



Clow Valve Co.

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ECCENTRIC PLUG VALVE O & M MANUAL

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Installation, Operation and Inspection Manual

ECCENTRIC PLUG VALVES

General;

Inspect all valves and actuators at time of delivery for shipping damage and confirm compliance with specifications. Valves are fully tested per the AWWA C517 standard and properly packaged by the manufacturer. The valves should be stored in such manner to protect them from the weather. Water and debris should not be allowed to collect in or on the valve. Valve should be stored with plug partly open. Flange protectors and other packaging materials removed for inspections should be replaced. Proper slinging and handling methods should be used when moving the valves. Do not place slings or other devices around operating shaft, or through the flow way. Do not use attached actuators for lifting.

I. INSTALLATION

1. *Check that valve and end joints are clean. Again check for damage to the valve. Open and close valve to insure proper operation. Close valve plug before placing in trench.*
2. *Handle valve carefully. Do not drop into position. Do not use attached actuators or other mechanisms as lifting devices. Do not place slings or chains through port opening.*
3. *Prepare pipe ends according to pipe manufacturer's instructions. Install valve per proper method according to end joint type. All piping should be properly supported to avoid line stress on the valve. Do not use the valves as a jack to force a pipeline into position.*
4. *Valves should be positioned for orientation of flow and any attached actuators. The valve is designed to operate with flow in two directions. The valve is normally used in the "standard flow" direction (seat on downstream of flow), with flow against the back of the plug. In buried installation, any valve boxes should be installed such that no load is transferred to the valve. Provisions should be made to prevent dirt and debris from entering valve box and getting on top of the valve which could impair the operation of the valve.*
5. *In buried installations, do not backfill before the system is tested. Leave valves exposed while the pipeline is being pressurized.*
6. *Do not test systems to greater than valve's rated working pressure.*
7. *With the valve in the open position, the entire system should be thoroughly flushed to prevent the valve closing on debris and damaging the seat.*

II. OPERATION

1. *Do not operate valves in systems that exceed the rated working pressure of the valve. (3"-12" 175 psi, 14" - 24" 150 psi)*
2. *System should be completely flushed before valve is actuated in normal cycle.*
3. *The Eccentric Plug Valve opens and closed through 90 degree of travel. The manual actuator has mechanical stops for fully open or closed position. Excessive force will improve seating or closing but could damage the actuator or the seat (if debris in line is holding plug open). The Eccentric plug valve closes by rotating the rubber covered plug into the seat. On non-gearred valves this is done with a quarter turn of the operating nut. On geared valves the number of turns are 4"-12", 10 turns; 14", 16 turns; 16"-20", 29 turns; 24", 90 turns. All valves open left (counter-clockwise). **Note; for valves with electric actuators, see actuator O&M.***
4. *If the actuator has become difficult to operate before completing the necessary number of turns (based on valve and actuator sizes) do not force. Open the valve fully and start over. The flow in the valve may flush obstructions from the seat area. If the plug is forced into the seat, damage to seats or actuator may result.*
5. *Frequency of operation should be based on the media being conveyed. Systems With higher solids contents should be exercised on a regular basis, suggested weekly.*

III. MAINTENANCE

1. *Semi annual inspections are minimum recommended. Valves should not be dis-assembled unless a break down has occurred.*
2. *The eccentric plug valve and actuator should not be opened, disassembled, or adjusted unless a breakdown in normal operation occurs.*
3. *Inspections should include checking gasketed joints for leakage.*
4. *During regular inspection, the valve should be opened and closed with pressure in the pipeline. The valve should function freely without vibration.*
5. *With the valve closed and pressure against the plug, a check for leakage is possible by "listening" to the valve for flow. A stethoscope will help in this procedure.*
6. *Attached actuators should be inspected per manufacturer's recommendations provided with those units.*
7. *A permanent record of the period inspections should be maintained for each valve.*

There are no lubrication requirements. (Unless disassembling)

Recommended Installation Position

Horizontal Installation with Liquids Containing Suspended Solids:

The valve plug shaft should be in the horizontal plane with the plug rotating towards the top of the valve body.

