

Purpose: Helium Transfer for PPMS; First-time Fill

System: PPMS

Introduction

Before attempting to transfer helium into the PPMS dewar, you should be aware of the risks and hazards associated with liquid helium. If your system includes a nitrogen-jacketed dewar, be certain to follow the nitrogen fill procedure before continuing. Also, once the nitrogen fill procedure has been followed, be certain that the system has been allowed to stand for at least 8 hours before continuing.

Equipment Needed

Refer to **Figure 1** and **Figure 2** for required equipment and transfer arrangement. The equipment shown is from the helium transfer kit provided by Quantum Design. Your own equipment may vary slightly.

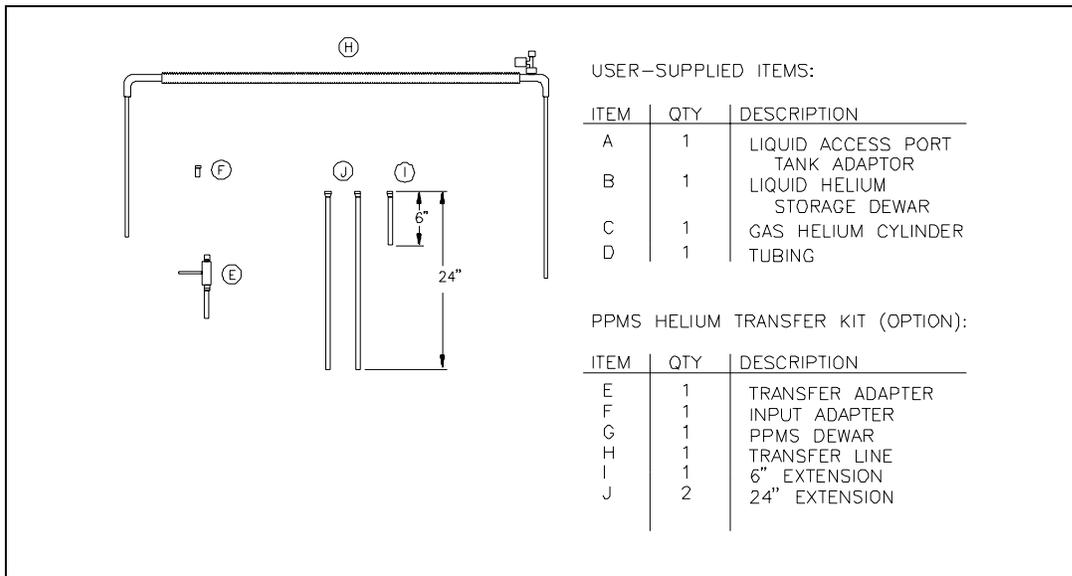


Figure 1. Helium Transfer Equipment, some listed items are shown in Figure 2.

