

November 2012

**Millcentric
Operation and Maintenance
Manual
Series 600**



**Milliken Valve Company
190 Brodhead Road, Suite 100
Bethlehem, PA 18017
Phone: (610) 861-8803
Fax: (610) 861-8094
Website: www.millikenvalve.com**

Operations & Maintenance

FUNCTIONAL DESCRIPTION

PLUG VALVE

Plug valves are designed with eccentric rubber disc seating surfaces. The plug rotates 1/4 turn to provide shutoff in pipes. The eccentric seating action provides for tighter shutoff as the actuator is adjusted to provide for more rotation. The valve can be adjusted to a maximum of 10 degrees over travel. The valves can be used to regulate flow rate by positioning the plug between 15 and 90 degrees open.

Manually operated plug valves are powered with levers/2" nuts (valves with torque collars), or gear actuators, which convert multiple handwheel, chainwheel, or nut input turns into 1/4 turn valve operation. The travel of the valve plug is limited by physical stops in the torque collar for wrench operated valves, and in the actuator housing for gear operated valves.

CAUTION: Forcing the handwheel, chainwheel, or nut against the stops will not provide tighter shutoff of the valve and may damage the actuator. Only actuator adjustments will affect valve shutoff.

Motor operated valves are powered with gear actuators, which convert multiple motor input turns into 1/4 turn valve operation. The travel of the valve plug is limited by limit switches in the motor housing and physical stop in the actuator housing. Valve shutoff is affected by limit switch and physical stop settings.

CAUTION: Improperly set limit switches and/or physical stops may damage the motor and/or actuator.

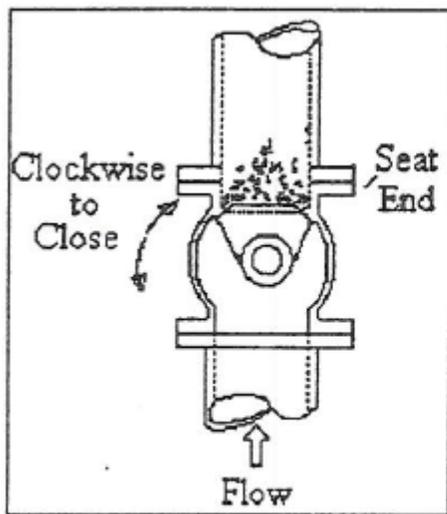
Operations & Maintenance

INSTALLATION

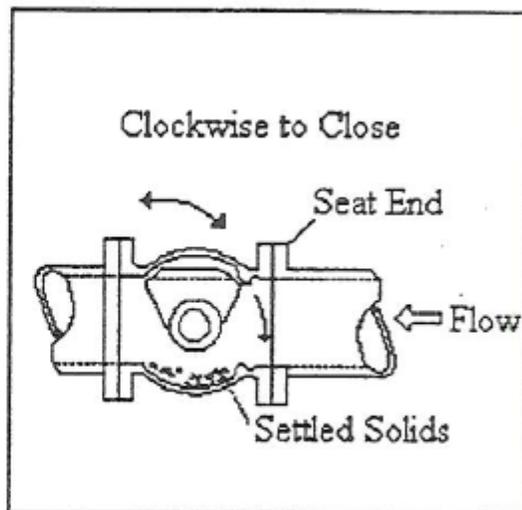
When installing the valves, the seat end should be noted. The seat end of the valve is cast in raised letters on the appropriate flange of the valve. Generally, straightway valves should be installed with the highest pressure applied from the opposite end from the seat. This will tend to push the plug into the seat. On pump discharge installations the seat end should be towards the pump.

In the case where shut-off is required in both directions, the valve should be installed so that the highest differential pressure at shut-off is opposite the seat end.

When the service is of a clogging type, with suspended solids likely to build up in the valve body, it is recommended that the valve be installed with the media entering the seat end first. In extreme cases, the valve should be installed with the plug horizontal and rotating upward into the top portion of the valve body cavity to open.



