



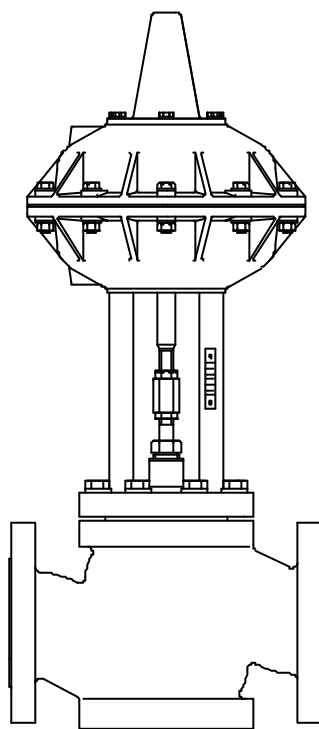
# **BOSSMATIC PARAGON CONTROL VALVES**

**601 Series – 15-65mm**

**Installation, Operation**

**&**

**Maintenance Instructions**



**Document Reference: OMV1P**      **Date: 11/09/02**



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## 1.0. General Information

- 1.1. These instructions cover Fig 621, Fig641, Fig 661 and Fig 681 Paragon control valves; sizes 15 – 65mm.
- 1.2. These instructions are intended to support unpacking, installing and maintenance of these valves. Users and maintenance personnel should read these instructions carefully before installing, operating or performing maintenance work.
- 1.3. Instructions do not contain information on valve ancillaries, positioner, etc. Refer to separate instructions as necessary.

**To avoid damage or injury to personnel or equipment, always heed all warnings and instructions. Unprofessional re-conditioning, the use of non-original manufacturers replacement parts or the performance of maintenance steps other than those described here, may cause the loss of efficiency or lead to personnel injury or damage to parts, and render the warranty void.**

## 2.0. Unpacking

- 2.1. Check all delivered items against the despatch note.
- 2.2. Report any transport damage to the carrier immediately.
- 2.3. Larger valves may require the use of slings for lifting purposes. If slings are used they are to be attached to the valve in a manner that will not damage the valve or any ancillaries attached to it.

**Important: Be aware that the centre of gravity of the valve may be above the lifting point. In this case ensure that the valve is properly supported prior to lifting.**

## 3.0. Installation

**Cast Iron Valves must not be exposed to shock loading (via the process fluid) or superimposed pipe loads.**

- 3.1 Clean all pipes/tubing prior to installation.
- 3.2 Remove all stops and protective bungs.
- 3.3 Check that the valve has been supplied with the correct mode of operation.
- 3.4 Check the valve flow direction (as shown on the valve body) prior to installation. Ensure that the flange seating surfaces and gaskets are free from debris before bolting the valve into line.
- 3.5 Whenever possible install the valve in an upright position (actuator at the top), to ease maintenance. The valve may be installed with the actuator in the horizontal plane ensuring that the two yoke pillars are vertically opposed.
- 3.6 Sufficient clearance above the valve should be allowed for future disassembly.
- 3.7 For modulating applications the valve is generally fitted with an NK pneumatic or electro-pneumatic positioner. Refer to separate instructions for further details.
- 3.8 Connect an air supply to the valve, this will usually be to a connection on the positioner. If no positioner is fitted the connection is made straight into the actuator. If an air filter regulator is fitted then the air supply is connected to it.
- 3.9 Connect the signal input to the positioner (pneumatic or electrical) as applicable.

**Max air supply pressure 6.0 BarG. For specific application pressures refer to Northvale Korting sales department.**



**4.0. Valve Operating Principles**

- 4.1 An important factor in maintaining the control valve is an understanding of the construction and mode of operation. With this knowledge and the following diagrams maintenance is straightforward.
- 4.2 The control valve plug/spindle is moved to the required position by means of an applied pneumatic pressure to the diaphragm actuator assembly (or by rotation of the handjack override if fitted - see separate instructions for details).
- 4.3 The position/extent of valve travel is determined by the level of pneumatic pressure applied by the control system, which is normally 0.2 to 1 Bar (3 to 15 PSI) for modulating applications, amplified by mains air supplied from the positioner.
- 4.4 For ON/OFF applications, the fully open and fully closed positions are used, usually controlled by turning the air supply ON or OFF by means of a solenoid valve in the air supply line (this can be factory fitted to the valve if required).

**5.0. Performance & Functioning Checks**

- 5.1. For satisfactory valve performance the plug must move freely in response to load changes as signalled by the control system. If it does not move freely then check for the following faults.
  - a) Leaking pressure tubing or connections.
  - b) Ruptured diaphragm.
  - c) Leaking diaphragm housing.
  - d) Binding between valve plug and seat.
  - e) Excessive tightness of gland packing.
  - f) Binding between valve spindle and guide bush.
  - g) Positioner incorrectly set / faulty.

**6.0. Allowable Seat Leakage**

- 6.1 Valve seat leakage's conform to the following:  
 Metal to metal seats: EN1349 Class IV.  
 Soft seat inserts: EN1349 Class V.
- 6.2 If the valve leakage rate exceeds the limits given above, the following checks should be made before considering further action.
  - a) Check that the spindle is travelling the full stroke of the valve :

| Valve Size (mm) | Valve stroke (mm) |
|-----------------|-------------------|
| 15-25           | 20                |
| 40-65           | 30                |

- b) Inspect for wear and/or damage to the valve plug and/or seat face(s).
- c) Binding of valve spindle to the guide bush or gland packing. Consult Northvale Korting sales department.
- d) Insufficient spring force to close air-fail-closed valves against the line pressure. Consult Northvale Korting sales department.

