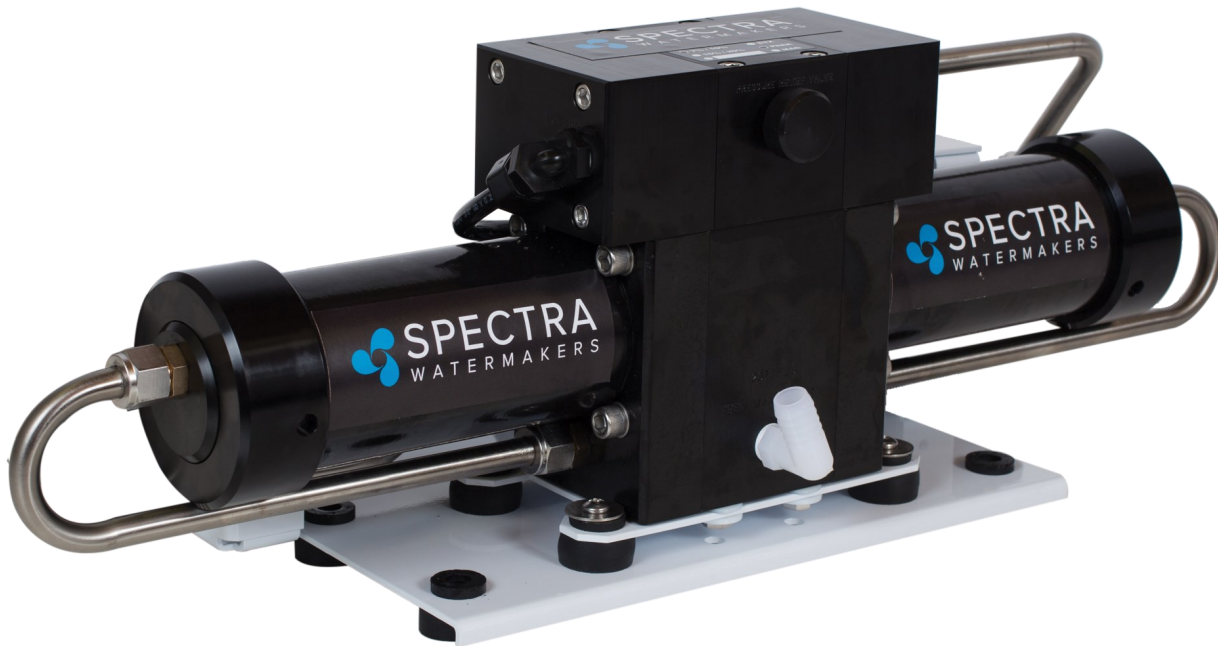


Rebuild Manual for Clark Pumps  
 Step - by -step instructions for the rebuilding process  
 Updated May 2017



Upstream Documents:	Clark Pump Assembly SOP
Follow-up Documents:	
Applies to the following products:	7%, 10%, and 20% Clark Pumps

## Welcome

This guide will walk a technician through the rebuilding of a Clark Pump. The goal of this process is to provide the customer with a rebuilt and upgraded pump that carries one-year warranty.

During the remanufacturing process we will replace all degradable parts, such as O-rings, springs, and seals, as well as any parts that show damage or wear.

The Clark Pump has been consistently refined and improved over the years, so during remanufacturing we will also bring older pumps up to current standards, wherever possible. Stainless steel elbows and compression fittings will be replaced with nickel-bronze fittings to eliminate crevice corrosion, which can crack plastic components. We replace PET end caps (units made between 2006 and 2009) , which have a limited lifespan, with Delrin.

The photos and part numbers referenced in this guide are for a 7% Clark Pump, with key measurements and tolerances given for 10% and 20% displacements. The process and many of the part numbers are identical for 10% and 20% models. A few key parts will of course be different, but these differences should be obvious with the parts in front of you. A brief appendix shows key differences and part numbers for the 20% Clark Pump.

Only a handful of 15% Clark Pumps were built. Rebuilding them is straightforward, and Katadyn maintains an inventory of replacement parts, but we recommend consulting with Katadyn, or returning the unit to Katadyn for remanufacturing.

**Tools:**

Small flashlight

Small drill bit

Dental pick

Piston rod installation tool (a section of 7% piston rod with a rounded end)

Forceps

Wire cutter

Silicon oil

Mechanical press

1/4-inch Allen wrench or drill attachment

Two 5/16-inch Allen wrenches

7/8, 13/16, and 15/16-inch end wrenches

Piston assembly tool, including base, cylinder, and horn.

Annular ring installation tool

Socket wrench with 1/4" Allen wrench and 1/2" sockets

Mar-proof hammer

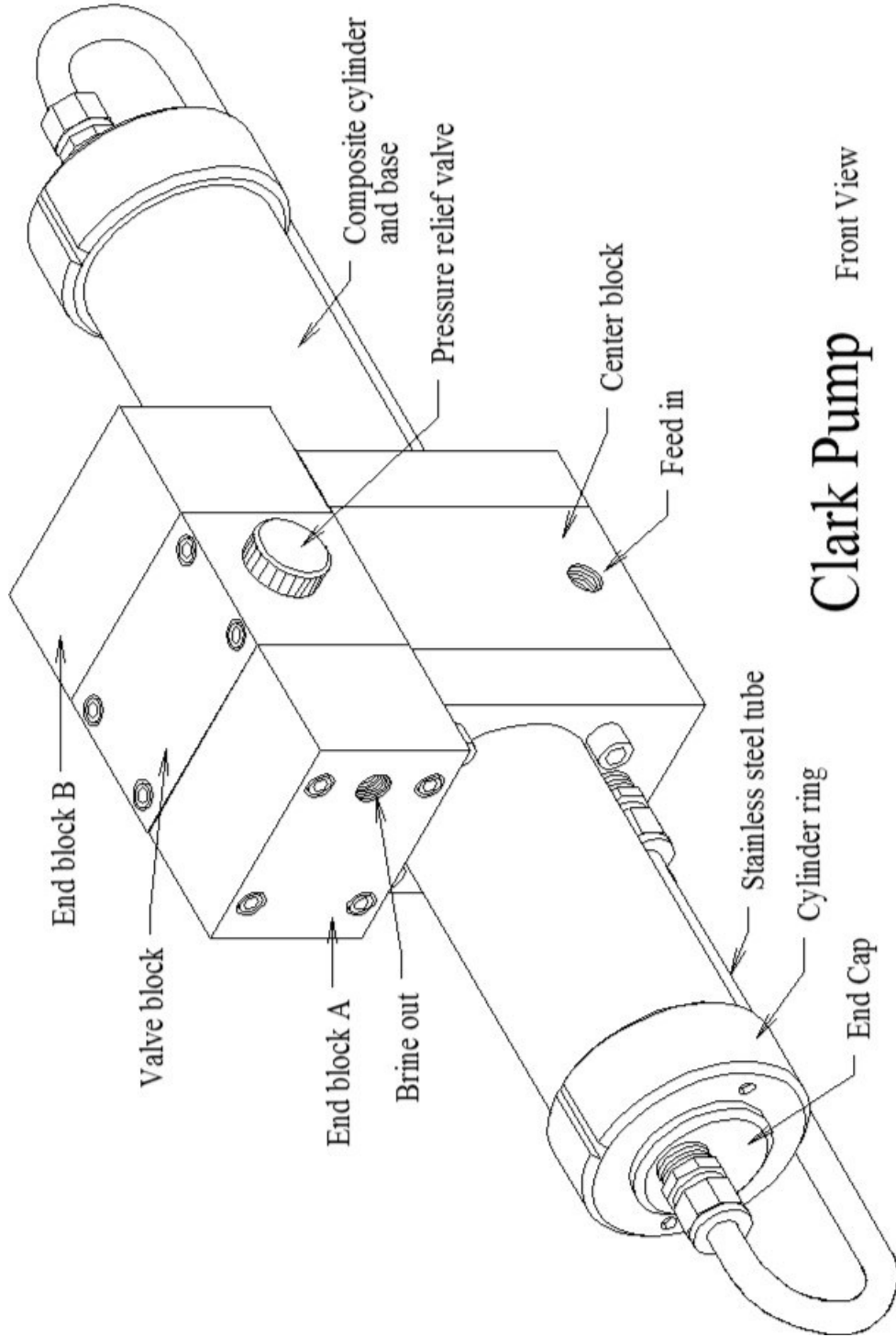
Ring wrench.

**Consumables:**

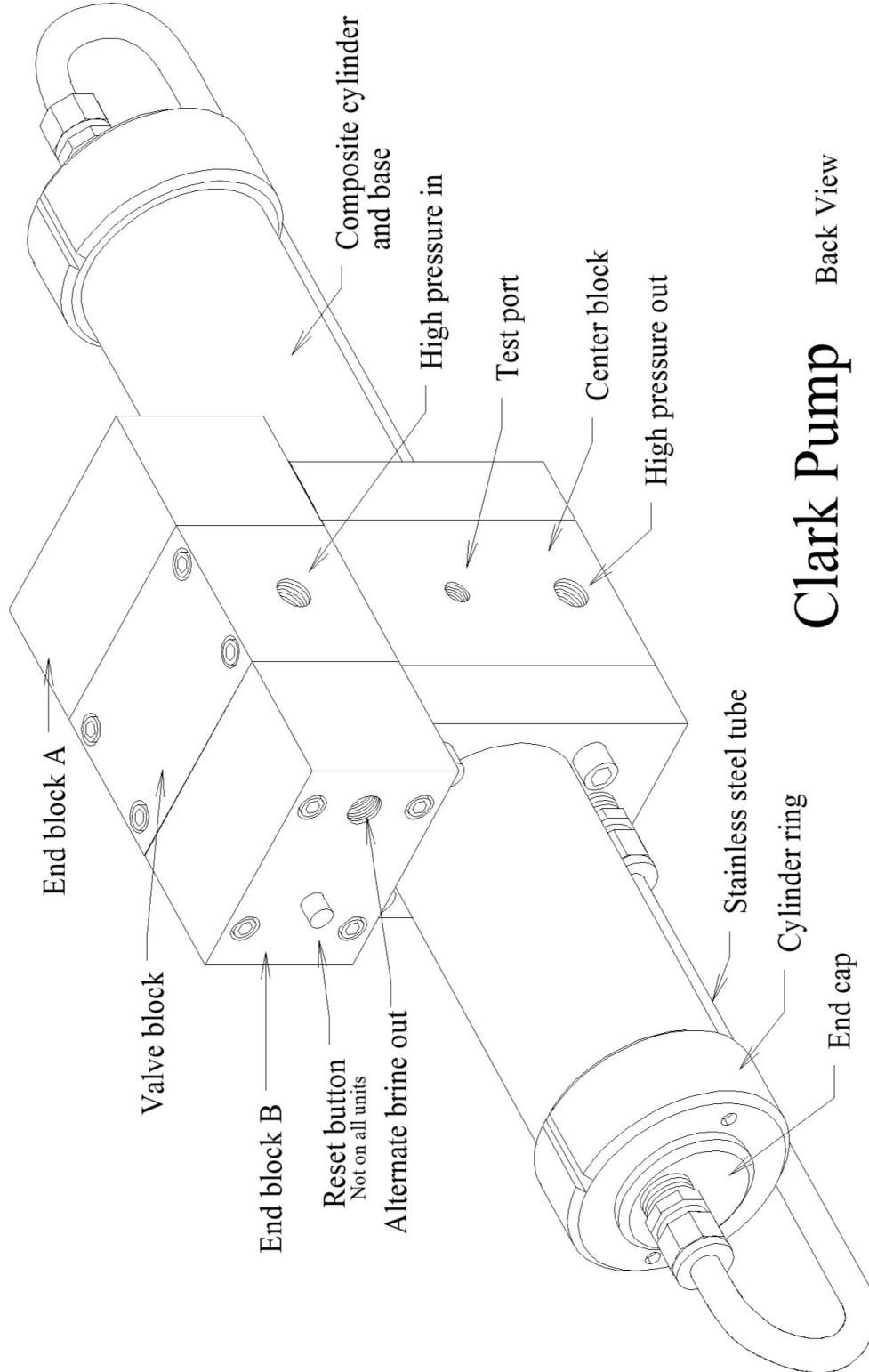
Silicone grease (Molykote 111)

Silicone oil

Teflon tape



**Clark Pump** Front View

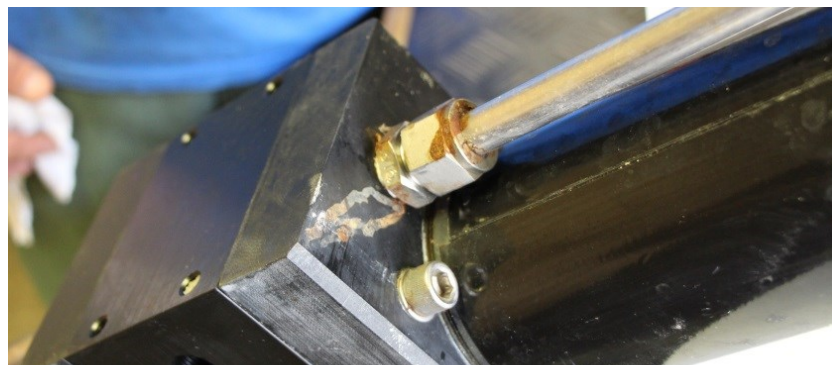


Clark Pump Back View

1.1. Before disassembling, check the Clark Pump for damage and defects. This valve block is cracked from over tightening its mounting screws, and will need to be replaced.



1.2. This cylinder base fitting shows evidence of prolonged leaking. This fitting and the J tube may need to be replaced.



1.3. Begin by removing all the external elbows, the test port plug, and the pressure relief valve. The two high pressure elbows, if stainless steel, should be discarded and replace with nickel-bronze.



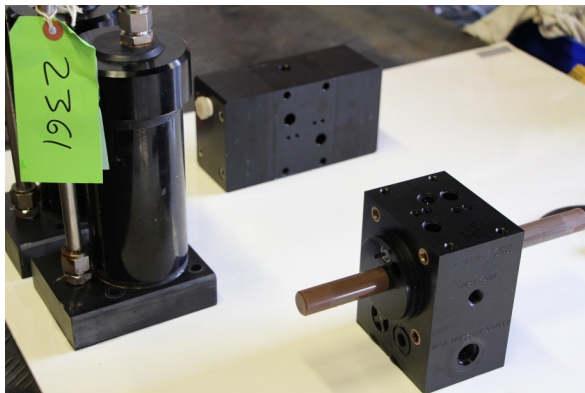
1.4. Remove the valve block assembly from the center block by removing the four mounting bolts.



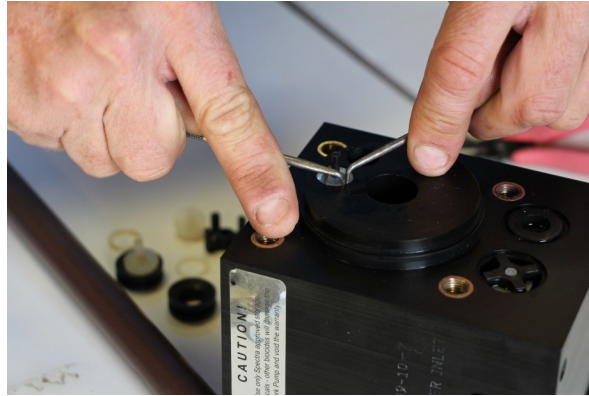
1.5. Remove the cylinders from the center block using two 5/16-inch Allen wrenches.



