

4100 Series Standard Port

Class 150 & 300 ANSI Unibody Ball Valve



USER'S MANUAL

Installation & Maintenance

Valve & Actuator Engineering Specification

Number: IOM- 11

Date: 7/24/2004

Title: Unibody Flanged-End Ball Valve IOM for: 4100

I. Initial Inspection

- A. Remove valve from packaging; remove flange protectors and discard, if so equipped.
- B. Inspect flange faces for any damage caused in shipment or handling.
- C. Confirm Valve Size and Class is correct for installation.

II. Installation

- A. Confirm flanges installed on adjacent piping are correct pressure class and match valve flange pattern.
- B. Confirm "lay-length" between piping flanges matches valve "lay-length".
- C. Slide valve between piping flanges, then insert first spiral-wound flange gasket between one valve flange and piping flange.
- D. Insert flange bolts and hand-tighten flange nuts on first side.
- E. Insert second spiral-wound flange gasket between opposite valve flange and piping flange.
- F. Insert flange bolts, and hand-tighten flange nuts on second side.
- G. With a torque wrench having capacity to apply torque as recommended by flange gasket manufacturer, start to torque first side flange bolts to 25% of recommended final torque, using an alternating "across flange" torqueing sequence to insure correct gasket compression.
- H. Using same "across-flange" torqueing sequence, increase torque to 50% of recommended flange bolt final torque.
- I. Using same "across-flange" torqueing sequence, increase torque to 75% of recommended flange bolt final torque.
- J. Using same "across-flange" torqueing sequence, increase torque to recommended flange bolt final torque.
- K. Perform steps "G" through "J" on opposite flange connection.

III. Operation:

- A. After Installation, confirm handle has adequate clearance by rotating 90 degrees from open to closed position and back to open.

- B. All Quadrant ball valves are designed for on-off operation only. DO NOT attempt to “throttle” with Quadrant ball valves, unless they are specifically designed for and tagged “FOR THROTTLING SERVICE”.
- C. If application is in STEAM PIPING, be cautious when operating valve-handle will be HOT!

IV. Initial Pressurization of System

- A. Upon initial pressurization of piping system, check all connections for leaks and correct if required.
- B. Once system reaches “Steady State” conditions of operating pressure and operating temperature, it will be necessary to make initial stem packing adjustment. Tighten Part #9, “Stem Packing Nut” to 20-25 in-lbs on ¼”-1” Sizes. On 1-1/2” to 6” sizes, **evenly** tighten the two “Packing Nuts”, Part #12, to 30-40 In-Lbs.

V. Maintenance

- A. Quadrant Ball Valves require no maintenance other than periodic stem packing adjustment in applications where many cycles of on-off operation occur on a weekly basis.
- B. In high-cycle applications, check stem packing area regularly to confirm there is no leakage from stem packing. If leakage occurs, follow step #IV-B to correct.

VI. Repair & Reconditioning- F1 Series Unibody Flanged-End Ball Valves

NOTE: Refer to Assembly Drawings and Parts Lists as shown in Quadrant Folder F1-CS/F1-SS- this can be downloaded at www.QUADRANTVALVE.com or see Quadrant Engineering Binder under “Flanged-End Ball valves”.

- A. Depressurize line, drain fluid.
- B. Remove flange bolting, slide valve from between piping flanges, discard spiral-wound flange gaskets.
- C. Place valve assembly on a secure table surface with Part #2 “Insert” facing up, and opposite body flange contacting table surface. Table or bench must be equipped with “studs” or bolts to engage body flange holes, and **must have a protective surface to prevent damage to body flange face.**
- D. **Note: Significant torques are required to be applied to Part #2 “Insert” to disassemble & reassemble valve- secure table or bench to floor or wall.**
- E. Obtain “male” hexagon drivers of the following sizes:

Valve Size	Hexagon Driver (Across-Flats)	Valve Size	Hexagon Driver (Across-Flats)
½”	10.4MM (13/32”)	3”	64.5MM (2-17/32”)
¾”	15.8MM (5/8”)	4”	86.5MM (3-13/32”)
1”	20.8MM (13/16”)	6”	131.0MM (5-5/32”)
1-1/2”	31.7MM (1-1/4”)		
2”	42.7MM (1-11/16”)		

