Trouble Shooting Guide

The following trouble shooting guide has been prepared for the novice as well as experienced service technicians. Often it is more expedient to simply replace old parts with new ones and get back to work, but for the chromatographer who doesn't have the budget for that, or who is down on a weekend with no spare parts, we hope these tips get your HPLC pump up and running, and keep it running.

Problem	Cause	Remedy
Erratic Pressure	Dirty inlet valve	**Remove inlet valve and flush with 50 mL of clean HPLC grade solvent.**
	Dirty outlet valve	**Replace with new valve (an inlet cartridge can be substituted for an outlet if no outlet valves are available).** **If there is no filter on the outlet, then it may be cleaned in the same manner as an inlet.**
	Clogged solvent intake filter	**Replace with new filter.**
	Leak at solvent inlet line	**Tighten fitting.** **Replace ferrule and fitting if no longer serviceable.**
	Note: *This problem may not be easy to detect! On the intake side of the pump there is a slight vacuum, so air will leak into the pump rather than solvent leaking out. There will be no visible sign of a leak. To detect this problem, make sure that there is no air in the intake lines, then open the outlet fitting and watch for air bubbles coming out (place a drop of solvent at the outlet fitting to observe air bubbles). If you continue to observe air bubbles after 60 seconds, then air is probably entering the head from the inlet fitting, a leaky pump seal, or an insufficiently tightened inlet housing.*	
	Worn pump seal or piston	**Replace seal.** **Inspect piston and replace if worn.**
	Note: *If your piston is worn, you can sometimes get a Teflon seal to work for a short time, until a new piston can be obtained. Teflon will generally conform to and seal with a worn piston better than UHMW-PE, but not for long. Also, Teflon will generate copious amounts of wear material when used with a worn piston. Replace the worn piston ASAP.*	

Problem	Cause	Remedy
Erratic Pressure continued	Air in pump head	**Purge pump for 30 seconds, then operate at 1,000 PSI or higher. The air will dissolve in the solvent and be expelled within about 30 minutes.**
	Note: *This symptom is normal after replacing a pump seal or piston. Wet the seal and inside of the pump head with IPA to reduce the amount of time it takes to eliminate air from the head.*	
	Not using degassed solvents	**Degas, preferably using vacuum and sonication.**
	Air bubbles in inlet line	**Degas solvent. Replace solvent inlet filter. Make sure solvent bottle still has solvent!**
Frequent Check Valve Failure	Contaminated solvent	**Use clean HPLC grade solvent.**
	No solvent inlet filter	**Always use 10 micron or finer solvent filter.**
	Worn pump seal or Piston	**Replace seal. Inspect piston and replace if worn.**
	Note: *If the seal is badly worn, then the pump head will be contaminated with seal wear material. Remove the check valves and seal from head and sonicate the head in 20% nitric acid for 30 minutes. Rinse thoroughly, then sonicate for 10 minutes in DI water. Wet seal and pump head with IPA prior to reassembly. The inlet valve should be flushed with 50 mL of HPLC grade IPA or Water, and the outlet valve filter inspected (if there is no filter on the outlet, then flush with 50 mL HPLC solvent).*	
	Service life of check valves has been exceeded	**Install new valves.**

Problem	Cause	Remedy
Failure to Prime	Excess back pressure in pump head	**Open purge valve, or open fittings at outlet check valve.**
	Valve installed upside down	**Verify that arrow faces up for both inlet and outlet valve.**
	Clogged solvent inlet filter	**Clean or replace with new filter.**
	Clogged outlet valve filter	**Replace outlet valve filter.**
	Note: *The outlet valve filter should last at least 2 years in normal service. However, if piston seals are wearing out frequently, then wear material from the seal may cause premature clogging of the outlet frit, as well as contaminating the inlet valve. Replace the outlet filter, and inspect the sapphire piston for wear or score marks.*	
Operating Pressure is Lower than Normal	Worn seal or piston	**Replace seal.** **Inspect piston and replace if worn.**
	Air in pump head or intake line	**Purge pump for 30 seconds, then operate at 1,000 PSI or higher.** **The air will dissolve in the solvent and be expelled within about 30 minutes.**
	Clogged solvent inlet filter	**Clean or replace with new filter.**
	Dirty inlet valve	**Remove inlet valve and flush with 50 mL of clean HPLC grade solvent.**
	Dirty outlet valve	**Replace with new valve (an inlet cartridge can be substituted for an outlet if no outlet valves are available).** **If there is no filter on the outlet, then it may be cleaned in the same manner as an inlet.**

Problem	Cause	Remedy
Operating Pressure is Lower than Normal continued	Leaky fitting	**Tighten fitting.** **Replace ferrule if badly deformed.**
	Note: *If a slight amount of additional tightening does not slow stop the leak, then replace the ferrule. Over-tightening the fitting can damage the seat, strip the threads, or worse, cause the nut to shear off. Never exceed 15 in-lbs of torque.*	
Seal Life Unusually Short	Worn or scratched piston	**Replace with new piston.**
	Note: *It is not always obvious by visual inspection if a piston is worn or scratched. Use a magnifying glass to look for a glazed appearance, or axial grooves and scratches. The piston is badly worn if any such conditions are visible.*	
	Build-up of salts on piston	**Use the piston flush option if available. Always run DI water through the pump before shutting down for the day when running buffers.**
	Mobile phase incompatible with seal material	**Use a Teflon seal.**
	Note: *The UHMW-PE blend that is used by ASI is resistant to almost all HPLC solvents. However, there are a few solvents for which Teflon is more suitable. These are 100% methylene chloride and 100% toluene. Refer to catalog section on seals.*	