

**Yamatake**

**OPERATOR'S MANUAL**

CONTROL VALVE

MODEL : VDP

## TABLE OF CONTENTS

I.	DESCRIPTION .....	1
	1. CONSTRUCTION	
	2. SPECIFICATIONS	
	3. VALVE BODY	
	4. ACTUATOR	
II.	INSTALLATION .....	4
III.	INSPECTION .....	5
IV.	LUBRICATING GROUND PACKING .....	6
V.	CALIBRATION AND ADJUSTMENT .....	7
	1. LIFT ADJUSTMENT	
	2. SPRING COMPRESSION ADJUSTMENT	
VI.	DISASSEMBLY AND REASSEMBLY .....	9
	1. DISASSEMBLY	
	2. REASSEMBLY	
VII.	PARTS REPLACEMENT .....	12
	1. GROUND PACKING	
	2. VALVE PLUG, VALVE STEM AND SEAT RING	
	3. DIAPHRAGM OF DIAPHRAGM MOTOR	
VIII.	CHANGE OF VALVE ACTION .....	13

I. DESCRIPTION

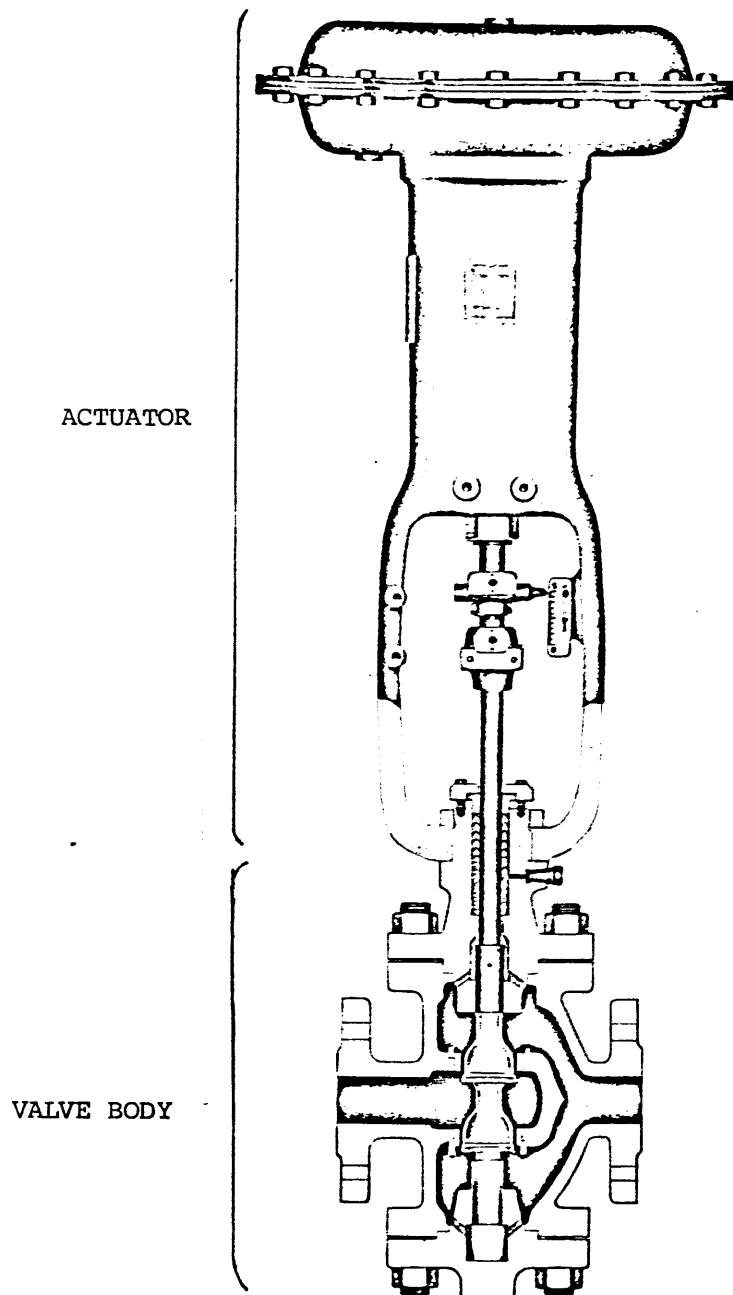


Fig. 1 VDP Type, Top and Bottom guide double-seated Valve

I-1 CONSTRUCTION

The VDP-type, top and bottom guide double-seated Valve mainly consists of a globe type valve body and spring type diaphragm actuator.

The VDP valve is available for use with variety of combinations of valve size, rated pressure, connection type, material, actuator size, etc.

I-2 SPECIFICATIONS

Main specifications such as basic model number, valve size and rated pressure are indicated on the nameplate below. Make sure that the specifications are suitable for the condition of a site being installed.


CONTROL VALVE	
TAG. No	
PROD. No	
MODEL	ACT.
SIZE	LIFT
RATING	
BODY	
TRIM	
PLUG	
PACKING	
GASKET	
GREASE	
SPRING RANGE	kgf/cm <sup>2</sup>
POSITIONER SUPPLY	kgf/cm <sup>2</sup>
AIR TO	VALVE
DATE	
 <b>Yamatake</b> TOKYO JAPAN YN-23	

Fig. 2 Nameplate

I-3 VALVE BODY

The valve body consists of a valve body, bonnet, tailpiece and trim composed of a valve plug, seat ring, etc.

The bonnet and tailpiece are connected by stud bolts and nuts with gaskets, acting as pressure chamber positively sealed off fluid to prevent causing any leakage. The trim is assembled in the valve body, bonnet and tailpiece, and for valve action, direct acting or reverse acting type is provided.



## II. INSTALLATION

Prior to install the valve on a pipeline, inspect and confirm the following items.

- (1) Before installing valve, remove all scale, chips and welding spatter inside the pipeline, then install the valve.
