CKD

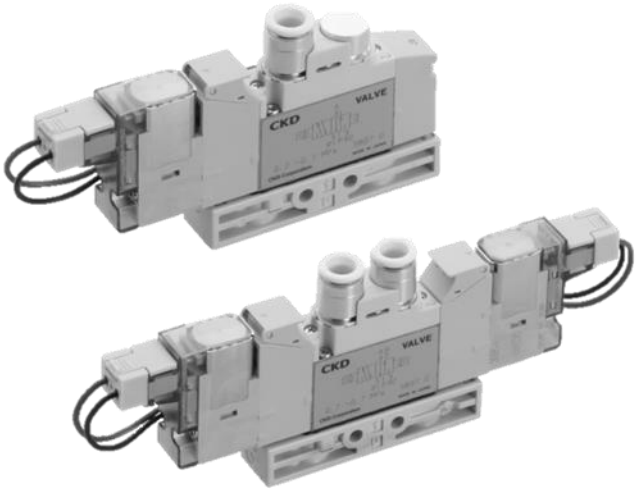
3, 5-PORT PNEUMATIC SOLENOID VALVE

(M)3GA/B R SERIES
(M)4GA/B R SERIES
(M)3GD/E R SERIES
(M)4GD/E R SERIES

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

INSTRUCTION MANUAL

SM-P00077-A/3



- 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.

- 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.

(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.)

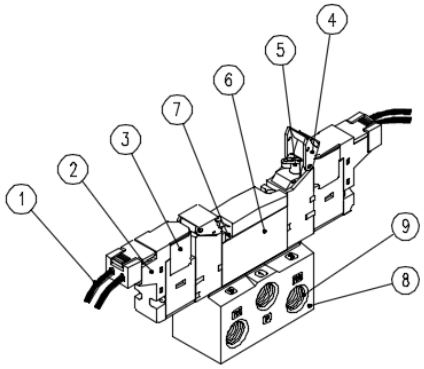
Do not handle the product or remove pipes and devices until confirming safety.

- 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.

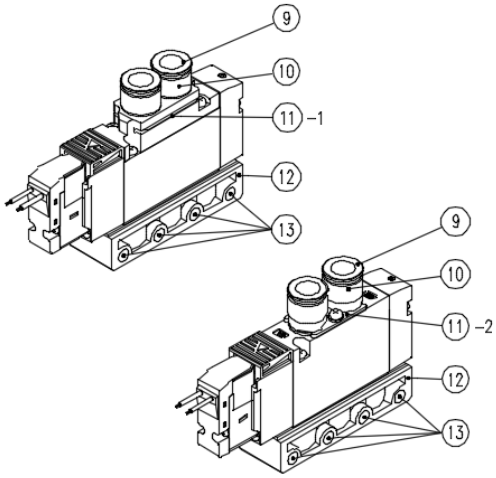
CONTENTS

1. PRODUCT OVERVIEW

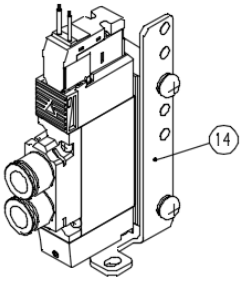
1.1 Part Name



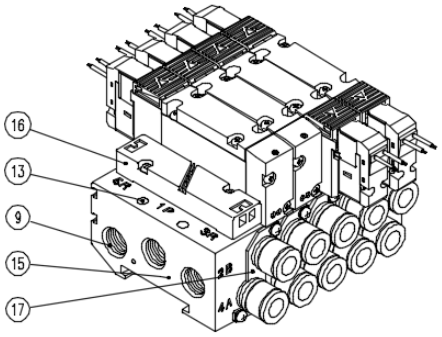
Base piping type single valve



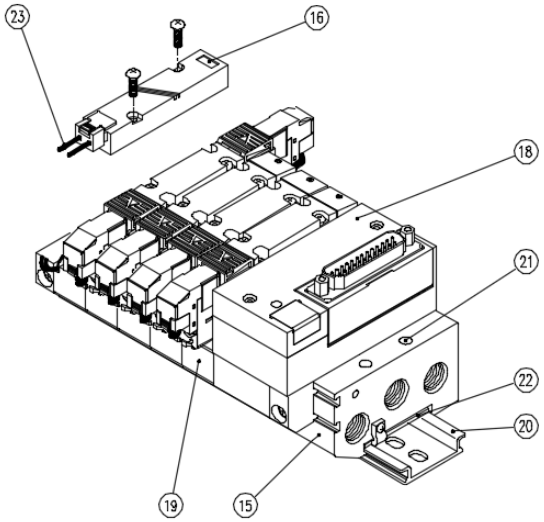
Body piping type single valve



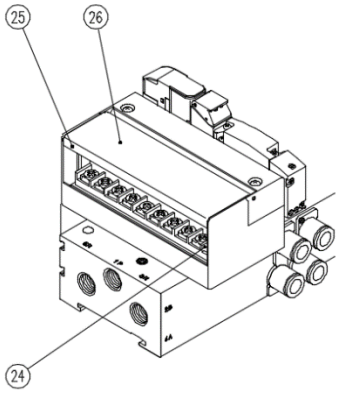
Mounting plate



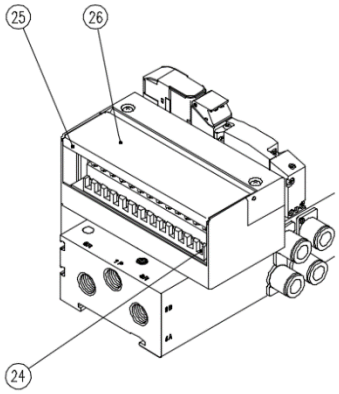
Individual wiring manifold



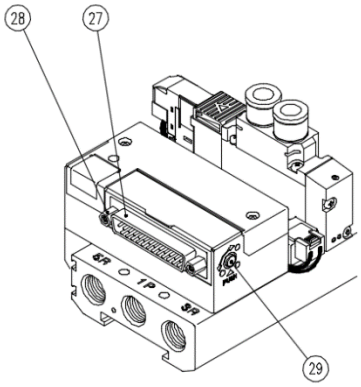
Reduced wiring manifold
(figure shown is DIN rail mount)



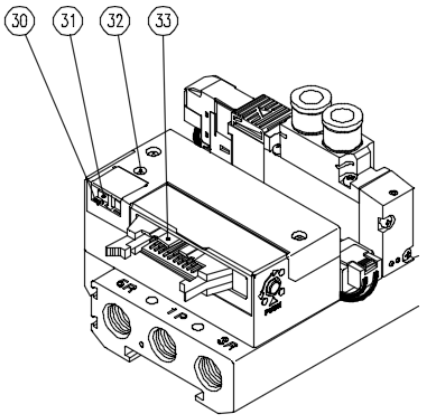
Common terminal block (T10)
M3 thread fastening type



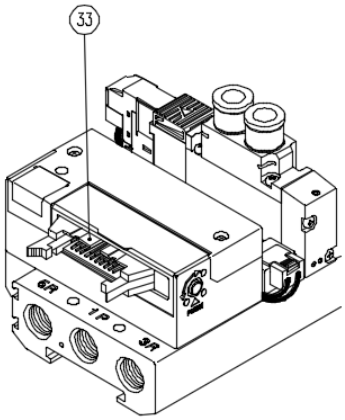
Common terminal block (T11)
Clamping type



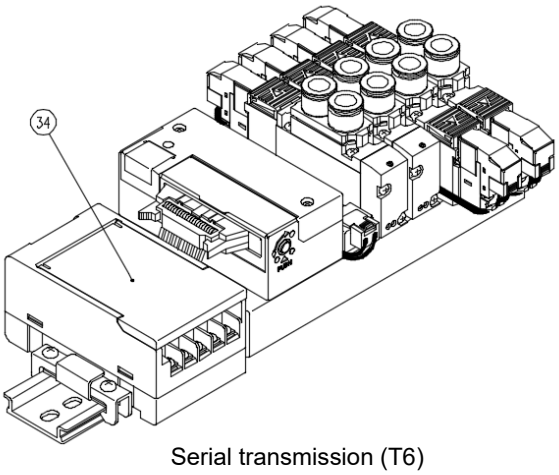
D-sub connector (T30)



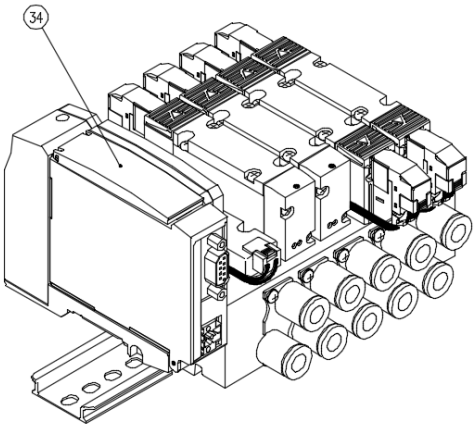
Flat cable connector (T50)



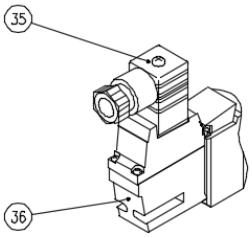
Flat cable connector (T51)



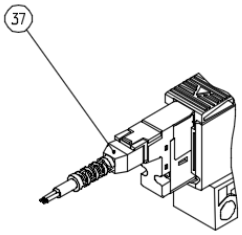
Serial transmission (T6)



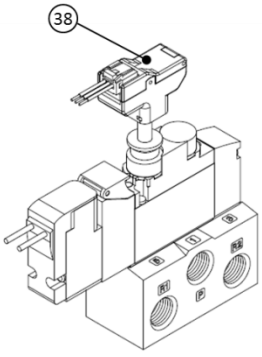
Serial transmission (T8)



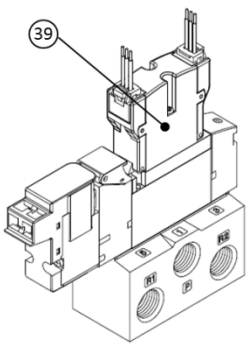
DIN terminal box (B)



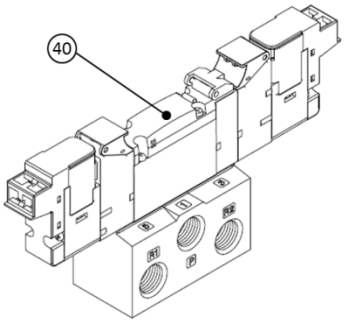
Socket with cover (EJ)



Pressure sensor (G1)



Pressure sensor (G2)



Residual pressure exhaust mechanism (X, X1)

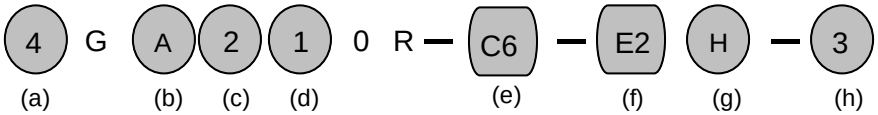
No.	Part name	Description
1	Lead wire	Wire which has no polarity.
2	Electrical component cover	Cover provided with a power indicator on the top surface which lights green while the coil is energized (only for E-type and A-type connectors).
3	Coil assembly	Coil assembly which varies depending on the type of electrical connection and voltage selected for the valve. Not interchangeable with No. 36.
4	Manual protection cover	Cover which prevents accidental operation of the manual override and is opened to operate the manual override.
5	Manual override	Manual operation device which has both locking and non-locking overrides.
6	Single valve	Valve equipped with a mechanism which opens/closes an air passage.
7	Single valve mounting screw	Screw used for securing a single valve to various bases (2 screws provided for each valve).
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	Fitting	Cartridge type push-in fitting which can be replaced.
11-1	Fitting stopper pin	Pin used for securing a cartridge type fitting. (4GA R Series)
11-2	Fitting stopper plate	Plate used for securing a cartridge type fitting. Not interchangeable with No. 17. (4GD R Series)
12	Pipe adaptor	Adaptor which comes assembled to a body piping type single valve.
13	Mounting hole	Hole used for direct mounting.
14	Mounting plate	Plate used for vertical mounting of a body piping type single valve.
15	Manifold base	Metal base manifold provided with multiple piping ports.
16	Masking plate	Plate replaced by a single valve when adding a valve.
17	Fitting stopper plate	Plate used for securing a cartridge type fitting. Not interchangeable with No. 11-2.
18	Electrical component block	Component block which stores and secures a printed circuit board mounted with PCB connectors.
19	Wiring duct	Duct provided for protecting cables contained.
20	DIN rail	Rail which complies with DIN standard (German Industry Standard) and is used for mounting a solenoid valve.
21	DIN rail mounting screw	Screw used for securing the entire manifold in place on the DIN rail and located at both ends of the base.
22	Holder	Holder used together with the DIN rail mounting screw (only for 4G2/4G3).
23	Spare cable	Cable used when adding a valve.
24	Terminal block	Connector block provided with a set of terminals for controlling the manifold valves.
25	Cover	Cover which is opened to work on wiring and must be closed before energization in order to avoid an electric shock.
26	Terminal block layout	Diagram which indicates the layout of the terminal block and on which notes can be written.
27	D-sub 25-pin connector	Connector provided with a set of terminals for controlling the manifold valves.
28	Mounting screw	Screw used for securing the connectors (screw size is M2.6).
29	Connector rotation button	Button used for changing the direction of the connector wiring upward or sideways. Pressing in the button releases the lock and allows the connector to rotate. Rotating the connector to a predetermined position pushes out the button and locks the connector.
30	Power supply terminal block	Terminal block used when an external power supply is required.
31	Power polarity marking	Marking which indicates the power polarity (▽ mark indicates the ground side).
32	Power indicator	Indicator which lights up when power is supplied with right polarity.

No.	Part name	Description
33	Flat cable connector	Connector provided with a set of terminals for controlling the manifold valves.
34	Serial transmission slave unit	Slave unit specifically designed for manifold manufactured by CKD.
35	DIN terminal box	Terminal box provided with a power indicator which lights green while the coil is energized.
36	Coil assembly	Coil assembly provided for DIN terminal box type valve. Not interchangeable with No. 3.
37	Socket with cover	Socket provided with a covered cabtyre cable (only for E-type connectors).
38	Pressure sensor	Sensor used for detecting pressure of port 4(A).
39	Pressure sensor	Sensor used for detecting pressure of port 2(B)/4(A).
40	Residual pressure exhaust mechanism	Mechanism in 3-position all ports closed and 3-position ABR connection models and used for releasing pressure of outlet port to the atmosphere.

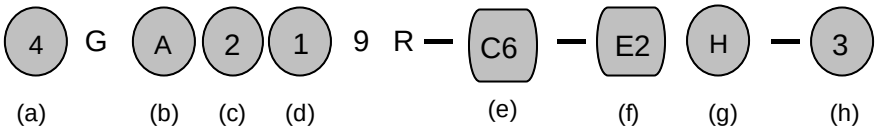
1.2 Model Number Indication

1.2.1 Single valve

●Single valve



●Single valve for mounting on base



(a) Number of ports		(b) Piping direction		(c) Series		(d) Solenoid position		(e) Port size
Symbol	Description	Symbol	Description	Symbol	Description	Symbol	Description	Note 1
3	3-port valve (two units integrated)	A	Top (body piping)	1	M4G1R	1	2-position Single	
4	5-port valve	B	Side (base piping)	2	M4G2R	2	2-position Double	
		D	Top (body piping)	3	M4G3R	3	3-position All ports closed	
		E	Side (base piping)			4	3-position ABR connection	
						5	3-position PAB connection	
						1	NC: Normally closed (3GA, 3GD)	
						11	NO: Normally open (3GA, 3GD)	
						66	Two 3-port valves integrated type (NC - NC)	
						67	Two 3-port valves integrated type (NC - NO)	
						76	Two 3-port valves integrated type (NO - NC)	
						77	Two 3-port valves integrated type (NO - NO)	

(f) Electrical connection	(g) Option	(h) Rated voltage	
Note 2	Note 3	Symbol	Description
		1	100 VAC
		2	200 VAC
		3	24 VDC
		4	12 VDC

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

Note 1: (e) Port size

Symbol	Description	
Variation	Ports 4(A), 2(B)	Ports P, R1, R2
CF	ø1.8 barbed fitting	M5
C18	ø1.8 push-in fitting	M5
C4	ø4 push-in fitting	M5, Rc1/8
C6	ø6 push-in fitting	M5, Rc1/8, Rc1/4
C8	ø8 push-in fitting	Rc1/8, Rc1/4
C10	ø10 push-in fitting	Rc1/4
M5	M5	M5
06	Rc1/8	Rc1/8
08	Rc1/4	Rc1/4
C3N	ø1/8 push-in fitting	M5
C4N	ø5/32 push-in fitting	M5
C6N	ø1/4 push-in fitting	1/8NPT
C8N	ø5/16 push-in fitting	1/8NPT, 1/4NPT
C10N	ø3/8 push-in fitting	1/4NPT
06N	1/8NPT	1/8NPT
08N	1/4NPT	1/4NPT
10N	3/8NPT	3/8NPT
C4G	ø4 push-in fitting	G1/8
C6G	ø6 push-in fitting	G1/8
C8G	ø8 push-in fitting	G1/8, G1/4
C10G	ø10 push-in fitting	G1/4
06G	G1/8	G1/8
08G	G1/4	G1/4
00	Single valve for mounting on base	-

Note 2: (f) Electrical 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

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

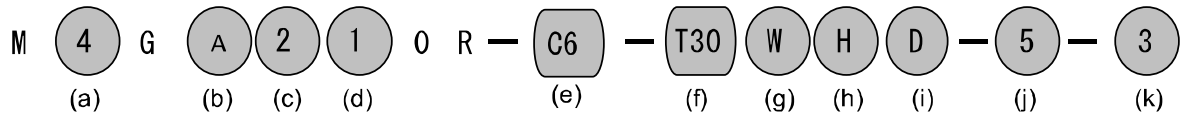
Note 3: (g) Option

Symbol	Description
Blank	Non-locking/locking combination manual override
M	Non-locking type manual override
H	Equipped with exhaust malfunction prevention valves
P	Mounting plate
K	External pilot
A	Ozone/cutting oil proof
S	Surgeless
E	Low heat generating/energy saving circuit
F	Built-in A/B-port filter
G1	1-port detection type pressure sensor (pressure range: 0 MPa to 0.7 MPa)
G2	2-port detection type pressure sensor (pressure range: 0 MPa to 0.7 MPa)
X	Non-locking type residual pressure exhaust mechanism
X1	Locking type residual pressure exhaust mechanism

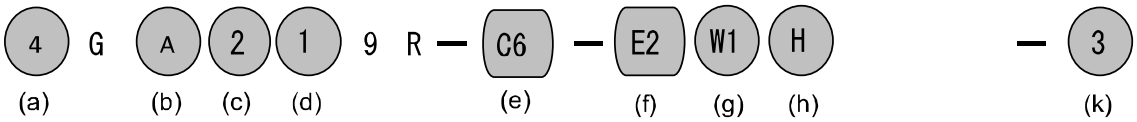
For precautions on selecting the model number, refer to the catalog.

1.2.2 Manifold

●Manifold model no.



