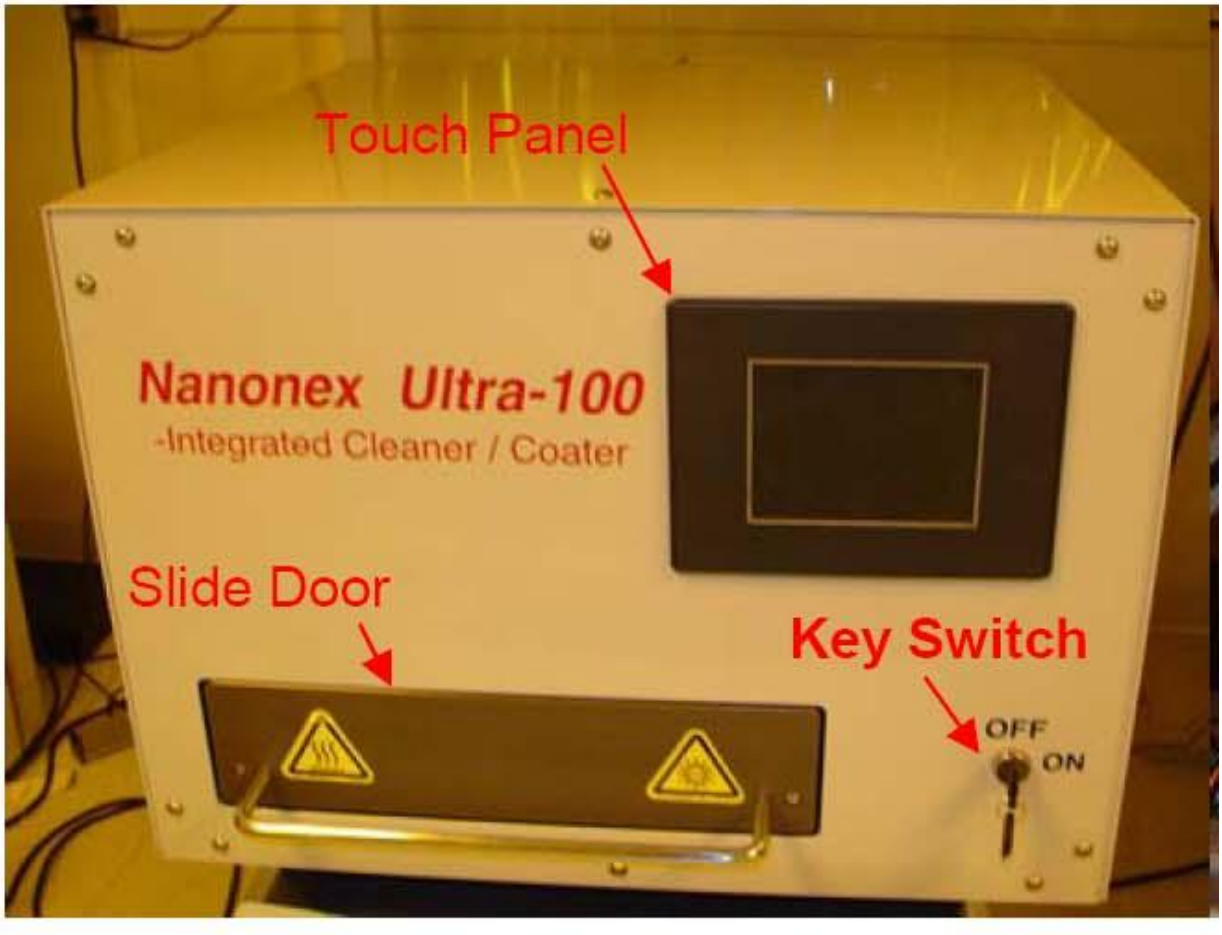
Nanonex Ultra-100
Integrated UV-Ozone Cleaner / Molecular Vapor Coater
Users Manual



