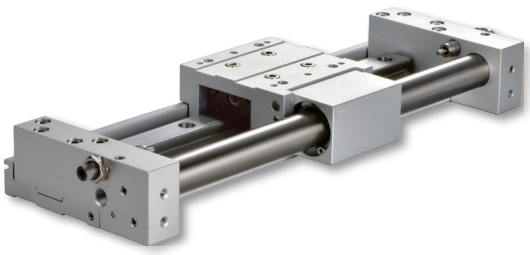
Feature

- Stainless steel cylinder tube design, light weight and strong rigidity.
- Magnetic design. The radial magnetic force transmits power to drives the loading by the built-in magnetic ring on the piston and the external magnet inside the body.
- With the integrated design of the single shaft attached to the guide rail, the friction resistance of the sliding guide rail can be reduced to achievethe high load capacity.
- One-sided inlet port design provides group piping arrangment easily.



Specification

Item \ Bore size(mm)		Ø10	Ø15	Ø20	Ø25
Action		Double acting			
Fluid		Air			
Pressure range	kgf/cm² (kPa)	1.5 ~ 4.5(150~450)	1.5 ~ 6.0 (150 ~ 600)		
Max. operating pressure	kgf/cm² (kPa)	5.0 (500)	6.5 (650)		
Ambient and fluid temperature	°C	0 ~ 60			
Piston speed	mm/s	50 ~ 500			
Lubrication		Lubrication free type			
Port size		M5			

Standard stroke

Unit: mm

Bore	Standard stroke	Max stroke
Ø10	50, 100, 150, 200, 250, 300	300
Ø15	50, 100, 150, 200, 250, 300, 350, 400, 450, 500	500
Ø20	50, 100, 150, 200, 250, 300, 350, 400, 450, 500	800
Ø25	50, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600	800

Theoretical output

Unit: kgf

Bore size (mm)	Operating	Piston area (cm²)	Air pressure (kgf / cm²)					
			1	2	3	4	5	6
Ø10	Push	1.5	—	1.6	2.4	3.2	4	4.7
Ø15	Push	1.76	—	3	5	7	8	10
Ø20	Push	3.14	—	6	9	12	15	18
Ø25	Push	4.90	—	9	14	19	24	29

Note: All of above are theoretical data. Before actual adoption, the frictional resistance and mechanical efficiency shall be taken into consideration (about 70% ~ 80%)

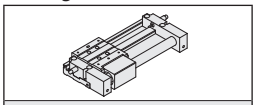
Code of order MRX – R 10 x 100 – A2 – 9D 2

1 2 3 4 5 6

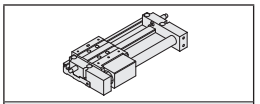
1

Mark	Port position
F	Air ports from left/ right side
R	Air port from right side
L	Air port from left side

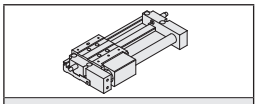
Image



F: Air ports from left/right side



R: Air port from right side



L: Air port from left side

2

Mark	Bore size (mm)
10	Ø10
15	Ø15
20	Ø20
25	Ø25

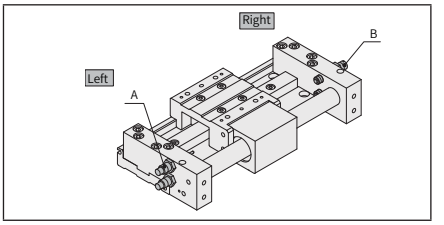
3

Bore size (mm)	Stroke (mm)
Ø10	50 ~ 300
Ø15	50 ~ 500
Ø20	
Ø25	50 ~ 600

4

Mark	Cushion option	Cushion
None	Without cushion	A: Shock absorber B: Adjusting bolt
A1	Left side with shock absorber	
B1	Left side with adjusting bolt	
A2	Both sides with shock absorber	
B2	Both sides with adjusting bolt	
A3	Right side with shock absorber	
B3	Right side with adjusting bolt	
A4	Left A + Right B	
B4	Left B + Right A	

Assembly example and direction



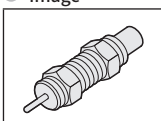
How to select Shock absorber

Bore size (mm)	Shock absorber model	Maximum absroption (kgf · m)
Ø10	SAT-0806	0.3
Ø15	SAT-0806	0.3
Ø20	SAT-1007	0.6
Ø25	SAT-1007	0.6

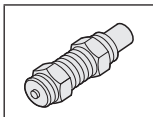
Adjusting bolt (Option)

Bore size (mm)	Specification	Stroke adjustment (mm)
Ø10	M8x1.0P	0 ~ 15
Ø15	M8x1.0P	0 ~ 15
Ø20	M10x1.0P	0 ~ 20
Ø25	M10x1.0P	0 ~ 20

Image



A: Shock absorber



B: Adjusting bolt

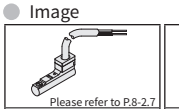
Shock absorber quantity

Bore size (mm)	Quantity	Assembly position
Ø10	2	1pc to left and right
Ø15	4	2 pcs to left and right
Ø20	4	2 pcs to left and right
Ø25	4	2 pcs to left and right

5

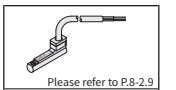
Mark	Sensor switch
None	Without sensor switch
8B	CS-8B
8G	CS-8G
9B	CS-9B
9D	CS-9D

