



Product Support
Life Science Mass Spectrometry

Revision 00 – June 2019

Orbitrap Exploris 480 Disassembly and Cleaning

Tools



Tool	Use
4 mm allen key	Bent flatapole
3 mm allen key	Top cover, Quadrupole
Flat head screwdriver	Injection filter

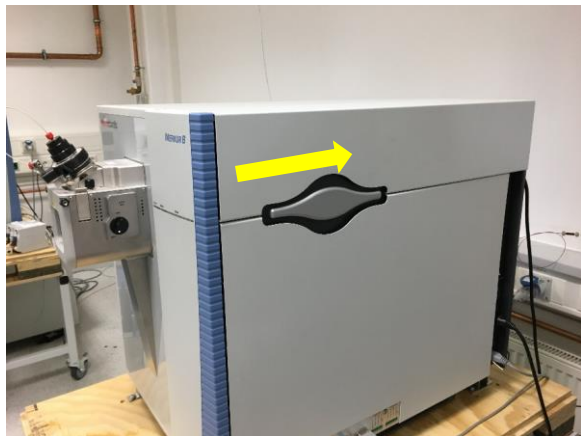
Preparatory steps

- Switch the instrument into “Off” mode in the Tune software
- Switch the main power switch into “Off” position.
- Let the instrument vent and cool down.

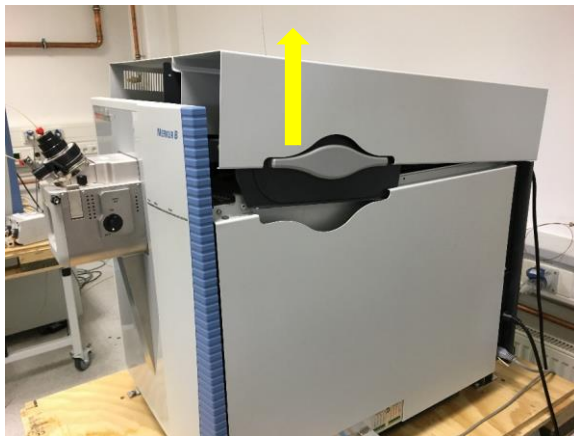


The ion transfer tube and spray cone can be very hot. It can take up to 2 hours for it to cool down to room temperature.

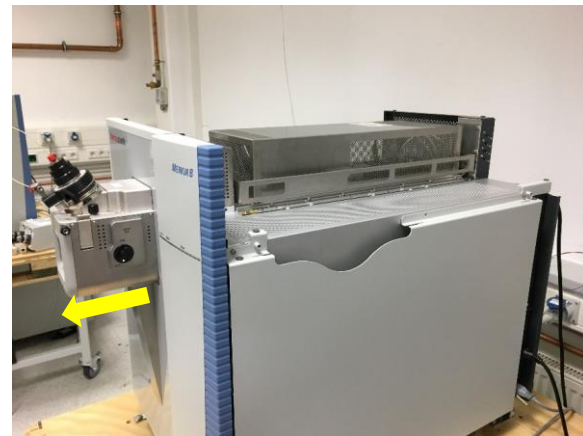
Removal of the top cover and the source housing



- Remove screws keeping top cover in place. ②
- Slide the top cover back a few centimeters until the side tabs are cleared.



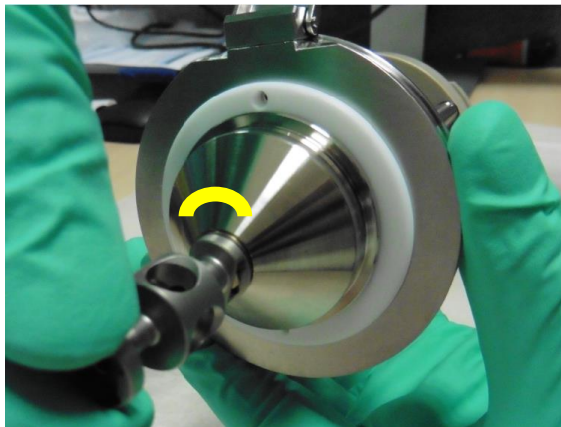
- Lift the top cover from the front and then slide forward to clear the hooks at the back.



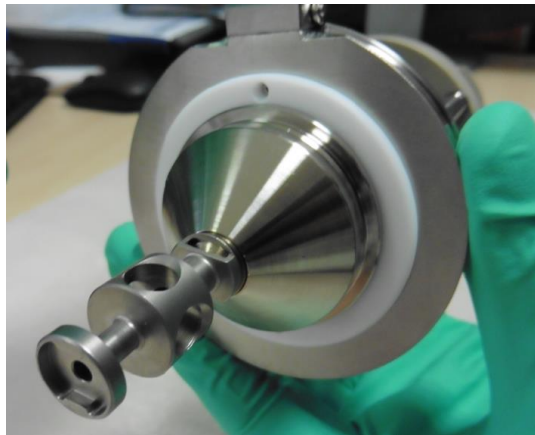
- Remove the source housing to access the sweep cone and the inlet stack.

