

Jamesbury™ Wafer-Sphere™ butterfly valve cryogenic 3"-12"

Installation, maintenance and
operating instructions



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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. DESCRIPTION

The Jamesbury™ *Wafer-Sphere*™ valve is a butterfly valve of high performance design with a one-piece body and a resilient, positive-sealing seat. It is available in three standard series:

8100 Series – Wafer design for ANSI Class 300 piping systems (can also be installed in Class 150 piping systems).

8200 Series – Single flange lugged design for ANSI Class 150 piping systems.

8300 Series – Single flange lugged design for ANSI Class 300 piping systems.

IMPORTANT NOTE: Maximum shut-off pressure rating depends on the materials chosen. Refer to the tag attached to each valve for this rating.

1.1 ECCENTRIC SHAFT DESIGN

One of the design features of the *Wafer-Sphere* valve that is responsible for its superior performance is the valve's eccentric shaft design. The shaft is offset in two planes: (1) away from the valve disc centerline; and (2) behind the disc sealing plane (See **Fig. 4**). Offset shaft design makes the rotating disc cam back and away from the seat, completely eliminating the usual wear points at the top and bottom of the seat. Because the disc rotates off the seat in an eccentric arc, it operates in one quadrant only (See **Fig. 6**).

1.2 POSITIVE STOP FEATURE

To prevent seat damage from over-travel of the disc beyond the closed position (primarily during field mounting of a handle or actuator), a "positive stop" feature has been designed into the *Wafer-Sphere* butterfly valve. The "positive stop" feature also makes it possible to adjust the actuator travel stop in-line. The location of this feature on the body insert is shown in **Fig. 3**.

WARNING

SAFETY FIRST! FOR YOUR SAFETY, TAKE THE FOLLOWING PRECAUTIONS BEFORE REMOVING THE VALVE FROM THE LINE, OR BEFORE ANY DISASSEMBLY:

1. **WHAT'S IN THE LINE?** BE SURE YOU KNOW WHAT FLUID IS IN THE LINE. IF THERE IS ANY DOUBT, DOUBLE-CHECK WITH THE PROPER SUPERVISOR.
2. **ARE YOU PROTECTED?** WEAR ANY PROTECTIVE CLOTHING AND EQUIPMENT NORMALLY REQUIRED TO AVOID INJURY FROM THE LOW TEMPERATURE FLUID IN THE LINE.
3. **IS THE LINE DEPRESSURIZED?** DEPRESSURIZE THE LINE AND DRAIN THE SYSTEM FLUID. THE *WAFER-SPHERE* VALVE'S OFFSET SHAFT CREATES GREATER DISC AREA ON ONE SIDE OF THE SHAFT. THIS MEANS THAT A *WAFER-SPHERE* VALVE TENDS TO OPEN WHEN PRESSURIZED ON THE INSERT SIDE WITHOUT AN ACTUATOR ON THE VALVE.

NOTE: DO NOT PRESSURIZE THE VALVE WITHOUT AN ACTUATOR MOUNTED ON IT. DO NOT REMOVE A HANDLE OR AN ACTUATOR FROM A VALVE UNDER PRESSURE.

4. **IS THE VALVE CLOSED?** BEFORE YOU INSTALL A *WAFER-SPHERE* VALVE IN, OR REMOVE IT FROM THE LINE, CYCLE THE VALVE FULLY CLOSED. THE *WAFER-SPHERE* VALVE MUST BE REMOVED FROM THE LINE IN THE CLOSED POSITION. ANY ATTEMPT TO REMOVE THE VALVE IN THE OPEN POSITION WILL RESULT IN DAMAGE TO THE WAFER.

2. INSTALLATION

I. KEL-F SEATED CRYOGENIC WAFER-SPHERE VALVES

Kel-F seated cryogenic *Wafer-Sphere* butterfly valves are single-directional. They must be installed **ONLY** with the disc face toward the higher pressure (shaft downstream).