Vertical Pipeline



Horizontal Pipeline

Class 125 flanged end valves have ANSI B16.1 flat faced 125/150 flanges. Class 250 flanged end valves have ANSI B16.1 raised face 250 flanges. Standard ANSI B16.21 flanges and gaskets should be used to install the valves in the pipeline. Certain size valves utilize tapped holes on the top and bottom of the flange where a backing nut is not possible. Please check specific drawings for detailed information on sizes and quantities of hexagon head screws required on these valves.

Prior to installing valve, especially ones that are buried, they should be cycled open and closed several times to ensure they are in good working order and have not been damaged during shipment or storage.

Operations & Maintenance

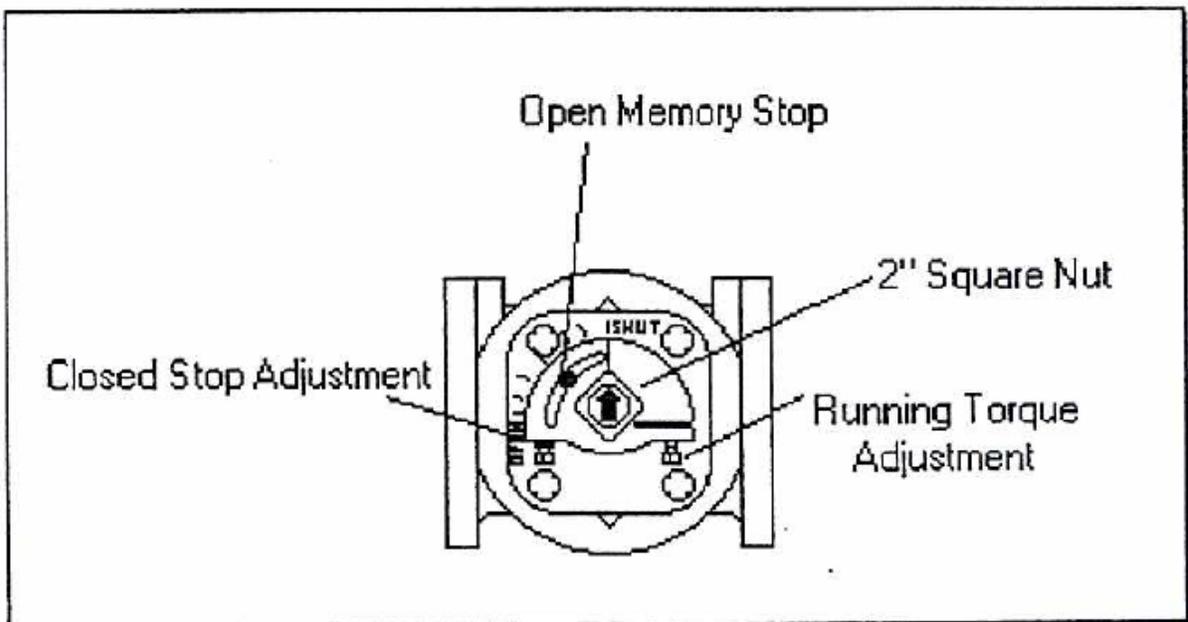
OPERATING INSTRUCTIONS

Running Torque Adjustment

The nature of the eccentric plug valves "camming" action eliminates the majority of the torque prior to seating. To prevent the plug from creeping open or slamming closed, the torque collar maintains a constant drag on the shoulder of the valve bonnet. This component is factory adjusted. However, once the valve has been installed, it is recommended that the torque adjustment nut be further tightened to assure proper friction exists to prevent unwanted closure.

To prevent the plug from unnecessary movement, rotate the hex head bolt clockwise until there is a substantial drag on the plug but not so much as to prevent the movement of the plug with the supplied wrench.

Wrench Operated Valve with Torque Collar



Operations & Maintenance

OPERATING INSTRUCTIONS

Wrench Operated Millcentric

Wrench operated Millcentric valves close by turning the valve 90 degrees clockwise.

