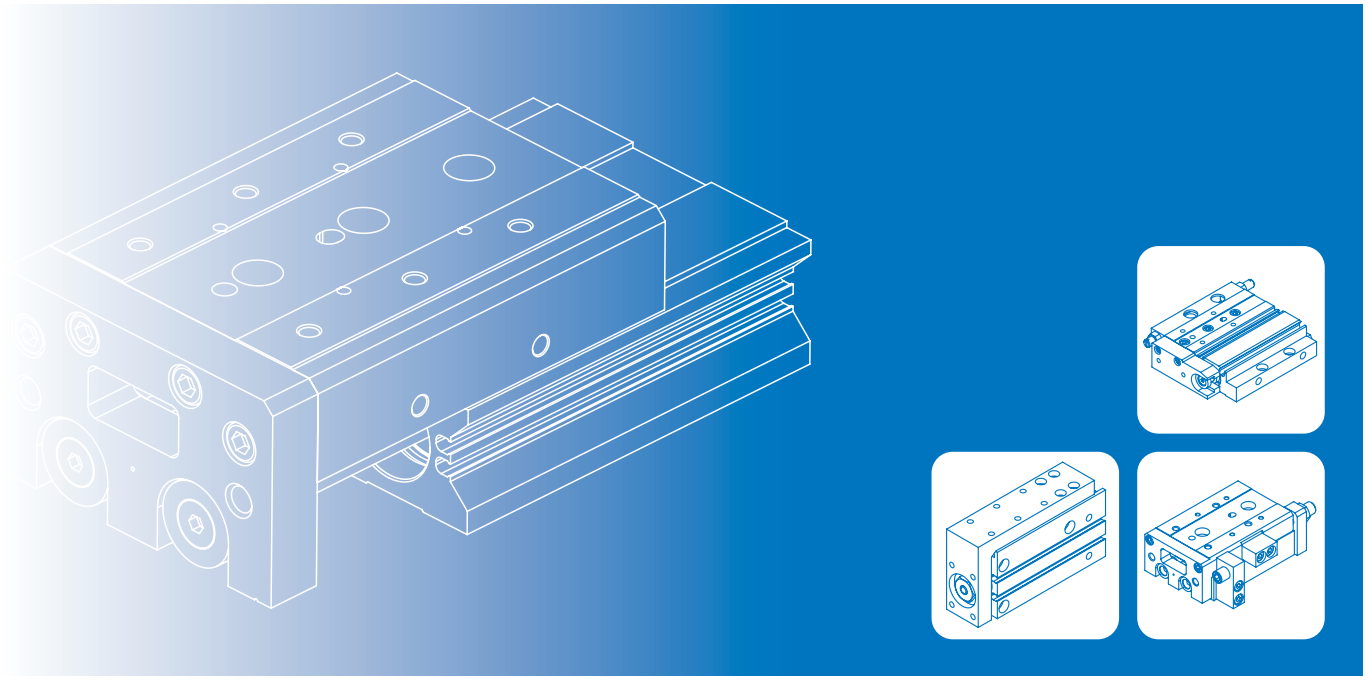
# TABLE





**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.

Technical data

Caution for safety
(Read beforeinstalling)

## Features

- High precision combination of cylinder and linear rail.
- Flush fitting sensor groove.
- Provide optional combination for stroke adjuster and end lock (for vertical installation to prevent falling).
- 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) | | | | | |
| End lock — Operating speed range | – | 50~500 mm/sec | | | | |
| End lock — Holding force (N) | – | 25 | 60 | 110 | 160 | 250 |
| Sensor switch | RCE, RCE1, RDEP | | | | | |

## 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 |
| ø20, 25 | 10, 20, 30, 40, 50, 75, 100, 125, 150 |

## Order example

MCSS — 20 L — 50 — AS — X12 — HL — □

- MODEL
- TUBE I.D.
- Blank: Standard
  **L**: Symmetric style
- STROKE
- (*1) 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
- (*2) ADJUSTABLE RANGE
  Blank: 5mm
  **X11**: 15mm
  **X12**: 25mm
  (Only for stroke adjuster)
- (*3,4) END LOCK
  Blank: Without
  **HL**: With end lock
  (for ø8~ø25)
- PORT THREAD
  Blank: M thread
  (for ø6~ø16)
  Blank: Rc thread
  **G**: G thread
  **NPT**: NPT thread
  (for ø20,ø25)

*1. Adjustable range is not available for shock absorber type. Shock absorber is not available for MCSS-6.
*2. **X12** (adjustable range: 25mm) is not available for MCSS-6.
*3. End lock (**HL**) not suit for symmetric style (**L**) and MCSS-6.

## 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 |

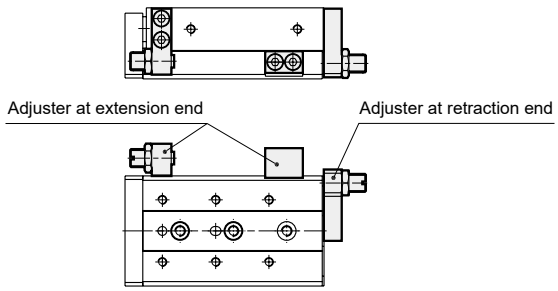
## (*4) Option combination

| End lock / Stroke adj. | Blank | HL |
|---|---|---|
| Blank | ○ | ○ |
| **AS** | ○ | ○ |
| **AT** | ○ | × |
| **A** | ○ | × |
| **BS** | ○ | ○ |
| **BT** | ○ | × |
| **B** | ○ | × |
| **AB** | ○ | × |
| **BA** | ○ | × |

# Options

## Stroke adjuster

- Adjustable stroke range:
  0~5mm (Standard), 0~15mm (-X11), 0~25mm (-X12)
  **AS**: Adjuster at extension end
  **AT**: Adjuster at retraction end
  **A**: Adjuster at both ends

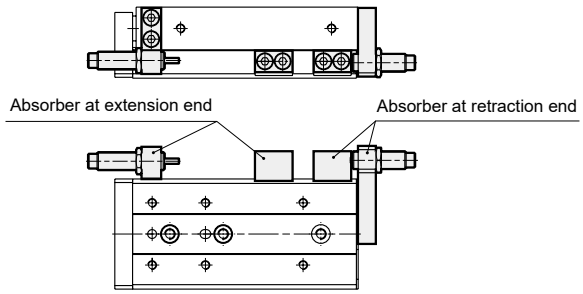



- Tightening torque of mounting bolts
  Insufficient torque will cause a decrease in the positioning accuracy and lead to malfunction.

| Tube I.D. (mm) | Adjuster at extension end (AS) | | | | Adjuster at retraction end (AT) | |
|---|---|---|---|---|---|---|
| | Body mounting section | | Table mounting section | | | |
| | Bolt size | Tightening torque (N.m) | Bolt size | Tightening torque (N.m) | Bolt size | Tightening torque (N.m) |
| 6 | M2.5×10 | 0.5 | M2.5×8 | 0.5 | M2.5×8 | 0.5 |
| 8 | M3×12 | 0.9 | M3×10 | 0.9 | M3×10 | 0.9 |
| 12 | M4×15 | 2.1 | M4×12 | 2.1 | M4×8 | 2.1 |
| 16 | M5×18 | 4.4 | M5×18 | 4.4 | M5×10 | 4.4 |
| 20 | M6×20 | 7.0 | M6×20 | 7.0 | M5×12 | 4.4 |
| 25 | M8×25 | 18.0 | M8×25 | 18.0 | M6×16 | 7.0 |

## With shock absorber

- Enable adjustment of stroke.
- Absorb the collision at stroke end and stops smoothly.
  **BS**: Absorber at extension end
  **BT**: Absorber at retraction end
  **B**: Absorber at both ends

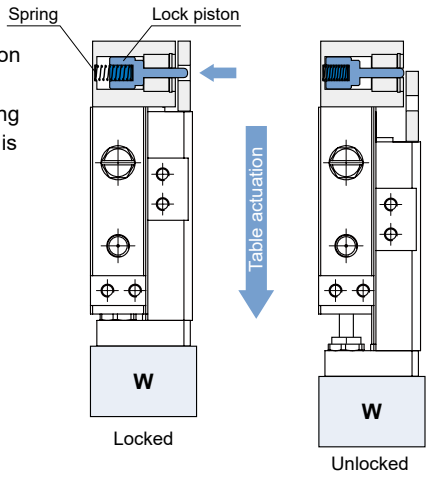



- Tightening torque of mounting bolts.
  Insufficient torque will cause a decrease in the positioning accuracy and cause malfunction.

| Tube I.D. (mm) | Absorber at extension end (BS) | | Absorber at retraction end (BT) | | | |
|---|---|---|---|---|---|---|
| | | | Body mounting section | | Table mounting section | |
| | Bolt size | Tightening torque (N.m) | Bolt size | Tightening torque (N.m) | Bolt size | Tightening torque (N.m) |
| 8 | M3×16 | 0.9 | M3×12 | 0.9 | M3×16 | 0.9 |
| 12 | M4×15 | 2.1 | M4×8 | 2.1 | M4×15 | 2.1 |
| 16 | M5×18 | 4.4 | M5×10 | 4.4 | M5×18 | 4.4 |
| 20 | M6×25 | 7.0 | M5×12 | 4.4 | M6×25 | 7.0 |
| 25 | M8×25 | 18.0 | M6×16 | 7.0 | M8×25 | 18.0 |

## With End lock

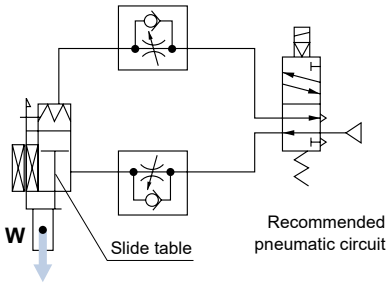
- Hold the return position of cylinder to prevent the table from dropping even if the air supply is cut off.




## Caution

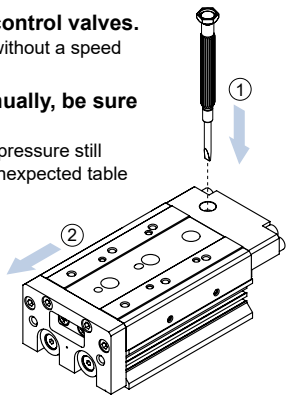
**1. Use 4/2 or 5/2 solenoid valves.**

A malfunction may occur with a control circuit that exhausts from two ports, such as exhaust center 3 position valves.




**2. Be sure to use meter-out speed control valves.**
If it is used in meter-in speed control or without a speed controller, it may result in malfunction.

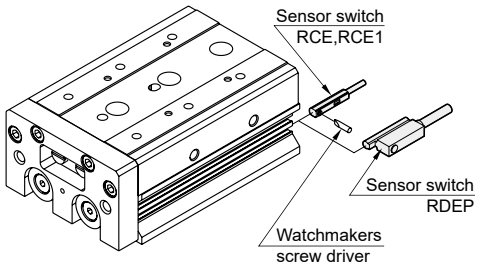
**3. When releasing the end lock manually, be sure that air pressure is released.**
If the End Lock is unlocked while the air pressure still remains, it may cause damage, due to unexpected table moving.

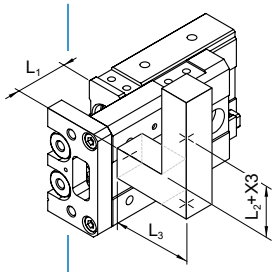



**How to unlock the end lock**

Before proceeding, make sure that there is no residual air pressure.
① Push down the lock piston pin.
② Slide the table forward.

## Installation of sensor switch



| 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)

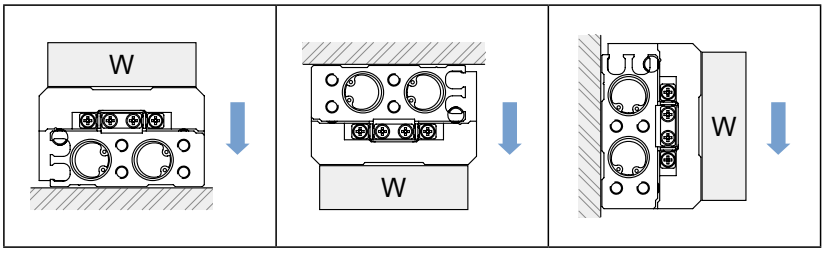



Table 2: Max. allowable load mass: Wmax (kg)

| 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: Xn (mm)

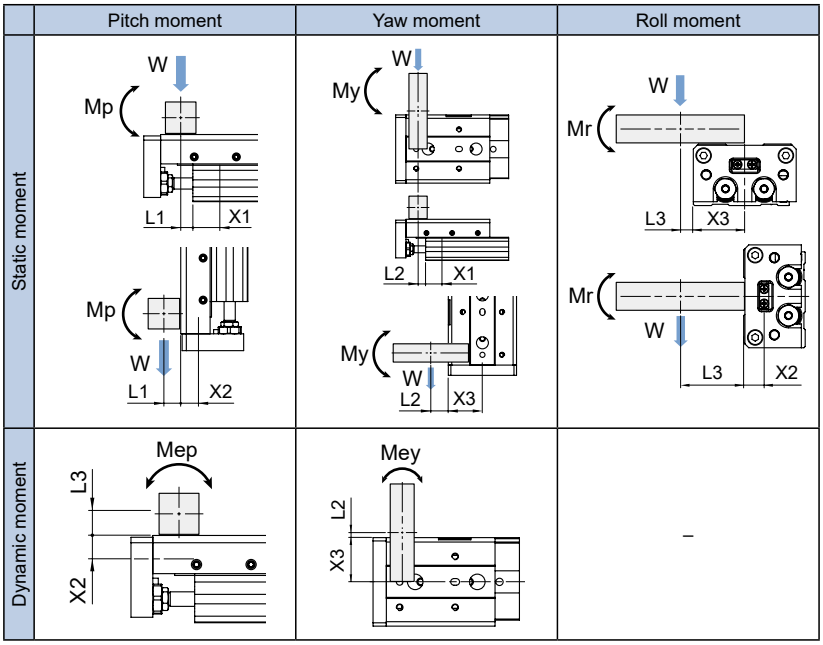
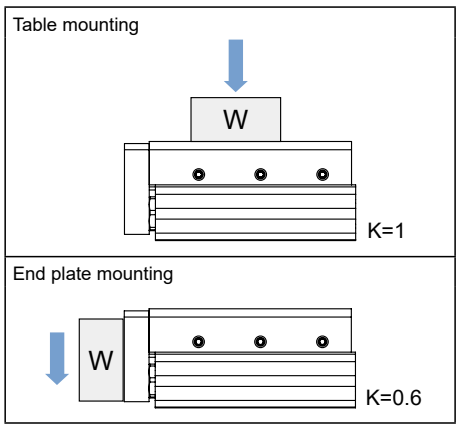



Fig 3: Workpiece mounting coefficient: K




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**<br>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 $\alpha_1 = 0$.)<br>Find the load factor of the load mass $\alpha_1$. | $Wa = K \cdot \beta \cdot Wmax$<br>Workpiece mounting coefficient K: Fig 3<br>Allowable load mass coefficient β: Fig 4<br>Max. allowable load mass Wmax: Table 2<br>$\alpha_1 = W/Wa$ | $Wa = 1 \cdot 1 \cdot 0.6 = 0.6$<br>$K = 1$<br>$\beta = 1$<br>$Wmax = 0.6$<br>$\alpha_1 = 0.3/0.6 = 0.5$ |
| **3-2 Load factor of static moment**<br>Find the static moment M (N·m).<br>Find the allowable static moment Ma (N·m).<br>Find the load factor $\alpha_2$ of the static moment. | $M = W \cdot 9.8(Ln+Xn) / 1000$<br>Correction value of moment center position distance Xn: Table 3<br>$Ma = K \cdot \gamma \cdot Mmax$<br>Workpiece mounting coefficient K: Fig 3<br>Allow load mounting coefficient γ: Fig 4<br>Max. allowable moment Mmax: Table 4<br>$\alpha_2 = M/Ma$ | Yawing<br>Examine My.<br>$My = 0.3 \cdot 9.8(4+14.5)/1000 = 0.05$<br>$X_1 = 14.5$<br>$May = 1 \cdot 1 \cdot 0.7 = 0.7$<br>$Mymax = 0.7$<br>$K = 1$<br>$\gamma = 1$<br>$\alpha_2 = 0.05/0.7 = 0.072$<br><br>Rolling<br>Examine Mr.<br>$Mr = 0.3 \cdot 9.8(5+6)/1000 = 0.033$<br>$X_2 = 6$<br>$Mar = 0.7$<br>(Same value as May)<br>$\alpha'_2 = 0.033/0.7 = 0.047$ |
| **3-3 Load factor of dynamic moment**<br>Find the dynamic moment Me (N·m).<br>Find the allowable dynamic moment Mea (N·m).<br>Find the load factor $\alpha_3$ of the dynamic moment. | $Me = 1/3 \cdot We \cdot 9.8 \frac{(Ln+Xn)}{1000}$<br>Correction equivalent to impact $We = \delta \cdot W \cdot V$<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<br>$Mea = K \cdot \gamma \cdot Mmax$<br>Workpiece mounting coefficient K: Fig 3<br>Allowable mounting coefficient γ: Fig 4<br>Max. allowable moment Mmax: Table 4<br>$\alpha_3 = Me/Mea$ | Pitching<br>Examine Mep.<br>$Mep = 1/3 \cdot 2.52 \cdot 9.8 \cdot \frac{(5+6)}{1000} = 0.09$<br>$We = 4/100 \cdot 0.3 \cdot 210 = 2.52$<br>$X_2 = 6$<br>$Meap = 1 \cdot 1 \cdot 0.7 = 0.7$<br>$K = 1$<br>$\gamma = 1$<br>$Mpmax = 0.7$<br>$\alpha_3 = 0.09/0.7 = 0.128$<br><br>Yawing<br>Examine Mey.<br>$Mey = 1/3 \cdot 2.52 \cdot 9.8 \cdot \frac{(4+16)}{1000} = 0.165$<br>$We = 2.52$<br>$X_3 = 16$<br>$Meay = 0.7$ (Same value as Meap)<br>$\alpha'_3 = 0.165/0.7 = 0.235$ |
| **3-4 Sum of load factors**<br>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>$\Sigma\alpha_n = 0.5 + 0.072 + 0.047 + 0.128 + 0.235 = 0.982 \leq 1$<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 | 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

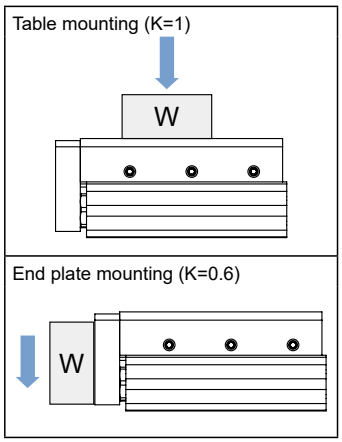
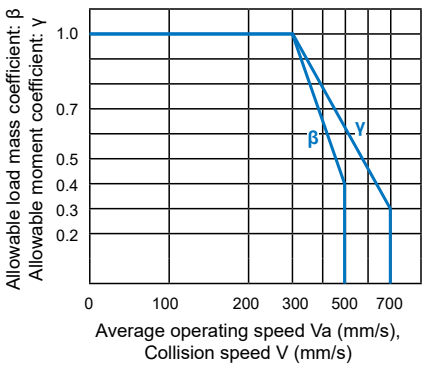



Fig.4: Allowable load mass coefficient: β
Allowable moment coefficient: γ

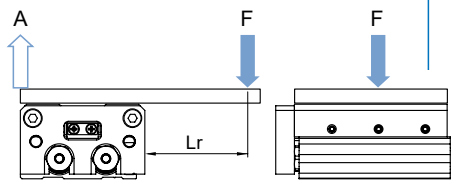


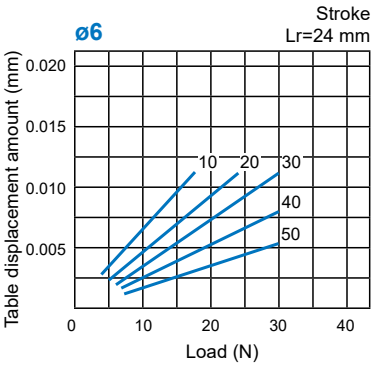

γ note: Use the average operating speed when calculating static moment. Use the collision speed when calculating dynamic moment.

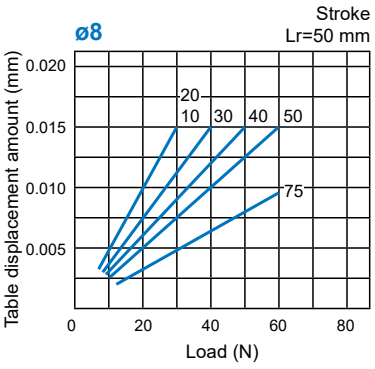
## Table deflection (Reference values)

**Table displacement due to roll moment load**

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



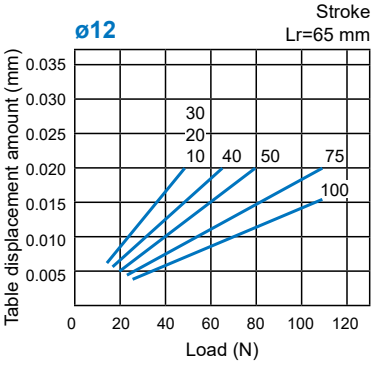
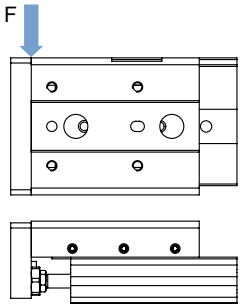
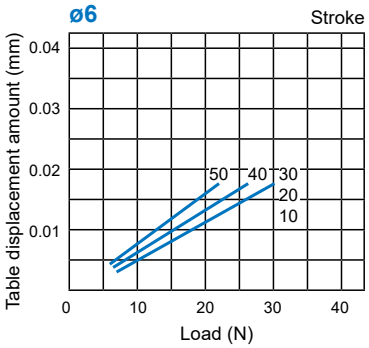
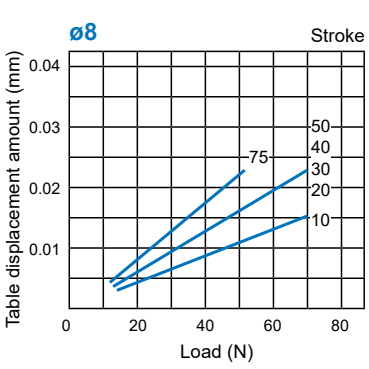




**Table displacement due to yaw moment load**

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



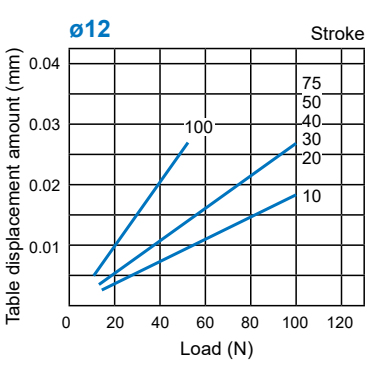
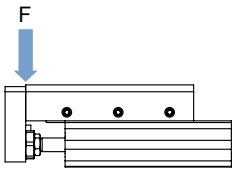
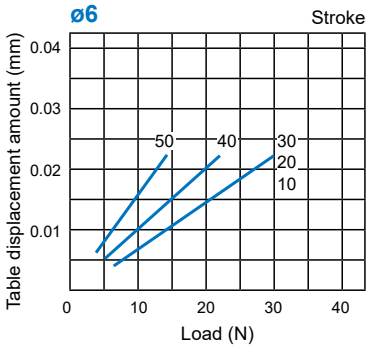
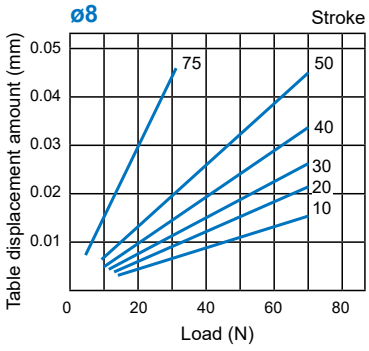



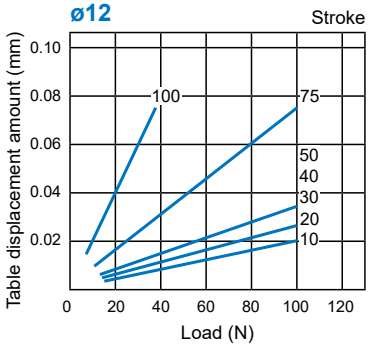

**Table displacement due to pitch moment load**

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



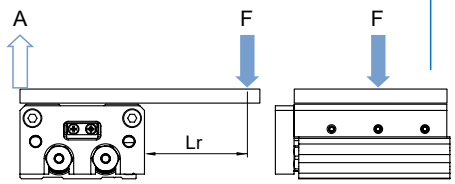



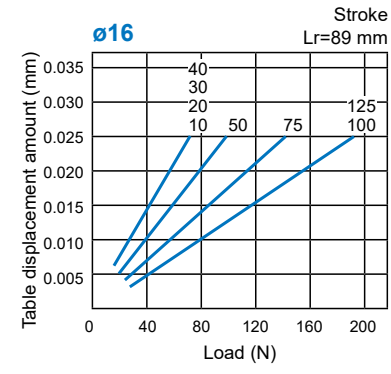



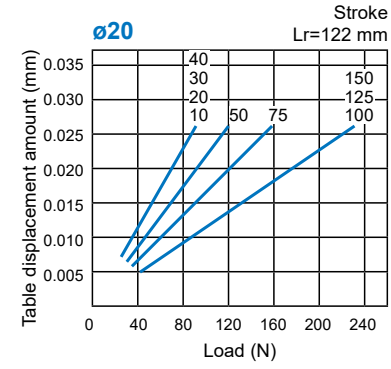
## Table deflection (Reference values)

