CKD

SM-290603-A

INSTRUCTION MANUAL

OIL MIST FILTER

MEDIUM PRESSURE TYPE

MM*000 Series

- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation

Safety precautions

When designing and manufacturing a device using CKD products, the manufacturer is obligated to manufacture a safe product by confirming safety of the system comprising the following items:

■Device mechanism

■Pneumatic or water control circuit

■Electric control that controls the above

It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD product is used safely.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured, and manufacture a safe device.

⚠WARNING

1. This product is designed and manufactured as a general industrial machine part
   It must be handled by someone having sufficient knowledge and experience.

2. Use this product within its specifications.
   Consult with CKD for details when using the product beyond the unique specification range, outdoors, or in the following conditions or environment: Additionally, the product must not be modified or machined.
   ① Use for special applications requiring safety including nuclear energy, railroad, aviation, ship, vehicle, medical equipment, equipment or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
   ② Use for applications where life or assets could be adversely affected, and special safety measures are required.

3. Observe corporate standards and regulations, etc., related to the safety of device design and control, etc.
   ISO4414, JIS B 8370 (pneumatic system rules)
   JFPS2008(principles for pneumatic cylinder selection and use)
   Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, body standards and regulations, etc.

4. Do not handle, pipe, or remove devices before confirming safety.
   ① Inspect and service the machine and devices after confirming safety of the entire system related to this product.
   ② Note that there may be hot or charged sections even after operation is stopped.
   ③ When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Discharge any compressed air from the system, and pay enough attention to possible water leakage and leakage of electricity.
   ④When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.

5. Observe warnings and cautions on the pages below to prevent accidents.

■The safety cautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

⚠ DANGER	: When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.
⚠ WARNING	: When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.
⚠ CAUTION	: When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. In any case, important information that must be observed is explained.

Precautions with regard to guarantee

● Guarantee period
The guarantee period of our product shall be one (1) year after it is delivered to the place specified by the customer.

● Guarantee coverage
If any failure for which CKD CORPORATION is recognized to be responsible occurs within the above warranty period, a substitute or necessary replacement parts shall be provided free of charge, or the product shall be repaired free of charge at the plant of CKD CORPORATION.

However, the guarantee excludes following cases:
① Defects resulting from operation under conditions beyond those stated in the catalogue or specifications.
② Failure resulting from malfunction of the equipment and/or machine manufactured by other companies.
③ Failure resulting from wrong use of the product.
④ Failure resulting from modification or repairing that CKD CORPORATION is not involved in. Failure resulting from causes that could not be foreseen by the technology available at the time of delivery.
⑤ Failure resulting from disaster that CKD is not responsible of.

Guarantee stated here covers only the delivered products. Any other damage resulting from failure of the delivered products is not covered by this guarantee.

● Confirmation of product compatibility
Our customer shall be responsible of confirming compatibility of our product used in our customer's system, machinery or device.

【 INDEX 】

1. UNPACKING

1) Confirm that the product model number ordered and the product model number marked on the product are identical with each other.
2) Inspect tha product for damage.
3) If the package contains any documents other than this INSTRUCTION MANUAL, such as handling notes, be sure to familiarize yourself with the contents before use.

⚠ CAUTION Do not remove tha port protective plug (port seal or cap) immediately before piping in order to prevent entry of foreign matter. Failure to follow this instrutioin may result in malfunction of terminal equipment.

2. INSTALLATION

2.1 Installation Environment

Avoid installing the product in the following environments. If installation in any of these environments is unavoidable, provide appropriate protection, such as a cover or casing.

1) Avoid using the product outside the range of 5 to 60℃(5 to 30℃ for the mantle option "X").
2) Avoid using the product in a dusty atmosphere.
3) Avoid using the product in an atmosphere containing corrosive gas.
4) Avoid using the product in an atmosphere where spluttering may occur.
5) Do not expose the product to direct sunlight, rain, wind or water.
6) Do not expose the product to radiant heat if the product is installed near a heat source.
7) Avoid using the product in an atmosphere where ozone is produced.
8) Do not expose the product to excessive shock or vibration.

⚠ WARNING Do not this product in an atmosphere containing organic or other chemicals or where chemicals may adhere to the product. Failure to follow this instruction may result in breakage.

2.2 Piping

1) So mount that arrow mark on plate cover of oil mist filter matches with the intended air flow.

2) Avoid to mount an oil mist filter with connecting ports smaller than the dia of pipes of the air system.

3) Drain Pipe

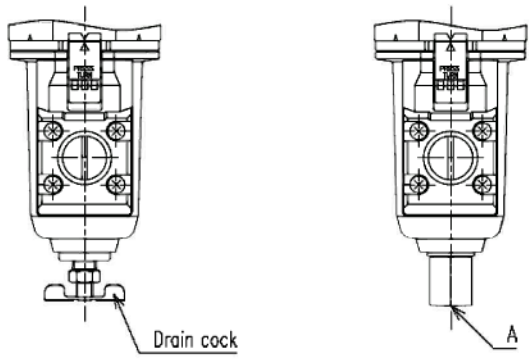
Drainage "blank"

With manual drain cock. (Drain pipe cannot be connected..)

Drainage "F1"

A drain pipe can be connected with the attached Rc1/8 female screw.

