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CKD

CM-0421-A

INSTRUCTION MANUAL

DIRECT OPERATED 3-PORT SOLENOID VALVE

02
FS1-03 -3
04

- 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.

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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 instruction 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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Direct Operated 3-Port Solenoid Valve

Manual No. CM-0421-A

NOTE : Letters & figures enclosed within Gothic style bracket (examples such as [C2-4PP07] · [V2-503-B] etc.) are editorial symbols being unrelated with contents of the book.

Aug.23.1990
Revision. : Jul.12.2000

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1. PRODUCTS

1.1 Characteristics

1) These models withstand high frequent operation.
2) Spool motion is not influenced by Air pressure, Piping conditions and Direction of pressurization.

1.2 Specification

Model code / Item		FS1-02-3	FS1-03-3	FS1-04-3
Port size	Rc	1/4	3/8	1/2
Effective sectional area	mm^2	38	45	48
Operating method(manual operation)		Direct operated Metal spool valve (Non locking type)		
Media		Compressed air		
Working pressure range	MPa	0 to 1.0		
Fluidtemperature range	℃	5 to 60		
Ambient temperature range	℃	5 to 60		
Lubrication		Required (Use Turbine oil Class 1, ISO VG32)		
Wiring		Conduit, lead		
Response time	mS	20		
Mass	kg	0.85		

Coil Specifications

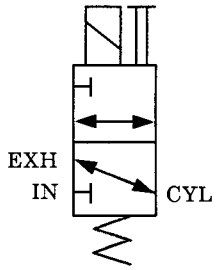
Item		Specifications	
Rated Voltage	V	AC100V (50/60Hz)	AC200V (50/60Hz)
Inrush current	A	2.0/1.3	1.0/0.7
Holding current	A	0.32/0.225	0.16/0.115
Power consumption	W	9/7 (50/60Hz)	
Insulation class		B type	

Note 1 : Will manufacture appropriately on order for out door installation or water dripping area. Provide a water proof cover over it when only standard model is available.

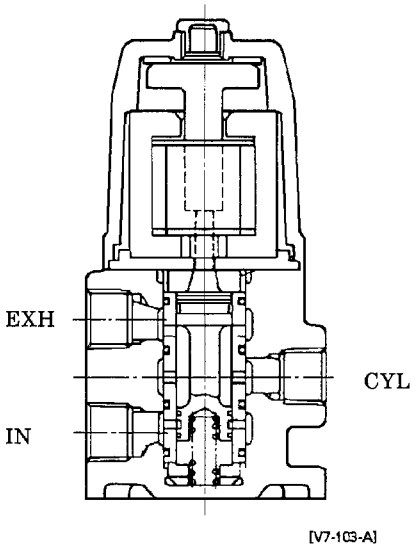
Note 2 : Eliminate such low frequent actuation as less than once a day.

[CM-0421-A]

