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Agilent Technologies

VS PD03 Scroll Pump and Components Replacement

*FIELD INSTALLATION
INSTRUCTIONS*

Part Number 699910017
Rev. A
February 2009

Varian Field Instruction Sheet

VS PD03 Scroll Pump and Components Replacement

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)



ON Supply (Power)



AC – Alternating Current



Warning, Risk of danger



Frame or chassis Terminal



Earth (Ground) Terminal



Caution, Hot Surface



Caution, Risk of Electrical Shock



Protective Conductor 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 Nitrile 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.

Scroll Pump Replacement

Equipment Required

- Extended Length M5 Allen Wrench
- Metric Allen Wrench Set
- M3 Phillips Head Screw Driver

For clarity, some items have been omitted from views.

WARNING



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

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 and Front Cover Screws) and detach the rear plastic cover from the unit.

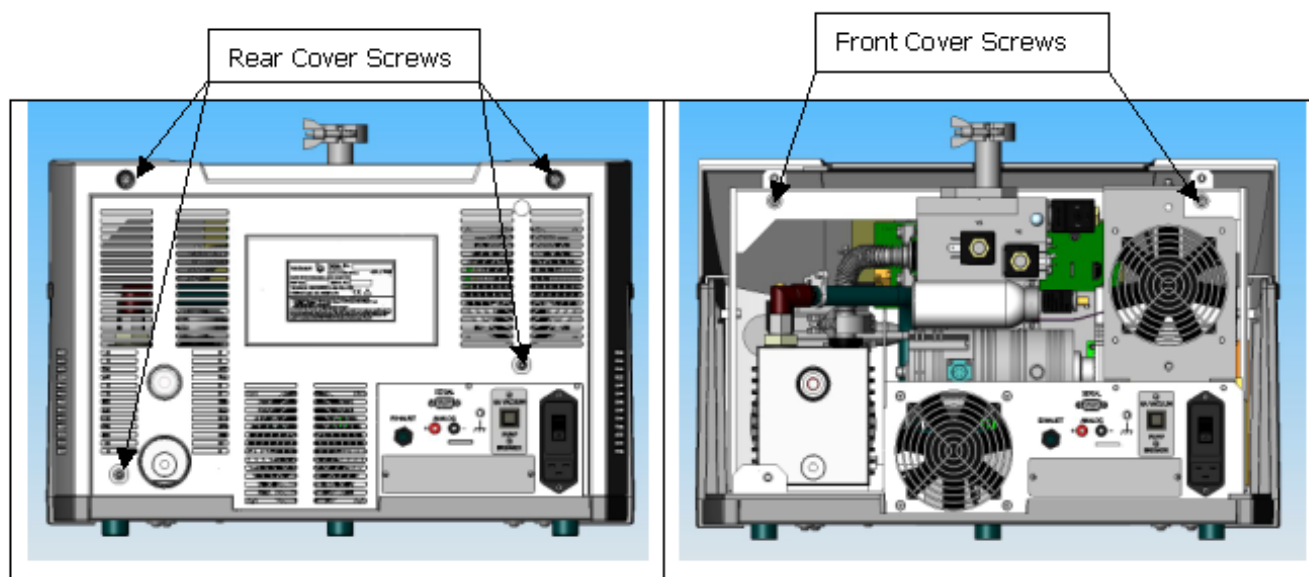


Figure 1: Rear and Front Cover Screws

4. Disconnect the NW 16 connection (Figure 2: NW 16 Connection).

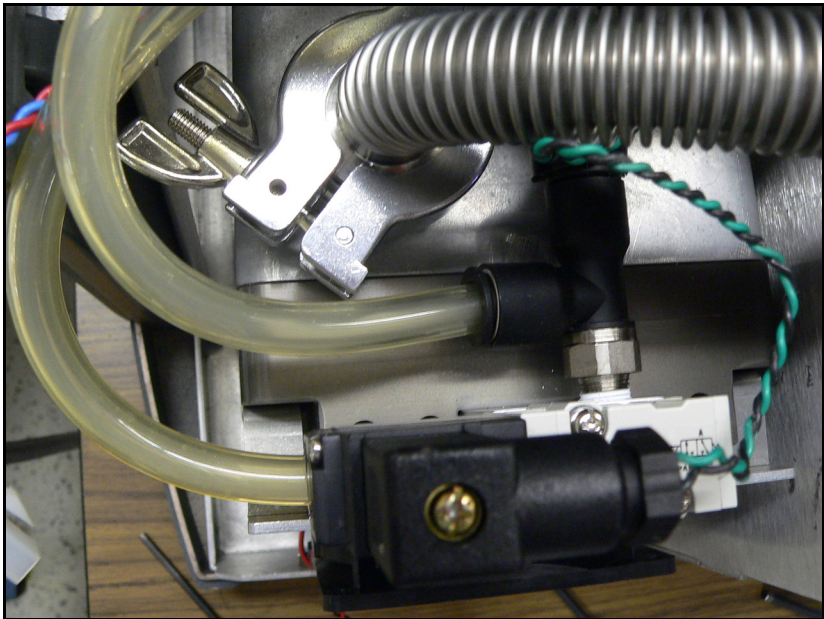


Figure 2: NW 16 Connection

5. Tilt the unit and unscrew the four connections underneath that hold the pump (Figure 3: Scroll Pump Mounting Connections). Place the unit flat again and remove the whole pump assembly.

