

## Freeze Dryer (G33A): manual mode

Lyostar II (FTS systems)

Drain: Clockwise (→) to close.

### Before you start:

Drain water from the condenser and clean up the condenser with paper towel.

Make sure “this side in” for both doors (chamber and condenser) faces in.

### Operation:

1. **Power – ON:** This box will turn red to signify it is on and then enable all other switches.

<b>Power ON</b>	
<b>Shelf</b>	<b>OFF</b>
<b>Condenser</b>	<b>OFF</b>
<b>Vacuum</b>	<b>OFF</b>
<b>Isolate</b>	<b>OPEN</b>
<b>Release</b>	<b>OFF</b>

2. Set the shelf temperature.

*\* Your samples can be placed in the shelf at this point and be frozen as the shelf temperature drops. Alternatively, you can put your already frozen samples after the shelf temperature reaches -40°C (i.e., after step #4.).*

3. **Shelf – ON:** This will start the refrigeration system and begin to cool the shelves. It can take up to 4 hours or longer to freeze the product to -40°C.
4. **Condenser – ON** after the shelf temperature has reached the set temperature. The refrigeration system will now cool the condenser. It will take about 10 minutes for the temperature to reach -40°C.
5. **Vacuum – ON** after the condenser has reached -40°C or cooler. Set the vacuum set-point. Values between 10 – 100 mTorr are acceptable; however, for most products, drying above 400 mTorr can be a problem. If you are unsure of a proper vacuum level, it is recommended to set it at 100 mTorr or less.
  - If vacuum reading does not change from “out of range”, it is possible that the chamber vacuum sensor (CM: capacitance manometer) is not working. Monitor the vacuum level (Pirani) at DATA or HISTORICAL menu in the lower right corner.)
  - If the vacuum (CM and/or Pirani) level is fluctuating and/or does not go below 4,000 mTorr, your vacuum seal is not good. Do steps #7, 8, and 10, clean the condenser, doors and rubber seals, close the doors, **turn off the release**, and start over from step #4.
6. Once the vacuum has reached 200 mTorr or less, and the condenser is well below -40 °C, the drying process begins. Change the Shelf-temperature set-point between -50°C to +65°C as desired. It is suggested to start with very low shelf temperature and increase it as the product dries. Reduce the set-point any time the condenser warms above -50°C or the vacuum goes above 400 mTorr.

### Shutoff:

7. Vacuum-OFF
8. Condenser-OFF
9. Shelf-OFF
10. Release-ON: This will allow the pressure in the chamber to reach atmosphere (~760,000 mTorr). If you turn this on before you turn off the vacuum, it will automatically turn off the vacuum pump. It will take 3-30 minutes to bring the system to atmospheric pressure. **NEVER** force to open the door.
11. Once you have removed your samples, drain water from condenser, wipe up moisture in the condenser, and close the drain by turning it clockwise.