



Agilent Technologies

Vacuum Products Division

Filament Replacement for VS Series Leak Detector

*FIELD INSTALLATION
INSTRUCTIONS*

Part Number 699909994
Rev. C
May 2018

Agilent Field Instruction Sheet


Filament Replacement for VS Series Leak Detector

Preface


Documentation Standards

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.**



Hazard and Safety Information

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

	OFF Supply (Power)		Earth (Ground) Terminal
	ON Supply (Power)		Caution, Hot Surface
	AC – Alternating Current		Caution, Risk of Electrical Shock
	Warning, Risk of danger		Protective Conductor Terminal
	Frame or chassis Terminal		

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.

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 enclosure, the LCD display and Front Panel buttons, 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.

Vacuum Equipment and Cleanliness

Cleanliness is vital when servicing the leak detector or any vacuum equipment. There are some techniques that are more important in leak detector servicing than in general vacuum work:

CAUTION



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



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.

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.

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.



Equipment Required

- Filament Service Kit (PN: VSFLDFR)
- Extended Length M5 Allen Wrench
- Metric Allen Wrench Set
- Needle nose pliers or tweezer
- M3 Phillips Head Screw Driver
- 1.5 mm Hex Driver
- 5 mm Hex 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)

Installation Procedure

For clarity, some items have been omitted from views.

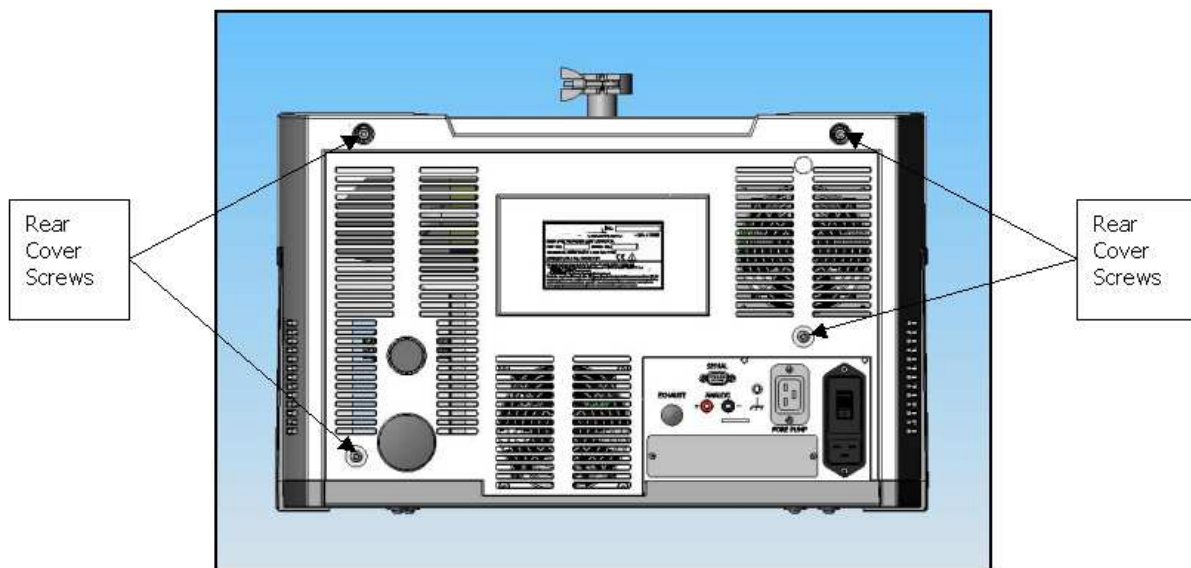


Figure 1: Rear Screws

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 1: Rear Screws).
4. Detach the rear plastic cover from the unit.

