

Series *MHK2*

ø12, ø16, ø20, ø25

How to Order

Standard model

MHK 2 — 20 D 1 F — F9NL S

Long stroke model

MHKL 2 — 20 D 1 F — F9NL 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	Perpendicular	In-line	0.5 (—)		3 (L)
Solid state switch	—	Grommet	With	3 wire (NPN)	24V	5V 12V	—	F9NV	F9N	●	●	Relay, PLC
				3 wire (PNP)				F9PV	F9P	●	●	
				2 wire	12V	F9BV	F9B	●	●			
	Water resistant (2 color indication)	—	F9BA	—	●							



*Lead wire length: 0.5m — (Example) F9N
3m L (Example) F9NL

Note) Be careful for the hysteresis of 2 color indication type D-F9BAL.
Refer to "Auto Switch Hysteresis" on p.2.4-16
Refer to p.2.11-1 for auto switch specifications.

Specifications

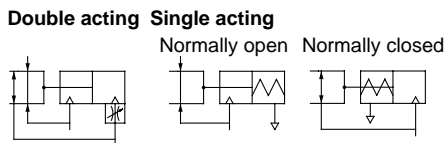


Fluid		Air	
Operating pressure	Double acting		0.1 to 0.6MPa
	Single acting	Normally open	0.25 to 0.6MPa
		Normally closed	
Ambient and fluid temperature		-10 to 60°C	
Repeatability		±0.01mm	
Lubrication		Not required	
Action		Double acting/Single acting	
Auto switch (Optional) Note)		Solid state switch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



Note) Refer to p.2.11-1 for further information on auto switch specifications.

Symbol

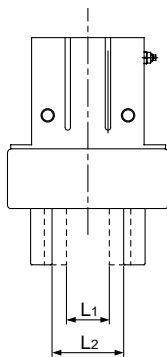


Options

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

MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

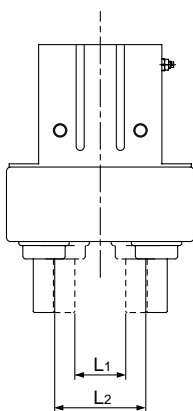
MHY2

MHW2

MRHQ

Auto switch

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.2.4-7 to 2.4-11.

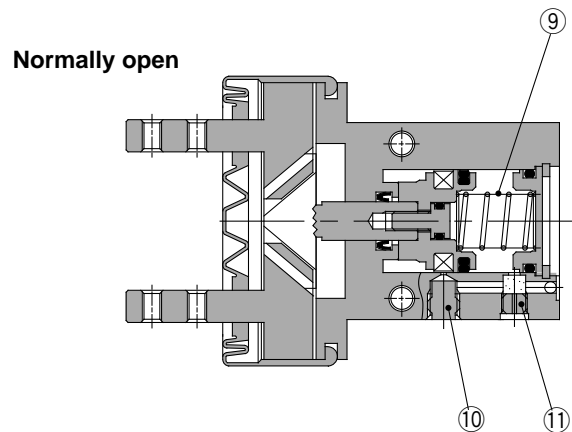
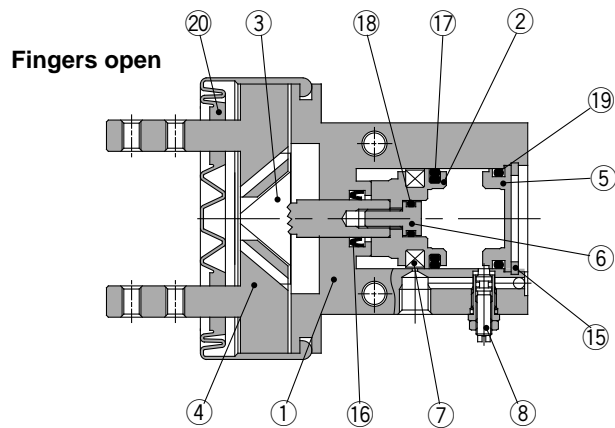


