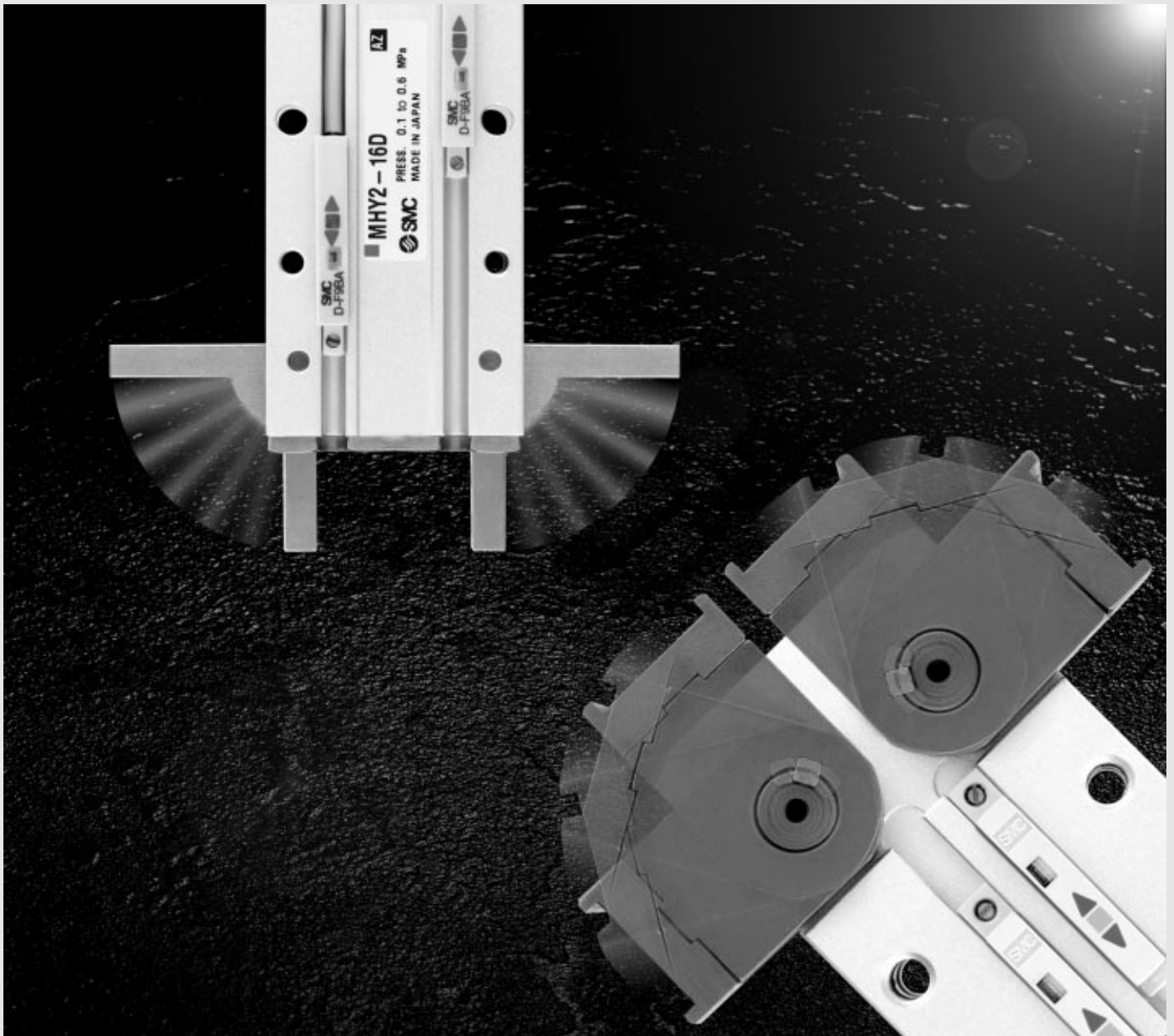


# 180° Angular Gripper

Cam Style

Rack & Pinion Style

# Series *MHY2/MHW2*



MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

**MHY2**

**MHW2**

MRHQ

Auto switch

Cam actuation style is now standardized !

# 180° Angular Gripper

Cam Style

Rack & Pinion Style

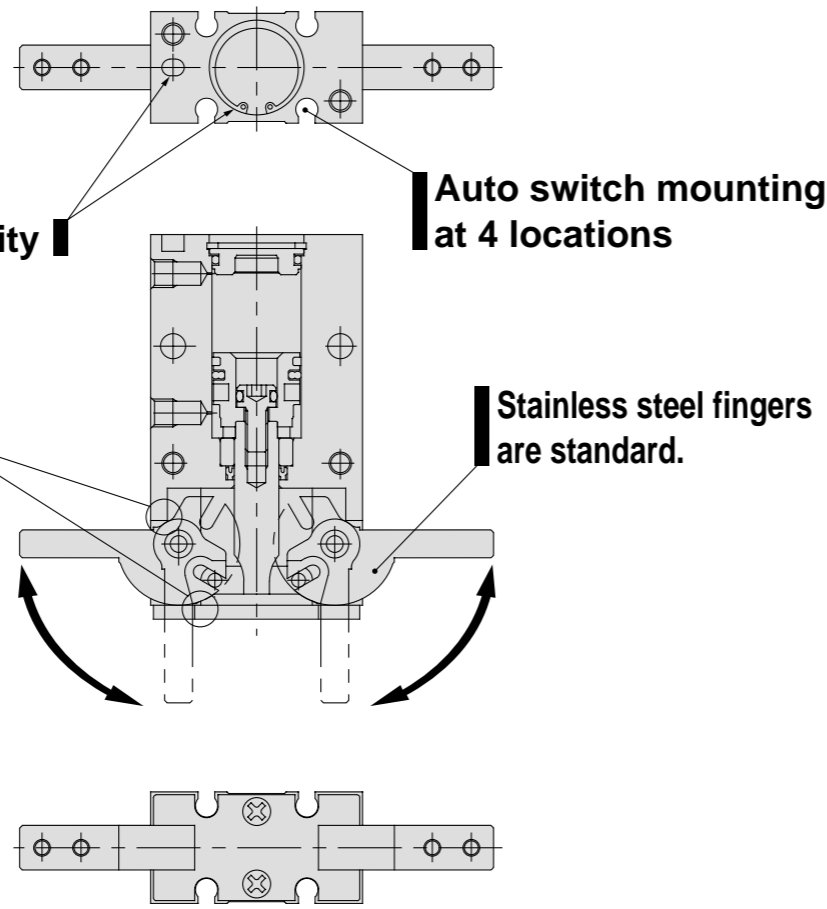
## Series *MHY2/MHW2*

### Series *MHY/Cam Style*

Light and compact size in small bore sizes

Model	Bore size mm	Effective holding moment* Nm	Overall length Lmm	Weight g
MHY2-10D	10	0.16	71	70
MHY2-16D	16	0.54	84	150
MHY2-20D	20	1.10	106	320
MHY2-25D	25	2.28	131	560

\*At pressure of 0.5MPa



### Series *MHW/Rack & Pinion Style*

Unique seal design allows shorter total length construction and constant holding force when opening and closing fingers. (PAT.PEND)



Model	Bore size mm	Holding moment* Nm	Over length Lmm	Weight g
MHW2-20D	20	0.30	68	300
MHW2-25D	25	0.73	78	510
MHW2-32D	32	1.61	93.5	905
MHW2-40D	40	3.70	117.5	2135
MHW2-50D	50	8.27	154	5100

\*At the pressure of 0.5MPa

**Auto switch mounting at 4 locations**

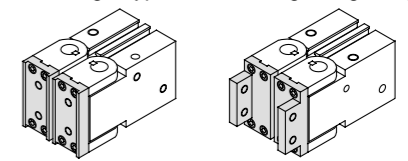
**Key connection is ideal for impact resistance.**

Key connection between finger and shaft prevents finger angle slippage during impact.

