CKD

SM-3209-A

INSTRUCTION MANUAL

SELEX VALVE

4F110 4F120
4F130 4F140

- 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 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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SELEX Valve
Manual No. SM-3209-A

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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.

Apr.3.1989
Revision : Aug.7.2000

1. PRODUCTS

1.1 Specification

1) General Specification

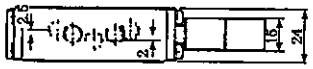
Item	Specification
Working fluid	Compressed air
Working pressure MPa	0.15 to 1.0 (Single) 0.1 to 1.0 (Double) 0.2 to 1.0 (3-Position)
Proof pressure MPa	1.5
Ambient temperature °C	−10 to 60 (Not to be frozen)
Fluid temperature °C	5 to 60
Lubrication	Not required (Use turbine oil type 1, ISO VG 32 when required)
Valve type and operation	Pilote type spool valve

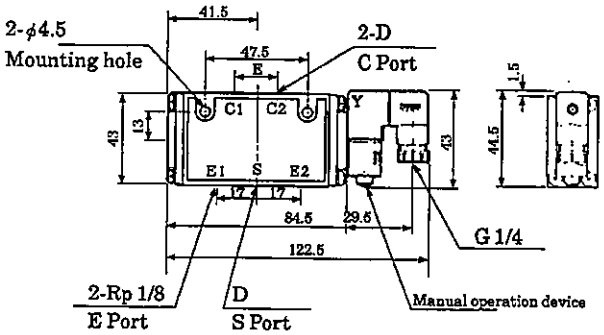
2) Electric specification

Rated voltage	AC100V (50/60Hz)	AC200V (50/60Hz)	DC12/24V	AC110V (50/60Hz)	AC220V (50/60Hz)
Starting current (A)	0.056/0.044	0.034/0.026	0.15/0.075	0.051/0.040	0.034/0.024
Holding current (A)	0.028/0.022	0.017/0.013		0.026/0.020	0.016/0.012
Power consumption (W)	1.8/1.4	2.1/1.6	1.8	1.8/1.4	2.1/1.6
Thermal class	B (Moulded coil)				

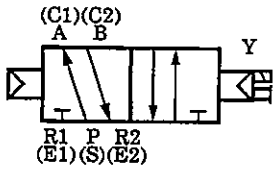
3) External dimensions

(1) 2-Position, Single solenoid, Small DIN terminal box type
Model 4F110





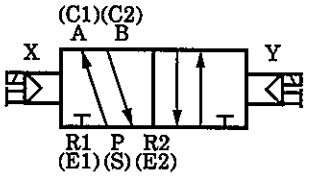
Symbol

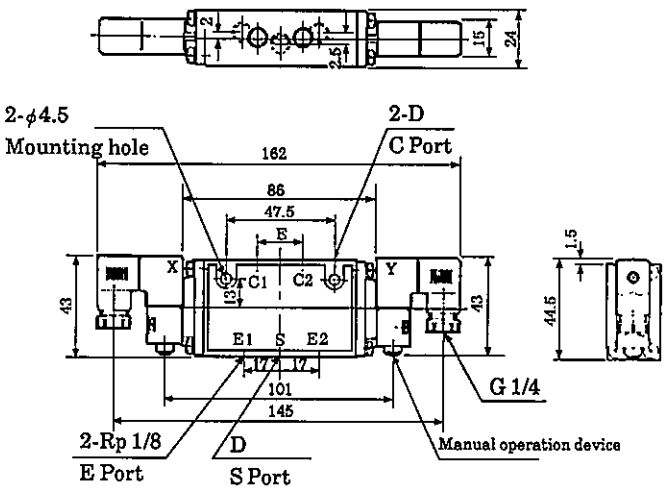


Marking / Model code	D	E
※-06	Rp 1/8	20
※-08	Rp 1/4	22

(2) 2-Position, Double solenoid, Small DIN terminal box type
Model 4F120

Symbol



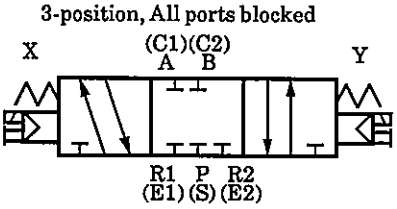


Marking / Model code	D	E
※-06	Rp 1/8	20
※-08	Rp 1/4	22

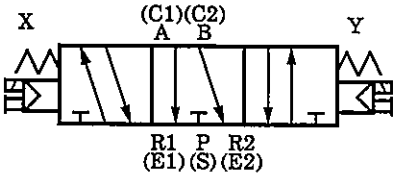
(3) 3-Position
Models 4F130 All ports blocked, Small DIN terminal box type
4F140 ABR connection, Small DIN terminal box type