1.3 JIS Symbol

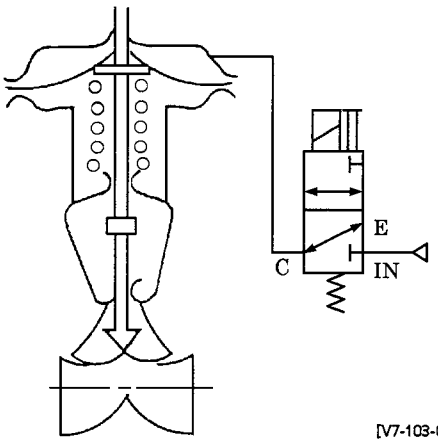


JIS Symbol

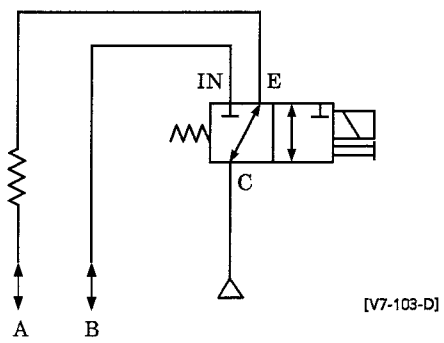


1.4 Fundamental circuit diagram

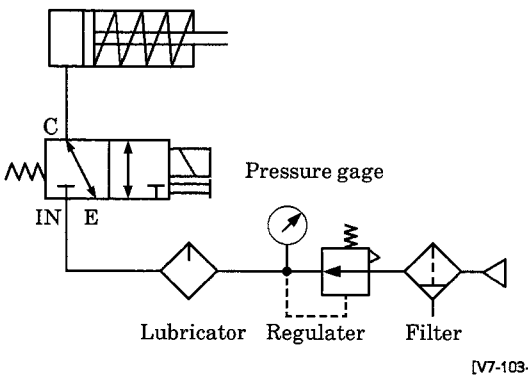
1. Connection to diaphragm valve



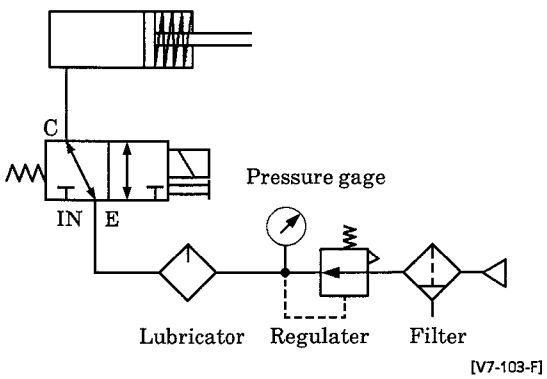
2. Connection to Flow direction shifting valve



3. Connection to Single acting cylinder and intending no actuation while valve is deelectrified.



4. Connection to Single acting cylinder but intending to actuate cylinder while the valve is de-electrified.



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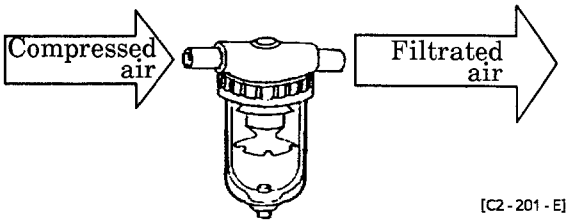
2
WARNING

2. CAUTION

2.1 Fluid

1) Use the compressed air, filtrated and dehumidified. Carefully select a filter of an adequate filtration rate (5μm or lower preferred), flow rate and its mounting location (as closest to directional control valve as possible).
2) Be sure to drain out the accumulation in filter periodically.
3) Note that the intrusion of carbide of compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of solenoid valve and cylinder. Be sure to carry out thorough inspection and maintenance of compressor.



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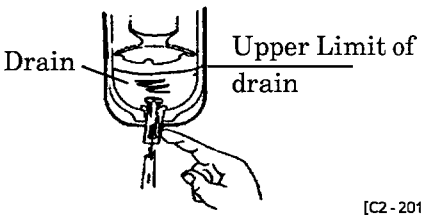


[C2-201-F]

2.2 Lubrication

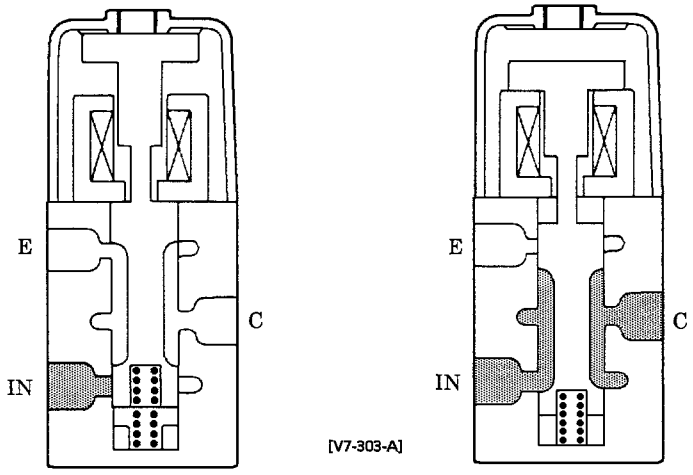
Use Turbine oil Grade 1, ISO VG32 (#90).
This solenoid valve must be lublicated by lublicator etc.

2.3 Operational caution

Eliminate such a low frequent actuation as less than once a day.

3. OPERATION

3.1 Outline of Actuation



[V7-303-A]

- While coil is demagnetized
  Spool is pushed back toward coil side due to expanding spring.
  Air is allowed to flow from C to E port.

- When coil is magnetized
  Plunger is attracted to magnetized coil pushing spool against spring.
  Air is allowed to flow from IN to C port.

3.2 Manual Operation

Except the Model of Option code P (Manual lock type), it becomes same condition as electrically magnetized when manually push the plunger with a stick after removing rubber cap on solenoid end cover. It returns, due to the spring force, to the same condition as demagnetized when releasing the stick.

