

# Low Torque Metal Seal Type Rotary Joint

Long service life

**MQR1 : 1 billion rotations**  
**MQR2 : 0.5 billion rotations**  
**MQR4 : 0.3 billion rotations**  
**MQR8 : 0.2 billion rotations**  
**MQR12: 0.1 billion rotations**  
**MQR16: 0.1 billion rotations**

\* Under SMC's life test conditions.

Low rotational torque

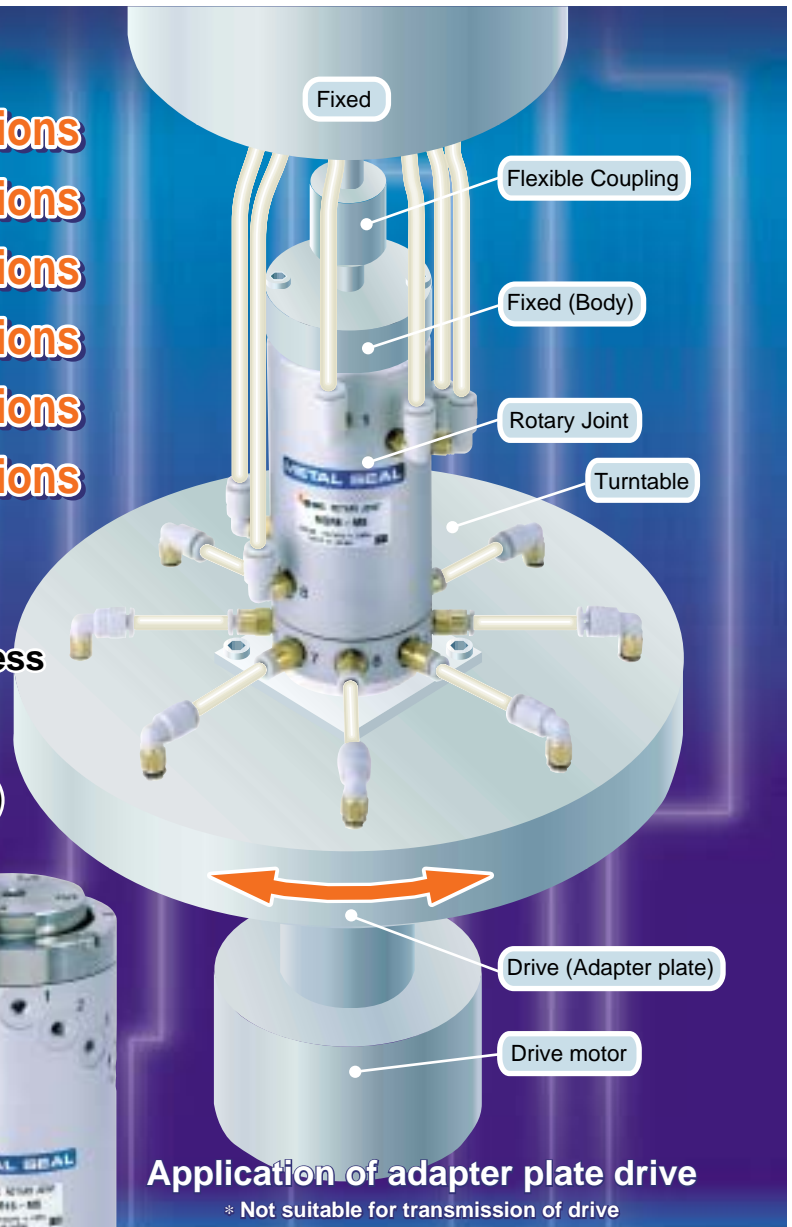
**0.003 to 0.50 N·m or less**

Allowable RPM

**200 to 3000 min<sup>-1</sup> (r.p.m)**

Operating temperature

**-10 to 80°C**



◀ **16 circuits have been added to the MQR series.**

**Series MQR**



# Low Torque Metal Seal Type Rotary Joint Series MQR

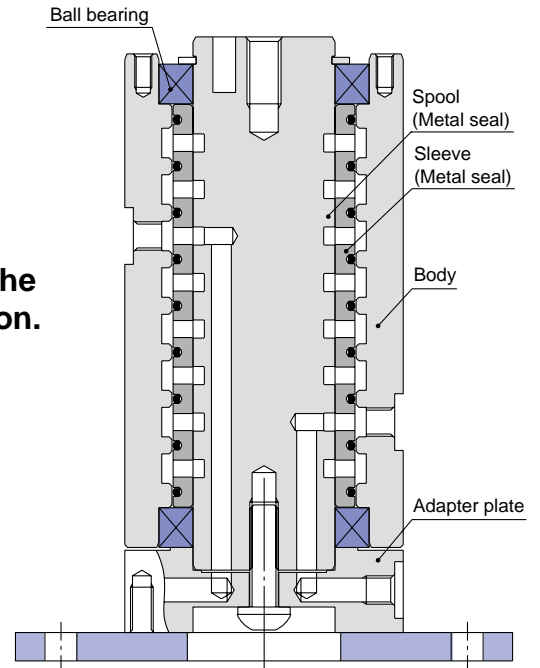


Rotational torque unaffected by supply pressure and temperature fluctuations

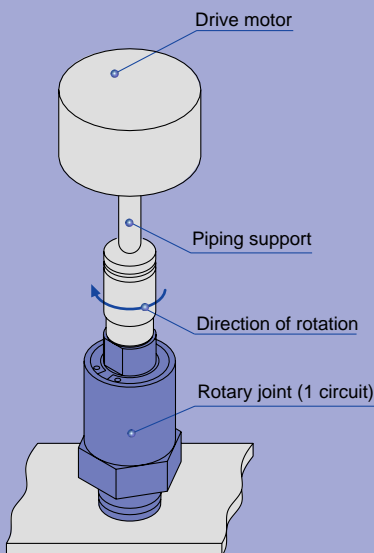
Use of metal seals prevents the spool from sticking to the rotating surface even after a long period of non-operation.

