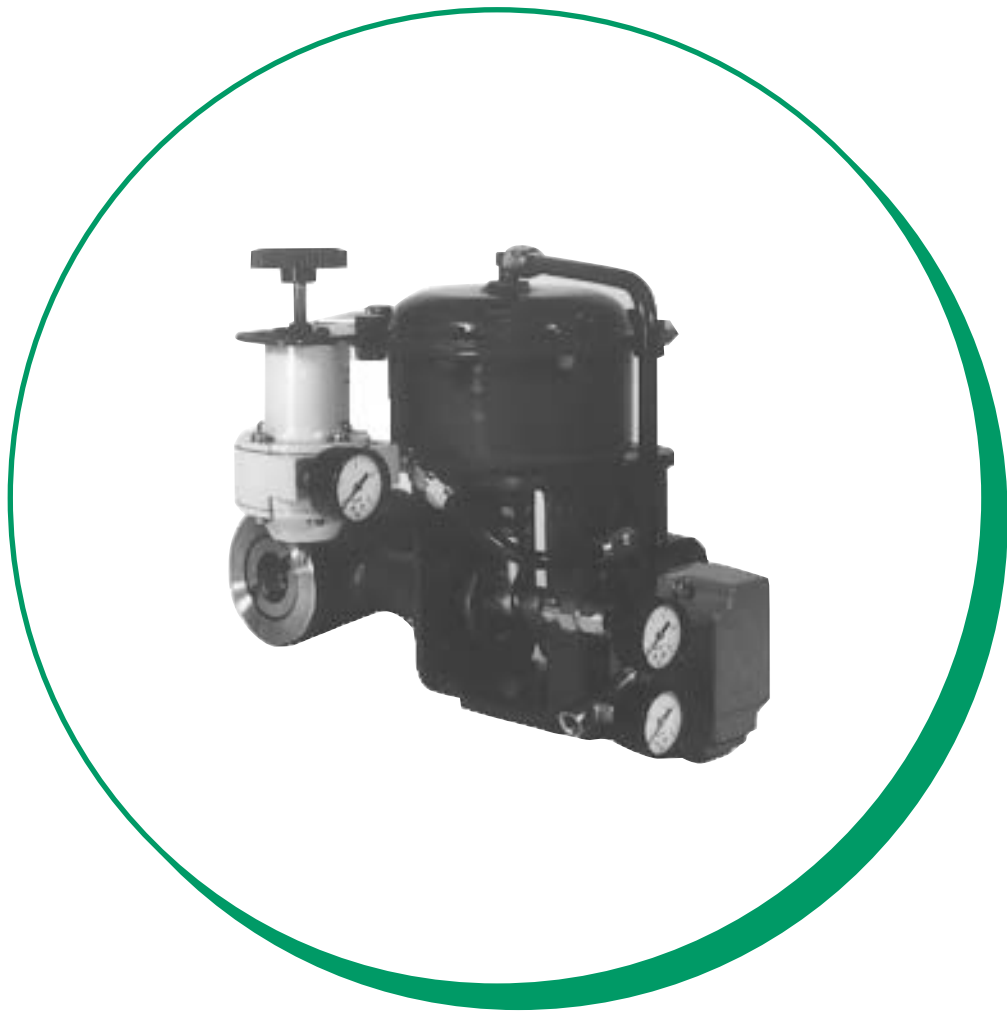


**azbil**

**FloWing  
Eccentric Rotary type Control Valves  
Model: VFR  
(1, 1½, 2 inches)**

**User's Manual**



Azbil Corporation

OM2-8130-0300  
5th edition

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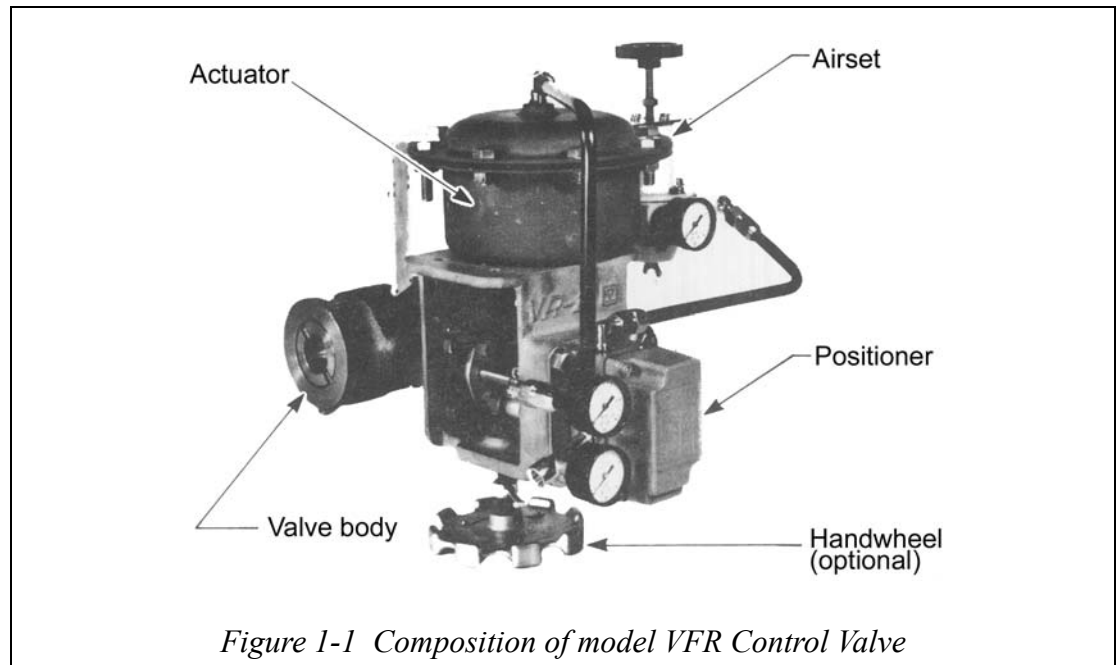
## General

The model VFR Control Valve consists of three main sections, namely, a valve body, a pneumatic actuator, and a valve positioner.

The valve body is of an eccentric rotary type, which features large valve capacity and high operation stability. It is possible to use this valve for slurry service.

The actuator is a pneumatic and spring type diaphragm motor. The actuator stem rotates the clamp. The rotational force of the clamp is transmitted to the valve stem as torque, and the valve plug is securely held in a position corresponding to the pneumatic signal applied. The actuator can be a optional handwheel for manual control. This handwheel can be used also as a limiting stopper.

The positioner is a single-action positioner with a pneumatic force balance type servo-mechanism. The cam directly mounted on the valve stem feeds back the valve position information to ensure that the valve plug is accurately fixed in the position that corresponds to the applied pneumatic signal.



*Figure 1-1 Composition of model VFR Control Valve*

# Chapter 1 : Installation

## 1-1 : Confirming the specifications

Prior to installing the valve, check that the model number, size, rating, materials and other specifications indicated on the nameplate attached on the actuator conform with those which were ordered.

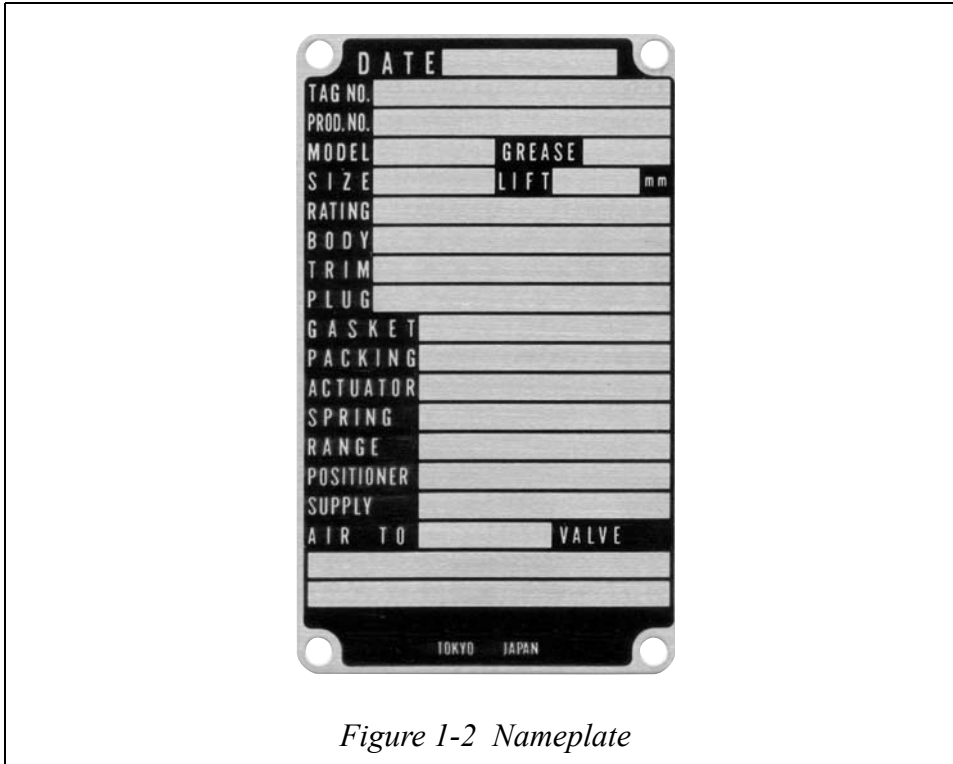


Figure 1-2 Nameplate

## 1-2 : Installation on piping

- (1) Before installing the valve, remove, scale, welding chips and other foreign material from both the upstream and downstream sides of the piping.
- (2) Pass the longer bolts through the lower half of the flanges to make a cradle for the valve and place the valve on the cradle.
- (3) Place the gasket for piping and pass the longer bolts through the upper half of the flanges. For the mounting bolts, see Figure 1-3 and Table 1-1.

**~Note** Use the shorter bolts in such places where the longer bolts will interfere with the packing box.

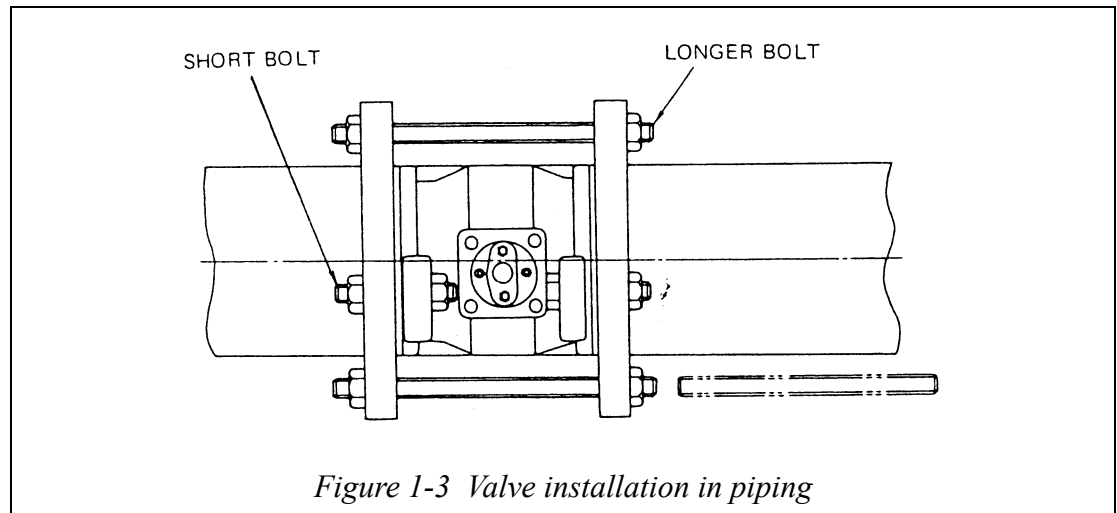


Table 1-1

Valve size (in.)	Longer bolts				Shorter bolts			
	JIS 10K	JIS 20K	ANSI 150	JIS 30K, 40K ANSI 300, 600	JIS 10K	JIS 20K	ANSI 150	JIS 30K, 40K ANSI 300, 600
1	M16×204		M12×191	M16×204	-	-	-	-
1½	M16×204		M12×191	M20×228	-	-	-	-
2	M16×240		M16×240	M16×240	-	M16×95	-	M16×95

\*: Unavailable for ANSI 150.

