Nordson AP-300/600 Plasma Systems Operational Manual

July 2017

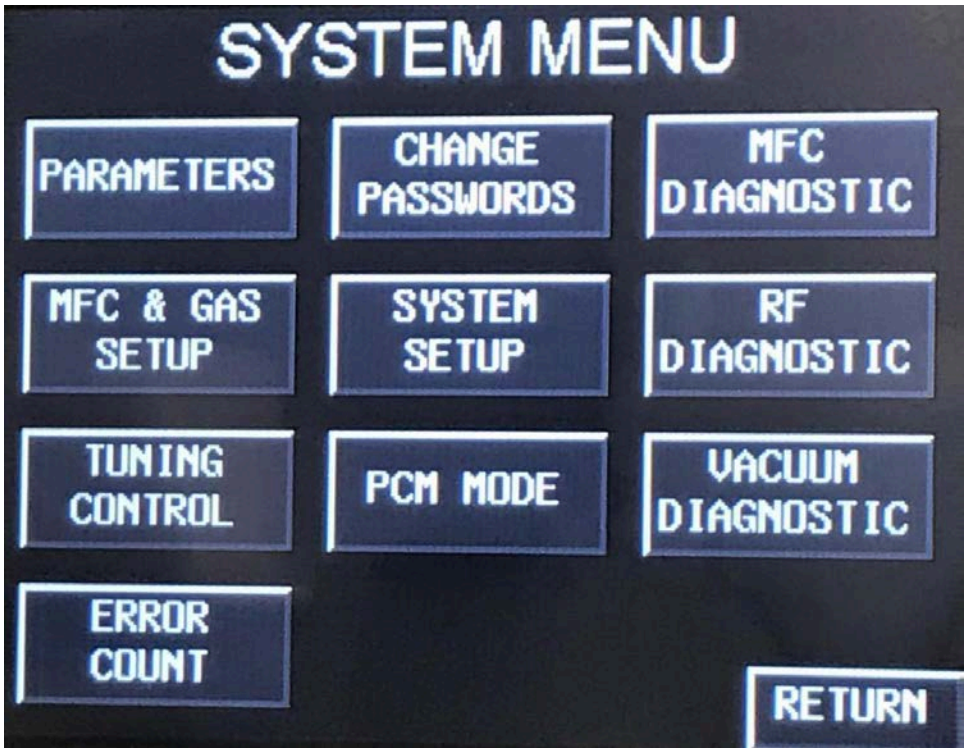
A. OPERATING PROCEDURES

2.1 System Start-up

To start the system first check the following:

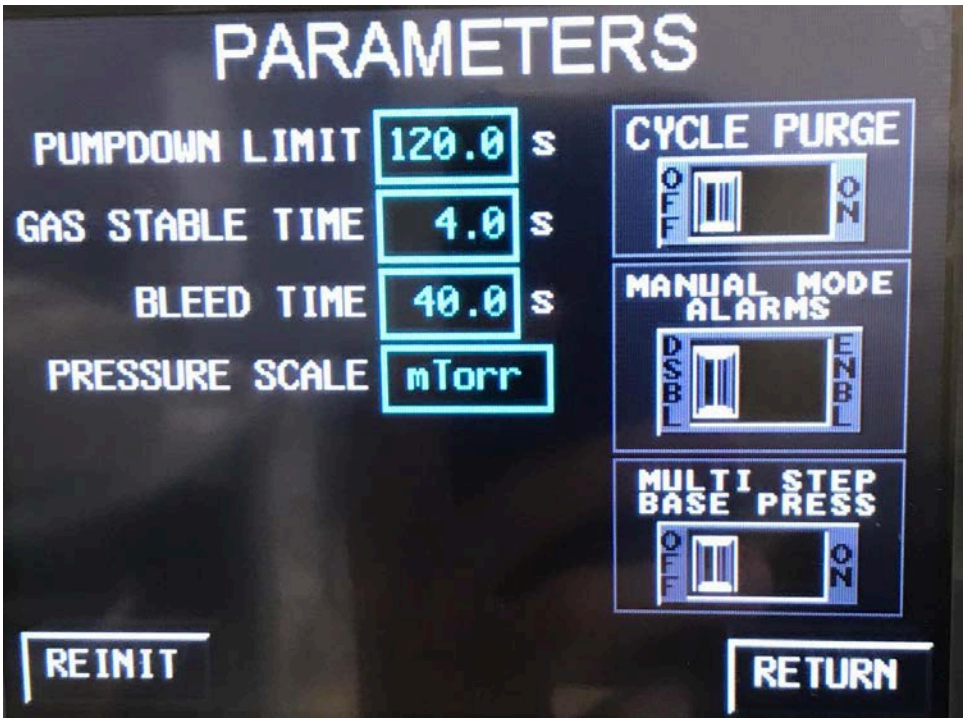
1. The pump in the back is turned on and running
2. Check oil level of the pump (Fomblin oil)
3. Compressed air is turned on (located behind the computer on the wall)
4. Nitrogen gas is turned on and **no greater than 30 psi**
5. Argon gas is turned on and set at **15 psi**
6. Release the **EMO** switch
7. Press the green **ON** Button, wait for initialization
8. Touch anywhere on the screen
9. Login as the engineer by clicking on Operator:
    a. 55555555 Technician
    b. 11111111 Engineer

