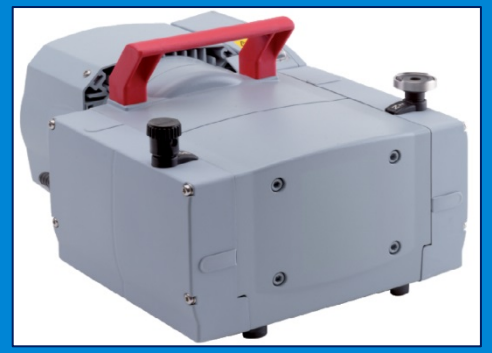
Rough Pumps on Agilent 597Xx GCMS systems

May 2021



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Foreline Pumps used on Agilent GCMS Single Quadrupole systems

The Pfeiffer Duo 3.0

Agilent IDP-3 Dry Scroll Pump

The Pfeiffer MVP 070-3 and MVP 070-3C (for corrosive gases)

Pfeiffer Duo 3.0 Rotary Mechanical Vane Pump

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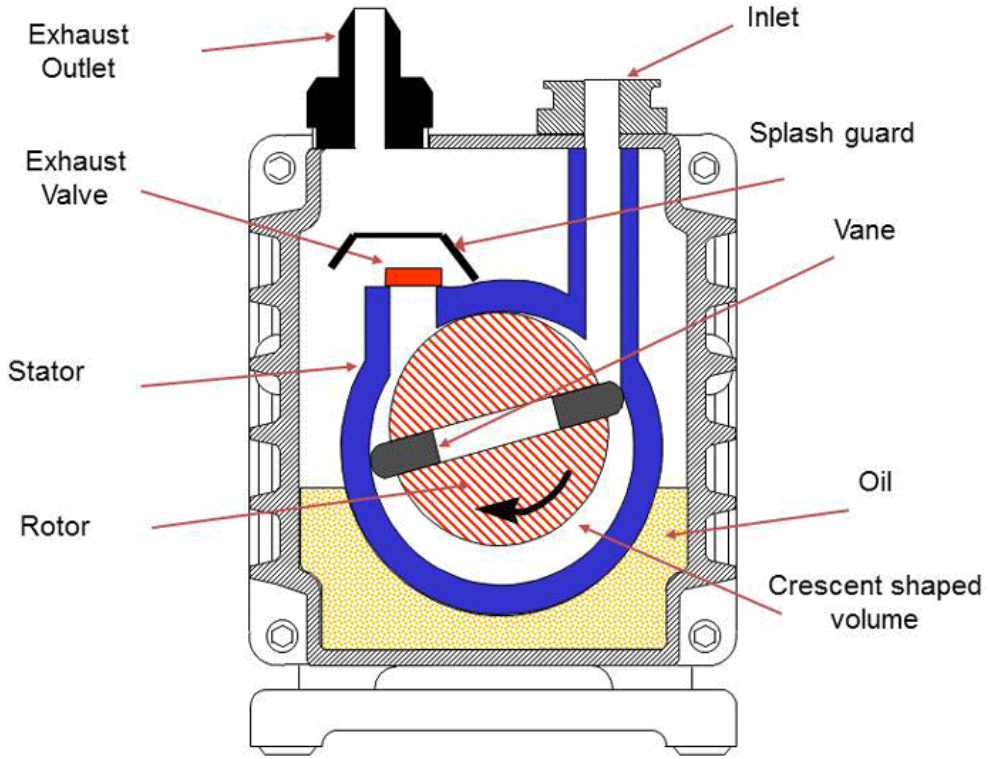
Rotary Mechanical Vane Pumps

Rotary mechanical vane pumps operate on a continual cyclical change in the suction volume by rotation of an off-center cylinder. Longitudinal vanes move out of the cylinder and make contact with the sides of the pump housing. The vanes are either spring-loaded or extend by the centripetal force of the spinning cylinder. The seal is guaranteed by the oil.



