Angular Type Air Gripper/Standard Type

MHC2 Series

ø10, ø16, ø20, ø25

How to Order

MHC2 – 20 D – M9BW ☐

Angular type air gripper

Bore size

10	10 mm
16	16 mm
20	20 mm
25	25 mm

Action

D	Double acting
S	Single acting

Auto switch

Nil	Without auto switch (Built-in magnet)

∗For the applicable auto switch model, refer to the table below.

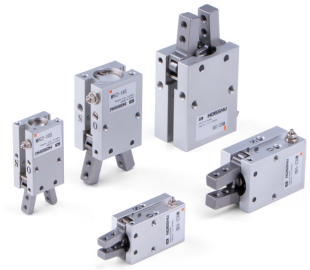
Number of auto switches

Nil	2 pcs.
S	1 pc.

Applicable Auto Switches

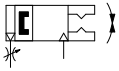
Type	Electrical entry	Indicator light	Wiring (Output)	Load volta		Auto switch model	
				DC	AC	Perpendicular	In-line
Solid state auto switch	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	—	**M9N**
						F8N	—
			3-wire (PNP)			—	**M9P**
						F8P	—
			2-wire	12 V		—	**M9B**
						F8B	—

∗ Lead wire length 3 meter.
∗ When ordering the air gripper with auto switch, auto switch mounting brackets are supplied with the air gripper.



Symbol

Double acting: External grip



Single acting/ Normally open: External grip

Specifications

Fluid		Air
Operating pressure	**Double acting**	0.1 to 0.6 MPa
	Single acting	0.25 to 0.6 MPa
Ambient and fluid temperature		–10 to 60°C
Repeatability		±0.01 mm
Max. operating frequency		180 c.p.m
Lubrication		Not required
Action		Double acting, Single acting
Auto switch (Option)		Solid state auto switch (3-wire, 2-wire)

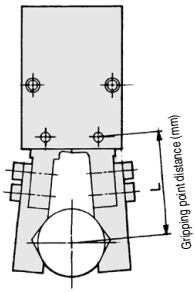
Model

Action	Model	Bore size (mm)	Gripping moment (N-m) (Effective value) (1)	Opening/closing angle (Both sides)	Weight (2) (g)
Double acting	**MHC2-10D**	10	0.10	30° to –10°	39
	MHC2-16D	16	0.39		91
	MHC2-20D	20	0.70		180
	MHC2-25D	25	1.36		311
Single acting	**MHC2-10S**	10	0.070	30° to –10°	39
	MHC2-16S	16	0.31		92
	MHC2-20S	20	0.54		183
	MHC2-25S	25	1.08		316

Note 1) At the pressure of 0.5 MPa. Refer to "Effective Gripping Force" data on page 2 for gripping force of each gripping point.
Note 2) Except auto switch.

Gripping Point

- Workpiece gripping point should be within the range indicated in the graph.

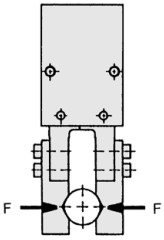


Guidelines for the selection of the gripper with respect to workpiece mass

- Although conditions differ according to the workpiece shape and the coefficient of friction between the attachments and the workpiece, select a model that can provide a gripping force of 10 to 20 times the workpiece mass, or more.
- If high acceleration, deceleration or impact forces are encountered during motion, a further margin of safety should be considered.
- If there is an overhang, please consult with SMC.

● **Indication of effective gripping force**

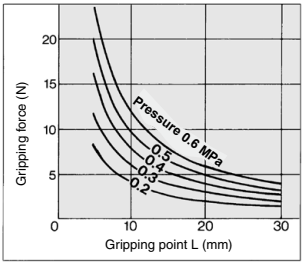
The effective gripping force shown in the graphs below is expressed as **F**, which is the thrust of one finger, when both fingers and attachments are in full contact with the workpiece as shown in the figure below.



