

## INSTRUCTION MANUAL

### AIR MANIFOLD

#### GMF1・GMF2 series

(Based on ISO)

- Please read this instruction manual thoroughly before using the product.
- In particular, carefully read the contents related to safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

## 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

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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.
  - This product cannot be used beyond its specifications. Additionally, the product must not be modified or machined.
  - This product is intended for use in general industrial devices and parts. Use beyond such conditions is not considered. Consult with CKD for details when using the product beyond the unique specification range, in the following conditions or environments. In any case, measures for safety shall be provided when the valve malfunctions.
  - 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.
  - SO4414, 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, 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. Release any compressed air from the system, and pay enough attention to possible water leakage and leakage of electricity.
  - ④ When starting or restarting a machine or device that incorporates pneumatic components, make sure that 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.

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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.
- ⑤ Failure resulting from causes that could not be foreseen by the technology available at the time of delivery.
- ⑥ 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.

### UNPACKING (Section 3)



#### **CAUTION :**

Bags containing solenoid valves should be opened only when you are ready to connect the valves to the pipes immediately afterward.

- If bags are opened before the valves are ready to be connected to the pipes, the entry of foreign matter from the piping ports could cause the solenoid valves to fail or malfunction.

### INSTALLATION (Section 4)



#### **CAUTION :**

If you have to use the product under conditions that are different from the specified conditions or if you intend to use the product for a special application, be sure to consult us about the product specifications before using the product.

### ENVIRONMENT (Section 4.1)



#### **CAUTION :**

- a) In a dusty environment, foreign matter may enter even through the exhaust port.
  - The movement of the exhaust valve causes a respiratory action at the exhaust valve, which may cause inhalation of foreign matter near the exhaust port. This potential situation would be worse if the exhaust port is facing upward. Attach a silencer to the exhaust port or have the exhaust port face downward.
- b) Do not keep water or coolant dripping to the solenoid valve system constantly.
  - In case that the solenoid valve system is used under the conditions with constant water splash, protect it by a cover or install it inside a enclosure.
  - If the cylinder rod is splashed with cutting oil, the oil may penetrate through the cylinder into the secondary side piping of the solenoid valve. This must be prevented to avoid malfunctions. Consult with CKD us for preventive measures.
- c) The coils will produce heat.
  - Particularly if the solenoid valve system is installed in a control board or if the solenoid coils need to be energized for a long time, consider providing sufficient ventilation to release the heat. The coils can get very hot.
- d) Do not use the solenoid valve system in an atmosphere that includes a corrosive gas or solvent vapors.
  - Do not use the solenoid valve system in an atmosphere that includes a corrosive gas such as the sulfur dioxide gas or in an atmosphere that includes solvent vapors.
- e) Vibrations and shocks
  - Do not subject the solenoid valve system to vibrations  $50\text{m/s}^2$  or stronger or shocks  $300\text{m/s}^2$  or stronger.
- f) Do not use the normal type solenoid valves for an application that requires conformity with explosion-proof specifications. Choose explosion-proof solenoid valves instead.

## INSTALLATION (Section 4.2)



### **WARNING :**

When installing a manifold, never attempt to hold it in position by means of the pipes connected to it.

Mount the solenoid valve by applying the mounting screws and/or mounting plate to the manifold.

## PIPING (Section 4.3)



### **CAUTION :**

- a) Observe the recommended tightening torque when connecting pipes.
  - Observing the recommended tightening torque prevents air leakage and damage to the screw threads. To prevent damage to the screw threads, first use your hand to lightly tighten the screw and then use a tool to tighten the screw to the recommended torque.
- b) Make sure that the pipes will not be disconnected at the joints by mechanical movements, vibrations or tension.
  - If the exhaust piping of the pneumatic circuit is disconnected, the actuator speed control is disabled.
  - If the above happens to a chuck holding mechanism, the chuck will open. The inadvertent opening of the chuck may cause a serious accident.
- c) When supplying the compressed air for the first time after completing the piping, be sure to check every joint in the piping for air leakage.
- d) When supplying the compressed air for the first time after completing the piping, increase the air pressure gradually but never introduce a highly-pressurized air suddenly.
  - A sudden introduction of a highly-pressurized air may disconnect pipes at joints and/or cause the tubes to jump around, any of which may cause an injury.
- e) Do not decrease the inside diameter of the piping from any of the solenoid valve exhaust ports to a diameter less than the exhaust pipe connecting port size.
  - Normal operation of the actuator depends on the smoothness of the exhaust flow. With a manifold system, a restriction to the exhaust flow may prevent normal operation of other solenoid valves.
- f) Removal of foreign matter
  - Rust and other foreign matter in the pneumatic circuit may cause a malfunction or leakage from the valve seat. Insert a filter (maximum allowable particle size 5µm or less) immediately upstream of the solenoid valve.
- g) Air supply

Do not restrict the flow of air through the air supply piping. With a manifold system with multiple stations, a drop in the air supply pressure may cause trouble through a delay in the operation timing.

## AIR QUALITY (Section 5.3)



### **WARNING :**

- a) Do not supply anything other than compressed air.
- b) Supply clean compressed air without any mixture of corrosive gas.



### **CAUTION :**

- a) Compressed air usually contains a large amount of drain, oxidized oil, tar, foreign matter, and rust from the piping. Filter out those elements in the supplied air because they may cause a malfunction and decrease service life. In addition, clean the exhaust before it is released to the air to minimize pollution.
- b) Once you have lubricated a pre-lubricated valve, the valve is no longer capable of running without being lubricated from the outside. Do not leave the valve without lubrication but keep it lubricated.
- c) Do not use spindle oil or machine oil. They may induce expansion of the rubber parts, which may cause a malfunction.

## PERIODIC INSPECTION (Section 6.1)



### **WARNING :**

Before providing a maintenance service, cut the power and the supply of compressed air and confirm the absence of residual pressure.

The above is required to ensure safety.



### **CAUTION :**

Regularly perform the daily and periodic inspections to correctly maintain product performance.

If the product is not correctly maintained, product performance may deteriorate dramatically, resulting in a shorter service life, fractures of components, and malfunctions.

## DISASSEMBLING AND ASSEMBLING (Section 6.2)



### **WARNING :**

Before increase or decrease block of manifold, cut the power and the supply of compressed air.

When disassembling or assembling the manifold, perform it after reading the Instruction Manual carefully and with full.

- You are required to understand the structure of solenoid valve and its operation principle to secure the safety.
- A level of 2nd Class or more of Pneumatics Technology Certification is required.