**Table displacement due to roll moment load**

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



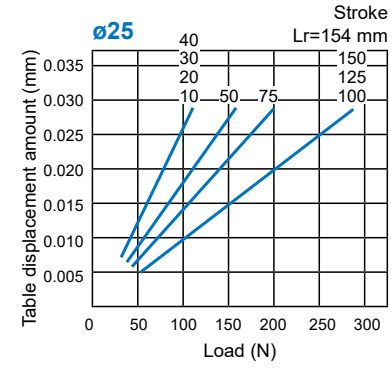
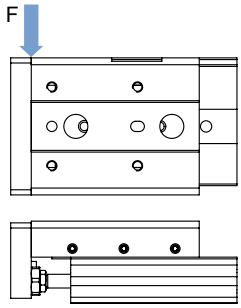
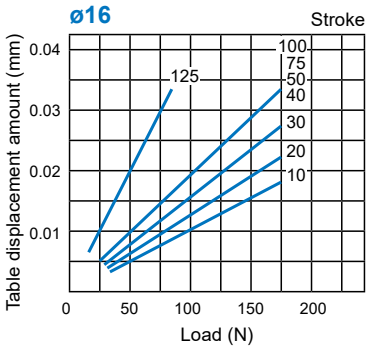
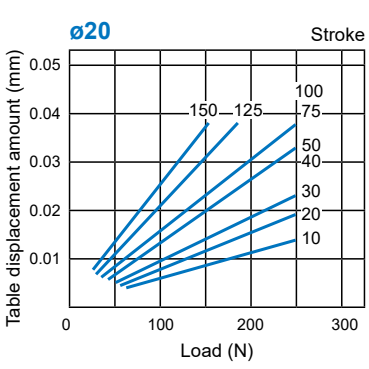




**Table displacement due to yaw moment load**

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



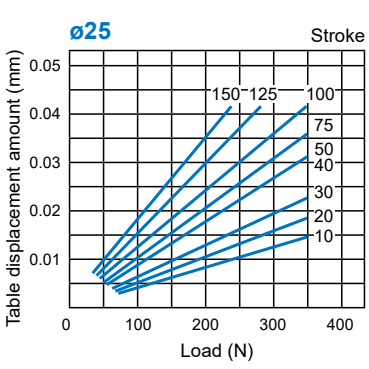
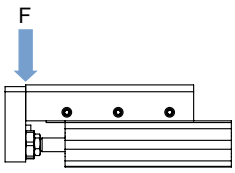
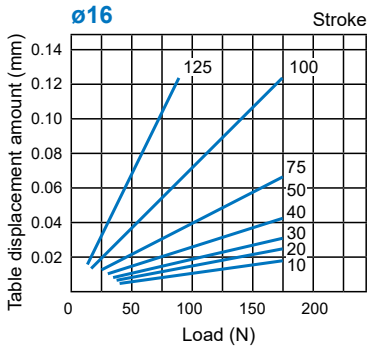
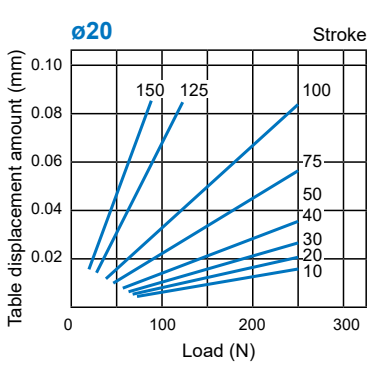



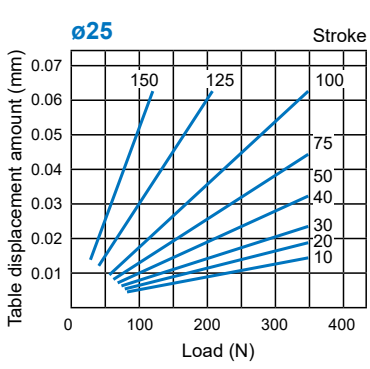

**Table displacement due to pitch moment load**

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

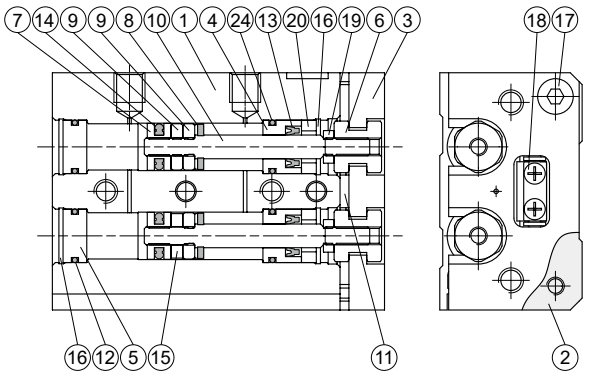


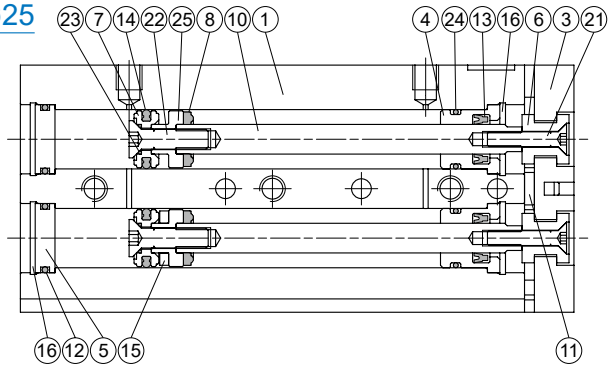



ø6, ø8

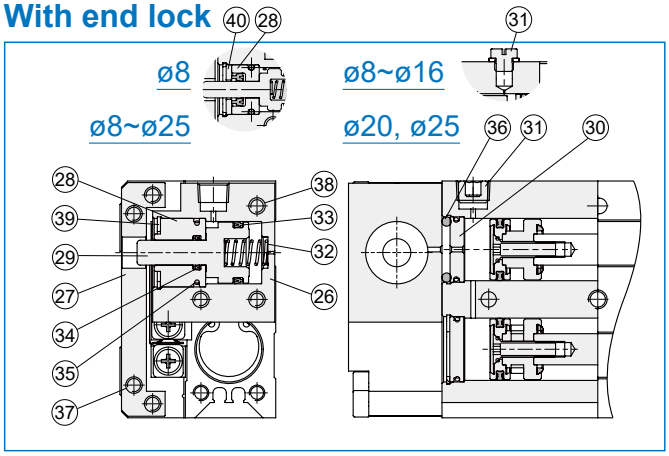



ø12~ø25




## With end lock

ø8 ø8~ø16 ø8~ø25 ø20, ø25




## Order example of repair kits

| Tube I.D. | Repair kits (Seal kit) | |
|---|---|---|
| | Body | Body + End lock |
| ø6 | **PS-MCSS-6** | – |
| ø8 | **PS-MCSS-8** | **PS-MCSS-8-HL** |
| ø12 | **PS-MCSS-12** | **PS-MCSS-12-HL** |
| ø16 | **PS-MCSS-16** | **PS-MCSS-16-HL** |
| ø20 | **PS-MCSS-20** | **PS-MCSS-20-HL** |
| ø25 | **PS-MCSS-25** | **PS-MCSS-25-HL** |

## Material

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

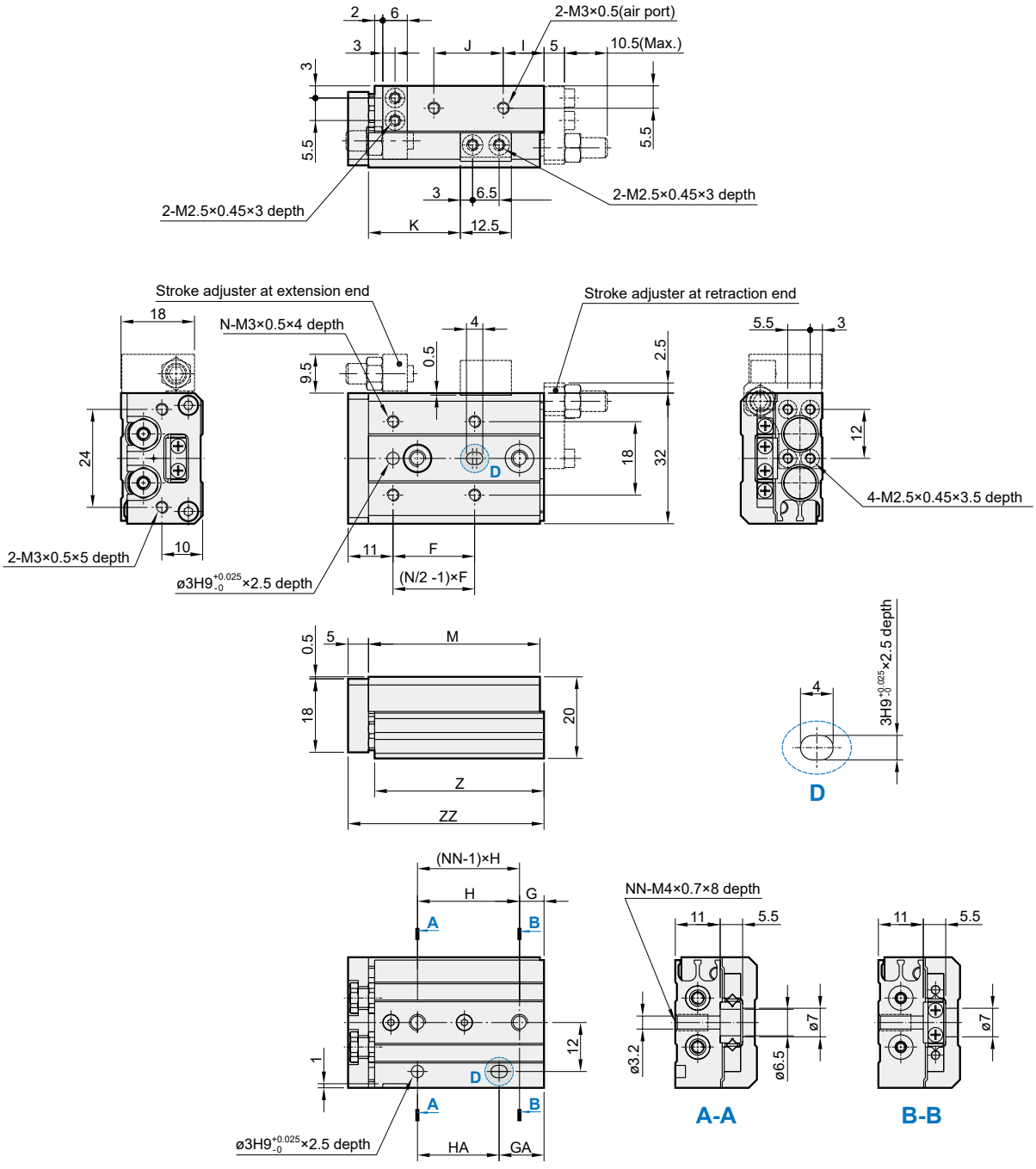
| No. | Part name \ Tube I.D. | 6 | 8 | 12~25 | Q'y | Repair kits (inclusion) |
|---|---|---|---|---|---|---|
| 1 | Body | Aluminum alloy | | | 1 | |
| 2 | Table | Aluminum alloy | | | 1 | |
| 3 | Plate | Aluminum alloy | | | 1 | |
| 4 | Rod cover | Aluminum alloy | | | 2 | |
| 5 | Head cover | Aluminum 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*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 | |

| No. | Part name \ Tube I.D. | 6 | 8 | 12~25 | Q'y | Repair kits (inclusion) |
|---|---|---|---|---|---|---|
| 23 | Piston gasket | – | | NBR | 2 | ● |
| 24 | Cover ring | NBR | | | 2 | ● |
| 25 | Piston for magnet ring | – | | *1 | 2 | |

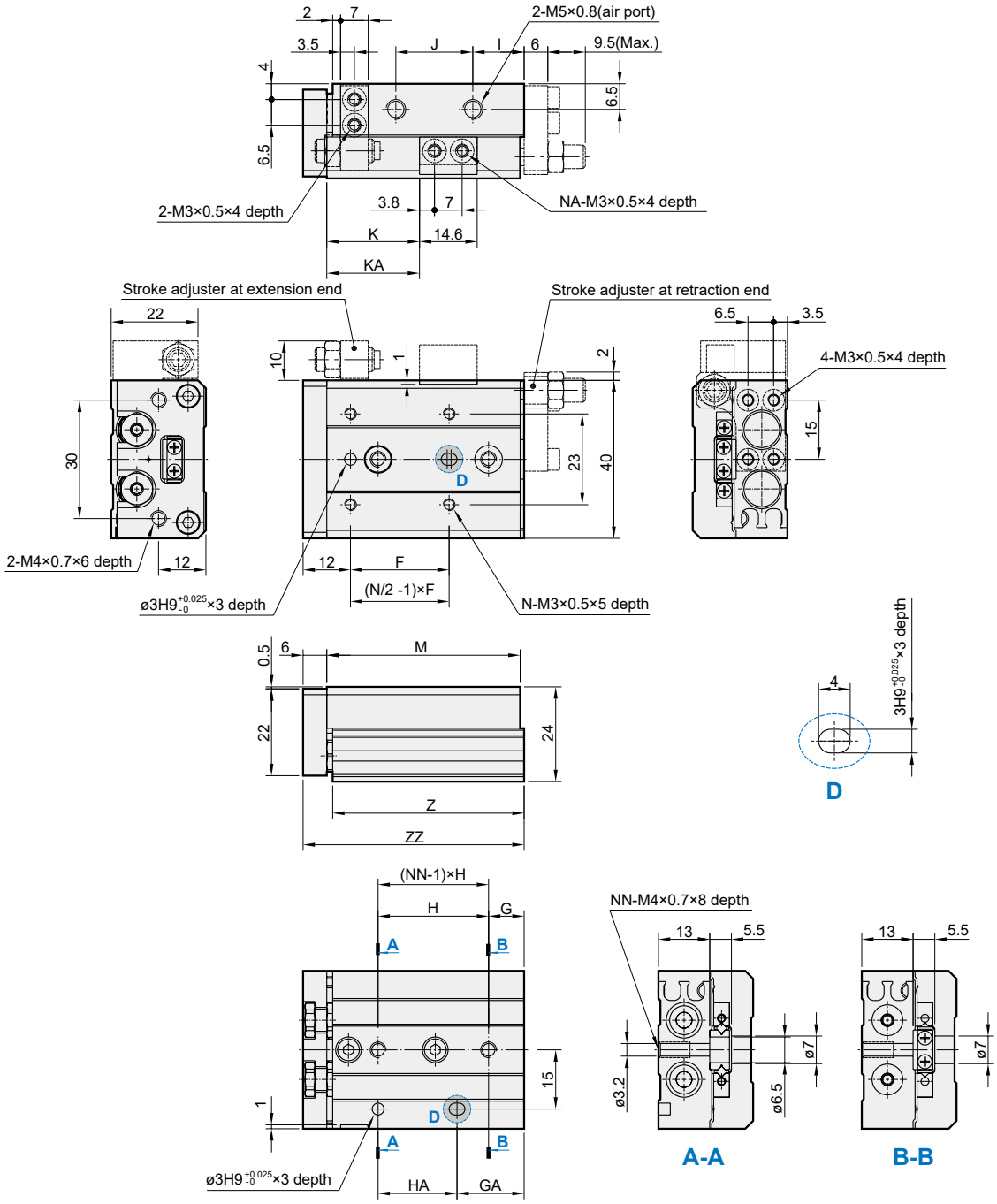
### With end lock

| No. | Part name | Material | Q'y | Repair kits (inclusion) |
|---|---|---|---|---|
| 26 | Body for lock | Aluminum alloy | 1 | |
| 27 | Table support | Carbon steel | 1 | |
| 28 | Rod cover | Aluminum alloy | 1 | |
| 29 | Piston rod | Stainless steel | 1 | |
| 30 | Bushing | Aluminum alloy | 1 | |
| 31 | Plug | Brass | 1 | |
| 32 | Return spring | Stainless steel | 1 | |
| 33 | Pison packing | NBR | 1 | ● |
| 34 | Rod packing | NBR | 1 | ● |
| 35 | Cover ring | NBR | 1 | ● |
| 36 | O-ring | NBR | 1 | ● |
| 37 | Bolt | Stainless steel | 2*4 | |
| 38 | Bolt | Stainless steel | 3 | |
| 39 | Snap ring | Stainless steel | 1 | |
| 40 | Rod cover washer | Stainless steel | 1 | |

*4. Item 17 and 37: Tube I.D. ø20, 25 (Q'y: 4pcs).

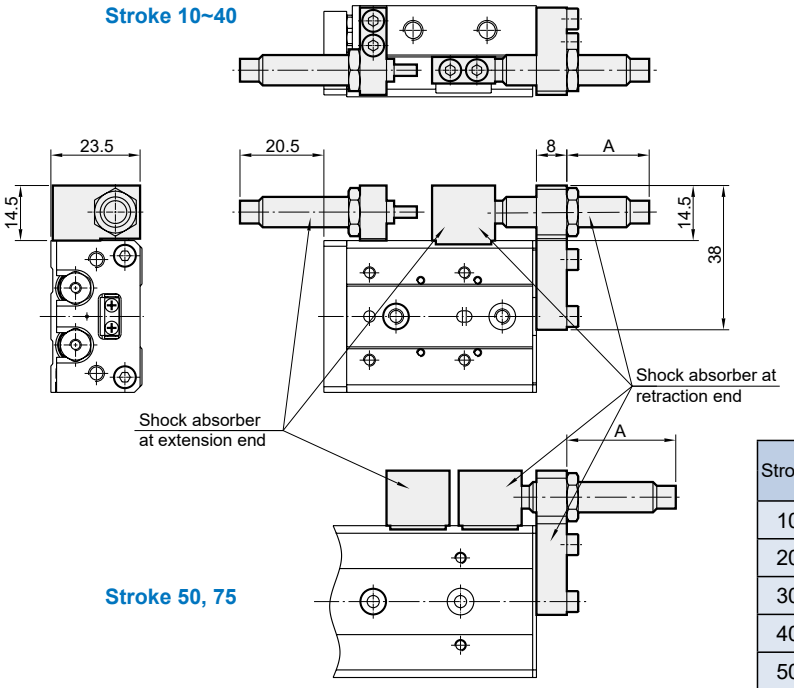



| Code / Stroke | F | G | GA | H | HA | I | J | K | M | N | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 20 | 6 | 11 | 25 | 20 | 10 | 17 | 22.5 | 42 | 4 | 2 | 41.5 | 48 |
| 20 | 30 | 6 | 21 | 35 | 20 | 10 | 27 | 32.5 | 52 | 4 | 2 | 51.5 | 58 |
| 30 | 20 | 11 | 31 | 20 | 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 |



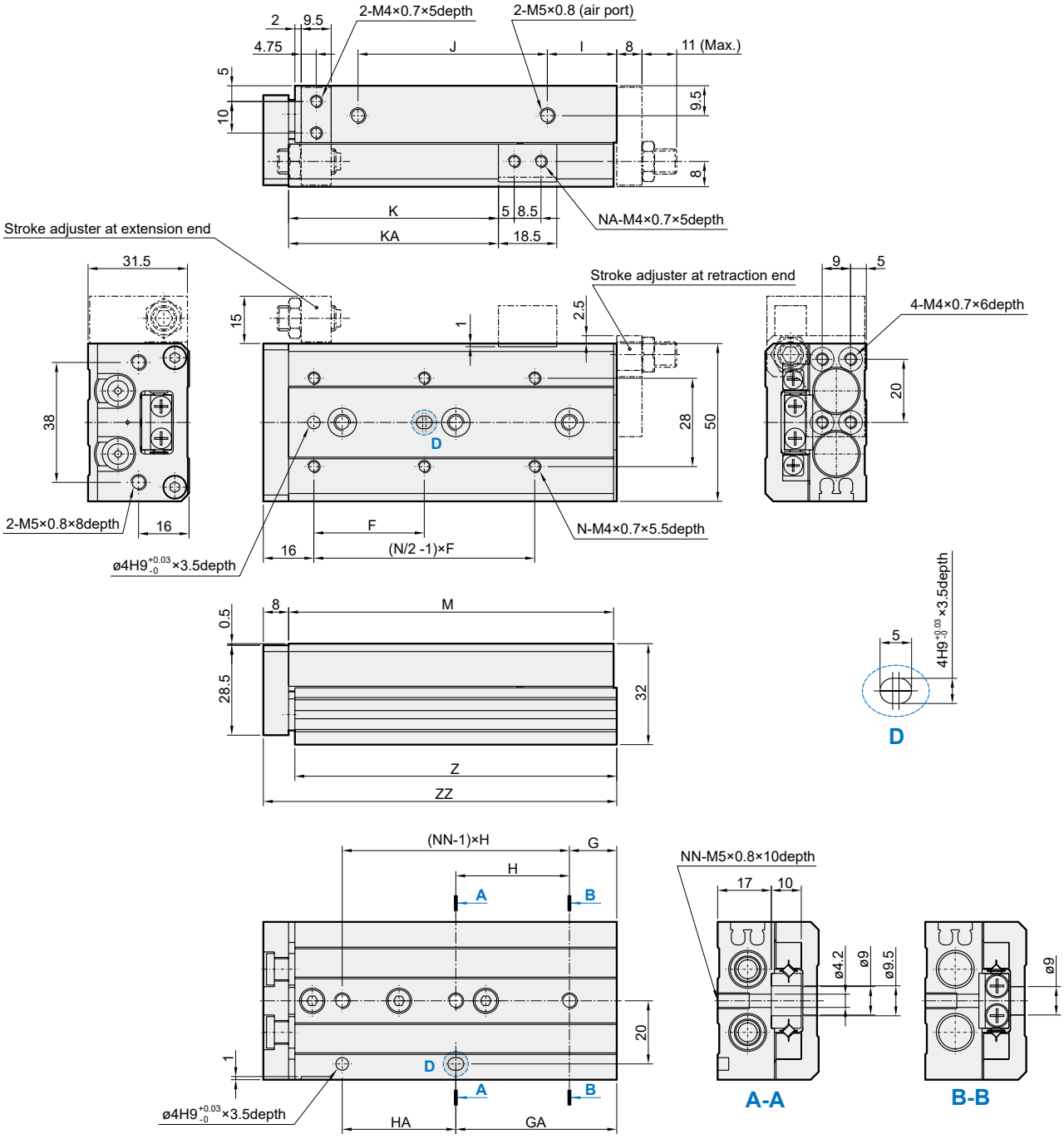

| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 25 | 9 | 17 | 28 | 20 | 13 | 19.5 | 23.5 | - | 49 | 4 | 2 | 2 | 48.5 | 56 |
| 20 | 25 | 12 | 12 | 30 | 30 | 8.5 | 29 | 33.5 | - | 54 | 4 | 2 | 2 | 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

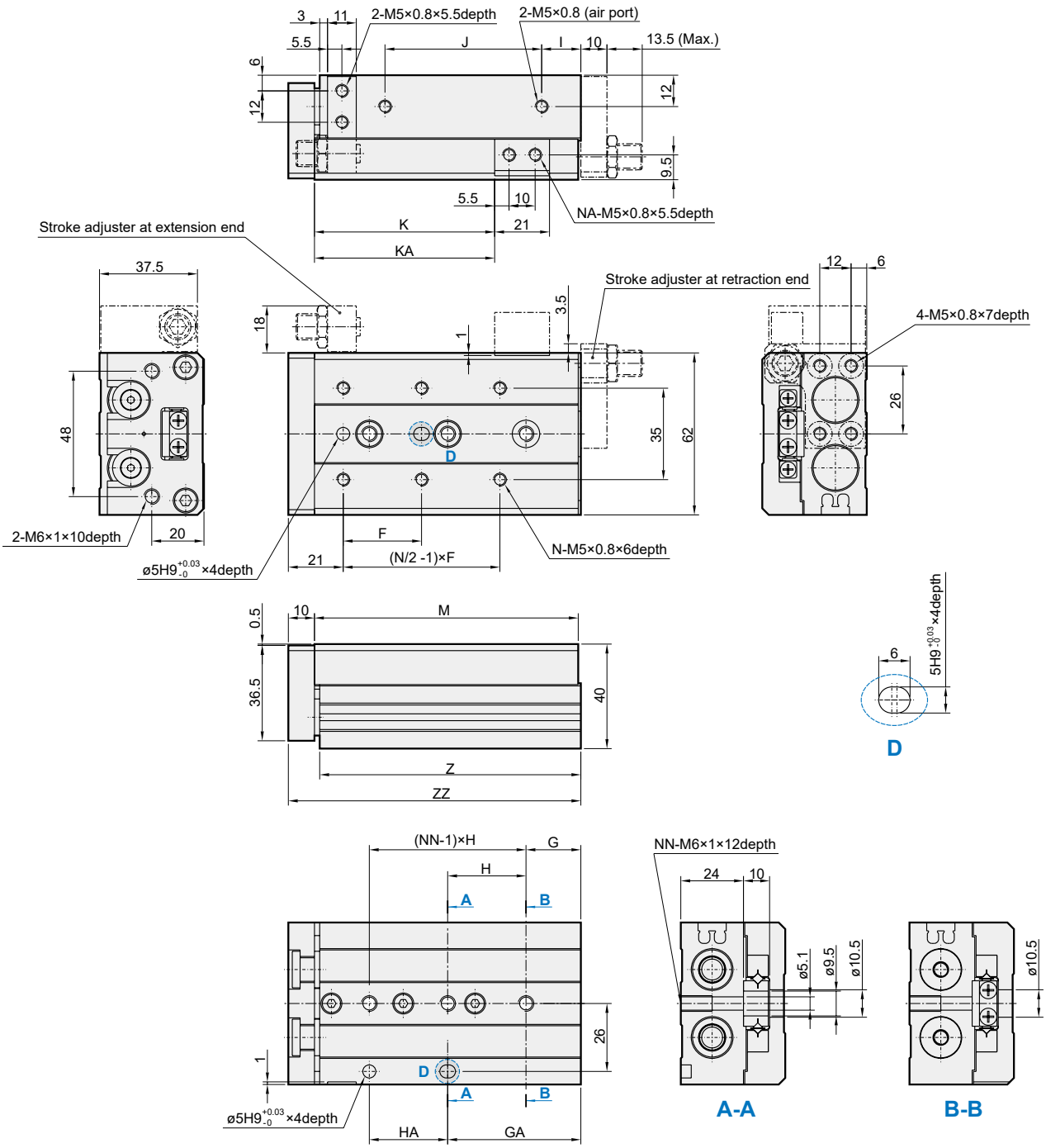



| Stroke | Stroke adjustment range | | A dimension (Retracted side mounting) |
|---|---|---|---|
| | Extending | Retracting | |
| 10 | Max. 21 | 11.5 | 20.1 |
| 20 | | 16.1 | 25.1 |
| 30 | | 15.1 | 24.1 |
| 40 | | 7.1 | 16.1 |
| 50 | | 18.1 | 27.1 |
| 75 | | 18.1 | 27.1 |

