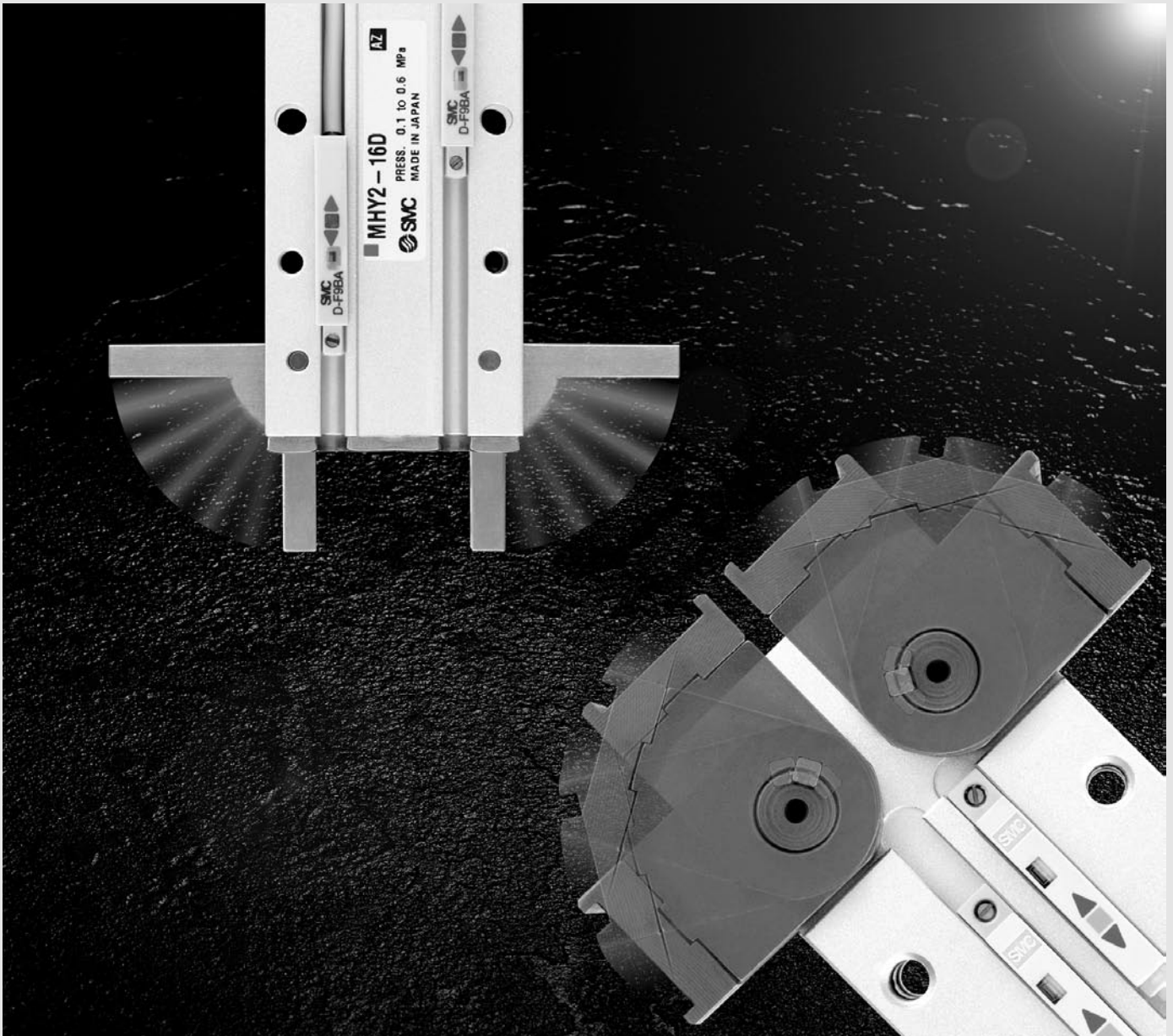


180° Angular Gripper

Cam Style

Rack & Pinion Style

Series *MHY2/MHW2*



Cam actuation style is now standardised !

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



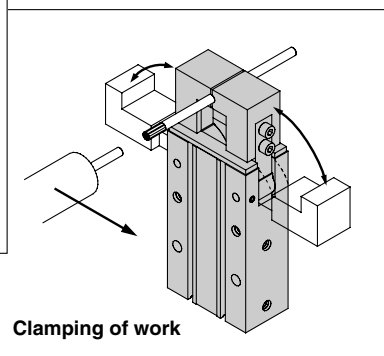
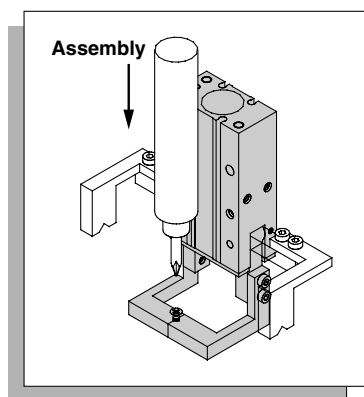
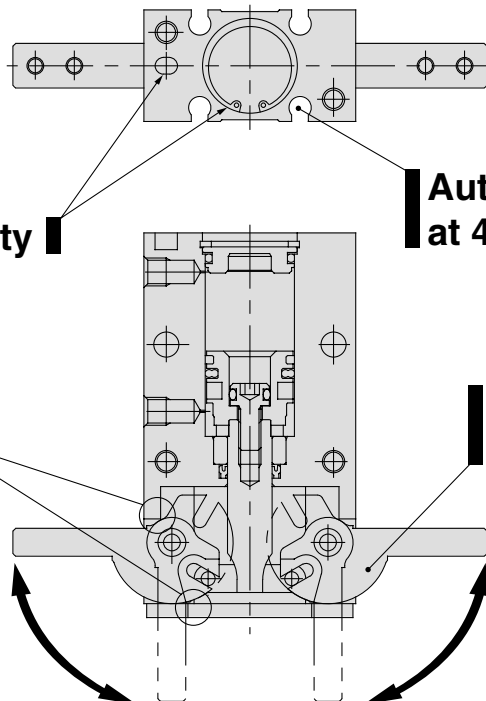
Improved mounting repeatability

**Auto switch mounting
at 4 locations**

Resistance to dusty environments

Reduced opening sizes helps prevent foreign substance from entering.

**Stainless steel fingers
are standard.**



Variation

		Bore size (mm)						
		10	16	20	25	32	40	50
Cam style	Series MHY	●	●	●	●			
Rack & Pinion style	Series MHW			●	●	●	●	●

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 mement* 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**

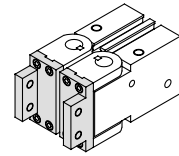
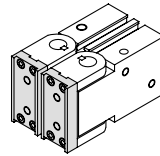
**Key connection is
ideal for impact
resistance.**

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

Two finger styles available.