- (2) Avoid an installing place on the pipeline where it is apt to collect foreign substance and to occur water hammer.
- (3) The valve shall be installed horizontally on the pipeline, as a rule, that is, the valve is so installed that the actuator is vertical with respect to the horizontal pipeline.
- (4) The valve shall be connected to the pipeline so that fluid flows in direction indicated on the valve body.
- (5) For installing pipeline connection gaskets, perform it taking into consideration not to protrude the gaskets inside the valve aperture. Use gaskets made of material suitable for kind and temperature of fluid being measured.
- (6) Take care not to act excess stress on the pipeline and tighten evenly bolts on the circumference of the connection flanges.
- (7) Upon completion of the valve installation, before connecting air tubing, blow down it to remove dust, foreign substance in the tubing.
- (8) Provide ample space above the actuator to be able to access assembling and disassembling the actuator. Furthermore, for reverse acting model, provide enough space below the valve body available for removal of the valve body.
- (9) Make sure that pressure and temperature of fluid and ambient temperature at the valve installation site do not exceed the rated valve of the valve.

## III. INSPECTION

Before starting up the operation after completion of valve installation, perform the following inspection and confirmation to prevent occurrence of malfunctions during operation.

- (1) Air connections are tight. (In case of employing seal tapes on joints, tighten them not to insert seal materials into the air connections.)
- (2) Diaphragm case bolts are tight.
- (3) Spring compression is properly adjusted.
- (4) Actuator stem is tightly connected to valve stem.
- (5) Stems are properly adjusted.
- (6) Actuator stem and valve stem are straight and aligned.
- (7) Stems are not scored, nicked or scratched.
- (8) Packing flange nuts are finger-tight just enough to stop leaks.
- (9) Actuator yoke lock nut is tight.
- (10) For valve with asbestos packing, the packing rings are properly lubricated.
- (11) Both nuts on bonnet and tailpiece are tight.
- (12) Valve is installed straight-in-line with piping.

