

Factory: BREMEN	Date: 23-Jul-12	#: Exactive- 062
Model: Q Exactive	Product Line: Hybrid-LSMS	
Instrument: Exactive Series	Revision Level: 0	
Author: Andreas Boegehold		

Priority

- Urgent
- Next visit
- Not required

Category

- Safety
- Upgrade
- Fix
- Info
- New Feature

Issue

- Hardware
- Software
- Application
- Documentation

Implementation

- Field
- Depot

Sensitivity

- General Distribution
- Preferred Customer
- Internal

Quadrupole Cleaning Procedure

In some special cases the quadrupole on the Q Exactive can become contaminated over time.

The contamination will appear on the TK lens and the front of the Quadrupole rods. Typically only two opposing rods should show the contamination.

Under good lighting conditions the contamination can be found by visual inspection, but it is hard to spot. Thorough cleaning as described in the following procedure is recommended for all 4 rods. The cleaning should only be performed by authorized FSEs.

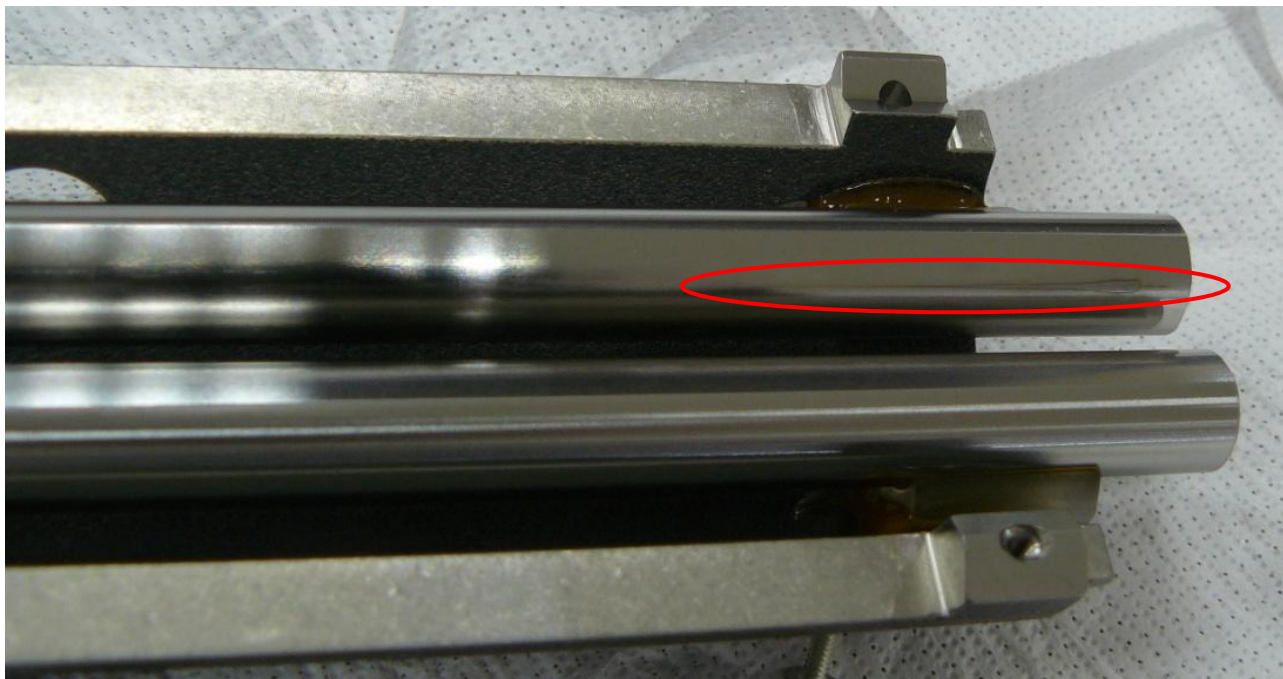
The picture below shows the contamination and where it will be located.

Action Required

Logistics: _____
Institute: _____
Order Entry: _____
Technical Support: _____
Other: _____

