

Wedge Cam Operation Slide Guide Air Gripper

Series *MHK2*



- MHZ
- MHF
- MHL
- MHR
- MHK**
- MHS
- MHC
- MHT
- MHY
- MHW
- MRHQ
- Misc.
- D-
- 20-

Load Resistant, Dust Cover for Adverse Environments

2 types of finger materials

Standard: Carbon steel

Option: Stainless steel

3 types of dust cover materials

Standard: Chloroprene rubber (CR)Black

Optional: Fluoro rubber (FKM)Black

Silicon rubber (Si)White

Wedge Cam Operation Provides Dust Cover for Adverse

Wedge Cam Operation Slide Guide Air Gripper (2 Finger)

Mounting repeatability
Centering accuracy ± 0.1 mm

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

Pin hole for positioning on top side

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.

High precision repeatability: ± 0.01 mm

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

2 types of finger materials are available for different applications.

Standard: Carbon steel
Option: Stainless steel

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

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

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*

Application

Assembling

Transferring

Loading/Unloading work into machine tools

Universal mounting

Axial mounting
(Body tapped)

Vertical mounting
(Body tapped)

Lateral mounting
(Body tapped)

Vertical mounting
(Body through-hole)

Interchangeable with Series MHQ2

Series Variations

	Series	Model	Bore size (mm)	Opening/Closing stroke (mm)	Option
Parallel opening/closing	Standard type Series MHK2	MHK2-12□	12	4	<ul style="list-style-type: none"> ■ Finger option Carbon steel (Standard), Stainless steel ■ Dust cover option Chloroprene rubber (Standard) Fluoro rubber Silicon rubber ■ Auto switch Solid state switch D-M9N(V), D-M9P(V) D-M9B(V), Water resistant (2-color indication), D-F9BAL
		MHK2-16□	16	6	
		MHK2-20□	20	10	
		MHK2-25□	25	14	
	Long stroke type Series MHKL2	MHKL2-12□	12	11	
		MHKL2-16□	16	14	
		MHKL2-20□	20	18	
		MHKL2-25□	25	22	

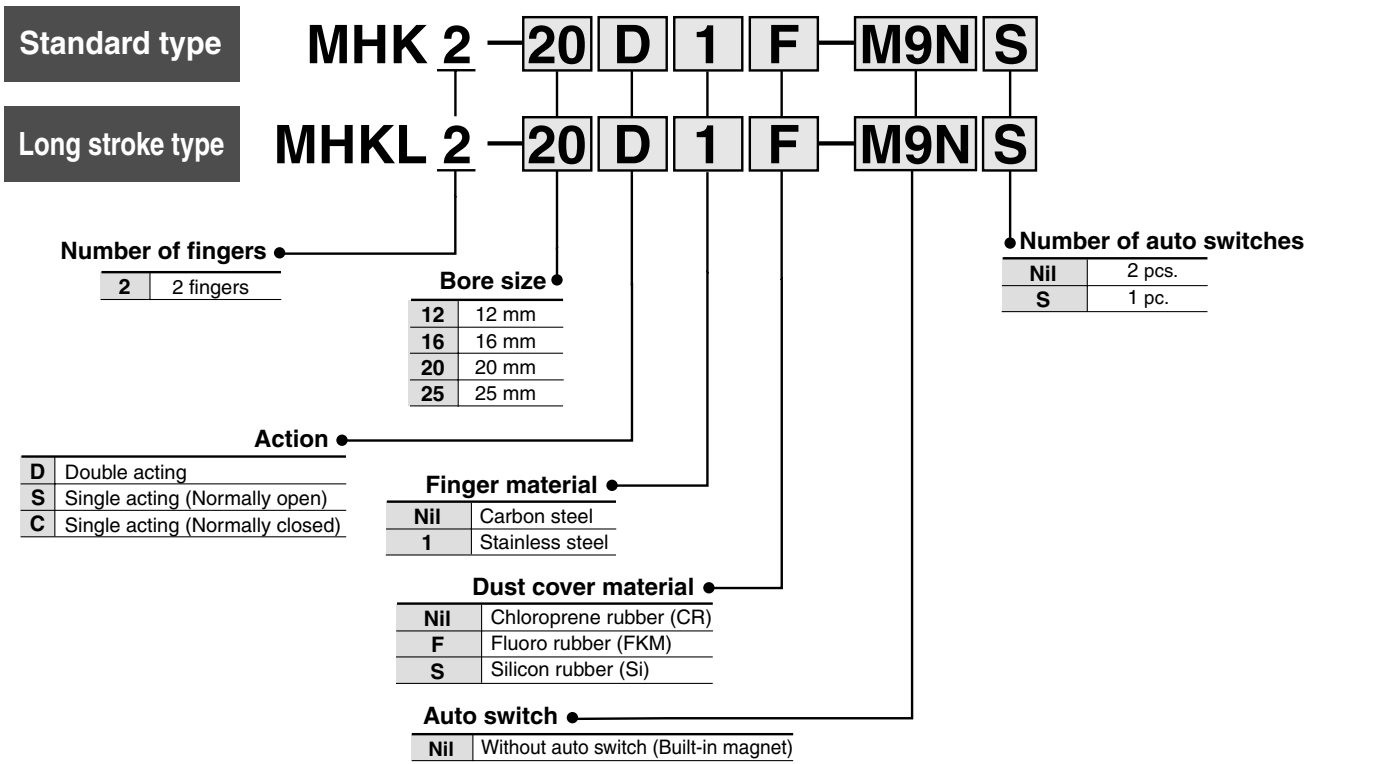
- MHZ
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Wedge Cam Operation Slide Guide Air Gripper

Series *MHK2*

Size: 12, 16, 20, 25

How to Order



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

Applicable Auto Switch/Refer to page 12-13-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto Switch model		Lead wire length (m)*			Flexible lead wire (-61)	Pre-wire connector	Applicable load		
					DC	AC	Electrical entry		0.5 (Nil)	3 (L)	5 (Z)					
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	12 V	—	Perpendicular	M9NV	M9N	●	●	○	Standard	○	IC circuit
				In-line				M9PV	M9P	●	●	○	○			
				M9BV				M9B	●	●	○	○				
	Water resistant (2-color indication)	—	—	—	—	—	—	F9BA	—	●	○	○	○	—	—	

* Lead wire length symbols: 0.5 m Nil (Example) M9N
 3 m L (Example) M9NL
 5 m Z (Example) M9NZ

* Auto switches marked with a "○" symbol are produced upon receipt of order.

Note) Be careful for the hysteresis of 2-color indication type D-F9BAL. Refer to "Auto Switch Hysteresis" on page 12-6-16.



Refer to page 12-13-25 for solid state switch with pre-wire connector.

Wedge Cam Operation Slide Guide Air Gripper Series **MHK2**

Specifications



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



Note) Refer to page 12-13-1 for further information on auto switches.

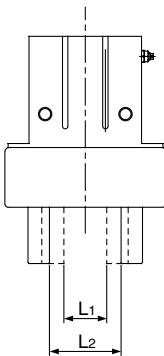
Option

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

Model

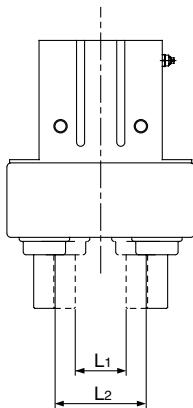
Series MHK/Standard Type

Action	Model	Bore size (mm)	Max. operating frequency (c.p.m)	Effective gripping force per finger (N) ^{Note)}	Opening/Closing stroke (mm) L2-L1	Width at closing (mm) L1	Width at opening (mm) L2	Weight (g)	
Double acting	MHK2-12D	12	120	External grip: 15 Internal grip : 16	4	9	13	75	
	MHK2-16D	16		External grip: 31 Internal grip : 36	6	14.6	20.6	113	
	MHK2-20D	20		External grip: 46 Internal grip : 56	10	16	26	235	
	MHK2-25D	25		External grip: 80 Internal grip : 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 Type

Action	Model	Bore size (mm)	Max. operating frequency (c.p.m)	Effective gripping force per finger (N) ^{Note)}	Opening/Closing stroke (mm) L2-L1	Width at closing (mm) L1	Width at opening (mm) L2	Weight (g)	
Double acting	MHKL2-12D	12	90	External grip: 14 Internal grip : 16	11	9	20	104	
	MHKL2-16D	16		External grip: 27 Internal grip : 30	14	14.6	28.6	164	
	MHKL2-20D	20		External grip: 45 Internal grip : 53	18	16	34	312	
	MHKL2-25D	25		External grip: 79 Internal grip : 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 0.5 MPa, when gripping point L is 20 mm.

Single acting normally open: External holding force, Single acting normally closed: Internal gripping force.

Refer to "Effective Gripping Force" for the gripping force at each gripping position on pages 12-6-7 to 12-6-11.