## IV. LUBRICATING GROUND PACKING

The lubricant used must always conform to the requirements of the condition of usage.

Check the nameplate for proper lubricant number.

If no lubrication is required (for teflon packing), nothing is indicated.

To lubricate ground packing, perform lubrication using lubricator on the front of bonnet as in the following procedures.

Lubricator is filled with lubricant, so turning it screw in by loosening lubricator handle.

If lubrication is not satisfactorily obtained in the packing with the screw completely turned, first shut off the lubricator handle and remove the lubricator screw, then insert the lubricant.

Turn in lubricator screw while loosening the lubricator handle. Repeat this procedures until the lubrication is satisfactorily obtained.

After completion of lubricating, tighten the lubricator handle.

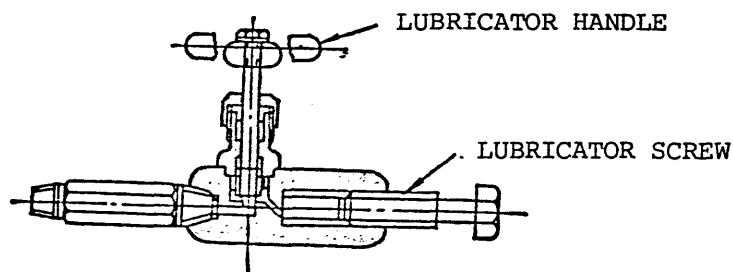


Fig. 5 Lubricator

## V. CALIBRATION AND ADJUSTMENT

Adjustment of lift and spring compression should be made when performing disassembly and reassembly after overhaul or parts replacement.

(For calibration of HTP and VPI type Valve Positioners, refer to instruction manual nos. FC-8011 (HTP) and FC-8034 (VPI))

Note: For disassembly, reassembly and parts replacement, refer to pertinent paragraphs.

## V-1 LIFT ADJUSTMENT

Caution: Valve stem should be rotated with a pin inserted into a hole on the top of the stem, however, for bellows sealed type, do not rotate the valve stem.

## V-1-1 Direct Acting Actuator (Air to Close)

When the valve stem and actuator stem are not fixed by the stem connector, first push the valve stem down to seat the valve plug on the seat ring and then set the scale by loosening the lock screw so that the pointer indicates OPEN position on the scale.

Connect air line to the actuator and apply air pressure which corresponds to the maximum spring range of the actuator and connects the stem connector.

Release air pressure slightly and fasten the stem connector tightly where the pointer indicates slightly adjacent to OPEN position.

When the stem connector is fixed, loosen its lock bolts to be able to turn the stem lightly and then turn the valve stem in the stem connector 2 to 3 turns.

Loosen the lock screw of the Scale and set the scale where the pointer indicates OPEN position.

Apply air pressure corresponding to the maximum spring range so that the pointer indicates SHUT position on the scale, then turn the valve stem backward until the valve plug seats on the seat ring.

Release air pressure slightly and fasten the stem connector tightly where the pointer indicates slightly adjacent to OPEN position.

## V-1-2 Reverse Acting Actuator (Air to Open)

When the valve stem and actuator stem are not fixed by the stem connector, first connect air line to the actuator. Apply air pressure corresponding to the maximum spring range of the actuator and ensure that the actuator stem does not move even when applying more than this pressure. Holding this state, loosen the lock screw of the scale and set the scale where the pointer indicates OPEN position.

Release air pressure until the pointer indicates SHUT position and raise the valve stem so that the valve plug seats on the seat ring.

Holding this state, fixed the stem connector.

Increase air pressure slightly and fasten the stem connector where the pointer indicates slightly adjacent to OPEN position.

When the stem connector is fixed, apply air pressure slightly greater than that corresponds to the maximum spring range of the actuator and ensure that the actuator stem does not move even when applying more than this pressure.

