Doc. No. DOC1061738

Operation Manual

PRODUCT NAME

VACUUM FILTER

MODEL / Series / Product Number

AFJ20-(F,N)01～(F,N)02(B)-(5,40,80)-(S,T)(-6,R,Z)-D

AFJ30-(F,N)02～(F,N)03(B)-(5,40,80)-(S,T)(-6,R,Z)-D

AFJ40-(F,N)02～(F,N)04(B)-(5,40,80)-(S,T)(-6,R,Z)-D

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 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 and nylon bowl

Type	Chemical name	Application examples	Material	
			Polycarbonate	Nylon
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 sliding parts and seals may flow to the outlet side.

(2) Oil included in air cannot be separated.

(3) If a more powerful moisture separator of moist is necessary, the vacuum drain separator AMJ series is recommended.

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) Connect the product ensuring the direction of "1"(IN) and "2"(OUT) for air direction and indicated arrow. Incorrect connections may cause malfunction.

(4) Install with adequate space for maintenance beneath the product. Refer to the section [11. Dimensions] (P18) 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) When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealant do not get inside the pipe. When a sealant tape is used, leave 1 thread ridges exposed at the end of the threads.

(3) Connect piping/fittings using the recommended torque while holding the female thread side tightly. Insufficient tightening torque leads to cause of loosening or sealing failure, and excessive tightening torque leads to cause of breakage of screws. Tightening without holding female thread applies an excessive force to the bracket directly, leading to breakage.

Recommended tightening torque Unit: N m

Thread size	1/8	1/4	3/8	1/2
Torque	3 to 5	8 to 12	15 to 20	20 to 25

(4) Before using an SMC fitting and S coupler, please refer to "Tightening the threaded portion of the connection thread" of the Fittings & Tubing Precautions.

(5) Do not apply torsion or bending moment other than the weight of the product itself. External piping needs to be supported separately as it may cause breakage. Non-flexible piping like steel tube is susceptible to excessive moment load or vibration. Insert flexible tubes to prevent this.

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.

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 resin bowl.
If any of these appear, replace with a new bowl. Otherwise, breakage may occur. Investigate and/or review the operating conditions if necessary.

(4) Check for dirt in resin bowl periodically. If any dirt is seen, replace with new bowl. If removing dirt by washing the resin bowl, never use washing material other than neutral detergent. Otherwise, the bowl is damaged.

(5) Replace the element every 2 years or when the pressure drop at the output pressure from initial operation becomes 20 kPa, whichever comes first, to prevent damage to the element.

(6) For AFJ20-D, discharge drain in the bowl before it reaches the baffle. For AFJ30-D and AFJ40-D, discharge drain in the bowl before it reaches the upper drain level indicated on the bowl. If drain flows into the outlet side, it may be cause of operation failure. Furthermore, when drain is discharged, release the pressure in the bowl to the atmosphere and remove the bowl before proceeding. Refer to the section [9-1. Bowl Assembly Replacement] (P13-14) for removing the bowl.

⚠ **Caution**

(1) When a filter element is used repeatedly, clean it with air blow or wash it with a neutral detergent. (For 40 μm, For 80 μm)
Check the condition of the element and replace the element with a new one when the specifications are not satisfied.

(2) 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.

(3) Do not apply excessive force to the mesh. (For 40 μm, For 80 μm)
It will cause the mesh to peel off.

2. Application

This product aims at eliminating drop of water and solid foreign matter in the air line for vaccum.

3. Standard Specifications

Model			AFJ20-D		AFJ30-D		AFJ40-D		
Port size			1/8	1/4	1/4	3/8	1/4	3/8	1/2
Fluid			Air						
Ambient and fluid temperature			-5 to 60 °C (with no freezing)						
Proof pressure			0.5 MPa						
Operating pressure range			-100 to 0 kPa						
Vacuum release pressure			0.5 MPa or less						
Filtration Note 1) to Note 4)			5 μm, 40 μm, 80 μm						
Drain capacity			8 cm^3		25 cm^3		45 cm^3		
Bowl material			Polycarbonate						
Bowl guard			-		Standard (Polycarbonate)				
Recommended flow rate Note 5) [L/min(ANR)]	Water drop removal type (-S)	5 μm	80	100	180	230	200	310	370
		40 μm	100	130	210	340	230	390	500
		80 μm							
	Large flow type (-T)	5 μm	100	140	190	250	210	350	440
		40 μm	120	180	230	380	250	480	660
		80 μm							
Weight			0.09 kg		0.17 kg		0.35 kg		

Note 1) 5 μm elements use fiber type element which filtrate 5 μm.

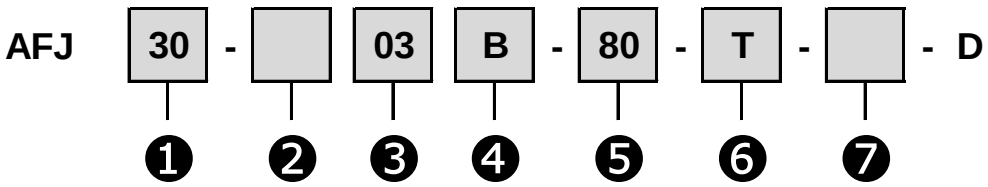
Note 2) The element for 40 μm uses a resin mesh with openings of 40 μm in height and width.

Note 3) The element for 80 μm uses a resin mesh with openings of 80 μm in height and width.

Note 4) The size of solid particles collectable by the element 40 μm (80 μm) shall be 40 μm (80 μm) or more in depth x height x width.

Note 5) The amount of processed air when the initial pressure loss is 4 kPa.

