CKD

PNEUMATIC 5-PORT DIRECTIONAL CONTROL VALVE

(M)4SA/B0 R SERIES

- Discrete
- Manifold (metal base)

INSTRUCTION MANUAL

SM-B16825-A

- Be sure to read this Instruction Manual before using the product.
- In particular, read safety instructions carefully.
- Keep this Instruction Manual safe, so that you can readily consult it whenever necessary.

CKD株式会社

PREFACE

Thank you very much for purchasing CKD's **pneumatic 5-port directional control valve**. This Instruction Manual describes basic matters such as installation and usage in order to fully demonstrate the performance of this product. Read this manual carefully to use this product correctly.
Keep this Instruction Manual safe, so that it will not be lost.

Specifications and appearance described in this Instruction Manual are subject to change without notice.

- This product is intended for people who have a basic knowledge of materials, fluids, piping and electricity when using control valves (directional control valves, motor-operated valves, air-operated valves, etc.). CKD shall not be liable for any accident caused by the selection or use of a control valve by a person without knowledge of the control valve or without sufficient training.
- 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 work at its full performance or an accident may occur due to fluid, pipework, or other conditions. It is the customer's responsibility to check the product specifications and determine the method of use depending on the application and usage.

SAFETY INFORMATION

When you design or manufacture equipment using this product, you are obligated to manufacture safe equipment. To do this, make sure that the mechanical mechanism of the equipment and the pneumatic or water control circuits, as well as the systems that electrically control them, are safe.

In regard to the safety related to the design and management of the equipment, please be sure to observe all industrial standards and regulations.

ISO 4414, JIS B 8370, JFPS 2008 (latest edition of each standard)
High Pressure Gas Safety Act, Occupational Safety and Health Act, other safety regulations, industrial standards, regulations, etc.

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 implemented 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 a potentially hazardous situation which, if handled improperly, could result in imminent danger of death or serious injury.
⚠WARNING	Indicates a potentially hazardous situation which, if handled improperly, could result in death or serious injury.
⚠CAUTION	Indicates a potentially hazardous situation which, if handled improperly, could result in personal injury or property damage.

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.

Instructions 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 scope of 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.

Since this product is intended for use in devices or parts for general industrial machinery, it is not intended for use outdoors or in the conditions or environment listed below.

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

- In applications for nuclear power, railroad system, aviation, ship, vehicle, medical equipment, and equipment that directly touches beverage or food.
- For applications that require safety including amusement equipment, emergency shut-off circuit, press machine, brake circuit, and safety measures.
- For applications where significant effects on people and property are expected, especially in applications where safety is required.

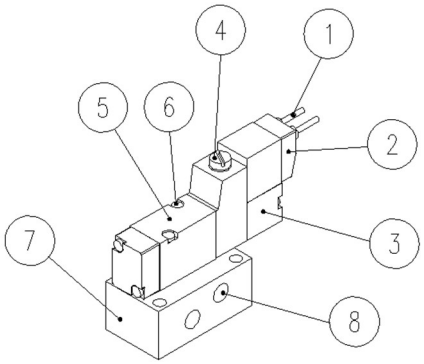
Do not handle the product or remove pipes and devices before confirming safety.

- Confirm the safety of all systems involved in the product before inspecting or maintaining the machine and devices. Also, shut off the supplied air and water, which are energy sources, as well as the power of the equipment, vent the compressed air in the system, and watch out for water leaks and electric leakage.
- Even when the operation is stopped, there still may be a hot section or an electrified section, so be careful when handling the product and removing pipes and devices.
- Before starting or restarting a machine or device that uses pneumatic equipment, check whether the safety of the system is ensured by measures such as a pop-out prevention mechanism.

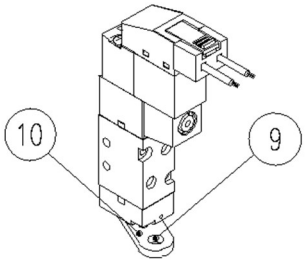
CONTENTS

1. PRODUCT OVERVIEW

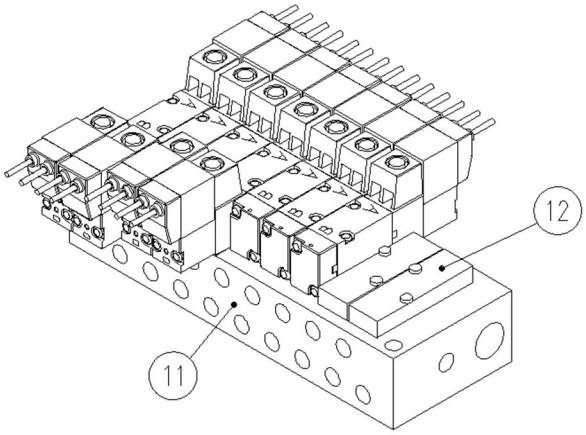
1.1 Part name



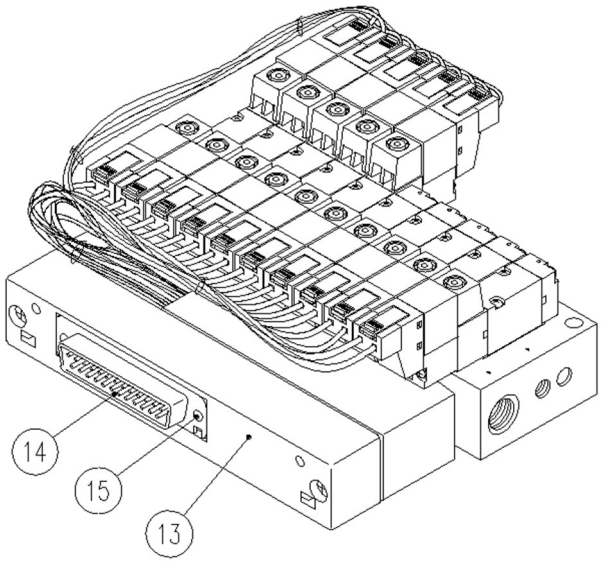
Base piping type



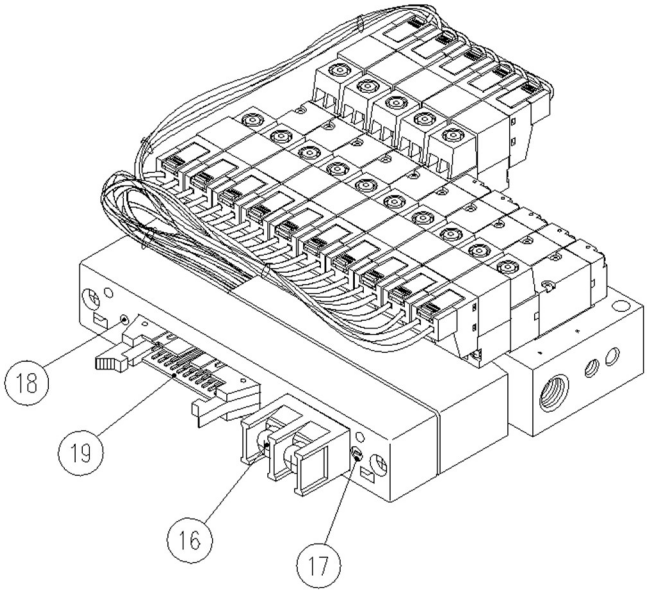
Direct piping type (with mounting plate)



Individual wiring manifold



Reduced wiring manifold (D-sub connector)



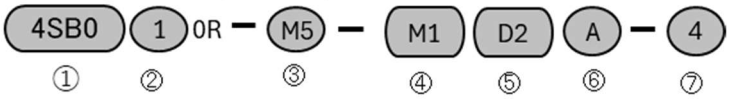
Reduced wiring manifold (Flat cable connector)

No.	Name	Description
1	Lead wire	When selecting a model with a surge killer and lamp that features a low-heat, power-saving circuit, the lead wires have polarity.
2	Electrical component cover	While the coil assembly (solenoid) is energized, the red energization indicator is lit on the upper surface. (Only for C type and D type connectors with a surge killer and a lamp)
3	Coil assembly	It varies depending on the wire connection type and voltage.
4	Manual override	There are two types of manual override: lock type and non-lock type.
5	Directional control valve (discrete)	It has a mechanism to open and close the air passage.
6	Mounting screw for directional control valve	Each directional control valve has two screws, which secure the valve to various bases.
7	Subplate	It is assembled when the base piping type is used alone.
8	Piping port	1(P) for air supply, 3(R2)/5(R1) for exhaust, and 2(B)/4(A) for output port.
9	Mounting hole	It is used for direct mounting.
10	Mounting plate	It is used to mount the direct piping type directional control valve upright.
11	Manifold base	It is a metal base of the manifold with multiple piping ports.
12	Masking plate	When adding directional control valves, it is replaced with a directional control valve.
13	Electrical block	It incorporates and secures a printed circuit board with connectors.
14	D-sub 25 pin connector	It is a group of control terminals for the manifold type directional control valve.
15	Mounting screw	It is used to secure connectors to be connected. The screw size is M2.6.
16	Terminal block for power supply	It is used when external power supply is required.
17	Power supply polarity mark	It is a polarity mark of power supply.
18	Power indicator	It is Illuminated when power is supplied with correct polarity.
19	Flat cable connector	It is a group of control terminals for the manifold type directional control valve.

