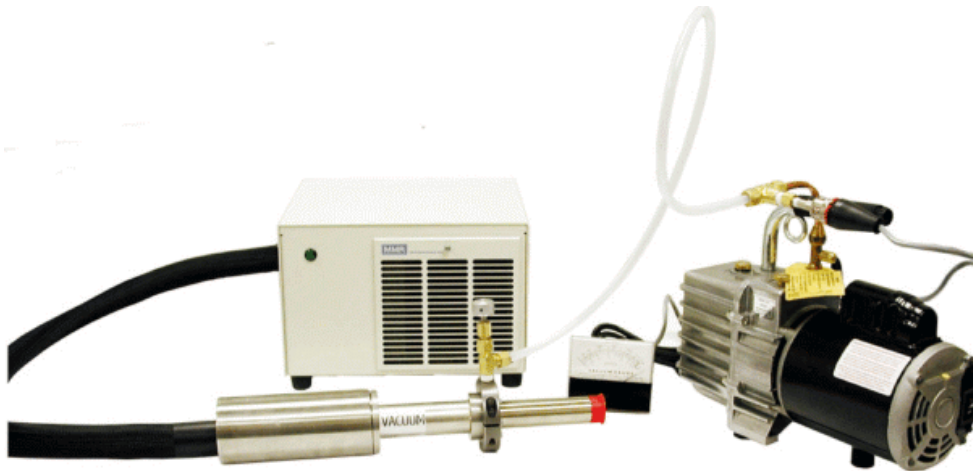


## VACUUM PUMPING PROCEDURE for the X-COOLER HEAT EXCHANGER/CRYOSTAT

### I. Introduction

The X-Cooler's cryostat-heat exchanger uses molecular sieve to maintain their internal vacuum for proper thermal transfer. Molecular sieve by design has tremendous capacity to pump gases. After a period of several months, due to permeation and out gassing, these gases may accumulate in such volume to prevent proper thermal transfer. This condition may be evident by moisture accumulation on the heat exchanger-cryostat and/or decreased cooling capacity. In such cases it may become necessary to vacuum pump the exchanger-cryostat.



**X-Cooler and vacuum pumping system**

Evacuation of the cryostat should only be performed by qualified field service personnel. This procedure outlines the proper procedure and equipment that must be used.

**\*Note: It is not necessary to remove the detector capsule from the cryostat for this procedure**

### II. Equipment:

Complete X-Cooler Pump-out Kit contains: Pump-out Valve Operator, Vacuum Pump and Gage:

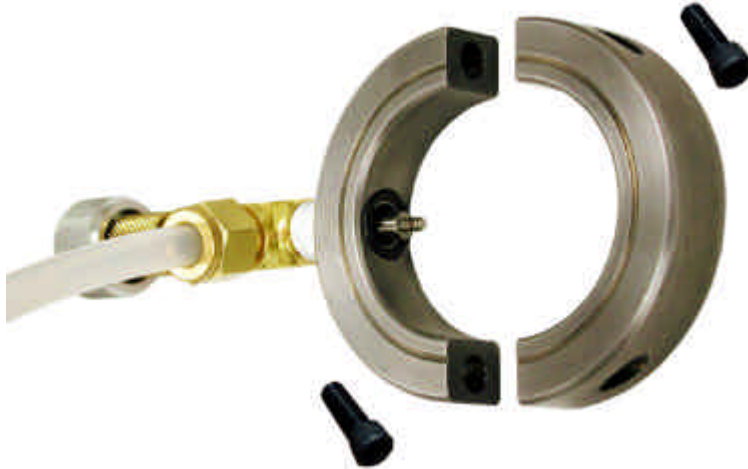
**·110V/60Hz Model part number: X-Cool-PK-110**

**·or**

**·220V/50Hz Model part number; X-Cool-PK-220**

If you have a suitable vacuum pump then you will only need the Pump-out Valve Operator.

