Doc. No. AL∗-OMX0056-B

Operation Manual

PRODUCT NAME

Lubricator

MODEL / Series / Product Number

AL20-(F,N)01～(F,N)02(B)(-2,3,6,C,R,Z)-D

AL30-(F,N)02～(F,N)03(B)(-2,3,6,8,R,W,Z)-D

AL40-(F,N)02～(F,N)04(B)(-2,3,6,8,R,W,Z)-D

AL40-(F,N)06(B)(-2,3,6,8,R,W,Z)-D

AL50-(F,N)06～(F,N)10(B)(-2,3,6,8,R,W,Z)-D

AL60-(F,N)10(B)(-2,3,6,8,R,W,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 external parts including the bowl and sight dome. 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 used for the bowl and sight dome

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.

When the above factors are present or there is some doubt, use a metal bowl for safety.

(3) Avoid the application where charge and discharge of pressure to/from a standard bowl is switched frequently. This may damage the bowl. A metal bowl is recommended in these cases.

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

Selection

⚠ Warning

(1) Do not use the product when the lubricator is used other than for lubricating pneumatic equipment.
(2) When the lubricator is used at high frequency, such as press machine, as the internal components may break or operation failure may occur on the outlet side equipment.
(3) If the air consumption is small, oil may not drip. Select a proper size of product according to the minimum dripping flow rate.
(4) Do not flow from the outlet side (backflow) as it may cause breakage of the internal components.
(5) When the piping is branched on the inlet side, install a check valve on the inlet side of the lubricator to prevent the lubricant from back flowing.

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 section [12. Dimensions] (P 33) for necessary space.
(5) Install the lubricator vertically so that the bowl is downward. It cannot be used in horizontal or upward direction.

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 piping bracket directly, leading to breakage.

Recommended tightening torque Unit: N m

Thread size	1/8	1/4	3/8	1/2	3/4	1
Torque	3 to 5	8 to 12	15 to 20	20 to 25	28 to 30	36 to 38

(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.
(6) The cylinder volume should be larger than the piping volume between the solenoid valve and cylinder. If the cylinder volume is smaller, operation oil may not be fed to the cylinder.

⚠ Caution

(1) Avoid rising piping and piping branches on the outlet piping. Otherwise, lubricating failure may occur.

Air Source

⚠ Warning

(1) Use clean air. Do not use compressed air containing chemicals, organic solvent, synthetic oil or corrosive gas as it may be cause of breakage of components or operation failure.

(2) Air containing too much moisture may cause malfunction. Install an air drier or aftercooler before the lubricator.

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 or metal 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) Open and close the drain cock manually. The use of tools can result in damage to the product.

(6) Use class 1 turbine oil (with no additives) ISO VG32. Using other lubricant can cause damage to devices and result in malfunction.

(7) Adjustment of the oil regulating valve should be carried out manually, the use of tools etc. can result in damage to the unit. Refer to section [8. Operation and Adjustment] (P16-19) for adjustment of the amount of oil.

(8) AL20-D cannot replenish lubricant while being pressurized. Before lubrication, exhaust the inlet pressure and make sure that there is no pressure in the bowl. Refer to section [8. Operation and Adjustment] (P16-19) for the oil supply method.

(9) Loosen the lubrication plug and release the pressure in the bowl before lubricating using AL30-D, AL40-D, AL50-D or AL60-D. As air containing oil may come out, be sure to wear protective glasses when lubricating. Refer to section [8. Operation and Adjustment] (P16-19) for the oil supply method.

⚠ Caution

(1) Check the dripping amount once a day. Drip failure can cause damage to the components that need lubrication.

(2) Use clean oil. Otherwise, it may cause dripping failure or clogging.

(3) The lubrication amount should be less than the upper limit of oil level of the bowl.

(4) Discharge drain periodically so that the drain is not accumulated beyond the upper limit of the drain level of the bowl. If a large amount of drain enters lubricator, it may cause dripping failure.

2. Application

This product aims at lubricating air-driven equipment and solenoid operated directional control valves and supplying oil into compressed air.

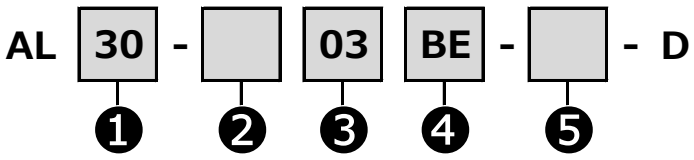
3. Standard Specifications

Model	AL20-D	AL30-D	AL40-D	AL40-06-D	AL50-D	AL60-D
Port size	1/8, 1/4	1/4, 3/8	1/4, 3/8, 1/2	3/4	3/4, 1	1
Fluid	Air					
Ambient and fluid temperature	-5 to 60 °C (with no freezing)					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. dripping flow rate Note 1)	15 L/min (ANR)	Port size 1/4: 30 L/min(ANR) Port size 3/8: 40 L/min(ANR)	Port size 1/4: 30 L/min(ANR) Port size 3/8: 40 L/min(ANR) Port size 1/2: 50 L/min(ANR)	50 L/min(ANR)	190 L/min(ANR)	220 L/min(ANR)
Oil capacity	25 cm^3	55 cm^3	135 cm^3			
Recommended lubricant	Class 1 turbine oil (ISO VG32)					
Bowl material	Polycarbonate					
Bowl guard	Semi-standard (Steel)	Standard (Polycarbonate)				
Weight	0.10 kg	0.18 kg	0.37 kg	0.41 kg	0.92 kg	0.99 kg

Note 1) - The flow rate is 5 drops/min under the following conditions: Inlet pressure of 0.5 MPa; Class 1 turbine oil (ISO VG32); Temperature at 20 °C; Oil adjustment valve fully open.

- For a circuit that repeatedly turns ON and OFF on the outlet side, make the adjustment so that the average air consumption per minute becomes equal to the minimum dripping flowrate or more.

4. How to Order

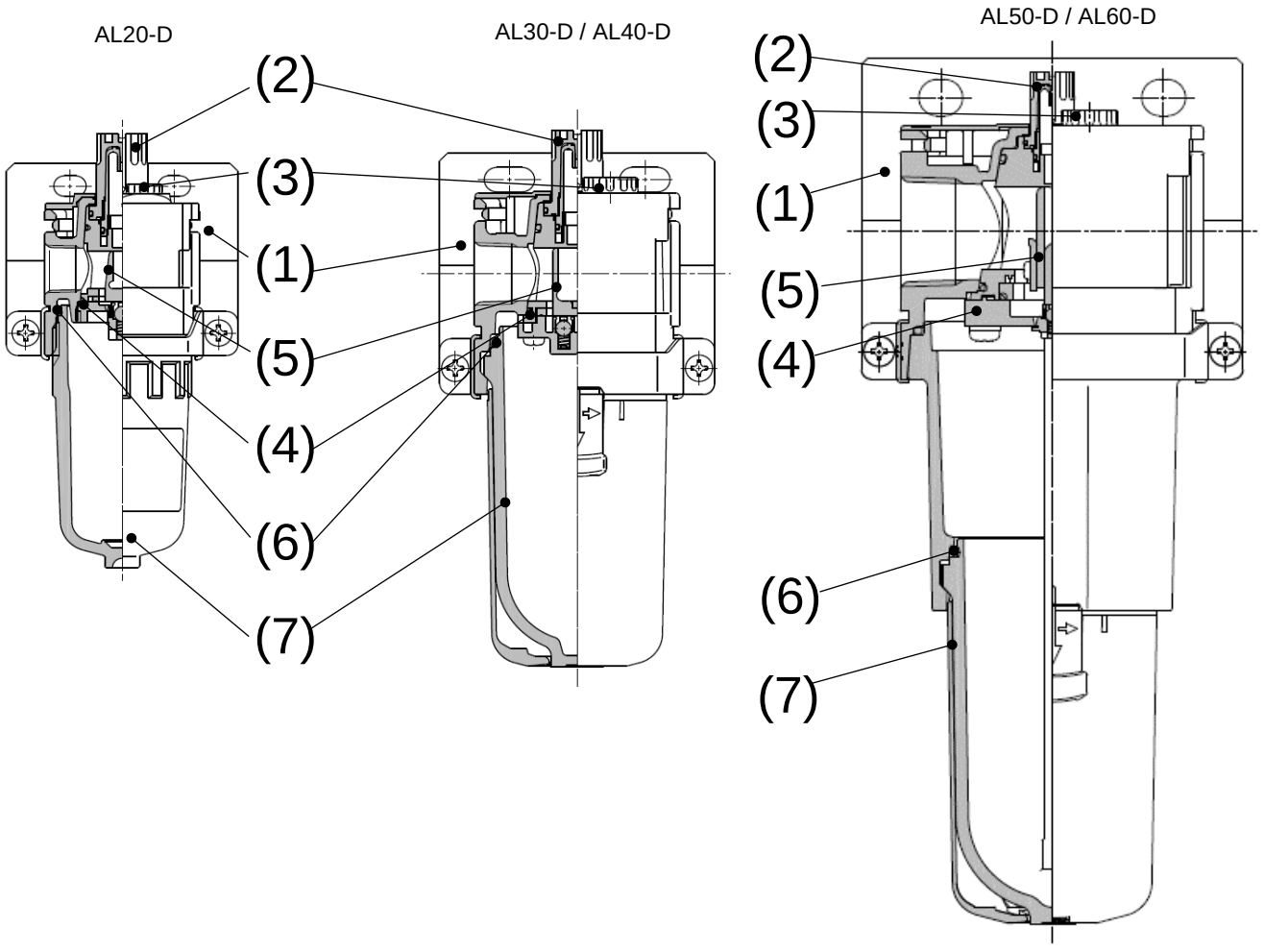


				Symbol	Description	❶ Body size				
						20	30	40	50	60
❷	Thread type			Nil	Rc	●	●	●	●	●
				N	NPT	●	●	●	●	●
				F	G	●	●	●	●	●
❸	Port size			01	1/8	●	—	—	—	—
				02	1/4	●	●	●	—	—
				03	3/8	—	●	●	—	—
				04	1/2	—	—	●	—	—
				06	3/4	—	—	●	●	—
				10	1	—	—	—	●	●
❹	Option (Mounting)			Nil	Without mounting option	●	●	●	●	●
				B	With bracket	●	●	●	●	●
❺	Semi-standard	**a**	Bowl	Nil	Polycarbonate bowl	●	●	●	●	●
				2	Metal bowl	●	●	●	●	●
				6	Nylon bowl	●	●	●	●	●
				8	Metal bowl with level gauge	—	●	●	●	●
				C	With bowl guard	●	—	—	—	—
				6C	With bowl guard (Nylon bowl)	●	—	—	—	—
		b	Lubricant exhaust port	Nil	Without drain cock	●	●	●	●	●
				3	With drain cock	●	●	●	●	●
				3W	Drain cock with barb fitting	—	●	●	●	●
		c	Flow direction	Nil	Flow direction: Left to right	●	●	●	●	●
				R	Flow direction: Right to left	●	●	●	●	●
		d	Pressure unit Temp. unit	Nil	Pressure unit: MPa Temp. unit: °C	●	●	●	●	●
				Z	Pressure unit: psi Temp. unit: °F	○ Note 2)	○ Note 2)	○ Note 2)	○ Note 2)	○ Note 2)

Note 1) ❺Semi-standard: Select one each for a to d.
Note 2) ○: For NPT thread type only.

5. Structural Drawing, Option and Replacement Parts

Structural drawing / Option / Replacement parts



Option

No. Note 1)	Description	Part No.					
		AL20-D	AL30-D	AL40-D	AL40-06-D	AL50-D	AL60-D
(1)	Bracket assembly Note2)	AF24P-070AS	AF34P-070AS	AF44P-070AS	AF49P-070AS	AF54P-070AS	

Note 1) The number in the table and structural drawing is consistent with the number in [10. How to Replace the Components] (P21-30) and [11. Disassembly Drawing] (P31-32).

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

Replacement part

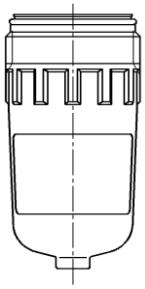
No. Note 1)	Description	Part No.					
		AL20-D	AL30-D	AL40-D	AL40-06-D	AL50-D	AL60-D
(2)	Sight dome assembly Note 2)	AL20P-080AS					
(3)	Lubrication plug assembly	AL24P-060AS	AL34P-060AS	AL44P-060AS			
(4)	Bumper retainer assembly Note 3)	AL20P-030AS	AL30P-030AS	AL40P-030AS		-	
	Bumper seat retainer assembly Note 3)	-	-	-		AL54P-030AS	AL60P-030AS
(5)	Bumper	AL20P-040S	AL30P-040S	AL44P-040S		-	
	Bumper assembly	-	-	-		AL60P-040AS	
(6)	Bowl seal	C2SFP-260S	C32FP-260S	C42FP-260S			
(7)	Bowl assembly	Refer to section [6. Bowl Assembly Specifications] (P10-P14).					

Note 1) The numbers in the table and structural drawing are consistent with the numbers in [10. How to Replace the Components] (P21-30) and [11. Disassembly Drawing] (P31-32).