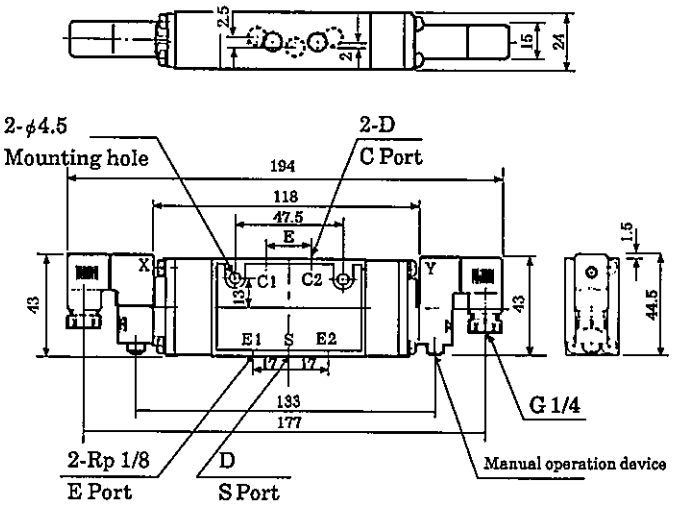
Symbol

3-position, All ports blocked



3-position, ABR connection



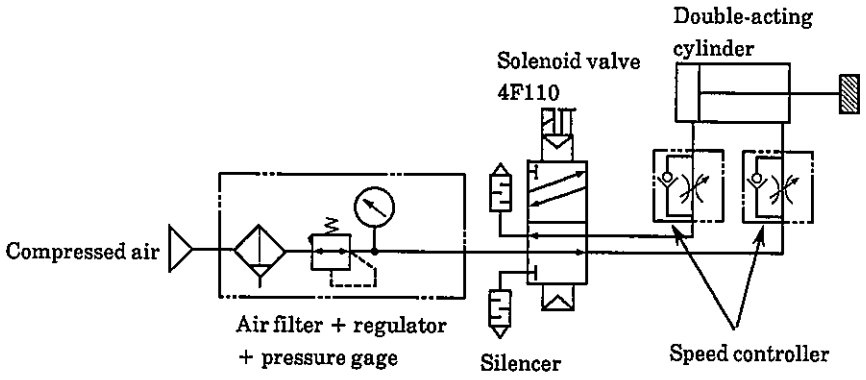


Marking / Model code	D	E
※-06	Rp 1/8	20
※-08	Rp 1/4	22

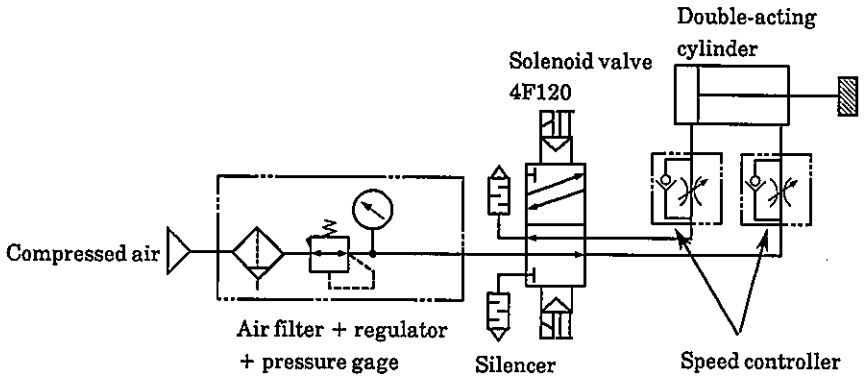
1.2 Fundamental circuit diagram

Fundamental circuit diagram to drive cylinder with 2-position valve, generally, appears as shown below.

1) 4F110

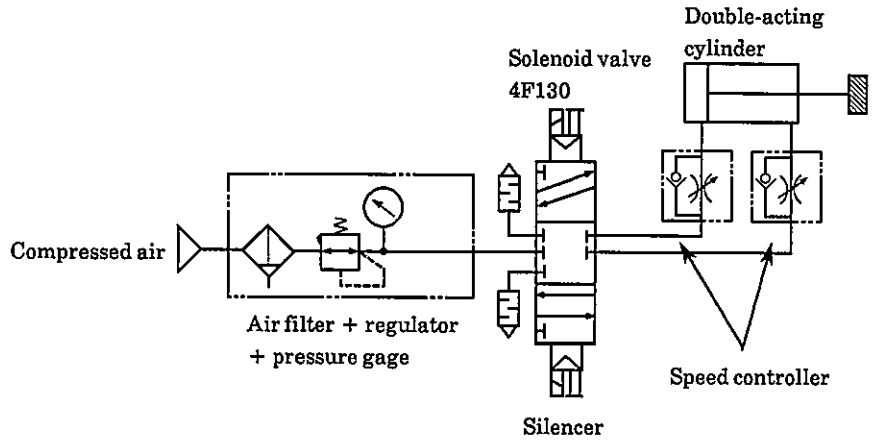


2) 4F120

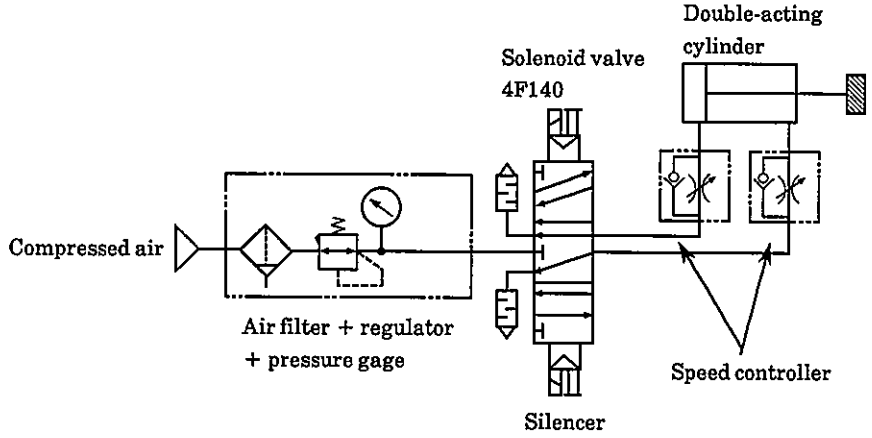


Fundamental circuit diagram to drive cylinder with 3-position valve, generally, appears as shown below.

3) 4F130



4) 4F140



2. CAUTION

2.1 Operational cautions

1) Environmental conditions

(1) When the solenoid valve is used in the area of much dust, please attach either a silencer or elbow joint downwardly to the R (Exhaust) port to keep the R (Exhaust) port from dust.

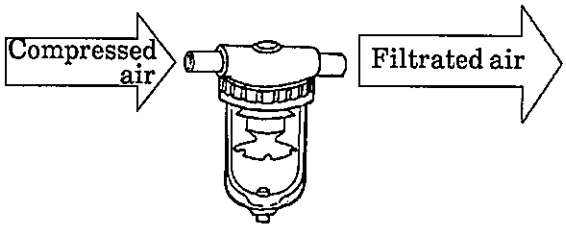
(2) Instead of leaving water or cutting coolant dripping over the solenoid, either provide a cover or install the solenoid enclosed by a box.

