Doc.No.DOC1072250

Operation Manual

PRODUCT NAME

Elastic Finger

MODEL / Series / Product Number

MH-AT1A090080*-X7654

SMC Corporation

Contents

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)[*1)], and other safety regulations.

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots
etc.

Danger	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
Warning	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Caution	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above have been implemented and the power from any appropriate source is cut, Read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

Safety Instructions

⚠ Caution

SMC develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not allowed.
Products SMC manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
Read and accept them before using the product.

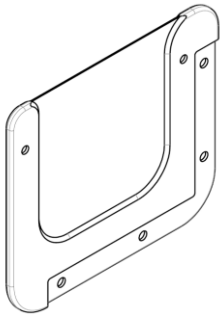
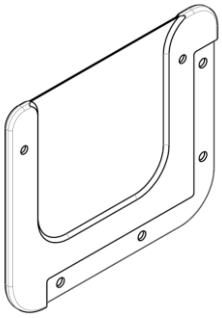
Limited warranty and Disclaimer

1. This product is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

1. Product List

	Rubber Material	
	Ethylene Propylene rubber (EPDM)	**Silicone rubber (Si)**
Appearance	**MH-AT1A090080E-X7654** 	**MH-AT1A090080S-X7654** 

2. How to order

MH-AT1A090080E-X7654

❶

❶Material

E	EPDM(Black)
S	silicone rubber (Blue)

*When using with a 2-finger gripper, please order 2 of this product, to ensure 1 per finger.

3. Specification

3-1. Specification

Model	MH-AT1A090080E-X7654	MH-AT1A090080S-X7654
Rubber Material	Ethylene-propylene rubber (EPDM)	Silicone rubber (Si) *1
Color	Black	Blue
Metal Material (Mounting section)	Stainless steel	
Effective gripping dimension [mm]	58 X 60	
Mass *2 [g]	35.6	34.4

*1 Only the rubber parts are compliant with the FDA's (U.S. Food and Drug Administration) 21CFR § 177.2600 dissolution test.

The adhesive between the rubber and the metal plates is not FDA-compliant.

*2 Weight per finger

3-2. Rubber Material and Characteristics

◎＝Excellent…Not affected at all, or almost effect
○＝Good…Affected a little, but adequate resistance depending on conditions
△＝Better not to use if possible
×＝Unsuitable for usage. Severely affected.

General name		Ethylene-propylene rubber (EPDM)	Silicone rubber (Si)
Main Features		Exhibits good resistance against alcohol and ketone. Also exhibits good ozone resistance.	Exhibits good workpiece following capability due to its flexibility. Exhibits good heat resistance and cold resistance and offers a wide operating temperature range. Also exhibits good ozone resistance. Compliant with FDA/Food Sanitation Law.
Properties of pure rubber (specific gravity)		0.86-0.87	0.95-0.98
Physical properties of compounded rubber	Impact resilience	○	◎
	Abrasion resistance	○	× to △
	Tear resistance	△	× to △
	Flex crack resistance	○	× to ○
	Max. operating temperature [℃]	150	200
	Min. operating temperature [℃]	−20	−30
	Heat aging	○	◎
	Weather resistance	○	◎
	Ozone resistance	◎	◎
	Gas permeability resistance	× to △	× to △
Oil resistance Solvent resistance	Gasoline・Gas oil	×	× to △
	Benzene・Toluene	×	×
	Alcohol	◎	◎
	Ether	○	× to △
	Ketone (MEK)	◎	○
	Ethyl acetate	◎	△
Alkaline resistance Acid resistance	Water	◎	○
	Organic acid	×	○
	Highly concentrated organic acid	○	△
	Low Concentration Organic Acids	◎	○
	Strong alkali	◎	◎
	Weak alkali	◎	◎

*Properties, chemical resistance, and other values are only reference values to be used as a guide, not guaranteed values.
- The above general characteristics may vary depending on the operating conditions and environment.
- When determining the materials to be used, please check and examine the candidate materials in advance.
- SMC will not assume any responsibility for the accuracy of these data and damage incurred by them.

