

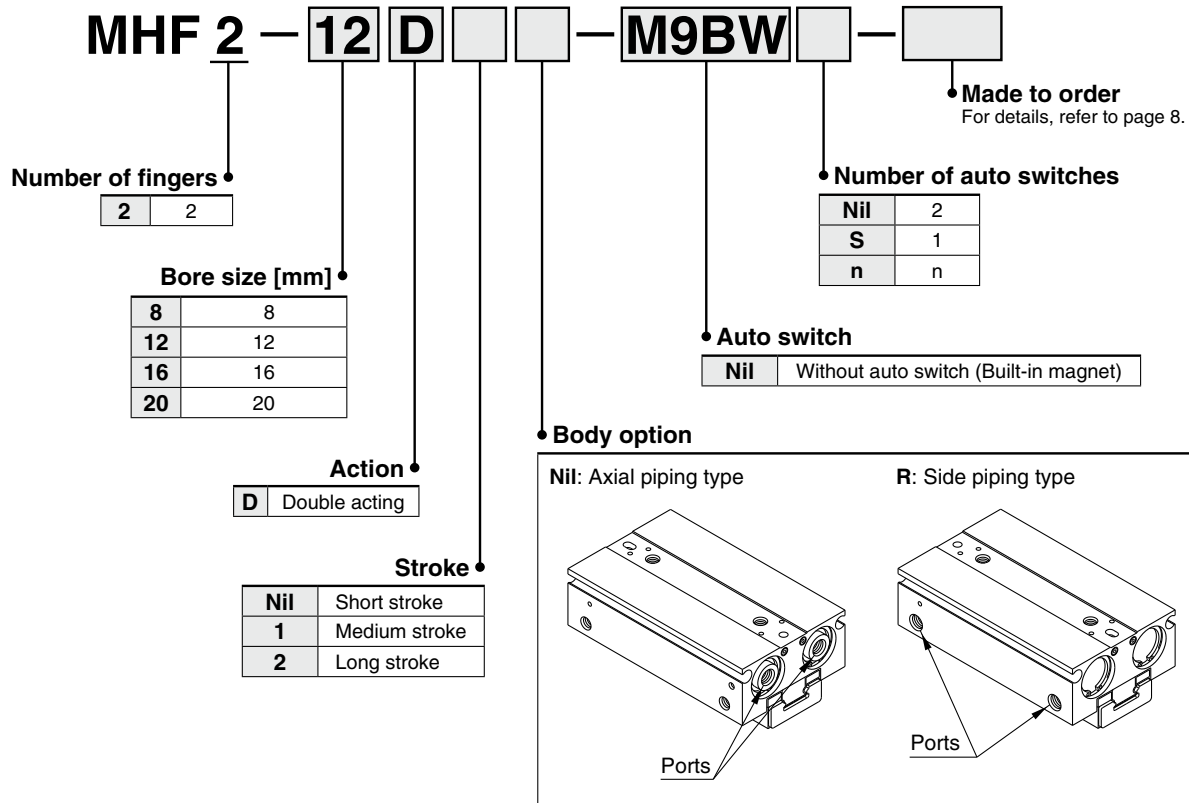
Low Profile Air Gripper

MHF2 Series

ø8, ø12, ø16, ø20



How to Order



Applicable Auto Switches/Refer to the Web Catalog for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length [m]*2				Pre-wired connector	Applicable load		
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)		IC circuit	Relay, PLC	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PV	M9P	●	●	●	○	○		
				2-wire	M9BV	M9B	●	●	●	○	○					
	Diagnostic indication (2-color indicator)			5 V, 12 V	3-wire (NPN)	M9NWV	M9NW	●	●	●	○	○	○	IC circuit		
					3-wire (PNP)	M9PWV	M9PW	●	●	●	○	○	○	IC circuit		
				Water resistant (2-color indicator)	5 V, 12 V	2-wire	M9B WV	M9B W	●	●	●	○	○	○	—	
		3-wire (NPN)	M9NAV*1			M9NA*1	○	○	●	○	○	○	IC circuit			
	12 V	3-wire (PNP)	M9PAV*1	M9PA*1	○	○	●	○	○	○	○	—				
		2-wire	M9BAV*1	M9BA*1	○	○	●	○	○	○	○	—				

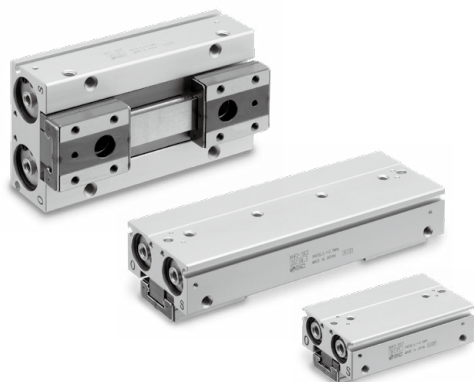
*1 Water-resistant type auto switches can be mounted on the above models, but SMC cannot guarantee water resistance.

*2 Lead wire length symbols: 0.5 m..... Nil (Example) M9NW
 1 m..... M (Example) M9NWM
 3 m..... L (Example) M9NWL
 5 m..... Z (Example) M9NWZ

* Solid state auto switches marked with a "○" are produced upon receipt of order.

* When using the 2-color indicator type, please make the setting so that the indicator is lit in red to ensure the detection at the proper position of the air gripper.

Specifications



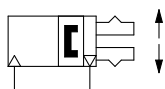
Fluid		Air
Operating pressure		ø8: 0.15 to 0.7 MPa ø12 to 20: 0.1 to 0.7 MPa
Ambient and fluid temperatures		-10 to 60°C (No freezing)
Repeatability		±0.05 mm*1
Max. operating frequency	Short stroke	120 c.p.m.
	Medium stroke	120 c.p.m.
	Long stroke	60 c.p.m.
Lubrication		Non-lube
Action		Double acting
Auto switch (Option)*2		Solid state auto switch (3-wire, 2-wire)

*1 This is the value when no offset load is applied to the finger.
When an offset load is applied to the finger, the max. value is ±0.15 mm due to the influence of backlash of the rack and pinion.

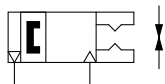
*2 Refer to the **Web Catalog** for further information on auto switches.

Symbol

Double acting:
Internal grip



Double acting:
External grip



Model

Action	Model	Bore size [mm]	Gripping force*1	Opening/closing stroke (Both sides) [mm]	Weight*2 [g]	Internal volume [cm ³]	
			Effective gripping force per finger [N]			Finger open side	Finger close side
Double acting	MHF2-8D	8	19	8	65	0.7	0.6
	MHF2-8D1			16	85	1.1	1.0
	MHF2-8D2			32	120	2.0	1.9
	MHF2-12D	12	48	12	155	1.9	1.6
	MHF2-12D1			24	190	3.3	3.0
	MHF2-12D2			48	275	6.1	5.8
	MHF2-16D	16	90	16	350	4.9	4.1
	MHF2-16D1			32	445	8.2	7.4
	MHF2-16D2			64	650	14.9	14.0
	MHF2-20D	20	141	20	645	8.7	7.3
	MHF2-20D1			40	850	15.1	13.7
	MHF2-20D2			80	1,225	28.0	26.6

*1 At the pressure of 0.5 MPa, when gripping point L is 20 mm

*2 Excluding the auto switch weight



Made to Order
(For details, refer to pages 28 to 36.)

Symbol	Specifications
-X4	Heat resistant (-10 to 100°C)
-X5	Fluororubber seal
-X50	Without magnet
-X53	Ethylene propylene rubber seal (EPDM)
-X63	Fluorine grease
-X79	Grease for food processing machines: Fluorine grease
-X79A	Grease for food processing machines: Aluminum complex soap base grease
-X81A	Anti-corrosive treatment of finger
-X81B	Anti-corrosive treatment of finger and guide
-X83	With an adjustable opening/closing finger positioning
-X7050	Actuator position sensor compatible type

Moisture Control Tube IDK Series

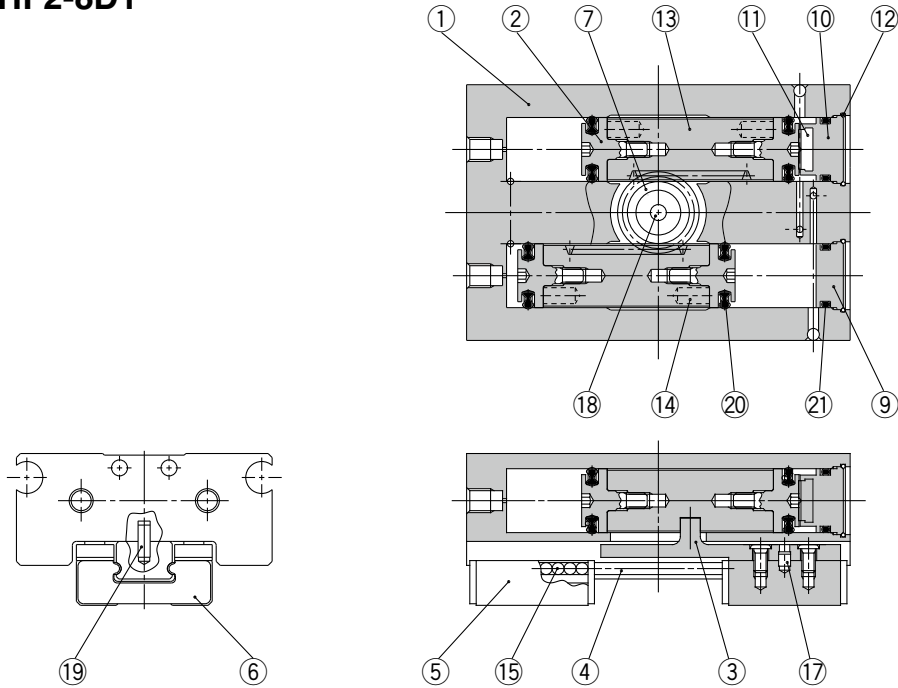


When operating an actuator with a small bore size and a short stroke at a high frequency, dew condensation (water droplets) may occur inside the piping depending on the conditions. Simply connecting the moisture control tube to the actuator will prevent dew condensation from occurring. For details, refer to [the IDK series in the Web Catalog](#).

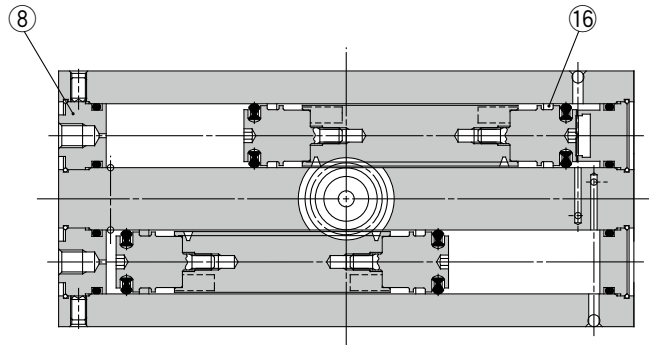
MHF2 Series

Construction

MHF2-8D, MHF2-8D1



MHF2-8D2



Component Parts

No.	Description	Material	Note
1	Body	Aluminum alloy	Hard anodized
2	Piston	Stainless steel	
3	Joint	Stainless steel	Heat treatment
4	Guide rail	Stainless steel	Heat treatment
5	Finger	Stainless steel	Heat treatment
6	Roller stopper	Stainless steel	
7	Pinion	Carbon steel	Nitriding
8	Cap A	Aluminum alloy	Clear anodized
9	Cap B	Aluminum alloy	Clear anodized
10	Cap C	Aluminum alloy	Clear anodized

Component Parts

No.	Description	Material	Note
11	Head bumper	Urethane rubber	
12	Clip	Stainless steel wire	
13	Rack	Stainless steel	Nitriding
14	Magnet	—	Nickel plating
15	Steel ball	High carbon chromium bearing steel	
16	Wear ring	Synthetic resin	
17	Roller	High carbon chromium bearing steel	
18	Needle roller	High carbon chromium bearing steel	
19	Parallel pin	Stainless steel	
20	Piston seal	NBR	
21	Gasket	NBR	

Replacement Parts

Description	Kit no.			Contents
	MHF2-8D	MHF2-8D1	MHF2-8D2	
Seal kit	MHF8-PS	MHF8-PS	MHF8-PS-2	12, 20, 21
Finger assembly	MHF-A0802	MHF-A0802-1	MHF-A0802-2	3, 4, 5, 6, 15, 17, 19, Mounting screw

Replacement part/Grease pack part no.:

Guide unit: GR-S-010 (10 g)
Cylinder unit: GR-L-005 (5 g)

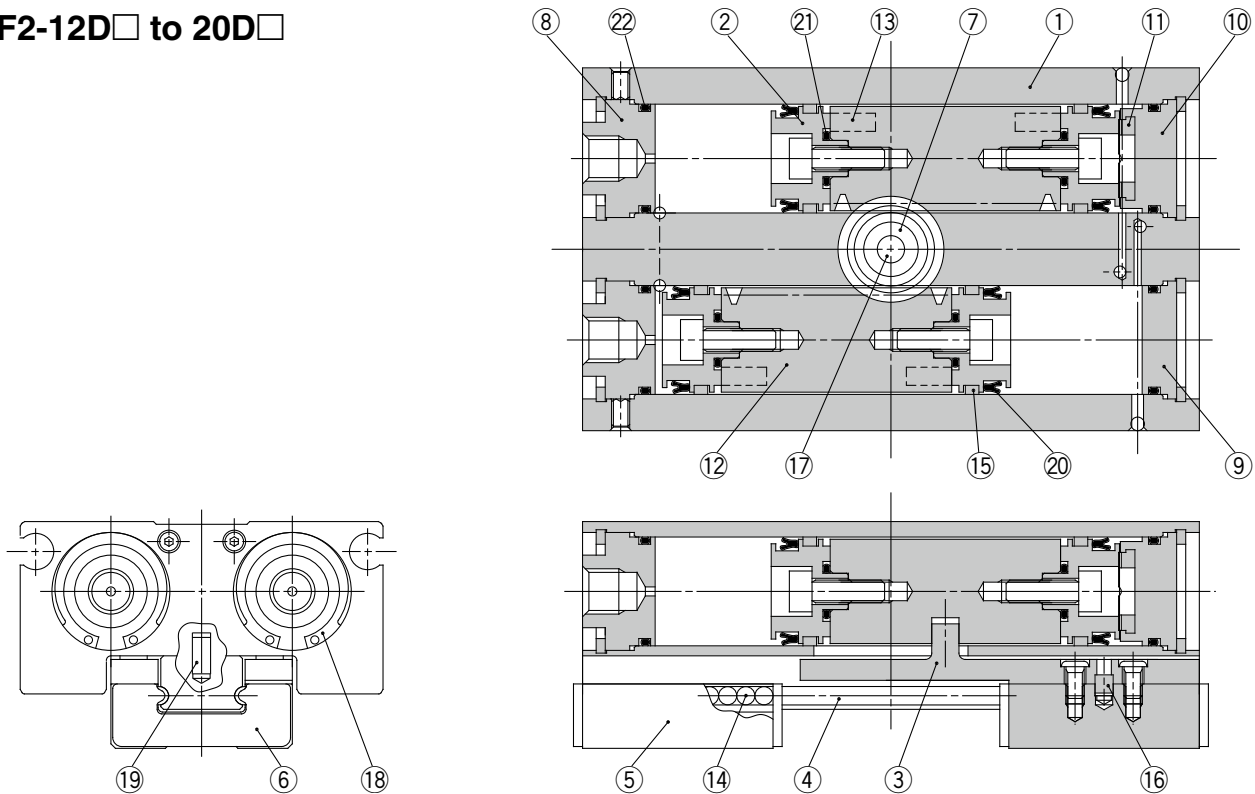
Bolts for Body Through-hole Mounting

Part no.	Number of pieces	
MHF-B08	MHF2-8D	2 pieces/unit
	MHF2-8D1	2 pieces/unit
	MHF2-8D2	4 pieces/unit

* The bolts for body through-hole mounting are attached to the product. They are also provided at an order of 1 piece or more with the above part numbers.