Operating pressure **-100kPa to 1MPa**

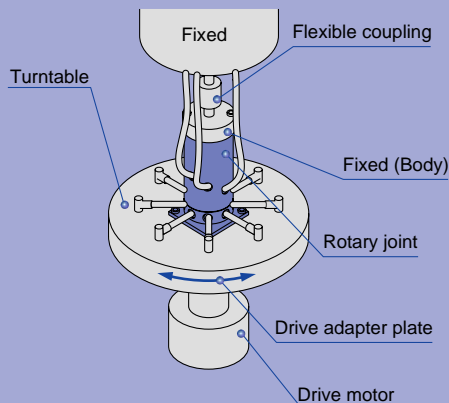
Piping ports are aligned in a spiral line for easy piping



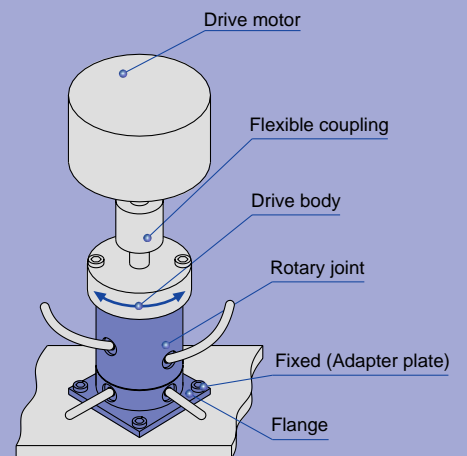
*Applications: Air supply to rotary/pivot shafts of turntables and robot arms*



Example of 1 circuit



Example of adapter plate drive



Example of body drive

## Made to Order

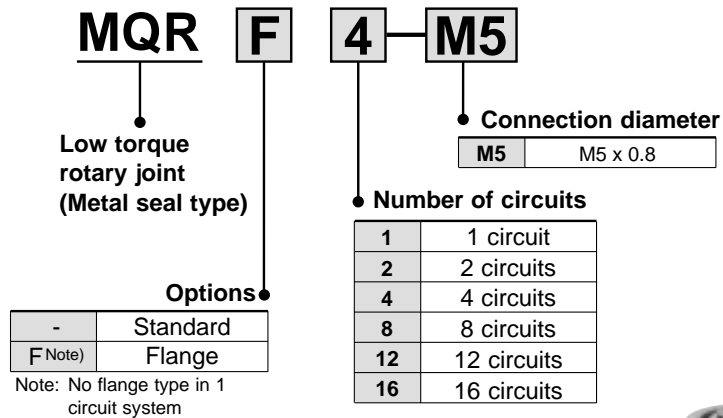
● Contact SMC if you wish to use rotary joints at temperatures outside the range of  $-10^{\circ}\text{C}$  to  $80^{\circ}\text{C}$  or to have joints made with 20 circuits or more or a through hole specification.

# Low Torque Metal Seal Type Rotary Joint

# Series MQR

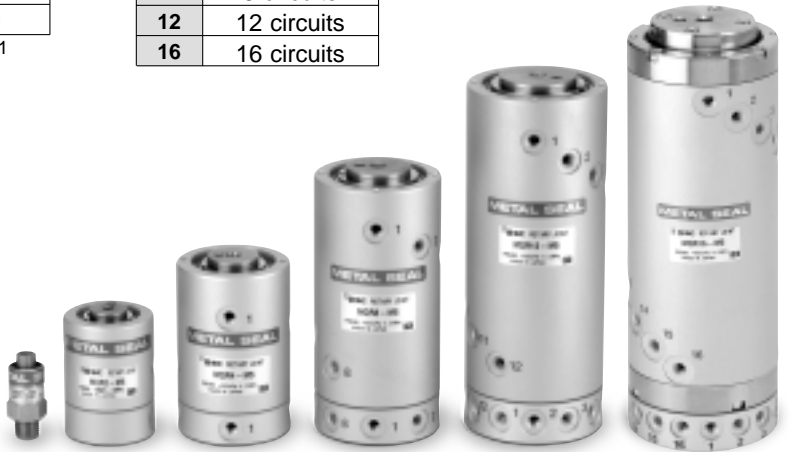
1 circuit, 2 circuits, 4 circuits, 8 circuits, 12 circuits, 16 circuits

## How to Order



## Options/Mounting Bracket

Number of circuits	Flange part number
2 circuits	MQR2-F
4 circuits	MQR4-F
8 circuits	MQR8-F
12 circuits	MQR12-F
16 circuits	MQR16-F



## Specifications

Model	MQR1-M5	MQR2-M5	MQR4-M5	MQR8-M5	MQR12-M5	MQR16-M5
Number of circuits (Number of ports)	1	2	4	8	12	16
Fluid	Air / Inert gas					
Seal structure	Metal seal					
Guide structure	Bearing supported	Bearing supported at both ends				
Port size	Male R1/8	M5				
	Female M5					
Flow rate characteristics	C[dm <sup>3</sup> /(s·bar)]		b	Cv	Q[l/min (ANR)] <sup>Note5</sup>	
	0.50		0.40	0.17	136	
Lubrication	Not required					
Min. operating pressure	-100kPa					
Max. operating pressure	1.0MPa					
Ambient temperature and operating fluid temperature <sup>Note 1)</sup>	-10 to 80°C					
Allowable rotation torque <sup>Note 2)</sup>	0.003 N·m or less	0.03 N·m or less	0.05 N·m or less	0.10 N·m or less	0.20 N·m or less	0.50 N·m or less
Allowable rotation number	3000 min <sup>-1</sup> (r.p.m.) or less <sup>Note 3)</sup>	2000 min <sup>-1</sup> (r.p.m.) or less	1500 min <sup>-1</sup> (r.p.m.) or less	900 min <sup>-1</sup> (r.p.m.) or less	600 min <sup>-1</sup> (r.p.m.) or less	200 min <sup>-1</sup> (r.p.m.) or less
Allowable radial load (allowable coupling axis reaction) <sup>Note 4)</sup>	1N or less	15N or less	30N or less	40N or less	50N or less	50N or less
Weight	0.025kg	0.16kg	0.39kg	0.76kg	1.26kg	2.80kg

Note 1) The temperature 80°C includes temperature rise during rotation.

