CKD

SM－7011-A/3

INSTRUCTION MANUAL

SELEX VALVE

5 PORT PILOT OPERATED VALVE

4F2 TO 4F7
M4F2 TO M4F7

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

Revision4

CKD Corporation

For Safety Use

To use this product safety, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (ISO 4414 *1, JIS B 8370 *2).
We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.
Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your application, requirements, and how to use it.
This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents, **read this operation manual carefully for proper operation.**
Observe the cautions on handling described in this manual, as well as the following instructions:

⚠ **DENGER** : Failure to pay attention to DANGER notices may cause a situation that results in a fatality or serious injury and that requires urgent addressing

⚠ **WARNING** : Failure to pay attention to WARNING notices may result in a fatality or serious injury.

⚠ **CAUTION** : Failure to pay attention to WARNING notices may result in injury or damage to equipment or facilities.

*1) ISO 4414 : Pneumatic fluid power ··· Recommendations for the application of equipment to transmission and control systems.

*2) JIS B 8370 : General rule for pneumatic systems

UNPACKING (Page 11)

⚠ CAUTION : Bags containing solenoid valves should be opened only when you are ready to connect the valves to the pipes immediately afterward.

- If bags are opened before the valves are ready to be connected to the pipes, the entry of foreign matter from the piping ports could cause the solenoid valves to fail or malfunction.

INSTALLATION (Page 12)

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

ENVIRONMENT (Page 12)

⚠ CAUTION :

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

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

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

- If the solenoid valve system is wet by a direct contact with water or cutting oil, an electrical leak or burnt solenoid coils may result. Protect the solenoid valve system by using a cover or by installing it inside a paneled casing. If the cylinder rod is splashed with cutting oil, the oil may penetrate through the cylinder into the secondary side piping of the solenoid valve. This must be prevented to avoid malfunctions. Consult us for preventive measures.

c)The coils will produce heat.

- Particularly if the solenoid valve system is installed in a control board or if the solenoid coils need to be energized for a long time, consider providing sufficient ventilation to release the heat. The coils can get very hot.

d)Do not use the solenoid valve system in an atmosphere that includes a corrosive gas or solvent vapors.

- Do not use the solenoid valve system in an atmosphere that includes a corrosive gas such as the sulfur dioxide gas or in an atmosphere that includes solvent vapors.

e)Vibration resistance and Shock resistance

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

ENVIRONMENT (Page 12, 13)

⚠ CAUTION :

f) Avoid using the solenoid valve system in a humid environment because the humidity is likely to cause condensation with a change in the temperature.

g) Do not use the normal type solenoid valves for an application that requires conformity with explosion-proof specifications. Choose explosion-proof solenoid valves instead.

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

・Please replace parts periodically.

※Please be careful below at the time of the outdoor specification option (W) selection.

i) In use on the outdoors, please do not make opening the exhaust port (E1, E2, and PE port), but take the measure in which neither garbage and dust nor rain water infiltrates into the inside of this product.

Moreover, please take a waterproofing measure also about electric wire piping in a cable ground etc.

j) You can use this option on the outdoors under a general environmental condition.

However, when used in a special environment, the possibility of faults, such as generating of the rust in a short period of time, becomes high.

In use, please consult separately in a special environment.

INSTALLATION (Page 13)

⚠ WARNING :

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

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

PIPING (Page 13)

⚠ CAUTION :

a) Observe the recommended tightening torque when connecting pipes.

- Observing the recommended tightening torque prevents air leakage and damage to the screw threads. To prevent damage to the screw threads, first use your hand to lightly tighten the screw and then use a tool to tighten the screw to the recommended torque.

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

・If the exhaust piping of the pneumatic circuit is disconnected, the actuator speed control is disabled.

・If the above happens to a chuck holding mechanism, the chuck will open. The inadvertent opening of the chuck may cause a serious accident.

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

PIPING (Page 13)

⚠ CAUTION :

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

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

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

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

PIPING (Page 14)

⚠ CAUTION :

f) Removal of foreign matter

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

g) Air supply

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

h) Don't plug Port PE.

- Pilot pressure is not exhausted and the valve does not work.

i) External pilot is only used for Port P(S) pressurization. Consult with CKD about vacuuming and pressurizing from another port.

j) Station number

- When operating valves of more than 6 stations at the same time, supply pressure (S) form both ends of manifold block, and perform atmospheric release of exhaust air (E) form both ends. Malfunction may be caused if not piped form both ends.

WIRING (Page 17)

⚠ WARNING :

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

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

⚠ CAUTION :

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

b) When DIN terminal box type is used with high ambient temperature and continuous energizing, please periodically replace gasket because the gasket is quickly deteriorated.

MANUAL OVERRIDE (Page 25)

⚠ WARNING :

a) After using the manual override, be sure to reset the manual override to the original (OFF) position before resuming the operation of the device.
After a lock type operation (push and lock), be sure to release the lock to turn the manual override OFF.

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

c) For locking manual override, release locking before regular operation. If used with locking for long term, locking mechanism may be destroyed and switch the status form ON to OFF.

AIR QUALITY (Page 26)

⚠ WARNING :

a) Do not supply anything other than compressed air.

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

⚠ CAUTION :

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

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

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

ELECTRIC CIRCUITS (Page 27)

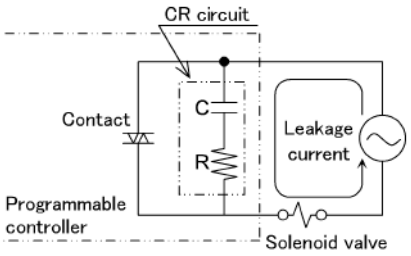
⚠ CAUTION :

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

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

b) Restriction on current leak

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



For 200VAC	1.5 mA or less
For 100VAC	3.0 mA or less
For 24VDC	1.8 mA or less

PERIODIC INSPECTION (Page 28)

⚠ WARNING :

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

- The above is required to ensure safety.

⚠ CAUTION :

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

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

DISASSEMBLING AND REASSEMBLING (Page 29)

⚠ WARNING :

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

- A person who disassembles and reassembles a solenoid valve system needs to have a knowledge for safely performing such operation based on the understanding about the mechanisms and operating principles of solenoid valves.
- Personnel involved in this step must have passed the Pneumatic Pressure Skill Test Class 2 or higher.

INDEX

SELEX VALVE

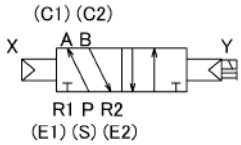
Manual No.SM-7011-A

Feb.28.1997
Revision: Jun.30.2003
Revision2: March.30.2012
Revision3: Jan.23.2023

1. PART NAME AND DESCRIPTION

● 2-position single

JIS SYMBOL



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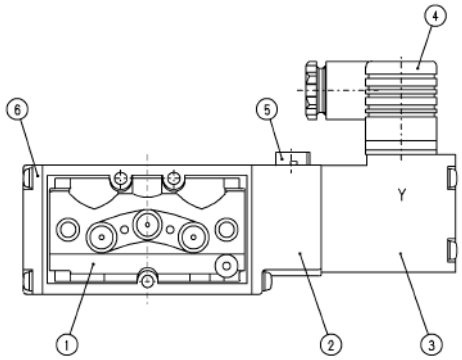

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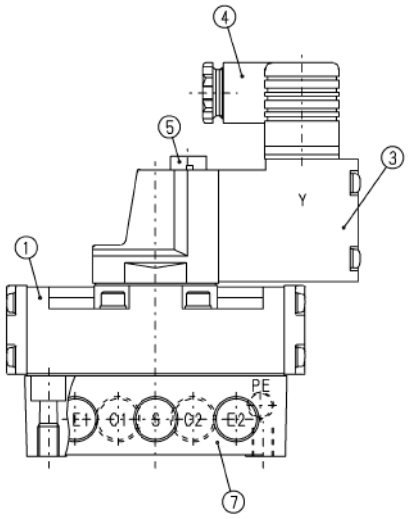
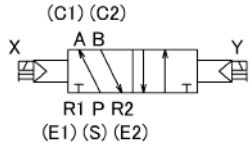


No.	Parts Name	Description
①	Body ass'y	Changing the main flow passage.
②	Pilot valve body ass'y	Pilot air passage to change the main fluid passage.
③	Coil ass'y	The electrical signal is converted into the electromagnetic force to change the pilot passage.
④	DIN terminal box	DIN type terminal receiving the electrical signal.
⑤	Manual override	Change the pilot flow passage using manual operation.
⑥	Cap	Seal the pressure, which is returned to the return side as the pressure of the air source is received.
⑦	Sub plate	Main flow passage.

● 2-position double

JIS SYMBOL



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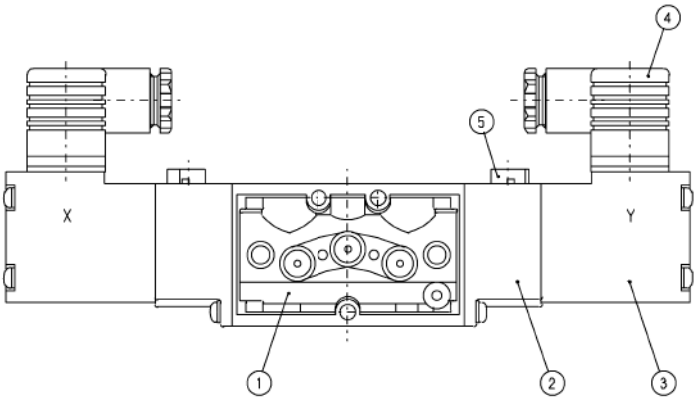

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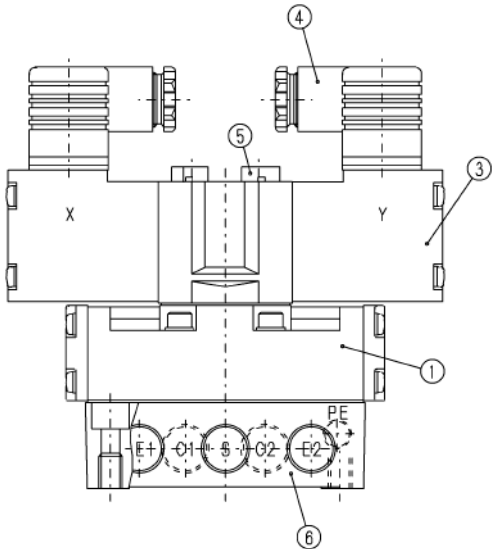
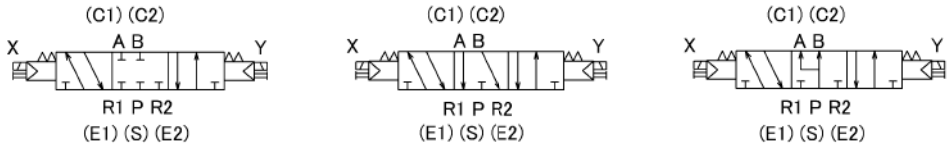


No.	Parts Name	Description
①	Body ass'y	Changing the main flow passage.
②	Pilot valve body ass'y	Pilot air passage to change the main fluid passage.
③	Coil ass'y	The electrical signal is converted into the electromagnetic force to change the pilot passage.
④	DIN terminal box	DIN type terminal receiving the electrical signal.
⑤	Manual override	Change the pilot flow passage using manual operation.
⑥	Sub plate	Main flow passage.

● 3-pos. all ports closed　　3-pos. ABR connection　　3-pos. PAB connection

JIS SYMBOL



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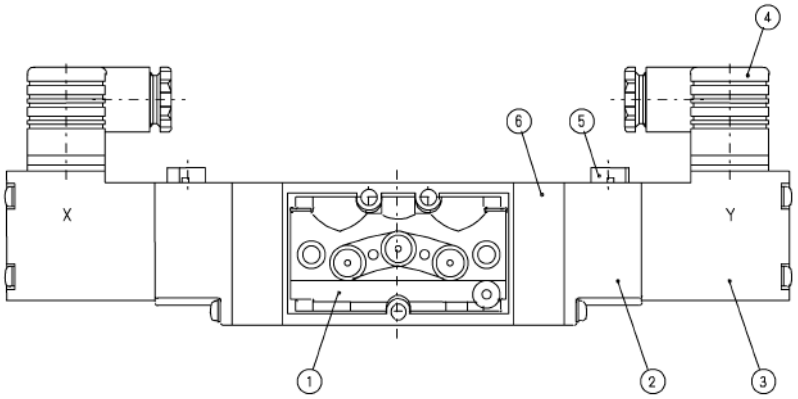
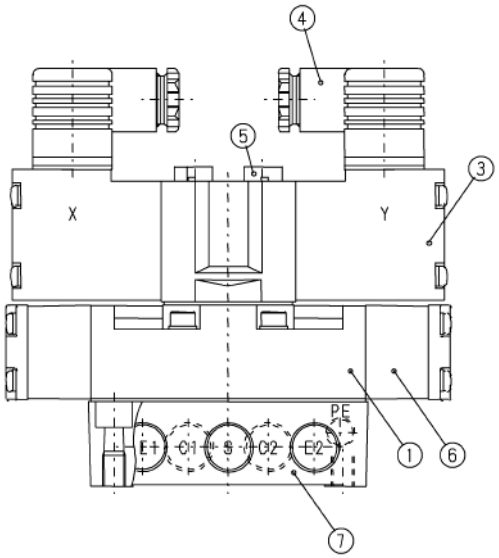


• 4F4 to 7



No.	Parts Name	Description
①	Body ass'y	Changing the main flow passage.
②	Pilot valve body ass'y	Pilot air passage to change the main fluid passage.
③	Coil ass'y	The electrical signal is converted into the electromagnetic force to change the pilot passage.
④	DIN terminal box	DIN type terminal receiving the electrical signal.
⑤	Manual override	Change the pilot flow passage using manual operation.
⑥	Body block	A spring is mounted to return to the neutral position when the 3-position type is energized or turned OFF.
⑦	Sub plate	Main flow passage.

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

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

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

Table of conversion between SI units and conventional units

(The values printed in Bolds fonts are values given in the International System of Units (SI)):

Example (converting a pressure value):

1kgf/cm^2 → **0.980665MPa** **1MPa** → 1.01972×10kgf/cm^2

- Force

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

- Stress

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

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

- Pressure

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

Note: 1Pa=1N/m^2

3. UNPACKING

⚠ CAUTION : Bags containing solenoid valves should be opened only when you are ready to connect the valves to the pipes immediately afterward.

- If bags are opened before the valves are ready to be connected to the pipes, the entry of foreign matter from the piping ports could cause the solenoid valves to fail or malfunction.