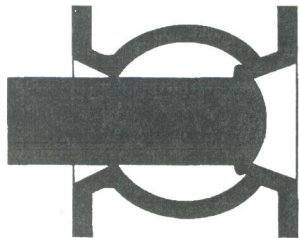
Vertical Installation with Liquids Containing Suspended Solids:

The valve should be installed with the seat end on the top side, regardless of the flow direction, with the plug rotating to the top of the valve.

ECCENTRIC PLUG VALVE
Flow Designated

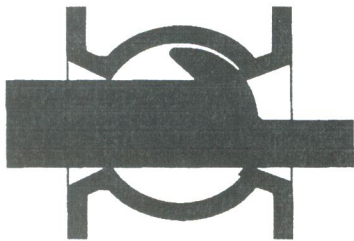
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CLOSED



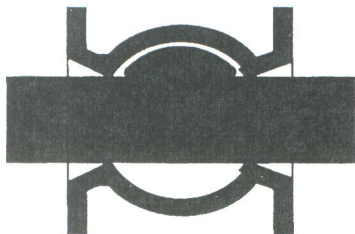
As the plug component is rotated to valve closure, the offset condition of the plug causes the seating surface to move axially downstream into the nickel. The results in a high seating force thereby crushing trapped solids and resulting in a bubble-tight seal. The upstream pressure acting on the convex side of the plug further improves the bubble-tight seal.

OPENING



Upon opening the valve, the initial rotation of the plug causes the resilient seating surface to move axially away from the nickel seat in the body. This action minimizes wear and scraping of the resilient seat, thereby improving the life of the valve. The plug can be positioned at any position between open and closed for throttling applications.

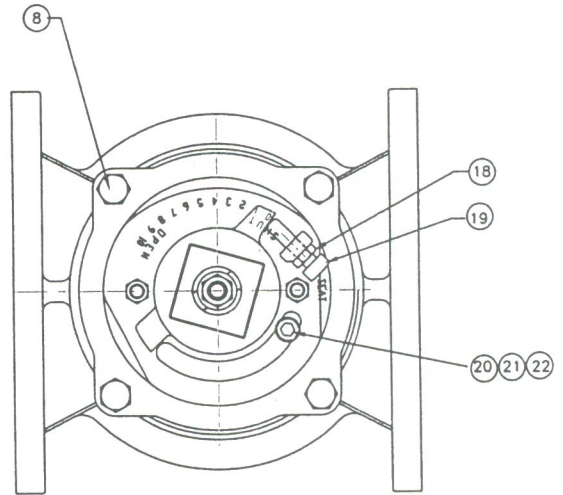
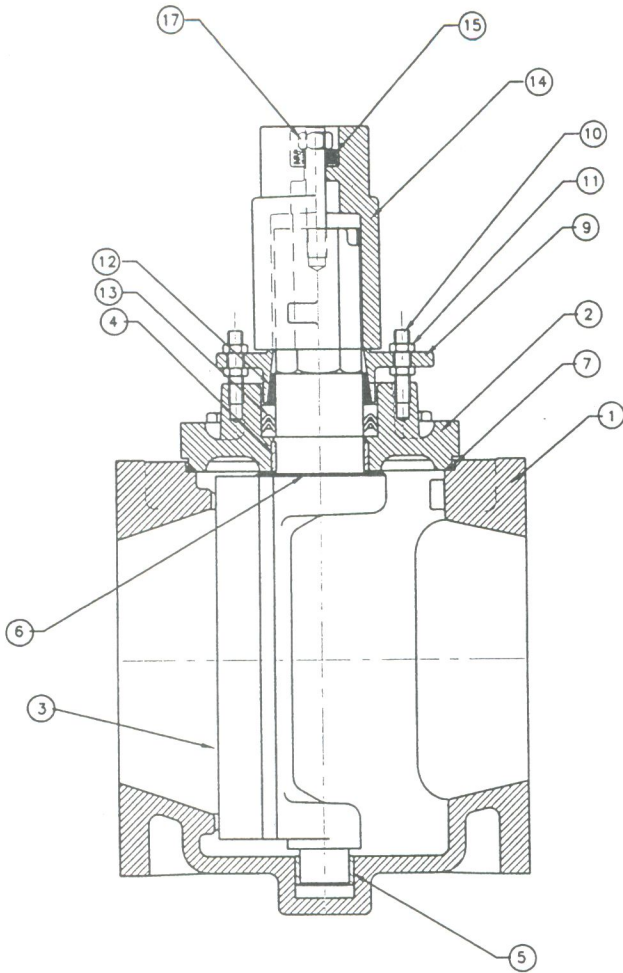
OPEN



