 30 | | 9.9 | 18.9 |
| 40 | | 5.9 | 14.9 |
| 50 | | 9.9 | 18.9 |
| 75 | | 13.9 | 22.9 |

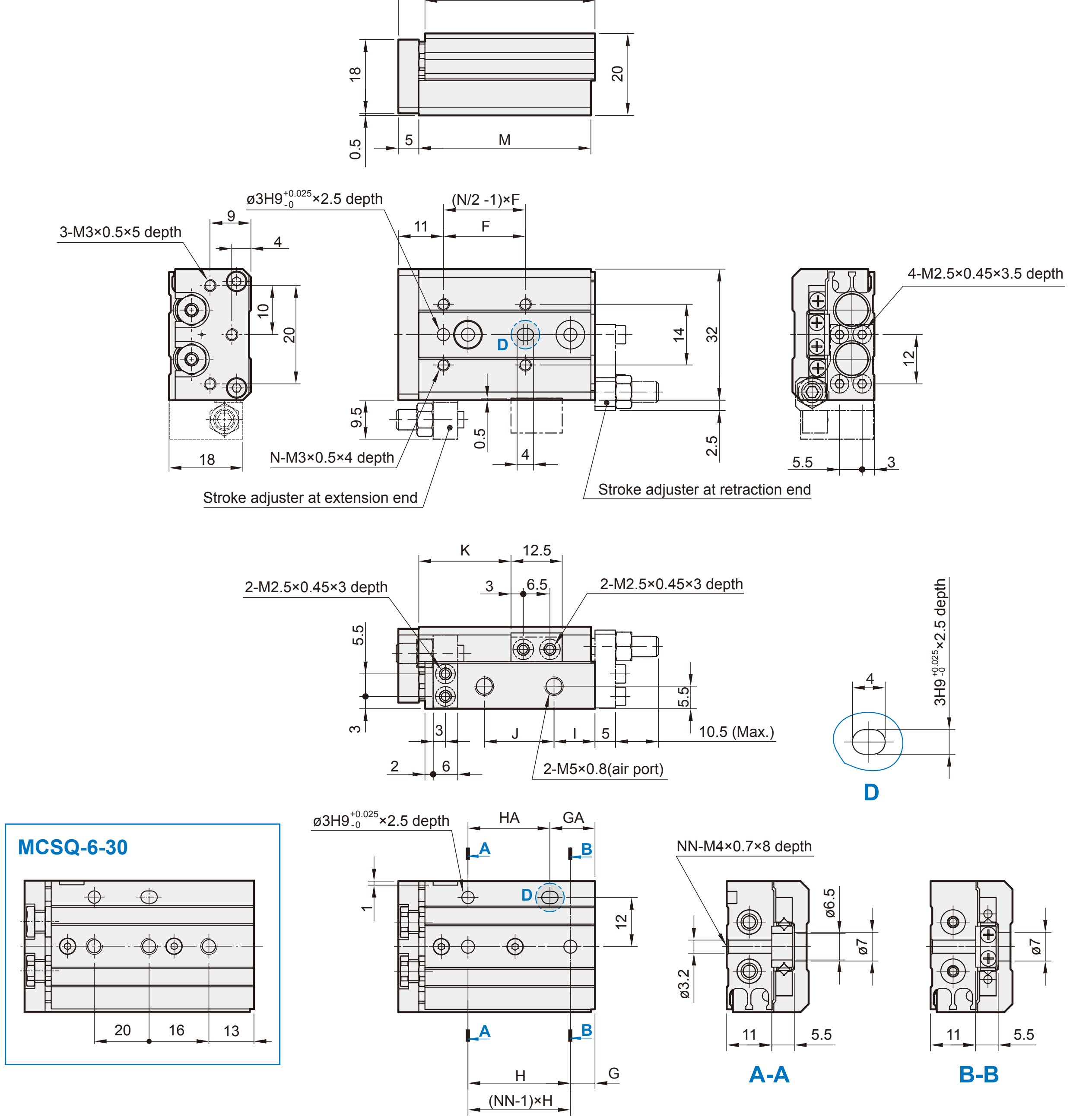
* Other dimensions not indicated are the same as the basic style.

# MCSQ Dimensions – Symmetric style ø6

## SLIDE CYLINDER

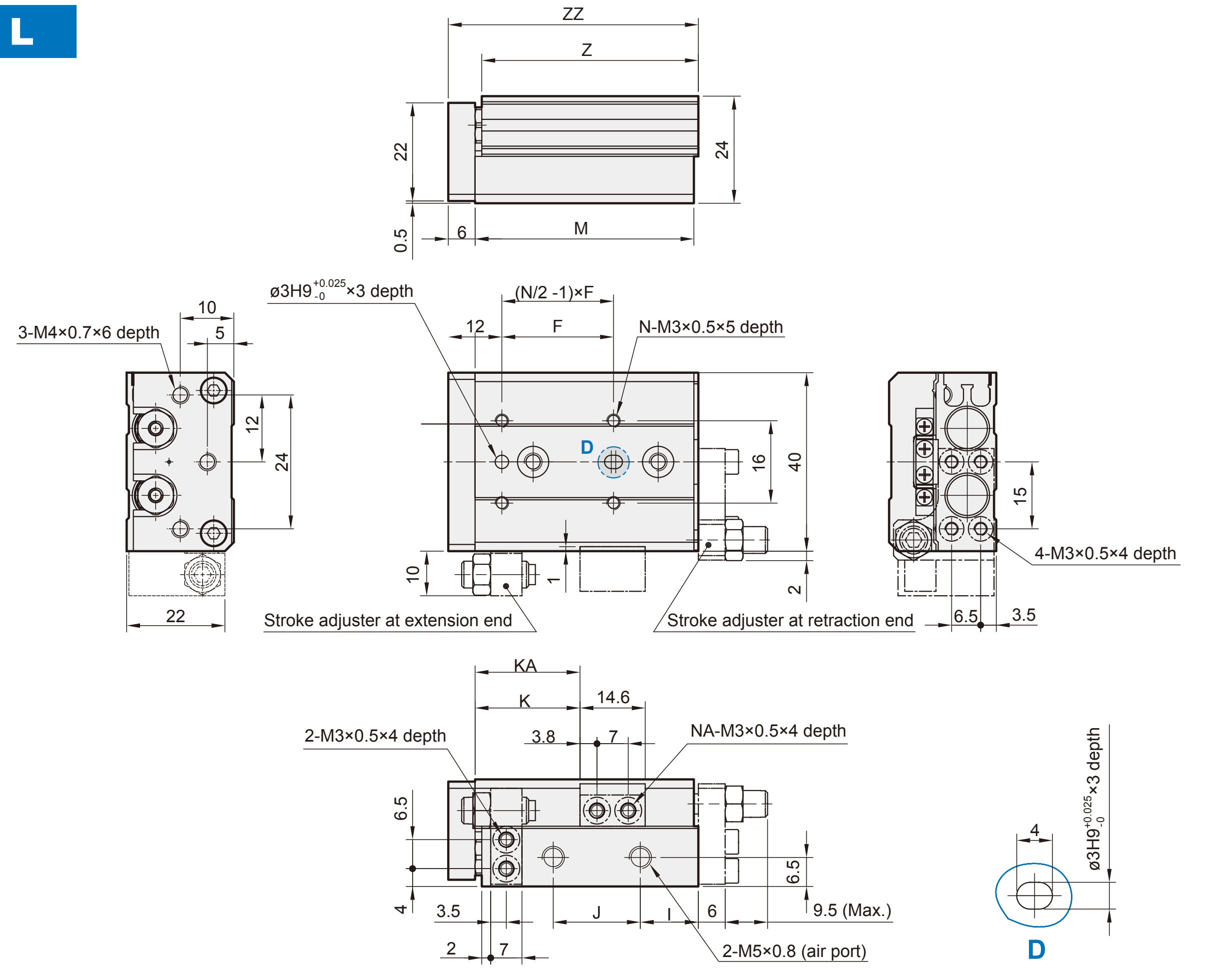
mindman

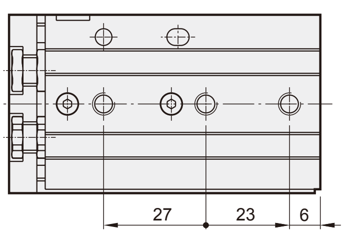
**L**

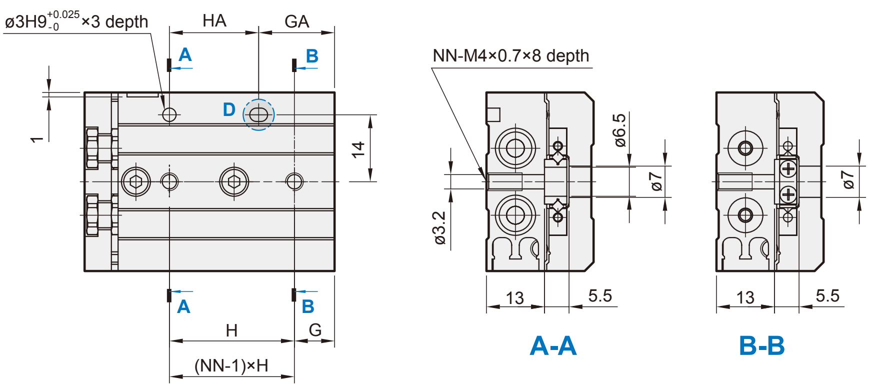



| Code / Stroke | F | G | GA | H | HA | I | J | K | M | N | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 22 | 6 | 13 | 23 | 16 | 9 | 17 | 21.5 | 42 | 4 | 2 | 41.5 | 48 |
| 20 | 25 | 13 | 13 | 26 | 26 | 9 | 27 | 31.5 | 52 | 4 | 2 | 51.5 | 58 |
| 30 | 21 | – | 29 | – | 20 | 9 | 37 | 41.5 | 62 | 6 | 3 | 61.5 | 68 |
| 40 | 26 | 11 | 39 | 28 | 28 | 16 | 48 | 51.5 | 80 | 6 | 3 | 79.5 | 86 |
| 50 | 27 | 21 | 49 | 28 | 28 | 9 | 65 | 61.5 | 90 | 6 | 3 | 89.5 | 96 |

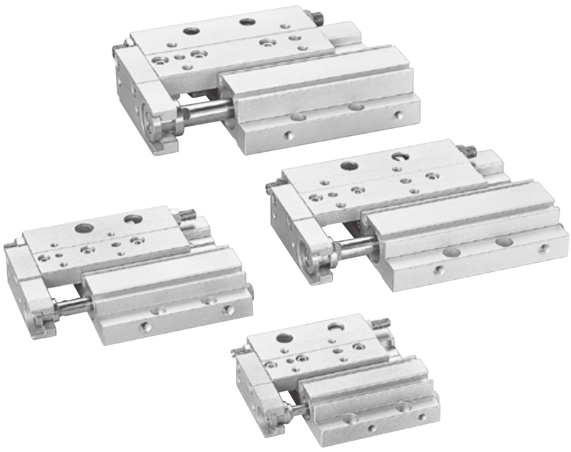
**L**




| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 25 | 7 | 13 | 25 | 19 | 11 | 17 | 23.5 | – | 46 | 4 | 2 | 2 | 45.5 | 53 |
| 20 | 25 | 14 | 14 | 28 | 28 | 10 | 28 | 33.5 | – | 56 | 4 | 2 | 2 | 55.5 | 63 |
| 30 | 26 | – | 29 | – | 27 | 12 | 40 | 43.5 | – | 70 | 6 | 2 | 3 | 69.5 | 77 |
| 40 | 32 | 8 | 39 | 31 | 31 | 14 | 52 | 53.5 | – | 84 | 6 | 2 | 3 | 83.5 | 91 |
| 50 | 46 | 8 | 37 | 29 | 58 | 13 | 78 | 63.5 | 82.5 | 109 | 6 | 4 | 4 | 108.5 | 116 |
| 75 | 50 | 31 | 61 | 30 | 60 | 12 | 105 | 88.5 | 112.5 | 135 | 6 | 4 | 4 | 134.5 | 142 |



## Features

- Parallel mounting of guide to cylinder gives slim compact unit.
- Flush fitting sensor groove.
- Magnetic as standard.