Note 2) The rotational torque does not change with the supply pressure or with non-use (remains within allowable torque), but it does change with the rotational speed. (Refer to page 2).

Note 3) If using at a speed above 600 min<sup>-1</sup> (r.p.m.), ensure rotation is in the direction in which the joint is fastened.

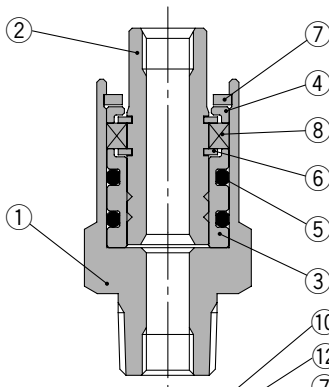
Note 4) Rubber / resin couplings are recommended due to their excellent absorption of off center, shocks, and vibrations.

Note 5) This value has been calculated according to the ISO 6358 and represents the flow rate measured in standard conditions at an upstream pressure of 6bar (relative pressure) and a differential of pressure of 1 bar.

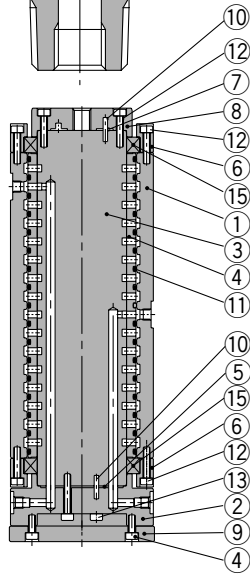
# Series MQR

## Construction

MQR1-M5



MQR2 to 16-M5



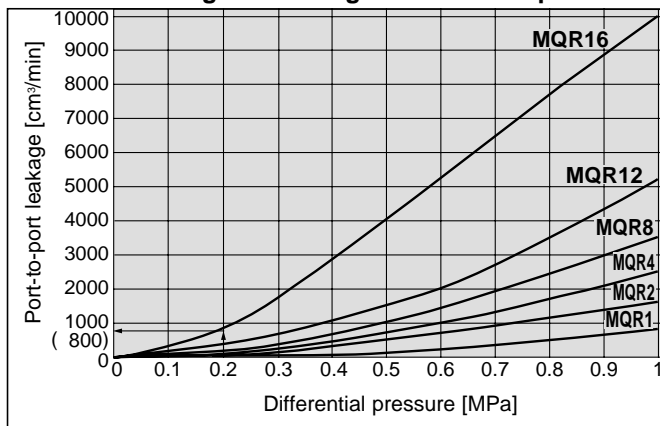
Component Parts/(MQR1 - M5, 1 circuit)

No.	Name	Material	Remarks
1	Body	Stainless steel	
2	Spool	Special stainless steel	
3	Sleeve	Special stainless steel	
4	Plate	Aluminium	
5	O-ring	HNBR	
6	Retaining ring	Carbon steel	
7	Retaining ring	Carbon steel	
8	Radial bearing		

Component Parts/(MQR2 to 16 - M5, 2 to 16 circuits)

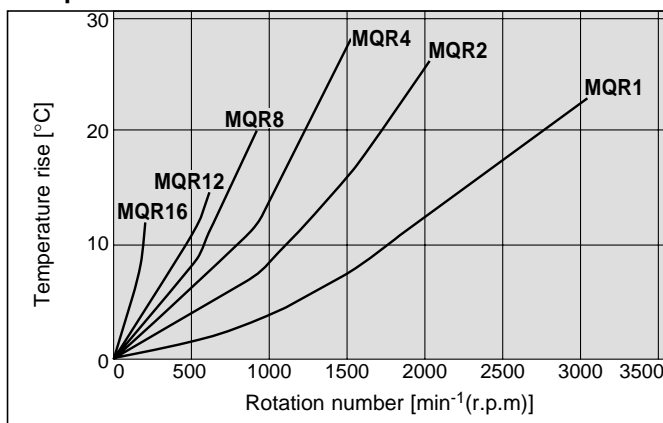
No.	Name	Material	Remarks
1	Body	Aluminum	
2	Adapter plate	Aluminum	
3	Spool	Special stainless steel	
4	Sleeve	Special stainless steel	
5	Gasket	HNBR	
6	Bearing holder	Aluminum	16 circuits only
7	Gasket	HNBR	16 circuits only
8	Plate	Aluminum	16 circuits only
9	Flange	Aluminum	
10	Parallel pin	Carbon steel	Except for 2 circuits
11	O-ring	HNBR	
12	Bolt	Carbon steel	16 circuits only
13	Bolt	Carbon steel	
14	Bolt	Carbon steel	
15	Radial bearing	—	

Allowable leakage according to differential pressure

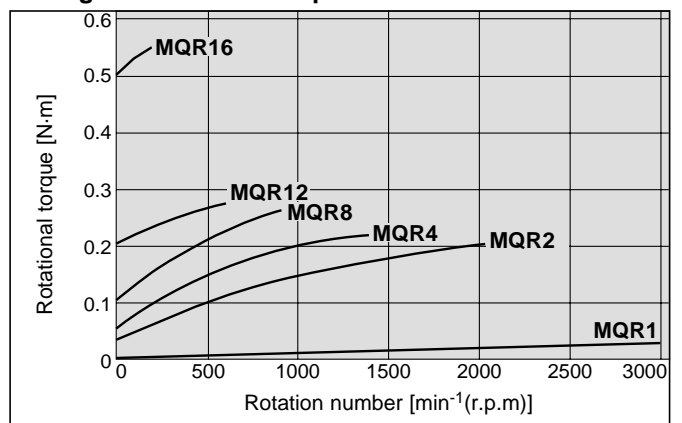


e.g.: If adjacent ports are connected to vacuum pressure of -0.1 MPa and positive pressure of 0.1 MPa in MQR16, then differential pressure is 0.2 MPa, and leakage is 800 (cm<sup>3</sup>/min).

