Q. How can I get my pumps to last longer?
A. Read on...

Some background--When a solenoid opens or closes, a tiny bit of mist is created inside the tubing. The pump continuously has to deal with this mist. The small glass waste accumulator on the front flow panel and the vacuum accumulators (2 bluish clear plastic canisters inside the instrument) trap out some of the moisture (sometimes they are the problem). When the instrument is unexpectedly turned OFF then ON or RESET, all of the valves pop open-creating mist, and the pump runs right into this mist--shortening its' life. Any slight malfunction will cause elevated amounts of moisture/mist to be present. Any Electro-Mechanical or Leak & Clog, Incorrect setting or Operator problem may cause liquid, bubbles, vapor, liquid and mist to be sucked into the pump.

Electro-Mechanical Problems

SYSTEM ERRORS

❑**"Vacuum Level Timeout"** error messages. This message occurs during startup, the computer gives the pump one (1) minute to reach 8-9" in Hg (while it goes through the priming process). If it doesn't make it within that minute, you get the error message.

❑Fix them first, if possible. Keep them in mind as you progress.

PUMP

❑May be weak (a pump running flat out with **no** regulator should deliver 11in Hg or more, otherwise replace it) make sure your gauge is calibrated

❑Mount it on end to effectively pump out any accumulated liquid. The pressure ports should be lower than the vacuum ports.

❑Should not be burping (constantly turning off and on to top off the vacuum), running continuously or running too frequently. Ideally the pump should charge up vacuum then shut off until a sample is run. Top off a few times then shut off until the next sample, ad infinitum...

❑Don't tighten the pump screws. The diaphragms are mounted at a precise 2kgf/m at the factory. Anything more will crack the diaphragms causing premature failure.

❑The pump reeds are not check valves. Two duckbill check valves (like our part number 3008092) are required. One between the pump (input) and the instrument. One on the output to quiet the pump.

SSR (Solid State Relay)

❑Relay on the SDM (solenoid driver module) may be feeding a little bit of current to the pump, causing it to always be on. This may accelerate wear of the reed valves. The vacuum regulator may be rapidly turning it on and off.

❑May be bad, or slightly shorted causing the pump to run slightly. The vacuum regulator may be contributing.

VACUUM REGULATOR

❑Vacuum regulator; toggling off/on at a rapid rate. This may make the SSR appear to be defective. You may have a small vacuum leak somewhere, or defective regulator. The offset or blue pins may be set wrong.

❑May be bad, overly sensitive or incorrect offset for the opamps. Get the procedure for setting offset from the manufacturer.

FLOW TIMING

❑May be corrupted from the diskette (try a new diskette).

FANS & FILTERS

❑Must be fully operational and the filters clean and not snagging the fan blades. Keeping the instrument cool may slow down vapor and mist.

VACUUM ACCUMULATORS

❑Liquid may be traveling from the intake fitting to the exhaust fitting. Staining can often be seen on the top-inside the accumulator. Put a 1 inch or more piece of tubing protruding down inside the fittings at the top of the accumulators. This will ensure that any liquid will drip down to the bottom of the canister.

BUBBLE MIX

❑Turned up too high and bubbles getting into the vacuum system during draining.

Leak & Clog Reagent Problems

SOLENOID(S)

❑Bad, weak, intermittent or worn out .

❑Bottom out before completely pinching tube (shim it).

❑Broken or weak spring and/or tubing not "flossed" deeply into NC (Normally Closed) solenoid.

❑Balance tubing not in place

TUBING

❑Wrong place or kinked. Balance tubing not in solenoid.

❑Too tough and/or weak/dirty solenoid not bottoming.

❑Wrong diameter, type or hardness (or too old).

VALVES

❑Directional valve; not moving properly.

❑Check valves bad, replace all.

FITTINGS

❑Cracked, clogged, wrong material or wrong size.

GLASS

❑Hemoglobin flow cell; broken, clogged or partially clogged.

❑Diluent buffer, Hemoglobin Flow cell, Waste Accumulator, Waste bottles, Premix Cup; cracked, broken, glued together temporarily contribute to vacuum and reagent problems.

REAGENTS

❑Wrong brand or type creating too many bubbles or vapor and mist.

❑Clamped off or empty or lines kinked/pinched.

WASTE

❑Transducer;, no draining at the end of a sample, look for kinks or clogs and clean the hemoglobin flow cell.

❑System; not pumping out properly (waste full?), kinked line, leaking solenoid, leaking jar and seal. Wrong diameter waste line.

❑Accumulator; (on the flow panel) not draining properly. Check the tubing for kinks or clogs. Clean the hemoglobin flow cell.

❑Other....

Operator Training

❑Train the Medtechs to resist hitting the RESET button or turning the machine off and on whenever they have a problem.

❑Train the Medtechs to properly SHUT DOWN the instrument using the menus.

❑Train the Medtechs to clean the air filters. If the fan filter frame is white, convert them to the new style black, our part number (3008453 small fan, 3008473 large fan). There is less danger of the new style black type snagging the fan blades.

❑On smaller instruments, train the Medtechs to remove the waste stopper from the waste bottle and clamp the lines before shutting off the instrument.

❑With new Medtechs, find the Operators' Manual and show them how to find the important parts. Troubleshooting, operation, etc.

❑When Training, Demonstrate your professionalism; Be serious, Follow the manual, Don't clown around or make jokes, No shortcuts. If they don't respect you, they won't respect the instrument.

❑**"Anything you do, they will do".** Remember, they are watching and you are training them even though you don't know it. They will do everything they saw you do and more, to get their samples completed. Your shortcuts will become their short(er)cuts. When they train somebody else, their short(er)cuts will become short{(er)(er)} cuts.