Torque Collar

All wrench operated Millcentric valves are equipped with a multifunction device referred to here as a torque collar. This device serves as:

1. Wrench Adaptor-2" square
2. Position Indicator
3. Open Memory Stop
4. Closed Memory Stop
5. Running Torque Adjustment

Position Indicator

The top of the plug has an indicator plate to show the approximate plug position. Cast onto the torque collar is an indicator mark which corresponds to a graduated scale cast on the bonnet of the valve. This scale is divided into 15 degree lines and indicated the exact valve opening from full open to full closed.

Open Memory Stop

The torque collar also incorporates an open memory stop feature. The plug can be set by tightening the open memory stop adjustment bolt after the correct flow is achieved. The valve can then be closed for maintenance and reopened to the proper position without resetting the flow.

Closed Memory Stop

The closed memory stop is provided to allow for adjustment to compensate for wear of either the plug coating or the seat. The closed stop is pre-set at the factory and should not require readjustment unless wear occurs.

To adjust the plug for excess plug or seat wear simply rotate the closed stop two turns counter-clockwise and then rotate the plug (clockwise) further into the seat and check the flow. Should this movement fail to shut off the flow, repeat the above step. Afterward, reset the lock nut to prevent the position from being altered.

Operations & Maintenance

OPERATING INSTRUCTIONS

Gear Operated Millcentric

Gear operated Millcentric valves close by turning the gear input shaft clockwise until closed. Please see specific valve drawing for the exact number of turns to close.

Position Indicator

(Above ground units only)

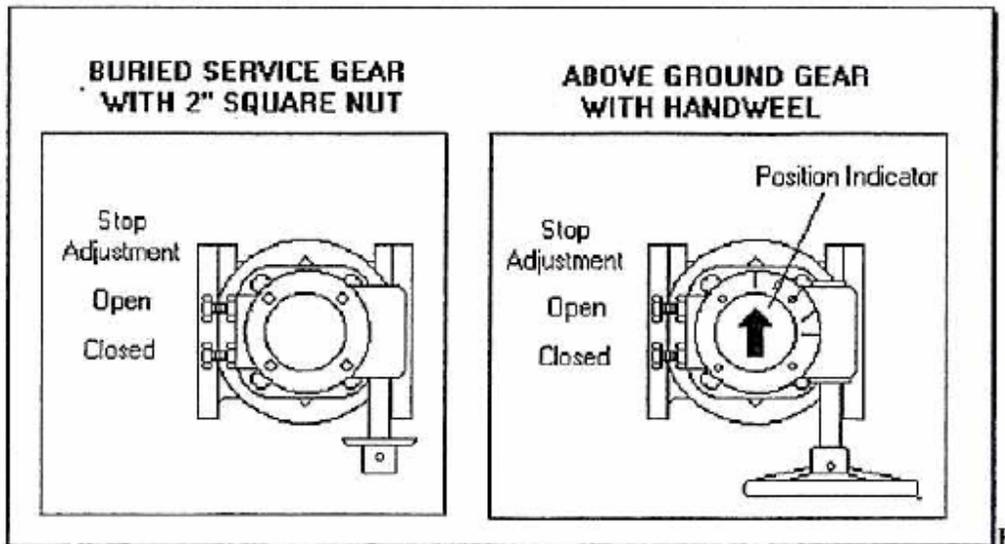
The top of the gear operator has an indicator plate to show the plug position. This scale, cast onto the gear housing, is divided into 15 degree lines and indicates the exact valve opening from full open to full closed. Buried service units are totally enclosed and sealed for use below grade.

Open and Closed Memory Stops

The closed memory stop is provided to allow for adjustment to compensate for wear of either the plug coating or the seat. The closed stop is pre-set at the factory and should not require readjustment unless wear occurs.

To adjust the plug for excess plug or seat wear simply rotate the closed stop two turns counterclockwise then rotate the hand wheel or nut (clockwise) to move the plug further into the seat and check the flow. Should this movement fail to shut off the flow then repeat the above step. Afterward re-set the lock nut to prevent the position from being altered.

