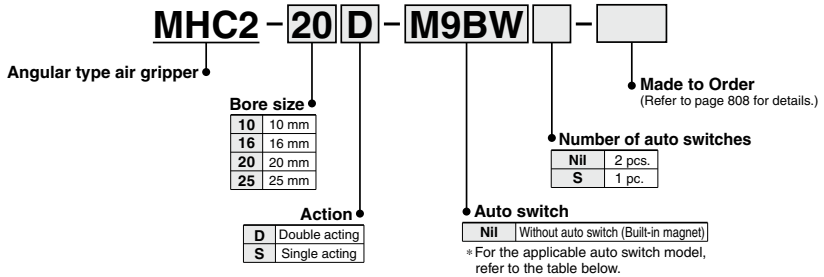


# Angular Type Air Gripper/Standard Type

# MHC2 Series

ø10, ø16, ø20, ø25

## How to Order



### Applicable Auto Switches

Refer to pages 929 to 983 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)*			Pre-wired connector	Applicable load	
					DC	AC	Electrical entry direction		0.5 (Nil)	1 (M)	3 (L)			5 (Z)
							Perpendicular	In-line						
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	—	M9NV	M9N	●	●	○	○	IC circuit	
				3-wire (PNP)			M9PV	M9P	●	●	○	○		
				2-wire			M9BV	M9B	●	●	○	○		—
				3-wire (NPN)			M9NVV	M9NW	●	●	○	○		IC circuit
				3-wire (PNP)			M9PWW	M9PW	●	●	○	○		IC circuit
				2-wire			M9BWW	M9BW	●	●	○	○		—
	Water resistant (2-color indicator)			3-wire (NPN)	M9NAV**	M9NA**	○	○	●	○	○	IC circuit		
				3-wire (PNP)	M9PAV**	M9PA**	○	○	●	○	○	IC circuit		
				2-wire	M9BAV**	M9BA**	○	○	●	○	○	—		

\*\* Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance.

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

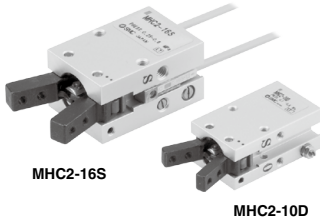
\* Solid state auto switches marked with a "○" symbol are produced upon receipt of order.

Note 1) 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.

Note 2) When ordering the air gripper with auto switch, auto switch mounting brackets are supplied with the air gripper.  
 When ordering the auto switch separately, auto switch mounting brackets (BMG2-012) are required.

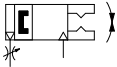
# MHC2 Series

- A large amount of gripping force is provided through the use of a double piston mechanism, while maintaining a compact design.
- Built-in variable throttle
- A solid state auto switch with an indicator light can be mounted.



## Symbol

Double acting: External grip



Single acting/ Normally open:  
External grip



**Made to Order**  
[Click here for details](#)

Symbol	Specifications/Description
-X4	Heat resistance (100°C)
-X5	Fluororubber seal
-X50	Without magnet
-X53	EPDM seal/Fluorine grease
-X56	Axial Ported
-X63	Fluorine grease
-X64	Finger: Side tapped mounting
-X65	Finger: Through-hole mounting
-X79	Grease for food processing machines, Fluorine grease
-X79A	Grease for food processing machines
-X81A	Anti-corrosive treatment of finger

## Moisture Control Tube IDK Series



When operating an actuator with a small diameter and a short stroke at a high frequency, the dew condensation (water droplet) 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 [Web Catalog](#).

## Specifications

Fluid		Air
Operating pressure	Double acting	0.1 to 0.6 MPa
	Single acting	0.25 to 0.6 MPa
Ambient and fluid temperature		-10 to 60°C
Repeatability		±0.01 mm
Max. operating frequency		180 c.p.m
Lubrication		Not required
Action		Double acting, Single acting
Auto switch (Option) <small>Note)</small>		Solid state auto switch (3-wire, 2-wire)

Note) Refer to pages 929 to 983 for further information on auto switches.

