



Butterfly Valves

Also Refer to the Following:

Index:

Valve Operator		Ground Wire	Operation	Handle Installation	Panel Installation
Electric Actuator		2	3	--	4
Manual Actuator	Indicating	5	6	7	
	Non-Indicating	--	9	10	--
Pneumatic Actuator		--	11	--	--
Troubleshooting		12			

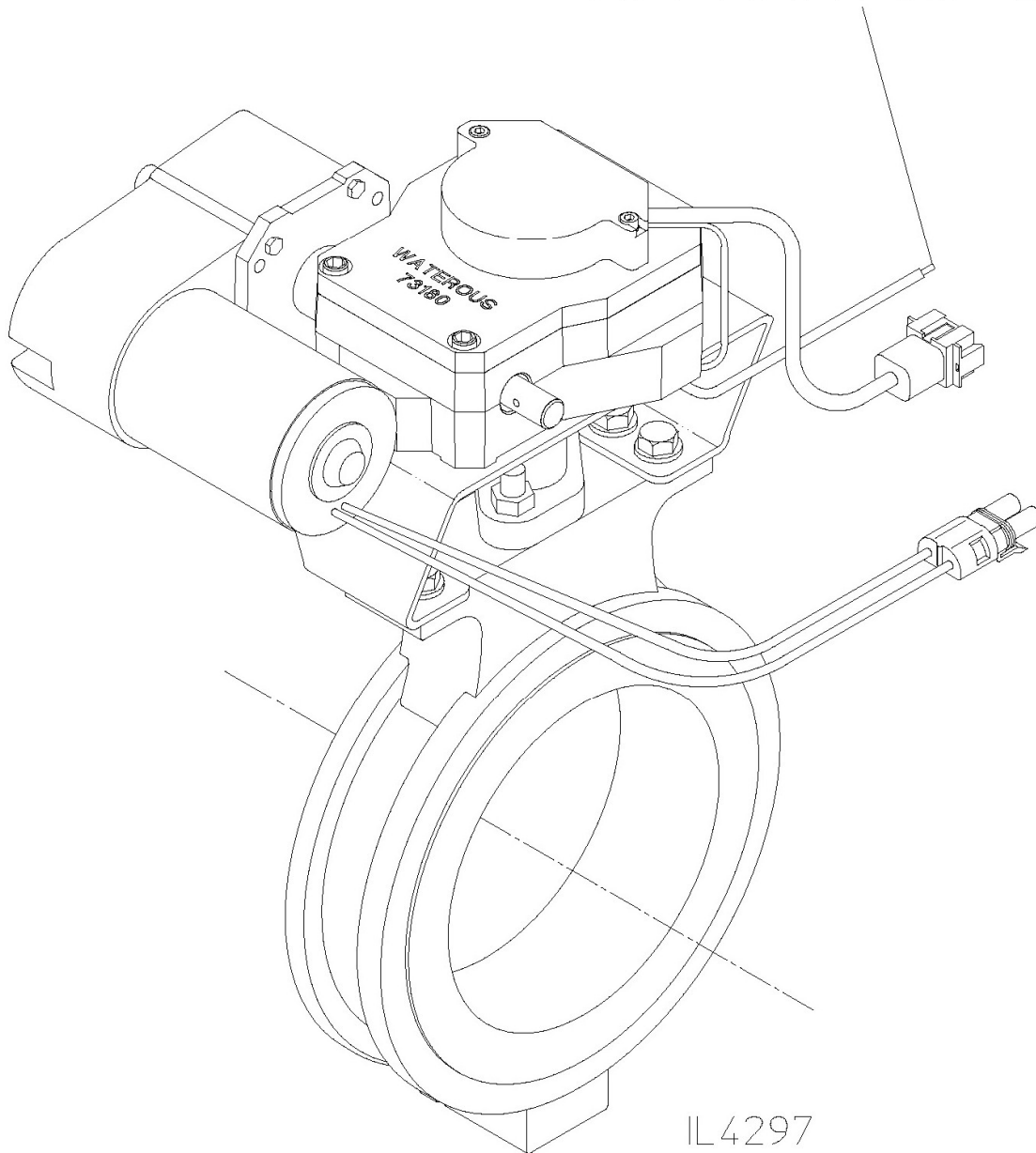
Valve Operator		Actuator, Installation, Operation, Maintenance and Repair Parts	Repair Parts	
			From Valve Manufacturer	From Waterous
Electric Actuator		--	13	See: SPL82743 (6 in. Valves) SPL82966 (8 in. Valves)
Manual Actuator	Indicating			
	Non-Indicating			
Pneumatic Actuator		See: F-1031, Section 2319		

NOTE: Instructions subject to change without notice.

Electric Actuator – Ground Wire

Connect 18 AWG ground wire (5 foot length furnished) to the apparatus chassis which will ensure a proper ground for the valve rotary encoder.

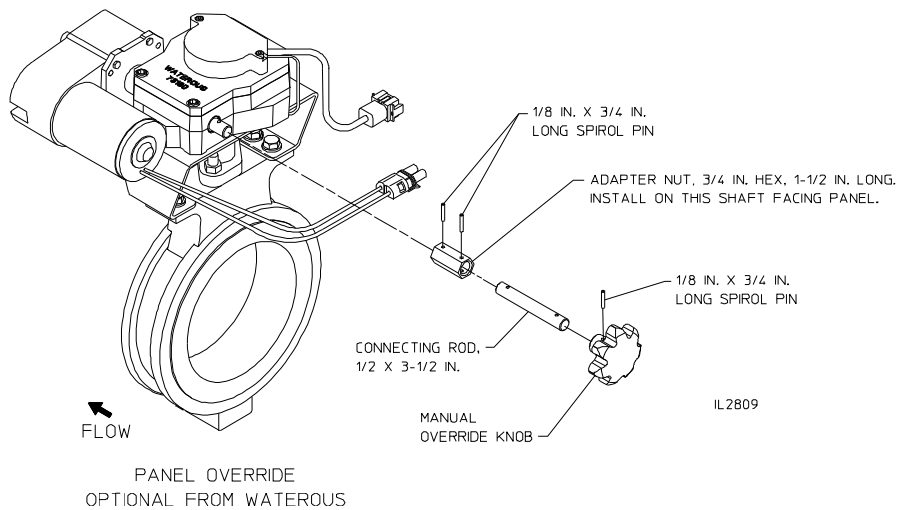
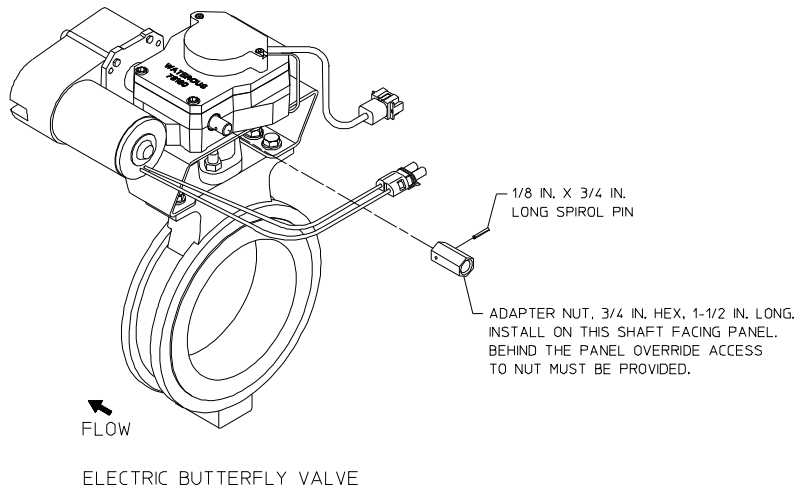
GROUND WIRE,
CONNECT TO
APPARATUS CHASSIS



Electric Actuator – Operation Manual Override

Valve may be manually overridden two ways:
 Behind the panel via a hex adapter.
 From the panel via a knob.

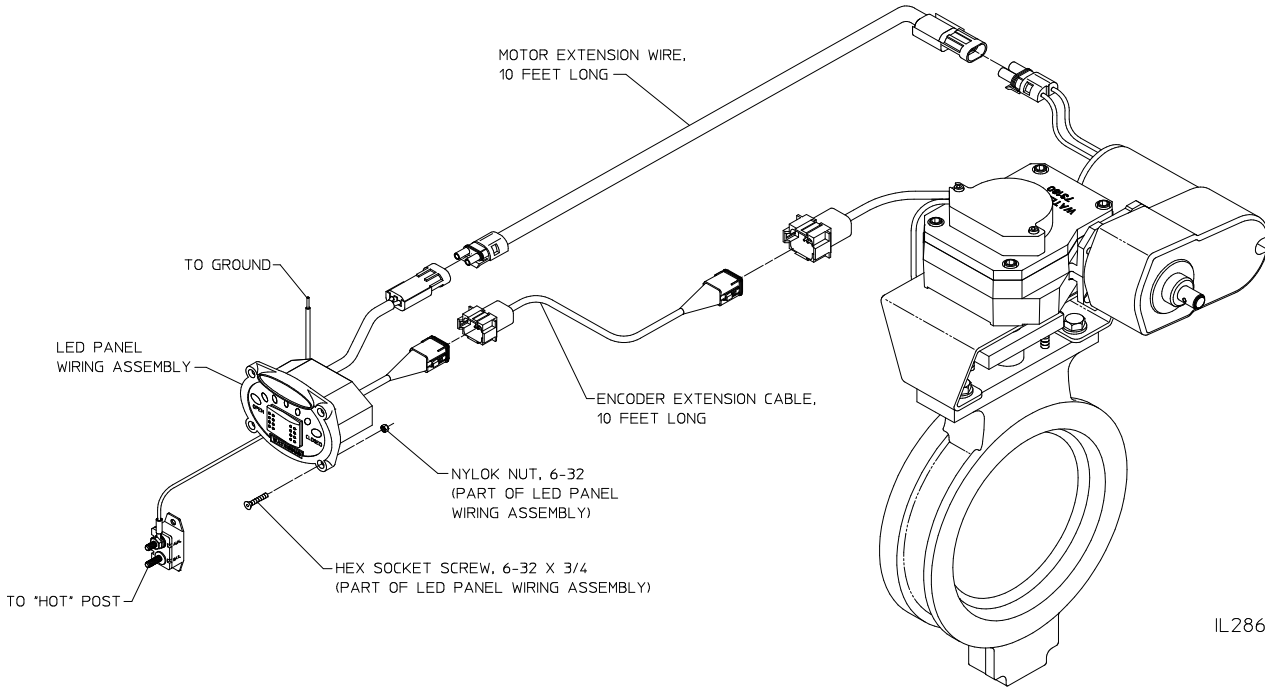
The valve actuator override stem is positioned at the factory for override operation from the panel where the intake is located.



