

## Installation, Operation, Maintenance Instructions

# Tandem Rotary Actuators

### GENERAL INFORMATION

The following instructions are designed to assist in unpacking, installing and performing maintenance as required on Valtek™ tandem rotary actuators. Product users and maintenance personnel should thoroughly review this bulletin along with Installation, Operation, Maintenance Instructions 10, **Valdisk™ Control Valves**, prior to installing, operating or performing any maintenance on the actuator. (additional features such as handwheels, limit switches, fail-safe systems, etc).

This publication does not contain information on Valtek positioners. Refer to the appropriate Installation, Operation, Maintenance Instructions for installing, maintaining, troubleshooting, calibrating, and operating these accessories.

**To avoid possible injury to personnel or damage to valve parts, WARNING and CAUTION notes must be strictly adhered to. Modifying this product, substituting non-factory of inferior parts, or using maintenance procedures other than outlined could drastically affect performance and be hazardous to personnel and equipment.**

### Spare Parts

Valtek international recommends quality, factory-built parts be used when servicing Valtek valves. In the USA phone **1 800 99 SPARE** for spare parts information.

### Unpacking

Before unpacking the actuator, check the packing list against the materials received. Lists describing the actuator and accessories are included in each shipping container.

1. When lifting the actuator from the shipping container, position lifting straps to avoid damage to tubing and mounted accessories. With tandem rotary actuators, do not attach a lifting ring; instead, use lifting straps through the yoke legs.

**WARNING: When lifting the actuator with lifting straps, be aware that the center of gravity may not be at the lifting point. Therefore, support must be given to prevent the actuator from rotat-**

**ing. Failure to do so can cause serious injury to personnel or damage to nearby equipment.**

2. In the event of shipping damage, contact your shipper immediately.
3. Should any problem arise, contact your Valtek representative.

### Installation

Prior to installation, make sure adequate overhead and side clearance is provided to allow for proper removal and maintenance of the actuator.

1. Connect air supply and instrument signal. Both connections are marked for the respective positioner port. Since both cylinder and positioner are suitable for 150 psi air supply, an air regulator is not required unless the supply pressure exceeds 150 psi.

**NOTE:** *In some cases, the air supply must be limited to less than 150 psi. In this case, a sticker near the upper cylinder air supply connection will indicate the maximum pressure and an air regulator should be installed to ensure the supply pressure does not exceed this value.*

2. Use the actuator to close the rotary valve tightly in the seat before installing between the line flanges. Do not allow actuator to open the valve until it is properly bolted between the line flanges (see Maintenance Instructions 10).

**CAUTION: Failure to do so may cause seat misalignment and damage to the seat.**

3. Installation of an air filter on the supply line is recommended.
4. Using a soap solution, make sure all air connections are free of leaks.
5. Be sure mounting box is sealed on all possible locations.

