

## CLARKSON FIGURE 215 SLIDE GATE VALVE

### INSTALLATION AND MAINTENANCE INSTRUCTIONS

Before installation these instructions must be fully read and understood



#### **WARNING**

*The user is responsible for correct directional installation.*

On select applications, greater performance may be realized by installing a unidirectional valve in the reverse flow position, contact factory for details.

**Packing assembly:** the packing gland bolts should be checked and adjusted to obtain a first time packing seal. Packing gland bolts may become slightly loose when valve is shipped. Field adjustment is expected and desired. (Tighten just enough to stop any leakage. Overtightening may increase valve operating torque and shorten packing life.) The Figure 215 is equipped with two packing assemblies.

**Operators:** standard manual handwheels are shipped loose for field installation. It is necessary to use a pipe wrench or large crescent wrench to properly tighten the handwheel retaining nut. Be sure to fully tighten.

If valve is supplied with other than standard handwheel operator, additional support may be required, especially if valve is other than vertical. See page 6 for further details.

**Bolting:** the mating line flanges must be properly aligned. Slip on or weld flanges can be used. Never try to make up for misaligned pipe flanges by the line bolting. Pipe supports and/or expansion joints should be used to minimize pipe loads on valves.

Most Figure 215 valves are suitable for use in either vertical or horizontal lines. If operator is other than vertical, additional support may be required if valve is not handwheel operated. For horizontal pipes with valves mounted with the stem horizontal, additional wear strips may be required. Consult factory.

#### **GENERAL INFORMATION**

Thank you for purchasing a Figure 215 slide gate valve from Emerson. With proper care it should provide you a long service life.

**Valve types:** standard Figure 215 is UNIDIRECTIONAL (one-way shut-off). Uni-directional valves have a preferred shut-off direction, however, they will handle flow in both directions without concern.

#### **WARNING**

*Care must be taken in valve installation with respect to direction of flow.*

Uni-Directional valves have the preferred direction of shut-off indicated by the word "SEAT" stamped on the upper right hand corner of the gate on the seat side or a flow arrow (pointing toward the preferred direction). A unidirectional valve is normally installed with the seat side (preferred direction) downstream, with the line pressure pushing the gate toward the seat.

# CLARKSON FIGURE 215 SLIDE GATE VALVE

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### INSTALLATION INSTRUCTIONS

Please take note of the specific installation tags provided with each valve.

The mating line flanges must be properly aligned. Slip on or weld flanges can be used. Never try to make up for misaligned pipe flanges by the line bolting. Pipe supports and/or expansion joints should be used to minimize pipe loads on valves.

Most Figure 215 valves are suitable for use in either vertical or horizontal lines. If operator is other than vertical, additional support may be required if valve is not handwheel operated. For horizontal pipes with valves mounted with the stem horizontal, additional wear strips may be required. Consult factory.

### Bolting and installation instructions for standard slide gates

(Valves with drilled and tapped flange mounting holes)

All standard Class 150 Figure 215 valves are "flanged" design. The port flanges of the valves NPS 2 to 24 are drilled and tapped to ASME B16.5/150. The valves are normally provided in the MSS standard face-to-face with the port flange bolt holes drilled and tapped. The bolt holes in the chest or upper flange area are blind tapped, see Figure 1.

### WARNING

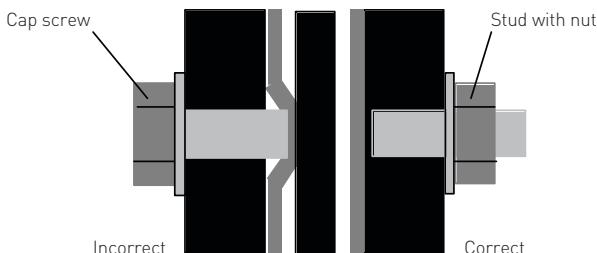
Care must be taken when installing studs or bolts in the tapped holes of the flange in the valve chest area to prevent damage.

Cap screws or bolts that are too long can pinch the valve body, thereby forcing it into the gate and springing the gate out of line. Additional damage can occur on the gate face, such as scoring or scratching of the gate. This type of damage normally requires the valve be returned to our shop for repair. To avoid damage, it is recommended that studs be used on all tapped bolt holes, especially the upper chest holes. If cap screws are used, be sure that they do not enter beyond the depth of the tapped hole when fully tightened. See Table A for flange thicknesses of MSS face-to-face knife gate valves.

