



# BR5000

## Pneumatically Operated Chemical Injection Pump

### MAINTENANCE

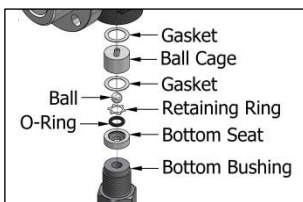


**Disconnect power source and ensure pressure is removed from pump head prior to performing any maintenance. Hazardous pressures can result in serious injury or property damage.**

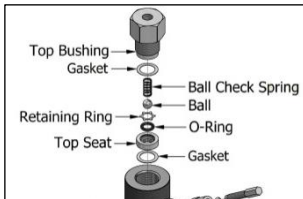
### Pump Head Maintenance

#### Pump Head Assembly

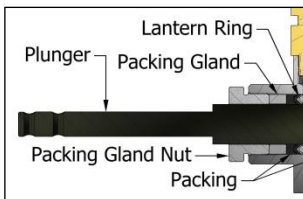
**Step 1:** Ensure all parts are clean and free from damage (see Inspection section). Lubricate all O-rings with petroleum based lubricant; lubricate packing and plunger with a suitable packing lubricant grease (Teflon or Graphite based packing lubricant is recommended, but an equivalent suitable lubricant like a Molybdenum disulfide based lubricant can be substituted).



**Step 2:** Install O-ring into bottom seat (and for 1/4" and 3/8" plunger sizes install retaining ring into bottom seat). Place ball and gasket onto bottom seat and cover ball with ball cage (for 1/2" and larger plunger sizes, this gasket is the wider of the four gaskets). Place gasket onto ball cage and insert into the suction end of body. Thread bottom bushing into suction end of body utilizing a thread sealant. Tighten bottom bushing.



**Step 3:** Install O-ring and retaining ring into top seat. Install top seat into body with a gasket on either side of seat. Install ball check spring, and ball into top bushing and thread top bushing into body utilizing a thread sealant. Tighten top bushing.



**Step 4:** Install packing (and lantern ring, if applicable) into body ensuring it is installed in correct order and orientation. *Note: The "V-Ring" point should be pointing outward and the lantern ring in line with the grease jack.* Place plunger packing gland on packing. Insert plunger into packing. Snugly tighten the plunger packing gland nut onto body, do **not** over tighten. (For 1 1/4" plunger size, packing gland nut has to be installed after head assembly is inserted into body.)

**Step 5:** Install head assembly into housing ensuring plunger fits through the stuffing box and fits into the thrust rod. Install adjusting pin. Install and tighten hex bolts.

**Step 6:** Install gasket and cover with wing screw. Install and tighten priming valve into body.

#### Pump Head Disassembly

**Step 1:** Disconnect operating air supply and ensure all pressure is removed from pump head assembly and isolate fluid discharge and suction lines. Open and remove priming valve. Disconnect fluid discharge and suction lines.

**Step 2:** Remove cover, to get access to and remove the adjusting pin from the thrust rod.

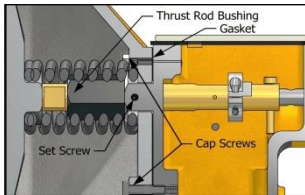
**Step 3:** Remove the hex bolts and the pump head assembly from the housing.

- Step 4:** Loosen and remove top bushing, ball check spring, ball, gaskets, and top check valve seat. Remove the retaining ring and O-ring from the top check valve seat.
- Step 5:** Loosen and remove bottom bushing, bottom check valve seat, ball, ball cage and gaskets. Remove the O-ring and retaining ring from the bottom check valve seat.
- Step 6:** Unthread plunger packing gland nut and remove plunger, plunger packing gland, plunger packing and lantern ring. *Note: 1 ¼” pump head assembly does not have a lantern ring.*

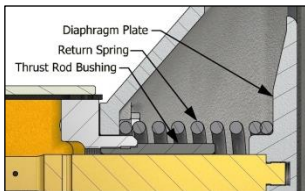
## Housing Maintenance

### Housing Assembly

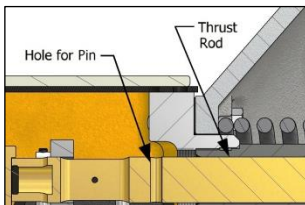
**Step 1:** Ensure all parts are clean and free from damage (see Inspection section).



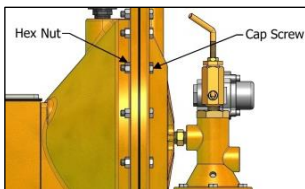
**Step 2:** If removed, thread the thrust rod bushing into the housing. Install set screw into housing and reassemble the housing by connecting the two halves with cap screws ensuring gasket is placed between the halves.