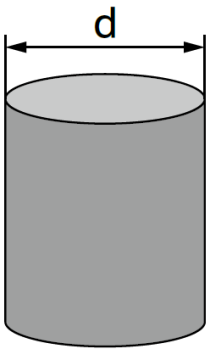
3-3. Max. workpiece mass

The graphs below show the maximum weights of sample workpieces in the shapes of rod, square bar, and ball.

These are reference values because they vary depending on the workpiece material, shape, and other conditions.

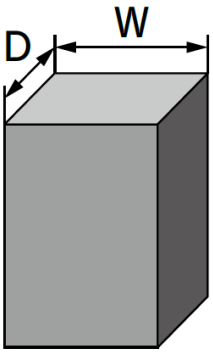
When workpiece protrudes from the elastic finger end face

Round bar

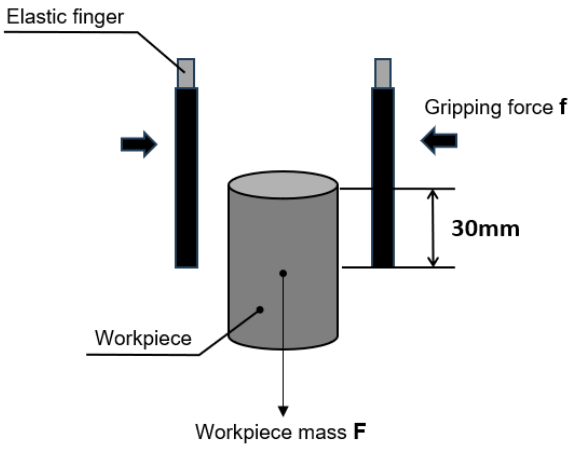


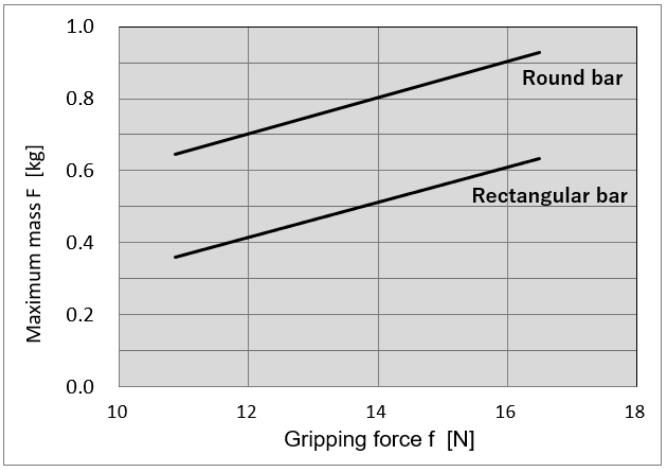
Diameter d × length L [mm]	Φ40 × 60
Surface roughness Rz [μm]	4.3

Rectangular bar



Range W × Depth D × Length L [mm]	40 × 40 × 60
Surface roughness Rz [μm]	1.2





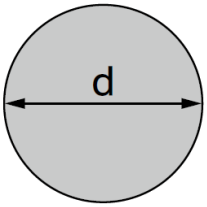
⚠ Caution

Please check with the actual workpiece before use.

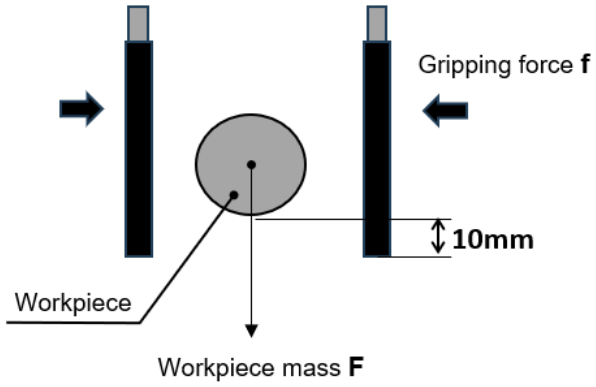
The greppable and holdable mass varies depending on workpiece characteristics including material, shape, mass, and surface condition.

