CKD

SM－296701-A

INSTRUCTION MANUAL

BLOCK MANIFOLD

W4G2-SERIES

- Individual sub base type
- One end port type
- Multi-connector type
- D-sub connector type
- Flat cable connector type
- I/O connector cable type

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

CKD Corporation

Safety precautions

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

- Device mechanism
- Pneumatic or water control circuit
- Electric control that controls the above

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

⚠ WARNING

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

2. Use this product within its specifications.

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.

SO4414, JIS B 8370 (pneumatic system rules)
JFPS2008 (principles for pneumatic cylinder selection and use)
Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, standards and regulations, etc.

4. Do not handle, pipe, or remove devices before confirming safety.

① Inspect and service the machine and devices after confirming safety of the entire system related to this product.
② Note that there may be hot or charged sections even after operation is stopped.
③ When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Release any compressed air from the system, and pay enough attention to possible water leakage and leakage of electricity.
④ When starting or restarting a machine or device that incorporates pneumatic components, make sure that system safety, such as pop-out prevention measures, is secured.

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

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

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

WARNING : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

CAUTION : When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

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 (Page 12)

⚠ 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 (Page 13)

⚠ 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 (Page 13, 14)

⚠ 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) Vibration resistance and Shock resistance

- Do not subject the solenoid valve system to vibrations 50m/s^2 or stronger or shocks 300m/s^2 or stronger.

⚠ CAUTION:

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.

INSTALLATION (Page 14)

⚠ WARNING:

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.

⚠ CAUTION:

When mounting this product on the DIN rail, check the strength

- If the strength is insufficient, mount the manifold base directly.

PIPING (Page 16)

⚠ 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.

- With a female thread type for 4GA2, 4GA3 valve, The parts can deform if the A,B ports is of the excessive torque and be a factor of air leakage.

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.

⚠ CAUTION:

d) When supplying the compressed air for the first time after completing the piping, increase the air pressure gradually but never introduce a highly-pressurized air suddenly.

- A sudden introduction of a highly-pressurized air may disconnect pipes at joints and/or cause the tubes to jump around, any of which may cause an injury.

e) Do not decrease the inside diameter of the piping from any of the solenoid valve exhaust ports to a diameter less than the exhaust pipe connecting port size.

- Normal operation of the actuator depends on the smoothness of the exhaust flow. With a manifold system, a restriction to the exhaust flow may prevent normal operation of other solenoid valves.

f) Removal of foreign matter

- Rust and other foreign matter in the pneumatic circuit may cause a malfunction or leakage from the valve seat. Insert a filter (maximum allowable particle size 5μm or less) immediately upstream of the solenoid valve.

g) Air supply

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

WIRING (Page 20)

⚠ CAUTION:

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

⚠ WARNING:

When carrying out electrical connections, please perform disassembling and assembling work after reading the Instruction Manual carefully and with full understanding of its contents.

- Your understanding of the structure of solenoid valve and its operation principle is required in order to secure the safety.

MANUAL OVERRIDE (Page 44)

⚠ WARNING:

a) After using the manual override, be sure to reset the manual override to the original (OFF) position before resuming the operation of the device.
After a operation, be sure to release the lock to turn the manual override OFF.
With the W4G2-Series solenoid valve system, the lock is released (the manual override turned OFF) if the manual override protection cover is closed.

⚠ WARNING:

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

AIR QUALITY (Page 48)

⚠ WARNING:

a) Do not supply anything other than compressed air.

b) Supply clean compressed air without any mixture of corrosive gas.

⚠ CAUTION:

a) Compressed air usually contains a large amount of drain, oxidized oil, tar, foreign matter, and rust from the piping. Filter out those elements in the supplied air because they may cause a malfunction and decrease service life. In addition, clean the exhaust before it is released to the air to minimize pollution.

b) Once you have lubricated a pre-lubricated valve, the valve is no longer capable of running without being lubricated from the outside. Do not leave the valve without lubrication but keep it lubricated.

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

ELECTRIC CIRCUITS (Page 50)

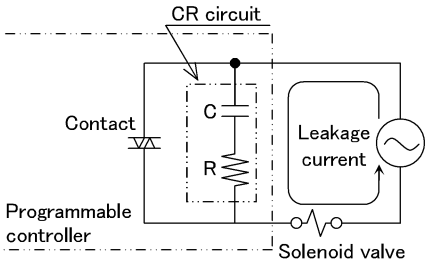
⚠ CAUTION:

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	2.0 mA or lower
DC12V	1.5 mA or lower
DC24V	1.8 mA or lower

PERIODIC INSPECTION (Page 51)

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

- The above is required to ensure safety.

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

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

DISASSEMBLING AND ASSEMBLING (Page 52)

⚠ WARNING: When disassembling or assembling the solenoid valve, perform it after reading the Instruction Manual carefully without fail and with full understanding of its contents.

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

ADDITIONAL INSTALLATION OF A VALVE UNIT TO A REDUCED-WIRING MANIFOLD (Page 55)

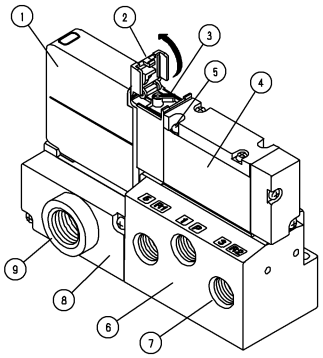
⚠ WARNING: When disassembling or assembling the manifold, perform it after reading the Instruction Manual carefully and with full understanding of its contents.

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

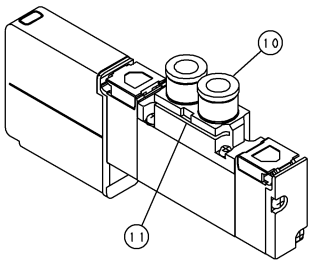
INDEX

MW4G2
Block Manifold
Manual No. SM-296701-A

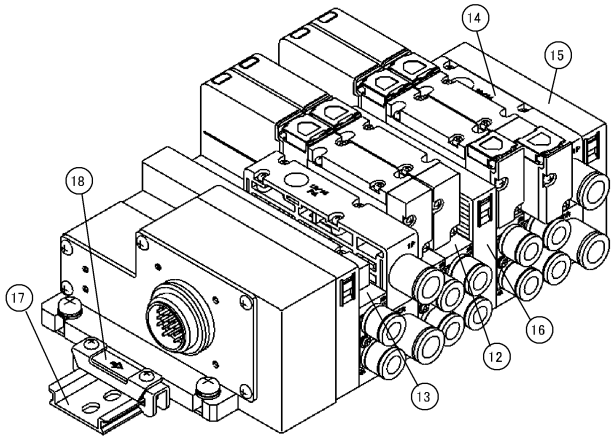
1. PRODUCT



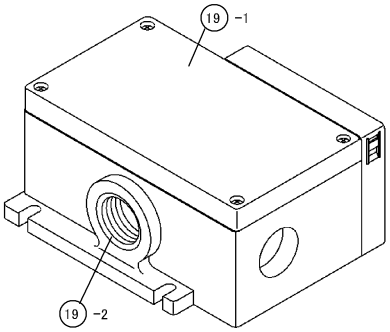
Individual base piping type



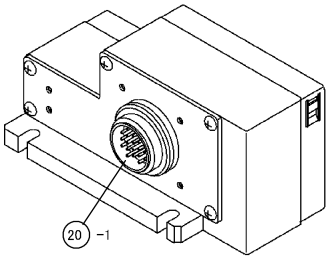
Solenoid valve of body porting type



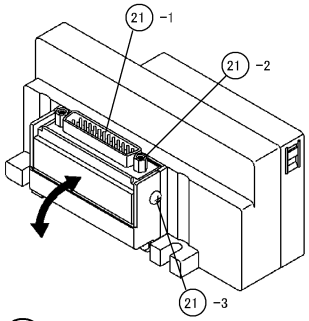
Fewer wiring type manifold (The sketch shows DIN rail mount type.)



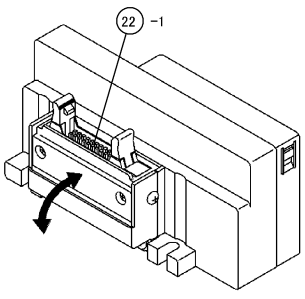
⑲ One end port (T10)
M3 screw tightening type



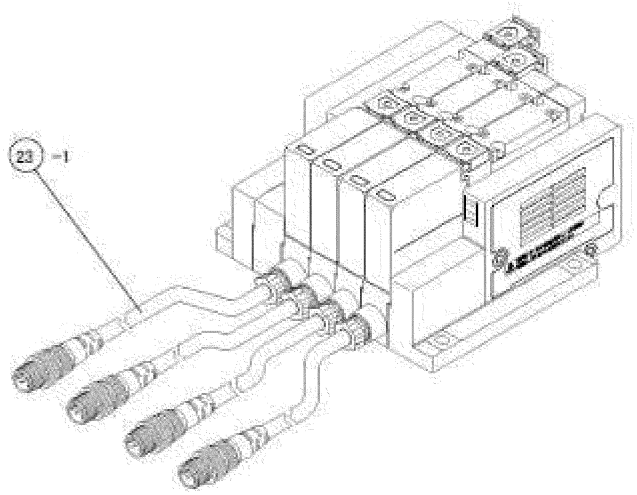
⑳Multi-connector (T20)



㉑ D-sub connector (T30)



㉒ Flat cable connector (T51)



㉓ Manifold with I/O connector cable (R1)

No.	Name	Description
1	Drip-proof cover	When coil is energized, a display lamp indicating energized status turns ON on the upper face. (a: Red when ON b: Green when ON)
2	Manual operation protection cover	A protection cover to protect the manual overrun from malfunctioning Release during manual operation.
3	Manual override	Common for locked and non-locked types
4	Individual valve	
5	Fixing screw for individual valve	2 screws are provided for each individual valve. Individual valve is fixed to each type of base by these screws.
6	Sub base	In case of an individual specification, assemble this sub base.
7	Piping port	1(P) is supply, 3(R2)/5(R1) is exhaust and 2(B)/4(A) is an output port respectively.
8	Sub base cover	Remove when connecting.
9	Connection port of cable clamp	After wiring, connect the cable clamp.
10	Joint	A one-touch joint of replaceable cartridge type
11	Stopper pin	To fix cartridge joints, etc.
12	Valve block with a solenoid valve	A block composed of an assy. of individual solenoid valve and valve block (split resin base)
13	Valve block with a masking plate	A block composed of an assy. of masking plate and valve block
14	Supply/exhaust block	A block with a supply port and an exhaust port
15	End block R	A block that blocks supply and exhaust A type releasing the exhausted air into air (X) is also available.
16	Partition block	This blocks supply and exhaust optionally and is used for various pressure circuit.
17	DIN rail	
18	End retainer	This is used for fixing the manifold of a solenoid valve on DIN rail.
19	One end port of M3 screw specification (T10)	
19-1	Cover for electric components (Cover for one end port)	Remove when connecting.
19-2	Connection port of cable clamp	To connect cable clamp after wiring

No.	Name	Description
20	Multi-connector (T20)	
20-1	Receptacle	To connect the cable with a connector
21	D-sub connector (T30)	
21-1	D-sub 25-pin connector	A connector conforming to RS232C standard
21-2	Fixing screw	This is used for fixing the connector to be connected (M2.6).
21-3	Non-rotating screw	Loosen when changing the drawing direction of connecting cable and fix after setting.
22	Flat cable connector (T51)	
22-1	20-pin connector	A connector in compliance with MIL standards (MIL-C-83503)
23	Manifold with I/O connector cable (R1)	
23-1	I/O connector cable	M12 connector with a cable

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

2.1 Port Indication

Each piping port is marked with ISO and JIS conformable piping port indication codes like 1P and 4A.

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

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

In this manual, values are expressed using the International System of Units (SI).
Use the table below to convert them into values expressed in conventional units.

Table of conversion between SI units and conventional units
(The values printed in Bolds fonts are values given in the International System of Units (SI))

Example (converting a pressure value):
$1kgf/cm^2 \rightarrow$ **0.980665Mpa** **1MPa** $\rightarrow 1.01972 \times 10kgf/cm^2$

- 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.

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

4. INSTALLATION

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

4.1 Environment

⚠ CAUTION:

a) In a dusty environment, foreign matter may enter even through the exhaust port.

- The movement of the exhaust valve causes a respiratory action at the exhaust valve, which may cause inhalation of foreign matter near the exhaust port. This potential situation would be worse if the exhaust port is facing upward. Attach a silencer to the exhaust port or have the exhaust port face downward.

b) 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) Vibration resistance and Shock resistance

- Do not subject the solenoid valve system to vibrations 50m/s^2 or stronger or shocks 300m/s^2 or stronger.

⚠ CAUTION:

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.

4.2 Installation

⚠ WARNING:

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.

⚠ CAUTION:

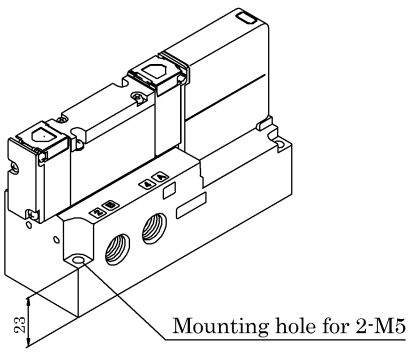
When mounting this product on the DIN rail, check the strength

- If the strength is insufficient, mount the manifold base directly.

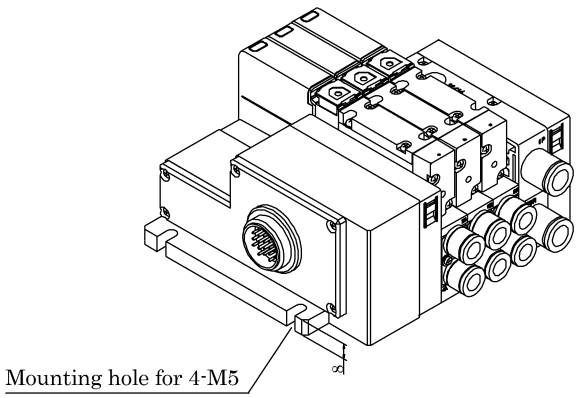
4.2.1 Please secure an enough space around the solenoid valve for mounting, dismounting and piping work.

4.2.2 In case of installing directly

1) Individual sub base type
Use the two (2) drilled holes.

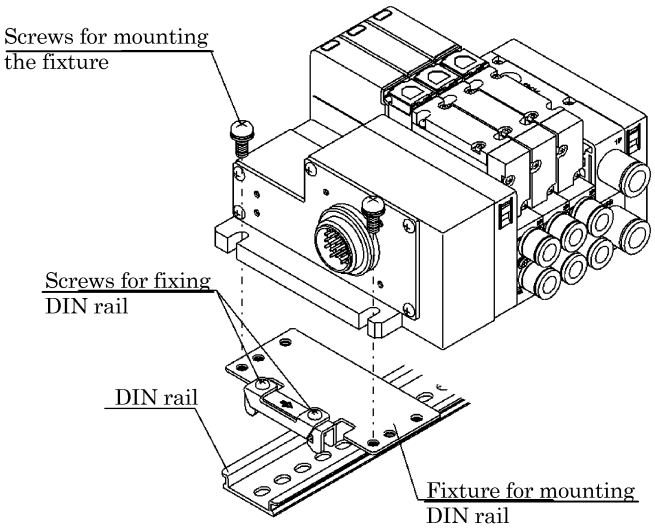


2) Manifold type
Use the four (4) holes for mounting.



