

# Valtek Valdisk 150 Control Valves

## GENERAL INFORMATION

The following instructions are designed to assist in unpacking, installing, operating and performing maintenance as required on Valdisk 150 butterfly valves. Product users and maintenance personnel should thoroughly review this bulletin prior to working on the valve. Separate maintenance instructions cover additional features (such as positioners, special accessories, fail-safe systems, etc.)

This publication does not contain information on installing, maintaining, troubleshooting, calibrating, and operating Valtek actuators or positioners. Refer to the appropriate Valtek Installation, Operation, Maintenance Instructions when this information is required.

**To avoid possible injury to personnel or damage to valve parts, WARNING and CAUTION notes must be strictly adhered to. Modifying this product, substituting nonfactory parts, or using maintenance procedures other than outlined could drastically affect performance, be hazardous to personnel and equipment, and may void existing warranties.**

**WARNING: Standard industry safety practices must be adhered to when working on this, or any other, process control product. Specifically, personal protective and lifting devices must be used as warranted.**

**NOTE:** *Selecting the proper fastener material is the responsibility of the customer. Typically, the supplier does not know what the valve service conditions or environment may be. Valtek's standard bolting material is B7/2H. B8 (stainless steel) is optional for applications above 800° F and with stainless steel or alloy body valves. The customer therefore must consider the material's resistance to stress corrosion cracking in addition to general corrosion. As with any mechanical equipment, **periodic inspection and maintenance is required.** For more information about fastener materials, contact your local Valtek representative or factory.*

## Unpacking

1. While unpacking the valve, check the packing list against the materials received. Lists describing the valve and accessories are included in each shipping container.
2. When lifting the valve from the shipping container, position lifting straps to avoid damage to tubing and mounted accessories. Most Valdisk 150 valves may be lifted by the actuator lifting ring. If no lifting ring is provided, lift the valve using lifting straps or hook through the yoke legs and outer end of the body.
3. In the event of shipping damage, contact your shipper immediately.
4. Should any problem arise, contact your Valtek representative.

## Installation

1. Before installing the valve, clean the line of dirt, scale, welding chips, and other foreign material. Clean gasket surfaces thoroughly to insure leak-proof joints.
2. Check flow direction to be sure valve is installed correctly. Fail-closed valves should be installed with the **shaft upstream only in gas service**. It is preferred that liquid service valves be installed with the shaft downstream regardless of air failure action. However, under certain flow conditions the valve can flow shaft upstream. Consult the factory if the valve must be mounted with the shaft upstream in liquid service. Fail-open valves should be installed with the shaft downstream.
3. Fully close the valve before and during the installation process.

**WARNING:** Keep hands, hair, clothing, etc. away from the rotating disc and the seat when operating the valve. Failure to do so could cause serious injury.

**WARNING:** When valve is installed for end-of-line service, retainer ring must be supported by the mating pipe flange.

**CAUTION:** Because of Valdisk 150's self-centering seat, there is no reason to open the valve at any time during installation. Therefore, the valve should remain closed until the valve is fully installed.

4. Connect the air supply and instrument signal. Throttling valves are usually equipped with valve positioners. Two connections are marked for the air supply and for the instrument signal. Both cylinder and positioner are suitable for 150 psi air supply. An air regulator is not required unless the supply pressure exceeds 150 psi. An air filter is recommended unless the supply air is unusually clean and dry. All connections must be free of leaks.

**NOTE:** In some rare cases, the air supply must be limited to 80 psi rather than 150 psi. In this case, a sticker found near the upper air port on the cylinder will indicate this and an air regulator may need to be installed to insure the supply pressure does not exceed 80 psi.

5. Make sure proper clearance exists internally in the mating piping to permit proper disc rotation.
6. Apply the recommended torque values to the line flange bolting for proper sealing (see Table 1).

**TABLE I:**

**Flange Bolting Torques\* (Class 150)**

Valve Size (inches)	Torque Values	
	(ft-lbs)	(newton-meter)
2, 3, 4	118	160
6, 8	209	282
10, 12	337	455

\* For intermediate strength bolting, per ASME/ANSI B16.5 – 1988.