Note 3) For the bumper retainer assembly and bumper seat retainer assembly for the metal bowl with level gauge, add "-8" to the end of the product number.
Example: AL30P-030AS-8

6. Bowl Assembly Specifications

6-1. Bowl assembly for AL20-D

<table>
<tr><td>Semi-standard symbol</td><td>—</td><td>6</td><td>C</td><td>6C</td></tr>
<tr><td>Appearance and part No.</td><td colspan="2">Semi-standard: - (Standard)
<table><tr><td>Piping port thread type</td><td>(7) Part No.</td></tr><tr><td>Rc</td><td rowspan="2">C2SL-D</td></tr><tr><td>G</td></tr><tr><td>NPT</td><td>C2SL(-Z)-D</td></tr></table>
Semi-standard: 6
<table><tr><td>Piping port thread type</td><td>(7) Part No.</td></tr><tr><td>Rc</td><td rowspan="2">C2SL-6-A</td></tr><tr><td>G</td></tr><tr><td>NPT</td><td>C2SL-6(Z)-A</td></tr></table>
  </td><td colspan="2">Semi-standard: C
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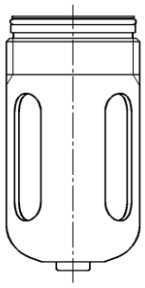
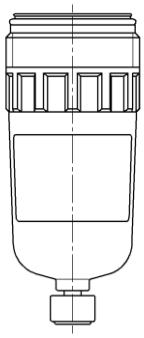
  </td></tr>
<tr><td>Semi-standard symbol</td><td>3</td><td>36</td><td>3C</td><td>36C</td></tr>
<tr><td>Appearance and part No.</td><td colspan="2">Semi-standard: 3
<table><tr><td>Piping port thread type</td><td>(7) Part No.</td></tr><tr><td>Rc</td><td rowspan="2">C2SL-3-D</td></tr><tr><td>G</td></tr><tr><td>NPT</td><td>C2SL-3(Z)-D</td></tr></table>
Semi-standard: 36
<table><tr><td>Piping port thread type</td><td>(7) Part No.</td></tr><tr><td>Rc</td><td rowspan="2">C2SL-36-A</td></tr><tr><td>G</td></tr><tr><td>NPT</td><td>C2SL-36(Z)-A</td></tr></table>
  </td><td colspan="2">Semi-standard: 3C
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Semi-standard: 36C
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 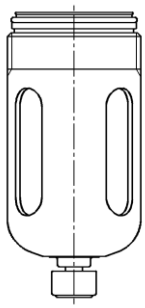 </td></tr>
<tr><td>Semi-standard symbol</td><td colspan="2">2</td><td colspan="2">23</td></tr>
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 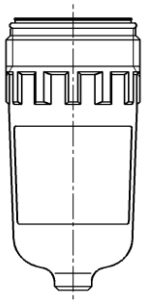 </td><td colspan="2">Semi-standard: 23
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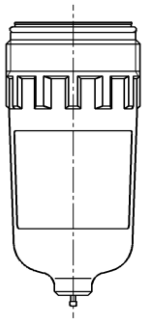
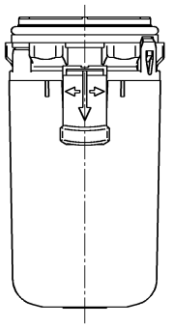
  </td></tr>
</table>

Note 1) Part No. (7) includes Bowl seal (6). Refer to section [11. Disassembly Drawing] (P31).

Note 2) "Z" in Part No. (7) indicates semi-standard specifications. The pressure unit: psi. The temperature unit: ^{o}F.

Note 3) Refer to section [4. How to Order] (P8) for option and semi-standard symbols.

6-2. Bowl assembly for AL30-D

<table>
<tr><td>Semi-standard symbol</td><td>—</td><td>6</td><td>3</td><td>36</td></tr>
<tr><td>Appearance and part No.</td><td colspan="2">Semi-standard: - (Standard)
<table><tr><td>Piping port thread type</td><td>(7) Part No.</td></tr><tr><td>Rc</td><td rowspan="2">C3SL-D</td></tr><tr><td>G</td></tr><tr><td>NPT</td><td>C3SL(-Z)-D</td></tr></table>
Semi-standard: 6
<table><tr><td>Piping port thread type</td><td>(7) Part No.</td></tr><tr><td>Rc</td><td rowspan="2">C3SL-6-D</td></tr><tr><td>G</td></tr><tr><td>NPT</td><td>C3SL-6(Z)-D</td></tr></table>
  </td><td colspan="2">Semi-standard: 3
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Semi-standard: 36
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 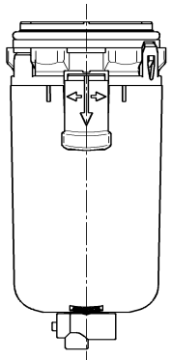 </td></tr>
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 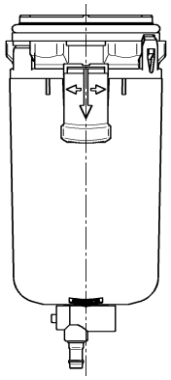 </td><td colspan="2"></td></tr>
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 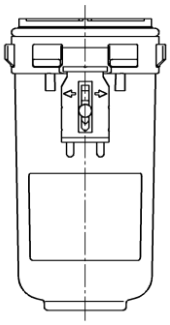 </td><td colspan="2">Semi-standard: 23
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 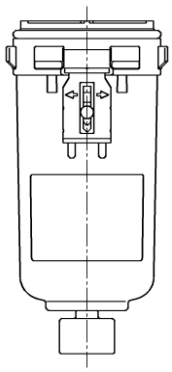 </td></tr>
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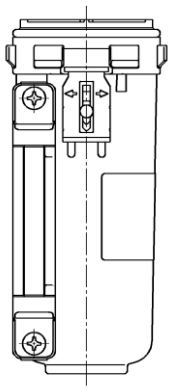
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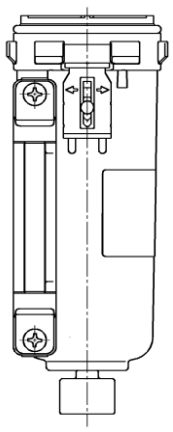
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Note 1) Part No. (7) includes Bowl seal (6). Refer to section [11. Disassembly Drawing] (P31).

Note 2) "Z" in Part No. (7) indicates semi-standard specifications. The pressure unit: psi. The temperature unit: ^{o}F.

Note 3) Refer to section [4. How to Order] (P8) for option and semi-standard symbols.

6-3. Bowl assembly for AL40, 50, 60-D

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 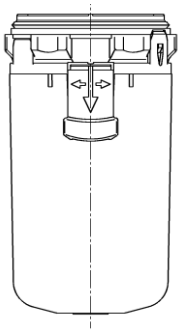 </td><td colspan="3">Semi-standard: 3
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 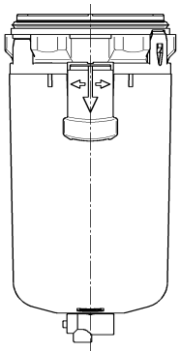 </td></tr>
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Semi-standard: 36W
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 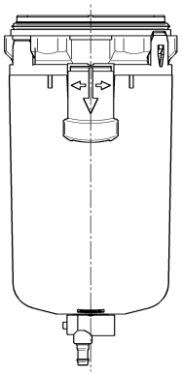 </td><td colspan="3"></td></tr>
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 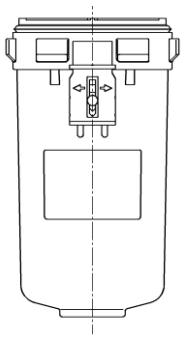 </td><td colspan="3">Semi-standard: 23
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 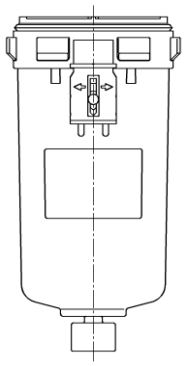 </td></tr>
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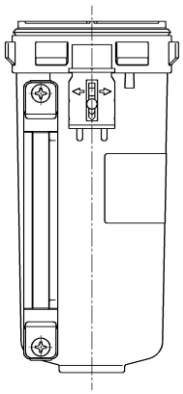
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Semi-standard: 38
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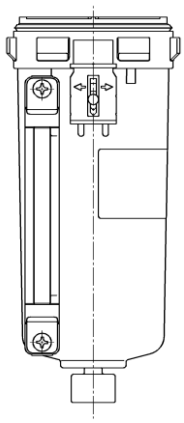
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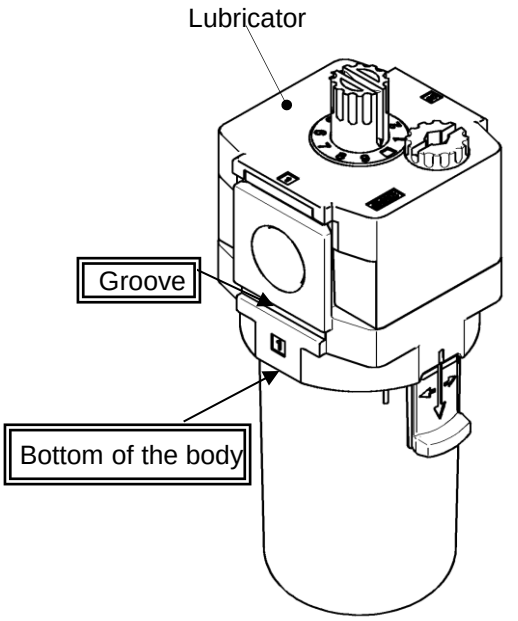
Note 1) Part No. (7) includes Bowl seal (6). Refer to section [11. Disassembly Drawing] (P31-32).

Note 2) "Z" in Part No. (7) indicates semi-standard specifications. The pressure unit: psi. The temperature unit: ^{o}F.

Note 3) Refer to section [4. How to Order] (P8) for option and semi-standard symbols.

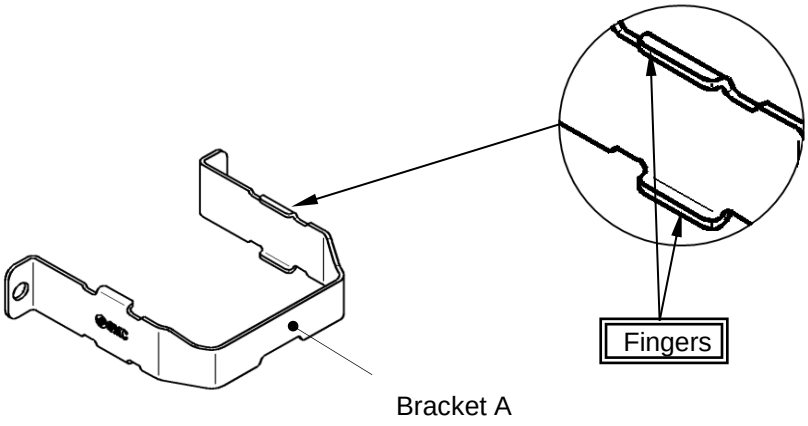
7. Assembly of Optional Parts

7-1. Bracket



1) Mounting of bracket A

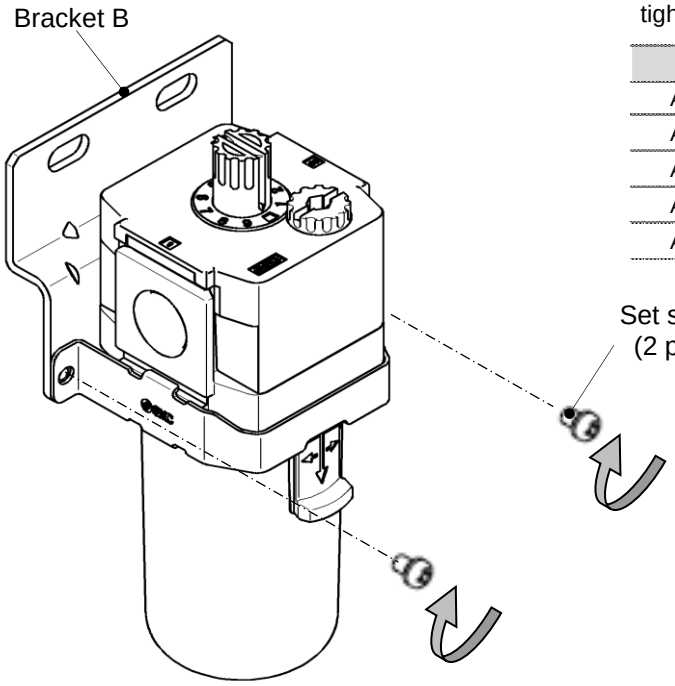
Insert bracket A from the front of the lubricator so that the fingers of the bracket A hold the lubricator at the groove and the bottom of the body.



2) Mounting of bracket B

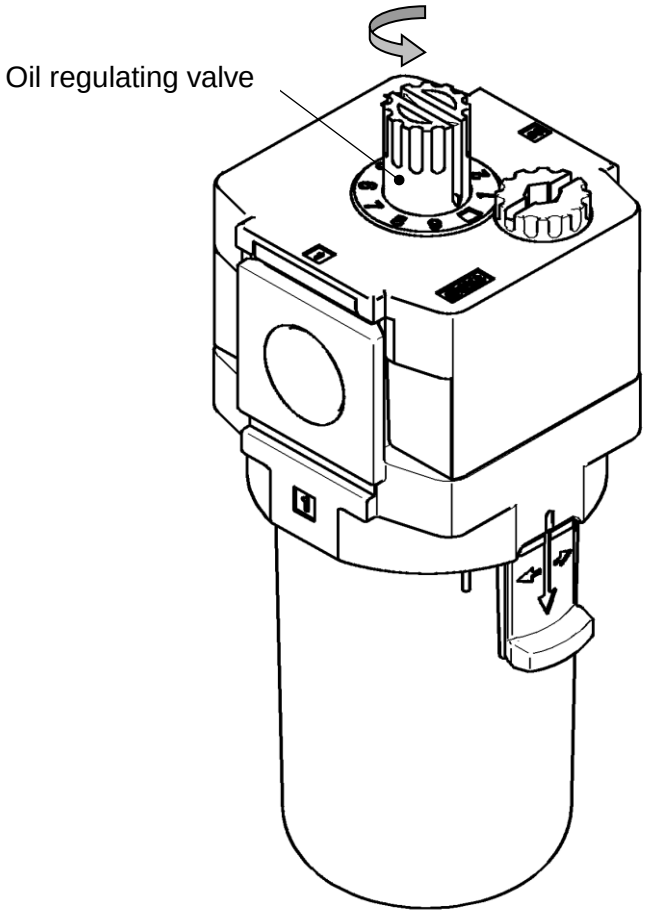
Fix the bracket B with the set screw (2 pcs.) included in the package. Refer to the table below for the tightening torque.