2.2 System Menu Tabs

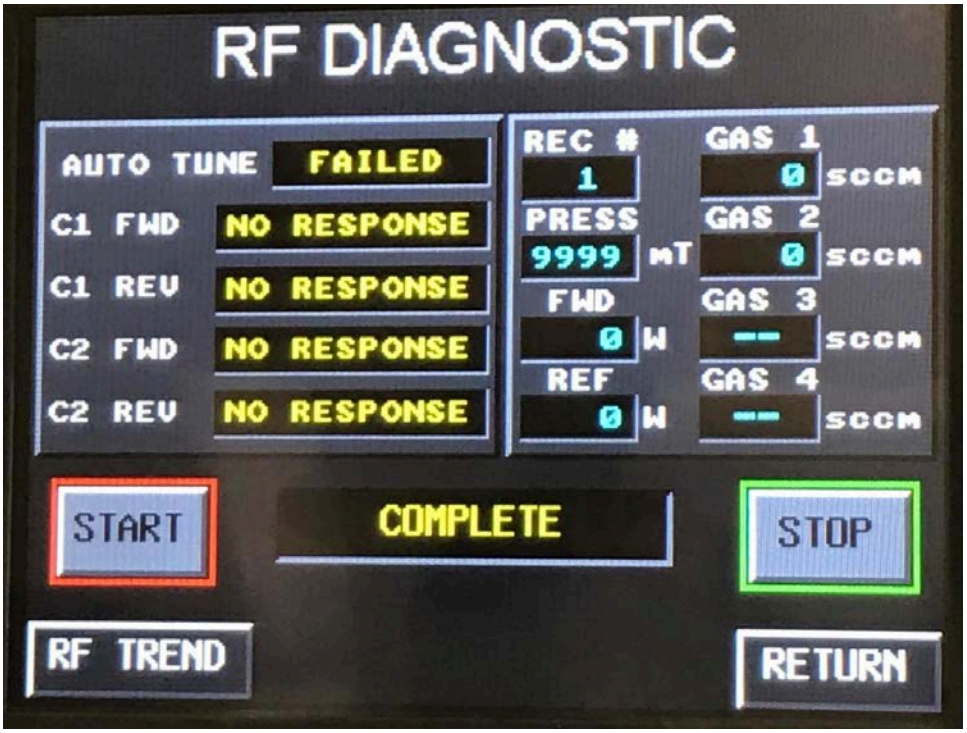


Notes about tabs under the system menu:

- Parameters:

