

Wafer-Sphere[®], High Performance Butterfly Valves

3"-14" (DN 80-350) Series 815W & 815L

(Model A & B)

3"-12" (DN 80-300) Series 830W, 830L, 860W, 860L,

Model A

Installation, Maintenance and
Operating Instructions

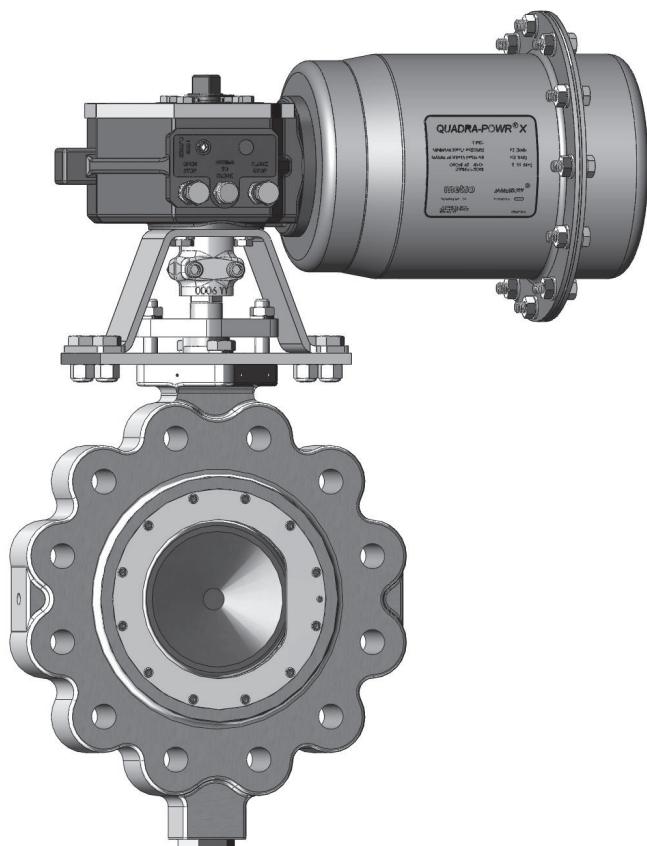


Table of Contents

1. GENERAL.....	3	5. ACTUATOR MOUNTING.....	11
1.1 Scope of the Manual	3	5.1 Change of Actuator Quadrant	11
1.2 Valve Markings	3		
1.3 Safety Precautions.....	3		
1.4 Eccentric Shaft Design	4		
1.5 Positive Stop Feature.....	4		
1.6 Wafer Body Design.....	4		
1.7 Actuation	4		
2. TRANSPORTATION AND STORAGE.....	4	6. CHANGE OF HANDLE QUADRANT	12
3. INSTALLATION.....	4	7. SETTING ADJUSTMENTS.....	12
3.1 General	4	7.1 Setting Stops (Valve in the Line)	12
3.2 Installing in the pipeline	4	7.2 Setting Stops (Valve Out of Line).....	12
3.3 Valve Insulation.....	5	7.3 Setting Handle Stop (Figure 15)	13
3.4 Actuator	5	7.4 Setting Stops on ST and ST-MS Pneumatic Actuators (Figure 16)	13
3.5 Commissioning	5	7.5 Setting Stops on Quadra-Powr® Actuators	14
4. MAINTENANCE.....	7	7.6 Setting Stops on MA Manual Gear Actuator (Figure 17)	14
4.1 General	7	7.7 Setting Stops on Electric Actuators	16
4.2 Actuated Valve.....	7		
4.3 Manual Valve - with Handle	7		
4.4 Seat Replacement Non Fire-Tite® Valves.....	7		
4.5 Seat Replacement Fire-Tite Valves.....	8		
4.6 Shaft Packing Replacement.....	9		
4.7 Valve Disassembly.....	10		
4.8 Valve Assembly.....	10		
4.9 High Cycle Construction (860 only)	11		
4.10 Testing the Valve.....	11		
		8. SERVICE / SPARE PART	16

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.
 Addresses and phone numbers are printed on the back cover.
 See also www.metso.com/valves for the latest documentation.

SAVE THESE INSTRUCTIONS!

Subject to change without notice.
 All trademarks are property of their respective owners.

1. GENERAL

1.1 Scope of the Manual

This instruction manual contains important information regarding the installation, operation and maintenance of Jamesbury® Wafer-Sphere high performance butterfly valves, 3"- 14" (DN 80 - 350) Series 815W and 815L, Model A & B, 3"- 12" (DN 80 - 300) Series 830W, 830L, 860W, 860L, Model A. Please read the instructions carefully and save them for future reference.

WARNING

AS THE USE OF THE VALVE IS APPLICATION SPECIFIC, A NUMBER OF FACTORS SHOULD BE TAKEN INTO ACCOUNT WHEN SELECTING A VALVE FOR A GIVEN APPLICATION. THEREFORE, SOME OF THE SITUATIONS IN WHICH THE VALVES ARE USED ARE OUTSIDE THE SCOPE OF THIS MANUAL.

IF YOU HAVE ANY QUESTIONS CONCERNING THE USE, APPLICATION OR COMPATIBILITY OF THE VALVE WITH THE INTENDED SERVICE, CONTACT METSO FOR MORE INFORMATION.

1.2 Valve Markings

The valve has an identification plate attached to the pipeline flange (see **Figure 1**).

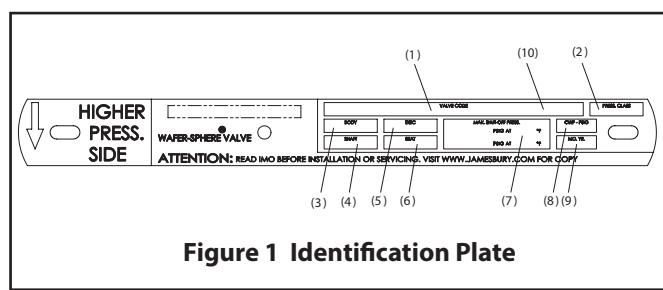


Figure 1 Identification Plate

Identification plate markings:

1. Valve Catalog Code
2. Pressure Class
3. Body Material
4. Shaft Material
5. Disc Material
6. Seat Material
7. Maximum/minimum shut-off pressure/temperature
8. CWP (cold working pressure)
9. Assembly date
10. Valve model

1.3 Safety Precautions

WARNING

DO NOT EXCEED THE VALVE PERFORMANCE LIMITATIONS!

EXCEEDING THE PRESSURE OR TEMPERATURE LIMITATIONS MARKED ON THE VALVE IDENTIFICATION PLATE MAY CAUSE DAMAGE AND LEAD TO UNCONTROLLED PRESSURE RELEASE. DAMAGE OR PERSONAL INJURY MAY RESULT.

WARNING

SEAT AND BODY RATINGS!

THE PRACTICAL AND SAFE USE OF THIS PRODUCT IS DETERMINED BY BOTH THE SEAT AND BODY RATINGS. READ THE IDENTIFICATION PLATE AND CHECK BOTH RATINGS. THIS PRODUCT IS AVAILABLE WITH A VARIETY OF SEAT MATERIALS. SOME OF THE SEAT MATERIALS HAVE PRESSURE RATINGS THAT ARE LESS THAN THE BODY RATINGS. ALL OF THE BODY AND SEAT RATINGS ARE DEPENDENT ON VALVE TYPE AND SIZE, SEAT MATERIAL, AND TEMPERATURE.

DO NOT EXCEED THESE RATINGS!

WARNING

BEWARE OF DISC MOVEMENT!

KEEP HANDS, OTHER PARTS OF THE BODY, TOOLS AND OTHER OBJECTS OUT OF THE OPEN FLOW PORT. LEAVE NO FOREIGN OBJECTS INSIDE THE PIPELINE. WHEN THE VALVE IS ACTUATED, THE DISC FUNCTIONS AS A CUTTING DEVICE. THE DISC MAY ALSO CHANGE POSITIONS AS A RESULT OF MOVING THE VALVE.

WARNING

WHEN HANDLING THE VALVE OR VALVE/ACTUATOR ASSEMBLY, TAKE ITS WEIGHT INTO ACCOUNT!