Model	Tool	Tightening torque
AL20-D	Phillips screw driver	0.75+/-0.2 N m
AL30-D		
AL40-D		
AL50-D		1.5+/-0.2 N m
AL60-D		



8. Operation and Adjustment

8-1. Adjustment of Dripping Amount

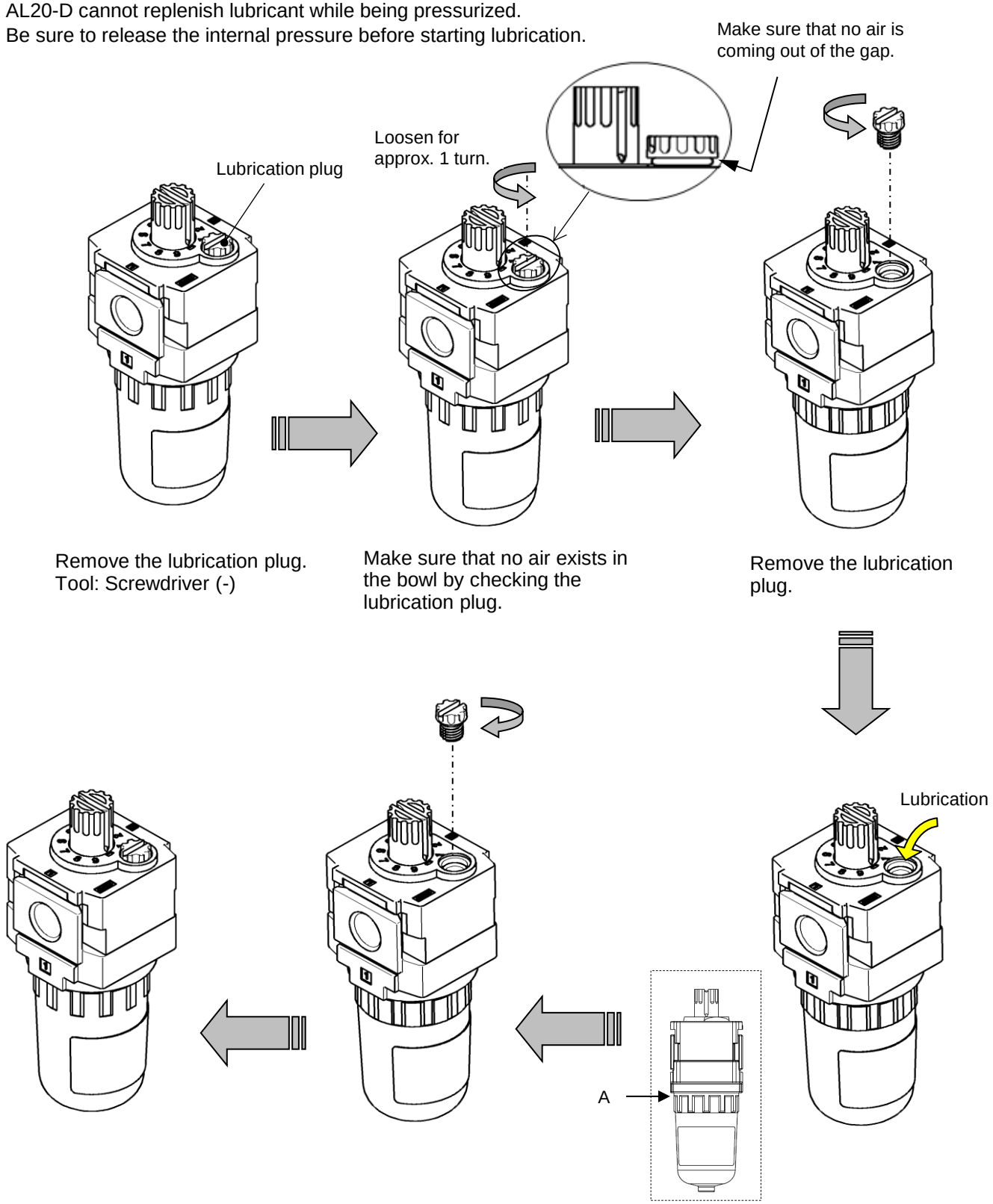


While supplying air, rotate the oil regulating valve to adjust the amount of oil.
Rotate the valve in the arrow direction shown in the figure to increase the amount of oil supplied.
(The amount of oil decreases when rotated in reverse.)
From the fully closed position, three rotations will bring it to the fully opened position. Do not rotate it any further than this.
Note that the numbered scale markings are guidelines for adjusting the position, and not indicators of the dripping amount.
Furthermore, oil may drip even when the oil regulating valve is at a fully closed position. If dripping is not acceptable, please stop using the lubricator.

8-2. Lubrication

AL20-D

AL20-D cannot replenish lubricant while being pressurized.
Be sure to release the internal pressure before starting lubrication.



Remove the lubrication plug.
Tool: Screwdriver (-)

Make sure that no air exists in the bowl by checking the lubrication plug.

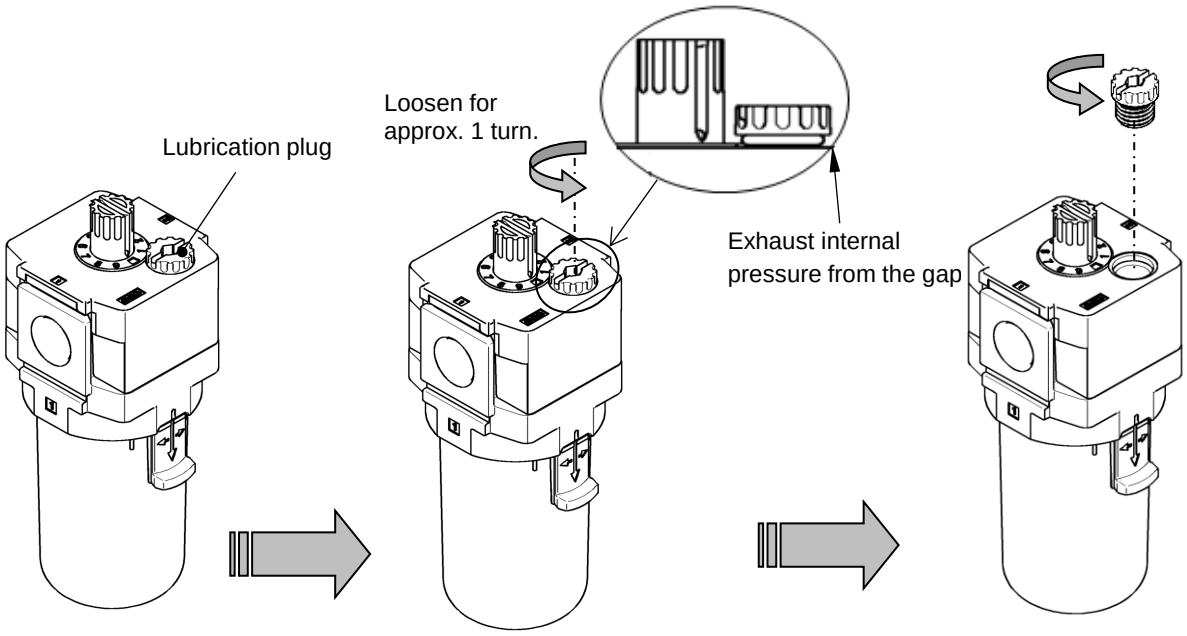
Remove the lubrication plug.

Supply lubricant up to the threaded part (A) of the bowl.
Note) If an oil film appears on the lubrication port, oil may overflow. Supply lubricant slowly so that the oil film is not generated.

After supplying lubricant, check the mounting condition of the lubrication plug O-ring and screw it in gently.
Because of the O-ring seal structure, it is not necessary to screw strongly.
<Recommended tightening torque>
0.3 +/- 0.05 N m

AL30-D, AL40-D, AL50-D, AL60-D

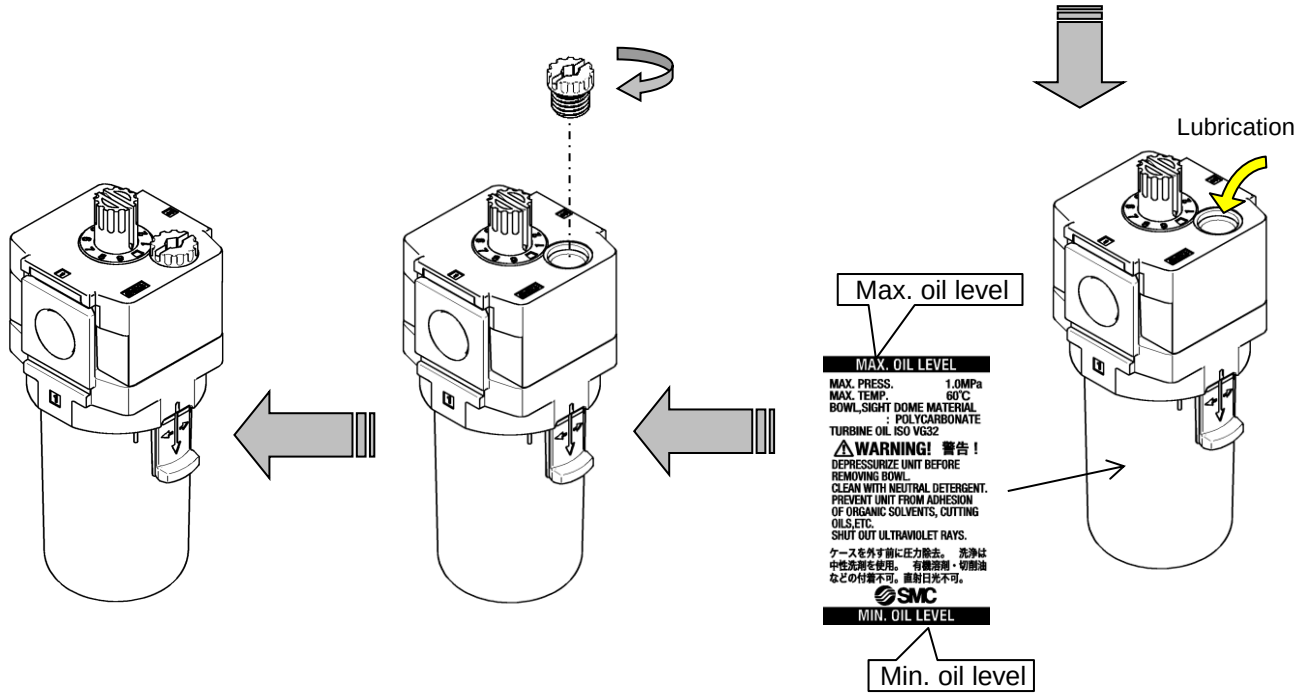
AL30-D, AL40-D, AL50-D and AL60-D can replenish lubricant while being pressurized. When supplying lubricant under pressure, loosen the lubrication plug slowly by approximately one turn to exhaust the air in the bowl. After confirming that the exhaust is complete, remove the lubrication plug (there is a small leakage even after the exhaust is complete). There is always a small leakage from the lubrication port. Supply lubricant slowly up to the oil level limit so that an oil film is not generated.



Remove the lubrication plug.
Tool: Screwdriver (-)

Exhaust internal air from the lubrication plug.

Remove the lubrication plug.



After supplying lubricant, check the mounting condition of the lubrication plug O-ring and screw it in gently.
Because of the O-ring seal structure, it is not necessary to screw strongly.
<Recommended tightening torque>
AL30-D: 0.4+/-0.05 N m
AL40-D, AL50-D, AL60-D: 0.55+/-0.05 N m

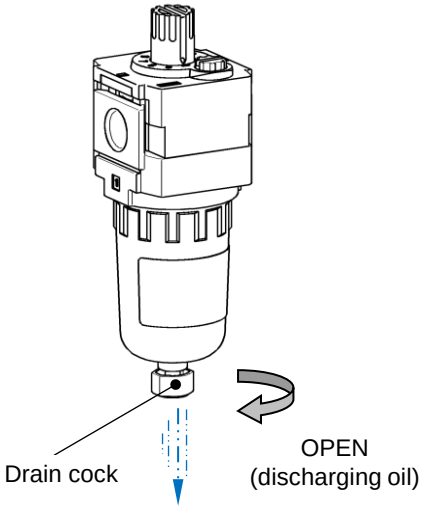
Supply lubricant until the oil surface comes between the lower and upper limits of the oil level of the bowl.
Note) If an oil film appears on the lubrication port, oil may overflow. Supply lubricant slowly so that an oil film is not generated. Air containing oil may come out. Be sure to wear protective glasses when supplying lubricant.