●Single valve for mounting on base



(a) Number of ports		(b) Piping direction		(c) Series		(d) Solenoid position		(e) Port size
Symbol	Description	Symbol	Description	Symbol	Description	Symbol	Description	Note 4
3	3-port valve (two units integrated)	A	Top (body piping)	1	M4G1R	1	2-position Single	
4	5-port valve	B	Side (base piping)	2	M4G2R	2	2-position Double	
		D	Top (body piping)	3	M4G3R	3	3-position All ports closed	
		E	Side (base piping)			4	3-position ABR connection	
						5	3-position PAB connection	
						1	NC: Normally closed (3GA, 3GD)	
						11	NO: Normally open (3GA, 3GD)	
						66	Two 3-port valves integrated type (NC - NC)	
						67	Two 3-port valves integrated type (NC - NO)	
						76	Two 3-port valves integrated type (NO - NC)	
						77	Two 3-port valves integrated type (NO - NO)	
						8	Mixed	

(f) Electrical connection	(g) Terminal/connector pin layout		(h) Option	(i) Mount type		(j) Number of stations		(k) Rated voltage	
Note 5	Symbol	Description	Note 6	Symbol	Description	Symbol	Description	Symbol	Description
	Blank	Standard wiring for individual reduced wiring		Blank	Direct mount	2 to 20	n stations	1	100 VAC
				D	DIN rail mount			2	200 VAC
								3	24 VDC
	W	Double wiring for reduced wiring						4	12 VDC
	W1	Double wiring for reduced wiring (with single spare wiring)							

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

Note 4: (e) Port size

Symbol	Description	
Variation	Ports 4(A), 2(B)	Ports P, R1, R2
CF	ø1.8 barbed fitting	Rc1/8
C18	ø1.8 push-in fitting	Rc1/8
C4	ø4 push-in fitting	Rc1/8, Rc1/4
C6	ø6 push-in fitting	Rc1/8, Rc1/4, Rc3/8
C8	ø8 push-in fitting	Rc1/8, Rc1/4, Rc3/8
C10	ø10 push-in fitting	Rc1/4, Rc3/8
CL18	ø1.8 L-shape push-in fitting (upward)	Rc1/8
CL4	ø4 L-shape push-in fitting (upward)	Rc1/8
CL6	ø6 L-shape push-in fitting (upward)	Rc1/8, Rc1/4
CL8	ø8 L-shape push-in fitting (upward)	Rc1/4, Rc3/8
CL10	ø10 L-shape push-in fitting (upward)	Rc3/8
CD18	ø1.8 L-shape push-in fitting (downward)	Rc1/8
CD4	ø4 L-shape push-in fitting (downward)	Rc1/8
CD6	ø6 L-shape push-in fitting (downward)	Rc1/8, Rc1/4
CD8	ø8 L-shape push-in fitting (downward)	Rc1/4, Rc3/8
CD10	ø10 L-shape push-in fitting (downward)	Rc3/8
CX	Mix push-in fitting	Rc1/8, Rc1/4, Rc3/8
M5	M5	Rc1/8
06	Rc1/8	Rc1/4
08	Rc1/4	Rc3/8
C3N	ø1/8 push-in fitting	1/8NPT
C4N	ø5/32 push-in fitting	1/8NPT
C6N	ø1/4 push-in fitting	1/4NPT
C8N	ø5/16 push-in fitting	1/4NPT, 3/8NPT
C10N	ø3/8 push-in fitting	3/8NPT
CL3N	ø1/8 L-shape push-in fitting (upward)	1/8NPT
CL4N	ø5/32 L-shape push-in fitting (upward)	1/8NPT
CL6N	ø1/4 L-shape push-in fitting (upward)	1/4NPT
CL8N	ø5/16 L-shape push-in fitting (upward)	1/4NPT
CXN	Mix push-in fitting	1/8NPT, 1/4NPT, 3/8NPT
M5N	M5	1/8NPT
06N	1/8NPT	1/4NPT
08N	1/4NPT	3/8NPT
C4G	ø4 push-in fitting	G1/8, G1/4
C6G	ø6 push-in fitting	G1/8, G1/4
C8G	ø8 push-in fitting	G1/4, G3/8
C10G	ø10 push-in fitting	G3/8
CL4G	ø4 L-shape push-in fitting (upward)	G1/8
CL6G	ø6 L-shape push-in fitting (upward)	G1/8, G1/4
CL8G	ø8 L-shape push-in fitting (upward)	G1/4
CXG	Mix push-in fitting	G1/8, G1/4
M5G	M5	G1/8
06G	G1/8	G1/4
08G	G1/4	G3/8
00	Single valve for mounting on base	-

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

Note 5: (f) Electrical connection

Individual wiring

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

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

Reduced wiring

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
T6A0	UNI-WIRE SYSTEM	NPN 8 points
T6A1		NPN 16 points
T6C0	CompoBus/S	NPN 8 points
T6C1		NPN 16 points
T6E0	S-Link	NPN 8 points
T6E1		NPN 16 points
T6G1	CC-Link	NPN 16 points
T6J0	UNI-WIRE H SYSTEM	NPN 8 points
T6J1		NPN 16 points
T8D1	DeviceNet (thin type)	NPN 16 points
T8D2		NPN 32 points
T8DP1		PNP 16 points
T8DP2		PNP 32 points
T8G1	CC-Link (thin type)	NPN 16 points
T8G2		NPN 32 points
T8GP1		PNP 16 points
T8GP2		PNP 32 points
T8P1	PROFIBUS-DP (thin type)	NPN 16 points
T8P2		NPN 32 points
T8PP1		PNP 16 points
T8PP2		PNP 32 points
T8EC1	EtherCAT (thin type)	NPN 16 points
T8EC2		NPN 32 points
T8ECP1		PNP 16 points
T8ECP2		PNP 32 points
T8EN1	EtherNet/IP (thin type)	NPN 16 points
T8EN2		NPN 32 points
T8ENP1		PNP 16 points
T8ENP2		PNP 32 points
A2N	Without lead wire (without socket)	With surge suppressor/lamp

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

Note 6: (h) Option

Symbol	Description
Blank	Non-locking/locking combination manual override
M	Non-locking type manual override
H	Equipped with exhaust malfunction prevention valves
K	External pilot
A	Ozone/cutting oil proof
S	Surgeless
E	Low heat generating/energy saving circuit
F	Built-in A/B-port filter
G1	1-port detection type pressure sensor (pressure range: 0 MPa to 0.7 MPa)
G2	2-port detection type pressure sensor (pressure range: 0 MPa to 0.7 MPa)
X	Non-locking type residual pressure exhaust mechanism
X1	Locking type residual pressure exhaust mechanism
Z1	Air supply spacer
Z2	In-stop valve spacer
Z3	Exhaust spacer
Z6	Spacer-type pilot check valve

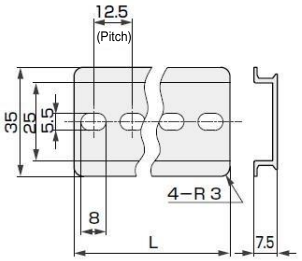
For precautions on selecting the model number, refer to the catalog.

1.2.3 Related products

■ Mounting rail

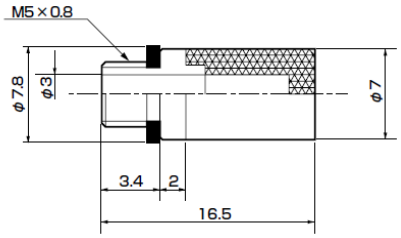
<N4GR-BAA>

- Minimum length is 87.5 mm.
- Select the length in pitches of 12.5 mm.

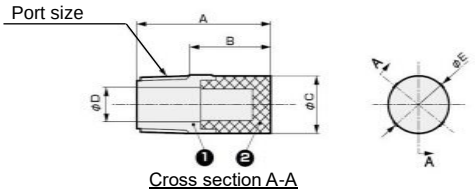


■ Silencer

<SLM-M5>

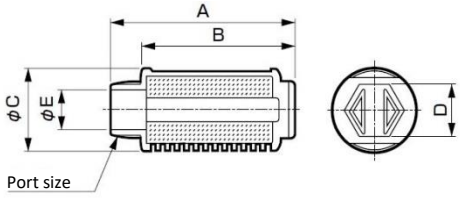


<SLW-6S, 8S>



Model	Port size	A	B	C	D	E
SLW-6S	R1/8	22	13.3	10.5	6	10.5
SLW-8S	R1/4	28	19	14.8	9	15.4

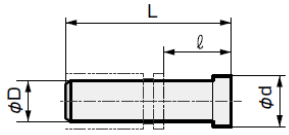
<SLW-6A, 8A, 10A, 10L>



Note 1: Check the dimensions to select the right silencer.
Note 2: Use SLW-8S for DIN rail mount type M4GA2 R.
Interference will occur if SLW-8A is used.

Model	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-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

■ Blanking plug



Model	D	L	ℓ	d
PG-P2-B	ø1.8	20	13	5
GWP4-B	ø4	27	16	6
GWP6-B	ø6	29	11.5	8
GWP8-B	ø8	33	14	10
GWP10-B	ø10	40	18.5	12

■ Screw plug

<4G1R-M5P> **<4G□R-□P>**

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

Model	Applicable port size
4G1R-M5P	M5
4G2R-06P	Rc1/8
4G3R-08P	Rc1/4
4G3R-10P	Rc3/8
4G2R-06NP	NPT1/8
4G3R-08NP	NPT1/4
4G3R-10NP	NPT3/8
4G2R-06GP	NPT1/8
4G3R-08GP	NPT1/4
4G3R-10GP	NPT3/8

1.2.4 Kit parts

■ Coil assembly

Part name	Model number
Coil assembly (for individual wiring)	4GR-[Electrical connection]-[Option]-COIL-[Rated voltage] Rated voltage: 1: 100 VAC, 2: 200 VAC, 3: 24 VDC, 4: 12 VDC Option: Blank: Standard, A: Ozone-proof Electrical connection: Blank: Grommet lead wire, E□: E-type connector, E□J: EJ-type connector, B: DIN terminal box
Coil assembly (for reduced wiring)	4GR-A2N-[Option]-COIL-[Rated voltage] Rated voltage: 3: 24 VDC, 4: 12 VDC Option: Blank: Standard, A: Ozone-proof

■ Lead wire related parts

Part name	Model number
E-type connector socket assembly	4GR-SOCKET-ASSY-[Electrical connection]-[Rated voltage] Rated voltage: 1: 100 VAC, 3: 24 VDC, 4: 12 VDC Electrical connection: E□: E-type connector
Socket assembly with cover	4GR-SOCKET-ASSY-[Electrical connection] Electrical connection: E□J: EJ-type connector
DIN terminal box	4G-TERMINAL-BOX-[Rated voltage] Rated voltage: 1: 100 VAC, 2: 200 VAC, 3: 24 VDC, 4: 12 VDC

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

■ Cartridge type fitting

Model	Part name	Model number
4G1 R	ø1.8 barbed	4G1R-JOINT-CF
	ø1.8 straight	4G1R-JOINT-C18
	ø4 straight	4G1R-JOINT-C4
	ø6 straight	4G1R-JOINT-C6
	ø8 straight	4G1R-JOINT-C8
	ø1.8 elbow	4G1R-JOINT-CL18, CLL18
	ø4 elbow	4G1R-JOINT-CL4, CLL4
	ø6 elbow	4G1R-JOINT-CL6, CLL6
	ø1/8 inch straight	4G1R-JOINT-C3N
	ø5/32 inch straight	4G1R-JOINT-C4N
	ø1/8 inch elbow Note 1	4G1R-JOINT-CL3N, CLL3N
	ø5/32 inch elbow Note 1	4G1R-JOINT-CL4N, CLL4N
	Plug cartridge	4G1R-JOINT-CPG
4G2 R	ø4 straight	4G2R-JOINT-C4
	ø6 straight	4G2R-JOINT-C6
	ø8 straight	4G2R-JOINT-C8
	ø10 straight	4G2R-JOINT-C10
	ø6 elbow	4G2R-JOINT-CL6, CLL6
	ø8 elbow	4G2R-JOINT-CL8, CLL8
	ø1/4 inch straight	4G2R-JOINT-C6N
	ø5/16 inch straight	4G2R-JOINT-C8N
	ø1/4 inch elbow Note 1	4G2R-JOINT-CL6N, CLL6N
	ø5/16 inch elbow Note 1	4G2R-JOINT-CL8N, CLL8N
	Plug cartridge	4G2R-JOINT-CPG
4G3 R	ø6 straight	4G3R-JOINT-C6
	ø8 straight	4G3R-JOINT-C8
	ø10 straight	4G3R-JOINT-C10
	ø8 elbow	4G3R-JOINT-CL8, CLL8
	ø10 elbow	4G3R-JOINT-CL10, CLL10
	ø5/16 inch straight	4G3R-JOINT-C8N
	ø3/8 inch straight	4G3R-JOINT-C10N

Note 1: Made-to-order product

■ Mounting plate kit

Model	Model number	Kit contents
3G1 R, 4G1 R	4G1R-MOUNT-PLATE-KIT	Mounting plate (1), mounting screw (2), nut (2)
3G2 R, 4G2 R	4G2R-MOUNT-PLATE-KIT	Mounting plate (1), mounting screw (2)
3G3 R, 4G3 R	4G3R-MOUNT-PLATE-KIT	Mounting plate (1), mounting screw (2)

■ Fitting stopper plate kit

Model	Model number	Kit contents
M4G1 R	4G1R-JNT-STP-PLATE-KIT	Fitting stopper plate (1), mounting screw (2)
M4G2 R	4G2R-JNT-STP-PLATE-KIT	Fitting stopper plate (1), mounting screw (2)
M4G3 R	4G3R-JNT-STP-PLATE-KIT	Fitting stopper plate (1), mounting screw (2)

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

■ Plate kit

Model	Model number	Kit contents
3GB1 R, 4GB1 R	4G1R-PLATE-KIT	Plate (1), gasket (1), mounting screw (2)
3GB2 R, 4GB2 R	4G2R-PLATE-KIT	Plate (1), gasket (1), mounting screw (2)
4GB3 R	4G3R-PLATE-KIT	Plate (1), gasket (1), mounting screw (2)

■ Fitting adaptor kit

<4G 1 R-JNT-ADAPTOR-KIT-C4 NC-F>

Model	Port size	Model number	Kit contents
3GA1 R, 4GA1 R	CF	4G1R-JNT-ADAPTOR-KIT-CF[*1]-[*2]	Fitting adaptor (includes fitting) (1), gasket (1), mounting screw (2)
	C18	4G1R-JNT-ADAPTOR-KIT-C18[*1]-[*2]	
	C4	4G1R-JNT-ADAPTOR-KIT-C4[*1]-[*2]	
	C6	4G1R-JNT-ADAPTOR-KIT-C6[*1]-[*2]	
	C3N	4G1R-JNT-ADAPTOR-KIT-C3N[*1]-[*2]	
	C4N	4G1R-JNT-ADAPTOR-KIT-C4N[*1]-[*2]	
3GA2 R, 4GA2 R	C4	4G2R-JNT-ADAPTOR-KIT-C4[*1]-[*2]	
	C6	4G2R-JNT-ADAPTOR-KIT-C6[*1]-[*2]	
	C8	4G2R-JNT-ADAPTOR-KIT-C8[*1]-[*2]	
	C6N	4G2R-JNT-ADAPTOR-KIT-C6N[*1]-[*2]	
	C8N	4G2R-JNT-ADAPTOR-KIT-C8N[*1]-[*2]	
3GA3 R, 4GA3 R	C6	4G3R-JNT-ADAPTOR-KIT-C6[*1]-[*2]	
	C8	4G3R-JNT-ADAPTOR-KIT-C8[*1]-[*2]	
	C10	4G3R-JNT-ADAPTOR-KIT-C10[*1]-[*2]	
	C8N	4G3R-JNT-ADAPTOR-KIT-C8N[*1]-[*2]	
	C10N	4G3R-JNT-ADAPTOR-KIT-C10N[*1]-[*2]	

[*1] Specify NC for 3GA□10R, NO for 3GA□110R and leave blank for models other than 3GA□10R and 3GA□110R.
[*2] Specify F for built-in A/B-port filter and leave blank if built-in A/B-port filter is not necessary (standard).

■ Internal thread adaptor kit

<4G 1 R-FML-ADAPTOR-KIT-M5-F>

Model	Model number	Kit contents
3GA1 R, 4GA1 R	4G1R-FML-ADAPTOR-KIT-[Port size]-[*1]	Internal thread adaptor (1), gasket (1), mounting screw (2)
3GA2 R, 4GA2 R	4G2R-FML-ADAPTOR-KIT-[Port size]-[*1]	Internal thread adaptor (1), gasket (1), mounting screw (2)
3GA3 R, 4GA3 R	4G3R-FML-ADAPTOR-KIT-[Port size]-[*1]	Internal thread adaptor (1), gasket (1), mounting screw (2), body mounting screw (2)

[*1] Specify F for built-in A/B-port filter and leave blank if built-in A/B-port filter is not necessary (standard).

■ Masking plate kit

Model	Model number	Kit contents
M3G1 R, M4G1 R	4G1R-MP	Masking plate (1), gasket (1), mounting screw (2)
M3G2 R, M4G2 R	4G2R-MP	Masking plate (1), gasket (1), mounting screw (2)
M3G3 R, M4G3 R	4G3R-MP	Masking plate (1), gasket (1), PR check valve (2), mounting screw (2)

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

■ DIN rail

Model number	Kit contents
N4GR-BAA [*1]	DIN rail (1)

[*1] Specify the length to cut the DIN rail.
Select the rail length from the table to the right.

L_1: Manifold length		L_2: Rail length	A: Mounting pitch
Longer than 35	47.5 or shorter	87.5	75
47.5	60	100	87.5
60	72.5	112.5	100
72.5	85	125	112.5
85	97.5	137.5	125
97.5	110	150	137.5
110	122.5	162.5	150
122.5	135	175	162.5
135	147.5	187.5	175
147.5	160	200	187.5
160	172.5	212.5	200
172.5	185	225	212.5
185	197.5	237.5	225
197.5	210	250	237.5
210	222.5	262.5	250
222.5	235	275	262.5
235	247.5	287.5	275
247.5	260	300	287.5
260	272.5	312.5	300
272.5	285	325	312.5
285	297.5	337.5	325
297.5	310	350	337.5
310	322.5	362.5	350
322.5	335	375	362.5
335	347.5	387.5	375
347.5	360	400	387.5
360	372.5	412.5	400
372.5	385	425	412.5
385	397.5	437.5	425
397.5	410	450	437.5
410	422.5	462.5	450
422.5	435	475	462.5
435	447.5	487.5	475
447.5	460	500	487.5
460	472.5	512.5	500
472.5	485	525	512.5
485	497.5	537.5	525
497.5	510	550	537.5

If the manifold length exceeds 510 mm, calculate the rail length by adding a multiple of 12.5 to the value in the last row.