- “Pump-out valve operator” [part number: X-Cool-PK-ADPT](#)



(Includes valve operator, clamp and 2ea socket head screws)

### III. Pumping The Cryostat

**Preparing the pump station:** The pump station should be situated where it will not be in a high traffic area or in an area where tampering could occur. The cryostat should be positioned within easy reach of the pump connection so that the minimum stress on connections is applied while pumping is achieved.

**Preparing the cryostat:** **The detector must be completely warm prior to pumping the X-Cooler cryostat. Turn off the X-Cooler and allow at least 24 hours for the detector to warm to room temperature.**

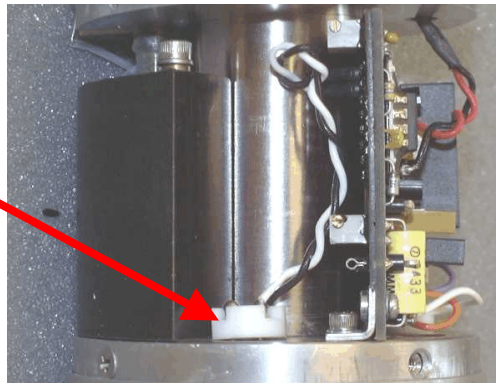
1. **To determine detector temperature:**
  - To insure the detector is warm, the thermal element (T/E) must be measured.



- Remove the shroud that covers the detector electronics by removing the phillips head screws.
- Slide the shroud toward the end of the capsule to allow for full access to the detector electronics.

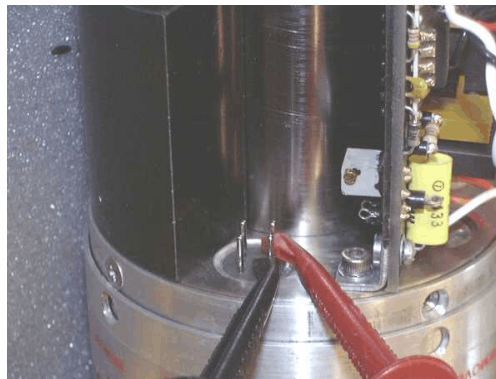


Find the white Teflon feedthrough connection next to the HV Filter.

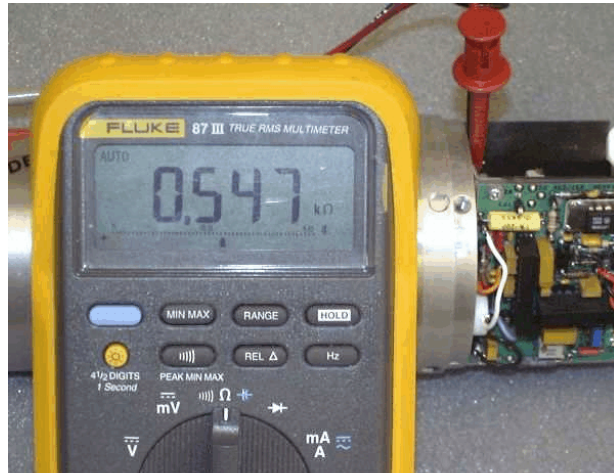


**Note connector orientation for reconnection.** The black and white wires connect to the internal temperature element.

Carefully remove the Teflon connection from the T/E pins. The T/E pins are in a glass mount. If excessive force is used when removing the Teflon connection the pins can bend possibly causing a vacuum leak. Pull the Teflon connection straight off from the pins with NO side motion. The connection should come off with minimal effort.



- .. Connect an ohmmeter to the two pins, which correspond to the black and white wires.
- .. The resistance measurement for a warm detector should be greater than 535 Ohms.



- .. The measurement shown above is typical of a detector at a room temperature of 75°F (24°C).
- .. **Note:** If the T/E is less than 535 ohms, allow additional time for the detector to warm until the proper reading is achieved.

**2. Connecting the pumpout adapter:**

- .. Locate the pumpout port on the heat exchanger's cryostat. It has a small brass vacuum plug. If you are not certain please contact the ORTEC Customer Service department for assistance.