Flat finger type

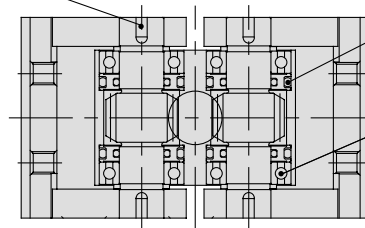
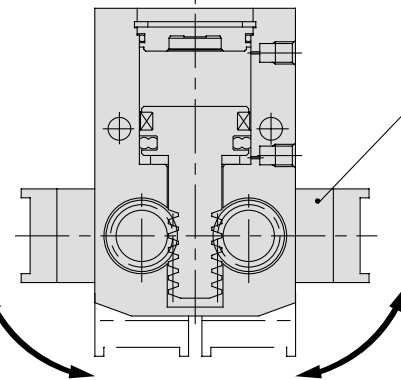
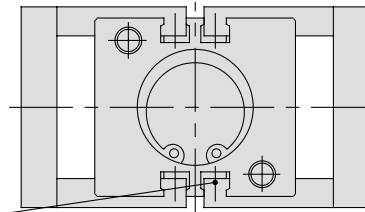
Right angle finger type



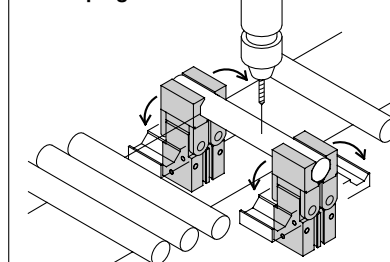
Dust proof construction

Seal arrangement protects gripper from harsh
dusty environments.

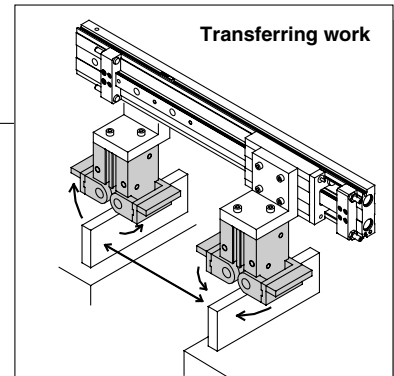
Bearings are standard.



Clamping work



Transferring work



INDEX

Applicable auto switch

Page

Solid state switch
D- M9/M9 □ W type
Water resistant
2 color indication
D-M9BA Type

P.5-248

Solid state switch
D-Y5/Y6 type
D-Y7 type
Water resistant
2 color indication
D-Y7BA type

P.5-256

Series MHY2/MHW2

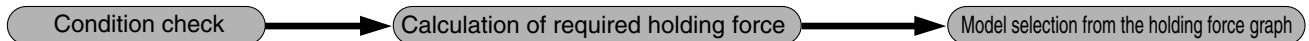
How to Select the Applicable Model

How to Select

Procedure



Step 1 Confirm holding force



Example Work weight: 0.05kg

Guidelines on model selection according to work weight

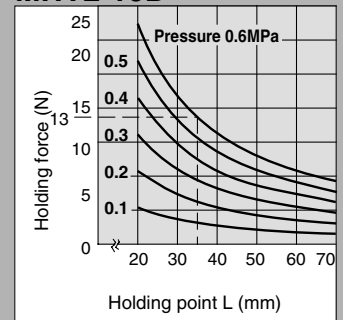
- Although the condition differs according to the coefficient of friction between the attachment and work, select a model that can produce a holding force of 10 to 20 times the work weight.
- Further allowance should be provided when great acceleration or impact is expected during work transfer.

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.

Holding point L = 35mm

Operating pressure: 0.6MPa

MHY2-16D

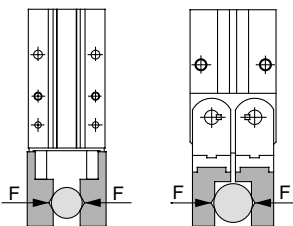


- When MHY2-16D is selected, the holding force is determined to be 13N according to the holding point distance (L = 35mm) and the pressure (0.6MPa).
- The holding force is 26 times the work weight meeting the guideline that holding force should be more than 20 times the set holding force value.

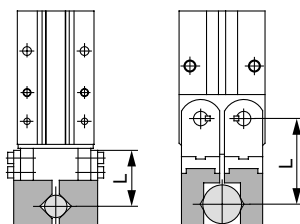
Effective holding force

Series MHY2/MHW2 Double acting

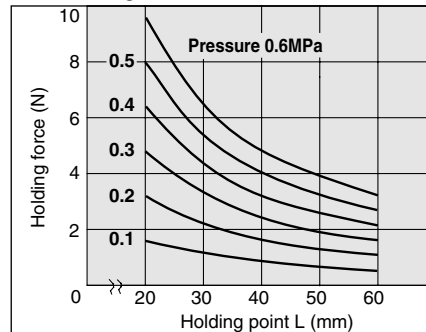
- Indication of effective holding force
 The holding force shown in the tables represents the holding force of one finger when all fingers and attachments are in contact with the work.
 (F: Thrust of one finger)