Series MHK2

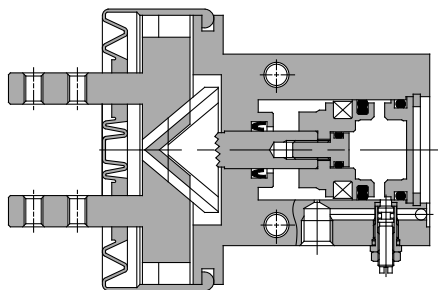
Construction

Double acting

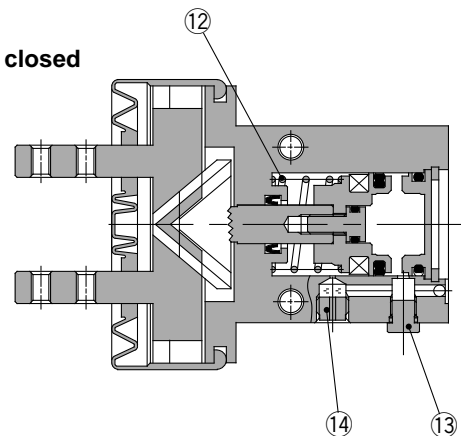
Single acting



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

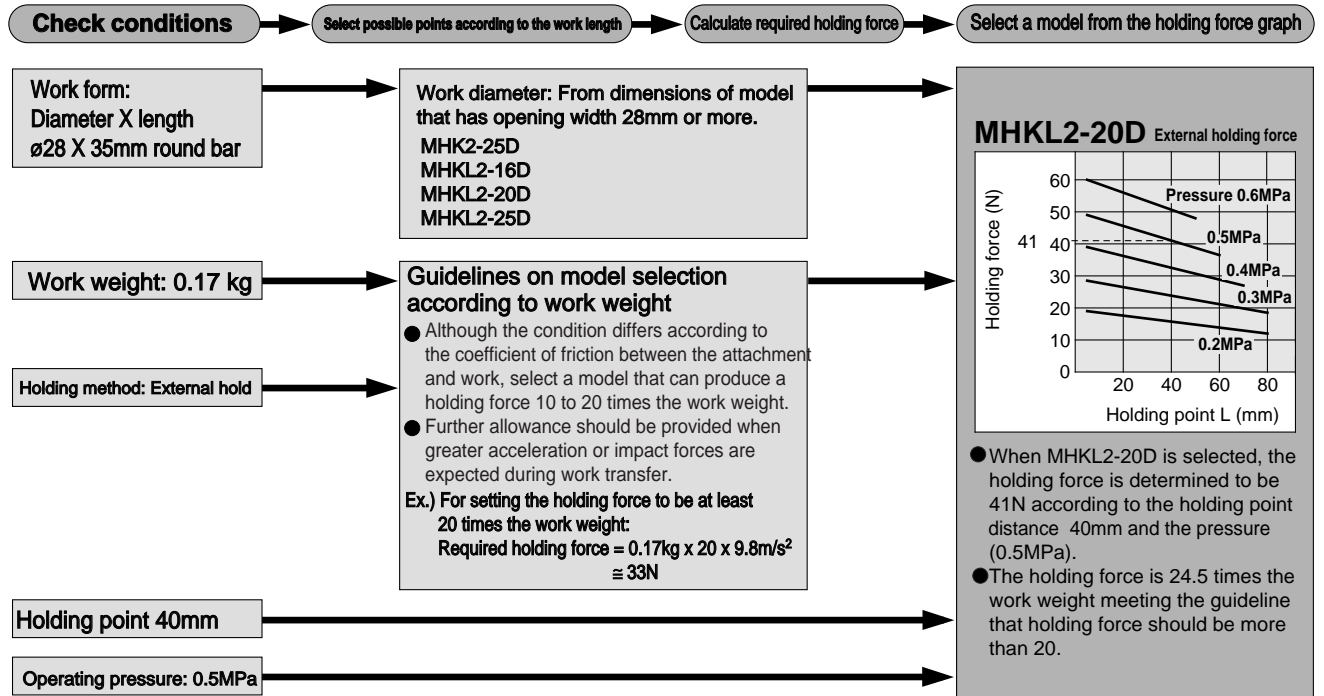
Replacement Parts: Seal Kits

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 ⁽²⁾	P3318105	P3318113	P3318205	P3318213	P3318305	P3318313	P3318405	P3318413
		FKM ⁽²⁾	P3318105-1	P3318113-1	P3318205-1	P3318213-1	P3318305-1	P3318313-1	P3318405-1	P3318413-1
		Si ⁽²⁾	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

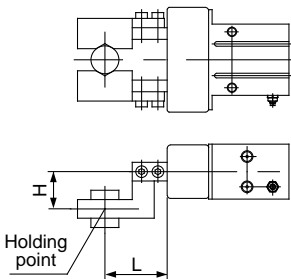
Procedures



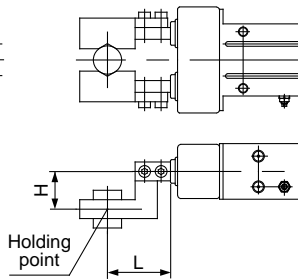
Holding Point

External hold

Series MHK

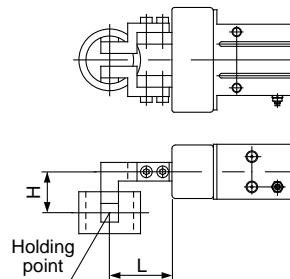


Series MHKL

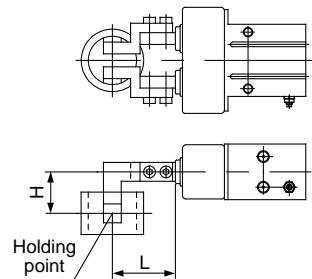


Internal hold

Series MHK



Series MHKL

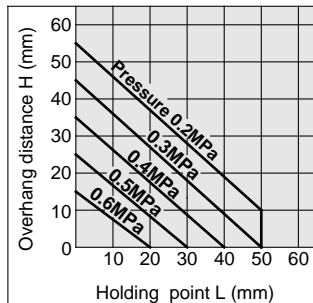


L: Distance to the holding point
H: Overhang distance

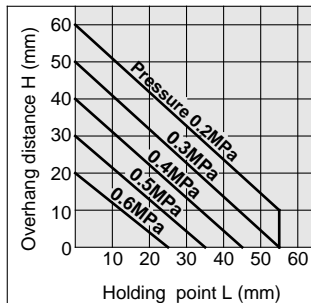
- Proper holding points should be selected in accordance with the operating pressure. The distance to the holding point L and the overhang distance H should be within the limited range shown in the graph below.
- When the work holding point is out of range, the unbalanced load applied to the finger and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

Limitations of Holding Point

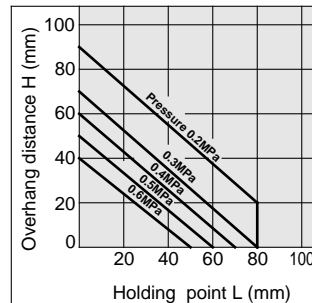
MHK2-12□ MHKL2-12□



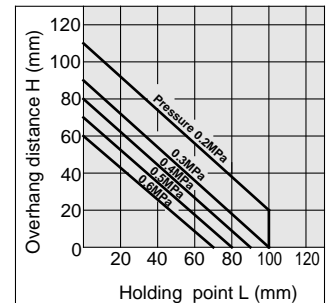
MHK2-16□ MHKL2-16□



MHK2-20□ MHKL2-20□



MHK2-25□ MHKL2-25□



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.

MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

MHY2

MHW2

MRHQ

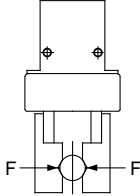
Auto switch

Series MHK2

Effective Holding Force: Series MHK2 double acting

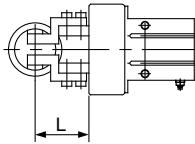
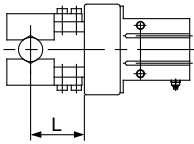
● Indication of effective holding force

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.



