Discontinue

CKD

SM-9048-A

INSTRUCTION MANUAL

MASTERVALVE

4F4～7 SERIES

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

CKD Corporation

For Safety Use

To use this product safely, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (to the level pursuant to JIS B 8370 Pneumatic System Rules).

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 :

⚠ Precautions

- Do not touch electric wiring connections (exposed live parts) : this will cause an electric shock. During wiring, keep the power off. Also, do not touch these live parts with wet hands.

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4F4~4F7 Series
Master Valve
SM 9048-A

1. PRODUCTS

1-1. Specifications

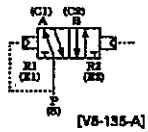
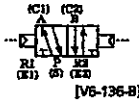
1) Common Specifications

Item	Specifications
Working fluid	Compressed air
Max. working pressure	1MPa
Ambient temperature	−10~60°C
Lubrication	Not required
Valve type and operation	Pilot (soft spool)

2) Model code and specifications

Series · Model code		Specifications						
		Connecting port diam.				Effective sectional area (mm^2)	Main pressure MPa	Pilot signal MPa
		Supply air port S	Cylinder port C	Ex. port E Pilot, Ex. port PE	Pilot port			
4F4	4F411	Rc1/4	Rc1/4	E : Rc1/4	Rc1/8	32	0.15~1	P≧0.06×(Main pressure)+0.06
	4F421			Rc3/8			0~1	P≧0.15
	4F431					21		P≧0.2
	4F441	Rc3/8	Rc3/8	PE:Rc1/8		22		
	4F451							
4F5	4F511	Rc3/8	Rc3/8	E : Rc3/8	Rc1/8	47	0.15~1	P≧0.06×(Main pressure)+0.06
	4F521			Rc1/2			0~1	P≧0.15
	4F531					41		P≧0.2
	4F541	Rc1/2	Rc1/2	PE:Rc1/8		43		
	4F551							
4F6	4F611	Rc1/2	Rc1/2	E : Rc1/2	Rc1/8	90	0.15~1	P≧0.06×(Main pressure)+0.06
	4F621			Rc3/4			0~1	P≧0.15
	4F631					80		P≧0.2
	4F641	Rc3/4	Rc3/4	PE:Rc1/4				
	4F651							
4F7	4F711	Rc3/4	Rc3/4	E : Rc3/4	Rc1/8	160	0.15~1	P≧0.06×(Main pressure)+0.06
	4F721			Rc 1			0~1	P≧0.15
	4F731							P≧0.2
	4F741	Rc 1	Rc 1	PE:Rc1/4				
	4F751							

JIS Symbols

2-pos. single	2-pos. double	3-pos. All ports blocked	3-pos. A · B · R Connection	3-pos. · (4F3 · 4 · 5 · 6 · 7) P · B · B Connection
 [V8-135-A]	 [V8-136-B]	 [V8-136-C]	 [V8-136-D]	 [V8-136-E]

Regarding Rp (PS) thread

Rp thread is adopted to Models 4F0 ~ 4F3 so as to enable being build with manifolds. Rp thread as for parallel female thread is commonly adopted to meet with tapered male thread. It is also clearly torerated within JIS standard.

2 WARNING

2. CAUTIONS

2-1. Operational Cautions

1) Environmental conditions

(1) Within the area of much dust or floating foreign particles, mount either silencer or elbow joint to R (Exh.) port keeping its open end downward to provide protective measurement of keeping those foreign particles from falling into R port.

(2) Instead of leaving water dripping over the solenoid, either provide a cover or install the solenoid within a panel box.

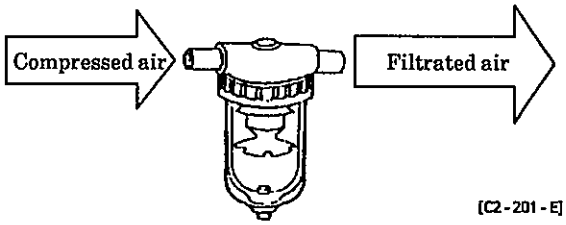
2) Installation auxiliary equipment

(1) Filter

Select a filter element of 5μm or smaller.

