ORIGINAL INSTRUCTIONS

Instruction Manual

Lubricator

Series AL10-A to AL60-A



The intended use of AL-A modular style lubricator is to provide accurate lubricator of downstream equipment by adjusting the oil drop rate. The transparent bowl allows 360° monitoring of oil levels.

Validated according to ISO 13849, see section 2.

Refer to product catalogues for additional information.

2 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 relating to systems.
ISO 4413: Hydraulic fluid power - - General rules relating to systems.
IEC 60204-1: Safety of machinery - - Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots - - Safety. etc.

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- To ensure safety of personnel and equipment the safety instructions in this manual must be observed, along with other relevant safety practices.

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

⚠ Warning

- **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 catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

1 Safety Instructions - continued

- **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.
- **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.
- **Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
  1) Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
  2) Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustions and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specification described in the product catalogue.
  3) An application which could have negative effects on people, property, or animals requiring special safety analysis outside the scope of ISO 13849 described in this document.
  4) Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.
- **Always ensure compliance with relevant safety laws and standards.**
  All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

⚠ Caution

- **The product is provided for use in manufacturing industries.**
  The product herein described is basically provided for peaceful use in manufacturing industries.
  If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
  If anything is unclear, contact your nearest sales branch.

2 Specifications

2.4 Standard Specifications

Model	AL10-A	AL20-A	AL30-A	AL40-A	AL40-06-A	AL50-A	AL60-A
Port size	M5x0.8	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 temp.	-5 to 60°C (with no freezing)						
Proof pressure	1.5 MPa						
Max. operating pressure	1.0 MPa						
Min. operating frequency	1 cycles / min						
Min. dripping flow rate (L/min (ANR)) Note 1)	4	15	1/4: 30 3/8: 40	1/4: 30 3/8: 40 1/2: 50	50	190	220

Note 1) Assembly of a bracket and 2 mounting screws.

2.3 Bowl Assembly/Part No.

Bowl material	Lubricant exhaust port	Other	Model			
			AL10-A	**AL20-A**	**AL30-A**	**AL40-A AL40-06-A AL50-A AL60-A**
Polycarbonate bowl	Without drain cock	-	C1SL-A	C2SL-A	-	-
		With bowl guard	-	C2SL-C-A	C3SL-A	C4SL-A
	With drain cock	-	C1SL-3-A	C2SL-3-A	-	-
		With bowl guard	-	C2SL-3C-A	C3SL-3-A	C4SL-3-A
	Drain cock with barb fitting	With bowl guard	-	-	C3SL-3W-A	C4SL-3W-A
Nylon bowl	Without drain cock	-	C1SL-6-A	C2SL-6-A	-	-
		With bowl guard	-	C2SL-6C-A	C3SL-6-A	C4SL-6-A
	With drain cock	-	C1SL-36-A	C2SL-36-A	-	-
		With bowl guard	-	C2SL-36C-A	C3SL-36-A	C4SL-36-A
	Drain cock with barb fitting	With bowl guard	-	-	C3SL-36W-A	C4SL-36W-A
Metal bowl	Without drain cock	-	C1SL-2-A	C2SL-2-A	C3SL-2-A	C4SL-2-A
		With level gauge	-	-	C3LL-8-A	C4LL-8-A
	With drain cock	-	C1SL-23-A	C2SL-23-A	C3SL-23-A	C4SL-23-A
		With level gauge	-	-	C3LL-38-A	C4LL-38-A

Table 3

Note) Bowl assembly for the AL20-A to AL60-A models comes with a bowl seal. Please consult with SMC separately for psi and °F unit display specifications.