■ Gasket

Model	Model number
3G1 R, 4G1 R	4G1R-GASKET
3G1 R, 4G1 R (for masking plate)	4G1R-MP-GASKET
3G2 R, 4G2 R	4G2R-GASKET
3G2 R, 4G2 R (for masking plate)	4G2R-MP-GASKET
3G3 R, 4G3 R	4G3R-GASKET

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

■ Gasket with exhaust malfunction prevention valve

Model	Model number
3G1 R, 4G1 R	4G1R-CHECK-VALVE
3G2 R, 4G2 R	4G2R-CHECK-VALVE
3G3 R, 4G3 R	4G3R-CHECK-VALVE

■ PR check valve kit (2 per set)

Model	Model number
3G1 R, 4G1 R	4G1R-PR
3G2 R, 4G2 R	4G2R-PR
3G3 R, 4G3 R	4G3R-PR

■ Mounting screw (10 per set)

Model	Model number
3G1 R, 4G1 R	4G1R-SET-SCREW
3G2 R, 4G2 R	4G2R-SET-SCREW
3G3 R, 4G3 R	4G3R-SET-SCREW
3GA3 R, 4GA3 R (for 08-port size)	4G3R-SET-SCREW-L

■ DIN rail kit

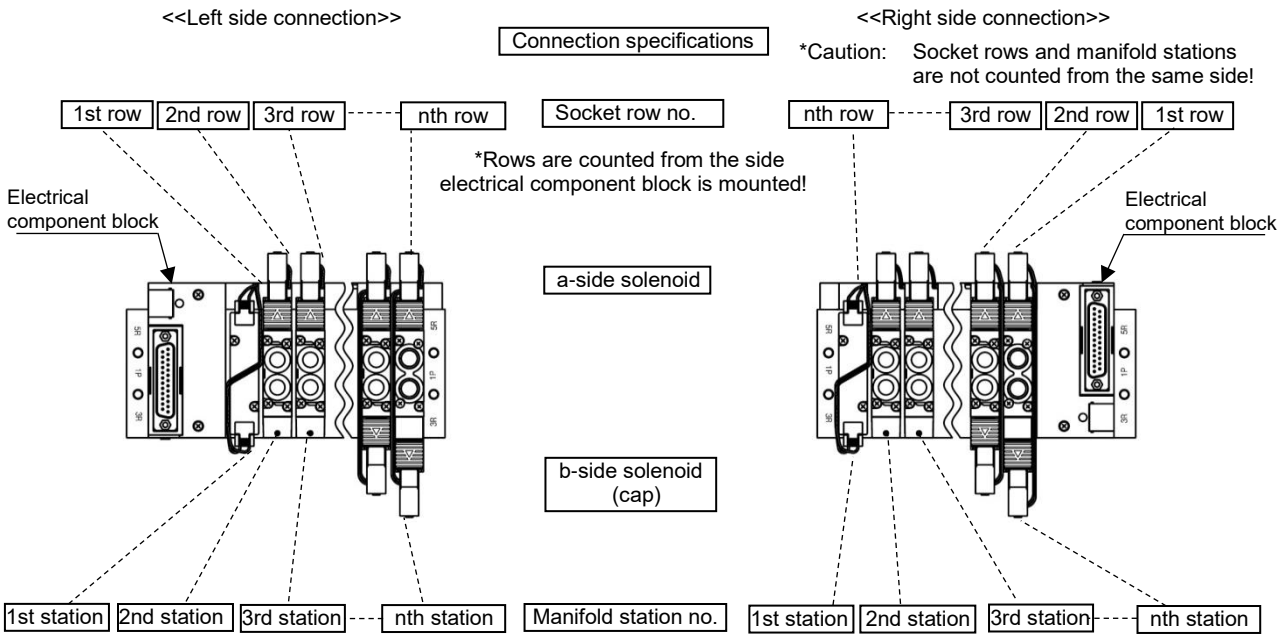
Model	Model number	Kit contents
M4G1 R	4GA1R-BAA[*1]-[*2]D	DIN rail (1), mounting screw (2), lock nut (2)
	4GB1R-BAA[*1]-[*2]D	
M4G2 R	4GA2R-BAA[*1]-[*2]D	DIN rail (1), holder (2), tapping screw(2), mounting screw (4)
	4GB2R-BAA[*1]-[*2]D	
M4G3 R	4GA3R-BAA[*1]-[*2]D	
	4GB3R-BAA[*1]-[*2]D	

[*1] Specify the length to cut the DIN rail.
[*2] Specify K for external pilot.

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

■ Socket assembly for adding a valve

For the socket assembly for adding a valve, specify a cable of appropriate length depending on the position where the valve is added.
Incorrect selection may cause the cable to become disconnected or pinched.
For A-type connector socket assembly, the position where the valve is added is indicated by specifying the row number, which is counted from the side on which the electrical component is mounted. Note that this counting method is different from the counting method for the manifold valve station number, which is counted in order from left to right with the b-side solenoid towards the user.



* Stations are counted in order from left to right, with the b-side solenoid (cap) towards the user.

Model number of socket assembly for adding a valve

A-type connector socket assembly

4G*1R-SOCKET-ASSY-A*2 *3-*4

*1: Series		*2: Connection specifications		*3: Solenoid coil position		*4: Socket row no.	
Symbol	Description	Symbol	Description	Symbol	Description	Symbol	Description
1	4G1	Blank	Left	A	a-side	1	1st row
2	4G2	R	Right	B	b-side	to	to
3	4G3					24	24th row

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

1.3 Specifications

1.3.1 Common specifications

Model		4G1 R, 4G2 R, 4G3 R
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 3
Proof pressure MPa		1.05
Ambient temperature °C		-5 to 55 (no freezing)
Fluid temperature °C		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		50 or less
Shock resistance m/s^2		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: Degree of protection is dust-proof, not drip-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: 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		4G1 R, 4G2 R, 4G3 R					
Rated voltage		24 VDC	12 VDC	5 VDC	3 VDC	100 VAC	200 VAC
Voltage fluctuation range		± 10%					
Holding current A Note 1	**Standard**	0.015 (0.017)	0.030 (0.034)	0.072 (0.082)	0.120 (0.136)	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)		0.35 (0.40)		-	
	With low heat generating/ energy saving circuit	0.1		-		-	
Apparent power VA Note 1	**Standard**	-		-		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		4GA/B R Series						4GD/E R Series					
		4GA/B1 R		4GA/B2 R		4GA/B3 R		4GD/E1 R		4GD/E2 R		4GD/E3 R	
		ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
Two 3-port valves integrated type		9	12	12	29	-	-	12	15	15	30	-	-
2-position	Single	12	12	19	19	25	28	15	25	20	30	25	40
	Double	9	-	18	-	24	-	15	-	20	-	25	-
3-position	ABR connection	8	15	17	30	23	45	20	30	25	35	35	50

* 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.

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 [dm^3/(s/bar)]	b	C [dm^3/(s/bar)]	b
3GA1 R 4GA1 R 3GD1 R 4GD1 R	Two 3-port valves integrated type		0.98	0.45	0.71	0.34
	2-position		1.2	0.47	0.72	0.37
	3-position	All ports closed	1.1	0.39	0.70	0.34
		ABR connection	1.1	0.33	0.72	0.34
		PAB connection	1.3	0.61	0.72	0.36
3GA2 R 4GA2 R 3GD2 R 4GD2 R	Two 3-port valves integrated type		1.8	0.29	2.3	0.32
	2-position		2.4	0.33	2.8	0.30
	3-position	All ports closed	2.2	0.28	2.5	0.28
		ABR connection	2.3	0.26	2.8	0.27
		PAB connection	2.5	0.38	2.4	0.30
3GA3 R 4GA3 R 3GD3 R 4GD3 R	2-position		3.4	0.29	4.0	0.24
	3-position	All ports closed	3.1	0.27	3.4	0.28
		ABR connection	3.1	0.33	4.1	0.20
		PAB connection	3.5	0.43	3.4	0.32
3GB1 R 4GB1 R 3GE1 R 4GE1 R	Two 3-port valves integrated type		0.92	0.08	1.1	0.26
	2-position		1.3	0.27	1.2	0.22
	3-position	All ports closed	1.1	0.31	1.1	0.27
		ABR connection	1.1	0.31	1.3	0.29
		PAB connection	1.4	0.30	1.1	0.26
3GB2 R 4GB2 R 3GE2 R 4GE2 R	Two 3-port valves integrated type		1.7	0.42	2.1	0.26
	2-position		2.6	0.20	2.6	0.19
	3-position	All ports closed	2.3	0.32	2.2	0.22
		ABR connection	2.2	0.23	2.6	0.16
		PAB connection	2.4	0.10	2.4	0.22
4GB3 R 4GE3 R	2-position		4.3	0.24	4.2	0.24
	3-position	All ports closed	3.3	0.40	3.4	0.27
		ABR connection	3.3	0.36	4.2	0.18
		PAB connection	4.5	0.28	3.4	0.30

* C: Sonic conductance, b: Critical pressure ratio

■ Manifold

Model	Solenoid position		1(P) -> 4(A)/2(B)		4(A)/2(B) -> 5(R1)/3(R2)	
			C [dm^3/(s/bar)]	b	C [dm^3/(s/bar)]	b
M3GA1 R M4GA1 R M3GD1 R M4GD1 R	Two 3-port valves integrated type		0.86	0.31	1.1 (0.66)	0.19 (0.22)
	2-position		0.99	0.20	1.2 (0.70)	0.20 (0.12)
	3-position	All ports closed	0.94	0.23	1.1 -	0.20 -
		ABR connection	0.93	0.18	1.3 (0.70)	0.23 (0.02)
		PAB connection	1.1	0.28	1.1 -	0.23 -
M3GA2 R M4GA2 R M3GD2 R M4GD2 R	Two 3-port valves integrated type		1.7	0.40	2.3 (1.7)	0.29 (0.32)
	2-position		2.3	0.36	2.9 (1.7)	0.24 (0.33)
	3-position	All ports closed	2.1	0.35	2.5 -	0.32 -
		ABR connection	2.2	0.37	2.9 (1.8)	0.32 (0.29)
		PAB connection	2.4	0.34	2.5 -	0.33 -
M3GA3 R M4GA3 R M3GD3 R M4GD3 R	2-position		3.2	0.37	3.8 (2.5)	0.13 (0.28)
	3-position	All ports closed	2.9	0.35	3.3 -	0.35 -
		ABR connection	3.0	0.34	3.8 (2.6)	0.12 (0.27)
		PAB connection	3.3	0.30	3.3 -	0.32 -
M3GB1 R M4GB1 R M3GE1 R M4GE1 R	Two 3-port valves integrated type		0.86	0.35	1.1 (0.67)	0.22 (0.23)
	2-position		1.1	0.22	1.2 (0.70)	0.20 (0.10)
	3-position	All ports closed	0.98	0.22	1.1 -	0.24 -
		ABR connection	0.97	0.35	1.3 (0.68)	0.22 (0.24)
		PAB connection	1.1	0.38	1.1 -	0.21 -
M3GB2 R M4GB2 R M3GE2 R M4GE2 R	Two 3-port valves integrated type		1.7	0.44	2.1 (1.6)	0.32 (0.30)
	2-position		2.4	0.34	2.7 (1.7)	0.24 (0.31)
	3-position	All ports closed	2.2	0.34	2.4 -	0.29 -
		ABR connection	2.2	0.34	2.8 (1.8)	0.24 (0.27)
		PAB connection	2.4	0.29	2.4 -	0.29 -
M4GB3 R M4GE3 R	2-position		3.5	0.34	3.8 (2.6)	0.11 (0.27)
	3-position	All ports closed	3.1	0.33	3.3 -	0.22 -
		ABR connection	3.0	0.30	3.8 (2.7)	0.11 (0.22)
		PAB connection	3.6	0.36	3.3 -	0.28 -

* 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.
* Values in ( ) apply to models equipped with exhaust malfunction prevention valves.

1.3.5 Weight

■ 4GA/B R Series

(Unit: g)

Solenoid position/ electrical connection			3GA1 R	3GA2 R	3GA3 R	4GA1 R	4GA2 R	4GA3 R	3GB1 R 4GB1 R	3GB2 R 4GB2 R	4GB3 R
2-position	Single	Grommet lead wire	48 (41)	104 (74)	142 (100)	48 (41)	109 (79)	151 (109)	80 (38)	156 (74)	215 (96)
		E-type connector	50 (43)	106 (76)	144 (102)	50 (43)	111 (81)	153 (111)	82 (40)	158 (76)	217 (98)
		DIN terminal box	-	141 (111)	177 (135)	-	146 (116)	186 (144)	-	193 (111)	249 (130)
	Double	Grommet lead wire	-	-	-	65 (58)	127 (97)	174 (128)	97 (55)	173 (91)	233 (114)
		E-type connector	-	-	-	69 (62)	131 (101)	178 (132)	101 (59)	177 (95)	237 (118)
		DIN terminal box	-	-	-	-	169 (139)	214 (168)	-	216 (134)	273 (154)
3-position	All ports closed	Grommet lead wire	-	-	-	67 (60)	139 (109)	183 (141)	98 (56)	184 (102)	242 (123)
		E-type connector	-	-	-	71 (64)	143 (113)	187 (145)	102 (60)	188 (106)	246 (127)
		DIN terminal box	-	-	-	-	181 (151)	223 (181)	-	227 (145)	282 (163)

■ 4GD/E R Series

(Unit: g)

Solenoid position/ electrical connection			3GD1 R	3GD2 R	3GD3 R	4GD1 R	4GD2 R	4GD3 R	3GE1 R 4GE1 R	3GE2 R 4GE2 R	4GE3 R
2-position	Single	Grommet lead wire	48 (41)	110 (80)	144 (102)	48 (41)	115 (85)	153 (111)	80 (38)	158 (76)	221 (102)
		E-type connector	50 (43)	112 (82)	146 (104)	50 (43)	117 (87)	155 (113)	82 (40)	160 (78)	223 (104)
		DIN terminal box	-	147 (117)	178 (136)	-	152 (122)	187 (145)	-	195 (113)	255 (136)
	Double	Grommet lead wire	-	-	-	65 (58)	133 (103)	175 (129)	97 (55)	175 (93)	240 (121)
		E-type connector	-	-	-	69 (62)	137 (107)	179 (133)	101 (59)	179 (97)	244 (125)
		DIN terminal box	-	-	-	-	176 (146)	215 (169)	-	218 (136)	280 (161)
3-position	All ports closed	Grommet lead wire	-	-	-	67 (60)	145 (115)	184 (142)	98 (56)	186 (104)	249 (130)
		E-type connector	-	-	-	71 (64)	149 (119)	188 (146)	102 (60)	190 (108)	253 (134)
		DIN terminal box	-	-	-	-	188 (158)	224 (182)	-	229 (147)	289 (170)

* Values in ( ) do not include the weight of pipe adaptor. 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.
* The two 3-port valves integrated type has the same weight as the 2-position double.

■ Manifold base

• Body piping

(Unit: g)

Pilot air exhaust method	M3GA1 R, M4GA1 R M3GD1 R, M4GD1 R		M3GA2 R, M4GA2 R M3GD2 R, M4GD2 R		M3GA3 R, M4GA3 R M3GD3 R, M4GD3 R	
	Direct mount	DIN rail mount	Direct mount	DIN rail mount	Direct mount	DIN rail mount
Standard	23n + 52	25n + 60	47n + 64	49n + 92	74n + 88	76n + 117
External pilot	36n + 105	38 + 113	88n + 135	90n + 163	136n + 194	138n + 223

• Base piping

(Unit: g)

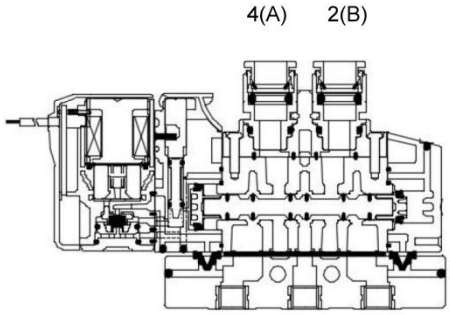
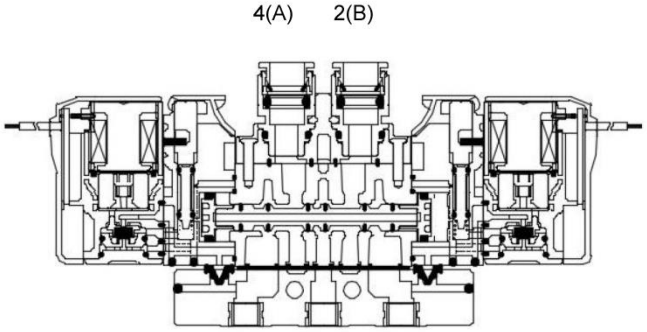
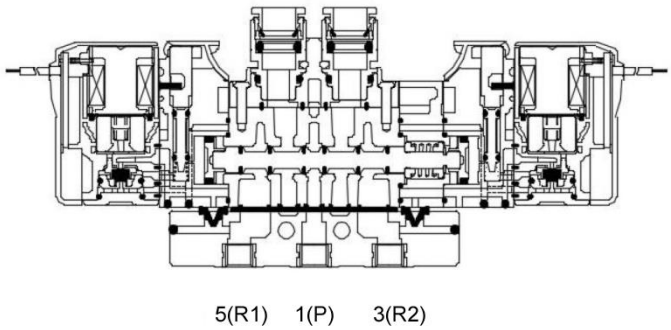
Pilot air exhaust method	M3GB1 R, M4GB1 R M3GE1 R, M4GE1 R		M3GB2 R, M4GB2 R M3GE2 R, M4GE2 R		M4GB3 R M4GE3 R	
	Direct mount	DIN rail mount	Direct mount	DIN rail mount	Direct mount	DIN rail mount
Standard	35n + 61	36n + 115	71n + 106	73n + 134	113n + 170	115n + 119
External pilot	35n + 106	36n + 114	76n + 135	78n + 166	118n + 194	120n + 223

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

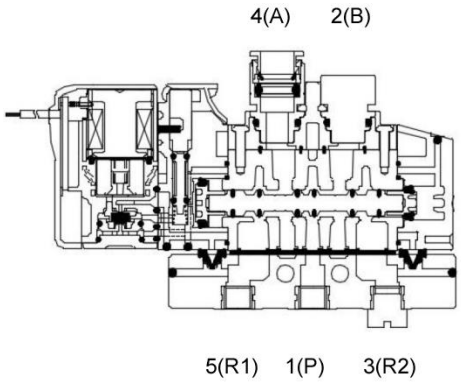
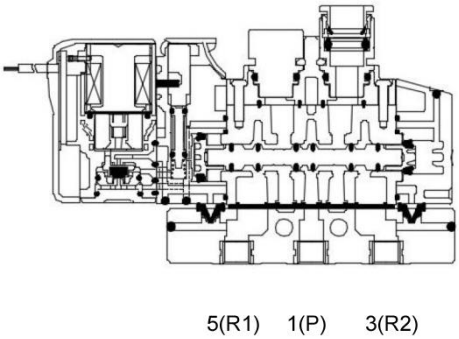
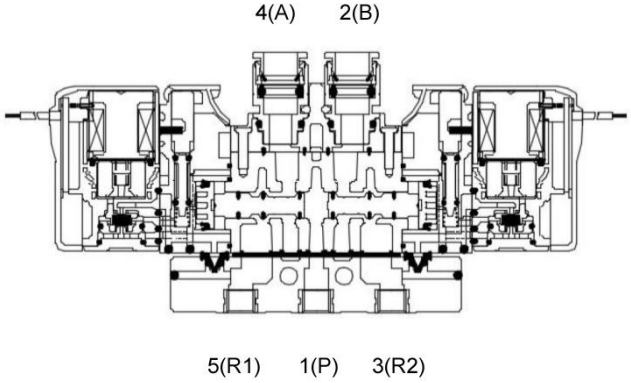
1.4 Internal Structure

1.4.1 Description of operation

■ Valve operation

	Diagram of operation (with 4GA R Series as an example)	Description of operation
4G□10R 2-position Single		De-energized (shown in the diagram) 1(P) -> 2(B) 4(A) -> 5(R1) Energized 1(P) -> 4(A) 2(B) -> 3(R2)
4G□20R 2-position Double		SOL a Energized 1(P) -> 4(A) 2(B) -> 3(R2) SOL b Energized (shown in the diagram) 1(P) -> 2(B) 4(A) -> 5(R1) After energized, solenoid position is retained even after electricity is cut off.
4G□30R 4G□40R 4G□50R 3-position		4G□30R De-energized 1(P), 4(A), 2(B), 5(R1), and 3(R2) closed 4G□40R De-energized 1(P) closed 4(A), 2(B) -> 5(R1), 3(R2) 4G□50R De-energized 1(P) -> 4(A), 2(B) 5(R1) and 3(R2) closed

* SOL = solenoid

	Diagram of operation (with 3GA R Series as an example)	Description of operation
3GA□10R Normally closed		De-energized (shown in the diagram) 4(A) -> 5(R1) Energized 1(P) -> 4(A)
3GA□110R Normally open		De-energized (shown in the diagram) 1(P) -> 2(B) Energized 2(B) -> 3(R2)
3G□660R 3G□670R 3G□760R 3G□770R Two 3-port valves integrated type		3G□660R De-energized 4(A) -> 5(R1) 2(B) -> 3(R2) SOL a Energized 1(P) -> 4(A) SOL b Energized 1(P) -> 2(B) 3G□670R De-energized 4(A) -> 5(R1) 1(P) -> 2(B) SOL a Energized 1(P) -> 4(A) SOL b Energized 2(B) -> 3(R2) 3G□760R De-energized 1(P) -> 4(A) 2(B) -> 3(R2) SOL a Energized 4(A) -> 5(R1) SOL b Energized 1(P) -> 2(B) 3G□770R De-energized 1(P) -> 4(A) 1(P) -> 2(B) SOL a Energized 4(A) -> 5(R1) SOL b Energized 2(B) -> 3(R2)

* SOL = solenoid

■ Manifold operation

The main and pilot exhaust air are collected in the manifold base and discharged from the exhaust port.

