

This instruction covers the set-up and use of the Nitrogen Anneal Furnace for annealing samples within the cleanroom. Please note, this machine used to be called the "Ammonia Anneal Furnace" but it never contained Ammonia due to safety reasons.

1. SAFETY REQUIREMENTS

- 1.1 Safety glasses must be worn whenever in the cleanroom, except when using a microscope or when wearing protective goggles.
- 1.2 Information regarding the hazardous materials used in the cleanroom can be found through MSDS documentation located in the gowning room.
- 1.3 When handling hazardous liquids and chemicals, Personal Protective Equipment must be worn.
- 1.4 Do not attempt to load or unload samples that are above 150°C.

2. EQUIPMENT

- 2.1 Nitrogen Anneal Furnace
- 2.2 Temperature Control Panel
- 2.3 Gas Panel
- 2.4 Quartz push rod – 60 inches long
- 2.5 Quartz boat – 4 inch wafer
- 2.6 Quartz tube – 6 inch bore

Gas
Selector
Switch

Furnace
Tube

Temperature
Controllers

Power Switch



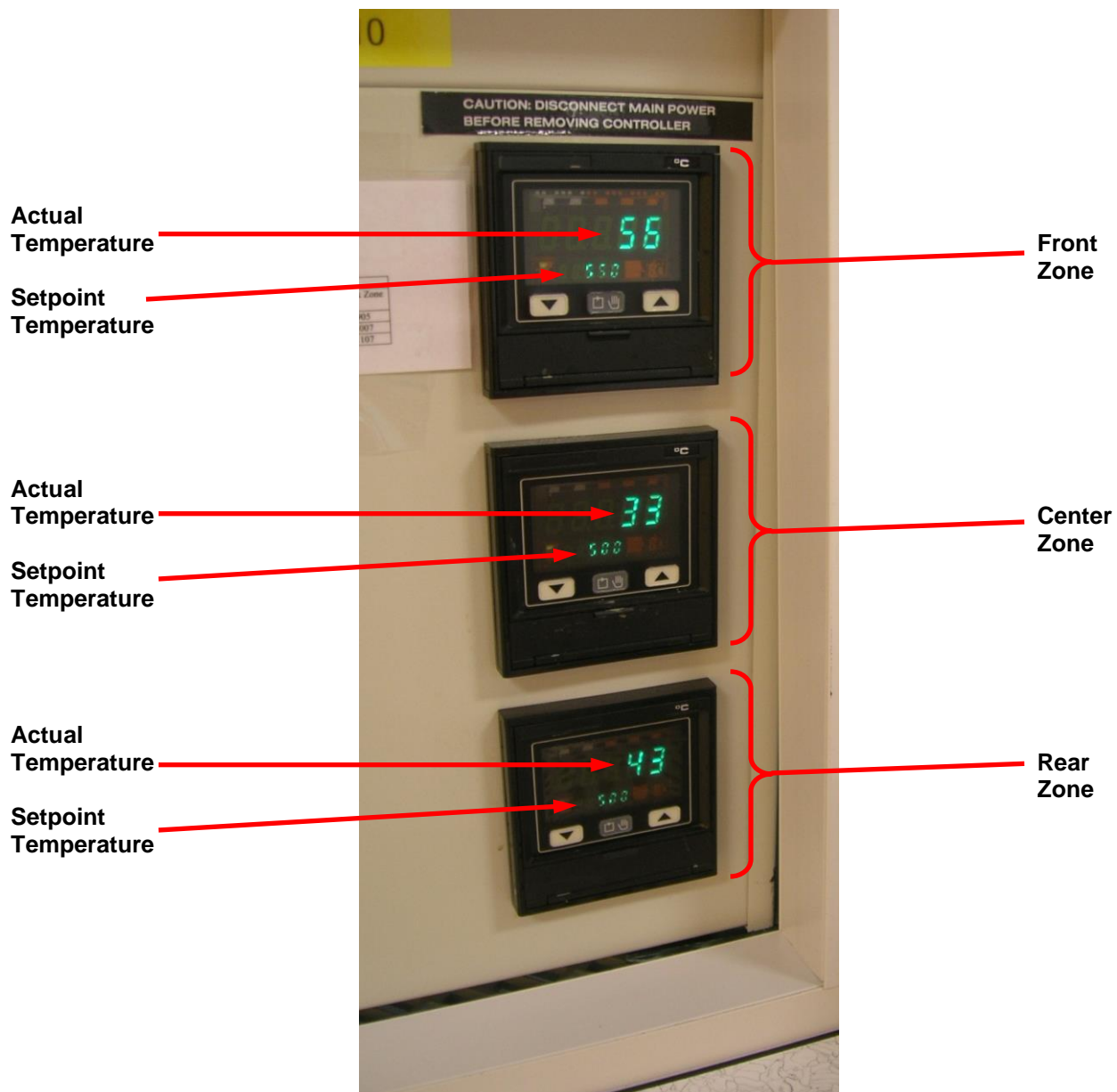
3. MATERIALS

- 3.1 Nitrogen - 20 psi, 1/4" UHP SS Tubing – House supplied
- 3.2 Argon - 20 psi, 1/4" UHP SS Tubing – House supplied