Construction

MHF2-12D□ to 20D□



Component Parts

No.	Description	Material	Note
1	Body	Aluminum alloy	Hard anodized
2	Piston	Aluminum alloy	Clear anodized
3	Joint	Stainless steel	Heat treatment
4	Guide rail	Stainless steel	Heat treatment
5	Finger	Stainless steel	Heat treatment
6	Roller stopper	Stainless steel	
7	Pinion	Carbon steel	Nitriding
8	Cap A	Aluminum alloy	Clear anodized
9	Cap B	Aluminum alloy	Clear anodized
10	Cap C	Aluminum alloy	Clear anodized
11	Head bumper	Urethane rubber	
12	Rack	Stainless steel	Nitriding

No.	Description	Material	Note
13	Magnet	—	Nickel plating
14	Steel ball	High carbon chromium bearing steel	
15	Wear ring	Synthetic resin	
16	ø12: Roller ø16 to ø20: Parallel pin	High carbon chromium bearing steel Stainless steel	
17	Needle roller	High carbon chromium bearing steel	
18	ø12: R shape retaining ring ø16 to ø20: Type C retaining ring	Carbon steel	Phosphate coating
19	Parallel pin	Stainless steel	
20	Piston seal	NBR	
21	Gasket	NBR	
22	Gasket	NBR	

Replacement Parts

Description	Kit no.			Contents
	MHF2-12D	MHF2-12D1	MHF2-12D2	
Seal kit	MHF12-PS	MHF12-PS	MHF12-PS	20, 21, 22
Finger assembly	MHF-A1202	MHF-A1202-1	MHF-A1202-2	3, 4, 5, 6, 14, 16, 19, Mounting screw

Description	Kit no.			Contents
	MHF2-16D	MHF2-16D1	MHF2-16D2	
Seal kit	MHF16-PS	MHF16-PS	MHF16-PS	20, 21, 22
Finger assembly	MHF-A1602	MHF-A1602-1	MHF-A1602-2	3, 4, 5, 6, 14, 16, 19, Mounting screw

Description	Kit no.			Contents
	MHF2-20D	MHF2-20D1	MHF2-20D2	
Seal kit	MHF20-PS	MHF20-PS	MHF20-PS	20, 21, 22
Finger assembly	MHF-A2002	MHF-A2002-1	MHF-A2002-2	3, 4, 5, 6, 14, 16, 19, Mounting screw

Bolts for Body Through-hole Mounting

Part no.	Number of pieces	
	MHF2-12D	2 pieces/unit
	MHF2-12D1	2 pieces/unit
MHF2-12D2	4 pieces/unit	

* The bolts for body through-hole mounting are attached to the product. They are also provided at an order of 1 piece or more with the above part numbers.

* When mounting MHF2-16D□ or MHF2-20D□ with the body through-holes, use hexagon socket head cap screws available on the market.

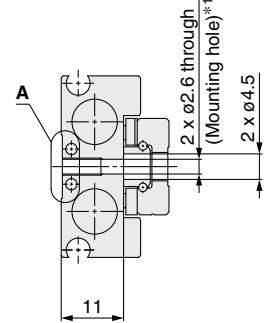
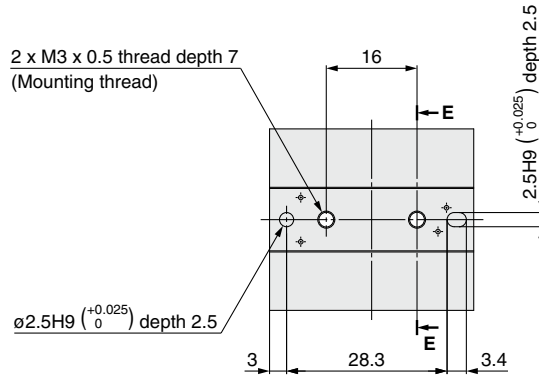
Grease Pack Part Nos.

MHF2-□□D, D1 (ø12, ø16, ø20)	GR-S-010 (10 g) (Guide unit)
MHF2-□□D2 (ø12)	GR-L-005 (5 g) (Cylinder unit)
MHF2-□□D2 (ø16, ø20)	GR-S-010 (10 g) (Guide unit)
	GR-L-010 (10 g) (Cylinder unit)

MHF2 Series

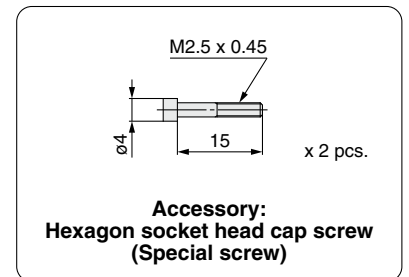
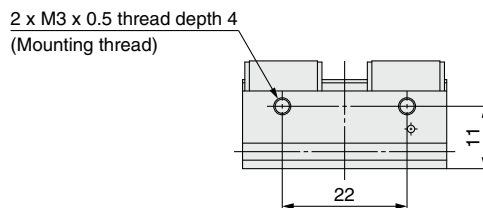
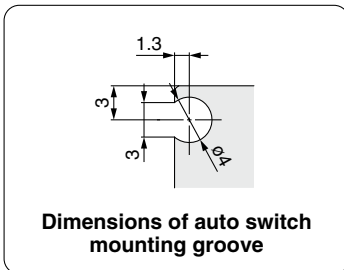
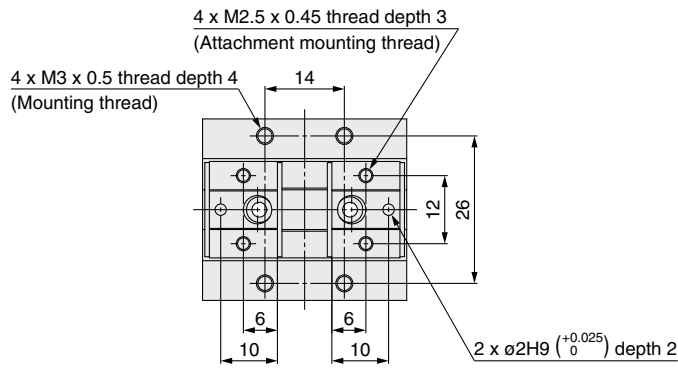
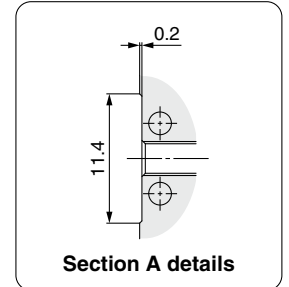
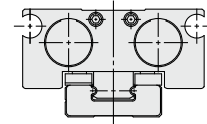
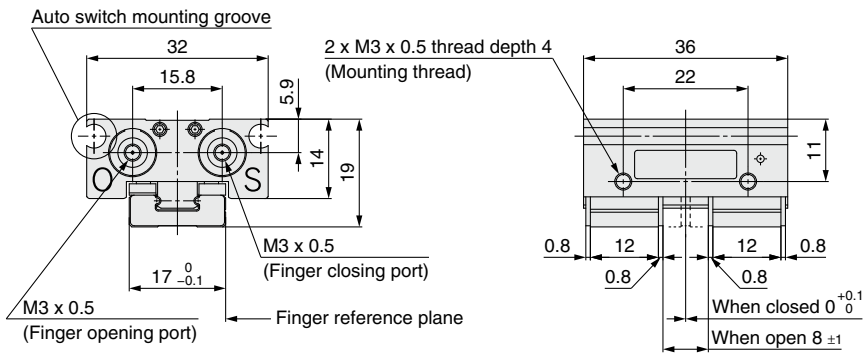
Dimensions: 8D

MHF2-8D



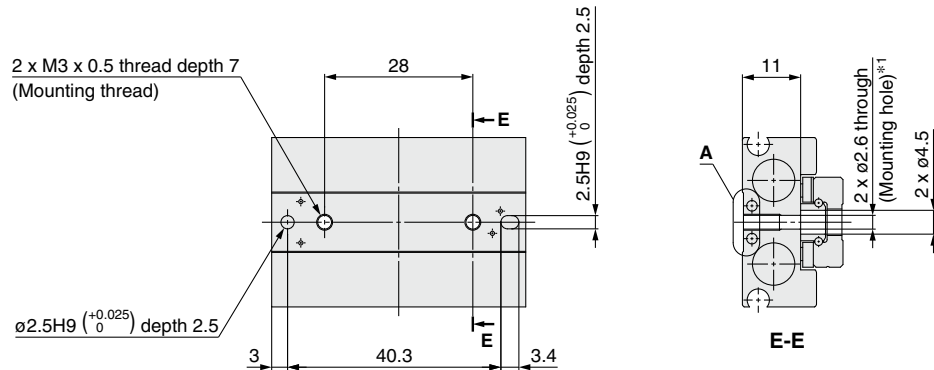
E-E

*1 Use the attached hexagon socket head cap screws for mounting holes.

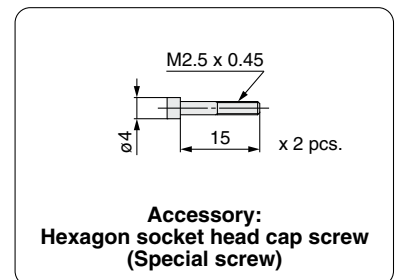
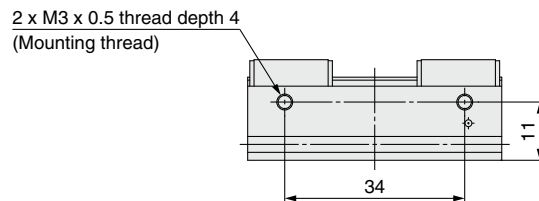
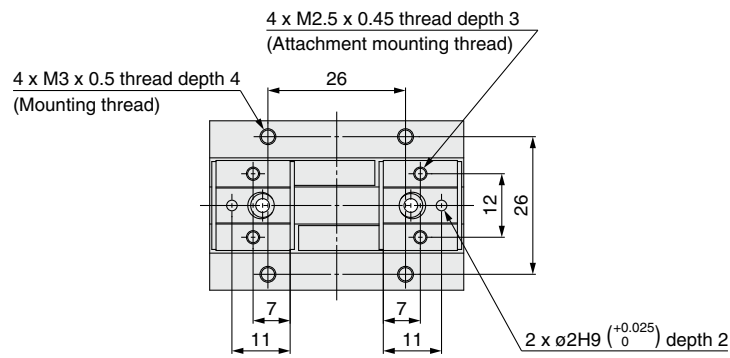
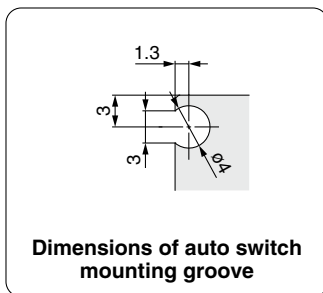
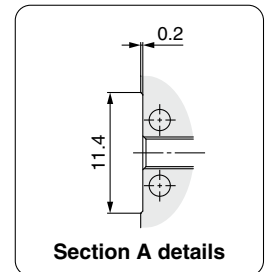
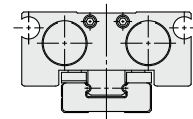
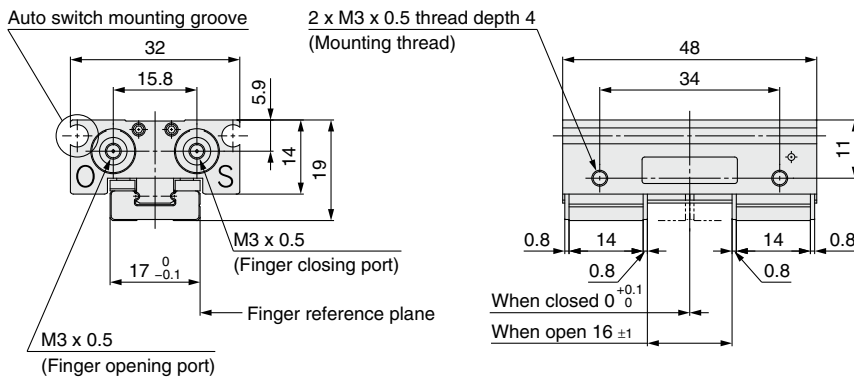


Dimensions: 8D1

MHF2-8D1



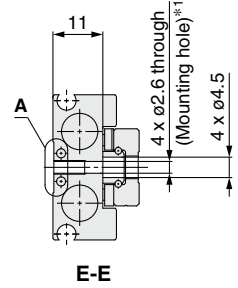
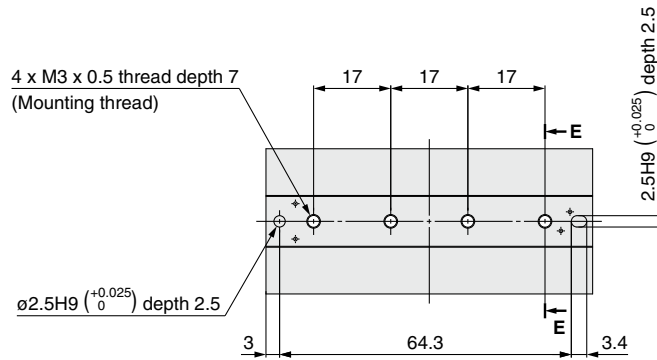
*1 Use the attached hexagon socket head cap screws for mounting holes.