## Model

Action	Model	Bore size (mm)	Gripping moment (N·m) (Effective value) <sup>(1)</sup>	Opening/closing angle (Both sides)	Weight <sup>(2)</sup> (g)
Double acting	MHC2-10D	10	0.10	30° to -10°	39
	MHC2-16D	16	0.39		91
	MHC2-20D	20	0.70		180
	MHC2-25D	25	1.36		311
Single acting	MHC2-10S	10	0.070	30° to -10°	39
	MHC2-16S	16	0.31		92
	MHC2-20S	20	0.54		183
	MHC2-25S	25	1.08		316

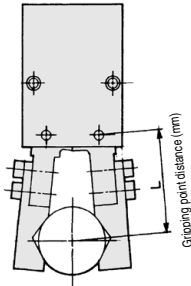
Note 1) At the pressure of 0.5 MPa.

Refer to "Effective Gripping Force" data on page 809 for gripping force of each gripping point.

Note 2) Except auto switch.

## Gripping Point

- Workpiece gripping point should be within the range indicated in the graph.

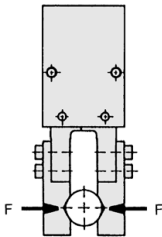


## Guidelines for the selection of the gripper with respect to workpiece mass

- 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 mass, or more.
- If high acceleration, deceleration or impact forces are encountered during motion, a further margin of safety should be considered.
- If there is an overhang, please consult with SMC.

## ● Indication of effective gripping force

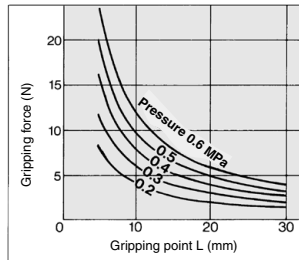
The effective gripping force shown in the graphs below is expressed as  $F$ , which is the thrust of one finger, when both fingers and attachments are in full mass contact with the workpiece as shown in the figure below.



