

MCSF series ø8~ø20

LOW PROFILE SLIDE CYLINDER



ø5.2



Technical data



Caution for safety
(Read before installing)

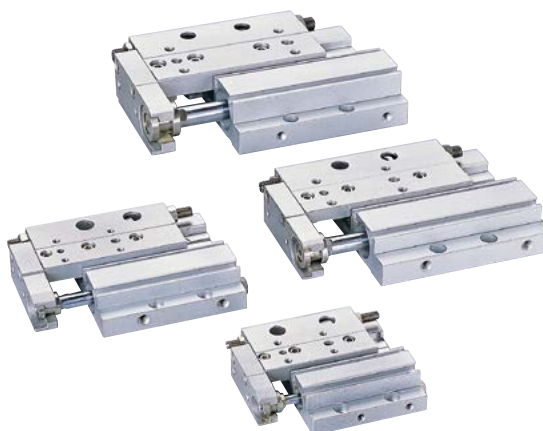


Table for standard stroke

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

MODEL

TUBE I.D.

STROKE

STROKE ADJUSTABLE

Blank: 5mm
X11: 15mm
X12: 25mm

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

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

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	

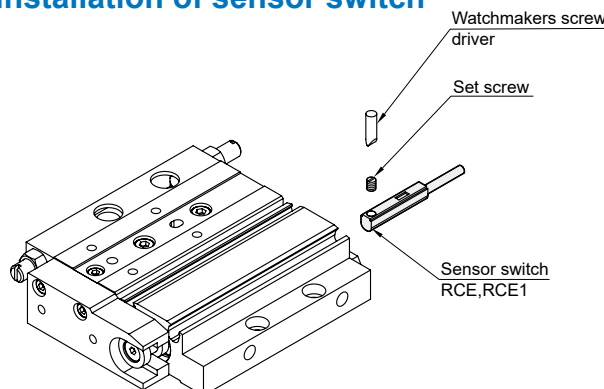
Theoretical force

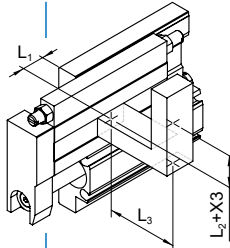


Unit: N

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	

Installation of sensor switch



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

(Continued)

Table 1: Max. allowable kinetic energy: E_{max} (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)

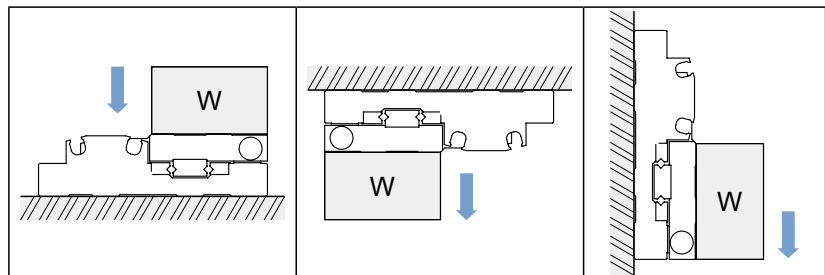


Table 2: Max. allowable load mass: W_{max} (kg)

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

Fig 2: Overhang: L_n (mm), Correction value of moment center position distance: X_n (mm)

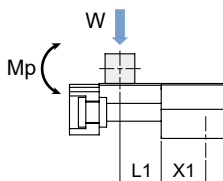
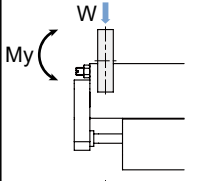
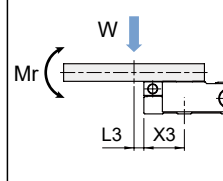
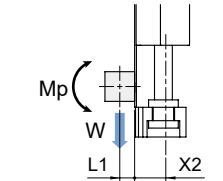
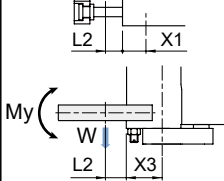
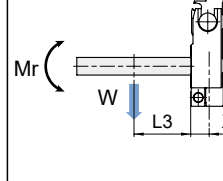
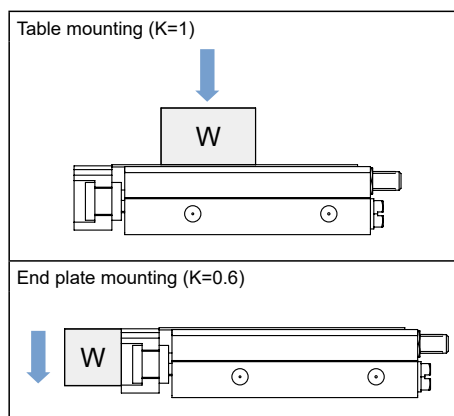
	Pitch moment	Yaw moment	Roll moment
Static moment			
Dynamic moment			

