

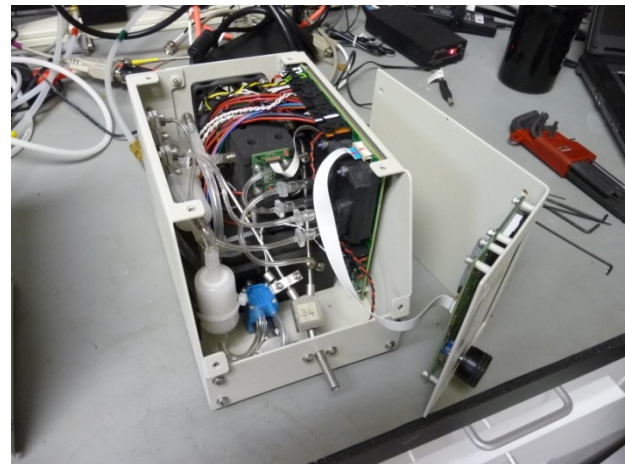
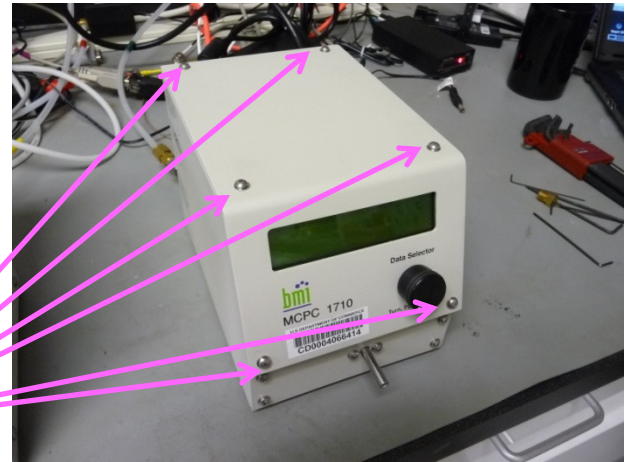
Cleaning of the Optical Block,
Critical Orifice, and Focusing
Nozzle of the Brechtel Model
1710 Mixing CPC

Over time, the optical block and sample flow path of the Brechtel Model 1710 MCPC will need cleaning. This document shows how to do this.

Symptoms of a dirty optical block and/or clogged sample flow path can include low count rates, low sample and saturator flow rates, and oscillating flow rates. The oscillating flow rates are typically observed with an external flow monitoring or calibration device such as a BIOS or Gilibrator flow calibrator.

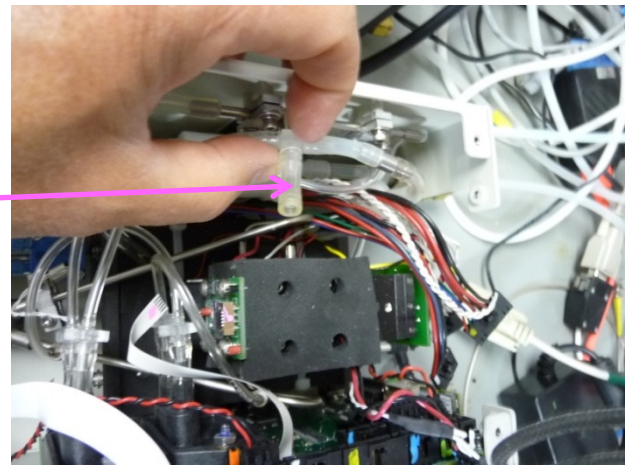
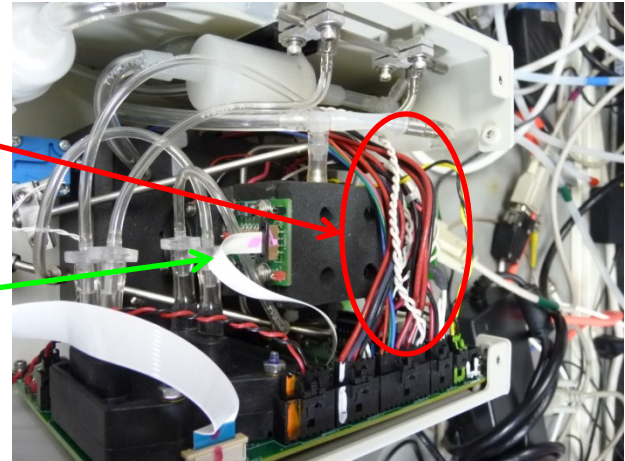
Step 1. Open MCPC

- Remove power connector from back panel!
- Disconnect the vacuum tube (or shut off vacuum pump) from the hose barb on the back panel
- Remove the 6 Allen head screws that secure the top part of the instrument cover
- Lay the top cover down to the side