(2) Lubricator

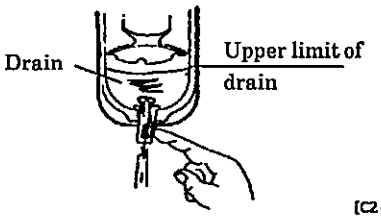
4F Master valve series does not particularly require lubrication. (Use Turbine oil, Class 1, ISO VG32 (#90) or equivalent, if and when lubrication is preferred.)



[C2-201-E]

3) Drain the sludge

Much sludge (such as condensed humidity, oxide oil, tarry material and foreign particles) apt to be contained within the compressed air which destructs the reliability of pneumatic equipment remarkably. Consider the following remedies of removing such sludge.



[C2-201-F]

- Improving the quality of compressed air

Dehumidifying by use of after-cooler dryer, removing foreign particles by use of air filter, removing tarry accumulation by use of tar removal filter, etc.

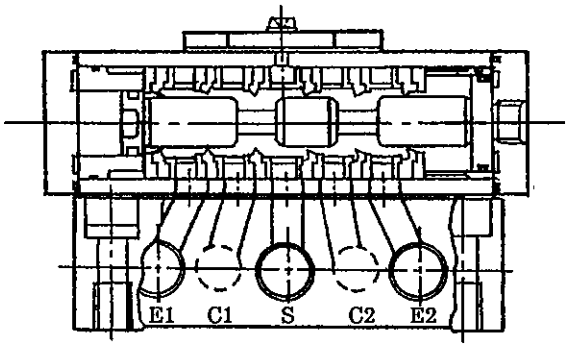
3. OPERATION

3-1. Function

Model 4F4※※ is illustrated. Except valve dimensions of Models 4F5~4F7, general structure is alike each other.

4
● 4F511
6
7

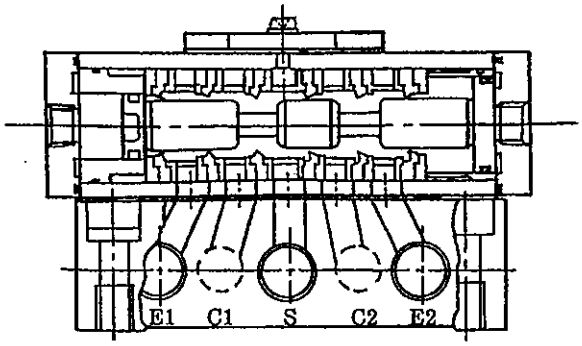
- No pressure to PB (Illustrated)
  S → C1
  C2 → E2 (E1 port is closed.)
- PB is pressurized
  S → C2
  C1 → E1 (E2 port is closed.)



[V6-337-A]

4
● 4F521
6
7

- PA is pressurized (Illustrated)
  S → C1
  C2 → E2
  (E1 port is closed.)
- PB is pressurized
  S → C2
  C1 → E1
  (E2 port is closed.)
- Self-holds new position of the spool once either PA or PB is pressurized, even after the pilot line is exhausted.



[V6-337-B]

Discontinue

4

● 4F531

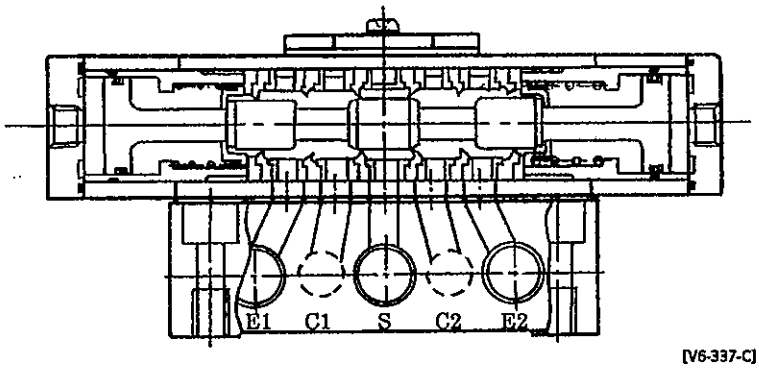
64

75

· PA is pressurized
S → C1
C2 → E2
(E1 port is closed.)