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

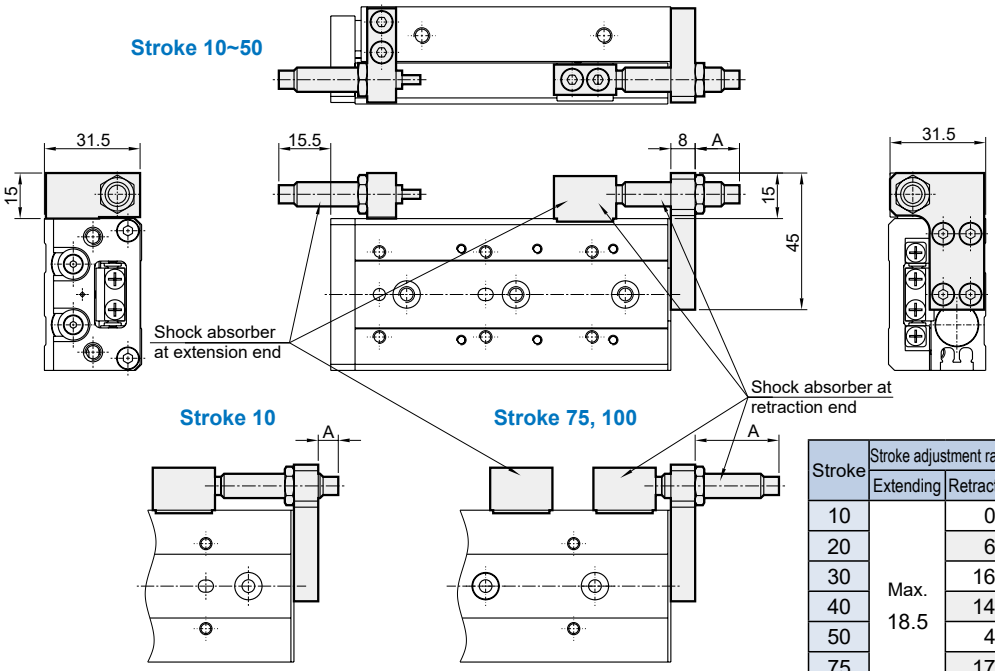



| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 35 | 15 | 15 | 40 | 40 | 10 | 40 | 26.5 | - | 71 | 4 | 2 | 2 | 70 | 80 |
| 20 | 35 | 15 | 15 | 40 | 40 | 10 | 40 | 36.5 | - | 71 | 4 | 2 | 2 | 70 | 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 |

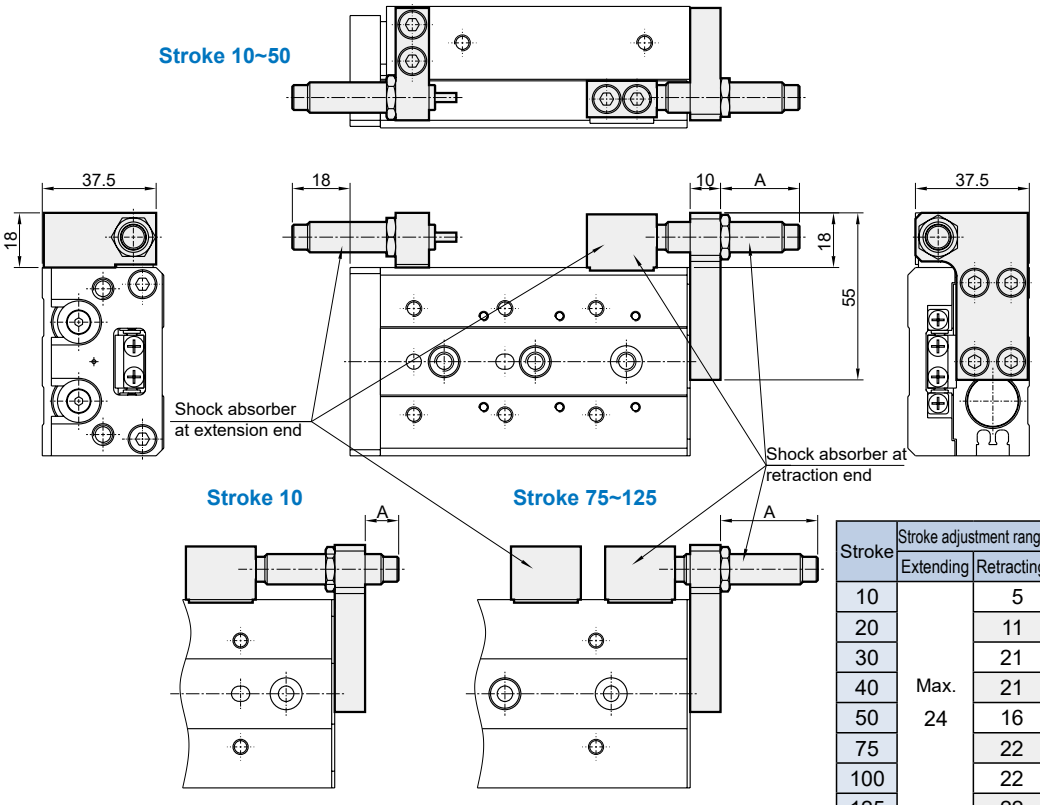
## ø12




| 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 |

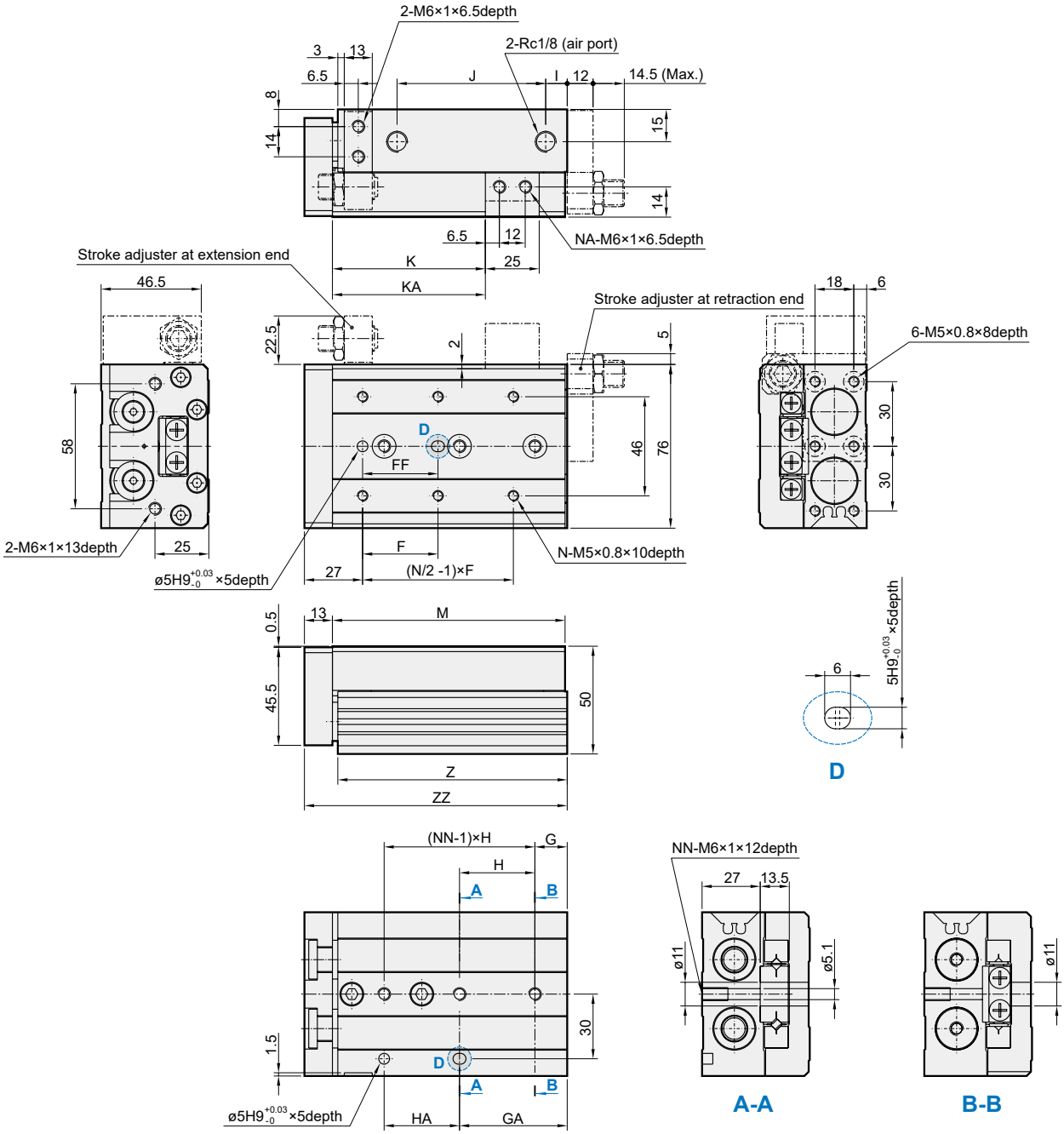
* Other dimensions not indicated are the same as the basic style.

## ø16

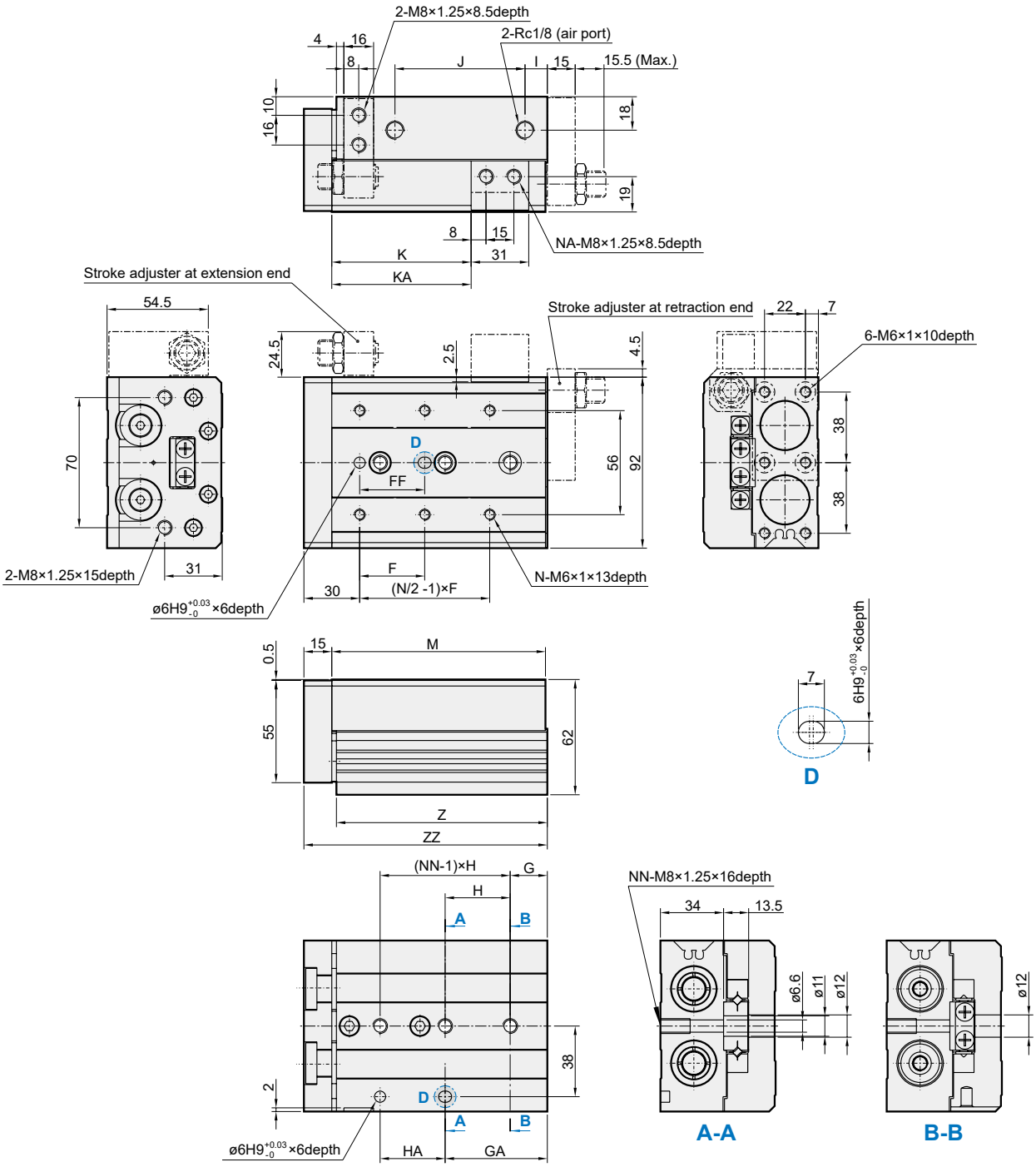



| Stroke | Stroke adjustment range | | A dimension (Retracted side mounting) |
|---|---|---|---|
| | Extending | Retracting | |
| 10 | Max. 24 | 5 | 10 |
| 20 | | 11 | 20 |
| 30 | | 21 | 30 |
| 40 | | 21 | 30 |
| 50 | | 16 | 25 |
| 75 | | 22 | 31 |
| 100 | | 22 | 31 |
| 125 | | 22 | 31 |

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

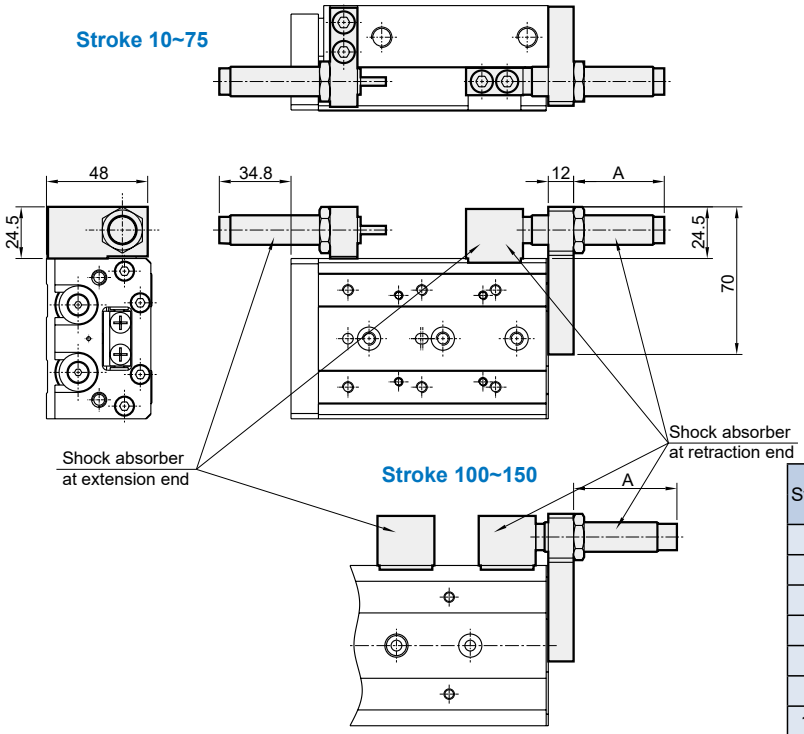



| Code / Stroke | F | FF | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 50 | 40 | 15 | 25 | 45 | 35 | 10 | 44 | 31 | - | 83 | 4 | 2 | 2 | 81.5 | 97 |
| 20 | 50 | 40 | 15 | 25 | 45 | 35 | 10 | 44 | 41 | - | 83 | 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 |




| 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 |

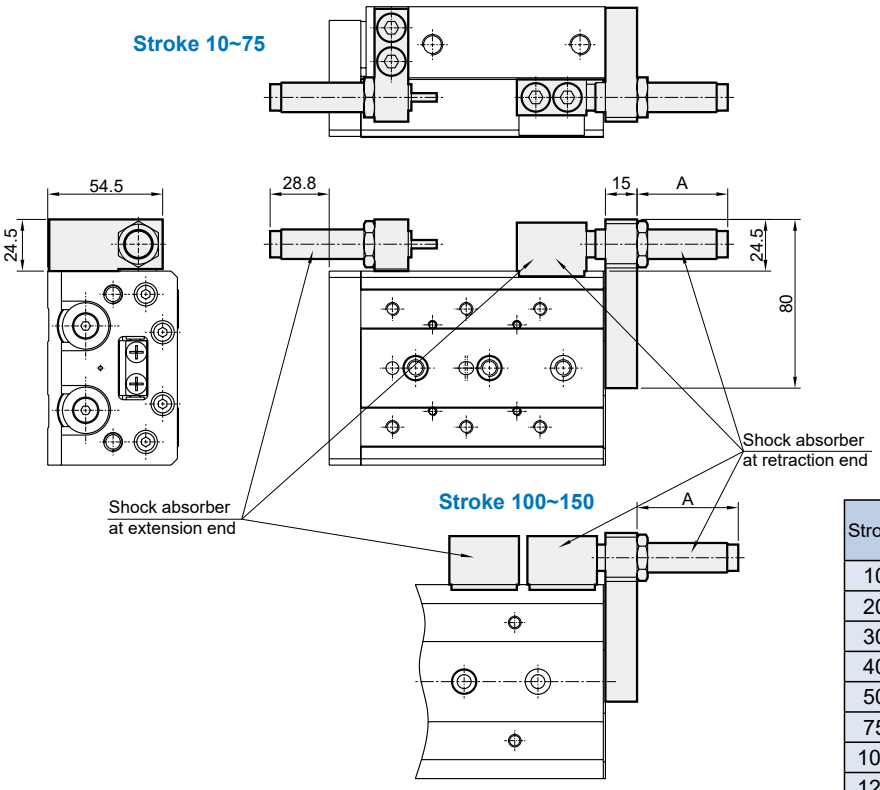
## ø20




| Stroke | Stroke adjustment range | | A dimension (Retracted side mounting) |
|---|---|---|---|
| | Extending | Retracting | |
| 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.

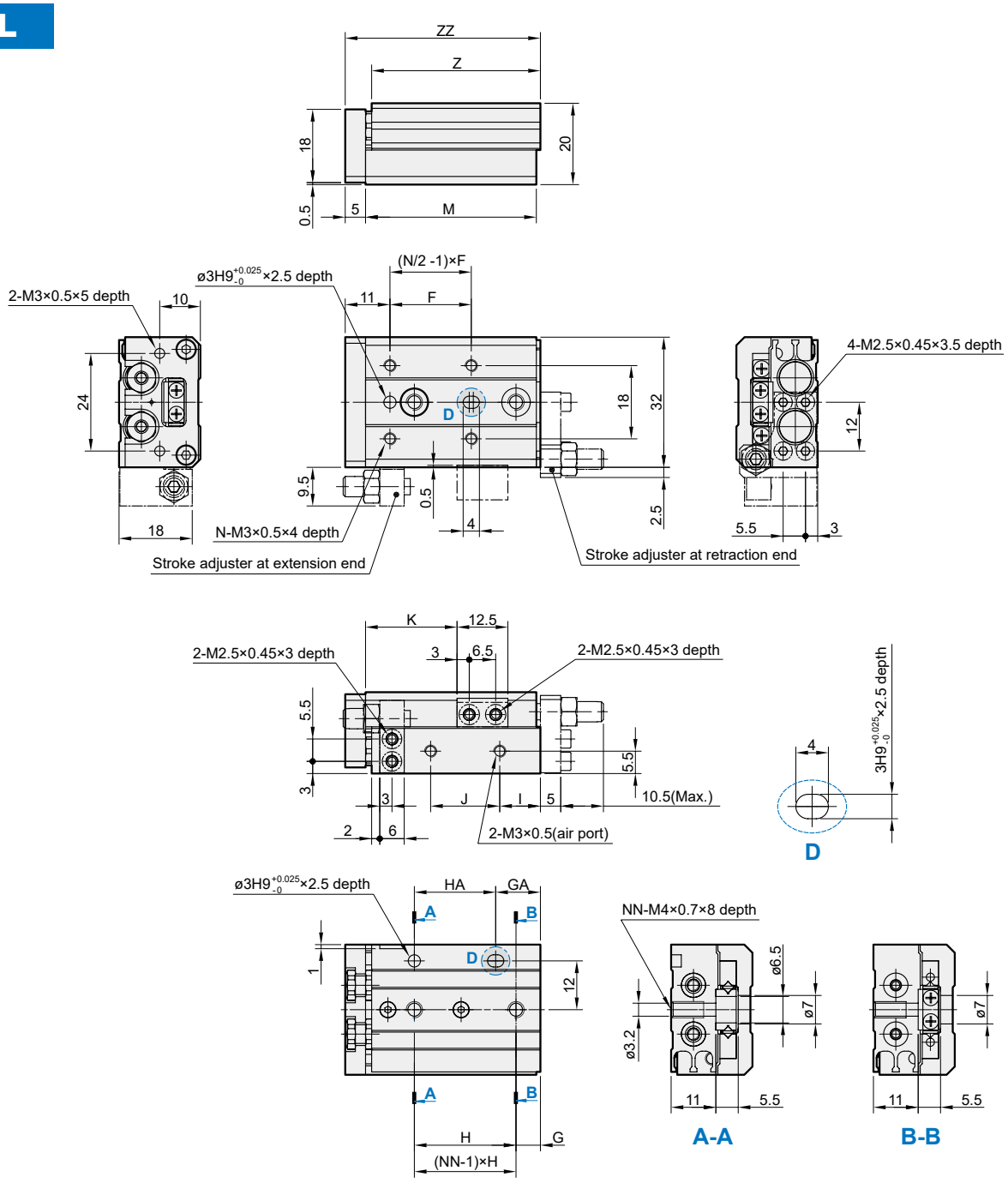
## ø25




| Stroke | Stroke adjustment range | | A dimension (Retracted side mounting) |
|---|---|---|---|
| | Extending | Retracting | |
| 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 |

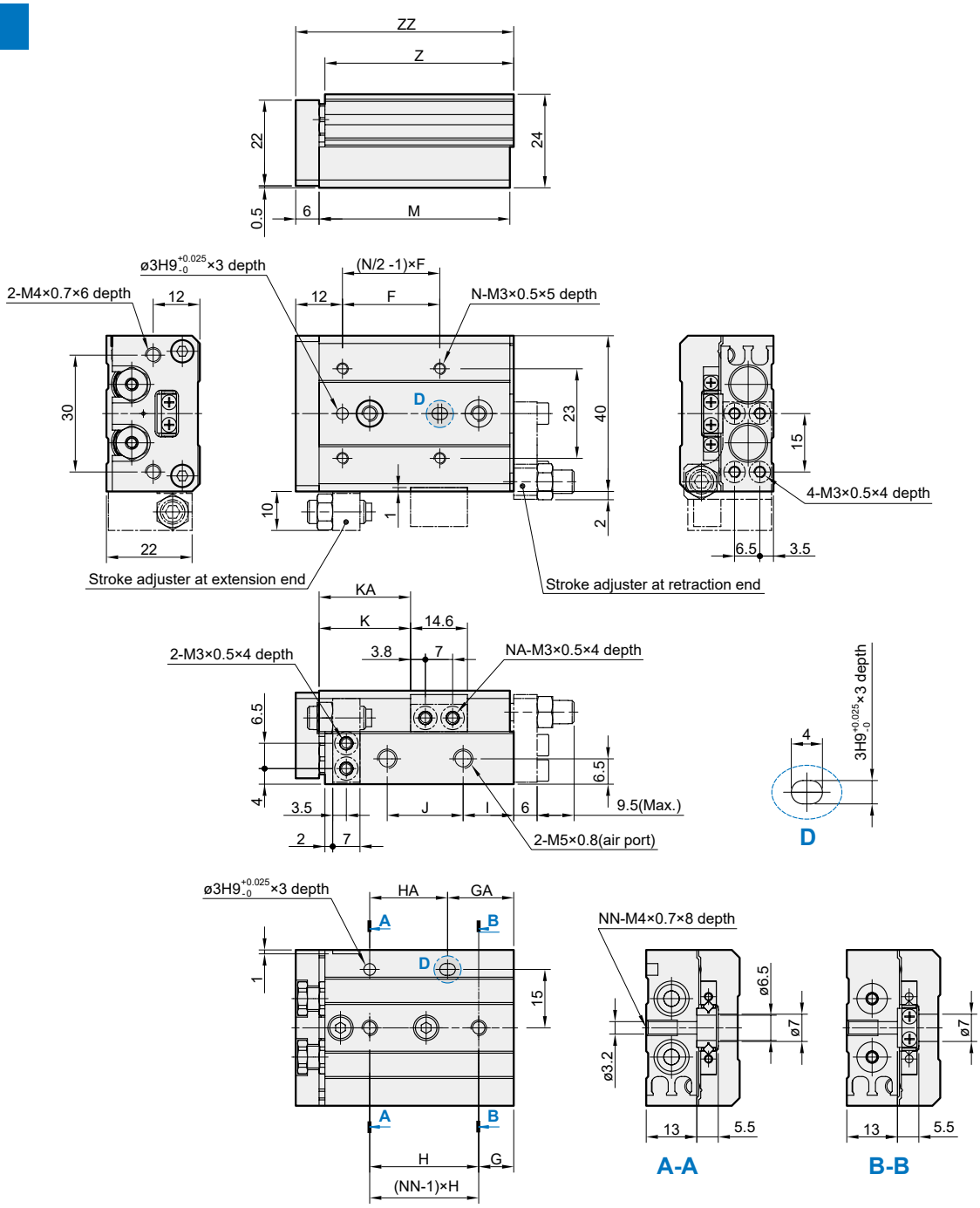
* Other dimensions not indicated are the same as the basic style.