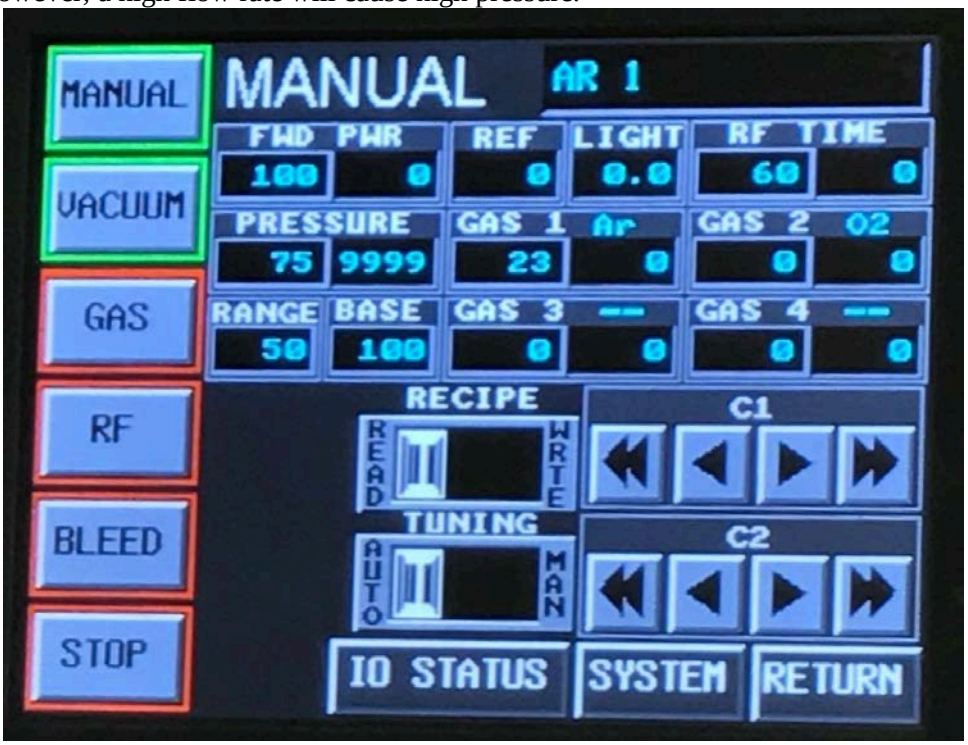


  - Pump down limit: The time limit for the reaction chamber to reach a set pressure (currently set at 120s. Tool will error out if the time limit is exceeded).
  - Gas stable limit: The time limit for the gas flow to reach the target pressure (currently set at 4s).
  - Bleed time: How long the purging gas is pumped into the reaction chamber to return pressure to atmospheric pressure (can always bleed more after process has ended).
  - Cycle Purge: Only turn on for extra purge when we are using toxic, flammable gas (HF_3, H_2, H, CF_4).
  - Manual Mode Alarms: turn off if processing a manual lot.
  - Multi-step base press: Only turn on if one recipe requires multiple steps. (for example, if we want to run Argon etching right after Oxygen etching on the wafer).
- Tuning Control: Use for trouble shooting. Is always on before a process runs and off during RF ramping. The tuning time is how long it takes to match the impedance of the RF generator.
- PCM Mode: Use if there is a robot that can load wafers into the machine (currently there is not one available, so this should be disabled).
- RF Diagnostic: Always says fail on the start screen. To test, run the process and it will say pass or fail in the top box and nothing in the other boxes.



2.3 Manual Mode

When running a recipe there is a balance between time and quality. For high quality cleaning the process should be run at a low pressure (for better uniformity). For faster cleaning the gas should be run at a high flow rate. However, a high flow rate will cause high pressure.



Check the following parameters before processing:

- PWR: Stands for power, currently set at 100 W, but can be in the range of 50-600W
- FWD: Power being delivered to the chamber
- REF: Power being reflected back to the generator usually ~0W
- LIGHT: Reading off a light sensor used to tell when a process is done (Currently not installed on our system)
- RF: Stands for RF generator processing time, currently it is turned on for 60s
- TIME: The elapse time the process has been running
- PRESSURE: The set pressure for the reaction in mTorr (currently set at 75 mTorr)
- RANGE: The range for acceptable pressure (currently set at ±50 mTorr)
- BASE: The pressure at which the process gas is turned on (currently set at 100 mTorr)

2.4 Running the Process

After checking all your parameters you can begin to run the process. To run press MANUAL on the main screen and follow the procedure below:

1. Place part for cleaning in the chamber and close door
2. Press VACUUM
3. Press GAS when the pressure has reached inside your range set (100 mTorr in our case)
4. Press RF when processing gas hits the target pressure (23 in our case) and RF generator will be turned off when the process is finished (in 60s in our case).
5. Press Bleed to return the reaction chamber to atmospheric pressure once the process is complete
6. Once the bleed is finished, press STOP to end process
7. Remove part by opening the chamber door, avoid touching the top and bottom surfaces of the part
8. If you cannot open the chamber door, it is due to low pressure inside the chamber, then you'll have to bleed again (click on return and go back to manual again, then click on bleed – now it will allow you to bleed without re-run the entire recipe). If you want to stop the bleeding before the 40s cycle click on bleed again. Now you should be able to open the chamber door. If not, bleed longer.

2.6 Shutting Down

The following are the steps for routine shutdown of the machine:

1. Use the touch screen to stop the process
2. After all system movement has stopped and the chamber vacuum has been bled to atmospheric pressure press the **EMO** button
3. Turn off the pump
4. Turn off the nitrogen at the tank **not the regulator**
5. Turn off the argon at the tank **not the regulator**
6. Turn off the compressed air

2.7 Other Notes

- Process trend tab (on main screen) provides a diagram of the process, this diagram is only stored for 20 minutes before being deleted. There is no memory on the tool.
- **WARNING!** Do not stare at the plasma process frequently or for extended periods of time.

- SSCM stands for standard cubic cm per minute.
- Pressure on the main screen will say 9999 mTorr for pressure that is greater than 10000 mTorr (atmospheric pressure is 760,000 mTorr).