CKD

Medium Main Line Filter

AF2 Series

INSTRUCTION MANUAL

SM-A13794-A

- Read this Instruction Manual before using the product.
- Read the safety notes carefully.
- Keep this Instruction Manual in a safe and convenient place for future reference.

CKD Corporation

PREFACE

Thank you for purchasing CKD's **"AF2 Series" Medium Main Line Filter**.
This Instruction Manual contains basic matters such as installation and usage instructions in order to ensure optimal performance of the product. Please read this Instruction Manual thoroughly and use the product properly.
Keep this Instruction Manual in a safe place and be careful not to lose it.

Product specifications and appearances presented in this Instruction Manual are subject to change without notice.

- The product is intended for users who have basic knowledge about materials, piping, electricity, and mechanisms of pneumatic components. CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training.
- Since there are a wide variety of customer applications, it is impossible for CKD to be aware of all of them. Depending on the application or usage, the product may not be able to exercise its full performance or an accident may occur due to fluid, piping, or other conditions. It is the responsibility of the customer to check the product specifications and decide how the product shall be used in accordance with the application and usage.

SAFETY INFORMATION

When designing and manufacturing any device incorporating the product, the manufacturer has an obligation to ensure that the device is safe. To that end, make sure that the safety of the machine mechanism of the device, the pneumatic, and the electric system that controls such mechanism is ensured.

To ensure the safety of device design and control, observe organization standards, relevant laws and regulations, which include the following:

ISO 4414, JIS B 8370, (the latest edition of each standard), the High Pressure Gas Safety Act, the Industrial Safety and Health Act, other safety rules, organization standards, relevant laws and regulations

In order to use our products safely, it is important to select, use, handle, and maintain the products properly.
Observe the warnings and precautions described in this Instruction Manual to ensure device safety.

Although various safety measures have been adopted in the product, customer's improper handling may lead to an accident. To avoid this:

Thoroughly read and understand this Instruction Manual before using the product.

To explicitly indicate the severity and likelihood of a potential harm or damage, precautions are classified into three categories: "DANGER", "WARNING", and "CAUTION".。

⚠ **DANGER**	Indicates an imminent hazard. Improper handling will cause death or serious injury to people.
⚠ **WARNING**	Indicates a potential hazard. Improper handling may cause death or serious injury to people.
⚠ **CAUTION**	Indicates a potential hazard. Improper handling may cause injury to people or damage to property.

Precautions classified as "CAUTION" may still lead to serious results depending on the situation.
All precautions are equally important and must be observed.

Other general precautions and tips on using the product are indicated by the following icon.

	Indicates general precautions and tips on using the product.

Precautions on Product Use

⚠ WARNING

The product must be handled by a qualified person who has extensive knowledge and experience.

The product is designed and manufactured as a device or part for general industrial machinery.

Use the product within the specifications.

The product must not be used beyond its specifications. Also, the product must not be modified and additional work on the product must not be performed.

The product is intended for use in devices or parts for general industrial machinery. It is not intended for use outdoors or in the conditions or environment listed below.

- In applications for nuclear power, railroad system, aviation, ship, vehicle, medical equipment, and equipment that directly touches beverage or food.
- For special applications that require safety including amusement equipment, emergency shut-off circuit, press machine, brake circuit, and safety measures.
- For applications where life or properties may be adversely affected and special safety measures are required.

(Exception is made if the customer consults with CKD prior to use and understands the specifications of the product. However, even in that case, safety measures must be taken to avoid danger in case of a possible failure.)

Do not handle the product or remove pipes and devices until confirming safety.

- Inspect and service the machine and devices after confirming the safety of the entire system. Also, turn off the energy source (air supply or water supply) and power to the relevant facility. Release compressed air and fluid from the system and use extreme care to avoid water or electric leakage.
- Since there may be hot or live parts even after operation has stopped, use extreme care when handling the product or removing pipes and devices.
- When starting or restarting a machine or device that incorporates pneumatic components, make sure that a safety measure (such as a pop-out prevention mechanism) is in place and system safety is secured.

Precautions on Product Disposal

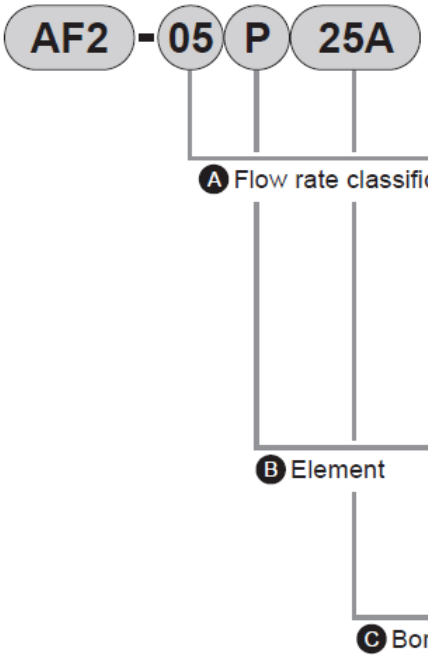
⚠ CAUTION

When disposing of the product, comply with laws pertaining to disposal and cleaning of wastes and have an industrial waste disposal company dispose of the product.

