Agilent 6400 Series Triple Quad LC/MS

Maintenance Guide

Agilent Technologies

Notices

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1 Maintenance

This chapter contains maintenance tasks for the Agilent 6400 Series Triple Quad LC/MS.

Calibrant Delivery System and Divert Valve

This section describes maintenance tasks that are related to the calibrant delivery system and divert valve.

When you do maintenance procedures on the divert valve:

- Check drain bottle in shorter intervals as usual!
- Do not bend any capillary line.
- The position of the divert valve can be set only in the On mode.
- Put the instrument in the Off mode.
- Remove the covers before you begin.
- Install the covers of the instrument after you finish.

Table 1 Divert Valve Connection (see Figure 2 and Figure 3)

No.	Port	Connection	User action
1	Inlet	from the front inlet union behind the inlet cover	none
2	Inlet	from CDS	none (permanent connection from calibrant delivery system)
3	Outlet	to the ion source	connect the flexible capillary to the ion source
4	Loop	loop to port 6	none (permanent connection)
5	Waste	to the drain bottle	none
6	Loop	loop to port 4	none (permanent connected)

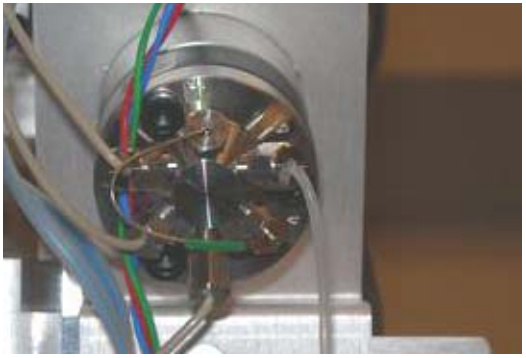

Figure 1 Divert valve with port position indicators

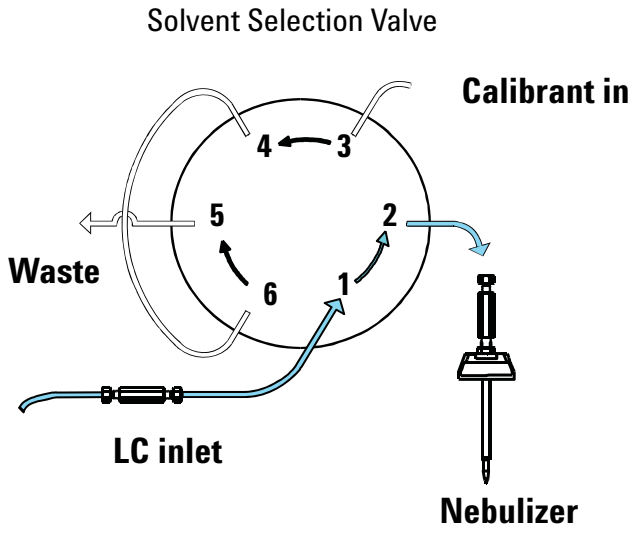

Figure 2 LC to LC/MS flow

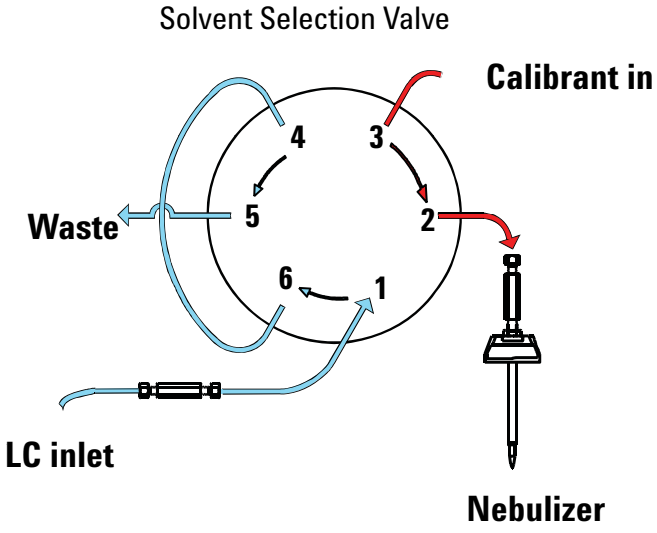

Figure 3 Calibrant to LC/MS flow

To prepare the reference mass solution

The dilutions in this topic are used for installation and check-out. You may need to adjust the dilution for your own analysis.

Before you begin, check that you have:

- The G1969-85001 ES-TOF Reference Mass Solution Kit, which contains two ampoules each (2.2 mL/ampoule) of the following reference ions:
  - 100 mM (millimolar) ammonium trifluoroacetate in 90:10 acetonitrile:water. This solution is abbreviated 100 mM TFANH4.
  - 5 mM (millimolar) purine in 90:10 acetonitrile:water
  - 2.5 mM (millimolar) hexakis(1H, 1H, 3H-tetrafluoropropoxy)phosphazine in 90:10 acetonitrile:water. This solution is abbreviated 2.5 mM HP-0921.
- Acetonitrile UV - B&J Brand High Purity Solvent for HPLC, Gas Chromatography, Pesticide Residue Analysis and Spectrophotometry. (Material number: 10071618, Cat. number 015-4).
- Nanopure D.I. Water (18 megaΩ-cm, organic-free)

The reference solution provides internal reference masses for reference mass correction in positive and negative ion modes of operation. For the purposes of mass accuracy performance verification, make the following reference mass solution.

1. Put on protective gloves.
2. Using a graduated cylinder, pour 950 mL of acetonitrile and 50 mL of water into the 1-liter Nalgene bottle (p/n 9301-6460) supplied in the TOF System ship kit.
3. Using a pipettor, add the following amounts of the individual calibrants to the 1-liter Nalgene bottle containing the acetonitrile/water solution made in step 2.

   Before you break open each ampoule, invert the ampoule several times to mix. Inspect the ampoule's contents to ensure that all the solution is contained in the lower cylindrical base. Shake the ampoule, if needed, to dislodge any air pocket that may prevent solution from settling in the lower portion of the ampoule.
4. Cap and invert the bottle several times to thoroughly mix the reference mass solution.
5. Transfer 100 mL of this solution to CDS Reference Bottle “A”.

Use of ES-TOF Reference Mass Solution

Use these guidelines to adjust the amounts of IRM compounds to add to this preparation.

- IRM abundances less than 1000 counts generally do not yield acceptable ion statistics for good correction. Ideally, abundances will be at the level of 10,000 counts or greater at any point in the analysis where correction is desired.
- The abundances of the reference mass compounds change during an HPLC gradient, with lesser abundances occurring at higher organic compositions. This is especially true when using acetonitrile as the organic component. Make sure the abundances are high enough during the entire gradient.
- Interference at one of the reference masses can cause problem with mass accuracy, most likely the reference mass 121 *m/z* at the low end of the scan range, where the background response is the highest. This causes an error in determining that reference mass value, leading to an error in assignment of other mass peaks in that scan. Sometimes, the problem can be lessened by increasing the amount of that reference mass component. Sometimes a different compound can be chosen to serve as the reference mass compound (e.g., a phthalate response at 391.284286 m/z). More often, the problem is remedied by altering the sample cleanup procedures to remove the interfering component(s).
- The values chosen for the reference mass correction depend on the adducts present during the analysis. Refer to the instruction sheet included with the internal reference mass kit for the accurate m/z values of the most common adducts.
- For instruments with Agilent Jet Stream Technology only: Higher sheath gas temperatures and sheath gas flows will increase the response of the 922 m/z reference mass compound.

The internal reference mass solution allows you to get accurate mass time-of-flight data. A minimum reference mass signal abundance of several thousand counts and maximum abundance of several hundred thousand counts will provide accurate reference mass corrections. If LC mobile phase modifiers are present (e.g. Na+, K+, acetate, formate), competition may cause multiple molecular species to attenuate the reference mass response. The actual concentrations of the mass reference compounds in the solution you prepare will depend upon several instrument operating parameters:

- LC gradient or isocratic operation

- LC flow rate, mobile phases and modifiers
- MS source settings including fragmentor and octopole RF voltages

The data acquisition mass range should be set wide enough to include all of the reference masses. For small molecule analysis, this range is typically m/z 50 to 1000 for positive mode and m/z 50 to 1100 for negative mode. Note that m/z 1034 is the TFA adduct of HP-0921.

Table 2 ES-TOF Reference Masses (shaded cells indicate principal ions)

Species	Positive Ion (m/z)	Negative Ion (m/z)	Formula Wt.	Molecular Formula
CF3 (TFA fragment)		68.995758		C F3
TFA anion		112.985587	131.06	C2 O2 F3 (N H4)
Purine	121.050873	119.036320	120.11	C5 H4 N4
HP-0921	922.009798	1033.988109	921.24	C18 H18 O6 N3 P3 F24
HP-0921 (+ formate)		966.000725		
HP-0921 (+ acetate)		980.016375		

To check calibrant levels

When required Monthly or weekly if you tune the instrument frequently

Tools required None

Parts required None

1 Examine each calibrant bottle. Enough tuning mix must be present to immerse the end of the intake tube.

2 If the tuning mix level is within a few millimeters of the end of the intake tube, refill the calibrant bottle.

NOTE Record this procedure in the Maintenance Logbook.

To fill a calibrant bottle

When required As needed.

Tools required None

Parts required
- APCI/APPI Calibrant (p/n G2432A)
- APCI-L Tuning Mix (p/n G1969-85010)
- ESI-L Tuning Mix (p/n G1969-85000)
- MMI-L Tuning Mix (p/n G1969-85020)

1 Turn the bottle to be refilled clockwise until it can be removed from the fixed bottle cap.
2 Refill the bottle with the appropriate tuning mix.
3 Put the intake tube into the refilled bottle as you lift the bottle into position.
4 Attach the calibrant bottle onto the fixed bottle cap. Turn the bottle counterclockwise to tighten.

CAUTION Tighten the bottle by hand. Do not overtighten it. The bottle only needs to be snug.

NOTE Record this procedure in the Maintenance Logbook.

To check for leaks

When required When the sensor indicates a leak has occurred.

Tools required
- Cloths, clean, lint-free (p/n 05980-60051)
- Cotton swabs (p/n 5080-5400)
- Screwdriver, TORX, T-10 (p/n 8710-1623)

Parts required None

1 Remove the front cover and top cover from the instrument.
2 Remove the calibrant bottles.
3 Turn off the Spray Chamber nebulizer pressure, drying gas temp, and vaporizer temp (for APCI or multimode).
4 Disconnect the nebulizing gas tubing and the LC tubing from the nebulizer.
5 Remove the spray chamber from the instrument.

WARNING **The spray chamber operates at very high temperatures. Give the spray chamber time to cool before proceeding.**

6 Remove the two screws and remove the cover of the calibrant delivery system.
7 Check the catch tray. If you see liquid, the pump has a leak. If no liquid is present, the leak sensor may be out of calibration. See the online Help for instructions to calibrate the leak sensor.
8 If a leak occurs during a long unattended run, the liquid from the leak may evaporate to give you the impression that no leak exists and the leak sensor is out of calibration. Turn the system back on and make sure no leak exists before you recalibrate the leak sensor.
9 Check the selection valve, the waste fitting, the inlet fitting, and the calibrant delivery system valves. If you find a leak, correct it and check the remaining locations.
10 Dry the catch tray and leak sensor.
11 When the catch tray and leak sensor are thoroughly dry, reassemble the instrument.

To replace the LC filter elements

When required When back pressure is high on the LC pump or when the sensor indicates a leak has occurred.

Tools required
- Tweezers
- Wrench, ½-inch

Parts required Filter Element, 5 µm (p/n 0100-2051)

1 Stop the flow of LC solvent to the instrument.
2 Remove the front and top covers.
3 Turn off the spray chamber nebulizer pressure, drying gas temp, and vaporizer temp (if APCI or multimode).
4 Remove the spray chamber.
5 Remove the upper left front cover to access the inlet filter assembly.

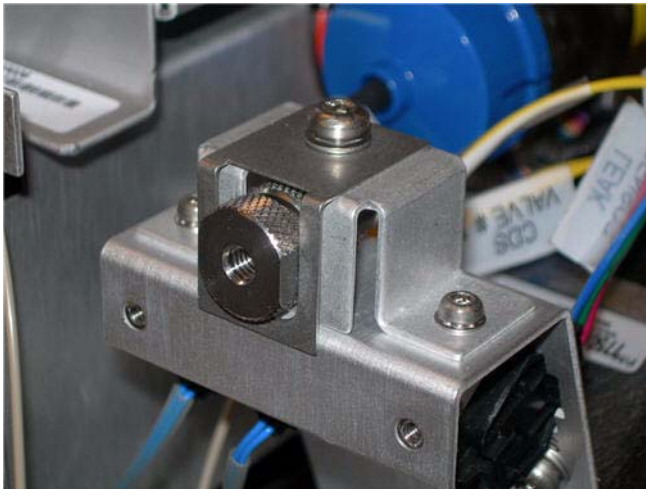

Figure 4 Inlet filter assembly

6 Remove the retaining screw at the top of the inlet filter assembly and pull the filter assembly forward out of the bracket.
7 While holding the knurled lower part of the assembly, twist the upper part counterclockwise until the two parts are separated.

8 Use tweezers to remove the filter element from the upper part of the assembly. The filter element is a stainless steel frit surrounded by a PTFE ring.

9 Insert the new filter element.

10 Reassemble the filter assembly.

11 Reinsert the assembly into the bracket and reinstall the top retaining screw.

12 Reinstall the covers and spray chamber.

To replace the MS selection valve rotor seal

When required Approximately annually or when no calibrant flow exists during tuning, or when the back pressure is high on the LC pump during acquisition.

Tools required Hex key wrench

Parts required Rotor seal (p/n 0100-1855)

1 Stop the flow of LC solvent to the instrument.

2 Remove the front cover.

3 Remove the top cover.

4 Remove the left side cover.

5 Remove the tubing connections from the six-port MS selection valve.

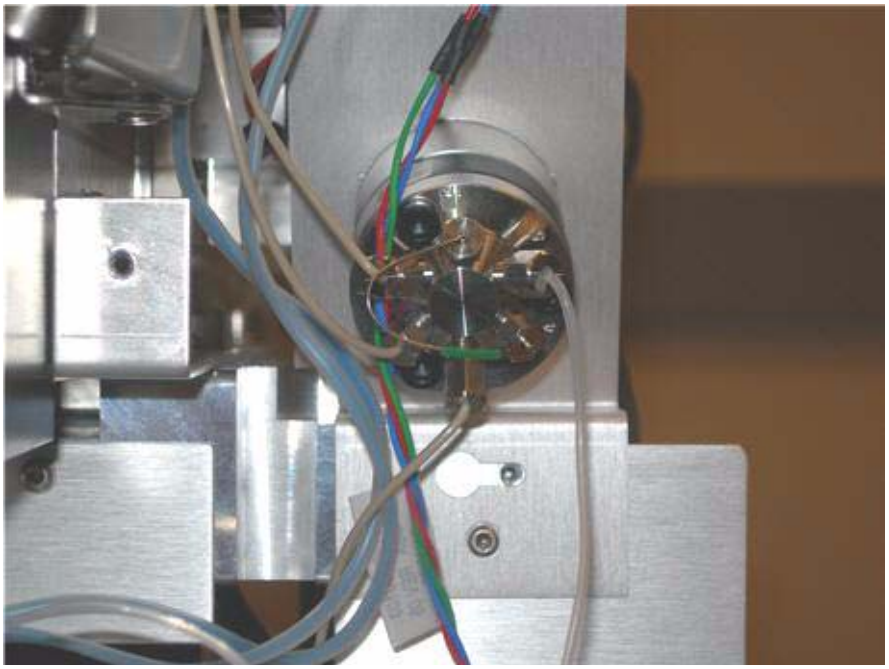

Figure 5 Six-port MS selection valve

6 Use the hex key wrench to remove the three hex head screws from the stator face of the selection valve.

7 Remove the rotor seal and replace it with a new one. Be sure to install it in the proper orientation.

8 Reinstall the stator face assembly.

9 Reconnect the tubing to the selection valve.

10 Reinstall the left, top and front covers.

Electrospray Ion Source

This section describes the removal, disassembly, cleaning, and reassembly of the API-interface and the assemblies that make up the source.