Coral name: Molecular Vapor Coater
Model: Nanonex Ultra-100
Location: Nanofab, Building 215
Contact: nanofab_litho@nist.gov
Revision: 1.0

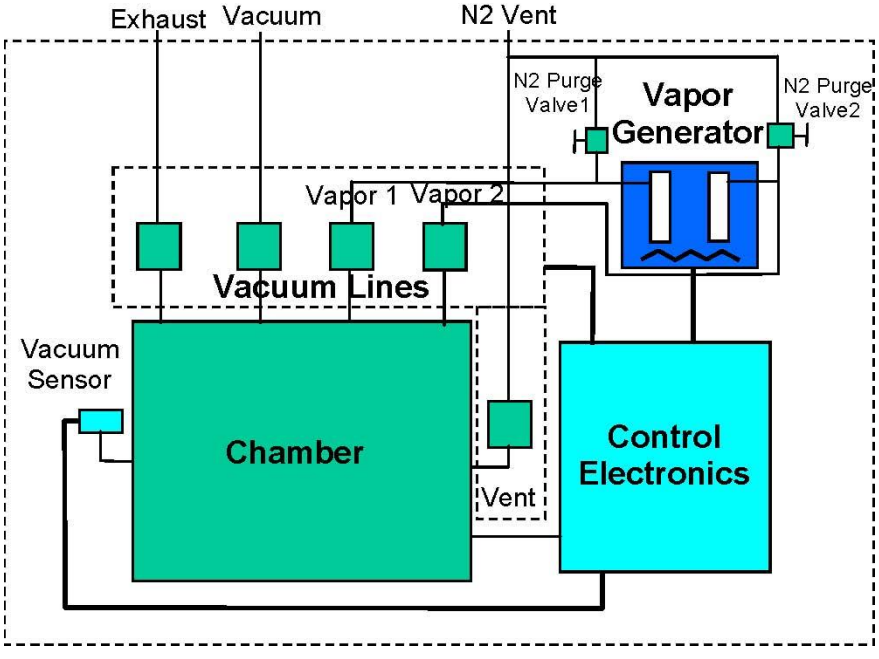


Figure 1 illustrates Subsystem Block Diagram of tool.

Process is controlled by the touch screen panel. There are nine programs available for processes. Three programs are pre-set to standard programs provide by Nanonex. Six programs are available for users to make their own programs. Each program consists of multi steps. Each step controls valves, UV grid lamp, door lock solenoids, chuck heater, vapor generator heater, and step timer. Various settings of each step form a continuous flow of process. User must understand meaning of these parameters for each step in order to edit existing program or make new program. Program is limited to maximum 30 steps.