**Two finger styles available.**

Flat finger type

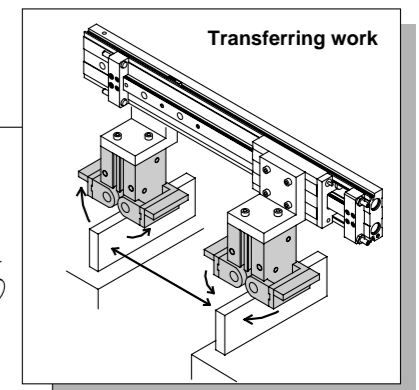
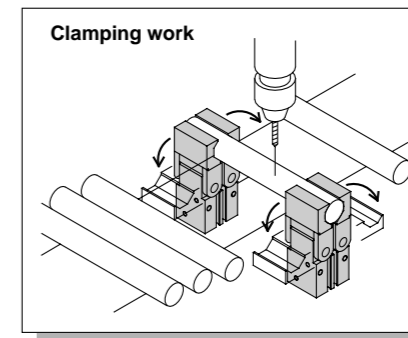
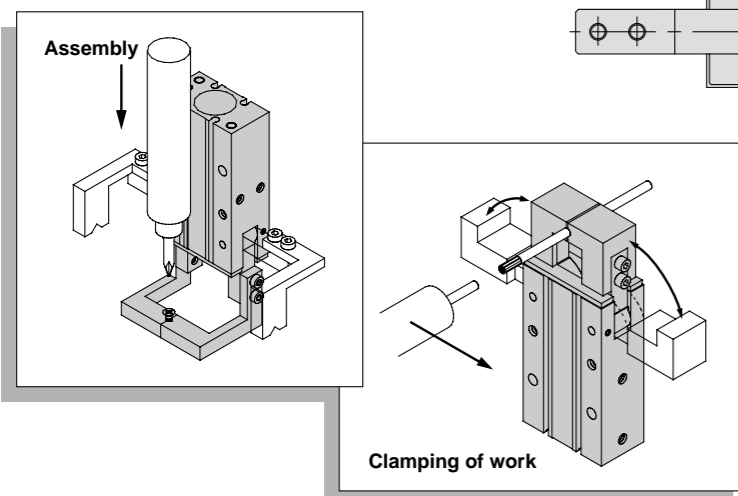
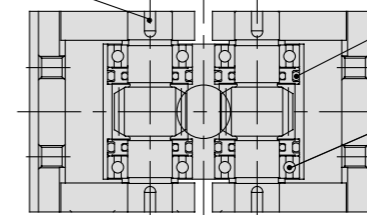
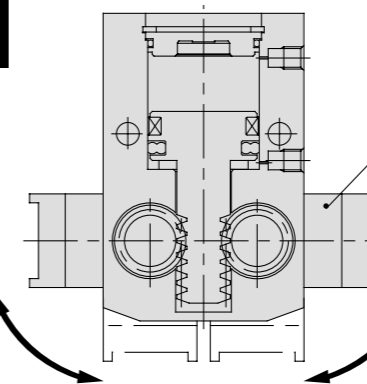
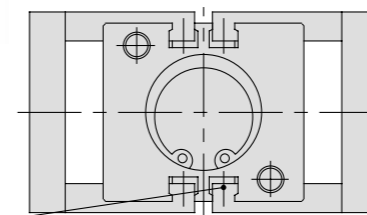
Right angle finger type



**Dust proof construction**

Seal arrangement protects gripper from harsh dusty environments.

**Bearings are standard.**



#### Variation

	Bore size (mm)						Applicable auto switch	Page
	10	16	20	25	32	40		
Cam style Series <b>MHY</b>	●	●	●	●	●	●	Solid state switch D- F9/F9 □ W type Water resistant 2 color indication D-F9BA Type	P.2.8-8 to 2.8-15
Rack & Pinion style Series <b>MHW</b>			●	●	●	●	Solid state switch D-Y5/Y6 type D-Y7 type Water resistant 2 color indication D-Y7BA type	P.2.8-16 to 2.8-23

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P.2.8-8 to 2.8-15
P.2.8-16 to 2.8-23

MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

MHY2

MHW2

MRHQ

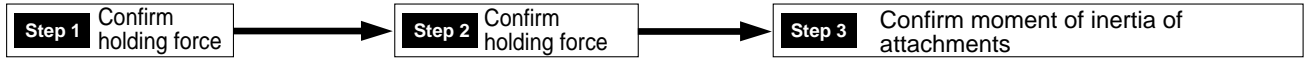
Auto switch

# Series MHY2/MHW2

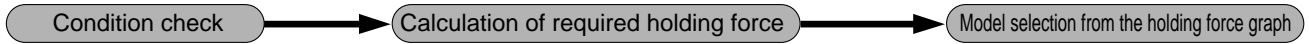
# How to Select the Applicable Model

## How to Select

### Procedure



### Step 1 Confirm holding force



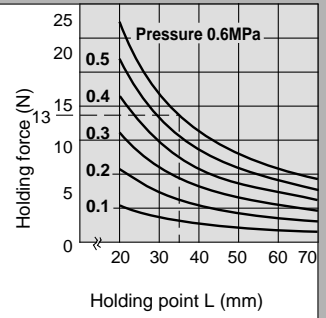
Example Work weight: 0.05kg

#### Guidelines on model selection according to work weight

- Although the condition differs according to the coefficient of friction between the attachment and work, select a model that can produce a holding force of 10 to 20 times the work weight.
- Further allowance should be provided when great acceleration or impact is expected during work transfer.

Ex.) For setting the holding force to be at least 20 times the work weight;  
 Required holding force =  $0.05\text{kg} \times 20 \times 9.8\text{m/s}^2$   
 = 10N min.

#### MHY2-16D



- When MHY2-16D is selected, the holding force is determined to be 13N according to the holding point distance (L = 35mm) and the pressure (0.6MPa).
- The holding force is 26 times the work weight meeting the guideline that holding force should be more than 20 times the set holding force value.

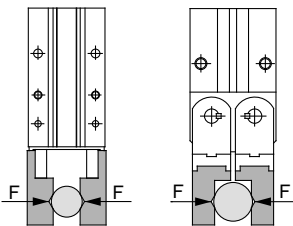
Holding point L = 35mm

Operating pressure: 0.6MPa

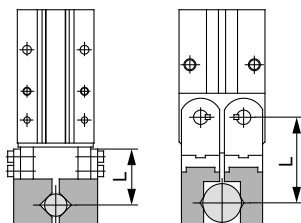
## Effective holding force

### Series MHY2/MHW2 Double acting

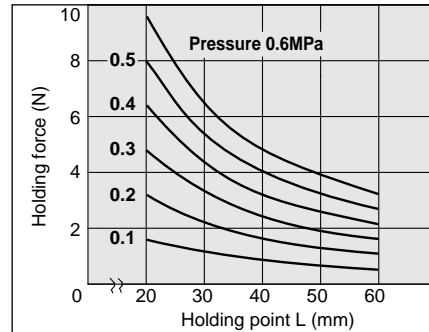
- Indication of effective holding force  
 The holding force shown in the tables represents the holding force of one finger when all fingers and attachments are in contact with the work.  
 (F: Thrust of one finger)