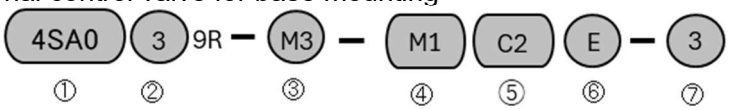
1.2 Model number indication

1.2.1 Discrete type

●Directional control valve (discrete)



●Directional control valve for base mounting



[1] Model number		[2] Switching position category		[3] Connection bore	[4] Manual override		[5] Wire connection	[6] Option
Symbol	Description	Symbol	Description	Note 1	No symbol	Non-locking type	Note 2	Note 3
4SA0	Direct piping type	1	2-position single		M1	Locking type		
4SB0	Base piping type	2	2-position double					
		3	3-position closed center					
		4	3-position exhaust center					
		5	3-position pressure center					

[7] Rated voltage	
Symbol	Description
3	24 V DC
4	12 V DC

Please refer to the catalog for notes on selecting a model number.

Note 1: [3] Connection bore

Symbol	Description	
Type	Ports 4(A) and 2(B)	Port P, R1 and R2
M3	M3	M3
M5	M5	M5
T4	φ4 barb fitting	M3
00	Directional control valve for base mounting	

Please refer to the catalog for notes on selecting a model number.

Note 2: [4] Wire connection

Symbol	Description	
Grommet lead wire		
No symbol	Grommet lead wire (300 mm)	
C type connector (side lead wire type)		
C	Lead wire (300 mm)	
C00	Lead wire (500 mm)	
C01	Lead wire (1000 mm)	
C02	Lead wire (2000 mm)	
C1	No lead wire (with socket)	
C2	Lead wire (300 mm)	With surge killer and lamp
C20	Lead wire (500 mm)	With surge killer and lamp
C21	Lead wire (1000 mm)	With surge killer and lamp
C22	Lead wire (2000 mm)	With surge killer and lamp

C2N	No lead wire (no socket)	With surge killer and lamp
C3	No lead wire (with socket)	With surge killer and lamp
C4	For reduced wiring (T31/T50)	With surge killer and lamp
C type connector (top lead wire type)		
D	Lead wire (300 mm)	
D00	Lead wire (500 mm)	
D01	Lead wire (1000 mm)	
D02	Lead wire (2000 mm)	
D1	No lead wire (with socket)	
D2	Lead wire (300 mm)	With surge killer and lamp
D20	Lead wire (500 mm)	With surge killer and lamp
D21	Lead wire (1000 mm)	With surge killer and lamp
D22	Lead wire (2000 mm)	With surge killer and lamp
D2N	No lead wire (no socket)	With surge killer and lamp
D3	No lead wire (with socket)	With surge killer and lamp
D4	For reduced wiring (T30)	With surge killer and lamp

Please refer to the catalog for notes on selecting a model number.

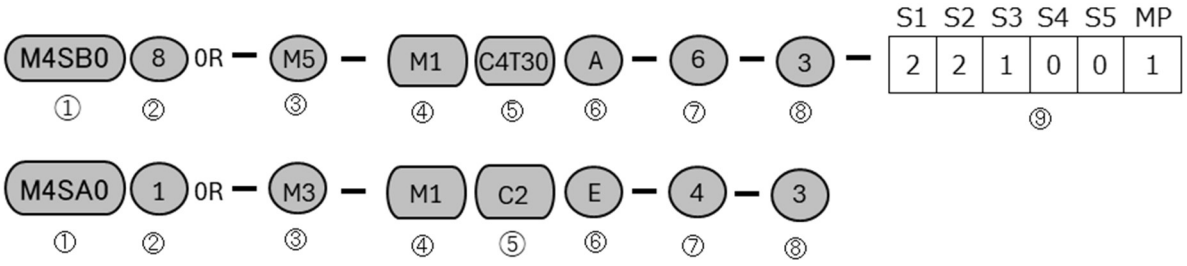
Note 3: [6] Option

Symbol	Description
No symbol	No options
P	Mounting plate
A	Works with ozone and cutting oil
E	Low heat generating/energy saving circuit

Please refer to the catalog for notes on selecting a model number.

1.2.2 Manifold

●Manifold model number



[1] Model number		[2] Switching position category		[3] Connection bore	[4] Manual override		[5] Wire connection	[6] Option
Symbol	Description	Symbol	Description	Note 1	No symbol	Non-locking type	Note 2	Note 3
M4SA0	Direct piping type	1	2-position single		M1	Locking type		
M4SB0	Base piping type	2	2-position double					
		3	3-position closed center					
		4	3-position exhaust center					
		5	3-position pressure center					
		8	Mix manifold					

[7] Number of stations		[8] Rated voltage		[9] Directional control valve combination
Symbol	Description	Symbol	Description	Note 4
2 to 20	Number of stations	3	24 V DC	
		4	12 V DC	

Please refer to the catalog for notes on selecting a model number.

Note 1: [3] Connection bore

Symbol	Description		
Type	Ports 4(A) and 2(B)	Port P	Port R1 and R2
M3	M3	M5	Rc1/8
M5	M5	M5	Rc1/8
GS4	φ4 push-in fitting	M5	Rc1/8
T4	φ4 barb fitting	M5	Rc1/8
T6	φ6 barb fitting	M5	Rc1/8
PM5	M5	Rc1/8	Rc1/8
PGS4	φ4 push-in fitting	Rc1/8	Rc1/8
PT4	φ4 barb fitting	Rc1/8	Rc1/8
PT6	φ6 barb fitting	Rc1/8	Rc1/8

Please refer to the catalog for notes on selecting a model number.

Note 2: [5] Wire connection

Individual wiring

Symbol	Description	
Grommet lead wire		
No symbol	Grommet lead wire (300 mm)	
C type connector (side lead wire type)		
C	Lead wire (300 mm)	
C00	Lead wire (500 mm)	
C01	Lead wire (1000 mm)	
C02	Lead wire (2000 mm)	
C1	No lead wire (with socket)	
C2	Lead wire (300 mm)	With surge killer and lamp
C20	Lead wire (500 mm)	With surge killer and lamp
C21	Lead wire (1000 mm)	With surge killer and lamp
C22	Lead wire (2000 mm)	With surge killer and lamp
C2N	No lead wire (no socket)	With surge killer and lamp
C3	No lead wire (with socket)	With surge killer and lamp
C type connector (top lead wire type)		
D	Lead wire (300 mm)	
D00	Lead wire (500 mm)	
D01	Lead wire (1000 mm)	
D02	Lead wire (2000 mm)	
D1	No lead wire (with socket)	
D2	Lead wire (300 mm)	With surge killer and lamp
D20	Lead wire (500 mm)	With surge killer and lamp
D21	Lead wire (1000 mm)	With surge killer and lamp
D22	Lead wire (2000 mm)	With surge killer and lamp
D2N	No lead wire (no socket)	With surge killer and lamp
D3	No lead wire (with socket)	With surge killer and lamp

Reduced wiring

Symbol	Description	
C4T31	D-sub connector (side type)	
D4T30	D-sub connector (top type)	
C4T50	Flat cable connector	

Please refer to the catalog for notes on selecting a model number.

Note 3: [6] Option

Symbol	Description
No symbol	No options
A	Works with ozone and cutting oil
E	Low heat generating/energy saving circuit

Please refer to the catalog for notes on selecting a model number.

Note 4: [9] **Directional control valve combination**

● Combination details description method
When selecting a combination manifold, enter "8" in item ❶ and specify the required function symbols in the table on the right. Then, enter the position numbers in the remarks column below the standard model number as shown in the example.
Number the positions sequentially starting from the left as No. 1 and continuing up to the specified number of stations.

Symbol	Function
S1	2-position single
S2	2-position double
S3	3-position closed center
S4	3-position exhaust center
S5	3-position pressure center
MP	Masking plate

1	2	3	4	5	6	7
2-position single	2-position double	3-position closed center	3-position closed center	2-position double	2-position single	3-position exhaust center
(S1)	(S2)	(S3)	(S3)	(S2)	(S1)	(S4)

The model number for the seven-station combination manifold with the arrangement shown in the diagram on the left, when used with ports A, B, and P, M5, and 24 V DC, is:

M4SB080-M5-C4T50-7-3-222100

S1=1,6 S2=2,5 S3=3,4 S4=7

Symbol Position

● If 10 or more actuators of the same model number are used in the mix manifold, use the symbols in the table below for designation.