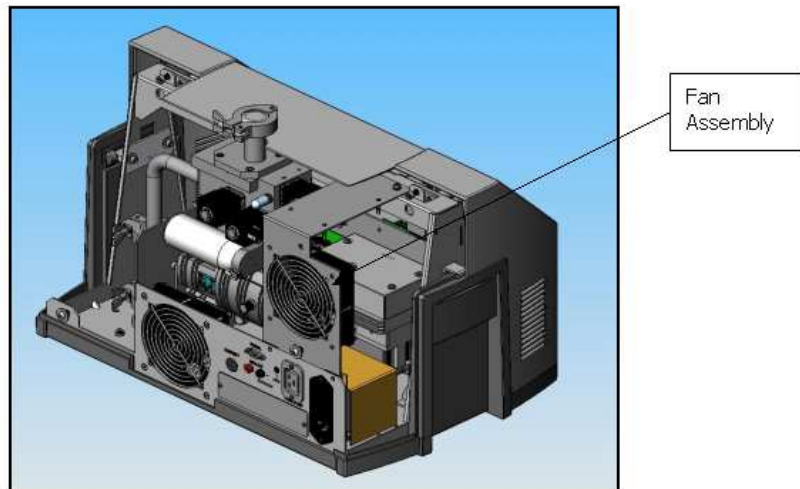


Figure 2: Fan Assembly

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

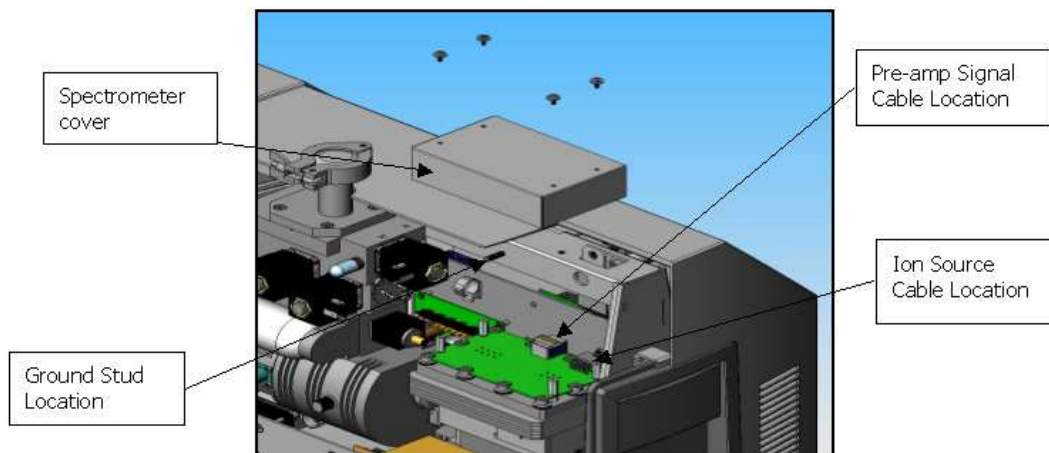


Figure 3: Cable Locations

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: Cable Locations).

NOTE



Cables not shown for clarity.

7. Using an M3 Phillips screw driver, remove the spectrometer cover.

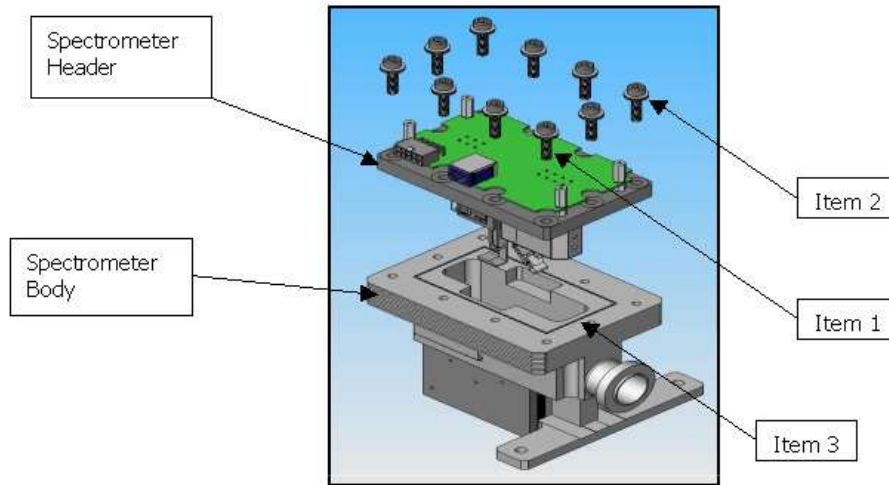


Figure 4: Spectrometer Exploded View

CAUTION



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

8. Loosen screws (item 1) and carefully remove the spectrometer header from the body. The vacuum system vents to atmosphere as the screws are loosened. Retain the socket head cap screws (item 1) and the Belleville washers (item 2). See line item 21 for correct orientation of the Belleville washers (Figure 10: Direction of Cone).
9. Remove the metal gasket (item 3) and discard. Do not scratch the mating surface when removing the gasket. Do not attempt to reuse the gasket (Figure 4: Spectrometer Exploded View).
10. Examine the spectrometer cavity for discolored areas. If present, refer to the service manual for cleaning instruction.

