CKD

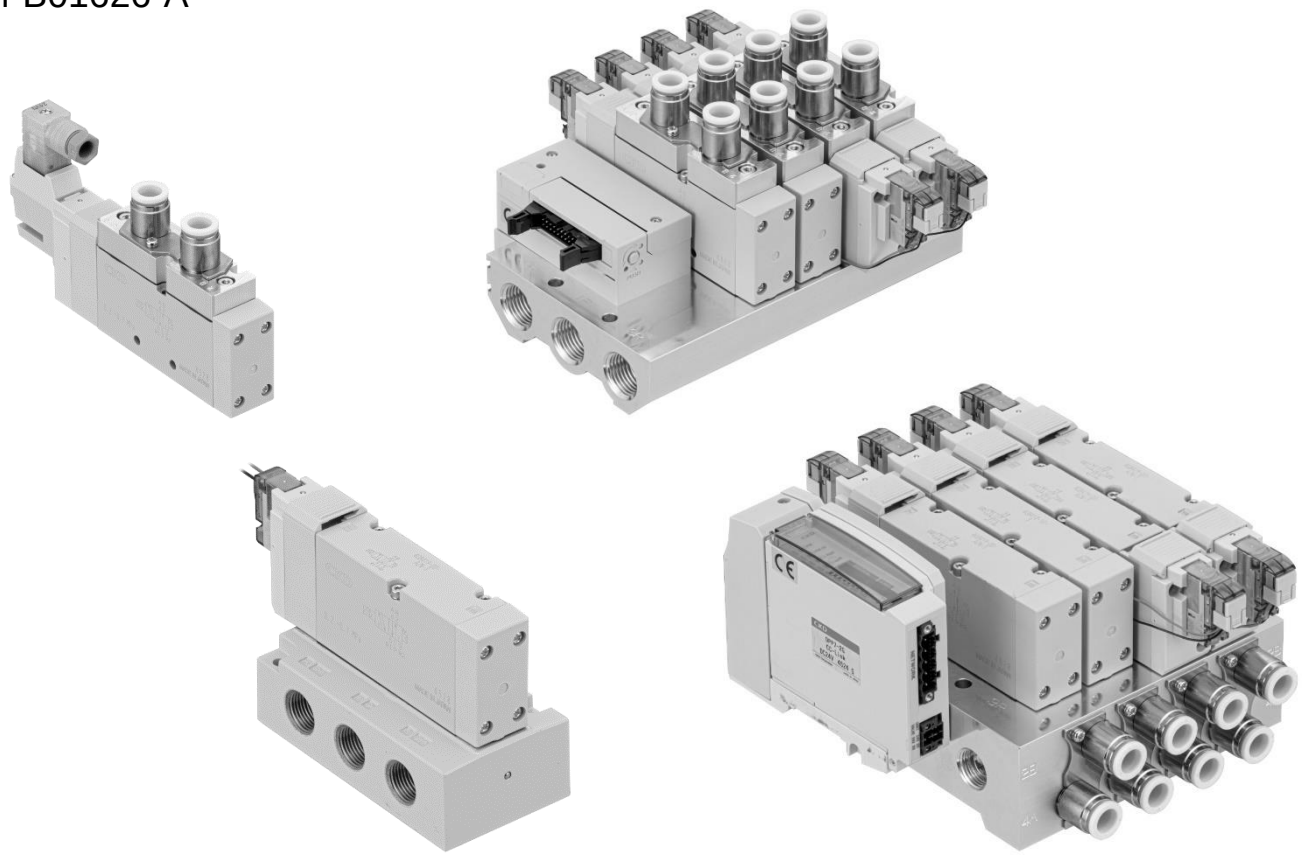
# 3, 5-PORT PNEUMATIC SOLENOID VALVE

## (M)4GA/B4 R SERIES

**- Single Valve**
**- Manifold (Metal Base)**

# INSTRUCTION MANUAL

SM-B01626-A



- Read this Instruction Manual before using the product.
- Read the safety notes carefully.
- Keep this Instruction Manual in a safe and convenient place for future reference.

**CKD Corporation**

# PREFACE

Thank you for purchasing CKD's **3, 5-port pneumatic solenoid valve**. This Instruction Manual contains basic matters such as installation and usage instructions in order to ensure optimal performance of the product. Please read this Instruction Manual thoroughly and use the product properly.
Keep this Instruction Manual in a safe place and be careful not to lose it.

Product specifications and appearances presented in this Instruction Manual are subject to change without notice.

- The product, which uses control valves such as solenoid valves, motor valves, and air operated valves, is intended for users who have basic knowledge about materials, fluids, piping, and electricity. CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training with respect to control valves.
- Since there are a wide variety of customer applications, it is impossible for CKD to be aware of all of them. Depending on the application or usage, the product may not be able to exercise its full performance or an accident may occur due to fluid, piping, or other conditions. It is the responsibility of the customer to check the product specifications and decide how the product shall be used in accordance with the application and usage.

# SAFETY INFORMATION

When designing and manufacturing any device incorporating the product, the manufacturer has an obligation to ensure that the device is safe. To that end, make sure that the safety of the machine mechanism of the device, the pneumatic or water control circuit, and the electric system that controls such mechanism is ensured.

To ensure the safety of device design and control, observe organization standards, relevant laws and regulations, which include the following:

ISO 4414, JIS B 8370, JFPS 2008 (the latest edition of each standard),
the High Pressure Gas Safety Act, the Industrial Safety and Health Act, other safety rules, organization standards, relevant laws and regulations

In order to use our products safely, it is important to select, use, handle, and maintain the products properly.
Observe the warnings and precautions described in this Instruction Manual to ensure device safety.

Although various safety measures have been adopted in the product, customer's improper handling may lead to an accident. To avoid this:

**Thoroughly read and understand this Instruction Manual before using the product.**

To explicitly indicate the severity and likelihood of a potential harm or damage, precautions are classified into three categories: "DANGER", "WARNING", and "CAUTION".

| | |
|---|---|
| ⚠ **DANGER** | Indicates an imminent hazard. Improper handling will cause death or serious injury to people. |
| ⚠ **WARNING** | Indicates a potential hazard. Improper handling may cause death or serious injury to people. |
| ⚠ **CAUTION** | Indicates a potential hazard. Improper handling may cause injury to people or damage to property. |

Precautions classified as "CAUTION" may still lead to serious results depending on the situation.
All precautions are equally important and must be observed.

Other general precautions and tips on using the product are indicated by the following icon.

| | |
|---|---|
|  | Indicates general precautions and tips on using the product. |

# Precautions on Product Use

## ⚠ WARNING

**The product must be handled by a qualified person who has extensive knowledge and experience.**

The product is designed and manufactured as a device or part for general industrial machinery.

**Use the product within the specifications.**

The product must not be used beyond its specifications. Also, the product must not be modified and additional work on the product must not be performed.

The product is intended for use in devices or parts for general industrial machinery. It is not intended for use outdoors or in the conditions or environment listed below.

(Exception is made if the customer consults with CKD prior to use and understands the specifications of the product. However, even in that case, safety measures must be taken to avoid danger in case of a possible failure.)

- In applications for nuclear power, railroad system, aviation, ship, vehicle, medical equipment, and equipment that directly touches beverage or food.
- For special applications that require safety including amusement equipment, emergency shut-off circuit, press machine, brake circuit, and safety measures.
- For applications where life or properties may be adversely affected and special safety measures are required.

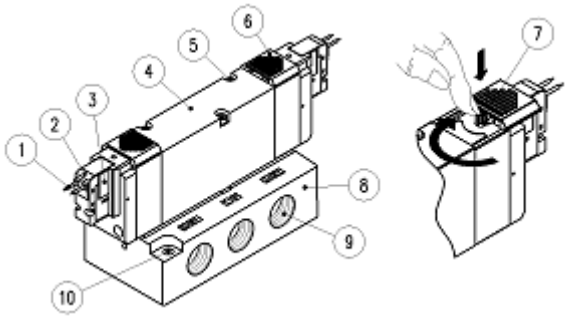
**Do not handle the product or remove pipes and devices until confirming safety.**

- Inspect and service the machine and devices after confirming the safety of the entire system. Also, turn off the energy source (air supply or water supply) and power to the relevant facility. Release compressed air from the system and use extreme care to avoid water or electric leakage.
- Since there may be hot or live parts even after operation has stopped, use extreme care when handling the product or removing pipes and devices.
- When starting or restarting a machine or device that incorporates pneumatic components, make sure that a safety measure (such as a pop-out prevention mechanism) is in place and system safety is secured.

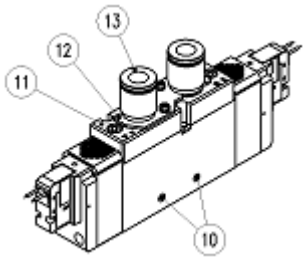
# CONTENTS

# 1. PRODUCT OVERVIEW

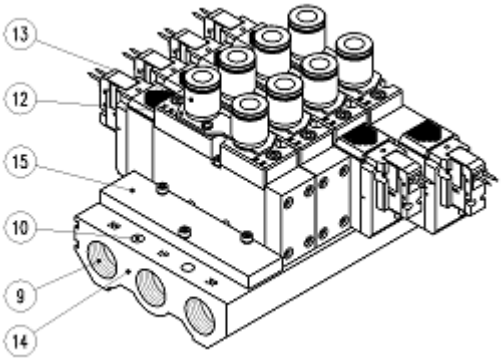
## 1.1 Part Name



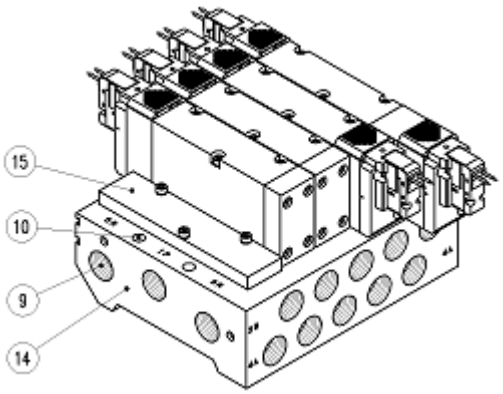

Single valve (base piping)



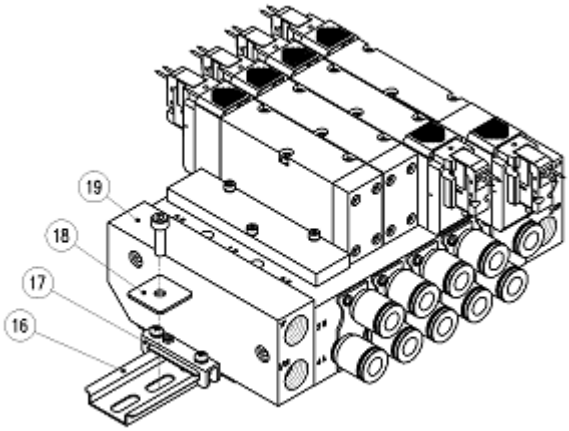

Single valve (body piping)



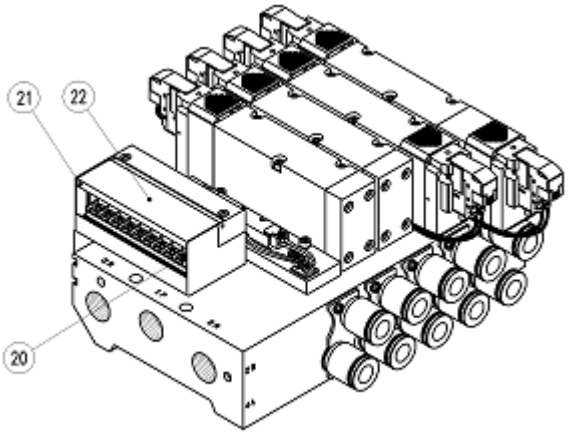

Individual wiring manifold
(body piping)



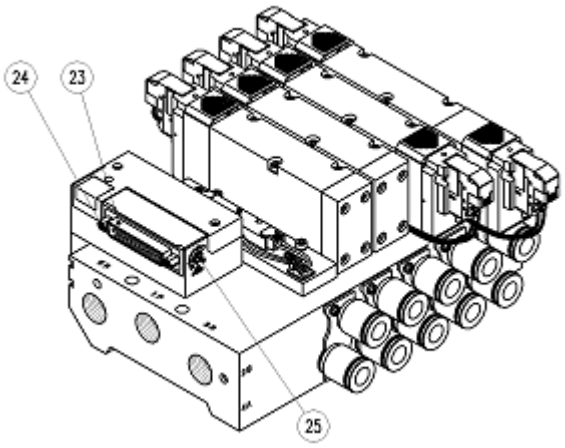

Individual wiring manifold
(direct piping)



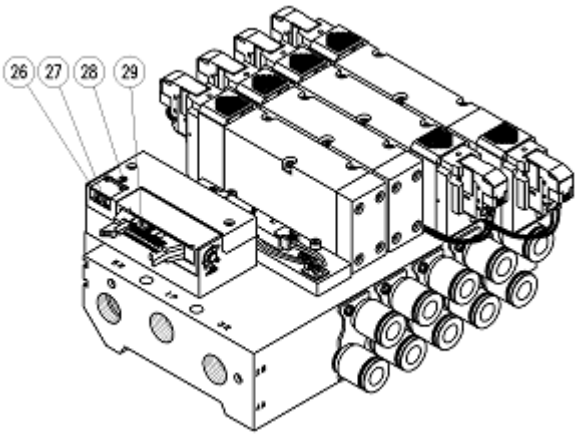

Individual wiring manifold
(DIN rail mount)



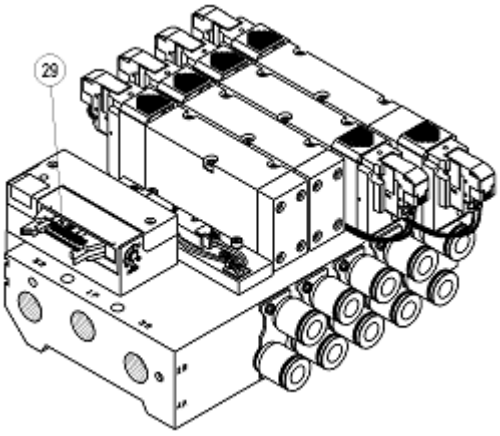

Common terminal block (T10)
M3 thread fastening type



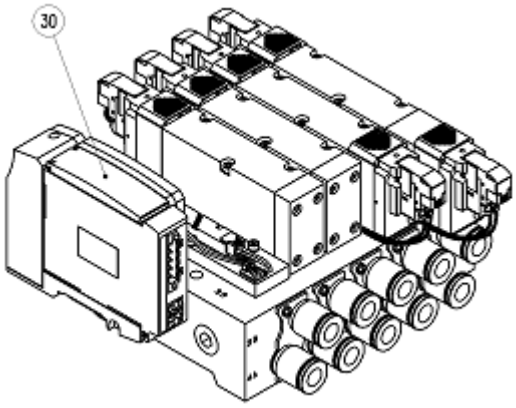

D-sub connector (T30)



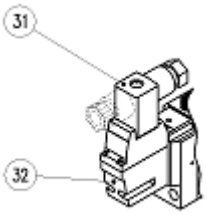

Flat cable connector (T50)



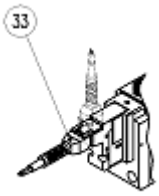

Flat cable connector (T51)




Serial transmission (T8)




DIN terminal box (B)

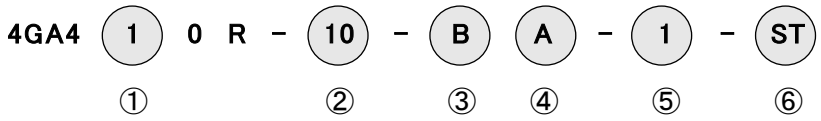



Socket with cover (EJ)

| No. | Part name | Description |
|---|---|---|
| 1 | Lead wire | Wire which has no polarity. |
| 2 | Electrical component cover | Cover provided with a power indicator on the top surface which lights green while the coil is energized (only for E-type and A-type connectors). |
| 3 | Coil assembly | Coil assembly which varies depending on the type of electrical connection and voltage selected for the valve.<br>Not interchangeable with No. 32. |
| 4 | Single valve | Valve equipped with a mechanism which opens/closes an air passage. |
| 5 | Single valve mounting screw | Screw used for securing a single valve to various bases (3 screws provided for each valve). |
| 6 | Manual protection cover | Cover which prevents accidental operation of the manual override and is opened to operate the manual override. |
| 7 | Manual override | Manual operation device which has both locking and non-locking overrides. |
| 8 | Subplate | Subplate which comes assembled to a base piping type single valve. |
| 9 | Piping port | Port provided for supply, indicated by 1(P); for exhaust, indicated by 3(R2) or 5(R1); for output, indicated by 2(B) or 4(A). |
| 10 | Mounting hole | Hole used for direct mounting. |
| 11 | Pipe adaptor | Adaptor which comes assembled to a body piping type single valve. |
| 12 | Fitting stopper plate | Plate used for securing a cartridge type fitting. |
| 13 | Fitting | Cartridge type push-in fitting which can be replaced. |
| 14 | Manifold base | Metal base manifold provided with multiple piping ports. |
| 15 | Masking plate | Plate replaced by a single valve when adding a valve. |
| 16 | DIN rail | Rail which complies with DIN standard (German Industry Standard) and is used for mounting a solenoid valve. Made of steel. |
| 17 | Retainer | Fixture used for securing a manifold base to a DIN rail. |
| 18 | Square washer | Washer used for fixing DIN rails. |
| 19 | Air supply and exhaust block | Block used for assembling DIN rail mount type. |
| 20 | Terminal block | Connector block provided with a set of terminals for controlling the manifold valves. |
| 21 | Cover | Cover which is opened to work on wiring and must be closed before energization in order to avoid an electric shock. |
| 22 | Terminal block layout | Diagram which indicates the layout of the terminal block and on which notes can be written. |
| 23 | D-sub 25-pin connector | Connector block provided with a set of terminals for controlling the manifold valves. |
| 24 | Mounting screw | Screw used for securing the connectors (screw size is M2.6). |
| 25 | Connector rotation button | Button used for changing the direction of the connector wiring upward or sideways.<br>Pressing in the button releases the lock and allows the connector to rotate.<br>Rotating the connector to a predetermined position pushes out the button and locks the connector. |
| 26 | Power supply terminal block | Terminal block used when an external power supply is required. |
| 27 | Power polarity marking | Marking which indicates the power polarity (▽ mark indicates the ground side). |
| 28 | Power indicator | Indicator which lights up when power is supplied with right polarity. |
| 29 | Flat cable connector | Connector block provided with a set of terminals for controlling the manifold valves. |
| 30 | Serial transmission slave unit | Slave unit specifically designed for manifold manufactured by CKD. |
| 31 | DIN terminal box | Terminal box provided with a power indicator which lights green while the coil is energized. |
| 32 | Coil assembly | Coil assembly provided for DIN terminal box type valve. Not interchangeable with No. 3. |
| 33 | Socket with cover | Socket provided with a covered cabtyre cable (only for EJ-type connectors). |

# 1.2 Model Number Indication

## 1.2.1 Single valve: Body piping




| (1) Solenoid position | | (2) Port size | (3) Wiring connection | (4) Option | (5) Voltage | | (6) Special specifications | |
|---|---|---|---|---|---|---|---|---|
| Symbol | Description | Note 1 | Note 2 | Note 3 | Symbol | Description | Symbol | Description |
| 1 | 2-position single | | | | 1 | 100 VAC | Blank | Standard |
| 2 | 2-position double | | | | 2 | 200 VAC | P4 | Rechargeable battery compatible specifications |
| 3 | 3-position All ports closed | | | | 3 | 24 VDC | ST | CE marking compatible specifications |
| 4 | 3-position A, B, R connection | | | | 4 | 12 VDC | | |
| 5 | 3-position P, A, B connection | | | | 5 | 110 VAC | | |

Note 1: (2) Port size

| Symbol | Description | |
|---|---|---|
| Variation | Ports 4(A), 2(B) | Ports 1(P), 5(R1), 3(R2) |
| C8 | ø8 push-in fitting | Rc1/4 |
| C10 | ø10 push-in fitting | Rc1/4 |
| C12 | ø12 push-in fitting | Rc1/4 |
| 10 | Rc3/8 | Rc1/4 |
| 10G | G3/8 | G1/4 |
| 10N | NPT3/8 | NPT1/4 |

Note 2: (3) Wiring connection

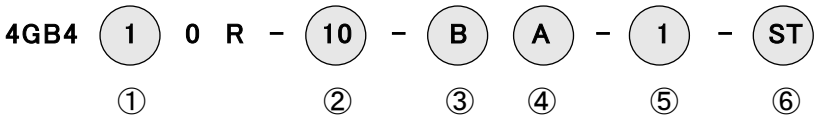
| Symbol | Description | |
|---|---|---|
| **Lead wire, DIN terminal box** | | |
| Blank | Grommet lead wire (300 mm) | |
| B | DIN terminal box (Pg7) | With surge suppressor/lamp |
| BN | DIN terminal box (Pg7) (without terminal box) | With surge suppressor |
| **E-type connector (top and side socket entries)** | | |
| E0 | Lead wire (300 mm) | |
| E00 | Lead wire (500 mm) | |
| E01 | Lead wire (1000 mm) | |
| E02 | Lead wire (2000 mm) | |
| E03 | Lead wire (3000 mm) | |
| E0N | Without lead wire (without socket) | |
| E1 | Without lead wire (with socket/terminal) | |
| E2 | Lead wire (300 mm) | With surge suppressor/lamp |
| E20 | Lead wire (500 mm) | With surge suppressor/lamp |
| E21 | Lead wire (1000 mm) | With surge suppressor/lamp |
| E22 | Lead wire (2000 mm) | With surge suppressor/lamp |
| E23 | Lead wire (3000 mm) | With surge suppressor/lamp |
| E2N | Without lead wire (without socket) | With surge suppressor/lamp |
| E3 | Without lead wire (with socket/terminal) | With surge suppressor/lamp |
| **EJ-type connector (socket with cover, top and side socket entries)** | | |
| E01J | Lead wire (1000 mm) | |
| E02J | Lead wire (2000 mm) | |
| E03J | Lead wire (3000 mm) | |
| E21J | Lead wire (1000 mm) | With surge suppressor/lamp |
| E22J | Lead wire (2000 mm) | With surge suppressor/lamp |
| E23J | Lead wire (3000 mm) | With surge suppressor/lamp |

Note 3: (4) Option

| Symbol | Description |
|---|---|
| Blank | Standard |
| A | Cutting oil proof |
| S | Surgeless |
| E | Low heat generating/energy saving circuit |
| F | Built-in A/B-port filter |

For precautions on selecting the model number, refer to the catalog.

