



MPMS Application Note 1014-305

Removing and Installing the Sample Tube

The sample tube contains all of the MPMS thermometry and sample space heaters. In the event that any thermometer or heater fails, it is necessary to replace the sample tube.

The MPMS system needs to be prepared for the replacement of the sample tube. The sample tube can be replaced while the probe is in the dewar, but the sample transport and airlock valves, top plate, and head cover assembly need to be removed in order to replace the sample tube.

This procedure details the removal and reinstallation of these assemblies and the sample tube. **It is important to complete this procedure quickly to minimize the chance of forming an ice plug.**

Removing the Sample Tube

1. Set the system to room temperature, 298 K and wait for the system temperature to stabilize.

Vent the sample space.

1. Press **F7** to access the **Diagnostic Menus**.
2. Move the cursor to the **Gas Control** entry field.
3. Press Enter to access the Diagnostic Gas Controls menu.
4. Move the cursor to the **Vent Sample Space** entry field.
5. Press **Enter** to activate this process. Stay in the **Diagnostic Gas Controls** menu.
6. Disable the valves by moving the cursor to the **Valve Operation** entry field and pressing **Enter**.
7. Move the cursor to **Disable** and press **Enter**.

Remove the sample transport.

1. Loosen two 4-40 X 32 hex bolts on the front of the transport top plate. See Figure 1B.
2. Remove two 1/4-20 hex bolts from the back of the top plate. See Figure 1A.

Remove the black airlock handle.

1. Loosen the 7/64 hex nut inside the handle. See Figure 2A.
2. Pull and twist the handle counter-clockwise to remove.

Remove the head cover assembly

1. Loosen the eight 8-32 screws from the panels of the head cover assembly. See Figure 2B.

Note: Carefully remove the head cover as there are wire connectors mounted on the inside of this plate.

2. Disconnect the three electronic connectors that are inside the head cover assembly. See Figure 2C.

Remove the top plate

1. Remove the four 1/4-20 hex bolts, Figure 2E, and the two 6-32 screws, Figure 2K.

Note: These four 4-inch bolts secure all the probe head assemblies. There are no other bolts or screws holding the assemblies in place, so be careful not to shift these components until they are removed.

Remove the airlock valve assembly

1. Disconnect the swage locks, Figure 2F.
2. Disconnect the gas flow lines by gently pulling them apart from the airlock valve assembly.

Important: Do not lose the o-ring, Figure 2G, located on the airlock valve assembly where it mates with the block of the sample tube assembly.

Important: Be extremely careful not to damage the wiring running down the outside of the sample tube. Do not allow the sample tube to bend.

Remove the sample tube assembly

1. Remove the electronic connector, Figure 2H, from the sample tube.

Note: The brown wire is aligned with the arrow on the connector socket.

2. Remove the sample tube assembly by gripping the brass block. It may be necessary to turn it slightly as you raise it.

Note: Do not lose the o-ring, Figure 2I, located on the sample tube assembly block where it mates with the vacuum sleeve assembly.

Installing the Sample Tube

Note: If you just removed the sample tube assembly, proceed to the next step, Installing the new sample tube assembly.

1. Set the system to room temperature, 298 K, and wait for the system temperature to stabilize.

Vent the sample space.

1. Press **F7** to access the **Diagnostic Menu**.
2. Move the cursor to the **Gas Control** entry field.

3. Press Enter to access the Diagnostic Gas Controls menu.
4. Move the cursor to the **Vent Sample Space** entry field.
5. Press **Enter** to activate this process. Stay in the **Diagnostic Gas Controls** menu.
6. Disable the valves by moving the cursor to the **Valve Operation** entry field and pressing **Enter**.
7. Move the cursor to **Disable** and press **Enter**.

Installing the new sample tube assembly

1. Ensure the o-ring, Figure 2I, at the bottom of the sample tube block, Figure 2, is adequately greased (Apiezon M).
2. Gripping the brass block, slowly lower the sample tube into the vacuum sleeve. It may be necessary to turn it slightly as you lower it.
Caution: Be extremely careful not to damage the wiring running down the outside of the sample tube. Do not allow the sample tube to bend.
3. The sample tube block should now be seated on the vacuum sleeve assembly.
4. Reinstall the electronic connector that connects the sample tube to the black lemo.
Note: The brown wire is pin number 1. Align the brown wire with the arrow on the sample tube's connector socket.

Reinstall the airlock valve assembly

1. Ensure the o-ring, figure 2G, at the bottom of the airlock valve assembly is adequately greased (Apiezon M).
2. Seat the airlock valve assembly on the sample tube.
3. Reconnect the two 1/8" swage locks, Figure 2F, to the gas flow lines.
4. Tighten the swage locks to 1/4 turn past hand-tight.