Image



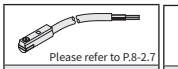
Please refer to P.8-2.7

CS-8B



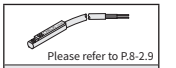
Please refer to P.8-2.9

CS-9B



Please refer to P.8-2.7

CS-8G



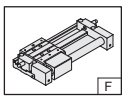
Please refer to P.8-2.9

CS-9D

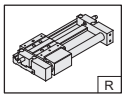
6

Mark	Sensor quantity
1	1 pc
2	2 pcs

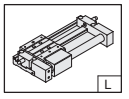
Hole position expression



Hole display in position ③ and ④



Hole display in position ⑤ and ⑥

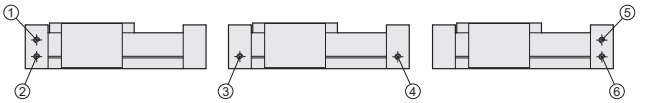


Hole display in position ① and ②

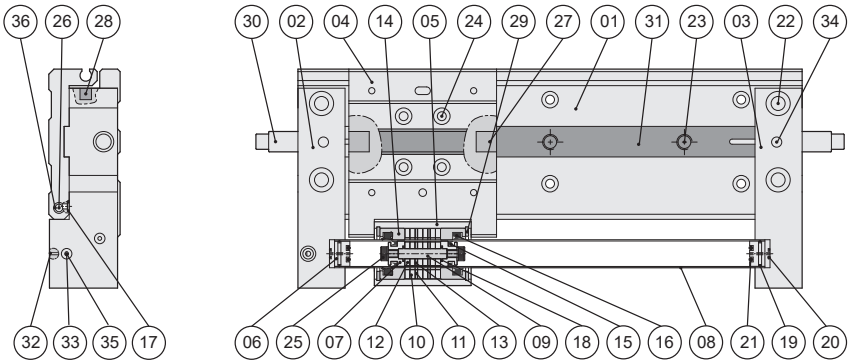
The limit of cylinder pressure

Unit: kgf/cm²

Bore size	Min operating pressure	Max. operating pressure
Ø10	1.5	5
Ø15	1.5	6.5
Ø20	1.5	6.5
Ø25	1.5	6.5



Internal structure



Components and material list

NO.	Item	Material	NO.	Item	Material	NO.	Item	Material
01	Slide base	Aluminum alloy	13	Piston magnect spacer	Pig iron	25	Piston rod screw	Stainless steel
02	Left end cap	Aluminum alloy	14	Shaft packing plate	POM	26	Set screw	Alloy steel
03	Right end cap	Aluminum alloy	15	Piston packing	NBR	27	Stopper	Bearing steel
04	Slider	Aluminum alloy	16	Shaft packing	NBR	28	Sensing magnet	Rare earth
05	body	Aluminum alloy	17	Supply port O-ring	NBR	29	C clip	Alloy steel
06	Air cushion lever	Aluminum alloy	18	Piston O-ring	NBR	30	Shock absorber	Carbon steel
07	Piston	POM	19	Air cushion lever O-ring	NBR	31	Slider set	Customized
08	Shaft	Stainless steel	20	Air cushion lever O-ring	NBR	32	Stainless ball	Stainless steel
09	Piston rod joiner	Stainless steel	21	Air cushion O-ring	NBR	33	Set screw	Alloy steel
10	Body magnet	Rare earth	22	End cap screw	Alloy steel	34	Dowel pin	Bearing steel
11	Magnect spacer	Pig iron	23	Rail screw	Alloy steel	35	Absorbing rubber	NBR
12	Piston magnet	Rare earth	24	Slider screw	Alloy steel	36	O-ring	NBR

Packing and O-ring material list

Unit: mm

Item / Bore size \ Quantity	Piston packing	Shaft packing	Cushion O-ring
	2	2	2
Ø10	PPY – 10	PDU — 11×16.7	Ø2.8 × Ø1.9
Ø15	DYP – 15	PDU — 17×22.4	Ø10 × Ø1.5
Ø20	DYP – 20	PDU — 21×28.3	—
Ø25	PPY – 25	PDU — 26×34.4	—

Note: The piston packing and shaft packing are from MITSUBISHI, SAKAGAMI or the same good level of quality material.

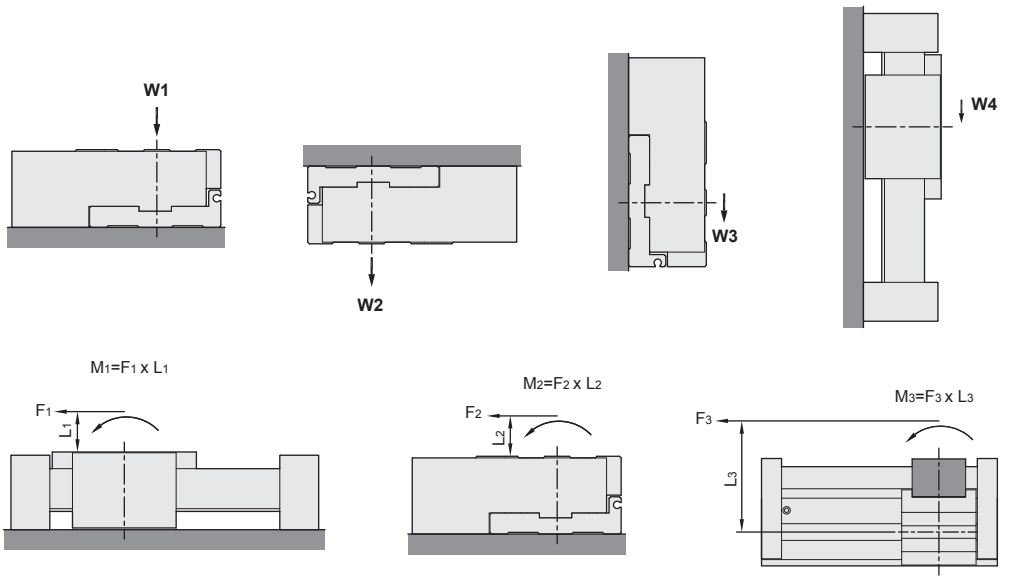
Product weight

Unit: kgf

Bore size (mm)	Stroke = 0mm	Additional weight
Ø10	0.52	0.32
Ø15	0.72	0.4
Ø20	1.05	0.6
Ø25	1.2	0.7