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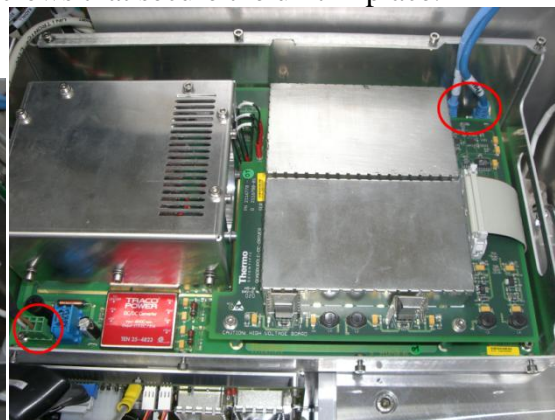
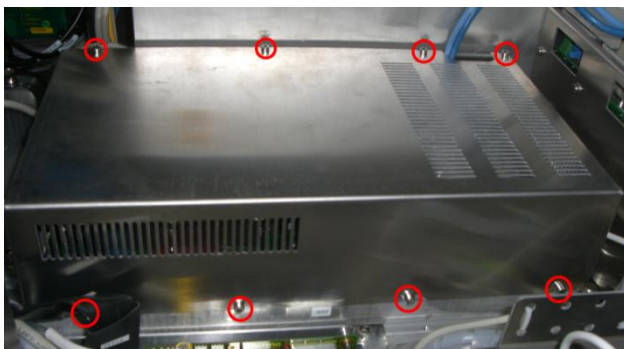
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Contamination on one of the quadrupole rods shown on a disassembled quadrupole assembly (disassembled for illustration purposes only!). It is on the half of the quadrupole facing the TK lens.

1. Taking out the quadrupole

- Switch off the instrument and remove the covers
- Remove the quad electronics by loosening the 8 screws, pulling off the lid and removing the power and SPI bus cables. Then loosen the 4 screws that secure the unit in place.



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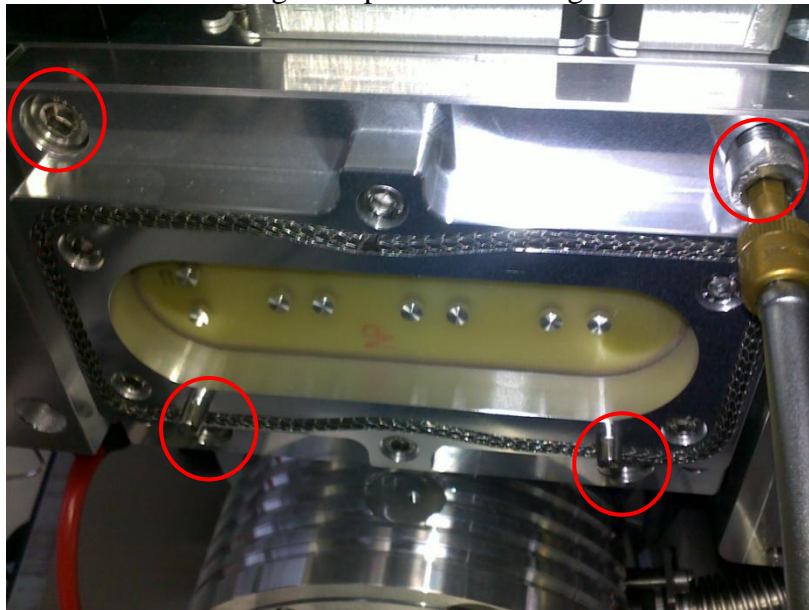
- Loosen the screws on the CLT-RF board and swing it out of the way.



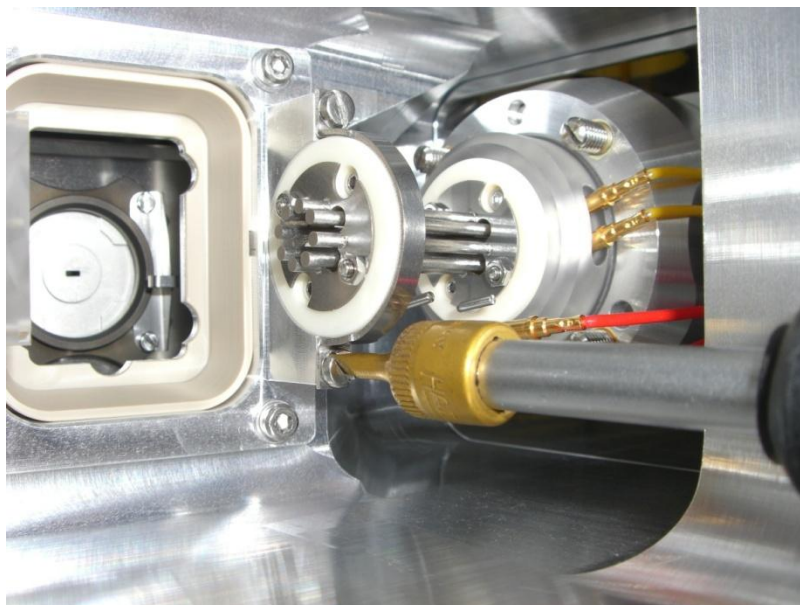
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- Loosen the 4 screws on the CLT flange and pull out the flange with the CLT.