II. GENERAL INFORMATION

1. Read the **WARNING** Section carefully.
2. **IMPORTANT:** Only operating handle stops or actuator stop set screws must be used to stop the disc in position. **DO NOT** use the "positive stop" insert (2) by itself to limit actuator travel.
3. Visually check the position of the wafer when the valve is in the closed position and the insert is fully compressed. There should be a slight gap (approximately 1/64") between the wafer and the "positive stop" insert, in this optimum sealing position.
4. Before installing the closed valve in the line, be sure that the handle or actuator is attached so that a counterclockwise rotation, viewed from above, opens the valve (See **Fig. 6**). Again, fully close the valve before installing it in the line.
5. The *Wafer-Sphere* butterfly valve must be centered between flanges to avoid disc-pipe contact which could damage the disc and shaft. Any flange or pipeline welding should be done prior to installing of the valves. If this is impossible, protective covering or shields must be placed in the pipeline between the valve and the area being welded prior to welding. Not only must the valve be protected against weld slag, but also against any excessive heat, which could cause seat damage. It is essential that all weld slag, rods, debris, tools, etc., be removed from the pipeline before valves are installed or cycled.
6. Secure the valve between flanges. Compress the flange gasket **EVENLY** by tightening the fasteners in an alternating sequence.

IMPORTANT: The valve should be tightened between flanges using appropriate gaskets and fasteners for the service, in compliance with applicable piping codes and standards. Recommended fastener lengths are listed in Bulletin T104-1.

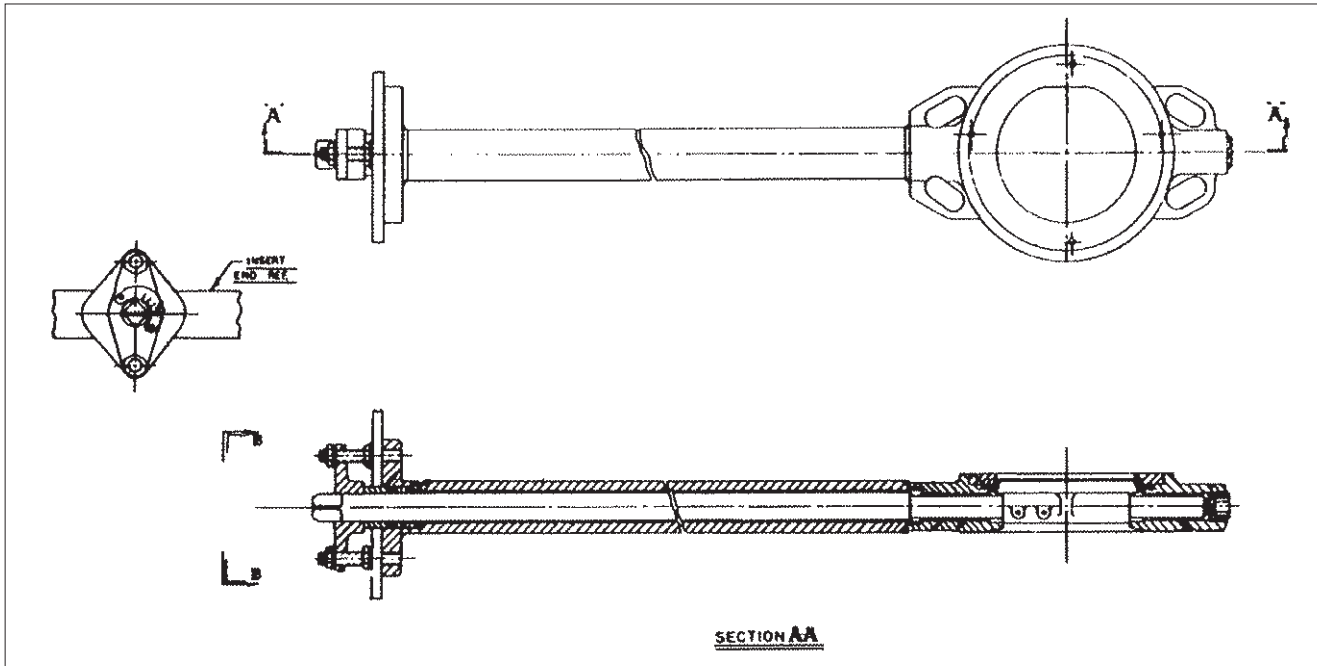


Figure 1.