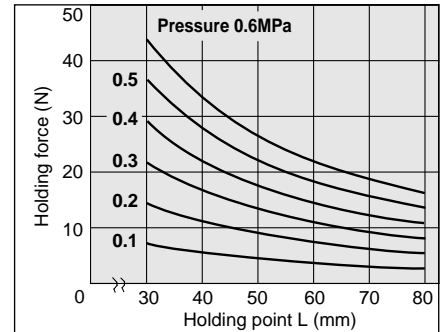
#### External hold



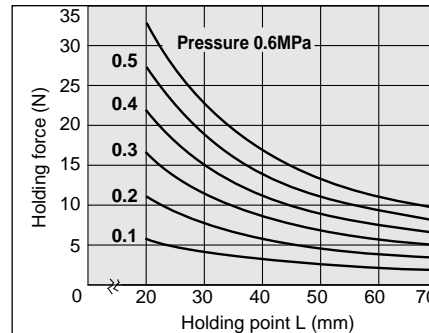
#### MHY2-10D



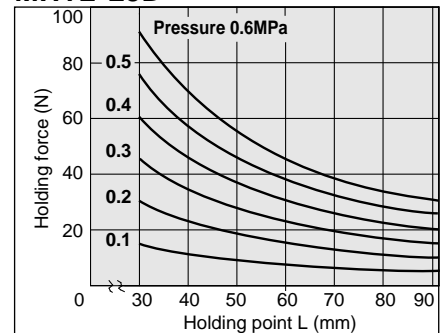
#### MHY2-20D



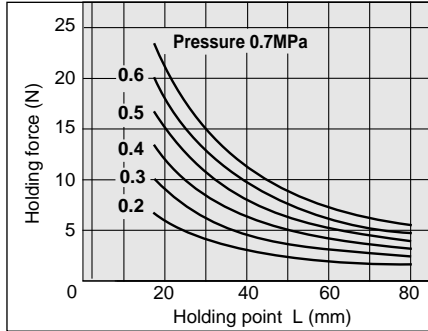
#### MHY2-16D



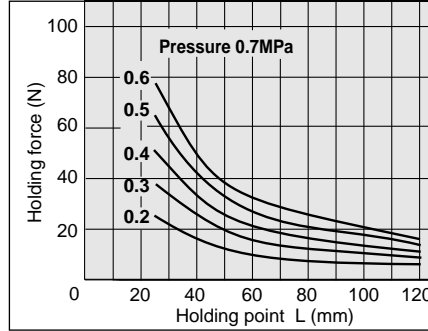
#### MHY2-25D



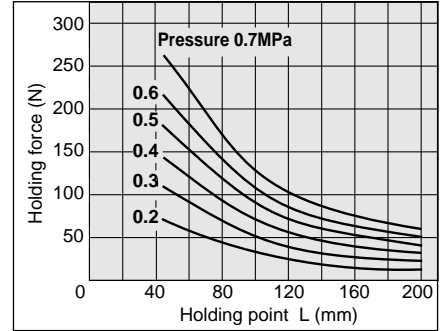
**MHW2-20D**



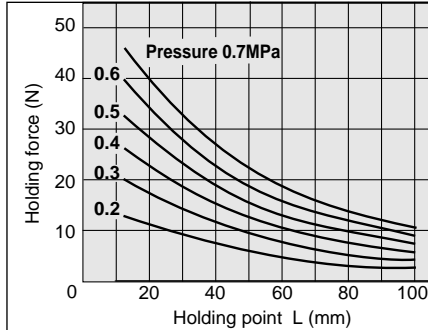
**MHW2-32D**



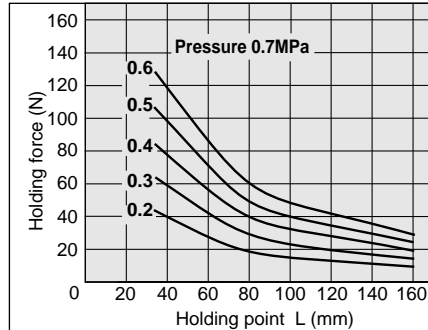
**MHW2-50D**



**MHW2-25D**



**MHW2-40D**



MHZ2

MHZJ2

MHQ

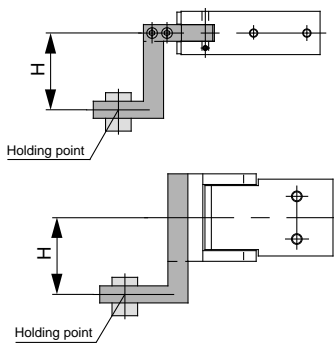
MHL2

MHR

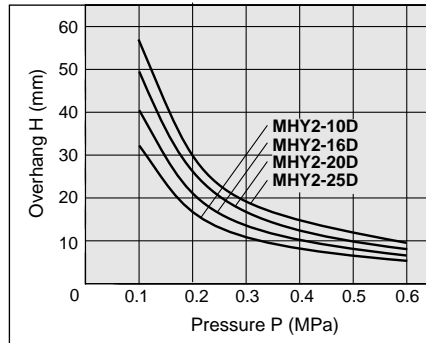
MHK

MHS

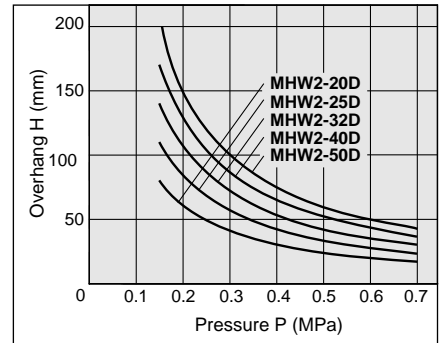
**Step 2** Confirmation of holding point



**MHY**



**MHW**



MHC2

MHT2

**MHY2**

**MHW2**

MRHQ

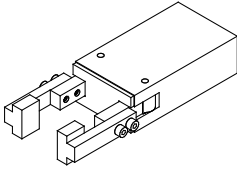
Auto switch

- Work should be held at a point within the range of overhanging distance (H) for a given pressure indicated in the tables on the right.
- When the work is held at a point outside of the recommended range for a given pressure, it may cause adverse effect on the product life.

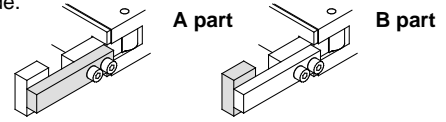
# Series MHY2/MHW2

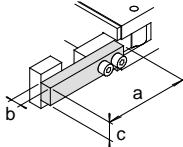
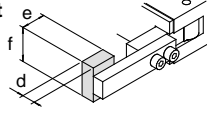
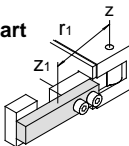
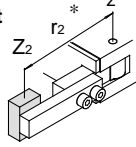
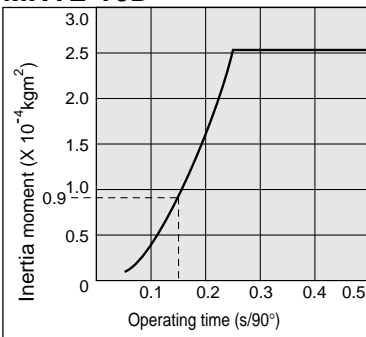
## How to Select the Applicable Model

### Step 3 Confirm moment of inertia of attachments



Confirm the moment of inertia for the attachment at one side.  
Calculate the moment of inertia for A and B separately as shown in the figures on the right.