**7.0 General Maintenance**

**Prior to carrying out any maintenance tasks the following should be observed.**

- a) **Isolate the valve from the line pressure.**
- b) **Relieve pressure from within the valve body.**
- c) **Disconnect the air supply to the actuator.**

- 7.1. The following checks should be made at regular intervals to ensure valve performance.



- 7.2. Examine gaskets for leaks and if necessary re-tighten bolts.
- 7.3. Check valve for damage caused by corrosive residues or corrosive vapours.
- 7.4. Clean valves and re-paint if necessary.
- 7.5. Check gland for leaks.
- 7.6. Stroke valve and check for smooth movement of spindle. Irregular movement may indicate internal defects.
- 7.7. If possible, close the supply pressure and check the fail-safe position.
- 7.8. Prior to re-tightening any joint it is essential that all jointing faces be clean and free from any debris. It is preferable that a new gasket is used each time a seal is made.
- 7.9. Flange / joint bolting is to be lubricated using a suitable copper based lubricant.
- 7.10. All bolts are to be tightened in a minimum of 3 stages and in a manner that allows equal force distribution. Shock loading (the hammering of spanners) should be avoided.
- 7.11. The following final torque's are to be used for the bolt sizes given.

| Bolt Dia (mm) | Final Bolt Torque (Nm) |
|---------------|------------------------|
| 8             | 25                     |
| 10            | 50                     |
| 12            | 90                     |
| 16            | 220                    |
| 20            | 425                    |

**8.0. Hand jack Removal**

- 8.1. Refer to Fig. 1 for Fig. 621 valves, Fig. 2 for Fig. 641 valves, Fig. 3 for Fig. 661 valves and Fig. 4 for Fig. 681 valves.

**8.2. Fig.621/661 Valves (Fig.7)**

- 8.3. Unscrew and remove the 4 socket head cap screws holding the handjack onto the actuator. Withdraw the handjack housing assembly over the actuator spindle.

- 8.4. Unscrew and remove the actuator spindle locknut and remove the handjack nut complete with the bearing.

**8.5. Fig.641/681 Valves (Fig.8)**

- 8.6. Unscrew and remove the 4 socket head cap screws holding the cap onto the handjack shaft and remove.

- 8.7. Unscrew and remove the actuator spindle locknut and remove the handjack nut complete with the bearing.

- 8.8. Unscrew and remove the 4 socket head cap screws holding the handjack onto the actuator and withdraw the handjack assembly over the actuator spindle.

**9.0. Hand jack Re-fitting**

- 9.1. Refer to Fig. 1 for Fig. 621 valves, Fig. 2 for Fig. 641 valves, Fig. 3 for Fig. 661 valves and Fig. 4 for Fig. 681 valves.

**9.2. Fig.621/661 Valves (Fig.7)**

- 9.3. Screw the handjack nut complete with the bearing onto the actuator spindle, leaving approximately two threads free at the bottom on the actuator spindle. Lock in place with the actuator spindle locknut.

- 9.4. Unwind the handjack sleeve in the housing by 3 or 4 turns to give clearance between the sleeve and the bearing.



- 9.5. Fit the housing assembly over the actuator spindle locating the bearing into the sleeve. Secure in place using four socket head cap screws into the actuator top.
- 9.6. Wind down the handjack until the clearance between the sleeve and the bearing is taken up and then back off by a half-turn.
- 9.7. The minimum distance between the handjack cap and the housing in the inactive state is -
  - 25mm for 20mm stroke valve.
  - 35mm for 35mm stroke valve,
- 9.8. **Fig.641/681 Valves (Fig.8)**
- 9.9. Ensure that the handjack sleeve is protruding by approximately 5mm above the handjack housing.
- 9.10. Fit the housing assembly over the actuator spindle and secure in place using four socket head cap screws into the actuator top.
- 9.11. Screw the handjack nut complete with the bearing onto the actuator spindle until it bottoms on the shoulder of the sleeve. Lock in place with the locknut.
- 9.12. Re-fit the cap and secure using four socket head cap screws.
- 9.13. Wind the handjack down until the cap rests upon the housing to give clearance below the bearing in the inactive state

#### 10.0 Actuator Removal

- 10.1 Refer to Fig. 1 for Fig. 621 valves, Fig. 2 for Fig. 641 valves, Fig. 3 for Fig. 661 valves and Fig. 4 for Fig. 681 valves.
- 10.2 Remove the positioner and its interconnecting pipework; refer to separate instructions.
- 10.3 Undo the bolts holding the actuator housing top and bottom covers together, taking care to leave the long bolts until last. Remove the actuator housing top cover.

**Warning: The actuator contains a strong spring and the long bolts are provided to safely absorb the spring tension/compression, as they are undone.**

- 10.4. Remove the positioner take-off plate assembly and spacers from the spindle coupling
  - 10.5. Loosen the spindle locking nuts and screw the spindle coupling onto the actuator spindle.
  - 10.5 Remove the spring and the spindle/diaphragm assembly (taking the spindle coupling off the actuator spindle prior to pushing the spindle/diaphragm assembly through the actuator bottom cover).
  - 10.6 Undo the spacer nut and remove the diaphragm support and the diaphragm. This now leaves the valve with the bonnet, pillars and actuator bottom cover still assembled.
- 11.0 Actuator Re-assembly**
- 11.1 Re-assemble in reverse order of section 10. Apply Loctite '242' to the threads of the spacer nut and screw firmly 'by hand' against the diaphragm support. Take care to use the longer bolts for initial tightening of the actuator housing top/bottom cover.