P. 12-6-17

MHZ

MHF

MHL

MHR

MHK

MHS

MHC

MHT

MHY

MHW

MRHQ

Misc.

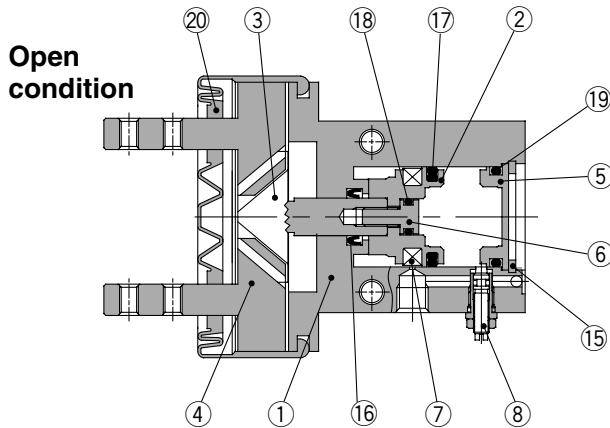
D-

20-

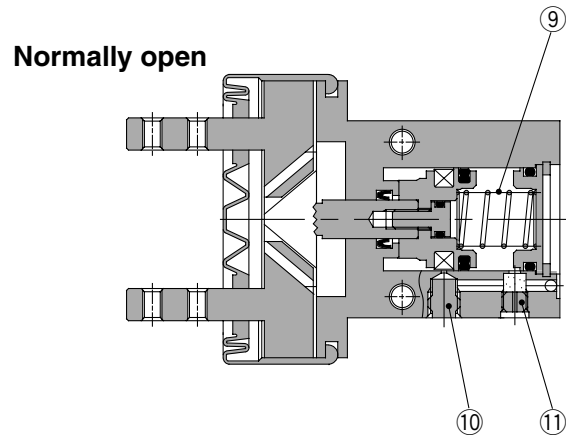
Series MHK2

Construction

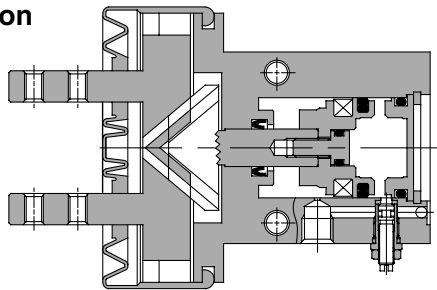
Double acting



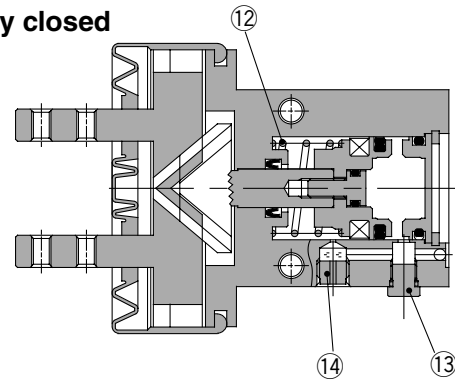
Single acting



Closed condition



Normally closed



Component Parts

No.	Description	Material	Note
①	Body	Aluminum alloy	Hard anodized
②	Piston	Aluminum alloy	Hard anodized
③	Cam	Carbon steel	Heat treated, Specially treated
④	Finger	Carbon steel	Heat treated, Specially treated
		Stainless steel 304	Option
⑤	Cap	Aluminum alloy	Hard anodized
⑥	Piston bolt	Stainless steel	
⑦	Rubber magnet	Synthetic rubber	

No.	Description	Material	Note
⑧	Needle assembly		
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 assembly	Brass	Electroless nickel plated
⑭	Exhaust plug A	Brass	Electroless nickel plated
⑮	Type C snap ring	Carbon steel	Nickel plated

MHK2 Replacement Parts

Description	MHK2-12□	MHK2-16□	MHK2-20□	MHK2-25□	Main parts	
Seal kit	MHK12-PS	MHK16-PS	MHK20-PS	MHK25-PS	⑬⑭⑮⑯	
Piston assembly	MHK-A1201	MHK-A1601	MHK-A2001	MHK-A2501	②⑥⑦	
Cam	P3318103	P3318203	P3318303	P3318403	③	
Finger	P3318104	P3318204	P3318304	P3318404	④	
Needle assembly	MH-A1006				⑧	
Dust cover	Material	CR	MHK2-J12	MHK2-J16	MHK2-J20	MHK2-J25
		FKM	MHK2-J12F	MHK2-J16F	MHK2-J20F	MHK2-J25F
		Si	MHK2-J12S	MHK2-J16S	MHK2-J20S	MHK2-J25S

* Order 2 pieces per one finger unit.

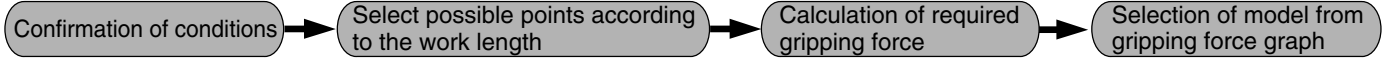
MHKL2 Replacement Parts

Description	MHKL2-12□	MHKL2-16□	MHKL2-20□	MHKL2-25□	Main parts	
Seal kit	MHK12-PS	MHK16-PS	MHK20-PS	MHK25-PS	⑬⑭⑮⑯	
Piston assembly	MHK-A1201	MHK-A1601	MHK-A2001	MHK-A2501	②⑥⑦	
Cam	P3318111	P3318211	P3318311	P3318411	③	
Finger	P3318112	P3318212	P3318312	P3318412	④	
Needle assembly	MH-A1006				⑧	
Dust cover	Material	CR	MHKL2-J12	MHKL2-J16	MHKL2-J20	MHKL2-J25
		FKM	MHKL2-J12F	MHKL2-J16F	MHKL2-J20F	MHKL2-J25F
		Si	MHKL2-J12S	MHKL2-J16S	MHKL2-J20S	MHKL2-J25S

* Order 2 pieces per one finger unit.

Model Selection Example

Procedure



Workpiece form:
Diameter x Length
ø28 x 35 mm round bar

Workpiece diameter: From dimensions of model that has opening width 28 mm or more.
MHK2-25D
MHKL2-16D
MHKL2-20D
MHKL2-25D

Work weight: 0.17 kg

Guidelines for the selection of the gripper with respect to component weight

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

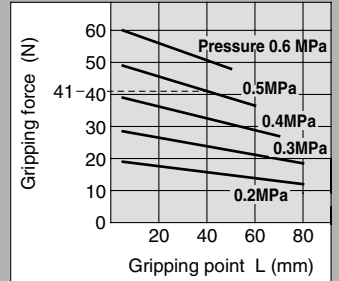
Ex.) For setting the gripping force to be at least 20 times the workpiece weight:
Required gripping force = 0.17 kg x 20 x 9.8 m/s²
≒ 33 N

Gripping method:
External gripping

Gripping point 40 mm

Operating pressure: 0.5 MPa

MHKL2-20D External Gripping Force

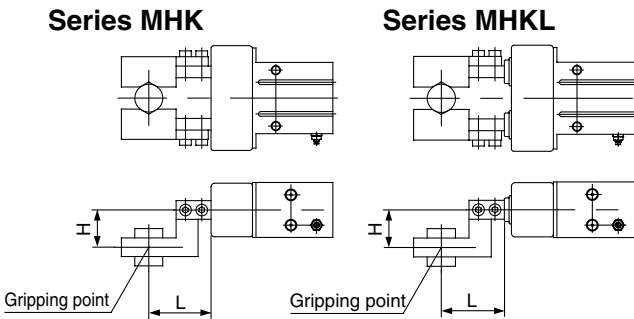


- When MHKL2-20D is selected, the gripping force is determined to be 41N according to the gripping point distance 40 mm and the pressure (0.5 MPa).
- The gripping force is 24.5 times the workpiece weight meeting the guideline that gripping force should be more than 20.

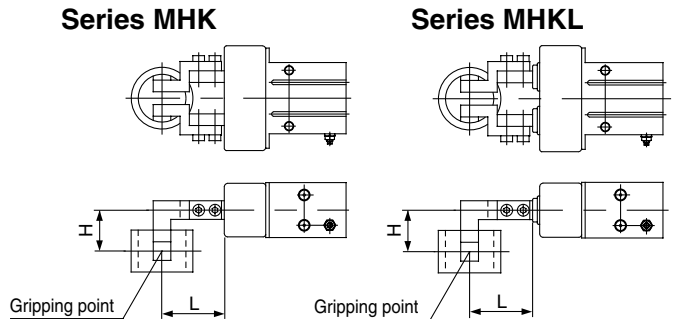
- MHZ
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Gripping Point

External grip



Internal grip

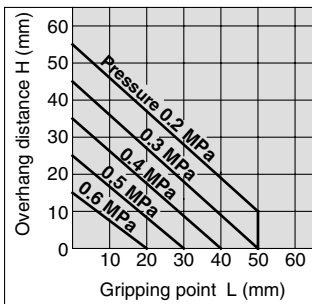


L: Gripping point distance
H: Overhang distance

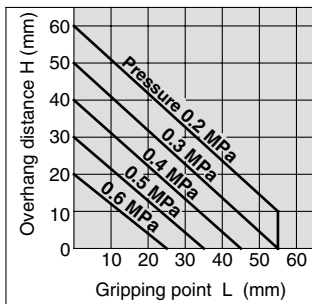
- Proper gripping points should be selected in accordance with the operating pressure. The distance to the gripping point L and the overhang distance H should be within the limited range given in the graphs below.
- When the gripping point distance becomes large, the finger attachment applies an excessively large load to the finger sliding section, causing excessive play of the fingers and possibly leading to premature failure.

