

# Wedge Cam Operation Slide Guide Air Gripper (2 Finger)

## Series *MHK2*

ø12, ø16, ø20, ø25



Load Resistant, Dust Cover for Adverse Environments

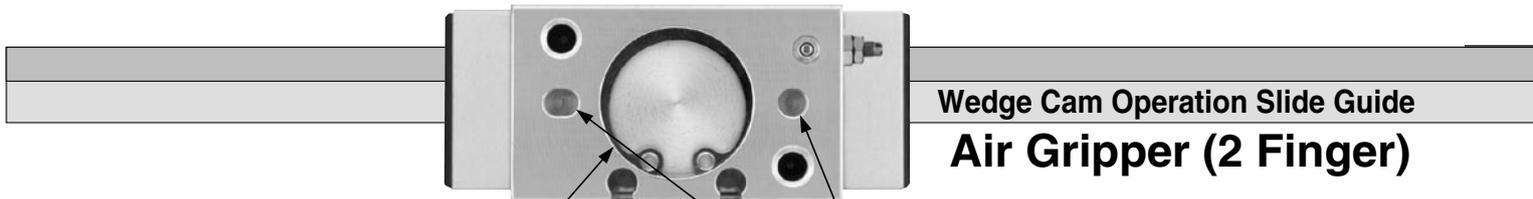
### 2 types of finger materials

Standard: Carbon steel  
Optional: Stainless steel

### 3 types of dust cover materials

Standard: Chloroprene rubber (CR) ...Black  
Optional: Silicon rubber (Si) ...White  
Fluoro rubber (FKM) ...Black

# Wedge Cam Operation Provides Dust Cover for Adverse



Wedge Cam Operation Slide Guide  
Air Gripper (2 Finger)

## Mounting repeatability

Centering accuracy  $\pm 0.1\text{mm}$

Pin hole for positioning  
on top side

## Auto switch mountable

Grooves for auto switch are located on one side. Easy handling for adjustment and installation.

## Built-in adjustment needle for finger speed

Possible to adjust the speed for finger closing direction.

## Wedge cam structure

The wedge structure allows no lateral vibration along stroke direction once work is held.

## High rigidity

Slide type guide bearing enables highly rigid finger motion.

## Improved performance

Incorporation of dust cover prevents dust, water, etc. from entering the body and avoids generating dust and releasing grease from air gripper.

High precision  
Repeatability:  
 $\pm 0.01\text{mm}$

2 types of finger materials are available for different applications.

Standard: Carbon steel  
Optional: Stainless steel

## 3 types of dust covers are available for use in different environments.

Standard: Chloroprene rubber (CR) .....Black  
Optional: Silicon rubber (Si) ...White  
Fluoro rubber (FKM) ...Black

## Longer strokes are now standard.



Bore size (mm)	Opening/Closing stroke (mm)	
	Long stroke	Standard stroke
12	11	4
16	14	6
20	18	10
25	22	14

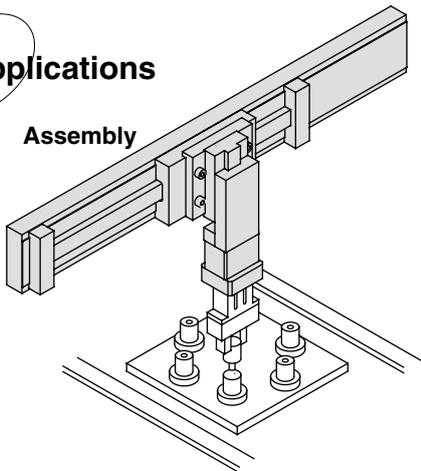
# High Precision and Rigidity. Environmental Conditions.



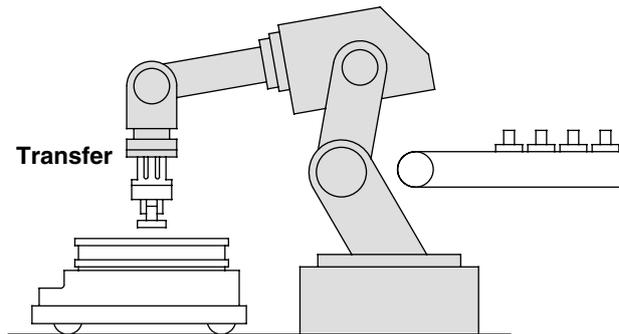
## Series *MHK2*

### Applications

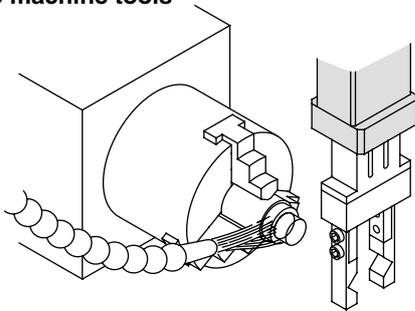
Assembly



Transfer

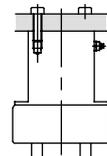


Loading/unloading work  
into machine tools



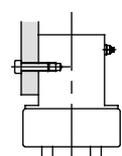
### Universal Mounting

Axial mounting



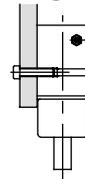
(Body tapped)

Vertical mounting

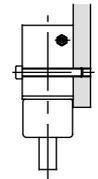


(Body tapped)

Side mounting



(Body tapped)



(Body through hole)

Interchangeable with MHQG2

### Variations

Series	Model	Bore size (mm)	Opening/Closing stroke (mm)	Options
Parallel opening/closing Standard model series <b>MHK2</b>	<b>MHK2-12</b> □	12	4	<ul style="list-style-type: none"> <li>■ Finger option</li> <li>Carbon steel (Standard), Stainless steel</li> <li>■ Dust cover option</li> <li>Chloroprene rubber (Standard)</li> <li>Fluoro rubber</li> <li>Silicon rubber</li> <li>■ Auto Switch</li> <li>Solid state switch</li> <li>D-M9N(V), D-M9B(V)</li> <li>Water resistant (2 colour indication)</li> <li>D-M9BA</li> </ul>
	<b>MHK2-16</b> □	16	6	
	<b>MHK2-20</b> □	20	10	
	<b>MHK2-25</b> □	25	14	
Long stroke model series <b>MHKL2</b>	<b>MHKL2-12</b> □	12	11	
	<b>MHKL2-16</b> □	16	14	
	<b>MHKL2-20</b> □	20	18	
	<b>MHKL2-25</b> □	25	22	

# Series MHK2

ø12, ø16, ø20, ø25

## How to Order

Standard model  
Long stroke model

MHK 2 — 20 D 1 F — M9PL S  
MHKL 2 — 20 D 1 F — M9PL S

Number of fingers ●

2	2 fingers
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Bore size ●

12	12mm
16	16mm
20	20mm
25	25mm

Action ●

D	Double acting
S	Single (Normally open)
C	Single (Normally closed)

Finger material ●

—	Carbon steel
1	Stainless steel

Dust cover material ●

—	Chloroprene rubber (CR)
F	Fluoro rubber (FKM)
S	Silicon rubber (Si)

Auto switch ●

—	Without auto switch (Built-in magnet)
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Number of auto switches ●

—	2
S	1

### Applicable auto switch

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch symbol		Lead wire length (mm)*		Applicable load	
					DC	AC	Electrical entry	In-line	0.5 (-)	3 (L)		
Solid state switch	—	Grommet	With	3 wire (NPN)	24V	5V 12V	Perpendicular	M9NV	M9N	●	●	Relay, PLC
				3 wire (PNP)				M9PV	M9P	●	●	
				2 wire	12V	M9BV	M9B	●	●			
	Water resistant (2 colour indication)	—	M9BA	—	●							



\*Lead wire length: 0.5m ..... — (Example) M9N  
3m ..... L (Example) M9NL

Note) Be careful for the hysteresis of 2 colour indication type D-M9BAL.  
Refer to "Auto Switch Hysteresis" on p.5-156  
Refer to p.6-15 for auto switch specifications.

## Specifications

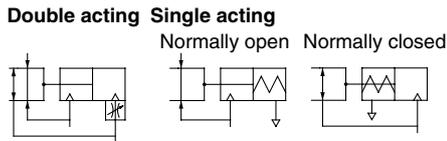


Fluid		Air	
Operating pressure	Double acting		0.1 to 0.6MPa
	Single acting	Normally open	0.25 to 0.6MPa
		Normally closed	
Ambient and fluid temperature		-10 to 60°C	
Repeatability		±0.01mm	
Lubrication		Not required	
Action		Double acting/Single acting	
Auto switch (Optional) Note)		Solid state switch (3 wire, 2 wire)	



Note) Refer to p.6-15 for further information on auto switch specifications.

### Symbol

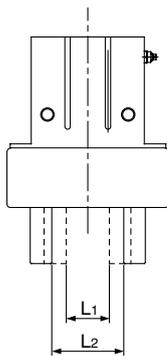


## Options

Finger materials	Carbon steel (Standard), Stainless steel
Dust cover materials	Chloroprene rubber (CR) (Standard), Fluoro rubber (FKM), Silicon rubber (Si)

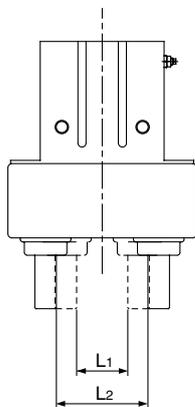
## Model

### Series MHK/Standard models



Action	Model	Bore size (mm)	Max. operating frequency (c.p.m)	Effective holding force per finger (N) Note)	Opening/Closing stroke (mm) (L2-L1)	Closed distance (mm) (L1)	Open distance (mm) (L2)	Weight (g)	
Double acting	MHK2-12D	12	120	External hold: 15 Internal hold: 16	4	9	13	75	
	MHK2-16D	16		External hold: 31 Internal hold: 36	6	14.6	20.6	113	
	MHK2-20D	20		External hold: 46 Internal hold: 56	10	16	26	235	
	MHK2-25D	25		External hold: 80 Internal hold: 86	14	19	33	440	
Single acting	Normally open	MHK2-12S		12	9	4	9	13	76
		MHK2-16S		16	23	6	14.6	20.6	114
		MHK2-20S		20	34	10	16	26	237
		MHK2-25S		25	58	14	19	33	443
	Normally closed	MHK2-12C		12	12	4	9	13	76
		MHK2-16C		16	25	6	14.6	20.6	115
		MHK2-20C		20	44	10	16	26	237
		MHK2-25C		25	73	14	19	33	443

### Series MHKL2/Long stroke models



Action	Model	Bore size (mm)	Max. operating frequency (c.p.m)	Effective holding force per finger (N) Note)	Opening/Closing stroke (mm) (L2-L1)	Closed distance (mm) (L1)	Open distance (mm) (L2)	Weight (g)	
Double acting	MHKL2-12D	12	90	External hold: 14 Internal hold: 16	11	9	20	104	
	MHKL2-16D	16		External hold: 27 Internal hold: 30	14	14.6	28.6	164	
	MHKL2-20D	20		External hold: 45 Internal hold: 53	18	16	34	312	
	MHKL2-25D	25		External hold: 79 Internal hold: 90	22	19	41	562	
Single acting	Normally open	MHKL2-12S		12	9	11	9	20	105
		MHKL2-16S		16	17	14	14.6	28.6	165
		MHKL2-20S		20	32	18	16	34	314
		MHKL2-25S		25	53	22	19	41	565
	Normally closed	MHKL2-12C		12	11	11	9	20	105
		MHKL2-16C		16	22	14	14.6	28.6	166
		MHKL2-20C		20	40	18	16	34	314
		MHKL2-25C		25	63	22	19	41	565



Note) At the pressure of 0.5MPa, when holding point L is 20mm.