Reinstall the top plate

1. Seat the top plate on the airlock valve assembly, Figure 2.
2. Install the four 1/4-20 hex bolts, Figure 2E.
3. Install the two 6-32 screws (**Figure 2.K**).
Note: Tighten these 4" bolts only after all of the head cover assembly screws are in place.

Reinstall the head cover assembly.

1. Reconnect the three electronic connectors that are inside the head cover assembly.
2. White wires connect to J1.
3. Brown wires connect to J2.
4. Black wires connect to J3.

5. Fit the head cover assembly around the airlock valve assembly, the sample tube, and vacuum sleeve assembly.
6. Install the eight 8-32 screws, Figure 2B, into the front panel of the head cover assembly.
7. Tighten the front panel screws and the top plate bolts simultaneously.

Reinstall the black airlock handle

1. Push and twist the handle counter-clockwise to install.
2. Tighten the 7/64 hex nut inside the handle.

Reinstall the sample transport

1. Seat the sample transport on the top plate, Figure 2D.
2. Install two 4-40 hex bolts, Figure 1A, onto the front of the transport top plate.
3. Install two 1/4-20 hex bolts, Figure 1B, onto the back of the top plate.

Restore the MPMS system

Enable the valves

1. Press **F7** to access the **Diagnostic Menu**.
2. Move the cursor to the **Gas Control** entry field.
3. Press Enter to access the Diagnostic Gas Controls menu.
4. Move the cursor to the **Valve Operation** entry field and press **Enter** to enable the valves.
5. Move the cursor to **Enable** and press **Enter**.

Purge and copy new files

1. Purge the system several times by pressing the Purge Air Lock button, Figure 2.
2. IPL files contain the thermometry calibration data and each sample tube has a unique set of IPL files. Copy the new IPL files into the MPMSR2 directory.
3. Insert the floppy with the IPL files into the drive.
4. Go to the C:\MPMSR2 directory.
5. Type **copy a:* .ipl**.

