CKD

SM－P00124－A

INSTRUCTION MANUAL

3QE1
M3QE1, M3QZ1

● 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株式会社

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.

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, outdoors, or in the following conditions or environments.
In any case, measures for safety shall be provided when the vavle 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.

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, 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.

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) Keep the solenoid valve system dry. Take care to avoid direct contact with dripping water or splashes of cutting oil.

- If the solenoid valve system is wet by a direct contact with water or cutting oil, an electrical leak or burnt solenoid coils may result. Protect the solenoid valve system by using a cover or by installing it inside a paneled casing. 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 $50m/s^2$ or stronger or shocks $300m/s^2$ 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 valve. The packing and gaskets may deteriorate sooner

h) Than usual if used in an atmosphere with a higher than normal density of ozone (for example, the atmosphere near a beach or in an area with frequent thunderstorms

- Consult us for the packing and gaskets to be used in an atmosphere with a higher ozone density.

i) There is no resistance to surges caused by overvoltage from switching and lightning transients(CE Marking :IEC61000-4-5). Please take measures against surges on the equipment side.

INSTALLATION (Section 4.2)

⚠ WARNING :

a) When installing a solenoid valve unit, 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 solenoid valve.

b) Tighten the screws with proper torque. If the assembly or tightening is not conducted properly, it may cause some air leakage, falling-off of products, or screw damaging.

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
- The 1(P) port includes a mesh filter as standard to prevent suction of foreign matter into the valve, but the filter is not capable of removing fine dust.

g) Do not use the product as emergency cutout solenoid valve.
- Starting response time can be late, when leaving under elevated pressure for a long time.

WIRING (Section 4.4)

⚠ WARNING: Turn off the power before wiring. Do not touch or put wet hands close to any terminal while power is on. Doing so may cause electric shock. Before wiring, read the instruction manual carefully and understand the instructions.

- A person who wires needs to have knowledge for safely performing such operation based on the understanding about the mechanisms and operating principles of solenoid valves.

⚠ CAUTION:

a) Before supplying the power, check the power supply voltage and the current type (AC or DC).

b) Do not apply stress to the lead wires.
- Undue stress may cause such problems as a break in the wire or disconnection of the contact terminal.

c) The voltage drop may be caused with the simultaneous energization and/or cable length. Confirm the voltage drop on the solenoid valve is within 10% of its rated voltage.

d) Connect this product with the output unit. In case the product is connected with the input unit, it may result in serious trouble(s), not only on these apparatuses but also on the peripheral equipment.

MANUAL OVERRIDE (Section 5.2)

⚠ WARNING:

a) Do not operate the manual override with excessive force. Doing so may damage it.
- Non-locking manual override: 15～25N
- Locking manual override: Turn with a light force with a tool. (0.1N･m or less)

b) When using the locking manual override, be sure to release the lock before normal operation. Failure to do so may cause malfunction or failure.

c) Before using the manual override, make sure that nobody is present near the cylinder to be activated.

AIR QUALITY (Section 5.3)

⚠ WARNING :

a) Do not supply anything other than compressed air or low vacuum.

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) Basically, the product is designed as oil less specifications, however if you prefer to supply oil, use the class 1 turbine oil (additive-free) ISO VG32.

- 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. Keep it lubricated.

c) Do not use spindle oil or machine oil. They induce expansion of the rubber parts, which will cause malfunction.

d) You can't use under negative pressure。In case of used in mixed conditions of negative and positive pressure, like a vacuum break circuit, it malfunctions.

ELECTRIC CIRCUITS (Section 5.4)

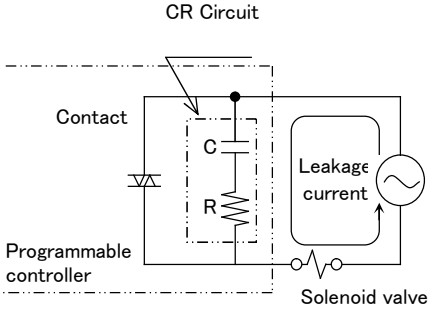
⚠ CAUTION :

a) Check for the presence of any current leak from the external control device because it may cause an erroneous valve operation.

- When a programmable controller or a similar control device is used, a current leak may prevent the normal returning of the valve when the solenoid is de-energized.

b) Restriction on current leak

- When controlling solenoid valves using a programmable controller or a similar control device, make sure that the current leak in the programmable controller output is equal to or less than the level shown in the table below. A current leak larger than the allowable level may cause an erroneous valve operation.2



AC100V	1.0 mA or lower
DC3V	8.0 mA or lower
DC5V	4.8 mA or lower
DC12V	1.6 mA or lower
DC24V	1.0 mA or lower

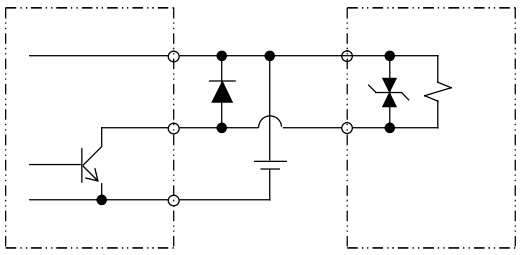
⚠ CAUTION:

a) The surge suppressor limits the surge voltage generating from the solenoid valve, which reaches several hundred volts, to a low voltage level bearable for output contacts. This function may be insufficient for some output circuits and the voltage may cause breakage or malfunction. Check the surge voltage limitation level of the solenoid valve in your circuit, the dielectric voltage and circuit configuration of the output devices and the delay for recovery to check for serviceability. If necessary, install another measure against surges. The 4GR Series solenoid valves equipped with a surge suppressor suppress the terminal-to-terminal reverse voltage surge generating upon shutoff, to the level shown in the table below.

In case of 3V DC	About 6.2V
In case of 5V DC	About 13V
In case of 12V DC	About 27V
In case of 24V DC	About 47V
In case of option "S ", "E "	About 1V

b) When the output unit is an NPN type, a surge voltage of “voltage stated in above table” + “power voltage” may be applied to the output transistor. To avoid this trouble, it may be required to separately install a contact protection circuit or to choose option ″s″.

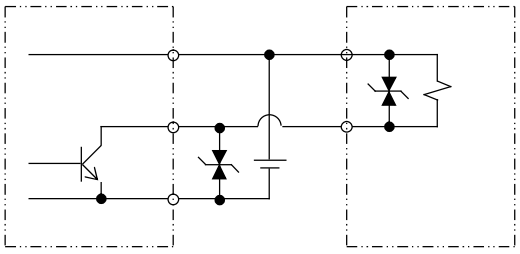
< Example 1 Separate installation of output transistor protection circuit >



Programmable controller side

Solenoid valve side

< Example 2 Separate installation of output transistor protection circuit >



Programmable controller side

Solenoid valve side

c) If another devices or solenoid valves are connected to the solenoid valve in parallel, the reverse surge voltage occurred while the power of the solenoid valve is OFF is applied to those devices. When the solenoid valve with the surge killer for DC24V is used, the surge voltage reaches minus several tens V due to the type, and another device connected in parallel may be broken or be malfunctioned by this voltage of reverse polarity. Do not connect in parallel the solenoid valve and another device, which are weak of the voltage of reverse polarity (for example LED lamp).

When a few solenoid valves are functioned in parallel, the surge of another solenoid valve is flowed to surge killer of one solenoid valve with it, and therefore it may make burning breakage the surge killer due to current value.