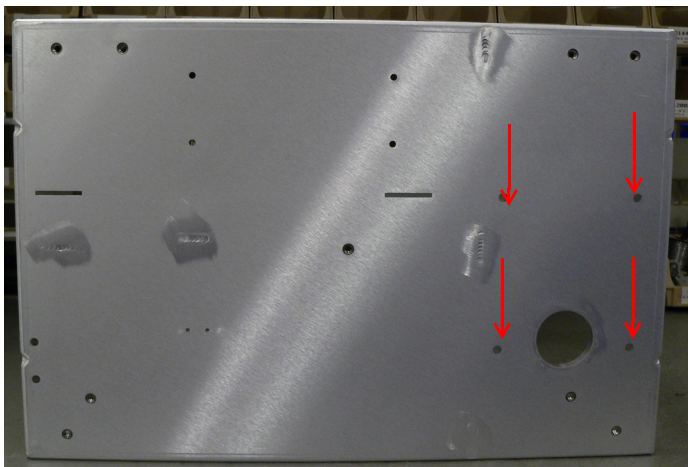


Figure 3: Scroll Pump Mounting Connections

6. Disconnect the exhaust hose (Figure 4: Exhaust Hose).

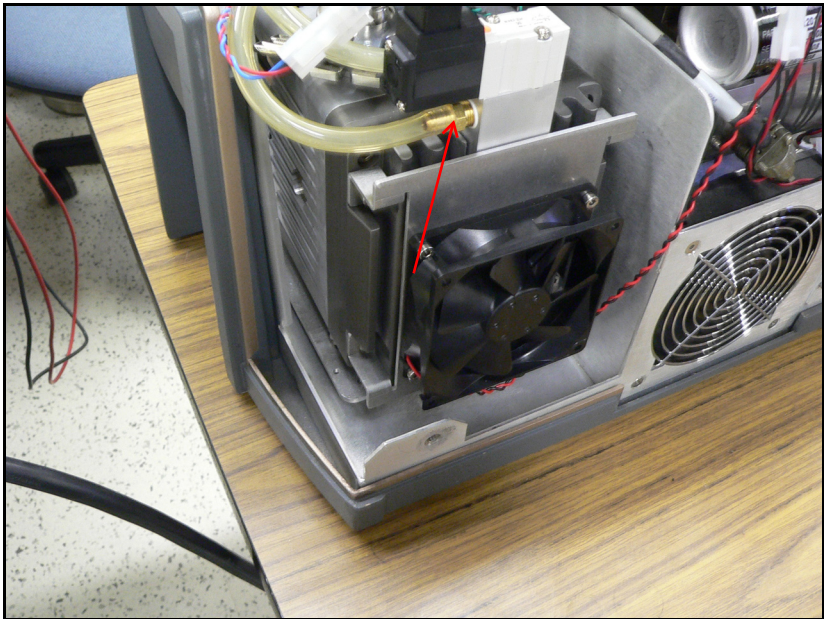


Figure 4: Exhaust Hose

- 7. Disconnect the diaphragm, fan and motor power connectors.
- 8. Remove the fan assembly bracket and lay it aside (Figure 5: Fan Assembly Mounts).