## Quick-check

Prior to start-up, check the control valve by following these steps.

1. Check for full stroke by making the appropriate instrument signal change. Observe the disc position indicator plate mounted on the actuator transfer case cover plate. The disc should change position in a smooth, rotary fashion.
2. Check all air connections for leaks. Tighten or replace any leaking lines.
3. Evenly tighten the packing nuts on the valve to finger tight plus 1/2 to one full turn (Teflon only).

**CAUTION:** Do not overtighten packing. This can cause excessive packing wear and high shaft friction, which may impede shaft rotation.

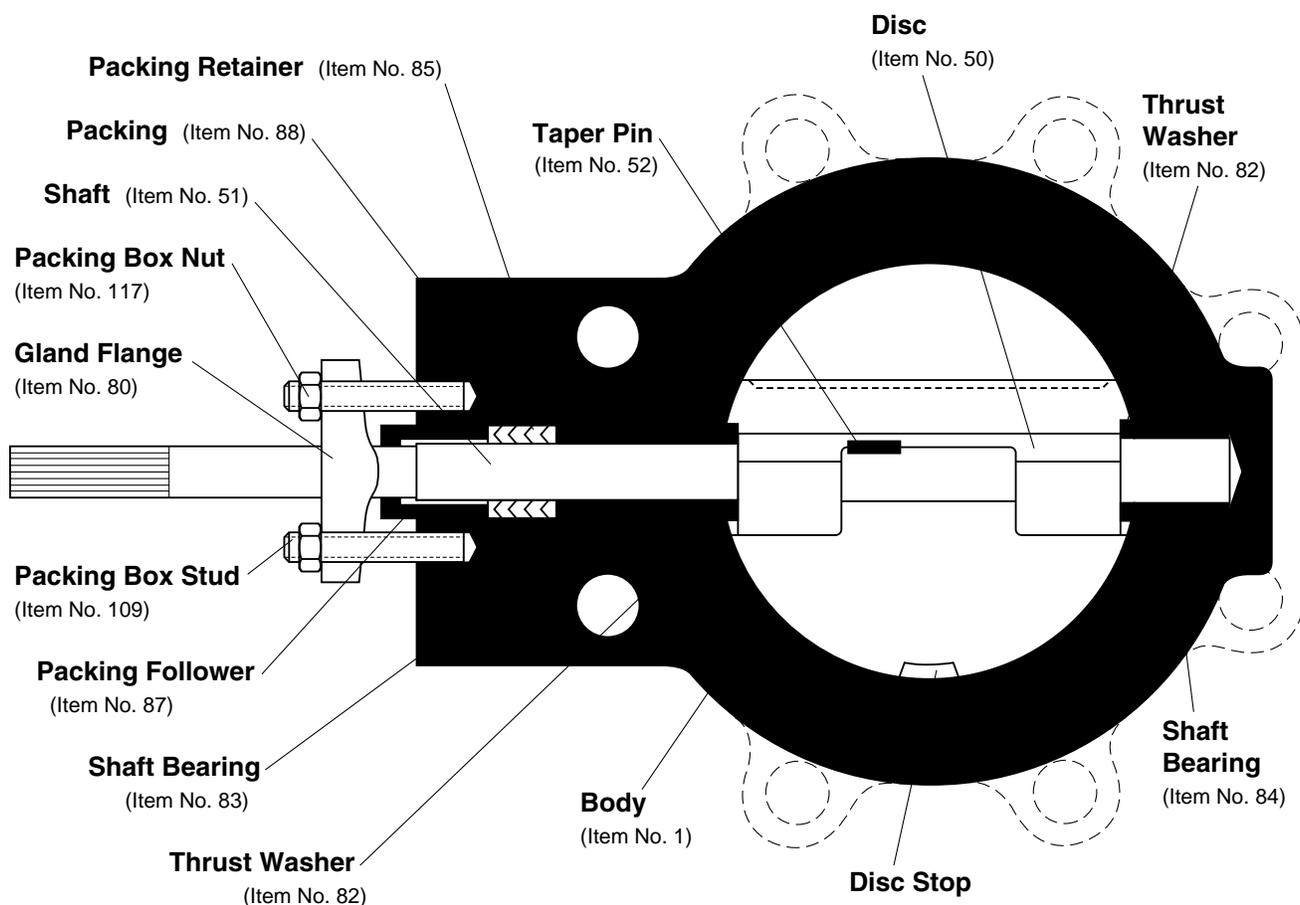
After the valve has been in operation for a short time, check the packing nuts to make sure they are just over finger-tight (readjust if necessary). If packing box leaking occurs, tighten the packing nuts only enough to stop leakage.