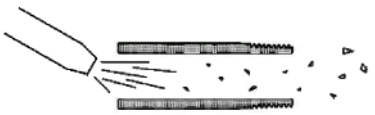
If a joint is connected to the Rc1/8 female screw, turn the joint into the screw while holding the hexagonal cock with a spanner. If a drain pipe is connected to the tightening joint, the auto drain metal bowl cannot be manually operated.



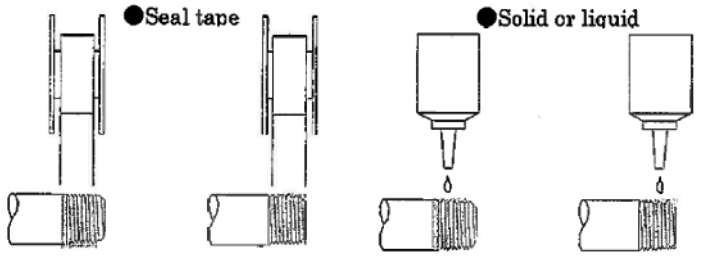
Type of thread air system	A
Rc	Rc 1/8
NPT	1/8 NPT
G	G 1/8

4) Mount a bowl parpendicularly underneath of pipe.

5) Flush air into the pipe to blow out foreign substan and chips before piping.



6) Refrain from mapplying sealant or sealing tape approx. to pitches of thread off the tip of the pipe to avoid residual substances from falling into the piping system.

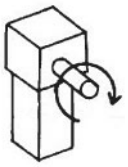


Right False Right False

⚠ WARNING Be sure to prevent foreign matter (such as sealant and chips) from entering the filter. Failure to follow this instruction may result in malfunction of terminal equipment.

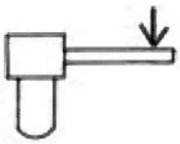
7) Apply torque to tighten a pipe as indicated below.
Avoid applying too much torque to the body or the piping.

Serise	MM3000	MM6000
	MM4000	MM8000
Max. torque(N・m)	30	70

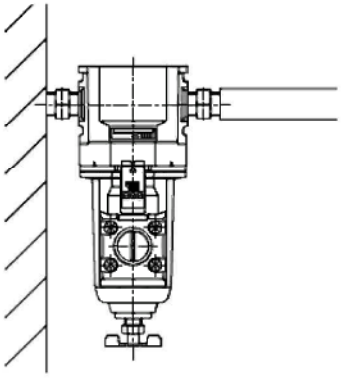


8) The following table specifies the piping load torque.
Avoid applying a piping load or torque to the body or piping.

Serise	MM3000	MM6000
	MM4000	MM8000
Max. torque(N・m)	50	100



Do not overhang the oill mist filter with a pipe as shown below.
If installed in this manner, the filter may receive abnormal stress, resulting in breakage.



⚠ WARNING In piping, avoid applying too much torque, load, or overhanging. Failure to follow this instruction may result in breakage of the product.

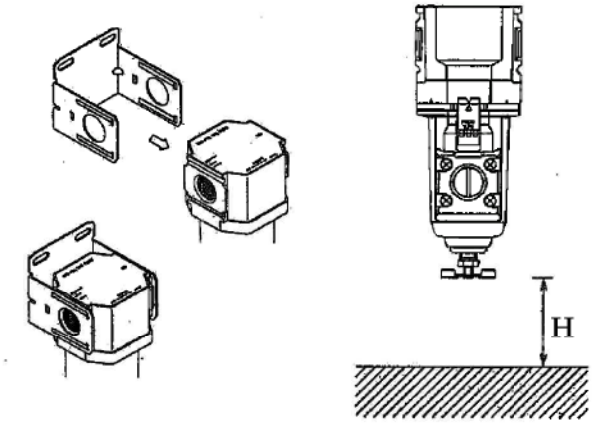
2.3 Installation

1) In case of making use of the C type bracket "BW" (optional), mount the regulator onto the C type bracket first, prior to screwing a piece of pipe into body of regulator. After aligning side grooves of body of regulator to the ridges on both sides of the C type bracket, push slide the bracket forcibly along the groove as per illustrated in the following figure.

2) Mount the oil mist filter so that its drain port settles downward.

3) Mount it in the upper steam of the pneumatic equipment to be serviced as close as possible.

4) Allow a clearance for maintenance under the bowl so that parts can be removed during disassembly.



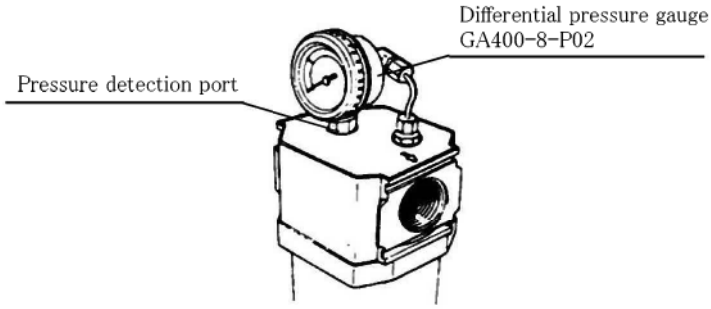
	Maintenance clearance H
MM3000	60mm or more
MM4000	60mm or more
MM6000	60mm or more
MM8000	200mm or more

5) Installation of Pressure Differential Gauge

＜Installation example of 6000-W, 8000-W seriese＞

Pressure detection port is available as option for 6000-W, 8000-W seriese.