Gripping Point Range Limit

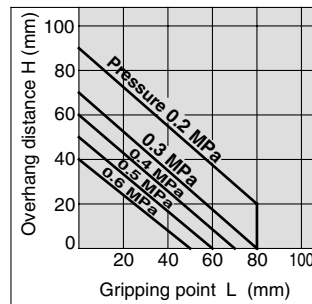
8MHK2-12□
MHKL2-12□



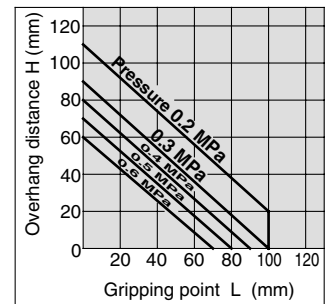
MHK2-16□
MHKL2-16□



MHK2-20□
MHKL2-20□



MHK2-25□
MHKL2-25□

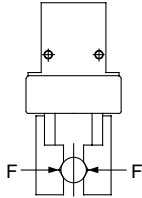


Note) Distance to the gripping point L of single acting type is shortened by spring return.
Use air gripper within gripping force line shown for each pressure in effective gripping force graph.

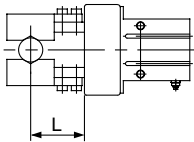
Series MHK2

Effective Gripping Force: Series MHK2 Double Acting

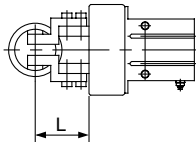
- Indication of effective gripping force
The effective gripping force shown in the graphs to the right is expressed as F, which is the thrust of one finger, when both fingers and attachments are in full contact with the work-piece as shown in the figure below.



External grip
Series MHK2

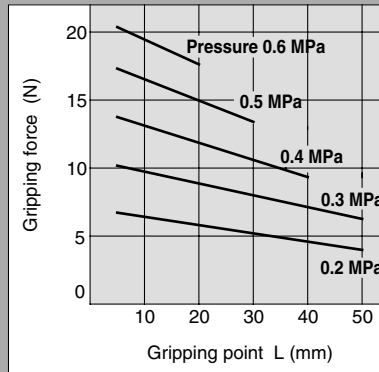


Internal grip
Series MHK2

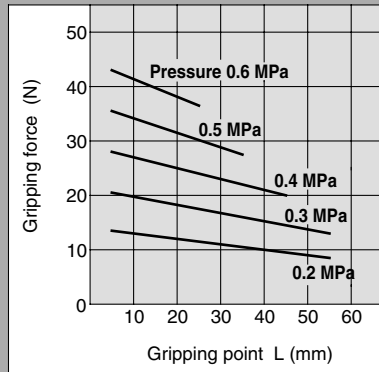


External Grip

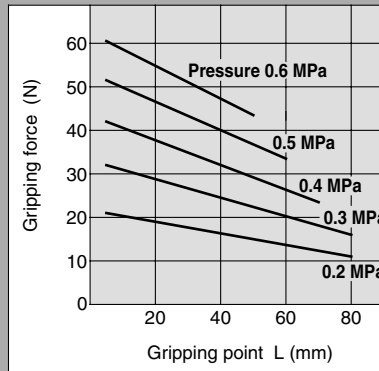
MHK2-12D



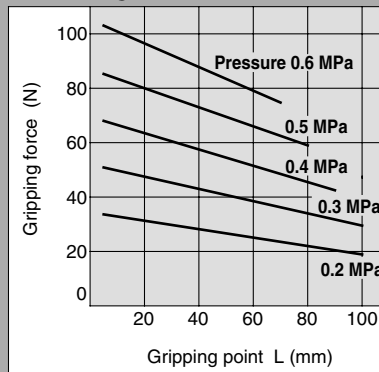
MHK2-16D



MHK2-20D

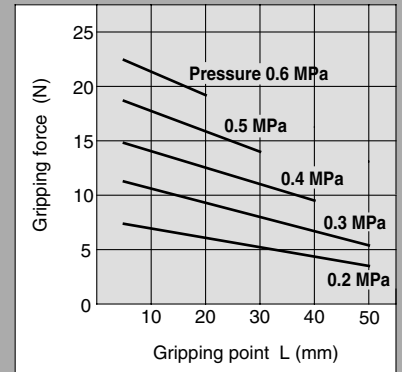


MHK2-25D

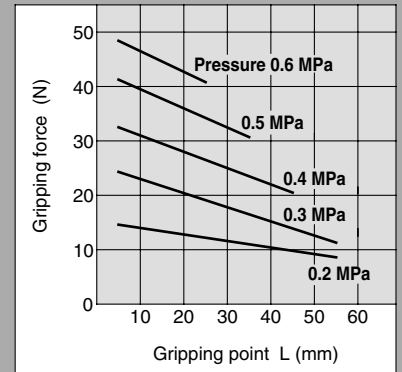


Internal Grip

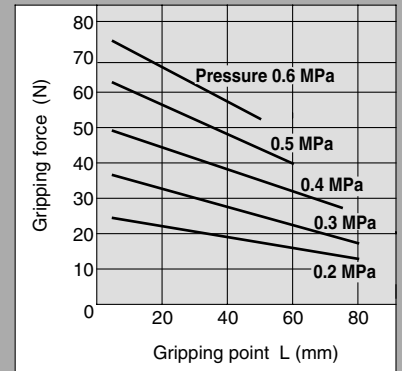
MHK2-12D



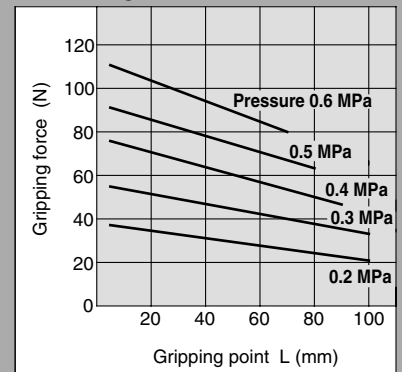
MHK2-16D



MHK2-20D

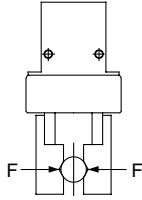


MHK2-25D



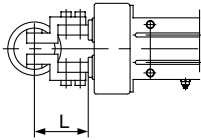
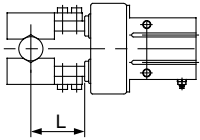
Effective Gripping Force: Series MHKL2 Double Acting

- Indication of effective gripping force
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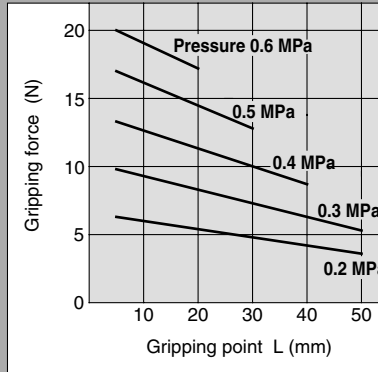
External grip
Series MHKL2

