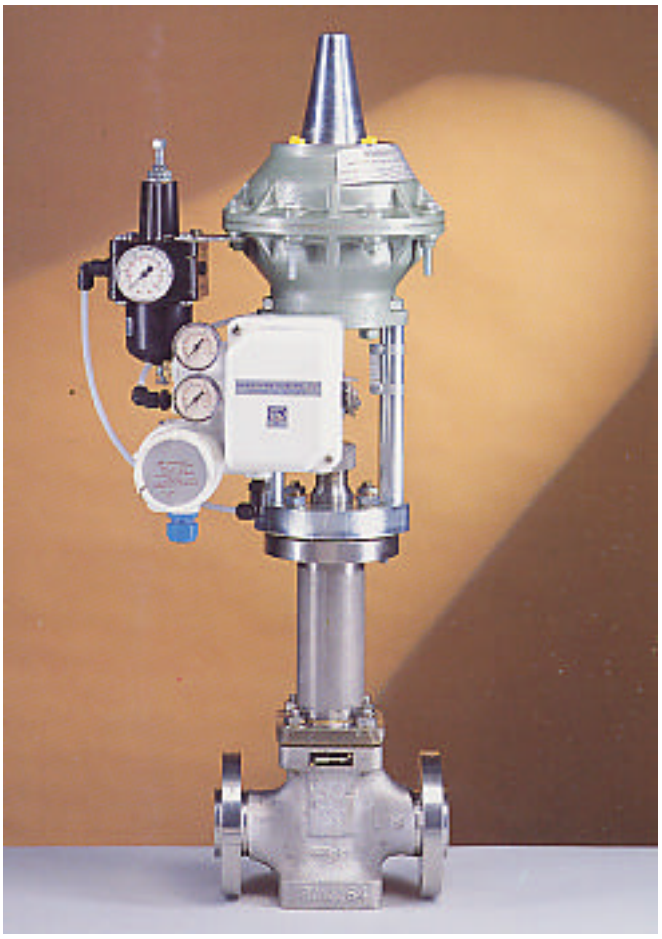
BOSSMATIC PARAGON CONTROL VALVES

801 Series – 15-65mm

Installation, Operation &Maintenance Instructions



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NORTHVALE KORTING LTD, UXBRIDGE RD, LEICESTER, ENG, LE4 7ST, TEL 0044 (0) 116 2665911, FAX 0044 (0) 116 2610050,
EMAIL sales@northvalekorting.co.uk

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1.0. General Information.

1.1. These instructions cover the 15-65mm size Paragon bellows seal control valves (Fig 821, Fig 841, Fig 861 and Fig 881).

1.2. Users and maintenance personnel should carefully read these instructions before unpacking, installing, operating or maintaining the valve.

1.3. These instructions do not contain information on any ancillary equipment, including valve positioners, fitted to the valve. Separate instructions are provided for this this equipment.

To avoid equipment damage or injuries to personnel always observe all warnings and instructions. Unprofessional re-conditioning, the use of third party replacement parts or the performance of maintenance procedures other than those described here, may cause the valve to operate incorrectly or lead to personnel injury or damage to parts, and render the warranty void.

2.0. Unpacking.

2.1. Check the delivered items against the despatch note and report any transport damage to the carrier immediately.

2.2. Larger valves may need to be lifted using slings and they must be attached to the valve in a way that will not cause any damage to the valve or ancillary equipment attached to it.

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.

3.1. Clean all pipes and tubing prior to installation.

3.2. Remove all stops and protective bungs from the valve and any ancillary equipment.

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 make maintenance easier. The valve may be installed with the actuator in the horizontal plane providing the two yoke pillars are vertically opposed.

3.6. A suitable leak indicator (e.g. an inspection window, a contact pressure gauge, an outlet to an open vessel, etc.) should be fitted to the "BSP test connection on the secondary gland.

3.7. Sufficient clearance should be allowed above the valve for disassembly.

3.8. For modulating applications the valve is generally fitted with a positioner; installation, operating and maintenance instructions for this are given separately.

3.9. 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.

The maximum actuator air supply pressure is 6.0 BarG; for specific application pressures contact Northvale Korting.

3.10. Connect the control signal to the positioner (pneumatic or electrical) as applicable.

4.0. Valve Operating Principles.

4.1. An important factor in maintaining the valve is an understanding it's construction and mode of operation. With this knowledge and the following diagrams maintenance can be carried out but suitably skilled personnel.

4.2. The control valve plug/spindle is moved to the required position by means of a pneumatic pressure applied to the diaphragm actuator assembly or by rotation of the handjack override, if fitted.

4.3. The amount of pneumatic pressure applied to the actuator determines the extent of valve travel. The control system normally provides a 0.2 to 1 Bar (3 to 15 PSI) control signal for modulating applications, which is amplified by mains air supplied by 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 and Functioning Checks.