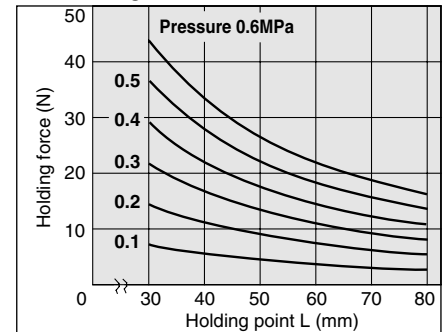
External hold



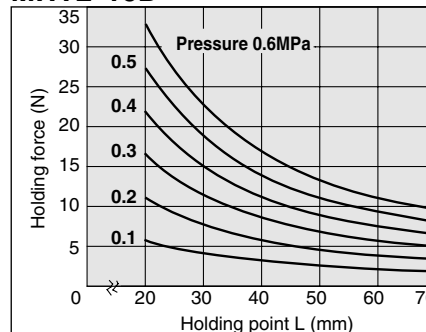
MHY2-10D



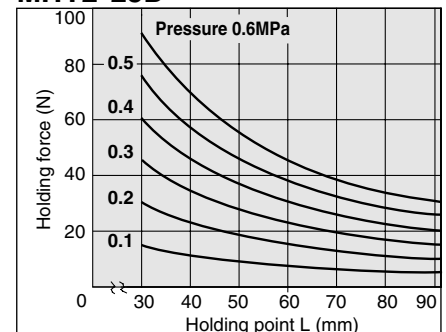
MHY2-20D



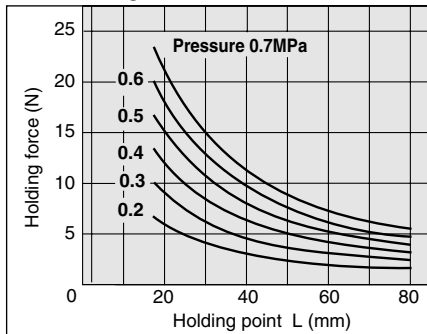
MHY2-16D



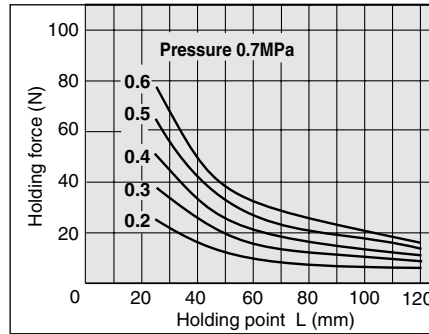
MHY2-25D



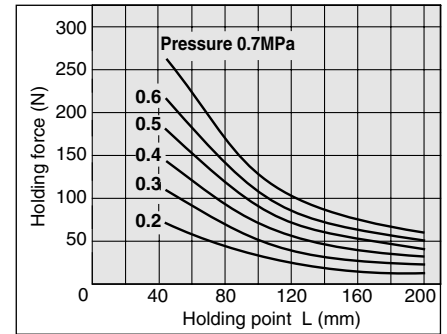
MHW2-20D



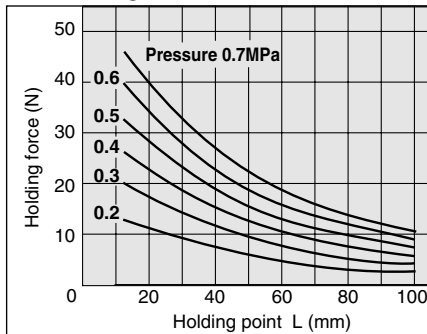
MHW2-32D



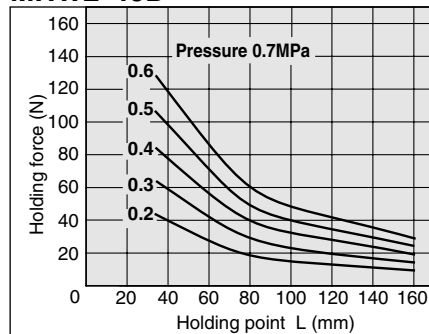
MHW2-50D



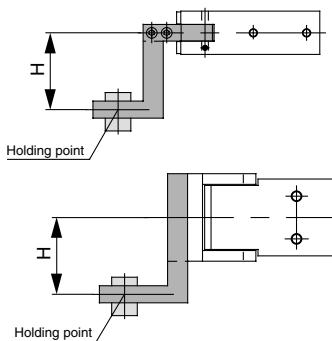
MHW2-25D



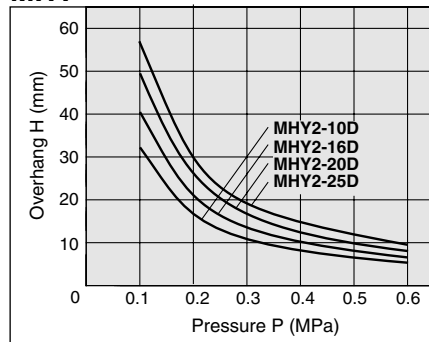
MHW2-40D



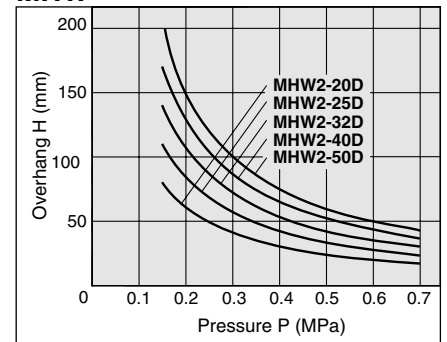
Step 2 Confirmation of holding point



MHY



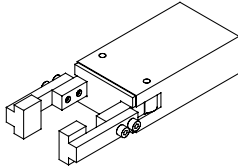
MHW



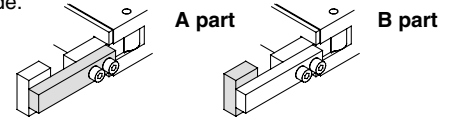
- Work should be held at a point within the range of overhanging distance (H) for a given pressure indicated in the tables on the right.
- When the work is held at a point outside of the recommended range for a given pressure, it may causes adverse effect on the product life.

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
1 Check the operating conditions, dimensions of attachment, etc.	A part B part	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)
2 Calculate the moment of inertia of attachment.	A part Calculation of weight $m_1 = a \times b \times c \times \text{Specific gravity}$ Moment of inertia around Z1 axis $I_{z1} = \{m_1(a^2 + b^2)/12\} \times 10^{-6}$ Moment of inertia around Z axis $I_A = I_{z1} + m_1 r_1^2 \times 10^{-6}$ B part Calculation of weight $m_2 = d \times e \times f \times \text{Specific gravity}$ Moment of inertia around Z2 axis $I_{z2} = \{m_2(d^2 + e^2)/12\} \times 10^{-6}$ Moment of inertia around Z axis $I_B = I_{z2} + m_2 r_2^2 \times 10^{-6}$ Total moment of inertia (*: constant for unit conversion) $I = I_A + I_B$	Material of attachment: Aluminum alloy (Specific gravity = 2.7) $r_1 = 37$ (mm) $m_1 = 40 \times 7 \times 8 \times 2.7 \times 10^{-6}$ $= 0.006$(kg) $I_{z1} = \{0.006 \times (40^2 + 7^2)/12\} \times 10^{-6}$ $= 0.8 \times 10^{-6}$ (kgm²) $I_A = 0.8 \times 10^{-6} + 0.006 \times 37^2 \times 10^{-6}$ $= 9.0 \times 10^{-6}$(kgm²) $r_2 = 47$(mm) $m_2 = 5 \times 10 \times 12 \times 2.7 \times 10^{-6}$ $= 0.002$(kg) $I_{z2} = \{0.002 \times (5^2 + 10^2)/12\} \times 10^{-6}$ $= 0.02 \times 10^{-6}$ (kgm²) $I_B = 0.02 \times 10^{-6} + 0.002 \times 47^2 \times 10^{-6}$ $= 4.4 \times 10^{-6}$ (kgm²) $I = 9.0 \times 10^{-6} + 4.4 \times 10^{-6}$ $= 13.4 \times 10^{-6} = 0.13 \times 10^{-4}$ (kgm²)
3 Determine the allowable moment of inertia from the graph.	MHY2-16D	The moment of inertia is determined to be 0.9×10^{-4} (kgm²) according to the operating time (0.15s) from the graph on the left.
4 Confirm the moment of inertia of one attachment is within the allowable range.	Moment of inertia of attachment < Allowable moment of inertia	0.13×10^{-4} (kgm²) < 0.9×10^{-4} (kgm²) Possible to use this model MHY2-16D completely.

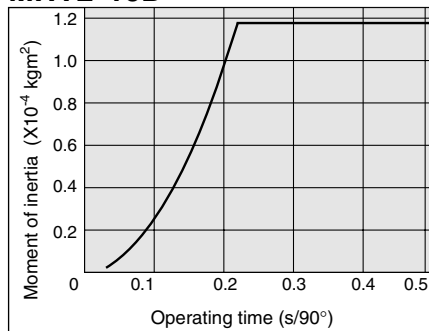
Symbol

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

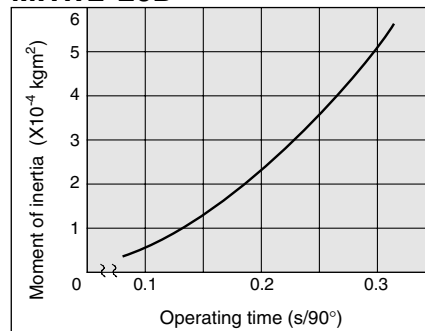
Symbol	Definition	Unit
IA	Moment of inertia around the Z axis of A part of attachment	kgm ²
IB	Moment of inertia around the Z axis of B part of attachment	kgm ²
m1	Weight of A part of attachment	kg
m2	Weight of B part of attachment	kg
r1	Distance between Z and Z1 axis	mm
r2	Distance between Z and Z2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

