

# MILLIKEN®

a MUELLER brand

## INSTALLATION/OPERATING MANUAL

# Multiport (3-way) Plug Valve Operation and Maintenance Manual Series 604

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### WARNING:

1. Read all applicable directions and instructions prior to any maintenance, troubleshooting or installation.
2. Personnel involved in the installation or maintenance of valves should be constantly alert to potential emission of pipeline material and take appropriate safety precautions. Always wear suitable protection when dealing with hazardous pipeline materials.
3. Order parts from your local Milliken sales representative or directly from Milliken. When ordering parts, please include the serial number located on the valve tag.

**NOTE:** "WARNING" and "CAUTION" messages (flagged with an exclamation symbol) indicate procedures that must be followed exactly to avoid equipment damage, physical injury, or death.

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# MUELLER

# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

## Design and Function

### DESIGN AND FUNCTION

The Multiport valve is a non-lubricated plug valve designed for diverting applications and are use in water and wastewater applications, and HVAC systems. The valve is a flanged 3-way design with a rubber encapsulated taper plug. The straight through or 90° flow paths allow a plug rotation up to 270° in increments of 90°. Wrench operated valves may be factory set for the plug/port positioning by the inclusion of a styling ring. Valves fitted with gear operators will have the travel stops factory set when customers specify the particular port selections at ordering stage.

The life of the valve is dependent on its application, frequency of use and freedom from misuse. The properties of the fluid passing through the valve such as pressure, temperature, chemical constituents and solids content must be taken into consideration to avoid premature failure. A well-designed system will take into consideration additional factors such as the electrolytic interaction between dissimilar metals in the valve and pipework. Before commissioning a system, it should be flushed to eliminate debris and chemically cleaned as appropriate which will help prolong the life of the valve. Not suitable for fatigue loading, creep conditions, fire testing, fire hazard environment, corrosive or erosive service, transporting fluids with abrasive solids.

### PRESSURE AND TEMPERATURE LIMITS

These valves must be installed in a piping system whose normal pressure and temperature do not exceed the ratings shown below. If system testing will subject the valve to pressures in excess of the working pressure rating, this should be within the test pressure for the body, with the valve partially open. The maximum allowable pressure is for non-shock conditions. Water hammer and impact for example, should be avoided.

If the limits of use specified in these instructions are exceeded or if the valve is used on applications for which it was not designed, a potential hazard could result. The operating temperature of the valve may depend on the elastomer used for the plug and seals and are as follows.

Elastomer	High Temp	Low Temp
Buna N	212 °F	-20 °F
EPDM	250 °F	-20 °F
Neoprene	225 °F	-20 °F
Viton	300 °F	-10 °F

Figure 604 Multiport 3-way plug valves are provided with **ANSI** Class 125 Flanges.

Size Range	Rated Pressure*	Shell Hydro	Seat Test **
3"-16"	175 psi	265 psi	175 psi

\*Pressure rating is given at ambient temperatures

\*\*3-way Plug Valves **DO NOT** offer drip tight shutoff

# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

Safety

## SAFETY

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Personnel involved with the installation or maintenance of these valves should be aware of the potential hazards involved with the handling and installation of valves. Appropriate safety precautions should be taken prior to maintenance work commencing particularly in respect to possible emissions or leakage of pipeline fluids. The Maintenance Engineer must be skilled and fully aware of the nature of the pipeline fluid and the system operating conditions.

Suitable protection should be worn - particularly appropriate footwear, hard hats and gloves. During maintenance work, eye and respiratory protection may also be necessary. There are no hazardous materials used in the construction of the valve. 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.

## RECEIVING AND STORAGE

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Inspect the valves upon receipt for damage during shipment. Valves must be carefully unloaded. Do not lift valves with slings or chains through the seat area or attached to hand-wheels or actuators.

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. Valves should be kept in clean and dry storage facility and protected against the ingress of debris. Care should be taken to avoid direct sunlight or exposure to heat 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.

# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

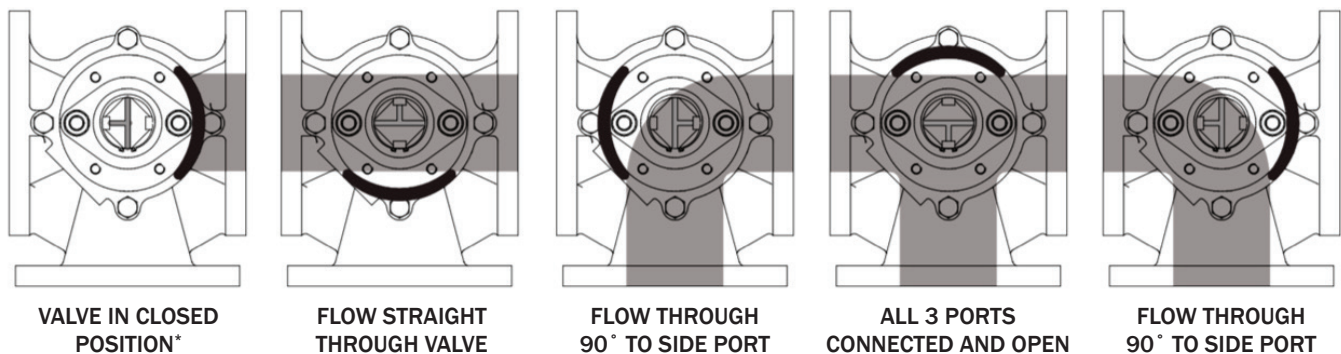
Installation

## INSTALLATION

The Milliken® Multi-Port 3-way plug valve can be installed in any orientation although it is advisable to have the valve stem vertical for ease of access. If the valve has been supplied for tight shut-off, the flow path and therefore the upstream pressure should be against the rear side of the plug (see Fig.1). The valve is suitable for flow in any direction although it is recommended that the valve is installed with pipeline pressure applied behind the plug with the plug face in the downstream position.

