

Optima XPN-100 Ultracentrifuge



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Overview and Specifications

Beckman Coulter's Optima XPN-100 Ultracentrifuge is a high performance centrifuge optimized for spinning its rotor at speeds that can achieve speeds approaching 100,000 rpm or 802,000 x g. It features an imbalance detector that will prevent dangerous operations, a diffusions pump in series with a mechanical vacuum pump to increase spin efficiency, and interchangeable rotors and accessories to customize specific sample requirements. Its main purpose is to separate components of a sample through the use of relative centrifugal force. It has a wide range of applications ranging from separating blood to measuring conformational changes in proteins.

Temperature Range: 0 to 40 °C± 1 °C.
Temp Control: ± .5 °C

Maximum Speed: 100,000 rpm or 802,000 x g
Speed Control ± 2 rpm of set speed above 1000 rpm



Figure 1: XPN-100's Home Screen

Safety

Aerosol Generation

Aerosol Generation: Centrifuges can produce aerosols, and there is risk of tube breakage or seal failure. Biohazards, as well as any other materials that can produce hazardous aerosols are not to be used in this

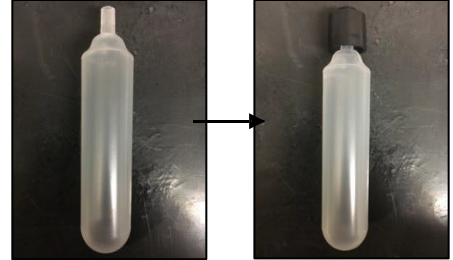
Rotating Equipment and Mechanical Failure

High Speed Rotation and Mechanical Failure: Never open centrifuge unless rotation is stopped. Stop the system (red button) if there is any unusual noise or vibration. Noise or vibration may mean samples are not balanced, tube or bucket has broken, or could be due to

Running the Ultracentrifuge

Prepping the Tube

- 1) Place your samples and counterweights into a sample tube
 - Be aware that the tubes will collapse if there is not enough of your sample in them, so be sure to fill the tubes per the tube supplier recommendations
- 2) Cover the centrifuge tube with a Teflon cap
- 3) Heat the top of the centrifuge tube with the soldering gun and press
- 4) Remove the Teflon cap. The tube should be sealed



Mounting the Sample

- 1) Open the hatch to the ultracentrifuge
- 2) Insert the sample and its counterweight into a rotor
 - When using the swinging buckets, all of the buckets must be placed in the rotor even if they are empty
 - The rotor must still be balanced
 - Example: If the rotor has space for six buckets, they should all be placed in the rotor even if four of the buckets are empty
- 3) Close the rotor and place into the ultracentrifuge
 - Be sure not to spin the rotor prior to running your test or else the system will throw an error
- 4) Close the hatch



This is an example of what not to do

Centrifugation Setup

- 1) Turn on the XPN-100 (Power switch on the right)
- 2) Press the Login button (Green Lock)
 - a. Select your group and enter pin number
- 3) Start on the Home Page
 - a. Press the Home Page
- 4) Set the Speed and Rotor
 - a. Select the **Set Speed Tab**
 - b. Select the corresponding rotor and labware for your sample
 - c. Press OK
 - d. Select the desired RPM or RCF.
 - e. Converting from RPM and g-force:
 - i. Visit this website: <https://www.beckman.com/centrifuges/rotors/calculator>
 - ii. Select your rotor type
 - iii. Enter desired RPM or RCF value and the website will convert it for you
- 5) Set Acceleration and Deceleration Profile
 - a. Touch the **Set Acceleration/Deceleration Profiles Tab**
 - b. Select your desired profiles and press OK.

	Acceleration/Deceleration	
Profile #	Time	RPM
0 (Max)	0:00	0
1	2:00	170
2	2:40	350
3	3:00	500
4	3:00	170
5	4:00	350
6	4:30	500
7	4:00	170
8	5:20	350
9	6:00	500
10 (Decel)	Coast	500

Ex: At an acceleration value of 5, it will take four minutes to accelerate to 350 rpm. It will then proceed to the run speed at maximum acceleration. At the deceleration value of 10, it will slow down due to natural friction as no friction is applied.