Temperature rise with rotation number



Change in rotational torque with rotation number

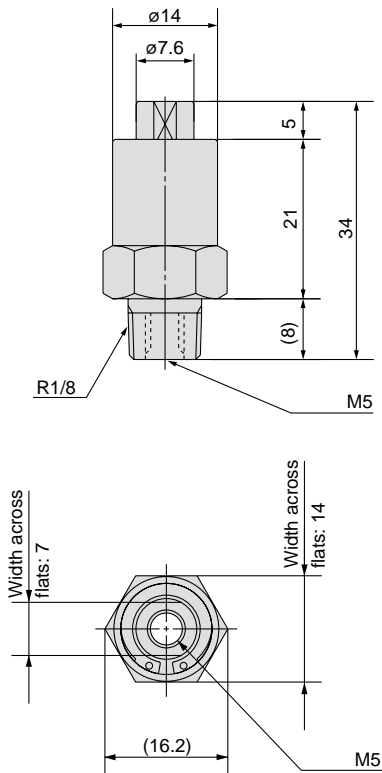


Note 1: Value when no pressure applied. Temperature rise is reduced by supply of air.

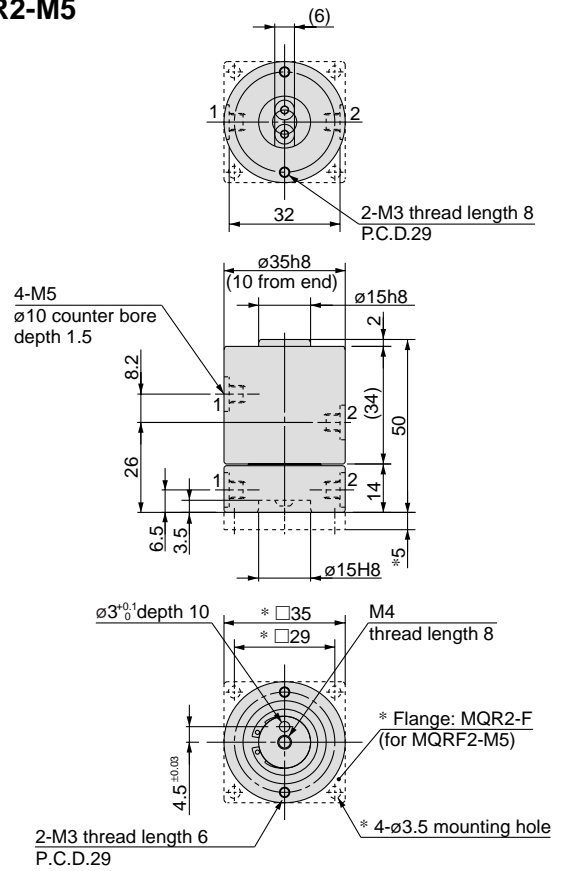
**Dimensions: Standard Type/Flange Type**