Valves must be provided with adequate support. Adjoining pipework must be supported to avoid the imposition of pipeline strains on the valve body. Heavy valves may need independent support or anchorage.

FIG. 1: AVAILABLE FOW PATHS



*\*It is advisable that the flow is against the rear side of the plug for tight shut-off applications. Not available with double-style plug.*

Prior to installation, inspection of the body marking must be made to ensure that the correct valve is being installed. Valves are precision manufactured items and should not be subjected to misuse such as:

- Careless handling
- Allowing dirt to enter the valve through the end ports
- Lack of cleaning both valve and system before operation
- Excessive force during bolting.

When large valves are provided with lifting lugs or eye bolts, these should be used to lift the valve. Immediately prior to valve installation, the pipework to which the valve is to be fastened should be checked for cleanliness and freedom from debris. All special packaging material must be removed.

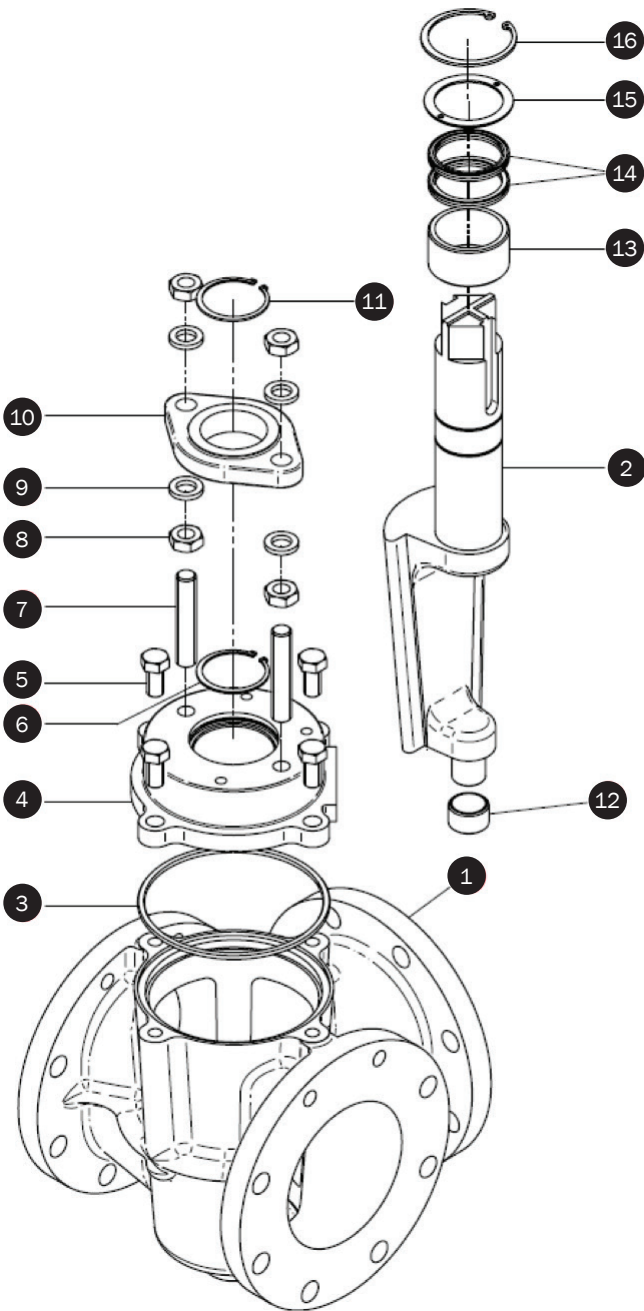
The mating flange (both valve and pipework flanges) should be checked for correct gasket contact face, surface finish and condition. If a condition is found which might cause leakage, no attempt to install the valve should be made until the condition has been corrected. The gaskets should be suitable for the operating conditions and maximum pressure/temperature ratings and should be checked to ensure freedom from defects or damage.

Care should be taken to provide correct alignment of the flanges being assembled. Suitable lubricant on bolt threads should be used. In assembly, bolts are tightened sequentially to make the initial contact of flanges and gaskets followed by gradual and uniform tightening in an opposite bolting sequence to avoid bending one flange relative to the other, particularly on flanges with raised faces. Parallel alignment of flanges is especially important in the case of the assembly of a valve into an existing system. The bolting must be checked for correct size, length, material and that all connection flange bolt holes are utilized.

Certain sizes of valves have tapped bolt holes in the connecting flanges where there is no room for nuts behind the flange, refer to drawings on pages 13 - 15.

# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

Standard Materials of Construction



Item	Component	Material
1	Body	Cast Iron A126 Class B
2	Plug	Ductile Iron ASTM A536 Rubber Coated
3	Bonnet O-Ring	Elastomer as Specified
4	Bonnet	Cast Iron A126 Class B
5	Setscrew	Steel - Zinc Plated
6	Snap Ring -Internal	Steel
7	Stud	Steel - Zinc Plated
8	Nut	Steel - Zinc Plated
9	Washer	Steel - Zinc Plated
10	Gland	Ductile Iron ASTM A536
11	Snap ring - Internal	Steel
12	Journal Bearing	Stainless Steel
13	Journal Bearing	Stainless Steel
14	"U" Cup Seal	Elastomer as Specified
15	Seal Retaining Ring	Brass
16	Snap ring - External	Steel

# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

## Replace "U" Cup Seals

### REPLACE "U" CUP SEALS

The Multiport 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.