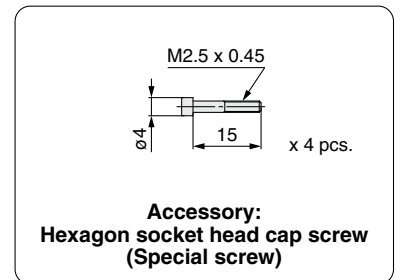
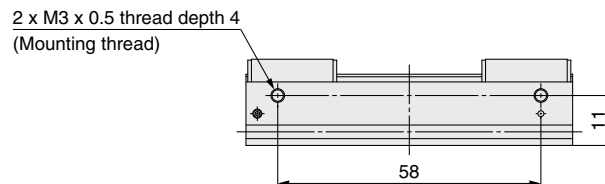
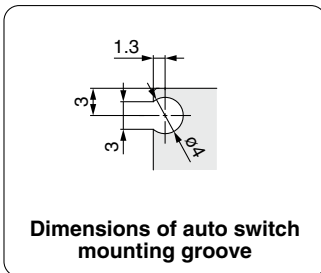
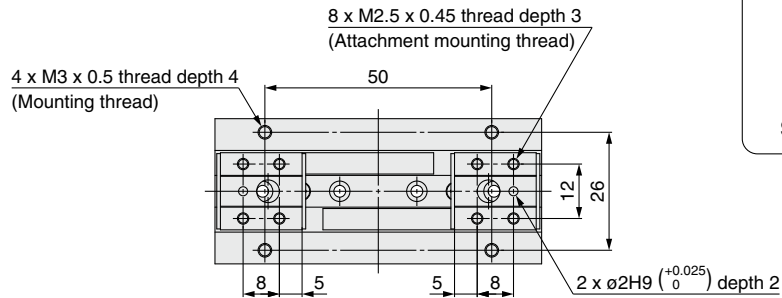
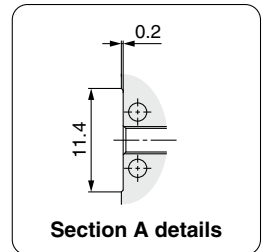
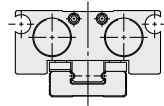
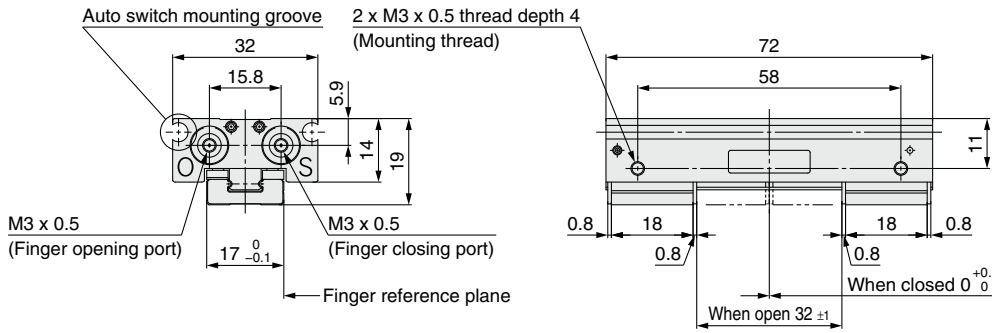
MHF2 Series

Dimensions: 8D2

MHF2-8D2

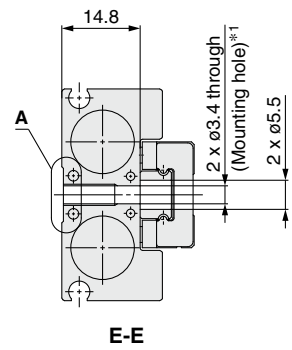
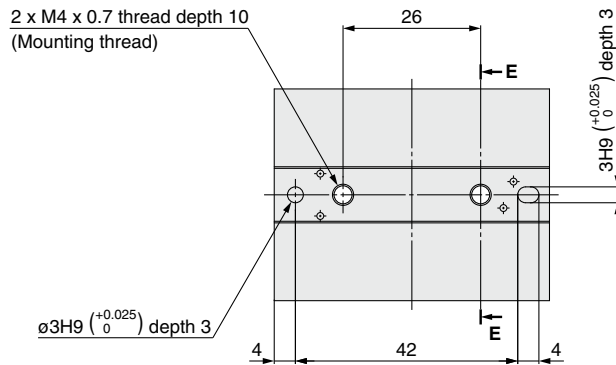


*1 Use the attached hexagon socket head cap screws for mounting holes.

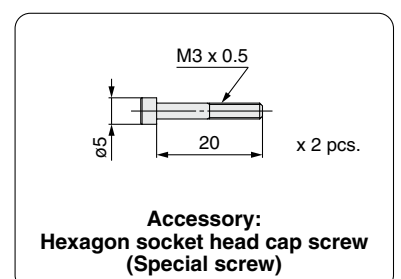
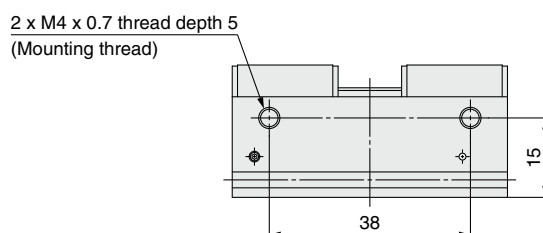
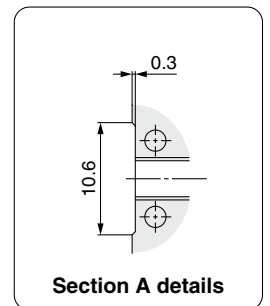
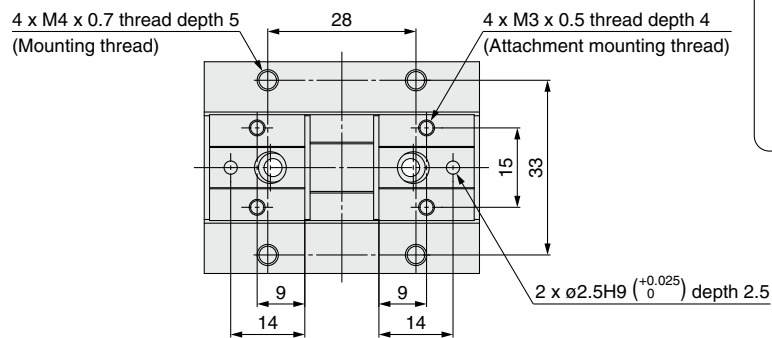
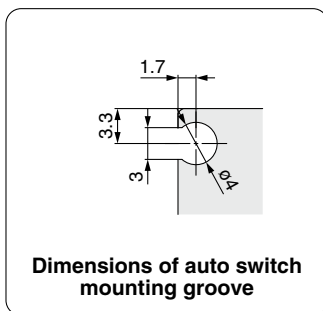
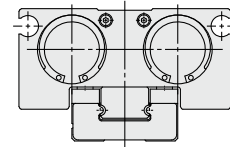
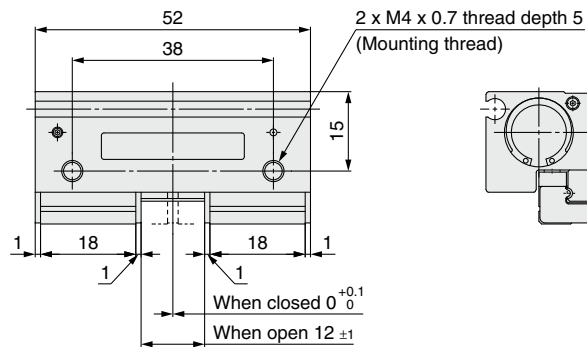
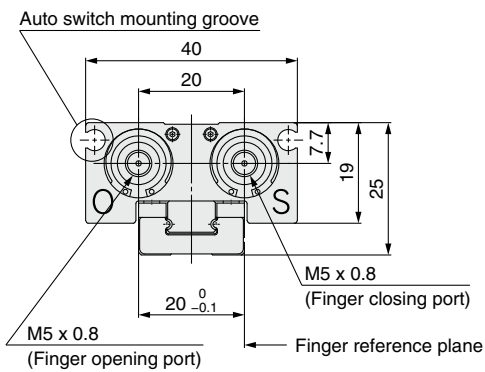


Dimensions: 12D

MHF2-12D



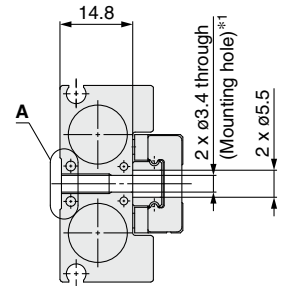
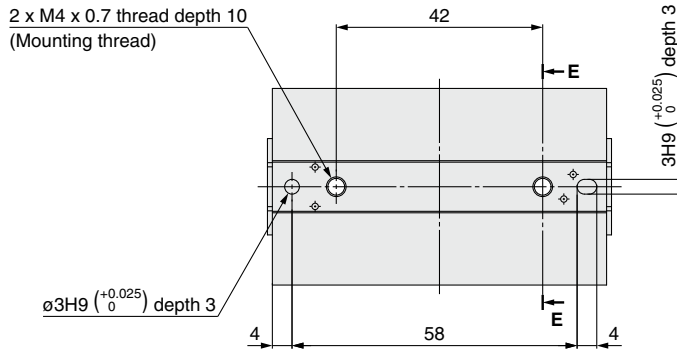
*1 Use the attached hexagon socket head cap screws for mounting holes.



MHF2 Series

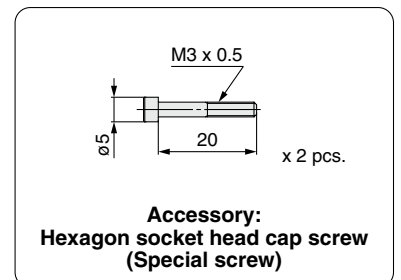
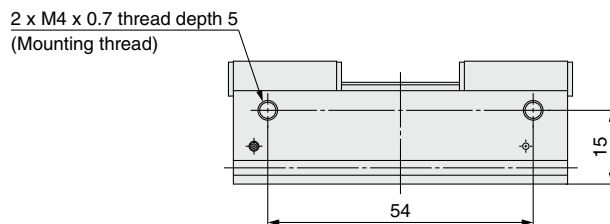
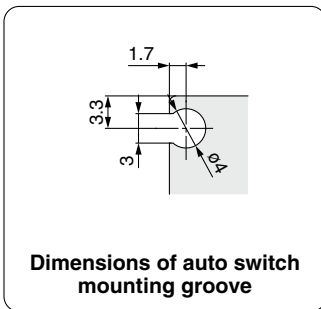
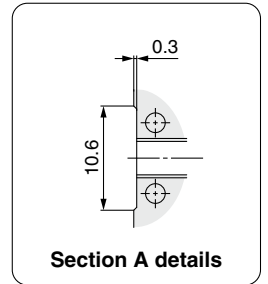
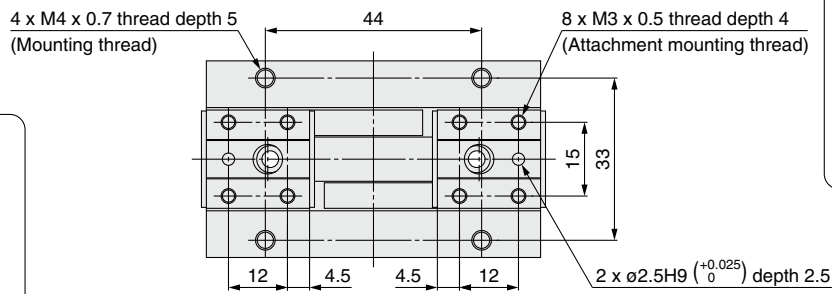
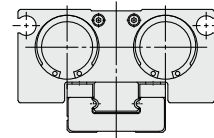
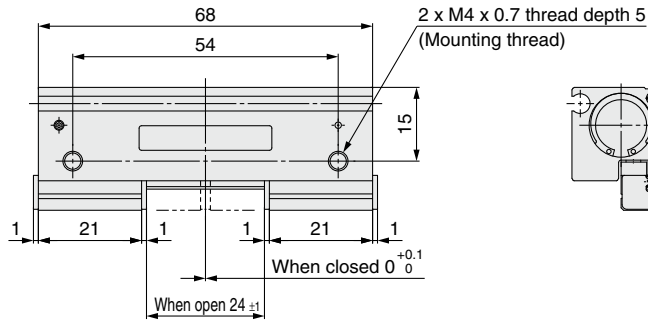
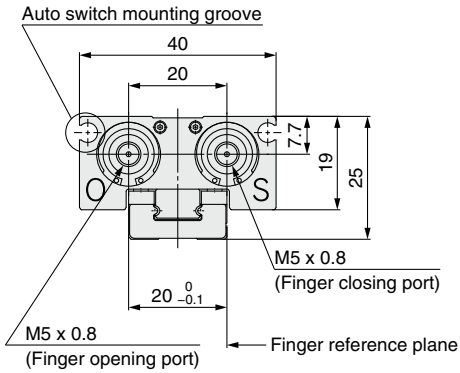
Dimensions: 12D1

MHF2-12D1



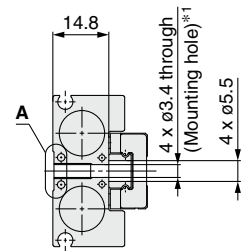
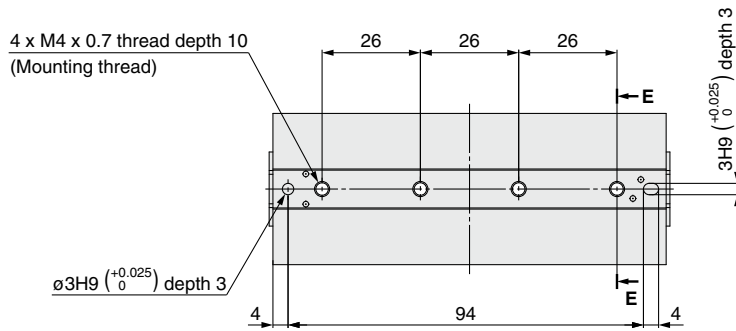
E-E

*1 Use the attached hexagon socket head cap screws for mounting holes.



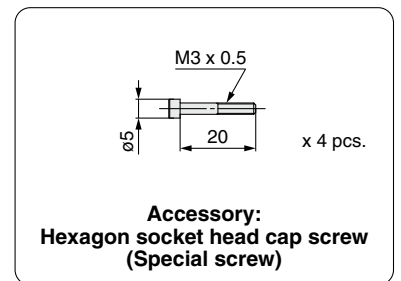
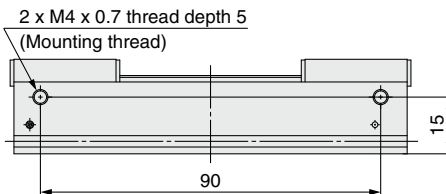
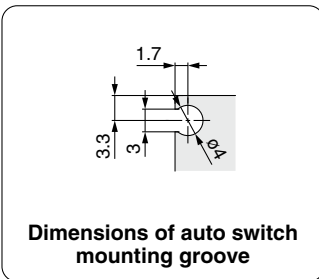
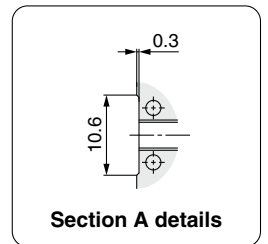
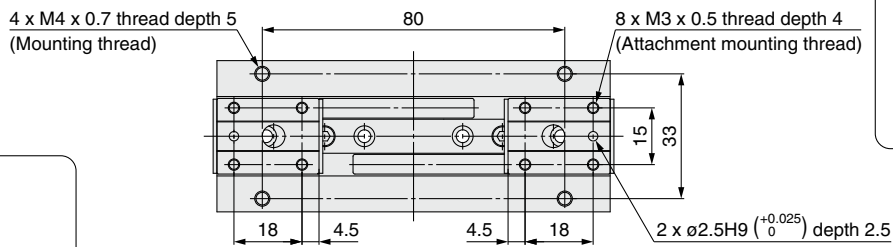
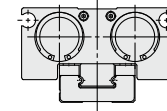
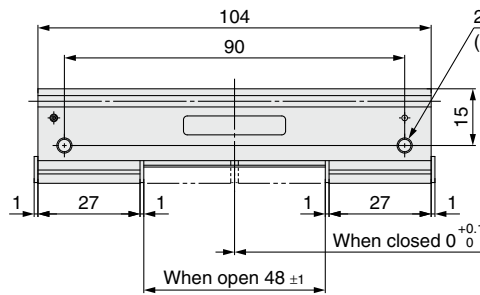
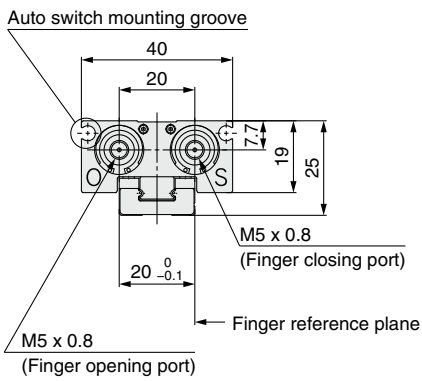
Dimensions: 12D2