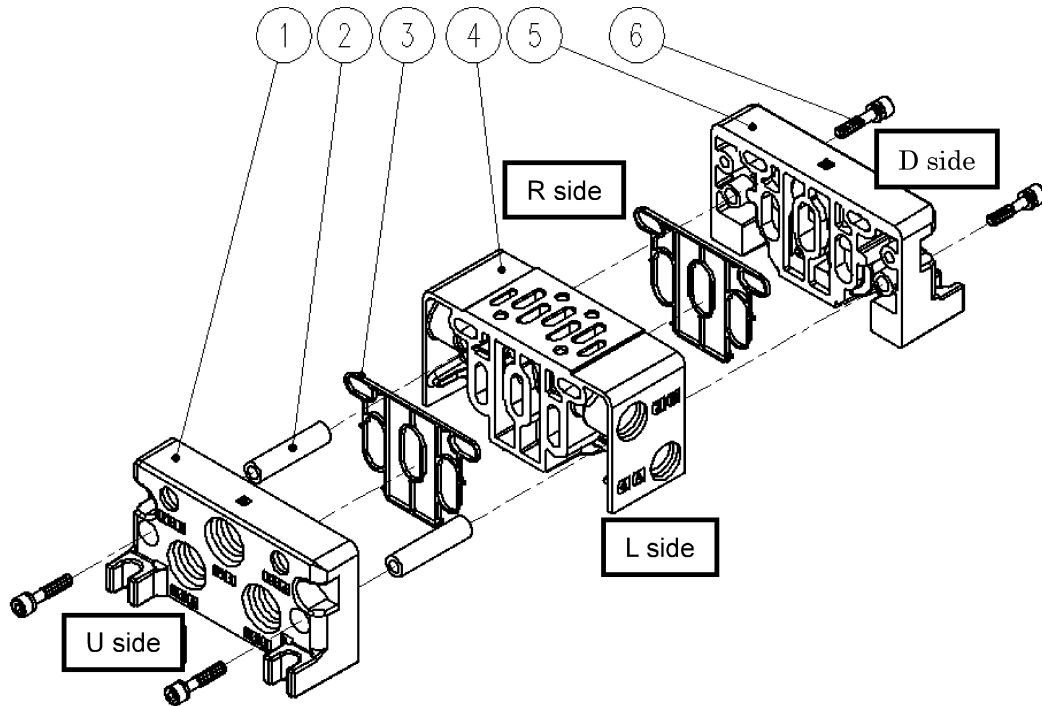
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GMF1・GMF2  
Manual No. SM-P00047-A

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# 1. PRODUCT



No.	Name
①	Foot U
②	Tie rod
③	Manifold block gasket
④	Manifold block
⑤	Foot D
⑥	Set screw



## 2. INTERNATIONAL SYSTEM OF UNITS (SI) AND PORT INDICATION

### 2.1 Port Indication

Each piping port is marked with JIS conformable piping port indication codes.

Application	JIS	ISO
Supply port	P	1
Output port	A	4
Output port	B	2
Exhaust port	R1	5
Exhaust port	R2	3

- Installing position of the solenoid valve is free.

### 2.2 Conversion between International System of Units (SI) and Conventional Units

In this manual, values are expressed using the International System of Units (SI).

Use the table below to convert them into values expressed in conventional units.

Table of conversion between SI units and conventional units

(The values printed in **Bolds** fonts are values given in the International System of Units (SI)):

<p>Example (converting a pressure value):</p> $1\text{kgf/cm}^2 \rightarrow 0.0980665\text{MPa}$ $1\text{MPa} \rightarrow 1.01972 \times 10\text{kgf/cm}^2$
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#### ● Force

N	dyn	kgf
1	$1 \times 10^5$	$1.01972 \times 10^{-1}$
$1 \times 10^{-5}$	1	$1.01972 \times 10^{-6}$
9.80665	$9.80665 \times 10^5$	1

#### ● Stress

Pa or N/m <sup>2</sup>	MPa or N/mm <sup>2</sup>	kgf/mm <sup>2</sup>	kgf/cm <sup>2</sup>
1	$1 \times 10^{-6}$	$1.01972 \times 10^{-7}$	$1.01972 \times 10^{-5}$
$1 \times 10^6$	1	$1.01972 \times 10^{-1}$	$1.01972 \times 10$
$9.80665 \times 10^6$	9.80665	1	$1 \times 10^2$
$9.80665 \times 10^4$	$9.80665 \times 10^{-2}$	$1 \times 10^{-2}$	1

※:  $1\text{Pa}=1\text{N/m}^2$ ,  $1\text{MPa}=1\text{N/mm}^2$

#### ● Pressure

Pa	kPa	MPa	bar	kgf/cm <sup>2</sup>	atm	mmH <sub>2</sub> O	MmHg or Torr
1	$1 \times 10^{-3}$	$1 \times 10^{-6}$	$1 \times 10^{-5}$	$1.01972 \times 10^{-5}$	$9.86923 \times 10^{-6}$	$1.01972 \times 10^{-1}$	$7.50062 \times 10^{-3}$
$1 \times 10^3$	1	$1 \times 10^{-3}$	$1 \times 10^{-2}$	$1.01972 \times 10^{-2}$	$9.86923 \times 10^{-3}$	$1.01972 \times 10^2$	7.50062
$1 \times 10^6$	$1 \times 10^3$	1	$1 \times 10$	$1.01972 \times 10$	9.86923	$1.01972 \times 10^5$	$7.50062 \times 10^3$
$1 \times 10^5$	$1 \times 10^2$	$1 \times 10^{-1}$	1	1.01972	$9.86923 \times 10^{-1}$	$1.01972 \times 10^4$	$7.50062 \times 10^2$
$9.80665 \times 10^4$	$9.80665 \times 10$	$9.80665 \times 10^{-2}$	$9.80665 \times 10^{-1}$	1	$9.67841 \times 10^{-1}$	$1 \times 10^4$	$7.35559 \times 10^2$
$1.01325 \times 10^5$	$1.01325 \times 10^2$	$1.01325 \times 10^{-1}$	1.01325	1.01323	1	$1.03323 \times 10^4$	$7.60000 \times 10^2$
9.80665	$9.80665 \times 10^{-3}$	$9.80665 \times 10^{-6}$	$9.80665 \times 10^{-5}$	$1 \times 10^{-4}$	$9.67841 \times 10^{-5}$	1	$7.35559 \times 10^{-2}$
$1.33322 \times 10^2$	$1.33322 \times 10^{-1}$	$1.33322 \times 10^{-4}$	$1.33322 \times 10^{-3}$	$1.35951 \times 10^{-3}$	$1.31579 \times 10^{-3}$	$1.35951 \times 10$	1

※:  $1\text{Pa}=1\text{N/m}^2$



### 3. UNPACKING




**CAUTION :** Bags containing solenoid valves should be opened only when you are ready to connect the valves to the pipes immediately afterward.