To flush the nebulizer

When required Daily or at the end of each shift (or more often) to flush traces of samples and buffers out of the tubing, valves and nebulizer.

Tools required
- Acetonitrile, HPLC-grade or better
- Water, HPLC-grade or better

Parts required None

1 Make sure acetonitrile and water are two of the solvents installed in your liquid chromatograph.

NOTE This procedure applies to both electrospray and APCI nebulizer.

2 Set the liquid chromatograph to pump a mixture of 90% acetonitrile and 10% water at 2 ml/minute.

3 Pump this mixture through the nebulizer for 3 minutes.

NOTE This is a good general-purpose flushing mixture but you may need to adjust it based on the solvents, samples and buffers you are using. For example, a mixture of 50% acetonitrile and 50% water works well for removing salts.

To clean the electrospray spray chamber daily

When required Daily or at the end of each shift or anytime you suspect carryover contamination from one sample or analysis to another.

Tools required

- Cloths, clean, lint-free (p/n 05980-60051)
- Gloves, clean
- Isopropanol, reagent grade or better
- Mobile phase, current
- Wash bottle, clean
- Water, reagent-grade or better

Parts required None

NOTE Recent residue should be soluble in the mobile phase. If you are not sure what mobile phase was used recently, a mixture of 50% isopropanol and 50% water works well as a general cleaning solution.

1 Prepare the mobile phase you have been using.

2 Turn off the spray chamber.

WARNING **The electrospray spray chamber operates at high temperatures. Allow sufficient time to cool down before cleaning.**

3 Remove the electrospray nebulizer.

4 Open the spray chamber (Figure 6).

Figure 6 Opened electrospray spray chamber

5 Rinse the interior of the spray chamber with the current mobile phase or with a mixture of isopropanol and water.

WARNING **Some mobile phases are dangerous. Use the degree of caution appropriate for the mobile phase being used.**

6 Wipe the interior of the spray chamber with a clean, lint-free cloth.

7 Rinse the area around the spray shield.

CAUTION Do not spray directly toward the tip of the capillary. This can cause pressure surges in the vacuum system.

8 Dampen a clean cloth with the mobile phase.

9 Wipe the spray shield and the area around the spray shield.

10 Close the spray chamber.

NOTE Use the weekly cleaning procedure if symptoms of contamination persist or if the spray shield or capillary cap show significant discoloration that cannot be removed by the regular, daily cleaning.

To clean the electrospray spray chamber weekly

When required Weekly or whenever symptoms indicate that contamination exists in the spray chamber and normal daily cleaning does not correct the problem.

Tools required

- Abrasive paper, 4000 grit (p/n 8660-0827)
- Cloths, clean, lint-free (p/n 05980-60051)
- Cotton swabs (p/n 5080-5400)
- Gloves, clean
- Isopropanol, reagent grade or better
- Mobile phase, current
- Wash bottle, clean
- Water, reagent-grade or better

Parts required None

NOTE Recent residue should be soluble in the mobile phase. If you are not sure what mobile phase was used recently, a mixture of 50% isopropanol and 50% water works well as a general cleaning solution.

1 Turn off the spray chamber.

WARNING **The electrospray spray chamber operates at high temperatures. Allow sufficient time to cool down before cleaning.**

2 Remove the electrospray nebulizer.

3 Open the spray chamber and remove it from the instrument.

4 Fill the spray chamber with clean mobile phase, or with a mixture of isopropanol and water.

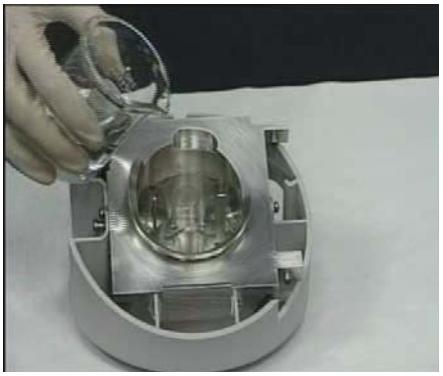

Figure 7 Filling the spray chamber

WARNING **Some mobile phases are dangerous. Use the degree of caution appropriate for the mobile phase being used.**

5 Scrub the insulators and the interior of the spray chamber with a clean cotton swab.

6 Empty the spray chamber.

7 Reinstall the spray chamber on the instrument.

8 Remove the spray shield.

9 Use abrasive paper to gently clean the end of the capillary cap.

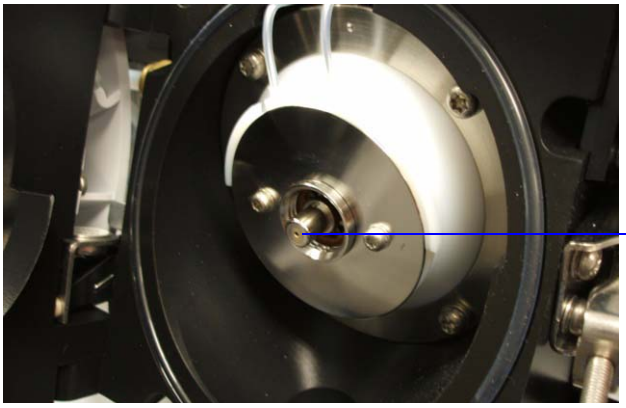

Figure 8 End of capillary cap

10 Dampen a clean cloth and wipe the end of the capillary cap.

11 Reinstall the spray shield.

12 Use abrasive paper to gently clean the spray shield.

13 Dampen a clean cloth and wipe the spray shield.

14 Rinse the area around the spray shield.

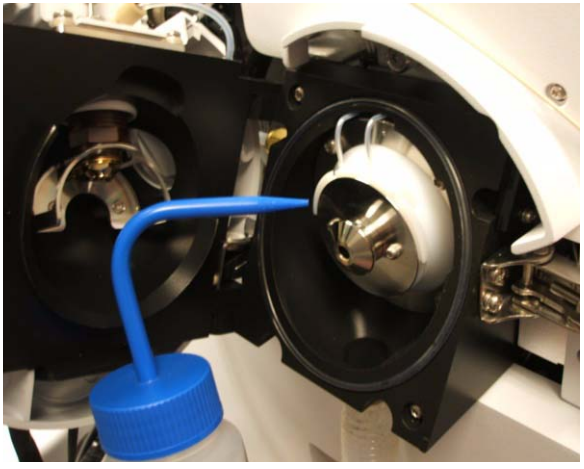

Figure 9 Rinsing the area around the spray shield

CAUTION Do not spray directly toward the tip of the capillary. This can cause pressure surges in the vacuum system.

15 Wipe the area around the spray shield.

16 Close the spray chamber.

17 Reinstall the electrospray nebulizer.

To remove the electrospray nebulizer

When required When you need to access the nebulizer for maintenance.

Tools required Gloves, clean

Parts required None

NOTE Recent residue should be soluble in the mobile phase. If you are not sure what mobile phase was used recently, a mixture of 50% isopropanol and 50% water works well as a general cleaning solution.

Figure 10 Electrospray nebulizer

1. Shut off the flow of LC solvent.
2. Shut off the flow of nebulizing gas.
3. Slide back the plastic cover from over the nebulizer.
4. Disconnect the LC tubing and nebulizing gas tubing from the nebulizer.
5. Turn the nebulizer counterclockwise until it disengages from the retaining screws.
6. Gently lift the nebulizer out of the spray chamber.

WARNING **The tip of the nebulizer may be very hot. Allow it to cool before handling it.**

To replace the electrospray nebulizer needle

When required When the needle is plugged. Common symptoms of a plugged needle are increased LC back pressure or off-axis spraying or dripping from the nebulizer.

Tools required

- Adjustment fixture (p/n G1946-20215)
- Gloves, clean
- Pliers, long nose (p/n 7810-0004)
- Wrench 3-mm, open-end (p/n 8710-2699)
- Wrench ¼-inch x 5/16-inch, open-end (p/n 8710-0510)

Parts required Electrospray nebulizer needle kit (includes needle, ferrule, and needle holder, p/n G2427A)

Figure 11 Electrospray nebulizer needle in needle holder

1. Install the nebulizer in the adjustment fixture.
2. Loosen the locknut next to the zero-dead-volume (ZDV) union.
3. Remove the union from the nebulizer.
4. Loosen the locknut of the needle holder.
5. Unscrew the needle holder and pull it out of the nebulizer.
6. Slide the non-tapered end of the needle through the new needle holder from the narrower side.

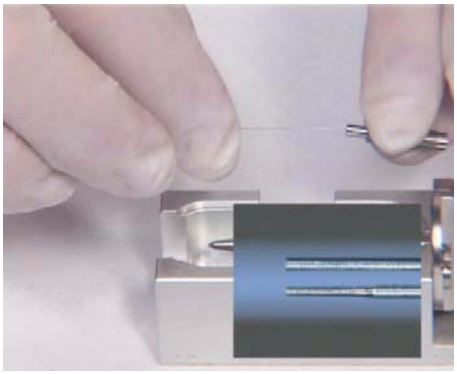

Figure 12 Sliding the non-tapered end of the needle through the new needle holder

7 Push a new ferrule, flat-side first, onto the needle.

8 Be sure the needle does not extend from the ferrule.

9 Reinstall the locknut and the union. Hand tighten the union.

10 Hold the needle holder steady with a 3-mm wrench. Tighten the union one-quarter to one-half turn to compress the ferrule.

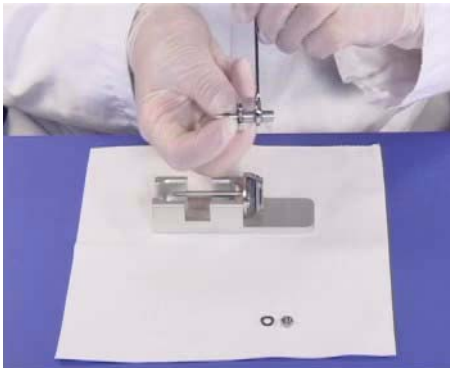

Figure 13 Tightening the union screw to compress the ferrule

11 Tighten the locknut against the union.

12 Pull carefully on the needle to ensure the needle is held firmly in place.

13 Replace locknut and washer.

14 Insert the needle into the nebulizer shaft.

CAUTION Take care when inserting the needle. The tapered end of the needle must pass through the restrictions in the nebulizer shaft. The tip of the needle can be damaged if excessive force is applied.

15 Adjust the electrospray needle position before reinstalling the nebulizer in the spray chamber.

NOTE Record this procedure in the Maintenance Logbook.

To adjust the electrospray nebulizer needle

When required After replacing the electrospray nebulizer needle or if symptoms indicate the needle is not correctly adjusted,

Tools required

- Adjustment fixture (p/n G1946-20215)
- Gloves, clean
- Magnifier (p/n G1946-80049)
- Wrench 3-mm, open-end (p/n 8710-2699)
- Wrench ¼-inch x 5/16-inch, open-end (p/n 8710-0510)

Parts required None

1 Install the nebulizer in the adjustment fixture.

Figure 14

2 Loosen the needle holder locknut.

3 Position the magnifier so you can see the tip of the nebulizer.

4 Adjust the needle holder until the needle is even with the tip of the nebulizer.

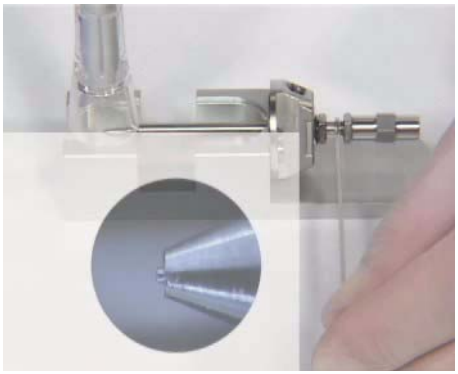

Figure 15 Adjusting the needle holder

5 Tighten the locknut. Make sure this does not change the position of the needle.

6 Remove the nebulizer from the adjustment fixture and reinstall it in the electrospray spray chamber.

7 Be very careful not to hit the tip of the nebulizer against anything. Any damage will have a large, negative effect on system performance.

NOTE Record this procedure in the Maintenance Logbook.

To reinstall the electrospray nebulizer

When required As needed.

Tools required None

Parts required None

1 Insert the nebulizer part way into the spray chamber.

CAUTION Do not hit the tip of the needle as you insert the nebulizer. The tip of the needle is easily damaged.

2 Reconnect the nebulizing gas tubing to the nebulizer.

3 Finish inserting the nebulizer into the spray chamber.

4 Turn the nebulizer clockwise and lock it in place.

5 Reconnect the LC tubing to the nebulizer.

CAUTION Do not overtighten the LC fitting. Overtightening the fitting can crush the tubing, creating a restriction.

6 Close the nebulizer cover.

To clean skimmer 1

When required When symptoms indicate it is necessary.

Tools required Cloth, clean, lint-free (p/n 05980-60051)
Gloves, clean
Isopropanol, reagent grade or better
Water, reagent-grade or better

Parts required None

1 Remove the desolvation assembly.
2 Dampen a clean cloth with a mixture of Isopropanol and water.
3 Wipe the skimmer.

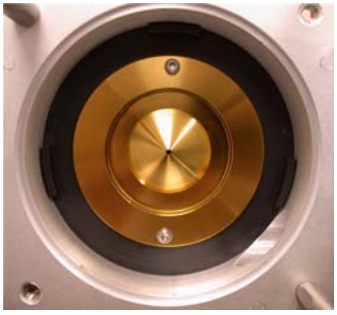

Figure 16 Wipe the skimmer.

CAUTION The tip of the skimmer is delicate. Do not damage it.

4 Reinstall the desolvation assembly.

ESI with Agilent Jet Stream Technology

This section describes the removal, disassembly, cleaning, and reassembly of the electrospray interface with Agilent Jet Stream Technology.

To flush the nebulizer daily

When required Daily or at the end of each shift (or more often) to flush traces of samples and buffers out of the tubing, valves and nebulizer

Tools required
- Acetonitrile, HPLC-grade or better
- Water, HPLC-grade or better

Parts required None

1. Make sure acetonitrile and water are two of the solvents installed in your liquid chromatograph.
2. Set the liquid chromatograph to pump a mixture of 90% acetonitrile and 10% water at 2 ml/minute.
3. Pump this mixture through the nebulizer for 3 minutes.

NOTE This is a good general-purpose flushing mixture but you may need to adjust it based on the solvents, samples and buffers you are using. For example, a mixture of 50% acetonitrile and 50% water works well for removing salts.

To flush the nebulizer monthly

When required Monthly or as needed at the end of each shift (or more often) to flush traces of samples and buffers out of the tubing, valves and nebulizer

Tools required

- HPLC Flushing Solvent
- Cyclohexane, HPLC-grade or better
- Acetonitrile, HPLC grade or better
- Alternatively if available: isooctane, HPLC-grade or better

Parts required None

1. Make sure HPLC flushing, cyclohexane, and acetonitrile are three of the solvents installed in your liquid chromatograph.
2. Pump HPLC flushing solvent for 10 minutes at 5 mL/minute.
3. Switch to cyclohexane, and pump for 10 minutes at 5 mL/minute.
4. Pump this mixture through the nebulizer for 3 minutes.
5. Prepare enough acetonitrile and flush overnight.