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Rotary Mechanical Vane Pumps

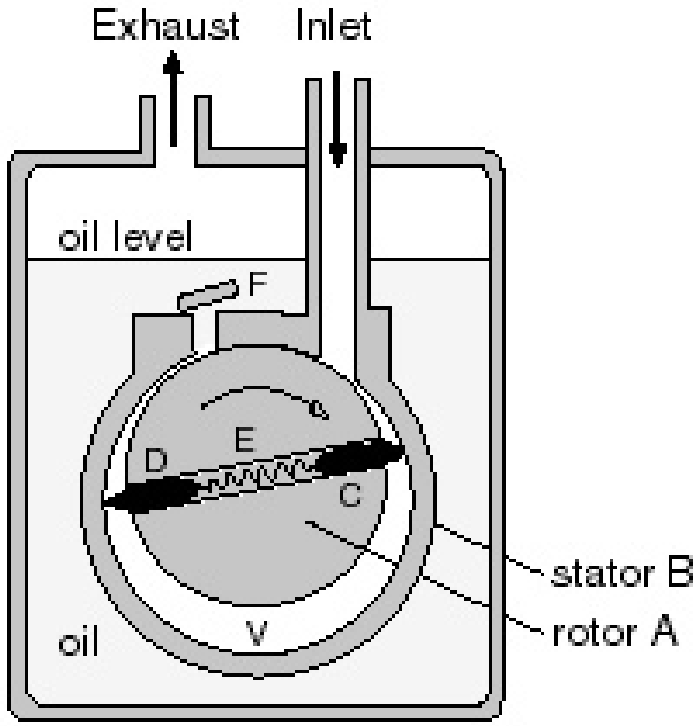
The pump takes in air from the volume to be pumped through the inlet.

Air molecules are sucked into the space between a pair of vanes (C and D) by the depressurization caused by rotation of the cylinder

The isolated packet of air is compressed by the off-center rotation of the cylinder (E) until it has sufficiently high pressure high to force open the exhaust valve (F)

The air molecules exit through the oil to the outside.

The outlet valve (F) and moving parts of the pump are bathed in oil that serves to both lubricate the moving parts of the pump but also to trap air molecules. The process operates until there are too few air molecules to push open the exhaust valve. Gas molecules in the pressure range of a mechanical pump pressure range move via viscous flow.



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Rotary Mechanical Vane Pumps

