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SM-50389-A/1

INSTRUCTION MANUAL

FOR

COOLANT VALVE

CV3 SERIES

CVS3 SERIES

Prior to using the Product, it is essential to read this INSTRUCTION MANUAL, especially the description of safety-use issue.

For quick reference whenever necessary, keep this INSTRUCTION MANUAL in a good manner.

CKD Corporation

FOR SAFETY USE

The Product is to be used by those who has a basic knowledge about material, fluid, piping electricity regarding Control Valves (solenoid valves, motor valves, air operated valves and so on.)

Never use this Product by those who have no knowledge or are not well trained about Control Valves.

Should be any trouble or accident caused by a wrong selection and/or wrong use of the Product even by a person of basic knowledge about Control Valves, we are not responsible therefore.

Since any customer of the Product have a variety of its application, we are not in a position to get all the information on how and where the Product is used. There may be the cases where that the Product may not meet customers' requirement or may cause any trouble or accident, by fluid, piping or other condition that are not within the specifications of the Product.
Under such a circumstance, select with their responsibility the most suitable application and use of the Product according to the customers' requirements.

The Product incorporates a various safety arrangement, however miss-handling of the product may lead to any trouble or accident on customers side. **To avoid any possible trouble, read this INSTRUCTION MANUAL carefully and understand it fully.**

Pay your attention to the items described in this Text, as well as the items indicated below.

⚠ CAUTIONS

- **When energized, heat is generated at coil portion of solenoid valves and motor valves particularly "Class H" coil where may have a high temperature.**

- **There my have electric shock when wire connecting portion of solenoid valves or motor valves are touched. In case of disassembly or inspection, turn off power supply beforehand. Don't touch live portion by wet hands.**

- **Make piping so as not to have leakage and check for no leakage before use, because in case of control valves for high temperature fluid like steam, leakage may cause heat injury.**

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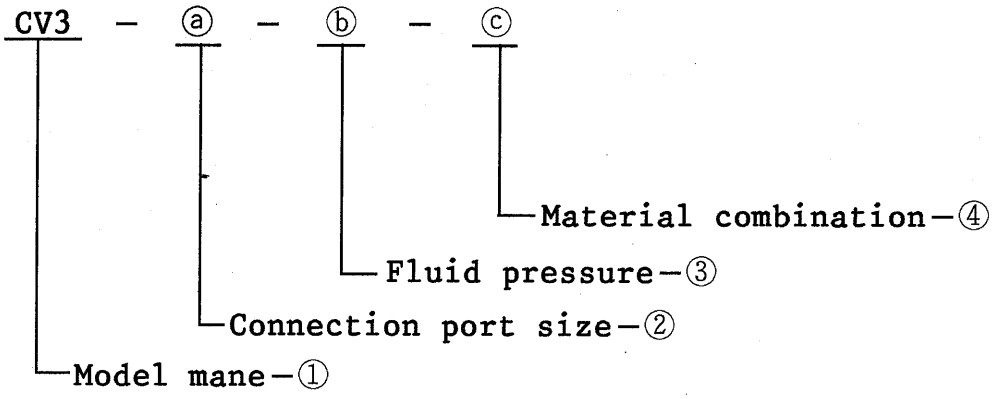
SM-50389-A

1. METHOD TO SPECIFY THE MODEL



① Model name

CV3	Air-operated type

② Connection port size

ⓐ	Connection port size
10A	Rc 3/8
15A	Rc 1/2
20A	Rc 3/4
25A	Rc 1
32A	Rc $1\frac{1}{4}$
40A	Rc $1\frac{1}{2}$
50A	Rc 2

③ Fluid pressure

ⓑ	Fluid pressure
17	0~1.75MPa { 0~17.5kgf/cm^2 }
35	0~3.5MPa { 0~35kgf/cm^2 }
70	0~7.0MPa { 0~70kgf/cm^2 }

④ Material combination

ⓒ	Material combination	
	Body	Seal
0	Corbon steel	Nitrile rubber
B	Corbon steel	Fluoro rubber

NOTE

(1) Body materials for fluid pressure 70 and 17, 35 of port sizes 10A, 15A are stainless steel.

(2) Connection port sizes differ from fluid pressure.
For details please refer to the relevant catalogs.