**L**



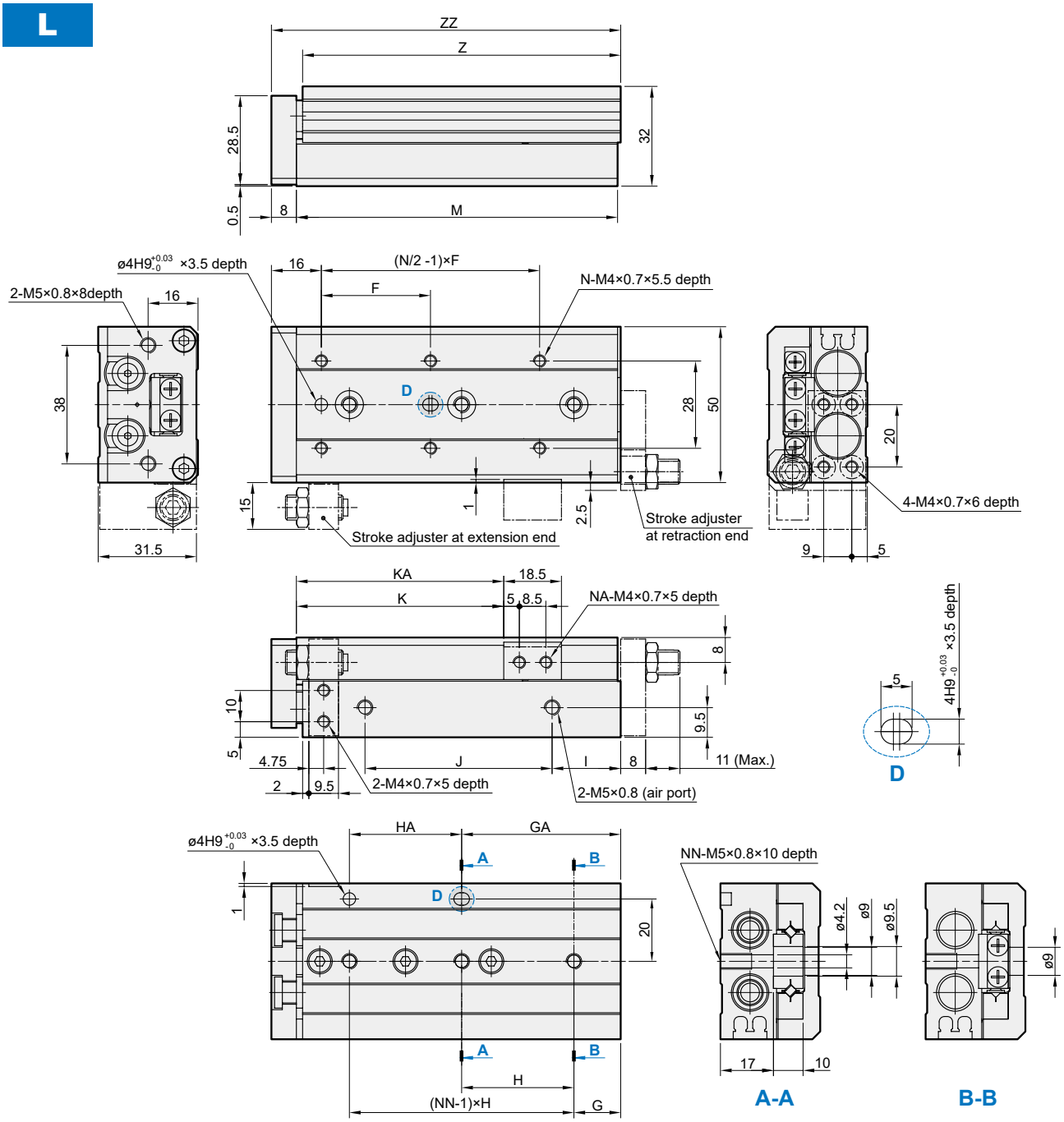

| Code / Stroke | F | G | GA | H | HA | I | J | K | M | N | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 20 | 6 | 11 | 25 | 20 | 10 | 17 | 22.5 | 42 | 4 | 2 | 41.5 | 48 |
| 20 | 30 | 6 | 21 | 35 | 20 | 10 | 27 | 32.5 | 52 | 4 | 2 | 51.5 | 58 |
| 30 | 20 | 11 | 31 | 20 | 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



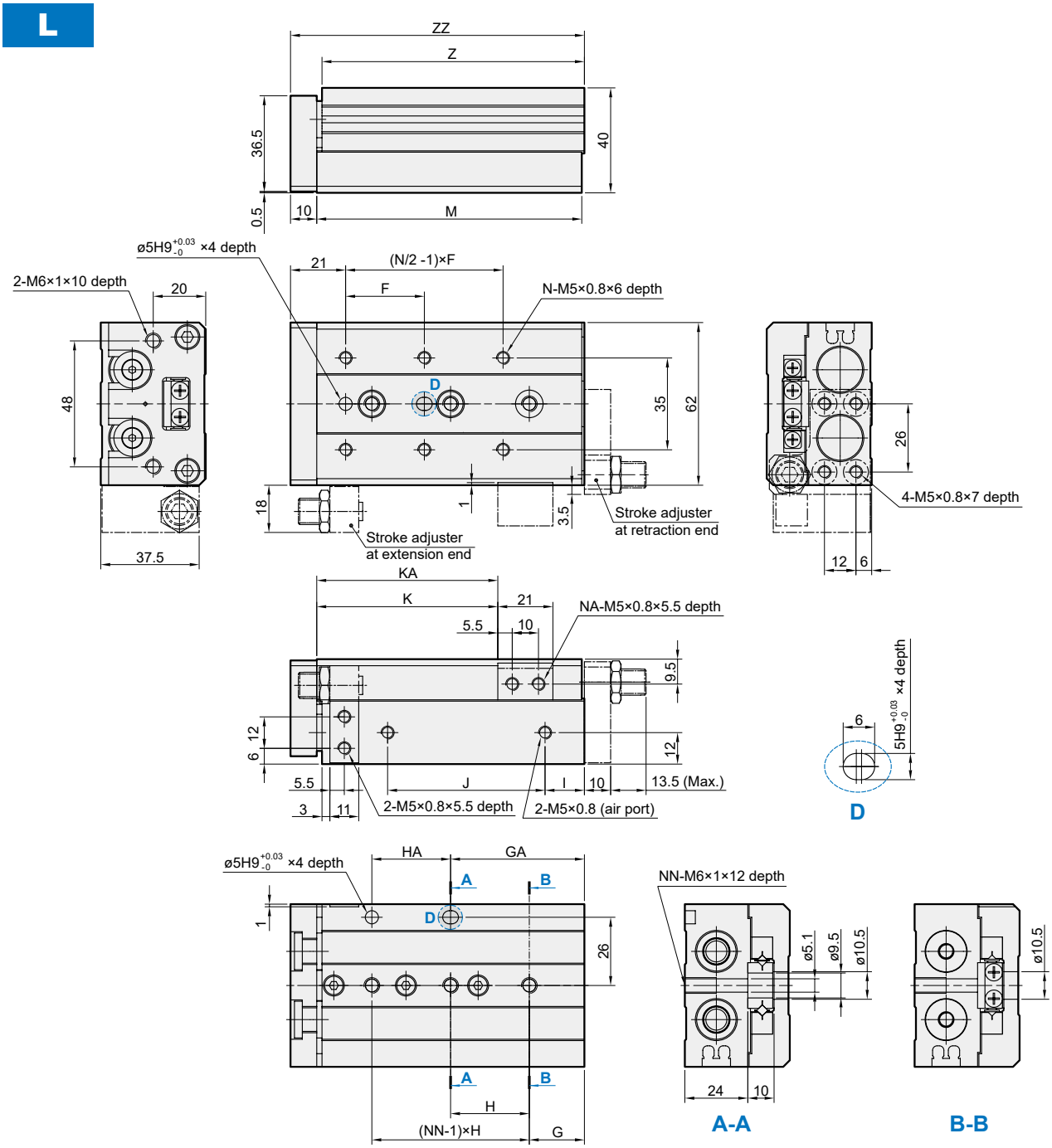

| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 25 | 9 | 17 | 28 | 20 | 13 | 19.5 | 23.5 | – | 49 | 4 | 2 | 2 | 48.5 | 56 |
| 20 | 25 | 12 | 12 | 30 | 30 | 8.5 | 29 | 33.5 | – | 54 | 4 | 2 | 2 | 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 |

**L**



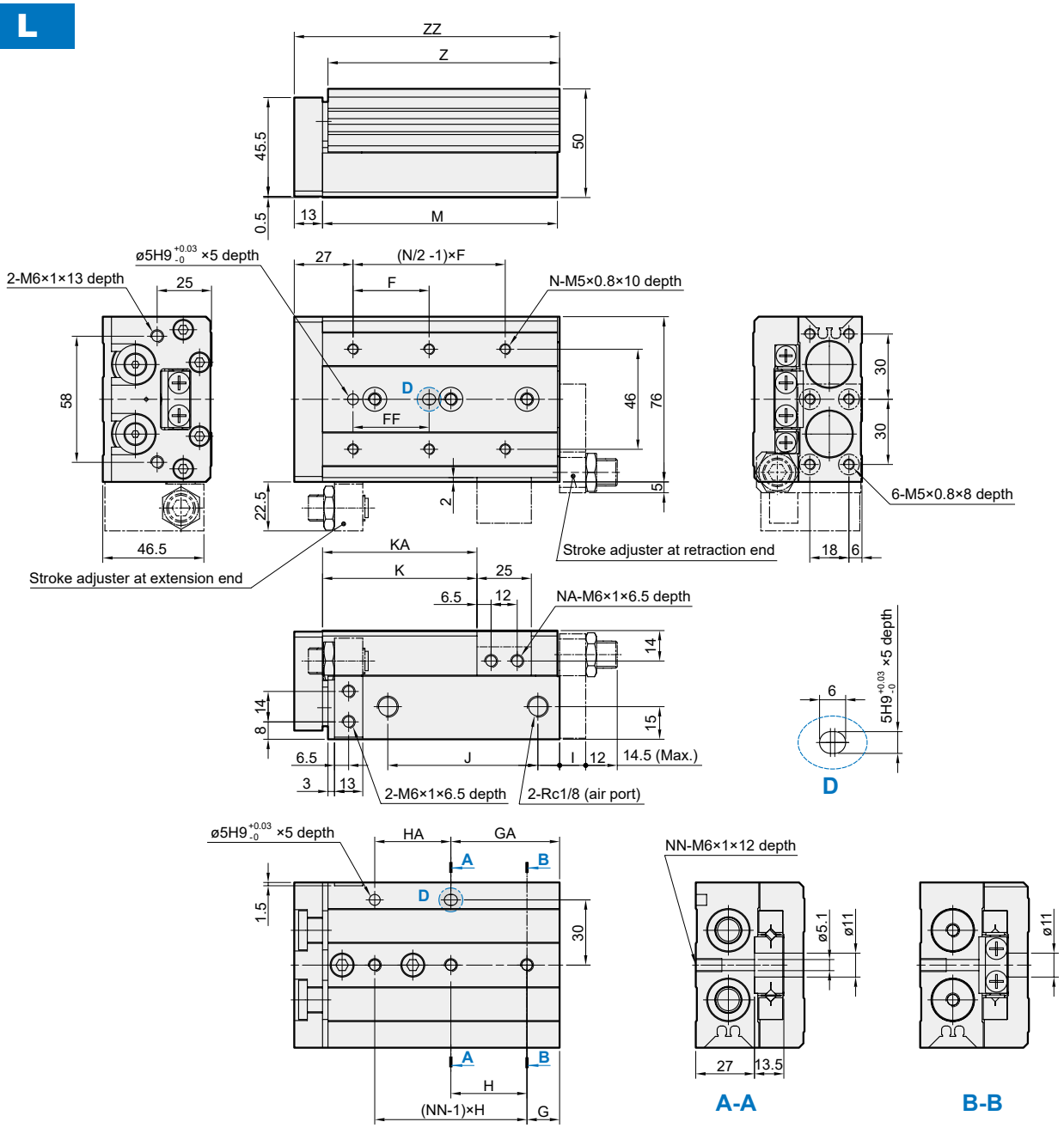

| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 35 | 15 | 15 | 40 | 40 | 10 | 40 | 26.5 | – | 71 | 4 | 2 | 2 | 70 | 80 |
| 20 | 35 | 15 | 15 | 40 | 40 | 10 | 40 | 36.5 | – | 71 | 4 | 2 | 2 | 70 | 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 |

**L**



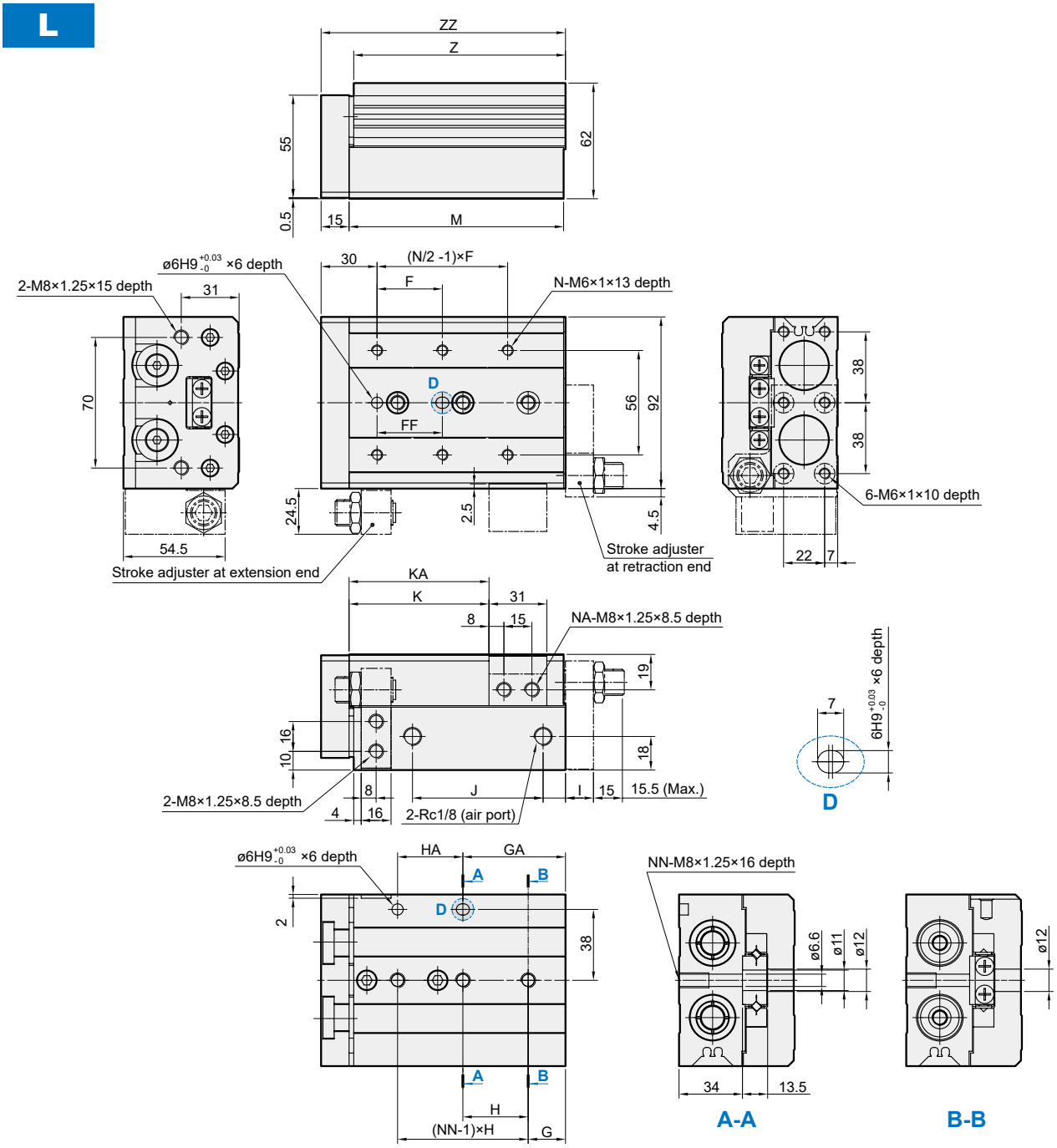

| Code / Stroke | F | G | GA | H | HA | I | J | K | KA | M | N | NA | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 35 | 16 | 16 | 40 | 40 | 10 | 40 | 29 | – | 76 | 4 | 2 | 2 | 75 | 87 |
| 20 | 35 | 16 | 16 | 40 | 40 | 10 | 40 | 39 | – | 76 | 4 | 2 | 2 | 75 | 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 |

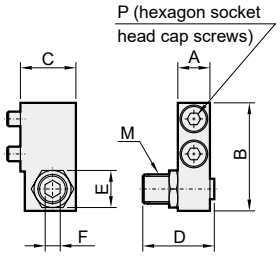
## Order example of stroke adjuster

MCSS — 20 L — AS — X12

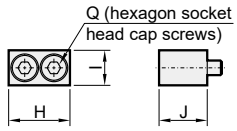
- MODEL
- TUBE I.D.
- Blank: Standard
  **L**: Symmetric style
- STROKE ADJUSTER
  **AS**: Adjuster at extension end
  **AT**: Adjuster at retraction end
  **A**: Adjuster at both ends
  **A2**: Adjusting bolt
- ADJUSTABLE RANGE
  Blank: 5mm
  **X11**: 15mm
  **X12**: 25mm
  * **X12** (adjustable range: 25mm) is not available for MCSS-6.

## AS Stroke adjuster at extension end ( Standard and symmetric style share the same order code )

### Mounted to body
Material: Aluminum alloy



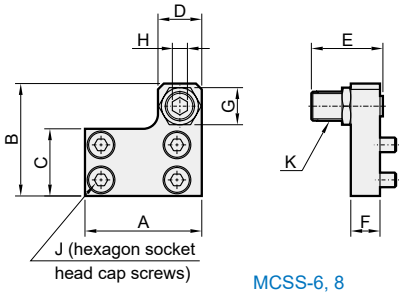

### Mounted to table
Material: Aluminum alloy



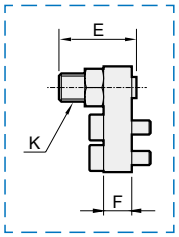

| Tube I.D. | Order code | Adjustable stroke range (mm) | Mounted to body | | | | | | | | Mounted to table | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | E | F | M | P | H | I | J | Q |
| 6 | MCSS-6-AS | 5 | 6 | 17.8 | 10.5 | 16.5 | 7 | 2.5 | M5×0.8 | M2.5×10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

## AT Stroke adjuster at retraction end ( ø6, ø8: Standard and symmetric style share the same order code )

### Mounted to body
Material: Aluminum alloy




MCSS-6, 8

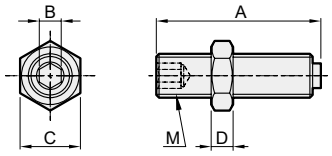



| Tube I.D. | Order code | Adjustable stroke range (mm) | A | B | C | D | E | F | G | H | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | MCSS-6-AT | 5 | 21 | 19 | 10.5 | 8 | 16.5 | 5 | 7 | 2.5 | M2.5×8 | M5×0.8 |
| | MCSS-6-AT-X11 | 15 | | | | | 26.5 | | | | | |
| 8 | MCSS-8-AT |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

* □ For standard and symmetric style options.

## A2 Adjusting bolt ( Standard and symmetric style share the same order code )

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 | | | | |

## Cylinder weight

Unit: g

| Model | Stroke (mm) | | | | | | | | | Adjuster | | Absorber | | End lock |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 75 | 100 | 125 | 150 | AS | AT | BS | BT | |
| MCSS-6(L) | 89 | 110 | 122 | 161 | 199 | – | – | – | – | 10 | 10 | – | – | – |
| MCSS-8(L) | 155 | 166 | 201 | 246 | 281 | 394 | – | – | – | 18 | 18 | 31 | 41 | 40 |
| MCSS-12(L) | 360 | 362 | 369 | 425 | 529 | 722 | 960 | – | – | 40 | 36 | 46 | 57 | 92 |
| MCSS-16(L) | 576 | 600 | 602 | 674 | 762 | 1095 | 1410 | 1702 | – | 67 | 66 | 76 | 101 | 168 |
| MCSS-20(L) | 1050 | 1060 | 1092 | 1145 | 1320 | 1815 | 2365 | 2880 | 3368 | 113 | 111 | 173 | 211 | 316 |
| MCSS-25(L) | 1636 | 1650 | 1673 | 1797 | 1989 | 2713 | 3260 | 4260 | 4530 | 198 | 185 | 239 | 309 | 562 |

AS/ BS: Extension end
AT/ BT: Retraction end

## Order example of absorber

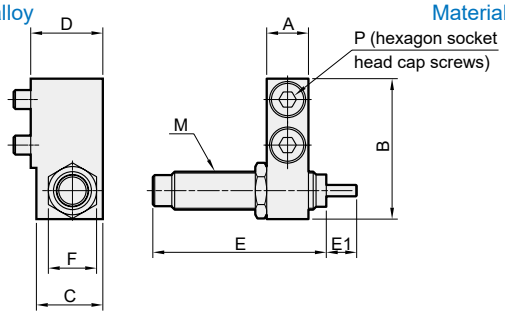
MCSS — 20 L — B — P

- MODEL: MCSS
- TUBE I.D.: 8~25
- Blank: Standard; **L**: Symmetric style
- ABSORBER: **BS**: Absorber at extension end; **BT**: Absorber at retraction end; **B**: Absorber at both ends
- APPLICABLE RANGE (Only for absorber code B)

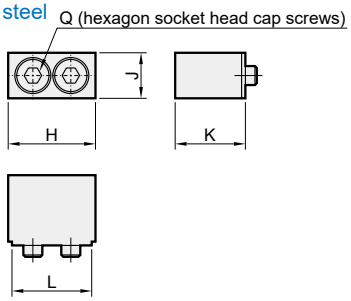
| Tube I.D. | Stroke | |
|---|---|---|
| | Blank: Mounted to table × 1 | **P**: Mounted to table × 2 |
| 8 | 10~40 | 50,75 |
| 12 | 10~50 | 75,100 |
| 16 | 10~50 | 75~125 |
| 20 | 10~75 | 100~150 |
| 25 | 10~75 | 100~150 |

## BS Stroke adjuster at extension end ( Standard and symmetric style share the same order code )

### Mounted to body
Material: Aluminum alloy



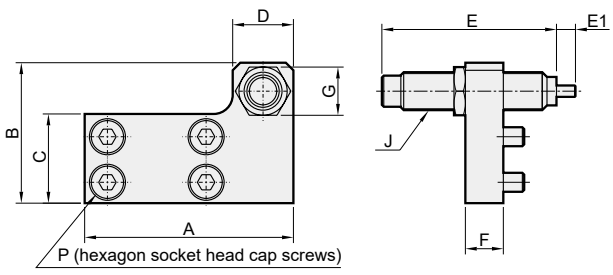

### Mounted to table
Material: Carbon steel



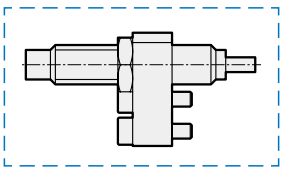

| Tube I.D. | Order code | Mounted to body | | | | | | | | | | Mounted to table | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | E1 | F | M | | P | H | J | K | L | Q |
| 8 | **MCSS-8-BS** | 7 | 23 | 14 | 15.5 | 38.5 | 6 | 11 | M8×1 | MDSC-0806-3-N | 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 |

## BT Stroke adjuster at retraction end ( ø8: Standard and symmetric style share the same order code )

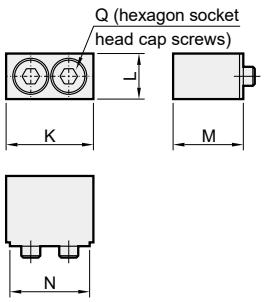
### Mounted to body
Material: Aluminum alloy




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 |

* □ For standard and symmetric style options.