### MAXIMUM FLANGE BOLT TORQUES (ft-lbs)

Size	Torque	Size	Torque
5/8	55 +/-5	1 1/8	150 +/-5
3/4	65 +/-5	1 1/4	200 +/-5
7/8	110 +/-5	1 1/2	250 +/-5
1	135 +/-5		

FIGURE 1



# CLARKSON FIGURE 215 SLIDE GATE VALVE

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

**TABLE A - MSS-SP81 DIMENSIONS**

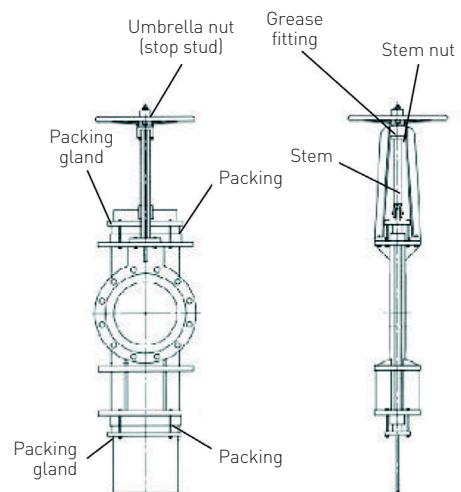
Valve size	Flange outside dia. <sup>[1]</sup>	Raised face o.D. <sup>[1]</sup>	Bolt circle dia. <sup>[1]</sup>	Bolting dimensions <sup>[1,3]</sup>		Face to face	Flange thickness <sup>[2]</sup>
				No. of bolts	Tap size		
2	6	3 <sup>5</sup> / <sub>8</sub>	4 <sup>3</sup> / <sub>4</sub>	4	5/8 - 11 NC	1 <sup>1</sup> / <sub>8</sub>	1/2
3	7 <sup>1</sup> / <sub>2</sub>	5	6	4	5/8 - 11 NC	2	1/2
4	9	6 <sup>3</sup> / <sub>16</sub>	7 <sup>1</sup> / <sub>2</sub>	8	5/8 - 11 NC	2	1/2
5	10	7 <sup>5</sup> / <sub>16</sub>	8 <sup>1</sup> / <sub>2</sub>	8	3/4 - 10 NC	2 <sup>1</sup> / <sub>4</sub>	5/8
6	11	8 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	8	3/4 - 10 NC	2 <sup>1</sup> / <sub>4</sub>	5/8
8	13 <sup>1</sup> / <sub>2</sub>	10 <sup>5</sup> / <sub>8</sub>	11 <sup>1</sup> / <sub>4</sub>	8	3/4 - 10 NC	2 <sup>3</sup> / <sub>4</sub>	5/8
10	16	12 <sup>3</sup> / <sub>4</sub>	14 <sup>1</sup> / <sub>4</sub>	12	7/8 - 9 NC	2 <sup>3</sup> / <sub>4</sub>	3/4
12	19	15	17	12	7/8 - 9 NC	3	3/4
14	21	16 <sup>1</sup> / <sub>4</sub>	18 <sup>3</sup> / <sub>4</sub>	12	1 - 8 NC	3	13/ <sub>16</sub>
16	23 <sup>1</sup> / <sub>2</sub>	18 <sup>1</sup> / <sub>2</sub>	21 <sup>1</sup> / <sub>4</sub>	16	1 - 8 NC	3 <sup>1</sup> / <sub>2</sub>	7/8
18	25	21	22 <sup>3</sup> / <sub>4</sub>	16	1 1/8 - 7 NC	3 <sup>1</sup> / <sub>2</sub>	15/ <sub>16</sub>
20	27 <sup>1</sup> / <sub>2</sub>	23	25	20	1 1/8 - 7 NC	4 <sup>1</sup> / <sub>2</sub>	1
24	32	27 <sup>1</sup> / <sub>4</sub>	29 <sup>1</sup> / <sub>2</sub>	20	1 1/4 - 7 NC	4 <sup>1</sup> / <sub>2</sub>	1

### NOTES

For larger size valves, refer to the customer drawing.