Panel Override Optional from Waterous

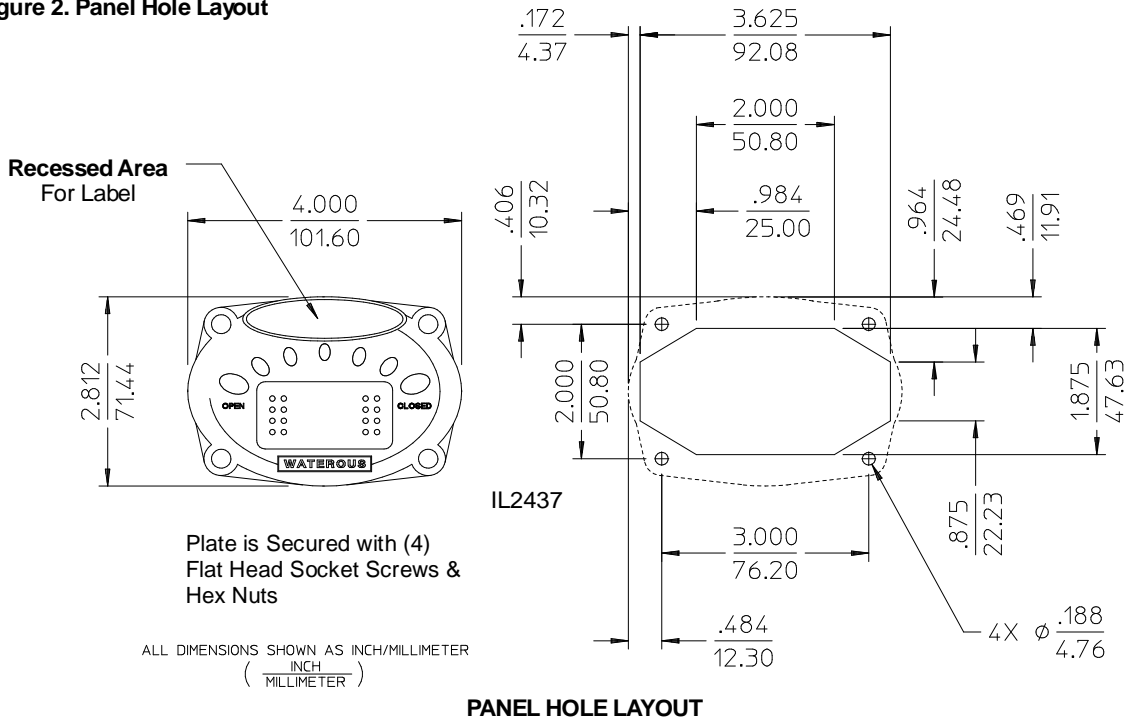
Electric Actuator - Panel Installation

Figure 1. Panel Wiring Installation



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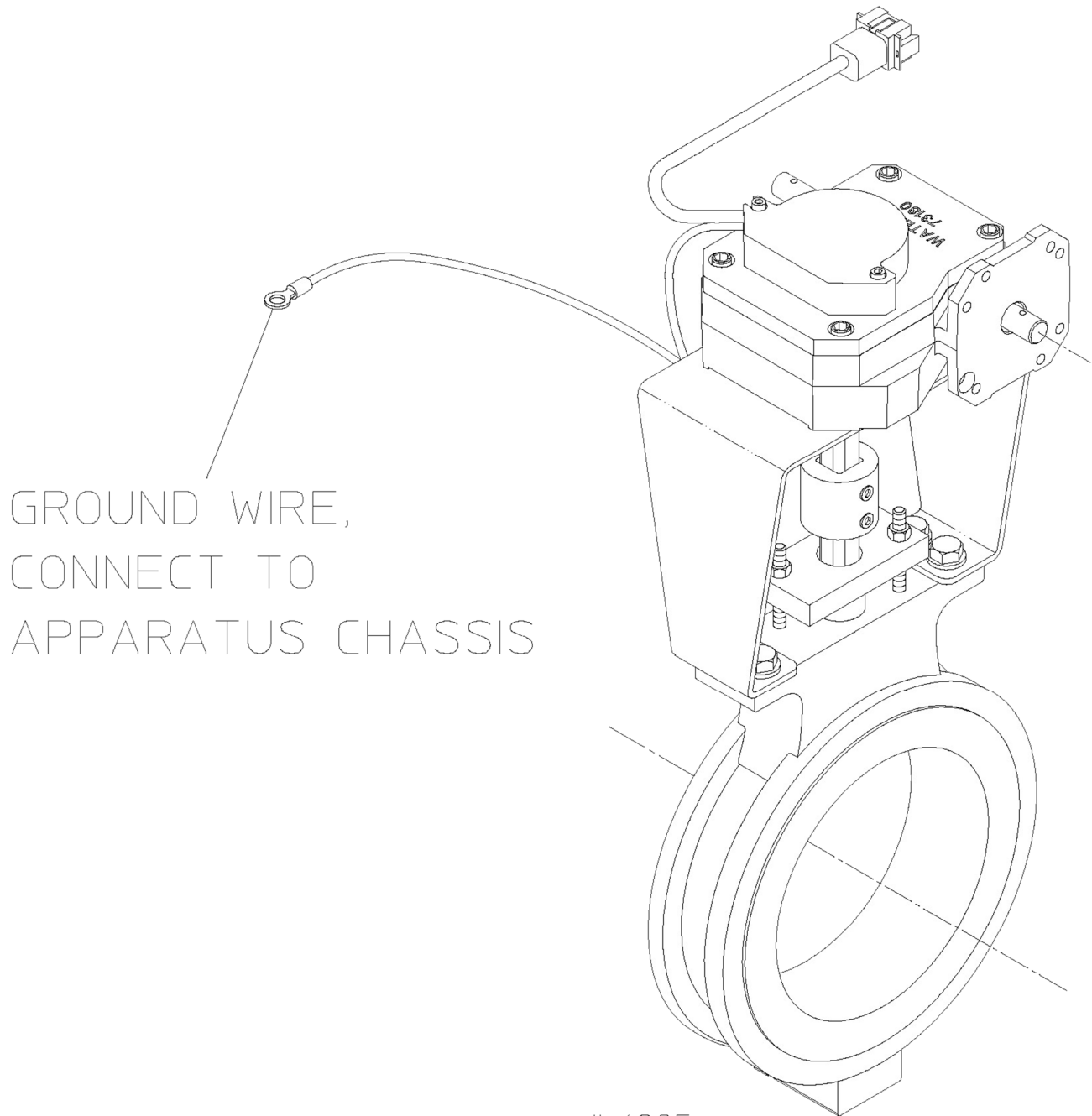
Figure 2. Panel Hole Layout



PANEL HOLE LAYOUT

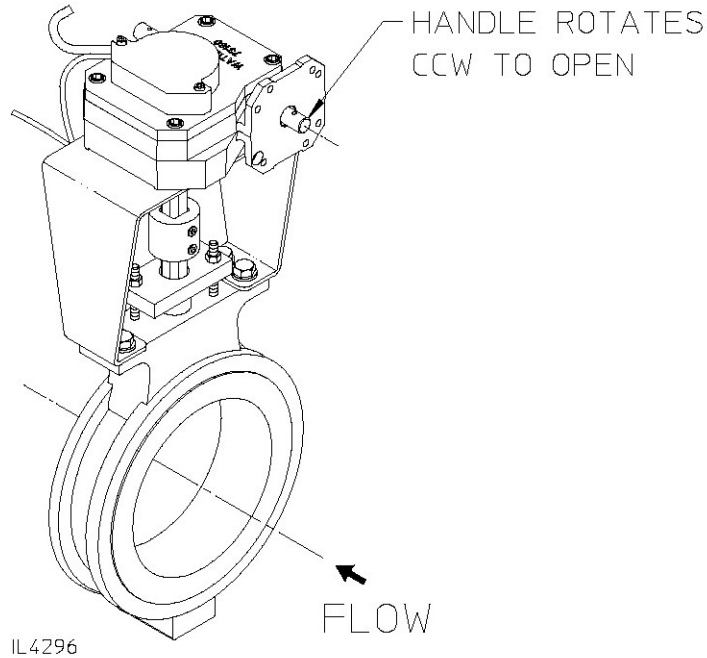
Manual Actuator – Indicating Ground Wire

Connect 18 AWG ground wire (5 foot length furnished) to the apparatus chassis which will ensure a proper ground for the valve rotary encoder.

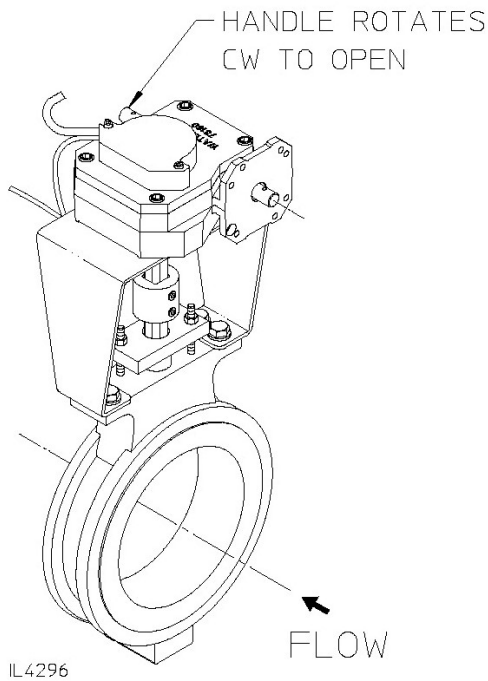


Manual Actuator – Indicating Operation

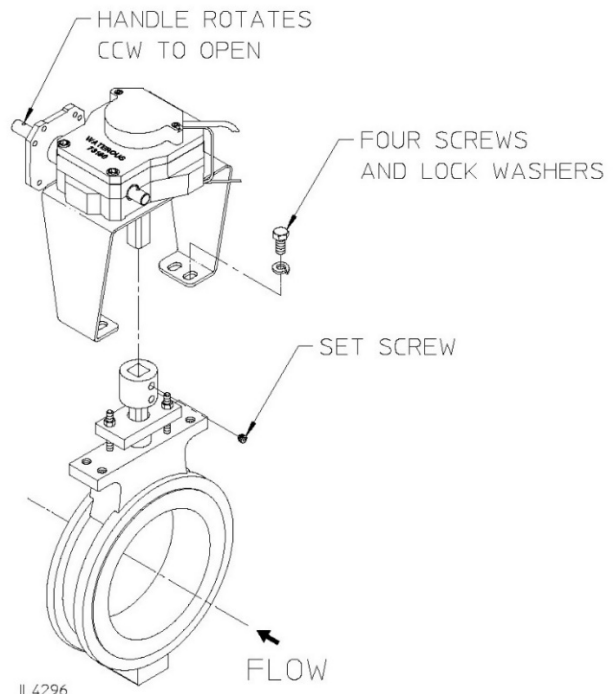
The actuator shaft is positioned at the factory for operation of the valve from the panel where the intake is located, the handle rotates CCW to open.



If the valve is to be operated from the panel on opposite side of the vehicle, the handle can be connected in one of two ways:

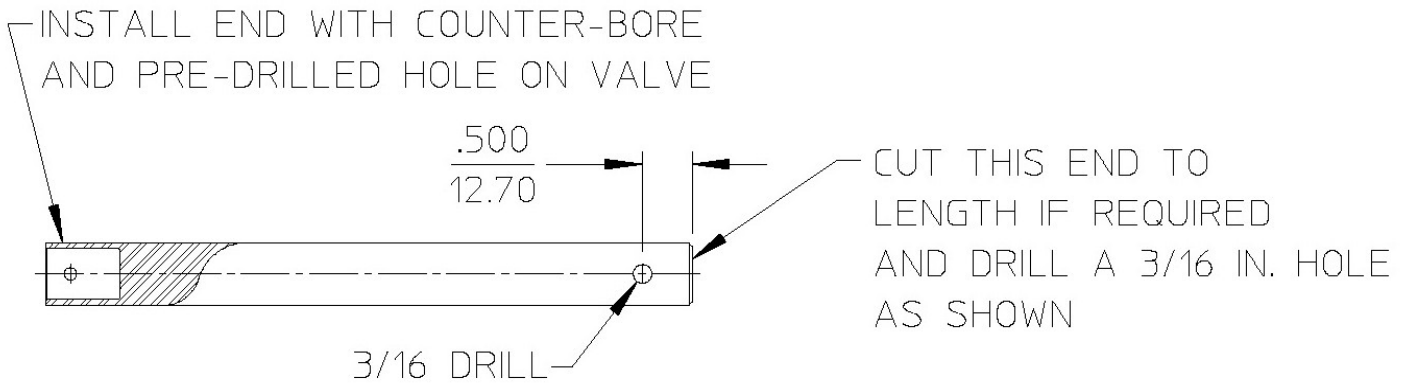
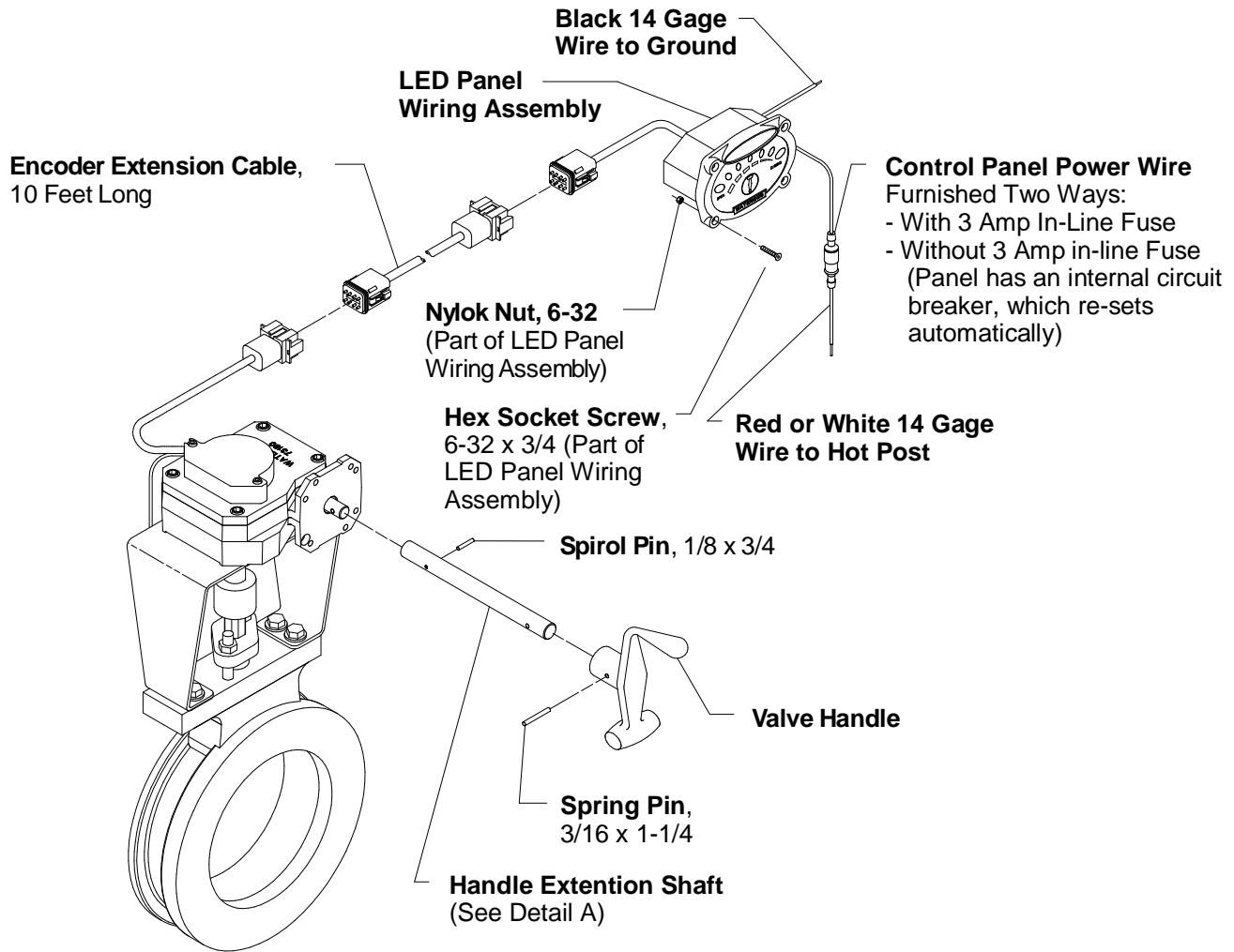


Connect handle to shaft on opposite side of the actuator. The handle will rotate CW to open valves with this modification.