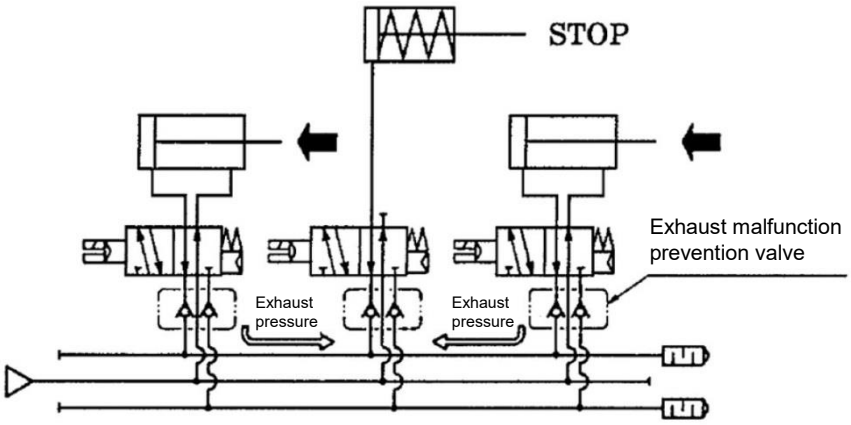
■ Malfunction prevention

PR check valves are provided as a standard.
PR check valves prevent malfunction of the solenoid valve itself caused by pilot back pressure.
In addition, gaskets equipped with exhaust malfunction prevention valves can be selected as an option.
This optional gasket prevents malfunctions in a single-acting cylinder or a double-acting cylinder connected to ABR connection valve due to the flow of back pressure caused by actuation of other cylinders.
Note that this option cannot be selected for valves with all ports closed and PAB connection valves since there is no back pressure flowing.

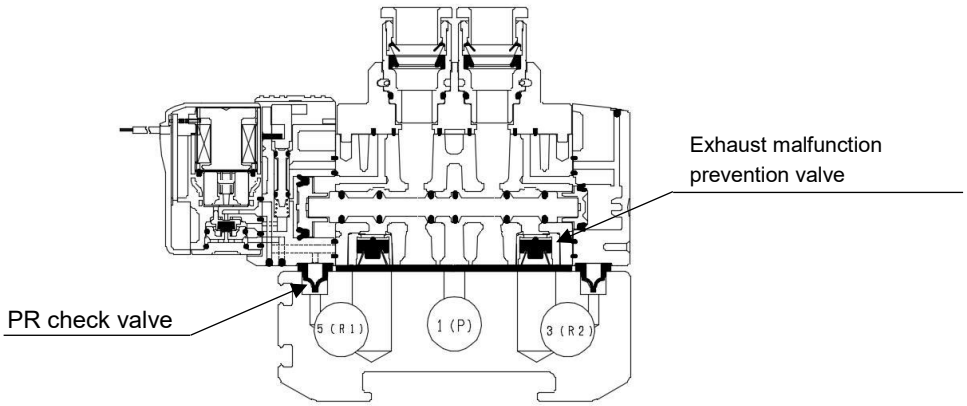
Exhaust malfunction prevention valves are check valves. Do not directly operate the cylinder rod under no pressure, as it causes the check valve to open and prevent the cylinder rod from moving.

<4G R Series pneumatic pressure system>

- Malfunction prevention for a single-acting cylinder



- PR check valve and exhaust malfunction prevention valve



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.

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.

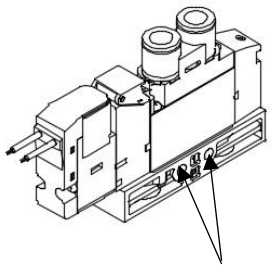
- If the manifold weighs more than 1 kg, or if the installation environment is subject to vibrations or shocks, secure the DIN rail onto the mounting surface at intervals of 50 mm to 100 mm.
- If the DIN rail is not strong enough, mount the manifold base directly.

2.3.1 How to mount a body piping type single valve

■ Mounting directly

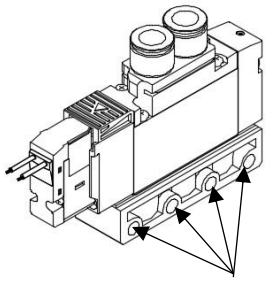
The 4GA2 R/4GA3 R Series body piping type single valve can be mounted using through holes or screw holes. When using screw holes, the recommended tightening torque is 0.7 N·m to 1.2 N·m (4GA1 R Series has only through holes).

4GA1 R Series



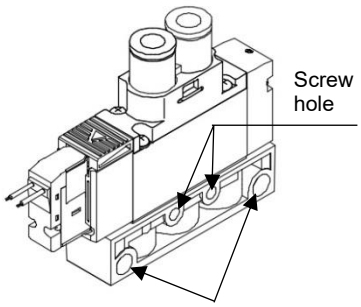
ø3.2 Through hole

4GA2 R Series



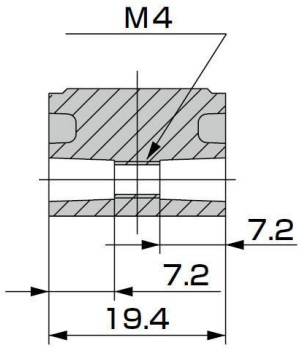
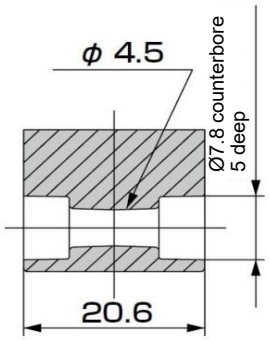
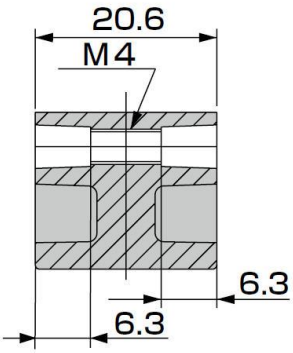
For use as either through hole or screw hole

4GA3 R Series



Through hole

<Mounting hole shape>

	4GA2 R Series	4GA3 R Series	
	For use as either through hole or screw hole	Through hole	Screw hole
Sectional view of mounting hole			

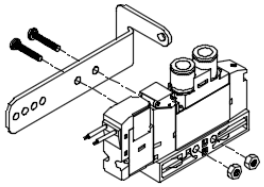
■ Mounting with mounting plate

The way the body piping type single valve is mounted on the mounting plate differs among 2-position single, 2-position double, and 3-position. Attach the valve and the mounting plate in the right direction and use correct holes since damage can occur if not mounted correctly.

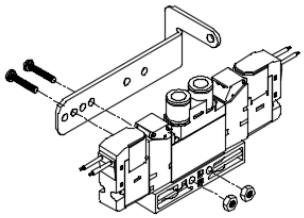
<For grommet lead wire and E-type connector (DC voltage) connections>

4GA1 R, 4GD1 R Series

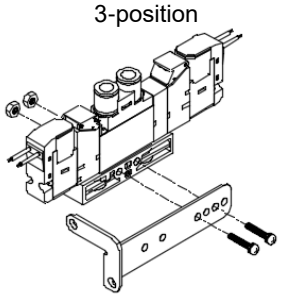
2-position single



2-position double

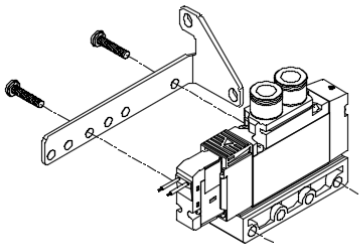


3-position

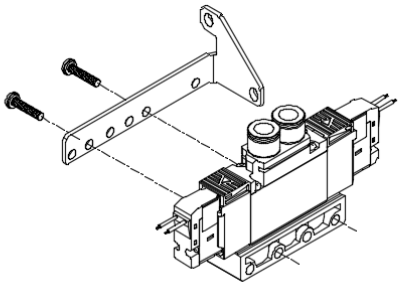


4GA2 R, 4GD2 R Series

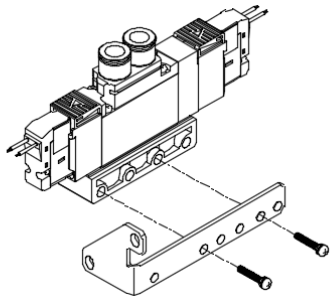
2-position single



2-position double

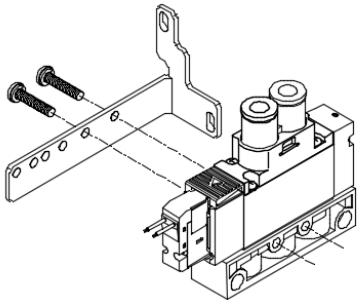


3-position

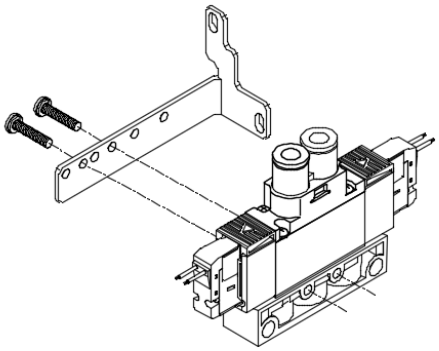


4GA3 R, 4GD3 R Series

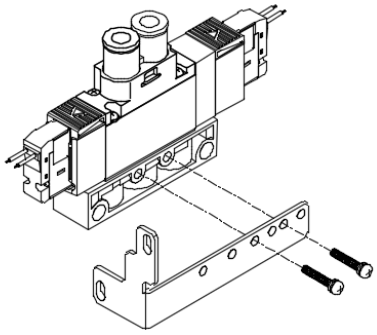
2-position single



2-position double



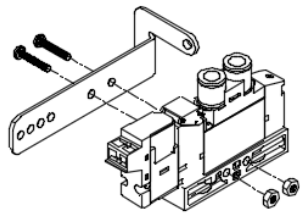
3-position



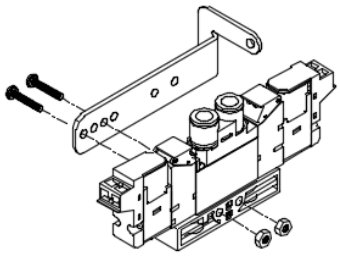
<For DIN terminal box and E-type connector (AC voltage) connections>

4GA1 R, 4GD1 R Series

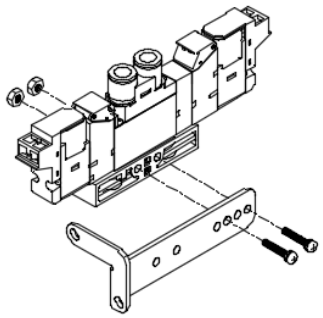
2-position single



2-position double

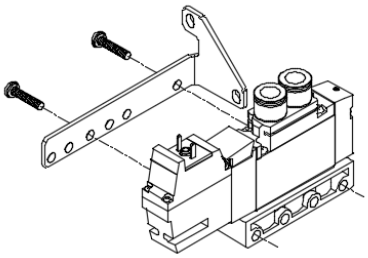


3-position

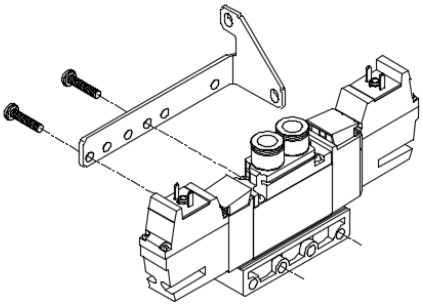


4GA2 R, 4GD2 R Series

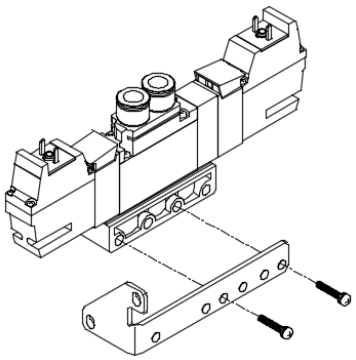
2-position single



2-position double

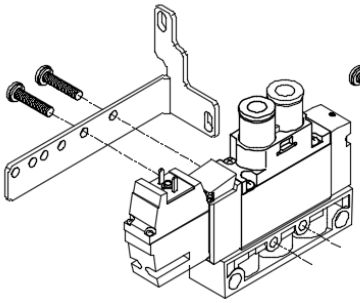


3-position

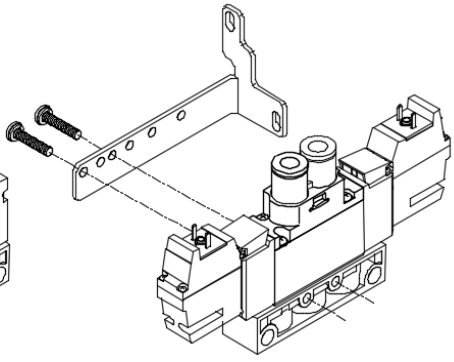


4GA3 R, 4GD3 R Series

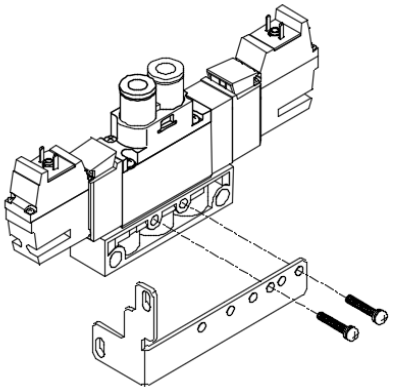
2-position single



2-position double



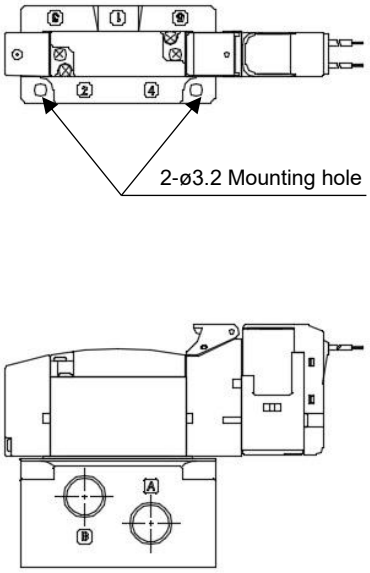
3-position



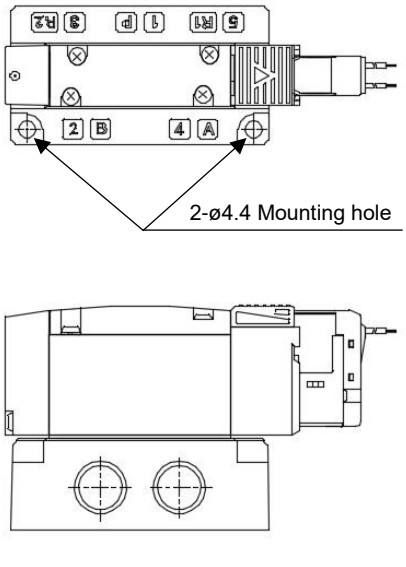
2.3.2 How to mount a base piping type single valve

The base piping type single valve can be mounted using through holes in the subbase.