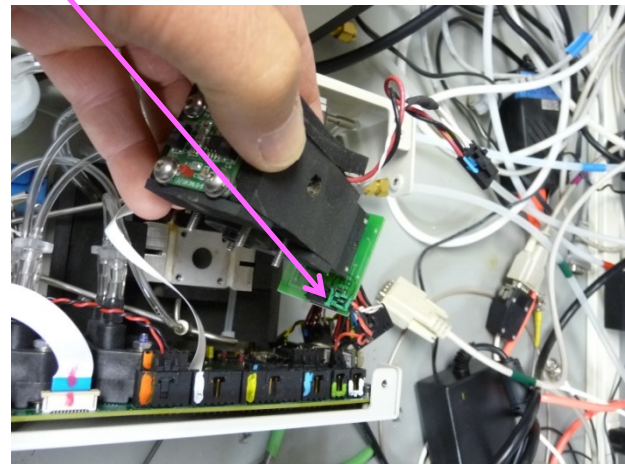
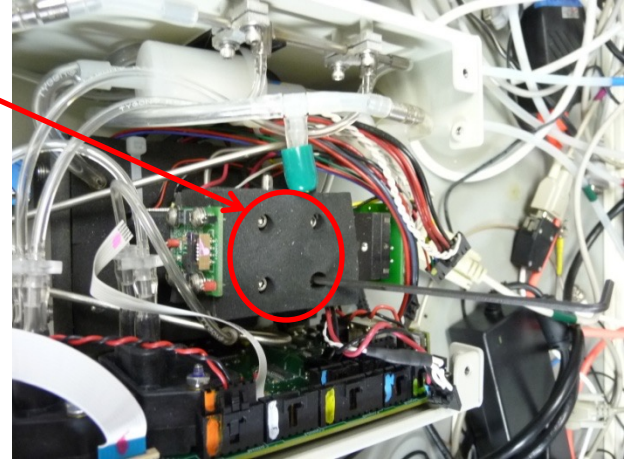
Step 2. Gain access to the optics block

- Disconnect all cables that attach to the IC board that block removal of the optical block. This includes the small white ribbon cable. If they have not already been color coded, be careful to mark ones of similar size so that they go back on the same connectors.
- Disconnect the vacuum tube from the critical orifice (C.O.) hose barb on the side of the optics block



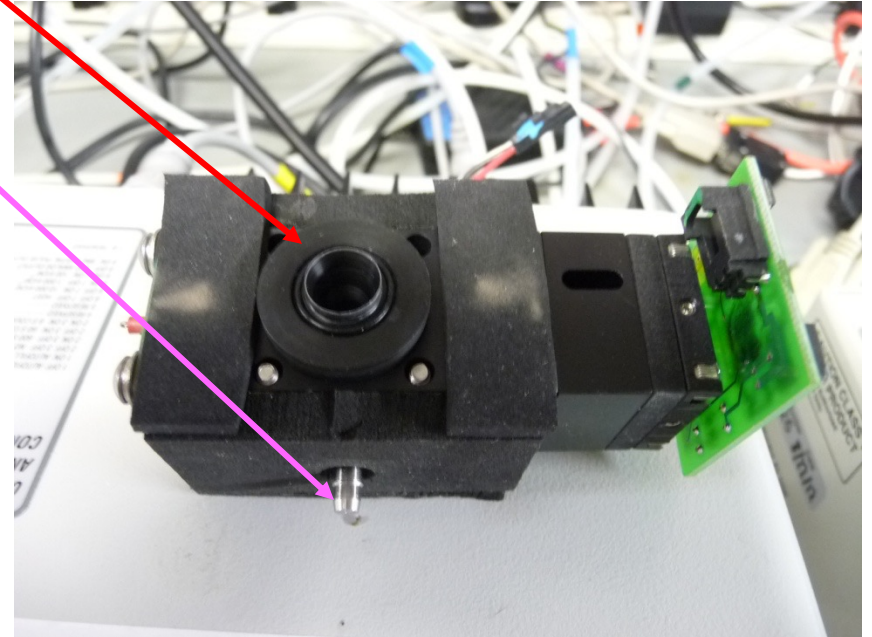
Step 3. Remove optics block from MCPC column

- Remove the 4 Allen head bolts holding the optics block to the column
- Carefully lift the optics block up so that the last 2-pin connector can be removed
- Then remove the optics block from the column and set it upside down to expose the focusing nozzle assembly. **Be careful when working around the 2 small IC boards at either end of the optical block assembly.**