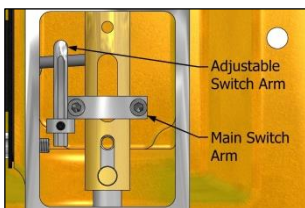
**Step 3:** Thread and tighten thrust rod onto diaphragm plate. Install return spring over thrust rod and slide thrust rod through thrust rod bushing. Lubricate thrust rod with molydisulfide lubricant grease.



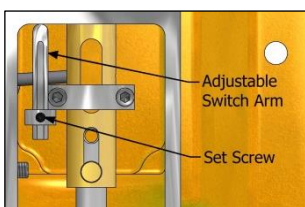
**Step 4:** Push thrust rod into housing against return spring until large hole in thrust rod is visible and install a pin (punch or drift pin) into hole to retain spring preload and prevent rod from turning. *Note: Ensure thrust rod fits over plunger if installed while installing thrust rod. Insert adjusting pin through thrust rod and plunger (if pump head is installed).*



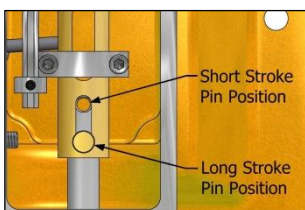
**Step 5:** Install diaphragm and diaphragm cover with cap screws and hex nuts. Evenly tighten cap screws. *Note: Do not over tighten cap screws resulting in the diaphragm being compressed.* Remove pin installed in thrust rod hole.



**Step 6:** Place halves of switch arm collar around thrust rod with the adjustable switch arm oriented vertically on the micro switch side of the thrust rod. Position switch arm collar so that the edge allows a small portion of the oval hole through the thrust rod to be visible, as shown in figure. Tighten cap screws to lock the collar in place.



**Step 7:** Loosen set screw on adjustable switch arm and extend switch arm to rest against the housing for maximum stroke length. *Note: Ensure micro switch arm is located in between the switching arm rods.* Tighten set screw to hold adjustable switch arm vertical and in place. Further adjustments should be made as required to ensure pump operates correctly and continuously.



**Step 8:** Install adjusting pin into correct location for desired stroke length.

**Step 9:** Install air vent, safety valve, connector, master valve/regulator assembly (utilizing thread sealant) and micro switch line assemblies. Lubricate thrust rod with molydisulfide lubricant grease. Install gasket and cover with wing screw.

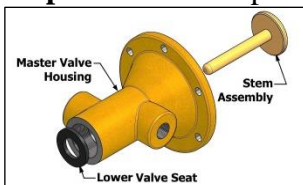
## Housing Disassembly

- Step 1:** Disconnect operating air supply and ensure all pressure is removed from pump head assembly and isolate fluid discharge and suction lines. Open and remove priming valve. Disconnect fluid discharge and suction lines.
- Step 2:** Remove wing screw, cover, and gasket.
- Step 3:** Remove adjusting pin. Loosen both cap screws on main switch arm and remove the switch arm assembly.
- Step 4:** Place a pin (punch or drift pin) into large hole next to main switch arm on thrust rod to prevent rod from turning or moving under spring load. *Note: It may be necessary to place a small amount of pressure onto the diaphragm in order to extend the thrust rod allowing access to the hole.*
- Step 5:** Remove micro switch line assemblies and master valve/regulator assembly if required.
- Step 6:** Loosen diaphragm cover cap screws and hex nuts. Leave one cap screw/hex nut combination loosely installed while removing remaining cap screws. Ensure diaphragm cover is loose and free prior to removing all cap screws. *Note: Diaphragm cover may be retaining return spring load, use caution when removing.* Remove diaphragm cover.
- Step 7:** Remove both diaphragms. Remove pin installed in thrust rod being careful to retain the small spring load while removing pin and remove thrust rod assembly from housing. Remove return spring.
- Step 8:** If necessary, unscrew thrust rod from diaphragm plate.
- Step 9:** If necessary to remove the thrust rod bushing, it is important to remove the set screw from the housing that locks the bushing in place prior to attempting to unscrew the bushing. Access to the set screw can be obtained by separating the housing pieces by removing cap screws.

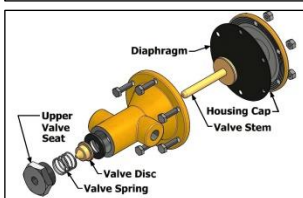
## Master Valve Maintenance

### Master Valve Assembly

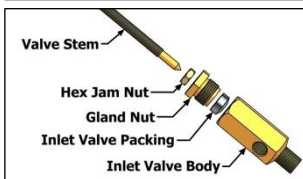
- Step 1:** Ensure all parts are clean and free from damage (see Inspection section).