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

4. INSTALLATION

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

4.1 Environment

⚠ CAUTION :

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

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

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

- If the solenoid valve system is wet by a direct contact with water or cutting oil, an electrical leak or burnt solenoid coils may result. Protect the solenoid valve system by using a cover or by installing it inside a paneled casing. If the cylinder rod is splashed with cutting oil, the oil may penetrate through the cylinder into the secondary side piping of the solenoid valve. This must be prevented to avoid malfunctions. Consult us for preventive measures.

c) The coils will produce heat.

- Particularly if the solenoid valve system is installed in a control board or if the solenoid coils need to be energized for a long time, consider providing sufficient ventilation to release the heat. The coils can get very hot.

d) Do not use the solenoid valve system in an atmosphere that includes a corrosive gas or solvent vapors.

- Do not use the solenoid valve system in an atmosphere that includes a corrosive gas such as the sulfur dioxide gas or in an atmosphere that includes solvent vapors.

e) Vibration resistance and Shock resistance

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

f) Avoid using the solenoid valve system in a humid environment because the humidity is likely to cause condensation with a change in the temperature.

g) Do not use the normal type solenoid valves for an application that requires conformity with explosion-proof specifications. Choose explosion-proof solenoid valves instead.

4.1 Environment

⚠ CAUTION :

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

- Please replace parts periodically.

4.2 Installation

⚠ WARNING :

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

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

4.2.1 A workspace for installation, removal, wiring, and piping operations should be provided around the installed solenoid valve system.

4.3 Piping

⚠ CAUTION :

a) Observe the recommended tightening torque when connecting pipes.

- Observing the recommended tightening torque prevents air leakage and damage to the screw threads. To prevent damage to the screw threads, first use your hand to lightly tighten the screw and then use a tool to tighten the screw to the recommended torque.

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

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

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

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

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

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

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

4.3 Piping

⚠ CAUTION :

f) Removal of foreign matter

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

g) Air supply

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

h)Don't plug Port PE.

- Pilot pressure is not exhausted and the valve does not work.

i) External pilot is only used for Port P(S) pressurization. Consult with CKD about vacuuming and pressurizing from another port.

j) Station number

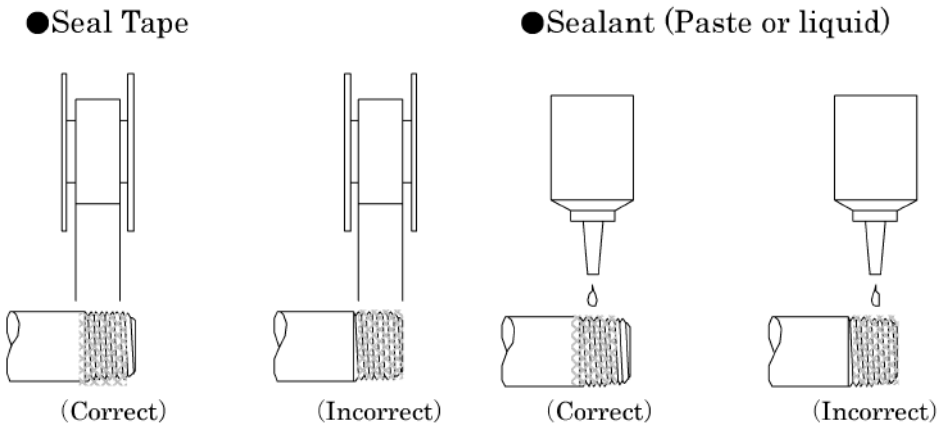
- When operating valves of more than 6 stations at the same time, supply pressure (S) form both ends of manifold block, and perform atmospheric release of exhaust air (E) form both ends. Malfunction may be caused if not piped form both ends.

Appropriate torque

Joint screw	Appropriate torque N·m
Rc1/8	3 to 5
Rc1/4	6 to 8
Rc3/8	13 to 15

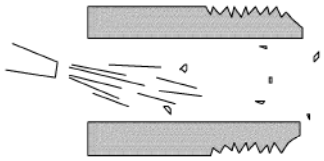
4.3.1 Sealant

Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.



4.3.2 Flushing

Before connecting pipes, flush the interiors of the tubes, solenoid valves, and connected devices to remove foreign matter.



4.3.3 Blow circuit

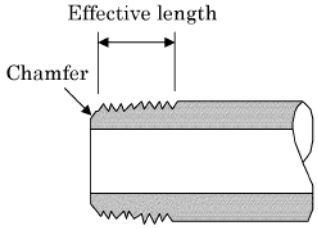
Do not open the cylinder port circuit to the air because a drop in the air supply pressure may cause a malfunction. Additionally, when opened to the atmosphere, the grease of the sliding part flows out and the minimum working pressure is increased, causing the service life of the seal part to be shortened.
The lowest allowable pressure with the internal pilot type design is 0.15MPa.

4.3.4 Exhaust port

Minimize the restriction to the flow of the exhaust air because such restriction may cause a delay in the cylinder response. If such a delay happens, the speed needs to be adjusted between the cylinder and solenoid valve.
Avoid applying a plug screw at the end of PE, otherwise its exhaust is hindered.

4.3.5 Pipe connections

(1) Strictly observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.



(2) Tubes to be used
For use with solenoid valves with one-touch joints, select tubes of the type specified by us:

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

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

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

(5) When selecting from tubes commercially available, carefully study the accuracy of the outside diameter as well as the wall thickness and the hardness. The hardness of an urethane tube should be 93℃ or more (as measured by a rubber hardness meter).
With a tube that does not have a sufficient accuracy of the outside diameter or the specified hardness, a decrease in the chucking force may cause disconnection or difficulty in inserting.

Tube dimensions

Outside diameter mm	Inside diameter mm	
	Nylon	Urethane
φ4	φ2.5	φ2
φ6	φ4	φ4
φ8	φ5.7	φ5
φ10	φ7.2	φ6.5

Outside diameter allowance

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

(6) Minimum bending radius of tubes
Observe the minimum bending radius of tubes. Neglecting the minimum bending radius may cause disconnection or leaks.

Tube bore	Minimum bending radius mm	
	Nylon	Urethane
φ4	10	10
φ6	20	20
φ8	30	30
φ10	40	40

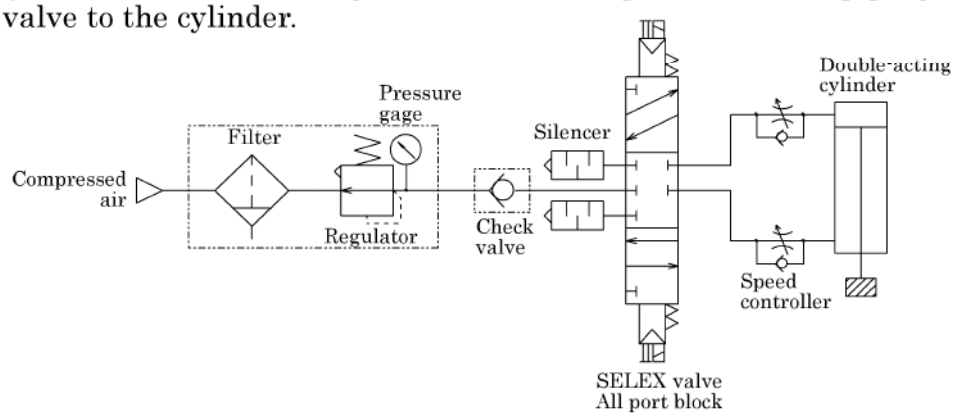
(7) Cutting a tube
To cut a tube, use a tube cutter to cut the tube perpendicularly to the length of the tube. Inserting an obliquely cut end of a tube may cause air leakage.

(8) Tube connections
Do not bend a tube immediately at where it is connected to the joint but lead it out straight from the end of the joint for a length equal to or greater than the outside diameter of the tube. The tension applied sideways through the tube should not exceed 40N.

4.3.6 Prevention of back flow from C1/C2 port to S port

Make sure a check valve is installed to Supply port of selex valve, 3-position, all closed type, because much more accuracy of intermediate stopping position is achieved once a check valve is added to the supply port of this type valve.

Verify that there is no leakage from the sealed portions of the piping from the check valve to the cylinder.



4.4 Wiring

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

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

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

b) When DIN terminal box type is used with high ambient temperature and continuous energizing, please periodically replace gasket because the gasket is quickly deteriorated.

4.4.1 Wiring connections

• DIN terminal box

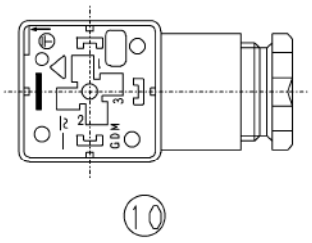
1) Disassembling

(1) After loosening center-screw①, pull up housing② to take off the connector from body (such as solenoid).

(2) Pull out center-screw① and take off the gasket⑫.

(3) Contact-bearer⑪ has a cut out ⑩ at the one corner of sole (indicated by arrow) and can be lifted from the housing② by using a tool like a screw drive.

(4) Screw the cable-gland⑤ off the housing and take out washer④ and rubber packing③.



2) Wring

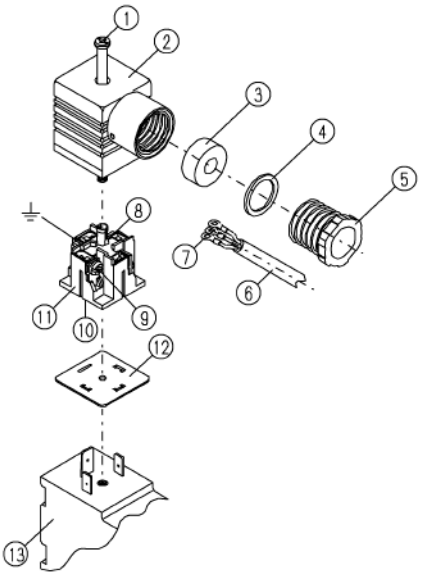
(1) Pass the cable⑥ through cable-gland⑤, washer④, rubber packing③ and housing②.

(2) Cable⑥ has to be cut according(30±2mm), and clamp the terminals⑦ end of leads.

(3) Take off contact-screws⑨ from the contact⑧ (just loosen for Y-terminal), and after attaching terminals⑦, re-tighten the contact-screws⑨.

(Attention)

Tightening torque should be 0.5N·m±15%.



Remarks

a: Wiring can be done without clamping terminal. In that case, loosen contact-screws⑨ and insert the leads into the contacts⑧ and re-tighten.

b: Maximum size of clamping terminal⑦:
O-terminal:1.25m2-3.5, Y-terminal:1.25mm2-4

c: Suitable outer diameter of cable⑥ is φ6-12mm.

(Attention)

Cut off the inner of rubber packing③ for the cable with φ9-12mm diameter.

3) Assembling

(1) Install the finished Contact-bearer⑪ to housing②. (snap down with a click.)

(2) Put the rubber packing③ and washer④ into the thread of housing② and tighten the cable-gland⑤ steadily.

(3) Putting the gasket⑫ between plug and connector, attach the connector on body. Insert the center-screw① and screw down.
(Attention) Tightening torque should be 0.5N·m±20%.

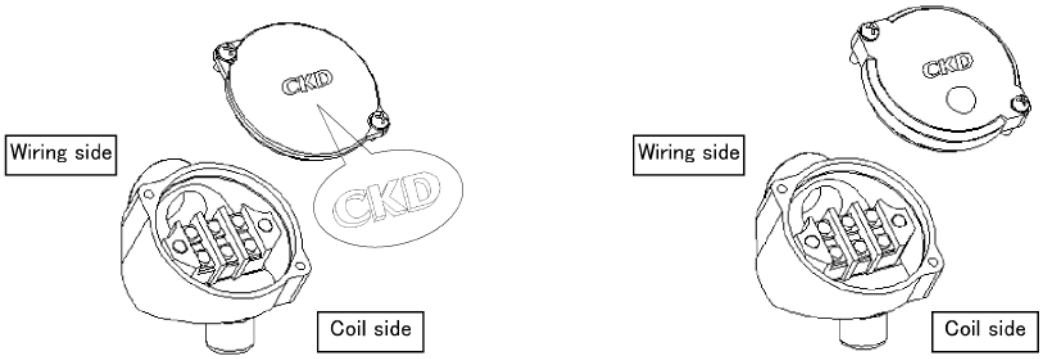
Remarks:
Contact-bearer⑪ can be mounted in housing② through 90° as required.

4.4.1 Wiring connections

- Round terminal box

1) Notes at the time of cap attachment

There is directivity in attachment of a cap.
When you attach a cap after doing wiring work etc., be careful for attachment of a cap and attach. (It unites with direction of the following figure and our logo mark.)
Conversely, attachment of a cap cannot be performed when it attaches.



2) Wring

(1) Put the crimp terminal for copper wire on the wiring cable, and crimp the terminal.
The terminal screw size is M3 and 7 mm or less of crimping terminal outer sizes.
The crimping terminal used should use a terminal with an insulator.

(2) Tighten the screw with the following tightening torque.
Cap mounting screw tightening torque…0.5Nm.
Terminal screw tightening torque…0.5Nm.

(3) There are two leads wired by the terminal box from a coil.

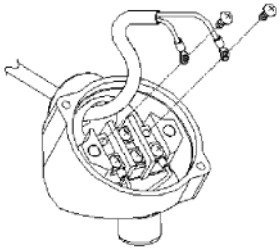
For a lamp-less terminal box (B1, B, G)

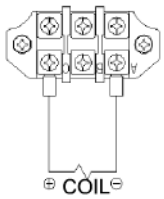
Wire to the A terminal and C terminal on the terminal block. There is no polarity.

For DC voltage terminal box with lamp (BL, GL)

There is polarity, so wire the " - " pole to the terminal board's A terminal and the "+" pole to the C terminal.

Note: For safety and equipment protection, it is recommended to put a fuse in the electric circuit.





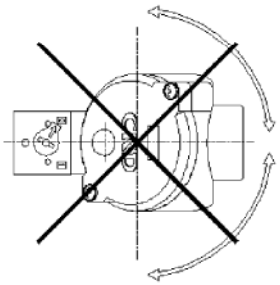
DC voltage : polarity
AC voltage : no polarity

2) Notes at the time of use an outdoor specification option

Notes: At the time of decomposition and attachment

The male screw part of the circular terminal box is being fixed to the solenoid valve coil part by adhesives.

Please do not remove a circular terminal box, or do not change the direction of a wiring port. There is a possibility that rain water may permeate from the male screw part of a circular terminal box.



・In use on the outdoors, please do not make opening the exhaust port (E1, E2, and PE port), but take the measure in which neither garbage and dust nor rain water infiltrates into the inside of a this product.

Moreover, please take a waterproofing measure also about electric wire piping in a cable ground etc.

・The exterior parts of this product have the corrosion resistance which can be equal to use by a general environmental condition.

・However, when it is used in a special environment, the possibility of the fault of the rust in a short period of time, etc. becomes high.