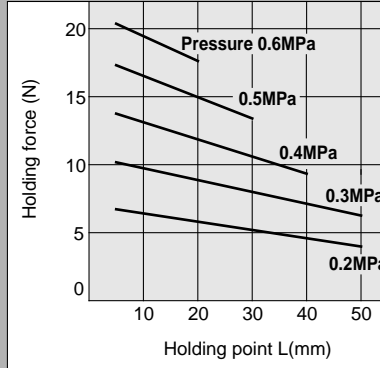
External hold
Series MHK2

Internal hold
Series MHK2

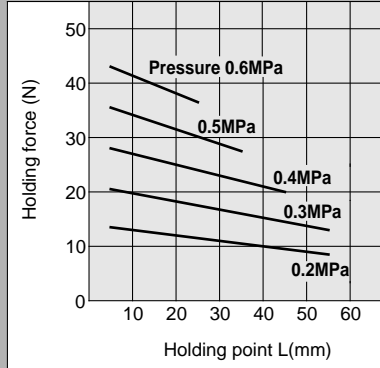


External Holding Force

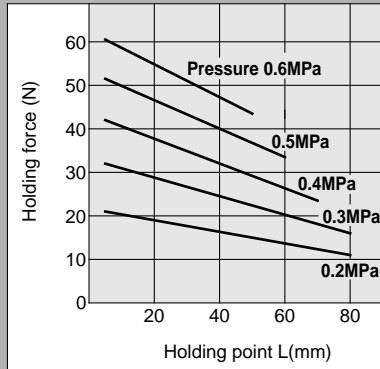
MHK2-12D



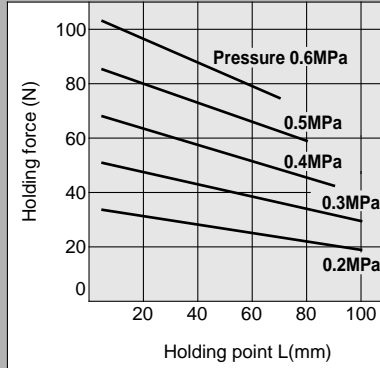
MKH2-16D



MHK2-20D

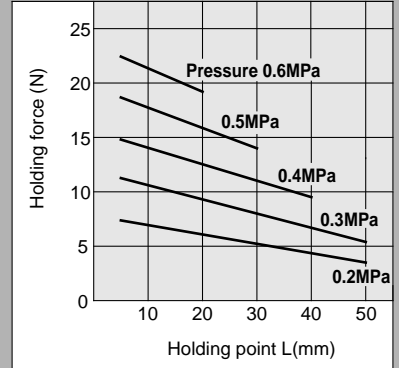


MHK2-25D

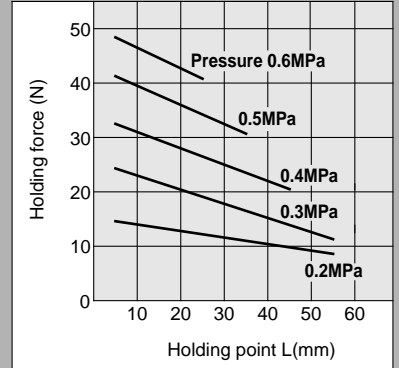


Internal Holding Force

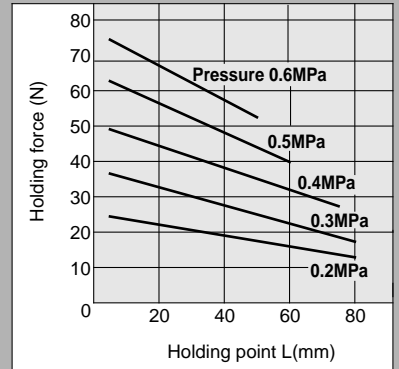
MHK2-12D



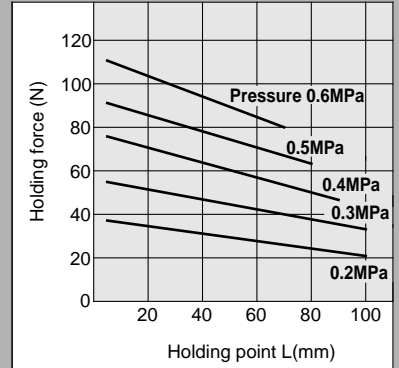
MKH2-16D



MHK2-20D



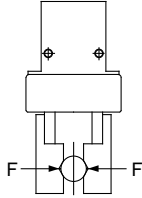
MHK2-25D



Effective Holding Force: Series MHKL2 Double acting

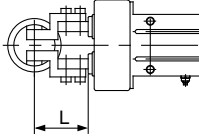
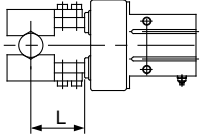
● **Indication of effective holding force**

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



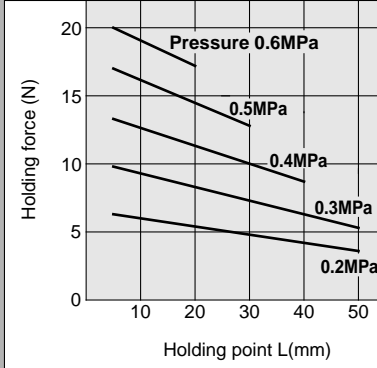
External hold
Series MHKL2

Internal hold
Series MHKL2

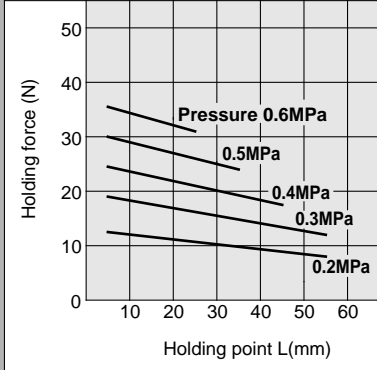


External Holding Force

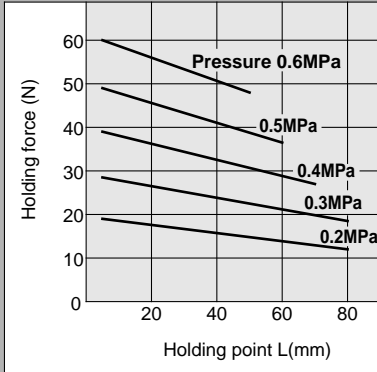
MHKL2-12D



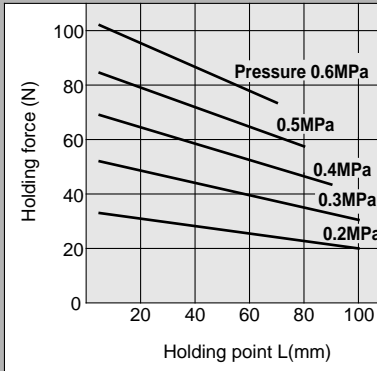
MHKL2-16D



MHKL2-20D

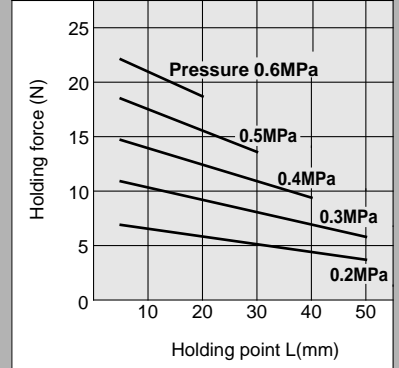


MHKL2-25D

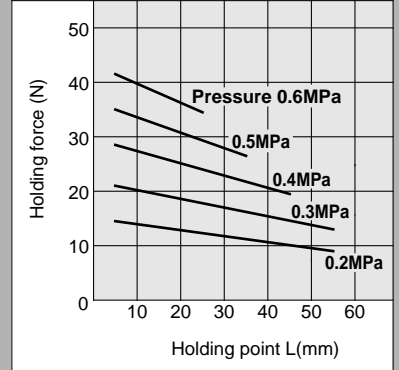


Internal Holding Force

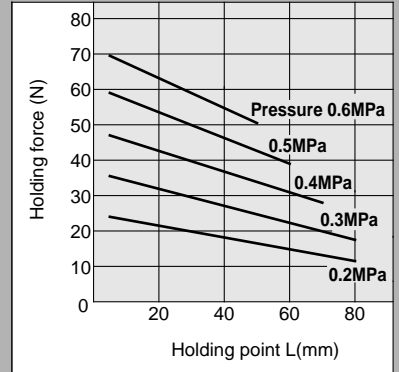
MHKL2-12D



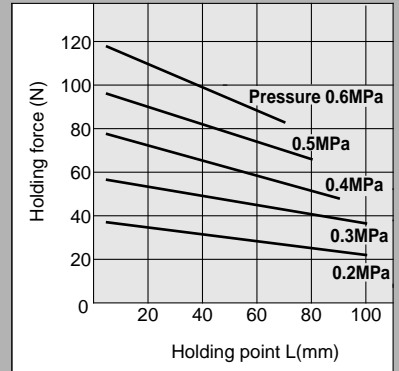
MHKL2-16D



MHKL2-20D



MHKL2-25D



MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

MHY2

MHW2

MRHQ

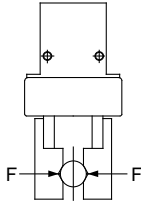
Auto switch

Series MHK2

Effective Holding Force: Series MHK2 Single acting

● Indication of effective holding force

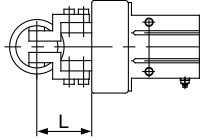
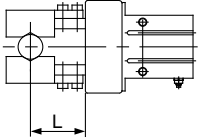
The holding force shown in the tables represents the holding force when all fingers and attachments are in contact with the work. F = one finger thrust.