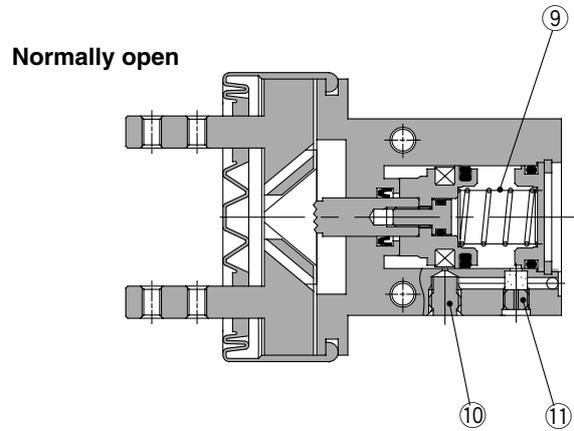
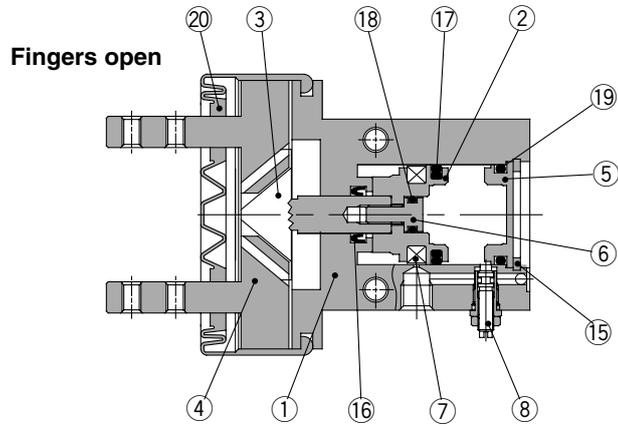
Single acting normally open: External holding force, Single acting normally closed: Internal holding force  
Refer to "Effective Holding Force" for the holding force at each holding position on p.5-147 to 5-151

# Series MHK2

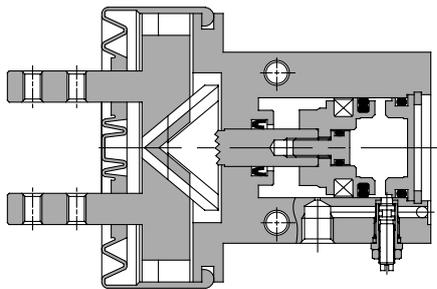
## Construction

### Double acting

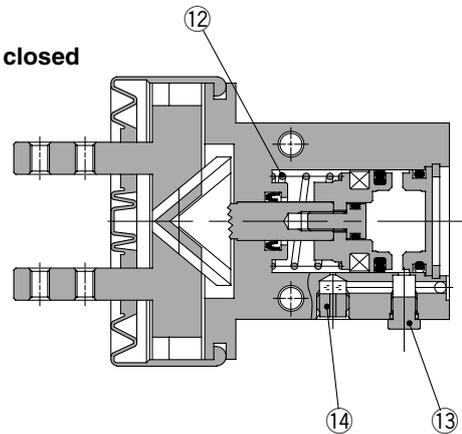
### Single acting



**Fingers closed**



**Normally closed**



### Component Parts

No.	Description	Material	Note
①	Body	Aluminum alloy	Anodized
②	Piston	Aluminum alloy	Anodized
③	Cam	Carbon steel	Heat treatment, Special treatment
④	Finger	Carbon steel	Heat treatment, Special treatment
		Stainless steel SUS304	Optional
⑤	Cap	Aluminum alloy	Hard anodized
⑥	Piston bolt	Stainless steel	
⑦	Rubber magnet	Synthetic rubber	

### Component Parts

No.	Description	Material	Note
⑧	Needle Ass'y		
⑨	N.O. spring	Piano wire	
⑩	Plug	Brass	Electroless nickel plated
⑪	Exhaust plug	Brass	Electroless nickel plated
⑫	N.C. spring	Piano wire	
⑬	Plug Ass'y	Brass	Electroless nickel plated
⑭	Exhaust plug A	Brass	Electroless nickel plated
⑮	C-shape snap ring	Carbon steel	Nickel plated

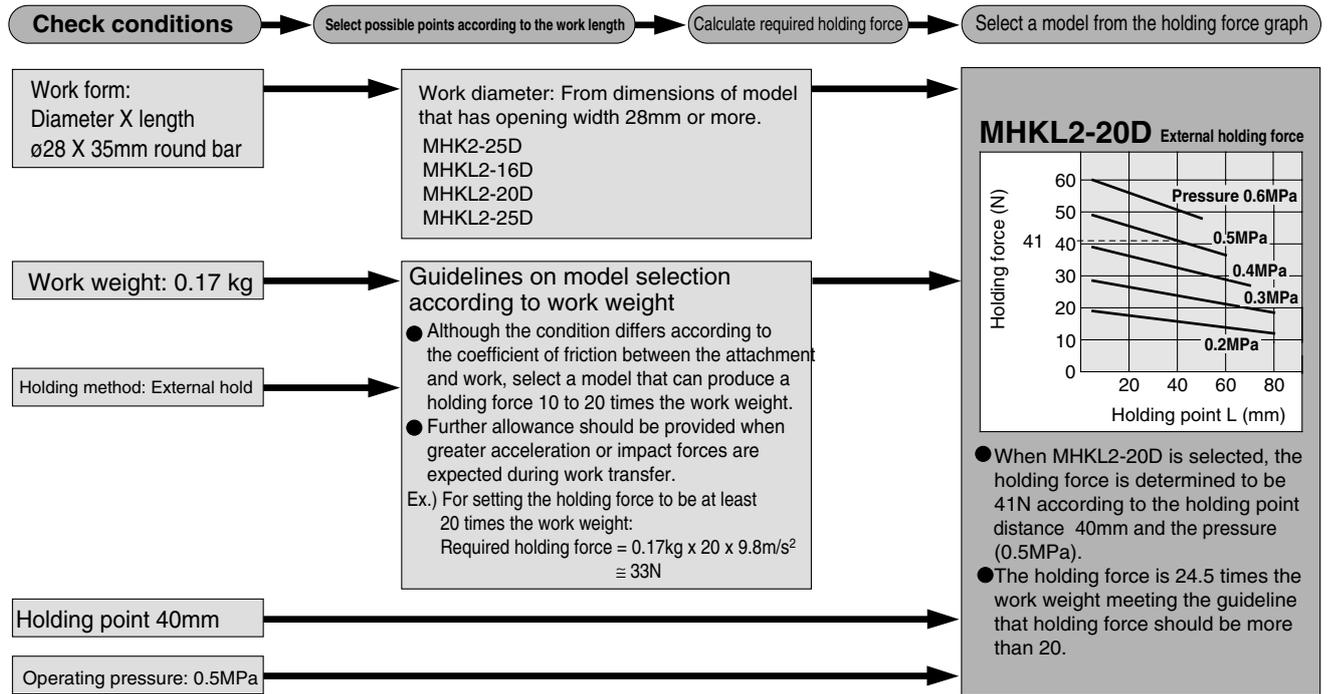
### Replacement Parts: Seal Kits

No.	Description	Material	Kit No.								
			MHK2-12	MHKL2-12	MHK2-16	MHKL2-16	MHK2-20	MHKL2-20	MHK2-25	MHKL2-25	
⑯	Seal kit	NBR	MHK12-PS		MHK16-PS		MHK20-PS		MHK25-PS		
⑰											
⑱											
⑲											
⑳	Dust cover	CR <sup>(2)</sup>	P3318105	P3318113	P3318205	P3318213	P3318305	P3318313	P3318405	P3318413	
		FKM <sup>(2)</sup>	P3318105-1	P3318113-1	P3318205-1	P3318213-1	P3318305-1	P3318313-1	P3318405-1	P3318413-1	
		Si <sup>(2)</sup>	P3318105-2	P3318113-2	P3318205-2	P3318213-2	P3318305-2	P3318313-2	P3318405-2	P3318413-2	

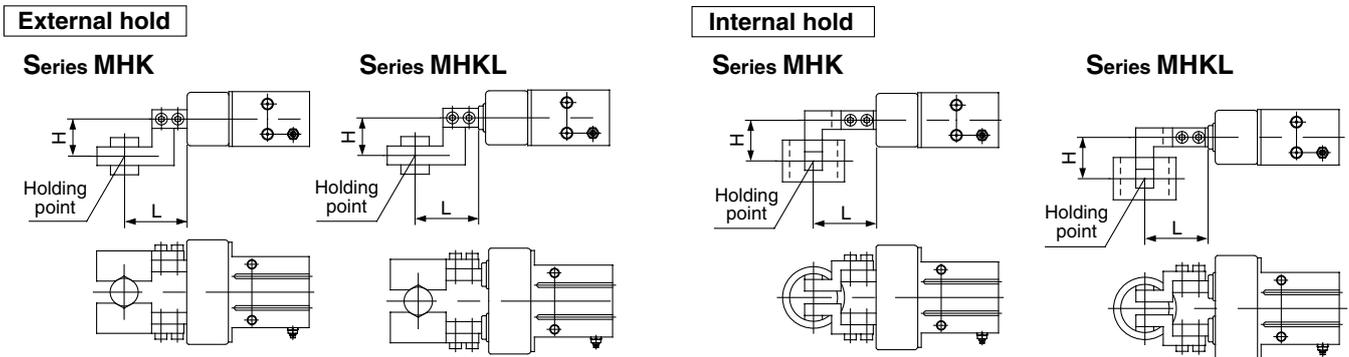
Note 1) No. ⑯ to ⑲ are supplied in one unit for each seal kit. Designate the part number for each bore size when ordering.  
CR: Chloroprene rubber, FKM: Fluoro rubber, Si: Silicon rubber.