4. How to Order



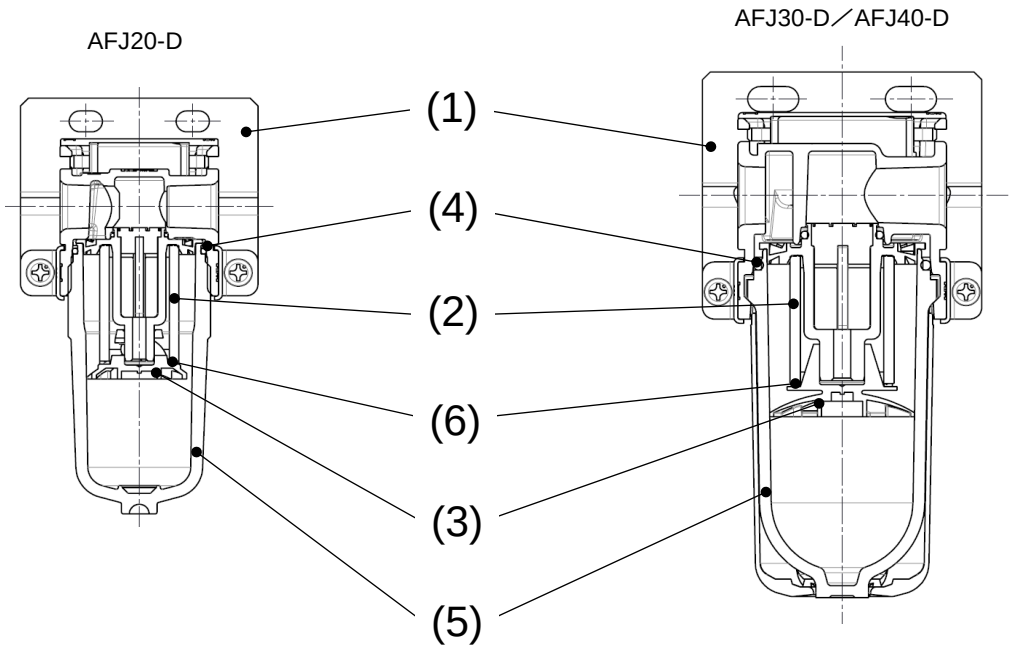
				Symbol	Description	❶ Body size		
						20	30	40
❷	Thread type			Nil	Rc	●	●	●
				N	NPT	●	●	●
				F	G	●	●	●
❸	Port size			01	1/8	●	–	–
				02	1/4	●	●	●
				03	3/8	–	●	●
				04	1/2	–	–	●
❹	Bracket			Nil	Without bracket	●	●	●
				B	With bracket	●	●	●
❺	Filtration			5	5 μm	●	●	●
				40	40 μm	●	●	●
				80	80 μm	●	●	●
❻	Type			S	Water drop removal type	●	●	●
				T	Large flow type	●	●	●
❼ Note 1)	Semi-standard	**a**	Bowl	Nil	Polycarbonate bowl	●	●	●
				6	Nyron bowl	●	●	●
		b	Flow direction	Nil	Flow direction: Left to right	●	●	●
				R	Flow direction: Right to left	●	●	●
		c	Pressure unit Temp. unit	Nil	Pressure unit: kPa Temp. unit: °C	●	●	●
				Z	Pressure unit: psi Temp. unit: °F	○ Note 2)	○ Note 2)	○ Note 2)

Note 1) Select one each for a to c.

Note 2) ○: For the pipe thread type: NPT only

5. Structural Drawing, Option and Replacement Parts

Structural drawing / Option / Replacement parts



Option

No.	Part name	Part No.		
		AFJ20-D	AFJ30-D	AFJ40-D
(1)	Bracket assembly Note 1)	AF24P-070AS	AF34P-070AS	AF44P-070AS

Note 1) Assembly of 2 types of bracket and 2 set screws.

Replacement Parts

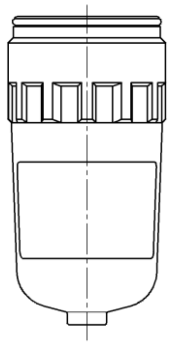
No.	Part name		Part No.		
			AFJ20-D	AFJ30-D	AFJ40-D
(2)	Element	5μm	AF20P-060S	AF30P-060S	AF40P-060S
		40μm	AF22P-820S	AF32P-820S	AF42P-820S
		80μm	AF22P-830S	AF32P-830S	AF42P-830S
(3)	Baffle		AF24P-040S	AF34P-040S	AF44P-040S
(4)	Bowl seal		C2SFP-260S	C32FP-260S	C42FP-260S
(5)	Bowl assembly		Refer to the section [6. Bowl Assembly Specifications] (P10).		
(6)	Seal Note 2)		AW22P-070S	AW32P-070S	AW42P-070S

Note 1) The numbers in the table and structural drawing are consistent with the numbers in
[9. How to Replace the Components] (P13-16) and [10. Disassembly Drawing] (P17).

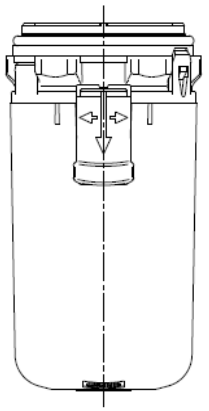
Note 2) The seal is for 40 μm and 80 μm elements.

6. Bowl Assembly Specifications

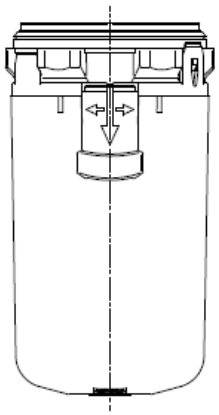
6-1. Bowl assembly for AFJ20-D

Semi-standard symbol	–	6
Appearance and part No.	Semi-standard: – (Standard) Piping port thread type / (5) Part No. Rc, G / C2SJ-D NPT / C2SJ(-Z)-D Semi-standard: 6 Piping port thread type / (5) Part No. Rc, G / C2SJ-6-D NPT / C2SJ-6(Z)-D	

