Spectrometer Header M1 Replacement for VS Series Leak Detector

Part Number 699910012
Rev. A
September 2008
This page intentionally left blank.
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 Varian. 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 Varian 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, Varian' 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**

Varian 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.
- Varian 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**

- Extended Length M5 Allen Wrench
- Metric Allen Wrench Set (Range 1.5 mm to 10 mm)
- M3 Phillips Head Screw Driver
- Torque Wrench (must be adjustable to 45 in-lbs (5.0 N-m) and 90 in-lbs (10.2 N-m))
- Digital Multimeter (Fluke 187 or equivalent)

**Installation Procedure**

**WARNING**

Disconnect power from the unit before performing any maintenance procedure that requires physically disconnecting any part of the system.

**NOTE**

Inspect the new header 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.

For clarity, some items have been omitted from views.

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.
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 2: Fan Assembly

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.

CAUTION Wear non-powdered, ESD-safe Nitride or equivalent gloves (not included in kit) to prevent skin oils from getting on vacuum surfaces. Ensure that personnel are properly grounded before proceeding.

8. Use an M5 allen wrench to 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 7: 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, clean with Isopropyl alcohol and clean, lint-free wipes.

NOTE Wear non-powdered, ESD-safe Nitride or equivalent gloves (not included in kit) to prevent skin oils from getting on vacuum surfaces. Ensure that personnel are properly grounded before proceeding.

11. Unpack the new header assembly.
12. Remove the top cover from the header assembly by removing the four screws using an M3 Philips screw driver (Figure 5: Header Assembly Screws).

![Figure 5: Header Assembly Screws](image)

13. Remove the protective shipping cover by removing the four screws using an M5 allen head wrench.

**NOTE**

Reuse the cover on the old header assembly when it is shipped back to Varian.

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

**NOTE**

Varian recommends that you use the Vac-u-solv spectrometer cleaning kit (PN: 670029096).
15. 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.

16. Guide the spectrometer header into pocket with the detector housing closest to the inlet (Figure 6: Spectrometer Alignment).

17. Insert a screw with three Belleville washers into each hole and finger tighten (Figure 7: Direction of Cone).

NOTE The cones of the Belleville washers should all point to the head of the screw.
18. Following the pattern shown in Figure 7: Direction of Cone, torque screws to 45 in-lbs (5.0 N-m).
19. 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.
20. Wait a minimum of five minutes then torque the screws shown in pattern (Figure 7: Direction of Cone) to 90 in-lbs (10.2 N-m).

![Figure 7: Direction of Cone](image)

21. 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 8: Ion Source Header Pin Schematic). If there is continuity (short circuit) at any of the points, remove the header and inspect for shorting.

![Figure 8: Ion Source Header Pin Schematic](image)

22. Place the spectrometer cover over the header and align the holes (Figure 9: Ion Source Header Pin Locations).
23. Install screws and washers (items 5 & 6), then tighten using a M3 Phillips screwdriver (Figure 9: Ion Source Header Pin Locations).
24. Connect the spectrometer ground cable, the preamp signal cable and the ion source cable to the spectrometer cover.

![Figure 9: Ion Source Header Pin Locations](image)
25. Ensure that the vent valve on the turbo molecular pump (if installed) is tightened (Figure 10: Vent Valve).

**NOTE**

The vent valve is not installed on most turbo pumps.

26. 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.

27. Power up the unit.

28. 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 0.8 mA.

29. Use the display menus (MENUS, SET-UP, MANUAL TUNING, EMISSION) to set the emission to 0.8 mA.

**NOTE**

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

30. Calibrate the system per the user manual. For proper operation the system must be calibrated after opening the spectrometer or changing a filament.

31. 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 - 0.2 mA), 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.

32. Leak check the spectrometer to ensure a leak free joint.

33. Attach the rear cover and secure to the unit using existing hardware.

   When calibration is successful, header replacement is complete.
Canada
Central coordination through:
Varian, Inc.
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel.: +1 781 861 7200
Toll-Free: +1 800 882 7426
Fax: +1 781 860 5437

China
Varian Technologies China, Ltd.
Room 1648
Central Tower South Wing
Beijing Junefield Plaza
No. 10 XuanWuMenWai Street
Beijing 100052
P. R. China
Tel.: +86 (10) 6310 8550
Toll-Free: 800 820 6556
Fax: +86 (10) 6310 0141

France
Varian s.a.
7 avenue des Tropiques
Z.A. de Courtaboeuf - B.P. 12
91941 Les Ulis cedex
France
Tel.: +33 (0) 1 69 86 38 84
Fax: +33 (0) 1 69 86 29 88

Benelux
Varian Vacuum Technologies
Herculesweg 8
4338 PL Middelburg
The Netherlands
Tel.: +31 118 671570
Fax: +31 118 671569

Germany & Austria
Varian Deutschland GmbH
Alsfelder Strasse 6
Postfach 11 14 35
64289 Darmstadt
Germany
Tel.: +49 (0) 6151 703 353
Fax: +49 (0) 6151 703 302

India
Varian India Pvt. Ltd.
205-A, "A" wing of Galleria
2nd floor, Hiranandani Gardens
Powai, Mumbai-400 076
India
Tel.: +91 22 2570 8595/8597
Fax: +91 22 2570 8599
Mobile: +91 98 679 55969

Italy
Varian, Inc.
via F.lli Varian 54
10040 Leini, (Torino)
Italy
Tel.: +39 011 997 9111
Toll-Free: 00 800 234 234 00
Fax: +39 011 997 9350

Japan
Varian Technologies Japan, Ltd.
8th Floor
Sumitomo Shibaura Building
4-16-36 Shibaura Minato-ku
Tokyo 108
Japan
Tel.: +81 3 5232 1253
Toll-Free: 0120 655 040
Fax: +81 3 5232 1710

Korea
Varian Technologies Korea, Ltd.
Shinsa 2nd Bldg. 2F
966-5 Daechi-dong
Kangnam-gu, Seoul
Korea 135-280
Tel.: +82 2 3452 2452
Toll-Free: 080 222 2452
Fax: +82 2 3452 2451

Mexico
Varian, S. de R.L. de C.V.
Concepcion Beistegui No 109
Col Del Valle
C.P. 03100
Mexico, D.F.
Tel.: +52 5 523 9465
Fax: +52 5 523 9472

Taiwan
Varian Technologies Asia, Ltd.
14F-6, No. 77, Hsin Tai Wu Road, Sec. 1
Hsi chih, Taipei Hsien
Taiwan, R.O.C.
Tel.: +886 2 2698 9555
Toll Free: 0800 051 342
Fax: +886 2 2698 96782

United States
Varian, Inc.
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel.: +1 781 861 7200
Toll-Free: +1 800 882 7426
Fax: +1 781 860 5437

Other Countries
Varian Vacuum Technologies
via F.lli Varian 54
10040 Leini, (Torino)
Italy
Tel: (39) 011 997 9 111
Fax: (39) 011 997 9 350

Customer Support and Service:
North America
Tel: 1 (800) 882-7426 (toll-free)
v.tl.technical.support@varianinc.com

Europe
Tel: 00 (800) 234 234 00 (toll-free)
v.tl.technical.support@varianinc.com

Japan
Tel: (81) 3 5232 1253 (dedicated line)
v.tj.technical.support@varianinc.com

Korea
Tel (82) 2 3452 2452 (dedicated line)
v.tk.technical.support@varianinc.com

Taiwan
Tel: 0 (800) 051 342 (toll-free)
v.tw.technical.support@varianinc.com

Worldwide Web Site,
Catalog and On-line Orders:
www.varianinc.com

Representatives in most countries