4.2.3 In case of installing by means of DIN rail

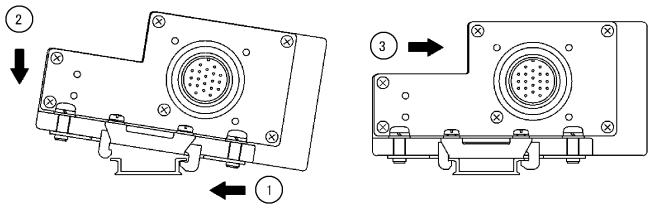
For W4G2 Series, you can change the manifold of direct mounting type to DIN rail mounting type. If not counted properly, dropping down of the manifold or damage to it may be caused, to which please pay your careful attention. In addition, in case of the gross weight of manifold exceeding 1.0kg or it is installed in an environment where vibration or shock occurs, fix DIN rail to the mounting face with a distance of 50 – 100mm. Make sure that the installation has been carried out completely and then start using. There is no restriction to the mounting direction or mounting posture, but the mounting screws may become loose due to resonance with any vibration which may cause the manifold to drop down. Please pay your careful attention to this point when operating.



●How to mount DIN rail

1. Fit the fixtures for mounting DIN rail
   (Tightening torque: 1.8 – 2.3N･m)
2. Hook the jaws on DIN rail in the order of ① and ②.
3. Push toward ③ direction.
4. Tighten the screws for fixing DIN rail.

(Tightening torque: 1.2 – 1.6N・m)



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.
- With a female thread type for 4GA2, 4GA3 valve, The parts can deform if the A,B ports is of the excessive torque and be a factor of air leakage.

b) Make sure that the pipes will not be disconnected at the joints by mechanical movements, vibrations or tension.

- If the exhaust piping of the pneumatic circuit is disconnected, the actuator speed control is disabled.
- If the above happens to a chuck holding mechanism, the chuck will open. The inadvertent opening of the chuck may cause a serious accident.

c) When supplying the compressed air for the first time after completing the piping, be sure to check every joint in the piping for air leakage.

d) When supplying the compressed air for the first time after completing the piping, increase the air pressure gradually but never introduce a highly-pressurized air suddenly.

- A sudden introduction of a highly-pressurized air may disconnect pipes at joints and/or cause the tubes to jump around, any of which may cause an injury.

e) Do not decrease the inside diameter of the piping from any of the solenoid valve exhaust ports to a diameter less than the exhaust pipe connecting port size.

- Normal operation of the actuator depends on the smoothness of the exhaust flow. With a manifold system, a restriction to the exhaust flow may prevent normal operation of other solenoid valves.

f) Removal of foreign matter

- Rust and other foreign matter in the pneumatic circuit may cause a malfunction or leakage from the valve seat. Insert a filter (maximum allowable particle size 5μm or less) immediately upstream of the solenoid valve.

g) Air supply

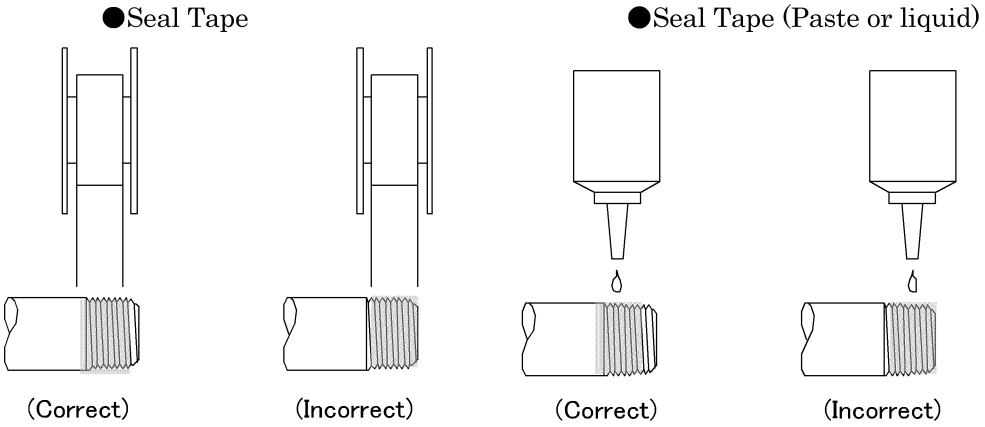
- Do not restrict the flow of air through the air supply piping. With a manifold system with multiple stations, a drop in the air supply pressure may cause trouble through a delay in the operation timing.

Tightening torque

Joint screw	Tightening torque N·m
Rc1/8	3 to 5
Rc1/4	6 to 8

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 M5 fitting

An M5 fitting is sealed using a gasket (Model No. for the gasket only: FGS).Do not retighten the fitting screw when pressure is generated in the pneumatic circuit . Design and construct the piping system in such a way that the valves may be removed and reinstalled if a trouble should happen.

4.3.4 Blow circuit

Do not open the cylinder port circuit to the air because a drop in the air supply pressure may cause a malfunction. Select the external pilot type design instead of the internal piolt type design. The lowest allowable pressure with the internal pilot type design is 0.2 MPa.

4.3.5 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.

4.3.6 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)

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

(3) For a piping used for both hydraulic and pneumatic controls, select a hydraulic hose.
When combining a spiral tube with a standard one-touch joint, fix the tube origin using a hose band. Otherwise the rotation of the tube will decrease the efficiency of the clamping.
For use in a high-temperature atmosphere, select fastener joints instead of one-touch joints.

(4) When selecting from tubes commercially available, carefully study the accuracy of the outside diameter as well as the wall thickness and the hardness. The hardness of 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
φ4	φ2.5	φ2
φ6	φ4	φ4
φ8	φ5.7	φ5
φ10	φ7.2	φ6.5

Outside diameter allowance

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

(5) 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
φ4	10	10
φ6	20	20
φ8	30	30
φ10	40	40

(6) Cutting a tube

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

(7) Tube connections

Do not bend the tube immediately at the joint connection point. 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.

(8) Blank plug to be used

For use with a solenoid valve with a push-in joint, select the blank plug specified by us:

Blank plug GWP□-B Series

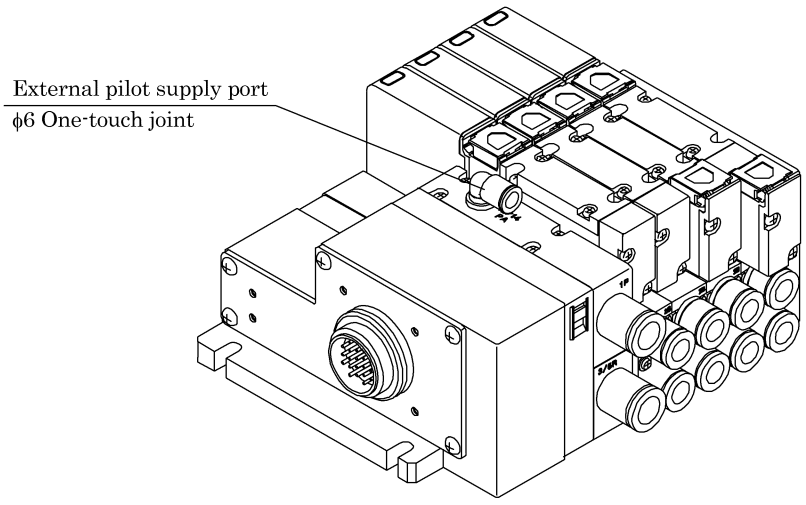
4.3.7 External pilot (K) type piping port

A different type supply port will be provided for the external pilot (K) type air supply. Since a 6mm diameter push-in joint is used for the pilot air supply, be sure to connect the piping correctly. Erroneous piping can cause a malfunction.

Port display

Usage		Display (ISO standards)
Pilot air	Supply port	12/14

- Manifold



4.4 Wiring

> **CAUTION:** Before energizing, check the voltage of power source and whether AC or DC.

> **WARNING:** When carrying out electric wiring, please perform disassembling and assembling work after reading the Instruction Manual carefully and with full understanding of its contents.
>
> - Your understanding of the structure of solenoid valve and its operation principle is required in order to secure the safety.

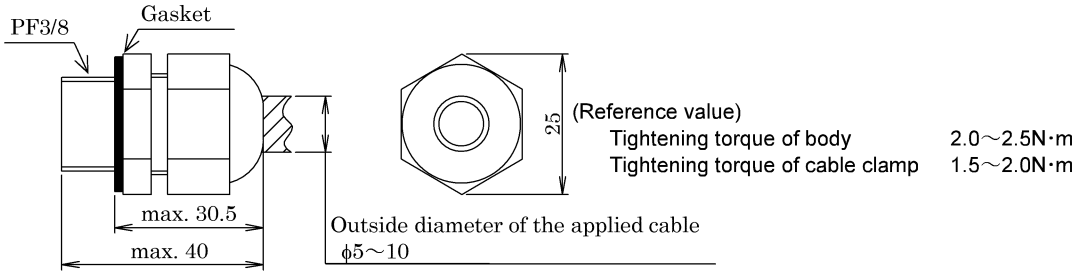
4.4.1 Individual sub base type

1) About the terminal strip (no mark)
   (1) Remove the cover and terminal strip from sub base.
   (2) Connect the wires to the terminal strip through the connection port of cable clamp, paying careful attention to avoid any improper wire connection.For connection, use Y-terminal or ring terminal. For crimp terminal, use the same for M3 with width smaller than 6.2. If you connect the lead wire directly, improper operation of the solenoid valve may be caused due to disconnection, contact failure, etc.
   (3) If IP65 performance is required, apply a protection by connecting a cable clamp, etc. to the cover. In such a case, please pay your careful attention to the tightening torque.

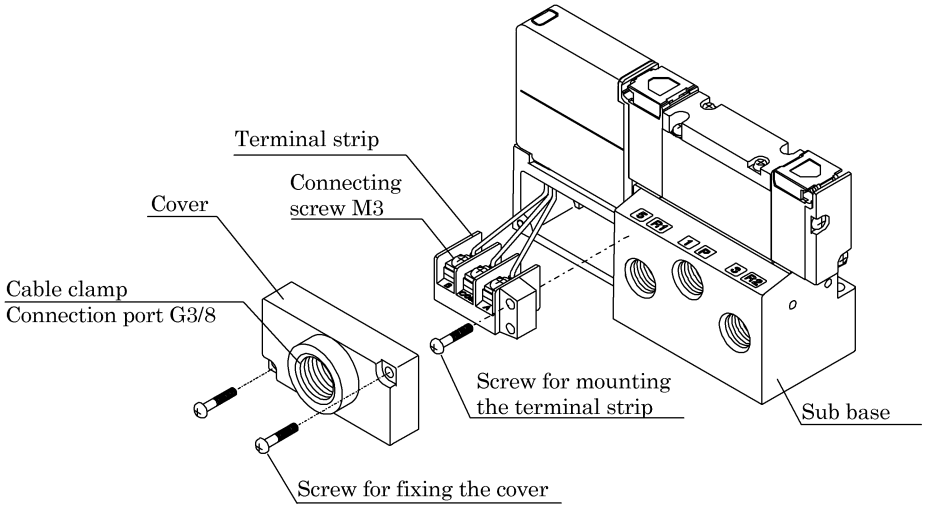
Parts kit for terminal strip type

- Cable clamp (with gasket)

Model No.	Description
W4G-BMS-038GP	Used for prevention of drips on the cable



(4) Proper tightening torque of connecting screw, screw for mounting the terminal strip and the screw for mounting the cover: 0.6N・m



2) About I/O connector (R1)

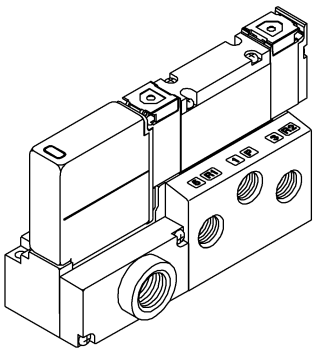
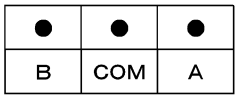
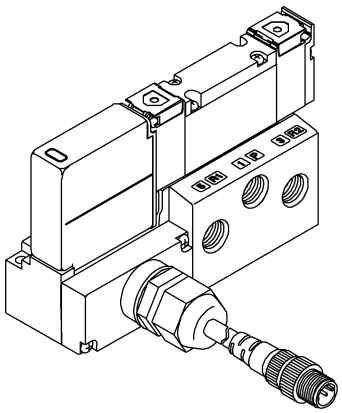
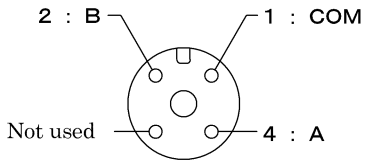
(1) The internal wiring has already been made at the factory.

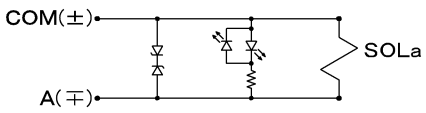
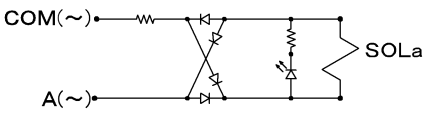
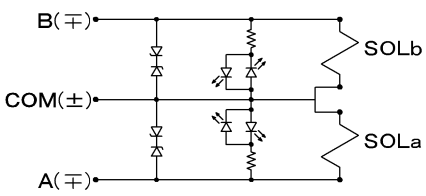
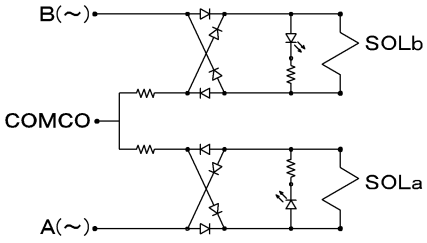
(2) Please connect a connection cable suitable to I/O connector. In such a case, pay your careful attention to the tightening torque.

Example of connection cable of I/O connector type

Manufacturer's name	Model number
Omron Co., Ltd.	XS2W-D421-B81-T

3) Wiring

<table>
<tr><th>Name</th><th>Symbol</th><th colspan="2">Shape</th><th>Terminal wiring</th></tr>
<tr><td>Terminal strip</td><td>No mark</td><td colspan="2">  </td><td> 
</td></tr>
<tr><td>I/O connector</td><td>R1</td><td colspan="2">  </td><td> 

Model
Sensor I/O connector (Omron)
XS2H-D421-B80-T</td></tr>
<tr><td rowspan="3">Solenoid valve Internal circuit diagram</td><td></td><td>DC</td><td>AC</td></tr>
<tr><td>Single</td><td> 
</td><td> 
</td></tr>
<tr><td>Double</td><td> 
</td><td> 
</td></tr>
</table>

Note) Refer to page 42 for details on manifold with I/O connector cable (R1).

4.4.2 One end port type: Wiring style T10

1) Points requiring your attention with one end port type (T10)

(1) Remove the cover for electric components when wiring. The proper tightening torque of the screws to fix the cover: 0.6N・m

(2) Lead the wire through the connection port of cable clamp.
(If IP65 performance is required, apply a protection by connecting a cable clamp, etc. to the cover. In such a case, please pay your careful attention to the tightening torque.)

(3) The internal common wiring for one end port type has already been made. So, please unify the power source of manifold.
In case of a PC output unit of independent contact point type, apply a common wiring at the contact point.

(4) In order to avoid any improper wiring, please make sure again that the number of the station is corresponding to the solenoid. Follow the wiring style 3).

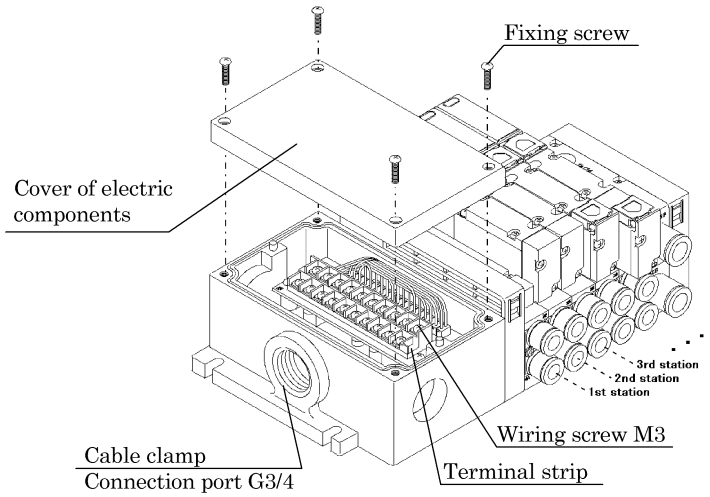
(5) If the number of solenoid exceeds 18, this cannot be supported, which please bear in your mind in advance.

