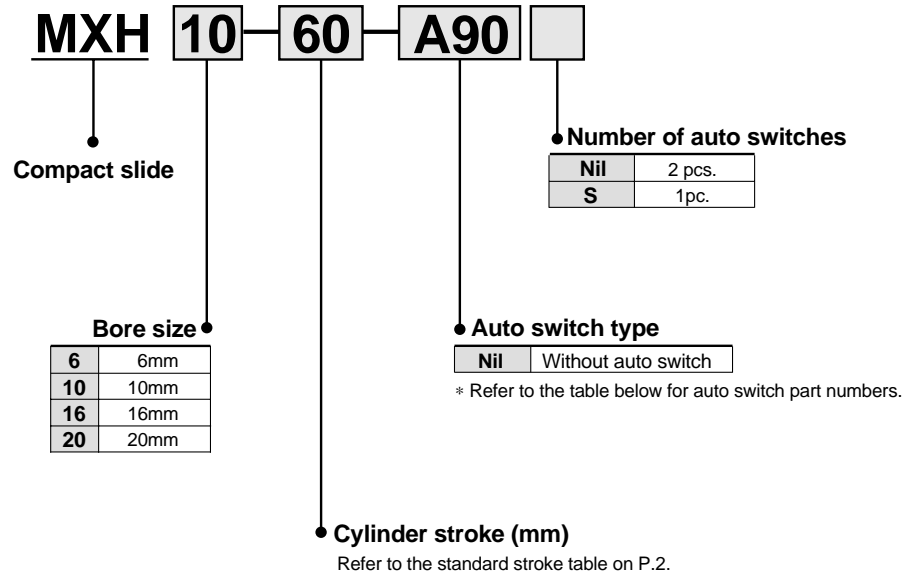


# Series MXH

ø6, ø10, ø16, ø20

## How to Order



### Applicable auto switch types

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage			Auto switch model		Lead wire length (m) *			Applicable load		Detailed specifications
					DC	AC		Electrical entry direction		0.5 (Nil)	3 (L)	5 (Z)			
						5V	100V or less	Vertical	Lateral						
Reed switch	-	Grommet	No	2 wire	24V	5V	100V or less	A90V	A90	●	●	-	IC circuit	Relay PLC	P.14
			Yes			12V	100V	A93V	A93	●	●	-			
			Yes	3 wire (NPN equiv.)	-	5V	-	A96V	A96	●	●	-	IC circuit	-	
Solid state switch	-	Grommet	Yes	3 wire (NPN)	24V	12V	-	F9NV	F9N	●	●	-	-	Relay PLC	P.15
				3 wire (PNP)				F9PV	F9P	●	●	-			
				2 wire				F9BV	F9B	●	●	-			
	3 wire (NPN)			F9NWV				F9NW	●	●	○	-			P.16
	3 wire (PNP)			F9PWV				F9PW	●	●	○				
	2 wire			F9BWV				F9BW	●	●	○				

\* Lead wire length symbol 0.5m ..... Nil (Example) A93  
3m ..... L (Example) A93L  
5m ..... Z (Example) F9NWZ

\* Solid state switches marked with a "O" are produced upon receipt of order.

\* Refer to pages 12 through 17 for sections related to auto switches.

# Compact Slide *Series MXH*

## Specifications



1MPa: Approx. 10.2kgf/cm<sup>2</sup>

Bore size (mm)	<b>6</b>	<b>10</b>	<b>16</b>	<b>20</b>
Guide rail width (mm)	5	7	9	12
Fluid	Air			
Action	Double acting type			
Piping port size	M5 x 0.8			
Minimum operating pressure	0.12MPa {1.2kgf/cm <sup>2</sup> }	0.06MPa {0.61kgf/cm <sup>2</sup> }		0.05MPa {0.51kgf/cm <sup>2</sup> }
Maximum operating pressure	0.7MPa{7.1kgf/cm <sup>2</sup> }			
Proof pressure	1.05MPa{10.7kgf/cm <sup>2</sup> }			
Ambient and fluid temperature	Without auto switch: -10 to 70°C (without freezing) With auto switch: -10 to 60°C (without freezing)			
Piston speed	50 to 500mm/s			
Allowable kinetic energy J (kgf·cm)	0.0125(0.127)	0.025(0.25)	0.05(0.5)	0.1(1.0)
Lubrication	Non-lube			
Cushion	Rubber bumpers at both ends			
Stroke length tolerance	+1.0 0			
Auto switches (optional)	Reed switch D-A9□ Solid state switch D-F9□			

## Standard Stroke Table

Bore size (mm)	Standard strokes (mm)
<b>6, 10, 16, 20</b>	5, 10, 15, 20, 25, 30, 40, 50, 60

## Theoretical Output Table

(N)

Bore size (mm)	Rod diameter (mm)	Operating direction	Piston area (mm <sup>2</sup> )	Operating pressure MPa		
				0.3	0.5	0.7
<b>6</b>	3	OUT	28.3	8.49	14.2	19.8
		IN	21.2	6.36	10.6	14.8
<b>10</b>	4	OUT	78.5	23.6	39.3	55.0
		IN	66.0	19.8	33.0	46.2
<b>16</b>	6	OUT	201	60.3	101	141
		IN	172	51.6	86.0	121
<b>20</b>	8	OUT	314	94.2	157	220
		IN	264	79.2	132	185

## Minimum Stroke for Mounting of Auto Switches

(mm)

Number of auto switches mounted	Applicable auto switch models		
	D-A9□ D-A9□V	D-F9□ D-F9□V	D-F9□W D-F9□WV
1pc.	5	5	5
2pcs.	10	5	10

## Weight Table

(g)

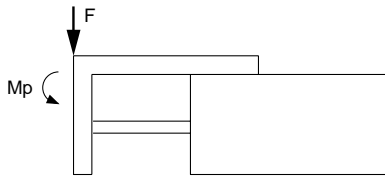
Model	Stroke (mm)								
	5	10	15	20	25	30	40	50	60
<b>MXH6</b>	62	67	76	81	91	96	111	125	140
<b>MXH10</b>	117	125	140	148	162	170	192	215	238
<b>MXH16</b>	216	227	247	258	279	290	323	353	386
<b>MXH20</b>	437	455	486	505	542	560	597	656	700