MHF2-12D2



E-E

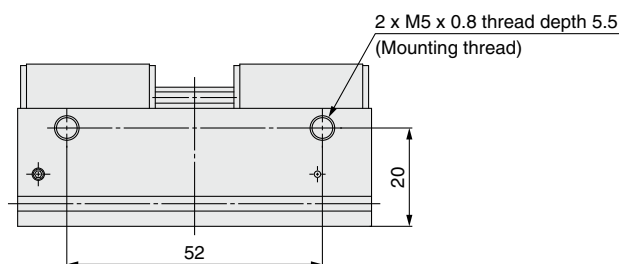
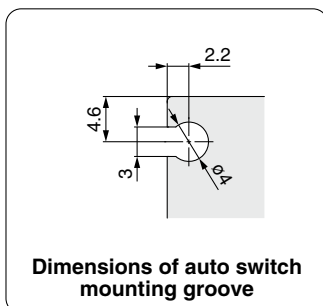
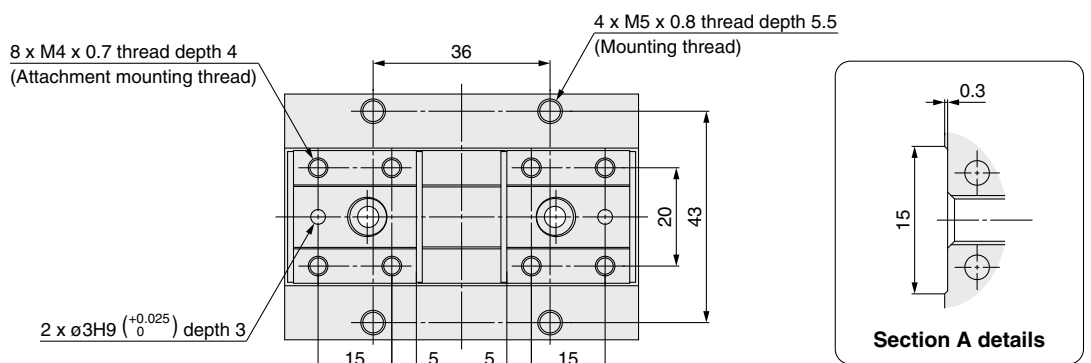
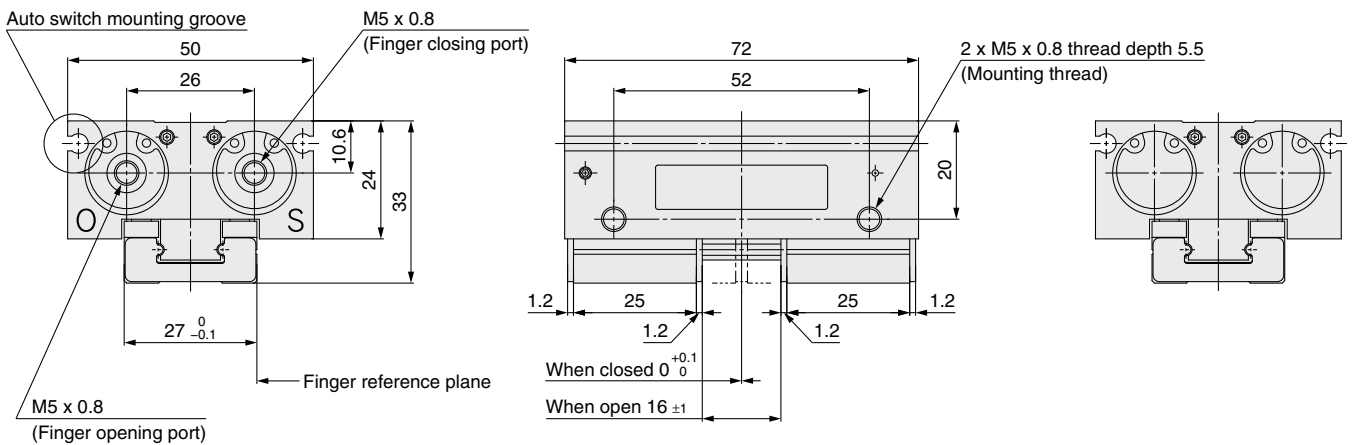
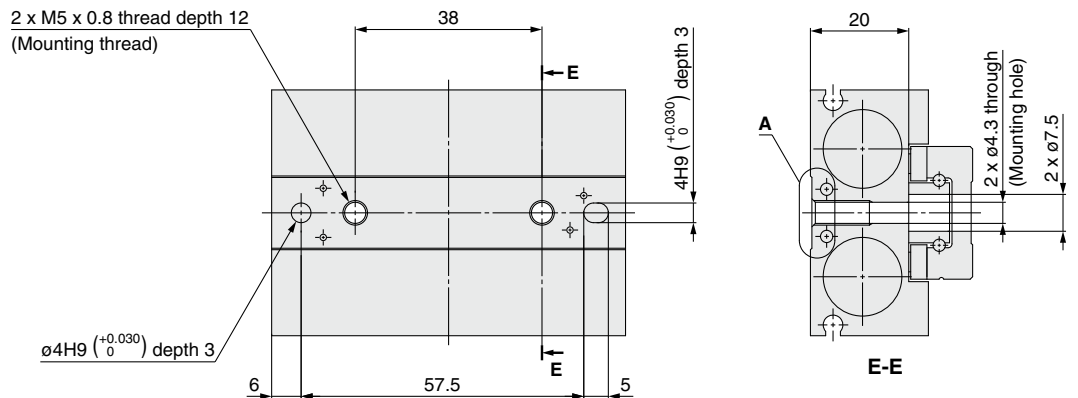
*1 Use the attached hexagon socket head cap screws for mounting holes.



MHF2 Series

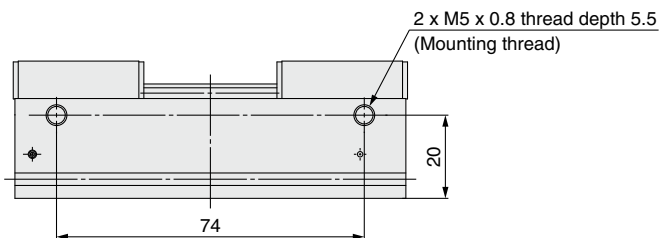
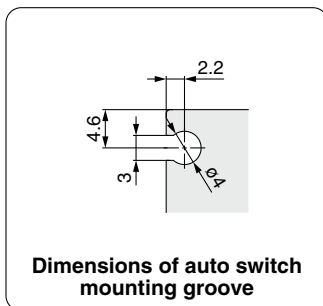
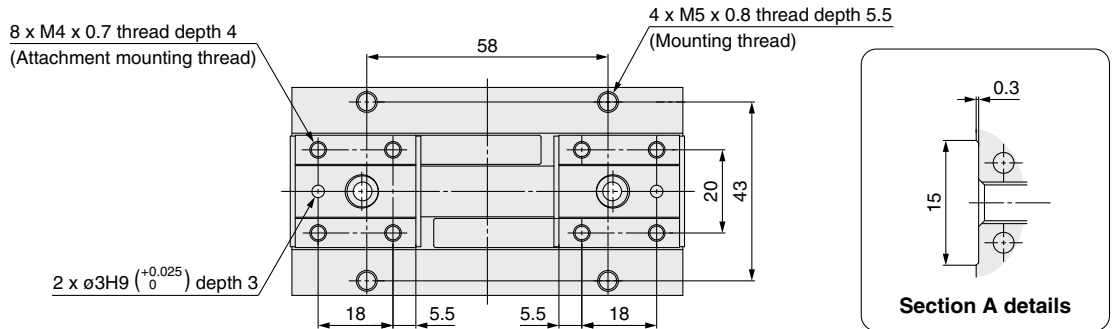
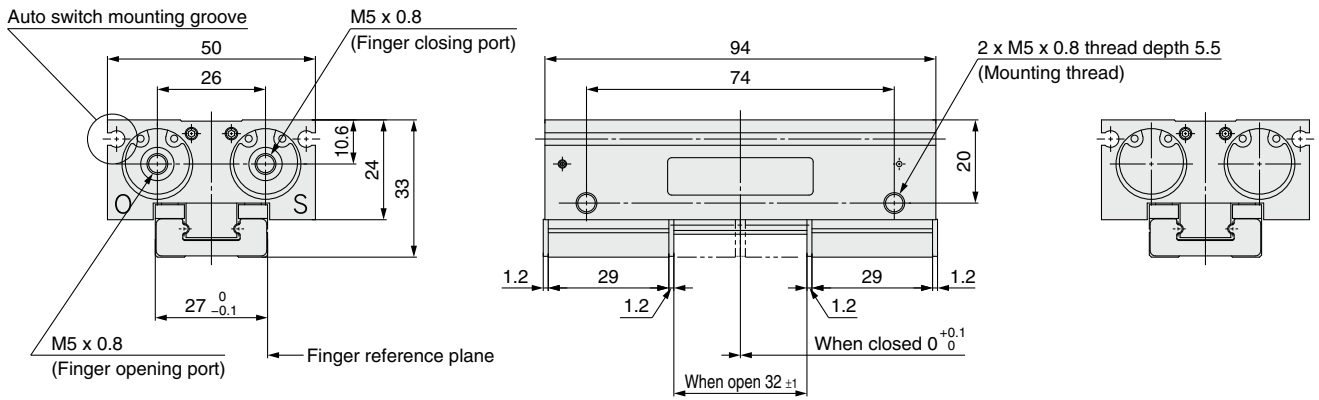
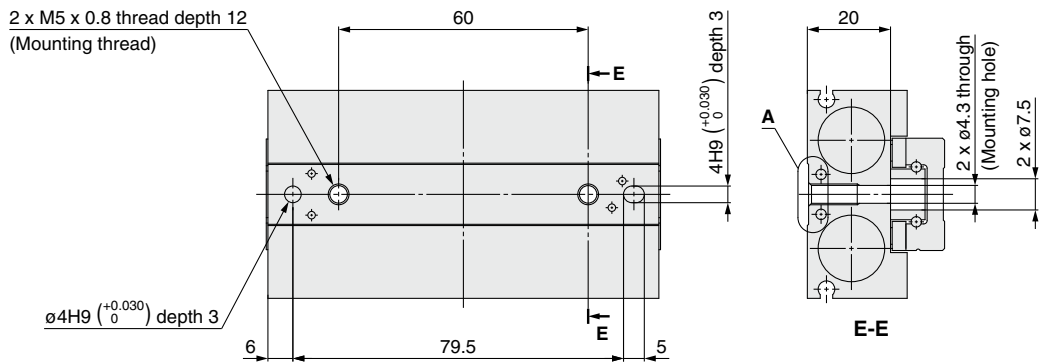
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MHF2-16D