Place the valve in the closed position. Rotate the valve actuator 180° per detail above. The handle will rotate CCW to open valves with this modification.

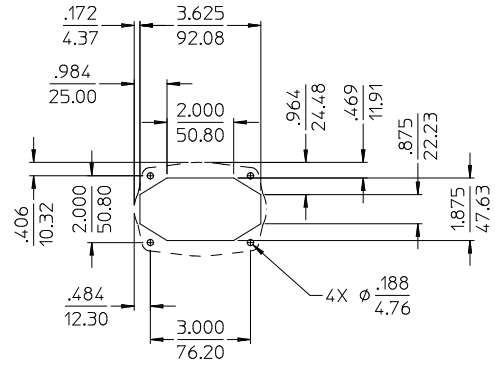
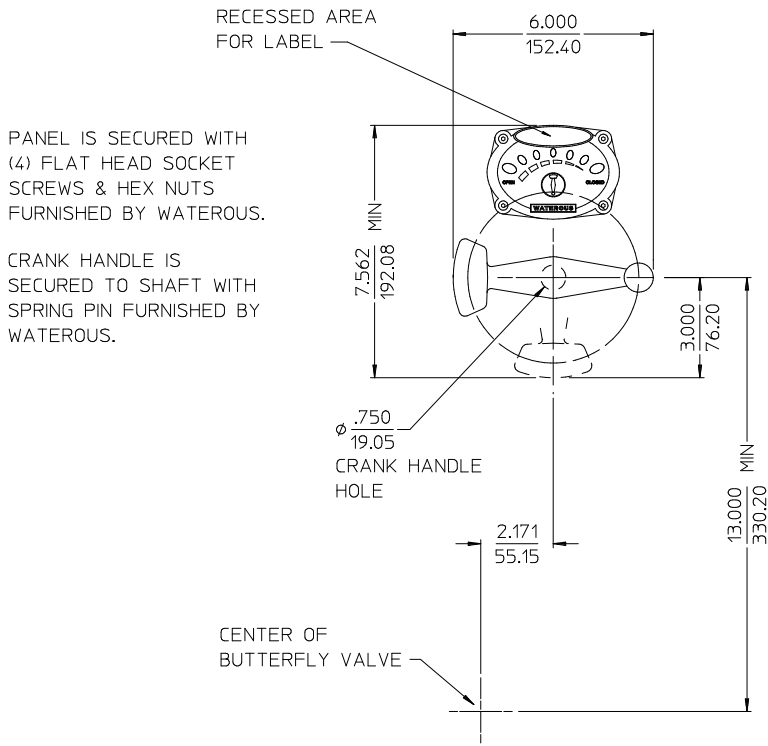
Manual Actuator - Indicating Handle Installation



DETAIL A
HANDLE EXTENSION SHAFT

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Manual Actuator – Indicating Panel Installation



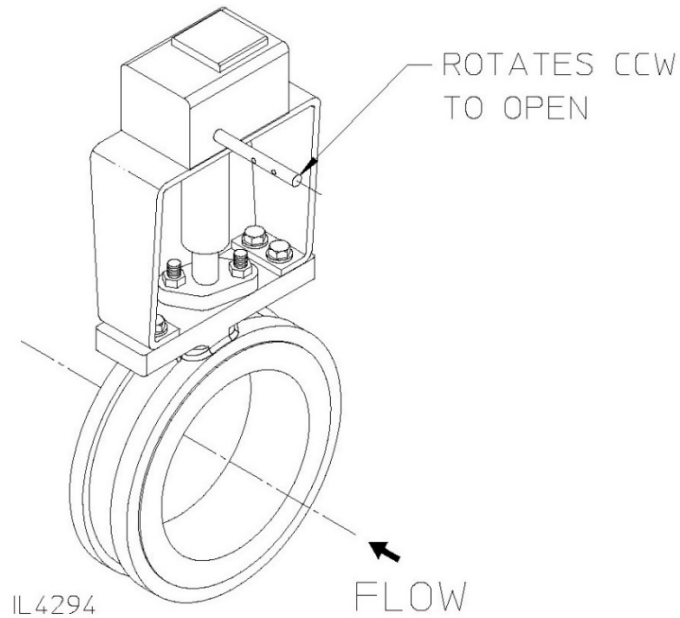
PANEL HOLE LAYOUT

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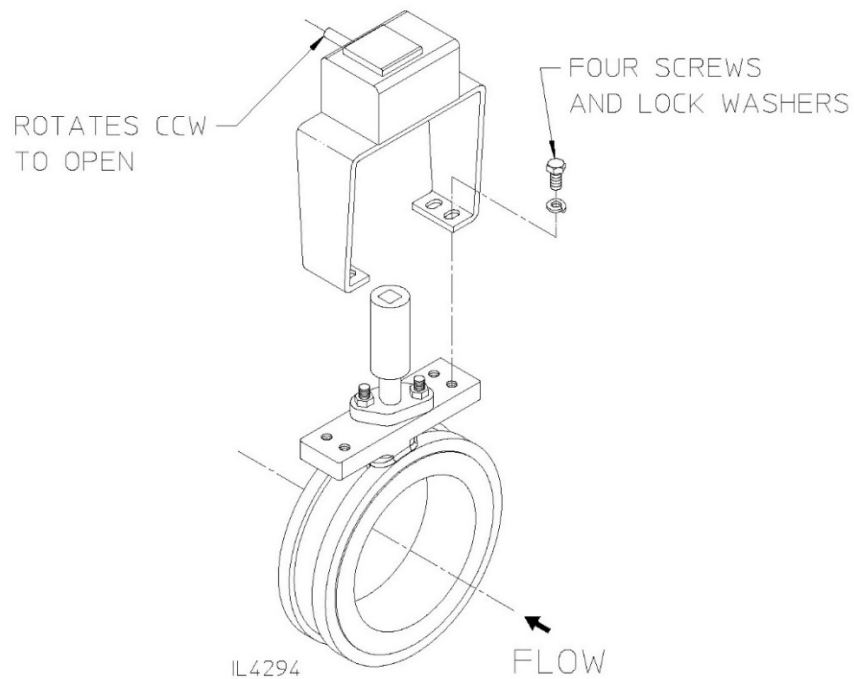
ALL DIMENSIONS SHOWN
AS INCH/MILLIMETER
($\frac{\text{INCH}}{\text{MILLIMETER}}$)

Manual Actuator - Non-Indicating Operation

The valve stem is positioned at the factory for operation of the valve from the panel where the intake is located, the handle rotates CCW to open.

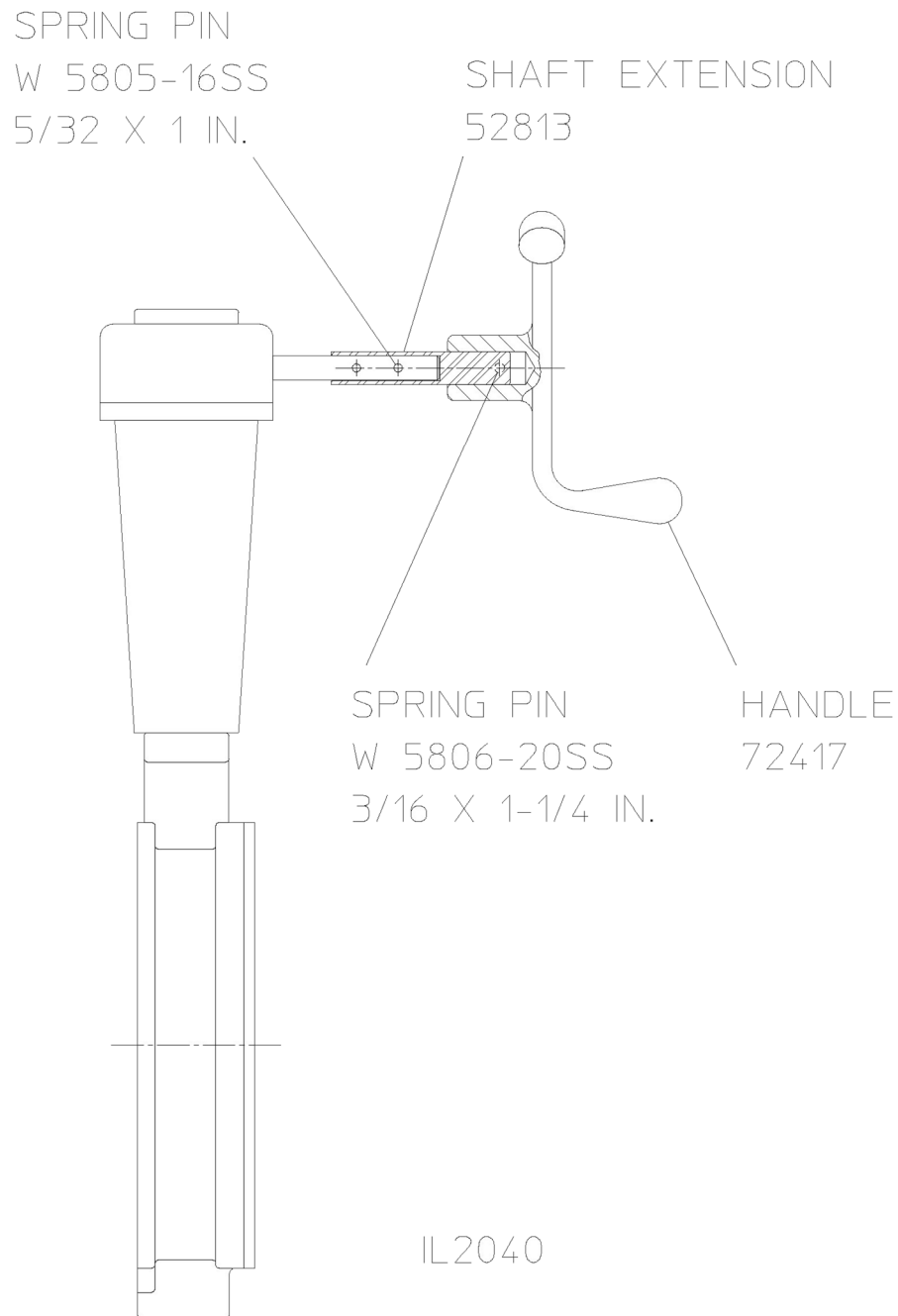


If the valve is to be operated from the panel on the opposite side of the vehicle, rotate the valve actuator 180° per the drawing below. The handle will rotate CCW to open valves with this modification.