### PREVENTATIVE MAINTENANCE

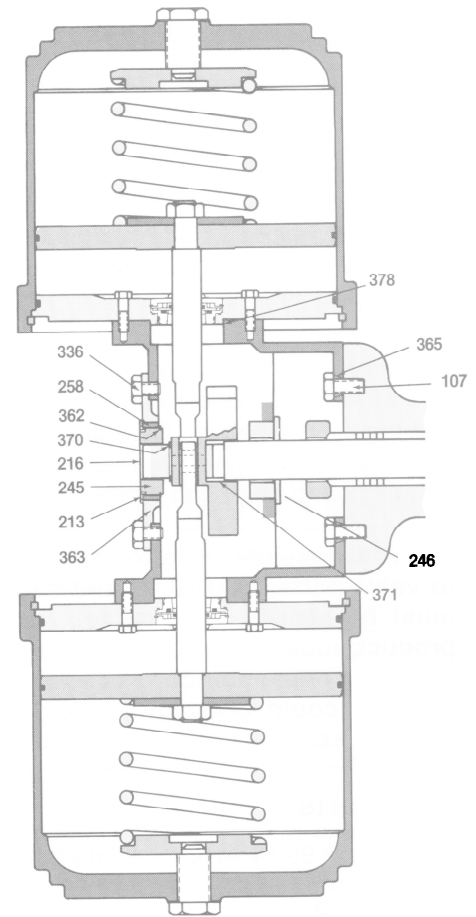
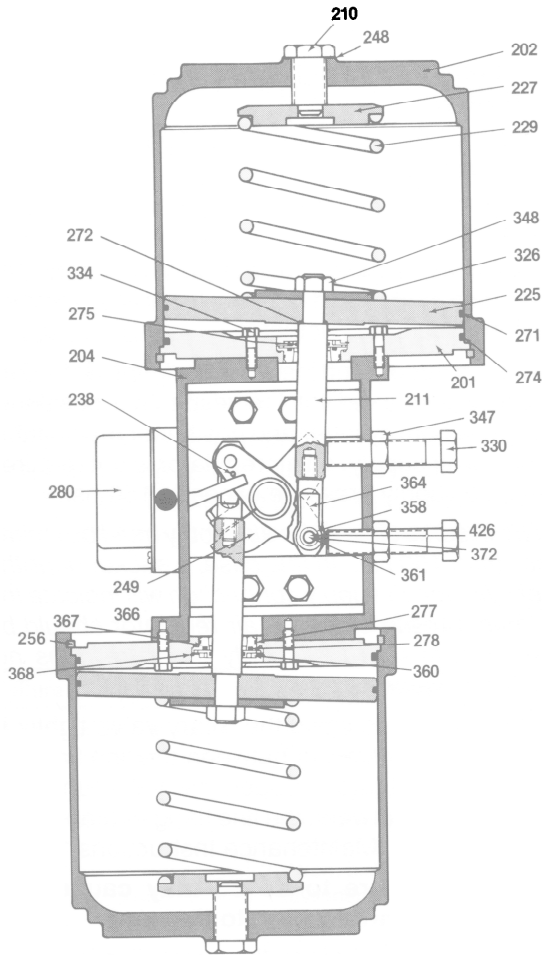
At least once every six months, check for proper operation by following the preventative maintenance steps outlined below. These steps can be performed while the actuator is in service and, in some cases, without interrupting service. If an internal problem is suspected with the actuator, refer to the Disassembly and Reassembly section.

1. Examine the actuator for damage caused by corrosive fumes and process drippings.
2. Clean the actuator and repaint areas of oxidation.
3. If possible, operate the actuator and check for full-stroke operation. Observe the disc position indicator plate mounted on the transfer case: The disc position indicator should change position in a smooth, rotary fashion. Unsteady movement of the indicator suggests a possible internal valve or actuator problem.
4. After depressurizing the line and disconnecting the air supply, remove the transfer case cover plate and

make sure the lever arm is securely fastened to the shaft. The positioner follower arm should be correctly linked to the follower pin on the lever arm.

**CAUTION: Do not operate the actuator with the cover plate removed. Failure to replace the cover plate before operating the actuator will cause damage to the shaft, since the cover plate houses a shaft support bearing.**

5. Replace transfer case cover plate and be sure all mounted accessories (including the positioner), brackets, and associated bolting are securely fastened.



**Sectioned View (Front)  
Full Open or Closed**

**Figure 1: 4-inch Stroke Tandem Actuator**

**Sectioned View (Side)  
Mid-Stroke**

**Parts List**

- 107. Body bolt
- 201. Yoke plate
- 202. Cylinder
- 204. Transfer case
- 204. Adjusting screw
- 211. Actuator stem
- 213. Stroke plate
- 216. Indicator plate
- 225. Piston
- 227. Spring button
- 229. Spring
- 238. Follower pin

- 245. Bearing
- 246. Yoke bushing
- 248. Adjusting screw gasket
- 249. Lever arm
- 256. Cylinder retaining ring
- 258. Cover plate bushing
- 261. Dust cover (not shown)
- 262. Flange cover (not shown)
- 271. Piston o-ring
- 272. Piston stem O-ring
- 274. Cylinder O-ring
- 275. Actuator stem Wing
- 277. Base seal O-ring

- 278. Base slider O-ring
- 280. Positioner
- 326. Spring guide
- 330. Stroke stop bolt
- 334. Yoke plate bolts
- 336. Cover plate bolts
- 347. Stroke stop jam nut
- 348. Actuator stem locknut
- 358. Rod end bearing
- 360. Sliding seal top clamp
- 361. Pivot pin
- 362. Splined bearing snap-ring
- 363. Cover plate

- 364. Rod end
- 365. Doweled washer
- 366. Sliding seal collar
- 367. Base seal
- 368. Spiral retaining ring
- 370. Retaining ring
- 371. Shaft spacer
- 372. Flat washer
- 378. Gasket
- 426. Cotter pin
- 427. Bolt (not shown)