Procedure	Formula	Calculation example
<p><b>1</b> Check the operating conditions, dimensions of attachment, etc.</p>	<p><b>A part</b></p>  <p><b>B part</b></p> 	<p>Operating model: MHY2-16D Opening time: 0.15s a = 40 (mm) b = 7 (mm) c = 8 (mm) d = 5 (mm) e = 10 (mm) f = 12 (mm)</p>
<p><b>2</b> Calculate the moment of inertia of attachment.</p>	<p><b>A part</b></p>  <p>Calculation of weight <math>m_1 = a \times b \times c \times \text{Specific gravity}</math></p> <p>Moment of inertia around Z1 axis <math>I_{z1} = \{m_1(a^2 + b^2)/12\} \times 10^{-6}</math>*</p> <p>Moment of inertia around Z axis <math>I_A = I_{z1} + m_1 r_1^2 \times 10^{-6}</math>*</p> <p><b>B part</b></p>  <p>Calculation of weight <math>m_2 = d \times e \times f \times \text{Specific gravity}</math></p> <p>Moment of inertia around Z2 axis <math>I_{z2} = \{m_2(d^2 + e^2)/12\} \times 10^{-6}</math>*</p> <p>Moment of inertia around Z axis <math>I_B = I_{z2} + m_2 r_2^2 \times 10^{-6}</math>*</p> <p>Total moment of inertia (*: constant for unit conversion) <math>I = I_A + I_B</math></p>	<p>Material of attachment: Aluminum alloy (Specific gravity = 2.7) <math>r_1 = 37</math> (mm)</p> <p><math>m_1 = 40 \times 7 \times 8 \times 2.7 \times 10^{-6}</math> <math>= 0.006</math> (kg)</p> <p><math>I_{z1} = \{0.006 \times (40^2 + 7^2)/12\} \times 10^{-6}</math> <math>= 0.8 \times 10^{-6}</math> (kgm<sup>2</sup>)</p> <p><math>I_A = 0.8 \times 10^{-6} + 0.006 \times 37^2 \times 10^{-6}</math> <math>= 9.0 \times 10^{-6}</math> (kgm<sup>2</sup>)</p> <p><math>r_2 = 47</math> (mm)</p> <p><math>m_2 = 5 \times 10 \times 12 \times 2.7 \times 10^{-6}</math> <math>= 0.002</math> (kg)</p> <p><math>I_{z2} = \{0.002 \times (5^2 + 10^2)/12\} \times 10^{-6}</math> <math>= 0.02 \times 10^{-6}</math> (kgm<sup>2</sup>)</p> <p><math>I_B = 0.02 \times 10^{-6} + 0.002 \times 47^2 \times 10^{-6}</math> <math>= 4.4 \times 10^{-6}</math> (kgm<sup>2</sup>)</p> <p><math>I = 9.0 \times 10^{-6} + 4.4 \times 10^{-6}</math> <math>= 13.4 \times 10^{-6} = 0.13 \times 10^{-4}</math> (kgm<sup>2</sup>)</p>
<p><b>3</b> Determine the allowable moment of inertia from the graph.</p>	<p><b>MHY2-16D</b></p> 	<p>The moment of inertia is determined to be <math>0.9 \times 10^{-4}</math> (kgm<sup>2</sup>) according to the operating time (0.15s) from the graph on the left.</p>
<p><b>4</b> Confirm the moment of inertia of one attachment is within the allowable range.</p>	<p>Moment of inertia of attachment &lt; Allowable moment of inertia</p>	<p><math>0.13 \times 10^{-4}</math> (kgm<sup>2</sup>) &lt; <math>0.9 \times 10^{-4}</math> (kgm<sup>2</sup>) Possible to use this model MHY2-16D completely.</p>

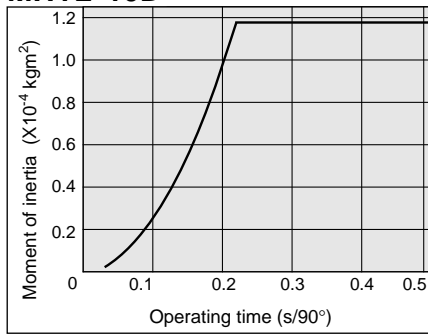
## Symbol

Symbol	Definition	Unit
Z	Finger rotation axis	—
Z1	Axis on the center gravity of A part of attachment and parallel to Z	—
Z2	Axis on the center gravity of B part of attachment and parallel to Z	—
I	Total moment of inertia for attachment	kgm <sup>2</sup>
Iz1	Inertia moment around the Z1 axis of A part of attachment	kgm <sup>2</sup>
Iz2	Inertia moment around the Z2 axis of B part of attachment	kgm <sup>2</sup>

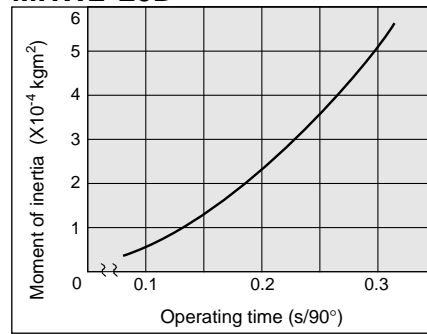
Symbol	Definition	Unit
IA	Moment of inertia around the Z axis of A part of attachment	kgm <sup>2</sup>
IB	Moment of inertia around the Z axis of B part of attachment	kgm <sup>2</sup>
m1	Weight of A part of attachment	kg
m2	Weight of B part of attachment	kg
r1	Distance between Z and Z1 axis	mm
r2	Distance between Z and Z2 axis	mm