When a few solenoid valves with the surge killer are functioned in parallel, the surge current converges on the surge killer of the lowest limiting voltage, and it may make burning breakage similarly. If the solenoid valves are same model number, the surge killer may make burning breakage at worst because their limiting voltages vary widely. Do not function in parallel a few solenoid valves

d) When the surge killer installed in the solenoid valve is broken by the over voltage or the over current from besides the solenoid valve, it short-circuits in many cases. Therefore, after broken it, a large current is flowed while the output is ON, and the output circuit or the solenoid valve may be broken or get a fire at worst. Do not keep a continuous energizing while the solenoid valve is broken. In addition, install the protection circuit of the over current at the power source or the functioning circuit, or use the power source with the protection of over current not to continue flowing a large current.

⚠ CAUTION :

■About AC models

(1) The AC voltage models have a built-in full-wave rectifier circuit. If an SSR is used to turn on and off the solenoid valve, the solenoid valve may cause recovery failure depending on the type of the SSR. Carefully select the SSR. (We recommend that you consult with the relay or PLC manufacturer.)

(2) When the solenoid valve is used in the continuously energized state, the coil's outer surface will become hot. Do not touch the coil while the power is on. Doing so may cause burn injury.

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.

REPLACING OF THE SOLENOID VALVE (Section 6.2)

⚠ WARNING :

Before replacing solenoid valves, read the instruction manual carefully and understand the instructions.

- A person who replaces a solenoid valve system needs to have knowledge for safely performing such operation based on the understanding about the mechanisms and operating principles of solenoid valves.
- Pneumatic technician certification test class 2 or higher.

INDEX

3QE1,
M3QE1, M3QZ1

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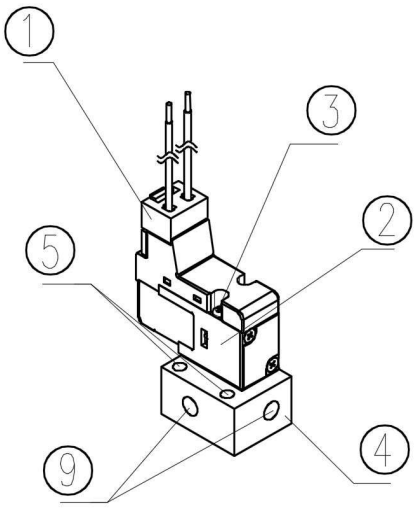
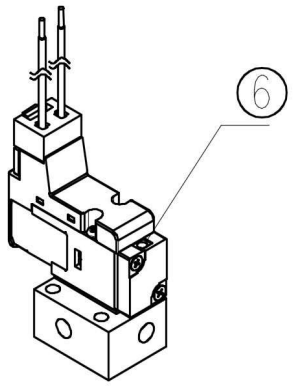
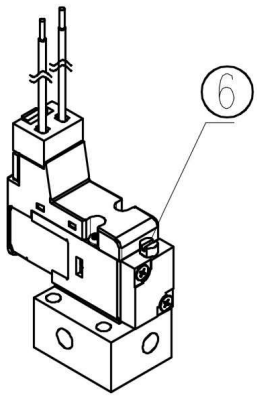
1. PART NAME AND DESCRIPTION



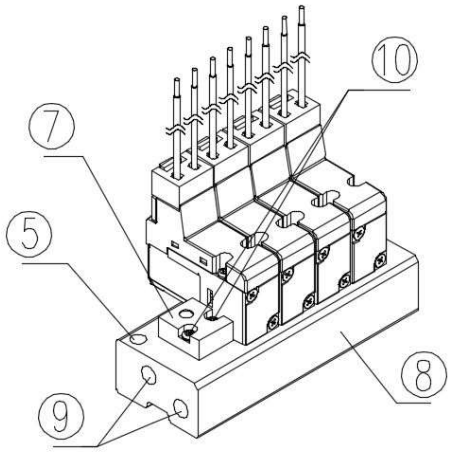
3QE1(Without manual override)



3QE1(Non-locking manual override)



3QE1(Locking manual override)



M3QE／Z

No.	Part Name	Explanation
①	Wire connection	Its connections to the electric circuit
②	Valve unit	This is sub plate piping.
③	Mounting screw	Two screws are provided for each individual valve so as to fix the valve unit to various bases.
④	Sub plate	This sub plate is assembled to use it in the sub plate piping specifications.
⑤	Mounting hole	The sub plate and manifold base can be secured with screws M2.5 and M3, respectively.
⑥	Manual override (1→2port)	It is used for manual operation. The non-locking and locking types are available.
⑦	Masking plate	It masks the clear space of valve unit in the manifold.
⑧	Manifold base	It uses in case of performing common supply or common exhaust to several valve units.
⑨	Piping port	“1(P)”, “3(R2)/5(R1)”, and “2(B)/4(A)” show the supply, exhaust, and output ports, respectively.
⑩	Masking plate mounting screw	Each masking plate has two screws. They are used to secure the masking plate on the manifold base.

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

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)):

Example (converting a pressure value):

1kgf/cm^2 → **0.0980665Mpa** **1MPa** → 1.01972×10kgf/cm^2

- Force

N	dyn	kgf
1	1×10^{5}	1.01972×10^{-1}
1×10^{-5}	1	1.01972×10^{-6}
9.80665	9.80665×10^{5}	1

- Stress

Pa or N/m^2	MPa or N/mm^2	kgf/mm^2	kgf/cm^2
1	1×10^{-6}	1.01972×10^{-7}	1.01972×10^{-5}
1×10^{6}	1	1.01972×10^{-1}	1.01972×10
9.80665×10^{6}	9.80665	1	1×10^{2}
9.80665×10^{4}	9.80665×10^{-2}	1×10^{-2}	1

Note : 1Pa=1N/m^2, 1MPa=1N/mm^2

- Pressure

Pa	kPa	MPa	bar	kgf/cm^2	atm	mmH2O	MmHg or Torr
1	1×10^{-3}	1×10^{-6}	1×10^{-5}	1.01972×10^{-5}	9.86923×10^{-6}	1.01972×10^{-1}	7.50062×10^{-3}
1×10^{3}	1	1×10^{-3}	1×10^{-2}	1.01972×10^{-2}	9.86923×10^{-3}	1.01972×10^{2}	7.50062
1×10^{6}	1×10^{3}	1	1×10	1.01972×10	9.86923	1.01972×10^{5}	7.50062×10^{3}
1×10^{5}	1×10^{2}	1×10^{-1}	1	1.01972	9.86923×10^{-1}	1.01972×10^{4}	7.50062×10^{2}
9.80665×10^{4}	9.80665×10	9.80665×10^{-2}	9.80665×10^{-1}	1	9.67841×10^{-1}	1×10^{4}	7.35559×10^{2}
1.01325×10^{5}	1.01325×10^{2}	1.01325×10^{-1}	1.01325	1.01323	1	1.03323×10^{4}	7.60000×10^{2}
9.80665	9.80665×10^{-3}	9.80665×10^{-6}	9.80665×10^{-5}	1×10^{-4}	9.67841×10^{-5}	1	7.35559×10^{-2}
1.33322×10^{2}	1.33322×10^{-1}	1.33322×10^{-4}	1.33322×10^{-3}	1.35951×10^{-3}	1.31579×10^{-3}	1.35951×10	1

Note : 1Pa=1N/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.