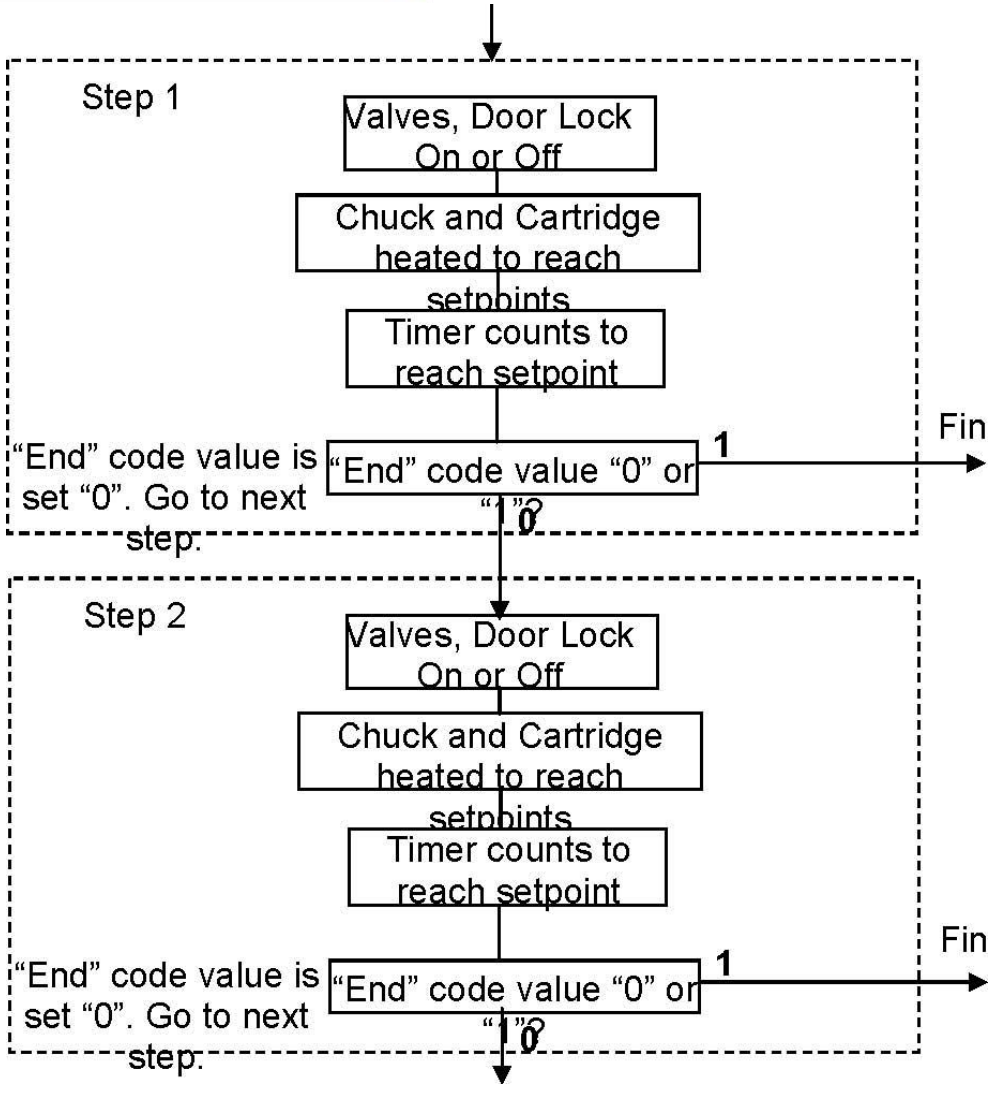


Figure 3. Hierarchy diagram of running process of program.

- Door Lock solenoids: 0-Off; 1-On. Must ON when UV is on or pumping starts.
- UV UV lamp: 0-Off; 1-On
- Vacuum valve: 0-Off; 1-On
- ON only when Exhaust and Vent are OFF.
- Exhaust valve: 0-Off; 1-On. ON only when Vacuum is OFF.
- Vent valve: 0-off; 1-On. ON only when Vacuum is OFF.
- Vapor 1 valve: 0-Off; 1-On (For mask release coating)
- Vapor 2 valve: 0-Off; 1-On
- Vapor 3 valve: 0-off; 1-On
- Vapor 4 valve: 0-Off; 1-On
- Chuck Temp: 0-120 0C
- Vapor Generator Temperature: 0-120 0C
- Time: 0-999s