## Example of Model Selection

### Procedures



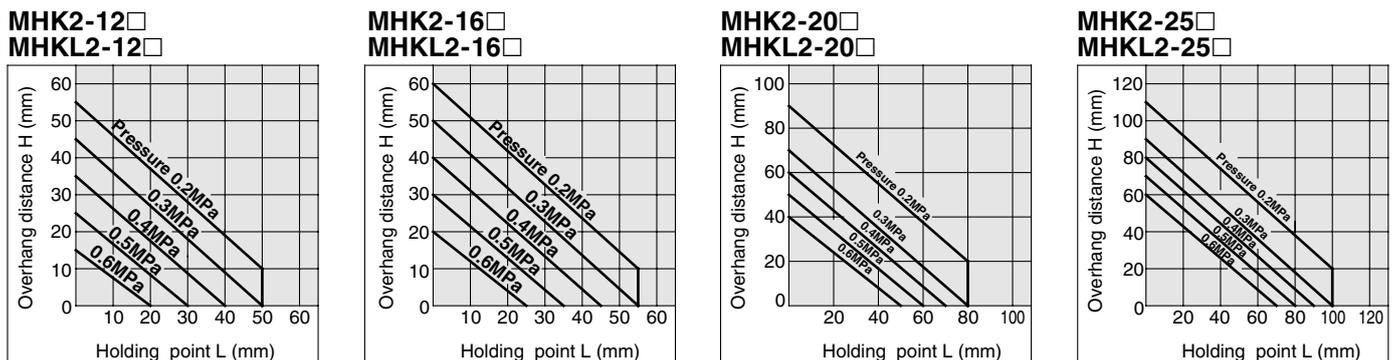
## Holding Point



L: Distance to the holding point  
H: Overhang distance

- Proper holding points should be selected in accordance with the operating pressure. The distance to the holding point L and the overhang distance H should be within the limited range shown in the graph below.
- When the work holding point is out of range, the unbalanced load applied to the finger and the guide section may cause excessive play in fingers and have an adverse effect on the gripper life.

### Limitations of Holding Point



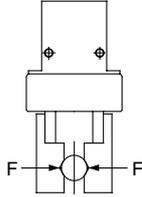
Note) Distance to the holding point L of single acting type is shortened end by spring return.  
Use air gripper within holding force line shown for each pressure in effective holding force graph.

# Series MHK2

## Effective Holding Force: Series MHK2 double acting

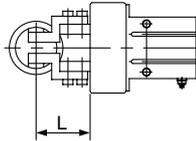
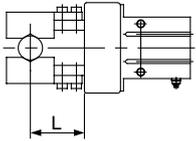
### ● Indication of effective holding force

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.



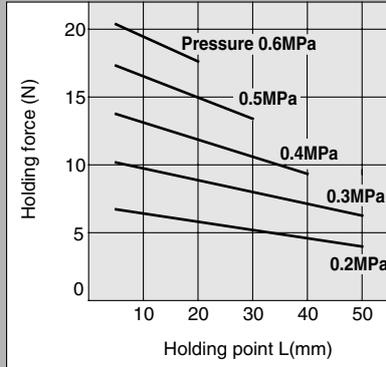
External hold  
Series MHK2

Internal hold  
Series MHK2

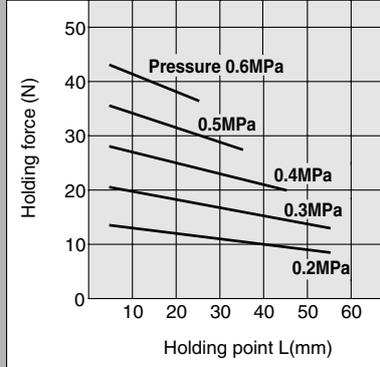


### External Holding Force

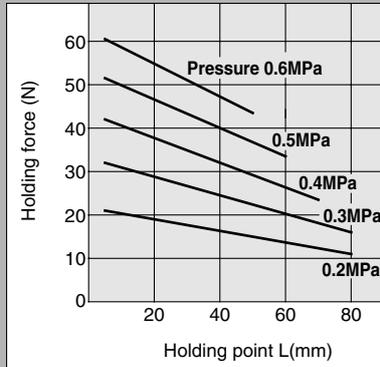
#### MHK2-12D



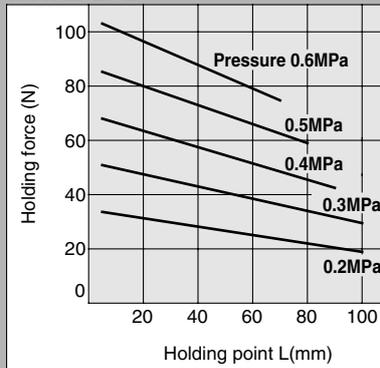
#### MKH2-16D



#### MHK2-20D

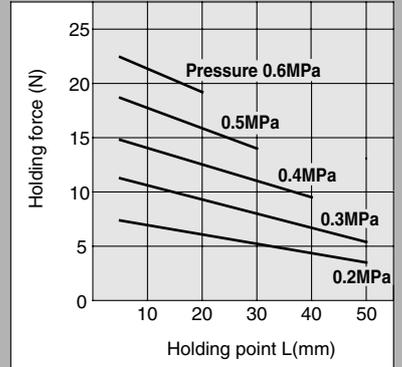


#### MHK2-25D

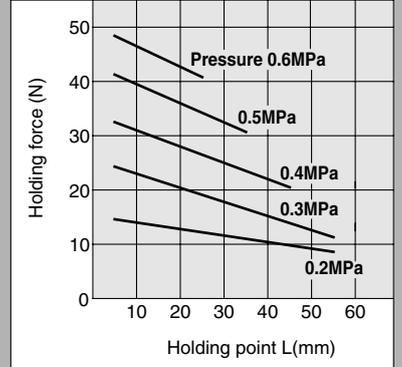


### Internal Holding Force

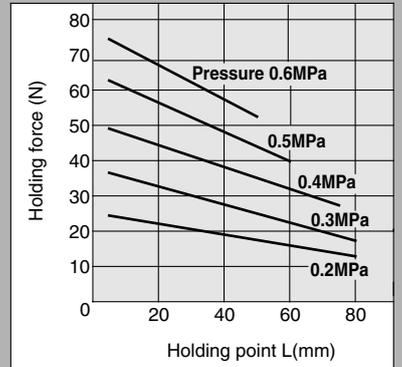
#### MHK2-12D



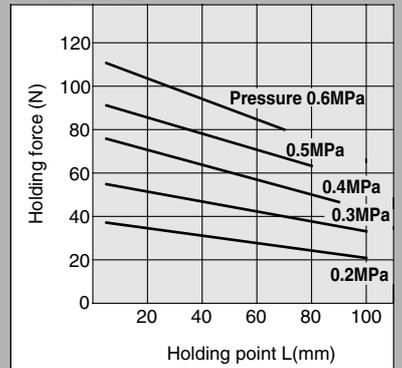
#### MKH2-16D



#### MHK2-20D



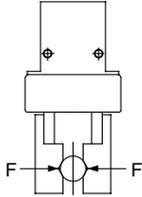
#### MHK2-25D



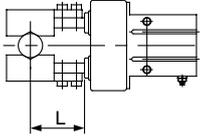
**Effective Holding Force: Series MHKL2 Double acting**

● **Indication of effective holding force**

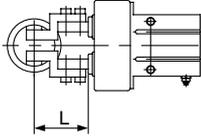
The holding force shown in the tables represents the holding force when all fingers and attachments are in contact with the work.