# Series MXH

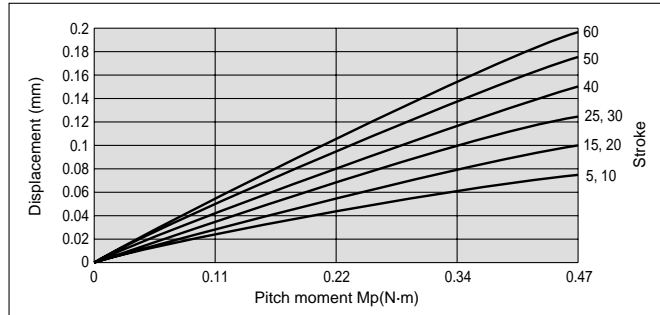
## Table Displacement

### Table displacement due to pitch moment

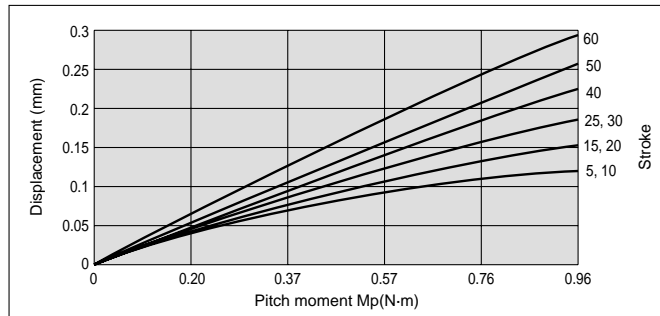
Table displacement (arrow) when a load acts upon the section marked with the arrow at the full stroke of the compact slide



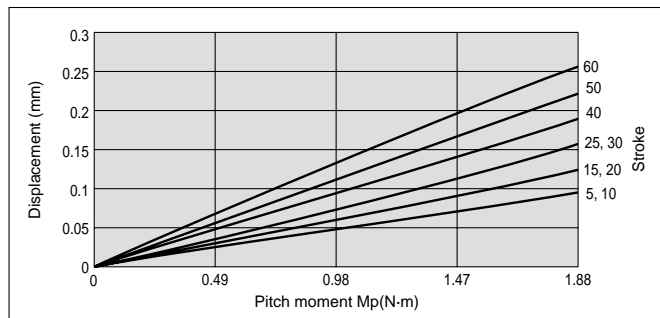
#### MXH6



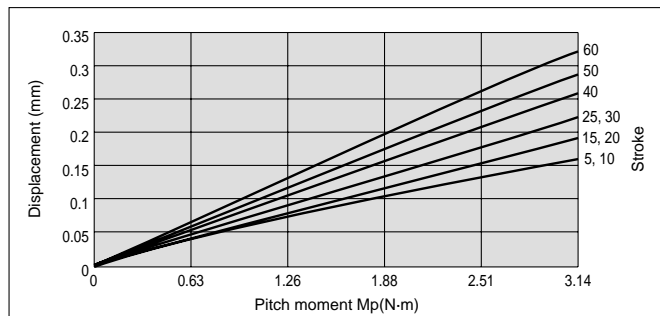
#### MXH10



#### MXH16



#### MXH20

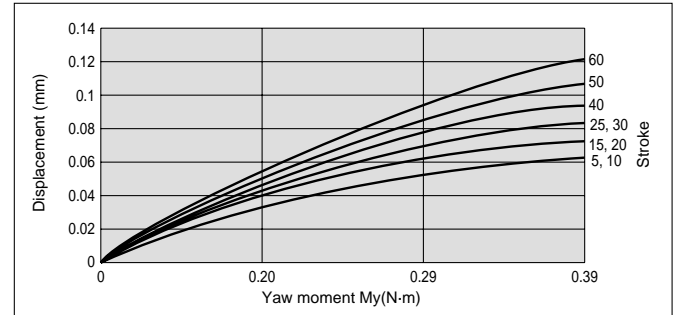


### Table displacement due to yaw moment

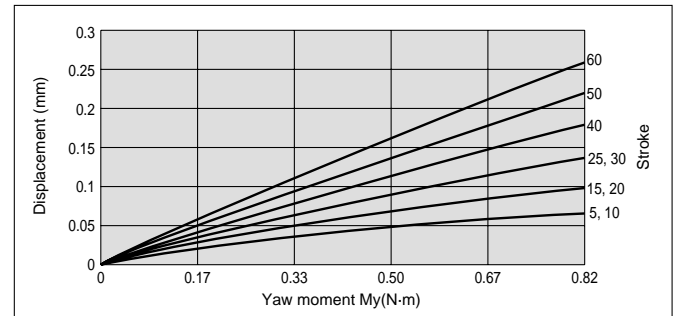
Table displacement (arrow) when a load acts upon the section marked with the arrow at the full stroke of the compact slide



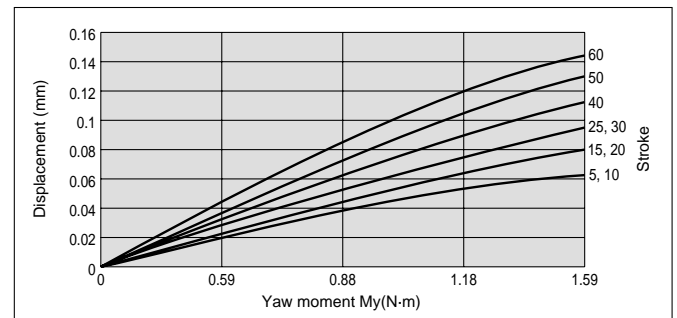
#### MXH6



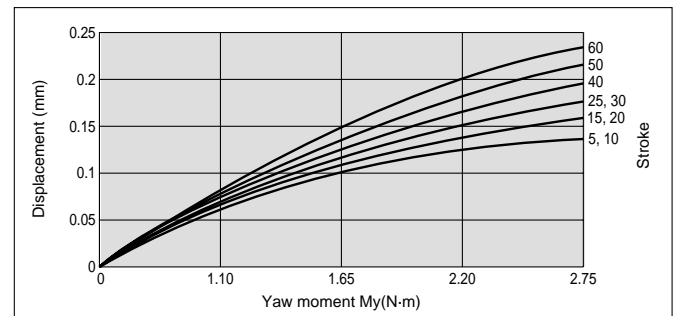
#### MXH10



#### MXH16



#### MXH20



### Design Precautions

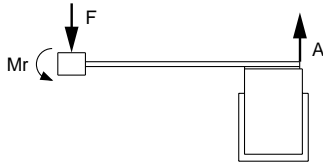


- ① Bore size selections cannot be made with the above graphs alone. Perform bore size selections with the model selection method provided on pages 5 and 6.
- ② The displacement may increase after the action of an impact load. When the table is subjected to an impact load, there may be permanent distortion of the guide unit and increased displacement.