## 1.2.2 Single valve: Base piping




| (1) Solenoid position | | (2) Port size | (3) Wiring connection | (4) Option | (5) Voltage | | (6) Special specifications | |
|---|---|---|---|---|---|---|---|---|
| Symbol | Description | Note 1 | Note 2 | Note 3 | Symbol | Description | Symbol | Description |
| 1 | 2-position single | | | | 1 | 100 VAC | Blank | Standard |
| 2 | 2-position double | | | | 2 | 200 VAC | P4 | Rechargeable battery compatible specifications |
| 3 | 3-position All ports closed | | | | 3 | 24 VDC | ST | CE marking compatible specifications |
| 4 | 3-position A, B, R connection | | | | 4 | 12 VDC | | |
| 5 | 3-position P, A, B connection | | | | 5 | 110 VAC | | |

Note 1: (2) Port size

| Symbol | Description | |
|---|---|---|
| Variation | Ports 4(A), 2(B) | Ports P, R1, R2 |
| 10 | Rc3/8 | Rc3/8 |
| 15 | Rc1/2 | Rc1/2 |
| 10G | G3/8 | G3/8 |
| 15G | G1/2 | G1/2 |
| 10N | NPT3/8 | NPT3/8 |
| 15N | NPT1/2 | NPT1/2 |

Note 2: (3) Wiring connection

| Symbol | Description | |
|---|---|---|
| **Lead wire, DIN terminal box** | | |
| Blank | Grommet lead wire (300 mm) | |
| B | DIN terminal box (Pg7) | With surge suppressor/lamp |
| BN | DIN terminal box (Pg7) (without terminal box) | With surge suppressor |
| **E-type connector (top and side socket entries)** | | |
| E0 | Lead wire (300 mm) | |
| E00 | Lead wire (500 mm) | |
| E01 | Lead wire (1000 mm) | |
| E02 | Lead wire (2000 mm) | |
| E03 | Lead wire (3000 mm) | |
| E0N | Without lead wire (without socket) | |
| E1 | Without lead wire (with socket/terminal) | |
| E2 | Lead wire (300 mm) | With surge suppressor/lamp |
| E20 | Lead wire (500 mm) | With surge suppressor/lamp |
| E21 | Lead wire (1000 mm) | With surge suppressor/lamp |
| E22 | Lead wire (2000 mm) | With surge suppressor/lamp |
| E23 | Lead wire (3000 mm) | With surge suppressor/lamp |
| E2N | Without lead wire (without socket) | With surge suppressor/lamp |
| E3 | Without lead wire (with socket/terminal) | With surge suppressor/lamp |

| EJ-type connector (socket with cover, top and side socket entries) | | |
|---|---|---|
| E01J | Lead wire (1000 mm) | |
| E02J | Lead wire (2000 mm) | |
| E03J | Lead wire (3000 mm) | |
| E21J | Lead wire (1000 mm) | With surge suppressor/lamp |
| E22J | Lead wire (2000 mm) | With surge suppressor/lamp |
| E23J | Lead wire (3000 mm) | With surge suppressor/lamp |

Note 3: (4) Option

| Symbol | Description |
|---|---|
| Blank | Standard |
| K | External pilot |
| A | Cutting oil proof |
| S | Surgeless |
| E | Low heat generating/energy saving circuit |
| F | Built-in A/B-port filter |

For precautions on selecting the model number, refer to the catalog.

## 1.2.3 Individual wiring manifold: Body piping

### ■ Manifold model no.

M4GA4 ① 0 R – ② – ③ ④ – ⑤ – ⑥ – ⑦

① 1
② 10
③ B
④ A
⑤ 3
⑥ 1
⑦ ST

### ■ Single valve for mounting on base

4GA4 ① 9 R – ② – ③ ④ – ⑥ – ⑦

① 1
② 10
③ B
④ A
⑥ 1
⑦ ST

| (1) Solenoid position | | (2) Port size | (3) Wiring connection | (4) Option | (5) Number of stations | | (6) Voltage | | (7) Special specifications | |
|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | Description | Note 1 | Note 2 | Note 3 | Symbol | Description | Symbol | Description | Symbol | Description |
| 1 | 2-position single | | | | 2 | 2 stations | 1 | 100 VAC | Blank | Standard |
| 2 | 2-position double | | | | to | to | 2 | 200 VAC | P4 | Rechargeable battery compatible specifications |
| 3 | 3-position All ports closed | | | | 15 | 15 stations | 3 | 24 VDC | ST | CE marking compatible specifications |
| 4 | 3-position A, B, R connection | | | | | | 4 | 12 VDC | | |
| 5 | 3-position P, A, B connection | | | | | | 5 | 110 VAC | | |
| 8 | Mixed manifold | | | | | | | | | |

Note 1: (2) Port size

| Symbol | Description | |
|---|---|---|
| Variation | Ports 4(A), 2(B) | Ports 1(P), 5(R1), 3(R2) |
| C8 | ø8 push-in fitting | Rc1/2 |
| C10 | ø10 push-in fitting | Rc1/2 |
| C12 | ø12 push-in fitting | Rc1/2 |
| CX | Mix push-in fitting | Rc1/2 |
| 10 | Rc3/8 | Rc1/2 |
| 10G | G3/8 | G1/2 |
| 10N | NPT3/8 | NPT1/2 |

Note 2: (3) Wiring connection

| Symbol | Description | |
|---|---|---|
| **Lead wire, DIN terminal box** | | |
| Blank | Grommet lead wire (300 mm) | |
| B | DIN terminal box (Pg7) | With surge suppressor/lamp |
| BN | DIN terminal box (Pg7) (without terminal box) | With surge suppressor |
| **E-type connector (top and side socket entries)** | | |
| E0 | Lead wire (300 mm) | |
| E00 | Lead wire (500 mm) | |
| E01 | Lead wire (1000 mm) | |
| E02 | Lead wire (2000 mm) | |
| E03 | Lead wire (3000 mm) | |
| E0N | Without lead wire (without socket) | |
| E1 | Without lead wire (with socket/terminal) | |
| E2 | Lead wire (300 mm) | With surge suppressor/lamp |
| E20 | Lead wire (500 mm) | With surge suppressor/lamp |
| E21 | Lead wire (1000 mm) | With surge suppressor/lamp |
| E22 | Lead wire (2000 mm) | With surge suppressor/lamp |
| E23 | Lead wire (3000 mm) | With surge suppressor/lamp |
| E2N | Without lead wire (without socket) | With surge suppressor/lamp |
| E3 | Without lead wire (with socket/terminal) | With surge suppressor/lamp |
| **EJ-type connector (socket with cover, top and side socket entries)** | | |
| E01J | Lead wire (1000 mm) | |
| E02J | Lead wire (2000 mm) | |
| E03J | Lead wire (3000 mm) | |
| E21J | Lead wire (1000 mm) | With surge suppressor/lamp |
| E22J | Lead wire (2000 mm) | With surge suppressor/lamp |
| E23J | Lead wire (3000 mm) | With surge suppressor/lamp |

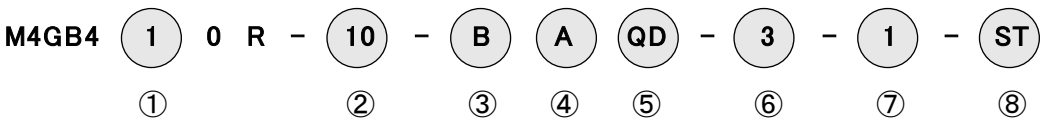
Note 3: (4) Option

| Symbol | Description |
|---|---|
| Blank | Standard |
| A | Cutting oil proof |
| S | Surgeless |
| E | Low heat generating/energy saving circuit |
| F | Built-in A/B-port filter |
| Z1 | Air supply spacer |
| Z3 | Exhaust spacer |

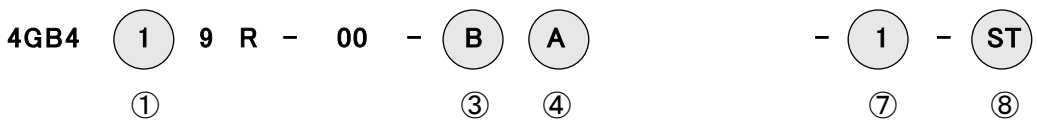
For precautions on selecting the model number, refer to the catalog.

## 1.2.4 Individual wiring manifold: Base piping

### ■ Manifold model no.




### ■ Single valve for mounting on base



| (1) Solenoid position | | (2) Port size | (3) Wiring connection | (4) Option | (5) Mount type | | (6) Number of stations | |
|---|---|---|---|---|---|---|---|---|
| Symbol | Description | Note 1 | Note 2 | Note 3 | Symbol | Description | Symbol | Description |
| 1 | 2-position single | | | | Blank | Direct mount | 2 | 2 stations |
| 2 | 2-position double | | | | QD | DIN rail mount | to | to |
| 3 | 3-position All ports closed | | | | | | 15 | 15 stations |
| 4 | 3-position A, B, R connection | | | | | | | |
| 5 | 3-position P, A, B connection | | | | | | | |
| 8 | Mixed manifold | | | | | | | |

| (7) Voltage | | (8) Special specifications | |
|---|---|---|---|
| Symbol | Description | Symbol | Description |
| 1 | 100 VAC | Blank | Standard |
| 2 | 200 VAC | P4 | Rechargeable battery compatible specifications |
| 3 | 24 VDC | ST | CE marking compatible specifications |
| 4 | 12 VDC | | |
| 5 | 110 VAC | | |

Note 1: (2) Port size

| Symbol | Description | | |
|---|---|---|---|
| Variation | Ports 4(A), 2(B) | Ports P, R1, R2 | |
| | | Option: other than K | Option: K |
| C8 | ø8 push-in fitting | Rc3/8 | Rc1/2 |
| C10 | ø10 push-in fitting | Rc3/8 | Rc1/2 |
| C12 | ø12 push-in fitting | Rc3/8 | Rc1/2 |
| CX | Mix push-in fitting | Rc3/8 | Rc1/2 |
| 08 | Rc1/4 | Rc3/8 | Rc1/2 |
| 10 | Rc3/8 | Rc3/8 | Rc1/2 |
| 15 | Rc1/2 | Rc1/2 | Rc1/2 |
| 08G | G1/4 | G3/8 | G1/2 |
| 10G | G3/8 | G3/8 | G1/2 |
| 15G | G1/2 | G1/2 | G1/2 |
| 08N | NPT1/4 | NPT3/8 | NPT1/2 |
| 10N | NPT3/8 | NPT3/8 | NPT1/2 |
| 15N | NPT1/2 | NPT1/2 | NPT1/2 |

Note 2: (3) Wiring connection

| Symbol | Description | |
|---|---|---|
| **Lead wire, DIN terminal box** | | |
| Blank | Grommet lead wire (300 mm) | |
| B | DIN terminal box (Pg7) | With surge suppressor/lamp |
| BN | DIN terminal box (Pg7) (without terminal box) | With surge suppressor |
| **E-type connector (top and side socket entries)** | | |
| E0 | Lead wire (300 mm) | |
| E00 | Lead wire (500 mm) | |
| E01 | Lead wire (1000 mm) | |
| E02 | Lead wire (2000 mm) | |
| E03 | Lead wire (3000 mm) | |
| E0N | Without lead wire (without socket) | |
| E1 | Without lead wire (with socket/terminal) | |
| E2 | Lead wire (300 mm) | With surge suppressor/lamp |
| E20 | Lead wire (500 mm) | With surge suppressor/lamp |
| E21 | Lead wire (1000 mm) | With surge suppressor/lamp |
| E22 | Lead wire (2000 mm) | With surge suppressor/lamp |
| E23 | Lead wire (3000 mm) | With surge suppressor/lamp |
| E2N | Without lead wire (without socket) | With surge suppressor/lamp |
| E3 | Without lead wire (with socket/terminal) | With surge suppressor/lamp |

| EJ-type connector (socket with cover, top and side socket entries) | | |
|---|---|---|
| E01J | Lead wire (1000 mm) | |
| E02J | Lead wire (2000 mm) | |
| E03J | Lead wire (3000 mm) | |
| E21J | Lead wire (1000 mm) | With surge suppressor/lamp |
| E22J | Lead wire (2000 mm) | With surge suppressor/lamp |
| E23J | Lead wire (3000 mm) | With surge suppressor/lamp |

Note 3: (4) Option

| Symbol | Description |
|---|---|
| Blank | Standard |
| K | External pilot |
| A | Cutting oil proof |
| S | Surgeless |
| E | Low heat generating/energy saving circuit |
| F | Built-in A/B-port filter |
| Z1 | Air supply spacer |
| Z3 | Exhaust spacer |

For precautions on selecting the model number, refer to the catalog.

## 1.2.5 Reduced wiring manifold: Body piping

### ■ Manifold model no.

M4GA4 ① 0 R – ② – ③ ④ ⑤ – ⑥ – ⑦ – ⑧

① = 1

② = 10

③ = T10

④ = W

⑤ = A

⑥ = 3

⑦ = 3

⑧ = P4

### ■ Single valve for mounting on base

4GA4 ① 9 R – ② – A2N ⑤ – ⑦ – ⑧

① = 1

② = 10

⑤ = A

⑦ = 3

⑧ = P4

| (1) Solenoid position | | (2) Port size | (3) Wiring connection | (4) Terminal/connector pin layout | | (5) Option | (6) Number of stations | |
|---|---|---|---|---|---|---|---|---|
| Symbol | Description | Note 1 | Note 2 | Symbol | Description | Note 3 | Symbol | Description |
| 1 | 2-position single | | | Blank | Standard wiring | | 2 | 2 |
| 2 | 2-position double | | | W | Double wiring | | to | to |
| 3 | 3-position All ports closed | | | | | | 15 | 15 stations |
| 4 | 3-position A, B, R connection | | | | | | | |
| 5 | 3-position P, A, B connection | | | | | | | |
| 8 | Mixed manifold | | | | | | | |

| (7) Voltage | | (8) Special specifications | |
|---|---|---|---|
| Symbol | Description | Symbol | Description |
| 3 | 24 VDC | Blank | Standard |
| 4 | 12 VDC | P4 | Rechargeable battery compatible specifications |

Note 1: (2) Port size

| Symbol | Description | |
|---|---|---|
| Variation | Ports 4(A), 2(B) | Ports 1(P), 5(R1), 3(R2) |
| C8 | ø8 push-in fitting | Rc1/2 |
| C10 | ø10 push-in fitting | Rc1/2 |
| C12 | ø12 push-in fitting | Rc1/2 |

| Symbol | Description | |
|---|---|---|
| Variation | Ports 4(A), 2(B) | Ports 1(P), 5(R1), 3(R2) |
| CX | Mix push-in fitting | Rc1/2 |
| 10 | Rc3/8 | Rc1/2 |
| 10G | G3/8 | G1/2 |
| 10N | NPT3/8 | NPT1/2 |

Note 2: (3) Wiring connection

| Symbol | Description | |
|---|---|---|
| T10 | Common terminal block (M3 thread) | Left side connection |
| T10R | | Right side connection |
| T11 | Common terminal block (clamping) | Left side connection |
| T11R | | Right side connection |
| T30 | D-sub connector | Left side connection |
| T30R | | Right side connection |
| T50 | 20-pin flat cable connector (with power supply terminal) | Left side connection |
| T50R | | Right side connection |
| T51 | 20-pin flat cable connector (without power supply terminal) | Left side connection |
| T51R | | Right side connection |
| T52 | 10-pin flat cable connector (without power supply terminal) | Left side connection |
| T52R | | Right side connection |
| T53 | 26-pin flat cable connector (without power supply terminal) | Left side connection |
| T53R | | Right side connection |
| T8D2 | DeviceNet | NPN 32 points |
| T8DP2 | | PNP 32 points |
| T8G2 | CC-Link | NPN 32 points |
| T8GP2 | | PNP 32 points |
| T8P2 | PROFIBUS-DP | NPN 32 points |
| T8PP2 | | PNP 32 points |
| T8EC2 | EtherCAT | NPN 32 points |
| T8ECP2 | | PNP 32 points |
| T8EN2 | EtherNet/IP | NPN 32 points |
| T8ENP2 | | PNP 32 points |
| T8EB2 | CC-Link IEF Basic | NPN 32 points |
| T8EBP2 | | PNP 32 points |
| T8EF2 | CC-Link IE Field | NPN 32 points |
| T8EFP2 | | PNP 32 points |
| T8EP2 | PROFINET | NPN 32 points |
| T8EPP2 | | PNP 32 points |
| T8KC2 | IO - Link | NPN 32 points |
| T8KCP2 | | PNP 32 points |
| T8TG2 | CC - Link IE TSN | NPN 32 points |
| T8TGP2 | | PNP 32 points |
| A2N | Without lead wire (without socket) | With surge suppressor/lamp |

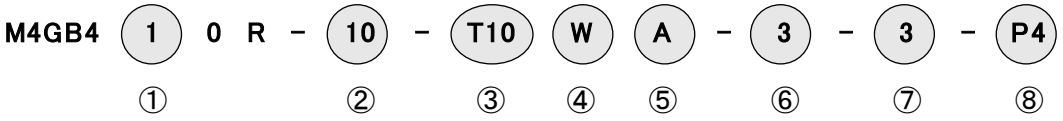
Note 3: (4) Option

| Symbol | Description |
|---|---|
| Blank | Standard |
| A | Cutting oil proof |
| S | Surgeless |
| E | Low heat generating/energy saving circuit |
| F | Built-in A/B-port filter |
| Z1 | Air supply spacer |
| Z3 | Exhaust spacer |

For precautions on selecting the model number, refer to the catalog.

## 1.2.6 Reduced wiring manifold: Base piping

### ■ Manifold model no.




### ■ Single valve for mounting on base


| (1) Solenoid position | | (2) Port size | (3) Wiring connection | (4) Terminal/connector pin layout | | (5) Option | (6) Number of stations | |
|---|---|---|---|---|---|---|---|---|
| Symbol | Description | Note 1 | Note 2 | Symbol | Description | Note 3 | Symbol | Description |
| 1 | 2-position single | | | Blank | Standard wiring | | 2 | 2 |
| 2 | 2-position double | | | W | Double wiring | | to | to |
| 3 | 3-position All ports closed | | | | | | 15 | 15 stations |
| 4 | 3-position A, B, R connection | | | | | | | |
| 5 | 3-position P, A, B connection | | | | | | | |
| 8 | Mixed manifold | | | | | | | |

| (7) Voltage | | (8) Special specifications | |
|---|---|---|---|
| Symbol | Description | Symbol | Description |
| 3 | 24 VDC | Blank | Standard |
| 4 | 12 VDC | P4 | Rechargeable battery compatible specifications |

Note 1: (2) Port size

| Symbol | Description | | |
|---|---|---|---|
| Variation | Ports 4(A), 2(B) | Ports P, R1, R2 | |
| | | Option: other than K | Option: K |
| C8 | ø8 push-in fitting | Rc3/8 | Rc1/2 |
| C10 | ø10 push-in fitting | Rc3/8 | Rc1/2 |
| C12 | ø12 push-in fitting | Rc3/8 | Rc1/2 |
| CX | Mix push-in fitting | Rc3/8 | Rc1/2 |
| 08 | Rc1/4 | Rc3/8 | Rc1/2 |
| 10 | Rc3/8 | Rc3/8 | Rc1/2 |
| 15 | Rc1/2 | Rc1/2 | Rc1/2 |
| 08G | G1/4 | G3/8 | G1/2 |
| 10G | G3/8 | G3/8 | G1/2 |
| 15G | G1/2 | G1/2 | G1/2 |
| 08N | NPT1/4 | NPT3/8 | NPT1/2 |
| 10N | NPT3/8 | NPT3/8 | NPT1/2 |
| 15N | NPT1/2 | NPT1/2 | NPT1/2 |

Note 2: (3) Wiring connection

| Symbol | Description | |
|---|---|---|
| T10 | Common terminal block (M3 thread) | Left side connection |
| T10R | | Right side connection |
| T11 | Common terminal block (clamping) | Left side connection |
| T11R | | Right side connection |
| T30 | D-sub connector | Left side connection |
| T30R | | Right side connection |
| T50 | 20-pin flat cable connector (with power supply terminal) | Left side connection |
| T50R | | Right side connection |
| T51 | 20-pin flat cable connector | Left side connection |

| Symbol | Description | |
|---|---|---|
| T51R | (without power supply terminal) | Right side connection |
| T52 | 10-pin flat cable connector (without power supply terminal) | Left side connection |
| T52R | | Right side connection |
| T53 | 26-pin flat cable connector (without power supply terminal) | Left side connection |
| T53R | | Right side connection |
| T8D2 | DeviceNet | NPN 32 points |
| T8DP2 | | PNP 32 points |
| T8G2 | CC-Link | NPN 32 points |
| T8GP2 | | PNP 32 points |
| T8P2 | PROFIBUS-DP | NPN 32 points |
| T8PP2 | | PNP 32 points |
| T8EC2 | EtherCAT | NPN 32 points |
| T8ECP2 | | PNP 32 points |
| T8EN2 | EtherNet/IP | NPN 32 points |
| T8ENP2 | | PNP 32 points |
| T8EB2 | CC-Link IEF Basic | NPN 32 points |
| T8EBP2 | | PNP 32 points |
| T8EF2 | CC-Link IE Field | NPN 32 points |
| T8EFP2 | | PNP 32 points |
| T8EP2 | PROFINET | NPN 32 points |
| T8EPP2 | | PNP 32 points |
| T8KC2 | IO - Link | NPN 32 points |
| T8KCP2 | | PNP 32 points |
| T8TG2 | CC - Link IE TSN | NPN 32 points |
| T8TGP2 | | PNP 32 points |
| A2N | Without lead wire (without socket) | With surge suppressor/lamp |

Note 3: (4) Option

| Symbol | Description |
|---|---|
| Blank | Standard |
| K | External pilot |
| A | Cutting oil proof |
| S | Surgeless |
| E | Low heat generating/energy saving circuit |
| F | Built-in A/B-port filter |
| Z1 | Air supply spacer |
| Z3 | Exhaust spacer |

For precautions on selecting the model number, refer to the catalog.

