

# **Operation Manual**

# PRODUCT NAME

# Activated Carbon Filter

MODEL / Series / Product Number

AMK20-(F, N)01 ~ (F, N)02(B)(-2, 6, C, R, Z)-D AMK30-(F, N)02 ~ (F, N)03(B)(-2, 6, R, Z)-D AMK40-(F, N)02 ~ (F, N)04(B)(-2, 6, R, Z)-D

**SMC** Corporation

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# Safety Instructions

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

\*1) ISO 4414: Pneumatic fluid power -- General rules 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: Manipulating industrial robots -Safety.

etc.



# 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. 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, combustion 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 specifications described in the product catalog.
  - 3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
  - 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.



# **Safety Instructions**

# **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.

# 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 regulation 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.

# A Warning

- 1) Consult SMC if no leakage is allowed due to the environment, or if the operating 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.

Туре	Chemical name	Application examples		erial
туре		Application examples	Polycarbonate	Nylon
Acid	Hydrochloric acid Sulphuric acid, Phosphoric acid Acetic acid Chromic acid	Acid washing liquid for metals	Δ	x
Alkaline	Sodium hydroxide (Caustic soda) Potash Calcium hydroxide (Slacked lime) Ammonia water Carbotane of soda	Degreasing of metals Industrial salts Water-soluble cutting oil	×	0
Inorganic salts	Sodium sulphide Sulphate of potash Sulphate of soda	-	×	Δ
Chlorine solvents	Carbon tetrachloride Chloroform Ethylene chloride Methylene chloride	Cleaning 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 I P A Methyl alcohol	Antifreeze Adhesives	Δ	×
Oil	Gasoline Kerosene	-	×	0
Ester	Phthalic acid dim ethyl Phthalic acid diethyl	Synthetic oil Anti-rust additives	×	0
Ether	Methyl ether Ethyl ether	Brake oil additives	×	0
Amino	Methyl amine	Cutting oil Brake oil additives Rubber accelerator	×	×
Others	Thread-lock fluid Sea water Leak tester	-	×	Δ
0:	Essentially safe. $\Delta$ :	Some effects may occur.	×: Effects will occ	ur.

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) Protect from ultra violet ray and radiation heat by shield.

- 5) If the air equipment is mounted on the outlet of the product, particles will be generated from the equipment and required cleanliness may not be obtained. Instead, install the air equipment at the inlet.
- 6) Applications in which the difference between the inlet and outlet pressure exceeds 0.1 MPa must be avoided. Otherwise, the element may break.
- 7) For air blow applications, prevent airborne particles from the operating environment entering into the compressed air stream. Foreign matter may adhere to the workpiece during the air blow.

# \land Caution

1) The activated carbon filter (AMK series) adsorbs oil vapor contained in the compressed air and removes the odors derived from it, but does not remove all odors.

#### Selection

# 🕂 Warning

- 1) Grease is slightly used on the threaded parts and seals. If this is not acceptable, please consult SMC.
- 2) Select the model so that the maximum discharge value (instantaneous) of the flow rate will not exceed the maximum flow capacity.

#### Mounting

# \land 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 or an arrow.
- 4) Install with adequate space for maintenance beneath the product. Refer to 12. Dimensions (page 31) for necessary space.

#### Piping

# \Lambda Warning:

- 1) Before piping, perform flushing or cleaning of the piping, etc. to remove any cutting chips, cutting oil, solid foreign matter, etc. from the piping. 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 1.5 to 2 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 can cause loose piping or sealing failure. Excess tightening torque may cause damage to threads. If the female side is not held while tightening, excessive force will be applied to the bracket directly, causing breakage.

|--|

Thread	1/8	1/4	3/8	1/2
Torque	7 to 9	12 to 14	22 to 24	28 to 30

- 4) When a one-touch fitting of SMC is used, refer to the operation manual for the one-touch fitting.
- 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 damage. Non-flexible piping like steel tube is susceptible to excessive moment load or vibration. Insert flexible tubes to prevent this.