1) Check the model number imprinted on the product to make sure that the product you received is exactly the product you ordered.
2) Check the exterior of the product for any damage.
3) 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) Keep the solenoid valve system dry. Take care to avoid direct contact with dripping water or splashes of cutting oil.
- If the solenoid valve system is wet by a direct contact with water or cutting oil, an electrical leak or burnt solenoid coils may result. Protect the solenoid valve system by using a cover or by installing it inside a paneled casing. 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 50m/s^2 or stronger or shocks 300m/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.

h) The packing and gaskets may deteriorate sooner than usual if used in an atmosphere with a higher than normal density of ozone (for example, the atmosphere near a beach or in an area with frequent thunderstorms).
   - Consult us for the packing and gaskets to be used in an atmosphere with a higher ozone density

i) There is no resistance to surges caused by overvoltage from switching and lightning transients(CE Marking :IEC61000-4-5). Please take measures against surges on the equipment side.

4. 2 Installation

⚠ WARNING : Then installing a solenoid valve unit, never attempt to hold it in position by means of the pipes connected to it.

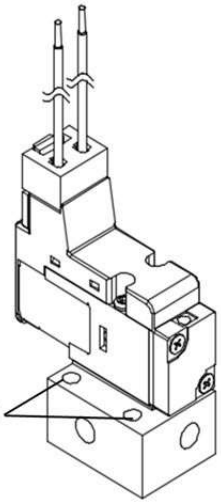
- Mount the solenoid valve by applying the mounting screws and/or mounting plate to the solenoid valve.

4. 2. 1 A work space for installation, removal, wiring, and piping operations should be provided around the installed solenoid valve system.

4. 2. 2 Direct mounting

1) Unit Sub plate Type

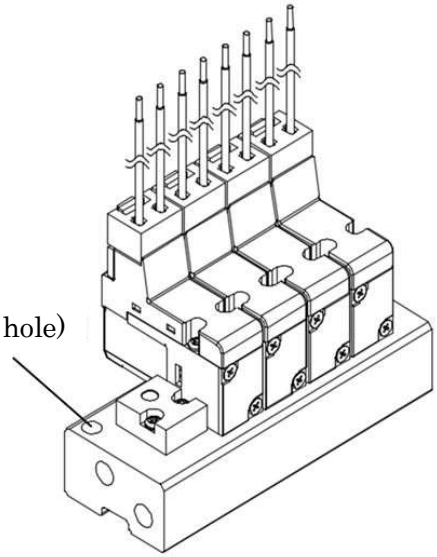
Use two mounting holes



2- ϕ 2.7
(Mounting hole)

2) Manifold Type

Use two mounting holes



2- ϕ 3.5
(Mounting hole)

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
- The 1(P) port includes a mesh filter as standard to prevent suction of foreign matter into the valve, but the filter is not capable of removing fine dust.

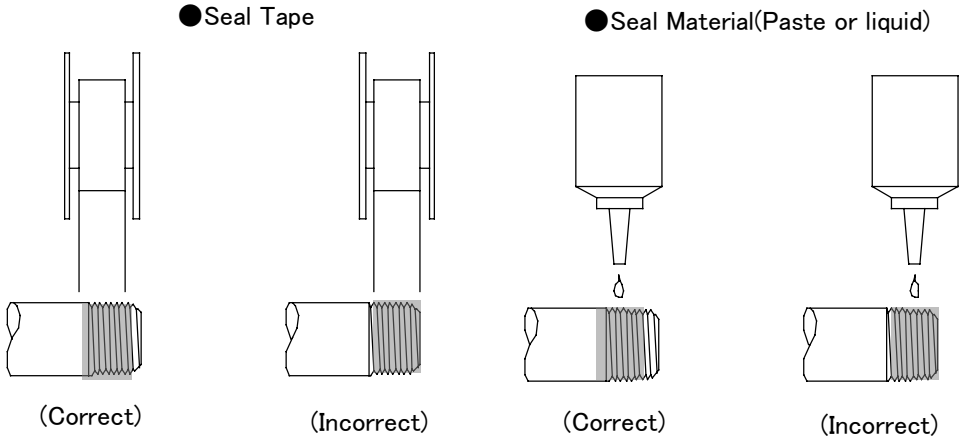
g) Do not use the product as emergency cutout solenoid valve.
- Starting response time can be late, when leaving under elevated pressure for a long time.

Appropriate tightening torque

Connecting screw	Tightening torque N·m
M5	1.0～1.5
Rc1/8	3～5

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 About M5 joint

M5 seal it with gasket (model : FGS). Don't tight while increasing Pressure. Consider a trouble of emergency, Design and enforce to be possible to remove and mount of a valve.

4. 3. 4 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. 5 Pipe connections

(1) Tubes to be used

For use with solenoid valves with one-touch joints, select tubes of the type specified by us.

Soft nylon tubes (F-1500 Series)
Urethane tubes (U-9500 Series)

＊For the ϕ 1.8 push-in joint (C18), use UP-9402 (urethane).

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

(3) 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 an urethane tube should be 93° C 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
ϕ1.8	—	ϕ1.2
ϕ3	—	ϕ2
ϕ4	ϕ2.5	ϕ2
ϕ6	ϕ4	ϕ4

Outside diameter allowance

Soft or hard nylon	±0.1mm
Urethane ϕ1.8, ϕ3	±0.1mm
Urethane ϕ4, ϕ6	+0.1mm −0.15mm

(4) Minimum 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
ϕ1.8	—	4
ϕ3	—	8
ϕ4	10	10
ϕ6	20	20

(5) 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.

(6) 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 of the tube. The tension applied sideways through the tube should not exceed 40N. (About 5N for C18)

4. 4 Wiring

⚠ WARNING: Turn off the power before wiring. Do not touch or put wet hands close to any terminal while power is on. Doing so may cause electric shock. Before wiring, read the instruction manual carefully and understand the instructions.

- A person who wires needs to have knowledge for safely performing such operation based on the understanding about the mechanisms and operating principles of solenoid valves.

⚠ CAUTION:

a) Before supplying the power, check the power supply voltage and the current type (AC or DC).

b) Do not apply stress to the lead wires.
- Undue stress may cause such problems as a break in the wire or disconnection of the contact terminal.

c) The voltage drop may be caused with the simultaneous energization and/or cable length. Confirm the voltage drop on the solenoid valve is within 10% of its rated voltage.