## Allowable range of inertia moment of attachment

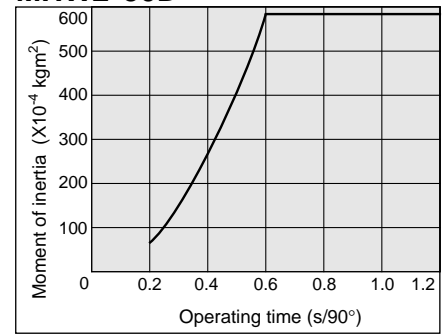
### MHY2-10D



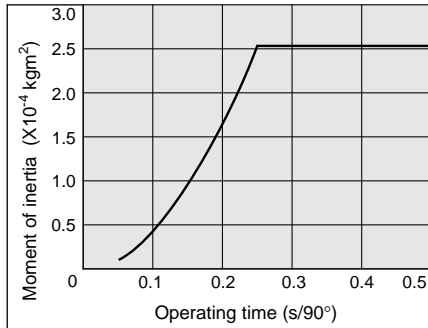
### MHW2-20D



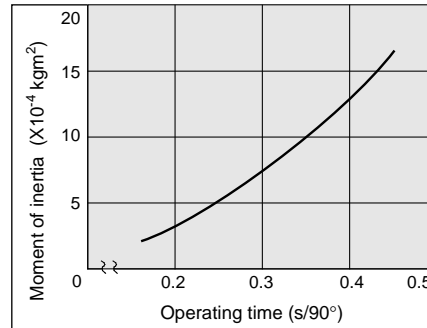
### MHW2-50D



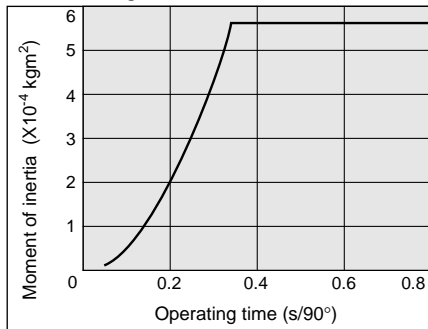
### MHY2-16D



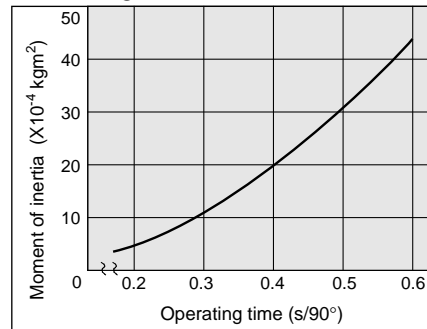
### MHW2-25D



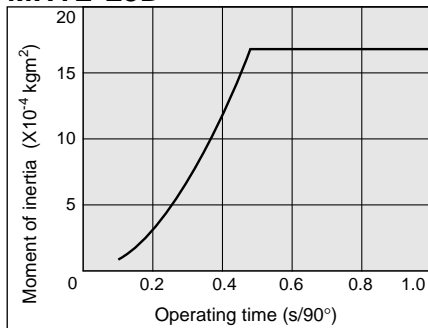
### MHY2-20D



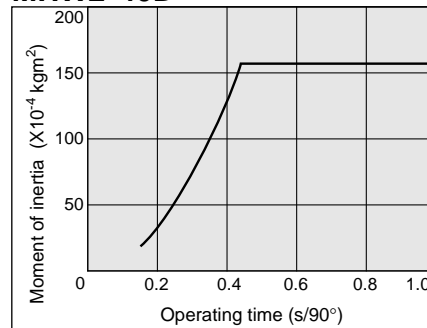
### MHW2-32D



### MHY2-25D



### MHW2-40D



MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

**MHY2****MHW2**

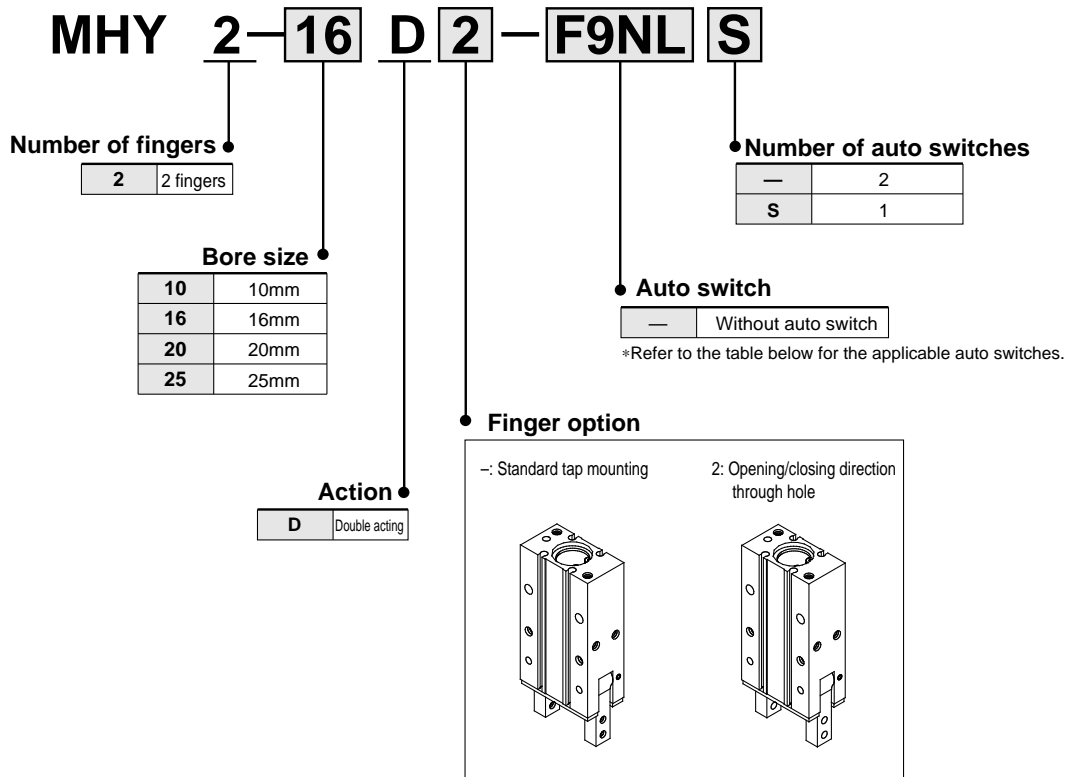
MRHQ

Auto switch

# Series *MHY2*

∅10, ∅16, ∅20, ∅25

## How to Order



### Applicable Auto Switches

Type	Special function	Electrical entry	Indicator	Wiring (Output)	Load voltage		Symbol		Lead wire length (m)		Applicable load			
					DC	AC	Electrical entry		0.5 (-)	3 (L)				
							Perpendicular	In-line						
Solid state	—	Grommet	With	3 wire (NPN)	24V	—	F9NV	F9N	●	●	Relay PLC			
				3 wire (PNP)					F9PV	F9P		●	●	
				2 wire					F9BV	F9B		●	●	
	3 wire (NPN)			F9NWV					F9NW	●		●		
	3 wire (PNP)									F9PWV		F9PW	●	●
	2 wire									F9BWV		F9BW	●	●



\*Lead wire length: 0.5m.....— (Example) F9N  
3m.....L (Example) F9NL  
Note 1) Refer to "Auto Switch Specifications" on p.2.11-1.

## Specifications



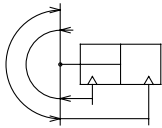
<b>Fluid</b>	Air
<b>Operating pressure</b>	0.1 to 0.6MPa
<b>Ambient and fluid temperature</b>	-10 to 60°C
<b>Repeatability</b>	±0.2mm
<b>Max. operating frequency</b>	60c.p.m
<b>Lubrication</b>	Not required
<b>Action</b>	Double acting
<b>Auto switch (Optional) <sup>Note)</sup></b>	Solid state switch (3 wire, 2 wire)



Note) Refer to p. 2.11-1 for details of auto switch specifications.

## Symbol

### Double acting



## Model

Model	Bore size (mm)	Effective holding force (Nm) <sup>(1)</sup>	Opening angle (Both sides)		Weight <sup>(2)</sup> (g)
			Opening side	Closing side	
<b>MHY2-10D</b>	10	0.16	180°	-3°	70
<b>MHY2-16D</b>	16	0.54			150
<b>MHY2-20D</b>	20	1.10			320
<b>MHY2-25D</b>	25	2.28			560



Note 1) At the pressure of 0.5MPa

Note 2) Not including auto switch



• Refer to the "How to Select the Applicable Model" on p.2.8-4.

• Refer to p.2.8-4 and 2.8-5 for the details of effective holding force and allowable overhanging distance.

MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

**MHY2**

MHW2

MRHQ

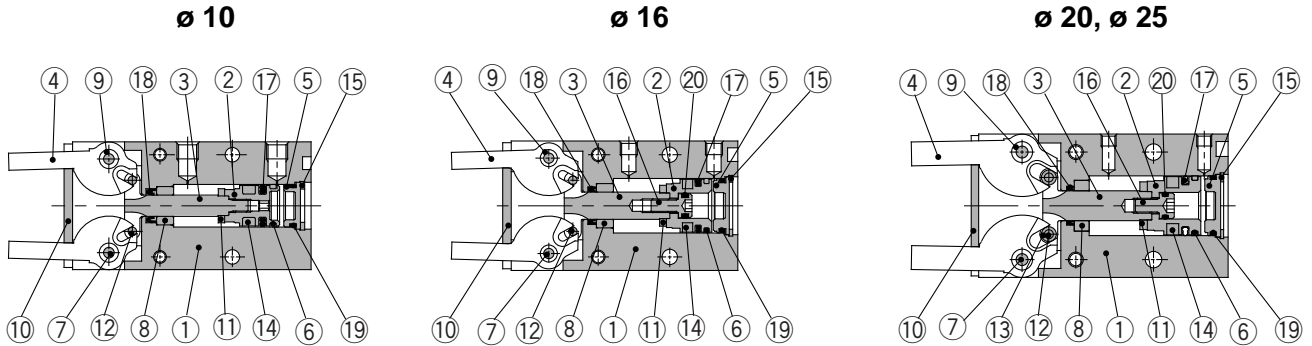
Auto switch



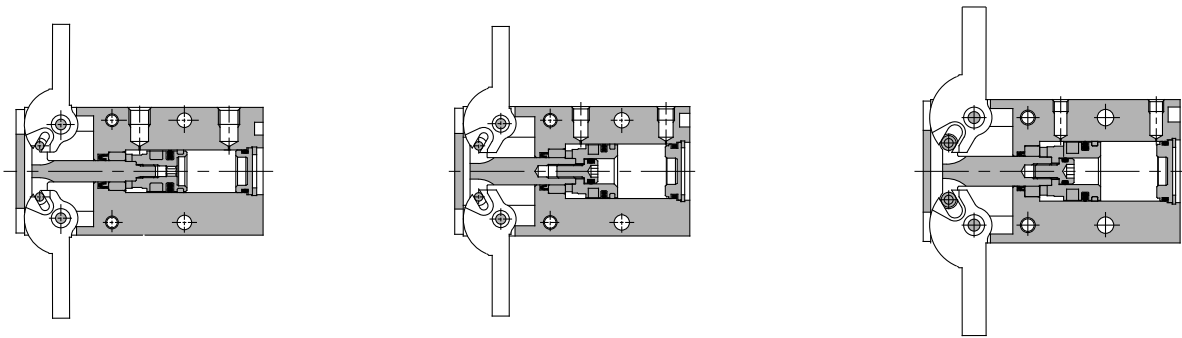
# Series MHY2

## Construction

### Closed



### Open



### Component Parts

No.	Description	Material	Note
①	<b>Body</b>	Aluminum alloy	Hard anodized
②	<b>Piston</b>	ø10: Stainless steel ø16 to 25: Aluminum alloy	ø16 to 25: Chromated
③	<b>Joint</b>	Stainless steel	Heat treatment
④	<b>Finger</b>	Stainless steel	Heat treatment
⑤	<b>Cap</b>	Resin	
⑥	<b>Ware ring</b>	Resin	
⑦	<b>Shaft</b>	Stainless steel	Nitriding
⑧	<b>Bushing A</b>	Sintered alloy steel	

