

PAL Maintenance and Troubleshooting

Syringe (change at least every 10,000 strokes):

- Check plunger for looseness or binding on a weekly basis or sooner.
- Ensure that syringe is properly installed with the flat side of the barrel flanges are oriented toward the syringe adapter plate. The barrel lock should be closed and plunger holder tightened.
- Inspect for visual signs of plunger wear:
 1. Presence of a large air gap below plunger tip during aspiration (this can also be caused by the aspiration speed being set too high for either the syringe needle ID or sample viscosity, resulting in cavitation)
 2. Presence of fluid above the plunger seal, between the glass barrel and plunger shaft

Order:

Contact [AUTOSAMPLER Guys](#) for recommended replacement syringe models

Adjustment of Needle Penetration in Injection Valve:

- Confirm proper adjustment after every syringe change.
- Using handheld controller and from the home page press F1 (Menu)/Utilities/Injectors/LC-VLV1/Move to Injector (F3)/Needle Penetration.
- Slowly advance needle down until contact with injection port bottom (you will hear a “thunk”). Raise needle position by 0.2mm by turning the scroller wheel counter clockwise two “clicks“. Confirm the setting and repeat procedure once more.

Changing Needle Seal (approx. every 2,000 injections):

- Located inside/below the injection port needle guide – consists of Teflon tube with a swaged ferrule.
- Provides positive seal between OD of injection needle and ID of the Teflon tube.
- Prevents sample from backing up into region of injection port that will not be washed and potentially result in carryover. Also ensures dispensed sample is properly loaded into loop.
- Check by: 1) visually inspecting top of injection port needle guide for unexplained residual liquid and/or dried crystalline residue. If present, replace needle seal. 2) manually insert the 22g needle of a PAL syringe into the injection port/needle guide. You should feel a notable moment of resistance as the needle passes slowly through the ferrule - if absent, replace the needle seal.

Order-

[P/N: PAL.NdlSeal - 22g needle seal, pack of 10](#)

Injection Valve:

- Valve rotor is inspected and, if necessary, replaced during annual PM procedure.
- Valve rotor can be accessed for inspection by removing the thumbscrew tensioner on the face of the type WK valve (turn counter clockwise to remove). In case of

Cheminert (visually ID by manufacturer inscription and the mostly flat face of the valve), access to rotor is by removing two hex screws in the face of the stator.

- After removing the rotor of type WK valve, replace it with the ID letter on back fin turned down (at approximately 4 o'clock position) as the rotor is inserted into the stator cavity. For Cheminert valve, tabs on the outside of the rotor will index it to the proper orientation.
- The entire valve body can be removed by loosening the Torx screw located on the right side of the valve body clamp.
- Flow path restrictions at the injection port, within the valve and at the waste port can occur (by sample sediment or piece of plate mat, for example). When looking for a blockage, start with the waste line and then move to the injection port followed by the valve itself. Checking the valve requires disassembly and depending on the nature of the plug, the stator may be scored requiring partial or whole valve replacement.

Order -

P/N: DC6WK-CTC-K 6-port VICI type WK Injection Valve

P/N: C2V-1006D-CTC-K 6-port VICI Cheminert Injection Valve

P/N: C72VX-1696D-CTC-K 6-port VICI Cheminert Injection Valve, 15K PSI for UHPLC

P/N: SSAC6W Rotor for DC6WK-CTC type WK injection valve

P/N: C2-10R6 Rotor for C2V-1006D-CTC-K Cheminert injection valve

P/N: C2V-1C06 Stator for C2V-1006D-CTC-K Cheminert injection valve

P/N: C72-16R2 Rotor for C72VX-1690D-CTC-K Cheminert injection valve, 15K PSI

P/N: C72V-1C96 Stator for C72VX-1696D-CTC-K Cheminert injection valve, 15K PSI

Waste Port and Line:

- Use only Teflon tubing with a 0.9mm ID for the waste line. This ensures a close match between valve port and waste line ID's ensuring no flow resistance. Preferably, attach the waste line with stainless steel nut and ferrule. Tighten the nut while the waste line is fully inserted to the bottom of the valve port and only as much as is needed to firmly hold the line. Over tightening the nut will crimp the ferrule too tightly and cause a partial or full blockage. Confirm proper tightening 1) by pulling gently on the waste line and ensuring it does not slip out of ferrule 2) remove the newly installed line, nut and ferrule and check the tubing ID by inserting the needle of a PAL syringe into the end of the waste line just below the ferrule. If it slips into the waste line without notable resistance, it's properly tensioned.