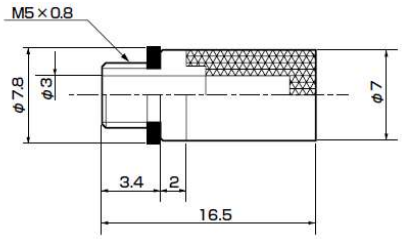
Number of actuators	10	11	12	13	14	15	16	17	18	19
Symbol	A	B	C	D	E	F	G	H	I	J

S1	S2	S3	S4	S5	MP
2	2	2	1	0	0

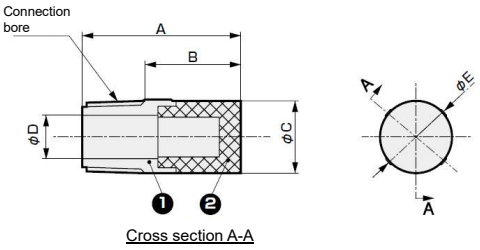
1.2.3 Related equipment

■ Silencer

<SLM-M5>

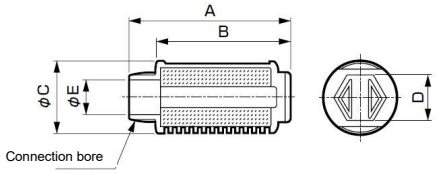


<SLW-6S>



Model number	Connection bore	A	B	C	D	E
SLW-6S	R1/8	22	13.3	10.5	6	10.5

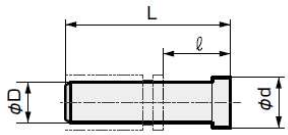
<SLW-6A>



Model number	Sound-dampening effect dB(A)	Effective cross-sectional area (mm²)	A	B	C	D	E	Connection bore
SLW-6A	30 or more	10	34.5	28	16.5	10	7	R1/8

Note 1: Select the silencer after confirming the dimensions.

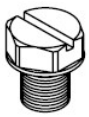
■ Blank plug



Model number	D	L	ℓ	d
GWP4-B	φ4	27	16	6

■ Screw plug

<FPL-M3> **<4G□R-□P>**
<4G1R-M5P>



Model number	Applicable bore
FPL-M3	M3
4G1R-M5P	M5
4G2R-06P	Rc1/8

Please refer to the catalog for notes on selecting a model number.

1.2.4 Kit parts

■ Coil assembly

Part name	Model number
Coil assembly	4SR-Wire Connection-Option-COIL-Rated Voltage Rated Voltage: 3: 24 V DC, 4: 12 V DC Option: No symbol: Standard, A: Ozone-resistant, E: Low heat generating/energy saving Wire Connection: No symbol: Grommet lead wire, C□: C type connector, D□: D type connector

■ Lead wire related parts

Part name	Model number
Socket assembly for C and D type connectors, lead wire length 300 mm	3Q-SOCKET-ASSY-300
Socket assembly for C and D type connectors, lead wire length 500 mm	3Q-SOCKET-ASSY-500
Socket assembly for C and D type connectors, lead wire length 1000 mm	3Q-SOCKET-ASSY-1000
Socket assembly for C and D type connectors, lead wire length 2000 mm	3Q-SOCKET-ASSY-2000
Socket set for C and D type connectors	3Q-SOCKET-SET

■ Fitting

Model	Part name	Model number
4SA0☐☐R 4SB0☐☐R	φ1.8 barb type	PTN2-M3
	φ1.8 barb type	PTN2-M5
	φ4 barb type	FTS4-M5
	φ6 barb type	FTS6-M5
	φ4 straight type	GWS 4-M3-S
	φ4 straight type	GWS 4-M5-S

■ Masking plate kit

Model	Model number	Parts included
M4SA0☐☐R	4SAR-MP	Masking plate, 1 gasket, 2 mounting screws
M4SB0☐☐R	4SBR-MP	Masking plate, 1 gasket, 2 mounting screws

■ Gasket

Model	Model number
4SA0☐☐R	4SAR-GASKET-KIT
4SB0☐☐R	4SBR-GASKET-KIT

■ Mounting screws (a set of 2 screws)

Model	Model number
4SA0□□R, 4SB0□□R	4SR-SET-SCREW

■ Discrete subbase

Model	Model number
4SB0☐☐R	4SBR-SUB-BASE-KIT

■ Manifold base

Model	Model number
M4SA0☐☐R	M4SAR-M5-☐
M4SB0☐☐R	M4SBR-☐M5-☐

1.3 Specifications

1.3.1 Common specifications

Model number	4SA0R, 4SB0R
Valve type and operation method	Pilot type soft spool valve
Fluid used	Compressed air
Maximum working pressure MPa	0.7
Minimum working pressure MPa	0.2
Withstanding pressure MPa	1.05
Ambient temperature ºC	5 to 55
Fluid temperature ºC	5 to 55
Manual override	Non-locking, locking selectable type
Lubrication Note 1	Not required
Protective structure Note 2	Dust-proof
Vibration resistance m/s^2	50 or less
Impact resistance m/s^2	300 or less
Atmosphere	This product cannot be used in corrosive gas atmosphere.

Note 1: When lubricating, use turbine oil Class 1 ISO VG 32.
Excessive or intermittent lubrication makes operation unstable.
Note 2: The protective structure is dust-proof. It is not drip-proof. Use the product in a manner that prevents water droplets, oil and other substances from coming into contact with it.
Note 3: 4SA0 is a pilot released type. For 4SB0, the pilot exhaust is concentrated to the R port.

1.3.2 Electrical specifications

Model number		4SA0R, 4SB0R	
Rated voltage		24 V DC	12 V DC
Voltage fluctuation range		±10%	
Holding current A Note 1	**Standard**	0.025 (0.029)	0.050 (0.058)
	With low heat generating/ energy saving circuit	(0.013)	—
Power consumption W Note 1	**Standard**	0.6 (0.7)	
	With low heat generating/ energy saving circuit	(0.3)	—
Heat-resistant class		B	
Surge killer		Option	
Indicator		Lamp (optional)	

Note 1: ( ) indicates the value for products with a lamp. Products with low-heat, power-saving circuits are available only with lamps.

1.3.3 Response time

(Unit: ms)

Switching position category	4SA/B□ R Series	
	ON	OFF
2-position	15 ms or less	15 ms or less
3-position	30 ms or less	30 ms or less

*The response time is measured at a supply pressure of 0.5 MPa and 20°C without lubrication. It changes depending on the pressure and oil quality.

1.3.4 Flow rate characteristics

■ Discrete type

Model number	Switching position category		1(P)→4(A)/2(B)				4(A)/2(B)→5(R1)/3(R2)			
			C[dm³/(s/bar)]	Q[l/min (ANR)]	S [mm²]	b	C[dm³/(s/bar)]	Q[l/min (ANR)]	S [mm²]	b
4SA0R	2-position		—	65	1.1	—	—	65	1.1	—
	3-position	Closed center	—	65	1.1	—	—	65	1.1	—
		Exhaust center	—	65	1.1	—	—	65	1.1	—
		Pressure center	—	65	1.1	—	—	65	1.1	—
4SB0R	2-position		0.32	77	—	0.20	0.30	72	—	0.21
	3-position	Closed center	0.32	76	—	0.19	0.29	66	—	0.11
		Exhaust center	0.31	73	—	0.18	0.29	70	—	0.22
		Pressure center	0.33	79	—	0.20	0.29	70	—	0.21

* C: sonic conductance, b: critical pressure ratio
* The conversion between the effective cross section S and the sonic conductance C is S ≈ 5.0 × C.

■ Manifold

Model number	Switching position category		1(P)→4(A)/2(B)				4(A)/2(B)→5(R1)/3(R2)			
			C [dm³/(s/bar)]	Q[l/min (ANR)	S [mm²]	b	C [dm³/(s/bar)]	Q[l/min (ANR)	S [mm²]	b
M4SA□R	2-position		—	65	1.1	—	—	65	1.1	—
	3-position	Closed center	—	65	1.1	—	—	65	1.1	—
		Exhaust center	—	65	1.1	—	—	65	1.1	—
		Pressure center	—	65	1.1	—	—	65	1.1	—
M4SB□R	2-position		0.30	70	—	0.15	0.30	72	—	0.21
	3-position	Closed center	0.29	67	—	0.14	0.30	72	—	0.20
		Exhaust center	0.29	67	—	0.14	0.30	72	—	0.20
		Pressure center	0.29	67	—	0.14	0.30	72	—	0.20

* C: sonic conductance, b: critical pressure ratio

* Note that the flow rate may be reduced depending on the effective cross-sectional area of the fitting for T4 (when the φ4 barb fitting is used).
* The conversion between the effective cross section S and the sonic conductance C is S ≈ 5.0 × C.