2 Specifications - continued

Oil capacity (cm^3)	7 / 25 / 55 / 135
Recommended lubricant	Class 1 turbine oil (ISO VG32)
Bowl material	Polycarbonate
Bowl guard	- / Semi-standard (Steel) / Standard (Polycarbonate)
Weight (kg)	0.07 / 0.10 / 0.20 / 0.38 / 0.43 / 0.94 / 1.09
Air quality required	5 µm filtration or smaller
Impact and vibration resistance	See section 3.2
B_{10} Note 2)	3.4 million cycles
B_{10D} Note 2)	6.8 million cycles
Standards	Complies with the basic and well-tried safety principles of EN ISO 13849-2:2012.

Table 1

Note 1) The flow rate is 5 drops or greater/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 the minimum dripping flow rate or more.
Note 2) Under SMC test conditions. The B_{10} figure is estimated from SMC life tests. The B_{10D} figure is derived from B_{10} using the assumption in EN ISO 13849-1:2015 Annex C. Contact SMC for details.

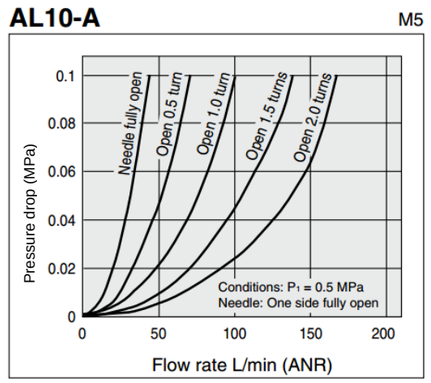
2.2 Option/Part No. Specifications

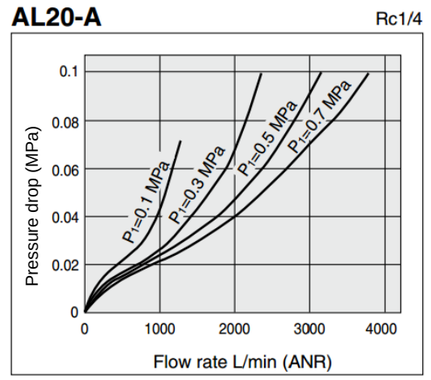
Optional specifications	Model						
	AL10-A	**AL20-A**	**AL30-A**	**AL40-A**	**AL40-06-A**	**AL50-A**	**AL60-A**
Bracket assembly Note 1)	-	AF22P-050AS	AF32P-050AS	AF42P-050AS	AF42P-070AS	AF52P-050AS	

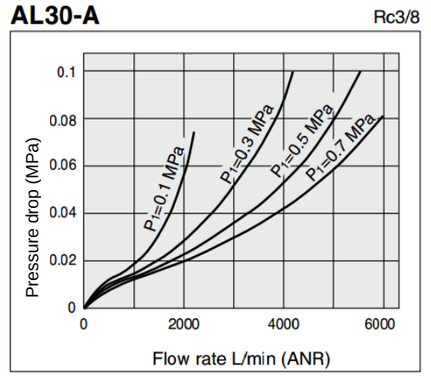
Table 2

2.4 Flow Rate Characteristics Specifications

(Representative values)



