

Series MHS4

ø16, ø20, ø25, ø32, ø40, ø50, ø63

How to Order

Cylinder Bore Size

ø16 to ø25

MHS 4 — 20 D — F9N

Number of fingers

4 4 fingers

Cylinder bore size

16	16mm
20	20mm
25	25mm

Action

D Double acting

Number of auto switches

Nil	2 pcs.
S	1 pc.

Auto switch type

Nil Without auto switch (built-in magnet)

Auto switch specifications

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch models		Lead wire length (m)*			Applicable loads
					DC	AC	Perpendicular	In-line	0.5 (Nil)	3 (L)	5 (Z)	
Solid state	—	Grommet	Yes	3 wire (NPN)	24V	5V, 12V	F9NV	F9N	●	●	—	Relay, PLC
				3 wire (PNP)			F9PV	F9P	●	●	—	
				2 wire	F9BV	F9B	●	●	—			
	Water resistant (2 color indicator)			—	F9BA	—	●	○				

* Lead wire length symbols: 0.5m Nil (Example) F9B
3m L (Example) F9BL
5m Z (Example) F9BZ

D-F9BA is available only as "L".

* Auto switches marked with a "○" symbol are produced upon receipt of order.

Note 1) Take note of hysteresis with 2 color indication type switches.

Note 2) Refer to pages 53 through 65 for detailed auto switch specifications.

Cylinder Bore Size

ø32 to ø63

MHS 4 — 50 D — Y59A

Number of fingers

4 4 fingers

Cylinder bore size

32	32mm
40	40mm
50	50mm
63	63mm

Action

D Double acting

Number of auto switches

Nil	2 pcs.
S	1 pc.

Auto switch type

Nil Without auto switch (built-in magnet)

Auto switch specifications

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch models		Lead wire length (m)*			Applicable loads
					DC	AC	In-line	Perpendicular	0.5 (Nil)	3 (L)	5 (Z)	
Solid state	—	Grommet	Yes	3 wire (NPN)	24V	5V, 12V	Y69A	Y59A	●	●	○	Relay, PLC
				3 wire (PNP)			Y7PV	Y7P	●	●	○	
				2 wire	Y69B	Y59B	●	●	○			
	3 wire (NPN)			Y7NWV	Y7NW	●	●	○				
	3 wire (PNP)			Y7PWV	Y7PW	●	●	○				
	2 wire			Y7BWV	Y7BW	●	●	○				
Water resistant (2 color indicator)	—	Y7BA	—	●	○	—						

* Lead wire length symbols: 0.5m Nil (Example) Y59B
3m L (Example) Y59BL
5m Z (Example) Y59BZ

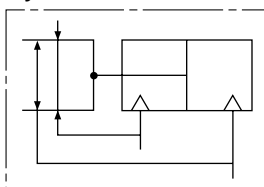
D-Y7BA is available only as "L".

* Auto switches marked with a "○" symbol are produced upon receipt of order.

Note 1) Take note of hysteresis with 2 color indication type switches.

Note 2) Refer to pages 53 through 65 for detailed auto switch specifications.

Symbol



Models and Specifications

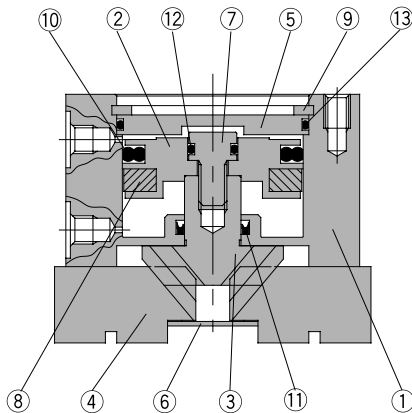


Model	MHS4-16D	MHS4-20D	MHS4-25D	MHS4-32D	MHS4-40D	MHS4-50D	MHS4-63D	
Cylinder bore size mm	16	20	25	32	40	50	63	
Fluid	Air							
Operating pressure MPa (psi)	0.2 to 0.6 (29 to 87)			0.1 to 0.6 (14 to 87)				
Ambient and fluid temperature	-10 to 60°C (14 to 140°F)							
Repeatability mm	±0.01							
Max. operating frequency c.p.m.	120			60				
Lubrication	Non-lube							
Action	Double acting							
Effective gripping force N (lb) at pressure of 0.5MPa (72psi) <small>Note 1)</small>	External gripping force	10 (2.2)	19 (4.3)	31 (7.0)	55 (12.4)	88 (19.8)	140 (31)	251 (56)
	Internal gripping force	12 (2.7)	21 (4.7)	35 (7.9)	61 (13.7)	97 (21.8)	153 (34)	268 (60)
Opening/closing stroke mm	4	4	6	8	8	12	16	
Weight g (oz)	66 (2.3)	110 (3.9)	154 (5.4)	300 (10.6)	390 (13.8)	590 (21)	1,095 (39)	