1.3.5 Mass

■ Discrete type

(Unit: g)

Switching position category		4SA0□R	4SB0□R
2-position	Single	23	43
	Double	35	55
3-position		39	59

■ Manifold base

(Unit: g)

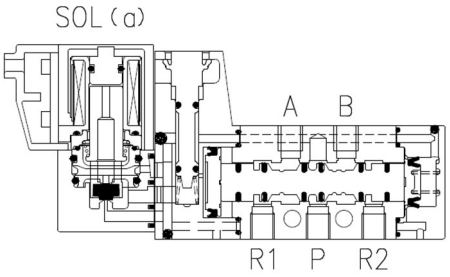
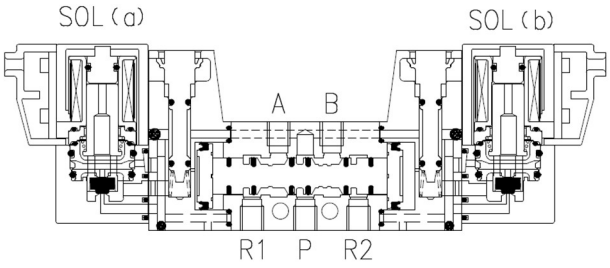
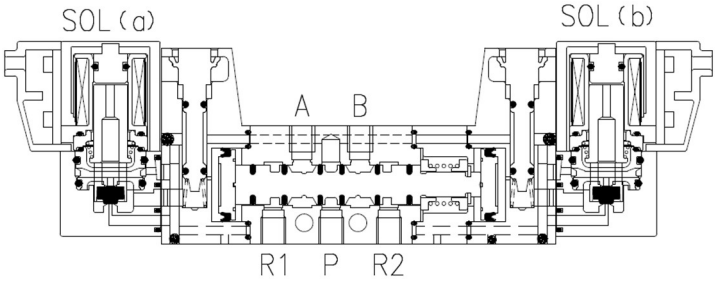
Item		M4SA0□R	M4SB0□R
Manifold base mass calculation formula (n: Number of stations)	Port P: M5	13n + 18	20n + 36
	Port P: Rc1/8		21n + 26

* n indicates the number of stations.
* The weights listed in the table correspond to models with threaded connections.

1.4 Internal structure

1.4.1 Description of operation

■ Directional control valve operation

	Operation diagram (shown by 4SA R Series as an example)	Description of operation
4S□010R 2-position single		When not energized (shown) 1(P) → 2(B) 4(A) → 5(R1) When energized 1(P) → 4(A) 2(B) → 3(R2)
4S□020R 2-position double		When SOL a is energized 1(P) → 4(A) 2(B) → 3(R2) When SOL b is energized (shown) 1(P) → 2(B) 4(A) → 5(R1) After being energized, the switch maintains its position even when it gets de-energized.
4S□030R 4S□040R 4S□050R 3-position		4S□030R When not energized 1(P), 4(A), 2(B), 5(R1) and 3(R2) are closed 4S□040R When not energized 1(P) is closed 4(A), 2(B) → 5(R1), 3(R2) 4S□050R When not energized 1(P) → 4(A), 2(B) 5(R1) and 3(R2) are closed

*SOL refers to solenoid.

2. INSTALLATION

2.1 Installation environment

⚠WARNING

Do not use the directional control valve in a way that allows water or cutting oil to splash directly onto it.

- Install a directional control valve inside the cover or panel for protection in an environment that may be splashed with water or cutting oil.
- If cutting oil splashes onto the rod of the cylinder, it can enter the piping on the secondary side of the directional control valve and cause a malfunction. In this case, please consult CKD.

Observe the following instructions since coils produce heat.

- Appropriate ventilation or heat dissipation measures must be considered if the product is installed in a control panel or if the coil needs to be energized for a long period.
- Be careful when touching the directional control 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 directional control 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 directional control valve when the valve is operated to supply or exhaust air or if the exhaust port is installed facing up. Install a silencer to prevent foreign matters from entering the exhaust port or install the exhaust port facing down.

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

Do not use the product in areas where vibration is greater than 50 m/s^2 and impact is greater than 300 m/s^2.

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

Packing and gaskets may deteriorate faster than usual.

Take measures against lightning surges on the device side.

The product is not resistant to lightning surges.

2.2 Unpacking

⚠CAUTION

Do not remove the packaging from the directional control valve until you are ready to install it.
If packaging bags are opened before conducting the piping work, foreign matters may enter the directional control valves from the piping ports and may cause a failure or malfunction.

- Check that the model number you have ordered and the model number indicated on the product are the same.
- Check that there is no damage on the exterior of the product.
- Read this manual together with the product's instruction manual before use.
- Secure sufficient space around the directional control valve for installation, removal, wiring, and piping.

2.3 Mounting method

⚠CAUTION

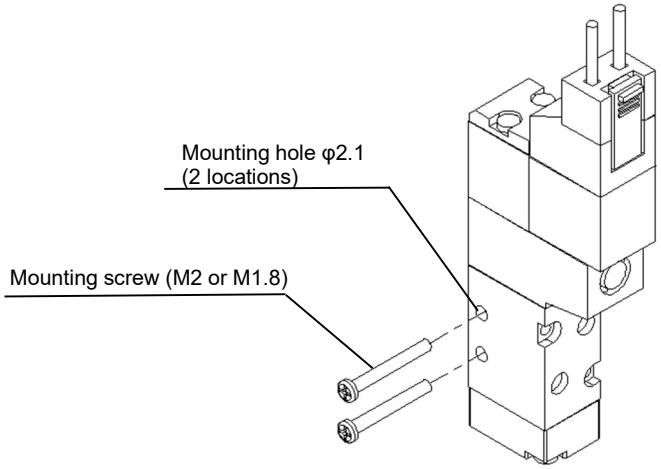
Do not mount directional control valves in a manner they are supported by pipes.
Mount and secure the directional control valve body.

Tighten the screws with the appropriate tightening torque.
If assembly or tightening is not appropriately done, it may result in air leakage, product falling off, or damage to the screw threads.

2.3.1 Mounting method of discrete direct piping type

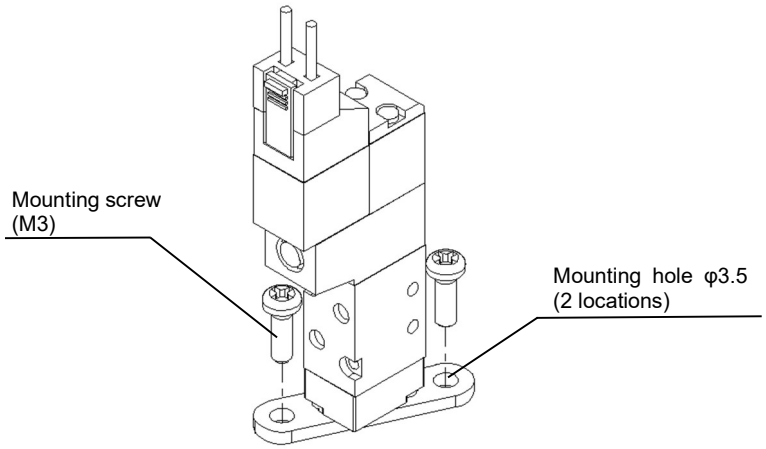
■ Direct mounting

The direct piping type can be mounted by tightening the screws into the through mounting holes. Tighten to the recommended torque according to the T series. (Clamped material: aluminum alloy)



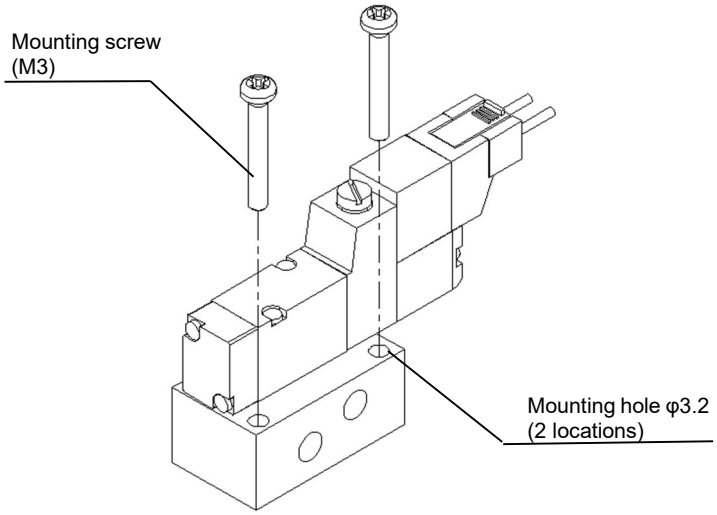
■ Mounting with a mounting plate (two-position single only)

The mounting plate for the direct piping type alone is two-position single type only. Note that 2-position double and 3-position cannot be selected. Follow the recommended tightening torque according to the T series. (Material being fastened: iron)



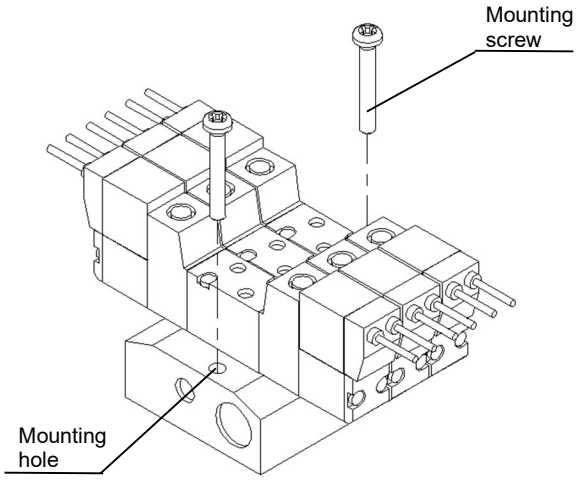
2.3.2 Mounting method of discrete base piping type

It can be mounted using the mounting holes in the subbase.
Tighten to the recommended torque according to the T series. (Clamped material: aluminum alloy)



2.3.3 Manifold mounting method

It can be mounted using the mounting holes in the manifold.
Tighten to the recommended torque according to the T series. (Clamped material: aluminum alloy)



	M4SA0□R	M4SB0□R
Mounting hole (2 locations)	φ3.3	φ4.3
Nominal size of mounting screw	M3	M4

2.4 Piping method

⚠CAUTION

Tighten the screws with the appropriate tightening torque for piping connection.
The purpose is to prevent air leakage and screw damage. Tighten the screws by hand first and then use tools to prevent damage to the threads.