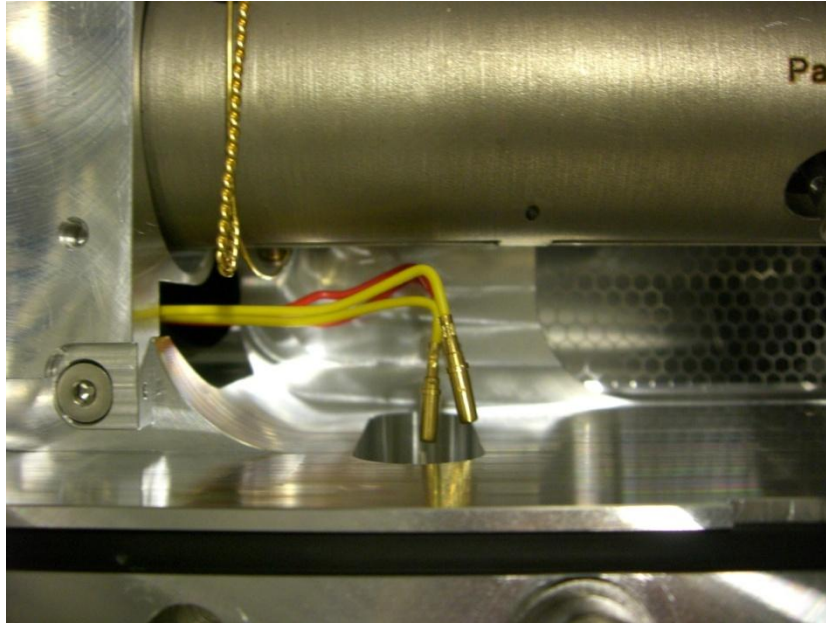
- Loosen the 2 screws on the transfer octapole and disconnect the wires. Remove the octapole from its holder.



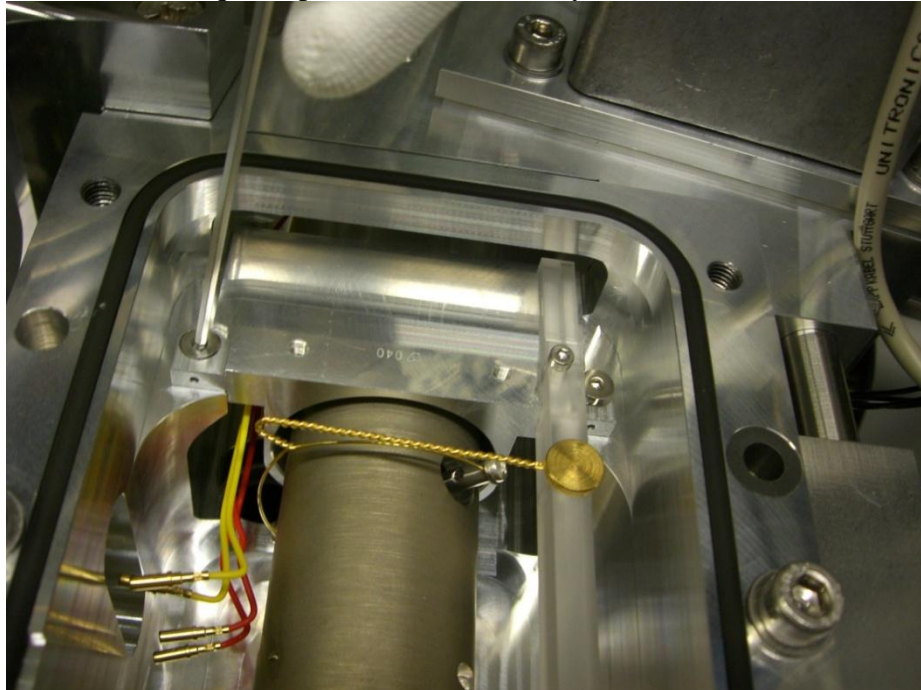
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- Loosen the screws on top of the vacuum chamber and remove the lid.
- Disconnect the wires to the IOS RF feedthrough (split lens, quad exit lens and RF2) on the vacuum chamber (the other side is attached to the assembly)