## Specification

| Model | MCSF | |
|---|---|---|
| Acting type | Double acting | |
| Tube I.D. (mm) | 8 | 12, 16, 20 |
| Port size | M3×0.5 | M5×0.8 |
| Medium | Air | |
| Operating pressure range | 0.15~0.7 MPa | |
| Proof pressure | 1 MPa | |
| Ambient temperature | -10~+60°C (No freezing) | |
| Available speed range | 50~500 mm/sec | |
| Lubricator | Not required | |
| Cushion | Rubber bumper | |
| Stroke length tolerance | $^{+1.0}_{0}$ | |
| Stroke adjuster range | Extend 5mm / Retract 5mm | |
| Sensor switch (*) | RCE, RCE1 | |

* RCE, RCE1 specification, please refer to page 8-12, 13.

## Table for standard stroke

| Tube I.D. | Stroke (mm) |
|---|---|
| ø8 | 10, 20, 30 |
| ø12 | 20, 30, 50 |
| ø16 | 30, 50, 75 |
| ø20 | 30, 50, 75, 100 |

* Produce after received your orders.

## Order example

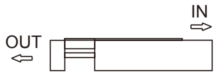
MCSF — 12 — 50 — X11

MODEL TUBE I.D. STROKE

STROKE ADJUSTABLE
Blank: 5mm
**X11**: 15mm
**X12**: 25mm

* **X12** (adjustable range 25mm) is not available in series **MCSF-8 / MCSF-12**.

## Theoretical force




Unit: N

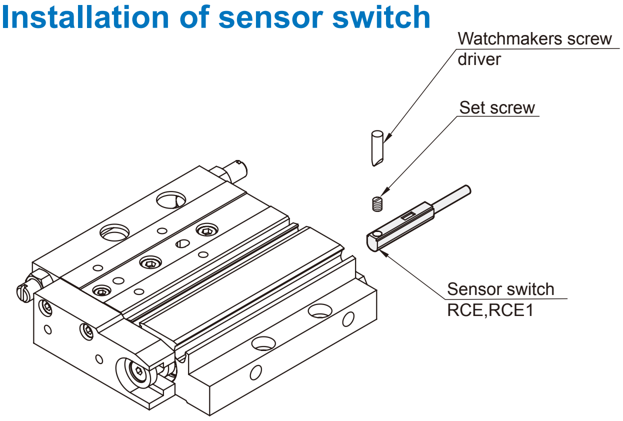
| Tube I.D. (mm) | Piston rod (mm) | Operating direction | Piston area ($mm^2$) | Operating pressure (MPa) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| 8 | 4 | OUT | 50 | 10 | 15 | 20 | 25 | 30 | 35 |
| | | IN | 38 | 8 | 11 | 15 | 19 | 23 | 27 |
| 12 | 6 | OUT | 113 | 23 | 34 | 45 | 57 | 68 | 79 |
| | | IN | 85 | 17 | 26 | 34 | 43 | 51 | 60 |
| 16 | 8 | OUT | 201 | 40 | 60 | 80 | 101 | 121 | 141 |
| | | IN | 151 | 30 | 45 | 60 | 76 | 91 | 106 |
| 20 | 10 | OUT | 314 | 63 | 94 | 126 | 157 | 188 | 220 |
| | | IN | 236 | 47 | 71 | 94 | 118 | 142 | 165 |

## Cylinder weight

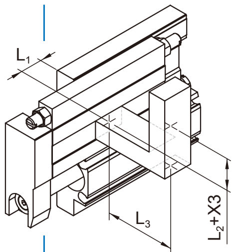
Unit: g

| Stroke (mm) | Tube I.D. | | | |
|---|---|---|---|---|
| | ø8 | ø12 | ø16 | ø20 |
| 10 | 125 | – | – | – |
| 20 | 132 | 212 | – | – |
| 30 | 171 | 248 | 372 | 608 |
| 50 | – | 357 | 522 | 775 |
| 75 | – | – | 696 | 1,053 |
| 100 | – | – | – | 1,351 |

## Installation of sensor switch




Standard cylinder
Compact cylinder
Mini cylinder
Guide cylinder
Table
Rodless cylinder
Stopper cylinder
Auxiliary Equipment

| Model selection steps | Formula / Data | Selection example |
|---|---|---|
| **1. Operating conditions**<br>List the operating conditions considering the mounting position and workpiece configuration.<br>Check that the load weight does not exceed the max. allowable load weight and that the average operating speed does not exceed the operating speed range. | ● Model to be used.<br>● Type of cushion.<br>● Workpiece mounting position.<br>● Average operating speed Va (mm/s)<br>● Load mass W (kg): Fig 1, Table 2<br>● Overhang Ln(mm): Fig 2 | <br>Cylinder: MCSF-8-10<br>Cushion: Rubber bumper<br>Workpiece table mounting<br>Mounting: Horizontal wall mounting<br>Average operating speed: Va = 100 mm/s<br>Load mass: W = 0.2 kg<br>$L_1$ = 2mm<br>$L_2$ = 3mm<br>$L_3$ = 4mm |
| **2. Kinetic energy**<br>Find the kinetic energy E (J) of the load.<br>Find the allowable kinetic energy Ea (J).<br>Confirm that the kinetic energy of the load does not exceed the allowable kinetic energy. | $E = \frac{1}{2} \cdot W \left(\frac{V}{1000}\right)^2$<br>Collision speed V = 1.4* • Va<br>* Correction factor (Reference values)<br>Ea = K • Emax<br>Workpiece mounting coefficient K: Fig 3<br>Max. allowable kinetic energy Emax: Table 1<br>Kinetic energy (E) ≤ Allowable kinetic energy (Ea) | $E = \frac{1}{2} \cdot 0.2 \left(\frac{140}{1000}\right)^2 = 0.002$<br>V = 1.4 • 100 = 140<br>Ea = 1 • 0.023 = 0.023<br>Can be used based on E = 0.002 ≤ Ea = 0.023 |

(Continued)

Table 1: Max. allowable kinetic energy: Emax (J)

| Tube I.D. (mm) | Allowable kinetic energy |
|---|---|
| | Rubber bumper |
| ø8 | 0.023 |
| ø12 | 0.050 |
| ø16 | 0.104 |
| ø20 | 0.153 |

Fig 1: Load mass: W (kg)

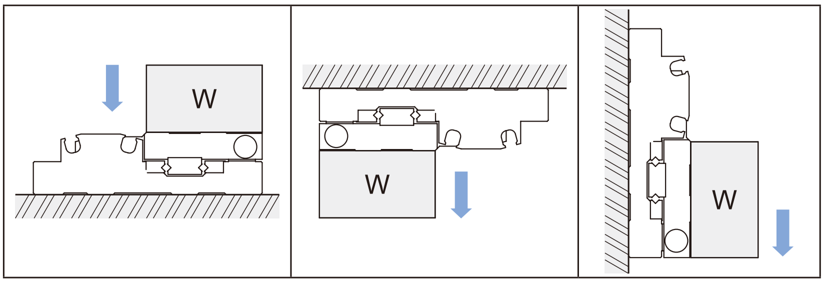
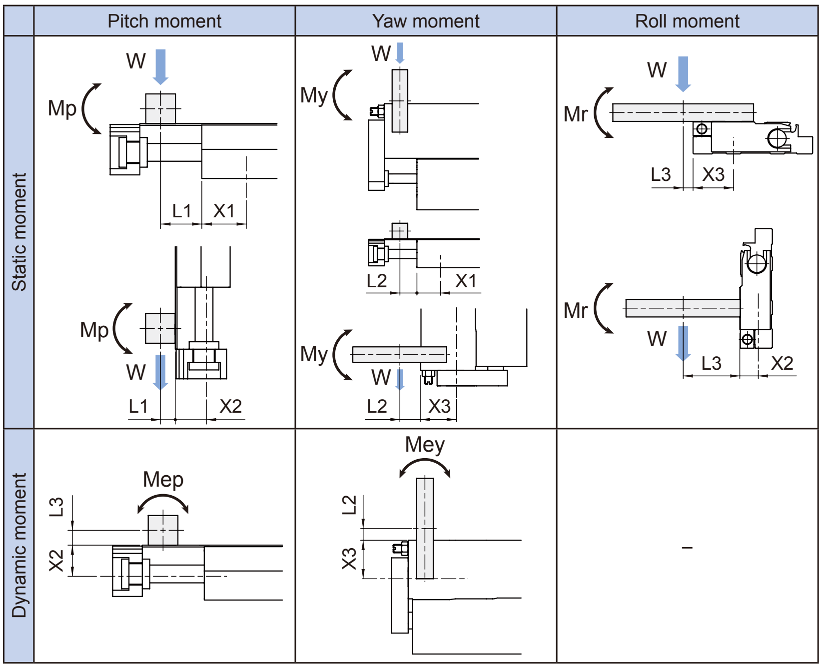



Table 2: Max. allowable load mass: Wmax (kg)

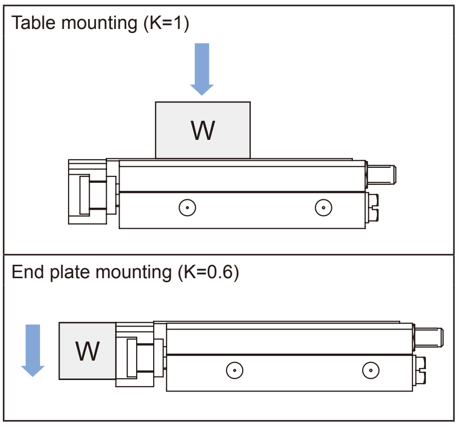
| Tube I.D. (mm) | Max. allowable load mass |
|---|---|
| ø8 | 0.5 |
| ø12 | 0.9 |
| ø16 | 1.8 |
| ø20 | 3.6 |

Fig 2: Overhang: Ln (mm), Correction value of moment center position distance: Xn (mm)




Note. Static moment: Moment generated by gravity.
Dynamic moment: Moment generated by impact when colliding with stopper.