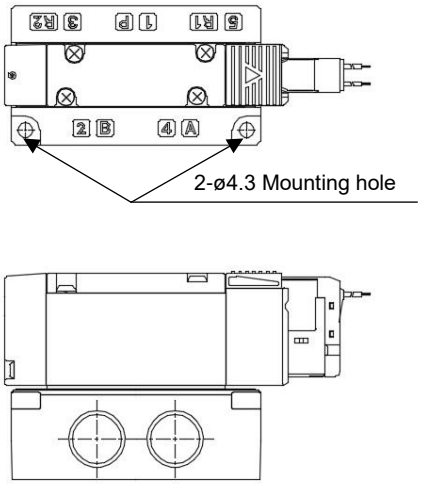
4GB1 R, 4GE1 R Series



4GB2 R, 4GE2 R Series



4GB3 R, 4GE3 R Series

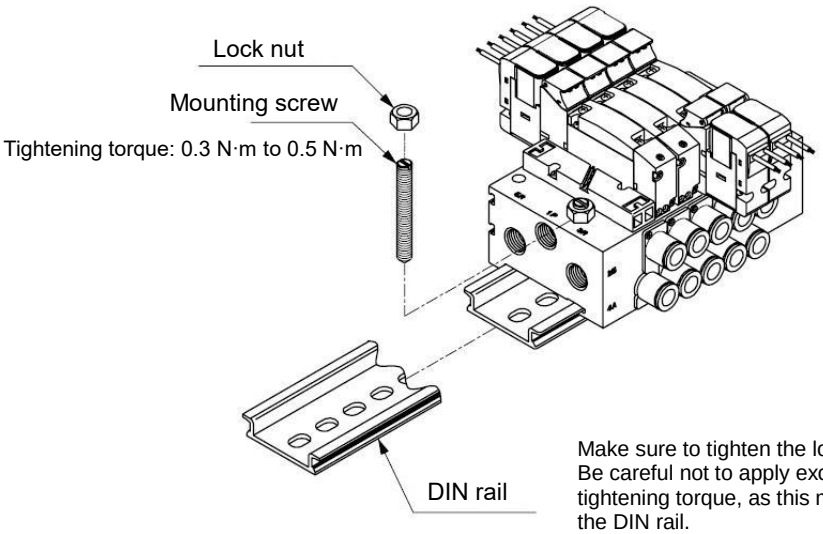


2.3.3 How to mount a manifold

■ Mounting with DIN rail

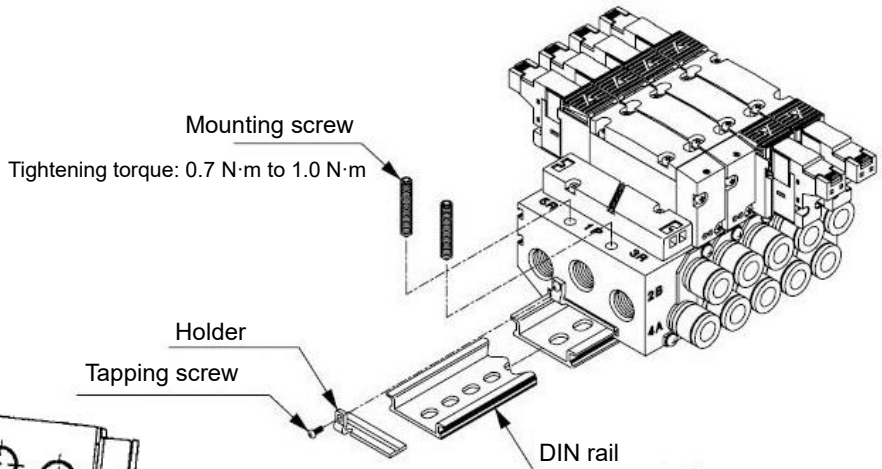
The manifold can be mounted on the DIN rail by selecting a DIN rail mount manifold (mount type symbol: D) or by modifying a direct mount manifold with the DIN rail kit. If not mounted correctly, the manifold may fall off or become damaged. If the installation environment is subject to vibrations or shocks, secure the DIN rail onto the mounting surface at intervals of 50 mm to 100 mm and make sure that there is no abnormality with the mounting condition.

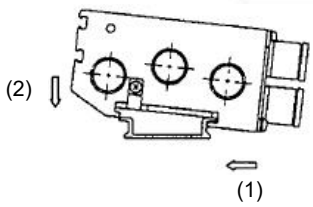
M4G1 R Series

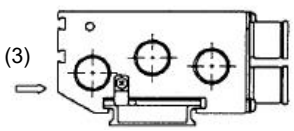


Make sure to tighten the lock nuts. Be careful not to apply excessive tightening torque, as this may deform the DIN rail.

M4G2 R, M4G3 R Series





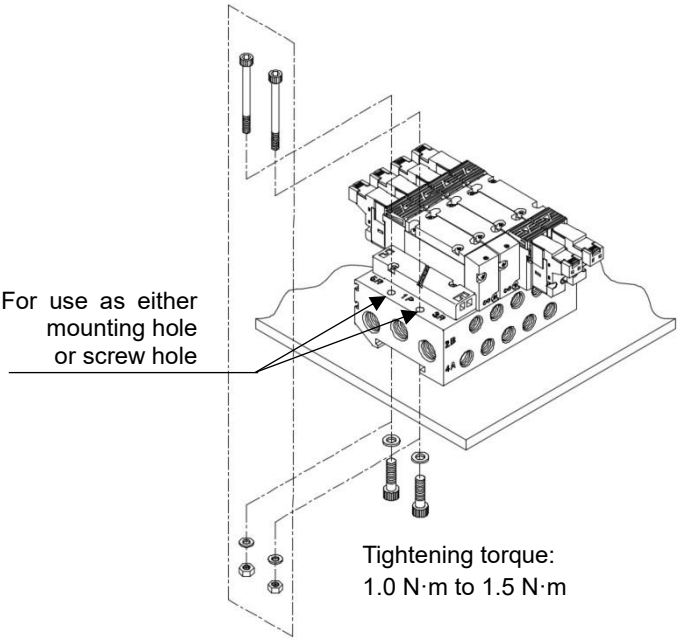


1. Attach the holder. (Secure with tapping screws to prevent it from falling off.)
2. Temporarily fasten the mounting screws.
3. Hook the manifold to DIN rail in order from (1) to (2).
4. Push in the direction of (3).
5. Tighten the mounting screws.

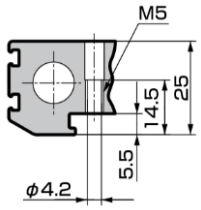
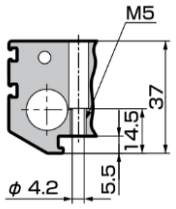
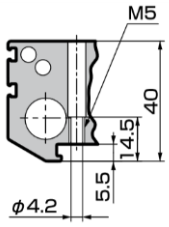
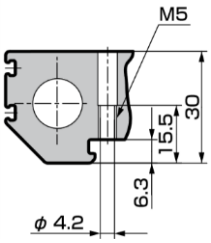
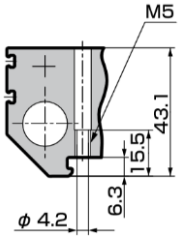
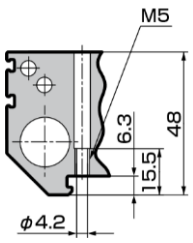
■ Mounting directly

M4G2 R/M4G3 R Series can be mounted using through holes or screw holes. When using screw holes, select bolts that can be screwed in by at least 10 threads and tighten them with proper tightening torque. The recommended tightening torque is 1.0 N·m to 1.5 N·m (M4G1 R Series has only through holes). If not mounted correctly, the threads may become damaged.

M4G2 R, M4G3 R Series



<Mounting hole shape (sectional view)>

	Internal pilot (standard)		External pilot (option symbol: K)
	Body piping [M4GA R, M4GD R]	Base piping [M4GB R, M4GE R]	
M4G2 R			
M4G3 R			

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

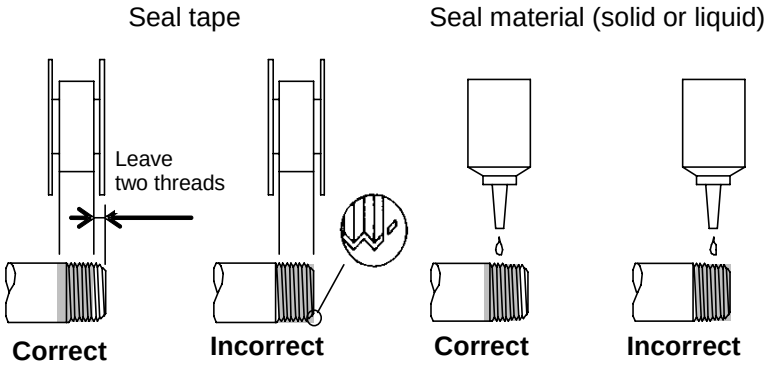
The following table shows the tightening torque for each connection thread.

Connection thread	Tightening torque (N·m)
M5	1.0 to 1.5
Rc1/8	3 to 5
Rc1/4	6 to 8
Rc3/8	13 to 15

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 M5 fitting

M5 fitting is sealed using a gasket. Do not retighten when pressure is applied in the pneumatic circuit. Design and construct the piping system in such a way that the valves can be removed and remounted in case of trouble.

2.4.5 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.

2.4.6 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.

2.4.7 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)

* For ø1.8 push-in fitting (C18), use UP-9402 (urethane).

■ 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.
In an atmosphere where the temperature is high, use fastening fittings, not push-in fittings.

■ 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
ø1.8	-	ø1.2
ø4	ø2.5	ø2
ø6	ø4	ø4
ø8	ø5.7	ø5
ø10	ø7.2	ø6.5

Outside diameter tolerance	
Soft or hard nylon	± 0.1 mm
Urethane ø1.8	± 0.1 mm
Urethane ø4, ø6	+0.1 mm -0.15 mm
Urethane ø8, ø10	+0.1 mm -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
ø1.8	-	4
ø4	10	10
ø6	20	20
ø8	30	30
ø10	40	40

■ 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 (or 5 N for C18, CL18, and CLL18).

■ Blanking plug to use

For solenoid valves provided with push-in fitting, use blanking plugs specified by CKD:
- Blanking plug (PG-P2-B) : ø1.8 push-in fitting
- Blanking plug (GWP□-B Series) : ø4 to ø10 push-in fitting

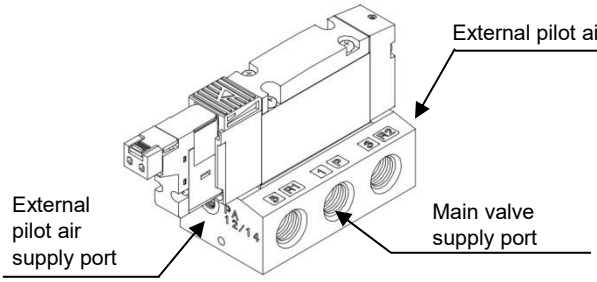
2.4.8 Piping ports for external pilot (option symbol: K)

The external pilot model (option symbol: K) has a separate pilot air exhaust. Since pilot air supply and exhaust ports are both M5 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

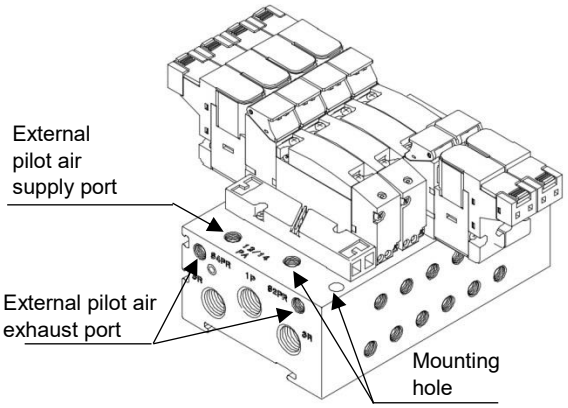
<Base piping type single valve (common to 4GB1 R through 4GB3 R)>



External pilot air supply port is located on the left side when the main valve supply port is facing the user.

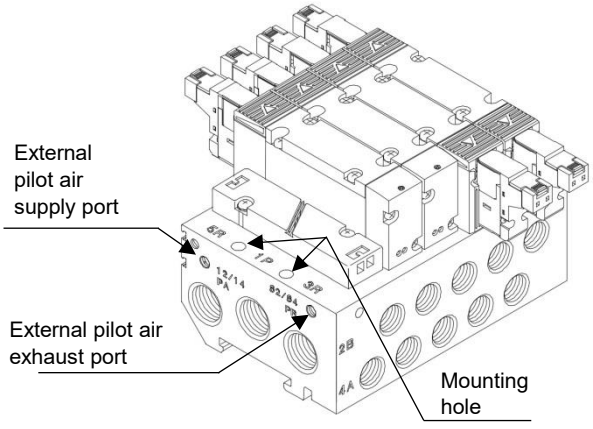
<Manifold>

- M4GB1 R



External pilot air supply port is located on the top surface of the manifold.
There are two ports, one on each side.

- M4GB2 R/M4GB3 R



External pilot air supply port is located far from ports A and B.
There are two ports, one on each of the end surfaces.

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.

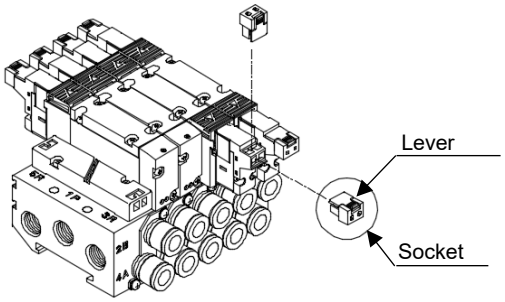
Connect the product to the output unit.
Connecting the product to the input unit may cause failures not only in the product but also in peripheral devices. Do not connect the product to the input unit.

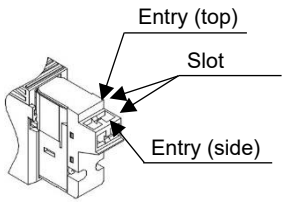
2.5.1 E-type connector

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

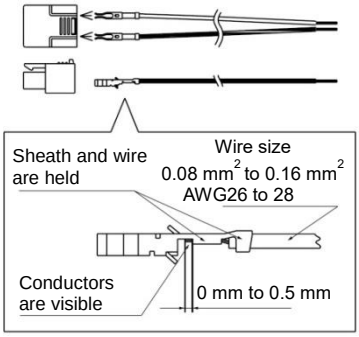
1. To attach the socket, hold the lever and the socket body with your fingers and insert the socket straight into the entry on the connector body.
2. Hook the tab on the lever into the slot on the connector body to lock the socket in place. To attach to the top entry, position the socket so that the 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.





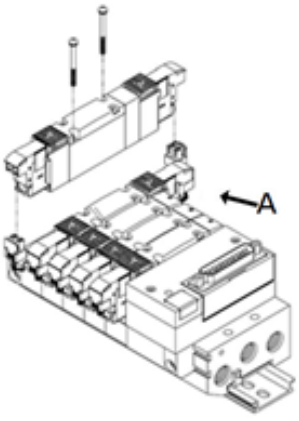
■ Connecting the lead wires

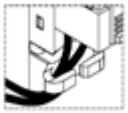
1. Strip the end of the lead wires by approximately 3 mm. Align the end of conductors, insert them into the contact terminal, and crimp with a crimp tool. When crimping, make sure that both the sheath and the conductors are held and 0 mm to 0.5 mm of the conductor end is visible.
2. After crimping, position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

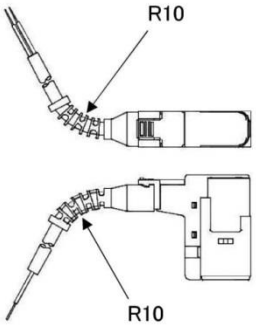




View A

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

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

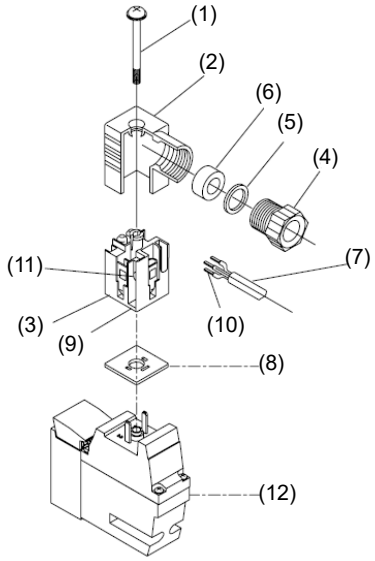


2.5.4 DIN terminal box

■ Disassembling the DIN terminal box

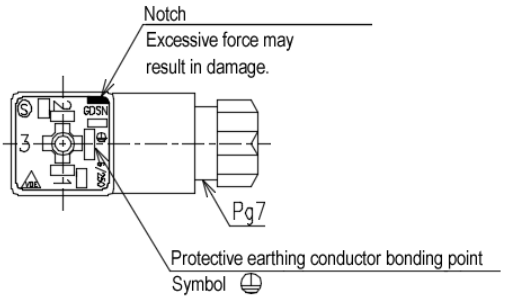
1 Loosen screw (1) and pull cover (2) in the direction of screw (1) to remove the connector from coil assembly (12).

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

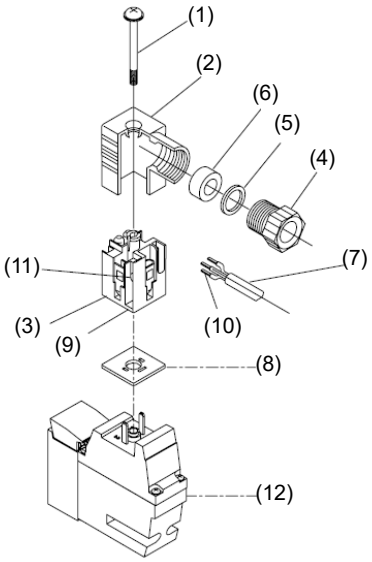


3 Locate notch (9) (next to the GDSN mark) at the bottom of terminal block (3). Insert a compact flat blade screwdriver into notch (9) and pry to remove terminal block (3) from cover (2) (refer to the figure to the right). Do not apply excessive force when removing terminal block (3) as this may damage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

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

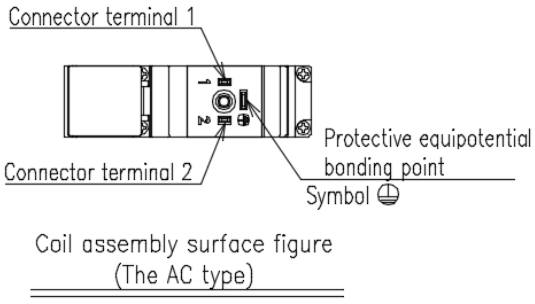


■ Wiring



1 How to prepare for wiring:
Applicable dimension for cable (7) is VCTF 2-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.

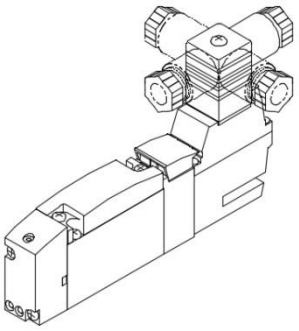
2 How to install wiring:
Insert cable gland (4), washer (5), and rubber packing (6) through cable (7) in this order and insert them into cover (2).
Wire the cable to terminals 1 and 2. There is no polarity.
Recommended tightening torque is 0.2 N·m to 0.25 N·m.
For AC type, establish a ground connection.
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 to 1.5 N·m.

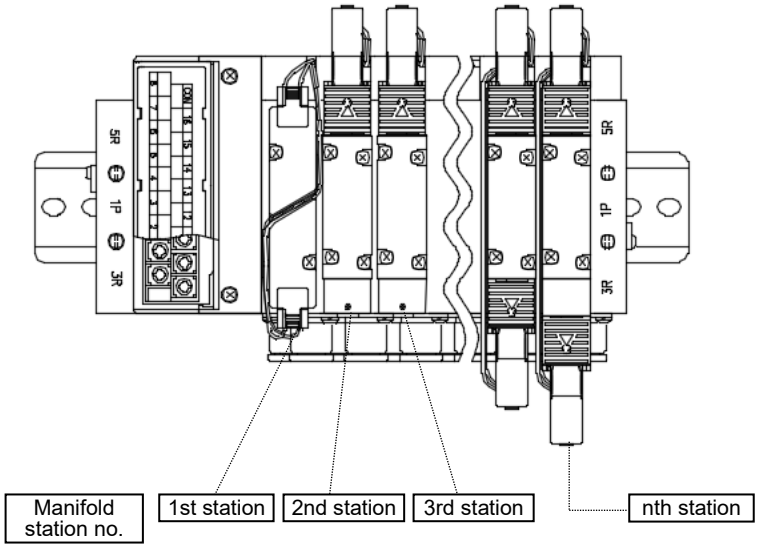
3 Check that cable (7) does not disconnect.