② 3mm allen key

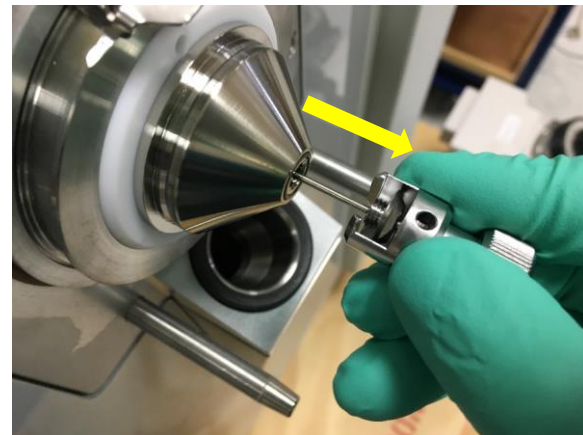
Removal of the ion transfer tube



- Use the removal tool shown on the photo to remove the ion transfer tube. $\frac{1}{4}$ quarter turn only (counterclockwise).

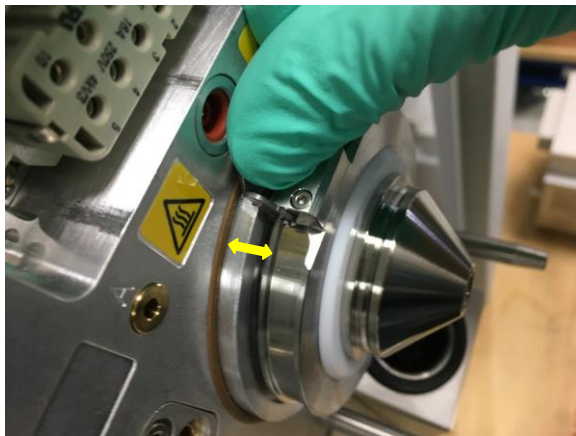


Be sure that the
Removal Tool is clean.



- Pull the ion transfer tube straight out and store it in a clean area.

Removal of the inlet stack

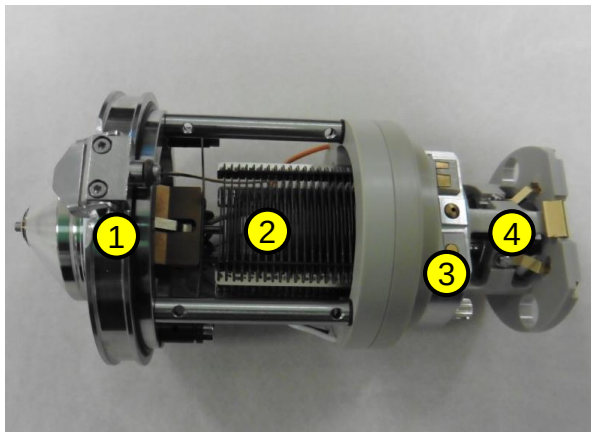


- Remove the cooled inlet stack by pushing the metal lever up.

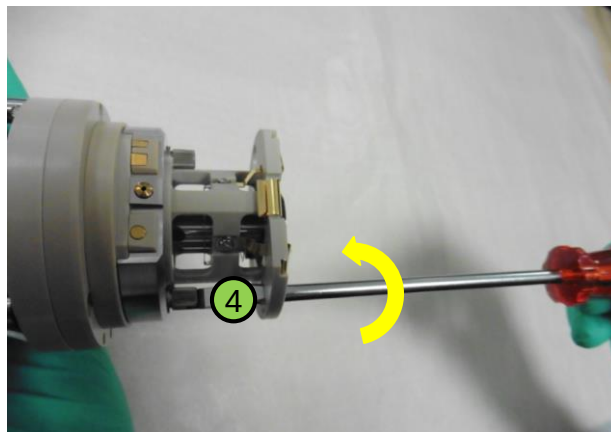
- Pull the inlet stack straight out and store it in a clean area.

Block the opening, e.g. with some aluminum foil, to prevent introduction of dust.

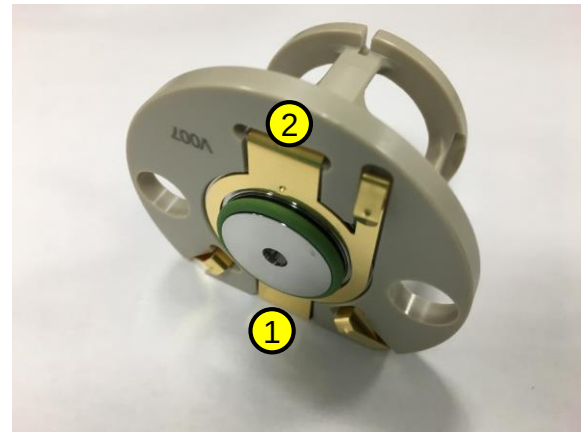
Disassembly of the injection filter and the flatapole focus lens



- Inlet stack components:
 1. Source cage
 2. Ion funnel
 3. Internal calibration unit
 4. Injection filter