#### Air Supply

#### 🕂 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 deteriorate the performance. Install the refrigerated air dryer or aftercooler before the line filter.
- 3) Make sure that the supply pressure is not below the minimum operating pressure. If it is used at the minimum operating pressure or less, pressure resistance increases, leading to the decrease of operation life or operation failure.

# 🕂 Caution

1) Install the micro mist separator AMD as a pre-filter to the inlet of the product in order to avoid the deteriorating the performance.

#### 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 the operation manual. Incorrect handling of the product may cause breakage or operation failure of the equipment or device.
- 3) Do not touch the product when operating at high temperature (40 to 60°C). The operators may get burnt. Be sure to confirm that the temperature of the container or operating part is reduced to 40 degrees or less to prevent burns.
- 4) Perform periodical check to find cracks, flaws or other deterioration on resin bowl. If any of them is seen, as malfunction is caused, replace with new bowl or metal bowl. Investigate and/or review the operating conditions if necessary.

- 5) 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.
- 6) Replace the element before 1 year or 2000 operating hours passed from start of use as it may deteriorate the performance.
   The replacement period of the element varies depending on the operating conditions. Even before the aforementioned replacement period is reached, if there is an oil smell on the outlet side, please replace it.

# \land Caution

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

#### 2. Application

This product aims at eliminating oil vapor in the air line.

#### 3. Standard specifications

Model No.	AMK20	AMK30	AMK40		
Port size	1/8, 1/4 1/4, 3/8 1/4, 3/8, 1/2				
Fluid		Air			
Ambient and o fluid temperature	-5	to 60 °C (No freezing	g)		
Proof pressure		1. 5MPa			
Max. operating pressure	1.0MPa				
Min. operating pressure	0.05MPa				
Outlet side oil concentration Note1)	Max. 0.003mg/m³(≒0.0025ppm)				
Compressed air purity class Note 2)	ISO8	3573-1: 2010[1: 4: 1]	Note 3)		
Max. flow capacity Note 4)	300 L/min (ANR) 750L/min(ANR) 1500L/min(ANI				
Bowl material	Polycarbonate				
Bowl guard	Semi-standard (Steel) Standard(Polycarbonate)				
Weight	0.19kg	0.39kg	0.79kg		

Note 1) Conditions in accordance with below and in addition to the conditions above.

 $\cdot~$  AMD is mounted on the inlet .

 $\cdot\,$  Flow capacity, inlet pressure, and the amount of solid bodies at the filter inlet are stable.

New element

Note 2) Based on ISO8573-1:2010 Compressed air - Part1: Contaminants and purity classes.

Note 3) The compressed air quality class on the inlet side is [1:4:2].

Note 4) Inlet pressure: 0.7 MPa. Flow at 20°C, atmospheric pressure, and 65% of relative humidity .

4. How to Order



	Symbol Details			Û				
			Symbol Details		Body size		9	
						20	30	40
				Nil	Rc	•	•	•
0		Thre	ead type	Ν	NPT	•	•	•
				F	G	•	•	•
				01	1/8	•	-	-
€		De	ort size	02	1/4	•	•	•
9		гι	512.6	03	3/8	-	•	•
				04	1/2	-	-	•
4	Options	а	Mounting	Nil	Without mounting option		•	•
0	Opt	a	wounting	В	With bracket		•	•
				Nil	Polycarbonate bowl		•	•
				2	Metal bowl		•	•
		b	Bowl	6	Nylon bowl		•	•
	lard			С	With bowl guard		-	-
0	Semi-standard			6C	With bowl guard (Nylon bowl)		-	-
	emi	с	Flow	Nil	Flow direction: left to right		•	•
	S	C	direction	R	Flow direction: Right to left		•	•
			Pressure unit	Nil	Pressure unit: MPa Temp. unit: °C	•	•	•
		d	Temperature unit	Z	Pressure unit: psi Temp. unit: °F	<sub>O</sub> Note 2)	<sub>O</sub> Note 2)	<sub>O</sub> Note 2)

Note 1) For ④ Options and ⑤ Semi-standard : Select one each for a to d.