Note: Valve must be in the CLOSED position

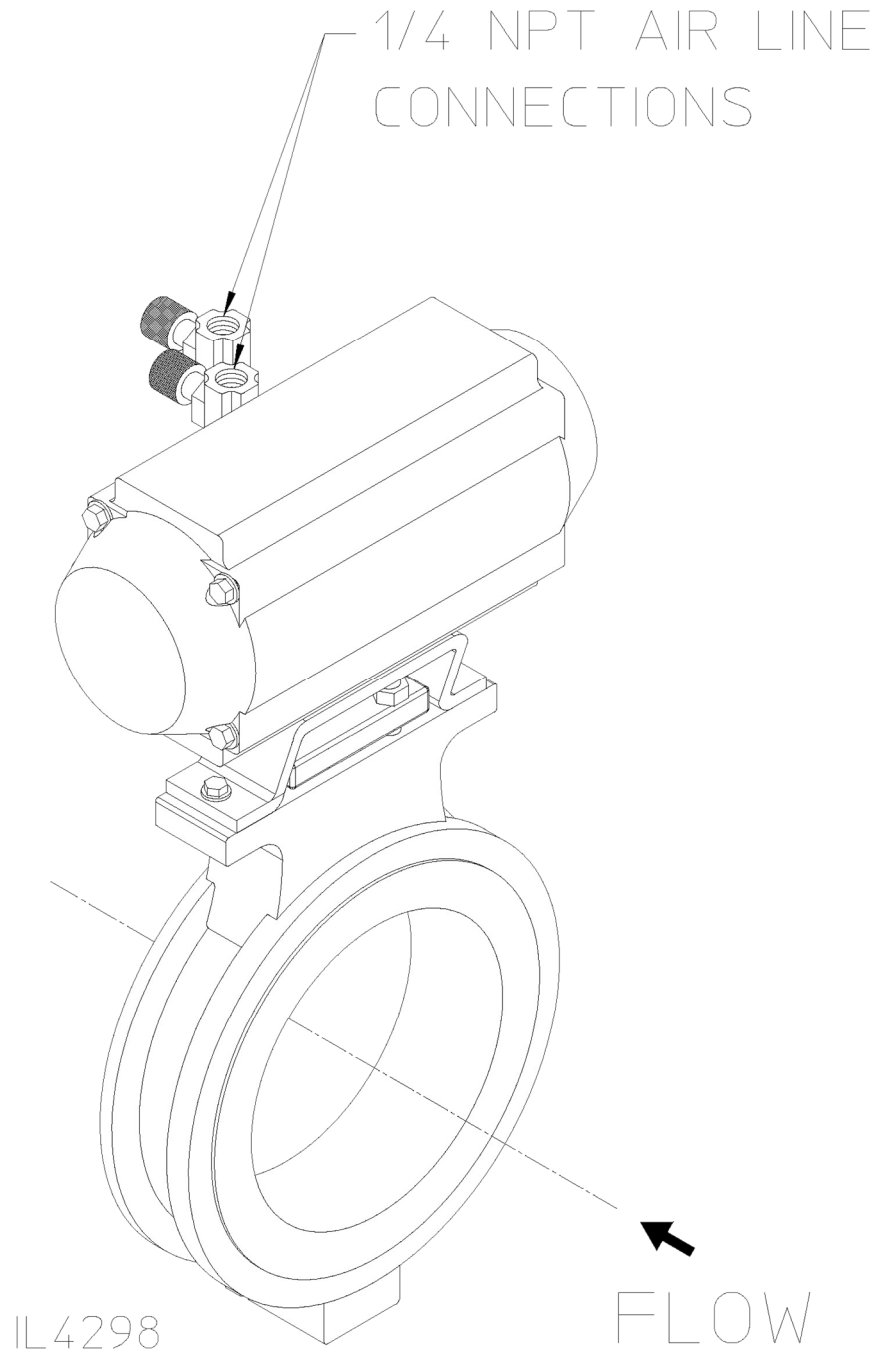
Manual Actuator - Non-Indicating Handle Installation



1. Insert shaft extension (P/N 52813) onto butterfly valve and fasten with 5/32 x 1" long spring pin (P/N W5805-16SS).
2. Drill 0.187" thru opposite end of shaft extension where handle location is preferred and install handle (P/N 72417 with 3/16 x 1-1/4" long spring pin (P/N W5806-20SS).

NOTE: May need to trim shaft extension shaft for desired handle location.

Pneumatic Actuator - Operation



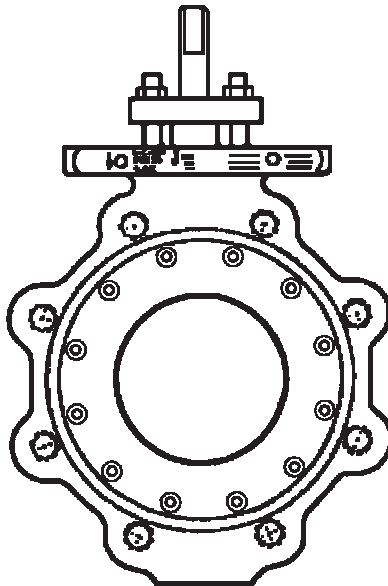
The valve is positioned at the factory with air connections located relative to flow as shown.

TROUBLESHOOTING:

PROBLEM	POSSIBLE CAUSE	SOLUTION
Valve leaking	Scored / Corroded butterfly valve wafer	Clean with emery cloth or replace
Panel LED's all illuminated constantly	Encoder not grounded	Check for ground on encoder assembly
	Defective encoder	Unplug encoder from panel – if LED's turn off, replace encoder
Valve Position LED's NOT illuminated	No power to panel	Check for power supply to panel
	Encoder not grounded	Check for ground on encoder assembly
	Defective encoder	Unplug encoder from panel – if all LED's turn off, replace encoder
	Defective panel	Connect jumper wire from 12V red wire deutsch connector to each other pin of the connector – should light the individual LED's on the panel
Electric Valve doesn't open or close	Defective switch	Check for proper connections
	Motor to switch connection	Check wiring from motor to switch
	Defective motor	Unplug connection at motor and measure motor continuity with an Ohm meter – should be less than 5 Ohms
	No power to panel	Check for power supply to panel
Motor runs constantly	Defective switch / short circuit across switch	Check for circuit across switch – replace in necessary

IMO - 308

Issue Date: 12/02



INSTALLATION, MAINTENANCE,
AND OPERATING INSTRUCTIONS

MODEL C WAFER- SPHERE®

Read entire instructions carefully before installation or servicing

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1 GENERAL

This instruction manual contains important information regarding the installation, maintenance, and operation of Jamesbury Model C *Wafer-Sphere*. Please read the instructions carefully and save them for future reference.

The Jamesbury *Wafer-Sphere* Valve is a high performance butterfly valve design. Maximum shutoff pressure rating depends on the materials chosen.

1.1 WARNING

SAFETY FIRST! FOR YOUR SAFETY, ASK THE FOLLOWING QUESTIONS BEFORE REMOVING THE VALVE FROM THE LINE, AND 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 PARTICULAR FLUID IN THE LINE.

3. IS THE LINE DEPRESSURIZED?

DEPRESSURIZE THE LINE AND DRAIN THE SYSTEM FLUID. THE *WAFER-SPHERE* BUTTERFLY'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 A HANDLE OR AN ACTUATOR ON THE VALVE.

4. IS THE VALVE CLOSED?

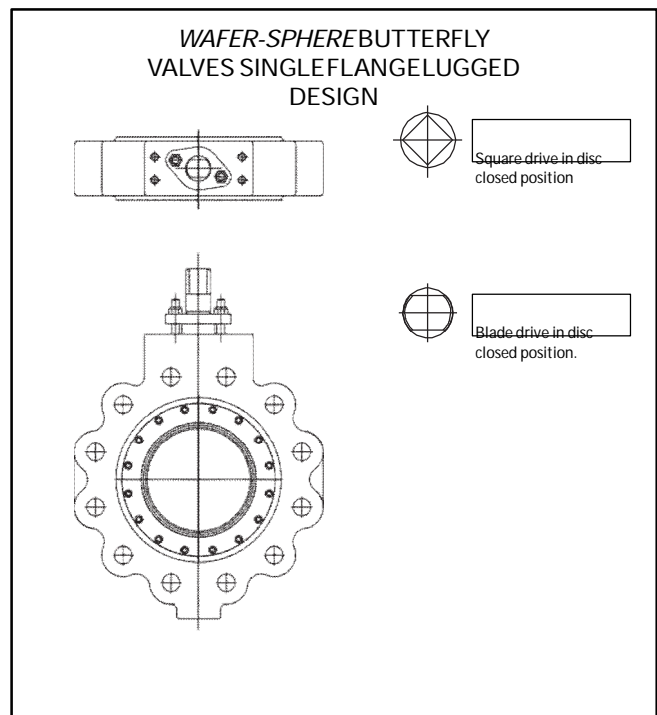
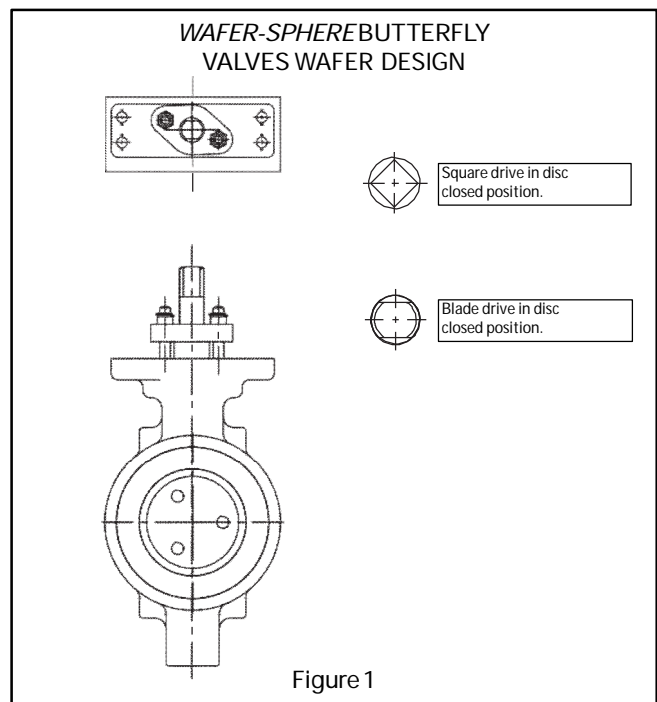
BEFORE YOU INSTALL A *WAFER-SPHERE* VALVE IN, OR REMOVE IT FROM THE LINE, FULLY CLOSE THE VALVE. THE *WAFER-SPHERE* BUTTERFLY VALVE MUST BE REMOVED FROM THE LINE IN THE CLOSED POSITION. THIS WILL PREVENT MECHANICAL DAMAGE TO THE DISC SEALING EDGE. THE BLADE DRIVE FLATS OR LINE ON TOP OF THE SHAFT WILL INDICATE THE POSITION OF THE DISC. (SEE FIGURES 1 AND 2)

1.2 Description

Refer to the tag attached to each valve for this rating. Do not use a valve at service conditions that exceed the rating on the name plate.

Offset Shaft Design

One of the design features of the *Wafer-Sphere* valve that is responsible for its superior performance is the valve's offset shaft design. The shaft is offset in two planes: (1)



Positive Stop Feature

away from the valve disc centerline and (2) behind the disc sealing plane (See Figure 3). 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 Figure 3).

To prevent seat damage from over-travel of the disc beyond the closed position (usually 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 stops in-line. The location of this feature is shown in (Figure 3).

Actuation

High line pressure may create high enough forces to pull a manual handle out of an operator's hand. With Types 815W, 815L, 830W, and 830L valves, either a manual gear

operator, a pneumatic or an electric actuator should be used in place of a detent handle on 2-1/2," 3" and 4" (DN 65, 80 and 100) valves when differential pressure exceeds 300 psi (20.7 bar), on 5", 6" and 8" (DN 125, 150 and 200) valves when differential pressure exceeds 150 psi (10.35 bar), and on 10" and 12" (DN 250 and 300) valves when differential pressure exceeds 50 psi (3.45 bar).

Wafer Body Design

Some wafer designs (See Figure 1) contain flange bolt holes or slots in the body to hold the valve and assist with correct alignment during installation in the line. The centering holes or slots in wafer bodies alone are not suitable, or intended for containing line pressure, and are only for use in conjunction with a fully bolted pipeline flange.

2 INSTALLATION

For lowest torque, *Wafer-sphere* butterfly valves should be installed with the body insert toward the higher pressure, (shaft downstream).

1. Read the WARNING Section on Page 2 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" by itself to limit travel.
3. Visually check the position of the disc when the valve is in the closed position and the insert is fully compressed. The disc should be parallel to the flanges within 1/32 " (.79 mm).
4. Before installing a closed valve in the pipeline, be sure that the handle or actuator is attached so that a counter-clockwise rotation, viewed from above, opens the valve (See Figure 3). Fully close the valve again before installing it in the pipeline.

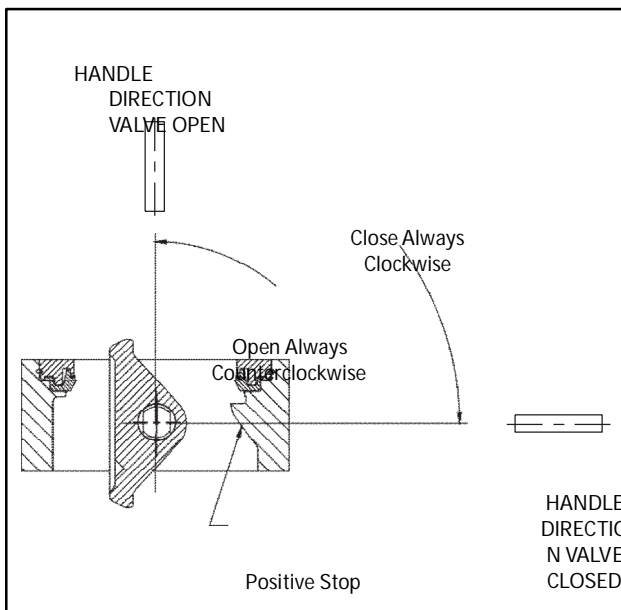


Figure 3

5. **THE PIPELINE:** 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 installation 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.

7. If there is seepage past the shaft seal upon installation, the valve may have been subject to wide temperature variations in shipment. Leak tight performance will be restored by a simple packing adjustment described in the MAINTENANCE Section.