- 11.2 Re-set the actuator according to section 12.1 to 12.6 for Fig 621 or Fig 661 valves or 12.7 to 12.12 for Fig 641 or Fig 681 valves.
- 11.3 Re-fit the positioner and interconnecting pipework; refer to separate instructions.

**Check diaphragm, pillar O-rings & actuator housing O-rings/guide strips every time actuator is disassembled and replace if necessary.**

## 12.0 Actuator Re-setting

### 12.1 Fig.621/661 Valves

- 12.2 Ensure that the plug is firmly pushed into its seat by applying pressure to the top of the valve spindle.
- 12.3 Apply compressed air to the actuator in order to bring the actuator spindle down to meet the valve spindle.
- 12.4 Wind down the spindle coupling to equally cover both spindles.
- 12.5 Reduce the air pressure on the actuator in to bring the plug off the seat. Rotate the spindle coupling clockwise by one turn (this will ensure sufficient seating force) and tighten the spindle locking nuts.
- 12.6 Re-fit take-off arm/plate and spacers ensuring that plate is horizontal.
- ### 12.7 Fig.641/681 Valves
- 12.8 Apply compressed air to the actuator in order to raise the actuator spindle clear of the valve spindle. Ensure that the plug is firmly pushed into its seat by applying pressure to the top of the valve spindle.
- 12.9 Reduce the air pressure on the actuator in order to bring the actuator spindle down to meet the valve spindle.
- 12.10 Wind down the spindle coupling to equally cover both spindles.

- 12.11 Increase the air pressure on the actuator in order to bring the plug off the seat. Rotate the spindle coupling clockwise by one turn (this will pre-load the actuator) and tighten the spindle locking nuts.

- 12.12 Re-fit take-off arm/plate and spacers ensuring that plate is horizontal.

## 13.0 Gland Seal Replacement (Refer to Figs 5 & 6)

- 13.1 Remove the actuator (10.0 to 10.6)
- 13.2 Undo the bonnet to body bolting, unscrew the gland nut and remove the bonnet/pillar/actuator housing assembly.
- 13.3 On 2-way valves the plug and spindle assembly will also be removed. This should be pulled out of the gland.
- 13.4 Remove the lantern ring and using an awl-type instrument remove the stem seal, taking care not to damage the bonnet bore. Remove the guide bush.
- 13.5 Clean the spindle, bonnet bore and lantern ring ready for re-use.
- 13.6 Remove the gasket from the body/bonnet joint and clean the seating surface prior to fitting a new gasket.
- 13.7 For 2-way valves place plug and spindle into the seat.
- 13.8 For 3-way valves push the plug and spindle into the bottom seat
- 13.9 Place the bonnet/pillar/actuator housing assembly over the spindle and onto the body. Tighten bolts uniformly and in a diametrically staggered pattern.



- 13.10 Slide a new guide bush followed by a new stem seal and the lantern ring over the spindle and into the bonnet bore (taking care not to score the stem seal). Fit the gland nut finger tight only.
- 13.11 Re-fit the actuator assembly (11.0 to 11.3).
- 13.12 Tighten the gland nut down to the setting dimension shown in Fig. 5.

**Important: An over tightened gland nut can cause excessive packing wear and hinder free movement of the valve spindle.**

#### 14.0 Diaphragm Replacement

- 14.1 Refer to Figs.1–4 according to valve Fig. No.
- 14.2 Remove actuator (10.0 to 10.6).
- 14.3 Fit new diaphragm and re-assemble (11.0 to 11.3).

#### 15.0 Actuator Spindle O-ring & Wear Strip Replacement

- 15.1 Refer to Figs.1–4 according to valve Fig No.
- 15.2 Remove the actuator (10.0 to 10.6).
- 15.3 Fit new O-rings and wear strips into the grooves on the actuator housing top and bottom covers. The Orings are to be fitted on the outside of the wear strips.
- 15.4 Re-assemble the actuator (11.0 to 11.3).

#### 16.0 Change Action of Actuator

- 16.1 Remove the actuator (10.0 to 10.6).
- 16.2 Rotate the spindle/diaphragm assembly and spring through 180° and re-fit back into actuator housing bottom cover.

- 16.3 Re-set actuator according to section 12; 12.1 to 12.6 for Fig 621/661 valves or 12.7 to 12.12 for Fig 641/681 valves.

- 16.4 Re-fit the positioner and fit new interconnecting pipework; see separate instructions.

#### 17.0 Bottom Cover Removal (3-way Valves)

- 17.1 Undo the bottom cover to body bolting and remove the bottom cover.
- 17.2 Remove the gasket from the body/bottom cover joint and clean the seating face prior to fitting a new gasket.
- 17.3 Re-fit the bottom cover and tighten the bolts uniformly in a diametrically staggered pattern.

#### 18.0 Plug & Spindle Replacement

- 18.1 Remove the gland seal (13.0 to 13.5).
- 18.2 For 3-way valves remove the bottom cover (17.0 & 17.2)
- 18.3 Replace the plug and spindle.
- 18.4 Re-fit the bottom cover (17.3)
- 18.5 Fit new gland seal (13.7 to 13.12).

#### 19.0 Seat Replacement

- 19.1 Dependent upon size and duty, valves may be fitted with screwed or welded in seats. Screwed seats can (with care) be replaced on site but we recommend that valves with welded in seats be returned to our factory for replacement.
- 19.2 For 3-way valves undo the spindle coupling (10.4 – 10.5)
- 19.3 Undo the bonnet to body bolting and remove the bonnet/pillar/actuator/spindle assembly complete.