Internal grip
Series MHKL2

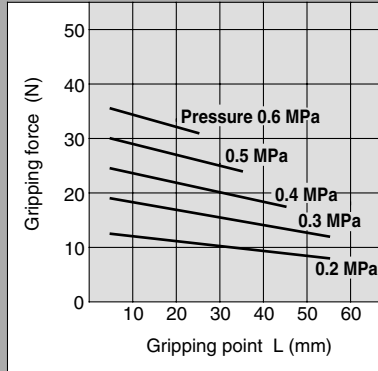


External Grip

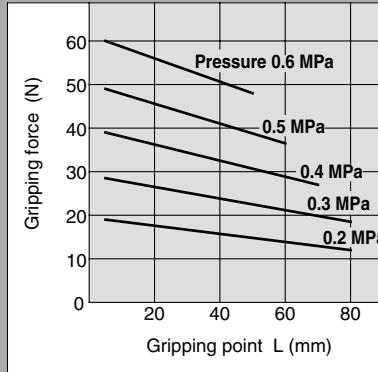
MHKL2-12D



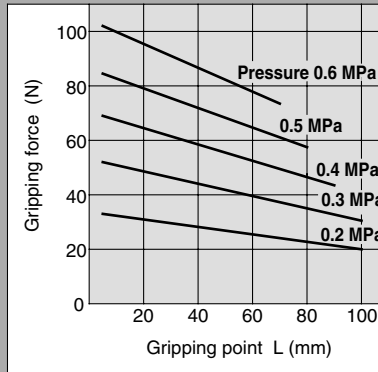
MHKL2-16D



MHKL2-20D

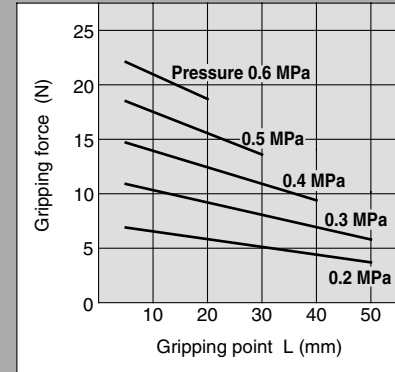


MHKL2-25D

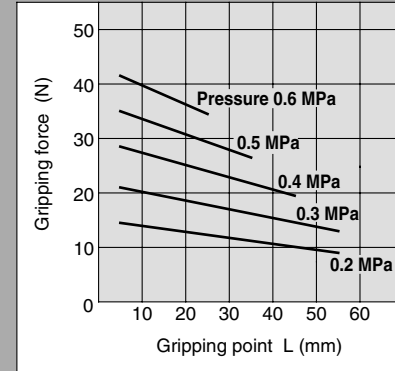


Internal Grip

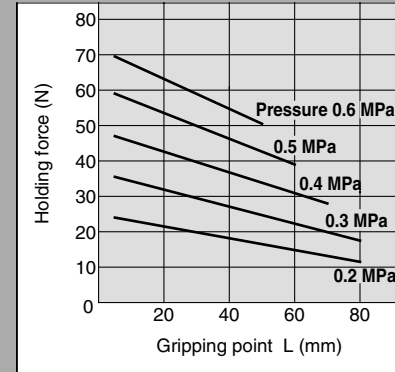
MHKL2-12D



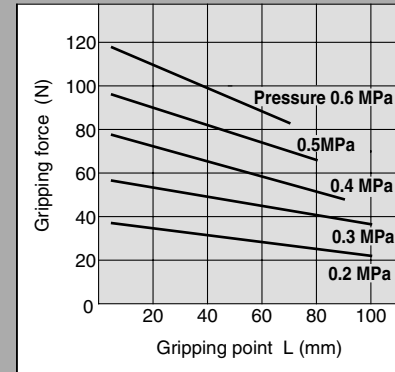
MHKL2-16D



MHKL2-20D



MHKL2-25D



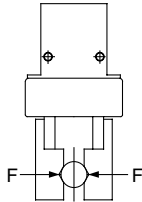
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Series MHK2

Effective Gripping Force: Series MHK2 Single Acting

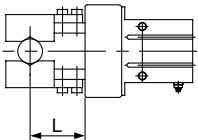
• Indication of effective gripping force

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

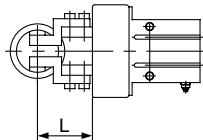


Note) In case of single acting type, the value is for stroke center.

External grip Series MHK2



Internal grip Series MHK2



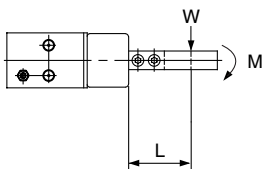
• Precautions when using the single acting type:

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

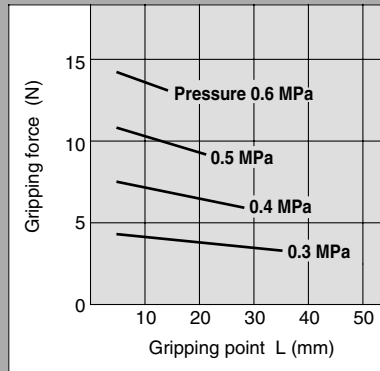
Model	Allowable moment (N·m)
MHK2-12S/C	0.05
MHK2-16S/C	0.12
MHK2-20S/C	0.25
MHK2-25S/C	0.49

M: Allowable moment (M = WL)

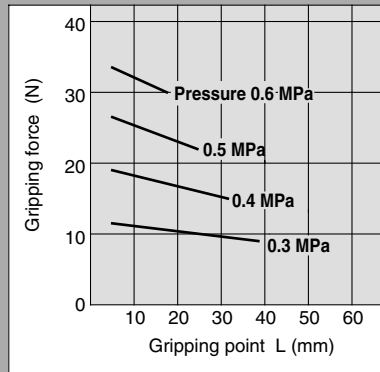


External Grip

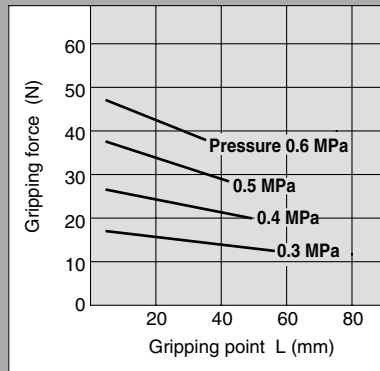
MHK2-12S



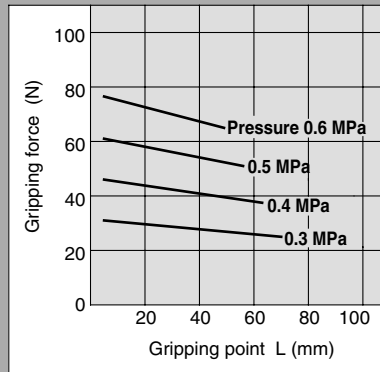
MHK2-16S



MHK2-20S

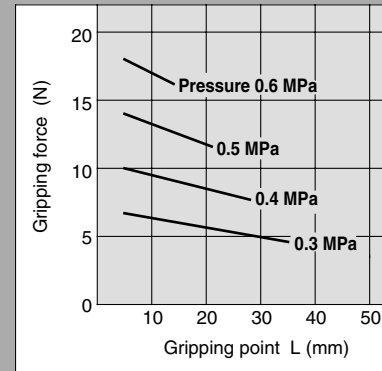


MHK2-25S

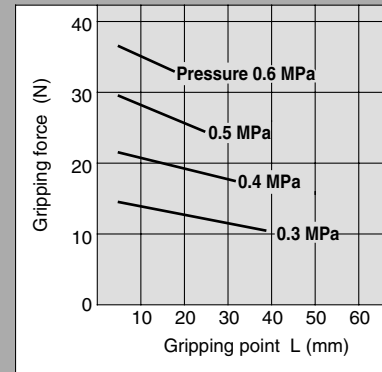


Internal Grip

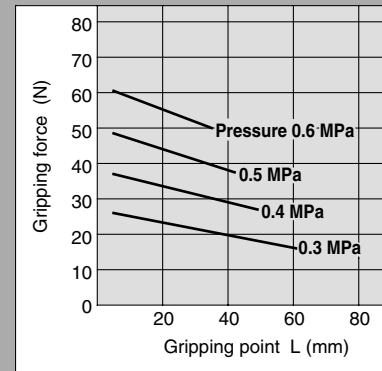
MHK2-12C



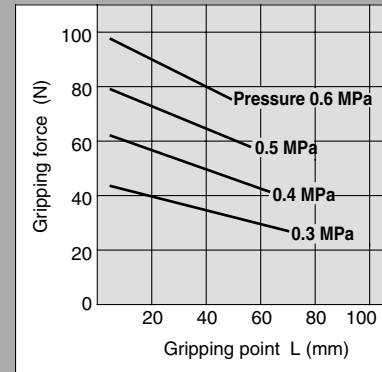
MHK2-16C



MHK2-20C

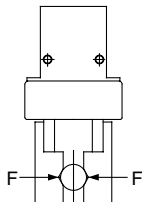


MHK2-25C



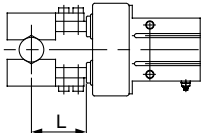
Effective Gripping Force: Series MHKL2 Single Acting

- Indication of effective gripping force
The effective gripping force shown in the graphs to the right is expressed as F, which is the thrust of one finger, when both fingers and attachments are in full contact with the work-piece as shown in the figure below.

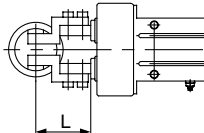


Note) In case of single acting type, the value is for stroke center.