Note 2) O: For NPT thread type only.

#### 5. Construction / Options / Replacement parts



#### **Replacement parts**

Component No.	Parts description		Component numbe	r	
110.		AMK20	AMK30	AMK40	
1	Element	AMK24P-060AS	AMK34P-060AS	AMK44P-060AS	
2	Bowl seal	C22FP-260S	C32FP-260S	C42FP-260S	
3	DOWI Seal	C22FF-2003	C32FF-2003	C42FF-2003	
	Bowl assembly			· · · · · · · · · · · · · · · · · · ·	
Auto drain (N.C.)		Refer to [6.Bowl assembly specifications (P11 to P18).			
	Auto drain (N.O.)		- (FILOFIO).		

Note 1) The numbers in the table and construction are consistent with the number in [10. Replacement work procedure] (P23-29) and 11. Disassembly Drawing](P30).

#### Options

Component number	Parts description	C	Component numbe	r
number		AMK20	AMK30	AMK40
5	Bracket assembly Note 2)	AF24P-070AS	AF34P-070AS	AF44P-070AS

Note 2) Refer to the 7. Assembly of Optional parts (P19) for mounting the bracket assembly.

#### 6. Bowl assembly specifications

#### 1) AMK20 bowl assembly

Semi-standard symbol	-	6	С	6C
Appearance and part No.	Semi-standard symbol: "- (Standard) Port thread ④ Part No. type Rc C2SF-D-X40 G C2SF-D-X40 NPT C2SF(-Z)-D-X4 Semi-standard symbol: "6 Port thread ④ Part No. type Rc C2SF-6-A-X4 G C2SF-6(Z)-A-X		Semi-standard symbol: Port thread type Rc C2SK-C-E MPT C2SK-C(Z) Semi-standard symbol: Port thread type Rc C2SK-6C- Q C2SK-6C- Q C2SK-6C(Z)	D. D. D. TGC" D. D. D.
Semi-standard symbol	2	<u>)</u>		
Appearance and part No.	Semi-standard symbol: " Port thread ④ Part No. type Rc G C2SF-2-A-X40 NPT C2SF-2(Z)-A-X40			

Note 1) Part No. ④ includes Bowl seal ③. Refer to [11. Disassembly Drawing ](P23).

Note 2) "Z" in Part No. ④ indicates standard specifications. The pressure unit: psi. The temperature unit: °F. Note 3) Refer to [4. How to Order] (P9) for option and semi-standard symbols

#### 2) AMK30 bowl assembly

Semi-standard symbol	-		6
	Semi-standa (Standard) Port		
	thread type Rc	④ Part No	
Appearance	G NPT	C3SK-D C3SK(-Z)-E	
and part No.	Semi-standa	ard symbol:	"6"
	Port thread type	④ Part No	
	Rc G NPT	C3SK-6-D C3SK-6(Z)-I	
Semi-standard			2
symbol Appearance and part No.	Port thread type Rc G	ard symbol: ④ Part No 3SF-2-A-X4 3SF-2(Z)-A->	

Note 1) Part No. ④ includes Bowl seal ③. Refer to [11. Disassembly Drawing ](P23).

Note 2) "Z" in Part No. ④ indicates standard specifications. The pressure unit: psi. The temperature unit: °F. Note 3) Refer to [4. How to Order] (P9) for option and semi-standard symbols

#### 3) AMK40 bowl assembly

Semi-standard symbol		-	6
	Semi-stand (Standard)	dard symbol: "-"	
	Port thread type	④ Part No.	
	Rc G	C4SK-D	
Appearance and part No.	NPT	C4SK(-Z)-D	
part NO.		dard symbol: "6'	<u> </u>
	Port thread type	④ Part No.	
	Rc G	C4SK-6-D	
	NPT	C4SK-6(Z)-D	
Semi-standard symbol			2
Appearance and part No.	Port thread type Rc G	dard symbol: "2' ④ Part No. C4SF-2-A-X401 4SF-2(Z)-A-X4(	

Note 1) Part No. ④ includes Bowl seal ③. Refer to [11. Disassembly Drawing ](P23).