3. MAINTENANCE

3.1 VALVE REMOVAL AND BENCH MAINTENANCE

- I. Read the **WARNING** Section carefully.
- II. Valve must be fully closed before sliding it out of the pipeline.
- III. **CAUTION:** Valves equipped with fail-open spring return actuators must be disconnected from the actuators or there must be sufficient air pressure supplied to the actuator to close the valve. After valve removal, slowly relieve the pressure in the actuator.
- IV. SEAT REPLACEMENT
 1. After removing the valve from the line, place it on a bench in a vise and cycle the valve open.
 2. Series 8100:
 3. With the disc in the open position, remove the insert (2). Using a nylon rod or a rod of other soft material, tap with a hammer from the back, or shaft, side of the valve.
 4. Series 8200 and 8300:
 5. Remove the insert screws. As above, use a soft material to complete insert removal, by tapping from the back, or shaft, side.
 6. Remove the seat, and discard it.
 7. All assembly work must be performed according to cleaning procedures. Work must be done in a proper area for the requirements of the systems.
 8. Carefully clean and polish the disc. It should be free of all grooves and scratches.

9. If the disc is lightly damaged it may be possible to smooth the sealing surface with crocus cloth, a fine stone, or the equivalent. If deep scratches are present replace the disc or return the valve to the factory for service.
10. Cycle the valve closed.
11. Clean the valve per requirements of the cryogenic systems.
12. Place the new seat in the valve.
13. Replace the insert.
14. The insert will bottom out in the body, flush with or slightly above the body face when compressed between flanges.
15. Cycle the valve fully closed, and compress the seat. Seat compression is accomplished when the valve is installed between flanges and the flange bolts are tightened.
- V. Shaft Packing Replacement
 1. Remove the handle.
 2. Take off the compression plate (10) by removing the stud nuts (15) and lockwashers (16). The studs (14) do not have to be removed.
 3. Remove the compression ring (3).
 4. Remove the old shaft packing (8) with a packing tool.
 5. Replace the old packing with new packing. **NOTE:** Keep the packing rings stacked in the same order as removed from kit. Install one ring at a time to prevent damage.
 6. Remove the spacer (7), only if complete disassembly is necessary.