External grip Series MHKL2



Internal grip Series MHKL2

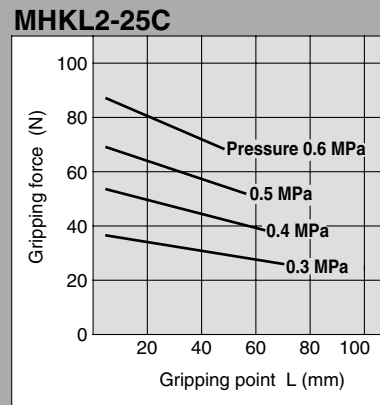
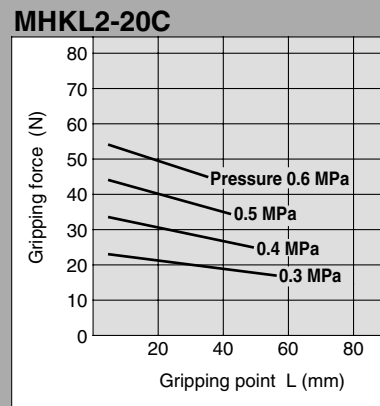
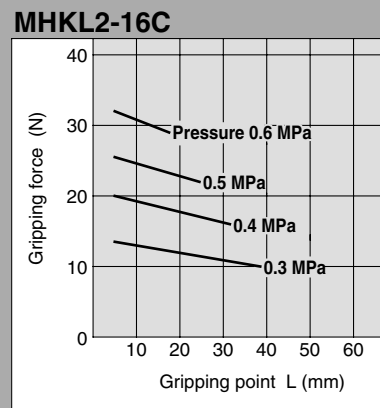
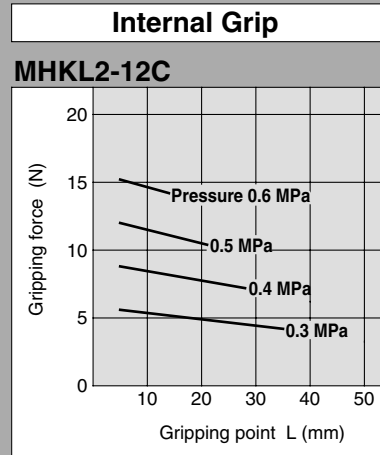
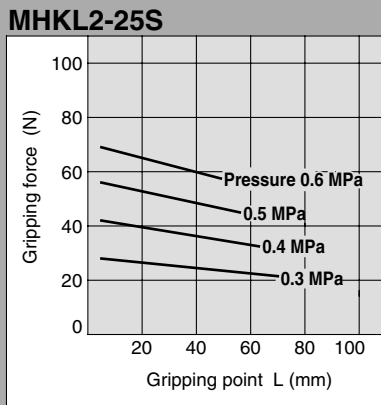
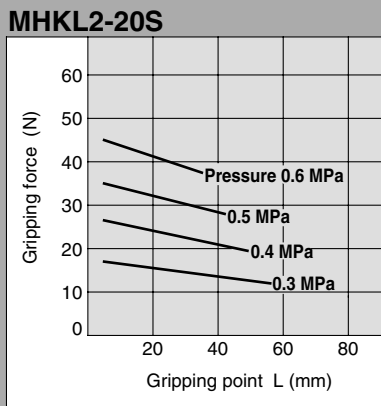
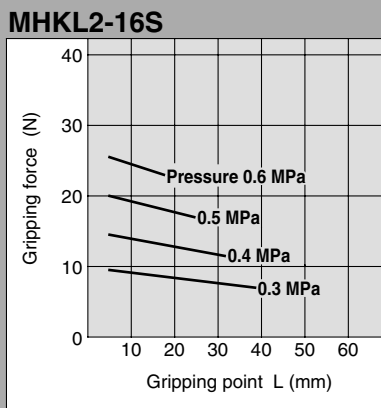
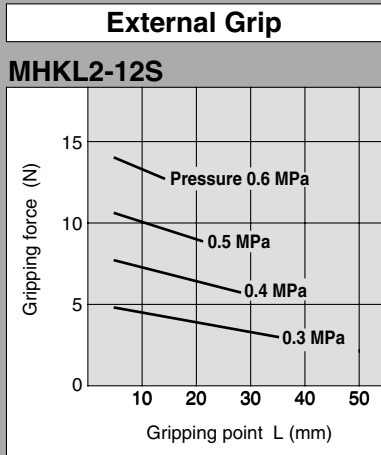
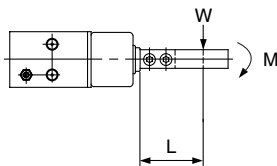


- Precautions when using the single acting type:
If a moment such as that illustrated below is applied to the finger, the finger might not be able to retract by the spring force alone. Therefore, make sure to use the air gripper within the allowable moment that is indicated in the table below.

Allowable Moment

Model	Allowable moment (N·m)
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)

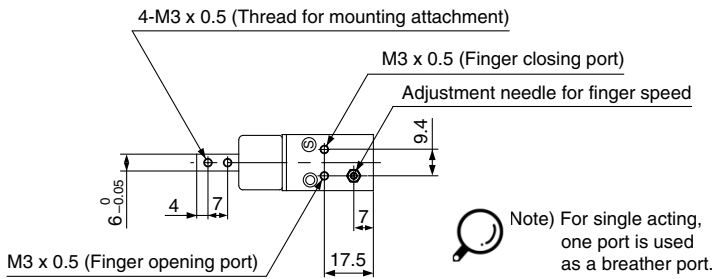
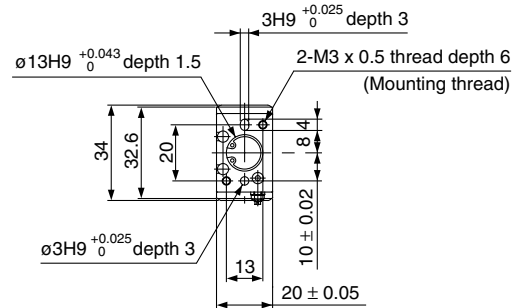
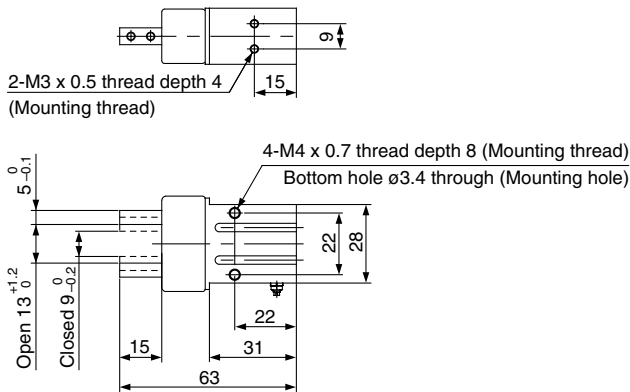


- MHZ
- MHF
- MHL
- MHR
- MHK**
- MHS
- MHC
- MHT
- MHY
- MHW
- MRHQ
- Misc.
- D-
- 20-

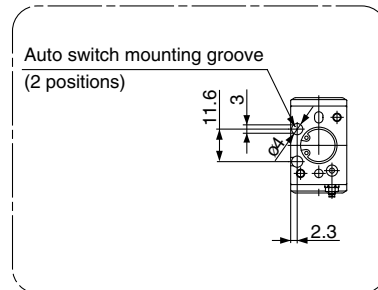
Series MHK2

Dimensions

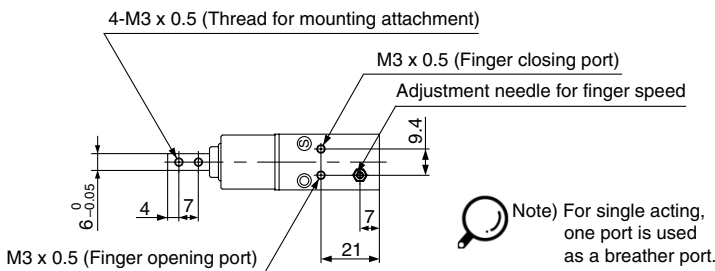
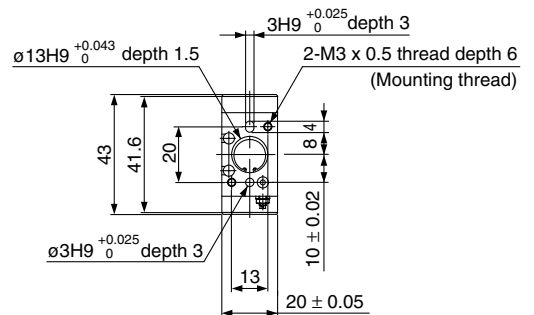
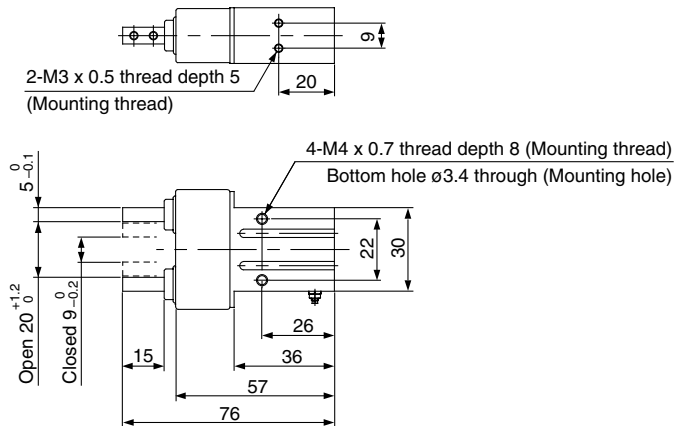
MHK2-12□: Standard type