In the full-open position, the plug is rotated out of the main fluid stream as shown. This allows for high capacity flow through the valve.

3"-12" ECCENTRIC PLUG VALVE Parts List

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DET.	QTY.	DESCRIPTION	MATERIAL
1	1	BODY	CAST IRON ASTM A-126 CLASS B
2	1	COVER	CAST IRON ASTM A-126 CLASS B
3	1	PLUG	CAST IRON & BUNA-N
4	1	TOP BEARING	316 STAINLESS STEEL
5	1	BOTTOM BEARING	316 STAINLESS STEEL
6	1	THRUST WASHER	NYLATRON
**	7	COVER O-RING	BUNA-N
8		COVER CAPSCREWS	ZINC PLATED STEEL
9	1	GLAND/BRAZE FOLLOWER	CAST IRON ASTM A-126 CLASS B
10	2	FOLLOWER STUD	ZINC PLATED STEEL
11	4	FOLLOWER NUTS	ZINC PLATED STEEL
12	1	BRAKE	GLASS REINFORCED PPS
**	13	1-SET VEE PACKING	BUNA-N
14	1	OPERATING NUT	CAST IRON ASTM A-126 CLASS B
15	5	BELLVEU SPRING WASHER	ZINC PLATED STEEL
16	1	ADJUSTING STUD	ZINC PLATED STEEL
17	1	LOCK NUT	ZINC PLATED STEEL
18	1	SQUARE HEAD SET SCREW	ZINC PLATED STEEL
19	1	JAM NUT	ZINC PLATED STEEL
20	1	SOCKET HEAD CAPSCREW	ZINC PLATED STEEL
21	1	FLAT WASHER	ZINC PLATED STEEL
22	1	JAM NUT	ZINC PLATED STEEL

**RECOMMENDED SPARE PARTS

Disassembly of 3" through 8" Eccentric Plug (1/4 turn)

Refer to 3" through 12" Parts List

Note; Line pressure must be 0 psi and the line drained if possible.

1. Put the valve in the full open position.
2. Remove #17 locknut.
3. Remove #15 bellvue spring washers.
4. Remove #14 operating nut.
5. Loosen and remove (2) follower nuts (item 11).
6. Remove gland/brake follower (item 9). This will relieve the sealing pressure on the V-Packing (item 13).
7. Loosen and remove the cover capscrews (item 8). Mark the position of the cover to body with a scribe or other markers.
8. Using (2) pry bars, one on each side of the cover (item 2) break the cover loose from the body (item 1). Remove the cover by sliding straight up over end of shaft.

* **NOTE; A suitable lubricant should be applied to the plug shaft to allow the packing to slide smoothly and prevent damage.**

9. The plug (item 3) can now be removed by turning and lifting out of the body.
10. Inspect top (item 4) and bottom bearings (item 5) for damage and replace if necessary.
11. Clean and inspect the nickel seating surface in the body (item 1). If seating surface is damaged, body should be replaced.
12. Inspect plug (item 3) sealing surface for nicks and wear. Replace if necessary.
13. Insert plug (item 3) into body (item 1) and orient in the open position.
14. Slide nylatron thrust washer (item 6) onto shaft of plug.
15. Inspect cover oring (item 7), and place in recess of body.
16. Remove old v-packing (item 13) from (item 2) recess.
17. Slide cover onto plug shaft. Align cover with scribe mark.
18. Install cover capscrews and tighten.
19. Slide packing set (item 13) over plug shaft and into packing recess in cover.
The follower gland (item 9) can be used to drive the packing into the cover.
20. Install brake #12 onto top of packing. Tapered end of brake should point up.
21. Install gland/brake follower.
22. Install follower nuts and tighten to seal packing.
23. Replace operating nut #14 with #16 adjusting stud installed in top of plug.
24. Replace bellvue spring washers #15 and lock nut#17.