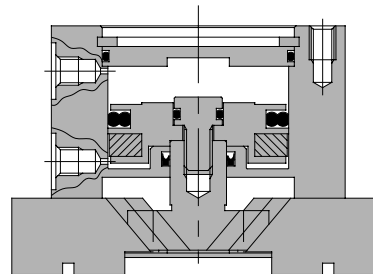
Note) Values for $\phi 16$ to $\phi 25$ are with gripping point L = 20mm, and for $\phi 32$ to $\phi 63$ with gripping point L = 30mm.
Refer to the "Effective Gripping Force" data for the gripping force at each gripping position.

Construction

Closed condition



Open condition



Parts list

No.	Description	Material	Note
1	Body	Aluminum alloy	Hard anodized
2	Piston	Aluminum alloy	Hard anodized
3	Cam	Carbon steel	Heat treated, Specially treated
4	Finger	Carbon steel	Heat treated, Specially treated
5	Cap	Aluminum alloy	Hard anodized
6	End plate	Stainless steel	
7	Piston bolt	Stainless steel	

No.	Description	Material	Note
8	Rubber magnet	Synthetic rubber	
9	C type snap ring	Carbon steel	Nickel plated
10	Piston seal	NBR	
11	Rod seal	NBR	
12	Gasket	NBR	
13	Gasket	NBR	

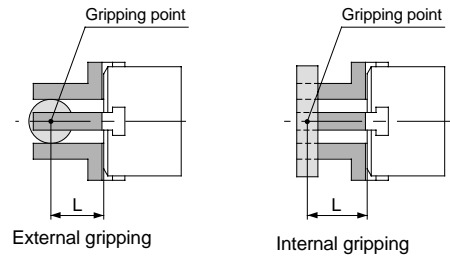
Replacement parts/Seal kits

Kit number							Contents
MHS4-16D	MHS4-20D	MHS4-25D	MHS4-32D	MHS4-40D	MHS4-50D	MHS4-63D	
MHS16-PS	MHS20-PS	MHS25-PS	MHS32-PS	MHS40-PS	MHS50-PS	MHS63-PS	A set of the above Nos. 10, 11, 12 and 13

* Seal kits are sets consisting of items 10, 11, 12 and 13, which can be ordered using the kit number for each cylinder bore size.

Gripping Point

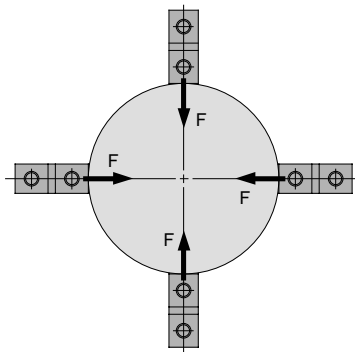
- The work piece gripping point distance should be within the gripping force ranges given for each pressure in the effective gripping force graphs below.
- If operated with the work piece gripping point beyond the indicated ranges, an excessive offset load will be applied to the sliding section of the fingers, which can have an adverse effect on the service life of the product.



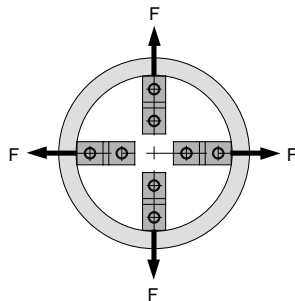
L: Gripping point distance

Effective Gripping Force

- Expressing the effective gripping force
- The effective gripping force shown in the graphs to the right is expressed as F, which is the impellent force of one finger when all four of the fingers and attachments are in full contact with the work piece as shown in the figure below. If only one of the two pairs of opposing fingers are used for gripping work pieces, while the other pair is used for another function such as positioning, the gripping force of the Series MHS4 will be the same as that of the Series MHS2.