2) Installation auxiliary equipment.

(1) Air filter

Select a filter element of 5μm or smaller.

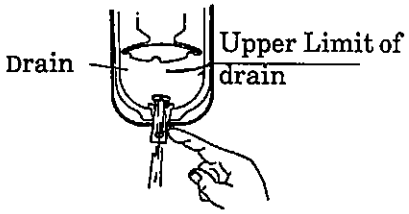
Periodically discharge the drain out of air filter.



(2) Lubricator

Both 4F110 and 4F140 do not particularly require lubrication. (Use Turbine oil, Type 1, ISO VG32 (Non-additive) if and when lubrication is preferred.)

Prevent to use spindle oil or machine oil, otherwise it may cause malfunction of system due to swollen packings.



3) Drain

Much drain (water which includes oxidized oil, tar and foreign particles) is contained within the compressed air. It destructs the reliability of pneumatic equipment remarkably. Consider the following remedies of removing such drain.

4) Improving the quality of compressed air

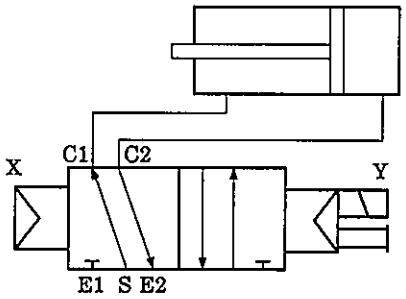
Dehumidifying by use of after-cooler and dryer, removing foreign particles by use of air filter and removing tarry accumulation by use of tar removal filter are effective to improve the quality of compressed air.

3. OPERATION

3.1 Electric Sigvnal Operatin

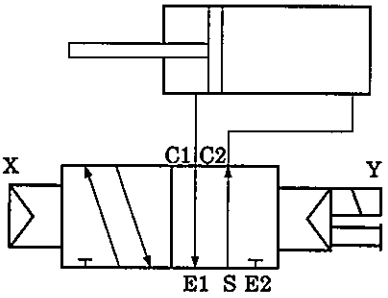
(a) 4F110

No signal current



From S (SUP) port to C1 (CYL 1) and from C2 (CYL 2) port to E2 (EXH 2)

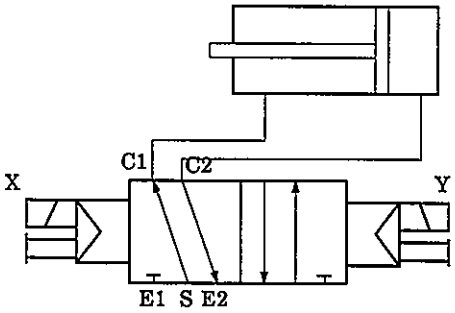
With signal current



From S (SUP) port to C2 (CYL 2) and from C1 (CYL 1) port to E1 (EXH 1)

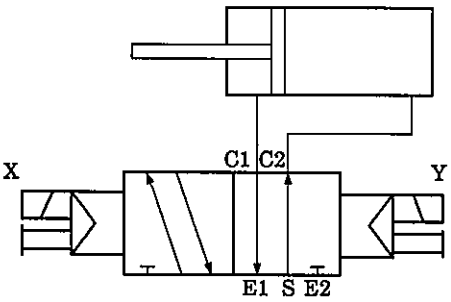
(b) 4F120

Current to X solenoid (This status of valve is held as is even after current is shut off.)



From S (SUP) port to C1 (CYL 1) and from C2 (CYL 2) port to E2 (EXH 2)

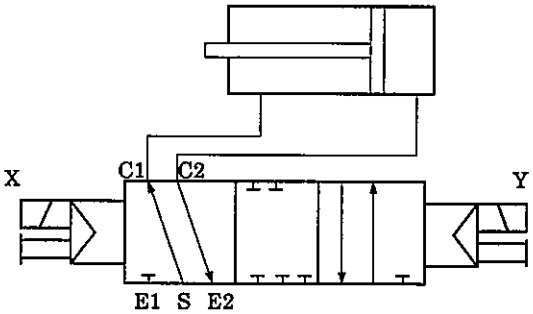
Current to Y solenoid (This status of valve is held as is even after current is shut off.)



From S (SUP) port to C2 (CYL 2) and from C1 (CYL 1) port to E1 (EXH 1)

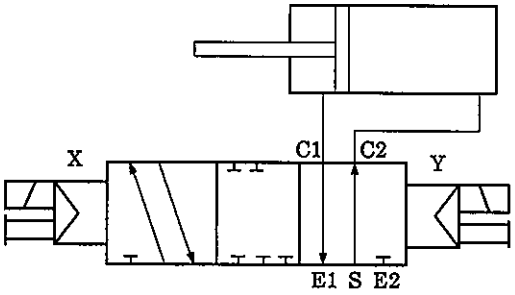
(c) 4F130

Current to X solenoid



From S (SUP) port to C1 (CYL 1) and from C2 (CYL 2) port to E2 (EXH 2)

Current to Y solenoid

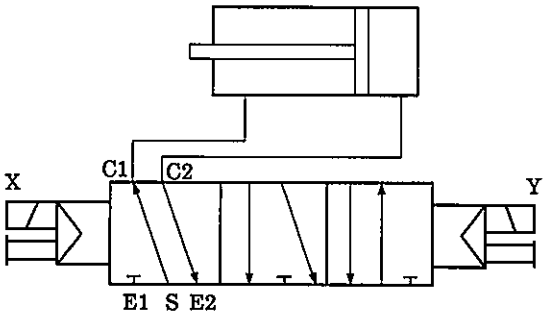


From S (SUP) port to C2 (CYL 2) and from C1 (CYL 1) port to E1 (Exh 1)

When both ends no current, each port S, C1, C2, E1 and E2 is blocked.