(6) The number of the manifold station has been set in the order starting from left with the piping port facing front. (Refer to the sketch below.)

(7) Voltage drop may be caused when energized simultaneously or depending on the cable length. Please make sure that the voltage drop against solenoid valve is kept within 10% of rated voltage.

(8) For connection, use Y-terminal or ring terminal. For crimp terminal, use the same for M3 with width smaller than 6.2. If you connect the lead wire directly, improper operation of the solenoid valve may be caused due to disconnection, contact failure, etc.

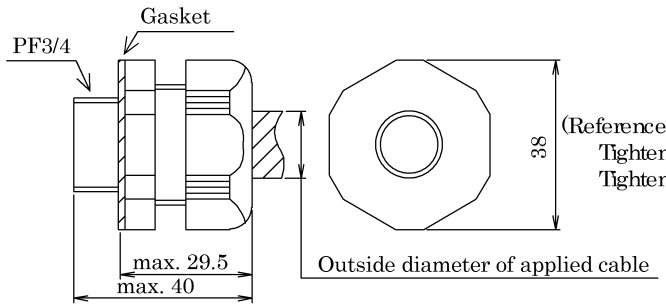
(9) Proper tightening torque of wiring screw: 0.6N・m



Parts kit for electric block T10

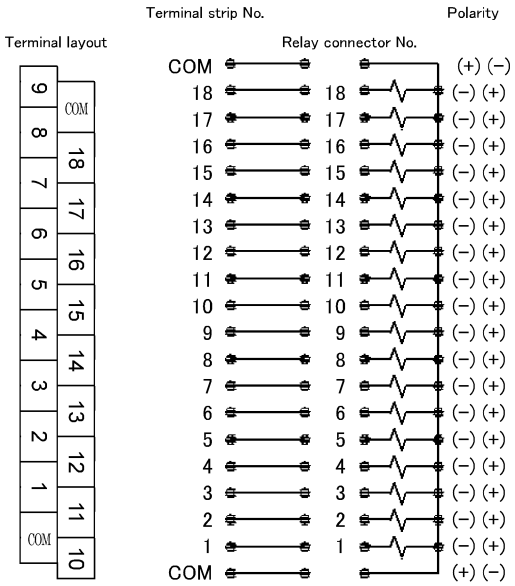
- Cable clamp

Model number	Outside diameter of applied cable	Description
W4G-SCL-18A	ϕ14.5～16.5	Used for prevention of drips on the cable
W4G-SCL-18B	ϕ16.5～18.5	



(Reference value)
Tightening torque of body 4～4.5N·m
Tightening torque of cable clamp 3～3.5N·m

2) Internal wire connection



3) Wiring style

The maximum number of manifold station varies depending on the model.
Please check the specifications for each model.

Note) Valve No. 1a, 2a, 2b …. the numbers indicate the 1st station and 2nd station respectively, and alphabet (a) means the solenoid on a-side and (b) means the solenoid on b-side respectively.

Terminal strip No.

	COM	18	17	16	15	14	13	12	11	10
9	8	7	6	5	4	3	2	1	COM	

<Standard wiring>

- In case of a single solenoid valve

(Max. number of MF station: 18)

Terminal strip No.	COM	18	17	16	15	14	13	12	11	10
Valve No.	COM	18a	17a	16a	15a	14a	13a	12a	11a	10a
Terminal strip No.	9	8	7	6	5	4	3	2	1	COM
Valve No.	9a	8a	7a	6a	5a	4a	3a	2a	1a	COM

- In case of a double solenoid valve

(Max. number of MF station: 9)

Terminal strip No.	COM	18	17	16	15	14	13	12	11	10
Valve No.	COM	9b	9a	8b	8a	7b	7a	6b	6a	5b
Terminal strip No.	9	8	7	6	5	4	3	2	1	COM
Valve No.	5a	4b	4a	3b	3a	2b	2a	1b	1a	COM

- In case of a mixture (Mixed installation of single and double)

(Max. number of solenoid: 18)

Terminal strip No.	COM	18	17	16	15	14	13	12	11	10
Valve No.	COM	(Empty)	(Empty)	(Empty)	(Empty)	9b	9a	8b	8a	7b
Terminal strip No.	9	8	7	6	5	4	3	2	1	COM
Valve No.	7a	6a	5b	5a	4b	4a	3a	2a	1a	COM

<Double wiring>

- In case of a single solenoid valve

(Max. number of MF station: 9)

Terminal strip No.	COM	18	17	16	15	14	13	12	11	10
Valve No.	COM	(Empty)	9a	(Empty)	8a	(Empty)	7a	(Empty)	6a	(Empty)
Terminal strip No.	9	8	7	6	5	4	3	2	1	COM
Valve No.	5a	(Empty)	4a	(Empty)	3a	(Empty)	2a	(Empty)	1a	COM

- In case of a double solenoid valve

(Max. number of MF station: 9)

Terminal strip No.	COM	18	17	16	15	14	13	12	11	10
Valve No.	COM	9b	9a	8b	8a	7b	7a	6b	6a	5b
Terminal strip No.	9	8	7	6	5	4	3	2	1	COM
Valve No.	5a	4b	4a	3b	3a	2b	2a	1b	1a	COM

- In case of a mixture (Mixed installation of single and double)

(Max. number of solenoid: 18)

Terminal strip No.	COM	18	17	16	15	14	13	12	11	10
Valve No.	COM	9b	9a	8b	8a	7b	7a	(Empty)	6a	5b
Terminal strip No.	9	8	7	6	5	4	3	2	1	COM
Valve No.	5a	4b	4a	(Empty)	3b	(Empty)	2a	(Empty)	1a	COM

4.4.3 Multi-connector type: Wiring style T20

1) Points requiring your attention with multi-connector type (T20)

(1) The internal common wiring for multi-connector type has already been made. So, please unify the power source of manifold.
In case of a PC output unit of independent contact type, apply a common wiring at the contact point.

(2) In order to avoid any improper connection, please make sure again that the number of the station is corresponding to the solenoid. Follow the wiring style 3).

(3) If the number of solenoid exceeds 16, this cannot be supported, which please bear in your mind in advance.

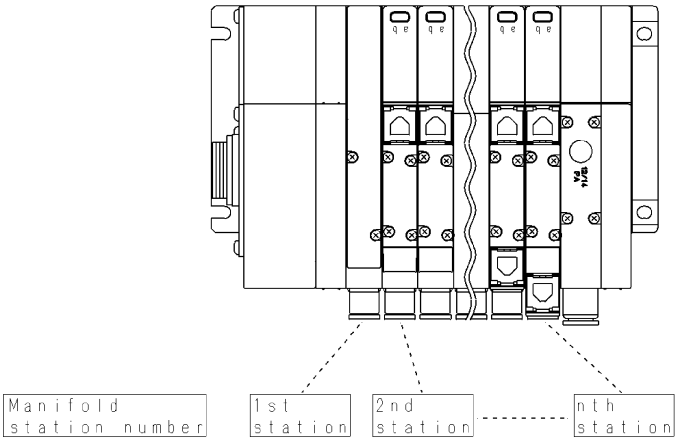
(4) The number of the manifold station has been set in the order starting from left with the piping port facing front. (Refer to the sketch below.)

(5) Voltage drop may be caused when energized simultaneously or depending on the cable length. Please make sure that the voltage drop against solenoid valve is kept within 10% of rated voltage.

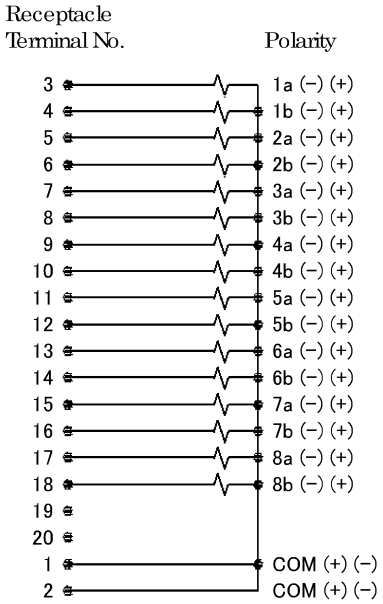
(6) Connect suitable connector cable to the receptacle. In such a case, pay your careful attention to the tightening torque.

Example of connection connector

Manufacturer's name	Model number
Hirose Electric Co., Ltd.	RM21WTP-20S



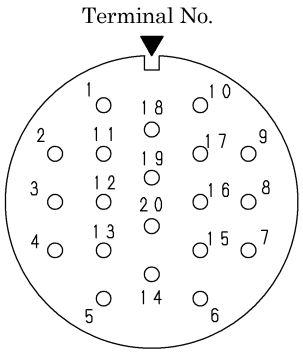
2) Internal wiring



3) Wiring style

The maximum number of manifold station varies depending on the model. Please check the specifications for each model.

Note) Valve No. 1a, 2a, 2b …. the numbers indicate the 1st station and 2nd station respectively, and alphabet (a) means the solenoid on a-side and (b) means the solenoid on b-side respectively.



<Double wiring>

- In case of a single solenoid valve

(Max. number of MF station: 8)

Terminal strip No.	20	19	18	17	16	15	14	13	12	11
Valve No.	(None)	(None)	(Empty)	8a	(Empty)	7a	(Empty)	6a	(Empty)	5a
Terminal strip No.	10	9	8	7	6	5	4	3	2	1
Valve No.	(Empty)	4a	(Empty)	3a	(Empty)	2a	(Empty)	1a	COM	COM

- In case of a double solenoid valve

(Max. number of MF station: 8)

Terminal strip No.	20	19	18	17	16	15	14	13	12	11
Valve No.	(None)	(None)	8b	8a	7b	7a	6b	6a	5b	5a
Terminal strip No.	10	9	8	7	6	5	4	3	2	1
Valve No.	4b	4a	3b	3a	2b	2a	1b	1a	COM	COM

- In case of a mixture (Mixed installation of single and double)

(Max. number of solenoid: 16)

Terminal strip No.	20	19	18	17	16	15	14	13	12	11
Valve No.	(None)	(None)	8b	8a	(Empty)	7a	6b	6a	5b	5a
Terminal strip No.	10	9	8	7	6	5	4	3	2	1
Valve No.	4b	4a	(Empty)	3a	2b	2a	(Empty)	1a	COM	COM

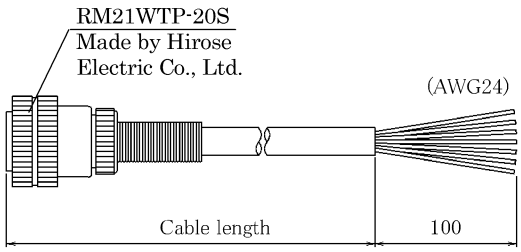
4) Specifications of cable and connector made by CKD

- The following model number of cable made by CKD can be used also.

Model No. W4G－RMC－□
(※1)

(※1) Cable length (L)

1	1m
3	3m
5	5m



Correspondence between terminal No. and wire core

Terminal No.		1	2	3	4	5	6	7	8	9	10
I/D of wire core	Wire color	White	Brown	Green	Yellow	Gray	Pink	Blue	Red	Black	Purple
	Mark tube No.	1	2	3	4	5	6	7	8	9	10

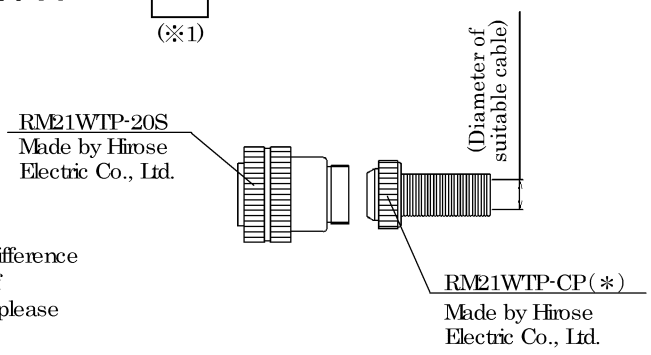
Terminal No.		11	12	13	14	15	16	17	18	19	20
I/D of wire core	Wire color	Gray/ Pink	Red/ Blue	White/ Green	Brown/ Green	White/ Yellow	Yellow/ Brown	White/ Gray	Gray/ Brown	(None)	(None)
	Mark tube No.	11	12	13	14	15	16	17	18	(None)	(None)

- The following model number of cable made by CKD can be used also.

Model No. W4G－RM21WTP－□
(※1)

(※1) Diameter of suitable cable

8	ϕ8
10	ϕ10
12	ϕ12

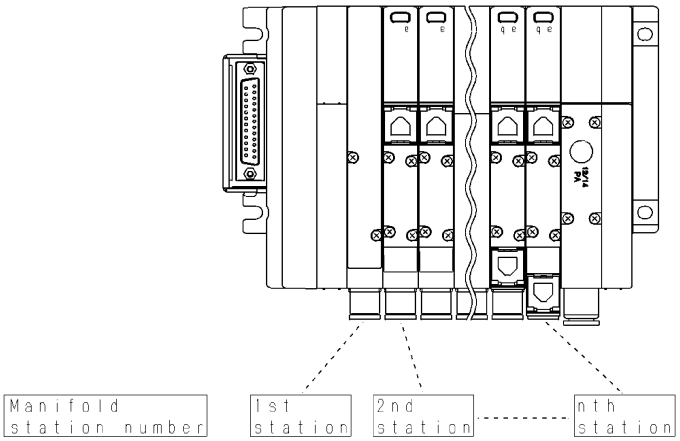


* The diameter of suitable cable gives a difference in the clamping force and the waterproof depending on the type of the cable. So, please check its type before starting using.

4.4.4 D-sub connector type: Wiring style T30

1) About T30 connector

The connector used for the wiring style T30 is called in general as D-sub connector, and used widely for FA and OA equipment. Especially, 25P type is used for PC communication function and specified by RS232C standard also. The number of manifold station has been set in the order starting from left with the piping port facing front.



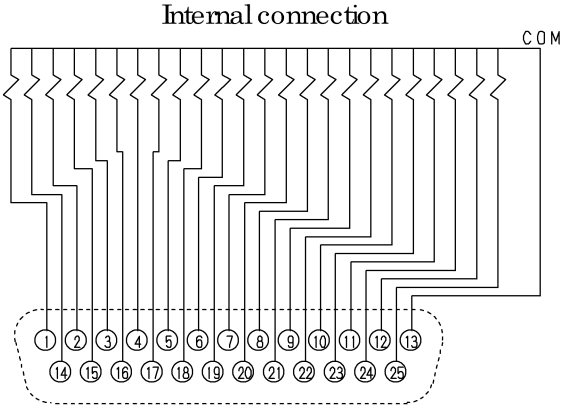
2) Points requiring your attention with the connector type (T30)

① The signal arrangements for PLC output unit and the valve side must be corresponding with each other.

② Power source to be used is exclusively DC24V and DC12V.

③ Voltage drop may be caused when energized simultaneously or depending on the cable length. Please make sure that the voltage drop against solenoid valve is kept within 10% of rated voltage.

Internal connection

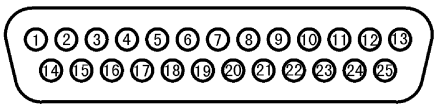


3) Wiring style

The maximum number of manifold station varies depending on the model. Please check the specifications for each model.

Note) Valve No. 1a, 2a, 2b …. the numbers indicate the 1st station and 2nd station respectively, and alphabet (a) means the solenoid on a-side and (b) means the solenoid on b-side respectively.

Connector pin No.