4. To observe the valve failure mode in case of air failure, 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 or closed. If incorrect, refer to the "Reversing the Actuator" section in the appropriate Actuator Maintenance Instructions.

## PREVENTIVE 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 valve is in line and, in some cases, without interrupting service. If an internal problem is suspected, refer to the "Disassembly and Reassembly" section.

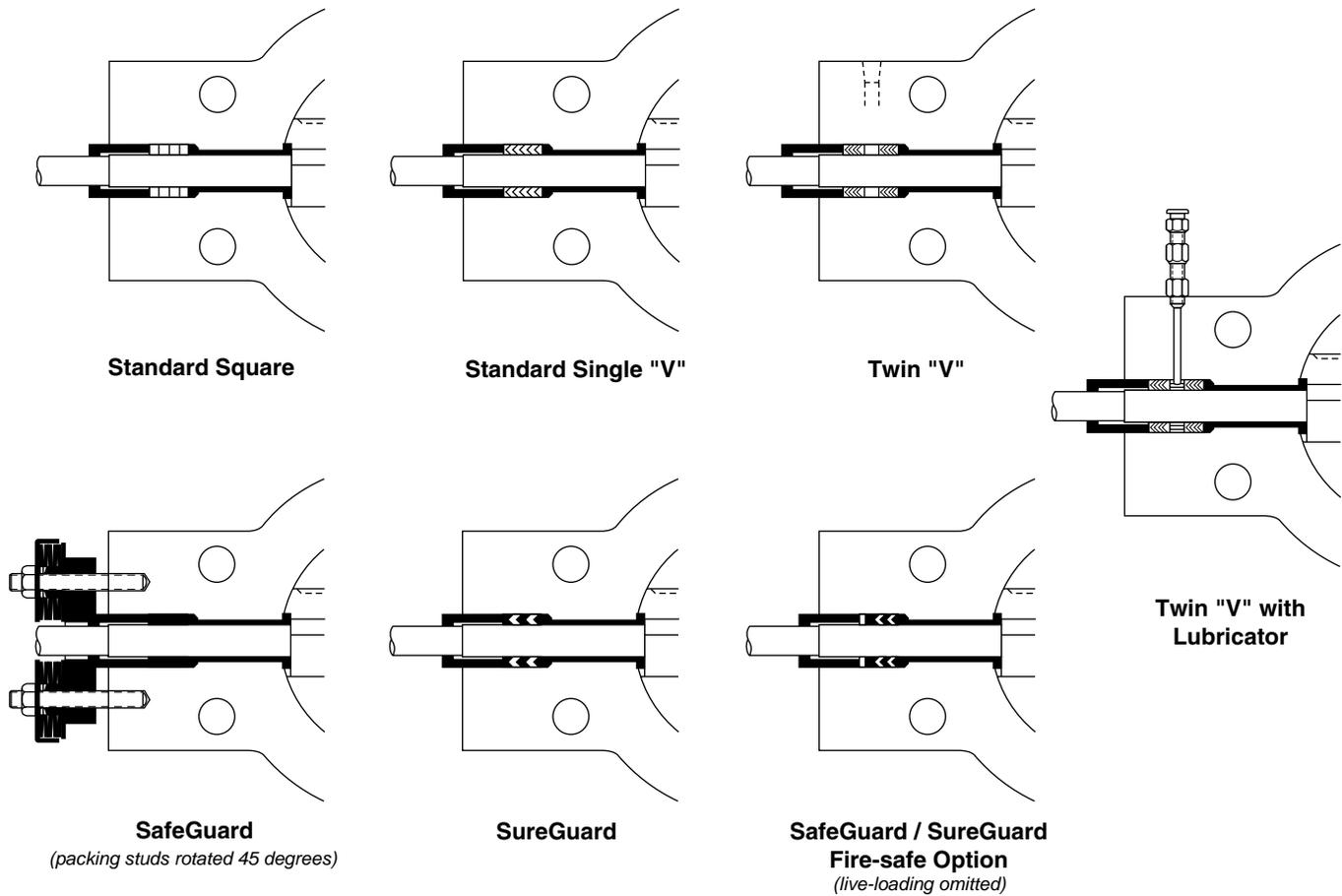
1. Look for signs of gasket leakage through the body and line flanges. Tighten flange bolting if necessary.
2. Note if any corrosive fumes or process drippings are damaging the valve.