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CVS3 – ⓐ – ⓑ – ⓒ ⓓ ⓔ – ⓕ

- ⓕ Reted voltage – ⑦
- ⓔ Other options – ⑥
- ⓓ Coil – ⑤
- ⓒ Material combination – ④
- ⓑ Fluid pressure – ③
- ⓐ Connection port size – ②
- CVS3 Model mane – ①

① Model name

CVS3	Solenoid valve mounted type

② Connection port size

ⓐ	Connection port size
10A	Rc 3/8
15A	Rc 1/2
20A	Rc 3/4
25A	Rc 1
32A	Rc $1\frac{1}{4}$
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50A	Rc 2

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④ Material combination

ⓒ	Material combination	
	Body	Seal
0	Corbon stell	Nitrile rubber
B	Corbon stell	Fluoro rubber

⑤ Coil

ⓓ	Coil
2G	With DIN terminal box
2H	With DIN terminal box and lamp
3T	With T type terminal box
3R	With T type terminal box with lamp

⑥ Other options

ⓔ	Other options
No symbol	No option
S	With surgekiller

⑦ Reted voltage

ⓕ	Reted voltage
1	AC100V 50/60Hz,110V 60Hz
2	AC200V 50/60Hz,220V 60Hz
3	DC24V

NOTE

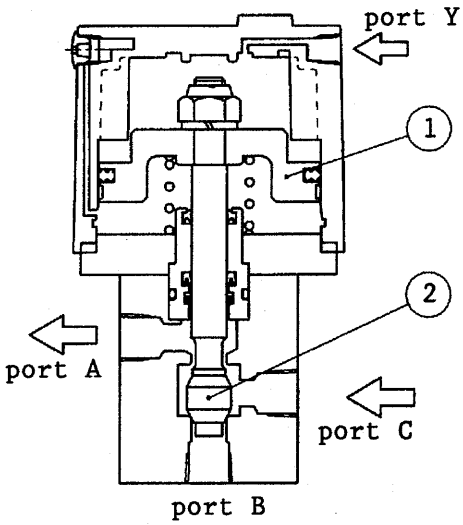
(1) Body materials for fluid pressure 70 and 17, 35 of port sizes 10A, 15A are stainless steel.

(2) Connection port sizes differ from fluid pressure.
For details please refer to the relevant catalogs.

2. OPERATING PRINCIPLES

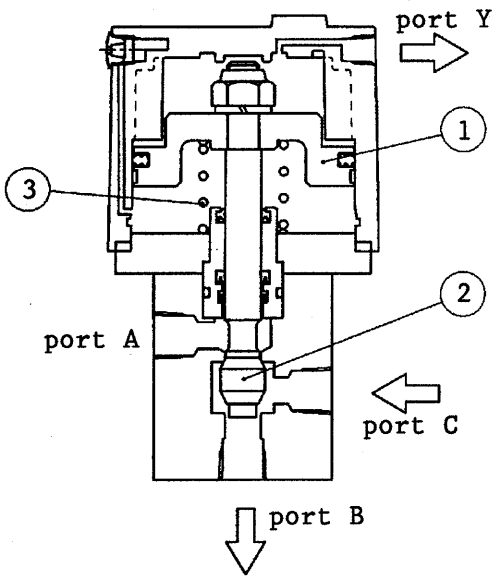
CV3

When operated



Charging compressed air into port Y,it's supplied to piston's① upper chamber,pushing the piston and vaive stem② downward. The port B is closed and the fluid flows into the port A.

When returned



Discharging compressed air charged in port Y. The piston① and valvestem② are pushed upward by spring③. The port A is closed and the fluid flows into the port B.

3. PRECAUTIONS

3-1. Precautions Prior to Operation

(1) The working pressure must be within the normal operating range. If your application exceeds the specified range,poor operation and/or external leakage may result.

(2) Pilot air can be supplied without lubrication. If in any circumstances it should require lubrication,a class 1 ISO VG32 (#90) turbine oil or its equivalent should be used. In this case,use a filter having an element of 5μm or less.

(3) The ambient and fluid temperatures must be within the normal operating range. If conditions exist where frozen fluid might possibly result,insulation must be provided.

(4) A suitable filter must be mounted at the inlet side of the valve if dust and/or foreign matter might possibly get in,or in cases where rust might possibly result in the piping. 80-100 mesh shall be used as a guideline.