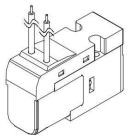
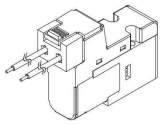
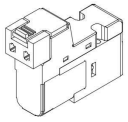
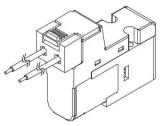
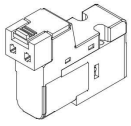
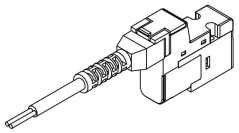
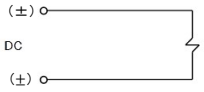
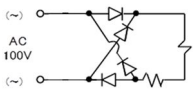
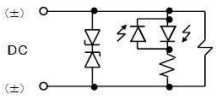
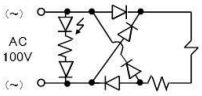
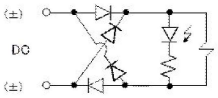
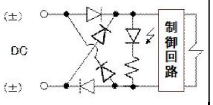
d) Connect this product with the output unit. In case the product is connected with the input unit, it may result in serious trouble(s), not only on these apparatuses but also on the peripheral equipment

4. 4. 1 Caution for wiring

(1) Use it under low dust or under avoiding direct contact with dripping water or splashing of cutting oil.
(2) For the electrical circuit, use a switching circuit free of chattering.
(3) The electrical circuit should have fuses.
(4) Be sure that the operation voltage is within 10% of the rated voltage.
(5) Install the valve so that wiring connections are not subject to any force(such as that caused by a device movement

4. 4. 2 Wire connection

■3QE1

Name	Grommet lead wire	E-connector				EJ-connector
Optioncode	None	E0＊	E1	E2＊	E3	EJ＊
Shape						
Circuit		DC E(J)0＊/1  AC E0＊ 	E(J)2＊/3  E2＊ 	Option 'S' 		Option' E ' 

4. 4. 3 How to use E-connector

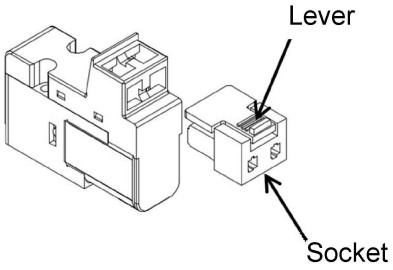
The E-connector is a top/side common connector to which the sockets can be connected to either the upward or lateral directions. The socket assembly is enclosed with the valve.

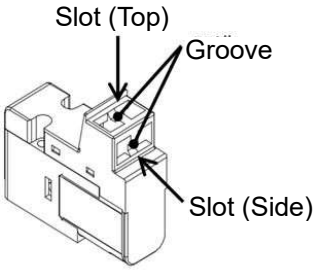
Select the connection direction based on installation.

1) How to mount/dismount socket

(1) When installing the socket, hold the lever and socket with your fingers and insert straight into the square window on the connector. Align the lever with the groove on the connector and lock. When installing from the top, face the socket so that the lever is in front. When installing from the side, face the socket so that the lever is on the top.

(2) When removing the socket, press down the lever to release jaws from the groove, then pull straight out.

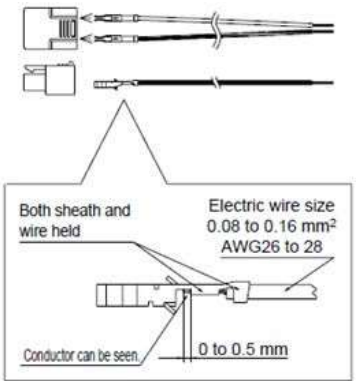




2) How to connect lead wire

(1) Peal sheath of lead wire 3 mm from the top, arrange the top of conductor, and insert the conductor into the crimp terminal and crimp them with a crimping tool. Crimp both the sheath and wire and check that 0 to 0.5 mm of the core wire end is visible.

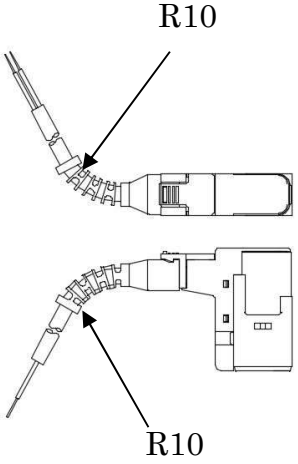
(2) After crimping, face the contact terminal as shown below, and insert into the square window on the socket. The terminal locks when it is inserted into the back. After insertion, tug lightly on the terminal to check that it is locked.



For the caulking tool, consult us.

4. 4. 4 How to use E*J type connector (Socket with cover type)

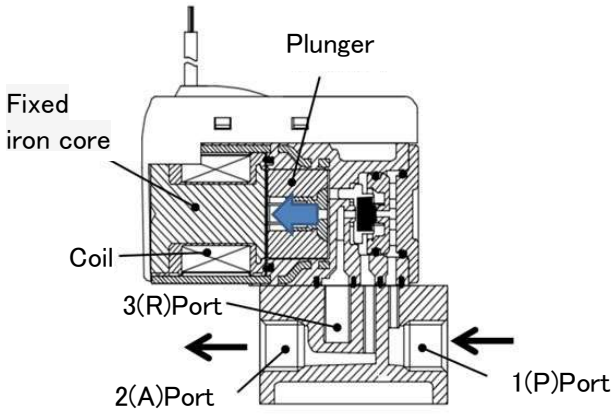
Dimensions below apply as the lead bending limit



5. OPERATING RECOMMENDATION

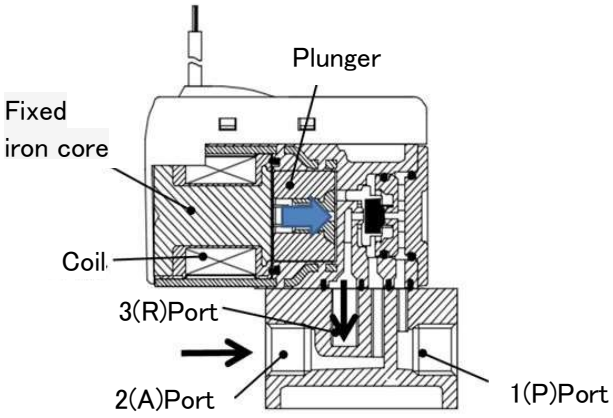
5. 1 Operation Explanation

●When energized



When the coil is energized, the plunger will be attracted to the fixed iron core, and compressed air will flow from the 1 (P) port to the 2 (A) port.

●When not energized



When the coil is de-energized, the plunger will be removed from the fixed iron core, and compressed air will flow from the 2 (A) port to the 3 (R) port.

* It cannot be used in the N.O. mode in which air is supplied from 3 ports.

5. 2 Manual Override

⚠ WARNING :

a) Do not operate the manual override with excessive force. Doing so may damage it.
- Non-locking manual override : 15～25N
- Locking manual override : Turn with a light force with a tool. (0.1N・m or less)

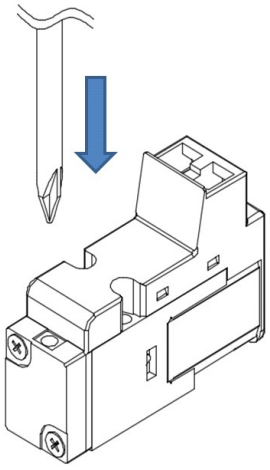
b) When using the locking manual override, be sure to release the lock before normal operation. Failure to do so may cause malfunction or failure.

c) Before using the manual override, make sure that nobody is present near the cylinder to be activated.

5. 2. 1 Manual operation device

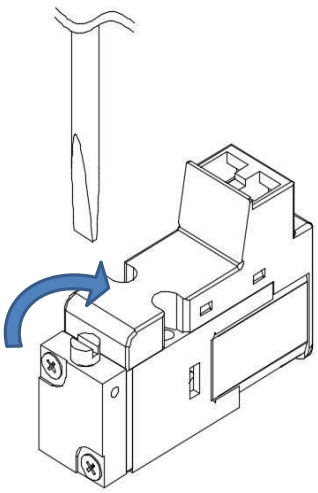
■Non-locking manual override

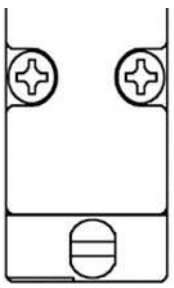
Press the manual button vertically with a tool having a fine point.