NEVER LIFT THE VALVE OR VALVE/ACTUATOR ASSEMBLY BY THE ACTUATOR, POSITIONER, LIMIT SWITCH OR THEIR PIPING. FOLLOW THE LIFTING METHODS SHOWN IN **FIGURE 2**. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN DAMAGE OR PERSONAL INJURY FROM FALLING PARTS.

WARNING

BEWARE OF NOISE EMISSIONS!

THE VALVE MAY PRODUCE NOISE IN THE PIPELINE. THE NOISE LEVEL DEPENDS ON THE APPLICATION. OBSERVE THE RELEVANT WORK ENVIRONMENT REGULATIONS ON NOISE EMISSION.

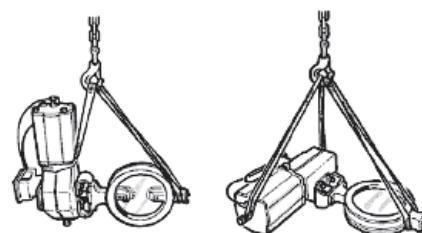


Figure 2 Lifting of the Valve

1.4 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 center line; and (2) behind the disc sealing plane (see **Figure 10**). 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 10**).

1.5 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 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 on the body insert for 3" - 12" (DN 80 - 300) and in the body for 14" (DN 350) (see **Figure 17**).

1.6 Wafer Body Design

Some wafer designs (see **Figures 1, 2, 8**) 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.

WARNING

HIGH LINE PRESSURE MAY CREATE HIGH ENOUGH FORCES TO PULL THE HANDLE OUT OF THE OPERATOR'S HAND.

1.7 Actuation

Types 815W, 815L, 830W and 830L valves, either a manual gear operator, or pneumatic or electric actuator should be used in place of a detent handle on 3" & 4" (DN 80 & 100) valves when differential pressure exceeds 300 psi (20.7 bar), on 6" & 8" (DN 150 & 200) valves when differential pressure exceeds 150 psi (10.4 bar), and on 10" & 12" (DN 250 & 300) valves when differential pressure exceeds 50 psi (3.5 bar). With series 860W and 860L valves in 3" - 6" (DN 80 - 150) sizes, a gear operator or actuator should be used when differential pressure exceeds 150 psi (10.5 bar).

2. TRANSPORTATION AND STORAGE

Check the valve and the accompanying devices for any damage that may have occurred during transport.

Store the valve carefully. Storage indoors in a dry place is recommended.

Do not remove the flow port protectors until installing the valve.

Move the valve to its intended location just before installation.

If the valve(s) will be stored for a long period, follow the recommendation in IMO-S1 to maintain the valves integrity.

3. INSTALLATION

3.1 General

Remove the flow port protectors and check that the valve is clean inside. Clean valve if necessary.

Flush the pipeline carefully before installing the valve. Foreign objects, such as sand or pieces of welding electrodes, will damage the disc and seat.

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

3.2 Installing in the pipeline

WARNING

THE VALVE SHOULD BE TIGHTENED BETWEEN FLANGES USING APPROPRIATE GASKETS AND FASTENERS COMPATIBLE WITH THE APPLICATION, AND IN COMPLIANCE WITH APPLICABLE PIPING CODES AND STANDARDS. CENTER THE FLANGE GASKETS CAREFULLY WHEN FITTING THE VALVE BETWEEN FLANGES. DO NOT ATTEMPT TO CORRECT PIPELINE MISALIGNMENT BY MEANS OF FLANGE BOLTING! RECOMMENDED FASTENER LENGTHS ARE LISTED IN TECHNICAL BULLETIN T104-1.

1. **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 actuator travel.
2. The valve may be installed in any position and offers tightness in both directions. It is recommended, however, that the valve be installed with the insert (2) facing upstream. Install the valve in the pipeline so the shaft is horizontal if possible. It is not recommended to install the valve with the stem on the underneath side because dirt in the pipeline may then enter the body cavity and potentially damage the stem packing.
3. Visually check the position of the disc when the valve is in the closed position and the insert is fully compressed. There should be .010" to .040" (.254 to 1.02 mm) clearance between the disc and the "positive stop" on the insert.

4. Before installing the closed valve in the line, be sure that the handle or actuator is attached so that a counter-clockwise rotation, viewed from above, opens the valve (see **Figure 10**). Again, fully close the valve before installing it in the line.
5. **CAUTION:** The *Wafer-Sphere* butterfly valve should be centered between flanges to prevent any damage to the disc or shaft which could be caused by the disc striking the pipe wall.
6. Secure the valve between flanges. Compress the flange gasket **EVENLY** by tightening the fasteners in an alternating sequence.
7. If there is weepage 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.

3.3 Valve Insulation

If necessary, the valve may be insulated. Insulation must not continue above the upper level of the valve (see **Figure 3**).

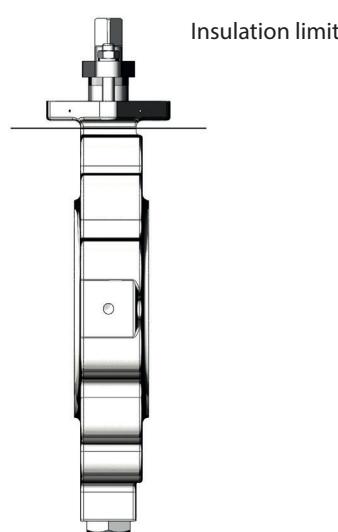


Figure 3 Insulation of the valve

3.4 Actuator

WARNING

WHEN INSTALLING THE ACTUATOR ON THE VALVE, MAKE SURE THAT THE VALVE ASSEMBLY FUNCTIONS PROPERLY. INFORMATION ON ACTUATOR INSTALLATION IS GIVEN IN SECTION 5 OR IN THE SEPARATE ACTUATOR INSTRUCTIONS.

The actuator should be installed in a manner that allows plenty of room for its removal.

The upright position is recommended for the actuator.

The actuator must not touch the pipeline, because pipeline vibration may interfere with its operation.

In certain cases it may be considered advantageous to provide additional support to the actuator. These cases will normally be associated with large actuators, extended stems, or where severe vibration is present. Please contact Metso for advice.

3.5 Commissioning

Ensure that there is no dirt or foreign objects left inside the valve or pipeline. Flush the pipeline carefully. Make sure that the valve is fully open when flushing.

Ensure that all nuts and fittings are properly fastened.

If so equipped, check that the actuator positioner and/or switch are correctly adjusted. Actuator adjustment is explained in **Section 5**. To adjust any accompanying device(s) refer to the separate control equipment instruction manuals.

Series 815W 3"-14" (DN 80-350) Wafer-Sphere Valves
Ansi Class 150 Wafer Design

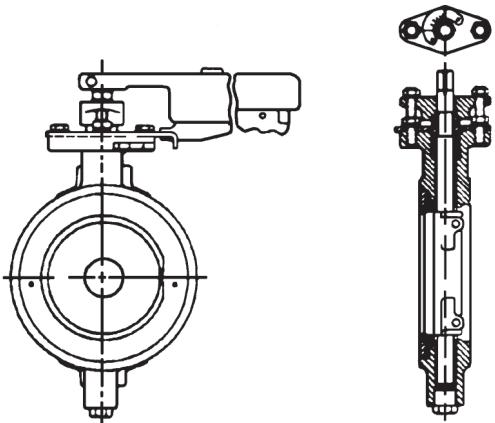


Figure 4

Series 830L 3"-12" (DN 80-300) Wafer-Sphere Valves
Ansi Class 300 Single Flange Lugged Design