- These dimensions duplicate Class 150 of ASME B16.5 to facilitate mating.
- Flange thickness includes 1/16" raised face.
- Hole size dimensions for through bolting shall conform to Class 150 of ASME B16.5.
- All dimensions are in inches.

**FIGURE 2**



### GENERAL MAINTENANCE

The factory recommends that all Figure 215 valves be inspected at least every 60 days.

The following points should be examined and corrected as required:

#### 1. Valve stems, extension stems, and stem

**nut:** look for excessive corrosion, galling or lack of lubrication. If a valve stem requires lubrication, utilize the grease fitting provided and pump standard bearing grease through the yoke hub to lubricate the stem and stem nut assembly. Additional lubrication may be applied directly onto stem or stem threads. (Use material which meets ASTM 4950 GBLB). See Figure 2.

**2. Packing glands:** check for leaks or worn packing. If leakage is occurring around the packing gland, tighten the packing gland bolts, being careful not to overstress the bolting. On some valves this will require two wrenches, one to tighten the nut and the other to hold the packing bolt from turning. If the valve requires repacking, you may use any standard square braided packing as suitable for your service. See additional instructions for repacking on page 5 for bonnetless valves.

- If possible, stroke the valve through the full open and closed position to make sure it is functioning properly.

### NOTES

- Stop all small leaks as soon as possible as considerable damage can be done to the valve and the surrounding area if leakage is allowed to continue to grow.
- Replacement parts including handwheel and yoke assemblies, gates, packing glands, and packing can be provided from our factory. If valve requires further repair, please contact our office for an estimate of feasibility and cost of repair.

# CLARKSON FIGURE 215 SLIDE GATE VALVE

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### SPARE PARTS

If service conditions necessitate maintaining spare parts, the following are recommended:

#### Valves:

- 2- Sets packing [2 sets recommended for slide gates, Figure 215]

#### Cylinder operator:

- 1-Repair kit

When ordering replacement parts for a Figure 215 valve or cylinder operator, please include valve or cylinder size and complete description including serial number with your request.

Additional replacement parts such as handwheels, stemnut assemblies, yokes, stems, packing glands, and gates are available from factory stock. Again, please provide complete description with serial number when ordering.

### NOTE

Stem nut assemblies include the retaining nut, thrust washer and stem nut.

Stem assemblies include the threaded bar and lifter attached and stop stud with umbrella nut.

FIGURE 3  
Typical metal seated slide gate valve

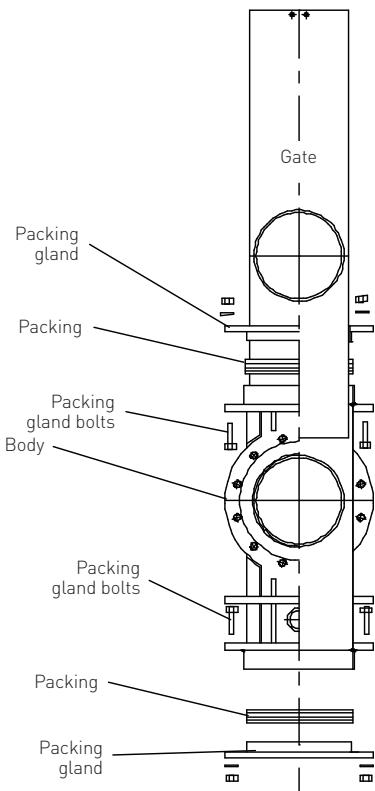
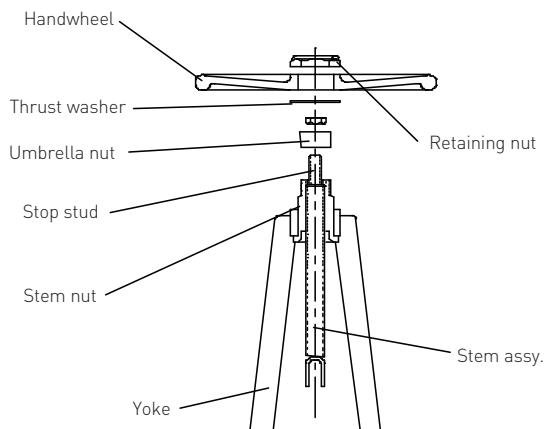