- If bags are opened before the valves are ready to be connected to the pipes, the entry of foreign matter from the piping ports could cause the solenoid valves to fail or malfunction.

- a) Check the model number imprinted on the product to make sure that the product you received is exactly the product you ordered.
- b) Check the exterior of the product for any damage.
- c) Before using the product, read the supplied documentation.

## 4. INSTALLATION


 **CAUTION :** If you have to use the product under conditions that are different from the specified conditions or if you intend to use the product for a special application, be sure to consult us about the product specifications before using the product.

### 4.1 Environment

 **CAUTION :**

- a) In a dusty environment, foreign matter may enter even through the exhaust port.
  - The movement of the exhaust valve causes a respiratory action at the exhaust valve, which may cause inhalation of foreign matter near the exhaust port. This potential situation would be worse if the exhaust port is facing upward. Attach a silencer to the exhaust port or have the exhaust port face downward.
- b) Do not keep water or coolant dripping to the solenoid valve system constantly.
  - In case that the solenoid valve system is used under the conditions with constant water splash, protect it by a cover or install it inside a enclosure.
  - If the cylinder rod is splashed with cutting oil, the oil may penetrate through the cylinder into the secondary side piping of the solenoid valve. This must be prevented to avoid malfunctions. Consult us for preventive measures.
- c) The coils will produce heat.
  - Particularly if the solenoid valve system is installed in a control board or if the solenoid coils need to be energized for a long time, consider providing sufficient ventilation to release the heat. The coils can get very hot.
- d) Do not use the solenoid valve system in an atmosphere that includes a corrosive gas or solvent vapors.
  - Do not use the solenoid valve system in an atmosphere that includes a corrosive gas such as the sulfur dioxide gas or in an atmosphere that includes solvent vapors.
- e) Vibrations and shocks
  - Do not subject the solenoid valve system to vibrations  $50\text{m/s}^2$  or stronger or shocks  $300\text{m/s}^2$  or stronger.
- f) Avoid using the solenoid valve system in a humid environment because the humidity is likely to cause condensation with a change in the temperature.
- g) Do not use the normal type solenoid valves for an application that requires conformity with explosion-proof specifications. Choose explosion-proof solenoid valves instead.

### 4.2 Installation

 **WARNING :** When installing a manifold, never attempt to hold it in position by means of the pipes connected to it.

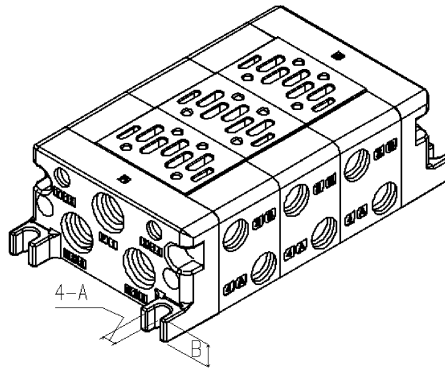
- Mount the solenoid valve by applying the mounting screws and/or mounting plate to the manifold.

4  
INSTALLATION

4.2.1 Please secure an enough space around the solenoid valve for mounting, dismantling and piping work.

4.2.2 In case of installing directly

- Manifold type  
Use the four (4) holes for mounting.



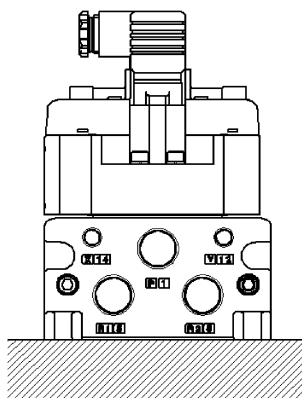
Size	Dimension A	Dimension B
GMF1	9	14
GMF2	9	20

4.2.3 Cautions regarding mounting posture and location

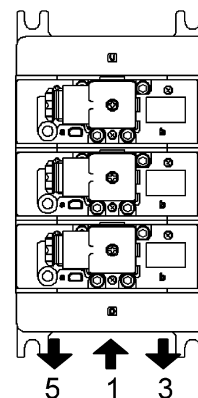
1) There is no restriction regarding mounting posture.

It is still recommendable to mount it on a horizontal surface or perpendicular mounting holding P & R ports top and bottom with A & B port held sideways.

P & R ports have to be held top and bottom with A & B port held sideways when FR unit is to be installed together with.



Horizontal mounting



Perpendicular mounting

2) Avoid its installation to the location where Vibration is to exceed then  $50\text{m/s}^2$  and Shock is more than  $300\text{m/s}^2$ .

### 4.3 Piping



#### **CAUTION :**

- a) Observe the recommended tightening torque when connecting pipes.
  - Observing the recommended tightening torque prevents air leakage and damage to the screw threads. To prevent damage to the screw threads, first use your hand to lightly tighten the screw and then use a tool to tighten the screw to the recommended torque.
- b) Make sure that the pipes will not be disconnected at the joints by mechanical movements, vibrations or tension.
  - If the exhaust piping of the pneumatic circuit is disconnected, the actuator speed control is disabled.
  - If the above happens to a chuck holding mechanism, the chuck will open. The inadvertent opening of the chuck may cause a serious accident.
- c) When supplying the compressed air for the first time after completing the piping, be sure to check every joint in the piping for air leakage.
- d) When supplying the compressed air for the first time after completing the piping, increase the air pressure gradually but never introduce a highly-pressurized air suddenly.
  - A sudden introduction of a highly-pressurized air may disconnect pipes at joints and/or cause the tubes to jump around, any of which may cause an injury.
- e) Do not decrease the inside diameter of the piping from any of the solenoid valve exhaust ports to a diameter less than the exhaust pipe connecting port size.
  - Normal operation of the actuator depends on the smoothness of the exhaust flow. With a manifold system, a restriction to the exhaust flow may prevent normal operation of other solenoid valves.
- f) Removal of foreign matter
  - Rust and other foreign matter in the pneumatic circuit may cause a malfunction or leakage from the valve seat. Insert a filter (maximum allowable particle size 5µm or less) immediately upstream of the solenoid valve.
- g) Air supply
  - Do not restrict the flow of air through the air supply piping. With a manifold system with multiple stations, a drop in the air supply pressure may cause trouble through a delay in the operation timing.