NOTE This is a good general-purpose flushing mixture but you may need to adjust it based on the solvents, samples and buffers you are using. For example, a mixture of 50% acetonitrile and 50% water works well for removing salts.

To clean the spray chamber daily for the ESI with Agilent Jet Stream

When required Daily or at the end of each shift or anytime you suspect carryover contamination from one sample or analysis to another

Tools required

- Cloths, clean, lint-free (p/n 05980-60051)
- Gloves, clean
- Isopropanol, reagent grade or better
- Mobile phase, current
- Wash bottle, clean
- Water, reagent-grade or better

Parts required None

NOTE Recent residue should be soluble in the mobile phase. If you are not sure what mobile phase was used recently, use a mixture of 50% isopropanol and 50% water as a general cleaning solution.

1 Prepare the mobile phase you have been using.

2 Turn off the spray chamber.

WARNING **The electrospray with Agilent Jet Stream Technology spray chamber operates at high temperatures. Allow sufficient time to cool down before cleaning.**

3 Remove the nebulizer.

4 Open the spray chamber (Figure 6).

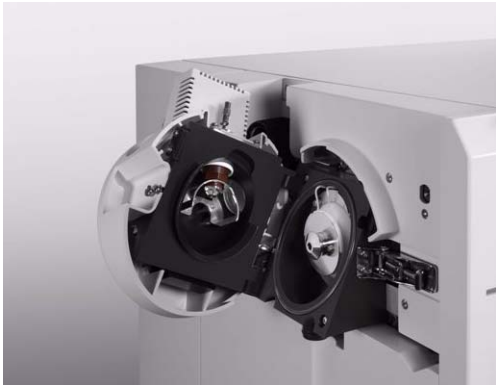

Figure 17 Opened electrospray Agilent Jet Stream Technology spray chamber

5 Rinse the interior of the spray chamber with the current mobile phase or with a mixture of isopropanol and water.

WARNING **Some mobile phases are dangerous. Use the degree of caution appropriate for the mobile phase being used.**

6 Wipe the interior of the spray chamber with a clean, lint-free cloth.

7 Rinse the area around the spray shield.

CAUTION Do not spray directly toward the tip of the capillary. This can cause pressure surges in the vacuum system.

8 Dampen a clean cloth with the mobile phase.

9 Wipe the spray shield and the area around the spray shield.

10 Close the spray chamber.

11 Reinstall the electrospray nebulizer.

NOTE Use the weekly cleaning procedure if symptoms of contamination persist or if the spray shield or capillary cap show significant discoloration that cannot be removed by the regular, daily cleaning.

To clean the spray chamber weekly for the ESI with Agilent Jet Stream

When required Weekly or whenever symptoms indicate that contamination exists in the spray chamber and normal daily cleaning does not correct the problem

Tools required

- Abrasive paper, 8000 grit (p/n 8660-0852)
- Cloths, clean, lint-free (p/n 05980-60051)
- Cotton swabs (p/n 5080-5400)
- Gloves, clean
- Isopropanol, reagent grade or better
- Mobile phase, current
- Wash bottle, clean
- Water, reagent-grade or better

Parts required None

NOTE Recent residue should be soluble in the mobile phase. If you are not sure what mobile phase was used recently, a mixture of 50% isopropanol and 50% water works well as a general cleaning solution.

1 Turn off the spray chamber.

WARNING **The electrospray with Agilent Jet Stream Technology spray chamber operates at high temperatures. Allow sufficient time to cool down before cleaning.**

2 Remove the electrospray nebulizer.

3 Open the spray chamber and remove it from the LC/MS.

4 Fill the spray chamber with clean mobile phase, or with a mixture of isopropanol and water.

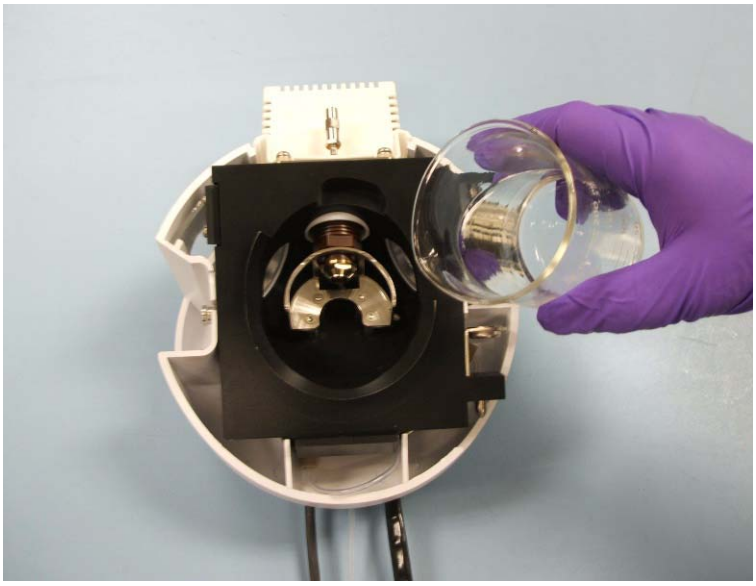

Figure 18 Filling the spray chamber

WARNING **Some mobile phases are dangerous. Use the degree of caution appropriate for the mobile phase being used.**

5 Scrub the insulators and the interior of the spray chamber with a clean cotton swab.

6 Empty the spray chamber.

7 Reinstall the spray chamber on the instrument.

8 Remove the spray shield.

9 Use abrasive paper to gently clean the end of the capillary cap.

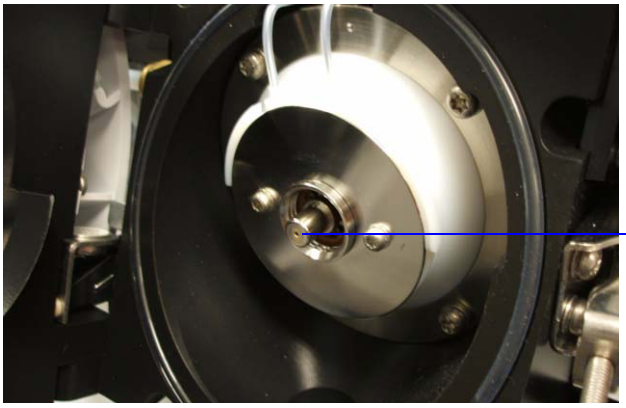

Figure 19 End of capillary cap

10 Dampen a clean cloth and wipe the end of the capillary cap.

11 Reinstall the spray shield.

12 Use abrasive paper to gently clean the spray shield.

13 Dampen a clean cloth and wipe the spray shield.

14 Rinse the area around the spray shield.

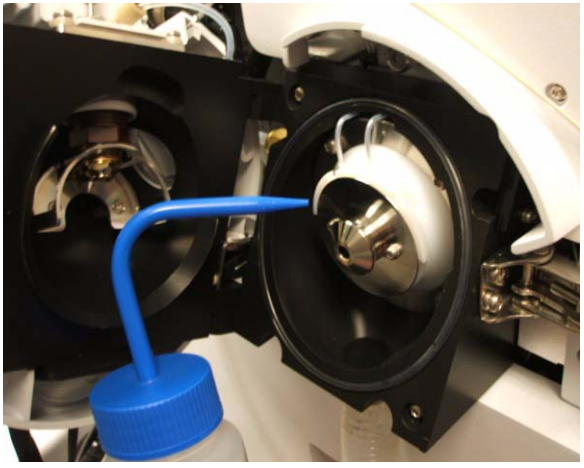

Figure 20 Rinsing the area around the spray shield

CAUTION Do not spray directly toward the tip of the capillary. This can cause pressure surges in the vacuum system.

15 Wipe the area around the spray shield.

16 Close the spray chamber.

17 Reinstall the electrospray nebulizer.

To remove the nebulizer for the ESI with Agilent Jet Stream

When required When you need to access the nebulizer for maintenance

Tools required Gloves, clean

Parts required None

NOTE Recent residue should be soluble in the mobile phase. If you are not sure what mobile phase was used recently, a mixture of 50% isopropanol and 50% water works well as a general cleaning solution.

Figure 21 Electrospray nebulizer

1. Shut off the flow of LC solvent.
2. Shut off the flow of nebulizing gas.
3. Slide back the plastic cover from over the nebulizer.
4. Disconnect the LC tubing and nebulizing gas tubing from the nebulizer.
5. Turn the nebulizer counterclockwise until it disengages from the retaining screws.
6. Gently lift the nebulizer out of the spray chamber.

WARNING **The tip of the nebulizer may be very hot. Allow it to cool before handling it.**

To replace the nebulizer needle for the ESI with Agilent Jet Stream

When required When the needle is plugged. Common symptoms of a plugged needle are increased LC back pressure or off-axis spraying or dripping from the nebulizer.

Tools required

- Adjustment fixture (p/n G1946-20215)
- Gloves, clean
- Pliers, long nose (p/n 7810-0004)
- Wrench 3-mm, open-end (p/n 8710-2699)
- Wrench ¼-inch x 5/16-inch, open-end (p/n 8710-0510)

Parts required Nebulizer accessory kit, ES with Agilent Jet Stream p/n G1958-60136

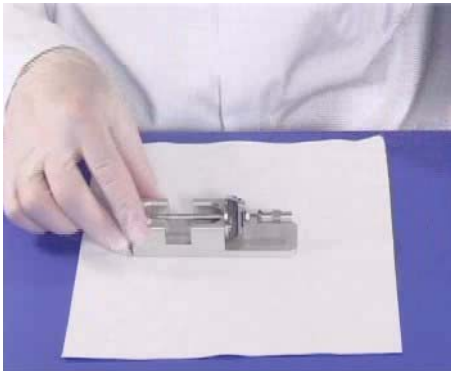

Figure 22 Electrospray nebulizer needle in needle holder

1. Install the nebulizer in the adjustment fixture.
2. Loosen the locknut next to the zero-dead-volume (ZDV) union.
3. Remove the union from the nebulizer.
4. Loosen the locknut of the needle holder.
5. Unscrew the needle holder and pull it out of the nebulizer.
6. Slide the non-tapered end of the needle through the new needle holder from the narrower side.

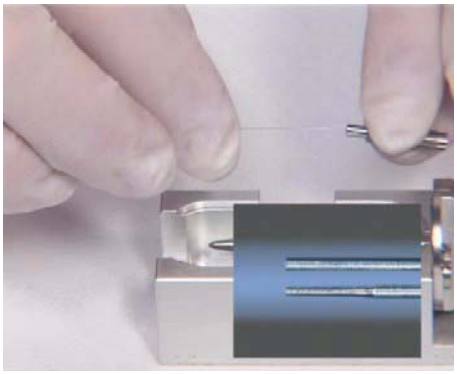

Figure 23 Sliding the non-tapered end of the needle through the new needle holder

7 Push a new ferrule, flat-side first, onto the needle.

8 Be sure the needle does not extend from the ferrule.

9 Reinstall the locknut and the union. Hand tighten the union.

10 Hold the needle holder steady with a 3-mm wrench. Tighten the union one-quarter to one-half turn to compress the ferrule.

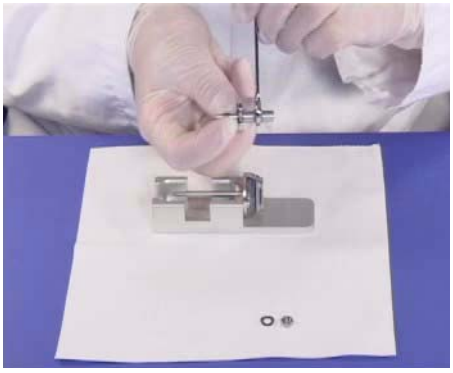

Figure 24 Tightening the union screw to compress the ferrule

11 Tighten the locknut against the union.

12 Pull carefully on the needle to ensure the needle is held firmly in place.

13 Replace locknut and washer.

14 Insert the needle into the nebulizer shaft.

CAUTION Take care when inserting the needle. The tapered end of the needle must pass through the restrictions in the nebulizer shaft. The tip of the needle can be damaged if excessive force is applied.

15 Adjust the electrospray needle position before reinstalling the nebulizer in the spray chamber.

NOTE Record this procedure in the Maintenance Logbook.

To adjust the nebulizer needle for the ESI with Agilent Jet Stream

When required After replacing the electrospray nebulizer needle or if symptoms indicate the needle is not correctly adjusted

Tools required

- Adjustment fixture (p/n G1946-20215)
- Gloves, clean
- Magnifier (p/n G1946-80049)
- Wrench 3-mm, open-end (p/n 8710-2699)
- Wrench ¼-inch x 5/16-inch, open-end (p/n 8710-0510)

Parts required None

1 Install the nebulizer in the adjustment fixture.

Figure 25

2 Loosen the needle holder locknut.

3 Position the magnifier so you can see the tip of the nebulizer.

4 Adjust the needle holder until the needle is even with the tip of the nebulizer.

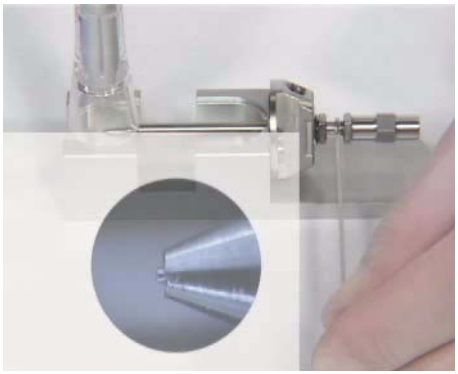

Figure 26 Adjusting the needle holder

5 Tighten the locknut. Make sure this does not change the position of the needle.

6 Remove the nebulizer from the adjustment fixture and reinstall it in the electrospray spray chamber.

7 Be very careful not to hit the tip of the nebulizer against anything. Any damage will have a large, negative effect on system performance.

NOTE Record this procedure in the Maintenance Logbook.

To reinstall the nebulizer for the ESI with Agilent Jet Stream

When required As needed

Tools required None

Parts required None

1 Insert the nebulizer part way into the spray chamber.

CAUTION Do not hit the tip of the needle as you insert the nebulizer. The tip of the needle is easily damaged.

2 Reconnect the nebulizing gas tubing to the nebulizer.

3 Finish inserting the nebulizer into the spray chamber.

4 Turn the nebulizer clockwise and lock it in place.

5 Reconnect the LC tubing the nebulizer.

CAUTION Do not overtighten the LC fitting. Overtightening the fitting can crush the tubing, creating a restriction.

6 Close the nebulizer cover.

APCI Source

This section describes how to open and close the APCI source and maintain it.

To clean the APCI spray chamber daily

When required Daily at the end of each shift or anytime you suspect carryover contamination from one sample or analysis to another.

Tools required

- Cloths, clean, lint-free (p/n 05980-60051)
- Gloves, clean
- Isopropanol, reagent grade or better
- Mobile phase, current
- Wash bottle, clean
- Water, reagent-grade or better

Parts required None

WARNING **The APCI spray chamber operates at high temperatures. Allow sufficient time to cool down before handling.**

Some mobile phases are dangerous. Use the degree of caution appropriate for the mobile phase being used.

CAUTION Do not spray the mobile phase upward into the vaporizer.

Do not spray directly toward the tip of the capillary. This can cause pressure surges in the vacuum system.