\* symbol indicates flange dimensions

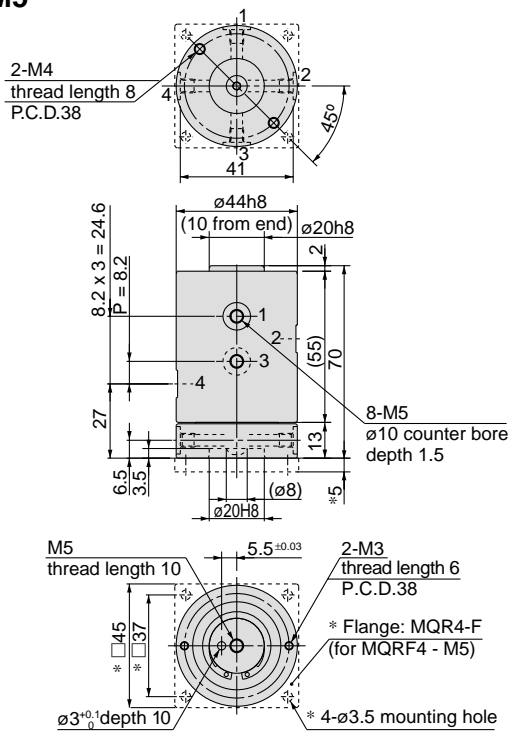
**MQR1-M5**



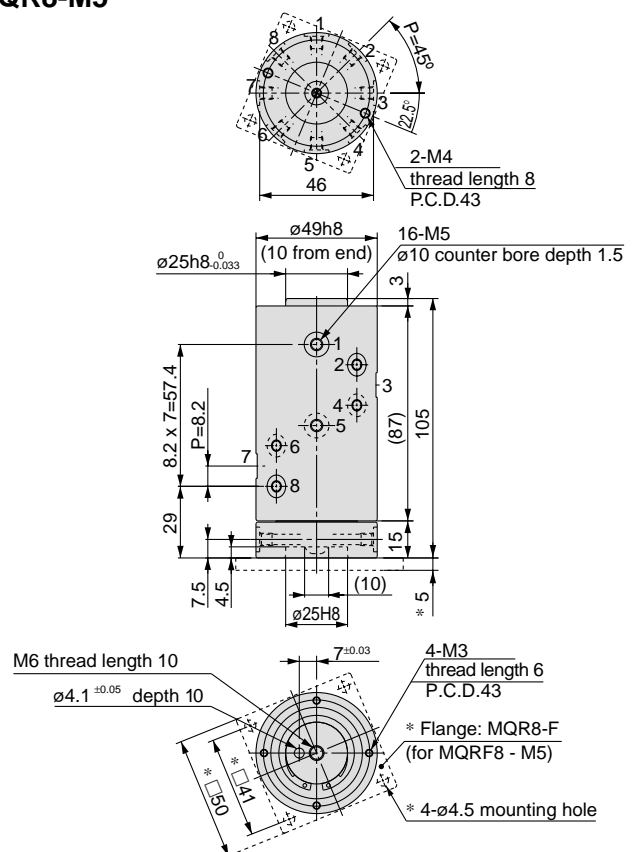
**MQR2-M5**



**MQR4-M5**



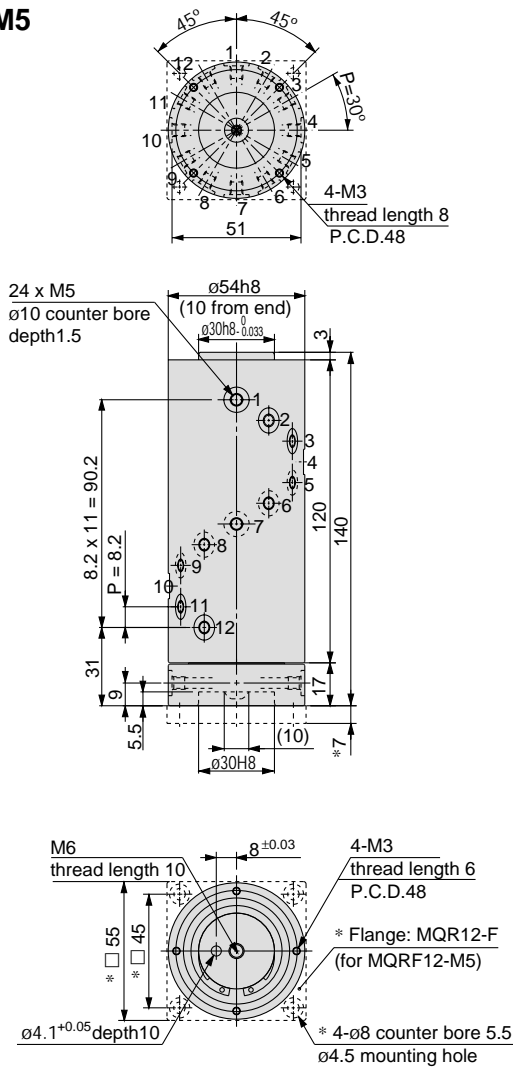
**MQR8-M5**



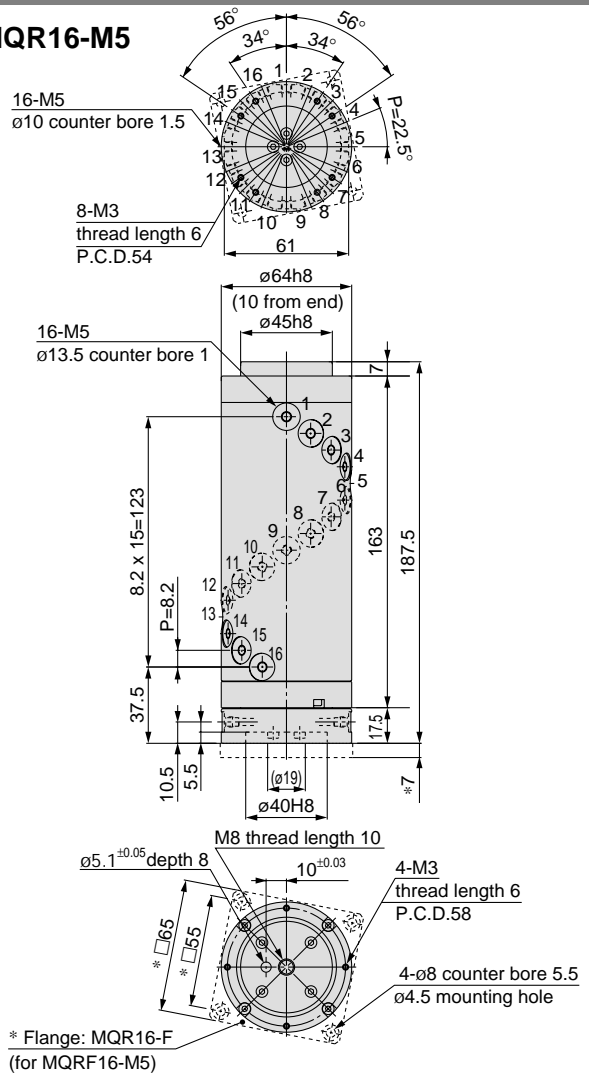
## Dimensions: Standard Type/Flange Type

\* symbol indicates flange dimensions

### MQR12-M5

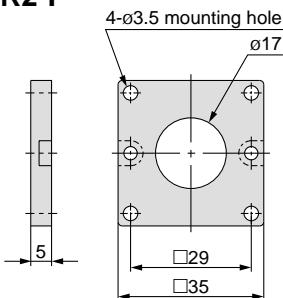


### MQR16-M5

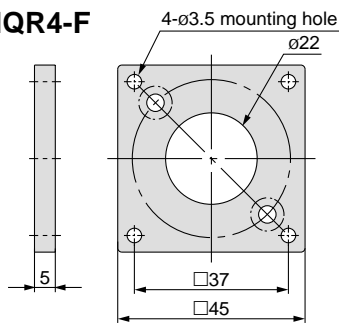


## Mounting Bracket/Flange

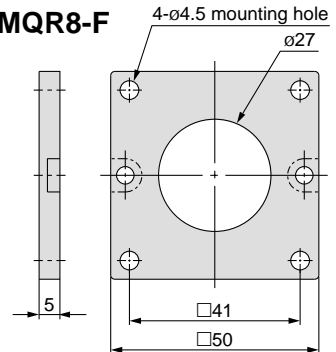
### MQR2-F



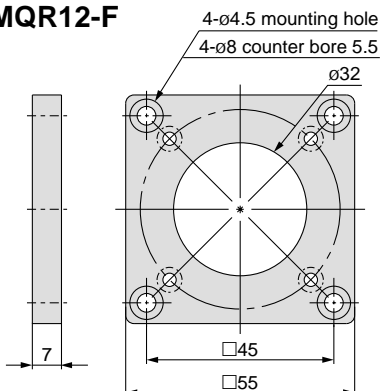
### MQR4-F



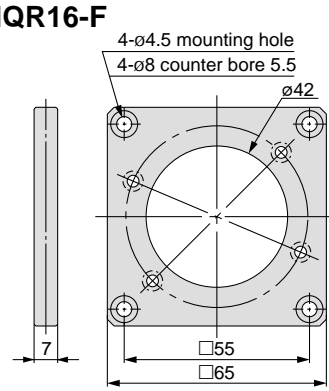
### MQR8-F



### MQR12-F



### MQR16-F





Series MRQ

# Safety Instructions

The following safety instructions are intended to prevent a hazardous situation and/or equipment damage. The instructions indicate the level of potential hazard by labels of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, please observe all safety practices, including ISO 4414 Note 1) and JIS B 8370 Note 2) .