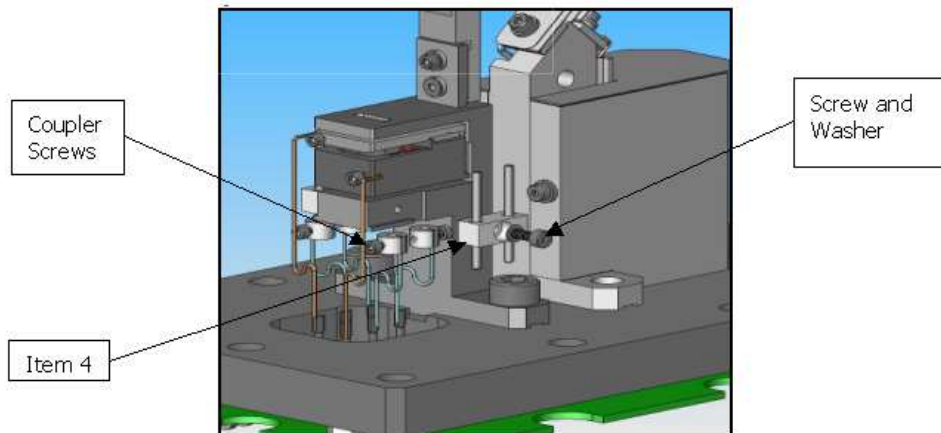


Figure 5: Coupler Screws

11. On a clean work surface, remove the defective filament(s) (item 4) from the spectrometer by loosening the two coupler screws. Then loosen the M2 screw and washer and remove the defective filament (Figure 5: Coupler Screws).