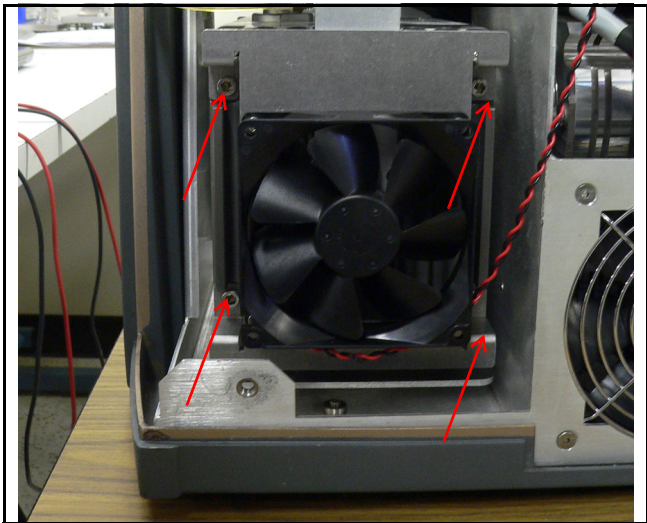


Figure 5: Fan Assembly Mounts

9. Unscrew the four M2 screws and remove the manifold block (Figure 6: Manifold Block Connections).

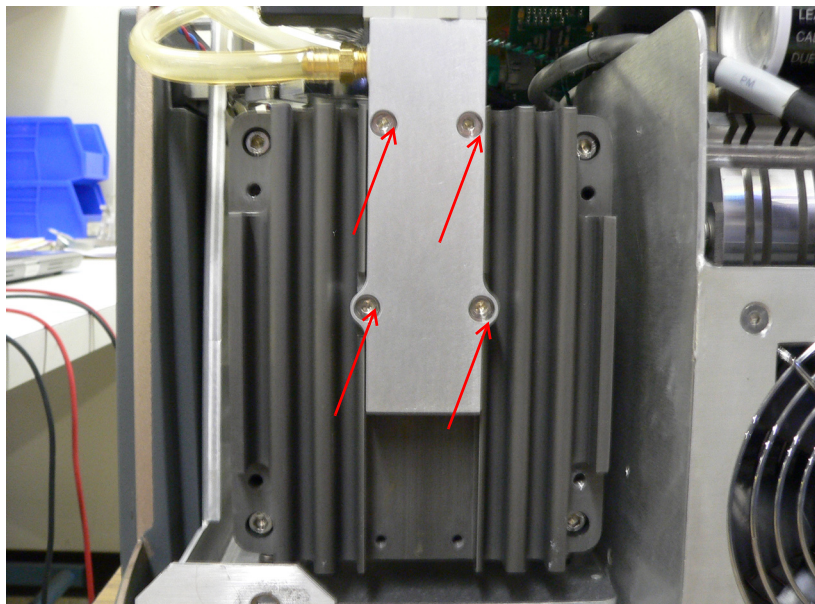


Figure 6: Manifold Block Connections

10. Remove the exhaust valve unit. See “Exhaust Valve Replacement” on page 10.
11. Remove the diaphragm pump. See “Diaphragm Pump Replacement” on page 12.
12. Mount the new scroll pump using the four connections seen in “Figure 3: Scroll Pump Mounting Connections” on page 5.
13. Reattach the diaphragm pump. See “Diaphragm Pump Replacement” on page 12.
14. Reattach the exhaust valve. See “Exhaust Valve Replacement” on page 10.
15. Reattach the four M2 screws to remount the manifold block.
16. Reattach the fan assembly.
17. Reconnect the diaphragm, fan and motor power connectors.
18. Reconnect the exhaust hose.
19. Attach the front cover and secure to the frame using existing hardware.
20. Connect the power cord and power up the unit.
21. Watch the home screen to verify the *Spectube Pressure Wait* message progresses to *Stabilization Wait* and *System Ready* within ten minutes.
22. Refer to the operator's manual if the system fails to reach the *System Ready* mode.
Varian recommends a full calibration of the unit prior to leak test operations.

Clippard Valve Replacement

Equipment Required

- Extended Length M5 Allen Wrench
- Metric Allen Wrench Set
- M3 Phillips Head Screw Driver

For clarity, some items have been omitted from views.

WARNING



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

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 7: Rear and Front Cover Screws) and detach the rear plastic cover from the unit.