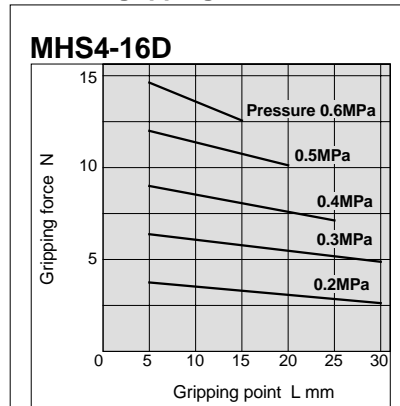
External gripping



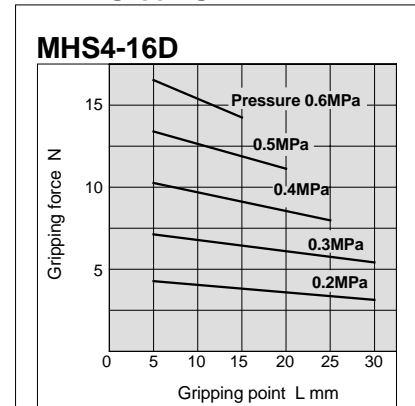
Internal gripping

Note: 1N = 0.2248lbf
1in = 25.4mm
1MPa = 145psi

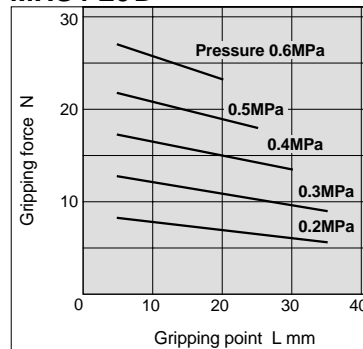
External gripping force



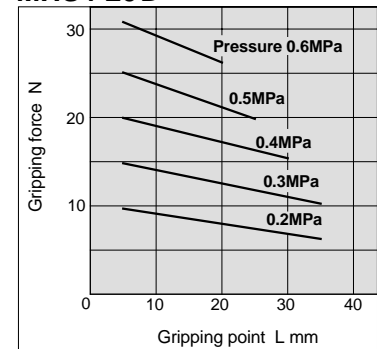
Internal gripping force



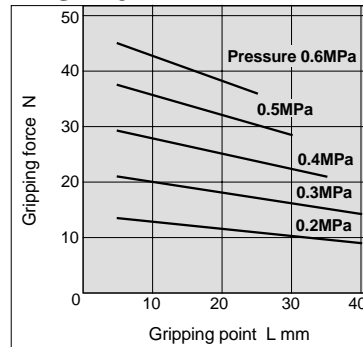
MHS4-20D



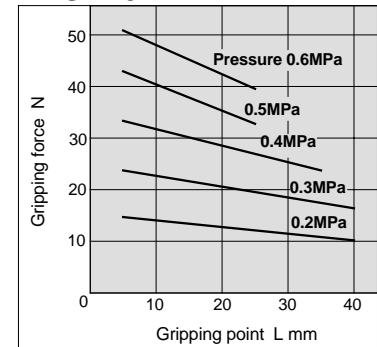
MHS4-20D



MHS4-25D



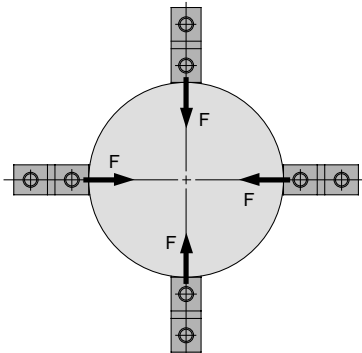
MHS4-25D



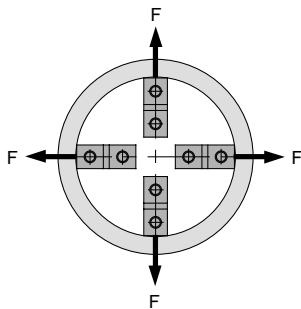
2 finger MHS2
3 finger MHS3
With dust cover MHSJ3
Through hole MHSH3
Long stroke MHSL3
4 finger MHS4
Auto switches
Model selection
Precautions

Effective Gripping Force

- Expressing the effective gripping force
- The effective gripping force shown in the graphs to the right is expressed as F, which is the impellent force of one finger when all four of the fingers and attachments are in full contact with the work piece as shown in the figure below. If only one of the two pairs of opposing fingers are used for gripping work pieces, while the other pair is used for another function such as positioning, the gripping force of the Series MHS4 will be the same as that of the Series MHS2.



External gripping

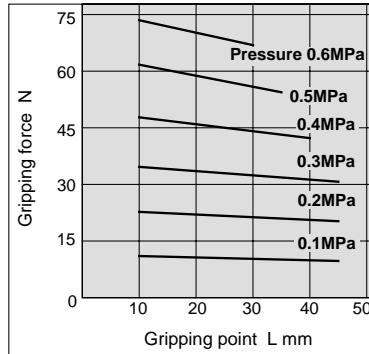


Internal gripping

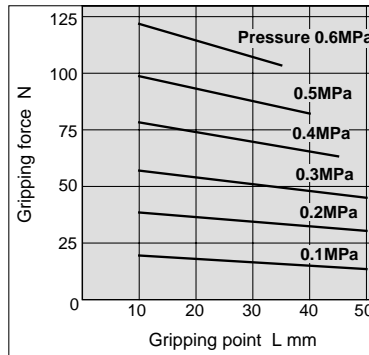
Note: 1N = 0.2248lbf
 1in = 25.4mm
 1MPa = 145psi