Connect pipes so that the pipes/tubes will not come off the joints through mechanical movements, vibrations or tension.

- If the exhaust side piping of the pneumatic circuit comes off, the speed control of the actuator becomes impossible.
- For the chuck holding mechanism, the chuck holding force will be lost when the piping comes off.

When the pipe connection is complete and compressed air is supplied, make sure there is no air leak in all parts of the pipe connection.

Ensure that high pressure is not applied suddenly when supplying compressed air for the first time after connecting the pipes/tubes.
Sudden application of highly-pressurized air may cause the pipes/tubes to come off and jump around, resulting in accidents.

Do not reduce the diameter of the exhaust port on the directional control valve to a size smaller than the piping connection port.
If the exhaust does not perform smoothly, the actuator will not work properly. In the case of manifolds, the exhaust can prevent other directional control valves from operating properly.

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

Do not restrict the flow of air through the supply piping.
A delay in operation may occur due to a drop in the pressure when multiple valves are operated.

2.4.1 Appropriate tightening torque

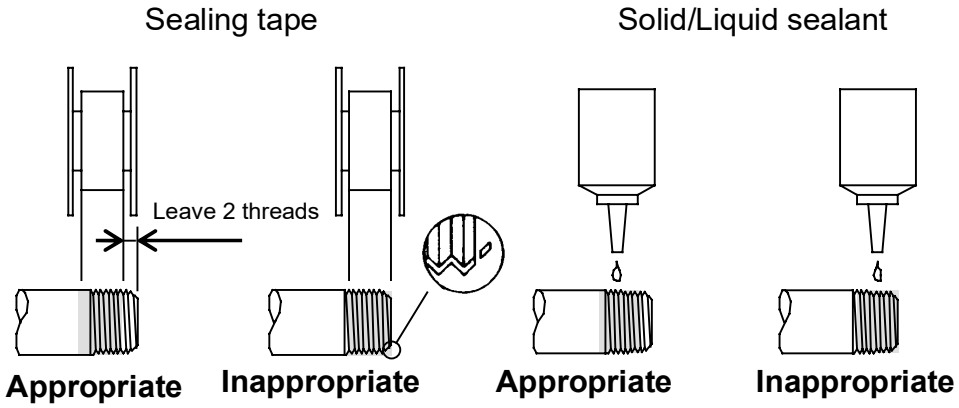
The tightening torque of each connection screw is as follows.

Connection screw	Tightening torque (N·m)
M3	0.3 to 0.6
M5	1.0 to 1.5
Rc1/8	3 to 5

2.4.2 Sealant

Apply seal tape or sealant at least two threads inward from the tip of the screw. During pipe threading, fragments of sealing tape or residual sealing compound may enter the directional control valve if it extends beyond the threaded portion of the pipe, causing malfunction.

When using a seal tape, wind it in the opposite direction of the screw threads and press it down firmly with your fingers.
When using a liquid sealant, be careful not to apply it to resin parts. Failure to do so may damage the resin parts, resulting in a failure or malfunction. In addition, do not apply the sealant to the female thread side.



2.4.3 Flushing

Before starting to install pipework, flush the pipes/tubes, directional control valves, and related equipment to remove foreign matters.

2.4.4 M3 and M5 fittings

Use a gasket to seal the M3 and M5 fittings. Do not retighten while pressure is applied. Design and construct the piping system to allow for the removal and installation of the directional control valve in case of unexpected trouble.

2.4.5 Blow circuit

Do not use in an open-to-atmosphere environment. A low supply air pressure may cause malfunction. The lower limit pressure is 0.2 MPa.

2.4.6 Exhaust port

Blocking the flow of exhaust air may cause a delay in the cylinder response. Adjust the speed between the cylinder and the directional control valve.

2.4.7 Piping connection

■ Appropriate tube

For directional control valves with push-in fittings, use CKD's designated tubes.
- Soft Nylon (F-1500 Series)
- Urethane (U-9500 Series)

■ Spatter

In an environment where the products can be 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 root of the tube with a hose band. If not fixed, the tube will rotate and lose its clamping ability.
Use fastening fittings in high-temperature atmosphere. Do not use push-in fittings.

■ Commercially available tubes

When using commercially available tubes, check the outside diameter accuracy, wall thickness, and hardness of such tubes. When using urethane tubes, the hardness must 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
φ4	φ2.5	φ2
φ6	φ4	φ4

Outside diameter tolerance
Urethane (φ4, φ6) +0.1 mm
-0.15 mm

■ Bending radius of tube

The bending radius of a tube shall be greater than the minimum bending radius. Failure to do so can cause coming off or leakage.

Outside diameter (mm)	Minimum bending radius (mm)	
	Nylon	Urethane
φ4	10	10
φ6	20	20

■ Tube cutting

Use a tube cutter to cut the tube perpendicular to the axial direction. Inserting an obliquely cut end of a tube may cause air leakage.

■ Tube connection status

From the end of the fitting, secure a straight section as long as the outside diameter of the tube. Do not bend the tube abruptly at the fitting insertion point. Make sure that the tension applied sideways through the tube does not exceed 40 N.

■ Applicable blanking plug

For directional control valves with push-in fitting, use blanking plugs specified by CKD.
Blanking plug (GWP4-B) : φ4 push-in fitting

2.5 Wiring method

⚠WARNING

Turn off the power before wiring.
Failure to do so may cause electric shock.

Do not touch the live part with your bare hands.
Failure to do so may cause electric shock.

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 directional control valves and has knowledge of how to ensure the safety.

⚠CAUTION

Check the power supply voltage and AC/DC before supplying power.

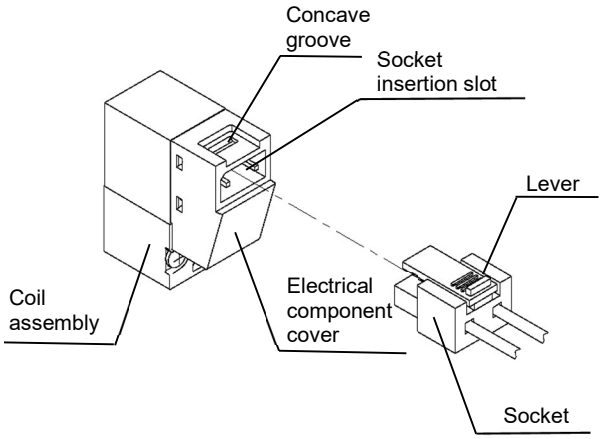
Do not apply a load to the lead wire.
Doing so may cause the lead wire to break or the contact terminal to come off.

Make sure that the voltage drop on the coil assembly (solenoid) does not exceed 10% of the rated voltage.
Voltage drop occurs when more than one solenoid is energized at the same time or depending on the cable length.

Connect this product to the output unit.
Connecting the product to the input unit may damage not only the product but also peripheral devices. Do not connect the product to the input unit.

2.5.1 C/D type connector

■ Socket insertion/removal direction



1 Hold the lever and socket body with your fingers when installing the socket. Insert it straight into the socket insertion slot of the coil assembly.

2 Engage the pawl of the lever with the concave groove of the electrical component cover of the coil assembly and lock. When installing from above, adjust the posture of the socket so that the lever is on the front. When installing from the side, adjust the posture of the socket so that the lever is on the top.

3 When pulling out the socket, push down on the lever to remove the pawl of the lever from the concave, and then pull it straight out.