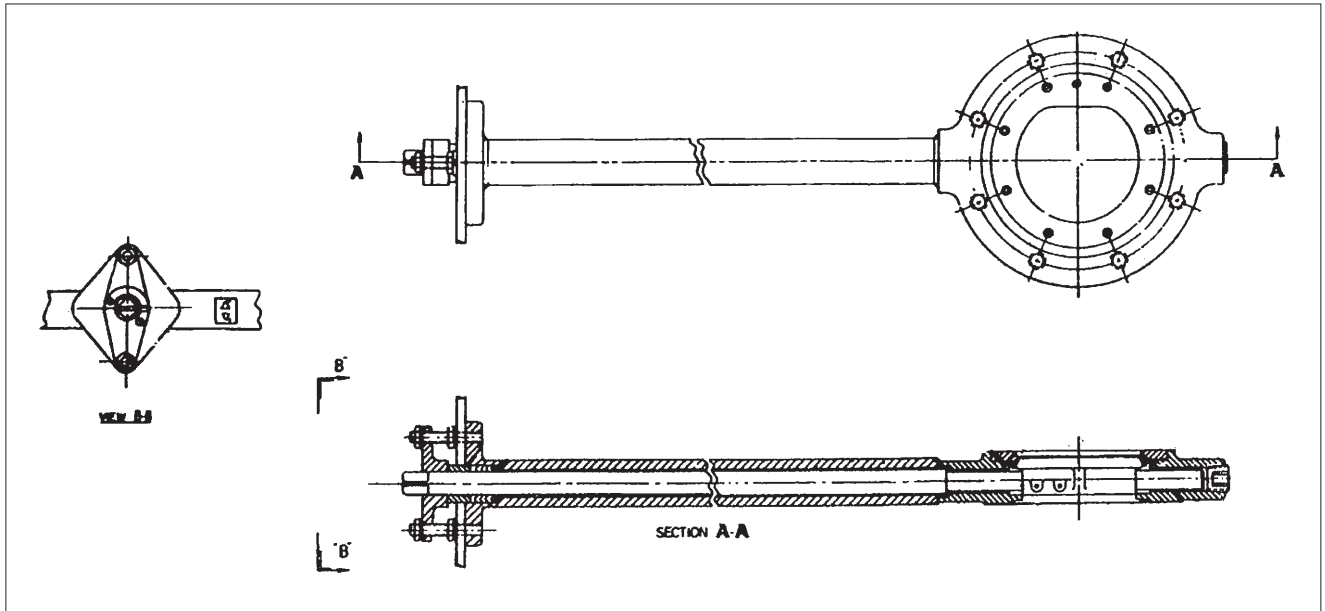


Figure 2.

VI. Bearing Replacement

1. Remove the wafer pin welds by grinding or machining off the weld. Drive out the taper pins in the direction shown in diagram (Fig. 3).
2. Remove the pressure plug (11).
3. Use a soft rod and hammer to tap the bottom of the shaft (4). Remove it through the top of the valve. **NOTE:** In doing so, and freeing the disc, be careful not to scratch the sealing surface of the disc.
4. Remove the top bearing (6) by pushing it up from the bottom (waterway).
5. Remove the bottom bearing (6) by pushing it down from the top (waterway). **NOTE:** To keep bearings in place, the valve body is staked on the I.D. **DO NOT** try to remove the bearings by pushing them toward the center of the valve.
6. To reassemble the valve, follow the instructions in the **ASSEMBLY** section.

VII. Actuator Mounting

SEE THE APPLICABLE ACTUATOR MOUNTING INSTRUCTIONS (AMI) FOR THE PARTICULAR ACTUATOR THAT IS BEING MOUNTED ON THE VALVE.

VIII. Actuator/Valve Adjustments

1. Type ST and Type ST-US pneumatic actuators:

CAUTION: While the actuator stops are being set, there must be no pressure across the valve. Reread the General Precautions section.

- a. Disc travel on a *Wafer-Sphere* valve with a Type ST or ST-US pneumatic actuator is controlled by a closed ("shut") travel stop set screw (20A) and by an open travel stop set screw (20B) in the actuator. See Fig. 5.

- b. With the valve held firmly in a vise, remove acorn nuts (19) protecting the closed ("shut") and open stop set screws (20A) and (20B), respectively. **NOTE:** Be sure O-rings remain in the acorn nuts.
- c. Partially open valve using a wrench on the actuator driver. On most ST-MS units air must be used to perform this.
- d. Unscrew closed (shut) stop set screw (20A) far enough to accomplish step (c).
- e. Close the valve. With ST-MS actuators, allow spring to overclose the valve. (Now the disc should be resting on the insert stop.)
- f. Carefully turn the closed (shut) stop set screw (20A in Fig. 5) in, or clockwise, until increased resistance to further motion is felt. Turn the screw in an additional 1/8 turn. At this point, there will be a slight movement of the driver (2), and the pointer (24) will just begin to move, and the disc will come off the insert stop.
- g. Cycle the valve open and back to closed several times. The pointer (2.) should return to the same position each time.
- h. Cycle the valve to the open position. If necessary, adjust the open stop set screw (20B) until the pointer (24) is approximately 90° from the closed (shut) position. This is full open.
- i. With the valve in the full open position, and with air applied so that load is applied to the open stop set screw to prevent it from moving, cover the open stop set screw (20B) with an acorn nut. Tighten the open stop set screw acorn nut.
- j. Now close the valve. With the valve in the closed position, and air applied, except on ST-MS versions, cover the closed stop set screw acorn nut (19) and tighten it.