Note 2) "Z" in Part No. ④ indicates standard specifications. The pressure unit: psi. The temperature unit: °F. Note 3) Refer to [4. How to Order] (P9) for option and semi-standard symbols

#### 7. Assembly of Optional parts

1) Bracket







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

Line filter	Tools	Tightening torque
AMK20	Phillips screwdriver(+)	
AMK30		0. 75+/-0. 2 N ∙ m
AMK40		

# 8 Troubleshooting

Refer to [9 Replacement work procedure](P16 to 22) and 10. Disassembly Drawing](P23).

Problem			Dessible severe	Counterror	Page for		
Category	Failure		Possible causes	Countermeasure	reference		
Flow rate	As pressure drop is large, fluid does not flow.	1.	The filter installed upstream is clogged.	Replace the element.	-		
	Oil is smelled from the outlet side.	1.	The element has reached the time for replacement.	Replace the element.	P16 to 17 P19 to 20		
Performance	Oil mist comes from the outlet side.	<ol> <li>The element installed in upstream side has reached the time for replacement.</li> </ol>		Replace the element of upstream filter and AMK element.	P16 to 17 P19 to 20		
		2.	Oil has accumulated in the inlet piping or filter drain.	Discharge the drain. Replace the element of AMK.	P16 to 17 P19 to 20		
	Air leaks between the body and joint.	1.	Breakage of joint seal.	Replace the bowl seal.	P18 P21 to 22		
Air leakage	Air leaks between the joint and the bowl.	1.	Breakage of the bowl seal.	Replace the bowl seal.	P18 P21 to 22		
	Air leakage from the bowl.	1.	Bowl is damaged.	Replace the bowl assembly.(If the solvent is considered to beharmful, replacement to the metal bowl is recommended)	P18 P21 to 22		

#### 9. How to Replace the Components

### 🕂 Warning

Before replacement, make sure that no pressure remains in the equipment. After replacement, confirm that the product satisfies specific functions and no external leakage occurs before operating it.

1.1) Element disassembly [AMK20]





#### Step 3



#### Step 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.



#### 2.2) Bowl assembly [AMK20]

#### Step 2



3.1) Element disassembly [AMK30, AMK40]



#### 3.2) Element assembly - assembly [AMK30, AMK40]



#### Step 3

While the lock button is held down, mount the body and joint where their marks meet. Rotate the joint until the lock button meets the body groove (approx. 30 degrees).



#### 4.1) Bowl disassembly [AMK30, AMK40]

#### Step 1





#### 11. Disassembly Drawing

1) Exploded drawing of AMK20

2) Exploded drawing of AMK30, AMK40



#### 12. Dimensions AMK20



Model	Standard specifications						Bracket mount									
No.	Р	A	В	С	D	E	G	J	м	N	Q	R	s	т	U	v
АМК20	1/8.1/4	40	133.9	17.5	21	-	25	21	30	27	22	5.4	8.4	60	2.3	28
АМКЗО	1/4•3/8	53	167	21.5	26.5	30	35	26.5	41	35	25	6.5	13	71	2.3	32
АМК40	1/4•3/8•1/2	70	212.5	25.5	35.5	38.4	40	35.5	50	52	30	8.5	12.5	88	2.3	39

#### semi-standard bowl

	Semi-standard specifications					
Model No.	Metal bowl					
	В					
AMK20	139.1					
AMK30	167					
AMK40	212.4					

Revision history

Revision A: December 2021 Partial revision of external dimensions

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