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.

2.5.5 Common terminal block (T10/T11)

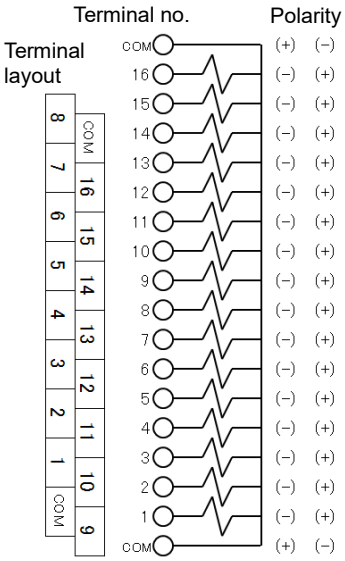
■ Precautions on wiring the common terminal block (T10/T11)

- 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.

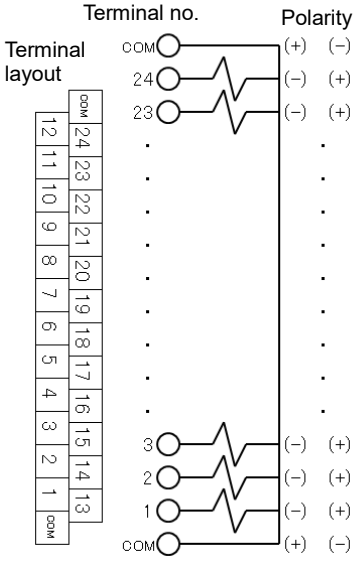


■ Internal wiring

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 16 stations)

Terminal no.	16	15	14	13	12	11	10	9
Valve no.	16a	15a	14a	13a	12a	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.	12a	11b	11a	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 20 stations)

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

- Double solenoid valve
  (Maximum of 12 stations)

Terminal no.	24	23	22	21	20	19	18	17	16	15	14	13
Valve no.	12b	12a	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 24 solenoids)

Terminal no.	24	23	22	21	20	19	18	17	16	15	14	13
Valve no.	18b	18a	17a	16a	15a	14a	13a	12b	12a	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 12 stations)

Terminal no.	24	23	22	21	20	19	18	17	16	15	14	13
Valve no.	Empty	12a	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 12 stations)

Terminal no.	24	23	22	21	20	19	18	17	16	15	14	13
Valve no.	12b	12a	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 24 solenoids)

Terminal no.	24	23	22	21	20	19	18	17	16	15	14	13
Valve no.	12b	12a	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

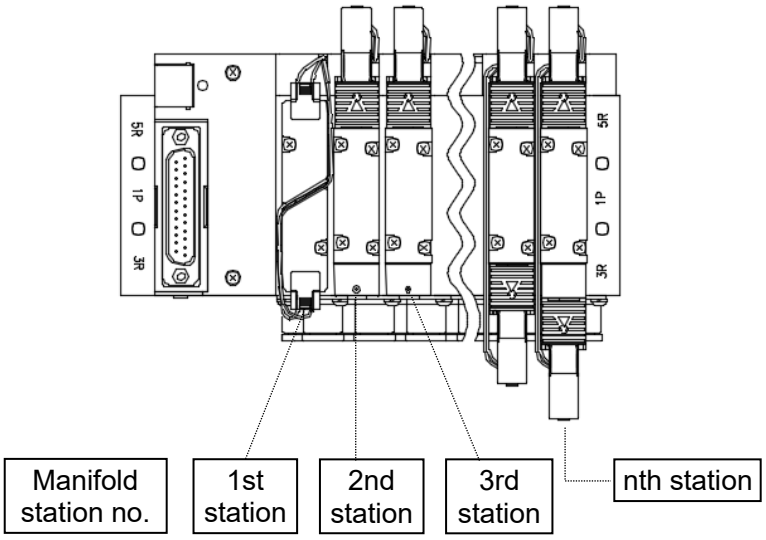
2.5.6 D-sub connector (T30)

■ Connector for T30

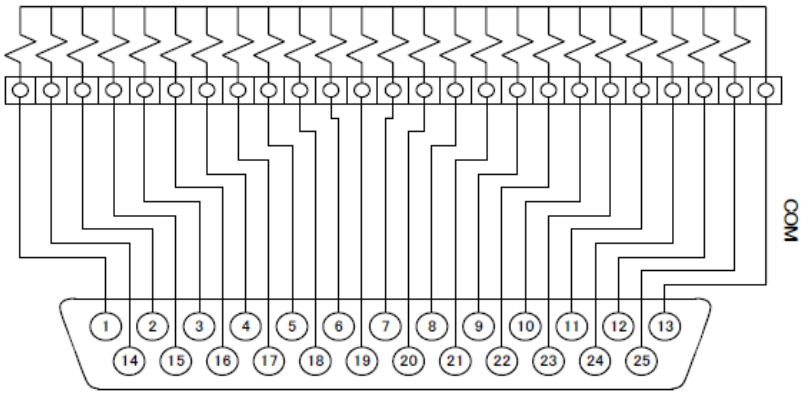
The connector used for wiring method T30, generally called D-sub connector, is used widely for FA and OA devices. The 25-pin D-sub connector is specified in the RS-232C standard and is especially used for communication between computers and peripheral devices.

■ 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.



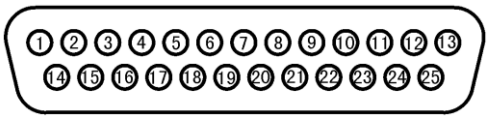
■ Internal wiring



■ 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 24 stations)

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

- Double solenoid valve
  (Maximum of 12 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	12a	COM
Pin no.	14	15	16	17	18	19	20	21	22	23	24	25	
Valve no.	1b	2b	3b	4b	5b	6b	7b	8b	9b	10b	11b	12b	

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

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

<Double wiring>

- Single solenoid valve
  (Maximum of 12 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	12a	COM
Pin no.	14	15	16	17	18	19	20	21	22	23	24	25	
Valve no.	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	

- Double solenoid valve
  (Maximum of 12 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	12a	COM
Pin no.	14	15	16	17	18	19	20	21	22	23	24	25	
Valve no.	1b	2b	3b	4b	5b	6b	7b	8b	9b	10b	11b	12b	

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

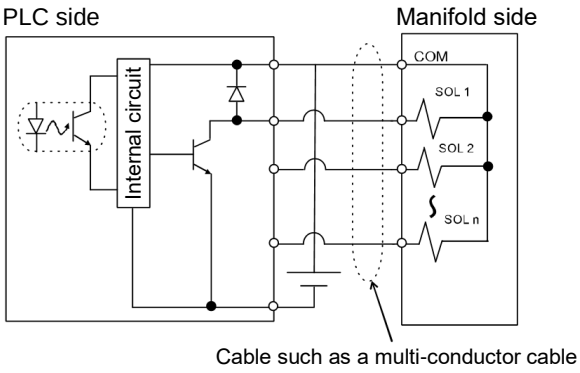
Pin no.	1	2	3	4	5	6	7	8	9	10	11	12	13
Valve no.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	COM
Pin no.	14	15	16	17	18	19	20	21	22	23	24	25	
Valve no.	Empty	Empty	3b	4b	Empty	Empty	14a	Empty	Empty	Empty	11b	12b	

■ How to connect to PLC

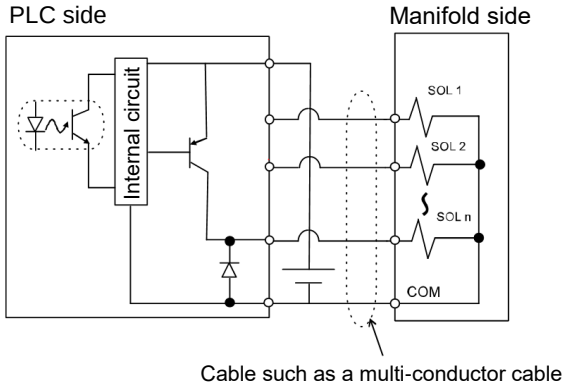
The common wiring has already been connected on the manifold side. Since the solenoid valves have no polarity, they can be connected to DC output unit (for PLC) of either output types (NPN or PNP).

Wire according to the following diagrams.

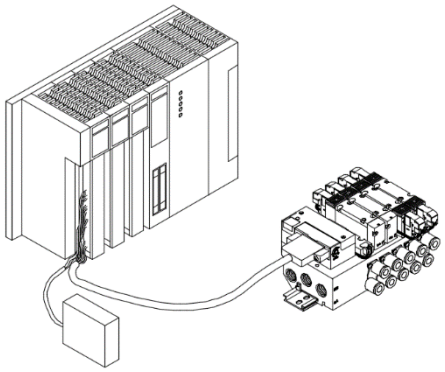
DC output unit (NPN output)



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	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 greater voltage since it can only use cables with thin conductors.

■ CKD cable specifications

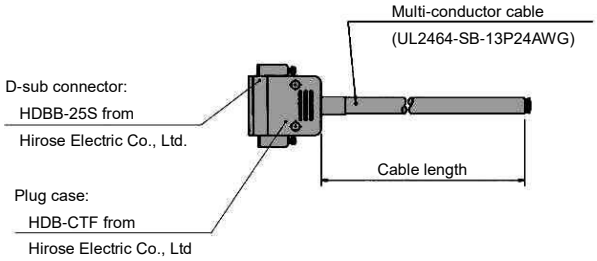
CKD cables can be ordered using the following model numbers.

4GR-CABLE-D [*1][*1] – [*2]

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

*2	Cable length
1	1 m
3	3 m
5	5 m

4GR-CABLE-D00-*2

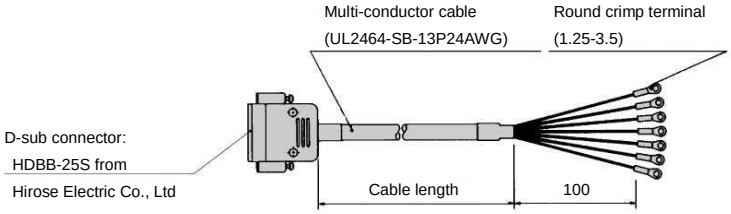


Correspondence between D-sub connector terminal number and conductor

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

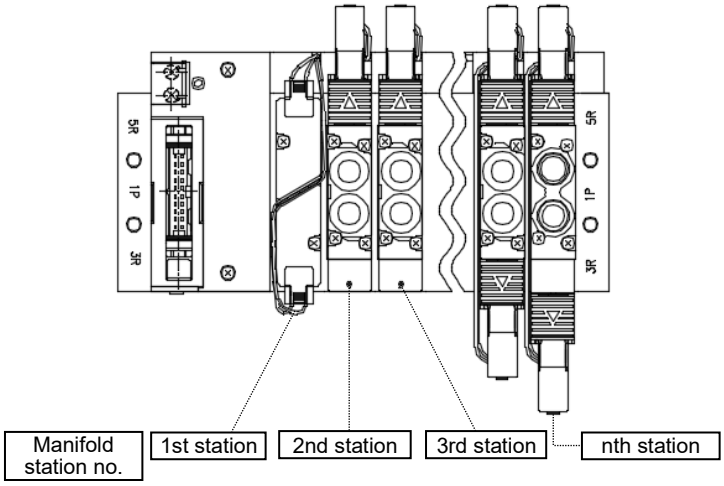
2.5.7 Flat cable connector (T50)

■ Flat cable connector

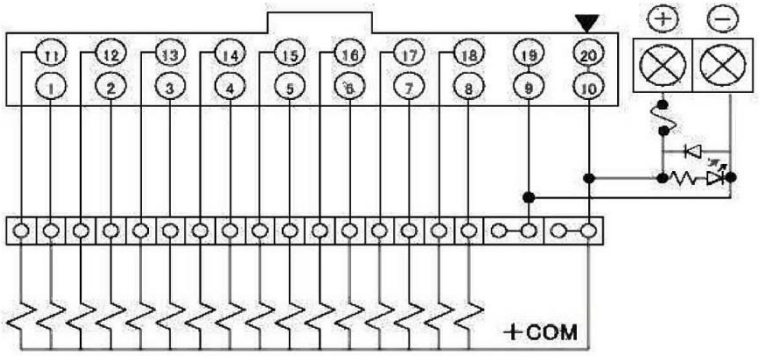
The connector used for wiring method T50 complies with MIL-C-83503 standard. Flat cable insulation displacement connector simplifies wiring work.
Pin numbers are assigned differently depending on the PLC manufacturer, but the functions are assigned in the same way. Use the triangle mark (▼) shown on 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.

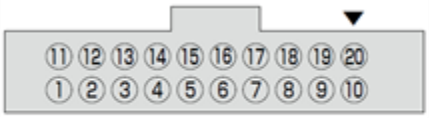


■ Internal wiring



■ 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 16 stations)

Pin no.	11	12	13	14	15	16	17	18	19	20
Valve no.	9a	10a	11a	12a	13a	14a	15a	16a	- 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)

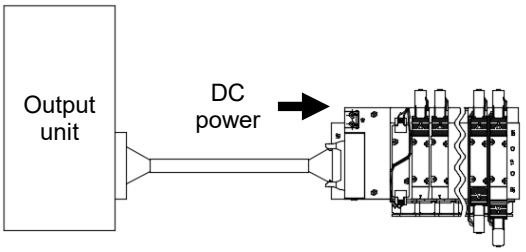
Pin no.	11	12	13	14	15	16	17	18	19	20
Valve no.	5a	5b	6a	6b	7a	7b	8a	8b	- power	+ power
Pin no.	1	2	3	4	5	6	7	8	9	10
Valve no.	1a	1b	2a	2b	3a	3b	4a	4b	- power	+ power

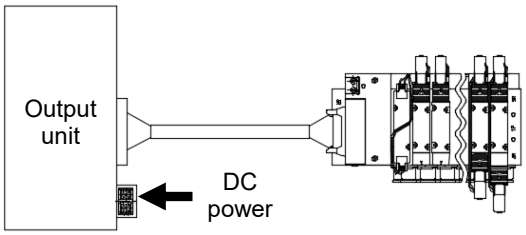
- Mixed (both single and double solenoid valves are mounted)
  (Maximum of 16 solenoids)

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

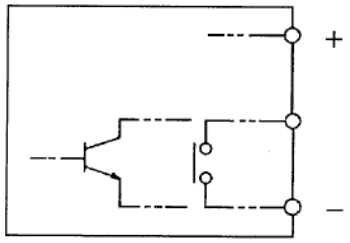
This terminal block is used when power needs to be supplied from the external source. Supply power to the wiring block or the input/output unit in a manner as shown in the following figures. When properly connected, the power indicator will light up. For wiring, check the polarity indicated on the cover 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

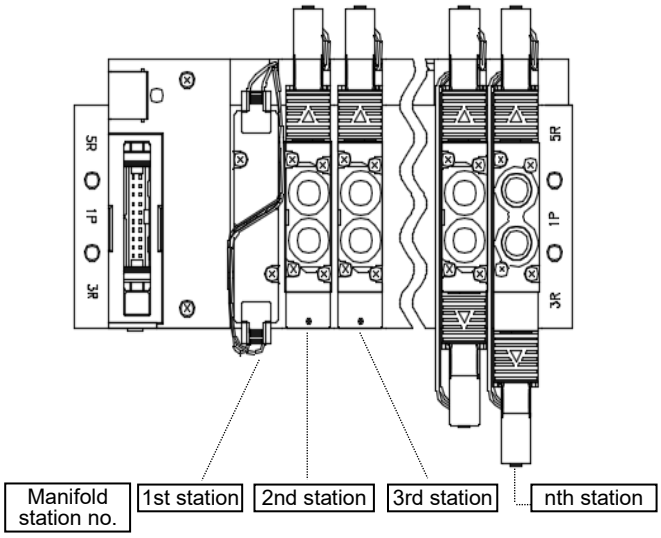
Make sure that the signal line and power line are wired correctly. Even if the connectors have the same shape, the signal pin arrangements may vary depending on the manufacturer or unit types. Make sure to check the pin arrangement of the connector to be used and wire it correctly.
For the output unit, 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)

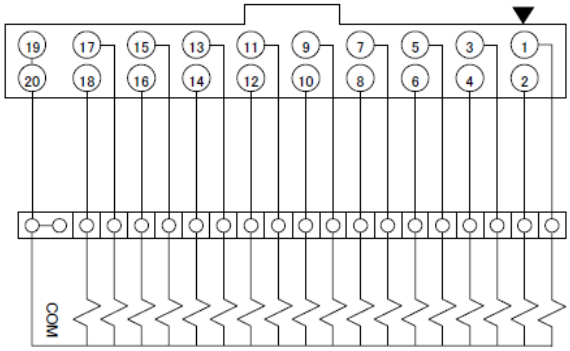
■ Precautions on wiring the flat cable connector (T51/T52/T53)

- 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.