8-3. Oil Discharge from the Product with Drain Cock

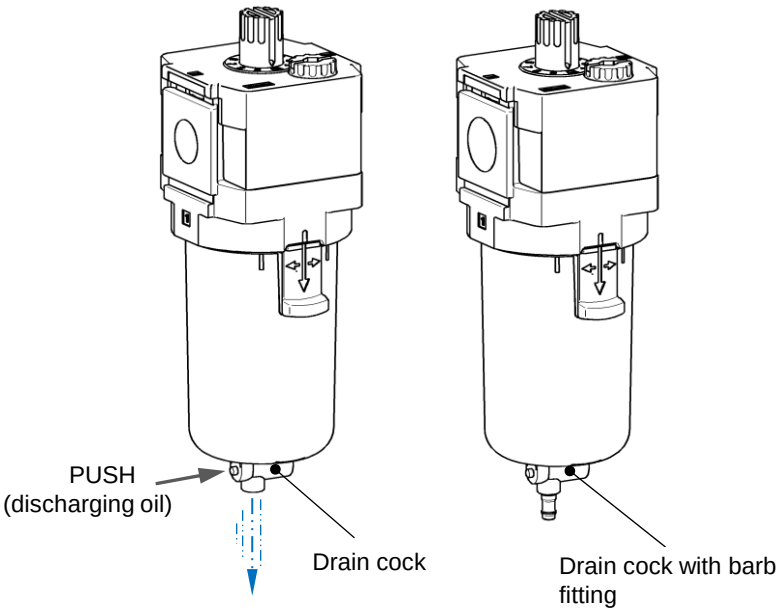
– Pressurize the inside of the lubricator when discharging oil. Oil will not be discharged properly if not pressurized.

– Oil discharge mechanism is different depending on the bowl assembly. Check the bowl assembly and discharge the oil following the method below.
Rotation type: After discharging the oil, tighten the drain cock to the opposite direction by hand until the seal inside seals correctly. Use of a tool can damage the product.

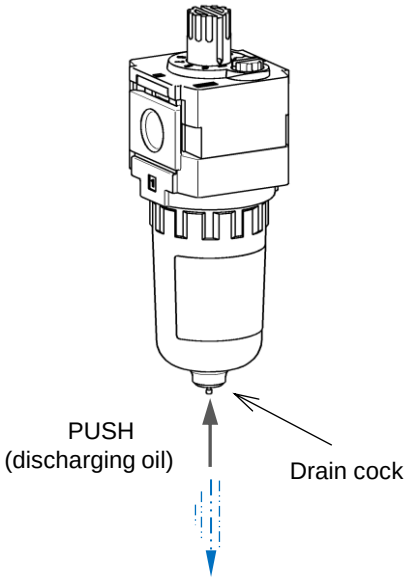
AL20-D: Drain cock (rotation type)
(Polycarbonate bowl / Nylon bowl)



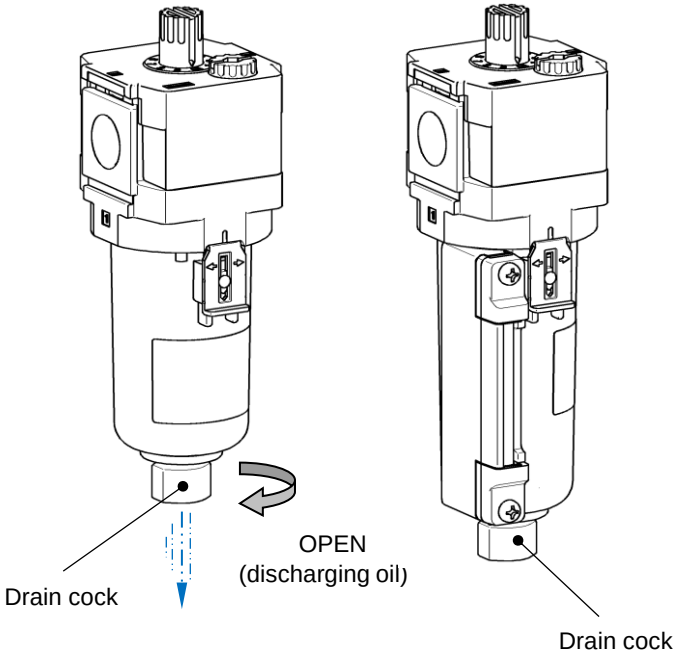
AL30-D/ AL40-D/ AL50-D/ AL60-D: Drain cock / with barb fitting (push type)
(Polycarbonate bowl / Nylon bowl)



AL20-D: Drain cock (push type)
(Metal bowl)



AL30-D/ AL40-D/ AL50-D/ AL60-D: Drain cock (rotation type)
(Metal bowl / Metal bowl with level gauge)



9. Trouble Shooting

Refer to sections [8. Operation and Adjustment] (P16-P19), [10. How to Replace the Components] (P21-30) and [11. Disassembly Drawing] (P31-32).

Trouble		Possible cause	Countermeasure	Page for reference
Category	Failure			
Oil droplets	Oil does not drip.	1. The product is installed opposite to the flow direction.	Install the product correctly after confirming the flow direction. "1" indicates the IN and "2" indicates the OUT.	-
		2. Oil level in the bowl is low.	Supply lubricant so that the oil surface appears above the "MIN. OIL LEVEL" display on the bowl.	P17-18
		3. The flow rate is insufficient.	Supply air more than the minimum dripping flow rate. If the flow rate cannot be increased, select the model based on the minimum dripping flow rate.	P7
		4. Bumper is damaged.	Replace the bumper.	P28-30
		5. Oil regulating valve is closed.	While supplying air, open the oil regulating valve to adjust the dripping amount. Refer to section [8. Operation and Adjustment] (P16) for the adjustment of the dripping amount.	P16
		6. Air leakage from the bowl or lubrication plug.	Replace the bowl seal or lubrication plug assembly.	P18 P21-23
		7. Element at the end of the siphon tube is clogged.	Replace the damper retainer assembly.	P24-27
		8. Air leakage from the sight dome.	Replace the sight dome assembly.	P28-30
	Bubble exists in an oil droplet.	1. Seal of the siphon tube is damaged.	Replace the damper retainer assembly.	P24-27
		2. Oil level in the bowl is low.	Supply lubricant so that the oil surface appears above the "MIN. OIL LEVEL" display on the bowl.	P17-18
Air leakage	Air or oil leaks from the sight dome.	1. The sight dome or O-ring is damaged.	Replace the sight dome assembly.	P28-30
	Air leaks from the lubrication plug.	2. O-ring is damaged.	Replace the lubrication plug assembly. Refer to section [8-2 Lubrication] of [8. Operation and Adjustment] for the replacement of the lubrication plug.	P17-18
	Air leaks from the gap between the bowl and body.	3. Bowl seal is damaged.	Replace the bowl seal. Apply grease before replacing the bowl seal. Note)	P21-23
	Air leaks from the bowl.	4. The bowl is damaged.	Replace the bowl assembly. (If the solvent is considered to be harmful, replacement to the metal bowl is recommended)	P21-23

Note) Fluorine grease is recommended.

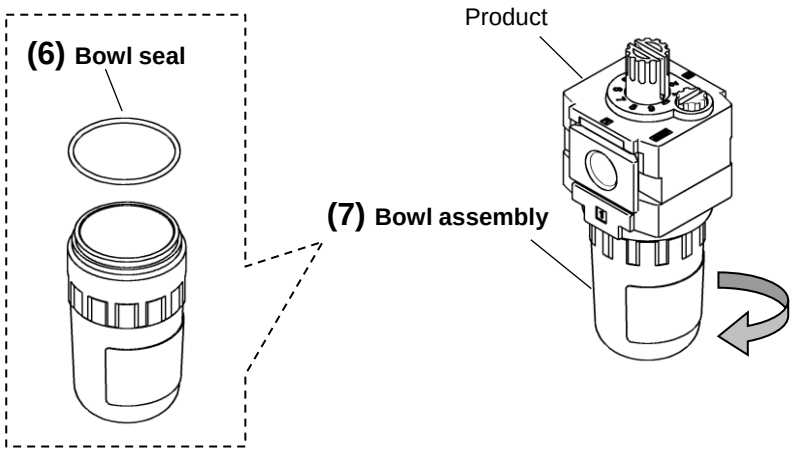
10. How to Replace the Components

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.

10-1. Bowl Assembly Replacement

<table>
<tr><th>Applicable model</th><th>Work category</th><th>Procedure</th><th>Tool</th><th>Criteria</th></tr>
<tr><td rowspan="6">AL20-D</td><td>Disassembly</td><td>1) Remove the bowl assembly from the product. If the bowl assembly is tightened too much to be removed, use a hook spanner until it can be loosened by hand.</td><td>Spanner specified for SMC Product No.: 1129129</td><td>–</td></tr>
<tr><td colspan="4"> 
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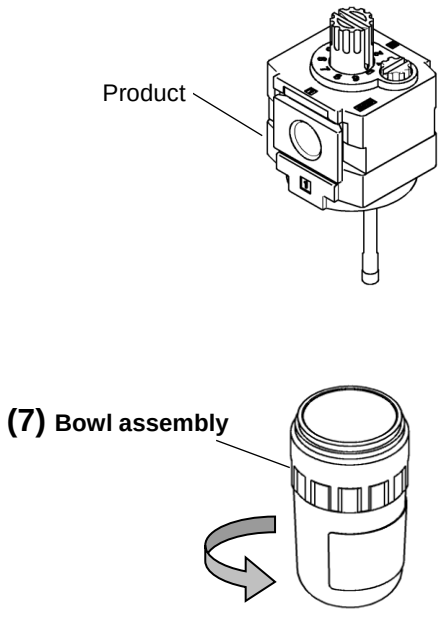
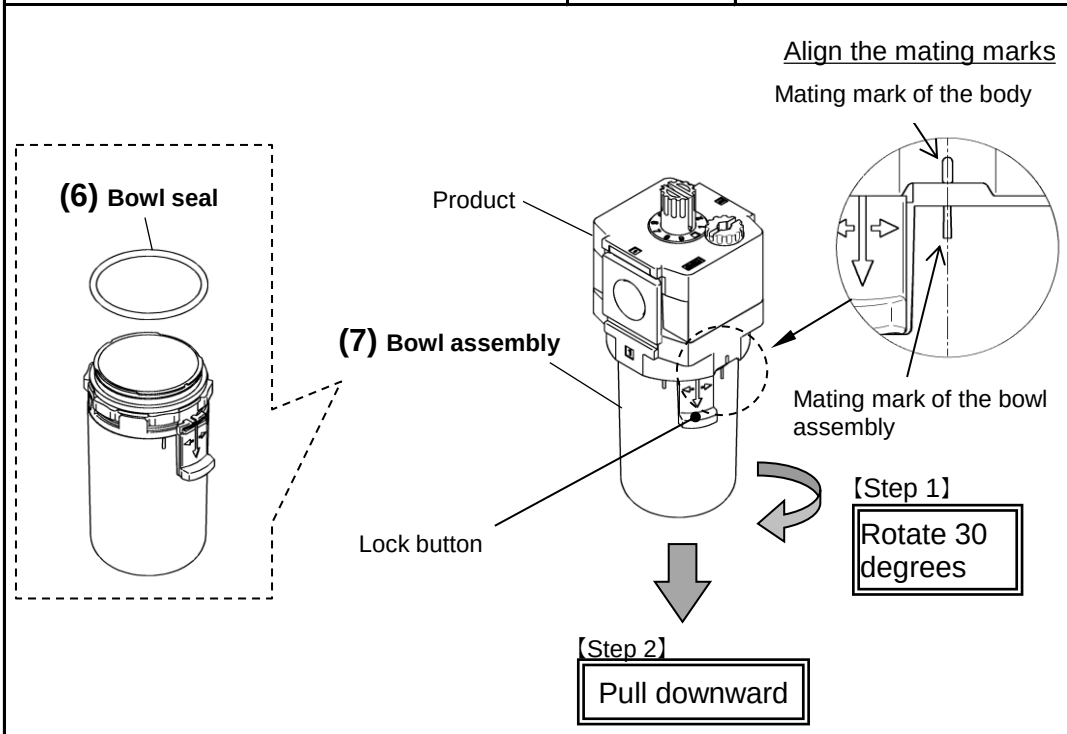
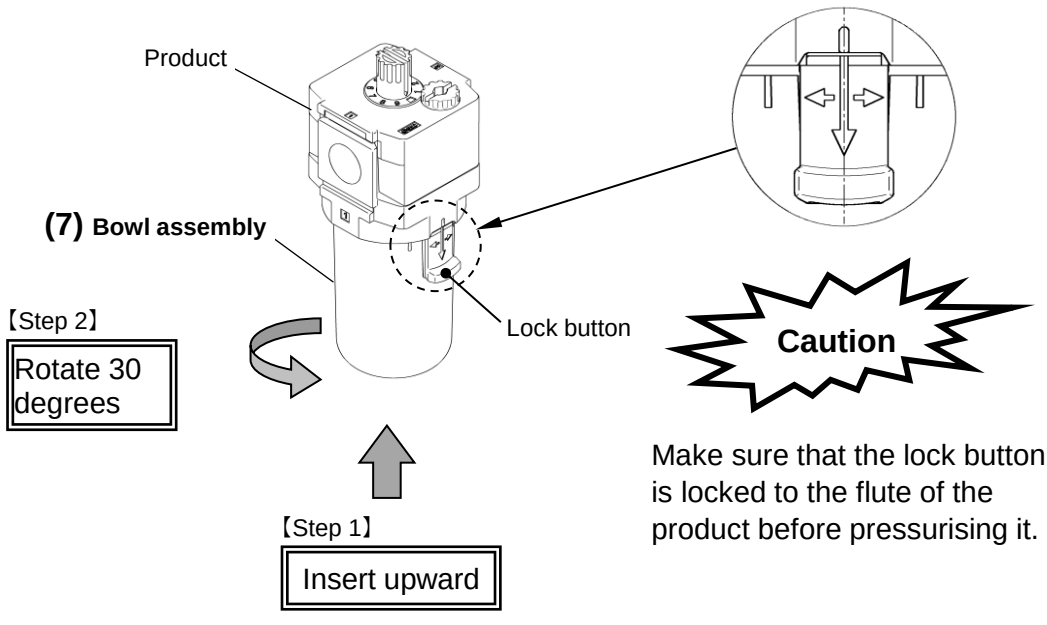
<tr><td>Work category</td><td>Procedure</td><td>Tool</td><td>Criteria</td></tr>
<tr><td>Assembly</td><td>2) Screw the bowl assembly into the product. Tighten it referring to the specified torque.</td><td>–</td><td>Reference tightening torque: 2.2 N m</td></tr>
<tr><td colspan="4"> 
</td></tr>
</table>