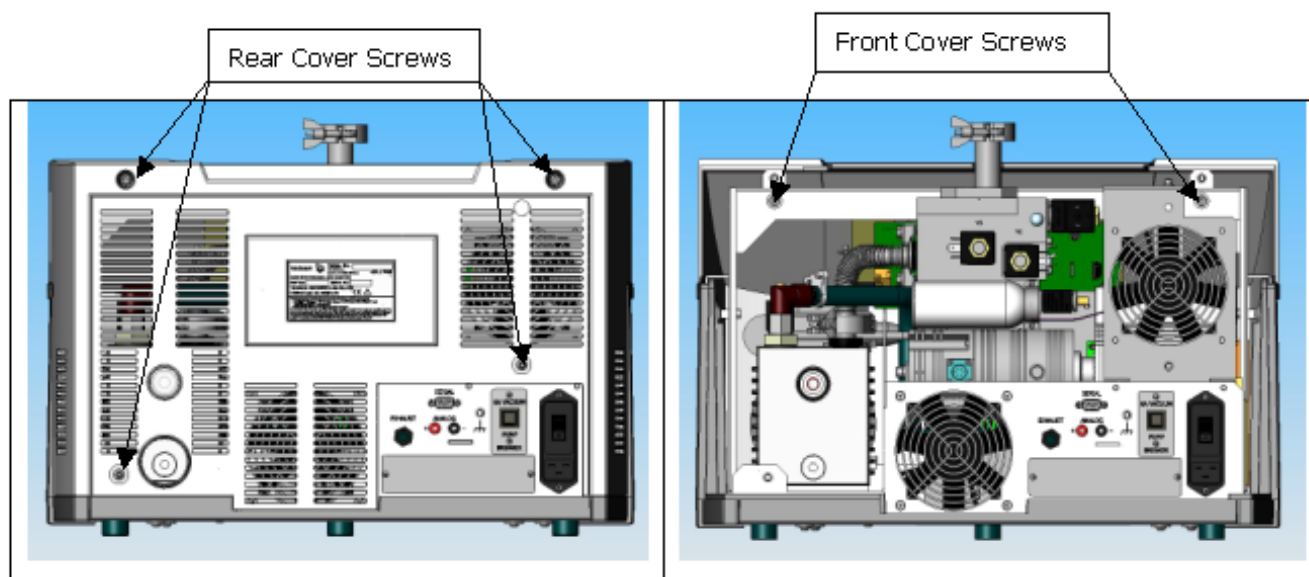


Figure 7: Rear and Front Cover Screws

4. Disconnect the two spade connectors (red arrow in Figure 8: Spade Connectors):

- Red/black
- Black/black

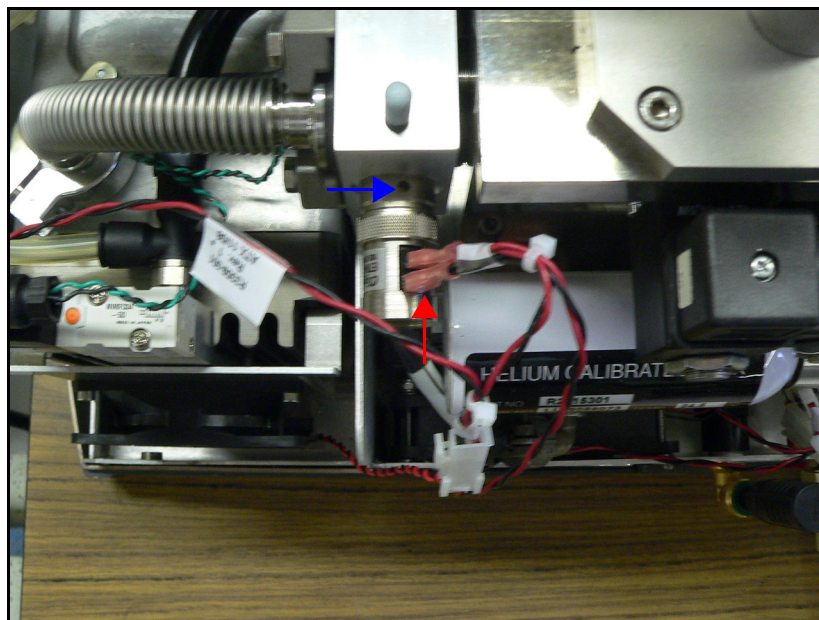


Figure 8: Spade Connectors

5. Use an Allen wrench to loosen valve from housing (blue arrow in Figure 8: Spade Connectors).

6. Mount the new valve and tighten.

7. Reconnect the two spade connections.

8. Attach the front cover and secure to the frame using existing hardware.

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

10. Connect the power cord and power up the unit.

11. Watch the home screen to verify the *Spectube Pressure Wait* message progresses to *Stabilization Wait* and *System Ready* within ten minutes.

Refer to the operator's manual if the system fails to reach the *System Ready* mode.

Exhaust Valve Replacement

Equipment Required

- Extended Length M5 Allen Wrench
- Metric Allen Wrench Set
- M3 Phillips Head Screw Driver

For clarity, some items have been omitted from views.

WARNING



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

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 9: Rear and Front Cover Screws) and detach the rear plastic cover from the unit.

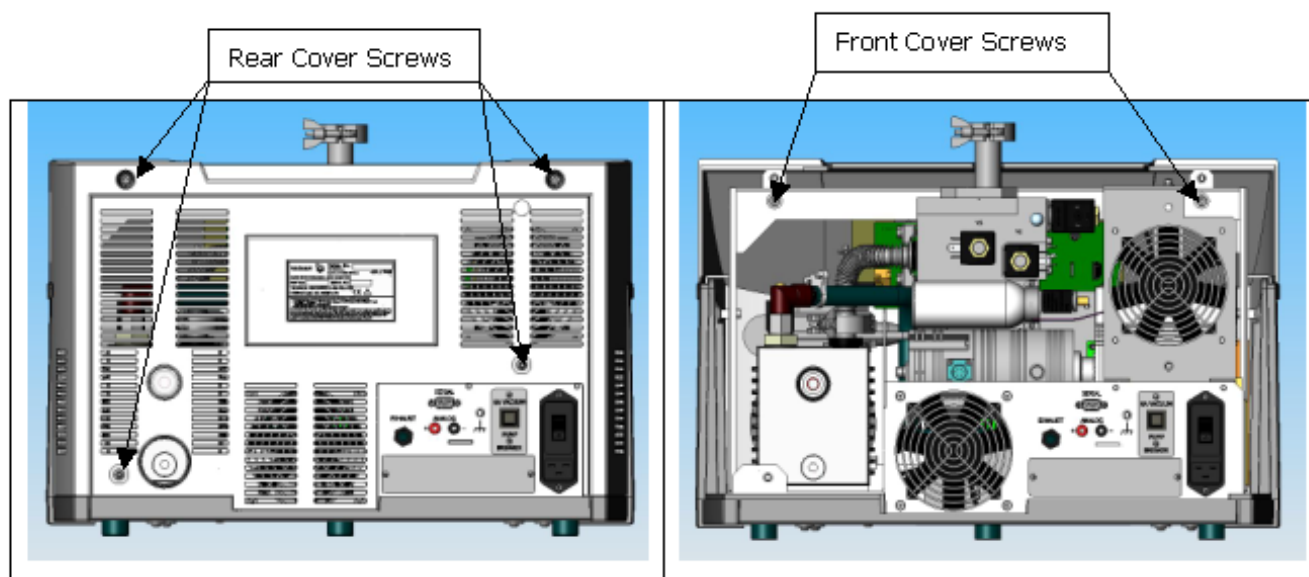


Figure 9: Rear and Front Cover Screws

4. Unscrew the black cover using the Philips head screw, pull up the cover and disconnect (red arrow in Figure 10: Unit Screws)