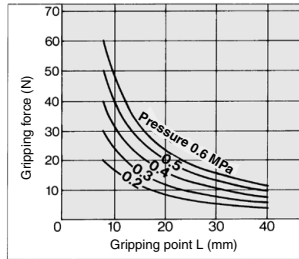
## Effective Gripping Force

### Double Acting

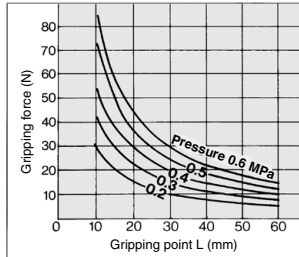
#### MHC2-10D



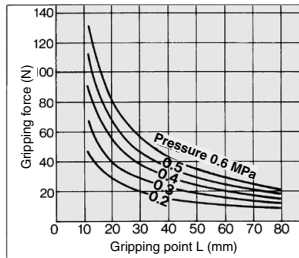
#### MHC2-16D



#### MHC2-20D

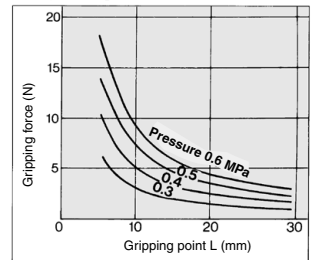


#### MHC2-25D

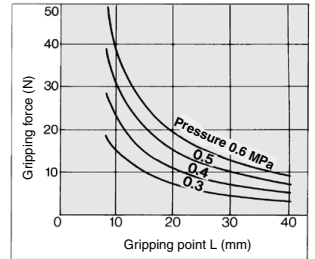


### Single Acting

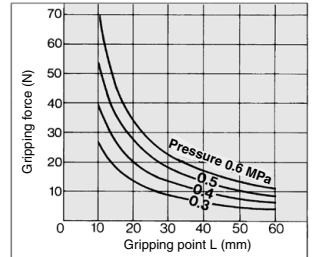
#### MHC2-10S



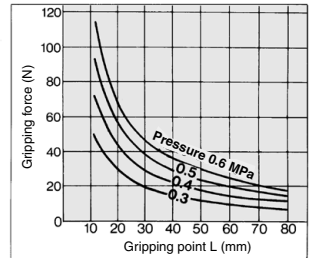
#### MHC2-16S



#### MHC2-20S



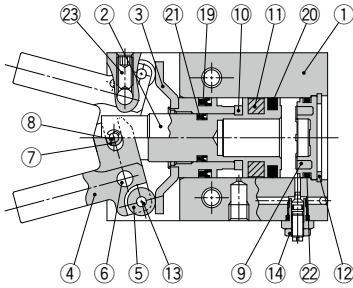
#### MHC2-25S



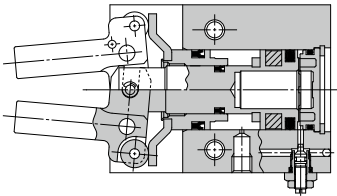
# MHC2 Series

## Construction

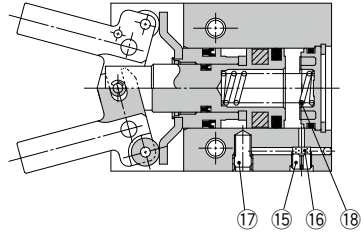
### Double acting/With fingers open



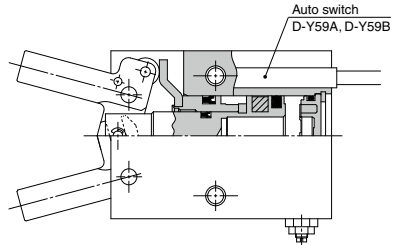
### Double acting/With fingers closed



### Single acting



### With auto switch



### Component Parts

No.	Description	Material	Note
1	Body	Aluminum alloy	Hard anodized
2	Piston A	Aluminum alloy	Hard anodized
3	Piston B assembly		
4	Finger	ø10 to ø20: Stainless steel ø25: Carbon steel	Heat treated Special black chromium treatment
5	Side roller	Carbon steel	Nitriding
6	Lever shaft	Stainless steel	Nitriding
7	Center roller	Carbon steel	Nitriding
8	Center pin	Carbon steel	Nitriding
9	Cap	Resin	
10	Bumpe	Urethane rubber	
11	Rubber magnet	Synthetic rubber	

### Component Parts

No.	Description	Material	Note
12	Type C retaining ring for hole	Carbon steel	Phosphate coated
13	Needle roller	High carbon chrome bearing steel	Heat treated
14	Needle assembly	Brass	Electroless nickel plated
15	Exhaust plug	Brass	Electroless nickel plated
16	Exhaust filter	Resin sponge	
17	Plug	Brass	Electroless nickel plated
18	Spring	Stainless steel spring wire	
19	Piston seal	NBR	
20	Piston seal	NBR	
21	Piston seal	NBR	
22	Gasket	NBR	
23	Hexagon socket cap screw	Carbon steel	Black zinc chromated

### Replacement Parts

Description	MHC2-10□	MHC2-16□	MHC2-20□	MHC2-25□	Main parts
Seal kit	MHC10-PS	MHC16-PS	MHC20-PS	MHC25-PS	(19)(20)(21)(22)
Finger assembly	MHC-A1003	MHC-A1603	MHC-A2003	MHC-A2503	(4)(5)(6)(7)(8)(13)
Piston assembly set	MHC-A1002	MHC-A1602	MHC-A2002	MHC-A2502	(2)(3)(7)(8)(9)(10)(11)(19)(20)(21)
Piston A assembly	MHC-A1001	MHC-A1601	MHC-A2001	MHC-A2501	(2)(10)(11)
Piston B assembly	P3311145B	P3311245B	P3311345B	P3311445C	(3)
Needle assembly	MH-A1006		MH-A1606		(14)