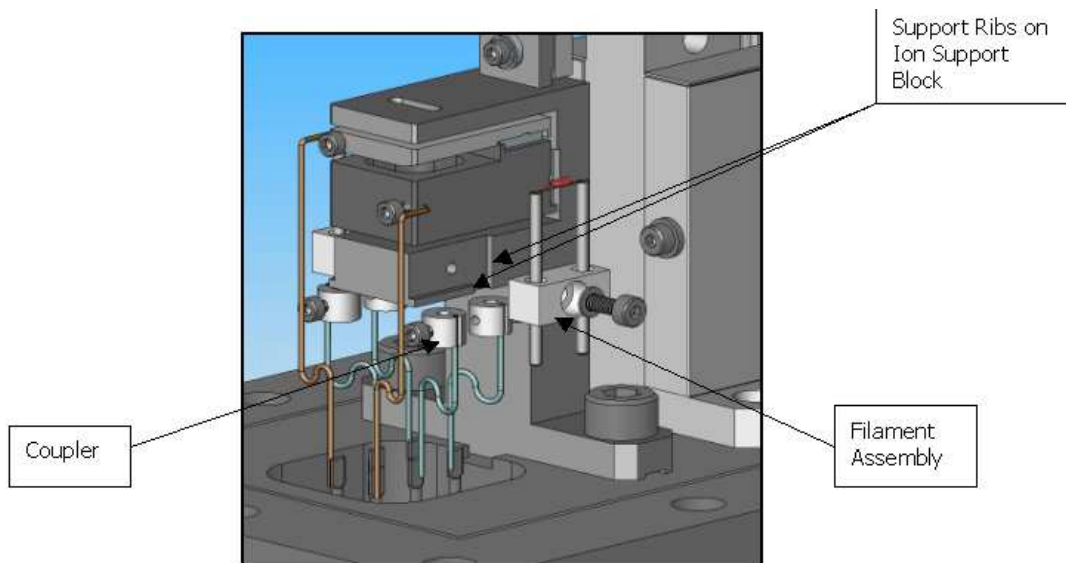


Figure 6: Coupler and Filament Assembly

12. Inspect the new filament assembly for deformation, damage and flaking of the coating prior to installation. Do not install if damaged.
13. Insert new filament assembly into the coupler.
14. Guide the ceramic against the bottom and side ribs of the ion source support block (Figure 6: Coupler and Filament Assembly and Figure 7: Filament Position). Correct positioning of filament is critical for proper spectrometer operation.
15. While holding the filament in position, insert the M2 screw and washer and tighten (Figure 7: Filament Position).
16. Tighten the coupler screws onto the filament posts (Figure 7: Filament Position).
17. Verify ceramic is tight against the bottom and right side ribs. Ensure that the filament is positioned in the slot of the ion source as shown (Figure 7: Filament Position and Figure 8: Filament Alignment).

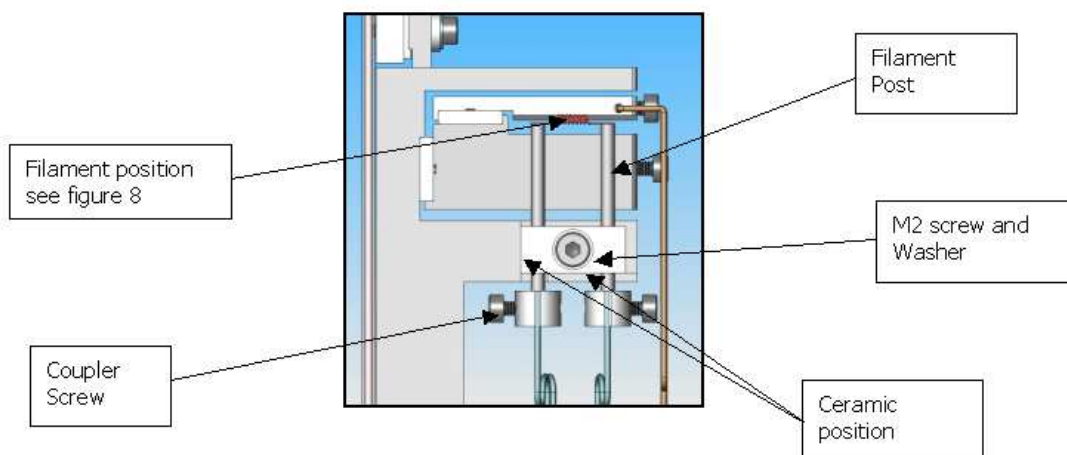


Figure 7: Filament Position

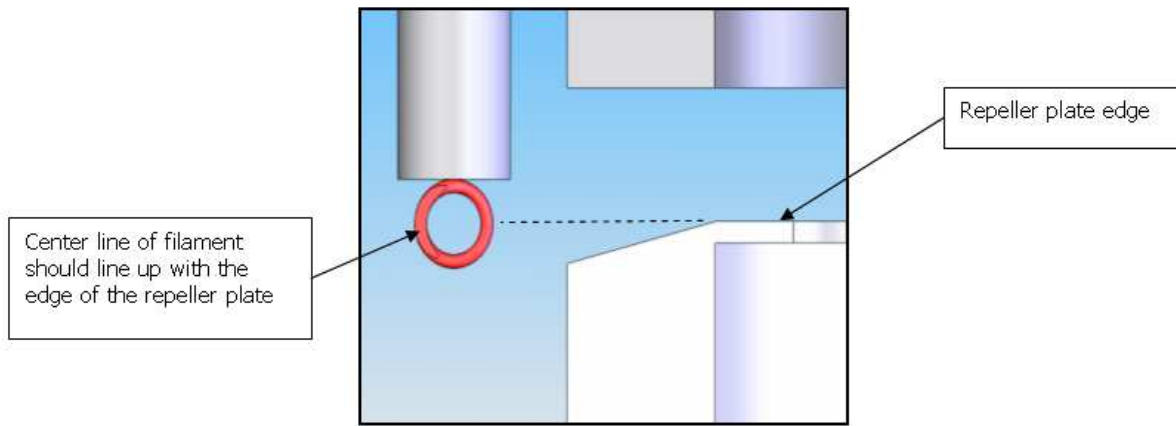


Figure 8: Filament Alignment

18. Clean the mating surfaces of the spectrometer body and header with Isopropyl alcohol and a clean lint free wipe.

NOTE



Agilent recommends that you use the Vac-u-solv spectrometer cleaning kit (PN: 670029096).