## Order example of stroke adjuster + absorber ( ø8: Standard and symmetric style share the same order code )

MCSS — 20 L — AB — P

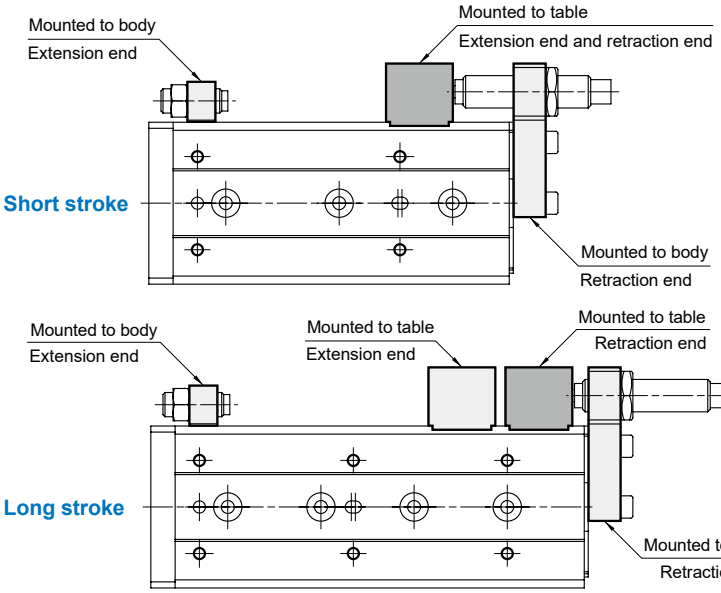
- MODEL
- TUBE I.D.: **8~25**
- Blank: Standard; **L**: Symmetric style
- ABSORBER: **AB**: Adjuster at extension end + Absorber at retraction end; **BA**: Absorber at extension end + Adjuster at retraction end

APPLICABLE RANGE
(Only for absorber code AB)

| Tube I.D. | Stroke | |
|---|---|---|
| | Blank: Mounted to table × 1 | **P**: 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 |

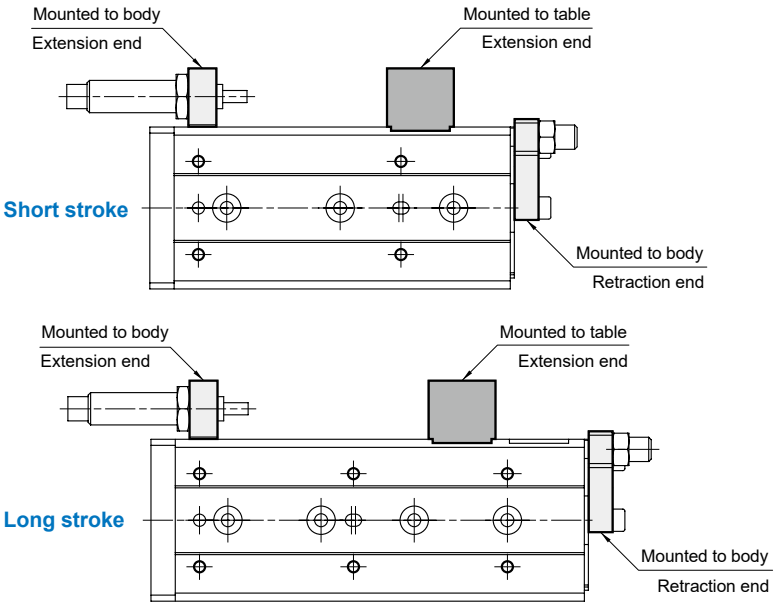
## AB Adjuster at extension end + Absorber at retraction end ( AS + BT )

Material
- Aluminum alloy
- Carbon steel




## BA Absorber at extension end + Adjuster at retraction end ( BS + AT )

Material
- Aluminum alloy
- Carbon steel

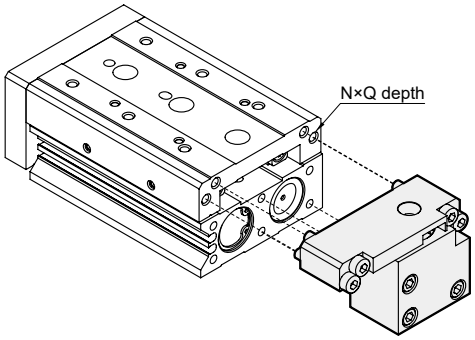


## Order example of end lock

MCSS — 20 — HL — □

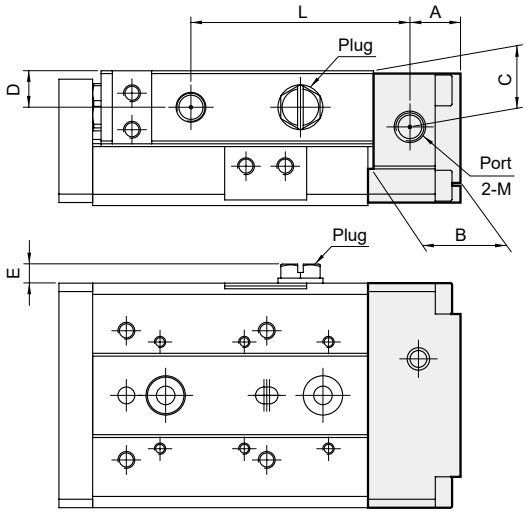
| MODEL | TUBE I.D. | END LOCK | PORT THREAD |
|---|---|---|---|
| | **8**, **12**, **16**<br>**20**, **25** | | Blank: M thread<br>(for ø8~ø16)<br>Blank: Rc thread<br>**G**: G thread<br>**NPT**: NPT thread<br>(for ø20,ø25) |

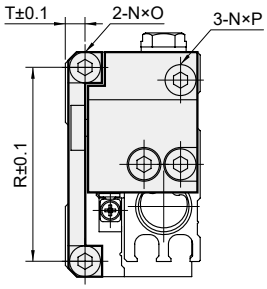
## Mounting of with end lock



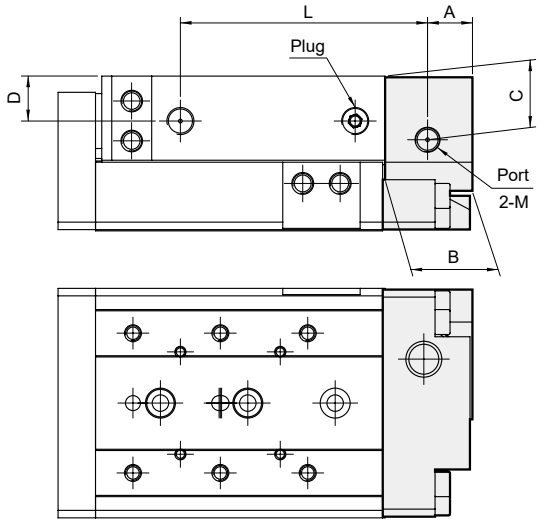

## HL With end lock

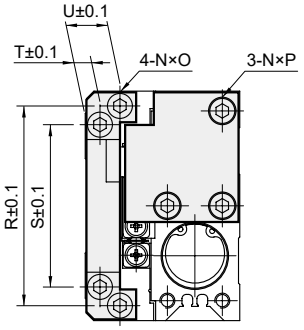
### ø8~ø16




### ø20, ø25




| Code / Stroke / Tube I.D. | A | B | C | D | E | L | | | | | | | | | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 10 | 20 | 30 | 40 | 50 | 75 | 100 | 125 | 150 | | | | | | | | | |
| 8 | 9 | 15.5 | 10 | 6.5 | 3.4 | 39 | 44 | 55 | 73 | 91 | 141 | – | – | – | M5×0.8 | M3×0.5 | 16L | 14L | 5 | 34.5 | – | 3.5 | – |
| 12 | 10.5 | 20 | 14.5 | 9.5 | 3.4 | 59.5 | 59.5 | 59.5 | 71.5 | 91.5 | 137.5 | 191.5 | – | – | M5×0.8 | M4×0.7 | 20L | 20L | 6 | 42.4 | – | 4.5 | – |
| 16 | 13 | 25 | 18 | 12 | 3.4 | 62 | 62 | 62 | 72 | 87 | 137 | 185 | 235 | – | M5×0.8 | M5×0.8 | 25L | 25L | 8 | 52 | – | 5.5 | – |
| 20 | 15.5 | 30 | 20 | 15 | – | 68.5 | 68.5 | 68.5 | 78.5 | 93.5 | 132.5 | 185.5 | 239.5 | 291.5 | Rc1/8 | M5×0.8 | 30L | 30L | 6 | 67 | 55 | 4.5 | 10.5 |
| 25 | 18 | 35 | 25.5 | 18 | – | 76 | 76 | 76 | 86 | 99 | 140 | 181 | 239 | 279 | Rc1/8 | M6×1.0 | 25L | 35L | 5 | 80 | 65 | 6 | 14 |

* Other dimensions are the same as the standard type.

Technical data
Caution for safety
(Read beforeinstalling)

## 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 | 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 | |

## Table for standard stroke

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

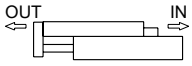
* Made to order.

## 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

## 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 |

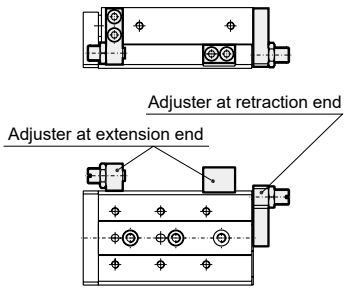
*X12 (adjustable range: 25mm) is not available for MCSQ-6.
*X11 and X12 are not available for shock absorber type.
*Shock absorber is not available on series MCSQ-6.
*Use the same stroke adjuster with MCSS.

## Stroke adjuster option

### Stroke adjuster

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

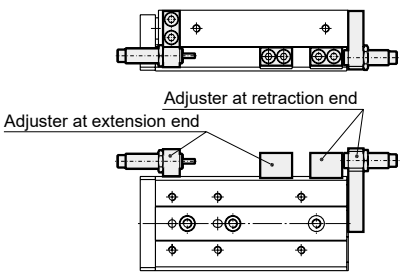
**AS**: Adjuster at extension end
**AT**: Adjuster at retraction end
**A**: Adjuster at both ends



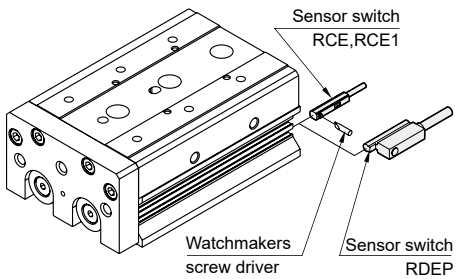

### With shock absorber

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

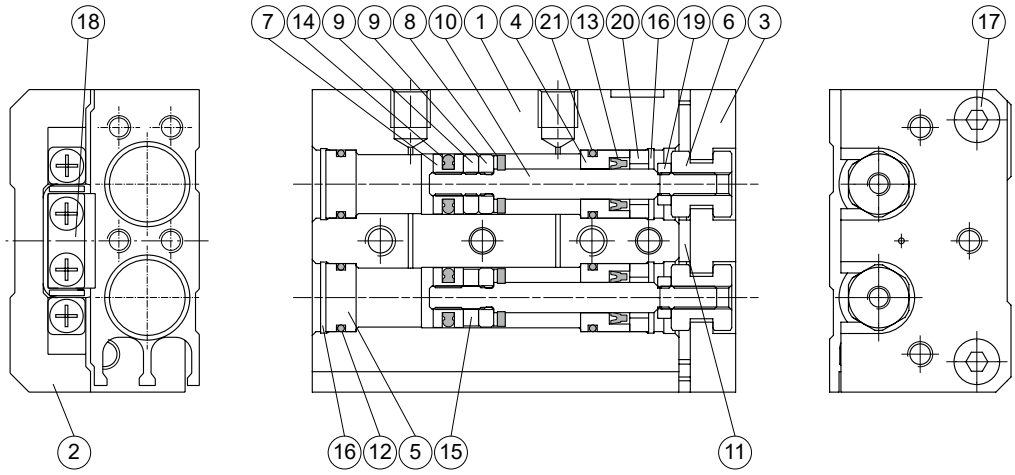
**BS**: Absorber at extension end
**BT**: Absorber at retraction end
**B**: Absorber at both ends




## Installation of sensor switch



ø6, ø8



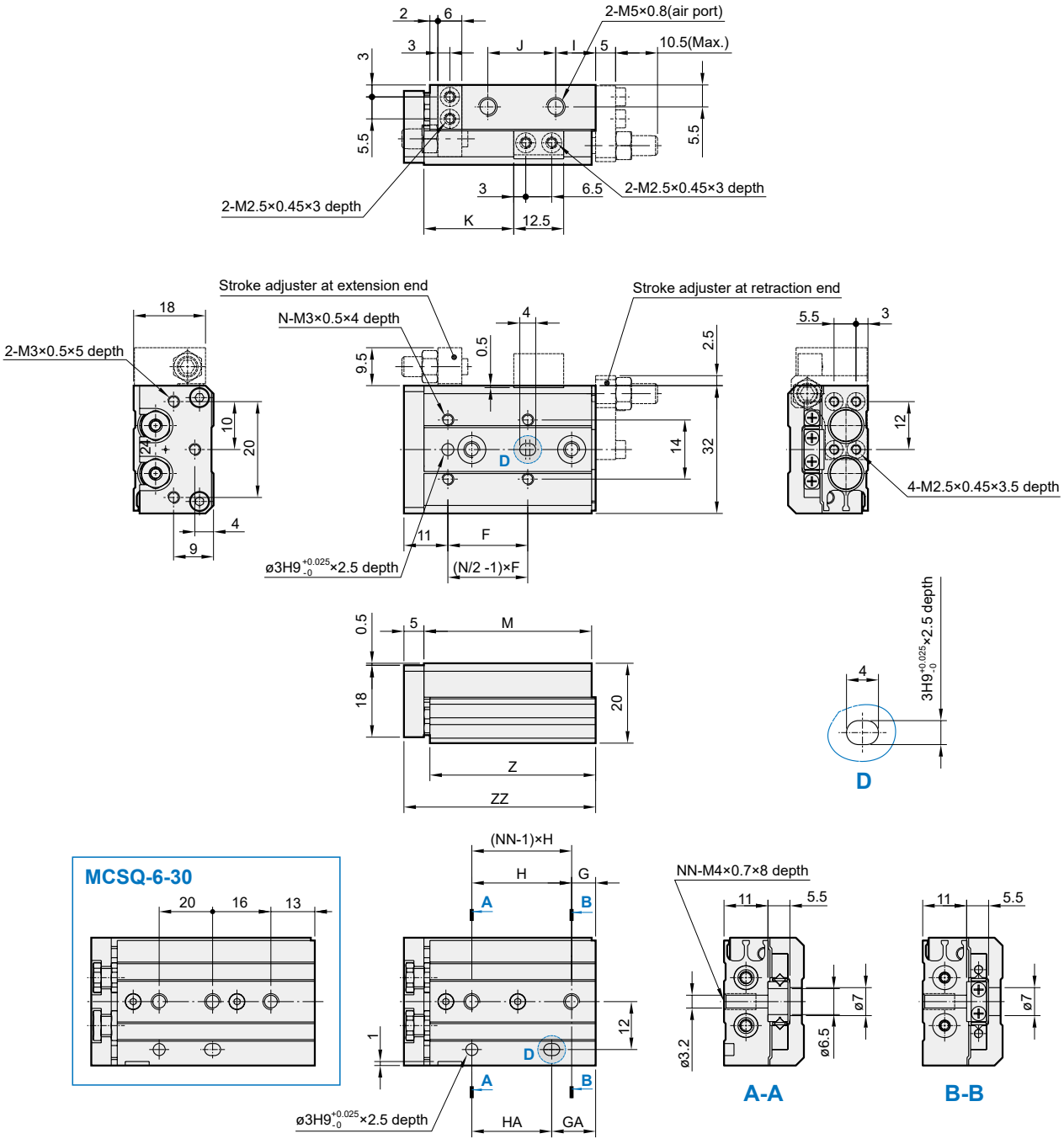

## Material

| 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 | |

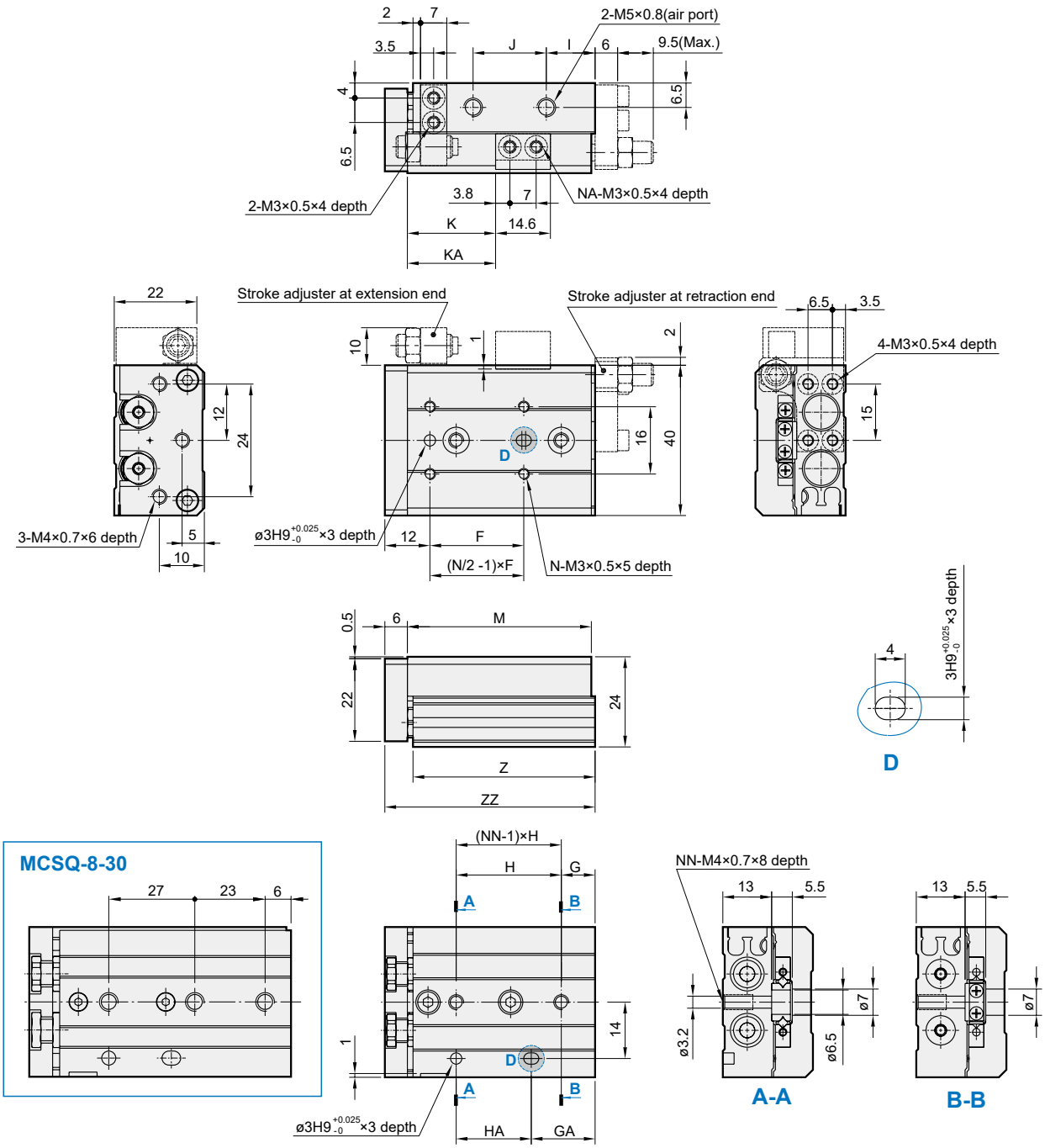
* Q'y: ø6=2, ø8=4

## Order example of repair kits

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

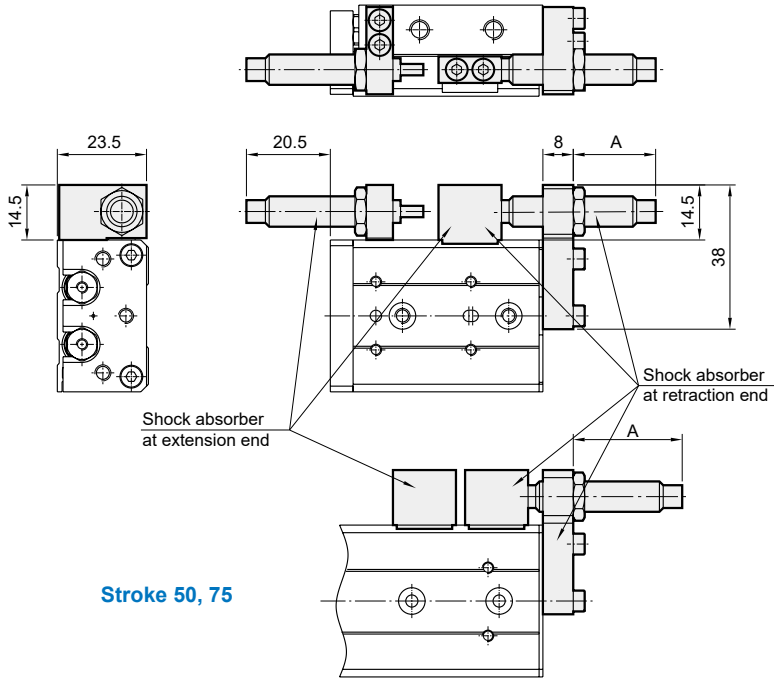



| Code / Stroke | F | G | GA | H | HA | I | J | K | M | N | NN | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 22 | 6 | 13 | 23 | 16 | 9 | 17 | 21.5 | 42 | 4 | 2 | 41.5 | 48 |
| 20 | 25 | 13 | 13 | 26 | 26 | 9 | 27 | 31.5 | 52 | 4 | 2 | 51.5 | 58 |
| 30 | 21 | – | 29 | – | 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

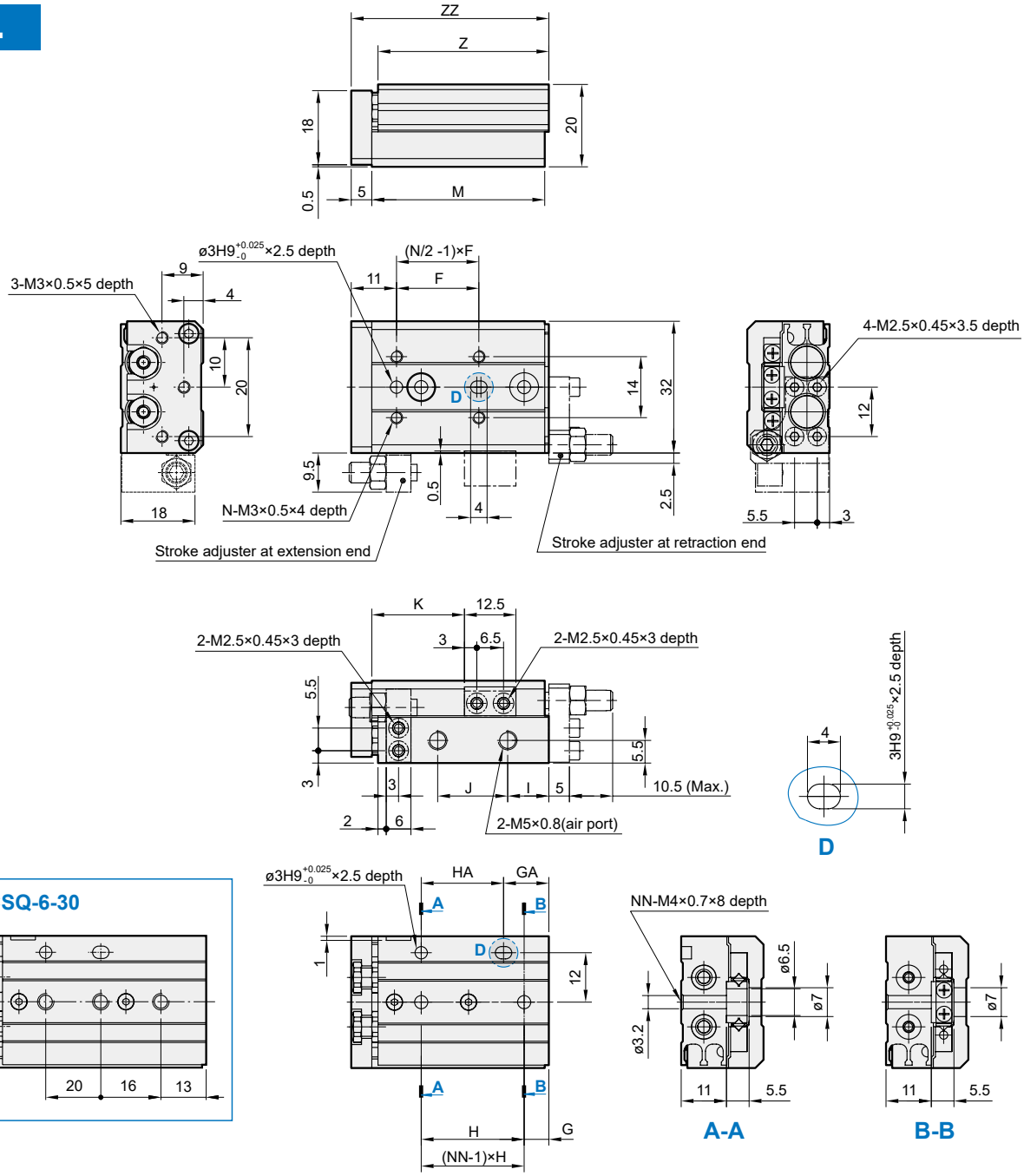



Stroke 50, 75

| 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 |

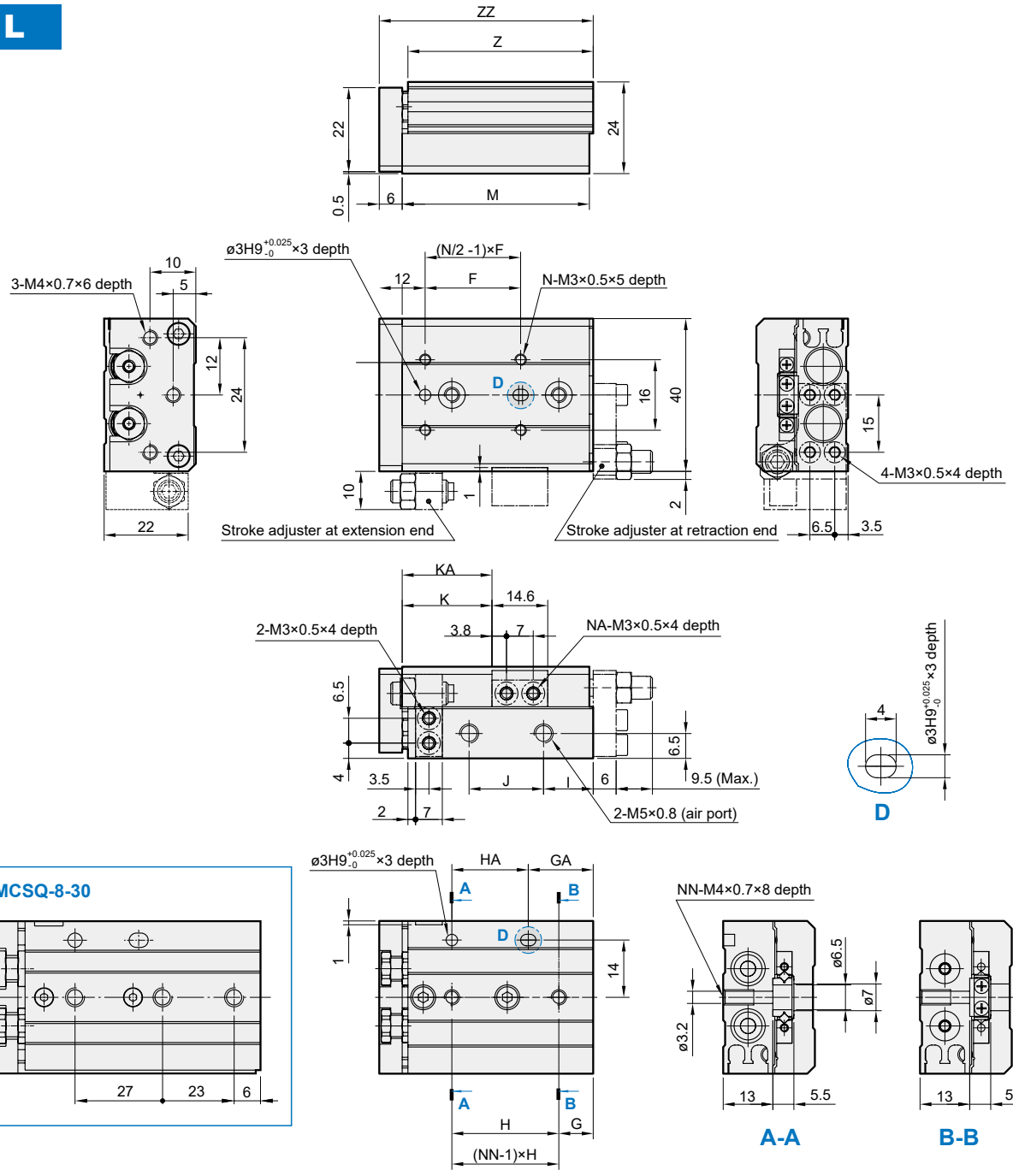
* Other dimensions not indicated are the same as the basic style.

