



Operation Manual

PRODUCT NAME

IN-LINE AIR FILTER

MODEL / Series / Product Number

ZFD5(3,4,5)(-H)

SMC Corporation

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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

Warning

Caution

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

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 are implemented and the power from any appropriate source is cut, and 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

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing business.

Use in non-manufacturing business is not covered.

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

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. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
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.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it 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

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.

Precautions for Design

Warning

- (1) Do not use the product if no leakage is allowed due to the environment, or if the fluid is not air.
- (2) Polycarbonate resin is used for the external parts including the bowl. Organic solvents including thinner, acetone, alcohol and ethylene chloride; chemicals including sulphuric acid, nitric acid and hydrochloric acid; cutting oil, synthetic oils, ester-based compressor oil, alkali, kerosene, gasoline, lock material of screw are harmful. Do not use the product where these are present.

Chemical resistance of polycarbonate

| Type | Chemical name | Application examples | Material |
|-------------------|---|---|---------------|
| | | | Polycarbonate |
| Acid | Hydrochloric acid Sulfuric acid Phosphoric acid Chromic acid | Acid washing liquid for metals | △ |
| Alkaline | Sodium hydroxide (Caustic soda) Potash Calcium hydroxide (Slack lime) Ammonia water Carbotane of soda | Degreasing of metals Industrial salts Water-soluble cutting oil | × |
| Inorganic salts | Sodium sulfide Potassium nitrate Sulfate of soda | - | × |
| Chlorine solvents | Carbon tetrachloride Chloroform Ethylene chloride Methylene chloride | Cleaning liquid for metals Printing ink Dilution | × |
| Aromatic series | Benzene Toluene Paint thinner | Coatings Dry cleaning | × |
| Ketone | Acetone Methyl ethyl ketone Cyclohexane | Photographic film Dry cleaning Textile industries | × |
| Alcohol | Ethyl alcohol IPA Methyl alcohol | Antifreeze Adhesives | △ |
| Oil | Gasoline Kerosene | - | × |
| Ester | Phthalic acid dimethyl Phthalic acid diethyl Acetic acid | Synthetic oil Anti-rust additives | × |
| Ether | Methyl ether Ethyl ether | Brake oil additives | × |
| Amino | Methyl amino | Cutting oil Brake oil additives Rubber accelerator | × |
| Others | Thread-lock fluid Sea water Leak tester | - | × |

○: Essentially safe. △: Some effects may occur. ×: Effects will occur.

- (3) Shield from ultra violet light and radiation with protective cover.

Caution

- (1) Do not use the product under pressure except momentary pressure (0.5 MPa or less) such as pressure release.

Selection

Warning

- (1) Grease used on the internal parts may flow to the outlet side.
- (2) Oil included in air cannot be separated.

Installation

Warning

- (1) Do not drop or apply impact during transportation or installation. It will cause damage to the product and result in operation failure.
- (2) Do not install in areas of high humidity or high temperature. Operation outside of the product specification range may cause damage to the product or operation failure, or shorten the product life.
- (3) Install with adequate space for maintenance both ends the product. Refer to the section [10. Dimensions] (P11) for necessary space.

Piping

Warning

- (1) Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and solid foreign material from inside the pipe. Contamination of piping may cause damage or malfunction.
- (2) Tubing to the product can be connected from either end, as long as one end is on the vacuum adsorption side and the other end is on the vacuum release side. However, after the product is installed, do not pipe in the opposite direction from the initial installation position. Doing so will reduce the outlet pressure and cause solid particles to flow out.

Air Source

Warning

- (1) Use clean air. Do not use air containing chemicals, organic solvent, synthetic oil or corrosive gas as it may be cause of breakage of components or operation failure.
- (2) Compressed air containing a large amount of drainage can cause the malfunction of pneumatic equipment. An air dryer or aftercooler should be installed upstream from filters.

Maintenance

Warning

- (1) Release the pressure in the product to the atmosphere when replacing parts or removing piping.
- (2) Maintenance and checks should be done by following the procedure in this operation manual. Incorrect handling of the product may cause breakage or operation failure of the equipment or device.
- (3) Perform periodical check to find cracks, flaws or other deterioration on bowl.
If any of these appear, replace with a new product. Otherwise, breakage may occur. Investigate and/or review the operating conditions if necessary.
- (4) Replace the element when the following conditions apply., to prevent damage to the element.
 - (1) 1 year after start of use
 - (2) When pressure drop reaches 0.1 MPa of positive pressure or 20 kPa of vacuum pressure.

