



Preventative Maintenance for the Vector PCX Maintenance Schedule

Routine Maintenance

- Check for leaks
- Replace the flush water reservoirs every week
- Record operating pressures
 - If increase in pressure determine the cause of the increased pressure
 - Replace filters or flush system with 80/20 Water/MeOH mixture

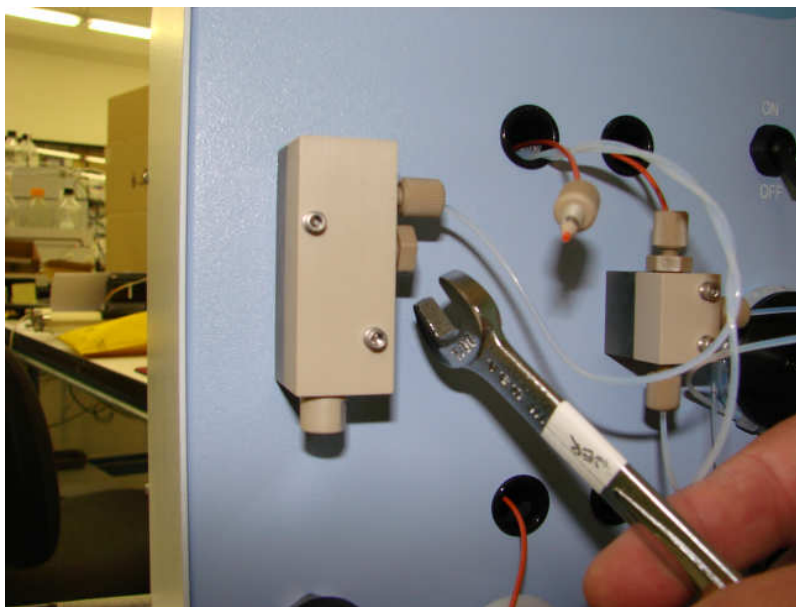
Annual Maintenance

- PM at least once a year
 - Replace valve seals, pump seals, and reagent filters.

Reagent Filter(s) Replacement

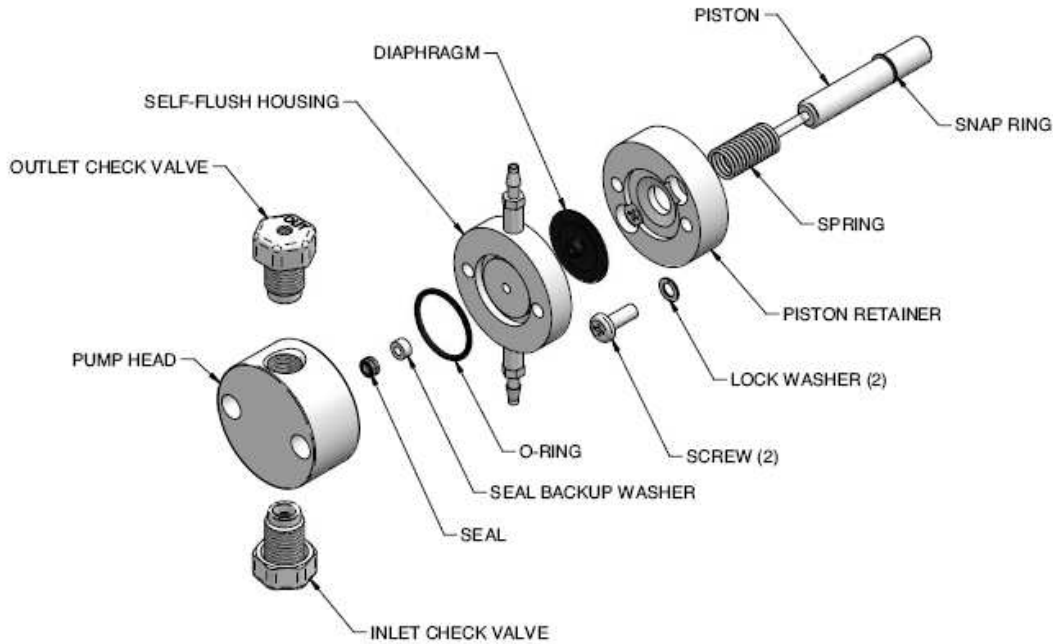
The reagent filters are located in each of the mixing manifolds. When there is an increase in the reagent pressure, it is usually an indication that the reagent filter should be replaced. The reagent filters (PN 3102-9040) are a 10um frit inside a PEEK housing. They are disposable and cannot be cleaned.