* **Mystic FG-2 food grade grease or equivalent.**

DISASSEMBLY OF 4" THROUGH 12" ECCENTRIC PLUG VALVES (With Actuators)

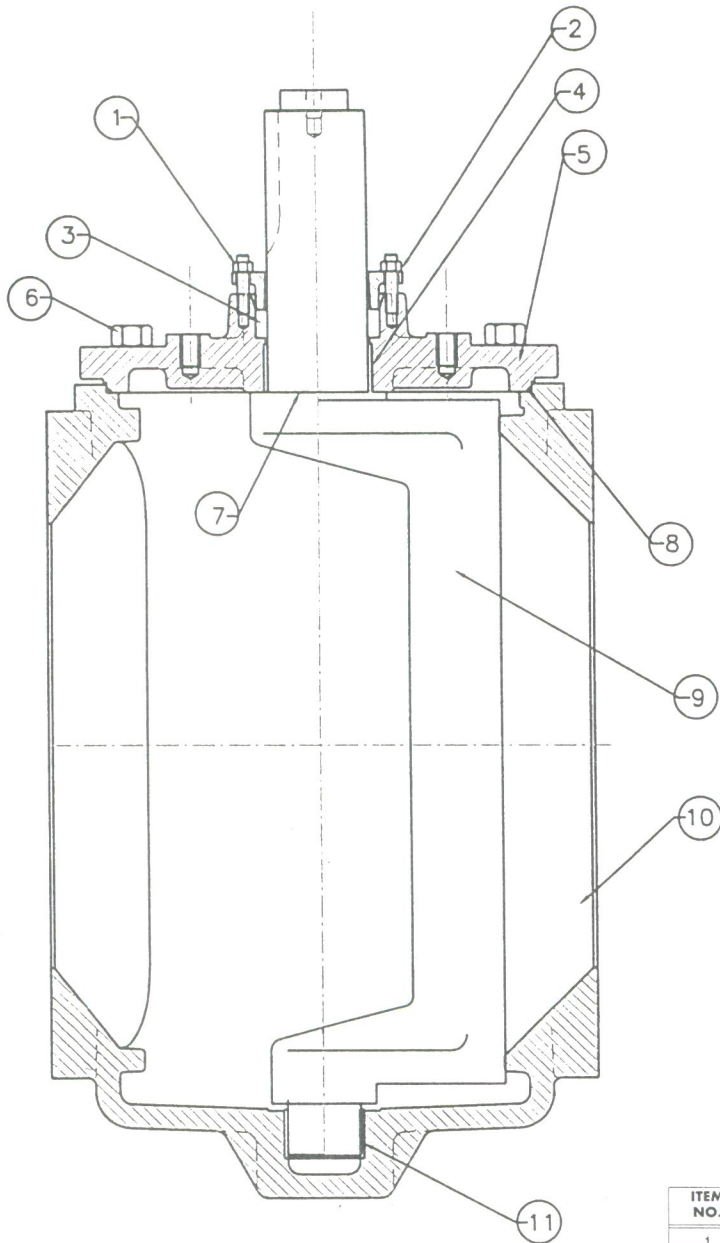
(Refer to 3"-12" Eccentric Plug Valve Parts List)

Note; Line pressure must be 0 psi and the line drained if possible.