Check high- and low-pressure port positions for the differential pressure installation port, and install correctly.



⚠WARNING Be sure to firmly secure the product with specified brackets, fixing feet, and pipe supports, otherwise the product may shake under pressure, causing an accident.

3. OPERATION

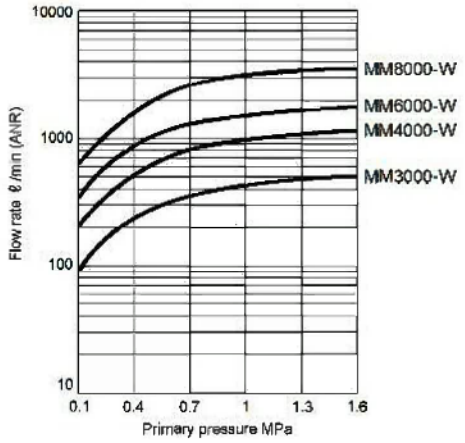
3.1 Important Safety Instructions

⚠ WARNING

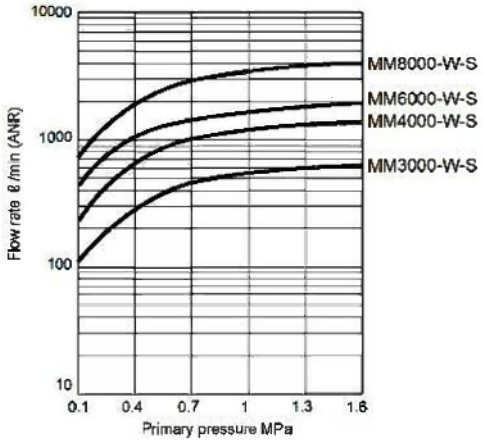
1) Circulate clean compressed air only. If the compressed air contains chemicals or corrosive gas, malfunction or breakage of the product may result.
2) Operate the product within the specified pressure and temperature ranges in the correct flow direction. Failure to follow this Instruction may result in breakage of the bowl of malfunction of terminal equipment.

1) Maintain the throuthput flow at or below the max. values specified in the charts below.

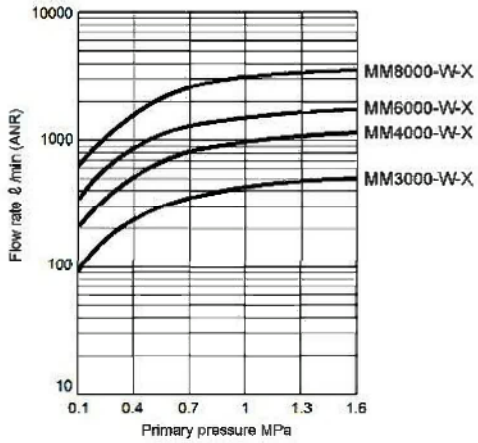
● MM*000-W



● MM*000-W-S



● MM*000-W-X



2) Do not allow more than the rated flow even temporarily or install the oil mist filter where there is strong pulsation. Failure to pay attention to this instruction may result in breakage of the mantle, or result in oil or drainage reaching the secondary side, causing malfunction of the terminal equipment.

3) Install a pre-filter on the primary side of the oil mist filter to prevent premature clogging.

4) Maintain the concentration of oil at or below 30mg/m^3.

5) For the service life or replacement of the mantle, see Chapter 4. MAINTENANCE.

6) The minimum working pressure for the filter with an optional auto drain is 0.15 MPa.

⚠ CAUTION Be sure to properly treat drainage collected in the bowl to avoid environmental pollution.

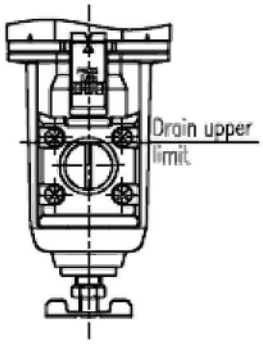
3.2 Draining out the accumulated sludge.

1) To remove the drainage collected in the bowl of the oil mist filter, turn the drain cock in a counterclockwise direction.

2) Be sure to turn it back clockwise after draining.

Note 1: Manual draining is unavailable for metal auto drain bowl. If a drain pipe is connected to the tightening joint, the metal auto drain bowl cannot be manually operated.

Note 2: Drain the bowl regularly so that the drainage limit is not exceeded. Failure to follow this instruction may result in breakage of the bowl or malfunction of terminal equipment.



⚠ WARNING Do not face the outlet when draining the bowl. Drainage may splash on your face and cause injury.

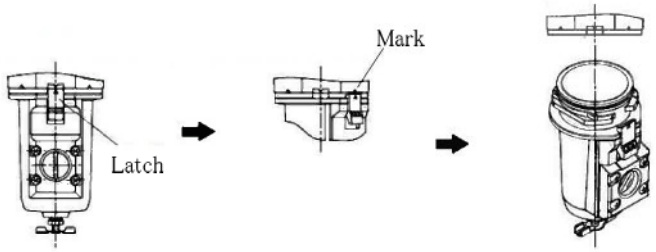
4. MAINTENANCE

4.1 Periodic Inspection

1) Drain the oil mist filter regularly so that the accumulated drainage does not exceed the upper limit.
2) To maintain normal operation of auto drain "F1", clean the drain (by blowing air or washing with tap water) regularly or replace it.

