

Operating Instructions – SEM

If the LEDs on the microscope base indicate that the ion pump is operating but the meter indicates that the ion pump current is zero (i.e. one of the current range LEDs is lit but the meter reads zero), the ion pump is actually not running. This is an intermittent logic error in the instrument electronics. **DO NOT TURN ON THE FILAMENT UNDER THESE CONDITIONS!** The logic error can sometimes be cleared by turning the ion pump off then back on. Sometimes it is necessary to turn off the entire instrument using the main power switch on the back and turn it back on again. **(If you are not a frequent user, please consult with an experienced SEM user first!)**

Pictures of the SEM side console and control console are shown in the back page:

1. Fill the liquid N₂ dewar (10L) - (get liquid N₂ from the chemistry department - Caputo 329). In the side console of the SEM is the diffusion pump. The pump needs to be cooled with liquid N₂. It needs ~5-6 L of liquid N₂. This will last for 6-8 hours of SEM operation.
2. Wait for frost to build on the plastic cap of the diffusion pump. This indicates that the pump is cooled and full of liquid N₂. When the SEM is on stand-by, the diffusion pump does not need to have liquid N₂.
3. To start the SEM for running samples ensure the N₂ container is full (see note 2) and the valve 1 (V1) is closed on the side console (see picture).

Note: This isolates the filament from the rest of the chamber - it is important not to expose the filament to high pressures.

4. To close V1 you need to press the silver knob on the body of the SEM until you hear a click sound.
5. The instrument should be on the standby mode when not in operation. To insert a sample, press the vent button on the side console to allow air into the sample chamber. Open the chamber/stage out slowly (use both hands) and load the sample.

Note: Samples that are non conductive or semi-conducting should first be gold coated using the gold sputtering machine in the lab. The instructions for the machine can be found in the drawer directly below it.

6. Be sure that the sample does not sit too high and secure it by tightening the set screw.
7. Gently push the stage back in (make sure the O-ring is positioned in the right spot and the stage fits evenly). While holding the stage closed press the evacuate button. When the vacuum pulls the stage snugly you will feel it. You can then let go of the stage door.
8. Give the system time to evacuate and reach the right pressure. There is a green LED that turns on when this system has reached the right pressure of operation. The SEM manual also indicates that it's advisable to let ion pump current fall below 350µA before turning on the filament/source.
9. When the system is evacuated and V1 is closed, the red V1 LED will flash.
10. Turn on the computer and the Control Console, and open V1 only when the green LED turns on.

FROM NOW ON YOU CAN USE THE CONTROLS on CONTROL CONSOLE

1. Adjust the acceleration potential to 20.0 kV by using the x10 arrows.
2. Press the auto heat button. The auto heat button will keep flashing until the filament is warmed up. The emission reading will be around 40-50 (filament knob should be set between 6-7- do not change- this knob is locked in place).
3. Adjust the magnification, contrast and brightness, and focus as necessary. Ensure the working distance (WD) is approximately 9 mm and no less than 4 mm.
4. To adjust the focus, find a large object to focus on first; then re-adjust as you zoom in.
5. To view a different area of the sample, move it by turning the X and Y knobs located on the sample stage.

Taking Pictures

1. Turn slow scanning on. Photo button should turn on as well at this point.
2. Start Orion 32.exe on the PC, and sync the program with the SEM. Ensure the SEM is on speed 3 and the program also has speed 3 selected.
3. Press F2 to display the image as the SEM sweeps through.
4. Press F3 when the image is fully displayed to capture the image.
5. Under File click on interpolate pixels (if you would like to eliminate the pixilation of an image).
6. Save the image as jpeg file in your folder or your flash drive.