5.1. For satisfactory valve performance the plug must move freely in response to changes 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 actuator diaphragm.
c) Leaking actuator housing.
d) Binding between the valve plug and seat.
e) Excessive tightness of the secondary gland packing.
f) Binding between the valve spindle and guide bushes.
g) Positioner incorrectly set / faulty.

6.0. Allowable Seat Leakage.

6.1. These valves have metal-to-metal seats with EN1349 leakage Class IV.

6.1 . If the valve leakage rate exceeds the limits specified above, the following checks should be made before considering further action: -

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

a) Check that the spindle is travelling the full stroke of the valve.

b) Inspect for wear and/or damage to the valve plug and/or seat face(s).

c) Check for binding of the valve spindle to the guide bush or gland packing; if so consult Northvale Korting.

d) Check that the actuator has sufficient spring force to close air-fail-closed valves against the line pressure, if not contact Northvale Korting.

7.0. General Maintenance.

7.1. Maintenance of these valves is not simple. We recommend that wherever possible the valve be removed from the pipeline and taken to a workshop for 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.

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

7.2.1. Examine gaskets for leaks and if necessary re-tighten bolts.

7.2.2. Check the valve for damage caused by corrosive residues or corrosive vapours.

7.2.3. Clean the valve and re-paint if necessary.

7.2.4. Check the bellows seal for leaks; use the test connection in the secondary gland.

7.2.5. Stroke the valve and check for smooth movement of spindle. Irregular movement may indicate internal defects.

7.2.6. If possible, close the supply pressure and check the fail-safe position.

7.3. Prior to re-tightening any joint it is essential that all jointing faces be clean and free from any debris. It is recommended that a new gasket is used each time a joint is made.

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

7.4. All flange / joint bolting is to be lubricated using a suitable copper based lubricant.

7.5. 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.

7.6. The final torques from the table should be used for the bolt sizes given.

7.7. If the bellows seal fails the secondary gland is used to provide a temporary gland seal until a new bellows seal can be fitted. The secondary gland will need to be tightened down initially and then periodically to ensure that it does not leak.

8.0. Handjack Removal.

8.1. Fig. 821/861 Valves (Fig. 7)

8.2. Unscrew and remove the four cap head screws holding the handjack onto the actuator. Remove the handjack housing assembly lifting it clear of the actuator spindle.

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

8.4. Fig. 841/881 Valves (Fig. 8)

8.5. Unscrew and remove the four cap head screws holding the handjack cap onto the handjack shaft and remove the handjack cap complete with handles.

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

8.7. Unscrew and remove the four cap head screws holding the handjack body assembly onto the actuator and remove the handjack body assembly lifting it clear of the actuator spindle.

9.0. Handjack Re-fitting.

9.1. Fig. 821/861 Valves (Fig. 7)

9.2. 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.

9.3. Unwind the handjack sleeve in the housing by three or four turns to give clearance between the sleeve and the bearing.

9.4. Fit the housing assembly over the actuator spindle locating the bearing into the sleeve. Secure to the actuator using four cap head screws.

9.5. Wind the handjack down until the clearance between the sleeve and the bearing is taken up and then back off by a half-turn.

9.6. 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.

9.7. Fig. 841/881 Valves (Fig. 8)

9.8. Ensure that the handjack sleeve is protruding by approximately 5mm above the handjack housing.

9.9. Fit the housing assembly over the actuator spindle and secure to the actuator using four cap head screws.

9.10. 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.

9.11. Re-fit the handjack cap and secure using four cap head screws.

9.12. Wind the handjack down until the handjack cap rests upon the handjack housing to give clearance below the bearing in the inactive state

10.0. Spindle Coupling Separation.

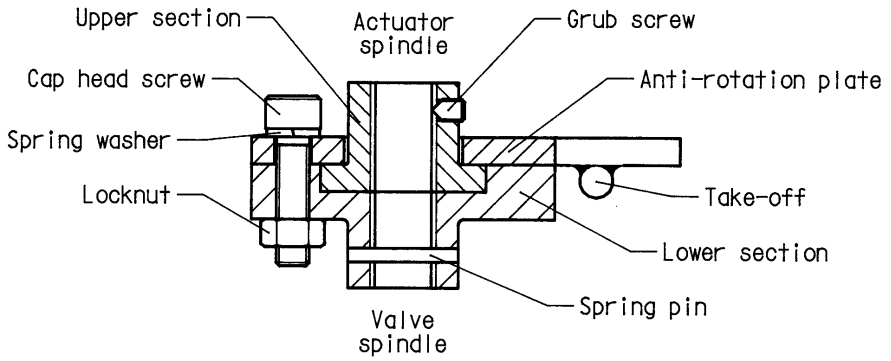

Figure 1. Detail of Anti-rotation Coupling

10.1. Remove the positioner and its interconnecting pipework, if fitted; refer to separate instructions.

10.2. Undo and remove the four locknuts on the underside of the spindle coupling.

10.3. Apply air to the actuator and position the valve at mid-stroke approx.

10.4. Unscrew and remove the four cap head screws and spring washers holding the coupling together.

11.0. Actuator Removal.

11.1. Refer to Fig. 3 and Fig. 4 for two-way valves, Fig. 5 for three-way valves and Fig. 6 for the air-fail-open actuator arrangement.