Allowable range of inertia moment of attachment

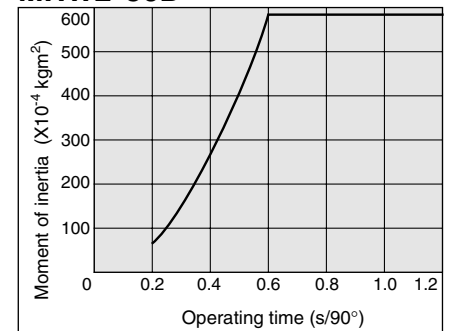
MHY2-10D



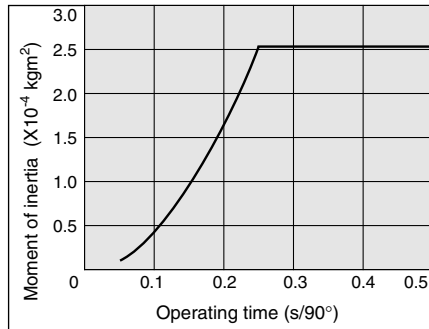
MHW2-20D



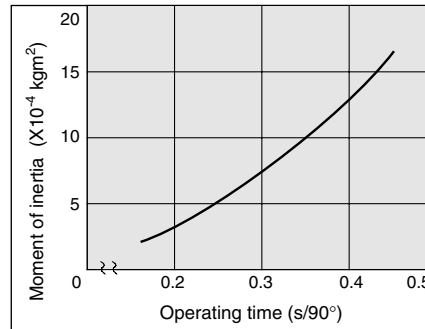
MHW2-50D



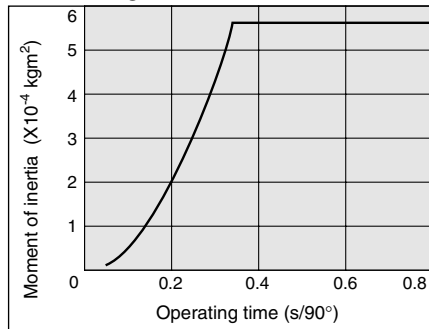
MHY2-16D



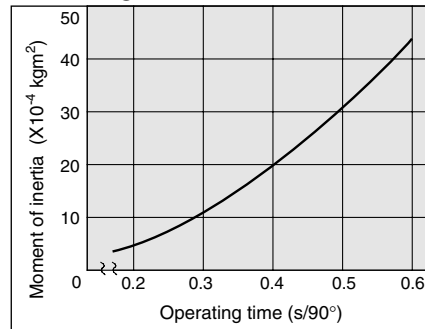
MHW2-25D



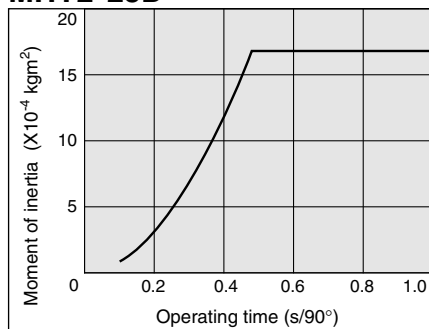
MHY2-20D



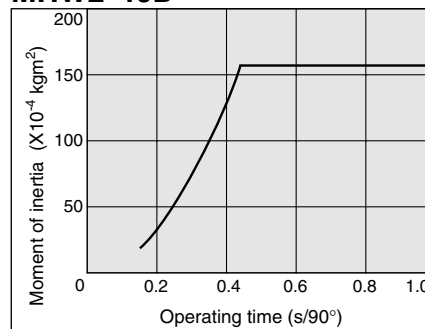
MHW2-32D



MHY2-25D



MHW2-40D



Series *MHY2*

Ø10, Ø16, Ø20, Ø25

How to Order

MHY 2-16 D 2-M9NL S

Number of fingers

2	2 fingers
---	-----------

Bore size

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

Action

D	Double acting
---	---------------

Number of auto switches

—	2
S	1

Auto switch

—	Without auto switch
---	---------------------

*Refer to the table below for the applicable auto switches.

Finger option

—: Standard tap mounting 2: Opening/closing direction through hole

Applicable Auto Switches

Type	Special function	Electrical entry	Indicator	Wiring (Output)	Load voltage			Symbol		Lead wire length (m)		Applicable load
								Electrical entry		0.5 (—)	3 (L)	
					DC		AC	Perpendicular	In-line			
Solid state	—	Grommet	With	3 wire (NPN)	24V	5V 12V	—	M9NV	M9N	●	●	Relay PLC
				3 wire (PNP)				M9PV	M9P	●	●	
				2 wire				M9BV	M9B	●	●	
	Diagnosis indicator (2 colour indication)			3 wire (NPN)	5V 12V	M9NWV	M9NW	●	●			
				3 wire (PNP)		M9PWV	M9PW	●	●			
				2 wire		M9BWV	M9BW	●	●			



*Lead wire length: 0.5m.....— (Example) M9N
3m.....L (Example) M9NL
Note 1) Refer to "Auto Switch Specifications" on p.6-15

Specifications



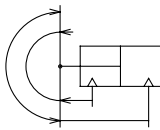
Fluid	Air
Operating pressure	0.1 to 0.6MPa
Ambient and fluid temperature	-10 to 60°C
Repeatability	±0.2mm
Max. operating frequency	60c.p.m
Lubrication	Not required
Action	Double acting
Auto switch (Optional) ^{Note)}	Solid state switch (3 wire, 2 wire)



^{Note)} Refer to p. 6-15 for details of auto switch specifications.

Symbol

Double acting



Model

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



^{Note 1)} At the pressure of 0.5MPa

^{Note 2)} Not including auto switch



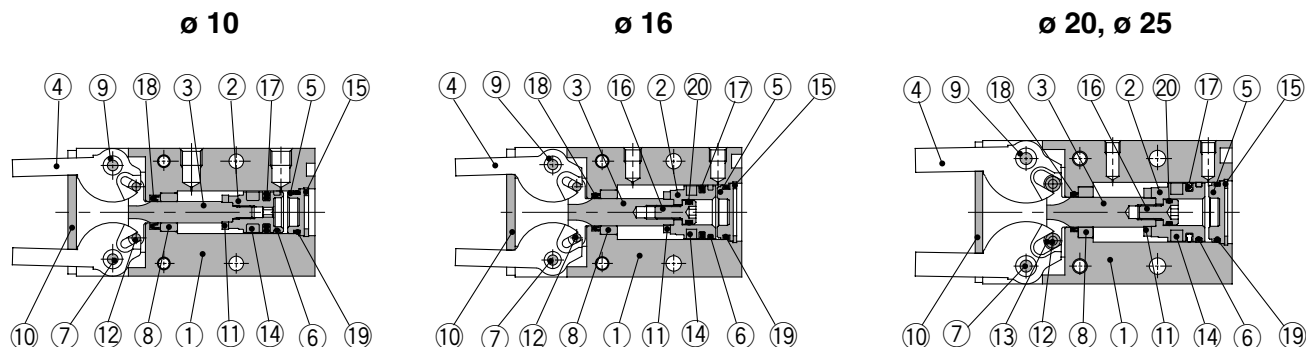
•Refer to the "How to Select the Applicable Model" on p.5-244

•Refer to p.5-244 and 5-245 for the details of effective holding force and allowable overhanging distance.