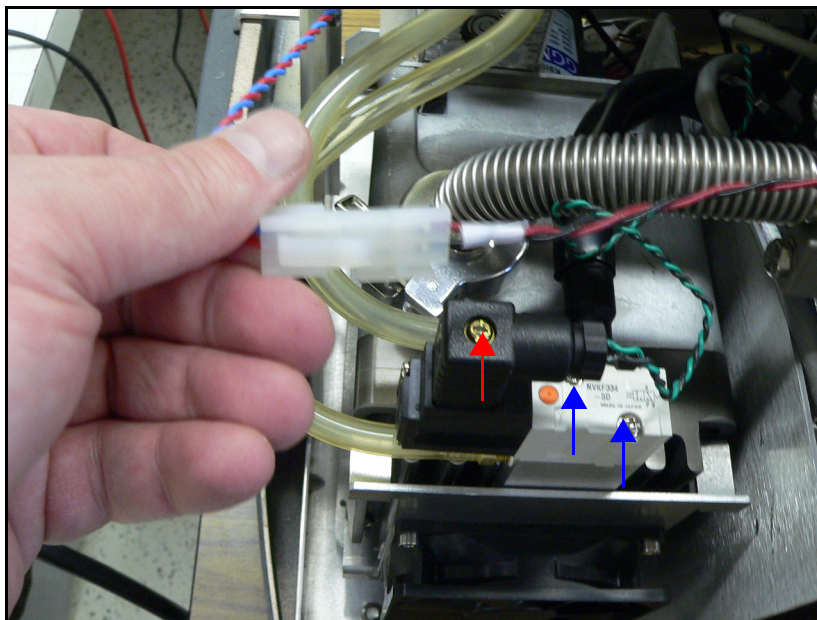


Figure 10: Unit Screws

5. Unscrew the two Philips head screws (blue arrow in “Figure 10: Unit Screws” on page 11) and pull the complete black/grey body up and out.
6. Mount new unit and replace the three Philips screws.
7. Attach the front cover and secure to the frame using existing hardware.
8. Attach the rear cover and secure to the unit using existing hardware.
9. Connect the power cord and power up the unit.
10. Watch the home screen to verify the *Spectube Pressure Wait* message progresses to *Stabilization Wait* and *System Ready* within ten minutes.
Refer to the operator's manual if the system fails to reach the *System Ready* mode.
11. Varian recommends a full calibration of the unit prior to leak test operations.

Diaphragm Pump Replacement

Equipment Required

- Extended Length M5 Allen Wrench
- Metric Allen Wrench Set
- M3 Phillips Head Screw Driver
- Adjustable Wrench

For clarity, some items have been omitted from views.

WARNING



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

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 11: Rear and Front Cover Screws) and detach the rear plastic cover from the unit.