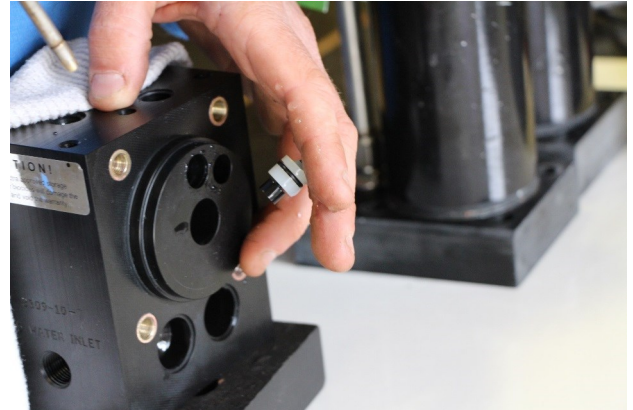
1.6. Wipe down each component and inspect carefully for cracks especially around the fittings as disassembly continues.



1.7. The pin valve retaining washers are split nylon washers (like a circlip) and can be removed from the center block using two O-ring picks, or an O-ring pick and a small screwdriver to pry the clip out of the groove.

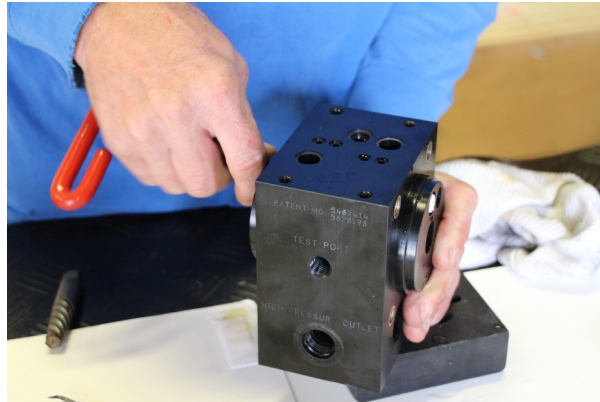


1.8. Remove the pin valve assemblies by gripping with a pair of pliers. Alternatively, they can be blown out of the center block using compressed air. Place a rag over the back side of the center block to keep the other pin valve in place. Plug the hole shown with your thumb while injecting air into the other.

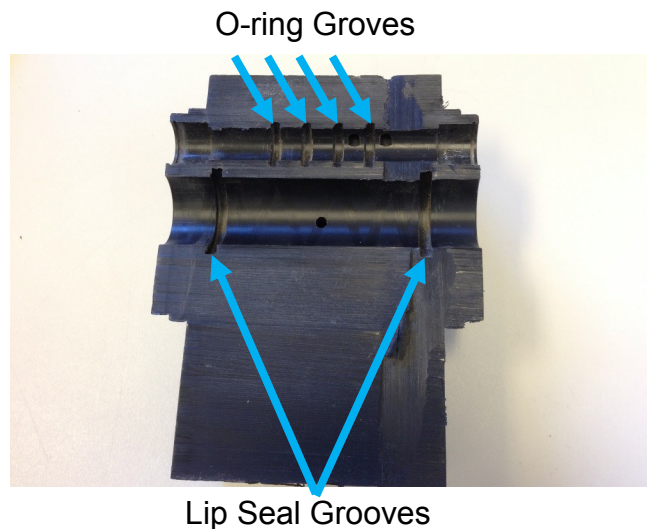




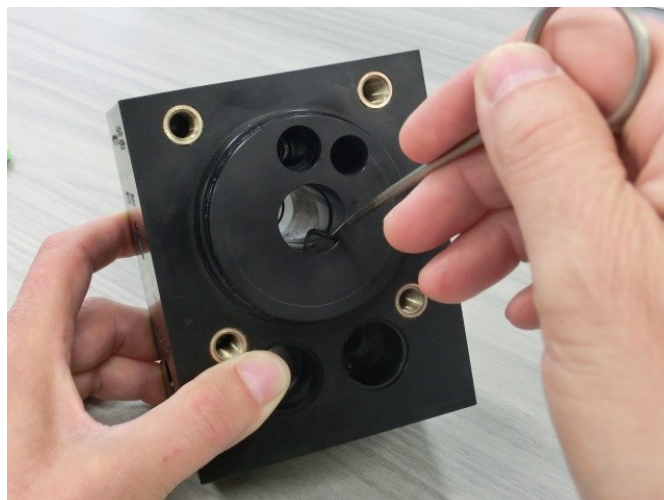
1.9. The pilot valve spool, and the pin valve assembly on the other side, can now be pushed out with an appropriate tool. The pin valve assemblies should be discarded and replaced.



1.10. This cutaway view shows the races for both the piston rod lip seals, and the pilot valve spool O-rings.



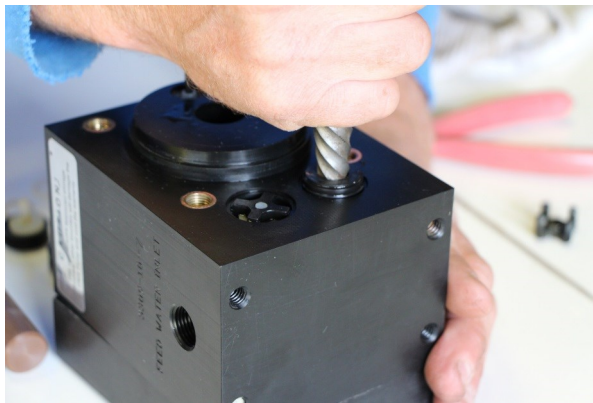
1.11. Remove the piston rod lip seals with forceps or a dental pick. Take care not to scratch the block or O-ring groove.



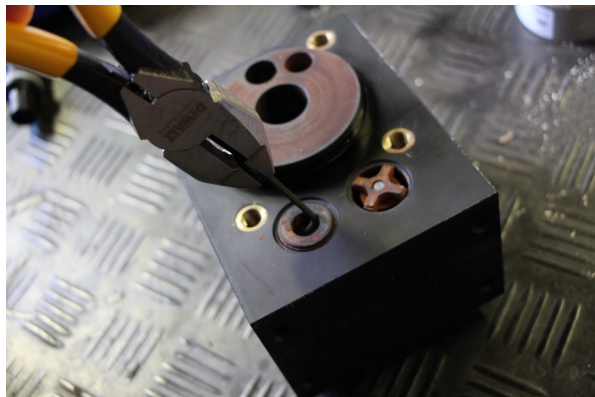
1.12. Likewise, remove pilot valve spool O-rings from the pilot valve bore. The easiest way is to stab the O-ring and then pry it out. Be careful to not push all the way through the O-ring so you don't damage the O-ring groove.



1.13. A #6 Easy-Out may be used to remove the valve seats. This may damage the seats, and they may need to be replaced.



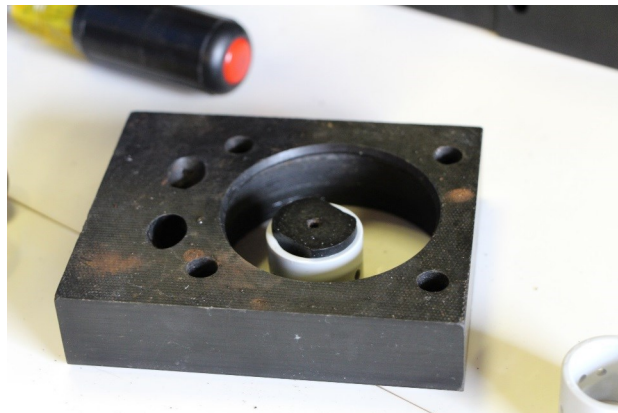
1.14. Alternatively valve seats can be removed with a small Allen wrench and pliers, taking care not to score the side of the valve port.



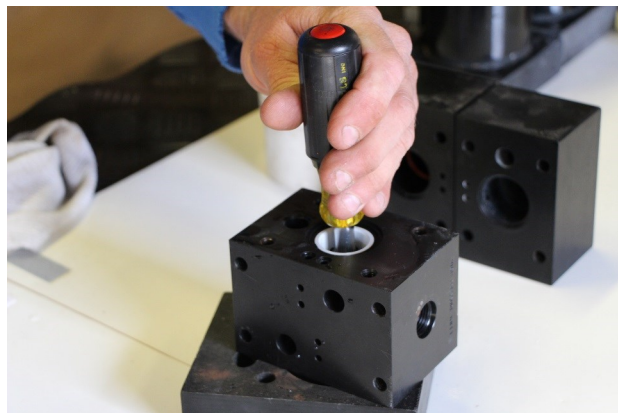
1.15. On some older units the check valve springs were white nylon. These can be discarded and replaced with stainless springs included in the kit.



1.16. Using the annular ring removal tool (shown, part number HDW-TL-AR) press out the annular rings from the valve block, slid it into place between the two annular rings (inside the block) and then push the ring out. Used annular rings should be replaced, but if they are not cracked (between the holes) you can save them as spares.



1.17. Pressing an annular ring out the other side of this valve block using a nut driver or a small socket. The annular ring is held in place with an o-ring so it should not take much force to remove it.



1.18. Using two wrenches, loosen the compression nut on the end cap.



1.19. Loosen the compression nut on the base and remove the stainless steel tube. Remove the compression fittings from the bases and end caps.



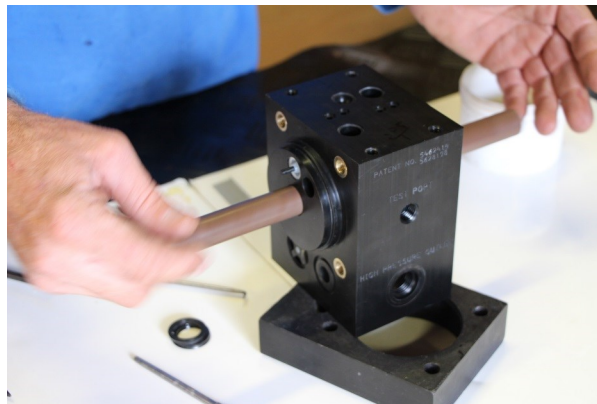
1.20. Using a ring wrench or strap wrench, remove the cylinder ring and end cap. If it is difficult to remove, heating the aluminum ring using a hair dryer (150°F, 65°C) will help loosen it. Heat the ring until you can leave your hand on it for 2 seconds (<150°F, 65°C).



2.1. Check the piston rod for scoring. It should be smooth and straight.



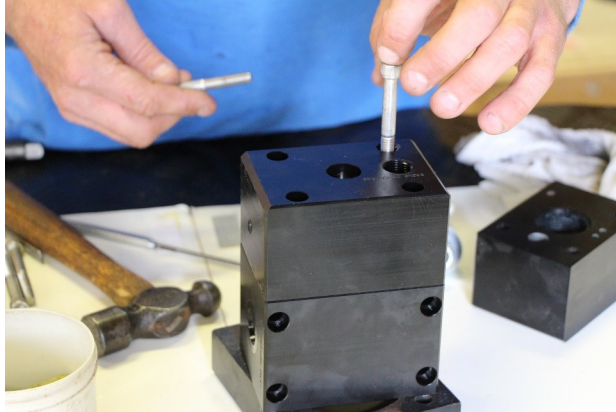
2.2. With the piston rod lip seals removed, the piston rod should have clearance in the center block bore and slide back and forth with no resistance. If there is any resistance, the center block will need to be honed or bored, and/or the rod replaced.



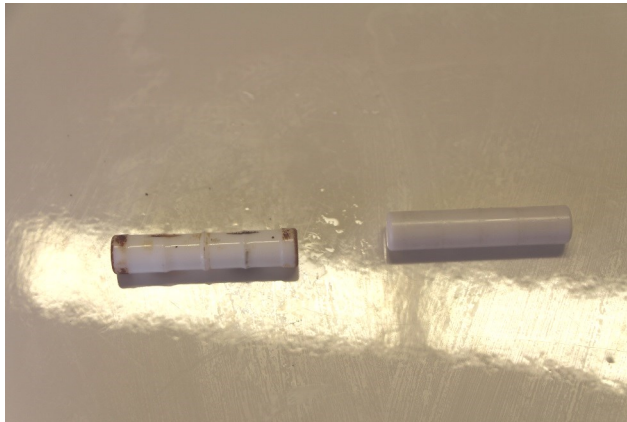
2.3. If the bronze inserts are protruding slightly, they should be shortened so the base of the cylinders touch the center block when bolted into place. It's ok for these inserts to be inset into the block up to 1/8" (3mm), they should not extend beyond the surface of the block.



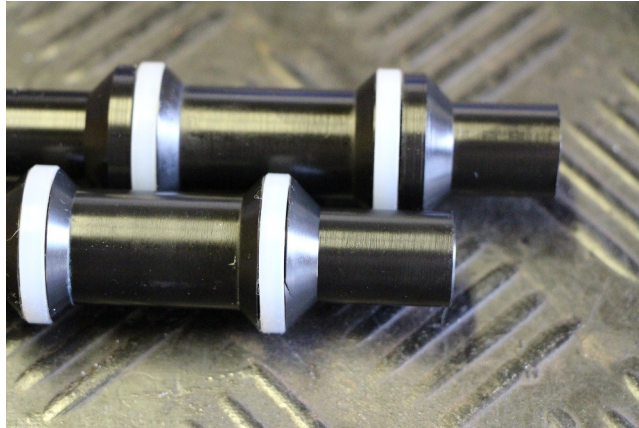
2.7. Likewise, bolts can become corroded over time so clean them and make sure they fit in the blocks, clean the threads and lubricate with silicon grease.



2.8. Inspect the pilot valve spool for wear. If it is in good condition, it can be reused. The pilot valve spool on the right is used, but still in good condition. If you can feel any ridges, like the one shown on the left (an extreme example) it must be replaced.



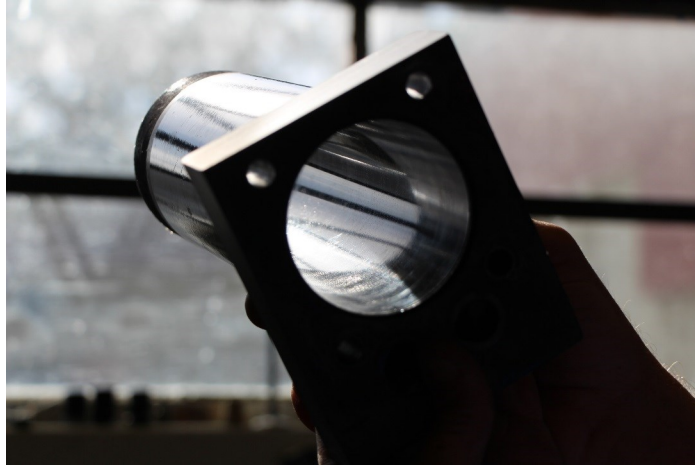
2.10. If the spool valve seals are smooth and do not show any scoring they can be reused. When in doubt replace the spool valve. The spool on top is for a 15 or a 20% pump and the one on the bottom is for a 7 or 10% pump.