11.2. Remove the handjack (Section 8), if fitted, and split the spindle coupling (section 10)

11.3. Undo the bolts holding the actuator housing 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.

11.4. Undo the grub screw in the upper section of the spindle coupling (see Figure 1 above) and unscrew the coupling, removing it and the anti-rotation plate from the actuator spindle.

11.5. Remove the spring and then the spindle/diaphragm assembly by pushing it through the actuator bottom cover.

11.6. Undo the spacer nut and remove the diaphragm support and the diaphragm. This now leaves the valve with the bonnet extension, pillars and actuator bottom cover still assembled.

12.0. Actuator Re-assembly.

12.1. Re-assemble the actuator in reverse order of section 11. 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.

12.2. Couple the actuator to the valve according to section 13.

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

13.0. Actuator Re-coupling.

13.1. Refer to Figure 1 above for details of the spindle coupling.

13.2. Ensure that the plug is firmly pushed into its seat by applying pressure to the top of the valve spindle.

13.3. Ensure that the actuator spindle is fully retracted; for Fig. 821/861 valves remove the air supply from the actuator and for Fig. 841/881 valves apply air to the actuator.

13.4. Slide the anti-rotation plate over the actuator spindle. Then screw the upper section of the spindle coupling, making sure the grub screw is fitted, onto the actuator spindle until it is level with the end of the spindle.

13.5. Fully extend the actuator spindle; for Fig. 821/861 valves apply air to the actuator and for Fig. 841/881 valves remove the air supply from the actuator.

13.6. Unscrew the upper section of the spindle coupling until it bottoms in the recess in the lower section of the coupling.

13.7. Partially retracted the actuator spindle (for Fig. 821/861 valves reduce the air supply pressure from the actuator and for Fig. 841/881 valves increase the air supply pressure to the actuator) and then unscrew the upper section of the spindle coupling by about one turn. Lock the spindle coupling in this position with the grub screw.

13.8. Fully extend the actuator spindle and engage the anti-rotation plate onto the yoke pillar. Fit the four cap head screws and spring washers through the holes in the anti-rotation plate into the tapped holes in the lower section of the spindle coupling and tighten up.

13.9. Fit lock nuts to the screws in the spindle coupling and tighten.

13.10. Re-mount the positioner and its interconnecting pipework, if fitted; refer to separate instructions

14.0 **Diaphragm Replacement.**

14.1 Remove the actuator according to section 11.

14.2 Fit the new diaphragm and re-assemble the actuator according to section 12. Then re-couple the actuator according to section 13.

15.0 **Actuator Spindle O-ring and Bearing Replacement.**

15.1 Remove the actuator according to section 11.

15.2 Fit new O-rings and bearing strips into the grooves on the actuator housings. The O-rings should be fitted on the outside of the wear strips.

15.3 Re-assemble and re-couple the actuator according to sections 12 and 13.

16.0. **Change Actuator Action.**

16.1. Refer to figure 6.

16.2. Remove the actuator according to section 11.

16.3. Rotate the spindle/diaphragm assembly and spring through 180° and re-fit into actuator bottom housing.

16.4. Re-assemble and re-couple the actuator according to sections 12 and 13.

17.0. **Bellows Seal Removal.**

17.1. Remove the handjack (if fitted), spindle coupling and actuator according to the instructions above.

17.2. Using a pin punch knock out the spring pin holding the lower section of the spindle coupling to the spindle. Then unscrew and discard the lower section of the spindle coupling. See Figure 1.

17.3. Slacken off the secondary seal gland nut. Then continue according to the instructions below dependant on whether it is a two-way or three-way valve.

17.4. **Two-Way Valves (Fig. 821 and Fig. 841).**

17.5. Refer to Figures 3, 4 and 6.

17.6. Undo the securing screws (four or eight) holding the bonnet extension (cooling fin) to the body and remove the cooling fin / secondary gland seal complete.

17.7. If the plug is being re-used grind-off the tack-weld holding the plug onto the spindle (the end of the spindle can be removed if necessary) and unscrew the plug. If the plug is being replaced then simply cut the spindle above the plug.