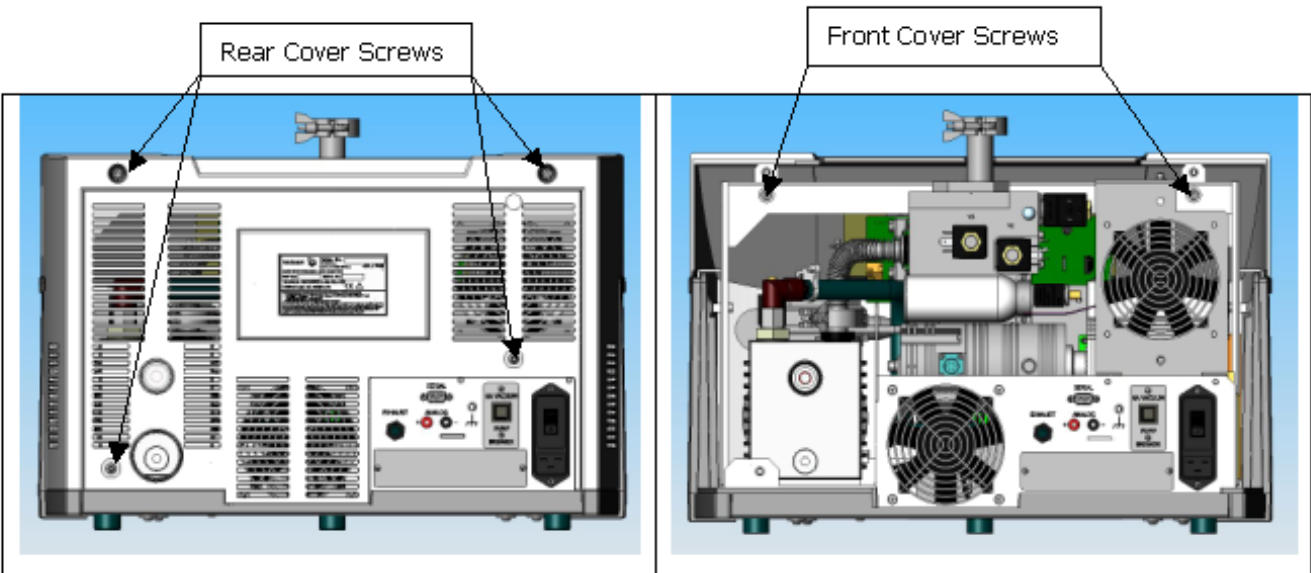


Figure 11: Rear and Front Cover Screws

4. Disconnect the R3359-301 Molex connector to the Clippard valve (Figure 12: Molex Connector).

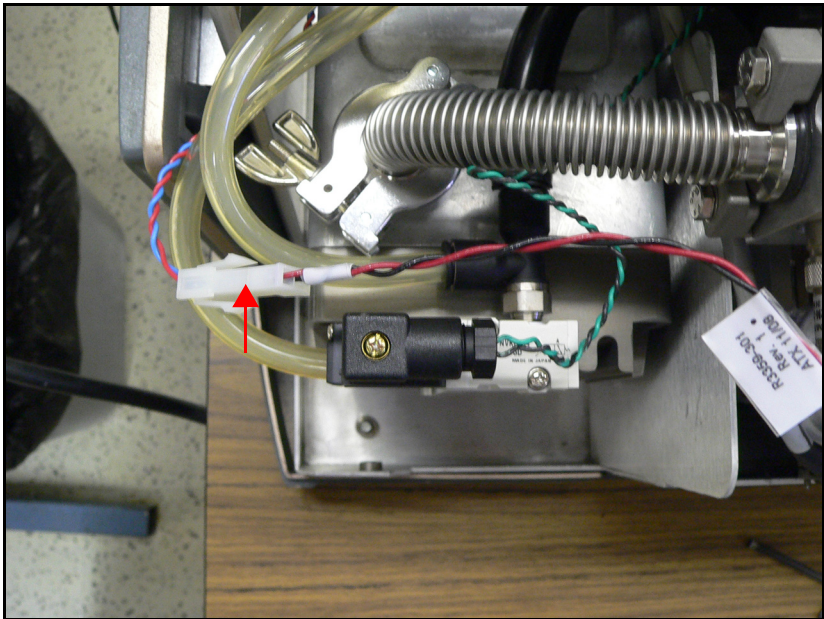


Figure 12: Molex Connector

5. Remove the ground connection to the system body (red arrow in Figure 13: Ground Connection).

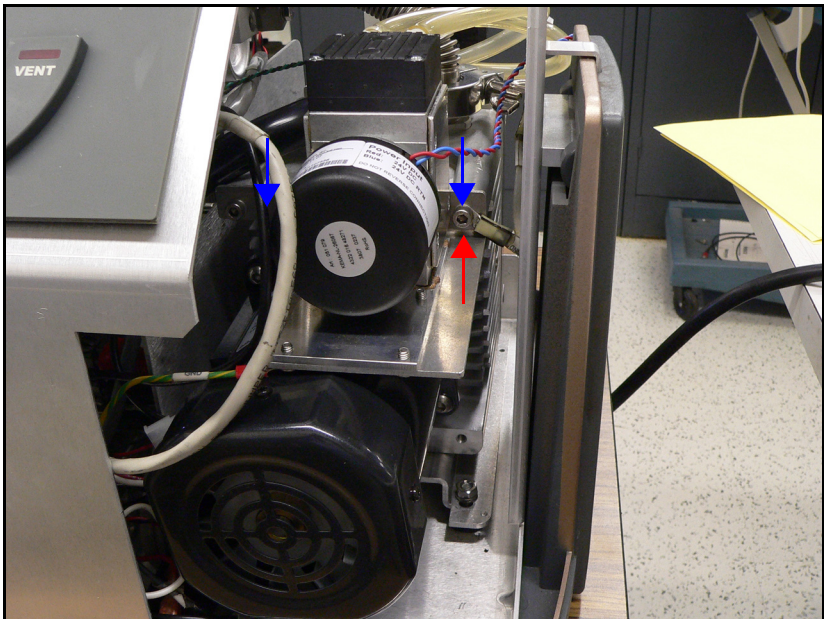


Figure 13: Ground Connection

6. Disconnect the two M4 screws mounting the plate to the scroll pump assembly (blue arrow in Figure 13: Ground Connection).

7. Remove the diaphragm pump assembly, turn it over and unscrew the four M2 screw holding the pump to the plate (Figure 14: Pump to Plate Connections - two shown).