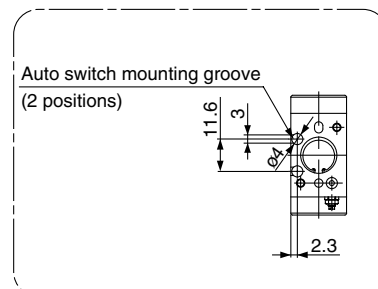
Auto Switch Mounting Groove Dimensions



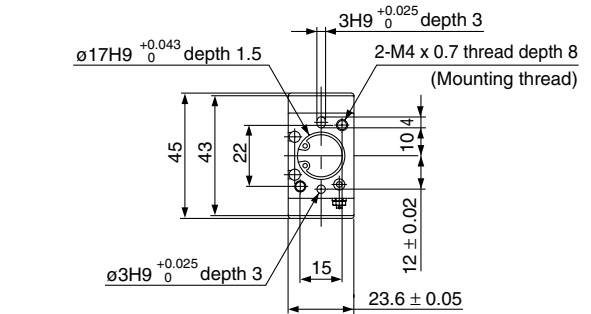
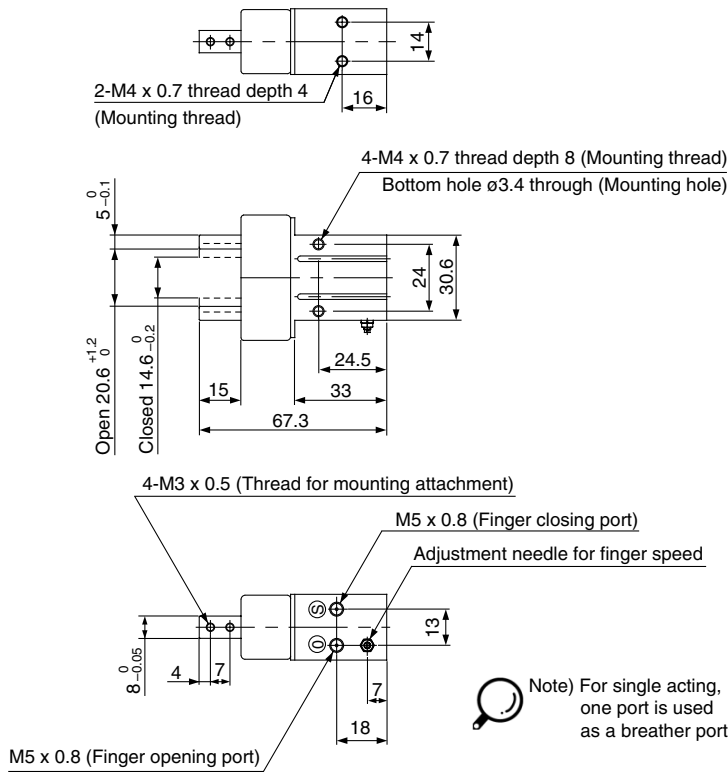
MHKL2-12□: Long stroke type



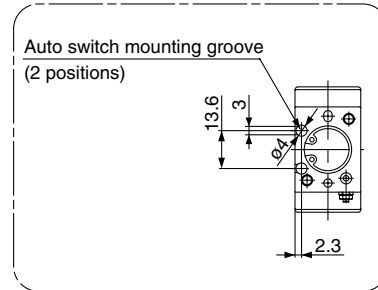
Auto Switch Mounting Groove Dimensions



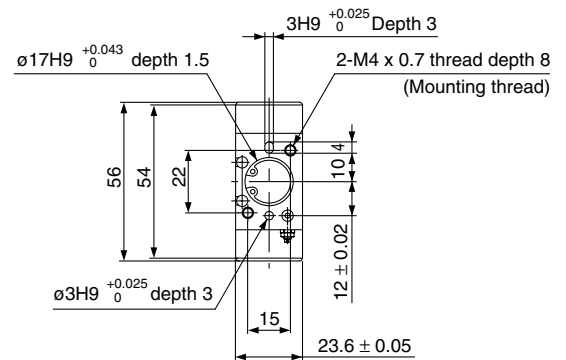
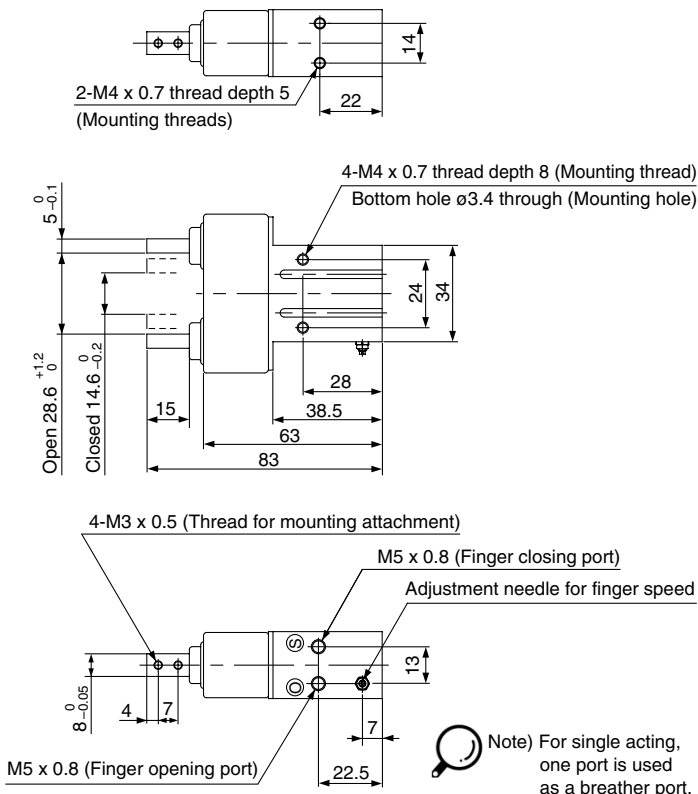
MHK2-16□: Standard type



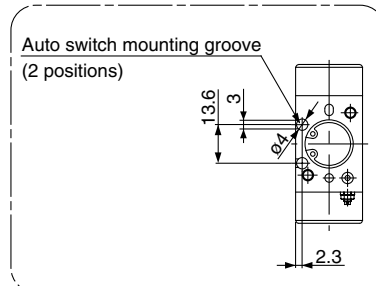
Auto Switch Mounting Groove Dimensions



MHKL2-16□: Long stroke type



Auto Switch Mounting Groove Dimensions

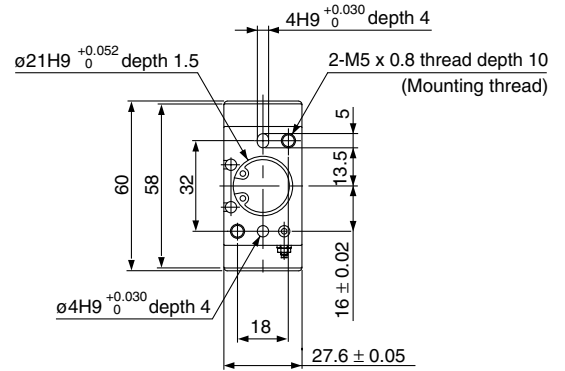
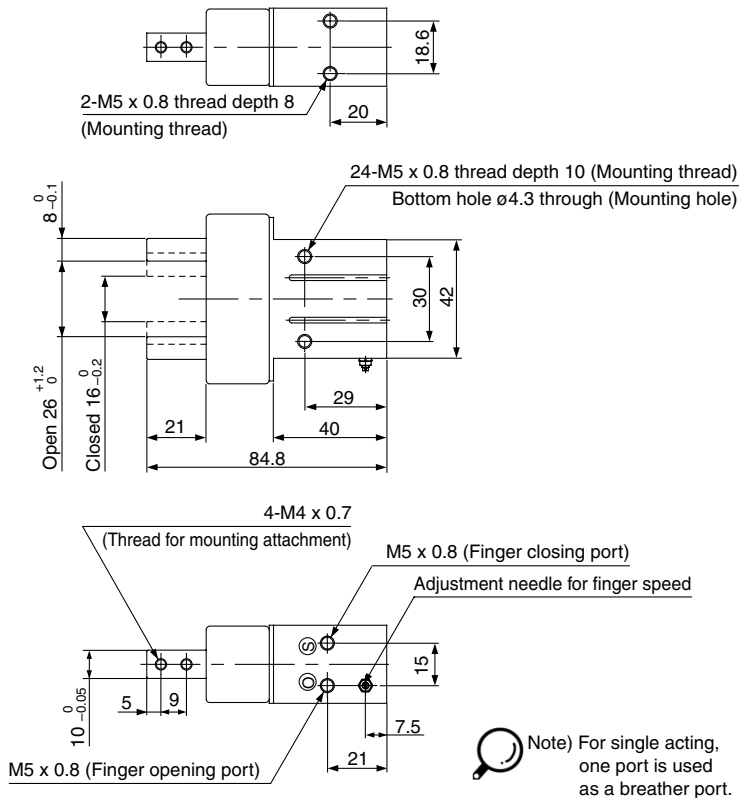