Gear Operated Valve



Operations & Maintenance

MOTOR OPERATED ECCENTRIC PLUG VALVES **OPERATING PROCEDURES**

This manual describes the operating instructions for an Eccentric plug valve when equipped with an electric motor actuator. Specific wiring details are contained the motor actuator manual. General arrangement drawings are also provided to illustrate the fitup and installation of the valve and wiring of the motor. As with any plug valve, the actuator will cause the valve plug to rotate through $\frac{1}{4}$ turn to open or close the valve.

Motor Actuator Function and Use:

The motor actuator is designed to open and close the valve through its one quarter turn of rotation. It contains gearing so that many turns of the motor or hand wheel will slowly move the valve from open to close position or vice versa. Electrical controls are included in the motor actuator for local electrical control.

The output motion of the actuator is limited to about 100 degrees of output rotation by mechanical stops in the gearing. These are factory set and should not need adjustment. The actual positioning of the valve plug will be done by limit switches in the motor actuator. The switches are also set at the factory, but adjustment is sometimes required if the motor unit is installed on a separate mounting base or floorstand. Detailed procedures are given in the motor manual if adjustment is needed for the mechanical stops or the limit switches. The wiring and power requirements are given on wiring diagrams included in this instruction manual.

Important Safety Notice

All persons who will install, operate or adjust this equipment must read the instructions and drawings carefully. Injury and property damage may occur from improper use. It is understood that this equipment will be installed by individuals with knowledge and skills in electrical equipment. The manufacturer cannot be responsible for the misuse of this information or equipment, nor can it assume any resultant liability.

Operations & Maintenance

PNEUMATIC OPERATED ECCENTRIC PLUG VALVES **OPERATING PROCEDURES**

This manual describes the operating instructions for the eccentric plug valve when equipped with a pneumatic actuator. General arrangement drawings are also provided to illustrate the fit up and installation of the valve and pneumatic actuator. As with any plug valve, the plug needs to turn 90 degrees to close, and the actuator will rotate 90 degrees to achieve that task.

Pneumatic Actuator Function and Use

The pneumatic actuator is designed to open and close the valve through its one quarter turn of rotation. It contains pistons that when air pressure is applied it will move the actuator 90 degrees plus or minus 5 degrees. The travel of the pneumatic actuator can be limited by mechanical stops integral to the actuator.

Optional Equipment

The double acting pneumatic actuator can be equipped with a spring, so that on loss of air pressure the valve will either “fail open” or “fail closed” depending on how the springs are set up.

The actuator can also be equipped with solenoid valves which are electrically operated and allow the pneumatic actuator to work through switching the air flow on or off. The actuators can also be fitted with limit switches for end of travel indication or as auxiliary switches for remote indication and/or switching other equipment. The final option would be a positioned either 3-15 psi or 4-20mA which can be used to modulate the flow.

Important Safety Notice

All persons who will install, operate or adjust this equipment must read the instructions and drawings carefully. Injury and property damage may occur from improper use. It is understood that this equipment will be installed by individuals with knowledge and skills in electrical equipment. The manufacturer cannot be responsible for the misuse of this information or equipment, nor can it assume any resultant liability.

Operations & Maintenance

MAINTENANCE INSTRUCTIONS

WRENCH OPERATED VALVE

The Millcentric is designed and manufactured to be a lifelong valve under normal circumstances. It does not require any routine maintenance.

However if maintenance is required, due to unusual wear or service conditions, the following procedure should be followed:

Disassembly Procedure

Body

The Millcentric is a top entry valve; therefore the body can remain in line during this operation. Remove the allen head cap screw securing the torque collar to the plug stem. Remove the torque collar and set aside. With the valve de-pressurized, remove the hexagonal head cap screws that hold the bonnet to the valve body. Remove the bonnet, leaving the plug in the body. At this point the plug, PTFE thrust washers, journal bearings and bonnet "O" ring are accessible and can be removed and replaced.

Care should be taken not to damage the plug elastomer or bonnet "O" rings upon reassembly.

Reverse the above process for reassembling the Millcentric.

Stem Seals

Remove the allen head cap screw securing the torque collar to the plug stem. Remove the torque collar and set aside.