In use, please consult separately in a special environment.

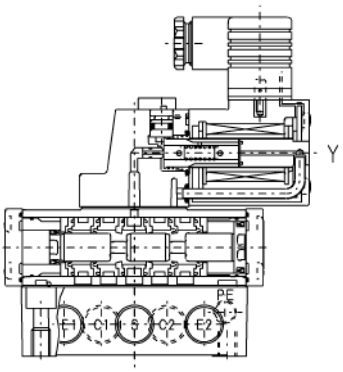
・The solenoid valve connection port of 4F2 and 4F3 is Rp screw (straight pipe thread).

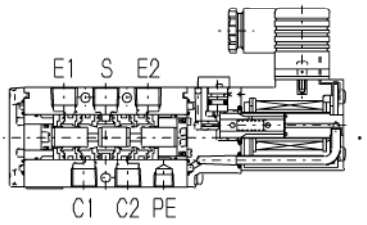
For the leak prevention at the time of piping, please make piping connection after rolling a seal tape certainly or applying seal adhesive.

5. OPERATING RECOMMENDATION

5.1 Operation

- 2-position single 4F4 to 4F7 4F3



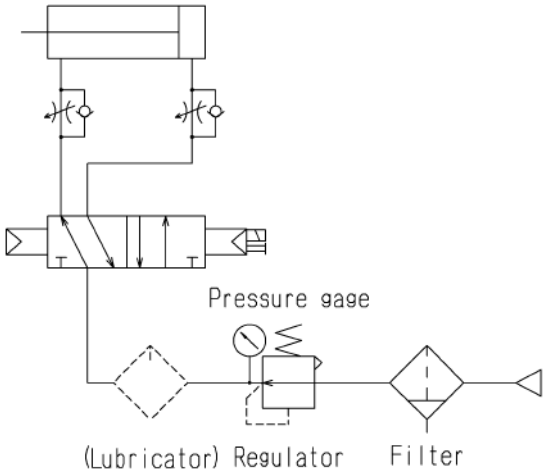


1) Valve operation

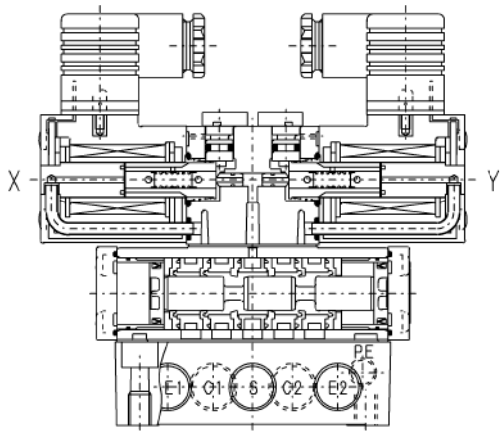
Operation when not energized	S→C1 C2→E2 E1→Closed
Operation when energized	S→C2 C1→E1 E2→Closed

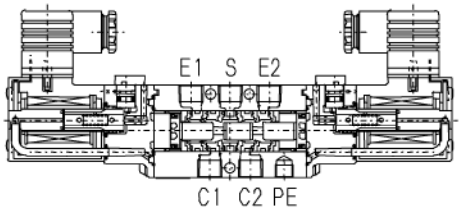
- Solenoid on = Cylinder advances(retracts)
  Solenoid off = Cylinder retracts(advances)

2) Fundamental circuit diagram



• 2-position double 4F4 to 4F7 4F3



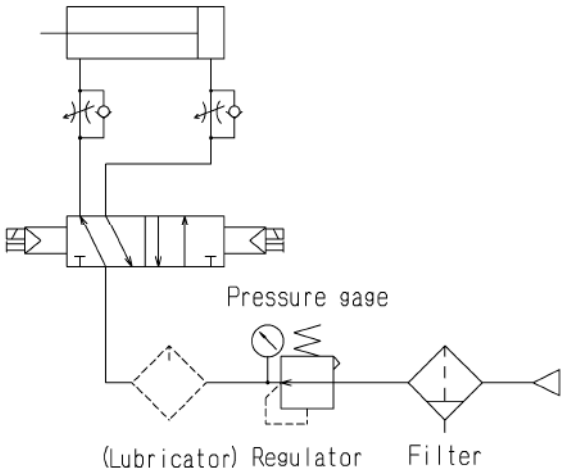


1) Valve operation

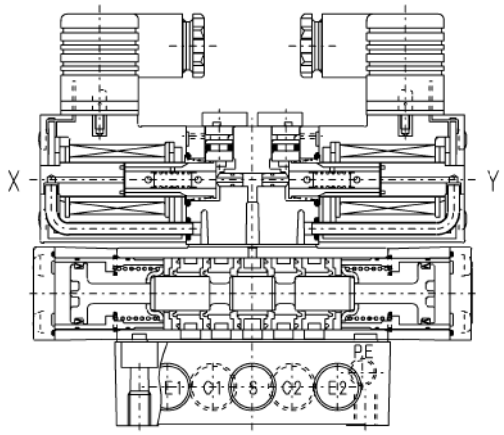
X solenoid on	S→C1 C2→E2 E1→Closed
Y solenoid on	S→C2 C1→E1 E2→Closed

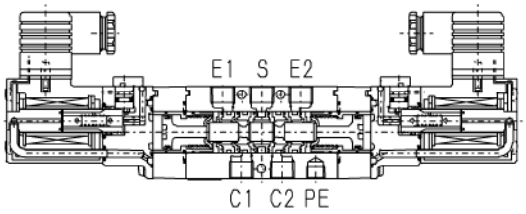
- One side solenoid on = Cylinder advances(retracts)
  The same solenoid off = Holds present position
  The other solenoid on = Cylinder retracts(advances)
- This concept is also used for self holding (Cylinder does not move even at the occasion of power failure.)

2) Fundamental circuit diagram



• 3-position 4F4 to 4F7 4F3





1) Valve operation

(1) All ports closed

When both solenoids receive no signal current — Every port such as S, C1, C2, E1 and E2 is blocked.

X solenoid on
S→C1
C2→E2
E1→Closed

Y solenoid on
S→C2
C1→E1
E2→Closed

• Cylinder stops at intermediate positions (when off). Once it stops, cylinder is locked and external force is unable to move the cylinder.

(2) ABR connection

When both solenoids receive no signal current
S→Closed
C1→E1
C2→E2

X solenoid on
S→C1
C2→E2
E1→Closed

Y solenoid on
S→C2
C1→E1
E2→Closed

• Cylinder stops at intermediate positions same as (1) above. But an external force is able to move the once stopped cylinder.

(3) PAB connection

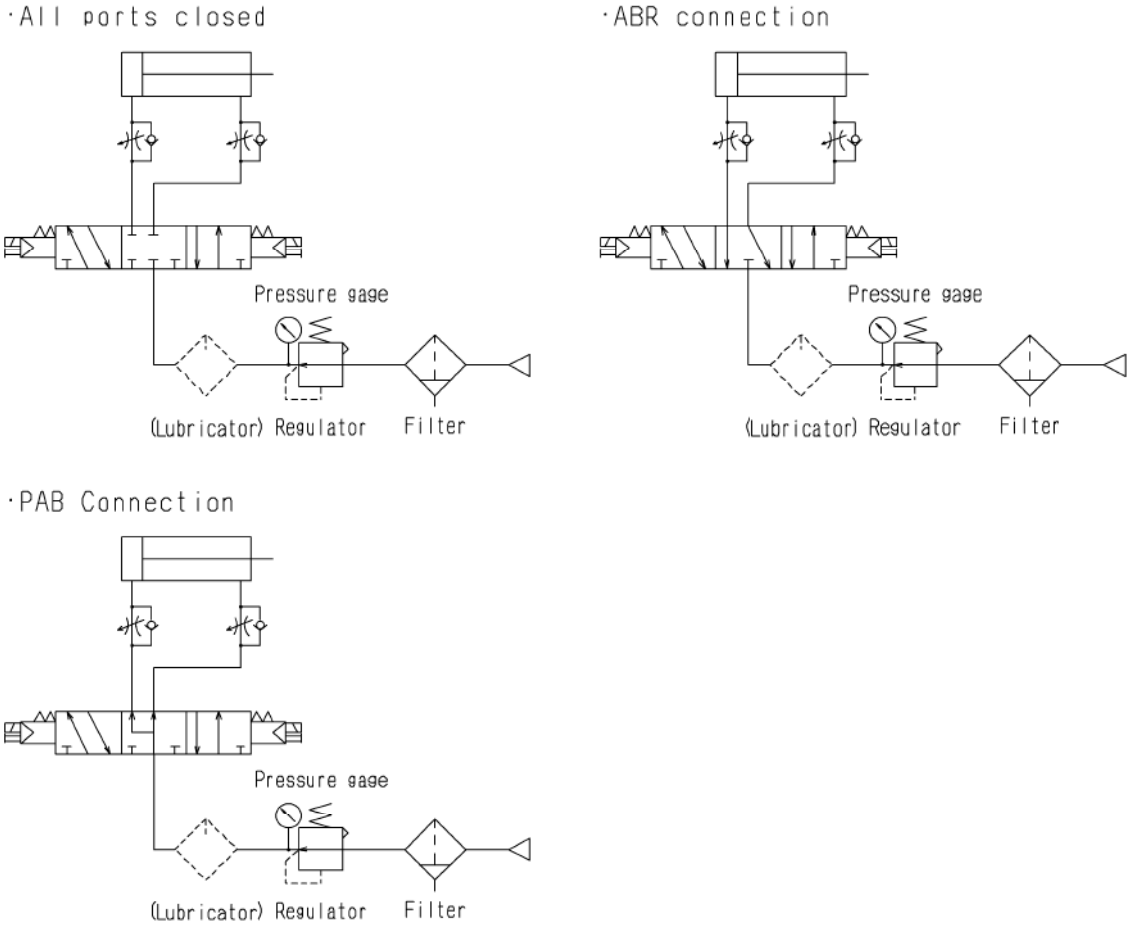
When both solenoids receive no signal current S→C1・C2
E1→Closed
E2→Closed

X solenoid on S→C1
C2→E2
E1→Closed

Y solenoid on S→C2
C1→E1
E2→Closed

- Cylinder stops at intermediate positions (when current is off) as same as (1) above. But the cylinder is not to stay still unless the unit pressure from both side of cylinder balances up due to individual pressurization to C1 port as well as to C2 port.

2) Fundamental circuit diagram



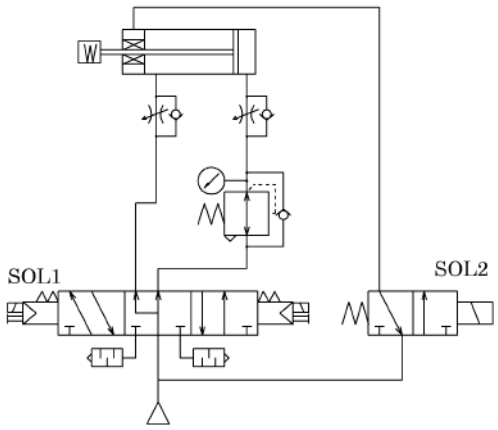
PAB connection is used for the purpose of letting either Rod-less cylinder or Seltop cylinder make intermediate stops.

3) Circuit diagrams for Seltop cylinder application are as shown below.

(1) In case of horizontal load

When piping is laid as shown in Fig1, equal pressure is applied to both sides of the piston when the system is in the OFF mode, thereby preventing the piston from jumping out. Install a regulator with a check valve on the head cover side to balance the thrust.

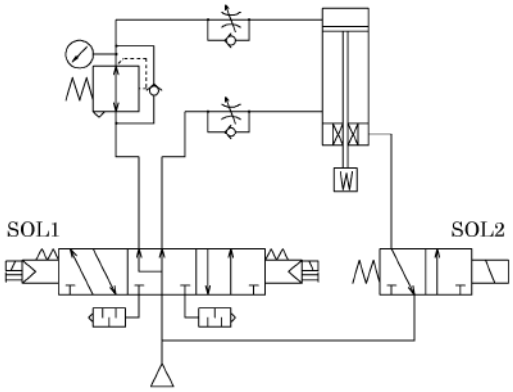
Fig 1



(2) In case of downward load

When the lay-out of circuit is as shown in Fig. 2, install a reducing valve with a check valve to the circuit of cylinder head side for the purpose of reducing the downward thrust of the rod and keeping a balance because the cylinder rod is apt to be suddenly pulled down due to the load at the moment the brake system is released.

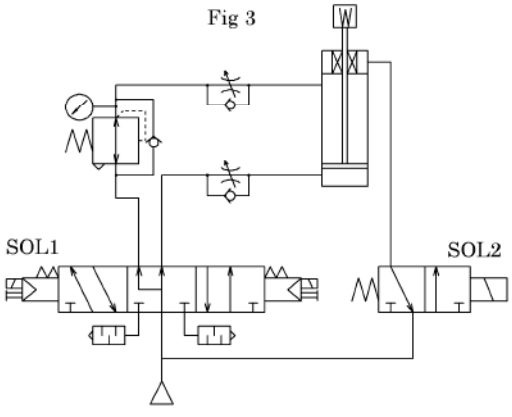
Fig 2



(3) In case of upward load

When the load is upward as shown in Fig.3, install a reducing valve with a check a check valve to the circuit of piston rod side for the purpose of reducing reversed thrust of the rod and keeping a balance because the cylinder rod is apt to be pushed backward due to the load at the moment the brake system is released.

Fig 3



5.2 Manual Override

⚠ WARNING :

a) After using the manual override, be sure to reset the manual override to the original (OFF) position before resuming the operation of the device.
After a lock-type operation (push and lock), be sure to release the lock to turn the manual override OFF.

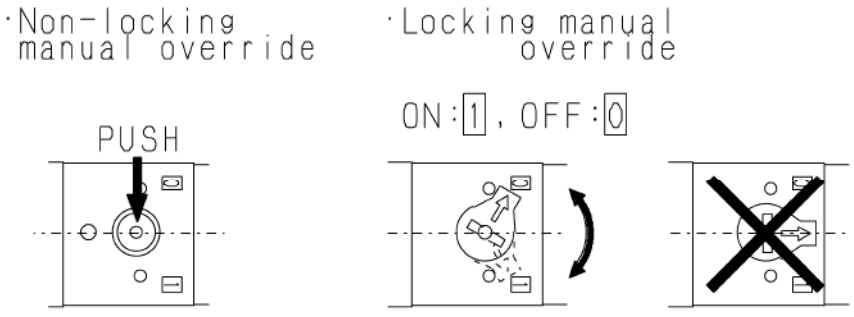
b) Before using the manual override, make sure that nobody is present near the cylinder to be activated.

c) For locking manual override, release locking before regular operation. If used with locking for long term, locking mechanism may be destroyed and switch the status form ON to OFF.