NOTE

- Recent residue should be soluble in the mobile phase. If you are not sure what mobile phase was used recently, use a mixture of 50% isopropanol and 50% water as a general cleaning solution.
- Use the weekly cleaning procedure if symptoms of contamination persist, or if the spray shield or capillary cap shows significant discoloration that cannot be removed by the regular daily cleaning.

1 Turn off the spray chamber.

2 Remove the corona needle.

3 Make sure the needle has cooled and then carefully clean it with abrasive paper.

4 Open the spray chamber.

Figure 27 Opened spray chamber

5 Rinse the interior of the spray chamber with the current mobile phase or with a mixture of isopropanol and water.

6 Wipe the interior of the spray chamber and the end of the vaporizer with a clean cloth.

7 Remove the spray shield.

8 Use abrasive paper to gently clean the end of the capillary cap.

9 Dampen a clean cloth and wipe the end of the capillary cap.

10 Reinstall the spray shield.

11 Use abrasive paper to gently clean the spray shield.

12 Dampen a clean cloth and wipe the spray shield.

13 Rinse the area around the spray shield.

14 Wipe the area around the spray shield with a clean cloth.

15 Close the spray chamber.

16 Reinstall the corona needle.

To clean the APCI spray chamber weekly

When required Weekly or whenever symptoms indicate contamination in the spray chamber and the normal daily cleaning does not correct the problem.

Tools required

- Abrasive paper, 4000 grit (p/n 8660-0827)
- Cloth, clean, lint-free, 05980-60051
- Cotton swabs, 5080-5400
- Gloves, clean
- Isopropanol, reagent grade or better
- Mobile phase, current
- Wash bottle
- Water, reagent-grade or better

Parts required None

1 Prepare the mobile phase you have been using.

   Recent residue should be soluble in the mobile phase. If you are not sure what mobile phase was used recently, use a mixture of 50% isopropanol and 50% water as a general cleaning solution.

2 Turn off the spray chamber.

3 The APCI spray chamber operates at high temperatures. Allow sufficient time to cool down.

4 Remove the corona needle.

5 Make sure the needle has cooled and then carefully clean it with abrasive paper.

6 Open the spray chamber.

7 Rinse the interior of the spray chamber with the current mobile phase or with a mixture of isopropanol and water.

   Some mobile phases are dangerous. Use caution that is appropriate for the current mobile phase.

WARNING **Do not spray the mobile phase upward into the vaporizer.**

8 Wipe the interior of the spray chamber and the end of the vaporizer with a clean cloth.

9 Remove the spray shield.

10 Use abrasive paper to gently clean the end of the capillary cap.

11 Dampen a clean cloth and wipe the end of the capillary cap.

12 Reinstall the spray shield.

13 Use abrasive paper to gently clean the spray shield.

14 Dampen a clean cloth and wipe the spray shield.

15 Rinse the area around the spray shield.

CAUTION Do not spray directly toward the tip of the capillary. This can cause pressure surges in the vacuum system.

16 Wipe the area around the spray shield with a clean cloth.

17 Close the spray chamber.

18 Reinstall the corona needle.

To remove the APCI nebulizer

When required When you need to access the nebulizer for maintenance.

Tools required
- Gloves, clean

Parts required None

Figure 28 APCI nebulizer

1. Shut off the flow of LC solvent.
2. Shut off the flow of nebulizing gas.
3. Disconnect the LC tubing and nebulizing gas tubing from the nebulizer.
4. Turn the nebulizer counterclockwise until it disengages from the retaining screws.
5. Gently lift the nebulizer out of the spray chamber.

WARNING **The tip of the nebulizer may be very hot. Allow it to cool before handling it.**

To replace the APCI nebulizer needle

When required When the needle is plugged. Common symptoms of a plugged needle are increased LC back pressure or off-axis spray from the nebulizer (difficult to see in an APCI system).

Tools required

- Adjustment fixture (p/n G1946-20215)
- Gloves, clean, lint-free (large, p/n 8650-0030; small, p/n 8650-0029)
- Pliers, long-nose (p/n 8710-0004)
- Wrench 3-mm, open-end (p/n G1946-20203)
- Wrench ¼-inch x 5/16-inch, 2 required (p/n 8710-0510)

Parts required Nebulizer needle kit, APCI (includes needle, ferrule, and needle holder, p/n G2428A).

1 Install the nebulizer in the adjustment fixture.

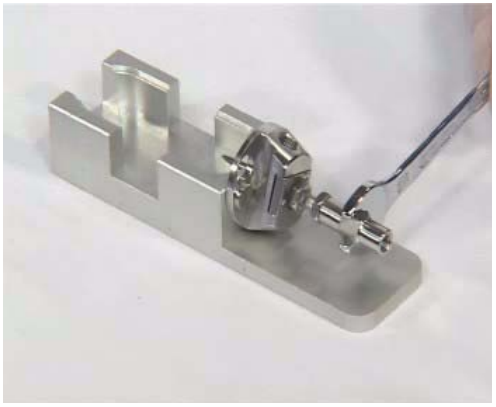

Figure 29 Installing the nebulizer in the adjustment fixture

2 Loosen the locknut next to the zero-dead-volume (ZDV) union.

3 Remove the union from the nebulizer.

4 Loosen the locknut of the needle holder.

5 Unscrew the needle holder and pull it out of the nebulizer.

6 Slide the non-tapered end of the needle through the new needle holder from the narrower side.

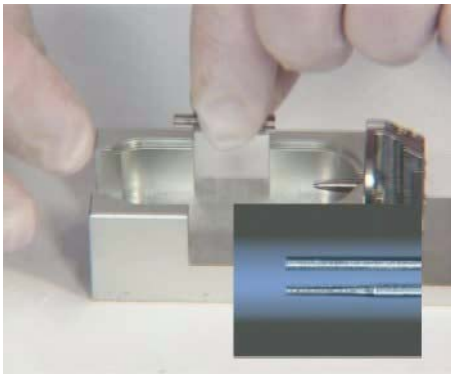

Figure 30 Sliding the non-tapered end of the needle through the new needle holder

7 Push a new ferrule, flat-side first, onto the needle.

8 Be sure the needle does not extend from the ferrule.

9 Reinstall the locknut and the union. Hand tighten the union.

10 Hold the needle holder steady with a 3-mm wrench and tighten the union one-quarter to one-half turn to compress the ferrule.

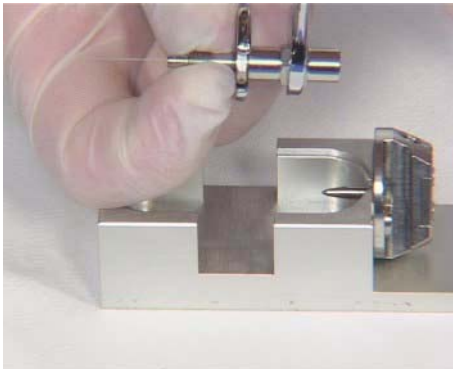

Figure 31 Tightening the union to compress the ferrule

11 Tighten the locknut against the union.

12 Pull carefully on the needle to ensure the needle is held firmly in place.

13 Replace locknut and washer.

14 Insert the needle into the nebulizer shaft.

CAUTION Take care when inserting the needle. The tapered end of the needle must pass through the restrictions in the nebulizer shaft. The tip of the needle can be damaged if excessive force is applied.

15 Adjust the APCI needle position before reinstalling the nebulizer in the spray chamber.

NOTE Record this procedure in the Maintenance Logbook.

To adjust the APCI nebulizer needle

When required After replacing the APCI nebulizer needle or if symptoms indicate the needle may not be correctly adjusted.

Tools required

- Adjustment fixture (p/n G1946-20215)
- Gloves, clean
- Magnifier (p/n G1946-80049)
- Wrench 3-mm, open-end (p/n 8710-2699)
- Wrench ¼-inch x 5/16-inch, 2 required (p/n 8710-0510)

Parts required None

1 Install the nebulizer in the adjustment fixture.

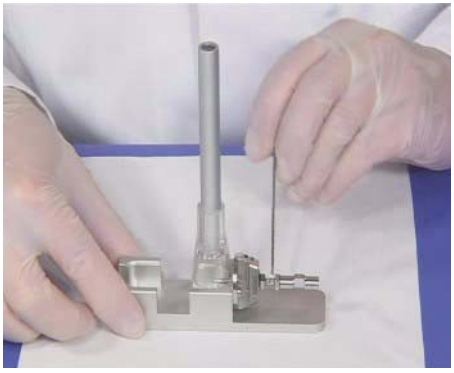

Figure 32 Installing the nebulizer in the adjustment fixture

2 Loosen the needle holder locknut.

3 Position the magnifier so you can view the tip of the nebulizer.

4 Adjust the needle holder until the needle is even with the tip of the nebulizer.

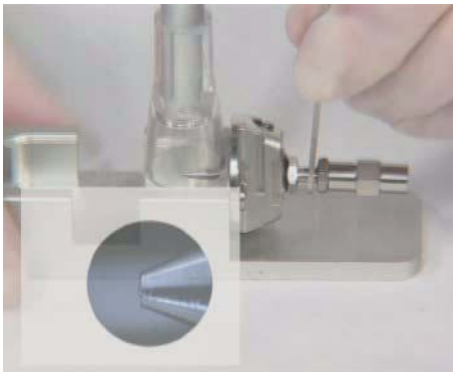

Figure 33 Adjusting the needle holder

5 Tighten the locknut. Make sure this does not change the position of the needle.

6 Remove the nebulizer from the adjustment fixture and reinstall it in the APCI spray chamber.

7 Be very careful not to hit the tip of the nebulizer against anything. Any damage will have a large, negative effect on system performance.

NOTE Record this procedure in the Maintenance Logbook.

To reinstall the APCI nebulizer

When required As needed.

Tools required None

Parts required None

1. Insert the nebulizer into the spray chamber.
2. Turn it clockwise to lock it into place.
3. Reconnect the nebulizing gas tubing to the nebulizer.
4. Reconnect the LC tubing to the zero-dead-volume union.
5. Do not overtighten the LC fitting. Overtightening the fitting can crush the tubing, creating a restriction.

To clean the corona needle

When required When you observe decrease sensitivity, decreased signal stability, and increase corona voltage during APCI operation.

Tools required

- Abrasive paper, 4000 grit (p/n 8660-0827)
- Cloths, clean, lint-free (p/n 05980-60051)
- Gloves, clean
- Isopropanol, reagent grade or better

Parts required None

1 Pull the corona needle assembly out of the spray chamber.

WARNING **The needle and related parts get very hot during operation. Make sure they have cooled before proceeding.**

Figure 34 Dirty APCI corona needle.

2 Fold a piece of abrasive paper over the base of the needle.

3 Pull and twist the abrasive paper along the needle and off the tip of the needle.

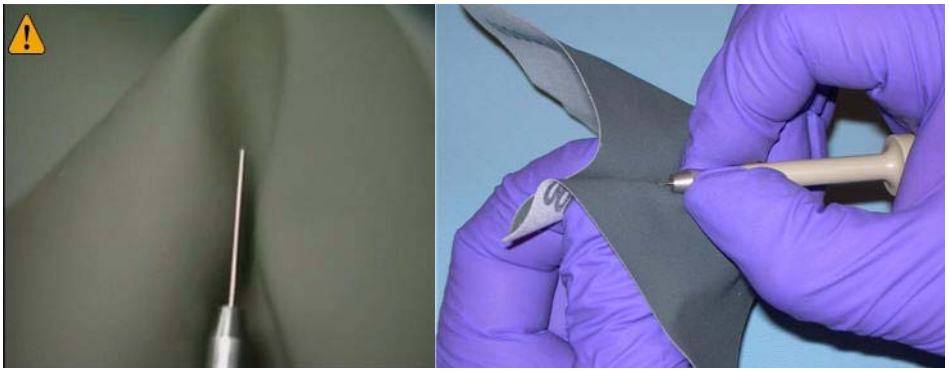

Figure 35 Pulling and twisting abrasive paper along the tip of the needle.

CAUTION Do not bend or blunt the tip of the needle, or it will decrease system performance. Sharpening the needle is not needed.

4 Repeat step 2 and step 3 several times.

5 Starting at the base of the needle, wipe the needle with a clean cloth. The cloth can be dry or dampened with isopropanol.

Figure 36 APCI corona needle after cleaning.

6 Reinstall the corona needle assembly in the spray chamber.

To replace the corona needle

CAUTION Do not hit the tip of the needle as you insert the nebulizer. The tip of the needle is easily damaged.

If this procedure fails to restore system performance, replace the corona needle.

When required When symptoms indicate poor corona needle performance and cleaning the needle does not restore performance.

Tools required

- Cloths, clean, lint-free (p/n 05980-60051)
- Gloves, clean
- Isopropanol, reagent grade or better

Parts required Corona needle (p/n G2429A)

1 Pull the corona needle assembly out of the spray chamber.

WARNING **The needle and related parts get very hot during operation. Make sure they have cooled before proceeding.**

2 Remove the needle collar.

3 Remove the old corona needle from the collar.

4 Install a new needle, with its integral ferrule, in the collar.

Figure 37 Installing a new needle into the collar

5 Turn the collar onto the needle holder and tighten by hand.

6 Reinstall the corona needle assembly in the spray chamber.

CAUTION Do not hit the tip of the needle as you insert the nebulizer. The tip of the needle is easily damaged.

NOTE Record this procedure in the Maintenance Logbook.

Multimode Source, APPI Source and HPLC-Chip/MS Interface

This section describes how to maintain the multimode source, APPI source and HPLC-Chip/MS interface.

To clean the multimode source daily

When required

Daily or anytime you suspect carryover contamination from one sample or analysis to another, or when you must access the end cap and capillary cap for cleaning and inspection.

Tools required

- Gloves
- Wash bottle, clean

Parts required

- Abrasive paper, 4000 grit (p/n 8660-0827)
- Cloths, clean, lint-free (p/n 05980-60051)
- Cotton swabs (p/n 5080-5400)
- Mobile phase from the current method *or* clean isopropanol, reagent grade or better
- Water, reagent-grade or better

1 Turn off the spray chamber, nebulizer pressure, drying gas flow, drying gas temp, and vaporizer temp.

WARNING **Do not touch the multimode source or the capillary cap. They may be very hot. Allow the multimode source to cool down before you handle them.**

2 Remove the nebulizer and the APCI corona needle.

3 Remove the cosmetic cover. You will have to remove the thermocouple probe before you can wipe the spray chamber. Otherwise, leave the thermocouple intact.

4 Open the spray chamber.

5 Rinse the interior of the spray chamber using the wash bottle filled with the current mobile phase or with a mixture of isopropanol and water.

NOTE Recent residue should be soluble in the mobile phase. If you are not sure what mobile phase was used recently, a solution of 50% isopropanol and 50% water works well as a general cleaning solution.

WARNING **Some mobile phases are dangerous. Use the degree of caution appropriate for the mobile phase being used.**

6 Wipe the interior of the spray chamber with a clean, lint-free cloth.

WARNING **Sharp edges can be found inside the spray chamber, such as the separator. Pay close attention when wiping the interior of the spray chamber.**

7 Rinse the area around the spray shield. Do not spray directly toward the tip of the capillary. This can cause pressure surges in the vacuum system.

8 Dampen a clean cloth with the mobile phase. Wipe the spray shield, field shaping electrodes and the area around the spray shield.

9 Replace the nebulizer and the APCI corona needle.

10 Install the thermocouple probe and adjust it so that it protrudes 15 mm from the inner spray chamber wall.

11 Replace the cosmetic cover.

12 Close the spray chamber.

NOTE Use the weekly cleaning process if symptoms of contamination persist, or if the spray shield or capillary cap show significant discoloration that can not be removed by the normal daily cleaning procedure.