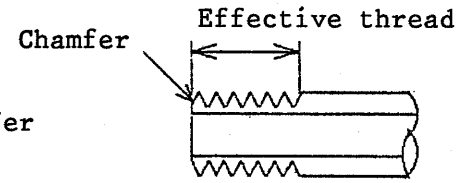
(5) The CVS3 series cannot be used in potentially explosive gas environments. When using in a potentially explosive gas environment,select the CV3 serises (separate application) anti-explosive type solenoid valve for use in the pilot circuit.

(6) If the main body is subject to being splashed by large amounts of water,oil,etc.,it should be suitably protected,such as by enclosing with a panel or cover. Especially the ports with no pilot air supply are released to the atmosphere and, therefore, requires careful handling to prevent the intrusion of water, etc.

(7) When using with high temperature material flow with the air-operated type (CV3 series) select fluoro rubber as the seal material. However select a material with a high temperature tolerance up to 80°C. (When using nitrile material as the rubber material or when using solenoid valve mounted type,select a material with a high temperature tolerance up to 60°C.)

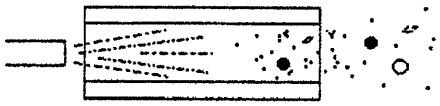
(8) Water hammering occurs when there is a difference between the flow rate from port C to port A,and the flow rate from port C to port B. To correct this by applying a fixed load to the coolant pump,install a needle valve on the OUT side of the CVS3 and adjust the pressure so that the pressure during flow to the machine side,and pressure during flow to the tank return side are approximately the same. Please note when using this 3 port valve as a 2 port valve that the piping is different. Please refer to 3-2 piping precautions(6) for the correct procedure.

3-2. Piping Precautions



(1) The gas piping should be threaded to cover the effective thread length. Chamfer about a half pitch at the thread's end.

(2) Always blow the piping with air to remove any foreign matter,chips,etc., before connecting.



(3) Avoid getting any selant,sealing tape, etc.,in the piping. The amount of sealant and the location of taping should be suitable and appropriate.

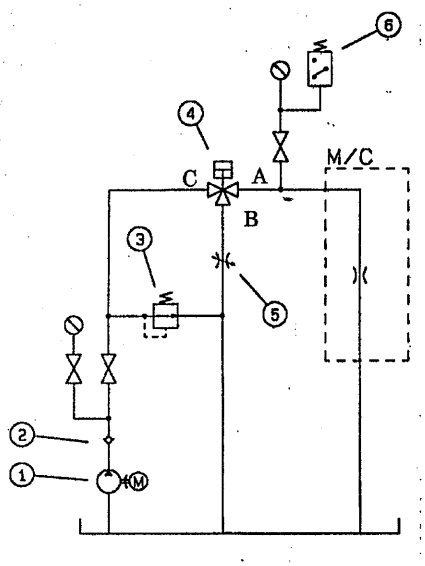
(4) The piping should be provided with a bypass circuit. This facilitates storage and maintenance.

(5) Do not try to use the solenoid valve for routing piping. This may result in damage.

(6) The piping should be such that the supply ports on the body end and pilot control end are as indicated in the table below.

Body end supply port	Pilot control end supply port
port C	port Y

SAMPLE FLOW CIRCUIT



① Coolant pump
② Check valve
③ Hydraulic relief valve
④ CVS3(Coolant valve 3 port valve)
⑤ Flow adjustment needle

The flow rate is adjusted by a needle valve to ensure that a fixed load is applied to the coolant pump. The flow rate is set by watching the main piping pressure meter and adjusting for about the same flow rate as when the coolant fluid is flowing to the machine side. The optimum valve in other word that point at which no fluctuations appear on the pressure meter is adjusted by turning the CVS3 on and off.

Note:When the tank return flow rate is constricted too much with respect to the flow to the machine side.Water hammering may occur during valve return of the CVS3. This means a larger flow rate should be set for tank return flow than for machine side flow.

⑥ Pressure switch

※ Please note that since the CVS3 is not of anti-water hammer construction,using it as a 2 port valve will cause water hammering and shorten the operating life of the valve and pump. When using it as a 2 port valve always route the body end supply port as shown in the table below.