5.2.1 Manual Operation Device

1) This is a pilot solenoid valve. If compressed air is not supplied to Port S, even manual override is operated, main valve doesn't switch.
2) Push the button of non-locking manual override with a rod.
For 3-position/single solenoid, pushing the button changes the status as same as energized. If the button released, the status returns. For 2-position/double solenoid, pushing the button of manual override on X (Y) side changes the status as same as X (Y) energized. If the button is release, the valve keeps the status. To return to the original position, operate the manual override at Y (X) side.
3) For locking manual override, 45° turn by a screw driver switches the valve status as same as energized status. Direction of rotation is clockwise only. When locked, don't turn furthermore. Too mach turn may cause damages. Never perform the turning operation. Turning operation may cause damage to the internal lead wires. For locking manual override, release locking before regular operation.

- 2-position type…There is no neutral position.
- 3-position type…Select this type of valve in the circuit where intermediate stopping is planned.



5.3 Air Quality

⚠ WARNING :

a) Do not supply anything other than compressed air.
b) Supply clean compressed air without any mixture of corrosive gas.

⚠ CAUTION :

a) Compressed air usually contains a large amount of drain, oxidized oil, tar, foreign matter, and rust from the piping. Filter out those elements in the supplied air because they may cause a malfunction and decrease service life. In addition, clean the exhaust before it is released to the air to minimize pollution.
b) Once you have lubricated a pre-lubricated valve, the valve is no longer capable of running without being lubricated from the outside. Do not leave the valve without lubrication but keep it lubricated.
c) Do not use spindle oil or machine oil. They may induce expansion of the rubber parts, which may cause a malfunction.

5.3.1 Lubrication

The 4F Series this explosion proof valve systems use pre-lubricated valves that usually do not require lubrication from the outside. If you have to lubricate a valve, use Type 1 turbine oil (ISO-VG32) without additives.
Excessive lubrication and extremely low pressure may cause a longer response time. The response time in the catalogue assumes no lubrication from the outside and the air supply pressure of 0.5 MPa.

5.3.2 Ultra-dry compressed air

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

5.3.3 Drain

1) The drain is produced by a drop of temperature in pneumatic piping and devices.
2) The drain may enter and instantaneously block a passage inside a pneumatic device and cause a malfunction.
3) The drain accelerates the production of rust, which may cause the failure of pneumatic devices.
4) The drain may wash away the lubrication pill, causing a malfunction from the lack of lubrication.

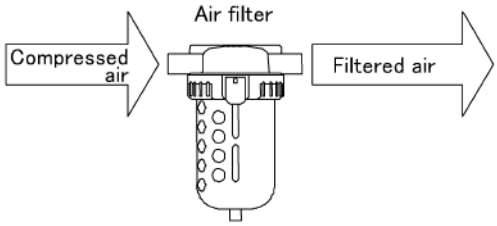
5.3.4 Foreign matter in the compressed air

1) Supply clean compressed air that does not include oxidized oil, tar, carbon, or other foreign matter from the air compressor.
   (1) If oxidized oil, tar, carbon, or the like enters a pneumatic device and sticks to its components, an increase in the resistance at sliding portions may cause a malfunction.
   (2) If oxidized oil, tar, carbon, or the like is mixed with the supplied lubrication oil, wear of the sliding components of the pneumatic device may be accelerated.

2) Supply clean compressed air that does not include solid foreign matter.
   (1) Solid foreign matter in the compressed air may cause wear of the sliding components of the pneumatic device or stick to such components and cause hydraulic lock.

5.3.5 Cleaning the supplied air

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



5.4 Electric Circuits

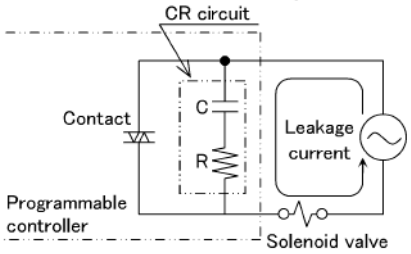
⚠ CAUTION :

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

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

b) Restriction on current leak

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



For 200VAC	1.5 mA or less
For 100VAC	3.0 mA or less
For 24VDC	1.8 mA or less

(1) With a double solenoid type valve system, energize the solenoid for at least 0.1 second even for an instantaneous valve operation. However, since the cylinder may malfunction depending on the load conditions on the secondary side, energize or perform the manual operation until the cylinder reaches its stroke end position. If the target valve can be affected by a back pressure induced by another solenoid valve, it is recommendable to energize the solenoid as long as the cylinder is making an action.

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

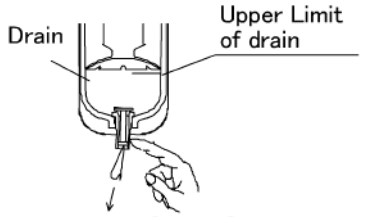
6. MAINTENANCE

6.1 Periodic Inspection

⚠ WARNING : Before providing a maintenance service, cut the power and the supply of compressed air and confirm the absence of residual pressure.
- The above is required to ensure safety.

⚠ CAUTION : Regularly perform the daily and periodic inspections to correctly maintain product performance.
- If the product is not correctly maintained, product performance may deteriorate dramatically, resulting in a shorter service life, fractures of components, and malfunctions.

1) To use the solenoid valve system under optimum conditions, perform a periodic inspection once or twice a year.



2) Check the screws for loosening and the joints in the piping for integrity of the sealing.
Regularly remove the drain from the air filters.
   (1) Checking the compressed air supply pressure:
   Is the supply pressure at the specified level?
   Does the pressure gauge indicate the specified pressure when the system is operating?
   (2) Checking the air filters:
   Is the drain normally discharged?
   Is the amount of dirt attached to the bowl and element at a normal level?
   (3) Checking joints in the piping for the leakage of compressed air:
   Are the pipes normally connected at joints, especially at the movable parts?
   (4) Checking the operation of solenoid valves:
   Is not there any delay in the operation? Is the exhaust flow normal?
   (5) Checking the operation of pneumatic actuators:
   Is the operation smooth?
   Does the actuator stop normally at the end of the stroke?
   Is the coupling with the load normal?
   (6) Checking the lubricator:
   Is the amount of oil adjusted properly?
   (7) Checking the lubrication oil:
   Is the supplied lubrication oil of the type specified by the manufacturer?

6.2 Disassembling and Reassembling

⚠ WARNING :

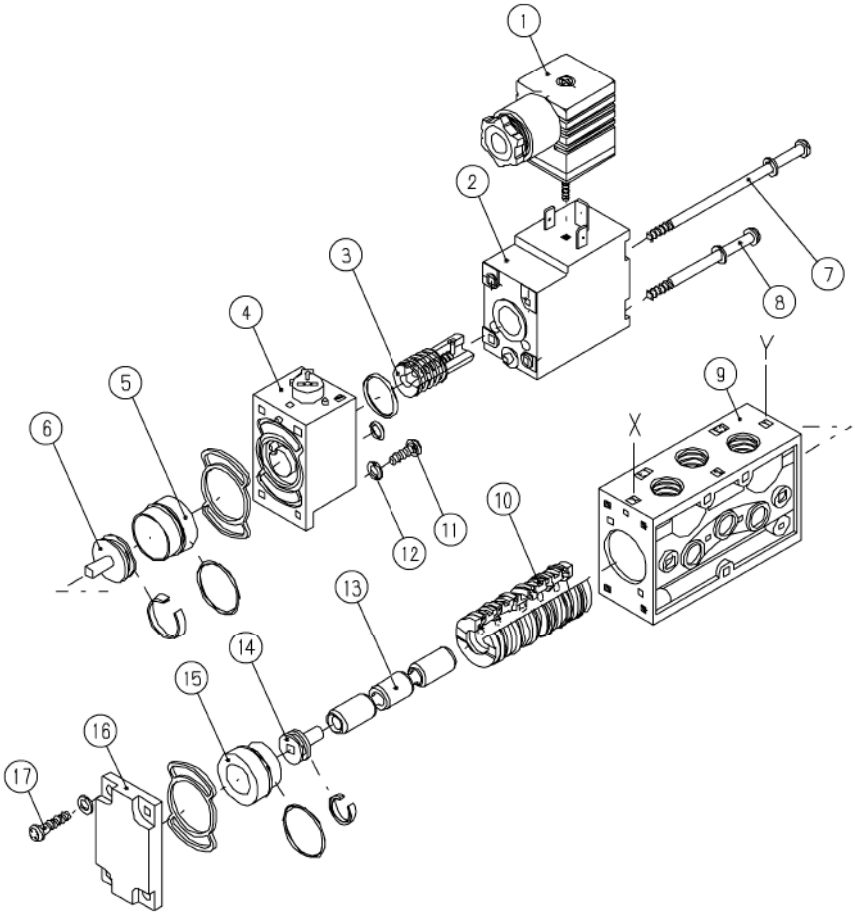
a) Before disassembling and reassembling solenoid valves, read the instruction manual carefully and understand the instructions.

- A person who disassembles and reassembles a solenoid valve system needs to have a knowledge for safely performing such operation based on the understanding about the mechanisms and operating principles of solenoid valves.
- Personnel involved in this step must have passed the Pneumatic Pressure Skill Test Class 2 or higher.

6.2.1 Solenoid valve mounting and detaching

Be sure top discharge the residual pressure before starting disassembling and reassembling.
When replacing the solenoid valve, play special attention so that no gaskets and O-ring are fallen down.
The proper tightening torque of the solenoid valve mounting screw is 1.7 to 1.9 N·m.

- 4F2·3 2-position single



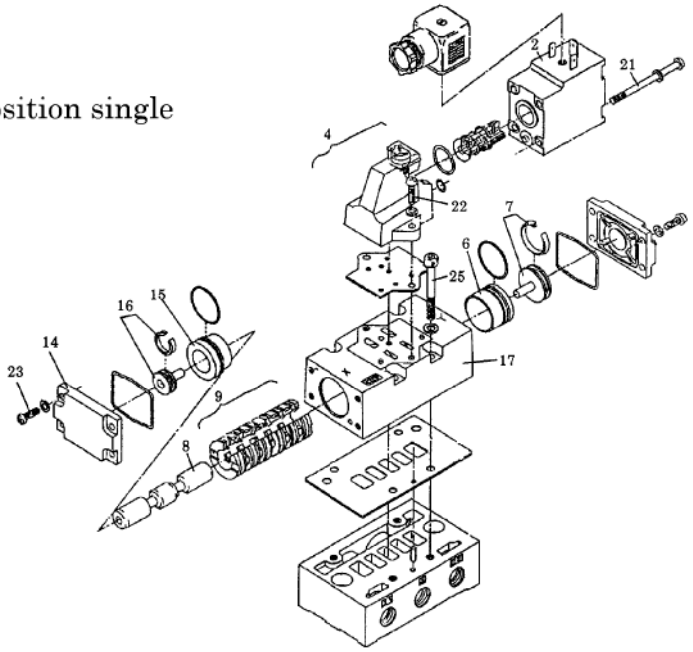
1) Disassembling and assembling Coil ass'y part
   (1) When removing the cross headed pan small screw⑦⑧, the coil ass'y② can be disassembled.
   Carry out the above work if noise at charge is generated, malfunction and/or broken wire.

2) Disassembling Pilot valve body ass'y part
   (1) When removing the cross headed pan small screw⑪, the pilot valve body ass'y④ can be disassembled.
   Carry out the above work if the valve operation is leak occurs.

3) Disassembling and assembling Body part
   (1) Loosen the mounting screws ⑰ of the caps on the X sides to detach the caps⑯, push the internal spacer from the E2 port of the body⑨ toward the Y side using a standard driver to project the cylinder⑤ forward. After that, take out the cylinder⑤ and piston⑥.
   (2) After the internal spacer has been pushed from the E1 port of the body⑨ toward the X side using a standard driver, take out the cylinder⑮ and piston⑭.
   (3) For built-in components, after the spool⑬ has been taken out from the body⑨, put your finger and take out the seal ass'y⑩.
   (4) The assembly position and orientation of the built-in piston are specified. Always carefully check the piston⑥⑭, cylinder⑤⑮ and seal ass'y⑩⑫ and orientation when reassembling the parts after disassembly.
   Carry out the above work if the valve operation is faulty or if leak occurs.

- Wash parts or blow each part or replace it with a new one.
- Carefully avoid giving striking indentation because each part is vitally important component for sealing effect.
- Eliminate of using organic solvent. There is potentiality of deterioration of rubber parts of malfunction due to swollen rubber parts.
- Take the reversed sequence of disassembling to assemble it back.
  Avoid minor assembling forgotten, o-ring getting out of place or leaving loosen screws.
- Carefully avoid slipping gasket out and contamination with foreign particles.
- Apply our company specification greases over seal ass'y, spool, cylinder, piston ass'y of sliding parts, body guide part and packing of stem ass'y.

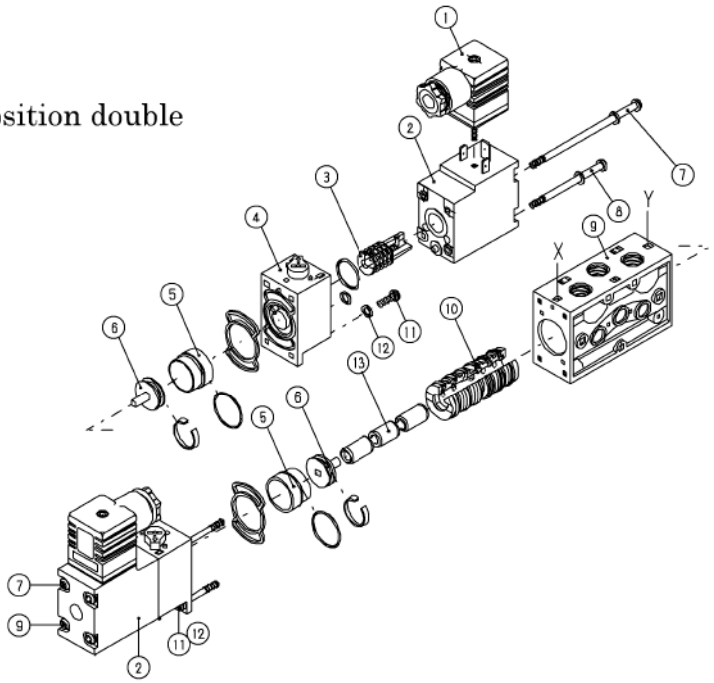
● 4F4 to 7 2-position single



1) Disassembling and assembling Coil ass'y part
   (1) When removing the cross headed pan small screw㉑, the coil ass'y② can be disassembled.
   Carry out the above work if noise at charge is generated, malfunction and/or broken wire.
2) Disassembling and assembling Pilot valve body ass'y part
   (1) When removing the cross headed pan small screw㉒, the pilot valve body ass'y④ can be disassembled.
   Carry out the above work if the valve operation is leak occurs.
3) Disassembling and assembling Body part
   (1) Loosen the mounting screws ㉓ of the caps on the X and Y sides to detach the caps⑭, push the internal spacer from the exhaust passage of the body ⑰ toward the Y side using a standard driver to project the cylinder⑥ forward. After that, take out the cylinder⑥ and piston⑦.
   (2) After the internal spacer has been pushed from the exhaust passage of the body⑰ toward the X side using a standard driver, take out the cylinder⑮ and piston⑯.
   (3) For built-in components, after the spool⑧ has been taken out from the body⑰, put your finger and take out the seal ass'y⑨.
   (4) The assembly position and orientation of the built-in piston⑦⑯, cylinder⑥ ⑮ and seal ass'y⑨ are specified. Always carefully check the position and orientation when reassembling the parts after disassembly.
   Carry out the above work if the valve operation is faulty or if leak occurs.

