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IOM 002
February 2018

VALVE SOLUTIONS - Quadrant

INSTALLATION, OPERATING, & MAINTENANCE INSTRUCTIONS

**F1 Unibody Flanged-End Ball Valve IOM for:
1/2"- 6" F1-CS & F1-SS – ANSI CLASS 150 & 300**

Read these entire instructions carefully before installation or servicing.

GENERAL INFORMATION

Safe and efficient operation of industrial installations requires not only complete knowledge of the engineering and functioning of all machinery and equipment but their continuous proper maintenance as well. Improper operation or maintenance of one single valve may affect the whole operation. To help you achieve trouble-free valve performance, general information is provided here for the optimum operation and maintenance of your Quadrant steel ball valves with floating ball design.

DESIGN

All Quadrant F1 series unibody-floating ball valves are a one-piece body design. The valves are non-directional and can be installed with either end upstream. These valves are designed and manufactured in accordance with ASME B16.34 and API 608. Valves have flanges drilled and faced in accordance with ANSI B16.5.

1. HANDLING VALVES BEFORE MOUNTING/STORAGE

- 1.1 Prior to shipment, blind covers are placed on the inlet and outlet of each Quadrant valve for protection from mechanical damage as well as for prevention of intrusion of dust and other foreign objects into the valve bore during transit. Do not remove these end protectors before valves are mounted.
- 1.2 For valve storage, a dust free place is recommended. Care should always be taken to avoid damaging stems. Placing valves directly

on the ground or concrete floor is not recommended. Under no circumstances should valves be stored outdoors. Valves are shipped in the open position to protect the ball surface.

- 1.3 When moving with a crane, valves should be positively rigged around valve bodies and end flanges. In no case should the crane wire be in direct contact with valve stems or operational gears.
- 1.4 The valve must never be stored in the partially open position. The soft seat can be damaged if the valve is left partially open for long periods. It is recommended that the valve be stored in the full open position to protect the ball and seats.

WARNING

| | |
|--|--|
| | NOTICE |
| | SAFETY FIRST! FOR YOUR SAFETY, TAKE THE FOLLOWING PRECAUTIONS BEFORE REMOVING THE VALVE ASSEMBLY FROM THE LINE OR BEFORE ANY DISASSEMBLY. |

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.

ARE YOU PROTECTED?



Wear any protective clothing and equipment normally required to avoid injury from the particular fluid in the line.

IS THE LINE DEPRESSURIZED?



Depressurize the line and drain the system fluid. Cycle the valve several times to relieve any pressure still inside the valve.

It is important to refer to the identification plate fastened to each valve for maximum pressure ratings and material description. In case there is any question concerning the valve, refer to Quadrant for maximum ratings.

| | |
|--|---|
| | WARNING |
| | Warning: AT ALL TIMES KEEP HANDS OUT OF THE BALL CAVITY. A REMOTELY ACTUATED VALVE COULD CLOSE AT ANY TIME AND RESULT IN SERIOUS INJURY. |

2. VALVE INSTALLATION

| | |
|--|---|
| | NOTICE |
| | Handling equipment is required for the weight involved. The Quadrant ball valve catalog furnishes the approximate weight of the specific valve. |

PROCEDURE

2.1 Verify the valve is correct as shown on the piping arrangement. Look at the identification plate, tags, and markings on the valve for size, pressure class, maximum operating pressure and temperature, and materials.

2.2 Remove end connection protectors.

NOTE: As piping sites are usually dusty, be sure not to remove valve end protectors before your valves are ready for mounting.

2.3 Inspect the valve bore for foreign matter and clean them if necessary. Valves are shipped with

ends sealed, but during the transit, foreign material may be introduced into the bore.

2.4 Inspect gasket contact faces on valve flanges for any scratches or defects. Correct such scratches or defects with sand paper.

2.5 Install valve in line with either end upstream.

Tighten bolts evenly and alternately on tangential line. The end of tightened bolts should protrude equally above the nut.

NOTE: Make sure that valve and pipeline are aligned accurately.

Valve and pipe interior should be flushed to remove foreign objects which may later cause a fluid leak.

Straightness of pipeline and flange faces should be assured to avoid uneven piping stresses against the valve.

Care should be taken to assure that general stress of the pipeline is not concentrated on the valve.