6-2. Bowl assembly for AFJ30-D

Semi-standard symbol	–	6
Appearance and part No.	Semi-standard: – (Standard) Piping port thread type / (5) Part No. Rc, G / C3SJ-D NPT / C3SJ(-Z)-D Semi-standard: 6 Piping port thread type / (5) Part No. Rc, G / C3SJ-6-D NPT / C3SJ-6(Z)-D	

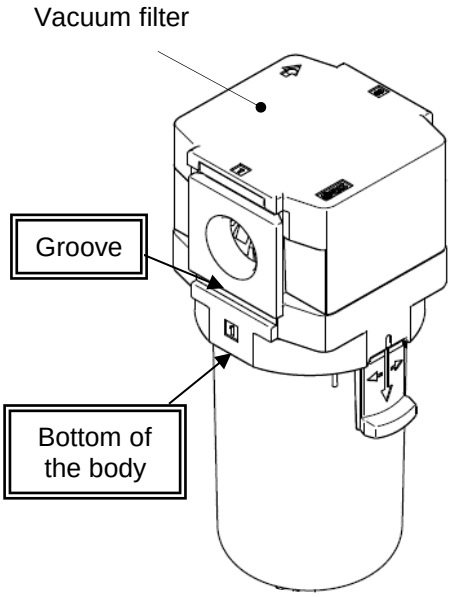
6-3. Bowl assembly for AFJ40-D

Semi-standard symbol	–	6
Appearance and part No.	Semi-standard: – (Standard) Piping port thread type / (5) Part No. Rc, G / C4SJ-D NPT / C4SJ(-Z)-D Semi-standard: 6 Piping port thread type / (5) Part No. Rc, G / C4SJ-6-D NPT / C4SJ-6(Z)-D	

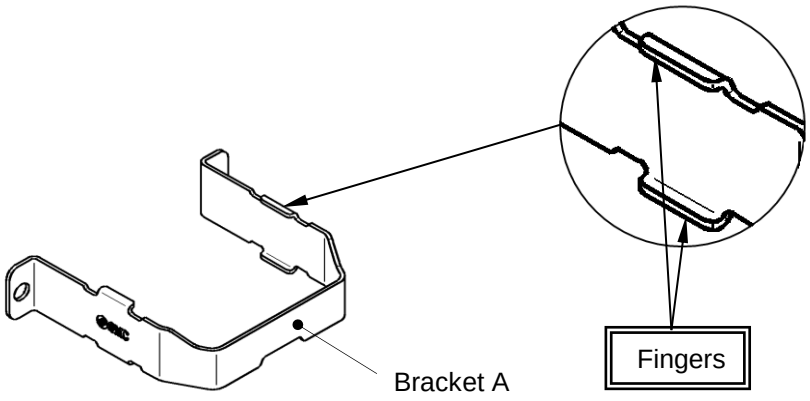
Note 1) Part No. (5) includes Bowl seal (4). Refer to the section [10. Disassembly Drawing] (P17).
Note 2) "Z" in Part No. (5) indicates semi-standard specifications. The pressure unit: psi. The temperature unit: °F
Note 3) Refer to the section [4. How to Order] (P8) for semi-standard symbols.

7. Assembly of Optional Parts

Bracket

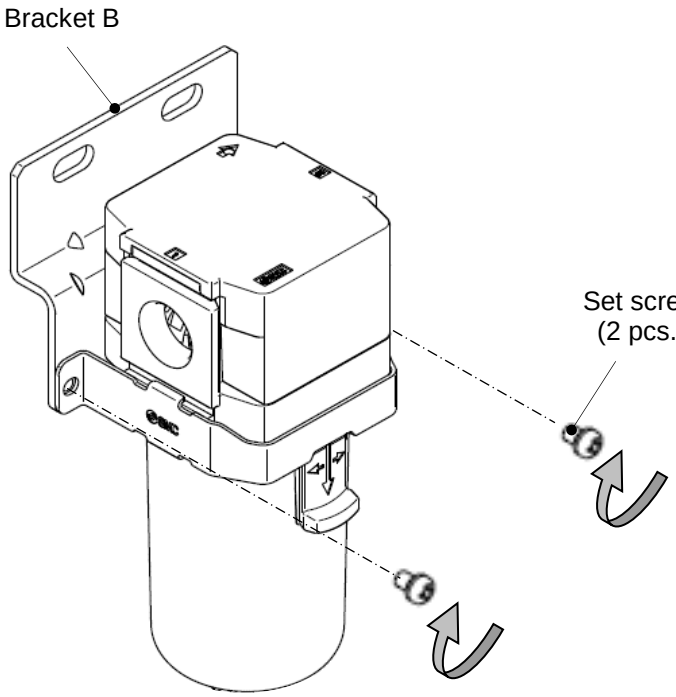


1) Mounting of bracket A
Insert bracket A from the front of the air filter so that the fingers of the bracket A hold the air filter at the groove and the bottom of the body.



2) Mounting of bracket B
Fix the bracket B with the set screw (2 pcs.) included in the package. Refer to the table below for the tightening torque.

Model	Tool	Tightening torque
AFJ20-D	Phillips screwdriver	0.75±0.2 N・m
AFJ30-D		
AFJ40-D		



8. Trouble Shooting

Refer to the sections [9. How to Replace the Components] (P13-16) and [10.Disassembly Drawing] (P17).

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.	P13-16
Vacuum pressure does not decrease	Air sucks from the gap between the bowl and body.	The bowl seal is damaged.	Replace the bowl seal.Grease up before replacing the bowl seal. Note)	P13-14
	Air sucks from the broken part of the bowl.	The bowl is damaged.	Replace the bowl assembly.	P13-14
Operability	Too much drain comes from the piping of outlet side.	Drain level reaches the baffle.	Discharge drain after removing bowl and replace the element.	P13-16

Note) Fluorine grease is recommended.