<Standard wiring>

- In case of a single solenoid valve

(Max. number of MF station: 18)

Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Valve No.	1a	3a	5a	7a	9a	11a	13a	15a	17a				COM
Pin No.	14	15	16	17	18	19	20	21	22	23	24	25	
Valve No.	2a	4a	6a	8a	10a	12a	14a	16a	18a				

- In case of a double solenoid valve

(Max. number of MF station: 12)

Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Valve No.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	COM
Pin No.	14	15	16	17	18	19	20	21	22	23	24	25	
Valve No.	1b	2b	3b	4b	5b	6b	7b	8b	9b	10b	11b	12b	

- In case of a mixture (Mixed installation of single and double)

(Max. number of solenoid: 24)

Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Valve No.	1a	3a	4a	5a	7a	8a	10a	11b	12b	14a	15b	17a	COM
Pin No.	14	15	16	17	18	19	20	21	22	23	24	25	
Valve No.	2a	3b	4b	6a	7b	9a	11a	12a	13a	15a	16a	17b	

<Double wiring>

- In case of a single solenoid valve

(Max. number of MF station: 12)

Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Valve No.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	COM
Pin No.	14	15	16	17	18	19	20	21	22	23	24	25	
Valve No.	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	

- In case of a double solenoid valve

(Max. number of MF station: 12)

Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Valve No.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	COM
Pin No.	14	15	16	17	18	19	20	21	22	23	24	25	
Valve No.	1b	2b	3b	4b	5b	6b	7b	8b	9b	10b	11b	12b	

- In case of a mixture (Mixed installation of single and double)

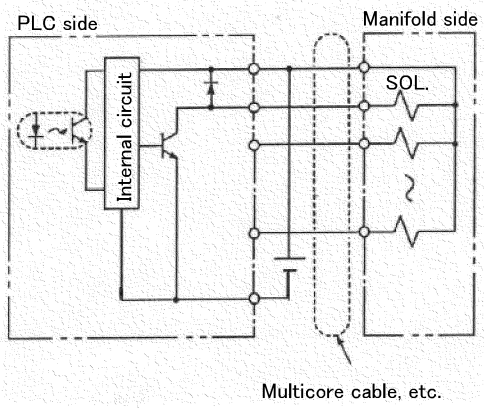
(Max. number of solenoid: 24)

Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Valve No.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	COM
Pin No.	14	15	16	17	18	19	20	21	22	23	24	25	
Valve No.	(Empty)	(Empty)	3b	4b	(Empty)	(Empty)	7b	(Empty)	(Empty)	(Empty)	11b	12b	

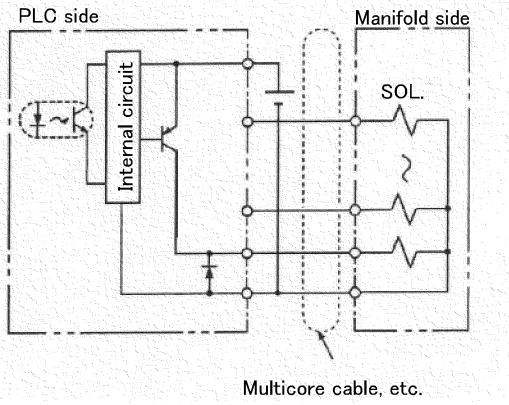
4) How to connect with PLC

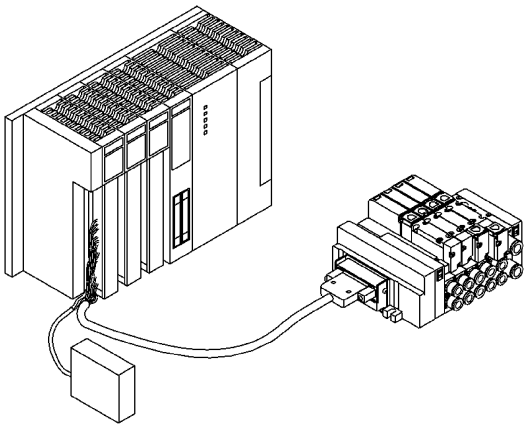
The internal common wiring on the manifold side has already been made. Because the solenoid valve has no polarity, you can connect either NPN output or PNP output of DC output unit of PLC. For each wiring, please follow the sketch below.

DC output unit (NPN output type)



DC output unit (PNP output type)





5) Manufacturing of cable

In case of manufacturing connection cables, the use of the following devices is recommendable.

Name	Model No.	Manufacturer's name
D-sub connector socket solder type	HDBB-25S	Hirose Electric
D-sub connector socket solder type	JAZ-25S	Japan Crimp Terminal
D-sub connector socket crimp type	CDB-25S	Hirose Electric
D-sub connector socket crimp type	JAC-25S	Japan Crimp Terminal
Plug case (for solder type) (with M2.6 screw)	HDB-CTF	Hirose Electric
Plastics cover with M2.6 screw	JCB-25M	Japan Crimp Terminal

Please avoid using of pressure welding type as far as possible, because its electric capacity is relatively small, and in addition, the core wire of available cable is relatively fine which will cause a relatively large voltage drop.

6) Specifications of cable made by CKD

The following model number of cable made by CKD can be used also.

Model No. N4T − Cable − D 0 [ ] (※1) − [ ] (※2)

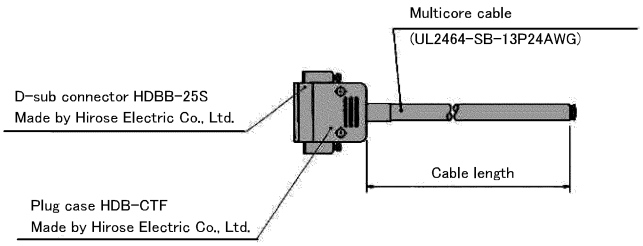
(※1) Connection style at user side

0	For cut off only
1	With ring terminal for M3.5 screw

(※2) Cable length (L)

1	1m
3	3m
5	5m

- N4T-CableD00- [L]

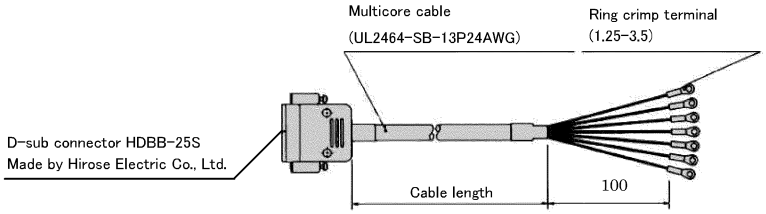


Correspondence between D-sub connector terminal No. and wire core

D-sub connector terminal No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
I/D of wire core	Insulation color	Orange	Orange	Yellow	Yellow	Green	Green	Gray	Gray	White	White	Orange	Orange	Yellow	Yellow	Green
	Mark type	1 type										2 types				
	Mark color	Black	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black

D-sub connector terminal No.		16	17	18	19	20	21	22	23	24	25
I/D of wire core	Insulation color	Green	Gray	Gray	White	White	Orange	Orange	Yellow	Yellow	Green
	Mark type	2 types					3 types				
	Mark color	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black

- N4T-cable D01- L



Correspondence between D-sub connector terminal No. and wire core

D-sub connector terminal No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
I/D of wire core	Insulation color	Orange	Orange	Yellow	Yellow	Green	Green	Gray	Gray	White	White	Orange	Orange	Yellow	Yellow	Green
	Mark type	1 type										2 types				
	Mark color	Black	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black
Mark tube No.		1	2	3	4	5	6	7	8	9	10	Cut off	Cut off	13	14	15

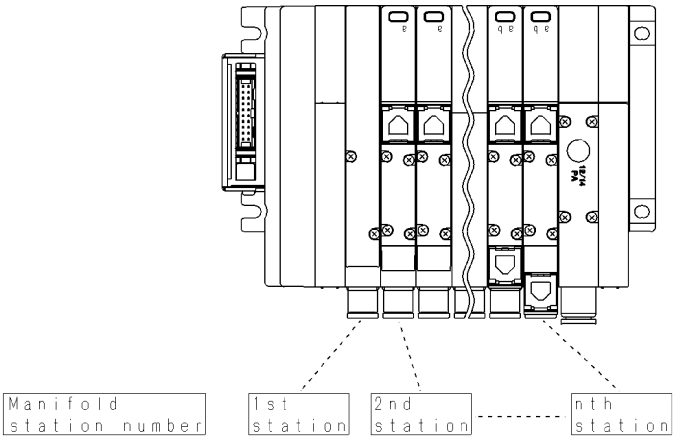
D-sub connector terminal No.		16	17	18	19	20	21	22	23	24	25
I/D of wire core	Insulation color	Green	Gray	Gray	White	White	Orange	Orange	Yellow	Yellow	Green
	Mark type	2 types					3 types				
	Mark color	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black
Mark tube No.		16	17	18	19	20	21	22	23	Cut off	Cut off

* This is a cable for 20 stations. If you need 21 stations or more, please use D00 type above.

4.4.5 Flat cable connector type: Wiring style T51

1) About T51 connector

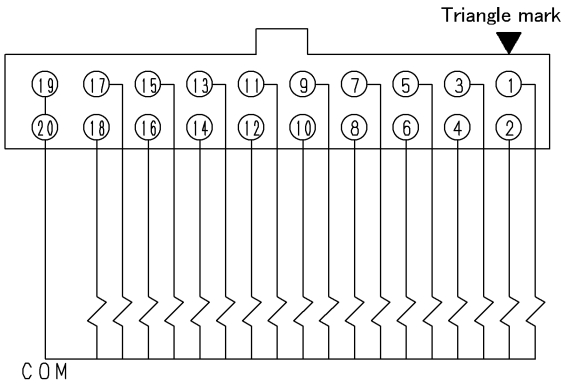
The connector used for wiring style T51 is in compliance with MIL standards (MIL-C-83503). Pressure welding of flat cable makes wiring job easier. The method of allocating pin number is different depending on the manufacturer, but the allocation of functions is the same. Please make layout according to the triangle mark (▼) of connector. The triangle mark (▼) is the base for plug and socket respectively. The number of manifold station has been set in the order starting from left with the piping port facing front.



2) Point requiring your attention with connector type (T51)

① The signal arrangements for PLC output unit and the solenoid valve side must be corresponding with each other.
② Power source to be used is exclusively DC24V and DC12V.
③ T51 type is driven by general output unit.
④ Never connect the manifold to input unit. Otherwise, it may cause serious troubles to not only this device but also the devices surrounding it. Please be sure to connect this manifold to the output unit.
⑤ Voltage drop may be caused when energized simultaneously or depending on the cable length. Please make sure that the voltage drop against solenoid valve is kept within 10% of rated voltage.

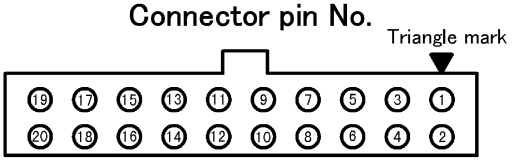
Internal connection



3) Wiring style

The maximum number of manifold station varies depending on the model. Please check the specifications for each model.

Note) Valve No. 1a, 2a, 2b …. the numbers indicate the 1st station and 2nd station respectively, and alphabet (a) means the solenoid on a-side and (b) means the solenoid on b-side respectively.



<Standard wiring>

- In case of a single solenoid valve

(Max. number of MF station: 18)

Pin No.	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	17a	15a	13a	11a	9a	7a	5a	3a	1a
Pin No.	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	18a	16a	14a	12a	10a	8a	6a	4a	2a

- In case of a double solenoid valve

(Max. number of MF station: 9)

Pin No.	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin No.	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	9b	8b	7b	6b	5b	4b	3b	2b	1b

- In case of a mixture (Mixed installation of single and double)

(Max. number of solenoid: 18)

Pin No.	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	12a	11a	10a	8a	7a	5a	4a	3a	1a
Pin No.	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	13a	11b	10b	9a	7b	6a	4b	3b	2a

<Double wiring>

- In case of a single solenoid valve

(Max. number of MF station: 9)

Pin No.	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin No.	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)

- In case of a double solenoid valve

(Max. number of MF station: 9)

Pin No.	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin No.	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	9b	8b	7b	6b	5b	4b	3b	2b	1b

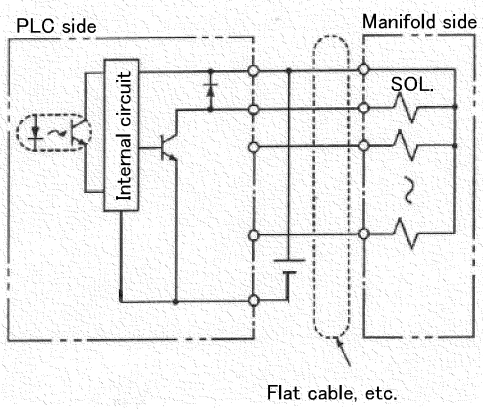
- In case of a mixture (Mixed installation of single and double)
(Max. number of solenoid: 18)

Pin No.	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin No.	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	(Empty)	(Empty)	7b	(Empty)	(Empty)	4b	3b	(Empty)	(Empty)

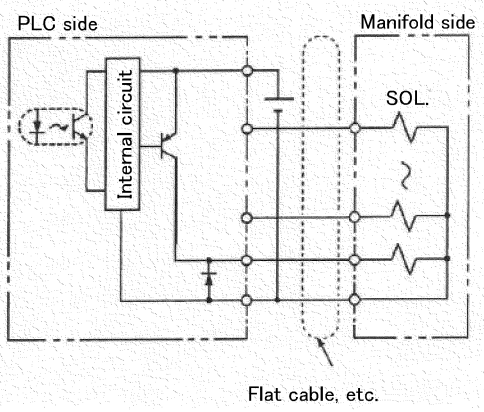
4) How to connect with PLC

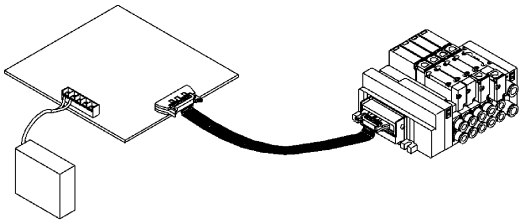
The internal common wiring on the manifold side has already been made. Because the solenoid valve has no polarity, you can connect either NPN output or PNP output of DC output unit of PLC. For each wiring, please follow the sketch below.

DC output unit (NPN output type)



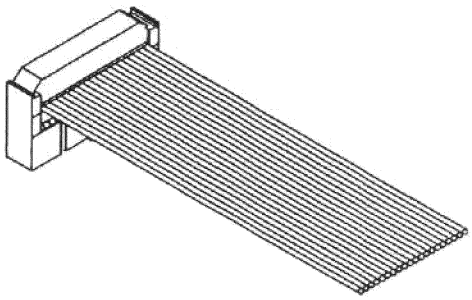
DC output unit (PNP output type)





5) Manufacturing of cable

In case of manufacturing connection cables, the use of the following devices on valve side is recommendable. Follow the catalogues data sheet correctly when selecting the cable and carrying out connection. Because these devices are in compliance with MIL standards (MIL-C-83503), there are various devices other than these that can be connected. But some devices have different locking mechanisms. In such a case, please fix the lock lever using a binding band.



- Made by Omron Co., Ltd. Socket Model No. XG4M-2030
  Strain relief Model No. XG4T-2004
- Made by Omron Co., Ltd. Pressure welding connector for bulk wires Model No. XGM-2032
- Made by Omron Co., Ltd. Pressure welding connector for bulk wires Model No. XG5M-2035

6) About cable

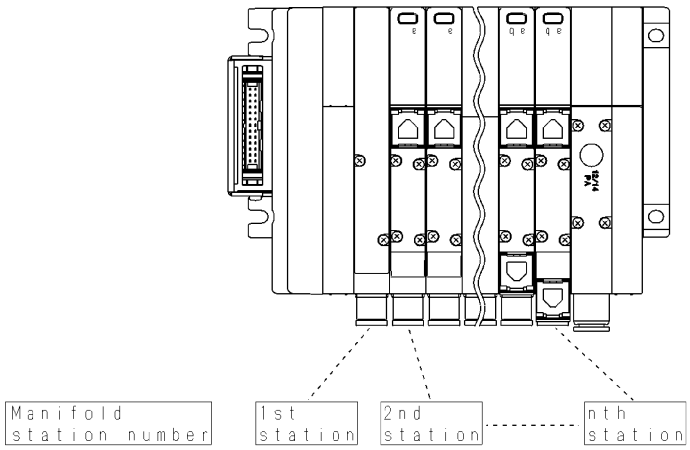
Flat cable or fine multicore cable is used for this system in general. Because the core wires of this cable are fine, please pay your careful attention to mechanical strength and electrical capacity.