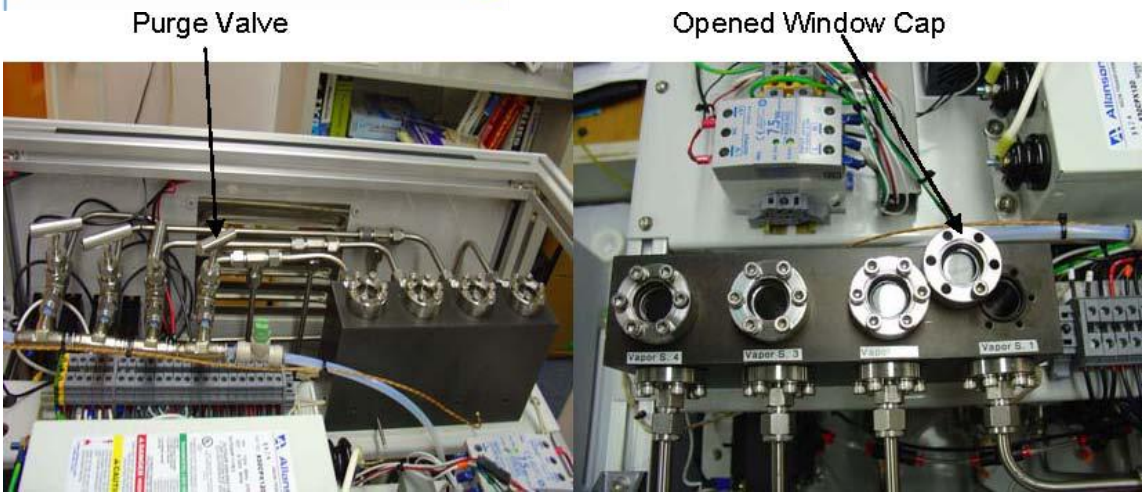
0-Continue; 1- end
Last step must set to “1”. Other steps must set to “0”

Interlocks:

- UV Grid Lamp in ON, Door Lock is ON.
- Chamber in vacuum, Exhaust Valve is OFF.
- Either one of Vapor Line (1-4) Valves in ON, Exhaust Valve is OFF
- Exhaust Valve in ON, Vacuum Valve is OFF.
- Vent Valve in ON, Vacuum Valve is OFF.
- Door not in Close position, Vacuum Valve is OFF.
- Door not in Close position, UV Grid Lampe is OFF.
- Either one of Vapor Line (1-4) Valves in ON, UV Grid Lamp is OFF
- Chamber not in vacuum, Vapor Line 1-4 Valves are OFF

Operation:

- Add Chemical
- Turn OFF power switch and four circuit breakers on rear panel.
- Take off top panel.
- Referring to images below, turn on purge valve first, then, open window cap. Quickly pour chemical into the reservoir.
- Close the window cap immediately.
- Tight cap screws evenly to fix the window cap.
- Turn off purge valve.
- Reinstall top panel. (Take nuts out of slots of frame bars. Put nuts onto screws prior to reinstall top panel for easy handling.)