4.2 Dismounting Bowl

⚠ WARNING Before removing the bowl, cut off the pressurized air and depressurize the bowl. Make sure that the bowl is completely depressurized. If it is not completely depressurized, the bowl may jump and cause an injury.



Trun the bowl and the bowl leftwards as indicated by the arrow while turning the latch.

Align the mark on the body or spacer with the mark on the latch and pull out the bowl .

To mount the bowl, follow the removal steps in reverse.
Before introducing compressed air, check that the latch is securaly fitted in the recess in the body or spacer.

4.3 Replacement of Filter Mantle (Element)

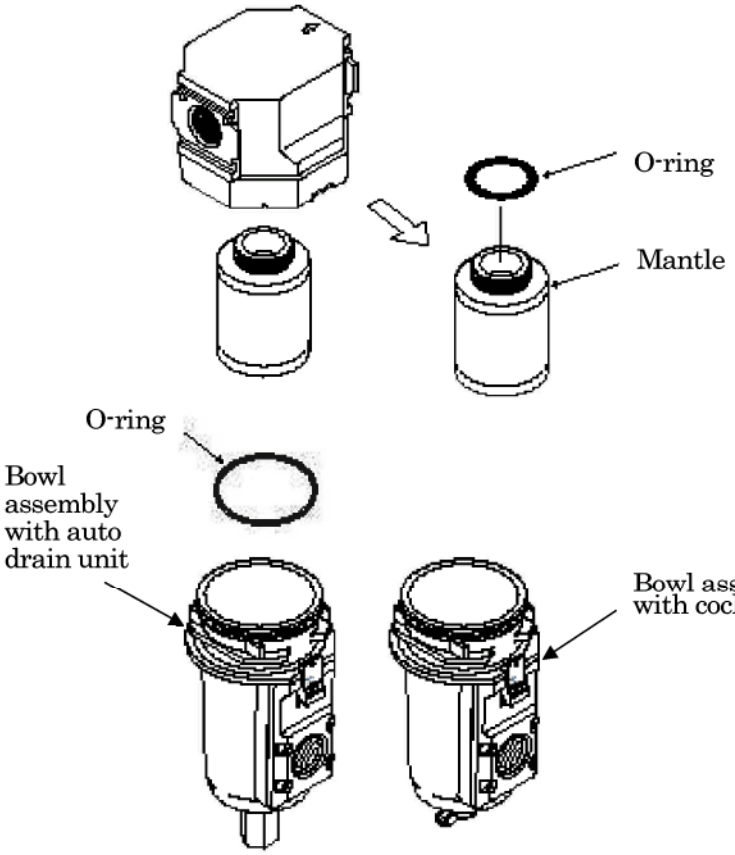
⚠ WARNING Do not hold the center of the mantle (element) when mounting and removing it. Failure to follow this instruction may result in breakage or poor performance of the product.

1) Removing the bowl
Turn the mantle (element) to remove the bowl.
If the mantle cannot be manually loosened, it can be turned more easily by fitting ahexagonal bar wrench (nominal No.6) in the hexagonal bottom indentation in the mantle (element).

2) Mounting the bowl

Mount the O-ring on the mantle (element). Turn the mantle (element) into the body. Tightening torque for mounting is appox. 2.5 N・m.

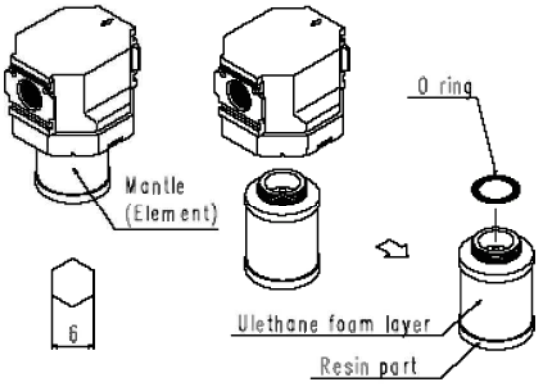
4.4 Expendable and Replacement Parts



Note 1: A set of O-ring, mantle, and O-ring for bowl assembly.

Note 2: The bowl construction has the O-ring.

Note 3: The O-ring is five sets.



Model	MM3000	MM4000	MM6000	MM8000
Repair kits M type	M3000-KIT	M4000-KIT	M6000-KIT	M8000-KIT
Repair kits S type	M3000-KIT –S	M4000-KIT –S	M6000-KIT –S	M8000-KIT –S
Repair kits X type	M3000- KIT –X	M4000- KIT –X	M6000- KIT –X	M8000- KIT –X
Mantle M type	M3000- MANTLE -ASSY	M4000- MANTLE -ASSY	M6000- MANTLE -ASSY	M8000- MANTLE -ASSY
Mantle S type	M3000- MANTLE -ASSY-S	M4000- MANTLE -ASSY-S	M6000- MANTLE -ASSY-S	M8000- MANTLE -ASSY-S
Mantle X type	M3000- MANTLE -ASSY-X	M4000- MANTLE -ASSY-X	M6000- MANTLE -ASSY-X	M8000- MANTLE -ASSY-X
Bowl assembly with cock	F3000-BOWL-M	F4000-BOWL-M	F4000-BOWL-M	F4000-BOWL-M
Bowl assembly with auto drain unit	M3000-BOWL-F1M	M4000-BOWL-F1M	M4000-BOWL-F1M	M4000-BOWL-F1M
O-ring	F3000-ORING	F4000-ORING	F4000-ORING	F4000-ORING