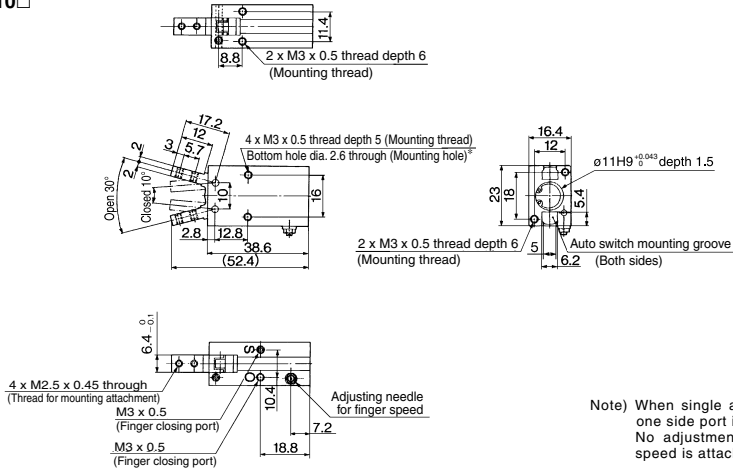
\* Order 1 piece finger assembly per one unit.

Replacement part/Grease pack part no.: GR-S-010 (10 g)



## Double Acting: Size 10, 16

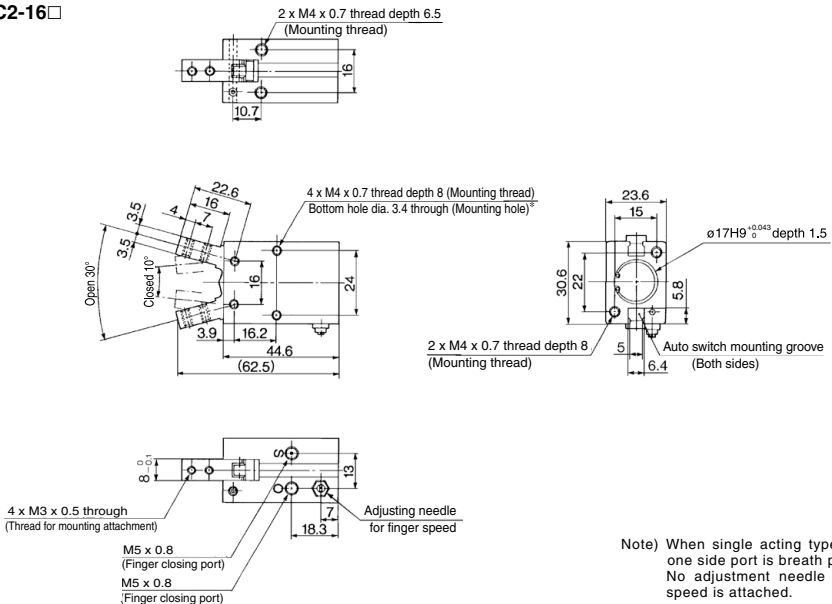
### MHC2-10□



Note) When single acting type is used, one side port is breath port. No adjustment needle for finger speed is attached.

\* When auto switches are used, through hole mounting is not available.

### MHC2-16□



Note) When single acting type is used, one side port is breath port. No adjustment needle for finger speed is attached.

\* When auto switches are used, through hole mounting is not available.

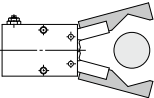
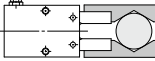
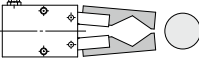
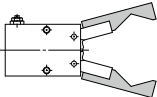
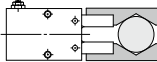
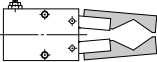
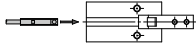
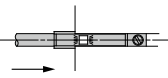
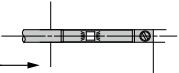
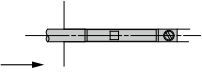
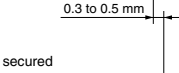
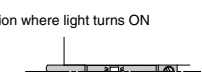
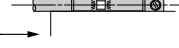
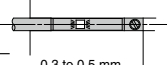
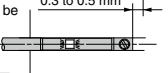