19. Center 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.

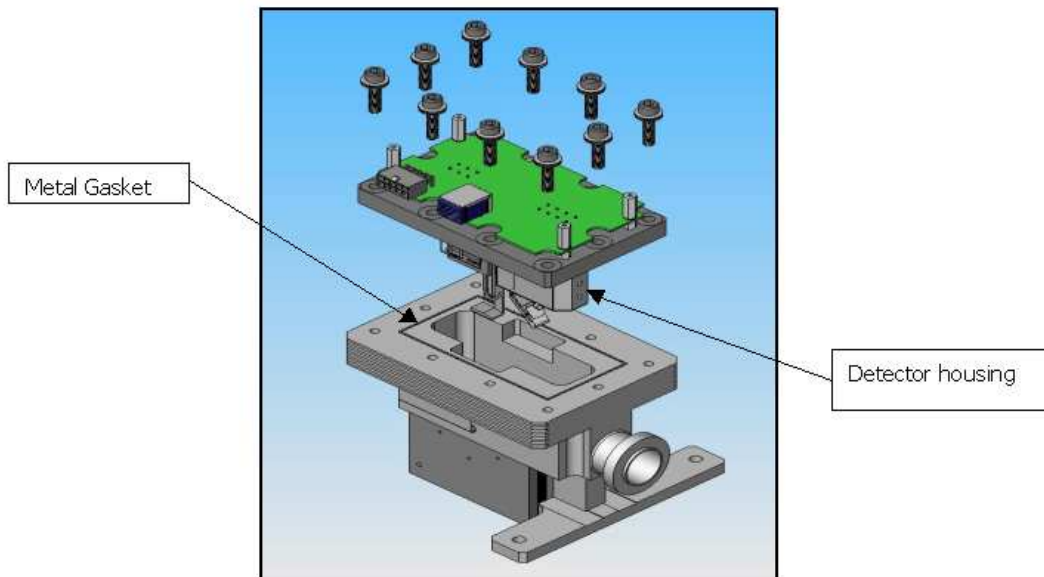


Figure 9: Spectrometer Alignment

20. Guide the spectrometer header into pocket with the detector housing closest to the inlet (Figure 9: Spectrometer Alignment).

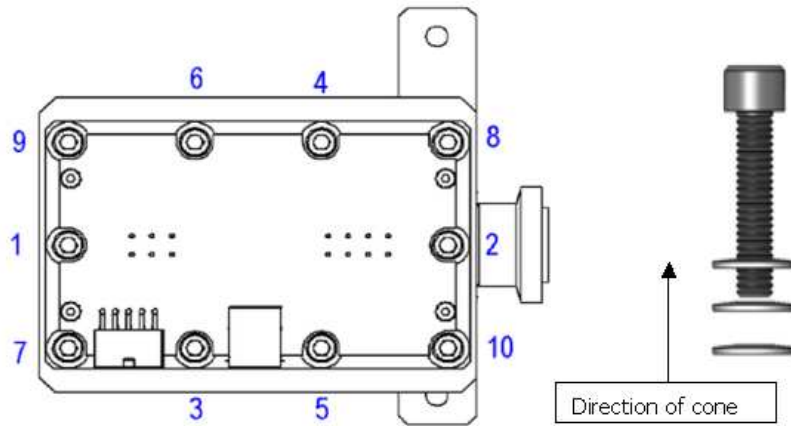


Figure 10: Direction of Cone

21. Insert a screw with three Belleville washers into each hole and finger tighten (Figure 10: Direction of Cone).

NOTE

The cones of the Belleville washers should all point to the head of the screw.



- 22. Following the pattern shown in Figure 10: Direction of Cone, torque screws to 40 in-lbs (4.5 N-m).
- 23. 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.
- 24. Wait a minimum of five minutes then torque the screws shown in pattern (Figure 10: Direction of Cone) to 90 in-lbs (10.2 N-m).