Fig 3: Workpiece mounting coefficient: K



| Model selection steps | Formula / Data | Selection example |
|---|---|---|
| **3. Load factor** | | |
| **3-1 Load factor of load mass** | | |
| Find the allowable load mass Wa (kg). Note: There is no need to consider this load factor in the case of using perpendicularly in a vertical position. (Define $\alpha_1$ = 0.) | Wa = K • β • Wmax<br>Workpiece mounting coefficient K: Fig 3<br>Allowable load mass coefficient β: Fig 4<br>Max. allowable load mass Wmax: Table 2 | Wa = 1 • 1 • 0.5 = 0.5<br>K = 1<br>β = 1<br>Wmax = 0.5 |
| Find the load factor of the load mass $\alpha_1$. | $\alpha_1$ = W/Wa | $\alpha_1$ = 0.2/0.5 = 0.4 |
| **3-2 Load factor of static moment** | | |
| Find the static moment M (N·m). | M = W • 9.8(Ln+Xn) / 1000<br>Correction value of moment center position distance Xn: Table 3 | Yawing<br>Examine My.<br>My = 0.2 • 9.8(2+27)/1000 = 0.06<br>$X_1$ = 27<br><br>Rolling<br>Examine Mr.<br>Mr = 0.2 • 9.8(4+9.5)/1000 = 0.026<br>$X_2$ = 9.5 |
| Find the allowable static moment Ma (N·m). | Ma = K • γ • Mmax<br>Workpiece mounting coefficient K: Fig 3<br>Allow load mounting coefficient γ: Fig 4<br>Max. allowable moment Mmax: Table 4 | May = 1 • 1 • 0.5 = 0.5<br>Mymax = 0.5<br>K = 1<br>γ = 1<br><br>Mar = 0.5<br>(Same value as May) |
| Find the load factor $\alpha_2$ of the static moment. | $\alpha_2$ = M/Ma | $\alpha_2$ = 0.06/0.5 = 0.114<br>$\alpha'_2$ = 0.026/0.5 = 0.053 |
| **3-3 Load factor of dynamic moment** | | |
| Find the dynamic moment Me (N·m). | $Me = 1/3 \cdot We \cdot 9.8 \dfrac{(Ln+Xn)}{1000}$<br>Correction equivalent to impact We = δ • W • V<br>δ: Bumper coefficient<br>With urethane bumper (Standard) = 4/100<br>With shock absorber = 1/100<br>Correction value of moment center position distance Xn: Table 3 | Pitching<br>Examine Mep.<br>$Mep = 1/3 \cdot 1.12 \cdot 9.8 \cdot \dfrac{(4+9.5)}{1000} = 0.05$<br>We = 4/100 • 0.2 • 140 = 1.12<br>$X_2$ = 9.5<br>Meap = 1 • 1 • 0.5 = 0.5<br>K = 1<br>γ = 1<br>Mpmax = 0.5<br>$\alpha_3$ = 0.05/0.5 = 0.099 |
| Find the allowable dynamic moment Mea (N·m). | Mea = K • γ • Mmax<br>Workpiece mounting coefficient K: Fig 3<br>Allowable mounting coefficient γ: Fig 4<br>Max. allowable moment Mmax: Table 4 | Yawing<br>Examine Mey.<br>$Mey = 1/3 \cdot 1.12 \cdot 9.8 \cdot \dfrac{(3+21)}{1000} = 0.088$<br>We = 1.12<br>$X_3$ = 21<br>Meay = 0.5 (Same value as Meap) |
| Find the load factor $\alpha_3$ of the dynamic moment. | $\alpha_3$ = Me/Mea | $\alpha'_3$ = 0.088/0.5 = 0.176 |
| **3-4 Sum of load factors** | | |
| Possible to use if the sum of the load factors does not exceed 1. | $\Sigma\alpha_n = \alpha_1 + \alpha_2 + \alpha_3 \leq 1$ | $\Sigma\alpha_n = \alpha_1 + \alpha_2 + \alpha'_2 + \alpha_3 + \alpha'_3 \leq 1$<br>$\Sigma\alpha_n$ = 0.4 + 0.114 + 0.053 + 0.099 + 0.176 = 0.841 ≤ 1<br>Add it is possible to use. |

Table 3: Correction value of moment center position distance: Xn (mm)

| Tube I.D. (mm) | X1, Stroke (mm) | | | | | | X2 | X3 |
|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 50 | 75 | 100 | | |
| ø8 | 27 | 32 | 39.5 | – | – | – | 9.5 | 21 |
| ø12 | – | 34.5 | 41 | 64.5 | – | – | 10.5 | 23 |
| ø16 | – | – | 44 | 66.5 | 96.5 | – | 11 | 27.5 |
| ø20 | – | – | 44 | 66.5 | 99.5 | 129 | 15 | 33.5 |

Table 4: Max. allowable moment: Mmax (N·m)

| Tube I.D. (mm) | Stroke (mm) | | | | | |
|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 50 | 75 | 100 |
| ø8 | 0.5 | 0.7 | 0.88 | – | – | – |
| ø12 | – | 1.49 | 2 | 3.01 | – | – |
| ø16 | – | – | 3.07 | 5.12 | 7.16 | – |
| ø20 | – | – | 5.99 | 8.23 | 12.33 | 16.44 |

Fig 3: Workpiece mounting coefficient: K

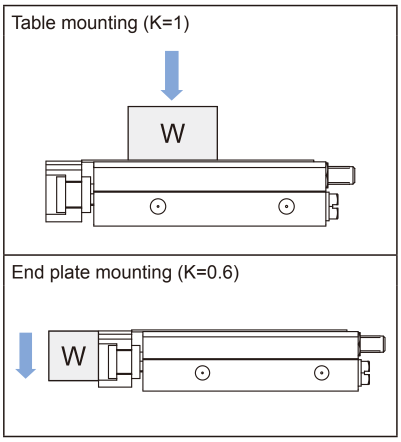
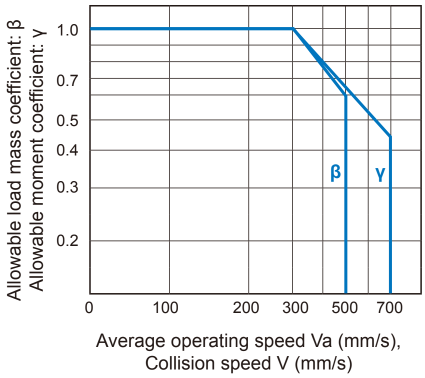



Fig.4: Allowable load mass coefficient: β
Allowable moment coefficient: γ

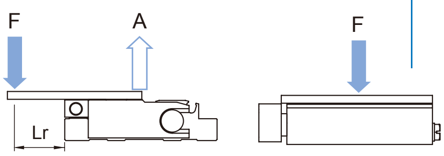


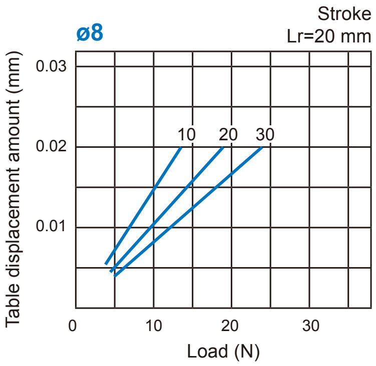

γ note: Use the average operating speed when calculating static moment. Use the collision speed when calculating dynamic moment.

## Table deflection (Reference values)

**Table displacement due to roll moment load**

Table displacement of section A when loads are applied to the section F with theslide table retracted.



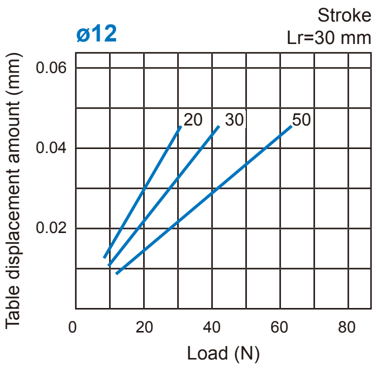
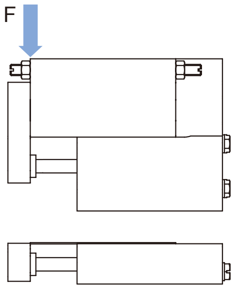
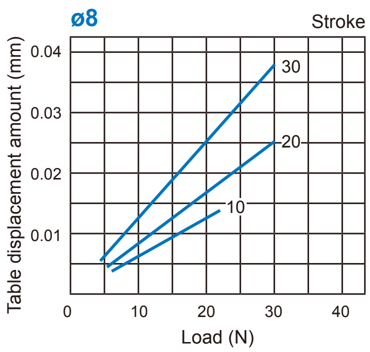




**Table displacement due to yaw moment load**

Table displacement when loads are applied to the section marked with the arrow at the full stroke.



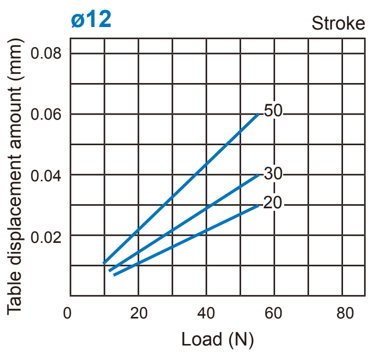
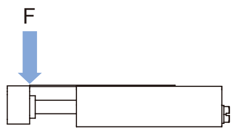
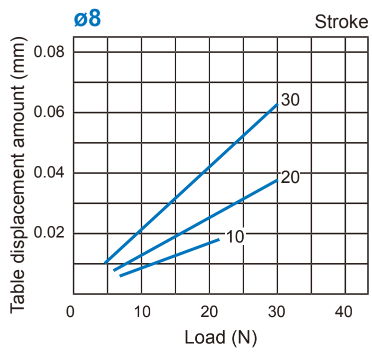
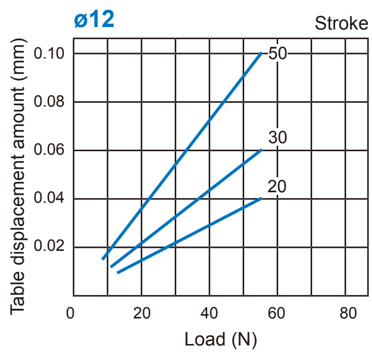




**Table displacement due to pitch moment load**

Table displacement when loads are applied to the section marked with the arrow at the full stroke.



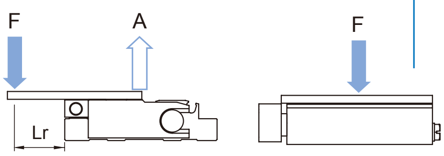



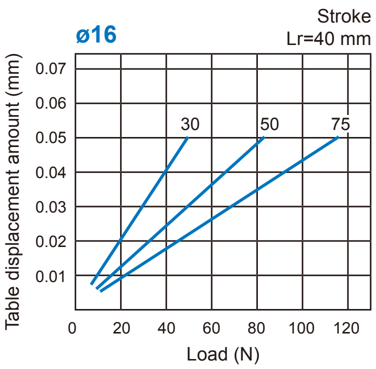



## Table deflection (Reference values)

**Table displacement due to roll moment load**

Table displacement of section A when loads are applied to the section F with theslide table retracted.



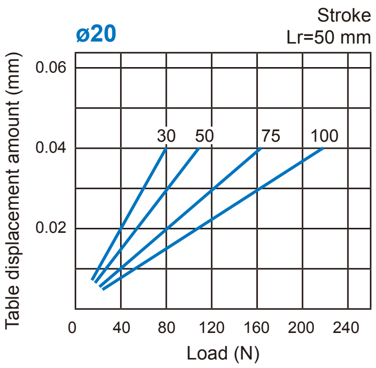
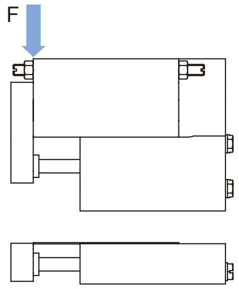
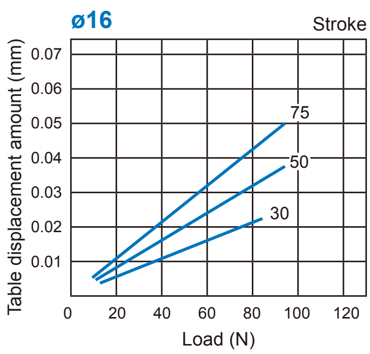




**Table displacement due to yaw moment load**

Table displacement when loads are applied to the section marked with the arrow at the full stroke.



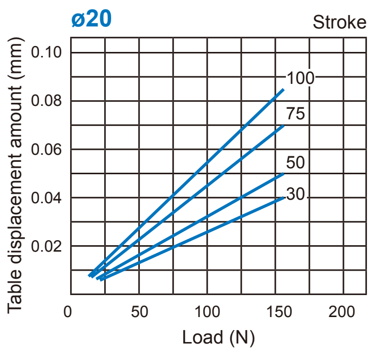
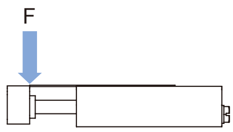
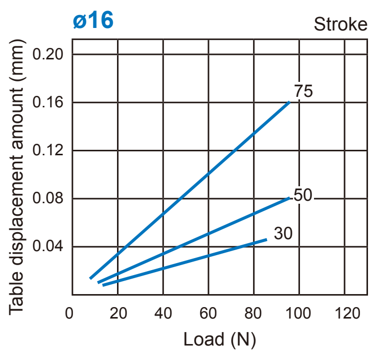
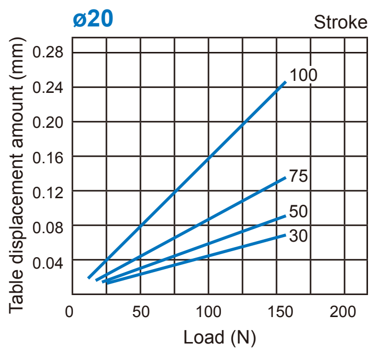




**Table displacement due to pitch moment load**

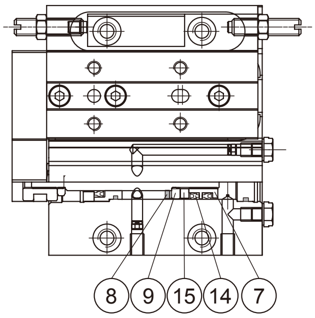
Table displacement when loads are applied to the section marked with the arrow at the full stroke.