### Component Parts

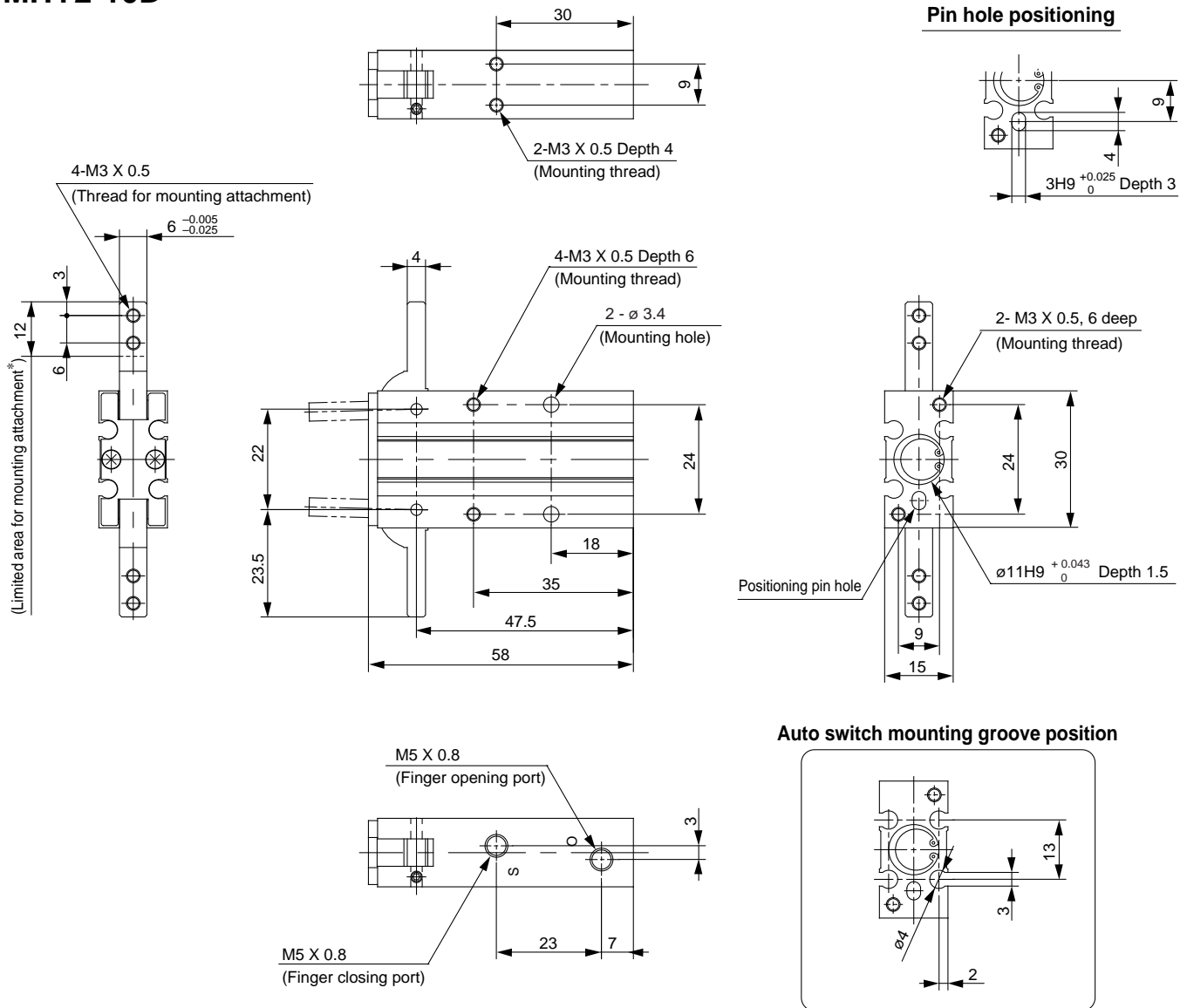
No.	Description	Material	Note
⑨	<b>Bushing B</b>	Sintered alloy steel	
⑩	<b>End plate</b>	Stainless steel	
⑪	<b>Bumper</b>	Urethane rubber	
⑫	<b>Cylindrical roller</b>	High carbon chrome bearing steel	
⑬	<b>Joint roller</b>	Carbon steel	Nitriding
⑭	<b>Rubber magnet</b>	Synthetic rubber	
⑮	<b>C-shape snap ring</b>	Carbon steel	Nickel plated
⑯	<b>Piston bolt</b>	Stainless steel	

### Replacement Parts: Seal Kits

No.	Description	Material	Kit No.			
			MHY2-10D	MHY2-16D	MHY2-20D	MHY2-25D
⑰	<b>Seal kit</b>	NBR	MHY10-PS	MHY16-PS	MHY20-PS	MHY25-PS
⑱						
⑲						
⑳						