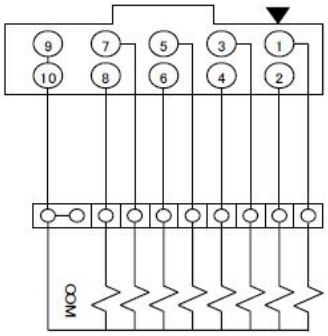


■ Internal wiring

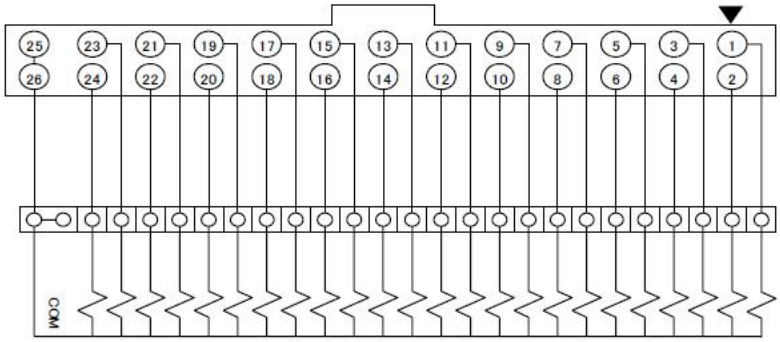
- T51



- T52

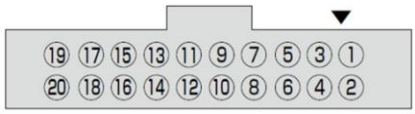


- T53



■ 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 18 stations)

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

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

<Double wiring>

- 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)

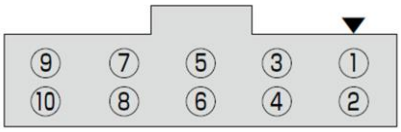
Pin no.	19	17	15	13	11	9	7	5	3	1
Valve no.	COM	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin no.	20	18	16	14	12	10	8	6	4	2
Valve no.	COM	9b	8b	7b	6b	5b	4b	3b	2b	1b

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

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)

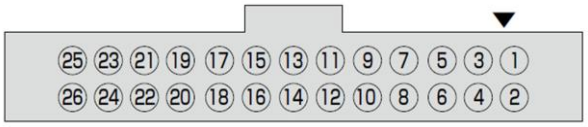
Pin no.	9	7	5	3	1
Valve no.	COM	4a	3a	2a	1a
Pin no.	10	8	6	4	2
Valve no.	COM	4b	3b	2b	1b

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

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 20 stations)

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

- 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	12a	11a	10a	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin no.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve no.	COM	12b	11b	10b	9b	8b	7b	6b	5b	4b	3b	2b	1b

- 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	16a	15a	14a	12a	10a	9a	8a	7a	5b	4b	3a	1a
Pin no.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve no.	COM	16b	15b	14b	13a	11a	9b	8b	7b	6a	5a	4a	2a

<Double wiring>

- 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	12a	11a	10a	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin no.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve no.	COM	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty

- 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	12a	11a	10a	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin no.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve no.	COM	12b	11b	10b	9b	8b	7b	6b	5b	4b	3b	2b	1b

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

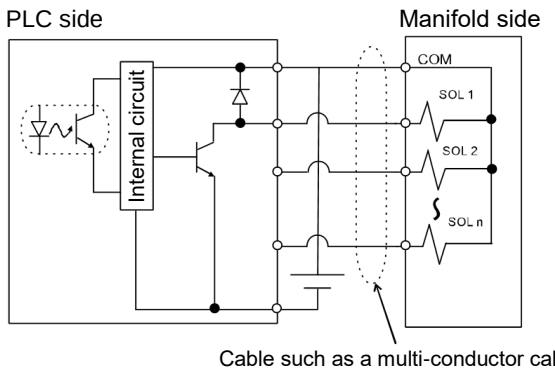
Pin no.	25	23	21	19	17	15	13	11	9	7	5	3	1
Valve no.	COM	12a	11a	10a	9a	8a	7a	6a	5a	4a	3a	2a	1a
Pin no.	26	24	22	20	18	16	14	12	10	8	6	4	2
Valve no.	COM	Empty	Empty	Empty	9b	8b	7b	Empty	5b	4b	Empty	Empty	Empty

■ How to connect to PLC

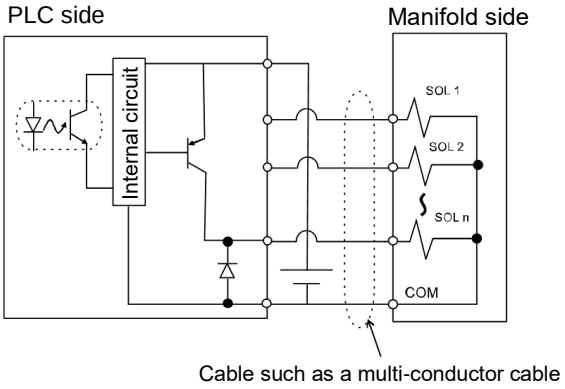
The common wiring has already been connected on the manifold side. Since the solenoid valves have no polarity, they can be connected to DC output unit (for PLC) of either output types (NPN or PNP).

Wire according to the following diagrams.

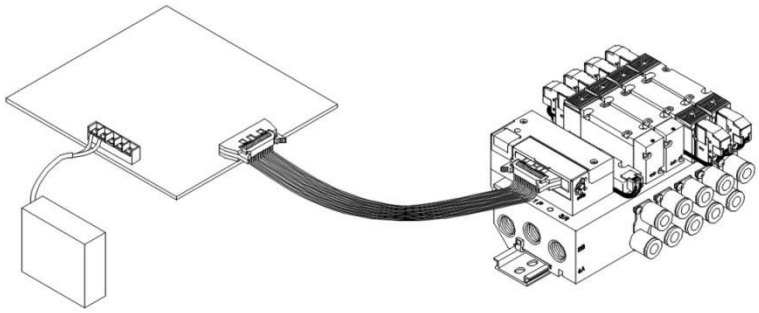
DC output unit (NPN output)



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 be also 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	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	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	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.

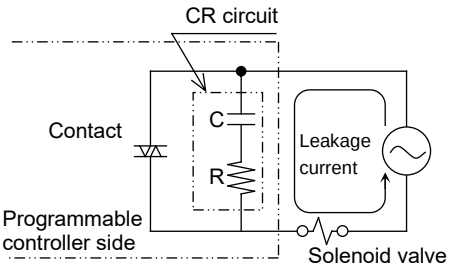
3.1.2 Electric circuit

⚠ 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 200 VAC	
For 3 VDC	8.3 mA or less
For 5 VDC	5.0 mA or less
For 12 VDC	1.8 mA or less
For 24 VDC	1.2 mA or less

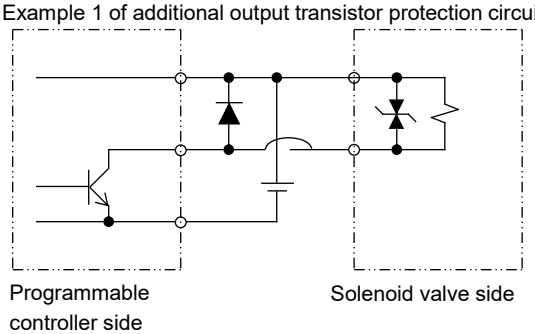
The surge suppressor limits the surge voltage generating from the solenoid valve, which can reach several hundred volts, to a low voltage level bearable for output contacts. However, this function may be insufficient for some output circuits and the voltage may cause breakage or malfunction of the product. 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.

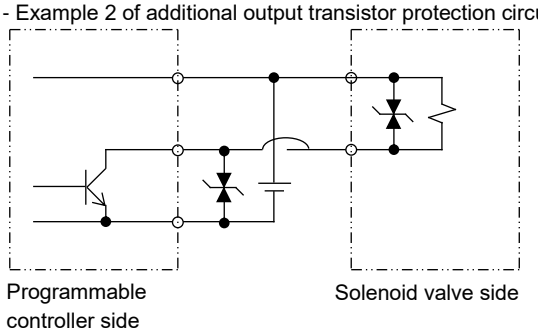
For 3 VDC	Approx. 6.2 V
For 5 VDC	Approx. 13 V
For 12 VDC	Approx. 27 V
For 24 VDC	Approx. 47 V
When option S or E is selected	Approx. 1 V

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



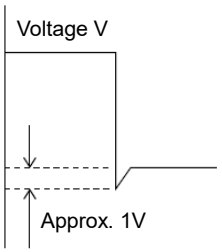
- Example 2 of additional output transistor protection circuit



- 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)

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.

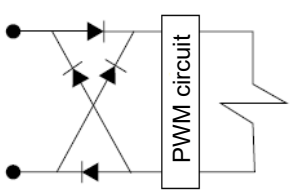
Turn off the power for 50 ms or more in order to turn on the solenoid valve again on occurrence of disturbance that causes a momentary power failure for 30 ms or less to the power supply unit of the solenoid valve in a continuous conducting state.
When a momentary power failure for 30 ms or less occurs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

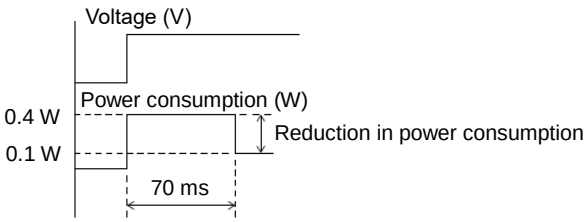
Do not raise the voltage gradually when using this type.
The valve cannot be operated.

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.

3.1.6 Pressure sensor (option symbol: G1, G2)

⚠ DANGER

Do not diassemble or dismantle the pressure sensor.
Parts can fly off when pressure is applied.

Use the product within the specified voltage range.
Applying voltage beyond the specified range may cause a malfunction, damage to the product, electric shock, or fire.

⚠ WARNING

Do not use the product with corrosive gas, combustible gas, and oxygen.

Prevent water, cutting oil, and coolant from splashing onto the product.
The degree of protection of pressure sensor is dust-proof, not drip-proof.

Turn off the power before wiring.
Discharge static electricity from your body, tools, and devices before and during work.

Do not touch electrical wiring connections (bare live parts).
An electric shock may occur.

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

Install the product and its wiring away from sources of noise such as high-voltage lines as much as possible.
Take measures against surges on the power cable, separately.

Do not apply AC power.
Applying AC power (100 VAC) may cause damage to the product, electric shock, or fire.

Do not short-circuit the load.
The product may burst or burn.

Do not incorrectly wire the polarity of the power.
The sensor may fail, burst, or burnt.

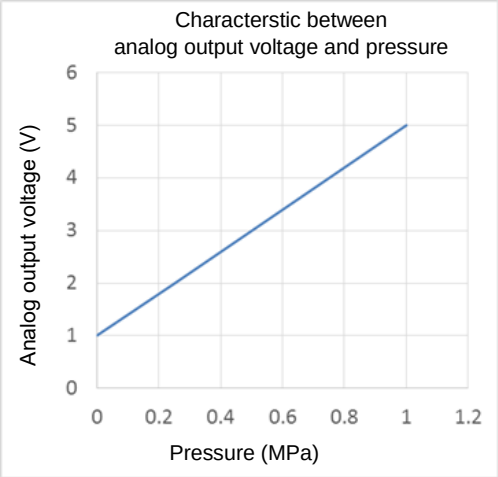
⚠ CAUTION

Do not use the product in such a way that it is rotated repeatedly.
Although the connection between the sensor body of the pressure sensor (1-port detection type) and the fitting can be rotated, rotating the product repeatedly can cause damage to the connection.

Do not apply tension and stress to the lead wires of the pressure sensor.
Applying such stress may cause leakage and connection failure.

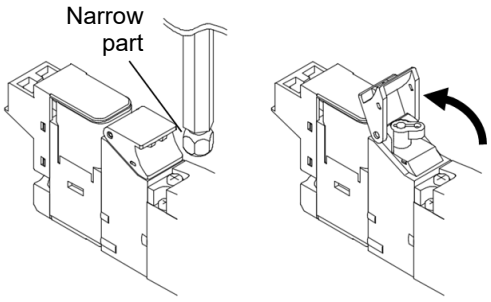
■ Pressure sensor specifications

Working pressure		0 MPa to 0.7 MPa
Supply voltage		10.8 VDC to 30.0 VDC
Current consumption		5 mA (24 VDC, at no load)
Pressure detection method		Diffused semiconductor pressure switch
Ambient temperature		0°C to 55°C
Proof pressure		1.05 MPa
Degree of protection		Dust-proof
Analog output	**Output voltage**	1 V to 5 V
	Zero point voltage	1 V ± 0.1 V
	Linearity	± 0.5%FS or less
	Temperature characteristics	± 2%FS or less
	Output current	0.5 mA max. (load resistance 10 kΩ)
Wiring method		Connector
Wire length		1000 mm

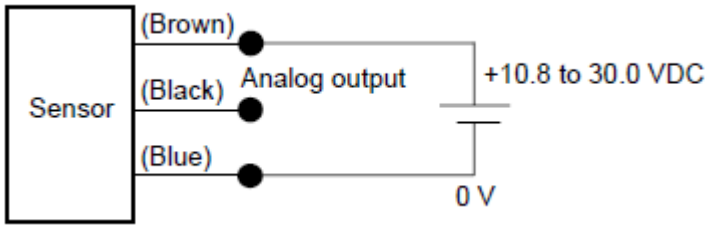


■ How to open and close the manual protection cover of valve with pressure sensor

Open the manual protection cover using the narrow part of a ball end hex key (across flats: 2.5 mm to 4 mm).



■ How to wire the pressure sensor



Output impedance of analog output part is 100 Ω. If the impedance of the connected load is low, the margin of error of the output will increase. When connecting a load, make sure that the load resistance is at least 10 kΩ.

Impedance of pressure sensor : $R_0 = 100\Omega$

Impedance of load : $R_x = 10k\Omega$

$$\text{Output value} = \left(1 - \frac{R_0}{R_0 + R_x}\right) \times 100\%$$

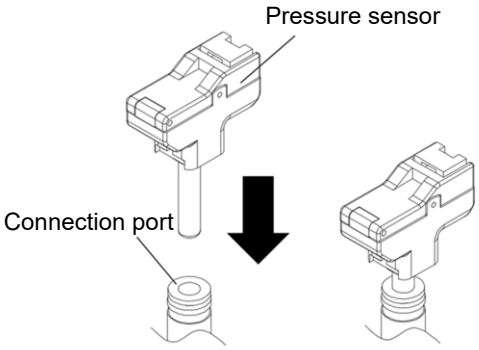
$$= \left(1 - \frac{100\Omega}{100\Omega + 10k\Omega}\right) \times 100\% \Rightarrow$$

Error of output value
Approximately 1%

■ How to replace the pressure sensor

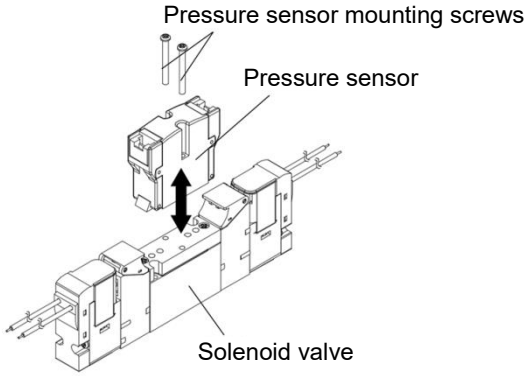
<1-port detection type (option symbol: G1)>

1. Insert the connecting part of the sensor all the way into the connection port.
2. Pull on the sensor to check that it does not come off.
   If it is not securely inserted all the way in, the sensor may come off or air leakage may occur.



<2-port detection type (option symbol: G2)>

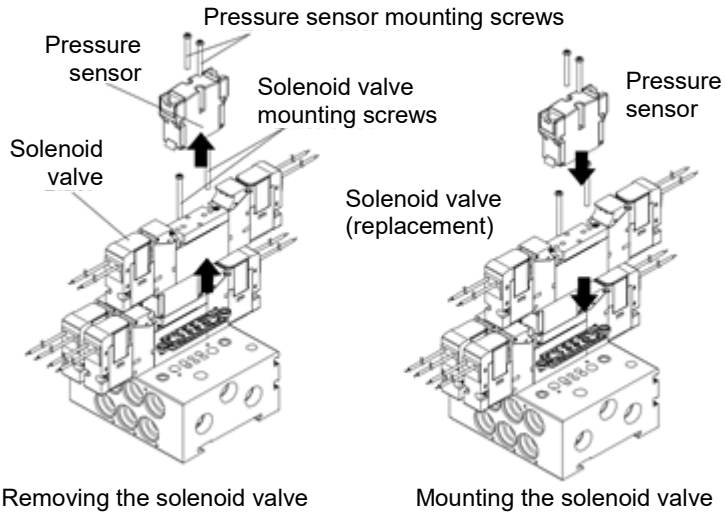
1. Remove the pressure sensor mounting screws with a screwdriver.
2. Remove the pressure sensor.
3. Replace with a new pressure sensor.
4. Tighten the pressure sensor mounting screws.
   Recommended tightening torque is 0.17 N·m.



■ How to replace the solenoid valve (4GB1 R Series)

1. Remove the pressure sensor.
2. Replace the solenoid valve.
3. Mount the new solenoid valve using the solenoid valve mounting screws.
4. Mount the pressure sensor back on.

Part name	Tightening torque (N·m)
Pressure sensor mounting screw	0.15 to 0.19
Soleniod valve mounting screw	0.18 to 0.22



Removing the solenoid valve　　Mounting the solenoid valve

3.2 Manual Operation

⚠ WARNING

After operating the manual override (including the residual pressure exhaust mechanism), 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 (including residual pressure exhaust).

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.

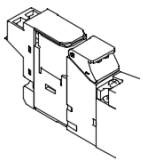
- The 4G R Series is a pilot operated solenoid valve. If air is not supplied to port P (or port PA for external pilot type), the main valve does not switch even if the manual override is operated.
- Manual protection cover is provided to this solenoid valve as standard. Since the manual protection cover 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

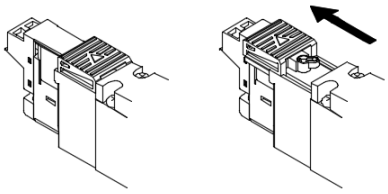
■ How to open and close the manual protection cover

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).

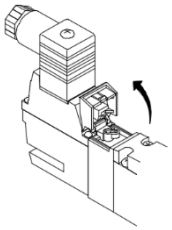
4G1 R Series



4G2 R/4G3 R Series



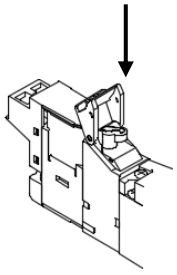
4G2 R/4G3 R Series
(DIN terminal box type valve)



■ How to operate the manual override

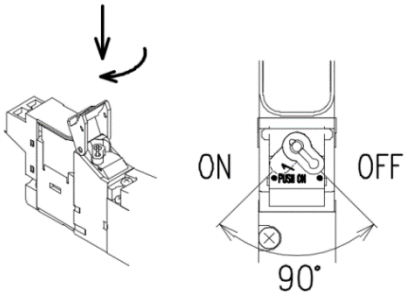
<Non-locking operation>

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>

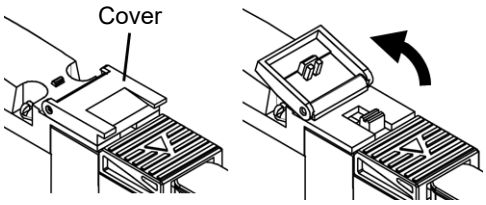
1. Press the lever down and turn it in the direction of the arrow until it stops.
   The lever is locked in place, maintaining the manual operation state.
2. Return the lever to the original position to disable manual operation.



3.2.2 Residual pressure exahust mechanism (option symbol: X, X1)

■ How to open and close the cover

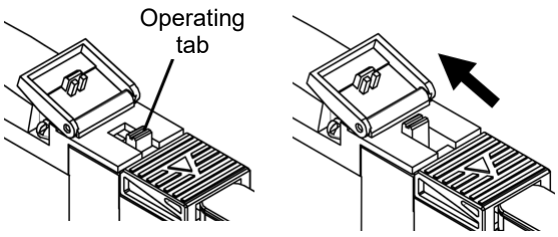
Do not apply excessive force to the cover when opening and closing the cover.
Excessive external force may cause damage (below 5 N).



■ How to operate the manual override for residual pressure exhaust

<Non-locking type (option symbol: X)>

1. Push the operating tab in the direction of the arrow. Residual pressure can be exhaused while the operating tab is pushed.
2. Release the tab to finish residual pressure exhaust. The tab returns to the original position when released.



<Locking type (option symbol: X1)>

1. Push the operating tab in the direction of the arrow. The tab is locked in place and residual pressure is exhausted.
2. Return the tab to the original position to disable residual pressure exhaust.

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.

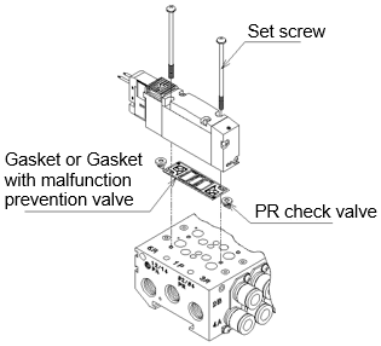
Do not disassemble or reassemble the inside of the solenoid valve.