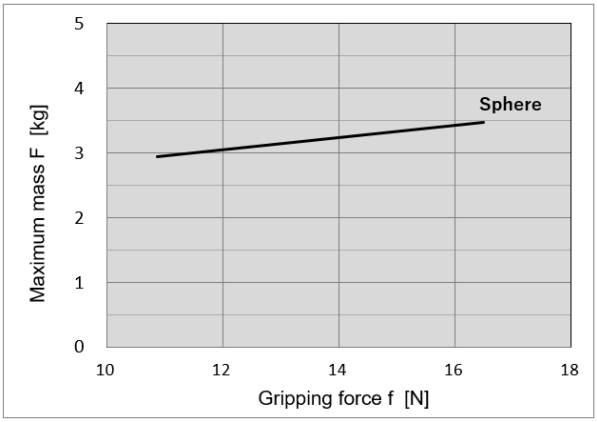
workpiece protrudes from the elastic finger end face

Sphere



Diameter d	SΦ40
Surface roughness Rz [μm]	0.8





⚠ Caution

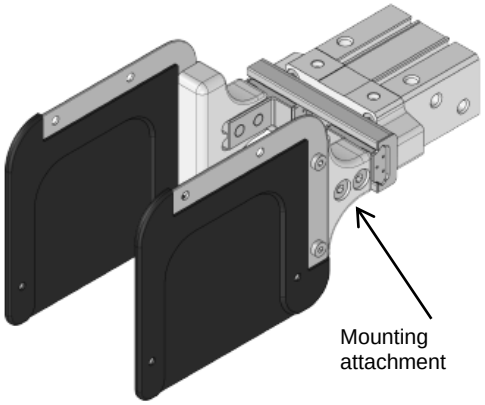
Please check with the actual workpiece before use.

The greppable and holdable mass varies depending on workpiece characteristics including material, shape, mass, and surface condition.

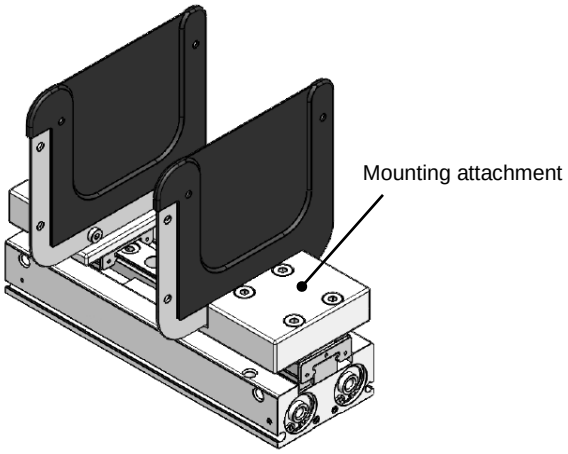
4. Assembly

4-1. Air gripper MH Series Mounting example

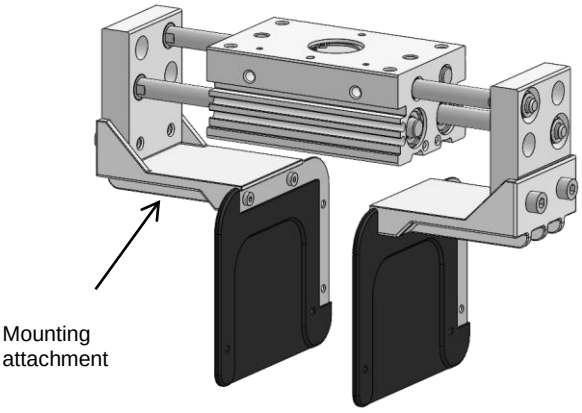
●Air chuck installation example



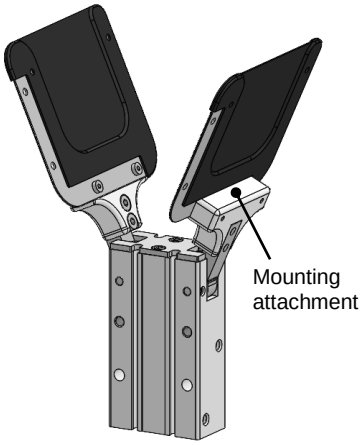
Parallel type(JMHZ Series)



Parallel type , Thin type (MHF Series)



Parallel type , Wide type(MHL Series)



180° Angular Style (MHY Series)

*Separately procure the gripper.

*Please select an air gripper by referring to the gripping force f shown in the graphs in “3-3. Workpiece maximum weight,” and assess its performance with an actual workpiece before using it.