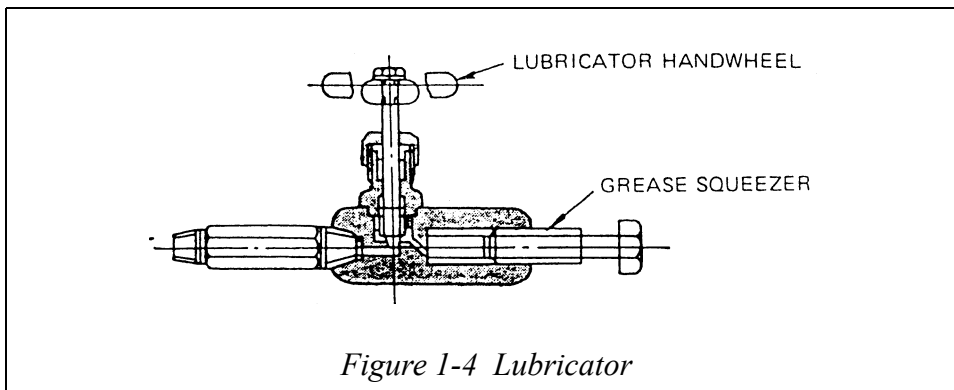
- (4) Align the center of the valve with that of the piping and tighten the bolts evenly.
- (5) Make sure that the direction of the arrow mark stamped on the valve body conforms with the direction of the process fluid flow in the piping.
- (6) Ensure that the piping connection gaskets do not protrude inside of the piping. Be sure to use gaskets of materials suitable to the type and temperature of the fluid to be controlled.
- (7) After installing the valve and connecting the air piping, blow the air piping clean to remove any dust and foreign material from inside the air piping.
- (8) Do not install any heating or cooling provisions for the bonnet section.

**~Note**      *The mounting attitude of the valve can be changed by altering the mounting position of the actuator. See “Chapter 5 : Changing the Mounting Attitude of Actuator and type of Valve” for procedures.*

### 1-3 : Inspecting and maintaining the installed valve

Follow the procedures given below when inspecting or servicing an installed valve.

- (1) Verify that there is no leak from the air piping.
- (2) Verify that there are no loose clamping-bolts or nuts on the diaphragm case.
- (3) Verify that there is no leak from the gland packing. Tighten the packing flange nuts as required.
- (4) Verify that there is no leak from the piping gaskets and check for loose clamping bolts and nuts.
- (5) To lubricate a valve which is equipped with a lubricator, proceed as follows:



*Figure 1-4 Lubricator*

- (a) Prepare the correct type of grease by referring to the grease number written on the nameplate.
- (b) Tightly close the lubricator handwheel.
- (c) Remove the squeezer and apply grease.
- (d) While opening, squeeze grease into the valve by rotating squeezer.
- (e) Repeat steps (b), (c) and (d) until grease is sufficiently fed into the valve. Then, close the lubricator handwheel.



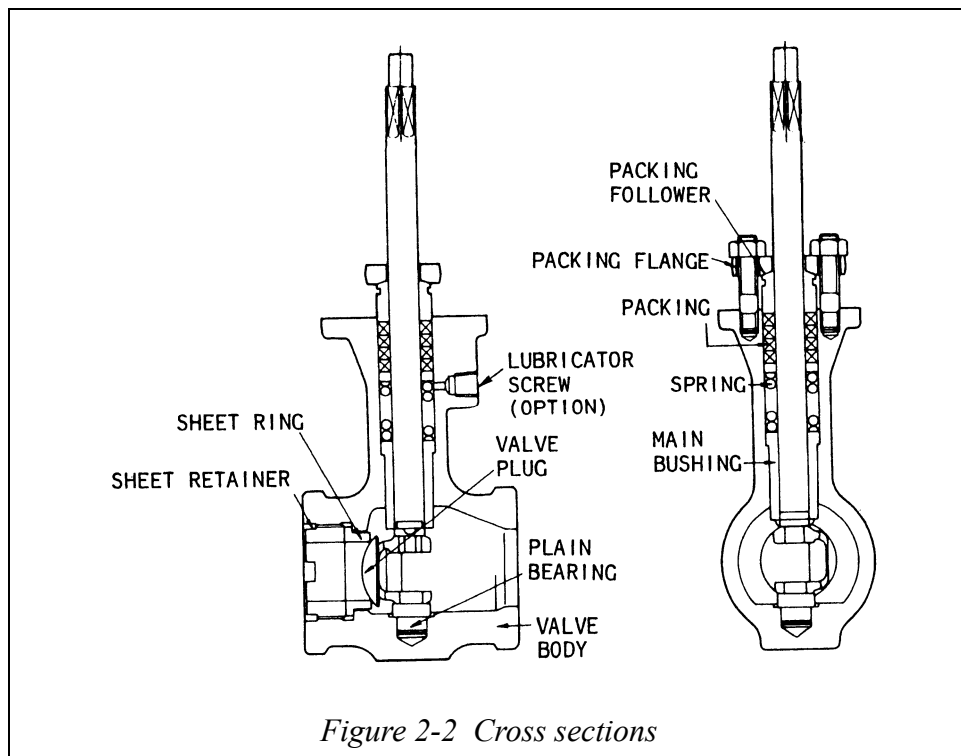
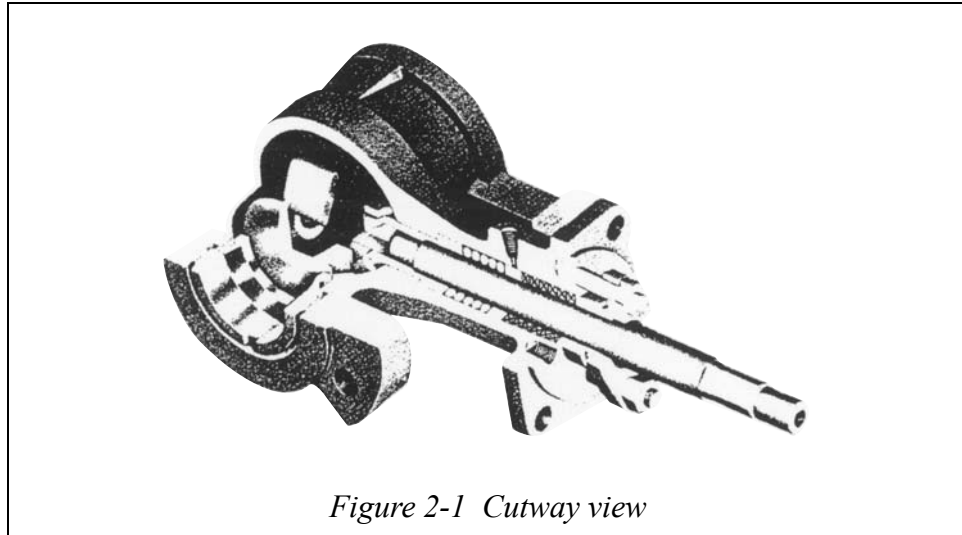
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## Chapter 2 : Valve body

### 2-1 : Description

Figure 2-1 shows a cutaway view of the valve body section of the model VFR eccentric rotary valve. The valve body section consists of a valve body and a bonnet constructed as a single unit, and of a valve plug, a seat ring, and other trim parts.



Cross sections and nomenclature of the valve body section are shown in Figure 2-2.

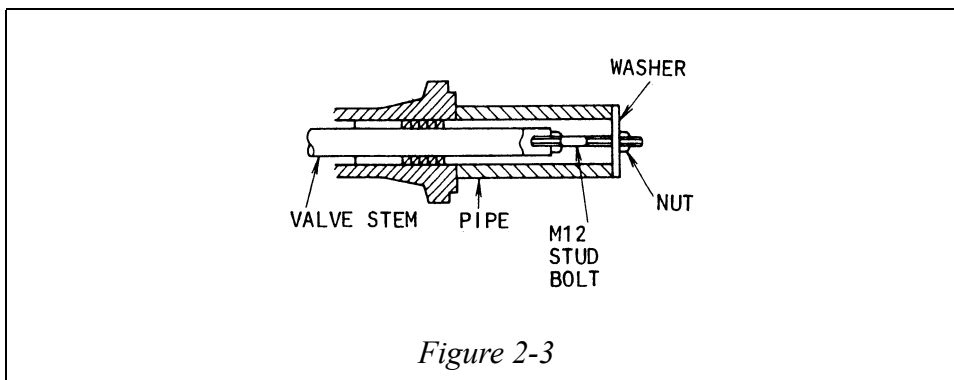
## 2-2 : Disassembly

For the disassembly of the valve body section, dismantle the actuator observing the disassembly instructions described in “Chapter 3 : Actuator” and then proceed as follows:

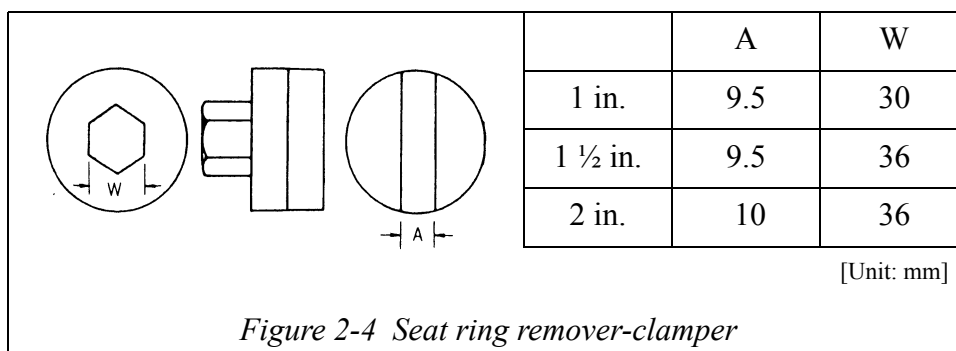
- (1) Remove the clamping-bolts from the packing flange.
- (2) Remove the packing flange and packing follower.
- (3) Pull out the valve stem together with the other gland parts (key, main bushing, spring, packing ring, and packing).

**~Note** *If the valve stem does not readily come out, pull it out using the following procedure:*

- (a) Remove several pieces of packing.
- (b) Prepare a pipe, a stud bolt, a nut and a washer as shown in Figure 2-3 and turn the nut so to pull the valve stem out. (When installing the cam holder on the end of the valve stem, apply a locking agent.)



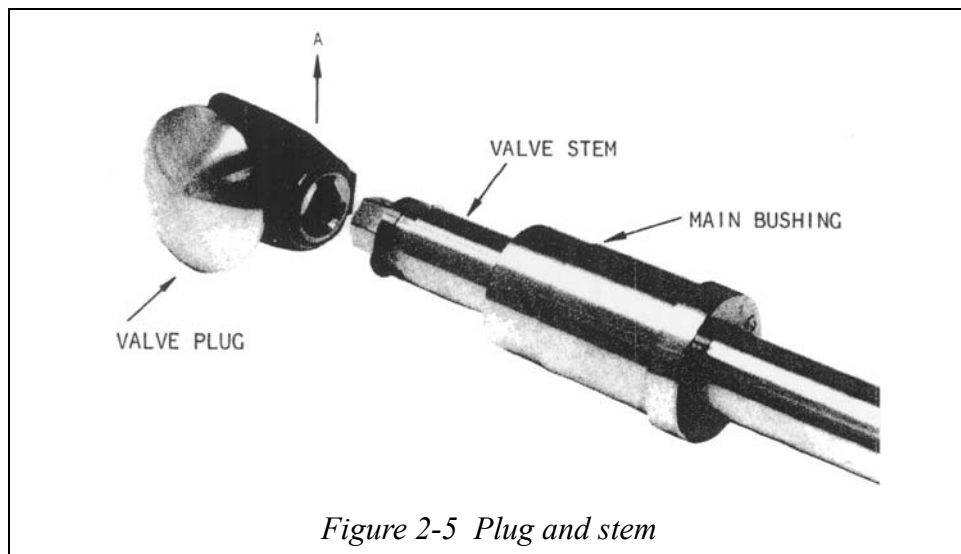
- (4) Remove the valve plug from the plain bearing.
- (5) Pull the valve plug out from the downstream side.
- (6) Remove the seat retainer by turning it counterclockwise with a seat ring remover-clamper (a special tool available separately). For the seat ring remover-clamper, see Figure 2-4.



- (7) Remove the seat ring. Inspect all of the removed parts and replace defective ones, if any, with new ones.