External gripping force

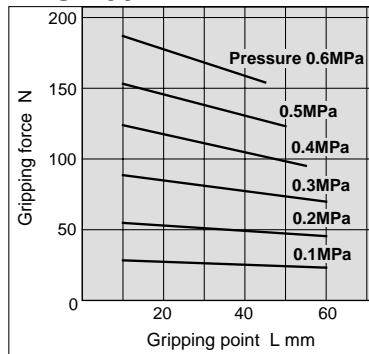
MHS4-32D



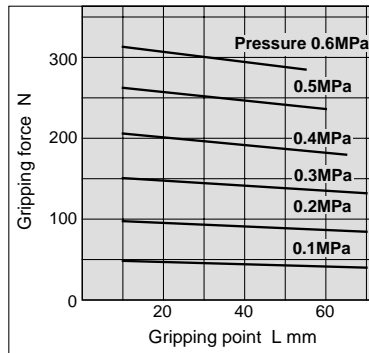
MHS4-40D



MHS4-50D

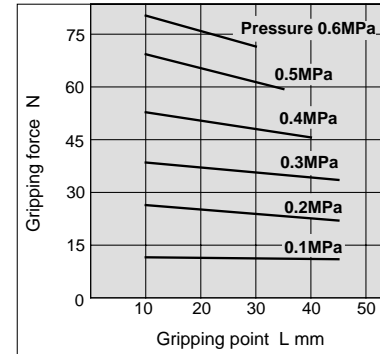


MHS4-63D

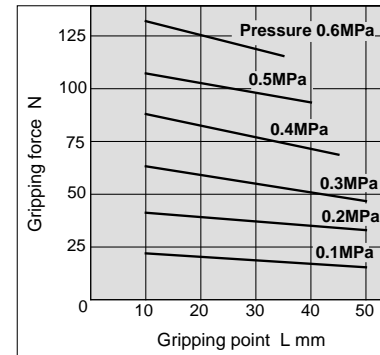


Internal gripping force

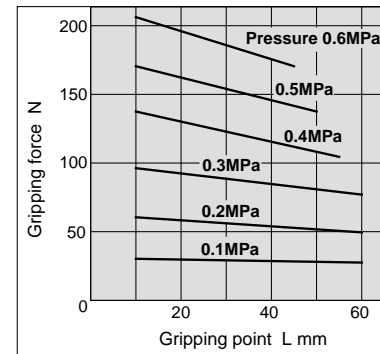
MHS4-32D



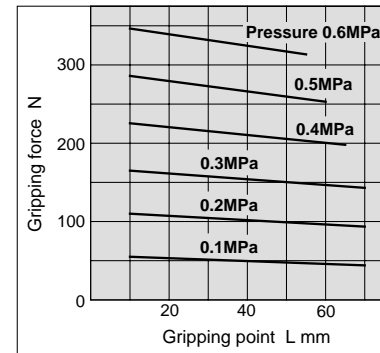
MHS4-40D



MHS4-50D



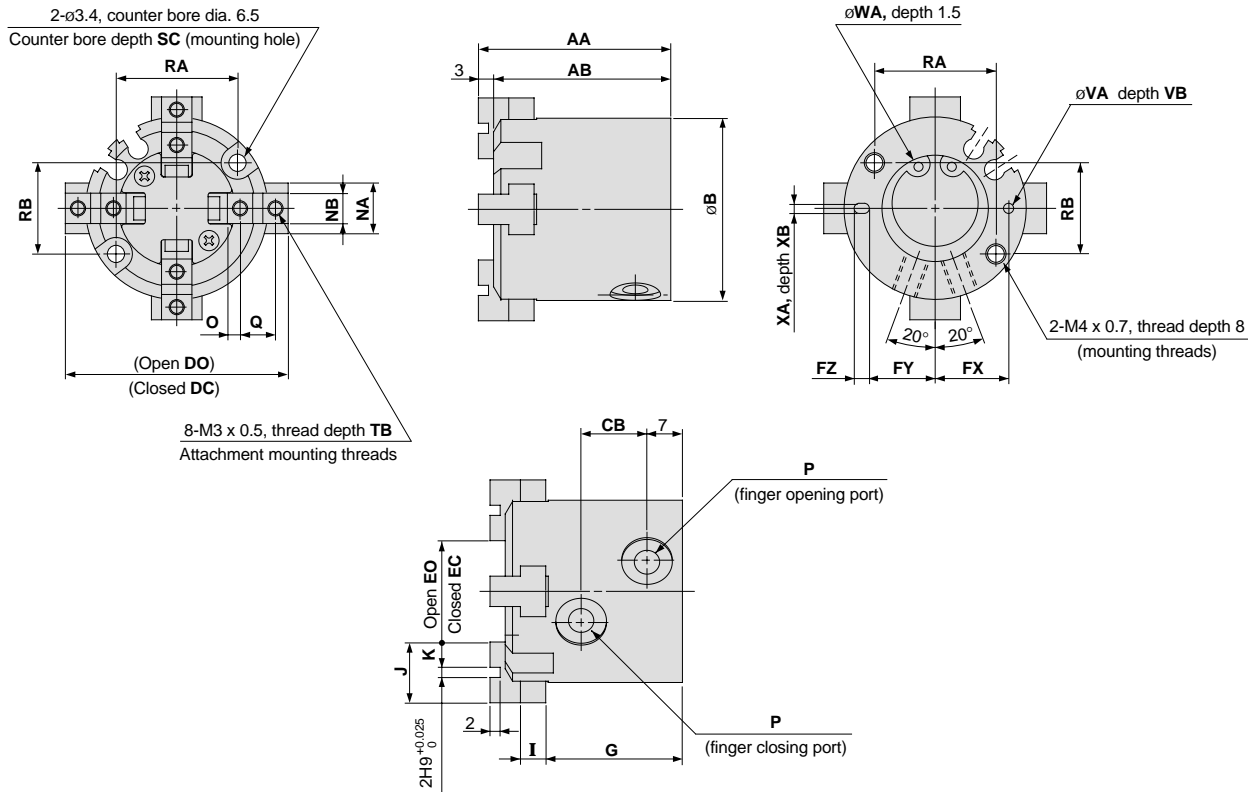
MHS4-63D



Dimensions (mm)

1in = 25.4mm

MHS4-16D to 25D

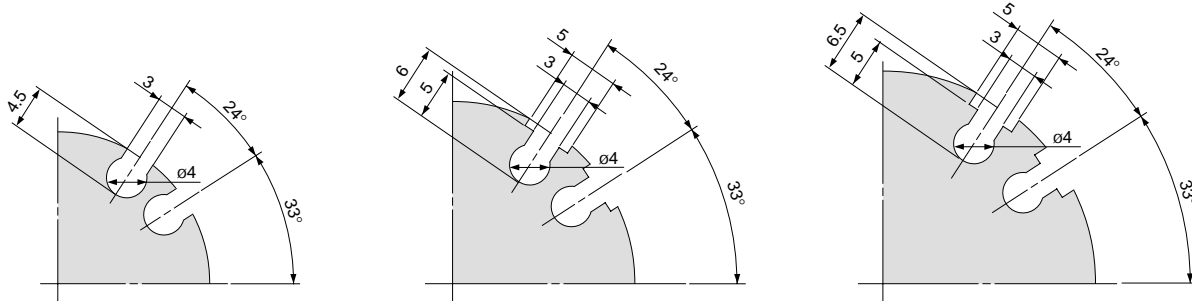


Auto switch mounting groove positions (2 locations)

MHS4-16D