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 |

ø8~ø20

Technical data

Caution for safety
(Read beforeinstalling)

## Features

- The thickness is 6.5mm, realizing the slim compact.
- Built-in guide for accurate motion.
- Flush fitting sensor groove.
- Magnetic as standard.

## Specification

| Model | MCSF |
|---|---|
| Acting type | Double acting |
| Tube I.D. (mm) | 5.2 |
| Stroke (mm) | 10 |
| Port size | M3×0.5 |
| Medium | Air |
| Operating pressure range | 0.2~0.7 MPa |
| Proof pressure | 1 MPa |
| Ambient temperature | -10~+60°C (No freezing) |
| Available speed range | 50~300 mm/sec |
| Cushion spring stroke (mm) | 2 |
| Cushion spring pressure (N) | 0.8 at the time of withdrawal, 2 at the time of acting |
| Lubricator | Not required |
| Stroke length tolerance (mm) | +1.0 0 |
| Sensor switch (*) | RDCV, RQCV, RDFEV |
| Weight (g) | 22 |

* Only suitable for vertical installation. Please refer to "Installation of sensor switch".

## Order example

* Made to order.

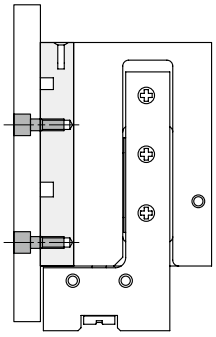
MCSF — 5 — 10

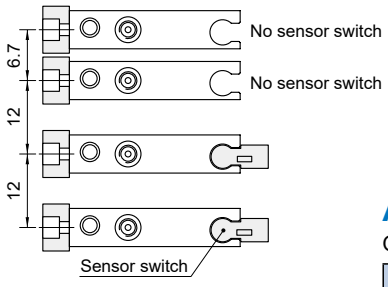
MODEL | TUBE I.D. | STROKE

**5**: 5.2 mm

## Installation

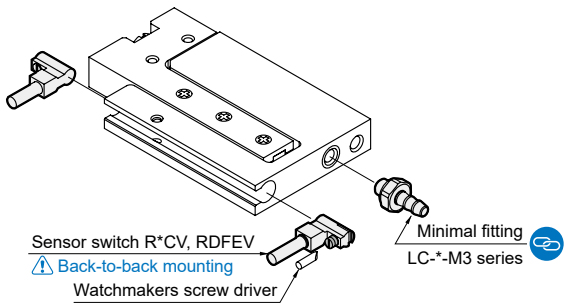
- Fixed screw tightening torque value
- Minimum distance of side installation



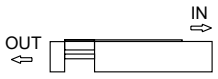



| Tube I.D. | Bolt | Max. tightening torque (N.m) |
|---|---|---|
| 5 | M2×0.4 | 0.3 |

## Installation of sensor switch




## Theoretical force




Unit: N

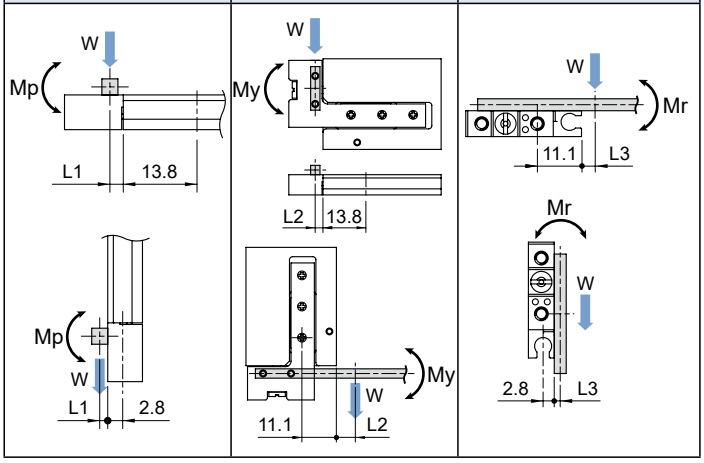
| Tube I.D. | Piston rod (mm) | Operating direction | Piston area ($mm^2$) | Operating pressure (MPa) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| 5 | 2.5 | OUT | 21.2 | 4.24 | 6.36 | 8.48 | 10.6 | 12.72 | 14.84 |
| | | IN | 16.3 | 3.26 | 4.89 | 6.52 | 8.15 | 9.78 | 11.41 |

## Allowable static moment

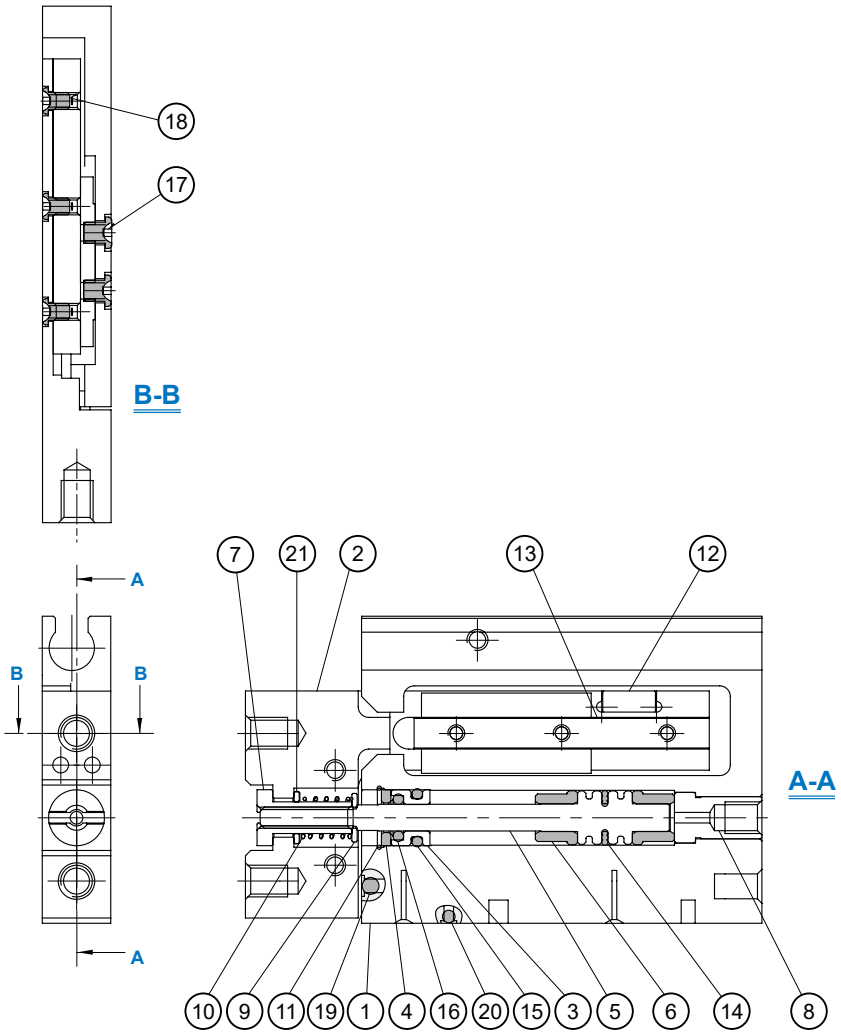
Overhang: Ln (mm)

Unit: kgf.m

| Pitch moment (Mp) | Yaw moment (My) | Roll moment (Mr) |
|---|---|---|
| 0.11 | 0.11 | 0.09 |



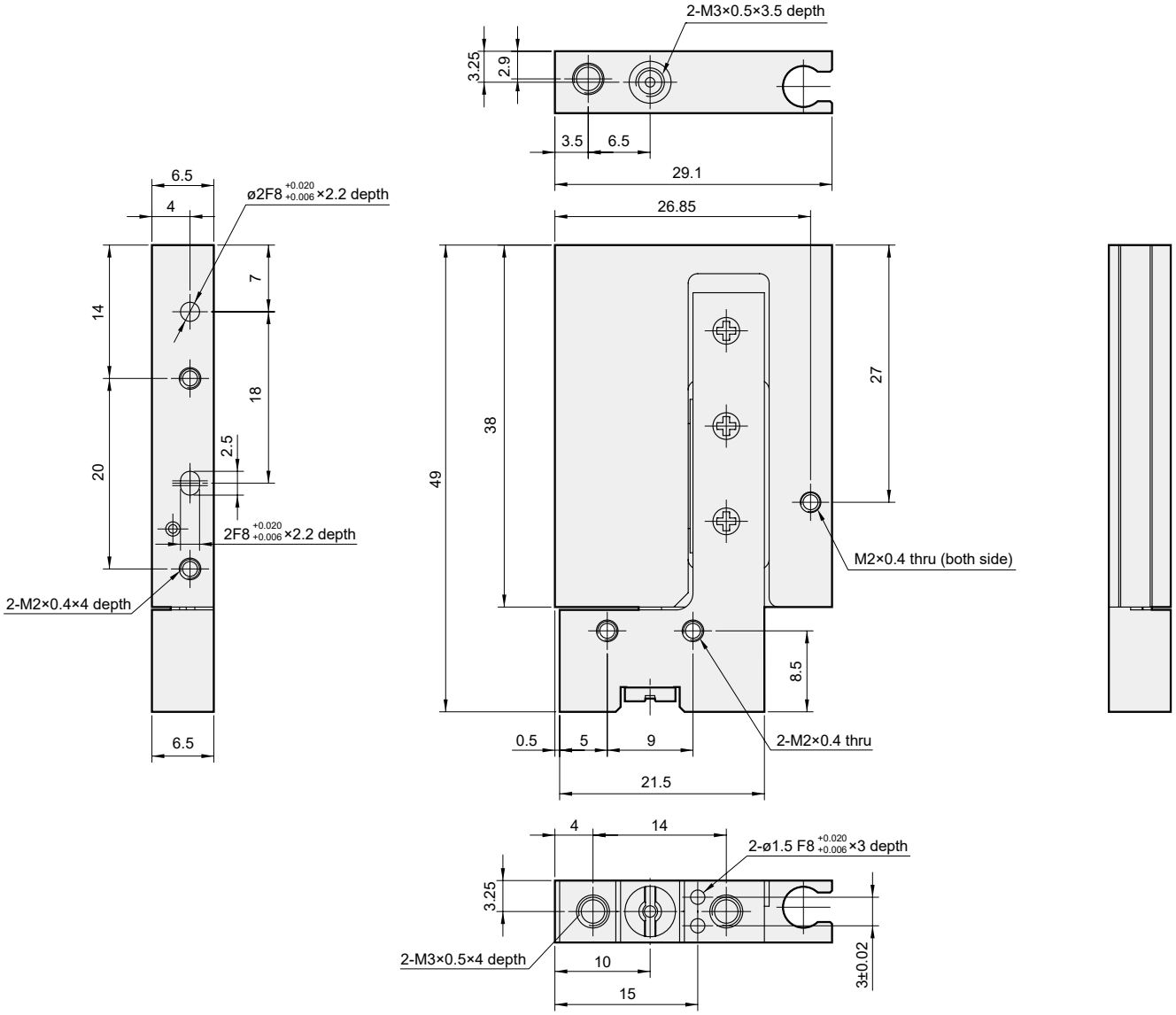

* The allowable torque (dynamic) is 0.1 times the allowable torque (static).




## Material

| No. | Part name | Material | Q'y |
|---|---|---|---|
| 1 | Body | Aluminum alloy | 1 |
| 2 | Table | Aluminum alloy | 1 |
| 3 | Head cover | Copper | 1 |
| 4 | Rod cover washer | Copper | 1 |
| 5 | Piston rod | Stainless steel | 1 |
| 6 | Cushion packing | POM | 2 |
| 7 | Floating connector | Stainless steel | 1 |
| 8 | End cover | Aluminum alloy | 1 |
| 9 | Spring gasket | Stainless steel | 1 |
| 10 | Spring | Spring steel | 1 |

| No. | Part name | Material | Q'y |
|---|---|---|---|
| 11 | Spring snap | Spring steel | 1 |
| 12 | Magnet | Magnet material | 1 |
| 13 | Linear guide set | – | 1 |
| 14 | Piston packing | NBR | 1 |
| 15 | O-ring | NBR | 1 |
| 16 | O-ring | NBR | 1 |
| 17 | Screw | Stainless steel | 2 |
| 18 | Screw | Stainless steel | 3 |
| 19 | Ball | Stainless steel | 1 |
| 20 | Ball | Stainless steel | 1 |
| 21 | Washer | Stainless steel | 1 |


2-M3×0.5×3.5 depth
3.25
2.9
3.5
6.5
29.1
26.85
6.5
4
ø2F8 +0.020 +0.006 ×2.2 depth
14
7
18
20
2.5
2F8 +0.020 +0.006 ×2.2 depth
2-M2×0.4×4 depth
6.5
49
38
27
M2×0.4 thru (both side)
8.5
0.5
5
9
2-M2×0.4 thru
21.5
4
14
2-ø1.5 F8 +0.020 +0.006 ×3 depth
3.25
2-M3×0.5×4 depth
10
15
3±0.02

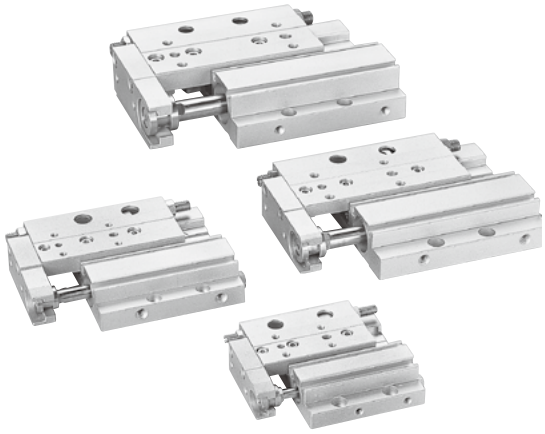
# MCSF series ø8~ø20

## LOW PROFILE SLIDE CYLINDER

ø5.2

Technical data

Caution for safety
(Read beforeinstalling)



## 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 | |

## 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 |

* Made to order.

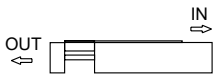
## Order example

MCSF — 12 — 50 — X11

- MCSF: MODEL
- 12: TUBE I.D.
- 50: STROKE
- X11: 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

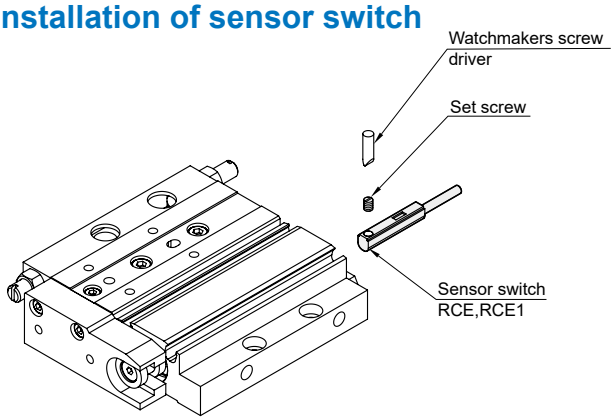
| Tube I.D. (mm) | Piston rod (mm) | Operating direction | Piston area ($mm^2$) | Operating pressure (MPa) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| 8 | 4 | OUT | 50 | 10 | 15 | 20 | 25 | 30 | 35 |
| | | IN | 38 | 8 | 11 | 15 | 19 | 23 | 27 |
| 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 |

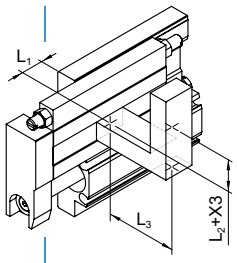
## Cylinder weight

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



| 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)

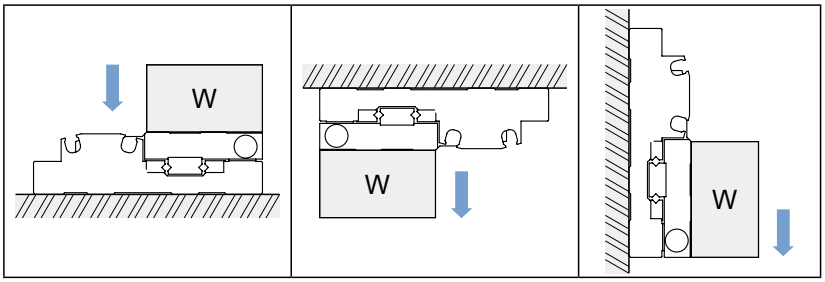



Table 2: Max. allowable load mass: Wmax (kg)

| 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)

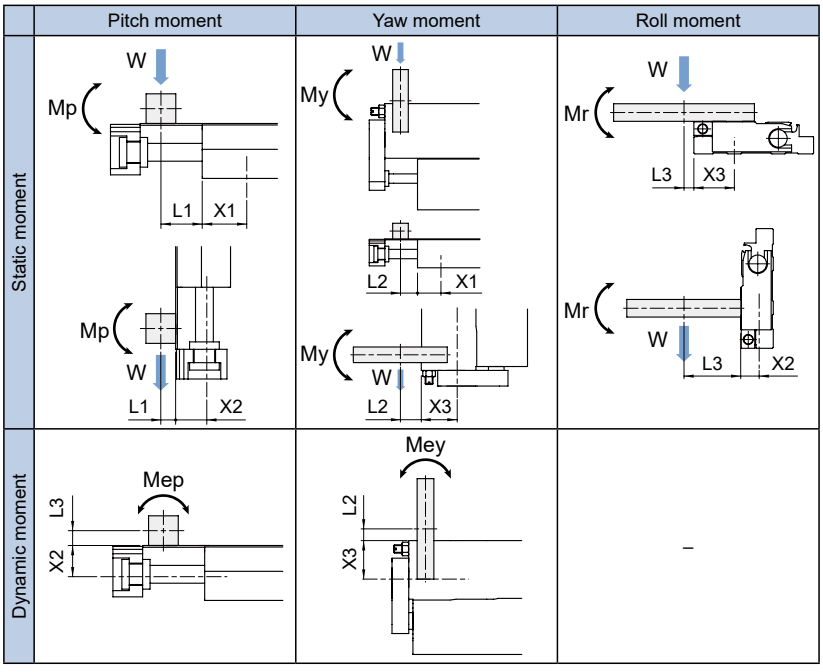
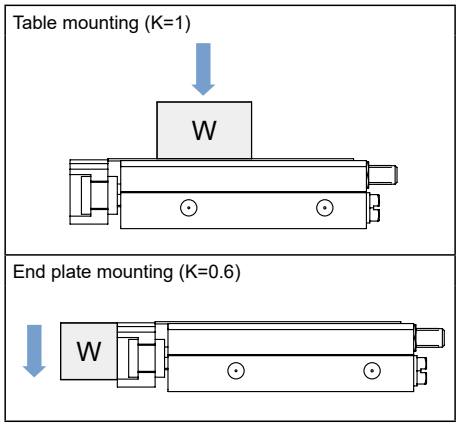



Fig 3: Workpiece mounting coefficient: K




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**<br>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 $\alpha_1 = 0$.)<br>Find the load factor of the load mass $\alpha_1$. | 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<br>$\alpha_1$ = W/Wa | Wa = 1 • 1 • 0.5 = 0.5<br>K = 1<br>β = 1<br>Wmax = 0.5<br>$\alpha_1$ = 0.2/0.5 = 0.4 |
| **3-2 Load factor of static moment**<br>Find the static moment M (N·m).<br>Find the allowable static moment Ma (N·m).<br>Find the load factor $\alpha_2$ of the static moment. | M = W • 9.8(Ln+Xn) / 1000<br>Correction value of moment center position distance Xn: Table 3<br>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<br>$\alpha_2$ = M/Ma | Yawing<br>Examine My.<br>My = 0.2 • 9.8(2+27)/1000 = 0.06<br>$X_1$ = 27<br>May = 1 • 1 • 0.5 = 0.5<br>Mymax = 0.5<br>K = 1<br>γ = 1<br>$\alpha_2$ = 0.06/0.5 = 0.114<br>Rolling<br>Examine Mr.<br>Mr = 0.2 • 9.8(4+9.5)/1000 = 0.026<br>$X_2$ = 9.5<br>Mar = 0.5<br>(Same value as May)<br>$\alpha'_2$ = 0.026/0.5 = 0.053 |
| **3-3 Load factor of dynamic moment**<br>Find the dynamic moment Me (N·m).<br>Find the allowable dynamic moment Mea (N·m).<br>Find the load factor $\alpha_3$ of the dynamic moment. | Me = 1/3 • We • 9.8 $\frac{(Ln+Xn)}{1000}$<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<br>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<br>$\alpha_3$ = Me/Mea | Pitching<br>Examine Mep.<br>Mep = 1/3 • 1.12 • 9.8 • $\frac{(4+9.5)}{1000}$ = 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<br>Yawing<br>Examine Mey.<br>Mey = 1/3 • 1.12 • 9.8 • $\frac{(3+21)}{1000}$ = 0.088<br>We = 1.12<br>$X_3$ = 21<br>Meay = 0.5 (Same value as Meap)<br>$\alpha'_3$ = 0.088/0.5 = 0.176 |
| **3-4 Sum of load factors**<br>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

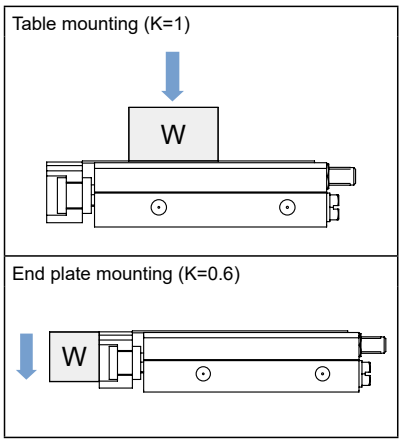
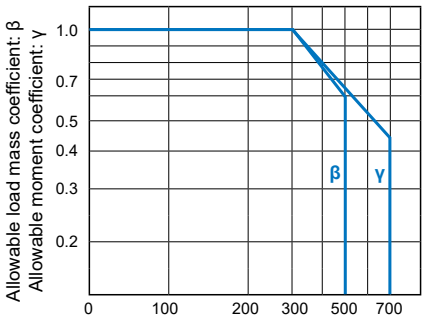



Fig.4: Allowable load mass coefficient: β
Allowable moment coefficient: γ

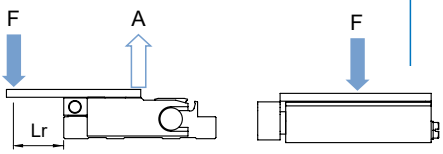


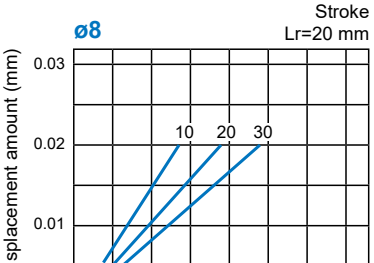

γ note: Use the average operating speed when calculating static moment. Use the collision speed when calculating dynamic moment.