CONTENTS

1. PRODUCT OVERVIEW

1.1 Model Number Indication



Code	Content
A Flow rate classification	
05	4.95 m^3/min(ANR)
08	7.93 m^3/min(ANR)
11	11.3 m^3/min(ANR)
13	12.8 m^3/min(ANR)
20	19.8 m^3/min(ANR)
24	24.1 m^3/min(ANR)
B Element	
P	P type (solid/oil removing filter)
M	M type (high-performance solid/oil removing filter)
X	X type (odor removing filter)
C Bore size	
25A	Rc1
32A	Rc1 1/4
40A	Rc1 1/2
50A	Rc2
65A	Rc2 1/2

1.2 Specifications

Descriptions		AF2-05□25A	AF2-08□32A	AF2-11□40A	AF2-13□50A	AF2-20□50A	AF2-24□65A
Processing air flow rate	m^3/min(ANR)	4.95	7.93	11.3	12.8	19.8	24.1
Working fluid		Compressed air					
Working pressure	MPa	0.1 to 1.0					
Proof pressure	MPa	1.5					
Port size	Rc	1	1¼	1½	2		2½
Weight	kg	2.2	6	5.9	5.7	6.9	13
Pop-up indicator		Standard equipment (Excluding X type)					
Drain discharger		Integrated (NO: with exhaust when not pressurized. Excluding X type)					
Drain outlet bore size	Rc	1/8 (Excluding X type)					

□ indicates type name.

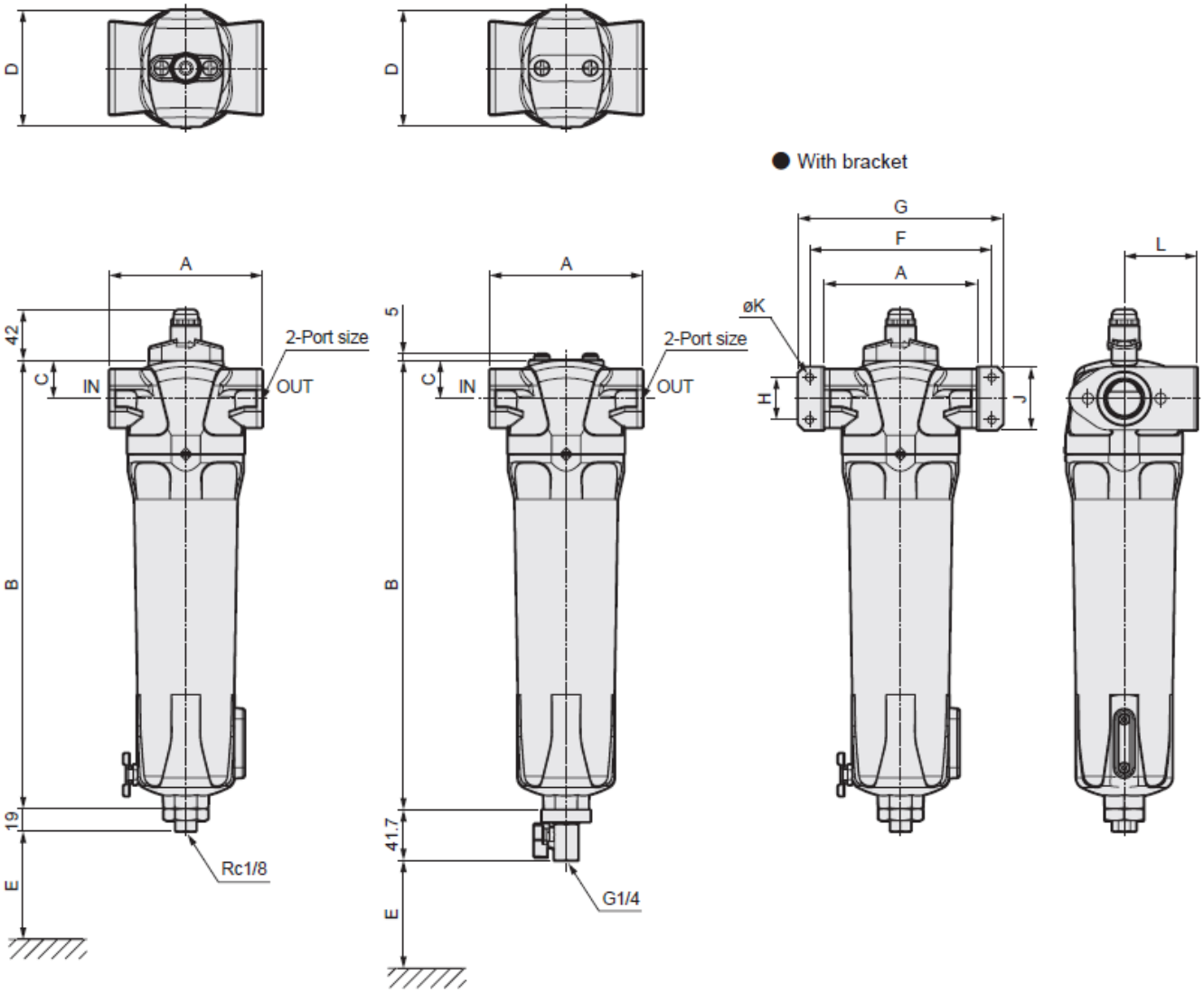
Descriptions		P	M	X
Operating ambient temperature range	°C	5 to 60		5 to 50
Filtration rating	μm	1	0.01	Suction by activated carbon
Secondary side oil concentration	mg/m^3	0.3	0.01	0.003
Initial pressure drop	MPa	0.0055	0.0085	0.0115
Regular pressure drop	MPa	0.0125	0.0125	–