With the valve de-pressurized, using internal snap ring pliers, remove the snap pin and thrust waster. The "U" cup seals can now be pried out of the seal cavity. To replace reverse the above process. After reassembly, cycle valve from open to close approximately five times in order to ensure "U" cups have been properly seated.

Operations & Maintenance

MAINTENANCE INSTRUCTIONS

Gear Operated Valve

The Millcentric is designed and manufactured to be a long life valve under normal circumstances. It does not require any routine maintenance. Cycling the valve from full open to full closed on an annual basis will increase the life of the valve and operator components.

However, if maintenance is required, due to unusual wear or service conditions the following procedure should be followed:

Disassembly Procedure

Body

The Millcentric is a top entry valve therefore the body can remain in line during this operation. Remove the bolts holding the gear operator cap in place. Remove the cap and remove the internal bolts fastening the gear operator cap in place. Remove the gear operator and set aside. With the valve de-pressurized, remove the hexagonal head cap screws that hold the bonnet to the valve body. Remove the bonnet, leaving the plug in the body. At this point, the plug, PTFE thrust washers, journal bearings and bonnet "O" ring are accessible and can be removed and replaced.

Care should be taken not to damage the plug elastomer or bonnet "O" rings upon reassembly.

Reverse the above process for reassembling the Millcentric.

Stem Seals

Remove the bolts holding the gear operator cap in place. Remove the cap and remove the internal bolts fastening the gear operator to the valve body. Remove the gear operator and set aside.

With the valve de-pressurized, using internal snap ring pliers, remove the snap ring and thrust washer. The "U" cup seals can now be pried out of the seal cavity. To replace reverse the above process. After reassembly, cycle valve from open to close approximately five times in order to ensure "U" cups have been properly seated.

Operations & Maintenance

MAINTENANCE INSTRUCTIONS

Actuated Valves

The Millcentric is designed and manufactured to be a long life valve under normal circumstances. It does not require any routine maintenance. Cycling the valve from full open to full closed on an annual basis will increase the life of the valve and operator components.

However, if maintenance is required, due to unusual wear or service conditions the following procedure should be followed:

Disassembly Procedure

Body

The Millcentric is a top entry valve therefore the body can remain in line during this operation. Remove the bolts holding the actuator bracket to the valve cap. You can then remove the actuator from the valve. With the valve de-pressurized, remove the hexagonal head cap screws that hold the bonnet to the valve body. Remove the bonnet, leaving the plug in the body. At this point, the plug, PTFE thrust washers, journal bearings and bonnet "O" ring are accessible and can be removed and replaced.

Care should be taken not to damage the plug elastomer or bonnet "O" rings upon reassembly.

Reverse the above process for reassembling the Millcentric.

Stem Seals

With the valve de-pressurized, using internal snap ring pliers, remove the snap ring and thrust washer. The "U" cup seals can now be pried out of the seal cavity. To replace reverse the above process. After reassembly, cycle valve from open to close approximately five times in order to ensure "U" cups have been properly seated.

Operations & Maintenance

MAINTENANCE INSTRUCTIONS

Pneumatic Actuated Valves

The Millcentric is designed and manufactured to be a long life valve under normal circumstances. It does not require any routine maintenance. Cycling the valve from full open to full closed on an annual basis will increase the life of the valve and operator components.

However, if maintenance is required, due to unusual wear or service conditions the following procedure should be followed:

Disassembly Procedure

Body

The Millcentric is a top entry valve therefore the body can remain in line during this operation. Remove the bolts holding the actuator bracket to the valve cap. You can then remove the actuator from the valve. With the valve de-pressurized, remove the hexagonal head cap screws that hold the bonnet to the valve body. Remove the bonnet, leaving the plug in the body. At this point, the plug, PTFE thrust washers, journal bearings and bonnet "O" ring are accessible and can be removed and replaced.

Care should be taken not to damage the plug elastomer or bonnet "O" rings upon reassembly.

Reverse the above process for reassembling the Millcentric.

Stem Seals

With the valve de-pressurized, using internal snap ring pliers, remove the snap ring and thrust washer. The "U" cup seals can now be pried out of the seal cavity. To replace reverse the above process. After reassembly, cycle valve from open to close approximately five times in order to ensure "U" cups have been properly seated.