Dimensions: 16D1

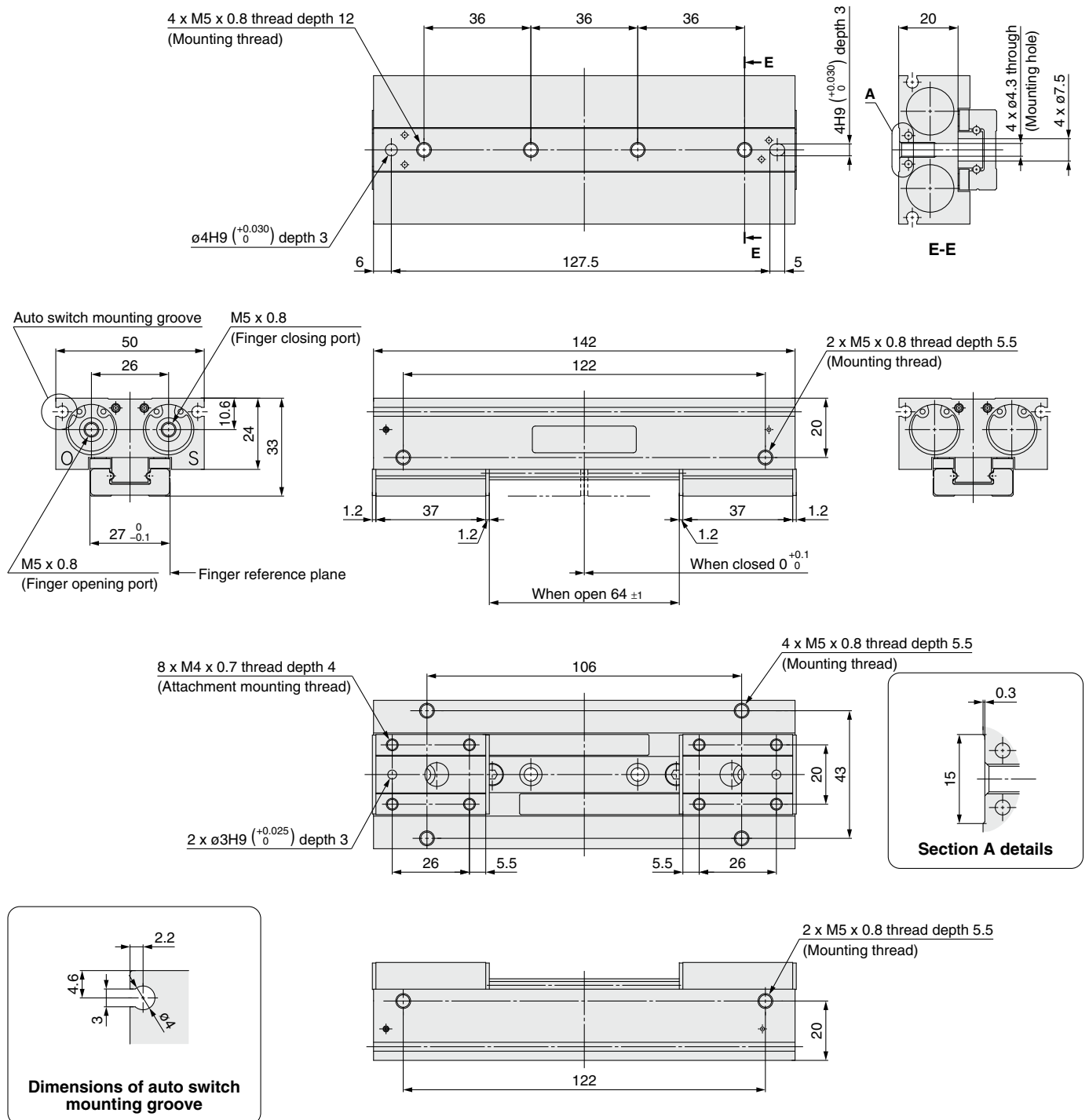
MHF2-16D1



MHF2 Series

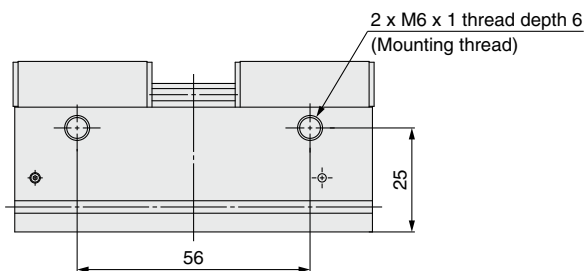
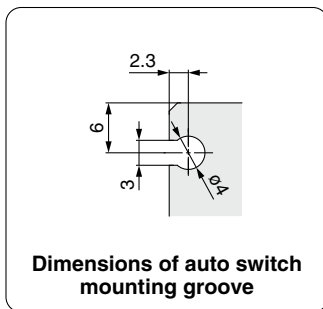
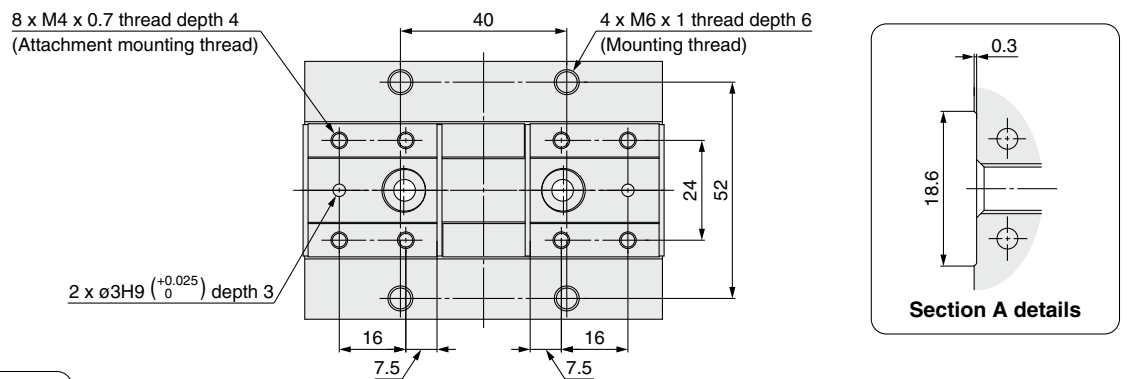
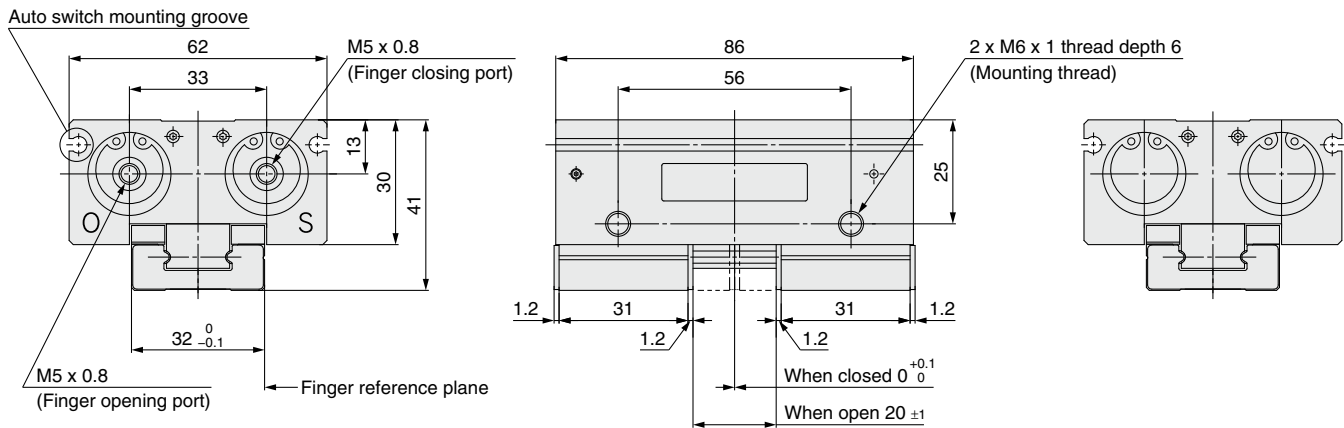
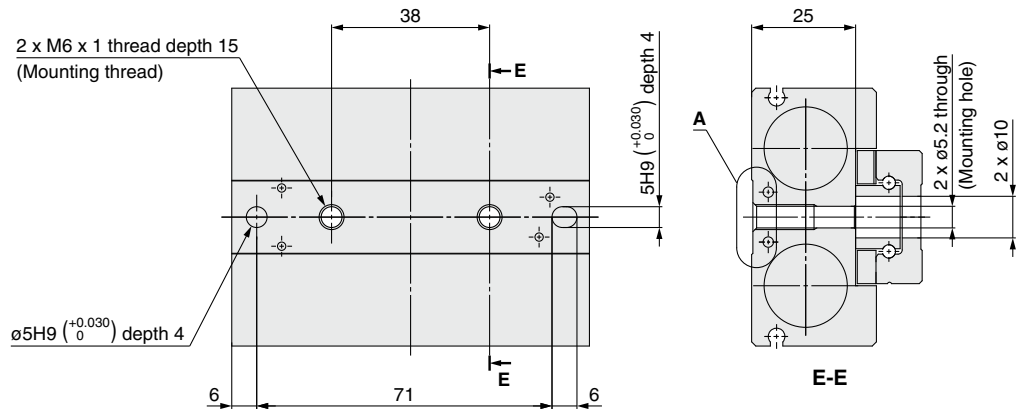
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MHF2-16D2



Dimensions: 20D

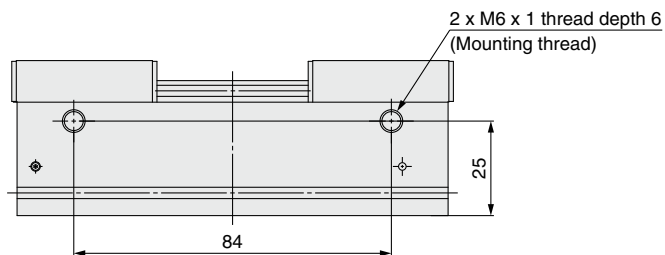
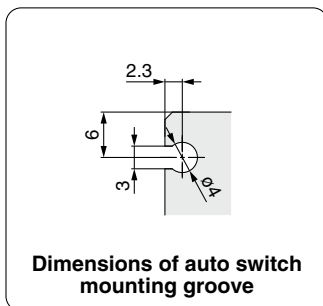
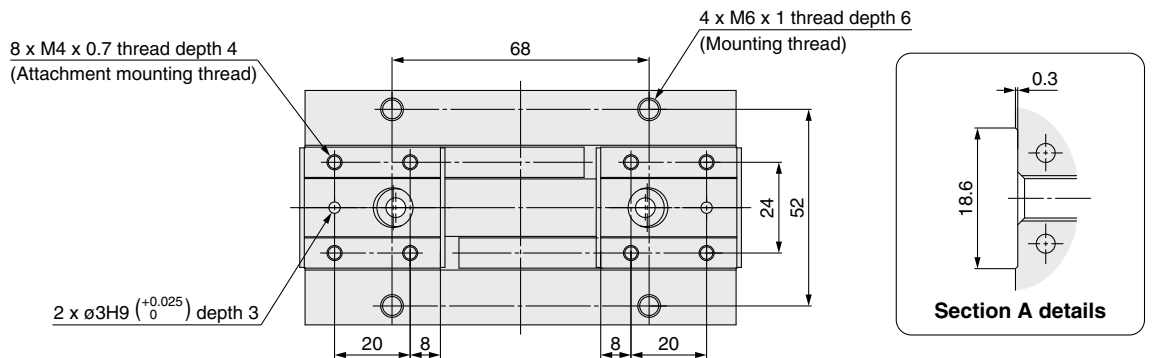
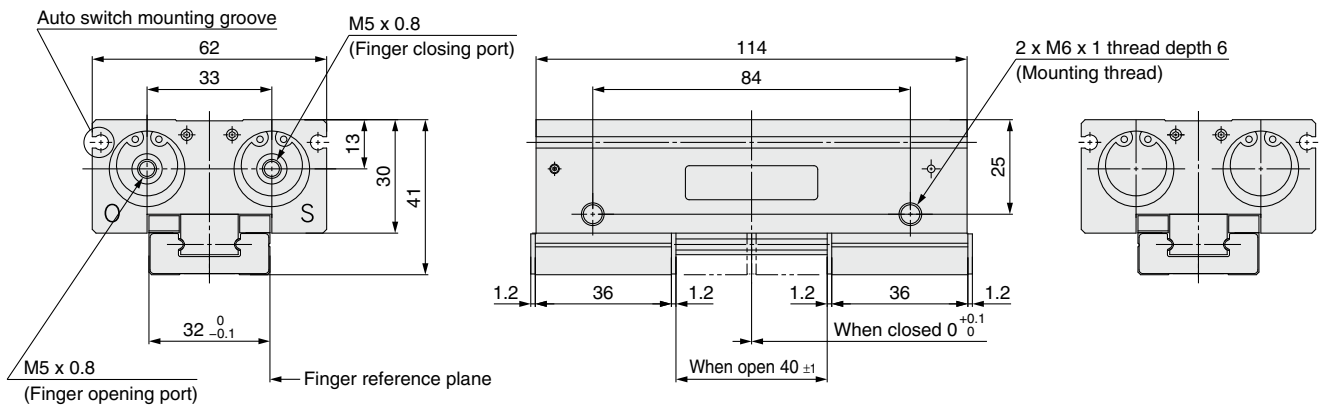
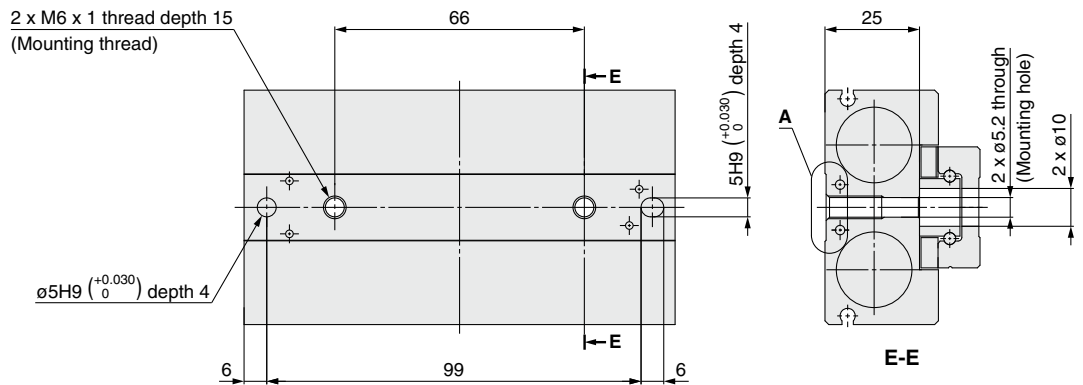
MHF2-20D



MHF2 Series

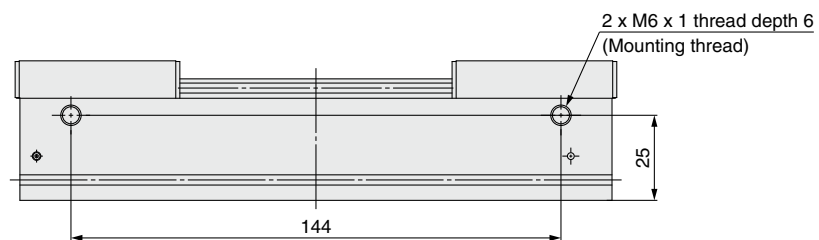
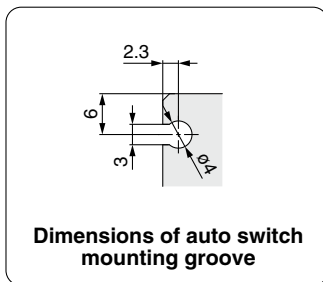
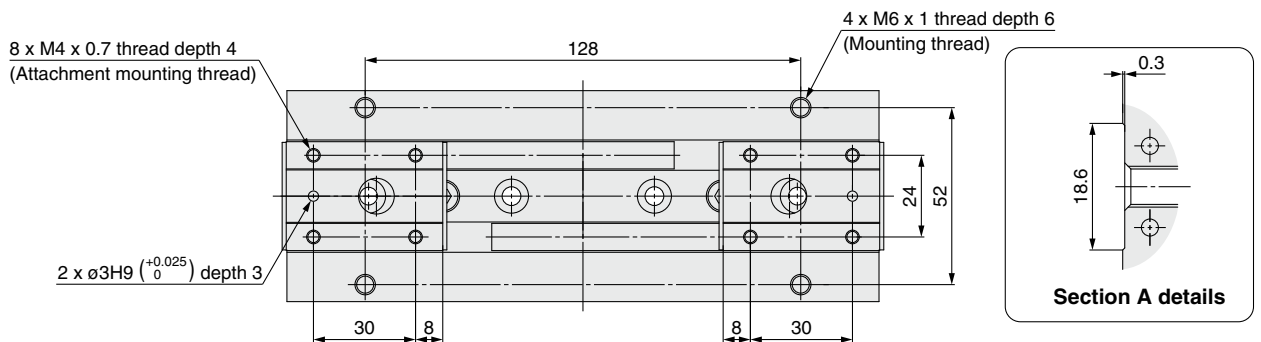
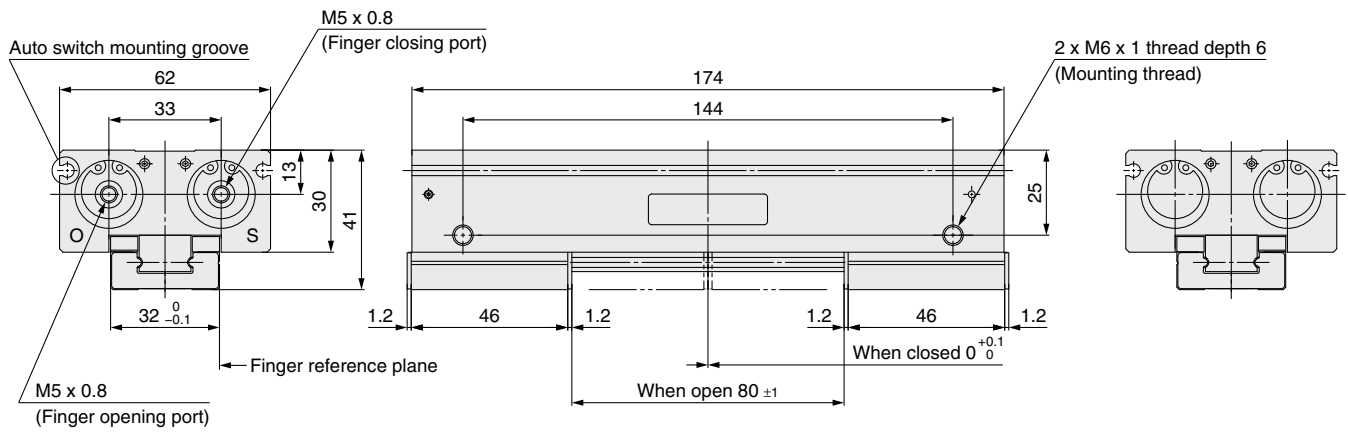
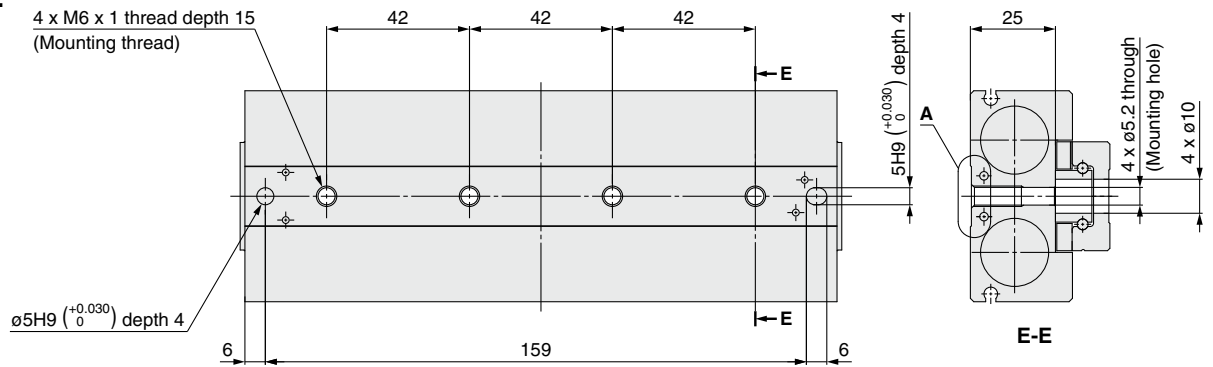
Dimensions: 20D1