17.8. **Three-Way Valves (Fig. 861 and Fig. 881).**

17.9. Refer to Figures 5 and 6.

17.10. Remove the bottom cover from the body according to Section 22.

17.11. Grind-off the tack-weld holding the plug retaining nut to the valve spindle. Unscrew and remove the plug-retaining nut. Remove the plug from the spindle; it should slide off.

17.12. **All Valves.**

17.13. Undo the four securing screws holding the secondary gland seal/yoke to the bonnet extension and remove the secondary gland seal/yoke with the bellows seal assembly.

17.14. Remove the bellows seal assembly from the secondary gland seal by pulling it out.

17.15. Clean the recess in the bonnet extension and the gasket-seating surface on the locating spigot of the secondary gland ready for new gaskets.

18.0. Secondary Gland Seal Removal.

18.1. It is recommended that the secondary gland seal be replaced if the bellows seal is replaced.

18.2. Remove the gland nut and put to one side.

18.3. Remove the guide bush and discard. With an awl type instrument remove and discard the stem seal.

18.4. Clean the bore of the secondary gland seal ready for reuse.

19.0. Lower Guide Bush Replacement.

19.1. The lower guide bush is located in the base of the bonnet extension and the means of replacement is dependant on the valve size and style (two-way or three-way).

19.2. **15-25mm Two-way Valves (Fig. 821/841).**

19.3. Refer to Figure 3.

19.4. Grind the tack-weld off of the guide-bush retaining nut on the bottom of the bonnet extension and remove the nut.

19.5. Remove the guide bush, clean out the bore of the guide bush housing and slide a new guide bush into the housing.

19.6. Re-fit the guide-bush retaining nut and tighten before tack welding to lock in position.

19.7. **40-65mm Two-way Valves (Fig. 821/841) and Three-Way Valves (Fig. 861/881).**

19.8. Refer to Figures 4 and 5.

19.9. Remove the circlip in the base of the bonnet extension and discard.

19.10. Remove the retaining washer, clean and put to one side.

19.11. Remove the guide bush, clean out the bore of the guide bush housing and slide a new guide bush into the housing.

19.12. Re-fit the retaining washer and hold in place with a new circlip.

20.0. **Fitting a New Bellows Seal.**

20.1. Take a new bellows seal assembly (bellows seal welded to the valve spindle) and insert into the bonnet extension. Take care to guide the spindle through the guide bush in the base of the extension.

20.2. Push the flange of the bellows seal into its recess in the bonnet extension and then fit a new gasket into the main recess.

20.3. Slide the secondary gland / yoke assembly over the spindle and locate into the recess on the bonnet extension.

20.4. Fit the four securing screws and tighten down to the torque specified in the table in Section 7.

From this stage onwards the valve spindle must not be rotated or serious damage to the bellows seal could occur. For any tightening operations a method of preventing spindle rotation must be employed.

20.5. Screw the new lower section of the coupling onto the spindle until the top of the spindle is level or just below the base of the recess and the small (2.5mm diameter) hole is facing forwards or backwards. It is essential that the orientation of the anti-rotation plate fixing holes is correct (they should be off-centres) and the plate should be fitted to ensure this.

20.6. A 2.5mm diameter drill, using the hole in the coupling as a guide, should then be used to drill through the spindle and coupling. Fit the new spring pin, supplied with the bellows seal assembly, into this hole and tap home.

20.7. The sequence of instructions now differs depending on whether the valve is two-way or three-way.

20.8. **For Two-way Valves (Fig. 821/841).**

20.9. Refer to Figures 3 and 4.

20.10. Screw the plug onto the spindle and carefully tighten. Then tack-weld the plug to the spindle.

20.11. Clean the recess in the valve body and fit a new gasket.

20.12. Locate the bonnet extension / secondary seal / yoke assembly into the body recess. Fit the securing bolts (four or eight) and tighten down to the torque specified in Section 7.

20.13. **For Three-way Valves (Fig 861/881).**

20.14. Refer to Figure 5.

20.15. Clean the top and bottom recesses in the valve body and fit a new gasket into the top recess.

20.16. Locate the bonnet extension / secondary seal / yoke assembly into the top recess of the body. Fit the securing bolts (four or eight) and tighten down to the torque specified in Section 7.

20.17. Slide the plug onto the spindle and screw on the new plug-retaining nut supplied with the bellows seal kit. Carefully tighten the nut and tack weld to the spindle.

20.18. Fit a new gasket into the bottom recess of the valve body.

20.19. Locate the three-way bottom cover in the bottom recess of the body. Fit the securing bolts or nuts (four or eight) and tighten down to the torque specified in the table in Section 7.