- F. Engage “male” hexagon driver into female hexagon drive in Part #2 “Insert”.
- G. Using “six-point” sockets of $\frac{3}{4}$ ” or 1” drive size to engage “male” drivers, or large pipe wrench, apply counter-clockwise torque to drivers to remove Part #2 “Insert”.
- H. Move handle to “closed” position, and remove ball and seats from body cavity. **Handle ball carefully to prevent damage.**
- I. For $\frac{1}{2}$ ” to 1” sizes:
 - a. Remove Handle (#12).
 - b. Remove Packing Nut (#9).
 - c. Push Stem (#4) down into body cavity and remove from body bore.
 - d. Remove Packing (#8) with packing hook- DO NOT DAMAGE PACKING BORE.
- J. For 1-1/2” to 6” sizes:
 - a. Remove Handle (#15)
 - b. Remove Snap Ring (#14) and Stop Plate (#13)
 - c. Remove Packing Nuts (#12), Belleville Washers (#11), Packing Bolts (#10) and Packing Plate (#9).
 - d. Push Stem (#4) down into body cavity and remove from body bore.
 - e. Remove Packing (#8) with packing hook- DO NOT DAMAGE PACKING BORE.

Reassembly:

- A. Inspect Ball (#3) and Stem (#4) for any damage or wear- replace if required.
- B. Apply lubricant to (1) new Seat (#5) and install in Body (#1)- press into seat recess.
- C. Install new Thrust washer (#6) on Stem (#4) and insert through body bore and up through stem bore- seat thrust washer against recess face.
- D. Move stem to “closed” position so that internal stem “tang” is parallel to body length centerline and install Ball (#3).
- E. Apply lubricant to second Seat (#5) and install into Insert (#2)- press into seat recess.
- F. Install new Body Seal (#7) onto Insert (#2), and apply anti-seize compound to Insert threads and/or Body threads.
- G. Hand-tighten Insert into Body using caution to protect Body Seal (#7) and to insure Seat (#5) stays in seat recess.
- H. Install new Stem Packing (#8) using caution to prevent damage to packing rings. **NOTE: for PTFE Packing, the “chevron” (^) points upwards toward handle, and upper & lower rings are “flat” on one side.**
- I. For $\frac{1}{2}$ ” to 1” Sizes:
 - a. Install Packing Nut (#9), torque to 20-25 In-Lbs.
 - b. Install Handle (#12), Lock washer (#10) and Handle Nut (#11).
- J. For 1-1/2” to 6” Sizes:
 - a. Install Packing Plate (#9), Packing Bolts (#10), Belleville Washers (#11) and Packing Nuts (#12)- torque evenly to 30-40 In-Lbs.
 - b. Install Stop Plate (#13), Snap Ring (#14) and Handle (#15).
- K. Place valve assembly on table or bench with Insert (#2) facing up and opposite body flange engaged with studs or bolts- **protect flange surfaces.**

- L. Using a torque wrench capable of producing the required final torques listed below, torque Insert (#2) into Body (#1) using “male” hexagon drivers noted in VI. Section E.

ASSEMBLY TORQUES

Valve Size	Assembly Torque (Ft-Lbs)
1/2"	140
3/4"	150
1"	150
1-1/2"	500
2"	800
3"	1200
4"	1800
6"	3000

- M. Retest valve assembly per API 598 or ASME B16.34.
N. Re-install per Section II.

4200 Series Standard Port

Class 150 & 300 ANSI Two-Piece Ball Valve



USER'S MANUAL

Installation & Maintenance

Valve & Actuator Engineering Specification

Number: IOM- 12

Date: 7/24/2004

Title: Split Body Flanged-End Ball Valve IOM for: 4200

I. Initial Inspection

- A. Remove valve from packaging; remove flange protectors and discard, if so equipped.
- B. Inspect flange faces for any damage caused in shipment or handling.
- C. Confirm Valve Size and Class is correct for installation.