Note: Additional weight per each 100 mm in ± 5% difference

Load and moment allowable



Bore size (mm)	Max. moment allowable (N • m)			Max. load allowable (kg)			
	M1	M2	M3	W1	W2	W3	W4
10	1	2	1	2	2	2	1.4
15	1.5	3	1.5	5	2	5	2
20	8	12	8	8	8	8	8
25	14	20	14	12	12	12	12

Max. load and moment allowable

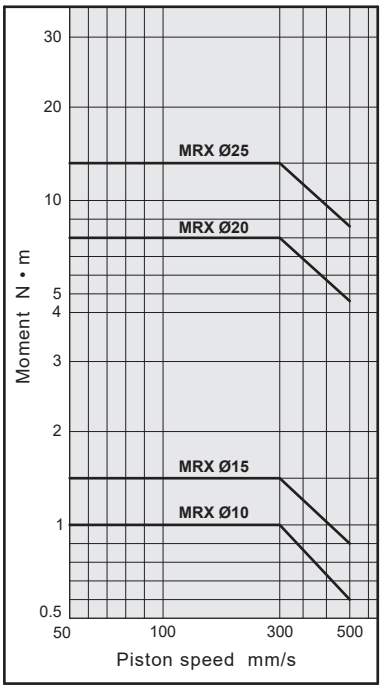
Select the moment from within the range of operating limits shown in the graphs. Note that the maximum allowable load value may sometimes be exceeded even within the operating limits. Therefore, also check the allowable load and moment.

Vertical operation for max. load allowable

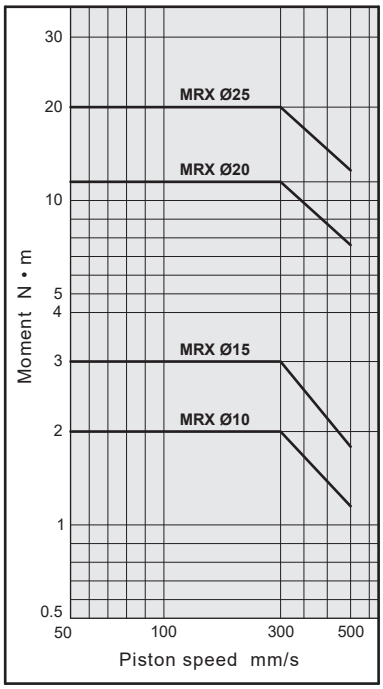
In vertical operation, observe the maximum load mass (W4) to prevent a drop due to slipping off of magnet couplings.

Load and moment allowable

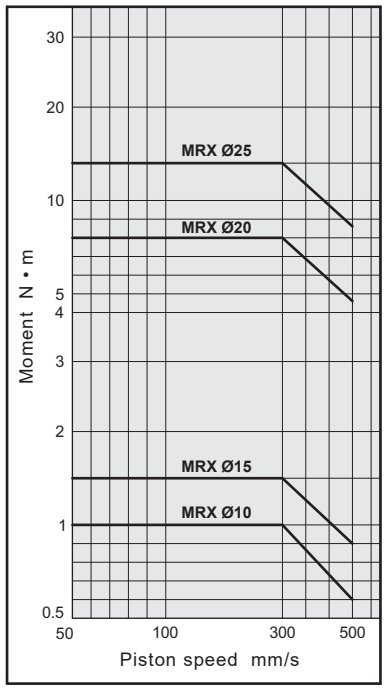
1 MRX / M 1



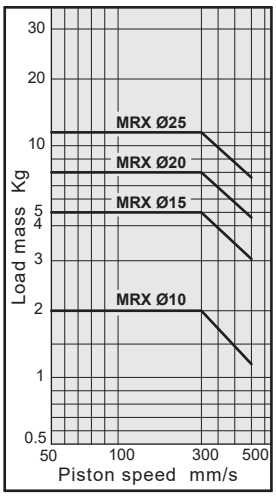
2 MRX / M 2



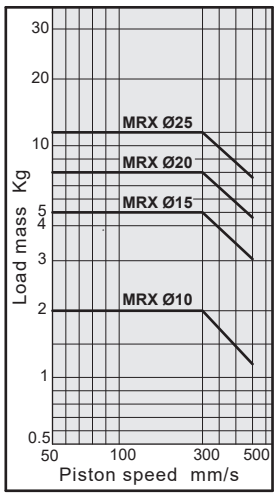
3 MRX / M 3



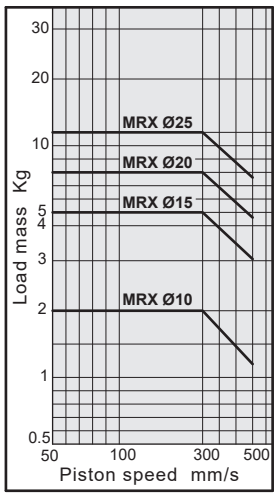
4 MRX / W 1



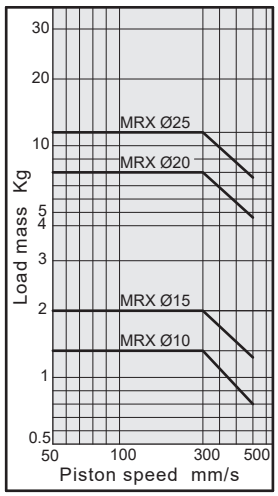
5 MRX / W 2



6 MRX / W 3



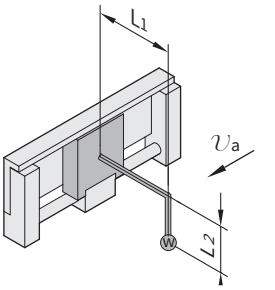
7 MRX / W 4



Selection calculation

The selection calculation finds the load factor (α_n) of the items blow, where the total ($\sum\alpha_n$) does not exceed 1. $\sum\alpha_n = \alpha_1 + \alpha_2 + \alpha_3 \leq 1$