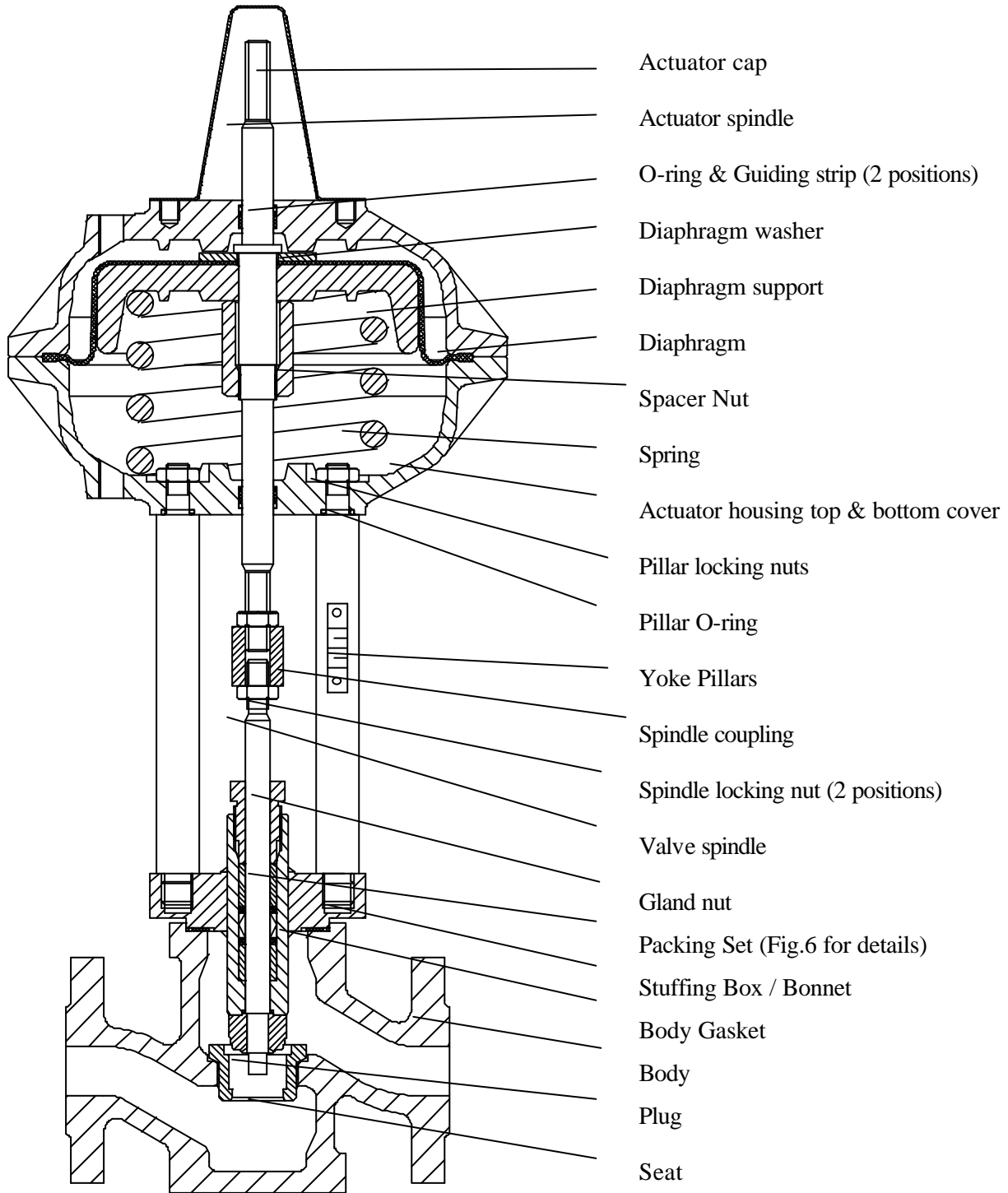
- 19.4 The seat can now be readily removed. Unscrew the seat using a suitable tool located in the slots/holes provided and clean the threads in the body using a suitable tool and/or solvent.
- 19.5 For 3-way valves the seat in the bottom cover should similarly be removed.
- 19.6 When fitting new seats, a continuous bead of thread sealant (Loctite 510 is recommended) should be placed around the seat threads. The new seat should then be screwed down tightly into place.
- 19.7 Remove the gasket from the body/bonnet joint and clean the seating surface prior to fitting a new gasket.
- 19.8 For 3-way valves remove the gasket from the body/bottom cover joint and clean the seating surface prior to fitting a new gasket (13.6). Re-fit the bottom cover (17.3).
- 19.9 **For Fig 641 and Fig 681 valves** - Apply compressed air to the actuator in order to raise the plug while re-fitting.
- 19.10 Place the bonnet/pillar/actuator/spindle assembly into the body. Tighten the body to bonnet bolts uniformly and in a diametrically staggered pattern.
- 19.11 **For Fig 641 and Fig 681 valves** - Remove compressed air from actuator.

## 20.0 Spare Parts / Valve Refurbishment

- 20.1 Northvale offers a full spare parts service and factory valve refurbishing service. Please contact our sales department for full details. When ordering spare parts please quote the valve serial number.