*1. Processing air flow rate is the atmospheric pressure conversion value where the inlet pressure is 0.7MPa.
*2. ANR indicates conditions of 20°C atmospheric pressure and relative humidity 65%.
*3. The secondary side oil concentration is the value when the inlet air temperature is 21°C.
*4. The drain discharger is NO. Air is purged with initial drainage until pressure reaches 0.1 MPa.
*5. The P/M type elements must be replaced after one year or when the pop-up indicator turns red, whichever is faster.
*6. Replace the X element after 1000 hours (at 21°C) or when the deodorizing effect is lost.
*7. The X type has a ball valve (G1/4) at the discharge outlet.
*8. The initial pressure drop is 0.008 MPa for AF2-20P50A and 0.011 MPa for AF2-20M50A.

1.3 Dimensions

● AF2-05P25A to AF2-24P65A
AF2-05M25A to AF2-24M65A

● AF2-05X25A to AF2-24X65A

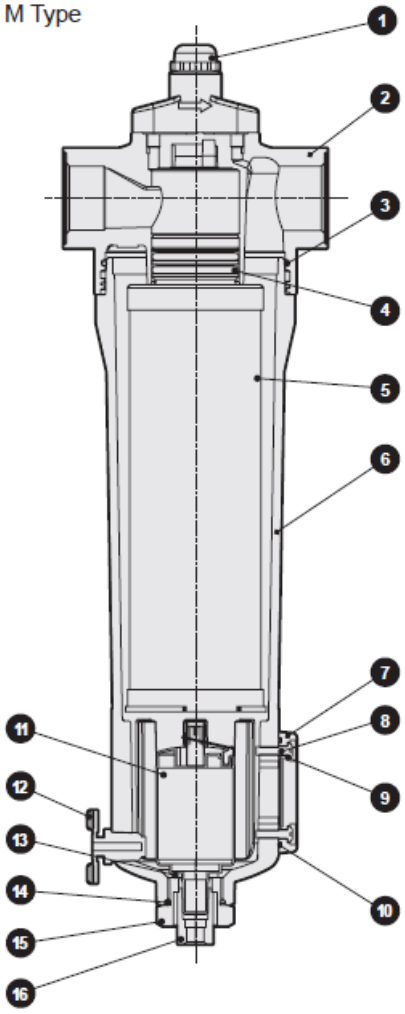


Model No.	Port size	A	B	C	D	E	F	G	H	J	K	L
AF2-05P25A/05M25A	Rc1	127	370	31.4	96	80	151	169	36	52	6.5	60
AF2-05X25A	Rc1	127	370	31.4	96	80	151	169	36	52	6.5	60
AF2-08P32A/08M32A	Rc1¼	170	508	53	133	100	206	230	65	95	9	90
AF2-08X32A	Rc1¼	170	508	53	133	100	206	230	65	95	9	90
AF2-11P40A/11M40A	Rc1½	170	508	53	133	100	206	230	65	95	9	90
AF2-11X40A	Rc1½	170	508	53	133	100	206	230	65	95	9	90
AF2-13P50A/13M50A	Rc2	170	508	53	133	100	206	230	65	95	9	90
AF2-13X50A	Rc2	170	508	53	133	100	206	230	65	95	9	90
AF2-20P50A/20M50A	Rc2	170	708	53	133	100	206	230	65	95	9	90
AF2-20X50A	Rc2	170	708	53	133	100	206	230	65	95	9	90
AF2-24P65A/24M65A	Rc2½	219	735	69	185	100	257	283	95	125	11	118
AF2-24X65A	Rc2½	219	735	69	185	100	257	283	95	125	11	118

The X Type does not have a pop-up indicator.
The E dimension shows the minimum dimension required to remove the element. Allow for the auto-drain piping dimensions when actually laying the pipe.

