Cryo-Torr® Pump
Decontamination Manual

For Technical Support contact Applied Cryogenics
1-510-252-9900

8040613 Revision AA

Section 5 - Maintenance Procedures

Helium Circuit Decontamination

Contamination of the helium-gas circuit is indicated by sluggish or intermittent operation (ratchetting) of the cold head drive mechanism. With severe contamination the cold head drive may seize and fail to operate. One of the major sources of contamination is using helium gas of less than the required purity. When performing the decontamination process, use only 99.999% pure-helium gas, and the regulator and charging line must be properly connected and purged.

This decontamination procedure will remove contaminants from the cold head and/or compressor, thereby restoring system performance. The cold-trapping of contaminants inside the cold head during this procedure will also decontaminate the compressor if the contamination of the system is not severe. Separate decontamination of the compressor is required whenever the compressor has been opened to atmosphere, or the pressure dropped to zero.

Cryo-Torr Cryopump Decontamination Procedures

NOTE: Refer also to the appropriate Compressor Manual.

1. Cool down the cryopump and operate it for one to three hours. If the system will not cool down, proceed to step 2. Operating the cryopump will isolate the contaminants by "freezing" them in the cold head. The contaminants in the helium-gas circuit of the cryopump tend to become frozen inside the cold head. The longer the cryopump is operated beyond the one-hour period, the greater is the amount of contamination that becomes isolated inside the cold head.
2. Shut down the cryopump.
3. *Immediately* disconnect the helium supply and return lines from the gas-supply and gas-return connectors at the rear of the compressor. Leave them attached to the cold head.
4. Attach the maintenance manifold to the disconnected ends of the return and supply lines.

5. Reduce the pressure in the cold head to a level of 30 psig by using the maintenance manifold. Reducing the pressure in the cold head to below 30 psig (200 kPa) may introduce more contaminants into the helium circuit.

   If you only have the manual regeneration option, turn the cryopump OFF and open the purge valve until the second stage temperature reaches 290K.

6. Attach a two-stage regulator (0-3000/0-400 psig) and charging line to a helium bottle (99.999% pure). DO NOT OPEN THE BOTTLE VALVE AT THIS TIME. Purge the regulator and charging line as introduced in steps a through d below. Do *not* use helium gas that is *less than 99.999% pure.*

   a. Open the regulator a small amount by turning the adjusting knob clockwise until it contacts the diaphragm; then, turn approximately 1/8 to 1/4 turn more, so that the regulator is barely open.

   b. Slowly open the bottle valve, and purge the regulator and line for 10 to 15 seconds. Turn the regulator knob counter-clockwise until the helium stops flowing.

   c. Loosely connect the charge line to the 1/8-inch Hoke valve on the maintenance manifold.

   d. Purge the charge line again, as in step a, for 30 seconds, and tighten the charge line flare fitting onto the Hoke valve while the helium is flowing.

This procedure is required to ensure that both the regulator and the charging line will be purged of air and that the air trapped in the regulator will not diffuse back into the helium bottle. For best results, BROOKS-CRYOGENICS suggests a dedicated helium bottle, regulator, and line, which are never separated, for adding helium.

7. Perform in sequence:

   a. Backfill the cold head with helium to a static charge pressure of 195-205 psig (1345-1415 kPa) by adjusting the regulator to the required pressure, and opening the Hoke valve on the manifold. Close the Hoke valve when the pressure is correct.

   b. Depressurize the cold head to 30 and 50 psig 200 and 330 kPa) by slowly opening the ball valve and allowing the helium to bleed out slowly. Do *not* reduce the pressure to *less than* 30 psig or the cold head may be further contaminated.

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c. Perform the flushing steps a and b four more times.

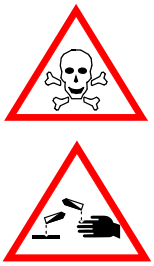
d. Pressurize the cold head to a static charge pressure of 195-205 psig (1345-1415 kPa) and run the cold head drive motor for 10 to 30 seconds.

e. Perform steps b through d four more times for a total of 25 flushes and 5 drive-motor runs.

8. Verify that the cold head is pressurized to the static charge pressure of 195-205 psig (1345-1415 kPa).
9. Disconnect the maintenance manifold from the helium return and supply lines.
10. Reconnect the helium return and supply lines to the return and supply connectors at the rear of the compressor. The cryopump is now ready for operation.

Cleaning the Cryo-Torr Cryopump

WARNING



If the cryopump has been used to pump toxic or dangerous materials, you must take adequate precautions to safeguard personnel.

Cleaning the arrays or other interior surfaces of the cryopump vacuum vessel is seldom required because dust build-up does not affect performance, and the special alloy copper cryo-condensing arrays are nickel plated for corrosion resistance.

If you wish to clean the arrays and other interior surfaces, follow the procedures below.

1. Confirm that an adequate supply of indium gasket material, P/N 3543738P001, is available to replace gaskets inadvertently damaged during disassembly. Available from Applied Gryogenics.
2. Carefully disassemble the components in the vacuum vessel, including the arrays and radiation shield, to avoid damage to the indium gaskets.
3. Clean the interior surface of the vacuum vessel, the 80K condensing array, and the 80K radiation shield as follows:

a. Wash each item in strong soap or detergent solution and hot water.

b. Rinse the item in *clean hot water*.

c. Air or oven dry all items at 150°F (66°C) maximum before reinstalling into the cryopump.

CAUTION

Do not clean the 15K cryo-adsorbing array, because you may severely contaminate the adsorbent in the cleaning process.

4. Wearing lint-free gloves, reassemble the cryopump. Replace any indium gasket damaged during disassembly with a gasket cut from indium gasket material.
5. Torque all screws that compress indium gaskets for a minimum of 5 seconds to allow proper gasket seating:

Table 5-1: Indium Gasket Screw Torque Specifications

Screw Thread	Torque (Inch-Pounds)
No. 4-40	11
No. 6-32	20

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Appendix A - Applied Cryogenics Customer Technical Support Information

When contacting Applied Cryogenics for Technical Support, please have the following information available.

1. Record the part number and serial number from the compressor.
2. Provide the installed location of the compressor.
3. Provide name, e-mail address, and telephone number of the person to contact.
4. List any error codes received during the failure.
5. Prepare a detailed description of the events relating to the error.
   - Time that the equipment has been in operation
   - Work that was done on the equipment prior to the error
   - Functions that the equipment was performing when the error occurred
   - Actions taken after the error and the results of those actions
   - Other information that may assist the Specialist
6. Contact Applied Cryogenic Technical Support at this number:

   `1-510-252-9900`