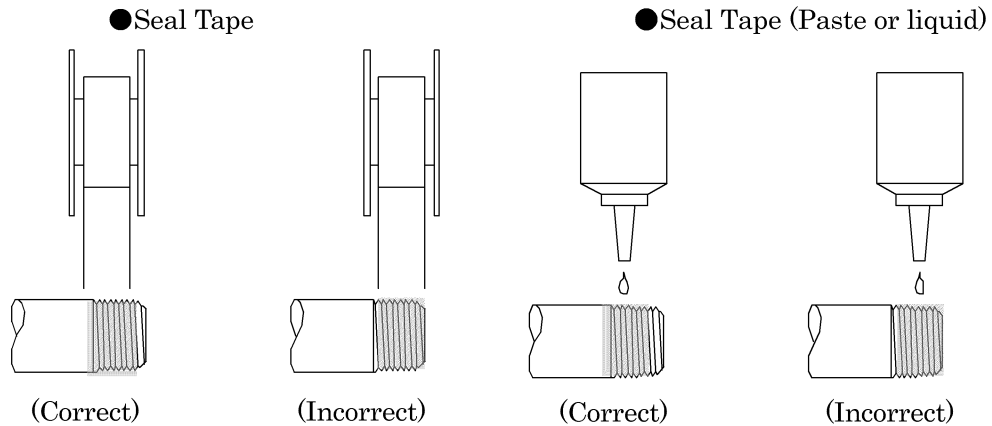
Tightening torque

Joint screw	Tightening torque N·m
Rc1/8	3 to 5
Rc1/4	6 to 8
Rc3/8	13 to 15
Rc1/2	16 to 18
Rc3/4	19 to 40

4  
INSTALLATION

### 4.3.1 Seal material

When using seal material, take care to avoid getting it in the pipes or overflowing on the exterior surface of the pipes.



When applying fluororesin sealing tape to the screw threads, wind the tape two or three times around the threads but leave the one or two threads at the pipe end uncovered. Firmly press the tape against the threads using the tip of your fingernail. When applying liquid type seal material, apply the material to all the threads except one or two threads at the pipe end and take care not to apply too much of it.

Never apply the seal material to the female threads in the device side piping port.

### 4.3.2 Flushing

Before connecting pipes, flush the interiors of the tubes, solenoid valves, and connected devices to remove foreign matter.

### 4.3.3 Exhaust port

Minimize the restriction to the flow of the exhaust air because such restriction may cause a delay in the cylinder response. If such a delay happens, the speed needs to be adjusted between the cylinder and solenoid valve.

#### 4.3.4 Pipe connections

(1) Tubes to be used

For use with solenoid valves with push-in joints, select tubes of the type specified by us:

Soft nylon tubes                   (F-1500 Series)

Urethane tubes                    (U-9500 Series)

(2) For installation at a site that has spatters in the air, select incombustible tubes or metal pipes.

(3) For a piping used for both hydraulic and pneumatic controls, select a hydraulic hose.

When combining a spiral tube with a standard push-in joint, fix the tube origin using a hose band. Otherwise the rotation of the tube will decrease the efficiency of the clamping.

For use in a high-temperature atmosphere, select fastener joints instead of push-in joints.

(4) When selecting from tubes commercially available, carefully study the accuracy of the outside diameter as well as the wall thickness and the hardness. The hardness of a urethane tube should be 93° or more (as measured by a rubber hardness meter).

With a tube that does not have a sufficient accuracy of the outside diameter or the specified hardness, a decrease in the chucking force may cause disconnection or difficulty in inserting.

Tube dimensions

Outside diameter mm	Inside diameter mm	
	Nylon	Urethane
φ4	φ2.5	φ2
φ6	φ4	φ4
φ8	φ5.7	φ5
φ10	φ7.2	φ6.5

Outside diameter allowance

Soft or hard nylon	±0.1mm
Urethane φ4, φ6	+0.1mm
	-0.15mm
Urethane φ8, φ10	+0.1mm
	-0.2mm

(5) Bending radius of tubes

Observe the minimum bending radius of tubes. Neglecting the minimum bending radius may cause disconnection or leaks.

Tube bore	Minimum bending radius mm	
	Nylon	Urethane
φ4	10	10
φ6	20	20
φ8	30	30
φ10	40	40

(6) Cutting a tube

To cut a tube, use a tube cutter to cut the tube perpendicularly to the length of the tube. Inserting an obliquely cut end of a tube may cause air leakage.

(7) Tube connections

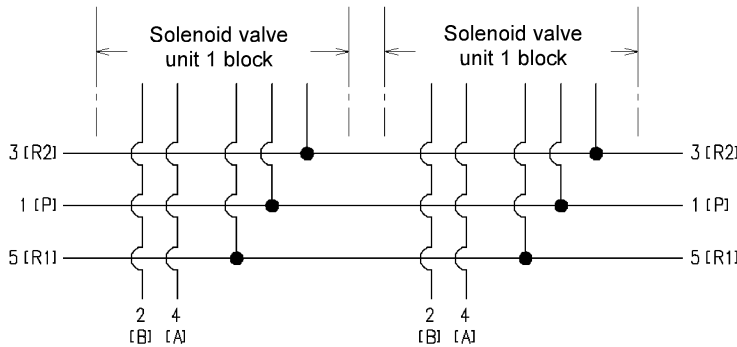
Do not bend a tube immediately at where it is connected to the joint but lead it out straight from the end of the joint for a length equal to or greater than the outside diameter or the tube.

The tension applied sideways through the tube should not exceed 40N.