Item	Load factor α_n	Note
1 Maximum load mass	α_1 = W / W max	Review W W max is the maximum load mass at V_a
2 Static moment	α_2 = M / M max	Review M1、M2、M3 M max is the allowable moment at V_a
3 Dynamic moment	α_3 = M_E / M_E max	Review M_{1E}、M_{2E}、M_{3E} M_E max is the allowable moment at V_a

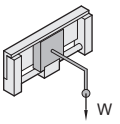
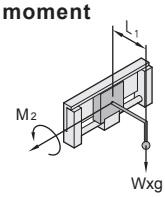
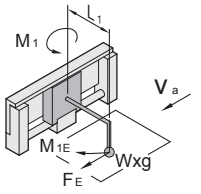
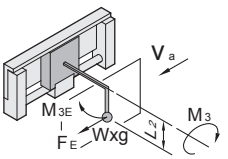


Calculation example ①

Operating conditions

Cylinder : MRX Ø15
Terminal butter mechanism : Standard (Shock absorber)
Mounting : Side mounting

Speed (Average) : V_a = 300 (mm/s)
Load mass : W = 0.5 (kg)
Excluding mass of arm section
L_1 = 50 (mm) L_2 = 40 (mm)

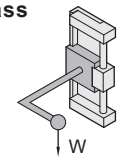
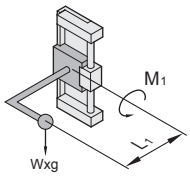
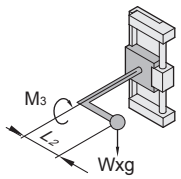
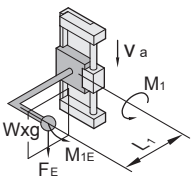
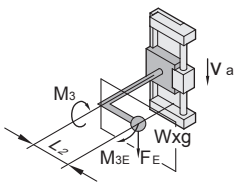
Item	Load factor	Note
1 **Load mass** 	α_1 = W / W max = 0.5 / 5 = 0.1	Investigate W Find the value of W max at 300 mm/s in graph 6 for W_3
2 **Static moment** 	M_2 = W × g × L_1 = 0.5 × 9.8 × 0.05 = 0.245 (N • m) α_2 = M_2 / M_2 max = 0.245 / 3 = 0.082	Investigate M_2 Find the value of M_2 max at 300 mm/s in graph 2
3 **Dynamic moment** 	M_{1E} = 1 / 3 × F_E × L_1 = 0.05 × V_a × W × L_1 = 0.05 × 300 × 0.5 × 0.05 = 0.375 (N•m) α_{3A} = M_{1E} / M_{1E} max = 0.375 / 1.07 = 0.35	V_a = 1.4 × V_a = 1.4 × 300 = 420 (mm/s) Find the value of M_{1E} max at 420 mm/s in graph 1
 F_E = 1.4 / 100 × V_a × g × W	M_{3E} = 1 / 3 × F_E × L_2 = 0.05 × V_a × W × L_2 = 0.05 × 300 × 0.5 × 0.04 = 0.3 (N•m) α_{3B} = M_{3E} / M_{3E} max = 0.3 / 1.07 = 0.28	From above, find the value of M_{3E} max at 420 mm/s in graph 3
$\sum\alpha_n = \alpha_1 + \alpha_2 + \alpha_{3A} + \alpha_{3B}$ = 0.1 + 0.082 + 0.35 + 0.28 = 0.812 $\sum\alpha_n$ = 0.812 ≤ 1 From above, selection cylinder match the request of MRX Ø15 operating		

Calculation example ②

Operating conditions

Cylinder : MRX Ø25
Terminal butter mechanism : Standard (Shock absorber)
Mounting : Vertical mounting

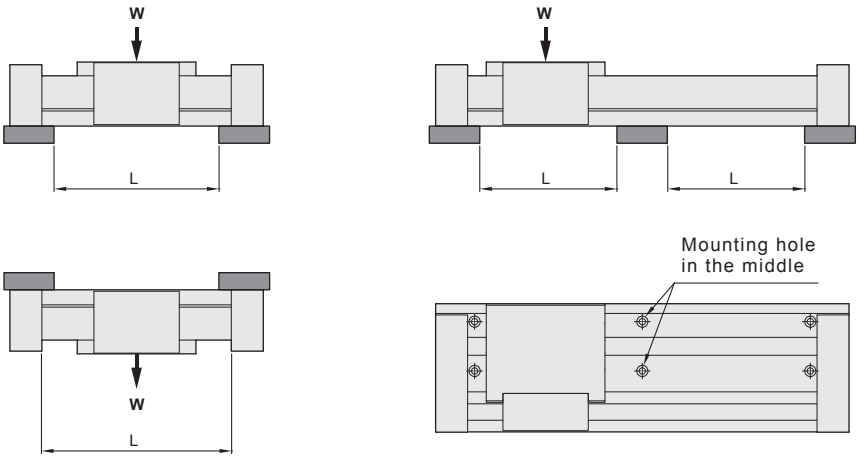
Speed (Average) : V_a = 300 (mm/s)
Load mass : W = 3 (kg)
Excluding mass of arm section
L_1 = 50 (mm) L_2 = 40 (mm)