20.20. **For all valves.**

20.21. Remove the anti-rotation plate from the spindle coupling and re-pack the secondary gland (see next Section).

21.0. **Secondary Gland Seal Replacement.**

21.1. This should be carried out at the same time as the bellows seal is replaced, and these instructions carry on from section 14 above.

21.2. Slide a new stem seal set ring-by-ring (see Fig. 2) over the spindle and push down into the bonnet bore using a suitable tool (taking care not to score the stem seal).

21.3. Slide a new guide bush over the spindle and into the bonnet bore.

21.4. Slide the gland nut over the spindle and screw down finger tight. Then screw the gland nut down a further two turns.

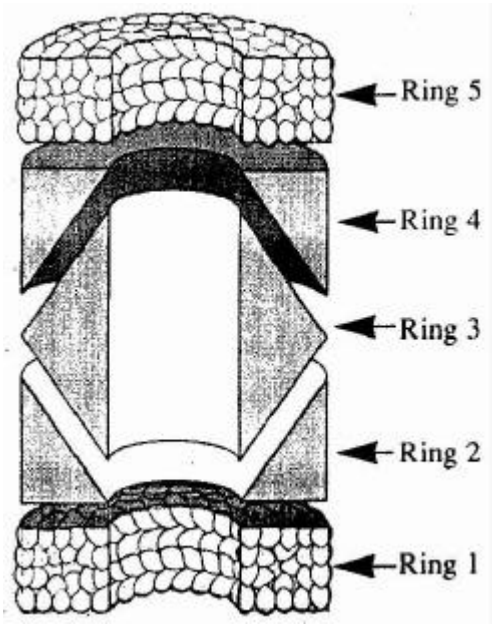

Figure 2. Secondary Gland Seal

22.0 **Bottom Cover Removal (3-way Valves).**

22.1 Undo the bottom cover to body bolting and remove the bottom cover.

22.2 Remove the gasket from the body/bottom cover joint and clean the seating face prior to fitting a new gasket.

22.3 Re-fit the bottom cover and tighten the bolts uniformly in a diametrically staggered pattern.

23.0 **Plug Replacement.**

23.1 This will invariably be done at the same time as replacing the bellows seal.

23.2 Following the instructions for removing (Section 17) and replacing (Section 20) the bellows seal.

24.0 **Seat Replacement.**

24.1 These valves are fitted with welded in seats and we recommend they be returned to our factory for replacement.

25.0 **Spare Parts / Valve Refurbishment.**

25.1 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, valve size and operating conditions.

Figure 3. General Arrangement 15-25mm Fig 841 Valve.