**Figure 1: Body Assembly**

**NOTE:** Item numbers correspond directly to the valve's bill of material. Refer to it for specific part numbers.

3. Clean valve and re-paint areas of severe oxidation.
4. Check packing box bolting for proper tightness. Packing nuts should be slightly over finger-tight; however, tighten as necessary to prevent stem leakage.  
**CAUTION: Do not overtighten packing.**
5. If the valve is supplied with a lubricator, check lubricant supply and add lubricant if necessary.
6. If possible, stroke the valve and check for smooth, full-stroke operation by observing the disc position indicator plate mounted on the transfer case. Unsteady movement of the disc could indicate an internal valve problem (jerky motion is normal whenever Grafoil packing is used).
7. Check positioner calibration by observing the gauges and disc position indicator plate. Make sure positioner is calibrated to the correct range. Refer to positioner instructions for additional preventative maintenance.
8. If possible, depressurize the actuator, and remove the actuator transfer case cover plate, and make sure the positioner linkage is securely fastened.  
**CAUTION: Never apply air to the actuator without the cover plate installed; otherwise, the unsupported shaft may sustain damage.**
9. Be certain all accessories, brackets and bolting are securely fastened.
10. If possible, remove the air supply and observe the position indicator plate for correct fail-safe action.
11. Spray soap solution around the cylinder retaining ring and the adjusting screw to check for air leaks through the O-rings.
12. Clean any dirt or other foreign material from the exposed portion of the shaft.
13. If an air filter is supplied, check and replace the cartridge if necessary.



**Figure 2: Typical Packing Configuration**

## DISASSEMBLY AND REASSEMBLY

### Removing Valve From Line

If an internal problem is suspected with the valve and disassembly is required, remove the valve from the line by proceeding as follows:

**WARNING: Depressurize line to atmospheric pressure, drain all process fluids and decontaminate the valve (if caustic or hazardous materials are present). Failure to do so can cause serious injury.**

1. Make sure the valve is fully closed.

**CAUTION: On valves with fail-open action, the air pressure must be supplied under the piston to close the valve. If the valve is supplied with a handwheel, it can be used to close the valve. Failure to do so will damage the valve disc upon removal from the line.**

2. Attach a hoist or some means to support the valve.
3. Remove the line bolting. Do not attempt to pry the line flanges apart by pushing or pulling on the valve or actuator.

4. Slide the valve carefully from the line. To avoid damage to gasket surfaces, do not twist the valve.
5. After the valve is completely removed from the line, slowly relieve air pressure from the actuator.

**CAUTION: On valves with fail-open action, the actuator spring will cause the disc to open. Make sure the disc will not strike any object upon opening. Protect disc edges from damage.**

### Removing Actuator From Body

In most cases, both the body assembly and the actuator are easier to disassemble with the actuator removed from the body. To do so, proceed as follows:

1. Support the actuator assembly by the lifting ring before disconnecting it from the body sub-assembly.
2. Depressurize actuator and allow it to move to its fail position.
3. Remove the bolts connecting the yoke to the actuator subassembly.
4. Slide the entire actuator assembly off the valve shaft.