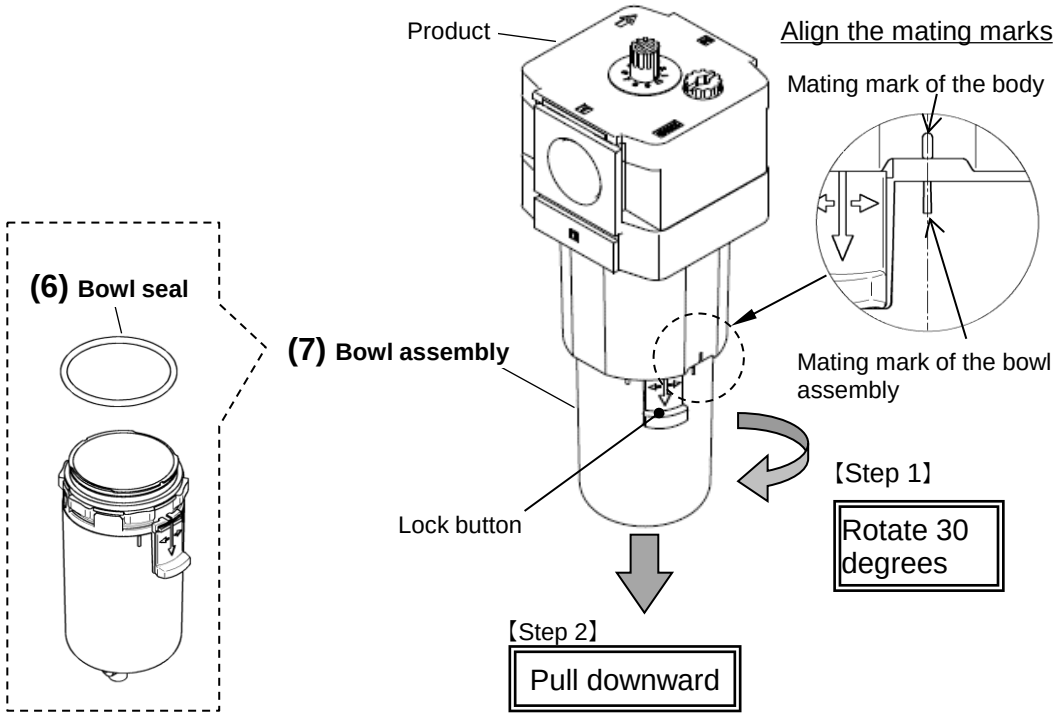
Applicable model	Work category	Procedure	Tool	Criteria
AL30-D AL40-D	Disassembly	1) Remove the bowl assembly from the product. While the lock button is held down, rotate the bowl assembly by approx. 30 degrees so that the mating marks of the body and bowl assembly meet each other. Then remove the bowl assembly by pulling it downward.	–	–



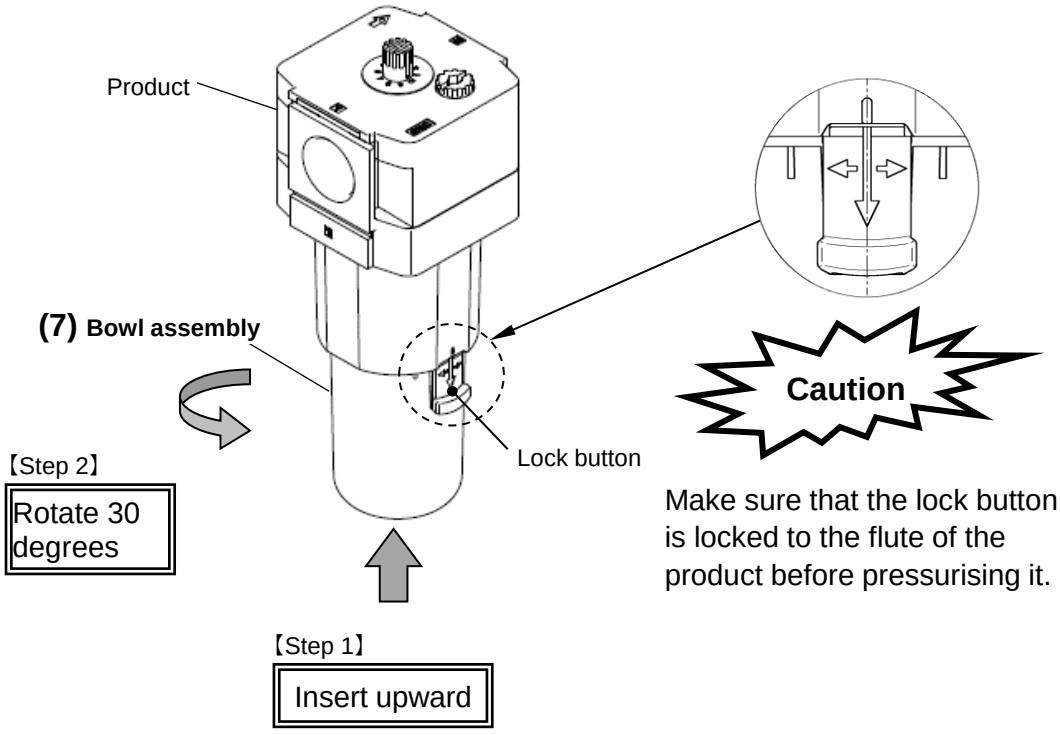
Work category	Procedure	Tool	Criteria
Assembly	1) Mount the bowl assembly to the product and rotate the bowl assembly until the lock button is locked in position as shown in the figure below.	–	–



Applicable model	Work category	Procedure	Tool	Criteria
AL50-D AL60-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.	–	–

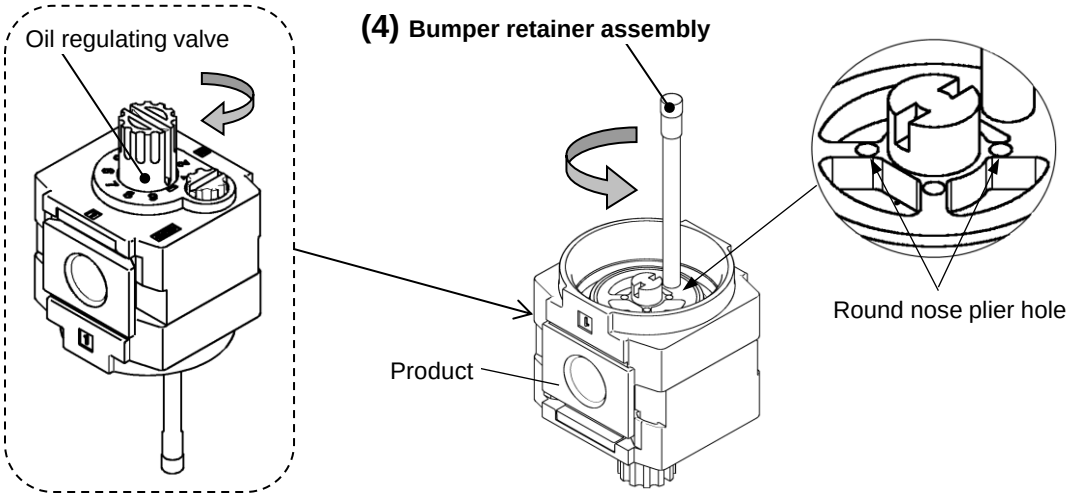


Work category	Procedure	Tool	Criteria
Assembly	1) Mount the bowl assembly to the product and rotate the bowl assembly until the lock button is locked in position as shown in the figure below.	–	–

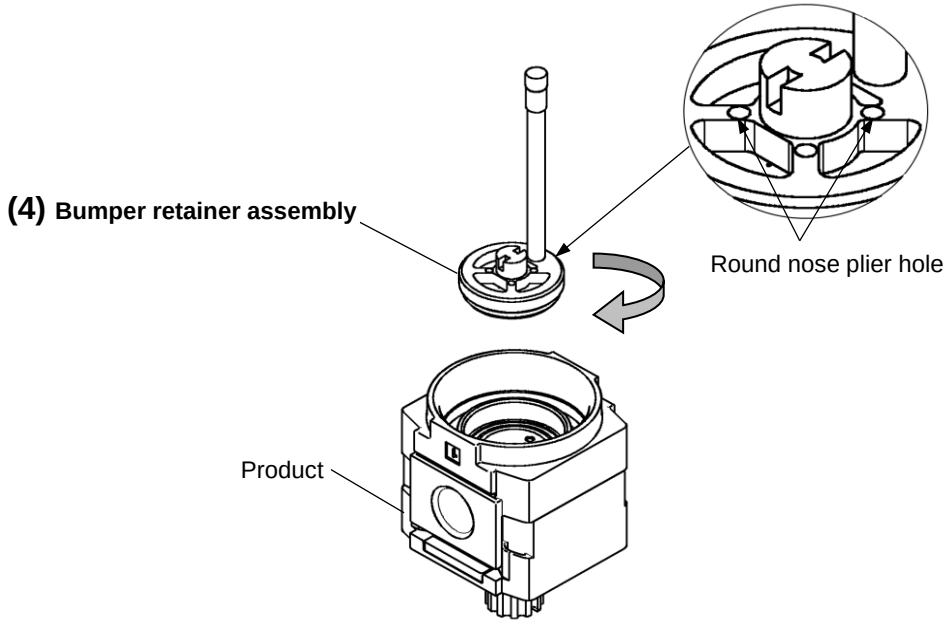


10-2. Bumper Retainer Assembly Replacement

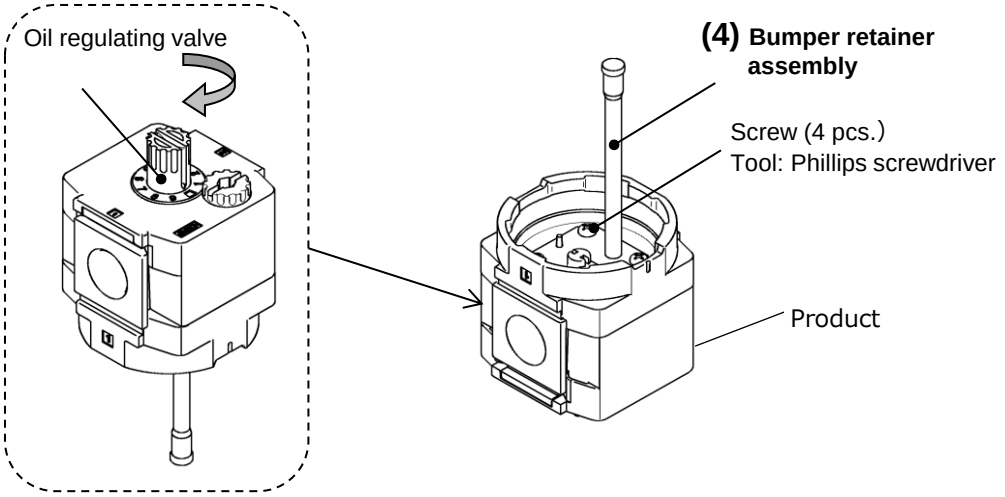
Applicable model	Work category	Procedure	Tool	Criteria
AL20-D	Disassembly	1) Remove the bowl assembly referring to section [10-1. Bowl Assembly Replacement] (P21). After removing the bowl assembly, rotate the oil regulating valve by hand to close the valve fully before disassembly. Remove the bumper retainer assembly by hooking the round nose pliers to the holes and turning them in the direction of the figure.	Round nose pliers (125 or 150)	–



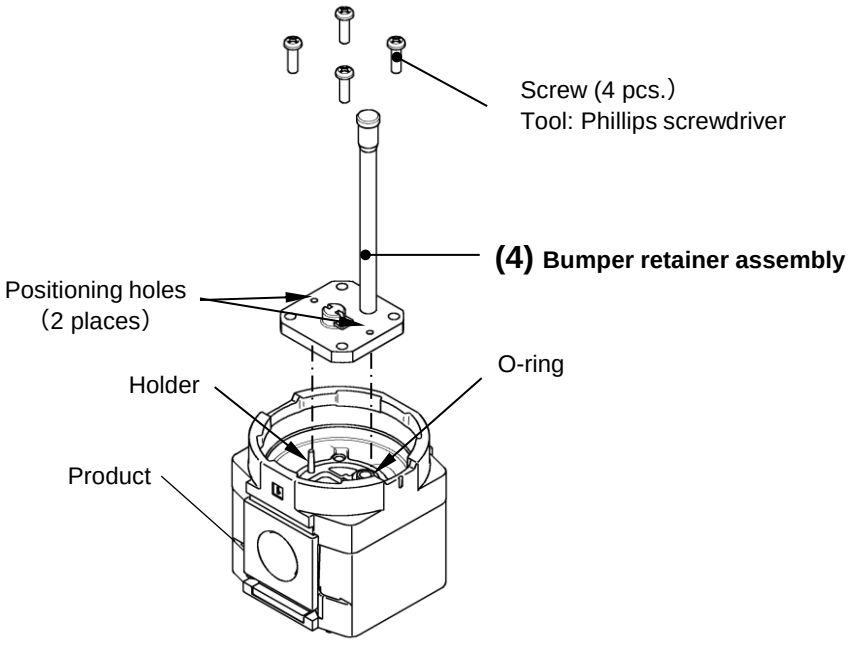
Work category	Procedure	Tool	Criteria
Assembly	2) Screw the damper retainer assembly into the product. After assembling, mount the bowl assembly referring to section [10-1. Bowl Assembly Replacement] (P21).	Round nose pliers (125 or 150)	Tightening torque [N m] Model: AL20-D — Torque: 1.4+/-0.1