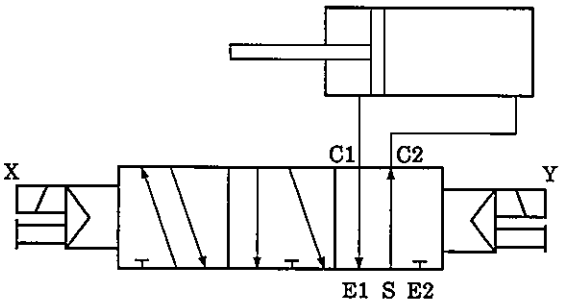
(d) 4F140

Current to X solenoid



From S (SUP) port to C1 (CYL 1) and from C2 (CYL 2) port to E2 (EXH 2)

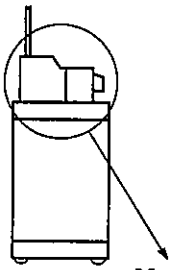
Current to Y solenoid



From S (SUP) port to C2 (CYL 2) and from C1 (CYL 1) port to E1 (EXH 1)

When both ends no current, S → blocked, C1 → E1 and C2 → E2.

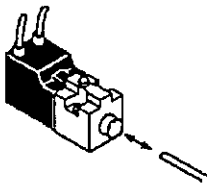
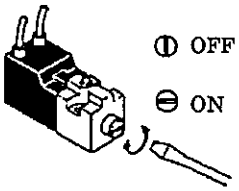
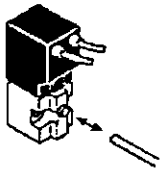
3.2 Manual Operation



When manually actuate a solenoid whichever side of valve, it is energized and manipulates the spool of valve accordingly.

Manual Contrql Fixture

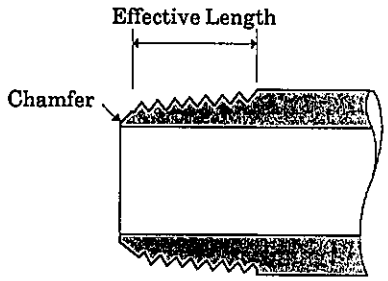
Manual control fixture

Model	Side fixture, Non-locking type	Side fixture, Locking type	Upright fixture, Non-locking type
Option coding	No code, M4	M1	M6
Appearance	 Push this button with a rod of less than ϕ3mm.	 Turn this fixture 90° with a screw driver of minus tip.	 Push this button with a rod of less than ϕ2mm.

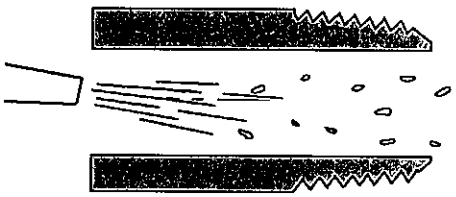
4. INSTALLATION

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) See to it that the pipe connecting cylinder and solenoid valve has effective sectional area needed for the cylinder to drive at specified speed.
3) Install filter preferably adjacent upper-stream to solenoid valve for eliminating rust, foreign substance and drain in the pipe.
4) Strictly observe the effective thread length of carbon steel pipe and give a chamfer of approx. 1/2 pitch from the threaded end.

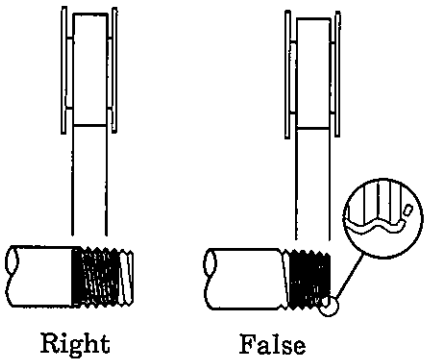


5) Flush air into the pipe to blow out foreign substances and chips before piping.

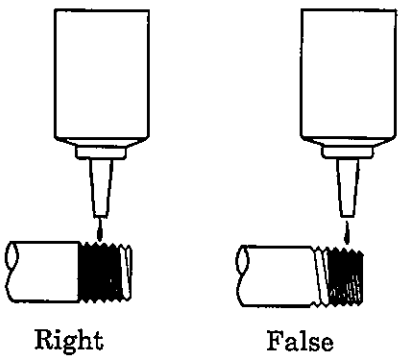


6) Refrain applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

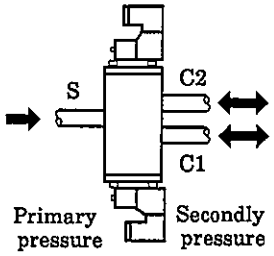
● Seal Tape



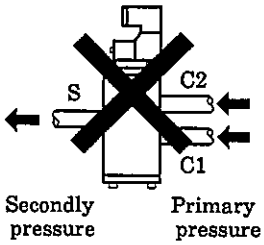
● Sealant (Paste or liquid)



7) Beware that the direction of air flow for the solenoid valve of this type is strictly specified. Carefully build the system.

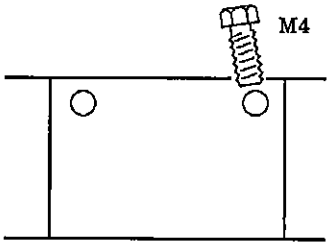


(Correct)

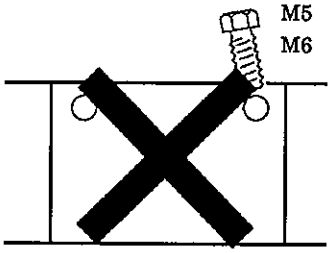


(Incorrect)

8) Use M4 bolt to mount the solenoid valve of this type. Adequate length of the bolts is 21mm.



(Correct)



(Incorrect)

9) Select an appropriate mounting location for valve, while designing a lay-out of circuit, where only the least vibration or shock is generated or nil.

10) Design plumbing circuit so as to provide an ample space for handling tools during later maintenance works.

11) Inspect against any external leakage at each threaded joint upon completion of plumbing, by applying soapy water over it.