## Disassembling the Body

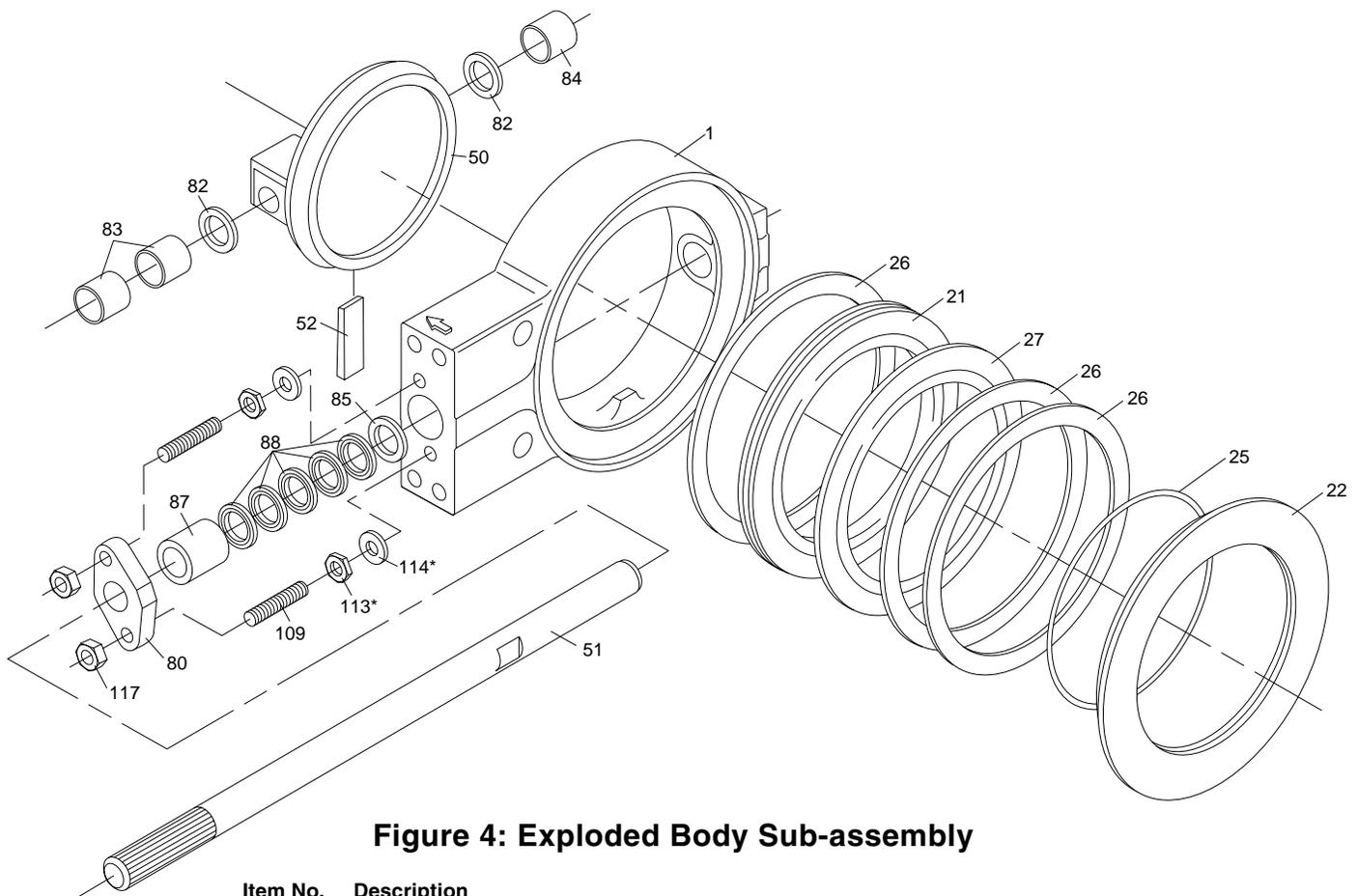
To disassemble the Valdisk 150 body, refer to Figures 1 and 3 and proceed as follows:

1. Lay the valve body on a flat surface with the seat surface up. Carefully insert a flat screwdriver into the groove behind the seat retainer and pry the retainer out of the body. The seat insert will now easily lift out of the body.
2. Turn the body over so its backside is up and mark the location of the thin end of the taper pin on the disc. (This mark will be used during reassembly.) Grind off the tackweld holding the taper pin in place. Drive the taper pin out of its slot using a punch and hammer.
3. Place the valve body into a vise with the shaft pointing up. Use brass jaws or wood blocks to prevent damage to the body surfaces.
4. Remove the two packing box nuts and gland flange from off the shaft.
5. Pull the shaft out of the body, noting that the disc may fall out of body. Use caution to prevent it from striking any hard objects or personnel. Next, remove the packing follower, packing set and packing retainer.
6. The disc can now be removed from the body, followed by the thrust and shaft bearings.
6. Place the disc into the body from the backside with the taper pin slot on top. Do not dislodge the thrust bearing.
7. Insert the second thrust bearing between the disc and the valve body. Align both bearings with the disc.
8. Insert the shaft into the body with the taper pin slot end first. Slowly insert it through the body, upper thrust bearing, disc, lower thrust bearing and into the shaft bearing.
9. Insert a new taper pin into the slot in the back of the disc and in the shaft. Refer to the mark on the disc made during disassembly and make sure the pin does not go beyond it. Be certain the pin is flat against the disc. Set in place with a punch and hammer.
10. Place the remaining shaft bearings\* over the shaft and into the bearing bore. (\*Refer to the valve's bill of materials for the number of shaft bearings required.) Next, place the packing retainer, followed by the packing set into the packing bore. (See Figure 2. Teflon packing chevrons point away from the disc.) Be careful to not damage the packing rings while inserting them over the shaft.
11. The packing follower is next inserted into the packing bore with machined lip end up.
12. If the packing box studs were removed, re-install them using anti-seize lubricant. Tighten until they bottom out. Place a washer over each stud and secure in place with a jam nut tightened until snug (valve sizes 1 thru 6-inch).
13. Place the gland flange over the shaft and onto the studs being certain the rocker knob is facing toward the disc. Place the packing box nuts onto the packing box studs and tighten finger tight plus  $\frac{1}{2}$  to one full turn with Teflon packing. (Rope packing should be torqued to 14 foot-pounds or 19 newton-meters.)
14. Install the seat assembly into the valve body by first inserting seat gasket into outer seat retainer groove. Next, remove the body from the vise and lay it on a flat surface with the seat side up. Proceed as follows.

## Reassembling the Body

To reassemble the Valdisk 150 body sub-assembly, refer to Figures 1, 2, and 3 and proceed as follows:

1. Clean or replace all parts. The O-ring and packing set should be replaced each time the valve is disassembled.
2. Check the disc seating surface to make sure it is smooth and free of excessive wear, scoring and scratches.  
**CAUTION: Damaged or dirty seat surfaces can cause excessive seat wear and high torque requirements. Damaged discs should be replaced.**
3. Inspect the shaft for scratches or galled surfaces. For maximum performance, Valdisk 150 shafts are machined to a very smooth finish. If damage exists, replace the shaft or contact the factory representative.  
**NOTE: Disc and shaft are interchangeable. Replacing the disc does not require replacing the shaft and vice versa.**
4. Place the valve body in a vise with shaft bore pointing up. Brass jaws or wood blocks are recommended to prevent damage to the valve surfaces while being held in the vise.
5. Place one shaft bearing into the lower bearing bore, followed by a thrust bearing.
6. Place the disc into the body from the backside with the taper pin slot on top. Do not dislodge the thrust bearing.
7. Insert the second thrust bearing between the disc and the valve body. Align both bearings with the disc.
8. Insert the shaft into the body with the taper pin slot end first. Slowly insert it through the body, upper thrust bearing, disc, lower thrust bearing and into the shaft bearing.
9. Insert a new taper pin into the slot in the back of the disc and in the shaft. Refer to the mark on the disc made during disassembly and make sure the pin does not go beyond it. Be certain the pin is flat against the disc. Set in place with a punch and hammer.
10. Place the remaining shaft bearings\* over the shaft and into the bearing bore. (\*Refer to the valve's bill of materials for the number of shaft bearings required.) Next, place the packing retainer, followed by the packing set into the packing bore. (See Figure 2. Teflon packing chevrons point away from the disc.) Be careful to not damage the packing rings while inserting them over the shaft.
11. The packing follower is next inserted into the packing bore with machined lip end up.
12. If the packing box studs were removed, re-install them using anti-seize lubricant. Tighten until they bottom out. Place a washer over each stud and secure in place with a jam nut tightened until snug (valve sizes 1 thru 6-inch).
13. Place the gland flange over the shaft and onto the studs being certain the rocker knob is facing toward the disc. Place the packing box nuts onto the packing box studs and tighten finger tight plus  $\frac{1}{2}$  to one full turn with Teflon packing. (Rope packing should be torqued to 14 foot-pounds or 19 newton-meters.)
14. Install the seat assembly into the valve body by first inserting seat gasket into outer seat retainer groove. Next, remove the body from the vise and lay it on a flat surface with the seat side up. Proceed as follows.  
**Soft or metal seat design** - Lay the seat insert into the valve body. Next, insert the seat retainer into the body seat counter bore. Use a rubber mallet or press to press the seat retainer into the body.  
**Fire-safe seat design** - Place one Grafoil gasket into the retainer ring groove. Place two additional Grafoil gaskets on either side of the seat insert. Place the metal seat on top of the seat/gasket assembly and then place the entire assembly into the retainer ring in the body. Next, insert the seat retainer into the body seat counter bore. Use a rubber mallet or press to press the seat retainer into the body.