To clean the multimode source weekly

The cleaning procedure for cleaning the multimode source weekly is similar to the daily procedure. The main difference is that the multimode source is removed from the instrument in the weekly procedure.

When required Weekly if the normal daily cleaning procedure is not sufficient

Tools required

- Gloves
- Wash bottle, clean

Parts required

- Abrasive paper, 4000 grit (p/n 8660-0827)
- Cloths, clean, lint-free (p/n 05980-60051)
- Cotton swabs (p/n 5080-5400)
- Mobile phase from the current method *or* clean isopropanol, reagent grade or better
- Water, reagent-grade or better

1 Remove the multimode source.

2 Fill the spray chamber with clean mobile phase, or with a mixture of isopropanol and water.

NOTE Recent residue should be soluble in the mobile phase. If you are not sure what mobile phase was used recently, a solution of 50% isopropanol and 50% water works well as a general cleaning solution.

WARNING **Some mobile phase are hazardous chemicals. Use the degree of caution appropriate for the mobile phase being used.**

3 Scrub the corona insulator and the interior of the spray chamber with a clean cotton swab.

4 Empty the spray chamber.

5 Wipe the interior of the spray chamber with a clean, lint-free cloth

WARNING **Sharp edges can be found inside the spray chamber, such as the separator. Pay close attention when wiping the interior of the spray chamber.**

6 Remove the spray shield. Use abrasive paper to gently clean the end of the capillary cap.

7 Dampen a clean cloth and wipe the end of the capillary cap.

8 Reinstall the spray chamber.

9 Use abrasive paper to gently clean the spray shield. Dampen a clean cloth and wipe the spray shield.

10 Rinse the area around the spray shield then wipe the area around the spray shield.

11 Reinstall the spray chamber on the instrument.

12 Replace the nebulizer and APCI corona needle.

13 Install the thermocouple probe and adjust it so that it protrudes 15mm from the inner spray chamber wall.

14 Replace the cosmetic cover.

15 Close the spray chamber.

To replace the APPI UV Lamp

When Replace the lamp if it becomes cracked or damaged, or if the lamp intensity has dropped considerably. The UV lamp has a useful lifetime of 6000 to 8000 hours if the MgF_2 window is not damaged.

Tools Required
- T15 Torx driver (p/n 8710-1622)
- T20 Torx driver (p/n 8710-1615)
- Hex Key Set (2 mm Hex Key) (p/n 9810-0641

Parts List
- UV Lamp, APPI (p/n G1971-60025)
- Clean Cloth (p/n 05980-60051)
- Vinyl/Rubber Gloves
- Cotton Swab (p/n 5080-5400)
- Isopropanol

NOTE Handle the quartz lamp body with gloves and keep it free of oils or grease. If the lamp body is touched or comes in contact with these materials, clean it with isopropyl alcohol.

1 Remove the Cosmetic Covers
   - **a** Place the APPI source on a clean flat surface. Use a lint-free clean cloth to protect the PTFE coating on the spray chamber.
   - **b** Remove the Nebulizer Cover. The cover should pop off easily, but you may need to pull the cover apart slightly. See Figure 38.
   - **c** Use a Torx T-20 screwdriver to remove the Cosmetic Cover Screws. See Figure 38. You might need a Torx T-15 screwdriver for the latch pot screw (not shown).
   - **d** With the spray chamber face down, carefully remove the Cosmetic Cover while holding onto the Spray Chamber Cover Windows (left and right). These can easily fall out and break. See Figure 39.

Figure 38 Removing the Nebulizer Cover (left) and Removing the Cosmetic Cover screws

Figure 39 Removing the Cosmetic Cover

2 Remove the APPI lamp drive module:

a Use a 2 mm Hex Key to remove the four screws securing the APPI Lamp Drive Module. Store the screws in a safe location. See Figure 40, left.

b Gently lift the Lamp Drive Module off of the APPI lamp assembly. The lamp has no wires because it is excited by an RF waveform.

Keep track of the nylon insulators underneath the Lamp Drive Module. They will fall off of the source and tend to roll. See Figure 40, right.

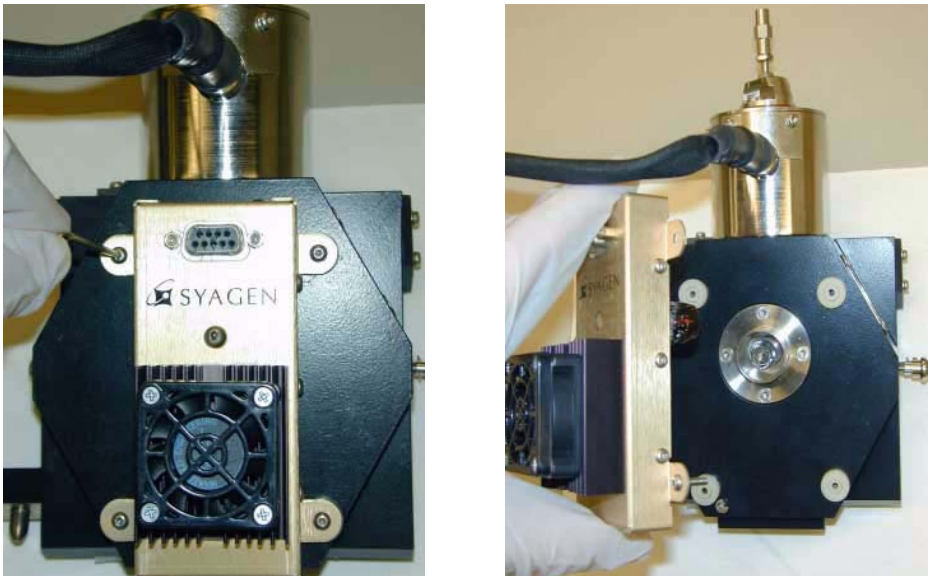

Figure 40 Use a 2 mm Hex Key (left) and Nylon Insulators

The UV lamp and lamp holder are now exposed. The lamp is held in place with an O-ring seal.

3 Remove and install the APPI UV lamp:

a Grasp the exposed end of the lamp with gloved fingers and gently rock the lamp back and forth while pulling the lamp out of the lamp holder. See Figure 41.

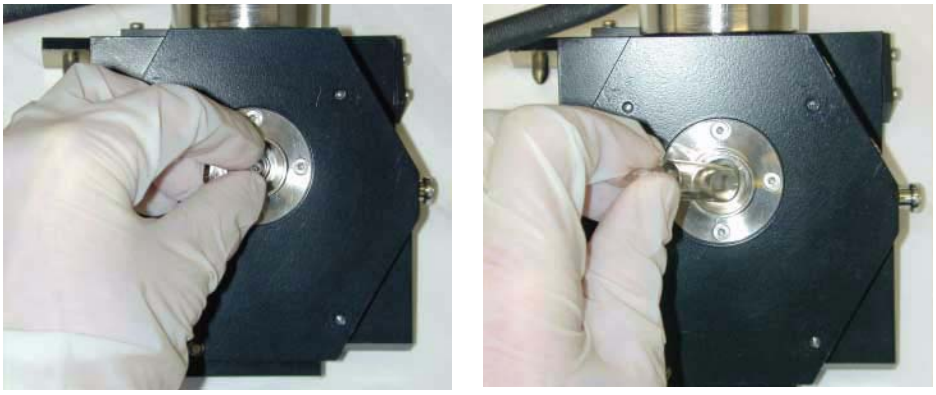

Figure 41 Grasp end of UV lamp (left) and pull lamp out of lamp holder (right)

b Install the new UV lamp into the lamp holder. Use a slight rocking motion to push the lamp through the O-ring seal. Push the lamp into the lamp holder until it extends approximately 6 mm into the spray chamber. See Figure 42.

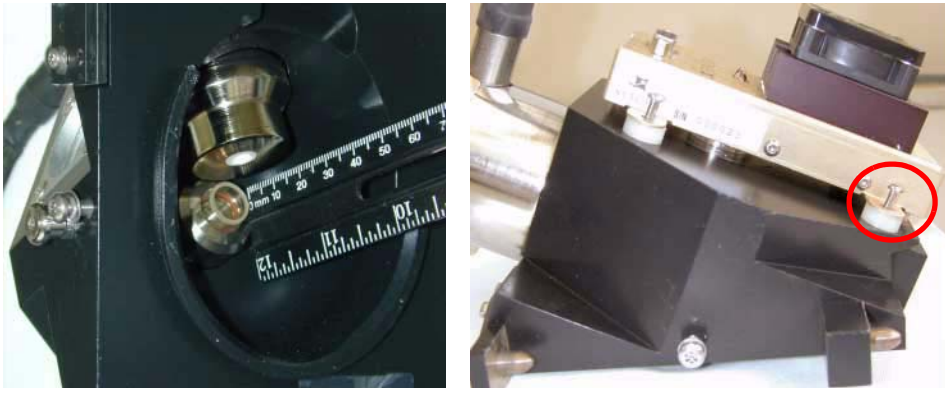

Figure 42 UV lamp should extend 6 mm (left). Lamp drive module should lie flat (right). Make sure switch is located on contact pin (circled above).

c Replace the nylon insulation and reinstall the lamp drive module. Make sure the lamp drive module lies flat against the nylon insulator. See Figure 43. If the lamp drive module does not lie flat, the UV lamp may not be inserted far enough.

d Push the UV lamp another millimeter or so into the lamp holder and check the fit of the lamp drive module again. Also make sure that the micro switch on the drive module is located on the source open/closed contact pin. If the switch is not positioned correctly, the UV lamp will not light.

e Tighten the four screws with a 2 mm Hex Key to secure the lamp drive module.

4 Reinstall the cosmetic covers.

a Hold the cover in your hand.

b Place the spray chamber into it *face up*.

This prevents damage to the spray chamber cover windows.

5 Tighten the three screws that secure the cosmetic cover.

c Reinstall the nebulizer cover to complete the procedure.

See Figure 43.

Figure 43 Reinstall cosmetic covers.

To change HPLC-Chip capillaries

When When broken, blocked or kinked

Tools Required
- Cube wrench (p/n G4240-83800)
- Hex key 3 mm, 12-cm long (p/n 8710-2411)

Parts List
- Fused silica/PEEK capillary (see Parts)

1 Unload the HPLC-Chip

WARNING **Do this procedure only if the Triple Quad LC/MS System is mounted on the MS or is sitting flat on a table because the center of gravity shifts and the instrument will tip over without adequate support.**

2 Press the cover release button once. When the lock opens pull the front panel down.

3 Unlock the stages assembly and flip it out.

4 Remove the capillary cover (A) and open the thumb screw of the strain relief (B). See Figure 44.

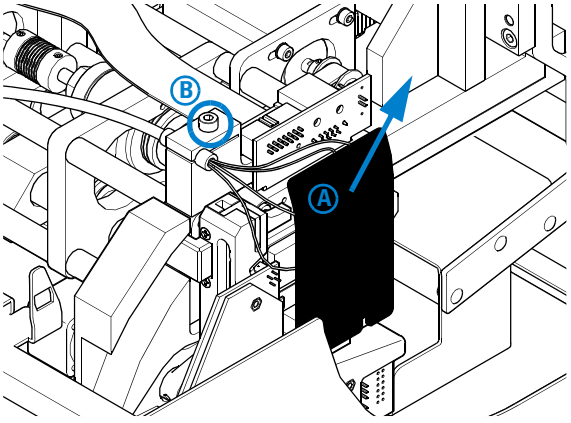

Figure 44

5 Loosen the slotted PEEK fitting using the Cube wrench and pull the capillary out. See Figure 45.

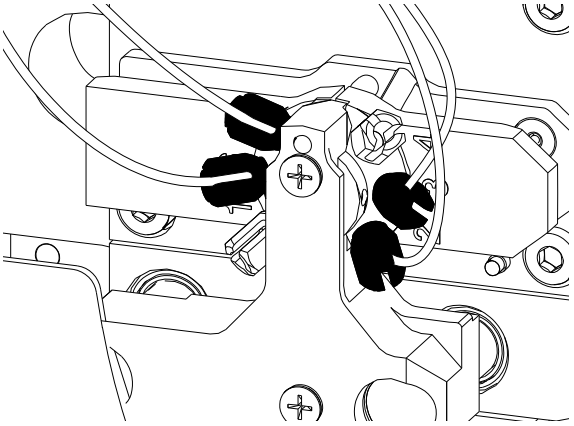

Figure 45

6 Push the new capillary through the capillary guide until the stopper is flush with the end of the guide tube. Tighten the thumb screw firmly.

The strain relief will only function properly if all 4 capillaries are in place.

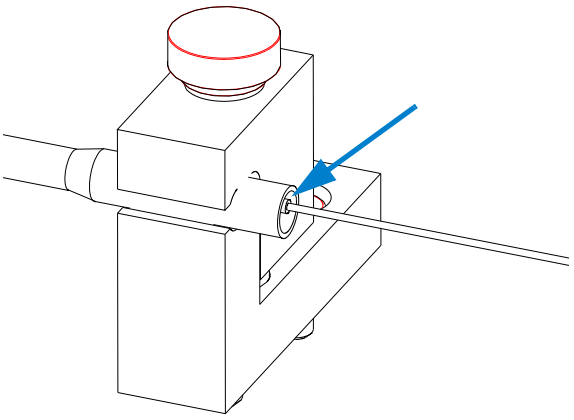

Figure 46

7 Connect the capillaries as follows to the HPLC-Chip valve stator:

For forward-flush mode (default)

- port 1 - not used
- port 2 - 15 µm (orange) to nanopump
- port 3 - 75 µm (blue) to infusion pump
- port 4 - not used
- port 5 - 100 µm (black) to waste
- port 6 - 25 µm (yellow) to port 6 of the µ-WPS

For backflush mode

- port 1 - not used
- port 2 - 15 µm (orange) to nanopump
- port 3 - 75 µm (blue) to infusion pump
- port 4 - not used
- port 5 - 25 µm (yellow) to port 6 of the µ-WPS
- port 6 - 100 µm (black) to waste

8 Route the capillaries exactly as shown in Figure 47.

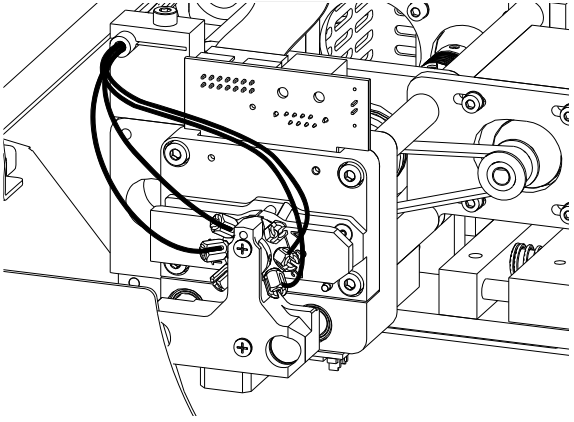

Figure 47

9 Reinstall the capillary cover. Do not overtighten the cover screws!

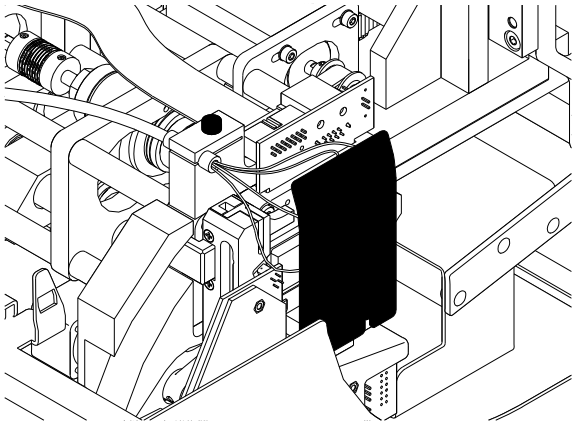

Figure 48

10 Flip the stages assembly up and close the front pane.

Ion Transfer Capillary

This section describes the steps to remove, clean and reinstall the ion transfer capillary.