Operations & Maintenance

PREVENTIVE MAINTENANCE

The Millcentric eccentric plug valves do not require any routine maintenance. They should, however, be cycled from fully open to fully closed once every 6 months, which will increase the life of the valve and operator.

Operations & Maintenance

TROUBLE SHOOTING

Wrench Operated Valves

<u>SYMPTON</u>	<u>POSSIBLE CAUSE</u>	<u>ACTION</u>
Valve will not open	<ul style="list-style-type: none">-Broken or Misadjusted Torque collar-Obstruction in line-Excessive Line Pressure-Elastomer Damage	<ul style="list-style-type: none">-Adjust or Replace torque collar-Remove obstruction-Reduce Pressure-Replace Plug
Valve will not close	<ul style="list-style-type: none">-Broken or Misadjusted Torque collar-Obstruction in line-Excessive Line Pressure-Elastomer Damage	<ul style="list-style-type: none">-Adjust or Replace torque collar-Remove obstruction-Reduce Pressure-Replace Plug
Valve will not shutoff flow	<ul style="list-style-type: none">-Improper stop adjustment-Obstruction in line-Excessive Line Pressure-Elastomer Damage	<ul style="list-style-type: none">-Adjust closed stop-Remove obstruction-Reduce Pressure-Replace Plug
Valve leaks at plug stem	<ul style="list-style-type: none">-“U” cup seals not properly seated-Damaged “U” cup seal	<ul style="list-style-type: none">-Cycle valve from open to close-Replace “U” Cups

Operations & Maintenance

TROUBLE SHOOTING

Gear Operated Valves

<u>SYMPTON</u>	<u>POSSIBLE CAUSE</u>	<u>ACTION</u>
Valve will not open	<ul style="list-style-type: none">-Bent input shaft-Obstruction in line-Excessive Line Pressure-Elastomer Damage	<ul style="list-style-type: none">-Replace Worm shaft-Remove obstruction-Reduce Pressure-Replace Plug
Valve will not close	<ul style="list-style-type: none">-Bent input shaft-Obstruction in line-Excessive Line Pressure-Elastomer Damage	<ul style="list-style-type: none">-Replace Worm shaft-Remove obstruction-Reduce Pressure-Replace Plug
Valve will not shutoff flow	<ul style="list-style-type: none">-Improper stop adjustment-Obstruction in line-Excessive Line Pressure-Elastomer Damage	<ul style="list-style-type: none">-Adjust closed stop-Remove obstruction-Reduce Pressure-Replace Plug
Valve leaks at plug stem	<ul style="list-style-type: none">-“U” cup seals not properly seated-Damaged “U” cup seal	<ul style="list-style-type: none">-Cycle valve from open to close-Replace “U” Cups

Operations & Maintenance

TROUBLE SHOOTING

Actuated Plug Valves

<u>SYMPTON</u>	<u>POSSIBLE CAUSE</u>	<u>ACTION</u>
Valve will not open/ Valve will not close	-No Power Source	-Check incoming power source and/or replace fuses
	-Improper Signal	-Check actuating signal Sequence
	-Burned Out or Impaired Component	-Check & repair or replace motor or relay devices
Valve will not shutoff flow	-Improperly set Limit Switch	-Re-set limit switch
	-Actuator Torques Out	-Check for obstructions In valve

Operations & Maintenance

TROUBLE SHOOTING

Pneumatic Actuated Plug Valves

<u>SYMPTON</u>	<u>POSSIBLE CAUSE</u>	<u>ACTION</u>
Valve will not open/ Valve will not close	-No Power Source or Air Supply	-Check incoming power source/check on air supply
	-Improper Signal	-Check actuating signal Sequence
	-Burned Out or Impaired Component	-Check & repair or replace solenoid or positioner
Valve will not shutoff flow	-Improperly set Limit Switch	-Re-set limit switch
	-Actuator Torques Out	-Check for obstructions In valve
	-Incorrect Mechanical stop Bolt setting	-Re-set mechanical stops

Operations & Maintenance

Maintenance Instructions Gear Operated Valves To Replace “U” Cup Seals

The Millcentric is designed and manufactured to be a long life valve under normal operating conditions. It does not require any routine maintenance. Cycling the valve from fully open to fully closed on an annual basis will increase the life of the valve and gear components.