4. INSTALLATION

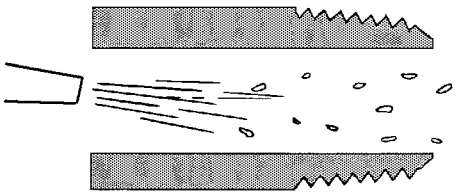
4.1 Wiring

1) Use the wire of core wire over 0.75mm^2.
2) Install a 3A fuse in the circuit for the purpose of circuit protection.
3) It is recommended the use of snap action switch(es) such as relay or magnetic switch to build a circuit.
4) Required voltage is marked on each solenoid housing.
5) The thread at leading out port of lead wire is G1/2.

4.2 Piping

1) Pealed rusts and foreign particle cause malfunction of valve or valve seat leakage. Install a filter preferably adjacent upper-stream to the solenoid valve.

2) Flushing
   (1) Prior to and after piping give a thorough flushing by removing solenoid valve, to blow off metal chip or any other foreign particles. Continue it for at least 3 minutes with pressure of 0.3MPa or over.

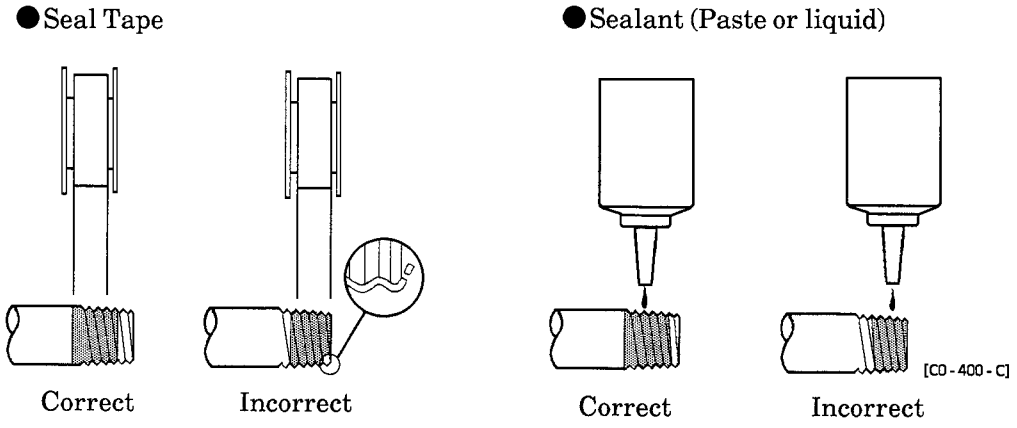


[C0-400-B]

   (2) After removing valve body, blow out foreign particles by supply compressed air from supply port. (For approx. one minute with pressure of 0.3MPa).
   (3) Thoroughly check for air leakage at every joint after the flushing.

3) Sealant

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.



4) Provide ample room within the system to hand tools for later maintenance work.

4.3 Posture of installation of valve

Make it general principal to mount it keeping coil vertical.

4.4 Mounting location

1) Avoid to install it in the location with vabration over 50m/s^2 or shock over 1000m/s^2.
2) Provide water-proove cover in case out-door installation or where water drips are expected. (Rain proof types are also available on order.)