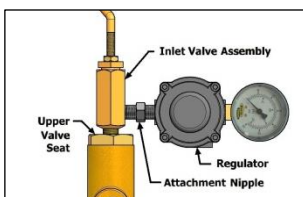
- Step 2:** Insert lower valve seat into groove in master valve housing. Insert stem assembly into master valve housing. Ensure stem assembly slides easily within housing.



- Step 3:** Install diaphragm and housing cap to the housing with cap screws and cap nuts. Install the valve disc over valve stem. Install valve spring and upper valve seat.



- Step 4:** Install the inlet valve packing into the inlet valve body, making sure the packing is situated in the correct orientation (concave down). Carefully insert gland nut into inlet valve body, along with the valve stem and hex jam nut.



- Step 5:** Thread the inlet valve assembly into the upper valve seat. Attach regulator with attachment nipple and tube fittings as required. Thread master valve/regulator assembly onto pump cover and attach micro switch line assemblies.

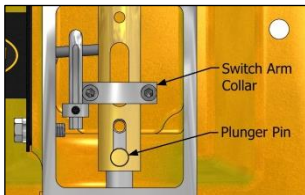
## Master Valve Disassembly

- Step 1:** Disconnect operating air supply. Loosen and disconnect micro switch line assembly.
- Step 2:** Remove the six cap screws and remove the housing cap, diaphragm and stem assembly.
- Step 3:** Loosen and disconnect micro switch line assembly to the regulator.
- Step 4:** Remove the master valve/regulator assembly from attachment nipple.
- Step 5:** Unscrew upper valve seat and remove valve spring, valve disc and lower valve seat.
- Step 6:** Unscrew and remove the valve stem from inlet gas valve, along with the hex jam nut.
- Step 7:** Unscrew and remove the gland nut and remove inlet valve packing from the inlet valve body.

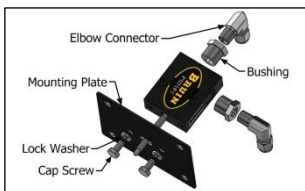
## Micro Switch Maintenance

### Micro Switch Assembly

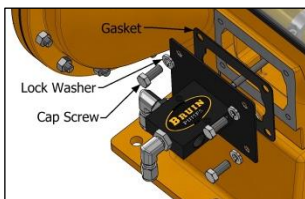
- Step 1:** Ensure all parts are clean and free from damage (see Inspection section).



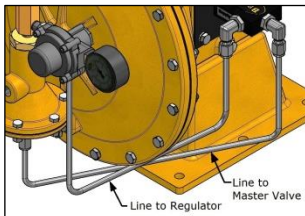
- Step 2:** Place halves of switch arm collar around thrust rod with the adjustable switch arm oriented vertically on the micro switch side of the thrust rod. Position switch arm collar so that the edge allows a small portion of the oval hole through the thrust rod to be visible, as shown in figure. Tighten cap screws to lock the collar in place.



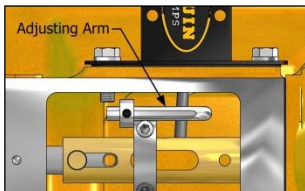
- Step 3:** Thread bushings and elbow connectors into micro switch valves utilizing a thread sealant. Mount micro switch onto mounting plate with cap screws and lock washer.



- Step 4:** Mount mounting plate to the pump housing utilizing cap screws and lock washers with gasket in place.



- Step 5:** Connect line assembly between micro switch elbow connector and master valve connector and connect line assembly between micro switch elbow connector and regulator connector.



- Step 6:** Modify adjustment switch arm location for desired stroke length and tighten set screw. Install cover gasket and cover with wing screws.

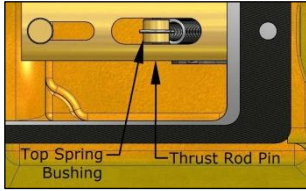
### Micro Switch Disassembly

- Step 1:** Disconnect operating air supply. Loosen and disconnect micro switch line assembly.
- Step 2:** Remove cap screws and lock washers from micro switch mounting plate. Remove micro switch assembly and gasket.
- Step 3:** Remove micro switch from mounting plate by removing cap screws and lock washers.
- Step 4:** Remove elbow connectors and bushings from micro switch.
- Step 5:** To remove switch arms, loosen cap screws and separate the two halves of the switch arm collar in order to remove the switch arms from the thrust rod.