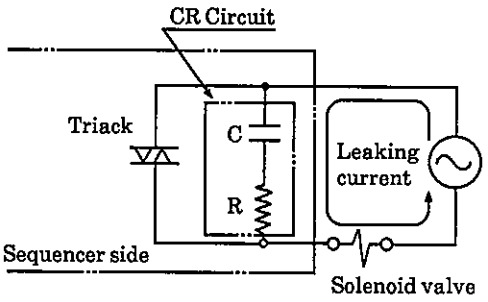
4.2 Wiring

1) Cautions of wiring
   (1) Install a 0.5 - 1A fuse in the circuit. to provide a protection.
   (2) It is recommended the use of snap action switch(es) such as relay or magnetic switch to build a circuit.
   (3) Use connector type (C, C1, C2 & C3) in the area with least mount of dust and where no splashing water or oil takes place.
   (4) Maintain voltage within the variation of ± 10% of the rated voltage.
   (5) Be extremely careful that it apt to give some undesirable effect to the function of product due to the leaking current through the CR element, when attempting to make use of the sequencer which has built-in CR circuit for absorbing surge voltage from the switching element.

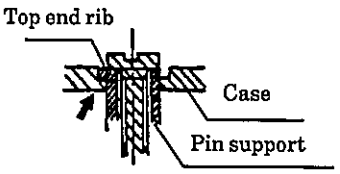
Unit: mA

		With Surge killer
AC200V	1.5	3
AC100V	3	6
DC24V	1.8	3

Regulate the residual leaking current within the limitations as above.

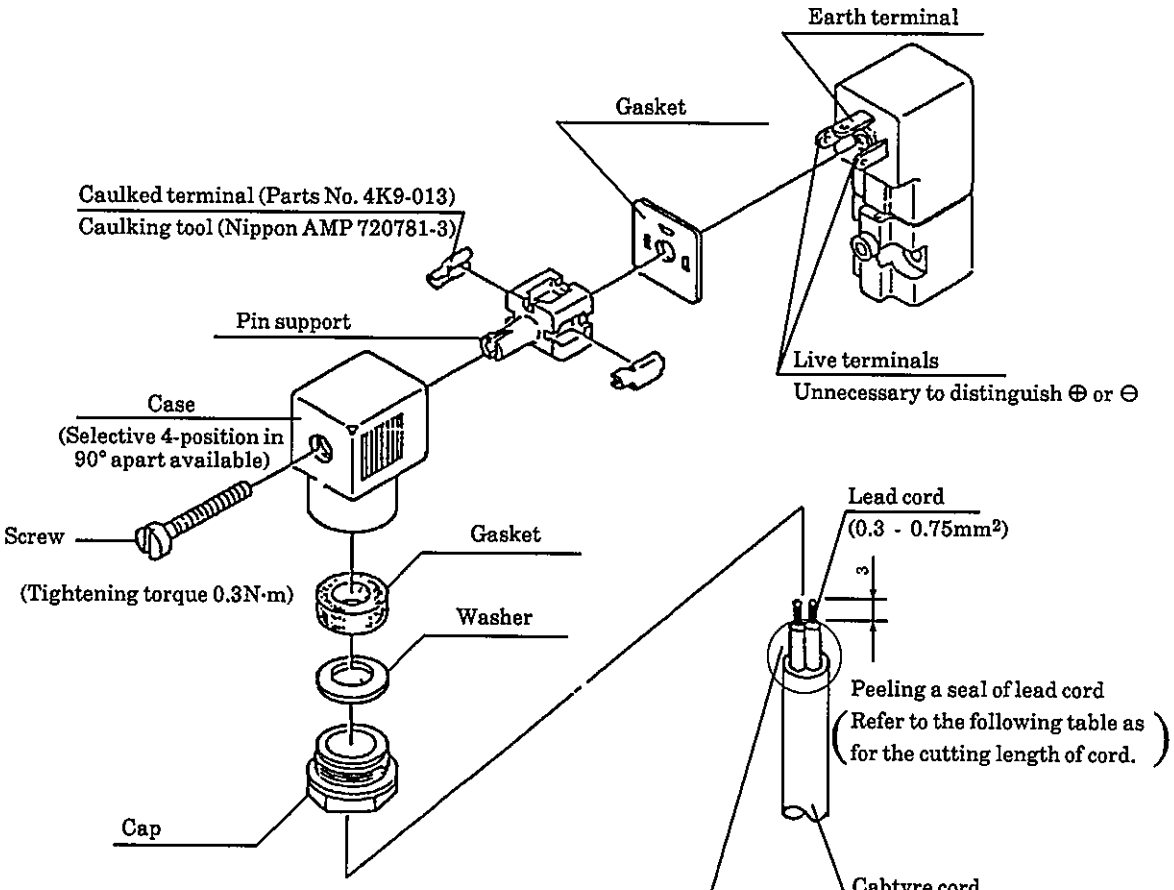


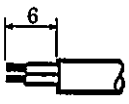
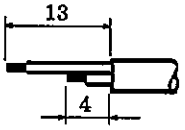
2) Wiring of small terminal box (B)
   (1) Use the following tools to caulk the terminal piece on cord. Tool No. 720781-3, made by Nippon AMP.
   (2) Think of direction of cord when placing caulked terminal pieces into the slits of the pin support.



   (3) Hook the top rib of pin support to the hole edge of the case when assembling the case as per illustrated right.
   (4) Use lead cord of sectional area 0.3 - 0.75 mm^2.
   (5) The cord outlet of case can be mounted in four different positions in 90° apart.
   (6) Use JIS C3306 VCTF0.75mm^2, 2-core, less than ϕ6.6 OD when intend to use cabtyre cord of round section.
   (7) Tighten cap against the case upon insertion a gasket and a washer.