## 1.2.7 Related products

### ■ Air supply spacer

4GA4 – P – 10

① ②

| (1) Model | | (2) Port size | |
|---|---|---|---|
| Symbol | Description | Symbol | Description |
| 4GA4 | Body piping | 10 | Rc3/8 |
| 4GB4 | Base piping | 10G | G3/8 |
| | | 10N | NPT3/8 |

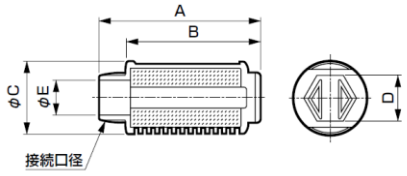
### ■ Exhaust spacer

4GA4 – R – 10

① ②

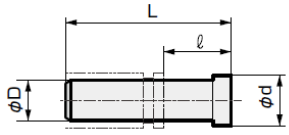
| (1) Model | | (2) Port size | |
|---|---|---|---|
| Symbol | Description | Symbol | Description |
| 4GA4 | Body piping | 10 | Rc3/8 |
| 4GB4 | Base piping | 10G | G3/8 |
| | | 10N | NPT3/8 |

### ■ Silencer




| Model number | Noise reduction effect dB(A) | Effective cross-sectional area mm² | A | B | C | D | E | Port size |
|---|---|---|---|---|---|---|---|---|
| SLW-6A | 30 or more | 10 | 34.5 | 28 | 16.5 | 10 | 7 | R1/8 |
| SLW-8A | 30 or more | 20 | 44.5 | 36 | 20 | 13 | 8.5 | R1/4 |
| SLW-8L | 30 or more | 30 | 57.4 | 48.5 | 25.5 | 17 | 8.5 | R1/4 |
| SLW-10A | 30 or more | 30 | 58.5 | 48.5 | 25.5 | 17 | 12 | R3/8 |
| SLW-10L | 30 or more | 60 | 68.2 | 58.4 | 28 | 19 | 12 | R3/8 |
| SLW-15A | 30 or more | 75 | 71.4 | 58.4 | 28 | 19 | 15 | R1/2 |

### ■ Blanking plug




| Model number | D | L | ℓ | d |
|---|---|---|---|---|
| GWP8-B | ø8 | 33 | 14 | 10 |
| GWP10-B | ø10 | 40 | 18.5 | 12 |
| GWP12-B | ø12 | 43 | 20 | 14 |

### ■ Screw plug

| Model number | Applicable port size |
|---|---|
| 4G4-8P | Rc1/4 |
| 4G4-10P | Rc3/8 |
| 4G4-15P | Rc1/2 |

For precautions on selecting the model number, refer to the catalog.

## ■ Masking plate kit (individual wiring)

| Model | Model number | Kit contents |
|---|---|---|
| 4GA4 | 4GA4-MP | Masking plate (1), gasket (1), mounting screw (3), O-ring (2), check valve (2) |
| 4GB4 | 4GB4-MP | Masking plate (1), gasket (1), mounting screw (3), O-ring (2), check valve (2) |

## ■ Masking plate kit (reduced wiring)

| Model | Model number | Kit contents |
|---|---|---|
| 4GA4 | 4GA4-MPC | Masking plate for reduced wiring (1), gasket (1), mounting screw (3), O-ring (2), check valve (2) |
| 4GB4 | 4GB4-MPC | Masking plate for reduced wiring (1), gasket (1), mounting screw (3), O-ring (2), check valve (2) |

## ■ Coil assembly

| Part name | Model number |
|---|---|
| Coil assembly (for individual wiring) (Grommet lead wire, E-type connector, EJ-type connector) | 4GR-[Electrical connection]-[Option]-COIL-[Rated voltage]<br>Rated voltage: 1:100 VAC, 2:200 VAC, 3:24 VDC, 4:12 VDC, 5:100 VAC<br>Option: Blank: Standard; A: Ozone-proof; S: Surgeless; E: Low heat generating/energy saving circuit; K: External pilot<br>Electrical connection: Blank: Grommet lead wire; E: E-type connector; EJ: EJ-type connector |
| Coil assembly (for individual wiring) (DIN terminal box type) | 4G4R-[Electrical connection]-[Option]-COIL-[Rated voltage]<br>Rated voltage: 1:100 VAC, 2:200 VAC, 3:24 VDC, 4:12 VDC, 5:100 VAC<br>Option: Blank: Standard; A: Ozone-proof; K: External pilot<br>Electrical connection: B: DIN terminal box is included.; BN: DIN terminal box is not included. |
| Coil assembly (for reduced wiring) | 4GR-A2N-[Option]-COIL-[Rated voltage]<br>Rated voltage: 3:24 VDC, 4:12 VDC<br>Option: Blank: Standard; A: Ozone-proof; S: Surgeless; E: Low heat generating/energy saving circuit; K: External pilot |

For precautions on selecting the model number, refer to the catalog.

## 1.2.8 Kit parts

### ■ Cartridge type push-in fitting

| Model | Part name | Model number |
|---|---|---|
| 4G4 | ø8 straight | 4G4-JOINT-C8 |
| 4G4 | ø10 straight | 4G4-JOINT-C10 |
| 4G4 | ø12 straight | 4G4-JOINT-C12 |

### ■ Fitting stopper plate kit

| Model | Model number | Kit contents |
|---|---|---|
| 4GA4 | 4GA4-JNT-STP-PLATE-KIT | Fitting stopper plate (1), mounting screw (2) |
| 4GB4 | 4GB4-JNT-STP-PLATE-KIT-1 *1 | Fitting stopper plate (1), mounting screw (2) |
| 4GB4 | 4GB4-JNT-STP-PLATE-KIT-2 *1 | Fitting stopper plate (1), mounting screw (2) |

*1: Select "4GB4-JNT-STP-PLATE-KIT-1" when the manifold P/R port is Rc3/8, G3/8, or NPT3/8, and "4GB4-JNT-STP-PLATE-KIT-2" when the manifold P/R port is Rc1/2, G1/2, or NPT1/2.

### ■ Fitting adaptor kit

| Model | Part name | Model number | Kit contents |
|---|---|---|---|
| 4GA4 | ø8 fitting adaptor kit | 4GA4-JNT-ADAPTOR-KIT-C8-Option *1 | Fitting adaptor (1), push-in fitting (2), fitting stopper plate (1), gasket (1), mounting screw (2), adaptor mounting screw (3) |
| 4GA4 | ø10 fitting adaptor kit | 4GA4-JNT-ADAPTOR-KIT-C10-Option *1 | |
| 4GA4 | ø12 fitting adaptor kit | 4GA4-JNT-ADAPTOR-KIT-C12-Option *1 | |

*1: When using built-in A/B-port filter type, specify option "F".

### ■ Internal thread adaptor kit

| Model | Model number | Kit contents |
|---|---|---|
| 4GA4 | 4GA4-FML-ADAPTOR-KIT-Port size-Option *1 | Internal thread adaptor (1), gasket (1), adaptor mounting screw (3) |

*1: When using built-in A/B-port filter type, specify option "F".

### ■ Subplate (for single valve)

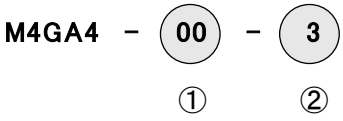
4G4-SUB-BASE - (10) - (F)

① ②

| (1) Port size | | (2) Option | |
|---|---|---|---|
| Symbol | Description | Symbol | Description |
| 10 | Rc3/8 | Blank | Standard |
| 15 | Rc1/2 | K | External pilot |
| 10G | G3/8 | F | Built-in P/A/B-port filter |
| 15G | G1/2 | | |
| 10N | NPT3/8 | | |
| 15N | NPT1/2 | | |

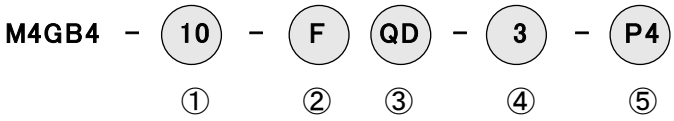
For precautions on selecting the model number, refer to the catalog.

## ■ Manifold subplate kit Individual wiring type: Body piping




| (1) Port size | | (2) Number of stations | |
|---|---|---|---|
| Symbol | Description | Symbol | Description |
| 00 | Rc screw | 2 | 2 stations |
| 00G | G screw | to | to |
| 00N | NPT screw | 15 | 15 stations |

## ■ Manifold subplate kit Individual wiring type: Base piping




| (1) Port size | (2) Option | | (3) Mount type | | (4) Number of stations | | (5) Special specifications | |
|---|---|---|---|---|---|---|---|---|
| Note 1 | Symbol | Description | Symbol | Description | Symbol | Description | Symbol | Description |
| | Blank | Standard | Blank | Direct mount | 2 | 2 stations | Blank | Standard |
| | K | External pilot | QD | DIN rail mount | to | to | P4 | Rechargeable battery compatible specifications |
| | F | A/B-port filter | | | 15 | 15 stations | | |

Note 1: Select from (2) Port size on page 9. However, "CX" cannot be selected.

## ■ Gasket

| Model | Model number |
|---|---|
| 4GA4 | 4GA4-GASKET |
| 4GB4 | 4GB4-GASKET |

## ■ PR check valve kit (2 per set)

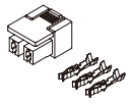
| Model | Model number |
|---|---|
| 4G4 | 4G4-PR |

## ■ Mounting screw (10 per set)

| Model | Model number |
|---|---|
| 4G4 | 4G4-SET-SCREW |

For precautions on selecting the model number, refer to the catalog.

## ■ Lead wire related parts

| Part name | Model number |
|---|---|
| E-type connector socket assembly | 4GR-SOCKET-ASSY-[Electrical connection]-[Rated voltage]<br>1:100 VAC<br>3:24 VDC<br>4:12 VDC<br>5:110 VAC<br>E: E-type connector |
| Socket set | 4GR-SOCKET-SET  |
| EJ-type connector socket assembly | 4GR-SOCKET-ASSY-[Electrical connection]<br>E J: EJ-type connector |
| DIN terminal box | 4GR-TERMINAL-BOX-[Rated voltage]<br>1:100 VAC<br>2:200 VAC<br>3:24 VDC<br>4:12 VDC<br>5:110 VAC |
| A-type connector socket assembly | 4G4-SOCKET-ASSY-A[Connection specifications][Solenoid position]-[Number of rows]<br>1: 1st row<br>to<br>15: 15th row<br>A: aSOL side<br>B: bSOL side<br>Blank: Left wiring specifications<br>R: Right wiring specifications |

For precautions on selecting the model number, refer to the catalog.

# 1.3 Specifications

## 1.3.1 Common specifications

| | | |
|---|---|---|
| **Model number** | | 4GA4, 4GB4 |
| **Valve type and operation** | | Pilot-operated soft spool valve |
| **Working fluid** | | Compressed air |
| **Max. working pressure** **MPa** | | 0.7 |
| **Min. working pressure** **MPa** | | 0.2 Note 5 |
| **Proof pressure** **MPa** | | 1.05 |
| **Ambient temperature** **ºC** | | -5 to 55 (no freezing) |
| **Fluid temperature** **ºC** | | 5 to 55 |
| **Manual override** | | Non-locking/locking combination type (standard) |
| **Pilot air exhaust method** | **Internal pilot** | Main valve/pilot valve common exhaust |
| | **External pilot** | Main valve/pilot valve individual exhaust |
| **Lubrication** **Note 1** | | Not required |
| **Degree of protection** **Note 2** | | Dust-proof |
| **Vibration resistance** **$m/s^2$ Note 3** | | 50 or less |
| **Shock resistance** **$m/s^2$ Note 4** | | 300 or less |
| **Atmosphere** | | Not for use in corrosive gas atmosphere |

Note 1: If lubrication is necessary, use Class 1 ISO VG 32 turbine oil.
Excessive or intermittent lubrication results in unstable operation.
Note 2: The degree of protection is for dust-proof. It is not splash-proof. Prevent water and oil from splashing onto the product.
DIN terminal box is rated IP65 (water-jet proof) provided that a cord (cable) with an appropriate outside diameter is used and the terminal box is secured in place with the specified tightening torque.
Note 3: Use DIN rail mount type with vibration of 30 $m/s^2$ or less.
Note 4: Use DIN rail mount type with an impact of 150 $m/s^2$ or less.
Note 5: Working pressure is 0 MPa to 0.7 MPa when the external pilot (option symbol: K) is selected. Set the external pilot pressure to a value between 0.2 MPa and 0.7 MPa.

## 1.3.2 Electrical specifications

| **Model number** | | 4GA4, 4GB4 | | | | |
|---|---|---|---|---|---|---|
| **Rated voltage** | | 24 VDC | 12 VDC | 100 VAC | 110 VAC | 200 VAC |
| **Voltage fluctuation range** | | ±10% | | | | |
| **Holding current A** **Note 1** | **Standard** | 0.015 (0.017) | 0.030 (0.034) | 0.009 (0.009) | 0.009 (0.009) | 0.006 (0.006) |
| | **With low heat generating/ energy saving circuit** | 0.005 | 0.010 | — | | |
| **Power consumption W** **Note 1** | **Standard** | 0.35(0.40) | | — | | |
| | **With low heat generating/ energy saving circuit** | 0.1 | | — | | |
| **Apparent power VA** **Note 1** | **Standard** | — | | 0.93 (0.98) | 0.93 (0.98) | 1.4 |
| **Thermal class** | | B | | | | |
| **Surge suppressor** | | Option | | | | |
| **Indicator** | | Lamp (option) | | | | |

* Electrical specifications for rated voltage of 200 VAC are values determined with DIN terminal box with lamp.
Note 1: Values in ( ) apply to models with lamp. Models with low heat generating/energy saving circuit are available only with lamp.

## 1.3.3 Response times

(Unit: ms)

| Solenoid position | | 4GA4, 4GB4 | |
|---|---|---|---|
| | | ON | OFF |
| 2-position | Single | 40(45) | 60(60) |
| | Double | 50(55) | 50(55) |
| 3-position | A, B, R connection | 30(35) | 80(90) |

* Values determined with surge suppressor/lamp are shown. They are values determined with a supply pressure of 0.5 MPa, a temperature of 20°C, and no lubrication. Response times vary depending on pressure and quality of lubricant. Values in ( ) apply to AC values.

## 1.3.4 Flow characteristics

### ■ Single valve

| Model | Solenoid position | | 1(P) -> 4(A)/2(B) | | | 4(A)/2(B) -> 5(R1)/3(R2) | | |
|---|---|---|---|---|---|---|---|---|
| | | | C[dm³/(s/bar)] | b | Q[L/min(ANR)] | C[dm³/(s/bar)] | b | Q[L/min(ANR)] |
| 4GA4 | 2-position | | 8.1 | 0.40 | 2203 | 8.0 | 0.31 | 2047 |
| | 3-position | All ports closed | 6.9 | 0.37 | 1838 | 7.5 | 0.42 | 2070 |
| | | A, B, R connection | 6.8 | 0.40 | 1850 | 8.7 | 0.37 | 2317 |
| | | P, A, B connection | 8.9 | 0.37 | 2370 | 7.6 | 0.27 | 1897 |
| 4GB4 | 2-position | | 11 | 0.19 | 2620 | 13 | 0.19 | 3096 |
| | 3-position | All ports closed | 9.1 | 0.11 | 2077 | 12 | 0.27 | 2995 |
| | | A, B, R connection | 9.2 | 0.11 | 2100 | 15 | 0.22 | 3634 |
| | | P, A, B connection | 10 | 0.06 | 2226 | 12 | 0.24 | 2941 |

### ■ Manifold

| Model | Port size | Solenoid position | | 1(P) -> 4(A)/2(B) | | | 4(A)/2(B) -> 5(R1)/3(R2) | | |
|---|---|---|---|---|---|---|---|---|---|
| | P, R1, R2 | | | C [dm³/(s/bar)] | b | Q [L/min(ANR)] | C [dm³/(s/bar)] | b | Q [L/min(ANR)] |
| M4GA4 | Rc1/2 G1/2 NPT1/2 | 2-position | | 7.3 | 0.12 | 1675 | 9.0 | 0.17 | 2120 |
| | | 3-position | All ports closed | 6.4 | 0.15 | 1492 | 8.2 | 0.22 | 1987 |
| | | | A, B, R connection | 6.4 | 0.16 | 1500 | 9.3 | 0.19 | 2215 |
| | | | P, A, B connection | 8.0 | 0.08 | 1798 | 8.3 | 0.22 | 2011 |
| M4GB4 | Rc3/8 G3/8 NPT3/8 | 2-position | | 6.4 | 0.42 | 1767 | 6.9 | 0.12 | 1583 |
| | | 3-position | All ports closed | 6.0 | 0.37 | 1598 | 6.8 | 0.12 | 1560 |
| | | | A, B, R connection | 6.1 | 0.38 | 1636 | 7.1 | 0.15 | 1655 |
| | | | P, A, B connection | 6.0 | 0.37 | 1598 | 6.8 | 0.13 | 1568 |
| | Rc1/2 G1/2 NPT1/2 | 2-position | | 8.3 | 0.23 | 2023 | 9.0 | 0.21 | 2168 |
| | | 3-position | All ports closed | 7.4 | 0.15 | 1725 | 8.8 | 0.19 | 2096 |
| | | | A, B, R connection | 7.5 | 0.15 | 1748 | 9.5 | 0.21 | 2288 |
| | | | P, A, B connection | 7.7 | 0.21 | 1855 | 8.7 | 0.18 | 2061 |

* C: Sonic conductance, b: Critical pressure ratio
* Formula for converting sonic conductance C to effective cross-sectional area S is S ≈ 5.0 x C.

## 1.3.5 Weight

### ■ Single valve

• 4GA4 Series

(Unit: g)

| Solenoid position/ electrical connection | | | 4GA4 |
|---|---|---|---|
| 2-position | Single | Grommet lead wire | 284(293) |
| | | E-type connector | 286(295) |
| | | DIN terminal box | 314(323) |
| | Double | Grommet lead wire | 318(327) |
| | | E-type connector | 322(331) |
| | | DIN terminal box | 378(387) |
| 3-position | All ports closed | Grommet lead wire | 349(358) |
| | | E-type connector | 353(362) |
| | | DIN terminal box | 409(418) |

* Values in ( ) are with mounting screws and gaskets attached. Values for E-type connector include the weight of socket assembly (with 300 mm lead wire).
For EJ-type connector, add 16 g per connector to the weight of E-type connector.

• 4GB4 Series

(Unit: g)

| Solenoid position/ electrical connection | | | 4GB4 |
|---|---|---|---|
| 2-position | Single | Grommet lead wire | 537(230) |
| | | E-type connector | 539(232) |
| | | DIN terminal box | 661(354) |
| | Double | Grommet lead wire | 567(260) |
| | | E-type connector | 571(264) |
| | | DIN terminal box | 627(320) |
| 3-position | All ports closed | Grommet lead wire | 602(295) |
| | | E-type connector | 606(299) |
| | | DIN terminal box | 662(355) |

* Values in ( ) are without single valve subplate. Values for E-type connector include the weight of socket assembly (with 300 mm lead wire).
For EJ-type connector, add 16 g per connector to the weight of E-type connector.

## ■ Individual wiring manifold base

• Body piping

(Unit: g)

| Pilot operated type | M4GA4 |
|---|---|
| | Direct mount |
| Standard | 150n+199 |
| External pilot | 379n+617 |

* Variable n represents the number of stations.
* Weights in the table above are the weights when the port size is a thread connection.

• Base piping

(Unit: g)

| Item | | M4GB4 | | | |
|---|---|---|---|---|---|
| | | Direct mount | | | DIN rail mount |
| Pilot operated type | | Standard | | External pilot | Standard |
| Connection Port size | A/B-port | Push-in fitting ø8, ø10, ø12<br>Rc1/4, Rc3/8<br>G1/4, G3/8<br>NPT1/4, NPT3/8 | Rc1/2<br>G1/2<br>NPT1/2 | Push-in fitting ø8, ø10, ø12<br>Rc1/4, Rc3/8, Rc1/2<br>G1/4, G3/8, G1/2<br>NPT1/4, G3/8, G1/2 | Push-in fitting ø8, ø10, ø12<br>Rc1/4, Rc3/8<br>G1/4, G3/8<br>NPT1/4, NPT3/8 |
| | P, R1, R2 Port | Rc3/8, G3/8, NPT3/8 | Rc1/2, G1/2, NPT1/2 | | Rc3/8, G3/8, NPT3/8 |
| Manifold base weight calculation formula | | 273n+329 | 391n+560 | 392n+555 | 278n+1082 |

* Variable n represents the number of stations.
* Weights in the table above are the weights when the port size is a thread connection.

## ■ Reduced wiring manifold base

• Body piping (common terminal block, D-sub connector, flat cable connector)

(Unit: g)

| Pilot operated type | M4GA4 |
|---|---|
| | Direct mount |
| Standard | 150n+530 |
| External pilot | 379n+1122 |

* Variable n represents the number of stations.
* Weights in the table above are the weights when the port size is a thread connection.

• Body piping (serial transmission)

(Unit: g)

| Pilot operated type | M4GA4 |
|---|---|
| | Direct mount |
| Standard | 150n+1016 |
| External pilot | 379n+2391 |

* Variable n represents the number of stations.
* Weights in the table above are the weights when the port size is a thread connection.

- Base piping (common terminal block, D-sub connector, flat cable connector)

(Unit: g)

| Item | | M4GB4 | | |
|---|---|---|---|---|
| | | Direct mount | | |
| Pilot operated type | | Standard | | External pilot |
| Connection Port size | A/B-port | Push-in fitting ø8, ø10, ø12<br>Rc1/4, Rc3/8<br>G1/4, G3/8<br>NPT1/4, NPT3/8 | Rc1/2<br>G1/2<br>NPT1/2 | Push-in fitting ø8, ø10, ø12<br>Rc1/4, Rc3/8, Rc1/2<br>G1/4, G3/8, G1/2<br>NPT1/4, G3/8, G1/2 |
| | Ports P, R1, R2 | Rc3/8, G3/8, NPT3/8 | Rc1/2, G1/2, NPT1/2 | |
| Manifold base weight calculation formula | | 292n+907 | 391n+1119 | 392n+1060 |

* Variable n represents the number of stations.
* Weights in the table above are the weights when the port size is a thread connection.