Fig 3: Workpiece mounting coefficient: K



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

Model selection steps	Formula / Data	Selection example
3. Load factor 3-1 Load factor of load mass Find the allowable load mass W_a (kg). Note: There is no need to consider this load factor in the case of using perpendicularly in a vertical position. (Define $\alpha_1 = 0$.) Find the load factor of the load mass α_1 .	$W_a = K \cdot \beta \cdot W_{max}$ Workpiece mounting coefficient K: Fig 3 Allowable load mass coefficient β : Fig 4 Max. allowable load mass W_{max} : Table 2 $\alpha_1 = W/W_a$	$W_a = 1 \cdot 1 \cdot 0.5 = 0.5$ $K = 1$ $\beta = 1$ $W_{max} = 0.5$ $\alpha_1 = 0.2/0.5 = 0.4$
3-2 Load factor of static moment Find the static moment M (N·m). Find the allowable static moment M_a (N·m). Find the load factor α_2 of the static moment.	$M = W \cdot 9.8(L_n + X_n) / 1000$ Correction value of moment center position distance X_n : Table 3 $M_a = K \cdot \gamma \cdot M_{max}$ Workpiece mounting coefficient K: Fig 3 Allow load mounting coefficient γ : Fig 4 Max. allowable moment M_{max} : Table 4 $\alpha_2 = M/M_a$	Yawing Examine M_y . $M_y = 0.2 \cdot 9.8(2+27)/1000 = 0.06$ $X_1 = 27$ $M_{ay} = 1 \cdot 1 \cdot 0.5 = 0.5$ $M_{ymax} = 0.5$ $K = 1$ $\gamma = 1$ $\alpha_2 = 0.06/0.5 = 0.114$ Rolling Examine M_r . $M_r = 0.2 \cdot 9.8(4+9.5)/1000 = 0.026$ $X_2 = 9.5$ $M_{ar} = 0.5$ (Same value as M_{ay}) $\alpha'_2 = 0.026/0.5 = 0.053$
3-3 Load factor of dynamic moment Find the dynamic moment M_e (N·m). Find the allowable dynamic moment M_{ea} (N·m). Find the load factor α_3 of the dynamic moment.	$M_e = 1/3 \cdot W_e \cdot 9.8 \frac{(L_n + X_n)}{1000}$ Correction equivalent to impact $W_e = \delta \cdot W \cdot V$ δ : Bumper coefficient With urethane bumper (Standard) = 4/100 With shock absorber = 1/100 Correction value of moment center position distance X_n : Table 3 $M_{ea} = K \cdot \gamma \cdot M_{max}$ Workpiece mounting coefficient K: Fig 3 Allowable mounting coefficient γ : Fig 4 Max. allowable moment M_{max} : Table 4 $\alpha_3 = M_e/M_{ea}$	Pitching Examine M_{ep} . $M_{ep} = 1/3 \cdot 1.12 \cdot 9.8 \cdot \frac{(4+9.5)}{1000} = 0.05$ $W_e = 4/100 \cdot 0.2 \cdot 140 = 1.12$ $X_2 = 9.5$ $M_{eap} = 1 \cdot 1 \cdot 0.5 = 0.5$ $K = 1$ $\gamma = 1$ $M_{pmax} = 0.5$ $\alpha_3 = 0.05/0.5 = 0.099$ Yawing Examine M_{ey} . $M_{ey} = 1/3 \cdot 1.12 \cdot 9.8 \cdot \frac{(3+21)}{1000} = 0.088$ $W_e = 1.12$ $X_3 = 21$ $M_{eay} = 0.5$ (Same value as M_{eap}) $\alpha'_3 = 0.088/0.5 = 0.176$
3-4 Sum of load factors Possible to use if the sum of the load factors does not exceed 1.	$\Sigma \alpha_n = \alpha_1 + \alpha_2 + \alpha_3 \leq 1$	$\Sigma \alpha_n = \alpha_1 + \alpha_2 + \alpha'_2 + \alpha_3 + \alpha'_3 \leq 1$ $\Sigma \alpha_n = 0.4 + 0.114 + 0.053 + 0.099 + 0.176 = 0.841 \leq 1$ Add it is possible to use.

