



PPMS Service Note 1070-601

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## **Helium Transfers on the Cold Dewar**

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Before attempting to transfer helium into the PPMS system, be aware of the precautions and hazards associated with liquid helium:

- The extremely cold liquid and gas can cause serious burns
- Always wear protective clothing, including thermal gloves and eye protection when working with helium or any other similar substance
- Perform this procedure in a well-ventilated room
- In the event of excessive helium release, immediately vent the room by opening any windows and doors
- If you are still uncertain about this procedure, check with someone who has prior experience with helium transfers or call Quantum Design

Before continuing, refer to Figure 1 and Figure 3 for required equipment and transfer arrangement.

### **About Helium Transfer**

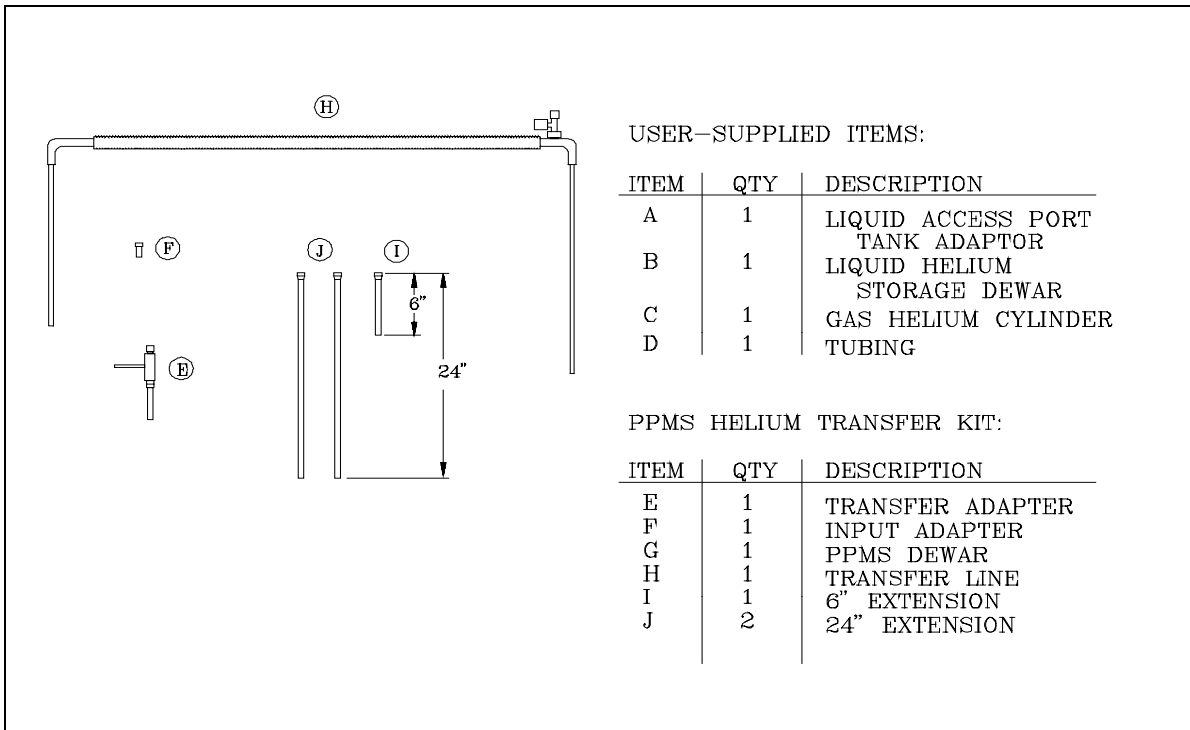
Helium transfers may be performed under two different conditions: warm or cold. If the dewar is warm or completely out of helium (the helium level meter reads negative), the helium transfer should be treated as a first-time transfer. That is, you should follow the procedure given in PPMS Service Note 1070-602 Helium Transfer: Warm Dewar. Otherwise, the following procedure is recommended for transfers when the dewar is low, but not empty, or whenever additional helium is required.

There are two different procedures for cold helium transfers, depending upon the level reading. The first is for normal helium transfers when the current helium level is above 20%. The second is for transfers applied when the level is below 20%. Both transfer arrangements are described below.