**External hold**  
Series MHKL2

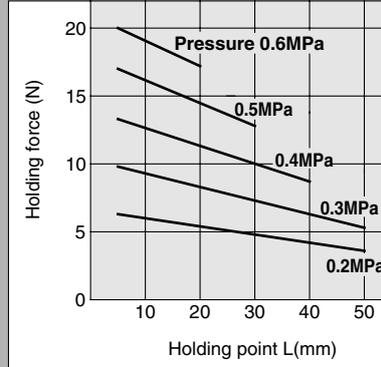


**Internal hold**  
Series MHKL2

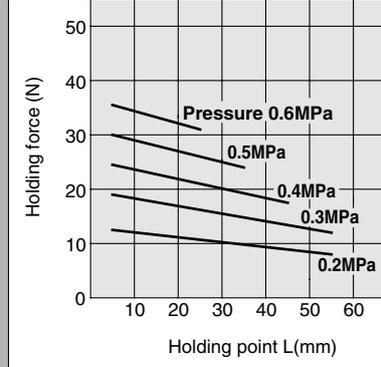


**External Holding Force**

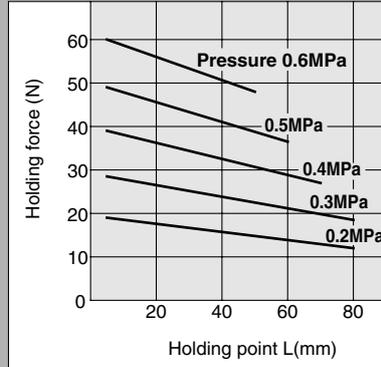
**MHKL2-12D**



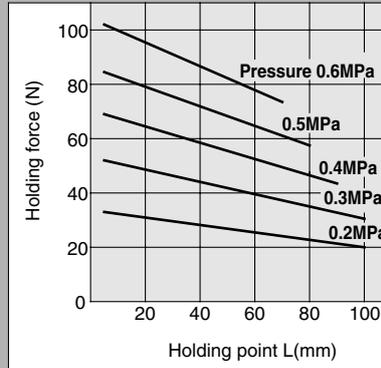
**MHKL2-16D**



**MHKL2-20D**

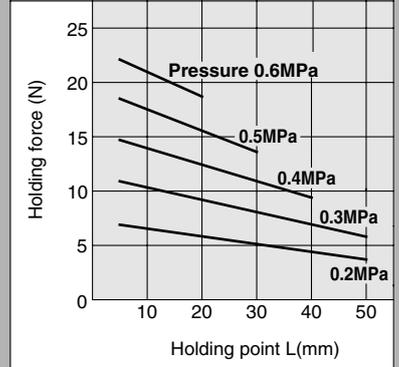


**MHKL2-25D**

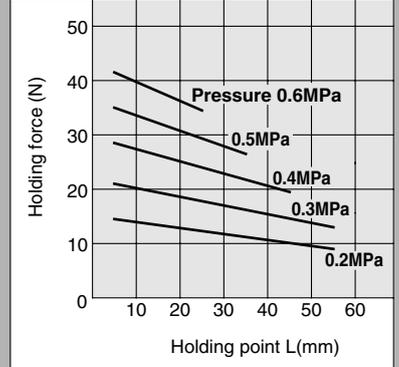


**Internal Holding Force**

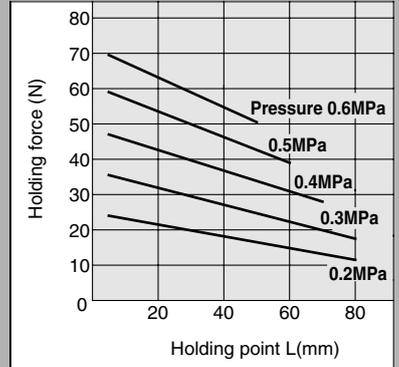
**MHKL2-12D**



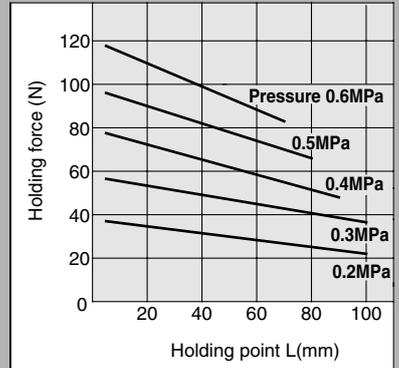
**MHKL2-16D**



**MHKL2-20D**



**MHKL2-25D**

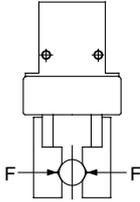


# Series MHK2

## Effective Holding Force: Series MHK2 Single acting

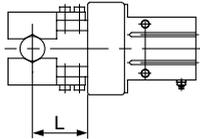
### ● Indication of effective holding force

The holding force shown in the tables represents the holding force when all fingers and attachments are in contact with the work. F = one finger thrust.

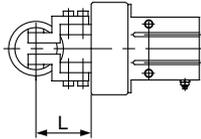


Note) In case of single acting type, the value is for stroke center.

External hold  
Series MHK2



Internal hold  
Series MHK2



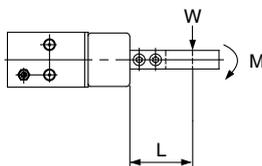
### ● Precautions when using the single acting type:

If a moment such as that illustrated below is applied to the finger, the finger might not be able to retract by the spring force alone. Therefore, make sure to use the air gripper within the allowable moment that is indicated in the table below.

#### Allowable moment

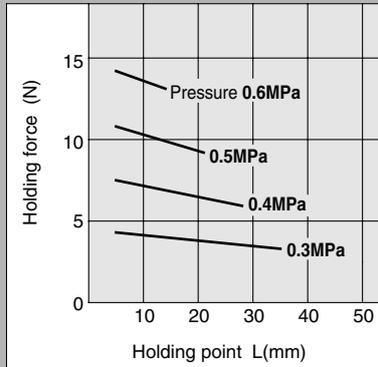
Model	Allowable moment Nm
MHK2-12S, C	0.05
MHK2-16S, C	0.12
MHK2-20S, C	0.25
MHK2-25S, C	0.49

M: Allowable moment  
( $M = WL$ )

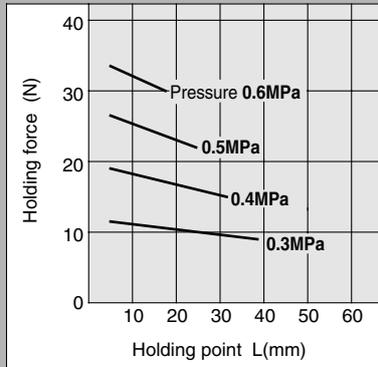


### External Holding Force

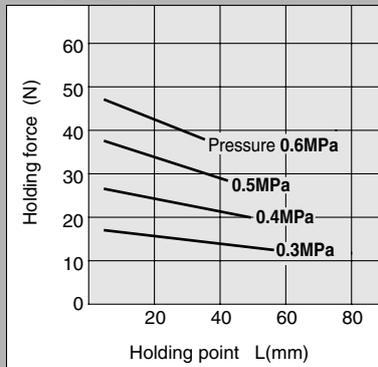
#### MHK2-12S



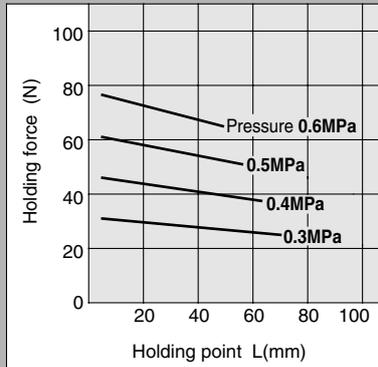
#### MHK2-16S



#### MHK2-20S

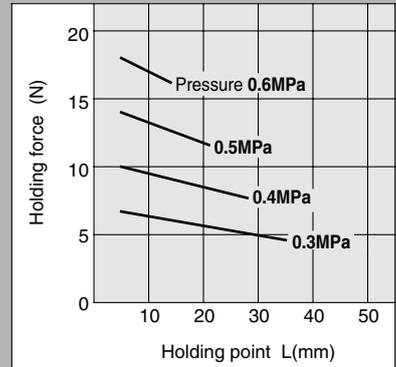


#### MHK2-25S

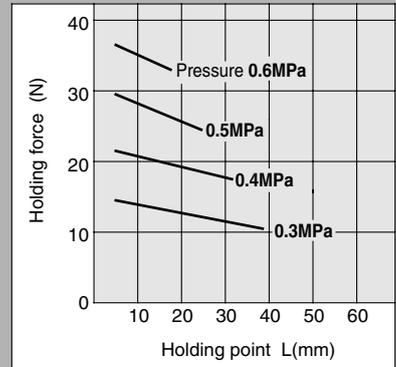


### Internal Holding Force

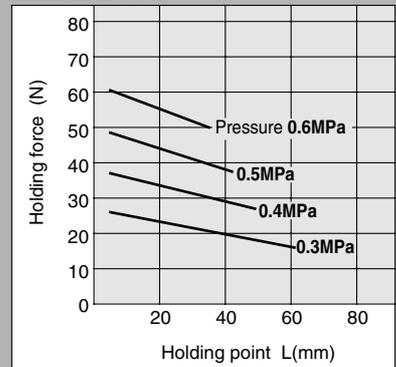
#### MHK2-12C



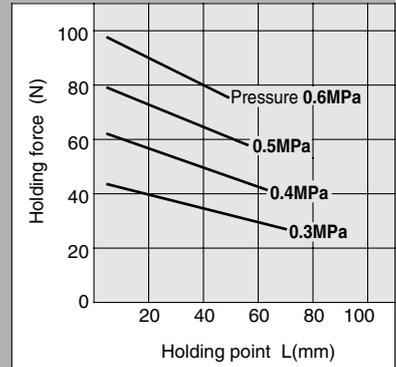
#### MHK2-16C



#### MHK2-20C



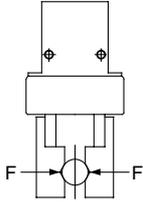
#### MHK2-25C



## Effective Holding Force: Series MHKL2 Single acting

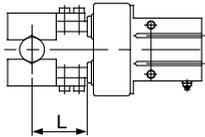
### ● Indication of effective holding force

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.

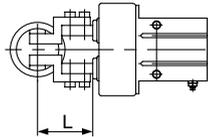


Note) In case of single acting type, the value is for stroke center.

External hold  
Series MHKL2



Internal hold  
Series MHKL2



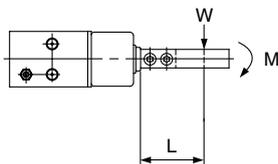
### ● Precautions when using the single acting type:

If a moment such as that illustrated below is applied to the finger, the finger might not be able to retract by the spring force alone. Therefore, make sure to use the air gripper within the allowable moment that is indicated in the table below.