Table 3: Correction value of moment center position distance: X_n (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: M_{max} (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

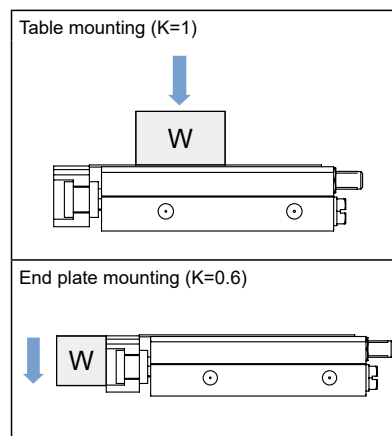
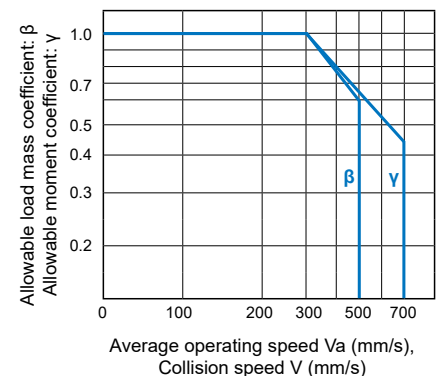


Fig.4: Allowable load mass coefficient: β
Allowable moment coefficient: γ



Y 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 the slide table retracted.

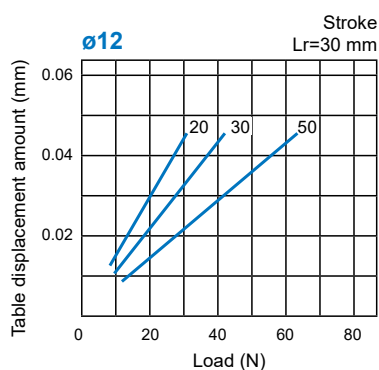
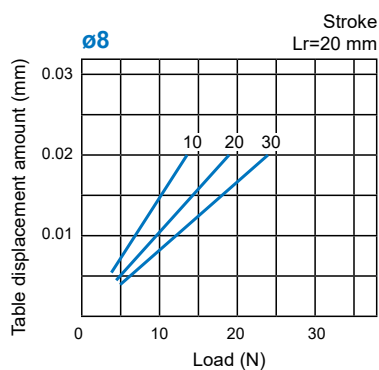
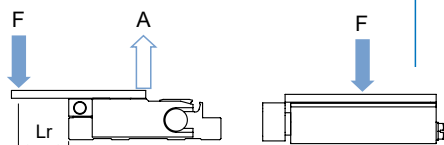


Table displacement due to yaw moment load

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

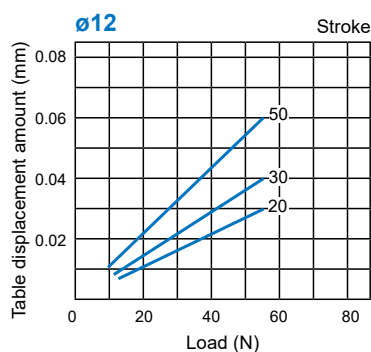
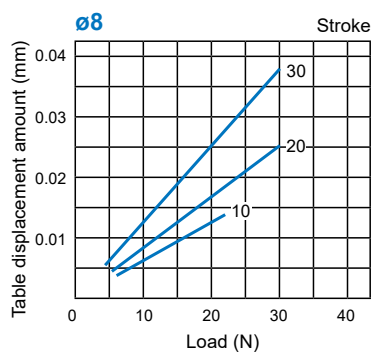
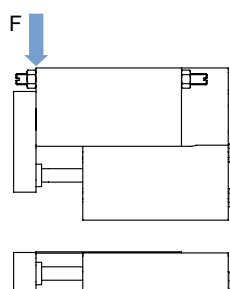


Table displacement due to pitch moment load

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

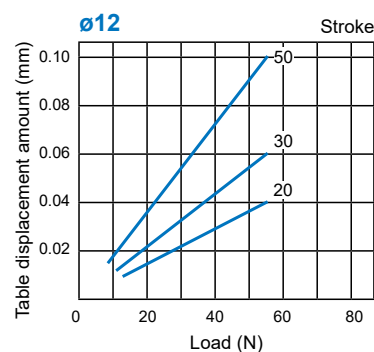
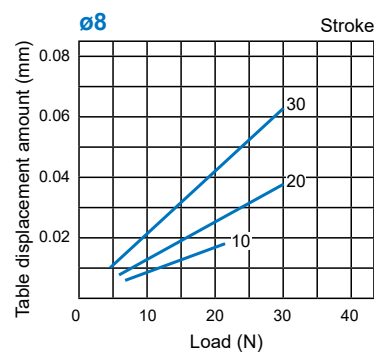