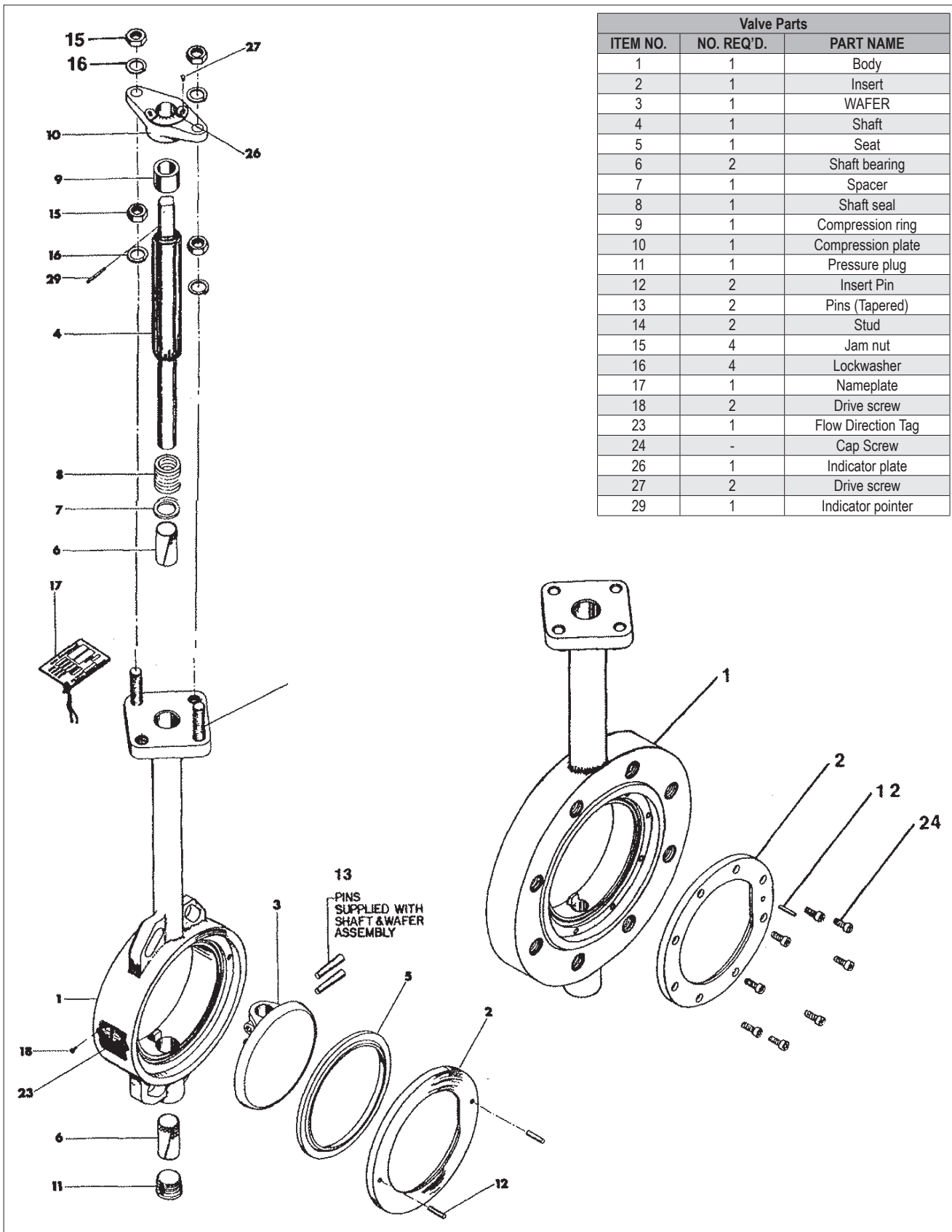


Figure 3. Exploded View

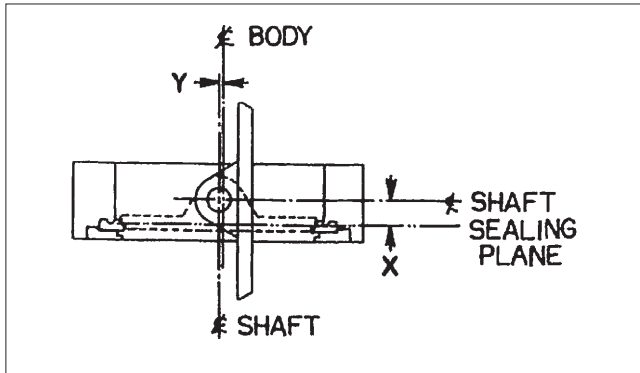


Figure 4.

