

CHANGING MECHANICAL PUMP BENCH-TOP VOYAGER DE, DE PRO, and DE RP

INTRODUCTION: This document provides a protocol that will explain how to change the Pfeiffer mechanical pump P/N: 4342613 or V209006 on the Voyager Bench-top mass spectrometers. This protocol can be performed while the instrument is running and powered on. The advantage of performing the procedure powered up is that the turbo pumps remain powered on and will not spin down. Also there is no need to restart prior to running samples. The disadvantages are: danger of electrical shock, the procedure needs to be preformed quickly in under 10 minutes to prevent stress on the turbo pumps, and the possibility of causing a short and accidentally damaging electrical/mechanical components.

This procedure can also be used to explain how to remove the pump for maintenance.

TOOLS:

1. NEEDLE NOSE PLIERS-used to tighten or loosen hinge clamps



SUPPLIES:

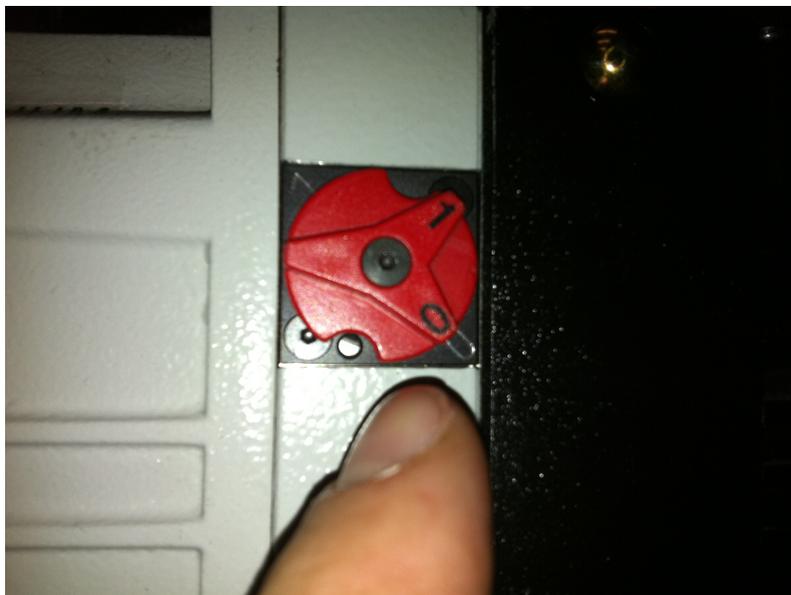
1. Voyager DE, DE RP, or DE PRO.
2. Pfeiffer DUO 2.5 Pump (P/N 4342613).
3. AC distribution PCA bypass cord (15 amp 110V)-supplied with new pumps.

4. 6.3 amp automotive type slow blow fuses (P/N: V103015), these fuses are normally in our Spares Kit, or the AB PM Kit. If you do not have fuses on-site please contact our office to have them included with your pump shipment.
5. Pfeiffer P3 oil (P/N 4200035).
6. Pfeiffer User Manual: [click here to download internet connection required](#)
7. Pfeiffer Oil Color Chart: [click her to download internet connection required](#)

PROCEDURE:

1. Unpack the new Pfeiffer pump and check that the following items are available:
 - a. at least 400 mLs P3 oil.
 - b. AC distribution PCA bypass cord (15 amp 110V).
 - c. 6.3 amp fuses.
2. Fill New Pump with oil to the appropriate oil level view sight glass.

