Agilent

Vacuum Products Division

CE

Field Installation Instructions

Ion Source Replacement

for Agilent Technologies Helium Leak Detection (G8610, G8611, or G8612)

or for VS Series Leak Detector

Part Number 699910005

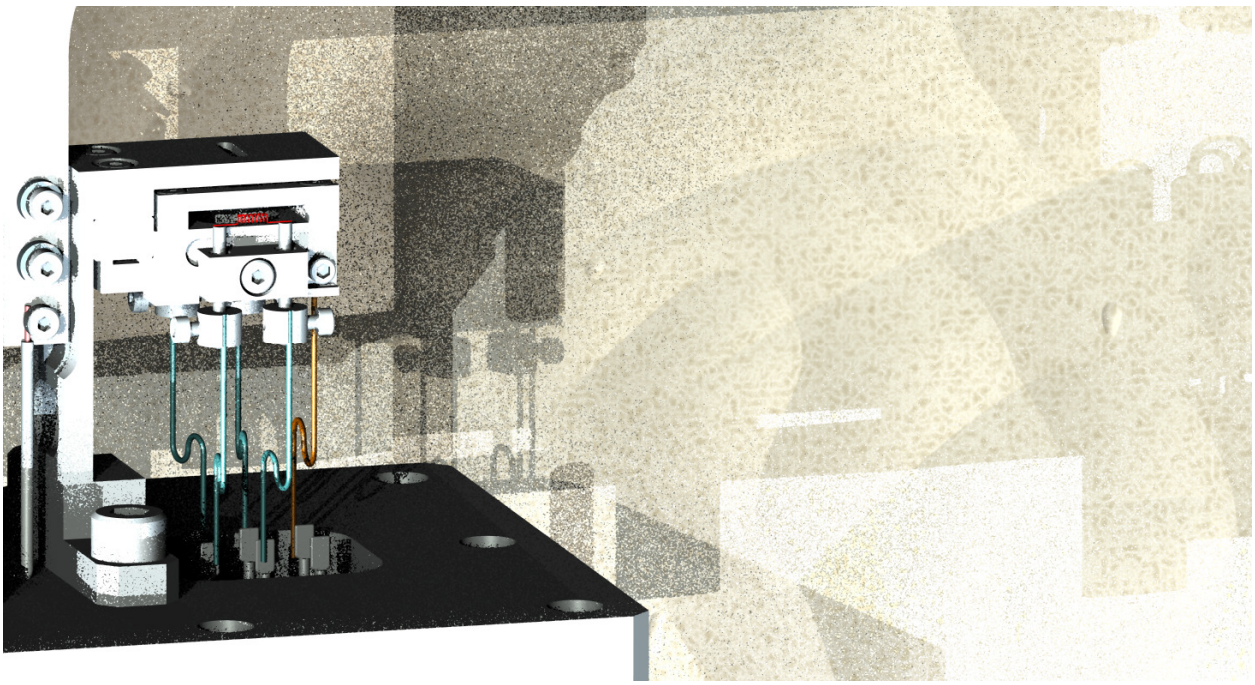
Rev. B

October 2017

699910005

Agilent Vacuum Products Division

Ion Source Replacement for Agilent Helium Leak Detector



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All claims under warranty must be made promptly after occurrence of circumstances giving rise thereto, and must be received within the applicable warranty period by Seller or its authorized representative. Such claims should include the Product serial number, the date of shipment, and a full description of the circumstances giving rise to the claim. Before any Products are returned for repair and/or adjustment, written authorization from Seller or its authorized representative for the return and instructions as to how and where these Products should be returned must be obtained. Any Product returned to Seller for examination shall be prepaid via the means of transportation indicated as acceptable by Seller. Seller reserves the right to reject any warranty claim not promptly reported and any warranty claim on any item that has been altered or has been returned by non-acceptable means of transportation. When any Product is returned for examination and inspection, or for any other reason, Customer shall be responsible for all damage resulting from improper packing or handling, and for loss in transit, notwithstanding any defect or non-conformity in the Product. In all cases, Seller has the sole responsibility for determining the cause and nature of failure, and Seller's determination with regard thereto shall be final. If it is found that Seller's Product has been returned without cause and is still serviceable, Customer will be notified and the Product returned at Customer's expense; in addition, a charge for testing and examination may be made on Products so returned.

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1 Preface

1.1 Documentation Standards

1.1.1 Symbols

This manual uses the following documentation standards:

NOTE

Notes contain important information.

CAUTION

Cautions appear before instructions, which if not followed, could cause damage to the equipment or data loss.

WARNING

Warnings appear for a particular procedure or practice which, if not followed correctly, could lead to serious injury or death.

1.2 Hazard and Safety Information

Operators and service personnel must be aware of all hazards associated with this equipment. They must know how to recognize hazardous and potentially hazardous conditions, and know how to avoid them. The consequences of unskilled, improper, or careless operation of the equipment can be serious. Every operator or service person must read and thoroughly understand operation/maintenance manuals and any additional information provided by Agilent. All warning and cautions must be read carefully and strictly observed. Consult local, state, and national agencies regarding specific requirements and regulations. Address any safety, operation, and/or maintenance questions to your nearest Agilent office.

The common international symbols used in this manual, and on the equipment, are defined below:

OFF Supply (Power)

Earth (Ground) Terminal

ON Supply (Power)

Protective Conductor Terminal

Warning, Risk of danger

Refer to documentation

Frame or Chassis Terminal

Alternating Current

Caution, Hot Surface

Direct Current

Caution, Risk of Electrical Shock

Do Not Place in Trash

1.2.1 Solvents

Warning

The mechanical components of leak detectors may be cleaned with one of the recommended solvents. When heated, sprayed, or exposed to high-temperature equipment, these solvents become flammable and explosive, causing serious injury or death. Do not use these solvents near a high-temperature source. Ventilate the working area with a blower and work in a large, well-ventilated room.

Solvents are irritants, narcotics, depressants and/or carcinogens. Their inhalation and/or ingestion may produce serious side effects. Prolonged or continued contact with the skin results in absorption through the skin and moderate toxicity. Always ensure that cleaning operations are carried out in large, well ventilated rooms, and wear eye shields, gloves, and protective clothing.

Due to the effective cleaning nature of VacuSolv solvent and its residue-free properties, Agilent' Component and Spectrometer Cleaning Kit (Part Number 670029096), used in accordance with the kit instructions, is recommended for cleaning spectrometer components. The kit can also be used for fine cleaning of other parts in the leak detector's vacuum system such as valves and fittings. No rinsing steps or high-temperature drying is required following cleaning with VacuSolv. Although appropriate precautions are advised, VacuSolv is compatible with most materials and does not contain toxic chemicals or CFCs (chlorofluorocarbons). Other acceptable solvents are isopropyl alcohol (IPA) or Dow Corning® OS-20.

To clean the leak detector plastic top enclosure, the LCD display and front panels, use only a soft cloth slightly dampened with water or a mild soap.

Do NOT use excess water or cleaning solvents of any kind.

Avoid splashing any cleaning solvents into the unit through the ventilation openings or Front Panel buttons. Wipe the surface with a dry lint-free cloth.

1.2.2 Vacuum Equipment and Cleanliness

Caution

Wear non-powdered, ESD-safe Nitride or equivalent gloves to prevent skin oils from getting on spectrometer internal components.

1.2.3 O-ring Care

When removing, checking, or replacing O-rings, keep in mind the following:

NOTE

Agilent recommends replacing all O-rings during routine maintenance or during any maintenance procedure requiring that O-rings be removed.

CAUTION

Remove O-rings carefully with your fingers. Do not use metal tools for this task; this prevents scratching of any sealing surfaces.

- *Wipe all O-rings clean with a lint-free cloth before installation to ensure that no foreign matter is present to impair the seal.*
- *Do not use grease or any other substance on O-rings that will come in contact with the vacuum surfaces.*
- *Do not use alcohol, methanol or other solvents on O-rings. Doing so causes deterioration and reduces their ability to hold a vacuum.*
- *Agilent does not recommend the use of vacuum grease. If applicable, apply a small amount of Apiezon® L grease and wipe the O-rings shiny dry.*

1.2.4 Metal Seal Care

CAUTION

Metal Seals must be replaced any time a spectrometer is opened. All fasteners must be installed and torqued per assembly procedure specifications. Remove Metal Seals carefully with your fingers or a soft tool. Metal tools scratch sealing surfaces.

- *Metal Seals are supplied in pre-cleaned condition. No cleaning is required. If necessary, Metal Seals can be cleaned using the recommended solvents. Wipe Metal Seals clean with a lint-free cloth before installation to ensure that no foreign matter impairs the seal.*
- *Do not use grease or any other substance on Metal Seals that will come in contact with the spectrometer.*

1.2.5 Spectrometer

CAUTION

Store the Ion Source/Preamplifier sub-assembly in a cool, dry area in a tightly sealed, ESD protected container. Wear non-powdered, ESD-safe Nitride or equivalent gloves when handling the spectrometer. Wash hands thoroughly after handling the spectrometer filaments and especially before smoking or eating.

The spectrometer and PCB's are static sensitive devices. Wear a grounding strap when performing any maintenance on these units and especially when performing maintenance of static sensitive parts.

CAUTION

The spectrometer operates at a very high vacuum produced by the high vacuum turbomolecular pump. Service of the spectrometer requires that this vacuum be vented to the atmosphere.

2 Filament Installation: Agilent Helium Leak Detector Model G8610, G8611, or G8612

The same filament replacement kit is compatible with any model G8610, G8611, or G8612, as well as legacy Agilent model VS series leak detectors.

2.1 Equipment Required for G8610, G8611, or G8612

The following tools are suggested for assembly.

Table 2-1. Equipment required for G8610, G8611, or G8612 models

Item	Note
Hot Ion Source Replacement Kit (VSFLDHIS)	--
Slotted screw driver	Use to remove leak detector covers
Metric Allen wrench set (Range 1.5 mm to 10 mm	--
Needle nose pliers or tweezer	--
M3 Phillips head screw driver	--
Torque wrench (must be adjustable to 40 in-lbs (4.5 N-m) and 90 in-lbs (10.2 N-m))	--
Digital multimeter (Fluke 187 or equivalent)	For resistance and continuity measurements

NOTE

Inspect the new ion source kit for deformation, damage and filament coating flaking prior to installation. Do not install if damaged. Touching the filament under any condition will cause damage.