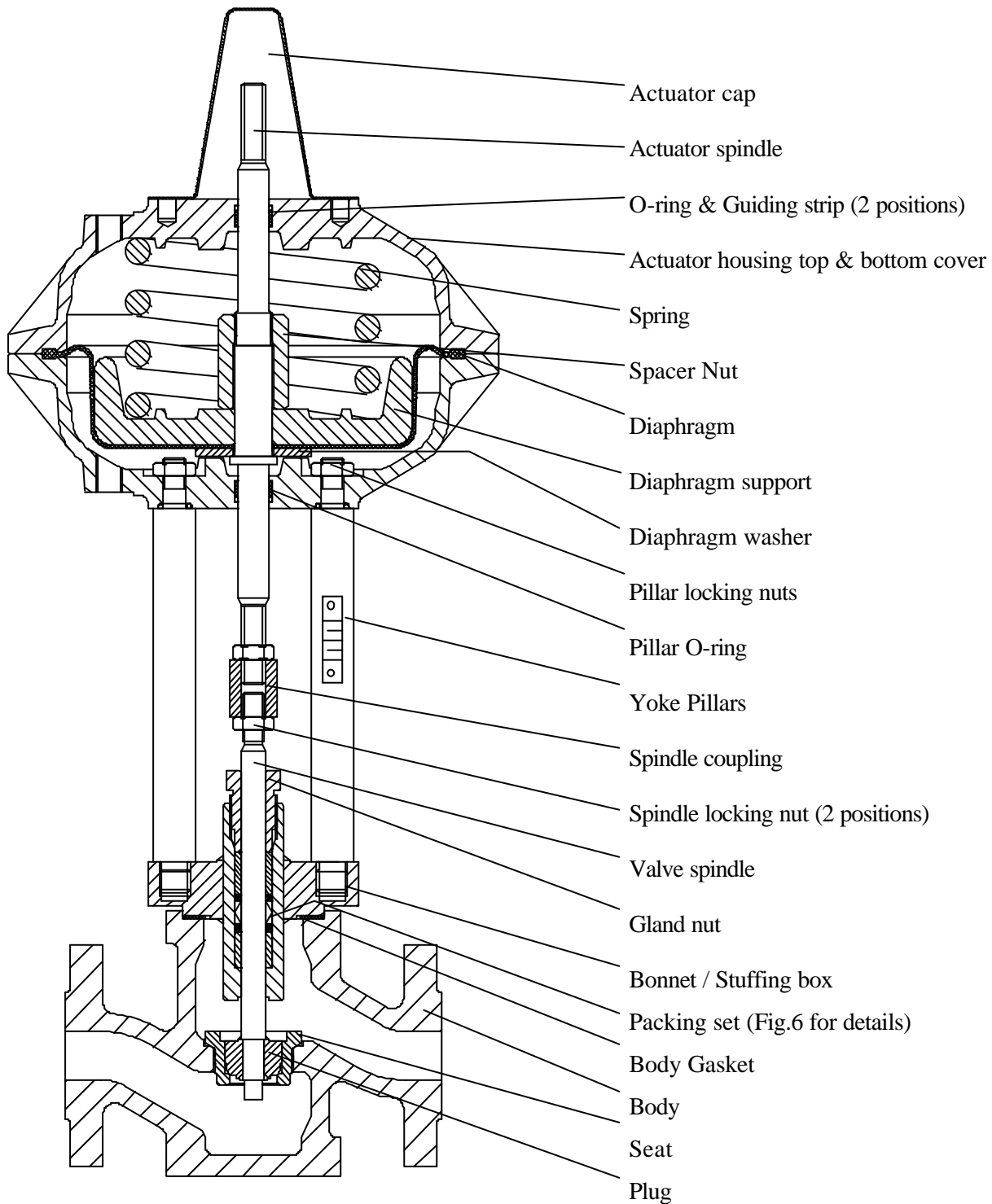
**Fig.1 General Arrangement for Figure 621 Fail Open Valve**



- Actuator cap
- Actuator spindle
- O-ring & Guiding strip (2 positions)
- Diaphragm washer
- Diaphragm support
- Diaphragm
- Spacer Nut
- Spring
- Actuator housing top & bottom cover
- Pillar locking nuts
- Pillar O-ring
- Yoke Pillars
- Spindle coupling
- Spindle locking nut (2 positions)
- Valve spindle
- Gland nut
- Packing Set (Fig.6 for details)
- Stuffing Box / Bonnet
- Body Gasket
- Body
- Plug
- Seat

