

Removing the Ion Sweep Cone and the Ion Transfer Tube

Because buffer salts or high concentrations of samples can cause blockages in the bore of the ion transfer tube, you must clean it.

If pressure in the ion transfer tube and RF lens region (Source Pressure gauge) drops below 2 Torr (TSQ Altis) or 1 Torr (TSQ Quantis or TSQ Fortis), a blocked ion transfer tube is probably the cause.



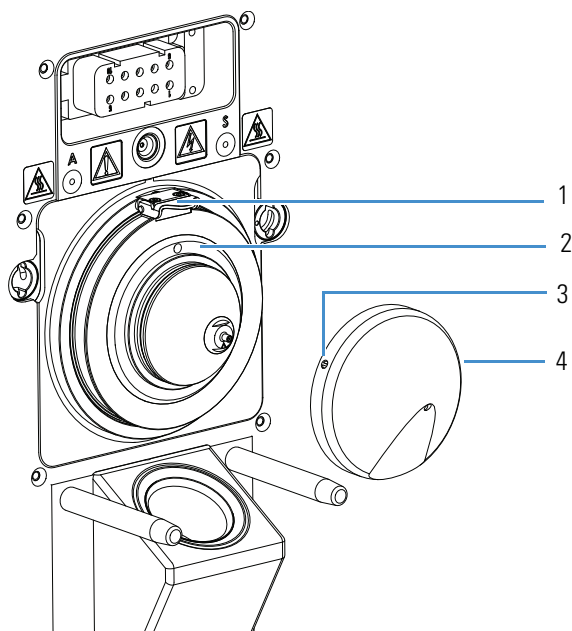
CAUTION Hot surface. The external surface of the spray insert, API source housing, and entry to the ion transfer tube can be hot enough to burn your skin. Allow the parts to cool to room temperature (approximately 20 minutes) before you touch it.

1. Turn off the liquid flow to the API source.
2. In the Tune application, place the MS in **Standby** mode.
3. In the Ion Source pane, set the Ion Transfer Tube Temperature and Vaporizer Temperature to 50 °C or less and observe the readback temperatures.
4. Place the MS in the **Off** mode.
5. After the source cools to room temperature, remove the source housing, refer to the *OptaMax NG Ion Source User Guide*, Chapter 2 section *Removing and Installing the API Source*.
6. Remove the ion sweep cone by grasping its outer ridges and pulling it off (Figure 45). If necessary, loosen the screws on the ion sweep cone.



CAUTION

- Make sure that you do not accidentally lift the release lever that is located above the API source interface, which will vent the MS.
- To avoid contaminating the ion transfer tube, do not touch its exposed entrance.

Figure 45. Ion sweep cone removed from the MS mount assembly

No.	Description	No.	Description
1.	Release lever for the API source interface	2.	API cone seal
3.	Ion sweep cone screw	4.	Ion sweep cone

7. Depending on the MS model, do the following:
 - a. For the TSQ Altis MS, align the flat end of the 1/4 turn ion transfer tube removal tool with the flat edges on the ion transfer tube's nose cone.
 - b. Rotate the tube counterclockwise by a quarter turn to release the pins behind the nose cone that secure the tube to the spray cone.

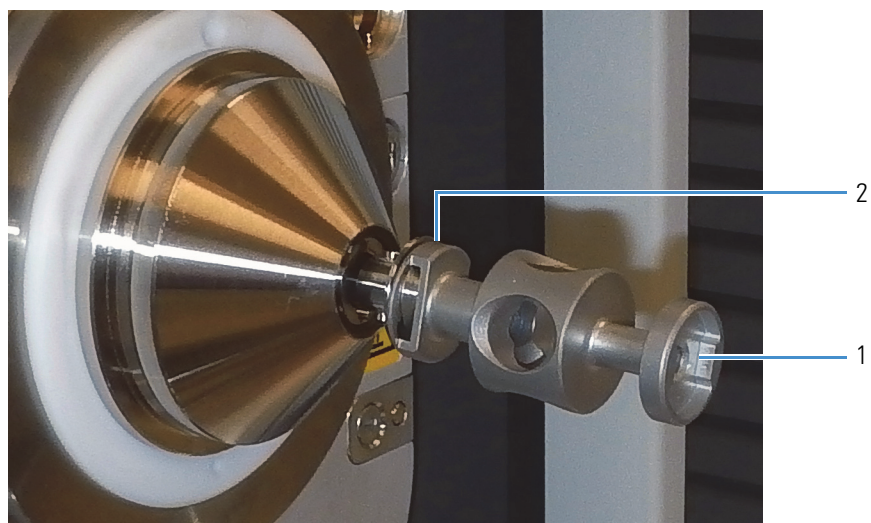
Figure 46. Turning the nose cone counterclockwise by a quarter turn (TSQ Altis MS)