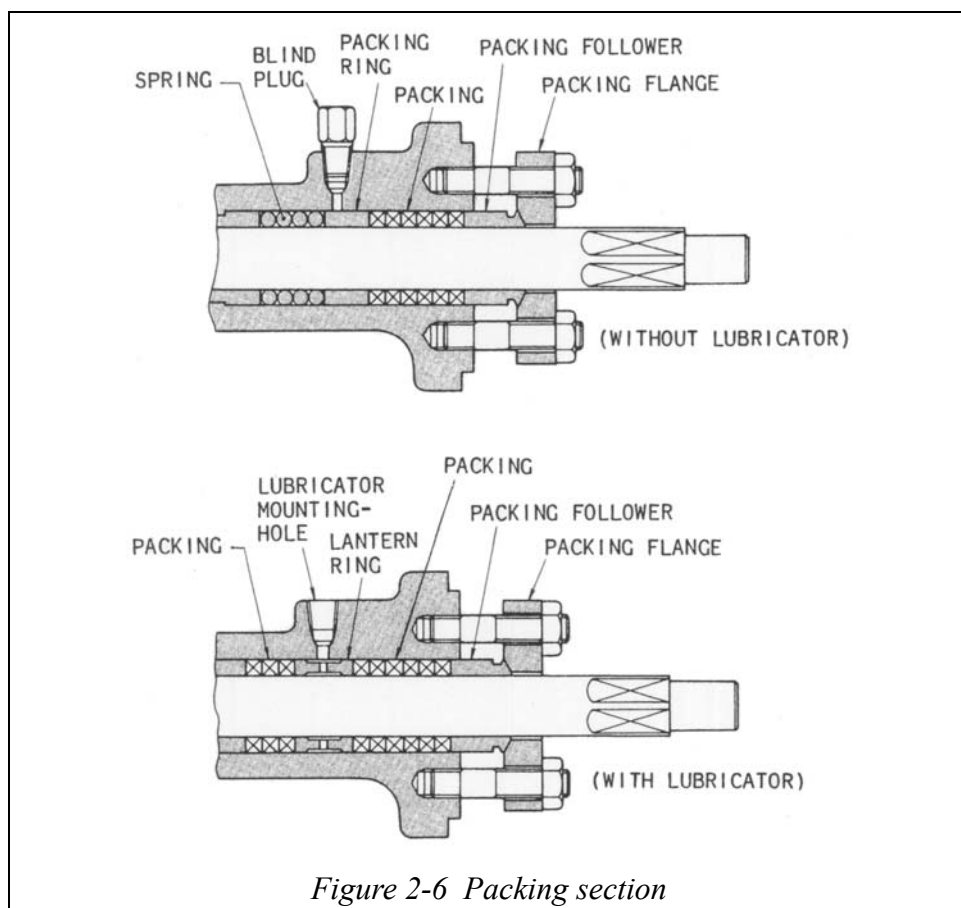
## 2-3 : Assembly

- (1) Insert the valve plug into the valve body and press it against the plain bearing.
- (2) Insert the valve stem into the main bushing. (See Figure 2-5)
- (3) Insert the valve stem into the valve body. (See Figure 2-5)



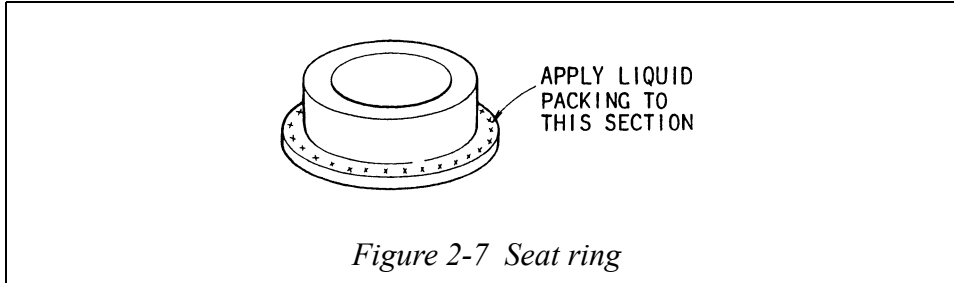
- (4) Install the gland parts. For the packing, pay attention to whether the valve is with or without a lubricator. For assembly, see Figure 2-6.

**~Note**      *Place packing in such a manner that their ends are positioned alternately.*



- (5) While holding the valve plug open, install the seat ring and finger-tighten it with the seat retainer.

**~Note**     *Apply liquid packing to the seat ring. (See Figure 2-7)*  
*Apply an anti-binding agent to the threaded section of the seat retainer.*



- (6) Turn the valve stem so that the valve plug presses against the seat ring then, tighten the seat retainer with the seat ring remover-clamper.

# Chapter 3 : Actuator

## 3-1 : Description

The model VR1 actuator is a pneumatic and spring type diaphragm motor designed specifically for rotary type control valves. It holds the valve plug in a position where the pneumatic force and pneumatic force are mutually balanced.

For proportional control, a dedicated positioner has been incorporated.

Valve position can be manually adjusted using the handwheel. As the handwheel is rotated counterclockwise\*, the actuator stem moves downward.

(\* The open/close directions are indicated on the direction indicator plate on the handwheel.)

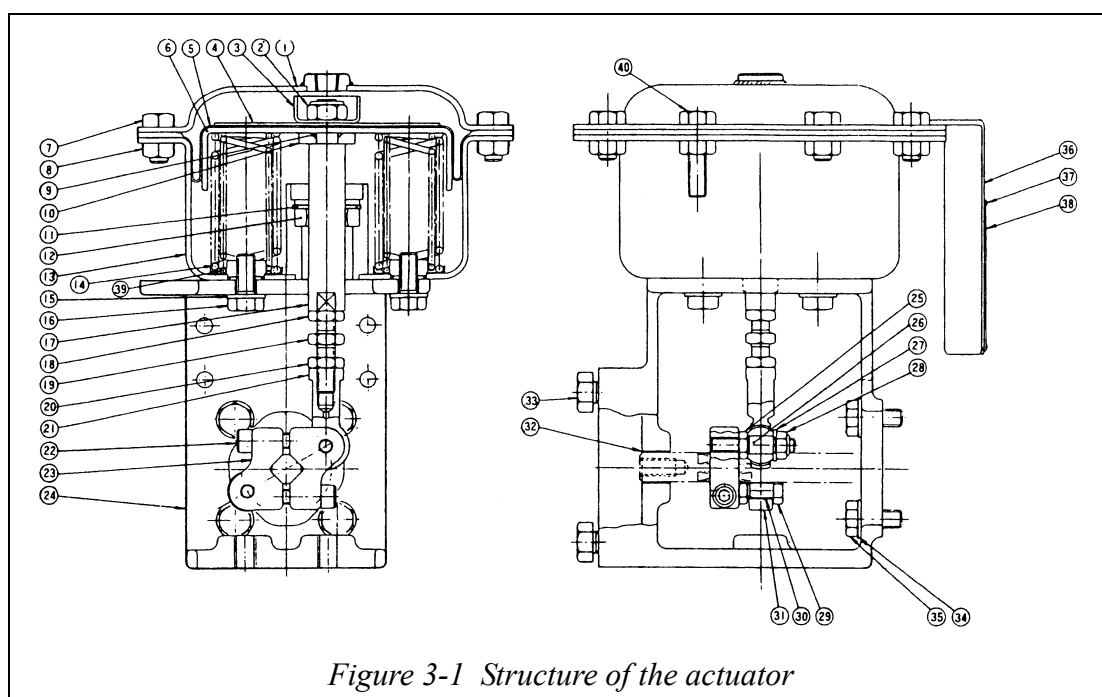


Figure 3-1 Structure of the actuator

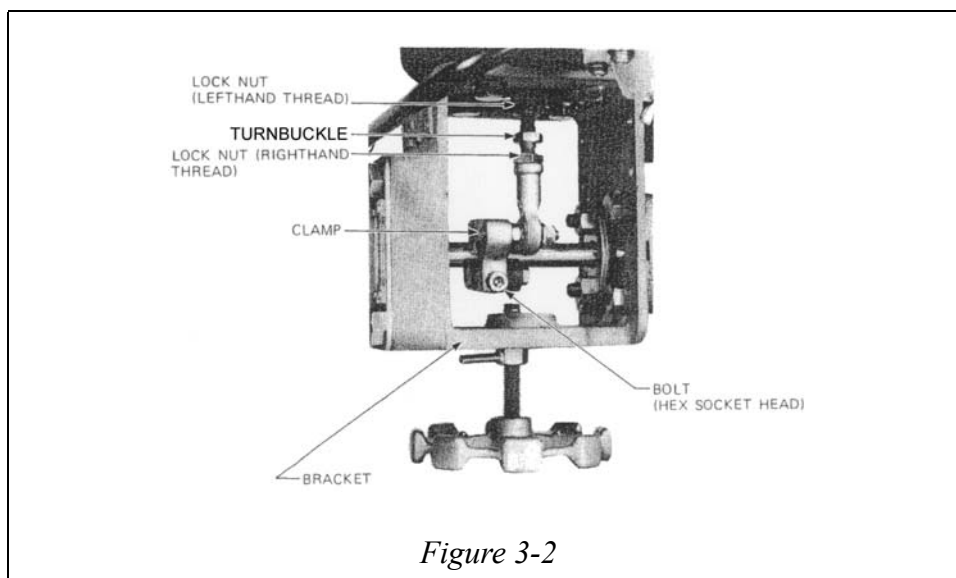
Table 3-1 Actuator parts list

No	Parts	No	Parts	No	Parts
1	Diaphragm case	14	Spring (large)	27	Flat washer (for M8)
2	Lock nut	15	Flat washer	28	Lock nut
3	Stopper	16	Bolt	29	Bolt
4	Sheet retainer	17	Stem	30	Spacer
5	R-phragm (Diaphragm)	18	Nut	31	Roller (for manual operation)
6	Piston	19	Turnbuckle	32	Bushing
7	Bolt	20	Nut	33	Bolt
8	Nut	21	Rod end	34	Flat washer
9	O-ring	22	Bolt (hex socket head)	35	Hex bolt
10	Piston receiver	23	Clamp	36	Nameplate base
11	C-clip for hole	24	Bracket	37	Drive screw
12	Guide metal	25	Nut	38	Nameplate
13	Cylinder	26	Link bolt	39	Spring (small)
				40	Bolt

### 3-2 : Adjusting the actuator

The actuator requires to be adjusted if the valve starts to exhibit control shifts or after the valve has been overhauled. Before adjusting the actuator, turn the manual handwheel to the fully clockwise position as viewed from the direction indicator plate so that the handwheel moves fully away from the roller. (See Figure 3-6).

- (1) Provide air piping to the actuator through a pressure regulator.
- (2) Loosen the two lock nuts (one is right hand threaded and the other, left hand threaded) on the turnbuckle, and release the turnbuckle by rotating it in the direction that its threaded sections become more exposed. (See Figure 3-2 and Figure 3-4)
- (3) By adjusting the pressure regulator, apply to the actuator a pressure corresponding to the upper limit of the spring range if the valve is in direct-action mode or a pressure corresponding to the lower limit of the spring range if the valve is in reverse-action mode.
- (4) Use a wrench to rotate the hex section of the turnbuckle until rotation becomes heavy and the parts on the clamp shaft do not turn any further. The rotating directions are as follows:
  - For a direct-action valve, rotate the turnbuckle in the direction that it comes out.
  - For a reverse-action valve, rotate the turnbuckle in the direction that it goes in.