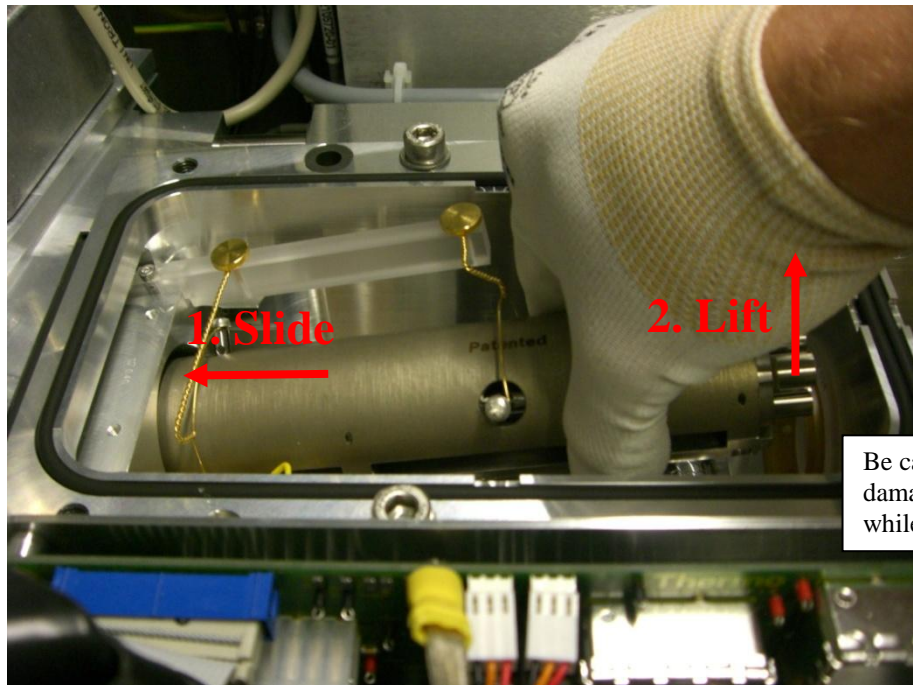
- Loosen the 2 screws on the quadrupole retainer assembly.



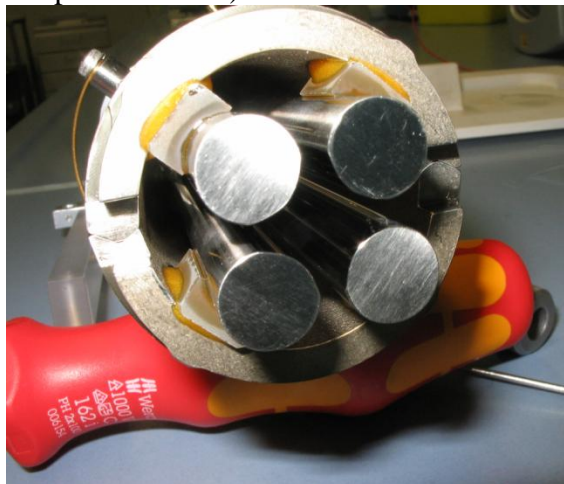
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- Firmly grip the quadrupole assembly and slide it to the left (the retainer should move, if it is stuck, gently lift it upwards until free and proceed.). Gently tilt the quadrupole until the rods are clear of the vacuum chamber wall and pull the quadrupole out of the chamber.



- When putting the quadrupole assembly down, **take care to not place it on one of the connector bolts for the RF**, as these are directly connected to the rods. Support the end that is not inside the retainer with something, e.g. a screwdriver handle (place it under the shell, not under the rods, as seen in the picture below).