To remove the capillary

When required When you need to clean or replace the capillary.

Tools required Gloves, clean

Parts required None

1 Vent the system.

2 Unplug the instrument power cord from the power outlet after venting is complete.

WARNING **The 6490 uses two external power cords to provide input power. Make sure you unplug the input power cord for the main power supply and the input power cord for the power extension box (into which the two rough pumps are plugged) before you continue.**

3 Open the spray chamber.

WARNING **The spray chamber operates at very high temperatures. Give the spray chamber time to cool before proceeding.**

4 Remove the spray shield.

5 Remove the capillary cap from the end of the capillary.

6 Carefully pull the capillary out of the desolvation assembly.

Figure 49 Pulling the capillary out of the desolvation assembly

CAUTION Carefully pull the capillary out along its long axis. The capillary is glass or of similar material, and you can break it by putting vertical or horizontal pressure on it.

To clean the capillary

When required When you observe decreased sensitivity and decreased signal stability

Tools required
- 5190-1401 Cleaning Powder, Dielectric Capillary
- 100mL polypropylene graduated cylinder, or glass-graduated cylinder with two 1 mL pipette tip

Parts required Powdered Precision Cleaner (Alconox catalog number 1104)

1 Dissolve 1 g Alconox Powdered Precision Cleaner in 100 mL deionized water.

   This concentration is the recommended concentration for “manual or ultrasonic cleaning”.

2 Place the ion transport capillary upright in a 100 mL polypropylene graduated cylinder and fill with Alconox solution.

3 Sonicate the graduated cylinder with the ion transport capillary in an ultrasonic cleaner for 10 to 15 minutes.

You may use a 1 mL pipette over the end of the ion transport capillary to protect the metallized plating. Trim the pipette tip to approximately 4 cm so that the capillary can be immersed in the cleaning solution.

To maintain proper cleanliness, handle the ion transport capillaries with protective gloves.

4 Rinse the ion transport capillary and graduated cylinder several times with deionized water.

5 Fill the graduated cylinder with deionized water and sonicate the graduated cylinder with the ion transport capillary for 10 to 15 minutes.

6 Remove the ion transport capillary from the graduated cylinder and remove the pipette tip (if one was used).

7 Blow out excess water from the ion transport capillary bore using AeroDuster or oil-free pressurized gas.

8 Install the ion transport capillary in LC/MS Desolvation Assembly:

   a Lubricate the ion transport capillary surface with isopropanol and insert carefully into Desolvation Assembly. Support the front and rear of the capillary and keep it level during installation.

      When 2 to 3 cm of the capillary remains extended from the Desolvation Assembly, the capillary will “hold up” on the rear contact spring. Continue to apply pressure until approximately 1 cm remains extended from the Desolvation Assembly.

   b Lubricate the ion transport capillary tip with isopropanol and install the Capillary Cap.

   c Install the threaded Spray Shield by turning clockwise.

9 Close the spray chamber and begin an instrument pump down.

NOTE If a new capillary was installed, record this procedure in the Maintenance Logbook.

To reinstall the capillary

When required After cleaning the capillary or when installing a new capillary.

Tools required Gloves, clean

Parts required Isopropanol, HPLC grade or better

1 Lubricate the capillary entrance end with isopropanol.

2 Slide the capillary out straight into the desolvation assembly. The capillary must be aligned correctly so that its end will fit into a fixed capillary cap inside the desolvation assembly.

Figure 50 Reinstalling the capillary

CAUTION Putting vertical or horizontal pressure on the capillary can break it.

3 Reinstall the capillary cap over the outer end of the capillary.

4 Reinstall the spray shield.

5 Close the spray chamber.

NOTE If a new capillary was installed, record this procedure in the Maintenance Logbook.

Desolvation Assembly

This section describes how to maintain the desolvation assembly.

To remove the desolvation assembly

When required When you need to access the optics assembly

Tools required
- Wrench, ½-inch x 9/16-inch, open-end (p/n 8710-0877)
- Screwdriver, TORX, T-20 (p/n 8710-1615)

Parts required None

WARNING **The spray chamber operates at very high temperatures. Give the spray chamber time to cool before proceeding.**

1 Vent the system.

2 Unplug the instrument power cord from the power outlet after venting is complete.

WARNING **The 6490 uses two external power cords to provide input power. Make sure you unplug the input power cord for the main power supply and the input power cord for the power extension box (into which the two rough pumps are plugged) before you continue.**

3 Remove the front, top and left side covers.

4 Disconnect the connections to the Aux module on top of the vacuum manifold, and lift off and remove the Aux module. Disconnect the drying gas tubing from the desolvation assembly.

5 Disconnect the drying gas heater cable from the desolvation assembly.

6 Disconnect the drain hose from the desolvation assembly.

7 Remove the two retaining screws that keep the desolvation assembly attached to the support rods.

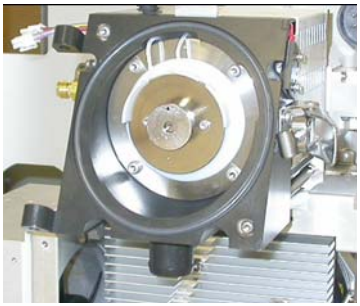

Figure 51 Desolvation assembly with retaining screws removed

8 Slide the desolvation assembly off of the support rods.

NOTE The capillary column is contained in the desolvation assembly. It does not need to be removed in order to remove the desolvation assembly.

To clean skimmer 1

When required When symptoms indicate it is necessary.

Tools required Cloth, clean, lint-free (p/n 05980-60051)
Gloves, clean
Isopropanol, reagent grade or better
Water, reagent-grade or better

Parts required None

1 Remove the desolvation assembly.

2 Dampen a clean cloth with a mixture of Isopropanol and water.

3 Wipe the skimmer.

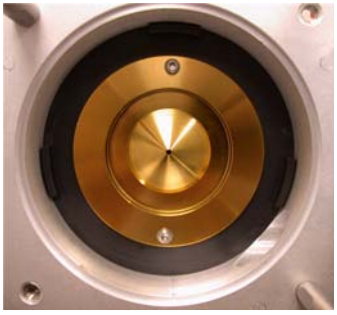

Figure 52 Wipe the skimmer.

CAUTION The tip of the skimmer is delicate. Do not damage it.

4 Reinstall the desolvation assembly.

To reinstall the desolvation assembly

When required As needed

Tools required Wrench, ½-inch x 9/16-inch, open-end (p/n 8710-0877)

Parts required None

1. Put the desolvation assembly on the support rods and slide it back until it seals against the vacuum manifold.
2. Install the two retaining screws.
3. Reconnect the drain hose to the desolvation assembly.
4. Reconnect the drying gas heater cable to the desolvation assembly.
5. Reconnect the nebulizing gas tubing to the desolvation assembly.
6. Reinstall the Aux module on top of the vacuum manifold.
7. Reconnect the connections to the Aux module.

Analyzer and Ion Optics Assembly

This section describes the maintenance steps for the analyzer and ion optics assembly.

To open the analyzer

When required As needed for maintenance.

Tools required None

Parts required None

1 Vent the system.

2 Unplug the instrument power cord from the power outlet after venting is complete.

WARNING **The 6490 uses two external power cords to provide input power. Make sure you unplug the input power cord for the main power supply and the input power cord for the power extension box (into which the two rough pumps are plugged) before you continue.**

3 Remove the front cover from the instrument.

4 Remove the top cover from the instrument.

5 Remove the left side covers.

6 Disconnect the connections to the Aux module, and lift off and remove the Aux module. Put on an antistatic wrist strap. Attach the wrist strap to a grounded surface such as the back panel of the instrument.

7 Lift off the vacuum manifold cover.

To replace the electron multiplier horn

When required When sensitivity or poor and autotune consistently sets the detector gain to its maximum value

Tools required
- Gloves, clean
- Pliers, long-nose (p/n 8710-0004)

Parts required High gain electron multiplier horn (p/n G2571-80103)

1 Disconnect the signal wire from the electron multiplier horn.
2 Open the retaining clip.
3 Remove the electron multiplier horn.
4 Install a new electron multiplier horn.
5 Close the retaining clip.
6 Connect the signal wire to the pin on the electron multiplier horn.
7 Close the analyzer.

NOTE Record this procedure in the Maintenance Logbook.

To clean the high energy dynode

When required When sensitivity is poor and autotune consistently sets the detector gain to its maximum value

Tools required

- Beakers, large (2 required, at least 500 ml each)
- Gloves, clean
- Hex wrench, 0.8mm (p/n 8710-1225)
- Isopropanol, reagent grade or better
- Pliers, long-nose (p/n 8710-0004)
- Screwdriver, TORX, T-20 (p/n 8710-1615)

Parts required None

1 Disconnect the two braided wires from the electron multiplier.

2 Remove the two screws that hold the electron multiplier to the vacuum manifold.

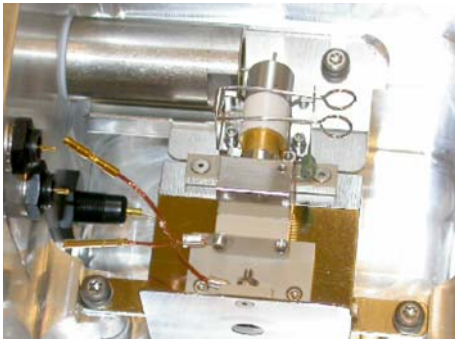

Figure 53 Electron multiplier exposed

3 Remove the electron multiplier and, at the same time, carefully disconnect the two remaining rigid wires.

4 Remove the electron multiplier horn from the electron multiplier.

CAUTION The solvents used in the cleaning process will damage the electron multiplier horn.

5 Loosen the two small set screws that hold the resistor in place. Remove the resistor.

CAUTION The solvents used in the cleaning process will damage the resistor.

6 Place the electron multiplier (without the horn or resistor) into a beaker containing 200 ml of isopropanol. Make sure the high energy dynode is immersed.

7 Gently agitate the beaker by hand for 1 minute.

CAUTION Do not use an ultrasonic bath. It could loosen screws or disrupt the precise alignment of electron multiplier components.

8 Transfer the electron multiplier to another beaker containing about 200 ml of methanol. Make sure the high energy dynode is immersed.

9 Gently agitate the beaker by hand for 1 minute. This helps to rinse off the isopropanol.

CAUTION Do not use an ultrasonic bath. It could loosen screws or disrupt the precise alignment of electron multiplier components.

10 Remove the electron multiplier and allow it to dry. The methanol will dry quickly. Do not bake the electron multiplier or otherwise try to speed the drying process.

11 Reinstall the resistor and electron multiplier horn.

12 Reinstall the electron multiplier in the vacuum manifold and, at the same time, connect the two rigid wires to the electron multiplier.

13 Install and tighten the two screws that hold the electron multiplier in place. Reconnect the two braided wires to the electron multiplier.

To close the analyzer

When required As needed after analyzer maintenance.

Tools required None

Parts required None

NOTE If you worked on any components in the analyzer, check to be sure the electrical connections are correct before closing the analyzer.

1. Position the manifold cover on the vacuum manifold.
2. Reinstall the top cover of the instrument.
3. Reinstall the Aux module on to the top of the vacuum manifold.
4. Reconnect the connections to the Aux module.
5. Reinstall the left side covers. Reinstall the front cover of the instrument.
6. Pump down the instrument.

To clean the ion optics assembly

When required When the system has difficulty tuning, or when the system has poor sensitivity.

Tools required

- Gloves, clean
- Cloths, clean, lint-free (p/n 05980-60051)
- Beakers, 500 ml, 2 ea
- Tweezers
- Screwdriver, TORX, T-10 (p/n 8710-1623)
- Ball driver, 1.5 mm (p/n 8710-1570)
- Methanol, reagent grade or better
- Isopropanol, reagent grade or better
- Acetone, reagent grade or better

Parts required None

1. Vent the system.
2. Remove the source.
3. Remove the desolvation assembly.
4. Remove the vacuum manifold cover.
5. Unplug all of the ion optics cables so that the ion optics assembly can be removed. Pay close attention to the orientation of the cables and their respective locations.

WARNING **The 6490 uses two external power cords to provide input power. Make sure you unplug the input power cord for the main power supply and the input power cord for the power extension box (into which the two rough pumps are plugged) before you continue.**

6. Use your finger to push on the skimmer spacer to get the ion optics to pop out of the instrument. Be careful to catch it so it doesn't fall on the floor. See Figure 54.

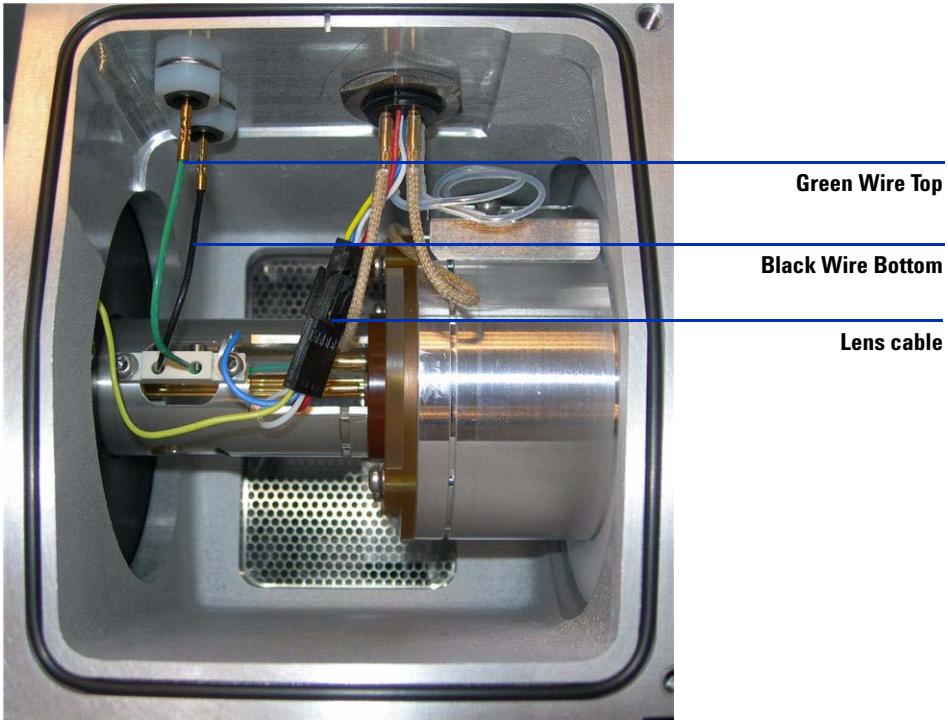

Figure 54 Optics assembly

7 Place the ion optics assembly on a clean cloth (Figure 55). Reposition assembly holding the skimmer spacer and remove the two screws that hold skimmer 1 and carefully be removed skimmer 1 (Figure 56). You may need to use a flat blade screwdriver to gently pry skimmer 1 from its seat.

CAUTION Be careful! The screwdriver blade can damage the octopole rods. If you damage the octopole rods, you must replace the entire assembly.