## Table Accuracy

### Table displacement due to roll moment

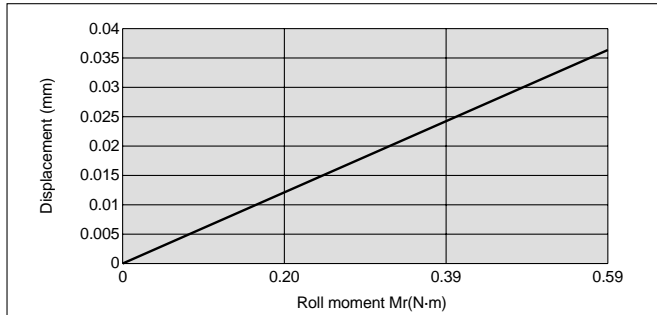
Table displacement (at A) when a load acts upon section F at the full stroke of the compact slide



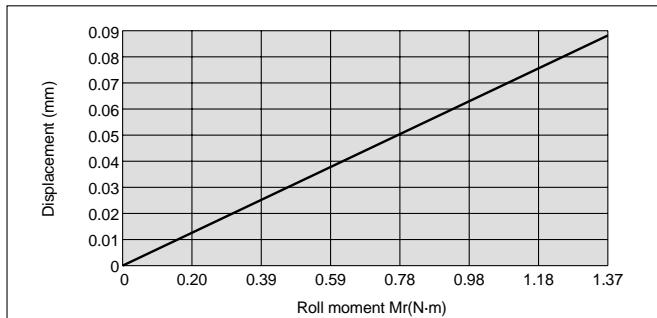
Running parallelism	Stroke (st)	
	5 to 30	40 to 60
	0.05mm or less	0.1mm or less

Model	Allowable moment (N-m)		
	Pitch moment	Yaw moment	Roll moment
	Mp	My	Mr
<b>MXH6</b>	0.47	0.39	0.59
<b>MXH10</b>	0.96	0.82	1.37
<b>MXH16</b>	1.88	1.59	2.75
<b>MXH20</b>	3.14	2.75	5.49

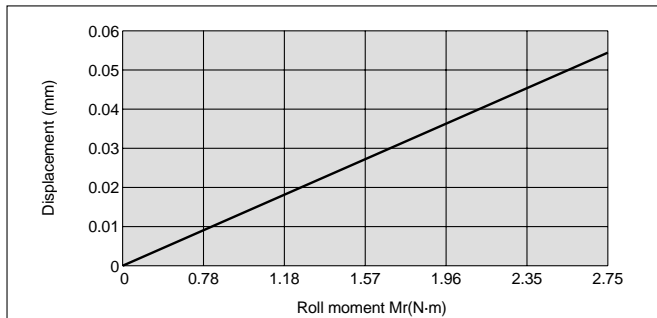
#### MXH6



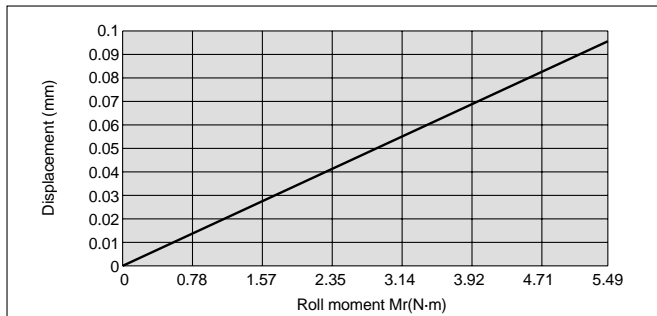
#### MXH10



#### MXH16



#### MXH20



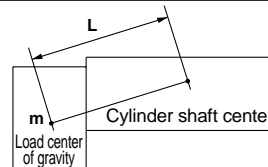
# Series MXH Model Selection Method

**⚠ Caution** Separate confirmation of the theoretical output is necessary. Refer to the theoretical output table on page 2.

**Selection Conditions:** Determine the selection conditions in order, starting from the upper row in the table below, and choose one of the selection graphs to be used.

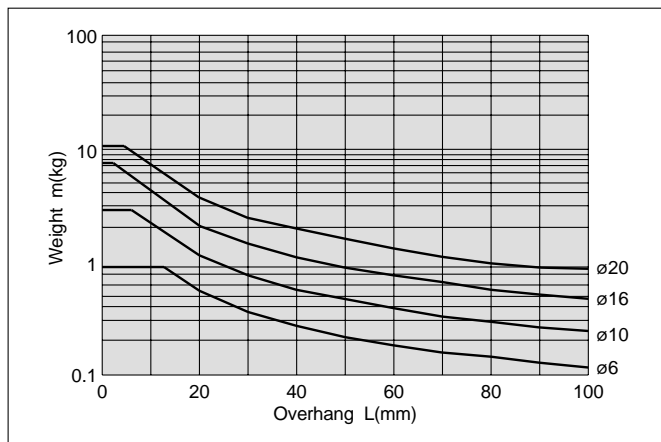
Mounting position	Vertical			Horizontal								
Maximum speed mm/s	to 100	to 300	to 500	to 100			to 300			to 500		
Load eccentricity /mm	-			50	100	200	50	100	200	50	100	200
Selection graph	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>

\* 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.  
(See drawing at right)

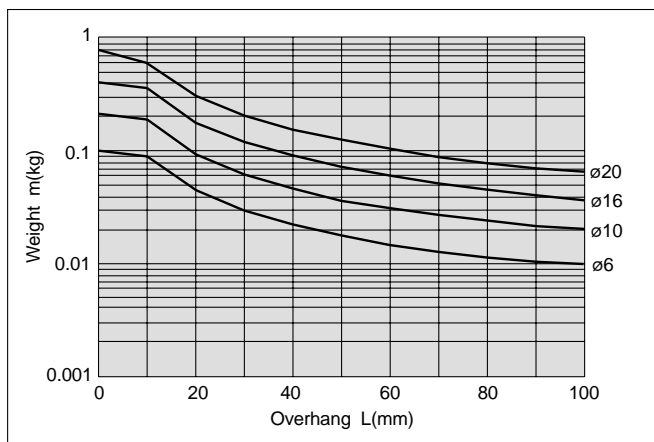


## Selection Graphs **1** to **3** (Vertical Mounting)

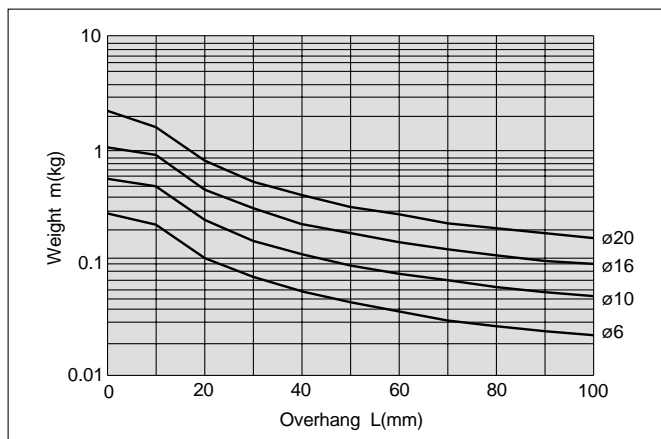
**Graph 1** Maximum speed 100(mm/s) or less



**Graph 3** Maximum speed 500(mm/s) or less



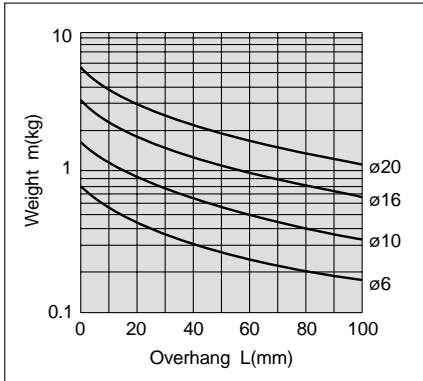
**Graph 2** Maximum speed 300(mm/s) or less