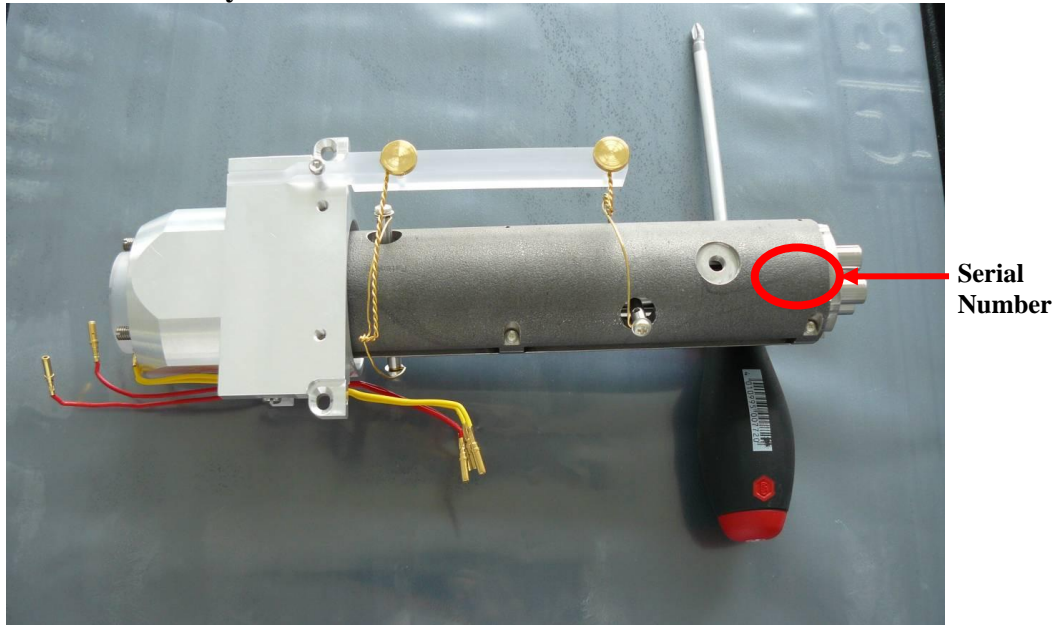


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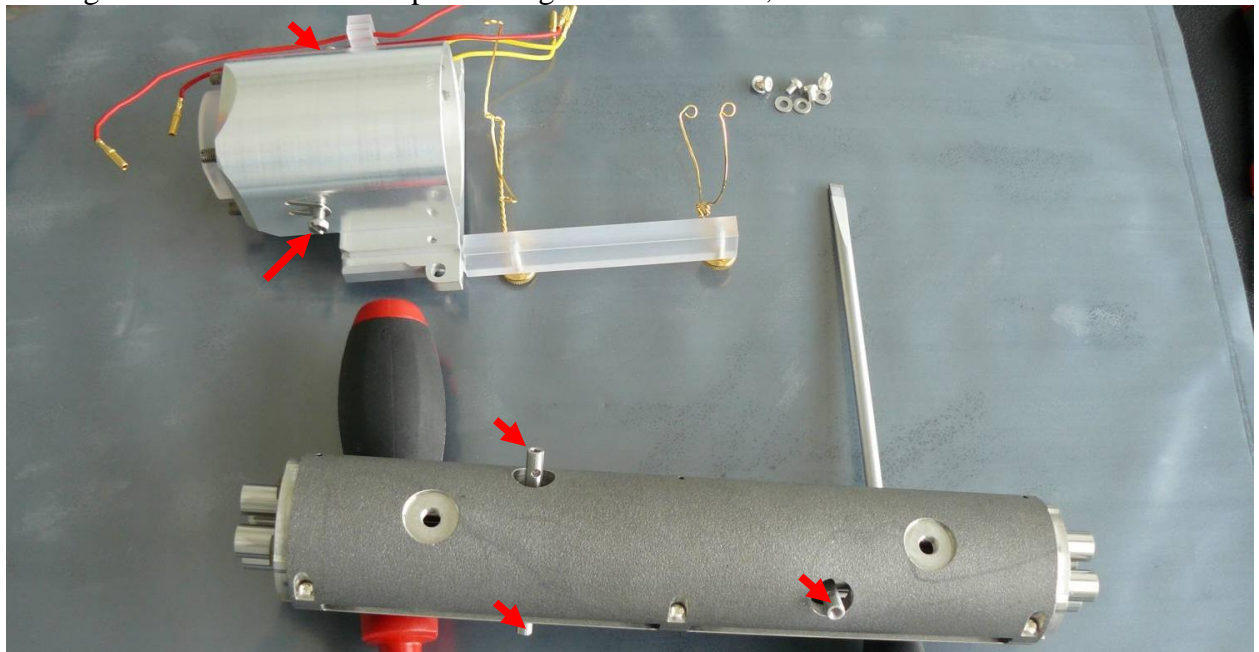
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2. Removal of the retainer parts and connectors

- Each quad carries two serial numbers. Use one serial number of the two quad shells „V0000“ as reference for the orientation: Write down one serial number and its position (entrance/exit and upper/lower). **To not mix up the plastic rings, put the one that is already loose into the TK lens assembly.**



