

2 Environmentally Resistant 3-Finger Air Gripper

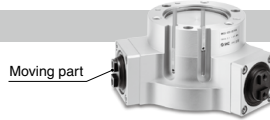
Symbol
-X6708

Applicable for environments with **water droplets** and **dust**

Durability 10 times or more^{*1}

^{*1} Compared with the standard model in environments with water splashing

A variety of scrapers and Lube-retainers for various applications (environments) are available.



Water droplets	Dust	
In environments with water splashing	In dusty environments	In micro-powder (10 to 100 μm) environments
With water-resistant scraper + Lube-retainer	With heavy-duty scraper + Lube-retainer	With double Lube-retainer
<ul style="list-style-type: none"> Applicable for environments in which coolant scatters in machine tools and water scatters in food machines, cleaning machines, etc. A grease film is formed on the finger by the Lube-retainer in order to improve durability. 	<ul style="list-style-type: none"> Applicable for environments containing particles or foreign matter A grease film is formed on the finger by the Lube-retainer in order to improve durability. 	<ul style="list-style-type: none"> Prevents particles and foreign matter from entering the gripper The Lube-retainer ensures a consistent film of grease, improving gripper durability.

Model Selection Example

Selection Procedure



Step 1 Check the gripping force.



Example Workpiece mass: 0.4 kg

Gripping method:
External gripping

Number of fingers: 3

Gripping point: 20 mm

Operating pressure:
0.4 MPa

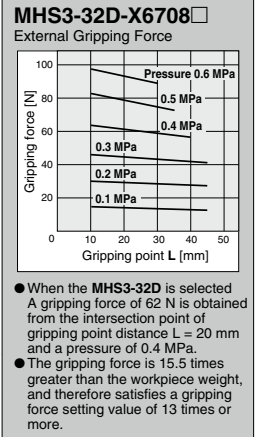
Guidelines for the selection of the gripper with respect to workpiece mass

- Although differences will exist depending on the coefficient of friction between attachments and workpieces, select a model which will provide a gripping force as shown in the table below.
- * Refer to the model selection illustration regarding multiples of the workpiece weight.

Model	Multiples of gripping force by workpiece weight
MHS3	7 to 13 times or more

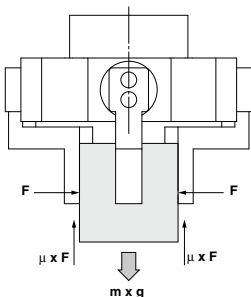
- Further allowance should be provided when great acceleration or impact is expected during workpiece transfer.

Example) For setting the gripping force to be at least 13 times greater than the workpiece weight:
Required gripping force = 0.4 kg x 13 x 9.8 m/s² = 50.9 N or more



* For **Step 2**, refer to the gripping point for the effective gripping force on page 781.

Model Selection Illustration



When gripping a workpiece as in the figure to the left, and with the following definitions,
3: Number of fingers
F: Gripping force [N]
 μ : Coefficient of friction between the attachments and the workpiece
m: Workpiece mass [kg]
g: Gravitational acceleration (9.8 m/s²)
mg: Workpiece weight [N]
 the conditions under which the workpiece will not drop are
 $3 \times \mu F > mg$
 and therefore,
 $F > \frac{mg}{3 \times \mu}$
 With "a" as the safety margin, F is determined as follows:
 $F = \frac{a \times mg}{3 \times \mu}$

Multiples of Gripping Force by Workpiece Mass

Number of fingers: When n = 3

- SMC performs calculations allowing for impacts which occur during normal transfer, etc., using a safety margin of a = 4.

When $\mu = 0.2$	When $\mu = 0.1$
$F = \frac{mg}{3 \times 0.2} \times 4$	$F = \frac{mg}{3 \times 0.1} \times 4$
$= 10 \times mg$	$= 20 \times mg$



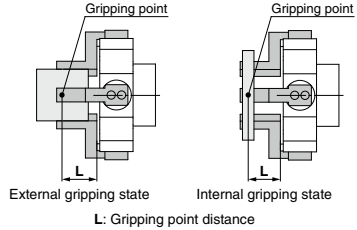
* - Even in cases where the coefficient of friction is greater than $\mu = 0.2$, for reasons of safety, select a gripping force which is at least 7 to 13 times greater than the workpiece weight, as recommended by SMC.
 - If high acceleration, or impact forces are encountered during motion, a further margin should be considered.

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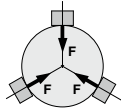
Gripping Point

- The workpiece gripping point distance should be within the gripping force ranges given for each pressure in the effective gripping force graphs below.
- If operated with the workpiece gripping point beyond the indicated ranges, an excessive offset load will be applied to the sliding section of the fingers, which can have an adverse effect on the service life of the product.