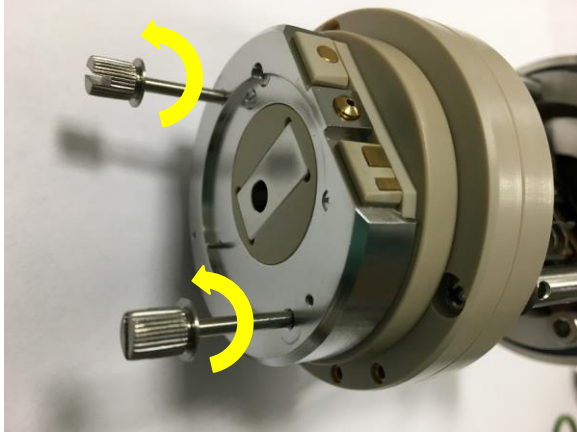
- Insert a flat head screwdriver through the holes in the injection filter PEEK holder to loosen the screws.



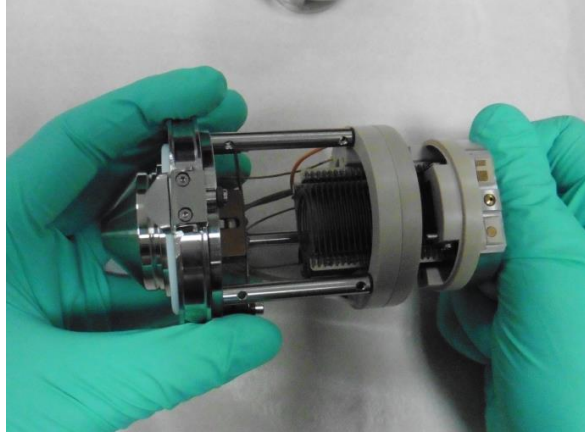
- Pull up tab 1 of the metal retainer for the flatapole focus lens until it is freed from the PEEK holder. Unhook tab 2 and remove the lens.

④ Flat head screwdriver

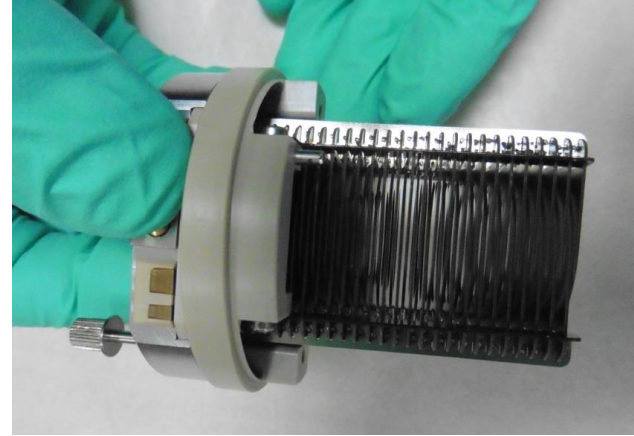
Disassembly of the Ion Funnel



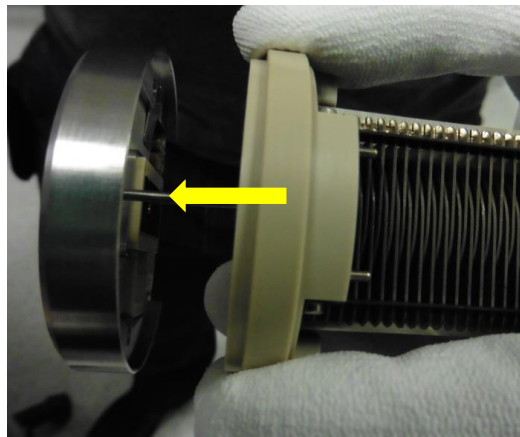
- By hand, continue to unscrew the long screws until the second set of windings is free.



- Pull the entire Ion Funnel and IC unit assembly straight out of the source cage.



Disassembly of the Exit Lens IC (internal calibration) Unit



- Separate the IC unit from the Ion funnel being sure not to bend the long metal pin extending through the PEEK holder of the Funnel.

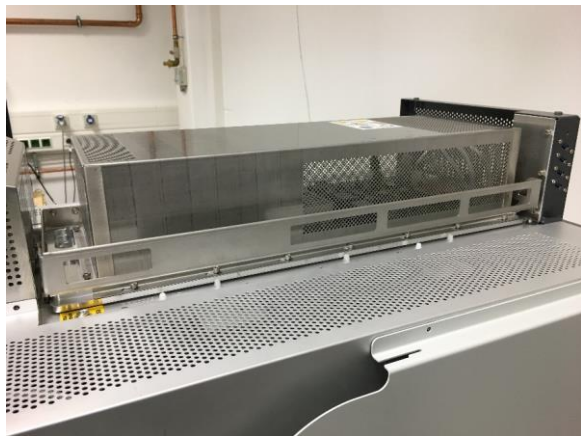


- Wipe clean with wet lint-free wipes according to the cleaning procedure.