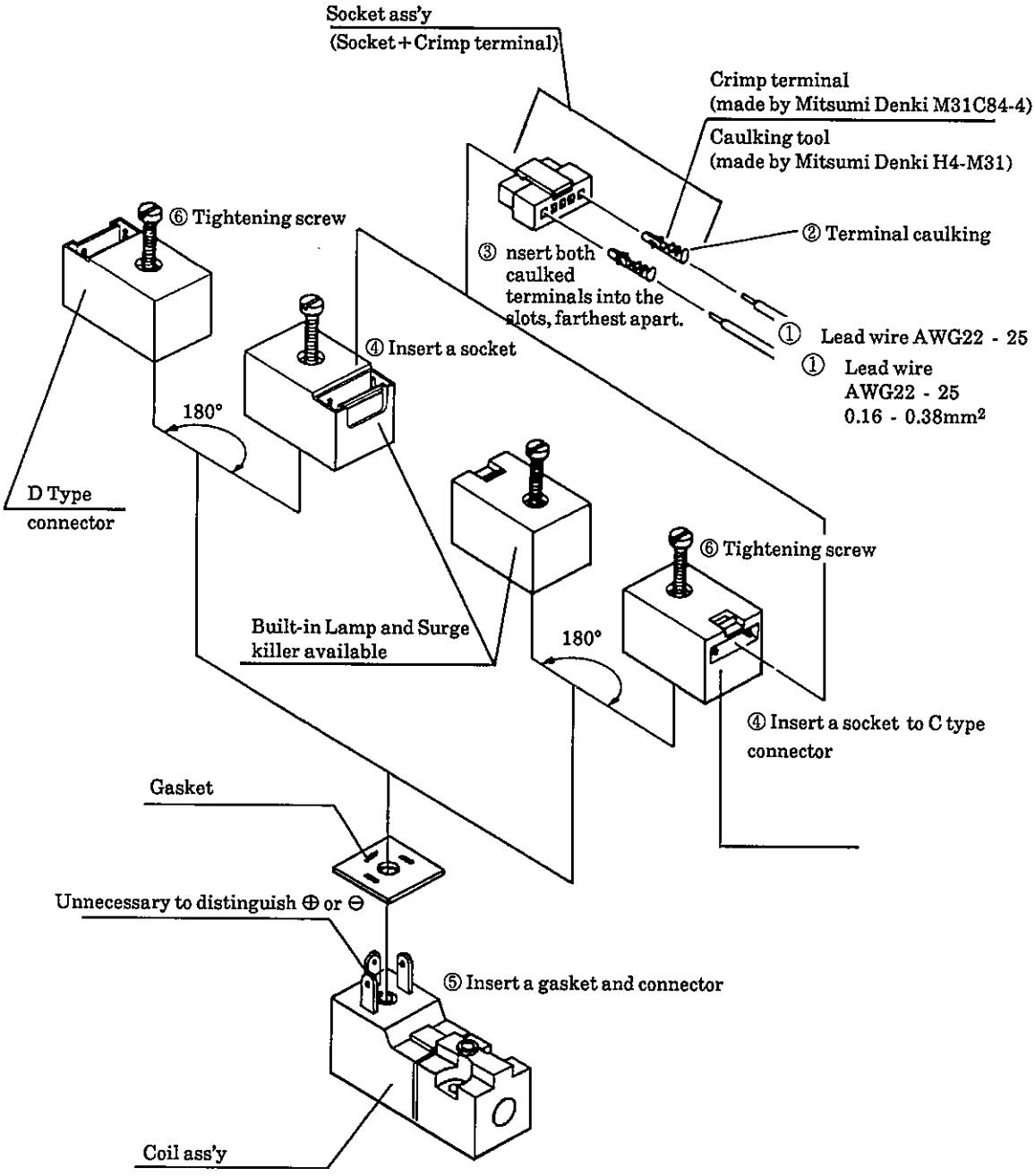
Wiring in small terminal Box (B)



	Direction of the case as per illustrated above or 180° opposite.	Direction of the case 90° to the right or left off per illustrated as above.
Length of lead cord		

3) Wiring the connector Model C and Model D

Wire either connecter in the sequence of ① to ⑤ referring the following illustration.