- 6) Set Time
 - a. Touch the **Set Time Tab**
 - b. Select your desired duration (hours:minutes)

- i. If you want to set a future start or stop time, select **Delay Start** and enter your values. To change between start and stop, select the **Start At** button.
 - ii. To have it run indefinitely, press the **Hold** button.
 - c. Press OK.
 - 7) Set Temp
 - a. Touch the **Set Temp** Tab
 - b. Set the desired temperature between 0 to 40 °C in 1 °C increments.
 - 8) Start Run
 - a. Ensure that all samples are placed correctly within the rotor.
 - b. Mount the rotor according to the safety procedure
 - c. Close and lock the chamber door
 - d. Select the Start Button

Programming the Ultra-Centrifuge

Notice: Only Administrators and Super Users are able to create, edit, and delete programs and users. For access to these features, talk to the Department Administrator.

User Setup

- 1) Select the **Menu** Button
- 2) Select **Options**
- 3) Select the **User** Tab, then select **Manage Users**
- 4) Select **Add**
- 5) Select **User ID** and create a new User ID.
- 6) Press OK and repeat for the remaining fields.

Creating Programs

- 1) Select **Program** button (Folder) from the side menu on the **Home** page
- 2) Select **New** to create a program.
- 3) Use the keyboard to name your program
- 4) Press OK
- 5) Press the **Accel/Decel** button
- 6) Set the respective profiles and press OK.
- 7) Select the **New Step** button
- 8) Set the desired parameters for speed, time, and temperature.
- 9) Steps can be added, deleted, or edited with their respective buttons.

Running Programs

- 1) Select **Program** from the side menu on the **Home** page.
- 2) Choose the program you want to run and press OK.

- 3) Press the **Start** button.

Editing Programs

- 1) Select **Program** button from the side menu on the **Home** page
- 2) Select the program to edit and press OK.
 - a. You can't edit programs that are running unless you have administrator or super user privileges.
- 3) Select the numbered step to edit and press **Edit Step**

Deleting Programs

- 1) Select **Program** button from the side menu on the **Home** page
- 2) Select the program to be deleted then select the **Delete** button.
- 3) The system will display a confirmation message. Select **Yes** to delete the program or **No** to cancel the deletion.

Data Viewing

Viewing the Real-Time Run Data

- 1) Go to the Home Page
- 2) Select the **Run Graph** button (Graph Icon) on the side menu
- 3) Select a run from the Run History Page
- 4) Select the **Graph** Button to display the run data
- 5) Select **Options** to change the following element:
 - a. Run Graph View Scope
 - i. Fit To Screen: Fits the entire graph to the screen dimensions
 - ii. Auto Scroll: Scrolls through the graph intermittently
 - iii. Manual Scroll: Allows for manual control when viewing the screen

View Past Run-Time Data

- 1) Go to the Home Page
- 2) Select the **Run History** button (Clock) on the side menu.
- 3) The following options are available:
 - a. Filter: To sort and specify the run history
 - b. Print: Prints all listed run logs
 - c. Graph: Graphs the historic data
 - d. Export: Allows for the information to be transferred to a USB or network drive

Finishing Up

Removing the Sample

- 1) Press the **Vacuum** gauge on the Home Page to deactivate the hatch

- You may press this at any point once the speed has dropped below 3,000rpm
 - When the speed gets down to zero, the machine will chime, but that is not always an indication that the door is ready to be opened (listen for air to stop)
- 2) Remove the sample, counterweight, and rotor from the ultracentrifuge
 - 3) Remove the sample and counterweight from the rotor
 - 4) Extract the material of interest using a syringe
 - 5) Dispose of all waste.
 - 6) Turn off the XPN-100.

Notice: For problems or training information, visit labs.jhu.edu for the user manual or contact JHU's Department of Material Science & Engineering

Additional Notes

How to Deal with Errors

- 1) If you get an error and it tells you that you have to wait a certain amount of time, please leave the machine on
 - The machine will need to wait the entire time before the error will be cleared
 - If the machine is turned off, the time will not go down, so when it gets turned on again, the next person will be stuck waiting
- 2) Vacuum Error
 - If the system has not been run for a while, it may have a vacuum error
 - One way to avoid this on your sample run is to run the system for about twenty minutes before you run your sample (this warms up the pump oil and makes pumping more efficient)