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

External hold
Series MHK2

Internal hold
Series MHK2



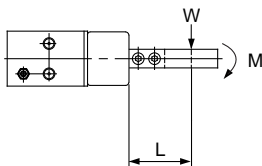
● Precautions when using the single acting type:

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

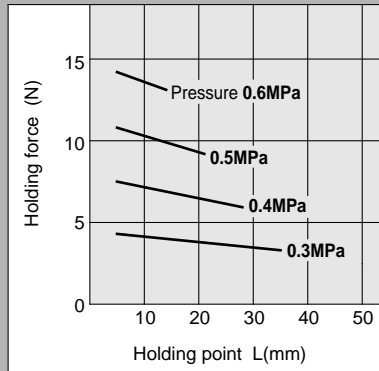
Model	Allowable moment Nm
MHK2-12S, C	0.05
MHK2-16S, C	0.12
MHK2-20S, C	0.25
MHK2-25S, C	0.49

M: Allowable moment
($M = WL$)

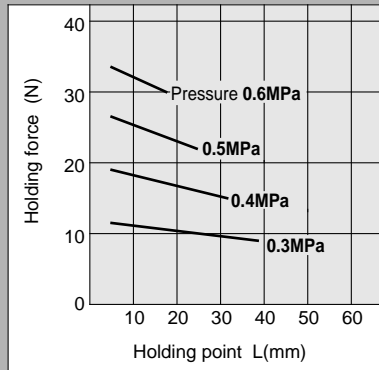


External Holding Force

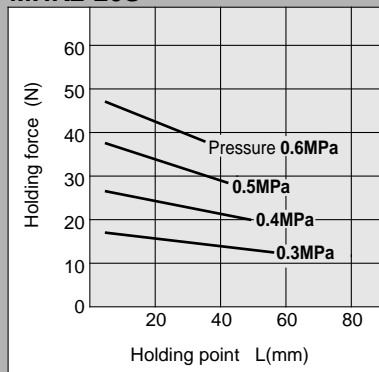
MHK2-12S



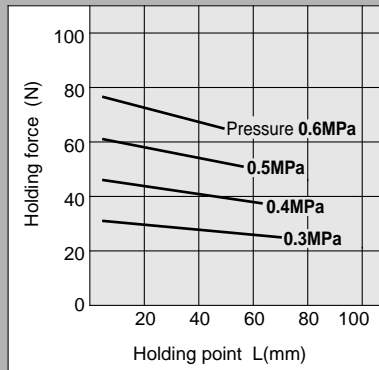
MHK2-16S



MHK2-20S

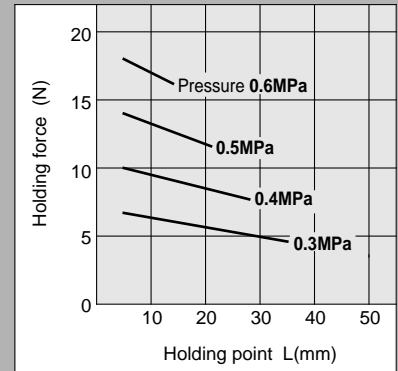


MHK2-25S

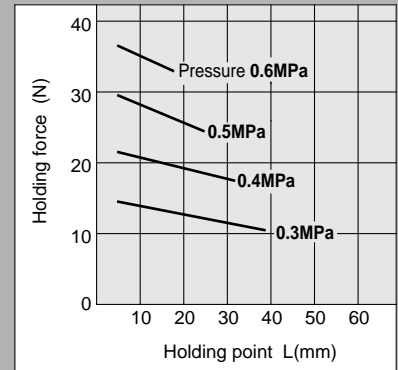


Internal Holding Force

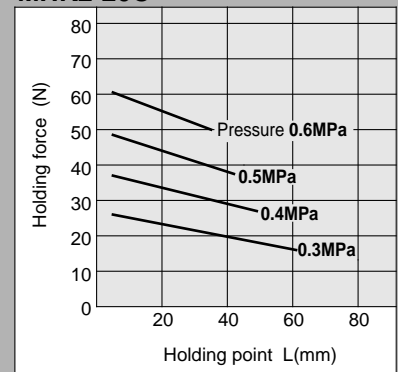
MHK2-12C



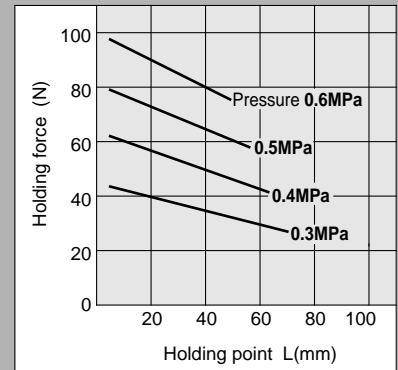
MHK2-16C



MHK2-20C



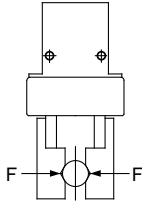
MHK2-25C



Effective Holding Force: Series MHKL2 Single acting

● **Indication of effective holding force**

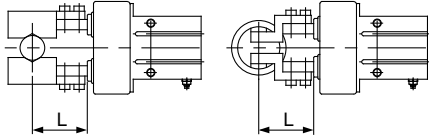
The holding force shown in the tables represents the holding force of one finger when all fingers and attachments are in contact with the work.



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

External hold
Series MHKL2

Internal hold
Series MHKL2



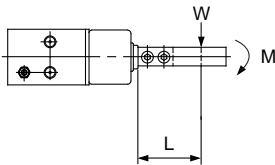
● **Precautions when using the single acting type:**

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

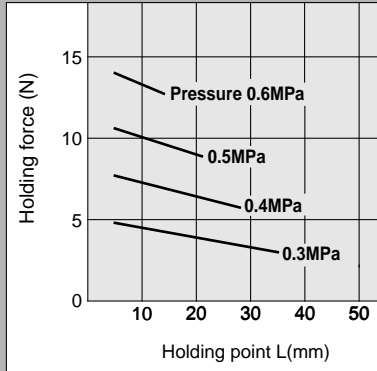
Model	Allowable moment Nm
MHKL2-12S, C	0.05
MHKL2-16S, C	0.12
MHKL2-20S, C	0.25
MHKL2-25S, C	0.49

M: Allowable moment
($M = WL$)