## Selection Graphs 4 to 12 (Horizontal Mounting)

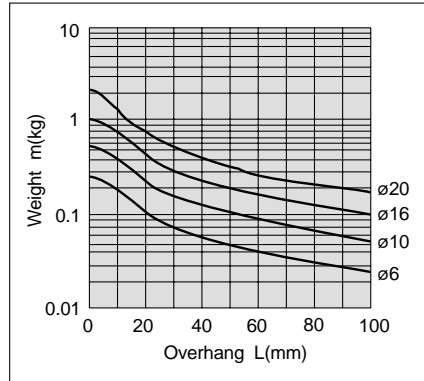
Maximum speed 100mm/s or less

Graph 4 Load eccentricity 50mm



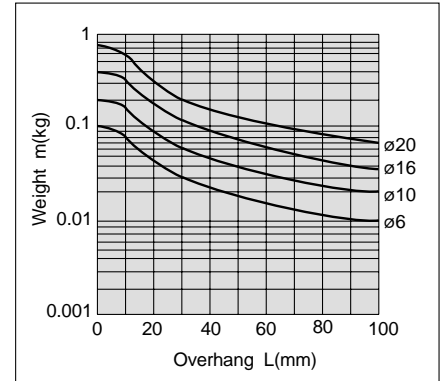
Maximum speed 300mm/s or less

Graph 7 Load eccentricity 50mm

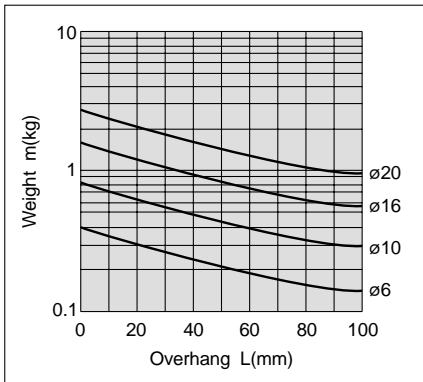


Maximum speed 500mm/s or less

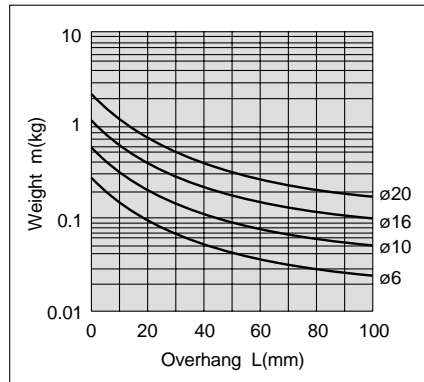
Graph 10 Load eccentricity 50mm



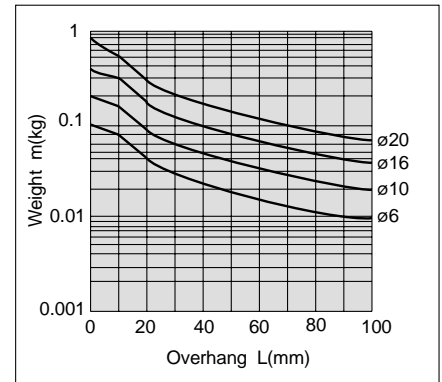
Graph 5 Load eccentricity 100mm



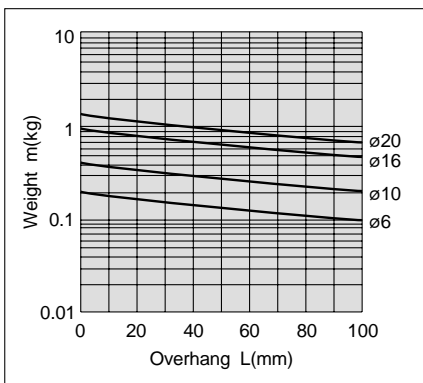
Graph 8 Load eccentricity 100mm



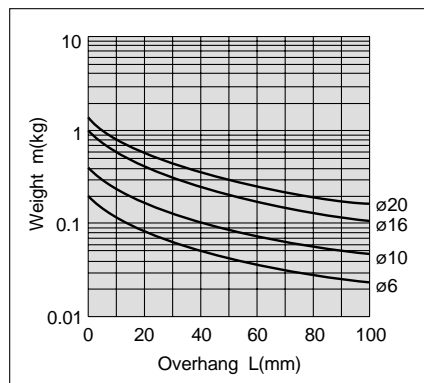
Graph 11 Load eccentricity 100mm



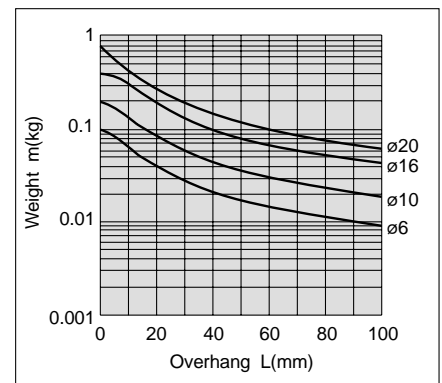
Graph 6 Load eccentricity 200mm



Graph 9 Load eccentricity 200mm



Graph 12 Load eccentricity 200mm



## Selection Examples

- ① Selection conditions
- Mounting: Vertical
  - Maximum speed: 500mm/s
  - Overhang: 40mm
  - Load weight: 0.1Kg

Refer to Graph 3 based on vertical mounting and a speed of 500mm/s.  
In Graph 3, find the intersection of a 40mm overhang and load weight of 0.1Kg, which results in a determination of ø20.

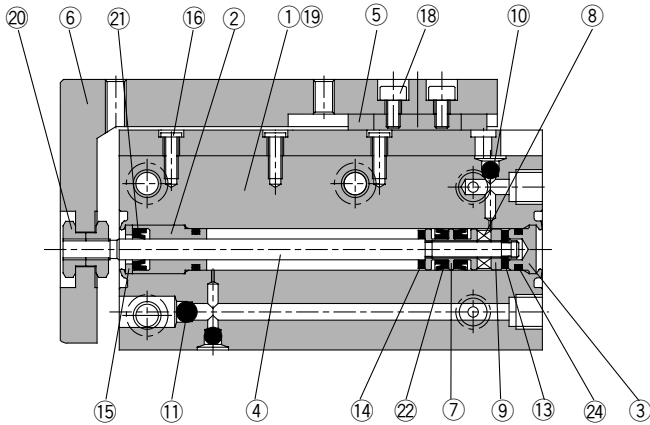
- ② Selection conditions
- Mounting: Horizontal
  - Maximum speed: 500mm/s
  - Load eccentricity: 50mm
  - Overhang: 30mm
  - Load weight: 0.1Kg

Refer to Graph 10 based on horizontal mounting, a speed of 500mm/s and load eccentricity of 50mm.  
In Graph 10, find the intersection of a 30mm overhang and load weight of 0.1Kg, which results in a determination of ø16.