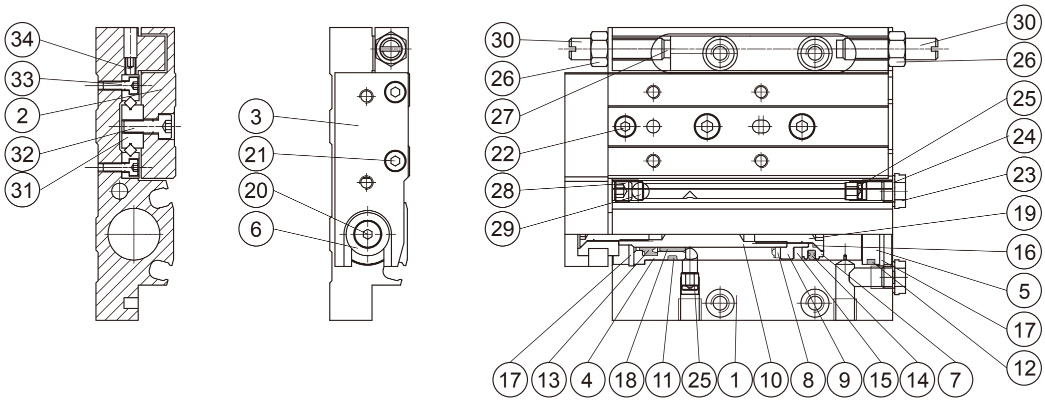



## ø8




## ø12, ø16, ø20




## Material

| No. | Tube I.D. / Part name | 8 | 12~20 | Q'y | Repair kits (inclusion) |
|---|---|---|---|---|---|
| 1 | Body | Aluminum alloy | | 1 | |
| 2 | Table | Aluminum alloy | | 1 | |
| 3 | Plate | Aluminum alloy | | 1 | |
| 4 | Rod cover | Aluminum alloy | | 1 | |
| 5 | Head cover | Aluminum alloy | | 1 | |
| 6 | Floating connector | Stainless steel | | 1 | |
| 7 | Piston | *2 | *1 | 1 | |
| 8 | Cushion pad | NBR | | 1 | ● |
| 9 | Piston | *2 | *1 | 1 | |
| 10 | Piston rod | Stainless steel | | 1 | |
| 11 | Cover ring | NBR | | 1 | ● |
| 12 | Cover ring | NBR | | 1 | ● |
| 13 | Rod packing | NBR | | 1 | ● |
| 14 | Piston packing | NBR | | 1 or 2 | ● |
| 15 | Magnet ring | Magnet material | | 1 | |
| 16 | Gasket | — | NBR | 1 | ● |
| 17 | Stop ring | Stainless steel | | 2 | |
| 18 | Rod bush | — | Bearing alloy | 1 | |
| 19 | Piston bolt | — | *2 | 1 | |
| 20 | Floating connector bolt | — | *2 | 1 | |
| 21 | Bolt | Stainless steel | | 2 | |

* Item 14. Tube I.D. ø8 (Q'y: 2pcs); Tube I.D. ø12~20 (Q'y: 1pc).

| No. | Tube I.D. / Part name | 8 | 12~20 | Q'y | Repair kits (inclusion) |
|---|---|---|---|---|---|
| 22 | Bolt | Stainless steel | | 1 | |
| 23 | Plug | Copper | | 2 | |
| 24 | Plug gasket | POM | | 2 | |
| 25 | Orifice | Stainless steel | | 2 | |
| 26 | Nut | Copper/Stainless steel | | 2 | |
| 27 | End cushion | PU | | 2 | ● |
| 28 | Plug | — | *2 | 1 | |
| 29 | Ball | — | *2 | 1 | |
| 30 | Adjuster bolt | Copper/Stainless steel | | 2 | |
| 31 | Slide way | Bearing steel | | 1 | |
| 32 | Bolt | Stainless steel | | *3 | |
| 33 | Bolt | Stainless steel | | *3 | |
| 34 | Bolt | Stainless steel | | *3 | |

*1. Aluminum alloy
*2. Stainless steel
*3. Quantity varies depending on the stroke length.

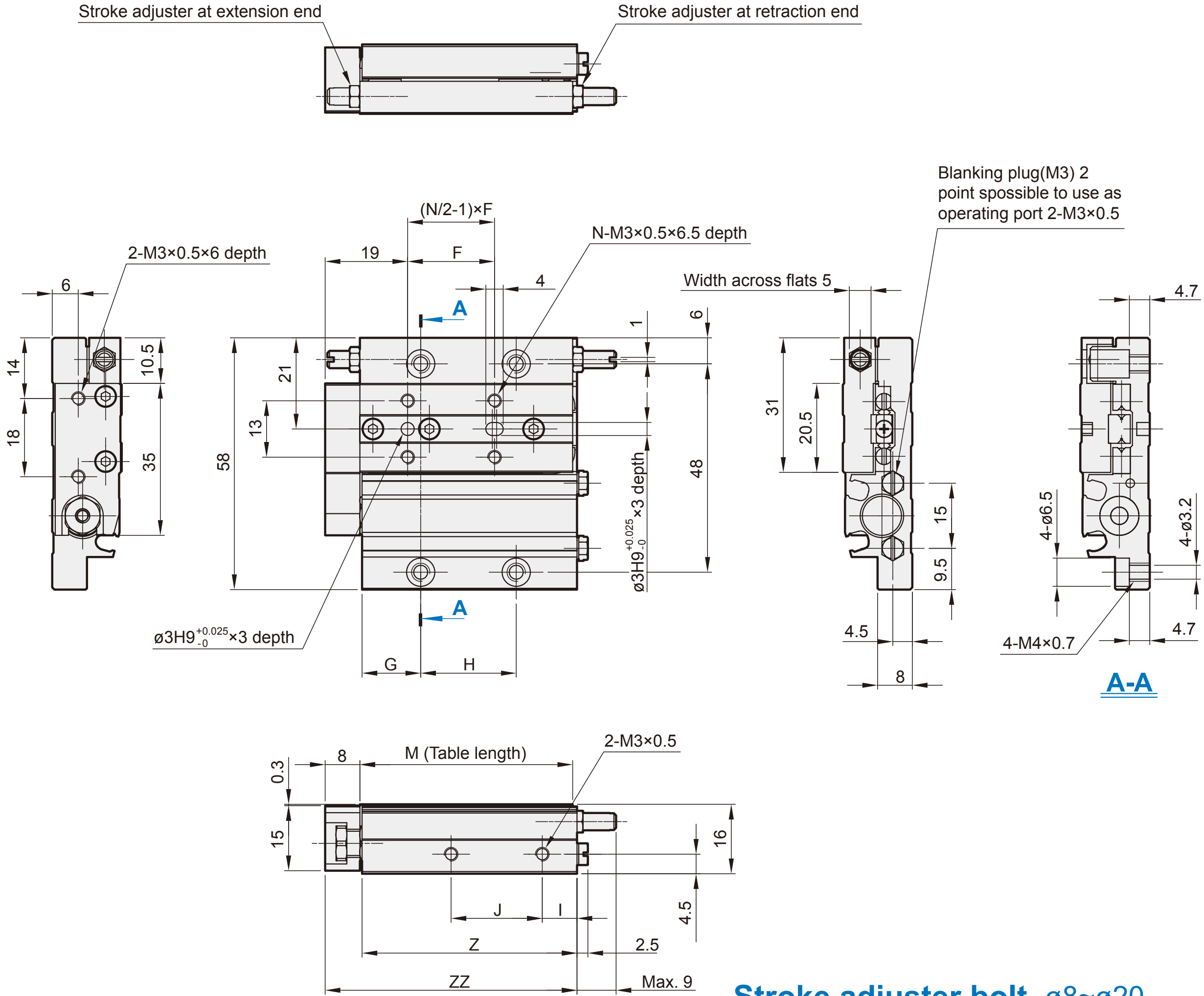
## Order example of repair kits

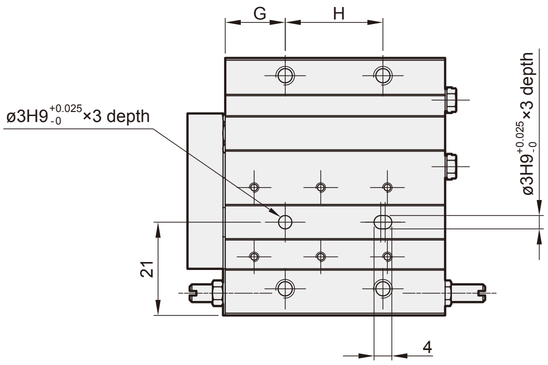
| Tube I.D. | Repair kits |
|---|---|
| ø8 | **PS-MCSF-8** |
| ø12 | **PS-MCSF-12** |
| ø16 | **PS-MCSF-16** |
| ø20 | **PS-MCSF-20** |

# MCSF Dimensions ø8

## LOW PROFILE SLIDE CYLINDER

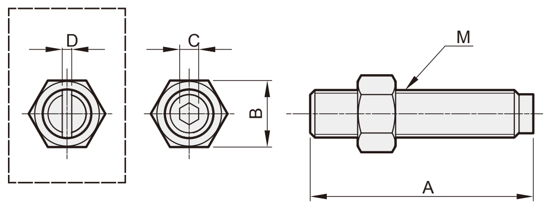
mindman



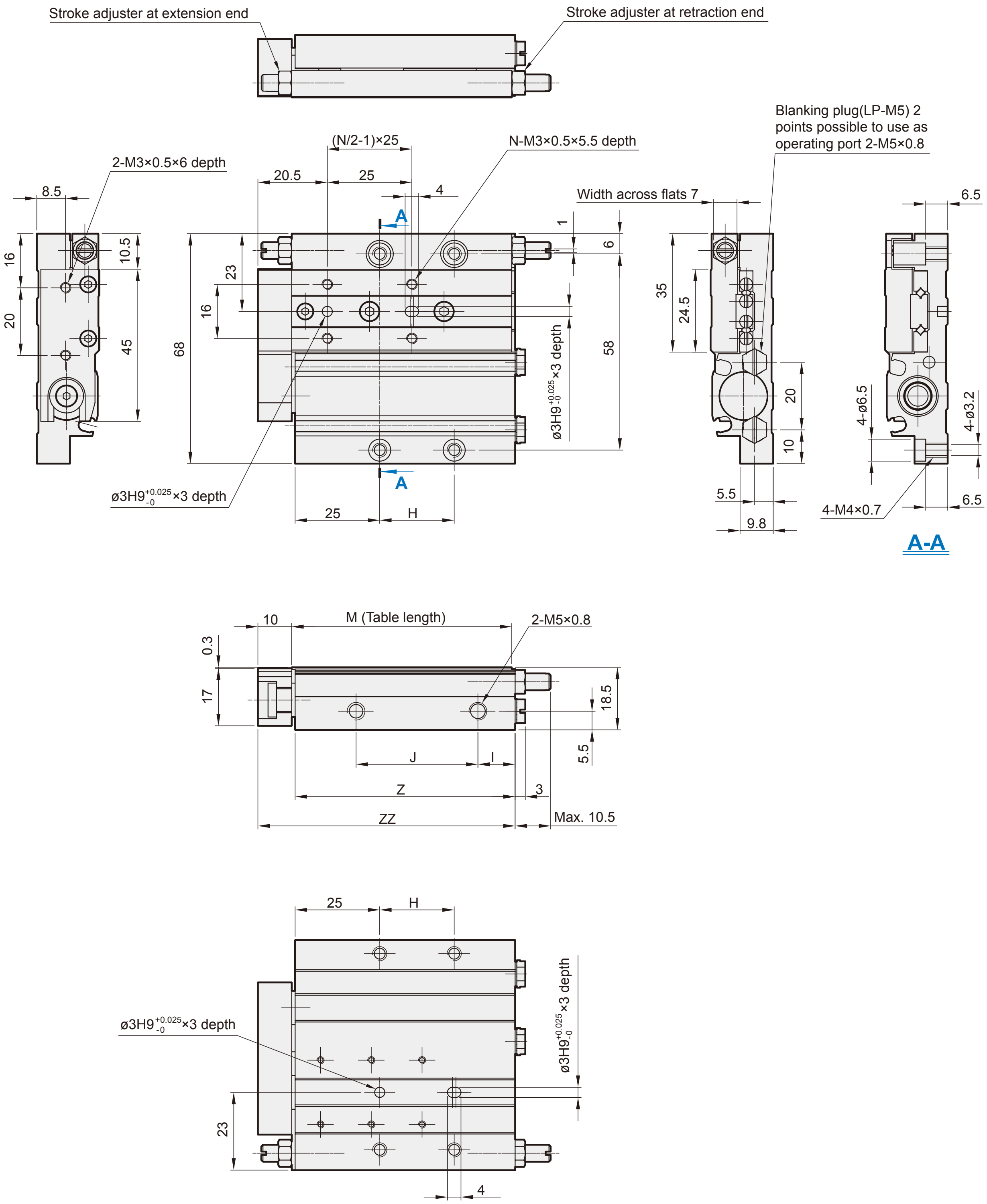




| Code / Stroke | F | G | H | I | J | M | N | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 20 | 13.5 | 22 | 8 | 21 | 49 | 4 | 49.5 | 58 |
| 20 | 26 | 14.5 | 26 | 6.5 | 28 | 54 | 4 | 54.5 | 63 |
| 30 | 26 | 14.5 | 40 | 8 | 41 | 69 | 6 | 69.5 | 78 |