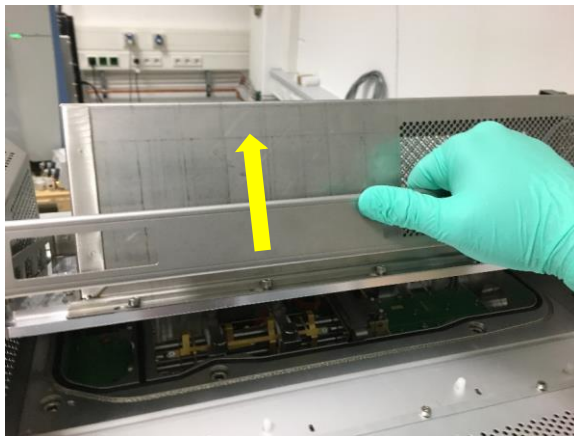


- For cleaning see slide 15/16.
 1. Source Cage
 2. Ion Funnel
 3. Internal Calibration Unit
 4. Exit Lens
 5. Injection Filter
 6. Flatapole Focus Lens

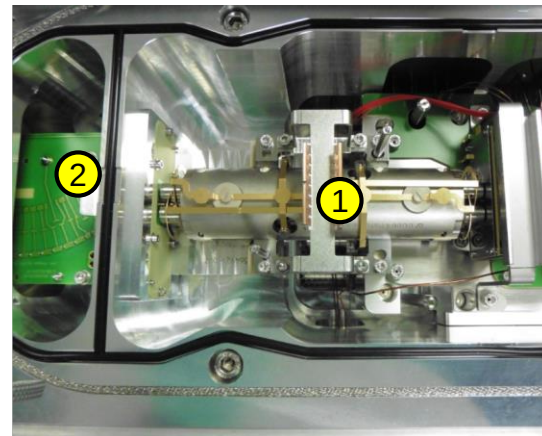
Open the main chamber



- **Important:**
To avoid dust coming into the main chamber, keep the lid closed if not actively removing or installing components.

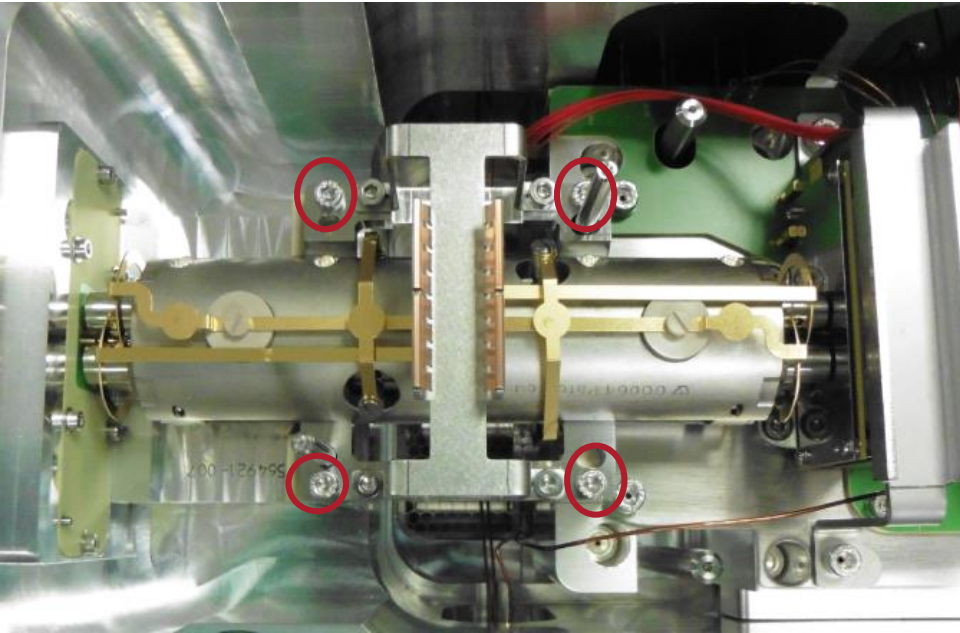


- Use the handle to open the lid of the main chamber.