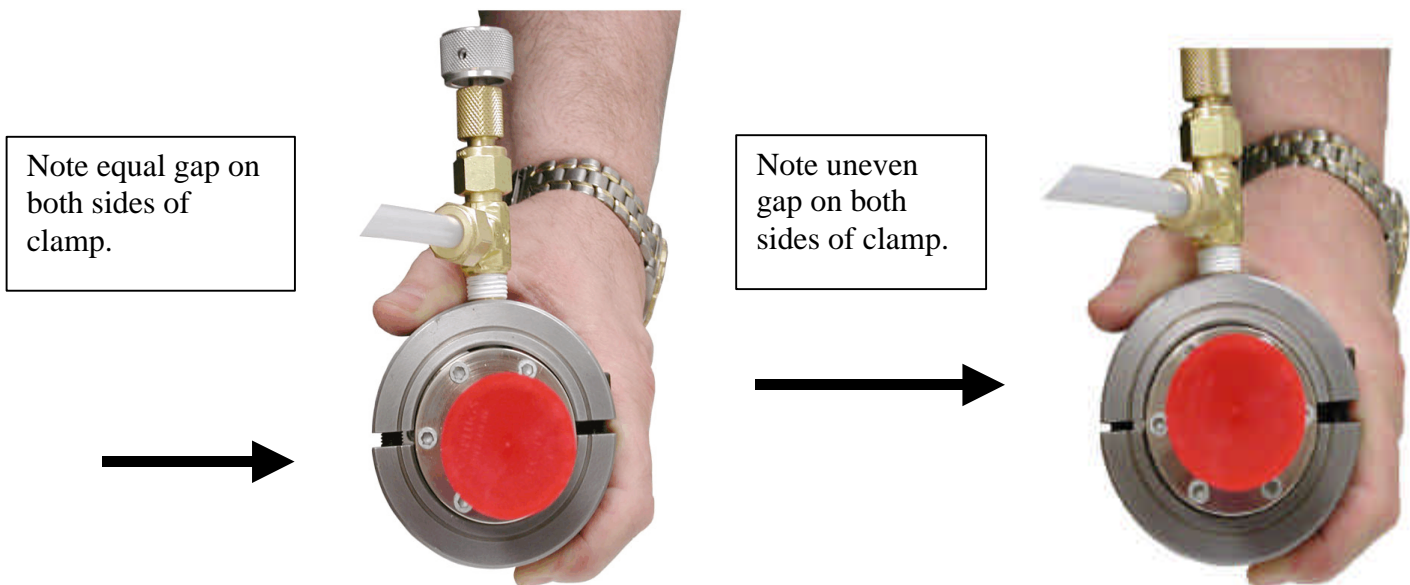


**3. Attach the pumpout valve operator to the cryostat:**

- Remove the 2 allen screws (1/4") from the two halves of the Pump-out valve clamp.
- Using the operator's knurled knob engage the threads in the brass vacuum plug by rotating the valve shaft CW, as in the figure.



- Now tighten the 2 allen screws proportionally to maintain an equal gap on both sides of the clamp. Do not over tighten, use only enough force to compress the o-ring.



- Ensure the compression nut is finger tight to seal the Pump-out Valve Operator.

\*Never pull the handle out unless it is positive that the shaft is not connected to the vacuum plug or that the vacuum pump is running and a vacuum has been established. Doing so would vent the cryostat to room air, which could contaminate the internal surfaces.

- “ **Starting the vacuum pump and placing the cryostat under vacuum**  
Energize the pump and wait for the system to stabilize to a pressure of at least  $10^{-3}$  Torr. Then pull the Pump-out Valve Operator handle out until the handle stops to open the vacuum plug. To ensure the vacuum plug does not reseal during pumping prop open the valve handle. (A piece of Tygon tubing can be split down the side and slipped around the handle shaft.)
- “ **Allow the cryostat to remain on the pump for a minimum of 30 minutes.**

#### 6. **Removing the cryostat from the vacuum after vacuum restoration:**

- “ Push the Valve Operator handle in until it stops, indicating proper vacuum plug seating. The handle should be almost flush with the compression nut.
- “ Unscrew the Valve Operator handle from the vacuum plug. To insure the successful disconnection of the Valve Operator handle from the vacuum plug, continue to unscrew the Valve Operator handle with slight inward pressure until the threads can be felt “popping’ against each other. One pop for one full rotation after threads are fully disconnected.
- “ De-energize the pump to allow for venting.