II. Installation

- A. Confirm flanges installed on adjacent piping are correct pressure class and match valve flange pattern.
- B. Confirm "lay-length" between piping flanges matches valve "lay-length".
- C. Slide valve between piping flanges, then insert first spiral-wound flange gasket between one valve flange and piping flange.
- D. Insert flange bolts and hand-tighten flange nuts on first side.
- E. Insert second spiral-wound flange gasket between opposite valve flange and piping flange.
- F. Insert flange bolts, and hand-tighten flange nuts on second side.
- G. With a torque wrench having capacity to apply torque as recommended by flange gasket manufacturer, start to torque first side flange bolts to 25% of recommended final torque, using an alternating "across flange" torqueing sequence to insure correct gasket compression.
- H. Using same "across-flange" torqueing sequence, increase torque to 50% of recommended flange bolt final torque.
- I. Using same "across-flange" torqueing sequence, increase torque to 75% of recommended flange bolt final torque.
- J. Using same "across-flange" torqueing sequence, increase torque to recommended flange bolt final torque.
- K. Perform steps "G" through "J" on opposite flange connection.

III. Operation:

- A. After Installation, confirm handle has adequate clearance by rotating 90 degrees from open to closed position and back to open.

- B. All Quadrant ball valves are designed for on-off operation only. DO NOT attempt to “throttle” with Quadrant ball valves, unless they are specifically designed for and tagged “FOR THROTTLING SERVICE”.
- C. If application is in STEAM PIPING, be cautious when operating valve-handle will be HOT!

IV. Initial Pressurization of System

- A. Upon initial pressurization of piping system, check all connections for leaks and correct if required.
- B. Once system reaches “Steady State” conditions of operating pressure and operating temperature, it will be necessary to make initial stem packing adjustment. **Evenly** tighten the two “Packing Nuts”, Part #16, to 30-40 In-Lbs.

V. Maintenance

- A. Quadrant Ball Valves require no maintenance other than periodic stem packing adjustment in applications where many cycles of on-off operation occur on a weekly basis.
- B. In high-cycle applications, check stem packing area regularly to confirm there is no leakage from stem packing. If leakage occurs, follow step #IV-B to correct.

VI. Repair & Reconditioning- F2 Series Split Body Flanged-End Ball Valves

NOTE: Refer to Assembly Drawings and Parts Lists as shown in Quadrant Folder F2-CS/F2-SS- this can be downloaded at www.QUADRANTVALVE.com or see Quadrant Engineering Binder under “Flanged-End Ball valves”.

- A. Depressurize line, drain fluid.
- B. Remove flange bolting, slide valve from between piping flanges, discard spiral-wound flange gaskets.
- C. Place valve assembly on a secure table surface with Part #2 “Adaptor” facing up, and opposite body flange contacting table surface. Table or bench must be equipped with “studs” or bolts to engage body flange holes, and **must have a protective surface to prevent damage to body flange face.**
- D. **Note: Significant torques are required to be applied to “Body Nuts” (#13) to disassemble & reassemble valve- secure table or bench to floor or wall.**
- E. Using “six-point” sockets, loosen “Body Nuts” (#13) and remove.
- F. Carefully lift “Adaptor” (#2) upward away from “Body” (#1).
- G. Move handle to “closed” position, and remove “Ball” (#4) and “Seat” (#3) from body cavity. **Handle ball carefully to prevent damage.**
- H. Remove second “Seat” (#3) from Adaptor (#2)
- I. For 1” to 10” sizes:
 - a. Remove Handle (#20)
 - b. Remove Snap Ring (#19) and Stop Plate (#18)

- c. Remove Packing Nuts (#16), Belleville Washers (#17), Packing Bolts (#15) and Gland Flange (#14).
- d. Remove Gland (#11)
- e. Push Stem (#5) down into body cavity and remove from body bore.
- f. Remove Packing (#8) and Packing Washer (#9) with packing hook- **DO NOT DAMAGE PACKING BORE.**
- g. Remove Stem Bushing (#10) from Gland (#11).
- h. Discard: Seats (#3), Packing (#8), Packing Washer (#9), Thrust Washer (#7), and Body Seal (#6). New parts are included in repair kit.