· PB is pressurized
S → C2
C1 → E1
(E2 port is closed.)

· No pressure to neither PA nor PB
4F※31 : S, C1, C2, E1 & E2 are all closed.
4F※41 : C1 → E1, C2 → E2, S is closed.
4F※51 : S → C1 & C2, E1 & E2 are closed.



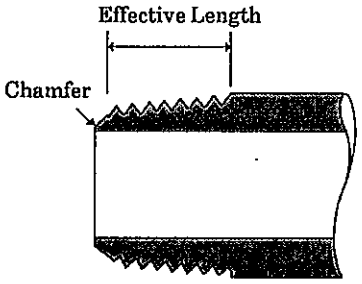
[V6-337-C]

4. INSTALLATION

4-1. Piping

1) For piping beyond the filter, use pipes that hardly get corroded such as galvanized pipes, nylon tubes, rubber tubes, etc.

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

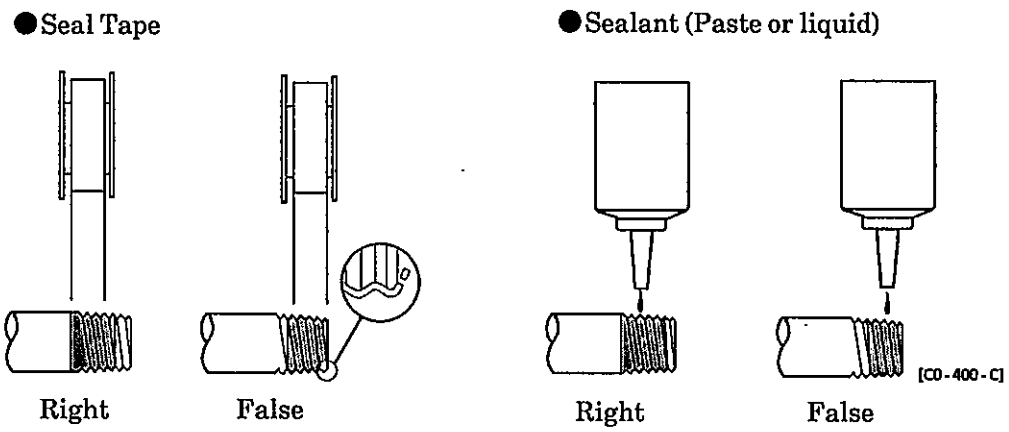


[C0-400-A]

3) Flush air into the pipe to blow out foreign substances and chips before piping.

[C0-400-B]

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



[C0-400-C]

5) Avoid such layout of piping to release C1 port or C2 port to an open air by squeezing Supply port (S port).

Carefully joint pipings to eliminate the leakage between master valve and cylinder particularly when laying such 3-position, all port block type valve as 4F※31.

Make sure to use the cylinder with no leakage at packing or piston packing.

6) Although there is no restriction as to the mounting posture of master valve, it is recommendable to mount it on a flat surface and horizontally.
Eliminate of using it in the area of vibration 5G or more or the area of shock 30G or more.

4-2. Environmental Conditions

Within the area of much dust or floating foreign particles, mount either silencer or elbow joint to R port keeping its open end downward to prevent those foreign particles from falling into R port.