9. How to Replace the Components

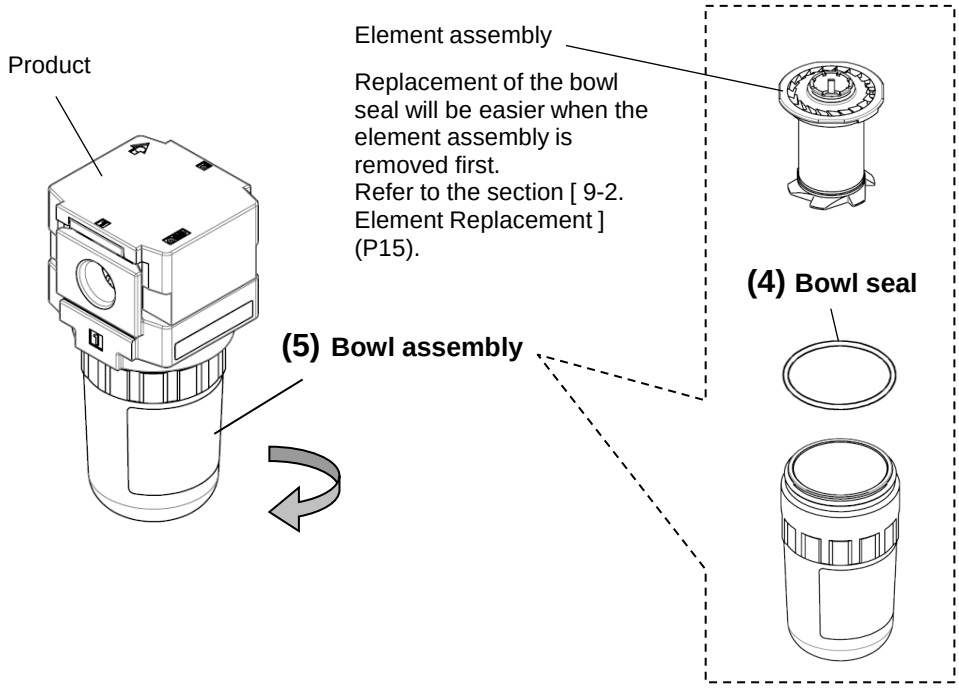
⚠ Warning

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

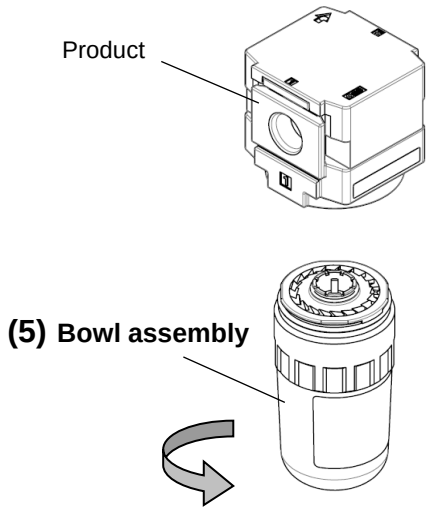
After replacement, confirm that the product satisfies specific functions and no external leakage occurs before operating it.

9-1. Bowl Assembly Replacement

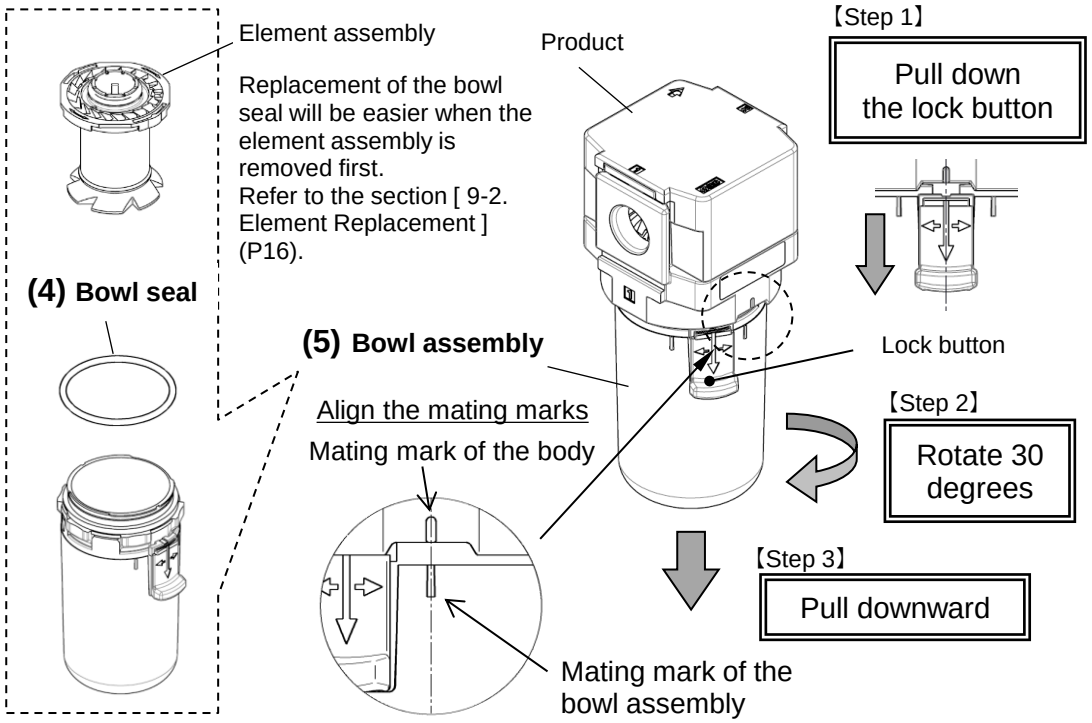
Applicable model	Work category	Procedure	Tool	Criteria
AFJ20-D	Disassembly	1) Remove the bowl assembly from the product. If the bowl assembly is tightened too much to be removed, use the spanner specified for SMC until it can be loosened by hand.	Spanner specified for SMC Product No.: 1129129	–