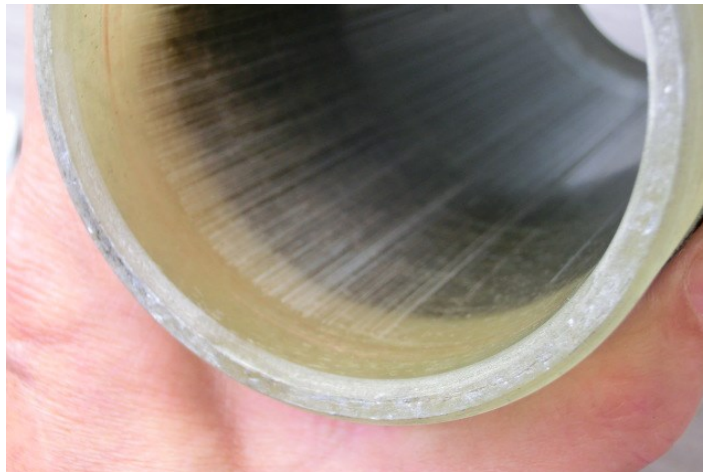
2.11. Clean the cylinder rings so they are ready to replace.



2.12. Inspect cylinders for wear and deep grooves (this one retains a smooth finish and is in good shape).



2.13. This cylinder has pronounced grooves. Any grooves you can feel with your fingernail need to be addressed. A ball hone as shown in the next step works well for minor scoring.

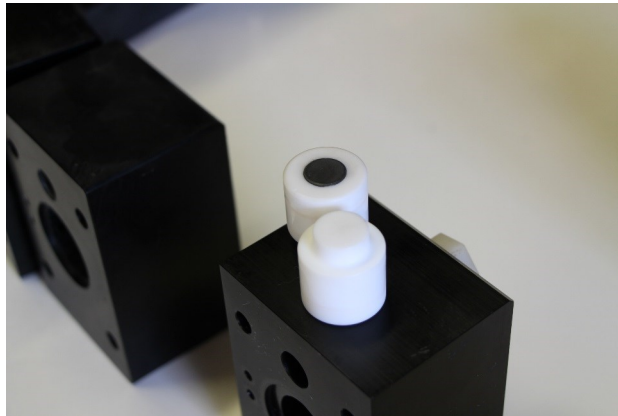




2.14. Minor grooves can be carefully removed with a wet 2-3/4-inch hone. In a pinch you can use sand paper to smooth down the ridges, it's not a permanent solution but it will work for awhile.



2.15. Check spool pistons for excessive wear. If in good condition, they can be reused. If your system is still using a stroke sensor be sure to reuse the piston with the magnet.



2.16. Inspect pistons for wear and snug fit in the cylinders. If pistons remain in good condition, and still seal snugly in the cylinder, they can be reused. Again using the new parts is always a good idea and then you can save the old parts for spares.



2.17. Only reuse J tubes and fittings that show no signs of pitting or leakage. This ferrule is pitted and won't reseal again:



2.18. Note that you can see the sealing surface where the ferrule contacts the fitting. This compression fitting is pitted, and must be discarded.



2.19. This compression fitting still looks good. If it is a stainless fitting for an end cap, it must be replaced with nickel-bronze, even if the stainless fitting is in good condition. Stainless fittings can react with the Delrin end caps over time and must be cleaned every two years or crevice corrosion will begin and can damage the plastic parts.



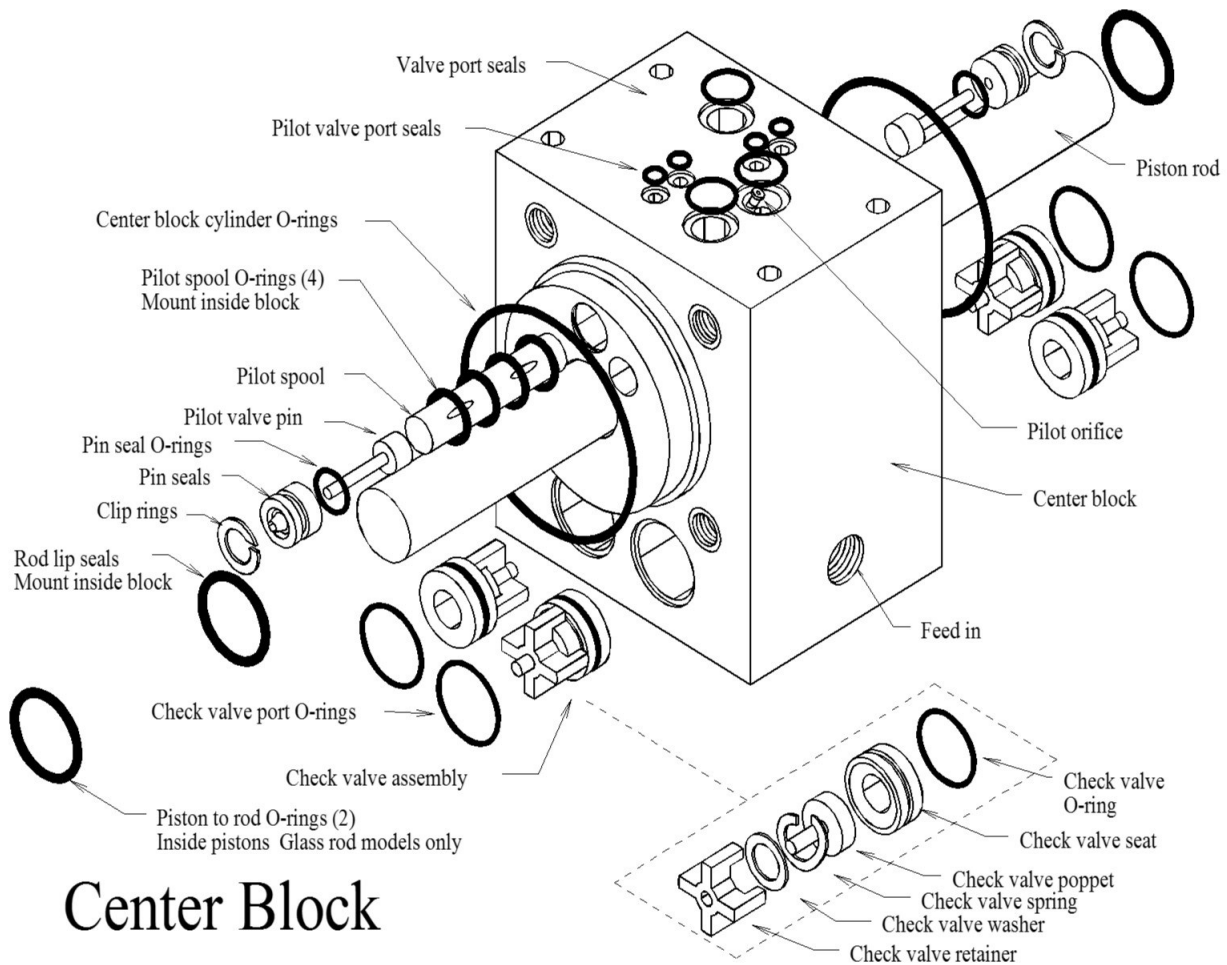
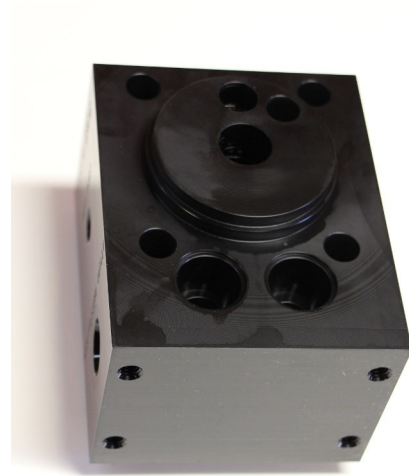
2.20. Stainless fittings can be reused in fiberglass base of the cylinders, but only if in excellent condition. There is no compatibility problem between stainless and the fiberglass base and these fittings are sealed with Teflon tape.



2.21. On even a fairly routine rebuild, many parts should be discarded and replaced:



# Center Block



# Center Block

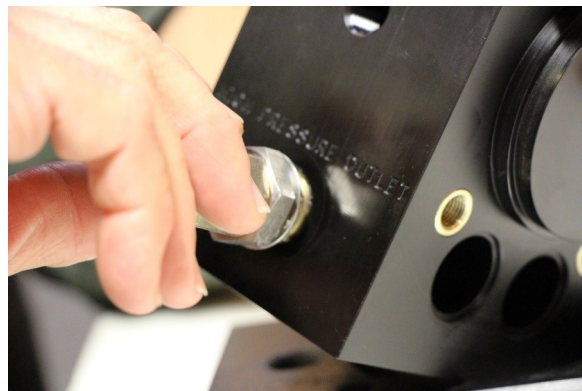
3.1. Place O-ring (SO-FT-STF, size 3-908) over threads on a nickel-bronze elbow (PL-MTE-3/4S1/2B). Take care not to cut the O-ring on the threads. **Reminder: stainless steel elbows should be replaced with nickel-bronze.** If you do not have bronze fittings the stainless fitting will work but the should be removed and cleaned every 24 months.



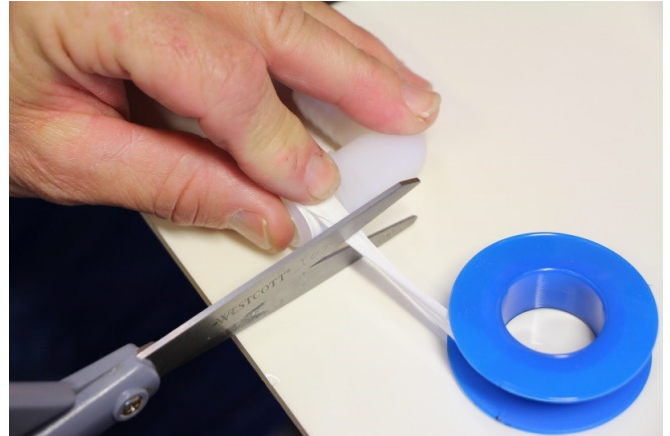
3.2. Lightly coat threads with silicon grease (Molykote 111).



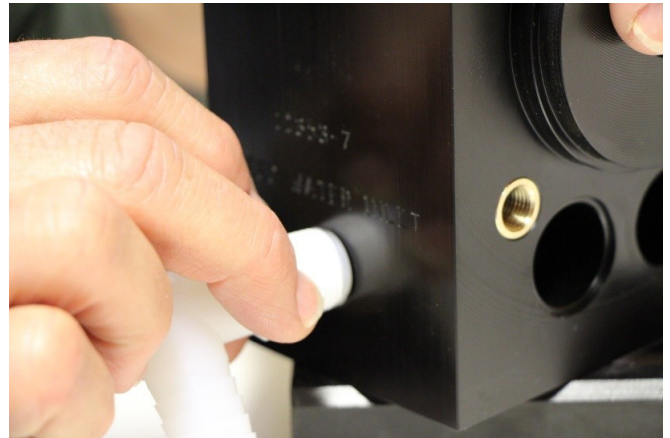
3.3. Screw the nickel-bronze elbow into the center block's high pressure outlet. Leave the elbow loose, because it will be reoriented and tightened later, during testing.



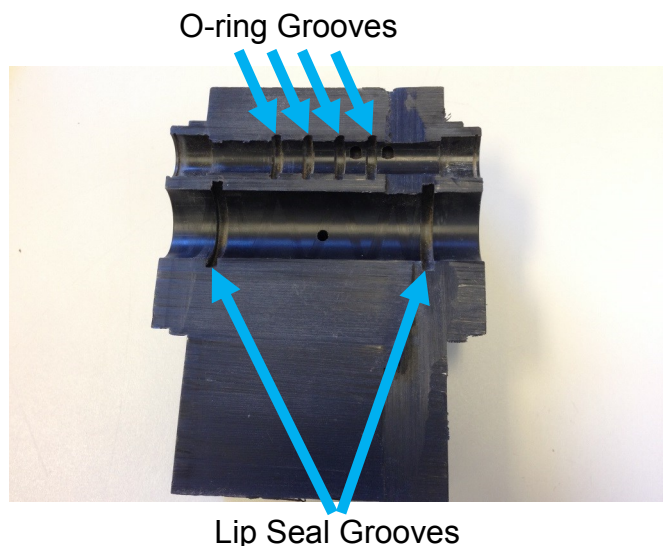
3.4. When applying Teflon tape to fittings do not wrap the first two threads which will make it easier to start the fitting in the threaded hole. Wrap six turns of Teflon tape around the threads of a 3/8" x 5/8" Nylon elbow (PL-HBE-3/8x5/8) and apply a small amount of silicon grease to the threads to lubricate for installation. For 20% Clark Pumps, see note in next step.



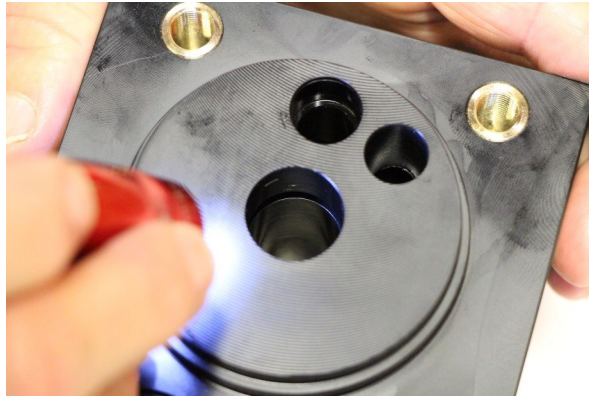
3.5. Screw the Nylon elbow into Feed Water Inlet. Leave the elbow finger tight, as it will be reoriented and tightened later, during testing. Note: On 20% Clark Pumps instead of the Nylon elbow, this will be another bronze elbow (PL-MTE-3/4S1/2B) with an O-ring (SO-FT-STF, size 3-908), just like the two fittings installed in the previous steps.



Again, cutaway view shows the races for the piston rod lip seals and the pilot valve spool seals in the following steps.



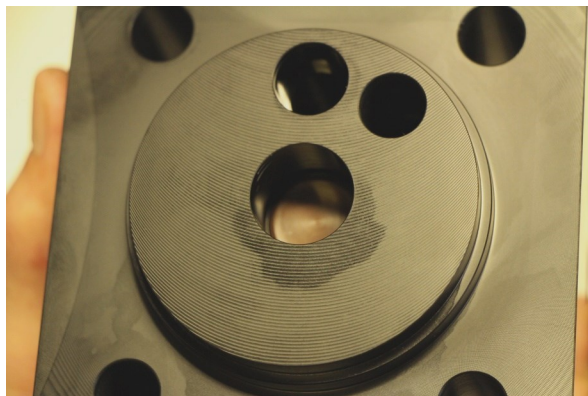
3.6. The two piston rod lip seals go in the large (3/4-inch or 7/8-inch) center block bore. Begin by inspecting the grooves in the bore for debris from manufacturing, as any contamination can interfere with the seals. Remove the debris with a dental pick or compressed air.



3.7. Use the Piston Rod (HP-CYL-PT for 7%; HP-CYL-7/8R for 10%) to aid installation of the seals.



3.8. Insert Piston Rod into the bore until even with the grooves for the seal which will help you push the new seal into position.