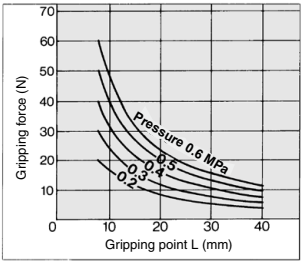
Effective Gripping Force

Double Acting

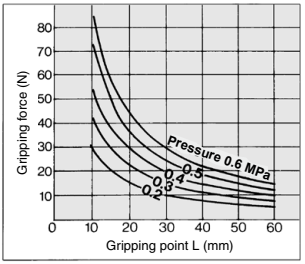
MHC2-10D



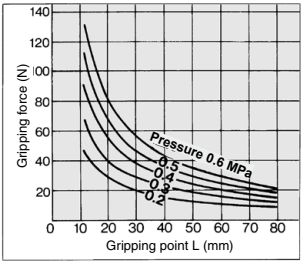
MHC2-16D



MHC2-20D

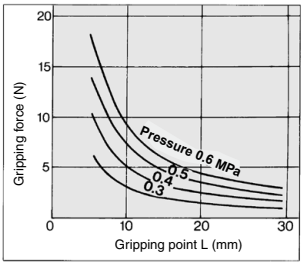


MHC2-25D

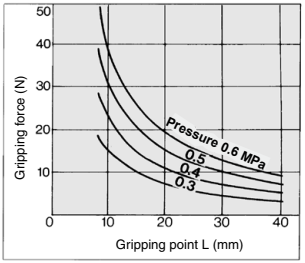


Single Acting

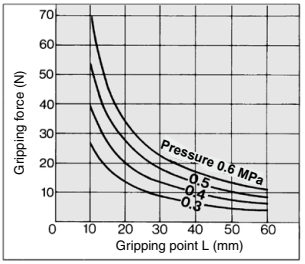
MHC2-10S



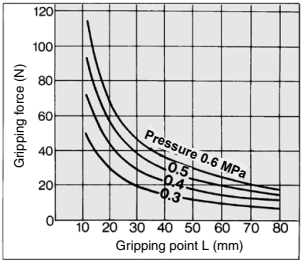
MHC2-16S



MHC2-20S

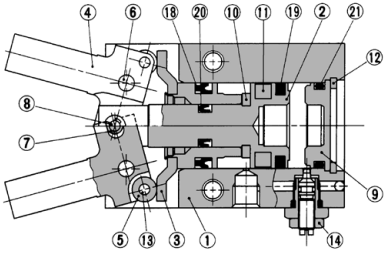


MHC2-25S

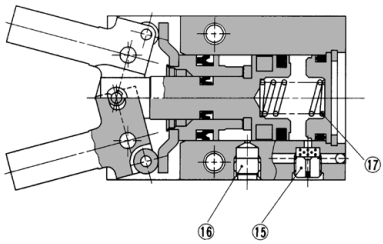


Construction

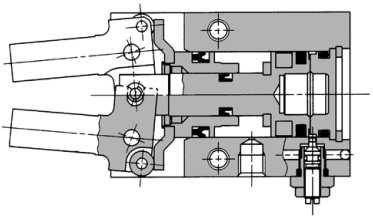
Double acting/With fingers open



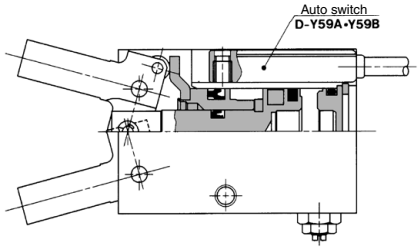
Single acting



Double acting/With fingers closed



With auto switch



Component Parts

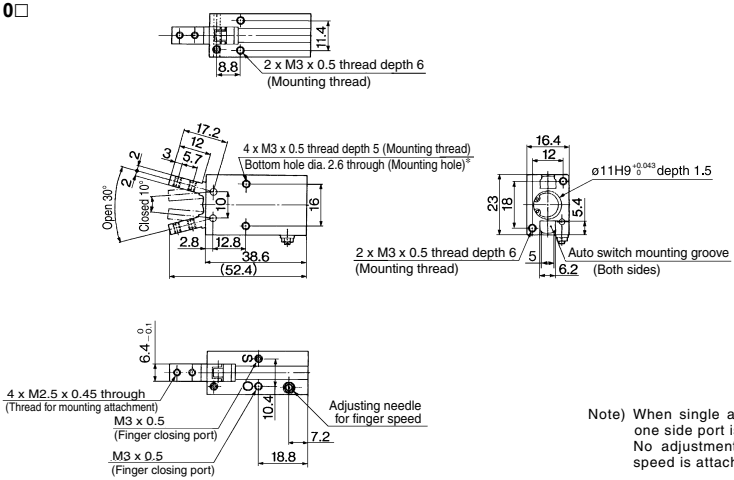
No.	Description	Material	Note
1	**Body**	Aluminum alloy	Hard anodized
2	**Piston A**	Aluminum alloy	Hard anodized
3	**Piston B assembly**		
4	**Finger**	ø10 to ø20: Stainless steel ø25: Carbon steel	Heat treated
5	**Side roller**	Carbon steel	Nitriding
6	**Lever shaft**	Stainless steel	Nitriding
7	**Center roller**	Carbon steel	Nitriding
8	**Center pin**	Carbon steel	Nitriding
9	**Cap**	Resin	
10	**Bumper**	Urethane rubber	