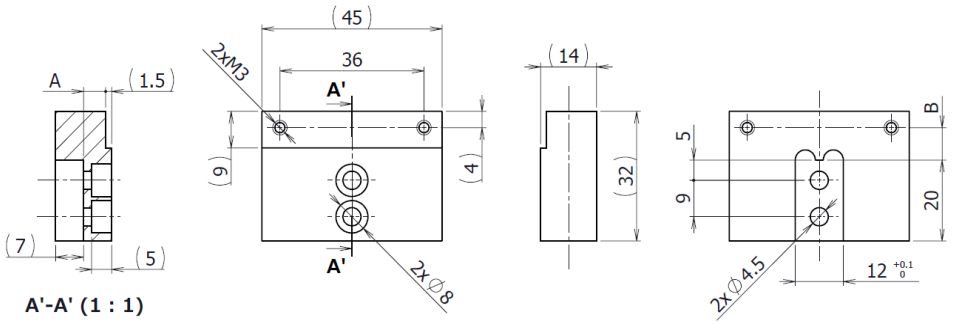
*Please prepare an elastic finger mounting attachment by yourself. Refer to “4-2. Reference dimensions for attachment design.”

4-2. Reference dimensions for attachment design

When preparing an elastic finger mounting attachment by yourself, refer to the dimensions shown below.

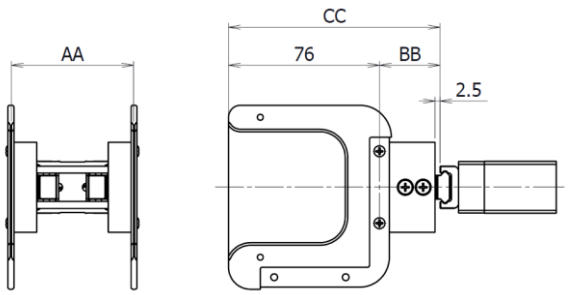
reference example ①

Model：JMHZ2-20D／RMHZ2-20D

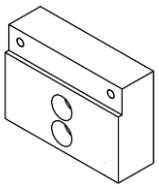


Mounting attachment dimensions

Round head screw for mounting (reference)
M3 x 5mm ⋯ 4 pcs.
M4 x 10mm ⋯ 4 pcs.



Air gripper as of after mounting of elastic finger



Mounting attachment dimensions

*The dimensions in the parentheses are reference dimension values.

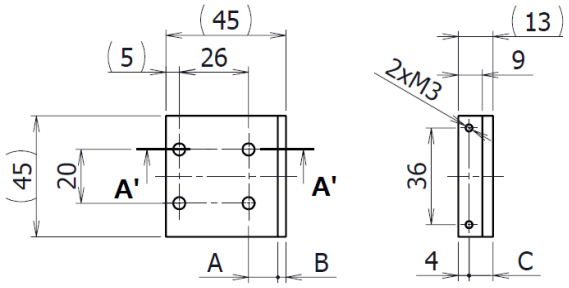
(mm)

Attachment mounting	AA		A	B	BB	CC
	When open	When close				
After installation	61.5	47.5	5.5	8.0	30.5	106.5
Before installation：JMHZ2-20D	50	36	—	—	—	—

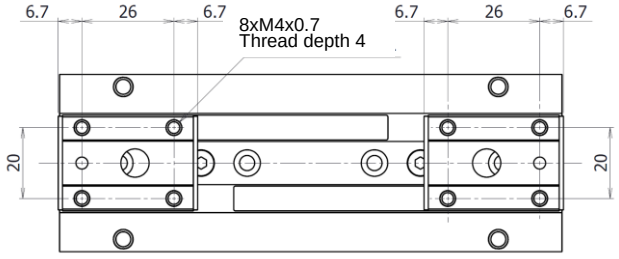
AA: opening width or closing width as of after mounting of elastic finger [mm] ... Opening width or closing width of air chuck + 2A + 0.5
BB: distance from gripping datum to elastic finger mounting position [mm] ... B + 22.5
CC: distance from gripping datum to finger tip [mm] ... BB + 76