- Give R (radius) without fail to where the flat cable needs bending.
- Because the resistance of the cable is large (AWG28: about 0.22Ω/m), please pay your careful attention to any voltage drop on the cable. When 16 stations of solenoid valve are energized, about 0.1V/m voltage drop occurs in case of DC24V.

4.4.6 Flat cable connector type: Wiring style T53

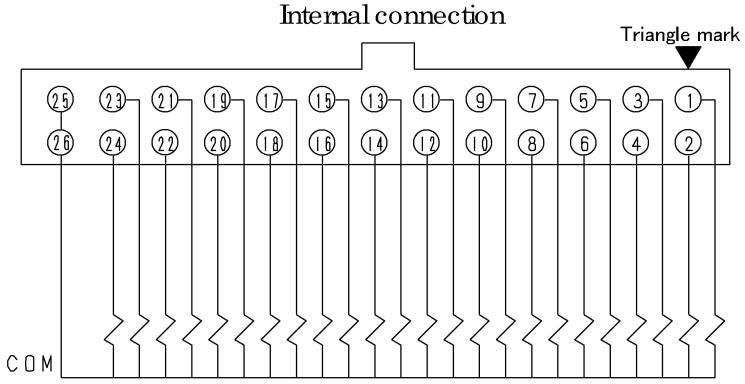
1) About T53 connector

The connector used for wiring style T53 is in compliance with MIL standards (MIL-C-83503). Pressure welding of flat cable makes wiring job easier. The method of allocating pin number is different depending on the manufacturer, but the allocation of functions is the same. Please make layout according to the triangle mark (▼) of connector. The triangle mark (▼) is the base for plug and socket respectively. The number of manifold station has been set in the order starting from left with the piping port facing front.



2) Point requiring your attention with connector type (T53)

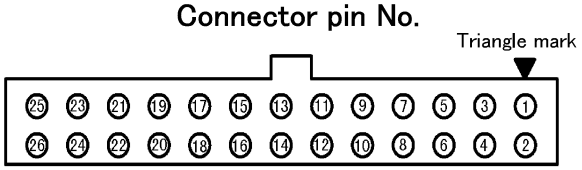
① The signal arrangements for PLC output unit and the solenoid valve side must be corresponding with each other.
② Power source to be used is exclusively DC24V and DC12V.
③ T53 type is driven by general output unit.
④ Never connect the manifold to input unit. Otherwise, it may cause serious troubles to not only this device but also the devices surrounding it. Please be sure to connect this manifold to the output unit.
⑤ Voltage drop may be caused when energized simultaneously or depending on the cable length. Please make sure that the voltage drop against solenoid valve is kept within 10% of rated voltage.



3) Wiring style

The maximum number of manifold station varies depending on the model. Please check the specifications for each model.

Note) Valve No. 1a, 2a, 2b .... the numbers indicate the 1st station and 2nd station respectively, and alphabet (a) means the solenoid on a-side and (b) means the solenoid on b-side respectively.



<Standard wiring>

- In case of a single solenoid valve

(Max. number of MF station: 18)

Pin No.	25	23	21	19	17	15	13	11	9	7	5	3	1
Valve No.	COM				17a	15a	13a	11a	9a	7a	5a	3a	1a
Pin No.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve No.	COM				18a	16a	14a	12a	10a	8a	6a	4a	2a

- In case of a double solenoid valve

(Max. number of MF station: 12)

Pin No.	25	23	21	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	12a	11a	10a	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin No.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	12b	11b	10b	9b	8b	7b	6b	5b	4b	3b	2b	1b

- In case of a mixture (Mixed installation of single and double)

(Max. number of solenoid: 24)

Pin No.	25	23	21	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	16a	15a	14a	12a	10a	9a	8a	7a	5b	4b	3a	1a
Pin No.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	16b	15b	14b	13a	11a	9b	8b	7b	6a	5a	4a	2a

<Double wiring>

- In case of a single solenoid valve

(Max. number of MF station: 12)

Pin No.	25	23	21	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	12a	11a	10a	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin No.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)	(Empty)

- In case of a double solenoid valve

(Max. number of MF station: 12)

Pin No.	25	23	21	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	12a	11a	10a	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin No.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	12b	11b	10b	9b	8b	7b	6b	5b	4b	3b	2b	1b

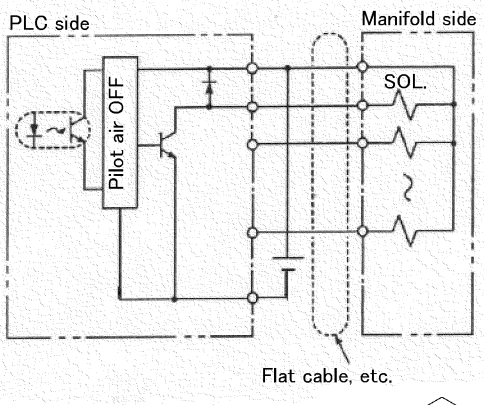
- In case of a mixture (Mixed installation of single and double)
(Max. number of solenoid: 24)

Pin No.	25	23	21	19	17	15	13	11	9	7	5	3	1
Valve No.	COM	12a	11a	10a	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin No.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve No.	COM	(Empty)	(Empty)	(Empty)	9b	8b	7b	(Empty)	5b	4b	(Empty)	(Empty)	(Empty)

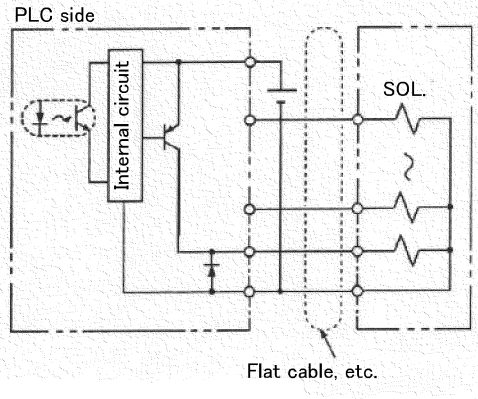
4) How to connect with PLC

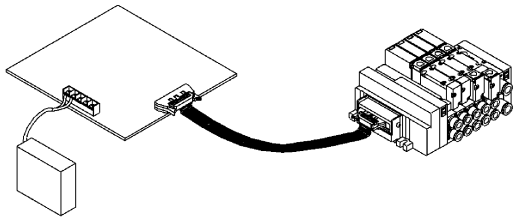
The internal common wiring on the manifold side has already been made. Because the solenoid valve has no polarity, you can connect either NPN output or PNP output of DC output unit of PLC. For each wiring, please follow the sketch below.

DC output unit (NPN output type)



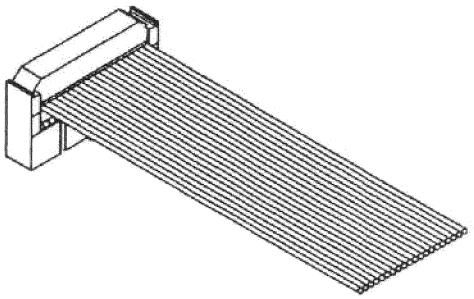
DC output unit (PNP output type)





5) Manufacturing of cable

In case of manufacturing connection cables, the use of the following devices on valve side is recommendable. Follow the catalogues data sheet correctly when selecting the cable and carrying out connection. Because these devices are in compliance with MIL standards (MIL-C-83503), there are various devices other than these that can be connected. But some devices have different locking mechanisms. In such a case, please fix the lock lever using a binding band.



●	Made by Omron Co., Ltd.	Socket	Model No. XG4M-2030
		Strain relief	Model No. XG4T-2004
●	Made by Omron Co., Ltd.	Pressure welding connector for bulk wires	Model No. XGM-2032
●	Made by Omron Co., Ltd.	Pressure welding connector for bulk wires	Model No. XG5M-2035

6) About cable

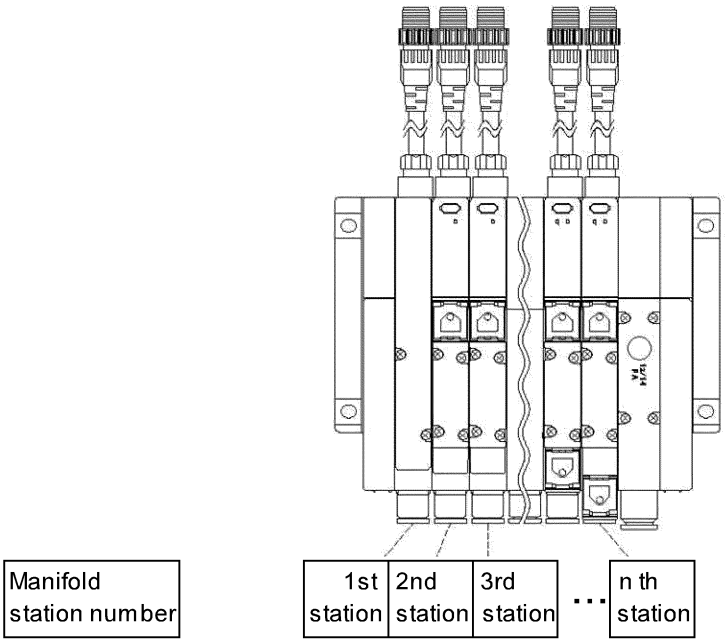
Flat cable or fine multicore cable is used for this system in general. Because the core wires of this cable are fine, please pay your careful attention to mechanical strength and electrical capacity.

- Give R (radius) without fail to where the flat cable needs bending.
- Because the resistance of the cable is large (AWG28: about 0.22Ω/m), please pay your careful attention to any voltage drop on the cable. When 16 stations of solenoid valve are energized, about 0.1V/m voltage drop occurs in case of DC24V.

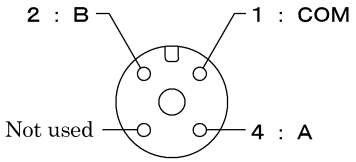
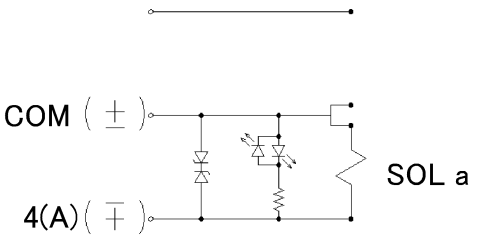
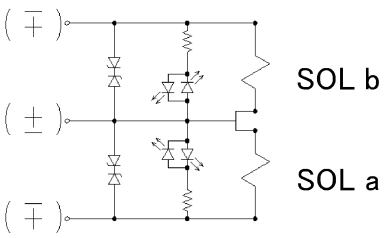
4.4.7 Manifold with I/O connector cable (R1)

1) About manifold with I/O connector cable (R1)

It uses M12 connector which is highly versatile as a sensor connector.
Connector wiring not only facilitates wiring work but also helps improve connection quality.



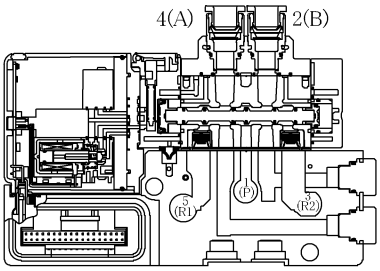
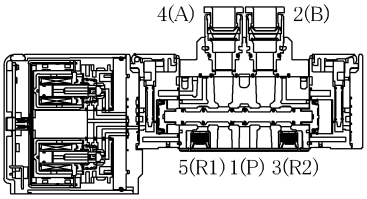
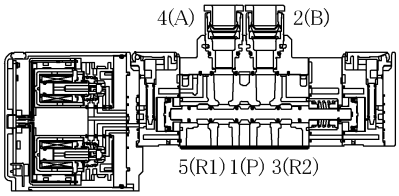
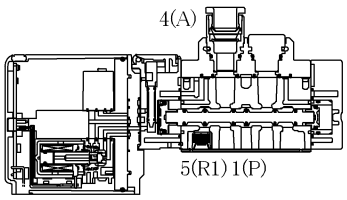
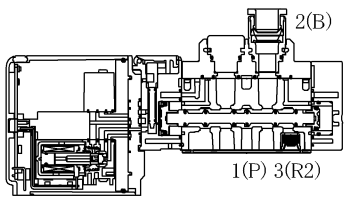
2) Wiring style

Connector terminal wiring (View from connector side)		
Solenoid valve Internal circuit diagram	Single	
	Double	

5. OPERATING RECOMMENDATION

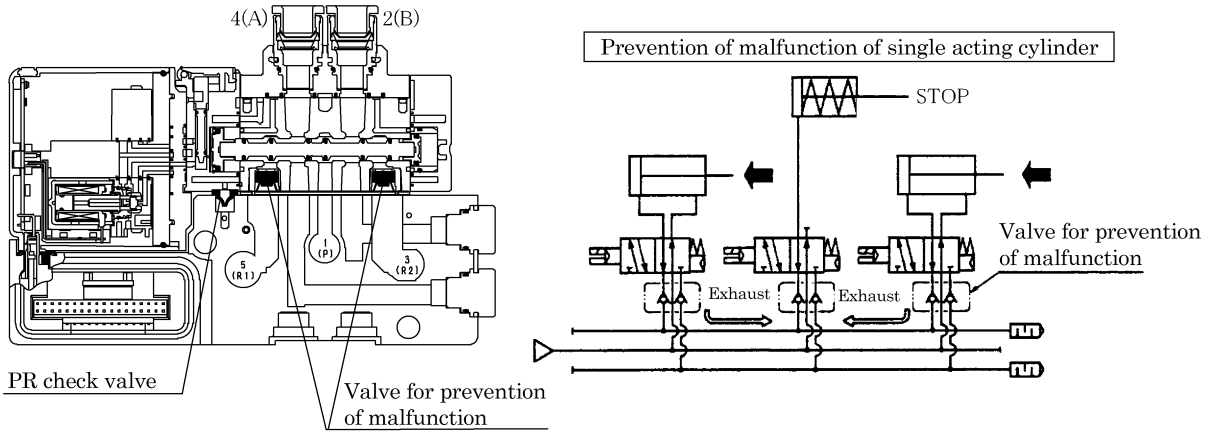
5.1 Operation

1) Valve operation

	Illustration of operation	Explanation of operation
NW4G※210 Single		When de-energized (shown on the illustration) 1(P) → 2(B) 4(A) → 5(R1) When energized 1(P) → 4(A) 2(B) → 3(R2)
NW4G※220 Double		SOLa When energized 1(P) → 4(A) 2(B) → 3(R2) SOLb When energized (Shown on the illustration) 1(P) → 2(B) 4(A) → 5(R1) The valve, once energized, retains by itself its position even if the power supply is switched off.
NW4G※230 NW4G※240 NW4G※250 3-position		NW4G※230 When de-energized 1(P), 4(A), 2(B), 5(R1), 3(R2) close NW4G※240 When de-energized 1(P) close 4(A), 2(B) → 5(R1), 3(R2) NW4G※250 When de-energized 1(P) → 4(A), 2(B) 5(R1), 3(R2) close
NW3GA210 Normal Close		When de-energized (shown on the illustration) 4(A) → 5(R1) When energized 1(P) → 4(A)
NW3GA2110 Normal Open		When de-energized (shown on the illustration) 1(P) → 2(B) When energized 2(B) → 3(R2)

2) Manifold operation
For both standard internal and external pilot specifications, the main exhaust (R) and pilot exhaust (PR) are collected within the manifold base and discharged from exhaust port.