5. MAINTENANCE

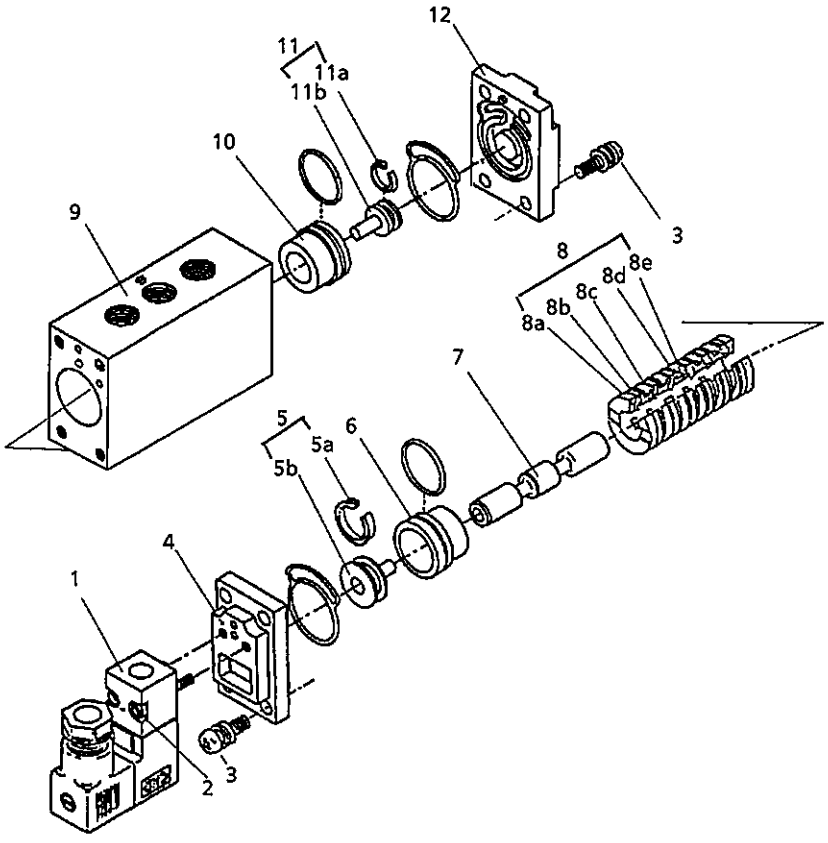
5.1 Trouble Shooting

Trouble	Cause	Countermeasure
Does not operate	No pressure or inadequate pressure	Provide an adequate pressure source.
	Signal is not transmitted to direction control valve	Correct the control circuit.
	Manual control button is left "On" status (Only the model M1)	Return the manual control button "Off" status.
	Damage to pilot valve	Replace the pilot valve.(1)
Does not function smoothly	Many foreign particles caught by spool	Disassemble the spool(7) and remove the caught foreign particles.
	Damage or tear and wear of piston packing	Replace piston ass'y (8).
Air leaks	Tear and wear of piston packing (External leakage.)	Replace piston ass'y (11) & (5).
	Tear and wear of spool packing (E port leaking)	Replace seal ass'y (8).
Unusual noise out of coil section	Wear and tea of pilot valve	Replace pilot valve (1).

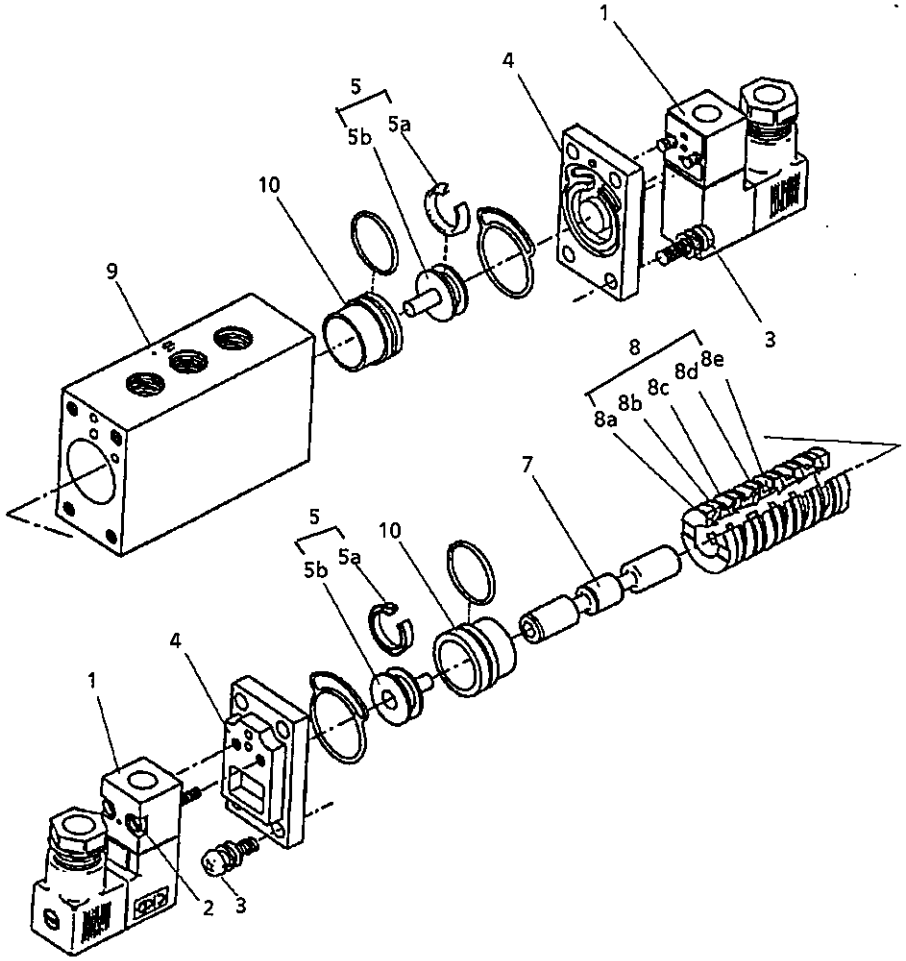
Refer to the Disassembling Drawing as for parts numbers used above.