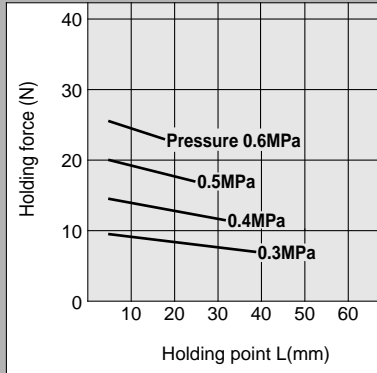


External Holding Force

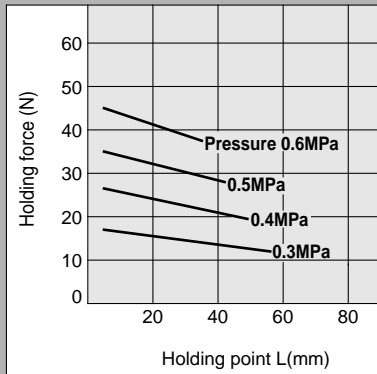
MHKL2-12S



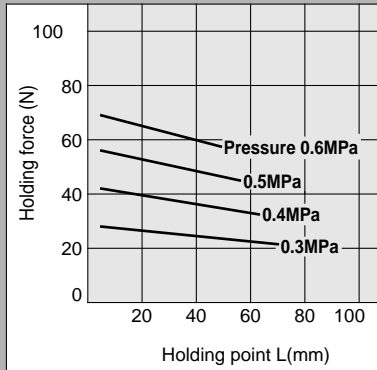
MHKL2-16S



MHKL2-20S

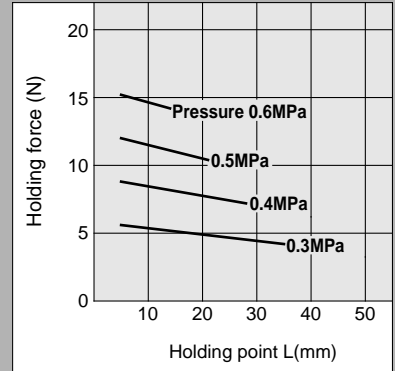


MHKL2-25S

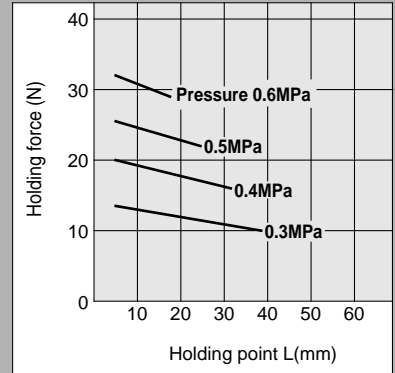


Internal Holding Force

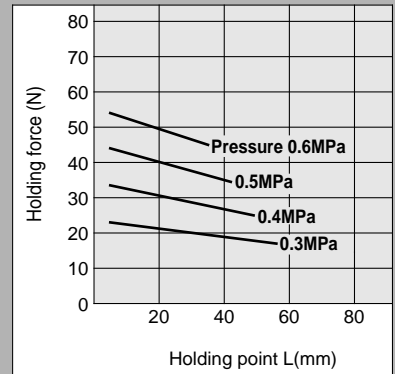
MHKL2-12C



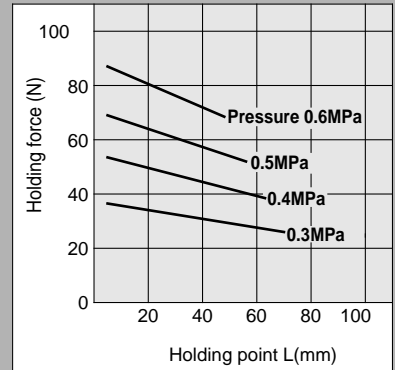
MHKL2-16C



MHKL2-20C



MHKL2-25C



MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

MHY2

MHW2

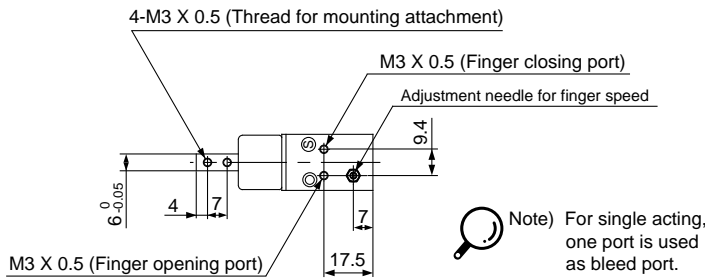
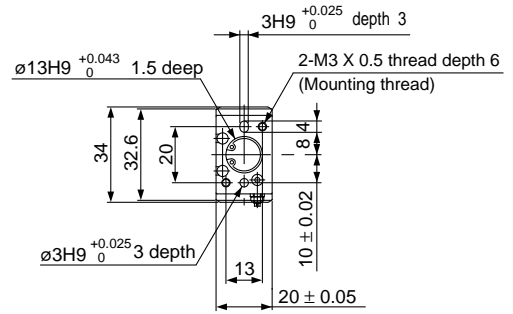
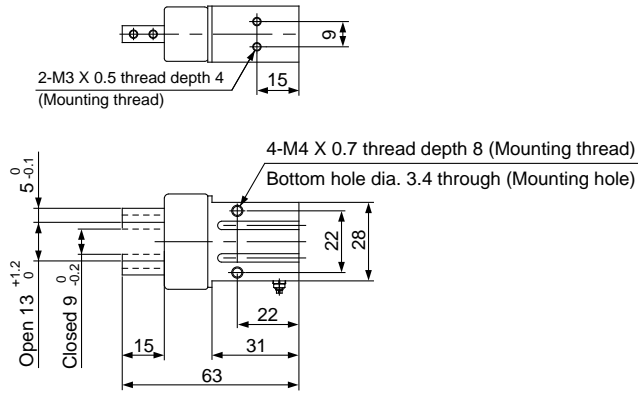
MRHQ

Auto switch

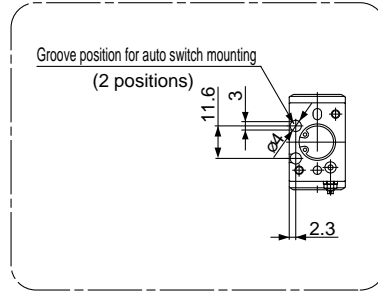
Series MHK2

Dimensions

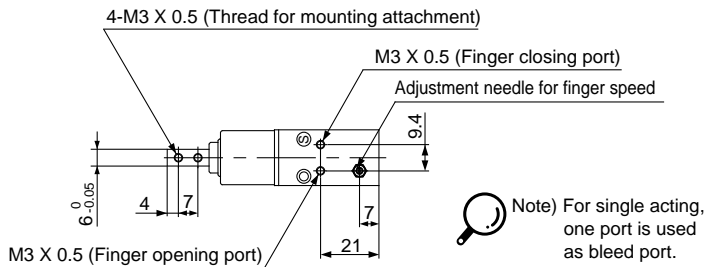
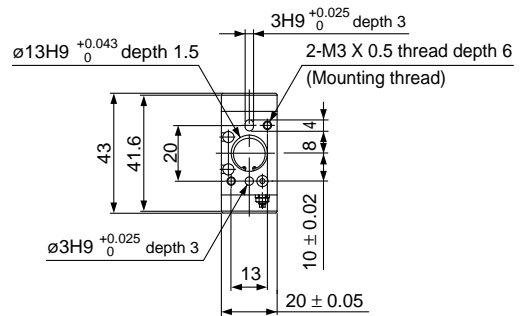
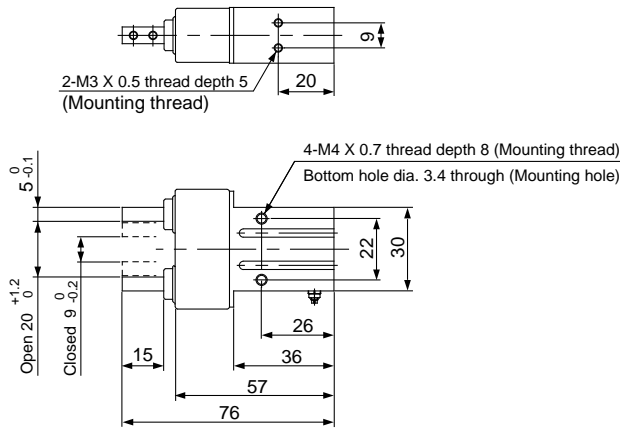
MHK2-12□/Standard model



