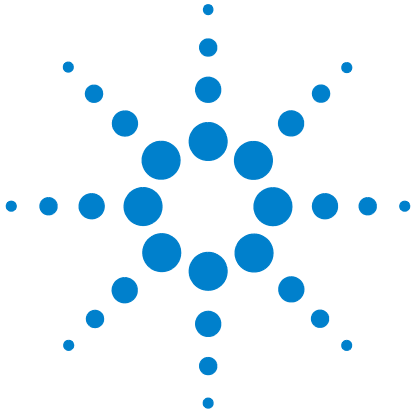

Agilent DS 42 Foreline Pump

Maintenance Guide

Agilent Technologies

Notices

Manual Part Number

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CAUTION

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WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Contents

1 General Information

The vacuum system creates the high vacuum (low pressure) required for a mass spectrometer or similar instrument to operate. Without the vacuum, the molecular mean free path would be very short and ions would collide with air molecules before they could reach the detector. Attempted operation at such pressures also would damage analyzer components.

The DS 42 foreline pump creates a low vacuum, then a high vacuum turbomolecular (turbo) pump engages to create the vacuum needed for operation.

The standard DS 42 foreline pump is a two-stage Rotary Vane Pump (RVP) and uses a pump oil.

Most vacuum system operation is automated. Operator interaction is through the data system or control panel. Monitor the vacuum system through the data system and/or local control panel.

Before Starting

For your safety, read all of the information on the DS 42 vacuum pump. Read the documentation that came with your Mass Spectrometer before doing maintenance.

Scheduled maintenance

Common maintenance tasks are listed in Table 1. Performing these tasks when scheduled can reduce operating problems, prolong system life, and reduce overall operating costs.

Keep a record of system performance (tune reports) and vacuum pump maintenance operations performed. This makes it easier to identify variations from normal operation and to take corrective action.

Table 1 Maintenance schedule

Task	Every week	Every 6 months	As needed
Check the foreline pump oil level	X		
Ballasting the foreline pump			X
Replace the foreline pump oil		X	
Replace Oil Mist Filter element		X	

Tools, spare parts, and supplies

Some of the required tools, spare parts, and supplies are included in the shipping kit. You must supply others yourself.

Chemical residue

Only a small portion of your sample is ionized by the ion source. Most of a sample passes through the ion source without being ionized and is pumped away by the vacuum system. As a result, the exhaust from the foreline pump will contain traces of the carrier gas and your samples. Exhaust from the RVP standard foreline pump also contains tiny droplets of foreline pump oil.

WARNING **The oil trap supplied with the standard RVP pump stops only foreline pump oil. It does not trap or filter out toxic chemicals. If you are using toxic solvents or analyzing toxic chemicals, attach a hose from the Oil Mist Filter to the outside or to a fume hood.**

Install a hose to take the exhaust from the foreline pump outdoors or into a fume hood vented to the outdoors. Be sure to comply with your local air quality regulations.

The oil in the RVP foreline pump also collects traces of the samples being analyzed. All used pump fluid should be considered hazardous and handled accordingly. Dispose of used fluid correctly, as specified by your local regulations.

WARNING **When replacing pump fluid, use appropriate chemical-resistant gloves and safety glasses. Avoid all contact with the fluid.**

Foreline Pump

The foreline pump (Figure 1 reduces the pressure in the) analyzer chamber so the high vacuum pump can operate. It also pumps away the gas load from the high vacuum pump. The foreline pump is connected to the high vacuum pump by a 160-cm hose called the foreline hose.

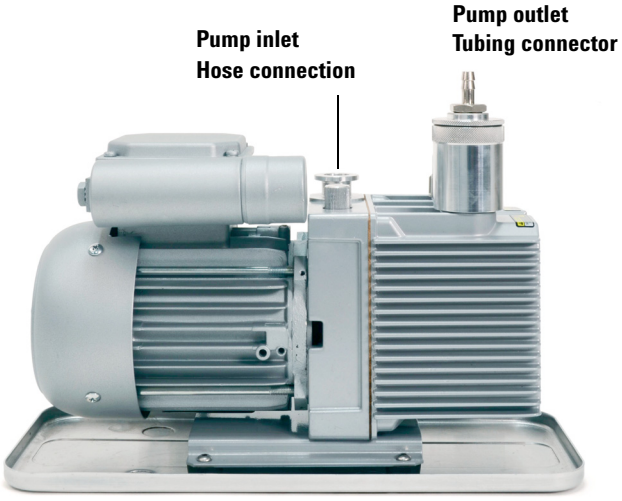

Figure 1 The DS 42 RVP Foreline pump

The RVP foreline pump is an oil-sealed two-stage rotary-vane pump. The pump turns on when the instrument power is turned on. The foreline pump has a built-in anti-backflow valve to help prevent backstreaming in the event of a power failure.

