

Situation

The rough pumps (first-stage vacuum pumps) of mass-spectrometers provide primary vacuum to the MS chambers; the turbo pump inside the instrument provides the second-stage, ultra-low vacuum.

The rough pumps used with most MS systems:

- are large and heavy
- generate a lot of noise
- get very hot

Manufacturers recommend regular oil changes to prevent damage to the rough pump, and to prolong pump life. This warning is often neglected because changing the oil is difficult. As a result, rough pump lifetime is often shortened.

Why isn't the oil changed regularly? Oil finds its way to the outside of the pump, the pump feet, and the pump tray or floor, making a real mess. Leaking oil also makes the pump very slippery, which, along with the weight of the pump, makes it very difficult to pick up or move the pump for routine maintenance.

An access cover and LED allow reading of the pump oil level and oil drainage, as well as ballast adjustment. A step-on tilting apparatus and full-size oil pan allow oil to be effectively changed without moving the vacuum pump

Agilent has designed the Quiet Cover for superior access to the pump, and allow simplified oil changes. It also reduces pump noise in the lab during use.



Thermal Performance Test

The table below shows temperature readings taken at various locations in and around the pump while in a controlled-environment chamber. The pump was installed in the Quiet Cover. The chamber temperature was set to 35 and 40°C, and temperature readings were taken at the same locations in two experiments.

The most critical temperature is that of the pump oil itself since this indicates the temperature inside the pump. The data show oil temperature is lower when using the Quiet Cover. In each of the elevated-temperature experiments, the pump oil temperature is kept safely below the 69.5°C reached by the pump oil in the reference experiment.

	Pump Oil	Pump Front	Pump Top	Pump Side
Reference @ 40 C	69.5	56.2	58.9	61.1
Reference @ 35 C	65.1	50.5	53.8	57.5
Quiet Cover @35 C	64.3	50.0	52.5	55.8
Delta QC v Ref 40	-5.1	-6.2	-6.3	-5.4
Delta QC v Ref 35	-0.7	-0.5	-1.2	-1.7

Noise Performance Tests

Noise testing was performed according to Agilent Technologies "Acoustic Test Procedure" as defined in the "Environmental Test Manual." Readings were taken in a quiet room with a background sound pressure level (SPL) of only 38.1 dB using a Type 2250 B&K handheld meter mounted on a tripod. SPL readings were taken at fixed distances of 1.0M or 1.5M from the pump, at nine defined locations. The location specific reductions ranged from a low 3.2dB to a high of 8.4dB.

Pump Type	Pump Only	With Quiet Cover	Mean Delta
Edwards	61.0	56.0	5.1
Pfeiffer	59.6	54.6	5.0
Agilent	58.4	51.7	6.7

Photography



Quiet Cover Design Features

1. Floating oil/drip pan with deep basin

The oil pan/drip pan was designed to reduce the mess from any dripped or splattered pump oil. The pan forms the bottom of the cover to catch all oil drips. The pan floats below the pump (without touching it, Fig. 1) so that oil is kept away from the pump. Oil changes can be performed in the Quiet Cover without an additional container. The pan contains a large basin to hold the full contents of the pump.

2. Open-access cover

The acoustic cover was designed to provide extremely good access to the pump for optimal maintenance. Oil levels are quickly checked using the window lit with an internal LED (Fig 4). An easy to open lid allows adjustment of the ballast and addition of oil (Fig 2), as well as access to the vacuum tubing and filter. With full cover lifted, the pump inside is fully exposed on three sides or maintenance, installation, or removal.

3. Lift-n-Tilt kickstand

The kickstand of the acoustic enclosure was designed from user input that the vacuum pumps are difficult to lift and drain of all oil. The kickstand was ergonomically designed to effortlessly lift the motor-end of the pump (Fig. 2A) so that oil is effectively drained from it.

Feature	Benefits	Advantage
Sound-absorbing cabinet with resistant foam insulation	Reliable noise control	Effectively reduces pump noise creating a better lab environment when using multiple pumps
A built-in kickstand, handle, and no-mess drip pan	Easier pump maintenance	Save time by simplify oil changes. Keep the lab space clean and professional.
Constant fan cooling and easy to see oil level	Longer Pump Lifetime	Save money on costly pump replacements and repairs.

Quiet Cover Compatibility

Part Number	Compatible with these Agilent Systems	Pump Model
G6011A 'Quiet Cover MS'	325-MS QQQ LC/MS 500 Ion Trap LC/MS 6100 Series SQ LC/MS 6420 QQQ LC/MS 6490 QQQ LC/MS (x2 MS40+ Pumps)	Agilent MS40+
G6012A 'Quiet Cover DS'	7700 ICP-MS 7200 GC-QTOF	Agilent DS202 Agilent DS302 Agilent DS402 Agilent DS602
G3199B 'Quiet Cover 2.0'	8800 ICP-QQQ 6530 Q-TOF LC/MS 6540 Q-TOF LC/MS 6230 TOF LC/MS 6430 QQQ LC/MS 6460 QQQ LC/MS	BOC Edwards E2M28 BOC Edwards E2M18 BOC Edwards E1M18
G6014A 'Quiet Cover GCMS'	5977 GC/MS 5975 GC/MS 5973 GC/MS	Pfeiffer Duo 2.5 Edwards E2M1.5 Agilent DS42 Agilent DS42i