



PPMS Service Note 1070-303

## Test of Internal Flow Sensors

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Temperature control problems in the PPMS may be attributed to a malfunctioning flow sensor in the Model 6000. This sensor is important to temperature control as it measures and controls helium flow through the impedance tube and cooling annulus. Use the following test to verify that this internal flow sensor is functioning properly.

**Note:** This procedure must be performed with the dewar helium level at or above about 15% and the system hardware turned on, as under normal operating conditions. The procedure also requires an external flow meter with at least 500 cc/min. range.

### Flow Sensor Test

1. Using the flexible tubing, which should already be connected to the external flow meter, connect the flow meter to the oil mist filter to measure the flow of exhaust from the system. The oil mist filter is connected to the pump exhaust and hangs on the inside wall of the electronics cabinet.
2. From the Model 6000, place the PPMS in shutdown mode using the following keystrokes: **CTRL, 1. Interactive Control..., 8. Shutdown Mode.**
3. Press the **Status** key on the Model 6000 and read the system temperature. Record this temperature here:\_\_\_\_\_.

**Note:** In shutdown mode, the sample chamber is sealed, and the temperature control hardware goes into standby mode. This turns off all system heaters, maintains low power to the impedance heater to keep liquid helium out of the annulus, and maintains a 100 cc/min flow rate through the impedance and annulus. The status of the temperature control hardware should read **standby**. If it does not, wait until it does before you continue.

4. Record the flow rate (shown on the external flow meter) here:\_\_\_\_\_. It should read about 100 cc/min (calibrated for air).
5. Open the **Gas Monitor** software on the PPMS computer:
  - a) Double click the **Main** icon group in the **Program Manager**.
  - b) Double click **File Manager**.
  - c) At the top of the file manager window, click on drive **c:**.
  - d) In the right file manager window, double click the **\$diag** directory.
  - e) In the right file manager window, double click the **ppms** directory.

- f) In the right file manager window, double click **gasmon.exe**.
6. The Flow rate is displayed in the box representing the Model 6000 directly below the Model 6000 label. The value should be near 0.100 liters/min (100 cc/min). Record the flow rate displayed here:\_\_\_\_\_.
  7. Take the system out of shutdown mode by setting any temperature value. After you execute the temperature setting, the status of the temperature control hardware should change from **standby** to some other state. If it does not, contact your Quantum Design representative.

## **Test Results**

- If the flow rate reported by Gas Monitor does not agree with that reported by the flow meter on the pump exhaust, the system's internal flow meters are not functioning properly. Notify your Quantum Design representative of these test results.
- If both flow rates agree, but are significantly different than 100 cc/min (0.100 l/min), there may be other problems with the system, including a plugged impedance tube. To diagnose a plugged impedance tube, refer to MPMS Application Note 1014-303.
- If both flow rates read approximately 100 cc/min for this test but temperature control problems persist, you may wish to check the system's heater drivers and heaters. See PPMS Service Notes 1070-304 and 1070-305.