Caution

- (1) Check the element periodically and replace it with a new one if necessary. If it is found that outlet pressure drops lower than the normal condition or the flow is restricted during operation, check the condition of the element.

2. Application

This product aims at eliminating solid foreign matter in the air line.

3. Standard Specifications

| Model | ZFD53 | ZFD54 | ZFD55 |
|--------------------------------------|---------------------------|-------|-------|
| Applicable tubing O.D. (Metric size) | Φ4 | Φ6 | Φ8 |
| Fluid | Air | | |
| Ambient and fluid temperature | 0~50°C (with no freezing) | | |
| Proof pressure | 0.5MPa | | |
| Operating pressure range | -100 to 0 kPa | | |
| Vacuum release pressure | 0.5 MPa or less | | |
| Filtration Note | 5μm | | |
| Bowl material | Polycarbonate | | |
| Weight | 34g | 33g | 35g |

4. How to Order

ZFD 5 4 — H

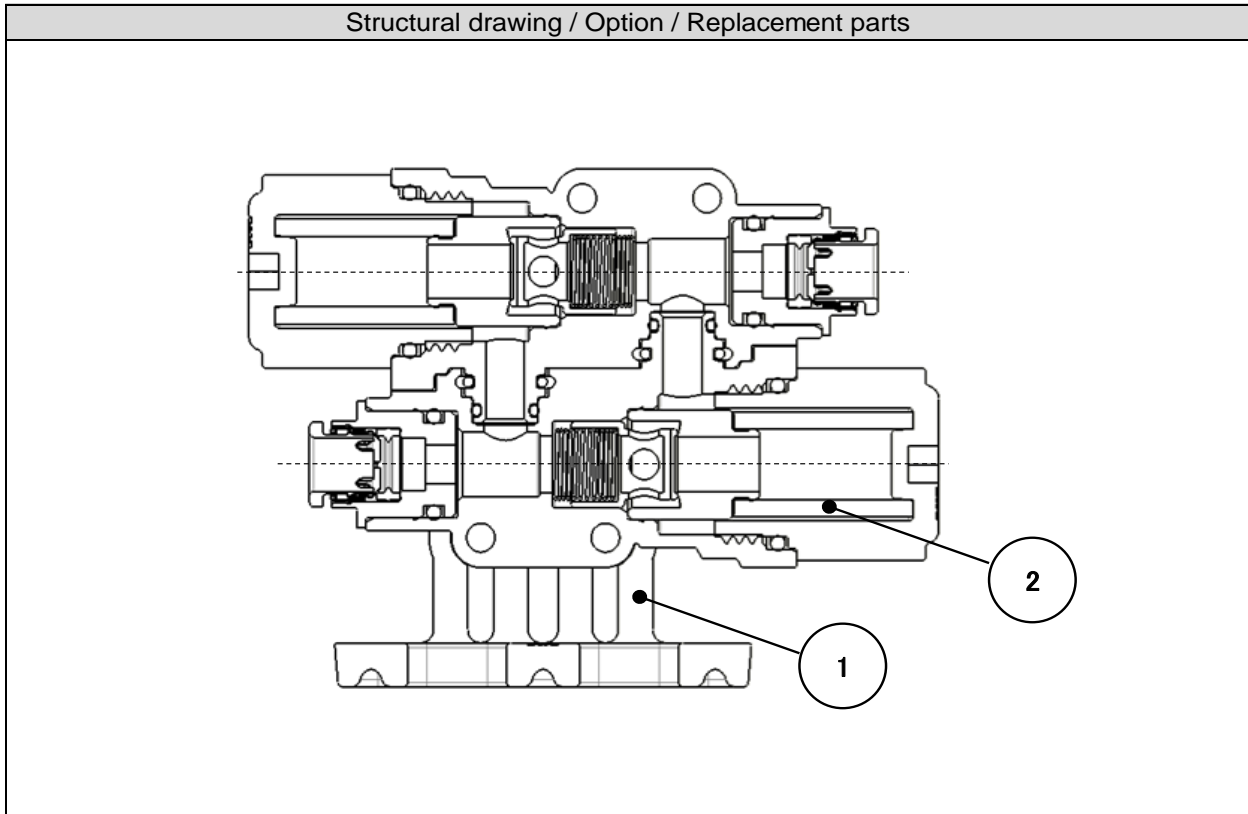
Applicable tubing O.D.
Metric size

| Symbol | Applicable tubing O.D. |
|--------|------------------------|
| 3 | Φ4 |
| 4 | Φ6 |
| 5 | Φ8 |