#### Allowable moment

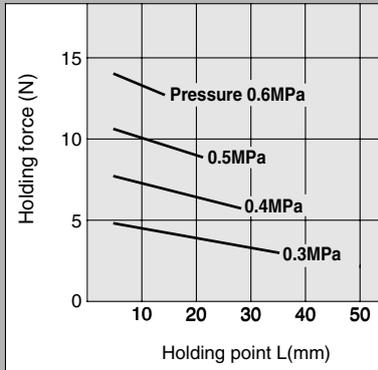
Model	Allowable moment Nm
MHKL2-12S, C	0.05
MHKL2-16S, C	0.12
MHKL2-20S, C	0.25
MHKL2-25S, C	0.49

M: Allowable moment  
( $M = WL$ )

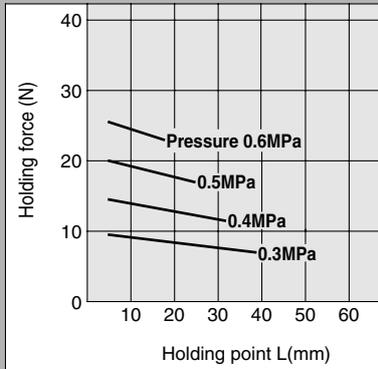


### External Holding Force

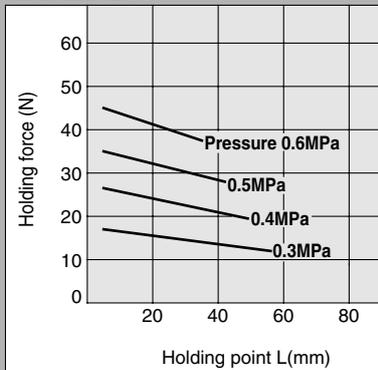
#### MHKL2-12S



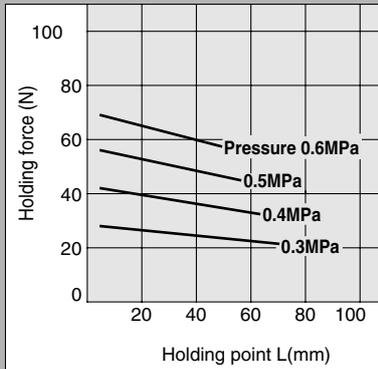
#### MHKL2-16S



#### MHKL2-20S

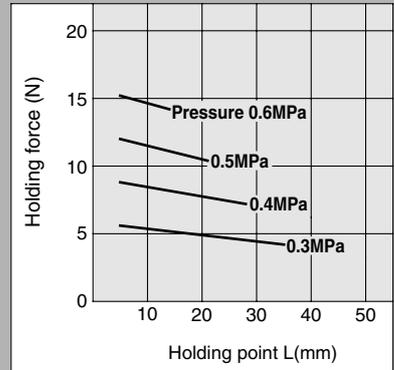


#### MHKL2-25S

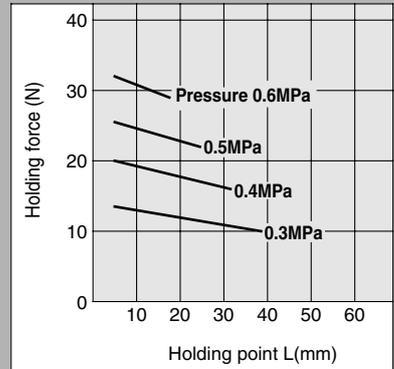


### Internal Holding Force

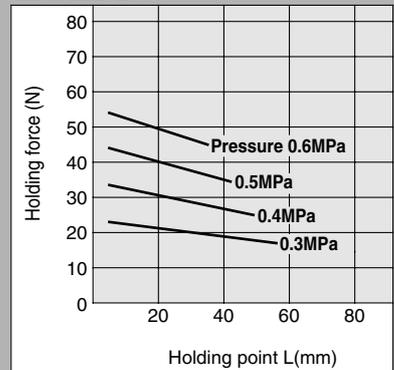
#### MHKL2-12C



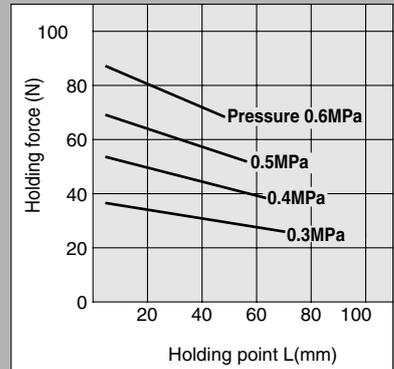
#### MHKL2-16C



#### MHKL2-20C



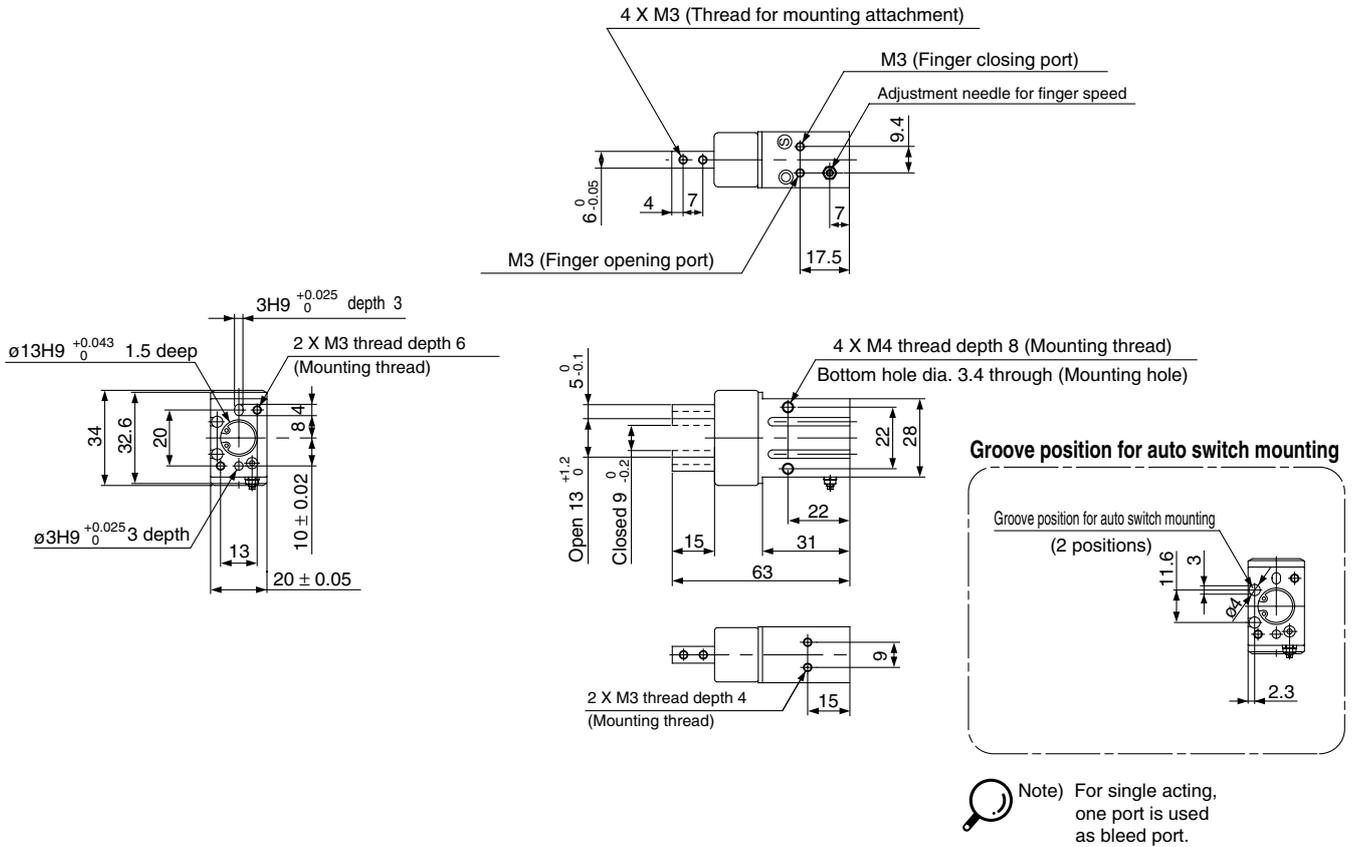
#### MHKL2-25C



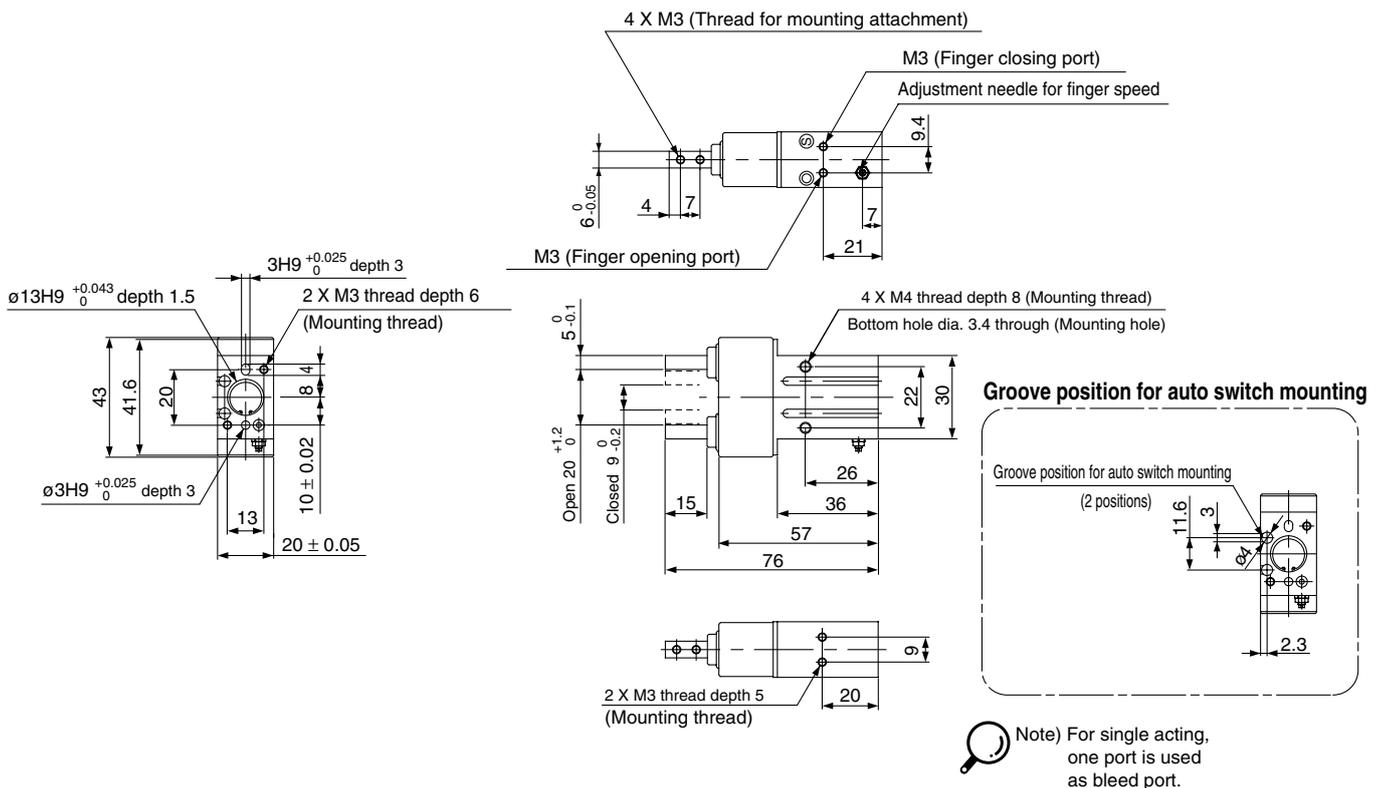
# Series MHK2

## Dimensions

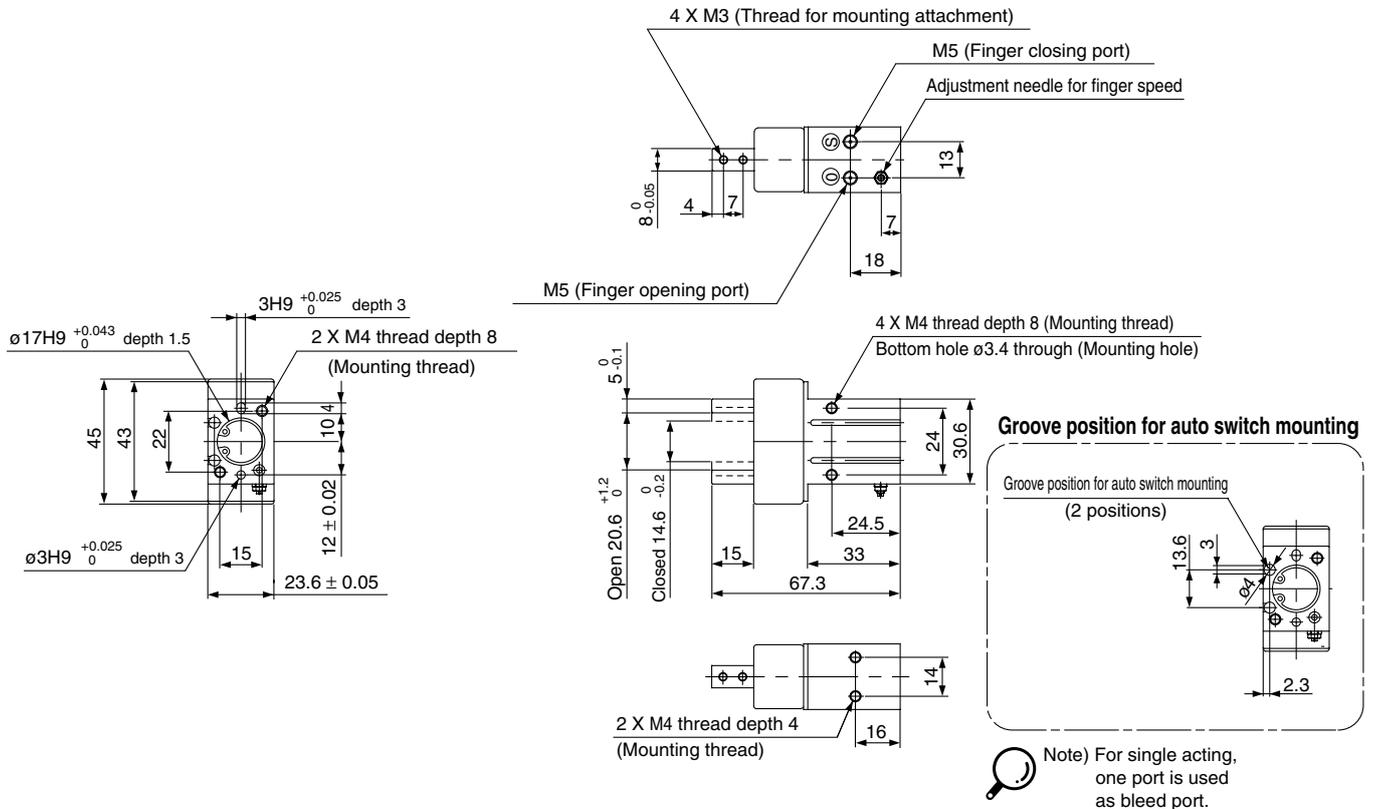
### MHK2-12□/Standard model



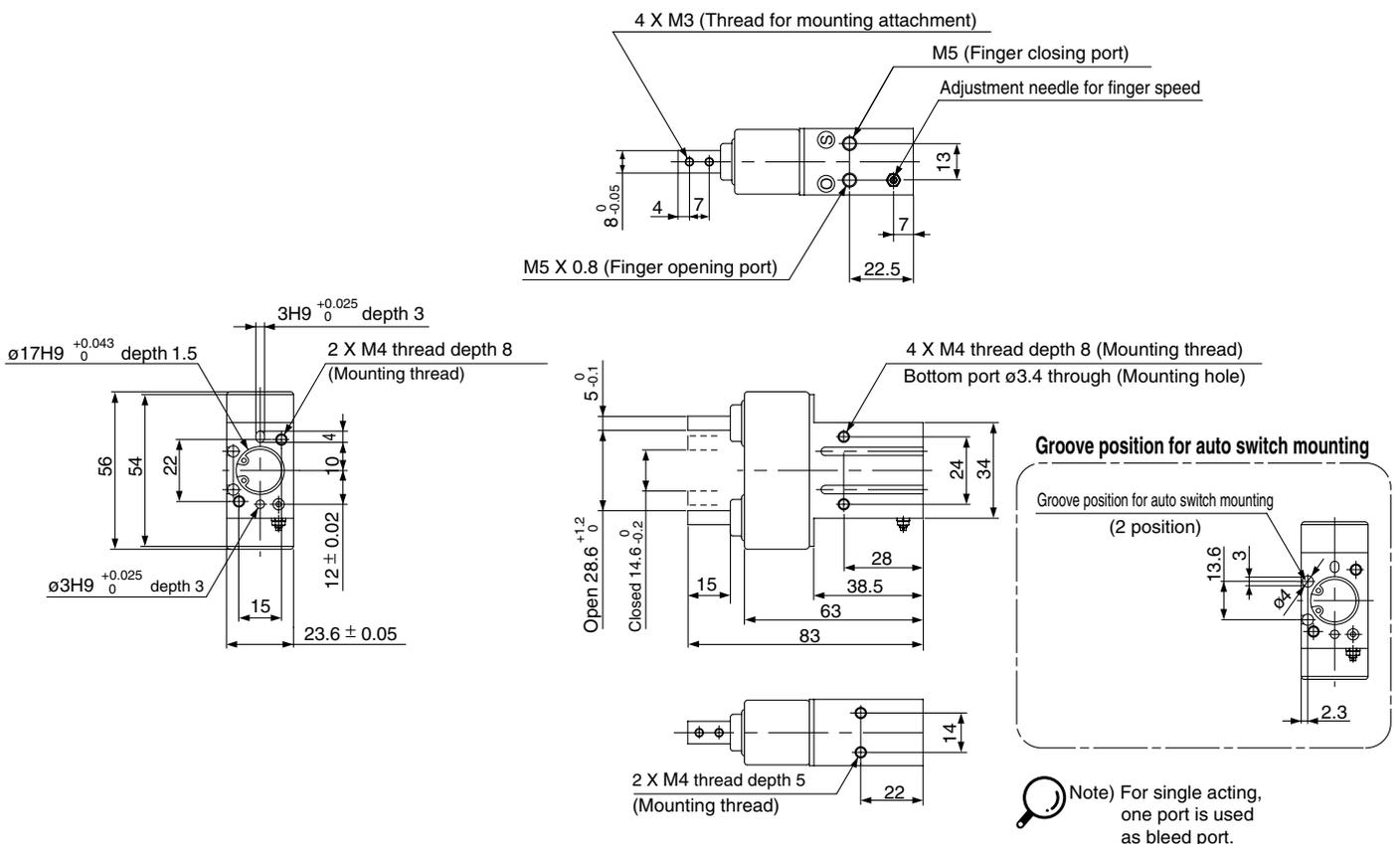
### MHKL2-12□/Long stroke model



## MHK2-16□/Standard model



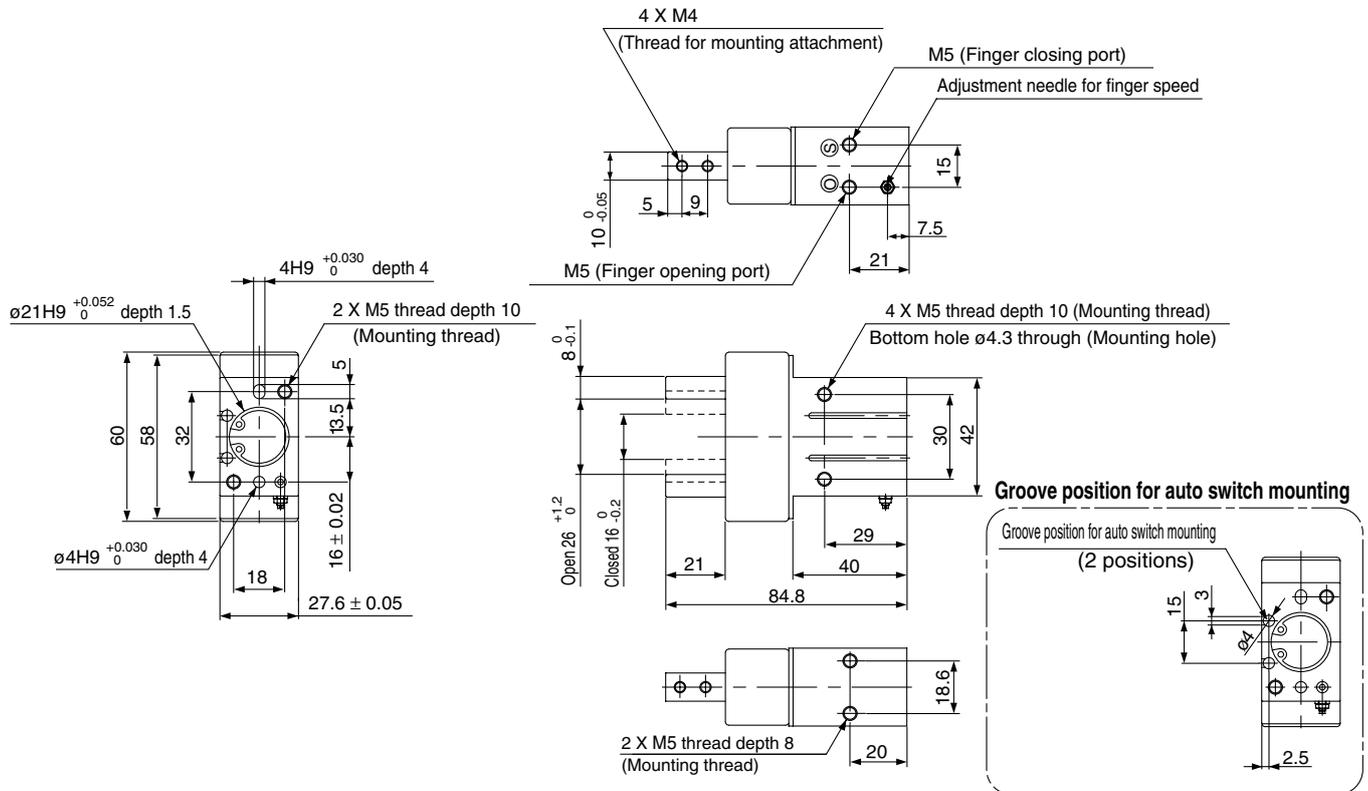
## MHKL2-16□/Long stroke model



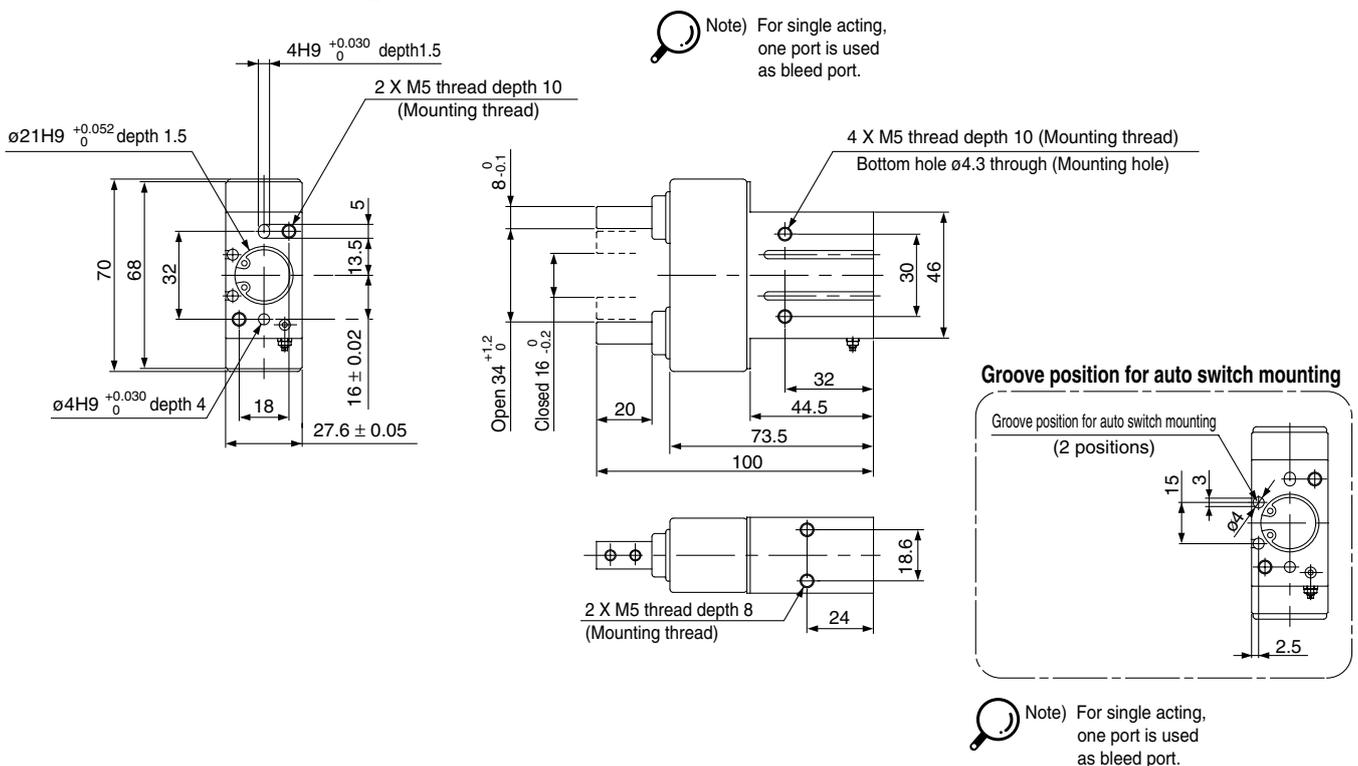
# Series MHK2

## Dimensions

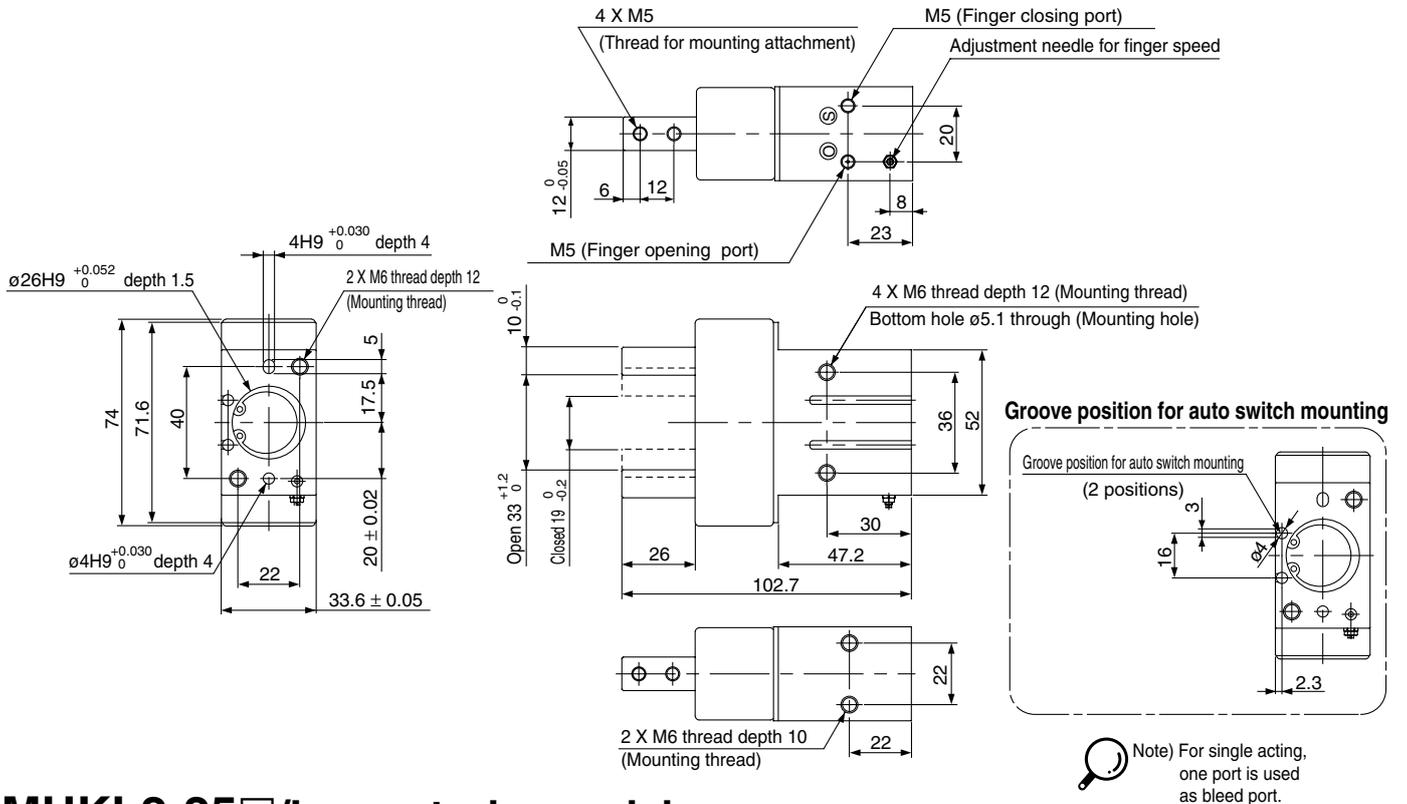
### MHK2-20□/Standard model



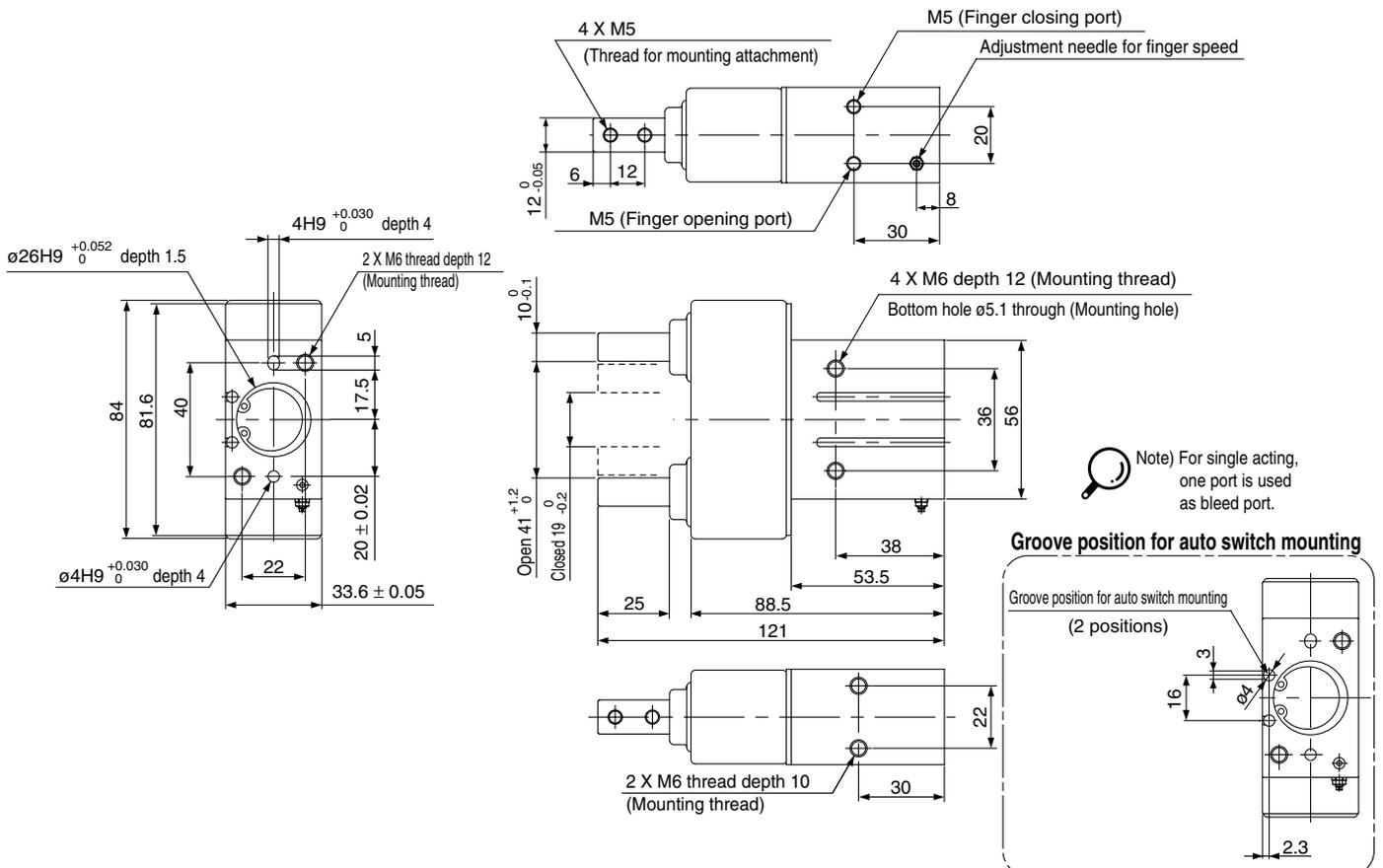
### MHKL2-20□/Long stroke model



## MHK2-25□/Standard model



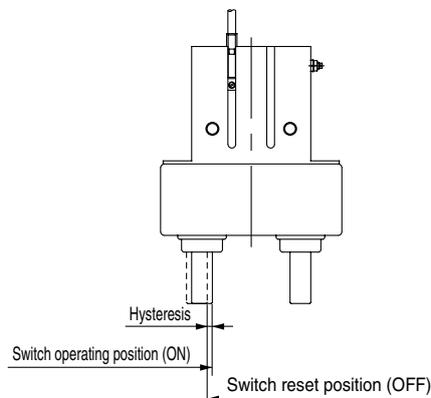