## 5. OPERATING RECOMMENDATION

### 5.1 Operation

GMF1 , GMF2



### 5.2 Explanation of Function

Model GMF1,GMF2※-03L-04B-※

- 1) Compressed air supplied through P port of air manifold comes out to Supply port of each manifold block. (Figure 1)
- 2) Compressed air coming from Supply port through solenoid valve comes out to Supply A port (or Supply port B) through Supply A (or Supply B). (Figure 2)

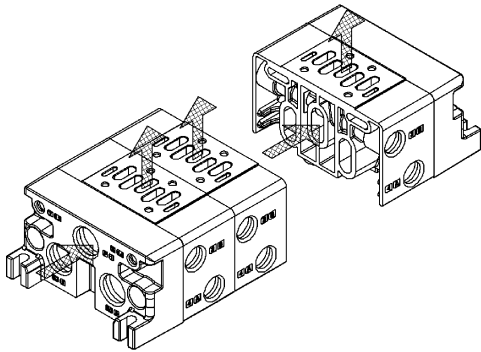


Figure 1

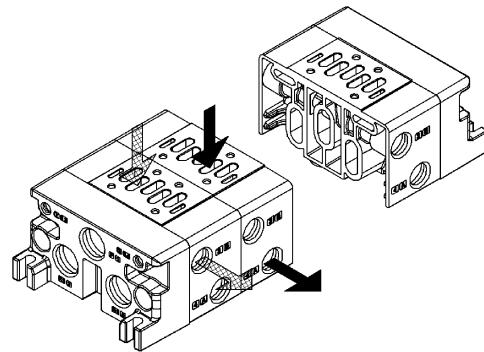


Figure 2

- 3) Exhaust R1 (or R2) is decentralized from Exhaust port R1 (or R2) through each air manifold block. (Figure 3)

NOTE : In case when exhaust pressurizing air manifold is used, exhaust R2 is independent and exhaust R1 only is decentralized.

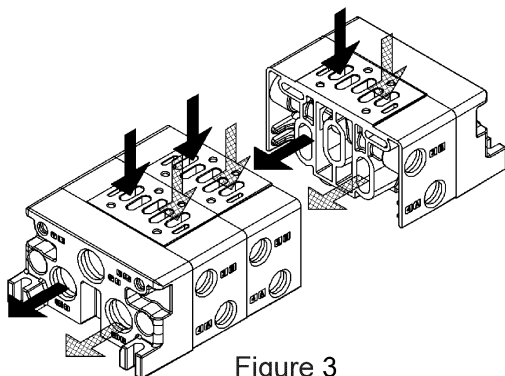


Figure 3



### 5.3 Air Quality



#### **WARNING :**

- a) Do not supply anything other than compressed air.
- b) Supply clean compressed air without any mixture of corrosive gas.



#### **CAUTION :**

- a) Compressed air usually contains a large amount of drain, oxidized oil, tar, foreign matter, and rust from the piping. Filter out those elements in the supplied air because they may cause a malfunction and decrease service life. In addition, clean the exhaust before it is released to the air to minimize pollution.
- b) Once you have lubricated a pre-lubricated valve, the valve is no longer capable of running without being lubricated from the outside. Do not leave the valve without lubrication but keep it lubricated.
- c) Do not use spindle oil or machine oil. They may induce expansion of the rubber parts, which may cause a malfunction.

#### 5.3.1 Lubrication

The GMF1 · GMF2 Series manifold systems use pre-lubricated valves that usually do not require lubrication from the outside. If you have to lubricate a valve, use Type 1 turbine oil (ISO-VG32) without additives.

#### 5.3.2 Ultra-dry compressed air

The use of ultra-dry compressed air will cause splashing of the lubrication oil and result in a shorter service life.

#### 5.3.3 Drain

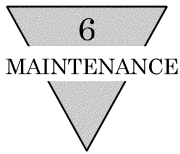
- (1) The drain is produced by a drop of temperature in pneumatic piping and devices.
- (2) The drain may enter and instantaneously block a passage inside a pneumatic device and cause a malfunction.
- (3) The drain accelerates the production of rust, which may cause the failure of pneumatic devices.
- (4) The drain may wash away the lubrication oil, causing a malfunction from the lack of lubrication.

#### 5.3.4 Foreign matter in the compressed air

- 1) Supply clean compressed air that does not include oxidized oil, tar, carbon, or other foreign matter from the air compressor.
  - (1) If oxidized oil, tar, carbon, or the like enters a pneumatic device and sticks to its components, an increase in the resistance at sliding portions may cause a malfunction.
  - (2) If oxidized oil, tar, carbon, or the like is mixed with the supplied lubrication oil, wear of the sliding components of the pneumatic device may be accelerated.
- 2) Supply clean compressed air that does not include solid foreign matter.
  - (1) Solid foreign matter in the compressed air may cause wear of the sliding components of the pneumatic device or stick to such components and cause hydraulic lock.


#### 5.3.5 Cleaning the supplied air

Compressed air usually contains a large amount of drain (water, oxidized oil, tar, and foreign matter). Remove these elements and clean the supplied air because they may cause a failure of the air compressor. For example, remove the humidity using an after-cooler dryer and remove the tar using a tar filter.




## 6. MAINTENANCE

### 6.1 Periodic Inspection

 **WARNING :** Before providing a maintenance service, cut the power and the supply of compressed air and confirm the absence of residual pressure.


- The above is required to ensure safety.

 **CAUTION :** Regularly perform the daily and periodic inspections to correctly maintain product performance.

- If the product is not correctly maintained, product performance may deteriorate dramatically, resulting in a shorter service life, fractures of components, and malfunctions.

- 1) To use the solenoid valve system under optimum conditions, perform a periodic inspection once or twice a year.
- 2) Check the screws for loosening and the joints in the piping for integrity of the sealing. Regularly remove the drain from the air filters.
  - (1) Checking the compressed air supply pressure:  
Is the supply pressure at the specified level?  
The pressure gauge indicates the specified pressure when the system is operating?
  - (2) Checking the air filters:  
Is the drain normally discharged?  
Is the amount of dirt attached to the bowl and element at a normal level?
  - (3) Checking joints in the piping for the leakage of compressed air:  
Are the pipes normally connected at joints, especially at the movable parts?
  - (4) Checking the operation of solenoid valves:  
Is not there any delay in the operation? Is the exhaust flow normal?
  - (5) Checking the operation of pneumatic actuators:  
Is the operation smooth?  
Does the actuator stop normally at the end of the stroke?  
Is the coupling with the load normal?
  - (6) Checking the lubricator:  
Is the amount of oil adjusted properly?
  - (7) Checking the lubrication oil:  
Is the supplied lubrication oil of the type specified by the manufacturer ?