FIGURE 4  
Typical conventional handwheel topworks



# CLARKSON FIGURE 215 SLIDE GATE VALVE

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### INSTRUCTIONS FOR REPACKING BONNETLESS METAL SEATED SLIDE GATE VALVES

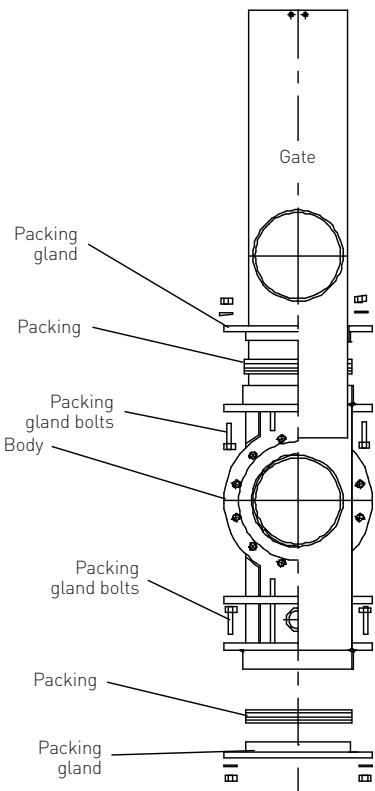
#### Tools and materials required

1. Open end wrenches, (2).
2. Packing, four or five rows of the required packing. Figure 215 valve standard packing is special PTFE impregnated synthetic (AFPL).
3. Knife, to cut packing.
4.  $\frac{3}{8}$ " x 2" flat bar approximately 24" long with rounded end.
5. Tool with radius end to fit inside of packing box.

#### Prepare valve

1. Relieve pressure on valve or remove valve from line.
2. Close the valve.
3. Disconnect the gate lifter.
4. Remove yoke bolts, pull yoke off of valve.
5. Remove packing gland bolts, packing gland, and old packing.

FIGURE 5  
Typical metal seated slide gate valve



### INSTALLATION OF NEW PACKING

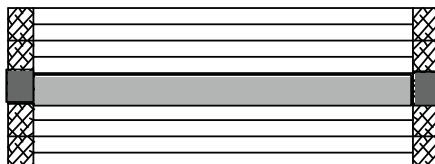
If valve is equipped with SM636 packing, see note 2 before starting.

1. Cut packing to exact length for each row. Starting on the side of the gate opposite the seat (note the flow arrow attached to the valve or the word "seat" stamped on the top of the gate indicating the seat side of the valve); install the packing on both sides of the gate one row at a time. Alternate sides of the gate where the ends of the packing meet against each other. Ends of packing must not line up. If they do, premature leakage could occur. Reassemble packing gland and bolt to valve.
2. Reassemble the valve yoke and stem. Bolt the yoke to the valve body and the gate to the lifter.
3. Apply pressure to the line and adjust packing, see Note 1.
4. The Figure 215 has two packing boxes (one each end of body). Repacking procedure is the same, be sure and repack both ends.

### NOTES

1. Important, do not tighten packing gland bolts any more than required to stop packing gland leaks after line pressure is applied.
2. SM636 packing is triangular in shape,  $\frac{1}{2}$ " (equilateral) on a side and about  $2\frac{1}{2}$ " long. It can be broken into pieces to conform to the shape of the packing box. Install one (or two) row(s) of Self Mold #636 as appropriate for the size valve. See Figure 6. Make sure that all voids are filled.