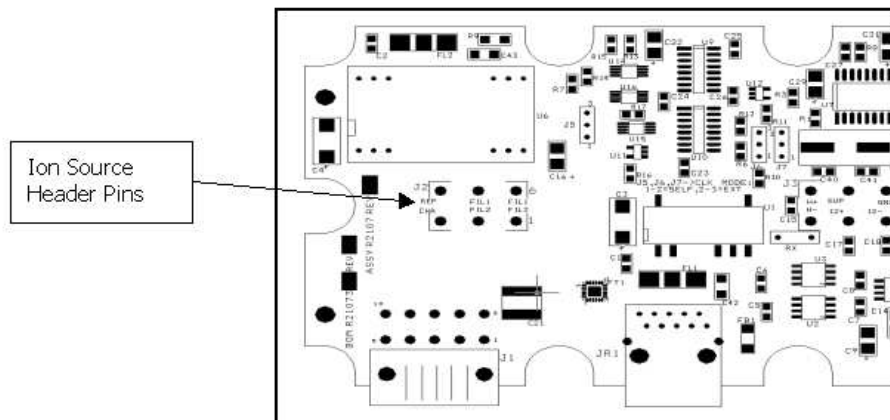


Figure 11: Ion Source Header Pin Schematic

25. 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 11: Ion Source Header Pin Schematic). If there is continuity (short circuit) at any of the points, remove the header and inspect for shorting.

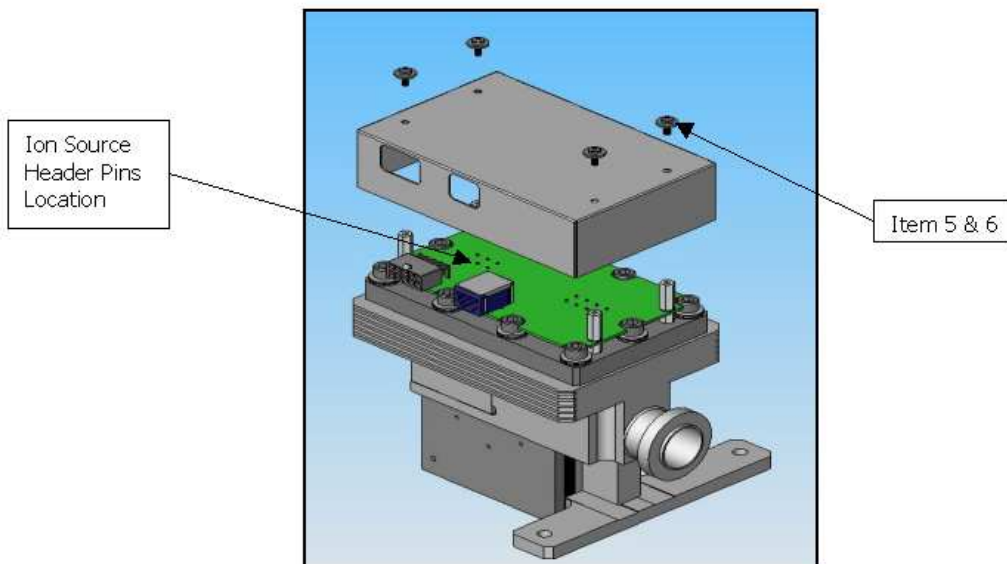


Figure 12: Ion Source Header Pin Locations

26. Place the spectrometer cover over the header and align the holes (Figure 12: Ion Source Header Pin Locations).
27. Install screws and washers (items 5 & 6), then tighten using a M3 Phillips screw driver (Figure 12: Ion Source Header Pin Locations).
28. Connect the spectrometer ground cable, the preamp signal cable and the ion source cable to the spectrometer cover.

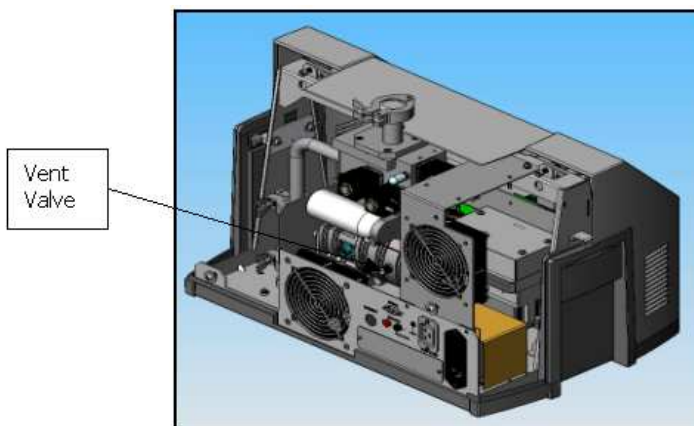


Figure 13: Vent Valve

29. Ensure that the vent valve on the turbo molecular pump (if installed) is tightened (Figure 13: Vent Valve).

NOTE

The vent valve is not installed on most turbo pumps.