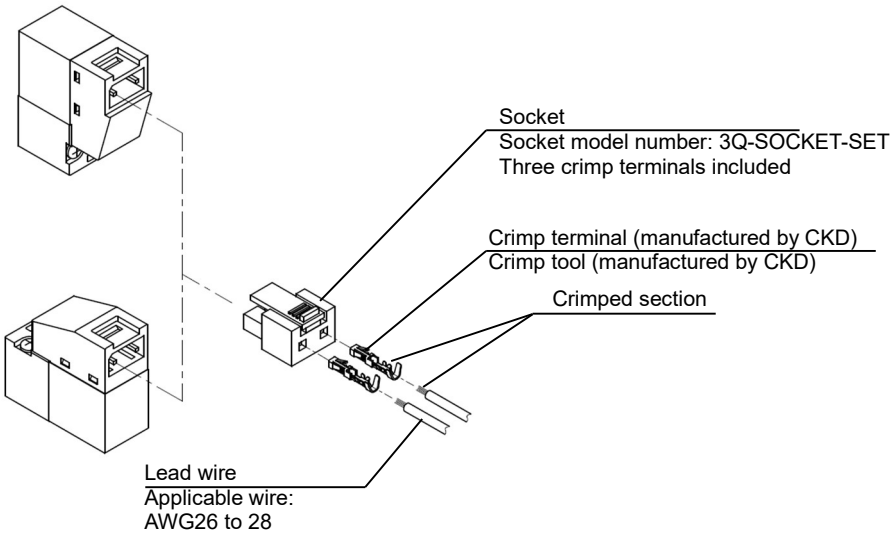
■ Lead wire connection method

1 Strip the coating from the end of the lead wire by 2 to 3 mm.

2 Using the dedicated tool, crimp the lead wire to the crimp terminal.

3 Insert the terminals into the holes on both sides of the socket.

4 Insert the socket into the directional control valve connector.



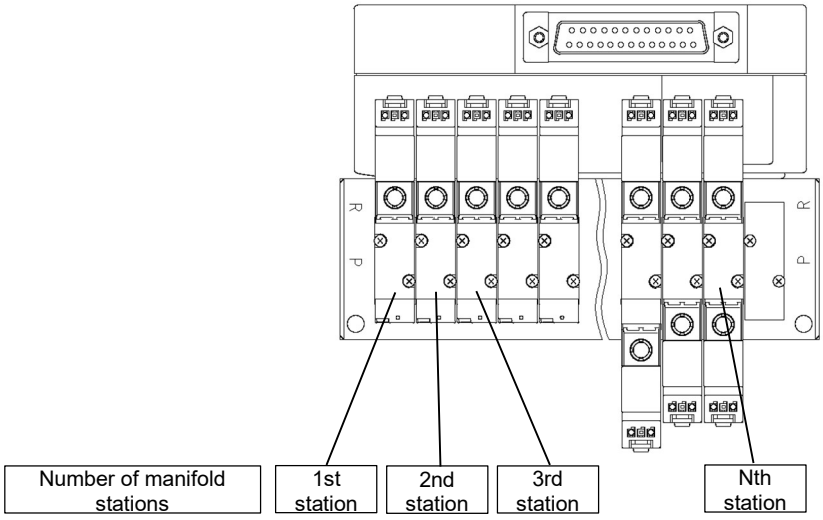
2.5.2 D-sub connector (C4T30, C4T31)

■ Connectors for C4T31 and D4T30

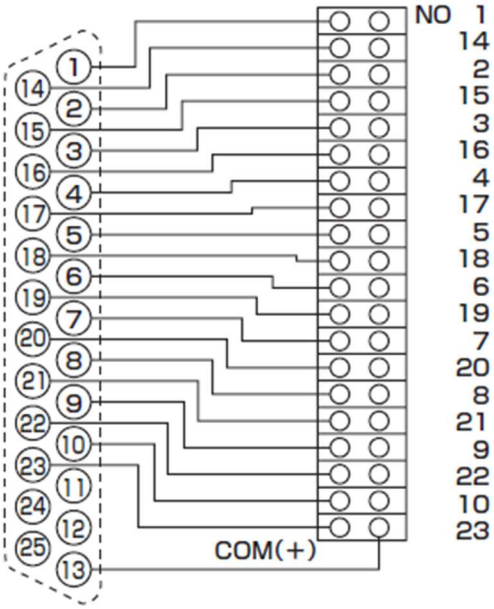
The connector used in the C4T31 and D4T30 wiring systems is generally called a D-sub connector and is widely used in FA and OA devices. In particular, the 25P type is also the connector designated by the RS232C standard, which is adopted as a PC communication function.

■ Cautions on D-sub connector (C4T31, D4T30)

- The signal arrangement of the PLC output unit must match the signal arrangement on the directional control valve side.
- The power supply is exclusively for 24 V DC and 12 V DC.
- The maximum number of solenoids (coil assembly) is 24. The number exceeding the maximum number is not supported.
- Manifold stations are numbered in order from left to right with the piping port facing the user (see the figure below).
- Voltage drop occurs when more than one solenoid is energized 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.



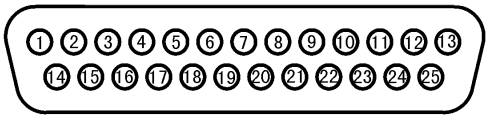
■ Internal connection



■ Connector pin arrangement of C4T31 and C4T30 wiring methods (example)

The maximum number of manifold stations varies depending on the model. Check the specifications for each model.
The numeral of each directional control valve number (No. 1a, 2a, 2b, ...) indicates a station number (1st, 2nd, ...), and alphabet a indicates the side a and b indicates the side b.

Connector pin No.



<Standard wiring>

- Single solenoid directional control valve
  (Maximum number of manifold stations: 20)

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			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			

- Double solenoid directional control valve
  (Maximum number of manifold stations: 10)

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			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			

- Mixing (single and double mixing)
  (Maximum number of solenoids: 20)

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

■ CKD cable specifications

You can order CKD cables using the following models.

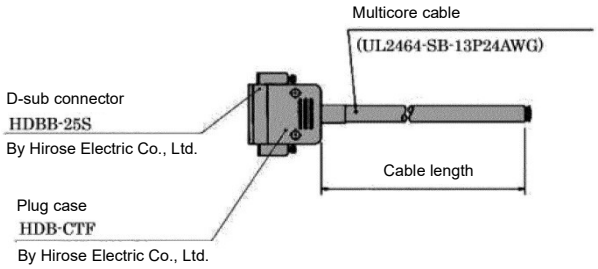
4GR-CABLE–D

※1	※2
0 0 –	1

※1	User side connection method
0	Cutting only
1	With round terminal for M3.5 screw

※2	Cable length
1	1m
3	3m
5	5m

4GR-CABLE-D00*2

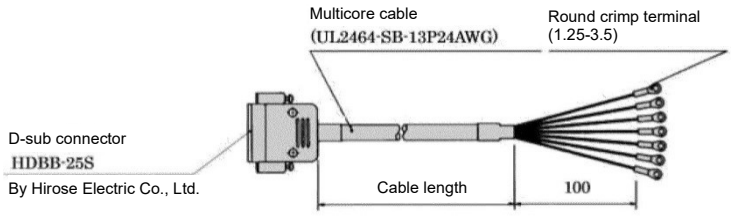


Correspondence between D-sub connector terminal No. and wire core

D-sub connector terminal No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Wire core identification	Color of insulator	Orange	Orange	Yellow	Yellow	Green	Green	Gray	Gray	White	White	Orange	Orange	Yellow	Yellow	Green
	Mark type	1										2				
	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
Wire core identification	Color of insulator	Green	Gray	Gray	White	White	Orange	Orange	Yellow	Yellow	Green
	Mark type	2					3				
	Mark color	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black

4GR-CABLE-D01-*2



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

D-sub connector terminal No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Wire core identification	Color of insulator	Orange	Orange	Yellow	Yellow	Green	Green	Gray	Gray	White	White	Orange	Orange	Yellow	Yellow	Green
	Mark type	1										2				
	Mark color	Black	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black
Mark tube No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

D-sub connector terminal No.		16	17	18	19	20	21	22	23	24	25
Wire core identification	Color of insulator	Green	Gray	Gray	White	White	Orange	Orange	Yellow	Yellow	Green
	Mark type	2					3				
	Mark color	Red	Black	Red	Black	Red	Black	Red	Black	Red	Black
Mark tube No.		16	17	18	19	20	21	22	23	24	25

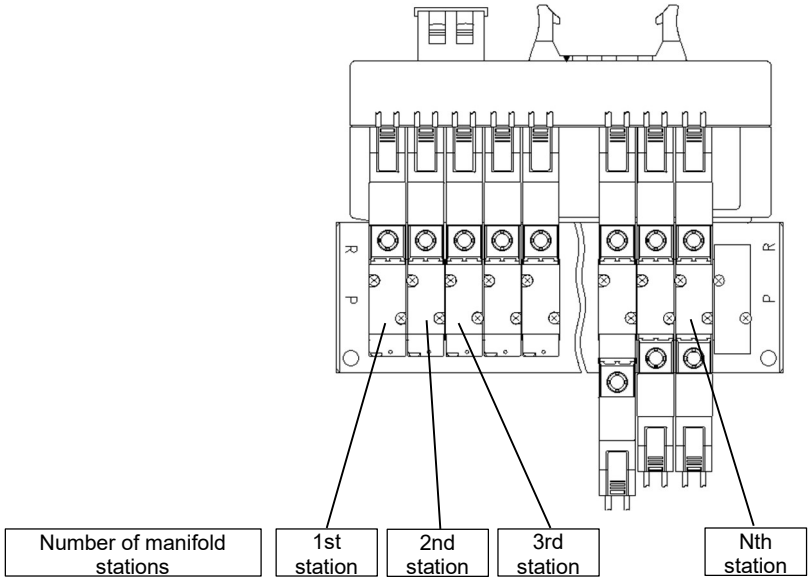
2.5.3 Flat cable (C4T50)