MHS4-20D

MHS4-25D



Model	AA	AB	B	CB	DC	DO	EC	EO	FX	FY	FZ	G	I	J	K	NA	NB	O	P	Q
MHS4-16D	35	32	30	11	33	37	13	17	12.5	11	3	25	4	10	4	8	5h9 ₀ ^{+0.030}	2	M3 x 0.5	6
MHS4-20D	38	35	36	13	39	43	15	19	14.5	13	3	27	5	12	5	10	6h9 ₀ ^{+0.030}	2.5	M5 x 0.8	7
MHS4-25D	40	37	42	15	48	54	20	26	17	14.5	5	28	5	14	6	12	6h9 ₀ ^{+0.030}	3	M5 x 0.8	8

Model	RA	RB	SC	TB	VA	VB	WA	XA	XB
MHS4-16D	18	16	8	5	2H9 ₀ ^{+0.025}	2	17H9 ₀ ^{+0.043}	2H9 ₀ ^{+0.025}	2
MHS4-20D	24	18	9.5	6	2H9 ₀ ^{+0.025}	2	21H9 ₀ ^{+0.052}	2H9 ₀ ^{+0.025}	2
MHS4-25D	26	22	10	6	3H9 ₀ ^{+0.025}	3	26H9 ₀ ^{+0.052}	3H9 ₀ ^{+0.025}	3