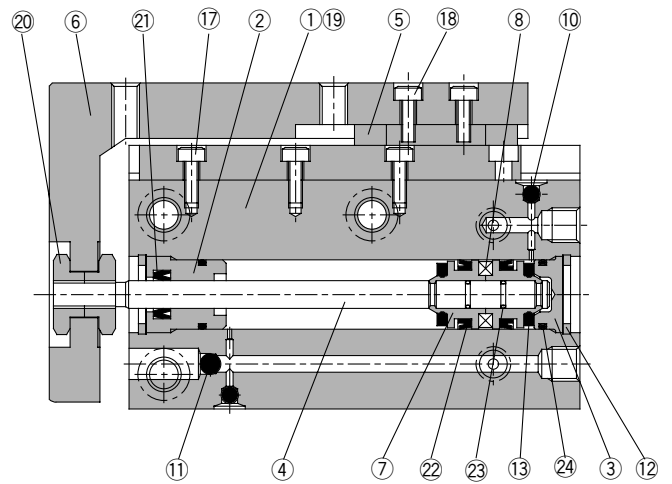
# Series MXH

## Construction

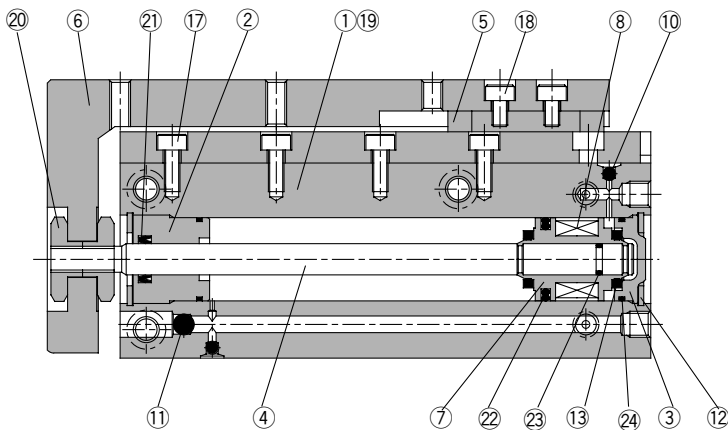
### MXH6 (ø6)



### MXH10 (ø10)



### MXH16, 20 (ø16, ø20)



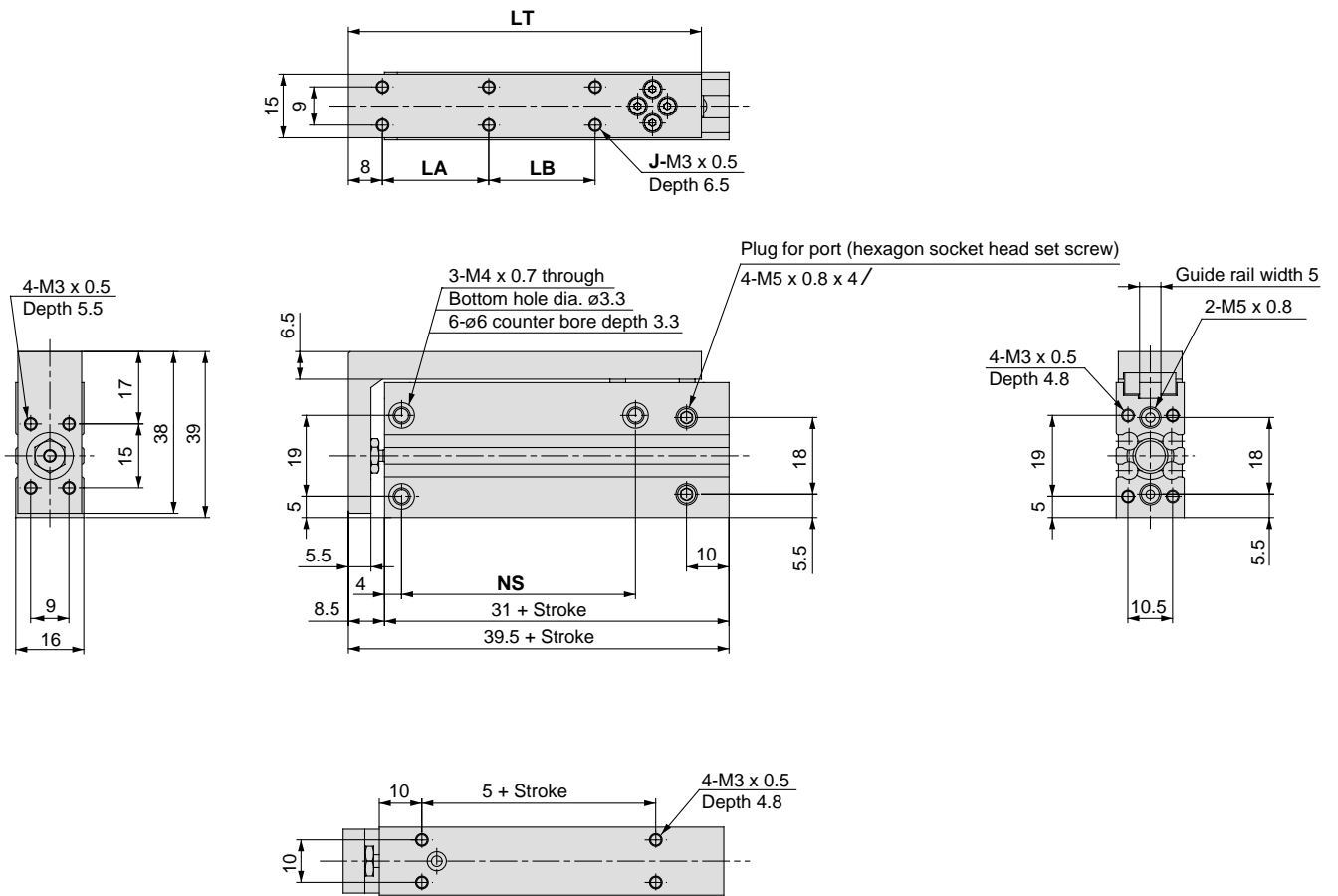
#### Parts list

No.	Description	Material	Note
1	Cylinder tube	Aluminum alloy	Hard anodized
2	Rod cover	Brass	
3	Head cover	Brass	ø6, ø10 electroless nickel plated
		Aluminum alloy	ø16, ø20 white chromated
4	Piston rod	Stainless steel	
5	Linear guide	—	
6	Table	Aluminum alloy	Hard anodized
7	Piston	Brass	ø6, ø10
		Aluminum alloy	ø16, ø20
8	Magnet	Magnet material	ø6, ø10 nickel plated
		Synthetic rubber	ø16, ø20
9	Magnet holder	Brass	ø6
10	Steel ball A	High carbon chrome bearing steel	
11	Steel ball B	High carbon chrome bearing steel	