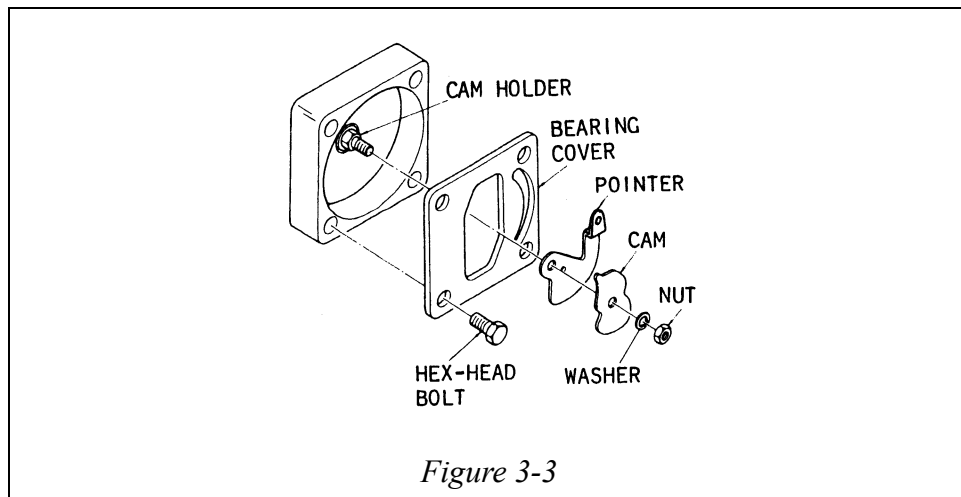


*Figure 3-2*

- (5) As is align the pointer with the S index of the scale.
- (6) Tighten securely the lock nuts.
- (7) For the adjustment of the positioner, see “Chapter 4 : Valve Positioner”.

### 3-3 : Removing actuator from valve body

- (1) First, remove the positioner from the valve body referring to “Chapter 4 : Valve Positioner”.
- (2) After removing the positioner, remove the nut and then remove the cam and pointer from the valve stem end. (See Figure 3-3.)
- (3) For a reverse-action valve, since the initial compression force is being applied to the actuator stem, loosen both lock nuts (one is right hand threaded and the other left hand threaded) and then release the turnbuckle by rotating it in the direction that its threaded sections become more exposed.
- (4) Remove the clamps by removing their screws (hex socket head type). (See Figure 3-4.)
- (5) Remove the four bolts which fix the bracket to the valve body, and remove the actuator from the valve body.
- (6) Loosen the turnbuckle further and remove it from the actuator stem.



### 3-4 : Disassembly of actuator

To disassemble the actuator for parts replacement or servicing, follow the procedure described below. (See Figure 3-4.) When disassembling the actuator, take care not to damage the diaphragm or piston.

- (1) Remove the actuator from the valve body. (See “3-3 : Removing actuator from valve body” and Figure 3-4.)
- (2) While excluding the two longer bolts which are located at mutually opposite positions, remove all clamping bolts and nuts from the diaphragm case (top). (See “3-3 : Removing actuator from valve body” and Figure 3-4.)
- (3) Alternately and uniformly loosen the two longer clamping screws and remove the diaphragm case (top).
- (4) Take out the cut section of the diaphragm from the cylinder, raise the bottom of the piston, and remove the piston section from the cylinder.
- (5) Remove the top nut by applying a wrench to the two flat cutaway planes at the bottom of the actuator stem. Remove the piston, diaphragm, sheet retainer, stopper, spacer, and O-ring.



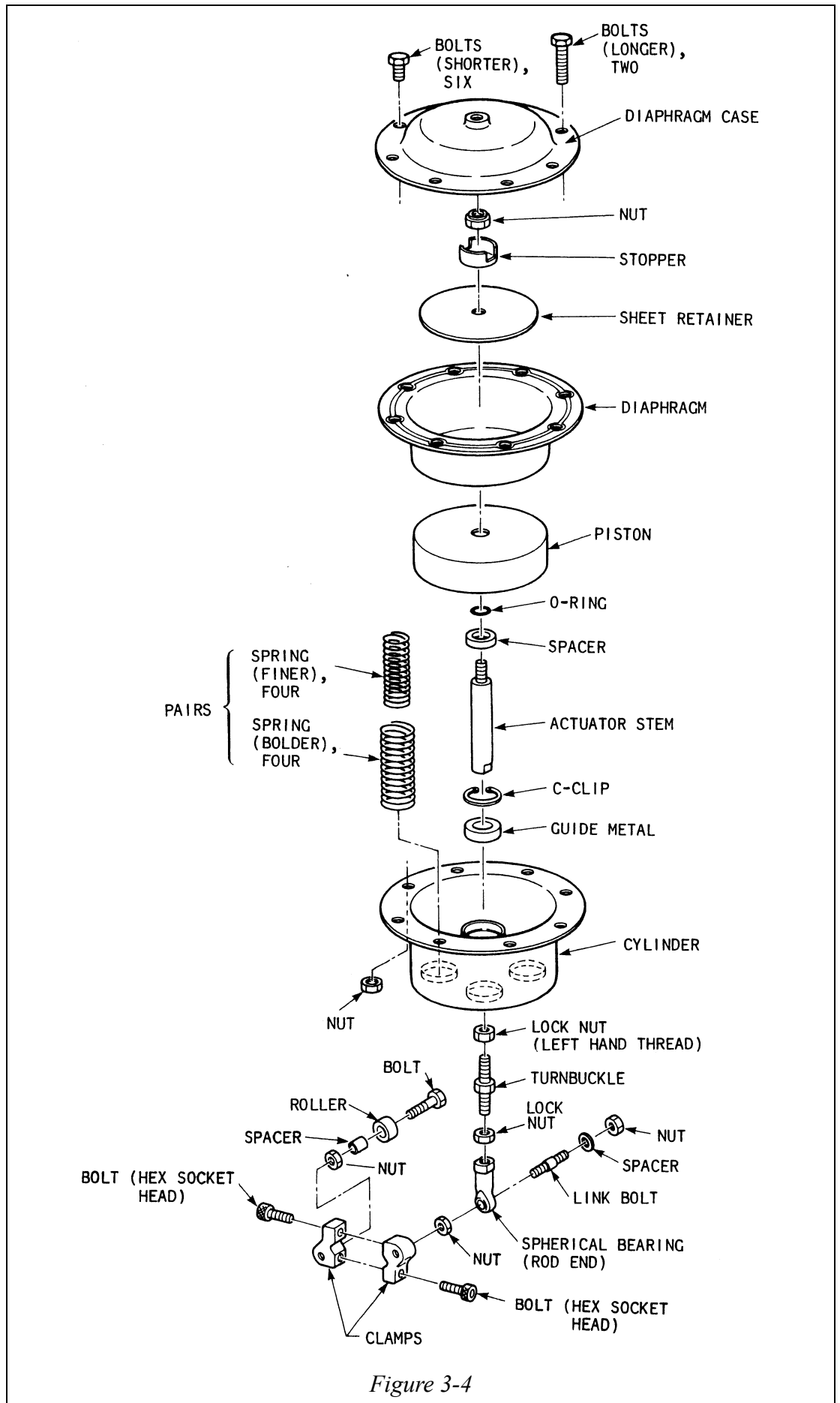


Figure 3-4

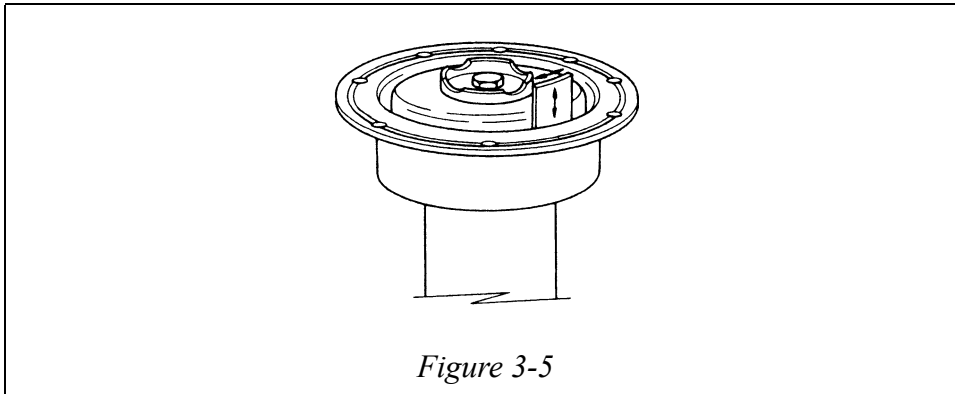
### 3-5 : Assembly of actuator

Since the mounting positions of parts differ depending on whether the valve is for direct action or reverse action, confirm the valve action by referring to the nameplate prior to assembling the actuator.

For the assembly of the actuator, follow the procedure given in “3-4 : Disassembly of actuator” in the reverse order.

**~Note** 1 *Apply molybdenum bisulfide (MoS<sub>2</sub>) powder liberally onto the diaphragm-contacting surfaces of the piston, the diaphragm surfaces (front and back), and the diaphragm-contacting inside surface of the cylinder.*

**~Note** 2 *Align the holes of the cup-shaped diaphragm brim with those of the cylinder, and fold back the outer circumference of the diaphragm into the cylinder so that the diaphragm brim for the entire circle uniformly touches the cylinder flange, using a soft plate and while exercising care not to damage the cylinder inside. (See Figure 3-5.)*



### **3-6 : Mounting actuator onto valve body**

To mount the actuator on the valve body, follow, in the reverse order, the procedure described in “3-3 : Removing actuator from valve body”. After mounting the actuator, adjust the actuator as described in “3-2 : Adjusting the actuator”.

### **3-7 : Manual device (Handwheel)**

The manual device of the actuator can function as a limit stopper as well as its function as a conventional manual control device for the valve.

This device is available as an option.

#### **3-7-1 : Setting automatic operation**

When the valve is to be operated in automatic mode, set the manual device as follows:

- (1) Release the handwheel lock by turning it clockwise (as viewed looking down towards the direction indicator plate).
- (2) Pull the handwheel shaft out as far as it can by turning the handwheel clockwise.
- (3) Lock the handwheel by turning the handwheel lock counterclockwise.
- (4) Keep the handwheel as such while the valve is being operated in automatic mode.

#### **3-7-2 : Setting manual control**

First, switch the bypass cock (See Figure 4-6) of the positioner to the “ON” position.

If the handwheel lock is released and the handwheel is rotated counterclockwise as viewed down towards the direction indicator plate, the valve will close if it is a direct action type or it will open if it is a reverse action type. For manual control of the flow using the valve, turn the handwheel to the desired position in the required direction referring to the direction indicator plate and tighten the handwheel lock to fix the valve to that position.

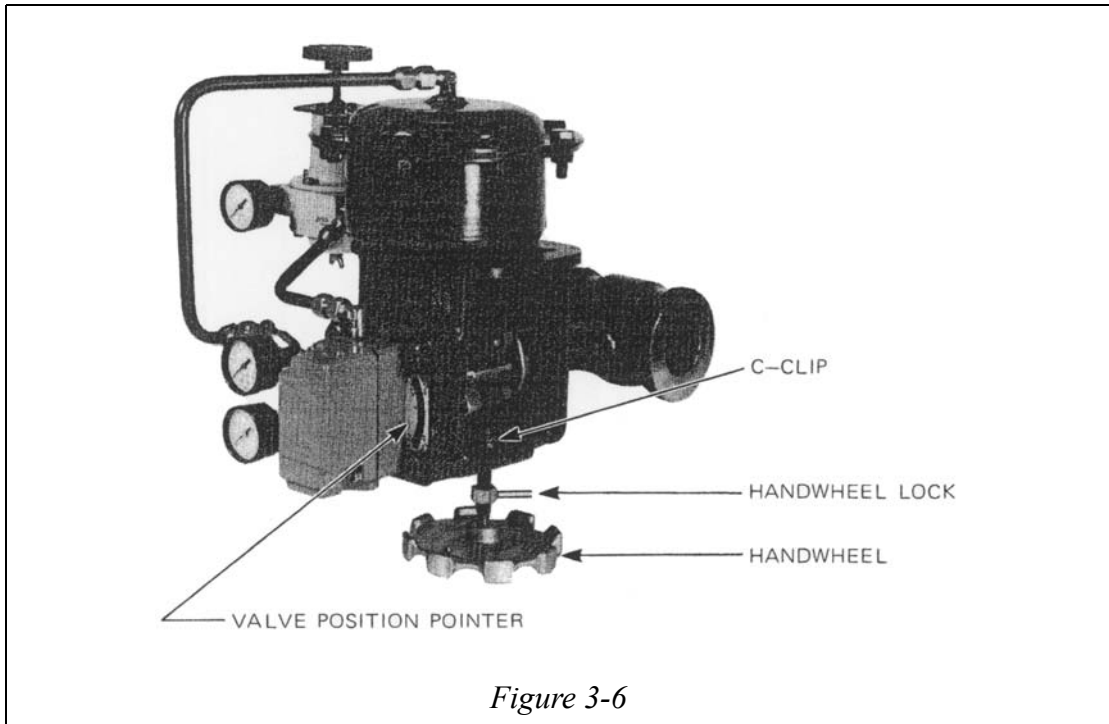
Be sure to set the valve as described in “3-7-1 : Setting automatic operation” before commencing to operate the valve in automatic mode.