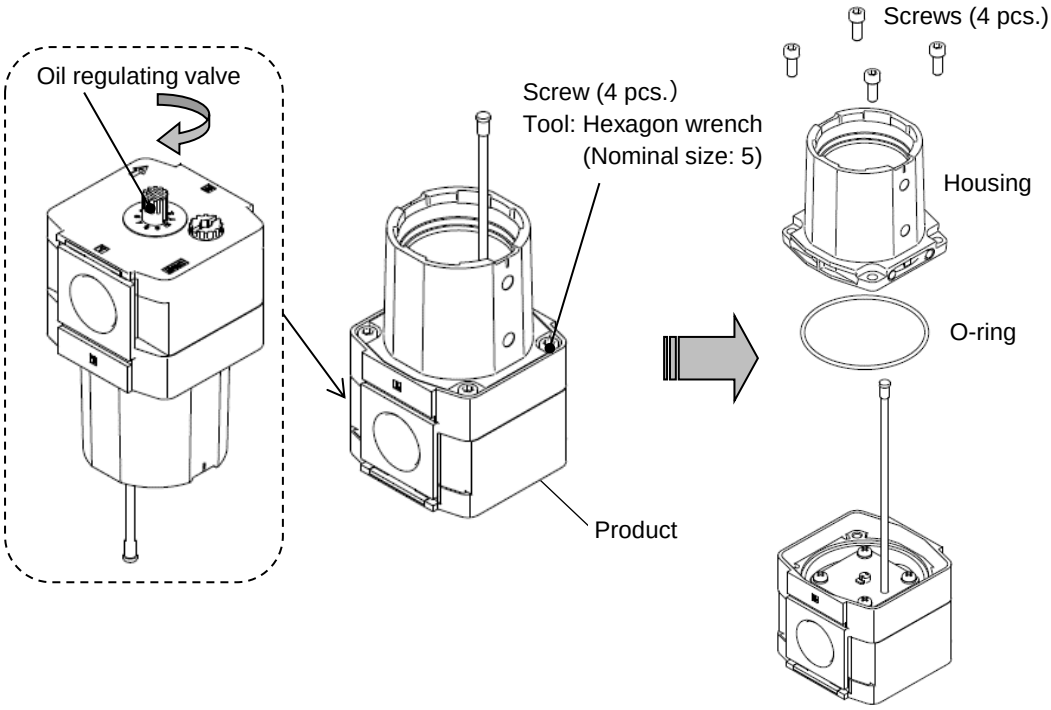
Applicable model	Work category	Procedure	Tool	Criteria
AL30-D AL40-D	Disassembly	1) Remove the bowl assembly referring to section [10-1. Bowl Assembly Replacement] (P22). After removing the bowl assembly, rotate the oil regulating valve by hand to close the valve fully before disassembly. Remove the four screws, and then remove the bumper retainer assembly. There is an O-ring between the bumper retainer assembly and the holder assembly. Be careful not to miss it.	Phillips screwdriver	–



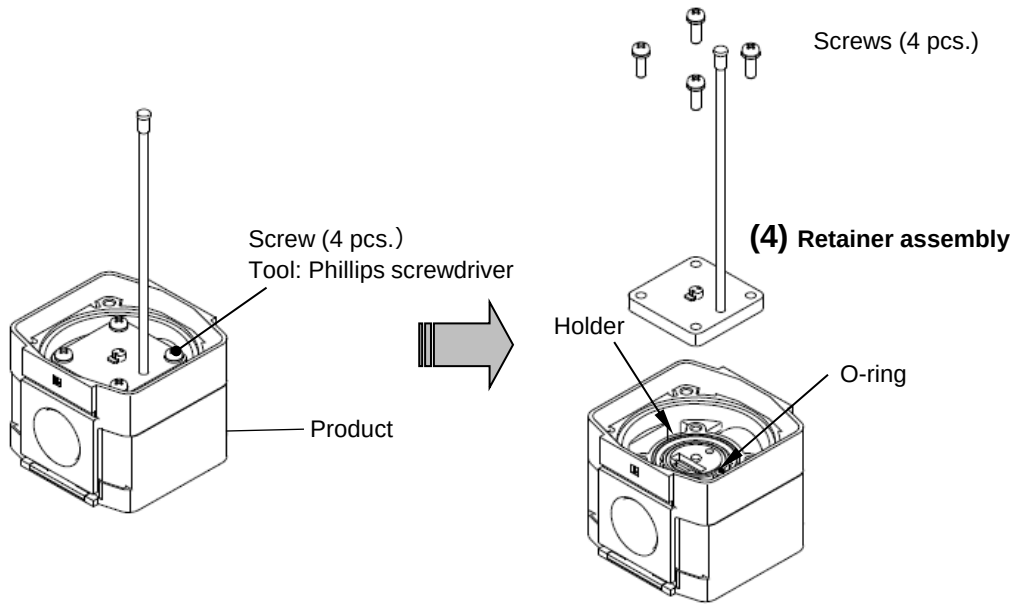
Work category	Procedure	Tool	Criteria
Assembly	2) Ensure that the O-ring is mounted correctly. Mate the holders and the positioning holes on the bumper retainer assembly. Tighten the bumper retainer assembly with 4 screws as in the figure below. After assembling, mount the bowl assembly referring to section [10-1. Bowl Assembly Replacement] (P22).	Phillips screwdriver	Tightening torque [N m] Model / Torque AL30-D / 0.4+/-0.1 AL40-D / 0.7+/-0.2



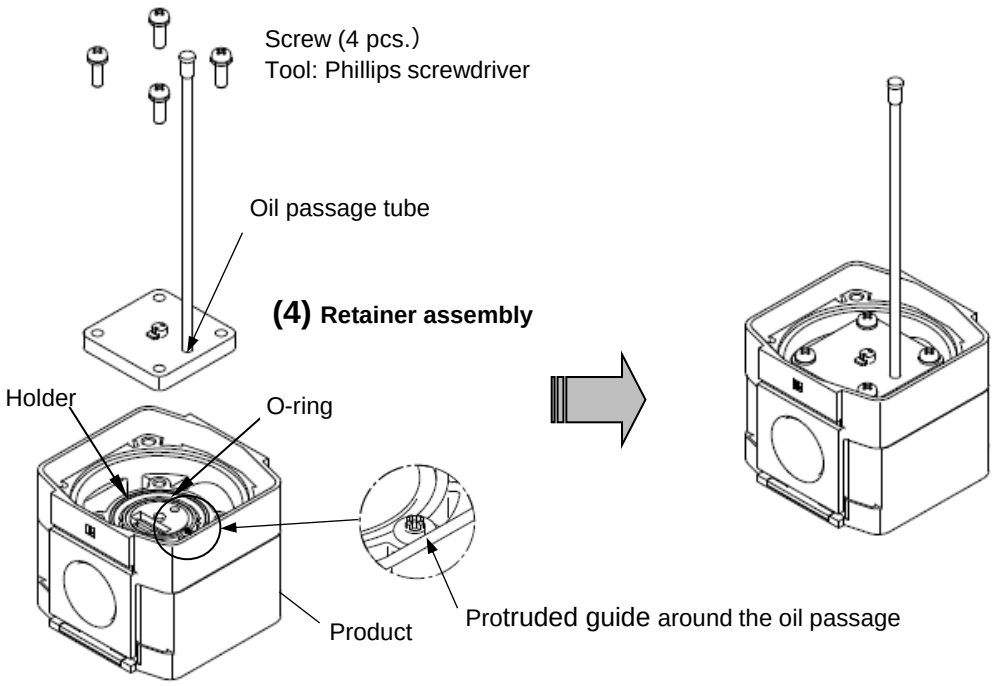
Applicable model	Work category	Procedure	Tool	Criteria
AL50-D AL60-D	Disassembly	1) Remove the bowl assembly referring to section [10-1. Bowl Assembly Replacement] (P23). After removing the bowl assembly, rotate the oil regulating valve by hand to close the valve fully before disassembly. Remove 4 screws. Remove the housing and O-ring.	Hexagon wrench (Nominal size: 5)	–



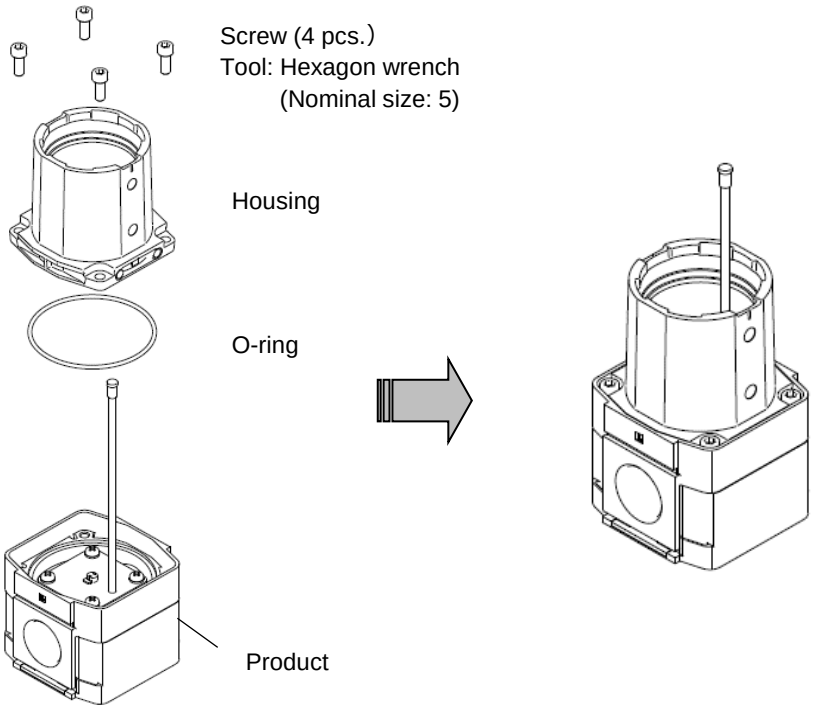
Work category	Procedure	Tool	Criteria
Disassembly	2) Remove the four screws and then remove the bumper retainer. There is an O-ring between the bumper retainer assembly and the holder assembly. Be careful not to miss it.	Phillips screwdriver	–



Applicable model	Work category	Procedure	Tool	Criteria
AL50-D AL60-D	Assembly	1) Ensure that the O-ring is mounted correctly. Match the position of the oil passage tube on the retainer assembly with the protruded guide around the oil passage on the holder. Mount the retainer assembly to the holder in the direction shown in the drawing below and tighten it with 4 screws.	Phillips screwdriver	Tightening torque [N m] Model: AL50-D, AL60-D — Torque: 1.4+/-0.1

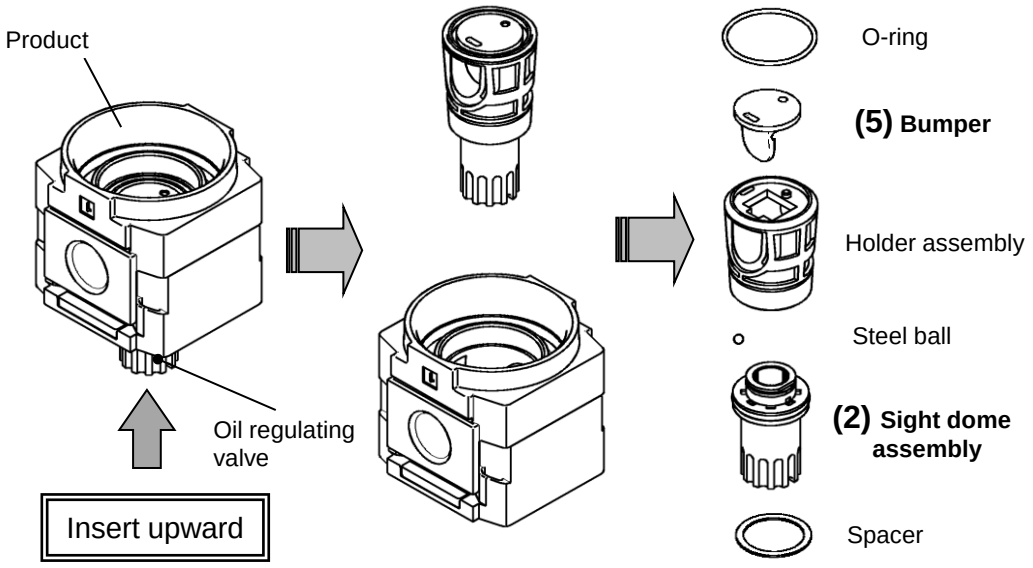


Work category	Procedure	Tool	Criteria
Assembly	2) Mount the O-ring and housing to the body. Assemble them with 4 screws. After assembling, mount the bowl assembly referring to section [10-1. Bowl Assembly Replacement] (P23).	Hexagon wrench (Nominal size: 5)	Tightening torque [N m] Model: AL50-D, AL60-D — Torque: 3.5+/-0.3