Component Parts

No.	Description	Material	Note
11	**Rubber magnet**	Synthetic rubber	
12	**Type C retaining ring**	Carbon steel	Phosphate coated
13	**Needle roller**	High carbon chrome bearing steel	
14	**Needle assembly**	Brass	Electroless nickel plated
15	**Exhaust plug**	Brass	Electroless nickel plated
16	**Plug**	Brass	Electroless nickel plated
17	**Spring**	Stainless steel spring wire	
18	**Piston seal**	NBR	
19	**Piston seal**	NBR	
20	**Piston seal**	NBR	
21	**Gasket**	NBR	

Double Acting: Size 10, 16

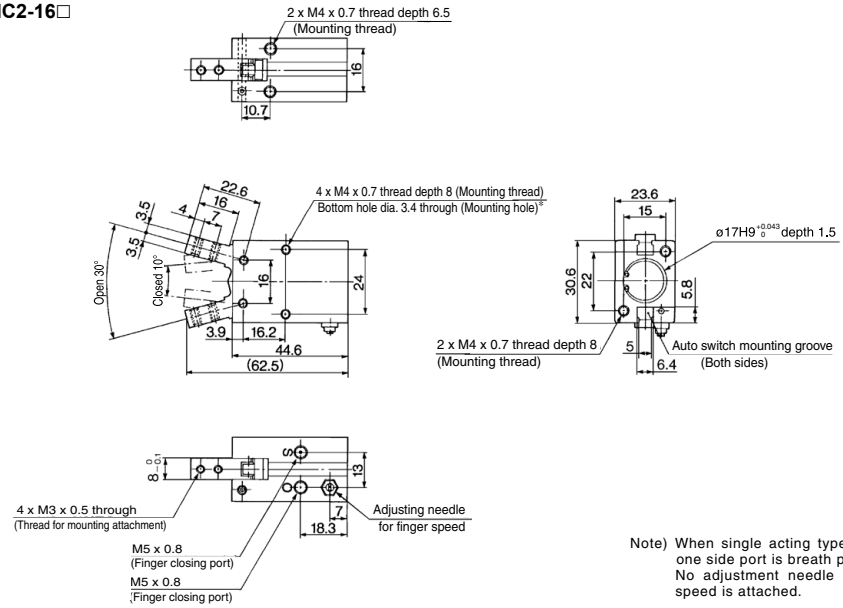
MHC2-10□



Note) When single acting type is used, one side port is breath port. No adjustment needle for finger speed is attached.

* When auto switches are used, through hole mounting is not available.