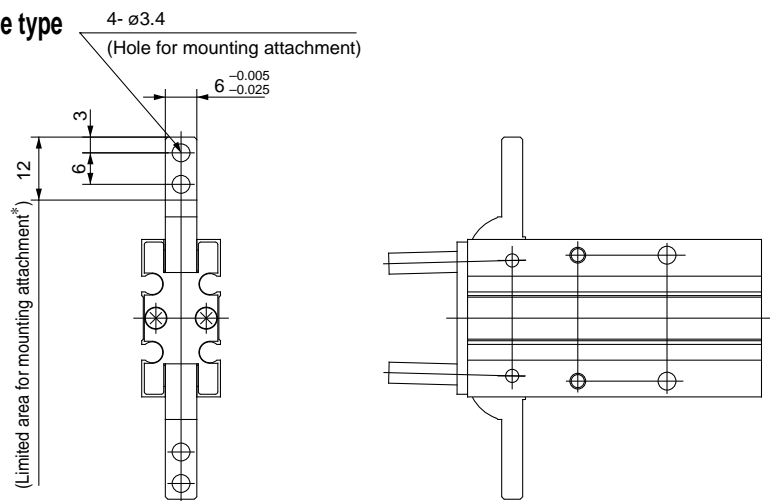
**Dimensions**

**MHY2-10D**



**MHY2-10D2**

Opening/closing direction through hole type



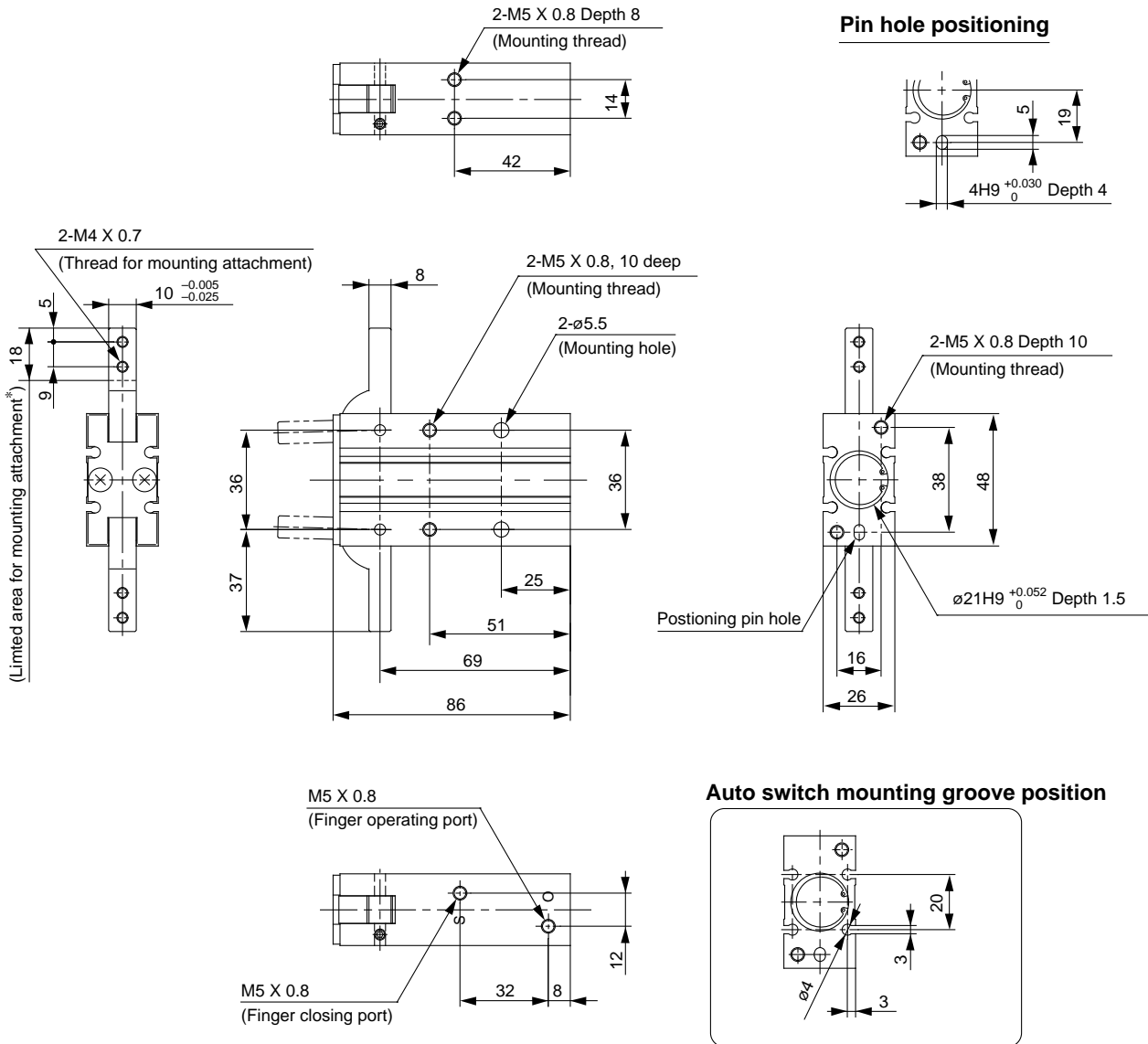
\* Do not extend the attachment from limited area for mounting to avoid interference with the attachment or main body.

- MHZ2
- MHZJ2
- MHQ
- MHL2
- MHR
- MHK
- MHS

- MHC2
- MHT2
- MHY2**
- MHW2
- MRHQ
- Auto switch

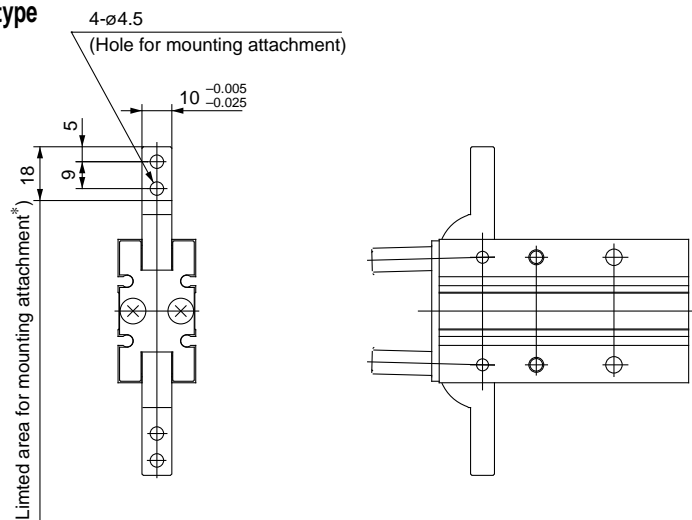


**MHY2-20D**



**MHY2-20D2**

Opening/closing direction through hole type



\* Do not extend the attachment from limited area for mounting to avoid interference with the attachment or main body.

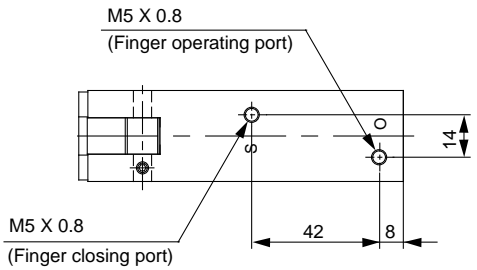
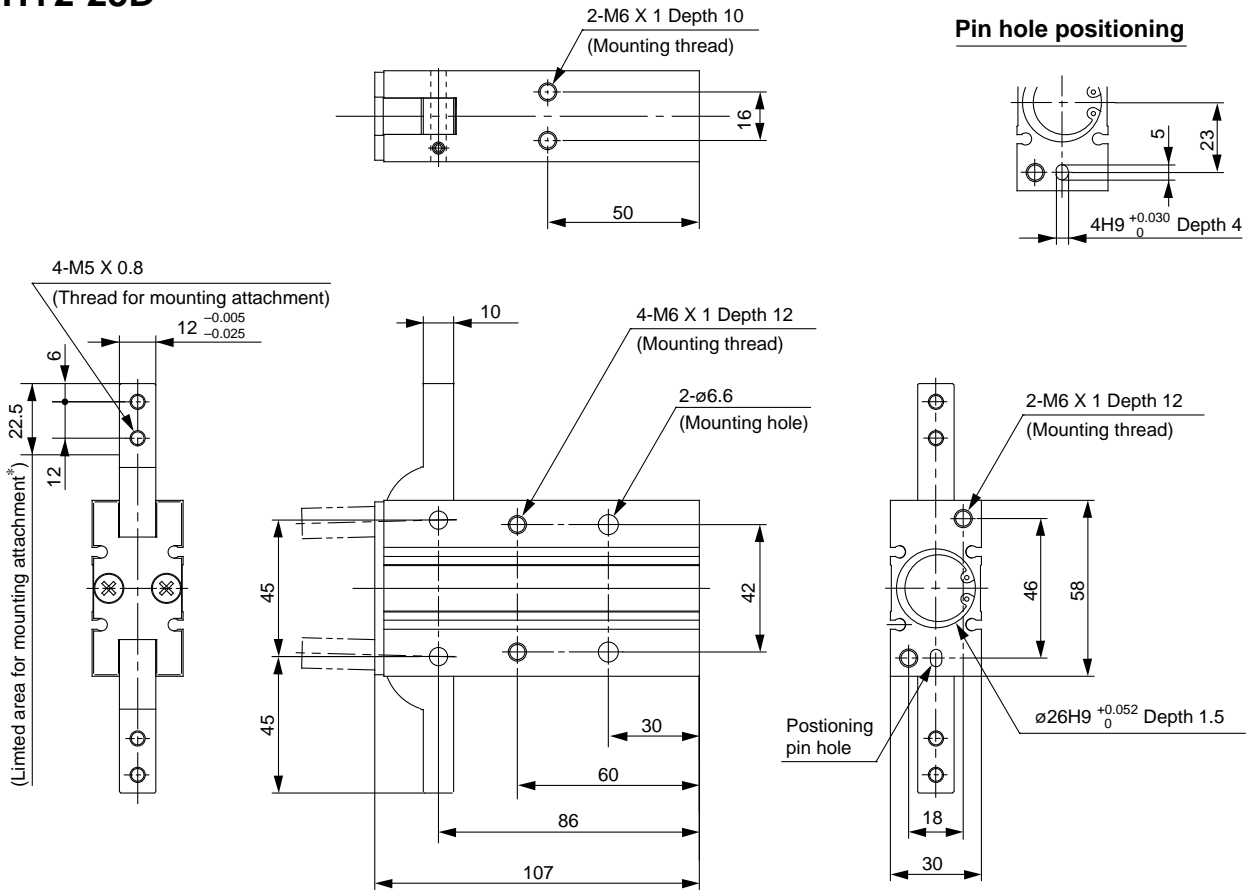
- MHZ2
- MHZJ2
- MHQ
- MHL2
- MHR
- MHK
- MHS