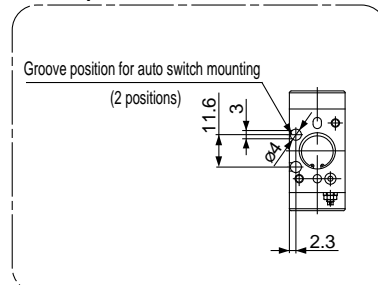
Groove position for auto switch mounting



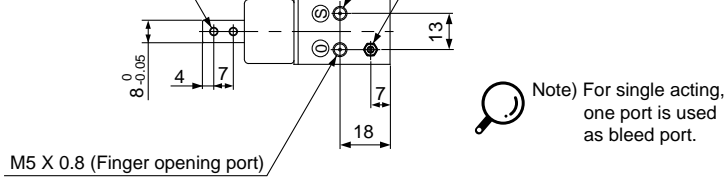
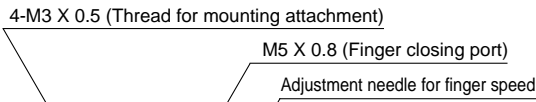
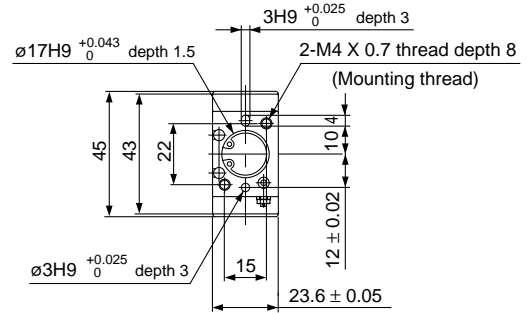
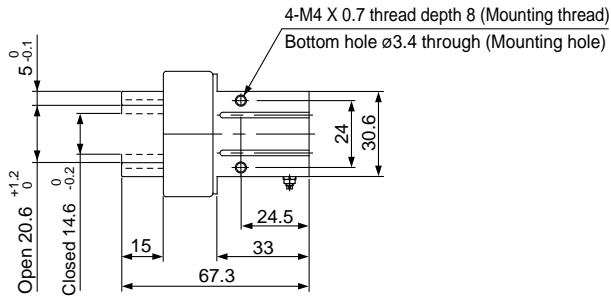
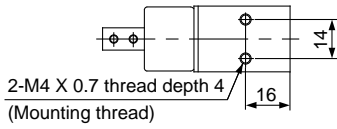
MHKL2-12□/Long stroke model



Groove position for auto switch mounting

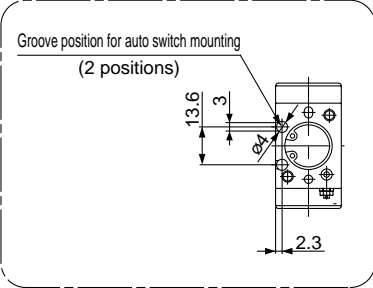


MHK2-16□/Standard model

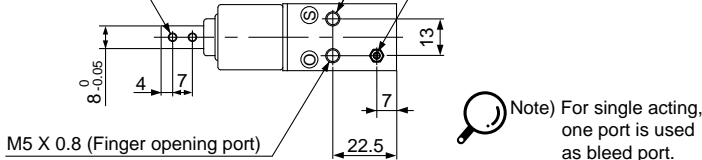
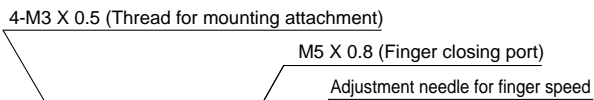
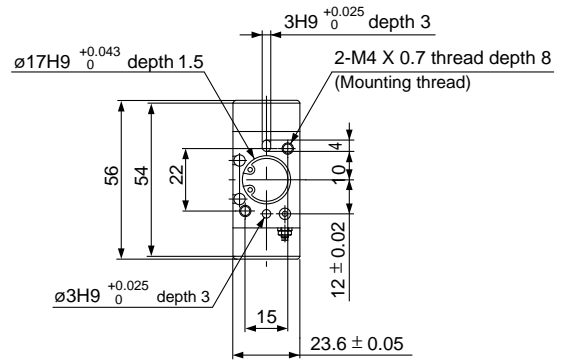
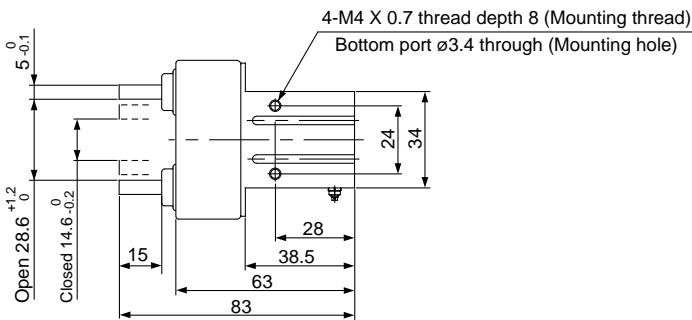
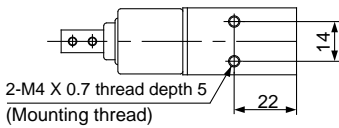


Note) For single acting, one port is used as bleed port.

Groove position for auto switch mounting

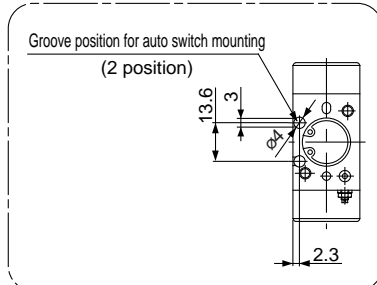


MHKL2-16□/Long stroke model



Note) For single acting, one port is used as bleed port.

Groove position for auto switch mounting



MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

MHY2

MHW2

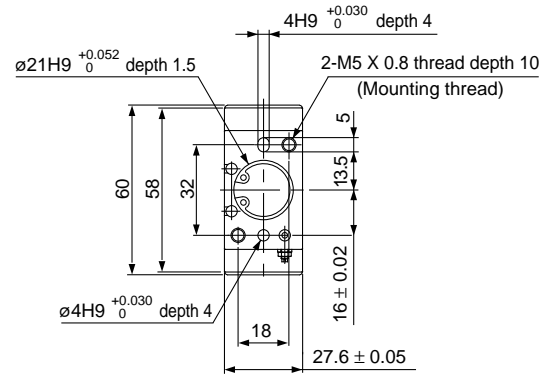
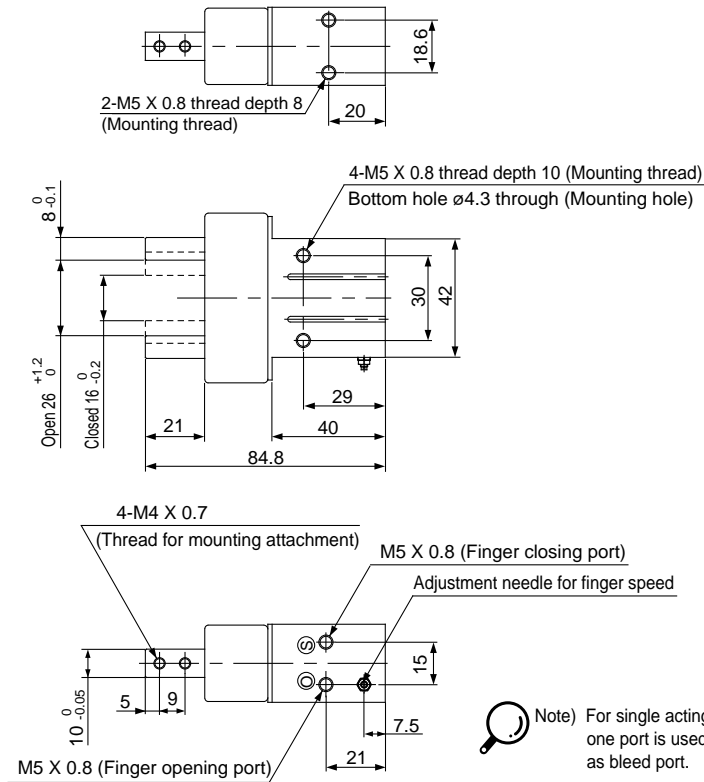
MRHQ