Option

| | |
|-----|-------------|
| Nil | None |
| H | With holder |

5. Structural Drawing, Option and Replacement Parts



Option

| No. | Part name | Part No. | | | Quantity |
|-----|-----------|----------|-------|-------|----------|
| | | ZFD53 | ZFD54 | ZFD55 | |
| ① | Holder | ZFD-H003 | | | 1 pcs. |

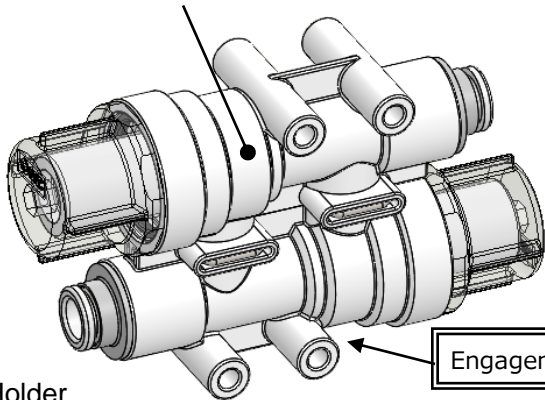
Replacement Parts

| No. | Part name | Part No. | | | Quantity |
|-----|-----------|----------|-------|-------|----------|
| | | ZFD53 | ZFD54 | ZFD55 | |
| ② | Element | ZFC-EL-3 | | | 10 pcs. |

6. Assembly of Optional Parts

Holder

In-line air filter



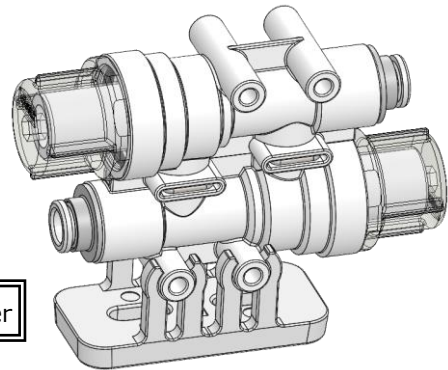
Holder

Engagement on body

Engagement on holder

- 1) Mounting of the holder
Install the holder from the top side so that the body mating part and the holder mating part fit together.

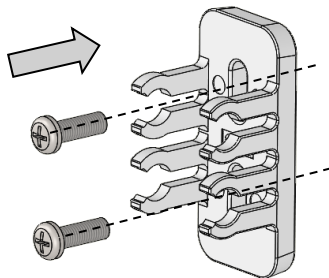
After mounting of the holder



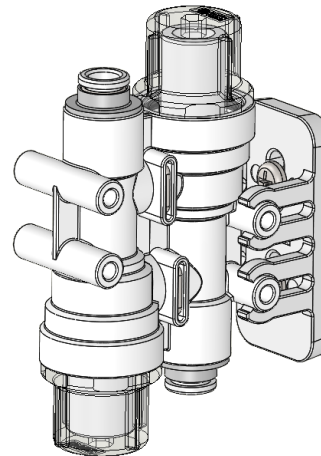
Refer to the section [10. Dimensions] (P11) for necessary mounting dimensions of the holder. The mounting screws should be prepared by the user.

(Reference tightening torque when using M4 size is 0.30 ± 0.1 N-m)

Mounting with holder



Example mounting the product



7. Trouble Shooting

Refer to the sections [8. How to Replace an Element] (P10) and [9.Disassembly Drawing] (P11).

| Trouble | | Possible cause | Countermeasure | Page for reference |
|-------------|---|--|---|--------------------|
| Category | Failure | | | |
| Flow rate | As pressure drop is large, fluid does not flow. | Clog of the element. | Replace the element. | 10 |
| Air leakage | Air leaks from the gap between the bowl and body. | The bowl seal is damaged. | Replace the product. | - |
| | Air leaks from the broken part of the bowl. | The bowl is damaged. | Replace the product. | - |
| | Check valve does not operate. | Foreign materials caught in the valve. | Remove the bowl and element and air blow against the check valve. | 10 |
| | | Spring is damaged. | Replace the product. | - |