1.4 Internal Structure

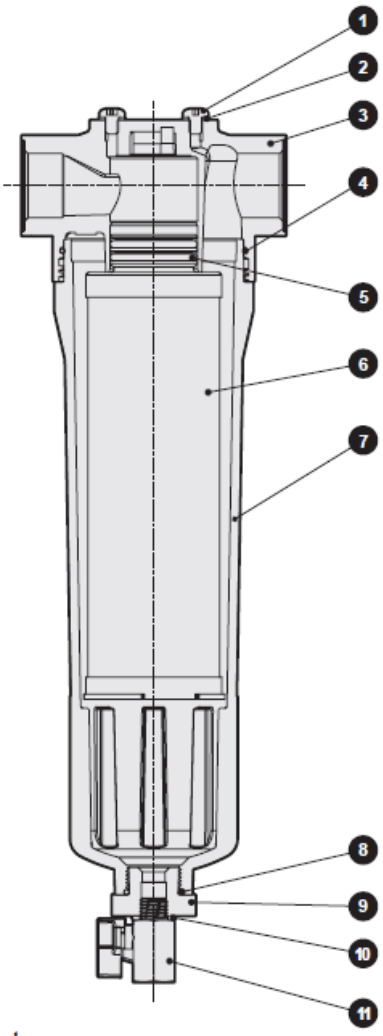
● P, M Type



Parts list

NO.	Part name	Material
1	Pop-up indicator	Polyamide resin
2	Cover	Aluminum
3	O-ring	Nitrile rubber
4	O-ring	Nitrile rubber
5	Element	
6	Bowl	Aluminum
7	Observation glass	Polyamide resin
8	Small machine screw	Steel
9	Packing	Polyamide resin
10	Packing	Nitrile rubber
11	Auto-drain	
12	Valve	Copper alloy
13	Packing	Nitrile rubber
14	O-ring	Nitrile rubber
15	Drain adapter	Aluminum
16	Adapter nut	Copper alloy

● X Type



Parts list

NO.	Part name	Material
1	Small machine screw	Steel
2	Seal washer	Polyamide resin, Nitrile rubber
3	Cover	Aluminum
4	O-ring	Nitrile rubber
5	O-ring	Nitrile rubber
6	Element	
7	Bowl	Aluminum
8	O-ring	Nitrile rubber
9	Drain adapter	Aluminum
10	Seal washer	Steel, Nitrile rubber
11	Valve	Copper alloy

2. INSTALLATION

2.1 Environment

Do not use the product in an environment where:

- Ambient temperature is outside the range of 5°C to 60°C
- Water drop or cutting oil can splash onto the product
- Condensation may occur due to high humidity and temperature change
- Atmosphere contains corrosive gas, fluids, or chemicals
- Atmosphere contains a lot of dust
- It is exposed to direct sunlight, rain, wind, or water
- Ozone is produced
- Locations that may freeze
- Vibrations or impact are present

Chemical resistance of plastic

Type of chemicals	Classification	Major chemical products	Example of general use	Polyamide resin
Inorganic chemicals	Acid	Sodium hypochlorite, Hydrochloric acid, sulfuric acid, hydrofluoric acid, phosphoric acid, and chromic acid	Pickling solution for metal, acidic degreasing solution, and film treatment solution	N
	Alkali	Alkaline substances such as caustic soda, caustic potash, slaked lime, ammonia water, and sodium carbonate	Alkaline degreasing solution for metal, water-soluble cutting oil agent, and leak detection agent	Y
	Inorganic salt	Sodium sulfide, sodium nitrate, potassium dichromate, and sodium sulfate		Y
Organic chemicals	Aromatic hydrocarbon	Benzene, toluene, xylene, ethylbenzene, and styrene	Included in paint thinner (benzene, toluene, and xylene)	N
	Chlorinated aliphatic hydrocarbon	Methyl chloride, ethylene chloride, methylene chloride, acetylene chloride, chloroform, trichlene, berklene, and carbon tetrachloride	Organic solvent cleaning solution for metal (trichlene, berklene, carbon tetrachloride, etc.)	Y
	Chlorinated aromatic hydrocarbon	Chloro-benzene, dichloro-benzene, and benzene hexachloride (B, H, C)	Agricultural chemicals	Y
	Petroleum composition	Solvent naphtha, gasoline, and kerosene		Y
	Alcohol	Methyl alcohol, ethyl alcohol, cyclohexanol, and benzyl alcohol	Anti-freezing agent and leak detection agent	N
	Phenol	Carbolic acid, cresol, and naphthol	Antiseptic solution	N
	Ether	Methyl ether, ethyl methyl ether, and ethyl ether	Additive for brake oil	Y
	Ketone	Acetone, methyl ethyl ketone, Cyclohexanone, and acetophenone		N
	Carboxylic acid	Formic acid, acetic acid, butyric acid, acrylic acid, oxalic acid, and phthalic acid	Stain, aluminum treatment agent (oxalic acid), base material for paint (phthalic acid), and leak detection agent	N
	Ester	Dimethyl phthalate (DMP), diethyl phthalate (DEP), dibutyl phthalate (DBP), and dioctyl phthalate (DOP)	Additive for lubrication oil, synthetic oil, and rust preventive oil Plasticizer for synthetic resins	Y
	Hydroxy acid	Glycolic acid, lactic acid, malic acid, citric acid, and tartaric acid		N
	Nitro compound	Nitromethane, nitroethane, nitroethylene, and nitrobenzene		Y
	Amine	Methylamine, dimethylamine, ethylamine, aniline, and acetanilide	Additive for brake oil	N
	Nitrile	Acetonitrile, acrylonitrile, benzonitrile, and acetisonitrile	Raw material for nitrile rubber	Y