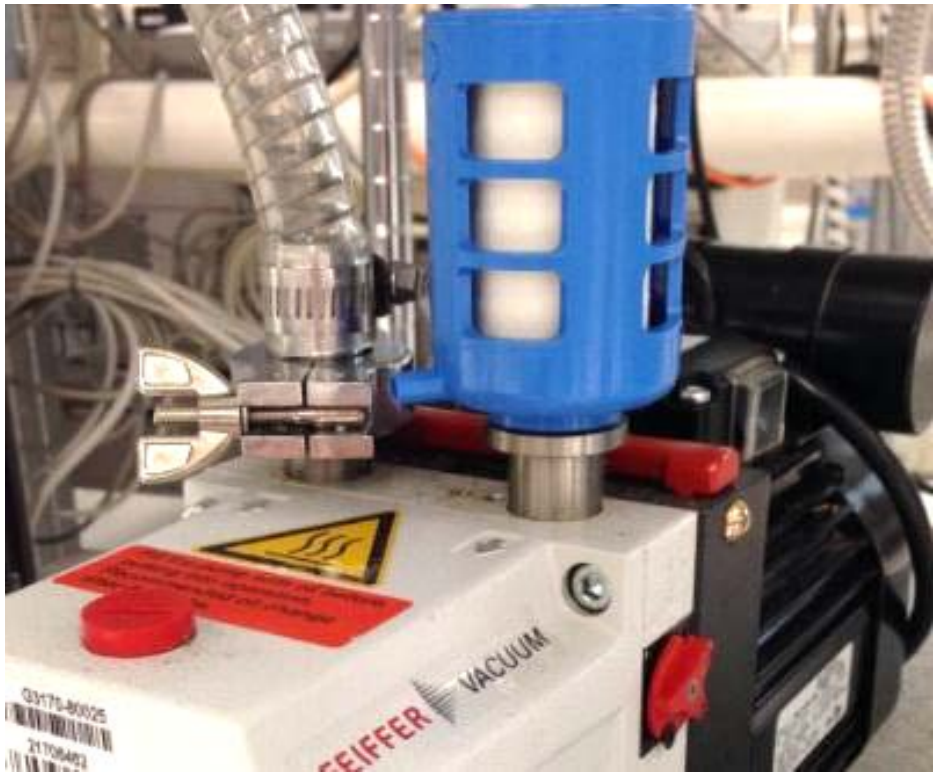
Agilent AVF Platinum
Foreline Pump Oil

5191-5851	1 quart
5191-5852	1 gallon

These pumps are air cooled but the oil helps transfer the heat to the case.

Add oil up to the maximum fill line.

Pfeiffer Duo Foreline Pump – Oil mist filter



Replace the mist filter at <u>every</u> oil change!

G1099-80039

Backpressure on the pump is bad and a contaminated mist filter will cause the pump to fail early.

Do not use any mist filter if running Chemical Ionization (CI). Use the barb fitting and hose to vent the pump exhaust.

Replaceable mist filter after running ammonia CI

Pfeiffer Duo Foreline Pump – Maintenance

- ❑ Check for evidence of oil leakage
- ❑ Drain and replace Mechanical pump oil
- ❑ Replace Oil Mist Filter if installed
- ❑ Consider the need for more frequent oil changes if the oil is dirty.
- ❑ Blow out, vacuum, and/or wipe off the fan on the end of the rough pump.
- ❑ Wipe off the outside of the pump housing

The pump must be cool. It needs:

- Sufficient airflow.
- The correct total flow.
  - Too high a column flow or a big leak will cause it to overheat.
- Clear, unrestricted exhaust
  - Replace the mist filters frequently
  - Do not have a very long exhaust tube attached (<= 20 feet)
- Not operated on an Uninterruptible Power Supply (UPS)

If the temperature is too high for too long, the oil starts to break down. The breakdown products are microscopically very sharp and will cut the shaft seal as they circulate.

Foreline pump oil.
5191-5851 1 quart
5191-5852 1 gallon
G1099-80039 Oil mist filter

From new to old. Clear to black. If the oil in the sight glass looks like number four…it already needed to be changed a while ago!

Oil sealed vacuum pumps sit on a drip tray to catch oil leaking from the shaft seal and prevent it from making a mess on and perhaps damaging the floor. A tiny leak from a wearing shaft seal happens frequently. This is not necessarily a reason to replace the entire pump instantly! Watchful monitoring may be in order.

Vacuum pumps are often under a bench, behind an instrument or in a cabinet and do not receive the regular service that must be carried out.

If the temperature is too high for too long, the oil starts to break down. The breakdown products are microscopically very sharp and will cut the shaft seal as they circulate.

Pfeiffer Duo Foreline Pump – Maintenance

The 5977x Troubleshooting and Maintenance Manual says that the recommended oil change frequency is every six months. Operators should be changing the oil and mist filter in between yearly scheduled preventive maintenance visits by Agilent.

If running CI with methane every day, the oil may need to be changed even more often.

Running ammonia CI every day, the oil may need to be changed every three months or even more frequently!

Table 8 Maintenance schedule

Task	Every week	Every 6 months	Every year	As needed
Tune the MSD				X
Check the foreline pump oil level	X			
Check the calibration vial(s)		X		
Replace the foreline pump oil*		X		

* Every 3 months for CI MSDs using ammonia reagent gas.

Pfeiffer Duo Foreline Pump – Maintenance

Oil leakage is the primary reason that rough pumps are replaced. It is relatively rare that this type of pump stops working or has reduced pumping capacity. There are only four possible places for oil to come out.

1. The drain plug O ring – replacement p/n **0905-1619**
2. The sight glass. Extremely unusual.
3. The oil reservoir gasket. Do NOT overtighten the four case screws. Tight is tight enough.
4. The motor shaft seal. Change the oil and mist filter frequently!