- MHZ
- MHF
- MHL
- MHR
- MHK**
- MHS
- MHC
- MHT
- MHY
- MHW
- MRHQ
- Misc.
- D-
- 20-

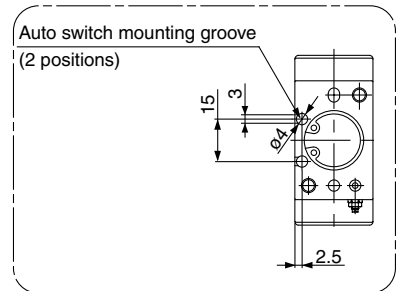
Series MHK2

Dimensions

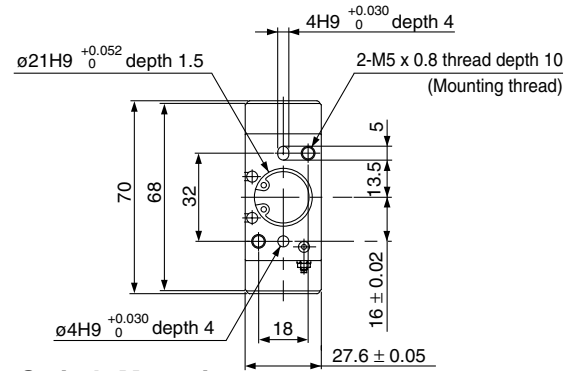
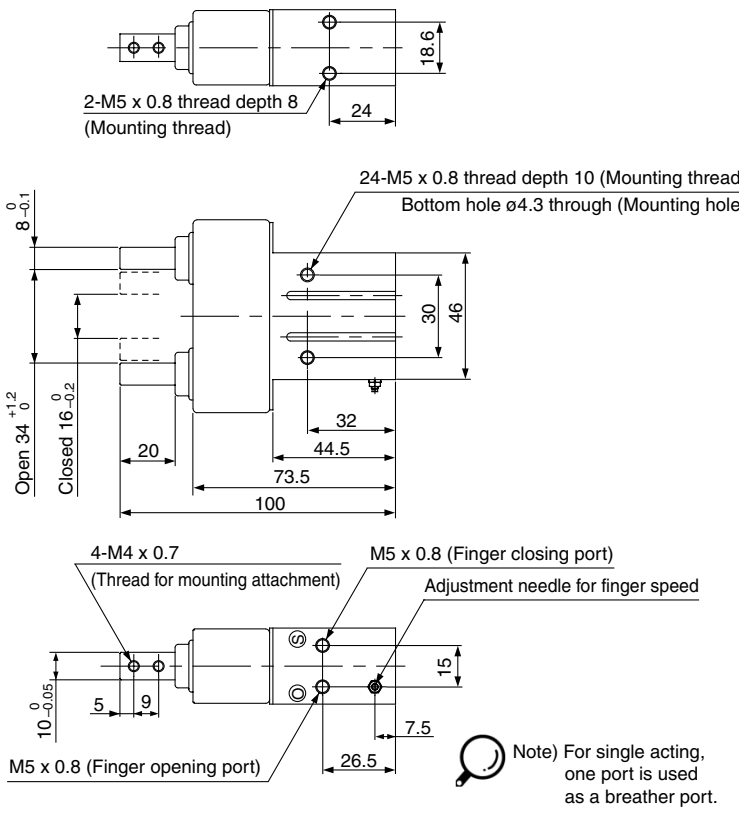
MHK2-20□: Standard type



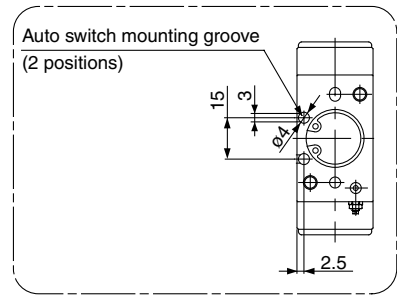
Auto Switch Mounting Groove Dimensions



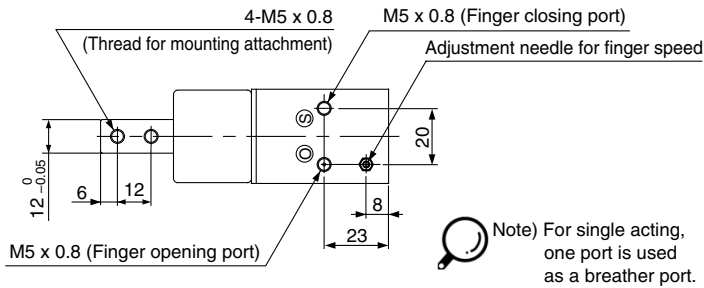
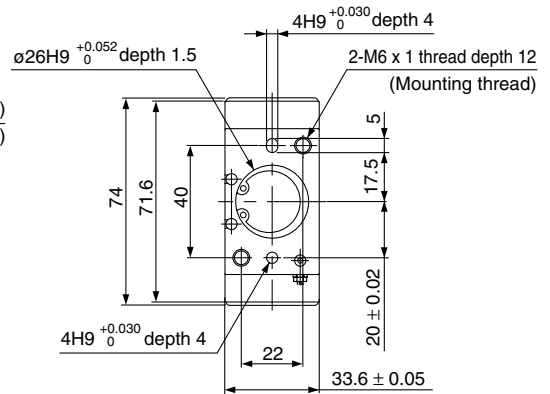
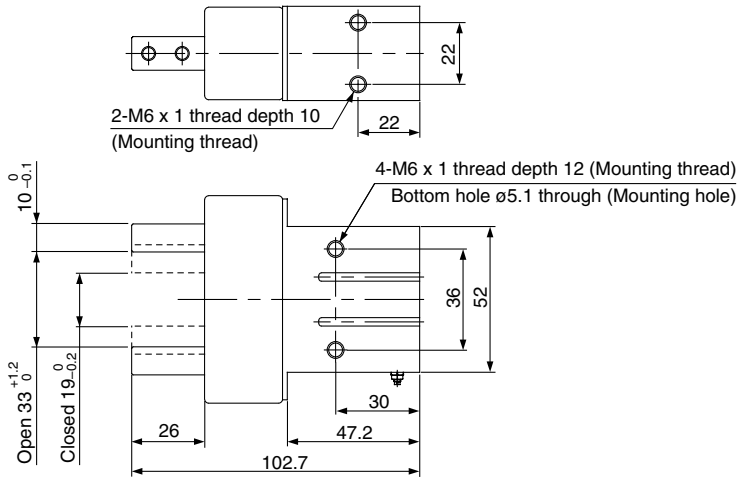
MHKL2-20□: Long stroke type