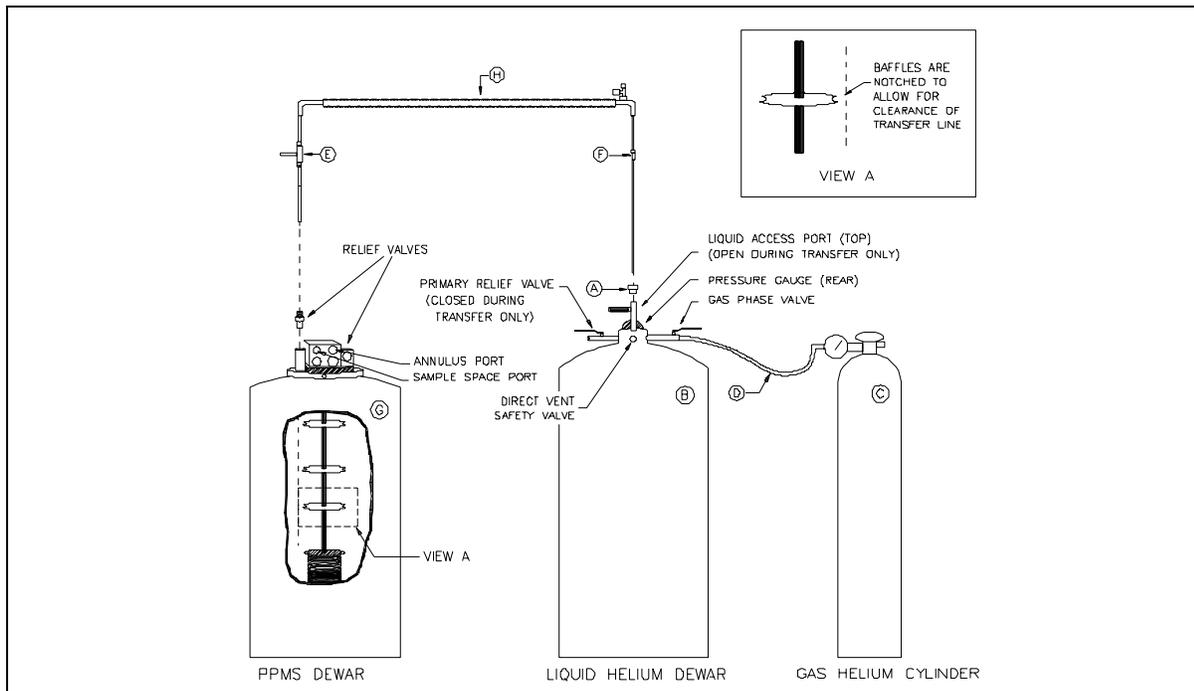


Figure2. Helium Transfer Configuration

Helium Transfer

This transfer (Initial Helium Transfer) is performed when the helium level meter reads negative or when the PPMS dewar has been dry (out of helium) for a long period of time. If the PPMS dewar is cold (containing some liquid helium), then you should follow the instructions provided in the PPMS User's Manual, Chapter Two "Subsequent Helium Transfers".

1. Make sure that both the large (annulus port) and small (sample space port) pumping lines are connected from the probe to the Model 6000. These are the two top ports on the probe head (**Figure 2**).
2. Verify that the vacuum pump is turned on.
3. Set the system temperature to 5K from the **Immediate Operations** menu (under the **Control** menu) of the Model 6000. This will cause the cooling valve to open and turn the impedance heater off.

Note: The function of the cooling valve is to allow the system to self-flush the temperature control impedance as the system cools down. Flushing allows the helium gas to carry out contaminants found in the warm dewar. Shortly after liquid helium begins collecting in the bottom of the dewar, the impedance will be covered in liquid, reducing the chance of the impedance becoming blocked with contaminants.

4. Verify that the proper adapters and extensions are installed on the helium transfer line. The long extension is connected to the output end of the transfer line during the initial transfer only.
5. Vent the pressure from the liquid helium dewar (storage dewar) by slightly opening the gas phase valve
6. Close the gas phase valve after the pressure has been reduced.
7. Close the primary relief valve of the liquid dewar. This valve is closed only during the transfer.
8. Use the tubing to connect the helium gas cylinder to the gas phase port of the liquid dewar.
9. Slide down the input and output adapters on the PPMS transfer line to just above the attached extensions.
10. Remove either of the dewar relief valves. These are the valves located on either side of the probe head (**Figure 2**).
11. Open the liquid access port of the liquid dewar.

12. Insert the transfer line into both the PPMS dewar and the liquid dewar at the same time. The baffles on the PPMS probe are notched to allow the transfer tube to be inserted into either port.
13. Lower the transfer line as far down as it will go.
14. On the input side (liquid dewar), raise the end up off the bottom about 1/4 of an inch.
15. Open the gas phase valve (on the liquid dewar).
16. Open the gas cylinder regulator to start the transfer.
17. Monitor the transfer rate from the Model 6000 in the following manner:
 - a. Press the **Control** key to enter the **Control Menu**.
 - b. Select item 1, **Interactive Control**, and press **Enter**.
 - c. Select item 0, **Fill Dewar**, and press **Enter**.
18. After 5-10 minutes, purge the sample space two or three times by selecting **Purge and Seal** from the **Interactive Control** menu. Each time you select **Purge and Seal** the system will immediately perform this operation for one cycle.
19. Return to the **Fill Dewar** screen to continue monitoring the transfer rate (step 17).
20. Continue the transfer at a slow, steady rate until the level reaches 25-30%. At this point the flow rate should be between 2-2.5 liters per minute. The transfer rate may now be increased and you may set the desired system temperature.
21. When the helium level reads 97-100% close the gas cylinder regulator.
22. On the liquid dewar, close the gas phase valve.
23. Open the primary relief valve of the liquid dewar.
24. Remove the PPMS transfer line.
25. Install the dewar relief valve.
26. Close the liquid access port on the liquid dewar.
27. The helium sensor will turn off automatically when the **Fill Dewar** screen is exited.