- MHC2
- MHT2
- MHY2**
- MHW2
- MRHQ
- Auto switch

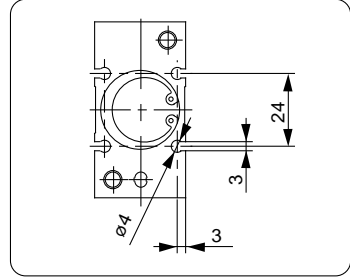
# Series MHY2

## Dimensions

### MHY2-25D

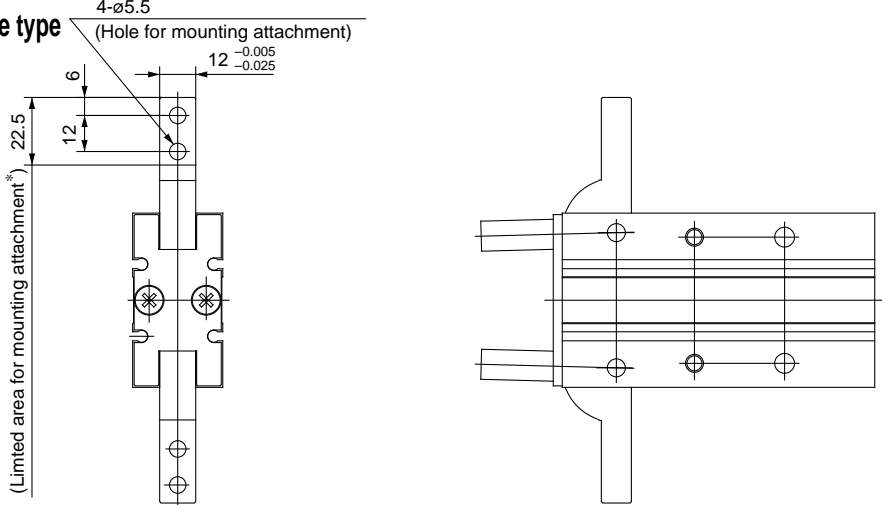


### Auto switch mounting groove position



### MHY2-25D2

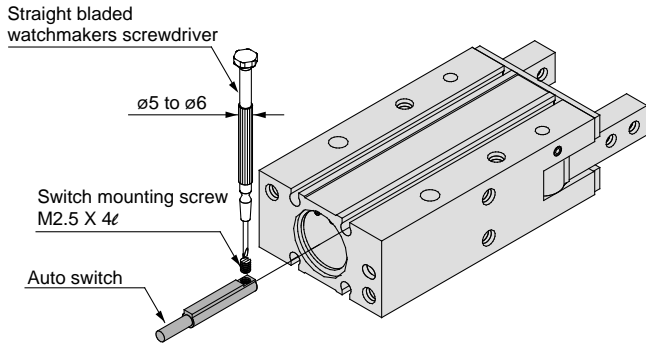
#### Opening/closing direction through hole type



\* Do not extend the attachment from limited area for mounting to avoid interference with the attachment or main body.

## Setting Method of Auto Switch

To set the auto switch, insert the auto switch into the installation groove of the gripper from the direction indicated in the following drawing. After establishing the installation position, tighten the attached switch mounting screw with a straight bladed watchmakers screwdriver.

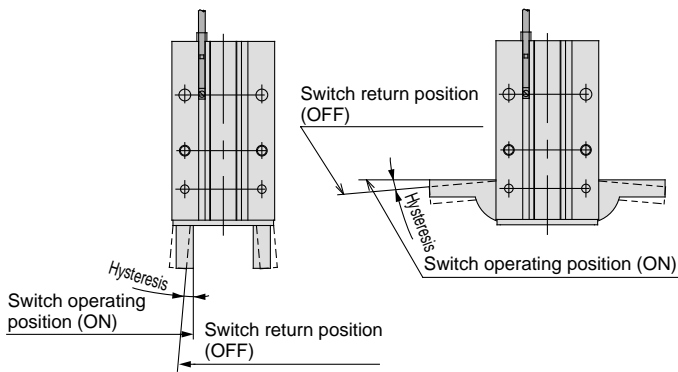


Note) Use a watchmakers screwdrivers with a grip diameter of 5 to 6 mm to tighten the auto switch mounting screw. Use a tightening torque of 0.05 to 0.1Nm. As a rough guide, tighten the screw an additional 90° after feeling a tighter resistance.

\*Refer to the p.2.11-7 for the details of "Solid State Switch /Connection Method and Connection Example".

## Auto Switch Hysteresis

Auto switches have a differential like a micro switch. Please refer to the following table as a guide when setting auto switch positions.

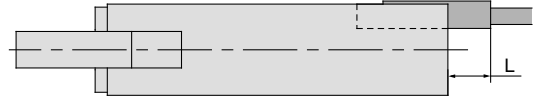


		D-F9N(V) D-F9B(V)	D-F9NW(V)		D-F9BA	
			Red light at ON	Green light at ON	Red light at ON	Green light at ON
<b>MHY2-10D</b>	Finger fully closed	2°	2°	4°	2°	3°
	Finger fully open	4°	4°	7°	4°	5°
<b>MHY2-16D</b>	Finger fully closed	2°	2°	4°	2°	2°
	Finger fully open	3°	3°	6°	3°	4°
<b>MHY2-20D</b>	Finger fully closed	2°	2°	3°	2°	2°
	Finger fully open	3°	3°	5°	3°	3°
<b>MHY2-25D</b>	Finger fully closed	1°	1°	3°	1°	2°
	Finger fully open	2°	2°	5°	2°	3°

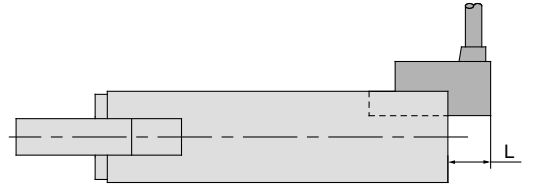
## Projection of Auto Switch from Body Edge

The projection of an auto switch from the edge of the body is shown in the table below. Use the table as a guideline for mounting.

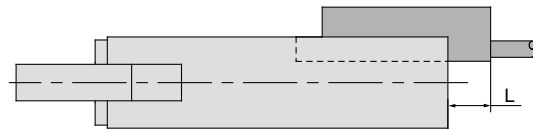
Note) 2 color indicator type and perpendicular entry type protrude in the direction of the lead wire entry.



When auto switch D-F9N is used



When auto switch D-F9□V is used



When auto switch D-F9BA is used

Max. protrusion of auto switch from edge of body (L) Unit: mm

Gripper Model No.	Auto switch model No.	Protrusion						
		In-line			Perpendicular			
		D-F9N	D-F9B	D-F9BA	D-F9NW	D-F9NV	D-F9BV	D-F9NWV
<b>MHY2-10D</b>	O	—	—	—	—	—	—	—
	S	3	8	13	6	1	1	8
<b>MHY2-16D</b>	O	—	—	—	—	—	—	—
	S	3	8	13	7	1	1	8
<b>MHY2-20D</b>	O	—	—	—	—	—	—	—
	S	—	5	10	4	—	—	5
<b>MHY2-25D</b>	O	—	—	—	—	—	—	—
	S	—	3	9	3	—	—	3

MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

**MHY2**

MHW2

MRHQ

Auto switch