Holding this state, loosen the lock screw of the scale and set the scale where the pointer indicates OPEN position. Then loosen the stem connector bolts so that the valve stem rotates lightly and turn the stem backward 2 to 3 turns.

Decrease air pressure applied to the actuator until the pointer indicates SHUT on the scale and turn the valve stem in the stem connector so that the valve plug seats on the seat ring.

Increase air pressure slightly until the pointer indicates slightly adjacent to OPEN position and then fasten the stem connector.

## V-2 SPRING COMPRESSION ADJUSTMENT

## V-2-1 Direct Acting Actuator (Air to Close)

Connect air line to the actuator.

Apply air pressure corresponding to the maximum spring range of the actuator ( $1.0 \text{ kg/cm}^2$  or 1.5 psi as standard) and adjust the spring compression adjustment in order to obtain SHUT position.

If tight-closed is required, turn in the spring compression adjustor more half-turn.

## V-2-2 Reverse Action Actuator (Air to Open)

Connect air line to the actuator.

Apply air pressure corresponding to the minimum spring range of the actuator ( $0.2 \text{ kg/cm}^2$  or 3 psi as standard).

Then turn the spring compression adjustor in order to obtain SHUT position.

If tight-closed is required, turn in the spring compression adjustor more half-turn.

## VI . DISASSEMBLY AND REASSEMBLY

## VI-1 DISASSEMBLY

For disassembly valve, first shut off process flow in pipeline. And make sure that no pressure is remained in the valve body whose temperature is lowered to the ambient value.

## VI-1-1 Disassembly of Valve Plug and Seat Ring

Direct Acting Actuator (Air to Close)

- (1) Remove air line
- (2) Loosen the stem connector to disassembly the actuator stem and valve stem.
- (3) Remove the yoke lock nut and remove the actuator from the valve body.
- (4) Loosen the packing nut and remove the bonnet nut, then bonnet, taking consideration not to damage the ground packing.
- (5) Lift out the valve plug (with stem) from the body.
- (6) Remove the seat ring using disassembly tool by turning it counterclockwise.  
(For 4" or smaller size upper and lower seat rings, lift out in the same direction, however, for 6" or greater, lift out in upper and downward directions, respectively.)

Reverse Acting Actuator (Air to Open)

- (1) Apply air pressure so that the pointer indicates 50% on the scale and hold it at this pressure.
- (2) Loosen the stem connector and remove the actuator stem and valve stem.
- (3) Remove air line.
- (4) Remove the yoke nut and remove the actuator from the valve body.
- (5) Loosen the packing nut and bonnet nut and bonnet, taking consideration not to damage the ground packing.
- (6) Hold the valve plug from the bonnet side not to fall down and remove tailpiece nuts, then tailpiece with care.
- (7) Remove the valve plug with stem from toward tailpiece.
- (8) Remove the seat ring using disassembly tool by turning it counterclockwise.  
(For 4" or smaller size upper and lower seat rings, lift out in the same direction, however, for 6" or greater, lift out in upper and downward direction, respectively.)

## V-2 REASSEMBLY

For reassembly of the valve, perform in the reverse manner of procedures in DISASSEMBLY, taking the following items into consideration.

Procedure in Reassembly

- (1) Reassembly of seat ring.
- (2) Reassembly of valve plug with stem.
- (3) Reassembly of bonnet and tailpiece.

Caution: For fastening nuts of bonnet and tailpiece, first, fasten all nuts with finger and then fasten them tightly with a wrench using a gap gauge to be fixed evenly.

- (4) Reassembly of actuator.

Caution: For reassembly of stem connector, care must be taken to that the length of screw thread of the actuator stem and valve stem become the same.

