



Service Note 1083-201

Modifying Cryopumps Installed with EverCool Systems

Quantum Design has developed a copper extension (PN 4083-234) to increase the efficiency of cryopumps that are installed in systems that also have the EverCool option. The special temperature profile in the EverCool dewar prevents optimal cryopump operations. After the extension has been attached to the cryopump pumping tube, the cryopump will be more effective at producing high vacuum in the sample space.

The procedures for mounting the extension for the cryopump are described below. Please review the procedures before you begin them. Also, verify that you have received all the listed items.

Modification Kit

- extension (solid or with threaded holes)



Figure 1. Extensions for pumping tube

- bolts and washers (extension with threaded holes)
- Tra-Con Supertherm glue (solid extension)
- sandpaper

Materials

It will also be helpful to have the following items on hand:

- rags or similar materials (to wipe up liquids)
- tape (plastic package tape or similar)

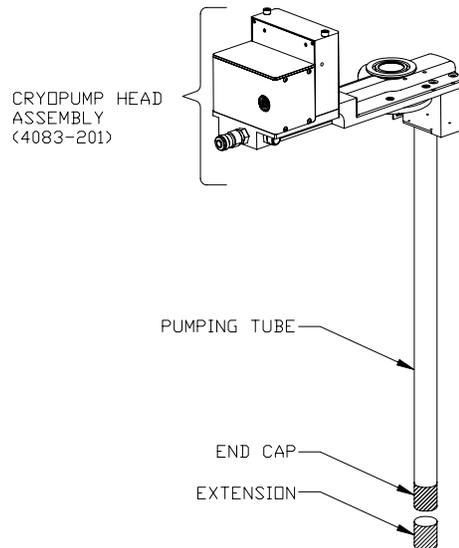


Figure 2. Modifying the cryopump pumping tube with an extension

WARNING!

Always wear protective clothing, including thermal gloves, eye protection, and covered shoes, when you install the cryopump in the dewar, when you remove it, and when you work with any cryogen. See the *PPPMS Hardware Manual* for more about safety.

I. Prepare the System to Remove (Install) the Cryopump



WARNING!

Wear safety gloves and goggles for the following procedures. Your skin will freeze almost instantly if it directly contacts cryogenics in high boil-off gas flows.

Disable the cold head and relieve the pressure in the dewar, using the instructions below.

1. In the dropdown MultiVu menus, select **Instrument >> Evercool** to open the **EverCool System** dialog.
2. Click on the **Disable Cold Head** button at the lower right of the dialog. The cold head will be turned off and automatic (system) control of the cold head will be disabled for 20 minutes.
3. Put on cryogenic safety gloves, if you do not already have them on.
4. Using the utmost caution to avoid the cold gas, relieve the pressure in the dewar:
 - a. Unlatch the lock on one of the transfer port fittings on the top of the PPMS probe.
 - b. Quickly pull out that transfer port fitting. **WARNING:** Ultra-cold helium gas will be forced out of the dewar, where it is held at overpressure.
5. When the cold gas is no longer coming from the transfer port, replace the fitting.
 - a. Wipe the transfer port fitting until it is completely dry.
 - b. Insert the fitting into the transfer port, pushing down hard on the fitting if necessary to seat it all the way into the port.
 - c. Latch the fitting in place after you have inserted it.

II. Prepare the Cryopump for Modification

1. Remove the cryopump from the dewar by using the instructions in Section 2.3 of the *PPMS Cryopump High Vacuum Option User's Manual*.
2. Put the cryopump to the side so that it can warm to room temperature (about 300 K) while you seal off the PPMS dewar.
3. When the cryopump is warm and the dewar has been sealed, position the pump assembly so that you can examine the bottom of the pumping tube.
 - a. If the end cap has threaded holes, use the instructions in Section III.A.
 - b. If the end cap is solid, use the installation instructions in Section III.B.

III.A. Mount the Extension with Bolts

Use the instructions below to mount the copper extension with the bolts and washers that were shipped with it.

1. Apply a drop of Apiezon M grease to the contact surface.
2. Place the extension on the pumping tube, lining up the bolt holes.
3. Place the washers over the bolt ends, insert the bolts into the bolt holes, and screw them into the pumping tube. This completes the cryopump modification.
4. Disable the cold head and relieve the gas pressure in the dewar, using the instructions in Section I above.

5. Complete the re-installation of the cryopump by following the instructions in Section 2.4 of the *PPMS Cryopump High Vacuum Option User's Manual*.

III.B Mount the Extension with Glue

Use the instructions below to mount the copper extension with the Tra-Con Supertherm glue that was shipped with it.

1. Place the cryopump upside down on a table and wedge it so that it will be held upright and steady for the next 24 hours.
2. Thoroughly clean the surface of the extension and the end cap of the pumping tube. Verify that you have removed all grease from the surface before you continue.
3. Sand the contact surfaces (end cap and extension).
4. Clean the surface of the extension and the end cap of the pumping tube again.
5. Remove the opaque bag containing the BIPAX kit from its box. **Tear open** the foil sleeve of the bag—**do not cut the bag**, because you might slice into the glue container.

Important: Once you begin working with the Supertherm package, the materials will be usable for only about one hour.

6. Examine the glue materials for crystals. If there are any, melt them by heating the BIPAX package to 125°F (52°C) for 15 minutes.
7. Put on safety goggles and gloves and provide a local exhaust (recommended by the manufacturer of Supertherm).¹

CAUTION!

Supertherm hardener and resin can irritate the skin, eyes, and respiratory system. When you use the product, wear protective gear and ensure that the area has good ventilation.

8. Remove the bar between the hardener and resin and knead them together for about five minutes. If the color is not uniform after five minutes, knead the package for two more minutes.
9. Cut the corner of the package to dispense the epoxy.
10. Apply a small amount of Supertherm to the contact surface of the extension and put it on the end cap of the pumping tube (see Figures 2 and 3).
Using gentle pressure, move the extension around on the end cap so that the epoxy is evenly distributed between the two surfaces and it has no bubbles.
11. Center the extension on the cap and then fix it in position on the tube with tape. The tape should be tight enough to apply pressure to the glue joint during the cure time.

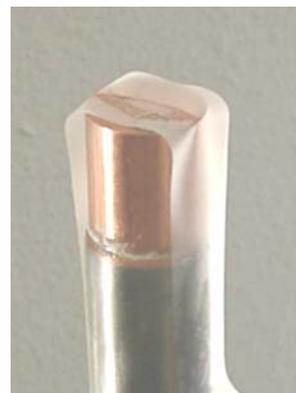


Figure 3. Copper extension glued to the end cap of the cryopump pumping tube, held in place with tape during the cure

¹ For further information about Supertherm BIPAX, see the product materials, visit the Tra-Con Web page (www.tra-con.com), or call their technical support at 1-800-872-2661.

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12. Remove any excess Supertherm so that no material extends outside the diameter of the pumping tube.
13. Let the cryopump and extension sit without being disturbed for about 24 hours so that the Supertherm can cure.
14. The modification is complete. Disable the cold head and relieve the gas pressure in the dewar, using the instructions in Section I above.
15. Complete the re-installation of the cryopump by following the instructions in Section 2.4 of the *PPMS Cryopump High Vacuum Option User's Manual*.