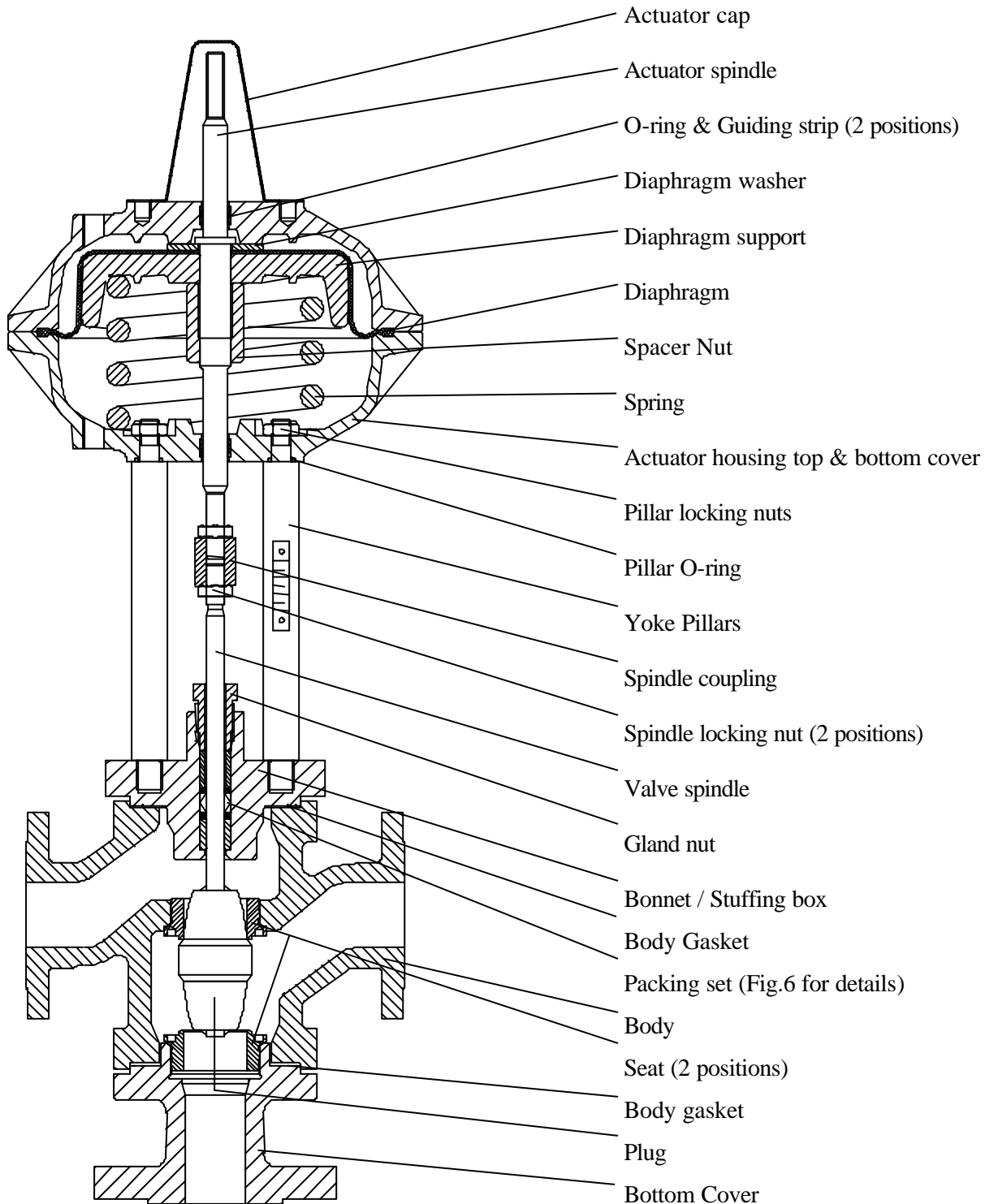


**Fig.2 General Arrangement for Figure 641 Fail Closed Valve**



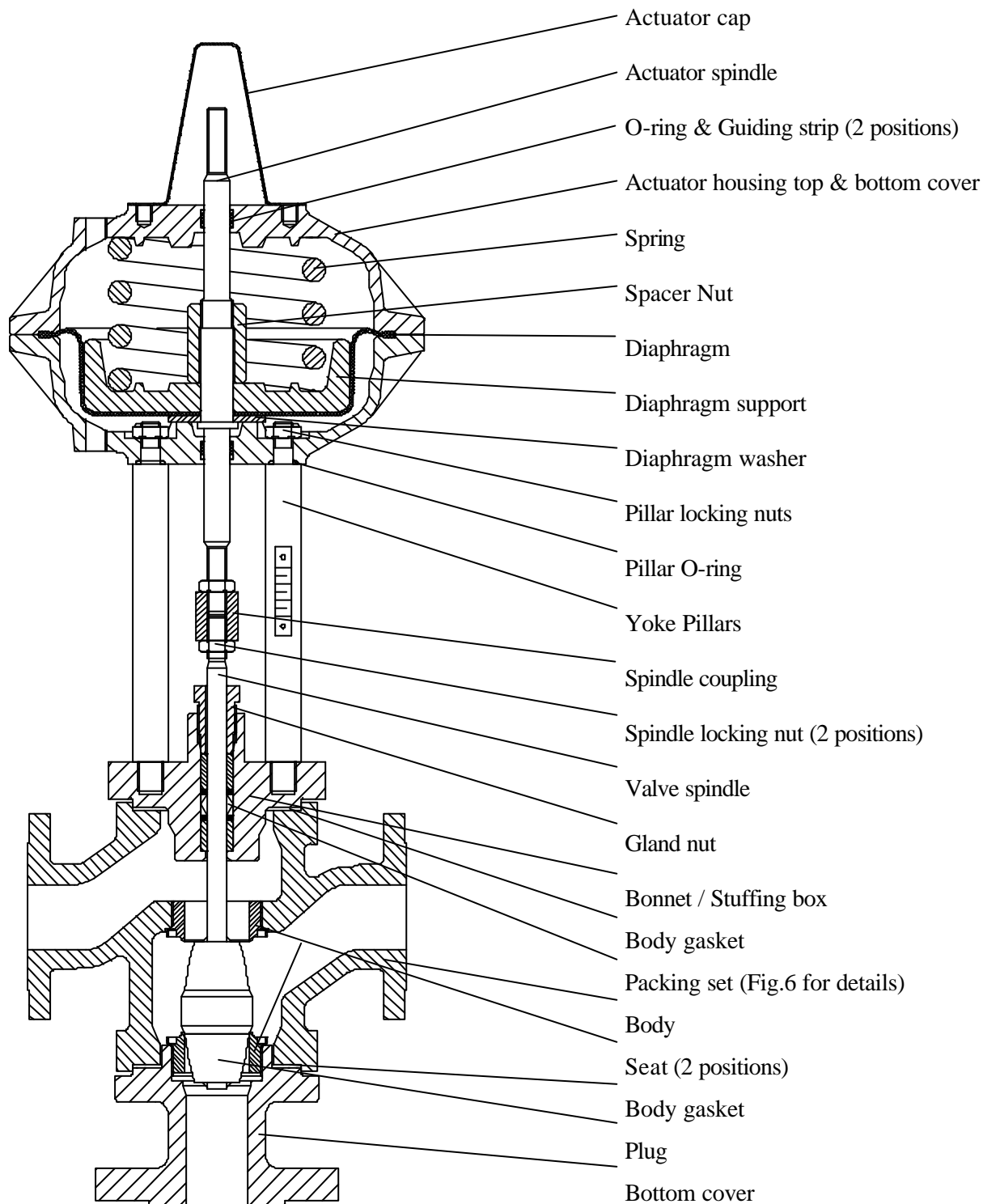


**Fig.3 General Arrangement for Figure 661 