3. VALVE OPERATION

3.1 Rotation of the valve stem by 90° fully opens or closes the valve. Clockwise rotation closes the valve, and counterclockwise rotation opens it.

Note: To prolong the life of the seats, the ball valve should be fully open or closed. Leaving the ball in a half open/closed position could damage the seats.

3.2 On the pilot run, be sure to detect fluid leakage from the packing area, body-insert coupling, flange gasket or piping flange gasket.

3.3 When leakage is detected from packing area. Retighten packing nut [12] and observe result. **Refer to Sketch 1, Sketch 2, and Table 2**

Note: Care should be taken not to overtighten the packing nut, as it would reduce elasticity and consequently sealing performance of packing. If re-tightening does not solve the problem, gland packing should be replaced with new packing. **Refer to Sketch 1, Sketch 2, and Table 2**

- 3.4 When leakage is detected from body-insert joint, torque the insert [2] to the specified torque in table 1. Refer to Sketch 1

4. DAILY VALVE INSPECTION DURING OPERATION – ON STREAM MAINTENANCE

- 4.1 In order to operate your valve safely and satisfactorily, daily inspection is very important. The following are the main items for your daily inspection.

Fluid leakage

- a. leakage from the gland area
- b. leakage from the flange connector
- c. leakage through the valve body surface
- d. leakage through the insert/body area

Generation of abnormal noise

- a. from the valve itself
- b. from the loose bolting
- c. from the vibrating pipelines

Visual confirmation

- a. correct valve operating position
- b. bolting securely tight

- 4.2 If any of the above problems are detected, remedial measures are to be taken immediately as follows:

Fluid leakage

Refer to section 3.3 “Valve Operation” to remedy leakage from the packing area. For the leakage through the valve body surface, a valve repair specialist should be called.

Generation of abnormal noise

Abnormal noise can be distinguished easily from normal noise, if your maintenance engineer gets used to it during daily inspection. For the abnormal noise generated from the valve itself or the pipelines, your piping engineer should be called. Loose bolting should be immediately re-tightened.

Visual Confirmation

Make sure that the valve is operated in the fully opened or closed position. No intermediate position is recommended.

CAUTION: Ball valves are generally not recommended for throttling service, where the fluid flow or the edge of the ball bore may damage or deform plastic ball seats and cause leakage when they are fully closed. You might have an increased concern with the possibility of seat damage or deformation when your ball valves are used for servicing liquid with extremely high fluid velocity and/or high abrasive service such as slurry or a fluid containing many materials.

For this reason, ball valves are basically to be considered as a measure to fully open or shut off the fluid flow. Leaving your ball valves slightly open (intentionally or unintentionally) should be particularly prohibited because of excessive increase of the fluid velocity through the very narrow slit between the seat and edge of the ball bore, which may damage or deform the ball seats.

PERIODIC VALVE INSPECTION OFF STREAM MAINTENANCE

Inspection should be made periodically to detect wear of the ball stem, corrosion of the body or insert interior, and wear of the threads. Usually, stem packing, gaskets, insert seal, stem seal, body O-ring, and ball seats are replaced as a part of basic maintenance operations. For a list of recommended spare parts, see Quadrant ball valve catalog or contact a Quadrant Valve representative.

5. DISASSEMBLY PROCEDURE

(Refer to Assembly Illustration for part identification and location.)

- 5.1 If the valve is in line, isolate the valve from the line pressure.
- 5.2 Release the pressure from the inlet and outlet ports.
- 5.3 It is recommended to cycle the valve four to five times to make sure there is no pressure trapped inside the body cavity.
- 5.4 Before dismantling the valve from the pipeline, mark the flanges adequately in their original location and position to avoid confusion or mistake on subsequent re-installation of valve.
- 5.5 Remove the valve from line.

NOTE: Care should be taken when disassembling not to scratch the stem, ball, or the body interior. All valve components should be kept isolated for easier examination and reassembly.