MHF2-20D1



Dimensions: 20D2

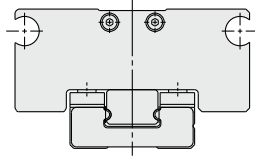
MHF2-20D2



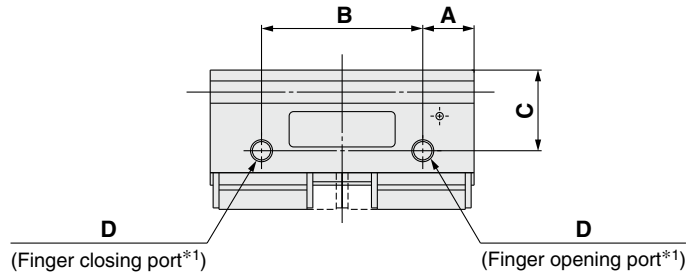
MHF2 Series

Body Option: Side Piping Type

MHF2-8DR
MHF2-8D1R



Port side of axial piping type

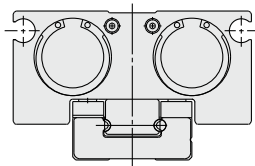


Body Option Dimensions

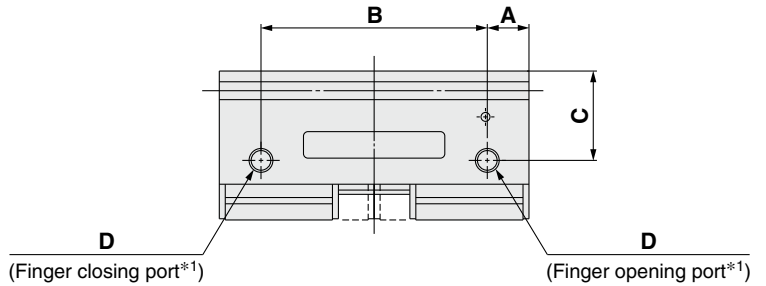
[mm]

Model	A	B	C	D
MHF2-8DR	5.5	25	11	M3 x 0.5
MHF2-8D1R		37		

MHF2-8D2R
MHF2-12D□R
MHF2-16D□R
MHF2-20D□R



Port side of axial piping type



Body Option Dimensions

[mm]

Model	A	B	C	D
MHF2-8D2R	5.5	61	11	M3 x 0.5
MHF2-12DR	7	38	14.8	M5 x 0.8
MHF2-12D1R		54		
MHF2-12D2R		90		
MHF2-16DR	9	54	19	M5 x 0.8
MHF2-16D1R		76		
MHF2-16D2R		124		
MHF2-20DR	10	66	23	M5 x 0.8
MHF2-20D1R		94		
MHF2-20D2R		154		

*1 There is no port on the other side of the product.

* There are no mounting threads for the port side surface.

* Dimensions other than those shown above are the same as those of the axial piping type.

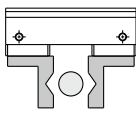
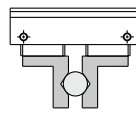
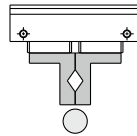
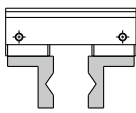
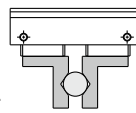
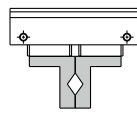
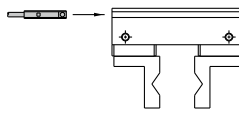
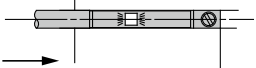
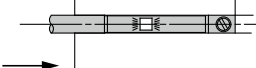
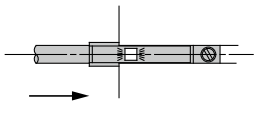
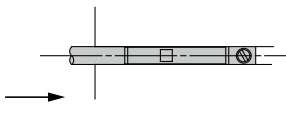
For details, refer to the dimensions on pages 11 to 22.

MHF2 Series

Auto Switch Installation Examples and Mounting Positions

Various auto switch applications are possible through different combinations of auto switch quantities and detecting positions.

1) Detection when Gripping Exterior of a Workpiece

Detection example		① Confirmation of fingers in reset position	② Confirmation of a workpiece held	③ Confirmation of a workpiece released
Position to be detected		Position of fingers fully open 	Position when gripping a workpiece 	Position of fingers fully closed 
Operation of auto switches		When fingers return: Auto switch to turn ON (Light ON)	When gripping a workpiece: Auto switch to turn ON (Light ON)	When a workpiece is not held (Abnormal operation): Auto switch to turn ON (Light ON)
Detection combinations	One auto switch * One position, any of ①, ② and ③ can be detected.	●	●	●
	Two auto switches * Two positions of ①, ② and ③ can be detected.	Pattern A	●	—
		Pattern B	—	●
Pattern C	●	—	●	
How to determine auto switch installation position		Step 1) Fully open the fingers. 	Step 1) Position fingers for gripping a workpiece. 	Step 1) Fully close the fingers. 
At no pressure or low pressure, connect the auto switch to a power supply, and follow the directions.		Step 2) Insert the auto switch into the auto switch mounting groove in the direction as shown in the illustration to the right. 		
		Step 3) Slide the auto switch in the direction of the arrow until the indicator light illuminates and fasten it at a position 0.3 to 0.5 mm in the direction of the arrow beyond the position where the indicator light illuminates. Position where light turns ON  0.3 to 0.5 mm Position to be secured 	Step 3) Slide the auto switch in the direction of the arrow until the indicator light illuminates. 	Step 4) Slide the auto switch further in the direction of the arrow until the indicator light goes out. 

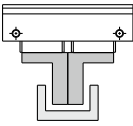
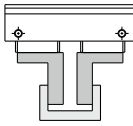
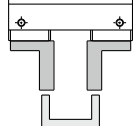
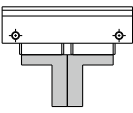
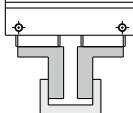
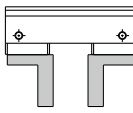
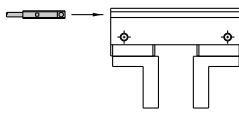
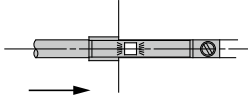
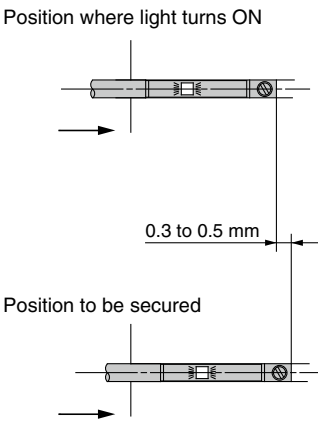
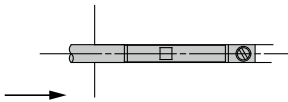
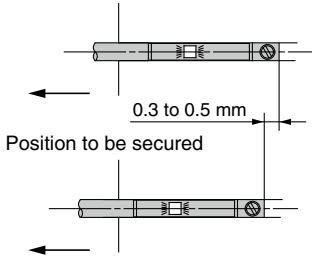
- * It is recommended that gripping of a workpiece be performed close to the center of the finger stroke.
- * When holding a workpiece close at the end of opening/closing stroke of fingers, detecting performance of the combinations listed in the table above may be limited, depending on the hysteresis of an auto switch, etc.

MHF2 Series

Auto Switch Installation Examples and Mounting Positions

Various auto switch applications are possible through different combinations of auto switch quantities and detecting positions.

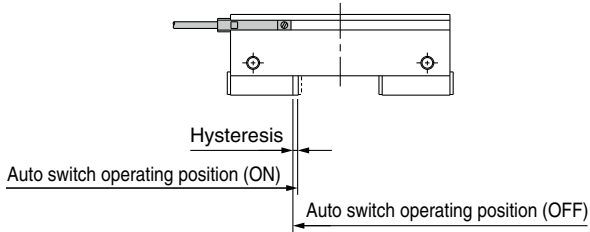
2) Internal Gripping

Detection example		① Confirmation of fingers in reset position	② Confirmation of a workpiece held	③ Confirmation of a workpiece released	
Position to be detected		Position of fingers fully closed 	Position when gripping a workpiece 	Position of fingers fully open 	
Operation of auto switches		When fingers return: Auto switch to turn ON (Light ON)	When gripping a workpiece: Auto switch to turn ON (Light ON)	When a workpiece is not held (Abnormal operation): Auto switch to turn ON (Light ON)	
Detection combinations	One auto switch * One position, any of ①, ② and ③ can be detected.	●	●	●	
	Two auto switches * Two positions of ①, ② and ③ can be detected.	A	●	—	
		B	—	●	
	C	●	—		
How to determine auto switch installation position		Step 1) Fully close the fingers. 	Step 1) Position fingers for gripping a workpiece. 	Step 1) Fully open the fingers. 	
At no pressure or low pressure, connect the auto switch to a power supply, and follow the directions.		Step 2) Insert the auto switch into the auto switch mounting groove in the direction as shown in the illustration to the right. 			
		Step 3) Slide the auto switch in the direction of the arrow until the indicator light illuminates. 	Step 3) Slide the auto switch in the direction of the arrow until the indicator light illuminates and fasten it at a position 0.3 to 0.5 mm in the direction of the arrow beyond the position where the indicator light illuminates. 		
		Step 4) Slide the auto switch further in the direction of the arrow until the indicator light goes out. 			
		Step 5) Slide the auto switch in the opposite direction and fasten it at a position 0.3 to 0.5 mm beyond the position where the indicator light illuminates. 			

* • It is recommended that gripping of a workpiece be performed close to the center of the finger stroke.
• When holding a workpiece close at the end of opening/closing stroke of fingers, detecting performance of the combinations listed in the table above may be limited, depending on the hysteresis of an auto switch, etc.

Auto Switch Hysteresis

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

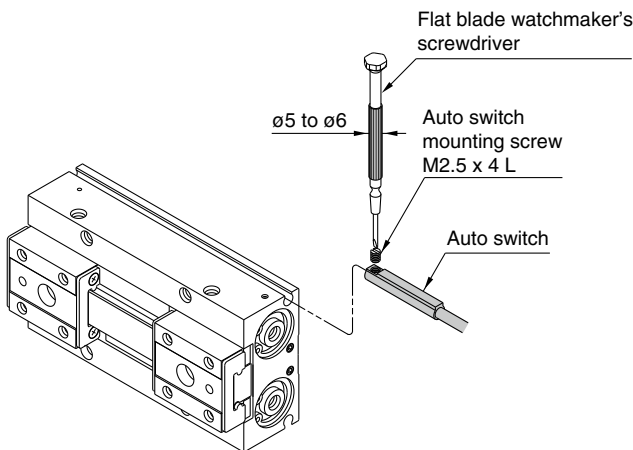


Hysteresis

	D-M9□(V) D-M9□W(V) D-M9□A(V)
MHF2-8D□	0.2
MHF2-12D□	0.3
MHF2-16D□	0.2
MHF2-20D□	0.5

Auto Switch Mounting

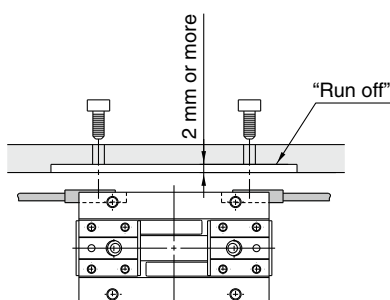
To set the auto switch, insert the auto switch into the auto switch mounting groove of the gripper from the direction as shown in the illustration below. After setting the position, tighten the attached auto switch mounting screw with a flat blade watchmaker's screwdriver.



* Use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm to tighten the auto switch mounting screw. Also, tighten with a torque of about 0.05 to 0.15 N·m, or about 0.05 to 0.10 N·m for D-M9□A(V).

⚠ Caution

When using an auto switch on the mounting plate side, the switch will protrude from the end face as shown in the right figure. Please provide a run off space of 2 mm or more on the mounting plate.



Protrusion of Auto Switch from Edge of Body

- The amount of auto switch protrusion from the body end surface is shown in the table below.
- Use this as a standard when mounting, etc.

Protrusion of Auto Switch

Lead wire type	Illustration	In-line entry		Perpendicular entry	
		D-M9□ D-M9□W	D-M9□A	D-M9□V D-M9□WV	D-M9AV
Model	Finger position Auto switch				
MHF2-8D	Open	6.5	8.5	4.5	6.5
	Closed	6.5	8.5	4.5	6.5
MHF2-8D1	Open	6.5	8.5	4.5	6.5
	Closed	6.5	8.5	4.5	6.5
MHF2-8D2	Open	0.5	2.5	—	—
	Closed	0.5	2.5	—	—
MHF2-12D	Open	3	5	1	3
	Closed	3	5	1	3
MHF2-12D1	Open	1	3	—	—
	Closed	1	3	—	—
MHF2-12D2	Open	—	—	—	—
	Closed	—	—	—	—
MHF2-16D	Open	—	—	—	—
	Closed	—	—	—	—
MHF2-16D1	Open	—	—	—	—
	Closed	—	—	—	—
MHF2-16D2	Open	—	—	—	—
	Closed	—	—	—	—
MHF2-20D	Open	—	—	—	—
	Closed	—	—	—	—
MHF2-20D1	Open	—	—	—	—
	Closed	—	—	—	—
MHF2-20D2	Open	—	—	—	—
	Closed	—	—	—	—

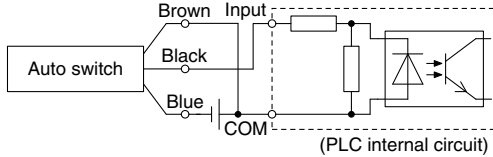
* There is no protrusion for sections of the table with no values entered.

Prior to Use

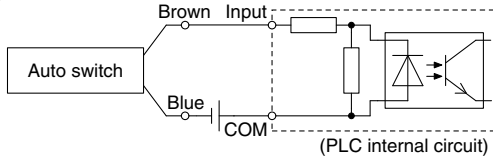
Auto Switch Connections and Examples

Sink Input Specifications

3-wire, NPN

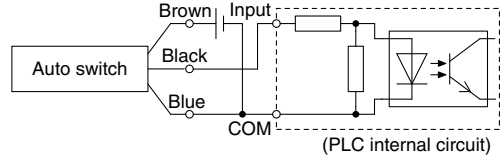


2-wire

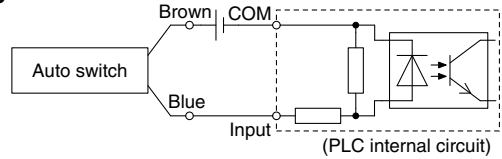


Source Input Specifications

3-wire, PNP



2-wire

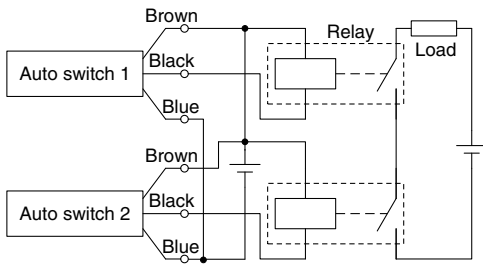


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

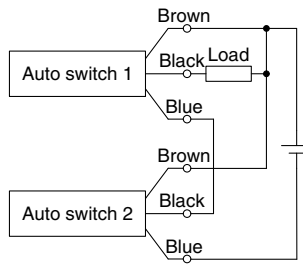
Examples of AND (Series) and OR (Parallel) Connections

* When using solid state auto switches, ensure the application is set up so the signals for the first 50 ms are invalid. Depending on the operating environment, the product may not operate properly.