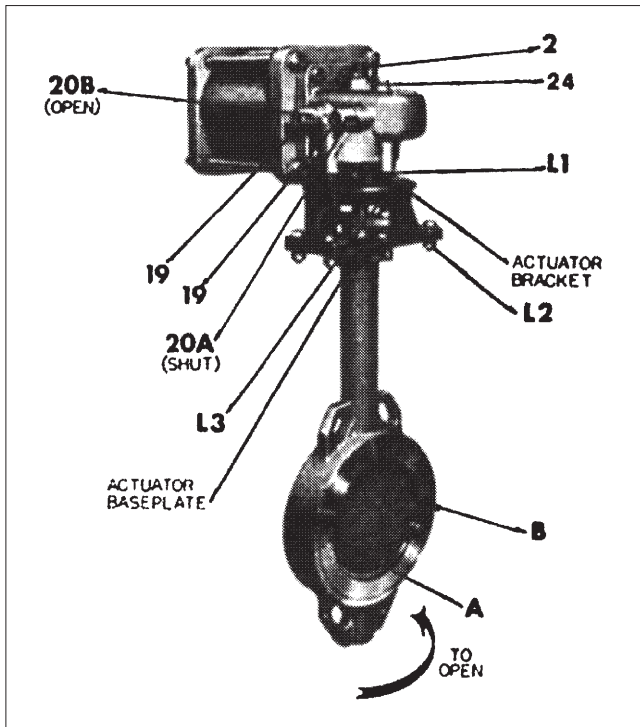


Figure 5.

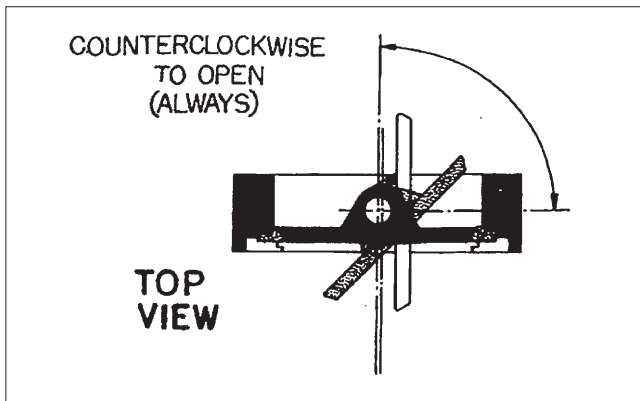


Figure 6.

- k. Cycle the valve open and closed, with full air pressure, three times. The pointer should return to the same position each time.
- l. Check all linkages and coupling bolts for tightness.

NOTE: Type ST-MS safety return actuators can only operate in the fail-closed direction.

2. Quadra-Powr® Spring-Diaphragm Actuator:

Depending on the type and series of *Quadra-Powr* actuator, follow the instructions for adjustment of ST-MS actuators. *Quadra-Powr* actuators may be mounted for either fail-closed or fail-open operation.

3. Type MA Manual Gear Actuators:

Disc travel on a *Wafer-Sphere* valve with a Type MA manual gear actuator is also controlled by a closed (shut) travel stop set screw and an open travel stop set screw.

- a. Adjust actuator travel stops by following essentially the same procedure as described in #1 above for Type ST pneumatic actuators; set the two stop set screws of the actuator so as to prevent disc over travel.
- b. Turn the handwheel so that it closes the valve.
- c. Turn the closed (shut) stop set screw in, or clock-wise, until it stops. This will provide the proper closed setting.
- d. Tighten the jam nuts on the stop set screws. Maintain force on the stop set screws while tightening the nuts by applying torque to the actuator handle.

4. Type EJ, ERC, and ERCX Electric Actuators:

CAUTION: If an electric actuator's closed (shut) position switch adjustable cam (3) is not properly adjusted, the valve disc may contact the travel stop before the switch has been tripped. In this case, the actuator motor will continue to run, with possible damage resulting.