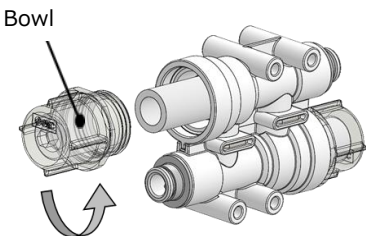
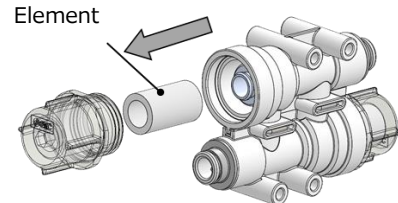
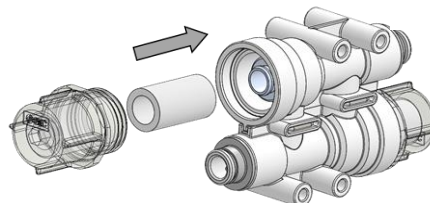
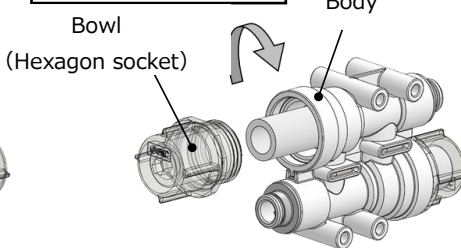
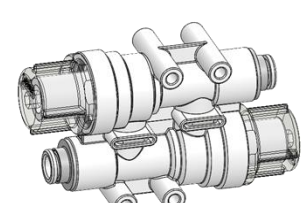
8. How to Replace an Element



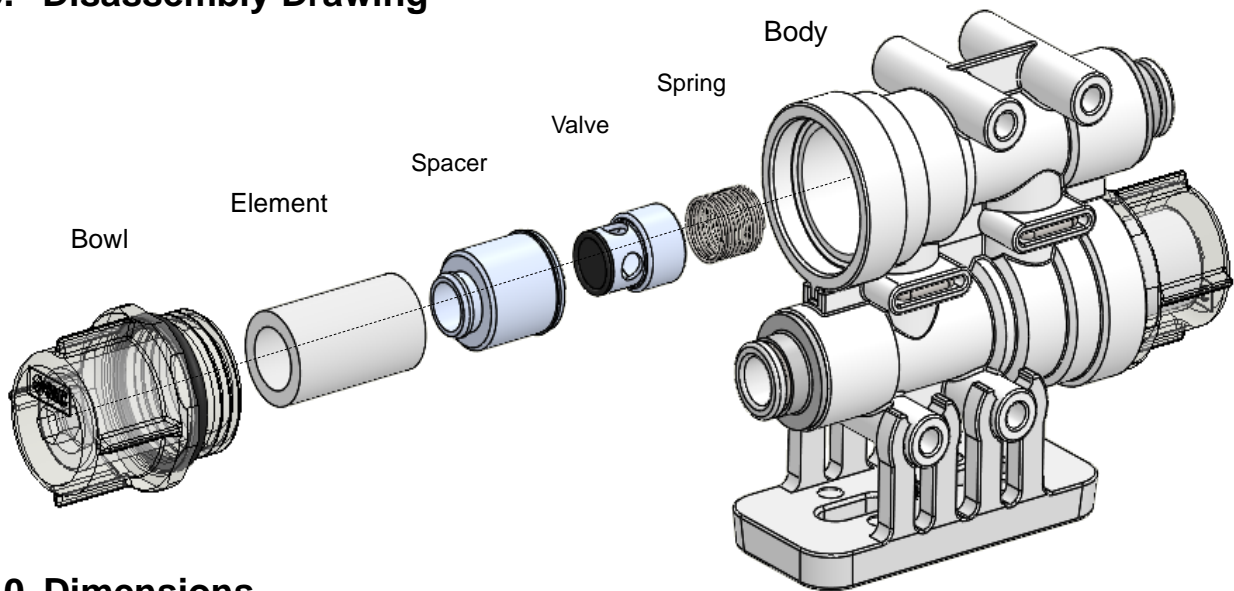
Warning

Before replacement, make sure that no pressure remains in the product.