30. Attach the fan assembly (Figure 2: Fan Assembly) by fastening two wing nuts and one M4 socket head cap screw. Then connect the fan cable to the unit.
31. Leak check the spectrometer to ensure a leak free joint.
32. Attach the rear cover and secure to the unit using existing hardware.
33. Power up the unit.
34. Watch the Home screen to verify that the *Spectube Pressure Wait* message progresses to *Stabilization Wait* and *System Ready* within ten minutes. Refer to the user manual if the system fails to reach the *System Ready* mode. The filament emission current normally operates at 0.8mA.
35. Use the display menus (MENUS, SET-UP, MANUAL TUNING, EMISSION) to set the emission to .8mA.

NOTE



Agilent recommends that you wait a minimum of 30 minutes for the vacuum system to clean up to obtain optimum calibration.

36. Calibrate the system per the user manual. For proper operation the system must be calibrated after opening the spectrometer or changing a filament.
37. If the system fails calibration, adjust the filament emission current as follows:
 - If gain is too low, there is too much signal; reduce emission current (by 0.1 - 0.2mA), then calibrate again.
 - If gain is too high, there is too little signal; increase emission, then calibrate again.
 The permitted emission current range is from 0.5 to 1.5 mA.
 When calibration is successful, filament replacement is complete.

Vacuum Products Division Instructions for returning products

Dear Customer:

Please follow these instructions whenever one of our products needs to be returned.

- 1) Complete the attached Request for Return form and send it to Agilent Technologies (see below), taking particular care to identify all products that have pumped or been exposed to any toxic or hazardous materials.
- 2) After evaluating the information, Agilent Technologies will provide you with a Return Authorization (RA) number via email or fax, as requested.
Note: Depending on the type of return, a Purchase Order may be required at the time the Request for Return is submitted. We will quote any necessary services (evaluation, repair, special cleaning, eg).
- 3) **Important steps for the shipment of returning product:**
 - Remove all accessories from the core product (e.g. inlet screens, vent valves).
 - Prior to shipment, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
 - If ordering an Advance Exchange product, **please use the packaging from the Advance Exchange to return the defective product.**
 - Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
 - Agilent Technologies is not responsible for returning customer provided packaging or containers.
 - **Clearly label package with RA number.** Using the shipping label provided will ensure the proper address and RA number are on the package. Packages shipped to Agilent without a RA clearly written on the outside cannot be accepted and will be returned.
- 4) Return only products for which the RA was issued.
- 5) **Product being returned under a RA must be received within 15 business days.**
- 6) **Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information.** Customer is responsible for freight charges on returning product.
- 7) Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.

RETURN THE COMPLETED **REQUEST FOR RETURN** FORM TO YOUR NEAREST LOCATION:

EUROPE:
Fax: 00 39 011 9979 330
Fax Free: 00 800 345 345 00
Toll Free: 00 800 234 234 00
vpt-customer@agilent.com

NORTH AMERICA:
Fax: 1 781 860 9252
Toll Free: 800 882 7426, Option 3
vpl-ra@agilent.com

PACIFIC RIM:
please visit our website for individual
office information
<http://www.agilent.com>



Please read important policy information on Page 3 that applies to all returns.

1) CUSTOMER INFORMATION

Company Name:		Contact Name:	
Tel:	Email:	Fax:	
Customer Ship To:		Customer Bill To:	
Europe only: VAT reg. Number:		USA/Canada only: <input type="checkbox"/> Taxable <input type="checkbox"/> Non-taxable	

2) PRODUCT IDENTIFICATION

Product Description	Agilent P/N	Agilent S/N	Original Purchasing Reference

3) TYPE OF RETURN (Choose one from each row and supply Purchase Order if requesting a billable service)

- 3A. Non-Billable Billable **➔** New PO # (hard copy must be submitted with this form):
- 3B. Exchange Repair Upgrade Consignment/Demo Calibration Evaluation Return for Credit

4) HEALTH and SAFETY CERTIFICATION

AGILENT TECHNOLOGIES CANNOT ACCEPT ANY PRODUCTS CONTAMINATED WITH BIOLOGICAL OR EXPLOSIVE HAZARDS, RADIOACTIVE MATERIAL, OR MERCURY AT ITS FACILITY.