Figure 55 Ion optics assembly

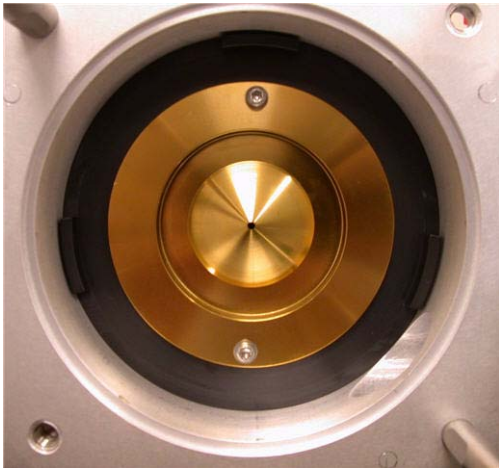

Figure 56 Skimmer 1 (detail)

8 Remove the two screws holding the octopole to the skimmer space (Figure 57). Be careful not to let the ion optics fall on the table. Support the octopole by holding it up by the octopole tube.

Figure 57 Octopole rods extending through Skimmer Spacer.

9 Disconnect wiring harness and connections (Figure 58). The lens 2 red wire and lens 1 white wire. Leave the yellow wires attached to skimmer spacer (Figure 59). Leave the ion optics in the skimmer spacer and use it as a stand to remove lens 2, spacer insulator, and lens 1. Be careful not to damage the octopole rods.

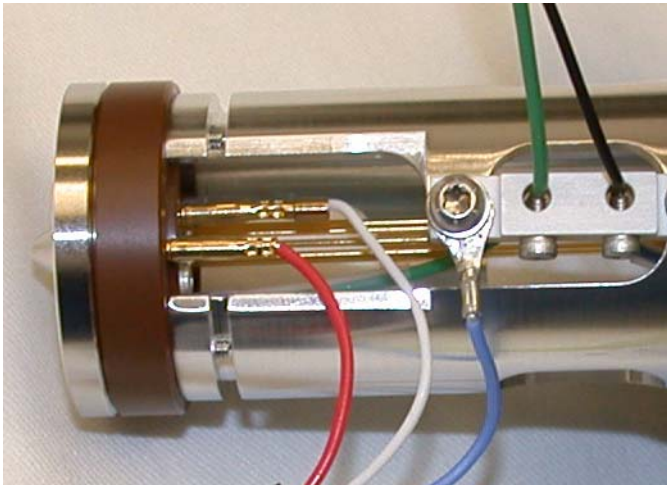

Figure 58 Lens 1 and Lens 2 wires

Figure 59 Skimmer spacer

10 Use the 1.5 mm ball driver to remove the two screws that hold Lens 2 (Figure 60). Then remove the spacer insulator (Figure 61).

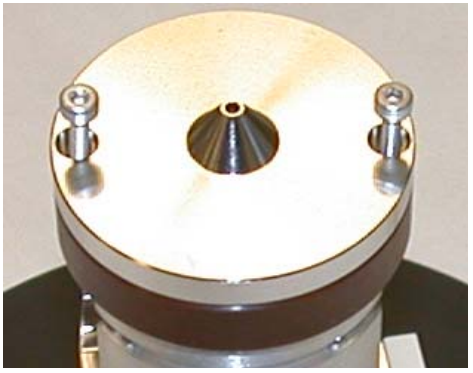

Figure 60 Lens 2

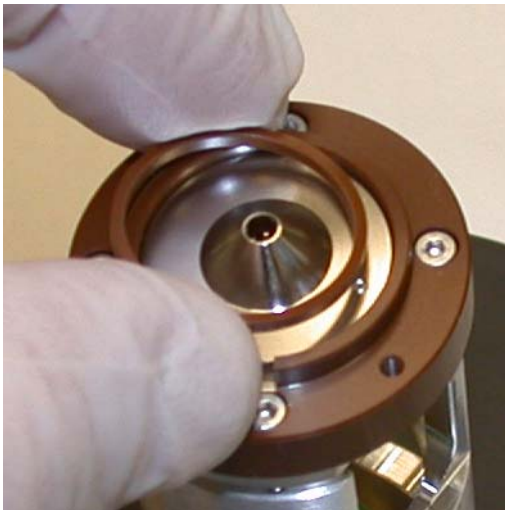

Figure 61 Spacer insulator

11 Remove Lens 1.

12 Pull the octopole out of the skimmer spacer. The octopole is now ready to be sonicated. There should be no further disassembly of the octopole.

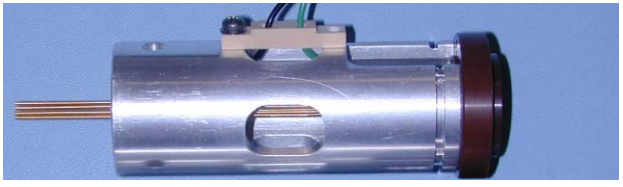

Figure 62 Octopole assembly

13 Take the entire octopole assembly and place it in a beaker of high purity isopropanol. Sonicate for 5 minutes. Pour out the isopropanol and refill the beaker with 100% acetone. Sonicate for another 5 minutes. Pour out the acetone and refill with 100% methanol. Sonicate for another 5 minutes.

14 Place Skimmer, Lens 1 and Lens 2 in a beaker of high purity isopropanol. Sonicate for 5 minutes. Pour out the isopropanol and refill the beaker with 100% acetone. Sonicate for another 5 minutes. Pour out the acetone and refill with 100% methanol. Sonicate for another 5 minutes. The skimmers and lenses can be wiped with lint-free cloth with solvent (methanol).

NOTE

- Do not abrasively clean the skimmer because it is plated, and abrasive cleaning will damage the plating.
- Do not expose the skimmer O-ring to these solvents.
- Do not reuse the solvents between sets of components.
- Sonicating the assembly will *not* damage the octopole or octopole wires unless you sonicate it for a long period.

---

15 Remove the parts from the beaker, place them on a lint-free cloth and allow them to air dry.

16 Wipe the skimmer spacer completely with a lint-free cloth dampened with methanol. Make sure to wipe off any oil droplets.

17 Inspect the octopole rods to make sure they are not broken. Using a small ball driver or pair of tweezers, gently touch each octopole rod on its end to make sure that it has not come detached from the connection on the end support. Do this on both ends of the octopole rods.

18 Reinstall the octopole assembly into the skimmer spacer. Position the octopole assembly so that the screws on skimmer side of skimmer spacer can be installed.

19 Reinstall skimmer 1. Don't forget the black O-ring that goes behind skimmer 1.

20 Install lens 1, space insulator and lens 2. Re-attach the wiring harness. Connect all previously disconnected wires (see Figure 55).

Figure 63 shows the exploded view of the ion optics assembly.

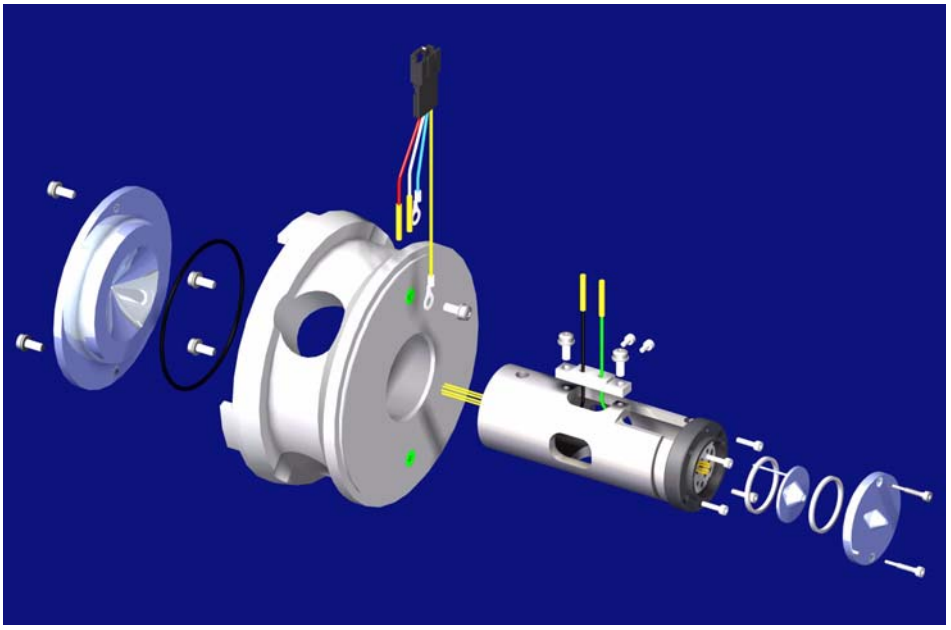

Figure 63 An exploded view of the ion optics assembly

21 After reassembly of the ion optics assembly (see Figure 64), reinstall the ion optics assembly into the vacuum manifold. Connect the green and black octopole leads, and reconnect the lens cable connector.

Figure 64 The re-assembled ion optics assembly

22 Reinstall the desolvation assembly onto the front of the vacuum manifold. Reinstall the Aux module onto the top of the vacuum manifold, and reconnect the connections to the Aux module. Reconnect the drying gas heater cable and the drying gas line to the side of the desolvation assembly.

High Pressure Ion Funnel

With time and with heavy usage, the High Pressure Ion Funnel needs to be cleaned to maintain its excellent performance on the Agilent 6490 QQQ.

To remove the High Pressure Ion Funnel

Parts Needed

- Needle nose pliers
- Torx T-20 wrench

1. Let the ESI source with Agilent Jet Stream Technology cool down, then remove it.
2. Remove the two M4 screws that hold down the desolvation assembly, then remove the assembly.
3. Disconnect the five internal wires from the feed-throughs. Use needle nose pliers. See Figure 65.

   Connectors are fragile. Please be gentle when you remove these wires.

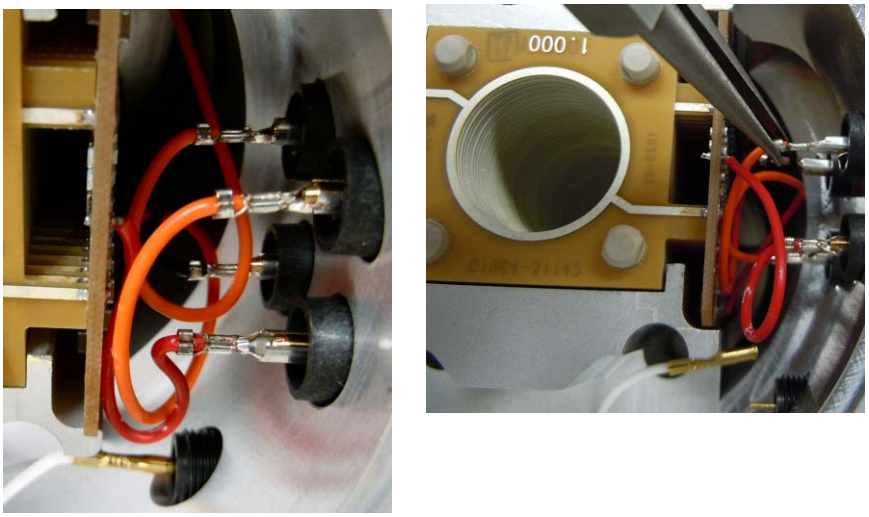

Figure 65 Five internal wires from the feed-through.

4 Loosen the two captive screws that secure the ion funnel to the housing. See Figure 66.

   The screws are captive so they will not come all the way out.

5 Remove the High Pressure Ion Funnel from the housing. (You can grab onto the heat sinks and pull the funnel out of the housing.)

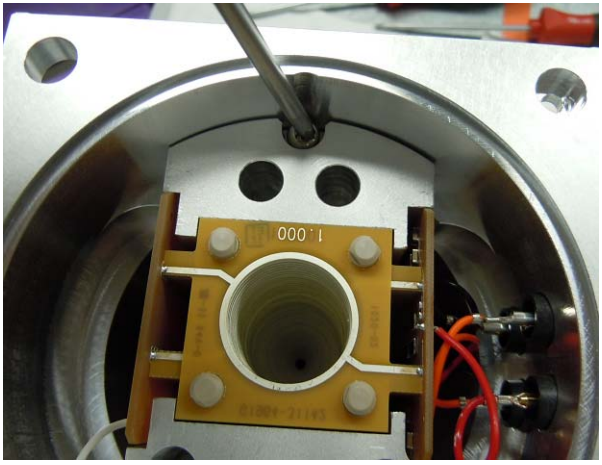

Figure 66 Loosening captive screw on the High Pressure Ion Funnel.

To clean the High Pressure Ion Funnel

Parts Needed

- 2000 mL clean beaker
- Isopropanol (IPA)
- Methylene Chloride
- One pair of glove

WARNING **Wear chemical-resistant gloves and safety glasses (goggles) for your safety.**

1 Put the High Pressure Ion Funnel on the table and on top of a clean cloth. See Figure 67.

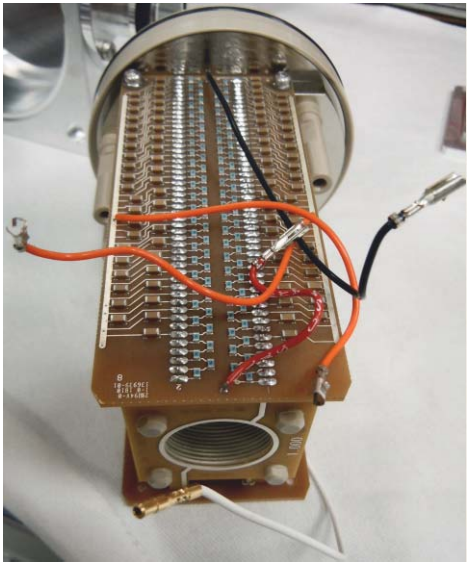

Figure 67 High Pressure Ion Funnel on top of a clean cloth.

2 Slowly put the High Pressure Ion Funnel in a glass beaker. See Figure 68.

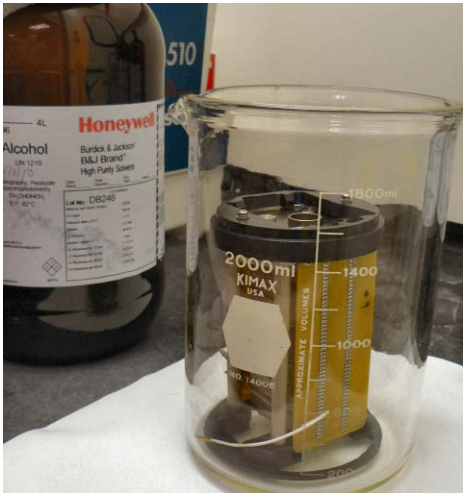

Figure 68 High Pressure Ion Funnel in a glass beaker.

3 Slowly pour isopropanol into the beaker until the solvent covers the Ion Funnel completely.

Figure 69 Pouring isopropanol into the glass beaker.

4 Sonicate the assembly in a beaker of isopropanol for 15 minutes. If a more aggressive cleaning is required, sonicate the High Pressure Ion Funnel in a chlorinated solvent such as Methylene Chloride and then followed with an isopropanol rinse.

5 Remove the High Pressure Ion Funnel from beaker and allow the isopropanol to drain off the entire assembly.

6 Use clean compressed nitrogen to blow out the remaining isopropanol from between the funnel plates.

7 Install the heat sink with the four M4 screws.

To reinstall the High Pressure Ion Funnel Process

Parts Needed

- Needle nose pliers
- Torx T-20 wrench

1 Install the ion funnel into the housing and secure with the two captive screws.

2 Connect the five internal wires to the feed throughs:
   - Connect the two orange wires to the top connectors.
   - Connect the black wire to the bottom-rear connector.
   - Connect the red wire to the front-rear connector.
   - Connect the white wire to the bottom-most connector.

See Figure 70.