Operation classification	Supply port	Discharge port	Plug
Normally closed type	Port A	Port C	Port B
Normally open type	Port B		Port A

(7) The port X to which no pilot pressure will be applied should be left open to the air. Also,it should be appropriately portected from dust,such as by installing a silencer or elbow joint with its opening facing down,if a large amount of dust is present in the ambient air. Also,if you do not want to allow the valve to intake or discharge air directly from its surroundings—in cases where air around the valve is contaminated,or where the scattering of dust in the surrounding atmosphere must be avoided,etc.,the CV3/CVS3 should be provided with piping leading to a place where no such problem is anticipated.

(8) Use the three or four—way solenoid valve for pilot control available from CKD Corporation. The peripheral devices(tube,joint,etc)for the related pilot port should be suitable to the specifications and applications of the solenoid valve for pilot control.
(For details please refer to the relevant catalogs.)

(9) When the piping is connected,make sure that no leakage is possible from connections. Also,introduce the fluid and perform several test runs to see that it operates normally.

3-3 Notes on wiring

(1) Use a wire cable with a nominal cross-width section of a minimum 0.5mm^2. Use an outer diameter of 4.5mm-7mm for cabtyre cord in the case of a DIN terminal box.

(2) Install a 0.5~1A fuse in the circuit.

(3) Use a voltage within 10% of the rated voltage.

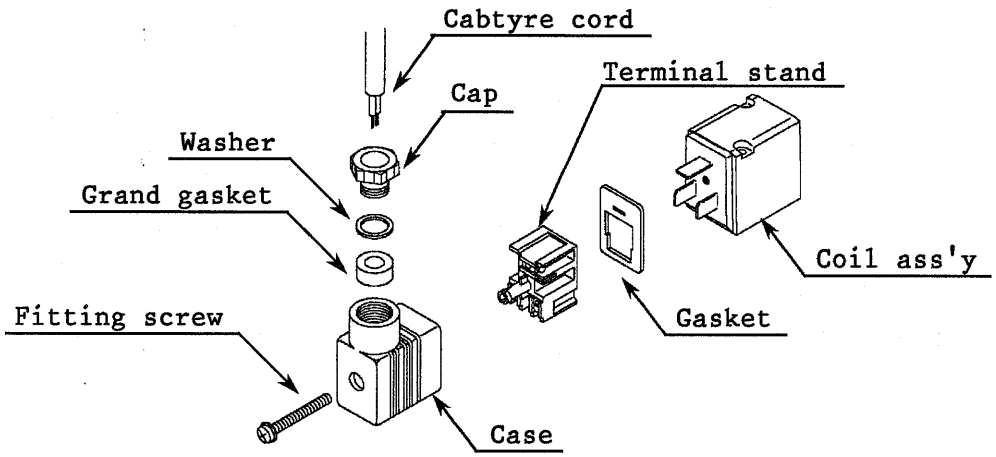
(4) When using a no-contact relay circuit,beware of leakage current.

AC100V	3	(6)mA or less
AC200V	1.5	(3)mA or less
DC 24V	1.8	(3)mA or less

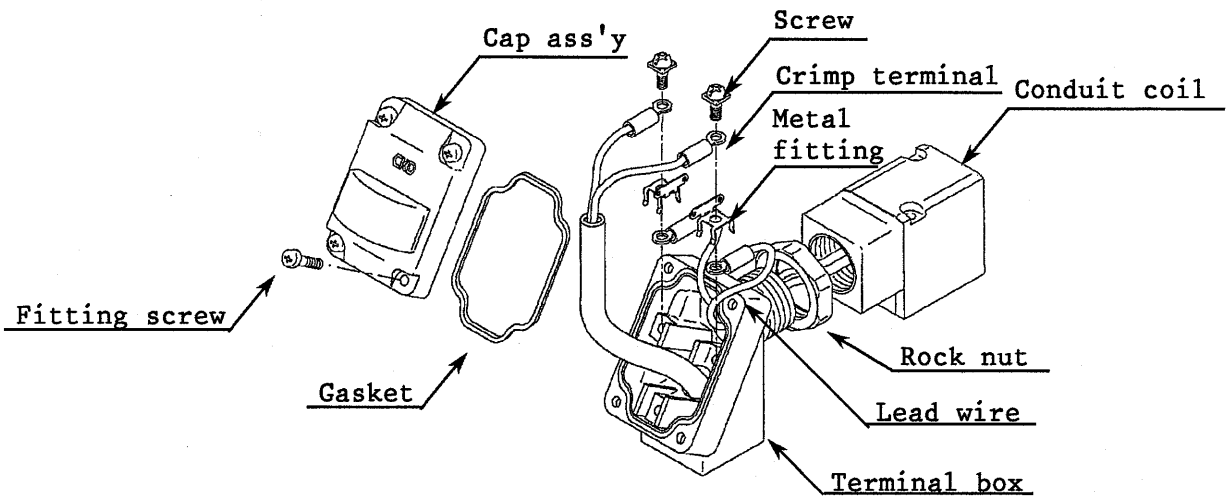
The numbers in the parentheses are for whe the surge-killer is used.