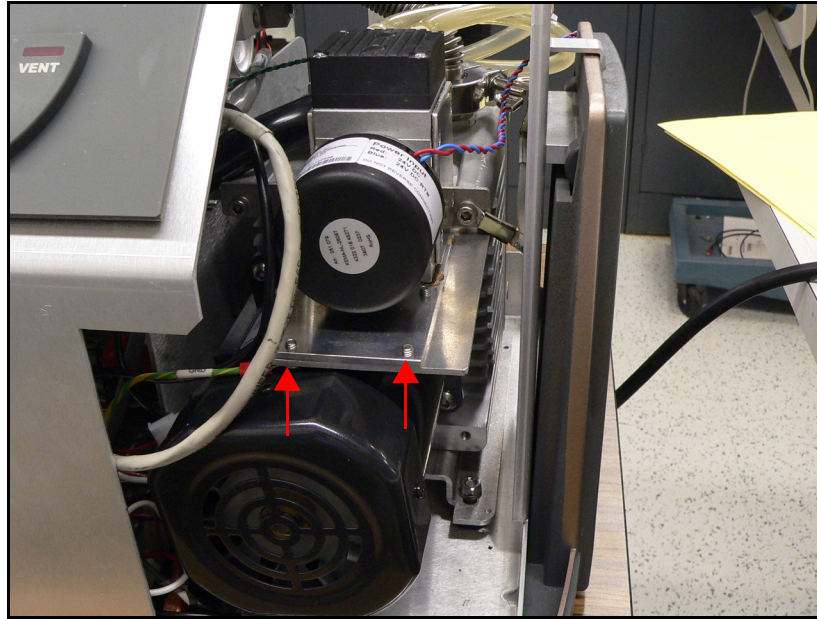


Figure 14: Pump to Plate Connections

8. Reattach the new pump to the plate.
9. Reattach the plate to the scroll pump.
10. Reattach the ground and Molex connections.
11. Attach the front cover and secure to the frame using existing hardware.
12. Attach the rear cover and secure to the unit using existing hardware.
13. Connect the power cord and power up the unit.
14. Watch the home screen to verify the *Spectube Pressure Wait* message progresses to *Stabilization Wait* and *System Ready* within ten minutes.
Refer to the operator's manual if the system fails to reach the *System Ready* mode.
15. Varian recommends a full calibration of the unit prior to leak test operations.

Diaphragm and Seal Replacement

Equipment Required

- Extended Length M5 Allen Wrench
- Metric Allen Wrench Set
- M3 Phillips Head Screw Driver
- Phillips Head Screw Driver, #1
- Felt Tip Pen
-

For clarity, some items have been omitted from views.

WARNING



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

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 15: Rear and Front Cover Screws) and detach the rear plastic cover from the unit.

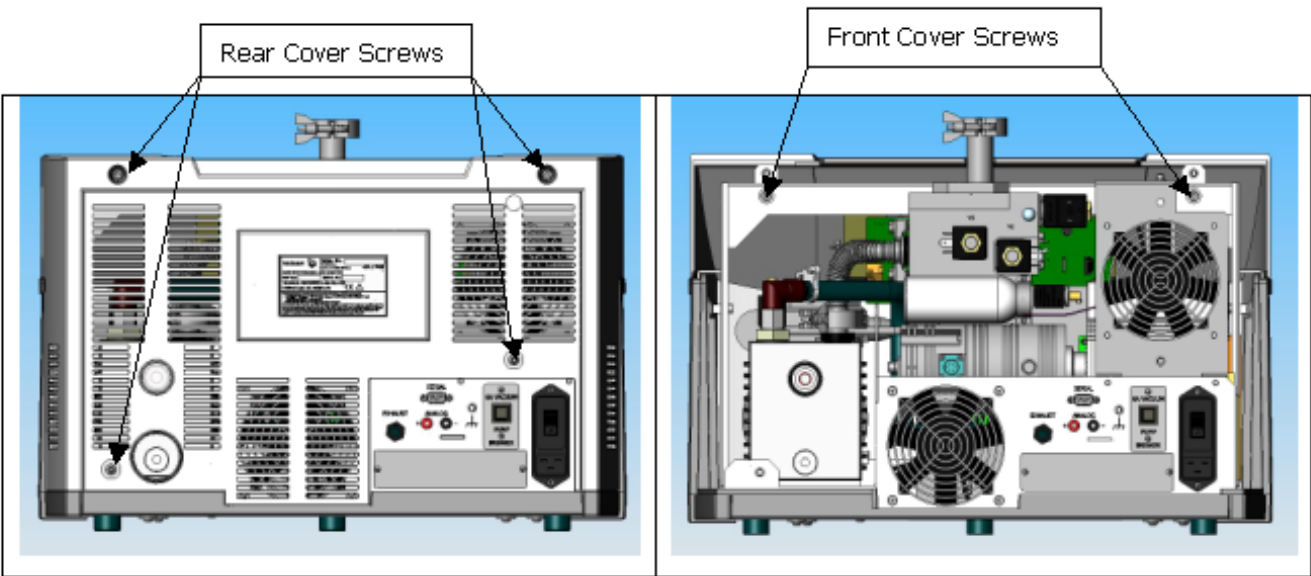


Figure 15: Rear and Front Cover Screws

NOTE



Always change the valve plates, diaphragm and sealing rings at the same time.