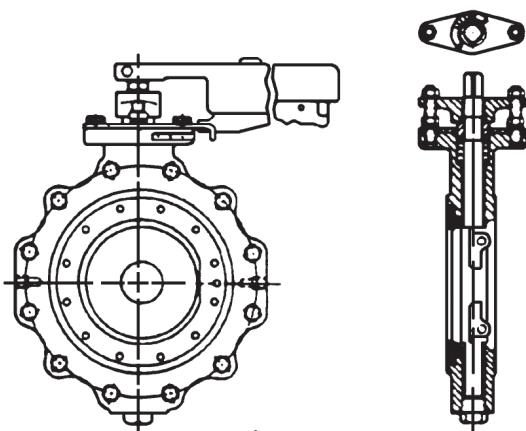


Figure 7

Series 830W 3"-12" (DN 80-300) Wafer-Sphere Valves
Ansi Class 300 Wafer Design

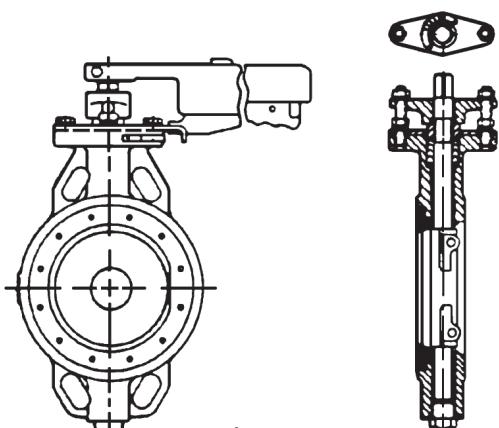


Figure 5

Series 860W 3"-12" (DN 80-300) Wafer-Sphere Valves
Ansi Class 600 Wafer Design

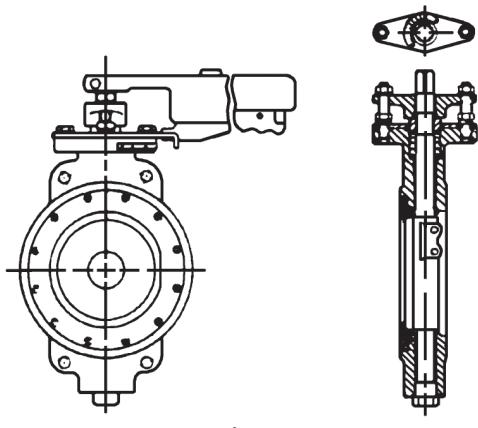


Figure 8

Series 815L 3"-14" (DN 80-350) Wafer-Sphere Valves
Ansi Class 150 Single Flange Lugged Design

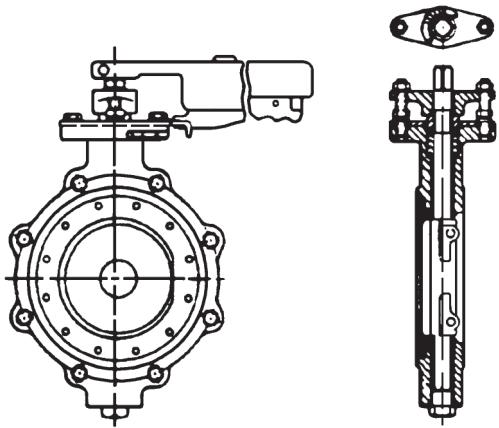


Figure 6

Series 860L 3"-12" (DN 80-300) Wafer-Sphere Valves
Ansi Class 600 Single Flange Lugged Design

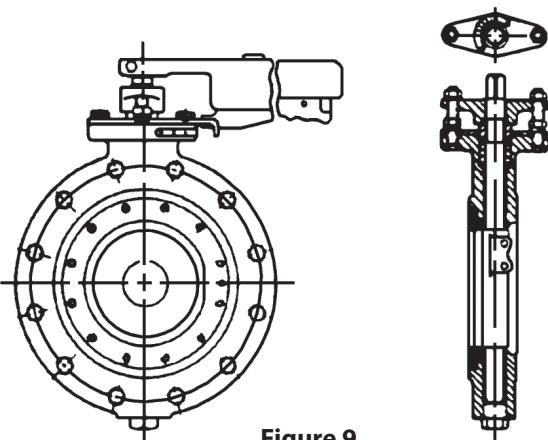


Figure 9

4. MAINTENANCE

4.1 General

Although Metso's *Jamesbury* valves are designed to work under severe conditions, proper preventative maintenance can significantly help to prevent unplanned downtime and in real terms reduce the total cost of ownership. Metso recommends inspecting valves at least every five (5) years. The inspection and maintenance frequency depends on the actual application and process condition. Routine maintenance consists of tightening the hex nuts (15) in (**Figure 18**) periodically to compensate for stem seal wear. The valve should be fully closed during the tightening. **CAUTION:** Tightening hex nuts (15) too severely will shorten the life of the shaft seals.

Overhaul maintenance consists of replacing seats and seals. These parts may be obtained through your authorized Metso Distributor.

NOTE: Always use original OEM parts to make sure that the valve functions properly.

WARNING

FOR YOUR SAFETY IT IS IMPORTANT THE FOLLOWING PRECAUTIONS BE TAKEN PRIOR TO REMOVAL OF THE VALVE FROM THE PIPELINE OR BEFORE ANY DISASSEMBLY:

1. BE SURE YOU KNOW WHAT FLUID IS IN THE PIPELINE. IF THERE IS ANY DOUBT, DOUBLE-CHECK WITH THE PROPER SUPERVISOR.
2. WEAR ANY PPE (PROTECTIVE CLOTHING OR EQUIPMENT) NORMALLY REQUIRED WHEN WORKING WITH THE FLUID INVOLVED.
3. DEPRESSURIZE THE PIPELINE AND DRAIN THE PIPELINE FLUID. THE WAFER-SPHERE VALVES OFFSET SHAFT CREATES GREATER DISC AREA ON ONE SIDE OF THE SHAFT. THIS WILL CAUSE THE WAFER-SPHERE VALVE TO OPEN WHEN PRESSURIZED ON THE INSERT SIDE WITHOUT A HANDLE OR ACTUATOR ON THE VALVE.

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

4. BEFORE YOU INSTALL A WAFER-SPHERE VALVE IN, OR REMOVE IT FROM THE PIPELINE, CYCLE THE VALVE CLOSED. THE WAFER-SPHERE VALVE MUST BE REMOVED IN THE CLOSED POSITION. FAILURE TO FOLLOW THESE INSTRUCTIONS WILL CAUSE MECHANICAL DAMAGE TO THE VALVE AND MAY RESULT IN PERSONAL INJURY.

4.2 Actuated Valve

It is generally most convenient to detach the actuator and its auxiliary devices before removing the valve from the pipeline. If the valve package is small or if it is difficult to access, it may be more practical to remove the entire assembly.

NOTE: To ensure proper reassembly, observe the position of the actuator and positioner/limit switch with respect to the valve before detaching the actuator.

WARNING

ALWAYS DISCONNECT THE ACTUATOR FROM ITS POWER SOURCE, PNEUMATIC, HYDRAULIC OR ELECTRICAL, BEFORE ATTEMPTING TO REMOVE IT FROM THE VALVE!

WARNING

DO NOT REMOVE A SPRING-RETURN ACTUATOR UNLESS A STOP-SCREW IS CARRYING THE SPRING FORCE!

1. Read all **WARNINGS** prior to attempting any maintenance.
2. Detach the air supply, electrical supply, hydraulic supply and control signal cables or pipes from their connectors.
3. If the valve uses a two-piece "no-play" bolted coupling, loosen the valve/actuator coupling screws.
4. Remove the four bolts holding the actuator bracket to the baseplate.
5. Lift the actuator straight up in line with the valve shaft until the coupling between actuator drive and valve stem is completely disengaged.
6. Place actuator in a safe location to avoid damage or personal injury.

4.3 Manual Valve - with Handle

1. Read all **WARNINGS** prior to attempting any maintenance.
2. Loosen the handle nut (H11). Lift the handle (H1) straight up in line with the valve shaft (4) until it is completely disengaged (see **Figure 18**).

4.4 Seat Replacement Non Fire-Tite Valves

Numbers in () refer to items shown in (**Figure 18**).

1. After removing the valve from the line, place it on a bench and cycle it open. Take care not to damage the sealing edge of the valve disc.

2. Remove the insert screws (21) and the insert (2) (See **Figure 18**). 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.
3. Remove the seat (5) and discard it.
4. Remove the body seal (40) when applicable, (3" and 4" [DN 80 and 100] Series 815L, 830L, 860L and 860W valves).
5. Clean the valve.
6. Carefully clean and polish the disc (3) sealing surface. It should be free of all grooves and scratches.
7. If the disc (3) is slightly damaged it may be possible to smooth the sealing surface with crocus cloth, a fine stone, or the equivalent. If the deep scratches are present, replace the disc or return the valve to the local Metso center.
8. Cycle the valve closed.
9. Install the seat (5) into the insert.
10. Place the new body seal (40) in the groove in the body (when applicable).
11. Replace the insert and seat together, using insert screws when applicable. Tighten the screws in a uniform sequence. Torque values are given in (**Table 1**). Open valve and retorque the insert screws (per **Table 1**). Take care not to damage the sealing edge of the disc. Close the valve.