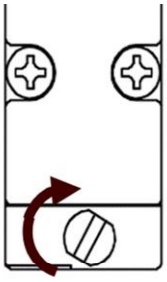
■Locking manual override

Turn the manual button in the arrow direction with a slotted screwdriver.
After the completion of manual operation, return the manual button to the original position.





OFF



ON

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) Basically the product is designed as oil less specifications, however if you prefer to supply oil, use the class 1 turbine oil (additive-free) ISO VG32.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. Keep it lubricated.

c) Do not use spindle oil or machine oil. They induce expansion of the rubber parts, which will cause malfunction

5. 3. 1 Lubrication

Generally, the 4GR -series does not require any lubrication. If the lubrication is required, use additive-free turbine oil grade 1 (ISO-VG32). Control the amount of lubrication appropriately. Excessive lubrication may cause malfunction.

5. 3. 2 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) If the amount of drain is large, the plunger may be in close contact with the fixed iron core, thereby causing malfunction.

5. 3. 3 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
3) The 1(P) port includes a mesh filter as standard to prevent suction of foreign matter into the valve, but the filter is not capable of removing fine dust.

5. 3. 4 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.

5. 3. 5 About Using under vacuum

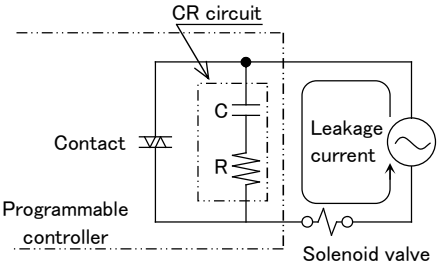
⚠ CAUTION: The product cannot be used under vacuum. If used under vacuum conditions, including to use with compressed air for vacuum breaking, it will malfunction.

5. 4 Electric Circuit

⚠ CAUTION:

a) Check for the presence of any current leak from the external control device because it may cause an erroneous valve operation.
- When a programmable controller or a similar control device is used, a current leak may prevent the normal returning of the valve when the solenoid is de-energized.

b) Restriction on current leak
- When controlling solenoid valves using a programmable controller or a similar control device, make sure that the current leak in the programmable controller output is equal to or less than the level shown in the table below. A current leak larger than the allowable level may cause an erroneous valve operation.



AC100V	1.0 mA or lower
DC3V	8.0 mA or lower
DC5V	4.8 mA or lower
DC12V	1.6 mA or lower
DC24V	1.0 mA or lower

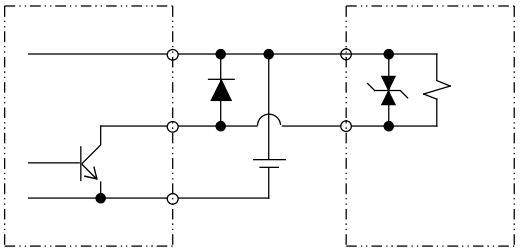
⚠ CAUTION:

a) The surge suppressor limits the surge voltage generating from the solenoid valve, which reaches several hundred volts, to a low voltage level bearable for output contacts. This function may be insufficient for some output circuits and the voltage may cause breakage or malfunction. Check the surge voltage limitation level of the solenoid valve in your circuit, the dielectric voltage and circuit configuration of the output devices and the delay for recovery to check for serviceability. If necessary, install another measures against surges. The 4GR Series solenoid valves equipped with a surge suppressor suppress the terminal-to-terminal reverse voltage surge generating upon shutoff, to the level shown in the table below.

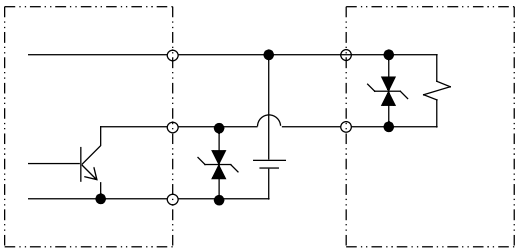
In case of 3V DC	About 6.2V
In case of 5V DC	About 13V
In case of 12V DC	About 27V
In case of 24V DC	About 47V
In case of option "S ", "E "	About 1V

b) When the output unit is a NPN type, a surge voltage of "voltage stated in above table" + "power voltage" may be applied to the output transistor. To avoid this trouble, it may be required to separately install a contact protection circuit. or to choose option "s".

< Example 1 Separate installation of output transistor protection circuit >



< Example 2 Separate installation of output transistor protection circuit >



c) If another devices or solenoid valves are connected to the solenoid valve in parallel, the reverse surge voltage occurred while the power of the solenoid valve is OFF is applied to those devices. When the solenoid valve with

⚠ CAUTION :

the surge killer for DC24V is used, the surge voltage reaches minus several tens V due to the type, and another device connected in parallel may be broken or be malfunctioned by this voltage of reverse polarity. Do not connect in parallel the solenoid valve and another devices, which are weak of the voltage of reverse polarity (for example LED lamp).

When a few solenoid valves are functioned in parallel, the surge of another solenoid valve is flowed to surge killer of one solenoid valve with it, and therefore it may make burning breakage the surge killer due to current value.

When a few solenoid valves with the surge killer are functioned in parallel, the surge current converges on the surge killer of the most low limiting voltage, and it may make burning breakage similarly. If the solenoid valves are same model number, the surge killer may make burning breakage at worst because their limiting voltages vary widely. Do not function in parallel a few solenoid valves.

d) When the surge killer installed in the solenoid valve is broken by the over voltage or the over current from besides the solenoid valve, it short-circuits in many cases. Therefore, after broken it, a large current is flowed while the output is ON, and the output circuit or the solenoid valve may be broken or get a fire at worst. Do not keep a continuous energizing while the solenoid valve is broken. In addition, install the protection circuit of the over current at the power source or the functioning circuit, or use the power source with the protection of over current not to continue flowing a large current.

⚠ CAUTION :

■ Continuous energizing

(1) For continuous energizing for a long period of time, use a low-heat-generating, power-saving type.

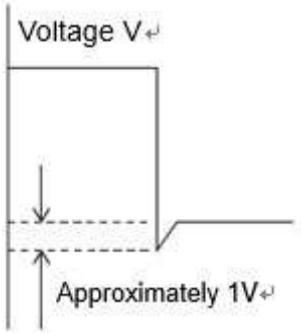
(2) If a valve other than the Low exoergic/energy type, power-saving type valve is used in the continuously energized state for a long period of time, the deterioration of valve performance may be accelerated. Take into consideration the above also in the following cases.

- When the energizing time exceeds the non-energizing time in the intermittent energization mode
- When one cycle of energization exceeds 30 minutes in the intermittent energization mode

When installing, thoroughly consider the heat dissipation.

5. 4. 1 Surge-less type

Surge-less type (option "S ") has the function of reducing a surge voltage of the solenoid valve to approximately 1V by an incorporated diode. It has no polarity.



⚠ CAUTION :

■ About low exoergic/energy type

(1) Never use this type of valve in an environment where vibrations or shocks exceeding the specified range may be applied to the valve. Doing so may result in valve malfunction.