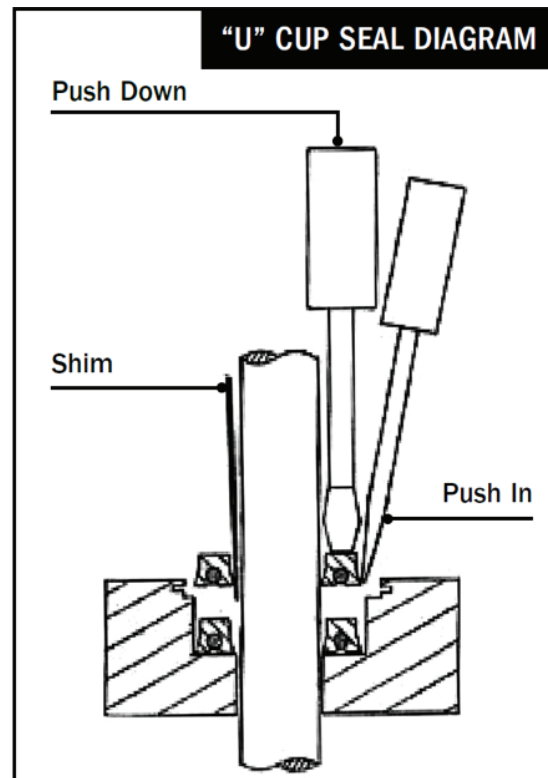
However, if maintenance is required, due to unusual wear or service conditions, the following procedure should be followed:

1. Remove nuts on top of plug adjustment gland.
2. Remove external snap ring from top of gland.
3. Remove gland.
4. Remove the internal snap ring using snap ring pliers.
5. Remove the thrust washer and the "U" cup seals are now visible.
6. Using a screwdriver pry out the old seals.
7. Apply a small amount of silicone or grease to the new "U" cup seals. This will help them slide in the packing cavity.
8. Put a piece of shim stock into the cavity and put the "U" cup over it.
9. Slide the "U" cup over the stem with shim stock against the stem. This will let any trapped air out of the packing cavity.
10. 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.
11. Repeat this procedure with the second "U" cup.
12. Replace the thrust washer and snap ring.
13. Replace adjustment gland by reversing first 3 steps.



#### CAUTION:

Valve should be depressurized for all maintenance activities



# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

## Plug To Seat Adjustment

### PLUG TO SEAT ADJUSTMENT

Using the Adjustable Gland arrangement, it is possible to set the vertical position of the plug in the valve seat. Plug to seat adjustment is factory set to provide the best possible shut off with the least amount of rotating torque.

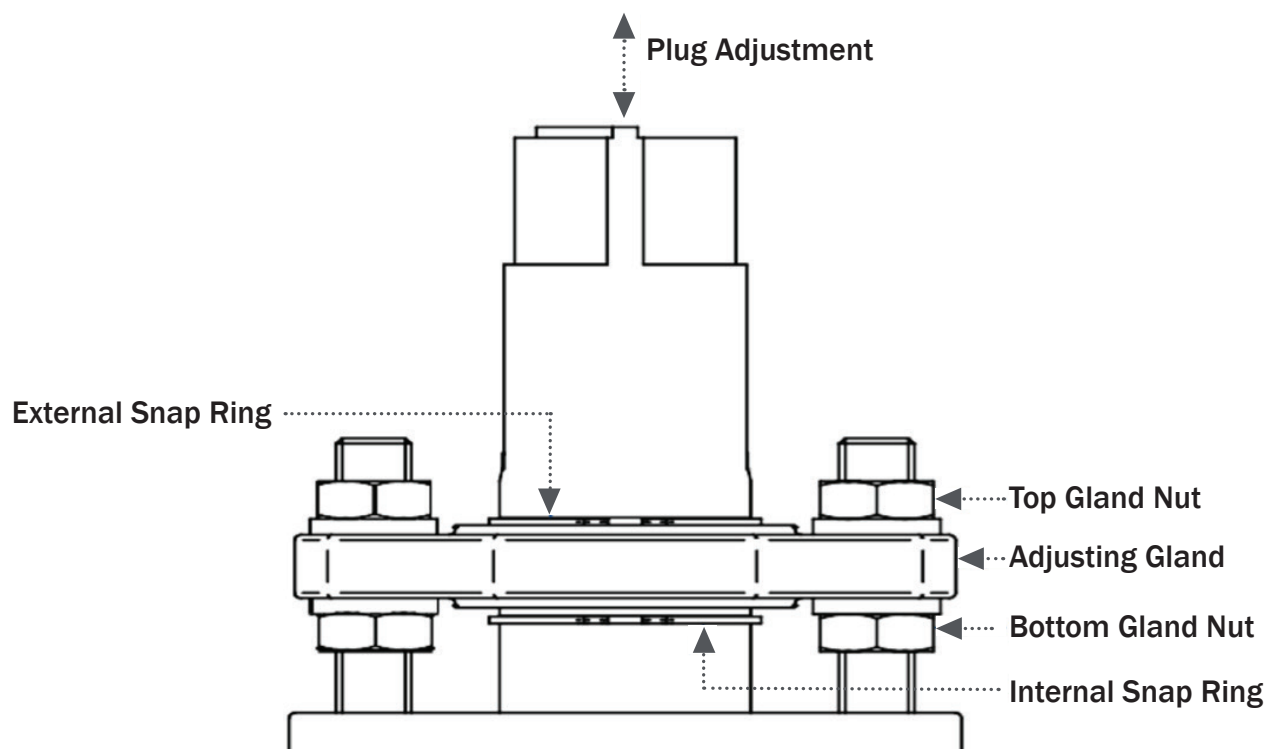
The Shut-Off condition requires the plug face to be in close contact with the valve body with upstream pressure applied behind the plug. Should it become necessary to adjust (increase or decrease) the seating force, the following instructions will apply:

#### To Decrease Seating Force (Lift Plug)

1. Loosen top gland nuts several turns.
2. Turn bottom gland nuts counterclockwise, each  $\frac{1}{2}$  turn at a time until proper plug elevation is reached.
3. Tighten top gland nuts.

#### To Increase Seating Force (Lower Plug)

1. Loosen bottom gland nuts several turns.
2. Turn top gland nuts clockwise, each  $\frac{1}{2}$  turn at a time until proper plug elevation is reached.
3. Tighten bottom gland nuts.



# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

## Disassembly and Reassembly

### DISASSEMBLY

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If it becomes necessary to inspect the valve internally or to remove debris and deposits, the valve can be disassembled without removing the valve body from the pipeline.

Servicing work on the valve should be undertaken by a skilled person using proper tools, slings and a hoist. Eye protection and gloves should be worn and it may be necessary to wear a mouth and nose mask or a respirator in extreme circumstances. Refer to the exploded view on page 5 to see the construction of the valve.

- Depressurize the system and isolate each of the pipes connected to the valve. The plug should be rotated so that it is partially across any two adjacent ports. This will ensure pressure is equalized between the three ports. Preferably drain the valve and the three pipes before removing the valve bonnet.
- Make a mark on the edge of the valve bonnet and a corresponding mark on the body to ensure the bonnet can be re-assembled in the same position.
- If an actuator or gearbox is fitted then the bonnet, plug, mounting bracket and operator may be removed as a sub-assembly.

Actuators should be removed using soft slings carefully placed to avoid damage.

Any hand-wheels present must not be used as a convenient point for lifting.

- Loosen the bonnet screws gradually in sequence to ensure there is not a rapid release of residual pressure. Remove the bonnet screws.
- Using a hoist and sling lift the bonnet and plug assembly clear of the valve and carefully set down.
- Remove the O-ring bonnet seal. Clear out the body of any solid matter and debris.
- Clean the internal tapered seating surface and clean the internal bore of the lower bearing.
- Clean the counter bore in the top of the body. Clean the valve plug and underside of the bonnet. Ensure the rubber encapsulation on the plug is undamaged and the O-ring sealing area on the bonnet is clean and undamaged.

### REASSEMBLY

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- Lightly apply silicone grease to a new O-ring bonnet seal and place in the counter bore at the top of the body. Using a hoist, lower the bonnet/ plug assembly into the body confirming that the previously applied marks on the body and bonnet are positioned to be in alignment. Engage the lower trunnion on the plug into the lower body bearing and carefully allow the bonnet to locate onto the body.
- Apply grease to the threads of the bonnet screws and screw them into place finger tight. Remove the sling and eyebolts from the bonnet.
- Tighten the bonnet screws in a diagonal and sequential order. The bonnet will achieve metal/ metal contact with the body.



# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

## Replacing The Plug

### REPLACING THE PLUG

This operation can be carried out without removing the valve from the pipeline. If the valve is fitted with a gearbox or actuator, that must be removed; follow the instructions for removal under section **Disassembly** on page 8.

Refer to the exploded view on page 5 to see the construction of the valve.

- Depressurize the system and isolate each of the pipes connected to the valve. The plug should be rotated so that it is partially across any two adjacent ports. This will ensure pressure is equalized between the three ports. Preferably drain the valve and the three pipes before removing the valve bonnet.
- Make a mark on the edge of the valve bonnet and a corresponding mark on the body to ensure the bonnet can be re-assembled in the same position. If an operator is fitted, make alignment marks on the mounting bracket and bonnet.
- Remove the screws holding the mounting bracket to the bonnet and lift the operator clear. If a stem adaptor is fitted that should be removed at this time.
- Remove the external snap ring (11) and the nuts (8) and washers (9). Lift the gland (10) clear of the valve. Remove the internal snap ring (6). Turn the lower gland nuts clockwise.
- Remove bonnet screws (5) and lift the bonnet clear of the valve. If the bonnet sticks, hit the side edge of the bonnet with a soft hammer to break the seal. It may be necessary to use a hoist to lift the bonnet from the valve. If the plug does not disengage from the bonnet, tap the end of the plug with a soft hammer so the bonnet can be removed leaving the plug in place in the body.
- Note the position of the plug face and make an external mark on the body to denote alignment with the plug face. Lift the plug from the valve body. For large plugs, it will be necessary to use a hoist to lift the plug.
- Clean the inside of the body and inspect the lower bearing (12). Clear any debris from the bearing cavity.
- Turn the bonnet over and inspect and clean the bore of the upper bearing (13). Clean the underneath surface of the bonnet paying particular attention to the machined location for the body.
- Inspect the new plug to ensure there is no damage to the rubber sealing face. Apply silicone grease to the lower trunnion and fit the new plug into the lower bearing. Ensure the plug face is aligned with the temporary marking on the body.
- It is recommended that main seals are replaced during a major servicing operation. Clean the O-ring seal location in the body; lightly apply silicone grease to the new O-ring (3) and carefully fit into the body counter bore location. Remove the existing bonnet U-cup seals (14) as described on page 6.
- Carefully assemble the bonnet over the stem and lower onto the valve ensuring that the temporary markings on the bonnet and body are aligned. Apply grease to the threads of the bonnet screws and fit - finger tight. Tighten the bonnet screws in a progressive diagonal fashion.
- Apply grease to both snap ring grooves and re-fit the lower snap ring (6). Apply grease to the bore of the gland and fit the gland over the stem and locate on the studs, resting on the lower snap ring. Re-fit the upper snap ring (11) and top gland nuts and washers. Adjust the upper and lower gland nuts until they are finger tight.
- Where applicable, re-fit the operator ensuring the temporary marking on the bonnet and mounting bracket are aligned.
- Set the plug position as described on page 7.

# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

## Lubrication Schedule & Spare Parts List

### LUBRICATION SCHEDULE

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The 3-way 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 Leahy Wolf Grease L-W 2500 or equivalent grease shall be used.