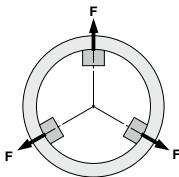


Effective Gripping Force

- Indication of effective gripping force
The effective gripping force shown in the graphs to the right is expressed as F, which is the thrust of one finger when all 3 of the fingers and attachments are in full contact with the workpiece as shown in the figure below.

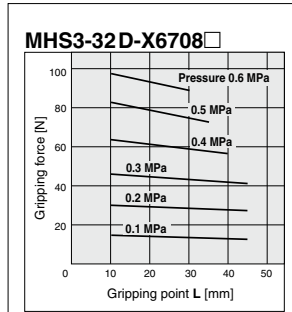


External grip

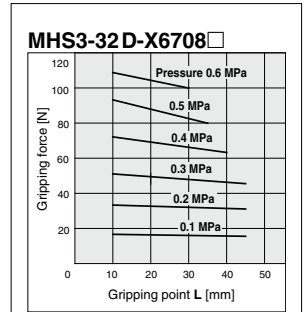


Internal grip

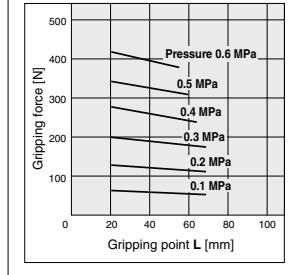
External Gripping Force



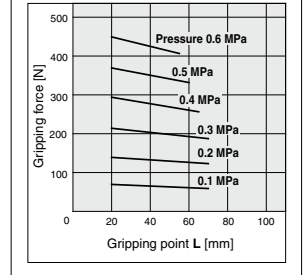
Internal Gripping Force



MHS3-63 D-X6708



MHS3-63 D-X6708



2 Environmentally Resistant 3-Finger Air Gripper

Symbol
-X6708

How to Order

MHS3-32 D-M9BA -X6708 A

Bore size

32	32 mm
63	63 mm

Auto switch

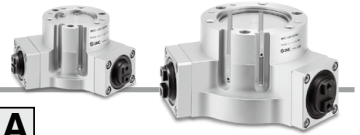
Nil	Without auto switch (Built-in magnet)
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* For applicable auto switches, refer to the table below.

Number of auto switches

Nil	2
S	1

**Environmentally Resistant
3-Finger Air Gripper**



Specifications

<p>A: With heavy-duty scraper + Lube-retainer</p>	<p>B: With water-resistant scraper + Lube-retainer</p>
<p>C: With double Lube-retainer</p>	

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]*2					Pre-wired connector	Applicable load
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)			
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	—	M9NV	M9N	●	●	○	○	IC circuit	Relay, PLC	
				3-wire (PNP)			M9PV	M9P	●	●	○	○			
	2-wire			M9BV	M9B	●	●	○	○	—					
	3-wire (NPN)			M9NVV	M9NV	●	●	○	○	IC circuit					
	3-wire (PNP)			M9PVV	M9PV	●	●	○	○						
	2-wire			M9BVV	M9BV	●	●	○	○	—					
	3-wire (NPN)			M9NAV *1	M9NA *1	○	○	○	○	IC circuit					
	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.

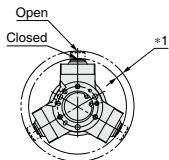
*2 Lead wire length symbols: 0.5 m..... Nil (Example) M9NV 3 m..... L (Example) M9NVL 1 m..... M (Example) M9NWM 5 m..... Z (Example) M9NWZ

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

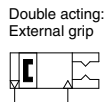
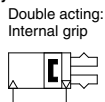
* When using the 2-color indicator type, please set it so that the indicator lights up red to ensure air gripper detection at the proper position.

Specifications

Model		MHS3-32D-X6708	MHS3-63D-X6708
Bore size		ø32	ø63
Fluid		Air	
Action		Double acting	
Operating pressure		0.2 to 0.6 MPa	
Ambient and fluid temperatures		-10 to 60°C	
Repeatability		±0.01 mm	
Gripping force (0.5 MPa, L = 30 mm)	External gripping force	74 N	335 N
	Internal gripping force	82 N	359 N
Finger stroke *1		4 mm	8 mm
Seal material		NBR	
Max. operating frequency		60 c.p.m.	
Lubricant		Non-lube	
Weight		600 g	2,400 g