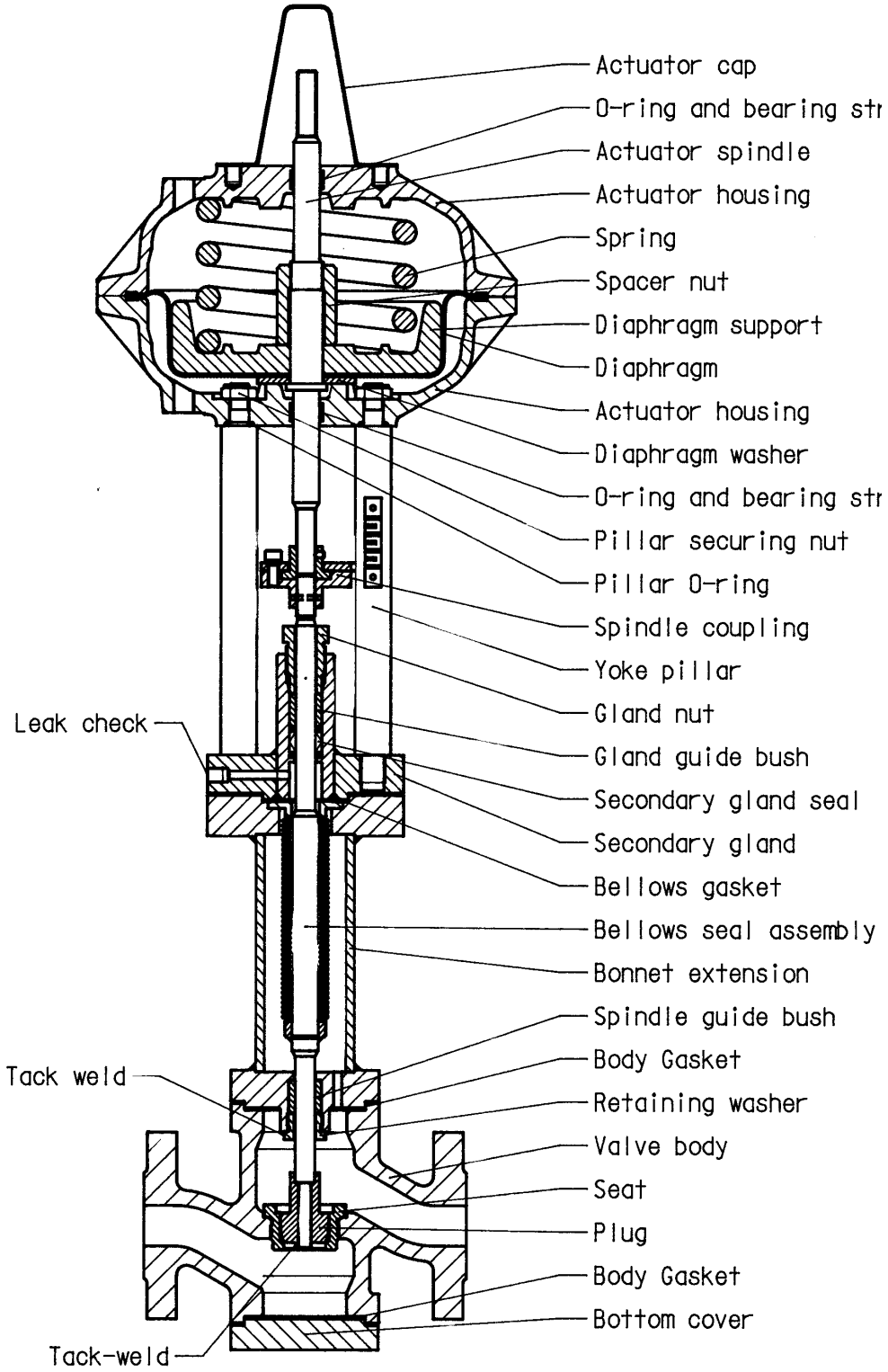

Figure 4. General Arrangement 40-65mm Fig 841 Valve

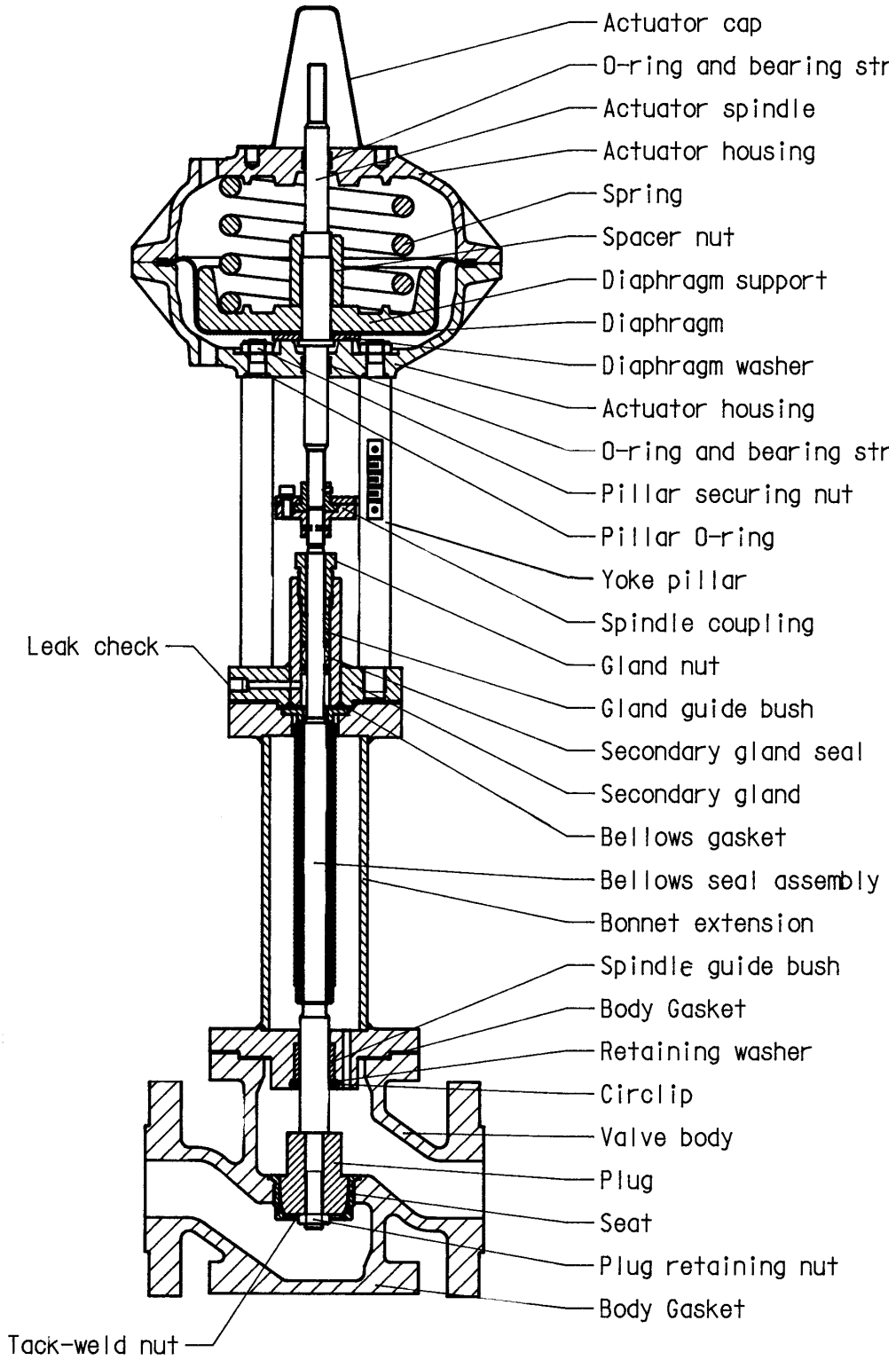