FIGURE 6  
For valves with SM636 packing

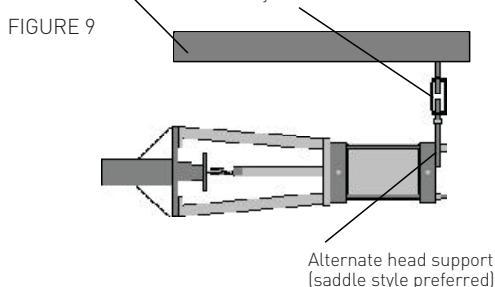
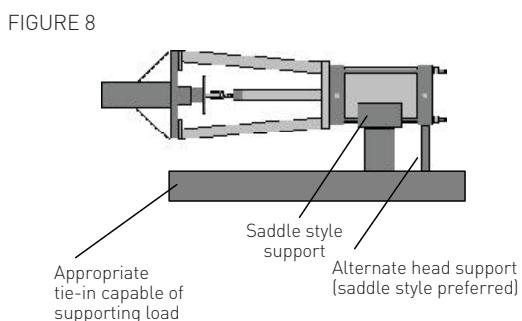
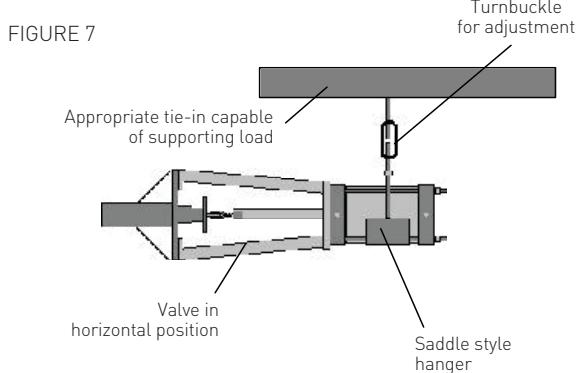


# CLARKSON FIGURE 215 SLIDE GATE VALVE

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### SUGGESTED CYLINDER SUPPORT WHEN CYLINDER IS MOUNTED HORIZONTAL OR OFF VERTICAL POSITION

Cylinders may require additional support when mounted in other than vertical position. Failure to do so could lead to premature failure of cylinder and/or valve. The following figures are suggestions, specific details will have to be determined by customer so support best suits surrounding area. It is important that the cylinder/gate alignment be maintained during valve operation. Supports should be designed to maintain alignment and support bulk of cylinder weight.



# CLARKSON FIGURE 215 SLIDE GATE VALVE

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### CONVENTIONAL YOKE STEM NUT REPLACEMENT INSTRUCTIONS

#### Tools required

1. Pipe wrench or large crescent wrench.
2. Appropriate size open end wrenches.

#### Prepare the valve

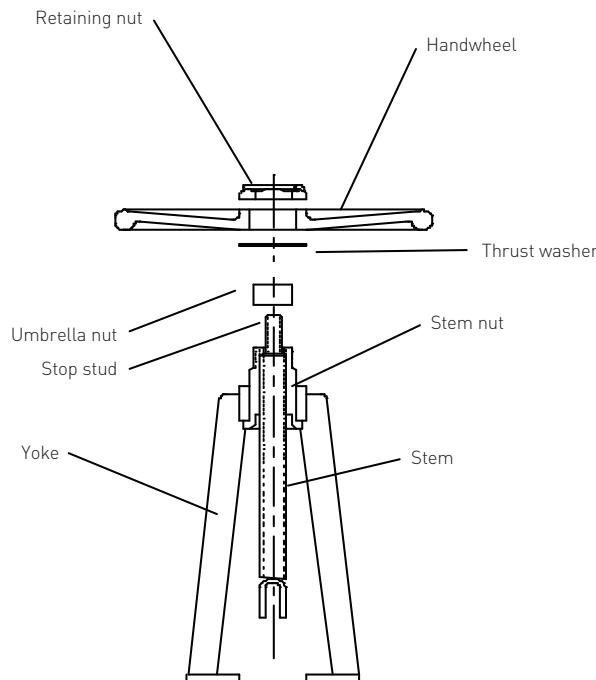
1. Take the following precautions if valve is in a charged line. Close the valve completely and secure the gate in place. These precautions are for safety to keep the gate from moving and coming out of valve.

#### Disassembly

1. Using pipe wrench or crescent wrench, remove handwheel retaining nut from stem nut.
2. Remove handwheel and thrust washer.
3. Remove (4) yoke nuts and bolts.
4. Pull yoke away from stem nut. (If this is not possible, remove gate bolts from stem lifter and pull entire assembly off then pull stem nut from yoke.)
5. Rotate stem nut free from stem. If the valve is equipped with an umbrella nut assembly, this assembly must be removed first to allow the stem to travel through the stem nut. To remove the umbrella nut, simply rotate nut loose from stud.