MHC2-16□

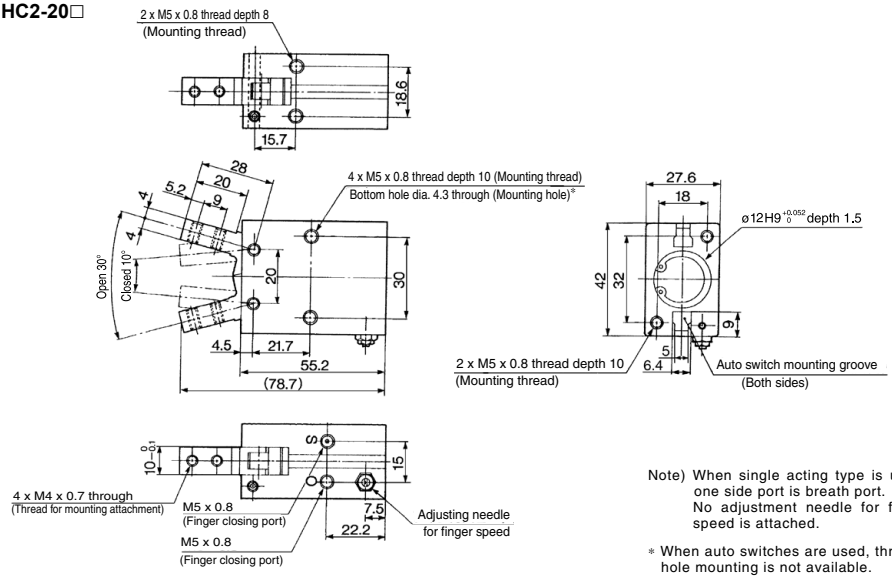


Note) When single acting type is used, one side port is breath port. No adjustment needle for finger speed is attached.

* When auto switches are used, through hole mounting is not available.

Double Acting: Size 20, 25

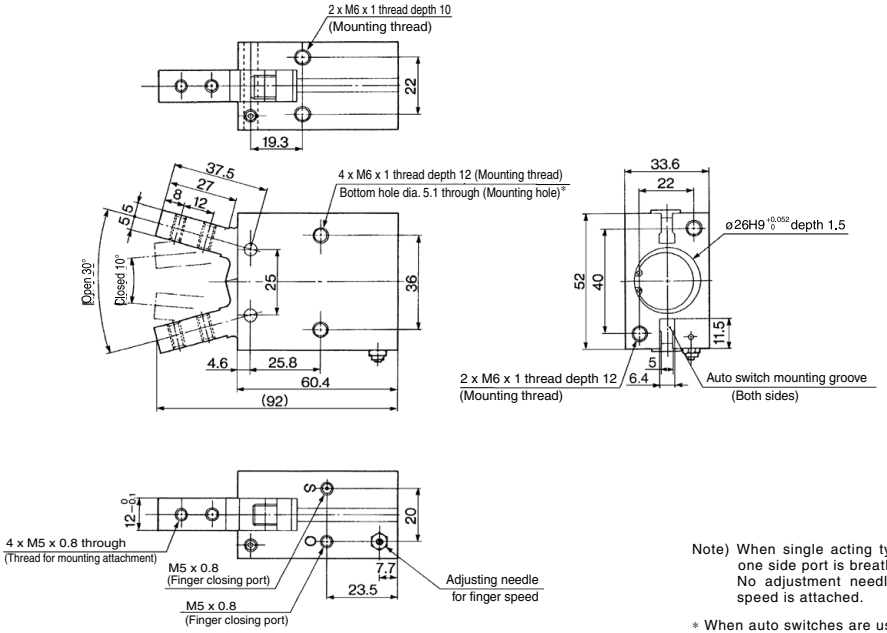
MHC2-20□



Note) When single acting type is used, one side port is breath port. No adjustment needle for finger speed is attached.

* When auto switches are used, through hole mounting is not available.

MHC2-25□



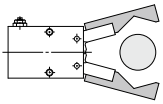
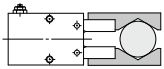
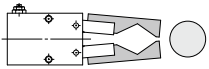
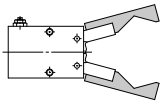
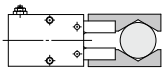
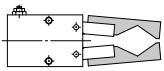
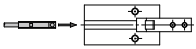
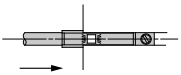
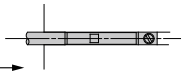
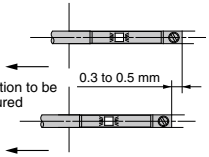
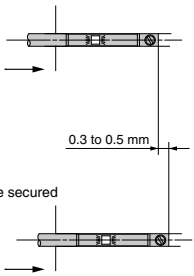
Note) When single acting type is used, one side port is breath port. No adjustment needle for finger speed is attached.

* When auto switches are used, through hole mounting is not available.

MHC2 Series
Auto Switch Installation Examples and Mounting Positions

Various auto switch applications are possible through different combinations of auto switch quantities and detecting positions.