Symbol



Replacement Parts

Cover assembly part number

MHS3-A -X6708

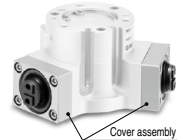
Bore size

32	32 mm
63	63 mm

Specifications

A	With heavy-duty scraper + Lube-retainer
B	With water-resistant scraper + Lube-retainer
C	With double Lube-retainer

No.	Description	X6708 A	X6708 B	X6708 C
1	Finger cover	●	●	●
2	Heavy-duty scraper	—	—	—
3	Water-resistant scraper	—	—	—
4	Lube-retainer	●	●	●
5	O-ring	●	●	●
6	Hexagon socket head cap screw *1	●	●	●



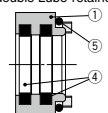
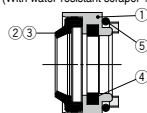
*1 Hexagon socket head cap screws for mounting (4 pcs.) are shipped together with the product.
* For the cover assembly, order 3 pieces per unit.

X6708A (With heavy-duty scraper + Lube-retainer)

X6708B (With water-resistant scraper + Lube-retainer)

X6708C

(With double Lube-retainer)



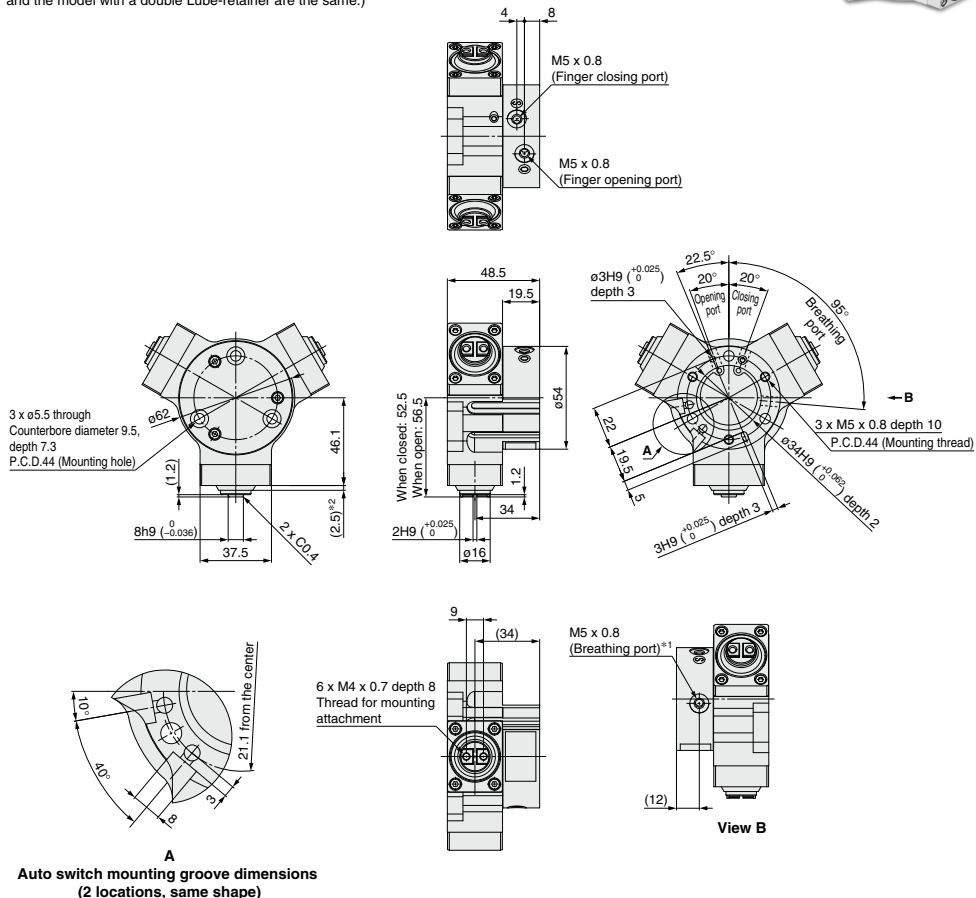
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-X6708

Dimensions

MHS3-32D-X6708

(The dimensions of the model with a heavy-duty scraper + Lube-retainer, the model with a water-resistant scraper + Lube-retainer, and the model with a double Lube-retainer are the same.)