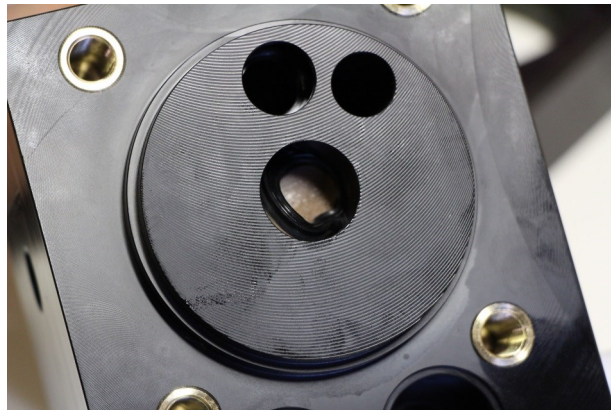


3.9. The lip seals must face out, and the X-ring within the lip seal must stay in place.



Outward face, showing X-ring

3.10. Place lip seal in valve bore, facing out.



3.11. Use forceps or a small stick to position the lip seal in groove. Repeat on other side of the center block. Feel around the periphery of both seals with your finger to smooth and check for lumps or twists. If the seal will not smooth out by pushing it into place with your finger then remove it and try again.





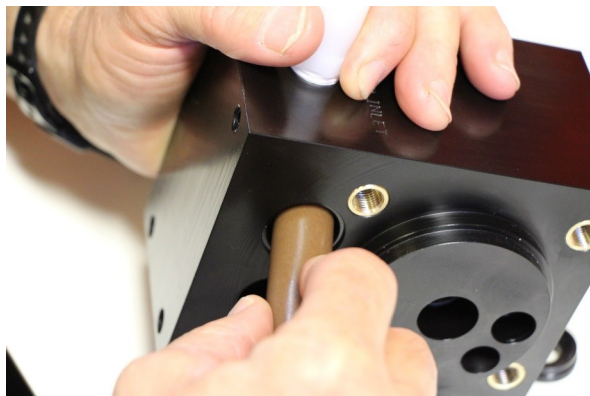
3.12. Roll all four check valve seat seals (SO-HPP-CVS, size 2-018) onto the check valve seats.



3.13. Insert check valve seats into the check valve bores on the INLET SIDE (the side of the center block that says "Feed Water Inlet" and now has the Nylon elbow). The tapered side of the valve (the seat side) should face out.



3.14. With a constant, even pressure, use your finger or the piston rod to push in the check valve seats until bottomed out.



3.15. Check for aberrations in manufacturing on the check valve retainers (HP-CB-CVR), especially additional material on the ends of the legs. Trim as necessary with an X-Acto knife.



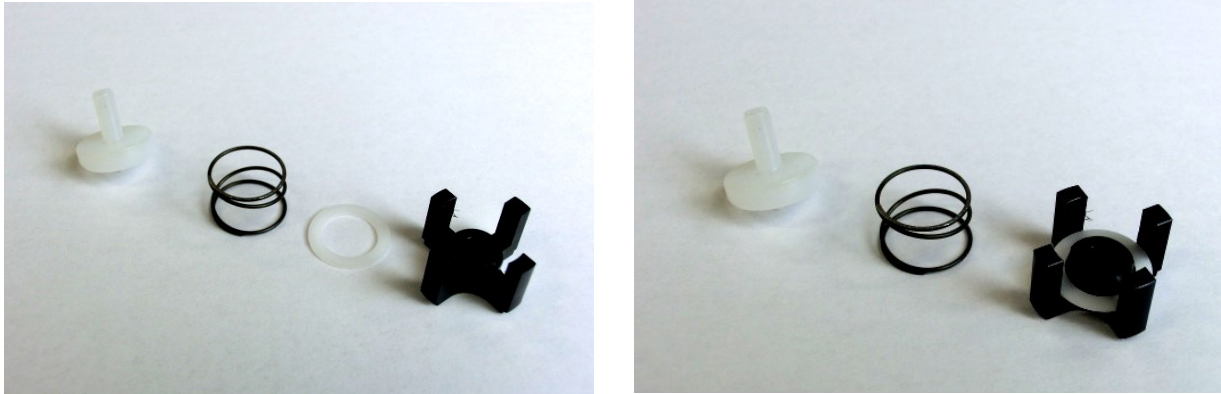
3.16. The two check valve retainers for the inlet side must be notched with clippers to ensure a secure fit in the check valve bores, otherwise they will fall out of their bores during assembly.



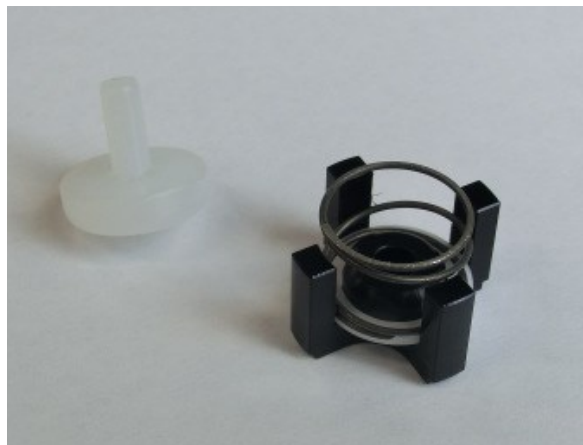
3.17. Notch the top of each leg of the check valve retainer legs, leaving pronounced burrs.



3.18. Place Nylon check valve washers (HP-CV-CVSW) on all four check valve retainers.



3.19. Place the stainless steel springs (HP-CB-SPR) on top of the nylon washers.



3.20. Check valves (HP-CB-CV) can be reused if in good condition. Insert check valves into check valve retainers and check for free movement.



3.21. Insert check valve assemblies and remaining two check valve seats into the bores on the outlet side (the side with the bronze fitting) of the center block.



3.22. To ease installation, loop the valve seat over the forceps, face down, then grip one of the legs of the valve retainer. Hold the valve down with the forceps as you press in the valve seat. Once installed, press on the valve to check for free operation.



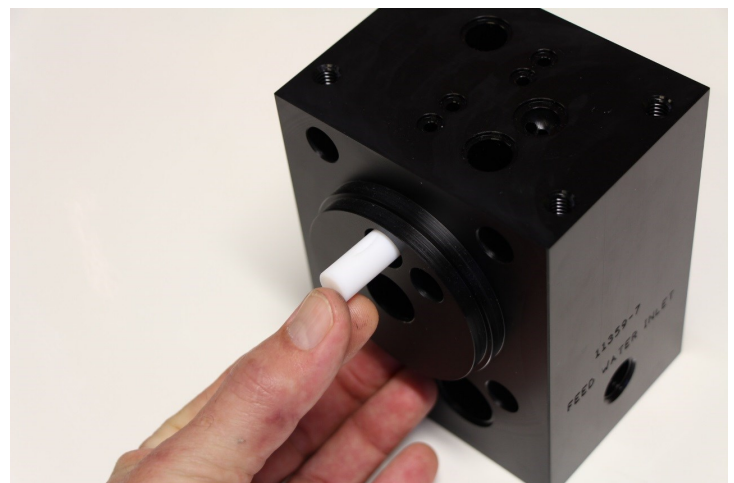
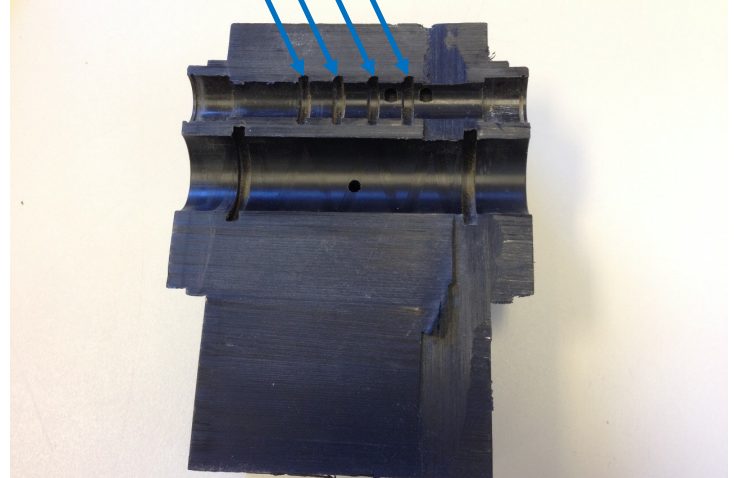
3.33. Insert the two check valve assemblies (with notched legs) on the inlet side (side with Nylon elbow). Hold the valve in compression with the dental pick while sliding the assembly into place. It may be necessary to wiggle the valve a little to get the cage pushed into place.



## Center Block continued...

- This cutaway view shows the grooves for the four pilot valve spool O-rings.
- You can use pilot valve spool (HP-CB-PVS) as a guide to install the four pilot valve spool seals.
- Insert pilot valve spool in pilot valve bore (the uppermost bore on the face) .

O-ring Grooves



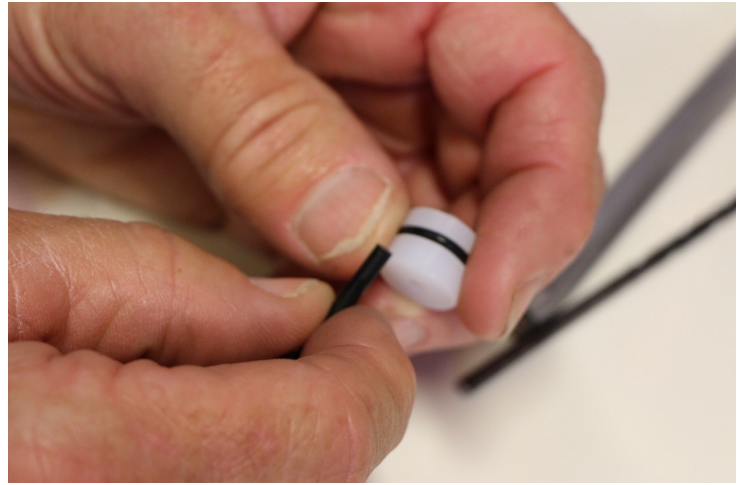
## Center Block continued...

- Move pilot valve spool through bore until it is even with the groove for one of the inner seals. This will help you push the o-ring into the groove, sounds easy but this is a little challenging.
- Using forceps or blunt tool, insert a new O-ring (SO-HPP-PV, size 2-111) and maneuver into groove. Repeat for all four O-rings, then inspect for even seating. Note: This is the most difficult part of assembling the Clark Pump, and requires patience and dexterity.
- Once all four seals are in place, lubricate the pilot valve spool with silicon grease and insert it into the pilot valve bore, where it will stay.

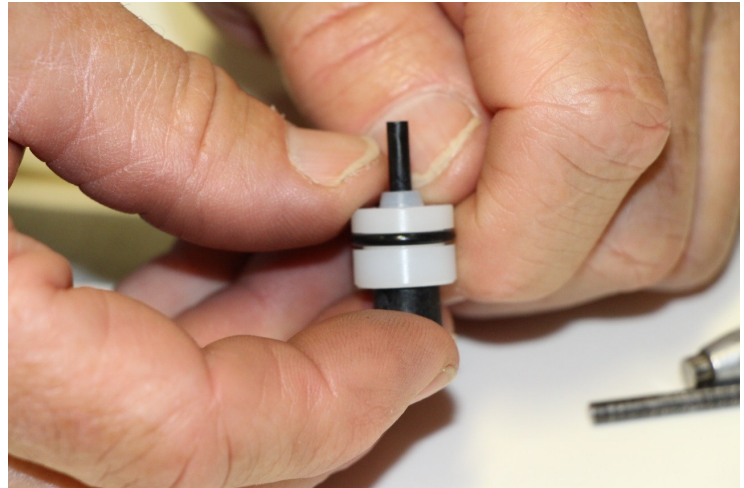


## Center Block continued...

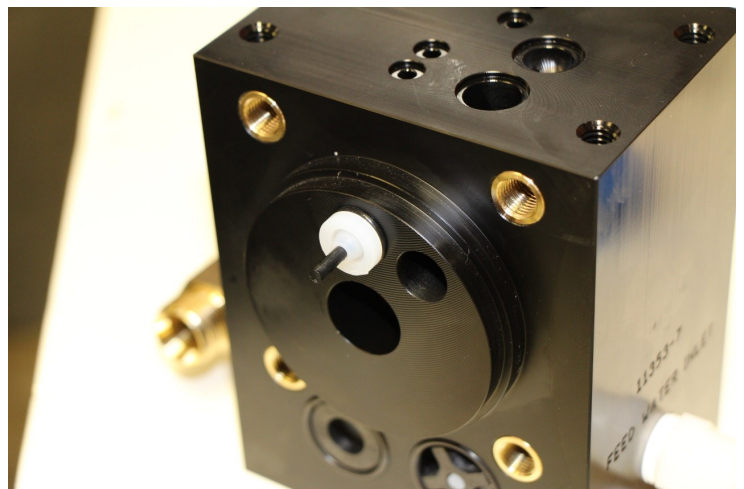
- Put new O-rings (SO-HPP-PS, size 2-013) around both new pilot valve pin seals (HP-CB-PVPS), seating them into the grooves.



- Insert new pilot valve pins (HP-CB-PPS) into the pilot valve pin seals.

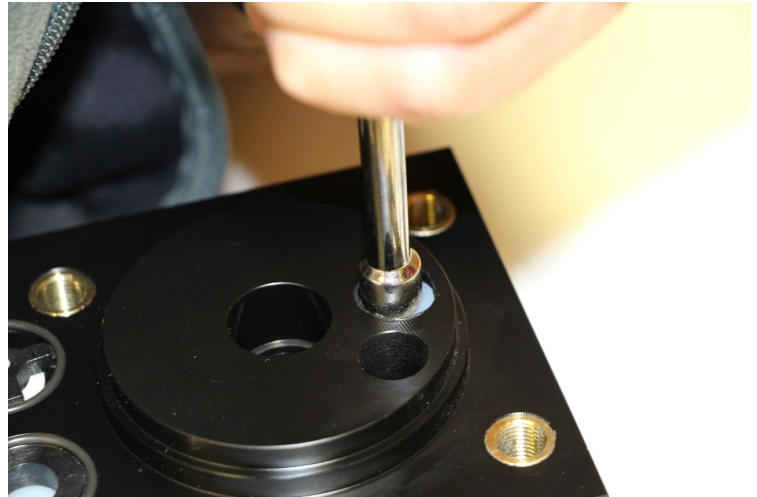


- Apply a layer of silicon grease to the outside of the pilot valve pin seal, and insert into the pilot valve bore.

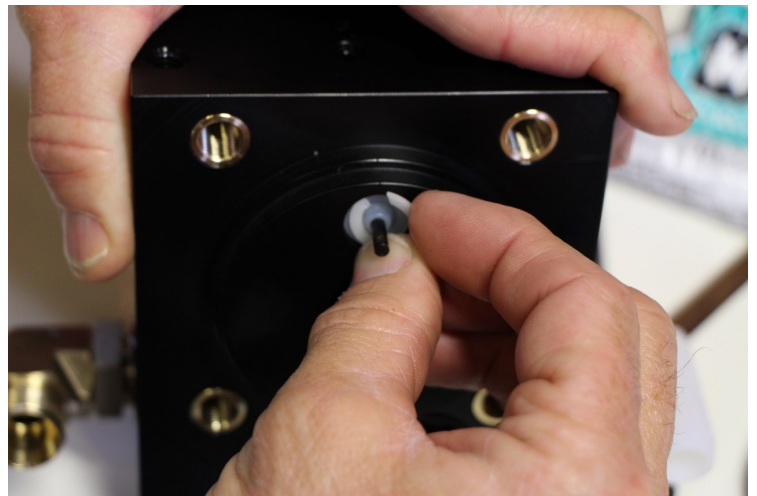


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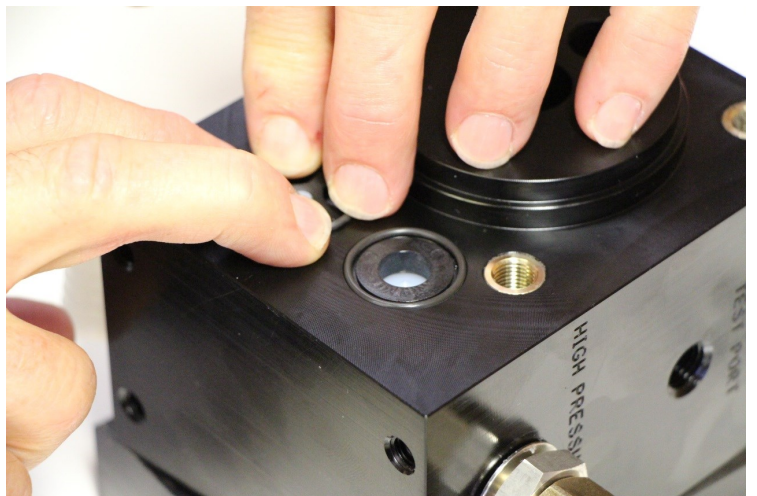
- Press pilot valve pin assembly into place using nut driver or similar tool, taking care not to damage the pin. Repeat on opposite side.