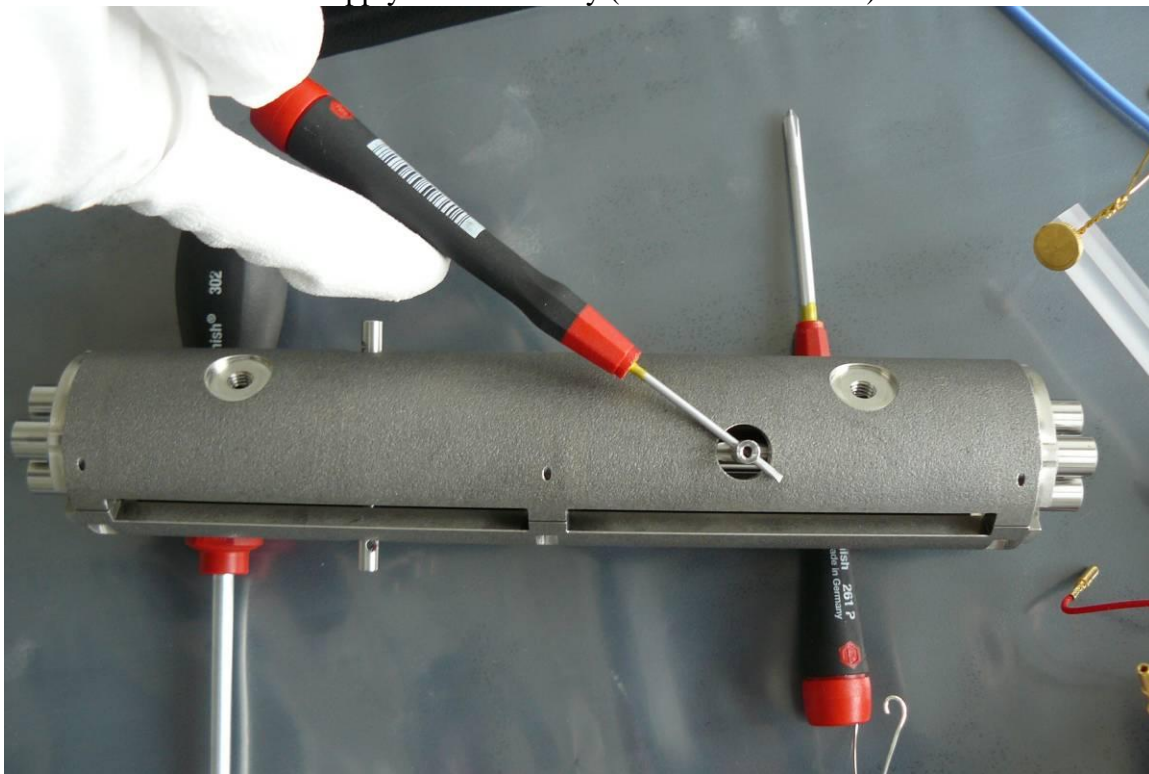
- Remove the Retainer from the Quad by loosening the two screws at the side, and the 4 screws holding the wires. Put the other plastic ring into the retainer, if it came out.



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- Remove the rods for the supply wires carefully (turn anti-clockwise):



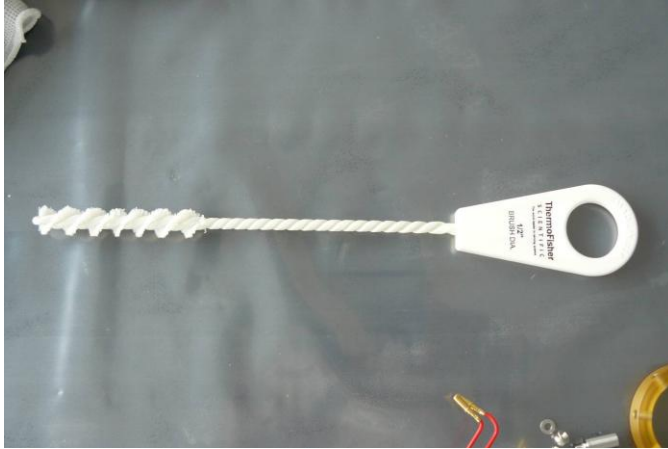
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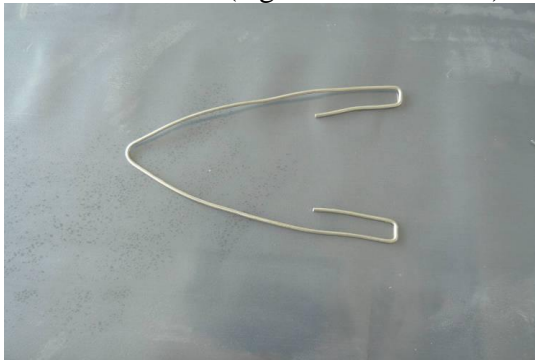
3. Cleaning the quadrupole rods

Required accessories:

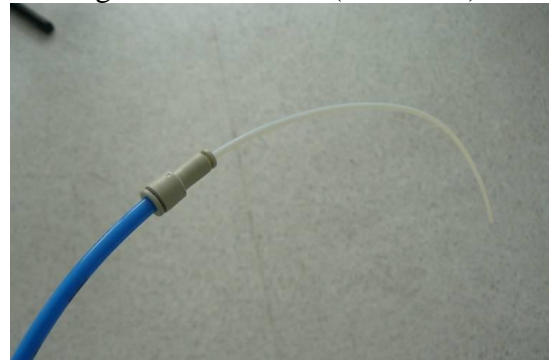
Nylon-covered brush (e.g. from TSQ cleaning kit, PN 70111-62112)



Self made holder (e.g. from 2mm wire):



Nitrogen blow-out tool (see below):



The nitrogen blow-out tool is a 6mm to 3.2mm (1/8 inch) OD adapter fitting (e.g. SMC KJH23-06) and a short piece of 3.2mm tubing. These can be attached to the 6 mm tubing that supplies the instrument to create a higher pressure.