A
Auto switch mounting groove dimensions
(2 locations, same shape)

- *1 Connect piping to the breathing port so that the dust, water, etc., in the surrounding atmosphere does not get into the product, and open the port to a safe place.
- *2 Only applies to the model with a heavy-duty scraper or water-resistant scraper

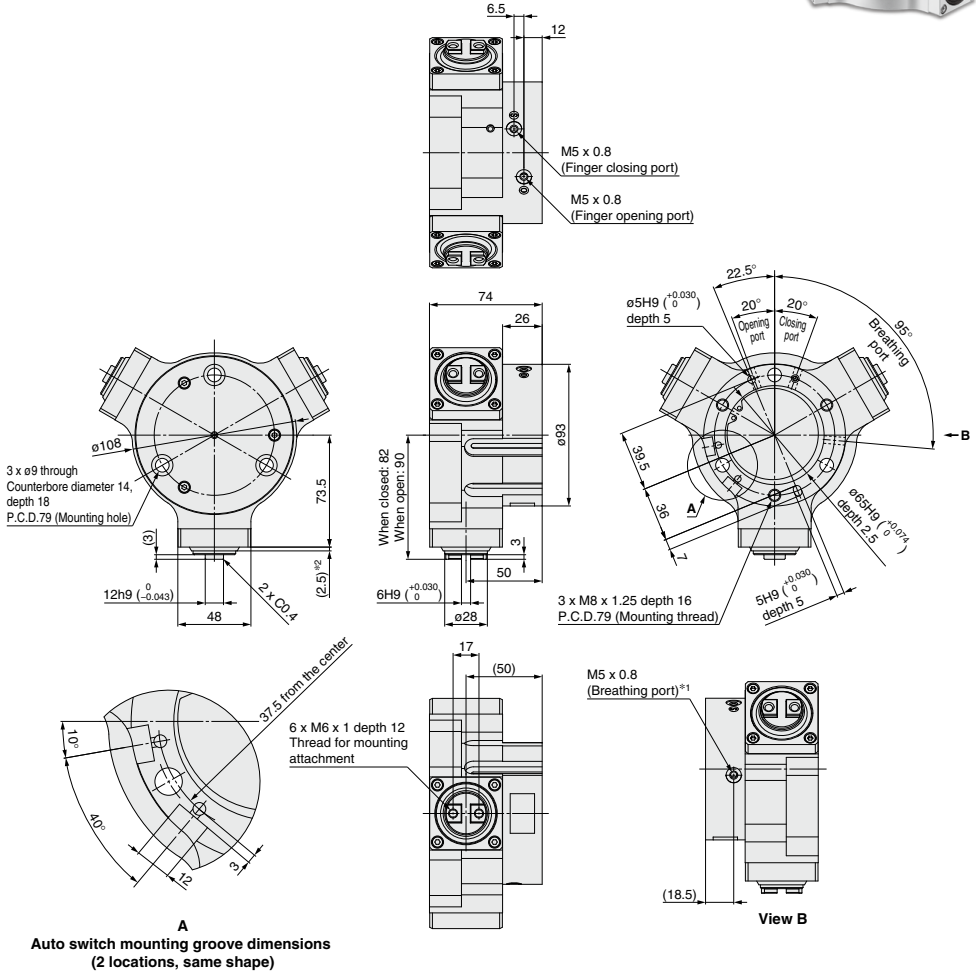
2 Environmentally Resistant 3-Finger Air Gripper

Symbol
-X6708

Dimensions

MHS3-63D-X6708□

(The dimensions of the model with a heavy-duty scraper + Lube-retainer, the model with a water-resistant scraper + Lube-retainer, and the model with a double Lube-retainer are the same.)

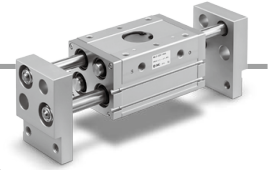


*1 Connect piping to the breathing port so that the dust, water, etc., in the surrounding atmosphere does not get into the product, and open the port to a safe place.

*2 Only applies to the model with a heavy-duty scraper or water-resistant scraper

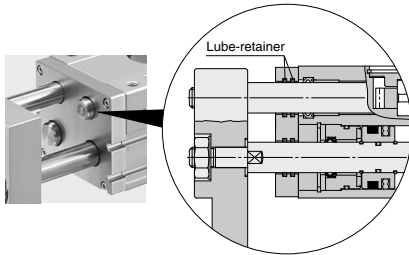
Related Products

Wide Type Parallel Style Air Gripper/MHL2-X85/-X86
ø10, ø16, ø20, ø25, ø32, ø40



• In micro-powder (10 to 100 μm) environments
With double Lube-retainer (-X85)

- * Prevents particles and foreign matter from entering the gripper
The Lube-retainer ensures a consistent film of grease, improving gripper durability.



• In dusty environments
With heavy-duty scraper + Lube-retainer (-X86□)

- * Applicable for environments containing particles or foreign matter
A grease film is formed on the rod by the Lube-retainer in order to improve durability.
- * Heavy-duty scraper material can be NBR or fluororubber.