#### Parts list

No.	Description	Material	Note
12	C type snap ring for hole	Carbon tool steel	ø10, ø16, ø20
13	Bumper	Urethane	
14	Bumper	Urethane	
15	Seal retainer	Stainless steel	ø6
16	Round head Phillips screw	Carbon steel	ø6 black zinc chromated
17	Hexagon socket head cap screw	Chrome molybdenum steel	ø10, ø16, ø20 nickel plated
18	Hexagon socket head cap screw	Chrome molybdenum steel	Nickel plated
19	Hexagon socket head plug	Chrome molybdenum steel	Nickel plated
20	Nut	Brass	Nickel plated
21	Rod seal	NBR	
22	Piston seal	NBR	
23	Piston gasket	NBR	ø10, ø16, ø20
24	Gasket	NBR	

## Dimensions/ø6

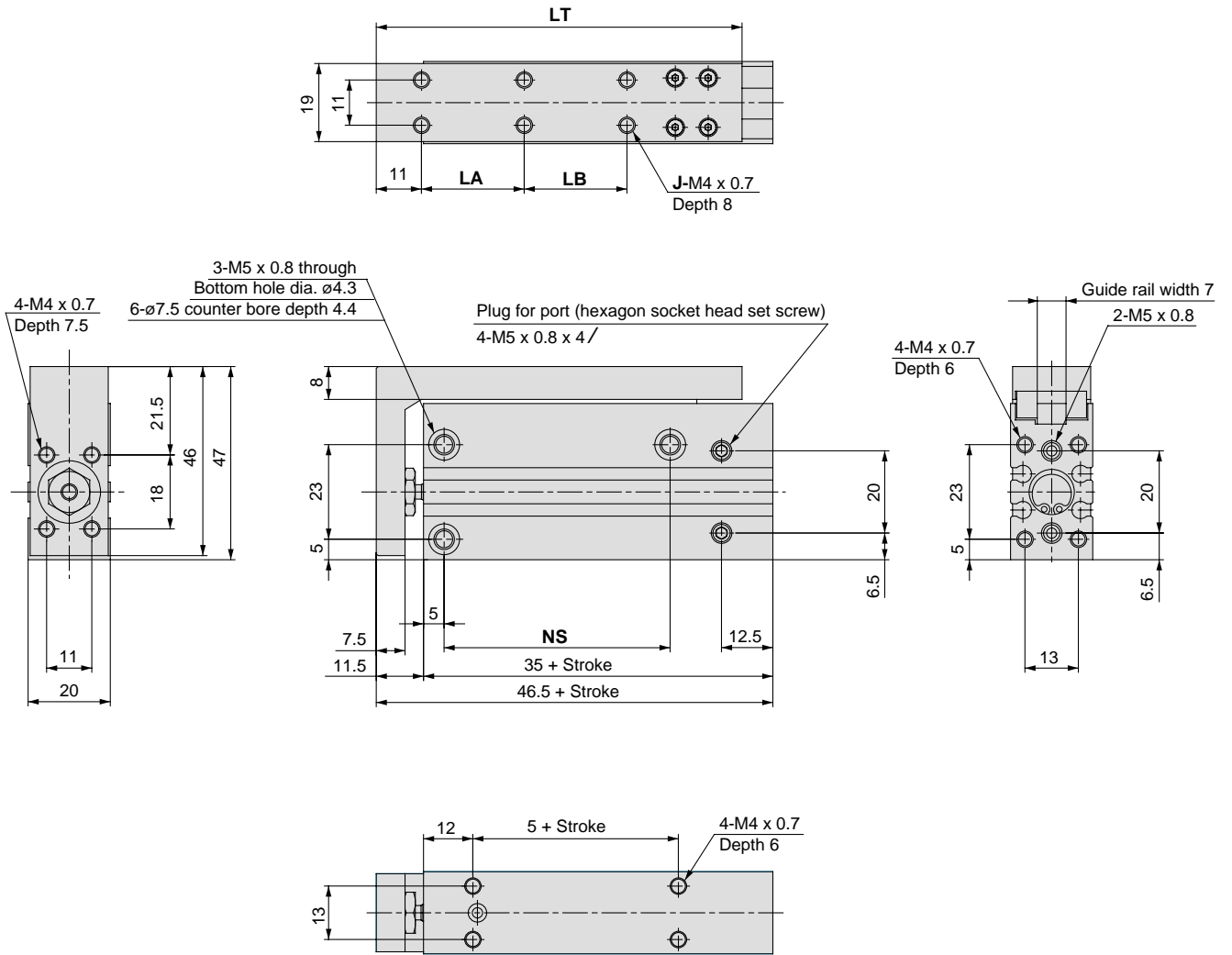


Stroke (mm)	J	LA	LB	LT	NS
5	4	10	—	42	14
10	4	10	—	42	14
15	4	20	—	52	24
20	4	20	—	52	24
25	4	30	—	62	30
30	4	30	—	62	30
40	6	20	20	72	45
50	6	25	25	82	55
60	6	30	30	92	60