- Base piping (serial transmission)

(Unit: g)

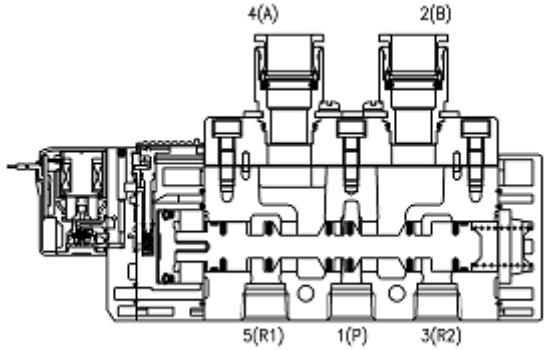
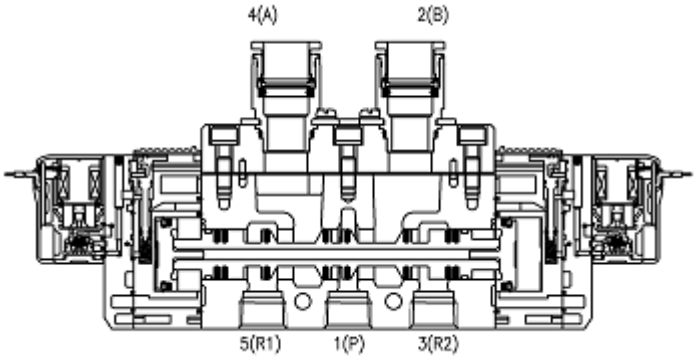
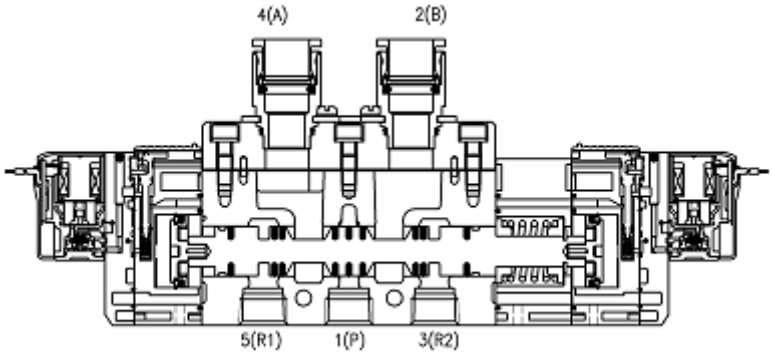
| Item | | M4GB4 | | |
|---|---|---|---|---|
| | | Direct mount | | |
| Pilot operated type | | Standard | | External pilot |
| Connection Port size | A/B-port | Push-in fitting ø8, ø10, ø12<br>Rc1/4, Rc3/8<br>G1/4, G3/8<br>NPT1/4, NPT3/8 | Rc1/2<br>G1/2<br>NPT1/2 | Push-in fitting ø8, ø10, ø12<br>Rc1/4, Rc3/8, Rc1/2<br>G1/4, G3/8, G1/2<br>NPT1/4, G3/8, G1/2 |
| | Ports P, R1, R2 | Rc3/8, G3/8, NPT3/8 | Rc1/2, G1/2, NPT1/2 | |
| Manifold base weight calculation formula | | 292n+1864 | 391n+2432 | 392n+2329 |

* Variable n represents the number of stations.
* Weights in the table above are the weights when the port size is a thread connection.

# 1.4 Internal Structure

## 1.4.1 Description of operation

### ■ Valve operation

| | Diagram of operation (with 4GA R Series as an example) | Description of operation |
|---|---|---|
| 4G□410R<br>2-position<br>Single |  | De-energized (shown in the diagram)<br>1(P) → 2(B)<br>4(A) → 5(R1)<br><br>Energized<br>1(P) → 4(A)<br>2(B) → 3(R2) |
| 4G□420R<br>2-position<br>Double |  | SOL a Energized<br>1(P) → 4(A)<br>2(B) → 3(R2)<br>SOL b Energized (shown in the diagram)<br>1(P) → 2(B)<br>4(A) → 5(R1)<br><br>After energized, solenoid position is retained even after electricity is cut off. |
| 4G□430R<br>4G□440R<br>4G□450R<br>3-position |  | 4G□30R De-energized<br>1(P), 4(A), 2(B), 5(R1), and 3(R2) closed<br><br>4G□40R De-energized<br>1(P) closed<br>4(A), 2(B) → 5(R1), 3(R2)<br><br>4G□50R De-energized<br>1(P) → 4(A), 2(B)<br>5(R1) and 3(R2) closed |

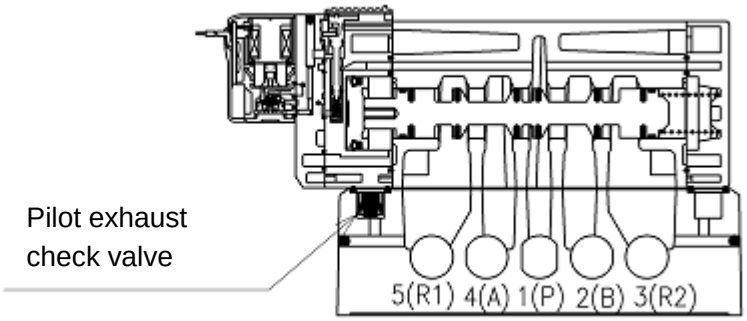
* SOL = solenoid

### ■ Manifold operation

For standard (internal pilot) specifications, the main and pilot exhaust air are collected in the manifold base and discharged from the exhaust port. For external pilot specifications, each is discharged separately.

## ■ Malfunction prevention

The 4GB4 single valve and M4GA/B4 manifold are equipped with a PR check valve in the base PR air passage.
PR check valves prevent malfunction of the solenoid valve itself caused by pilot back pressure.



# 2. INSTALLATION

## 2.1 Environment

### ⚠WARNING

**Do not use the product in an application where water or cutting oil can splash onto the valve directly.**

- In an environment where water and cutting oil can splash onto the valve, protect it by installing it under a cover or inside a paneled casing.
- If cutting oil splashes onto the cylinder rod, the oil may enter into the secondary side piping of the solenoid valve through the cylinder, causing a malfunction. Consult CKD before using the product in such an environment.

**Observe the following precautions since coils produce heat.**

- Appropriate ventilation or heat dissipation measures must be considered if the product is installed in a control board or if the solenoid coil needs to be energized for a long period.
- Be careful when touching the valve since the coil temperature may rise depending on the surrounding temperature and energization time.

**Do not use the product in the presence of corrosive gas or solvents.**

Do not use the product in an environment where corrosive gases such as sulfur dioxide gas or solvents are present.

**Do not use the product in a humid environment.**

Condensation may occur due to a change in the temperature.

**Do not use the product in an explosive gas environment.**

For use in an explosive gas environment, select an explosion-proof solenoid valve.

### ⚠CAUTION

**Take measures to prevent foreign matters from entering the exhaust port in a dusty environment.**

Foreign matters may enter the exhaust port of a solenoid valve when the valve is operated to supply or exhaust air or if the exhaust port is facing up. Install a silencer to prevent foreign matters from entering the exhaust port or mount the valve so that the exhaust port faces down.

**Do not use the product where it is subject to vibrations or shocks.**

Do not subject the product to vibrations exceeding 50 $m/s^2$ or shocks exceeding 300 $m/s^2$.
For DIN rail mount, do not subject the product to vibrations exceeding 30 $m/s^2$ or shocks exceeding 150 $m/s^2$.

**Use extreme care to avoid deterioration of packings and gaskets when using the product in a place with high ozone concentration (for example, near a beach or in an area with frequent thunderstorms).**

Packing and gaskets may deteriorate sooner than usual.

**Take measures against lightning surges on the device side.**

The product has no resistance to lightning surges.
Use AC voltage models in an installation category II environment.

# 2.2 Unpacking

**⚠CAUTION**

**Do not remove the solenoid valves from their packaging bag until just before piping.**
If bags are opened before the valves are ready to be piped, foreign matters may enter inside the solenoid valves from the piping ports and may cause a failure or malfunction.

- Check that the model number ordered and the model number indicated on the product are the same.
- Check the exterior of the product for any damage.
- When any cautionary documents are provided with the product, read them, as well as this Instruction Manual, before use.
- Secure sufficient space around the solenoid valve for installation, removal, wiring, and piping.

# 2.3 Mounting

**⚠CAUTION**

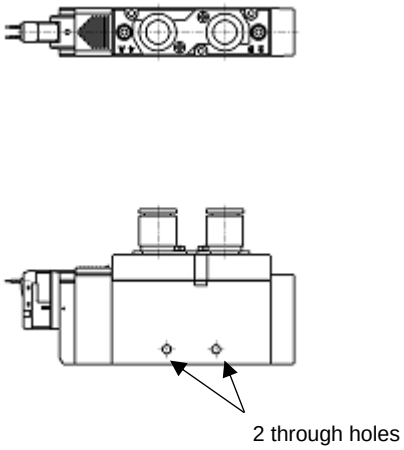
**Do not use a method of mounting that relies on support from the piping when mounting the solenoid valve.**
Mount and secure the solenoid valve body.

**Tighten the screws with the appropriate tightening torque.**
If assembly or tightening is not properly done, it may result in air leakage, product falling off, damage to the threads, or deformation of DIN rails.

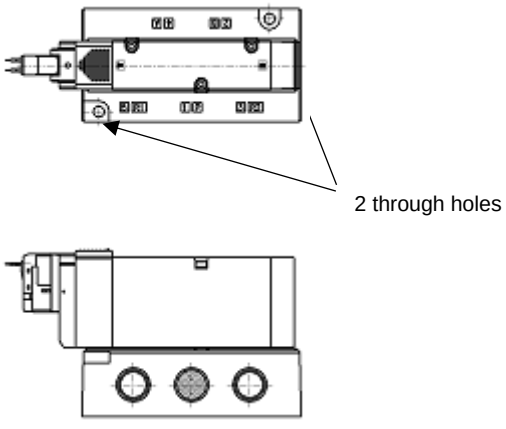
**If using a DIN rail, make sure that it is strong enough.**

- If the manifold weighs more than 1 kg, or if the installation environment is subject to vibrations or shocks, secure the DIN rail onto the mounting surface at intervals of 50 mm to 100 mm.
- If the DIN rail is not strong enough, mount the manifold base directly.

## 2.3.1 How to mount a single valve



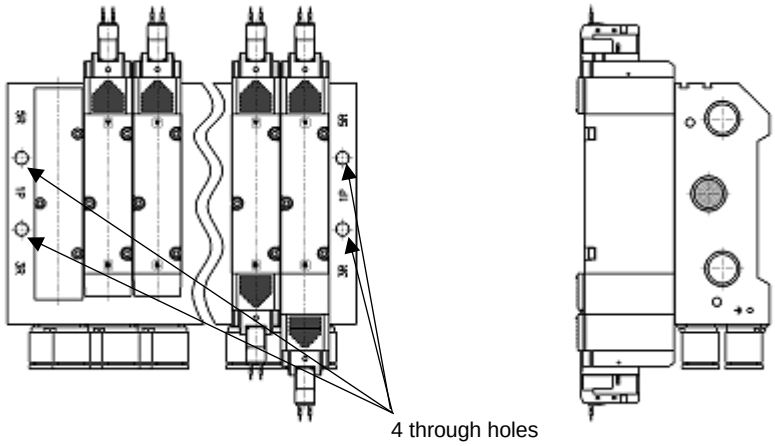

Single valve (body piping)




Single valve (base piping)

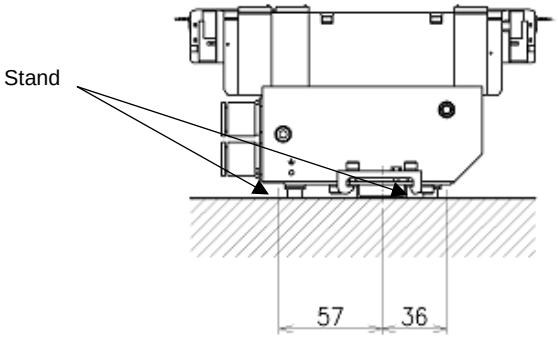
## 2.3.2 How to mount a manifold

### ■ For direct mount

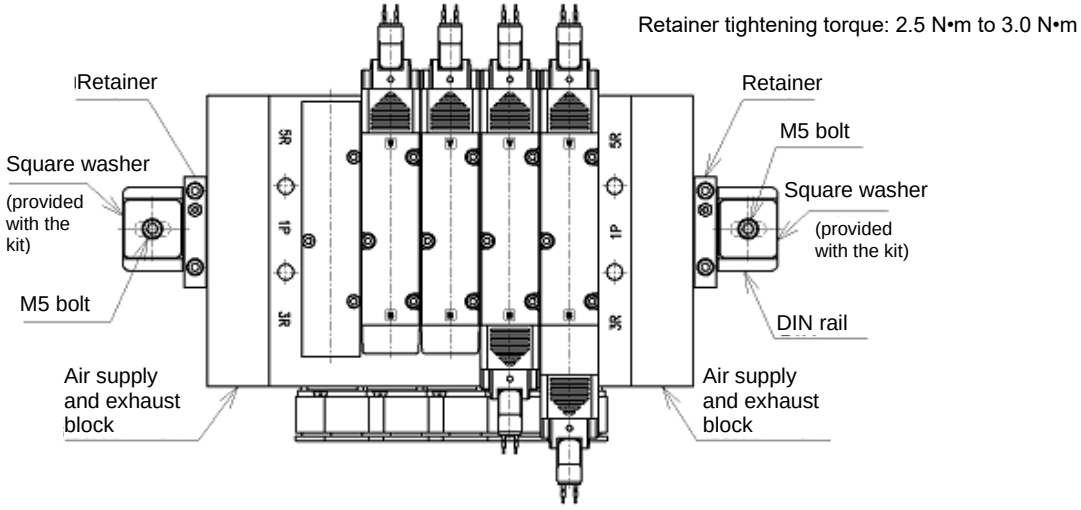



### ■ For DIN rail mount

The DIN rail-mounted type has stands attached to the air supply and exhaust blocks at both ends to reduce vibration and shock.
To ensure that the stands are properly installed on the DIN rail mounting surface, the area shown in the figure below (width 57 + 36 mm) must be flat.




Fix the DIN rails to the mounting surface at intervals of 75 mm to 100 mm with M5 bolts using the square washers provided, and make sure that there are no problems with the installation before use.
Also, when installing the valve, place it in a position where the retainer or air supply and exhaust block does not interfere with the M5 bolt. The DIN rails are made of steel to ensure strength.
Please use DIN rails made of steel, even if you prepare them separately.




If not mounted correctly, the manifold may fall off or become damaged. Please be careful.
The maximum number of stations to which a DIN rail can be mounted is 5.

# 2.4 Piping

## ⚠CAUTION

**Tighten the pipes/tubes with the appropriate tightening torque.**

Observe the appropriate tightening torque to prevent air leakage and damage to the threads. To prevent damage to the screw threads, first use your hands to lightly tighten the pipe/tube and then use a tool to tighten the pipe/tube further.

**Make sure that the pipes/tubes will not be disconnected at the joints by mechanical movements, vibrations or tension.**

- If the exhaust piping of the pneumatic pressure circuit is disconnected, the actuator speed cannot be controlled.
- For the chuck holding mechanism, the chuck holding force is lost when the piping is disconnected.

**When supplying compressed air for the first time after piping is complete, make sure that there is no air leakage at the joints.**

**Do not apply high pressure suddenly when supplying compressed air for the first time after connecting the pipes/tubes.**

Sudden introduction of highly-pressurized air may cause the tubes to become disconnected and jump around and an accident may occur.

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

Smooth exhaust flow is important for normal operation of the actuator. With a manifold, a restriction to the exhaust flow may prevent normal operation of other solenoid valves.

**Remove foreign matter.**

Rust and other foreign matters in the piping may cause a malfunction or valve seat leakage.
Insert a filter (which removes particles exceeding 5 μm) immediately upstream of the solenoid valve.

**Do not restrict the flow of air through the supply piping.**

A delay in operation may occur due to a drop in the supply pressure when multiple valves are operated.

## 2.4.1 Recommended tightening torque

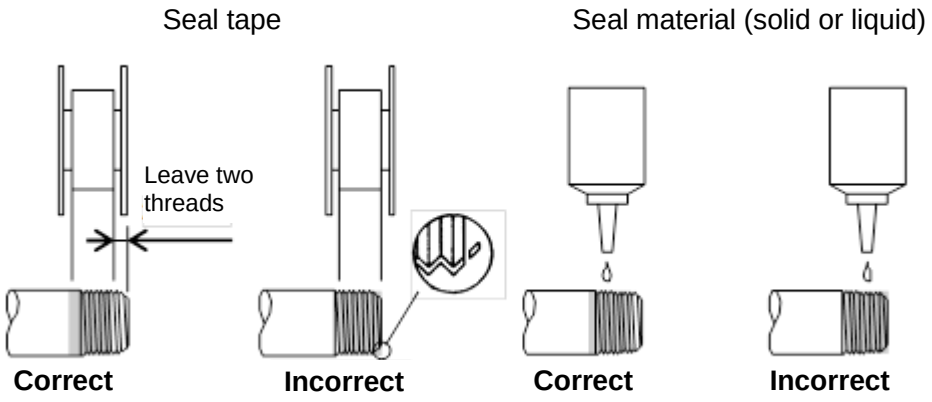
The following table shows the tightening torque for each connection thread.

| Connection thread | Tightening torque (N•m) |
|---|---|
| Rc1/8 | 3 to 5 |
| Rc1/4 | 6 to 8 |
| Rc3/8 | 13 to 15 |
| Rc1/2 | 16 to 18 |

## 2.4.2 Seal material

Apply a seal tape or seal material to the screw threads leaving two or more threads at the pipe end uncovered or uncoated. If the pipe end is fully covered or coated, a shred of seal tape or residue of seal material may enter inside of the solenoid valve and cause a failure.

When using a seal tape, wind it around the screw threads in the direction opposite from the screw threads and press it down with your fingers to attach it firmly.
When using a liquid seal material, be careful not to apply it to resin parts. The resin parts can become damaged and this may lead to a failure or malfunction. Also, do not apply seal material to the internal threads.




## 2.4.3 Flushing

Before piping, flush the pipes/tubes, solenoid valves, and connected devices to remove foreign matters.

## 2.4.4 Blow circuit

With the internal pilot type, do not open the supply port to the atmosphere because a drop in the supply pressure may cause malfunction. Select the external pilot type. The lowest allowable pressure with the internal pilot type design is 0.2 MPa.

## 2.4.5 Exhaust port

Blocking the flow of exhaust air causes a delay in the cylinder response. If such delay occurs, adjust the speed between the cylinder and solenoid valve.

## 2.4.6 Piping connection

### ■ Appropriate tube

For solenoid valves provided with push-in fitting, use tubes specified by CKD.
- Soft nylon tubes (F-1500 Series)
- Urethane tubes (U-9500 Series)

### ■ Spatter

In an environment exposed to spatter, use flame-retardant tubes or steel pipes.

### ■ Hydraulic hose

When piping is for use in both hydraulic and pneumatic systems, use a hydraulic hose.

When the standard push-in fitting is used with a spiral tube, secure the base or end of the tube with a hose clamp. Otherwise, the tube will rotate and lose its clamping ability.
Use fastening fittings in high-temperature atmospheres. Push-in fittings cannot be used.

## ■ Commercially available tubes

When using commercially available tubes, check the outside diameter accuracy, wall thickness, and hardness of such tubes. The hardness of a urethane tube should be 93° or more (as measured by a rubber hardness meter).
Using a tube with insufficient diameter accuracy and hardness will cause the chucking force to drop, which makes the tube come off easily or difficult to insert.

Tube dimensions

| Outside diameter (mm) | Inside diameter (mm) | |
|---|---|---|
| | Nylon | Urethane |
| ø6 | ø4 | ø4 |
| ø8 | ø5.7 | ø5 |
| ø10 | ø7.2 | ø6.5 |
| ø12 | ø8.9 | ø8 |

| Outside diameter tolerance | |
|---|---|
| Soft or hard nylon | ±0.1 mm |
| Urethane ø6 | +0.1 mm<br>-0.15 mm |
| Urethane ø8, ø10, ø12 | +0.1 mm<br>-0.2 mm |

## ■ Minimum allowable bending radius of tubes

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

| Outside diameter (mm) | Minimum allowable bending radius (mm) | |
|---|---|---|
| | Nylon | Urethane |
| ø6 | 20 | 20 |
| ø8 | 30 | 30 |
| ø10 | 40 | 40 |
| ø12 | 55 | 50 |

## ■ Tube cutting

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.

## ■ Tube connections

From the end of the fitting, secure a straight section as long as the outside diameter of the tube and do not bend the tube abruptly at the fitting connection point. The tension applied sideways through the tube should not exceed 40 N.

## ■ Blanking plug to use

For solenoid valves provided with push-in fitting, use blanking plugs specified by CKD:
- Blanking plug (GWP□-B Series)

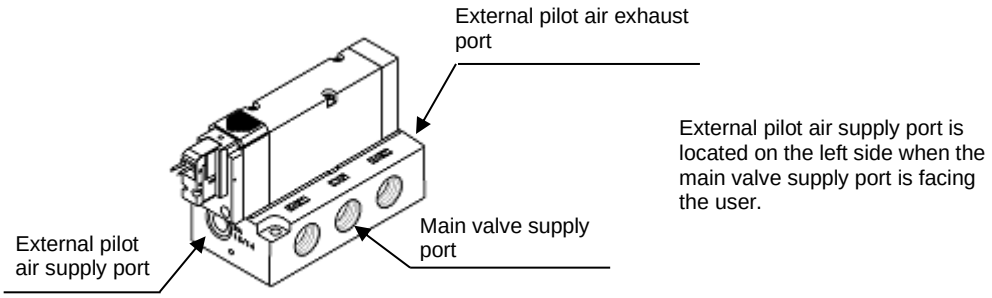
## 2.4.7 Piping ports for external pilot (option symbol: K)

The external pilot model (option symbol: K) has a separate pilot air exhaust. Since pilot air supply and exhaust ports are both Rc1/8 screw ports, make sure to pipe to correct ports. Otherwise, a malfunction may result.

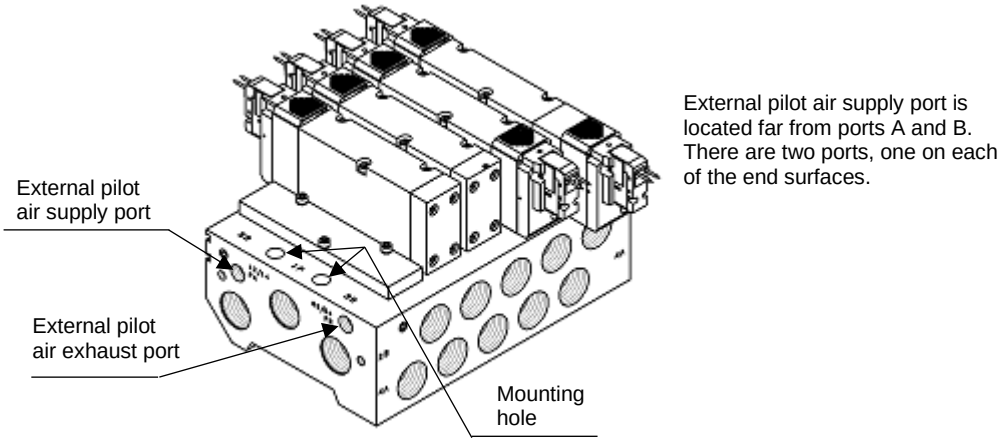
Port identification

| Usage | Port | Identification (ISO standard) |
|---|---|---|
| Pilot air | Supply port | 12/14 |
| | Exhaust port | 82/84 |

**<Base piping type single valve>**




**<Manifold>**



# 2.5 Wiring

## ⚠WARNING

**Turn off the power before wiring.**
An electric shock may occur.

**Do not touch live parts with bare hands.**
An electric shock may occur.

**Thoroughly read and understand this Instruction Manual before working on electrical wiring.**
The product must be handled by a person who understands the structure and operation principle of solenoid valve and has knowledge to secure the safety.