6. If possible, check for correct fail-safe action. Position the valve to mid-stroke and shut off the air supply or disconnect the instrument signal. By observing the indicator plate, the disc should either fail open, closed, or in place, depending on the air failure action. If the failure action does not operate correctly, refer to the "Troubleshooting" section.
7. Spray soap solution around the cylinder retaining ring, the adjusting screw, and actuator stem seal (this should be done when the cover plate is removed) to check for air leaks through the O-rings and adjusting screw gaskets.
8. Check all air connections for leaks. Tighten or replace any leaky lines.
9. Check positioner calibration by observing the gauges and the disc position indicator plate. Make sure positioner is calibrated to correct range. For the System 80 Positioner, push positioner cleanout plunger several times to clear any possible restrictions.
10. When using an air filter, check and replace the cartridge if necessary.

## DISASSEMBLY AND REASSEMBLY

### Removing Valve From Line

See Maintenance Instructions 10, **Valdisk Control Valves**, for instructions for removing the tandem rotary valve from the service line.

### Disassembling the Actuator

Because of the tandem actuator design, it is necessary to disassemble the actuator before removing the valve body from the transfer case. Refer to Figure 1:

1. Disconnect all tubing from the actuator.
2. Relieve the spring compression from both cylinders by removing both adjusting screws.

**WARNING: Failure to do so may result in personal injury.**

3. Using a screwdriver, remove the cylinder retaining ring from the groove at the base of each cylinder.
4. Pull both cylinders off the transfer case and pistons.

**NOTE: Substantial O-ring resistance may be felt.**

**WARNING: Do not use air pressure to remove cylinder. Personal injury and damage to valve parts may result.**

5. Remove both spring buttons and springs.
6. Using each piston as a handwheel, turn each until the actuator stem screws out of its rod end. Pull the piston/actuator stem assembly out of transfer case.

**CAUTION: Care must be taken not to damage the sliding seal assembly or actuator stem O-ring when removing the actuator stem.**

7. If the piston, piston stem O-ring, or actuator stem is to be replaced, remove the actuator stem locknut from actuator stem and slide spring guide, piston O-ring and piston off the actuator stem. If desired, the yoke plates can be removed from the transfer case by

removing both sets of yoke plate bolts.

8. Remove the spiral snap-ring holding the sliding seal assembly in place.
9. Remove the top clamp, sliding seal collar and base seal. The base seal can usually be removed by hand or by gently prying the inside lip of the seal upward.
 

**WARNING: Do not scratch the top surface of the base seal with a screw driver or sharp object. Scratches can cause excessive wear and possible leakage.**
10. Remove the transfer case cover plate.
11. Referring to the appropriate Maintenance Instructions, remove the positioner from the transfer case.
12. Remove the snap-ring from the shaft to allow the lever arm to slide off. Slide the lever arm off the shaft.
 

**NOTE: If the rod end bearing needs replacement, remove the cotter pin and the pivot pin that holds the rod end to the lever arm out of the lever arm. On the 200, and dual 200, a solid clevis pin with cotter pin retainer is used.**
13. Using a socket wrench and proper-length extension, insert the wrench through the transfer case and remove the four case bolts holding the transfer case to the valve body.
14. Remove the transfer case from the valve body, being careful not to damage the shaft.

**NOTE: If the shaft bearing is to be replaced, push it out with a press.**

### Reassembling the Actuator

To reassemble the actuator, refer again to Figure 1:

1. Clean and lubricate all internal parts. All O-rings should be replaced and lubricated using a silicone lubricant (Dow Corning 55M or equivalent). The bore that houses the sliding seal assembly in the transfer case must be smooth and clean.
2. Reassemble the sliding seal assembly by pushing the base seal into the transfer case. Place the sliding seal collar on top of the base seal so that the raised portion of the sliding collar protrudes through the hole in the top clamp.
3. Replace the top clamp and the spiral snap-ring.
 

**CAUTION: Avoid pinching or twisting the diaphragm seal while clamping it down.**
4. If the rod end bearings have been removed, press a new bearing into each rod end. Reinstall each rod end into the lever arm by inserting the pivot pin through the lever arm and rod end bearing. Replace the cotter pin in the hole of the pivot pin.
5. If the shaft bearing has been removed, press a new bearing into the transfer case. When pressing shaft bearings into the transfer case, the bearings may have to be ground out to fit the shaft bearing.
6. Use a socket wrench and proper-length extension to reinstall the four body bolts, attaching the transfer case to the valve body.