### 3-7-3 : Setting the limit stopper

The handwheel can be used also as a limit stopper - a stopper for a maximum aperture when in direct action mode or as a stopper for minimum aperture when in reverse action mode.

- (1) Release the handwheel lock. Turn the handwheel to the desired position in the required direction referring to the direction indicator plate.
- (2) Tighten the handwheel lock.

For automatic operation without the limit stopping effect, set the handwheel as described in “3-7-1 : Setting automatic operation”.



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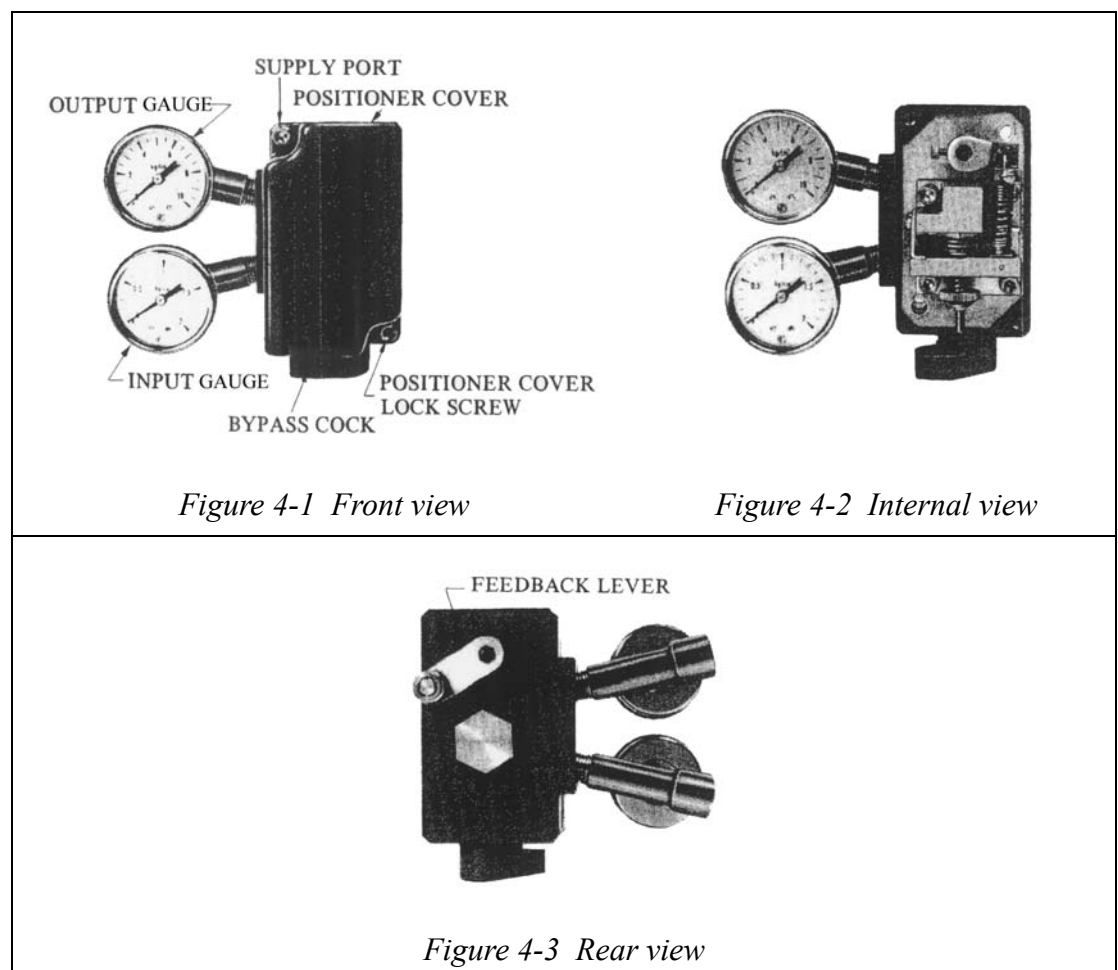
# Chapter 4 : Valve Positioner

## 4-1 : Description

The valve positioner is mounted on the VR actuator and has the function of positioning the valve plug accurately and rapidly to a position corresponding to the pneumatic signal received from the controller.

The valve positioner consists of the following components:

- Input gauge
- Output gauge
- Bypass cock
- Input bellows
- Flapper-nozzle mechanism
- Pilot relay
- Cam
- Cam follower
- Feedback spring
- Feedback lever



4-2 : Operating principle

The valve positioner employs a force balance mechanism. See Figure 4-4 and Figure 4-5 for its operating principle.

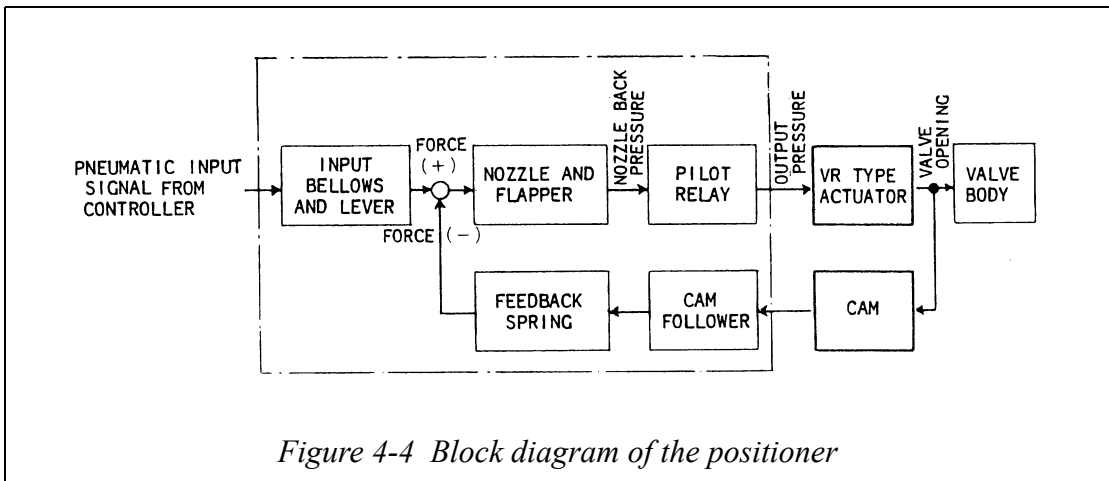


Figure 4-4 Block diagram of the positioner

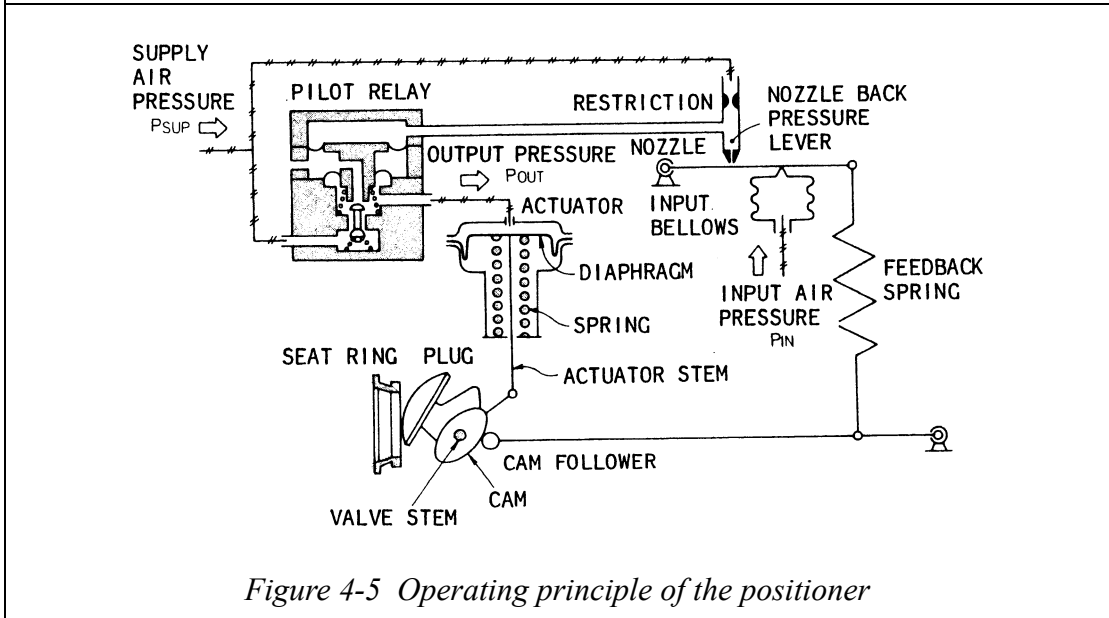


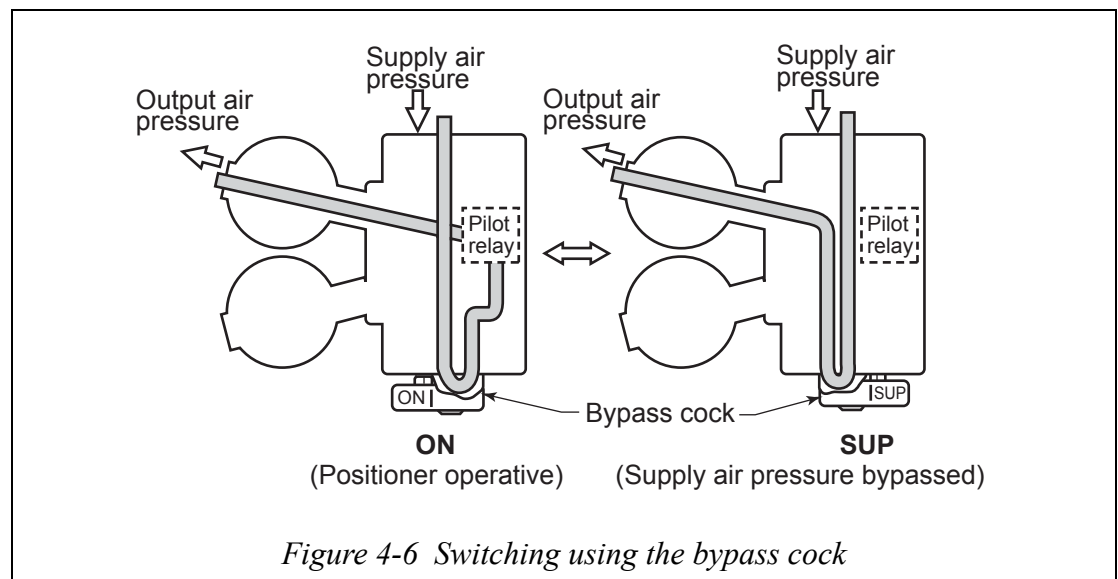
Figure 4-5 Operating principle of the positioner

## 4-3 : Bypass cock

### 4-3-1 : Function of bypass cock

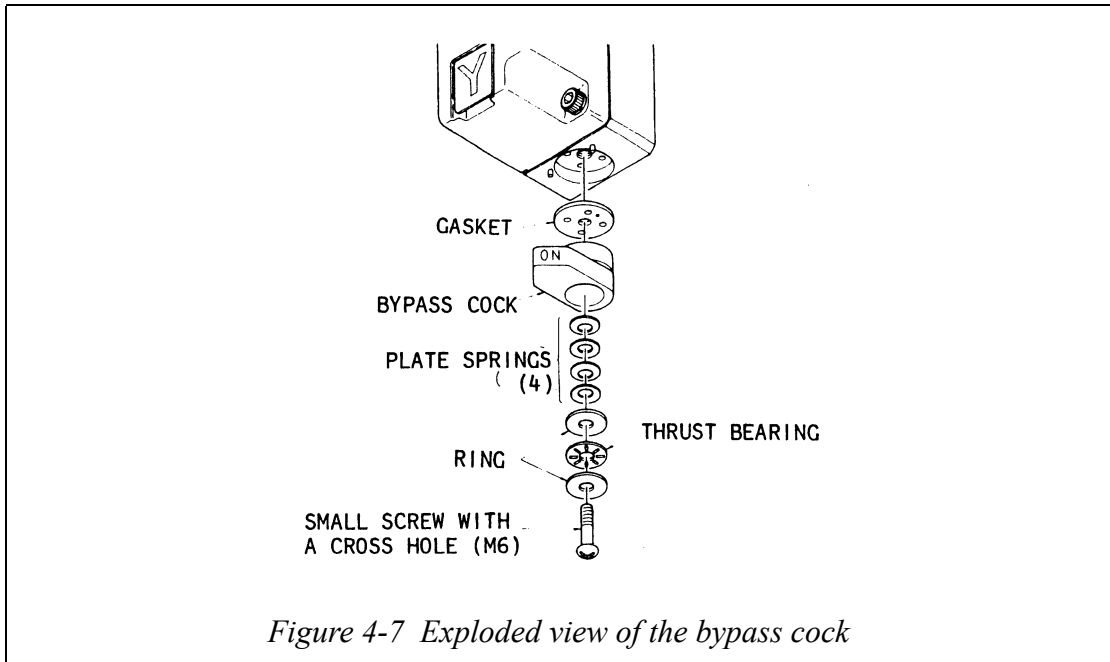
The supply air bypass cock mechanism is provided on the bottom of the valve positioner. It is used to switch between “ON” for “operation with positioner” and “SUP” for “operation with the supply air” as shown in Figure 4-6. When switched to “SUP”, the supply air bypasses the pilot relay and it is fed directly to the actuator, thereby enabling the following two things:

- (1) The valve opening can be directly controlled by the supply air.
- (2) As the pilot relay is isolated from the supply air and output air, the pilot relay can be inspected or serviced simply by shutting off the input signal air.