Auto switch

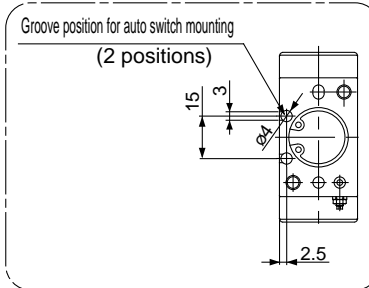
Series MHK2

Dimensions

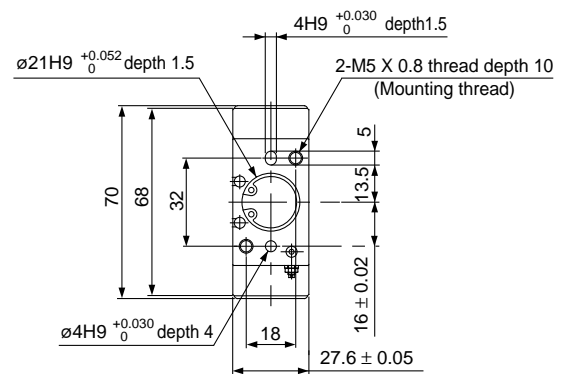
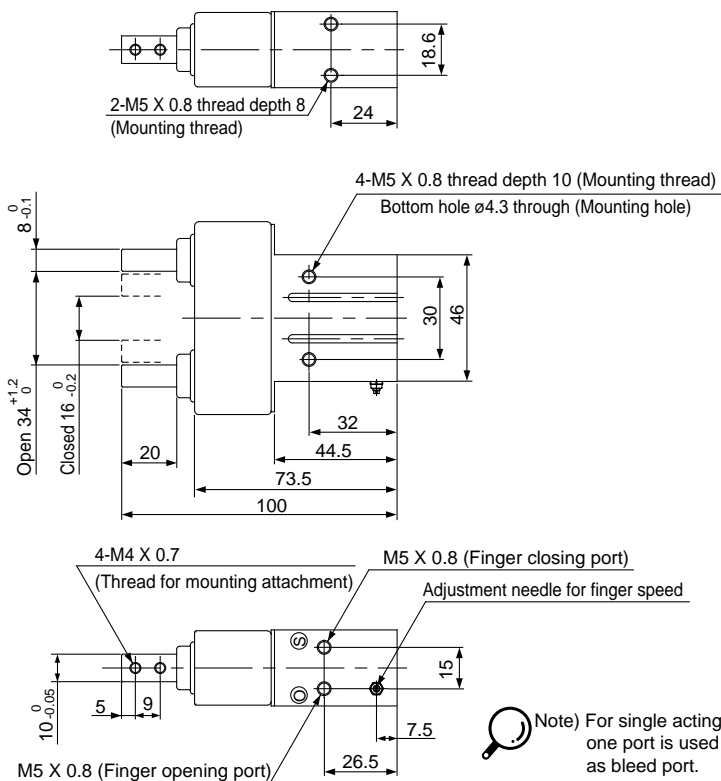
MHK2-20□/Standard model



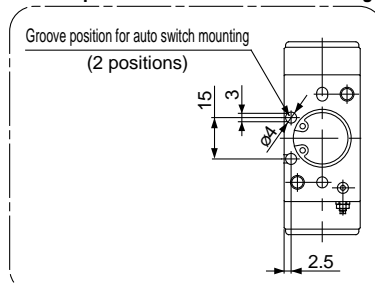
Groove position for auto switch mounting



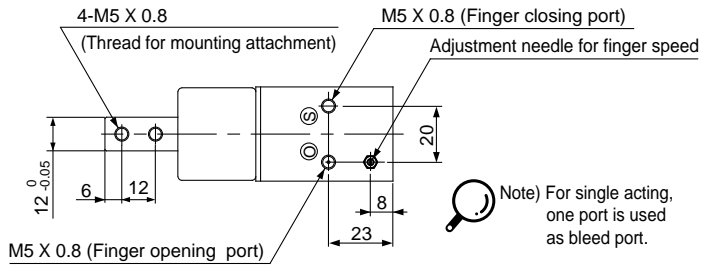
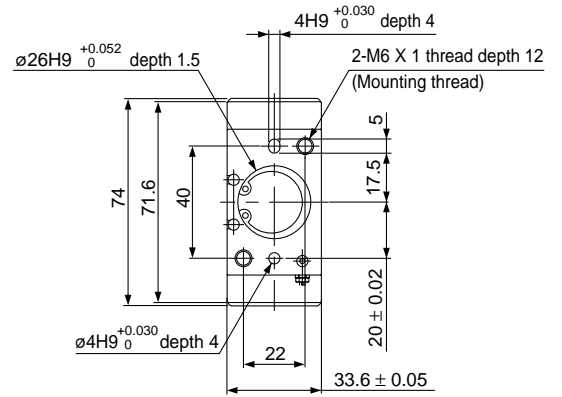
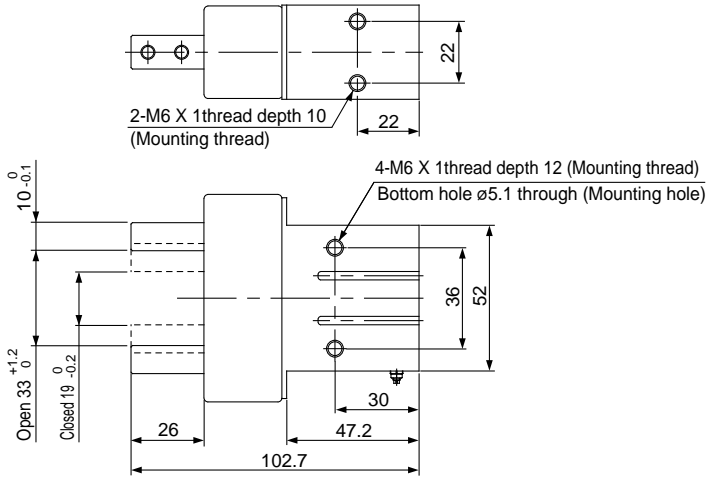
MHKL2-20□/Long stroke model



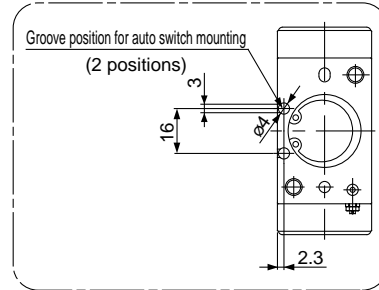
Groove position for auto switch mounting