- Wash parts or blow each part or replace it with a new one.
- Carefully avoid giving striking indentation because each part is vitally important component for sealing effect.
- Eliminate of using organic solvent. There is potentiality of deterioration of rubber parts of malfunction due to swollen rubber parts.
- Take the reversed sequence of disassembling to assemble it back.
  Avoid minor assembling forgotten, o-ring getting out of place or leaving loosen screws.
- Carefully avoid slipping gasket out and contamination with foreign particles.
- Apply our company specification greases over seal ass'y, spool, cylinder, piston ass'y of sliding parts, body guide part and packing of stem ass'y.

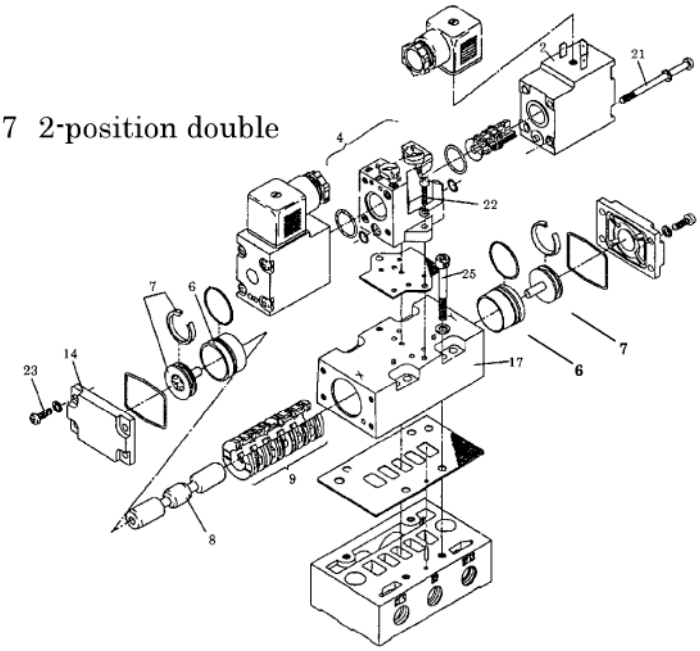
● 4F2・3 2-position double



1) Disassembling and assembling Coil ass'y part
   (1) When removing the cross headed pan small screw⑦⑧, the coil ass'y② can be disassembled.
   Carry out the above work if noise at charge is generated, malfunction and/or broken wire.
2) Disassembling and assembling Pilot valve body ass'y part
   (1) When removing the cross headed pan small screw⑪, the pilot valve body ass'y④ can be disassembled.
   Carry out the above work if the valve operation is leak occurs.
3) Disassembling and assembling Body part
   (1) After the pilot valve ass'y④ has been removed, push the internal spacer from the E2 port of the body⑨ toward the Y side using a standard driver to project the cylinder⑤ forward. After that, take out the cylinder⑤ and piston⑥.
   (2) After the internal spacer has been pushed from the E1 port of the body⑨ toward the X side using a standard driver, take out the cylinder⑤ and piston⑥.
   (3) For built-in components, after the spool⑬ has been taken out from the body⑨, put your finger and take out the seal ass'y⑩.
   (4) The assembly position and orientation of the built-in piston⑥, cylinder⑤ and seal ass'y⑩ are specified. Always carefully check the position and orientation when reassembling the parts after disassembly.
   Carry out the above work if the valve operation is faulty or if leak occurs.

- Wash parts or blow each part or replace it with a new one.
- Carefully avoid giving striking indentation because each part is vitally important component for sealing effect.
- Eliminate of using organic solvent. There is potentiality of deterioration of rubber parts of malfunction due to swollen rubber parts.
- Take the reversed sequence of disassembling to assemble it back.
  Avoid minor assembling forgotten, o-ring getting out of place or leaving loosen screws.
- Carefully avoid slipping gasket out and contamination with foreign particles.
- Apply our company specification greases over seal ass'y, spool, cylinder, piston ass'y of sliding parts, body guide part and packing of stem ass'y.

● 4F4 to 7 2-position double



1) Disassembling and assembling Coil ass'y part

(1) When removing the cross headed pan small screw㉑, the coil ass'y② can be disassembled.
Carry out the above work if noise at charge is generated, malfunction and/or broken wire.

2) Disassembling and assembling Pilot valve body ass'y part

(1) When removing the cross headed pan small screw㉒, the pilot valve body ass'y④ can be disassembled.
Carry out the above work if the valve operation is leak occurs.

3) Disassembling and assembling Body part

(1) Loosen the mounting screws㉓ of the caps on the X and Y sides to detach the caps⑭, push the internal spacer from the exhaust passage of the body ⑰ toward the Y side using a standard driver to project the cylinder⑥ forward. After that, take out the cylinder⑥ and piston⑦.

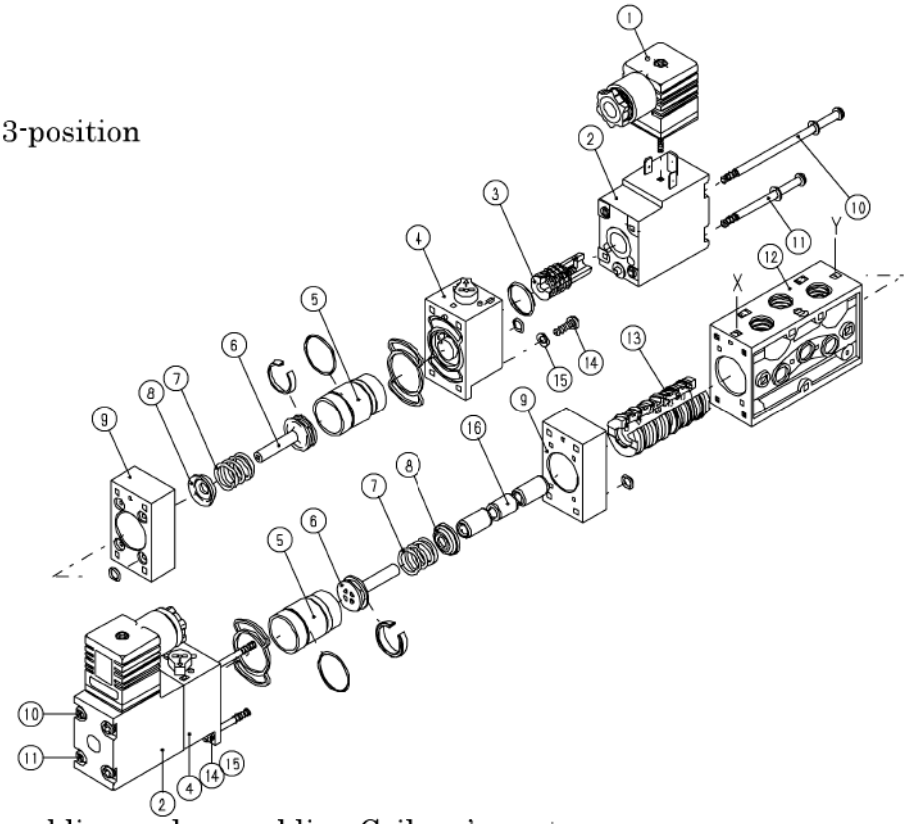
(2) After the internal spacer has been pushed from the exhaust passage of the body⑰ toward the X side using a standard driver, take out the cylinder⑥ and piston⑦.

(3) For built-in components, after the spool⑧ has been taken out from the body⑰, put your finger and take out the seal ass'y⑨.

(4) The assembly position and orientation of the built-in piston⑦, cylinder⑥ and seal ass'y⑨ are specified. Always carefully check the position and orientation when reassembling the parts after disassembly.
Carry out the above work if the valve operation is faulty or if leak occurs.

- Wash parts or blow each part or replace it with a new one.
- Carefully avoid giving striking indentation because each part is vitally important component for sealing effect.
- Eliminate of using organic solvent. There is potentiality of deterioration of rubber parts of malfunction due to swollen rubber parts.
- Take the reversed sequence of disassembling to assemble it back.
  Avoid minor assembling forgotten, o-ring getting out of place or leaving loosen screws.
- Carefully avoid slipping gasket out and contamination with foreign particles.
- Apply our company specification greases over seal ass'y, spool, cylinder, piston ass'y of sliding parts, body guide part and packing of stem ass'y.

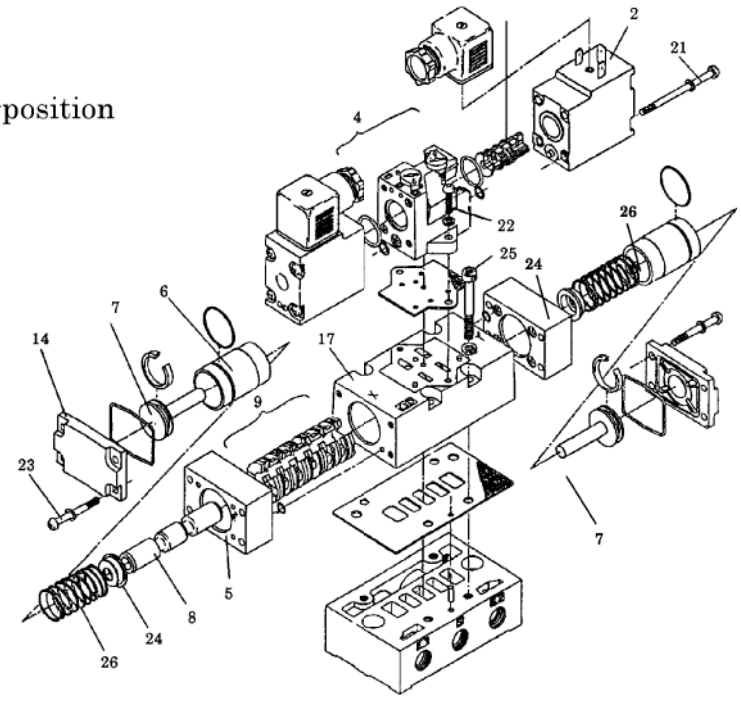
● 4F2･3 3-position



1) Disassembling and assembling Coil ass'y part
   (1) When removing the cross headed pan small screw⑩⑪, the coil ass'y② can be disassembled.
   Carry out the above work if noise at charge is generated, malfunction and/or broken wire.
2) Disassembling and assembling Pilot valve body ass'y part
   (1) When removing the cross headed pan small screw⑭, the pilot valve body ass'y④ can be disassembled. Since the spring⑦ is put inside, pay special attention to jump-up of the spring⑦.
   (2) After the cylinder⑤ has been taken out from the pilot valve body ass'y④, take out the piston⑥, spring⑦ and spring holder⑧.
   Carry out the above work if the valve operation is leak occurs.
3) Disassembling and assembling Body part
   (1) For built-in components, after the spool⑯ has been taken out from the body⑫, put your finger and take out the seal ass'y⑬.
   (2) The assembly position and orientation of the built-in piston⑥, cylinder⑤ spring holder⑧ and seal ass'y⑬ are specified. Always carefully check the position and orientation when reassembling the parts after disassembly.
   Carry out the above work if the valve operation is faulty or if leak occurs.

- Wash parts or blow each part or replace it with a new one.
- Carefully avoid giving striking indentation because each part is vitally important component for sealing effect.
- Eliminate of using organic solvent. There is potentiality of deterioration of rubber parts of malfunction due to swollen rubber parts.
- Take the reversed sequence of disassembling to assemble it back.
  Avoid minor assembling forgotten, o-ring getting out of place or leaving loosen screws.
- Carefully avoid slipping gasket out and contamination with foreign particles.
- Apply our company specification greases over seal ass'y, spool, cylinder, piston ass'y of sliding parts, body guide part and packing of stem ass'y.

● 4F4 to 7 3-position



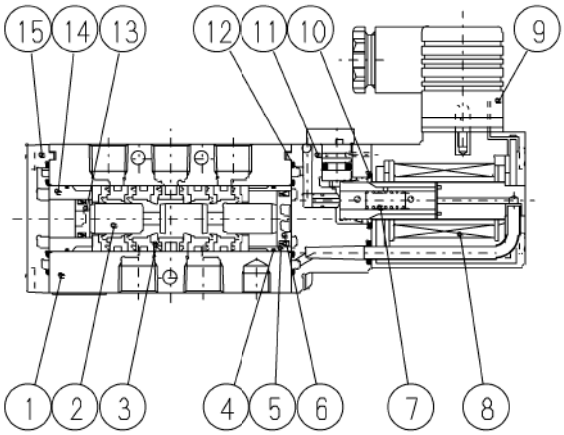
1) Disassembling and assembling Coil ass'y part
   (1) When removing the cross headed pan small screw ㉑, the coil ass'y② can be disassembled.
   Carry out the above work if noise at charge is generated, malfunction and/or broken wire.
2) Disassembling and assembling Pilot valve body ass'y part
   (1) When removing the cross headed pan small screw ㉒, the pilot valve body ass'y④ can be disassembled.
   Carry out the above work if the valve operation is leak occurs.
3) Disassembling and assembling Body part
   (1) Loosen the mounting screws ㉓ of the caps on the X and Y sides to detach the caps⑭. When taking out the caps⑭, pay special attention to jump-up of the spring ㉖ since the spring is put inside.
   After the cylinder⑥ has been taken out from the body⑰, take out the piston⑦, spring ㉖, spring holder ㉔ and body block⑤.
   (2) For built-in components, after the spool⑧ has been taken out from the body⑰, put your finger and take out the seal ass'y⑨.
   (3) The assembly position and orientation of the built-in piston⑦, cylinder⑥ spring holder ㉔ and seal ass'y⑨ are specified. Always carefully check the position and orientation when reassembling the parts after disassembly.
   Carry out the above work if the valve operation is faulty or if leak occurs.