**Figure 4: Exploded Body Sub-assembly**

Item No.	Description
1	body
21	seat insert
22	seat retainer
25	retainer O-ring
26	fire-safe gasket**
27	fire-safe seal**
50	disc
51	shaft
80	gland flange
82	thrust washer
83	shaft bearing
84	shaft bearing
85	packing retainer
87	packing follower
88	packing
109	packing box stud
113	jam nut*
114	washer*
117	packing box nut

\* 1 thru 6-inch only  
 \*\* Fire-safe designs only

15. Rotate disc several times to allow seat to self-center in the body. Again, check packing box nuts to be certain they are tight, per step number 13. Do not overtighten.

**CAUTION: Do not over tighten packing box nuts. This can cause excessive packing wear and high shaft friction, which may impede shaft rotation.**

16. After the valve is fully assembled and seat leak tested, use a compatible welding rod to tackweld the taper pin to the disc at its thickest end. Later, this will allow the taper pin to be removed after the weld has been ground off.

### Remounting Valve to Actuator

Before mounting a Valdisk 150 valve to a Valtek actuator, verify that the disc rotation matches the actuator rotation and complies with the air failure requirements.

Procedures for mounting the actuator are as follows.

1. Slide the entire actuator assembly onto the shaft. To ensure full rotation of the disc, marks provided on the end of the valve shaft and on the actuator lever arm should be aligned.
2. Bolt the actuator yoke to the valve body. Be certain the stroke indicator plate is positioned properly to accurately indicate the valve's rotation.
3. Adjust the actuator stroke stop bolts until the disc is parallel to the seat surface.

**CAUTION: Actuator stroke stop bolts must be properly adjusted to prevent the valve disc from overstroking. If incorrectly adjusted the valve shaft may be twisted or sheared off.**