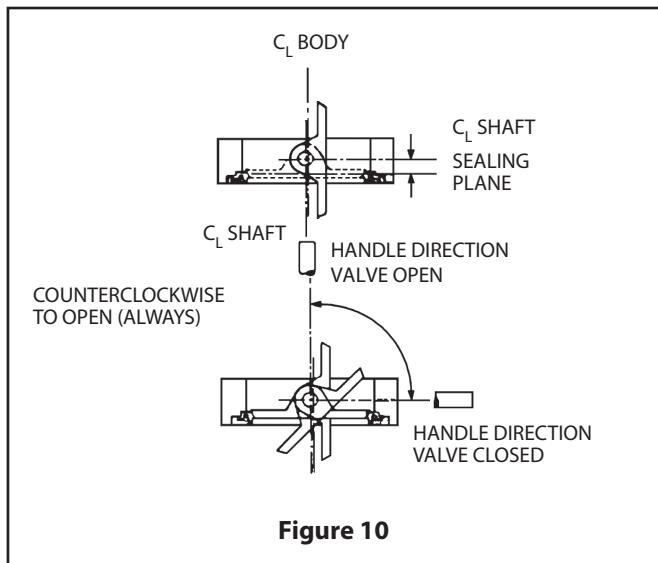


Figure 10

12. Set the handle or actuator stops as described in the **SETTING ADJUSTMENTS** Section. **NOTE:** After installation of a new seat, torque will be higher for a few cycles.

NOTE: If complete disassembly becomes necessary; it is recommended to replace the seat and all seals. Standard repair kits and/or spare parts may be obtained through your authorized Metso Distributor.

4.5 Seat Replacement Fire-Tite Valves

Numbers in () refer to items shown in (**Figure 18**).

1. After removing the valve from the line, place it on a bench and cycle it open. Take care not to damage the sealing edge of the valve disc.
2. Remove the insert screws (21) and the insert (2). (See **Figure 18**). 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.
3. Remove the seat (5) and discard it.
4. Remove the gasket from the insert and body.
5. Carefully clean the gasketing surfaces with solvent. They should be free of all grooves and scratches. If deep scratches are present, polish or repair as required.
6. Clean the valve.
7. Carefully clean and polish the disc (3). It should be free of all grooves and scratches.

TABLE 1.

Insert Screw Torque
(FT.LBS Unless Otherwise Specified)

ANSI CL 150/300/600	Screw Size	Torque C'stl. -IN-LBS (N·m)	Torque St. St'l -IN-LBS (N·m)
3" (DN 80)	#10	63/92 (7.1/10.4)	17/25 (1.9/2.9)
4" (DN 100)	1/4	10/16 (13.5/21.7)	4/7 (5.4/9.5)
6" (DN 150)	#10	63/92 (7.1/10.4)	17/25 (1.9/2.9)
8" (DN 200)	1/4	10/16 (13.5/21.7)	4/7 (5.4/9.5)
10" (DN 250)	1/4	10/16 (13.5/21.7)	4/7 (5.4/9.5)
12" (DN 300)	5/16	22/33 (19.8/44.7)	8/12 (10.9/16.3)
14" (DN 350)	3/8	37/55 (50.2/74.6)	15/22 (20.3/29.8)

8. If the disc (3) 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 local Metso center.
9. Cycle the valve closed.
10. A gasket is required between the seat tail and body as shown in (**Figure 12**). The valve uses a graphite type gasket (except 14" [DN 350] which uses PTFE paste sealant). This is installed in accordance with the following steps:
 - A. **IMPORTANT:** Exercise care at all times not to damage the gasket. A break will cause leakage, and hence cannot be allowed.
 - B. The bottom surface of the insert is to be free of all foreign particles. Clean thoroughly with a solvent that is compatible with the media.

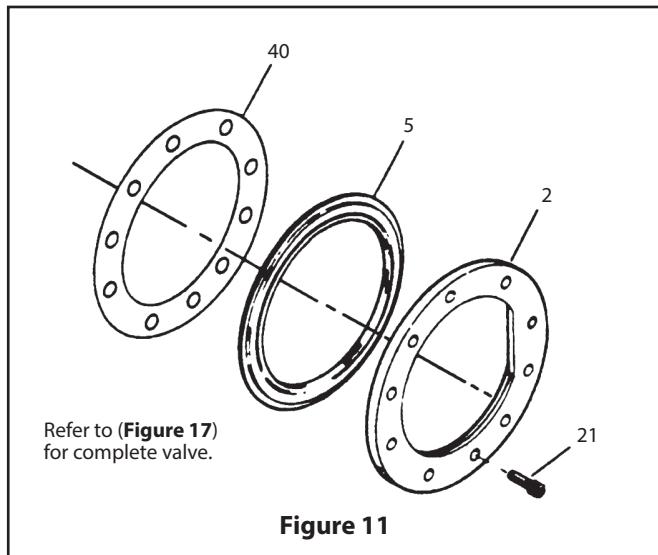


Figure 11

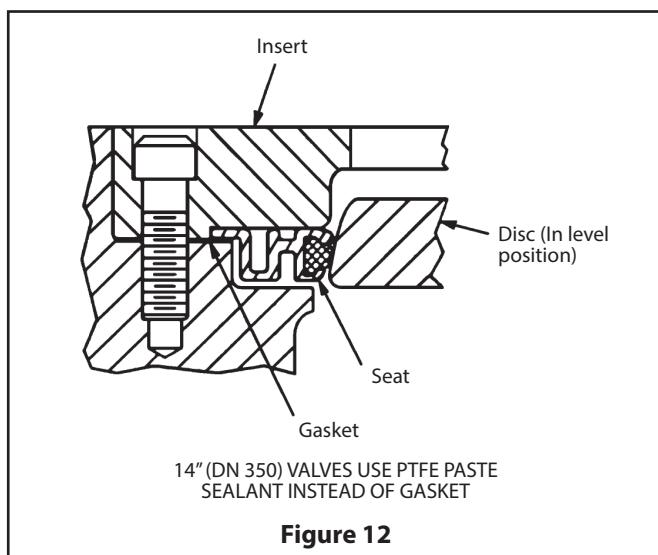


Figure 12

- C. Apply the gasket to the body taking care to align the holes in the gasket with the insert screw and pin holes. With 14" (DN 350) valves apply a uniform bead of PTFE paste to the under side of seat (grooved surface) only.
- 11. Verify that the disc is in the level position. Install new seat and insert (see **Figure 11**). Install the insert screws, and tighten them in a uniform sequence. Torque values are given in (**Table 1**). Open valve and retorque the insert screws (per **Table 1**). Take care not to damage the sealing edge of the disc. Close the valve.
- 12. Set the actuator stops as described in the **ACTUATOR/VALVE ADJUSTMENTS** 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.

4.6 Shaft Packing Replacement

Numbers in () refer to items shown in (**Figure 18**).

1. Remove the handle or actuator as described in 4.2 and 4.3.
2. Remove the indicator pointer (29) from the shaft. Pull it straight out with a pair of pliers to avoid breaking it off.
3. Remove the nuts (15) and washers (16) from above the compression plate (10). Remove the compression plate and blowout spacer (75) (3", 4" and 6" [DN 80, 100 and 150] 860 ONLY). The studs (14) do not have to be removed.
4. Slide the retainer ring (47) off the shaft.
5. Remove the compression ring (9).
6. Remove the old shaft packing (8) with a packing tool.
7. The spacer (7) need not be removed for shaft packing replacement.
8. Replace the old packing with new packing. **NOTE:** If the packing is of the PTFE chevron type, keep the packing rings stacked in the same order as removed from the kit. Remove one of the four center chevron rings from packing being installed in Series 815W and 815L valves. (**Note orientation in Figure 18**).
9. Reinstall the compression ring (9) (not on 14" [DN 350] Type 815), the retainer ring (47), the blowout spacer (75) (3", 4" and 6" [DN 80, 100 and 150] 860 ONLY), the compression plate (10), the lock washers (16) and nuts (15) and the indicator pointer (29). Be sure that the indicator plate is under the pointer.

