

Attachment 1

PUMPED (T<4.2K) IR-LABS DETECTOR OPERATIONS CHECKLIST *****WEAR EYE AND HAND PROTECTION*****

Pre-liquid helium filling.

1. With a turbo station, pump the warm detector guard vacuum space to $<1 \times 10^{-4}$ Torr, as read at the pump.
2. Fill the outer liquid N₂ reservoir with liquid nitrogen, then fill the inner liquid He reservoir also with liquid nitrogen. Inspect the liquid He fill port's Teflon gasket. Attach the cap/relief valve to the liquid N₂ reservoir fill port.
3. After proper cooling with liquid N₂, empty the liquid He reservoir of all liquid N₂.

Liquid helium filling procedures:

4. Purge the transfer line with He gas. Vent the liquid He storage dewar through the vent valve, then connect a purged gas line from a regulated He cylinder set at ~ 2 psi to the vent fitting.
5. Open the liquid He storage dewar top valve, close both the vent valve and the low-pressure relief valve, then gradually insert the purged transfer line until it reaches the bottom of the storage dewar. Tighten the compression fitting. Avoid jamming the transfer line into the bottom.
6. Open the vent valve (connection to the He gas cylinder) as necessary to pressurize the storage dewar and induce flow through the transfer line.
7. When the transfer line interior is cold, insert the delivery end into the detector liquid He fill port so that it reaches to near the bottom of the detector's liquid He reservoir. Turn on the detector pre-amplifier power.
8. When the detector liquid He reservoir is full (increase in dense white plume, cascading across top of detector), stop the transfer by disconnecting the He gas line and vent the storage dewar through the vent valve.
9. Loosen the compression fitting and remove the transfer line. Then close the storage dewar top valve and vent valve, and open the low-pressure relief valve.
10. Without delay, attach the detector's safety fixture to the detector liquid He fill port. The safety fixture must be connected to either a relief valve (part of pumping manifold) or draped hose.

Pumping:

11. Attached the pumping manifold hose if not already in place. Turn on the vacuum pump, then open the fine pump valve about 1/4 turn. Gradually increase the pumping rate using the fine pump valve - and later the coarse pump valve. Avoid excessive frost build-up on the pumping hose. The relief valve on the top of the safety fixture *must* remain frost-free.
12. When the manifold pressure and detector signal have stabilized, turn on the detector bias and then the input. The unit is ready for operation.

Re-filling:

13. Bleed-up the liquid He reservoir to 1 atm with He gas (only!). Continue at step 4. The safety fixture should be removed just prior to step 7.

Shutdown:

14. Turn off detector (input, bias and pre-amp power).
15. Allow detector to warm up on its own. Continued pumping on the liquid He reservoir is preferred. Do NOT leave detector's liquid He reservoir open to air.