(5) The direction of the coil can be altered 180°. Remove the two cross recessed head machine screws and rotate the coil. Be sure to rotate the coil and not the NO-body or NC-body. Refer to the disassembly figure for disassembly procedures.

(6) Refer to drawing below when wiring the DIN terminal box. Use a crimp terminal at the end of cord to prevent miscontact or detachment. Draw out the terminal stand from the case,turn 180°and then push into the case again to change the drawing direction.



(7) Refer to drawing below when wiring the T type terminal box. Use a crimp terminal at the end of cord to prevent miscontact (shorts). The terminal box can be rotated 360° when the locknut is loosened. However set it to plus or minus 180° when near the horizontal axis.



4 MAINTENANCE AND INSPECTION

4-1 Periodic Inspection

(1) To ensure that the CV3/CVS3 provides an optinal operation perform periodic inspection once or twice year.

(2) Inspection items

(a) No dust and foreign matter is accumulated in the CV3/CVS3. Also,no highly sticky matter has adhered inside. If any abnormality is detected,disassemble the valve and remove it.

(b) No abnormal wear or bruising is present on the valve seat of the CV3/CVS3, including the valve stem. If any abnormality is detected,disassemble the valve and remove it.

4-2 Disassembly, Reassembly, Inspection

4-2-1 Disassembly

(1) Before disassembling, be sure to turn off the power and remove the pilot air, fluid, and pressure.

(2) Solenoid actuator disassembly:
Remove the two cross recessed head machine screws㉘then remove the coil ㉙and any other parts. Since the parts are small take sufficient care not to lose the manual depressor pin and plunger spring etc.

(3) Removing the adapter(rod metal):

(a) The cylinder cover assembly③ can be removed by removing the four hexagon socket head bolts①.

(b) Insert an item such as a rod in the hole of valve stem㉖from the port C and secure it. Next loosen locknut④and remove the piston⑥. Please use caution as the resilient force of the spring ⑪ may cause it to fly outwards.

(c) The holder ⑭can be removed by removing the four hexagon socket head bolts⑫$^{-1}$. Then the adapter(rod metal)⑯can be removed.

(4) Removing the valve stem:
Remove the piston⑥using procedure(3). The NO-body ㉗can be removed by removing the four hexagon socket head bolt ⑫$^{-2}$. This allows the valve stem㉖to be removed.

4-2-2 Reassembly

(1) Reverse the assembly procedure. No parts should be left unassembled.

(2) Before passing valve stem ㉖through adapter(rod metal) ⑯ and assembling cylinder cover ass'y③,apply grease.

(3) The gasket ㊲ shall be installed in the correct orientation. Check that the profile of the gasket matches that of the groove before assembling the gasket to the NC-body ㊳ .

(6) When assembling the magnetic actuator into the cylinder cover, the (green) manual part of the NO-body sall face toward the X port on the cylinder cover. The coil may be installed in either direction.

4-2-3 Inspection

(1) Apply a pressure equivalent to that of the fluid used. Check that no interior and exterior leakage occurs from the CV3/CVS3.

(2) Next,apply the pilot pressure and send an electrical signal to confirm that the valve opens closes normally.