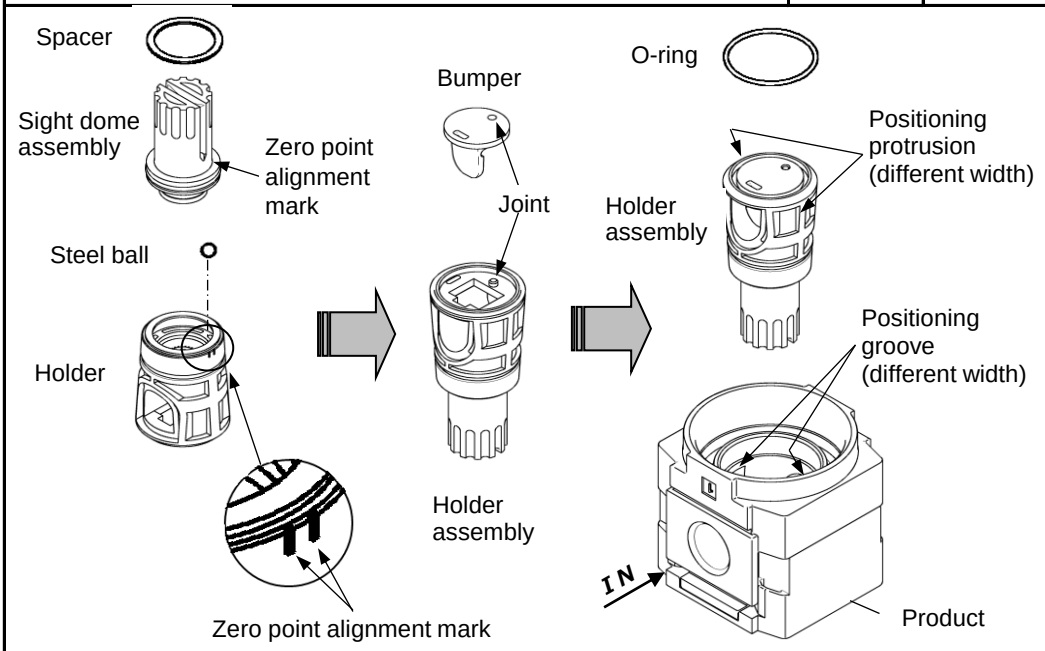


10-3. Bumper and Sight Dome Assembly Replacement

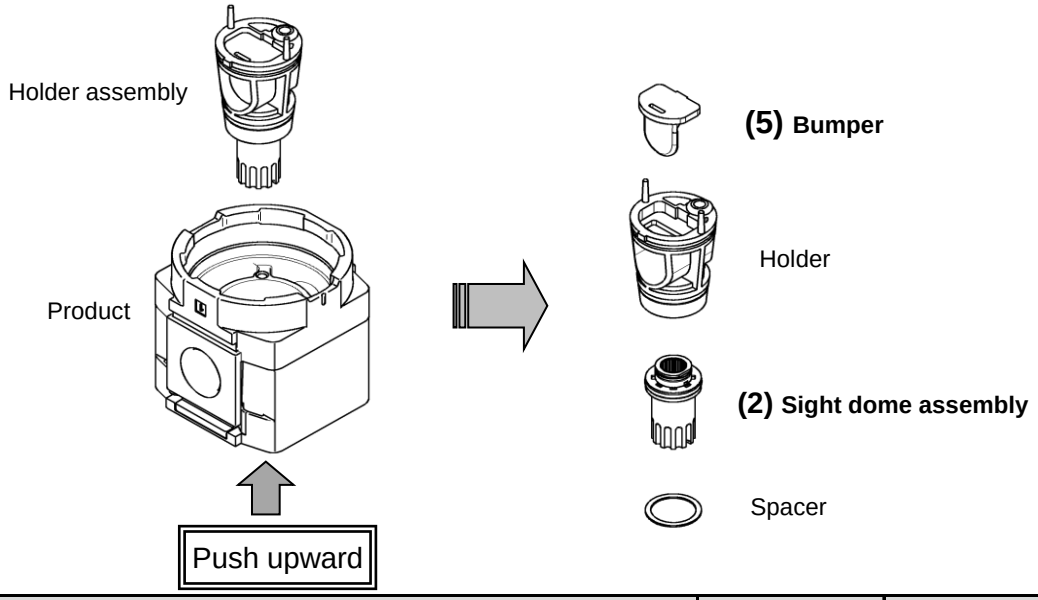
Applicable model	Work category	Procedure	Tool	Criteria
AL20-D	Disassembly	1) Remove the bumper retainer assembly referring to section [10-2. Bumper Retainer Assembly Replacement] (P24). After removing the bumper retainer assembly, remove the holder assembly by pushing the oil regulating value (sight dome assembly) into the body. Separate the holder assembly and sight dome assembly by hand. There is a steel ball inside. Please take care not to miss it.	–	–



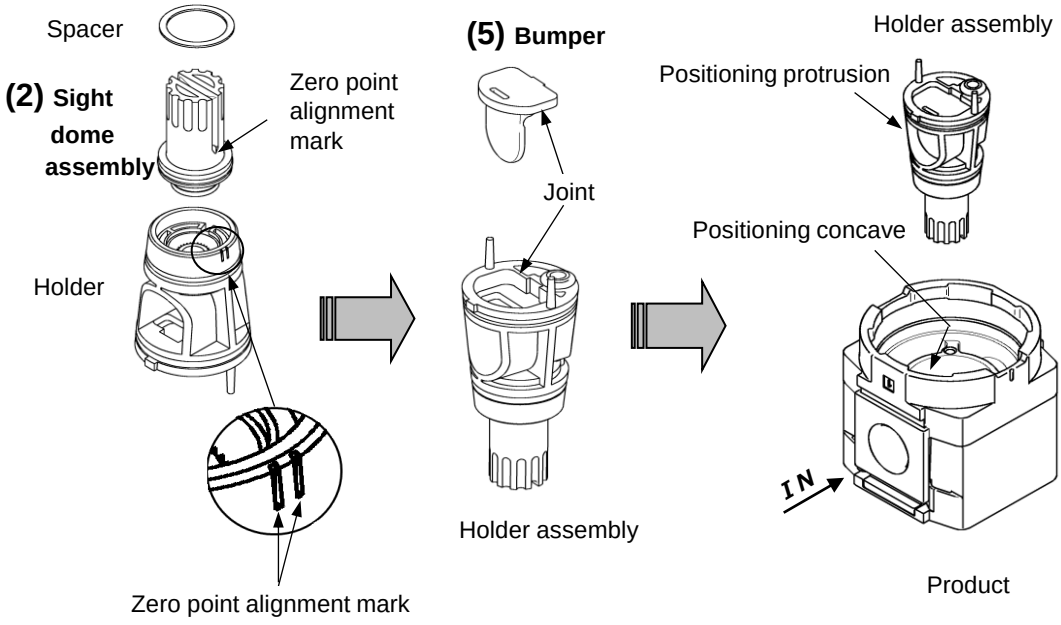
Work category	Procedure	Tool	Criteria
Assembly	2) Assemble the spacer, sight dome assembly, steel ball and holder. Place the steel ball in the oil inlet of the holder assembly and assemble the sight dome assembly by aligning the zero point alignment mark of the sight dome assembly with the zero point alignment mark of the holder assembly. Next, install the bumper in the holder assembly. Assemble them in a direction that matches the shape of the bumper and the protrusion of the holder assembly. Lastly, assemble the holder assembly to the body. When the holder assembly and body are assembled with correct positioning, the end surfaces of the holder and body become flat. After assembling the O-ring, assemble the bumper retainer assembly referring to section [10-2. Bumper Retainer Assembly Replacement] (P24).	–	–



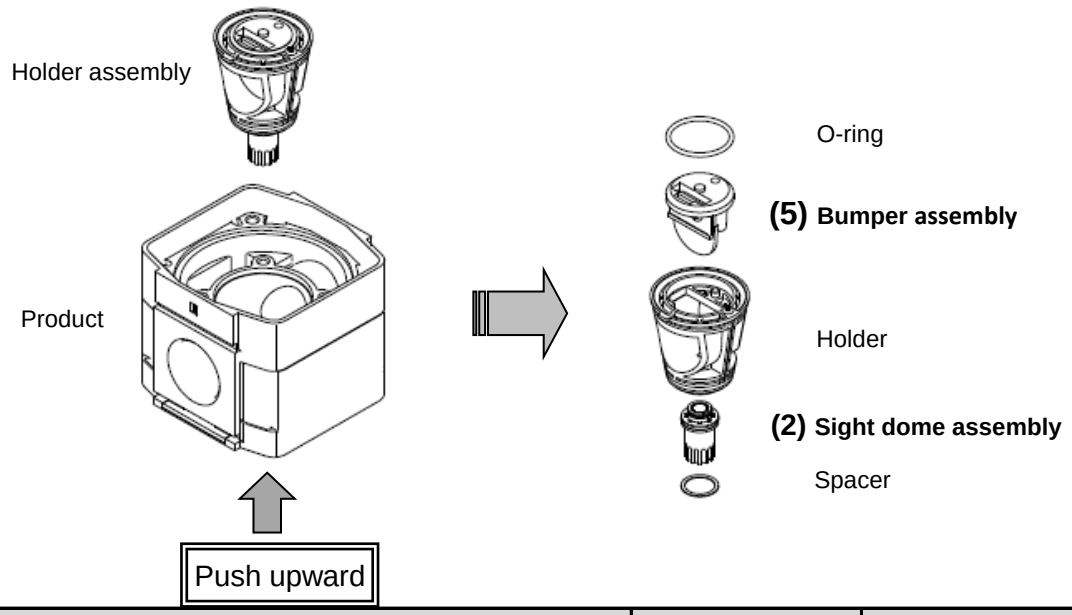
Applicable model	Work category	Procedure	Tool	Criteria
AL30-D AL40-D	Disassembly	1) Remove the bumper retainer assembly referring to section [10-2. Bumper Retainer Assembly Replacement] (P25). Remove the sight dome assembly by pushing it in the arrow direction. Separate the holder assembly and sight dome assembly by hand. Remove the bumper using tweezers so that it is not damaged.	Tweezers	–



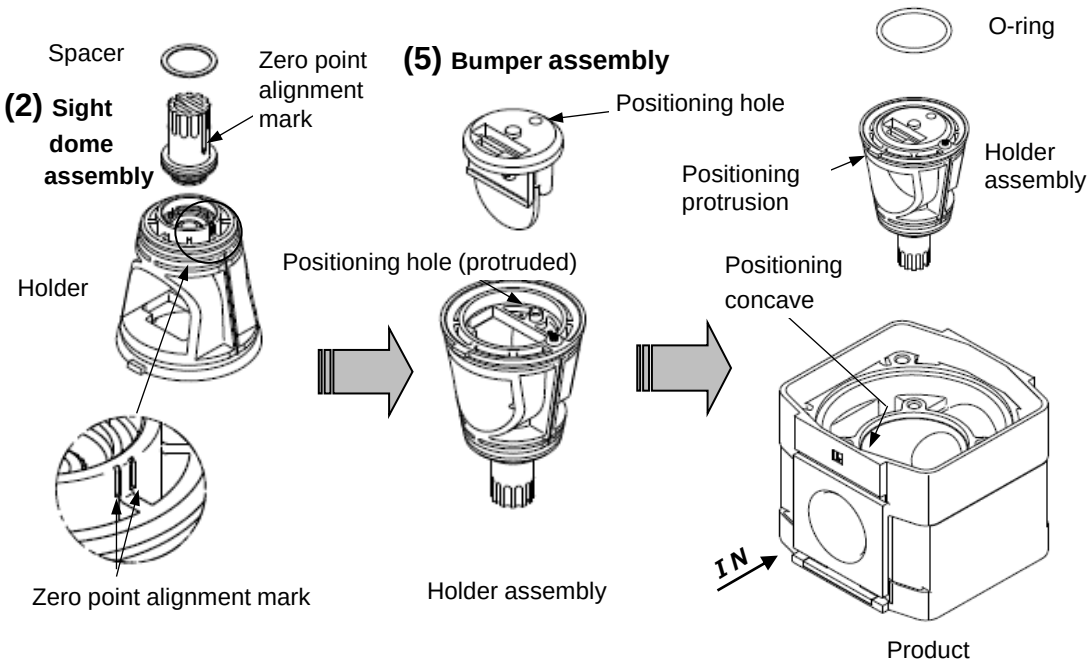
Work category	Procedure	Tool	Criteria
Assembly	2) Assemble the spacer, sight dome assembly and holder. Assemble the sight dome assembly by aligning the zero point alignment mark of the sight dome assembly with the zero point alignment mark of the holder assembly. Next, install the bumper in the holder assembly. Assemble them in a direction that matches the shape of the bumper and the concave of the holder assembly. Lastly, assemble the holder assembly to the body. When the holder assembly and body are assembled with correct positioning, the end surfaces of the holder and body become flat. After assembling, mount the bumper retainer assembly referring to section [10-2. Bumper Retainer Assembly Replacement] (P25).	–	–



Applicable model	Work category	Procedure	Tool	Criteria
AL50-D AL60-D	Disassembly	1) Remove the retainer assembly referring to section 10-2. Retainer Assembly Replacement] (P26 to 27). Remove the sight dome assembly by pushing it in the arrow direction. Separate the holder assembly and sight dome assembly by hand. Remove the bumper assembly using tweezers so that it is not damaged.	Tweezers	–