- 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.

Model	Screw size	Tightening torque (N·m)
4G1 R	M1.7	0.18 to 0.22
4G2 R	M2.5	0.35 to 0.40
4G3 R	M3	0.6 to 0.7



4.2.2 How to replace a coil assembly

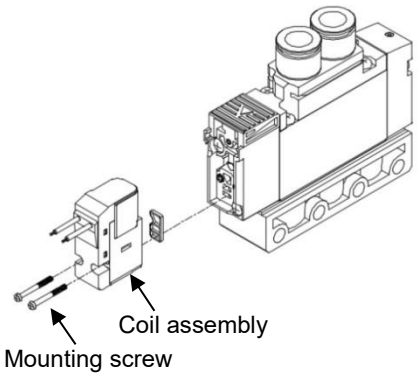
A DIN terminal box type valve is compatible with only a DIN terminal box coil assembly. A coil assembly for other electrical connection type cannot be used on a DIN terminal box type valve.

1 Remove two mounting screws securing the coil assembly and remove the old coil assembly. Loosening other screws may cause operation faults.

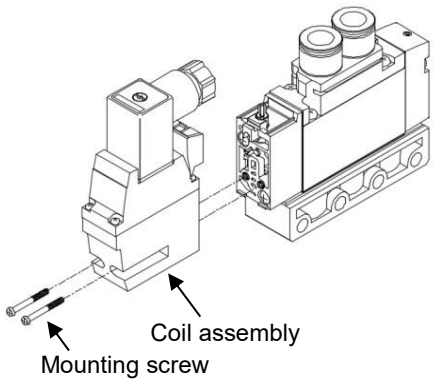
2 Check the replacement coil assembly to make sure that the gasket is installed on the coil assembly side.

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

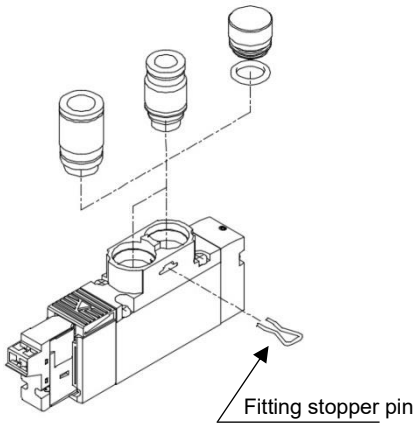


4.2.3 How to replace a cartridge type fitting (4GA/B R, 4GD/E R)

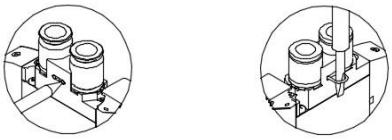
To change the push-in fitting size, check the procedure before replacing. If it is not installed correctly or if the tightening of the mounting screws is insufficient, problems such as air leakage will occur.

■ Body piping (4GA R) type

1. Remove the fitting stopper pin with a tool such as a screw driver.
2. Pull out the fitting.
3. Insert the replacement fitting vertically until its underside hits against the bottom.
4. Insert the fitting stopper pin.
5. Pull on the fitting and confirm that it is installed correctly.

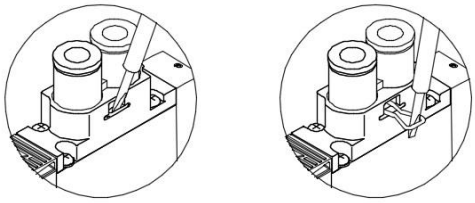


- 4GA1 R



Remove the stopper pin by pushing it out from the back.

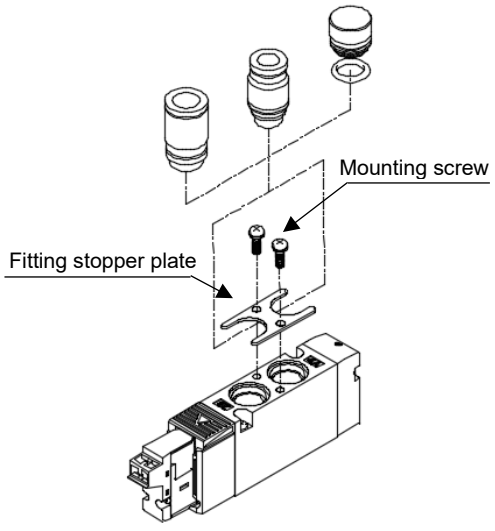
- 4GA2 R/4GA3 R



■ Body piping (4GD R) type

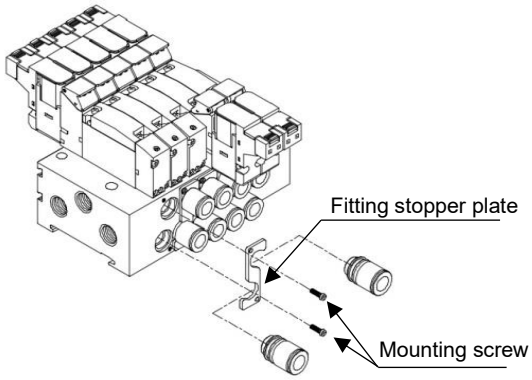
1. Remove the mounting screws.
2. Pull out the fitting stopper plate and fitting at the same time.
3. Adjust the groove on the replacement fitting to the fitting stopper plate and assemble them temporarily.
4. Mount the fitting stopper plate and fitting at the same time and tighten the mounting screw.

Model	Screw size	Tightening torque (N·m)
4G1 R	M1.7	0.18 to 0.22
4G2 R	M2.5	0.25 to 0.30
4G3 R	M3	0.6 to 0.7



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

■ Base piping (4GB R/4GE 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.

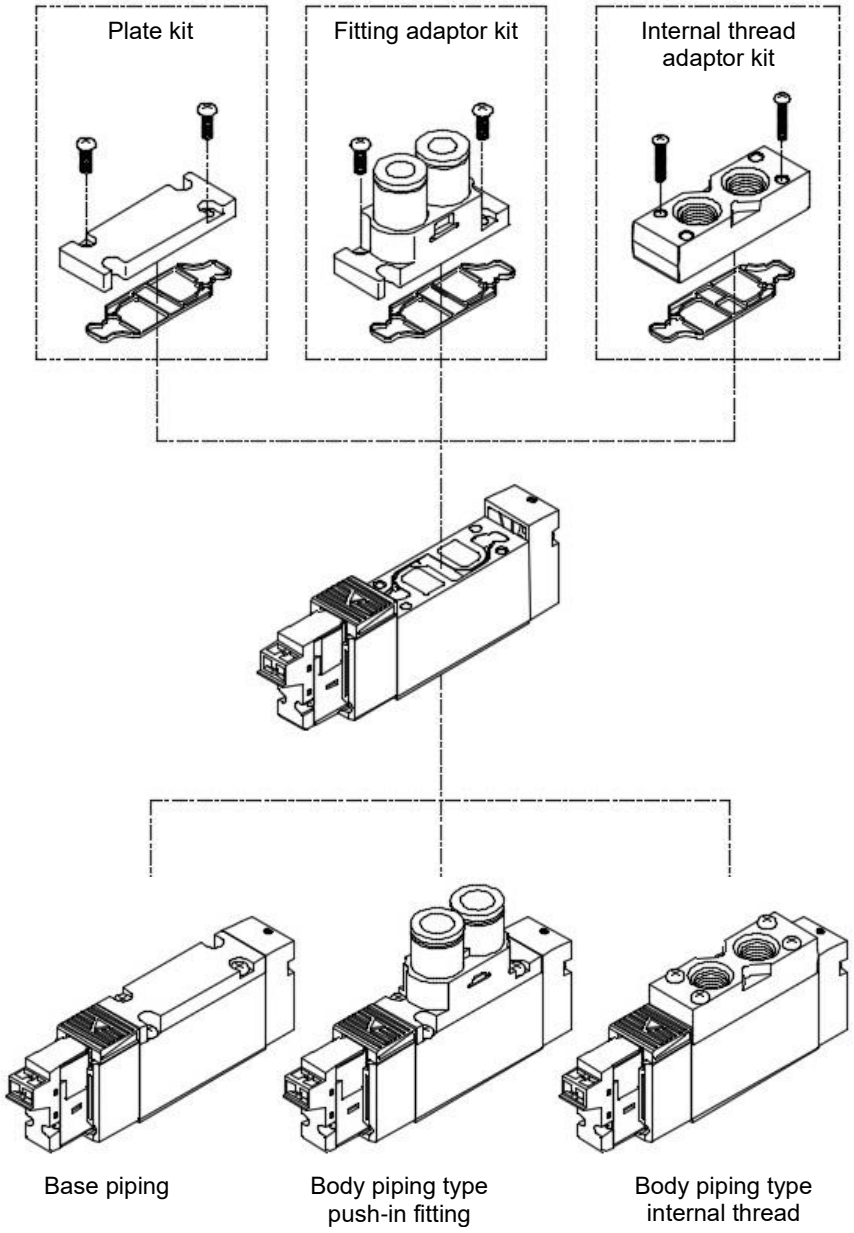
Model	Screw size	Tightening torque (N·m)
4G1 R	M1.7	0.18 to 0.22
4G2 R	M2.5	0.25 to 0.30
4G3 R	M3	0.6 to 0.7

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.

Model	Screw size	Tightening torque (N·m)
4G1 R	M1.7	0.18 to 0.22
4G2 R	M2.5	0.25 to 0.30
4G3 R	M3	0.6 to 0.7



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

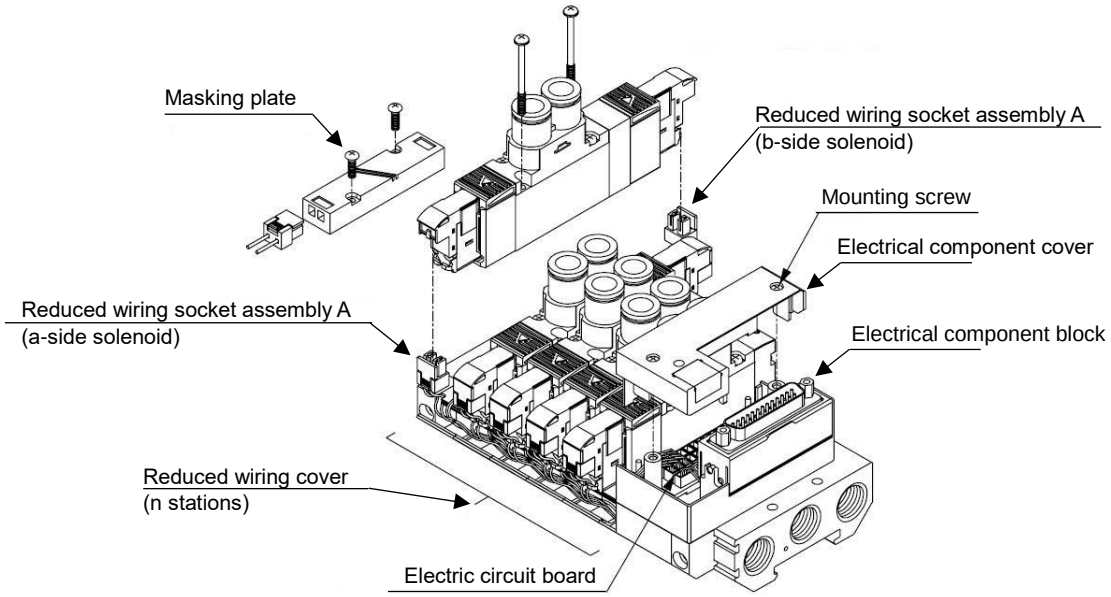
The masking plate at the reserved adding location is equipped with spare wiring beforehand.
To add a valve to the spare wiring location, follow the steps below.

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.

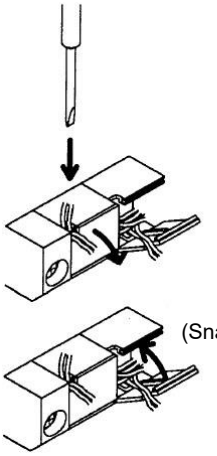
1. Remove the electrical component cover and open the reduced wiring cover.
2. Replace the valve from single solenoid to double solenoid.
   Replace the socket for a-side solenoid.
3. Attach the socket assembly for the b-side solenoid (separately purchasable).
   Pass the wiring through the valve and 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.

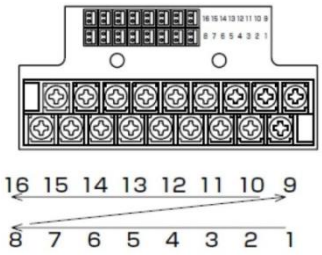
4.3.4 Instructions for wiring the electric circuit board connectors

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

Electric circuit board assembly



Correspondence between connectors and valves

1) Single solenoid valves only (maximum of 16 stations)

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

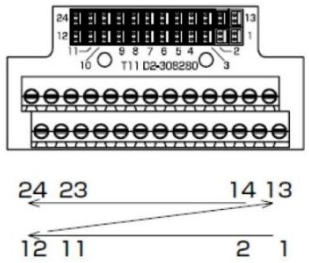
2) Double solenoid valves only (maximum of 8 stations)

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 20 stations)

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

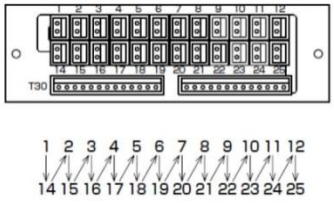
2) Double solenoid valves only (maximum of 12 stations)

Connector no.	24	23	22	21	20	19	18	17	16	15	14	13
Valve no.	12b	12a	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 24 solenoids)

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 20 stations)

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

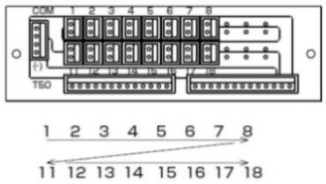
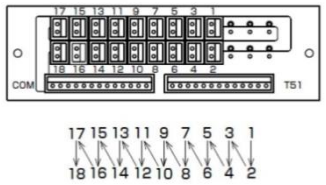
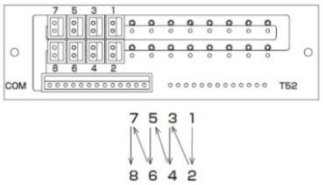
2) Double solenoid valves only (maximum of 12 stations)

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	12a
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	12b

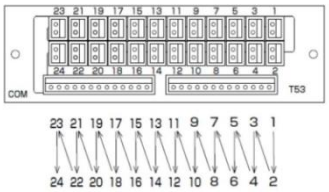
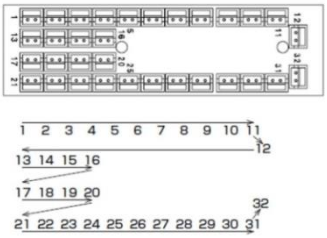
3) Mixed (both single and double) (maximum of 24 solenoids)

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 T6*		**1) Single solenoid valves only (maximum of 16 stations)** **Connector no.** 1 2 3 4 5 6 7 8 **Valve no.** 1a 2a 3a 4a 5a 6a 7a 8a **Connector no.** 11 12 13 14 15 16 17 18 **Valve no.** 9a 10a 11a 12a 13a 14a 15a 16a **2) Double solenoid valves only (maximum of 8 stations)** **Connector no.** 1 2 3 4 5 6 7 8 **Valve no.** 1a 1b 2a 2b 3a 3b 4a 4b **Connector no.** 11 12 13 14 15 16 17 18 **Valve no.** 5a 5b 6a 6b 7a 7b 8a 8b **3) Mixed (both single and double) (maximum of 16 solenoids)** **Connector no.** 1 2 3 4 5 6 7 8 **Valve no.** 1a 2a 3a 4a 4b 5a 5b 6a **Connector no.** 11 12 13 14 15 16 17 18 **Valve no.** 7a 8a 8b Empty Empty Empty Empty Empty
T51		**1) Single solenoid valves only (maximum of 18 stations)** **Connector no.** 17 15 13 11 9 7 5 3 1 **Valve no.** 17a 15a 13a 11a 9a 7a 5a 3a 1a **Connector no.** 18 16 14 12 10 8 6 4 2 **Valve no.** 18a 16a 14a 12a 10a 8a 6a 4a 2a **2) Double solenoid valves only (maximum of 9 stations)** **Connector no.** 17 15 13 11 9 7 5 3 1 **Valve no.** 9a 8a 7a 6a 5a 4a 3a 2a 1a **Connector no.** 18 16 14 12 10 8 6 4 2 **Valve no.** 9b 8b 7b 6b 5b 4b 3b 2b 1b **3) Mixed (both single and double) (maximum of 18 solenoids)** **Connector no.** 17 15 13 11 9 7 5 3 1 **Valve no.** Empty Empty Empty 8b 7a 5b 4b 3a 1a **Connector no.** 18 16 14 12 10 8 6 4 2 **Valve no.** Empty Empty Empty Empty 8a 6a 5a 4a 2a
T52		**1) Single solenoid valves only (maximum of 8 stations)** **Pin no.** 7 5 3 1 **Valve no.** 7a 5a 3a 1a **Pin no.** 8 6 4 2 **Valve no.** 8a 6a 4a 2a **2) Double solenoid valves only (maximum of 4 stations)** **Connector no.** 7 5 3 1 **Valve no.** 4a 3a 2a 1a **Connector no.** 8 6 4 2 **Valve no.** 4b 3b 2b 1b **3) Mixed (both single and double) (maximum of 8 solenoids)** **Connector no.** 7 5 3 1 **Valve no.** 5b 4b 3a 1a **Connector no.** 8 6 4 2 **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 20 stations)** **2) Double solenoid valves only (maximum of 12 stations)** **3) Mixed (both single and double) (maximum of 24 solenoids)**
T8		**1) Single solenoid valves only (maximum of 20 stations)** **2) Double solenoid valves only (maximum of 16 stations)** **3) Mixed (both single and double) (maximum of 32 solenoids)**

1) Single solenoid valves only (maximum of 20 stations)

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

2) Double solenoid valves only (maximum of 12 stations)

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

3) Mixed (both single and double) (maximum of 24 solenoids)

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

1) Single solenoid valves only (maximum of 20 stations)

Connector no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Valve no.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	13a	14a	15a	16a
Connector no.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Valve no.	17a	18a	19a	20a	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty	Empty

2) Double solenoid valves only (maximum of 16 stations)

Connector no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Valve no.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b
Connector no.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Valve no.	9a	9b	10a	10b	11a	11b	12a	12b	13a	13b	14a	14b	15a	15b	16a	16b

3) Mixed (both single and double) (maximum of 32 solenoids)

Connector no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Valve no.	1a	2a	3a	4a	4b	5a	5b	6a	7a	8a	8b	Empty	Empty	Empty	Empty	Empty
Connector no.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
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). Readjust the lubricator drip rate. Install a tar removing filter.
	Exhaust ports are clogged with dust.	Install a cover or silencer. 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). Use the solenoid valves away from where cutting oil is used. 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. Since the 4G Series has ports that are different in position from the 4K Series, check the port symbols and make sure to pipe correctly so that reverse operation of the cylinder does not occur.

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.