### 6.2 Disassembling and Reassembling

 **WARNING:** Before increase or decrease block of manifold, cut the power and the supply of compressed air.

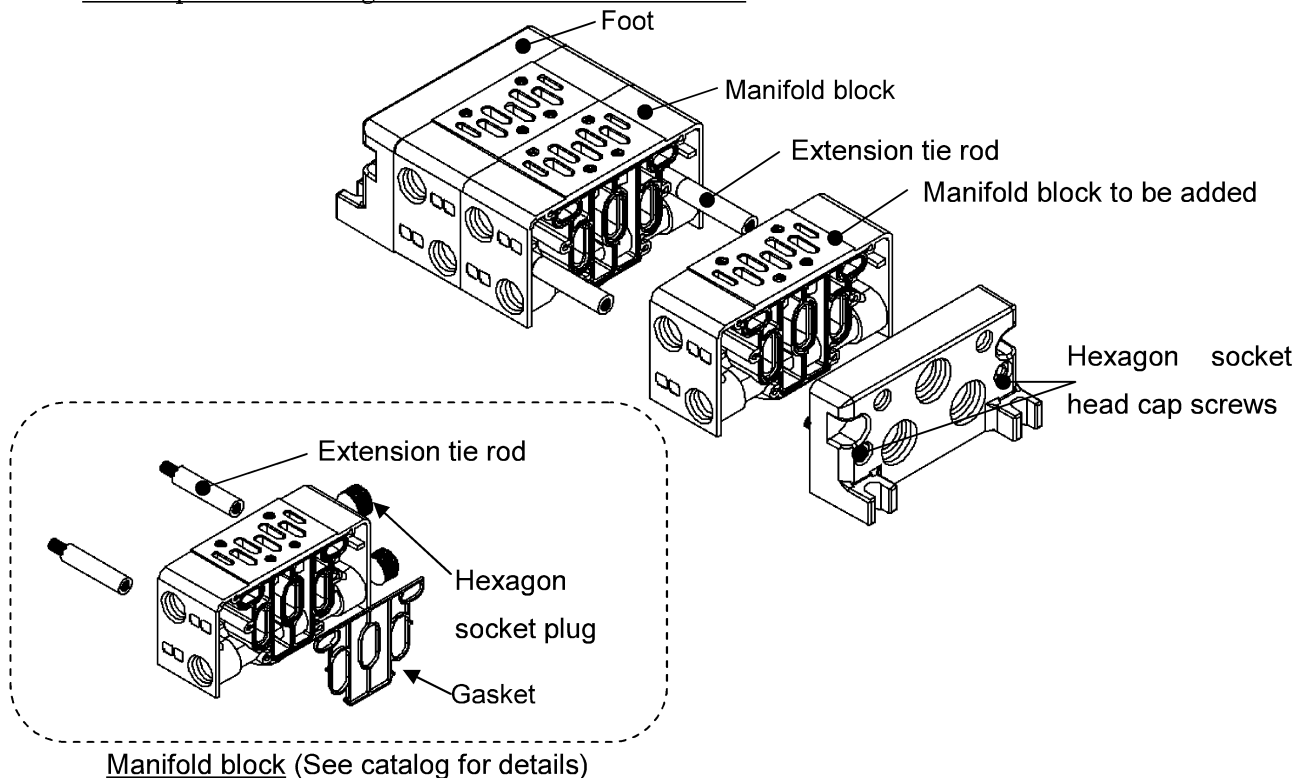
When disassembling or assembling the manifold, perform it after reading the Instruction Manual carefully and with full.

- You are required to understand the structure of solenoid valve and its operation principle to secure the safety.
- A level of 2nd Class or more of Pneumatics Technology Certification is required.

### 6.2.1 How to increase stations

- (1) Remove the hexagon socket head cap screws (2 places) from one foot.
  - (2) Remove the foot and manifold blocks from the tie rods up to the position where the manifold block to be added will be inserted. Make sure gaskets do not fall off.
  - (3) Connect the extension tie rods to the tie rods already in place. Or, replace the tie rods in place with the tie rods that cover the entire length after the increase.
  - (4) Attach a gasket to the manifold block to be added and insert the block into the tie rods.
  - (5) Insert the manifold blocks and foot that were removed back into the tie rods.
  - (6) Make sure the gaskets have not fallen off and there are no jams before fastening them using the hexagon socket head cap screws (2 places) .
- (Proper tightening torque: 5 to 6 N·m for GMF1 and 12 to 13 N·m for GMF2)

<Example> Increasing from 2 stations to 3 stations



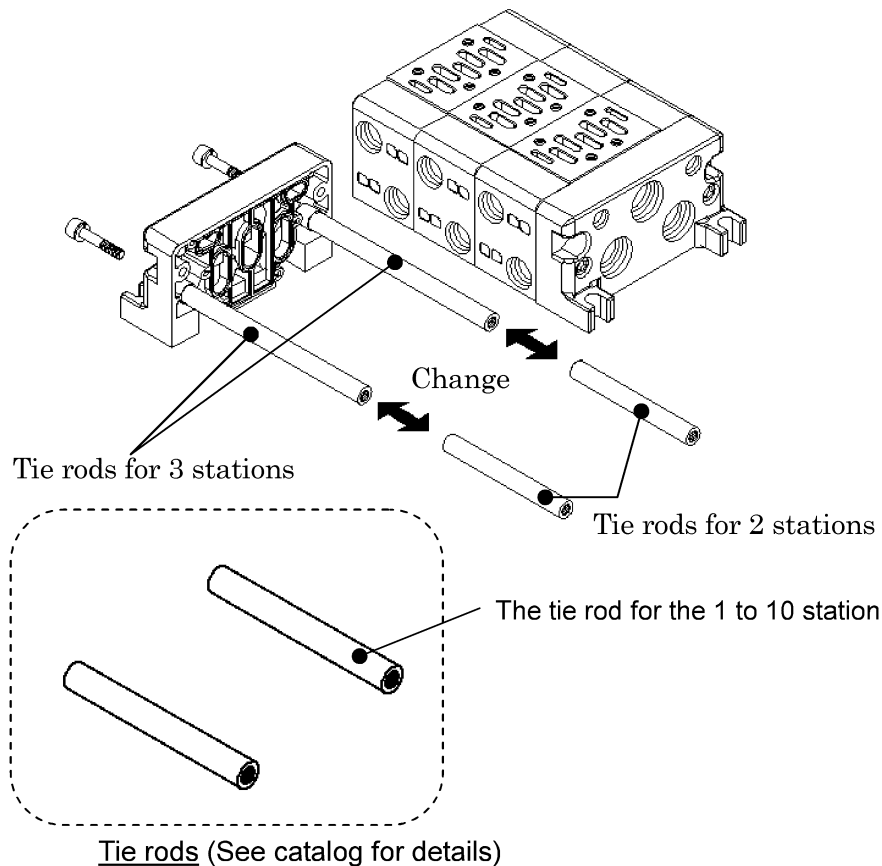
#### Tools necessary

Tool	Quantity	Application
Hex wrench for M6	2pcs	For GMF1 hexagon socket head cap screws
Hex wrench for M8	2pcs	For GMF2 hexagon socket head cap screws
Pipe wrench	1pc	For disassembling and fastening tie rods