# MHC2 Series

## Auto Switch Installation Examples and Mounting Positions

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

### Detection when Gripping Exterior of Workpiece

Detection example		1. Confirmation of fingers in reset position	2. Confirmation of workpiece held	3. Confirmation of workpiece released
Position to be detected		Position of fingers fully opened 	Position when gripping a workpiece 	Position of fingers fully closed 
Operation of auto switch		Auto switch turned ON when fingers return. (Light ON)	Auto switch turned ON when gripping a workpiece. (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 installation groove in the direction shown in the following drawing. 		
		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 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. 	Position where light turns ON 	
		Step 5) Move 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. 	Position to be secured 	
		Position where light turns ON 	Position to be secured 	

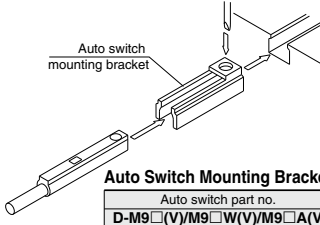
Note 1) It is recommended to grip a workpiece when the fingers are in parallel with each other.

Note 2) When holding a workpiece close at the end of open/close stroke of fingers, detecting performance of the combinations listed in the above table may be limited, depending on the hysteresis of an auto switch, etc.

# MHC2 Series

## Auto Switch Mounting

- (1) To set the auto switch, insert the auto switch into the installation groove of the cylinder as shown below and set it roughly.
- (2) Insert the auto switch into the auto switch bracket installation groove.
- (3) After confirming the detecting position, tighten the set screws (M2.5) attached to the auto switch and set it.
- (4) Be sure to change the detecting position in the state of (2).



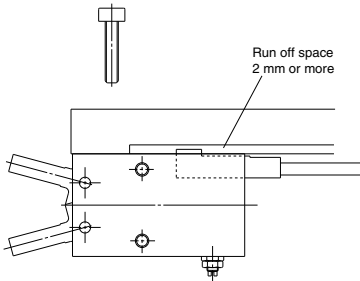
### Auto Switch Mounting Bracket: Part No.

Auto switch part no.	Auto switch mounting bracket part no.
D-M9□(V)/M9□W(V)/M9□A(V)	BMG2-012

Note) Use a screwdriver with a grip diameter of 5 to 6 mm to tighten the set screws (M2.5).  
The tightening torque should be 0.05 to 1 N·m.  
As a guide, it should be turned about 90° beyond the point at which tightening can be felt.

### Handling of Mounting Brackets: Precautions

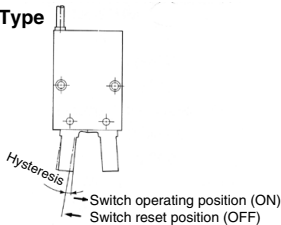
When auto switch is set on the mounting side as shown below, allow at least 2 mm run off space on mounting late since the auto switch is protruded from the gripper edge.



## Auto Switch Hysteresis

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

### Angular Type



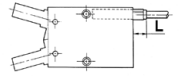
Air gripper model	Hysteresis degree (Max. value)
MHC2-10	4
MHC2-16	3
MHC2-20	2
MHC2-25	2

## Protrusion of Auto Switch from Edge of Body

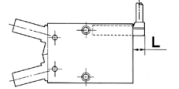
The maximum protrusion of an auto switch (when fingers are fully closed) from the edge of the body is shown in the table below.

### Angular Type

When auto switch  
D-M9□/M9□W/M9□A  
is used



When auto switch  
D-M9□V/M9□WV/M9□AV  
is used



## Max. Protrusion of Auto Switch from Edge of Body (L)

(mm)

Air gripper model	Auto switch model	D-M9□	D-M9□A	D-M9□(V)	D-M9□AV
	D-M9□W			D-M9□W(V)	
MHC2-10		7.5	9.5	5.5	7.5
MHC2-16		6.5	8.5	5.5	7.5
MHC2-20		5.5	7.5	4.5	6.5
MHC2-25		3.5	5.5	2.5	4.5

Note) The actual setting position should be adjusted after confirming the auto switch operating condition.