Table deflection (Reference values)

Table displacement due to roll moment load

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

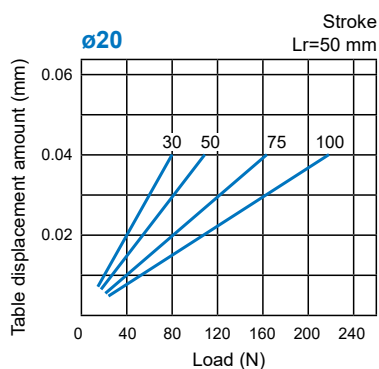
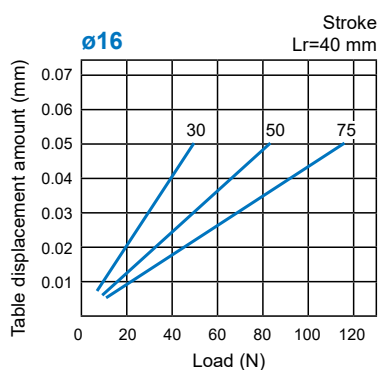
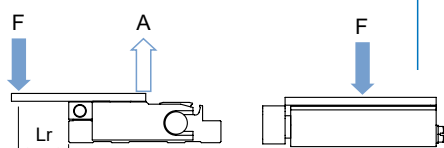


Table displacement due to yaw moment load

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

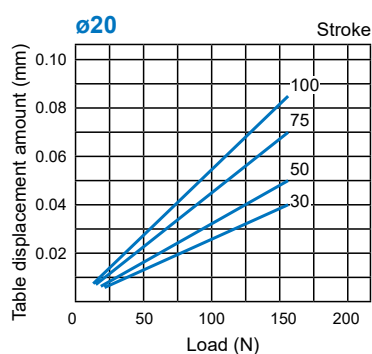
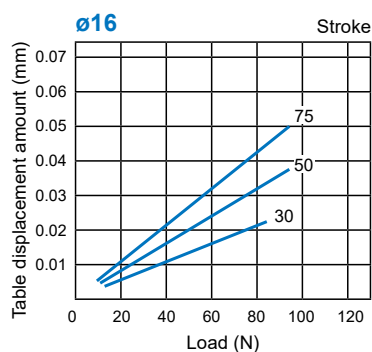
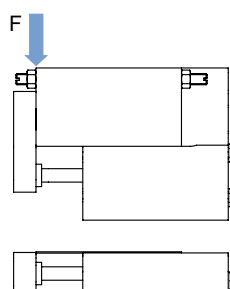
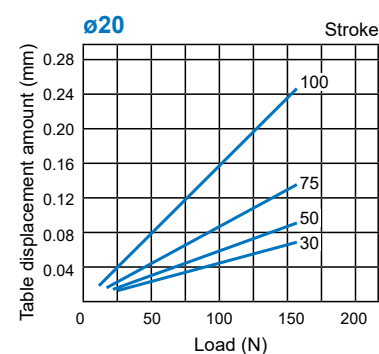
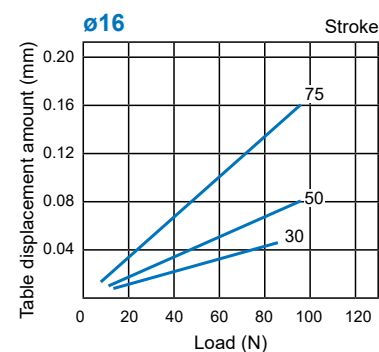


Table displacement due to pitch moment load

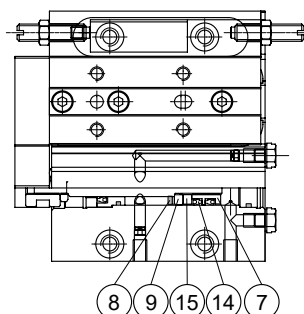
Table displacement when loads are applied to the section marked with the arrow at the full stroke.