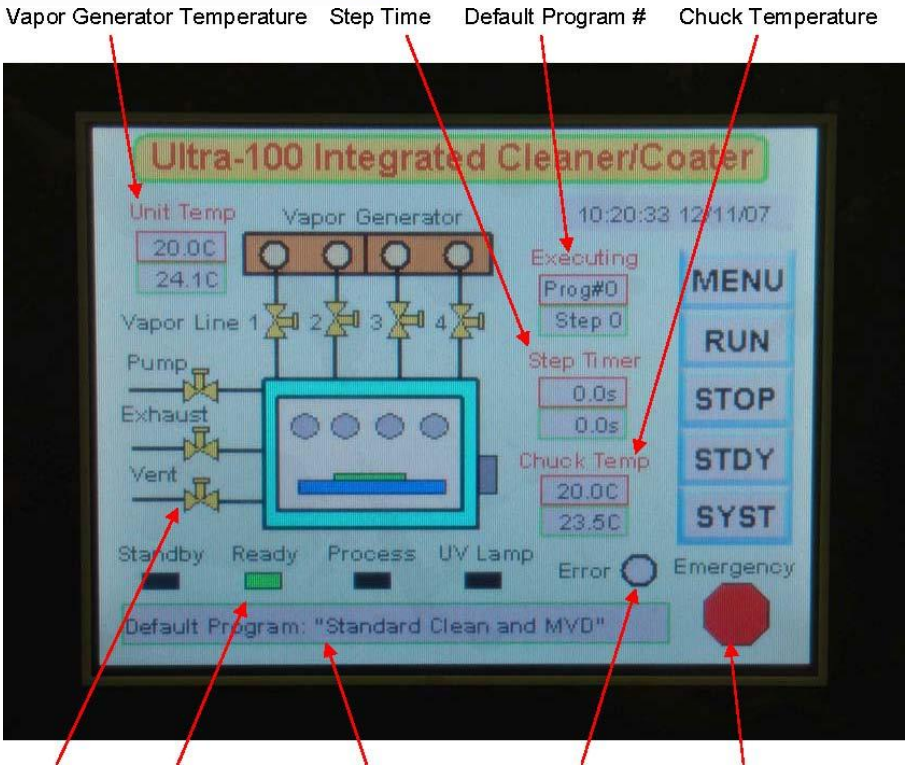


Maximum filling capacity inside chemical reservoir is 10 ml. Please do not overfill. When chemical is added, the tool should not be titled over 30 degree angle.

Once the chemical is filled

- Push all circuit breakers on rear panel to ON position
- Turn power switch on front panel from “OFF” to “ON”.
- Please wait for touch panel to initialize. This normally takes about 18 second.
- If chamber is still under vacuum, user will see chamber venting message. Please wait for chamber to reach atmosphere. There is a sensor to measure chamber pressure.
- Display panel will show “Default Program Updated”. Then, main screen is shown. User operates tool from main screen.
- If anything different from above description occurs, please turn power “OFF” and call the Nanofab. staff.

When the tool is ready for operation, open the door to load the wafer on the chuck. Start the process from main screen



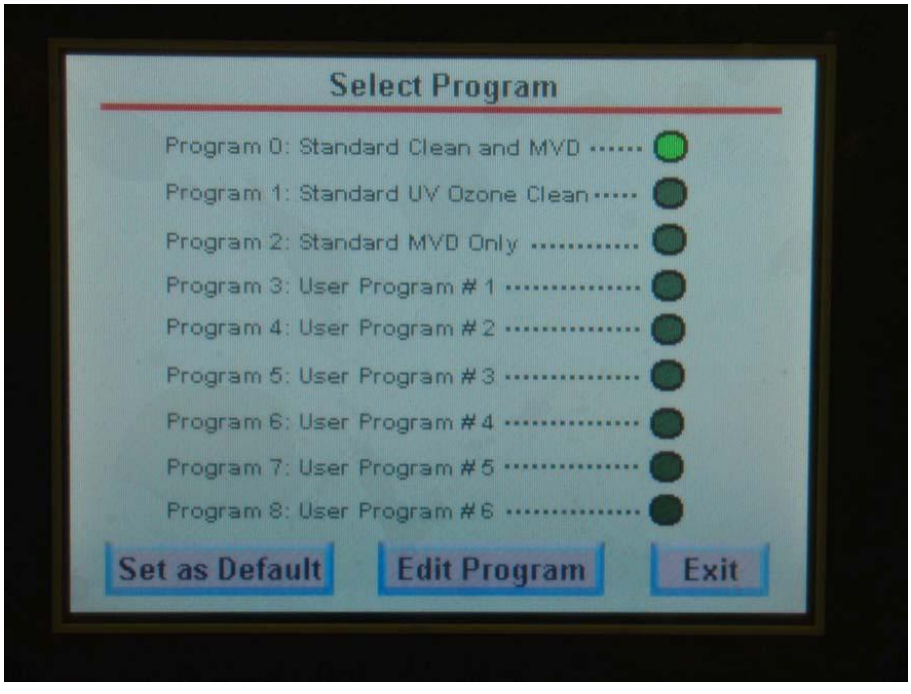
Message Box shows current default program. The default program is the program loaded for running process. The status of tool such as vapor generator temperature, wafer chuck temperature, step time, indicators of status, and vacuum valves can be seen on the screen.