2 finger MHS2

3 finger MHS3

With dust cover MHSJ3

Through hole MSHS3

Long stroke MHSL3

4 finger MHS4

Auto switches

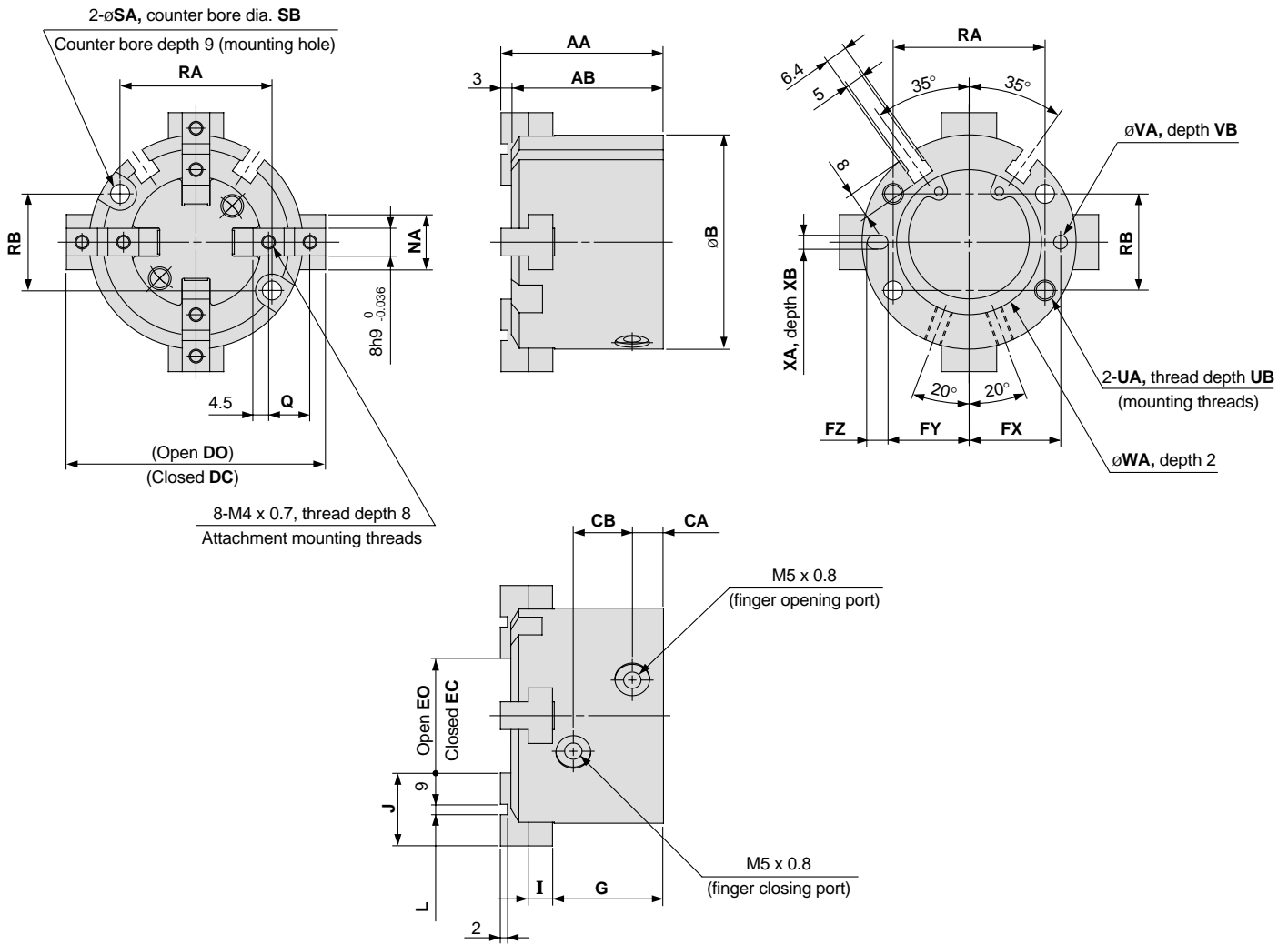
Model selection

Precautions

Dimensions (mm)

1in = 25.4mm

MHS4-32D, 40D



(mm)