### 6.2.2 How to decrease stations

- (1) Remove the hexagon socket head cap screws (2 places) from one foot.
  - (2) Remove the foot and all manifold blocks from the tie rods. Make sure gaskets do not fall off.
  - (3) Remove the hexagon socket head cap screws (2 places) from the other foot and replace the tie rods that were in place with the tie rods that cover the length after the decrease.
  - (4) Fasten the shorter length tie rods to the foot with the hexagon socket head cap screws (2 places).
  - (5) Insert the manifold blocks that were removed other than the one that is decreased and the remaining foot back into the tie rods.
  - (6) Make sure the gaskets have not fallen off and there are no jams before fastening them using the hexagon socket head cap screws (2 places).
- (Proper tightening torque: 5 to 6 N•m for GMF1 and 12 to 13 N•m for GMF2)

<Example> Decreasing from 3 stations to 2 stations



Tools necessary

Tool	Quantity	Application
Hex wrench for M6	2pcs	For GMF1 hexagon socket head cap screws
Hex wrench for M8	2pcs	For GMF2 hexagon socket head cap screws
Pipe wrench	1pc	For disassembling and fastening tie rods

## 7. TROUBLE SHOOTING

### TROUBLE SHOOTING

Trouble	Possible Cause	Remedies
Air doesn't flow	Miss-piping	Correct piping error.
	Insufficient air pressure	Adjust pressure to be more than 0.15MPa
Air leaks	Missing O ring on manifold block or pinching it	Install O ring or replace it with new one.
	Insufficient flatness of mounting surface	Correct flatness of mounting surface
	Missing gasket on bottom cover or pinching it	Replace the gasket of bottom cover

## 8. PRODUCT SPECIFICATIONS AND HOW TO ORDER

### 8.1 Product specifications

#### 1) Common specifications

Model number		GMF1 / GMF2
Item		
Working fluid		Compressed air
Min. working pressure	MPa	0.15
Max. working pressure	MPa	1.0
Proof pressure	MPa	1.50
Ambient temperature	°C	-5 to 60(No freezing)
Fluid temperature	°C	5~60
Lubrication	Note 1	Not required
Vibration resistance	m/s <sup>2</sup>	50 or less
Shock resistance	m/s <sup>2</sup>	300 or less
Atmosphere		Must not used in any corrosive gas environment

Note 1 : In case of lubrication, please use turbine oil 1st grade ISO VG32.

Excess lubrication or intermittent lubrication may cause unsteady operation.

#### 2) Electric specifications

Item		Specifications	
Model No.		GMF1	GMF2
Applicable Solenoid valve		ISO size 1 , PV5G-6 series	ISO size 2 , PV5G-8 series
Station number		1~10 station	1~10 station
Piping	A·B ports	Rc1/4、Rc3/8	Rc3/8、Rc1/2
	P·R1·R2 ports	Rc3/8、Rc1/2	Rc1/2、Rc3/4
Individual supply spacer (option)		CMF1-P-※ (※02 - Rc1/4、03 - Rc3/8)	CMF2-P-※ (※03 - Rc3/8、04 - Rc1/2)
Individual exhaust spacer (option)		CMF1-R-※ (※02 - Rc1/4、03 - Rc3/8)	CMF2-R-※ (※03 - Rc3/8、04 - Rc1/2)
Spacer type regulator (option)		CMF1-SR-※	CMF2-SR-※
Air pilot check valve (option)		CMF1-PC	CMF2-PC
Masking plate (option)		CM1-00	CM2-00