Fail Top Seat Valve**



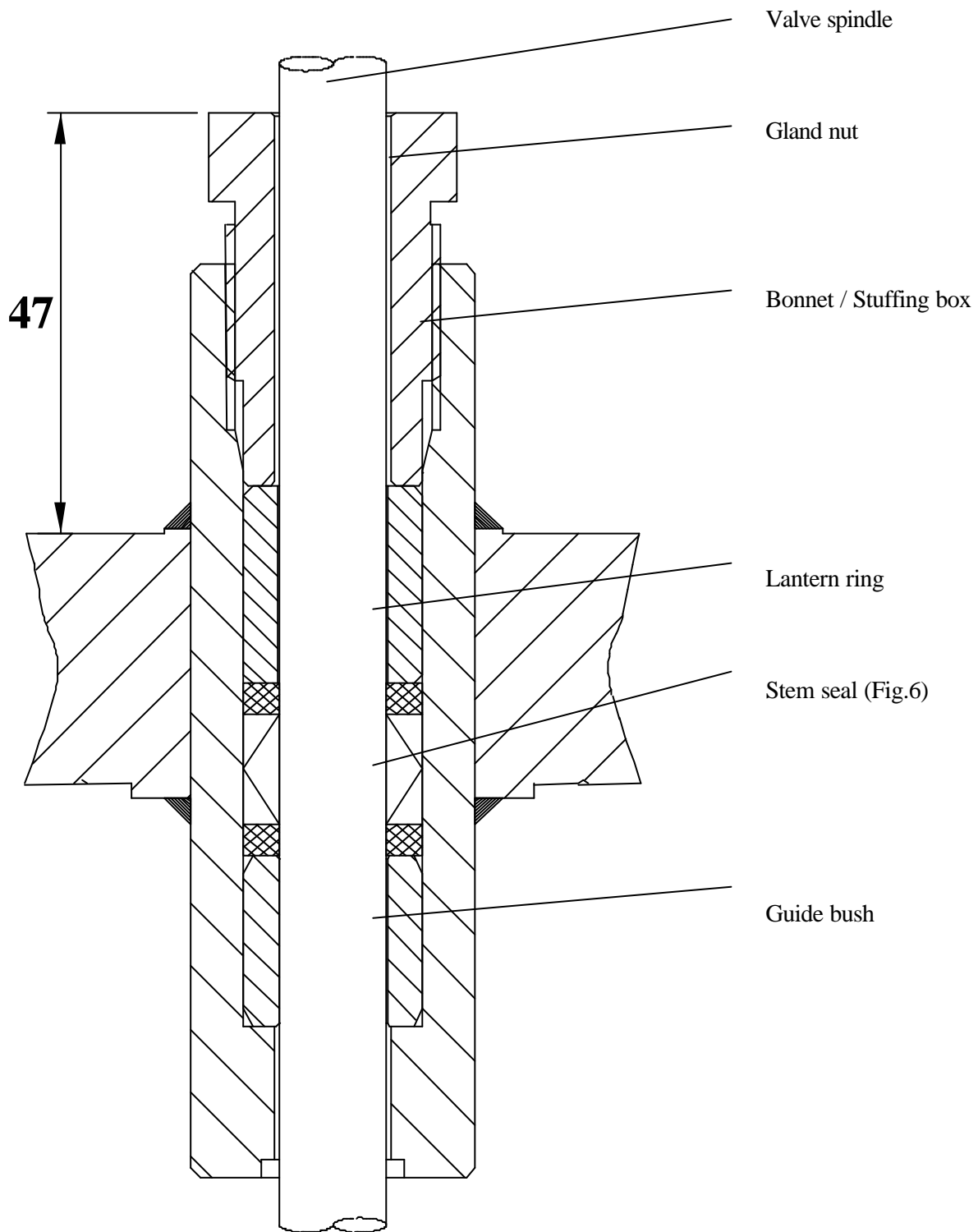


**Fig.4 General Arrangement for Figure 681 Fail Bottom Seat Valve**

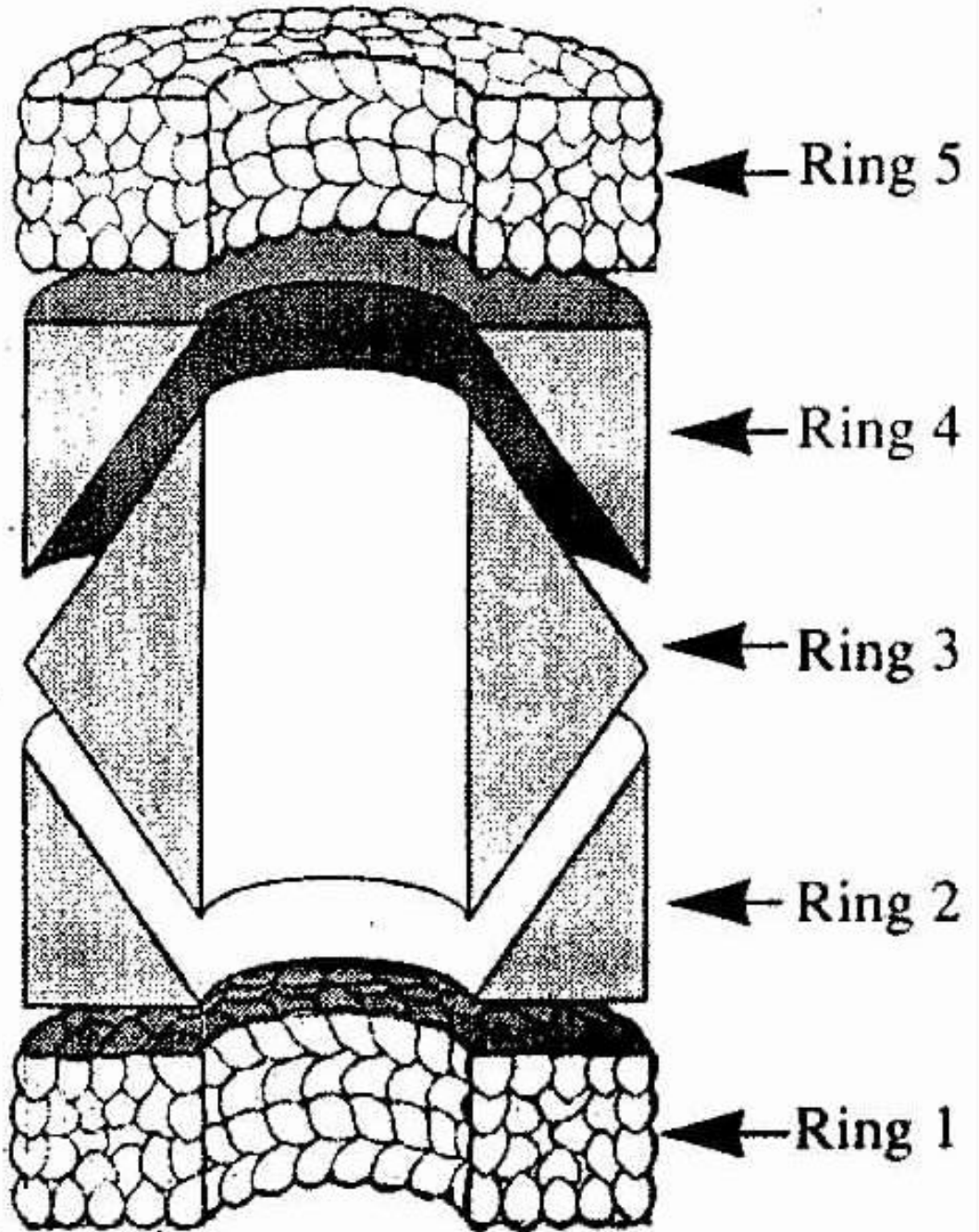