4. Remove the pump head by (Figure 16: Pump Head Removal):

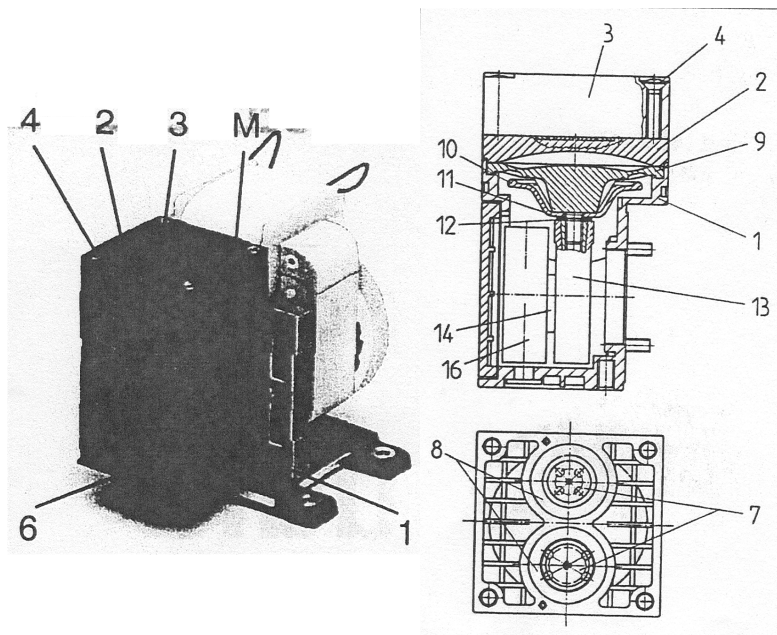


Figure 16: Pump Head Removal

- a. Making a mark (M) on the head plate (3), intermediate plate (2), and housing (1) with a felt-tip pen.
- b. Undoing the 4 screws (4) in the head plate and lifting the head plate, with the intermediate plate, off the pump housing.
- c. *For models with:*
 - DC motors (no cooling fan):* Removing the cover (6) from the pump housing (1) by inserting a screwdriver into the slots on the sides, and prying the cover off (with care the adhesive gasket between cover and housing may be reused).
 - No fan:* Reference is made to turning or holding the cooling fan, the necessary operations must be carried out by turning or holding the counterweight (16).

5. Change the diaphragm by (see Figure 16: Pump Head Removal):

- a. Turning the fan to bring the structured diaphragm (9) to top dead center.
- b. Lifting the edge of the diaphragm and, gripping it on opposite sides, unscrewing it by turning counterclockwise.

CAUTION



Ensure that the disc spring (12) and diaphragm spacers (11) on the threaded portion of the diaphragm do not fall into the housing.

- c. Taking the disc spring (12), diaphragm spacer(s) (11), and diaphragm support (10) off the threaded portion of the diaphragm and retaining them.
- d. Ensuring that all parts are free from dirt and clean them, if necessary.
- e. Placing the diaphragm support, diaphragm spacer(s), and disc spring, in that order, on the thread part of the new diaphragm. The concave side of the disc spring must be towards the diaphragm.

- f. Turning the fan until the connecting rod (13) is at top dead center.
 - g. Screwing the diaphragm, complete with diaphragm support, diaphragm spacer(s), and disc spring, into the connecting rod (clockwise) and tightening it by hand.
6. Change the valve plates by (see Figure 16: Pump Head Removal):
- a. Separating the head plate (3) from the intermediate plate (2).
 - b. Removing the valve plates (7) and sealing rings (8) from the intermediate plate.
 - c. Checking that the valve seats in the head plate and the intermediate plate are clean. If scratches, distortion, or corrosion are evident, replace that part.
 - d. Laying the new valve plates in the intermediate plate recesses. The valve plates for suction and pressure sides are identical, as are upper and lower sides of the plates.
 - e. Ensuring the valve plates are not deformed by moving them gently sideways in their recesses.
 - f. Laying the sealing rings on the intermediate plate.
7. Refit the pump heads by (see Figure 16: Pump Head Removal):
- a. Turning the fan to bring the diaphragm to top dead center.
 - b. Placing the intermediate plate (2), with valve plates (7), sealing rings (8), and head plate (3) on the housing, in the position indicated by the (M).
 - c. Checking that the head plate is centered by moving it gently sideways.
 - d. Gently tightening the screws (4), evenly and diagonally.
 - e. Turning the fan to check that the pump rotates freely.
 - f. Turning the fan again to bring the diaphragm to top dead center.
 - g. Tightening the screws (4).
 - h. *For DC versions (no cooling fan):* Reattaching the cover (6) to housing (1).
8. Attach the front cover and secure to the frame using existing hardware.
9. Attach the rear cover and secure to the unit using existing hardware.
10. Connect the power cord and power up the unit.
11. Watch the home screen to verify the *Spectube Pressure Wait* message progresses to *Stabilization Wait* and *System Ready* within ten minutes.
- Refer to the operator's manual if the system fails to reach the *System Ready* mode.



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