Reassembly:

- A. Inspect Ball (#4) and Stem (#5) for any damage or wear- replace if required.
- B. Apply lubricant to (1) new Seat (#3) and install in Body (#1)- press into seat recess.
- C. Install new Thrust washer (#7) on Stem (#5) and insert through body bore and up through stem bore- seat thrust washer against recess face.
- D. Move stem to “closed” position so that internal stem “tang” is parallel to body length centerline and install Ball (#4).
- E. Apply lubricant to second Seat (#3) and install into Adaptor (#2)- press into seat recess.
- F. Install new Body Seal (#6) onto Body counterbore, and apply anti-seize compound to Stud Bolts (#12).
- G. Lift “Adaptor” (#2) and align flange bolting with opposite body flange, while aligning cast stiffening ribs on “Adaptor” to be located aligned with stem and body base. **Use caution to protect Body Seal (#6) and to insure Seat (#3) stays in seat recess.**
- H. Hand-tighten Body Nuts (#13) to Studs (#12).
- I. Install new Stem Packing (#8) using caution to prevent damage to packing rings. **NOTE: for PTFE Packing, the “chevron” (^) points upwards toward handle, and upper & lower rings are “flat” on one side.**
- J. Install new Packing Washer (#9) using caution to prevent damage.
- K. Install new Stem Bushing (#10) into recess in Gland (#11).
- L. For 1” to 10” Sizes:
 - a. Install Gland Flange (#14), Packing Bolts (#15), Belleville Washers (#17) and Packing Nuts (#16)- torque evenly to 30-40 In-Lbs.
 - b. Install Stop Plate (#18), Snap Ring (#19) and Handle (#20).
- M. Place valve assembly on table or bench with Adaptor (#2) facing up and opposite body flange engaged with studs or bolts- **protect flange surfaces.**
- N. Using a torque wrench capable of producing the required final torques listed below, torque Body Nuts (#13) to Studs (#12) as follows:
 - a. Using an alternating “across-flange” torque sequence, torque Body Nuts to 25% of final recommended torque.
 - b. Using same procedure, torque to 50% of final torque.
 - c. Using same procedure, torque to 75% of final torque.
 - d. Using same procedure, torque to final torque.

BODY NUT ASSEMBLY TORQUES

	Assembly Torque (Ft-Lbs)	Assembly Torque (Ft-Lbs)	Assembly Torque (Ft-Lbs)
Valve Size	Class 150	Class 300	Class 600
1"	$\frac{5}{16}$ "-18 UNC: 101	$\frac{3}{8}$ "-16 UNC: 180	$\frac{3}{8}$ "-16 UNC: 180
1-1/2"	$\frac{3}{8}$ "-16 UNC: 180	$\frac{7}{16}$ "-14 UNC: 288	$\frac{1}{2}$ "-13 UNC: 439
2"	$\frac{7}{16}$ "-14 UNC: 288	$\frac{3}{8}$ "-16 UNC: 180	$\frac{1}{2}$ "-13 UNC: 439
2-1/2"	$\frac{7}{16}$ "-14 UNC: 288	n/a	n/a
3"	$\frac{7}{16}$ "-14 UNC: 288	$\frac{9}{16}$ "-12 UNC: 636	$\frac{3}{4}$ "-10 UNC: 1548
4"	$\frac{1}{2}$ "-13 UNC: 439	$\frac{3}{4}$ "-10 UNC: 1548	$\frac{7}{8}$ "-9 UNC: 2200
6"	$\frac{5}{8}$ "-11 UNC: 876	$\frac{7}{8}$ "-9 UNC: 2200	n/a
8"	$\frac{3}{4}$ "-10 UNC: 1548	1"-8 UNC: 3600	n/a
10"	$\frac{7}{8}$ "-9 UNC: 2200	n/a	n/a

- O. Retest valve assembly per API 598 or ASME B16.34.
- P. Re-install per Section II.