Item	Load factor	Note
1 **Load mass** 	$\alpha_1 = W / W_{max}$ $= 3 / 12$ $= 0.25$	Investigate W Find the value of W max at 300 mm/s in graph 7 for W_4
2 **Static moment** 	$M_1 = W \times g \times L_1$ $= 3 \times 9.8 \times 0.05$ $= 1.47$ (N • m) $\alpha_{2a} = M_1 / M_{1\,max}$ $= 1.47 / 14$ $= 0.105$	Investigate M_1 Find the value of M_1 max at 300 mm/s in graph 1
	$M_3 = W \times g \times L_2$ $= 3 \times 9.8 \times 0.04$ $= 1.176$ (N • m) $\alpha_{2b} = M_3 / M_{3\,max}$ $= 1.176 / 14$ $= 0.084$	Investigate M_3 Find the value of M_3max at 300 mm/s in graph 3
3 **Dynamic moment** 	$M_{1E} = 1/3 \times F_E \times L_1$ $= 0.05 \times V_a \times W \times L_1$ $= 0.05 \times 300 \times 3 \times 0.05$ $= 2.25$ (N•m) $\alpha_{3A} = M_{1E} / M_{1E\,max}$ $= 2.25 / 10$ $= 0.225$	$V = 1.4 \times V_a$ $= 1.4 \times 300$ $= 420$ (mm/s) Find the value of M_{1E} max at 420 mm/s in graph 1
	$M_{3E} = 1/3 \times F_E \times L_2$ $= 0.05 \times V_a \times W \times L_2$ $= 0.05 \times 300 \times 3 \times 0.04$ $= 1.8$ (N•m) $\alpha_{3B} = M_{3E} / M_{3E\,max}$ $= 1.8 / 10$ $= 0.18$	From above, find the value of M_{3E} max at 420 mm/s in graph 3
$F_E = 1.4 / 100 \times V_a \times g \times W$		

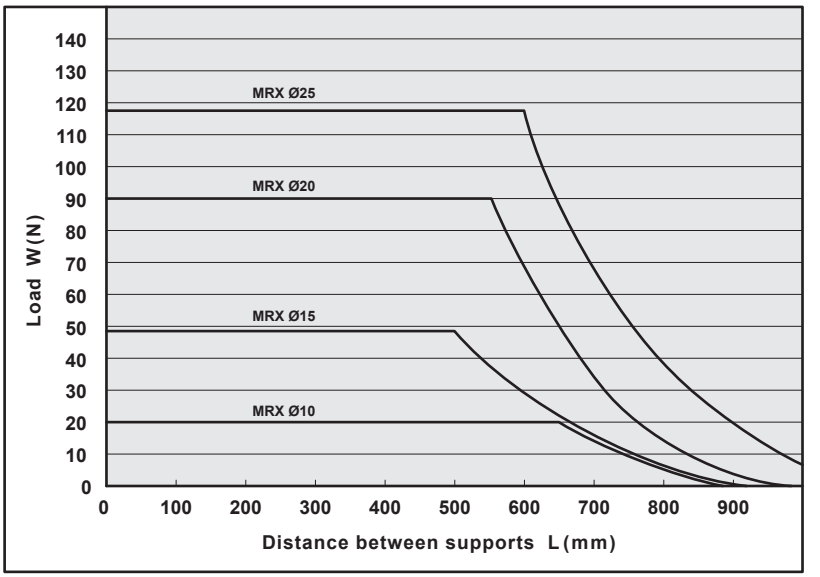
$\sum\alpha_n = \alpha_1 + \alpha_2 + \alpha_{3A} + \alpha_{3B} = 0.25 + 0.105 + 0.084 + 0.225 + 0.18 = 0.844$ $\sum\alpha_n = 0.844 \leq 1$
From above, selection cylinder match the request of MRX Ø25 operating

Caution for installation

1. Long stroke operation causes deflection of the path table or cylinder tube. In such a case, provide an intermediate support.
2. As the figure, provide an intermediate support with the mounting holes on the center of the path table if the load of mass (W) exceed distance between supports (L).
3. If the counter surface lacks precision, malfunction may result so adjust the level at the same time.
4. Providing an intermediate support with the mounting holes on the center of the path table if cylinder device in the section which is shock and strike easily.
5. In case the product is installed on the ceiling, please apply L position space as the bolt distance.