TABLE 1		
Insert Screw Torque Table (lb - ft Unless Otherwise Specified)		
Screw Size	Torque Carbon Steel FT•LBS	Torque Stainless Steel FT•LBS
#10	50 IN•LBS (6)	23 IN•LBS (3)
1/4"	14 (19)	6 (8)
5/16"	30 (41)	11 (15)
3/8"	50 (68)	20 (27)
7/16"	80 (109)	30 (41)
1/2"	120 (163)	40 (55)

TABLE 2	
Cover Plate Screw Torque Table	
Screw size	Torque - FT•LBS (N•m)
3/8"	35 (48)
1/2"	80 (109)
9/16"	110 (149)
5/8"	180 (244)
3/4"	270 (366)

3 MAINTENANCE

3.1 General

Routine maintenance consists of periodically tightening down the compression plate to compensate for shaft seal wear. The compression plate, however, should not be tightened down too tight, since this will shorten the life of the seals. More extensive maintenance such as seat, seal and bearing replacement is described below.

3.2 Valve Removal

1. Read the WARNING Section on Page 2 carefully.
2. Valve must be fully closed before removing it from the pipeline.
3. CAUTION: Valves equipped with spring-to-open (air-to-close) actuators must be disconnected from the actuators and then closed. Valves must be closed while removing them from the pipeline.

3.3 Seat Replacement Standard Valves

Numbers in () refer to items shown in (Figure 5).

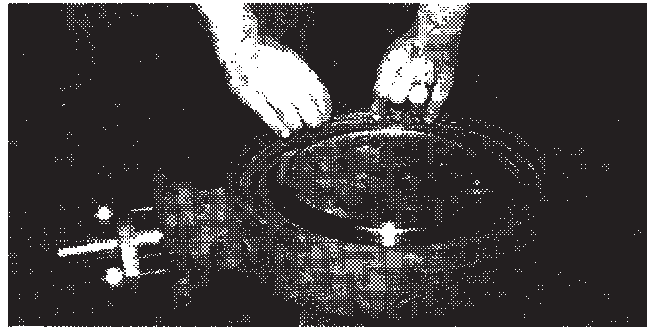
1. After removing the valve from the line, place it on a bench. Take care not to damage the sealing edge of the valve disc.
2. Insert Styles:
 - A. Bolted Insert:

Remove the insert screws (21) and the insert (2). If the insert does not lift out easily, tap it out from the shaft side using a wooden or plastic rod and a hammer. Do not strike the valve directly with a hammer.
 - B. Snap-In Insert (See Figure 4):

Using a wooden or plastic rod and hammer, drive the insert out of the body from the shaft side. The rod should be placed on either side of the positive stop in the body. Do not strike the valve directly with a hammer. (NOTE: Removal of the insert often results in damage to the seat being replaced.)
3. Remove the seat (5) and discard it.
4. Remove the body seal (40) when applicable, (2-1/2", 3" and 4" [DN 65, 80 and 100] Series 815L and 830L valves).
5. Clean the valve, and deburr the insert.
6. Carefully clean and polish the disc sealing surface. It should be free of all grooves and scratches.



Removing Insert



Placing Spring Into Groove



Tapping End Of Spring Into Body



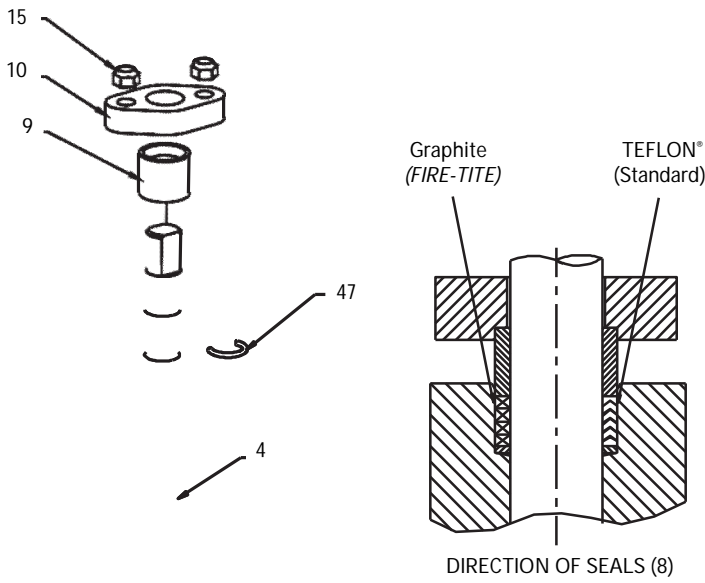
Installing Seat And Insert Assembly Into Body.
Angled As To Engage Insert Spring



Tapping Insert Assembly Into Body

Figure 4

EXPLODED VIEW
Valves Without Cover Plates



PARTS LIST		
ITEM	PART NAME	QTY
1	Body	1
2	Insert	1
3	Disc	1
4	Shaft	1
5+	Seat	1
6	Shaft Bearing	2
7	Spacer	1
	Shaft Seal	1
9	Compression Ring	1
10	Compression Plate	1
13	Disc Pin	2
14	Stud	2
15	Nut	2
17	Nameplate	1
18	Drive Screw	2
21	Cap Screw	**
40*	Body Seal (2.5", 3", 4" [DN 65, 80, 100] 815L & 830L Only)	1
41	Top Bearing Spacer	1
44	Paper Tag	1
47*	Retaining Ring	1
64	Thrust Bearing	2
77*	Insert Spring (3" - 12" [DN 80 - 300] Wafer Style Only)	1

** Cap Screw quantities vary by valve, size and style
* Parts contained in service kit

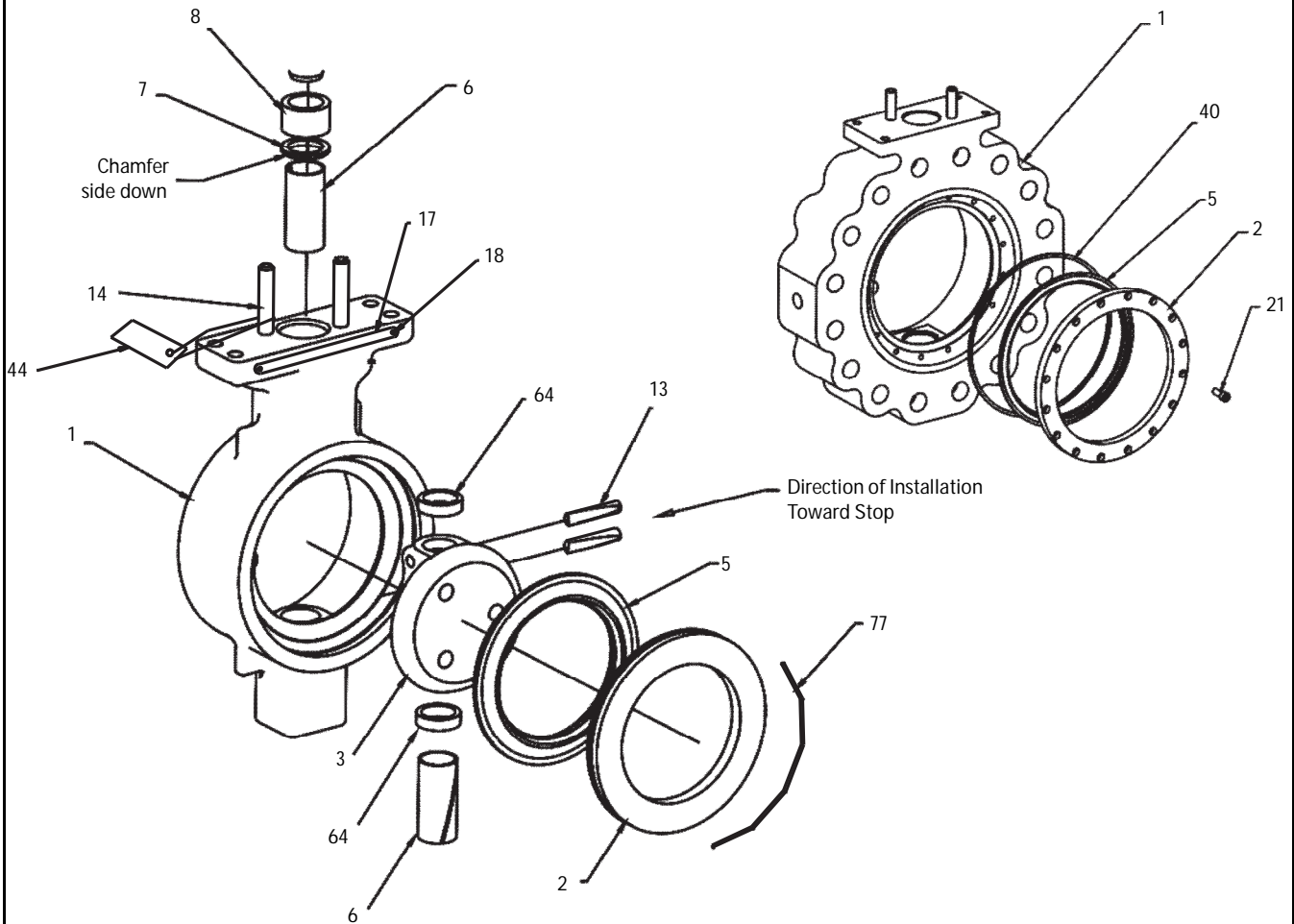
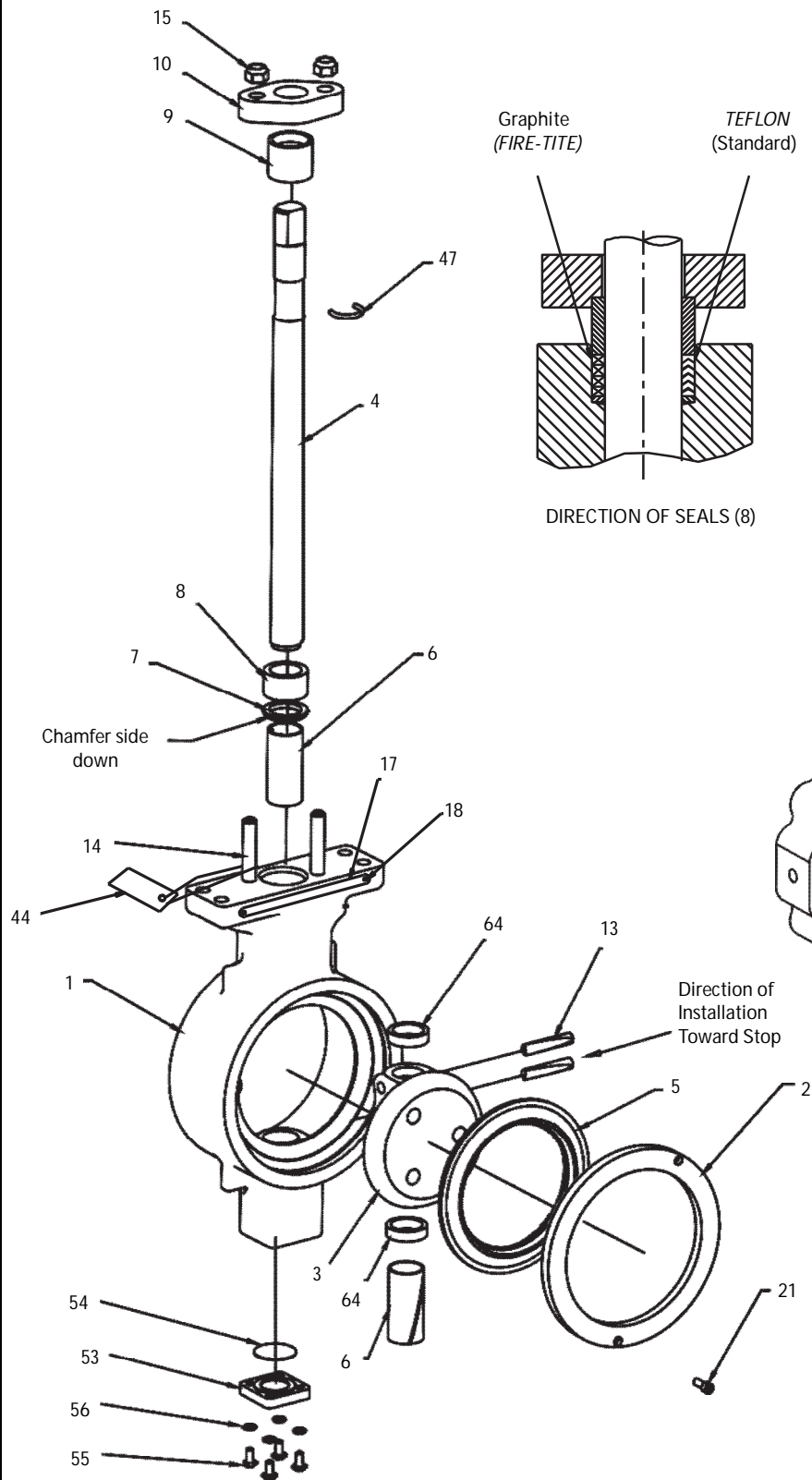


Figure 5

EXPLODED VIEW Valves With Cover Plates



PARTS LIST

ITEM	PART NAME	QTY
1	Body	1
2	Insert	1
3	Disc	1
4	Shaft	1
5	Seat	1
6	Shaft Bearing	2
7	Spacer	1
8	Shaft Seal	1
9	Compression Ring	1
10	Compression Plate	1
13	Disc Pin	#
14	Stud	2
15	Nut	2
17	Nameplate	1
18	Drive Screw	2
21	Cap Screw	**
29	Indicator Pointer (Square Drives Only)	1
41	Top Bearing Spacer	1
44	Paper Tag	1
47	Retaining Ring	1
53	Cover Plate	1
54	Gasket	1
55	Hex Head Cap Screw	#
56	Lockwasher	#
64	Thrust Bearing	2

** Cap Screw quantities vary by valve, size and style

+ Parts contained in service kit

Quantities vary by valve size

Figure 5A

7. If the disc is slightly 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 disc or return the valve to the factory for service.
8. Place the new body seal (40) into the groove in the body (when applicable).
9. Install the seat (5) into the insert (2).
10. Insert Styles:

A. Bolted Insert:

With the valve in the closed position, replace the insert and seat together, using the insert screws. Tighten the screws uniformly. Torque values are given in (Table 1). Open the valve and retorque the insert screws per (Table 1). Take care not to damage the sealing edge of the disc. Close the valve.