### 4-3-2 : Installing the bypass cock

To install the bypass cock which has been removed for gasket replacement or some other servicing, install it while referring to Figure 4-7. In this case, apply silicone grease sparingly to the surfaces of the gasket. If a new gasket is to be used, place it so that its white surface is faces out. After fully tightening the mounting screw (cross-hole head), loosen it by a 1/3 to 1/4 turn.

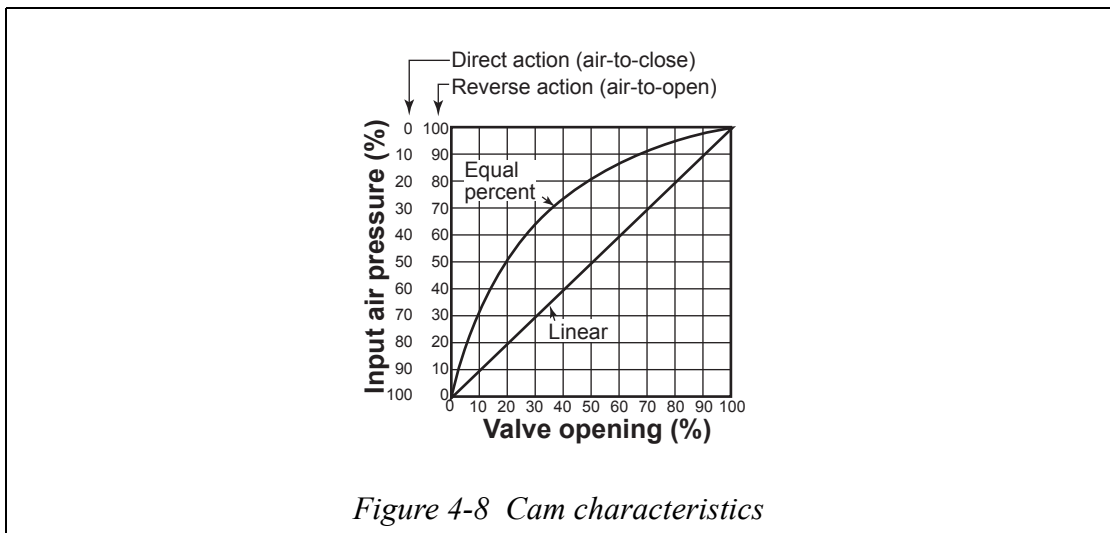


#### 4-4 : Selecting CAM characteristics

To change valve characteristics, select a proper cam and install it. (For installation and adjustment procedures, refer to the respective section.)

##### 4-4-1 : CAM characteristics

A single sheet of cam for the positioner can satisfy either linear characteristics or equal-percent characteristics.





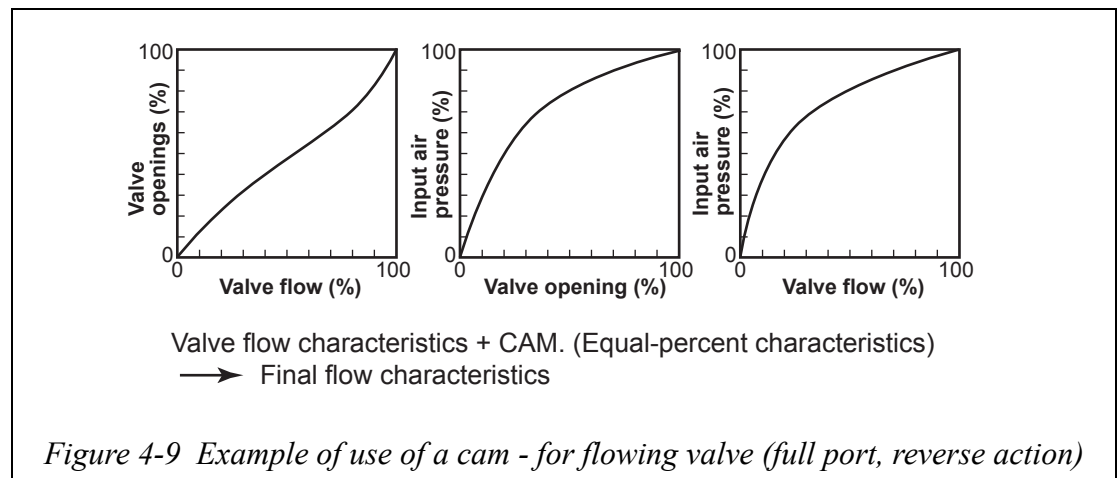
### 4-4-2 : Using the equal-percent cam

When the inherent characteristics of the valve are linear but equal-percent characteristics are required by the process, control characteristics of the valve can be converted into the equal-percent type simply by using an equal-percent cam.

### 4-4-3 : Selecting a cam

Select a proper cam as follows:

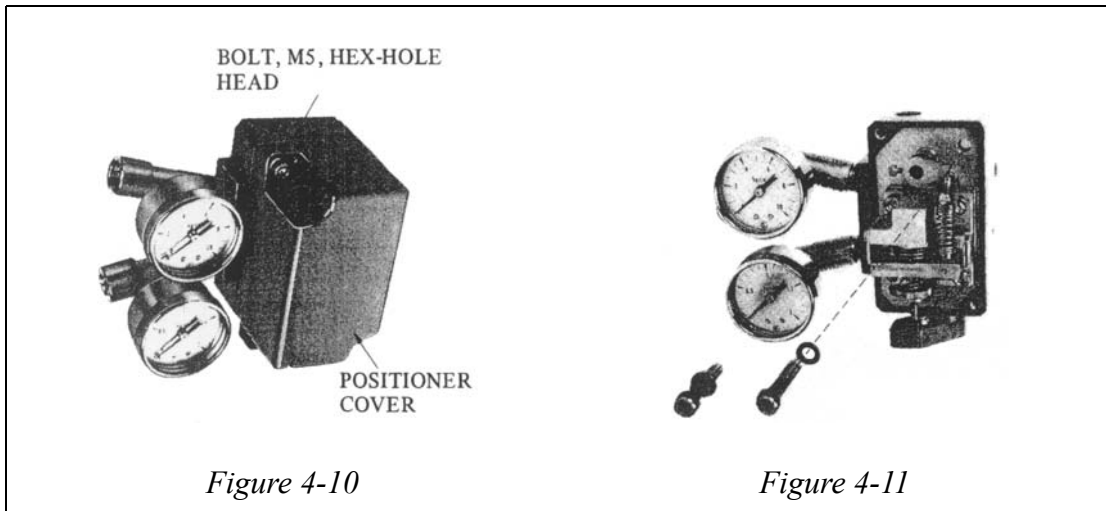
- (1) Confirm whether the valve is a direct action (air-to-close) or a reverse action (air-to-open) type.
- (2) Refer to Figure 4-9 and then select a cam which will provide the required flow characteristics for the process.



## 4-5 : Removing and installing the positioner

### 4-5-1 : Removal

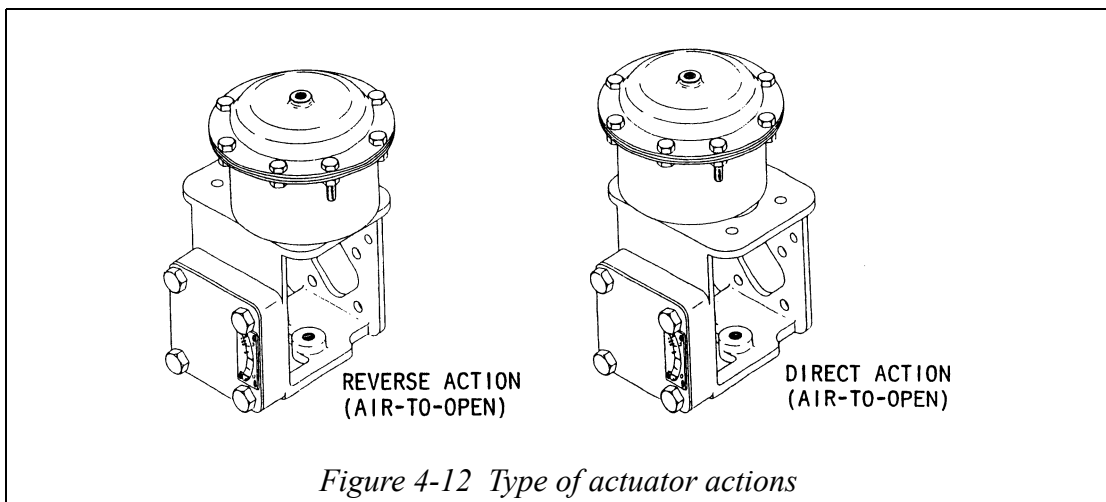
- (1) Disconnect the air piping from the positioner.
- (2) Loosen the two clamping-bolts (M5, hex-hole head) with a hex wrench (4 mm) and remove the positioner cover. (See Figure 4-10.)
- (3) Loosen the two inner clamping-bolts (M6, hex-hole head) with a hex wrench (5 mm). The positioner is now ready for removal. (See Figure 4-11).



### 4-5-2 : Installation

For the adjustment of a positioner after its installation has been completed, see “4-6 : Adjusting the positioner”.

- (1) Confirming the actuator specifications and cam characteristics by referring to the nameplate, confirm the following three items:
  - (a) Direct action (air-to-close) or reverse action (air-to-open)
  - (b) Spring range of the actuator
  - (c) Cam characteristics



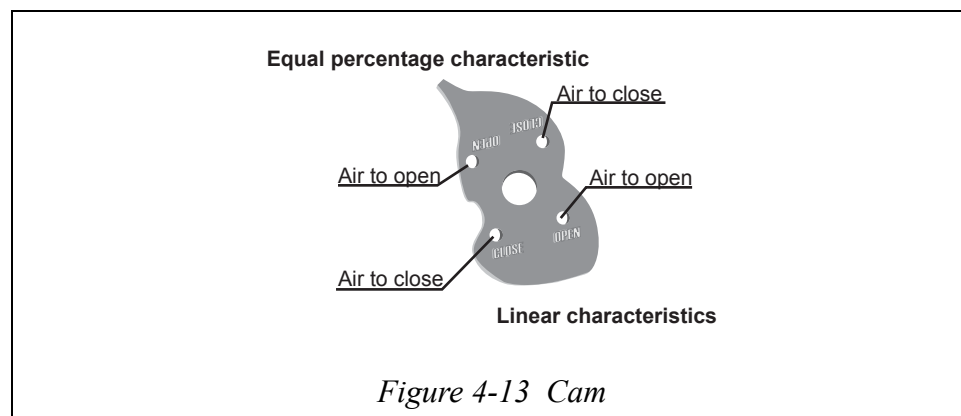
## (2) Installing the indicator and cam

- (a) Connect the air piping to the actuator and apply an air pressure referring to the table shown below. When this is done, the valve will be fully closed irrespective of the type of actuator action (direct action or reverse action).