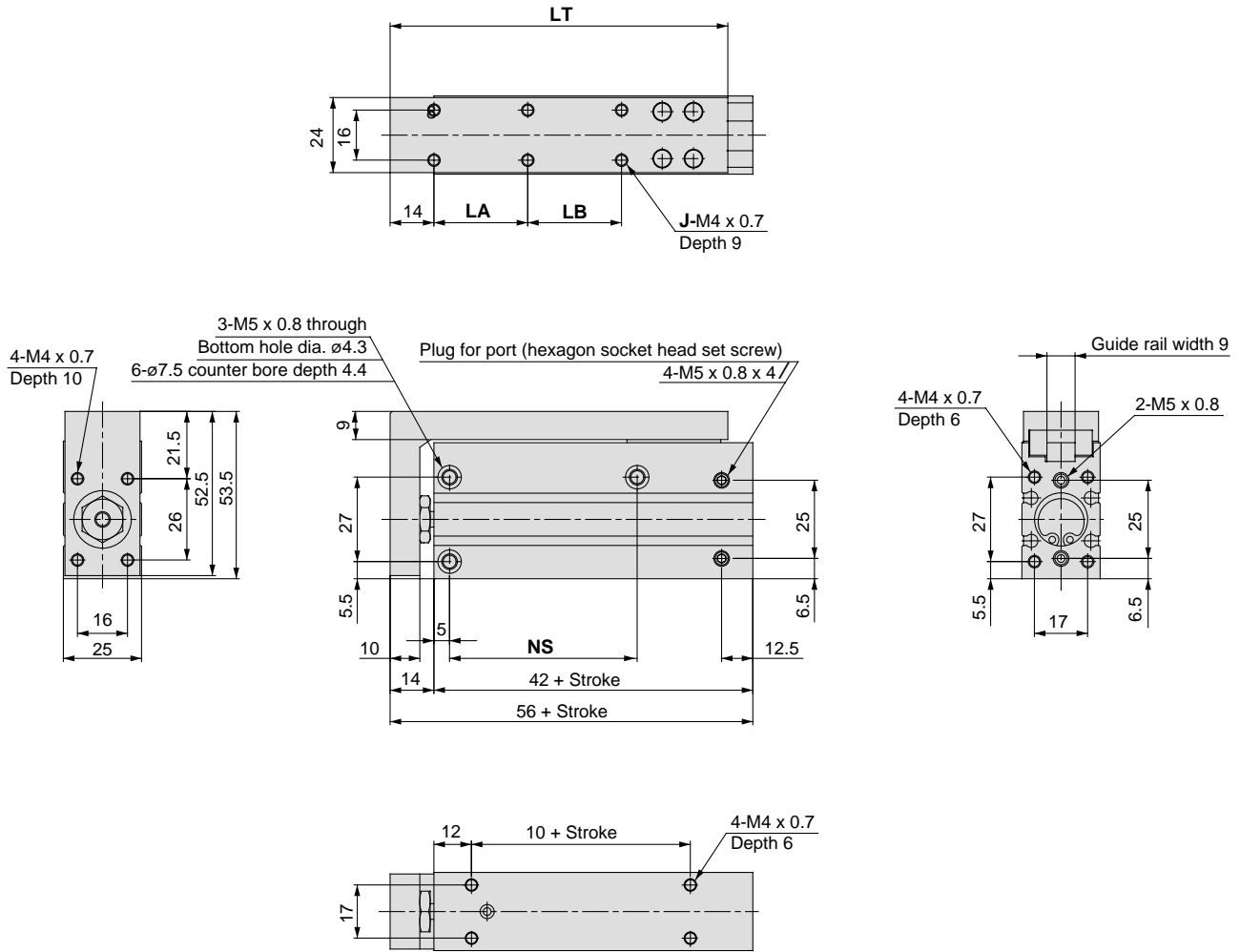
# Series MXH

## Dimensions/ $\phi 10$



Stroke (mm)	J	LA	LB	LT	NS
5	4	10	—	49	14
10	4	10	—	49	14
15	4	20	—	59	24
20	4	20	—	59	24
25	4	30	—	69	30
30	4	30	—	69	30
40	6	20	20	79	45
50	6	25	25	89	55
60	6	30	30	99	60

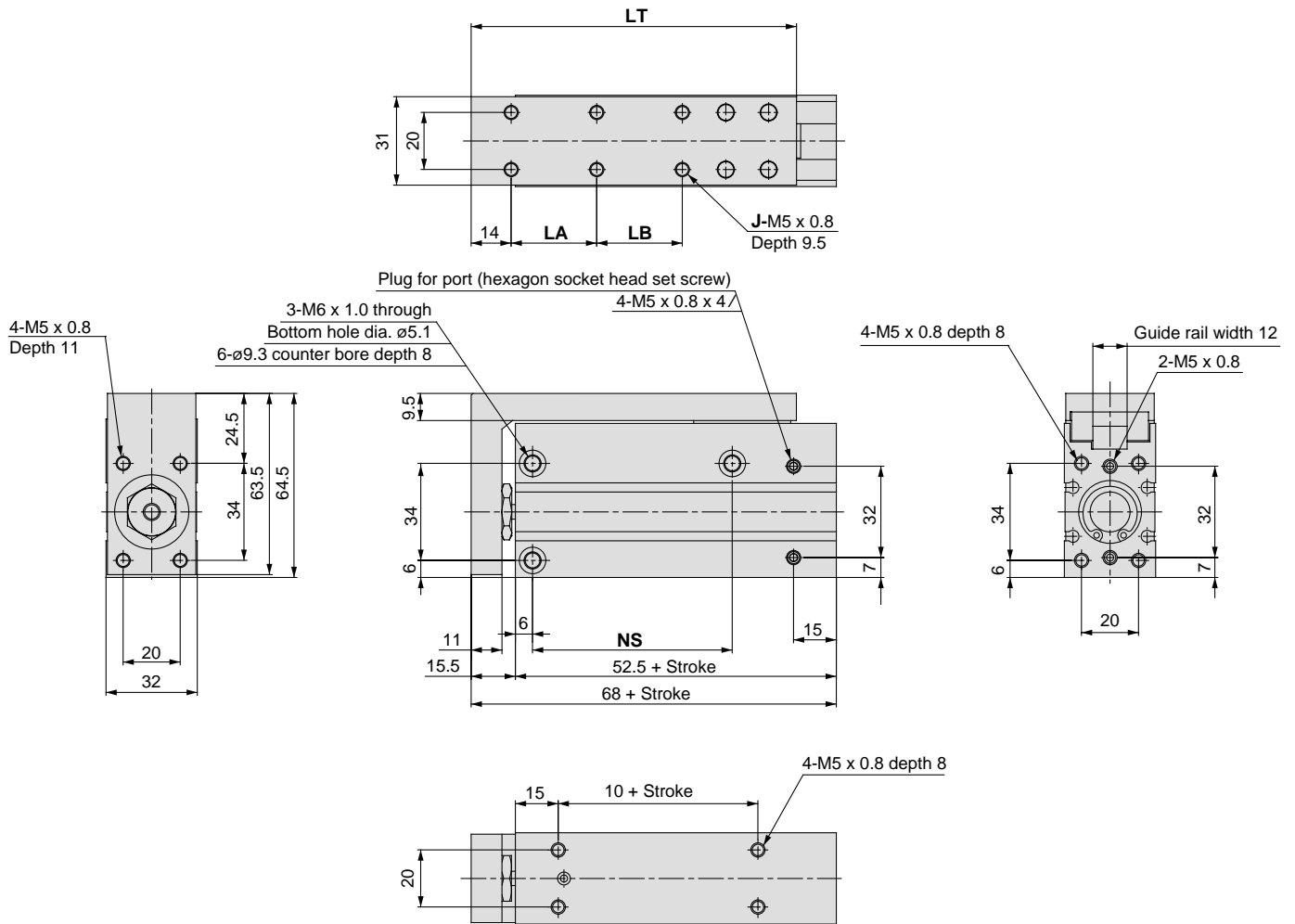
## Dimensions/ø16



Stroke (mm)	J	LA	LB	LT	NS
5	4	10	—	58	20
10	4	10	—	58	20
15	4	20	—	68	30
20	4	20	—	68	30
25	4	30	—	78	40
30	4	30	—	78	40
40	6	20	20	88	50
50	6	25	25	98	60
60	6	30	30	108	60

# Series MXH

## Dimensions/ $\phi 20$



Stroke (mm)	J	LA	LB	LT	NS
5	4	10	—	64	20
10	4	10	—	64	20
15	4	20	—	74	25
20	4	20	—	74	25
25	4	30	—	84	40
30	4	30	—	84	40
40	6	20	20	94	50
50	6	25	25	104	70
60	6	30	30	114	70

## Solid-state Auto Switches for Direct Mounting Series D-M9N(V)/D-M9P(V)/D-M9B(V)



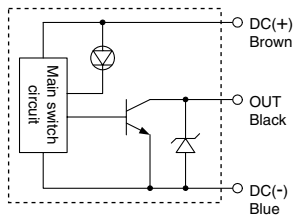
### Grommet

- Reduced load currents for two-wire model (2.5 to 40 mA)
- Compliance with lead-free requirements
- Use of UL-approved lead wires (style 2844)