Agilent IDP-3 Dry Scroll Pump

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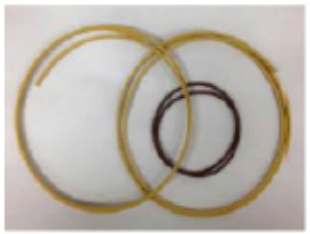
Agilent IDP-3 Dry Scroll Pump

The Agilent IDP-3 Dry Scroll Pump is sold included with a new system or as a replacement kit that can be used with almost any Agilent GCMS mainframe every sold. The IDP-3 Dry Scroll Pump is not compatible with Diffusion Pump systems or Ammonia CI.



One power supply for all input voltages from the MSD

G7077-67018 IDP3 PM Kit

http://www.agilent.com/en-us/video/agilent-idp-3-dry-scroll-pump-installation

http://www.agilent.com/en-us/video/agilent-idp-3-dry-scroll-pump-maintenance

Agilent IDP-3 Dry Scroll Pump

G6696A – Complete IDP-3 Upgrade Kit for GC/MSD 5977, 5975, and 5973

Includes pump, 24 V power supply, fittings, vacuum hose, and customer installation guide

Optional 1 Hour Installation Available

Option to Return Pfeiffer Duo 2.5/3.0 for credit from Agilent.

The hose must be replaced to avoid any possibility of pump oil getting into the scroll seals.

One power supply for all input voltages from the MSD

G7077-67018 IDP3 PM Kit

http://www.agilent.com/en-us/video/agilent-idp-3-dry-scroll-pump-installation

http://www.agilent.com/en-us/video/agilent-idp-3-dry-scroll-pump-maintenance

Agilent IDP3 Dry Scroll Pump - Maintenance

- ❑ Replace the tip seal on the IDP pump at least yearly.
- ❑ Check for evidence of poor vacuum - Turbo Power Demand, poor manifold vacuum
- ❑ Replace the Exhaust Filter.
- ❑ Blow out, vacuum, and/or wipe off the fan on the end of the rough pump.
- ❑ Wipe off the outside of the pump housing

The pump must be cool. It needs:

- Sufficient airflow.
- The correct total flow.
- Clear, unrestricted exhaust
  - Replace the particulate filter at least yearly
  - Do not have a very long exhaust tube attached (<=20 feet)
- Not operated on an Uninterruptible Power Supply (UPS)

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http://www.agilent.com/en-us/video/agilent-idp-3-dry-scroll-pump-maintenance

Pfeiffer MVP Dry Reciprocating Pump

Reciprocating Diaphragm Dry Pumps

The Pfeiffer MVP 070-3 & MVP 070-3C
These are not compatible with Diffusion Pump systems

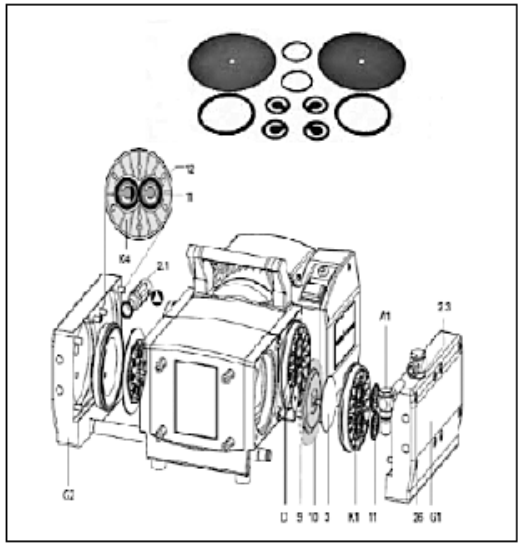
This pump is a flat four cylinder reciprocating pump with diaphragms. The motor turns a crankshaft and connecting rods to the diaphragms. There are built-in one way valves and an anti-suckback valve.