5.2 Disassembling and Assembling

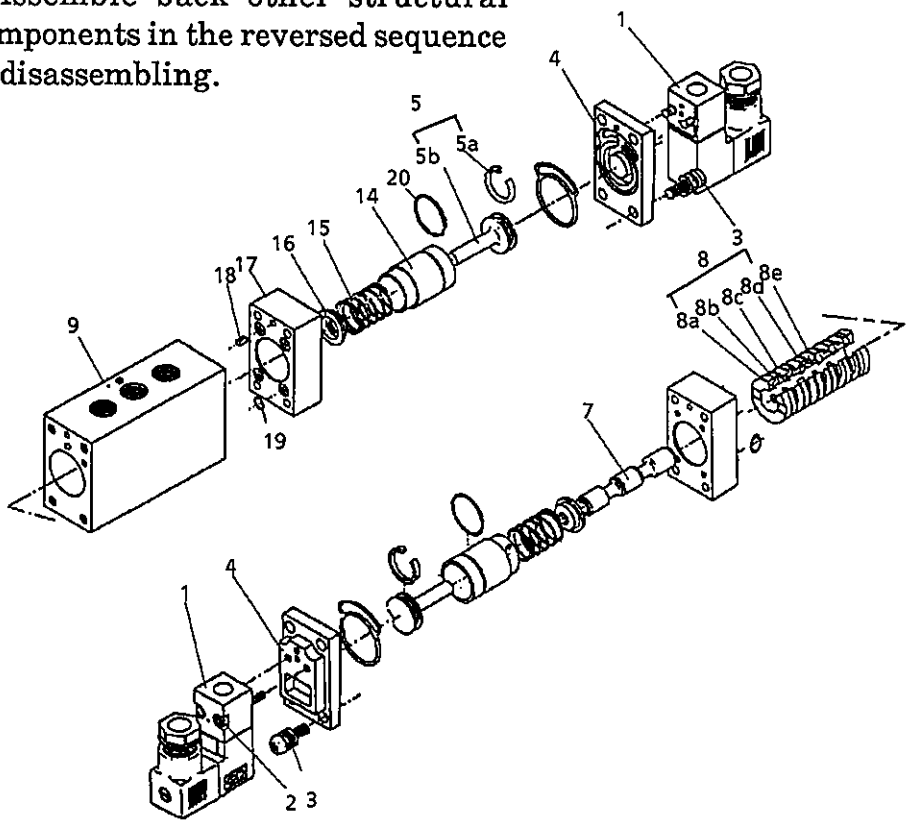
1) Model 4F110 Disassembling
   (1) Remove the mounting screws 2 to take out the solenoid 1.
   (2) Remove the mounting screws 3 to take out the caps 12.
   (3) Pull out piston ass'y 11 first and cylinder 10 out of Y side of body.
   (4) Pull out piston ass'y 5 then remove cylinder 6 away from X side of valve body.
   (5) nsert cylinder ass'y 5 back to the bore of X end of the valve body then push it through the bore all the way out to Y end. Components of internal structure such as spool 7 and seal ass'y 8, then, come out of the valve body.
2) Model 4F110 Assembling
   (1) When ready to start assembling, be sure to wipe off the dust from the surface of piston ass'y 5 & 11, spool 7 and seal ass'y 8 at where only least amount of dust is expected and apply grease of litium list, alkali base.
   (2) Insert seal component one at a time into the bore of valve body 9 to build up the seal ass'y. Assuming the S port as an assembly center of the seal ass'y, carefully watch the direction of lip and inserting order of each seal.
   (3) Assemble back other structural components in the reversed sequence of disassembling.



1) Model 4F120 Disassembling
   (1) Remove the mounting screws 2 to take out the solenoid 1.
   (2) Remove the mounting screws 3 to take out the caps 4.
   (3) Pull out piston ass'y 5 first and cylinder 10 out of Y side of body.
   (4) Insert cylinder ass'y 5 back to the bore of X end of the valve body then push it through the bore all the way out to Y end. Components of internal structure such as spool 7 and seal ass'y 8, then, come out of the valve body 9.
2) Model 4F120 Assembling
   (1) When ready to start assembling, be sure to wipe off the dust from the surface of piston ass'y 5 & 5, spool 7 and seal ass'y 8 at where only least amount of dust is expected and apply grease of litium list, alkali base.
   (2) Insert seal component one at a time into the bore of valve body 9 to build up the seal ass'y. Assuming the S port as an assembly center of the seal ass'y, carefully watch the direction of lip and inserting order of each seal.
   (3) Assemble back other structural components in the reversed sequence of disassembling.

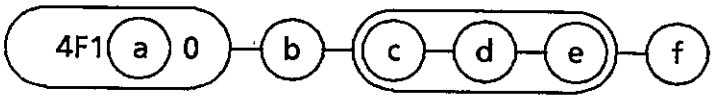


1) Model 4F130 & 4F140 Disassembling
   (1) Remove the mounting screws 2 to take out the solenoid 1.
   (2) Remove the mounting screws 3 to take out the caps 4 and, at the same time, together with body block 17, spring 15, spring seat 16 and cylinder 14.
   (3) Insert piston ass'y 21 from Y end of the body all the way through body 9 and components of internal structure and seal ass'y 8 come out of the valve body 9.
2) Model 4F130 & 4F140 Assembling
   (1) When ready to start assembling, be sure to wipe off the dust from the surface of piston ass'y 5 & 5, spool 7 and seal ass'y 8 at where only least amount of dust is expected and apply grease of litium list, alkali base.
   (2) Insert seal component one at a time into the bore of valve body 9 to build up the seal ass'y. Assuming the S port as an assembly center of the seal ass'y, carefully watch the direction of lip and inserting order of each seal.
   (3) Assemble back other structural components in the reversed sequence of disassembling.



Parts No. Parts name / Model	5 Seal ass'y	7 Piston ass'y Ⓐ	11 Coil Model No.	14 Piston ass'y Ⓑ
4F110	4F9-112	4F9-110	4F9- Microsol body Model No. (Basic P5132-MOB- voltage)	4F9-111
4F120				——
4F130		4F9-159		
4F140				

6. MODEL CODING



ⓐ Solenoid position	
1	2-position, single
2	2-position, double
3	3-position, All port blocked
4	3-position, ABR connection

ⓑ Port size	
06	Rp 1/8
08	Rp 1/4

ⓒ Manual override	
No code	Non-locking type
M1	Locking type
M4	Non-locking type with dust proof cover
M6	Non-locking type, upright
R	Manual, position change

ⓓ Electrical connections		
No code	Small DIN terminal box	
E	Grommet lead wire	
L	Small DIN termnal box	with lamp
	C type connector	
C	Lead wire length (300 mm)	
C1	No lead wire	
C2	Lead wire length (300 mm)	surge absorber and lamp provided
C3	No lead wire	surge absorber and lamp provided
	D type connector	
D	Lead wire length (300 mm)	
D1	No lead wire	
D2	Lead wire length (300 mm)	surge absorber and lamp provided
D3	No lead wire	surge absorber and lamp provided

ⓔ Other options	
P	Mounting feet (for 2-position, single)
P1	Mounting feet
S	Surge absorber attached
N	With plug (for 3-position, single)
NC	3-direction valve (C1 : A, E1 : R1) plug appended
NO	3-direction valve (C2 : B, E2 : R2) plug appended

ⓕ Rated voltage	
AC100V	100 VAC 50/60Hz
AC200V	200 VAC 50/60Hz
DC12V	12 VDC
DC24V	24 VDC
AC110V	110 VAC 50/60Hz
AC220V	220 VAC 50/60Hz

Note : Solenoid coil for AC100V and AC200V are serviceable with AC110V and AC220V 60Hz