**⚠ Caution :** Operator error could result in injury or equipment damage.

**⚠ Warning :** Operator error could result in serious injury or loss of life.

**⚠ Danger :** In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414 : Pneumatic fluid power --General rules relating to systems

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

## **⚠ Warning**

### **1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.**

Since the products specified here are used in various operating conditions, their compatibility with a specific pneumatic system must be based on specifications, post analysis and/or tests to meet a specific requirements. The expected performance and safety assurance is the responsibility of the person who determines the compatibility of the system. This person should continuously review the suitability of all specified items by referring to the latest information in the catalog and by taking into consideration the possibility of equipment failure when configuring the system.

### **2. Only trained personnel should operate pneumatic machinery and equipment.**

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

### **3. Do not service machinery/equipment or attempt to remove components until the safety of the worker is confirmed.**

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
2. When equipment is to be removed, confirm that all safety precautions have been followed. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before restarting any machinery/equipment exercise caution to prevent quick extension of a cylinder piston rod, etc.

### **4. Contact SMC if the product will be used in any of the following conditions:**

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having negative affect on people, property, or animals, requiring special safety analysis.



## Series MQR

# Rotary Joint/Precautions 1

Be sure to read before handling.

### Design

#### Warning

- 1. A protective cover is recommended to minimize the risk of human injury.**  
If a moving part poses a risk of human injury and/or damage to machinery/equipment, then a structure which prevents direct contact with that part should be adopted.
- 2. Securely tighten all stationary parts and connected parts so that they will not become loose.**  
Secure fastening is particularly important when the rotary joint has a high operating frequency.
- 3. Provide safety devices in drive circuit.**  
Collisions, or foreign material introduced by the air source, may cause scuffing or burning of rotating parts, which in turn leads to increased rotational torque. Install safety devices in the drive circuit accordingly.
- 4. Pressure**  
Air leakage occurs in these products. They cannot be used for pressure holding in pressure vessels, etc.
- 5. Do not use in an emergency shutdown air circuit.**  
These products are not designed for use in a safety circuit performing emergency shutdown. Other reliable safety protection means should be adopted for such systems.
- 6. Ensure room for maintenance.**  
Leave sufficient space for maintenance work.
- 7. Releasing residual pressure.**  
Provide a residual pressure release function in order to carry out maintenance work.
- 8. Using vacuum supply.**  
When using a vacuum air supply, install a suction filter, or equivalent, to prevent infiltration of dirt and foreign material via the absorption pad or exhaust port.

### Selection

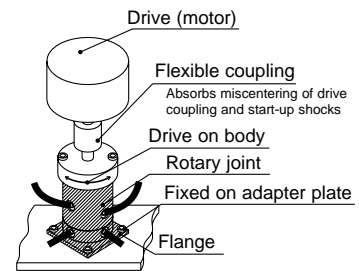
#### Warning

- 1. Confirm the specifications.**  
The products advertised in this catalog are designed according to use in industrial compressed air systems. If the products are used in conditions where pressure, temperature, etc., are out of specification, damage and/or malfunction may be caused. Do not use in these conditions. (Refer to specifications.)
- 2. Do not use for power transmission.**  
These products are not designed to be used as bearings for transmitting power from a drive source, such as a motor. Such use may lead to rotation faults, or damage.

### Mounting

#### Warning

- 1. Prevent impacts on shaft when drive source is started.**  
If excessive offset load is applied to the product, it may cause malfunction, breakdown, or personal injury or damage to machinery and equipment. Use a flexible coupling as illustrated below, to avoid direct radial load or axial load on the shaft. A rubber/resin coupling is recommended, due to its excellent absorption of off center, shocks, and vibrations. Please consult the coupling manufacturer to discuss the detailed operating conditions.
- 2. Do not make additions to this product.**  
Any additions made to this product will weaken it and may cause product failure, leading to human injury and/or damage to machinery/equipment.
- 3. Allow freedom of movement when securing the shaft.**  
If you do not allow some freedom of movement when fixing the shaft, then any eccentricity will cause abnormal wear, leading to malfunction, breakdown, and possible human injury and/or damage to machinery/equipment.



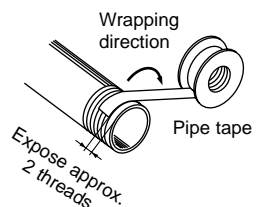
#### Caution

- 1. Confirm the model and size before installation. Check that there are no scratches, impact marks, cracks, or the like, on the product.**
- 2. When connecting tubes, take account of variations in pressure according to tube length.**
- 3. Do not wipe model designation on nameplate with organic solvents, etc.**  
This will cause designation to disappear.
- 4. Do not knock rotary shaft when main unit is fixed, or knock main unit when rotary shaft is fixed.**  
This may bend the rotary shaft and cause damage to the bearings. The rotary shaft should be fixed when attaching a load, etc. to it.

### Piping

#### Caution

- 1. Preparation before piping.**  
Before piping is connected, it should be thoroughly blown out with air (flushed), to remove chips, cutting oil and other debris from inside the piping.
- 2. Wrapping of pipe tape.**  
When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealant material do not get inside the piping. Also, when pipe tape is used, leave approximately 2 thread ridges exposed at the end of the threads.







## Series MQR

# Rotary Joint/Precautions 2

Be sure to read before handling.

### Piping

#### Caution

##### 3. Screw tightening and tightening torque.

Use the tightening torques in the table below, when screwing a fitting onto a piping port. Particular attention is required in the case of MQR1 (1 circuit), as this joint supports the piping.