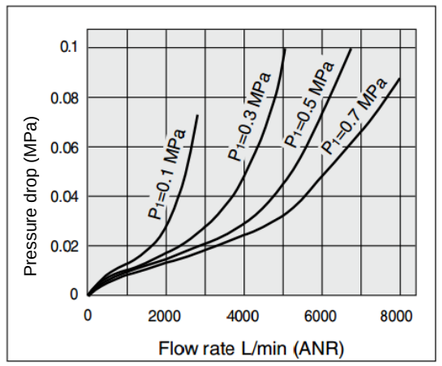




2 Specifications - continued

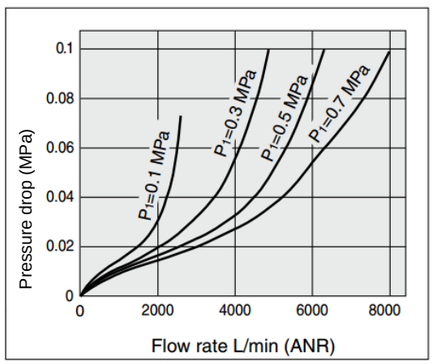
AL40-A

Rc1/2



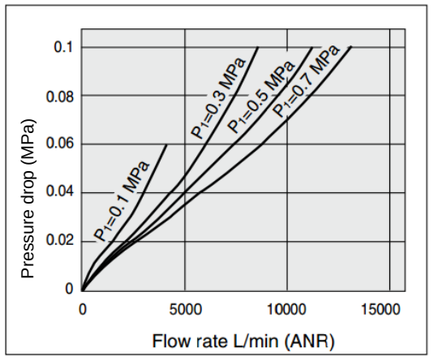
AL40-06-A

Rc3/4



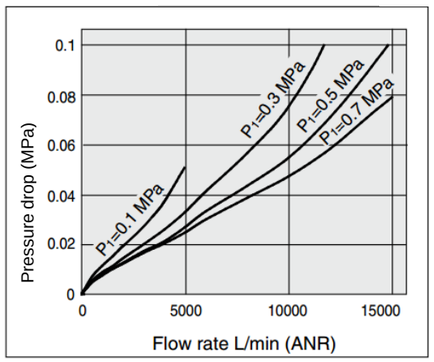
AL50-A

Rc1



AL60-A

Rc1



2 Specifications - continued

2.5 Special Products Specification

⚠ Caution

Special products might have specifications different from those shown in this section. Contact SMC for specific drawings. These drawings will give the appropriate specification details and compliance with the safety principles of ISO 13849, if applicable.

3 Installation

3.1 Installation

⚠ Warning

Do not install the product unless the safety instructions have been read and understood.

3.1.1 Selection

- Do not introduce air from the outlet side as this can damage the bumper.
- The standard bowl for the air filter, filter regulator, and lubricator, as well as the sight dome for the lubricator are made of polycarbonate. Do not use in an environment where they are exposed to or come in contact with organic solvents, chemicals, cutting oil, synthetic oil, alkali, and thread lock solutions.
- The volume of the cylinder must be larger than the volume of piping between the solenoid valve and cylinder; otherwise, oil may not be transferred to the cylinder.

⚠ Warning

Table 4 shows reference chemical data for substances potentially in the application atmosphere which can cause degradation to the product if in contact with its surfaces.

Type	Chemical name	Application examples	Material	
			Polycarbonate	Nylon
Acid	Hydrochloric acid Sulfuric acid, Phosphoric acid Chromic acid	Acid washing liquid for metals	Δ	×
Alkaline	Sodium hydroxide (Caustic soda) Potash Calcium hydroxide (Slack lime) Ammonia water Carbonate of soda	Degreasing of metals Industrial salts Water-soluble cutting oil	×	○
Inorganic salts	Sodium sulfide Sulfate of potash Sulfate of soda	-	×	Δ
Chlorine solvents	Carbon tetrachloride Chloroform Ethylene chloride Methylene chloride	Cleansing liquid for metals Printing ink Dilution	×	Δ
Aromatic series	Benzene Toluene Paint thinner	Coatings Dry cleaning	×	Δ
Ketone	Acetone Methyl ethyl ketone Cyclohexane	Photographic film Dry cleaning Textile industries	×	×
Alcohol	Ethyl alcohol IPA Methyl alcohol	Antifreeze Adhesives	Δ	×
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 Seawater Leak tester	-	×	Δ

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

Table 4

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

3 Installation - continued

⚠ Caution

- Use a check valve (AKM series) to prevent back flow of the lubricant when redirecting the air flow before the lubricator.

3.1.2 Mounting

- When the bowl is installed on the AL30-A to AL60-A, install them so that the lock button lines up to the groove of the front (or the back) of the body to avoid drop or damage of the bowl.
- Connect the lubricator ensuring the correct orientation of ports "1" (IN) and "2" (OUT) for air direction. Incorrect orientation of connection may cause malfunction.
- Install the bowl vertically with bowl facing down. If it is inclined, dripping may not be confirmed.
- Make space to provide easy access at the bottom of the product when replacing bowl or draining.