1. Put the valve in the full open position.
2. Remove capscrews securing the actuator (worm gear, motor operator, cylinder actuator, etc.), then lift off the actuator.
Retain keys, couplings etc., for reassembly of the actuator.
3. Loosen and remove (2) follower nuts (item 11).
4. Remove gland/brake follower (item 9). This will relieve the sealing pressure on the V-Packing (item 13).
5. Loosen and remove the cover capscrews (item 8). Mark the position of the cover to body with a scribe or other markers.
6. Using (2) pry bars, one on each side of the cover (item 2) break the cover loose from the body (item 1). Remove the cover by sliding straight up over end of shaft.
**NOTE; A suitable lubricant should be applied to the plug shaft to allow the packing to slide smoothly and prevent damage.
(*Mystic FG-2 Food Grade Grease or equivalent)*
7. The plug (item 3) can now be removed by turning and lifting out of the body.
8. Inspect top (item 4) and bottom bearings (item 5) for damage and replace if necessary.
9. Clean and inspect the nickel seating surface in the body (item 1). If seating surface is damaged, body should be replaced.
10. Inspect plug (item 3) sealing surface for nicks and wear. Replace if necessary.
11. Insert plug (item 3) into body (item 1) and orient in the open position.
12. Slide nylatron thrust washer (item 6) onto shaft of plug.
13. Inspect cover oring (item 7), and place in recess of body.
14. Remove old v-packing (item 13) from cover (item 2) recess.
15. Slide cover onto plug shaft. Align cover with scribe mark.
16. Install cover capscrews and tighten.
17. Slide packing set (item 13) over plug shaft and into packing recess in cover. The follower gland (item 9) can be used to drive the packing into the cover.
18. Install follower nuts and tighten to seal packing.
19. Actuator can be reinstalled.

14"-24" ECCENTRIC PLUG VALVE
Parts List

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ITEM NO.	DESCRIPTION	ASTM
1	STUD & HEX NUTS	STEEL - ZINC PLATED
2	FOLLOWER GLAND	CAST IRON
** 3	"V" RING SEALS	BUNA-N
4	316 S S OIL IMPREGNATED SLEEVE BEARING	
5	COVER	CAST IRON
6	HEX HEAD CAPSCREW	STEEL - ZINC PLATED
7	THRUST WASHER	NYLATRON
** 8	COVER O-RING	BUNA-N
9	PLUG	CAST IRON & BUNA-N
10	BODY	CAST IRON
11	316 S S OIL IMPREGNATED SLEEVE BEARING	

**RECOMMENDED SPARE PARTS

DISASSEMBLY OF 14" THROUGH 24" ECCENTRIC PLUG VALVES (With Actuators)

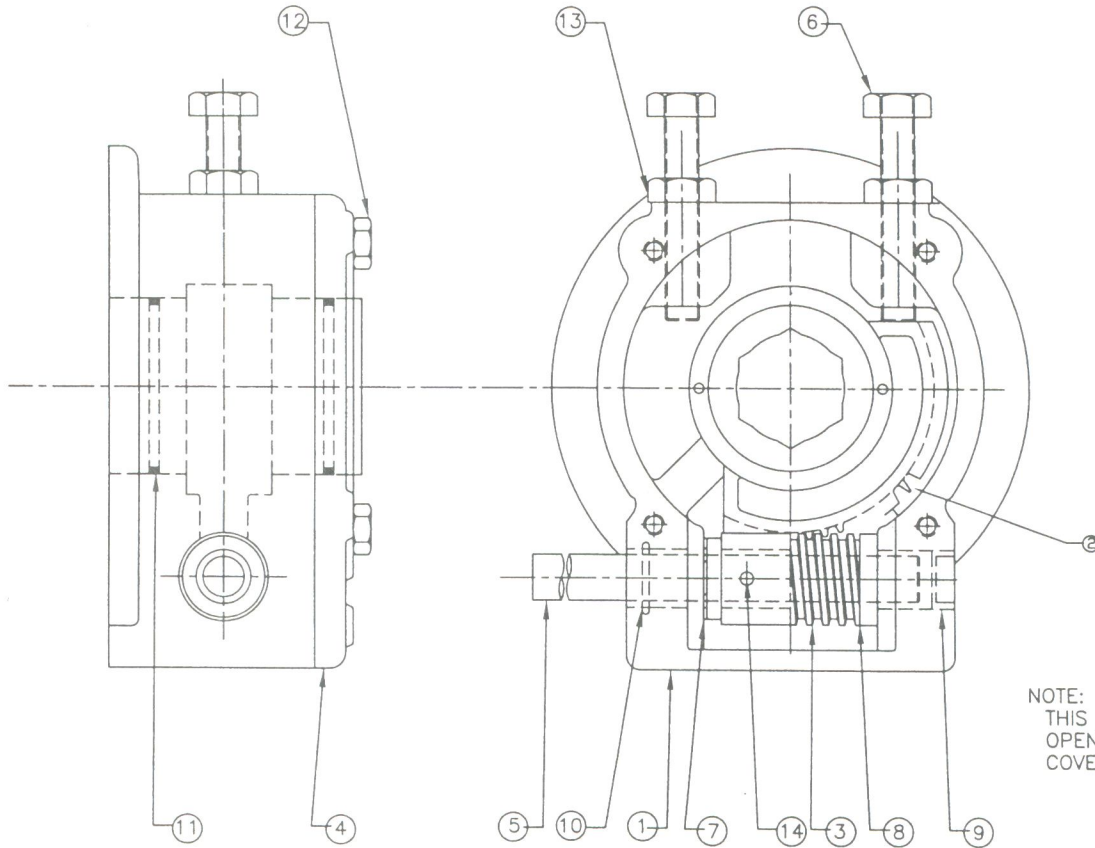
(Refer to 14"-24" Eccentric Plug Valve Parts List)