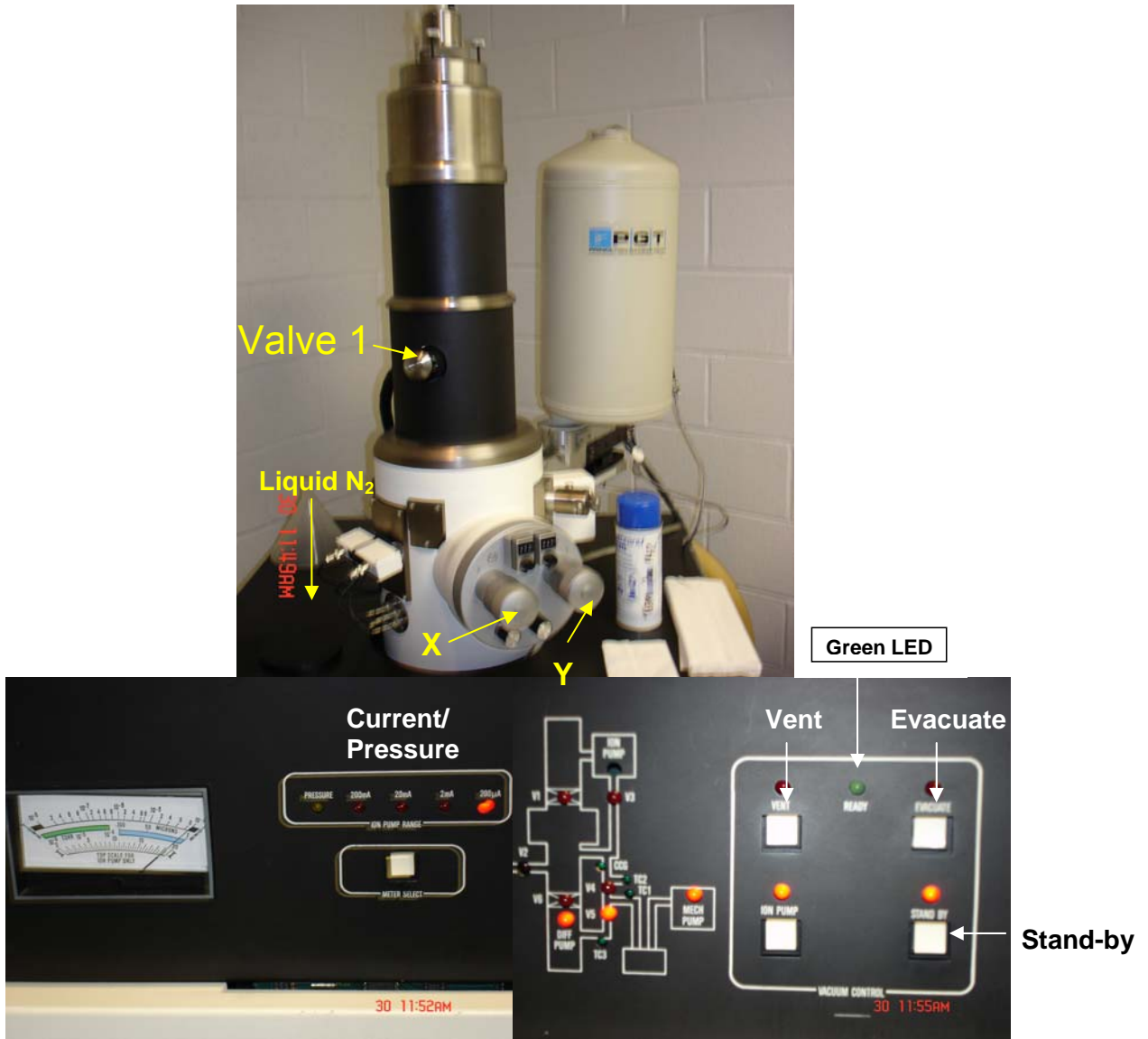
Changing Samples

1. Close V1 (you do not have to turn the filament off).
2. Press vent on the side panel and wait the system releases the chamber door. Open the stage as before and put in the new sample. Close the stage and press evacuate. Steps 5-10 from the first page should be followed for each new sample.
3. Open V1 and image the sample.

Shut Down

1. Close V1. Turn off the filament.
2. Press vent on the side panel and remove your last sample.
3. Close the sample stage and press evacuate. When the system has reached the right pressure and the green LED is on you can press stand-by and leave the SEM on that mode.
4. Turn off the console and PC.

SEM Side Console



SEM Control Console