- Insert the split washer (HP-CB-PVCR) into the groove over the pin seal. Ensure smooth and even seating by rotating the check valve retaining washer in its groove with an O-ring pick.



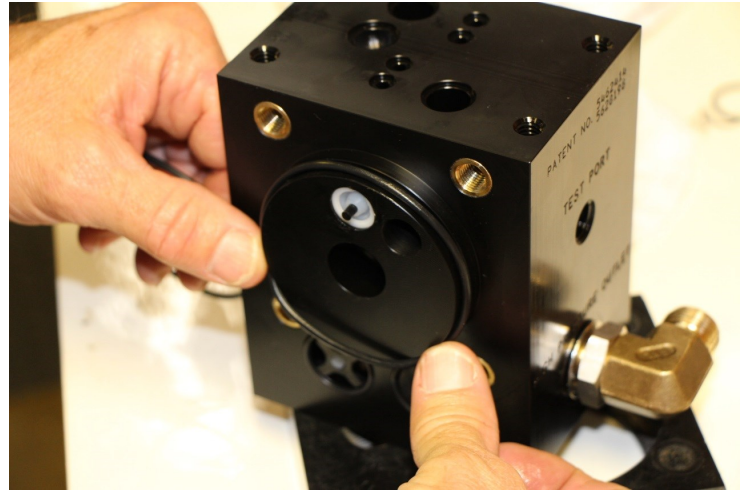
- Place new O-rings (SO-HPP-CVP1, size 2-020) over all four valve ports. If the O-rings don't stay in place, gently stretch them for a better fit. A small amount of silicon grease will help hold the O-rings in place during assembly.



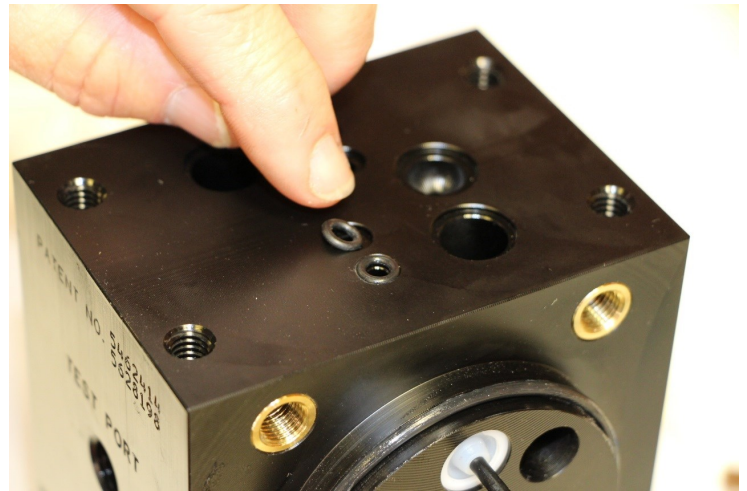


## Center Block continued...

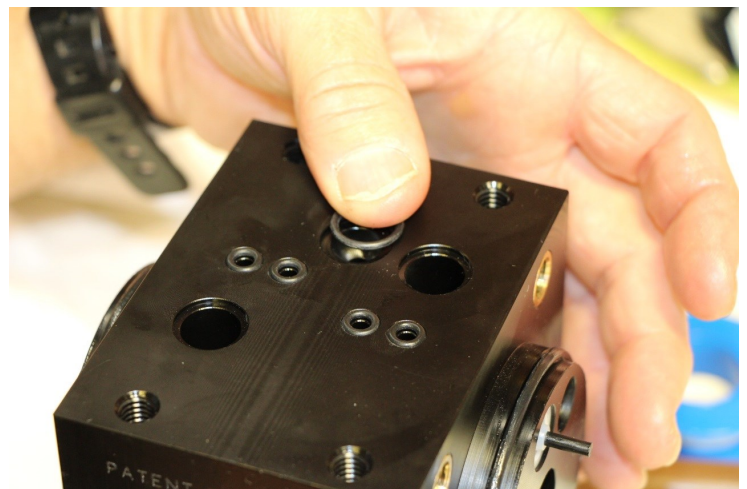
- Lubricate new center block seals (SO-HPP-ECCB, size 2-145) with silicon grease and position around faces on both sides of the center block.



- Place four new pilot port seals (SO-HPP-PLP, size 2-008) over the four pilot ports. A small amount of silicon grease will help hold the O-rings in place during assembly.

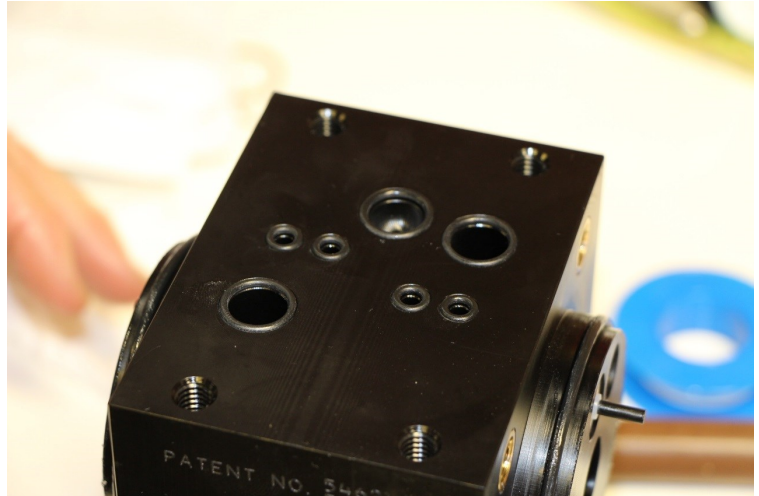


- Place three new valve port seals (SO-HPP-VP, size 2-114) over the three valve ports. A small amount of silicon grease will help hold the O-rings in place during assembly.

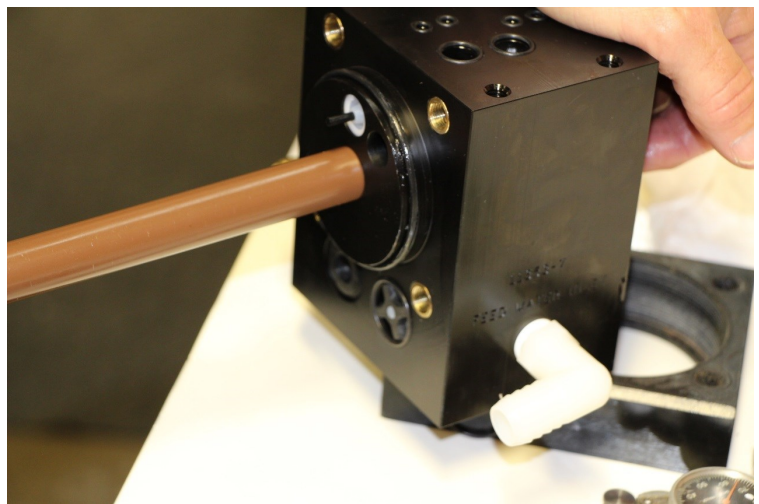


## Center Block continued...

- All upper seals shown in place



- Lubricate the piston rod (HP-CYL-PT) with silicon oil or grease. Carefully twist and insert the rod the piston rod bore, past the seals, taking care not to damage or dislodge the seals.



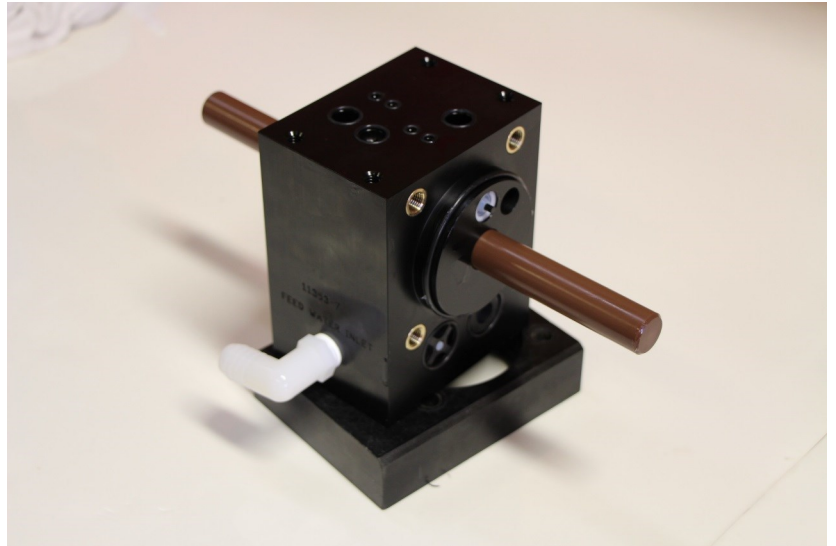
- Check for smooth movement of the piston rod in the piston rod bore. It will require a little force to move the rod, this is normal.



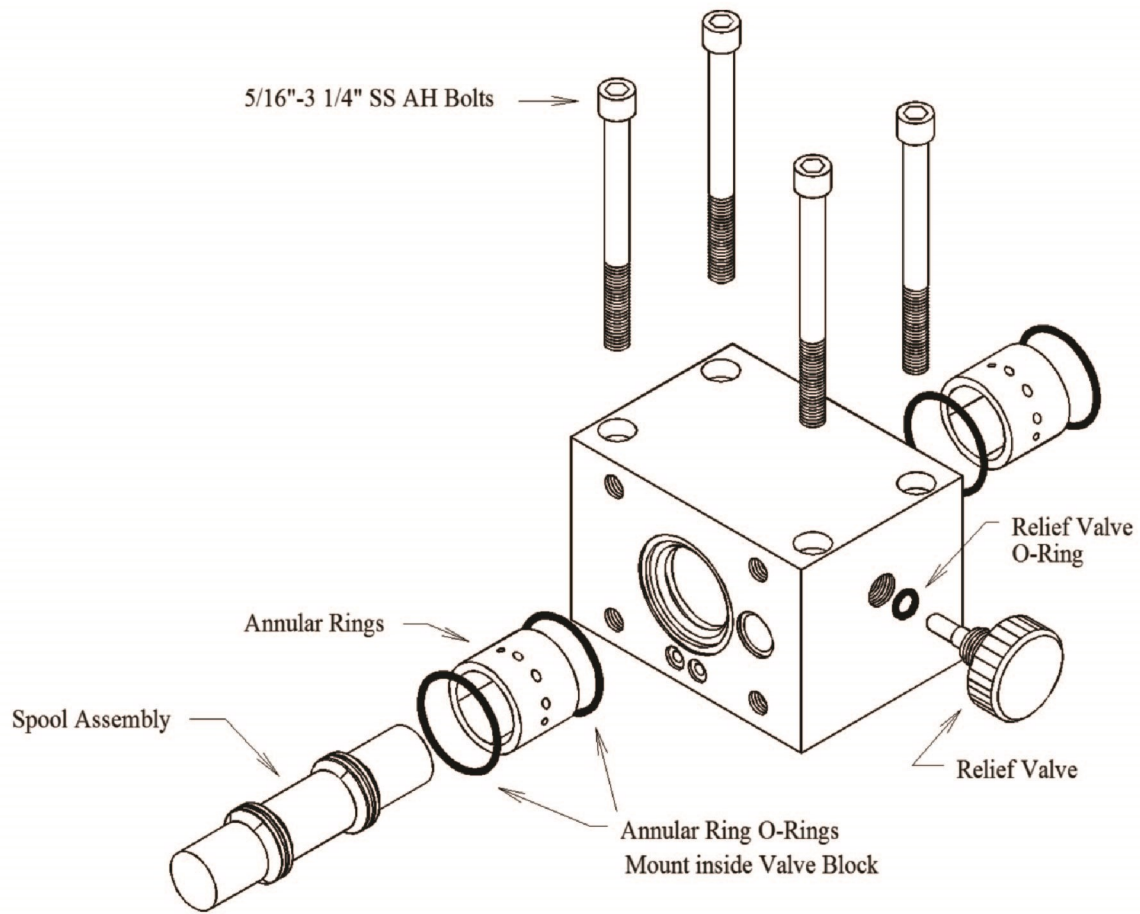
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## Center Block continued...

- This completes the center block assembly.

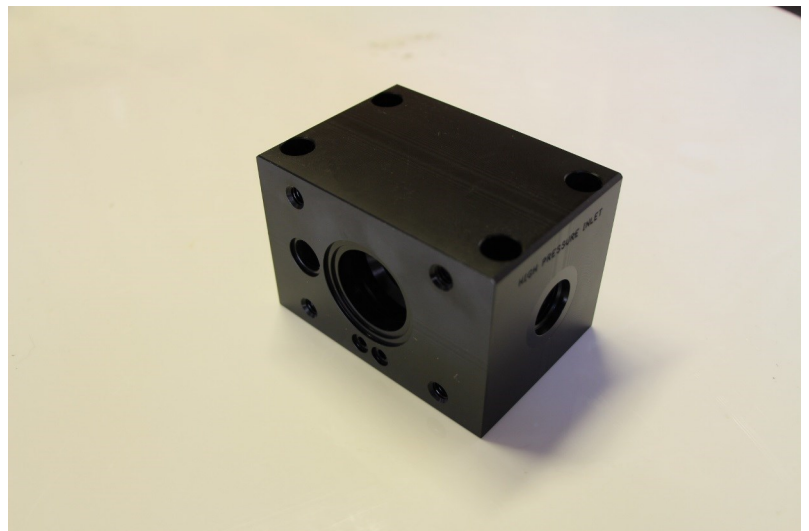


## 2. Valve Block Assembly



Valve Block

- The valve body is inscribed with “pressure relief valve” on one side, and “high pressure inlet” on the other.