7. Position the lever arm on the shaft (as shown in Figure 1) and tighten the linkage bolt securely.
8. Reinstall the positioner, making sure the positioner follower arm rides underneath the follower pin pressed into the lever arm.
9. If the yoke plates have been removed, reinstall them with both sets of yoke plate bolts. If necessary, install a new piston stem O-ring, piston and spring guide onto each actuator stem and secure each with the actuator stem locknut.
10. Being careful not to damage the sliding seal assemblies; reinstall both actuator stems through the transfer case until they engage the threaded rod ends. Turn the piston until the actuator stem and rod end threads are firmly engaged.
11. Bolt the transfer case cover plate to transfer case.
12. Install both springs and spring buttons.
13. Replace the piston and cylinder O-rings.
14. Slide cylinder down over piston and transfer case.

**CAUTION: The cylinder must be perpendicular with the piston when sliding it over the piston O-ring. If this is not done, the O-ring could be damaged.**

15. Reinsert both cylinder retaining rings by feeding each (a little at a time) into the groove in the cylinder.
16. Center the hole in both spring buttons directly under the adjusting screw hole in the cylinders. Install both adjusting screws and tighten only enough to provide an air seal with the gaskets. Do not overtighten.
17. Reconnect the tubing.

## Adjusting the External Stroke Stops

After disassembly and reassembly, it may be necessary to readjust the external stroke stops to avoid unnecessary overstressing of the shaft on the body disc stop (disc stop is a safety device designed to protect the seat). The external stroke stops can be adjusted while the valve is in line; however, there must be no line pressure on the disc. To adjust the external stroke stops, proceed as follows:

1. If the valve is out of the line, screw the stroke stop bolts out far enough to allow the disc to touch the disc stop in the closed position. If the valve is installed in the line, cycle the valve to the closed position with very low air pressure (10 - 15 psi). At this point, the disc should be resting on the disc stop.
- CAUTION: Overstressing the shaft can occur if full operating torque is applied to the disc stop.**
2. Screw the stroke stop in clockwise (as viewed from the end) until resistance is felt. By turning stroke stop an additional 1/8 - turn, disc should be just off disc stop.
3. Cycle valve open. Adjust the other stroke stop until disc is 90 degrees from the closed position.
4. Cycle the valve several times to make sure position indicator returns to the same position with each cycle.
5. Tighten the stroke stop jam nuts.

## REVERSING THE ACTUATOR ACTION

The Valdisk transfer case for the tandem actuator is designed for one failure mode only. Should a different failure mode be required, contact factory for a different transfer case.

## Troubleshooting Tandem Rotary Actuators

Failure	Probable Cause	Corrective Action
Actuator moves to failure position, bleeding from transfer case	<ol style="list-style-type: none"> <li>1. Failure of an actuator stem O-ring</li> <li>2. Failure of a sliding seal assembly</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace actuator stem O-ring</li> <li>2. Replace sliding seal assembly</li> </ol>
Jerky shaft rotation	<ol style="list-style-type: none"> <li>1. Improper adjustment of lever on shaft causing arm to contact transfer case</li> <li>2. Worn piston O-ring allowing piston to gall on cylinder wall</li> <li>3. Cylinder wall not lubricated</li> <li>4. Worn actuator stem O-ring causing actuator stem to gall on stem collar</li> <li>5. Valve bearings may have been damaged</li> </ol>	<ol style="list-style-type: none"> <li>1. Readjust lever arm</li> <li>2. Replace O-ring; if galling has occurred, replace all damaged parts</li> <li>3. Lubricate cylinder wall with silicone lubricant</li> <li>4. Replace O-ring; if actuator stem is galled, replace it</li> <li>5. Replace bearings according to Maintenance Bulletin 10</li> </ol>
Excessive leakage through seat	<ol style="list-style-type: none"> <li>1. Improper adjustment of external stroke stops</li> <li>2. Seat damage</li> </ol>	<ol style="list-style-type: none"> <li>1. See "Adjusting the External Stroke Stops" section</li> <li>2. See Maintenance Bulletin 10 to replace seat ring</li> </ol>
Actuator operates, shaft does not rotate	<ol style="list-style-type: none"> <li>1. Broken rod end or pivot pin</li> <li>2. Broken rod end bearing</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace rod end</li> <li>2. Replace rod end bearing</li> </ol>

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