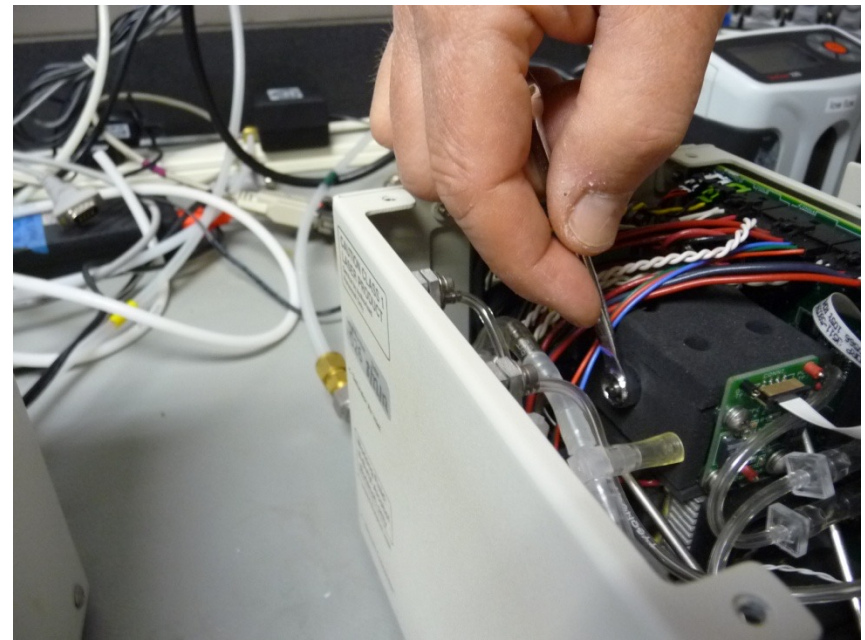
Step 4. Locate the critical orifice and the focusing nozzle

- The focusing nozzle assembly is located at the bottom of the optics block.
- The optical block critical orifice is a small metal hose barb with a tiny hole in it.



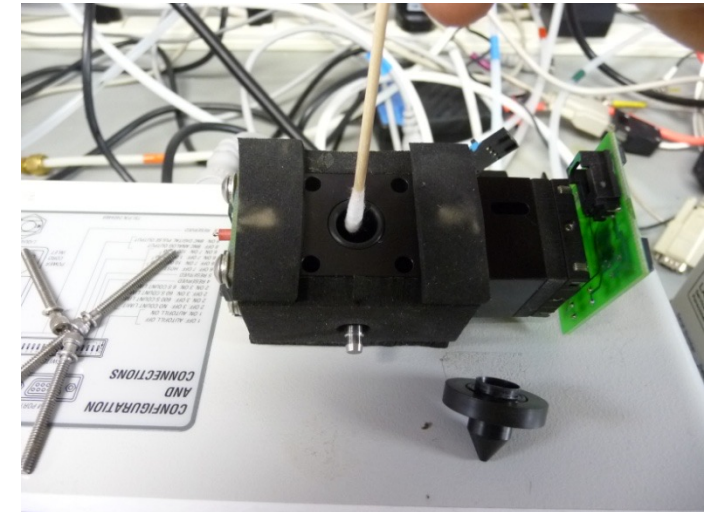
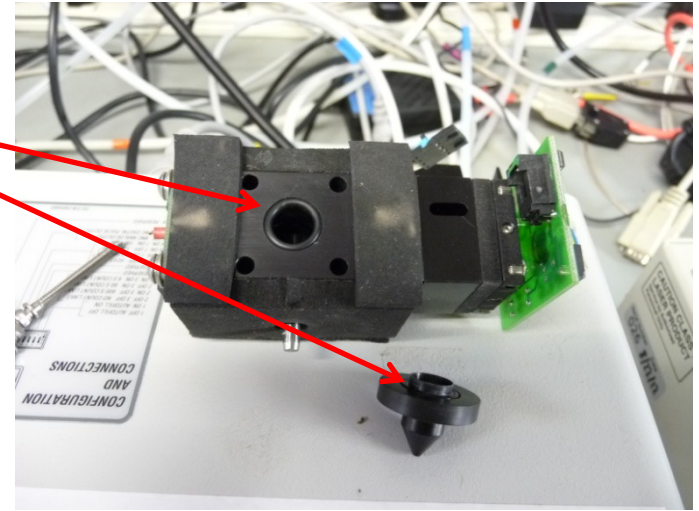
Step 5. Clean the critical orifice

- The C.O. can be removed using a 1/4" wrench. Note that this procedure can be performed without removing the optical block from the column
- The C.O. should be cleaned using alcohol (ethanol, methanol, isopropanol, etc.) to dissolve any clogging deposit
- Stubborn clogs may need to be displaced by inserting a shaved wooden (not metal) probe or toothpick into the orifice and twisting it
- When finished the C.O. should be reinserted by hand-tightening the fitting into the block to avoid cross-threading. Final tightening is by using the 1/4" wrench.