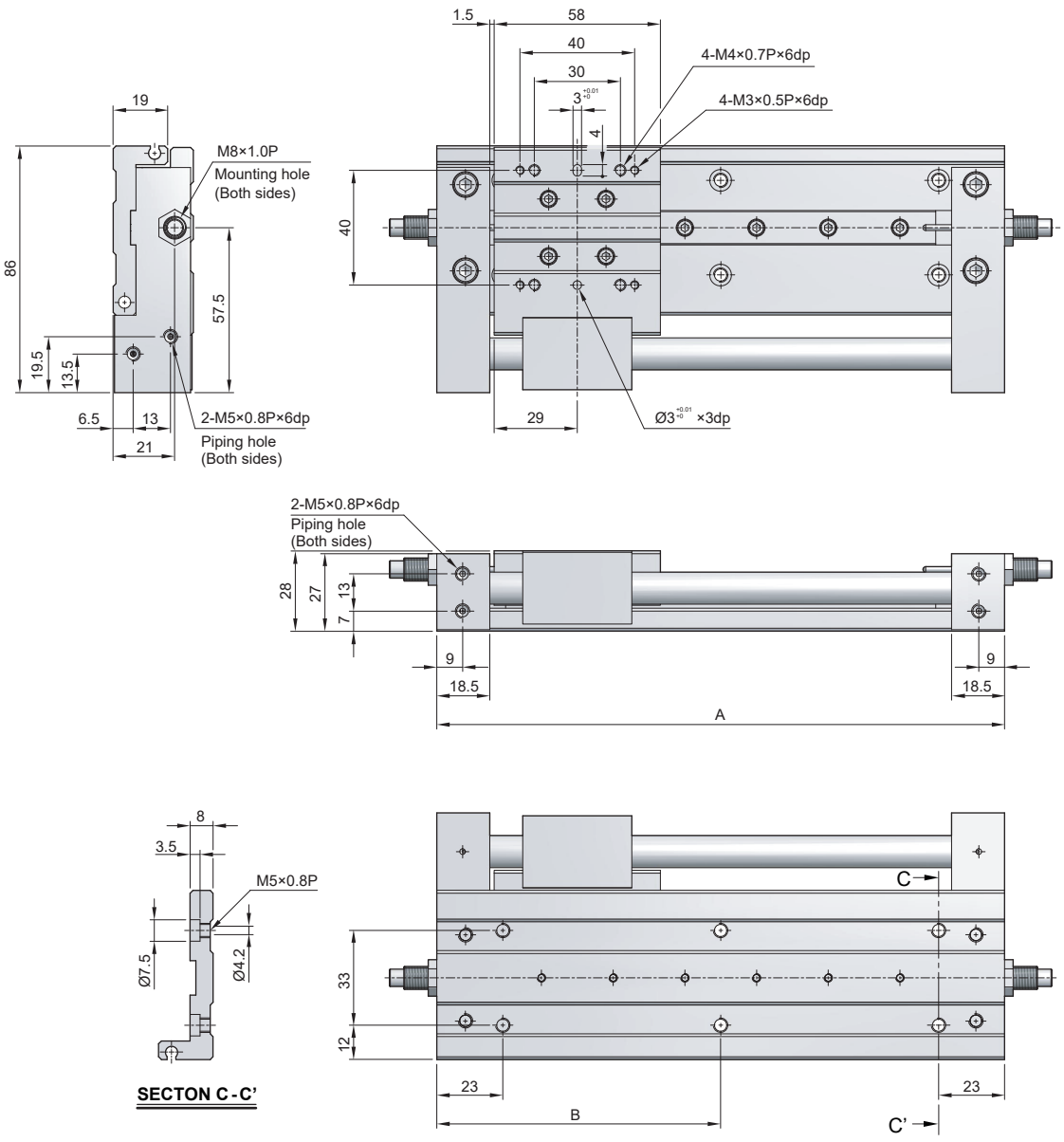
Distance between load and Supports



In vertical operation, besure the maximum load mass (W4) to prevent a drop due to slipping off of magnet couplings.

MRX Ø10 – □

MRX □ × □ ST

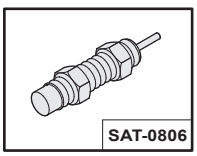


Dimension

Unit: mm

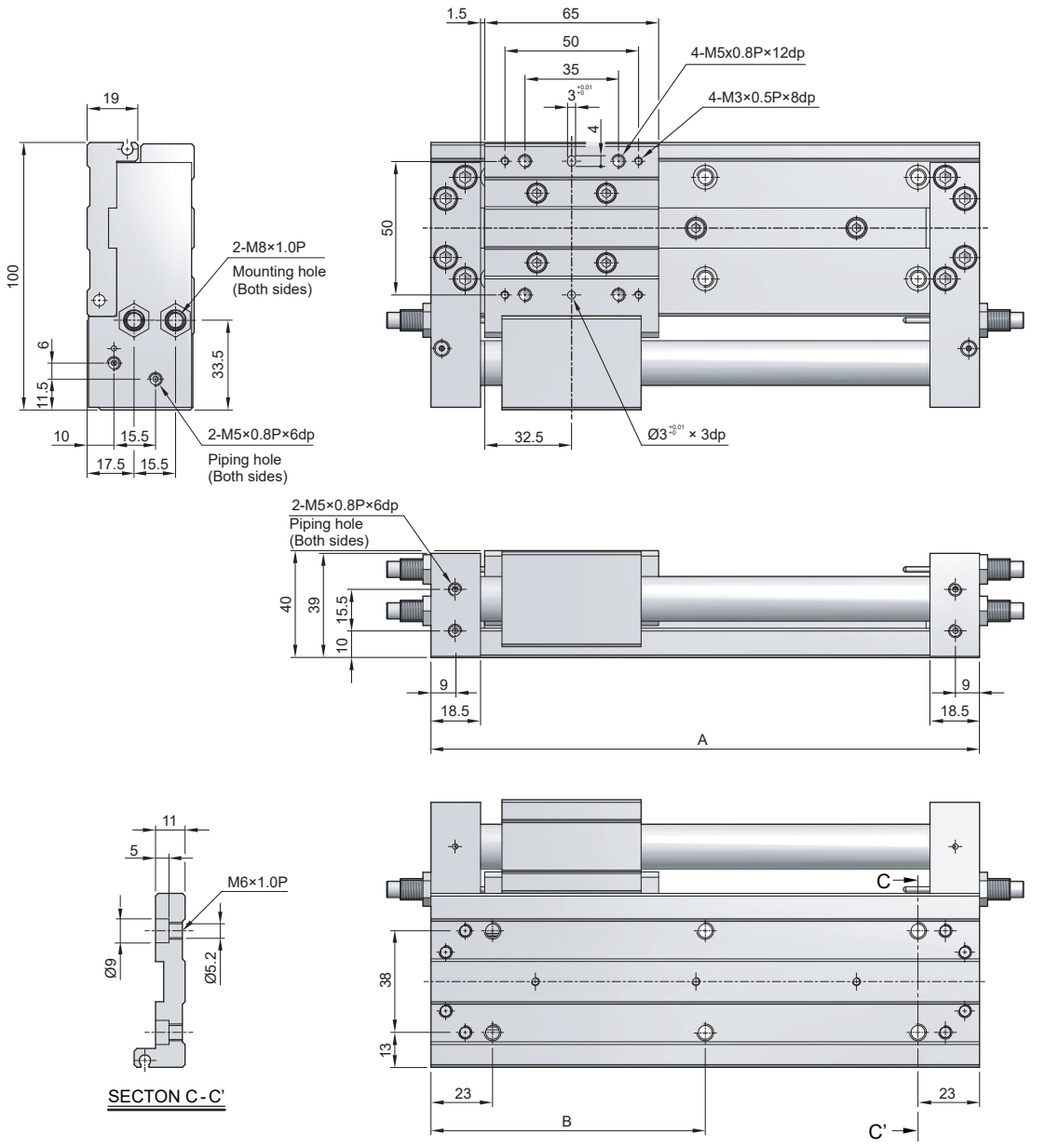
Mark \ Stroke	50	100	150	200	250	300
A	148	198	248	298	348	398
B	74	99	124	149	174	199

Shock absorber (Option)