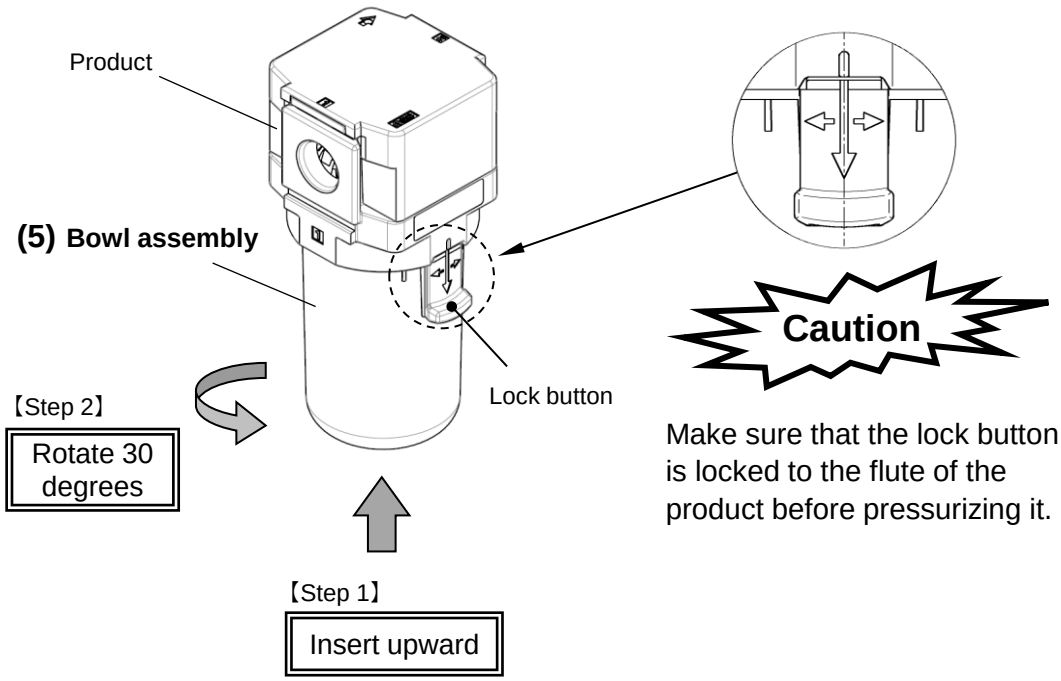
Work category	Procedure	Tool	Criteria
Assembly	1) Screw the bowl assembly into the product. Tighten it referring to the specified torque.	–	Reference tightening torque: 2.1 N m



Applicable model	Work category	Procedure	Tool	Criteria
AFJ30-D AFJ40-D	Disassembly	1) Remove the bowl assembly from the product. While the lock button is held down, rotate the bowl assembly by approx. 30 degrees so that the mating marks of the body and bowl assembly meet each other. Then remove the bowl assembly by pulling it downward.	–	–

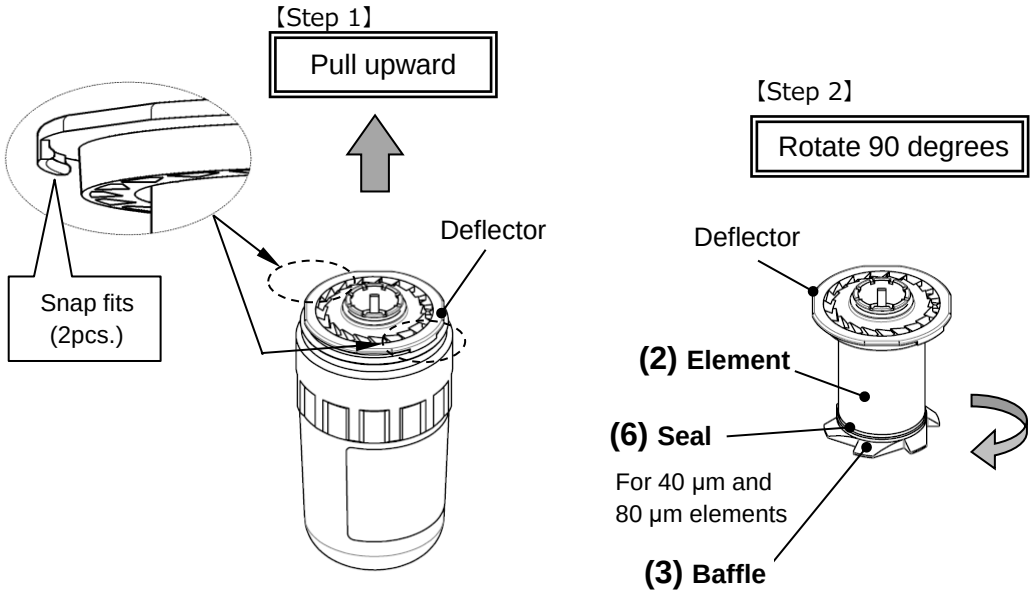


Work category	Procedure	Tool	Criteria
Assembly	1) Mount the bowl assembly to the product and rotate the bowl assembly until the lock button is locked in position as shown in the figure below.	–	–