2.2 Installation Procedure for G8610, G8611, or G8612

For clarity, some items have been omitted from views.

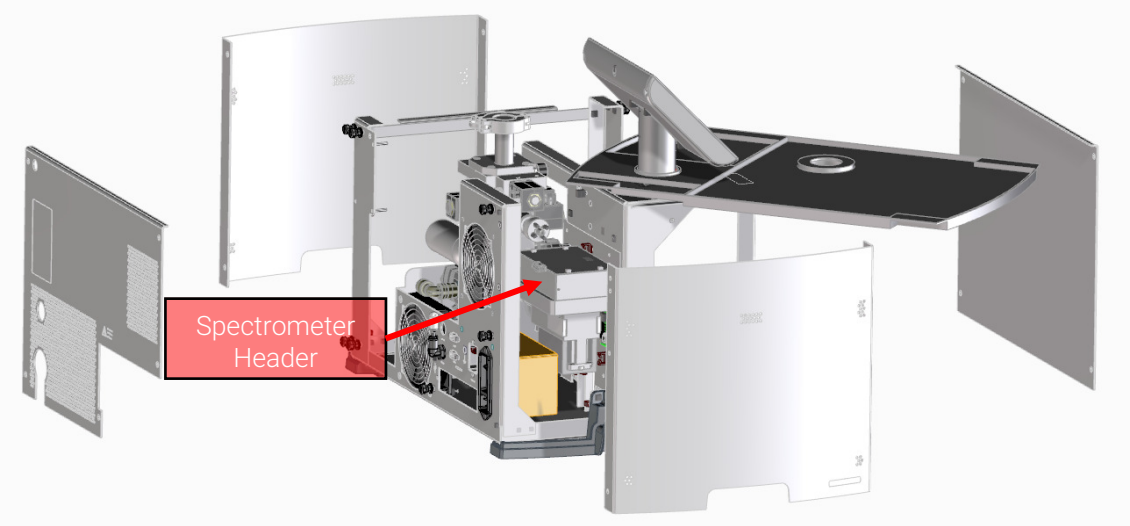

Figure 2-1. Covers

1. Turn off the power switch located on the back of the unit and unplug.
2. Wait 30 seconds for the high voltage to dissipate
3. Using a slotted screw driver, unfasten the captive screws holding each of the four covers. If the unit is equipped with a handle, remove the handle.
4. Detach all four covers and rotate the top lid about the display, as to give access to the spectrometer.

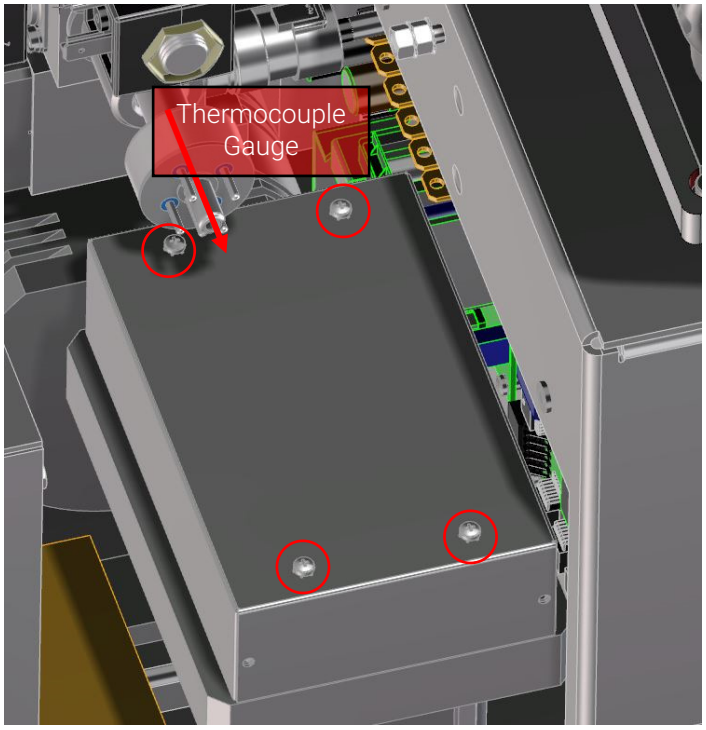

Figure 2-2. Spectrometer access

5. To remove the spectrometer top cover, it may be necessary to first pull straight out the thermocouple gauge (shown in Figure 2-2 with the red arrow. It is shown without the outside black plastic cover). Leave the thermocouple gauge connected to its wiring. Use an M3 Phillips head screw driver to remove the four screws securing it. The screw shown in the top right of Figure 2-2 will be securing a grounding strap. Leave the ground strap hanging from the leak detector frame. Disconnect the two electrical cables plugged into the spectrometer board, the pre-amp RJ45 style connector on the turbo side of the spectrometer, and the ion source multi-pin connector (Cables not shown for clarity: refer to Figure 2-3). Remove the top cover, set aside with the screws.

CAUTION

Static sensitive device, ensure that personnel are properly grounded before proceeding.

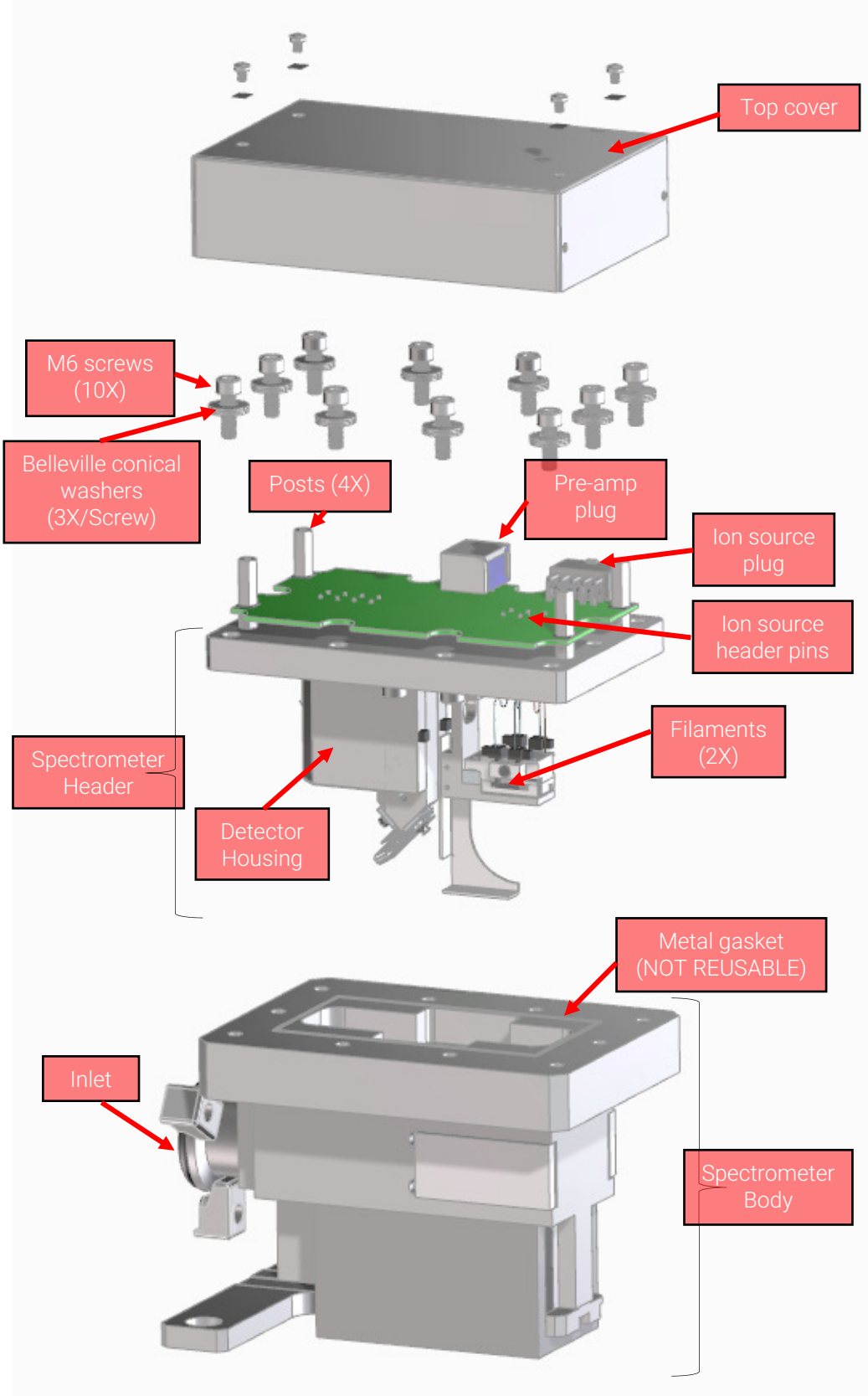

Figure 2-3. Spectrometer exploded view

CAUTION

Wear non-powdered, ESD-safe Nitride or equivalent gloves (not included in kit) to prevent skin oils from getting on vacuum surfaces.

Refer to Figure 2-3 for disassembly of the spectrometer header.

6. Loosen screws (10X) and remove spectrometer header from spectrometer body. The vacuum system vents to atmosphere as the screws are loosened. Retain the socket head cap screws and Belleville washers. Maintain correct orientation of Belleville (conical) washers when removing.
7. Remove the spectrometer header. Rest upside-down on the four posts sticking up from the printed circuit board.
8. Remove metal gasket and discard. Do not scratch the mating surface when removing the gasket. To prevent scratching of any sealing surface, do not use metal tools for this task. Do not attempt to reuse the gasket.
9. Examine the spectrometer cavity for discolored areas. If the inside of the spectrometer body appears dirty, clean it with Vac-u-solv spectrometer cleaning kit (Agilent part number 670029096).