### SPARE PARTS LIST

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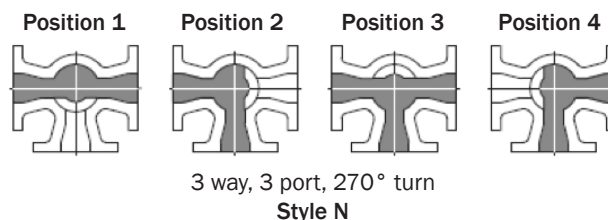
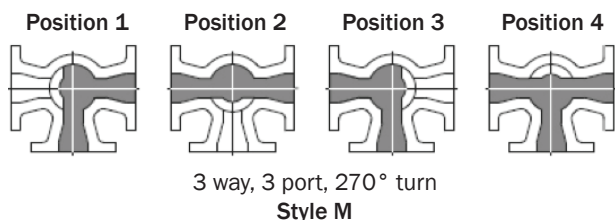
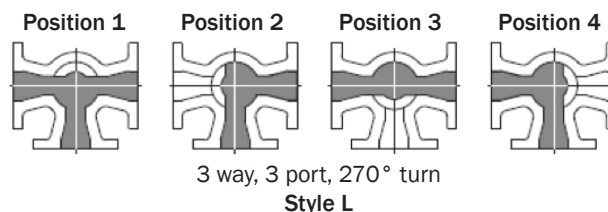
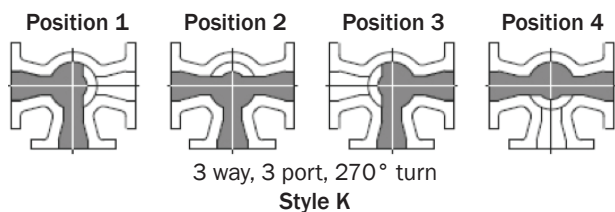
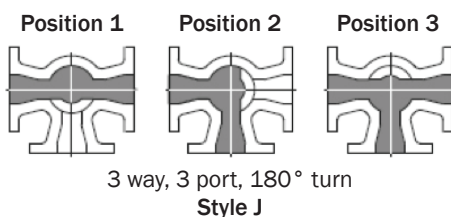
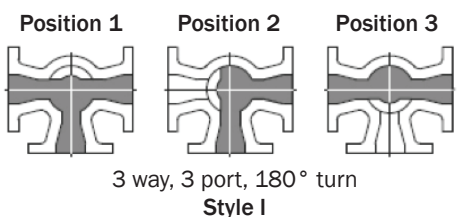
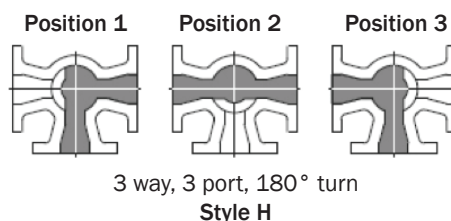
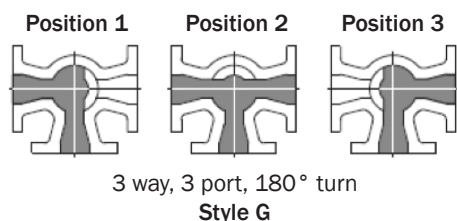
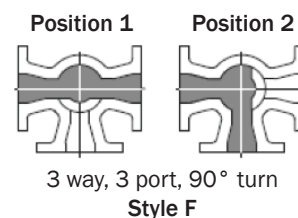
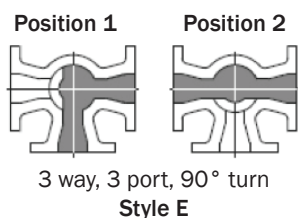
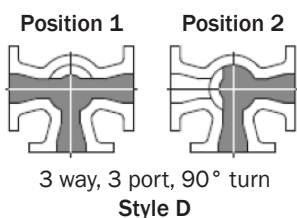
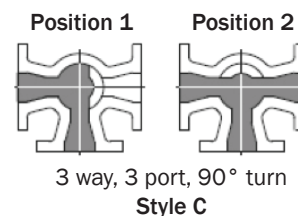
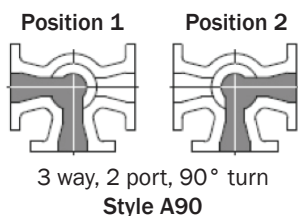
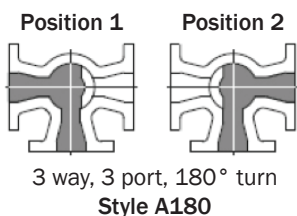
The Milliken 3-way plug valve is a long life valve and does not require stocking spare parts.

# MULTI-PORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

## Plug Valve Port Positions

### MILLIKEN® MULTI-PORT (3-WAY) PLUG VALVE PORT POSITIONS

Port Positions Viewed from Above



\* Requires Double-Style Plug

# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

## Troubleshooting

### TROUBLESHOOTING

#### Wrench Operated Plug Valve

Problem	Cause	Solution
Valve will not open	<ul style="list-style-type: none"> <li>• broken or misadjusted torque collar</li> <li>• obstruction in line</li> <li>• excessive line pressure</li> <li>• elastomer damage</li> </ul>	<ul style="list-style-type: none"> <li>• adjust or replace torque collar</li> <li>• remove obstruction</li> <li>• reduce pressure</li> <li>• replace plug</li> </ul>
Valve will not close	<ul style="list-style-type: none"> <li>• broken or misadjusted torque collar</li> <li>• obstruction in line</li> <li>• excessive line pressure</li> <li>• elastomer damage</li> </ul>	<ul style="list-style-type: none"> <li>• adjust or replace torque collar</li> <li>• remove obstruction</li> <li>• reduce pressure</li> <li>• replace plug</li> </ul>
Valve will not shut off flow	<ul style="list-style-type: none"> <li>• improper stop adjustment</li> <li>• obstruction in line</li> <li>• excessive line pressure</li> <li>• elastomer damage</li> </ul>	<ul style="list-style-type: none"> <li>• adjust closed stop</li> <li>• remove obstruction</li> <li>• reduce pressure</li> <li>• replace plug</li> </ul>
Valve leaks at plug stem	<ul style="list-style-type: none"> <li>• damaged “U” cup seal</li> </ul>	<ul style="list-style-type: none"> <li>• replace “U” cups</li> </ul>