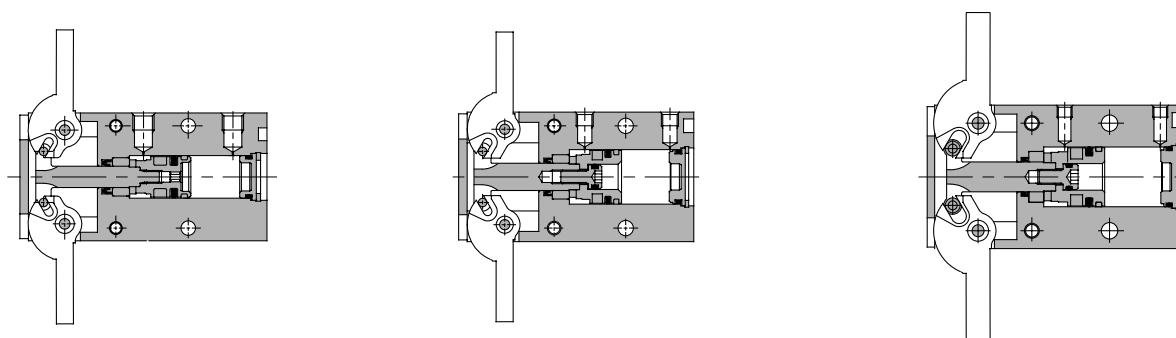
Series MHY2

Construction

Closed



Open



Component Parts

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

Component Parts

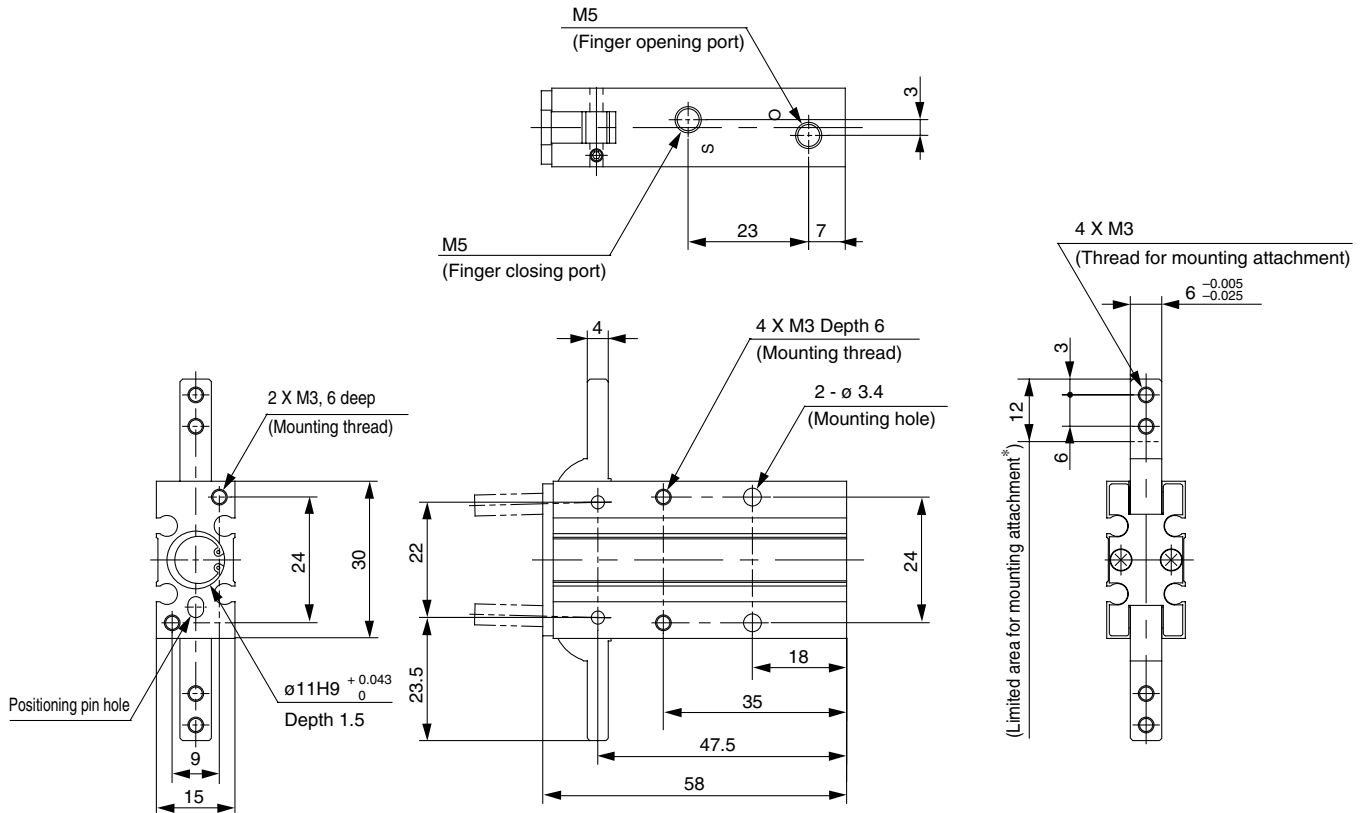
No.	Description	Material	Note
⑨	Bushing B	Sintered alloy steel	
⑩	End plate	Stainless steel	
⑪	Bumper	Urethane rubber	
⑫	Cylindrical roller	High carbon chrome bearing steel	
⑬	Joint roller	Carbon steel	Nitriding
⑭	Rubber magnet	Synthetic rubber	
⑮	C-shape snap ring	Carbon steel	Nickel plated
⑯	Piston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

Replacement Parts: Seal Kits

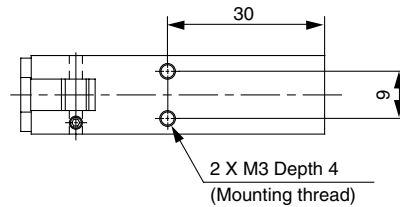
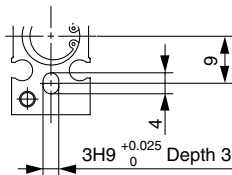
No.	Description	Material	Kit No.			
			MHY2-10D	MHY2-16D	MHY2-20D	MHY2-25D
⑰	Seal kit	NBR	MHY10-PS	MHY16-PS	MHY20-PS	MHY25-PS
⑱						
⑲						
⑳						