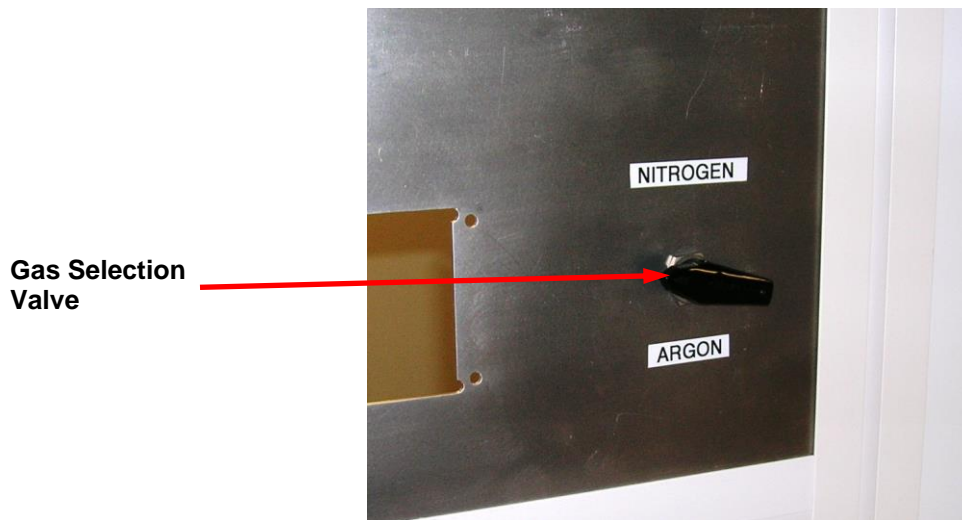
4. CYCLE OF OPERATIONS

- 4.1 Prior to beginning, please enable the Nitrogen Anneal Furnace through the I-Lab portal to ensure proper billing.
- 4.2 Turn on the power to the temperature controller panel on the front of the machine.
On each temperature controller, two numbers will now be visible.

Note: The large TOP number is the actual temperature of that zone furnace tube.
The small BOTTOM number is the temperature setpoint of that zone.



- 4.3 Using the gray arrow keys, push the down arrow to set the temperature setpoint to 0°C. Setting the temperature to 0°C ensure the tube will stay cool enough during the load sequence. Make sure the temperature of the tube is cool enough to safely load your sample.
- 4.4 Load your sample in the furnace tube
- Take off the quartz end cap and set it aside.
 - Pull out the quartz boat to the lip of the quartz tube.
 - Load your sample into the boat.
 - Carefully and slowly, push the boat to the center of the furnace with the push rod.
 - Replace the quartz end cap onto the end of the tube. Please **do not** put it on tightly.
- 4.5 Turn on the necessary gas – either Nitrogen or Argon – by turning the valve the proper direction.



- 4.6. Wait 20 minutes for the quartz tube to fully purge with your selected gas. By waiting 20 minutes, the chamber is properly purged with approximately 10 volumetric exchanges at mid-flow range.
- 4.7 Adjust the temperature setpoint **for each zone** to your desired process temperature. Please only use the gray arrow keys to adjust the setpoint.
- 4.8 Once your process is finished, adjust the temperature setpoint down to 0°C **for each zone**. This will allow your sample to cool down. Please wait for the furnace to reach 150°C before you remove your sample.
- 4.9 Remove your sample from the furnace tube
- Take off the quartz end cap and set it aside. Be careful, for it may still be hot to the touch.
 - Pull out the quartz boat to the lip of the quartz tube.
 - Remove your sample from the boat.
 - Carefully and slowly, push the boat to the center of the furnace with the push rod.
 - Replace the quartz end cap onto the end of the tube. Please **do not** put it on tightly.
- 4.10 Turn off your gas flow.
- 4.11 Turn the power off to the temperature controller panel.
- 4.12 Before you walk away, check to make sure the furnace is in the following state:
- ✓ Nitrogen and Argon are both turned OFF.
 - ✓ The quartz endcap has been replaced onto the tube.
 - ✓ The temperature setpoint is at 0°.
 - ✓ The power is off on the temperature controller panel.

5. REVISION RECORD

Reason for Revision	Date of Revision	Person Responsible
Initial Release.	November 6, 2008	Dan Hosler
Changed from Ammonia Anneal to Nitrogen Anneal Furnace, and remove Coral verbiage in exchange for I-Lab	October 20, 2016	Dan Hosler