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Procedure

- Prepare a solution of 1% Liquinox (or comparable detergent) in water.
- Scrub the quad from both sides for 2 minutes each.



- Use toothbrush to clean the ends of the quad rods.
- Thoroughly flush with tap water (ideally demineralized, otherwise rinse with some deionized water afterwards).



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- Wash off the water with pure (LC grade or better) methanol (LC grade Ethanol or Isopropanol are also acceptable). Use the holder to fully submerge in Methanol. A 500 mL graduated cylinder with 350 mL of methanol works fine.
- Blow off the methanol with nitrogen using the reducing adapter. Do this immediately after removing from methanol to prevent any drying marks. Pay special attention to vent holes, as residual solvents will considerably extend the pumping time afterwards.

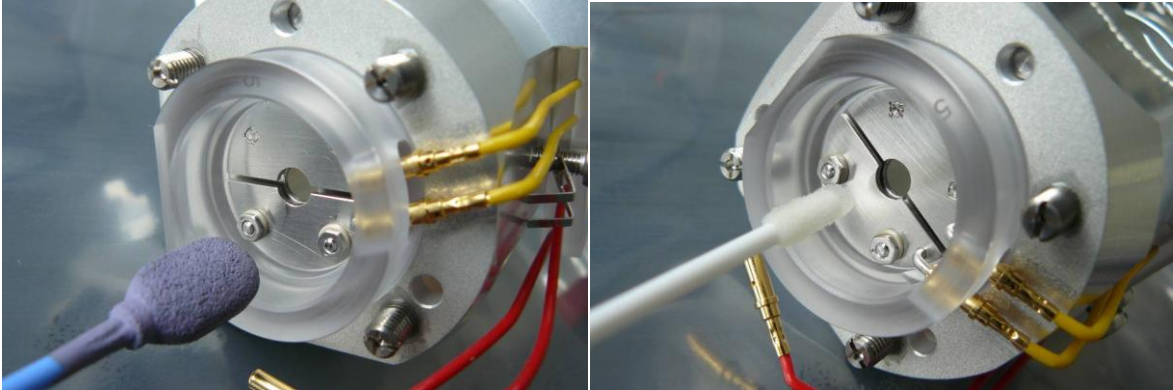


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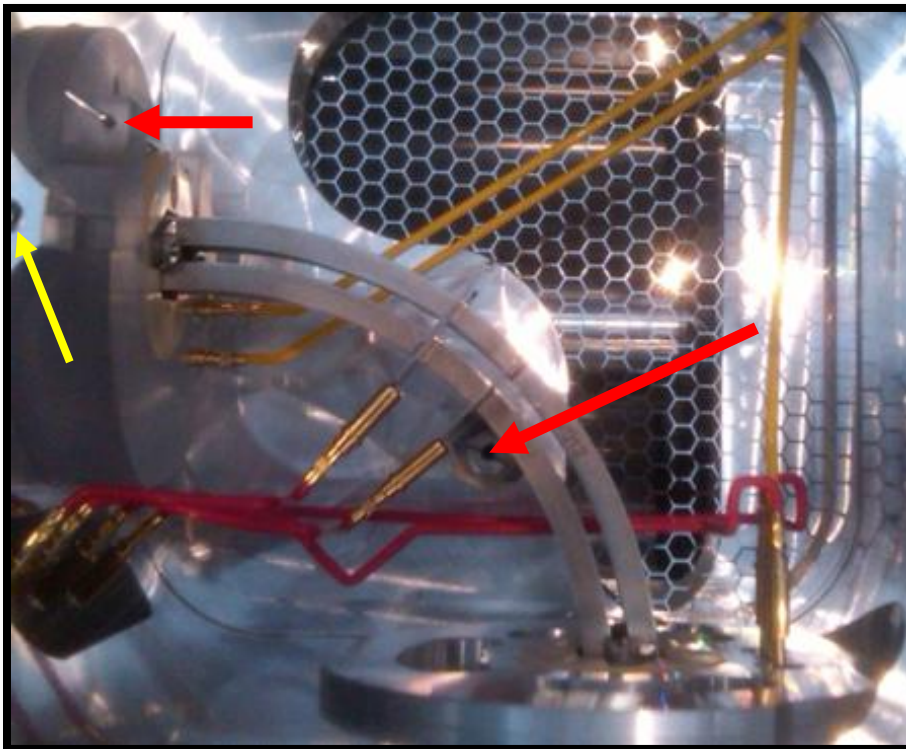
4. Cleaning the split lens

- Use a Micromesh 6000 swab to rub off the spot on the split lens.
- Use a lint-free swab with 50:50 methanol:water to wipe off the lens.
- Dry with nitrogen.
- Check carefully for residual lint.