Refer to Figure 2-4 for reference.

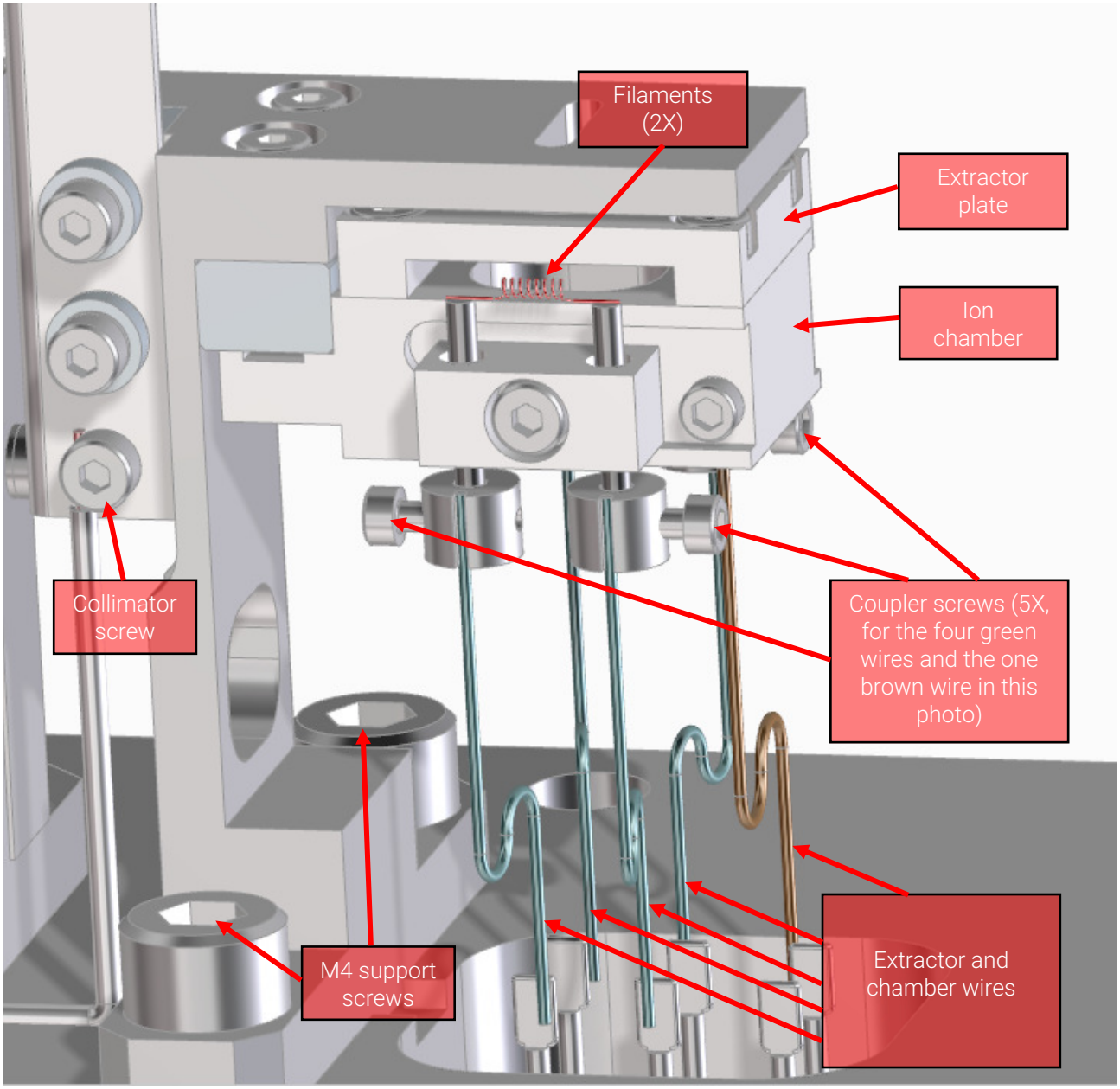

Figure 2-4. Ion support assembly

10. Loosen the four filament coupler screws.
11. Loosen the collimator screws.
12. Loosen two M1.6 socket head screws securing the ion source high voltage connection.
13. On a clean work surface, remove the two M4 support screws. See Figure 2-5.

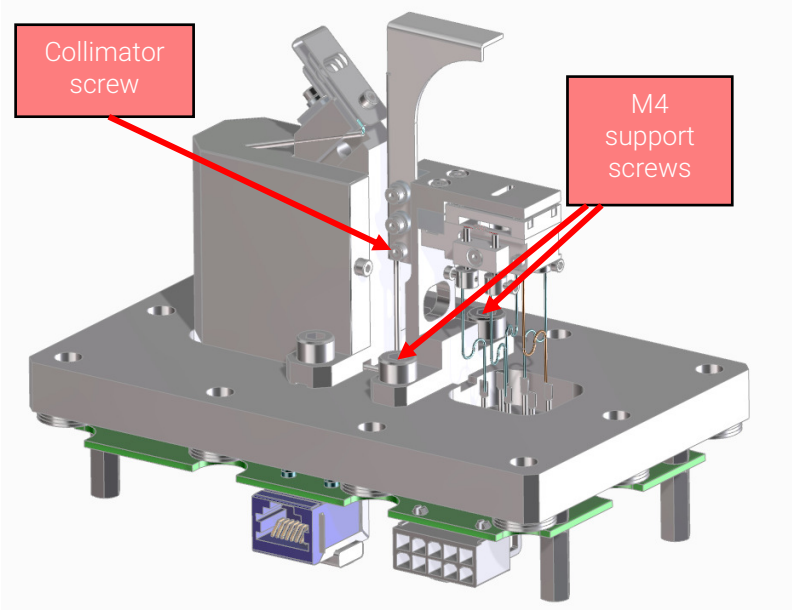

Figure 2-5. M4 support screws

14. Gently remove the ion support assembly from the spectrometer header.

NOTE

Ensure that no damage is done to the spectrometer wire during disassembly.

15. Position the new ion support assembly into the spectrometer header and align.
16. Secure the spectrometer header using two M4 support screws

17. Connect the collimator wire to the collimator plate using an M 1.5 screw. See Figure 2-6.
18. Connect the 4 coupler screws to their respective filaments.

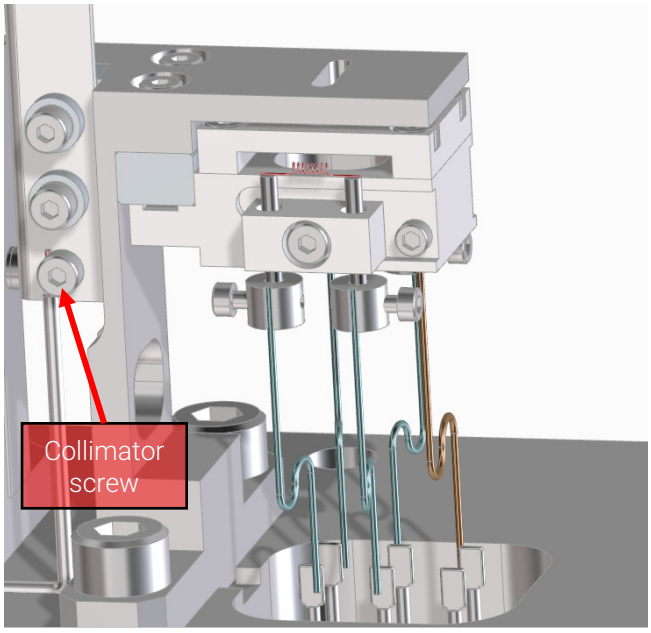

Figure 2-6. Collimator wire connection

19. Insert the high voltage ion source wire (brownish-orange wire in rendering) into the ion chamber and tighten the M1.6 socket head screw.

NOTE

Pull lightly with small pliers on the high voltage ion source wire (brownish-orange) to ensure it is connected securely and will not pull out.

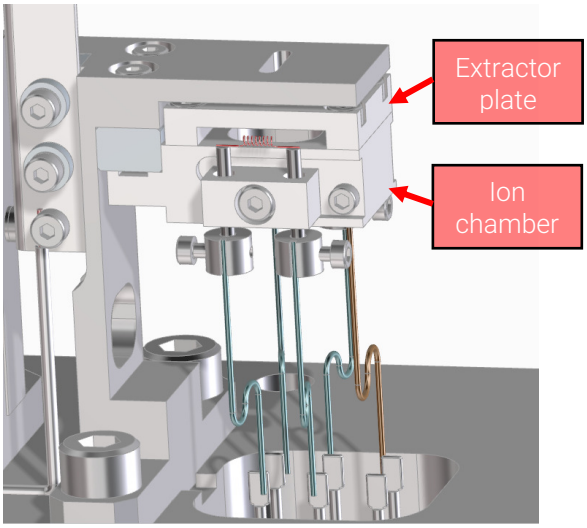

Figure 2-7. Ion chamber and extractor plate

20. Insert new filaments into a pair of couplers. Verify filament alignment as shown in Figure 2-8 and Figure 2-9. Keep screws loose while aligning the filament position, then tighten screws securely once aligned.