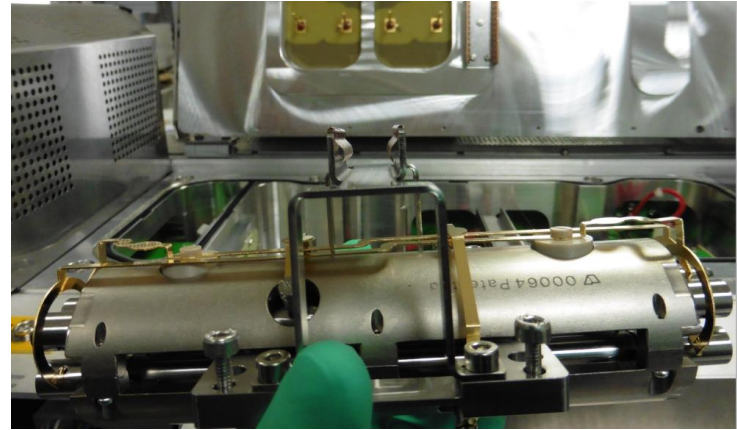


- Customer-accessible parts:
 1. Quadrupole
 2. Bent Flatapole

Removal of the segmented quadrupole

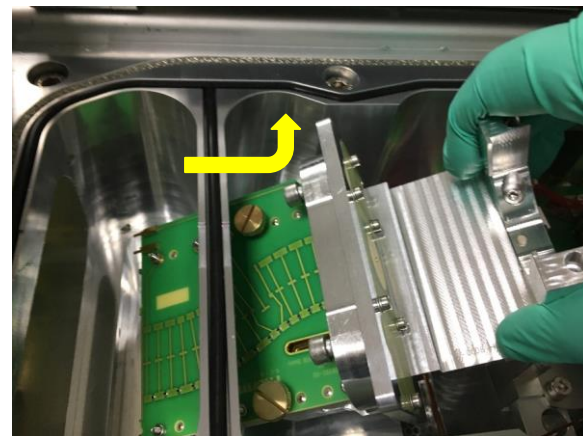
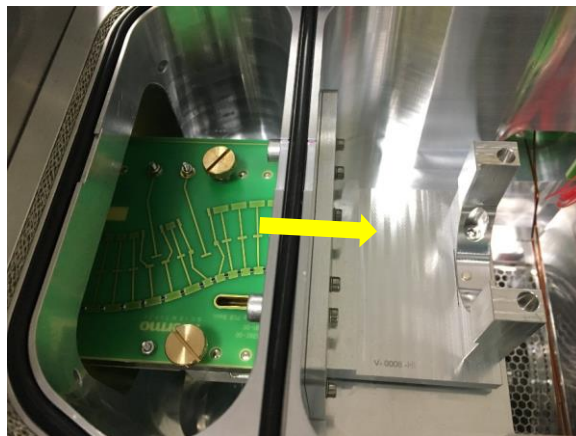
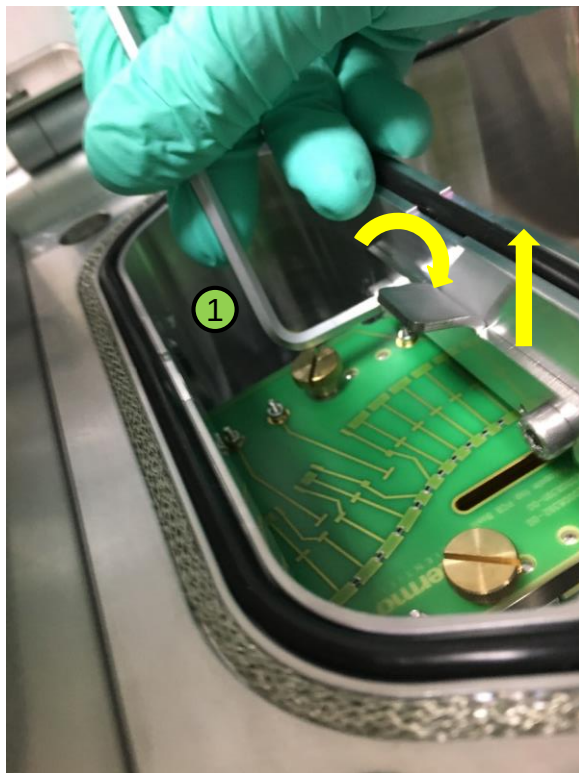


- Loosen the four screws and remove the screws and the holder plates.



- Lift the quadrupole straight up and take it out. Take care not to bump the ends on any adjacent parts.

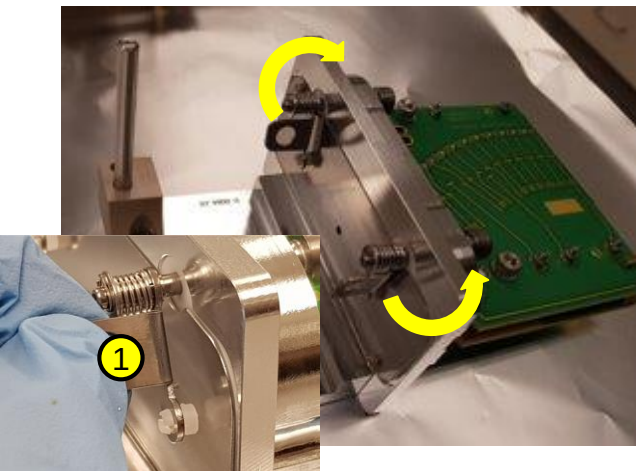
Removal of the bent flatapole



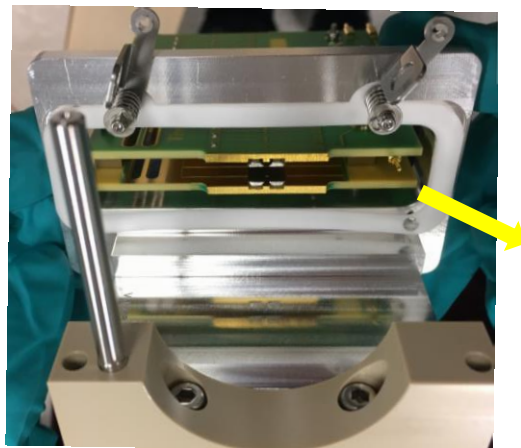
- Loosen the two 4 mm hex screws, lift the metal retainer out and store it in a clean area.
- Slide the complete holder straight toward the C-trap until the metal holder of the exit lens has cleared the separation and then tilt and remove the part from the chamber.