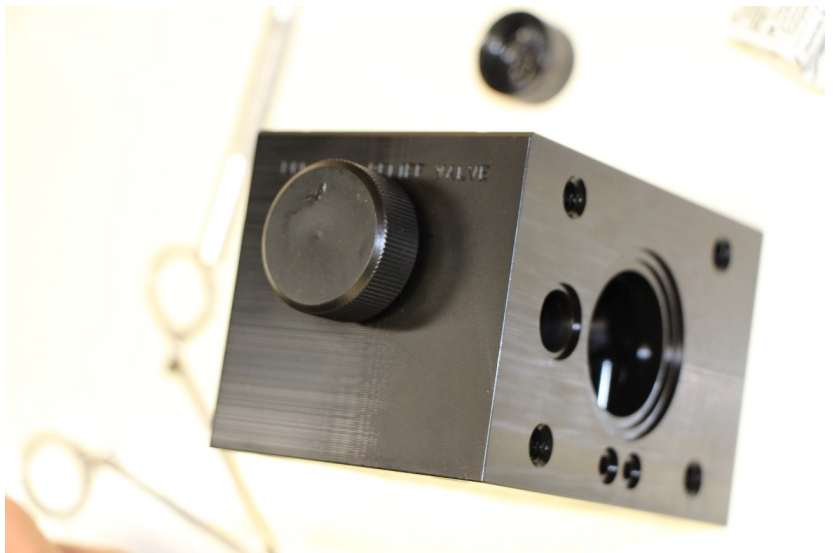


## Valve Block continued...

- Fit a new orange O-ring (SO-HPP-RV) to the relief valve (HP-TB-BV) and smear silicon grease on the threads.



- Screw the relief valve into the Pressure Relief Valve port.

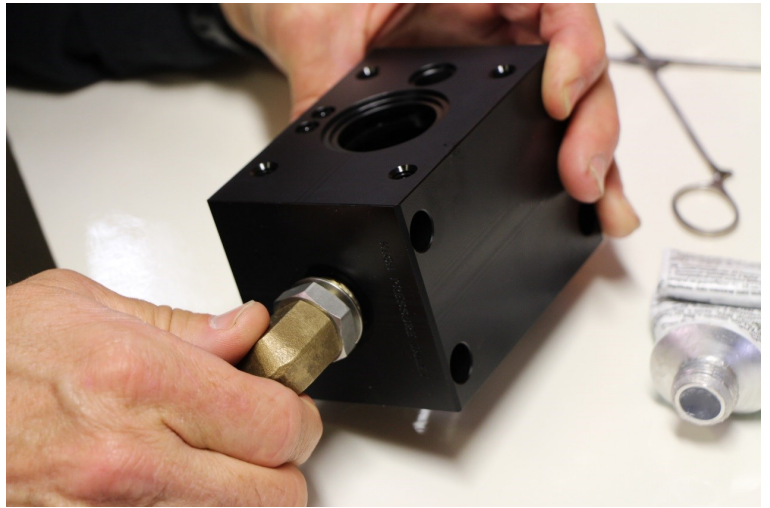


- Place a new O-ring (SO-HPP-RV size 3-908) over the threads on a nickel-bronze elbow (PL-MTE-3/4S1/2B) and grease the threads with silicon grease. Reminder: Stainless steel elbows should be replaced with nickel-bronze.



## Valve Block continued...

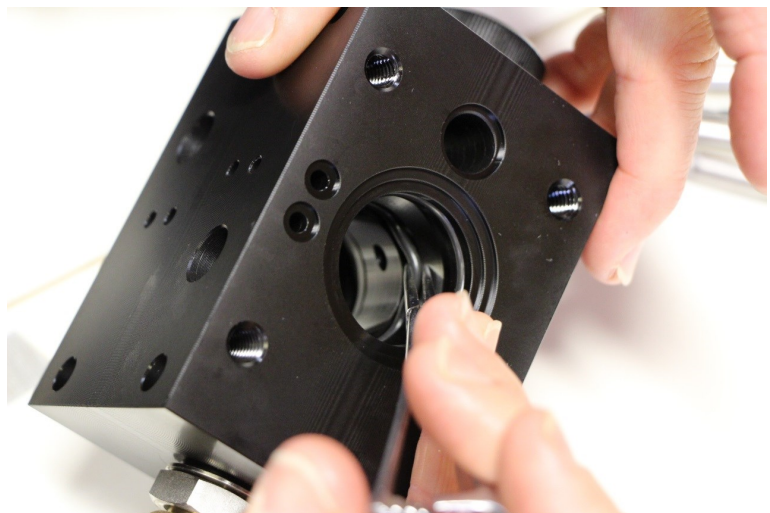
- Screw a nickel-bronze elbow (PL-MTE-3/4S1/2B) into the high pressure inlet port. Leave the elbow loose, as it will be adjusted and tightened during testing. The nut pushes the washer into the O-ring to seal, it only needs to be tight enough for the washer to touch the block.



- Seat four new annular ring O-rings (SO-HPP-AR) in the four grooves along the large bore in the valve block.



- Forceps may aid installation of the two inner annular ring O-rings.



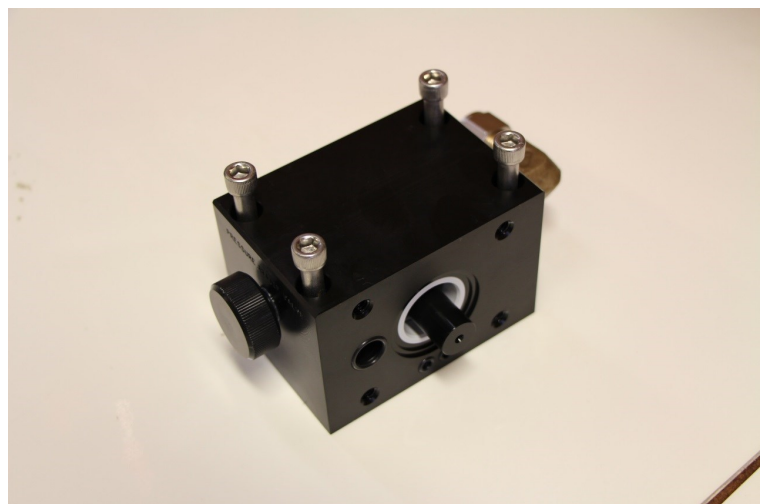
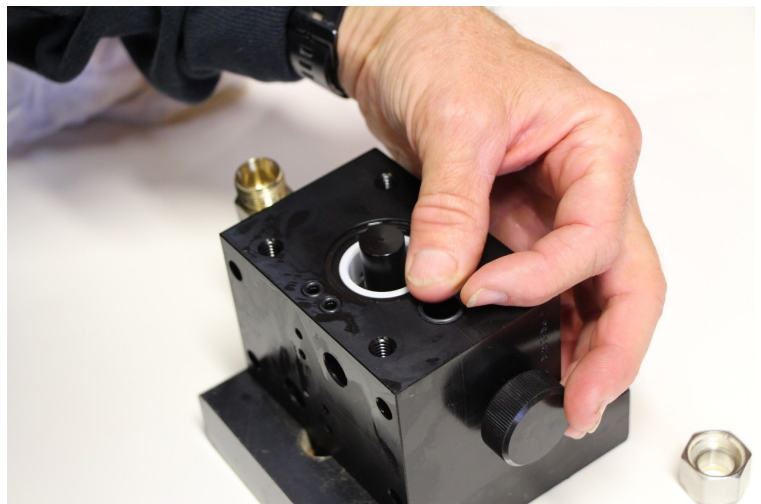
## Valve Block continued...

- To prepare for installation, lubricate both the annular rings and the valve block with silicon grease and soapy water.
- Press the annular ring into the valve block keeping it as straight as possible (we use a small press in the shop but you can push it in by hand). The old ring can be used as a tool to help push it in until it's bottomed out. Repeat on both sides of the valve block. If you don't have a mechanical press, they can be carefully tapped in with a hammer.



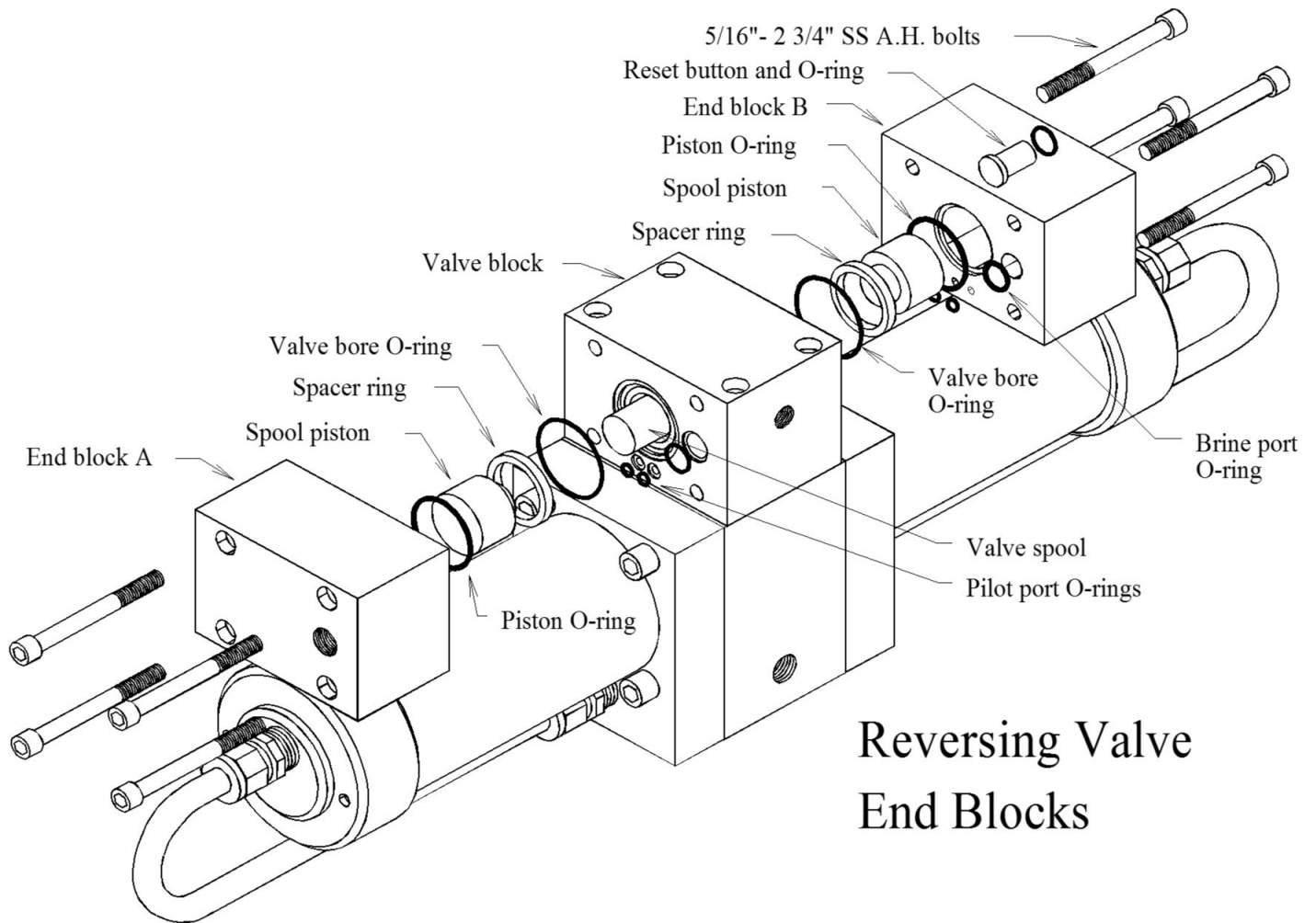
## Valve Block continued...

- Lubricate the annular rings with silicon grease and soapy water, then press the reversing valve assembly into the valve block. It requires a fair amount of force to push the reversing valve into place.
- Place new pilot port O-rings (SO-HPP-PLP, size 2-008) and new brine port O-rings (SO-HPP-VP, size 2-014) on both sides of the valve block. A small amount of silicon grease will help hold the O-rings in place during assembly.
- Four 5/16" x 3-1/4" stainless steel bolts (HD-CPS-5/16x3) will attach the valve block to the center block. Clean bolts, in good condition, can be re-used. This completes the valve block assembly.



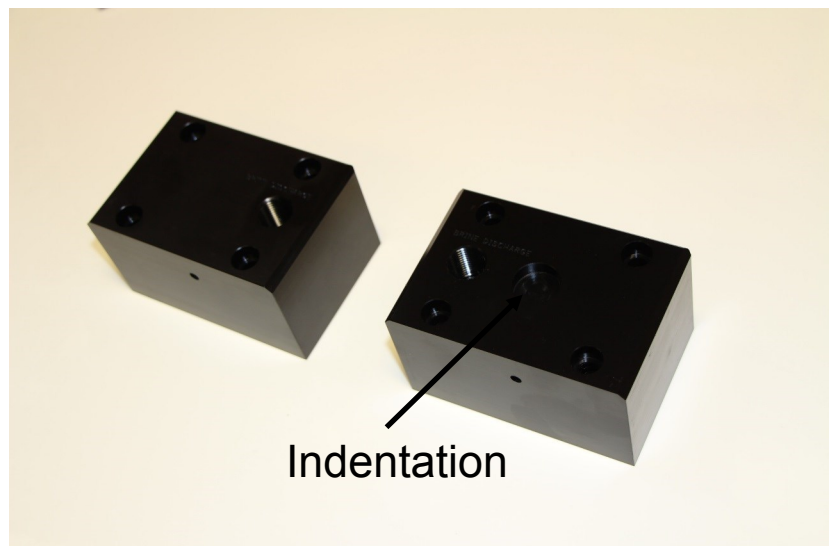


### 3. Reversing Valve End Blocks



Reversing Valve End Blocks

- The A and B end blocks are mirror images. The B side has an indentation that the A side does not have.



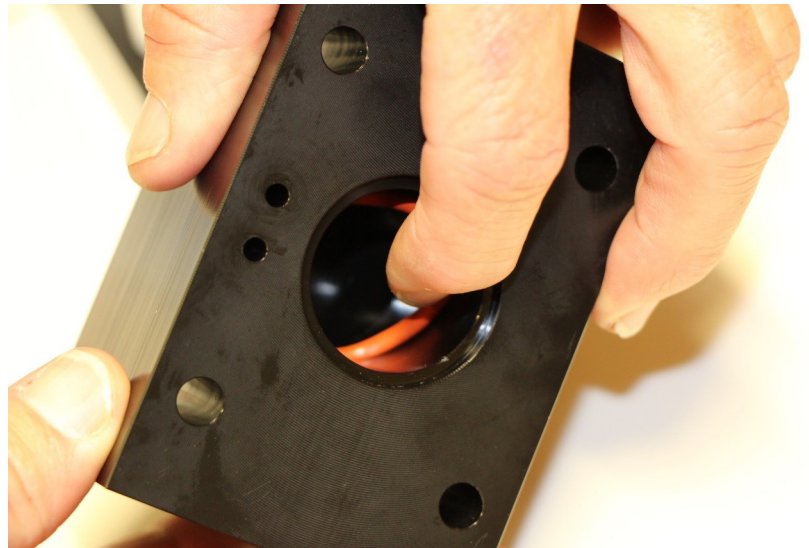
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## Reversing Valve End Blocks continued...

- Inspect both end blocks and check the O-ring groove for debris with an O-ring pick, being careful not to scratch the groove.



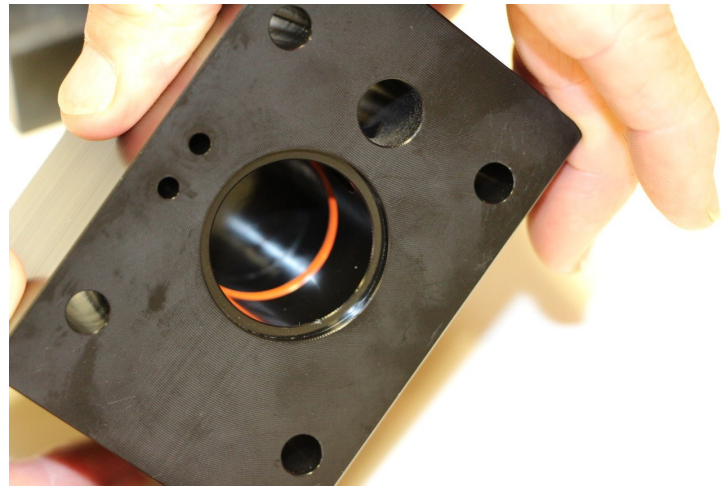
- Insert new orange piston O-rings (SO-HPP-SP) and seat them into their grooves.