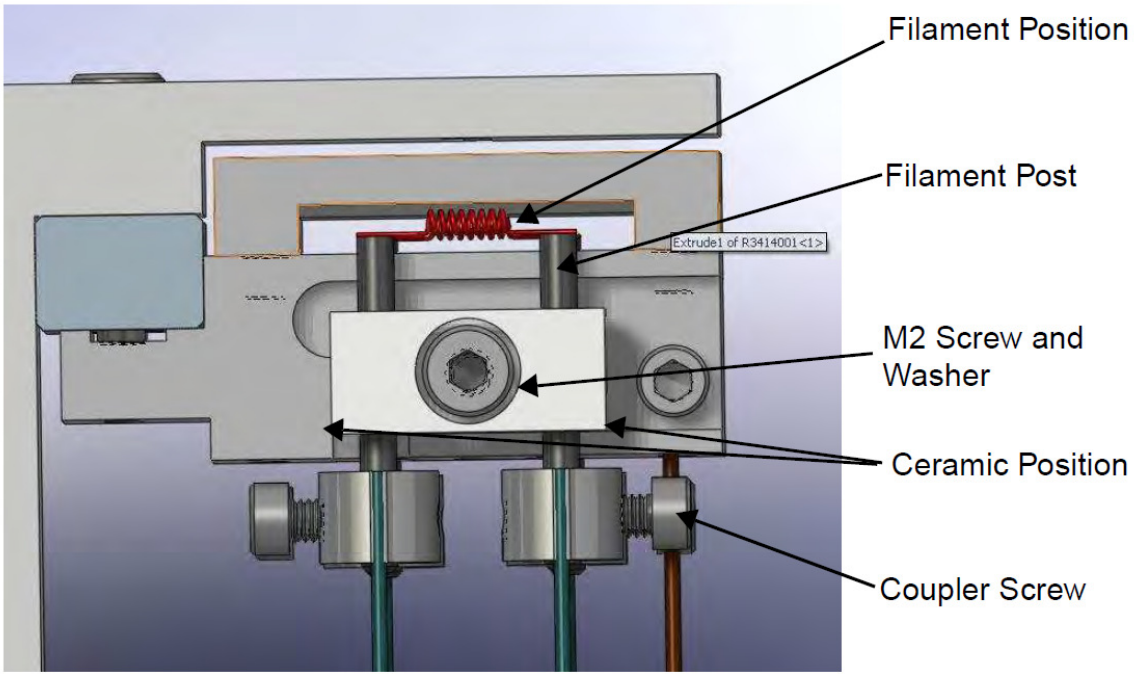

Figure 2-8. Filament positioning

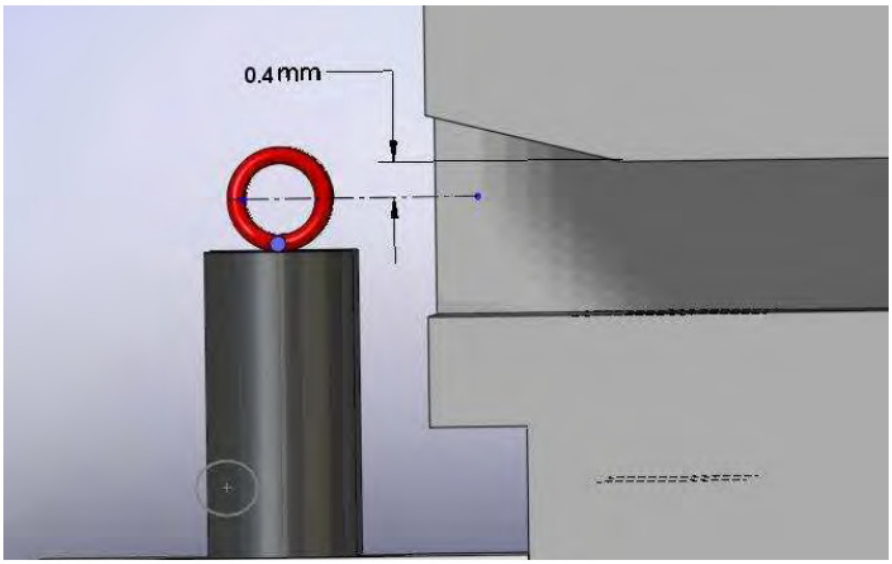

Figure 2-9. Filament alignment

21. Clean the mating surfaces of the spectrometer body and header with isopropyl alcohol and a clean lint free wipe. Agilent recommends use of the Vac-u-solv spectrometer cleaning kit (Agilent part number 670029096).
22. Center the replacement metal gasket inside the bolt pattern and outside of the body cavity. To prevent scratching of any sealing surface, do not use metal tools for this task (Figure 2-10).
23. Guide the spectrometer header into the pocket with the detector housing closest to the inlet.

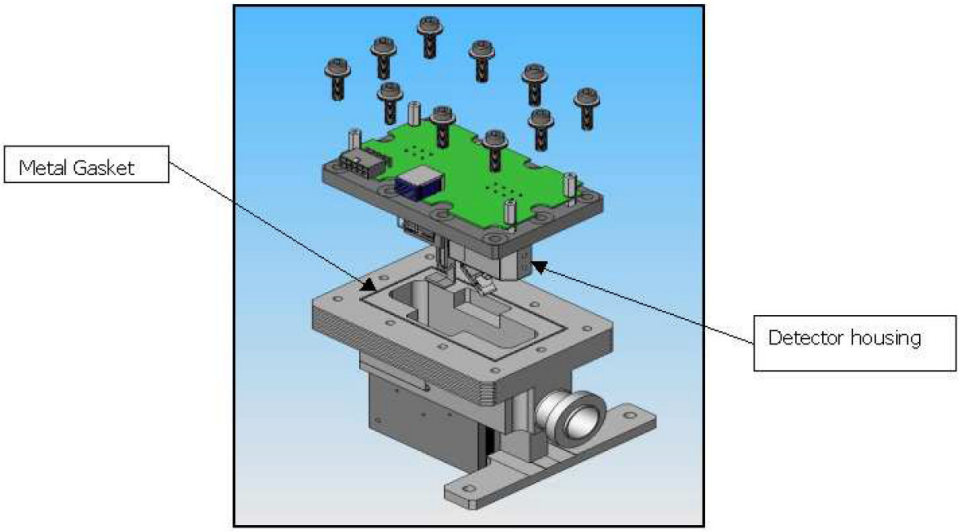

Figure 2-10. Spectrometer alignment

24. Insert a screw with three Belleville washers into each hole and finger tighten (see Figure 2-11).
25. Follow the torqueing pattern in Figure 2-11). Torque screws to 40 in-lbs (4.5 N-m).
26. Re-torque screws to 90 in-lbs (10.2 N-m) following the same pattern. Go through the entire torque pattern twice to ensure the metal gasket is firmly compressed.
27. Wait a minimum of five minutes, then torque the screws again in the same pattern (Figure 2-11) to a value of 90 in-lbs (10.2 N-m). This wait period allows the washers to decompress.

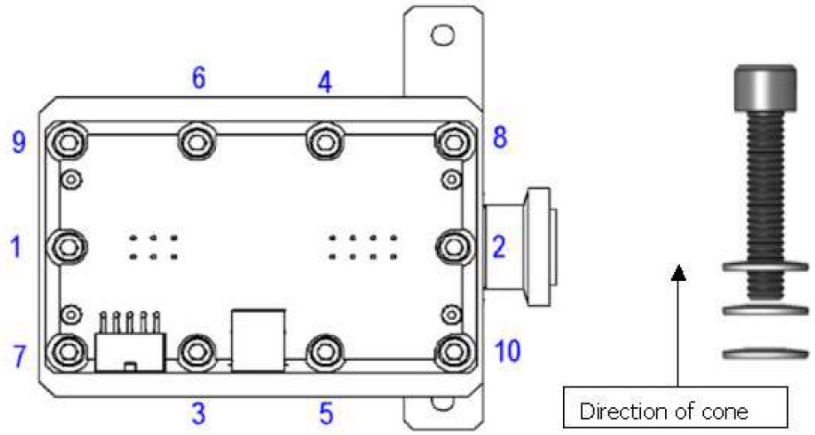

Figure 2-11. Tightening spectrometer header screws

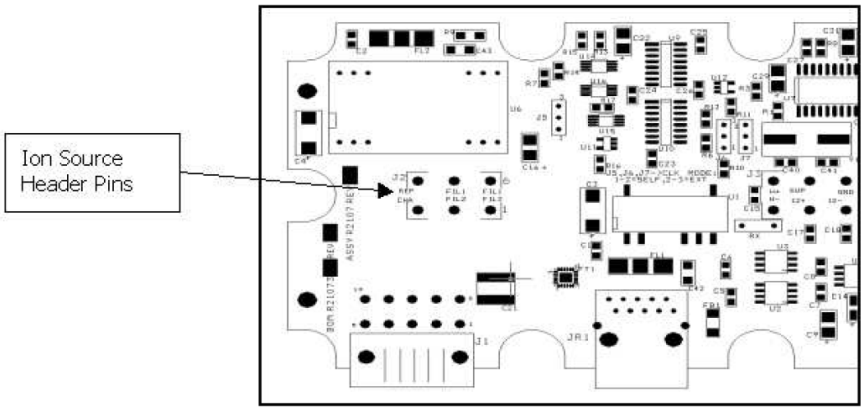

Figure 2-12. Ion source header pin schematic

28. On the PCB, use the resistance meter to verify an open circuit between any two of the six ion source header pins (except FIL-1 to FIL-1 and FIL-2 to FIL-2 which should be 0.3 Ohms or less). Also verify an open circuit between the body of the spectrometer and any of the ion source header pins (**Error! Reference source not found.**). If there is continuity (short circuit) at any of the points, remove the header and inspect for shorting.
29. If successful, leak check the spectrometer to ensure a leak free seal.

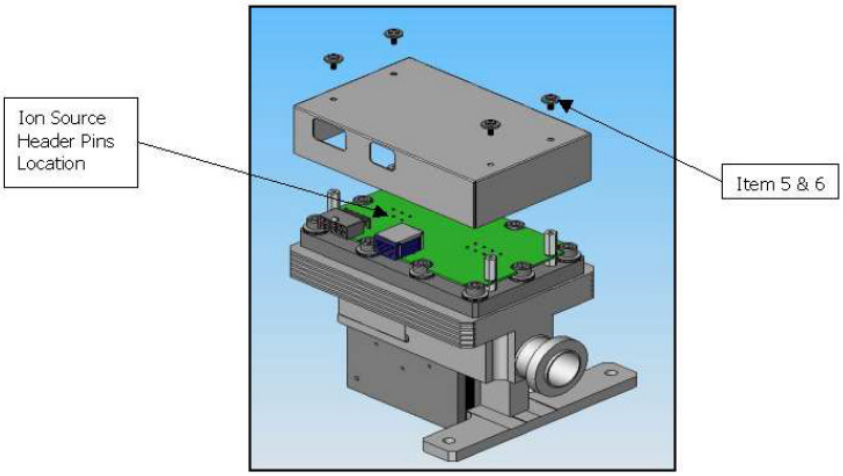

Figure 2-13. Ion source header pin locations

30. Place the spectrometer cover over the header and align the holes (Figure 2-13**Error! Reference source not found.**).
31. Install screws and washers (items 5 & 6), then tighten using a M3 Phillips screw driver (**Error! Reference source not found.**). Tighten one screw over the ground strap connector.
32. Re-plug in both the pre-amp and ion source cable.
33. Reinstall the leak detector covers and fasten hardware.
34. Power up the leak detector.
35. Let the unit run for 20-30 minutes, then perform a calibration (via the I/O, front panel display, or RS232), per the user manual, to validate a successful installation.