*If the compression ring initially sits too high to install the retainer ring it may be necessary to precompress the packing 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.

10. Close the valve (the seat and insert should be installed in the valve at this point).
11. Tighten the nuts (15) evenly until the packing is adequately compressed to prevent leakage. This should require tightening the nuts approximately 1-1/2 to 2 full turns past the "finger-tight" position.

4.7 Valve Disassembly

Numbers in () refer to items shown in (Figure 18).

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

1. Place the valve on a bench or other suitable working place.
2. If the seat is to be replaced, follow Steps 2, 3 and 4 in the **SEAT REPLACEMENT** Section. **NOTE:** It is a good idea to replace the seat (and body seal in 3" and 4" [DN 80 and 100] valves) any time a valve is rebuilt.
3. Remove the shaft packing compression hardware as detailed in Steps 1-5 in the **SHAFT PACKING REPLACEMENT** Section. The packing 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 weld. Drive out the pins in the direction shown in (Figure 18).
5. Grind or file off the tack weld locking the pressure plug (11). Remove the plug and its seal (42).
6. 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.

7. Remove the packing (8) and the spacer (7), and when applicable, the spacers (41) and (43).
8. Remove the top bearing (6) either through the top of the valve or the waterway.
9. Remove the bottom bearing (6) either from the bottom of the valve or the waterway.

4.8 Valve Assembly

Numbers in () refer to items shown in (Figure 18).

1. Clean all valve components.
2. Inspect all components for damage before starting to assemble the valve. Look especially for damage to sealing areas on the disc, shaft and body, and for wear in the bearing areas of the shaft and body.
3. Carefully clean and polish the disc sealing surface. It should be free of 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 local Metso Center.
5. Install the bearings (6) into the body bores.
6. Coat the shaft and the disc bore lightly with a lubricant compatible with the fluid to be handled by the valve.
7. Position the disc (3) in the body between the thrust bearings (64) and slide the shaft (4) through the

body and disc. For high cycle constructions, position excluder rings in shaft bore of body as shown in **Figure 13**. Use caution to prevent damage to the bearings. An arrow and the word "bonnet" on the disc indicates correct orientation with the compression plate (10).

8. Insert the disc pins (13) and drive them into place. The pins must be driven so that both pins are the same depth within 1/16" (1.6 mm). An arrow cast on the back of the disc shows the direction of pin installation. Be certain that the pins are installed from the direction shown in (Figure 18). When they are correct, the indicator pointer (29) will point exactly parallel with the face of the disc. Weld both ends of the pins, small end first. 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), the packing (8), the compression ring (9)(not on 14" [DN 350] Type 815), and the retainer ring (47) where applicable. If the packing is of the PTFE chevron type, be certain that it is installed in the orientation shown in (Figure 18).
10. If the studs (14) have been removed from the valve, reinstall them in the holes shown in (Figure 18).
11. If the handle ratchet plate or the actuator base plate has been removed from the valve, reinstall it in the orientation shown in (**Figure 15 or Figure 18**). Install lockwashers and screws in the two bonnet holes not used by the studs and install the lower lockwashers (16) and nuts (15) on the studs. Do not tighten the screws and nuts until the stops are set (see **SETTING ADJUSTMENTS** Section).
12. Install blowout spacer (75) (3", 4" and 6" [DN 80, 100 and 150] 860 **ONLY**). Place the compression plate (10) over the shaft (4) and studs (14). Orient the plate so that the indicator pointer will be over the indicator plate. Install the lockwashers (16) and nuts (15), but do not tighten. Install the indicator pointer in the shaft.
13. Install the lower bearing spacer (43), when applicable. Place the plug seal (42) in the recess at the bottom of the valve and install the plug (11). Torque the plug until it is flush with the body. A small (1/16" [1.6 mm]) tack weld on the corner of the plug is recommended. **CAUTION:** A larger tack weld is apt to have enough heat to damage the seal.
14. Cycle the valve fully closed. If the seat and body seal are to be replaced as recommended, do so at this point. See the **SEAT REPLACEMENT** Section for details.
15. Install the insert or insert screws as shown in (Figure 18). The 3" and 4" (DN 80 and 100) 815W and 830W series valves do not have insert screws. They use two pins (12) to locate and hold the insert. Tighten the screws in a uniform sequence. Torque values are given in (**Table 1**).
16. With the valve still 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 past the "finger-tight" position.
17. Set the handle or actuator stops as described in the **SETTINGS ADJUSTMENTS** Section. Tighten the screws and nuts holding the ratchet plate or actuator base plate.

4.9 High Cycle Construction (860 only)

Using these materials, Xtreme® (X) seat, filled super PTFE shaft seals, 316 SS/Woven PTFE shaft bearings, PEEK®-filled PTFE thrust bearings and excluder rings, yields significantly longer life than a standard configuration valve. Actual cycle performance is subject to media, pressure, and temperature conditions. Applications such as oxygen, nitrogen, hydrogen, water, and other clean media are ideally suited for this option.

WARNING

AVOID ANY MEDIA CONTAINING ACIDS OR CHEMICALS SUCH AS CHLORINE, BROMINE, SULFUR DIOXIDE, OR STEAM, OR TEMPERATURES THAT EXCEED 325°F (163°C).

For proper assembly, the excluder ring must be assembled with the open side toward the waterway on both sides. See **Figure 13** for proper assembly.

4.10 Testing the Valve

WARNING

WHEN PRESSURE TESTING, EXERCISE CAUTION AND MAKE SURE ALL EQUIPMENT USED IS IN GOOD WORKING CONDITION AND APPROPRIATE FOR THE INTENDED PRESSURE.

If the valve is to be tested prior to returning to service make sure the test pressures are in accordance with an applicable standard.

When testing the valve for external tightness, keep the disc in the half open position.

If testing the valve seat tightness, please contact Metso for advice.

WARNING

WHEN PERFORMING ANY TESTS, NEVER EXCEED THE MAXIMUM OPERATING PRESSURE OR MAXIMUM SHUT-OFF PRESSURE LISTED ON THE IDENTIFICATION PLATE!

5. ACTUATOR MOUNTING

Original mounting of actuators is not covered in this document because of the wide variety of possible actuators. If an actuator is to be added to the valve, see the Actuator Mounting Instructions (AMI) accompanying the linkage kit for the actuator being mounted. Adjust the actuator stops as described in the **STOP SETTING** Section for the appropriate actuator.

5.1 Change of Actuator Quadrant

If it is necessary to orient the actuator in a different quadrant (**Figure 15 and 16**):

1. If the valve uses a two-piece "no-play" bolted coupling, loosen the valve/actuator coupling by loosening the coupling screws.
2. Remove the four bolts holding the actuator bracket to the actuator base plate.