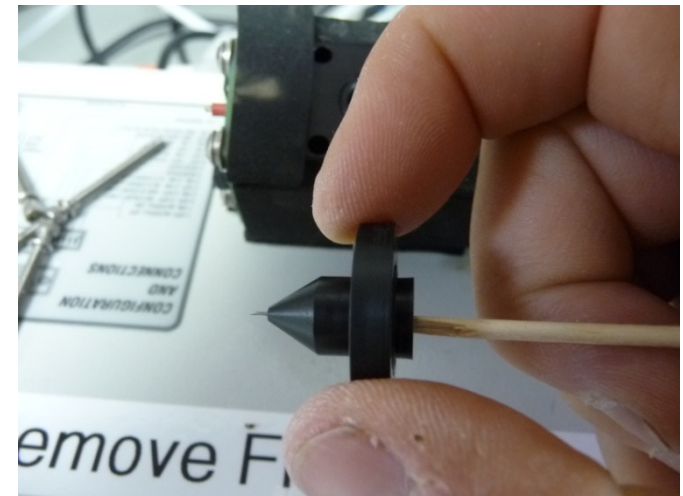
Step 6. Remove the focusing nozzle and clean the optical block

- The focusing nozzle assembly is sealed using **small o-rings**. Note the position of these o-rings and make sure they are back in place after working on the unit
- Use a cotton swab wetted with alcohol and clean the central portion of the optics block. Don't try to get out to the edges of the block... this could leave a deposit on the optical lenses.
- The main concern is to remove an aerosol deposit on the wall opposite the focusing nozzle. Use several cotton swabs until the last one comes out fairly clean.



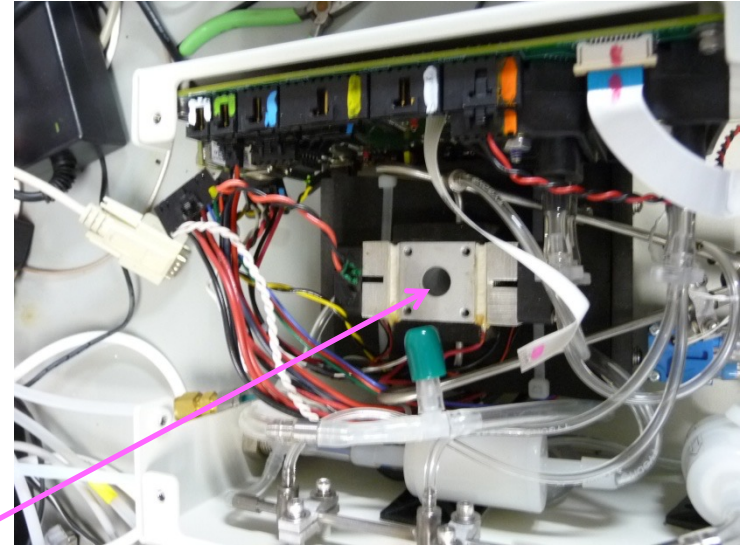
Step 7. Clean the focusing nozzle

- Get a wooden toothpick, or some other small sliver of wood. This will be used to clean the focusing nozzle. It must be made of wood or another soft material because the nozzle can deform or enlarge (both undesirable), especially if a hard metal pin is used
- You may have to take a blade and shave some wood from the tip of the toothpick to make it slender enough to fit inside the nozzle
- Gently (!) turn the toothpick in your fingers so that it rotates within the focusing nozzle orifice. This will clean off any deposits that have accumulated on the edges of the hole
- Use alcohol to clean off and dissolve any debris that remains on the orifice



Step 8. Reassemble the unit

- Insert focusing nozzle assembly and C.O. (if not already replaced) back into optical block unit. Make sure o-rings are in place for the focusing nozzle assembly.
- Connect the small 2-pin connector on the underside of the block as this will be difficult to do later
- Seat the optical block assembly over the hole in the column and insert the 4 Allen bolts. Tighten alternately to ensure a good o-ring seal.
- Re-attach vacuum tubing to C.O., and reattach all electrical connectors to IC board



Step 9. Perform a flow check

- Cleaning the C.O. and focusing nozzle will most likely change the flow through the instrument. Use a flow calibrator (BIOS, Gilibrator, etc.) to check the flow rate.
- The volume flow into the sample inlet of the instrument should be approximately 0.36 (+/- 0.06) lpm, assuming a critical (i.e., ~0.5 x atmospheric pressure) vacuum is applied to the unit.
- The sample flow and saturator flow rates should match closely.
- A freshly cleaned instrument should show a sample flow rate of at least 0.3 lpm. The actual measured flow rate is used in the calculation of the particle concentration.