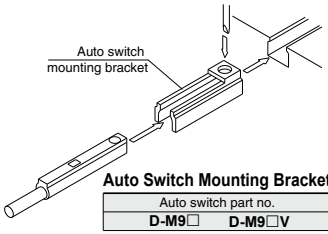
Detection when Gripping Exterior of Workpiece

Detection example	1. Confirmation of fingers in reset position	2. Confirmation of workpiece held	3. Confirmation of workpiece released
Position to be detected	Position of fingers fully opened 	Position when gripping a workpiece 	Position of fingers fully closed 
Operation of auto switch	Auto switch turned ON when fingers return. (Light ON)	Auto switch turned ON when gripping a workpiece. (Light ON)	When a workpiece is not held (Abnormal operation): Auto switch to turn ON (Light ON)
Detection combinations — One auto switch ∗ One position, any of ①, ② and ③ can be detected.	●	●	●
Detection combinations — Two auto switches ∗ Two positions of ①, ② and ③ can be detected. — Pattern A	●	●	—
Pattern B	—	●	●
Pattern C	●	—	●
How to determine auto switch installation position	Step 1) Fully open the fingers. 	Step 1) Position fingers for gripping a workpiece. 	Step 1) Fully close the fingers. 
At no pressure or low pressure, connect the auto switch to a power supply, and follow the directions.	Step 2) Insert the auto switch into the auto switch installation groove in the direction shown in the following drawing. 		
	Step 3) Slide the auto switch in the direction of the arrow until the indicator light illuminates.  Step 4) Slide the auto switch further in the direction of the arrow until the indicator light goes out.  Step 5) Move the auto switch in the opposite direction and fasten it at a position 0.3 to 0.5 mm beyond the position where the indicator light illuminates. Position where light turns ON 	Step 3) Slide the auto switch in the direction of the arrow until the light illuminates and fasten it at a position 0.3 to 0.5 mm in the direction of the arrow beyond the position where the indicator light illuminates. Position where light turns ON 	

Note 1) It is recommended to grip a workpiece when the fingers are in parallel with each other.
Note 2) When holding a workpiece close at the end of open/close stroke of fingers, detecting performance of the combinations listed in the above table may be limited, depending on the hysteresis of an auto switch, etc.

Auto Switch Mounting

(1) To set the auto switch, insert the auto switch into the installation groove of the cylinder as shown below and set it roughly.
(2) Insert the auto switch into the auto switch bracket installation groove.
(3) After confirming the detecting position, tighten the set screws (M2.5) attached t theauto switch and set it.
(4) Be sure to change the detecting position in the state of (2).



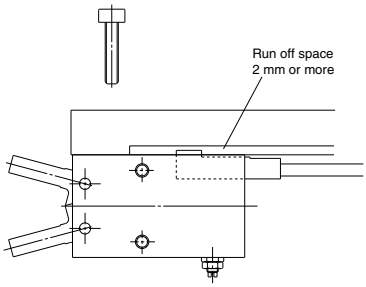
Auto Switch Mounting Bracket: Part No.

Auto switch part no.		Auto switch mounting bracket part no.
D-M9□	**D-M9□V**	BMG2-012

Note) Use a screwdriver with a grip diameter of 5 to 6 mm to tighten the set screws (M2.5).
The tightening torque should be 0.05 to 1 N·m.
As a guide, it should be turned about 90° beyond the point at which tightening can be felt.

Handling of Mounting Brackets: Precautions

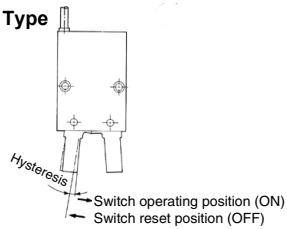
When auto switch is set on the mounting side as shown below, allow at least 2 mm run off space on mounting late since the auto switch is protruded from the gripper edge.



Auto Switch Hysteresis

Auto switches have hysteresis similar to micro switches. Use the table below as a guide when adjusting auto switch positions, etc.

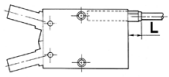
Angular Type



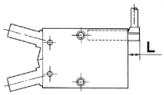
Air gripper model	Hysteresis degree (Max. value)
MHC2-10	4
MHC2-16	3
MHC2-20	2
MHC2-25	2

Protrusion of Auto Switch from Edge of Body

The maximum protrusion of an auto switch (when fingers are fully closed) from the edge of the body is shown in the table below.