■ Flat cable connector

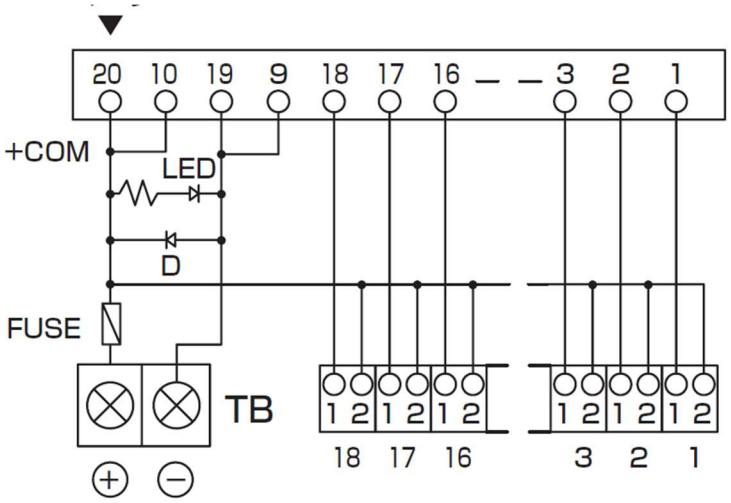
The connectors used for the wiring method C4T50 are compliant with MIL standard (MIL-C-83503). A flat cable crimping is used to facilitate wiring work.
Although the pin number assignment method differs depending on the PLC manufacturer, the function assignments are the same. Arrange them in reference to the connector and the triangle mark (▼) in the table below. The ▼ mark is used as a standard for both plugs and sockets.

■ Cautions on flat cable connector (C4T50)

- The signal arrangement of the PLC output unit must match the signal arrangement on the directional control valve side. Since direct connection with PLC is limited, use the dedicated cable suitable for each PLC manufacturer.
- The power supply is exclusively for 24 V DC and 12 V DC.
- When driving the flat cable connector with a general-purpose output unit, use the + terminals (pins 20 and 10) of the 20-pin connector as the positive common, and use an NPN open-collector transistor output for the drive circuit.
- Connecting the manifold to the input unit may damage not only the product but also peripheral devices. Do not connect the product to the input unit.
- Manifold stations are numbered in order from left to right with the piping port facing the user (see the figure below).
- Voltage drop occurs when more than one solenoid is energized 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.

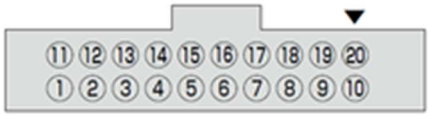


■ Internal connection



■ Connector pin arrangement of the wiring method C4T50 (example)

The maximum number of manifold stations varies depending on the model. Check the specifications for each model.
The numeral of each directional control valve number (No. 1a, 2a, 2b, ...) indicates a station number (1st, 2nd, ...), and alphabet a indicates the side a and b indicates the side b.



<Standard wiring>

- Single solenoid directional control valve
  (Maximum number of manifold stations: 16)

PIN No.	11	12	13	14	15	16	17	18	19	20
Valve No.	9a	10a	11a	12a	13a	14a	15a	16a	-Power supply	+Power supply
PIN No.	1	2	3	4	5	6	7	8	9	10
Valve No.	1a	2a	3a	4a	5a	6a	7a	8a	-Power supply	+Power supply

- Double solenoid directional control valve
  (Maximum number of manifold stations: 8)

PIN No.	11	12	13	14	15	16	17	18	19	20
Valve No.	5a	5b	6a	6b	7a	7b	8a	8b	-Power supply	+Power supply
PIN No.	1	2	3	4	5	6	7	8	9	10
Valve No.	1a	1b	2a	2b	3a	3b	4a	4b	-Power supply	+Power supply

- Mixing (single and double mixing)
  (Maximum number of solenoids: 16)

PIN No.	11	12	13	14	15	16	17	18	19	20
Valve No.	7a	7b	8a	9a	10a	10b	11a	11b	-Power supply	+Power supply
PIN No.	1	2	3	4	5	6	7	8	9	10
Valve No.	1a	2a	3a	3b	4a	4b	5a	6a	-Power supply	+Power supply

3. USAGE

⚠WARNING

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

3.1 Instructions on use

3.1.1 Air quality

⚠WARNING

Do not supply anything other than compressed air.
Use clean compressed air that does not contain corrosive gases.

⚠CAUTION

Improve the quality of air.
Compressed air usually contains a large amount of condensate, oxidized oil, tar, foreign matters, and rust from 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 for lubrication.
Although the product is structured for lubrication-free operations, once it is lubricated, it will require periodic lubrication from then on. Make sure to keep it lubricated.

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

■ Super-dry air

Super-dry air with a JIS B 8392-1 humidity rating of 0 to 3 may cause the lubricant to scatter, resulting in short service life.

■ Lubrication

Generally, the 4S0R Series does not require any lubrication. If lubrication is required, use Class 1 ISO VG 32 turbine oil.
The response time may be delayed if there is too much lubrication or if the pressure is extremely low. The response time indicated in the catalog shows the time obtained when the product is not lubricated and the pressure is 0.5 MPa.

■ Condensate

- Condensate is formed if the temperature inside the pneumatic piping or pneumatic equipment drops.
- If condensate enters and momentarily blocks the air passage inside the pneumatic components, it may cause an operation fault.
- If condensate causes rust, it may cause a failure in the pneumatic equipment.
- If condensate flushes the lubricant, it may cause a lubrication failure.

■ Contamination by foreign matters

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

■ Improvement of air quality

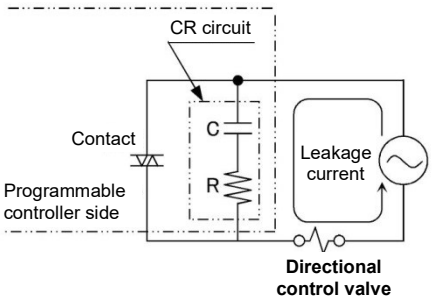
Improve the air quality by dehumidifying with an aftercooler and a dryer, removing foreign matters with a filter, or removing tar with a tar removing filter.

3.1.2 Electric circuit

⚠CAUTION

To avoid malfunction due to leakage current from other control devices, make sure that the leakage current is the permissible value or less.

When a programmable controller or similar device is used, leakage current may affect the directional control valve in a way that the valve does not switch even when it gets de-energized.
When operating a directional control valve using a programmable controller or similar device, make sure that the leakage current at the output of the programmable controller is less than the value shown in the table below.



For 12 V DC	1.8 mA or less
For 24 V DC	1.2 mA or less

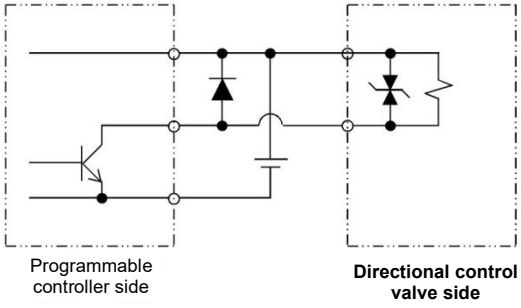
Surge killers work to limit directional control valve surge voltages, which can reach hundreds of volts, to low voltage levels that output contacts can withstand. However, this may not be sufficient for some output circuits, and the product may break or malfunction. Consider the surge voltage limit level of the directional control valve to be used, the withstanding voltage of the output device, the circuit configuration, and the degree of the return delay time before deciding whether to use it.

Take additional surge protection measures as needed. The 4S0□R Series directional control valves with surge killer can suppress the terminal-to-terminal reverse voltage surge generated upon shut-off, to the level shown in the table below.

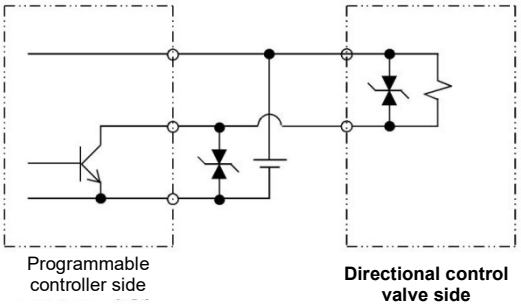
For 12 V DC	Approx. 27 V
For 24 V DC	Approx. 47 V
When option E is selected	Approx. 1 V

For an NPN type output unit, install an additional contact protection circuit since the output transistor may be 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. If back pressure from another directional control valve is possible, it is recommended to energize while the cylinder is operating.
- 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 Low heat generating/energy saving circuit (optional symbol: E)

⚠CAUTION

Do not use this type in any environment where vibrations and impacts exceeding the specified range are applied.
Doing so will cause malfunction of the directional control valve.

On occurrence of disturbance that causes a momentary power failure for 30 ms or less to the power supply unit of the directional control valve being continuously energized, turn off the power for 50 ms or more in order to turn the directional control valve on again.
When a momentary power failure for 30 ms or less occurs to a power supply unit of the directional control valve, the valve cannot remain energized.