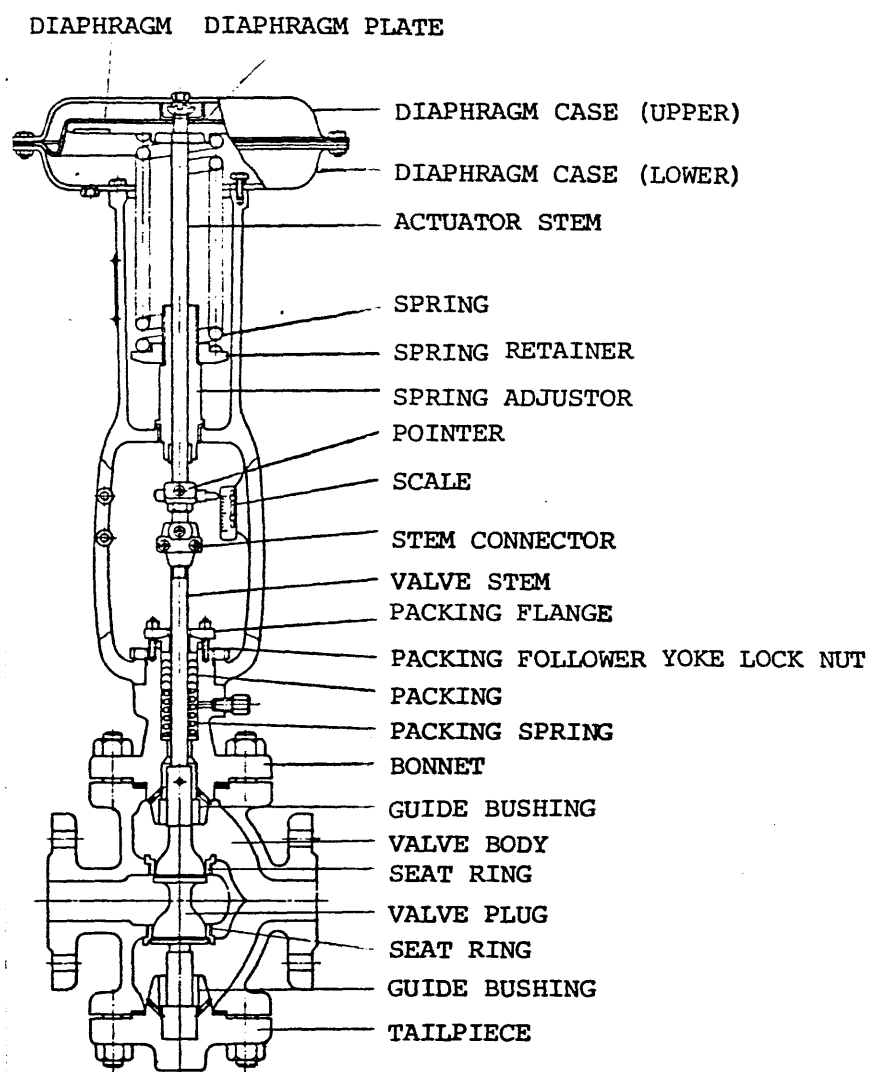


Fig. 6 VDP type valve

VII. PARTS REPLACEMENT

VII -1 GROUND PACKING

For replacement of parts, first shut off process flow in the pipeline. And make sure that no pressure is remained in the valve body, whose temperature is lowered to the ambient value.

(1) Asbestos packing

First remove the packing flange nuts, lift out the packing flange and packing follower and remove the asbestos packings using a packing hook.

And then, replace new packings in order to cut the end of each packing, with positions 90 to 180° out of place to each other and hold them with the packing follower.

Insert enough lubricant into grease cage. Finally fasten the packing flange nut.

(2) V-shape teflon packing

First, disconnect both stems. Remove the packing flange nut and lift out the packing follower from the valve stem.

Replace the packing with new one and hold it with the packing follower.

To reassemble, fasten the packing flange nut and readjust connection of the stems.