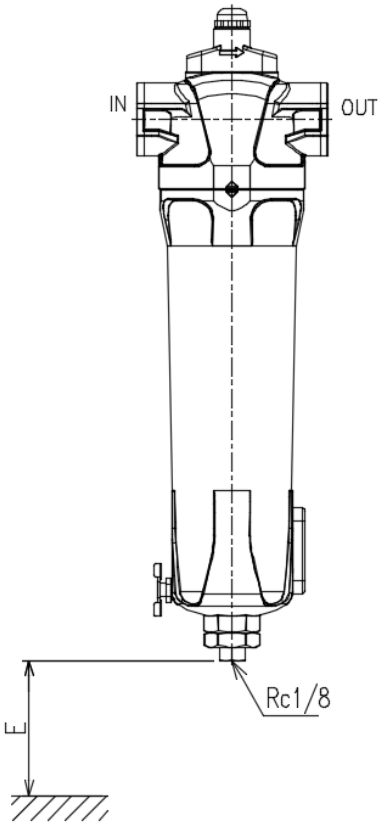
Y: Resistant; N: Not resistant (Plastic will break.)

2.2 Unpacking

- Check that the model number ordered and the model number indicated on the product are the same.
- Check the exterior of the product for any damage.

2.3 Mounting

- Install to withstand the weight of the product. Inadequate installation may cause water leak, injury due to falling.
- Do not mount before and behind the valve that opens and closes abruptly.
- Check the arrow indicating the air inlet before connecting, reverse flow may arise in Main line filter, resulting in damage of pop up indicator and element.
- Install the drain port facing downward as shown below.
- Install this product away from the compressor, before the compressed air enters the filter, it spontaneously radiates in the piping and is cooled.
- Keep the primary side pressure within 1.0MPa.
- For replacement of the filter element, set the distance from the floor as large as possible from the table below. (Install marginable and conosidering the length of the drain piping.)

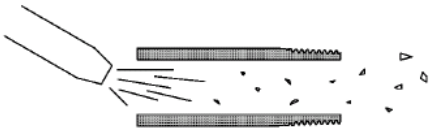


Model Number	E
AF2-05P25A/05M25A/05X25A	80
AF2-08P32A/08M32A/08X32A	100
AF2-11P40A/11M40A/11X40A	100
AF2-13P50A/13M50A/13X50A	100
AF2-20P50A/20M50A/20X50A	100
AF2-24P65A/20M65A/24X65A	100

2.4 Piping

2.4.1 Pipe cleaning

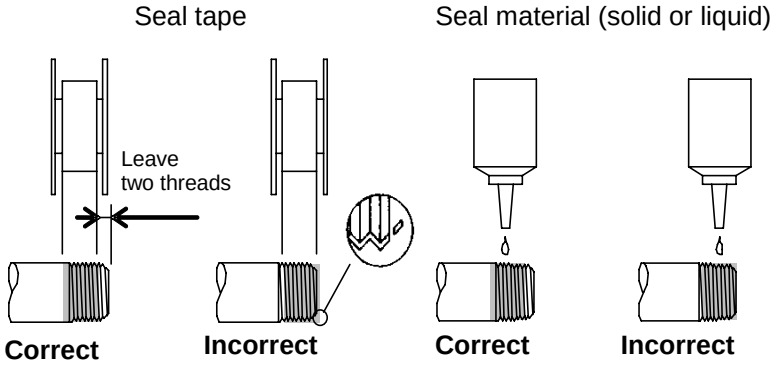
Before piping, blow air into the pipes to clean the interior and to remove cutting chips and foreign matters.
Remove cutting oil and rust preventive oil on the pipes and couplings. Especially flush M/X type carefully.