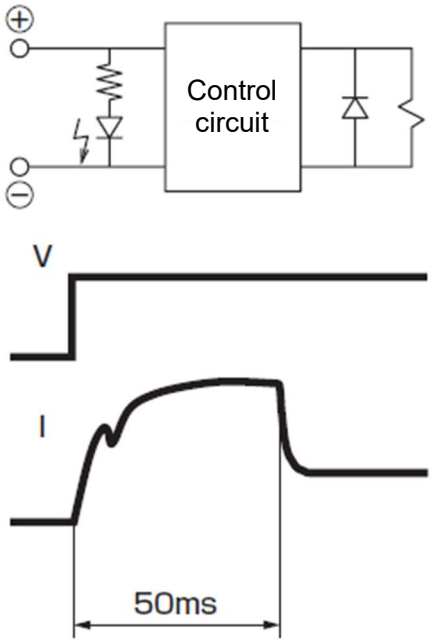
Do not increase the voltage gradually when using this type.
The directional control valve will not function.

Take measures against switching surge such as contactless relay or surge absorber.
The internal diodes may be damaged by switching surges from contact relays or switches.

The type with a low heat generating/energy saving circuit has a built-in PWM circuit and is designed to reduce the electric power required for the coil to attract and hold. Power consumption will be reduced to 1/2 compared to the standard products. In addition, the wires must have polarity.

<Low heat generating/energy saving circuit type>

	Voltage	Current A	Power consumption W
At start-up	24 V DC	0.025	0.6
When holding		0.013	0.3



3.2 Manual override

⚠WARNING

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

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

In the case of locking type manual override, unlock it before performing normal operation.

- Performing normal operation while the manual override is locked causes malfunction.

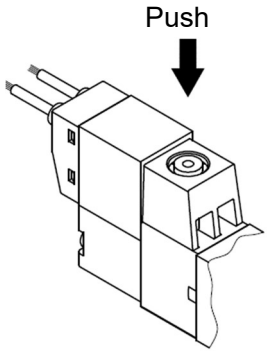
- The 4S0R Series is a pilot operated directional control valve. If compressed air is not supplied to the port 1(P), the main valve will not switch even if the manual override is operated.

■ Manual override operation method

<Non-locking operation>

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

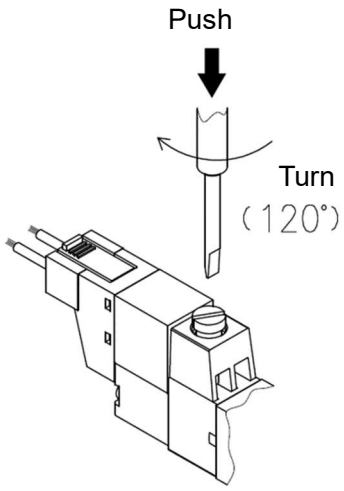
2 Release the lever to finish manual override.
The lever returns to its original position.



<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 override activated.

2 When the manual override is complete, return the lever to the original position.
Rotating it with excessive force will damage the manual override.



4. MAINTENANCE AND INSPECTION

4.1 Periodic inspection

⚠WARNING

Before performing maintenance, turn off the power, stop the supply of compressed air and make sure that there is no residual pressure.
It is a necessary condition to ensure safety.

⚠CAUTION

Conduct daily and periodic inspections in a planned manner to ensure proper maintenance management.
If maintenance is not properly managed, the product's functions may deteriorate significantly, leading 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 management of supplied compressed air

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

■ Management of pneumatic filters

- Is condensate properly discharged?
- Aren't the bowl and element abnormally dirty?

■ Management of compressed air leakage at pipe connections

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

■ Directional control valve operating condition management

- Is there any delay in operation?
- Do the valves exhaust air properly?

■ Pneumatic actuator operating condition management

- Does it operate smoothly?
- Does it reach the end stop properly?
- Are load connection points normal?

■ Management of lubricators

- Is the oil amount adjusted correctly?

■ Management of lubricants

- Is the specified lubricant supplied?

■ Management of screws

- Are there any loose screws?

4.2 Disassembly and assembly method

⚠WARNING

Before replacing the directional control valve, turn off the power and relieve the pressure.

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

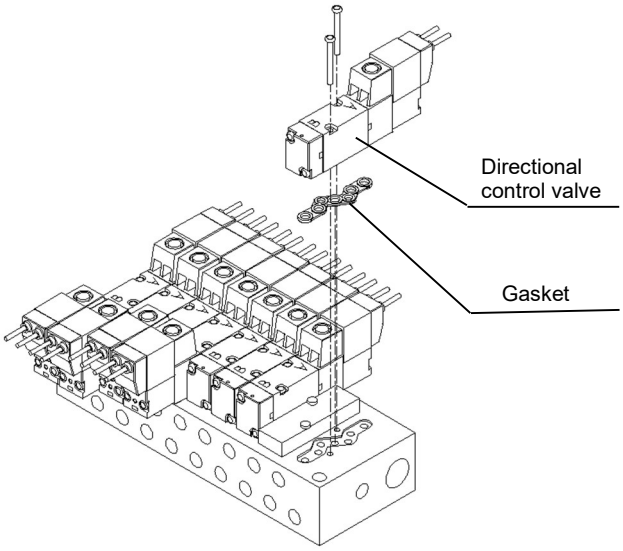
Do not disassemble or reassemble the interior of the directional control valve.

- Disassembling or reassembling the interior of the directional control valve will impair the sealing performance.
- Disassembled and reassembled directional control valves are not covered by the warranty.

4.2.1 Replacement of directional control valve

When replacing the directional control valve, be careful not to drop the gasket.

Model	Screw size	Appropriate tightening torque (N·m)
M4SA0R, M4SB0R	M1.7	0.18 to 0.22

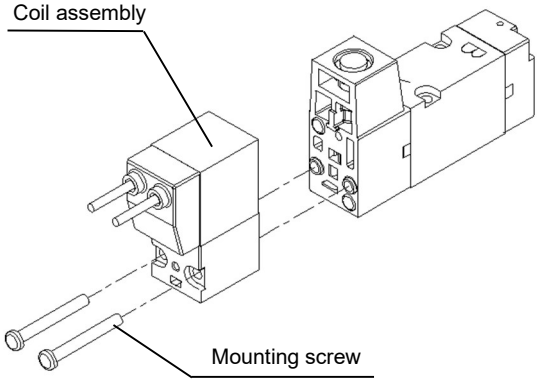


4.2.2 Coil assembly replacement method

1 Remove the two mounting screws from the coil assembly, then remove the assembly.
Note that loosening of other screws may cause malfunction.

2 Make sure that the gasket is installed on the coil assembly side.

3 Mount the coil assembly, then tighten the mounting screws to the recommended torque.
Incorrect tightening torque may cause air leakage and malfunction.
Appropriate tightening torque: 0.14 to 0.16 N·m



5. TROUBLESHOOTING

5.1 Causes and troubleshooting

If the product does not operate as intended, inspect the product according to the table below.

Problem	Cause	Solution
The product does not work.	No electrical signal.	Turn the power on.
	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 exhaust ports are blocked.	Check and correct the piping.
The product does not operate correctly.	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 the same as specified on the nameplate.	Correct the voltage to meet the specification.
	Coil is broken or short-circuited.	Replace the coil.
	The 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.	Check and correct the piping or install a surge tank.
	Pressure is supplied through exhaust port.	Check and correct the piping.
	Piping is incorrect or omitted.	Check and correct the piping.
	Speed controller throttle valve is fully closed.	Readjust the needle.
	Two or four ports are opened to atmosphere.	Use a fitting pipe with a diameter that is equal to or smaller than that of a single port.
	The directional control valve is frozen.	Take measures against freezing (add thermal insulation, remove moisture, etc.).
	Plunger return is delayed (too much oil, tar).	Check the quality of the lubricant (Class 1 ISO VG 32 turbine oil), readjust lubricator drip rate, and/or install tar removal filters.
	Exhaust ports are clogged with dust.	Install a cover or silencer and/or clean the exhaust periodically.
Operating pressure is high.	Packing is swollen.	Check the lubrication (Class 1 ISO VG 32 turbine oil), keep directional control valves away from areas where cutting oil is used, and/or keep organic solvents away.
	Two or four ports are opened to atmosphere.	Check and correct the piping.
	Foreign matters are stuck in packing.	Remove foreign matters from the packing

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

6. REFERENCE INFORMATION

6.1 Port identification

Piping ports are 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

There is no restriction on the mounting orientation of the directional control valves.

7. WARRANTY PROVISIONS

7.1 Warranty conditions

■ Warranty coverage

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

- When the product is handled or used under conditions or in environments other than those described in the catalog, specifications, or this Instruction Manual
- When the failure is caused by misuse due to carelessness or mismanagement
- When the failure is caused by reasons other than the product
- When the product is used in a manner other than its intended use
- When the failure is caused by modifications/alterations or repairs not carried out by CKD
- When the failure 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
- When the failure is caused by reasons unforeseen at the level of technology available at the time of delivery
- When the failure is caused by something CKD is not responsible for, such as acts of nature and disasters

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 take precedence.

7.2 Warranty period

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