- 5.6 Before disassembly, remove and collect residual objects from valves if any, and note their location. Examination of these records and materials will be found useful for better valve maintenance.
- 5.7 Scribe witness marks across edges of the coupled body [1] and insert [2] for correct and easy reassembly. **Refer to Sketch 1**
- 5.8 Fully close the valve, loosen handle bolt [18], and remove the handle [15]. **Refer to Sketch 1**
Note: For ½" - 1" valves, remove the handle nut [11] and lock washer [10] from the top of the stem [4]. Then remove the handle [12]. **Refer to Sketch 2**
- 5.9 Remove the snap ring [14] and stop plate [13]. **Refer to Sketch 1**
Note: For ½" - 1" valves the design does not include these components, skip this step. **Refer to Sketch 2**
- 5.10 Remove the packing nut [12], packing bolt [10], and Belleville washers [11]. **Refer to Sketch 1**
Note: For ½" - 1" valves, remove the Packing Nut [9] these valves do not have packing bolts or Belleville washers. Skip step 5.11 **Refer to Sketch 2**
- 5.11 Remove the gland plate [9]. **Refer to Sketch 1**
- 5.12 Remove the insert [2] from the body [1]. **Refer to Sketch 1**
NOTE: This will require the valve to be placed on a soft flat surface not to damage the raised face on the flange. It will be necessary to use the flange bolt holes to secure the valve in place. If the torque required to loosen the insert is over 1.5 times the assembly torque, stop and examine the valve for damage. It is suggested to bring that valve in to a Quadrant facility for further evaluation.
- 5.13 Remove the ball [3] from the body [1]. **Refer to Sketch 1**
NOTE: Removal of the ball should be made with extreme care so that it will not be scratched.
- 5.14 Remove the seats [5] from body [1]. **Refer to Sketch 1**

- 5.15 Remove the body seal [7] from the insert [2]. **Refer to Sketch 1**
- 5.16 Remove the stem [4] by pushing stem into the body cavity. **Refer to Sketch 1**
- 5.17 Remove the stem thrust washer [6] from the stem. **Refer to Sketch 1**
- 5.18** Remove the stem packing [8] from the stuffing box. The packing consists of graphite or TFM (R-PTFE) rings. **Refer to Sketch 1**

6. INSPECTION AND CLEANING

- 6.1 Wipe off metal parts with a soft cloth using petroleum solvent, steam, or oil.
- 6.2 Inspect metal parts for damage or burrs on all surfaces. Worn or corroded area of part shall be carefully examined visually or, if necessary, with a magnifying glass. Cracks should be carefully detected. Wall thickness should be periodically measured for recording corrosion with the passage of time.
- 6.3 Part replacement. For recommended spare parts list see Quadrant ball valve catalog.
NOTE: Soft goods should never be re-used after the valve has been disassembled. Always replace soft goods after disassembly with new pieces. The soft goods include: seats, stem packing, body seal, and thrust washer.

7. RE-ASSEMBLY PROCEDURE

(Refer to Assembly Illustration on last page for part identification and location.)

Valve should be assembled in the following sequence after all the component parts have been cleaned and new spare parts have been prepared. Be sure that rust and other soils are out of the seat retaining areas of the body and insert for optimal sealing performance.

- 7.1 Place the body [1], insert [2], and ball [3] on a clean solid surface and inspect for damage, paying close attention to sealing surfaces such as stem hole, stuffing box, seat pockets, gasket surfaces, and raised face surfaces. **Refer to Sketch 1 & 2**
- 7.2 Clean the body [1], insert [2], and ball [3] to ensure that no dirt or metal debris are trapped in the assembly. **Refer to Sketch 1**

7.3 Apply a thin layer of lubricant to the seat pocket in both the body [1] and insert [2]. Refer to Sketch 1

7.4 Inspect seats [5] for nicks, scratches, or other damages. DO NOT install if damaged. Refer to Sketch 1

7.5 Insert one seat [5] into the body [1] seat pocket. Refer to Sketch 1

Note: Apply a thin layer of lubricant to the top surface of the seats after installing them in the valve.

7.6 Push stem thrust washer [6] onto the stem [4] until washer contacts with the stem flange. Refer to Sketch 1

Note: Before installing the stem [4] in the valve, apply a thin layer of lubricant to the stem.

7.7 Carefully insert the stem [4] into the body [1] from inside body cavity. Refer to Sketch 1

7.8 Rotate stem [4] to closed position and carefully install ball [3] into the valve body [1] by sliding ball stem slot onto stem. Refer to Sketch 1

7.9 Spray some aerosol lubricant (WD 40) on top of ball [3] and rotate stem [4] open and closed several times to make sure the ball does not interfere with the body casting. Refer to Sketch 1

7.10 Insert the stem packing [8] into stuffing box seal area. Refer to Sketch 1

Note: Make sure not to damage packing when inserting into the stem seal area. Graphite packing is very fragile.