5. MAINTENANCE

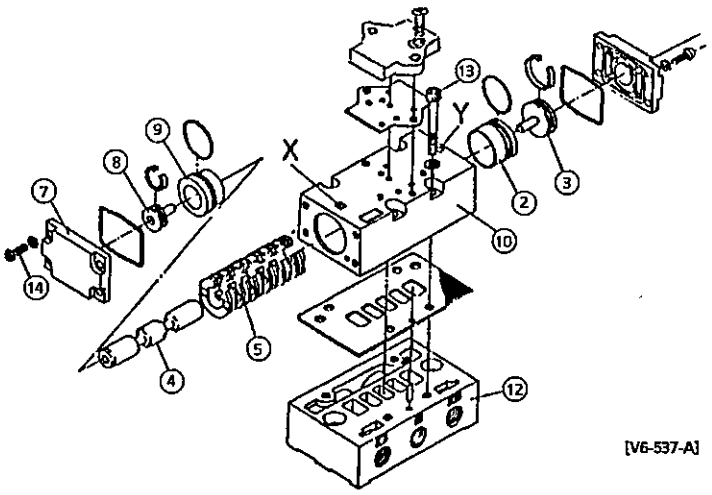
5-1. Periodic Inspection

1) Conduct periodic inspection (s) once or twice per annum for the best service condition of solenoid valves.
2) Items to inspect
   Inspect for dust or foreign particle and high viscosity substitute within valve. Disassemble valve and remove them if their existence is realized.

5-2. Disassembling

1) 4F411 · 4F511 · 4F611 · 4F711

Procedure



Carefully place each components during disassembling work because the positions and direction of piston ass'y ③⑧, cylinders ②⑨ and seal ass'y ⑤ are fixed.

a) Shut off air to valve.
b) Unscrew mounting screws ⑭ for both end caps ⑦.
c) Upon taking cylinder ② through Y end of body ⑩, push piston ass'y ③ from Y end toward X end so as to make internal components such as seal ass'y ⑤, spool ④, piston ass'y ⑧ and cylinder ⑨ come out of X end.
d) Take out mounting screws ⑬ for body ⑩.

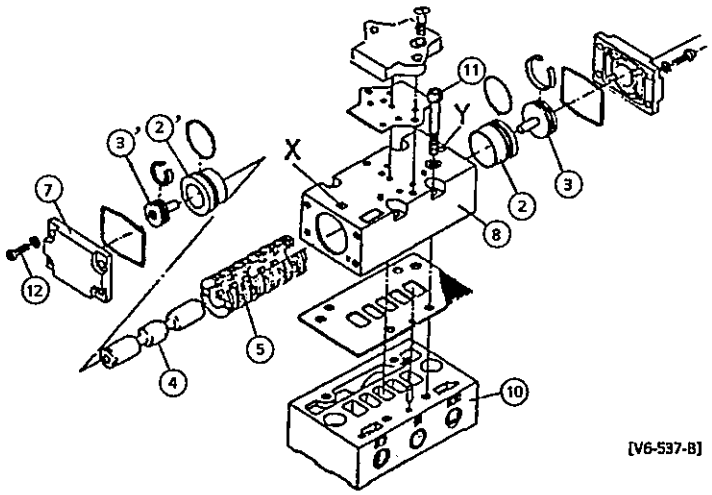
※ Apply either litium list, saponaceous grease or silicon grease as for lubricant.

Expendable parts list

No. parts / Model code	3 Piston A ass'y	5 Seal ass'y	8 Piston B ass'y
4F411	4F9-104	4F9-106	4F9-103
4F511	4F9-108	4F9-107	4F9-109
4F611	4F9-117	4F9-118	4F9-116
4F711	4F9-121	4F9-119	4F9-120

2) 4F421 · 4F521 · 4F621 · 4F721

Procedure



Carefully place each components during disassembling work because the positions and direction of piston ass'y ③③', cylinders ②②' and seal ass'y ⑤ are fixed.

a) Shut off air to valve.
b) Unscrew mounting screws ⑭ for caps ⑦ on both ends.
c) Upon taking cylinder ② through Y end of body ⑧, push piston ass'y ③ from Y end toward X end so as to make internal components such as seal ass'y ⑤, spool ④, piston ass'y ③' and cylinder ②' come out of X end.
d) Take out mounting screws ⑪ for body ⑧.

※ Apply either litium list, saponaceous grease or silicon grease as for lubricant.