## Stroke adjuster bolt ø8~ø20



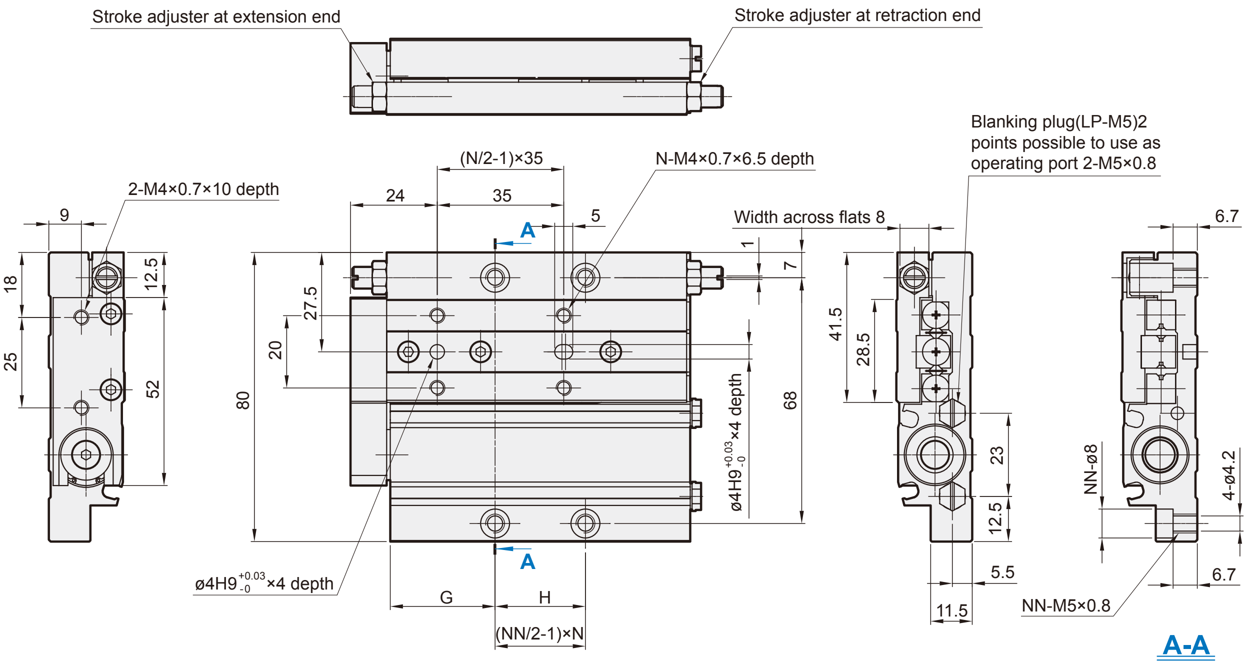
| Tube I.D. | Order code | Adjustable stroke range (mm) | A | B | C | D | M |
|---|---|---|---|---|---|---|---|
| 8 | MCSF-8 | 5 | 17 | 5 | — | 1 | M4×0.7 |
| | MCSF-8-X11 | 15 | 27 | | | | |
| 12 | MCSF-12 | 5 | 23.5 | 7 | — | 1 | M5×0.8 |
| | MCSF-12-X11 | 15 | 33.5 | | | | |
| 16 | MCSF-16 | 5 | 26.5 | 8 | 3 | — | M6×1 |
| | MCSF-16-X11 | 15 | 36.5 | | | | |
| | MCSF-16-X12 | 25 | 46.5 | | — | 1 | |
| 20 | MCSF-20 | 5 | 30 | 11 | 4 | — | M8×1 |
| | MCSF-20-X11 | 15 | 40 | | | | |
| | MCSF-20-X12 | 25 | 50 | | — | 1.5 | |

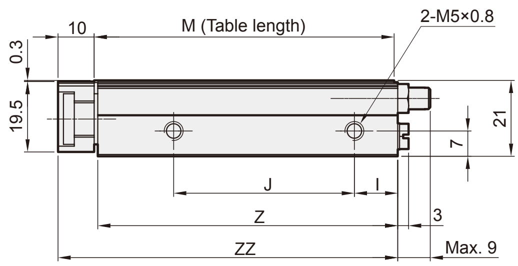


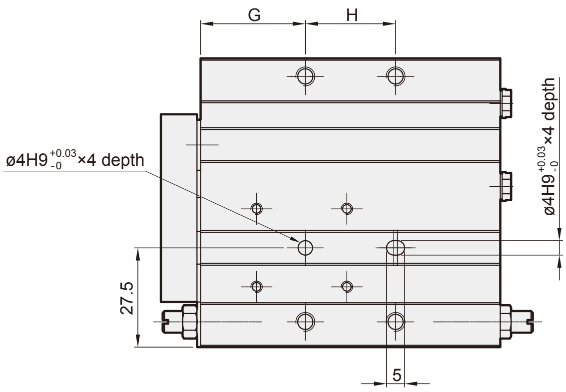

| Code / Stroke | H | I | J | M | N | Z | ZZ |
|---|---|---|---|---|---|---|---|
| 20 | 22 | 11 | 36 | 65 | 4 | 65 | 76 |
| 30 | 30 | 12 | 45 | 75 | 4 | 75 | 86 |
| 50 | 65 | 13 | 80 | 111 | 6 | 111 | 122 |

# MCSF Dimensions ø16

## LOW PROFILE SLIDE CYLINDER



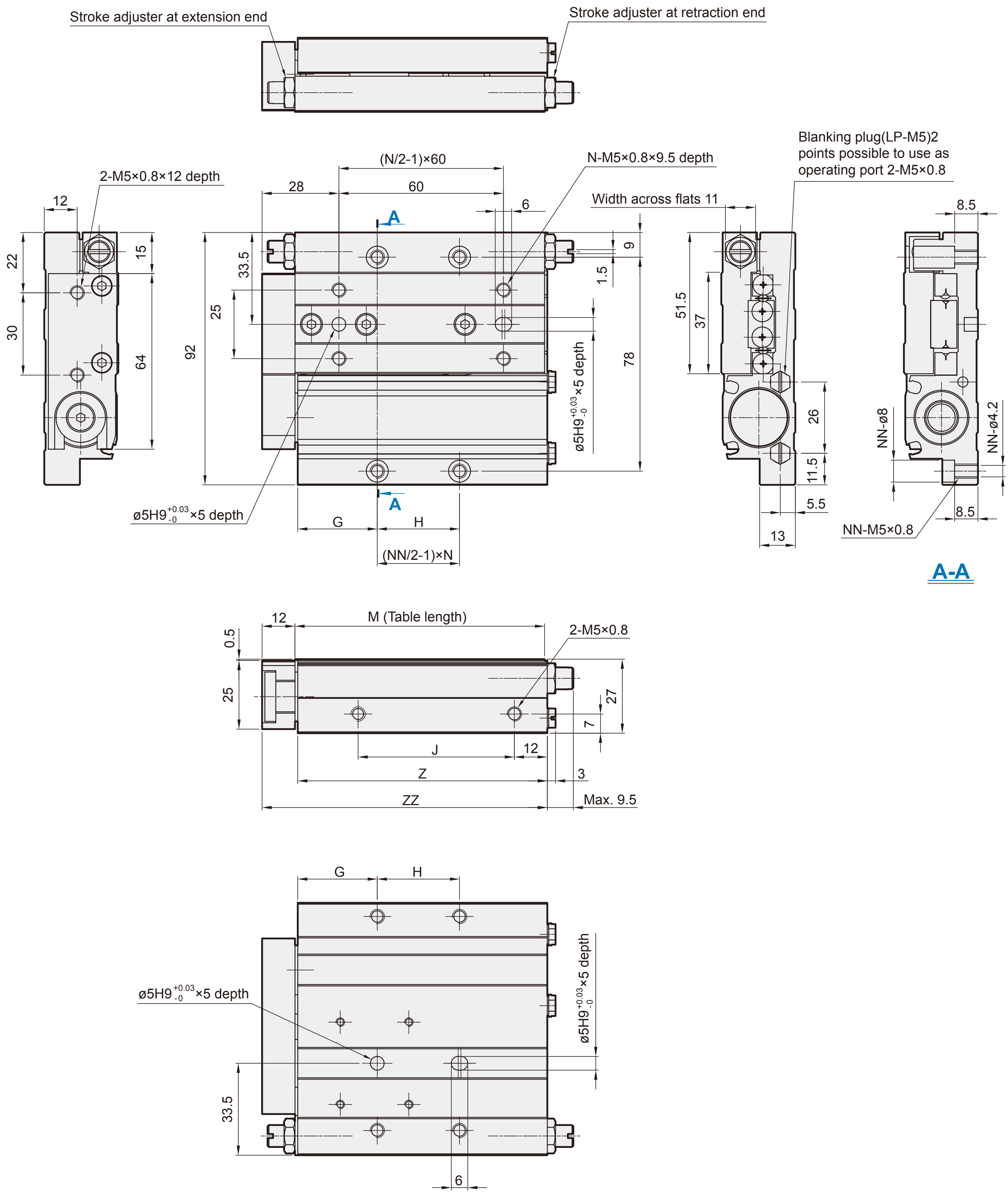




| Code / Stroke | G | H | I | J | M | N | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|
| 30 | 29 | 25 | 12 | 50 | 83 | 4 | 4 | 83 | 94 |
| 50 | 29 | 55 | 12 | 80 | 113 | 6 | 4 | 113 | 124 |
| 75 | 39 | 45 | 13 | 125 | 159 | 6 | 6 | 159 | 170 |

# MCSF Dimensions ø20

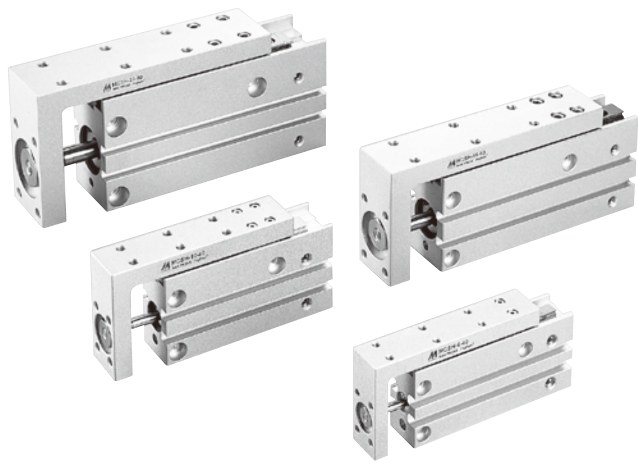
## LOW PROFILE SLIDE CYLINDER




| Code / Stroke | G | H | J | M | N | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|
| 30 | 29 | 30 | 57 | 91 | 4 | 4 | 91 | 104 |
| 50 | 36 | 45 | 77 | 113 | 4 | 4 | 113 | 126 |
| 75 | 40 | 45 | 125 | 162 | 6 | 6 | 162 | 175 |
| 100 | 59 | 60 | 175 | 211 | 6 | 6 | 211 | 224 |

# MCSH series

## COMPACT SLIDE CYLINDER



## Features

- Compact precision cylinder.
- Cylinder can take high lateral loads and is also non rotating.
- Cylinder can be mounted in 3 or 4 positions.
- Magnetic as standard.