#### Gas Operated Plug Valve

Problem	Cause	Solution
Valve will not open	<ul style="list-style-type: none"> <li>• bent input shaft</li> <li>• obstruction in line</li> <li>• excessive line pressure</li> <li>• elastomer damage</li> </ul>	<ul style="list-style-type: none"> <li>• replace worn shaft</li> <li>• remove obstruction</li> <li>• reduce pressure</li> <li>• replace plug</li> </ul>
Valve will not close	<ul style="list-style-type: none"> <li>• bent input shaft</li> <li>• obstruction in line</li> <li>• excessive line pressure</li> <li>• elastomer damage</li> </ul>	<ul style="list-style-type: none"> <li>• replace worn shaft</li> <li>• remove obstruction</li> <li>• reduce pressure</li> <li>• replace plug</li> </ul>
Valve will not shut off flow	<ul style="list-style-type: none"> <li>• improper stop adjustment</li> <li>• obstruction in line</li> <li>• excessive line pressure</li> <li>• elastomer damage</li> </ul>	<ul style="list-style-type: none"> <li>• adjust closed stop</li> <li>• remove obstruction</li> <li>• reduce pressure</li> <li>• replace plug</li> </ul>
Valve leaks at plug stem	<ul style="list-style-type: none"> <li>• damaged “U” cup seal</li> </ul>	<ul style="list-style-type: none"> <li>• replace “U” cups</li> </ul>

#### Actuated Plug Valve

Problem	Cause	Solution
Valve will not close/open	<ul style="list-style-type: none"> <li>• no power source</li> <li>• improper signal</li> <li>• burned out or impaired component</li> </ul>	<ul style="list-style-type: none"> <li>• check incoming power source and/or replace fuses</li> <li>• check actuating signal sequence</li> <li>• check and repair or replace motor or relay devices</li> </ul>
Valve will not shut off flow	<ul style="list-style-type: none"> <li>• improper stop adjustment</li> <li>• actuator torques out</li> </ul>	<ul style="list-style-type: none"> <li>• re-set limit switch</li> <li>• check for obstructions in valve</li> </ul>

# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

## 3"-16" Three-Way Plug Valve with Wrench Operated

VALVE SIZE	A	B	C	D	E	F	G	H
3	3	8	0.75	4.96	4.81	7.50	6.00	4
4	4	9.88	1.00	6.94	5.94	9.00	7.50	6
6	6	11.63	1.00	8.06	7.06	11.00	9.50	6
8	8	13.88	1.13	11.75	10.94	13.50	11.75	4
10	10	16.75	1.19	11.75	10.94	16.00	14.25	12
12	12	19.00	1.25	13.50	12.88	19.00	17.00	12
14	14	21.00	1.38	14.38	14.19	21.00	18.75	10
16	16	23.75	1.44	15.06	14.75	23.50	21.25	16

VALVE SIZE	J	N	P	Q	R	S	T	U
3	0.75	1.00	5.50	—	—	4	—	11.00
4	0.75	2.00	6.50	2	0.63	8	—	12.75
6	0.88	2.00	8	2	0.75	8	—	12.00
8	0.88	2.00	9	4	0.75	8	—	17.75
10	1	2.00	11	—	—	12	—	17.75
12	1	2.00	11.56	—	—	8	4	19.50
14	1.13	N/A (1)	12.50	2	1.00	8	4	18.31
16	1.13	N/A (1)	15.13	—	—	16	—	20.69

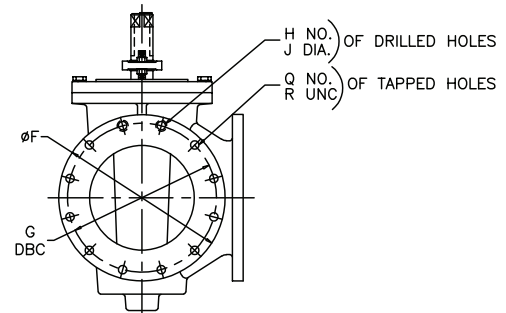
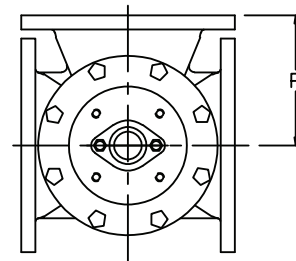
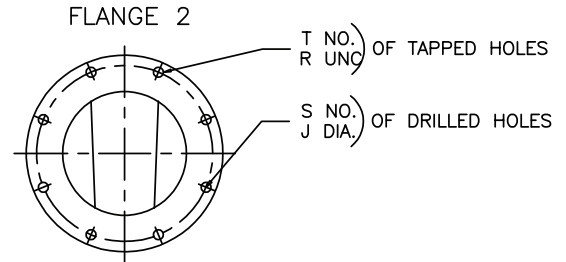
Notes:

1. 14" & 16" Require adapter to be lever operated.

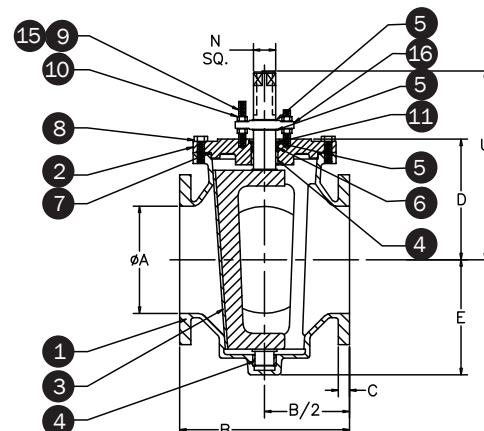
THREE-WAY VALVE PORT POSITION STYLES						
90°	A90	<input type="checkbox"/>	C	<input type="checkbox"/>	D	<input type="checkbox"/>
180°	A180	<input type="checkbox"/>	G	<input type="checkbox"/>	H	<input type="checkbox"/>
270°	—	<input type="checkbox"/>	K	<input type="checkbox"/>	L	<input type="checkbox"/>

