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## Mass Spec will not pump down Applies to 5989A/B

### What could be the problem?

There are several situations that could cause your 5989A/B to have problems pumping down, the following scenarios should help you in isolating problems related to pumping down the 598A/B and establishing a good working vacuum:

- Foreline/Auxillary Pumps
- Neslab (Diffusion Pump Cooling Water Source)
- Diffusion Pump O-Rings
- Manifold O-Ring
- Leak At GC Injection-Port
- Leak At Mass-Spec Interface
- Broken Column
- Column Flow Too High

### What To Check For

#### Operation Of Foreline/Auxiliary Pumps

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Verify the oil level in the sight glass of both foreline and auxiliary pumps, and that there are no oil leaks, then verify operation of the pumps. Make sure that both pumps are working. A gurgling noise may be normal, but should not continue for extended periods. If the gurgling sound is prolonged or constant, it can indicate a leak in the vacuum system. Verify that foreline pressures drop to normal levels when the foreline pump is running. Excessive foreline pressure could indicate a leak, excessive flow or a pump not working to capacity.

## **NESLAB - (diffusion pump coolant supply)**

Verify that the diffusion pump coolant source is operational, providing the correct flow rate at the proper temperature.

## **Diffusion Pump Drain/ Fill O-Ring**

If your pump down problems started after shutting down the mass spec for maintenance or column change, (in other words the system was cooled off after being up and running for a prolonged period of time), then it's possible for the O-rings on the diffusion pump drain/fill spouts are bad. Over a long period of time, and because of the harsh environment that these O-rings operate in, they will become hard and brittle. Typically, they will retain their seal until the first time that the system is cooled down and vented. This of course will cause the surfaces that these O-rings seal against to contract, which causes the O-ring, seal to be broken, and the O-rings will not be pliable enough to re-seal.

To correct or avoid this problem, **replace** all four O-rings, two O-rings per diffusion pump on the top and bottom cap of the diffusion pump drain/fill spout. These O-rings will be hard and brittle and may be difficult to remove.

## **Manifold O-Ring**

The 5989A/B has a single manifold o-ring seated in a groove, machined in the top of the vacuum manifold. When inspecting this O-ring it should be free of nicks, cuts or flat spots. The O-ring and the groove that it sits in can be cleaned with a lint free cloth and either isopropyl alcohol or methanol. The O-ring groove should also be cleaned, verifying that no particulate or lint is left in the O-ring groove. When replacing the O-ring, insure that it fits properly in the manifold o-ring groove. If it does not fit properly, replace the O-ring.

Before replacing manifold window, make sure that it is warp-free and clean, especially on the side that's exposed to the vacuum. Verify that the small magnet imbedded into the cover is in place. When positioning the cover on the manifold,

insure that the magnet is aligned with the magnetic switch on the manifold. Now attempt to pump down to verify if the problem still exists.

### **Leak at GC Injection Port**

After it's determined that the pumping system, (DIFFUSION and FORELINE/AUXILARY PUMPS), are functioning, then the easiest way to troubleshoot the system is by eliminating half of the system. In other words remove the column from the injection port of the GC and cap off (plug) the column by pressing the column end into a septum.

**NOTE:** If your column is at least 30 meters long or longer and 0.25mm id or smaller, you should be able to remove the column without venting the system. However, don't delay in plugging off the column.

Allow the system to continue to pump down for a reasonable time to establish if the problem has been corrected. If the problem is corrected by capping off the column, then we have proved it likely that the Mass Spec and the column as it's installed into the Mass-Spec Interface is OKAY. Troubleshooting can now be confined to problems at the injection port or column flow rate being too high. Remember column flow rate should be limited to 1ml/min or less to be able to establish a good working vacuum.

### **Leak at Mass Spec Interface**

If the leak persists with the column installed and plugged, you need to use the vent procedure to vent the Mass Spec for column removal.

When everything is cooled properly, remove the column from the Mass Spec interface. Cap off (plug) the Mass Spec interface by using a blank (no-hone) ferrule. If you don't have a blank ferrule, install a short length (< 100mm) of column into the Mass Spec interface using a new ferrule and brass interface nut in just the same way you would install a regular column. Then cap off (plug) the short length of column by pressing a septum on the end of the column. Pump the Mass Spec down and allow an appropriate pump down time to determine if the problem has been corrected. At this point if the Mass Spec pumps down then we know that the Mass Spec Interface and Mass Spec are OKAY. If we are satisfied that everything is okay, it's time to reinstall the column and make another attempt to pump down the Mass Spec.

**NOTE:** You can pump the system down in stages to verify everything as you go. To do this, install the column, using a **new** ferrule, into the Mass Spec interface and plug the injection port end of the column just like we did before. If everything checks out okay, remove the septum plug, from the injection port end of the column and install column into the GC injection port. Verify if the problem still exists. Proceed to next step if the problem is not corrected.

### **Broken Or Cracked Column**

If there was a problem pumping down with the column plugged, then shut system down and check column basket for a possible broken or cracked column.

### **Column Flow Too High**

Remember to always verify the flow rates into your Mass Spec. Typical flow rates are between 1 and 2 ml/min. Refer to your hardware manual for the particular flow rating for your pumping system. Also, using columns with internal diameters of .32mm or larger could make it difficult to achieve proper vacuum or to set proper head pressure on the column.

If the problem persists, Agilent Technical Support or on-site service is recommended.