2.4.2 Seal material

Apply a seal tape or seal material to the screw threads leaving two or more threads at the pipe end uncovered or uncoated. If the pipe end is fully covered or coated, a shred of seal tape or residue of seal material may enter inside of the pipes or device and cause a failure.

When using a seal tape, wind it around the screw threads in the direction opposite from the screw threads and press it down with your fingers to attach it firmly.
When using a liquid seal material, be careful not to apply it to resin parts. The resin parts can become damaged and this may lead to a failure or malfunction.
Also, do not apply seal material to the internal threads.



2.4.3 Piping connection

- For reducing pressure drop in piping, adjust pipe size and connection port size.
- It is recommended to use zinc coated pipes, lining pipes, or stainless pipe.
- Be sure to install M type before X type. Also install the air dryer necessarily.
- The drain port size is Rc 1/8. Use pipes with an inside diameter of ø5.7 or more and a length of 5 m or less for the section of pipes for discharging the drainage and avoid riser piping.
- Drainage is discharged by pressure. Securely fix the piping at the drain port so that drainage does not splatter.
- Install that the drain pipe is not pressurized. Bind several pipes together or attach a check valve will create a pressurized. Do not install the pipes in this state.
- The pipe is long or pipe is applied load, fix the inlet and outlet piping to the floor or ceiling with a holder or supporter, etc.
- When connecting inlet and outlet piping, fix the filter connecting port with the pipe wrench and screw it. Port and the root are transformed, damaged when excessive force is added with the connected piping, and it may cause air leakage.
- The valve is attached to the bottom of the filter. It can release internal pressure, also it can be used for manual drain discharge.

- If the air compressor can not be stopped in continuous operation, we will recommend to install a bypass piping and install a similar filter.
- Flush after removing elements, at the end of installation etc.

3. USAGE

3.1 Safety Instruction

⚠WARNING

Use the product within the specifications.

Before removing the bowl, stop supplying the compressed air, release the pressure from the bowl, and check that there is no residual pressure in the bowl.

- Do not reverse flow the compressed air.
- Do not pressurize suddenly.
- When releasing pressure from piping, release it slowly from the secondary side of Main line filter. If released from the primary side, reverse flow may arise in Main line filter, resulting in damage of pop up indicator and element.

4. MAINTENANCE AND INSPECTION

4.1 Periodic Inspection

4.1.1 Element replacement period

- Replace P/M type filter element, before the pop up indicator become red or one year of use, whichever comes first. Do not use clogged element can not be regenerated even after washing.
- X type absorbs odor with activated carbon. Because of this, lifetime measurement by differential pressure can not be used. Replace the element every 1000 hours(21°C) or its deodorizing effect disappers. The service life becomes shorter in the place where the intake air temperature is high. Do not use element with an end of life can not be regenerated even after washing.

4.1.2 Operation check of Automatic drain

- Drainage has to be discharged to outside certainly. Inspect occasionally whether the Automatic drain is working well.
- If it does not work disassemble and clean, or we recommend to replace a new one.

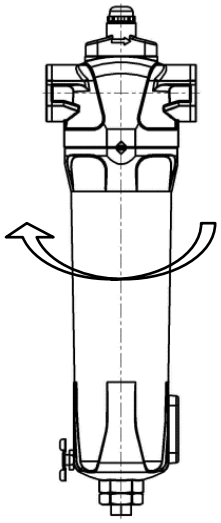
4.2 Removing and Mounting

4.2.1 Replacement procedures for element

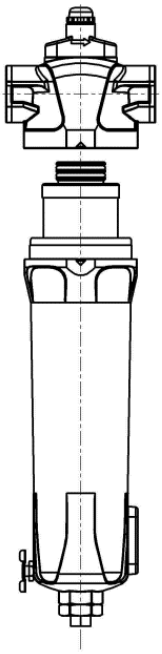
1 Stop supplying compressed air and release pressure in the filter.
（Do not release pressure from the primary side.）

2 Remove the bowl

①Turn the bowl to the left.
Remove it with belt wrench etc.

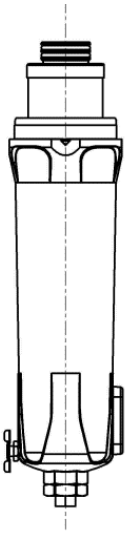


②Remove the bowl downwards,
and pull out the element.