3) For prevention of malfunction
The manifold of W4G Series is equipped with a valve for prevention of malfunction and PR check valve. This prevents any malfunction of the connected cylinder being caused by circulation of backpressure or any malfunction of the solenoid valve itself being caused by pilot backpressure.



5.2 Manual override

⚠ WARNING:

a) After using the manual override, be sure to reset the manual override to the original (OFF) position before resuming the operation of the device.
After a operation, be sure to release the lock to turn the manual override OFF.
With the W4G2-Series solenoid valve system, the lock is released (the manual override turned OFF) if the manual override protection cover is closed.

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

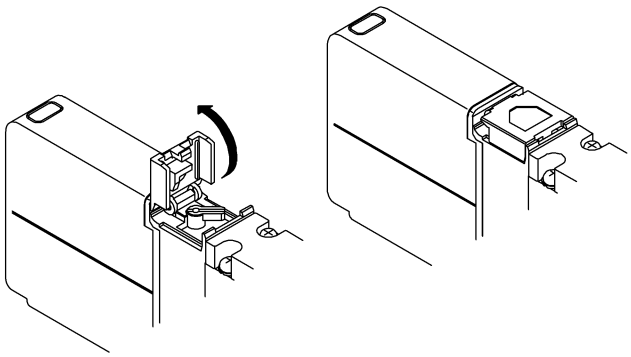
(1) W4G Series is of a kind of pilot type solenoid valve. If you do not supply air to P-port, the main valve cannot be switched even if you operate the manual override.

(2) A manual operation protection cover has been equipped as a standard supply. This cover has been closed when shipped out. So, you will not be able to see the manual override when you have received the delivery, because it has been protected. Open the protection cover and perform manual operation.
Be careful that the protection cover does not close unless the manual lock is released.

(3) A common manual override has been equipped for non-locked type and locked type. If you rotate it keeping pushing, the lock actuates. Whenever you want to lock, please rotate it after pushing without fail. If you rotate it without pushing, it may cause damages to the manual override or invite an air leakage.

5.2.1 How to open and close the manual operation protection cover

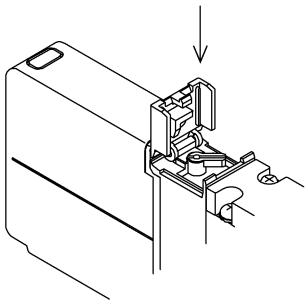
When opening or closing the manual operation protection cover, do not apply any force than necessary (less than 5N). If excess force is applied, it may cause any troubles.



5.2.2 How to operate the manual override

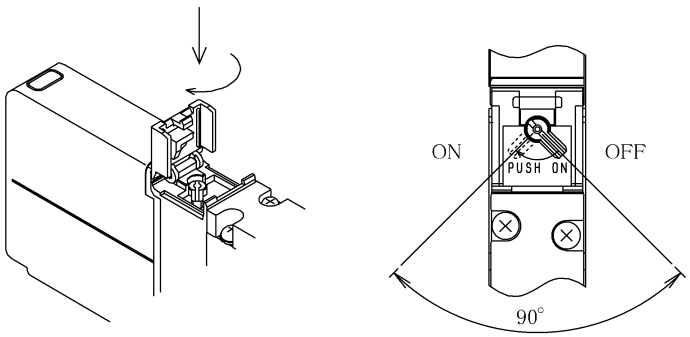
1) For operation with push/non-lock

Push in the direction as shown by an arrow in the sketch below until it stops. Then, stop pushing. The lock of manual override is now released.



2) For operation with push/lock

Push and rotate by 90˚in the direction as shown by an arrow in the sketch below and then start using. Even if you stop pushing, the lock of manual override will not be released.



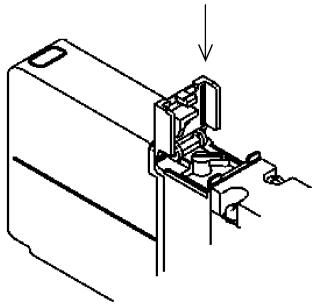
5.2.3 How to operate the manual override with an OFF function

⚠ CAUTION:

About manual override with an OFF function

The supply of pilot air while energized is compulsorily stopped. So, you can switch the main valve even if while energized.
When using the OFF function, the cylinder starts an immediate movement in case of 2-position single connection and three position ABR and PAB port connection, to which please pay your utmost careful attention.

1) For normal use (Push/non-lock operation)
Push in the direction as shown by an arrow in the sketch below until it stops. Then, stop pushing. The lock of manual override is now released.

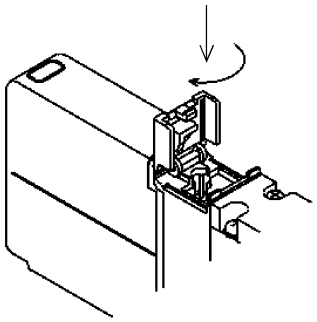


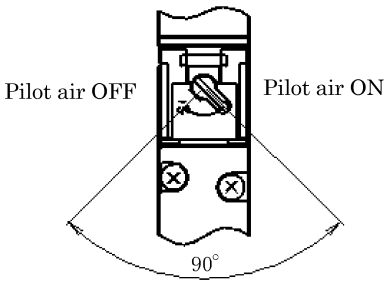
[Comparison table of output port position]

Position type		a-side operation	Non-operation	b-side operation
2-position	Single	4 (A)	2 (B)	—
	Double	4 (A)	After a-side operation 4 (A)	2 (B)
			After b-side operation 2 (B)	
3-position	All port block	4 (A)	After a-side operation 4 (A)	2 (B)
			After b-side operation 2 (B)	
	ABR port connection	4 (A)	—	2 (B)
	PAB port connection	4 (A)	4(A)/2(B)	2 (B)

2) For using the OFF function (Push/lock operation while energized)

Push and rotate by 90° in the direction as shown by an arrow in the sketch below and then start using. Even if you stop pushing, the lock of manual override will not be released.





[Comparison table of output port position]

Position type			OFF function (manual operation on energized side)		Manual operation on de-energized side
			Non-operation	Operation	Operation
2-position	Single	a-side when sol energized	4 (A)	2 (B)	—
	Double	a-side when sol energized	4 (A)	4 (A)	2 (B)
		b-side when sol energized	2 (B)	2 (B)	4 (A)
3-position	All port block	a-side when sol energized	4 (A)	4 (A)	2 (B)
		b-side when sol energized	2 (B)	2 (B)	4 (A)
	ABR port connection	a-side when sol energized	4 (A)	—	2 (B)
		b-side when sol energized	2 (B)	—	4 (A)
	PAB port connection	a-side when sol energized	4 (A)	4 (A)／2 (B)	2 (B)
		b-side when sol energized	2 (B)	4 (A)／2 (B)	4 (A)

* Manual operation on de-energized side is by push/non-lock operation.

5.3 Air Quality

⚠ WARNING:

a) Do not supply anything other than compressed air.

b) Supply clean compressed air without any mixture of corrosive gas.

⚠ CAUTION:

a) Compressed air usually contains a large amount of drain, oxidized oil, tar, foreign matter, and rust from the piping. Filter out those elements in the supplied air because they may cause a malfunction and decrease service life. In addition, clean the exhaust before it is released to the air to minimize pollution.

b) Once you have lubricated a pre-lubricated valve, the valve is no longer capable of running without being lubricated from the outside. Do not leave the valve without lubrication but keep it lubricated.

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

5.3.1 Lubrication

The W4G2 Series solenoid valve systems use pre-lubricated valves that usually do not require lubrication from the outside. If you have to lubricate a valve, use Type 1 turbine oil (ISO-VG32) without additives.

Excessive lubrication and extremely low pressure may cause a longer response time. The response time in the catalogue assumes no lubrication from the outside and the air supply pressure of 0.5 MPa.

5.3.2 Ultra-dry compressed air

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

5.3.3 Drain

(1) The drain is produced by a drop of temperature in pneumatic piping and devices.

(2) The drain may enter and instantaneously block a passage inside a pneumatic device and cause a malfunction.

(3) The drain accelerates the production of rust, which may cause the failure of pneumatic devices.

(4) The drain may wash away the lubrication oil, causing a malfunction from the lack of lubrication.

5.3.4 Foreign matter in the compressed air

1) Supply clean compressed air that does not include oxidized oil, tar, carbon, or other foreign matter from the air compressor.

(1) If oxidized oil, tar, carbon, or the like enters a pneumatic device and sticks to its components, an increase in the resistance at sliding portions may cause a malfunction.

(2) If oxidized oil, tar, carbon, or the like is mixed with the supplied lubrication oil, wear of the sliding components of the pneumatic device may be accelerated.

2) Supply clean compressed air that does not include solid foreign matter.

(1) Solid foreign matter in the compressed air may cause wear of the sliding components of the pneumatic device or stick to such components and cause hydraulic lock.

5.3.5 Cleaning the supplied air

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

5.4 Electric circuits

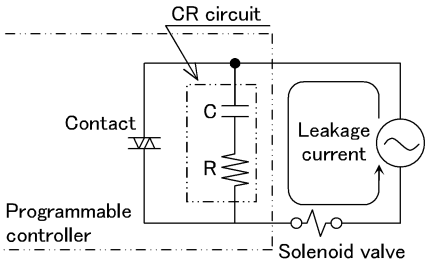
⚠ CAUTION:

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	2.0 mA or lower
DC12V	1.5 mA or lower
DC24V	1.8 mA or lower

(1) With a double solenoid type valve system, energize the solenoid for at least 0.1 second even for an instantaneous valve operation. If the target valve can be affected by a back pressure induced by another solenoid valve, it is recommendable to energize the solenoid as long as the cylinder is making an action.

(2) If solenoids are energized for a prolonged period of time, the surface temperature of the manifold will rise. Through this increase in the temperature should not be regarded as abnormal, provide a suitable means of ventilation or heat release.

About AC100V specifications

AC100V specifications have a built-in full wave rectified bridge.
In case of using SSR for ON/OFF of the solenoid valve, return failure of solenoid valve may occur depending on its type.
Please be careful when selecting SSR.

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?
Is the coupling with the load normal?

(6) Checking the lubricator
Is the amount of oil adjusted properly?

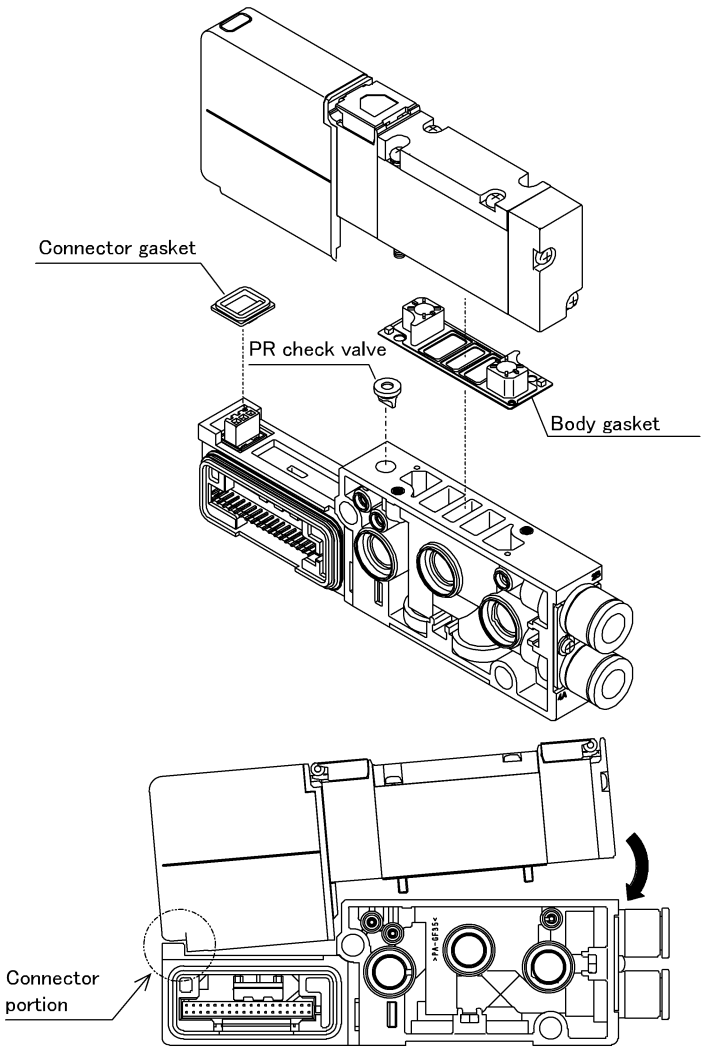
(7) Checking the lubrication oil
Is the supplied lubrication oil of the type specified by the manufacturer？

6.2 Disassembling and Reassembling

> **⚠ WARNING:** When disassembling or assembling the solenoid valve, perform it after reading the Instruction Manual carefully without fail and with full understanding of its contents.
>
> - You are required to understand the structure of solenoid valve and its operation principle to secure the safety.
> - A level of 2nd Class or more of Pneumatics Technology Certification is required.

6.2.1 When replacing the solenoid valve

When replacing the solenoid valve, please pay your careful attention so that no gasket or pilot check valve may fall apart. For fitting the solenoid valve, insert the connector portion on electric components side first, and perform the position adjustment of the main body (refer to the sketch below).Proper tightening torque of the screw for mounting of solenoid valve: 0.25 – 0.30N・m



6.2.2 How to replace the cartridge joint

When changing the size of one-touch joint, please check its procedures first before replacing. If not fitted correctly, or in case of insufficient tightening of the fitting screws, it may cause an air leakage, to which please pay your careful attention.

1) Body porting (A) type

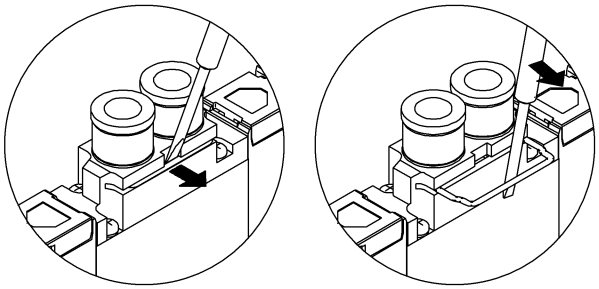
(1) Pull out the stopper pin using a screwdriver, etc.

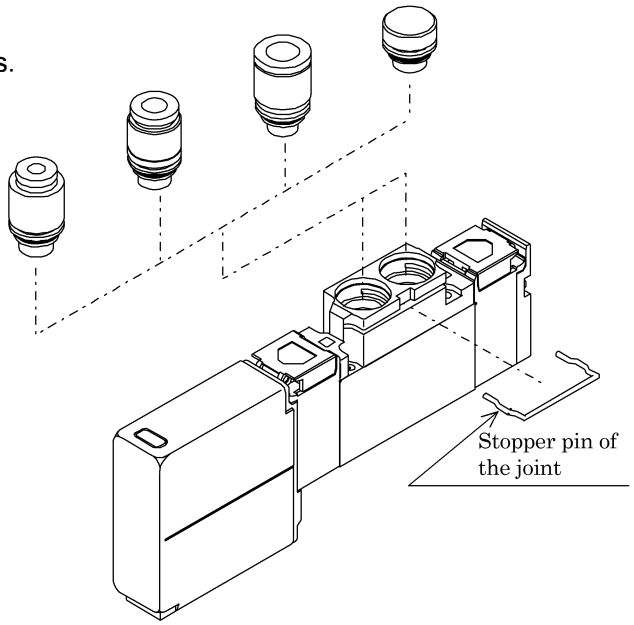
(2) Pull out the joint.

(3) Insert the replacing joint vertically until it hits.

(4) Insert the stopper pin.

Check the fitting by pulling the joint.