For temperatures and timer, upper framed values are set-points and lower framed values are current readings.

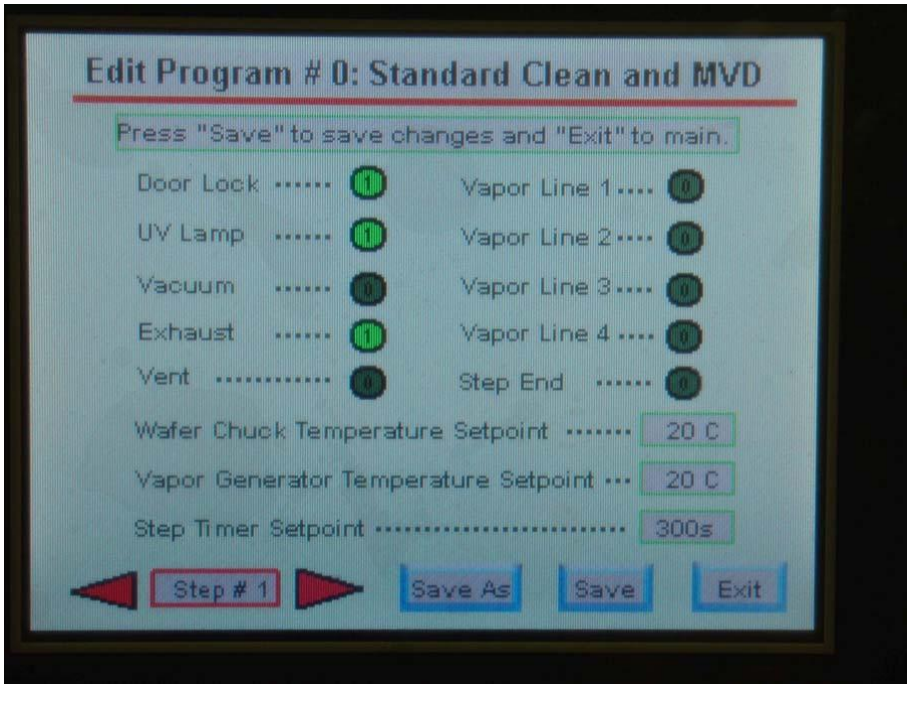
There is a special circular indicator to show Error Warning. If this indicator is on, touching the indicator will open a popup window to show details of errors.

Anytime touching “Emergency” at lower-right corner will turn off all control relays. User must restart the tool to exit Emergency Status. User can also turn the power switch off when emergency occurs

To view/edit/change program, touch “MENU”. Menu screen will be displayed as below.



Choose program by touching respective circular button at end of dashed line. Touch “Edit Program” to view or modify step parameters. Left or right arrows can move program to upper step or lower step. When “Step End” is set to “1”, current step is supposed to be last step. Remember to touch “Save” to store all changes. “Save As” allows user to duplicate a program and save it as another program number.