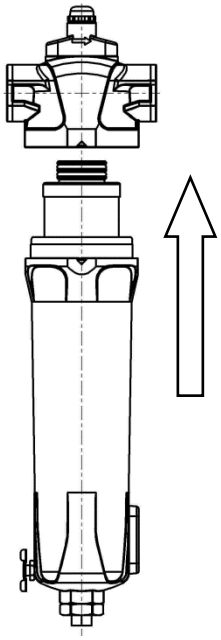


3 Replace the element

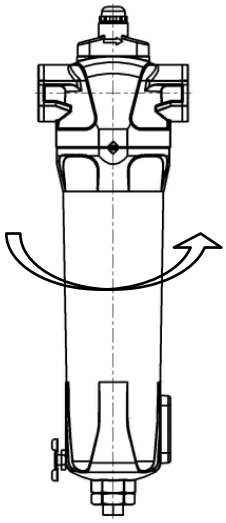
①Insert the new element to the bowl.



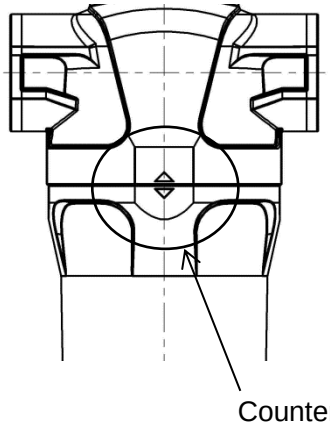
②Return to the bowl original position.



③Turn the bowl to the right and shut.



④Confirm the counter mark is matched.



4.2.2 How to replace Automatic drain

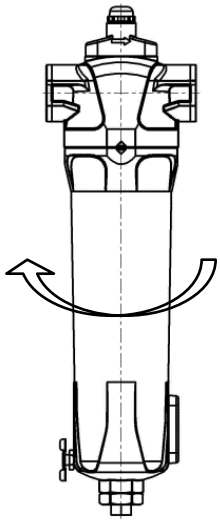
1 Stop supplying compressed air and release pressure in the filter. (Do not release pressure from the primary side.)

2 Turn the bowl to the left. Remove it with belt wrench etc.

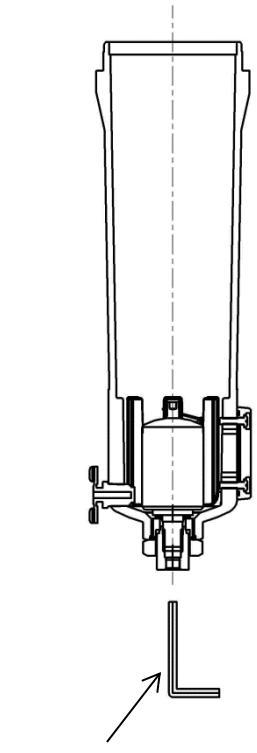
3 The hexagon nut is attached to the bottom of the filter, turn it and remove the automatic drain. Put the wrench in the hex nut part, then the automatic drain is fixed. Turn the hexagon nut in that state.

4 Replace to the new automatic drain and supplied packing.

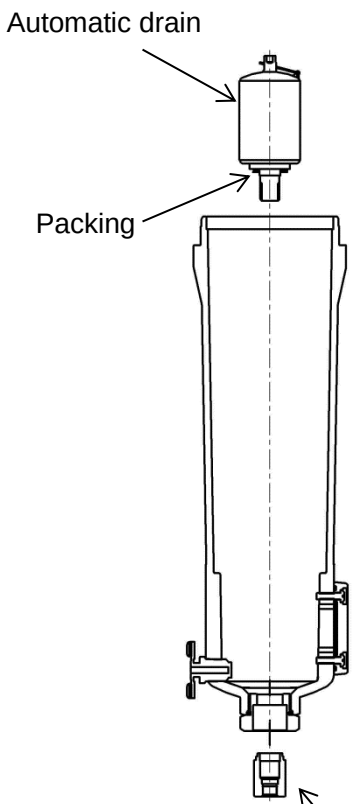
5 Assemble the bowl following the steps in the above "1 to 4" in reverse order.
Confirm the counter mark is matched.