However, if maintenance is required, due to unusual wear or service conditions, the following procedure should be followed:

- Remove the internal bolts holding the gear to the valve body.
- Remove gear operator and set aside.
- Remove the external snap ring and support collar.
- Remove the internal snap ring using snap ring pliers.
- Remove the thrust washer and the “U” cup seals are now visible.
- Using a screwdriver pry out the old seals.
- Apply a small amount of silicone or grease to the new “U” cup seals. This will help them slide in the packing cavity.
- Put a piece of shim stock into the cavity and put the “U” cup over it.
- Slide the “U” cup over the stem with shim stock against the stem. This will let any trapped air out of the packing cavity.
- Using two screwdrivers, coax the outer lip of the “U” cup into the cavity while pressing down on the top of the “U” cup with the other screwdriver. Continue to do this all the way around until the “U” cup is at the bottom of the packing cavity.
- Repeat this procedure with the second “U” cup.
- Replace the thrust washer and snap ring.
- Remount the gear operator on the valve-ensure key is inserted in correct keyway.

Operations & Maintenance

Maintenance Instructions Actuated Valves To Replace “U” Cup Seals

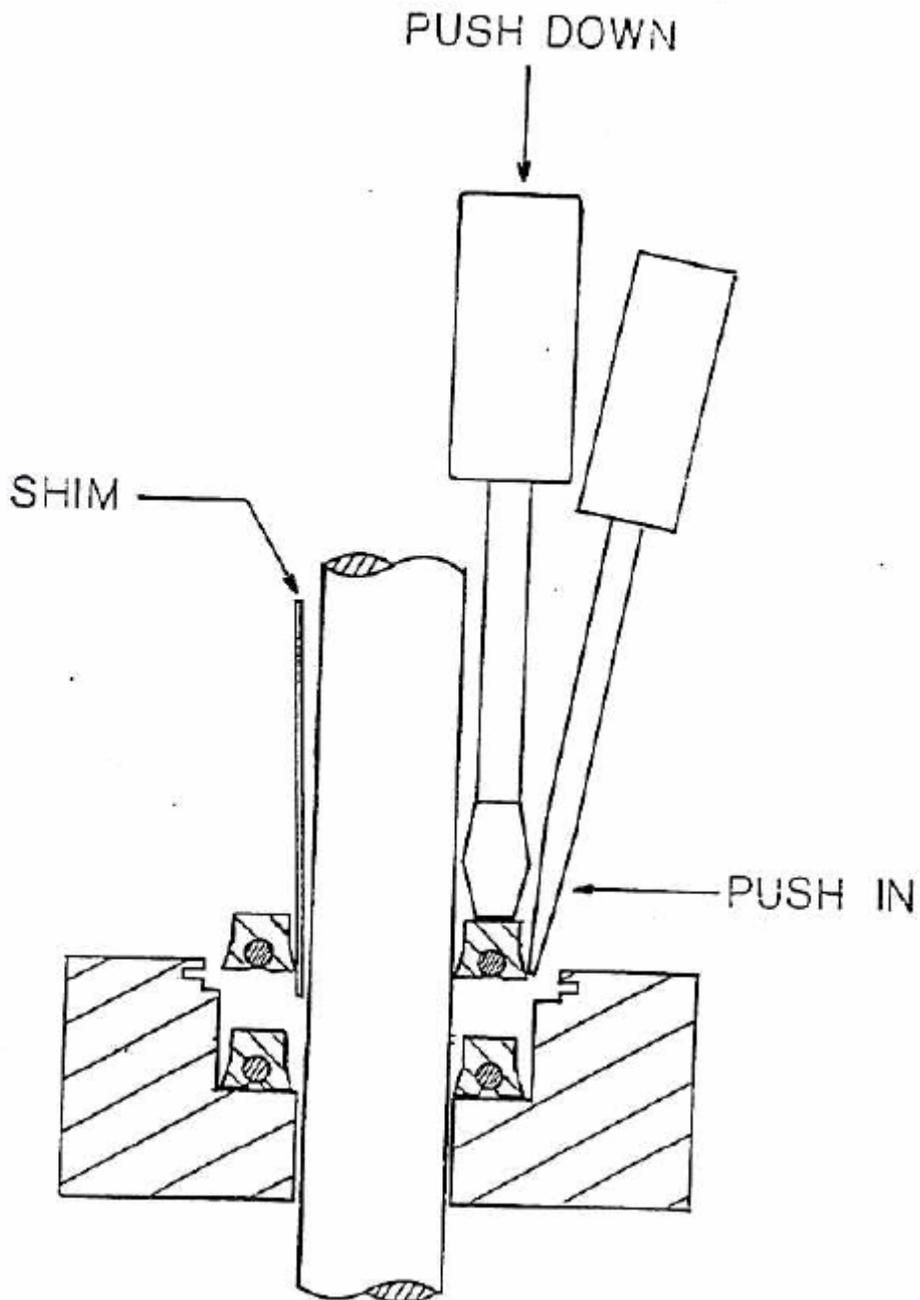
The Millcentric is designed and manufactured to be a long life valve under normal operating conditions. It does not require any routine maintenance. Cycling the valve from fully open to fully closed on an annual basis will increase the life of the valve and actuator components.