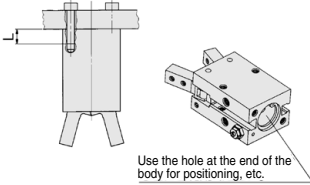
# MHC2 Series Specific Product Precautions

Be sure to read this before handling the products. Refer to page 7 for safety instructions and pages 14 to 22 for air gripper and auto switch precautions.

## Mounting Air Grippers/MHC2 Series

Possible to mount from 3 directions.

### Axial Mounting (Body tapped)

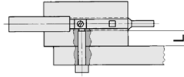


Model	Applicable bolts	Max. tightening torque N·m	Max. screw-in depth L mm
MHC2-10	M3 x 0.5	0.88	6
MHC2-16	M4 x 0.7	2.1	8
MHC2-20	M5 x 0.8	4.3	10
MHC2-25	M6 x 1	7.3	12

Model	Hole size (mm)	Hole depth (mm)
MHC2-10	ø11H9 <sup>+0.063</sup>	1.5
MHC2-16	ø17H9 <sup>+0.063</sup>	1.5
MHC2-20	ø21H9 <sup>+0.063</sup>	1.5
MHC2-25	ø26H9 <sup>+0.063</sup>	1.5

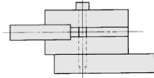
### Lateral mounting (Body tapped and through-hole)

#### ● Body tapped



Model	Applicable bolts	Max. tightening torque N·m	Max. screw-in depth L mm
MHC2-10	M3 x 0.5	0.69	5
MHC2-16	M4 x 0.7	2.1	8
MHC2-20	M5 x 0.8	4.3	10
MHC2-25	M6 x 1	7.3	12

#### ● Body through-hole

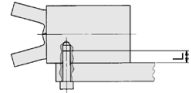


Model	Applicable bolts	Max. tightening torque N·m
MHC2-10	M2.5 x 0.45	0.49
MHC2-16	M3 x 0.5	0.88
MHC2-20	M4 x 0.7	2.1
MHC2-25	M5 x 0.8	4.3

Model	Max. screw-in depth L mm
MHC2-10	5
MHC2-16	8
MHC2-20	10
MHC2-25	12

Note) If an auto switch is to be mounted, only the tapped holes can be used. Make sure that the bolt's screw-in depth is less than those shown in the table on the left to prevent the tip of the bolt from pressing the switch body.

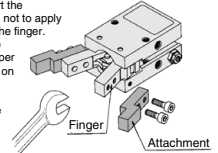
### Vertical Mounting (Body tapped)



Model	Applicable bolts	Max. tightening torque N·m	Max. screw-in depth L mm
MHC2-10	M3 x 0.5	0.88	6
MHC2-16	M4 x 0.7	1.6	6.5
MHC2-20	M5 x 0.8	3.3	8
MHC2-25	M6 x 1	5.9	10

### How to Mount the Attachment to the Finger

To mount the attachment to the finger, make sure to use a wrench to support the attachment so as not to apply undue strain on the finger. Refer to the table below for the proper tightening torque on the bolt used for securing the attachment to the finger.



Model	Applicable bolts	Max. tightening torque N·m
MHC2-10	M2.5 x 0.45	0.31
MHC2-16	M3 x 0.5	0.59
MHC2-20	M4 x 0.7	1.4
MHC2-25	M5 x 0.8	2.8

## Operating Environment

### ⚠ Caution

Use caution for the anti-corrosiveness of finger guide section.

Martensitic stainless steel is used for the finger. However, be aware that its anti-corrosion performance is inferior to austenitic stainless steel. In particular, the finger might be rusted in an environment where water droplets are adhered to it due to dew condensation.