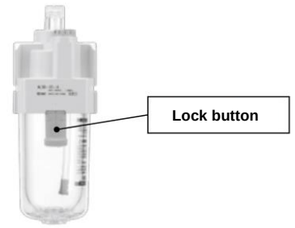


Figure 1

3.2 Environment

⚠ Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact. Check the product specifications.
- Do not mount in a location exposed to radiant heat.

3.3 Piping

⚠ Caution

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1 thread exposed on the end of the pipe/fitting.
- Avoid rising piping and piping branches on secondary side. Otherwise lubricating failure may be caused.
- Do not apply any torsional moment, or bending moment except the weight of the lubricator itself. External piping needs to be supported separately. Hard piping like steel tube is susceptible to excessive moment load or vibration.
- Tighten fittings to the specified tightening torque:

Screw	M5	1/8	1/4	3/8	1/2	3/4	1
Torque (N.m)	1 Note 1)	7~9	12~14	22~24	28~30	28~30	36~38

Table 5

Note 1) First tighten by hand, then give it an additional 1/6 turn with a wrench.

4 Settings

4.1 Adjusting Lubricant Feed Rate

- To adjust the lubricant feed rate, the oil adjustment valve can be adjusted by turning the sight dome.
- You can see the feed rate of lubricant by the frequency of drops in the sight dome for a given time. Note that numbered scale markings are guidelines for adjusting the position, and not indicators of the dripping amount.

4 Settings - continued

- Turn sight dome counter clockwise to increase the feed rate of lubricant and clockwise to decrease the feed rate. From the fully closed position, three rotations will bring it to the fully open position. Please do not rotate it any further than this.
- On AL10-A, some dripping may occur even when needle is fully closed.

5 How to Order

AL 30 – ☐ 03 B – ☐ – A

(1) (2) (3) (4) (5)

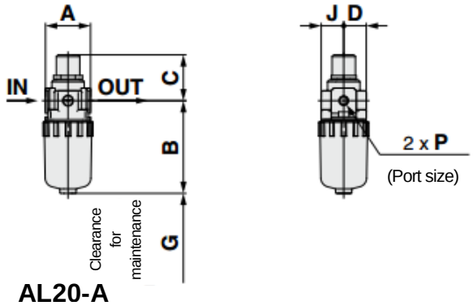
		Symbol	Description	1 Body Size 10	20	30	40	50	60
2	Pipe thread type	Nil	Metric thread (M5)	●	-	-	-	-	-
			Rc	-	●	●	●	●	●
		N	NPT	-	●	●	●	●	●
		F	G	-	●	●	●	●	●
3	Port size	M5	M5 x 0.8	●	-	-	-	-	-
		01	1/8	-	●	-	-	-	-
		02	1/4	-	●	●	●	-	-
		03	3/8	-	-	●	●	-	-
		04	1/2	-	-	-	●	-	-
		06	3/4	-	-	-	●	●	-
		10	1	-	-	-	-	●	●
4	Option (Mounting)	Nil	Without mounting option	●	●	●	●	●	●
		B (1)	With bracket	-	●	●	●	●	●
5	Semi-standard								
a	Bowl (2) (3)	Nil	Polycarbonate bowl	●	●	●	●	●	●
		2	Metal bowl	●	●	●	●	●	●
		6	Nylon bowl	●	●	●	●	●	●
		8	Metal bowl with level gauge	-	-	●	●	●	●
		C	With bowl guard	-	●	-(3)	-(3)	-(3)	-(3)
		6C	With bowl guard (Nylon)	-	●	-(4)	-(4)	-(4)	-(4)
b	Lubricant exhaust port	Nil	Without drain cock	●	●	●	●	●	●
		3	With drain cock	●	●	●	●	●	●
		3W (5)	Drain cock with barb fitting	-	-	●	●	●	●
c	Flow direction	Nil	Flow direction: Left to right	●	●	●	●	●	●
		R	Flow direction: Right to left	●	●	●	●	●	●
d	Pressure unit	Nil	Name plate and caution plate: MPa	●	●	●	●	●	●
		Z (6)	Name plate and caution plate: psi, °F	○(7)	○(7)	○(7)	○(7)	○(7)	○(7)