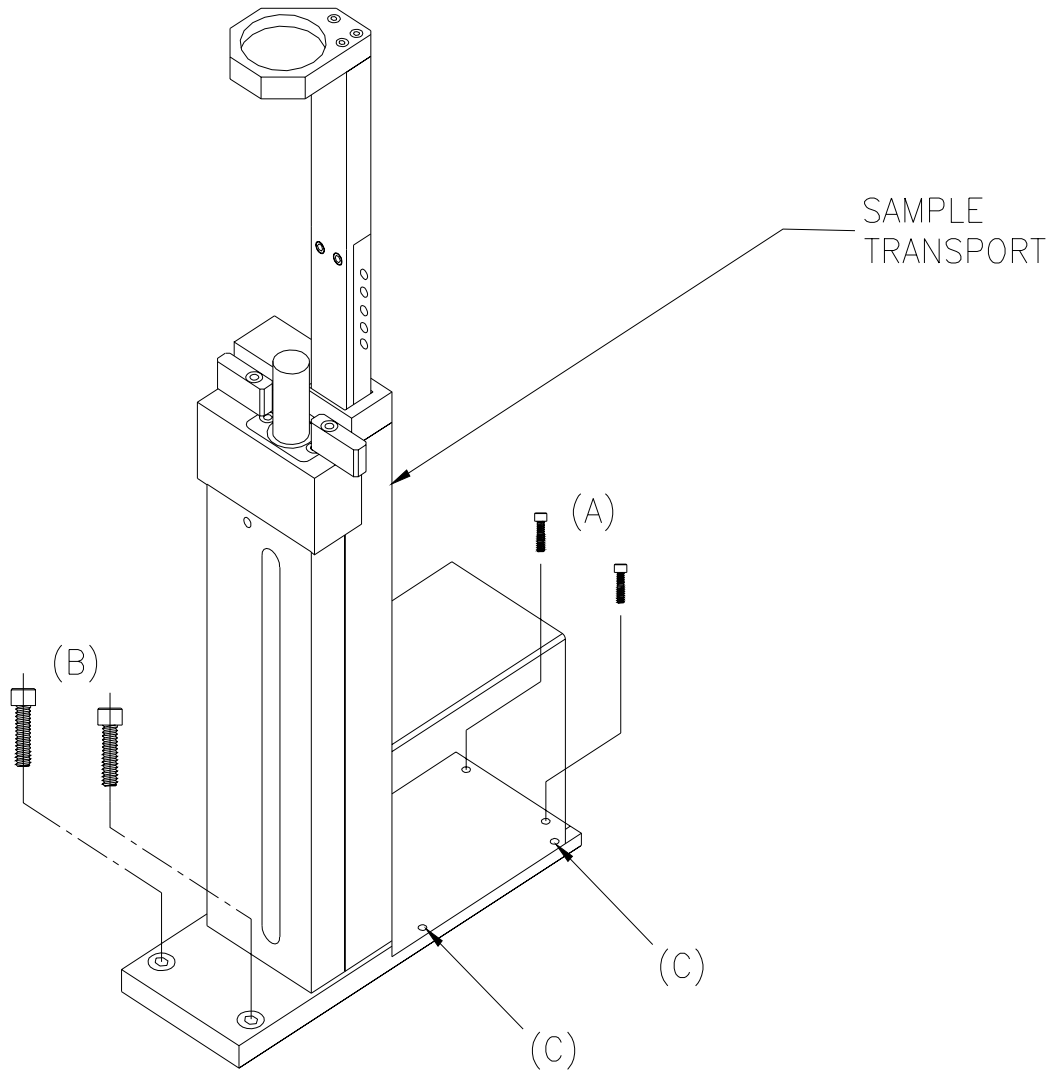


Figure 1. Sample Transport

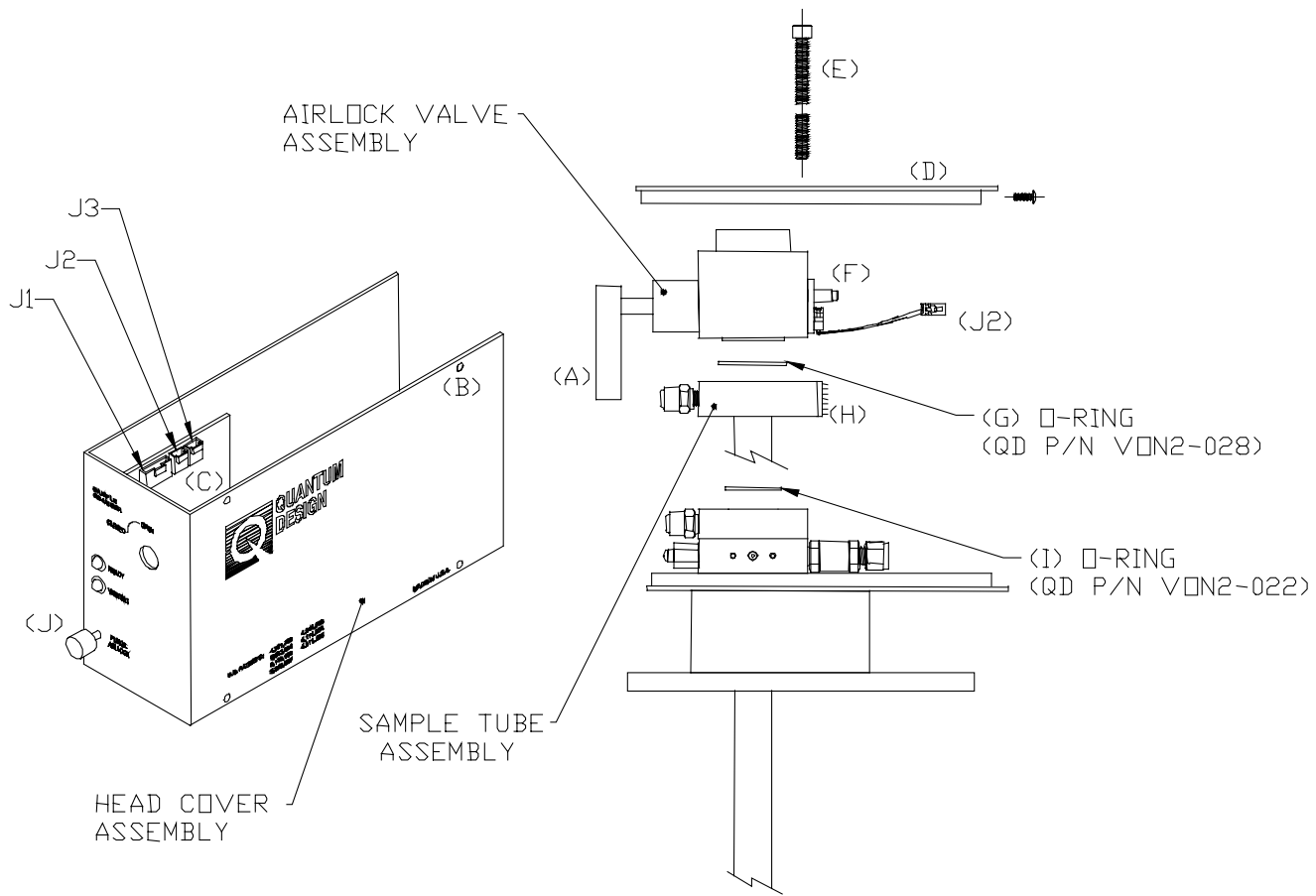


Figure 2. Probe Head