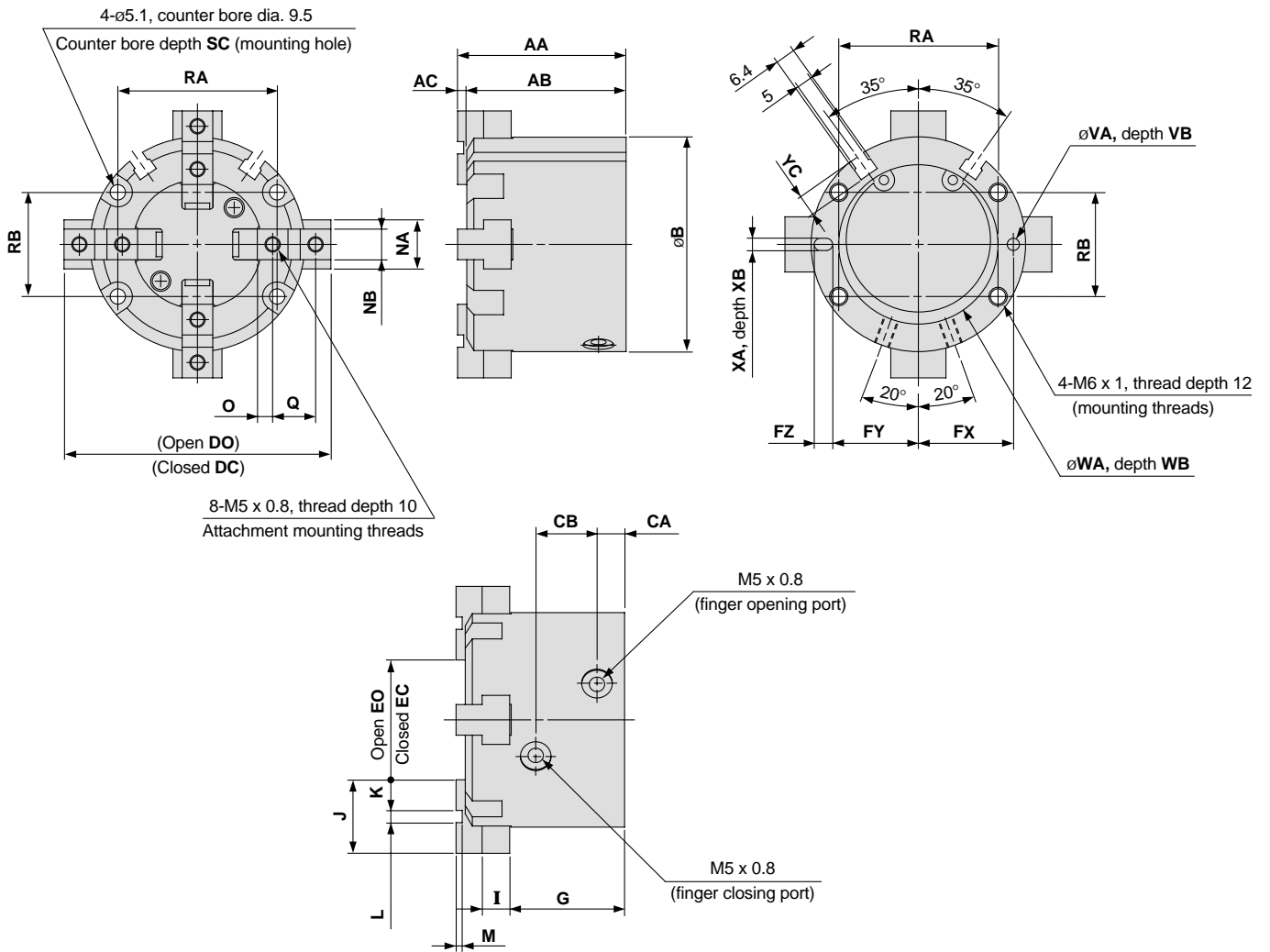
Model	AA	AB	B	CA	CB	DC	DO	EC	EO	FX	FY	FZ	G	I	J	L	NA	Q	RA	RB	SA
MHS4-32D	44	41	56	8	16	60	68	20	28	23	20.5	5	30.5	6	20	2H9 ^{+0.025} ₀	14	11	38	25	4.5
MHS4-40D	47	44	62	9	17	66	74	24	32	26.5	23.5	6	32	7	21	3H9 ^{+0.025} ₀	16	12	44	28	5.5

Model	SB	UA	UB	VA	VB	WA	XA	XB
MHS4-32D	8	M5 x 0.8	10	3H9 ^{+0.025} ₀	3	34H9 ^{+0.062} ₀	3H9 ^{+0.025} ₀	3
MHS4-40D	9.5	M6 x 1	12	4H9 ^{+0.030} ₀	4	42H9 ^{+0.062} ₀	4H9 ^{+0.030} ₀	4

Dimensions (mm)

1in = 25.4mm

MHS4-50D, 63D



Model	AA	AB	AC	B	CA	CB	DC	DO	EC	EO	FX	FY	FZ	G	I	J	K	L	M	NA	NB
MHS4-50D	55	52	3	70	9	20	74	86	26	38	31	28	6	37.5	9	24	10	4H9 ^{+0.030} ₀	2	18	10h9 ₀ ^{-0.036}
MHS4-63D	66	62	4	86	12	22	91	107	35	51	38	34.5	7	44	11	28	11	6H9 ^{+0.030} ₀	3	24	12h9 ₀ ^{-0.043}