reference example ②

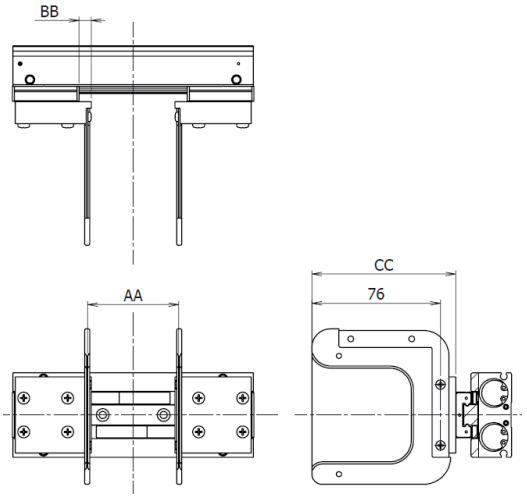
Model：MHF2-16D2／RMHF2-16D2



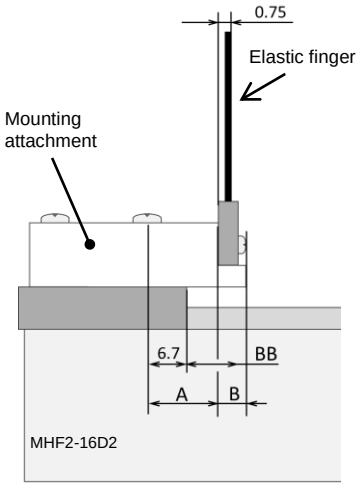
Mounting attachment dimensions



Air gripper MHF2-16D2

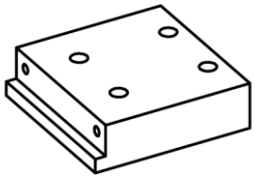


Air gripper as of after mounting of elastic finger



Image

Round head screw for mounting (reference)
M3 x 5mm ⋯ 4 pcs.
M4 x 18mm ⋯ 8 pcs.



Mounting attachment dimensions

*The dimensions in the parentheses are reference dimension values.

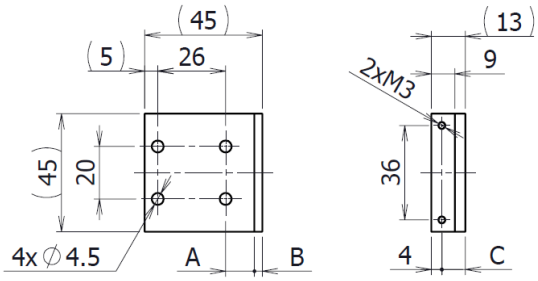
(mm)

Attachment mounting	AA		A	B	C	BB	CC
	When open	When close					
After installation (B :smallest)	53.9	4.5	11	3.0	9.0	7.3	85.0
After installation (A, B :smallest)	65.9	4.5	5.0	3.0	9.0	1.3	85.0
Before installation： MHF2-16D2	64	0	—	—	—	—	—

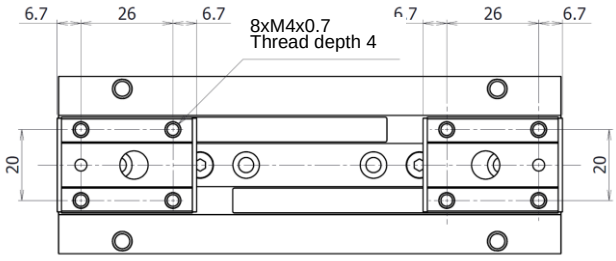
AA: Opening width as of after mounting of elastic finger [mm] ... Opening width of air chuck + 2A - 11.9
Closing width as of after mounting of elastic finger [mm] ... Closing width of air chuck + 2B - 1.5
BB: Distance from air chuck finger tip to attachment tip [mm] ... A + B - 6.7
CC: Distance from gripping datum to finger tip [mm] ... C + 76