5. TROUBLE SHOOTING

Phenomena	Major Causes	Remedies
Sludge comes out from directly after the filter.	Sludge (oil) accumulation has exceeded the max. drain level.	Drain sludge (oil).
	Flow rate exceeds the maximum flow rate.	Replace with a model suitable for the flow rate.
Sludge does not come out when open the drain cock.	Drain port has been clogged with foreign particles.	Remove the bowl, upon shutting air off, and clean inside. Replace it with new ass'y unit when cleaning does not provide any remedy.
Auto drain does not drain automatically. Air leaks from drain	Mechanical trouble of auto drain or clogged with foreign particle.	
Air leaks at the hook up of a bowl.	The O-ring is damaged or has foreign matter on its surface.	Remove the bowl, upon shutting air off, and replace the O-ring with new one or wash and rinse the packing.
	Bowl is defective.	Remove the bowl, upon shutting air off, and replace it with new one.

⚠ WARNING

1) When a flaw, such as a crack or a scratch, its found on the bowl, replaceit with a new one. Failure to follow this instruction may result in breakage of the bowl and an accident.
2) When cleaning a bowl, use a neutral detergent for home use and rinse it well water. Any other cleaning method may result in breakage of the bowl and an accident.

6. HOW TO ORDER AND PRODUCT SPECI FICATIONS

6.1 Product specifications

Model		MM3000-W	MM4000-W	MM6000-W	MM8000-W
Working fluid		Compressed Air			
Max Working Pressure	MPa	0.1 (≈15 psi, 1 bar) to 1.6 (≈230 psi, 16 bar) Note 2			
Proof Pressure	MPa	2.4 (≈350 psi, 24 bar) Note			
Drain capacity	cm^3	45	80	80	80
Port size	Rc,NPT,G	1/4, 3/8	1/4, 3/8, 1/2	3/4, 1	
Weight	kg	0.35	0.55	1.0	1.48

Mantle opution name		Blank(M type)	S(S type)	X(X type)
Flow rate Note 1 L/min(ANR) Primary pressure 1.4MPa	MM3000-W	490	610	610
	MM4000-W	1130	1370	1370
	MM6000-W	1740	1920	1920
	MM8000-W	3560	3980	3980
Anbient temperature °C		-5 (23 °F) to +60 (140°F) (no freezing) Note		-5 (23 °F) to +30 (86°F) (no freezing)
Fluid Temperature °C		5 (41 °F) to 60 (140°F) Note		5 (41 °F) to 30 (86°F)
Filtration rating µm		0.01 (nominal)	0.3	Suction by activated charcoal Note 3
Secondary side oil concentration mg/m^3		0.01 or less Note 4, 3 (0.1 or less after oil saturation)	0.5 or less Note 4	0.003 or less Note 4, 6
Mantle (element) change		1 year (6000 hours) or pressure drop 0.1MPa (≈14.6 psi, 1 bar)		- Note 7

Note 1: Use within the maximum processing flow rate.
If the maximum processing flow is exceeded temporarily, or if the filter is installed at a place with high levels of pulsation, the mantle could be damaged or oil or drainage, etc., could splatter to the secondary side and result in faults at the terminal.

Note 2: When "F1" with an automatic drain is selected, minimum operation pressure must be 0.15MPa.
Max working pressure is 1.5MPa, proof pressure is 2.25MPa, anbient temperature is -5 to +45°C (23 to 113°F), and fluid temperature is 5 to 45°C (41 to 113°F).

Note 3: Activated charcoal particles could flow to the secondary side, so install an air filter (F Series) or oil mist filter (M Series M type or S type) on the secondary side.

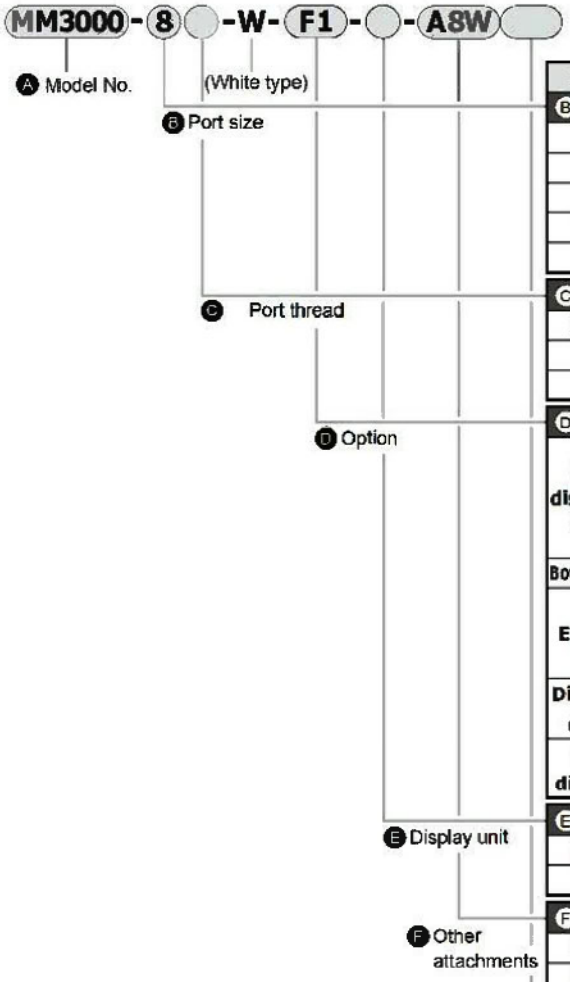
Note 4: The secondary oil concentration is the value when the primary oil concentration is 30 mg/m^3 and inlet air temperature is 21℃

Note 5: Install an oil mist filter (S type) as a prefilter on the primary side to prevent early clogging.