1. To replace the filter, ensure that both HPLC and Reagent pumps are stopped.
Turn the Blue valve on the reagent bottles to the Closed position.
2. Disconnect the Lite-touch fitting from the inlet of the filter that is blocked.
3. Using a 7/16" wrench, loosen and remove the blocked reagent filter. Replace it with a clean filter. Tighten firmly.
4. Re-connect the reagent line(s).
5. Turn on the HPLC pump, press the Enable button, and then start the Reagent pump to check for leaks.



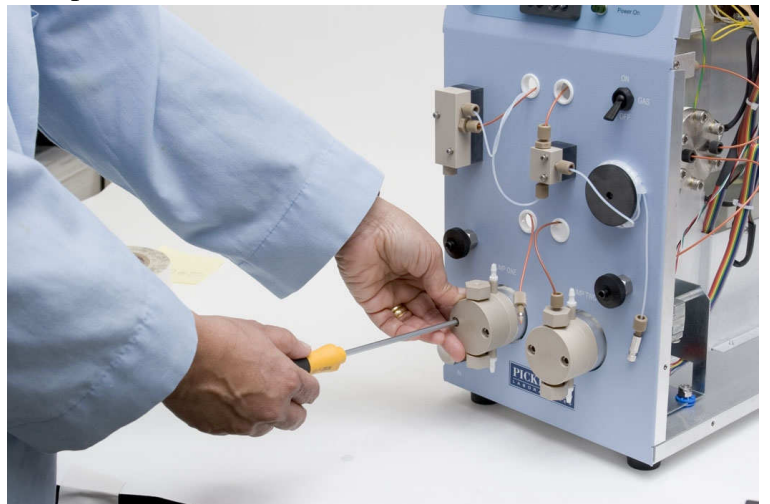
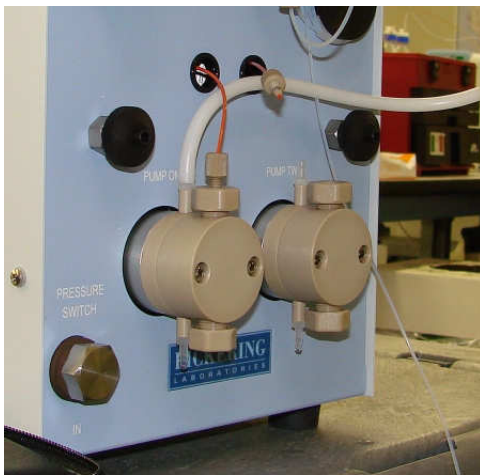
Pump Maintenance

Before performing any maintenance on the pump, be sure to flush the pump. Replace the reagent bottle with 80/20 Water/ Methanol and flush at 1 mL/min for 10 minutes. This is to ensure that any reagent is no longer in the pump.



Removing the Pump Head Unit

1. Remove the outlet line (orange) from the outlet check valve.
2. Remove the piston wash line (thick white tubes).
3. Using a 5/32" Hex wrench, loosen the two nuts at the front of the pump head.
4. **CAUTION:** Be careful not to break the piston when removing the pump head. Twisting the pump head can cause the piston to break.