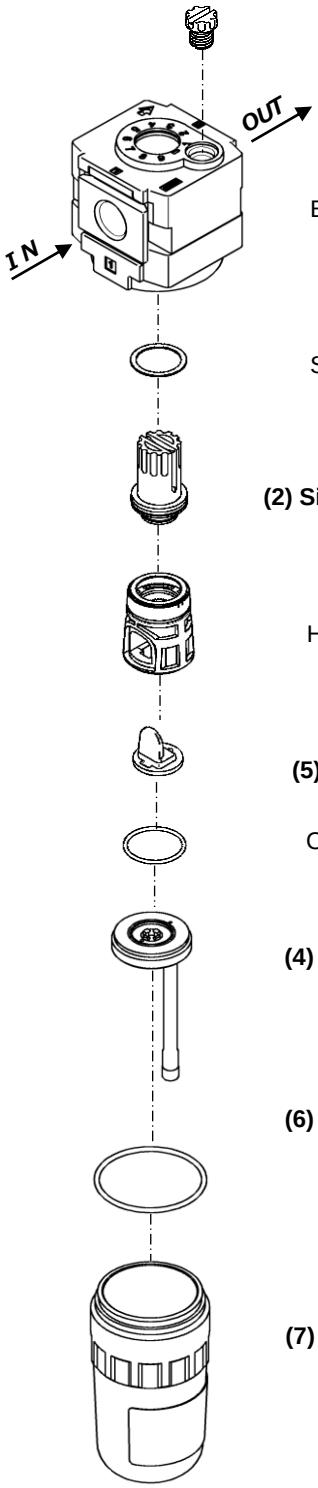


Work category	Procedure	Tool	Criteria
Assembly	2) Assemble the spacer, sight dome assembly and holder. Assemble the sight dome assembly by aligning the zero point alignment mark of the sight dome assembly with the zero point alignment mark of the holder assembly. Next, install the bumper assembly in the holder assembly. Assemble the bumper assembly and holder assembly when their positioning hole match. Be careful with the side of the protrusion. Lastly, assemble the holder assembly and O-ring to the body. When the holder assembly and body are assembled with correct positioning, the end surfaces of the holder and body become flat. After assembling, mount the retainer assembly referring to section 10-2. Retainer Assembly Replacement] (P26 to 27).	–	–



11. Disassembly Drawing

AL20-D



(3) Lubrication plug assembly

Body

Spacer

(2) Sight dome assembly

Holder

(5) Bumper

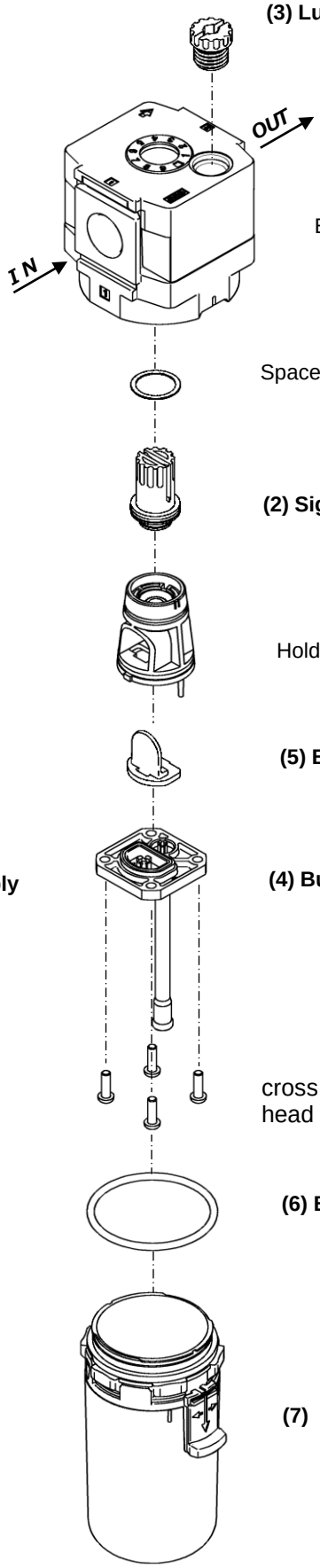
O-ring

(4) Bumper retainer assembly

(6) Bowl seal

(7) Bowl assembly

AL30-D, AL40-D



(3) Lubrication plug assembly

Body

Spacer

(2) Sight dome assembly

Holder

(5) Bumper

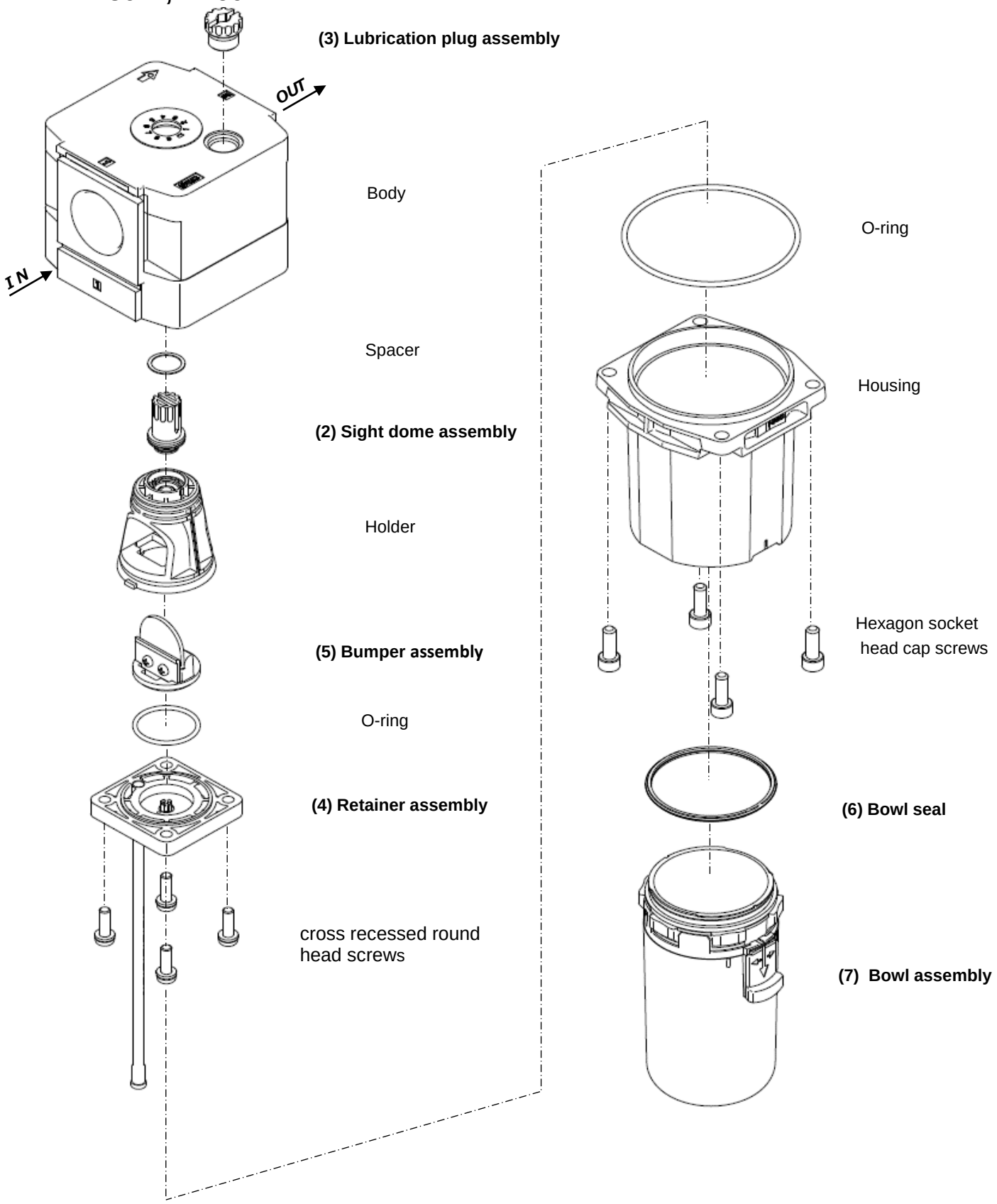
(4) Bumper retainer assembly

cross recessed round head screws

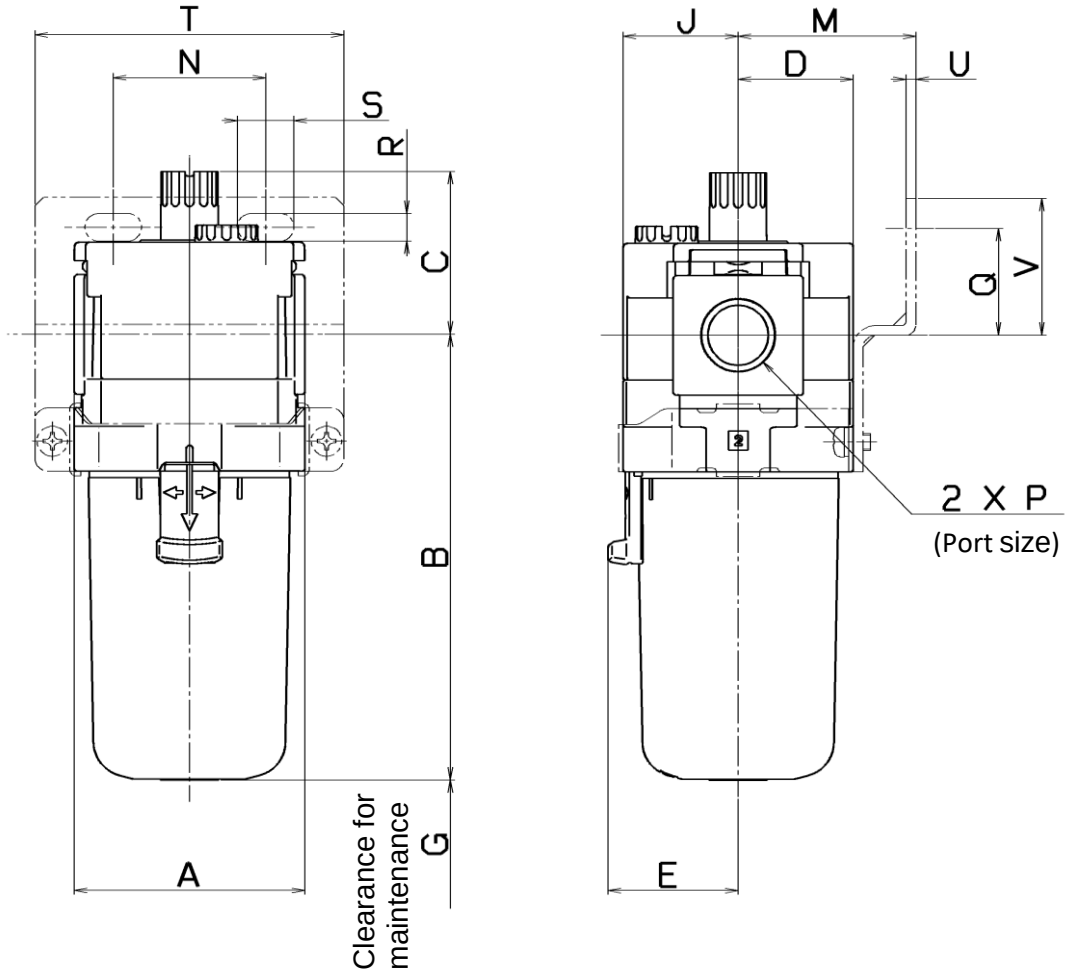
(6) Bowl seal

(7) Bowl assembly

AL50-D, AL60-D


(3) Lubrication plug assembly
OUT
IN
Body
Spacer
(2) Sight dome assembly
Holder
(5) Bumper assembly
O-ring
(4) Retainer assembly
cross recessed round head screws
O-ring
Housing
Hexagon socket head cap screws
(6) Bowl seal
(7) Bowl assembly

12. Dimensions



Model	Standard specifications								Bracket mount							
	P	A	B	C	D	E	G	J	M	N	Q	R	S	T	U	V
AL20-D	1/8, 1/4	40	79.3	35.9	21	–	60	21	30	27	22	5.4	8.4	60	2.3	28
AL30-D	1/4, 3/8	53	104.3	38.1	26.5	30	80	26.5	41	35	25	6.5	13	71	2.3	32
AL40-D	1/4, 3/8, 1/2	70	136.1	44	35.5	38.4	110	35.5	50	52	30	8.5	12.5	88	2.3	39
AL40-06-D	3/4	75	138.1	44	35.5	38.4	110	35.5	50	52	34	8.5	12.5	88	2.3	43
AL50-D	3/4, 1	90	209.1	48	45	–	110	45	70	66	40.5	11	13	113	3.2	52.5
AL60-D	1	95	223.1	48	45	–	110	45	70	66	40.5	11	13	113	3.2	52.5

Semi-standard bowl

Model	Semi-standard specifications					
	PC/PA bowl		Metal bowl		Metal bowl with level gauge	
	With drain cock	With barb fitting	Without drain cock	With drain cock	Without drain cock	With drain cock
	B	B	B	B	B	B
AL20-D	87.6	–	84.5	87.4	–	–
AL30-D	115.4	123.9	104.3	117.8	124.3	137.8
AL40-D	147.1	155.6	136	149.5	156.1	169.5
AL40-06-D	149.1	157.6	138	151.5	158.1	171.5
AL50-D	220.1	228.6	209	222.5	229	242.5
AL60-D	234.1	242.6	223	236.5	243	256.5

Revision history	
A	40-06,50,60 size added. Dec. 2020.
B	Changed the nylon bowl assembly number. (30,40 size) Nov. 2023

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