Call Agilent Technologies to discuss alternatives if this requirement presents a problem.

The equipment listed above (check one):

- HAS NOT** pumped or been exposed to any toxic or hazardous materials. OR
- HAS** pumped or been exposed to the following toxic or hazardous materials. If this box is checked, the following information must also be filled out. Check boxes for all materials to which product(s) pumped or was exposed:

- Toxic Corrosive Reactive Flammable Explosive Biological Radioactive

List all toxic/hazardous materials. Include product name, chemical name, and chemical symbol or formula:

NOTE: If a product is received at Agilent which is contaminated with a toxic or hazardous material that was not disclosed, **the customer will be held responsible** for all costs incurred to ensure the safe handling of the product, and **is liable** for any harm or injury to Agilent employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

Print Name: _____ **Authorized Signature:** **Date:** _____

5) FAILURE INFORMATION:

Failure Mode (REQUIRED FIELD. See next page for suggestions of failure terms):
Detailed Description of Malfunction: (Please provide the error message)
Application (system and model):

I understand and agree to the terms of Section 6, Page 3/3.

Print Name: _____ **Authorized Signature:** **Date:** _____



**Vacuum Products Division
Request for Return Form
(Health and Safety Certification)**

Please use these Failure Mode to describe the concern about the product on Page 2.

TURBO PUMPS and TURBO CONTROLLERS

APPARENT DEFECT/MALFUNCTION	POSITION	PARAMETERS
- Does not start - Does not spin freely - Does not reach full speed - Mechanical Contact - Cooling defective	- Noise - Vibrations - Leak - Overtemperature - Clogging	- Vertical - Horizontal - Upside-down - Other: Power: Rotational Speed: Current: Inlet Pressure: Temp 1: Foreline Pressure: Temp 2: Purge flow: OPERATING TIME:

ION PUMPS/CONTROLLERS

- Bad feedthrough - Vacuum leak - Error code on display	- Poor vacuum - High voltage problem - Other
---	--

VALVES/COMPONENTS

- Main seal leak - Solenoid failure - Damaged sealing area	- Bellows leak - Damaged flange - Other
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LEAK DETECTORS

- Cannot calibrate - Vacuum system unstable - Failed to start	- No zero/high background - Cannot reach test mode - Other
---	--

INSTRUMENTS

- Gauge tube not working - Communication failure - Error code on display	- Display problem - Degas not working - Other
--	---

SCROLL AND ROTARY VANE PUMPS

- Pump doesn't start - Doesn't reach vacuum - Pump seized	- Noisy pump (describe) - Over temperature - Other
---	--

DIFFUSION PUMPS

- Heater failure - Doesn't reach vacuum - Vacuum leak	- Electrical problem - Cooling coil damage - Other
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Section 6) **ADDITIONAL TERMS**

Please read the terms and conditions below as they apply to all returns and are in addition to the Agilent Technologies Vacuum Product Division – Products and Services Terms of Sale.

- Customer is responsible for the freight charges for the returning product. Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.
- Customers receiving an Advance Exchange product agree to return the defective, rebuildable part to Agilent Technologies **within 15 business days**. Failure to do so, or returning a non-rebuildable part (crashed), will result in an invoice for the non-returned/non-rebuildable part.
- Returns for credit toward the purchase of new or refurbished Products are subject to prior Agilent approval and may incur a restocking fee. Please reference the original purchase order number.
- Units returned for evaluation will be evaluated, and a quote for repair will be issued. If you choose to have the unit repaired, the cost of the evaluation will be deducted from the final repair pricing. A Purchase Order for the final repair price should be issued within 3 weeks of quotation date. Units without a Purchase Order for repair will be returned to the customer, and the evaluation fee will be invoiced.
- A Special Cleaning fee will apply to all exposed products per Section 4 of this document.
- If requesting a calibration service, units must be functionally capable of being calibrated.

Filament Replacement for VS Series Leak Detector

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