3 Filament Installation: Agilent Legacy VS Series Helium Leak Detector

The same filament replacement kit is compatible with any model G8610, G8611, or G8612, as well as legacy Agilent model VS series leak detectors.

3.1 Equipment Required for Agilent Legacy VS Series Helium Leak Detector

The following tools are suggested for assembly.

Table 3-1. Equipment required for VS models

Item	Note
Hot Ion Source Replacement Kit (VSFLDHIS)	--
Extended Length M5 Allen Wrench	For removing leak detector covers
Metric Allen wrench set	--
Needle nose pliers or tweezer	--
M3 Phillips head screw driver	--
Torque wrench (must be adjustable to 40 in-lbs (4.5 N-m) and 90 in-lbs (10.2 N-m))	--
Digital multimeter (Fluke 187 or equivalent)	For resistance and continuity measurements

3.2 Installation Procedure for Agilent Legacy VS Series Helium Leak Detector

For clarity, some items have been omitted from views.

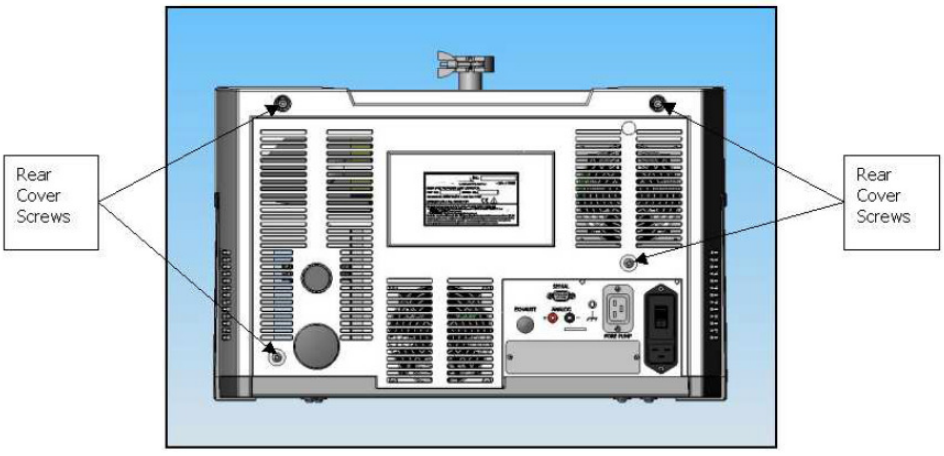

Figure 3-1. Rear screws

1. Turn off the power switch located on the back of the unit and unplug.
2. Wait 30 seconds for the high voltage to dissipate.

3. Using an extended length M5 Allen wrench, remove the four screws holding the rear plastic cover (Figure 3-1).
4. Detach the rear plastic cover from the unit.

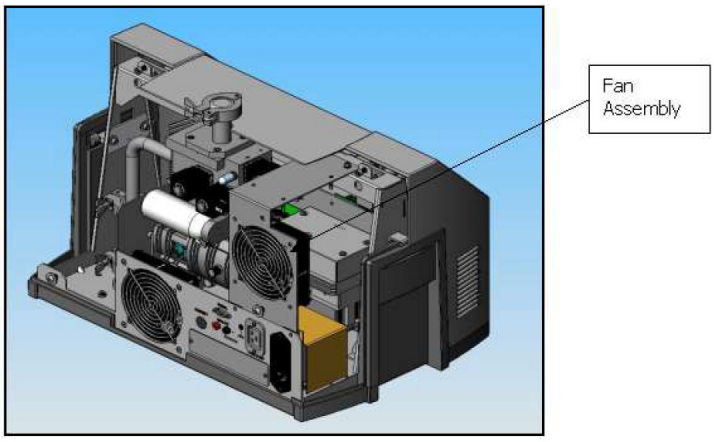

Figure 3-2. Fan assembly

5. Disconnect the fan cable and remove the fan assembly by unfastening two wing nuts and one M4 socket head cap screw (Figure 3-2).

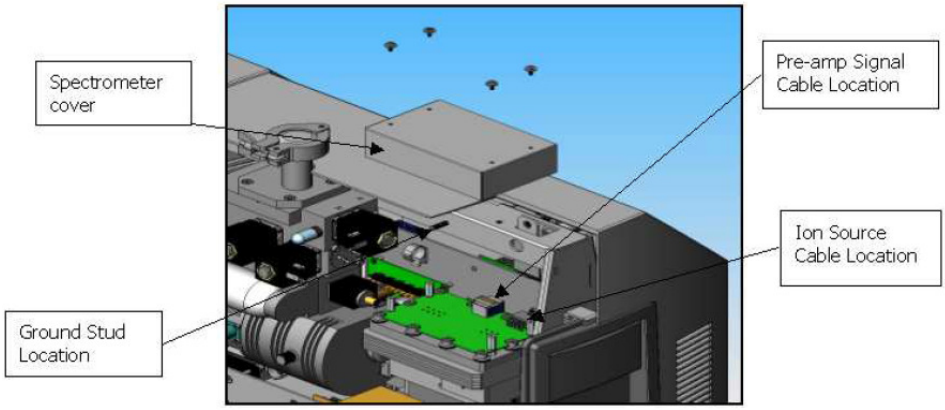

Figure 3-3. Cable locations

CAUTION *Static sensitive device, ensure that personnel are properly grounded before proceeding.*

6. Disconnect the spectrometer ground cable, the preamp signal cable and the ion source cable from the spectrometer (Figure 3-3).

NOTE *Cables not shown for clarity.*

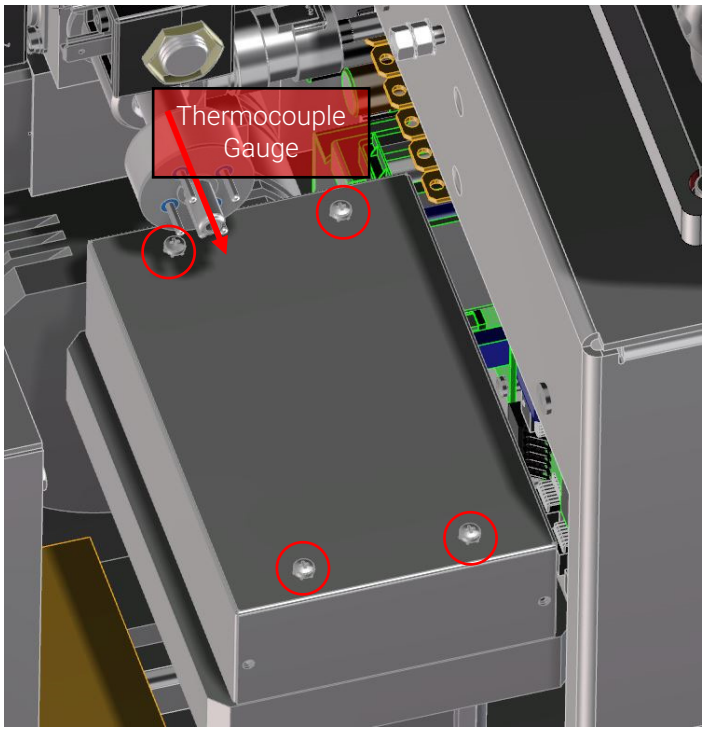

Figure 3-4. Spectrometer access

7. To remove the spectrometer top cover, it may be necessary to first pull straight out the thermocouple gauge (shown in Figure 3-4 with the red arrow. It is shown without the outside black plastic cover). Leave the thermocouple gauge connected to its wiring. Use an M3 Phillips head screw driver to remove the four screws securing it. The screw shown in the top right of Figure 3-4 will be securing a grounding strap. Leave the ground strap hanging from the leak detector frame. Disconnect the two electrical cables plugged into the spectrometer board, the pre-amp RJ45 style connector on the turbo side of the spectrometer, and the ion source multi-pin connector (Cables not shown for clarity: refer to Figure 3-5). Remove the top cover, set aside with the screws.