① 4 mm allen key

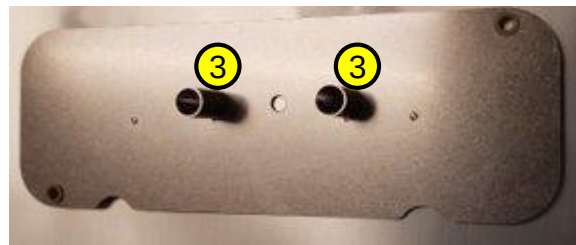
Disassembly of the bent flatapole exit lens



- By slightly pulling out on them, use your fingers to turn the two latches ① around to release the metal lens and the insulator behind. Be careful with the little holder pins ② underneath the latches.



- Pull the exit lens straight out being sure not to damage the “neutral collectors” ③ attached to the other side. The white insulator ring will stay in place.



- For cleaning see slide 15/16.

Ion optics cleaning

Description	Comments
Isopropanol, Methanol or Ethanol.	LC grade
Water	LCMS grade or ultrapure deionized water, e.g. Milli-Q™
Alkaline detergent	e.g. Mucasol™ or Decon-90™
Neutral detergent	e.g. Liquinox™
Nitrogen gas or compressed air	Clean and oil-free
Ion Transfer Tube removal tool	
Screwdriver, Slot Head	
Screwdriver, Philips Head #2	
Forceps or tweezers	
Magnifying glass	
Ultrasonic Bath	Ideally heatable
Gloves	Lint-free and powder-free
Chamois tipped swabs	
Lint-free foam tip swabs	
Lint-free wipes	Cleanroom wipes
Polishing paste	e.g. 1µm grain size diamond paste
Polishing linen	e.g. Micro-Mesh™ 6000 and 12000 universal mesh
Blow gun	Supplied with the cleaning kit.

Ion optics cleaning

- Prepare the following cleaning solutions.
 - 2% alkaline detergent in hot tap water
 - 50:50 xOH / water(ultrapure)
 - 100% xOH
- Ideally 3 beakers are prepared with each solvent, although the flushing steps in 50:50 xOH/water and xOH may be done consecutively in the same beakers.
- The ultrasonic bath may be heated to 50°C. Make sure to operate in a well-ventilated area and to cover the beakers with some aluminum foil or a watch glass when using xOH.

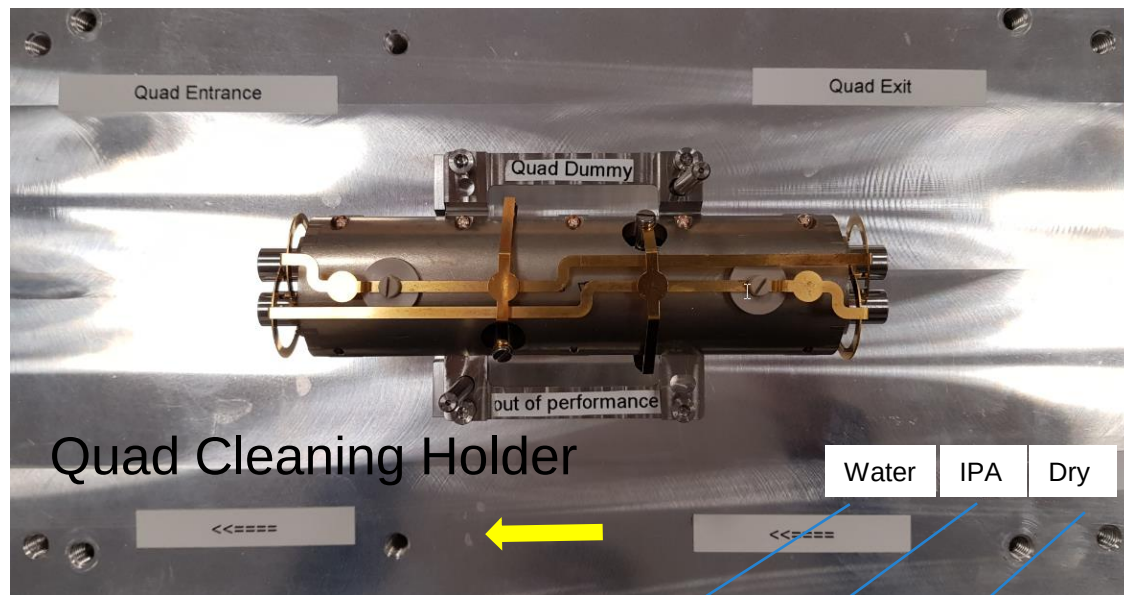
Ion optics cleaning procedure (1 / 2)