## ⚠CAUTION

**Check the power supply voltage and the type of current (AC or DC) before supplying power.**

**Do not apply stress to the lead wires.**
Undue stress may cause such problems as disconnection of the lead wires or the contact terminals.

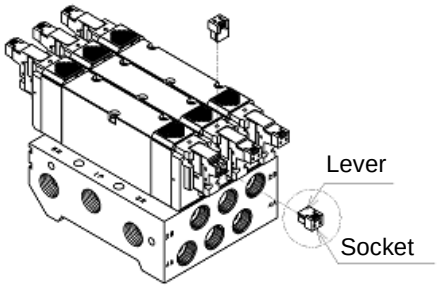
**Make sure that the voltage drop on the solenoid does not exceed 10% of the rated voltage.**
Voltage drop occurs when energizing solenoids at the same time or depending on the cable length.

**Connect the product to the output unit.**
Connecting the product to the input unit may cause failures not only in the product but also in peripheral devices. Do not connect this manifold to the input unit.

## 2.5.1 E-type connector

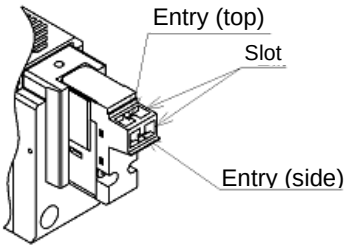
E-type connector has entries on both the top and side to which a socket can be connected from either direction. The socket is attached to the side entry at shipment. Change the connecting direction depending on the installation environment.

### ■ Attaching and detaching the socket



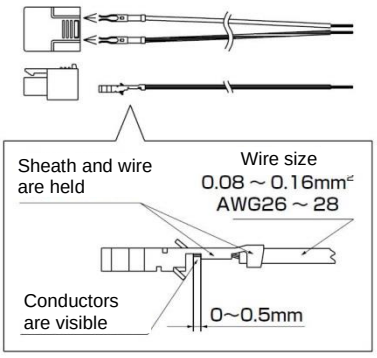

**1** To attach the socket, hold the lever and the socket body with your fingers and insert the socket straight into the entry on the connector body.

**2** Hook the tab on the lever into the slot on the connector body to lock the socket in place. To attach to the top entry, position the socket so that the lever is in front. To attach to the side entry, position the socket so that the lever is on top.




**3** To detach the socket, depress the lever to release the tab from the slot, and pull it out straight.

### ■ Connecting the lead wires

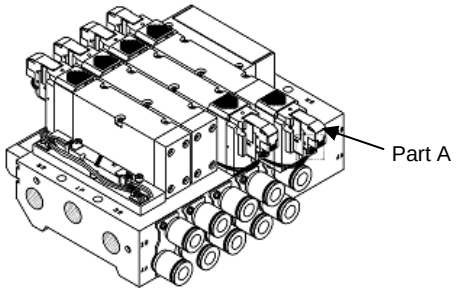


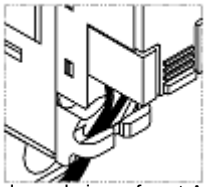

**1** Strip the end of the lead wires by approximately 3 mm. Align the end of conductors, insert them into the contact terminal, and crimp with a crimp tool.
When crimping, make sure that both the sheath and the conductors are held and 0 mm to 0.5 mm of the conductor end is visible.

**2** After crimping, position the contact terminal as shown in the figure to the right and insert it into the entry on the socket.
Insert the terminal until it hits the end to lock it in place. Pull gently on the terminal to check that it is locked.

## 2.5.2 A-type connector

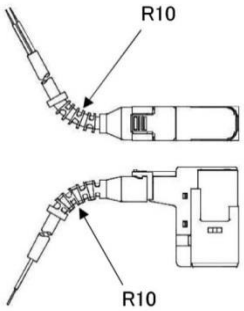
A-type connector is a connector exclusively designed for reduced wiring manifold, with which wires can be connected from the bottom. When attaching or detaching the socket, observe the same instructions as the E-type connector.





Enlarged view of part A

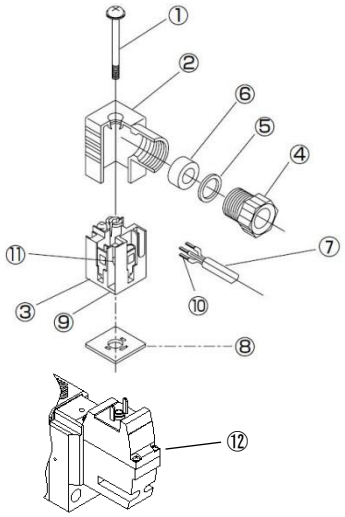
## 2.5.3 EJ-type ("socket with cover" type) connector

Do not bend the lead wire beyond the dimension shown below.




## 2.5.4 DIN terminal box

### ■ Disassembling the DIN terminal box

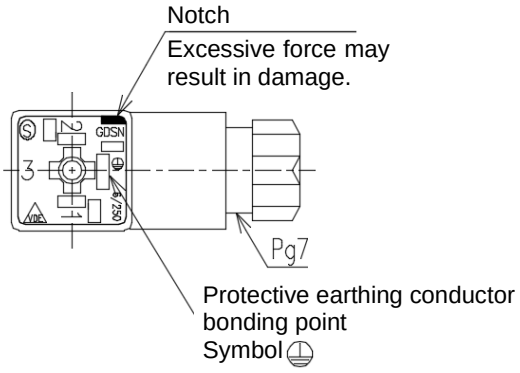



***1*** Loosen screw (1) and pull cover (2) in the direction of screw (1) to remove the connector from coil assembly (12).

***2*** Pull out screw (1) from cover (2).

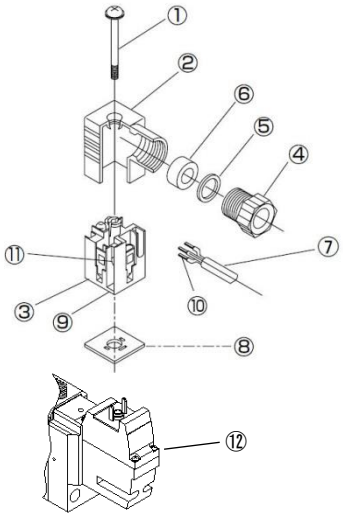
***3*** Locate notch (9) (next to the GDSN mark) at the bottom of terminal block (3). Insert a compact flat blade screwdriver into notch (9) and pry to remove terminal block (3) from cover (2) (refer to the figure to the right). Do not apply excessive force when removing terminal block (3) as this may damage it.

***4*** Remove cable gland (4) and take out washer (5) and rubber packing (6).

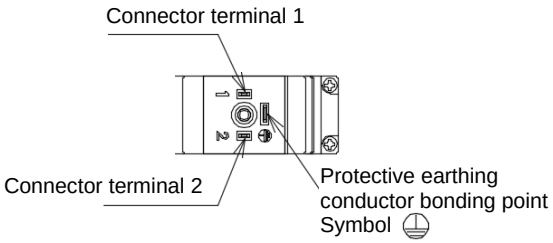


## ■ Wiring

**1** How to prepare for wiring:
Applicable dimension for cable (7) is VCTF2-conductor (3-conductor) (ø3.5 to ø7) defined in JIS C 3306.
Length of sheath peeled from lead wires of cable is 10 mm.
Either twisted wire or solid wire can be used for wiring.
When using twisted wire, avoid connecting a pre-soldered wire.
When using crimp sleeve (10) at the end of twisted wire, select H0.5/6 (0.3 $mm^2$ to 0.5 $mm^2$) or H0.75/6 (0.75 $mm^2$) ferrule manufactured by Weidmüeller, or an equivalent product.
The crimp sleeve is not supplied with the product.



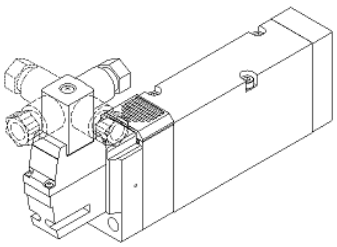

**2** How to install wiring:
Insert cable gland (4), washer (5), and rubber packing (6) through cable (7) in this order and insert them into cover (2).
Wire the cable to terminals 1 and 2. Wire which has no polarity.
Recommended tightening torque is 0.2 N•m to 0.25 N•m.
For AC type, establish a ground connection.
For DC type, a ground connection is not required.




Coil assembly surface figure
(The AC type)

## ■ Assembling the DIN terminal box

**1** Push wired terminal block (3) into cover (2) until it clicks.
Terminal block (3) can be set in four different directions (refer to the figure to the right).



**2** Insert rubber packing (6) and washer (5) in this order into the cable through-hole on cover (2) and securely tighten cable gland (4).
Recommended tightening torque for cable gland (4) is 1.0 N•m

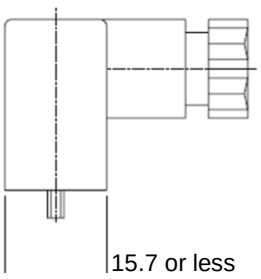
**3** Check that cable (7) does not disconnect.

**4** Place gasket (8) between the bottom part of terminal block (3) and the plug of coil assembly (12), insert the connector, insert screw (1) from top of cover (2) and tighten it.
Recommended tightening torque for screw (1) is 0.4 N•m to 0.45 N•m.

## ■ Precautions for terminal box

When using terminal boxes other than those manufactured by CKD, use products conforming to EN175301-803 Type C (DIN 43650-C).

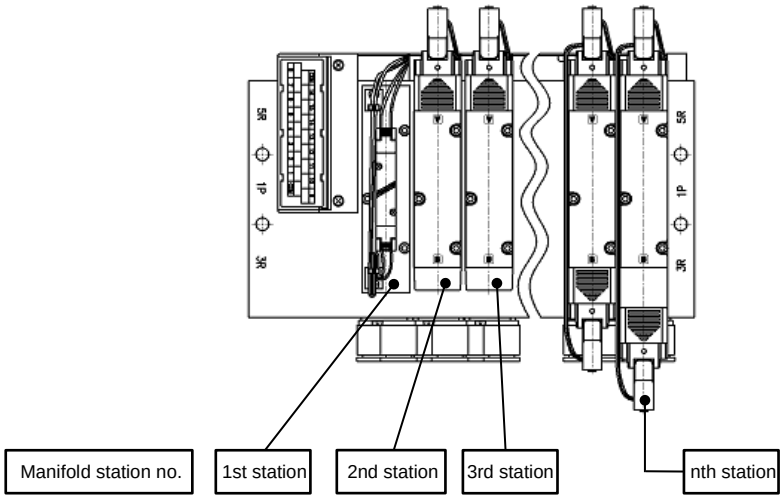
However, select a terminal box with dimensions of 15.7 or less on the solenoid valve side (refer to the figure below).



## 2.5.5 Common terminal block (T10/T11)

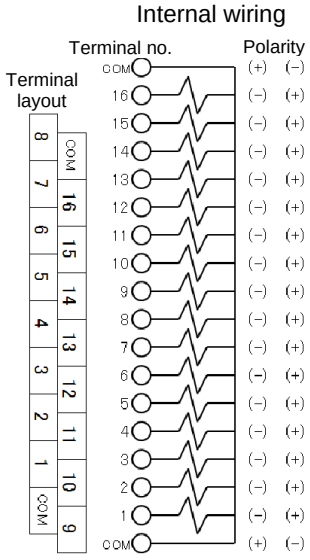
### ■ Precautions on wiring the common terminal block (T10/T11)

- With the common terminal block, common wires are connected beforehand. Therefore, use the same manifold power. When using an independent contact PLC output unit, wire so that contacts share a common connection.
- Check that the station number matches the solenoid positions to avoid incorrect wiring.
- Maximum number of solenoids is 16 for T10 and 24 for T11. Wiring exceeding the maximum number is unavailable.
- Manifold stations are numbered in order from left to right with the piping port towards the user (refer to the figure below).
- Voltage drop occurs when energizing solenoids at the same time or depending on the cable length. Make sure that the voltage drop on the solenoid does not exceed 10% of the rated voltage.
- Use a spade terminal or a ring terminal for connecting the wires. Use a crimp terminal for M3 screw with width of 6.2 or less. Connecting the lead wires directly can cause cable disconnection or contact failure and lead to improper operation of the solenoid valve.
- Recommended tightening torque for wiring screw is 0.6 N•m for T10 and 0.3 N•m for T11.

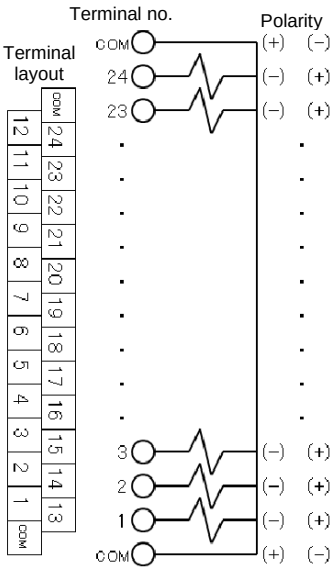



### ■ Internal wiring

Internal wiring of T10 (maximum of 16 solenoids)




Internal wiring of T11 (maximum of 24 solenoids)



## ■ Examples of terminal layouts for wiring method T10

Maximum number of stations on the manifold varies depending on the model. Check individual specifications.
In the table below, each valve number (Valve no.) consists of a number (the station number) and an alphabet (a for the a-side solenoid and b for the b-side solenoid). For example, “1a” refers to 1st station a-side solenoid.

Terminal no.

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

**<Standard wiring>**

- Single solenoid valve
  (Maximum of 11 stations)

| Terminal no. | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | Empty | Empty | Empty | 11a | 10a | 9a |
| Terminal no. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 8a | 7a | 6a | 5a | 4a | 3a | 2a | 1a |

- Double solenoid valve
  (Maximum of 8 stations)

| Terminal no. | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
|---|---|---|---|---|---|---|---|---|
| Valve no. | 8b | 8a | 7b | 7a | 6b | 6a | 5b | 5a |
| Terminal no. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 4b | 4a | 3b | 3a | 2b | 2a | 1b | 1a |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 16 solenoids)

| Terminal no. | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
|---|---|---|---|---|---|---|---|---|
| Valve no. | 11b | 11a | 10b | 10a | 9a | 8a | 7b | 7a |
| Terminal no. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 6a | 5a | 4b | 4a | 3b | 3a | 2a | 1a |

**<Double wiring>**

- Single solenoid valve
  (Maximum of 8 stations)

| Terminal no. | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | 8a | Empty | 7a | Empty | 6a | Empty | 5a |
| Terminal no. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | Empty | 4a | Empty | 3a | Empty | 2a | Empty | 1a |

- Double solenoid valve
  (Maximum of 8 stations)

| Terminal no. | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
|---|---|---|---|---|---|---|---|---|
| Valve no. | 8b | 8a | 7b | 7a | 6b | 6a | 5b | 5a |
| Terminal no. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 4b | 4a | 3b | 3a | 2b | 2a | 1b | 1a |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 16 solenoids)

| Terminal no. | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
|---|---|---|---|---|---|---|---|---|
| Valve no. | 8b | 8a | 7b | 7a | Empty | 6a | Empty | 5a |
| Terminal no. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 4b | 4a | Empty | 3a | 2b | 2a | 1b | 1a |

## ■ Examples of terminal layouts for wiring method T11

Maximum number of stations on the manifold varies depending on the model. Check individual specifications.
In the table below, each valve number (Valve no.) consists of a number (the station number) and an alphabet (a for the a-side solenoid and b for the b-side solenoid). For example, “1a” refers to 1st station a-side solenoid.

Terminal no.

| COM | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | COM | |

**<Standard wiring>**

- Single solenoid valve
  (Maximum of 11 stations)

| Terminal no. | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty |
| Terminal no. | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | Empty | 11a | 10a | 9a | 8a | 7a | 6a | 5a | 4a | 3a | 2a | 1a |

- Double solenoid valve
  (Maximum of 11 stations)

| Terminal no. | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | 11b | 11a | 10b | 10a | 9b | 9a | 8b | 8a | 7b | 7a |
| Terminal no. | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 6b | 6a | 5b | 5a | 4b | 4a | 3b | 3a | 2b | 2a | 1b | 1a |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 11 stations)

| Terminal no. | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | 11b | 11a | 10a |
| Terminal no. | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 9a | 8a | 7b | 7a | 6a | 5a | 4b | 4a | 3b | 3a | 2a | 1a |

**<Double wiring>**

- Single solenoid valve
  (Maximum of 11 stations)

| Terminal no. | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | Empty | 11a | Empty | 10a | Empty | 9a | Empty | 8a | Empty | 7a |
| Terminal no. | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | Empty | 6a | Empty | 5a | Empty | 4a | Empty | 3a | Empty | 2a | Empty | 1a |

- Double solenoid valve
  (Maximum of 11 stations)

| Terminal no. | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | 11b | 11a | 10b | 10a | 9b | 9a | 8b | 8a | 7b | 7a |
| Terminal no. | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 6b | 6a | 5b | 5a | 4b | 4a | 3b | 3a | 2b | 2a | 1b | 1a |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 11 stations)

| Terminal no. | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | 11b | 11a | Empty | 10a | Empty | 9a | Empty | 8a | 7b | 7a |
| Terminal no. | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | Empty | 6a | Empty | 5a | 4b | 4a | 3b | 3a | Empty | 2a | Empty | 1a |

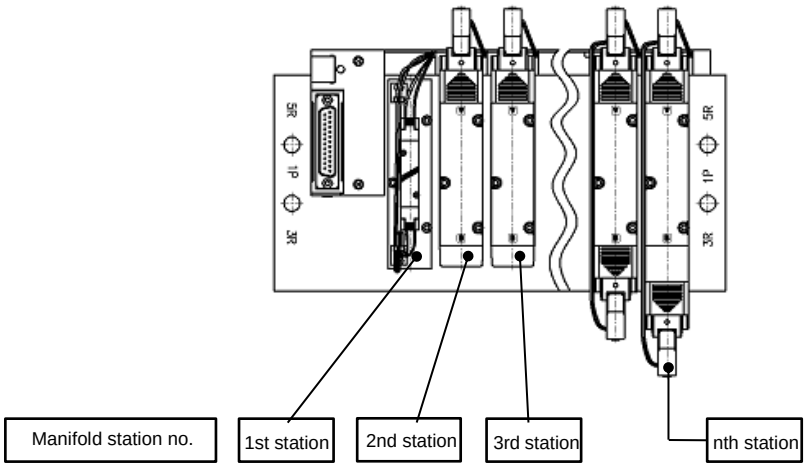
## 2.5.6 D-sub connector (T30)

### ■ Connector for T30

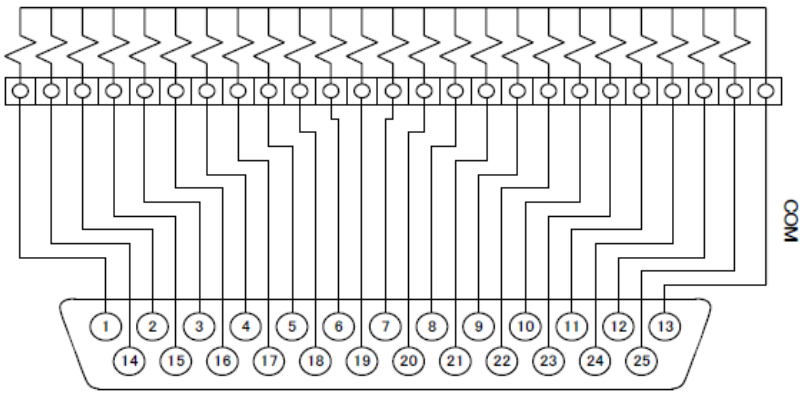
The connector used for wiring method T30, generally called D-sub connector, is used widely for FA and OA devices. The 25-pin D-sub connector is specified in the RS-232C standard and is especially used for communication between computers and peripheral devices.

### ■ Precautions on wiring the D-sub connector (T30)

- Signal arrays of the PLC output unit must match signal arrays on the valve side.
- Only 24 VDC or 12 VDC power can be used.
- Maximum number of solenoids is 24. Wiring exceeding the maximum number is unavailable.
- Manifold stations are numbered in order from left to right with the piping port towards the user (refer to the figure below).
- Voltage drop occurs when energizing solenoids at the same time or depending on the cable length. Make sure that the voltage drop on the solenoid does not exceed 10% of the rated voltage.



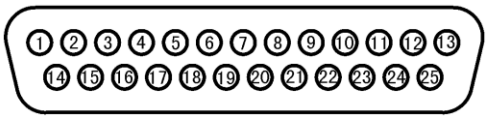

### ■ Internal wiring



## ■ Examples of connector pin layouts for wiring method T30

Maximum number of stations on the manifold varies depending on the model. Check individual specifications.
In the table below, each valve number (Valve no.) consists of a number (the station number) and an alphabet (a for the a-side solenoid and b for the b-side solenoid). For example, “1a” refers to 1st station a-side solenoid.

**Connector pin no.**




**<Standard wiring>**

- Single solenoid valve
  (Maximum of 11 stations)

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

- Double solenoid valve
  (Maximum of 11 stations)

| 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 | Empty | 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 | Empty | |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 11 stations)

| 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 | Empty | Empty | Empty | Empty | COM |
| Pin no. | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | |
| Valve no. | 2a | 3b | 4b | 6a | 7b | 9a | 11a | Empty | Empty | Empty | Empty | Empty | |

**<Double wiring>**

- Single solenoid valve
  (Maximum of 11 stations)

| 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 | Empty | 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 | |

- Double solenoid valve
  (Maximum of 11 stations)

| 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 | Empty | 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 | Empty | |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 11 stations)

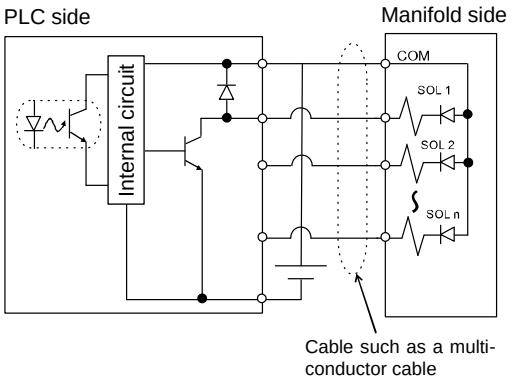
| Pin no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 1a | 2a | 3a | 4a | 5a | 6a | 7a | 8a | 9a | 10a | 11a | Empty | COM |
| Pin no. | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | |
| Valve no. | Empty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

## ■ How to connect to PLC

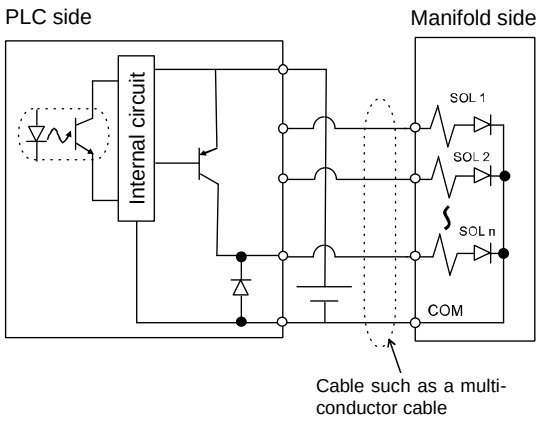
The common wiring has already been connected on the manifold side. Since the solenoid valves have no polarity, they can be connected to DC output unit (for PLC) of either output types (NPN or PNP).