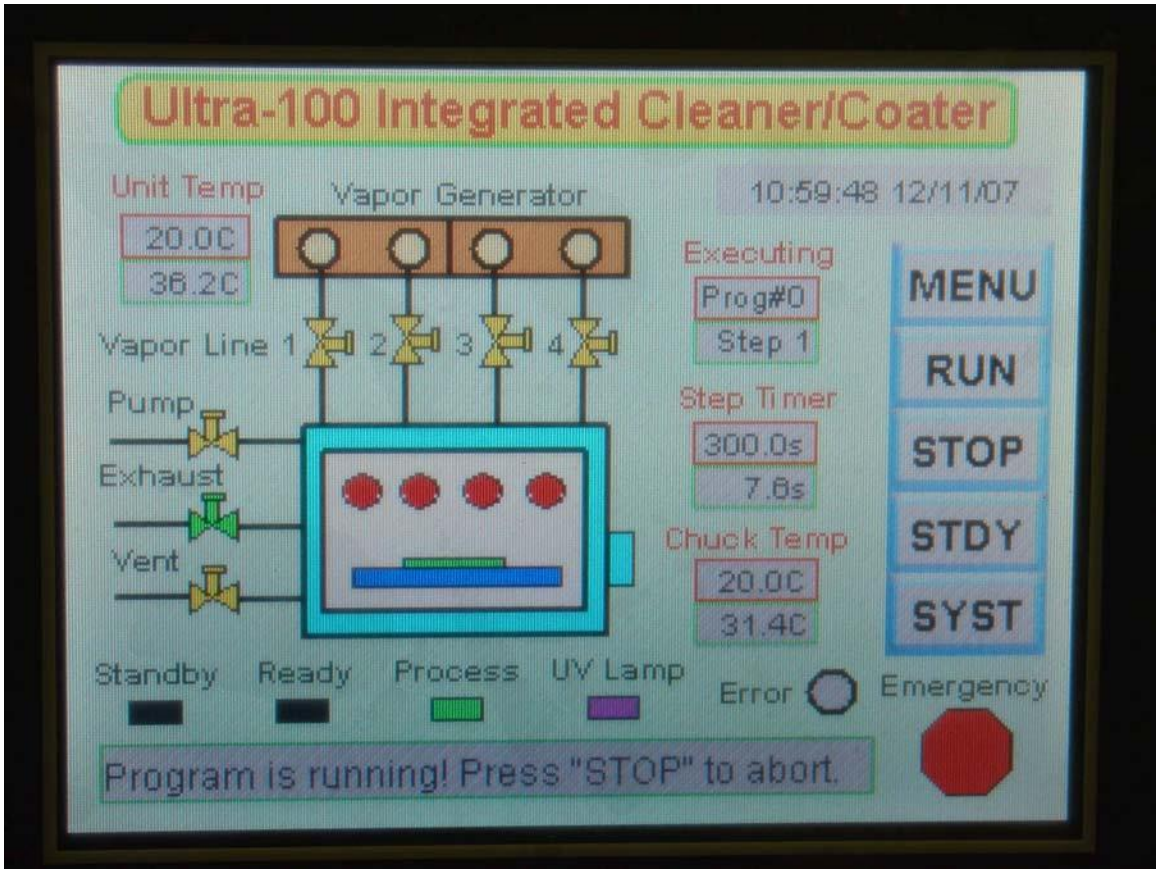
Standard programs provided include Standard Integrated Clean/MVD Process (Prog. #0), Standard Clean/Bake Process (Prog. #1), and, Standard MVD/Bake (Prog. #2).

Details are listed on the separate sheets.

Normally, user is not allowed to change default settings of relays to control tool status.

When “Ready” indicator is on, touch “RUN” button. The default program will start automatically. Running status of current step can be seen on the main screen, as shown in following image.

If interlock is violated during running, “Error” indicator will be turned on. However, program will continue with activated interlock unless fatal error occurs. User can touch “Error” indicator to see what error occurred after program is finished or aborted.