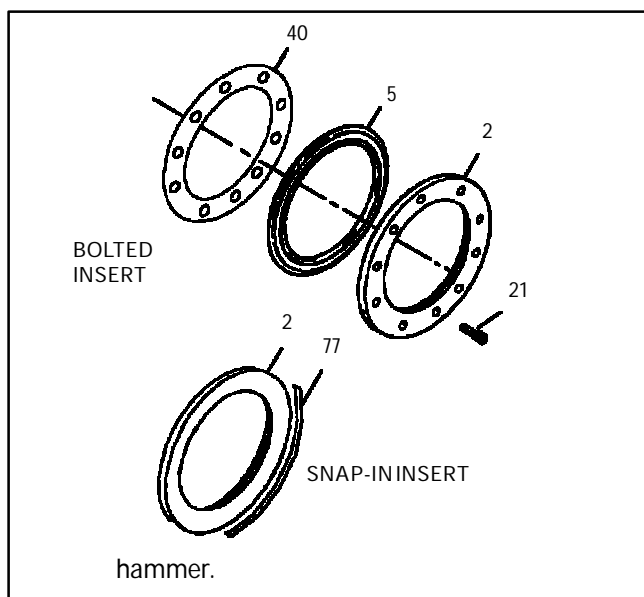
B. Snap-In Insert:

Place the insert spring (77) into the groove in the body, opposite the positive stop (See Figure 5). Lightly tap one end of the spring into the body groove. Be sure the spring is positioned snugly into the groove. Lightly tap the other end of the spring into the groove. Make sure that the ends of the spring are embedded into the body groove to prevent spring movement. With the seat assembled into the insert and the disc slightly open, install the assembly into the body such that it is angled into the body to engage the insert spring. Once the insert spring is engaged, "pop" the opposite side of the insert into the body by lightly tapping the insert with a block of wood and a hammer. Close the valve.

B. Snap-In Insert:

Using a wooden or plastic rod and hammer, drive the insert out of the body from the shaft side. The rod should be placed on either side of the positive stop in the body. Do not strike the valve directly with a hammer. (NOTE: Removal of the insert often results in damage to the seat being replaced.)

3. Remove the seat (5) and discard. Remove the body seal (40) from the insert and body.
4. Carefully clean the gasketing surfaces with a suitable solvent. They should be free of all grooves and scratches. If deep scratches are present, polish or repair is required.
5. Clean the valve and deburr the insert.



11. Set the handle or actuator stops as described in the SETTING HANDLE STOP Section or ACTUATOR MOUNTING INSTRUCTION Section. NOTE: After installation of a new seat, torque will be higher for a few cycles.

3.4 Seat Replacement *FIRE-TITE* Valves

Numbers in () refer to items shown in (Figure 6).

1. After removing the valve from the pipeline, place it on a bench and cycle it open. Take care not to damage the sealing edge of the valve disc.
2. Insert Styles:
 - A. Bolted Insert:

Remove the insert screws (21) and the insert (2). If the insert does not lift out easily, tap it out from the shaft side using a wooden or plastic rod and a hammer. Do not strike the valve directly with a

Figure 6

6. Carefully clean and polish the disc. It should be free from all grooves and scratches.
7. If the disc is slightly 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 disc or return the valve to the factory for service.
8. Cycle the valve closed.
9. A body seal (40) is required between the seat tail and body as shown in (Figure 7). The valve uses a graphite type gasket. This is installed in accordance with the following steps:
 - a. IMPORTANT: Exercise care at all times not to damage the gasket. A break may cause the gasket to leak.
 - b. The bottom surface of the insert is to be free of all foreign particles. Clean thoroughly with suitable solvent.
 - c. Apply the gasket to the body, and if a lug style, take care to align the holes in the gasket with the insert screw holes.

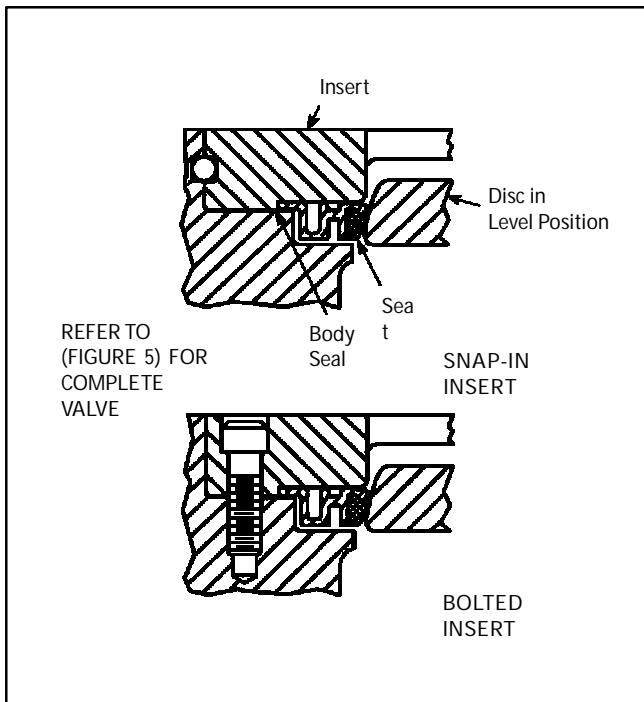


Figure 7

CAUTION: Read the WARNING Section (Page 2) before continuing.

1. Remove the handle or actuator coupling.
2. Remove the nuts (15) from above the compression plate (10). Remove the compression plate (10). The studs (14) do not have to be removed.
3. Remove C-shaped retainer ring (47) from the shaft.
4. Remove the compression ring (9).
5. Remove the old shaft seal (8) segments. Do not score the shaft or body bore!
6. The spacer (7) need not be removed for shaft seal replacement.

See IMO-317 for live loaded shaft seals.

10. Verify that the disc is in the level position. Install new seat and insert. (See Figure 6 & 7.) For bolted inserts, install the insert screws, and tighten them uniformly. Torque values are given in (Table 1). Whenever possible, open the valve and retorquing the insert screws per (Table 1). Take care not to damage the sealing edge of the disc. Close the valve. For snap-in inserts, place the retaining spring into the groove in the body, opposite the positive stop. (See Figure 4.) The tips of the spring should be toward the insert side of the valve. Lightly tap one end of the spring into the body groove. Be sure the spring is positioned snugly into the groove. Lightly tap the other end of the spring into the groove. Make sure the tips of the spring are embedded into the body groove to prevent spring movement. With the seat assembled into the insert, and the disc slightly open, install the assembly into the body, such that it is angled into the body to engage the retaining spring. Once the retaining spring is engaged, "pop" the opposite side of the insert into the body by lightly tapping the insert with a block of wood and a hammer.
11. Set the actuator stops as described in the ACTUATOR MOUNTING INSTRUCTIONS Section. Do not install and tighten flanges on a newly reseated valve until the actuator stops are properly set and the valve is fully closed. Incorrect disc positioning may cause damage to a new seat when the valve is compressed between flanges for the first time. **NOTE:** After installation of a new seat, torque will be higher for a few cycles.

3.5 Shaft Seal Replacement

Numbers in () refer to items shown in (Figure 5).

7. Replace the old shaft seal with a new shaft seal.
NOTE: If the seal is of the PTFE V-ring type, keep the seal rings stacked in the same order as removed from kit. Note the orientation in (Figure 5). This orientation is preferred for all applications, including vacuum.
8. Reinstall the compression ring (9), the retainer ring (47), the compression plate (10), the nuts (15).

*If the compression ring initially sits too high to install the retainer ring it may be necessary to precompress the shaft seals somewhat. In that case, install the compression plate and tighten the nuts enough to accomplish the precompression. Remove the compression plate to install the retainer ring and then complete the reassembly.

9. Close the valve.
10. With the valve closed, tighten the nuts (15) on the compression plate evenly until the packing is adequately compressed to prevent leakage. This should require tightening the nuts approximately 1-1/2 to 2 full turns after they have both come into contact with the compression plate.

3.6 Valve Disassembly

Numbers in () refer to items shown in (Figure 5 & 5A).

NOTE: If complete disassembly becomes necessary, replacement of seats and all seals is recommended.

1. Place the valve on a bench or other suitable working space.
2. If the seat is to be replaced or removed, follow Steps 2, 3, 4 and 5 in the SEAT REPLACEMENT Section.
NOTE: It is good practice to replace the seat, shaft and body seals and bearings any time a valve is disassembled.

3. Remove the shaft seal compression hardware as detailed in Steps 1-4 in the SHAFT SEAL REPLACEMENT Section. The seal material itself can be more easily removed after the shaft has been removed from the valve.
4. Remove the disc pin welds by grinding or machining off the welds. Drive out the pins opposite the installation direction shown in (Figure 5).
5. Remove screws (55) and cover plate (53), and remove gasket (54).
6. Remove the shaft (4). **NOTE:** When removing the shaft and freeing the disc, be careful not to scratch the sealing surface of the disc.
7. Remove the disc (3) and upper and lower thrust bearings (64).
8. Remove the top bearing (6) either through the top of the valve or the waterway.
9. Remove the bottom bearing (6).
8. Insert the disc pins (13), as shown in (Figure 5), and drive them into place. The pins must be driven so that both pins are the same depth within 1/16" (1.56 mm). When they are correctly installed the drive shaft will be as shown in (Figures 1 and 2). Weld both ends of the pins, small end first, grounding the shaft only (body on blocks of wood). After the disc cools, clean the welds with a wire brush. **CAUTION:** Use care to keep contamination out of the valve.
9. Install the upper bearing spacer (41) when applicable, the spacer (7) with chamfered side toward disc, the shaft seal (8), the compression ring (9) and the retainer ring (47). If the shaft seal is of the PTFE V-ring type, be certain that it is installed in the orientation shown in (Figure 5).
10. If the studs (14) have been removed from the valve, reinstall them in the holes shown in (Figure 5), using Loctite® or other locking compound to prevent vibration loosening. Stud protrusion should be 2" (50.8 mm) for the 3", 4", 6" and 8" (DN 80, 100, 150 and 200) valves and 2-1/4" (57.15 mm) for the 10" and 12" (DN 250 and 300) valves.

3.7 Valve Assembly

Numbers in () refer to items shown in (Figure 5).

1. Clean all valve components.
2. Inspect all components for damage before assembling the valve. Look for damage to the sealing areas on the disc, shaft, and body, and for wear in the bearing areas.
3. Carefully clean and polish the disc sealing surface. It should be free from all grooves and scratches.
4. If the disc is slightly 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.
5. Install the bearings (6) into the body bores.
6. To ease assembly of the shaft into the disc, it may be necessary to coat the shaft and the disc bore lightly with a lubricant compatible with the media to be handled by the valve.
7. Slide the shaft through the top bearing and engage the top thrust bearing (64). With the two pin holes toward the bonnet, place the disc in the waterway and slide the shaft through the shaft bore in the disc. Place the lower thrust bearing (64) below the disc, slide the shaft through and into the lower shaft bearing (6). Use caution to prevent damage to the shaft bearings and disc sealing surface.
11. Install new gasket (54), and secure cover plate to valve body using screws (55). To ensure even gasket loading tighten screws, in an alternating sequence to torque in (Table 2).
12. If the handle ratchet plate has been removed from the valve, reinstall it in the orientation shown in (Figure 6). Install lock washers and screws in the two bonnet holes. Do not tighten the screws until the stops are set. (See SETTING HANDLE STOP Section or ACTUATOR MOUNTING INSTRUCTIONS Section.)
13. Place the compression plate (10) over the shaft (4) and studs (14). Install the nuts (15), but do not tighten.
14. Cycle the valve fully closed. Install new unused seat and body seal. See the SEAT REPLACEMENT Section for details.
15. With the valve still closed, tighten the nuts (15) on the compression plate evenly until the shaft seals are adequately compressed to prevent leakage. This should require tightening the nuts approximately 1-1/2 to 2 full turns after they have both come into contact with the compression plate.
16. Set the handle or actuator stops as described in the SETTING HANDLE STOP Section or ACTUATOR MOUNTING INSTRUCTIONS Section. Tighten the screws holding the ratchet plate.