Order -

P/N: KitLCVlv Kit Waste - waste tubing for injection valve

Fast Wash Station:

- Ensure wash bottle caps have vent holes or cap is partially loose. This ensure a vacuum does not form as liquid is dispensed.
- Replace leaking fittings at either bottle or wash station. Replace any part of the system that has been cross threaded. Leaks can eventually wet electrical connections and cause system failure.
- Replace cracked needle wash sleeves (glass) in wash station.
- Ensure proper solvent flow to both wash locations. Use PAL utility to activate

wash solenoids. Listen for click of valve opening and closing. Check for visual signs that fluid flow is starting and stopping at the outlet of the needle wash sleeves. (High concentration organic washes will not “bead” to the same degree as more aqueous wash solutions.)

- Remove any blockages in the system by using Utilities function to open the valve and back or forward flushing with low pressure to dislodge the plug.

Order -

P/N: MM30-21 Glass sleeve for Fast Wash Station, 22g, ID 0.8mm, length 57mm

P/N: MM01-01 Fast Wash module for two solvents with holder or cable

P/N: MM11-00 Fast Wash module, valve assembly only

P/N: PAL.TubeWaste Waste line for Fast Wash Station

P/N: PAL.TubeFWash 1pc tubing with fittings and shutoff between bottle and wash station

P/N: PAL.TubeFWash1 1pc tubing including fittings between shutoff and wash station

P/N: 1000-WV 1000ml wash bottle for Fast Wash Station

P/N: 500-WV 500ml wash bottle for Fast Wash Station

Coolstack:

- Most issues impacting system operation can not be repaired in the field. Replacement of the stack, controller or both is the usual approach.
- When a problem is noticed, check to see if the vent fan on the back of the coolstack is running at a consistent high rate or if the RPM is alternating between high and low levels (pulsing). If the latter, suspect the controller is defective.
- Warped drawer faceplates can be field replaced with a new faceplate and nylon screw kit.
- The drawer rollers on some early model coolstack rusted after extended operation. In some cases, the resulting binding was severe enough to prevent the automated or even manual opening. Rollers can be repaired but it is recommended for an experienced engineer.

Order -

P/N: KitDrawFront Drawer covers for coolstack, 3 covers and screws included

P/N: Kit.StkRollsSST Coolstack drawer roller replacment kit, 12 pcs.

Injection Head:

- Servicing the injection head requires removal and some level disassembly (unless performing an exchange of injection heads). It is recommended only for an experienced engineer. Here are some possible problems and some likely causes:
 1. The PAL picking up and moving vials or plates after sampling indicates a severely worn short bungee cord or mechanical binding of the lower needle guide.
 2. “Missing vial/sample errors” suggest 1) corrupted PAL firmware settings - try reinstalling a current back-up with PAL Loader 2) severely worn short bungee cord 3) defective y-arm flex cable.
 3. PAL stops and returns home with a audible triple beep and error when it tries to open a coolstack drawer (especially the lower two drawers). This could be a defective flex cable.
 4. Inability of injection head to reach proper depth to engage lower needle guide magnet with coolstack drawer “pull button” or to properly reach the injection port or wash locations. A) Possibly due to corrupted firmware

- B) rail system supporting upper and lower needle guides damaged or binding C) knot on recently installed short bungee is incorrectly oriented and rubbing against an adjacent circuit board D) Binding between surfaces of upper and lower needle guides as they “nest” together.
5. Injection mechanism drops very quickly when power is cycled off and the lower needle guide may touch the surface of the table on which the PAL is installed. This is the result of a severely worn or broken long bungee cord.

Order:

P/N: PAL.Tcord280 Bungee Cord, 280mm (long)

P/N: PAL.Tcord90 Bungee Cord, 90mm (short)

P/N: PAL.StkDrwMag Stack drawer magnet assembly kit

PAL “appears dead”:

- Check to see if power supply is still connected to wall socket or power strip and power is available.
- Check to see if power supply LED is energized.
- Check to see if power cable between PAL and power supply is fully inserted at both ends.
- Look at the LED just adjacent to the power connection point on the back panel of the PAL. Is it flashing? If so, the PAL is in “Loader Mode”. This happens when a rapid power cycle occurs at any point in the system delivering energy to the PAL.
- To correct, turn OFF the power to the PAL at the power supply, wait five seconds and then turn the power switch back to the ON position. As soon as the LED on the back of the PAL panel turns red, rapidly cycle the PAL power supply OFF and then ON again. The PAL should start normally and return to operation. If not, repeat the procedure a couple of times. Getting the timing right is key to success.