CAUTION *Static sensitive device, ensure that personnel are properly grounded before proceeding.*

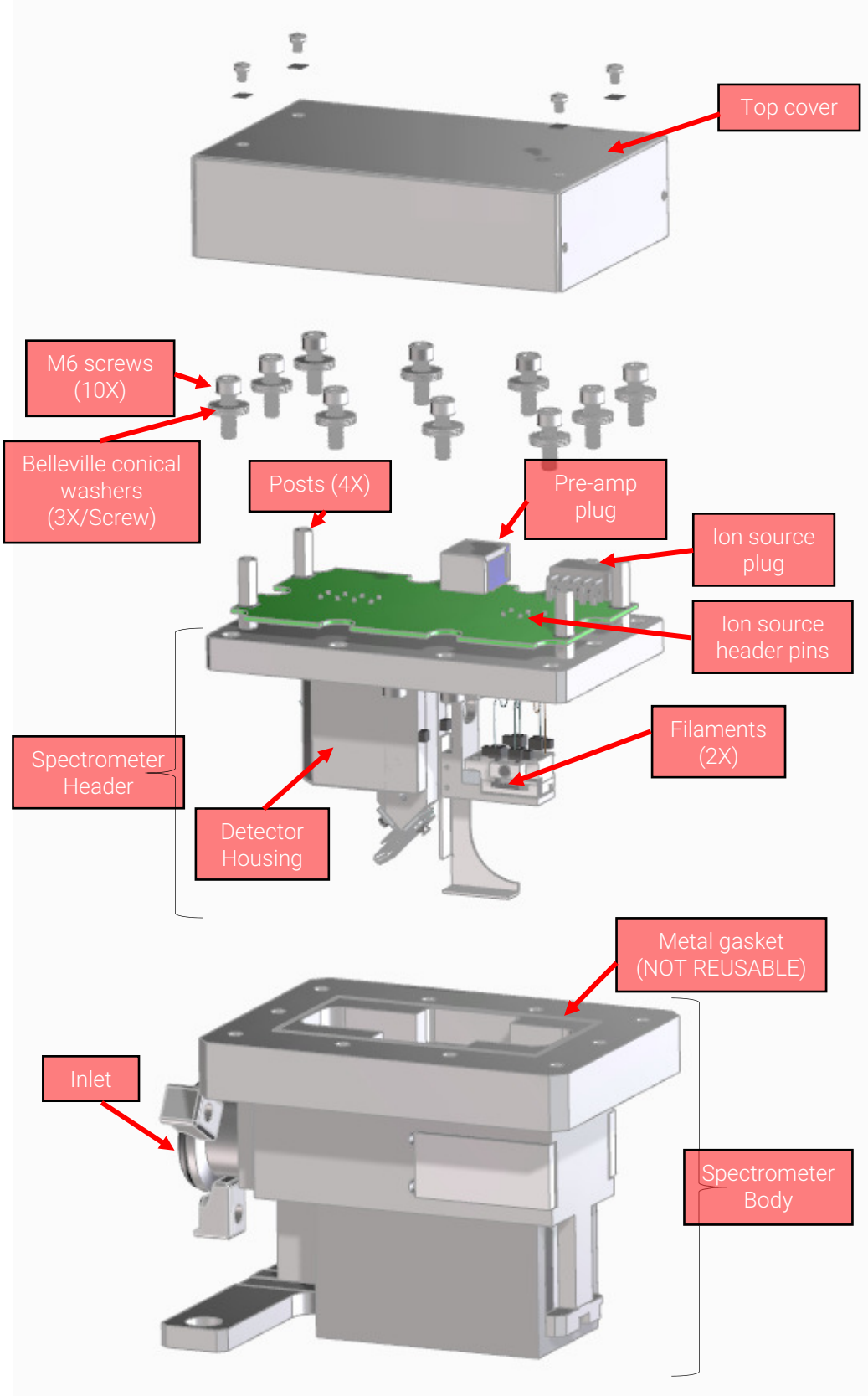

Figure 3-5. Spectrometer exploded view

CAUTION

Wear non-powdered, ESD-safe Nitride or equivalent gloves (not included in kit) to prevent skin oils from getting on vacuum surfaces.

Refer to Figure 2-3 for disassembly of the spectrometer header.

8. Loosen screws (10X) and remove spectrometer header from spectrometer body. The vacuum system vents to atmosphere as the screws are loosened. Retain the socket head cap screws and Belleville washers. Maintain correct orientation of Belleville (conical) washers when removing.
9. Remove the spectrometer header. Rest upside-down on the four posts sticking up from the printed circuit board.
10. Remove metal gasket and discard. Do not scratch the mating surface when removing the gasket. To prevent scratching of any sealing surface, do not use metal tools for this task. Do not attempt to reuse the gasket.
11. Examine the spectrometer cavity for discolored areas. If the inside of the spectrometer body appears dirty, clean it with Vac-u-solv spectrometer cleaning kit (Agilent part number 670029096).

Refer to Figure 3-6 for reference.

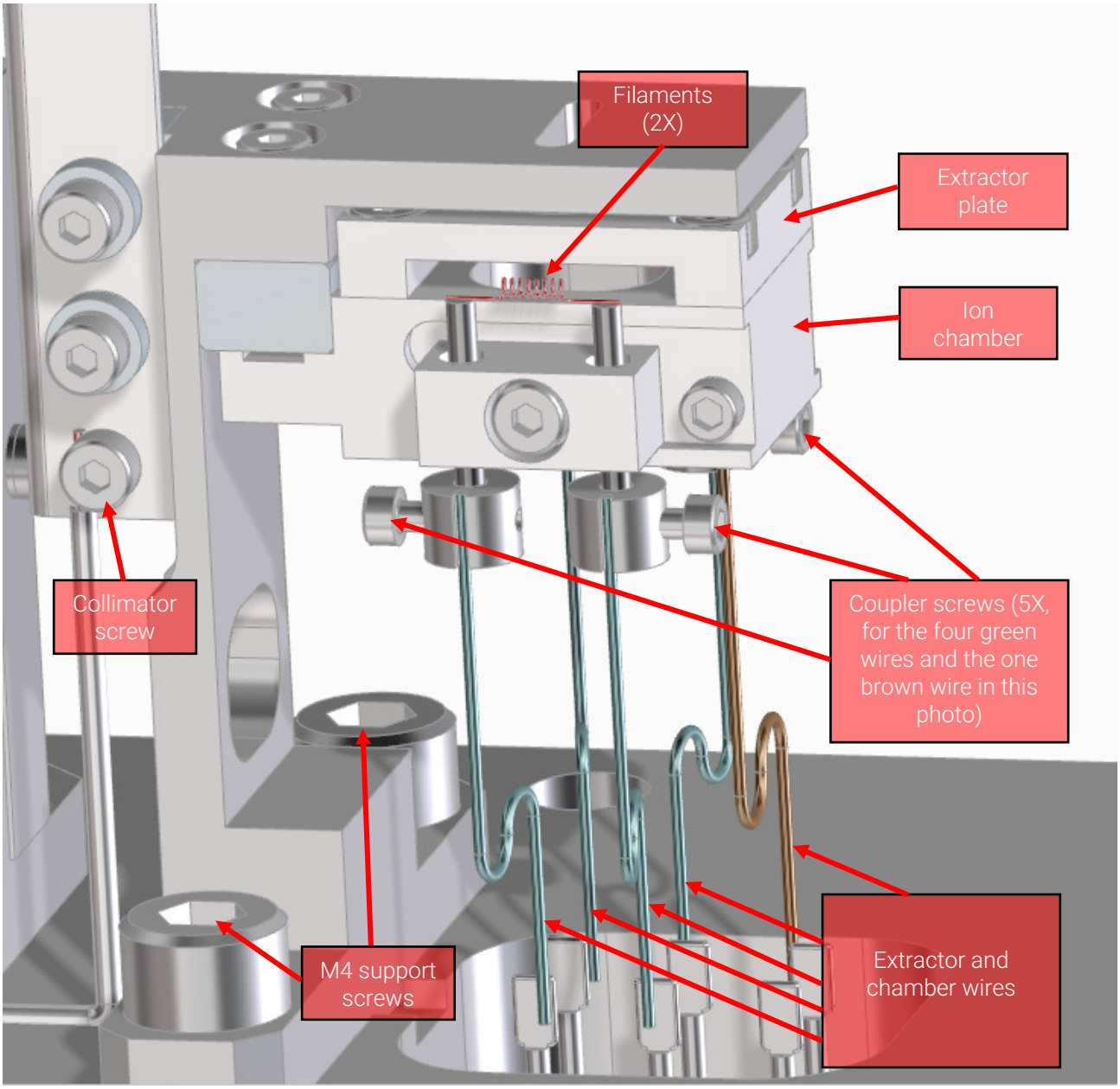

Figure 3-6. Ion Support Assembly

12. Loosen the four filament coupler screws.
13. Loosen the collimator screws.
14. Loosen two M1.6 socket head screws securing the ion source high voltage connection.
15. On a clean work surface, remove the two M4 support screws. See Figure 3-7.

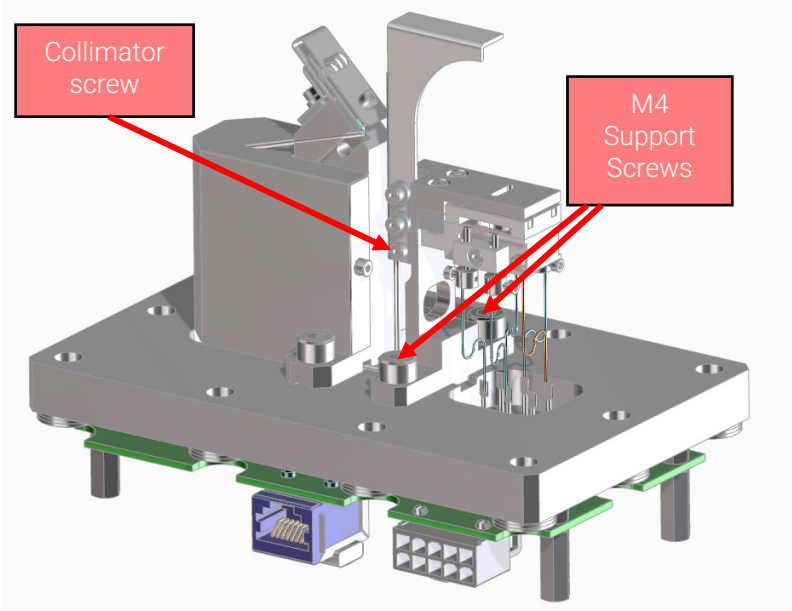

Figure 3-7. M4 support screws

16. Gently remove the ion support assembly from the spectrometer header.

NOTE

Ensure that no damage is done to the spectrometer wire during disassembly.

17. Position the new ion support assembly into the spectrometer header and align.
18. Secure the spectrometer header using two M4 support screws

19. Connect the collimator wire to the collimator plate using an M 1.5 screw. See Figure 3-8.
20. Connect the 4 coupler screws to their respective filaments.