The foreline pump can be placed on the bench beside the instrument (with the exhaust outlet to the rear) or on the floor below the instrument.

CAUTION Do not place the foreline pump near any equipment that is sensitive to vibration.

CAUTION The ballast knob controls the amount of air allowed into the pump. Keep the ballast control closed (fully clockwise) at all times, except when ballasting the pump.

A window (sight glass) in the front of the RVP foreline pump shows the level of the pump oil. There are two marks next to the window. The level of the pump oil should never be above the upper mark or below the lower mark. If the level of pump oil is near the lower mark, add foreline pump oil.

Common Vacuum System Problems

WARNING **Combustible materials (or flammable/non-flammable wicking material) placed under, over, or around the RVP foreline pump constitutes a fire hazard.**

Keep the pan clean, but do not leave absorbent material such as paper towels in it.

Air leak symptoms

The most common problems associated with any vacuum system are air leaks. Symptoms of air leaks include:

- Loud gurgling noise from the RVP foreline pump (very large leak.)
- Inability of the turbo pump to reach 95% speed
- Higher than normal high vacuum gauge controller readings

Agilent GC/MSDs will *not* pump down successfully unless you press on the side plate (analyzer door) when you turn on the instrument power. Continue to press until the sound from the foreline pump becomes quieter.

Pumpdown failure shutdown

The system will shut down both the high vacuum and the foreline pump if the turbo pump speed is below 80% after 7 minutes.

This is usually because of a ***large*** air leak: either the side plate has not sealed correctly or the vent valve is still open. This feature helps prevent the foreline pump from sucking air through the system, which can damage the analyzer and pump.

To restart the instrument, find and correct the air leak, then switch the power off and on. Be sure to press on the side plate when turning on the instrument power to ensure a good seal.

Periodic Maintenance

Some maintenance tasks for the vacuum system must be performed periodically. These include:

- Checking the RVP foreline pump fluid (every week)
- Ballasting the RVP foreline pump (as needed)
- Replacing the RVP foreline pump oil (every 6 months)
- Replacing the RVP Oil Mist Filter element (2710100200 2/pk) (every 6 months)

Failure to perform these tasks as scheduled can result in decreased instrument performance. It can also result in damage to your instrument.

To Replace the Primary Fuses

One of the causes for the failure of the primary fuses is a problem with the foreline pump. If the primary fuses in your MSD fail, check the foreline pump.

Materials needed

- Fuse, T8 A, 250 V (2110-0969) – 2 required
- Screwdriver, flat-blade (8730-0002)

Procedure

1 Vent the MSD and unplug the power cord from the electrical outlet.

If one of the primary fuses has failed, the instrument will already be off, but for safety you should switch off the instrument and unplug the power cord. It is not necessary to allow air into the analyzer chamber.

WARNING **Never replace the primary fuses while the instrument is connected to a power source.**

WARNING **If you are using hydrogen as a GC carrier gas, a power failure may allow it to accumulate in the analyzer chamber. In that case, further precautions are required.**