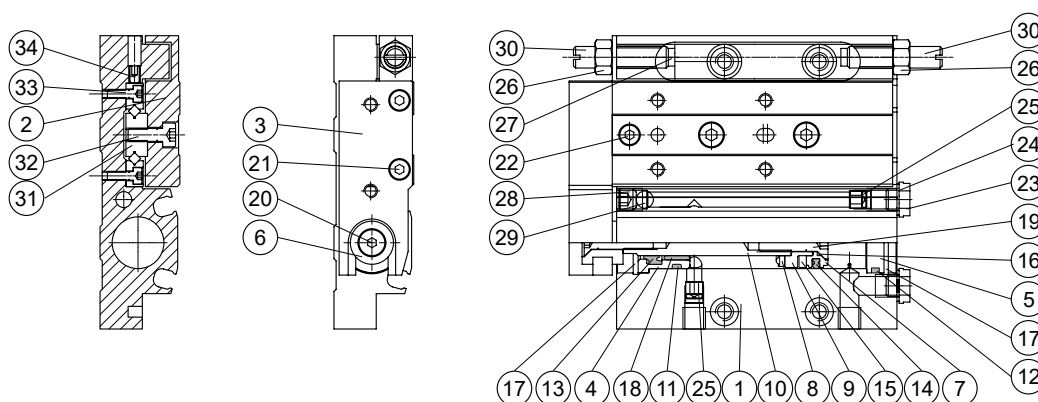
LOW PROFILE SLIDE CYLINDER

Mindman

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	

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

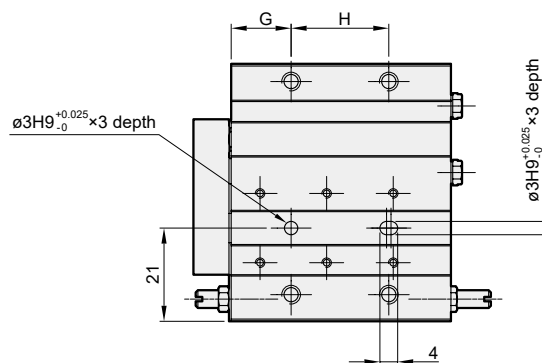
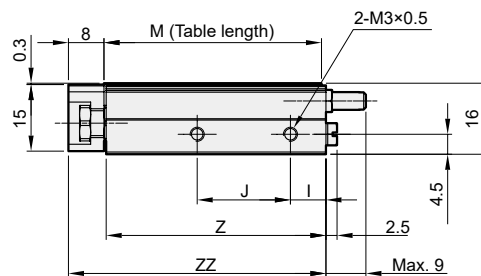
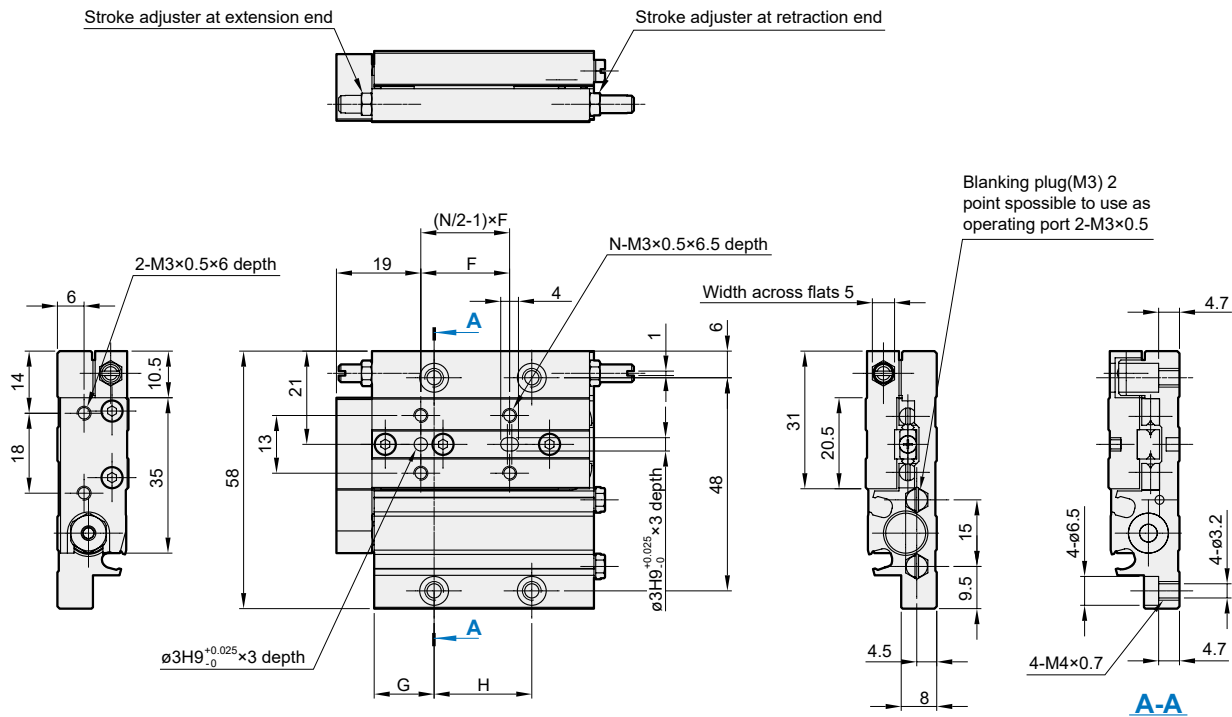
*2. Stainless steel

*3. Quantity varies depending on the stroke length.