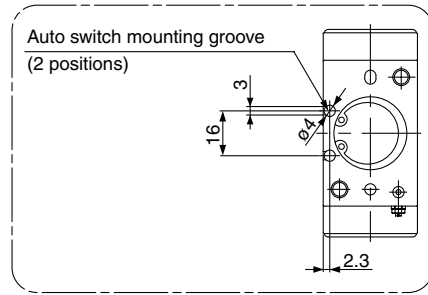
Auto Switch Mounting Groove Dimensions



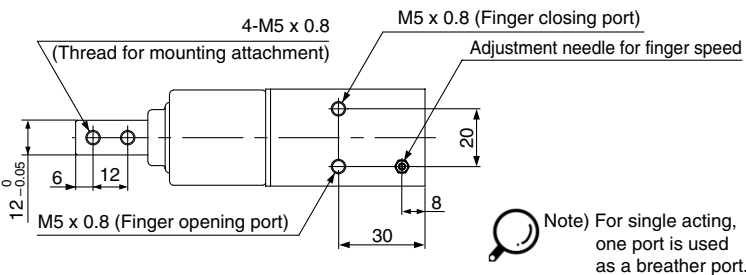
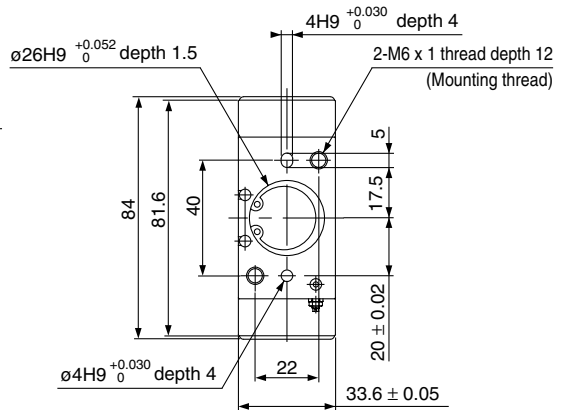
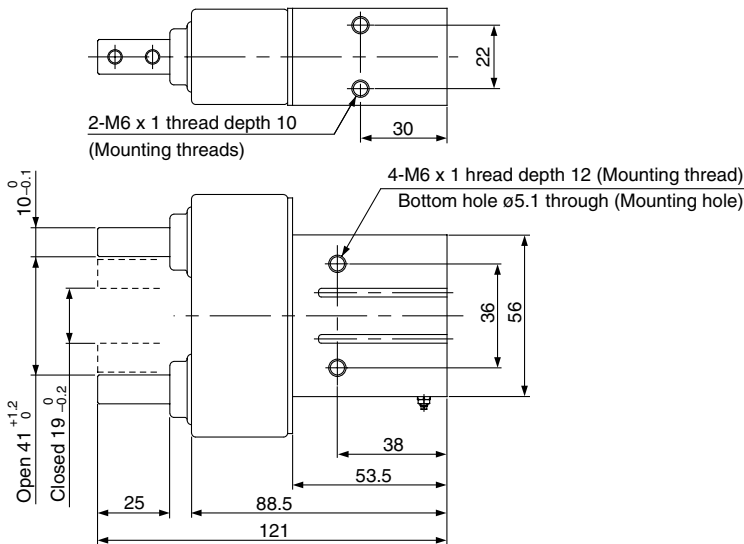
MHK2-25□: Standard type



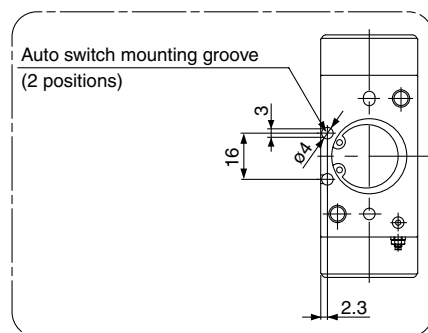
Auto Switch Mounting Groove Dimensions



MHKL2-25□: Long stroke type



Auto Switch Mounting Groove Dimensions

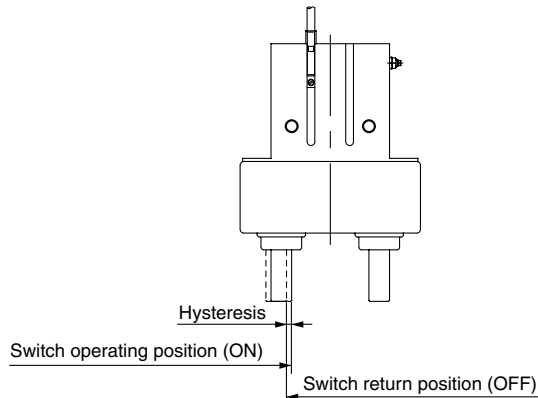


- MHZ
- MHF
- MHL
- MHR
- MHK**
- MHS
- MHC
- MHT
- MHY
- MHW
- MRHQ
- Misc.
- D-
- 20-

Series MHK2

Auto Switch Hysteresis

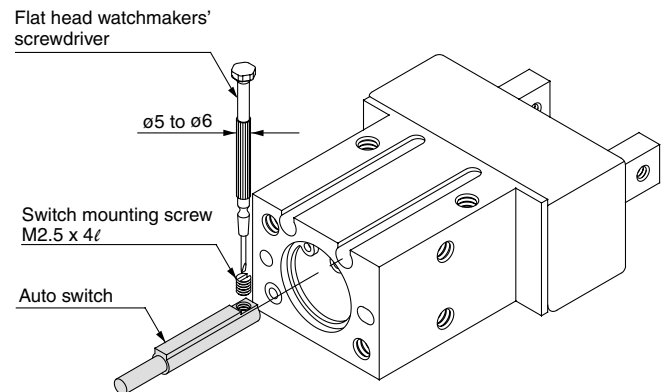
Auto switches have hysteresis similar to micro switches. Use the table below as a guide when adjusting auto switch positions, etc.



Auto switch model Air gripper model	Max. hysteresis (mm)		
	D-M9□(V)	D-F9BAL	
		Setting of ON position when red light is on.	Setting of ON position when green light is on.
MHK□2-12	0.3	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

Mounting of Auto Switch

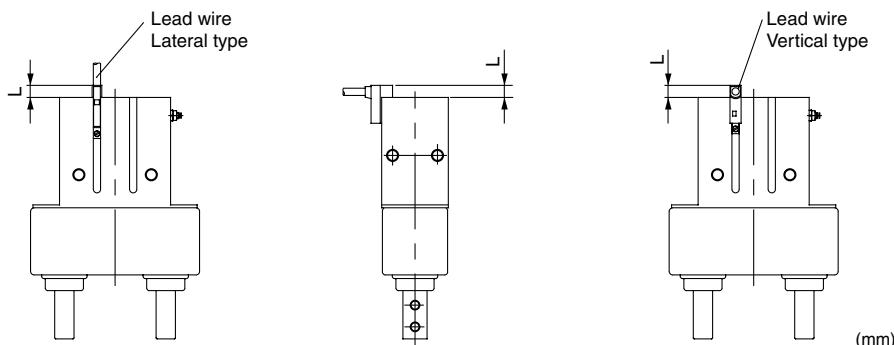
To set the auto switch, insert the auto switch into the installation groove of the gripper from the direction indicated in the following drawing. After setting the position, tighten the attached switch mounting set screw with a flat head watchmakers' screwdriver.



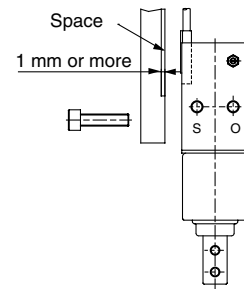
Note) Use a watchmakers' screwdriver with a grip diameter of 5 to 6 mm to tighten the auto switch mounting screw. The tightening torque should be about 0.05 to 0.1 N·m. As a rule, it should be turned about 90° beyond the point at which tightening can be felt.

Protrusion of Auto Switch from Edge of Body

- The amount of auto switch protrusion from the body's end surface is as shown 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 1 mm on mounting late since the auto switch is protruded from edge of gripper.



Air gripper model	Auto switch model Finger position	Lead wire type	In-line electrical entry type		Perpendicular electrical entry type
			D-M9□	D-F9BAL	D-M9□V
MHK2-12□	Open	—	—	7	—
	Closed	3	—	12	—
MHK2-16□	Open	—	—	6	—
	Closed	3	—	13	1
MHK2-20□	Open	—	—	1	—
	Closed	1	—	11	—
MHK2-25□	Open	—	—	—	—
	Closed	2	—	12	—
MHKL2-12□	Open	—	—	3	—
	Closed	3	—	12	—
MHKL2-16□	Open	—	—	1	—
	Closed	3	—	13	1
MHKL2-20□	Open	—	—	—	—
	Closed	1	—	11	—
MHKL2-25□	Open	—	—	—	—
	Closed	1	—	11	—

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

Series MHK2

Made to Order Specifications:

Please contact SMC for the details on dimensions, specifications, and delivery.

1 Oil Resistant Specifications -X5

MHK L 2 - Bore size D 1 F - X5

- Finger material
- Action

The packing class has been revised to adopt oil resistant materials for use in environments where there is exposure to cutting oil, etc.

Specifications

Type	Oil resistant type
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

Note 1) Some liquid may make the use of an air gripper or auto switch impossible. Confirm liquid, and please consult with SMC for the use.

Note 2) The dimensions are the same as the standard type.

2 Heat Resistant Specifications -X4

MHK L 2 - Bore size D 1 F - X4

- Finger material
- Action

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

Specifications

Type	Heat resistant type
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

Note 1) Items with auto switch cannot be manufactured.
Note 2) The dimensions are the same as the standard type.

3 With Grease Needle -X39

MHK L 2 - Bore size D 1 F - X39

- Dust cover material
- Finger material
- Action

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

Note 1) 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.

Note 2) The dimensions are the same as the standard type.

4 Grooves for Auto Switch on Both Sides -X41

MHK L 2 - Bore size D 1 F - X41

- Dust cover material
- Finger material
- Action

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 of other models are same as standard switch grooves.

MHZ

MHF

MHL

MHR

MHK

MHS

MHC

MHT

MHY

MHW

MRHQ

Misc.

D-

20-