MRX Ø15 – □

MRX □ × □ ST

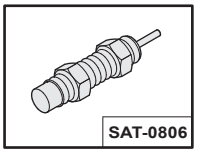


Dimension

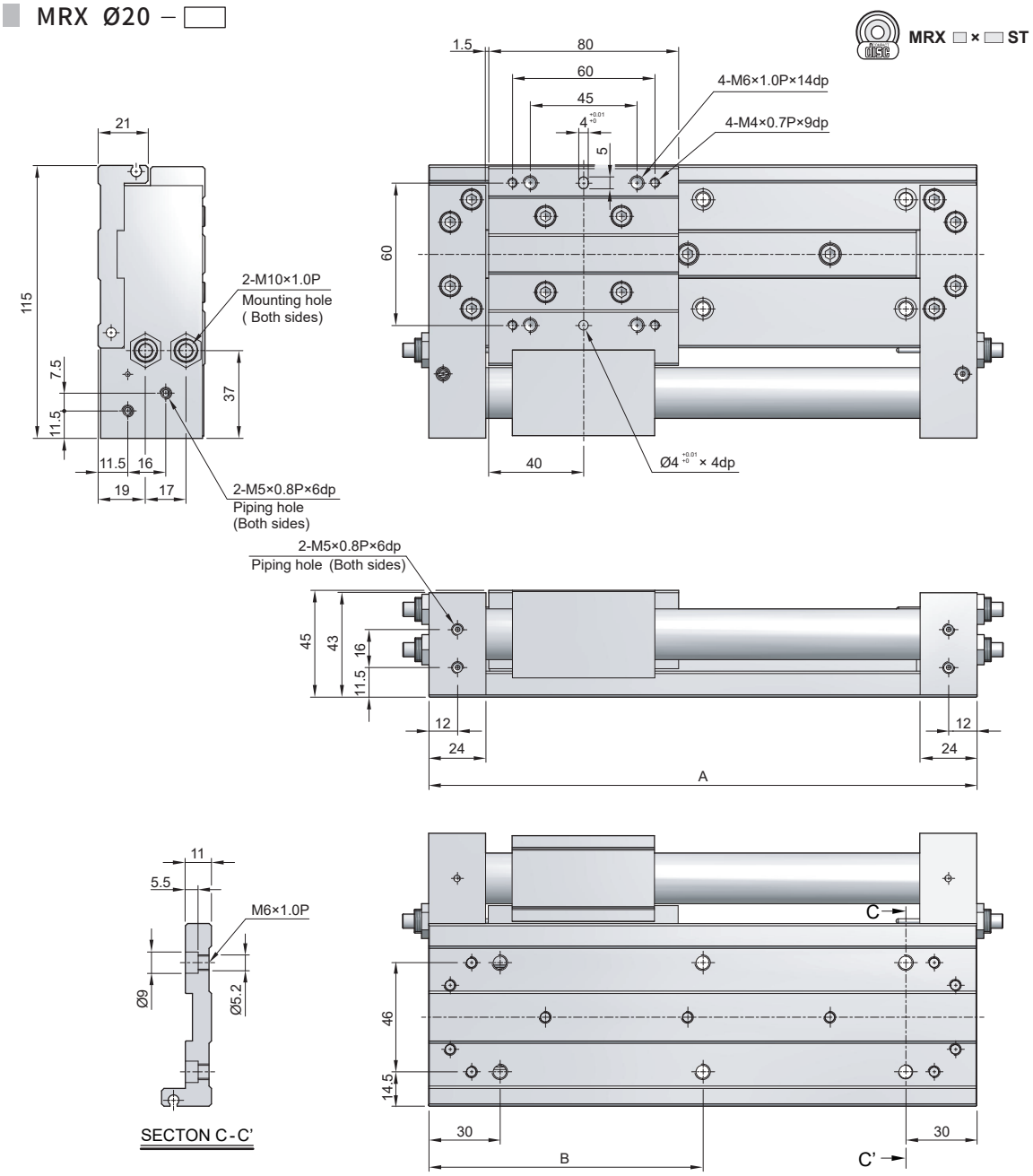
Unit: mm

Mark \ Stroke	50	100	150	200	250	300	350	400	450	500
A	155	205	255	305	355	405	455	505	555	605
B	—	102.5	127.5	152.5	177.5	202.5	227.5	252.5	277.5	302.5

Shock absorber (Option)