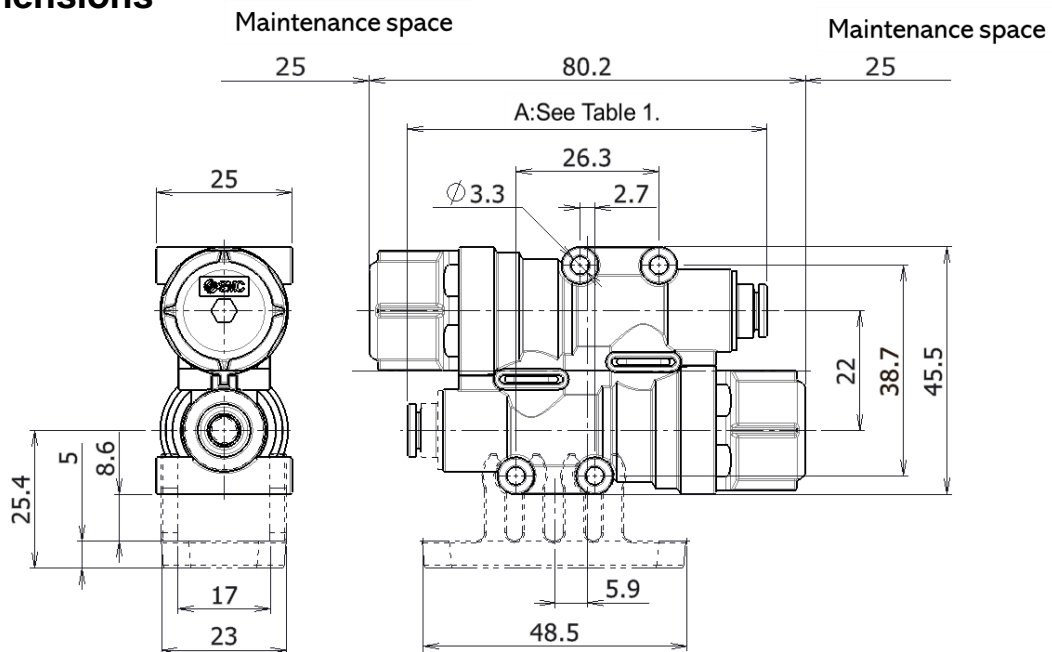
After replacement, confirm that the product satisfies specific functions and no external leakage occurs before operating it.

| Applicable model | Work category | Procedure | |
|------------------|---------------|--|--|
| ZFD5 | Disassembly | 1) | Grasp the product and rotate the bowl to remove it. |
| | | 2) | Pinch off the used element and remove it from the product |
| | | <p style="text-align: center;">Before replacement</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>【Step 1】</p> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Counterclockwise rotation</div>  <p>Bowl</p> </div> <div style="text-align: center;"> <p>【Step 2】</p> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Element detachment</div>  <p>Element</p> </div> </div> | |
| | Work category | Procedure | |
| | Assembly | 1) | Assemble the new element to the spacer. |
| | | 2) | Screw the bowl into the product using a hexagonal wrench (Nominal size: 4). (Recommended tightening torque: 1.0 N·m) Confirm that there is no gap between the bowl and the body. |
| | | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>【Step 1】</p> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Mounting of the element</div>  <p>Element Spacer</p> <p>Assemble the element while pushing it in until it hits the spacer. (Make sure there is no rattling or misalignment)</p> </div> <div style="text-align: center;"> <p>【Step 2】</p> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Clockwise rotation</div>  <p>Bowl (Hexagon socket) Body</p> <p>After replacement</p>  </div> </div> | |

9. Disassembly Drawing



10. Dimensions



Mounting dimensions of the holder

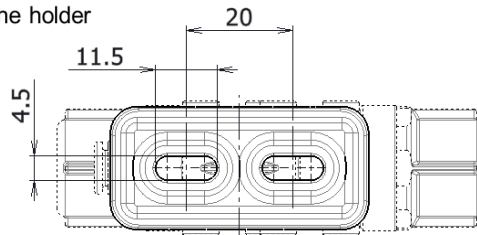
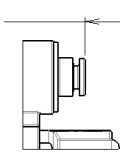
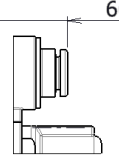
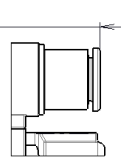


Table 1. Dimension A

| Model | ZFD53 | ZFD54 | ZFD55 |
|------------|---|---|--|
| Appearance |  66.1 |  66.1 |  78.2 |

| Revision history |
|------------------|
|------------------|

SMC Corporation

4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021 JAPAN
Tel: + 81 3 5207 8249 Fax: +81 3 5298 5362
URL <https://www.smcworld.com>

Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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