7.11 Place gland plate [9] over stem [4] and into stem seal area in the body. Refer to Sketch 1

NOTE: ½" - 1" valve does not include a gland plate or gland bolting. Apply a small amount of anti-seize compound on Packing Nut [9] thread, torque the Packing Nut to the torque specified in table 2 and skip steps 7.12 thru 7.13. Refer to Sketch 2 and Table 1

7.12 Install packing bolting [10]. The packing bolts will be inserted from the top; install two Belleville spring washers [11] with the large

diameters together then install the packing nut [12]. Tighten the packing nut evenly to the torque specified in table 2. Refer to Sketch 1 and Table 2.

7.13 Place stop plate [13] over the stem [4]. achieved. Refer to Sketch 1

7.14 Insert the second seat [5] and body seal [7] into the body [1] and insert [2]. A small amount of grease may be necessary to retain the seal in place. Refer to Sketch 1

7.15 **CRITICAL: Rotate ball [3] to closed position before installing the insert [2].** Refer to Sketch 1

7.16 Apply a small amount of anti-seize compound on insert [2] threads. Install insert into the body [1] and torque the insert to the torque required in table 1. Refer to Table 1 & Sketch 1

7.17 Place stop plate [13] over the stem [4]. Refer to Sketch 1

NOTE: ½" - 1" valve does not include a stop plate or snap ring. Skip steps 7.17 and 7.18. Refer to Sketch 2

7.18 Install the snap-ring [14] on the stem groove. Refer to Sketch 1

7.19 Install handle [15] on valve: put handle over stem [5] and tighten handle bolt [18]. Refer to Sketch 1

NOTE: For ½" - 1" valve place handle [12] over stem [4], then place handle nut [11] on top of handle, and tighten with appropriate wrench. Refer to Sketch 2

TEST AND INSPECTION

8.1 Check the valve operating condition by fully opening and closing several times. Make sure that lock plate matches extreme operating position of the valve.

8.2 All valves, after reassembly, should be subjected to hydrostatic or pneumatic seat test to insure valve performance.

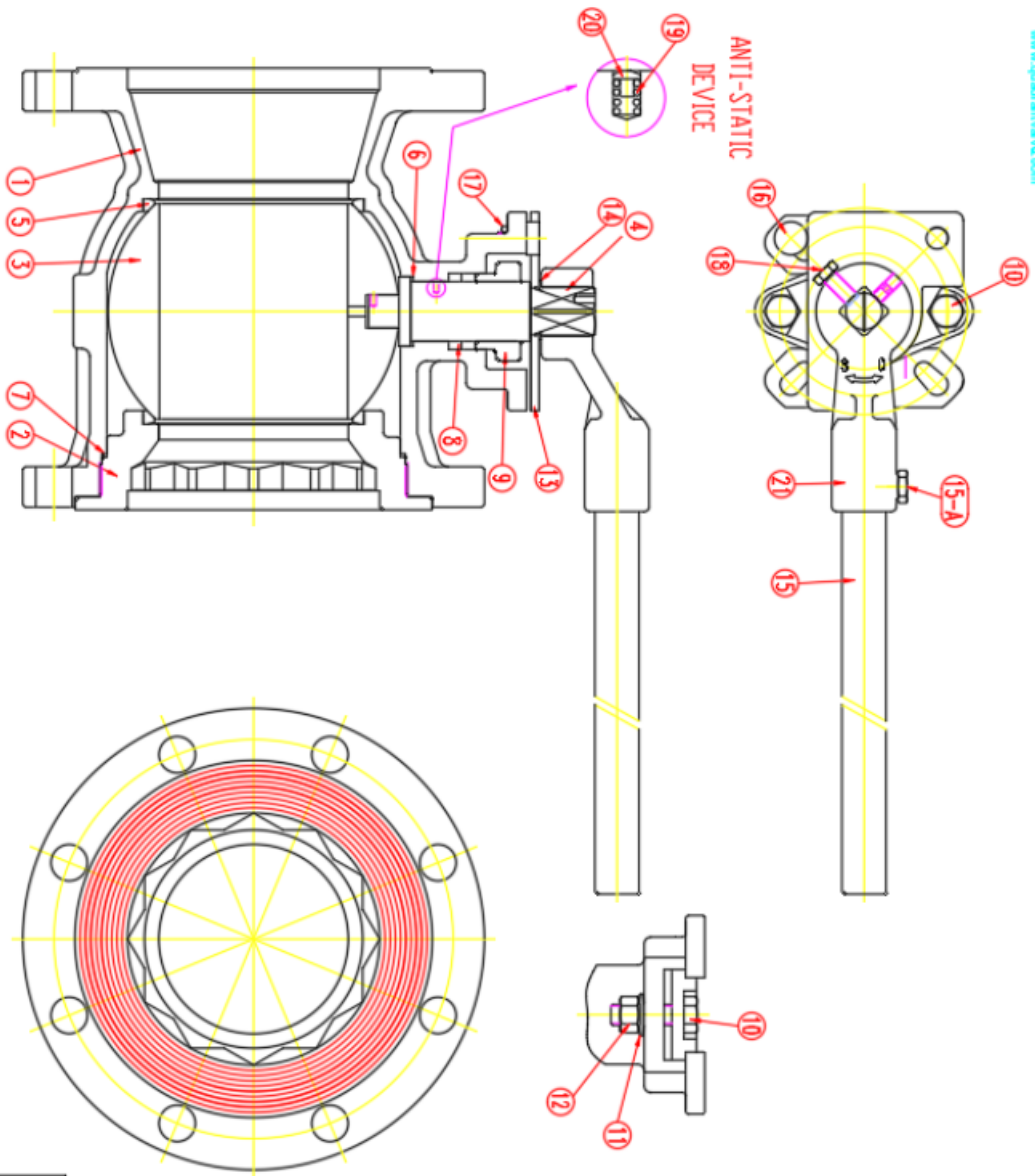
Table 1) Insert Torque (Ft.-Lbs.) according to Valve Size