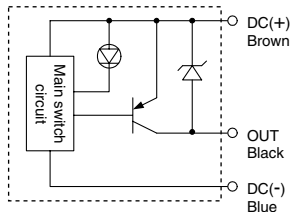


### Internal circuits

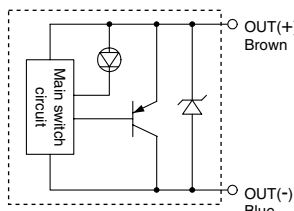
#### D-M9N/M9NV



#### D-M9P/M9PV



#### D-M9B/M9BV



### Auto Switch Specifications

PLC: Programmable Logic Controller

D-M9□/D-M9□V (with Indicator light)						
Model number	D-M9N	D-M9NV	D-M9P	D-M9PV	D-M9B	D-M9BV
Electrical entry	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring	Three-wire			Two-wire		
Output	NPN		PNP		—	
Applicable load	Integrated circuit, relay and PLC				24 V DC relay and PLC	
Power voltage	5, 12, or 24 V DC (4.5 to 28 V DC)				—	
Current consumption	10 mA or less				—	
Load voltage	28 V DC or less		—		24 V DC (10 to 28 V DC)	
Load current	40 mA or less				2.5 to 40 mA	
Internal voltage drop	0.8 V or less				4 V or less	
Leakage current	100 μA max. at 24 V DC				0.8 mA or less	
Indicator light	Red LED lights when ON.					

- Lead wire: oil-proof heavy-duty vinyl cable  
2.7 x 3.2 with elliptic cross-section, 0.15 mm<sup>2</sup>, two cores (D-M9B),  
or three cores (D-M9N and D-M9P)

### Solid state switch specifications

Leakage current	3-wire: 100 μA or less; 2-wire: 0.8 mA max.
Operating time	1 ms or less
Impact resistance	1000 m/s <sup>2</sup>
Insulation resistance	50 MΩ or more at 500 V DC (between lead wire and case)
Withstand voltage	1000 V AC for 1 min. (between lead wire and case)
Ambient temperature	-10°C to 60°C
Enclosure	IEC529 standard IP67, JIS C 0920 watertight construction

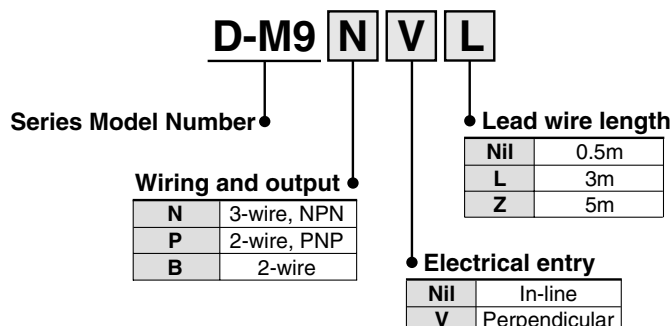
### Weight

Unit: g

Model	D-M9N(V)	D-M9P(V)	D-M9B(V)
Lead wire length (m)	0.5	8	8
	3	41	41
	5	68	68

### How to Order

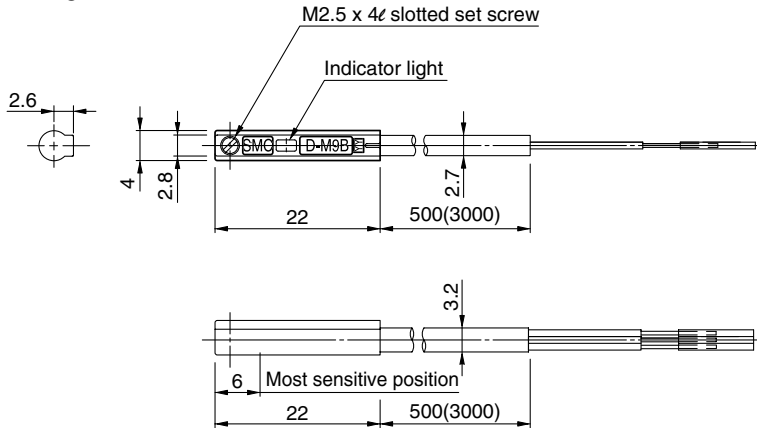
#### Standard Model Number



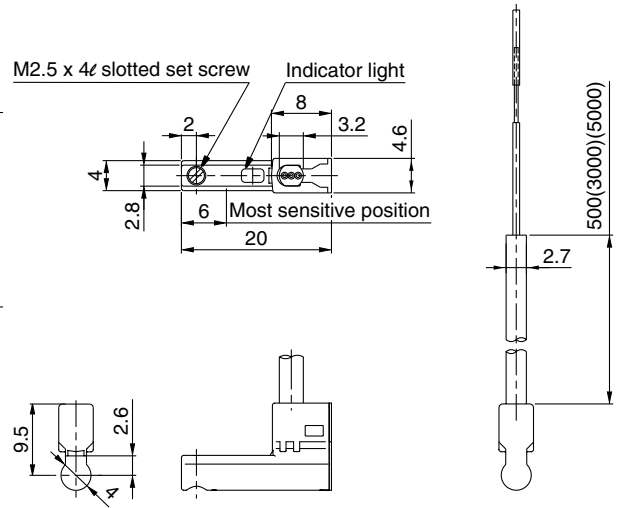
# Series D-M9

## Auto Switch Dimensions

### D-M9□



### D-M9□V



## ⚠ Specific Product Precautions

Be sure to read before handling. Contact SMC when the required specification is out of range.

### Handling

## ⚠ Caution

Observe the following precautions when handling the product.

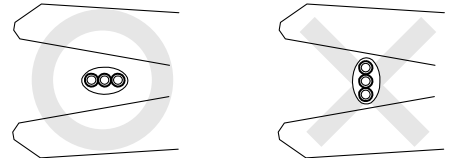
- The D-M9 series of auto switches is not overcurrent-protected. Faulty wiring or short circuit may result in breakage or burning-out of the switch.
- When stripping the cable clad, be careful about the orientation of the cable being stripped. The insulator may be accidentally torn or damaged depending on the orientation, as shown on the right.

- We recommend the following tools

Manufacturer	Product name	Product number
VESSEL	Wire stripper	No 3000G
Tokyo Ideal	Strip master	45-089

\* The stripper for the round shape cords (ø2.0) is for a 2-wire style.

- Please do not attach the switch with any other screws than those already attached to the auto switch body.



## The operation range is shorter than that of the conventional models.

If the auto switch replaces the conventional model, it may not function depending on its application because the operation range is shorter. Refer to the examples below.

- In an application where at the end, the stopping position shifting range is larger than the operation range. For example, pushing a work against something, or pressing a work into a hole, or clamping a work.
- In an application where the auto switch is used to detect an intermediate stopping position. (Detecting time is shortened.)

Note) Please contact SMC for the operation range details for each actuator.

The switch is damaged instantly when a load is shortened since short circuit protection is not built-in. Pay special attention to avoid reversing the connection of the brown lead of the power supply line and the black output line connection.