Note 6: When an oil mist filter (M Series M type) is installed on the primary side.

Note 7: The mantle (element) replacement period differs with the odor density in compressed air, and thus cannot be clearly indicated. Consider the total period from initial installation to when the smell of oil is confirmed as the effective deodorizing period, and replace at the same time as the X type or control with usage time.
Keep the primary air temperature at 30 or less. The deodorizing effect will drop if the temperature is high, so provide heat dissipation measures.

6.2 How to order



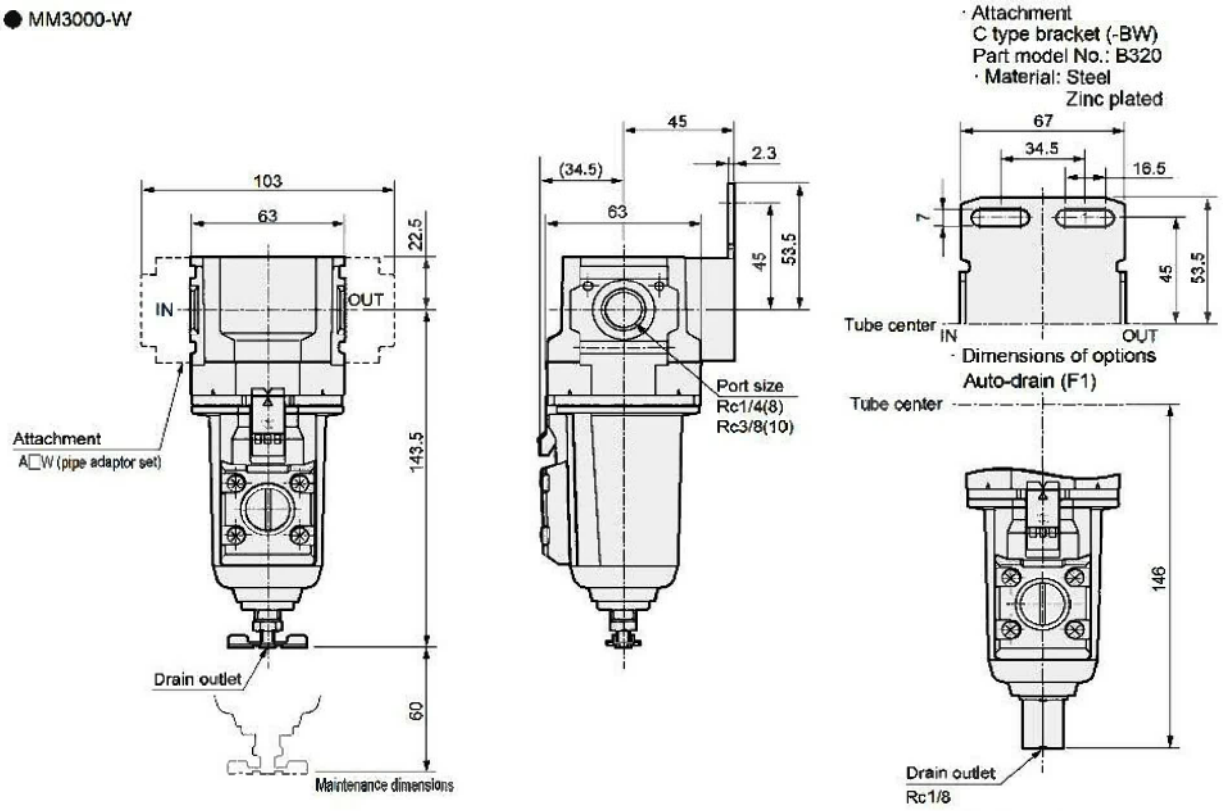
Code	Content	Ⓐ Model No. MM3000	MM4000	MM6000	MM8000
Ⓑ Port size					
8	1/4	●	●		
10	3/8	●	●		
15	1/2		●		
20	3/4			●	●
25	1			●	●
Ⓒ Port thread					*1
Blank	Rc thread	●	●	●	●
N	NPT thread	●	●	●	●
G	G thread	●	●	●	●
Ⓓ Option					*2
Drain discharge *3, *4	Blank: With manual drain cock	●	●	●	●
	F1: NC auto-drain (no press→no exhaust) drain outlet Rc1/8 Max. working press 1.5 MPa, max. operating amb temp 45°C	●	●	●	●
Bowl material	Blank: Metal bowl	●	●	●	●
Element	Blank: M type (nominal 0.01 μm; remaining oil 0.01 mg/m³)	●	●	●	●
	S: S type (nominal 0.3 μm; remaining oil 0.5 mg/m³)	●	●	●	●
	X: X type (deodorization; remaining oil 0.003 mg/m³) *5	●	●	●	●
Diff press detect	Blank: Without differential pressure detection port	●	●	●	●
	Q: With differential pressure detection port (Rc1/4)			●	●
Flow direction	Blank: Standard flow (left → right)	●	●	●	●
	X1: Reverse flow (right → left)	●	●	●	●
Ⓔ Display unit					
Blank	MPa display, Rc thread	●	●	●	●
J1	MPa display, NPT/G thread	●	●	●	●
Ⓕ Other attachments					*6, *7 Page 270
Blank	Not attached	●	●	●	●
A8*W	1/4 pipe adaptor set	●	●		
A10*W	3/8 pipe adaptor set	●	●		
A15*W	1/2 pipe adaptor set	●	●		
A20*W	3/4 pipe adaptor set		●	●	●
A25*W	1 pipe adaptor set			●	●
A32*W	1 1/4 pipe adaptor set			●	●
***Adaptor thread**					
Blank	Rc thread	●	●	●	●
N	NPT thread	●	●	●	●
G	G thread	●	●	●	●
Ⓖ Bracket (attachment)					Page 267
Blank	Not attached	●	●	●	●
BW	C type bracket	●	●	●	●