2 Turn one of the fuse holders (Figure 2) counterclockwise until it pops out. The fuse holders are spring loaded.

3 Remove the old fuse from the fuse holder.

4 Install a new fuse in the fuse holder.

5 Reinstall the fuse holder.

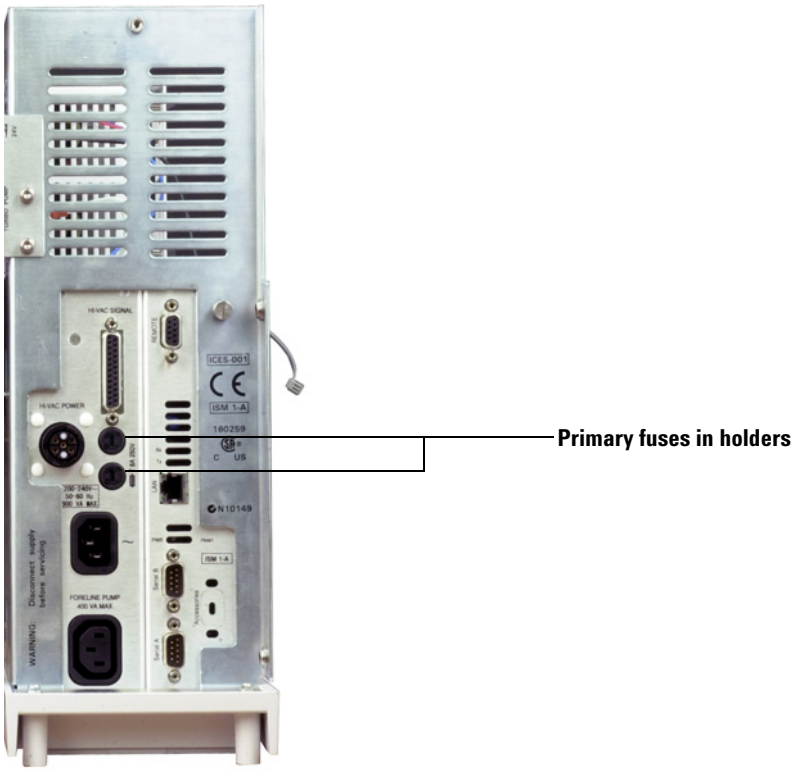

Figure 2 Primary fuses

6 Repeat steps 2 through 5 for the other fuse. Always replace both fuses.

7 Reconnect the instrument power cord to the electrical outlet.

8 Pump down the MSD.

2 Maintaining the DS 42 RVP Pump

Maintenance of this oil-sealed pump is mainly a matter of maintaining proper oil level and replacement, plus general housekeeping to deal with spilled oil to avoid creating a fire hazard.

To Check and Add Foreline Pump Oil

Materials needed

- Foreline pump oil (6040-0834)
- Funnel (9301-6461)
- Hex key, 8-mm, to remove drain plug (8710-2326)
- Screwdriver, flat-blade, to remove top fill cap

Procedure

1 Examine the oil level window (Figure 3).

Note the two lines on the pump left of the window. The oil level should be between the lines. The foreline pump oil should be almost clear. If the oil level is near or below the lower line, follow steps 2 through 6 to add foreline pump oil.

WARNING **Never add oil while the foreline pump is on.**

If your instrument is nearing its scheduled time for replacement of the foreline pump oil, replace the oil instead of adding oil. If the oil is dark or cloudy, replace it. See "To Refill the Foreline Pump" on page 13 for instructions about replacing the foreline pump oil.

2 Vent the instrument.

3 Remove the foreline pump fill cap.

4 Add pump fluid until the oil level in the window is near, but not above, the upper line.

5 Reinstall the fill cap.

6 Pump down the instrument.

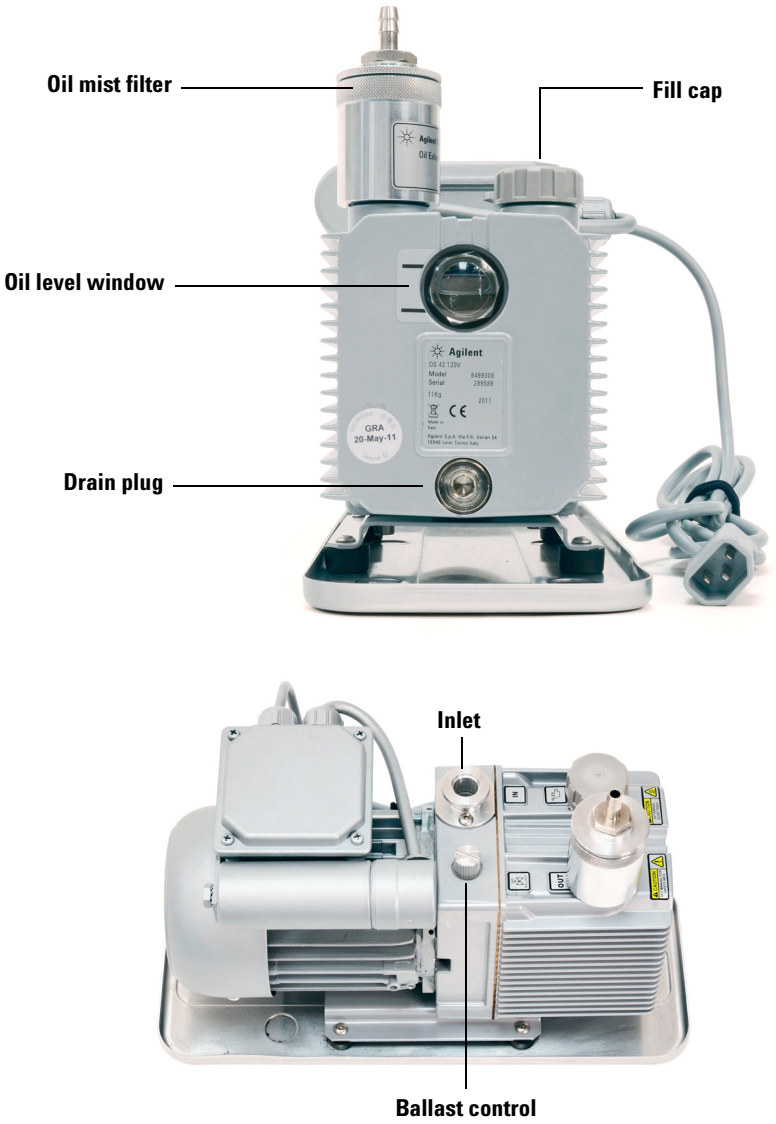

Figure 3 RVP foreline pump

To Drain the Foreline Pump

Materials needed

- Book or other solid object approximately 5 cm thick
- Container for catching old pump oil, 500 mL
- Gloves, oil- and solvent-resistant
- Hex key, 8-mm (8710-2326)