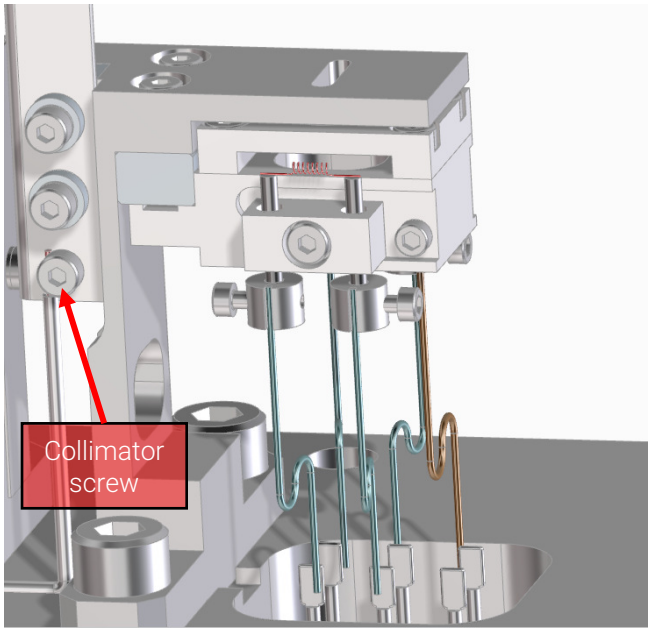

Figure 3-8. Collimator wire connection

21. Insert the high voltage ion source wire (brownish-orange wire in rendering) into the ion chamber and tighten the M1.6 socket head screw.

NOTE

Pull lightly with small pliers on the high voltage ion source wire (brownish-orange) to ensure it is connected securely and will not pull out.

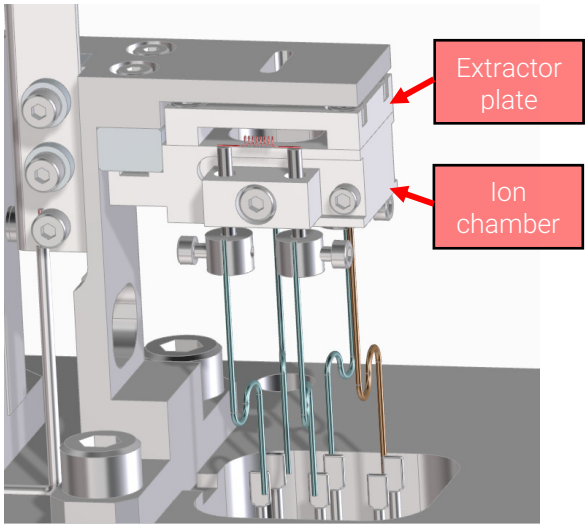

Figure 3-9. Ion chamber and extractor plate

22. Insert new filaments into a pair of couplers. Verify filament alignment as shown in Figure 3-10 and Figure 3-11. Keep screws loose while aligning the filament position, then tighten screws securely once aligned.

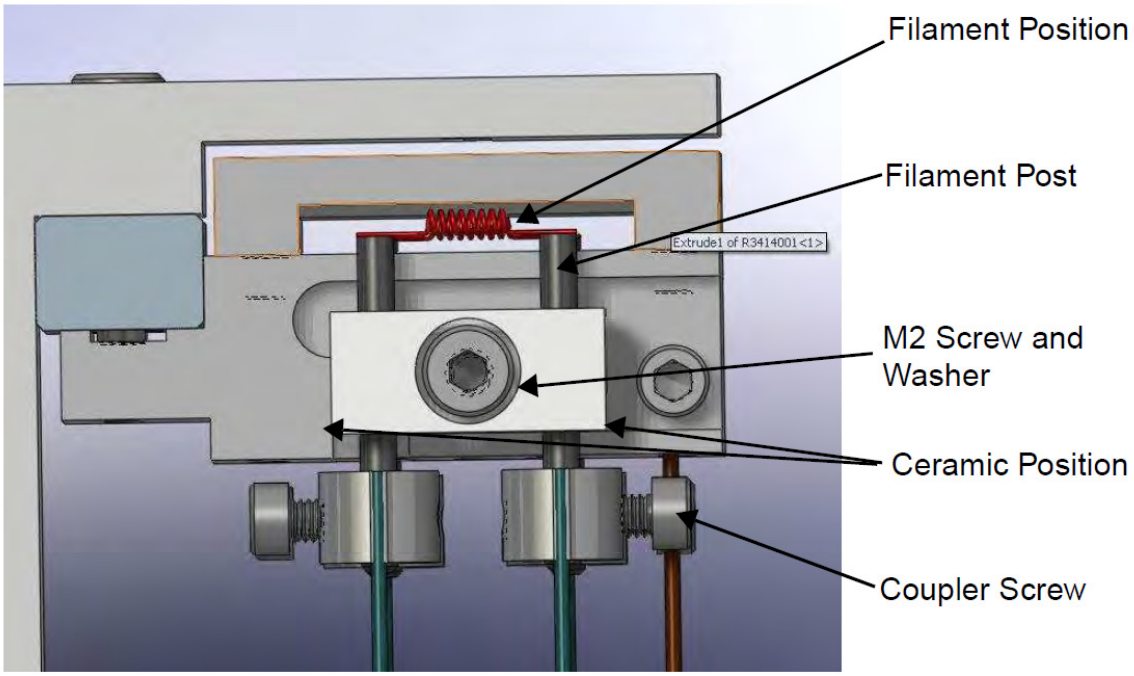

Figure 3-10. Filament positioning

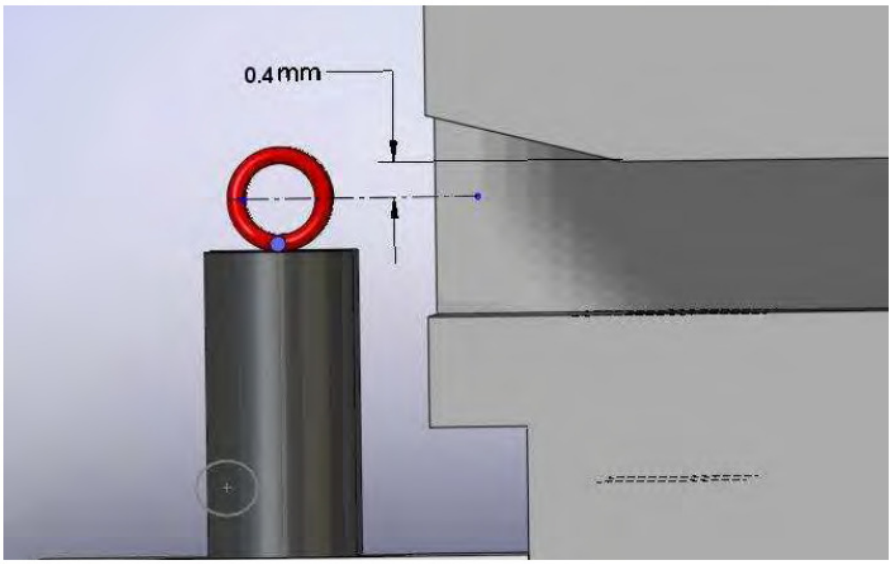

Figure 3-11. Filament alignment

23. Clean the mating surfaces of the spectrometer body and header with isopropyl alcohol and a clean lint free wipe. Agilent recommends use of the Vac-u-solv spectrometer cleaning kit (Agilent part number 670029096).
24. Center the replacement metal gasket inside the bolt pattern and outside of the body cavity. To prevent scratching of any sealing surface, do not use metal tools for this task (Figure 3-12).
25. Guide the spectrometer header into the pocket with the detector housing closest to the inlet.

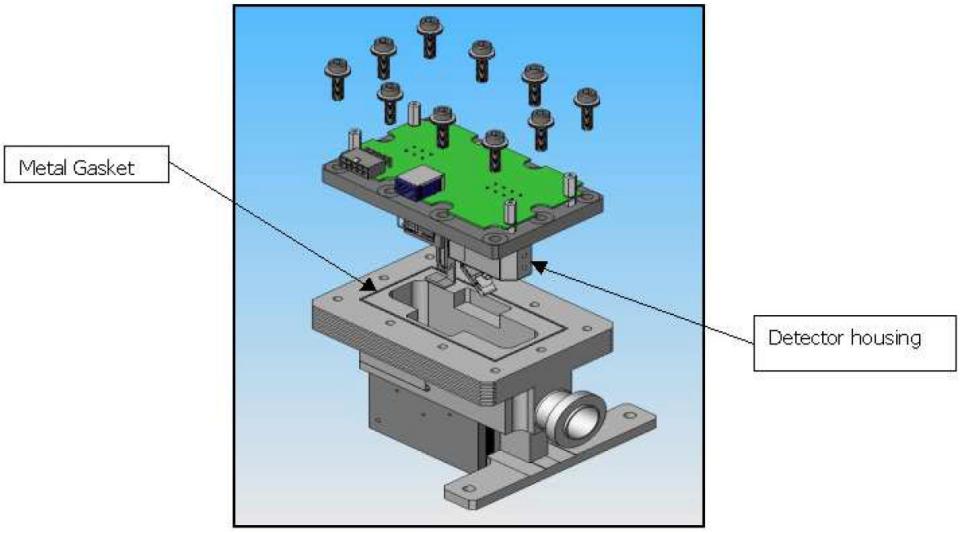

Figure 3-12. Spectrometer alignment

26. Insert a screw with three Belleville washers into each hole and finger tighten (see Figure 2-11).
27. Follow the torqueing pattern in Figure 3-13). Torque screws to 40 in-lbs (4.5 N-m).
28. Re-torque screws to 90 in-lbs (10.2 N-m) following the same pattern. Go through the entire torque pattern twice to ensure the metal gasket is firmly compressed.
29. Wait a minimum of five minutes, then torque the screws again in the same pattern (Figure 3-13) to a value of 90 in-lbs (10.2 N-m). This wait period allows the washers to decompress.