Order example of repair kits

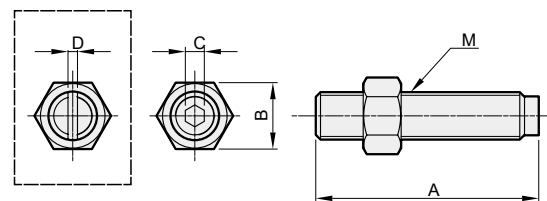
Tube I.D.	Repair kits
ø8	PS-MCSF-8
ø12	PS-MCSF-12
ø16	PS-MCSF-16
ø20	PS-MCSF-20

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

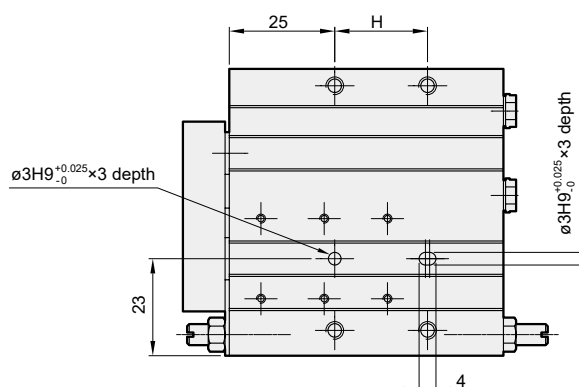
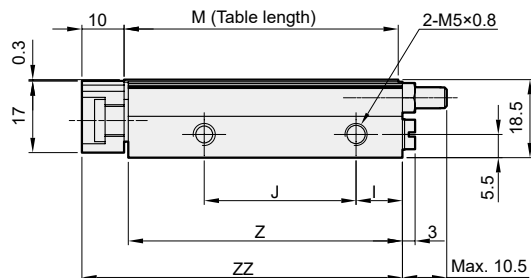
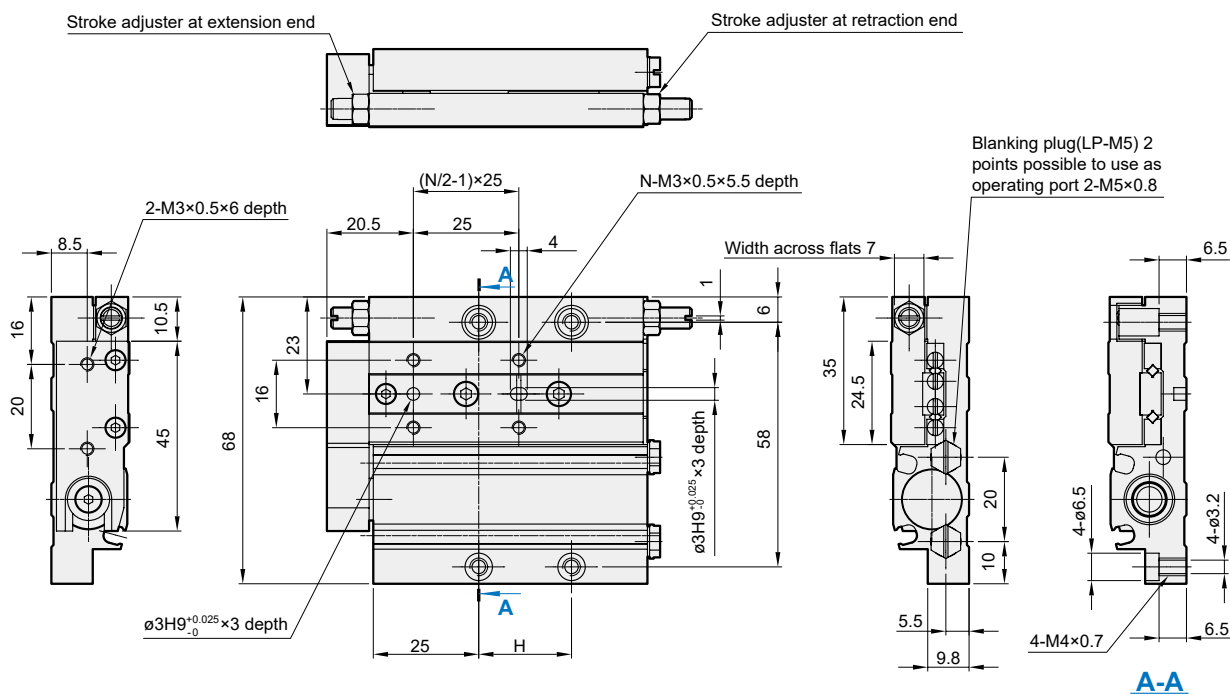