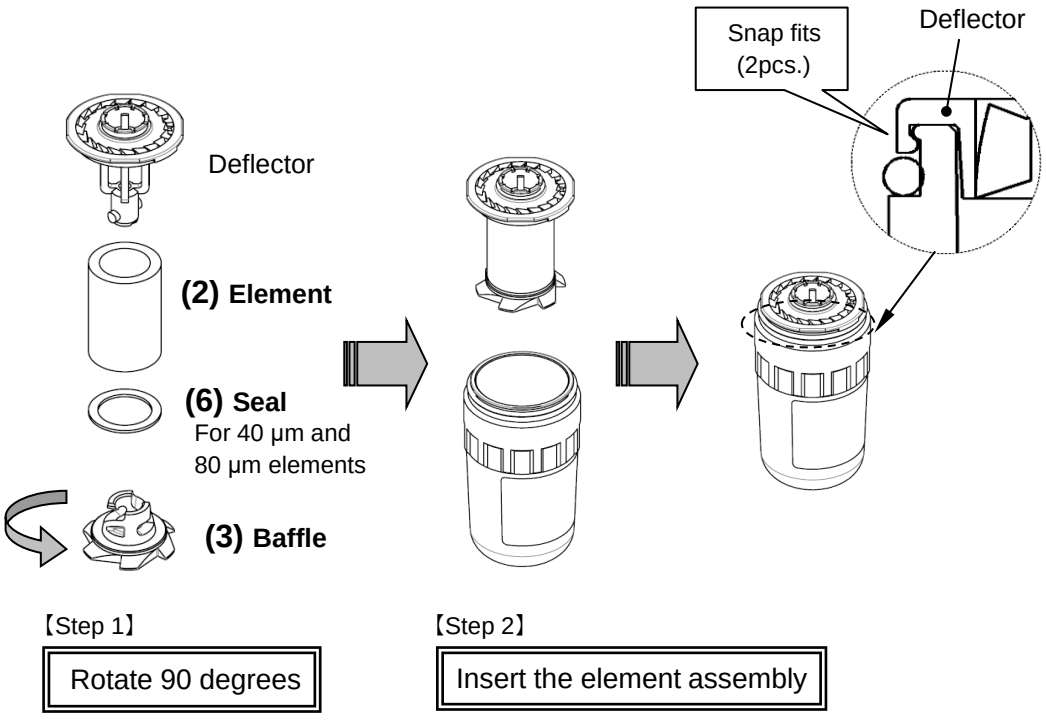


9-2. Element Replacement

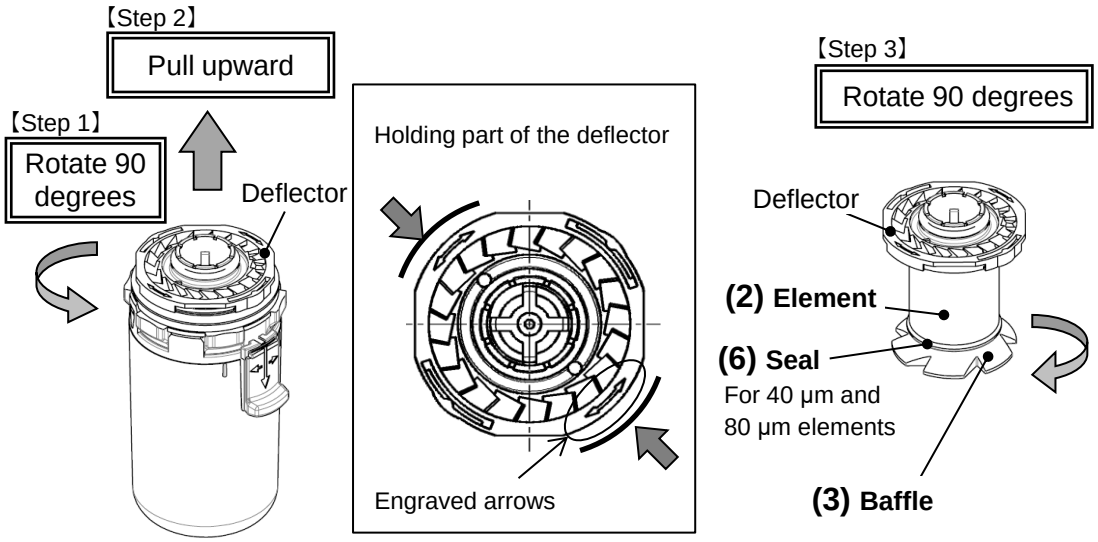
Applicable model	Work category	Procedure	Tool	Criteria
AFJ20-D	Disassembly	1) Remove the bowl assembly referring to the section [9-1. Bowl Assembly Replacement] (P13), then remove the snap fits (2 pcs.) of the deflector and pull upward to remove the element assembly.	–	–
		2) Rotate the baffle 90 degrees in the arrow direction to remove the element and the seal (For 40 µm and 80 µm elements) from the element assembly.	–	–



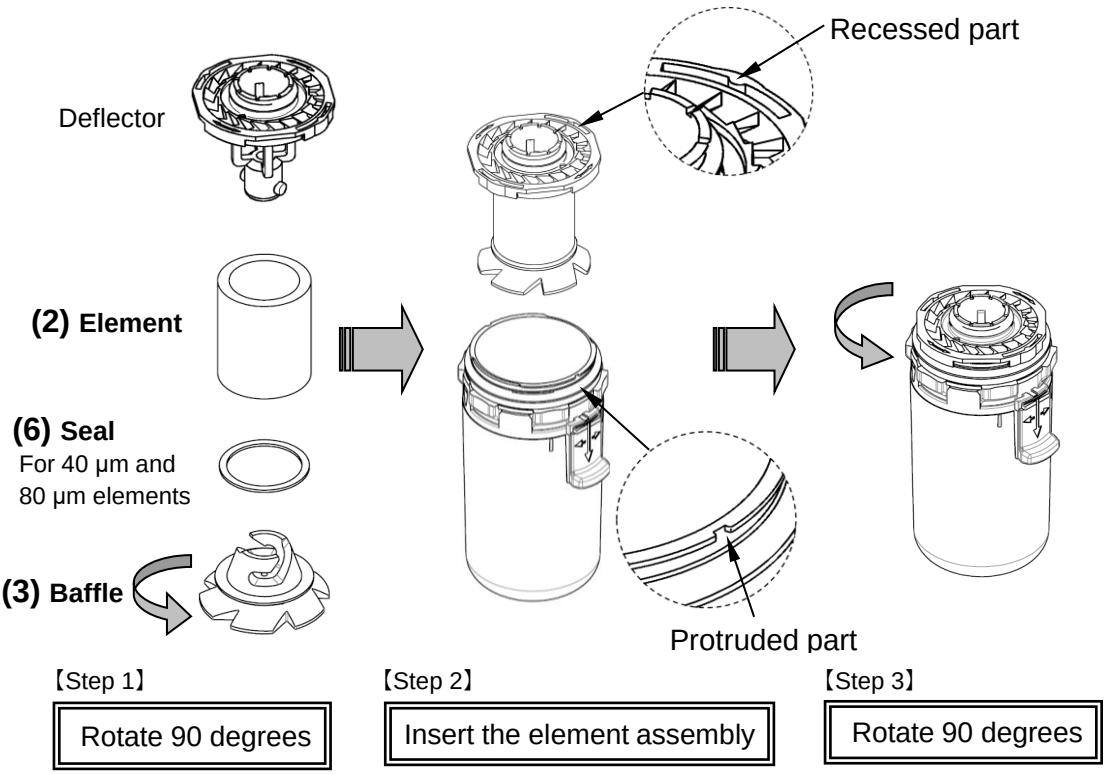
Work category	Procedure	Tool	Criteria
Assembly	1) Mount the element to the deflector and the seal (For 40 µm and 80 µm elements) to the baffle and rotate the baffle 90 degrees in the arrow direction to mount the element.	–	–
	2) Press the deflector downward until the snap fits (2 pcs.) are engaged with the bowl assembly. Mount the bowl assembly referring to section [9-1. Bowl Assembly Replacement] (P13).	–	–