Dimensions

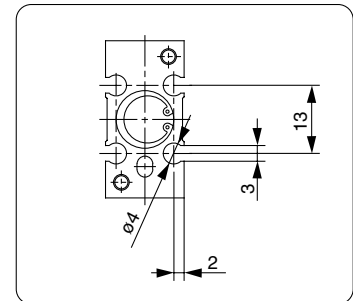
MHY2-10D



Pin hole positioning

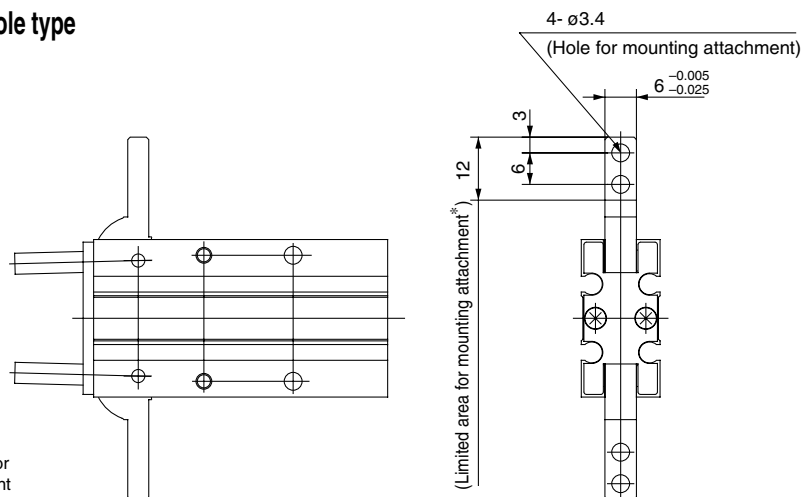


Auto switch mounting groove position



MHY2-10D2

Opening/closing direction through hole type

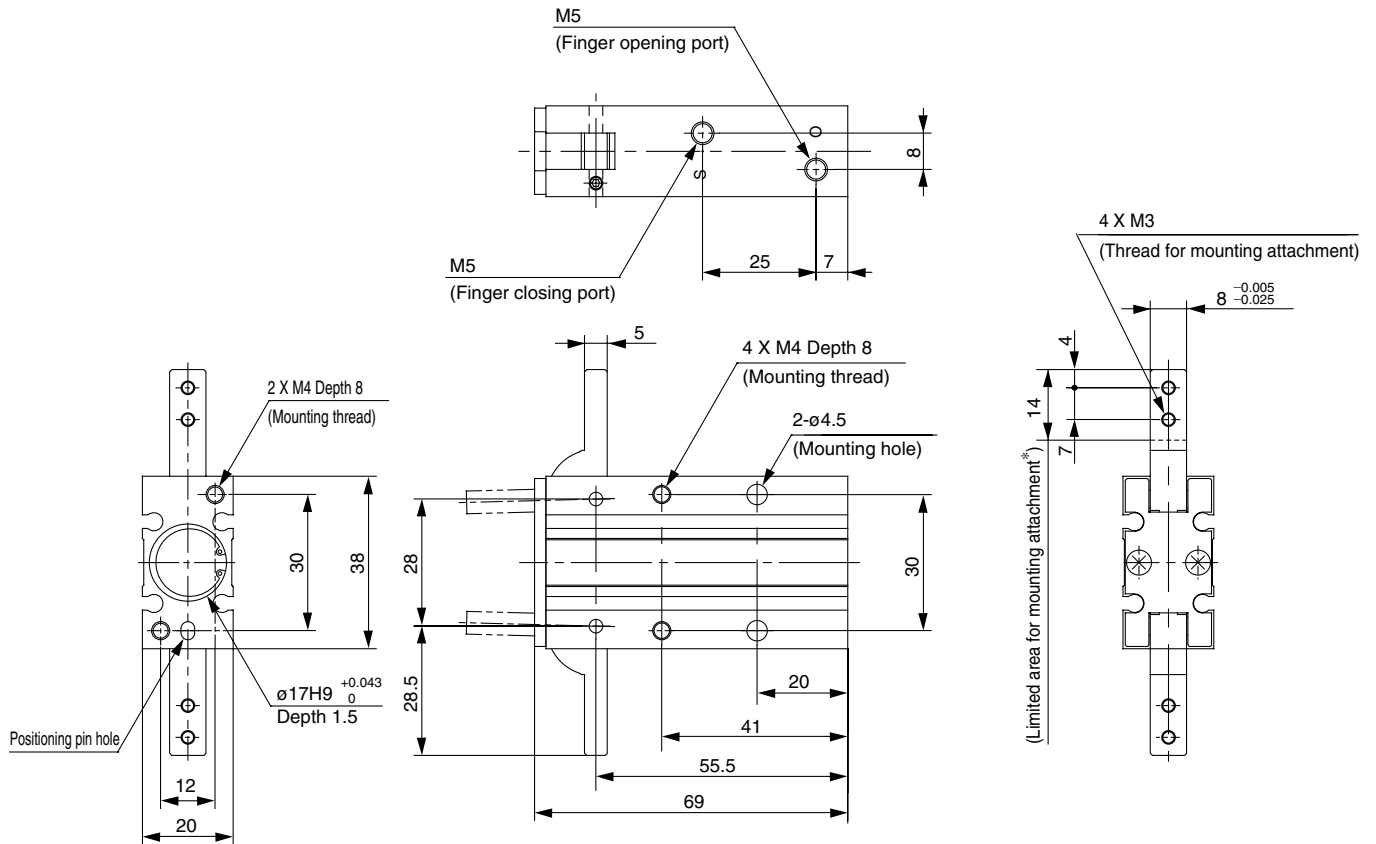


* Do not extend the attachment from limited area for mounting to avoid interference with the attachment or main body.

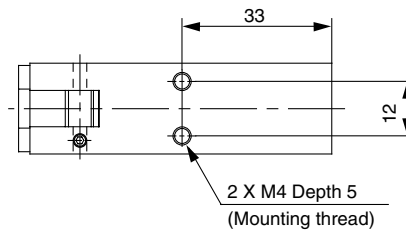
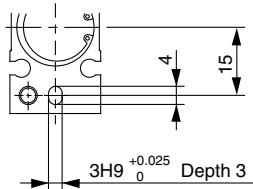
Series MHY2