Please see Milliken multiport plug valve catalogue page 5 for valve patterns of the three-way valve port positions

Item	QTY	Description	Material	
1	1	Body	Cast Iron	
2	1	Cap	Cast Iron	
3	1	Plug Elastomer As Spec.	Ductile Iron	
4	2	Sleeve Bearing	Stainless Steel	
5	3	Snap Ring	Spring Steel	
6	2	U Cup Seal	Elastomer As Spec.	
7	1	"O" Ring	Elastomer As Spec.	
8	AR	H.H. Cap Screw	<input type="checkbox"/> Steel	<input type="checkbox"/> Stn. Steel
9	2	Stud	<input type="checkbox"/> Steel	<input type="checkbox"/> Stn. Steel
10	4	Jam Nut	<input type="checkbox"/> Steel	<input type="checkbox"/> Stn. Steel
11	1	Retaining Ring	Steel	
14	1	Seal Ret. Ring	Brass	
15	AR	Flatwasher	<input type="checkbox"/> Steel	<input type="checkbox"/> Stn. Steel
16	1	Gland	Ductile Iron	



FLANGE 1 & 3  
(OPPOSITE SIDES)



# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

3"-16" Three-Way Plug Valve with 90° Turn Gear Operator & Handwheel or Nut or Chainwheel

VALVE SIZE	90° Gear Size	A	B	C	D	E	F	G
3	M3	3	8	0.75	4.96	4.81	7.50	6.00
4	M8	4	9.88	1.00	6.94	5.94	9.00	7.50
6	M8	6	11.63	1.00	8.06	7.06	11.00	9.50
8	M8	8	13.88	1.13	11.75	10.94	13.50	11.75
10	M8	10	16.75	1.19	11.75	10.94	16.00	14.25
12	M8	12	19.00	1.25	13.50	12.88	19.00	17.00
14	M8	14	21.00	1.38	14.38	14.19	21.00	18.75
16	M8	16	23.75	1.44	15.06	14.75	23.50	21.25

VALVE SIZE	90° Gear Size	H	J	P	Q	R	S	T
3	M3	4	0.75	5.50	—	—	4	—
4	M8	6	0.75	6.50	2	0.63	8	—
6	M8	6	0.88	8	2	0.75	8	—
8	M8	4	0.88	9	4	0.75	8	—
10	M8	12	1	11	—	—	12	—
12	M8	12	1	11.56	—	—	8	4
14	M8	10	1.13	12.50	2	1.00	8	4
16	M8	16	1.13	15.13	—	—	16	—

## THREE-WAY VALVE PORT POSITION STYLES

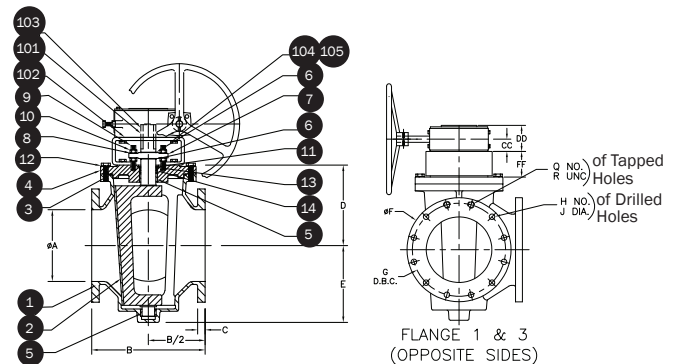
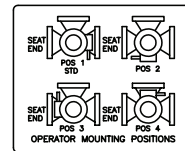
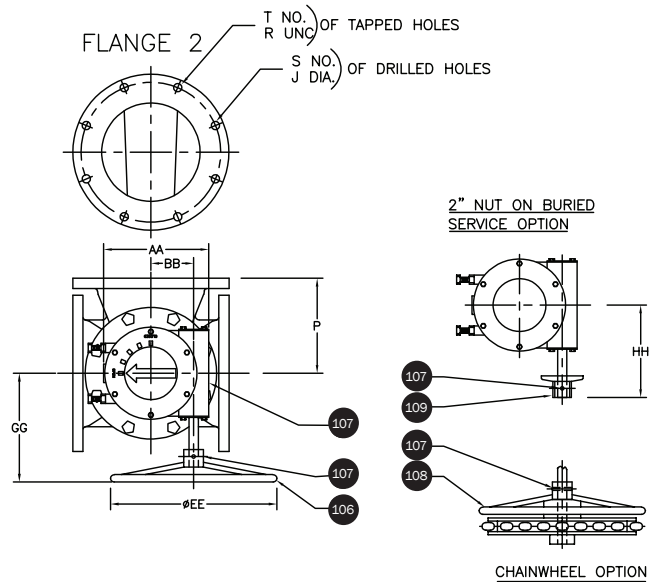
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Please see Milliken multiport plug valve catalogue page 5 for valve patterns of the three-way valve port positions

## 90° Gear Option

Gear Size	AA	BB	CC	DD	EE	FF	GG	HH
M3	7.00	2.56	1.50	3.56	6.00	6.00	9.50	8.00
M8	11.25	4.63	2.00	4.53	4.00	4.00	11.63	10.00

Item	QTY	Description	Material
1	1	Body	Cast Iron
2	1	Plug	Ductile Iron
3	1	"O" Ring	Elastomer As Spec.
4	1	Cap	Cast Iron
5	2	Bearing	Stainless Steel
6	2	Snap Ring	Spring Steel
7	1	Gland	Ductile Iron
8	4	Flatwasher	<input type="checkbox"/> Steel <input type="checkbox"/> Stn. Steel
9	2	Stud	<input type="checkbox"/> Steel <input type="checkbox"/> Stn. Steel
10	4	Jam Nut	<input type="checkbox"/> Steel <input type="checkbox"/> Stn. Steel
11	1	Retaining Ring	Steel
12	AR	Cap Screw	<input type="checkbox"/> Steel <input type="checkbox"/> Stn. Steel