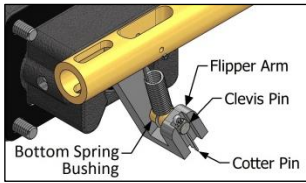
# Pilot Valve Maintenance

## Pilot Valve Assembly

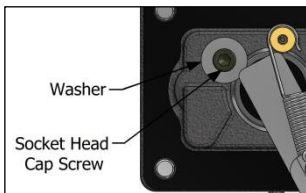
**Step 1:** Ensure all parts are clean and free from damage (see Inspection section).



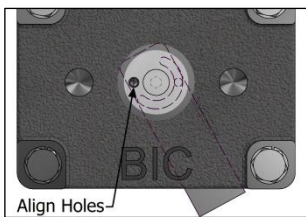
**Step 2:** Install the top spring bushing into the thrust rod using the thrust rod pin to lock it in place.



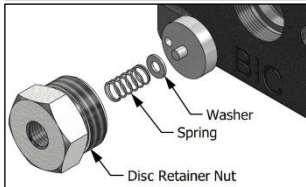
**Step 3:** Install the bottom spring bushing with spring attached into flipper arm with clevis pin and cotter pin. Spread cotter pin ends to lock in place.



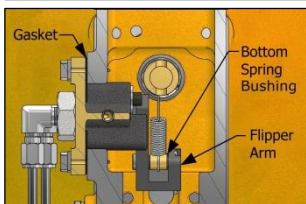
**Step 4:** Install the flipper arm and bearing assembly into the pilot valve body. *Note: Ensure that the flipper arm is in the correct orientation as shown in figure.* Lock flipper arm in position with socket head cap screw and washer.



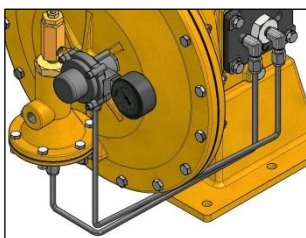
**Step 5:** Install drive pin into flipper arm. Lubricate face of valve disc with light petroleum grease or oil and install valve disc onto drive pin. *Note: Ensure valve disc is correctly orientated in regard to the flipper arm position with holes aligned as shown in figure.*



**Step 6:** Install and correctly orientate elbow connector into pilot valve body utilizing thread sealant. Install washer, spring and disc retainer nut. Install elbow connector into disc retainer nut utilizing thread sealant.



**Step 7:** Place gasket onto pilot valve body. Place pilot valve body into pump housing with the flipper spring installed onto the bottom spring bushing. Attach the pilot valve to the pump housing with lock washers and cap screws utilizing thread sealant. Connect flipper spring to top spring bushing.



**Step 8:** Install line assemblies. Install drain plug utilizing thread sealant and fill main cavity to the bottom of thrust rod with SAE 30 non-detergent oil (ISO 100 and AGMA 3 are equivalents). *Note: Use SAE 10W oil (ISO 32 and AGMA 0 are equivalents) for low ambient temperatures.* Install gasket and cover with wing screws.

## Pilot Valve Disassembly

**Step 1:** Disconnect operating air supply and ensure all pressure is removed. Remove line assemblies.

**Step 2:** Remove elbow connector from disc retainer nut.

**Step 3:** Drain body cavity of oil by removing drain plug. Remove cover and gasket by removing the wing screws.

- Step 4:** Remove disc retainer nut, spring, washer, valve disc, and pin. Remove remaining elbow connector from pilot valve body.
- Step 5:** Disconnect spring from top spring bushing within thrust rod.
- Step 6:** Remove hex head cap screws and lock washers. Remove pilot valve assembly from pump housing by rotating assembly and sliding out flipper arm from housing. Remove cotter pin, clevis pin, bottom spring bushing, and spring. Remove gasket.
- Step 7:** Remove socket head cap screw and retaining washer. Remove flipper arm assembly from pilot valve body with a punch and tapping the assembly out or threading a 3/8" bolt through pilot valve body center.

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## INSPECTION

**Inspect all components for damage. Replace or repair parts as necessary. The following is a guideline of what to inspect:**

- Inspect all threads for damage.
- Inspect all seals, packing and diaphragms for damage.
- Inspect body seal areas for corrosion, pitting or damage. Seal areas on the body include the packing area and the area below the top seat and ball cage.
- Inspect balls, top seat and bottom seat and ball check spring for corrosion or damage.
- Inspect plunger and thrust rod for wear, scarring or damage.
- Inspect housing for wear, scarring or damage within through bore.

### **Optional Pilot Valve Assembly Inspection**

- Inspect valve disc sealing face for pitting, scratches or damage. Inspect mating face on pilot valve body.
- Inspect valve disc pin.
- Inspect flipper arm and bearing assembly for ease of operation.
- Inspect flipper spring for damage.