Plasma Therm 790 RIE Operating Instructions

Emergency Procedures

Power Failure: No immediate action required. When power is restored, restart system as detailed below.

Water Leak: Push big red button on front of system to cut power. If leak is cooling water (green), close valves on the wall behind system. If heat exchanger is leaking, it has already been turned off with the system.

Starting The Machine From Power Up. (Not usually necessary)

1. Open the door on the front of the machine and push the green buttons marked “Machine” and “Mechanical Pump” (located on the lower right side).
2. When the computer has booted-up, log in using the appropriate operator name and password. Start the turbo pump by selecting the item “Turbo Pump On” under the “Utilities” menu. When the turbo pump is up to speed, its icon on the vacuum diagram will turn from red to green. Click the softkey “Standby” at the bottom of the screen.
3. To begin pumping the chamber, select the item “Pump Chamber (Turbo)” under the “Utilities” menu.

Notes:

If an alarm is sounding, click the “Alarm Silence” softkey at the bottom of the screen. This will stop the infernal beeping of the alarm. Check the “Alarm” text box on the screen to see if it is something obvious such as “Above atmospheric pressure in chamber”, meaning that you didn’t hold down the camber lid when you started pumpdown. To clear the alarm, click “Hold”, which rechecks the alarm condition and removes it if it no longer exists. If the alarm persists or you don’t understand the alarm message, contact a senior user or Prof. Snider.

Normal Log-in (You usually start here)

Choose the “logout” item under the “Utilities” menu. I know this is stupid when you are logging in, but we didn’t write the software! Enter the operator name “icfab” and password “icfab”. Sign in on the log sheet in the log book. Be sure to write the time that your wafers go into the chamber, and also the time you finish. This lets others know that your wafers are in the chamber.

Loading a Sample

To open the chamber, select the item “Vent” under the “Utilities” menu. The computer will automatically control the sequence to vent the chamber. When venting is complete the chamber icon on the vacuum diagram will turn blue and say ‘Atmosphere’. You can then open the chamber lid and place your sample on the platen. You should be able to fit several wafers at once. Wear gloves whenever your hands go inside the chamber. The chamber can be pumped in manual mode, or as part of running a process. The manual method is as follows: Close the lid, and select the “Pump Chamber (Turbo)” item under the “Utilities” menu, and press down on the chamber lid. The computer automatically executes the pumpdown sequence. Be sure to press down on the chamber lid, or the mechanical pump will try to rough out the room! You don’t have to lean on it hard, just enough pressure that the o-ring seals. (It takes about 30 sec. before the pump starts. When the o-ring seals the crack under the chamber “disappears”)

Running a Process

There are five processes of interest to IC Fab: “o2clean” (Clean chamber with O2), “descum” (remove PR scum after developing), “pr_strip” (remove PR with oxygen plasma), “polyetch” (etch polysilicon), and “Al_etch2” (etch aluminum). For the o2clean, descum, and pr_strip recipes you need to open the oxygen tank just as you did for the furnace oxidation. There is also a valve on the wall behind the RIE system that must be opened. It’s labeled “O2 Valve”.

Running a recipe

The machine should be in “Standby” mode. Select the desired recipe by selecting the item “Load” under the “Process” menu. This brings up a dialog box listing the available recipes. Select the desired recipe. Click on the “Ready” button at the bottom of the screen. Next, click on the “Run” button. If you haven’t already pumped out the chamber, the pumping sequence will begin now. Be sure to press down on the chamber lid. When the recipe is finished, you can vent the camber (menu item “Vent” under “Utilities”) and remove your sample.

When You’re Finished

Remove your last sample and click on the “Standby” button. Pump down the chamber (menu item “Pump Chamber (Turbo)” under “Utilities”). Fill out the log sheet if you haven’t already. Log out by choosing the “Logout” menu item, then hit “OK” without entering anything. Close the appropriate gas bottles.

Process Notes

O2clean: A high-power oxygen plasma recipe intended to clean the chamber. Check the logbook. If the last user of the system did a process other than oxygen, you should run this recipe to clean the chamber.

Descum: A low-power, short duration oxygen plasma intended to remove about 10–20 nm of resist. This will remove any residual resist in the developed patterns. You should do this after each lithography layer. (This is a backup in case the DryTek breaks).

Pr_strip: A high-power oxygen plasma intended to completely remove any resist on the surface of a wafer. (This is a backup in case the DryTek breaks).

Polyetch: A CF4 plasma used to pattern the polysilicon for the gates.

Al_etch2: Aluminum etch using chlorine.