Dimensions

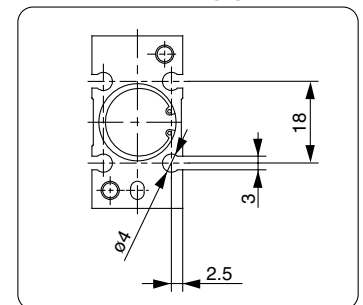
MHY2-16D



Pin hole positioning

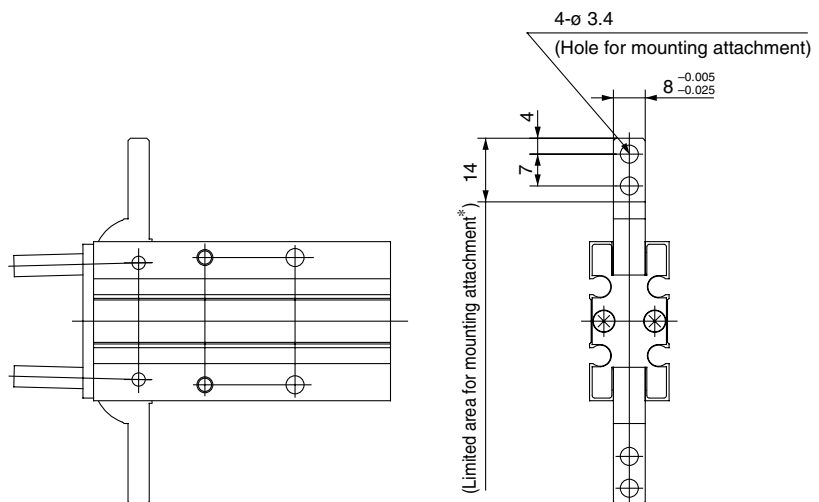


Auto switch mounting groove position



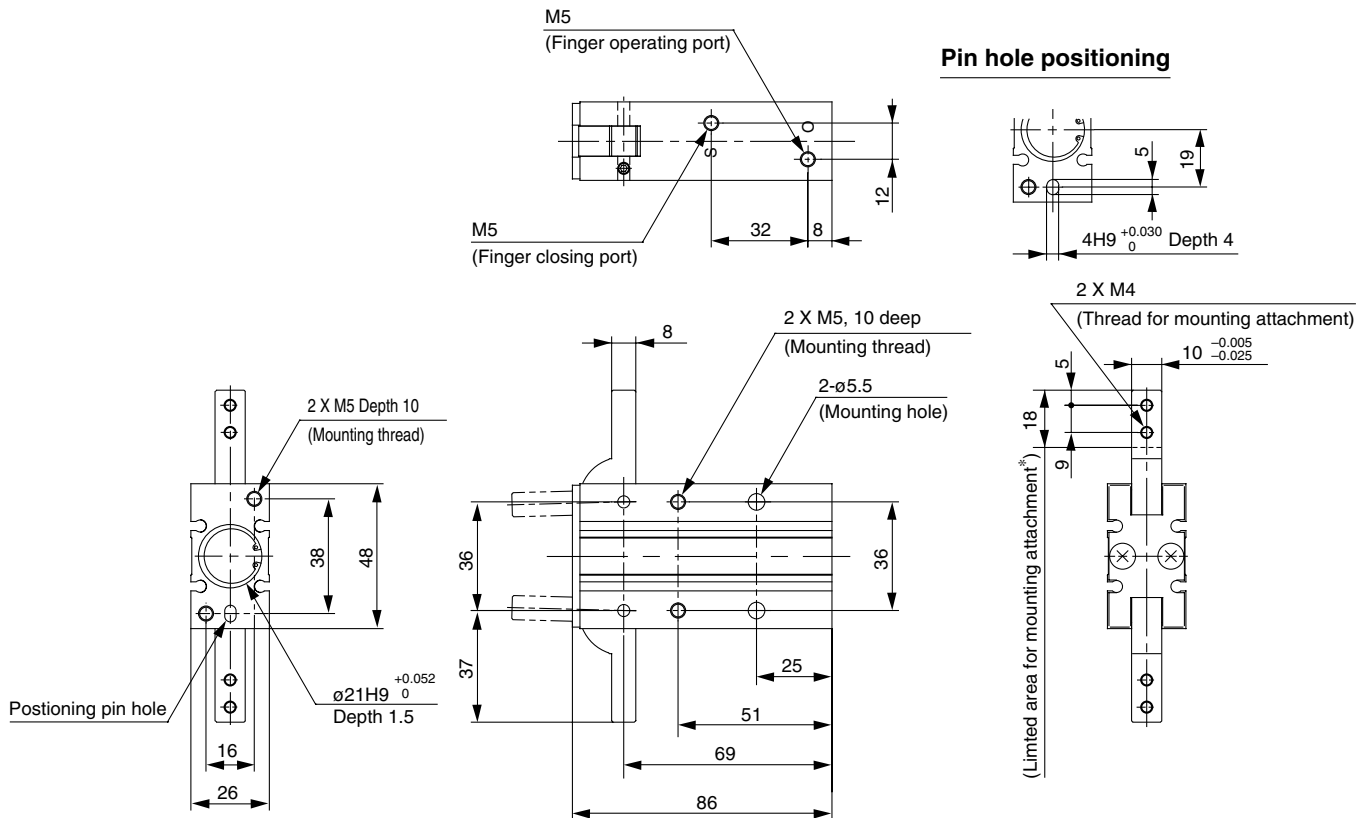
MHY2-16D2

Opening/closing direction through hole type

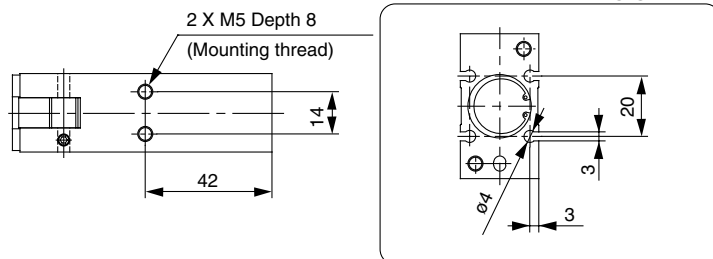


* Do not extend the attachment from limited area for mounting to avoid interference with the attachment or main body.