Ion Optic	Step 1	Step 2	Step 3	Step 4	Step 5
Source Cage / Sweep Cone	Clean the inside and outside of the ion sweep cone with lint-free wipes that have been soaked in a 50:50 xOH:water solution.	Clean the inside and outside of the ion sweep cone with lint-free wipes that have been soaked in xOH.	If the cone is still stained use MICRO-MESH™ 6000 to remove all stains and finish with 12000. Then repeat steps 1-2.	Sonicate in xOH for 5 minutes (don't sonicate the spray cone)	Purge with N2
Ion Transfer Tube	30 minutes ultrasonic bath in 2% alkaline	Flush with tap water from all sides	5 minutes ultrasonic bath 50:50 xOH/water	5 minutes ultrasonic bath xOH	Purge with N2
Ion Funnel	Place into a beaker with 2% alkaline detergent in water with the PEEK holder facing down. Sonicate for 60 minutes.	Rinse the ion funnel thoroughly with tap water.	Sonicate the ion funnel in a 50:50 xOH/water solution for five minutes. If there are noticeable residues coming off the funnel in this stage, repeat steps 1-3 until this is not noticeable anymore.	Sonicate the ion funnel in xOH for 5 minutes.	Purge with N2
Funnel Exit Lens/ Reagent Ion Source	Clean the flat surfaces with lint-free wipes that have been soaked in a 50:50 xOH:water solution.	Clean the inner surfaces with conical swabs that have been soaked in a 50:50 xOH/water solution.	Clean the flat surfaces with lint-free wipes that have been soaked in 100% xOH.	Clean the inner surfaces with conical swabs that have been soaked in xOH.	Purge with N2
Injection Filter	Sonicate the injection filter in a 2% solution of an alkaline detergent in water for 5 minutes.	Clean the rod surfaces facing the ion beam with a lint-free swab soaked in a 2% solution of an alkaline detergent in water. Wipe each rod (from both sides) 20 times.	Sonicate in a 2% solution of alkaline detergent in water for 10 minutes.	Rinse thoroughly under warm tap water. Sonicate in 50:50 xOH/water for 5 minutes.	Sonicate in xOH for 5 minutes. Dry under a strong stream of nitrogen.

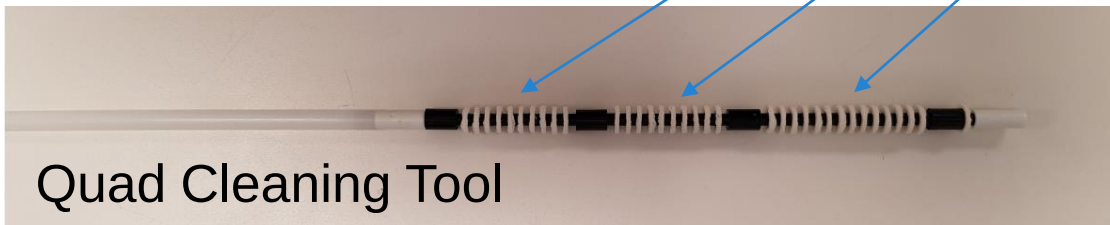
Ion optics cleaning procedure (2 / 2)

Ion Optic	Step 1	Step 2	Step 3	Step 4	Step 5
Flatapole Focus Lens.	Use a conical swab soaked with a 50:50 xOH/water solution to clean the inside of the orifice.	Wipe the lens orifice from both sides with a lint-free wipe wetted with a 50:50 xOH/water solution	Wipe the lens orifice from both sides with a lint-free wipe wetted with xOH.	Purge with N2	
Bent Flatapole	Purge with N2				
Bent Flatapole Exit Lens	Use a conical swab soaked soaked in 50:50 xOH:Water and clean the inside of the orifice.	Wipe off neutral spot from the lens with wet lint-free wipes soaked in 50:50 xOH:Water	Wipe the lens orifice from both sides with a lint-free wipe wetted with a 50:50 xOH/water solution.	Wipe the lens orifice from both sides with a lint-free wipe wetted with xOH.	Purge with N2
Segmented Quadrupole (see next slide)	Mount the quadrupole in the supplied holder and assemble the quadrupole cleaning tool and place in the holder recess.	Wet the two sections of the quadrupole cleaning tool as indicated. 1. Section: Water 2. Section: Isopropanol 3. Dry	Pull the tool all the way through the quad from the exit side to the entrance side. Repeat it four times.	Dry the quadrupole with a strong stream of nitrogen gas to make sure that the solvent evaporates completely.	With a magnifying device, inspect the quadrupole for any lint, particulates, and sample buildup or coatings

Cleaning of the Quad with the Quad Cleaning Kit



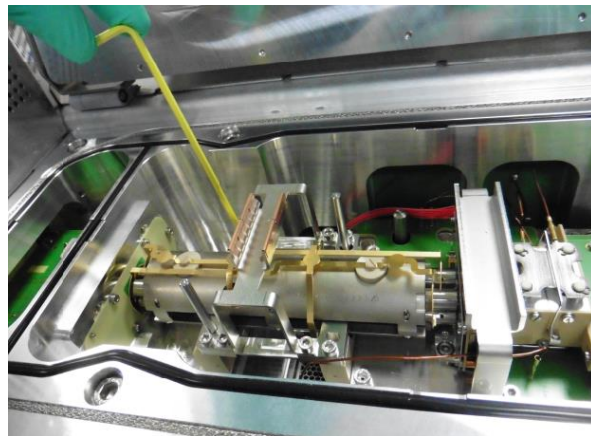
Quad Cleaning Tool



- Mount the quadrupole in the supplied holder and assemble the quadrupole cleaning tool and place in in the holder recess.
- Wet the two sections of the quadrupole cleaning tool as indicated. 1 Section: Water 2. Section: Isopropanol 3. Dry
- Pull the tool all the way through the quad from the exit side to the entrance side. Repeat it four times.
- Immediately dry with nitrogen