4 VALVE TESTING PROCEDURE

Should it become necessary to perform a leak test of the valve prior to its installation in the pipeline, follow the procedure outlined below.

1. In the following test, suitable gaskets are required between the faces of the valve and the test hardware.
 2. Before pressurizing the valve be sure all actuator linkage fasteners are tight, and that the power or pressure is applied to the actuator to maintain the valve in the closed position. The offset design on the valve may cause it to rotate when the test pressure is applied to one side of the disc.
 3. The valve should be installed between flanges or in a testing apparatus. If flanges are used, refer to INSTALLATION Section, part 6. If a testing device other than flanges is used, the clamping force of the device must be comparable with flange bolt loads on the valve.
 4. Slightly open the valve. Verify that you do not have a seal between the seat and the disc. Exercise caution when cycling a valve in the test apparatus to avoid possible disc damage from the disc striking the test fixture.
 5. Cap the downstream vent and apply 100 psi (6.9 bar) to the valve. Check the shaft seals, and flange gaskets for leakage. This can be done by applying a liquid mixture of soap and water at all seal joints and watching for bubbles.
- IMPORTANT:** If leakage is detected between the valve and flanges STOP IMMEDIATELY. Mark the area of leakage. Vent the valve, and when it has returned to 0 psi (0 bar), retighten the flange bolts in the area. Repressurize the valve checking the gasket again. If leakage persists, disassemble and inspect for damage.
6. If leakage is detected at the shaft seals, tighten the bonnet nuts only enough to stop the leak.
 7. Vent the valve, and when it has returned to 0 psi (0 bar), cycle the valve closed.
 8. Attach a small tube or hose to the downstream flange (shaft side of the valve).
 9. Be sure power/pressure is still applied to the actuator. Pressurize the upstream flange (insert side of valve) to 100 psi (6.9 bar). Check for leakage passing through the free end of the tube/hose.
 10. If leakage is detected, vent the valve and make an actuator close-stop adjustment as described in the appropriate Jamesbury actuator IMO, listed on Page 11.

11. Repressurize the valve and check the leakage. If valve still leaks, repeat step 10. If leakage cannot be stopped, adjust the actuator stop so that leakage is minimized.
12. Rebuilt valves may have some minor leakage due to damage to the disc. With the valve still pressurized, insert the free end of the tube/hose into a beaker of water and check for bubbles. In the absence of other test standards, observe leakage after it has reached a stable condition. Because of the volume of air that must be exhausted from a cycled valve, it may be necessary to wait several minutes for the leakage to stabilize or stop. One bubble per inch (25.4 mm) of valve diameter per minute may be considered acceptable for rebuilt soft seated or *Fire-Tite* valves.

5 MANUAL HANDLES

5.1 Handle adjustment

1. Depressurize the line.
2. 2-1/2" thru 6" (DN 65 thru 150) Valves - To ensure proper handle/shaft engagement, the handle must be mounted on the shaft such that it rests on the bottom of the shaft blade. (See Figure 8.)

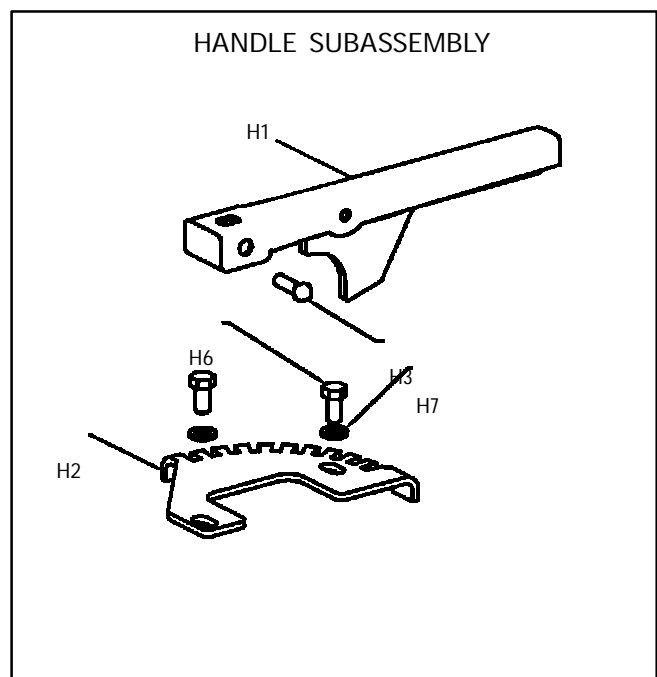
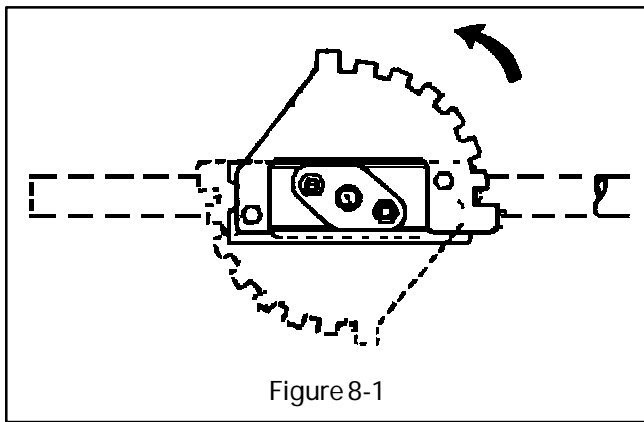


Figure 8

3. 8", 10" and 12" (DN 200, 250, and 300) Valves - Handles for these valves are of solid cast construction. Adjusting these handles along the blade to assure proper ratchet plate engagement is permitted.

NOTE: Handles not available on square drives.



5.2 Change of Handle Quadrant

If it is necessary to remount the handle 180 degrees from its standard direction (Figure 8-1).

1. Depressurize the line. Remove the handle, hex head cap screws (H6) and lockwashers (H7). Do not remove the studs (14), nuts (15), or compression plate (10).
2. Lift the ratchet plate up and rotate it 180 degrees. Do not turn it upside down.
3. Reinstall all the components which were just removed. Do not tighten the ratchet plate fasteners until the plate has been properly adjusted as described below in the SETTING HANDLE STOP Section. If the valve is not installed in the line, do not install it until the ratchet plate is properly adjusted.

5.3 Setting Handle Stop

1. It is recommended that the valve be out of the pipeline for proper adjustment. If this is not possible, valve must be depressurized before adjustment is made.
2. Loosen the two hex head cap screws (H6) clamping the ratchet plate to the valve.
3. Close the valve until the disc is parallel with the flange faces within 1/32" (.79 mm). Do not over close the valve, so that the disc is in contact with the positive stop in the body.
4. If the handle (H1 in Figure 8-1) has been removed from the valve, reinstall it on the shaft drive blade and tighten. Cast handles use a screw (H3) and nut (H5). Fabricated handles use only a set screw (H3). With the handle locking tab in the last (closed) notch of the ratchet plate, rotate the ratchet plate clockwise (when viewed from above the handle) until it is stopped by the locking tab. The disc/handle assembly is now trapped between the disc stop in the body and the ratchet plate.
5. Tighten the two screws (H6) holding the ratchet plate.

TABLE 4

Actuator	IMO
QUADRA-POWR	IMO-31, 32
ST-50	IMO-22
ST-60, 90, 115, 175MS	IMO-23
ST-200/400	IMO-26
ST-600/1200	IMO-24, 38
ST-160, 240, 290, 440MS	IMO-27, 39
ST-1800	IMO-506
Manual Gears	IMO-63
SP	IMO-512
BC, B1C	5 BC 70-A
BJ, B1J	5 BJ 70-A
EU Series	IMO-515
ER Series	IMO-516

6 ACTUATOR MOUNTING

6.1 WARNING

BEFORE INSTALLING THE VALVE AND ACTUATOR, BE SURE THAT THE INDICATOR POINTER ON TOP OF THE ACTUATOR IS CORRECTLY INDICATING THE VALVE POSITION. FAILURE TO ASSEMBLE THESE PRODUCTS TO INDICATE CORRECT VALVE POSITION COULD RESULT IN PERSONAL INJURY.

CAUTION: WHEN INSTALLING A LINKAGE OR SERVICING A VALVE/ACTUATOR ASSEMBLY, THE BEST PRACTICE IS TO REMOVE THE ENTIRE ASSEMBLY FROM SERVICE.

CAUTION: AN ACTUATOR SHOULD BE REMOUNTED ON THE VALVE FROM WHICH IT WAS REMOVED. THE ACTUATOR MUST BE READJUSTED FOR PROPER OPEN AND CLOSE POSITION EACH TIME IT IS REMOUNTED.

CAUTION: THE LINKAGE HAS BEEN DESIGNED TO SUPPORT THE WEIGHT OF THE Jamesbury ACTUATORS AND RECOMMENDED ACCESSORIES. USE OF THIS LINKAGE TO SUPPORT ADDITIONAL EQUIPMENT SUCH AS PEOPLE, LADDERS, ETC. MAY RESULT IN THE FAILURE OF THE LINKAGE, VALVE OR ACTUATOR AND MAY CAUSE PERSONAL INJURY.

WARNING: WHEN MOUNTING THE ACTUATOR MAKE SURE THAT THE VALVE AND ACTUATOR ARE BOTH IN THE SAME POSITION. MOUNTING AN OPEN ACTUATOR TO A CLOSED VALVE MAY RESULT IN VALVE STEM DAMAGE.

NOTE: WHEN A SINGLE-ACTING STMS PNEUMATIC SPRING-RETURN ACTUATOR IS MOUNTED TO A WAFER-SPHERE VALVE, IT CAN BE MOUNTED ONLY IN THE SPRING-TO-CLOSE MODE (AIR-TO-OPEN).

6.2 Actuator Mounting Instructions

1. When a spring-return actuator is being mounted, the valve should be in the closed position for spring-to-close operation or in the open position for the spring-to-open operation. When an electric or double-acting pneumatic actuator is being mounted, the valve position should correspond to the indicated actuator position.