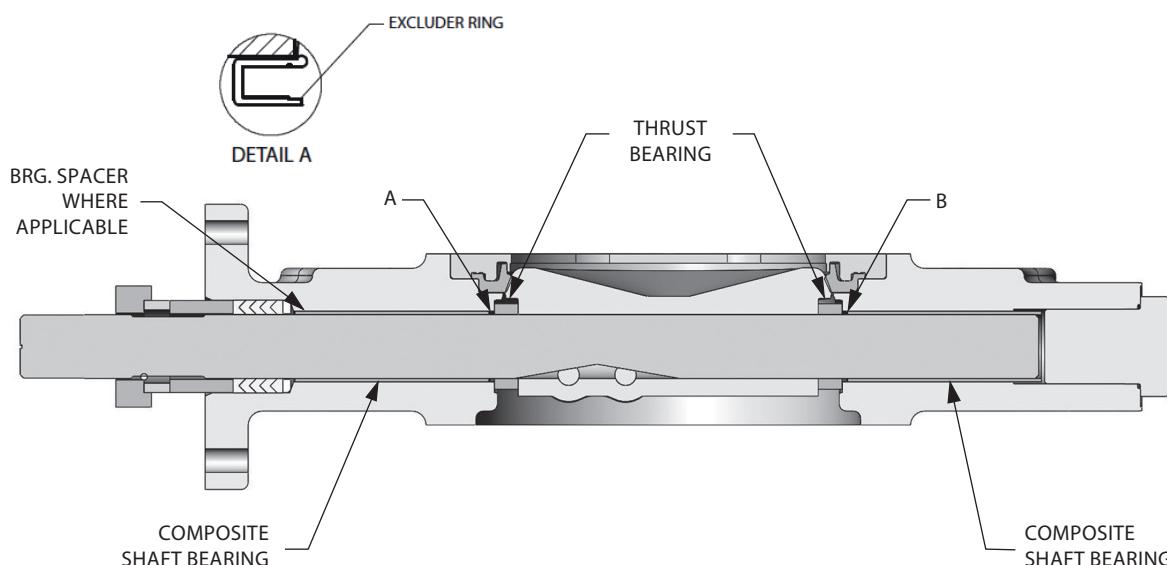
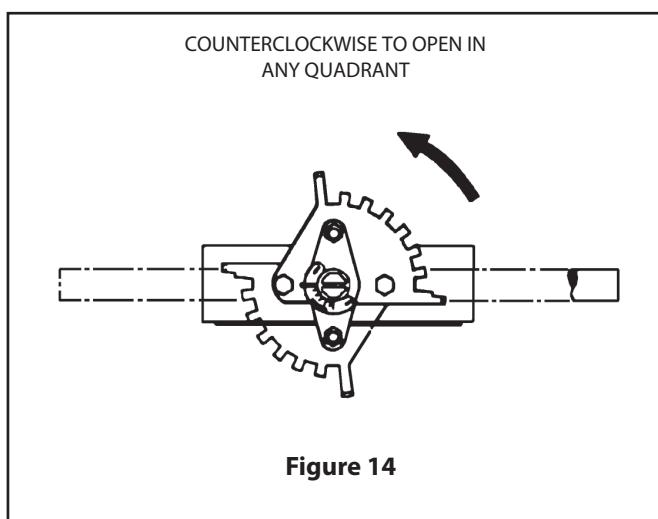


Figure 13

3. After removing the actuator and bracket from the valve, remove the four screws holding the actuator bracket to the actuator.
4. Reposition the actuator in the desired quadrant.
5. Reinstall and retighten the four screws which hold the actuator bracket to the actuator.
6. Verify that the actuator and valve positions match, i.e., valve closed and actuator at the "closed" end of stroke. This ensures opening of the valve in a counterclockwise direction, as shown in the illustrations.
7. Reinstall the bracket on the base plate, holding the two together with the four bolt and nuts. The bracket and base plate should touch each other at all four bolt holes, but the nuts should be only "finger-tight". (Excessive tightening will prevent proper alignment of the actuator drive shaft and valve stem. Failure to tighten snugly will cause the shaft and disc to be pushed downward away from the optimum seat contact when final tightening is accomplished.)
8. Install the coupling and tighten the coupling bolts. **Be sure the actuator drive shaft and valve stem are rigidly held together and properly aligned.**
9. Loosen slightly the four nuts and bolts joining the bracket and base plate so that the coupling can better align the actuator drive shaft and valve stem. Then fully tighten the nuts and bolts.
10. Set the actuator stops as described below in the **SETTINGS ADJUSTMENTS** Section for the appropriate actuator. If the valve is not installed in the line, do not install it until the actuator stops are properly adjusted.

6. CHANGE OF HANDLE QUADRANT

If it is necessary to remount the handle 180° from its standard direction (**Figure 14**):



1. Remove the handle, hex head cap screws (H6) and lockwashers (H12). Do not remove the studs (14).
2. Lift the ratchet plate up and rotate it 180° around the shaft. Do not turn it upside down.
3. Reinstall all the components which were just removed. Be certain that the indicator plate (26) is correctly oriented with respect to the indicator pointer (29) during the reassembly. Do not tighten the ratchet plate fasteners until the plate has been properly adjusted as described 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.

7. SETTING ADJUSTMENTS

7.1 Setting Stops (Valve in the Line)

It is preferable to adjust the stops on the handle or actuator before the valve is installed in the line because of the ability to check disc position visually. If this is not possible, and the valve is installed in the line, use the procedures which follow, ignoring any reference to measured clearance to the disc. **CAUTION:** There must be no pressure across the valve while the stops are being set. Following adjustments, check all linkage and coupling bolts for tightness. Recommended torque values for fasteners are shown in (**Table 1**).

7.2 Setting Stops (Valve Out of Line)

The following steps rely upon the insert (2) being clamped in the position it will take when installed in the line. The insert must be flush with the face of the body (1) within $1/32''$ (.79 mm) maximum. The installed seat tends to lift the insert unless it is completely clamped or screwed in place. It may be most convenient to adjust the stops with the seat removed from the valve. Following the setting of the stops, the seat and insert must be reinstalled as described in the **SEAT REPLACEMENT** Section.

Following adjustments, check all linkage and coupling bolts for tightness. Recommended torque values for fasteners are shown in (**Table 2**).

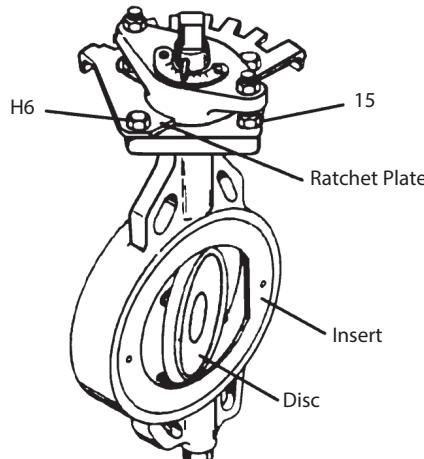


Figure 15

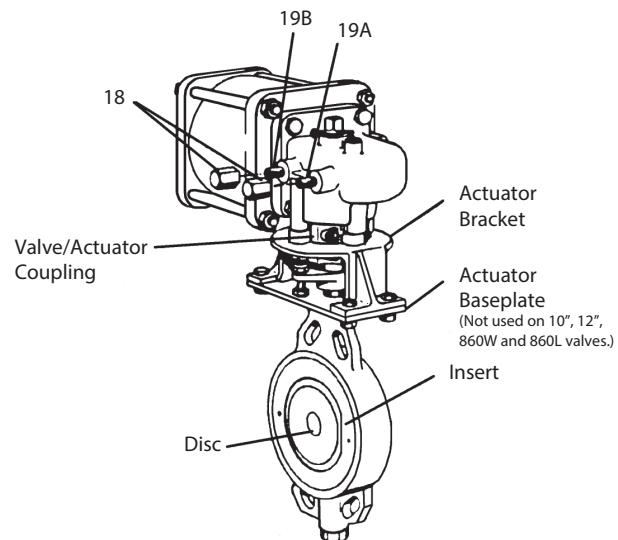


Figure 16

7.3 Setting Handle Stop (Figure 15)

1. Loosen the two hex head cap screws (H6) clamping the ratchet plate to the valve.
2. 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 insert.
3. If the handle (H1 in Figure 18) has been removed from the valve, reinstall it on the shaft drive square and tighten the nut (H11). The handle should be installed so that it is parallel with the disc (3) in order to provide visual indication of disc position when viewed from a distance. 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 lightly trapped between the insert and the ratchet plate.
4. Tighten the two nuts (15) and two screws (H6) holding the ratchet plate.