##### Tightening Torque for Piping

Connecting threads	Suitable tightening torque
M5	1.5 to 2 N·m
Rc 1/8	7 to 9 N·m

##### \* Comments

Fastening M5 thread fittings

Tighten manually, and then tighten a further quarter-turn using the fastening tool. If using miniature fittings, tighten manually, and then tighten a further quarter-turn using the fastening tool. If there are two gaskets, such as a universal elbow or universal tee, the final tightening should be doubled to a half-turn.

Note: Over-tightening of fittings may cause fracturing of the thread sections or deformation of the gaskets, leading to air leaks. If the fittings are under-tightened, the loosening of thread and air leaks may occur.

### Lubrication

#### Caution

##### 1. Lubrication

- Due to the initial lubricant provided, the product can be used without lubrication.
- Do not lubricate if using the product at low torque. Lubrication may cause an increase in the rotational torque, due to the viscosity and surface tension of the oil.
- In the event that lubrication is applied, use turbine oil class 1 (without additives) ISO VG32. Please consult us regarding use of turbine oil class 2 (with additives) ISO VG32.

### Air Supply

#### Warning

##### 1. Use clean air.

Do not use compressed air containing chemicals, synthetic oils containing organic solvents, salts, or corrosive gases, etc., as these can cause damage or malfunction.

### Air Supply

#### Caution

##### 1. Use the product within the range of specifications for fluid and ambient temperature.

Take measures to prevent freezing when used at 5°C or less, since moisture in circuits can freeze, causing malfunction.

##### 2. Install air filters.

Install air filters near valves on their upstream side. The filtration degree should be 5 µm or less. Furthermore, when using at low friction, it is also recommended to use clean air (atmospheric pressure dew point temperature of -10°C) and install mist separator series AM (filtration degree 0.3 µm or less) or series AM + AMD (filtration degree 0.01 µm or less).

##### 3. Install an after-cooler, air dryer or water separator (Drain Catch), etc.

Air containing excessive drainage can cause malfunction of valves and other pneumatic equipment. To prevent this, install an after-cooler, air dryer or water separator, etc.

Refer to the "Best Pneumatics vol.14" for details on compressed air quality.

### Operating Environment

#### Warning

##### 1. Do not use in environments where there is a danger of corrosion.

Refer to the construction drawings regarding rotary joint materials.

##### 2. Do not use in dusty locations or where water, oil, etc., will splash on the equipment.

### Maintenance

#### Warning

##### 1. Perform maintenance according to the procedures indicated in the instruction manual.

If handled improperly, malfunction and damage of machinery or equipment may occur.

##### 2. During maintenance, do not perform any disassembly or assembly whilst the air supply is connected.

#### Caution

##### 1. Drain flushing

Remove condensate from air filters at regular intervals.

### Disassembly

#### Caution

##### 1. The component parts of these products are manufactured to precision tolerances, and therefore cannot be disassembled.



# Series MQR

## Specific Product Precautions 1

Be sure to read before handling.

Refer to back pages 1 through to 3 for safety instructions and rotary joint precautions.

### Operation

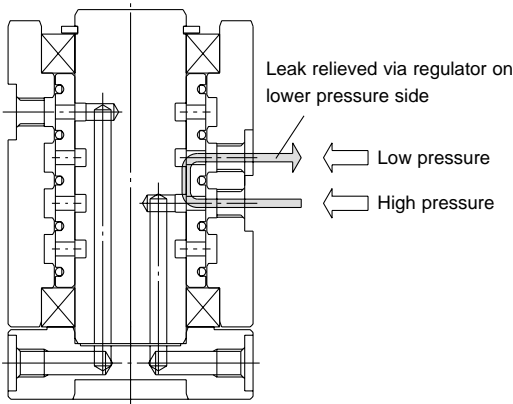
#### Caution

- The metal seal structure means that port-to-port leaking occurs. Therefore, please note the following points when using different pressures at neighbouring ports.

##### When using different pressures at normal pressure

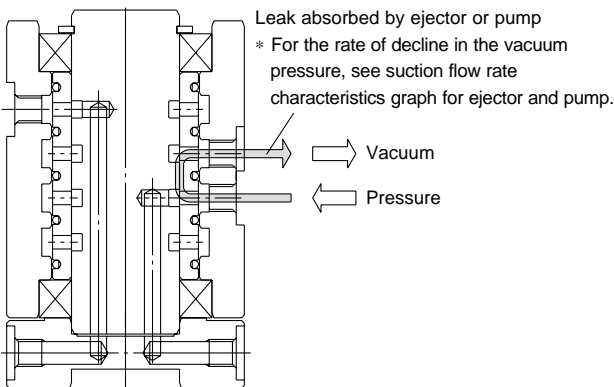
Use relieving type regulators.

Leaks between ports are to be exhausted via the relief port of the regulator on the lower pressure side.



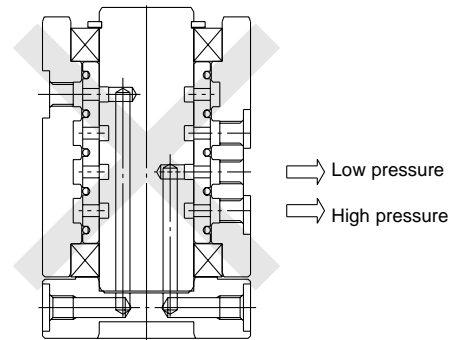
##### When combination of vacuum and normal pressures

When using a compact vacuum ejector (suction flow rate approx. 10 L/min), the vacuum pressure drop is several kPa or so, depending on the supply source characteristics and the piping conditions. For more details, please refer to the flow rate characteristics graph provided in the vacuum pump catalogue, instruction manual, etc.