2) Base piping (B) type

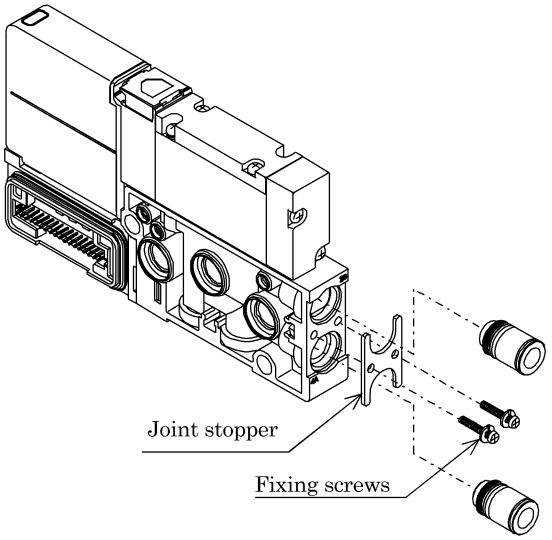
(1) Remove the fixing screws.

(2) Pull out the stopper plate and joint simultaneously.

(3) Fit the grooves of replacing joint with the stopper plate and perform a temporary assembling.

(4) Assemble the stopper plate and joint simultaneously and tighten the fixing screws. Check the fitting by pulling the joint.

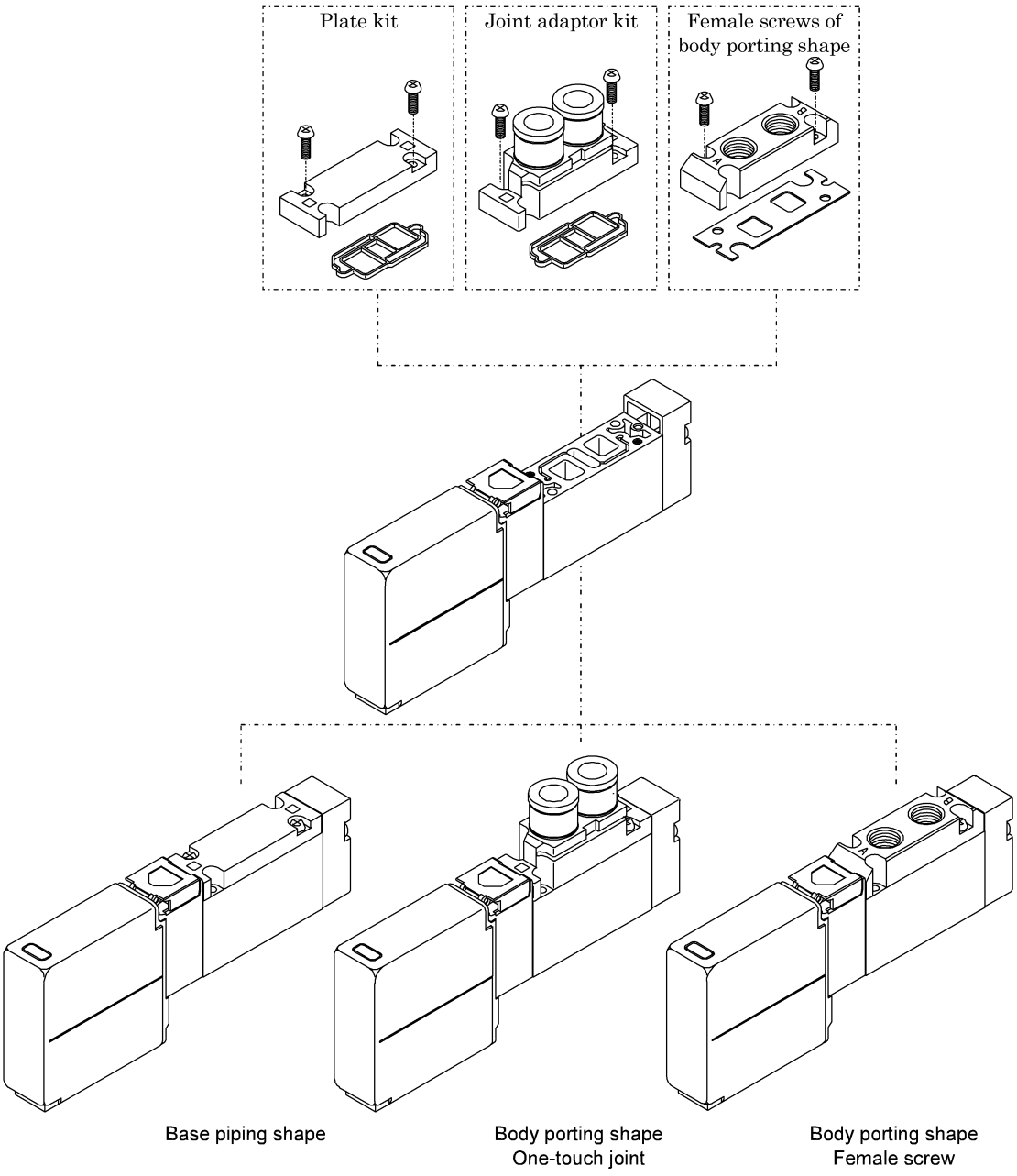
Proper tightening torque of the fixing screw: 0.4 – 0.44N･m



6.2.3 How to change the specifications of connecting port

In case of replacing the plate or joint adaptor mounted on the body, or in case of changing the body porting specifications and base piping specifications, or in case of changing the specifications of one-touch joint in the body porting shape and the specifications of female screws, air leakage may be caused if the fixing screws have not been tightened enough. Please pay your careful attention to the tightening torque.

Proper tightening torque of the fixing screw: 0.25 – 0.30N・m

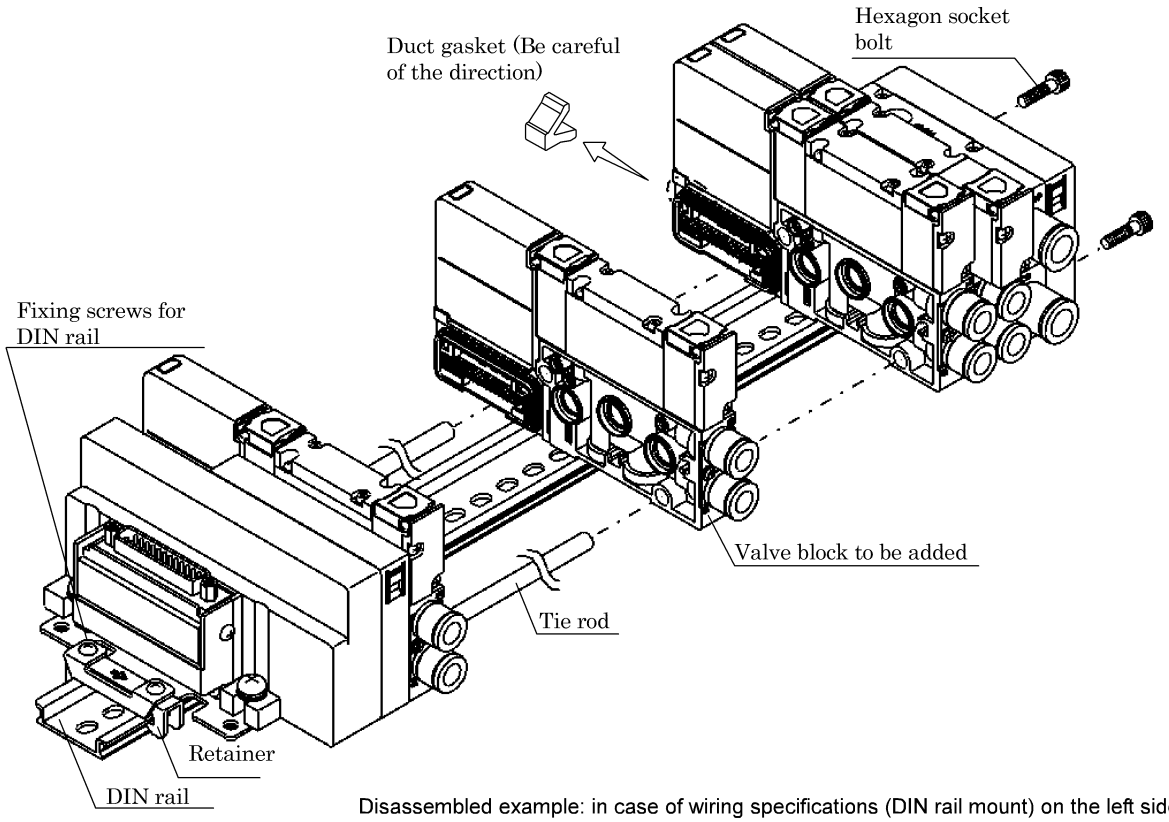


6.3 Additional installation of a valve unit to a reduced-wiring manifold.

⚠ WARNING: When disassembling or assembling the manifold, perform it after reading the Instruction Manual carefully and with full understanding of its contents.

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

6.3.1 Drawing of disassembled block manifold



Disassembled example: in case of wiring specifications (DIN rail mount) on the left side of MW4GB2 D-sub connector

6.3.2 How to add the station of valve block

(1) Loosen the fixing screws on DIN rail of retainer.
(2) Remove the hexagon socket bolts (2 bolts).
(3) Separate the blocks apart from each other located where you wish to add the station and pull out the tie rod.
In such a case, be careful so that the gasket may not fall apart.
(4) Connect the tie rod for additional station.
(5) Pass the valve block to be added through the tie rod and push it between the adjacent blocks without leaving any clearance and then connect.
(6) Connect the pulled out block in the same manner.
(7) Make sure that all blocks have been connected without leaving any clearance, and then tighten the hexagon socket bolts.
(Proper tightening torque: 1.1 - 1.3N・m)
(8) Hook the retainer jaw on DIN rail securely, push in the direction of arrow indicated on the retainer and tighten the fixing screws of DIN rail.
(Proper tightening torque: 1.2 - 1.6N・m)

6.3.3 Wiring between the electric block and valve block (DC specifications)

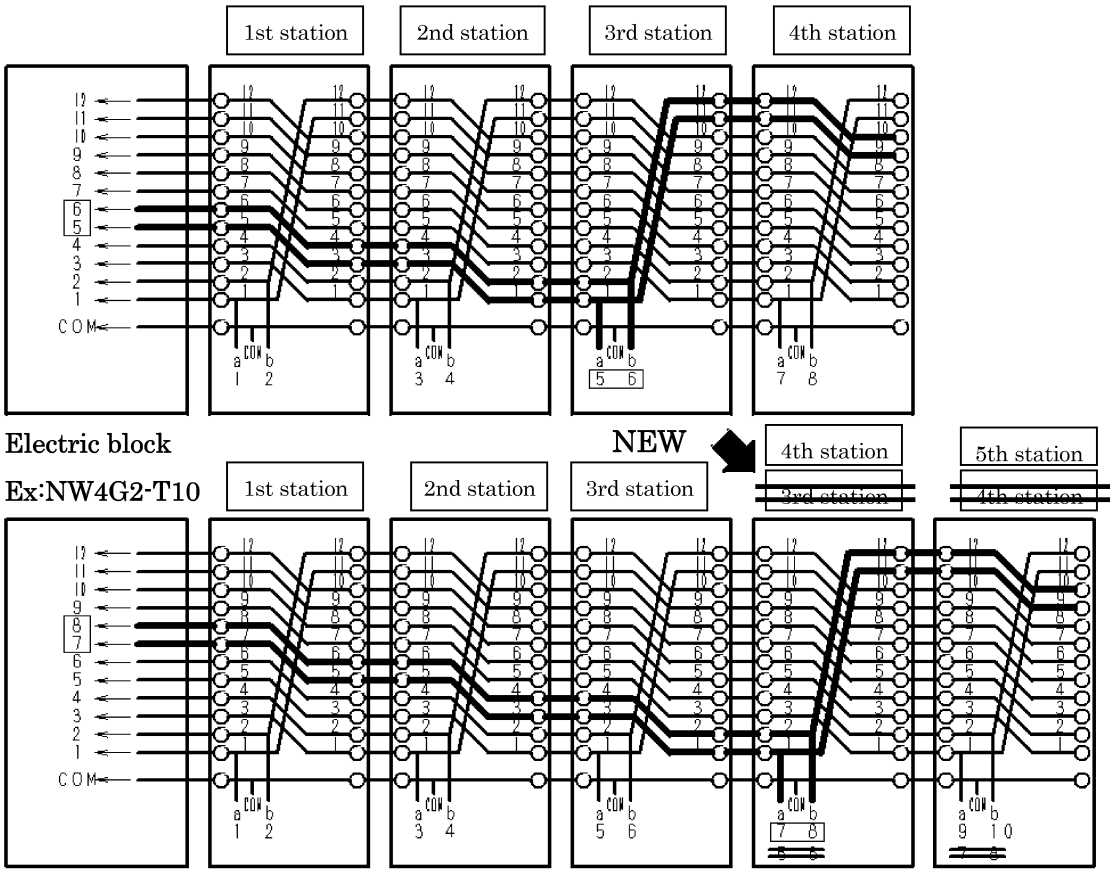
Component called exclusive wiring connector has been built-in in the valve block and supply/exhaust block, which gives a structure enabling to disassemble or assemble the block manifold and at the same time to carry out electrical wiring. No special wiring job is required when disassembling or assembling. Because there is a regularity between the connector pin number of electric block and wired valve, connect the wire between the valve and controlling system after checking "4.4 Wiring style". Pay your special attention when adding or reducing the station of valve block. The wiring circuit diagram for adding the station is shown below.

Example of wiring circuit

The diagram below shows the wiring circuit of MW4G2 only and is different from the actual specifications.

- Double wiring

When one station of valve block is added between the 2nd and 3rd stations, the output originally allocated to the terminal blocks No. 5 and No. 6 of electric block is allocated to the terminal strip No. 7 and No. 8 automatically after the output dislocates the position for the portion of 2-solenoid.



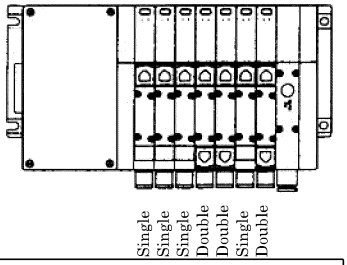
- Standard wiring

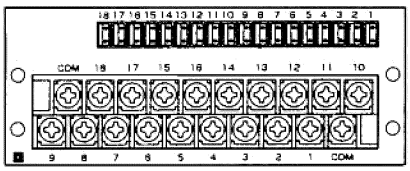
Same as the double wiring, output is allocated to the terminal strip numbers by dislocation, but with a different style of dislocation depending on the type of solenoid valve. Output is allocated by dislocating for 1-solenoid portion in case of 1 solenoid (2-position single operator) and 2-solenoid portion in case of 2 solenoids (2-position double operators/3-position).

6.3.4 Points for connecting the electric substrate connector

1) Points for connecting T10 electric substrate (standard wiring)

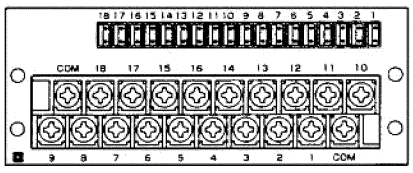
Due to the reduced wiring specifications (T10), the rules to be applied to the connector on the electric substrate and the valve are different. When wiring the connector, please check the connector number printed on the substrate. For mix wiring (mixed installation), the manifold structure in the sketch right is shown as an example.