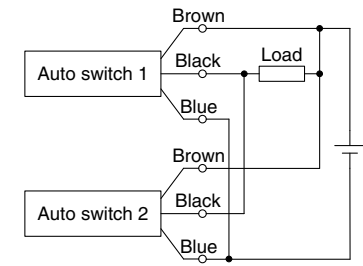
3-wire AND connection for NPN output (Using relays)



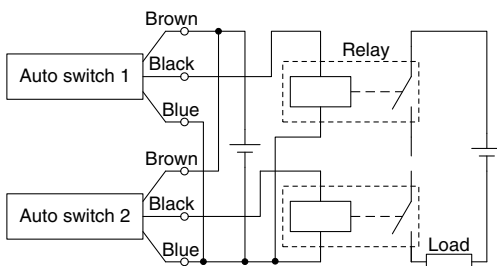
(Performed with auto switches only)



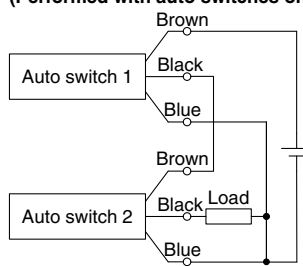
3-wire OR connection for NPN output



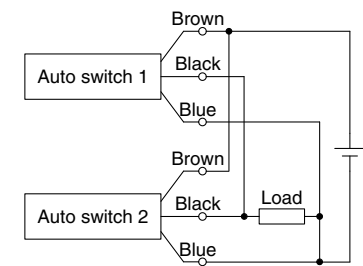
3-wire AND connection for PNP output (Using relays)



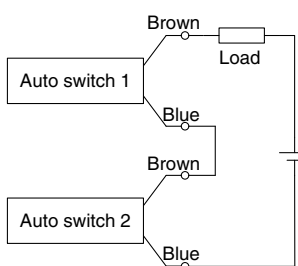
(Performed with auto switches only)



3-wire OR connection for PNP output



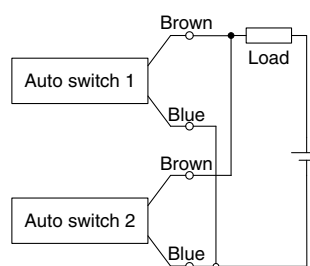
2-wire AND connection



When two auto switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up when both of the auto switches are in the ON state. Auto switches with a load voltage less than 20 V cannot be used. Please contact SMC if using AND connection for a heat-resistant solid state auto switch or a trimmer switch.

Example) Load voltage at ON
 Power supply voltage: 24 VDC
 Internal voltage drop: 4 V
 Load voltage at ON = Power supply voltage –
 Internal voltage drop x 2 pcs.
 = 24 V – 4 V x 2 pcs.
 = 16 V

2-wire OR connection



(Solid state)
 When two auto switches are connected in parallel, malfunction may occur because the load voltage will increase when in the OFF state.

(Reed)
 Because there is no current leakage, the load voltage will not increase when turned OFF. However, depending on the number of auto switches in the ON state, the indicator lights may sometimes grow dim or not light up, due to the dispersion and reduction of the current flowing to the auto switches.

Example) Load voltage at OFF
 Leakage current: 1 mA
 Load impedance: 3 kΩ
 Load voltage at OFF = Leakage current x 2 pcs. x
 Load impedance
 = 1 mA x 2 pcs. x 3 kΩ
 = 6 V

MHF2 Series

Made to Order



1 -X4	Heat Resistant (–10 to 100°C)	p. 29
2 -X5	Fluororubber Seal	p. 29
3 -X50	Without Magnet	p. 29
4 -X53	Ethylene Propylene Rubber Seal (EPDM)	p. 30
5 -X63	Fluorine Grease	p. 30
6 -X79	Grease for Food Processing Machines: Fluorine Grease	p. 30
7 -X79A	Grease for Food Processing Machines: Aluminum Complex Soap Base Grease	p. 31
8 -X81□	Anti-corrosive Treatment of Finger	p. 31
	-X81A (Special black chromium treatment is made on only the finger.)	
	-X81B (Special black chromium treatment is made on the finger and guide.)	
9 -X83	With An Adjustable Opening/Closing Finger Positioning	p. 32
10 -X7050	Actuator Position Sensor Compatible Type	p. 35

MHF2 Series

1 Heat Resistant (−10 to 100°C) Symbol **-X4**

Seal material and grease have been changed so that the product can be used at temperatures between −10 up to 100°C.

How to Order

Standard model no.	- X4
--------------------	------

Heat resistant ●

Specifications

Ambient temperature range	−10°C to 100°C (No freezing)
Seal material	Fluororubber
Grease	Heat-resistant grease (GR-F)

Specifications other than the above and dimensions	Same as those of the standard type
--	------------------------------------

⚠ Warning Precautions

Be aware that smoking cigarettes after your hands have come into contact with the grease used for this product can create a gas that is hazardous to humans.

- * Magnet is built-in, but when using an auto switch, the acceptable temperature range becomes −10 to 60°C.
- * For lubrication, specialized grease GR-F is recommended.

Replacement Parts: Seal Kit

Seal kit part number
MHF□□-PS-X4 (MHF8-PS-2-X4 for the MHF2-8D2-X4)

- * Enter the cylinder bore size into □□ of the seal kit part number. Refer to pages 9 and 10 for the replacement parts.
- * The seal kit does not include a grease pack. Order it separately.
Grease pack part number: GR-F-005 (5 g)

2 Fluororubber Seal Symbol **-X5**

How to Order

Standard model no.	- X5
--------------------	------

Fluororubber seal ●

Specifications

Seal material	Fluororubber
---------------	--------------

Specifications other than the above and dimensions	Same as those of the standard type
--	------------------------------------

- * Please contact SMC, since the type of chemical and the operating temperature may not allow the use of this product.
- * Since the standard type magnet is built-in, please contact SMC for the product's adaptability to the operating environment.

3 Without Magnet Symbol **-X50**

How to Order

Standard model no.	- X50
--------------------	-------

Without magnet ●

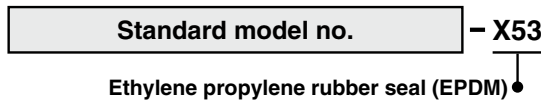
Specifications

Magnet	None
Specifications other than the above and dimensions	Same as those of the standard type

4 Ethylene Propylene Rubber Seal (EPDM) **Symbol -X53**

Seal material has been changed to ethylene propylene (EPDM), and grease to fluorine grease.

How to Order



* For lubrication, specialized grease GR-F is recommended.
Grease pack part number: GR-F-005 (5 g)

Specifications

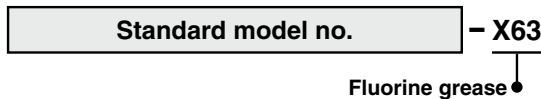
Seal material	Ethylene propylene rubber (EPDM)
Grease	Fluorine grease (GR-F)
Specifications other than the above and dimensions	Same as those of the standard type

Warning Precautions

Be aware that smoking cigarettes after your hands have come into contact with the grease used for this product can create a gas that is hazardous to humans.

5 Fluorine Grease **Symbol -X63**

How to Order



* For lubrication, specialized grease GR-F is recommended.
Grease pack part number: GR-F-005 (5 g)

Warning Precautions

Be aware that smoking cigarettes after your hands have come into contact with the grease used for this product can create a gas that is hazardous to humans.

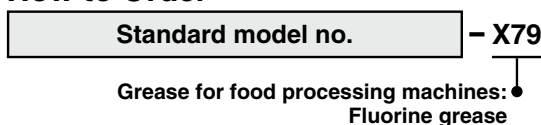
Specifications

Grease	Fluorine grease (GR-F)
Specifications other than the above and dimensions	Same as those of the standard type

6 Grease for Food Processing Machines: Fluorine Grease **Symbol -X79**

Use grease for food processing machines (NSF-H1 certified/fluorine grease).

How to Order



* For lubrication, specialized grease GR-H is recommended.
Grease pack part number: GR-H-010 (10 g)

Warning Precautions

Be aware that smoking cigarettes after your hands have come into contact with the grease used for this product can create a gas that is hazardous to humans.

Caution

Do not use air grippers in a food-related environment.

<Not installable>

Food zone..... Food may directly contact with air grippers, and is treated as food products.

<Installable>

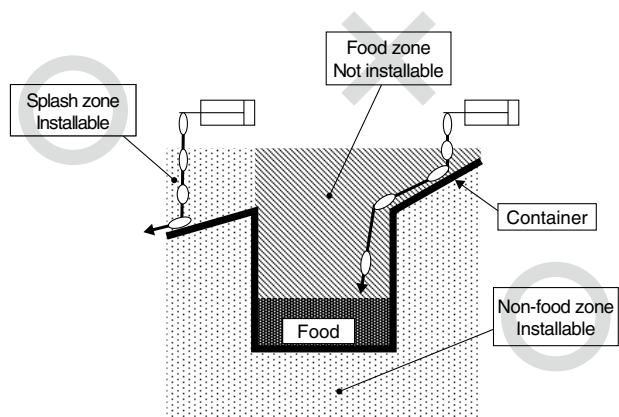
Splash zone..... Food may directly contact with air grippers, but is not treated as food products.

Non-food zone Air grippers do not directly contact food.

Specifications

Grease	Grease for food processing machines (NSF-H1 certified)/Fluorine grease
Specifications other than the above and dimensions	Same as those of the standard type

* If the fluorine grease is not applicable to the working environment, use "-X79A."



MHF2 Series

7 Grease for Food Processing Machines: Aluminum Complex Soap Base Grease Symbol **-X79A**

Use grease for food processing machines (NSF-H1 certified).

How to Order

Standard model no. **- X79A**
 Grease for food processing machines: Aluminum complex soap base grease

Caution

Do not use air grippers in a food-related environment.

<Not installable>

Food zone Food may directly contact with air grippers, and is treated as food products.

<Installable>

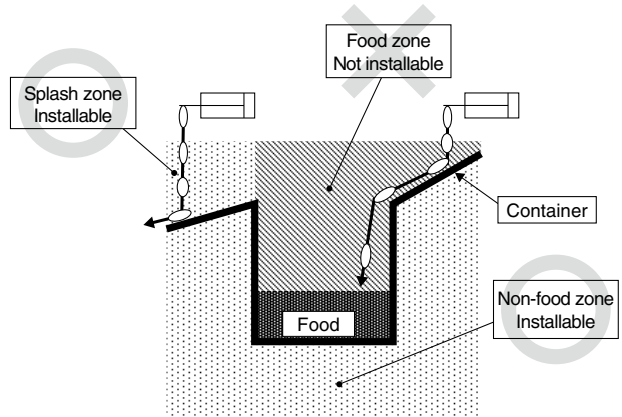
Splash zone Food may directly contact with air grippers, but is not treated as food products.

Non-food zone Air grippers do not directly contact food.

* For lubrication, specialized grease GR-R is recommended.
 Grease pack part number: **GR-R-010** (10 g)

Specifications

Grease	Grease for food processing machines (NSF-H1 certified)/Aluminum complex soap base grease
Specifications other than the above and dimensions	Same as those of the standard type



8 Anti-corrosive Treatment of Finger Symbol **-X81□**

- Special black chromium treatment
- The finger and guide use the martensitic stainless steel. When anti-corrosive measures better than the martensitic stainless steel level are required, use these series.

How to Order

Standard model no. **- X81A**
 Anti-corrosive treatment of finger

Standard model no. **- X81B**
 Anti-corrosive treatment of finger and guide

Specifications

Treatment	Special black chromium treatment
Specifications other than the above and dimensions	Same as those of the standard type

Symbol
-X83

9 With An Adjustable Opening/Closing Finger Positioning

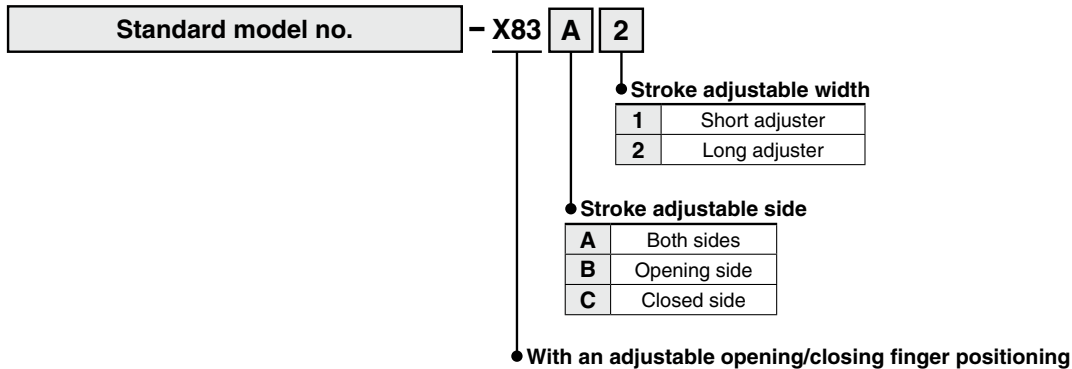
- Stroke can be adjusted to suit the workpiece
- 3 types of opening/closing finger stroke adjustments (Adjustable finger opening/closing position type, Adjustable finger opening position type, Adjustable finger closed position type)

Various strokes

- Standardized 3 stroke types and 2 stroke adjustment types for fine tuning

Bore size [mm]	Short stroke		Medium stroke		Long stroke	
	Full stroke	Stroke adjustable width	Full stroke	Stroke adjustable width	Full stroke	Stroke adjustable width
ø8	8 mm	Short Adjuster 4 mm Long Adjuster 8 mm	16 mm	Short Adjuster 6 mm Long Adjuster 10 mm	32 mm	Short Adjuster 12 mm Long Adjuster 22 mm
ø12	12 mm	Short Adjuster 8 mm Long Adjuster 12 mm	24 mm	Short Adjuster 8 mm Long Adjuster 14 mm	48 mm	Short Adjuster 18 mm Long Adjuster 28 mm
ø16	16 mm	Short Adjuster 10 mm Long Adjuster 14 mm	32 mm	Short Adjuster 8 mm Long Adjuster 18 mm	64 mm	Short Adjuster 16 mm Long Adjuster 36 mm
ø20	20 mm	Short Adjuster 8 mm Long Adjuster 18 mm	40 mm	Short Adjuster 10 mm Long Adjuster 20 mm	80 mm	Short Adjuster 20 mm Long Adjuster 40 mm

How to Order



Specifications

Finger Stroke Adjustable Width for Opening/Closing Position

[mm]

Model	Full stroke	Adjustable stroke width	A: Adjustable finger opening/closing position type		B: Adjustable finger opening position type	C: Adjustable finger closing position type
			Adjustable stroke width		Adjustable stroke width for opening position	Adjustable stroke width for closed position
			Closed position	Opening position		
MHF2-8D□	8	4	0 to 4	4 to 8	4 to 8	0 to 4
			8	0 to 8	0 to 8	0 to 8
MHF2-8D1□	16	6	0 to 6	10 to 16	10 to 16	0 to 6
			10	0 to 10	6 to 16	0 to 10
MHF2-8D2□	32	12	0 to 12	20 to 32	20 to 32	0 to 12
			22	0 to 22	10 to 32	0 to 22
MHF2-12D□	12	8	0 to 8	4 to 12	4 to 12	0 to 8
			12	0 to 12	0 to 12	0 to 12
MHF2-12D1□	24	8	0 to 8	16 to 24	16 to 24	0 to 8
			14	0 to 14	10 to 24	0 to 14
MHF2-12D2□	48	18	0 to 18	30 to 48	30 to 48	0 to 18
			28	0 to 28	20 to 48	0 to 28
MHF2-16D□	16	10	0 to 10	6 to 16	6 to 16	0 to 10
			14	0 to 14	2 to 16	0 to 14
MHF2-16D1□	32	8	0 to 8	24 to 32	24 to 32	0 to 8
			18	0 to 18	14 to 32	0 to 18
MHF2-16D2□	64	16	0 to 16	48 to 64	48 to 64	0 to 16
			36	0 to 36	28 to 64	0 to 36
MHF2-20D□	20	8	0 to 8	12 to 20	12 to 20	0 to 8
			18	0 to 18	2 to 20	0 to 18
MHF2-20D1□	40	10	0 to 10	30 to 40	30 to 40	0 to 10
			20	0 to 20	20 to 40	0 to 20
MHF2-20D2□	80	20	0 to 20	60 to 80	60 to 80	0 to 20
			40	0 to 40	40 to 80	0 to 40

* Specifications and details other than those shown above are the same as those of the standard type.