FIGURE 10

Conventional yoke operator assembly



#### Reassembly

1. If stem was removed, reattach to gate at this time.
2. Rotate new stem nut onto stem until approximately one inch of stem sticks out of top.
3. Place yoke over stem nut, lining up the yoke bolt holes.
4. Assemble yoke to body.
5. Rotate stem nut until it bottoms out against bottom of yoke boss.
6. Place new thrust washer in place.
7. Place handwheel over stem nut, aligning the hex.
8. Attach new handwheel retainer nut, using pipe wrench or crescent wrench, tighten completely.
9. Grease as required using grease fitting.
10. Figure 215 is equipped with an umbrella nut which will require adjustment.

To adjust umbrella nut on Figure 215:

- A. Thread umbrella nut onto stop stud until a gap approximately  $\frac{1}{8}$ " exists between top of stem and bottom of umbrella nut.
- B. With valve out of line, open the valve and examine the fit between the gate port I.D. and valve seat I.D. These should line up to achieve proper valve function. If misaligned, adjust umbrella nut until proper fit is achieved.

# CLARKSON FIGURE 215 SLIDE GATE VALVE

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

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### RECOMMENDED LONG TERM STORAGE PROCEDURE

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The following are factory recommendations for storage procedures to retain maximum product integrity during long term storage of 1 to 5 years.

Handwheel, lever or manual gear operated valve:

**A. Storage facility:** the preferred storage location is a clean, dry protected warehouse. If valves are to be stored outside, precautions should be taken to keep valves clean and dry. Standard packaging materials cannot be considered sufficient for outdoor storage.

**B. Equipment orientation:** valves may be stored in the vertical or horizontal position.

**C. Preparation for storage:** valves may be stored as shipped, provided the above storage location and equipment orientation instructions are followed. If valve packaging is altered or removed for receiving inspection, repackage valve as originally received.

**Note:** O-Ring seated valves should be stored with the gate slightly open (gate off the gate wedges).

**D. Storage inspection:** visual inspection shall be performed on a semiannual basis and results recorded. Inspection as a minimum shall include reviewing the following:

- Packaging
- Flange covers
- Dryness
- Cleanliness

**E. Maintenance:** maintenance shall consist of correcting deficiencies noted during inspection. All maintenance shall be recorded. Contact factory prior to performing any maintenance if valve is still covered under warranty.

### Cylinder operated valves

**A. Storage facility:** the preferred storage location is a clean, dry protected warehouse. If valves are to be stored outside, precautions should be taken to keep valves clean and dry. Standard packaging materials cannot be considered sufficient for outdoor storage.

**B. Equipment orientation:** the preferred orientation for optimum protection is with the valve fully opened and the cylinder in the vertical position. This position gives the best support to the cylinder rod and helps reduce the chance of a "flat spot" developing on the cylinder seals. An acceptable alternate position for valves with cylinder diameters of less than 6" is with the cylinder in the horizontal position.

**C. Preparation for storage:** valves may be stored as shipped, provided the above storage location and equipment orientation instructions are followed. If valve packaging is altered or removed for receiving inspection, repackage valve as originally received. Note: O-Ring seated valves should be stored with the gate slightly open (gate off the gate wedges).

### Cylinder storage

For storage of up to 3 years; Squirt a high quality grade of hydraulic oil or synthetic lubricant into the cylinder ports and operate cylinder 6-12 times on a yearly basis.  
For storage 3-5 years; Lubricate as above. Additionally, extend cylinder rod until the valve is fully closed. Coat cylinder rod with high quality heavy grease or synthetic lubricant. Retract cylinder rod until valve is fully open, drawing lubricant into rod end of cylinder. Securely plug cylinder ports with pipe plugs, if cylinder is not pre-piped to control accessories. If cylinder is pre-piped to accessories, plug all input and output ports of accessories.

These cylinder storage instructions are not intended to replace the instructions of the specific cylinder manufacturer and are to be used as a guide only. If specific instructions are required, please contact our office.