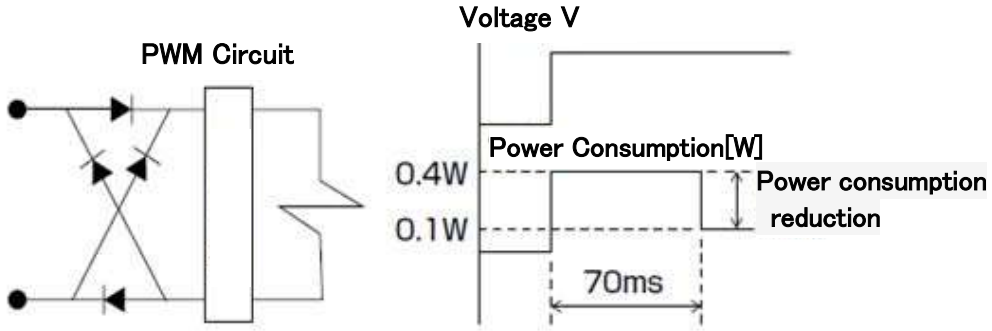
(2) If an instantaneous power failure for 30 ms or less occurs on the driving power supply for the solenoid valve, the energized state cannot be maintained. If a disturbance occurs in the continuously energized state and an instantaneous power failure for 30 ms or less occurs in the power supply for the solenoid valve, turn off the power for 50 ms or more to turn on the solenoid valve again.

(3) Do not increase the voltage gradually when using the valve. The valve will not operate.

5. 4. 2 Low exoergic/energy type

The Low exoergic/energy type solenoid valve has a built-in PWM circuit to reduce the power for keeping the attraction force of the coil. The power consumption is reduced to 1/4 of the standard value. It has no polarity.

Item		Current[A]	Power consumption [W]
At Starting	DC12V	0.033	0.4
	DC24V	0.017	0.4
At Holding	DC12V	0.010	0.1
	DC24V	0.005	0.1



⚠CAUTION: ■About AC models

(1) The AC voltage models have a built-in full-wave rectifier circuit. If an SSR is used to turn on and off the solenoid valve, the solenoid valve may cause recovery failure depending on the type of the SSR. Carefully select the SSR. (We recommend that you consult with the relay or PLC manufacturer.)

(2) When the solenoid valve is used in the continuously energized state, the coil's outer surface will become hot. Do not touch the coil while the power is on. Doing so may cause burn injury.

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?
   Does the pressure gauge indicate 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?

6. 2 Replacing Of The Solenoid Valve

⚠ WARNING : Before replacing solenoid valves, read the instruction manual carefully and understand the instructions.

- A person who replaces a solenoid valve system needs to have knowledge for safely performing such operation based on the understanding about the mechanisms and operating principles of solenoid valves.

⚠ CAUTION : Screws must be tightened with a correct torque. Otherwise, the product will be damaged.

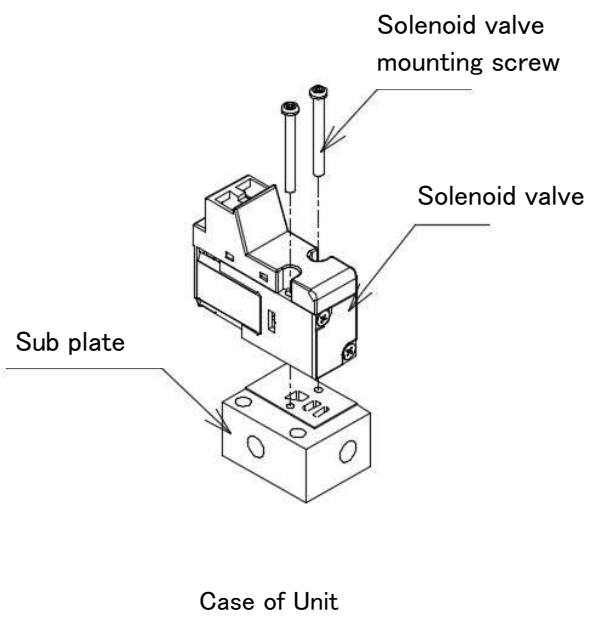
6. 2. 1 Solenoid valve mounting and detaching

When replacing the solenoid valve, play special attention so that no gaskets are fallen down.

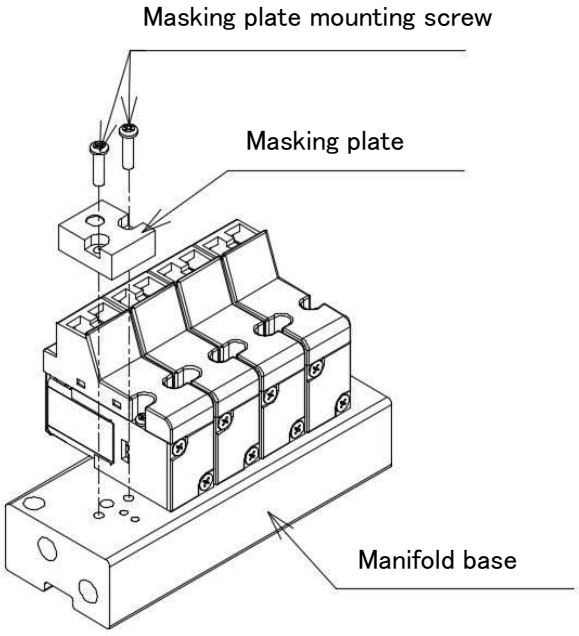
(The following figure reference)

The proper tightening torque of the solenoid valve mounting screw is 0.13±0.17 N･m

The proper tightening torque of the masking plate mounting screw is 0.13±0.17 N･m



Case of Unit

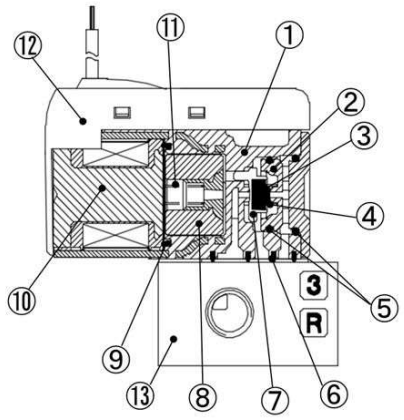


Case of MF

･Before replacing, be sure to turn off power supply and discharge the residual pressure.

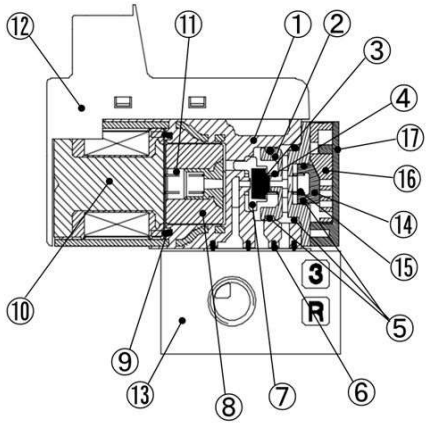
6. 3 Internal Structure And Parts List

3QE1(Without manual override)



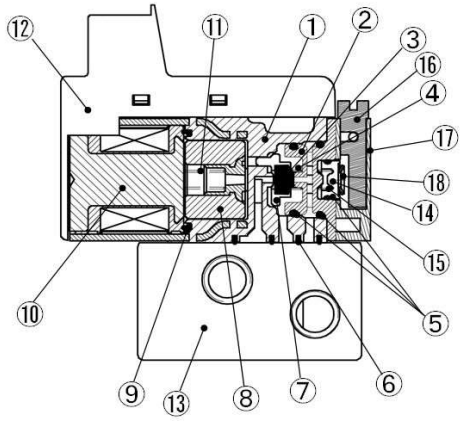
No.	Parts	Material
①	Body	Resin
②	Body (plug)	Resin
③	Valve sheet	Nitrile rubber
④	Valve spring	Stainless steel
⑤	O ring	Hydrogenated nitrile rubber
⑥	Body Gasket	Hydrogenated nitrile rubber
⑦	Valve guide	Resin
⑧	Plunger	Stainless steel
⑨	Coil Gasket	Silicone rubber
⑩	Coil ass'y	—
⑪	Plunger spring	Stainless steel
⑫	Cover	Resin
⑬	Sub plate	Zinc