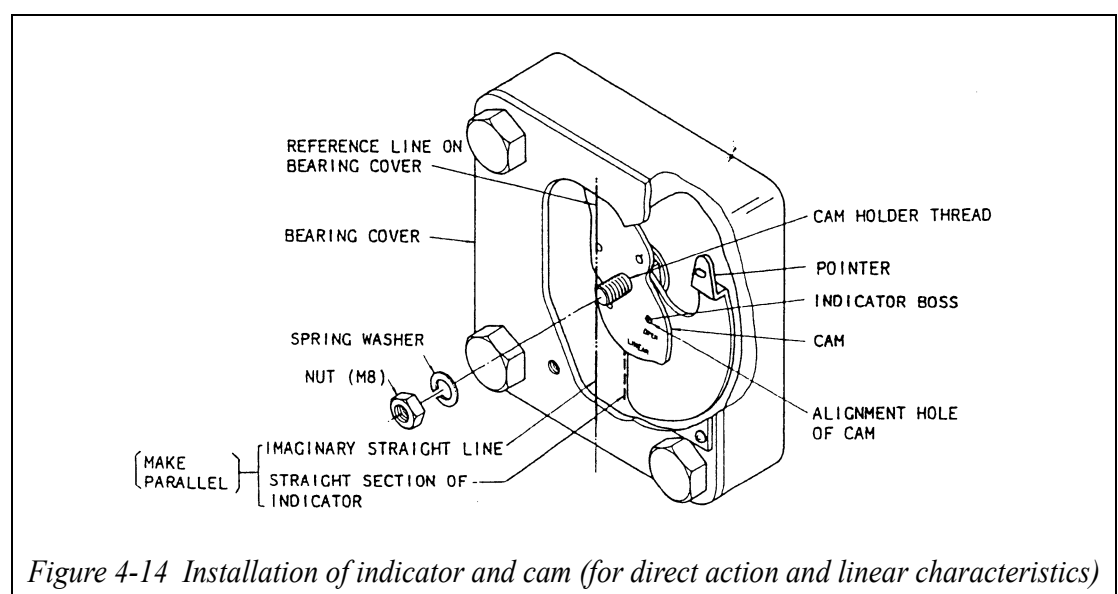
(Example: If the actuator is of the reverse action type and the spring range is 98 to 200 kPa {1 to 2 kgf/cm<sup>2</sup>}, apply an air pressure of 98 kPa {1 kgf/cm<sup>2</sup>} to the actuator.)

Valve action	Air pressure applied to actuator
Direct action	A pressure corresponding to upper limit of actuator spring.
Reverse action	A pressure corresponding to lower limit of actuator spring.

- (b) Install the indicator and cam onto the male-threaded section of the cam holder.
- (c) Select a setting hole of the cam that corresponds to the actuator action and cam characteristics referring to Figure 4-13 and set the selected hole onto the boss of the indicator.



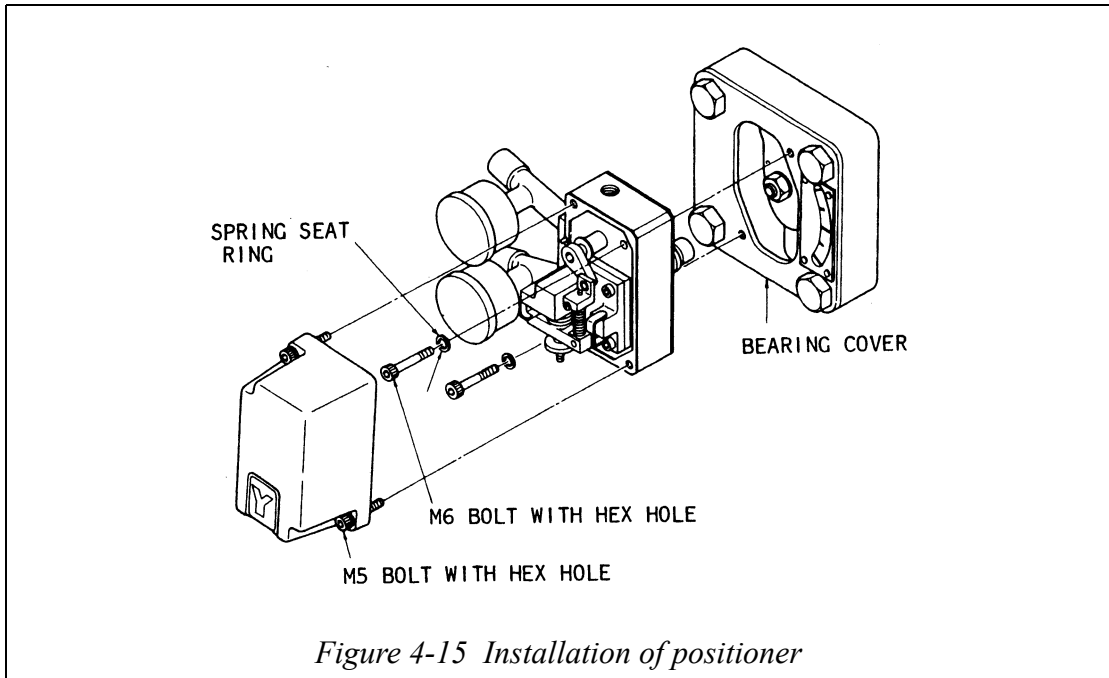
- (d) Engage the indicator with the cam holder serration in such a manner that the linear section of the indicator becomes as parallel as possible with the imaginary line of the reference line on the bearing cover. Fix the cam in this position with the spring washer and nut (M8). (See Figure 4-14)



- (e) Release the air pressure applied to the actuator and disconnect the air piping.

## (3) Installing the positioner

- (a) Loosen the two clamping-bolts (M5, hex-hole head) with a hex wrench (4 mm) and remove the positioner cover.
- (b) Mount the positioner (in such an attitude that the bypass cock is points downward) on the bearing cover with two bolts (M6, hex-hole head) and spring washers using a hex wrench (5 mm).



## (4) Connecting the air piping

Provide air piping between the union joint and the three air connection ports (IN, SUP, OUT; Rc1/4 tap thread) on the side plate of the positioner.

- IN : Input pneumatic pressure from controller  
 SUP : Air supply  
 OUT : Output pneumatic pressure to actuator

**~Note** *Apply liquid packing to the threaded sections of the connectors. Do not use seal tape lest the air paths of the positioner should become clogged.*

## 4-6 : Adjusting the positioner

The positioner installed on a valve has been factory adjusted before shipment. When it has been replaced, however, the newly installed positioner is required to be adjusted as described in the following procedure.

- (1) Switch the bypass cock to ON.
- (2) Confirm the positioner input air pressure range, supply air pressure and actuator spring range by referring to the nameplate.
- (3) Feed the supply air to the positioner.
- (4) The procedures hereunder are divided into steps for a direct-action positioner and those for a reverse-action positioner, and assume an input air pressure range of 20 to 98 kPa {0.2 to 1.0 kgf/cm<sup>2</sup>} for both cases.

**~Note**      *If the input air pressure range of the positioner is 20 to 60 kPa {0.2 to 0.6 kgf/cm<sup>2</sup>}, substitute 98 kPa {1.0 kgf/cm<sup>2</sup>} with 60 kPa {0.6 kgf/cm<sup>2</sup>} and 20 kPa {0.2 kgf/cm<sup>2</sup>} with 60 kPa {0.6 kgf/cm<sup>2</sup>} in the following steps.*

For direct action positioner (air-to-open).

- (5) Set the input air pressure to 20 kPa {0.2 kgf/cm<sup>2</sup>}
- (6) Turn the zero adjustment knob so that the output pressure of the positioner becomes the lower limit of the actuator spring range. When this is done, the indicator will indicate "S".

(Example: If the spring range of the actuator is 98 to 200 kPa {1 to 2 kgf/cm<sup>2</sup>}, set the output pressure of the positioner to 98 kPa {1 kgf/cm<sup>2</sup>}).

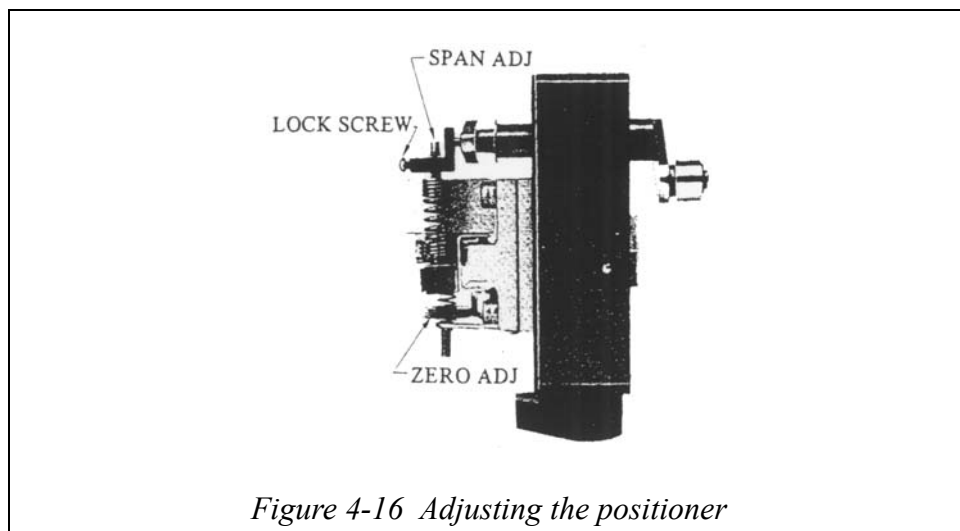


Figure 4-16 Adjusting the positioner

- (7) Set the input air pressure to 98 kPa {1.0 kgf/cm<sup>2</sup>}.
- (8) Loosen the lock screw with a screwdriver (-) and adjust the SPAN control so that the indicator indicates "0".

For direct action positioner (air-to-close)

- (5) Set the input air pressure to 98 kPa {1.0 kgf/cm<sup>2</sup>}

- (6) Turn the zero adjustment knob so that the output pressure of the positioner becomes the upper limit of the actuator spring range. When this is done, the indicator should indicate "S".

(Example: If the actuator spring range is 98 to 200 kPa {1 to 2 kgf/cm<sup>2</sup>}, set the output pressure of the positioner to 200 kPa {2 kgf/cm<sup>2</sup>}.)

- (7) Set the input air pressure to 20 kPa {0.2 kgf/cm<sup>2</sup>}.
- (8) Loosen the lock screw with a screwdriver (-) and adjust the SPAN control so that the indicator indicates "0".
- (9) Repeat step (5) to (8) several times.
- (10) After the adjustment has been completed, tighten the lock screw of the SPAN control with a screwdriver (-).

## 4-7 : Maintaining the positioner

### 4-7-1 : Operating precautions

- (1) Use only clean filtered air for the air supply, lest the nozzle or pilot relay should become clogged with foreign particles contained in the air supply.
- (2) When the positioner is installed outdoors, be sure to install the positioner so that the positioner cover is positioned vertically in order to prevent the ingress of water.