**D. Storage inspection:** visual inspection shall be performed on a semiannual basis and results recorded. Inspection as a minimum shall include reviewing the following:

- Packaging
- Flange covers
- Dryness
- Cleanliness

**E. Maintenance:** maintenance shall consist of correcting deficiencies noted during inspection. All maintenance shall be recorded. Contact factory prior to performing any maintenance if valve is still covered under warranty.

# CLARKSON FIGURE 215 SLIDE GATE VALVE

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### INSTRUCTIONS FOR CONVERTING A HANDWHEEL OPERATED FIGURE 215 VALVES WITH UMBRELLA NUT TO A BEVEL GEAR OPERATOR

Conversion kits include new yoke, stem, thrust style stem nut, bolts, and bevel gear operator with handwheel or drive nut as required.

#### Tools required

1. Pipe wrench or large crescent wrench.
2. Appropriate size open end wrenches.

#### Prepare the valve

1. Take the following precautions if valve is in a charged line. Close the valve completely and the secure gate in place. These precautions are for safety to keep the gate from moving and coming out of valve.

#### Disassembly

1. Using pipe wrench or crescent wrench, remove handwheel retaining nut from stem nut.
2. Remove handwheel and thrust washer.
3. Remove gate bolts from stem lifter.
4. Remove (4) yoke nuts and bolts.
5. Pull entire yoke assembly away from valve.

**Caution:** bolts are not retained and may fall free if not restrained.

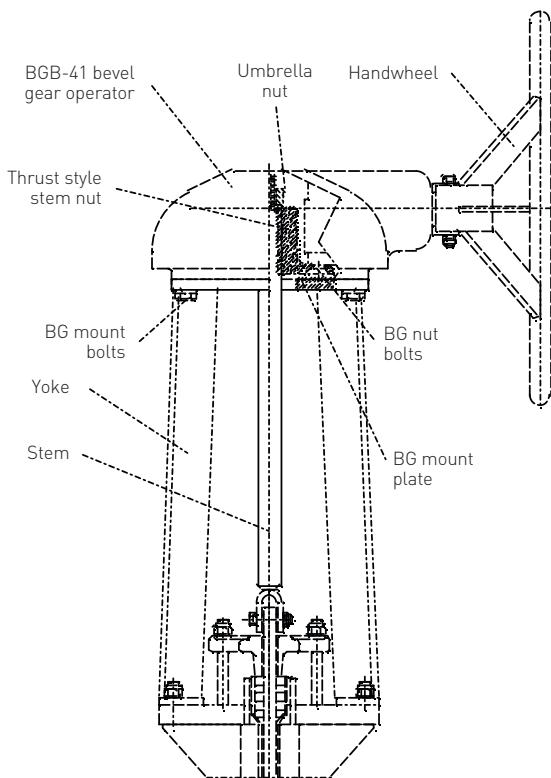
#### Reassembly

1. The conversion kit will be shipped with the bevel gear attached to the yoke, with the stem in place.
2. Rotate the stem until half its length is above the bevel gear.
3. Slip the new yoke onto the valve, bringing the yoke foot pads down to the valve top plate and aligning the bolt holes. If the yoke feet do not reach the valve, then rotate the stem which should bring the yoke feet into proper position.
4. Bolt the yoke assembly to the valve. Do not overstress bolting.
5. Rotate the stem until the lifter goes over the top of the gate, then rotate the bevel gear handwheel until the gate bolt holes line up.
6. Attach the gate to the stem.
7. Stroke the valve from full open to full closed making sure all parts are aligned and working properly. Check bolts for tightness, the gate and operator assembly should stay snug with the valve body.
8. If binding or off-center movement of gate is evident, loosen yoke bolts, stroke gate up and down a few times, retighten yoke bolts.
9. Grease as required using grease fitting.
10. The Figure 215 is equipped with an umbrella nut which will require adjustment.

To adjust umbrella nut on Figure 215:

- A. Open valve until entire stop stud is exposed through top of bevel gear.
- B. Thread umbrella nut onto stop stud until a gap approximately  $\frac{1}{8}$ " exists between top of stem and bottom of umbrella nut.
- C. If valve is out of line, open the valve and examine the fit between the gate port I.D. and valve seat I.D. These should line up to achieve proper valve function. If misaligned, adjust umbrella nut until proper fit is achieved.

FIGURE 11



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