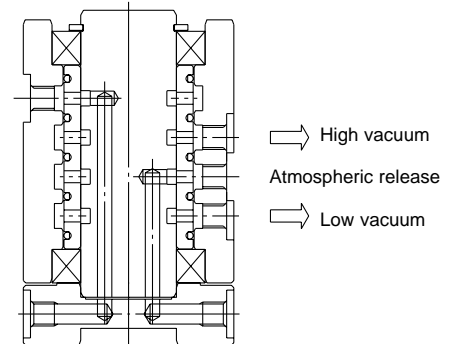


##### Using different pressures in vacuum

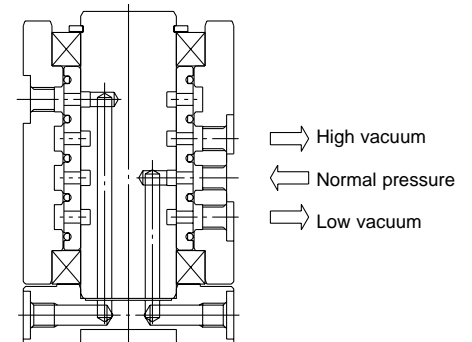
As neither the ejector nor the vacuum pump has a relief function, pressure interference may occur. Install an atmospheric release port (blanking port) or normal pressure circuit between the pressure ports having different vacuum pressures.



- \* If neighbouring ports are used at different vacuum pressures, the vacuum pressure on the lower vacuum side will increase and hence it cannot be used.



Using atmospheric release port



Using normal pressure port

- \* If using two or more ports at different vacuum pressures, an atmospheric release port or a normal pressure supply should be provided between the ports.



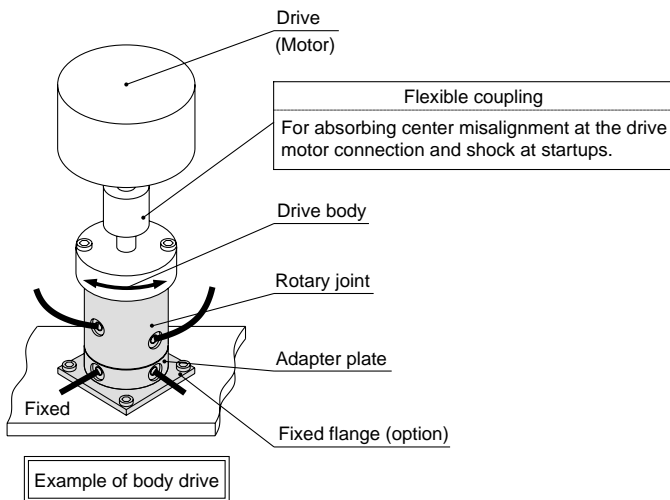
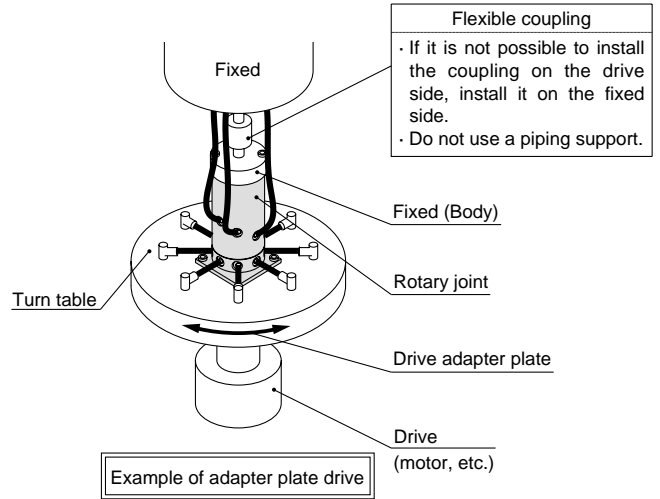
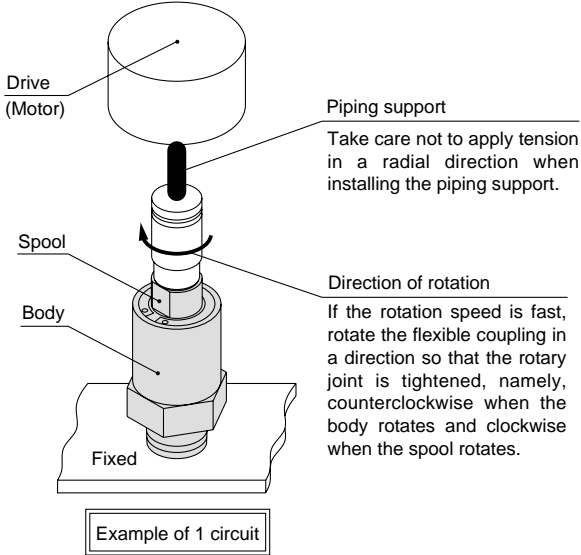
# Series MQR

## Specific Product Precautions 2

Be sure to read before handling.

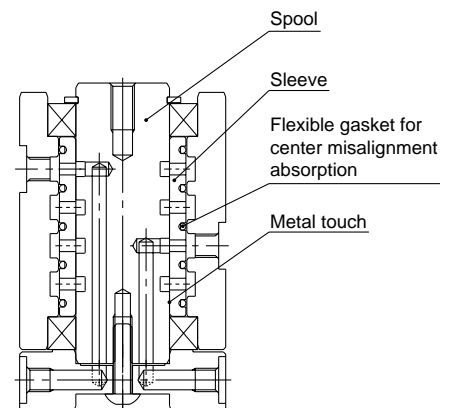
Refer to back pages 1 through to 3 for safety instructions and rotary joint precautions.

### Mounting



## ⚠ Caution

- ① The amount of center misalignment between the drive and fixed axes varies with the type and size of flexible coupling used. In general, adjust it to 0.3 mm or less to be absorbed. Note that if you fix rotary joints with two or more circuits using a piping support, an excessive radial load is temporarily caused, in particular when the rotary joints are started, due to the piping tension and distortion.
- ② Although the metal sealing is fitted with a flexible floating sleeve to absorb an accumulated center misalignment of all the components, install a flexible coupling to the drive connection so that rotational shock and misalignment between the drive and fixed axes can be absorbed. Rubber or resin couplings are recommended due to their excellent absorption of center misalignment, shocks, and vibrations. Refer to specifications on page 1 for allowable axis reaction force.





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