4. Install the valve in line as outlined in the "Installation" section.

## Troubleshooting Valdisk 150 Valves

Failure	Probable Cause	Corrective Action
Valve moves to failure position, excessive air bleeding from transfer case	<ol style="list-style-type: none"> <li>1. Failure of actuator O-ring</li> <li>2. Failure of sliding seal assembly</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace actuator stem O-ring</li> <li>2. Repair or replace sliding seal assembly</li> </ol>
Jerky shaft rotation	<ol style="list-style-type: none"> <li>1. Overtightened packing</li> <li>2. Improper adjustment of lever arm on shaft causing arm to contact transfer case</li> <li>3. Cylinder wall not lubricated</li> <li>4. Worn piston O-ring allowing piston to gall on cylinder wall</li> <li>5. Worn actuator stem O-ring causing actuator stem to gall on stem collar</li> <li>6. Worn (or damaged) thrust bearings, shaft bearings or packing followers</li> </ol>	<ol style="list-style-type: none"> <li>1. Retighten packing box nuts to slightly over finger-tight for V-ring packing, 14 ft-lbs for braided packing</li> <li>2. Readjust lever arm (see step 1 in the "Remounting Actuator" section)</li> <li>3. Lubricate cylinder wall with silicone lubricant</li> <li>4. Replace O-ring; if galling has occurred replace all damaged parts</li> <li>5. Replace O-ring; if actuator stem is galled replace it</li> <li>6. Disassemble and inspect parts; replace any worn or damaged parts</li> </ol>
Excessive leakage	<ol style="list-style-type: none"> <li>1. Improper adjustment of external stroke stops</li> <li>2. Worn or damaged seat</li> <li>3. Damaged disc seating surface</li> <li>4. Improper handwheel adjustment acting as limitstop</li> </ol>	<ol style="list-style-type: none"> <li>1. See "Remounting Valve to Actuator" section</li> <li>2. Replace seat</li> <li>3. Replace disc</li> <li>4. Adjust handwheel until disc seats properly</li> </ol>
Leakage through line	<ol style="list-style-type: none"> <li>1. Dirty line gasket surfaces</li> <li>2. Improper sealing of line flanges</li> <li>3. Flange or pipe misalignment</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean gasket surfaces and reinstall valve</li> <li>2. Tighten line flanges evenly and completely (see Table 1 for proper torque)</li> <li>3. Clean body bore and stem, replace packing</li> </ol>
Leakage through packing box	<ol style="list-style-type: none"> <li>1. Loose packing box nuts</li> <li>2. Worn or damaged packing</li> <li>3. Dirty or corroded packing</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten packing box nuts to slightly over finger-tight for V-ring packing, 14 ft-lbs for braided packing</li> <li>2. Replace packing</li> <li>3. Clean body bore and stem, replace packing</li> </ol>
Disc interferes with body	<ol style="list-style-type: none"> <li>1. Disc installed upside down</li> <li>2. Worn thrust bearings</li> </ol>	<ol style="list-style-type: none"> <li>1. Reinstall disc</li> <li>2. Replace thrust bearings</li> </ol>
Disc interferes with line	<ol style="list-style-type: none"> <li>1. Cement lining or heavy schedule pipe</li> </ol>	<ol style="list-style-type: none"> <li>1. Modify line to allow proper disc clearance</li> </ol>
Valve slams, won't open, or causes severe water hammer	<ol style="list-style-type: none"> <li>1. Improper valve installation</li> </ol>	<ol style="list-style-type: none"> <li>1. See step 2 in "Installation" section and correct flow direction</li> </ol>
Shaft rotates, disc remains open or closed	<ol style="list-style-type: none"> <li>1. Missing or broken taper pin</li> <li>2. Broken shaft</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace taper pin</li> <li>2. Replace shaft, make sure disc does not overstroke and contact disc stop</li> </ol>
Actuator operates, shaft does not rotate	<ol style="list-style-type: none"> <li>1. Broken internal actuator parts</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to appropriate actuator Maintenance Instructions</li> </ol>

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For more information, contact:

For more information about Flowsolve and its products, contact [www.flowsolve.com](http://www.flowsolve.com) or call USA 972 443 6500

**Regional Headquarters**

**Quick Response Centers**

1350 N. Mt. Springs Prkwy.  
Springville, UT 84663  
Phone 801 489 8611  
Facsimile 801 489 3719

5114 Railroad Street  
Deer Park, TX 77536 USA  
Phone 281 479 9500  
Facsimile 281 479 8511

12 Tuas Avenue 20  
Republic of Signapore 638824  
Phone (65) 862 3332  
Facsimile (65) 862 4940

104 Chelsea Parkway  
Boothwyn, PA 19061 USA  
Phone 610 497 8600  
Facsimile 610 497 6680

12, av. du Québec, B.P. 645  
91965, Courtaboeuf Cedex, France  
Phone (33 1) 60 92 32 51  
Facsimile (33 1) 60 92 32 99

1300 Parkway View Drive  
Pittsburgh, PA 15205 USA  
Phone 412 787 8803  
Facsimile 412 787 1944

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