How to Adjust Finger Stroke

After adjusting the opening/closing width adjustment thread, tighten the nut to fix.

Nut Tightening Torque

Part no.	Thread size	Tightening torque [N·m]
MHF2-8D□-X83□□	M4 x 0.7	1.5
MHF2-8D□R-X83□□		
MHF2-12D□-X83□□	M5 x 0.8	3.0
MHF2-12D□R-X83□□		
MHF2-16D□-X83□□	M6 x 1.0	5.2
MHF2-16D□R-X83□□		
MHF2-20D□-X83□□	M8 x 1.25	12.5
MHF2-20D□R-X83□□		

Warning

1. Adjust the stroke adjustment screw within the adjustable width.

If you adjust the adjustment screw beyond the maximum value, the adjustment screw may fall out and may cause damage to human bodies or equipment/devices.

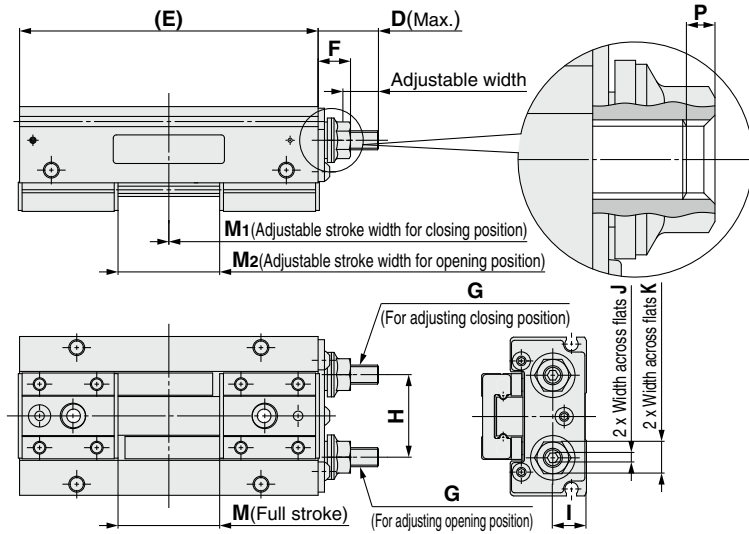
2. Do not adjust stroke when air pressure is applied to the adjustment screw side.

If air pressure is applied to the adjustment screw, the adjustment screw may fall out in some adjustment statuses. When applying pressure, make sure the adjustment screw is tightened enough.

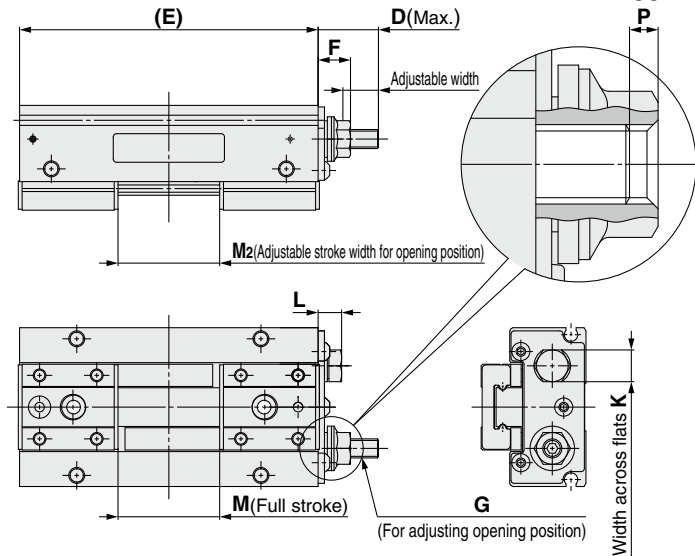
9 With An Adjustable Opening/Closing Finger Positioning

Dimensions (The dimensions below are the same as those of the standard type.)

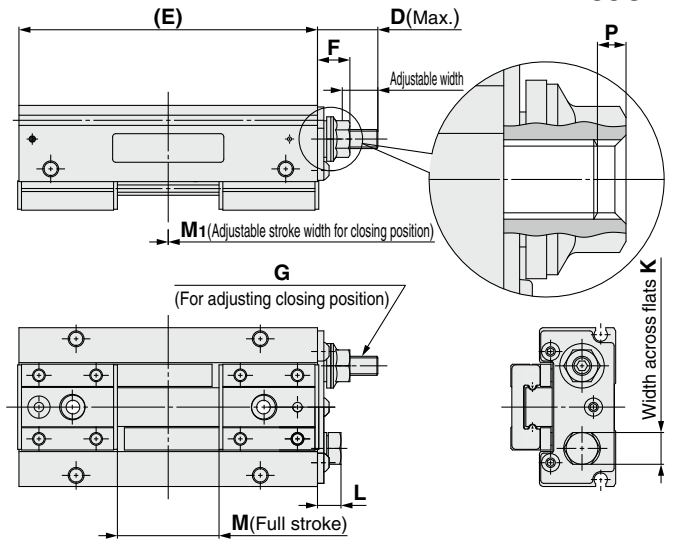
**Adjustable finger opening/closing position type: MHF2-□-X83A1
X83A2**



**Adjustable finger opening position type/MHF2-□-X83B1
X83B2**



**Adjustable finger closing position type/MHF2-□-X83C1
X83C2**

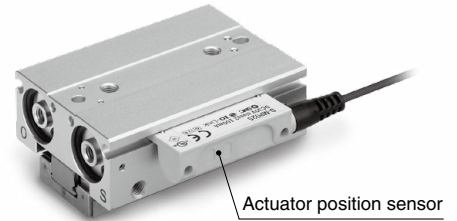


Dimensions (The □ in the table below indicates the symbol for stroke adjustable side (A: Adjustable finger opening/closing position type, B: Adjustable finger opening position type, or C: Adjustable finger closing position type).) [mm]

Model	A: Adjustable finger opening/closing position type B: Adjustable finger opening position type C: Adjustable finger closing position type						D	(E)	F	G	H	I	J	K	L	M	P	
	M1	M2	M1	M2	M1	M2												
MHF2-8D□	-X83□1	0 to 4	4 to 8	—	4 to 8	0 to 4	—	9	36							8		
	-X83□2	0 to 8	0 to 8	—	0 to 8	0 to 8	—	12										
MHF2-8D1□	-X83□1	0 to 6	10 to 16	—	10 to 16	0 to 6	—	10	48	6.8	M4 x 0.7	15.8	5.9	2	7	4.6	16	1.8
	-X83□2	0 to 10	6 to 16	—	6 to 16	0 to 10	—	12										
MHF2-8D2□	-X83□1	0 to 12	20 to 32	—	20 to 32	0 to 12	—	13	72								32	
	-X83□2	0 to 22	10 to 32	—	10 to 32	0 to 22	—	18										
MHF2-12D□	-X83□1	0 to 8	4 to 12	—	4 to 12	0 to 8	—	12	52								12	
	-X83□2	0 to 12	0 to 12	—	0 to 12	0 to 12	—	14										
MHF2-12D1□	-X83□1	0 to 8	16 to 24	—	16 to 24	0 to 8	—	12	68	8.2	M5 x 0.8	20	7.7	2.5	8	5.4	24	2.3
	-X83□2	0 to 14	10 to 24	—	10 to 24	0 to 14	—	15										
MHF2-12D2□	-X83□1	0 to 18	30 to 48	—	30 to 48	0 to 18	—	18	104								48	
	-X83□2	0 to 28	20 to 48	—	20 to 48	0 to 28	—	23										
MHF2-16D□	-X83□1	0 to 10	6 to 16	—	6 to 16	0 to 10	—	15	72								16	
	-X83□2	0 to 14	2 to 16	—	2 to 16	0 to 14	—	17										
MHF2-16D1□	-X83□1	0 to 8	24 to 32	—	24 to 32	0 to 8	—	14	94	10.2	M6 x 1	26	10.6	3	10	7.4	32	2.4
	-X83□2	0 to 18	14 to 32	—	14 to 32	0 to 18	—	19										
MHF2-16D2□	-X83□1	0 to 16	48 to 64	—	48 to 64	0 to 16	—	18	142								64	
	-X83□2	0 to 36	28 to 64	—	28 to 64	0 to 36	—	28										
MHF2-20D□	-X83□1	0 to 8	12 to 20	—	12 to 20	0 to 8	—	18	86								20	
	-X83□2	0 to 18	2 to 20	—	2 to 20	0 to 18	—	23										
MHF2-20D1□	-X83□1	0 to 10	30 to 40	—	30 to 40	0 to 10	—	18	114	13.2	M8 x 1.25	33	13	4	12	9.9	40	3
	-X83□2	0 to 20	20 to 40	—	20 to 40	0 to 20	—	23										
MHF2-20D2□	-X83□1	0 to 20	60 to 80	—	60 to 80	0 to 20	—	23	174								80	
	-X83□2	0 to 40	40 to 80	—	40 to 80	0 to 40	—	33										

10 Actuator Position Sensor Compatible Type

- The stroke position is output with an analog signal.
- Repeatability: 0.1 mm
- Direct mounting is possible.
- Analog output, Switch output



Applicable Actuator Position Sensors (Full stroke length detectable)

Stroke	Bore size			
	ø8	ø12	ø16	ø20
Short stroke	Not available	D-MP025□	D-MP025□	D-MP025□
Medium stroke	D-MP025□	D-MP025□	D-MP025□	D-MP025□
Long stroke	D-MP025□	D-MP050□	D-MP050□	D-MP050□

Specifications: Same as those of the standard type

How to Order

MHF2 - □□□□ - X7050

- Refer to the standard model number on page 7.
- Actuator position sensor compatible type

- * The short stroke type cannot be used for the ø8 because the mounting dimension is too short.
- * The actuator position sensor is not included with the product. It must be ordered separately.
- * D-M9 series auto switches cannot be used.

- * For details on the actuator position sensor (D-MP series), refer to the **Web Catalog**.



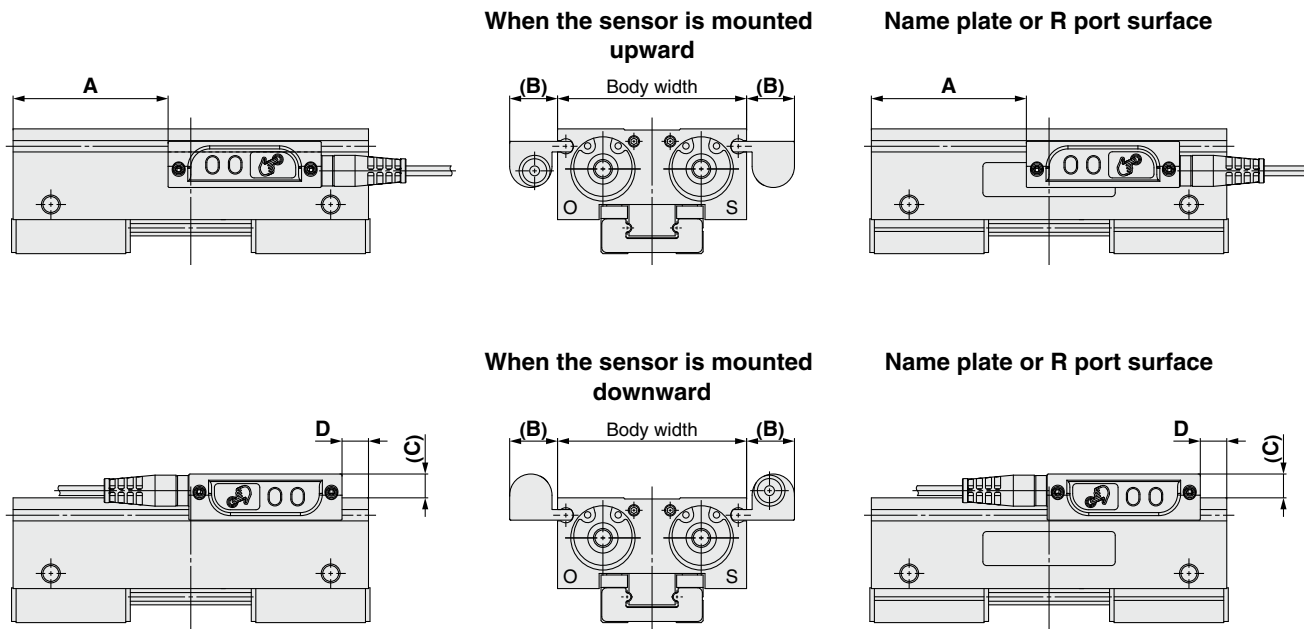
10 Actuator Position Sensor Compatible Type

Symbol
-X7050

Actuator Position Sensor Mounting Position (Guide)

This is a guideline for the mounting position when detecting the full stroke length.

* Adjust the sensor after confirming the operating conditions in the actual setting.



Actuator Position Sensor Mounting Position Guide

Model	A	(B)	(C)	D	Applicable actuator position sensor
MHF2-8D1(R)-X7050	5.5 to 7.5	(15)	(8.5)	0 to 1	D-MP025□
MHF2-8D2(R)-X7050	26.5 to 31.5	(15)	(8.5)	0 to 3.5	
MHF2-12D(R)-X7050	6 to 11.5	(15)	(8)	0 to 4	
MHF2-12D1(R)-X7050	19.5 to 27.5	(15)	(8)	0 to 6.5	D-MP050□
MHF2-12D2(R)-X7050	24 to 39	(15)	(8)	0 to 14	
MHF2-16D(R)-X7050	19 to 31.5	(14)	(7)	0 to 11	D-MP025□
MHF2-16D1(R)-X7050	36 to 44.5	(14)	(7)	0 to 13.5	
MHF2-16D2(R)-X7050	56 to 71	(14)	(7)	5.5 to 20.5	D-MP050□
MHF2-20D(R)-X7050	31 to 43	(14)	(5.5)	1 to 13	D-MP025□
MHF2-20D1(R)-X7050	54 to 56	(14)	(5.5)	15.5 to 17.5	
MHF2-20D2(R)-X7050	80 to 87	(14)	(5.5)	22 to 29	D-MP050□

* The □ in the applicable actuator position sensor part numbers indicates the lead wire type. For details, refer to the actuator position sensor in the [Web Catalog](#).

For the Side Piping Type

When the sensor is mounted on the same surface as the piping port on the side piping type, there will be interference between the sensor and the fitting and the speed controller, resulting in restricted use.

Model	Sensor: Upward	Sensor: Downward
MHF2-8D1R-X7050	×	○
MHF2-8D2R-X7050	×	○
MHF2-12DR-X7050	×	○
MHF2-12D1R-X7050	×	○
MHF2-12D2R-X7050	×	○
MHF2-16DR-X7050	×	○
MHF2-16D1R-X7050	×	○
MHF2-16D2R-X7050	×	○
MHF2-20DR-X7050	○	○
MHF2-20D1R-X7050	○	○
MHF2-20D2R-X7050	○	○