Figure 5. General Arrangement Fig 881 Valve

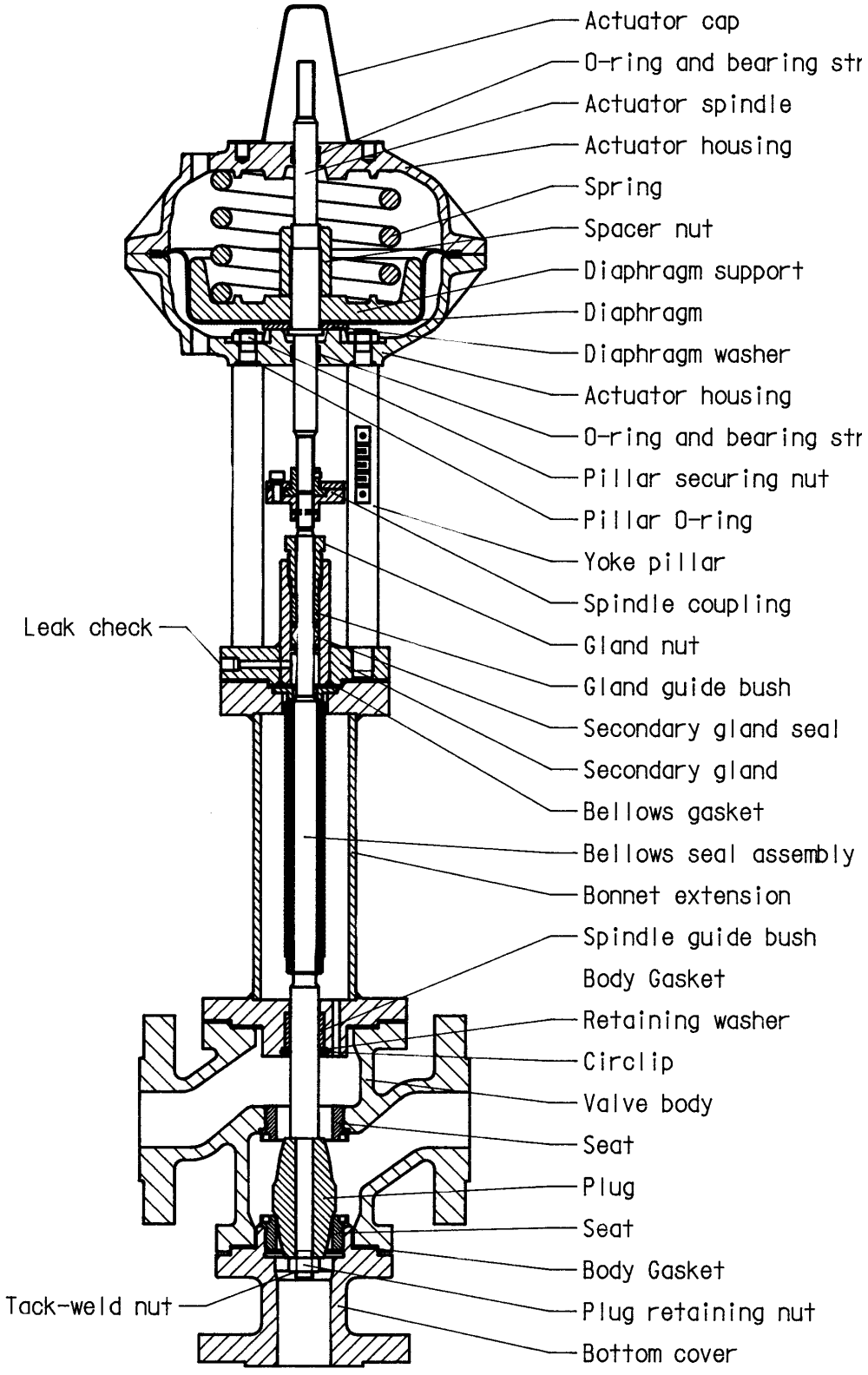

Figure 6. Actuator Arrangement Fig. 821 and Fig. 861 Valves

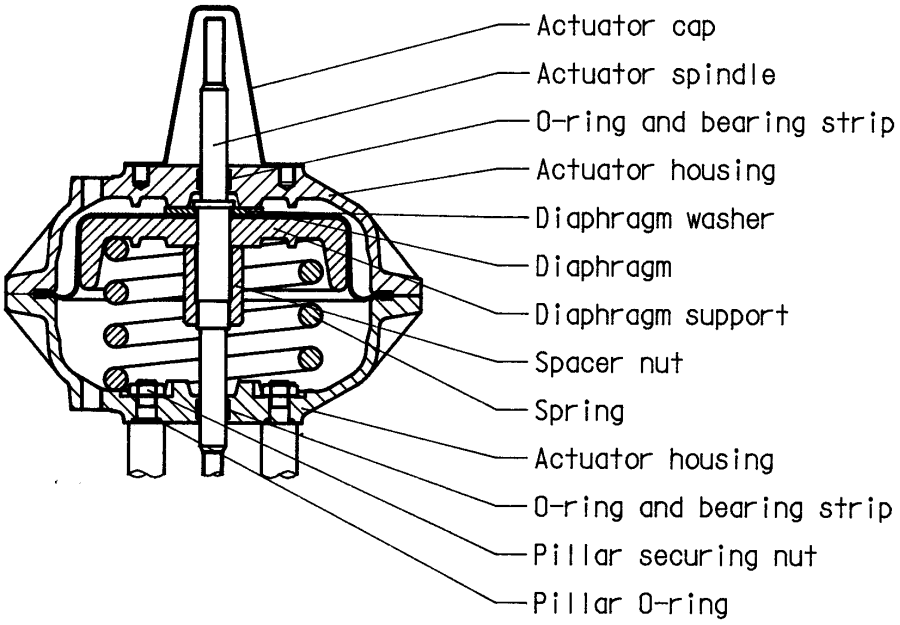