3QE1(Non-locking manual override)



No.	Parts	Material
①	Body	Resin
②	Body (plug)	Resin
③	Valve sheet	Nitrile rubber
④	Valve spring	Stainless steel
⑤	O ring	Hydrogenated nitrile rubber
⑥	Body Gasket	Hydrogenated nitrile rubber
⑦	Valve guide	Resin
⑧	Plunger	Stainless steel
⑨	Coil Gasket	Silicone rubber
⑩	Coil ass'y	—
⑪	Plunger spring	Stainless steel
⑫	Cover	Resin
⑬	Sub plate	Zinc
⑭	Manual adapter	Resin
⑮	Manual spring	Stainless steel
⑯	Manual shaft	Resin
⑰	Cover	Resin

M3QE1(Locking manual override)



No.	Parts	Material
①	Body	Resin
②	Body (plug)	Resin
③	Valve sheet	Nitrile rubber
④	Valve spring	Stainless steel
⑤	O ring	Hydrogenated nitrile rubber
⑥	Body Gasket	Hydrogenated nitrile rubber
⑦	Valve guide	Resin
⑧	Plunger	Stainless steel
⑨	Coil Gasket	Silicone rubber
⑩	Coil ass'y	—
⑪	Plunger spring	Stainless steel
⑫	Cover	Resin
⑬	Manifold base	Aluminum
⑭	Manual adapter	Resin
⑮	Manual spring	Stainless steel
⑯	Manual shaft	Resin
⑰	Cover	Resin
⑱	Disc spring	Phosphor bronze

7. TROUBLE SHOOTING

Motion troubles	Suspected cause	Remedies
Does not actuate	No electric signals	Turn on the power
	Damage to signal wiring system	Repair the control circuit
	Excessive fluctuating range of current or voltage	Reaffirm the power capacity (within ±10% of voltage fluctuation)
Malfunctions	Excessive leaking current	Correct control circuit and / or set a bleed circuit
	Chattering	Inspect switching system and / or tighten each loosen terminal screw
	Voltage deviates than specified on the name plate	Rectify the voltage to meet the specification
	Damaged or short circuited coil	Replace the solenoid valve
	Erroneous shut off pressure source	Turn on the power source
	Insufficient pressure	Reset the pressure reducer valve or install a pressure raising valve
	Insufficient flow of fluid	Rectify the size of pipe or install a surge tank
	Erroneous piping, erroneous omitting some piping	Rectify the piping system
	Speed control valve completely closed by error	Reset the needle valve
	Sticky stem Sticking tarry or liquid jelly substitute	Carry out pipe dressing Operate it periodically
	Valve is frozen	Add remedies of avoiding freezing (Heating system or dehumidifying system etc.)
	Delayed return of a plunger (Incorporation of oil, existence of tar)	Install a oil mist filter Install a tar removing filter
	Clogged-up exhausting port with dust	Install a cover or silencer and clean it regularly
Internal leakage	Bulged or decomposed packings (Incorporation of oil)	Install a oil mist filter and keep organic chemicals away from valves
	Bulged or decomposed packings Incorporation of drain Initial lubricant is washed off Incorporation of oil	Change the piping to an external pilot system Install dryer or filter
	Foreign particles cut into packing lips	Remove the foreign particle away from the packing Install a filter
Malfunctions when manifold is used	Delayed response when multiple blocks are used	Install Sup. (P) piping to 1 ports on both sides of manifold block
	Delayed response when multiple blocks are used	Connect Exh. (R) piping to 2 ports on both sides of manifold block so as to exhaust to an open air through
	Adjacent cylinder pops out. Intrusion of exhaust air	Rewire to have the solenoid valve in question is actuated prior to others sequentially Increase exhaust air Change type to individual exhaust

8. PRODUCT SPECIFICATIONS AND HOW TO ORDER

8. 1 Product Specifications

1) 3QE1 series

(1) Specifications

Item \ Model code		3QE1
Valve and operation		Direct acting poppet valve
Working fluid		Compressed air
Max. Working pressure	MPa	0.7
Min. Working pressure	MPa	0
Proof pressure	MPa	1.05
Ambient temperature	℃	-5～55 (Not to be frozen)
Fluid temperature	℃	5～55
Manual override		None/Non-locking manual/ Locking manual
Lubrication		Not required ＊1
Degree of protection		Dust-proof ＊2
Vibration resistance	m/s^2	50 or less
Impact resistance	m/s^2	300 or less
Atmosphere		Cannot be used in corrosive gas environments
Flow characteristic C	$dm^3/(s \cdot bar)$	1→2：0.04、2→3：0.06
Response time (ON/OFF)	ms	6±2／3±2 ＊3
Port size		M5
Weight	g	16(Without the base)

＊1. Use turbine oil Class 1 ISO VG32 for lubrication.

＊2. Avoid water drops or oil, etc., during use.

＊3. According to JIS B 8419:2010 Dynamic performance testing.

(Initial values at supply pressure 0.5 MPa, 20° C, no lubrication, rated voltage, continuous operation)

(2) Electric specifications

Item			Description	
			Standard	Low exoergic/low energy
Rated voltage		V	DC3、5、12、24、AC100	DC12、24
Range of voltage fluctuation			±10%	
Holding current *4	A	DC3V	0.120(0.136)	—
		DC5V	0.072(0.082)	—
		DC12V	0.030(0.034)	(0.010)
		DC24V	0.015(0.017)	(0.005)
		AC100V	0.009(0.009)	—
Power consumption Values in ( ) are with lamp *4	W	DC3V	0.35(0.40)	—
		DC5V	0.35(0.40)	—
		DC12V	0.35(0.40)	(0.1)
		DC24V	0.35(0.40)	(0.1)
Apparent power		VA	0.93(0.98)	—
Thermal class			B	
Surge suppressor			Option	
Indicator			LED	

*4. Values in ( ) apply when lamp is included. In addition, the type with low exoergic/energy circuit is only available with lamp.