Wire according to the following diagrams.

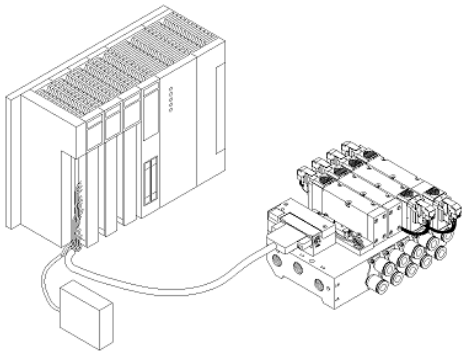
DC output unit (NPN output)




DC output unit (PNP output)




* SOL = solenoid



## ■ Cable fabrication

In fabricating the cable for connection to the valves, the following components are recommended.

| Part name | Model number | Manufacturer |
|---|---|---|
| Solder type D-sub connector socket | HDBB-25S | Hirose Electric Co., Ltd. |
| Solder type D-sub connector socket | JAZ-25S | J.S.T. Mfg. Co., Ltd. |
| Crimp type D-sub connector socket | CDB-25S | Hirose Electric Co., Ltd. |
| Crimp type D-sub connector socket | JAC-25S | J.S.T. Mfg. Co., Ltd. |
| Plug case (for solder type connector, equipped with M2.6 screws) | HDB-CTF | Hirose Electric Co., Ltd. |
| Plastic cover (equipped with M2.6 screws) | JCB-25M | J.S.T. Mfg. Co., Ltd. |

Avoid using an insulation displacement type connector (IDC) whenever possible, as it has low electrical capacity and there will be a greater voltage drop since it can only use cables with thin conductors.

## ■ CKD cable specifications

CKD cables can be ordered using the following model numbers.

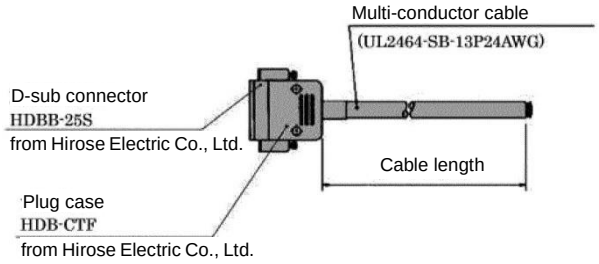
4GR-CABLE-D

| ※1 | ※2 |
|---|---|
| 0 | 0 – 1 |

| ※1 | User-side end of cable |
|---|---|
| 0 | Unfinished (cut to length only) |
| 1 | With round terminal for M3.5 screw |

| ※2 | Cable length |
|---|---|
| 1 | 1m |
| 3 | 3m |
| 5 | 5m |

4GR-CABLE-D00-*2

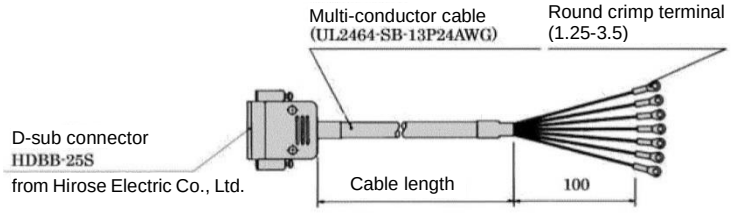



Correspondence between D-sub connector terminal number and conductor

| D-sub connector terminal no. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conductor identifiers | Insulator color | Orange | Orange | Yellow | Yellow | Green | Green | Gray | Gray | White | White | Orange | Orange | Yellow | Yellow | Green |
| | Mark type | One dot | | | | | | | | | | Two dots | | | | |
| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Conductor identifiers | Insulator color | Green | Gray | Gray | White | White | Orange | Orange | Yellow | Yellow | Green |
| | Mark type | Two dots | | | | | Three dots | | | | |
| | Mark color | Red | Black | Red | Black | Red | Black | Red | Black | Red | Black |

4GR-CABLE-D01-*2




Correspondence between D-sub connector terminal number and conductor

| D-sub connector terminal no. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conductor identifiers | Insulator color | Orange | Orange | Yellow | Yellow | Green | Green | Gray | Gray | White | White | Orange | Orange | Yellow | Yellow | Green |
| | Mark type | One dot | | | | | | | | | | Two dots | | | | |
| | Mark color | Black | Red | Black | Red | Black | Red | Black | Red | Black | Red | Black | Red | Black | Red | Black |
| Mark tubing no. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |

| D-sub connector terminal no. | | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Conductor identifiers | Insulator color | Green | Gray | Gray | White | White | Orange | Orange | Yellow | Yellow | Green |
| | Mark type | Two dots | | | | | Three dots | | | | |
| | Mark color | Red | Black | Red | Black | Red | Black | Red | Black | Red | Black |
| Mark tubing no. | | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |

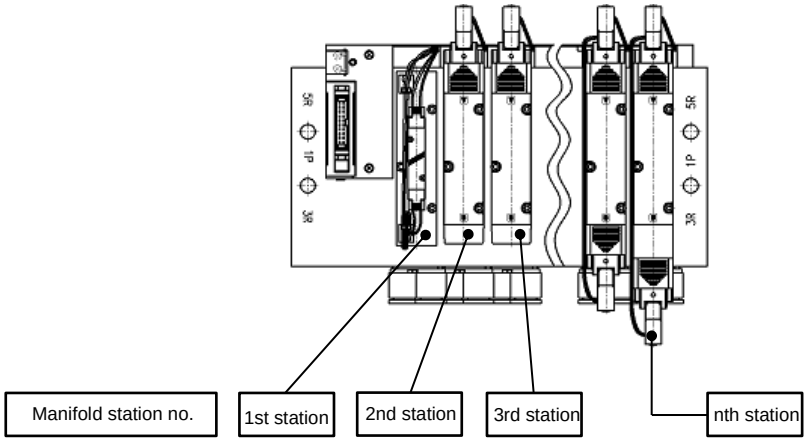
## 2.5.7 Flat cable connector (T50)

### ■ Flat cable connector

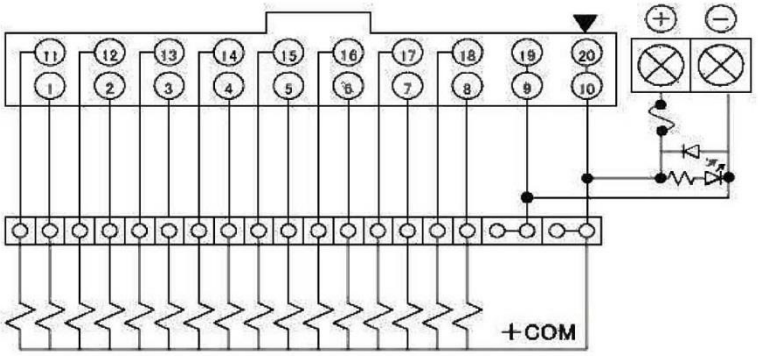
The connector used for wiring method T50 complies with MIL-C-83503 standard. Flat cable insulation displacement connector simplifies wiring work.
Pin numbers are assigned differently depending on the PLC manufacturer, but the functions are assigned in the same way. Use the triangle mark (▼) shown on the connector and the table below as a reference when wiring. The triangle mark (▼) indicates the reference point for both the plug and the socket.

### ■ Precautions on wiring the flat cable connector (T50)

- Signal arrays of the PLC output unit must match signal arrays on the valve side. Direct connections with the PLC are limited. Use the cable specified by the PLC manufacturer.
- Only 24 VDC or 12 VDC power can be used.
- When driving T50 type with a general output unit, use the + terminal (20, 10) of the 20-pin connector as the + side common and use the NPN transistor output open collector type for the drive circuit.
- Connecting this manifold to the input unit may cause damage not only to the manifold itself but also to peripheral devices. Do not connect this manifold to the input unit.
- Manifold stations are numbered in order from left to right with the piping port towards the user (refer to the figure below).
- Voltage drop occurs when energizing solenoids at the same time or depending on the cable length. Make sure that the voltage drop on the solenoid does not exceed 10% of the rated voltage.

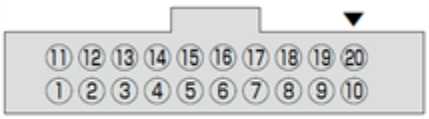



### ■ Internal wiring



## ■ Examples of connector pin layouts for wiring method T50

Maximum number of stations on the manifold varies depending on the model. Check individual specifications.
In the table below, each valve number (Valve no.) consists of a number (the station number) and an alphabet (a for the a-side solenoid and b for the b-side solenoid). For example, “1a” refers to 1st station a-side solenoid.




**<Standard wiring>**

- Single solenoid valve
  (Maximum of 11 stations)

| Pin no. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 9a | 10a | 11a | Empty | Empty | Empty | Empty | Empty | - power | + power |
| Pin no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Valve no. | 1a | 2a | 3a | 4a | 5a | 6a | 7a | 8a | - power | + power |

- Double solenoid valve
  (Maximum of 8 stations)

| Pin no. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 5a | 5b | 6a | 6b | 7a | 7b | 8a | 8b | - power | + power |
| Pin no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Valve no. | 1a | 1b | 2a | 2b | 3a | 3b | 4a | 4b | - power | + power |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 16 solenoids)

| Pin no. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 7a | 7b | 8a | 9a | 10a | 10b | 11a | 11b | - power | + power |
| Pin no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Valve no. | 1a | 2a | 3a | 3b | 4a | 4b | 5a | 6a | - power | + power |

**<Double wiring>**

- Single solenoid valve
  (Maximum of 8 stations)

| Pin no. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 5a | Empty | 6a | Empty | 7a | Empty | 8a | Empty | - power | + power |
| Pin no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Valve no. | 1a | Empty | 2a | Empty | 3a | Empty | 4a | Empty | - power | + power |

- Double solenoid valve
  (Maximum of 8 stations)

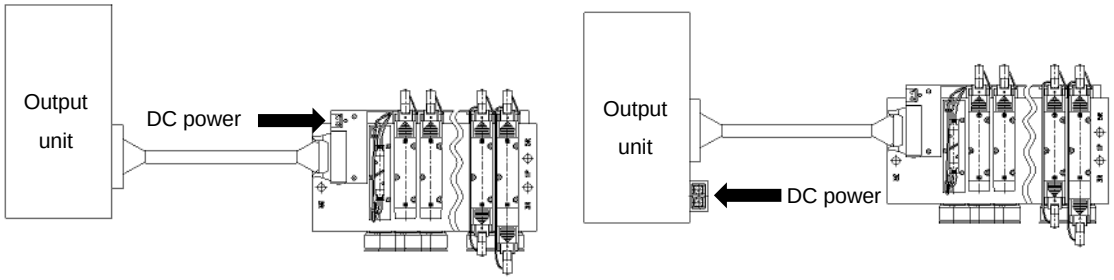
| Pin no. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 5a | 5b | 6a | 6b | 7a | 7b | 8a | 8b | - power | + power |
| Pin no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Valve no. | 1a | 1b | 2a | 2b | 3a | 3b | 4a | 4b | - power | + power |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 16 solenoids)

| Pin no. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 5a | Empty | 6a | Empty | 7a | 7b | 8a | Empty | - power | + power |
| Pin no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Valve no. | 1a | Empty | 2a | Empty | 3a | 3b | 4a | 4b | - power | + power |

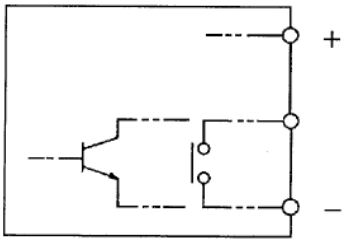
## ■ Power supply

This terminal block is used when power needs to be supplied from the external source. Supply power to the wiring block or the input/output unit in a manner as shown in the following figures. When properly connected, the power indicator will light up. For wiring, check the polarity indicated on the cover to wire with the correct polarity. Incorrect wiring causes a malfunction.
M3 x 6 screws are used for the terminal block. Use crimp terminals for M3 screws with width of 6.4 or less and secure the screws with a tightening torque of 0.3 N•m to 0.5 N•m.




## ■ How to connect to PLC

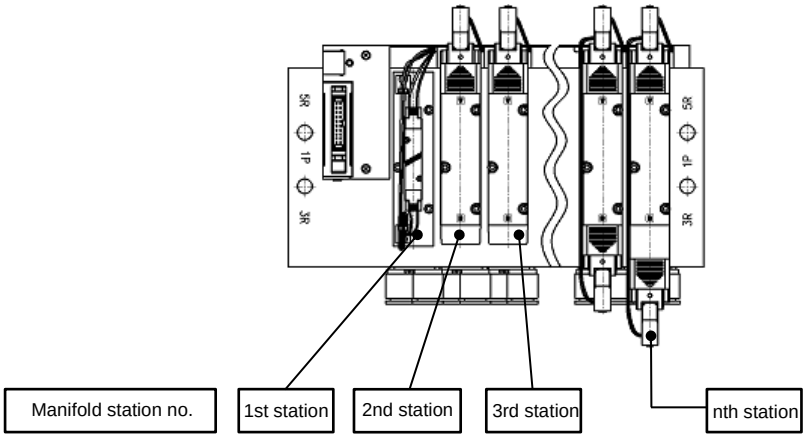
Make sure that the signal line and power line are wired correctly. Even if the connectors have the same shape, the signal pin arrangements may vary depending on the manufacturer or unit types. Make sure to check the pin arrangement of the connector to be used and wire it correctly.
For the output unit, use one with a contact between the minus side of the power source and the output point, or one that is an NPN transistor output open collector type.



## 2.5.8 Flat cable connector (T51/T52/T53)

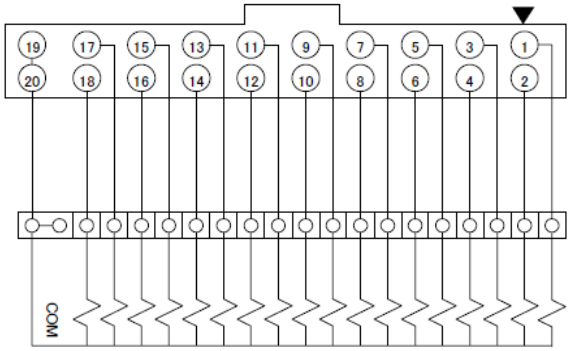
### ■ Precautions on wiring the flat cable connector (T51/T52/T53)

- Signal arrays of the PLC output unit must match signal arrays on the valve side.
- Only 24 VDC or 12 VDC power can be used.
- The T51/T52/T53 types are driven with a general output unit.
- Connecting this manifold to the input unit may cause damage not only to the manifold itself but also to peripheral devices. Do not connect this manifold to the input unit.
- Manifold stations are numbered in order from left to right with the piping port towards the user (refer to the figure below).
- Voltage drop occurs when energizing solenoids at the same time or depending on the cable length. Make sure that the voltage drop on the solenoid does not exceed 10% of the rated voltage.

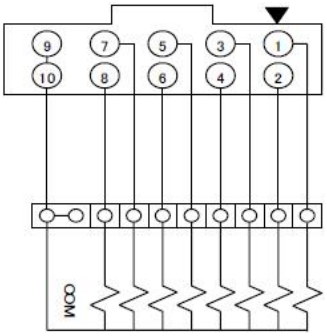



### ■ Internal wiring

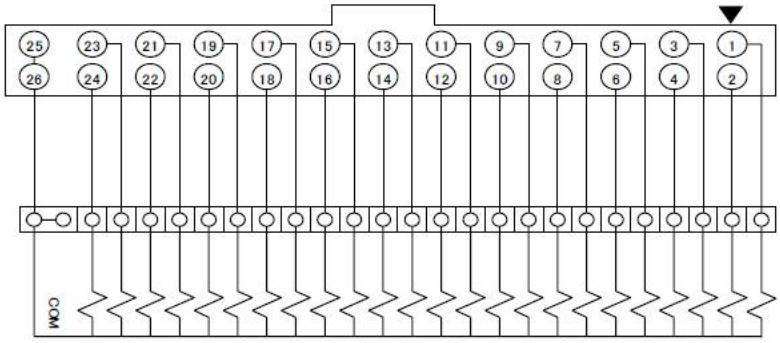
- T51




- T52

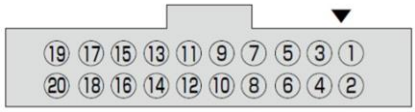



- T53



## ■ Examples of connector pin layouts for wiring method T51

Maximum number of stations on the manifold varies depending on the model. Check individual specifications.
In the table below, each valve number (Valve no.) consists of a number (the station number) and an alphabet (a for the a-side solenoid and b for the b-side solenoid). For example, “1a” refers to 1st station a-side solenoid.




**<Standard wiring>**

- Single solenoid valve
  (Maximum of 11 stations)

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

- Double solenoid valve
  (Maximum of 9 stations)

| 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 |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 18 solenoids)

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

**<Double wiring>**

- Single solenoid valve
  (Maximum of 9 stations)

| Terminal no. | 19 | 17 | 15 | 13 | 11 | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | COM | 9a | 8a | 7a | 6a | 5a | 4a | 3a | 2a | 1a |
| Terminal no. | 20 | 18 | 16 | 14 | 12 | 10 | 8 | 6 | 4 | 2 |
| Valve no. | COM | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty |

- Double solenoid valve
  (Maximum of 9 stations)

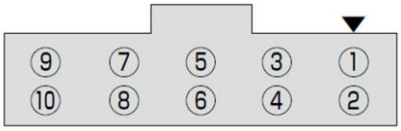
| Pin no. | 19 | 17 | 15 | 13 | 11 | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | COM | 9a | 8a | 7a | 6a | 5a | 4a | 3a | 2a | 1a |
| Pin no. | 20 | 18 | 16 | 14 | 12 | 10 | 8 | 6 | 4 | 2 |
| Valve no. | COM | 9b | 8b | 7b | 6b | 5b | 4b | 3b | 2b | 1b |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 9 stations)

| 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 |

## ■ Examples of connector pin layouts for wiring method T52

Maximum number of stations on the manifold varies depending on the model. Check individual specifications.
In the table below, each valve number (Valve no.) consists of a number (the station number) and an alphabet (a for the a-side solenoid and b for the b-side solenoid). For example, “1a” refers to 1st station a-side solenoid.




**<Standard wiring>**

- Single solenoid valve
  (Maximum of 8 stations)

| Pin no. | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|
| Valve no. | COM | 7a | 5a | 3a | 1a |
| Pin no. | 10 | 8 | 6 | 4 | 2 |
| Valve no. | COM | 8a | 6a | 4a | 2a |

- Double solenoid valve
  (Maximum of 4 stations)

| Pin no. | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|
| Valve no. | COM | 4a | 3a | 2a | 1a |
| Pin no. | 10 | 8 | 6 | 4 | 2 |
| Valve no. | COM | 4b | 3b | 2b | 1b |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 8 solenoids)

| Pin no. | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|
| Valve no. | COM | 5b | 4b | 3a | 1a |
| Pin no. | 10 | 8 | 6 | 4 | 2 |
| Valve no. | COM | 6a | 5a | 4a | 2a |

**<Double wiring>**

- Single solenoid valve
  (Maximum of 4 stations)

| Pin no. | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|
| Valve no. | COM | 4a | 3a | 2a | 1a |
| Pin no. | 10 | 8 | 6 | 4 | 2 |
| Valve no. | COM | Empty | Empty | Empty | Empty |

- Double solenoid valve
  (Maximum of 4 stations)

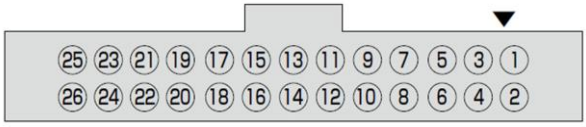
| Pin no. | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|
| Valve no. | COM | 4a | 3a | 2a | 1a |
| Pin no. | 10 | 8 | 6 | 4 | 2 |
| Valve no. | COM | 4b | 3b | 2b | 1b |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 4 stations)

| Pin no. | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|
| Valve no. | COM | 4a | 3a | 2a | 1a |
| Pin no. | 10 | 8 | 6 | 4 | 2 |
| Valve no. | COM | 4b | Empty | Empty | Empty |

## ■ Examples of connector pin layouts for wiring method T53

Maximum number of stations on the manifold varies depending on the model. Check individual specifications.
In the table below, each valve number (Valve no.) consists of a number (the station number) and an alphabet (a for the a-side solenoid and b for the b-side solenoid). For example, “1a” refers to 1st station a-side solenoid.




**<Standard wiring>**

- Single solenoid valve
  (Maximum of 11 stations)

| Pin no. | 25 | 23 | 21 | 19 | 17 | 15 | 13 | 11 | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | COM | Empty | Empty | Empty | Empty | Empty | Empty | 11a | 9a | 7a | 5a | 3a | 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 | 10a | 8a | 6a | 4a | 2a |

- Double solenoid valve
  (Maximum of 11 stations)

| Pin no. | 25 | 23 | 21 | 19 | 17 | 15 | 13 | 11 | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | COM | Empty | 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 | 11b | 10b | 9b | 8b | 7b | 6b | 5b | 4b | 3b | 2b | 1b |

- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 24 solenoids)

| Pin no. | 25 | 23 | 21 | 19 | 17 | 15 | 13 | 11 | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | COM | Empty | Empty | Empty | Empty | 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 | Empty | Empty | Empty | Empty | 11a | 9b | 8b | 7b | 6a | 5a | 4a | 2a |

**<Double wiring>**

- Single solenoid valve
  (Maximum of 12 stations)

| Pin no. | 25 | 23 | 21 | 19 | 17 | 15 | 13 | 11 | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | COM | Empty | 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 |

- Double solenoid valve
  (Maximum of 12 stations)

| Pin no. | 25 | 23 | 21 | 19 | 17 | 15 | 13 | 11 | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | COM | Empty | 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 | 11b | 10b | 9b | 8b | 7b | 6b | 5b | 4b | 3b | 2b | 1b |

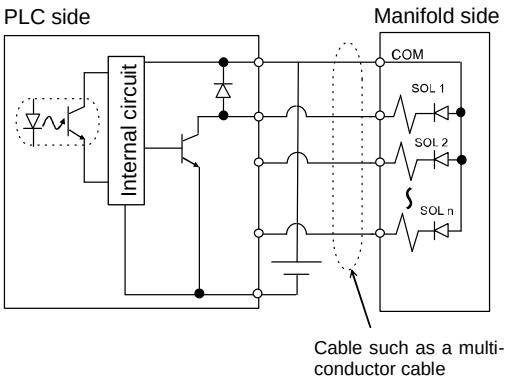
- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 24 solenoids)

| Pin no. | 25 | 23 | 21 | 19 | 17 | 15 | 13 | 11 | 9 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | COM | Empty | 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 |

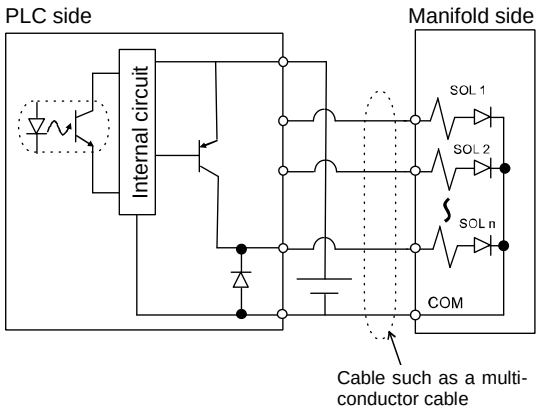
## ■ How to connect to PLC

The common wiring has already been connected on the manifold side. Since the solenoid valves have no polarity, they can be connected to DC output unit (for PLC) of either output types (NPN or PNP). Wire according to the following diagrams.