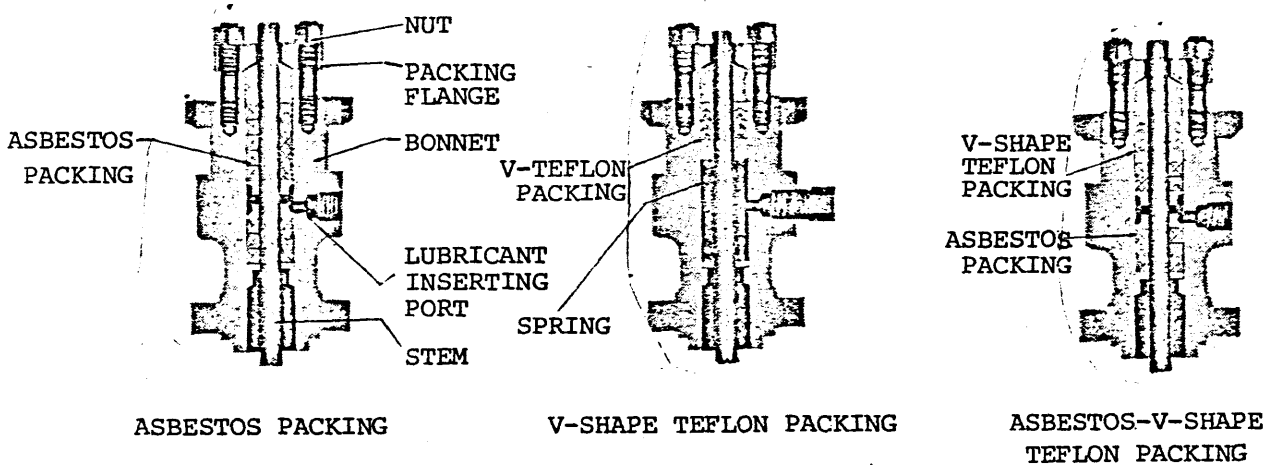


Fig. 7 Construction of ground packing

## VII-2 VALVE PLUG AND SEAT RING

- (1) For replacement of the valve plug and seat ring, perform referring to par. in DISASSEMBLY and REASSEMBLY.
- (2) The valve plug and valve stem shall be replaced with pair assembly. If either one of them is to be replaced, remove a pin on the valve plug, then disassemble the valve plug and stem by turning the stem backward. To assemble, turn the valve stem in the valve plug and check linearity of the valve stem.  
Make hole provided previously on the valve plug using electric drill and finish the tapered thread, then push in new tapered pin.
- (3) To rub valve seat, perform in conjunction with the valve plug, seat ring gaskets, bonnet and tailpiece assembled together.

## VII-3 DIAPHRAGM OF DIAPHRAGM MOTOR

- (1) For models VAL, 2 and 3, first remove air line.  
Loosen the spring adjustor by turning it clockwise. Remove the diaphragm case (upper), lift out the slotted pin and remove the slotted nut. If required, remove the nut with pointer lock nut held by a wrench or equivalent to prevent rotation of the actuator stem. Replace the diaphragm after removing the stopper.  
For reassembly, readjust the spring compression adjustor.
- (2) For models VA 4 and 5, first remove air line.  
Loosen spring adjustor, remove the diaphragm case (upper) and stopper, then replace the diaphragm.  
Upon reassembly, readjust the spring compression adjustor.

## VIII. CHANGE OF VALVE ACTION

To change valve action, from the valve body remove the actuator, bonnet, tail-piece and valve plug referring to par. in DISASSEMBLY. Then, disassemble the valve plug and valve stem referring to par. REPLACEMENT OF VALVE PLUG AND VALVE STEM, and turn the valve stem in other end of the plug. Make new hole in the valve stem and push in new pin.

Provide the valve body upside down and reassemble the valve plug, bonnet, tail-piece and actuator.

Mount the scale upside down on the actuator, and perform readjustment referring to par. CALIBRATION AND ADJUSTMENT.