Procedure

1 Vent the instrument.

2 If necessary, slide the foreline pump to a safe, accessible location.

WARNING **The foreline pump may be hot.**

3 Place a book or other object under the pump motor to tilt it up slightly. Remove the fill cap. See Figure 3.

4 Place a container under the drain plug.

5 Remove the drain plug. Allow the pump oil to drain out. The oil drains faster if it is still warm.

6 Tilt pump to drain all the remaining oil from the bottom of the pump.

WARNING **The old pump oil may contain toxic chemicals. Treat it as hazardous waste.**

7 Replace the drain plug after draining the oil.

8 See the next procedure to refill the pump.

To Refill the Foreline Pump

Materials needed

- Foreline pump oil (6040-0834) – approximately 0.5 L required
- Funnel (9301-6461)
- Gloves, oil- and solvent-resistant
- DS 42 RVP Drain plug O-ring (G3170-80073)
- Hex key, 8-mm (8710-2326)

Procedure

1 Drain the foreline pump. See page 12.

2 Reinstall the drain plug. If the O-ring appears worn or damaged, replace it.

3 Remove the propping object from under the pump motor.

4 Add foreline pump oil until the oil level in the window is near, but not above, the upper line. The foreline pump requires approximately 0.5 L of oil.

5 Wait a few minutes for the oil to settle. If the oil level drops, add oil to bring the oil level near the upper line.

6 Reinstall the fill cap.

7 If necessary, slide the foreline pump back into position.

The foreline pump may be located on the floor or on the lab bench next to the GC/MSD.

8 Pump down the instrument.

9 Reposition the pump as needed to provide slack in the tubing and cables.

Ballast to Improve Vacuum

Vapors in the vacuum pump inlet can condense during compression and mix with the vacuum pump oil. Two problems that arise from these vapors include reduced vacuum performance, and a decrease in the lubrication properties of the oil. To prevent harmful buildup of foreign liquids in the oil, open the “gas ballast valve”, located at the top of the pump. This allows these liquids to vaporize and be expelled with the pump discharge gases.

If the pump is expected to be stopped for a lengthy period, it is good practice to run it with the gas ballast open and the inlet line closed for a few minutes to limit the risk of foreign liquid buildup in the oil. Close the valve before switching off the pump. Vary the time that the gas ballast valve is left open and the frequency of ballasting based on the buildup of liquids in the oil and the performance of the vacuum system.

3 Replacement Parts for the DS 42 Foreline Pump

This chapter lists parts that can be ordered for use in maintaining the DS 42 foreline pump vacuum system.

Some of the parts listed are not user-replaceable. They are listed here for use by Agilent Technologies service representatives.

To Order Parts

To order parts for your GC/MSD, address the order or inquiry to your local Agilent Technologies office. Supply them with the following information:

- Model and serial number of your instrument, located on a label on the lower left side near the front of the instrument.
- Part number(s) of the part(s) needed
- Quantity of each part needed

Parts Lists

This section lists O-rings, seals, and standard (RVP) foreline pump and related components (Table 2).

Table 2 Parts list

Description	Part number
KF10/16 seal (foreline pump inlet)	KC16AV
DS 42 RVP Drain plug	G3170-80072
DS 42 RVP Drain plug O-Ring	G3170-80073
DS 42 RVP Oil fill cap	G3170-80074
DS 42 RVP Oil fill cap seal	G3170-80075
DS 42 RVP Oil Mist Eliminator exit seal	G3170-80076
DS 42 RVP Oil Mist Eliminator pump seal	G3170-80077

Table 2 Parts list (continued)

Description	Part number
DS 42 Oil Mist Eliminator 3/4G	G3170-80049
DS 42 RVP (115V)	G3170-80046
DS 42 RVP oil pan	G3170-00012
8-mm hex key for drain plug	8710-2326
NW10/16 Blanking flange, aluminum	KC160000AB
RVP Oil Mist Filter element (2/pk)	2710100200
Fuse, T8 A, 250 V	2110-0969
Screwdriver, flat-blade	8730-0002
Foreline pump oil	6040-0834
Funnel	9301-6461

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