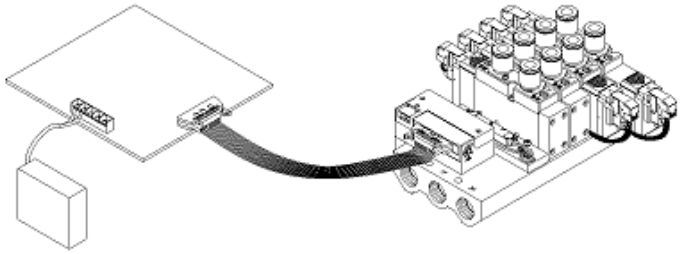
DC output unit (NPN output)




DC output unit (PNP output)




* SOL = solenoid



## ■ Cable fabrication

In fabricating the cable for connection to the valves, the following components are recommended. The components shown here all comply with MIL-C-85303 standard. There are many other components that can also be used for connection, but their locking mechanism may not be suitable. In such a case, secure the lock lever with a strap such as a cable tie.

**<For T50/T51>**

| Part name | Model number | Manufacturer |
|---|---|---|
| Socket | XG4M-2030 | Omron Corporation |
| Strain relief | XG4T-2004 | |
| Discrete-wire press connector | XG5M-2032-N | |
| Discrete-wire press connector | XG5M-2035-N | |
| Discrete-wire crimp connector (socket) | XG5N-201-U | |
| Discrete-wire crimp connector (contact) | XG5W-0231, 0232 | |

**<For T52>**

| Part name | Model number | Manufacturer |
|---|---|---|
| Socket | XG4M-1031 | Omron Corporation |
| Strain relief | XG4T-1004 | |
| Discrete-wire press connector | XG5M-1031-N | |
| Discrete-wire press connector | XG5M-1034-N | |
| Discrete-wire crimp connector (socket) | XG5N-101-U | |
| Discrete-wire crimp connector (contact) | XG5W-0231, 0232 | |

**<For T53>**

| Part name | Model number | Manufacturer |
|---|---|---|
| Socket | XG4M-2630 | Omron Corporation |
| Strain relief | XG4T-2604 | |
| Discrete-wire press connector | XG5M-2632-N | |
| Discrete-wire press connector | XG5M-2635-N | |
| Discrete-wire crimp connector (socket) | XG5N-261-U | |
| Discrete-wire crimp connector (contact) | XG5W-0231, 0232 | |

## ■ Cable

This system, in general, uses flat cables or thin multi-conductor cables. These cables have thin conductors and must be checked that they have sufficient mechanical strength and electrical capacity for the application.

- Make sure to make a rounded corner (R) when bending the flat cable.
- The cable has large electric resistance (approximately 0.22 Ω/m for AWG28). Use extreme care to avoid a voltage drop along the cable. For example, when 16 solenoid valves are energized at 24 VDC, a voltage drop of approximately 0.1 V/m will occur.

# 3. USAGE

**⚠WARNING**

**Consult CKD about the specifications before using the product outside the designated specifications or for special applications.**

## 3.1 Safety Instructions

### 3.1.1 Air quality

**⚠WARNING**

**Do not supply anything other than compressed air.**

**Use clean compressed air that does not contain corrosive gases.**

**Do not use the exhaust malfunction prevention valves for purposes other than to block the back pressure from adjacent air devices.**
Its structure cannot retain pressure continuously.

**⚠CAUTION**

**Improve the quality of air.**
Compressed air usually contains a large amount of drainage, oxidized oil, tar, foreign matters, and rust from the piping, which may cause malfunction such as an operation fault and short service life. In addition, the exhaust causes pollution.

**Use Class 1 ISO VG 32 turbine oil when lubricating.**
Although the product is designed for oil-free operations, if lubricated even once, it will require periodic lubrication from then on. Make sure to keep it lubricated.

**Do not use either spindle oil or machine oil.**
They induce expansion of the rubber parts, which will cause operation faults.

#### ■ Super-dry air

The super-dry air (humidity class of 0 to 3 as specified in JIS B 8392-1) may cause the lubricant to scatter, resulting in short service life.

#### ■ Lubrication

Generally, the 4G R Series does not require any lubrication. If lubrication is required, use Class 1 ISO VG 32 turbine oil.
If there is too much lubrication on the product or if the pressure is significantly low, the response time may be delayed. The response time indicated in the catalog shows the data obtained when the product is not lubricated and the pressure is 0.5 MPa.

#### ■ Drainage

- If the temperature inside the pneumatic piping or pneumatic component drops, drainage may occur.
- If drainage enters and momentarily blocks the air passage inside the pneumatic component, it may cause an operation fault.
- If drainage generates rust, it may cause a failure in the pneumatic component.
- If drainage flushes the lubricant, it may cause a lubrication failure.

## ■ Contamination

- Use compressed air that does not contain oxidized oil, tar, carbon, or other contaminants from the air compressor.
  If oxidized oil, tar, or carbon enters into and adheres to pneumatic components, the resistance of the sliding section may increase and result in operation faults.
  If the supplied lubricant mixes in with oxidized oil, tar, or carbon, the sliding section of the pneumatic components will wear out.
- Use compressed air that does not contain solid foreign matters.
  If solid foreign matters in compressed air enter into the pneumatic components, the sliding section will wear out and contaminants will adhere to the inside.

## ■ Improvement of air quality

Take measures (such as dehumidifying with an aftercooler or a dryer, removing foreign matters with an appropriate filter, or installing a tar removing filter) in order to improve the quality of air.

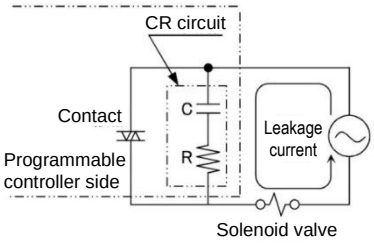
## 3.1.2 Electric circuit

### ⚠CAUTION

**Check for leakage currents from external control devices to prevent a malfunction.**

When a programmable controller or a similar control device is used, a leakage current may prevent the valve from operating correctly even if the solenoid valve is de-energized.

When controlling solenoid valves using a programmable controller or a similar control device, make sure that the leakage current from the programmable controller output is as specified in the table below.




| | |
|---|---|
| For 100 VAC | 1.2 mA or less |
| For 110 VAC | |
| For 200 VAC | |
| For 12 VDC | 1.8 mA or less |
| For 24 VDC | 1.2 mA or less |

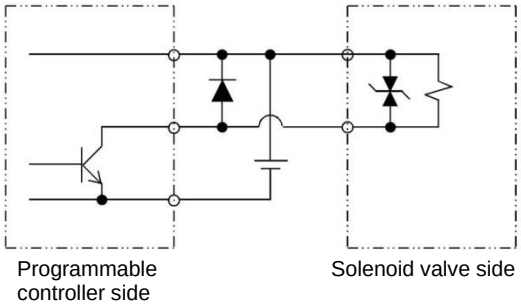
The surge suppressor limits the surge voltage generating from the solenoid valve, which can reach several hundred volts, to a low voltage level bearable for output contacts. However, this function may be insufficient for some output circuits and the voltage may cause breakage or malfunction of the product. Check the surge voltage limitation level of the solenoid valve to be used, the withstand voltage and circuit configuration of the output devices, and the reset delay time to determine serviceability.

If necessary, take a different measure against surge. The 4G R Series solenoid valves equipped with a surge suppressor suppress the terminal-to-terminal reverse voltage surge generated upon shut off, to the level shown in the table below.

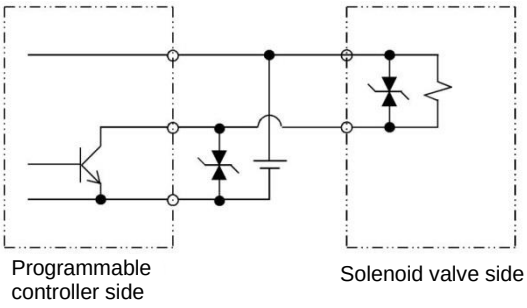
| | |
|---|---|
| For 12 VDC | Approx. 27 V |
| For 24 VDC | Approx. 47 V |
| When option S or E is selected | Approx. 1 V |

For an NPN type output unit, install an additional contact protection circuit since the output transistor is susceptible to the surge voltage of the sum of the voltage specified in the table above and the source voltage.

- Example 1 of additional output transistor protection circuit




- Example 2 of additional output transistor protection circuit



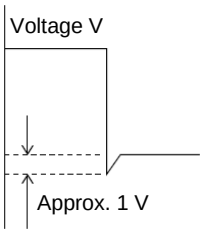

- When energizing a double-solenoid type instantaneously, the energizing time must be 0.1 second or longer. It is recommended to energize while the cylinder is operating when the back pressure of another solenoid valve is conceivable.
- When energizing continuously, the surface temperature of the manifold increases.
  This is not abnormal, but appropriate ventilation or heat dissipation measures must be considered.

## 3.1.3 Surgeless (option symbol: S)

**⚠CAUTION**

**Take measures against open/close surges, such as a non-contact relay or surge absorber.**
Open/close surges caused by contact relays and switches may damage the built-in diodes.

Diodes are incorporated in the solenoid valves of surgeless models to reduce the surge voltage of solenoid valves to approximately 1 V. There is no polarity with 4G R Series.




## 3.1.4 Low heat generating/energy saving circuit (option symbol: E)

**⚠CAUTION**

**Do not use this type under environment where vibrations and shocks exceeding the specified range are applied.**
Such usage will cause malfunction of the valve.

**Turn off the power for 50 ms or more in order to turn on the solenoid valve again on occurrence of disturbance that causes a momentary power failure for 30 ms or less to the power supply unit of the solenoid valve in a continuous conducting state.**
When a momentary power failure for 30 ms or less occurs to a power supply unit of the solenoid valve, the conducting state cannot be maintained.

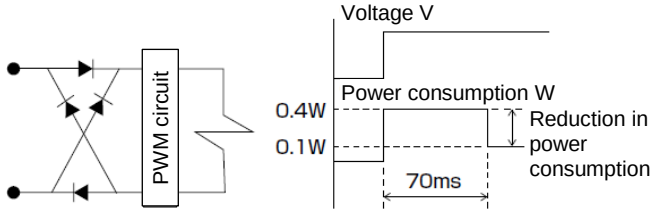
**Do not raise the voltage gradually when using this type.**
The valve cannot be operated.

**Take measures against open/close surges, such as a non-contact relay or surge absorber.**
Open/close surges caused by contact relays and switches may damage the built-in diodes.

Solenoid valves of low heat generating/energy saving circuit models have built-in PWM circuit and are structured to lower the electric power required for the coil to attract and hold. Power consumption is reduced to 1/4 compared with the standard model. There is no polarity with 4G R Series.

**<Low heat generating/energy saving circuit model>**

| | Voltage | Current (A) | Power consumption W |
|---|---|---|---|
| At start-up | 12 VDC | 0.033 | 0.4 |
| | 24 VDC | 0.017 | 0.4 |
| When holding | 12 VDC | 0.017 | 0.1 |
| | 24 VDC | 0.008 | 0.1 |




## 3.1.5 AC voltage models

**⚠CAUTION**

**Be careful when selecting SSR (Solid State Relay).**
AC voltage models have a built-in full wave rectified bridge. In case of using SSR for turning the solenoid valve on/off, reset failure of solenoid valve may occur depending on its type.
It is recommended to consult the manufacturer of the relay and programmable controller.

# 3.2 Manual Operation

**⚠WARNING**

**After operating the manual override, return the cylinder to the original position (initial position) before re-starting operation.**

**Make sure that nobody is near the cylinder to be activated before performing manual operation.**

**Release the lock before performing normal operation for non-locking/locking combination manual override.**

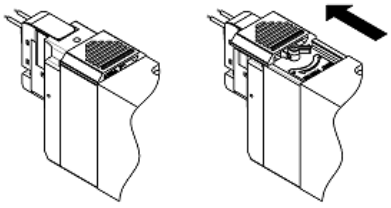
- Performing normal operation while the manual override is locked causes malfunction.
- If the manual cover is closed, the lock is released.

- The 4G R Series is a pilot operated solenoid valve. If air is not supplied to port P (or port PA for external pilot type), the main valve does not switch even if the manual override is operated.
- Manual protection cover is provided to this solenoid valve as standard. Since the manual protection cover is closed when shipped out of the factory, open it to operate the manual override. Note that the manual protection cover will not close unless the locking manual override is released.
- Manual override has both locking and non-locking overrides. It is locked by pressing down and turning the lever. When locking, make sure to turn the lever while pressing it down. Turning the lever without pressing it down could damage the manual override and cause air leakage.

## 3.2.1 Non-locking/locking combination manual override

### ■ How to open and close the manual protection cover

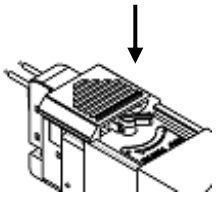
Do not apply excessive force to the manual protection cover when opening and closing the cover. Excessive external force may cause damage (below 5 N).



### ■ How to operate the manual override

<Non-locking operation>

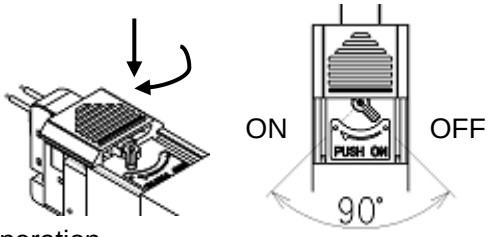
***1*** Press the lever down in the direction of the arrow until it stops.
Manual operation can be performed while the lever is pressed down.



***2*** Release the lever to finish manual operation.
The lever returns to the original position when released.

<Locking operation>

***1*** Press the lever down and turn it in the direction of the arrow until it stops.
The lever is locked in place, maintaining the manual operation state.




***2*** Return the lever to the original position to disable manual operation.

# 4. MAINTENANCE AND INSPECTION

## 4.1 Periodic Inspection

**⚠WARNING**

**Turn off the power, stop the supply of compressed air, and make sure that there is no residual pressure before maintenance.**
Observe the condition to ensure safety.

**⚠CAUTION**

**Plan and perform daily and periodic inspections so that maintenance can be managed properly.**
If maintenance is not properly managed, the product's functions may deteriorate significantly and this may lead to faults (such as short service life, damage, and malfunction) or accidents.

In order to use the product under optimum conditions, perform a periodic inspection once or twice a year.

### ■ Pressure of supplied compressed air

- Is the set pressure supplied?
- Does the pressure gauge indicate the set pressure during operation of the device?

### ■ Pneumatic filter

- Is drainage correctly discharged?
- Are the bowl and element clean enough to use?

### ■ Leakage of compressed air from piping connections

- Are all connections, especially at movable sections, correctly connected?

### ■ Operation of solenoid valves

- Is there any delay in operation?
- Are the valves exhausting properly?

### ■ Operation of pneumatic actuator

- Are operations smooth?
- Is the actuator reaching the end stop properly?
- Are loads connected properly?

### ■ Lubricator

- Is the oil rate correctly adjusted?

### ■ Lubricant

- Is the specified lubricant supplied?

### ■ Screws

- Are there any loose screws?

# 4.2 Disassembling and Assembling

**⚠WARNING**

**Thoroughly read and understand this Instruction Manual before working on disassembly or assembly of the manifold.**

- The product must be handled by a person who understands the structure and operation principle of solenoid valve and has knowledge to secure the safety.
- A level of 2nd grade (or higher) Certified Skilled Professional of Pneumatic Apparatus Assembling is required.

**Turn off the power and release the pressure before adding or removing a manifold valve.**

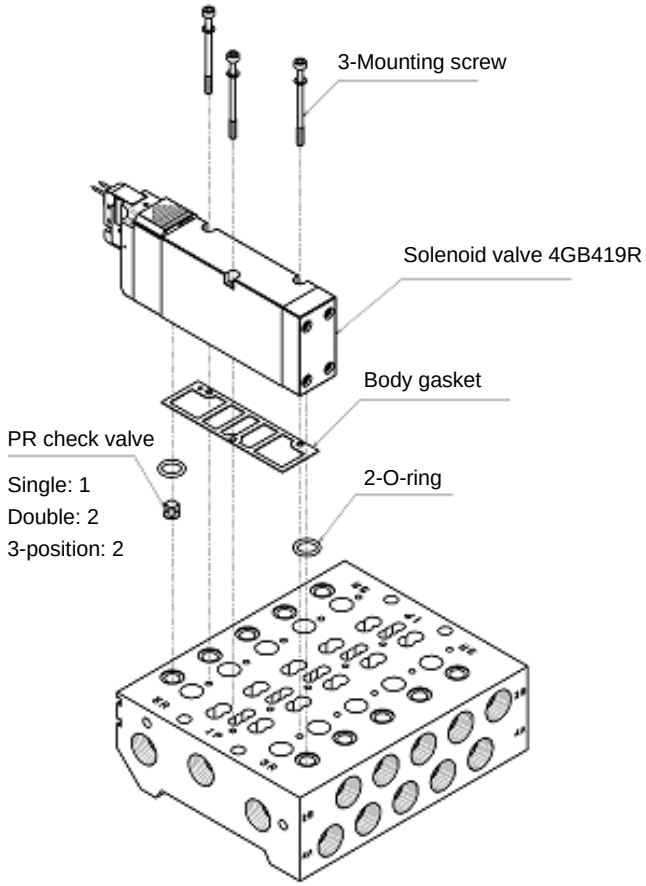
**Do not disassemble or reassemble the inside of the solenoid valve.**

- Disassembling and reassembling the inside of the solenoid valve will impair the sealing performance.
- Disassembling and reassembling the solenoid valve will void the warranty.

## 4.2.1 Replacement of solenoid valve

When replacing the solenoid valve, use extreme care so that the gasket and PR check valve do not fall off.

| Screw size | Tightening torque (N•m) |
|---|---|
| M3 | 1.6 to 1.8 |

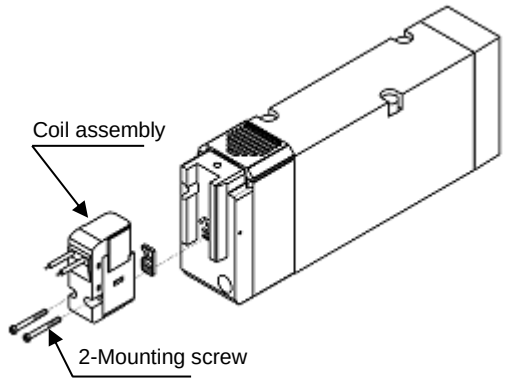


## 4.2.2 How to replace a coil assembly

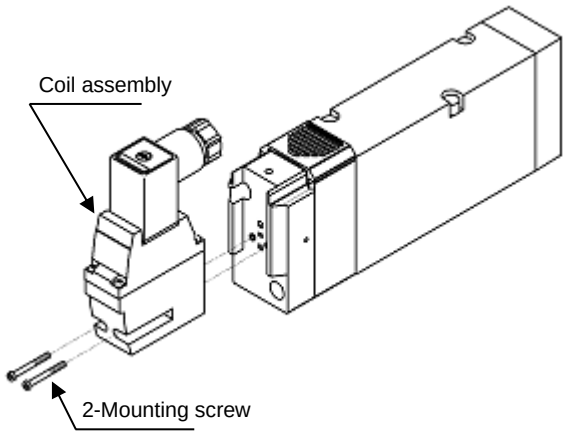
A DIN terminal box type valve is compatible with only a DIN terminal box coil assembly. A coil assembly for other electrical connection type cannot be used on a DIN terminal box type valve.

1. Remove two mounting screws securing the coil assembly and remove the old coil assembly. Loosening other screws may cause operation faults.
2. Check the replacement coil assembly to make sure that the gasket is installed on the coil assembly side.
3. Attach the replacement coil assembly and tighten the mounting screws. Improper tightening torque may cause air leakage or operation faults.
   **Recommended tightening torque: 0.15 N•m to 0.19 N•m**

- Grommet lead wire, E-type connector coil assembly




- DIN terminal box coil assembly

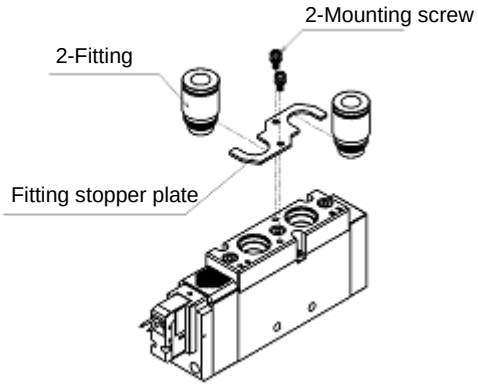



## 4.2.3 How to replace a cartridge type fitting (4GA/B4 R)

To change the push-in fitting size, check the procedure before replacing. If it is not installed correctly or if the tightening of the mounting screws is insufficient, problems such as air leakage will occur.

### ■ Body piping (4GA4 R) type

1. Remove the mounting screws.
2. Pull out the fitting stopper plate and fitting at the same time.
3. Adjust the groove on the replacement fitting to the fitting stopper plate and assemble them temporarily.
4. Mount the fitting stopper plate and fitting at the same time and tighten the mounting screw.




| Part name | Screw size | Tightening torque (N•m) |
|---|---|---|
| Stopper plate | M3 | 0.6 to 0.8 |

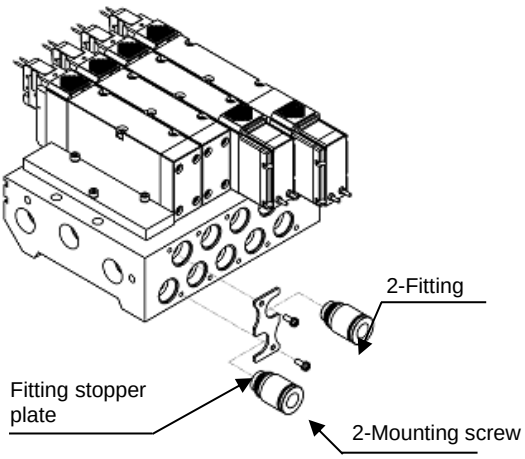
5. Pull on the fitting and confirm that it is installed correctly.