5. Cleaning the TK lens

- Disconnect the wires going to the bent flatapole.
- Remove the screw and Pin holding the bent flatapole:



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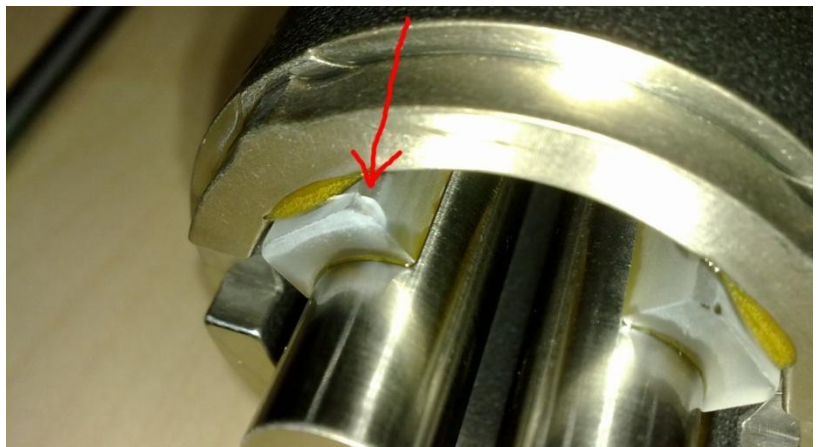
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- Take out the bent flatapole.
- Take note of the wiring for the inner and outer TK lens and unplug the two yellow wires.
- Loosen the holding screw on the TK lens assembly (yellow arrow) and pull the assembly out to the left. If it cannot be moved without force, wait some more time to let the instrument cool down further.
- Remove any contaminations like done before on the split lens.
- Blow dry with nitrogen
- Carefully check for remaining lint on the lenses.



6. Inspection

- Inspect the quadrupole for leftover dirt or any damage taken during the procedure. Repeat after reassembly.
- Especially check for cracks on the spacers holding the rods. Cracks like those shown in the picture on the right mean that the quadrupole assembly is broken and needs to be replaced



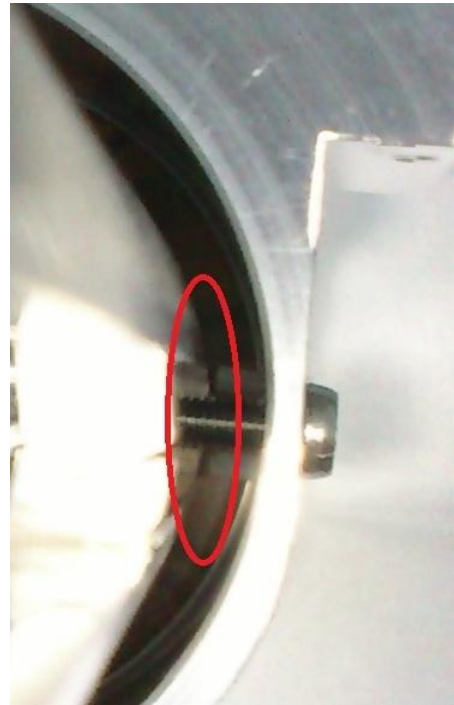
7. Reassembly

- Reinstall the TK lens assembly and tighten the holder screw.
- Connect the two yellow wires for the inner and outer TK lens.
- Install the bent flatapole (hint: take out the screw and washer and put them on the holder pin. Now hold the pin and screw, insert it into the thread and let the screw drop into place and turn it until it catches onto the thread before removing the pin). Now fix the bent flatapole in place with the pin and tighten the screw (do not use too much force as this will push the bent flatapole out of alignment).
- Go through the steps under **2** in reverse order to reassemble the quad.
- **Do not overtighten the bolts on the quad rods. This might bend the quadrupole rods or crack the isolators which hold them in the shell.**

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- **Take care to insert the quad in the same orientation it had before. Refer to the notes on serial numbers from the beginning of the procedure.**
- Check that the split lens assembly is aligned correctly (guidance pin) in the quadrupole retainer piece.
- To mount the retainer piece, the screws go into the slit between the two shells as shown in the picture on the right. Hold the retainer in your hands with the Quad installed then insert the screws and metal springs. If you put it down on a table, it will not be possible to get the screws installed properly.
- Go through the steps in **1** in reverse order to reassemble the remaining parts.



8. Calibration

- After performing the vacuum bakeout, the system will need to be fully calibrated in “Advanced Mode” to properly adjust the ion transfer settings to the clean quadrupole. Any Manual Settings in the quad tweak parameters need to be removed.

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