	Assembly of electric substrate Carry out wiring in the order as shown by arrows.	Correspondence with valve
T10	 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	(Max. number of MF station: 18) Terminal block No. COM 18 17 16 15 14 13 12 11 10 Valve No. COM 18a 17a 16a 15a 14a 13a 12a 11a 10a Terminal block No. 9 8 7 6 5 4 3 2 1 COM Valve No. 9a 8a 7a 6a 5a 4a 3a 2a 1a COM (Max. number of MF station: 9) Terminal block No. COM 18 17 16 15 14 13 12 11 10 Valve No. COM 9b 9a 8b 8a 7b 7a 6b 6a 5b Terminal block No. 9 8 7 6 5 4 3 2 1 COM Valve No. 5a 4b 4a 3b 3a 2b 2a 1b 1a COM (Max. number of solenoid valve: 18) Terminal block No. COM 18 17 16 15 14 13 12 11 10 Valve No. COM (Empty) (Empty) (Empty) (Empty) 9b 9a 8b 8a 7b Terminal block No. 9 8 7 6 5 4 3 2 1 COM Valve No. 7a 6a 5b 5a 4b 4a 3a 2a 1a COM

1) Points for connecting T10 electric substrate (double wiring)

The double wiring specifications are corresponding to the double solenoid wiring, regardless the position type of the solenoid valve to be installed. In case of the standard wiring and double SOL of double wiring only, the wiring is the same.

	Assembly of electric substrate Carry out wiring in the order as shown by arrows.	Correspondence with valve
T10	 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	(Max. number of MF station: 9) Terminal block No. COM 18 17 16 15 14 13 12 11 10 Valve No. COM (Empty) 9a (Empty) 8a (Empty) 7a (Empty) 6a (Empty) Terminal block No. 9 8 7 6 5 4 3 2 1 COM Valve No. 5a (Empty) 4a (Empty) 3a (Empty) 2a (Empty) 1a COM (Max. number of MF station: 9) Terminal block No. COM 18 17 16 15 14 13 12 11 10 Valve No. COM 9b 9a 8b 8a 7b 7a 6b 6a 5b Terminal block No. 9 8 7 6 5 4 3 2 1 COM Valve No. 5a 4b 4a 3b 3a 2b 2a 1b 1a COM (Max. number of solenoid valve: 18) Terminal block No. COM 18 17 16 15 14 13 12 11 10 Valve No. COM 9b 9a 8b 8a 7b 7a (Empty) 6a 5b Terminal block No. 9 8 7 6 5 4 3 2 1 COM Valve No. 5a 4b 4a (Empty) 3b (Empty) 2a (Empty) 1a COM

7. TROUBLE SHOOTING

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 coil
	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
	Pressure supplied through exhaust port	Change the piping to an external pilot system
	Erroneous piping, erroneous omitting some piping	Rectify the piping system
	Speed control valve completely closed by error	Reset the needle valve
	A port B port is directly released to an open air	Install pipe joints to A and B ports with diameter equal to or smaller than that of to P port joint
	Valve is frozen	Add remedies of avoiding freezing (Heating system or dehumidifying system etc.)
	Delayed return of a plunger (Excessive oil, existence of far)	Check the quality of the lubricant (Turbine oil type1, ISO VG 32 or equivalent) Rectify the quantity of lubricant drip Install a tar removing filter
	Clogged-up exhausting port with dust	Install a cover or silencer and clean it regularly
High actuating pressure is required	Bulged or decomposed packings	Check the quality of the lubricant (Turbine oil type1, ISO VG 32 or equivalent) Relocate the valves away from splashing area of cutting coolant Keep organic chemicals away from valves.
	Release of A and / or B port to an open air directly	Check the piping. Apply more grease.
	Foreign particles cut into packing lips	Remove the foreign particle away from the packing.

8. PRODUCT SPECIFICATIONS AND STYLE OF INDICATON OF THE MODEL NUMBER

8.1 Product specifications

1) Common specifications

Model number / Item			W4G2
Working fluid			Compressed air
Actuation			Pilot operated type
Valve structure			Soft spool valve
Min. working pressure		MPa	0.2
Max. working pressure		MPa	0.7
Proof pressure		MPa	1.05
Ambient temperature		°C	-5～55
Fluid temperature		°C	5～55
Manual override			Common (standard) for non-locked and locked types
Pilot exhaust method	Internal pilot		Common exhaust for main valve/pilot valve (with built-in check valve of pilot exhaust)
	External pilot		Individual exhaust of main valve/pilot valve
Lubrication		Note 1	Not required
Degree of protection		Note 2	Dust-proof/Jet-proof (IP65) Note 3
Vibration resistance		m/s^2	49 or less
Shock resistance		m/s^2	294 or less
Atmosphere			Must not used in any corrosive gas environment

Note 1 : In case of lubrication, please use turbine oil 1st grade ISO VG32.
Excess lubrication or intermittent lubrication may cause unsteady operation.
Note 2 : This is based on the standard test method of IP65 (IEC60529 [IEC529: 1989-11])
Please check the sealing tightness in advance.
Note 3 : The protection structures of D-sub connector (T30) and the flat cable connector (T5*) are of dust-proof type.
Please be careful so that any water drop, oil, etc. may not be spilled over.
Ref: The pressure unit is indicated in MPa. Conversion rate: 1MPa = 10.1972kgf/cm^2

2) Electric specifications

Model No. / Item			W4G2
Rated voltage	V	DC	12、24
		AC	100
Variation range of rated voltage			±10%
Holding current	A	DC24V	0.025
		DC12V	0.050
		AC100V	0.012
Power consumption	W	DC24V	0.6
		DC12V	0.6
Apparent power	VA	AC100V	1.2
Thermal class			B
Surge absorber			Standard
Indicator			Standard

3) Specifications for each model

Item			When ON	When OFF
Response time ms	2-position	Single	22	24
		Double	26	—
	3-position	ABR port connection	25	35

The response time is the value under supply pressure 0.5MPa and at 20□ without lubrication. This varies depending on the pressure and type of oil.

Item	Valve specifications		Position type		P→A/B	A/B→R
Effective cross-sectional area mm^2	Individual unit	W4GB2	2-position		13	13
			3-position	CC	11	11
				ABR port connection	11	13
				PAB port connection	15	11
	Manifold	MW4G2 series	2-position		11	9 (12)
			3-position	CC	10	10
				ABR port connection	10	9 (12)
				PAB port connection	12	10

- The value in ( ) shows the value when the valve for prevention of malfunction is not equipped.
- This is the value when the connecting port diameter of A/B ports are ϕ8 of one-touch joint.

8.2 How to order

- Individual valve block with solenoid valve

NW 4 G A 2 1 0 – 06 – ※1 W H ——— 3

- Manifold

MW 4 G B 2 1 0 – C8 – T10 W H D – 5 – 3

(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k)

(a) Number of port		(b) Direction of piping		(c) Series model number		(d) Position type	
Symbol	Description	Symbol	Description	Symbol	Description	Symbol	Description
3	3-port valve	A	Top (Body porting)	2	MW4G2	1	2-position single operator
4	5-port valve	B	Sideways (Base piping)			2	2-position double operator
		Z	Rear side (Base piping)			3	3-position all ports blocked
						4	3-position ABR port connection
						5	3-position PAB port connection
						1	Normal close NC (in case of 3GA)
						11	Normal open NO (in case of 3GA)
						8	Mix manifold

(e) Connecting port diameter		(f) Electrical connections	(g)Pin layout		(h) Option	(i) Mount type		(j) Number of station	
Symbol	Description	Ref: Table 2	Symbol	Description	Ref: Table 2	Symbol	Description	Symbol	Description
CX	Mix		No mark	Standard wiring		No mark	Direct mount	2～	Number of station
Ref: Table 1			W	Double wiring		D	DIN rail mount		

(k) Rated voltage	
Symbol	Description
1	AC100V
3	DC24V
4	DC12V

Table 1: (e) Connecting port

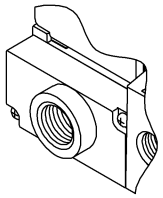
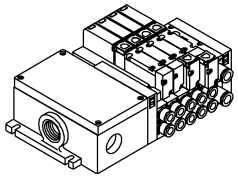
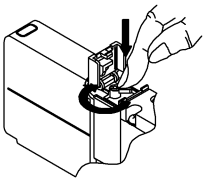
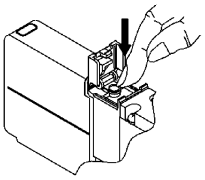
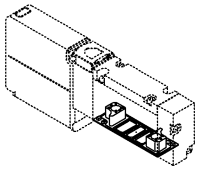
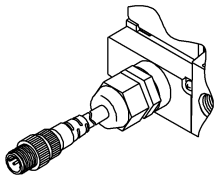
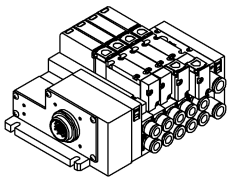
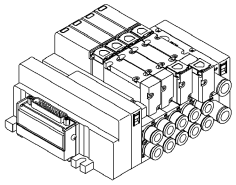
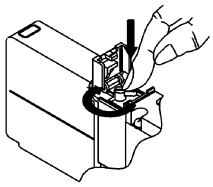
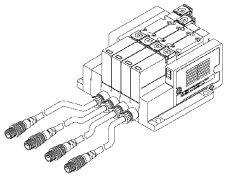
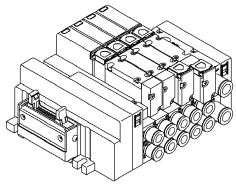
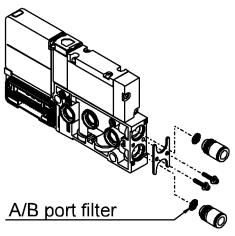
	Symbol	Connection specifications	MW4GA2	MW4GB2	MW4GZ2
A/B Port	C4	One-touch joint ϕ4	●	●	●
	C6	One-touch joint ϕ6	●	●	●
	C8	One-touch joint ϕ8	●	●	●
	06	Rc1/8	●		
	CL6	One-touch joint L-shape ϕ6		●	
	CL8	One-touch joint L-shape ϕ8		●	
P/R Port (one-touch joint)			ϕ8, ϕ8 L-shape ϕ10, ϕ10 L-shape		

※1 Please select the cable length of valve block. Selection Number for length: “2” to “8”

Note) Please select in advance a valve block with masking plate as a spare block, if any change in the specifications is expected in case of AC.

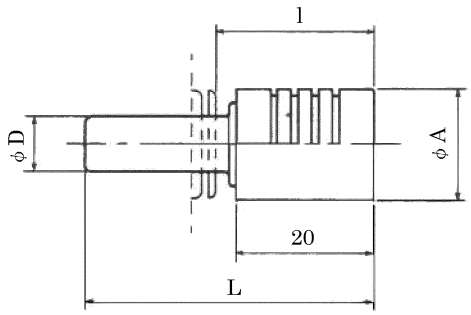
Confirm the catalogue in detail.

Table 2: (f) Electrical connections and (h) other options

<table>
<tr><th colspan="4">Electrical connections</th><th rowspan="3">Manual override</th><th colspan="4">Other options</th></tr>
<tr><th colspan="2">Individual</th><th colspan="2">Reduced wiring type manifold</th><th colspan="2" rowspan="2">M</th><th colspan="2" rowspan="2">H</th></tr>
<tr><th>No mark</th><th>Terminal strip</th><th>T10</th><th>One end port</th></tr>
<tr><td colspan="2">  </td><td colspan="2">  </td><td rowspan="3">●Common for non-locked and locked types (standard specifications)
 
①As a non-locked type, ON by PUSH and OFF when released
②As a locked type, ON is retained with PUSH + 90° rotation to the right, and the lock is released to OFF when rotated to the left.</td><td rowspan="2"> 
①ON by PUSH, OFF when released</td><td colspan="2"> 
Standard specifications for pilot exhaust</td></tr>
<tr><td>R1</td><td>I/O connector</td><td>T20</td><td>Multi-connector</td><td colspan="2">K</td><td colspan="2">External pilot</td></tr>
<tr><td colspan="2">●Length of lead wire 500mm
  </td><td colspan="2">  </td><td colspan="2">Individual circuit specifications for main pressure and pilot pressure</td><td colspan="2"></td></tr>
<tr><td colspan="2">Individual wiring type manifold</td><td>T30</td><td>D-sub connector</td><td colspan="2">M7</td><td colspan="2">Manual override with OFF function</td><td>A</td><td>Conforms to the regulations of Ozone layer/ Cutting oil</td></tr>
<tr><td>R1</td><td>With I/O connector cable</td><td colspan="2" rowspan="2">  </td><td colspan="2" rowspan="2">  </td><td colspan="2" rowspan="2">To select for conforming to the regulations against inflow of cutting oil and preservation of ozone layer</td><td colspan="2" rowspan="2"></td></tr>
<tr><td colspan="2">  </td></tr>
<tr><td colspan="2" rowspan="2"></td><td>T51/53</td><td>Flat cable connector</td><td colspan="2" rowspan="2"></td><td colspan="2" rowspan="2">①Normally, manual operation (Non-locked type) ON by PUSH and OFF when released
②Operation of OFF function (Locked type when energized)
To retain the pausing state of pilot air supply by PUSH + 90° rotation to the right direction
To release the lock and supply pilot air by rotating to the left</td><td>F</td><td>With built-in AB port filter</td></tr>
<tr><td colspan="2">  </td><td colspan="2"> 
A/B port filter</td></tr>
</table>

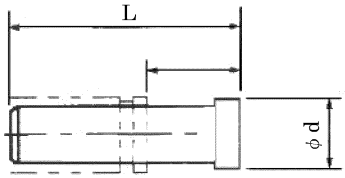
8.3 Accessories

1) Silencer



Model No.	D	L	l	A
SLW-H8	φ8	42	23	16
SLW-H10	φ10	53	34	20

2) Blank plug



Model No.	D	L	l	d
Joint GWP4-B	φ4	27	11	6
Joint GWP6-B	φ6	29	11.5	8
Joint GWP8-B	φ8	33	14	10
Joint GWP10-B	φ10	40	18.5	12

3) Tie rod

Model No.	Description
W4G2-TR-V1	For 1-station valve block (2 pieces)
W4G2-TR-Q	For supply/exhaust block (2 pieces)
W4G2-TR-S	For partition block (2 pieces)

8.4 Consumable parts

1) One-touch joint of cartridge type

Model name	Part name	Model number
4G2	φ4 straight type	4G2-joint-C4
	φ6 straight type	4G2-joint-C6
	φ8 straight type	4G2-joint-C8
	φ6 L type (facing upward)	4G2-joint-CL6、CLL6
	φ8 L type (facing upward)	4G2-joint-CL8、CLL8
	Plug cartridge	4G2-joint-CPG

2) Female adaptor kit

Model name	Kit model number	Parts set
4G2	4G2-Female Adaptor Kit	Female adaptor, gasket, 2 x fixing screws

3) Joint adaptor kit

Model name	Part name		Kit model number	Parts set
4G2	φ4 joint Adaptor kit	For NC	4G2- Joint Adaptor Kit -C4NC	Joint adaptor 2 x One-touch joint (1 x NC, 1 x NO) (1 x Plug cartridge for each NC and NO) Gasket Stopper pin 2 x Fixing screws
		For NO	4G2- Joint Adaptor Kit -C4NO	
			4G2- Joint Adaptor Kit -C4	
	φ6 joint Adaptor kit	For NC	4G2- Joint Adaptor Kit -C6NC	
		For NO	4G2- Joint Adaptor Kit -C6NO	
			4G2- Joint Adaptor Kit -C6	
	φ8 joint Adaptor kit	For NC	4G2- Joint Adaptor Kit -C8NC	
		For NO	4G2- Joint Adaptor Kit -C8NO	
			4G2- Joint Adaptor Kit -C8	

4) Plate kit

Model name	Kit model number	Parts set
4G2	4G2- Plate kit	Plate, gasket, 2 x fixing screws

5) Masking plate kit

Model name	Kit model number	Parts set
W4G2	W4G2-MP	Masking plate, gasket, PR check valve, 2 x fixing screws

6) Mounting fixture kit for DIN rail

(* 1 set of DIN mounting fixture is equivalent to 1 set for manifold.)

Model name	Kit model number	Parts set
W4G2	W4G2-D	2 x Mounting fixtures, 4 x fixing screws

7) DIN rail

Model name	Kit model number
4G	N4G-BAA(Length)