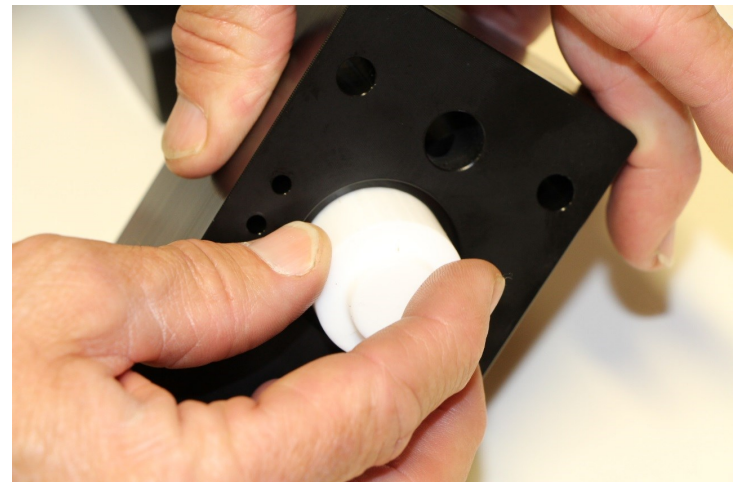
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## Reversing Valve End Blocks continued...

- Piston O-ring in place:



- Spool pistons showing any wear should be replaced. Load the spool piston (HP-TB-VSP) into both end blocks. Note: If the model has a stroke sensor, a magnet is embedded in one of the spool pistons, ensure replacement of the magnet on the correct side (just as it came apart).



- Press in until bottomed out.



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## Reversing Valve End Blocks continued...

- Install fitting into the brine discharge port on the A side (In some cases this will be reversed.) This may be a straight Nylon hose barb (PL-HBS-3/8 x 5/8) or a quick-connect fitting, wrapped with Teflon tape. This fitting will not be adjusted later, so it can be tightened for final use.

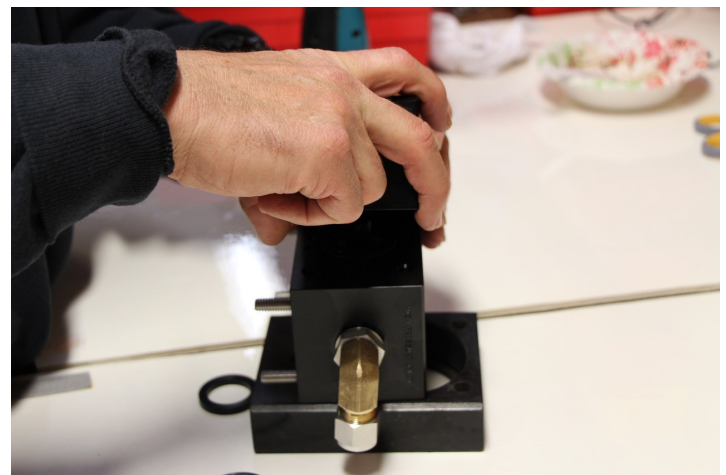
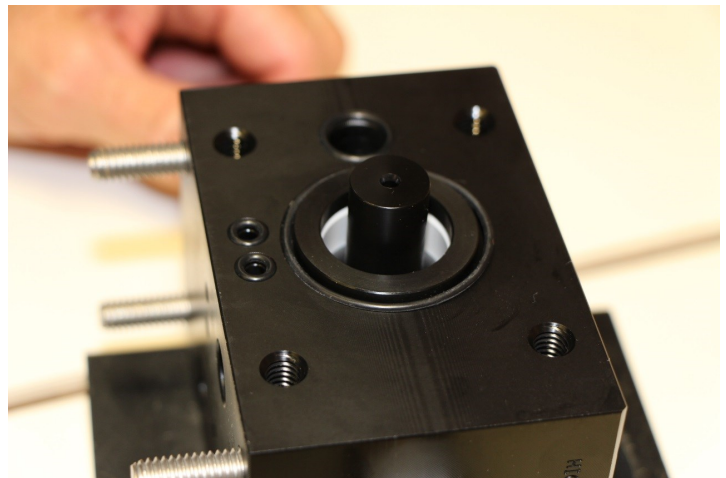
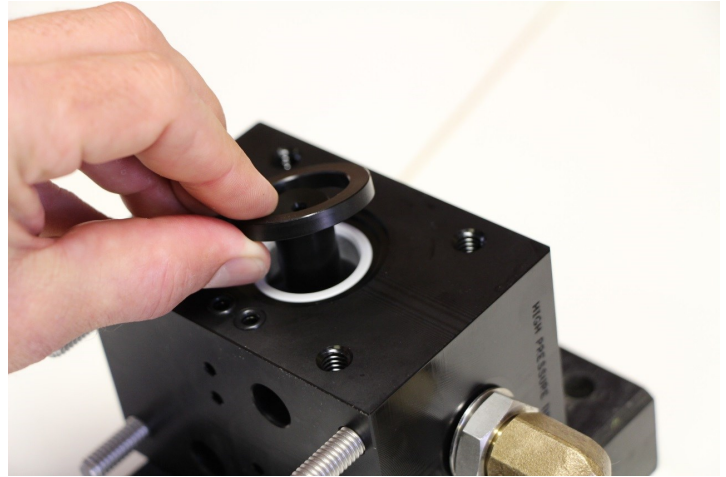


- Screw a black 3/8" plug (PL-HP-3/8N), wrapped with Teflon tape, into the brine discharge port on the B side. This plug will be removed later for testing, but should still be snug. (Again, the A and B discharges may be reversed in some cases.)



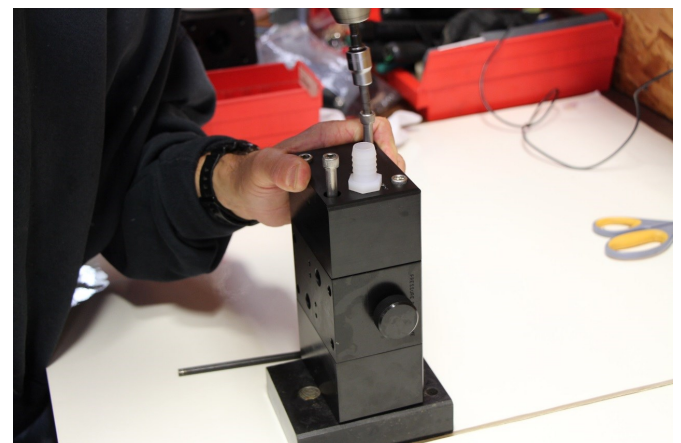
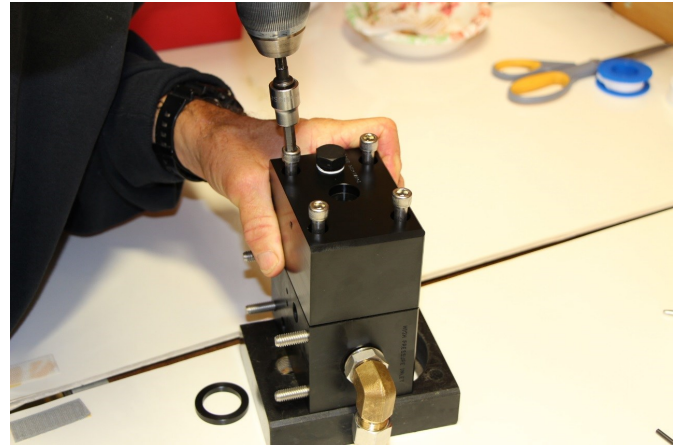
## 4. Join Reversing Valve End Blocks to Valve Block

- Spacer rings (HP-TB-SR) can be reused. Place spacer ring on valve bore. A small amount of silicon grease will help hold the ring in place during assembly.
- 
- Lubricate a new valve bore O-ring and the three other port O-rings with silicon grease and seat around the spacer ring and into valve block
- Press end block B down on valve block, ensuring spacer ring and all O-rings stay in place.



## Join Reversing Valve End Blocks to Valve Block contin-

- Set four 5/16" x 2-3/4" bolts in the four corner holes. With a 1/4" Allen wrench, tighten in an X pattern for even seating. Since these bolts thread into plastic, tighten them carefully, using an electric driver only on its lowest setting.
- **Overtightening will damage the blocks,** the O-rings seal all the water passages so the blocks just need to touch to make a good seal.
- Final tightening should be by hand, to approximately 40 inch-pounds of torque (use two fingers, not too tight).
- Repeat for attachment of the A side, with an additional spacer ring and new valve bore O-ring.



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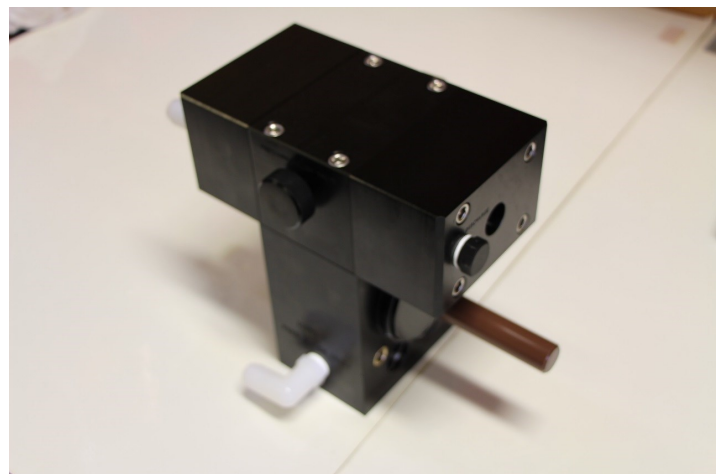
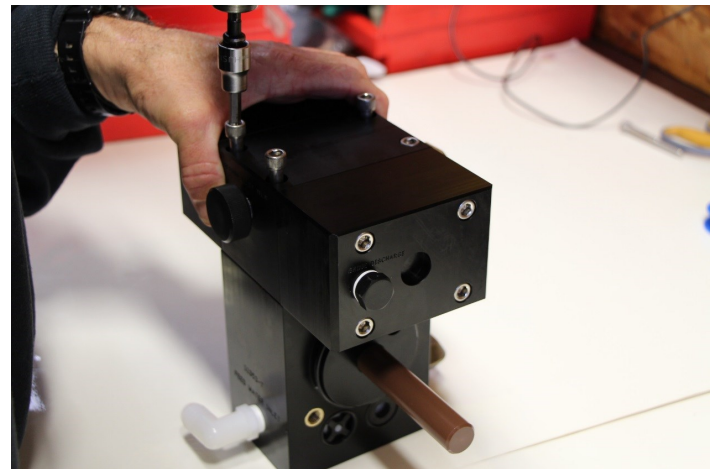
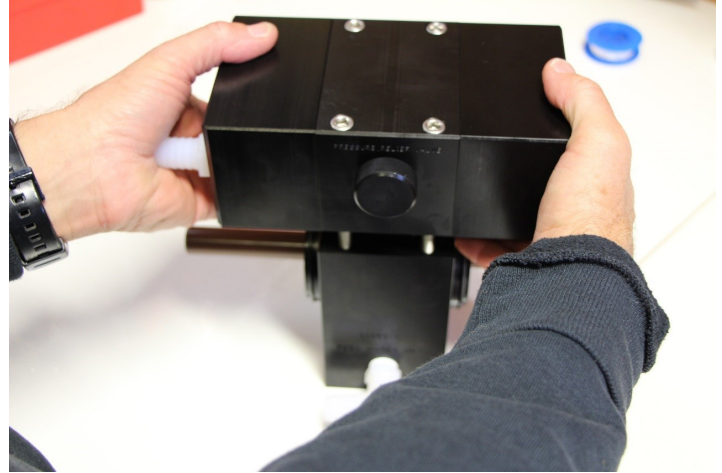
## Join Reversing Valve End Blocks to Valve Block cont...

- The valve blocks and valve body are now ready to be joined to the center block with four 5/16" x 3-1/4" bolts.



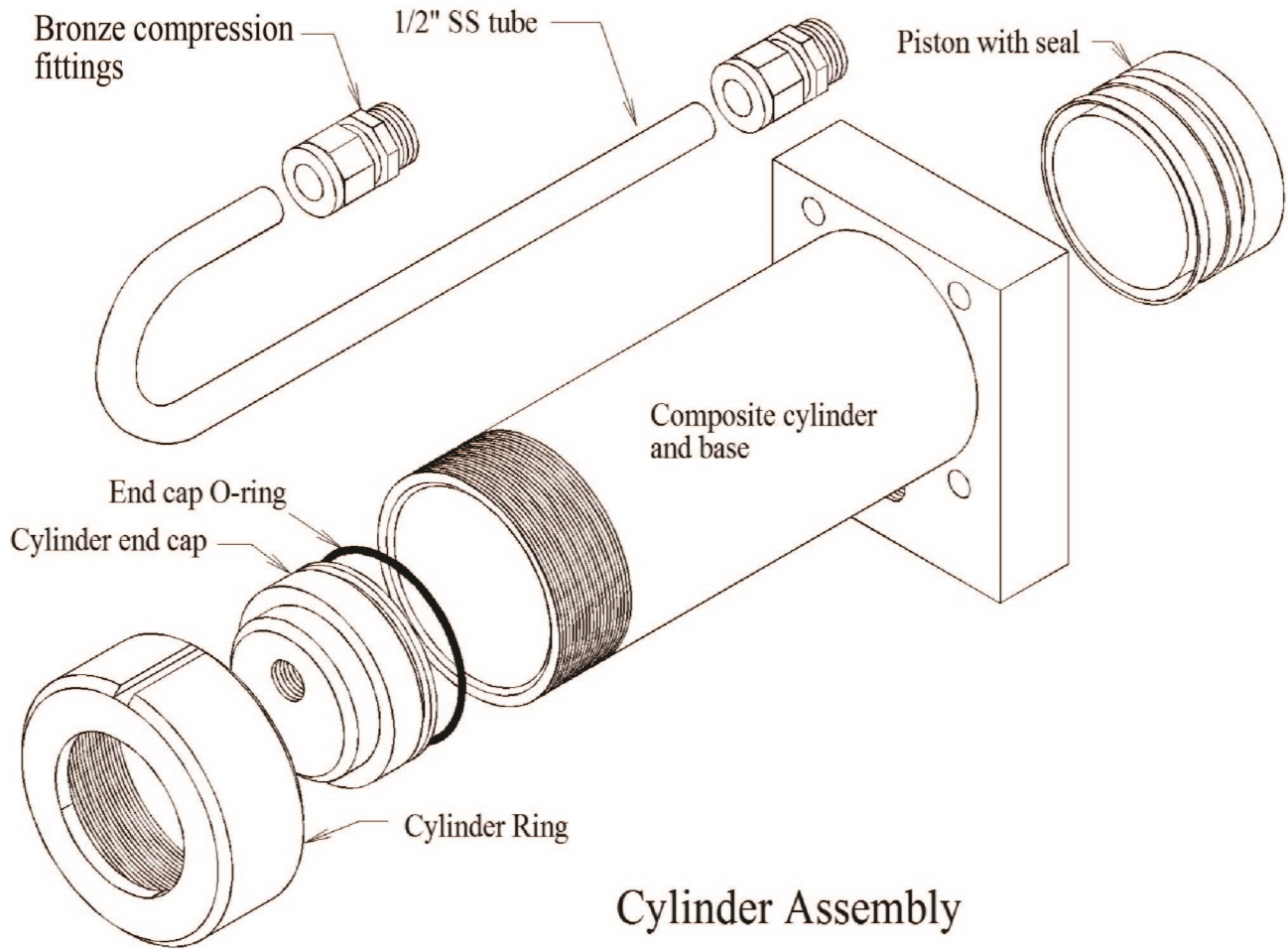
## 5. Join Valve and End Blocks to Center Block

- Place the valve and end block assembly on the center block, noting that the pressure relief valve on the valve block goes on the same side as the feed water inlet on the center block. Make sure all O-rings are in position on the center block.
- Tighten the bolts in an X pattern, again only using an electric driver on its gentlest setting. Finishing by hand to a torque of approximately 40 inch-pounds.
- Leave the pressure relief valve open several turns. It will be closed during testing.
- This completes the joining of the valve and end block assembly with the center block.