5. MAINTENANCE

5.1 Disassembly of Valve Body

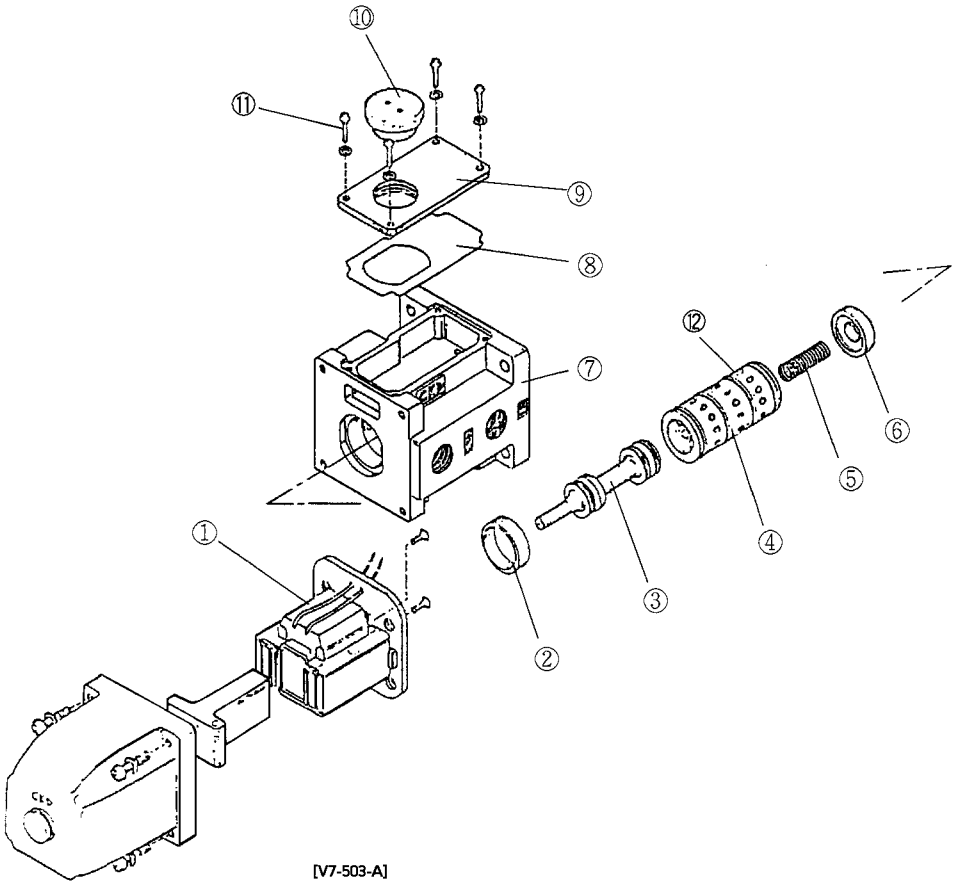
① Remove cover.
② Take out solenoid.
③ Pull out Spool.
④ Remove spring.
⑤ Pull out sleeve.

Refter to illustration

5.2 Maintenance Cautions

① Eliminate leaving pulled out spool in an open air for long. (Recommendable to keep it in oil.)
② Keep sleeve from disassembling as much possible, unless it is necessary to do. (O ring is apt to be damaged.)
③ Wear a pair of rubber gloves while removing sleeve and spool instead of handling them with bare hand. (Bare finger spot usually causes corrosion.)
④ Carefully wash dusts off and keep piston surface, spring hole and internal surface of sleeve from collecting any dust while assembling them back.
⑤ Fix the solenoid tightly. (It is apt to loosen under frequent operation, particularly.)

Disassembly drawing of Valve body



[V7-503-A]

No.	Parts	Material	Qty	Remarks
1	Solenoid ass'y		1	
2	Collar	STKM	1	
3	Spool	SUS	1	
4	Sleeve	SUS	1	
5	Spring	SWPB	1	
6	Stopper	PA6	1	
7	Body	AC4B	1	
8	Gasket	NBR	1	
9	Cover	PA6	1	
10	Bushing	NBR	1	
11	Cross recessed screw	SWRM	4	
12	O ring	NBR	4	

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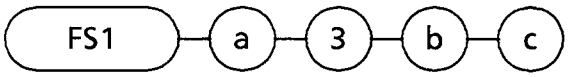
6. HOW TO ORDER



ⓐ Port size		ⓑ Option		ⓒ Voltage
02	Rc 1/4	P	With Manually Operation device (Lock type)	AC100V
03	Rc 3/8	C	With Snap Joint	AC200V
04	Rc 1/2	B	Round type terminal box	Note : Consult us then DC solenoid is required.
		G	With Round type terminal box Gland	
		U	Acid proof painting	

Note : o entry is necessary when no option is required.

- Example of Model coding FS1 - 02 - 3 - AC 100V

  It denotes that it is Direct Operated 3-port solenoid valve, Connecting port Rc 1/4, AC100V, without option