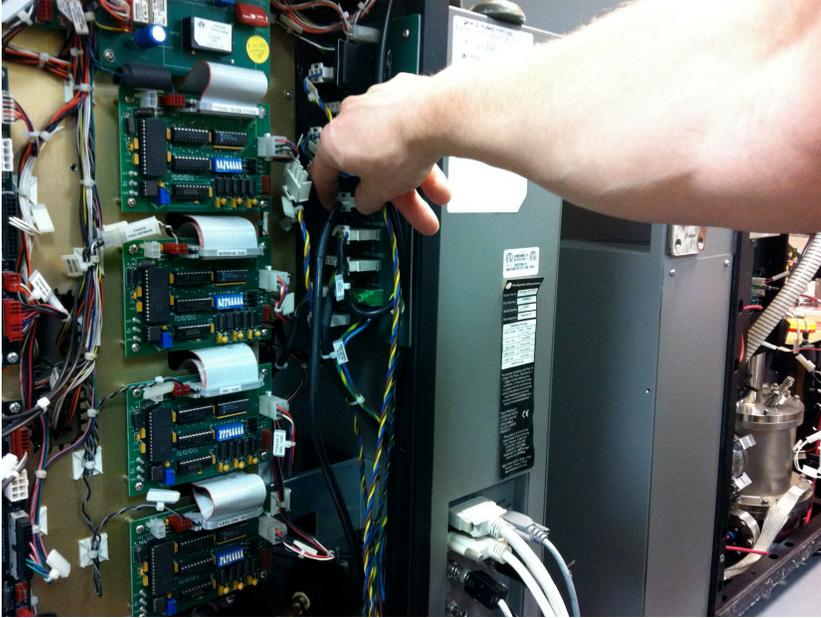




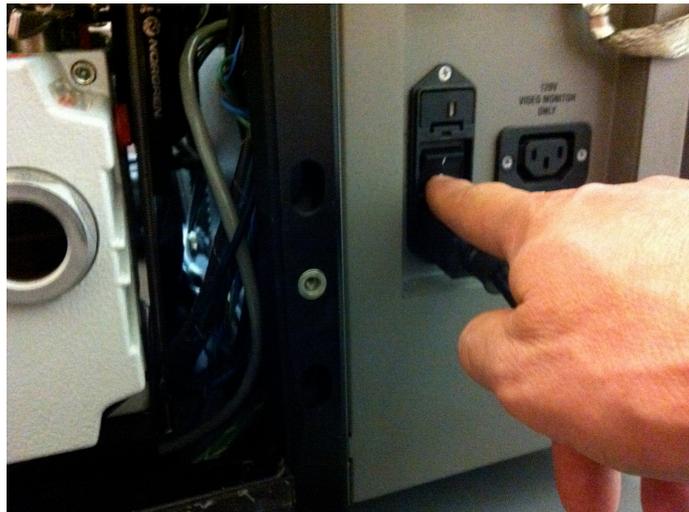
3. Verify that the ballast on the side of the pump is in the closed position.
4. Record the TC2 and applicable BA pressure readings if current pump is operational and the Voyager is powered on under vacuum.
5. Unplug the power to the fore-line valve #1 and #2.
6. Turn Off Ion Gauge(s):
 - a. Turn off the ion gauges using the EMIS button on the MULTI-GAUGE controller. Toggle between the BA and TC readings using the CHAN button. DO NOT PRESS ANY BUTTONS ON THE CONTROLLER EXCEPT EMIS AND CHAN. SEE BUTTONS WITH IN THE RED BORDER ON THE FIGURE BELOW.



7. Unplug the power for the Pfeiffer pump at the AC distribution PCA J4, cut any tie wraps that are holding the power cord.



8. Decide if you will be exchanging the pump with the instrument powered on, or if you would prefer to power down the Voyager so that all pumps are off and voltages are turned off.
 - a. If you decided to turn the power off then power OFF using the power switch on the right side of the Voyager, **if you do not want the turbos to spin down then leave the instrument powered on and proceed to STEP #9.**



- b. FOLLOW THIS STEP IS ONLY IF YOU POWERED OFF THE VOYAGER**
Unplug the Turbo Pump from the AC distribution PCA, J2 SOURCE, J3 MIRROR Turbo.

9. Disconnect the hinged clamp from the inlet (left side) side of the old Pfeiffer pump, have paper towels handy in case oil leaks out of the tube.



10. Disconnect the hinged clamp that holds the exhaust filter on the outlet of the pump.



11. Remove the old pump. Be careful the pump is heavy and will be hot to the touch (possibly causing a skin burn). **THE BUILT IN HANDLE IS OFTEN**

BRITTLE AND CAN BREAK, so be sure to support the pump from the bottom using paper towels or an absorbent cloth between the pump and your hand.

12. Install the new pump.
 - a. install the hinged clamp for the inlet
 - b. install the exhaust filter
13. Connect the AC distribution PCA bypass cord to the power connector for the pump.
14. Plug the power cord into a wall outlet rated for 15 amps.
15. Wait for the pump to initialize and warm up for 2 minutes.
16. Remove the power cord and install the pump power connector into the J4 position on the AC distribution PCA.
17. If you powered off the Voyager POWER ON using the power switch located on the right side of the Voyager.
18. Monitor the TC 2 value on the MULTI-GAUGE controller.
 - a. when the TC2 value displays $9.0E-2$ TORR or lower then:
 - i. plug in fore line valve #1, after TC 2 reaches $9.0E-2$ TORR
 - ii. plug in fore line valve #2, if you completely powered off the Voyager you will need to wait until the TC 2 reaches $9.0E-2$ TORR, then plug in the Turbo Pump(s) to the AC Distribution PCA.
19. Wait 2 minutes then turn on the Ion Gauge(s) using the EMIS button on the MULTI-Gauge Controller.
20. Monitor the Vacuum and wait for the appropriate vacuum level prior to using the Voyager.
 - a. $TC2 < 3.0E-2$ TORR
 - b. $BA1 < 2.0E-6$ TORR
 - c. $BA2 < 6.0E-7$ TORR (if applicable Voyagers with a MIRROR or Reflector and QTY 2 Turbo pumps).
21. Check the oil color at least every 3 months. Refer to the [Pfeiffer Oil Color Chart PDF](#) to determine if the oil needs to be replaced. Pfeiffer will not honor their warranty if they discover the oil was not replaced according to the OEM replacement recommendation. If there is a leak in the Voyager vacuum system or if extremely high temperatures are present then the oil will discolor and varnish quickly, causing irreversible damage to the pump.