Note; Line pressure must be 0 psi and the line drained if possible.

1. Put the valve in the full open position.
 2. Remove capscrews securing the actuator (worm gear, motor operator, cylinder actuator, etc.) then lift off actuator. Retain keys, coupling etc., for reassembly of the actuator.
 3. Loosen and remove (2) follower nuts (item 1).
 4. Remove gland follower (item 2). This will relieve the sealing pressure on the v-packing (item 3).
 5. Loosen and remove the cover capscrews (item 6). Mark the position of the cover to body with a scribe or other markers.
 6. Using (2) pry bars, one on each side of the cover (item 5) break the cover loose from the body (item 10). Remove the cover by sliding straight up over end of shaft.
- Note;** A suitable lubricant should be applied to the plug shaft to allow the packing to slide smoothly and prevent damage.
7. The plug (item 9) can now be removed by turning and lifting out of the body.
 8. Inspect top (item 4) and bottom bearings (item 11) for damage and replace if necessary.
 9. Clean and inspect the nickel seating surface in the body (item 10). If seating surface is damaged, body should be replaced.
 10. Inspect plug (item) sealing surface for nicks and wear. Replace if necessary.
 11. Insert plug (item 9) into body (item 10) and orient in the open position.
 12. Slide nylatron thrust washer (item 7) onto shaft of plug.
 13. Inspect cover o-ring (item 8), and place in recess of body.
 14. Remove old v-packing (item 3) from cover (item 5) recess.
 15. Slide cover onto plug shaft. Align cover with scribe mark.
 16. Install cover capscrews and tighten.
 17. Inspect packing set (item 3) over plug shaft and into packing recess in cover. The follower gland (item 2) can be used to drive the packing into cover.
 18. Install follower nuts and tighten to seal packing.
 19. Actuator can be reinstalled.

3"-24" ECCENTRIC PLUG VALVE
Worm Gear Operator – Parts List

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NOTE:
THIS VIEW SHOWN IN THE
OPEN POSITION WITH THE
COVER PLATE REMOVED

DET.	QTY.	DESCRIPTION	MATERIAL
1	1	HOUSING	CAST IRON ASTM A-126 CLASS B
2	1	DRIVE SLEEVE	MANGANESE BRONZE
3	1	WORM	AISI-11L41
4	1	COVER PLATE	CAST IRON ASTM A-126 CLASS B
5	1	WORM SHAFT	AISI-11L41
6	2	STOP SCREW	ASTM A108
7	2	SHIM	MILD STEEL
8	2	THRUST BEARING	OIL IMPREGNATED BRONZE
9	1	EXPANSION PLUG	ASTM A108
10	2	O-RING	BUNA-N
11	2	O-RING	BUNA-N
12	4	HEX HEAD CAP SCREW	ASTM A100
13	2	LOCK NUT	ASTM A-108
14	1	SPRING PIN	HIGH TENSILE STEEL