Note 1) Option is not assembled and supplied loose at the time of shipment.
Note 2) Refer to Chemical data on Table 4 (Section 3.1.1) for chemical resistance of the bowl.
Note 3) A bowl guard is provided as standard equipment (polycarbonate).
Note 4) A bowl guard is provided as standard equipment (nylon).
Note 5) The combination of metal bowl: 2 and 8 is not available.
Note 6) For pipe thread type: M5, NPT. This product is for overseas use only according to the new Measurement Law. (The SI unit type is provided for use in Japan.)
Note 7) ○: For pipe thread type: M5, NPT only.

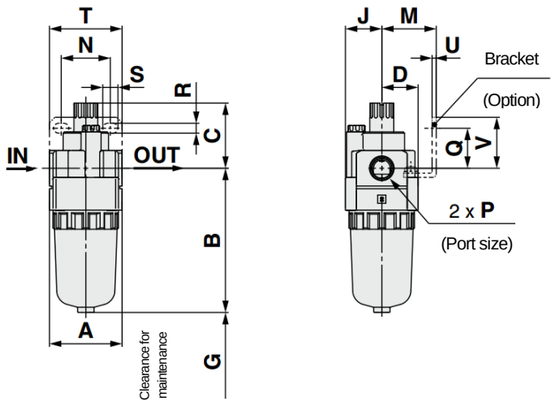
Validated according to ISO13849-2.