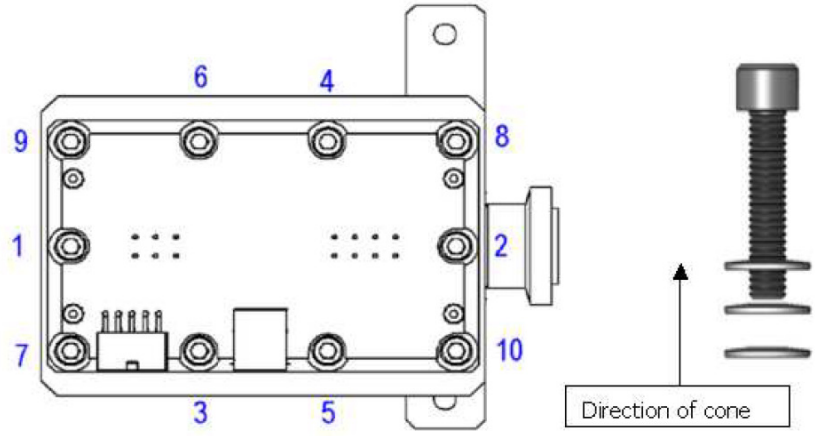

Figure 3-13. Tightening spectrometer header screws

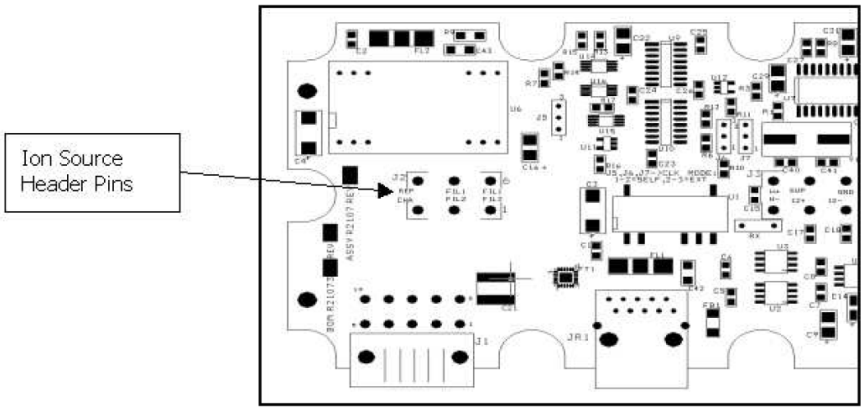

Figure 3-14. Ion source header pin schematic

30. On the PCB, use the resistance meter to verify an open circuit between any two of the six ion source header pins (except FIL-1 to FIL-1 and FIL-2 to FIL-2 which should be 0.3 Ohms or less). Also verify an open circuit between the body of the spectrometer and any of the ion source header pins (Figure 3-14). If there is continuity (short circuit) at any of the points, remove the header and inspect for shorting.
31. If successful, leak check the spectrometer to ensure a leak free seal.

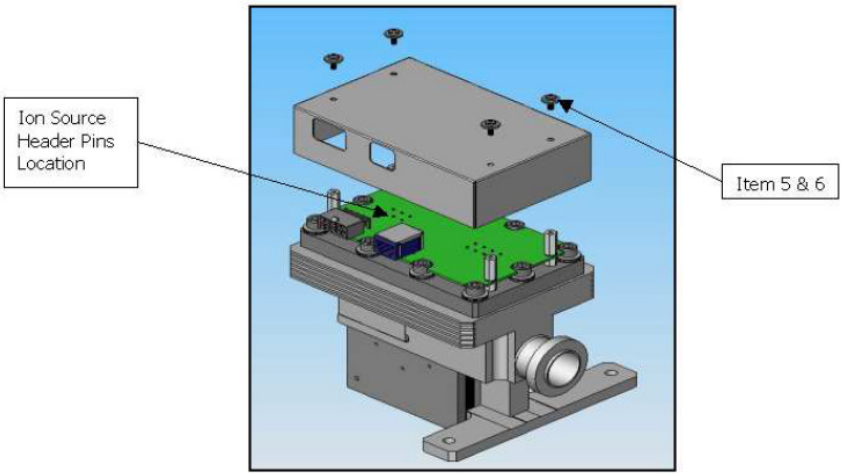

Figure 3-15. Ion source header pin locations

32. Place the spectrometer cover over the header and align the holes (Figure 2-13Figure 3-15).
33. Install screws and washers (items 5 & 6), then tighten using a M3 Phillips screw driver (**Error! Reference source not found.**). Tighten one screw over the ground strap connector.
34. Re-plug in both the pre-amp and ion source cable.
35. Reinstall the leak detector covers and fasten hardware.
36. Power up the leak detector.
37. Let the unit run for 20-30 minutes, then perform a calibration (via the I/O, front panel display, or RS232), per the user manual, to validate a successful installation.

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- Products returned that have not been drained from oil will be disposed.
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Failure Description:		Type of Process (for which the equipment was used)	

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Flammable	☐ YES ☐ NO				
Explosive (*)	☐ YES ☐ NO				
Radioactive (*)	☐ YES ☐ NO				
Biological (*)	☐ YES ☐ NO				
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Agilent Vacuum Products Division/Sales and Service Offices

United States
Agilent Technologies
121 Hartwell Avenue
Lexington, MA 02421 - USA
Tel. +1 781 861 7200
Fax. +1 781 860 5437
Toll-Free: +1 800 882 7426
vpl-customercare@agilent.com

Belgium
Agilent Technologies Belgium
S.A./N.V.
Customer Contact Center
Pegasus Park
De Kleetlaan 12A bus 12
B-1831 Diegem
Tel. +32 2 404 92 22
Fax. +32 2 626 46 30
customercare_belgium@agilent.cm

Brazil
Agilent Technologies Brasil
Avenida Marcos Penteado de Ulhoa Rodrigues, 939 - 6° andar
Castelo Branco Office Park
Torre Jacarandá - Tamboré
Barueri, Sao Paulo CEP: 06460-040
Toll-Free: +0800 728 1405

China
Agilent Technologies (China) Co. Ltd
No.3, Wang Jing Bei Lu, Chao Yang District
Beijing, 100102, China
Tel. +86 (0)10 64397888
Fax. +86 (0)10 64392765
Toll free: 800 820 6778 (Phone)
Toll free: 400 820 6778 (Cell Phone)
vacuum.cnmarketing@agilent.com
vpc-customerservice@agilent.com

France
Agilent Technologies
Parc Technopolis - Z.A. de Courtaboeuf
3, avenue du Canada - CS 90263
91978 Les Ulis cedex, France
Tel. +33 (0) 1 64 53 61 15
Fax. +33 (0) 1 64 53 50 01
vpf.sales@agilent.com

Germany and Austria
Agilent Technologies
Sales & Services GmbH & Co. KG
Lyoner Str. 20
60 528 Frankfurt am Main
GERMANY
Ph. +49 69 6773 43 2230
Fax. +49 69 6773 43 2250

India (Sales)
Agilent Technologies India Pvt. Ltd.
Unit Nos 110-116, & Part of 101 & 109
First Floor, Splendor Forum,
Plot No. -3, District Centre, Jasola
New Delhi-110025
Tel. +91 11 4623 7100
Fax. +91 4623 7105

India (Service)
Agilent Technologies India Pvt. Ltd.
C-Block, RMZ Centennial Plot Number -8A, 8B, 8C, 8D,
Doddanakundi Industrial Area, ITPL Road,
Mahadevapura Post, Bangalore-560048
Tel. +91 80 40614000
Fax. +91 80 40148991

Italy
Agilent Technologies Italia S.p.A.
Via F.lli Varian, 54
10040 Leini, (Torino) - Italy
Tel. +39 011 9979 111
Fax. +39 011 9979 350
Toll free: 00800 234 234 00
vpt-customerservice@agilent.com

Japan
Agilent Technologies Japan, Ltd.
9-1 Takakura-cho Hachioji-city,
Tokyo, Japan
Tel. +81- 3-5232-1253
Fax. +81-120-565-154
Toll-Free: +81-120-477-111
jp-vvt-sales.pdl-ext@agilent.com

Korea
Agilent Technologies Korea, Ltd.
Ilshin Builiding 4F
Yongsan-gu Hannam-daero
Seoul Korea 04418
Tel. +82 (0)2 2194 9449
Fax. +82 (0)2 2194 9853
Toll free: 080 222 2452
vpk-customerservice@agilent.com

Mexico
Agilent Technologies
Concepcion Beistegui No. 109
Col Del Valle
C.P. 03100 – Mexico, D.F.
Tel. +52 5 523 9465
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Netherlands
Agilent Technologies Netherlands B.V.
Customer Contact Center
Laan van Langerhuize 1, toren A-8
1186 DS Amstelveen
Tel. +31 020 547 2600
Fax. +31 020 654 5748
customercare_netherlands@agilent com

Singapore
Agilent Technologies Singapore Pte. Ltd,
1 Yishun Avenue 7,
Singapore 768923
Tel. (65) 6215 8045
Fax. (65) 6754 0574
Toll-Free: 1 800 2762622
vps-customerservice@agilent.com

Southeast Asia
Agilent Technologies Sales Sdn Bhd
Unit 201, Level 2 uptown 2,
2 Jalan SS21/37, Damansara Uptown
47400 Petaling Jaya, Selangor,
Malaysia
Tel. +603 7712 6181
Fax. +603 7727 1239
Toll-Free: +1 800 880 805
vps-customerservice@agilent.com

Taiwan
Agilent Technologies Taiwan Limited
No. 20 Gao-shuang Road, Ping-zhen Dis
Tao-Yuan City
32450 Taiwan, R.O.C.
Tel. +8863 3 4959004
Toll-Free: 0800 018 768
vpw-customerservice@agilent.com

UK and Ireland
Agilent Technologies LDA UK Limited
Lakeside Cheadle Royal Business Park
Cheadle, Cheshire SK8 3GR,
United Kingdom
Tel. +44 01865291570
Fax. +44 01865291571
Toll-Free: 00 800 234 234 00
Toll-Free fax.: 00 800 345 345 00
vpt-customercare@agilent.com

Other Countries
Agilent Technologies Italia S.p.A.
Via F.lli Varian, 54
10040 Leini, (Torino) - Italy
Tel. +39 011 997 9111
Fax. +39 011 997 9350
Toll-Free: 00 800 234 234 00
vpt-customercare@agilent.com

Customer Support & Service
NORTH AMERICA:
Toll Free: 800 882 7426
vpl-ra@agilent.com
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EUROPE:
Toll-Free: 00 800 234 234 00
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