## MHKL2-25□/Long stroke model



# Series MHK2

## Auto Switch Hysteresis

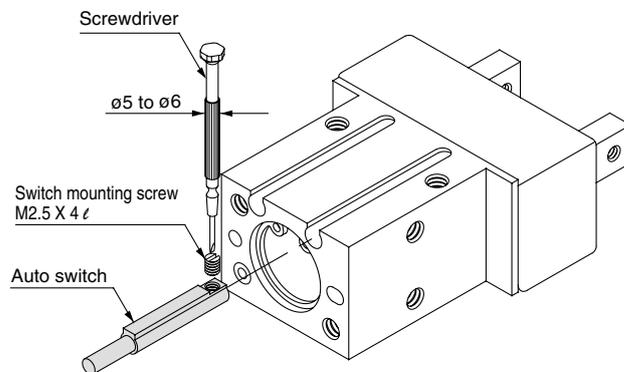
Similarly to micro switch, auto switch have hysteresis. The values in the following tables are criteria for switch position control etc.



Auto switch Model	Max. hysteresis mm		
	D-M9N(V) M9B(V)	D-M9BAL	
		ON: Red light emitting diode	ON: Green light emitting diode
MHK□2-12	0.4	0.4	1.6
MHK□2-16	0.4	0.4	1.6
MHK□2-20	0.4	0.4	1.6
MHK□2-25	0.4	0.4	1.6

## Setting Method of Auto Switch

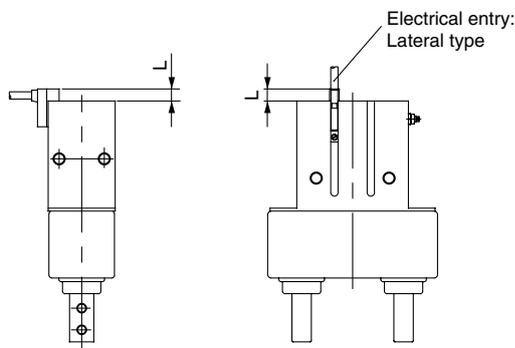
To set the auto switch, insert the auto switch into the switch groove of the air gripper from the direction indicated in the following drawing. After setting the position, tighten the attached switch mounting set screw with a straight bladed switchmakers screwdriver.



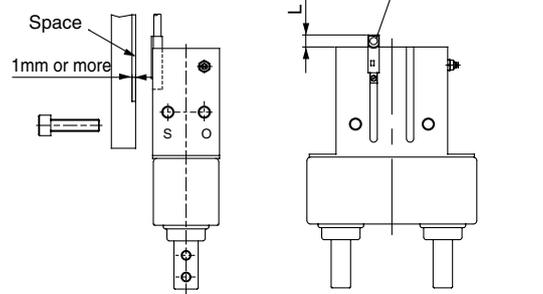
Note) Use a screwdriver with a grip diameter of 5 to 6mm to tighten the auto switch mounting screw. The tightening torque should be about 0.05 to 0.1Nm. When you begin to feel that the screw is being tightened, turn it further by 90°.

## Protrusion of Auto Switch from Edge of Body

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



Note) When auto switch for MHK2, MHKL2 is set on mounting side as figure below, allow for at least 1mm on mounting plate since the auto switch is protruded from edge of gripper.