## Specification

| Model | MCSH | | | |
|---|---|---|---|---|
| Acting type | Double acting | | | |
| Tube I.D. (mm) | 6 | 10 | 16 | 20 |
| Guide rail width (mm) | 5 | 7 | 9 | 12 |
| Port size | M5×0.8 | | | |
| Medium | Air | | | |
| Min. operating pressure | 0.12 MPa | 0.06 MPa | | 0.05 MPa |
| Max. operating pressure | 0.7 MPa | | | |
| Proof pressure | 1.07 MPa | | | |
| Ambient temperature | -10~+60°C (No freezing) | | | |
| Operating speed range | 50~500 mm/sec | | | |
| Allowable kinetic energy J (kgf · cm) | 0.125 | 0.25 | 0.5 | 1.0 |
| Lubricator | Not required | | | |
| Cushion | Rubber bumper | | | |
| Stroke length tolerance | $^{+1.0}_{0}$ | | | |
| Sensor switch (*) | RCE, RCE1, RDEP | | | |

* RCE, RCE1, RDEP specification, please refer to page 8-12, 13, 18.

## Order example

MCSH — 10 — 60

MODEL　TUBE I.D.　STROKE

## Cylinder weight

Unit: g

| Stroke (mm) | Tube I.D. | | | |
|---|---|---|---|---|
| | ø6 | ø10 | ø16 | ø20 |
| 5 | 62 | 117 | 216 | 437 |
| 10 | 67 | 125 | 227 | 455 |
| 15 | 76 | 140 | 247 | 486 |
| 20 | 81 | 148 | 258 | 505 |
| 25 | 91 | 162 | 279 | 542 |
| 30 | 96 | 170 | 290 | 560 |
| 40 | 111 | 192 | 323 | 597 |
| 50 | 125 | 215 | 353 | 656 |
| 60 | 140 | 238 | 386 | 700 |

## Table for standard stroke

| Tube I.D. | Stroke (mm) |
|---|---|
| ø6, 10, 16, 20 | 5, 10, 15, 20, 25, 30, 40, 50, 60 |

## Allowable moment

| Tube I.D. (mm) | Allowable moment (N.m) | | |
|---|---|---|---|
| | Roll moment load | Yaw moment load | Pitch moment load |
| | Mr | My | Mp |
| ø6 | 0.53 | 0.35 | 0.42 |
| ø10 | 1.23 | 0.73 | 0.86 |
| ø16 | 2.47 | 1.43 | 1.69 |
| ø20 | 4.94 | 2.47 | 2.82 |

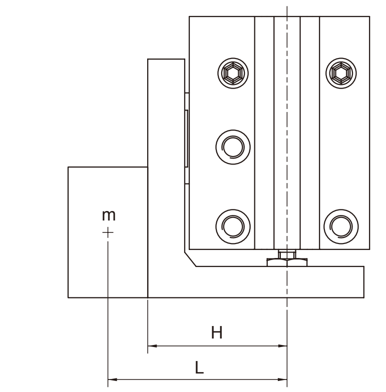
## Theoretical force

Unit: N

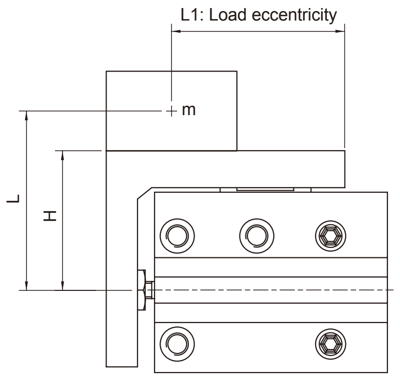
| Tube I.D. (mm) | Piston rod (mm) | Operating direction | Piston area ($mm^2$) | Operating pressure (MPa) | | |
|---|---|---|---|---|---|---|
| | | | | 0.3 | 0.5 | 0.7 |
| 6 | 3 | OUT | 28.3 | 8.49 | 14.2 | 19.8 |
| | | IN | 21.2 | 6.36 | 10.6 | 14.8 |
| 10 | 4 | OUT | 78.5 | 23.6 | 39.3 | 55.0 |
| | | IN | 66.0 | 19.8 | 33.0 | 46.2 |
| 16 | 6 | OUT | 201.0 | 60.3 | 101.0 | 141.0 |
| | | IN | 172.0 | 51.6 | 86.0 | 121.0 |
| 20 | 8 | OUT | 314.0 | 94.2 | 157.0 | 220.0 |
| | | IN | 264.0 | 79.2 | 132.0 | 185.0 |

## Selection conditions

| Selection fig | a1 | a2 | a3 |
|---|---|---|---|
| Max. speed (mm) | Up to 100 | Up to 300 | Up to 500 |
| **Vertical** Mounting direction | | | |




| Selection fig | b1 | b2 | b3 | b4 | b5 | b6 | b7 | b8 | b9 |
|---|---|---|---|---|---|---|---|---|---|
| Load eccentricity L1 (mm) | 50 | 100 | 200 | 50 | 100 | 200 | 50 | 100 | 200 |
| Max. speed (mm) | Up to 100 | | | Up to 300 | | | Up to 500 | | |
| **Horizontal** Mounting direction | | | | | | | | | |




| Tube I.D. | ø6 | ø10 | ø16 | ø20 |
|---|---|---|---|---|
| H dimension (mm) | 24.5 | 30.5 | 34.5 | 41.5 |

## Selection example

**● Vertical mounting**

Maximum speed: 300 mm/s
Overhang L: 20 mm
Load mass m: 0.2 kg

1. Refer to Graph a2 based on vertical mounting and a speed of 300 mm/s.
2. In Graph a2, find the intersection of a 20 mm overhang L and load mass m of 0.2 kg, which results in a determination of ø16.

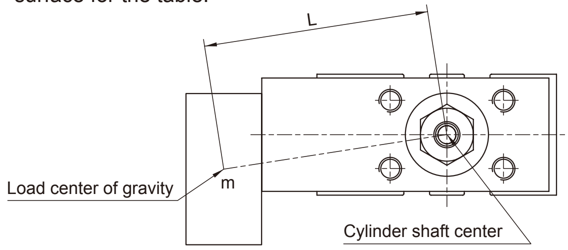
**● Horizontal Mounting**

Maximum speed: 300 mm/s
Load eccentricity L1: 50 mm
Overhang L: 60 mm
Load mass m: 0.1 kg

1. Refer to Graph b4 based on horizontal mounting, a speed of 300 mm/s and load eccentricity L1 of 50 mm.
2. In Graph b4, find the intersection of a 60 mm overhang L and load mass m of 0.1 kg, which results in a determination of ø20.

- L: Overhang (the distance from the cylinder shaft center to the load center of gravity)

  The direction of L can also be a diagonal direction. (Refer to the drawing below)
- H: Distance from the cylinder center axis to the mounting surface for the table.




## Vertical mounting (fig a1 ~ a3)

fig **a1** Max. speed 100 mm/s or less

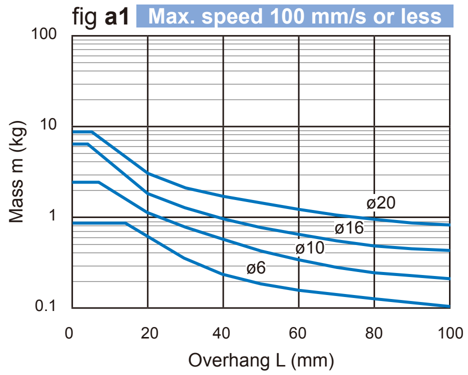



fig **a2** Max. speed 300 mm/s or less

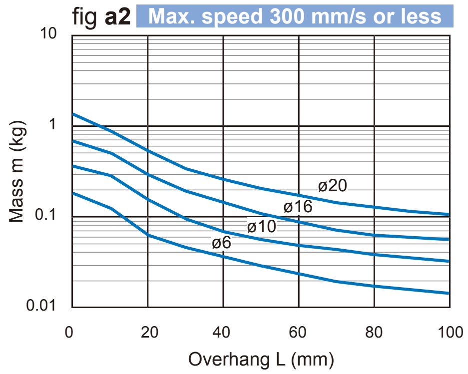
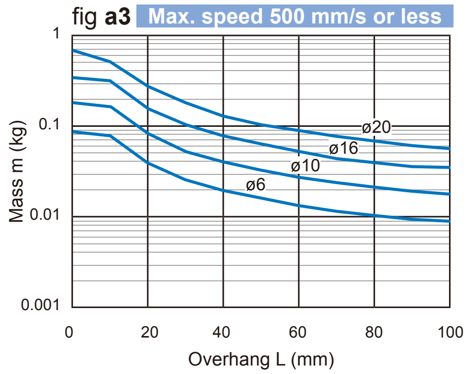



fig **a3** Max. speed 500 mm/s or less



## Horizontal mounting (fig b1 ~ b9)

**Max. speed 100 mm/s or less**

fig **b1** (Load eccentricity 50 mm)

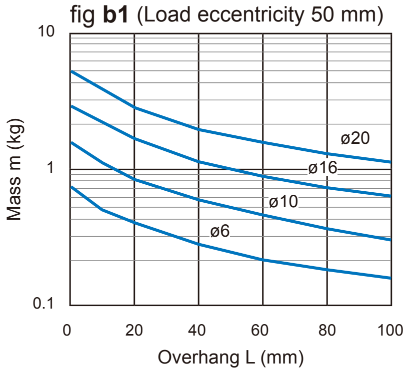



fig **b2** (Load eccentricity 100 mm)

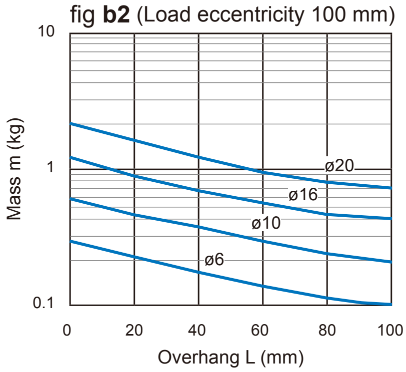
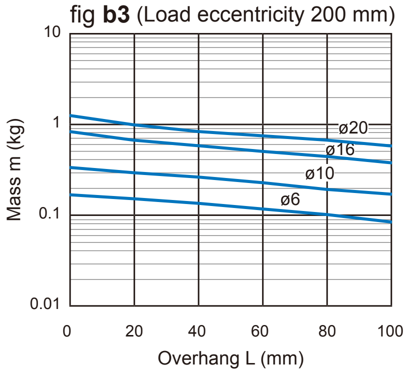



fig **b3** (Load eccentricity 200 mm)




**Max. speed 300 mm/s or less**

fig **b4** (Load eccentricity 50 mm)

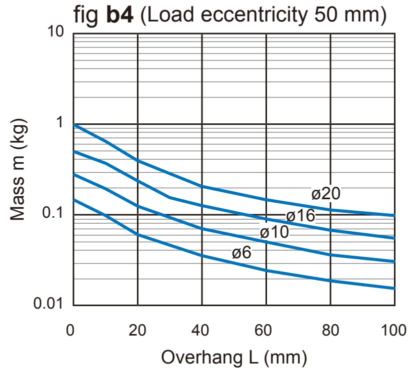



fig **b5** (Load eccentricity 100 mm)