Expendable parts list

No. parts / Model code	3 , 3'	5
	Piston A ass'y	Seal ass'y
4F421	4F9-104	4F9-106
4F521	4F9-108	4F9-107
4F621	4F9-116	4F9-118
4F721	4F9-120	4F9-119

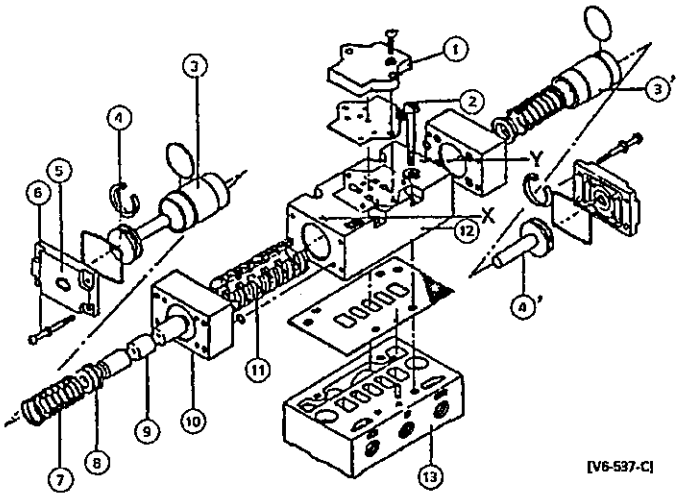
3) 4F431 · 4F531
4F641
4F751

Procedure

Carefully place each components during disassembling work because the positions and direction of piston ass'y ④④', cylinders ③③' and seal ass'y ⑪ are fixed.

a) Shut off air to solenoid valve.
b) Remove mounting screws ⑥ to take out caps ⑤ at both ends as well as body block ⑩, spring ⑦, spring seat ⑧ and cylinder ③.
c) Push out piston ass'y ④' from Y end toward X end of body to take internal component, such as seal ass'y ⑪, spool ⑨, piston ass'y ④ out of the body ⑫.
d) Remove mounting screws ② for body ⑫.

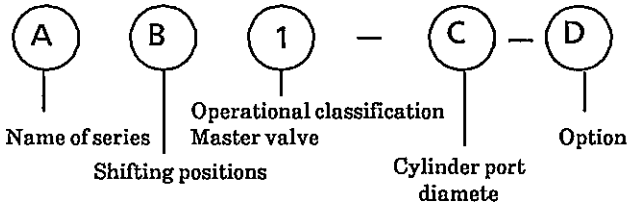
※ Apply either litium list, saponaceous grease or silicon grease as for lubricant.



Expendable parts list

No. parts	4, 4'	11
Model code	Piston A ass'y	Seal ass'y
4F431 4F441 4F451	4F9-114	4F9-106
4F531 4F541 4F551	4F9-115	4F9-107
4F631 4F641 4F651	4F9-122	4F9-118
4F731 4F741 4F751	4F9-123	4F9-119

6. MODEL CODING



Ⓐ Name of Series Ⓑ Shifting positions Ⓒ Cylinder port diameter Ⓓ Option

Symbol	Effective sectional area (mm^2)	Symbol	Content	Symbol	Content
A4F	2~3	1	2-pos. single	M5	M5×0.8
4F0		2	2-pos. double	06	Rp1/8
4F1	7~11	1	2-pos. single	06	Rp1/8
		2	2-pos. double	08	Rp1/4
4F2	11~18	3	3-pos. all ports block	08	Rp1/4
		4	3-pos. ABR connection		
4F3	17~32	1	2-pos. single	08	Rp1/4
				10	Rp3/8
4F4	21~32	2	2-pos. double	08	Rc1/4
				10	Rc3/8
4F5	41~47	3	3-pos. all ports block	10	Rc3/8
				15	Rc1/2
4F6	80~90	4	3-pos. ABR connection	15	Rc1/2
				20	Rc3/4
4F7	160	5	3-pos. PAB connection	20	Rc3/4
				25	Rc1

Symbol	Content
P	Mounting legs
P1	
N	w/plug (for use as 3-pos. valve.)
H	w/check valve (attached for 3-pos., all port block, only.)

Note 1 : P type mounting legs are available for 4F0~4F3, single only.
P1 type mounting legs are unavailable for 4F4~4F7.

Note 2 : Refer to page of each series respectively concerning to P type and P1 type mounting legs.

Note 3 : Manifold for master valve is available on order.
Example of model coding: M4F411-08-3-C
The model code of Actuator for manifold is 4F418-00.

● Example of model code
4F111-06-P

It denotes to be 4F1, 2-position single, Master valve, connecting port Rp 1/8 w/P type mounting legs.