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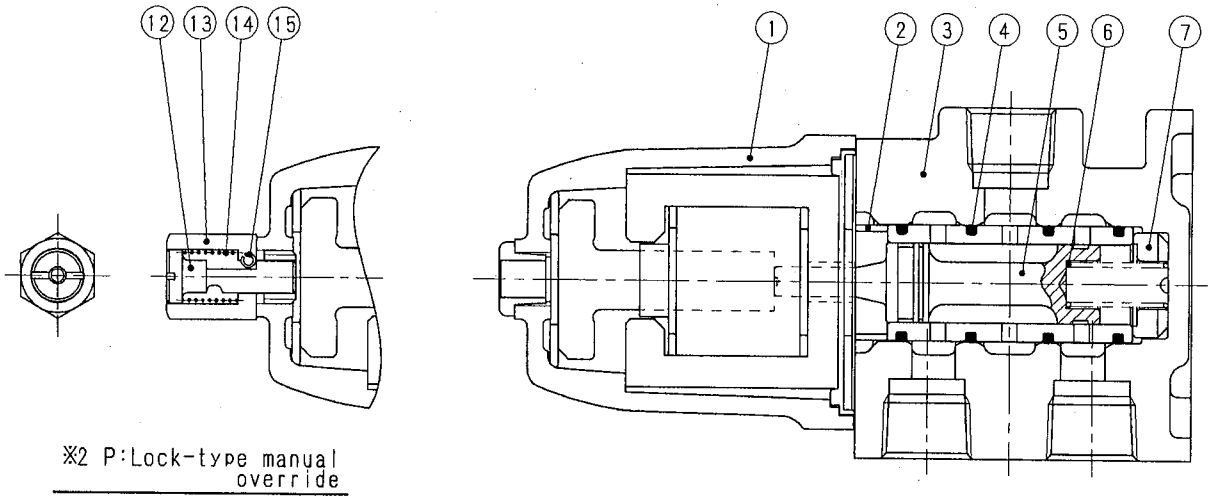
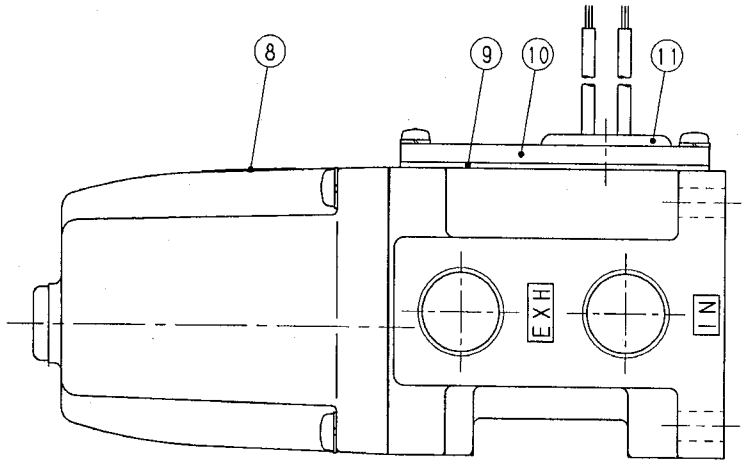


※2 P:Lock-type manual override



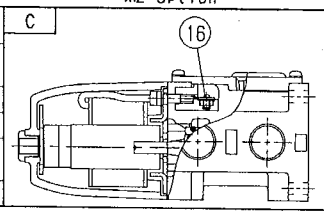
No	部品名 PARTS	材質/図番 MATERIAL/DRAW NO	数量 Q'TY	備考 REMARK
18	Circular terminal box	-	1	
17	Gland	-	1	
16	Connector assy.	-	1	
15	Spring pin	Steel	1	
14	Spring	Steel	1	
13	Guide	Steel	1	
12	Bushingrod	Steel	1	
11	Bushing	Acrylonitrile-butadiene rubber	1	
10	Cover	Polyamide	1	
9	Gasket	Acrylonitrile-butadiene rubber	1	
8	Identification plate	Tetronfilm	1	
7	Stopper	Polyamide	1	
6	Spring	Steel	1	
5	Sleeeve spool assy.	-	1	
4	O-ring	Acrylonitrile-butadiene rubber	4	
3	Body	Aluminim alloy casting	1	
2	Collar	Steel	1	
1	Solenoid assy.	-	1	

※1 Port size	
02	Rc1/4
03	Rc3/8
04	Rc1/2

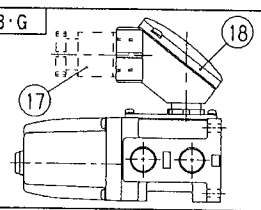
※3 Rated voltage	
AC100V	AC100V (50/60Hz)
AC200V	AC200V (50/60Hz)

※2 Option	
No code	No option (Lead wire type)
P	Lock-type manual override
C	Push-in connector
B	Circular terminal box
G	Circular terminal box with gland
U	Acid proof painting

C



B·G



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承認 APP'D	査閲 CH'D	設計 DES'D	第三角法		

仕様書No SPEC No	
品名 DESCRIPTION	DIRECT OPERATED 3 WAY VALVE (Internal structure drawings)
形番 MODEL	FS1-※1-3-※2-※3
図番 DRAW No	F3-8701119-A

CKD Corporation CAD

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