When auto switch D-M9□



When auto switch D-M9□V

Max. Protrusion of Auto Switch from Edge of Body (L)

(mm)

Air gripper model \ Auto switch model	D-M9□	D-M9□V
MHC2-10	7.5	5.5
MHC2-16	6.5	5.5
MHC2-20	5.5	4.5
MHC2-25	3.5	2.5

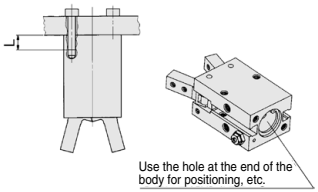
Note) The actual setting position should be adjusted after confirming the auto switch operating condition.

MHC2 Series
Specific Product Precautions
Be sure to read this before handling the products.

Mounting Air Grippers/MHC2 Series

Possible to mount from 3 directions.

Axial Mounting (Body tapped)

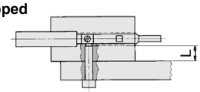


Model	Applicable bolts	Max. tightening torque N·m	Max. screw-in depth L mm
MHC2-10	M3 x 0.5	0.88	6
MHC2-16	M4 x 0.7	2.1	8
MHC2-20	M5 x 0.8	4.3	10
MHC2-25	M6 x 1	7.3	12

Model	Hole size (mm)	Hole depth (mm)
MHC2-10	ø11H9 $^{+0.043}_{0}$	1.5
MHC2-16	ø17H9 $^{+0.043}_{0}$	1.5
MHC2-20	ø21H9 $^{+0.043}_{0}$	1.5
MHC2-25	ø26H9 $^{+0.043}_{0}$	1.5

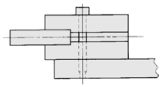
Lateral mounting (Body tapped and through-hole)

●**Body tapped**



Model	Applicable bolts	Max. tightening torque N·m	Max. screw-in depth L mm
MHC2-10	M3 x 0.5	0.69	5
MHC2-16	M4 x 0.7	2.1	8
MHC2-20	M5 x 0.8	4.3	10
MHC2-25	M6 x 1	7.3	12

●**Body through-hole**

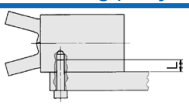


Model	Applicable bolts	Max. tightening torque N·m
MHC2-10	M2.5 x 0.45	0.49
MHC2-16	M3 x 0.5	0.88
MHC2-20	M4 x 0.7	2.1
MHC2-25	M5 x 0.8	4.3

Model	Max. screw-in depth L mm
MHC2-10	5
MHC2-16	8
MHC2-20	10
MHC2-25	12

Note) If an auto switch is to be mounted, only the tapped holes can be used. Make sure that the bolt's screw-in depth is less than those shown in the table on the left to prevent the tip of the bolt from pressing the switch body.

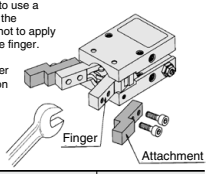
Vertical Mounting (Body tapped)



Model	Applicable bolts	Max. tightening torque N·m	Max. screw-in depth L mm
MHC2-10	M3 x 0.5	0.88	6
MHC2-16	M4 x 0.7	1.6	6.5
MHC2-20	M5 x 0.8	3.3	8
MHC2-25	M6 x 1	5.9	10

How to Mount the Attachment to the Finger

To mount the attachment to the finger, make sure to use a wrench to support the attachment so as not to apply undue strain on the finger. Refer to the table below for the proper tightening torque on the bolt used for securing the attachment to the finger.



Model	Applicable bolts	Max. tightening torque N·m
MHC2-10	M2.5 x 0.45	0.31
MHC2-16	M3 x 0.5	0.59
MHC2-20	M4 x 0.7	1.4
MHC2-25	M5 x 0.8	2.8

Operating Environment

⚠Caution

Use caution for the anti-corrosiveness of finger guide section.

Martensitic stainless steel is used for the finger. However, be aware that its anti-corrosion performance is inferior to austenitic stainless steel. In particular, the finger might be rusted in an environment where water droplets are adhered to it due to dew condensation.