Reference example ③

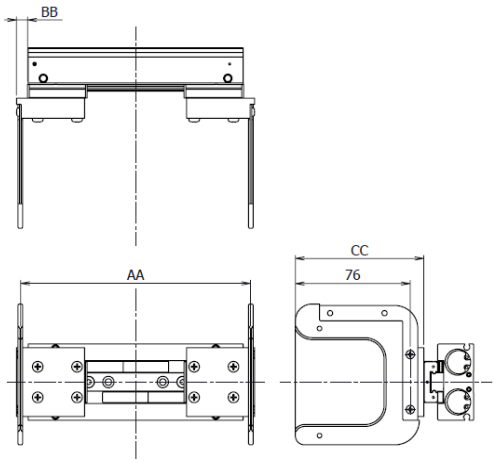
Model：MHF2-16D2／RMHF2-16D2



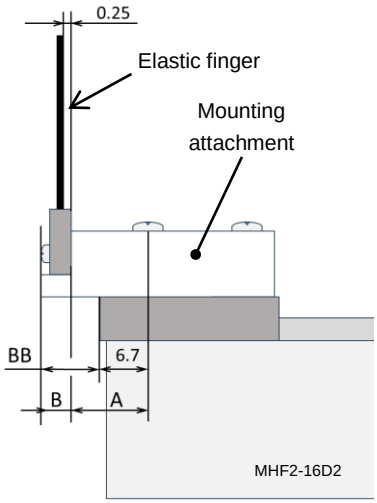
Mounting attachment dimensions



Air gripper MHF2-16D2

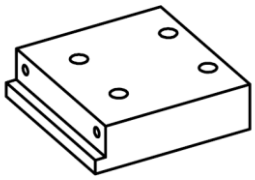


Air gripper as of after mounting of elastic finger



Image

Round head screw for mounting (reference)
M3 x 5mm ⋯ 4 pcs.
M4 x 18mm ⋯ 8 pcs.



Mounting attachment dimensions

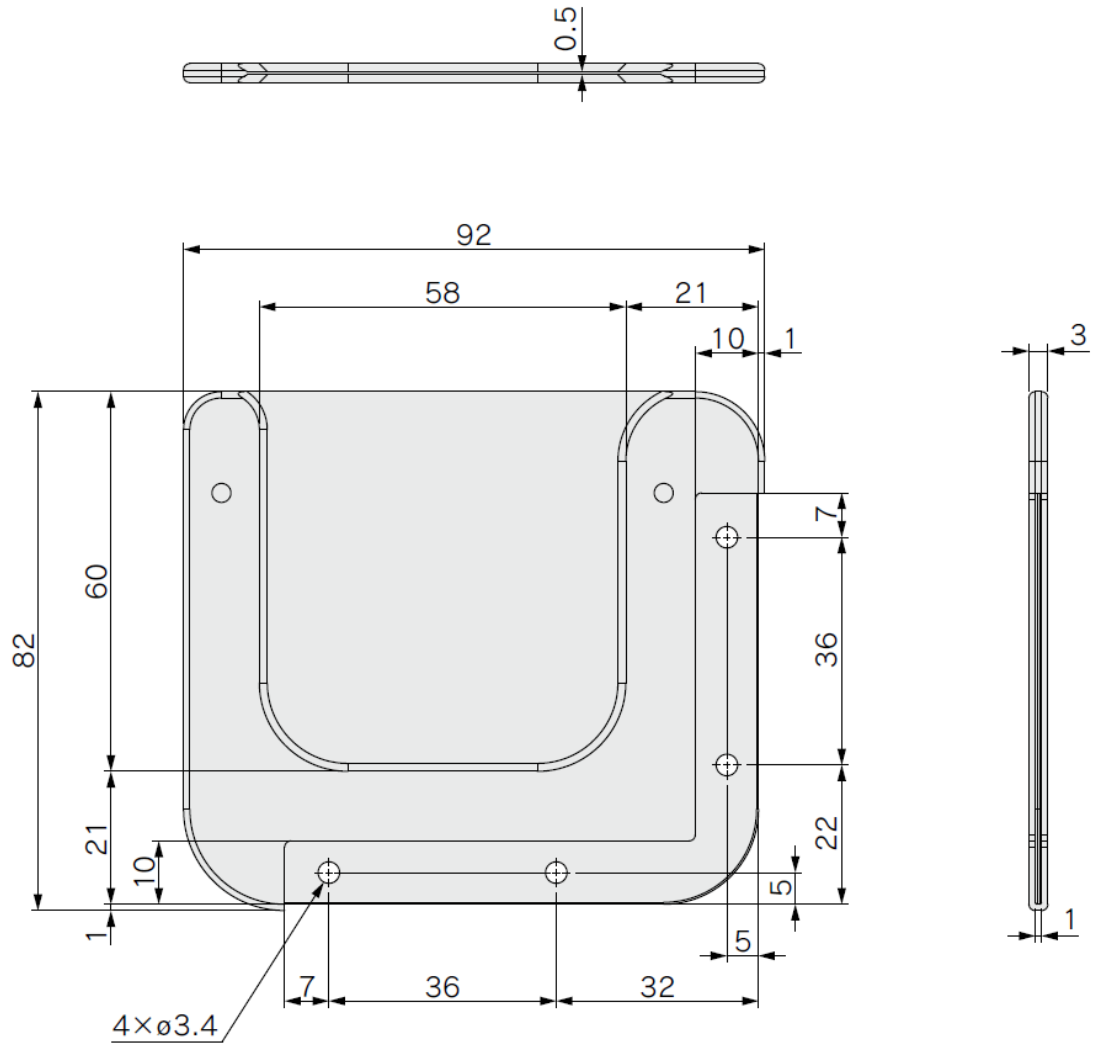
*The dimensions in the parentheses are reference dimension values.