Instructions to Rotate Gear Box on 4" through 12"

1. Completely close the valve against the closed stop.
2. Back off operating nut (1) turn to relieve closing torque on internal of gear.
3. On worm gear with position indicators remove (2) ¼" capscrews holding indicator plate and remove plate.
On worm gear with buried service cap (on top of gear) remove (3) ¼" capscrews retaining the cap and remove the cap.
4. Loosen and remove the ½" capscrew, lockwasher, and large flat washer under the indicator plate (or cap on buried service).
5. Loosen and remove the (4) 3/8" capscrews retaining the worm gear to the flanged adapter plate which is bolted to the valve cover. (Do not remove the flanged adapter plate from the valve cover).
6. Lift worm gear off of flange adapter and remove from plug shaft.
Rotate to the desired position and slide backover plug shaft.
7. Reassemble in reverse order.
8. Operate valve and check for correct closure. Re-adjust closed stop if necessary. (Refer to stop adjustment procedures, see troubleshooting)

**TROUBLESHOOTING
ECCENTRIC PLUG VALVES**

POSSIBLE MALFUNCTION	SYMPTOMS / CAUSES	CORRECTIVE ACTION
Joint Leak	Loose Bolts	Tighten Bolts
Shaft Leak	Loose Gland Packing Worn	Tighten Gland Tighten packing gland/ replace packing.
Seat Leak	Debris on seat. Damaged Seat If none of the above	Flush valve to clean seats. Inspect-replace plug *Adjust Closed position stops.
Hard to Operate (1/4 turn valve)	Gland Brake/ Follower Too tight	**Loosen follower /Plate

***Inspection for the above should be done semi annually at a minimum.*

***Instructions for adjusting stops;**

For quarter-turn op nut/lever operated valves;

1. Loosen #19 jam nut. Back off #18 (square head capscrew) appropriately.
2. Close valve. Repeat if necessary until valve seals.

For worm gear operated valves;

Note; Close stop adjustment bolt is located closest to input shaft of worm gear.

1. Loosen #13 (lock nut). Back off #6 (stop screw) ½ turn at a time. Close valve. Repeat as need to attain seal.

ECCENTRIC PLUG VALVE Troubleshooting (continued)

**Instructions for loosening Gland/Brake Follower;
(for quarter turn up nut/lever operated valves)

1. Loosen (#11) follower nuts. (2) on top of gland, #9. Adjust follower nuts (2) #11 on bottom of gland (#9) up to raise the gland.
2. Operate the valve several times to relax the packing (#13) and brake (#12).
Note; Addition of a penetrating oil or lubricant to the packing area may aid in freeing up the operation.
3. Repeat adjustments as necessary.
4. When valve operates freely, tighten the top (2) follower nuts, #11, down tight against the gland/brake follower, #9. Make sure gland/brake follower is level and not binding the brake/packing when operated.

For Parts and Service Contact Mfg's Rep;



Clow Valve Co.

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LIMITED WARRANTY

Clow warrants that the goods furnished hereunder, will be free from defects in material and workmanship, and will operate freely without failure or leakage under the service conditions they were installed under.

If within one year from date of initial operation, but not more than eighteen months from date of shipment by Clow of any item of product(s), the purchaser discovers that such item(s) was not as warranted above, notifies Clow in writing within 30 days from date purchaser discovered; or should have discovered, then Clow shall remedy such nonconformance by, at Clow's option, adjustment or repair or replacement of the item and any affected part of the product(s) within 30 days of such notice. Purchaser shall assume all responsibility and expense for removal, reinstallation and freight in connection with the foregoing remedies.

Clow shall not be liable for incidental or consequential losses, damages, or expenses, directly or indirectly arising from the sale, handling or use of the goods, or from any other cause relating thereto, and Clow's liability hereunder in any case is expressly limited to replacement (in the form originally shipped) of goods not complying with this agreement, or, at Clow's election, to the replacement of, or crediting Purchaser with, an amount equal to the purchase price of such goods whether such claims are for breach of warranty or negligence.

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