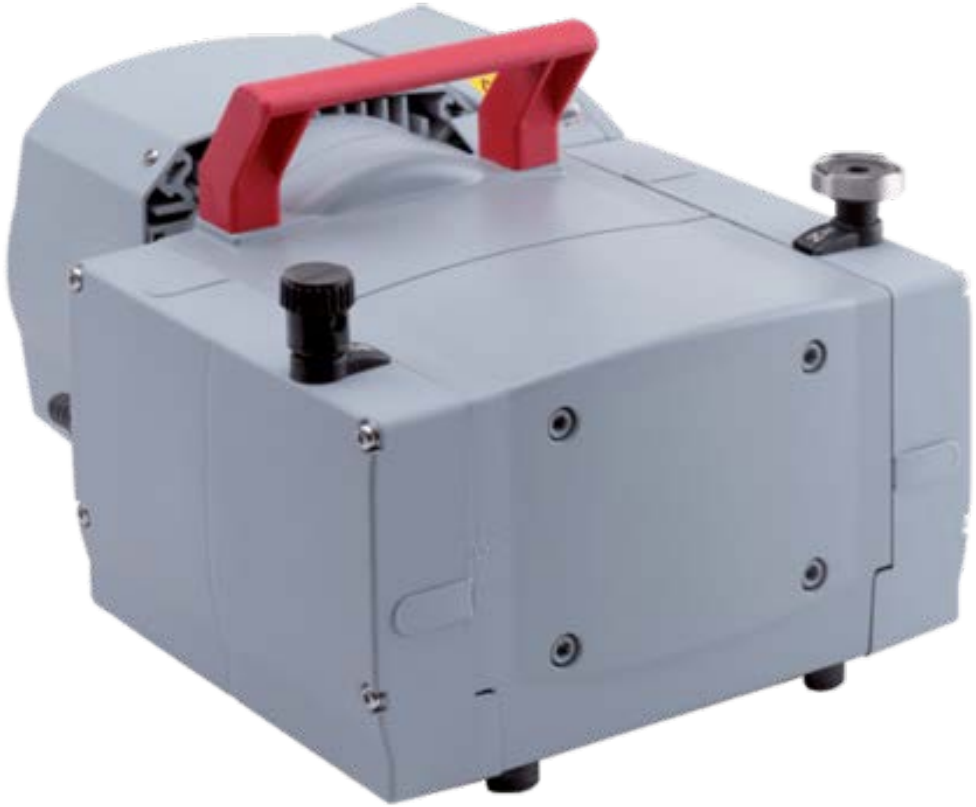
These turn on and run quietly. Their typical failure mode is no pumping at all when a diaphragm fails or a catastrophic mechanical failure.

Keep the pump clean and free from any dust.

Check to make sure which pump model is being replaced.

MVP 070-3C is for corrosive gases like ammonia CI.





Reciprocating Diaphragm Dry Pumps - Maintenance

The Pfeiffer MVP 070-3 & MVP 070-3C

- ❑ Blow out, vacuum, and/or wipe off the fan on the end of the rough pump.
- ❑ Wipe off the outside of the pump housing

The pump must be cool. It needs:

- Sufficient airflow.
- Clear, unrestricted exhaust
  - Do not have a very long exhaust tube attached (<= 20 feet)
- Not operated on an Uninterruptible Power Supply (UPS)

G3870-89051 MVP 070-3
G3870-89052 MVP 070-3C

These are not compatible with Diffusion Pump systems

Rough Pump Exhaust Venting

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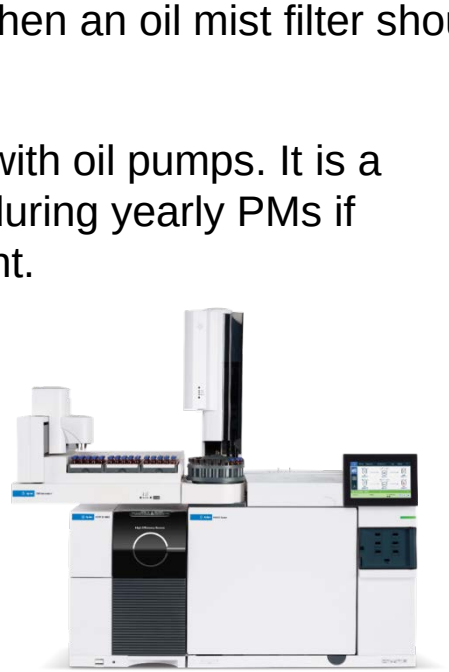
Rough pump exhaust:

Agilent recommends that all GC/MS system foreline pump exhausts are vented outside of the laboratory environment.

- Exhaust vent system should not be part of an environmental control system that recirculates air inside of a building.
- Exhaust venting requirements need to comply with all local environmental and safety codes.
- If the exhaust is non-toxic and will not be vented, then an oil mist filter should be used on the foreline pump exhaust.
- An oil mist filter is included with systems shipped with oil pumps. It is a customer replaceable consumable. It is replaced during yearly PMs if covered under a hardware maintenance agreement.
- Agilent requires that no additional traps be added after the supplied mist filters.

Intuvo 5977B



8890 / 5977B

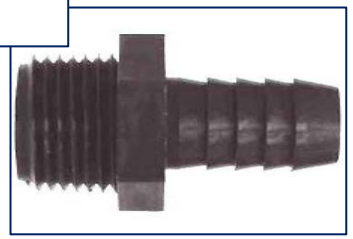
8890 / 7010B

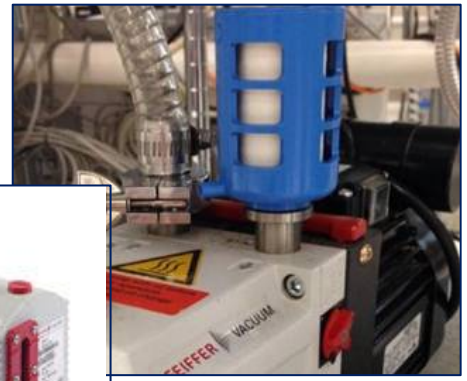
8890 / 7250A

Rough pump exhaust:

Agilent recommends that all GC/MS system foreline pump exhausts are vented outside of the laboratory environment.

G3170-80006
3/8” male BSP to 3/8”barb fitting.
Replaces the oil mist filter on
Duo 2.5/3.0

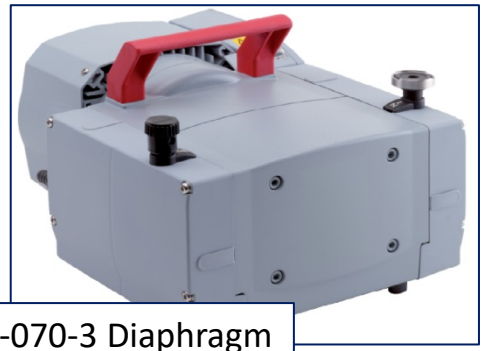




Pfeiffer oil rough pump

622981111
1/4” male **NPT** to 10mm barb fitting.
Replaces the exhaust silencer on
IDP-3

IDP-3 Dry Scroll
Rough Pump



MVP-070-3 Diaphragm
Rough Pump

G3170-80029
Fitting and seal

Rough pump exhaust:

A 6 meter (20ft.) length of 3/8 inch i.d. PVC/vinyl tubing is available for venting the foreline pump exhaust. It should be cut to length for the location of the instrument and not exceed 20 feet. The foreline pump exhaust should not be shared with exhaust tubing from another instrument. Separate 3/8 inch hose barbs are required to connect the tubing to the exhaust vent.

- Agilent sells the tubing and clamps:
  - ✓ G3170-60100 20’ of 3/8” ID tubing.
  - ✓ 1400-1234 hose clamp
- Make sure that there are:
  - ✓ No restrictions, no kinks, Very few sharp radius bends, and no low spots where oil could pool.

No additional traps should be added after the supplied mist filters.

Agilent

Trusted Answers

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