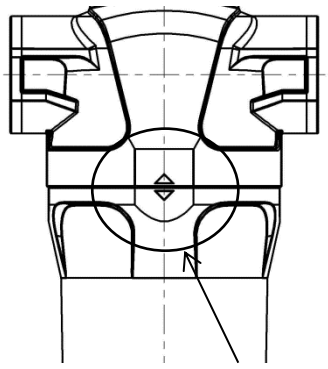
Turn the bowl
to left



Hex wrench

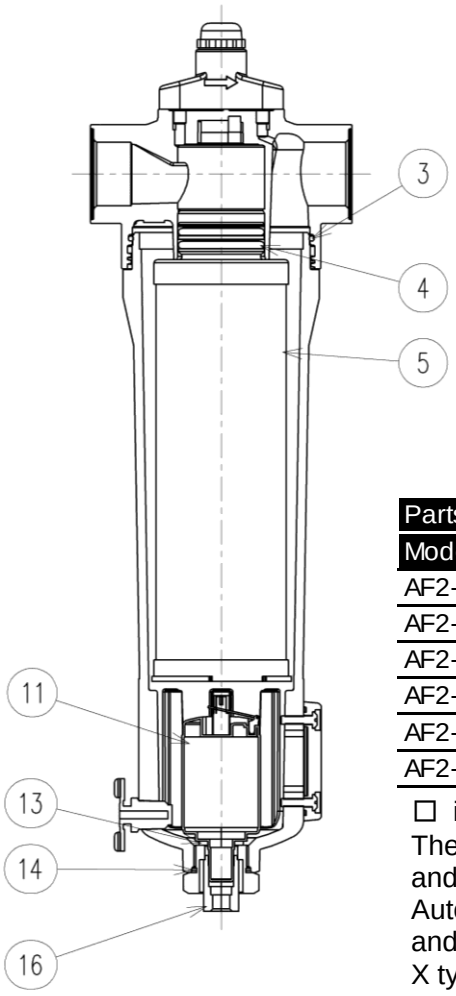


Hexagon Nut



Counter mark

4.3 Maintenance Parts



Parts / Model Number	O-ring kit ③④⑭	Automatic drain⑪⑬⑯
AF2-05☐25A	AF2-05K-FLA12532	AF2-DRN-FLA14439
AF2-08☐32A	AF2-08K-FLA12533	
AF2-11☐40A		
AF2-13☐50A		
AF2-20☐50A		
AF2-24☐65A	AF2-24K-FLA12534	

☐ indicates the type P/M/X.
The O-ring kit consists of two elements part, one bowl part and one nut part.
Autodrain is a set of the float assembly, the hexagon nut, and the gasket.
X type does not have automatic drain.

Element

Parts / Model Number	P type Element③④⑤	M type Element③④⑤	X type Element③④⑤
AF2-05☐25A	AF2-05P-FLA09029	AF2-05M-FLA09030	AF2-05X-FLA09031
AF2-08☐32A	AF2-08P-FLA09032	AF2-08M-FLA09033	AF2-08X-FLA09034
AF2-11☐40A	AF2-08P-FLA09032	AF2-08M-FLA09033	AF2-08X-FLA09034
AF2-13☐50A	AF2-08P-FLA09032	AF2-08M-FLA09033	AF2-08X-FLA09034
AF2-20☐50A	AF2-20P-FLA09035	AF2-20M-FLA09036	AF2-20X-FLA09037
AF2-24☐65A	AF2-24P-FLA09038	AF2-24M-FLA09039	AF2-24X-FLA09040

☐ indicates the type P/M/X.

5. TROUBLESHOOTING

5.1 Problems, Causes, and Solutions

If the product does not operate as intended, check the table below for a possible solution.

Problem	Cause	Solution
Air leaks from drain port.	Air pressure is low.	The automatic drain is normally open type, so air is discharged up to 0.1MPa.
	Drain pipe is thin.	Use pipes with an inside diameter of ø5.7 or more and a length of 5m or less for the section of pipes for discharging the drainage and avoid riser piping.
	Bind several tubes together.	Put the tubes one by one into drain pits.
	Check valve is installed in the middle of the drain tube.	Do not install because the inside of the tube is pressurized.
	Foreign matters are stuck in automatic drain.	Replace the automatic drain.
	Atomatic drain does not move.	Replace the automatic drain.
Indicator turns red.	Element is clogged.	Replace the element.
	Flow rate is excessive.	Set to the specified flow rate or less.
There is external leakage.	There are scratches on O-ring for bowl.	Replace the O-ring.
	Tightening of screw or bowl is loose.	Tighten the screw or the bowl.

If you have any other questions or concerns, contact your nearest CKD sales office or distributor.

6. WARRANTY PROVISIONS

6.1 Warranty Conditions

■ Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified below, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

- Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or this Instruction Manual.
- Failure caused by incorrect use such as careless handling or improper management.
- Failure not caused by the product.
- Failure caused by use not intended for the product.
- Failure caused by modifications/alterations or repairs not carried out by CKD.
- Failure that could have been avoided if the customer's machinery or device, into which the product is incorporated, had functions and structures generally provided in the industry.
- Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
- Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.

■ Confirmation of product compatibility

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.

■ Others

The terms and conditions of this warranty stipulate basic matters.
When the terms and conditions of the warranty described in individual specification drawings or the Specifications are different from those of this warranty, the specification drawings or the Specifications shall have a higher priority.

6.1 Warranty Period

The product is warranted for one (1) year from the date of delivery to the location specified by the customer.

6.2 Remarks

- If the product is exported outside Japan by the customer, it shall be repaired if returned to CKD's facility or a company or plant specified by CKD. Work and cost associated with the return shall not be covered by the warranty. The repaired product shall be delivered to a place in Japan specified by the customer in a package appropriate for delivery in Japan.
- Failure caused by expendable parts (element etc) dependent on usage conditions, is excluded from this warranty.