MHY2-20D

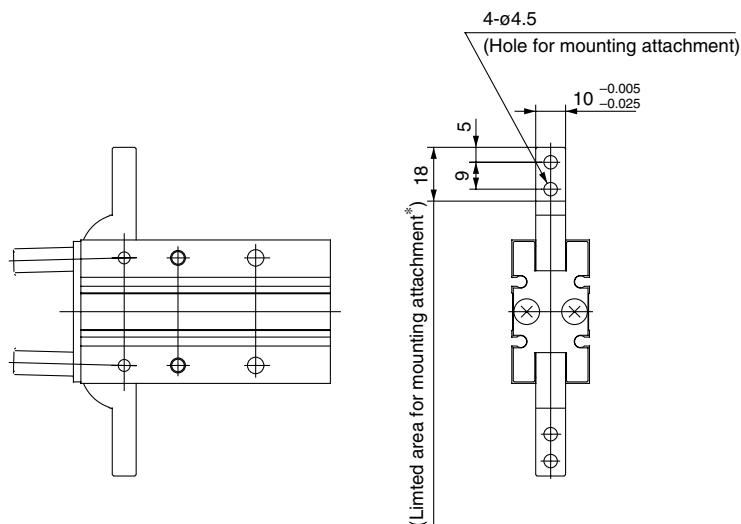


Auto switch mounting groove position



MHY2-20D2

Opening/closing direction through hole type

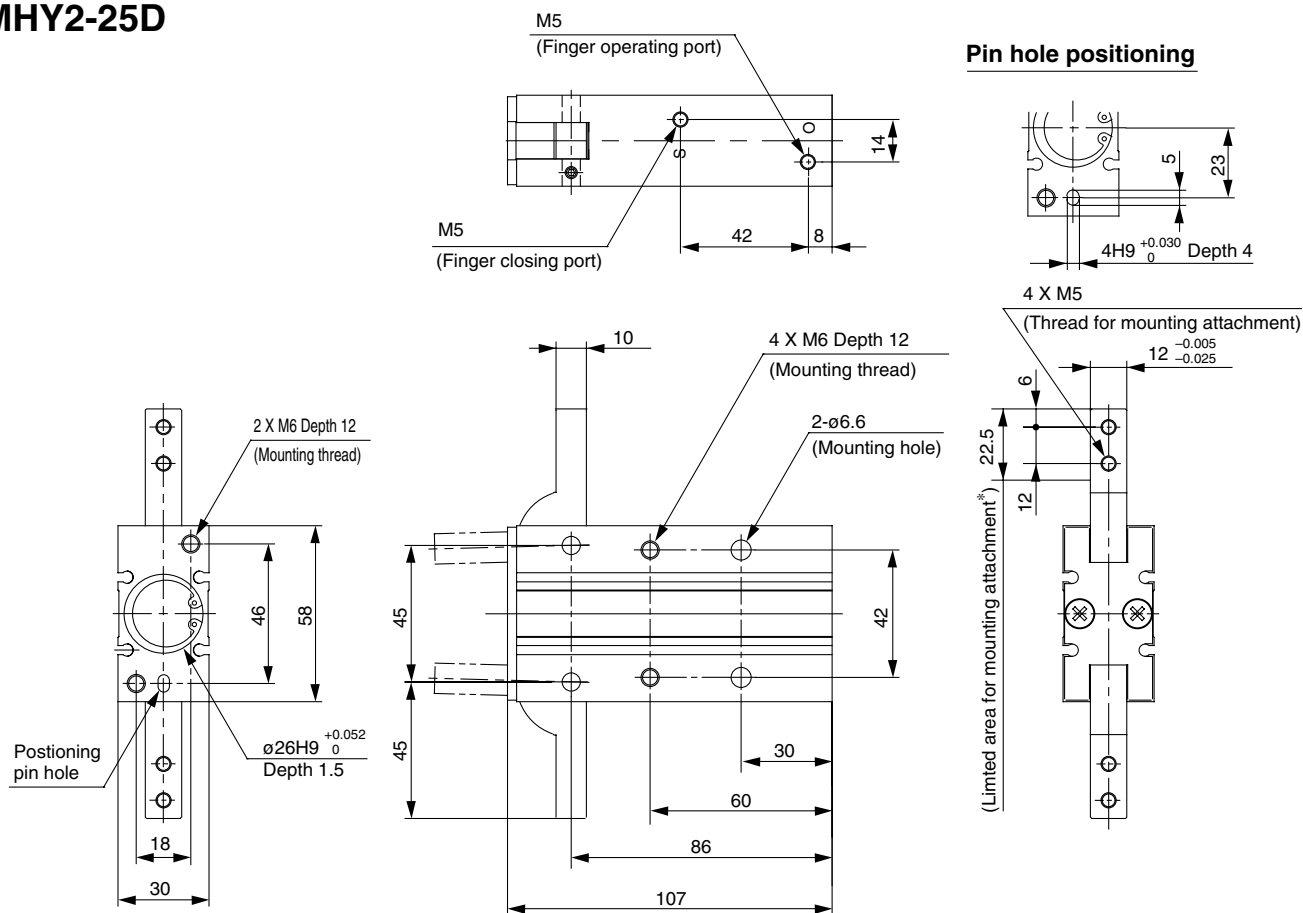


* Do not extend the attachment from limited area for mounting to avoid interference with the attachment or main body.

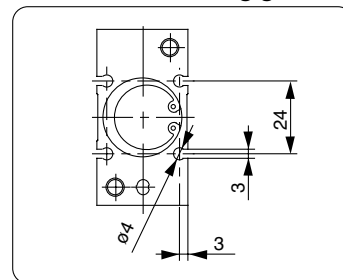
Series MHY2

Dimensions

MHY2-25D

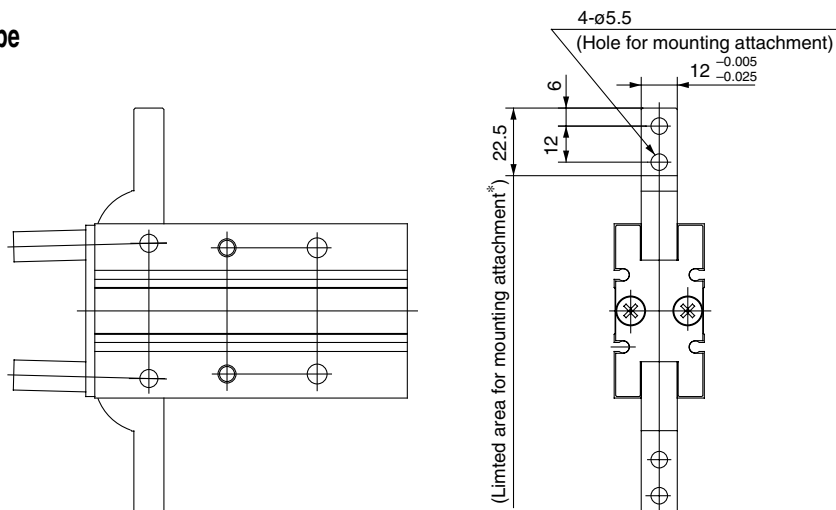


Auto switch mounting groove position



MHY2-25D2

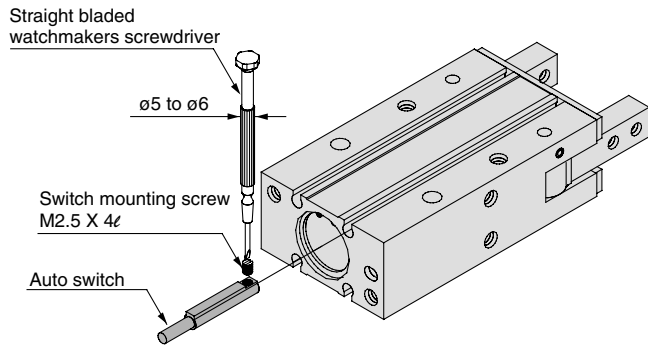
Opening/closing direction through hole type



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

Setting Method of Auto Switch

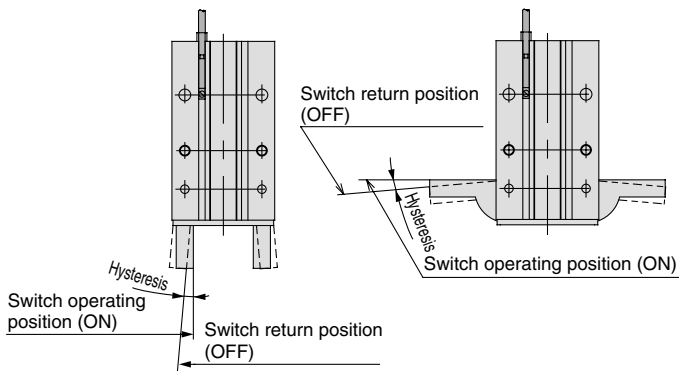
To set the auto switch, insert the auto switch into the installation groove of the gripper from the direction indicated in the following drawing. After establishing the installation position, tighten the attached switch mounting screw with a straight bladed watchmakers screwdriver.



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 0.1 Nm. As a rough guide, tighten the screw an additional 90° after feeling a tighten resistance.

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.

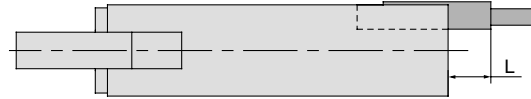


		D-M9N(V) D-M9B(V)	D-M9NW(V)		D-M9BA	
			Red light at ON	Green light at ON	Red light at ON	Green light at ON
MHY2-10D	Finger fully closed	2°	2°	4°	2°	3°
	Finger fully open	4°	4°	7°	4°	5°
MHY2-16D	Finger fully closed	2°	2°	4°	2°	2°
	Finger fully open	3°	3°	6°	3°	4°
MHY2-20D	Finger fully closed	2°	2°	3°	2°	2°
	Finger fully open	3°	3°	5°	3°	3°
MHY2-25D	Finger fully closed	1°	1°	3°	1°	2°
	Finger fully open	2°	2°	5°	2°	3°

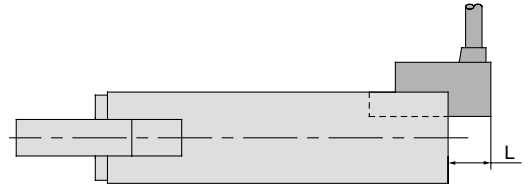
Projection of Auto Switch from Body Edge

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.

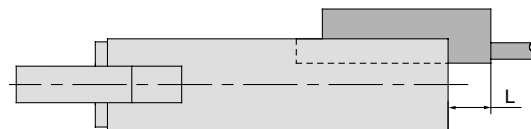
Note) 2 color indicator type and perpendicular entry type protrude in the direction of the lead wire entry.



When auto switch D-M9N is used



When auto switch D-M9□V is used



When auto switch D-M9BA is used

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

Auto switch model No. Gripper Model No.		Protrusion						
		In-line				Perpendicular		
		D-M9N	D-M9BD	D-M9BA	D-M9NW	D-M9NV	D-M9BVD	D-M9NWV
MHY2-10D	O	—	—	—	—	—	—	—
	S	3	8	13	6	1	1	8
MHY2-16D	O	—	—	—	—	—	—	—
	S	3	8	13	7	1	1	8
MHY2-20D	O	—	—	—	—	—	—	—
	S	—	5	10	4	—	—	5
MHY2-25D	O	—	—	—	—	—	—	—
	S	—	3	9	3	—	—	3