Applicable model	Work category	Procedure	Tool	Criteria
AFJ30-D AFJ40-D	Disassembly	1) Remove the bowl assembly referring to the section [9-1. Bowl Assembly Replacement] (P14). With the bowl assembly removed, rotate the deflector 90 degrees while holding the holding part.	–	–
		2) Pull upward and remove the element assembly while holding the holding part.	–	–
		3) Rotate the baffle 90 degrees in the arrow direction to remove the element and the seal (For 40 µm and 80 µm elements) from the element assembly.	–	–

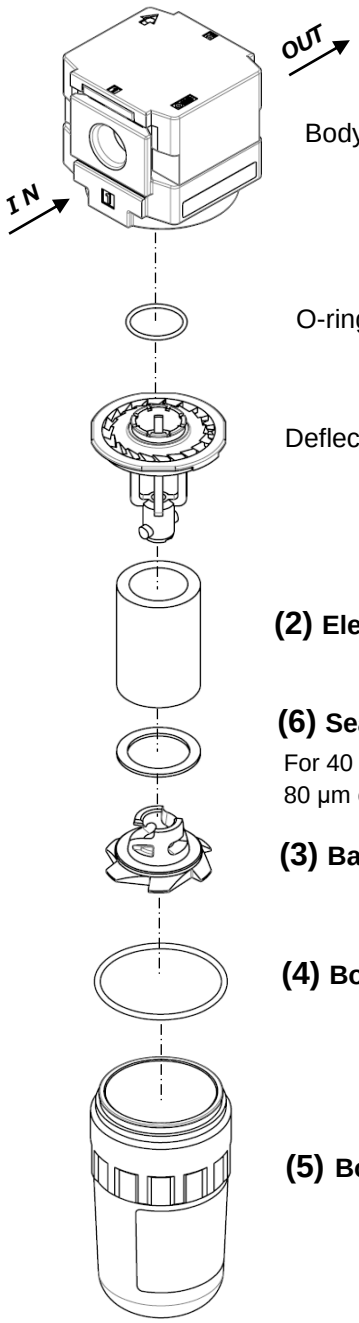


Work category	Procedure	Tool	Criteria
Assembly	1) Mount the element to the deflector and the seal (For 40 µm and 80 µm elements) to the baffle and rotate the baffle 90 degrees in the arrow direction to mount the element.	–	–
	2) Insert the element assembly into the bowl assembly.	–	–
	3) Rotate 90 degrees in either direction so that the protruded part of the element assembly engages with the recessed part of the bowl assembly. Mount the bowl assembly referring to the section [9-1. Bowl Assembly Replacement] (P14).	–	–