| Valve Size | 1/2" | 3/4" | 1" | 1 1/2" | 2" | 3" | 4" | 6" |
|--------------------------|-------------|-------------|-----------|---------------|-----------|-----------|-----------|-----------|
| Torque (Ft.-Lbs.) | 147 | 147 | 347 | 453 | 547 | 918 | 1179 | 1445 |

Table 2) Gland Bolting Torque

| Valve Size | Minimum Gland Bolting Torque (In.-Lbs.) |
|-------------------|--|
| 1/2 | 87 |
| 3/4" – 1" | 130 |
| 1 1/2" – 2" | 45 |
| 2 1/2" – 3" | 71 |
| 4" - 6" | 107 |

Assembly Illustrations

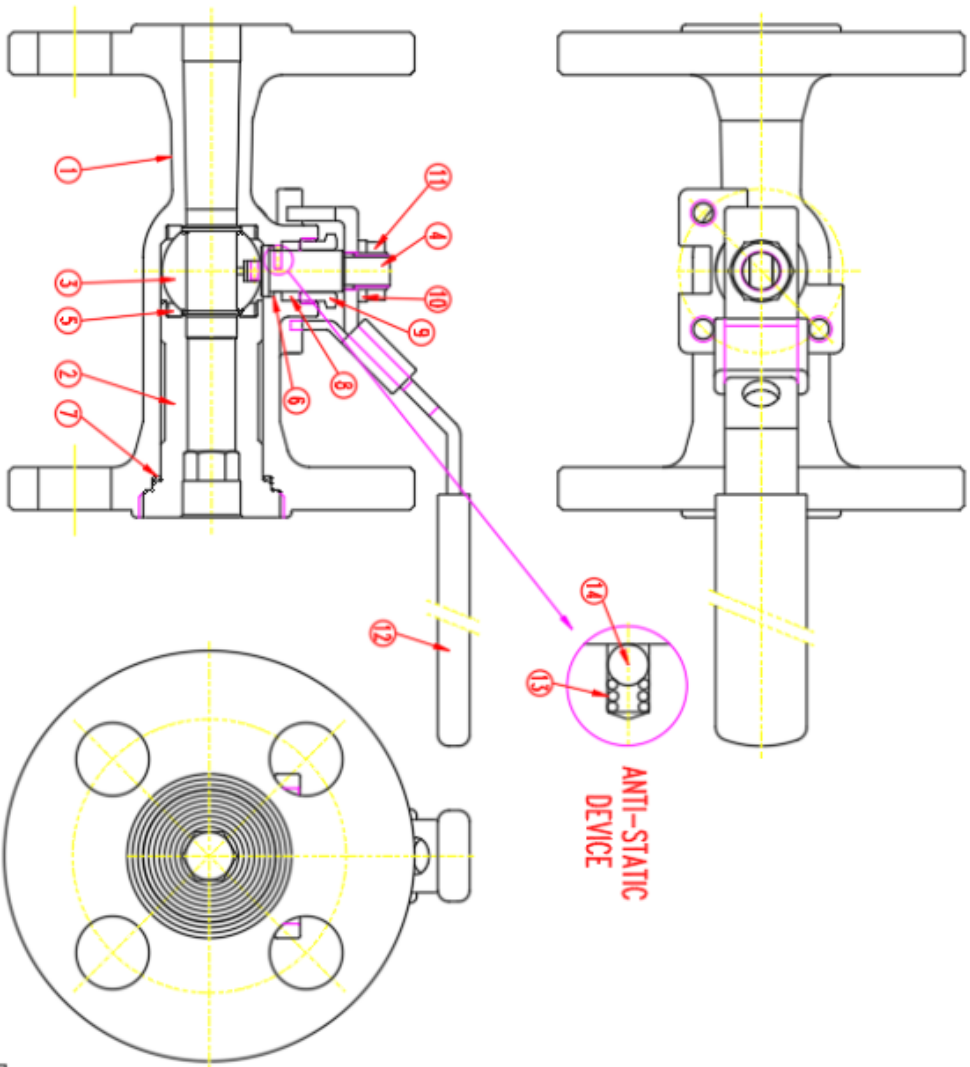


| ITEM | PART NAME |
|------|-------------------|
| 1 | BODY |
| 2 | INSERT |
| 3 | BALL |
| 4 | STEM |
| 5 | SEAT |
| 6 | THRUST WASHER |
| 7 | BODY SEAL |
| 8 | STEM PACKING |
| 9 | GLAND PLATE |
| 10 | PACKING BOLT |
| 11 | BELLEVILLE WASHER |
| 12 | PACKING NUT |
| 13 | STOP PLATE |
| 14 | SNAP RING |
| 15 | HANDLE |
| 15A | PIPE BOLT |
| 16 | STOP PIN |
| 17 | STOP PIN NUT |
| 18 | HANDLE BOLT |
| 19 | GROUNDING SPRING |
| 20 | GROUNDING BALL |
| 21 | HANDLE ADAPTOR |

| | | | |
|--|------------|---------------|-----|
