

## **VII. Equipment**

### ***D. Lyophilizer***

Before using the lyophilizer (freeze dryer), please do the following:

1. Wipe the interior of the collector chamber with a paper towel to remove any accumulated moisture.
2. Check the collector chamber drain hose to ensure that the hose is free of moisture and that the drain plug is securely installed.
3. Using a soft, lint-free cloth or paper towel, wipe the collector chamber lid gasket to remove any dirt and contaminants that could cause a vacuum leak. Vacuum grease is NOT required on the lid gasket.
4. Remove the drying chamber from the connection port and using a soft, lint free cloth or paper towel, wipe the port gasket and sealing surfaces of the drying chamber to remove any dirt and contaminants that could cause a vacuum leak. Reinstall the drying chamber on the connection port. Vacuum grease is NOT required on the port gasket.
5. Check that each sample valve is closed, or in the “vent” position.



#### ***Automatic Start-Up:***

1. Turn the Main Power switch ON. The refrigeration system will start and the LCD display will read: “Auto Vacuum HI mBar” and “Wait Collector: XX°C”



2. The vacuum pump will automatically start when the collector temperature reaches  $-40^{\circ}\text{C}$ .
3. The LCD display will show the actual temp. of the collector, and it will read: "Run Collector:  $-40^{\circ}\text{C}$ "
4. The LCD display will read: "HI" if the vacuum in the system is above 5 mBar. Below 5 mBar, the display will show the actual vacuum value.

*Adding and Removing Samples to the Manifold:*

1. **Pre-freeze samples in liquid nitrogen. The sample container size should always be at least two to three times the sample size.**
2. Place the pre-frozen sample in lyophilizer container. Connect the container to a sample valve on the manifold using an adaptor. Be sure you are using the correct diameter adaptor for the flask top and valve. Turn the plastic valve knob to the "VACUUM" position to open the valve, which

connects the attached sample to system vacuum. The bevel on the knob should be positioned toward the sample port to apply vacuum to the sample. This is the “Open” position.

3. Before adding another sample, allow the system vacuum to return to 0.133 mBar or lower. Any combination of valves and sample sizes may be utilized at one time provided that the system vacuum and collector temperature remain sufficiently low to prevent melting of the frozen sample. Once you are finished adding samples, leave samples to dry (typically 1-3 days depending on sample volume).
4. When all the frost has disappeared from the outer surface of the sample container and no cold spots can be detected by handling the container, the sample is nearly dry. To be certain of low final moisture content, dry the sample for several hours past this point.
5. To remove a container after drying is complete, turn the plastic knob on the valve to the “VENT” position, which closes the valve and vents the container. (Should backfilling with an inert gas be required, connect the gas supply line to the vent port on the valve before turning the plastic knob on the valve to vent position). The sample container may now be removed from the adaptor. In the vent position the bevel on the knob should point away from the sample port. This is the “Closed” position.

#### *Shut Down Procedure:*

1. At the end of a run the lyophilizer should be defrosted and cleaned. All samples should have been removed at this point. Release system vacuum by turning the plastic knob on a valve to the open or “VACUUM” position.
2. Press the Vacuum Switch on the control panel to turn the vacuum pump OFF. Turn OFF the Main Power Switch on the right side of the cabinet. Wait for the cooling coil to defrost before cleaning.

#### *Cleaning Procedure:*

1. Wash the interior of the collector chamber with distilled water several times and empty the water through the black plastic drain. You may need to ‘wiggle’ the lyophilizer to ensure all the water flows out the drain tube.
2. Wipe the interior of the collector chamber with a paper towel to remove any accumulated moisture. (You can wet the paper towel with acetone to ensure complete removal of water)
3. Check the collector chamber drain hose to ensure that the hose is free of moisture and that the drain plug is securely installed.
4. Using a soft, lint-free cloth or paper towel, wipe the collector chamber lid gasket to remove any dirt and contaminants that could cause a vacuum leak.