10. Disassembly Drawing

AFJ20-D



Body

O-ring

Deflector

(2) Element

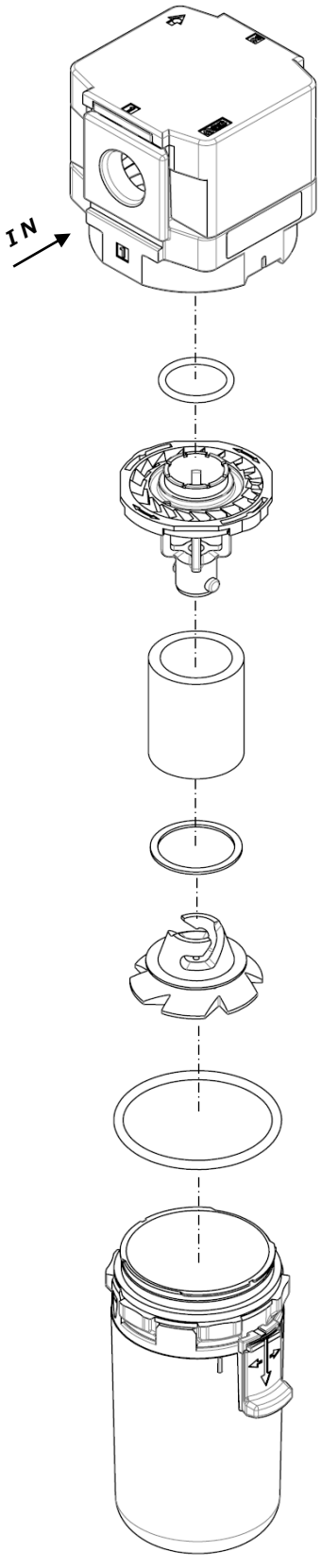
(6) Seal
For 40 µm and
80 µm elements

(3) Baffle

(4) Bowl seal

(5) Bowl assembly

AFJ30-D, AFJ40-D



Body

O-ring

Deflector

(2) Element

(6) Seal
For 40 µm and
80 µm elements

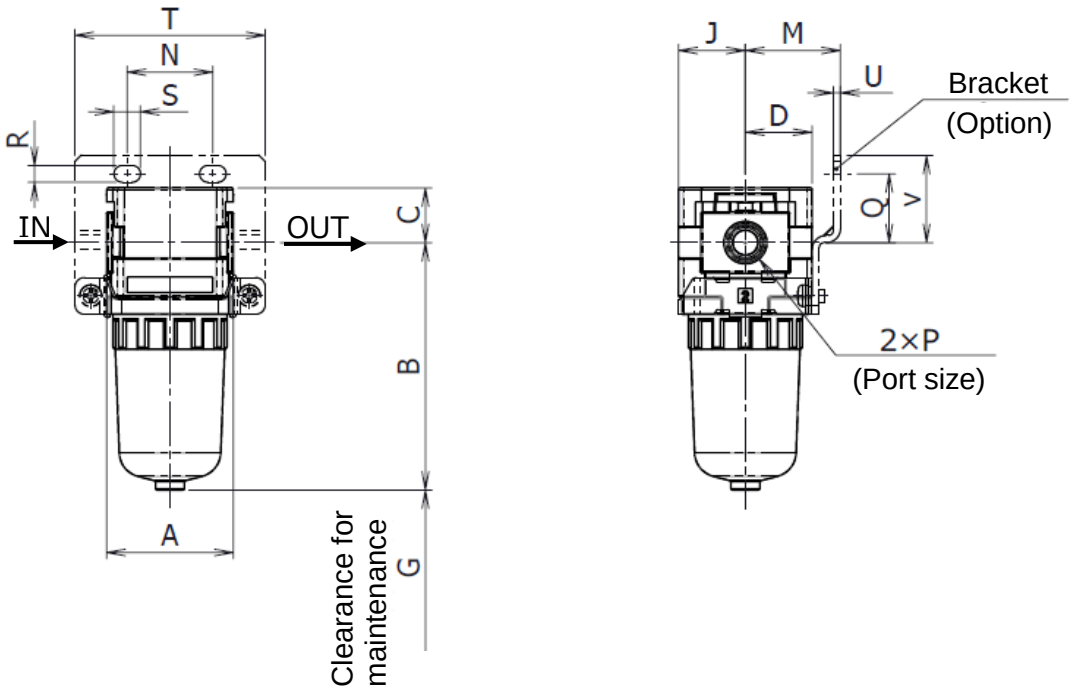
(3) Baffle

(4) Bowl seal

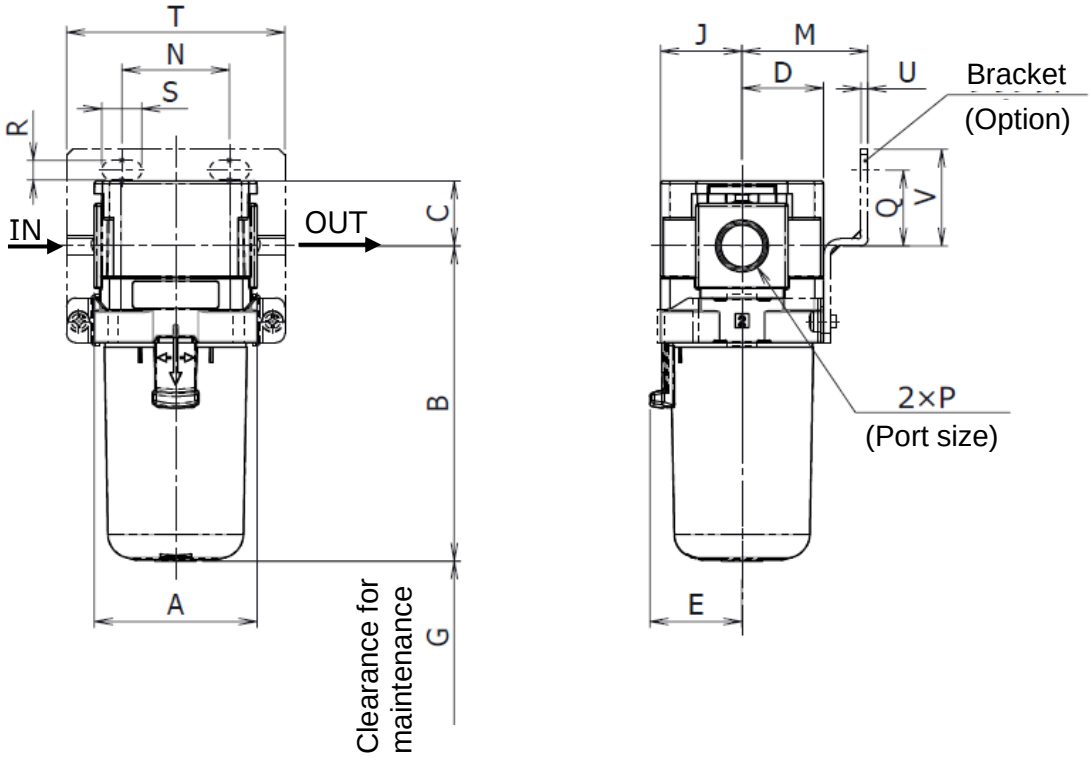
(5) Bowl assembly

11. Dimensions

AFJ20-D



AFJ30-D, AFJ40-D



Model	Standard specifications								Optional specifications							
									Bracket mount							
	P	**A**	**B**	**C**	**D**	**E**	**G**	**J**	**M**	**N**	**Q**	**R**	**S**	**T**	**U**	**V**
AFJ20-D	1/8・1/4	40	79.3	18	21	–	25	21	30	27	22	5.4	8.4	60	2.3	28
AFJ30-D	1/4・3/8	53	104.3	22	27	30	35	27	41	35	25	6.5	13	71	2.3	32
AFJ40-D	1/4・3/8・1/2	70	136.1	26	36	38	40	36	50	52	30	8.5	13	88	2.3	39

Revision history

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