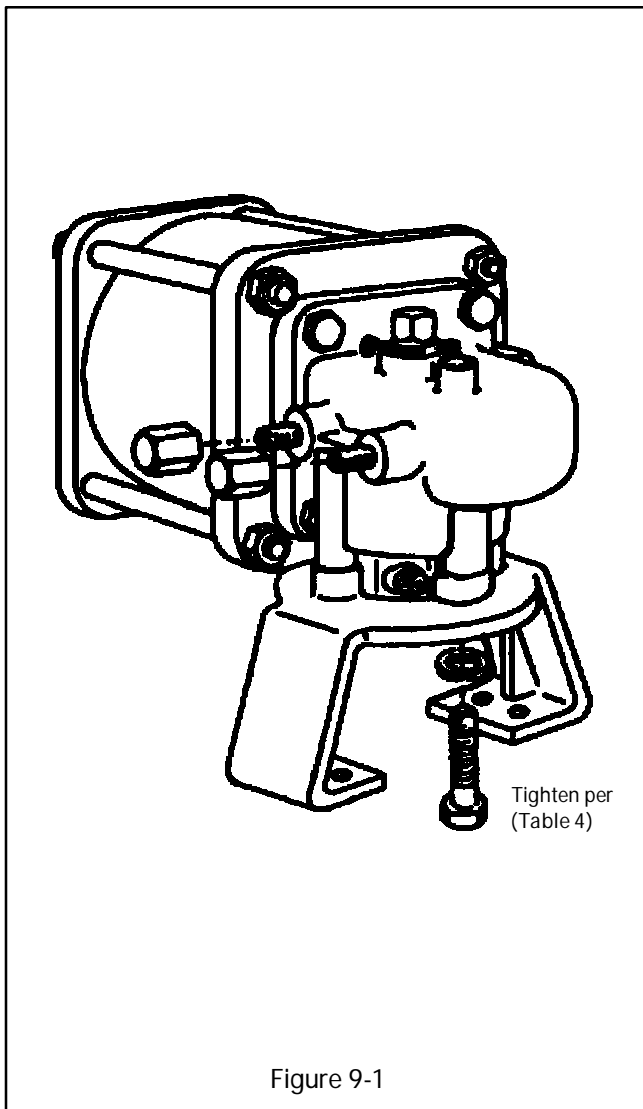


Figure 9-1

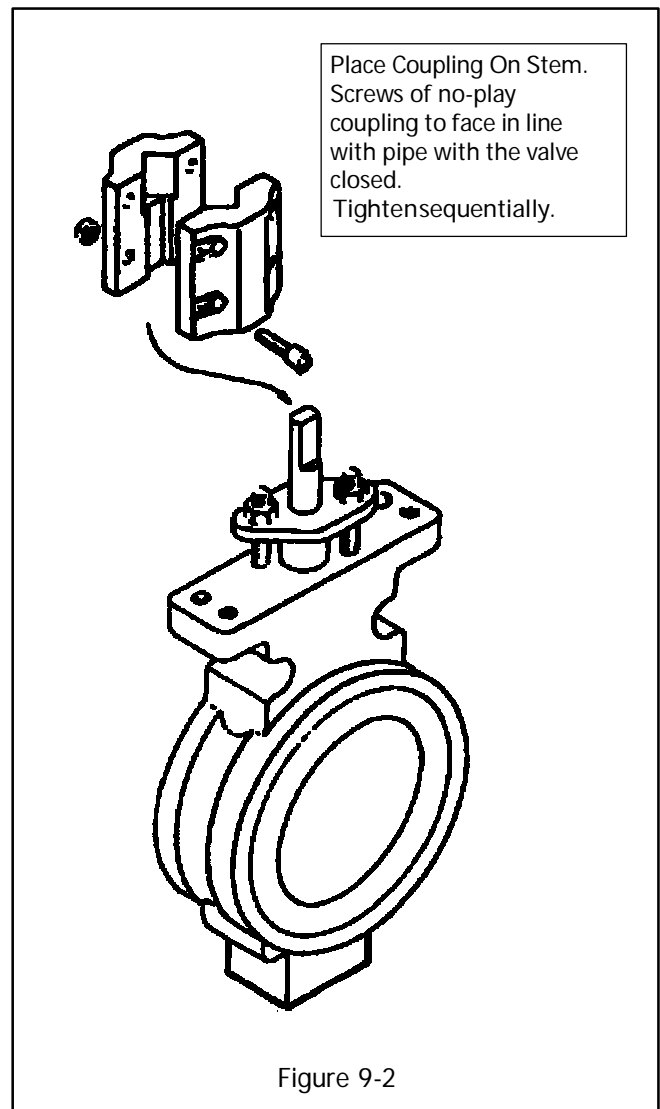


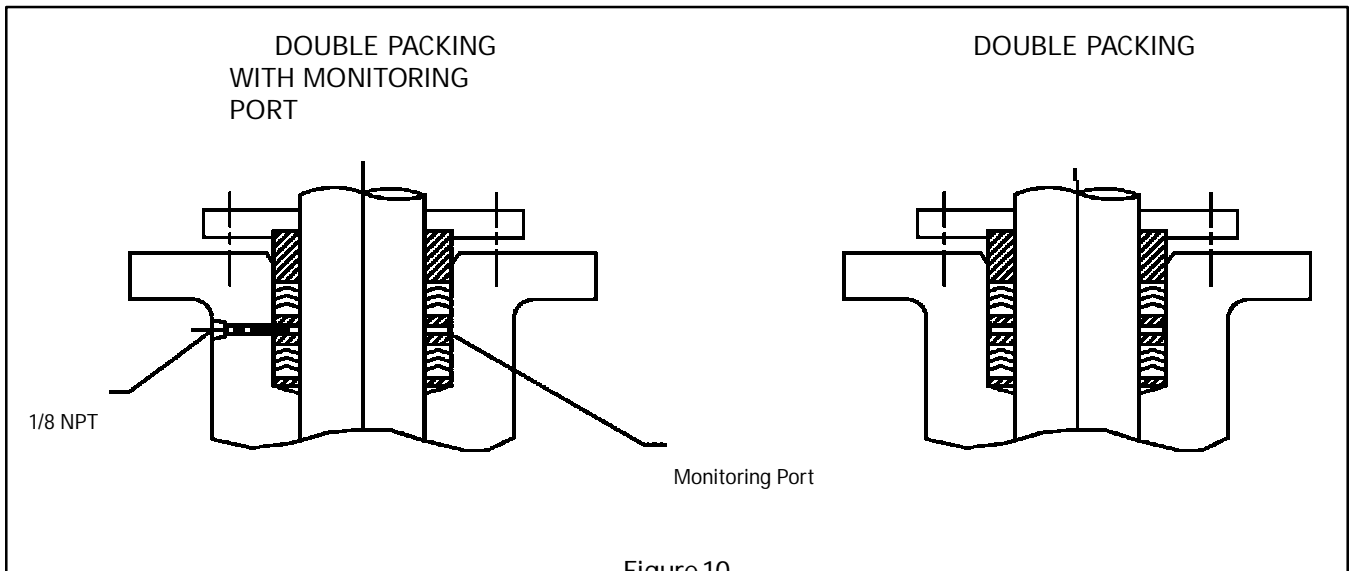
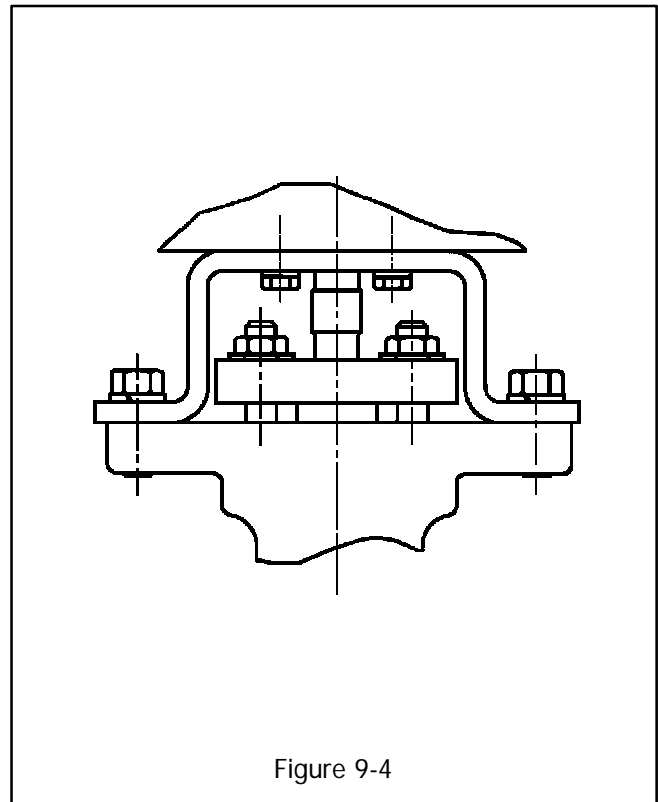
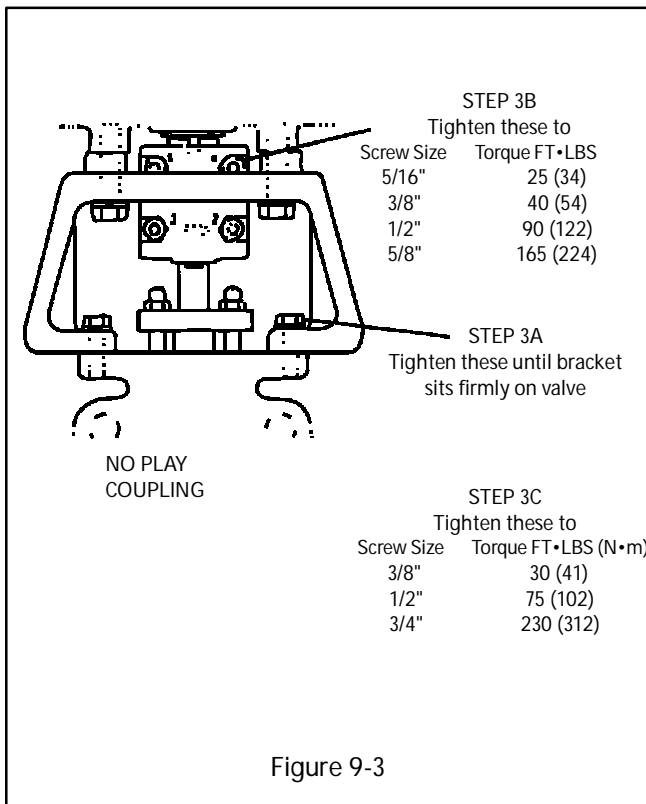
Figure 9-2

2. Assemble bracket to actuator as shown in (Figure 9-1). Tighten to torque listed in (Table 4).
3. Place the coupling onto the valve stem. If the valve has a two-piece "no-play" bolted coupling, assemble the coupling loosely on the valve stem. Use socket head cap screws and lock nuts. (See Figure 9-2.)
4. Lower actuator and bracket onto valve while engaging actuator stem driver into coupling. Tighten screws just enough to firmly mate bracket to valve. This should allow bracket to shift, allowing the coupling to align the valve and actuator shafts. (See Figure 9-3, Step 3A.)
5. Tighten the no-play coupling screws to torques shown in (Figure 9-3, Step 3B). Use alternating sequence shown.
6. Cycle actuator. See actuator instructions.
7. Fully tighten the screws holding the bracket to the valve, as shown in (Figure 9-3, Step 3C).
8. Recheck no-play coupling screw torques, using the torques in (Figure 9-3, Step 3B). Use alternating sequence shown.
9. Adjust the actuator travel stops as described in the actuator instructions to these proper valve open and closed positions:

Valve Open:	Disc face (or shaft blade) perpendicular with the flange face.
Valve Closed:	Disc face parallel to flange face within 1/32" (.79 mm).

6.3 Direct Drive Mounting

Follow instructions per Paragraph 6.2 except for coupling assembly. (See Figure 9-4.)



7 REPAIR KITS/SPARE PARTS

Service kits include one seat (seat assembly for *Fire-Tite* valves), and a set of shaft seals. When ordering service kits, seat and shaft seal materials must be specified. For example, a kit for a 10" (DN 250) type 815L valve with filled PTFE(M) seat and PTFE(T) seals is ordered as RKW-362MT. Wafer

style valves will also include insert springs. 2-1/2", 3", and 4" (DN 65, 80 and 100) lug style only will also include body seals.

For further information on spare parts and service or assistance visit our web-site at www.jamesbury.com.

TABLE 4
Bracket Bolting Torques for GR.5 Hex Cap Screws

	Torque to Aluminum Body Actuators		Torque to Cast/Ductile Body Actuators	
Bolt Size	No Lubrication to Screws			
inches	FT•LBS	N•m	FT•LBS	N•m
1/4	6	—	8	—
5/16	12	—	16	—
3/8	20	—	27	—
7/16	30	—	45	—
1/2	50	—	67	—
9/16	70	—	100	—
5/8	90	—	135	—
3/4	160	—	225	—
7/8	250	—	335	—
1	360	—	520	—
1-1/8	520	—	700	—
1-1/4	700	—	990	—
M6	—	6.8	—	9.5
M8	—	14.9	—	19.0
M10	—	30	—	38
M12	—	52	—	65
M16	—	122	—	156
M20	—	230	—	305
M30	—	773	—	1062
M36	—	1288	—	1826

<i>WAFER-SPHERE REPAIR KITS</i>				
MODEL C				
Size	Soft Seat		<i>FIRE-TITE</i>	
	Wafer	Lug	Wafer	Lug
2-1/2" (DN 65) 815 2-1/2" (DN 65) 830	RKW-470 RKW-470	RKW-471 RKW-471	O/A O/A	O/A O/A
3" (DN 80) 815 3" (DN 80) 830	RKW-352 RKW-352	RKW-358 RKW-358	RKW-364 RKW-364	RKW-370 RKW-370
4" (DN 100) 815 4" (DN 100) 830	RKW-353 RKW-353	RKW-359 RKW-359	RKW-365 RKW-365	RKW-371 RKW-371
5" (DN 125) 815	RKW-468	RKW-469	RKW-472	RKW-473
6" (DN 150) 815 6" (DN 150) 830	RKW-354 RKW-405	RKW-360 RKW-409	RKW-366 RKW-413	RKW-372 RKW-417
8" (DN 200) 815 8" (DN 200) 830	RKW-355 RKW-406	RKW-361 RKW-410	RKW-367 RKW-414	RKW-373 RKW-418
10" (DN 250) 815 10" (DN 250) 830	RKW-356 RKW-407	RKW-362 RKW-411	RKW-368 RKW-415	RKW-374 RKW-419
12" (DN 300) 815 12" (DN 300) 830	RKW-357 RKW-408	RKW-363 RKW-412	RKW-369 RKW-416	RKW-375 RKW-420
14" (DN 350) 815 14" (DN 350) 830	RKW-678 RKW-673	RKW-678 RKW-673	RKW-663 RKW-668	RKW-663 RKW-668
16" (DN 400) 815 16" (DN 400) 830	RKW-660 RKW-674	RKW-660 RKW-674	RKW-664 RKW-669	RKW-664 RKW-669
18" (DN 450) 815 18" (DN 450) 830	RKW-661 RKW-675	RKW-661 RKW-675	RKW-665 RKW-670	RKW-665 RKW-670
20" (DN 500) 815 20" (DN 500) 830	RKW-662 RKW-676	RKW-662 RKW-676	RKW-666 RKW-671	RKW-666 RKW-671
24" (DN 600) 815 24" (DN 600) 830	RKW-334 RKW-676	RKW-334 RKW-676	RKW-667 RKW-672	RKW-667 RKW-672

OA = ON APPLICATION

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