Environmentally Resistant 3-Finger Air Gripper

\( \varnothing 32, \varnothing 63 \)

Applicable for environments with water droplets and dust

Durability 10 times or more

\(^*1\) Compared with the standard model in environments with water splashing

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

<table>
<thead>
<tr>
<th>Water droplets</th>
<th>Dust</th>
</tr>
</thead>
<tbody>
<tr>
<td>In environments with water splashing</td>
<td>In dusty environments</td>
</tr>
<tr>
<td>With water-resistant scraper + Lube-retainer</td>
<td>With heavy-duty scraper + Lube-retainer</td>
</tr>
<tr>
<td>( \varnothing 32 ) 2H9 8h9</td>
<td>( \varnothing 63 ) 6H9 12h9</td>
</tr>
</tbody>
</table>

For use in environments with coolant splashing

For the transfer of containers filled with powder

Improved attachment position reproducibility

Mounting example

Standardized positioning groove

Solid state auto switches are mountable.

Applicable auto switch: D-M9

MHS3-X6708
Model Selection Example

Selection Procedure

Step 1: Check the gripping force.
- Check the conditions.
- Calculate the required gripping force.
- Select the model from gripping force graph.

Step 2: Check the gripping point.

Example

Workpiece mass: 0.4 kg
Gripping method: External gripping
Number of fingers: 3

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.

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 2.

Model Selection Illustration

When gripping a workpiece as in the figure to the left, and with the following definitions,
- n: 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:

\[F = a \times \frac{mg}{3 \times \mu}\]

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 \(\mu = 0.2\)

\[F = \frac{mg}{3 \times 0.2} = 10 \times mg\]

When \(\mu = 0.1\)

\[F = \frac{mg}{3 \times 0.1} = 20 \times mg\]

- 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.
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.
Environmental Resistant 3-Finger Air Gripper

MHS3-X6708

Ø32, Ø63

How to Order

MHS3 - 32 D - M9BA - X6708 A

Bore size

<table>
<thead>
<tr>
<th>32</th>
<th>32 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>63 mm</td>
</tr>
</tbody>
</table>

Auto switch

Nil Without auto switch (Built-in magnet)

Number of auto switches

| Nil | 2 |

Environmental Resistant 3-Finger Air Gripper

Specifications

Type Special function Electrical entry Indicator light Wiring (Output) Auto switch model Load voltage Lead wire length [m] Pre-wired connector Applicable load

| F | — | — | — |

Solid state auto switch

Diagnostic indicator (2-color indicator) Grommet Yes 3-wire (NPN) 5 V, 12 V M9NV M9N

Water resistant (2-color indicator) — — 2-wire 12 V M9B

Applicable Auto Switches

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Special function</th>
<th>Electrical entry</th>
<th>Indicator light</th>
<th>Wiring (Output)</th>
<th>Auto switch model</th>
<th>Load voltage</th>
<th>Lead wire length [m]</th>
<th>Pre-wired connector</th>
<th>Applicable load</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>With heavy-duty scraper + Lube-retainer</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>M9NV M9N</td>
<td>5 V, 12 V</td>
<td>—</td>
<td>C circuit</td>
<td>Relay, PLC</td>
</tr>
<tr>
<td>B</td>
<td>With water-resistant scraper + Lube-retainer</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>M9B</td>
<td>12 V</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>C</td>
<td>With double Lube-retainer</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>M9AV M9BA</td>
<td>12 V</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Applicable load

<table>
<thead>
<tr>
<th></th>
<th>DC</th>
<th>AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perpendicular</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>In-line</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

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

Specifications

Cover assembly part number

MHS3 - A - X6708

Bore size

<table>
<thead>
<tr>
<th>32</th>
<th>32 mm</th>
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<tbody>
<tr>
<td>63</td>
<td>63 mm</td>
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</table>

Specifications

A With heavy-duty scraper + Lube-retainer

B With water-resistant scraper + Lube-retainer

C With double Lube-retainer

For the cover assembly, order 3 pieces per unit.

*1 Hexagon socket head cap screws (4 pcs.) are supplied 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)
**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.)

*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
MHS3-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.)

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.

*1 Only applies to the model with a heavy-duty scraper or water-resistant scraper.
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.
  - Seal material can be NBR or fluororubber.

Coolant-resistant Air Gripper/MHZJ2-32D-X6544
Ø32

- Increased resistance to splashing coolant
- Finger portion with collar protected by dust cover prevents contamination.
- Dust cover and plate connection prevent contamination.
Safety Instructions: Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.