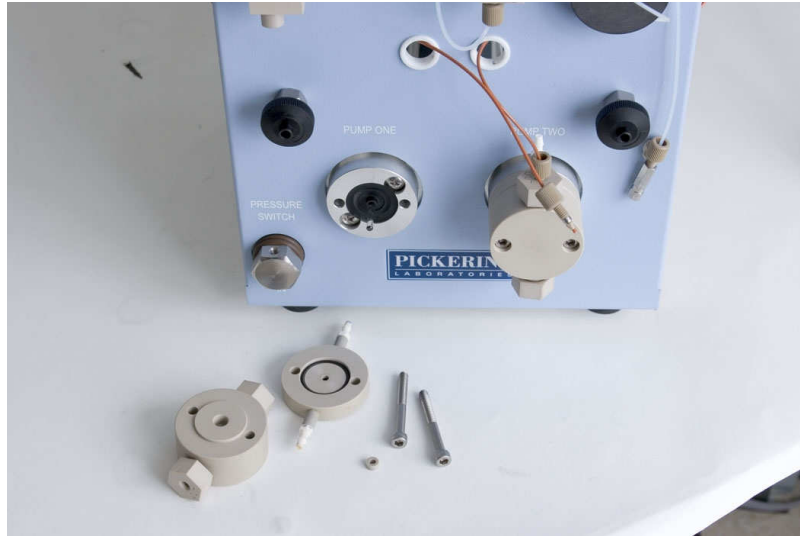


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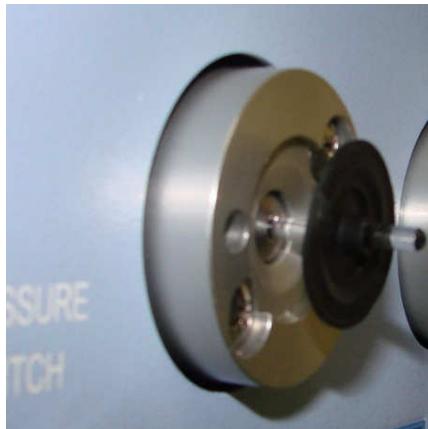
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5. Carefully separate the pump head and the flush housing from the pump. Pull straight out from the pump and remove both units from the piston. Be careful not to break or damage the piston.
6. Remove the O-ring.

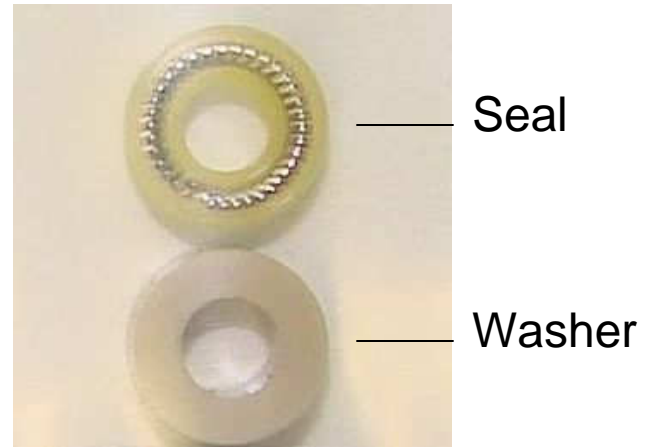
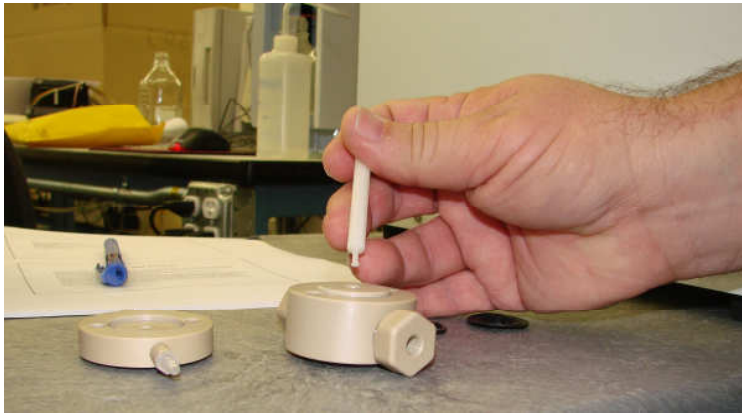


7. Remove the self-flush diaphragm from the piston by carefully grasping the sealing flange on two sides and sliding it straight out on the piston being careful not to exert side pressure that may break the piston.



Removing the Seal and Washer

1. Remove the seal and seal backup washer from the pump head.
2. Insert the flanged end of the seal insertion/removal tool into the seal cavity on the pump head.
3. Tilt it slightly so that the flange is under the seal and pull out the seal.
CAUTION: Using any other “tool” will scratch the finish.



Each replacement seal kit contains:
(PN 3106-1255)

- A pad to clean the piston when changing the seal
- A seal insertion/removal tool
- Seal
- Backup washer
- O-Ring
- Diaphragm



Cleaning the Pump Head Assembly

The pump head, check valves, and flushing housing may be further cleaned using a laboratory grade detergent solution in an ultrasonic bath for at least 30 minutes, followed by rinsing for at least 10 minutes in distilled water. Be sure that all particles loosened by the above procedures have been removed from the components before reassembly.

CAUTION: Be sure to wear gloves. Also, when cleaning check valves, be sure that the ball is not against the seat in the ultrasonic bath. This may destroy the precision matched sealing surface and the valve will not check. See **Check Valve Maintenance**

Cleaning the Piston

Clean the Piston to remove any salt build up or dirt. If there is a lot of build-up, clean the piston using the scouring pad as described below. Otherwise, use a lint-free cloth dampened with alcohol to wipe the piston clean. It is not necessary to remove the piston from the housing to clean the piston.