## 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.



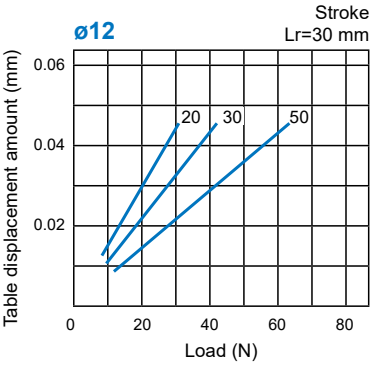
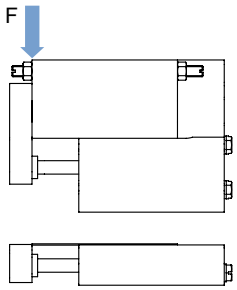
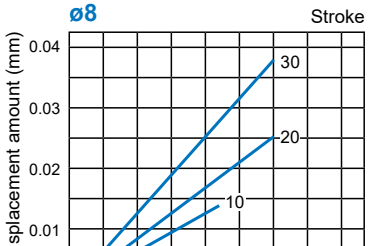




**Table displacement due to yaw moment load**

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



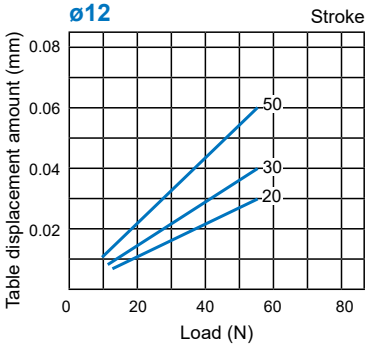
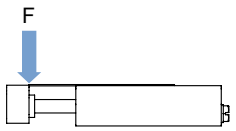
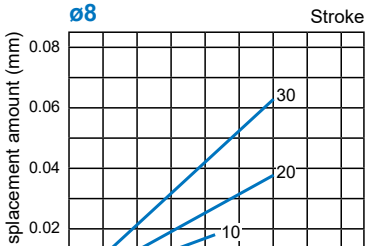
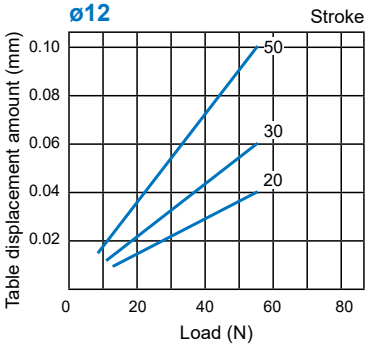




**Table displacement due to pitch moment load**

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



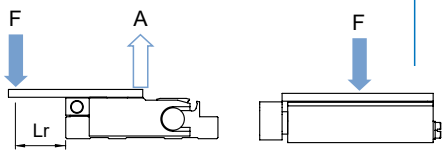



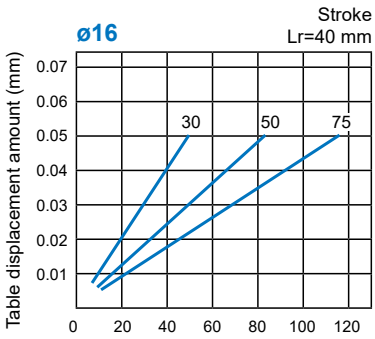



## Table deflection (Reference values)

**Table displacement due to roll moment load**

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



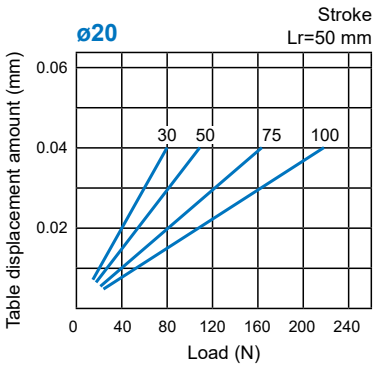
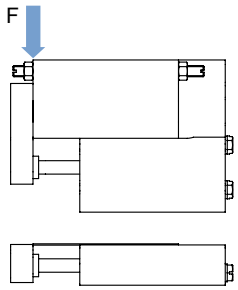
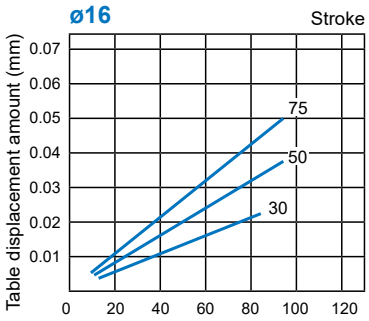




**Table displacement due to yaw moment load**

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



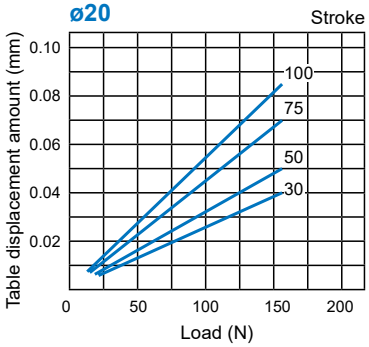
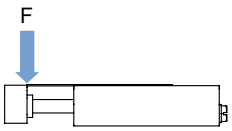
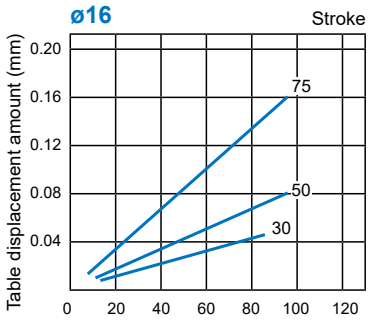
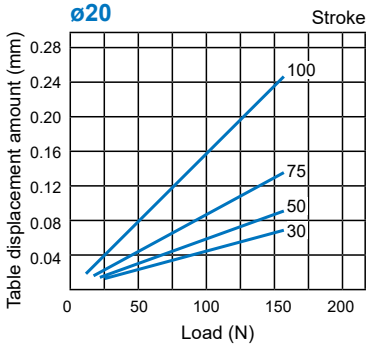




**Table displacement due to pitch moment load**

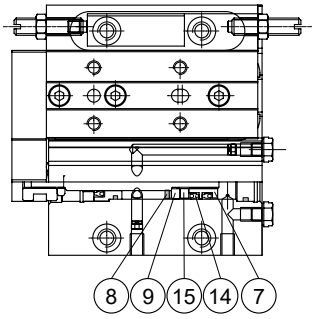
Table displacement when loads are applied to the section marked with the arrow at the full stroke.



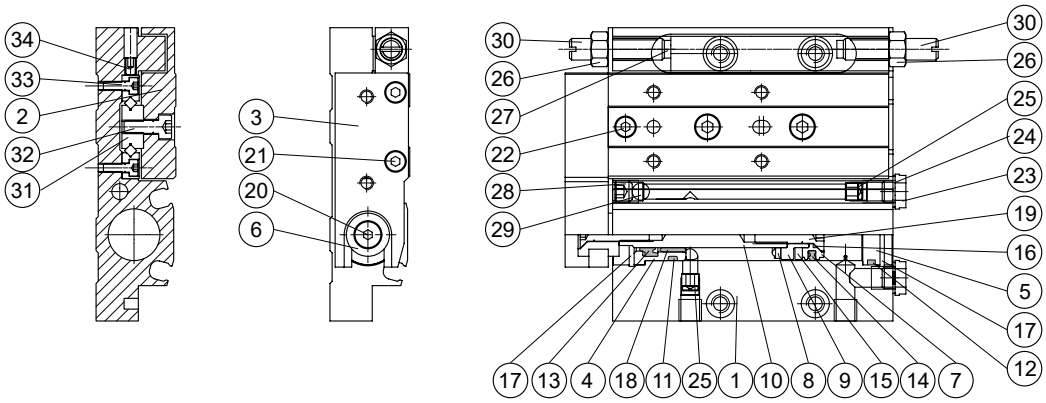



ø8




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 | |

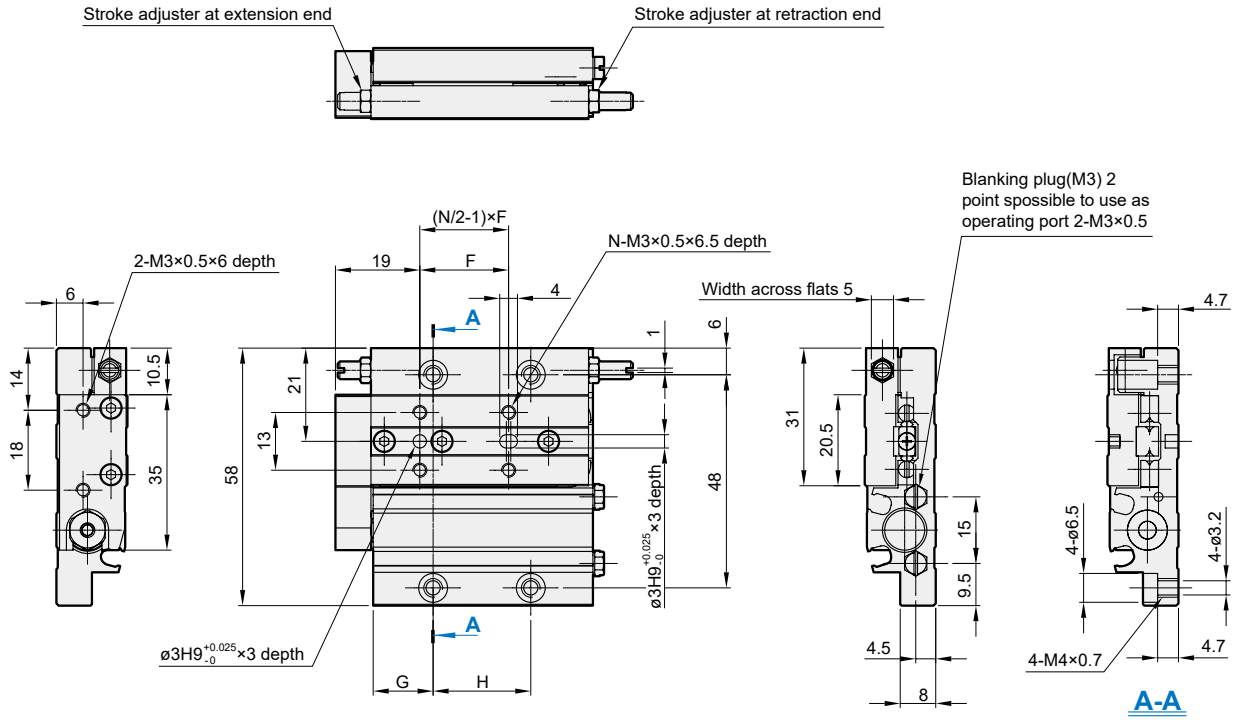
* Item 14. Tube I.D. ø8 (Q'y: 2pcs); Tube I.D. ø12~20 (Q'y: 1pc).

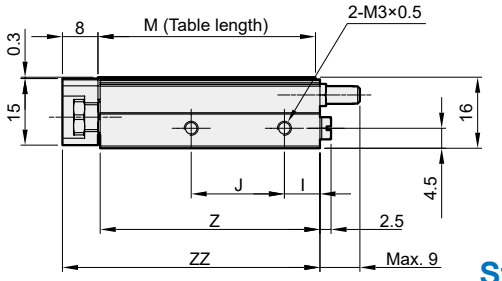
| No. | Tube I.D. / Part name | 8 | 12~20 | Q'y | Repair kits (inclusion) |
|---|---|---|---|---|---|
| 22 | Bolt | Stainless steel | | 1 | |
| 23 | Plug | Copper | | 2 | |
| 24 | Plug gasket | POM | | 2 | |
| 25 | Orifice | Stainless steel | | 2 | |
| 26 | Nut | Copper/Stainless steel | | 2 | |
| 27 | 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 | |

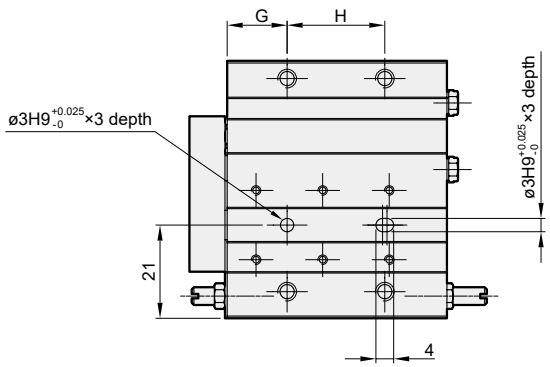
*1. Aluminum alloy
*2. Stainless steel
*3. Quantity varies depending on the stroke length.

## 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** |

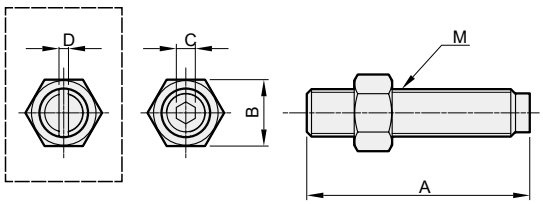


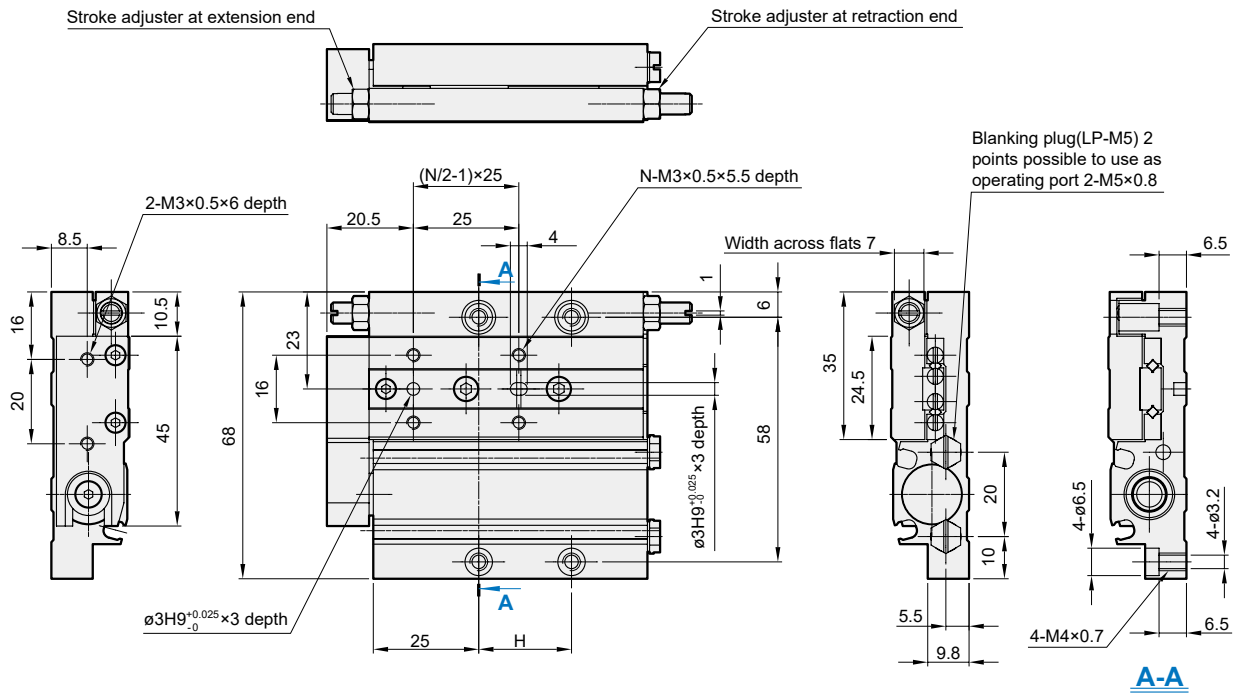



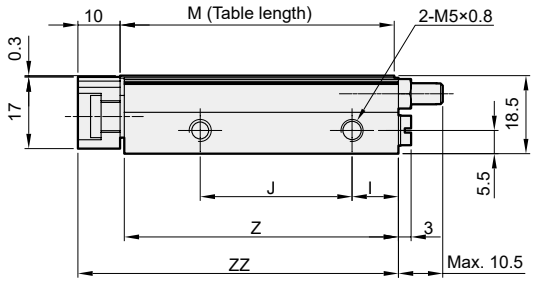

| Code / Stroke | F | G | H | I | J | M | N | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 20 | 13.5 | 22 | 8 | 21 | 49 | 4 | 49.5 | 58 |
| 20 | 26 | 14.5 | 26 | 6.5 | 28 | 54 | 4 | 54.5 | 63 |
| 30 | 26 | 14.5 | 40 | 8 | 41 | 69 | 6 | 69.5 | 78 |

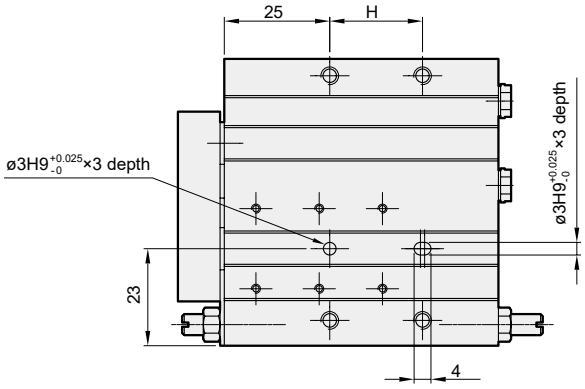
## Stroke adjuster bolt ø8~ø20



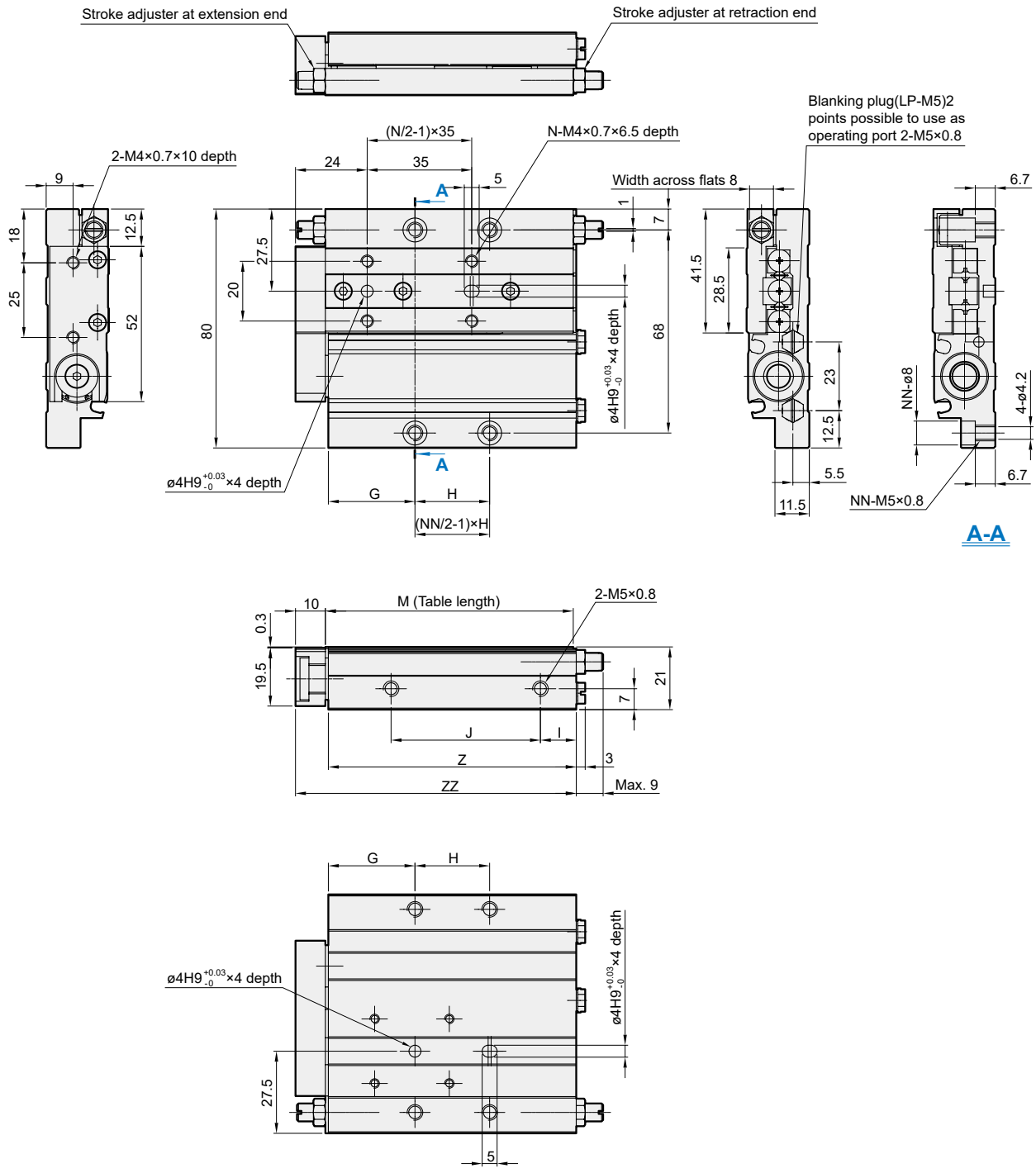

| Tube I.D. | Order code | Adjustable stroke range (mm) | A | B | C | D | M |
|---|---|---|---|---|---|---|---|
| 8 | MCSF-8 | 5 | 17 | 5 | – | 1 | M4×0.7 |
| | MCSF-8-X11 | 15 | 27 | | | | |
| 12 | MCSF-12 | 5 | 23.5 | 7 | – | 1 | M5×0.8 |
| | MCSF-12-X11 | 15 | 33.5 | | | | |
| 16 | MCSF-16 | 5 | 26.5 | 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 | |



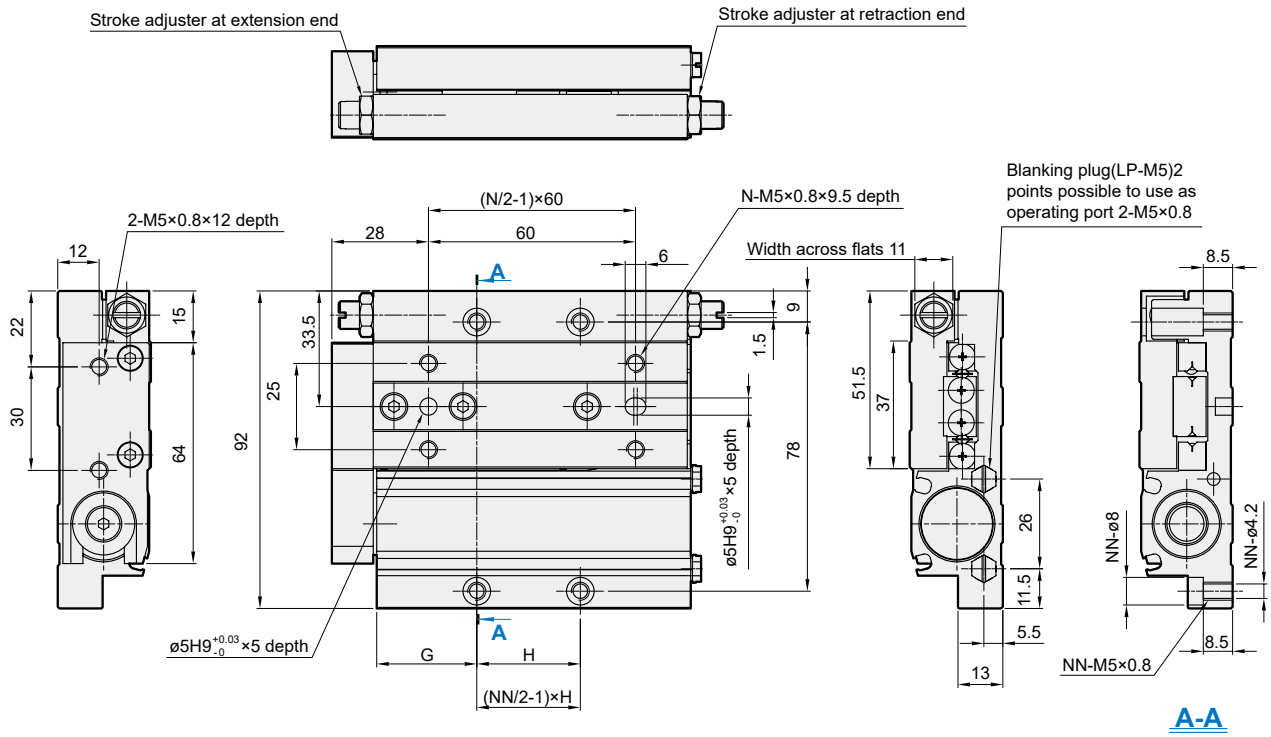



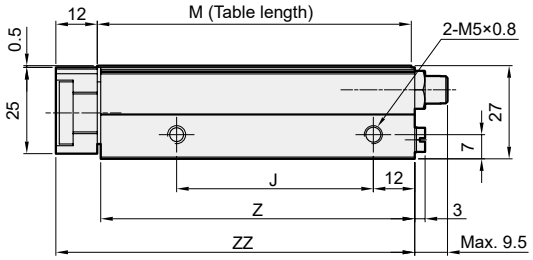



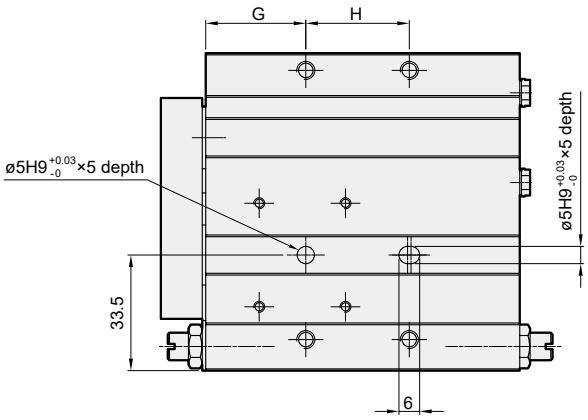

| Code / Stroke | H | I | J | M | N | Z | ZZ |
|---|---|---|---|---|---|---|---|
| 20 | 22 | 11 | 36 | 65 | 4 | 65 | 76 |
| 30 | 30 | 12 | 45 | 75 | 4 | 75 | 86 |
| 50 | 65 | 13 | 80 | 111 | 6 | 111 | 122 |




| 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 |




| 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 |

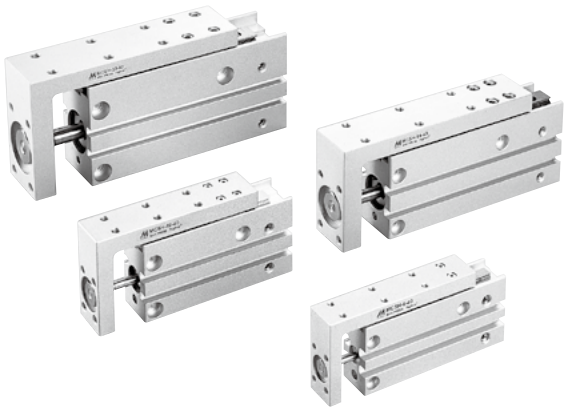
# MCSH series

## COMPACT SLIDE CYLINDER

mindman

Technical data

Caution for safety
(Read beforeinstalling)



## 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 | | | |

## 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

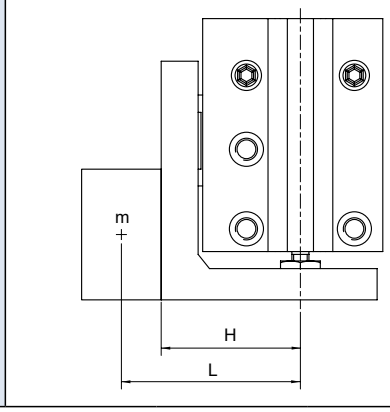
| Tube I.D. (mm) | Allowable moment (N.m) | | |
|---|---|---|---|
| | Roll moment load | Yaw moment load | Pitch moment load |
| | Mr | My | Mp |
| ø6 | 0.53 | 0.35 | 0.42 |
| ø10 | 1.23 | 0.73 | 0.86 |
| ø16 | 2.47 | 1.43 | 1.69 |
| ø20 | 4.94 | 2.47 | 2.82 |

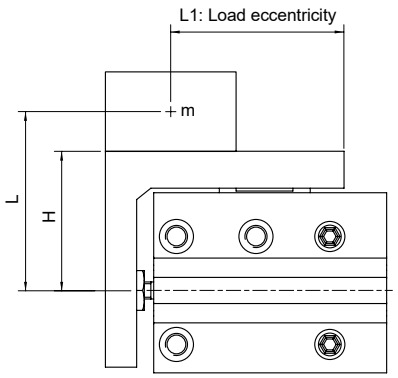
## Theoretical force

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**

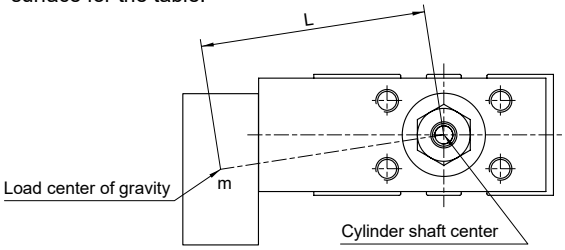
  Maximum speed: 300 mm/s
  Load eccentricity L1: 50 mm
  Overhang L: 60 mm
  Load mass m: 0.1 kg

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.