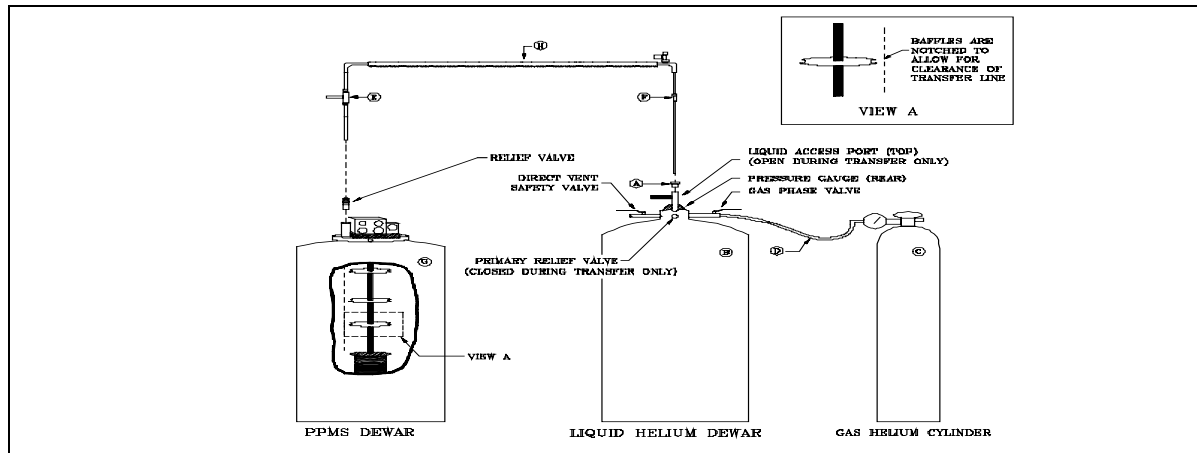
### **Helium Transfer Procedure: Level Above 20%**

1. Make sure both large and small pumping lines are connected from the probe to the Model 6000 and that the system pump is turned on.

- Set the system temperature to 3.5K. This will cause the cooling valve to open and turn the impedance heater off. 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 from the warm dewar. When the dewar level has reached 30%, the impedance is covered in liquid, reducing the chance of the impedance becoming blocked with contaminants. Verify that the proper adapters and extensions are installed on the helium transfer line.



**Figure 1.** Helium Transfer Equipment. Some items listed are shown in Figure 2.



**Figure 2.** Helium Transfer Configuration

3. Vent the pressure from the liquid helium dewar (storage dewar) by slightly opening the gas phase valve.
4. Close the gas phase valve after the pressure has been reduced.
5. Close the primary relief valve of the liquid dewar. **This valve is closed only during the transfer.**
6. Use the tubing to connect the helium gas cylinder to the gas phase port of the liquid dewar.
7. Slide down the input and output adapters on the PPMS transfer line to just above the attached extensions.
8. Remove either one of the dewar relief valves. These are the valves located on either side of the probe head. See Figure 2.
9. Open the liquid access port of the liquid dewar. Insert the transfer line, input end first, into the liquid dewar and lower it very slowly. Continue until you see an exhaust plume from the output end.
10. With the exhaust plume visible, carefully insert the output end into the PPMS dewar. Lower the transfer line as far down as it will go.
11. On the input side (liquid dewar), raise the end up off the bottom about 1/4 of an inch.
12. Open the gas phase valve (on the liquid dewar), then open the gas cylinder regulator to start the transfer.

### **Monitor the transfer from the Model 6000 Controller**

1. Press the **Control** key to enter the **Control Menu**.
2. Select item 1, **Interactive Control**, and press **Enter**.
3. Select item 0, **Fill Dewar**, and press **Enter**.
4. After 5-10 minutes, purge the sample space two or three times by selecting **Purge and Seal** from the **Sample Chamber** screen.
5. Continue the transfer at a slow, steady rate until the level reaches 25-30%.

**Note:** At this point, the flow rate should be between 2 and 2.5 liters per minute. The transfer may be increased, the cooling valve may be closed, and you may set the desired system temperature.

6. Continue the transfer until the level is 97-100%, then close the gas cylinder regulator.
7. On the liquid dewar, close the gas phase valve and open the primary relief valve.
8. Remove the PPMS transfer line and install the dewar relief valve.
9. Close the liquid access port on the liquid dewar. The helium sensor will turn off automatically when the rate is less than or equal to zero for over 30 seconds.

### **Helium Level Below 20% (Not Warm)**

When the current helium level is **below 20%** but not zero or negative, follow the same procedure as previously given except for the following changes.

1. When the helium level reaches 25-30% (in step 5 of the previous section) close the **Cooling Valve** from the **Diagnostic/Gas Controls** menu.
2. Set the desired Target Temperature.
3. Continue the transfer until the level is 97-100%.
4. Follow the same removal process (steps 7-9 of the previous section) for the Initial Helium Transfer.