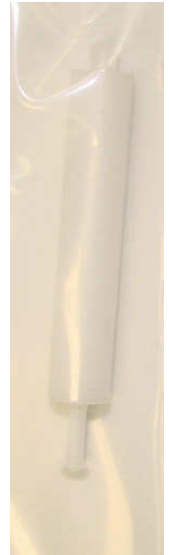
To Clean the Piston using the Scouring pad:

1. Use the scouring pad included in the seal replacement kit. Gently squeeze the piston within a folded section of the pad and rub the pad along the length of the piston.

2. Rotate the pad frequently to assure the entire surface is scrubbed.
3. Do not exert pressure perpendicular to the length of the piston, as this may cause the piston to break.
4. After scouring, use a lint-free cloth, dampened with alcohol, to wipe the piston clean.
5. Before replacing the pump head and seals, inspect, and if necessary, clean the pump head and check valves as described below.

Rebuilding the Pump Head Assembly

1. Place a high-pressure replacement seal on the rod-shaped end of the seal insertion/removal tool so that the spring is visible when the seal is fully seated on the tool.
2. Insert the tool into the pump head so that the open side of the seal enters first, facing the high-pressure cavity of the pump head. Be careful to line up the seal with the cavity while inserting. Then withdraw the tool, leaving the seal in the pump head. When you look into the pump head cavity, only the polymer portion of the seal should be visible.
3. Gently place the diaphragm onto the piston with the center hub protruding towards you. Push the diaphragm all the way back into recess and against the metal base of piston. Do not exert pressure perpendicular to the length of the piston, as this may cause the piston to break.
4. Place the new O-ring in the groove of the flush housing unit.
5. Carefully align the flush housing unit and the pump head and gently slide both into place on the pump. Make sure that the Inlet valve is on the bottom and the Outlet valve is on the top.
6. Tighten both hex screws in the pump head using the 5/32" wrench. **DO NOT over tighten!** Turn each screw alternately 1/4 turn while gently wiggling the pump head to center it.
7. Reattach the inlet and outlet lines.
8. Reattach the flush lines.
9. Change the flushing solution.



Check Valve Maintenance

Tighten each check valve to 12.5 inch-pounds if the check valves have been removed. This is usually done by tightening each check valve by hand, then using a torque wrench. If there is a leak, tighten to 13-14 inch-pounds, but **NEVER** above 15 inch-pounds. If no torque wrench is available, tighten each check valve no more than 1/8 turn past finger tight. **DO NOT** over tighten the check valve assembly as this will deform the seal and it will not work properly.



Each check valve assembly contains two capsules. The sapphire seat in each capsule must be oriented downward in all cases in the final pump assembly. Note: The **inlet check valve** has a larger opening (1/4"-28, flat-bottom seat) for the 1/8" inlet tubing; the **outlet check valve** has a smaller opening (#10-32, cone seat) for the 1/16" outlet tubing. The inlet check valve must be connected at the larger opening in the pump head.

Many check valve problems are the result of small particles interfering with the operation of the check valve. Pumping a strong solution of liquid laboratory grade detergent through the check valves at a rate of 1 ml/min for one hour can solve most problems. After washing with detergent, pump distilled water through the pump for fifteen minutes. **Always direct the output directly to a waste beaker during cleaning. If this does not work, the check valve should be replaced.**

Piston Replacement

- With your thumb pressing the piston retainer against the pump housing, remove the two Phillips head screws from the retainer. Do not allow the spring pressure to force the retainer away from the housing as the screws are loosened.
- After both screws have been removed, slowly allow the spring pressure to push the retainer out of the housing.
- Gently pull the retainer straight out and carefully remove it from the piston and threaded rods. Also, gently pull the spring straight out of the housing and remove.
- Grasp the metal base of the piston assembly so that you avoid exerting any pressure perpendicular to the length of the piston, and gently pull it from the pump housing.
- Use a small screwdriver to remove the snap ring from the groove on the old piston and place it into the groove on the new piston.
- Place a small amount of high quality lightning grease on the back end of the metal base of the piston assembly.
- Grasp the metal base of the piston assembly near the front so that you avoid exerting any pressure perpendicular to the length of the piston, and gently slide it into the pump housing.
- Gently slide the spring over the piston assembly and back into the pump housing.