2) M3QE/Z series

(1) Specifications

Item \ Model		M3QE1／M3QZ1
Type of manifold		Consolidated sub plate type
Number of blocks		2 to 20 blocks
Piping	Port 1	M5(Common supply)
	Port 2	M5
	Port 3	M5(Common exhaust)
Manual override		None/Non-locking manual/ Locking manual
Weight (Calculation formula forcalculating weight) g		24n+8(n:Number of blocks)

*The port symbol 1, 2, 3 represent:
Port 1 : P(supply)
Port 2 : A(output)
Port 3 : R(exhaust)

8. 2 How To Order

8. 2. 1 3QE1 series

3QE110 – (M5) – (M) (E2) (A) – (3)
(a) (b) (c) (d) (e)

(a) Port size		(b)Manual override		(b) Electric connection	
Code	Description	Code	Description	Code	Description
M5	M5	Blank	Without manual override	No code	Grommet lead wire (300 mm)
		M	Non-locking manual override	E0	E-connector lead wire (300 mm)
		M1	Locking manual override	E00	E-connector lead wire (500 mm)
				E01	E-connector lead wire (1000 mm)
				E02	E-connector lead wire (2000 mm)
				E03	E-connector lead wire (3000 mm)
				E0N	E-connector without lead wire (without socket)
				E1	E-connector without lead wire (with socket/terminal)
				E2	E-connector, lead wire (300 mm) with lamp/surge suppressor
				E20	E-connector, lead wire (500 mm) with lamp/surge suppressor
				E21	E-connector, lead wire (1000 mm) with lamp/surge suppressor
				E22	E-connector, lead wire (2000 mm) with lamp/surge suppressor
				E23	E-connector, lead wire (3000 mm) with lamp/surge suppressor
				E2N	E-connector without lead wire (without socket) with lamp/surge suppressor
				E3	E-connector without lead wire (with socket/terminal) with lamp/surge suppressor
				E01J	EJ-connector, lead wire (1,000 mm)
				E02J	EJ-connector, lead wire (2,000 mm)
				E03J	EJ-connector, lead wire (3,000 mm)
				E21J	EJ-connector, lead wire (1,000 mm) with lamp/surge suppressor
				E22J	EJ-connector, lead wire (2,000 mm) with lamp/surge suppressor
				E23J	EJ-connector, lead wire (3,000 mm) with lamp/surge suppressor

(d) Option		(e) Voltage	
Code	Description	Code	Description
A	Ozone/coolant proof	1	AC100V
S	Surgeless	3	DC24V
E	Low exoergic/energy circuit	4	DC12V
		7	DC3V
		8	DC5V

Check the catalog for details.

8. 2. 2 M3QE1 series

※ Solenoid valve for manifold 3QE119－(00)－( )(E0)(A)———(3)

Manifold M3QE110－(M5)－(M1)(E2)(S)－(5)－(3)

(a) (b) (c) (d) (e) (f)

(a) Port size		(b)Manual override		(b) Electric connection	
Code	Description	Code	Description	Code	Description
M5	M5	Blank	Without manual override	Blank	Grommet lead wire (300 mm)
		M	Non-locking manual override	E0	E-connector lead wire (300 mm)
		M1	Locking manual override	E00	E-connector lead wire (500 mm)
				E01	E-connector lead wire (1000 mm)
				E02	E-connector lead wire (2000 mm)
				E03	E-connector lead wire (3000 mm)
				E0N	E-connector without lead wire (without socket)
				E1	E-connector without lead wire (with socket/terminal)
				E2	E-connector, lead wire (300 mm) with lamp/surge suppressor
				E20	E-connector, lead wire (500 mm) with lamp/surge suppressor
				E21	E-connector, lead wire (1000 mm) with lamp/surge suppressor
				E22	E-connector, lead wire (2000 mm) with lamp/surge suppressor
				E23	E-connector, lead wire (3000 mm) with lamp/surge suppressor
				E2N	E-connector without lead wire (without socket) with lamp/surge suppressor
				E3	E-connector without lead wire (with socket/terminal) with lamp/surge suppressor
				E01J	EJ-connector, lead wire (1,000 mm)
				E02J	EJ-connector, lead wire (2,000 mm)
				E03J	EJ-connector, lead wire (3,000 mm)
				E21J	EJ-connector, lead wire (1,000 mm) with lamp/surge suppressor
				E22J	EJ-connector, lead wire (2,000 mm) with lamp/surge suppressor
				E23J	EJ-connector, lead wire (3,000 mm) with lamp/surge suppressor

(d) Option		(e) Station No		(f) Voltage	
Code	Description	Code	Description	Code	Description
A	Ozone/coolant proof	2	2stations	1	AC100V
S	Surgeless	～	～	3	DC24V
E	Low exoergic/energy circuit	20	20stations	4	DC12V
F	Port A filter integrated			7	DC3V
				8	DC5V

Check the catalog for details.

8. 2. 3 M3QZ1 series

(Rear piping manifold)

※ Solenoid valve for manifold 3QE119 – (00) – ( ) (E0) (A) ——— (3)

Manifold M3QZ110 – (M5) – (M1) (E2) (S) – (5) – (3)

(a) (b) (c) (d) (e) (f)

(a) Port size		(b)Manual override	
Code	Code	Code	Description
M5	Blank	Blank	Without manual override
		M	Non-locking manual override
		M1	Locking manual override

(b) Electric connection	
Code	Description
No code	Grommet lead wire (300 mm)
E0	E-connector lead wire (300 mm)
E00	E-connector lead wire (500 mm)
E01	E-connector lead wire (1000 mm)
E02	E-connector lead wire (2000 mm)
E03	E-connector lead wire (3000 mm)
E0N	E-connector without lead wire (without socket)
E1	E-connector without lead wire (with socket/terminal)
E2	E-connector, lead wire (300 mm) with lamp/surge suppressor
E20	E-connector, lead wire (500 mm) with lamp/surge suppressor
E21	E-connector, lead wire (1000 mm) with lamp/surge suppressor
E22	E-connector, lead wire (2000 mm) with lamp/surge suppressor
E23	E-connector, lead wire (3000 mm) with lamp/surge suppressor
E2N	E-connector without lead wire (without socket) with lamp/surge suppressor
E3	E-connector without lead wire (with socket/terminal) with lamp/surge suppressor
E01J	EJ-connector, lead wire (1,000 mm)
E02J	EJ-connector, lead wire (2,000 mm)
E03J	EJ-connector, lead wire (3,000 mm)
E21J	EJ-connector, lead wire (1,000 mm) with lamp/surge suppressor
E22J	EJ-connector, lead wire (2,000 mm) with lamp/surge suppressor
E23J	EJ-connector, lead wire (3,000 mm) with lamp/surge suppressor

(d) Option	
Code	Description
A	Ozone/coolant proof
S	Surgeless
E	Low exoergic/energy circuit
F	Port A filter integrated

(e) Station No	
Code	Description
2	2stations
～	～
20	20stations

(f) Voltage	
Code	Description
1	AC100V
3	DC24V
4	DC12V
7	DC3V
8	DC5V

Check the catalog for details.

8. 2. 4 Masking plate kit

Masking plate kit **3QE1-MP-KIT**

8. 2. 5 Socket assembly

E形 Socket assembly **3QE-SOCKET-ASSY-300-Voltage**

(a) (b)

(a) Electric connection		(b) Voltage	
Code	Description	Code	Description
300	wire length 300mm	DC	DC3,5,12,24V
500	wire length 500mm	AC100	AC100V
1000	wire length 1000mm		
2000	wire length 2000mm		

EJ-connector socket assembly **3QE1-SOCKET-ASSY-E01J**

(a)

(a) Electric connection	
Code	Description
E01J	Wire length 1000mm
E02J	Wire length 1000mm
E03J	Wire length 1000mm

Socket set **4G-SOCKET-SET**

8. 2. 6 Mounting screw(10pc/1set)

3QE1-SET-SCREW

8. 2. 7 Body Gasket

3QE1-GASKET

8. 2. 8 Sub plate

3QE1-SUB-BASE-M5

8. 2. 9 Manifold base

Manifold base **M3QE1-M5-F-5**

(a) (b)

(a) Option		(b) Station No.	
Code	Description	Code	Description
F	Port A filter integrated	2	2stations
		~	~
		20	20stations