- Wash parts or blow each part or replace it with a new one.
- Carefully avoid giving striking indentation because each part is vitally important component for sealing effect.
- Eliminate of using organic solvent. There is potentiality of deterioration of rubber parts of malfunction due to swollen rubber parts.
- Take the reversed sequence of disassembling to assemble it back.
  Avoid minor assembling forgotten, o-ring getting out of place or leaving loosen screws.
- Carefully avoid slipping gasket out and contamination with foreign particles.
- Apply our company specification greases over seal ass'y, spool, cylinder, piston ass'y of sliding parts, body guide part and packing of stem ass'y.

6.3 Internal Structure and Consumable Parts List

● 4F2･3 2-position single

1)Internal Structure



No	Parts	Material		No	Parts	Material	
①	Body	ADC12	Aluminum alloy die casting	⑨	DIN terminal box	—	
②	Spool	A6000 series	Aluminum alloy	⑩	O-Ring	NBR	Acryloni-trile-butadiene rubber
③	Seal ass'y	—		⑪	Pilot valve body ass'y	—	
④	O-Ring	NBR	Acryloni-trile-butadiene rubber	⑫	Gasket	NBR	Acryloni-trile-butadiene rubber
⑤	Cylinder(A) ass'y	—		⑬	Piston(B) ass'y	—	
⑥	Piston(A) ass'y	—		⑭	Cylinder(B) ass'y	—	
⑦	Plunger ass'y	—		⑮	Cap	ADC12	Aluminum alloy die casting
⑧	Coil ass'y	—					

2)Consumable Parts List

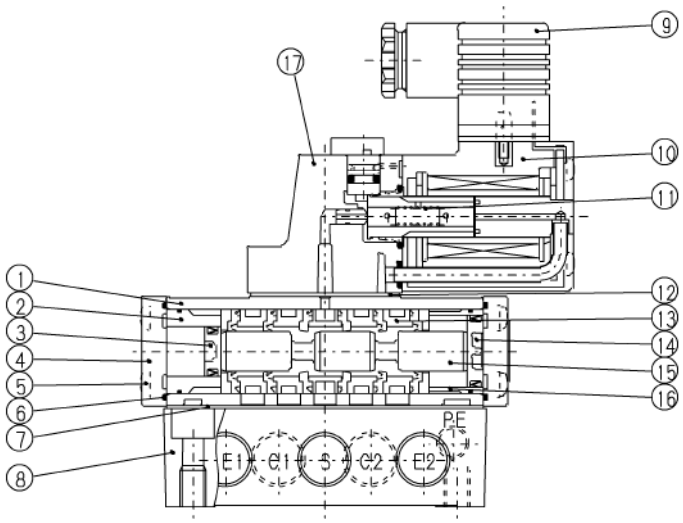
No./Parts name / Model no.	③, ⑥, ⑬ Repair Kits	③ Seal ass'y	⑥ Piston(A) ass'y	⑬ Piston (B) ass'y	⑧ Coil ass'y
4F210	4F210－K	4F9－105	4F9－101	4F9－102	4F□10-Electric connec-tion-Coil-Voltage
4F310	4F310－K	4F9－106	4F9－104	4F9－103	

Note: For consumable parts, kit is available. Please replace a whole kit but not a part. (The kit includes packing seal ass'y, piston ass'y (A) and (B) but not any coil ass'y.)

: Plunger ass'y is attached to coil ass'y.

● 4F4 to 7 2-position single

1)Internal Structure



No	Parts	Material		No	Parts	Material	
①	Body	ADC12	Aluminum alloy die casting	⑩	Coil ass'y	—	
②	Cylinder(B) ass'y	—		⑪	Plunger ass'y	—	
③	Piston(B) ass'y	—		⑫	Gasket	NBR	Acryloni-trile-butadiene rubber
④	Cap	ADC12	Aluminum alloy die casting	⑬	Seal ass'y	—	
⑤	Cross headed pan small screw with spring washer	SWRM	Steel	⑭	Piston(A) ass'y	—	
⑥	Gasket	NBR	Acryloni-trile-butadiene rubber	⑮	Spool	A6000 series	Aluminum alloy
⑦	Gasket	NBR	Acryloni-trile-butadiene rubber	⑯	Cylinder(A) ass'y	—	
⑧	Sub plate	ADC12	Aluminum alloy die casting	⑰	Pilot valve body ass'y	—	
⑨	DIN terminal box	—					

2)Consumable Parts List

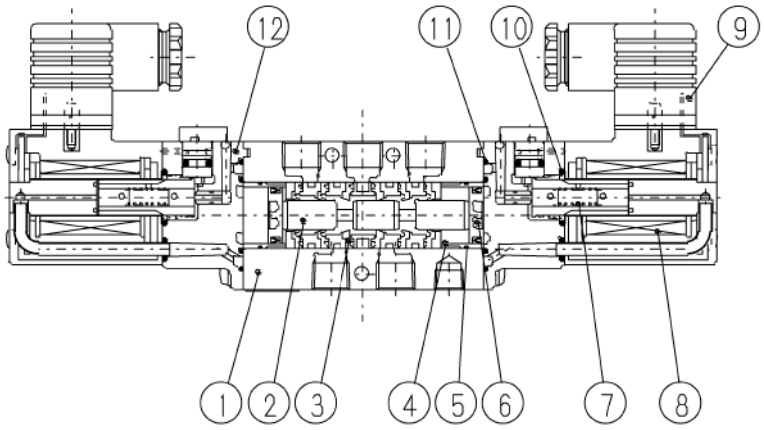
No./Parts name / Model no.	⑬, ⑭, ③	⑬	⑭	③	⑩
	Repair Kits	Seal ass'y	Piston(A) ass'y	Piston (B) ass'y	Coil ass'y
4F410	4F410−K	4F9−106	4F9−104	4F9−103	4F□10-Electric connec-tion-Coil-Voltage
4F510	4F510−K	4F9−107	4F9−108	4F9−109	
4F610	4F610−K	4F9−118	4F9−117	4F9−116	
4F710	4F710−K	4F9−119	4F9−121	4F9−120	

Note: For consumable parts, kit is available. Please replace a whole kit but not a part. (The kit includes packing seal ass'y, piston ass'y (A) and (B) but not any coil ass'y.)

: Plunger ass'y is attached to coil ass'y.

● 4F2･3 2-position double

1)Internal Structure



No	Parts	Material		No	Parts	Material	
①	Body	ADC12	Aluminum alloy die casting	⑦	Plunger ass'y	—	
②	Spool	A6000 series	Aluminum alloy	⑧	Coil ass'y	—	
③	Seal ass'y	—		⑨	DIN terminal box	—	
④	Cylinder(A) ass'y	—		⑩	O-Ring	NBR	Acryloni-trile-butadiene rubber
⑤	O-Ring	NBR	Acryloni-trile-butadiene rubber	⑪	Gasket	NBR	Acryloni-trile-butadiene rubber
⑥	Piston(A) ass'y	—		⑫	Pilot valve body ass'y	—	

2)Consumable Parts List

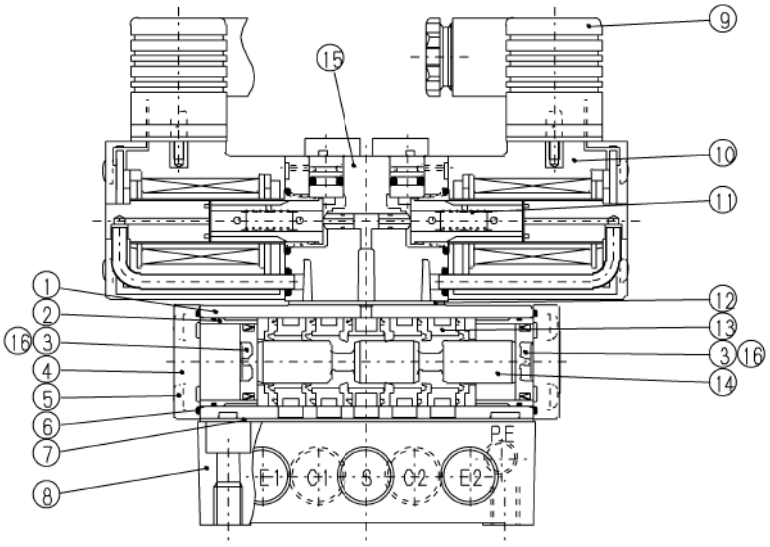
No./Parts name / Model no.	③, ⑥	③	⑥	⑧
	Repair Kits	Seal ass'y	Piston(A) ass'y	Coil ass'y
4F220	4F220－K	4F9－105	4F9－101	4F□20-Electric con-nection-Coil-Voltage
4F320	4F320－K	4F9－106	4F9－104	

Note: For consumable parts, kit is available. Please replace a whole kit but not a part. (The kit includes packing seal ass'y, piston (A) ass'y but not any coil ass'y.)

: Plunger ass'y is attached to coil ass'y.

● 4F4 to 7 2-position double

1) Internal Structure



No	Parts	Material		No	Parts	Material	
①	Body	ADC12	Aluminum alloy die casting	⑨	DIN terminal box	—	
②	Cylinder(A) ass'y	—		⑩	Coil ass'y	—	
③	Piston(A) ass'y	—		⑪	Plunger ass'y	—	
④	Cap	ADC12	Aluminum alloy die casting	⑫	Gasket	NBR	Acryloni-trile-butadiene rubber
⑤	Cross headed pan small screw with spring washer	SWRM	Steel	⑬	Seal ass'y	—	
⑥	Gasket	NBR	Acryloni-trile-butadiene rubber	⑭	Spool	A6000 series	Aluminum alloy
⑦	Gasket	NBR	Acryloni-trile-butadiene rubber	⑮	Pilot valve body ass'y	—	
⑧	Sub plate	ADC12	Aluminum alloy die casting	⑯	Piston(B) ass'y	—	

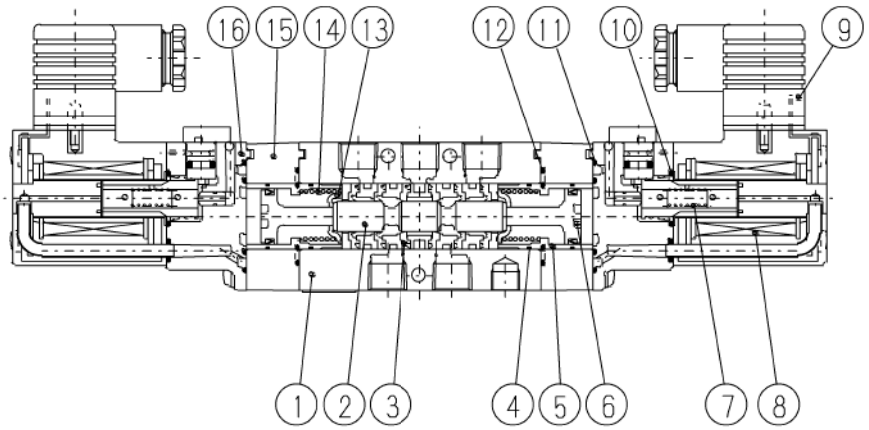
2) Consumable Parts List

No./Parts name / Model no.	⑬, ③, ⑰	⑬	③, ⑰	③, ⑰	⑩
	Repair Kits	Seal ass'y	Piston(A) ass'y	Piston (B) ass'y	Coil ass'y
4F420	4F420−K	4F9−106	4F9−104	—	4F□20-Electric connec-tion-Coil-Voltage
4F520	4F520−K	4F9−107	4F9−108	—	
4F620	4F620−K	4F9−118	—	4F9−116	
4F720	4F720−K	4F9−119	—	4F9−120	

Note: For consumable parts, kit is available. Please replace a whole kit but not a part. (The kit includes packing seal ass'y, piston ass'y (A) and (B) but not any coil ass'y.)
: Plunger ass'y is attached to coil ass'y.

● 4F2·3 3-position

1)Internal Structure



No	Parts	Material		No	Parts	Material	
①	Body	ADC12	Aluminum alloy die casting	⑨	DIN terminal box	—	
②	Spool	A5056	Aluminum alloy	⑩	O-Ring	NBR	Acryloni-trile-butadiene rub-ber
③	Seal ass'y	—		⑪	Gasket	NBR	Acryloni-trile-butadiene rub-ber
④	O-Ring	NBR	Acryloni-trile-butadiene rub-ber	⑫	O-Ring	NBR	Acryloni-trile-butadiene rub-ber
⑤	Cylinder(A) ass'y	A6000 series	Aluminum alloy	⑬	Spring holder	SUS304	Stainless steel
⑥	Piston(A) ass'y	—		⑭	Spring	SWP	Steel
⑦	Plunger ass'y	—		⑮	Body block	ADC12	Aluminum alloy die casting
⑧	Coil ass'y	—		⑯	Pilot valve body ass'y	—	

2)Consumable Parts List

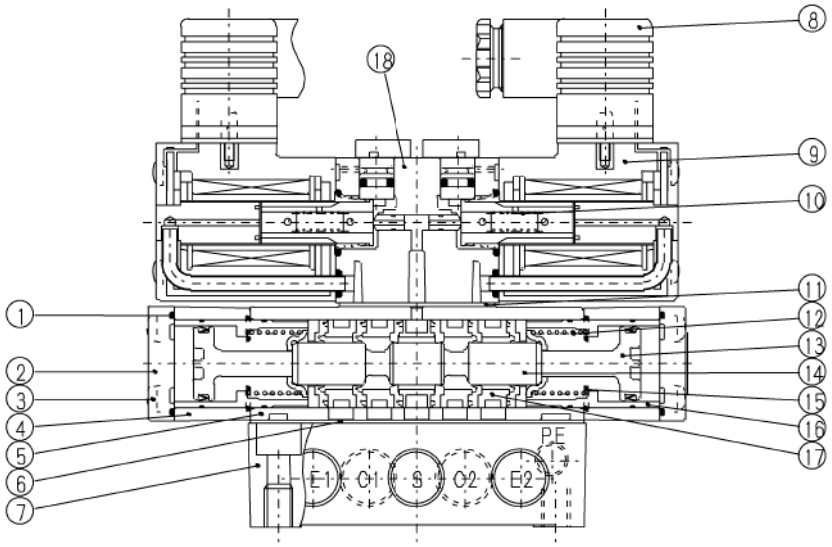
No./Parts name / Model no.	③, ⑥	③	⑥	⑧
	Repair Kits	Seal ass'y	Piston(A) ass'y	Coil ass'y
4F230·240	4F230－K	4F9－105	4F9－113	4F□□0-Electric connec-tion-Coil-Voltage
4F330·340·350	4F330－K	4F9－106	4F9－114	

Note: For consumable parts, kit is available. Please replace a whole kit but not a part. (The kit includes packing seal ass'y, piston (A) ass'y but not any coil ass'y.)

: Plunger ass'y is attached to coil ass'y.