6 Outline Dimensions (mm)

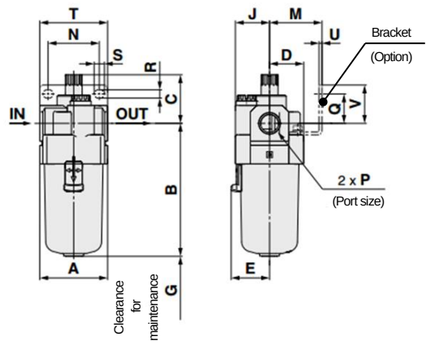
6.1 AL10-A



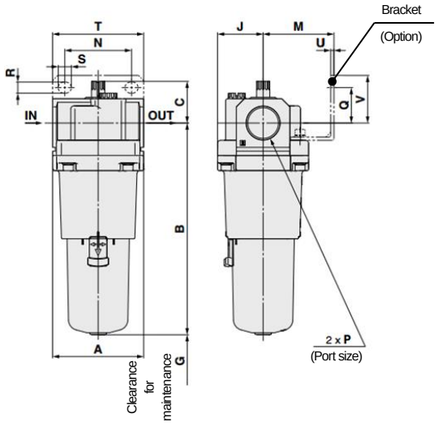
6.2 AL20-A



6.3 AL30-A to AL40-06-A



6.4 AL50-A / AL60-A



6 Outline Dimensions (mm) – continued

Model	Standard specifications								Optional specifications								Semi-standard specifications					
									Bracket mount								With drain cock	With barb fitting	Metal bowl	Metal bowl with drain cock	Metal bowl with level gauge	Metal bowl with level gauge with drain cock
	P	A	B	C	D	E	G	J	M	N	Q	R	S	T	U	V	B	B	B	B	B	B
AL10-A	M5 x 0.8	25	51.5	25.5	12.5	-	35	12.5	-	-	-	-	-	-	-	-	59.9	-	56.3	59.3	-	-
AL20-A	1/8, 1/4	40	79.3	35.9	20	-	60	20	30	27	22	5.4	8.4	40	2.3	28	87.7	-	84.5	87.5	-	-
AL30-A	1/4, 3/8	53	104.1	38.1	26.7	30	80	26.7	41	35	23	6.5	13	53	2.3	30	115.1	123.6	104.1	117.6	124.1	137.6
AL40-A	1/4, 3/8, 1/2	70	136.1	39.8	35.5	38.4	110	35.5	50	52	26	8.5	12.5	70	2.3	35	147.1	155.6	136.1	149.6	156.1	169.6
AL40-06-A	3/4	75	138.1	37.8	35.5	38.4	110	35.5	50	52	25	8.5	12.5	70	2.3	34	149.1	157.6	138.1	151.6	158.1	171.6
AL50-A	3/4, 1	90	209.1	41.2	45	-	110	45	70	66	35	11	13	90	3.2	47	220.1	228.6	209.1	222.6	229.1	246.2
AL60-A	1	95	223.1	44.7	47.5	-	110	47.5	70	66	35	11	13	90	3.2	47	234.1	242.6	223.1	236.6	243.1	256.6

Table 6

7 Maintenance

7.1 General Maintenance

⚠ Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous. Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

⚠ Warning

- Maintenance and checks should be done by following the procedure in the operation manual. Incorrect handling of the product may cause breakage or malfunction of the equipment or device.
- Open and close drain cock manually. Opening and closing too much may damage the drain cock.
- Perform periodical check to find cracks, flaws or other deterioration on the resin bowl and the sight dome which may cause malfunction. If any sign of deterioration is seen, replace with new bowl or sight dome.
- Check for dirt in the resin bowl periodically. If any dirt is seen, replace with a new bowl. If removing the dirt by washing instead of using a replacement, never use washing material other than neutral detergent. Otherwise, the bowl will be damaged.
- Use class 1 turbine oil (without additives) ISO VG32. Using other lubricant can cause damage to devices and result in malfunction.
- The AL10-A and AL20-A cannot supply oil under pressure. After releasing the inlet pressure and checking that there is no internal pressure in the case, remove the oil supply plug slowly and set oil supply to “Max Level” slowly while ensuring that an oil film is not formed in the oil supply orifice.
- The AL30-A, AL40-A, AL50-A and AL60-A have a slight leak from the inside of the case to the oil supply orifice. Loosen the oil supply plug one turn and wait a short time for pressure to release, then remove the oil supply plug. As there is a slight leak from inside the case to the oil supply orifice, set the oil supply to “Max Level” slowly, while ensuring an oil film is not formed over the oil supply orifice. When removing the oil supply plug, pressure within the case will be released, so ensure that protective goggles are worn. After oil is supplied, the oil supply “O” ring can be returned to its previous state by gently screwing it in. Ensure that it is correctly positioned.

7 Maintenance - continued

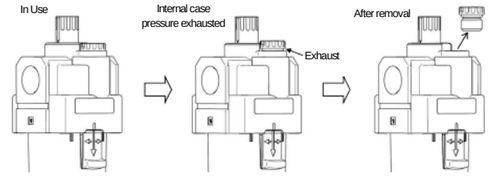


Figure 2

⚠ Caution

- Check the drip rate on the sight dome once a day. Dripping failure may cause damage to lubricated products downstream.
- Use clean oil to avoid dripping failure.
- The lubricating amount should be less than the upper limit of oil level. performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- Discharge drain to avoid that drain exceeds the upper limit of the air filter. Excessive drain in the lubricator may cause dripping failure.

8 Limitations of Use

8.1 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 [(1)]. 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 catalogue for the particular products.

  [(1)] 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.

8 Limitations of Use - continued

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.

⚠ Caution

- **SMC products are not intended for use as instruments for legal metrology.**

  Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.

  Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

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