⚠ Precautions for model No. selection

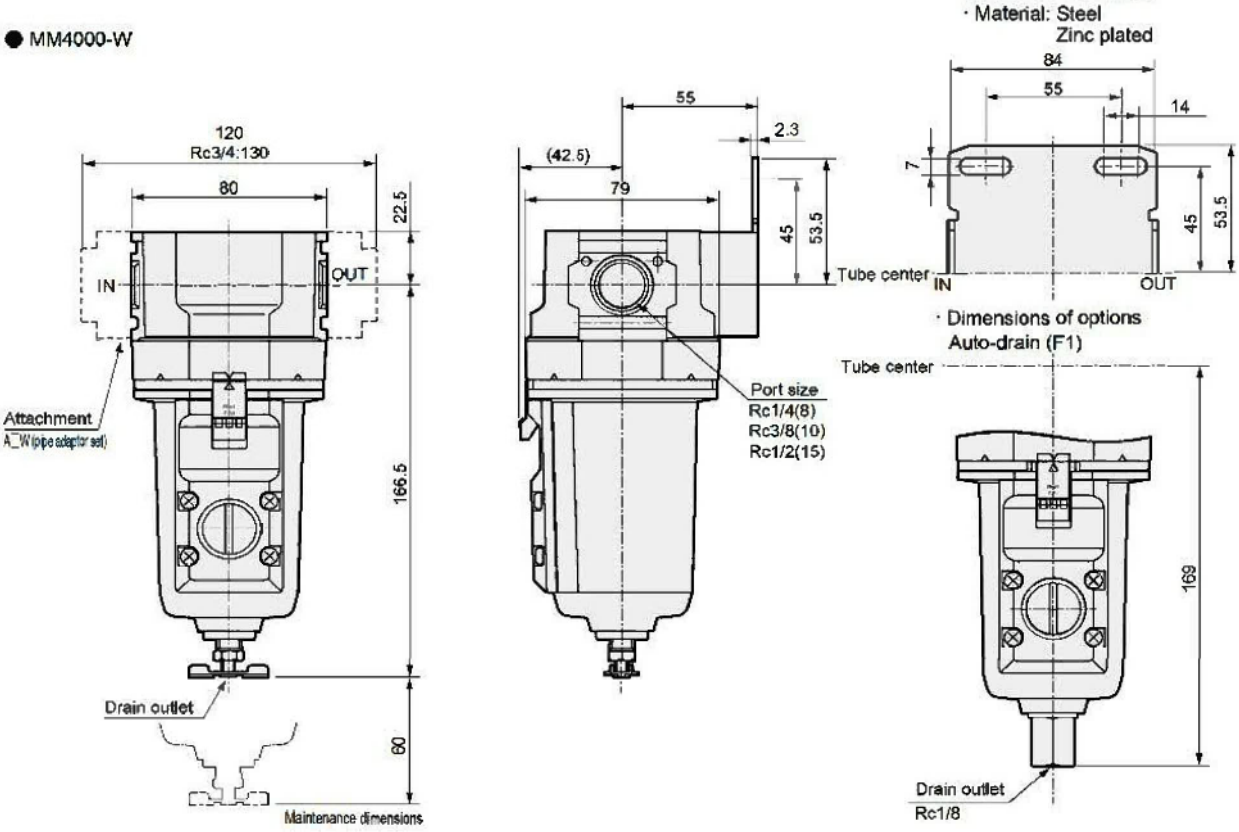
*1: NPT and G threads are available for IN, OUT, and drain ports.
*2: Select options for the drainage, bowl material, element and differential pressure detection. When selecting options for several items, list options in order from the top.
*3: NO auto-drain cannot be selected.
*4: Refer to page 280 for the auto-drain usage conditions.
*5: Combination with option F1 is not possible.
*6: The pipe adaptor set and C type bracket cannot be used together.
*7: The joiner set is enclosed with the pipe adaptor set.