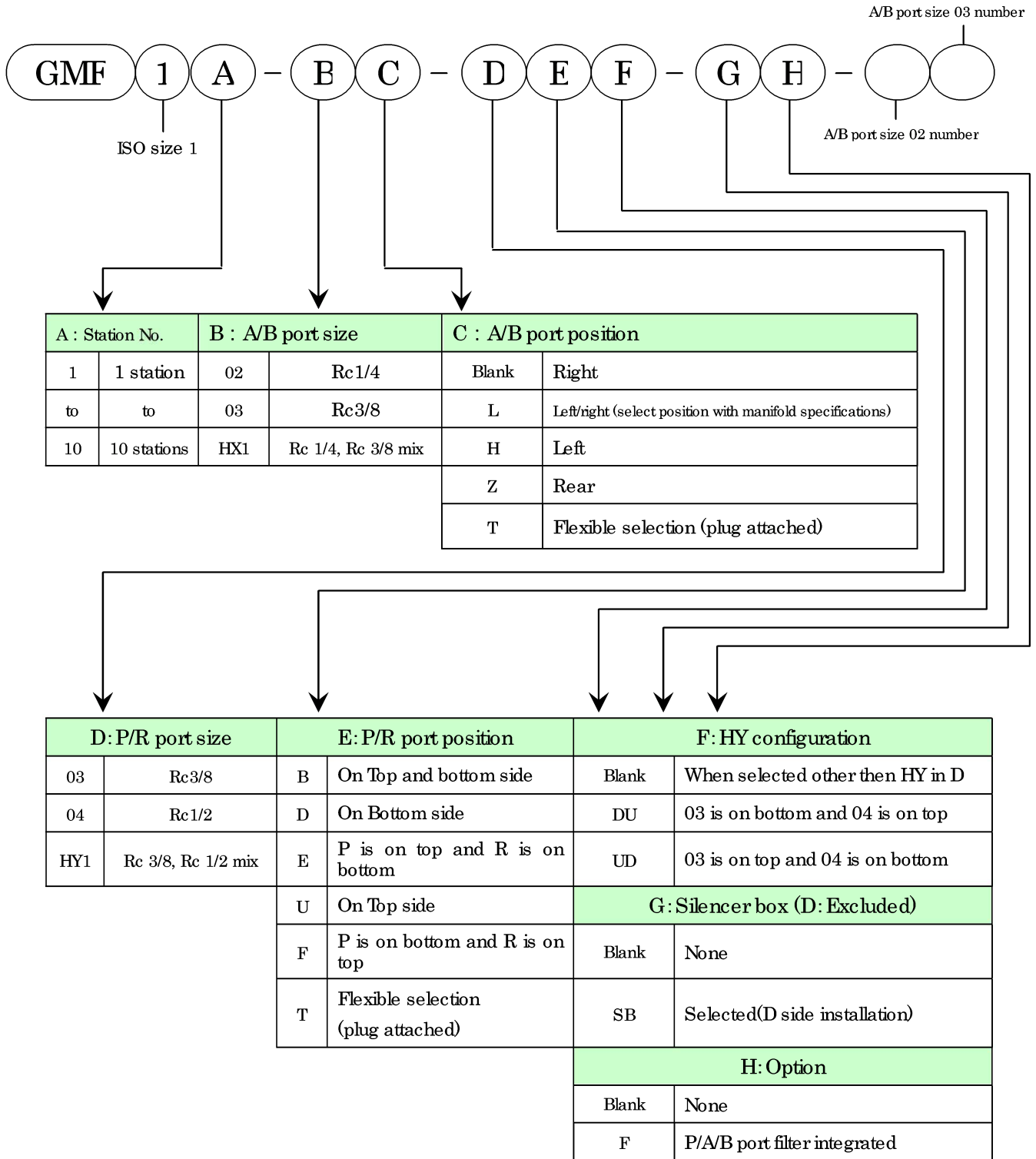
3) Flow specifications

Model	Connecting port diameter	Position	P→A/B		A/B→R1/R2	
			C[dm <sup>3</sup> /(s·bar)]	b	C[dm <sup>3</sup> /(s·bar)]	b
GMF1	Rc1/4	2-pos. Single	4.8	0.25	5.2	0.26
		2-pos. Double	4.8	0.25	5.2	0.26
		3-pos. All port block	4.4	0.27	4.7	0.27
		3-pos. A·B·R connection	4.4	0.25	5.3	0.25
		3-pos. P·A·B connection	4.8	0.27	4.7	0.27
		3-pos. All port block Non leak	3.2	—	2.8	—
GMF2	Rc3/8	2-pos. Single	9.7	0.12	11.0	0.14
		2-pos. Double	9.7	0.12	11.0	0.14
		3-pos. All port block	9.2	0.12	10.1	0.15
		3-pos. A·B·R connection	9.2	0.11	11.6	0.11
		3-pos. P·A·B connection	9.6	0.11	10.2	0.18
		3-pos. All port block Non leak	6.2	—	5.9	—

Reference: S (Effective sectional area) ≙ 5.0 X C (Sonic conductance)

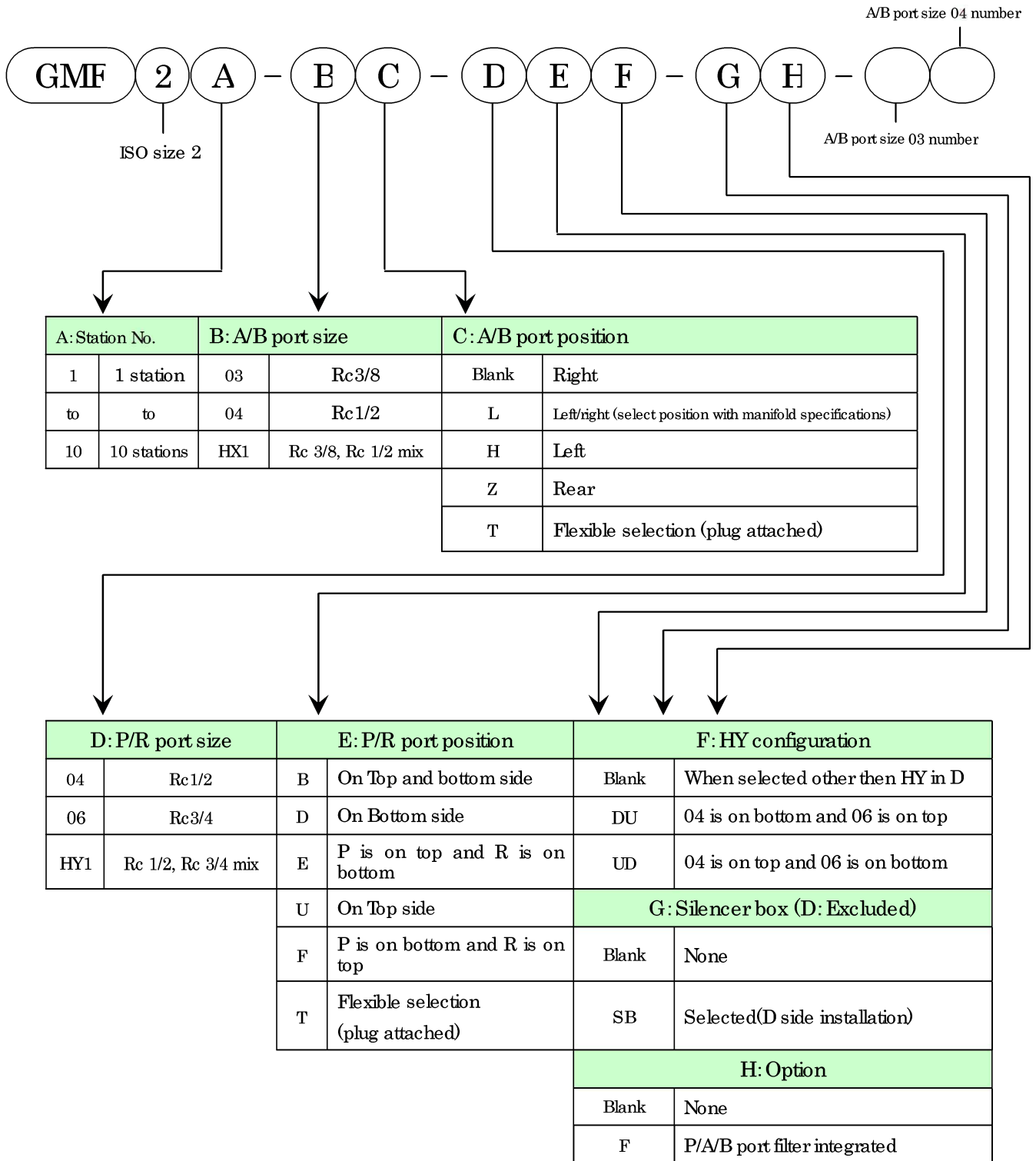
8  
HOW TO ORDER

## 8.2 How to order





8  
HOW TO ORDER



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HOW TO ORDER