● 4F4 to 7 3-position

1) Internal Structure



No	Parts	Material		No	Parts	Material	
①	Gasket	NBR	Acryloni-trile-butadiene rubber	⑩	Plunger ass'y	—	
②	Cap	ADC12	Aluminum alloy die casting	⑪	Gasket	NBR	Acryloni-trile-butadiene rubber
③	Cross headed pan small screw with spring washer	SWRM	Steel	⑫	Spring	SWP	Steel
④	Body block	ADC12	Aluminum alloy die casting	⑬	Piston(A) ass'y	—	
⑤	Body	ADC12	Aluminum alloy die casting	⑭	Spool	A6000 series	Aluminum alloy
⑥	Gasket	NBR	Acryloni-trile-butadiene rubber	⑮	O-Ring	NBR	Acryloni-trile-butadiene rubber
⑦	Sub plate	ADC12	Aluminum alloy die casting	⑯	Cylinder ass'y	—	
⑧	DIN terminal box	—		⑰	Seal ass'y	—	
⑨	Coil ass'y	—		⑱	Pilot valve body ass'y	—	

2) Consumable Parts List

No./Parts name / Model no.	⑰, ⑬ Repair Kits	⑰ Seal ass'y	⑬ Piston(A) ass'y	⑨ Coil ass'y
4F430·440·450	4F430－K	4F9－106	4F9－114	4F□□0-Electric connec-tion-Coil-Voltage
4F530·540·550	4F530－K	4F9－107	4F9－115	
4F630·640·650	4F630－K	4F9－118	4F9－122	
4F730·740·750	4F730－K	4F9－119	4F9－123	

Note: For consumable parts, kit is available. Please replace a whole kit but not a part. (The kit includes packing seal ass'y, piston ass'y (A) but not any coil ass'y.)
: Plunger ass'y is attached to coil ass'y.

7. TROUBLE SHOOTING

Motion troubles	Suspected cause	Remedies
Does not actuate	No electric signals	Turn on the power
	Damage to signal wiring system	Repair the control circuit
	Excessive fluctuating range of current or voltage	Reaffirm the power capacity. (within ±10% of voltage fluctuation)
Malfunctions	Excessive leaking current	Correct control circuit and / or set a bleed circuit
	Chattering	Inspect switching system and / or tighten each loosen terminal screw
	Voltage deviates than specified on the name plate	Rectify the voltage to meet the specification
	Damaged or short circuited coil	Replace the coil
	Erroneous shut off pressure source	Turn on the power source
	Insufficient pressure	Reset the pressure reducer valve or install a pressure raising valve
	Insufficient flow of fluid	Rectify the size of pipe or install a surge tank
	Erroneous piping, erroneous omitting some piping	Rectify the piping system
	Speed control valve completely closed by error	Reset the needle valve
	Sticking tarry or liquid jelly substitute	Carry out pipe dressing Operate it periodically
	Valve is frozen	Add remedies of avoiding freezing (Heating system or dehumidifying system etc.)
	Delayed return of a plunger (Excessive oil, existence of far)	Check the quality of the lubricant. (Turbine oil class 1, ISO VG 32 or equivalent)
	〃	Rectify the quantity of lubricant drip
	〃	Install a tar removing filter
	Clogged-up exhausting port with dust	Install a cover or silencer and clean it regularly.
Internal leakage	Bulged or decomposed packing Initial lubricant is washed off or excessive lubricants	Check the quality of the lubricant. (Turbine oil class 1, ISO VG 32 or equivalent)
	〃	Relocate the valves away from splashing area of cutting coolant
	〃	Keep organic chemicals away from valves.
	Initial lubricant is washed off or drain contamination	Change the piping to an external pilot system. Install dryer, Filter or grease up. Grease it up
	Foreign particles cut into packing lips.	Remove the foreign particle away from the packing Install a filter.
Malfunctions when manifold is used	Delayed response when multiple blocks are used. Insufficient air supply flow.	Install Sup. (P) piping to P ports on both sides of manifold block
	Delayed response when multiple blocks are used. Insufficient exhaust air flow.	Connect Exh. (R) piping to R ports on both sides of manifold block so as to exhaust to an open air through
	Adjacent cylinder pops out. Intrusion of exhaust air.	Rewire to have the solenoid valve in question is actuated prior to others sequentially. Increase exhaust air Change type to individual exhaust

8. PRODUCT SPECIFICATIONS AND HOW TO ORDER

8.1.1 Product Specifications

●4F2 Specifications

Descriptions	2-postion Single	2-postion Double	3pos. All port closed	3-pos. ABR connection
Working fluid	Compressed air			
Valve type and operation	Pilot type spool valve			
Min. working pressure MPa	0.10		0.15	
Max. working pressure MPa	1.0			
Proof pressure MPa	1.5			
Ambient temperature ※1 ℃	−10 to 60			
Fluid temperature ℃	5 to 60			
Lubrication ※2	Not required			
Protection structure ※3	Dust proof IP65 (The case of the circular terminal box)			
Vibration resistance m/s^2	50 or less			
Shock resistance m/s^2	300 or less			
Atmosphere	No corrosive gas should exist			
Port size Supplying port S ※4	Rp1/4			
Cylinder port C				
Exhaust port E				
Pilot exhaust port PE	Rp1/8			
Sonic conductance $cm^3/(s \cdot bar)$	3.0		2.5	
Response time ※5 ms	50 or less			
Weight ※6 kg	0.60	0.93	1.06	

※1 Ambient temperature applies when stored or sitting, and does not apply to the fluid temperature in operation.
※2 Use turbine oil type 1,ISO VG32 when required. If the oil is lubricated excessively or intermittently, this may cause unstable operation.
※3 The protective structure is dust-proof. Since the product is not applicable to the drip-proof structure, always protect the product with the cover so that water drops and/or oil do not splash onto it.
※4 As for models 4F2, Rp thread is adopted so as to be built with manifold. Rp, parallel female thread, has been adopted broadly to put in tapered male thread. (It is, also, clearly specified in JIS.)
※5 The response time above is the figure on the non-lubricated type at the supply pressure of 0.5MPa,and is subject to change by pressure and or quality of lubrication.
※6 Mass is a value in the DIN terminal box type.

Electric Specifications

Descriptions / Rated voltage (V)	Starting current (A) (50／60Hz)	Holding current (A) (50／60Hz)	Power consumption (W)
AC100	0.17／0.14	0.10／0.08	5／4
AC200	0.09／0.07	0.05／0.04	5／4
AC110	0.15／0.13	0.09／0.07	5／4
AC220	0.08／0.06	0.05／0.04	5／4
DC12	0.500		6
DC24	0.250		6
DC48	0.125		6
DC100	0.060		6
DC110	0.050		5.5
Voltage fluctuation	±10%		
Thermal class	B (Molded coil)		
Electric connection	DIN terminal box, Grommet lead wire, Conduit lead wire, Circular terminal box		

●4F3 Specifications

Descriptions	2-postion Single	2-postion Double	3pos. All port closed	3-pos. ABR connection	3-pos.PAB connection
Working fluid	Compressed air				
Valve type and operation	Pilot type spool valve				
Min. working pressure MPa	0.10		0.15		
Max. working pressure MPa	1.0				
Proof pressure MPa	1.5				
Ambient temperature ※1 ℃	−10 to 60				
Fluid temperature ℃	5 to 60				
Lubrication ※2	Not required				
Protection structure ※3	Dust proof IP65 (The case of the circular terminal box)				
Vibration resistance m/s^2	50 or less				
Shock resistance m/s^2	300 or less				
Atmosphere	No corrosive gas should exist				
Port size Supplying port S ※4	Rp1/4 ・ Rp3/8				
Cylinder port C					
Exhaust port E					
Pilot exhaust port PE	Rp1/8				
Sonic conductance $cm^3/(s\cdot bar)$ (Rp1/4 / Rp3/8)	3.9／5.8		4.0／4.4	4.5／5.1	4.0／4.4
Response time ※5 ms	50 or less				
Weight ※6 kg	0.69	1.01	1.20		

※1 Ambient temperature applies when stored or sitting, and does not apply to the fluid temperature in operation.
※2 Use turbine oil type 1,ISO VG32 when required. If the oil is lubricated excessively or intermittently, this may cause unstable operation.
※3 The protective structure is dust-proof. Since the product is not applicable to the drip-proof structure, always protect the product with the cover so that water drops and/or oil do not splash onto it.
※4 As for models 4F3, Rp thread is adopted so as to be built with manifold. Rp, parallel female thread, has been adopted broadly to put in tapered male thread. (It is, also, clearly specified in JIS.)
※5 The response time above is the figure on the non-lubricated type at the supply pressure of 0.5MPa,and is subject to change by pressure and or quality of lubrication.
※6 Mass is a value in the DIN terminal box type.

Electric Specifications

Descriptions / Rated voltage (V)	Starting current (A) (50／60Hz)	Holding current (A) (50／60Hz)	Power consumption (W)
AC100	0.17／0.14	0.10／0.08	5／4
AC200	0.09／0.07	0.05／0.04	5／4
AC110	0.15／0.13	0.09／0.07	5／4
AC220	0.08／0.06	0.05／0.04	5／4
DC12	0.500		6
DC24	0.250		6
DC48	0.125		6
DC100	0.060		6
DC110	0.050		5.5
Voltage fluctuation	±10%		
Thermal class	B (Molded coil)		
Electric connection	DIN terminal box, Grommet lead wire, Conduit lead wire, Circular terminal box		

・AC100V coil is available for AC110V(60Hz), while AC200V is available for AC220V(60Hz)

●4F4 Specifications

Descriptions	2-postion Single	2-postion Double	3pos. All port closed	3-pos. ABR connection	3-pos.PAB connection
Working fluid	Compressed air				
Valve type and operation	Pilot type spool valve				
Min. working pressure MPa	0.10		0.15		
Max. working pressure MPa	1.0				
Proof pressure MPa	1.5				
Ambient temperature ※1 ℃	−10 to 60				
Fluid temperature ℃	5 to 60				
Lubrication ※2	Not required				
Protection structure ※3	Dust proof IP65 (The case of the circular terminal box)				
Vibration resistance m/s²	50 or less				
Shock resistance m/s²	300 or less				
Atmosphere	No corrosive gas should exist				
Port size Supplying port S ※4	Rc1/4 ・ Rc3/8				
Cylinder port C					
Exhaust port E					
Pilot exhaust port PE	Rc1/8				
Sonic conductance cm³/(s•bar)	5.0		4.7	5.3	
Response time ※4 ms	60 or less				
Weight ※5 kg	1.01	1.29	1.45		

※1 Ambient temperature applies when stored or sitting, and does not apply to the fluid temperature in operation.
※2 Use turbine oil type 1,ISO VG32 when required. If the oil is lubricated excessively or intermittently, this may cause unstable operation.
※3 The protective structure is dust-proof. Since the product is not applicable to the drip-proof structure, always protect the product with the cover so that water drops and/or oil do not splash onto it.
※4 The response time above is the figure on the non-lubricated type at the supply pressure of 0.5MPa,and is subject to change by pressure and or quality of lubrication.
※5 Mass is a value in the DIN terminal box type.

Electric Specifications

Descriptions / Rated voltage (V)	Starting current (A) (50／60Hz)	Holding current (A) (50／60Hz)	Power consumption (W)
AC100	0.17／0.14	0.10／0.08	5／4
AC200	0.09／0.07	0.05／0.04	5／4
AC110	0.15／0.13	0.09／0.07	5／4
AC220	0.08／0.06	0.05／0.04	5／4
DC12	0.500		6
DC24	0.250		6
DC48	0.125		6
DC100	0.060		6
DC110	0.050		5.5
Voltage fluctuation	±10%		
Thermal class	B (Molded coil)		
Electric connection	DIN terminal box, Grommet lead wire, Conduit lead wire, Circular terminal box		

・AC100V coil is available for AC110V(60Hz), while AC200V is available for AC220V(60Hz)

●4F5 Specifications

Descriptions	2-postion Single	2-postion Double	3pos. All port closed	3-pos. ABR connection	3-pos.PAB connection
Working fluid	Compressed air				
Valve type and operation	Pilot type spool valve				
Min. working pressure MPa	0.10		0.15		
Max. working pressure MPa	1.0				
Proof pressure MPa	1.5				
Ambient temperature ※1 ℃	−10 to 60				
Fluid temperature ℃	5 to 60				
Lubrication ※2	Not required				
Protection structure ※3	Dust proof IP65 (The case of the circular terminal box)				
Vibration resistance m/s^2	50 or less				
Shock resistance m/s^2	300 or less				
Atmosphere	No corrosive gas should exist				
Port size Supplying port S ※4	Rc3/8 ・ Rc1/2				
Cylinder port C					
Exhaust port E					
Pilot exhaust port PE	Rc1/8				
Sonic conductance $cm^3/(s\cdot bar)$	10		9.7	9.8	
Response time ※4 ms	70 or less				
Weight ※5 kg	1.26	1.58	1.84		

※1 Ambient temperature applies when stored or sitting, and does not apply to the fluid temperature in operation.
※2 Use turbine oil type 1,ISO VG32 when required. If the oil is lubricated excessively or intermittently, this may cause unstable operation.
※3 The protective structure is dust-proof. Since the product is not applicable to the drip-proof structure, always protect the product with the cover so that water drops and/or oil do not splash onto it.
※4 The response time above is the figure on the non-lubricated type at the supply pressure of 0.5MPa,and is subject to change by pressure and or quality of lubrication.
※5 Mass is a value in the DIN terminal box type.

Electric Specifications

Descriptions / Rated voltage (V)	Starting current (A) (50／60Hz)	Holding current (A) (50／60Hz)	Power consumption (W)
AC100	0.17／0.14	0.10／0.08	5／4
AC200	0.09／0.07	0.05／0.04	5／4
AC110	0.15／0.13	0.09／0.07	5／4
AC220	0.08／0.06	0.05／0.04	5／4
DC12	0.500		6
DC24	0.250		6
DC48	0.125		6
DC100	0.060		6
DC110	0.050		5.5
Voltage fluctuation	±10%		
Thermal class	B (Molded coil)		
Electric connection	DIN terminal box, Grommet lead wire, Conduit lead wire, Circular terminal box		

・AC100V coil is available for AC110V(60Hz), while AC200V is available for AC220V(60Hz)

●4F6 Specifications

Descriptions	2-postion Single	2-postion Double	3pos. All port closed	3-pos. ABR connection	3-pos.PAB connection
Working fluid	Compressed air				
Valve type and operation	Pilot type spool valve				
Min. working pressure MPa	0.15				
Max. working pressure MPa	1.0				
Proof pressure MPa	1.5				
Ambient temperature ※1 ℃	−10 to 60				
Fluid temperature ℃	5 to 60				
Lubrication ※2	Not required				
Protection structure ※3	Dust proof IP65 (The case of the circular terminal box)				
Vibration resistance m/s^2	50 or less				
Shock resistance m/s^2	300 or less				
Atmosphere	No corrosive gas should exist				
Port size Supplying port S ※4	Rc1/2 ・ Rc3/4				
Cylinder port C					
Exhaust port E					
Pilot exhaust port PE	Rc1/4				
Sonic conductance $cm^3/(s \cdot bar)$	18		15		
Response time ※4 ms	200 or less				
Weight ※5 kg	1.92	2.26	2.56		

※1 Ambient temperature applies when stored or sitting, and does not apply to the fluid temperature in operation.
※2 Use turbine oil type 1,ISO VG32 when required. If the oil is lubricated excessively or intermittently, this may cause unstable operation.
※3 The protective structure is dust-proof. Since the product is not applicable to the drip-proof structure, always protect the product with the cover so that water drops and/or oil do not splash onto it.
※4 The response time above is the figure on the non-lubricated type at the supply pressure of 0.5MPa,and is subject to change by pressure and or quality of lubrication.
※5 Mass is a value in the DIN terminal box type.