### ■ Base piping (4GB4 R) type

1. Remove the mounting screws.
2. Pull out the fitting stopper plate and fitting at the same time.
3. Adjust the groove on the replacement fitting to the fitting stopper plate and assemble them temporarily.
4. Mount the fitting stopper plate and fitting at the same time and tighten the mounting screw.

| Part name | Screw size | Tightening torque (N•m) |
|---|---|---|
| Stopper plate | M3 | 0.6 to 0.8 |

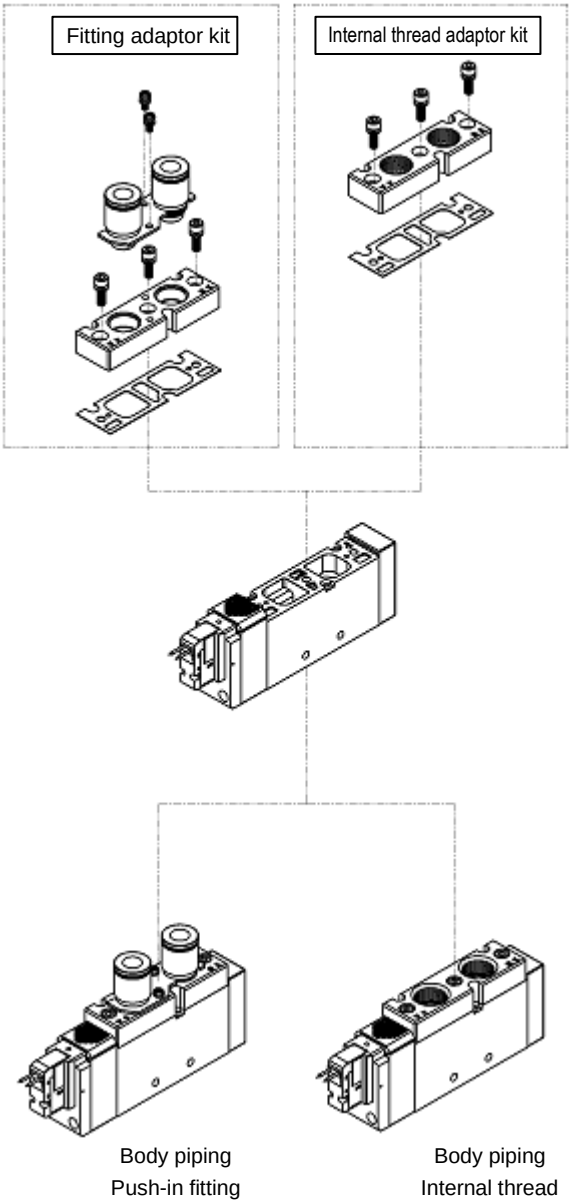
5. Pull on the fitting and confirm that it is installed correctly.




## 4.2.4 How to change piping connection specifications (4GA/B R)

Observe the tightening torque of the mounting screws when replacing the plate or the fitting adaptors attached to the body, when changing the body piping specifications and base piping specifications, or when changing the push-in fitting and internal thread specifications of body piping type. Insufficient tightening causes problems such as air leakage.

| Part name | Screw size | Tightening torque (N•m) |
|---|---|---|
| Fitting adaptor | M4 | 2.5 to 2.7 |



# 4.3 Adding a Valve to the Reduced Wiring Manifold

**⚠WARNING**

**Turn off the power and release the pressure before adding a manifold valve.**

## 4.3.1 How to add to the position where spare wiring is equipped

The masking plate at the reserved adding location is equipped with spare wiring beforehand.
To add a valve to the spare wiring location, follow the steps below.

***1*** Remove the spare socket from the masking plate.

***2*** Remove the masking plate from the base.

***3*** Mount the valve to be added to the base and assemble the socket.

## 4.3.2 How to add to the position where no spare wiring is equipped

When changing from single solenoid to double solenoid, additional internal wiring to the b-side solenoid to be added is required. To add the valve to where no spare wiring is equipped, follow the steps below.

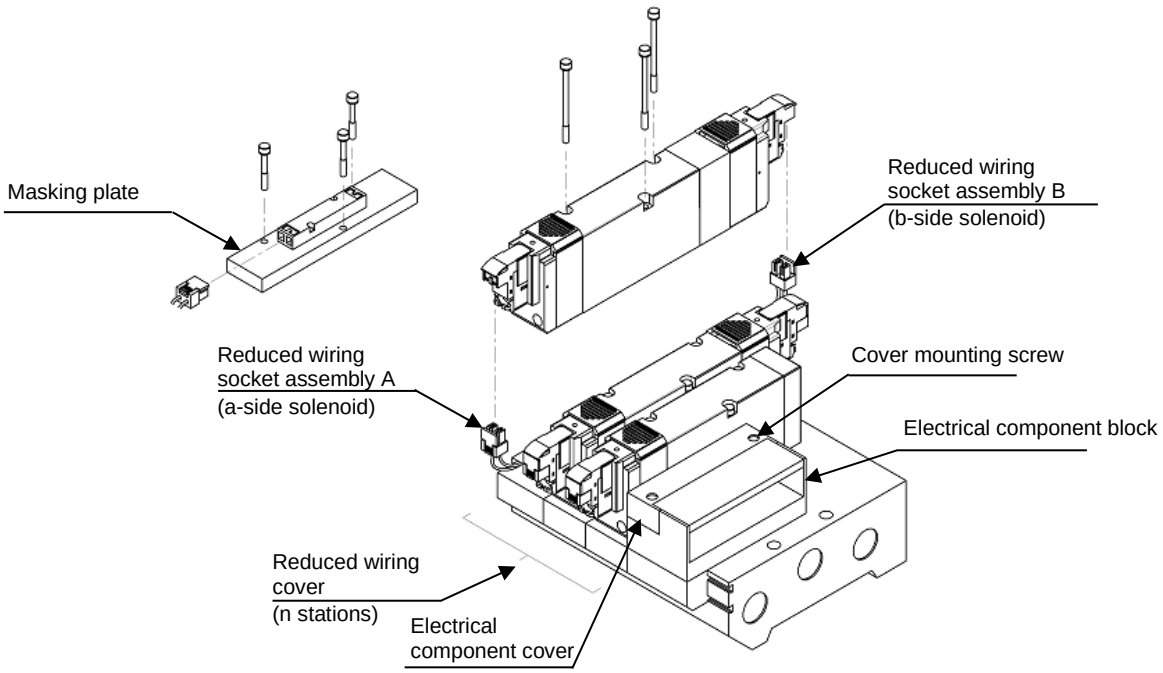
***1*** Remove the electrical component cover and open the reduced wiring cover.

***2*** Replace the valve from single solenoid to double solenoid.
Replace the socket for a-side solenoid.

***3*** Attach the socket assembly for the b-side solenoid (separately purchasable).
Pass the wiring through the valve and pull it out to the a-side.

***4*** Route the wire through the electrical component block and insert the connector to the electric circuit board.

***5*** Store the wiring in the reduced wiring cover. Close the reduced wiring cover and attach the electrical component cover.



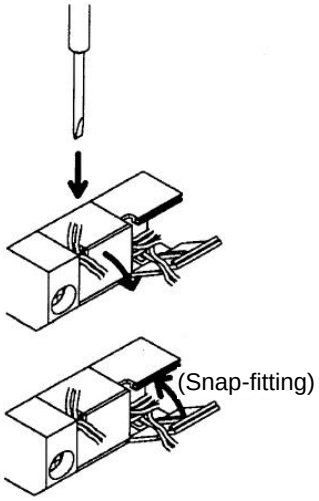
## 4.3.3 How to open and close the reduced wiring cover

### ■ How to open the reduced wiring cover

Open the reduced wiring cover by hooking the tip of a precision screw driver to the cable through hole on the cover.
Do not use a pointed tool so as not to damage the cable while hooking the cover.

### ■ How to close the reduced wiring cover

Pass the cable through the cable through hole on the reduced wiring cover and close the cover.
Make sure that the cable is not pinched and close the cover until a click is heard. (Snap-fitting)

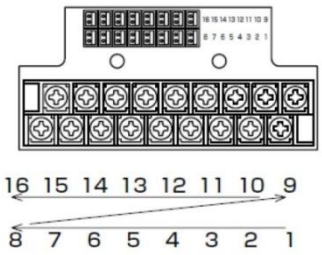


## 4.3.4 Instructions for wiring the electric circuit board connectors

Rules for establishing correspondence between the connectors on the electric circuit board and the valves differ depending on the wiring specifications. When wiring the electric circuit board connectors, always check the connector numbers printed on the circuit board.
The connector number in the table (Connector no.) indicates the pin number for each connector.

**Wire in the order indicated by the arrows.**

### T10




**1) Single solenoid valves only (maximum of 11 stations)**

| Connector no. | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | Empty | Empty | Empty | 11a | 10a | 9a |
| Connector no. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 8a | 7a | 6a | 5a | 4a | 3a | 2a | 1a |

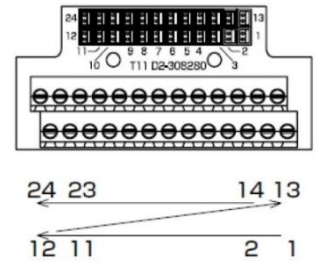
**2) Double solenoid valves only (maximum of 8 stations)**

| Connector no. | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
|---|---|---|---|---|---|---|---|---|
| Valve no. | 8b | 8a | 7b | 7a | 6b | 6a | 5b | 5a |
| Connector no. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 4b | 4a | 3b | 3a | 2b | 2a | 1b | 1a |

**3) Mixed (both single and double) (maximum of 16 solenoids)**

| Connector no. | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | Empty | Empty | Empty | Empty | 7b | 7a |
| Connector no. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 6a | 5b | 5a | 4b | 4a | 3a | 2a | 1a |

### T11




**1) Single solenoid valves only (maximum of 11 stations)**

| Connector no. | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty |
| Connector no. | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | Empty | 11a | 10a | 9a | 8a | 7a | 6a | 5a | 4a | 3a | 2a | 1a |

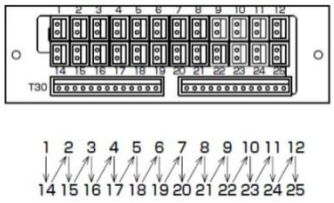
**2) Double solenoid valves only (maximum of 11 stations)**

| Connector no. | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | 11b | 11a | 10b | 10a | 9b | 9a | 8b | 8a | 7b | 7a |
| Connector no. | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | 6b | 6a | 5b | 5a | 4b | 4a | 3b | 3a | 2b | 2a | 1b | 1a |

**3) Mixed (both single and double) (maximum of 11 stations)**

| Connector no. | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty | Empty |
| Connector no. | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Valve no. | Empty | Empty | 7b | 7a | 6a | 5b | 5a | 4b | 4a | 3a | 2a | 1a |

### T30




**1) Single solenoid valves only (maximum of 11 stations)**

| Connector no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 1a | 3a | 5a | 7a | 9a | 11a | Empty | Empty | Empty | Empty | Empty | Empty |
| Connector no. | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Valve no. | 2a | 4a | 6a | 8a | 10a | Empty | Empty | Empty | Empty | Empty | Empty | Empty |

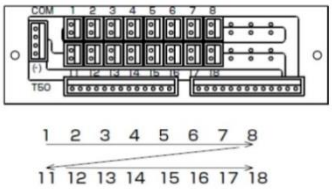
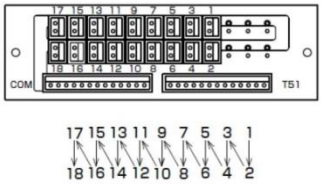
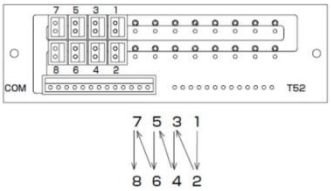
**2) Double solenoid valves only (maximum of 11 stations)**

| Connector no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 1a | 2a | 3a | 4a | 5a | 6a | 7a | 8a | 9a | 10a | 11a | Empty |
| Connector 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 | Empty |

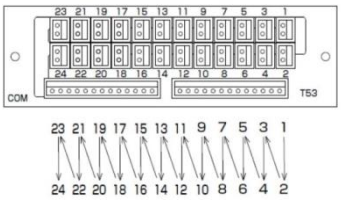
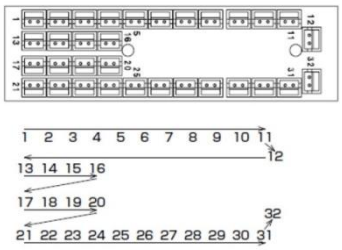
**3) Mixed (both single and double) (maximum of 11 stations)**

| Connector no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 1a | 3a | 4b | 5b | 7a | Empty | Empty | Empty | Empty | Empty | Empty | Empty |
| Connector no. | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Valve no. | 2a | 4a | 5a | 6a | 7b | Empty | Empty | Empty | Empty | Empty | Empty | Empty |

**Wire in the order indicated by the arrows.**

| | Electric circuit board assembly | Correspondence between connectors and valves |
|---|---|---|
| T50<br>T6* |  | **1) Single solenoid valves only (maximum of 11 stations)**<br>**Connector no.** 1 2 3 4 5 6 7 8<br>**Valve no.** 1a 2a 3a 4a 5a 6a 7a 8a<br>**Connector no.** 11 12 13 14 15 16 17 18<br>**Valve no.** 9a 10a 11a Empty Empty Empty Empty Empty<br><br>**2) Double solenoid valves only (maximum of 8 stations)**<br>**Connector no.** 1 2 3 4 5 6 7 8<br>**Valve no.** 1a 1b 2a 2b 3a 3b 4a 4b<br>**Connector no.** 11 12 13 14 15 16 17 18<br>**Valve no.** 5a 5b 6a 6b 7a 7b 8a 8b<br><br>**3) Mixed (both single and double) (maximum of 16 solenoids)**<br>**Connector no.** 1 2 3 4 5 6 7 8<br>**Valve no.** 1a 2a 3a 4a 4b 5a 5b 6a<br>**Connector no.** 11 12 13 14 15 16 17 18<br>**Valve no.** 7a 8a 8b Empty Empty Empty Empty Empty |
| T51 |  | **1) Single solenoid valves only (maximum of 11 stations)**<br>**Connector no.** 17 15 13 11 9 7 5 3 1<br>**Valve no.** Empty Empty Empty 11a 9a 7a 5a 3a 1a<br>**Connector no.** 18 16 14 12 10 8 6 4 2<br>**Valve no.** 18a Empty Empty Empty 10a 8a 6a 4a 2a<br><br>**2) Double solenoid valves only (maximum of 9 stations)**<br>**Connector no.** 17 15 13 11 9 7 5 3 1<br>**Valve no.** 9a 8a 7a 6a 5a 4a 3a 2a 1a<br>**Connector no.** 18 16 14 12 10 8 6 4 2<br>**Valve no.** 9b 8b 7b 6b 5b 4b 3b 2b 1b<br><br>**3) Mixed (both single and double) (maximum of 18 solenoids)**<br>**Connector no.** 17 15 13 11 9 7 5 3 1<br>**Valve no.** Empty Empty Empty 8b 7a 5b 4b 3a 1a<br>**Connector no.** 18 16 14 12 10 8 6 4 2<br>**Valve no.** Empty Empty Empty Empty 8a 6a 5a 4a 2a |
| T52 |  | **1) Single solenoid valves only (maximum of 8 stations)**<br>**Pin no.** 7 5 3 1<br>**Valve no.** 7a 5a 3a 1a<br>**Pin no.** 8 6 4 2<br>**Valve no.** 8a 6a 4a 2a<br><br>**2) Double solenoid valves only (maximum of 4 stations)**<br>**Connector no.** 7 5 3 1<br>**Valve no.** 4a 3a 2a 1a<br>**Connector no.** 8 6 4 2<br>**Valve no.** 4b 3b 2b 1b<br><br>**3) Mixed (both single and double) (maximum of 8 solenoids)**<br>**Connector no.** 7 5 3 1<br>**Valve no.** 5b 4b 3a 1a<br>**Connector no.** 8 6 4 2<br>**Valve no.** 6a 5a 4a 2a |

**Wire in the order indicated by the arrows.**

| | Electric circuit board assembly | Correspondence between connectors and valves |
|---|---|---|
| T53 |  | **1) Single solenoid valves only (maximum of 11 stations)**<br>**Connector no.** 23 21 19 17 15 13 11 9 7 5 3 1<br>**Valve no.** Empty Empty Empty Empty Empty Empty 11a 9a 7a 5a 3a 1a<br>**Connector no.** 24 22 20 18 16 14 12 10 8 6 4 2<br>**Valve no.** Empty Empty Empty Empty Empty Empty Empty 10a 8a 6a 4a 2a<br><br>**2) Double solenoid valves only (maximum of 11 stations)**<br>**Connector no.** 23 21 19 17 15 13 11 9 7 5 3 1<br>**Valve no.** Empty 11a 10a 9a 8a 7a 6a 5a 4a 3a 2a 1a<br>**Connector no.** 24 22 20 18 16 14 12 10 8 6 4 2<br>**Valve no.** Empty 11b 10b 9b 8b 7b 6b 5b 4b 3b 2b 1b<br><br>**3) Mixed (both single and double) (maximum of 11 stations)**<br>**Connector no.** 23 21 19 17 15 13 11 9 7 5 3 1<br>**Valve no.** Empty Empty Empty Empty Empty Empty 8b 7a 5b 4b 3a 1a<br>**Connector no.** 24 22 20 18 16 14 12 10 8 6 4 2<br>**Valve no.** Empty Empty Empty Empty Empty Empty Empty 8a 6a 5a 4a 2a |
| T8 |  | **1) Single solenoid valves only (maximum of 15 stations)**<br>**Connector no.** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16<br>**Valve no.** 1a 2a 3a 4a 5a 6a 7a 8a 9a 10a 11a 12a 13a 14a 15a Empty<br>**Connector no.** 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32<br>**Valve no.** Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty<br><br>**2) Double solenoid valves only (maximum of 15 stations)**<br>**Connector no.** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16<br>**Valve no.** 1a 1b 2a 2b 3a 3b 4a 4b 5a 5b 6a 6b 7a 7b 8a 8b<br>**Connector no.** 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32<br>**Valve no.** 9a 9b 10a 10b 11a 11b 12a 12b 13a 13b 14a 14b 15a 15b Empty Empty<br><br>**3) Mixed (both single and double) (maximum of 15 stations)**<br>**Connector no.** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16<br>**Valve no.** 1a 2a 3a 4a 4b 5a 5b 6a 7a 8a 8b Empty Empty Empty Empty Empty<br>**Connector no.** 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32<br>**Valve no.** Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty Empty |

# 5. TROUBLESHOOTING

## 5.1 Problems, Causes, and Solutions

If the product does not operate as intended, check the table below for a possible solution.

| Problem | Cause | Solution |
|---|---|---|
| Does not operate at all | There is no electric signal. | Turn on the power. |
| | Electric signals are faulty. | Repair the control circuit. |
| | Voltage or current fluctuation is excessive. | Check the power capacity (voltage fluctuation range: ± 10%). |
| | Wiring is not correct. | Correct the wiring. |
| | All pilot air exhaust ports are closed. | Inspect and correct the piping. |
| Does not operate properly | Leakage current is excessive. | Correct the control circuit and/or add a bleed circuit. |
| | Chattering occurs. | Check the switching system and check for loose wiring. |
| | Voltage is not as specified on nameplate. | Correct the voltage to meet the specification. |
| | Coil is damaged or short-circuited. | Replace the coil. |
| | Pressure source is disconnected. | Turn on the pressure source. |
| | Pressure is insufficient. | Readjust the pressure reducing valve or install a valve for increasing pressure. |
| | Flow rate is insufficient. | Inspect and correct the piping or install a surge tank. |
| | Pressure is supplied through exhaust port. | Inspect and correct the piping. |
| | Piping is incorrect or omitted. | Inspect and correct the piping. |
| | Speed control throttle valve is completely closed. | Readjust the needle. |
| | Port A or B is left open to atmosphere. | Use a pipe fitting with diameter equal to or smaller than the diameter of port P fitting. |
| | Valve is frozen. | Take measures against freezing (such as keeping the product warm and draining water). |
| | Return of plunger is delayed by excessive oil or existence of tar. | Check the quality of the lubricant (Class 1 ISO VG 32 turbine oil).<br>Readjust the lubricator drip rate.<br>Install a tar removing filter. |
| | Exhaust ports are clogged with dust. | Install a cover or silencer.<br>Clean the exhaust ports periodically. |
| Requires high pressure to operate | Packing is swelling. | Check the quality of the lubricant (Class 1 ISO VG 32 turbine oil).<br>Use the solenoid valves away from where cutting oil is used.<br>Keep organic chemicals away. |
| | Port A or B is open to atmosphere. | Inspect and correct the piping. |
| | Foreign matters are stuck in packing. | Remove foreign matters. |

If you have any other questions or concerns, contact your nearest CKD sales office or distributor.

# 6. REFERENCE INFORMATION

## 6.1 Port identification

Piping ports are identified and labeled, such as 1P and 4A, in accordance with ISO and JIS standards.

| Port | ISO standard | JIS standard |
|---|---|---|
| Supply port | 1 | P |
| Output port | 4 | A |
| Output port | 2 | B |
| Exhaust port | 5 | R1 |
| Exhaust port | 3 | R2 |
| Pilot air supply port | 12/14 | PA |
| Pilot air exhaust port | 82/84 | PR |

There is no restriction on the mounting orientation of the solenoid valves.

# 7. WARRANTY PROVISIONS

## 7.1 Warranty Conditions

### ■ Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified below, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

- Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or this Instruction Manual.
- Failure caused by incorrect use such as careless handling or improper management.
- Failure not caused by the product.
- Failure caused by use not intended for the product.
- Failure caused by modifications/alterations or repairs not carried out by CKD.
- Failure that could have been avoided if the customer's machinery or device, into which the product is incorporated, had functions and structures generally provided in the industry.
- Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
- Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.

### ■ Confirmation of product compatibility

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.

### ■ Others

The terms and conditions of this warranty stipulate basic matters.
When the terms and conditions of the warranty described in individual specification drawings or the Specifications are different from those of this warranty, the specification drawings or the Specifications shall have a higher priority.

## 7.2 Warranty Period

The product is warranted for one (1) year from the date of delivery to the location specified by the customer.