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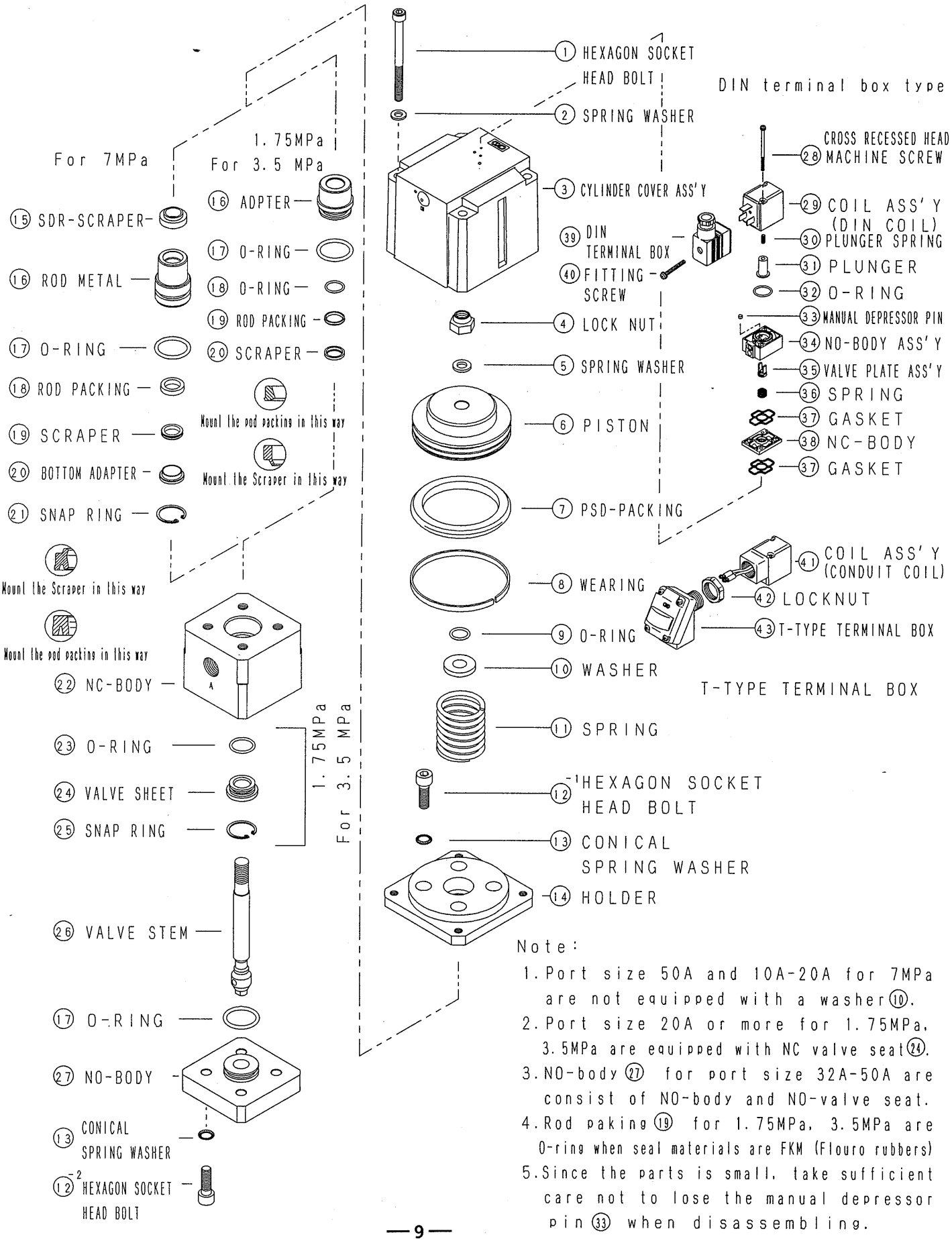
DISASSEMBLY FIGURE



Note:

1. Port size 50A and 10A-20A for 7MPa are not equipped with a washer ⑩.
2. Port size 20A or more for 1.75MPa, 3.5MPa are equipped with NC valve seat ㉔.
3. NO-body ㉗ for port size 32A-50A are consist of NO-body and NO-valve seat.
4. Rod paking ⑲ for 1.75MPa, 3.5MPa are O-ring when seal materials are FKM (Flouro rubbers)
5. Since the parts is small, take sufficient care not to lose the manual depressor pin ㉝ when disassembling.

4.3 Troubleshooting