6.3 Outside Dimension

● MM3000-W

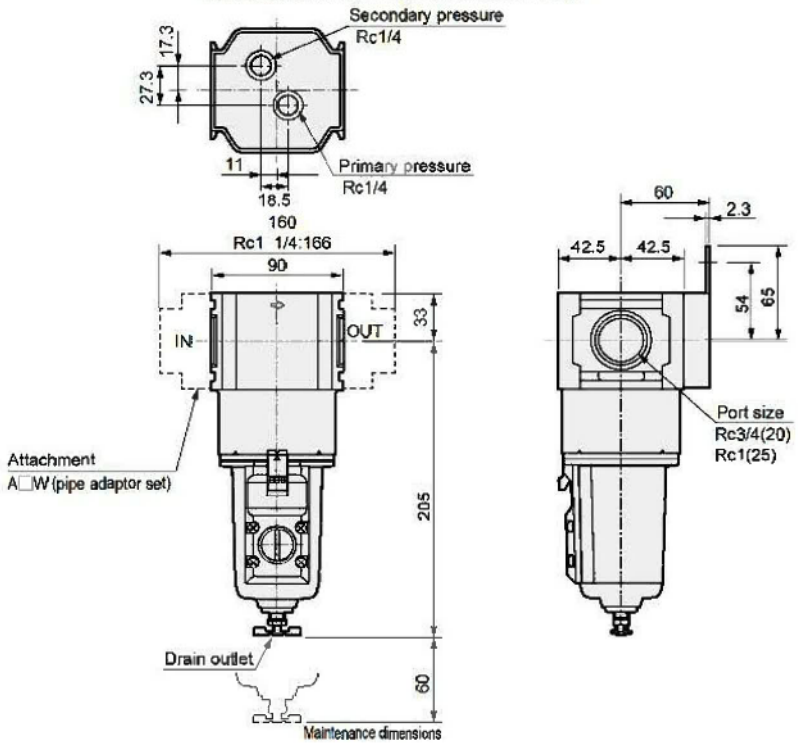


● MM4000-W

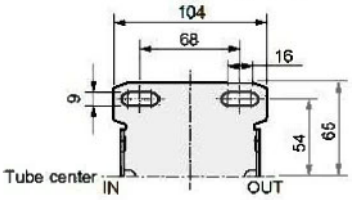


● MM6000-W

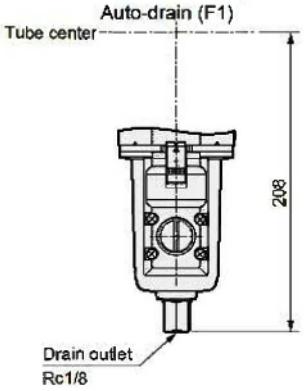
· Dimensions of options
With differential pressure detection port (Q)



· Attachment
C type bracket (-BW)
Part model No.: B620
· Material: Steel
Zinc plated

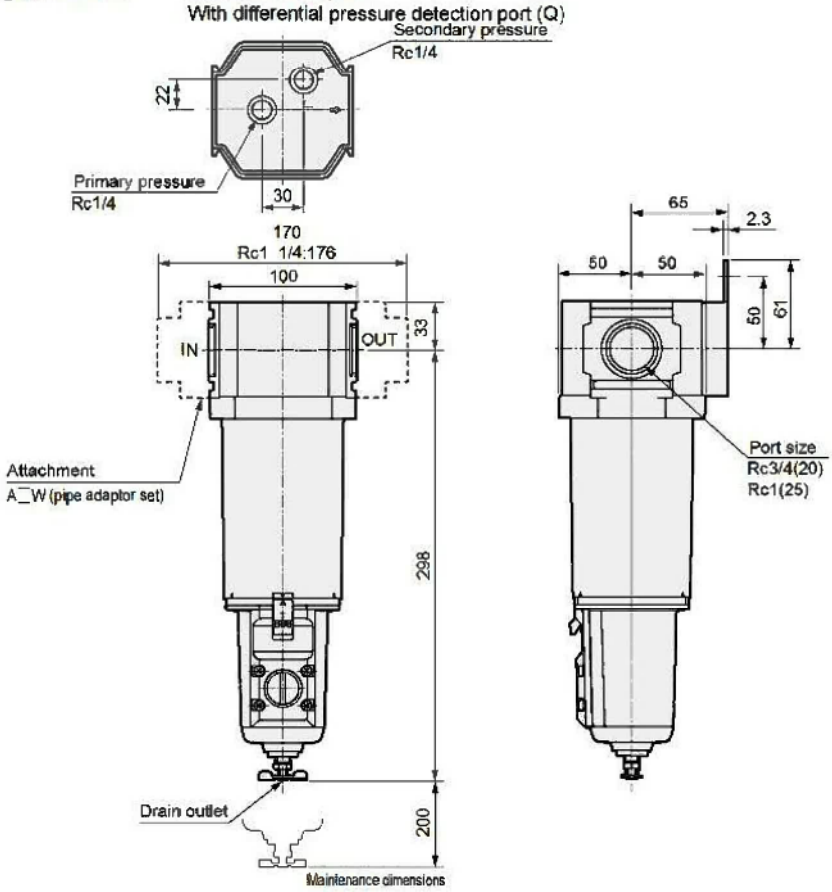


· Dimensions of options
Auto-drain (F1)

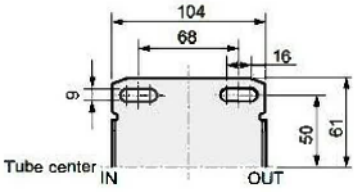


● MM8000-W

· Dimensions of options
With differential pressure detection port (Q)



· Attachment
C type bracket (-BW)
Part model No.: B820
· Material: Steel
Zinc plated



· Dimensions of options
Auto-drain (F1)