(mm)

Attachment mounting	AA		A	B	C	BB	CC
	When open	When close					
After installation (B : smallest)	151.9	87.9	11	3.0	9.0	7.3	85.0
After installation (A, B : smallest)	139.9	75.9	5.0	3.0	9.0	1.3	85.0
Before installation：MHF2-16D2	64	0	—	—	—	—	—

AA: Opening width as of after mounting of elastic finger [mm] ... Opening width of air chuck + 2A - 11.9
Closing width as of after mounting of elastic finger [mm] ... Closing width of air chuck + 2B - 1.5
BB: Distance from air chuck finger tip to attachment tip [mm] ... A + B - 6.7
CC: Distance from gripping datum to finger tip [mm] ... C + 76

5. Dimensions



6. Precautions for Design

⚠ Warning

1. If workpiece is heavy or hazardous, take measures to prevent loss of gripping force (guide for drop prevention, etc.).
   For the pneumatic transfer unit with the elastic finger, there is a danger of workpieces dropping if there is a decrease in gripping force due to a drop in circuit pressure caused by a power failure or trouble with the air supply.
   In addition, it is necessary to take measures such as drop prevention, so that injury and damage to machinery or equipment can be prevented; and maintenance of the elastic finger, because the gripping force will decrease with abrasion or cracks.
2. Gripping sharp protruding parts of a workpiece may damage the rubber.
   Be sure to check compatibility with the actual workpiece before use.
3. Please conduct assessment with an actual workpiece before using the product.
   The weight that can be gripped and retained vary depending on workpiece characteristics including the material, shape, weight as well as workpiece surface condition.

7. Precautions for assembly and use

⚠ Warning

1. This product cannot be used as a single unit. Use this product by mounting it on your pneumatic actuator or the like.
2. Assemble the product after carefully reading and understanding the operation manual. After reading this document, keep it safe.
3. Check the product for the following points before operation.
   a) Play and looseness of the mounting
   b) Harmful scratches, cracks, wear, and deformation of elastic finger
4. At the time of unpacking, check whether the actual product is as per the order.
   If a different product from that ordered is installed, injury or damage can result.
5. Do not drop, hit, or apply excessive shock to the product.

8. Storage

⚠ Caution

1. In storage of an elastic finger, we recommend that you store it in the environment shown in the table below.
   If an elastic finger is stored in an environment other than the recommended environment, its characteristics (deformation/discoloration/crack/viscosity, etc.) may change.

Table1. Recommended elastic finger storage environment

Temperature	15~25 [℃]
Humidity	50 [%] or less、No condensation
Other	Location not subject to direct sunlight and fluorescent lamp light

9. Maintenance and Inspection

⚠ Warning

1. Periodically perform maintenance of the elastic finger.
   As the elastic finger is intrinsically made of rubber, it will deteriorate without fail. The degree of deterioration depends on conditions including operating conditions, environment, and temperature. Perform regular maintenance. If an elastic finger has a harmful defect such as scratch, crack, and wear, immediately replace it.
   Do not damage the surface of the elastic finger.
2. If you observe collision, gouge, or scratch of the product during its use, conduct an inspection to see whether there is any abnormal component and, if an abnormality is found, replace the component with the abnormality.
3. When installing the products, allow access for maintenance.

Revision history

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