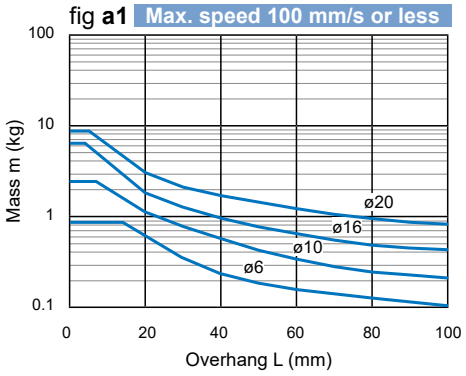
- L: Overhang (the distance from the cylinder shaft center to the load center of gravity)

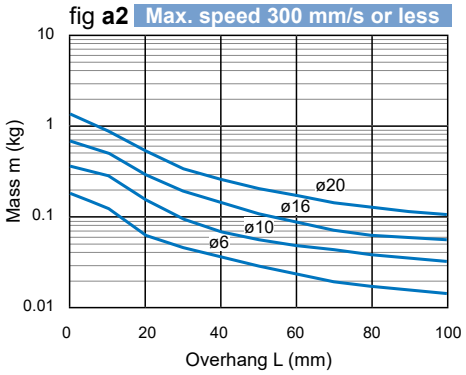
  The direction of L can also be a diagonal direction. (Refer to the drawing below)

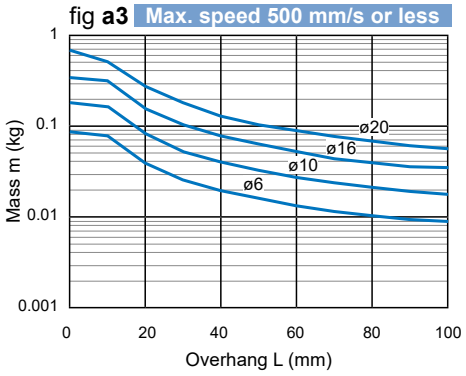
- H: Distance from the cylinder center axis to the mounting surface for the table.




## Vertical mounting (fig a1 ~ a3)



## Horizontal mounting (fig b1 ~ b9)

| Max. speed 100 mm/s or less | Max. speed 300 mm/s or less | Max. speed 500 mm/s or less |
|---|---|---|

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

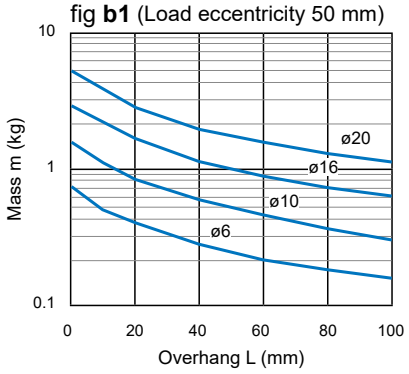



fig **b4** (Load eccentricity 50 mm)

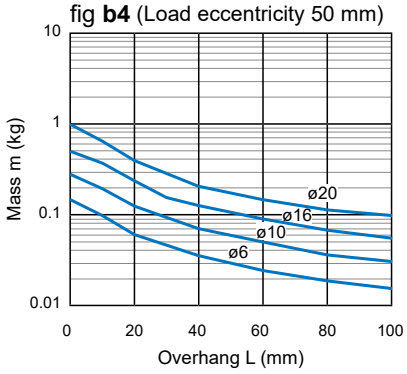



fig **b7** (Load eccentricity 50 mm)

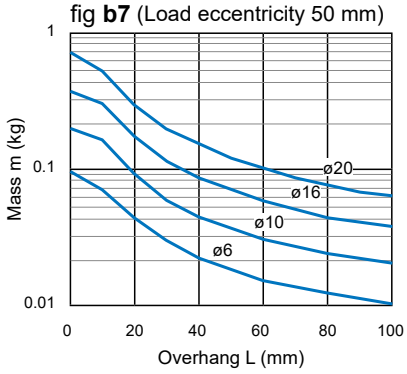



fig **b2** (Load eccentricity 100 mm)

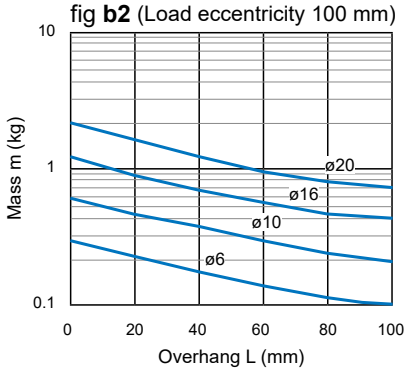



fig **b5** (Load eccentricity 100 mm)

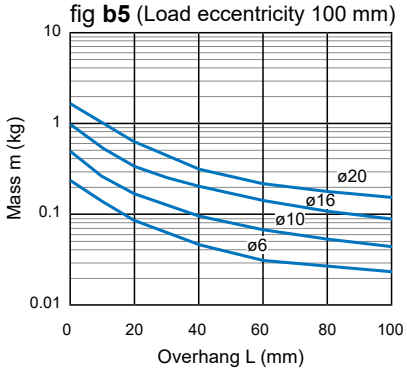



fig **b8** (Load eccentricity 100 mm)

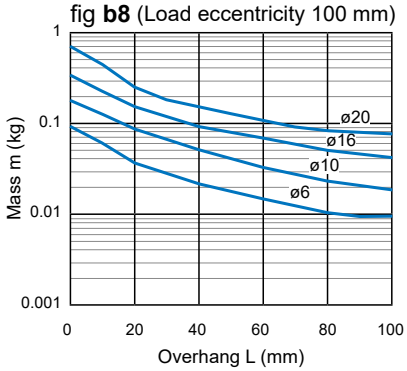



fig **b3** (Load eccentricity 200 mm)

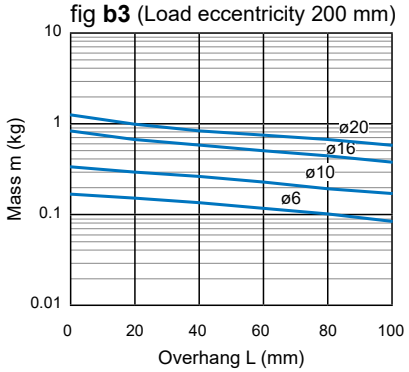



fig **b6** (Load eccentricity 200 mm)

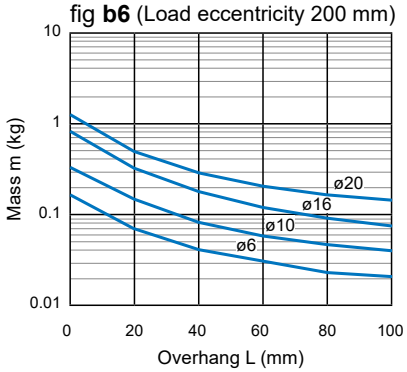
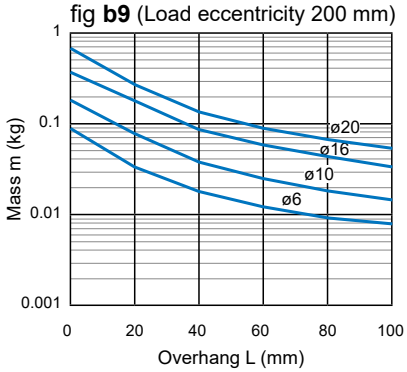


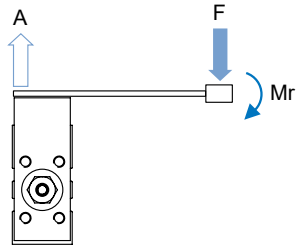

fig **b9** (Load eccentricity 200 mm)

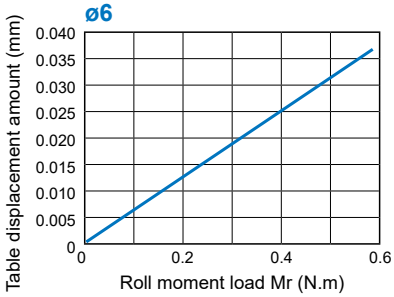


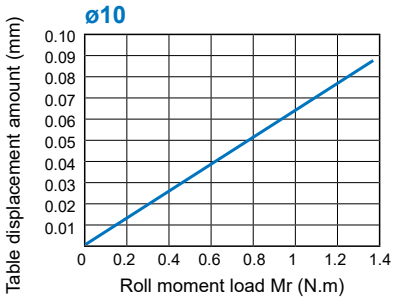
## Table deflection (Reference values)

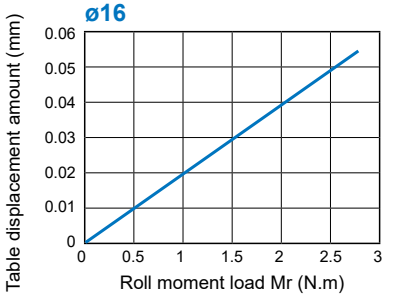
### Table displacement due to roll moment load

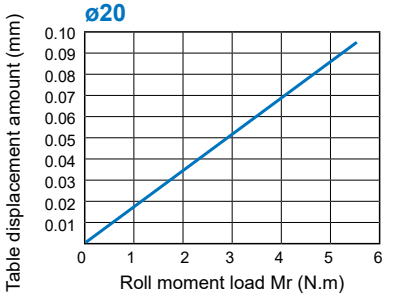
Table displacement of section A when loads are applied to the section F with theslide table retracted.



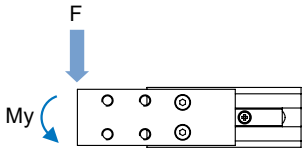



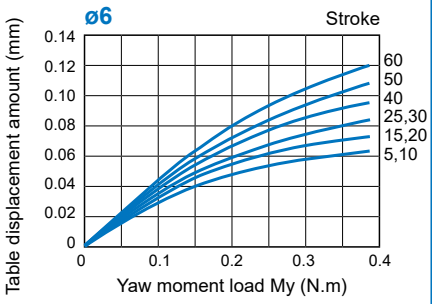



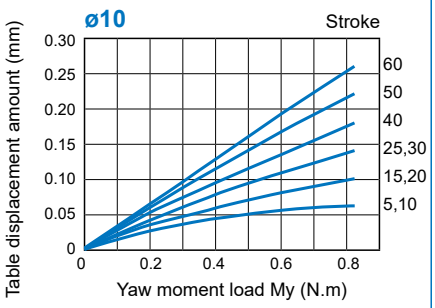



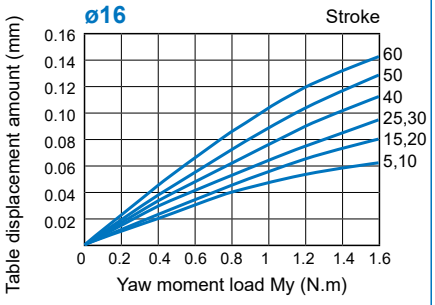

### Table displacement due to yaw moment load

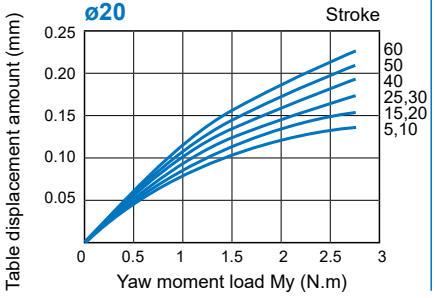
Table displacement when loads are applied to the section marked with the arrow at the full stroke.



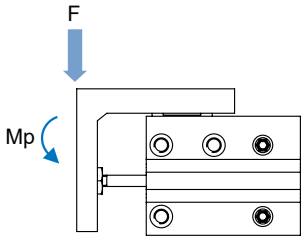



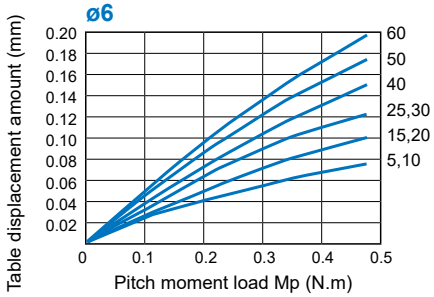



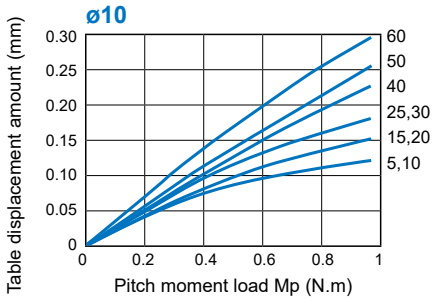



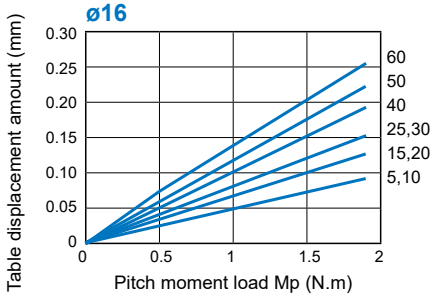

### Table displacement due to pitch moment load

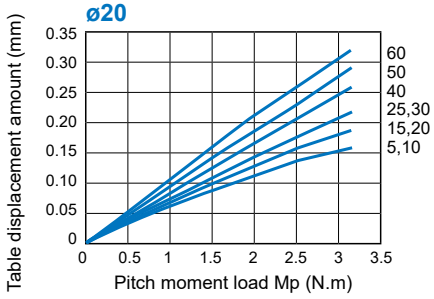
Table displacement when loads are applied to the section marked with the arrow at the full stroke.



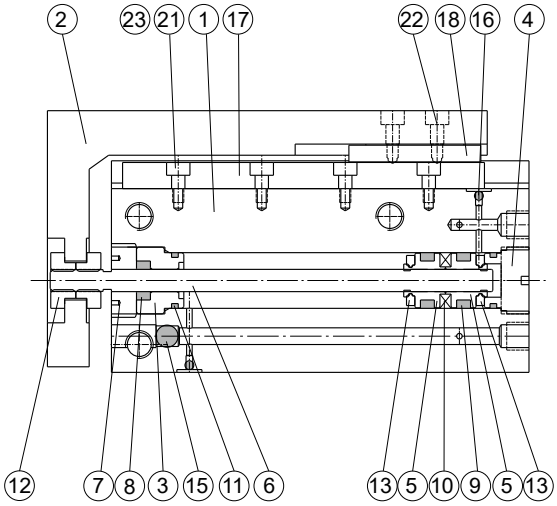



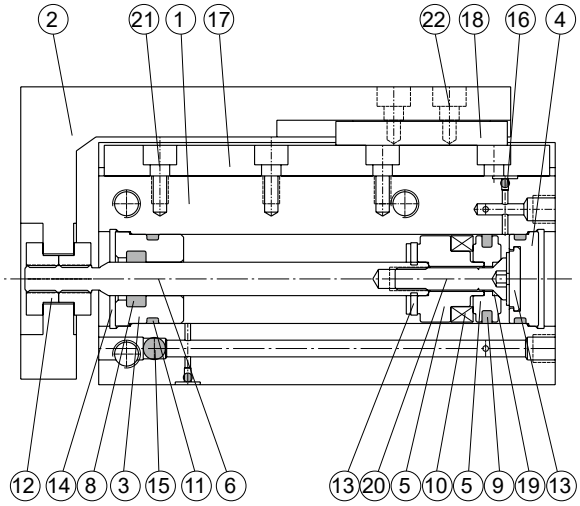



ø6, ø10




ø16, ø20




## Material

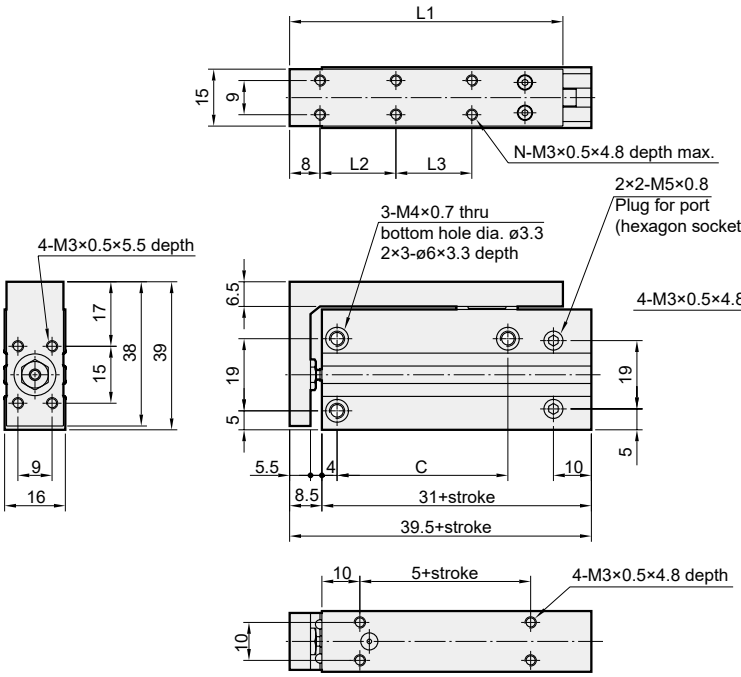
| No. | Tube I.D. / Part name | 6 | 10 | 16 | 20 | Note | Q'y | Repair kits (inclusion) |
|---|---|---|---|---|---|---|---|---|
| 1 | Body | Aluminum alloy | | | | | 1 | |
| 2 | Table | Aluminum alloy | | | | | 1 | |
| 3 | Rod cover | Brass | Aluminum alloy | | | | 1 | |
| 4 | Head cover | Aluminum alloy | | | | | 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

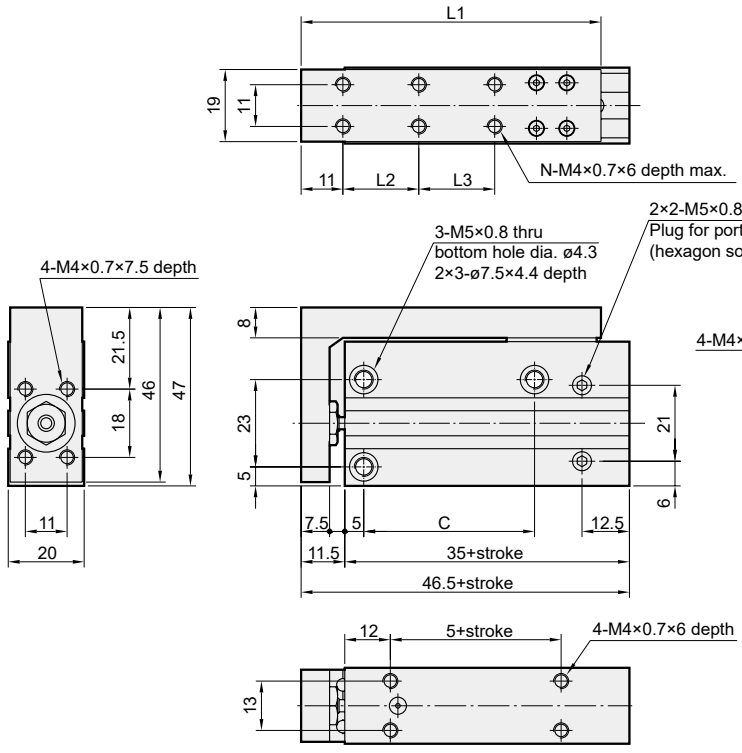
| Tube I.D. | Repair kits |
|---|---|
| ø6 | **PS-MCSH-6** |
| ø10 | **PS-MCSH-10** |
| ø16 | **PS-MCSH-16** |
| ø20 | **PS-MCSH-20** |

## ø6



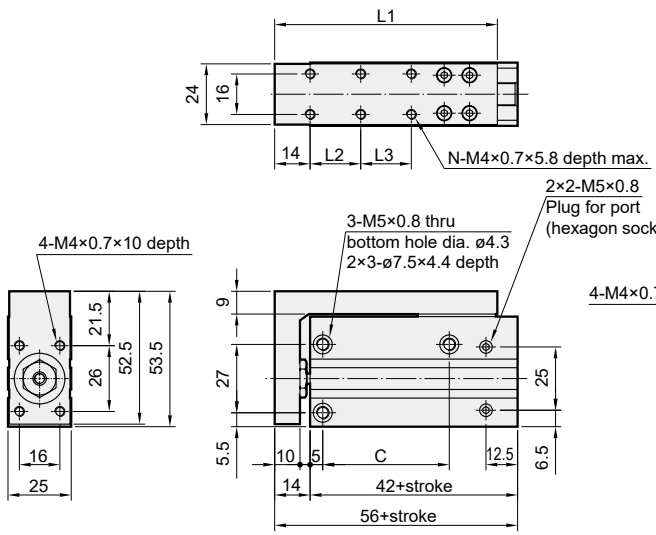

| Code / Stroke | C | L1 | L2 | L3 | N |
|---|---|---|---|---|---|
| 5 | 14 | 42 | 10 | – | 4 |
| 10 | 14 | 42 | 10 | – | 4 |
| 15 | 24 | 52 | 20 | – | 4 |
| 20 | 24 | 52 | 20 | – | 4 |
| 25 | 30 | 62 | 30 | – | 4 |
| 30 | 30 | 62 | 30 | – | 4 |
| 40 | 45 | 72 | 20 | 20 | 6 |
| 50 | 55 | 82 | 25 | 25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

## ø10



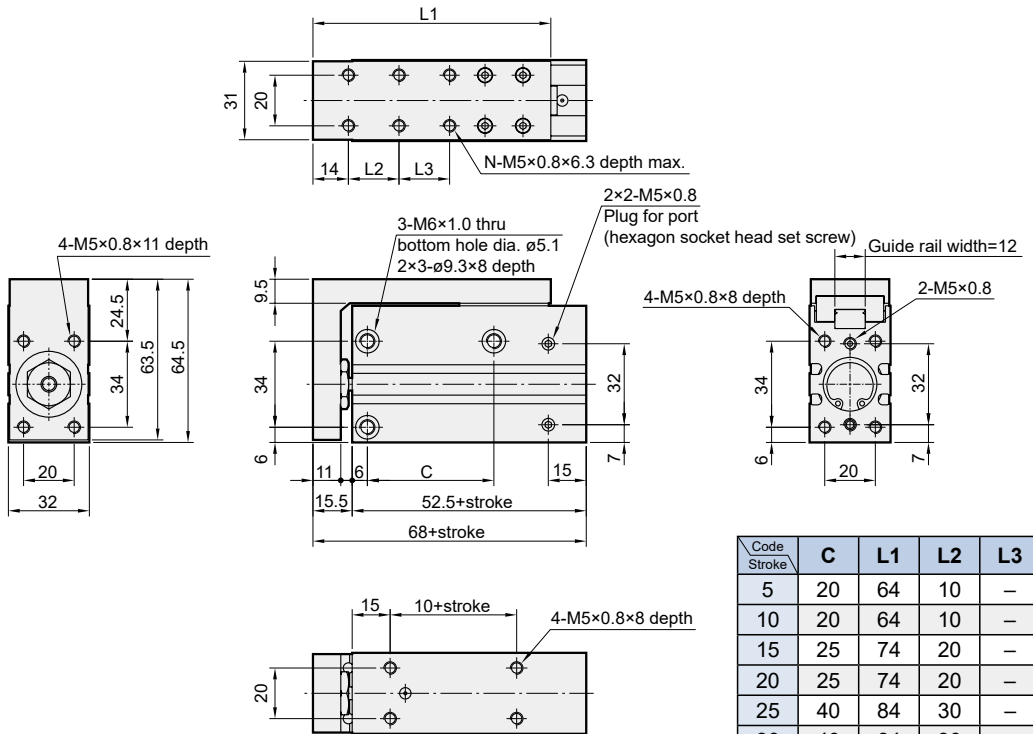

| Code / Stroke | C | L1 | L2 | L3 | N |
|---|---|---|---|---|---|
| 5 | 14 | 49 | 10 | – | 4 |
| 10 | 14 | 49 | 10 | – | 4 |
| 15 | 24 | 59 | 20 | – | 4 |
| 20 | 24 | 59 | 20 | – | 4 |
| 25 | 30 | 69 | 30 | – | 4 |
| 30 | 30 | 69 | 30 | – | 4 |
| 40 | 45 | 79 | 20 | 20 | 6 |
| 50 | 55 | 89 | 25 | 25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

## 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 |