Code Stroke	F	G	H	I	J	M	N	Z	ZZ
10	20	13.5	22	8	21	49	4	49.5	58
20	26	14.5	26	6.5	28	54	4	54.5	63
30	26	14.5	40	8	41	69	6	69.5	78

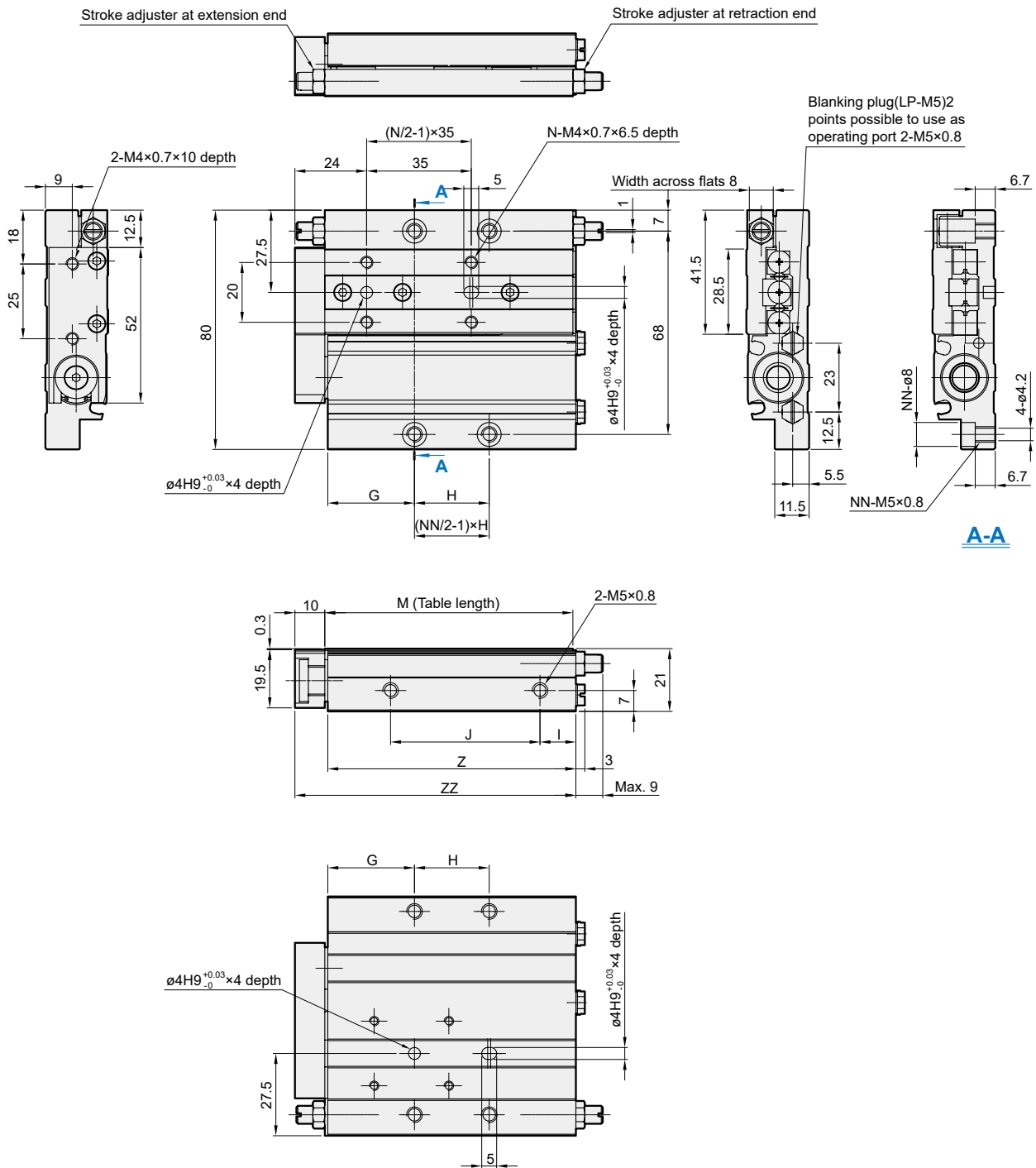
Stroke adjuster bolt ø8~ø20



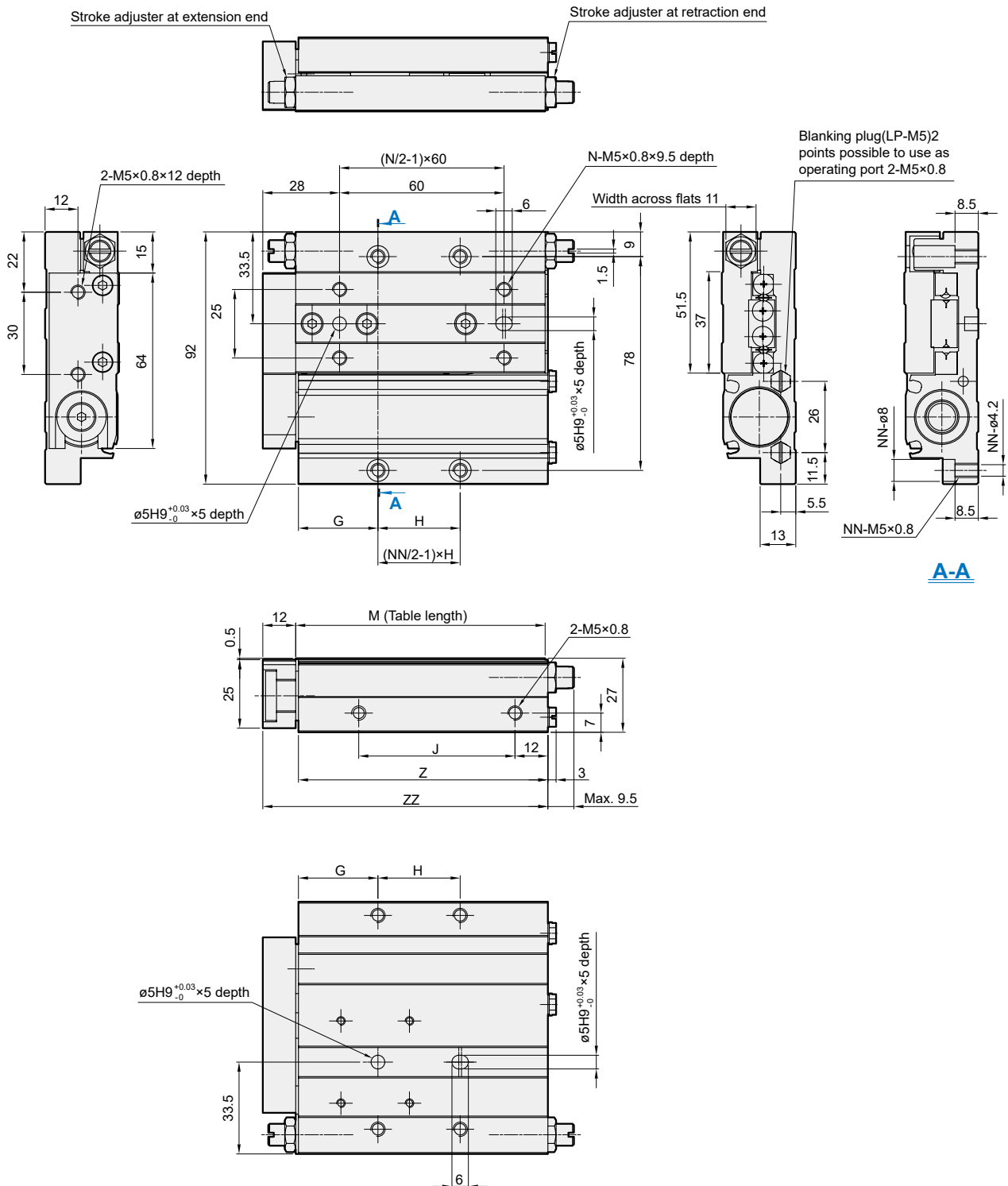
Tube I.D.	Order code	Adjustable stroke range (mm)	A	B	C	D	M
8	MCSF-8	5	17	5	—	1	M4×0.7
	MCSF-8-X11	15	27				
12	MCSF-12	5	23.5	7	—	1	M5×0.8
	MCSF-12-X11	15	33.5				
16	MCSF-16	5	26.5	8	3	—	M6×1
	MCSF-16-X11	15	36.5				
	MCSF-16-X12	25	46.5				
20	MCSF-20	5	30	11	4	—	M8×1
	MCSF-20-X11	15	40				
	MCSF-20-X12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



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