\*Only on 3" Valve is bracket and coupler used. All the others use only a bracket

# MULTIPORT (3-WAY) PLUG VALVE OPERATION AND MAINTENANCE MANUAL SERIES 604

3"-16" Three-Way Plug Valve with 180°, 270°, & 360° Turn Gear Operator & Handwheel

VALVE SIZE	Gear Size	A	B	C	D	E	F	G
3	DT03	3	8.00	0.75	4.96	4.81	7.50	6.00
4	DT21	4	9.88	1.00	6.94	5.94	9.00	7.50
6	DT21	6	11.63	1.00	8.06	7.06	11.00	9.50
8	DT21	8	13.88	1.13	11.75	10.94	13.50	11.75
10	DT21	10	16.75	1.19	11.75	10.94	16.00	14.25
12	DT21	12	19.00	1.25	13.50	12.88	19.00	17.00
14	DT21	14	21.00	1.38	14.38	14.19	21.00	18.75
16	DT21	16	23.75	1.44	15.06	14.75	23.50	21.25

VALVE SIZE	Gear Size	H	J	P	Q	R	S	T
3	DT03	4	0.75	5.50	—	—	4	—
4	DT21	6	0.75	6.50	2	0.63	8	—
6	DT21	6	0.88	8.00	2	0.75	8	—
8	DT21	4	0.88	9.00	4	0.75	8	—
10	DT21	12	1.00	11.00	—	—	12	—
12	DT21	12	1.00	11.56	—	—	8	4
14	DT21	10	1.13	12.50	2	1.00	8	4
16	DT21	16	1.13	15.13	—	—	16	—

THREE-WAY VALVE PORT POSITION STYLES

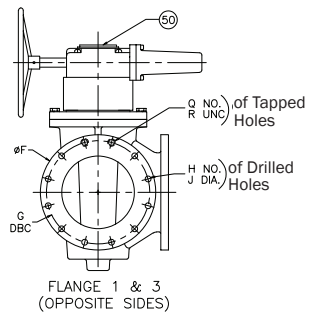
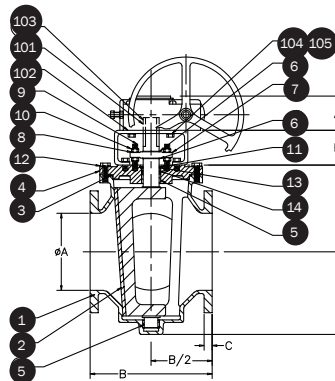
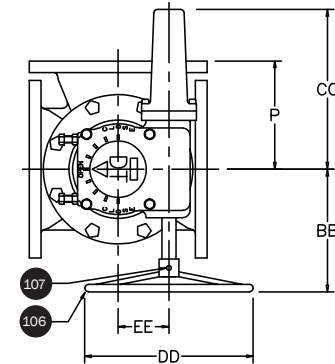
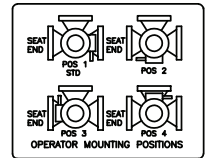
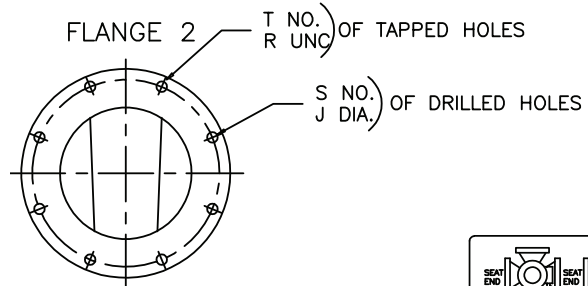
180°	A	<input type="checkbox"/>	G	<input type="checkbox"/>	H	<input type="checkbox"/>	I	<input type="checkbox"/>	J	<input type="checkbox"/>
270°	K	<input type="checkbox"/>	L	<input type="checkbox"/>	M	<input type="checkbox"/>	N	<input type="checkbox"/>	—	<input type="checkbox"/>
360°	K	<input type="checkbox"/>	L	<input type="checkbox"/>	M	<input type="checkbox"/>	N	<input type="checkbox"/>	—	<input type="checkbox"/>

Please see Milliken multiport plug valve catalogue page 5 for valve patterns of the three-way valve port positions

Gear Size

	AA	BB	CC	DD	EE	FF
DT03	2.59	6.25	5.50	6.00	1.75	6.00
DT21	3.54	9.27	10.96	12.00	3.63	4.00

Item	QTY	Description	Material
1	1	Body	Cast Iron
2	1	Plug Elastomer As Spec.	Ductile Iron
3	1	"O" Ring	Elastomer As Spec.
4	1	Cap	Cast Iron
5	2	Bearing	Stainless Steel
6	2	Snap Ring	Spring Steel
7	1	Gland	Ductile Iron
8	4	Flatwasher	<input type="checkbox"/> Steel <input type="checkbox"/> Stn. Steel
9	2	Stud	<input type="checkbox"/> Steel <input type="checkbox"/> Stn. Steel
10	4	Jam Nut	<input type="checkbox"/> Steel <input type="checkbox"/> Stn. Steel
11	1	Retaining Ring	Steel



Item	QTY	Description	Material
12	AR	Cap Screw	<input type="checkbox"/> Steel <input type="checkbox"/> Stn. Steel
13	1	Seal Ret. Ring	Brass
14	2	U Cup Seal	Elastomer As Spec.
50	1	Dynatorque DT03/DT21 Gear	
101	1	Key	Steel
102	1	Bracket	Steel
*103	1	Coupling	Steel
104	AR	Cap Screw	Steel/Zinc
105	AR	Lock Washer	Steel/Zinc
106	1	Handwheel	Ductile Iron
107	1	Spring Pin	Steel

\*Only on 3" Valve is bracket and coupler used. All the others use only a bracket

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