**Fig.5 Packing Set Arrangement**



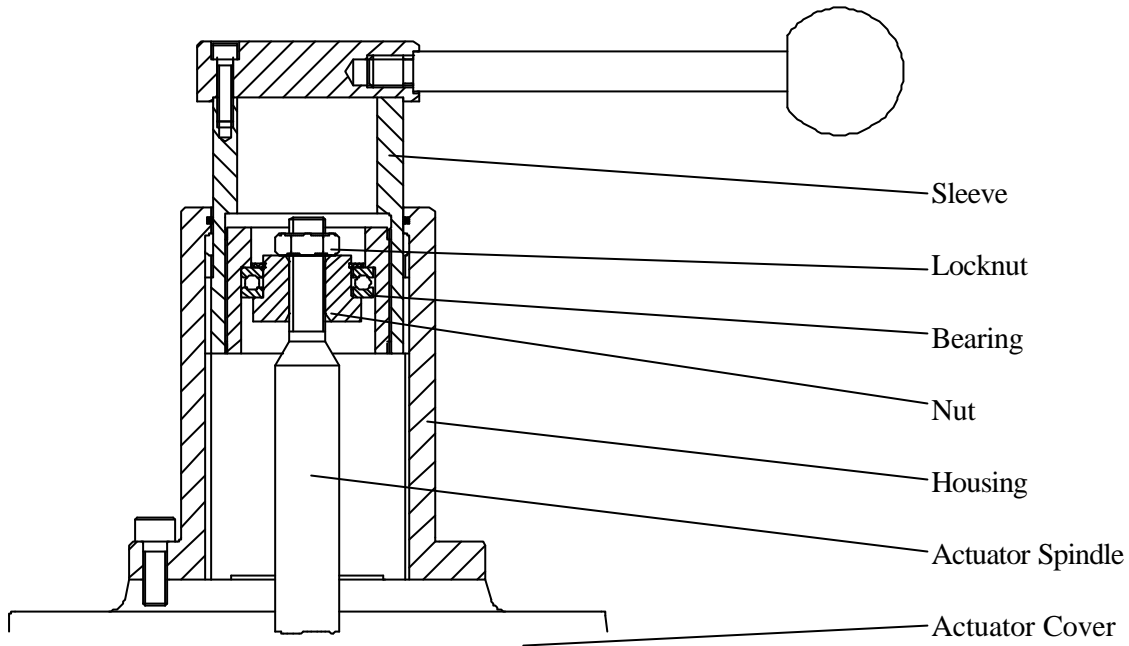
**Fig.6 Seal Arrangement**



**Fig.7 Handjack Assembly – Air Fail Open**

Cap

Arm



**Fig.8 Handjack Assembly – Air Fail Closed**