Electric Specifications

Descriptions / Rated voltage (V)	Starting current (A) (50／60Hz)	Holding current (A) (50／60Hz)	Power consumption (W)
AC100	0.17／0.14	0.10／0.08	5／4
AC200	0.09／0.07	0.05／0.04	5／4
AC110	0.15／0.13	0.09／0.07	5／4
AC220	0.08／0.06	0.05／0.04	5／4
DC12	0.500		6
DC24	0.250		6
DC48	0.125		6
DC100	0.060		6
DC110	0.050		5.5
Voltage fluctuation	±10%		
Thermal class	B (Molded coil)		
Electric connection	DIN terminal box, Grommet lead wire, Conduit lead wire, Circular terminal box		

・AC100V coil is available for AC110V(60Hz), while AC200V is available for AC220V(60Hz)

●4F7 Specifications

Descriptions	2-postion Single	2-postion Double	3pos. All port closed	3-pos. ABR connection	3-pos.PAB connection
Working fluid	Compressed air				
Valve type and operation	Pilot type spool valve				
Min. working pressure MPa	0.15				
Max. working pressure MPa	1.0				
Proof pressure MPa	1.5				
Ambient temperature ※1 ℃	−10 to 60				
Fluid temperature ℃	5 to 60				
Lubrication ※2	Not required				
Protection structure ※3	Dust proof IP65 (The case of the circular terminal box)				
Vibration resistance m/s^2	50 or less				
Shock resistance m/s^2	300 or less				
Atmosphere	No corrosive gas should exist				
Port size Supplying port S ※4	Rc3/4 ・ Rc1				
Cylinder port C					
Exhaust port E					
Pilot exhaust port PE	Rc1/4				
Effective cross-sectional area mm^2	160				
Response time ※4 ms	300 or less				
Weight ※5 kg	3.46	3.78	4.80		

※1 Ambient temperature applies when stored or sitting, and does not apply to the fluid temperature in operation.
※2 Use turbine oil type 1,ISO VG32 when required. If the oil is lubricated excessively or intermittently, this may cause unstable operation.
※3 The protective structure is dust-proof. Since the product is not applicable to the drip-proof structure, always protect the product with the cover so that water drops and/or oil do not splash onto it.
※4 The response time above is the figure on the non-lubricated type at the supply pressure of 0.5MPa,and is subject to change by pressure and or quality of lubrication.
※5 Mass is a value in the DIN terminal box type.

Electric Specifications

Descriptions Rated voltage (V)	Starting current (A) (50／60Hz)	Holding current (A) (50／60Hz)	Power consumption (W)
AC100	0.17／0.14	0.10／0.08	5／4
AC200	0.09／0.07	0.05／0.04	5／4
AC110	0.15／0.13	0.09／0.07	5／4
AC220	0.08／0.06	0.05／0.04	5／4
DC12	0.500		6
DC24	0.250		6
DC48	0.125		6
DC100	0.060		6
DC110	0.050		5.5
Voltage fluctuation	±10%		
Thermal class	B (Molded coil)		
Electric connection	DIN terminal box, Grommet lead wire, Conduit lead wire, Circular terminal box		

・AC100V coil is available for AC110V(60Hz), while AC200V is available for AC220V(60Hz)

8.1.2 Manifold Product Specifications

●Specifications

Descriptions		
Manifold structure		Manifold integrated
Manifold type		Common exhaust ・ Individual exhaust (M4F3)
Station #		2 to 10 station
Working fluid		Compressed air
Valve type and operation		Pilot type spool valve
Min. working pressure	MPa	Refer to following individual specifications.
Max. working pressure	MPa	1.0
Proof pressure	MPa	1.5
Ambient temperature ※1	℃	−10 to 60
Fluid temperature	℃	5 to 60
Lubrication ※2		Not required
Protection structure ※3		Dust proof IP65 (The case of the circular terminal box)
Vibration resistance	m/s^2	50 or less
Shock resistance	m/s^2	300 or less
Atmosphere		No corrosive gas should exist
Port size		Refer to following individual specifications.
Effective cross-sectional area	mm^2	Refer to following individual specifications.

※1 Ambient temperature applies when stored or sitting, and does not apply to the fluid temperature in operation.

※2 Use turbine oil type 1,ISO VG32 when required. If the oil is lubricated excessively or intermittently, this may cause unstable operation.

●Individual specifications

Descriptions			M4F2	M4F3	M4F4	M4F5	M4F6	M4F7
Min. working pressure MPa	2-pos.	Single	0.10	0.10	0.10	0.10	0.15	0.15
		Double						
	3-pos.	All port closed	0.15	0.15	0.15	0.15		
		ABR connection						
		PAB connection	—					
Port size ※3	Common exhaust method	Cylinder port C	Rp1/4	Rp1/4 (08) Rp3/8 (10)	Rc1/4	Rc3/8	Rc1/2	Rc3/4
		Exhaust port E	Rc3/8	Rc1/2	Rc3/8	Rc1/2	Rc3/4	Rc3/4
		Supplying port S						Rc1
	Individual exhaust method	Cylinder port C	Rp1/4	Rp1/4 (08) Rp3/8 (10)	Rc1/4 (※Back porting)	Rc3/8 (※Back porting)	Rc1/2	Rc3/4
		Exhaust port E (I type)	Rc1/4 (Rp1/4)	Rc1/4・(Rp1/4) (08) Rc3/8・(Rp3/8) (10)				Rc1/2
		Supplying port S	Rc3/8	Rc1/2	Rc3/8	Rc1/2	Rc3/4	Rc1
	Pilot exhaust port PE		Rp1/8	Rp1/8	Rc1/8	Rc1/8	—	—
Sonic conductance [cm³/(s・bar)] ※Effective cross-sectional area (mm²)	2-pos.	Single	3.0	3.9／5.8 (Rp1/4 , Rp3/8)	5.0	10	18	※160
		Double						
	3-pos.	All port closed	2.5	4.0／4.4	4.7	9.7	15	
		ABR connection		4.5／5.4	5.3	9.8		
		PAB connection	—	4.0／4.4				
Response time ※4 ms			50 or less	50 or less	60 or less	70 or less	200 or less	300 or less

※3 As for models M4F2 and 3, Rp thread is adopted so as to be built with manifold. Rp, parallel female thread, has been adopted broadly to put in tapered male thread. (It is, also, clearly specified in JIS.)

※4 The response time above is the figure on the non-lubricated type at the supply pressure of 0.5MPa,and is subject to change by pressure and or quality of lubrication.

Electric Specifications

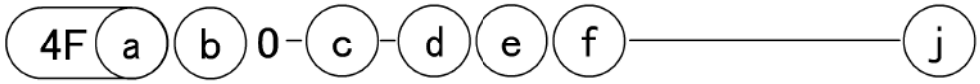
Descriptions Rated voltage (V)	Starting current (A) (50／60Hz)	Holding current (A) (50／60Hz)	Power consumption (W)
AC100	0.17／0.14	0.10／0.08	5／4
AC200	0.09／0.07	0.05／0.04	5／4
AC110	0.15／0.13	0.09／0.07	5／4
AC220	0.08／0.06	0.05／0.04	5／4
DC12	0.500		6
DC24	0.250		6
DC48	0.125		6
DC100	0.060		6
DC110	0.050		5.5
Voltage fluctuation	±10%		
Thermal class	B (Molded coil)		
Electric connection	DIN terminal box, Grommet lead wire, Conduit lead wire, Circular terminal box		

・AC100V coil is available for AC110V(60Hz), while AC200V is available for AC220V(60Hz)

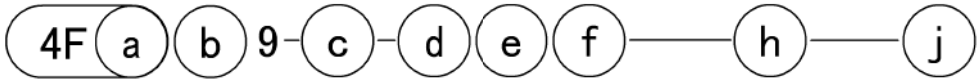
8.2 How to Order

- Individual solenoid valve

- Discrete solenoid valve of manifold
  (4F2・3 When exhaust air mounting style is CL,CU,IL or IU)

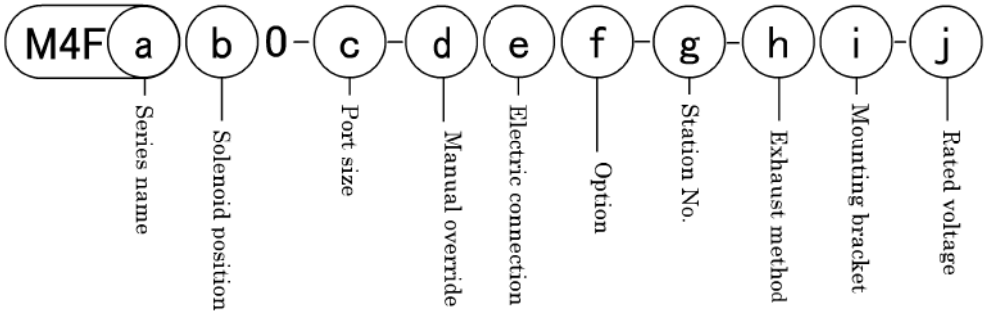


- Discrete solenoid valve of manifold
  (4F2・3 When exhaust air mounting style is C or I)



- Discrete solenoid valve of manifold (4F4 to 7)

- Manifold



Note: Screws and gasket are also supplied together with models 4F4※9, 4F5※9, 4F6※9 & 4F7※9.
For the seal ass'y, piston (A) ass'y,and piston (B) ass'y, refer to the kit number (ex.4F9-104) stated in 6.3 Internal Structure and Consumable Parts List.

a :Series		b :Solenoid position		c :Port size						
2	2	1	2-position single			4F3	4F4	4F5	4F6	4F7
3	3	2	2-position double	08	Rp1/4	○				
4	4	3	3-position all ports closed		Rc1/4		○			
5	5			10	Rp3/8	○				
6	6	4	3-position ABR connection		Rc3/8		○	○		
7	7			15	Rc1/2			○	○	
		5	3-position PAB connection	D15	R1/2				○	
				20	Rc3/4				○	○
		8	Mix. manifold	E20	R3/4					○
				25	Rc1					○

• As for models 4F2 and 3, Rp thread is adopted so as to be built with manifold. Rp, parallel female thread, has been adopted broadly to put in tapered male thread. (It is, also, clearly specified in JIS.)

d :Manual override		e :Electric connection	
Blank	Locking	Blank	DIN terminal box (Pg11)
M2	Non-Locking	L	DIN terminal box with lamp (Pg11)
M3	Locking with manual lever	F	DIN terminal box (G1/2)
R	Piston change of manual override	E	Grommet lead wire
		E1	Conduit with lead wire (CTC19)
		E2	Conduit with lead wire (G1/2)
		B	Round terminal box (G1/2)
		B1	Round terminal box (G3/4)
		BL	Round terminal box (G1/2) with lamp
		G	Round terminal box with gland (A-15a)
		GL	Round terminal box with lamp and gland (A-15a)

• For L of DC type, surge suppressor is integrated.

f :Option		g :Station No.	
Blank	None option	2	2
W	Outdoor specification (※)	to	to
P	Mounting bracket(4F21＊,31＊-L type),(4F4 to 7-U type) attached	10	10
P1	Mounting bracket(4F22＊,32＊ to 4F25＊ ,35*E-U type) attached		
S	Surge suppressor (Variable resistor) attached		
H	Check valve attached (Only 3-position all ports closed)		
N	Plug attached (3 port valve)		
NC	Plug assembly (C1 : A, E1 : R1)		
NO	Plug assembly (C2 : B, E2 : R2)		
R	Position change of manual override		

(※) As for outdoor specification, only 4F2 or 4F3 corresponds. (Electric connection "B", "B1", "G" ,"BL", "GL")

h :Exhaust method		i :Mounting bracket	
C	Common exhaust type	L	L model bracket (Single only) attached(Note)
I	Individual exhaust type	U	U shaped bracket attached(Note)

j :Rated voltage					
AC100V	100 VAC (50/60Hz)	DC12V	12 VDC	DC110V	110 VDC
AC200V	200 VAC (50/60Hz)	DC24V	24 VDC		
AC110V	110 VAC (50/60Hz)	DC48V	48 VDC		
AC220V	220 VAC (50/60Hz)	DC100V	100 VDC		

・12 VDC is not available with BL or GL with lamp.

(Note) Tightening torque for mounting bracket assembly screws : 5.0～5.5 N・m

• When building a system using one kind of manifold

M4F340−08−M2ES−5−CL−AC100V

- 5 port pilot operated valve manifold
- Solenoid position : 3-position ABR connection
- Port size : Rp1/4
- Manual override : Non-locking type
- Electric connection : Grommet lead wire
- Option : Surge suppressor attached
- Station No. : 5 station
- Exhaust method : Common exhaust type
- Mounting bracket : L model bracket
- Rated voltage : 100 VAC

• Mix manifold

- How to indicate mix manifold description
  When selecting mix manifold [indicate (a) as 8.], indicate model No., function symbol (A table reference) and allocation number (1 to station No. from left) according to the example.

A table

Symbol	Type
S1	2-position single
S2	2-position double
S3	3-position all port closed
S4	3-position ABR connection
S5	3-position PAB connection
MP	Masking plate

- Model No. mix manifold, as the B table, Port size Rp1/4, Common exhaust type, U shaped bracket, Voltage AC100V.

Model No.

M4F380−08−7−CU−AC100V− 2 2 1 1 1 0

S1 S2 S3 S4 S5 MP

Quantity of mix manifold

Remarks: S1=1,6、 S2=2,5、 S3=3、 S4=7、 S5=4、 MP = None

B table

Symbol	Type
1	2-position single (S1)
2	2-position double (S2)
3	3-position all port closed (S3)
4	3-position PAB connection (S5)
5	2-position double (S2)
6	2-position single (S1)
7	3-position ABR connection (S4)