22 Maintaining the External Components of the API Source Interface

Removing the Ion Sweep Cone and the Ion Transfer Tube

- c. Use the other end of the tool to pull the tube out of the API source interface.

Figure 47. Pulling the transfer tube out of the API source interface (TSQ Altis MS)



No.	Description
1.	Use this end of the tool to rotate the tube by a 1/4 turn, releasing it from the spray cone (not shown).
2.	Use this end of the tool to hook onto the released tube and pull it out of the spray cone (as shown in figure).

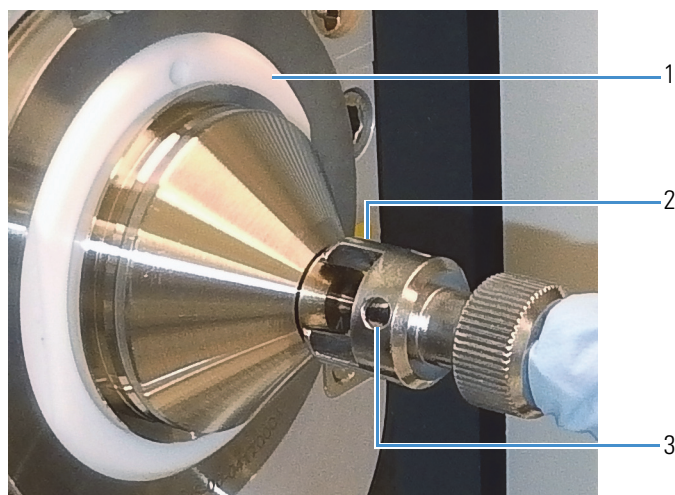
—or—

- a. For the TSQ Quantis MS or the TSQ Fortis MS, align the hook end of the ion transfer tube removal tube with the flat edges of the ion transfer tube's nose cone.

- b. Rotate the ion transfer tube counterclockwise until its threaded nose cone is free of the API interface.

Tip If necessary, insert a hex key through the side hole in the tool, and use it for leverage.

Figure 48. Ion transfer tube removal tool (TSQ Quantis MS and TSQ Fortis MS)



No.	Description
1.	API source interface
2.	Hook end of the tool aligned to the flat edges of the ion transfer tube's nose cone
3.	Side hole for leveraging tool

- c. Hook the tool onto the back of the ion transfer tube's nose cone, and then pull the tube out of the spray cone.

Figure 49 shows how to pull the ion transfer tube out of a TSQ Quantis MS or a TSQ Fortis MS.

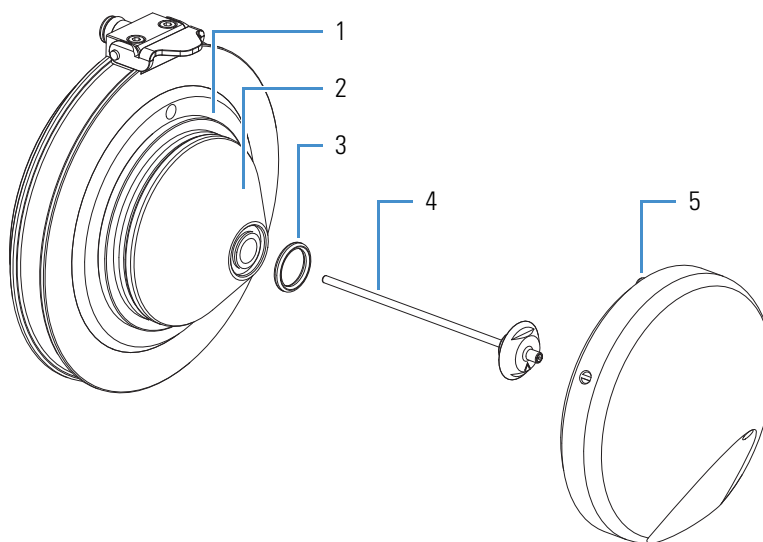
Figure 49. Pulling the tube out of the spray cone



Cleaning the Spray Cone and Seal

1. Soak the lint-free tissues or chamois-tipped swabs in a 50:50 solution of methanol/water, and then clean the exterior surface of the spray cone.
2. Remove and inspect the seal located in the spray cone under the entrance end of the ion transfer tube (Figure 50).