Figure 7 Handjack Assembly - Fig. 821/861 Valve

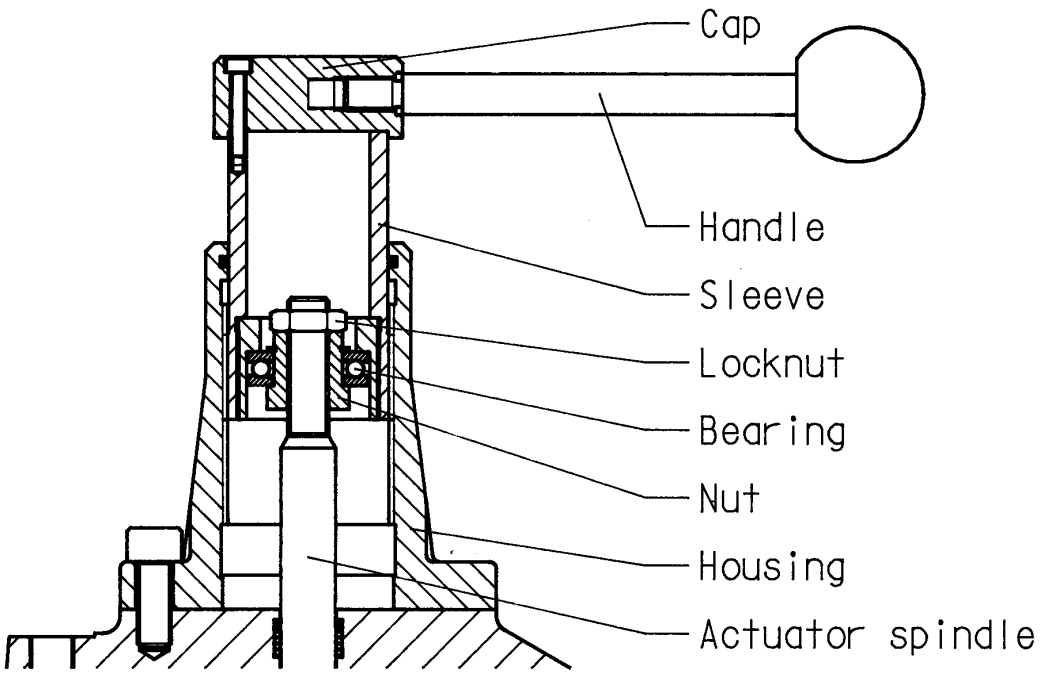

Figure 8 Actuator Assembly - Fig 841/881 Valve