Model	O	Q	RA	RB	SC	VA	VB	WA	WB	XA	XB	YC
MHS4-50D	5	14	52	34	12	4H9 ^{+0.030} ₀	4	52H9 ^{+0.074} ₀	2	4H9 ^{+0.030} ₀	4	7
MHS4-63D	5.5	17	66	38	14	5H9 ^{+0.030} ₀	5	65H9 ^{+0.074} ₀	2.5	5H9 ^{+0.030} ₀	5	7.5

(mm)

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



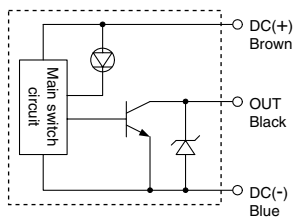
Grommet

- 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)

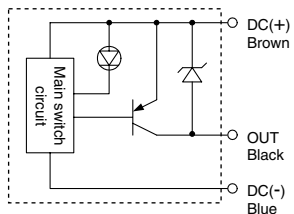


Internal circuits

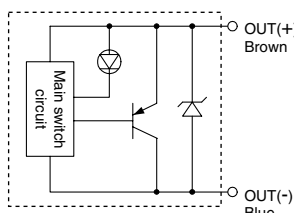
D-M9N/M9NV



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 mm², 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 ²
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

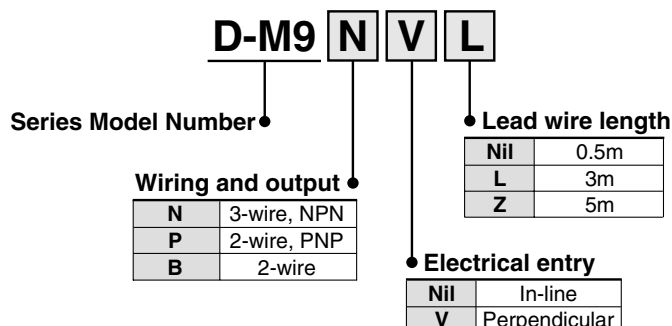
Weight

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

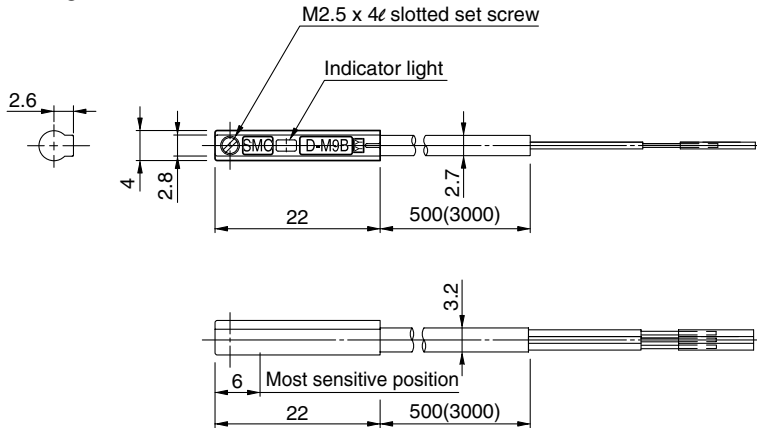
Standard Model Number



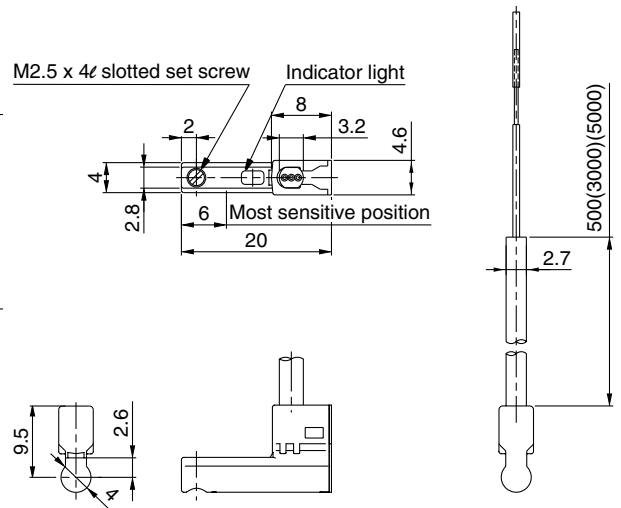
Series D-M9

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.

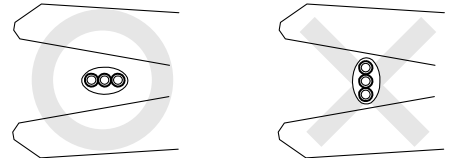
- The D-M9 series of auto switches is not overcurrent-protected. Faulty wiring or short circuit may result in breakage or burning-out of the switch.
- When stripping the cable clad, be careful about the orientation of the cable being stripped. The insulator may be accidentally torn or damaged depending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