MRX Ø20 – □

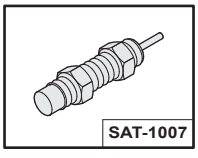


Dimension

Unit: mm

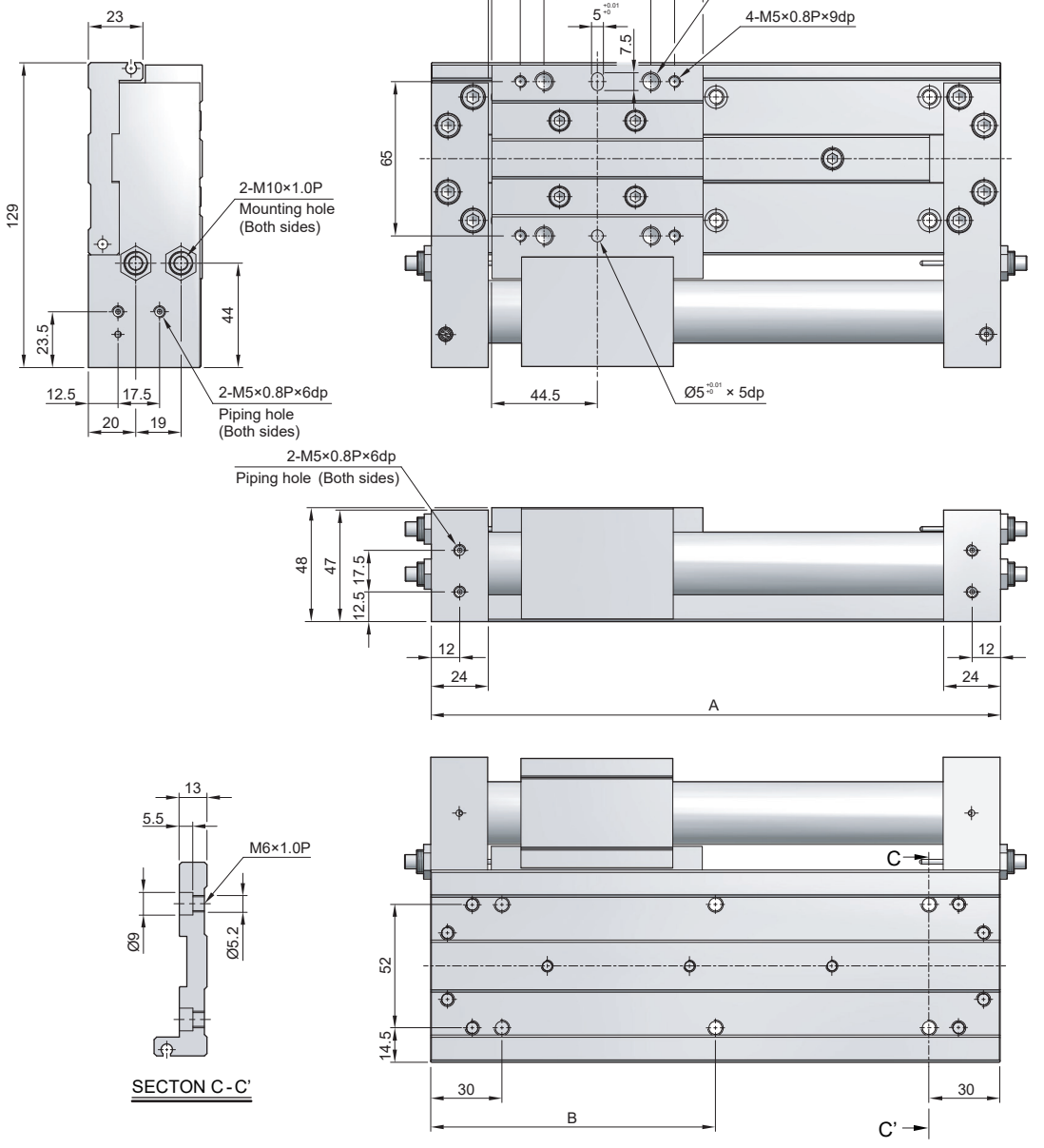
Mark \ Stroke	50	100	150	200	250	300	350	400	450	500
A	181	231	281	331	381	431	481	531	581	631
B	—	115.5	140.5	165.5	190.5	215.5	240.5	265.5	290.5	315.5

Shock absorber (Option)



MRX Ø25 – □

MRX □ × □ ST

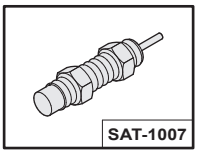


Dimension

Unit: mm

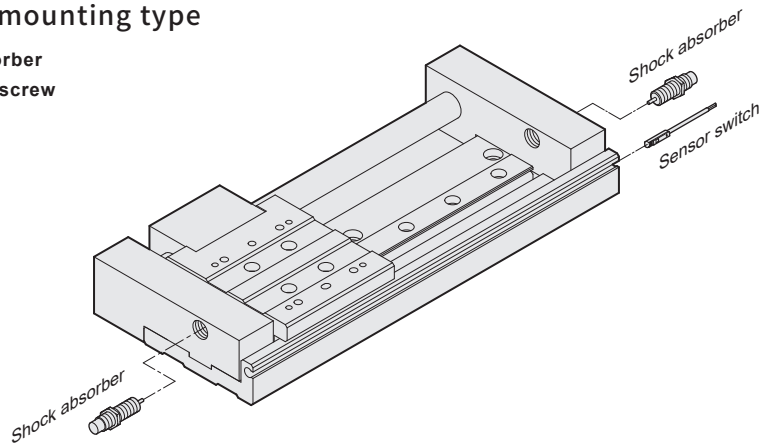
Mark \ Stroke	50	100	150	200	250	300	350	400	450	500	550	600
A	190	240	290	340	390	440	490	540	590	640	690	740
B	–	120	145	170	195	220	245	270	295	320	345	370

Shock absorber (Option)



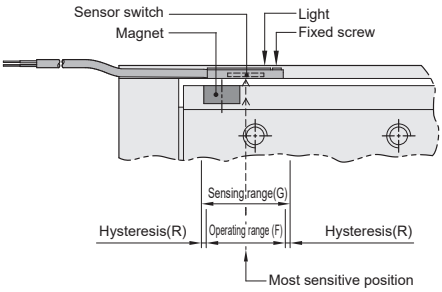
Sensor switch mounting type

- A With shock absorber
- B With adjustable screw



Sensor switch setting and operating range

● CS-9D(B)



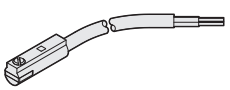
Sensing range

Sensor switch is fixed on the cylinder body. The magnetic piston head will activate the sensor switch when it enters the operating range. It has 0.5mm differential.

Operating range

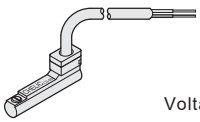
When piston head moves the switch setting and adjustment will be based on the responding range generated by the magnetic field and the switch.(Please refer to the below table)

Sensor switch introduction



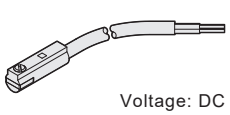
Voltage: DC 5~120V
AC 5~120V

CS-9D



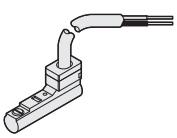
Voltage: DC 5~120V
AC 5~120V

CS-9B



Voltage: DC 5~30V

CS-8G



Voltage: DC 5~30V

CS-8B