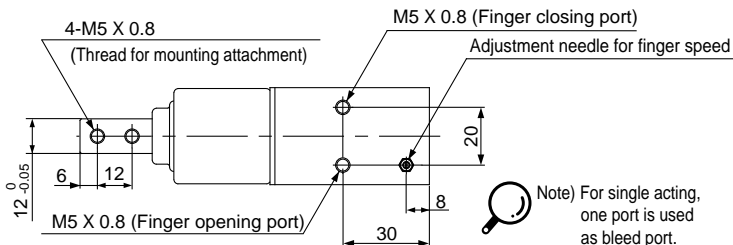
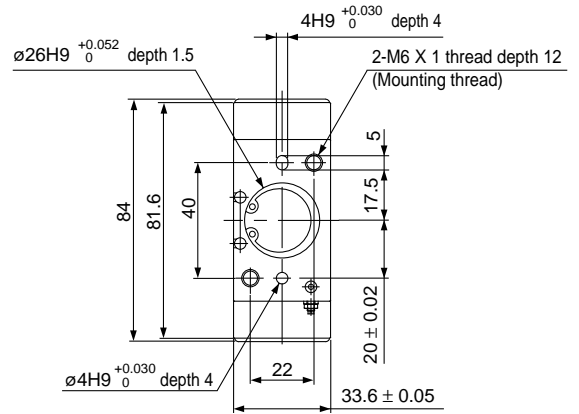
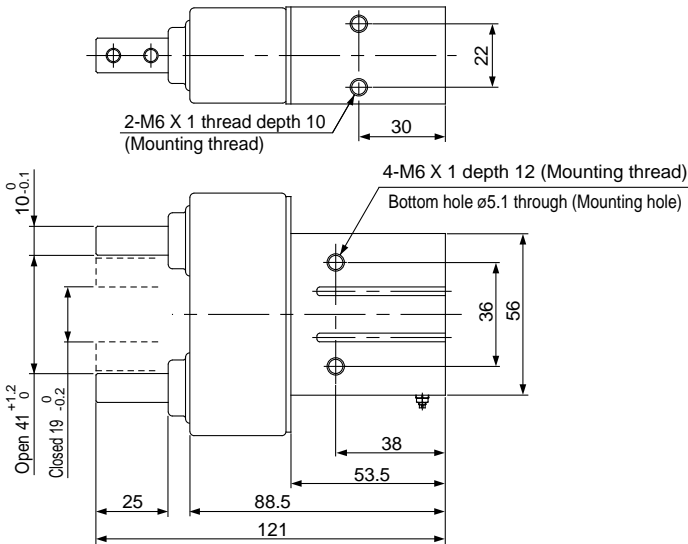
MHK2-25□/Standard model



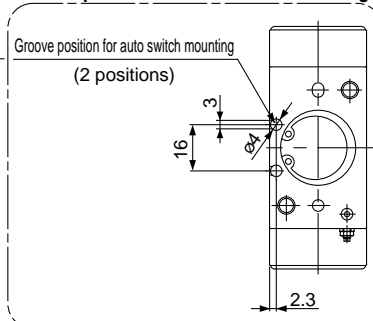
Groove position for auto switch mounting



MHKL2-25□/Long stroke model



Groove position for auto switch mounting



MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

MHY2

MHW2

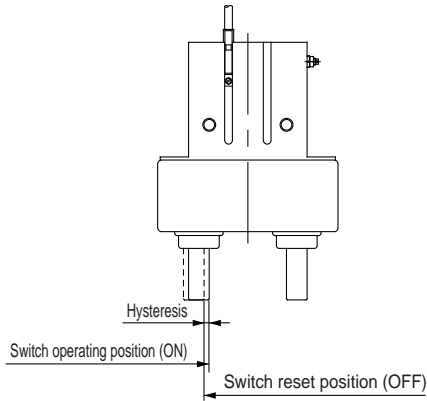
MRHQ

Auto switch

Series MHK2

Auto Switch Hysteresis

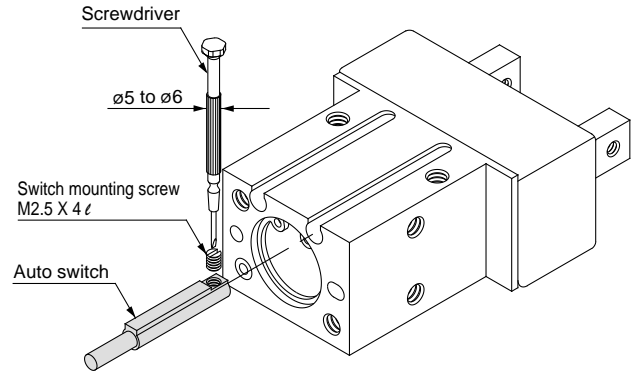
Similarly to micro switch, auto switch have hysteresis. The values in the following tables are criteria for switch position control etc.



Auto switch Model	Max. hysteresis mm		
	D-F9N(V) F9B(V)	D-F9BAL	
		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

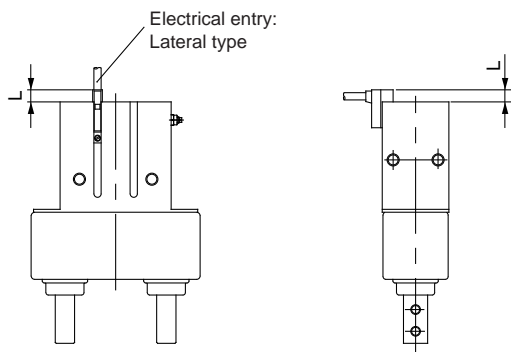
To set the auto switch, insert the auto switch into the switch groove of the air gripper from the direction indicated in the following drawing. After setting the position, tighten the attached switch mounting set screw with a straight bladed switchmakers screwdriver.



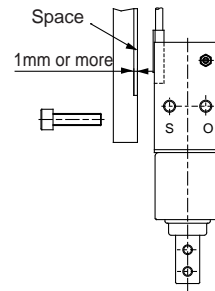
Note) Use a screwdriver with a grip diameter of 5 to 6mm to tighten the auto switch mounting screw. The tightening torque should be about 0.05 to 0.1Nm. When you begin to feel that the screw is being tightened, turn it further by 90°.

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.



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.



Unit: mm

Air gripper	Electrical entry Auto switch type Finger position	In-line entry			Perpendicular entry	
		D-F9N	D-F9B	D-F9BA	D-F9NV	D-F9BV
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.

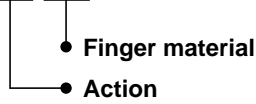
Series MHK2 Made to Order

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



1 Oil-proof

MHK **L** 2 - Cylinder bore **D** 1 F - X5



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

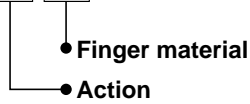
Specifications

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-F9BAL

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.

2 Thermal proof

MHK **L** 2 - Cylinder bore **D** 1 F - X4



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.

3 With grease needle

MHK **L** 2 - Cylinder bore **D** 1 F - X39



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.

4 Grooves for auto switch on both sides

MHK **L** 2 - Cylinder bore **D** 1 F - X41



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.

MHZ2

MHZJ2

MHQ

MHL2

MHR

MHK

MHS

MHC2

MHT2

MHY2

MHW2

MRHQ

Auto switch