Air gripper	Electrical entry Auto switch type Finger position	In-line entry			Perpendicular entry	
		D-M9N	D-M9B	D-M9BA	D-M9NV	D-M9BV
MHK2-12□	Open	—	2	7	—	—
	Closed	3	7	12	—	—
MHK2-16□	Open	—	2	6	—	—
	Closed	3	8	13	1	1
MHK2-20□	Open	—	—	1	—	—
	Closed	1	5	11	—	—
MHK2-25□	Open	—	—	—	—	—
	Closed	2	6	12	—	—
MHKL2-12□	Open	—	—	3	—	—
	Closed	3	7	12	—	—
MHKL2-16□	Open	—	—	1	—	—
	Closed	3	8	13	1	1
MHKL2-20□	Open	—	—	—	—	—
	Closed	1	6	11	—	—
MHKL2-25□	Open	—	—	—	—	—
	Closed	1	6	11	—	—

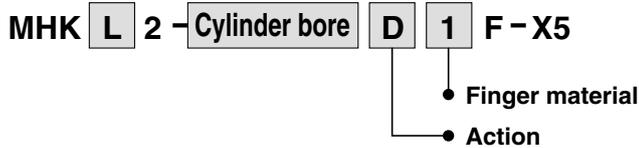
Note) There is no protrusion if no values are entered in the table.

# Series MHK2 Made to Order

Contact SMC for the details on dimensions, specifications, and delivery.



## 1 Oil-proof



The packing class has been revised to adopt oil-proof materials for use in an environment with splashing of cutting oil, etc.

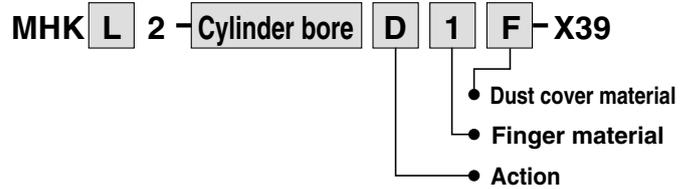
### Specifications

Type	Oil-proof
Bore size (mm)	12, 16, 20, 25
Action	Double acting, Single acting (normally open/normally closed)
Fluid	Air
Material	Dust cover, Seal, Gasket-fluoro rubber
Applicable auto switch	D-M9BAL



Notes) Some liquid may make the use of an air gripper or auto switch impossible. Confirm liquid and consult SMC for the use. The dimensions are the same as the standard type.

## 3 With grease needle



Lubrication from grease needle to interior is possible.