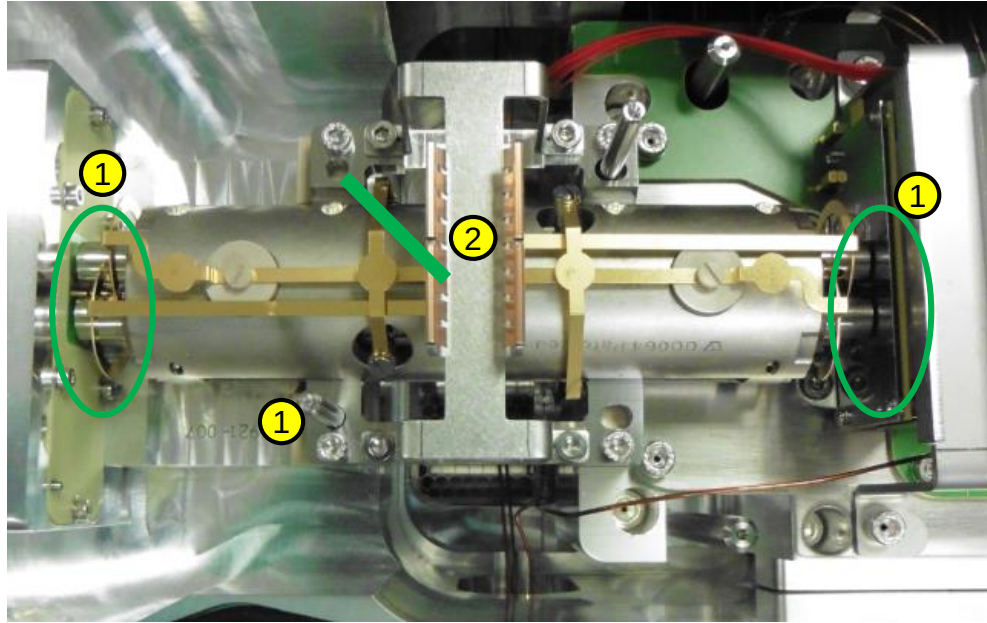
Reassembly of the segmented quadrupole

- Put the quadrupole straight down, taking care not to bump the ends on any adjacent parts.



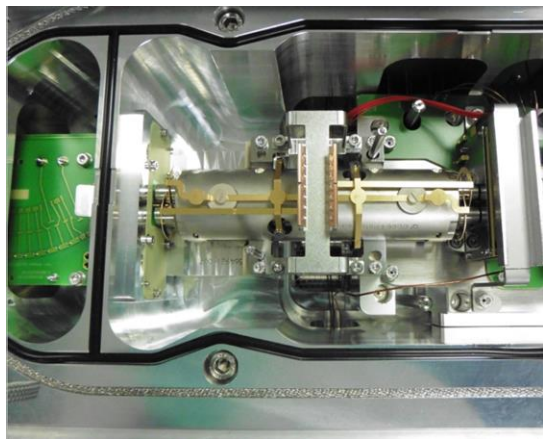
- Please pay attention to the next slide before moving on.
- Tighten the four screws.

Proper seating of the segmented quadrupole

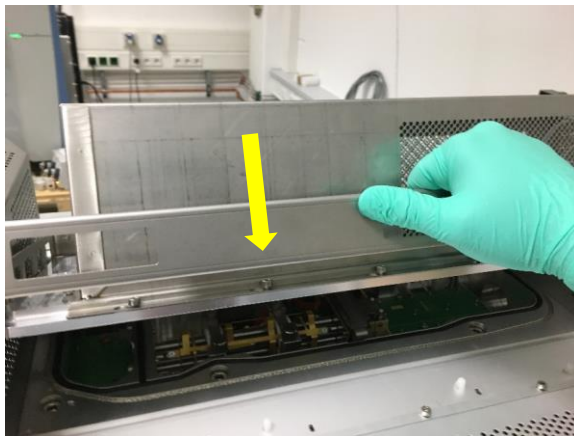


- ① When reassembling, the correct seating of the quadrupole is critical.
- ② Check the copper clips for a proper seating that they won't fall in the chamber

Prepare instrument for bake out



- Before closing the lid of the main chamber, check if there are any particles on the black sealing and remove them.



- Use the handle to close the lid of the main chamber.



- Push the reassembled inlet stack straight inside and insert the ion transfer tube.

Switch on instrument and run bake-out procedure

- Switch the instrument on by using the black and white main switch.
- Ensure the green service switch is in “Operating Mode” position.
- If everything is set up correctly, the bake out procedure will start automatically after the pumps are up to speed.