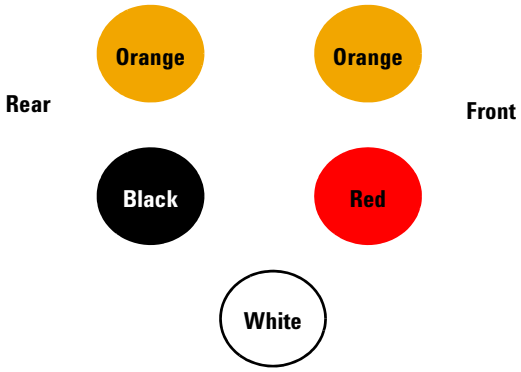

Figure 70 Internal wires to the feed through.

3 Install the desolvation assembly with two M4 screws.

4 Install the ESI with Agilent Jet Stream Technology.

5 Pump down the instrument.

Vacuum System

This section lists procedures to maintain the vacuum system of the instrument. Do these steps according to the maintenance schedule or as indicated by instrument symptoms.

Your system can include either the Varian MS40+ pump or the Edwards E2M28 rough pump.

To check the rough pump fluid level (Varian MS40+)

Check the level and color of the pump fluid weekly.

- Check the fluid level in the window of the rough pump. The fluid level should be between the marks for Max and Min (see Figure 72).
- Check that the color of the pump fluid is clear or almost clear with few suspended particles.
- If the pump fluid is dark or full of suspended particles, replace it.

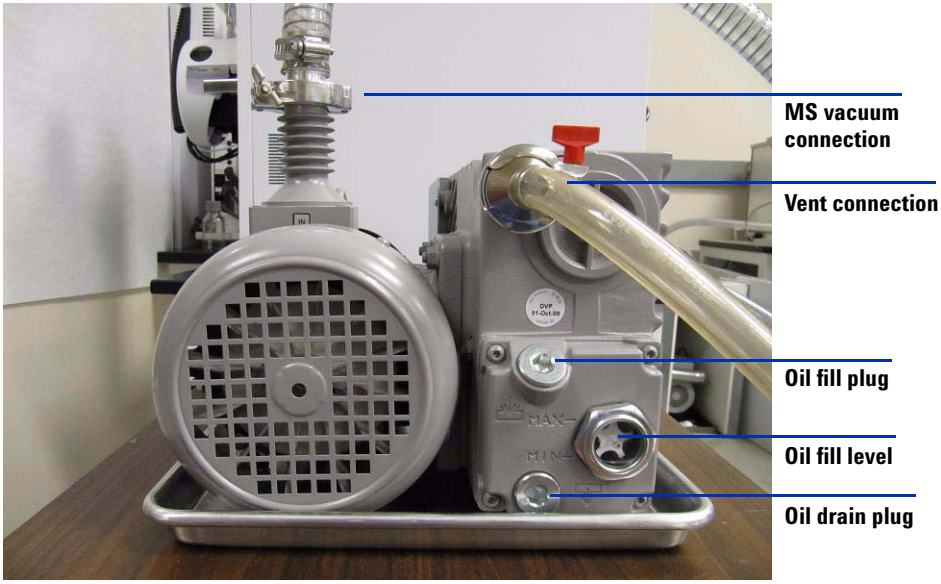

Figure 71 Fluid level window on the rough pump

To check the rough pump fluid level (Edwards E2M28)

Check the level and color of the pump fluid weekly.

- Check the fluid level in the window of the rough pump. The fluid level should be between the marks for Max and Min (see Figure 72).
- Check that the color of the pump fluid is clear or almost clear with few suspended particles.
- If the pump fluid is dark or full of suspended particles, replace it.

Figure 72 Fluid level window on the rough pump

WARNING **Never add or replace the rough pump fluid while the pump is on. Hot oil can splash out and cause harm.**

NOTE Record this procedure in the Maintenance Logbook.

To check the oil mist filter (Edwards E2M28)

Check the oil mist filter **weekly**.

- Check the oil mist filter.

  Check for any damage and if pump fluid has been collected in it.

- Check the oil mist filter for damage.

  If the oil mist filter is damaged, replace it.

- Check whether oil has collected in the bottom of the oil mist filter.

  If oil is found in the oil mist filter, open the gas ballast valve counterclockwise just enough to return the condensed oil back to the pump. Close the gas ballast valve clockwise.

NOTE When you close the ballast valve, you increase the efficiency of the pump. However, you lose oil to the mist filter if you don't recycle. Check the status of your oil mist filter at least once per week to ensure that it does not fill with oil. If you lose too much oil in the rough pump, the vacuum will not be maintained, and the Triple Quad LC/MS System will vent.

To add rough pump fluid

Add pump fluid when the pump fluid level is low. Before you begin, make sure you have:

- Funnel
- Gloves, chemical resistant, clean, lint free (p/n 9300-1751)
- 10-mm Hex key (for Varian MS40+) (p/n 8710-2612)
- For Varian MS40+: Rough pump fluid (SW60 oil, p/n 6040-1361)
- For Edwards E2M28: Rough pump fluid (Inland 45 oil, p/n 6040-0834)

WARNING **Wear chemical-resistant gloves and safety glasses (goggles) for your safety.**

WARNING **The fill cap and pump may be dangerously hot. Check that the fill cup and pump are cool before you touch them.The fill cap and pump may be dangerously hot. Check that the fill cup and pump are cool before you touch them.**

WARNING **The fill cap and pump may be dangerously hot. Check that the fill cup and pump are cool before you touch them.**

CAUTION Use only the rough pump fluid appropriate for your pump (SW60 oil for Varian MS40+, or Inland 45 oil for Edwards E2M28). Any other fluids can substantially reduce pump life and invalidates the pump warranty.

1 Vent and turn off the instrument.

See “To shut down the instrument” on page 18.

2 Unplug the instrument power cord from the electrical outlet.

Leave the power cord unplugged while you do this procedure.

WARNING **The 6490 uses two external power cords to provide input power. Make sure you unplug the input power cord for the main power supply and the input power cord for the power extension box (into which the two rough pumps are plugged) before you continue.**

3 Remove the fill cap on the rough pump (see Figure 74).

4 Add new pump fluid until the fluid level is near, but not over the maximum mark beside the fluid level window (see Figure 74).

5 Reinstall the fill cap.

6 Wipe off all excess oil around and underneath of the pump.

7 Reconnect the power cord.

8 Start up the instrument.

See "To start the system in Standby mode" on page 13.

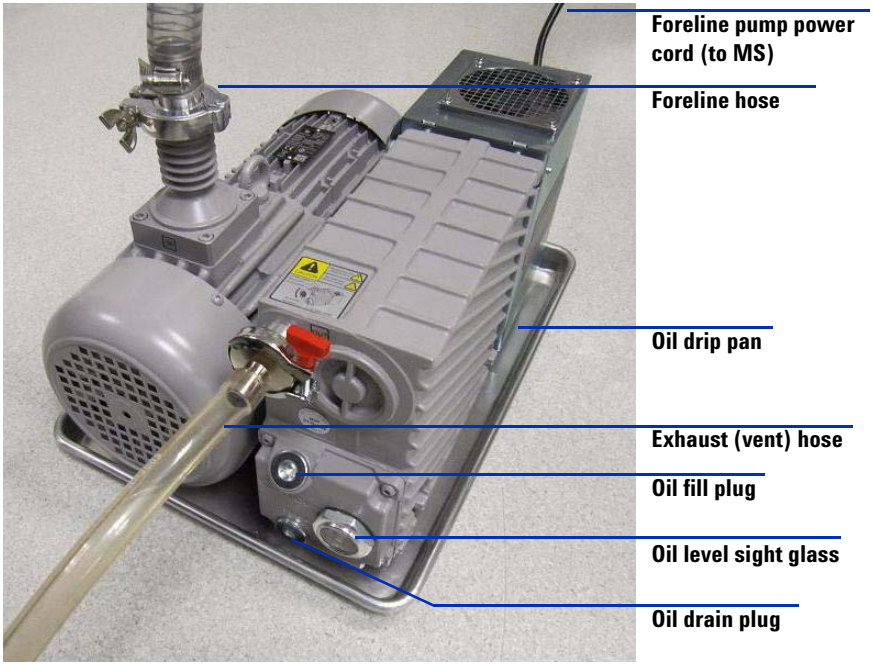

Figure 73 Rough pump (Varian MS40+).

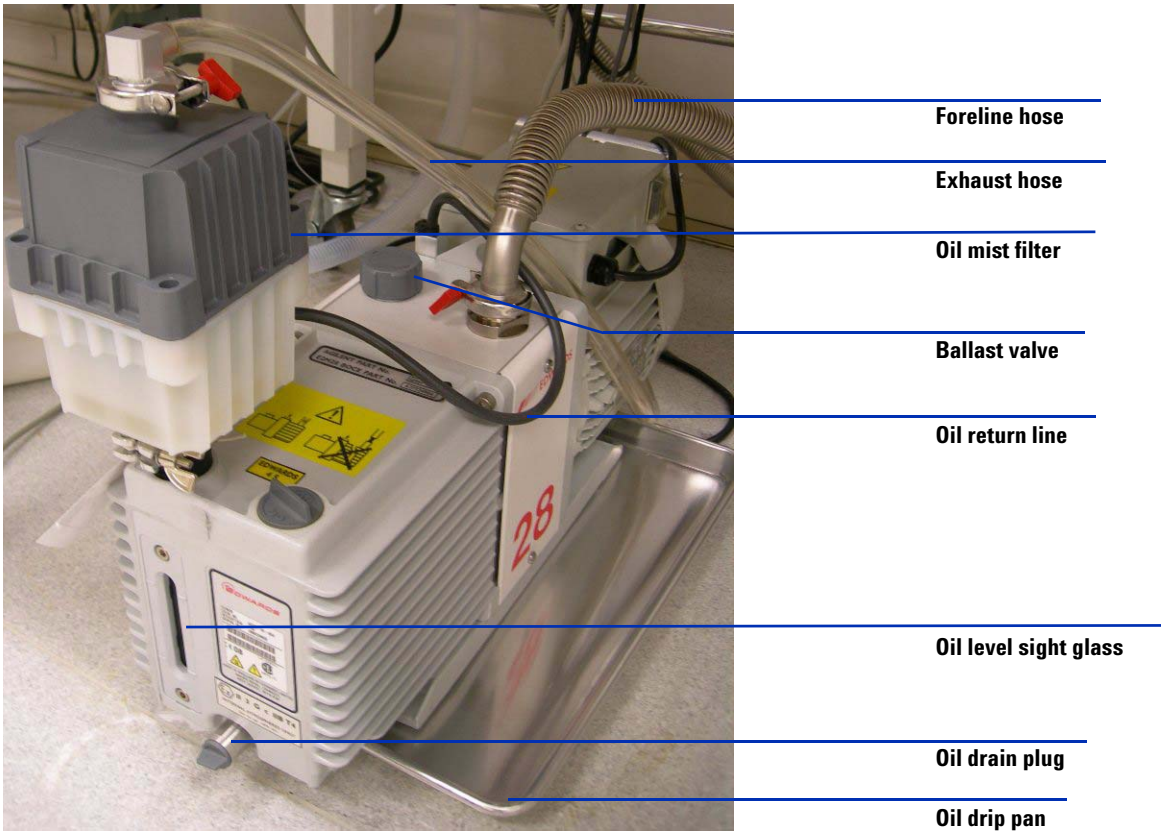

Figure 74 Rough pump.

To replace the rough pump fluid

Replace the pump fluid every six months. Replace it sooner if the fluid appears dark or cloudy.

Before you begin, make sure you have:

- Container for catching old pump fluid
- Funnel
- Gloves, chemical resistant, clean, lint free (p/n 9300-1751)
- 10-mm Hex key (for Varian MS40+) (p/n 8710-2612)
- For Varian MS40+: Rough pump fluid (SW60 oil, p/n 6040-1361)
- For Edwards E2M28: Rough pump fluid (Inland 45 oil, p/n 6040-0834)
- Screwdriver, flat-bladed, large (p/n 8710-1029)
- For Edwards E2M28: Rough pump fluid (Inland 45 oil, p/n 6040-0834)

WARNING **Wear chemical-resistant gloves and safety glasses (goggles) for your safety.**

WARNING **Never add or replace the rough pump fluid while the pump is on. Hot oil can splash out and cause harm.**

WARNING **The fill cap and pump may be dangerously hot. Check that the fill cup and pump are cool before you touch them.**

WARNING **Do not touch the fluid. The residue from some samples are toxic. Properly dispose of the fluid.**

CAUTION Use only the rough pump fluid appropriate for your pump (SW60 oil for Varian MS40+, or Inland 45 oil for Edwards E2M28). Any other fluids can substantially reduce pump life and invalidates the pump warranty.

1 Turn off the instrument.

   See "To shut down the instrument" on page 18.

2 Unplug the power cord from the instrument

   Leave the power cord unplugged while performing this procedure.

WARNING **The 6490 uses two external power cords to provide input power. Make sure you unplug the input power cord for the main power supply and the input power cord for the power extension box (into which the two rough pumps are plugged) before you continue.**

3 Place a container under the drain plug of the rough pump (see Figure 74 on page 116).

4 Remove first the fill cap (see Figure 74 on page 116), then open the drain plug.

   Allow the fluid to drain completely.

5 Reinstall the drain plug.

6 Pour in new pump fluid until the fluid level is near, but not above the maximum mark beside the fluid level window (see Figure 74 on page 116).

7 Reinstall the fill cap.

8 Reconnect the power cord.

9 Start up the instrument.

   See "To start the system in Standby mode" on page 13.

10 After 30 minutes pump down, inspect the pump for leak.

   Inspect for leak after overnight pump down.

To replace the fuses

When required As needed.

Tools required Flat Blade Screw Driver

Parts required
- 8 Amp Fuse 2110-0969
- 12.5 Amp Fuse 2110-1398

WARNING **Never replace a fuse with the instrument plugged into the power outlet, or you will run the risk of an electric shock.**

1 Unplug the instrument power cord from the power outlet.

Figure 75 Disconnect the instrument power cable.

WARNING **The 6490 uses two external power cords to provide input power. Make sure you unplug the input power cord for the main power supply and the input power cord for the power extension box (into which the two rough pumps are plugged) before you continue.**

2 Using a flat blade screw driver, remove the fuse holder of the blown fuse

Figure 76 AC Board fuses

3 Replace with the appropriate fuse. See "Replaceable Fuses" on page 123.

4 Reinstall the fuse holder.

5 Plug in the instrument.

For 6490, plug in both the cord for the main power supply cord and the cord for the power extension box (to which the two rough pumps are connected).

6 Push the front power switch to start an automatic pump down sequence.

2 Reference

This chapter contains safety and other reference information for your Agilent 6400 Series Triple Quad LC/MS.

Safety

If the Agilent 6400 Series Triple Quad LC/MS is used in a manner not specified by Agilent Technologies, the protections provided by the instrument may be impaired.

Warning,
Risk of hazard,
Consult documentation

Warning,
Risk of Electric Shock

Warning,
Hot Surfaces,
Risk of Burns

Environmental Conditions

Equipment Class	Class 1 Laboratory Equipment
Pollution Degree	2
Installation Category	II
Environment	Indoor Use
Altitude	Not to exceed 3000 m
Electrical supply	200 - 240 V AC, 50/60 Hz, 2500 VA
Mains supply voltage	Fluctuations not to exceed 10% of nominal supply voltage
Operating Temperature	15 to 35°C (59 to 95°F)
Humidity	< 85% RH at 35°C

Replaceable Fuses

T8A 250V	2110-0969
T12.5A 250V	2110-1398

www.agilent.com

In This Book

This book contains tasks to help you maintain your Agilent 6400 Series Triple Quad LC/MS.

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