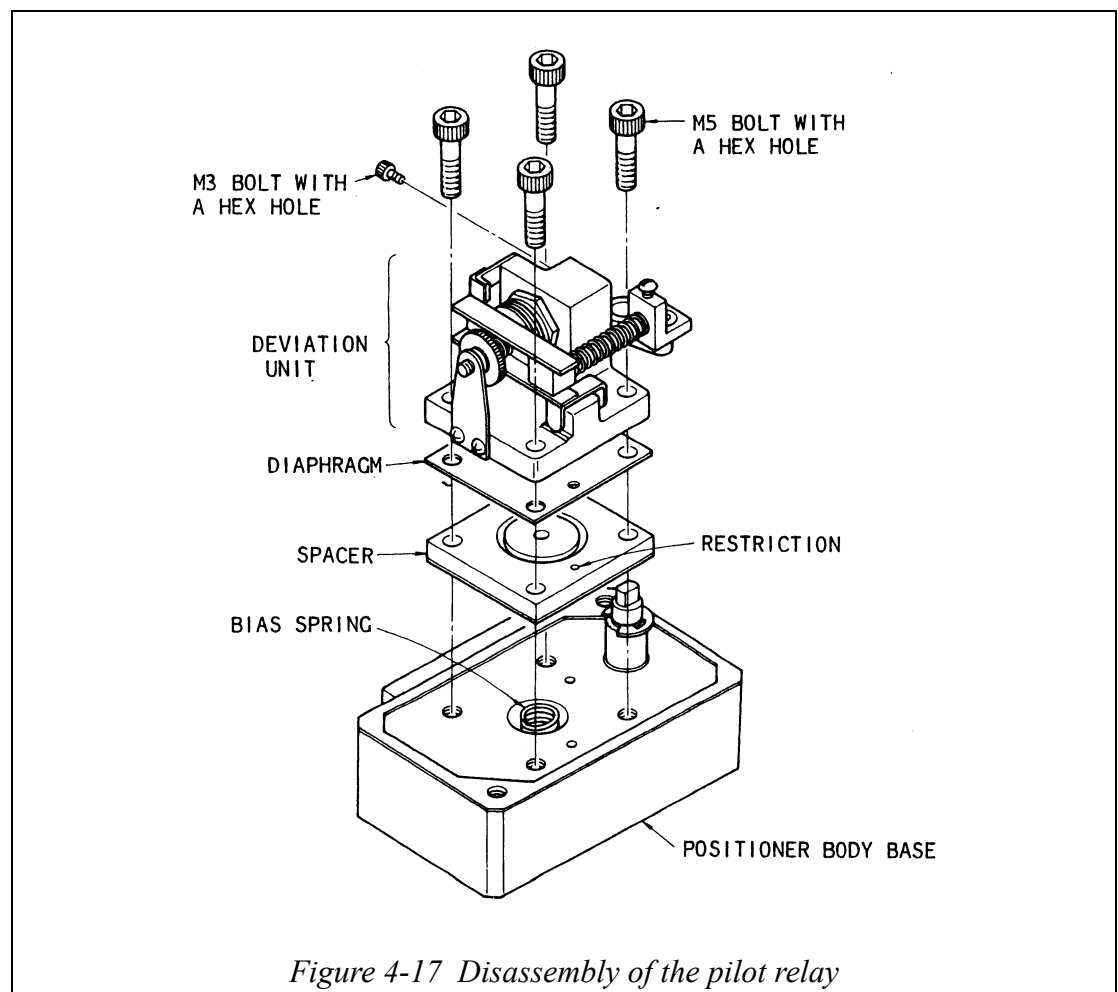
### 4-7-2 : Troubleshooting

If the positioner experiences problems or happens to malfunction, refer to “Troubleshooting chart” on page 4-12 and follow the stated procedures therein.

### 4-7-3 : Cleaning the restriction

If the restriction has become clogged with foreign particles and the positioner starts malfunctioning, remove the M5 bolts (hex-hole head) and M3 bolt (hex-hole head) with 4 mm and 2.5 mm allen wrenches, respectively; remove the spacer, and clean the restriction with a 0.3 mm wire.

Be sure to insert the bias spring when reassembling the pilot relay.



## Troubleshooting chart

Table 4-1 Troubleshooting

Symptom	Cause	Action to take
No output	<ol style="list-style-type: none"> <li>1. Incorrect adjustment</li> <li>2. Incorrect supply air pressure setting.</li> <li>3. Clogged restriction</li> <li>4. Incorrect mounting of cam</li> <li>5. Defective bellows</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to “4-6 : Adjusting the positioner”.</li> <li>2. Refer to “4-6 : Adjusting the positioner”.</li> <li>3. Refer to “4-7-3 : Cleaning the restriction”.</li> <li>4. Refer to “4-5 : Removing and installing the positioner”.</li> <li>5. *See note.</li> </ol>
Output pressure does not decrease	<ol style="list-style-type: none"> <li>1. Incorrect adjustment</li> <li>2. Clogged restriction</li> <li>3. Bias spring</li> <li>4. Bypass cock</li> <li>5. Incorrect mounting of cam</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to “4-6 : Adjusting the positioner”.</li> <li>2. *See note.</li> <li>3. Refer to “4-7-3 : Cleaning the restriction”.</li> <li>4. Switch bypass cock to “ON”.</li> <li>5. Refer to “4-5 : Removing and installing the positioner”.</li> </ol>
Unsatisfactory linearity	<ol style="list-style-type: none"> <li>1. Incorrect adjustment</li> <li>2. Incorrect mounting of cam</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to “4-6 : Adjusting the positioner”.</li> <li>2. Refer to “4-5 : Removing and installing the positioner”.</li> </ol>
Large hysteresis	<ol style="list-style-type: none"> <li>1. Loose bolts or nuts</li> <li>2. Defective bellows</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten the loose bolts or nuts.</li> <li>2. *See note.</li> </ol>
Sluggish action	<ol style="list-style-type: none"> <li>1. Bypass cock</li> <li>2. Clogged restriction of bellows</li> </ol>	<ol style="list-style-type: none"> <li>1. Switch bypass cock to “ON”.</li> <li>2. *See note.</li> </ol>
Hunting occurs	<ol style="list-style-type: none"> <li>1. Friction in valve body or actuator</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect the valve body and actuator.</li> </ol>

**~Note**      *The deviation unit requires to be disassembled.*

*Disassembly should desirably be done by an Azbil Corporation service agent. Disassembly by the customer is not recommended.*



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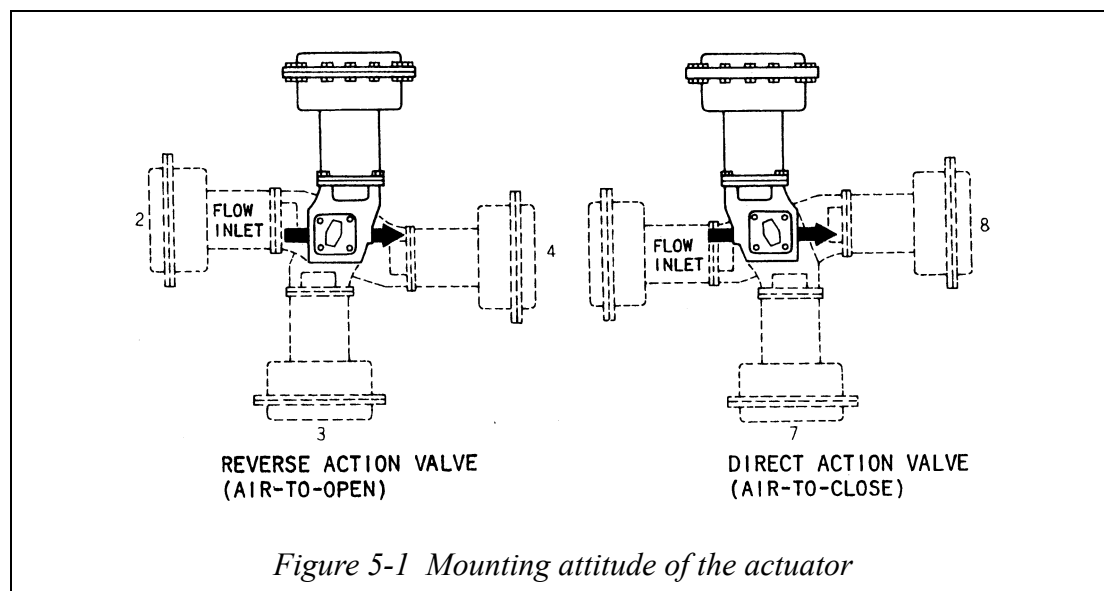
## Chapter 5 : Changing the Mounting Attitude of Actuator and type of Valve

The mounting attitude of the model VFR valve's actuator can be changed and the type of its action can be modified without requiring any additional parts.

### 5-1 : Changing the mounting attitude of actuator

The actuator can be installed in any one of the four attitudes shown in Figure 5-1. The standard mounting attitudes are positions 1 and 5 shown in Figure 5-1. When installing the actuator in an attitude other than the standard ones, take precautions not to let rain-water become entrapped inside the valve.

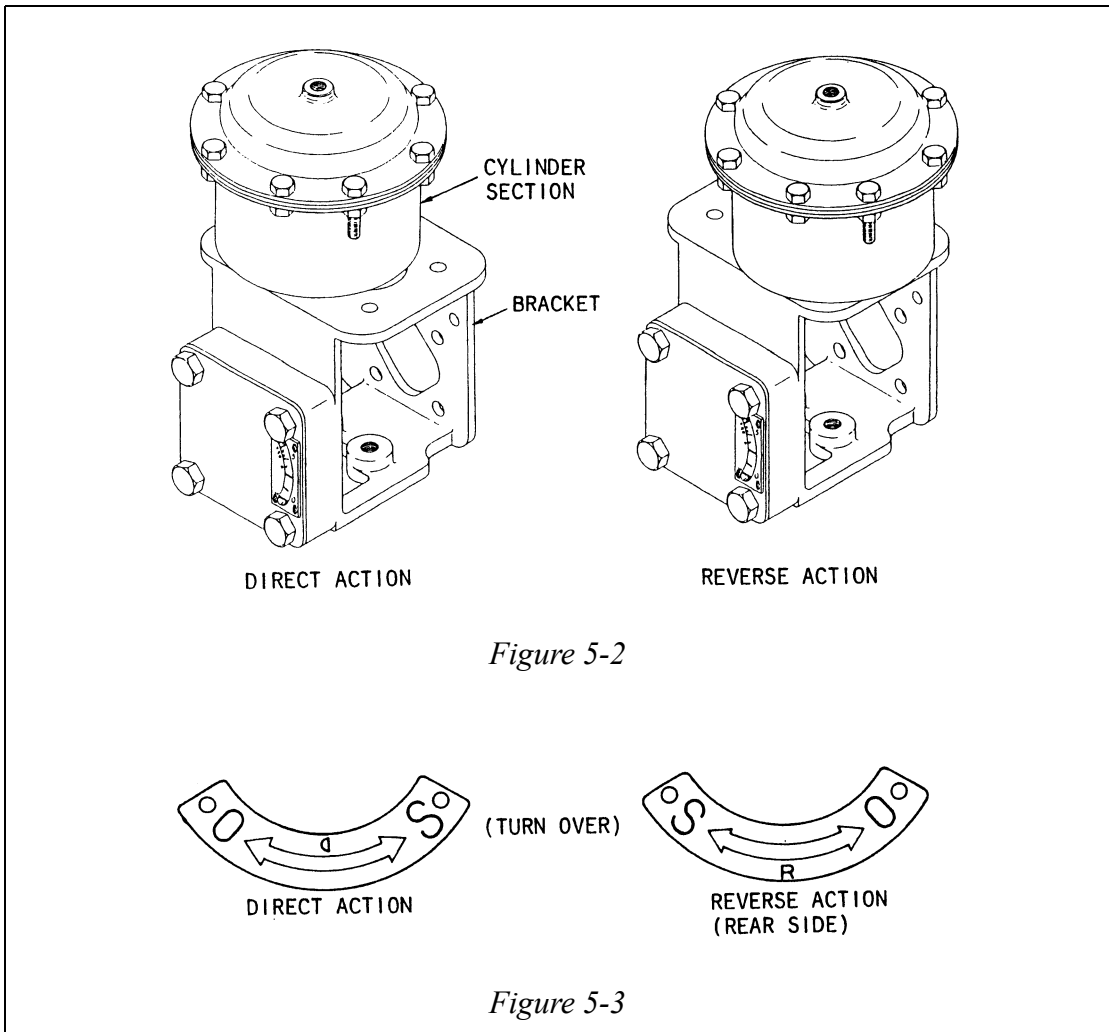
- (1) Remove the actuator from the valve body referring to steps (1) to (5) of "Chapter 3 : Actuator".
- (2) Set the actuator in the desired attitude and fix it in that position with the mounting-bolts.
- (3) Fix the actuator to the valve body by following in the reverse order the procedures in step (1) above. Make certain that the roller of the clamp is correctly set on the handwheel shaft.
- (4) Adjust the actuator by referring to "3-2 : Adjusting the actuator". For the positioner, refer to "4-6 : Adjusting the positioner".



### 5-2 : Changing the valve action

- (1) Remove the bolts (hex socket head) of the clamp, and remove the clamp from the valve stem.
- (2) Remove the bolts which fix the bracket to the cylinder. Change the location of the cylinder as shown in Figure 5-2.

(3) Change the labelling of the handwheel rotating direction markplate to conform with the valve action. D refers to direct action and R refers to reverse action. (See Figure 5-3.)



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