- a. Disc travel on a *Wafer-Sphere* valve with Type IX, ERC, or ERCX electric actuators is controlled by a closed (shut) travel switch cam and by an open travel switch cam.
- b. Proper settings are obtained by adjusting the appropriate switch cams within the actuator housing to position the valve disc in the proper open and closed positions.

NOTE: Refer to the applicable Valmet Installation, Maintenance, and Operation instruction (IMO) for identification of switches, cams and for the correct method of adjustment.

IX. In-Line Actuator/Valve Adjustments

1. **CAUTION: THERE MUST BE NO PRESSURE ACROSS THE VALVE WHILE ACTUATOR STOPS ARE SET. REREAD THE GENERAL PRECAUTIONS ON PAGE 3.**
2. The same procedure (with the exception of visual checking) as in Bench Procedures for Actuator/Valve Adjustments should be followed. See VIII 1, 2, 3, and 4 above.

4. ASSEMBLY

1. Comply with the instructions in the **WARNING** section.
2. Place the body (1) in a vise with the insert side facing the assembler.
3. Insert the TFE bearings (6), lubricating the inside diameter with silicone grease or other lubricant compatible with the fluid to be handled.
4. Position the disc (3) in the body and slide the shaft (4) through the body and disc. Use caution to prevent damage to the bearings. An arrow on the disc indicates correct orientation with the compression plate (10).
5. Insert the taper pin(s) (13) and drive them into place. Weld the small side of the pin. After the disc cools, clean the weld(s) with a wire brush. Caution: Use extreme care to keep contamination out of the valve.
6. Slide the spacer (7), chevron packing (8), and compression ring (9) over the shaft (4) and into the valve body (1).
7. Set the studs (14) into the body (1) and lock into place with the lockwashers (16) and nuts (15).
8. Slide the compression plate (10) over the shaft (4) and studs (14). Hold in place with the other two lockwashers and stud nuts. Do not tighten chevron packing at this time.
9. Using TFE tape to provide tight sealing, install the pipe plug (11). **NOTE:** Use ample torque to insure a good seal.
10. Install the seat (5) and insert (2). The rolled pins (12) will hold the insert (2) in place on 8000 and 8100 series valves. Spiral pins (12) and cap screws (24) are used on 8200, 8300, and 8500 series valves. The correct seating of the disc and seat will be accomplished when the flanges are tightened on the valve.
11. Tighten the compression plate (10) by tightening the nuts equally until they touch the plate. Then give another 3/4 of a turn to each.

To Change Actuator Quadrant or Linkage Installation (see **Fig. 5**)

If it is necessary to orient the actuator in a different quadrant):

1. Loosen the valve/actuator coupling by loosening the coupling bolts.
2. Remove the four bolts holding the actuator bracket to the actuator baseplate.
3. After removing the actuator and bracket from the valve, remove the four bolts holding the actuator bracket to the actuator.
4. Reposition the actuator in the desired quadrant.
5. Retighten the four bolts which hold the actuator bracket to the actuator.
6. Reinstall the bracket on the baseplate, holding the two together with the four bolts and nuts. **CAUTION:** When installing the bracket and actuator, match its position to the valve position, i.e., valve open/actuator open and vice versa. The fit should be snug but not too tight. (Excessive tightening will prevent proper alignment of the actuator drive shaft and valve stem. Failure to tighten snugly will allow the shaft and wafer to move downward away from optimum seat contact when final tightening is accomplished.)
7. Tighten the coupling bolts. Be sure the actuator drive shaft and valve stem are rigidly held together and properly aligned.
8. Now fully tighten the four bolts holding the bracket to the baseplate. **CAUTION: WHEN REINSTALLING THE ACTUATOR, MATCH ITS POSITION TO THE VALVE POSITION – VALVE OPEN/ACTUATOR OPEN.** This ensures opening of the valve in a counterclockwise direction, as shown in the illustrations. **NOTE:** Type ST-MS safety-return actuators can fail-closed only. They cannot be reoriented for fail-open. Fail-open actuators are available only in the *Quadra-Powr* series of actuators.

NOTE: For further information on mounting of actuators on valves, refer to the appropriate Actuator Mounting Instructions (AMI).

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