### Specifications

Type	With grease needle
Bore size (mm)	16, 20, 25
Action	Double acting, Single acting (normally open/normally closed)
Fluid	Air



Notes) Lubrication:

Fill lubricant to the bearing via magazine pocket so that foreign particles are not mixed in. Fine quality lithium soap grease (no. 2) for grease is recommended. The dimensions are the same as the standard type.

## 2 Thermal proof



The packing class has been revised to adopt thermal proof materials for use at high temperature of up to 100°C.

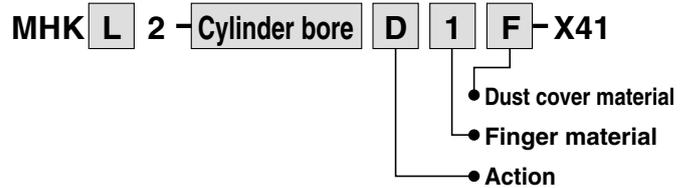
### Specifications

Type	Thermal proof
Bore size (mm)	12, 16, 20, 25
Action	Double acting, Single acting (normally open/normally closed)
Fluid	Air
Material	Dust cover, Seal, Gasket - fluoro rubber



Notes) Items with auto switch cannot be manufactured. The dimensions are the same as the standard type.

## 4 Grooves for auto switch on both sides

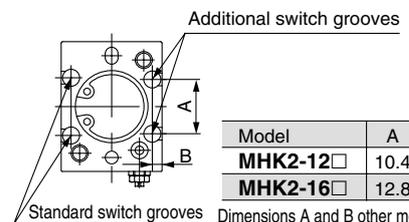


Possible to select the auto switch mounting side.

### Specifications

Type	Both sides grooves for auto switch mounting
Bore size (mm)	12, 16, 20, 25
Action	Double acting, Single acting (normally open/normally closed)
Fluid	Air

Groove position of auto switch



Model	A	B
MHK2-12□	10.4	1.8
MHK2-16□	12.8	1.6

Dimensions A and B other models are same as standard switch grooves.