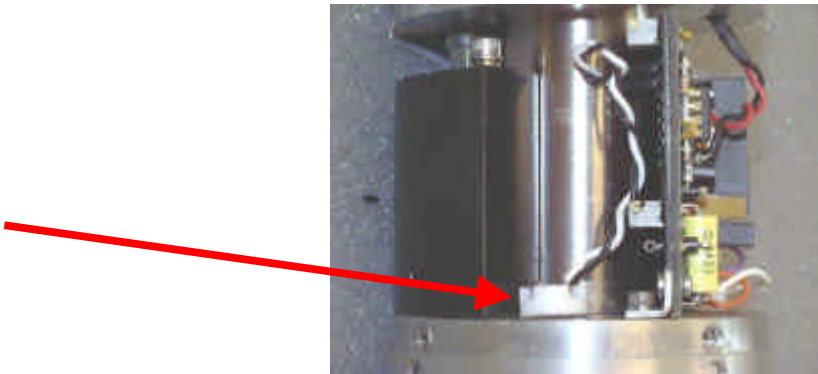
\*Never pull the handle out unless it is positive that the shaft is not connected to the vacuum plug or that the vacuum pump is running and a vacuum has been established. Doing so would vent the cryostat to room air, which could contaminate the internal surfaces.

- “ Remove the pumpout adapter.
- “ The compressor should sit for two hours after being moved this allows any oil to settle. The X-Cooler is now ready to be started and cool the detector.
- “ Monitor the X-Cooler cool down by observing the temperature change of the T/E.
- “ The X-Cooler may take up to 24 hours to cool.
- “ Nominal T/E reading of a cold detector is approximately 155 Ohms.
- “ The Bias Shutdown circuit is set at 196 Ohms, therefore the T/E must read less then 196 Ohms.

- “ If the T/E reading is not less than 196 Ohms at the end of the 24-hour cool down period, a mechanical fault is present. Contact the ORTEC Customer Service department for further assistance.
- “ When finished monitoring the detector cool down, disconnect the ohmmeter.

## 7. Reinstalling the shroud:

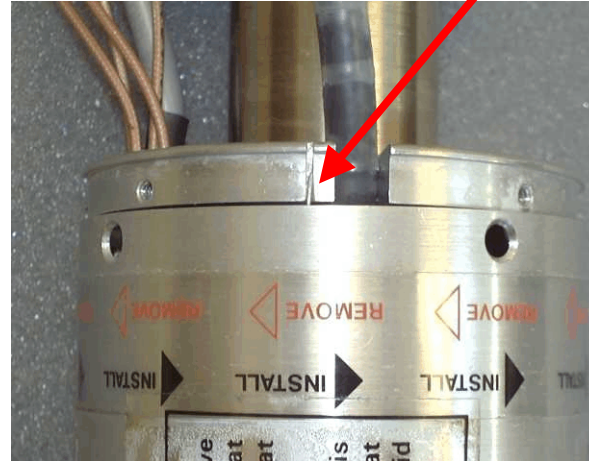
- “ Reconnect the T/E Teflon connector. The Teflon connector is flat on one edge, this allows it to fit closely to the HV Filter. Verify proper placement of the Teflon connector.



- “ Slide the shroud up over the electronics.



- “ Locate the HV Filter Ground Wire and place it into the groove in the shroud clamp.



- “ Line up the screw holes in the shroud, detector capsule and shroud clamp.
- “ Install screws in the shroud clamp first. This makes installation of screws in the detector capsule easier.