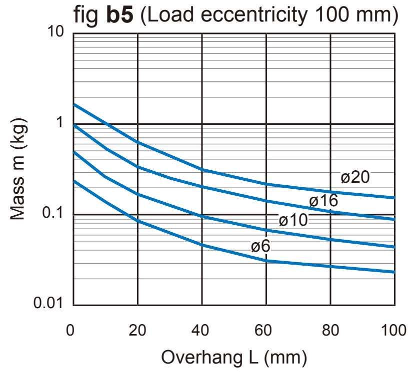
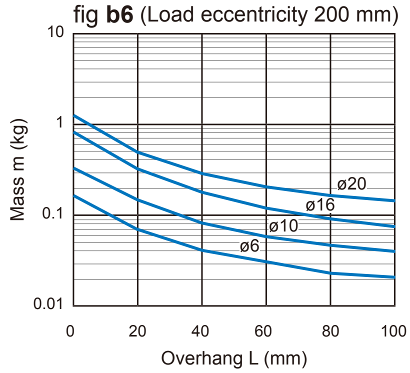



fig **b6** (Load eccentricity 200 mm)




**Max. speed 500 mm/s or less**

fig **b7** (Load eccentricity 50 mm)

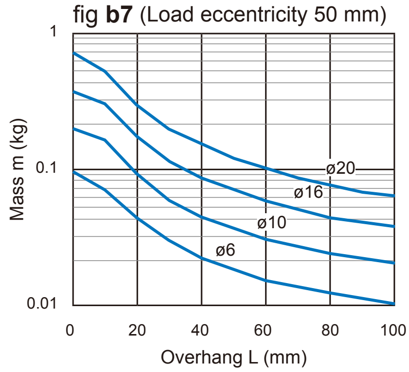



fig **b8** (Load eccentricity 100 mm)

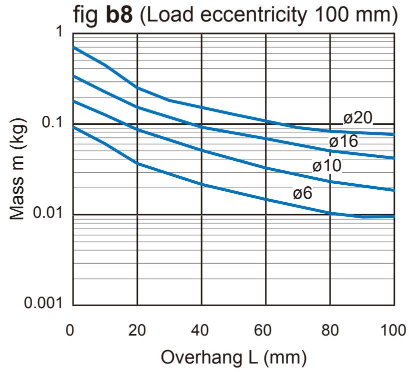
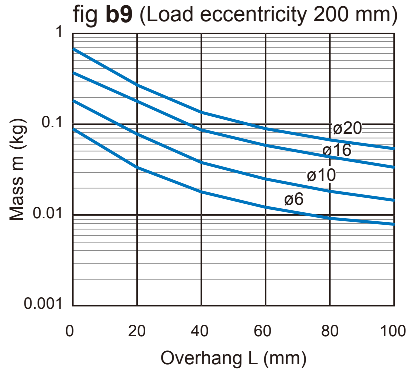



fig **b9** (Load eccentricity 200 mm)

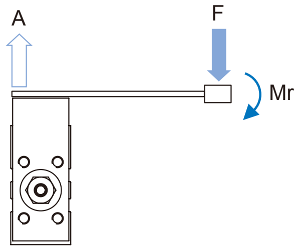


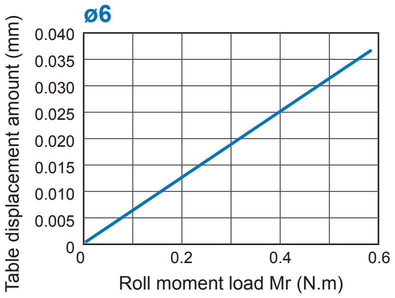

Standard cylinder
Compact cylinder
Mini cylinder
Guide cylinder
Table
Rodless cylinder
Stopper cylinder
Auxiliary Equipment

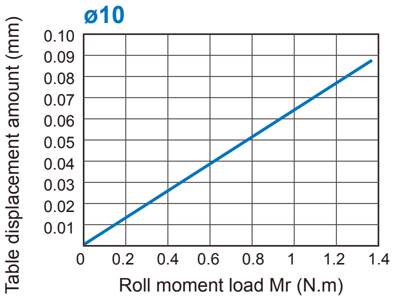
## Table deflection (Reference values)

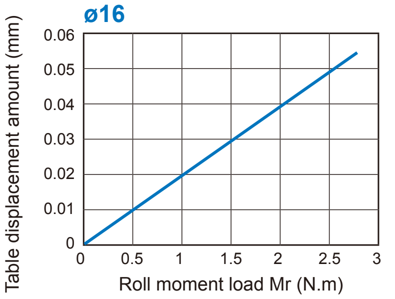
**Table displacement due to roll moment load**

Table displacement of section A when loads are applied to the section F with theslide table retracted.



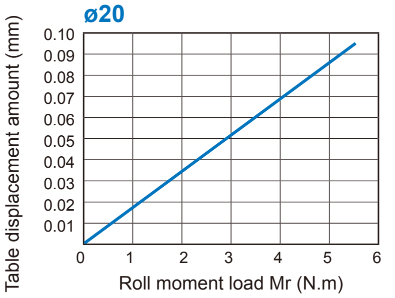
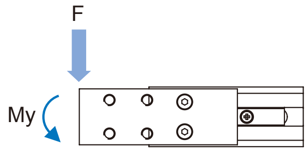
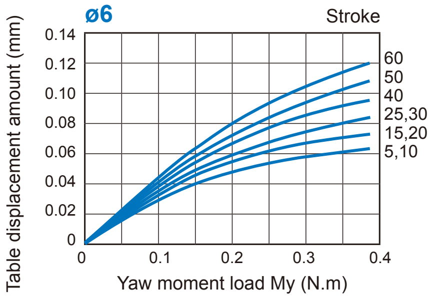
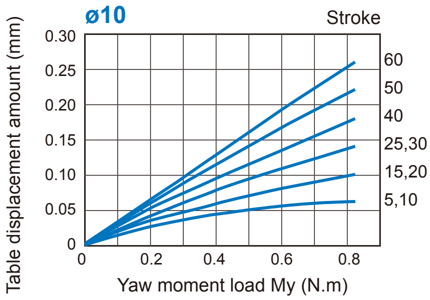



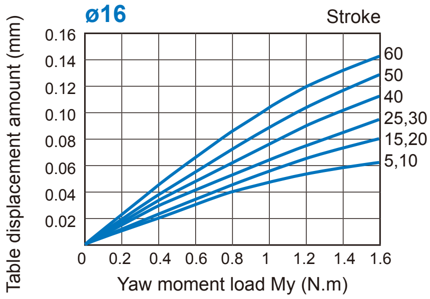

**Table displacement due to yaw moment load**

Table displacement when loads are applied to the section marked with the arrow at the full stroke.



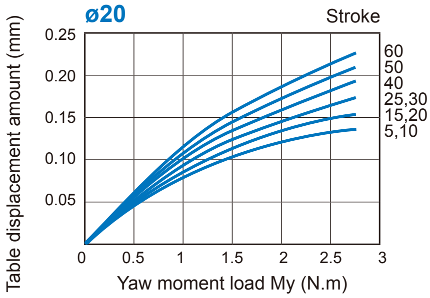
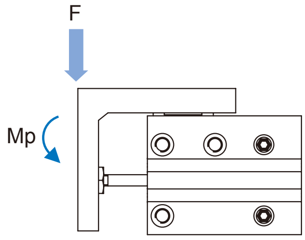
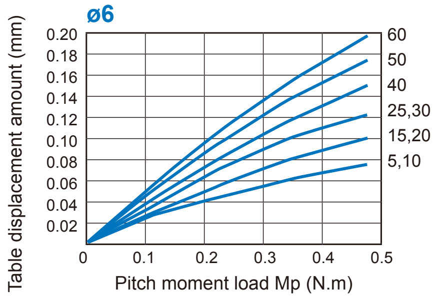
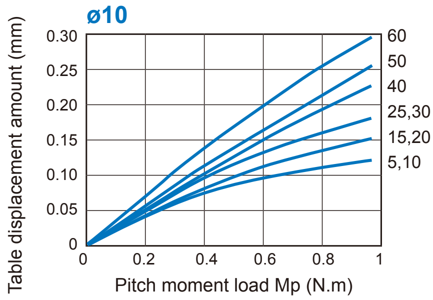



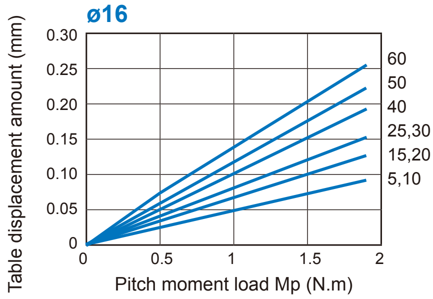

**Table displacement due to pitch moment load**

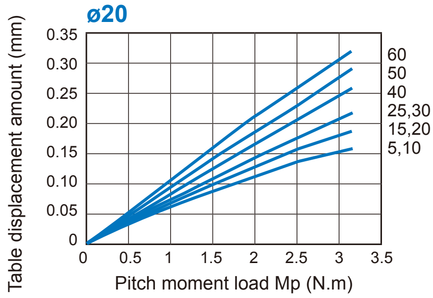
Table displacement when loads are applied to the section marked with the arrow at the full stroke.



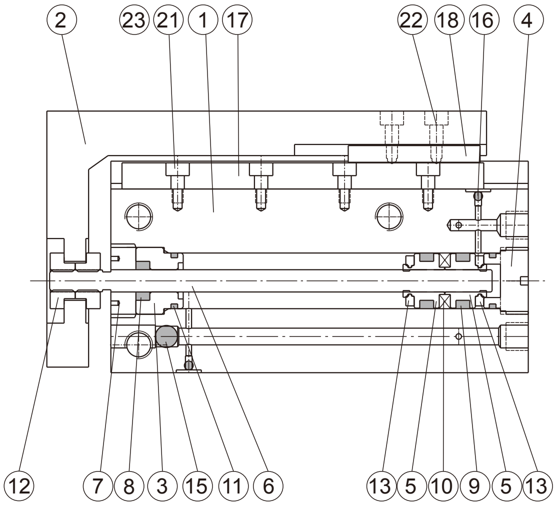



# MCSH Inside structure & Parts list

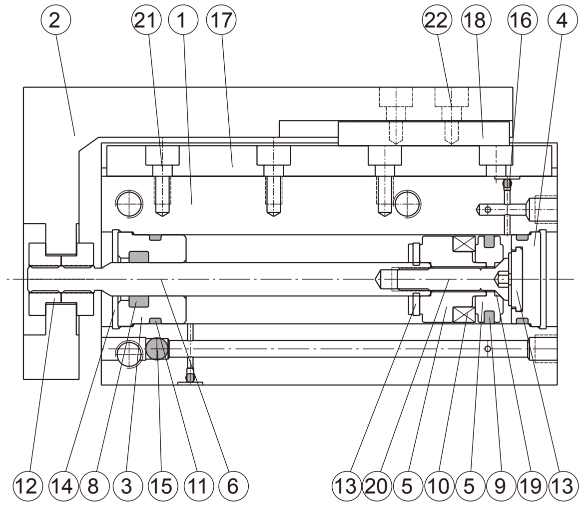
## COMPACT SLIDE CYLINDER

Mindman

ø6, ø10




ø16, ø20




## Material

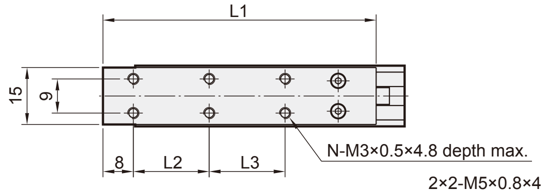
| No. | Tube I.D. / Part name | 6 | 10 | 16 | 20 | Note | Q'y | Repair kits (inclusion) |
|---|---|---|---|---|---|---|---|---|
| 1 | Body | Aluminum alloy | | | | | 1 | |
| 2 | Table | Aluminum alloy | | | | | 1 | |
| 3 | Rod cover | Brass | Aluminum alloy | | | | 1 | |
| 4 | Head cover | Aluminum alloy | | | | | 1 | |
| 5 | Piston | Aluminum alloy | | | | | 2 | |
| 6 | Piston rod | Stainless steel | | | | | 1 | |
| 7 | Rod cover locker | *1 | | — | | | 1 | |
| 8 | Rod packing | NBR | | | | | 1 | ● |
| 9 | Piston packing | NBR | | | | Tube I.D.ø6,ø10 ×2, ø16,ø20 ×1 | 1 or 2 | ● |
| 10 | Magnet ring | Magnet material | | | | | 1 | |
| 11 | Cover ring | NBR | | | | | 2 | ● |
| 12 | Rod front nut | Brass | | | | | 2 | |
| 13 | Cushion packing | NBR | | | | | 2 | ● |
| 14 | C type snap ring for hole | — | | Spring steel | | | 2 | |
| 15 | Steel ball A | Stainless steel | | | | | 1 | |
| 16 | Steel ball B | Stainless steel | | | | | 2 | |
| 17 | Linear guide | Stainless steel | | | | | 1 | |
| 18 | Guide seat | Stainless steel | | | | | 1 | |
| 19 | Piston gasket | — | | NBR | | | 1 | ● |
| 20 | Piston bolt | — | | *1 | | | 1 | |
| 21 | Hexagon socket head cap screw A | Stainless steel | | | | Tube I.D.ø10~20 (*3) | 2~5 | |
| 22 | Hexagon socket head cap screw B | *2 | Stainless steel | | | Tube I.D.ø6 ×2, ø10~20×4 | 2 or 4 | |
| 23 | Round head Phillips screw | Stainless steel | | | | Only for tube I.D.ø6 (*3) | 2~5 | |
| 24 | Plug gasket | NBR | | | | | 4 | ● |