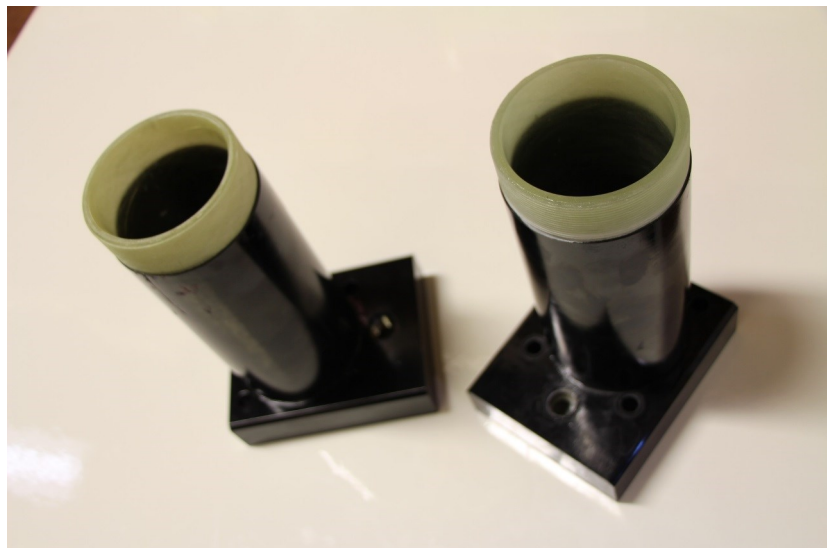




## 6. Cylinder Assembly



- Check both cylinder and base assemblies for defects.



## Cylinder Assembly continued...

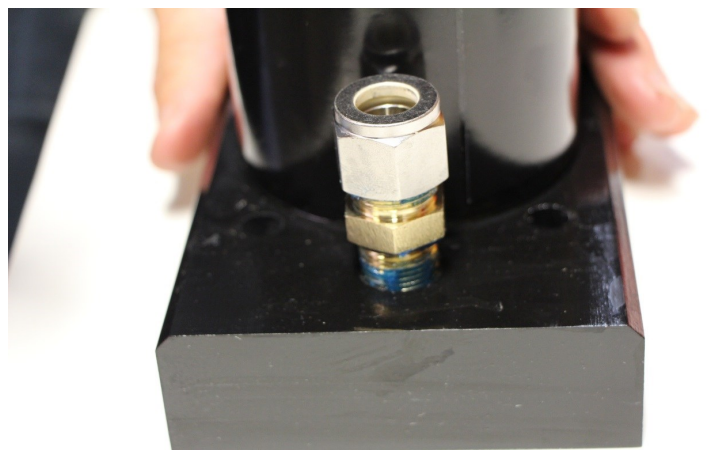
- Assemble four nickel-bronze compression fittings (PL-MTS-3/8x1/2S), two for each cylinder. First place a new O-ring (SO-HPP-CT, size 2-015) on the pipe thread side of each fitting. Reminder: existing stainless fittings can be reused in bases. End cap fittings must be nickel-bronze.



- Add a stainless steel ferrule, with the cone down.



- Grease all threads, replace the nut over the ferrule, and screw the fitting into the base.



## Cylinder Assembly continued...

- Place the cylinder in a tight vice, taking care to pad the jaws to avoid scratching. Tighten the bronze fitting firmly until the O-ring is completely compressed.



- Some older cylinders may have 3/8-inch NPT threads and no O-ring. In this case, wrap the fitting with 7 turns of Teflon tape and tighten firmly. Be sure to clean the old threads of any old Teflon tape and detritus.

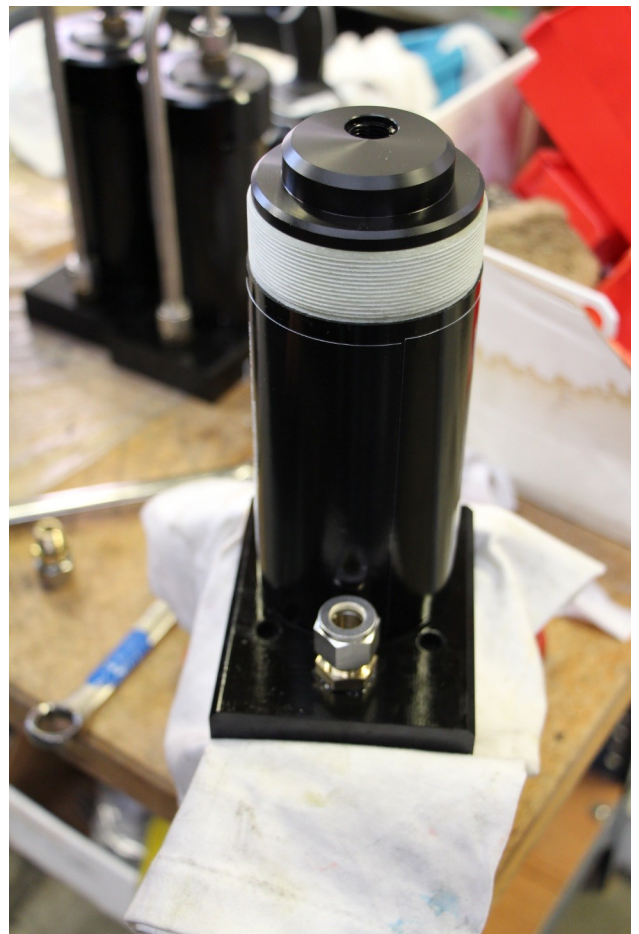


## Cylinder Assembly continued...

- Apply silicon grease to a new end cap O-ring and place on the cylinder end cap (HP-CYL-EC).



- Insert the end cap with O-ring into the cylinder, keeping the threaded hole at twelve o'clock, opposite the fitting on the base.



## Cylinder Assembly continued...

- Apply a generous layer of silicon grease to the cylinder ring (HP-CYL-R). Reminder: Older cylinder rings should be replaced with the new, thicker model. See page 16 of this guide.



- Spray both the cylinder ring and the threads on the cylinder with soapy water, then screw the cylinder ring onto the cylinder.

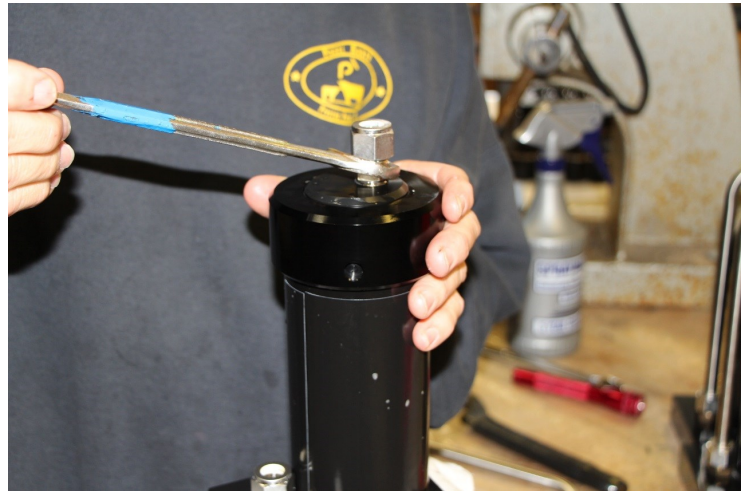


- Tighten cylinder ring with a ring wrench or strap wrench. The seal is with an O-ring so tighter is not better, it just makes it more difficult to undo the next time.



## Cylinder Assembly continued...

- Screw a nickel-bronze fitting into the cylinder end cap. Since the end cap is Delrin, tighten only enough to compress the O-ring, stop when the fitting touches the end cap.



- Coat all mating surfaces, including threads of the 1/2" stainless steel J-tube (HP-CYL-SST) assembly with silicone grease.



- Insert the J-tube into fittings, giving it a tap with a mar proof hammer to ensure complete seating. Tighten nuts finger tight, then tap again.



## Cylinder Assembly continued...

- Tighten the compression nut while holding the base nut in place with a second wrench. Do not allow the fitting to spin while tightening the compression nut or you may damage the O-ring seal. The compression nut must compress the ferrule around the tube and create a high pressure seal which takes about 75 ft. lbs. of force.

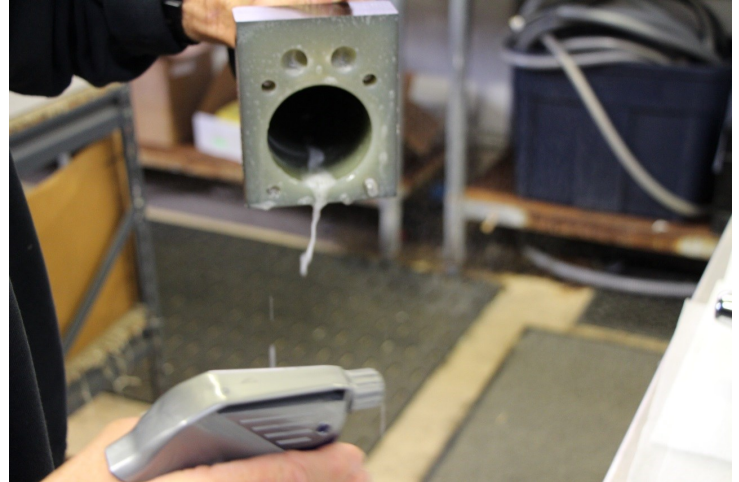


- The stainless steel tube should line up with the cylinder. If not, it can be tapped into place with a mar-proof hammer, even after the compression nuts are tight.



## Cylinder Assembly continued...

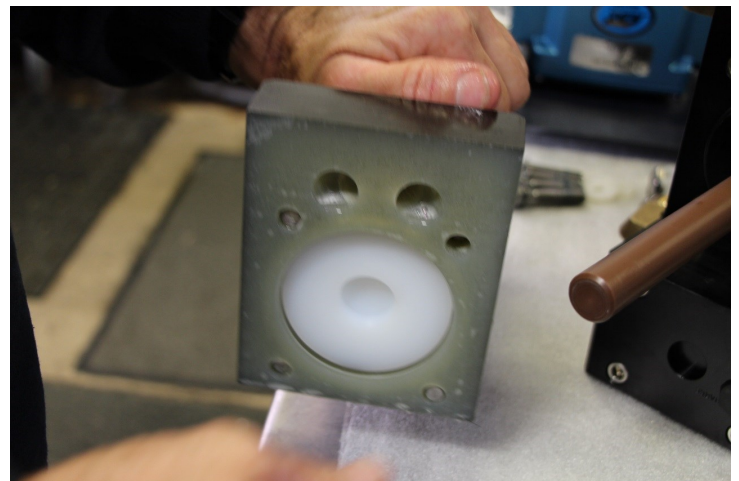
- Spray both pistons (HP-CYL-PT) and cylinders with soapy water.



- Press the pistons into each cylinder.



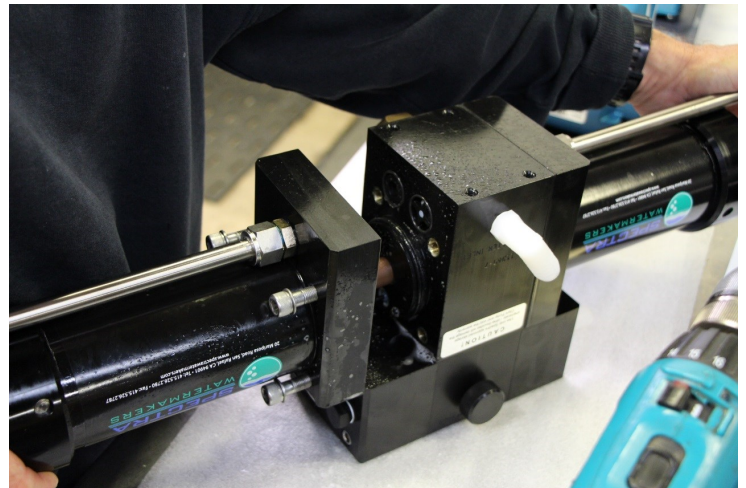
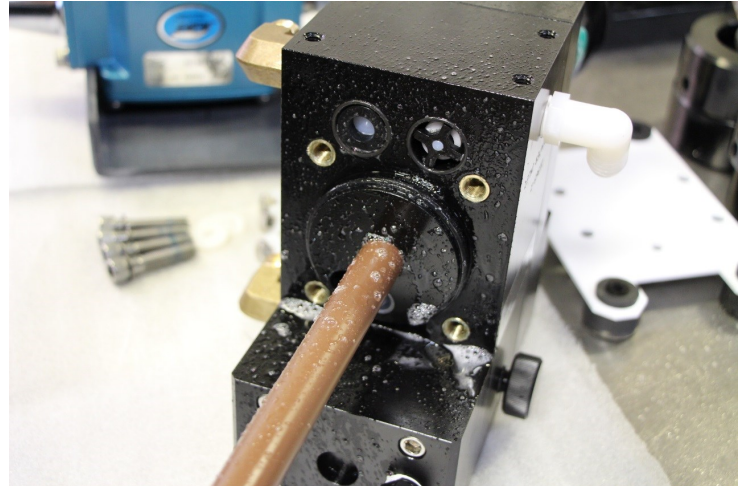
- The indentation for the piston rod should be facing out.





## 7. Attach Cylinder Assemblies

- Turn the center block assembly upside down. Spray both the center block and the cylinder base with soapy water to lubricate.
- Seat the cylinder and base, taking care that the O-rings and valve assemblies stay in place on the center block.
- Snug four  $\frac{3}{8}$ " x  $1\text{-}\frac{3}{4}$ " bolts with washers. Use the gentlest setting on a power driver, as uneven tightening could dislodge the nickel-brass inserts in the center block. Final tightening will be by hand.



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## Attach Cylinder Assemblies continued...

- Place the Clark Pump upside down in a vice and tighten the opposing cylinder bolts at the same time using two 5/16" Allen wrenches. Tighten gradually and repeatedly in an X pattern until all eight bolts are as very tight, approximately 200 inch-pounds of torque. Again, uneven tightening could shift one of the nickel-bronze inserts.
- This completes reassembly of the Clark Pump.