However, if maintenance is required, due to unusual wear or service conditions, the following procedure should be followed:

- Remove the actuator, bracket and coupling from the valve body.
- Remove actuator and set aside.
- Remove the external snap ring and support collar.
- Remove the internal snap ring using snap ring pliers.
- Remove the thrust washer and the “U” cup seals are now visible.
- Using a screwdriver pry out the old seals.
- Apply a small amount of silicone or grease to the new “U” cup seals. This will help them slide in the packing cavity.
- Put a piece of shim stock into the cavity and put the “U” cup over it.
- Slide the “U” cup over the stem with shim stock against the stem. This will let any trapped air out of the packing cavity.
- Using two screwdrivers, coax the outer lip of the “U” cup into the cavity while pressing down on the top of the “U” cup with the other screwdriver. Continue to do this all the way around until the “U” cup is at the bottom of the packing cavity.
- Repeat this procedure with the second “U” cup.
- Replace the thrust washer and snap ring.
- Remount the actuator on the valve-ensure key is inserted in correct keyway.

Operations & Maintenance

Maintenance Instructions Gear Operated or Actuated Valves To Replace "U" Cup Seals



Operations & Maintenance

SAFETY

Valves must be de-pressurized before any disassembly procedures are performed.

On gear operated valves, when the gears have the cover removed, extra caution should be taken to make sure hands or fingers are away from the moving parts. Close fitting clothing should be worn so as to avoid getting caught in the moving gears.

Operations & Maintenance

LUBRICATION SCHEDULE

The Millcentric plug valve is a low maintenance non-lubricated eccentric plug valve. As such there is no required lubrication for the valve itself.

The manual worm gear operators where applicable are also sealed grease lubricated units and should not require any type of periodic lubrication. Should the unit need to have the lubricant replaced, it is recommended that **Shell "Gadus S2 V100"** be used, formally named "Alvania RL".

Operations & Maintenance

STORAGE PROCEDURE

Milliken valves are shipped with the plugs in the open position. Care should be taken to maintain this position while the valves are in storage prior to installation in the pipeline.

Flanged valve end protectors (if supplied) should be kept on the valves until they are ready for installation. Special care should be given to mechanical joint valves to prevent damage to the internal pipe seating area.

Valves should be stored where internal contamination due to sand and mud can be kept to a minimum. Care should be taken to avoid direct sunlight on the plug elastomer during storage.

Electric, hydraulic and pneumatic valve actuators should be care for in accordance with the storage instructions of the actuator manufacturer.

Operations & Maintenance

SPARE PARTS LIST

The Milliken eccentric plug valve is a long life valve and does not require stocking spare parts.