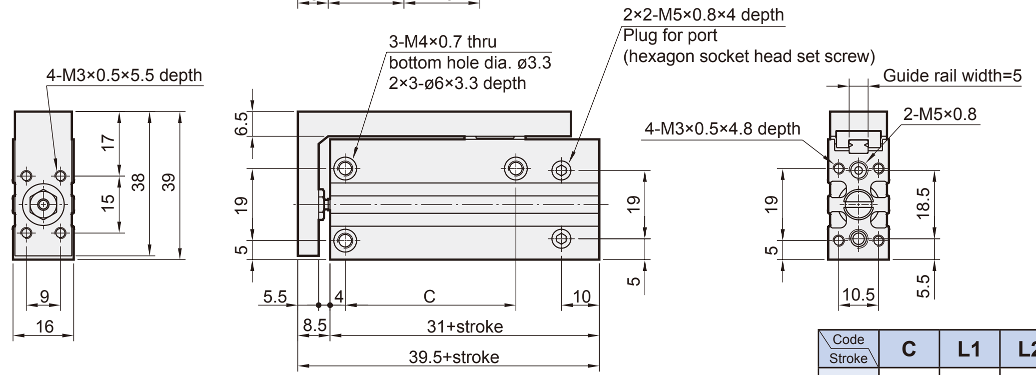
*1. Stainless steel *2. Carbon steel
*3. Quantity varies depending on the stroke length.

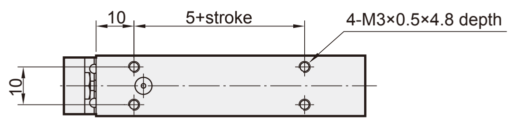
## Order example of repair kits

| Tube I.D. | Repair kits |
|---|---|
| ø6 | **PS-MCSH-6** |
| ø10 | **PS-MCSH-10** |
| ø16 | **PS-MCSH-16** |
| ø20 | **PS-MCSH-20** |

## ø6

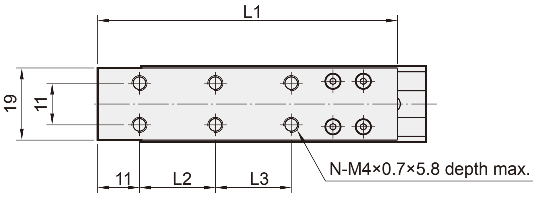


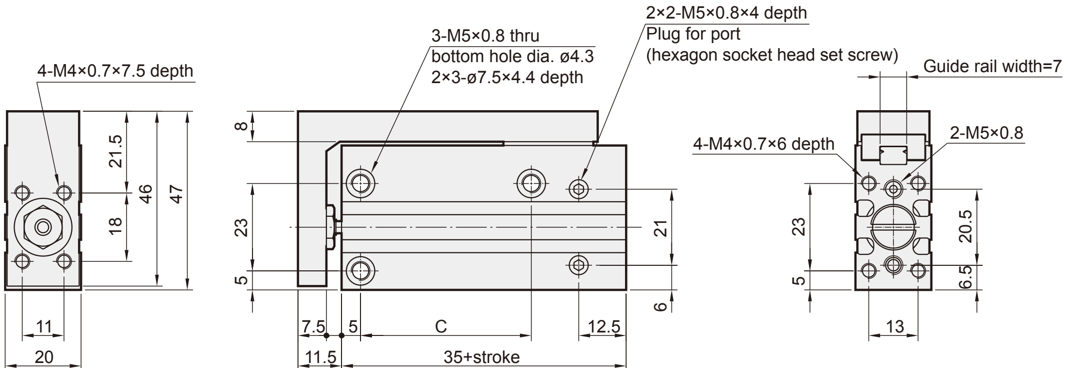



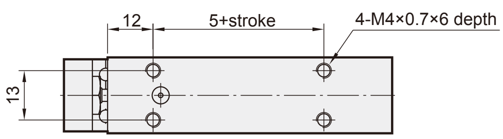




| Code / Stroke | C | L1 | L2 | L3 | N |
|---|---|---|---|---|---|
| 5 | 14 | 42 | 10 | – | 4 |
| 10 | 14 | 42 | 10 | – | 4 |
| 15 | 24 | 52 | 20 | – | 4 |
| 20 | 24 | 52 | 20 | – | 4 |
| 25 | 30 | 62 | 30 | – | 4 |
| 30 | 30 | 62 | 30 | – | 4 |
| 40 | 45 | 72 | 20 | 20 | 6 |
| 50 | 55 | 82 | 25 | 25 | 6 |
| 60 | 60 | 92 | 30 | 30 | 6 |

## ø10



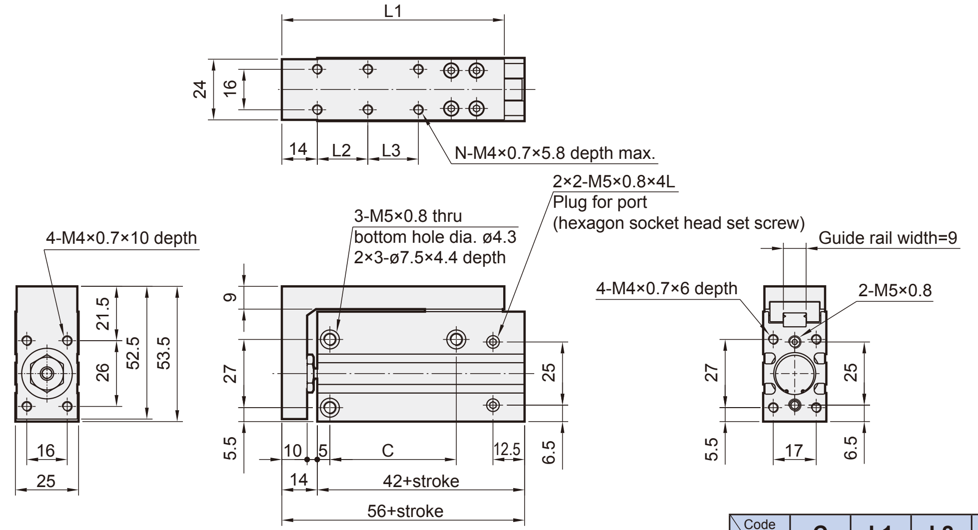

| Code / Stroke | C | L1 | L2 | L3 | N |
|---|---|---|---|---|---|
| 5 | 14 | 49 | 10 | – | 4 |
| 10 | 14 | 49 | 10 | – | 4 |
| 15 | 24 | 59 | 20 | – | 4 |
| 20 | 24 | 59 | 20 | – | 4 |
| 25 | 30 | 69 | 30 | – | 4 |
| 30 | 30 | 69 | 30 | – | 4 |
| 40 | 45 | 79 | 20 | 20 | 6 |
| 50 | 55 | 89 | 25 | 25 | 6 |
| 60 | 60 | 99 | 30 | 30 | 6 |

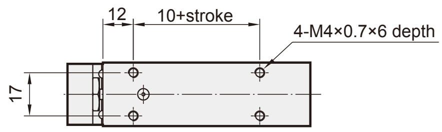
# MCSH Dimensions ø16, ø20

## COMPACT SLIDE CYLINDER



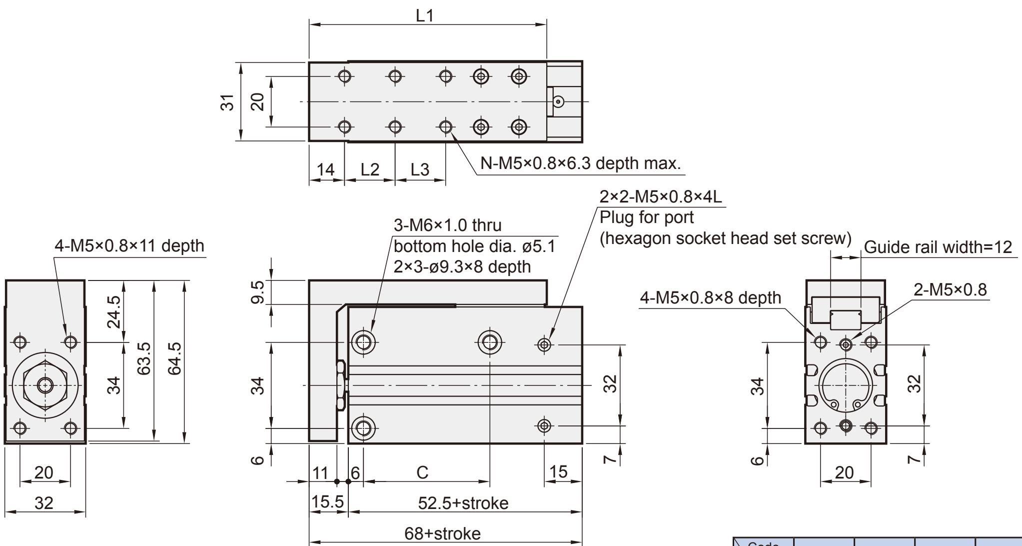
### ø16

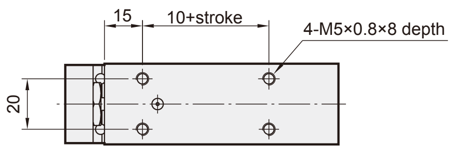



| Code / Stroke | C | L1 | L2 | L3 | N |
|---|---|---|---|---|---|
| 5 | 20 | 58 | 10 | – | 4 |
| 10 | 20 | 58 | 10 | – | 4 |
| 15 | 30 | 68 | 20 | – | 4 |
| 20 | 30 | 68 | 20 | – | 4 |
| 25 | 40 | 78 | 30 | – | 4 |
| 30 | 40 | 78 | 30 | – | 4 |
| 40 | 50 | 88 | 20 | 20 | 6 |
| 50 | 60 | 98 | 25 | 25 | 6 |
| 60 | 60 | 108 | 30 | 30 | 6 |

### ø20




| Code / Stroke | C | L1 | L2 | L3 | N |
|---|---|---|---|---|---|
| 5 | 20 | 64 | 10 | – | 4 |
| 10 | 20 | 64 | 10 | – | 4 |
| 15 | 25 | 74 | 20 | – | 4 |
| 20 | 25 | 74 | 20 | – | 4 |
| 25 | 40 | 84 | 30 | – | 4 |
| 30 | 40 | 84 | 30 | – | 4 |
| 40 | 50 | 94 | 20 | 20 | 6 |
| 50 | 70 | 104 | 25 | 25 | 6 |
| 60 | 70 | 114 | 30 | 30 | 6 |