Figure 50. Spray cone, seal, ion transfer tube, and ion sweep cone



No.	Description	No.	Description
1.	API cone seal	2.	Spray cone
3.	Graphite Vespel™ seal	4.	Ion transfer tube
5.	Gas inlet on the ion sweep cone		

3. Clean the seal with a wipe with methanol or replace the seal, if necessary.
4. Using a magnification device, inspect the components for any residual lint or particulates.

Note Inspect the inside surfaces and edges for the presence of lint or particulates. If present, use plastic tweezers or a similar tool to remove them.

5. Reinstall the seal in the spray cone.

Cleaning the Ion Transfer Tube

IMPORTANT Always use UHPLC/MS-grade methanol and water.

1. For extreme contamination, follow these steps. Otherwise, start with [step 2](#).
 - a. Overnight, sonicate the component in a 10% solution of Liquinox in water.
 - b. Rinse the component with water, and then for 2 minutes force a strong stream of water through the orifice.
 - c. For 30 minutes, sonicate the component in water.
2. For 30 minutes, sonicate the component in a 50:50 solution of methanol/water that contains 20% formic acid.
3. Rinse the component thoroughly with water.
4. For 15 minutes, sonicate the component in deionized water.
5. Rinse the component with methanol.
6. For 15 minutes, sonicate the component in methanol.
7. Dry the component thoroughly with nitrogen gas.

Replace the ion transfer tube if the bore becomes corroded or blocked.



CAUTION When you reinstall the ion transfer tube into the heater block, take these precautions:

- Put on a new pair of lint- and powder-free gloves.
- Verify that everything is properly aligned to prevent stripping the threads on the ion transfer tube.
- Rotate—do not bend—the ion transfer tube upon insertion.

Reinstalling the Ion Transfer Tube

1. Make sure that the API source housing is cooled to room temperature.
2. Insert the tube at a 0 degree angle into the API source housing and gently push the vent ball out of the way.

Note As you insert the tube, you feel a slight resistance from the vent ball. After you push the vent ball out of the way, the system vacuum draws the tube further into the API source housing.

3. Depending on the MS model, do one of the following:
 - a. For the TSQ Altis MS, align the tube's pin with the slot in the API source interface.

- b. Use the flat end of the 1/4 turn ion transfer tube removal tool to turn the tube clockwise by a quarter turn.

–or–

- For the TSQ Quantis MS or TSQ Fortis MS, align the ion transfer tube removal tool with the flat edges of the ion transfer tube's nose cone, and then rotate the tube clockwise until you completely tighten the nose cone to the spray cone.

Cleaning the Ion Sweep Cone

1. Soak lint-free tissues or chamois-tipped swabs in a 50:50 solution of methanol/water, and then clean both sides of the ion sweep cone.
2. For 10 minutes, sonicate the component in either a 50:50 solution of methanol/water or a 1% solution of Liquinox in water.
3. Rinse the component thoroughly with water.
4. Sonicate the component in water for 10 minutes.
5. Sonicate the component in methanol for 10 minutes.
6. Rinse the component with methanol.
7. Dry the component thoroughly with nitrogen gas.
8. Using a magnification device, inspect the component for any residual lint or particulates.
9. After you clean and reinstall these components, turn on the nonvacuum system voltages by placing the MS's electronics service switch in the Operating Mode (up) position.
10. To determine if you have successfully unblocked the ion transfer tube, check that the Source Pressure reading has increased to a normal value.

Table 18. Vacuum specification with ion transfer tube installed and open

Region	TSQ Altis	TSQ Quantis	TSQ Fortis
Source Pressure	less than 3.8 Torr	less than 2.0 Torr	less than 2.0 Torr

11. If the ion transfer tube is still blocked, replace it.