7.4 Setting Stops on ST and ST-MS Pneumatic Actuators (Figure 16)

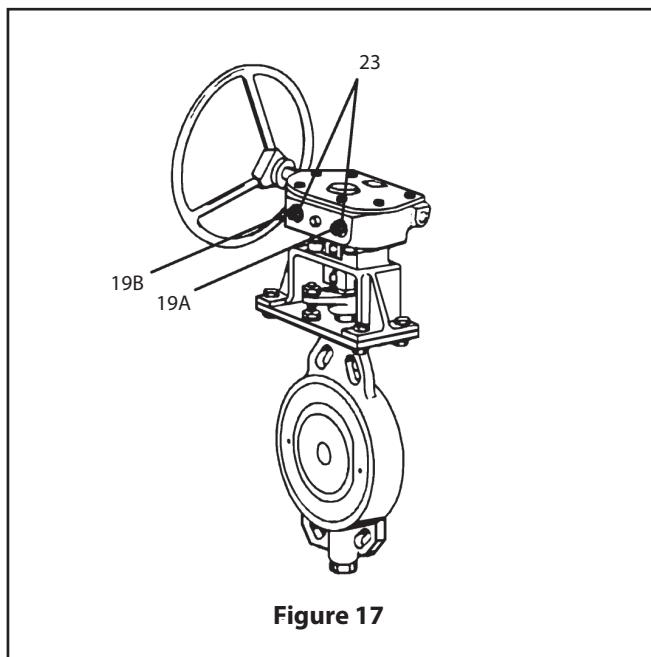
1. Disc travel on *Wafer-Sphere* valves with a type ST or ST-MS pneumatic actuator is controlled with a closed ("shut") travel stop set screw (19A), and by an open travel stop set screw (19B) in the actuator.
2. Remove acorn nuts (18) protecting the stop set screws. **NOTE:** Be sure O-rings remain in the acorn nuts.
3. Adjust the closed ("shut") stop set screw (19A) until the disc just touches the insert when the actuator is at the end of its stroke. Air pressure may have to be applied to ST-MS actuators to relieve the load on the closed ("shut") stop set screw during the adjustment. **CAUTION:** If pressure is supplied to the actuator while the valve is exposed, keep hands and tools away from the disc.
4. From the position which allows the disc to just touch the insert, turn the stop set screw in about $1/8$ turn to get the disc $.010"/.040"$ (.254/1.02 mm) off the insert.
5. Cycle the actuator open and back to closed several times and verify that the disc returns to the same position each time. Keep hands and tools away from the disc, and do not allow the disc to drag across surfaces which can scratch the sealing edge.
6. Cycle the valve to the open position. If necessary, adjust the open set stop screw (19B) until the pointer (24) is approximately 90° from the closed ("shut") position. This is full open.
7. With the valve in the full open position, and with air applied so that the load is applied to the open stop set screw to prevent it from moving, cover the open set screw with an acorn nut. Tighten the open stop set screw acorn nut.

8. Now close the valve. With the valve in the closed position, and air (or spring) load applied to the stop set screw, tighten the closed ("shut") stop set screw acorn nut.
9. Cycle the valve open and closed, with full air pressure, three times. The disc must return to the same position each time. Visually check to see that the disc is within .010"/.040" (.254/1.02 mm) of the insert stop, but is not lifting the insert from its proper position.

7.5 Setting Stops on Quadra-Powr Actuators

Follow the instructions for adjustment of ST-MS actuators with the following exceptions:

1. The *Quadra-Powr* has no acorn nuts on the stop screws.
2. Because the stop set screws can be held in position with a screwdriver while tightening the jam nuts, there is no need to apply a load to the ends of the screws during this operation.



7.6 Setting Stops on MA Manual Gear Actuator (Figure 17)

1. Loosen the jam nuts (23) locking the stop set screws (19). Back out the closed ("shut") stop set screw (19A) far enough to allow the actuator to move the disc until it is just touching the insert.
2. Screw in the closed ("shut") stop set screw until it stops against the gear face inside the actuator.

HANDLE PARTS		
ITEM	PART NAME	QTY
H1	Handle	1
H2	Lever	1
H3	Ratchet Plate	1
H4	Spring	1
H5	Spirol Pin	1
H6	Hex Head Cap Screw	2
H9	Hex Head Cap Screw	1
H10	Lockwasher	1
H11	Nut	1
H12	Star Washer	2
H13	Washer	2

VALVE PARTS		
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 Packing	1
9	Compression Ring*	1
10	Compression Plate*	1
11	Pressure Plug	1
12	Insert Roll Pin (3" - 4" [DN 80 - 100])	2
13	Disc Pin	2
14	Stud	2
15	Jam nut	4
16	Lockwasher	4
17	Name Plate	1
18	Drive Screw	3
21	Cap Screw (All valves except 3" & 4" [DN 80 & 100] series 815W & 830W)	+
26	Indicator Plate*	1
27	Drive Screw*	2
29	Indicator Pointer	1
40	Insert Seal (3" - 4" [DN 80 - 100] 815L & 830L; 860L & 860W)	1
41	Top Bearing Spacer	1
42	Plug Seal	1
43	Bottom Bearing Spacer	1
44	Paper Tag	1
47	Retainer Ring	1
64	Thrust Bearing	2
75	Blowout Spacer (3", 4", 6" [DN 80, 100, 150]) 860 ONLY	1

*On 14" (DN 350) Type 815 omit items 26 and 27. Items 9 and 10 are one piece.