- Carefully align the retainer and gently push it straight in against the spring force until the retainer is against the housing. If misalignment with the piston occurs, wiggle while pushing the retainer to align the piston & retainer.
- Hold the retainer flush against the housing with your thumb.
- Insert and tighten the phillips head screws. Do not allow the spring pressure to force the retainer away from the housing. Insure that there are no gaps between the retainer and the housing.
- Re-attach the pump head.

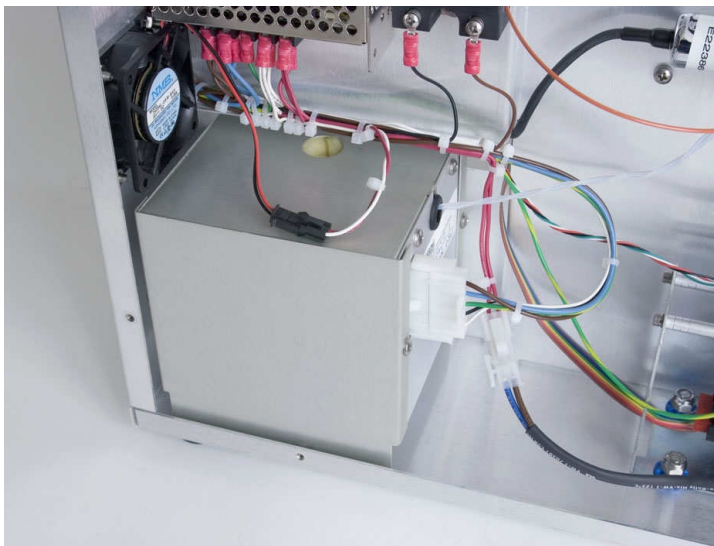
Break in New Seals

Remove the analytical column and plug the connection going into the first mixing tee. With a restrictor on the outlet of the Vector, run the pump with a 50:50 solution of isopropanol (or methanol) and water for 60 minutes at a backpressure of 2000 psi. Note: Use only organic solvents to break-in new seals. Buffer solutions and salt solutions should never be used to break-in new seals. At this time look for leaks.

Heated Reactor Maintenance

Flushing 80/20 Water/ Methanol through it can usually clean the heated reactor. If the reactor is completely blocked, it must be replaced.

1. Turn off the power to the Vector PCX.
2. Unplug the power cord and remove the cover by loosening the 6 screws on each side.
3. The heated reactor is located at the lower left back corner. Remove the three Phillips head screws that hold it to the chassis. (Access to these screws is from the right side).
4. Unplug the white cable harness by squeezing on the two tabs and then pulling out.
5. A replacement reactor (PN 1452-0162 for 120V 0.5mL or 1452-0163 for 240V 0.5mL) can be installed by reversing the above steps.



Pressure and Leak Tests

Pump fluid through the lines and look for leaks. Tighten fitting if they are leaking.

To perform a system pressure test, remove the analytical column and plug the line that goes into the first mixing tee and block the line going to the fluorescence detector. Allow the instrument to pump and build up pressure. The pressure should drop once it reaches 500 psi, due to the pressure relief valve. Stop the pump and brush a kim-wipe by each fitting to see any droplets forming. Tighten fittings if you find leaks. Allow pressure to slowly fall until it reaches a steady point around 450 psi. Set a timer for 10 minutes and note change in pressure. If pressure does not drop more than 50 psi in ten minutes, than the system passes. If the pressure drops more than 50 psi, you have a leak somewhere. Build up pressure again and look for leaks.

Vector PCX Reagent Pump Components

<u>Catalog No.</u>	<u>Price</u>	<u>Description</u>
3106-1254	\$231	Pump Check Valve Kit – PEEK (Inlet and Outlet)
3106-1255	\$79	Seal Kit, 10mL (Piston seal, Back-up O-ring, Diaphragm, Tool)
3106-1256	\$110	Pulse Damper Rebuild Kit (Diaphragm, O-rings, Diaphragm seal, Seal tool, 4 Hex wrenches)
3106-1258	\$292	Prime/Purge Valve – PEEK
3106-1259	\$898	Head Kit, Vector Pump, (head, check valves, piston and seal)
3106-1257	\$182	Piston, Vector Pump, 10 mL
1452-0176	\$42	Ferrule, PEEK 1/16 x 10-32 S/T, 5 each
1452-0177	\$59	Nut, PEEK Long 1/16 x 10-32 S/T, 5 each
3106-1260	\$14	Prime Purge Seal Kit - PEEK