| SIZE 1-1/2" - 6" - CLASS 150 & 300 UNIBODY FLANGE END FLOATING BALL VALVE F1RCSRGLH1FXXX | | | |
| DRAWN | NG | DWG. NO. | REV |
| APPROVED | NG | Q00S000400005 | 0 |
| DATE | 02/14/2018 | | |



Sketch 1



| ITEM | PART NAME |
|------|------------------|
| 1 | BODY |
| 2 | INSERT |
| 3 | BALL |
| 4 | STEM |
| 5 | SEAT |
| 6 | THRUST WASHER |
| 7 | BODY SEAL |
| 8 | STEM PACKING |
| 9 | PACKING NUT |
| 10 | LOCK WASHER |
| 11 | HANDLE NUT |
| 12 | HANDLE ASSY |
| 13 | GROUNDING SPRING |
| 14 | GROUNDING BALL |

SIZE 1/2" - 1" -CLASS 150 & 300
 UNIBODY FLANGE END FLOATING BALL VALVE
 F1RCSRGLH1FXXX

| DRAWN | NG | DWG. NO. | REV |
|----------|-----------|----------------|-----|
| APPROVED | NG | Q00S0000005006 | 0 |
| DATE | 2/26/2018 | | |



Sketch 2

Quadrant Valve & Actuator – Valve Solution is a wholly owned subsidiary of Forum Energy Technologies.

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Contact your local Quadrant ® representative for more information about other Quadrant ® Brand flow control products, or learn more about other fine Quadrant ® products by visiting www.f-e-t.com

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