+815W 14" (DN 350) = 4

+860W & 860L 3" - 8" (DN 80 - 200) = 12

+815W & 830W 6" - 12" (DN 150 - 300) = 2

+860W & 860L 10" (DN 250) = 16

+815L & 830L 3" - 8" (DN 80 - 200) = 12

+860W & 860L 12" (DN 300) = 20

+815L & 830L 10" (DN 250) = 16

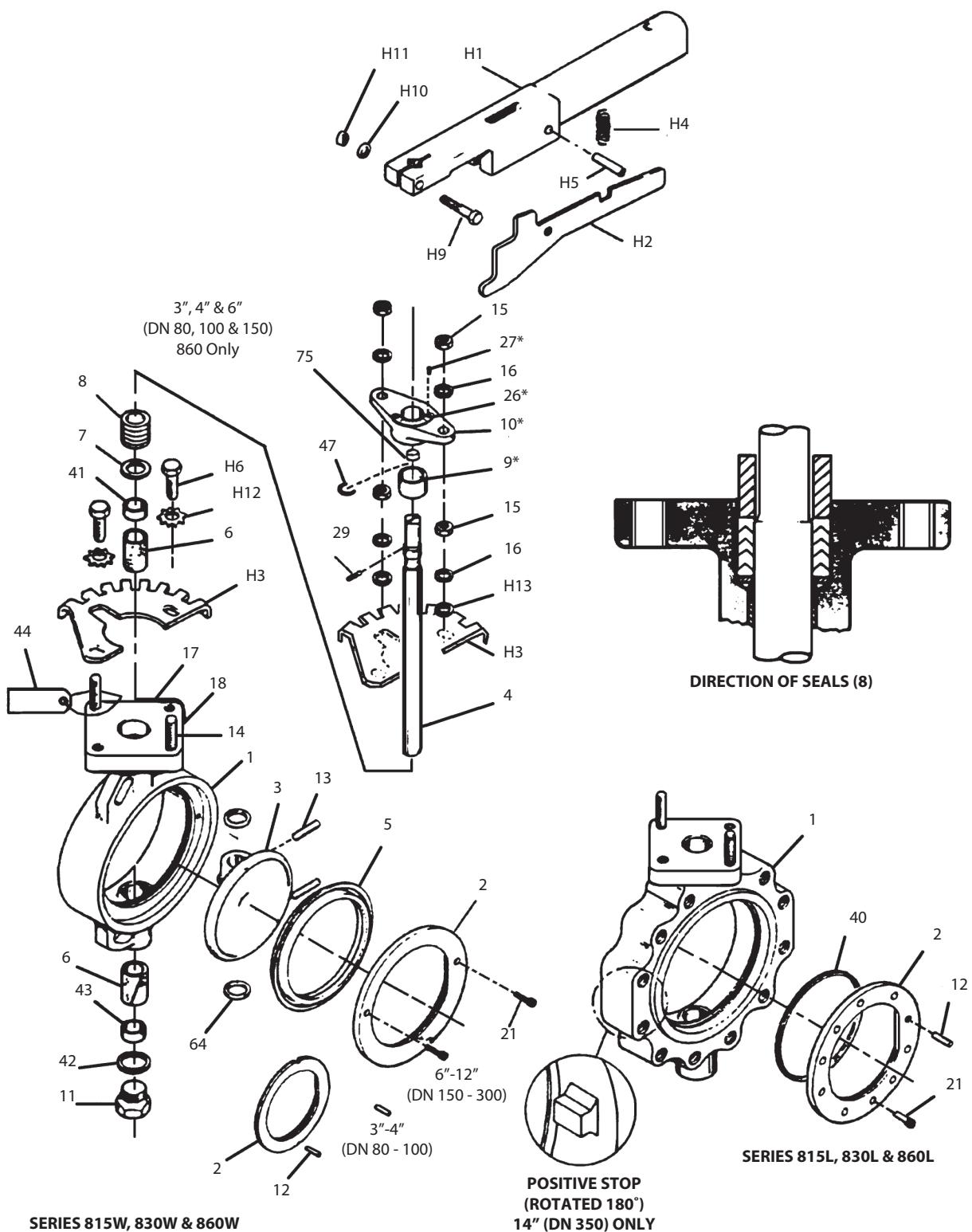
EXPLODED VIEW**Figure 18**

TABLE 2.			
BRACKET BOLTING TORQUES FOR GR. 5 HEX CAP			
Bolt Size	Torque to Aluminum Body Actuators		
	No Lubrication to Screws		
	FT•LBS	IN•LBS	N•m
1/4	6	72	8.1
5/16	12	144	16.3
3/8	20	240	27
7/16	30	360	41
1/2	50	600	68
9/16	70	840	95
5/8	90	1080	122
3/4	160	1920	217
7/8	250	3000	339
1	360	4320	488
1-1/8	520	6240	705
1-1/4	700	8400	949
M6	5	60	6.8
M8	11	132	14.9
M10	22	264	30
M12	38	456	52
M16	90	1080	122
M20	170	2040	230
M30	570	6840	773
M36	950	11400	1288
Bolt Size	Torque to Aluminum Body Actuators		
	No Lubrication to Screws		
	FT•LBS	IN•LBS	N•m
1/4	8	96	10.8
5/16	16	192	21.7
3/8	27	324	37
7/16	45	540	61
1/2	67	804	91
9/16	100	1200	136
5/8	135	1620	183
3/4	225	2700	305
7/8	335	4020	454
1	520	6240	705
1-1/8	700	8400	949
1-1/4	990	11880	1342
M6	7	84	9.5
M8	14	168	19.0
M10	28	336	38
M12	48	576	65
M16	115	1380	156
M20	225	2700	305
M30	783	9396	1062
M36	1347	16164	1826

REQUIRED TORQUE FOR NO-PLAY COUPLING FASTENERS (Gr. 8 Socket Cap Screws and Lock Nuts)	
No Lubrication to Screws/Nuts	
Thread Size	Tightening Torque - FT.LBS (N.m)
1/4 - 20	9 - 12 (12.2 - 16.3)
1/4 - 28	11 - 14 (14.9 - 19.0)
5/16 - 18, 5/16 - 24	22 - 27 (29.8 - 36.6)
3/8 - 16, 3/8 - 24	35 - 40 (47.5 - 54.2)
1/2 - 13, 1/2 - 20	80 - 90 (108.4 - 122.0)
5/8 - 11, 5/8 - 18	160 - 170 (217.0 - 230.5)

3. Taking care not to move the set screw, use the handwheel to open the disc slightly. Turn the closed ("shut") stop set screw in about 1/8 turn. Check to see that the disc is .010"/.040" (.254/1.02 mm) off the insert.
4. Lock the stop set screw with the jam nut at this point. The screw must be kept from moving while the nut is being tightened. This may be done either by holding the screw with a wrench, or by using the handwheel to drive the gear firmly against the end of the screw.
5. Open the valve so that the pointer is approximately 90° from the closed (shut position using the handwheel). Adjust the open stop set screw (19B) to stop the gear at this position. Hold the stop set screw and tighten the jam nut.

7.7 Setting Stops on Electric Actuators

Electric actuator stops are controlled by adjustable cams and switches. Follow basically the same procedure for these actuators as for ST actuators. The closed ("shut") switch should stop the disc within .010"/.040" (.254/1.02 mm) of the insert. Do not set the stop so that the disc touches the insert before the switch turns the actuator off.

8. SERVICE / SPARE PART

We recommend that valves be directed to our service centers for maintenance. The service centers are equipped to provide rapid turn-around at a reasonable cost and offer new valve warranty with all reconditioned valves.

NOTE: When sending goods to the service center for repair, do not disassemble them. Clean the valve carefully and flush the valve internals. Include the material safety datasheets (MSDS) for all media flowing through the valve. Valves sent to the service center without MSDS datasheet(s) will not be accepted.

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

NOTE: When ordering spare parts, always include the following information:

- a. Valve catalog code from identification plate,
- b. If the valve is serialized - the serial number (from identification plate)
- c. From **Figure 18**, the ballooned part number, part name and quantity required.

JAMESBURY BRAND WAFER-SPHERE VALVE, SERIES 800

1	2	3	4	5	6	7	8	9	10
3	815	W	-	11	22	36	XZ	A	QY

1. sign	VALVE SIZE (inch / mm)
INCHES	3, 4, 6, 8, 10, 12, 14
DN	80, 100, 150, 200, 250, 300, 350

2. sign	VALVE SERIES & STYLE
815	Standard Class 150
F815	Fire-Tite Class 150
818	Standard with CE Marking & Documentation Class 150
F818	Fire-Tite with CE Marking & Documentation Class 150
830	Standard Class 300
F830	Fire-Tite Class 300
838	Standard with CE Marking & Documentation Class 300
F838	Fire-Tite with CE Marking & Documentation Class 300
860	Standard Class 600
F860	Fire-Tite Class 600
868	Standard with CE Marking & Documentation Class 600
F868	Fire-Tite with CE Marking & Documentation Class 600

3. sign	BODY STYLE
W	Wafer
L	Single-flange Lugged

4. sign	CONSTRUCTION / SPECIAL SERVICE
-	Standard (no entry)
C	Chlorine
N	NACE MR0103-2003
O	Oxygen
H	Hard-coated Disc
HV	High Vacuum
HVC	High Vacuum Certified
D	Double Packing
DL	Double Packing with Monitoring Port

5. sign	SEAT TYPE
11	Standard (non Fire-Tite)
31	Fire-Tite

6. sign	BODY MATERIAL
22	Carbon Steel (WCB)
35	Alloy 20 (CN7M)
36	Stainless Steel (CF8M)
37	Stainless Steel (CG8M)
71	Monel® (M-35-1)
73	Hastelloy® C (CW-12MW)

Other materials available on application

7. sign	DISC AND SHAFT MATERIAL
35	Alloy 20 disc and shaft
36	316 Stainless Steel disc and shaft
37	317 Stainless Steel disc and shaft
71	Monel disc and shaft
73	Hastelloy C disc and shaft
HB	316 Stainless Steel disc, 17-4 PH shaft
00	Same as body material

Other materials available on application

8. sign	SEAT AND SEAL MATERIAL
	STANDARD
XZ	Xtreme seat & carbon-filled enhanced PTFE seal
TT	PTFE seat and seal
MT	Filled PTFE seat, PTFE seal
UU	PEEK/Graphite/Graphite
	FIRE-TITE
AE	PTFE/Stainless steel seat, graphite seal
AF	PTFE/Alloy-20 seat, graphite seal
AH	PTFE/Monel seat, graphite seal
XE	Xtreme/Stainless steel seat, graphite seal
XF	Xtreme/Alloy-20 seat, graphite seal
XH	Xtreme/Monel seat, graphite seal

9. sign	Model
A	-

10. sign	Modifier Code
-	Standard
QY	Live-loaded packing
MM	High Cycle Construction

Hastelloy® is a registered trademark of Haynes International, Inc
Monel® is a registered trademark of Special Metals Corporation

Subject to change without prior notice.

Metso Flow Control Inc.

Europe, Vanha Porvoontie 229, P.O. Box 304, FI-01301 Vantaa, Finland. Tel. +358 20 483 150. Fax +358 20 483 151

North America, 44 Bowditch Drive, P.O. Box 8044, Shrewsbury, MA 01545, USA. Tel. +1 508 852 0200. Fax +1 508 852 8172

South America, Av. Independéncia, 2500-Iporanga, 18087-101, Sorocaba-São Paulo, Brazil. Tel. +55 15 2102 9700. Fax +55 15 2102 9748

Asia Pacific, 238B Thomson Road, #17-01 Novena Square Tower B, Singapore 307685. Tel. +65 6511 1011. Fax +65 6250 0830

China, 11/F, China Youth Plaza, No.19 North Rd of East 3rd Ring Rd, Chaoyang District, Beijing 100020, China. Tel. +86 10 6566 6600. Fax +86 10 6566 2583

Middle East, Roundabout 8, Unit AB-07, P.O. Box 17175, Jebel Ali Freezone, Dubai, United Arab Emirates. Tel. +971 4 883 6974. Fax +971 4 883 6836

www.metso.com valves