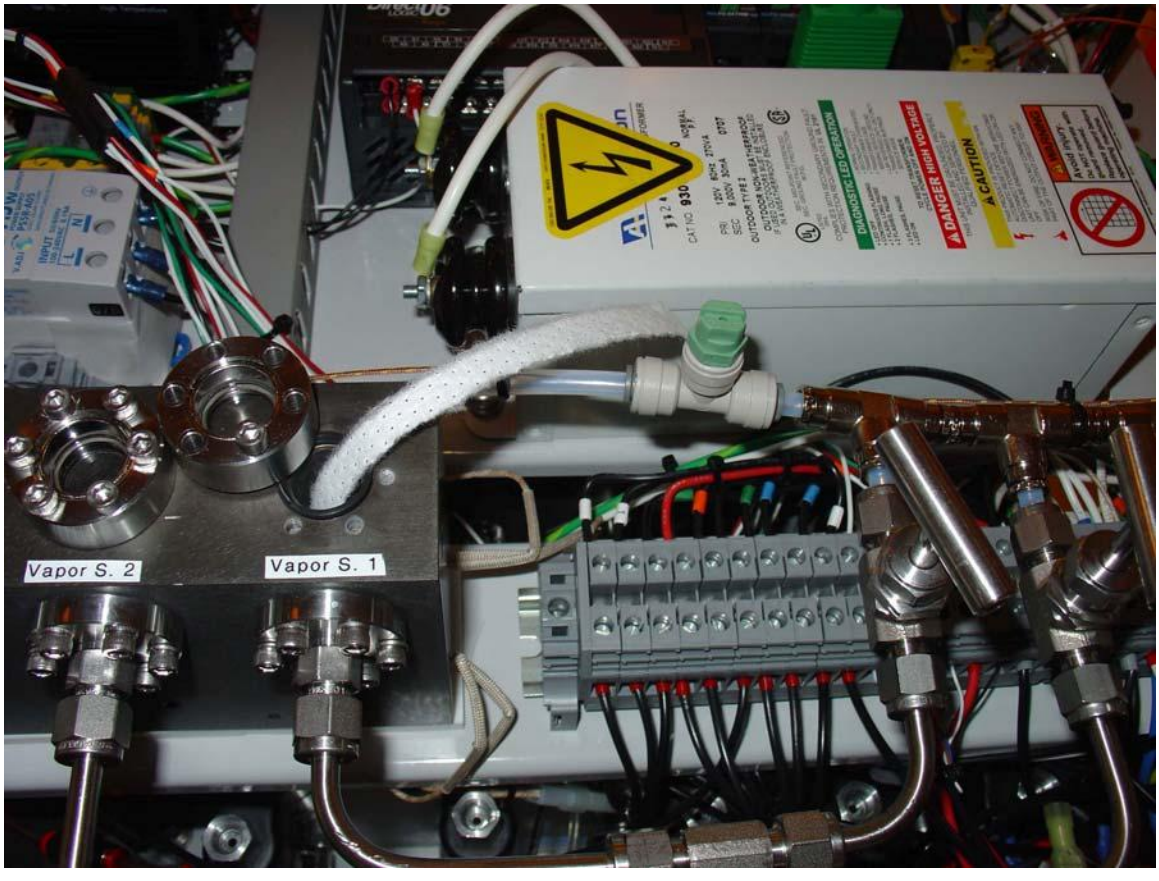


User should not try to pull the slide door when program is running.

Cleaning

After the process, chemical reservoir of vapor generator needs to be cleaned. Remove window cap that covers the reservoir first. Then, cut cleanroom wipers into long stripes. Dip wiper stripes into chemical reservoir deeply to absorb chemical, as shown in below image. Dispose the wiper strip soaked with chemical. Repeat with new wiper strip to absorb chemical as much as necessary in order to remove residual chemical. After removing residual chemical, rinse reservoir inner-wall with Acetone. Use

wiper stripes to remove Acetone liquid accumulated inside the reservoir. Repeat Acetone cleaning as much as necessary to clean reservoir inner-wall. Then, use Methanol to clean the reservoir inner-wall again. After cleaning is done, use N2 gun to blow N2 into reservoir to dry inside completely. Finally, reinstall the window cap to seal the reservoir.



End process

Please remember to put tool in STANDBY after use. STANDBY status could be reached by pressing “STDY” button at Main Screen. The tool should reach STANDBY status in about 90 seconds. User has to wait to see “System in STANDBY!…” message before leaving.

To shutdown tool, user must have tool in STANDBY first. When user sees “System in STANDBY!…”, tool is ready to be shutdown. Then, turn Power Switch on front panel to OFF position to shut down tool. After tool is shut down, vacuum pump could be turned off.

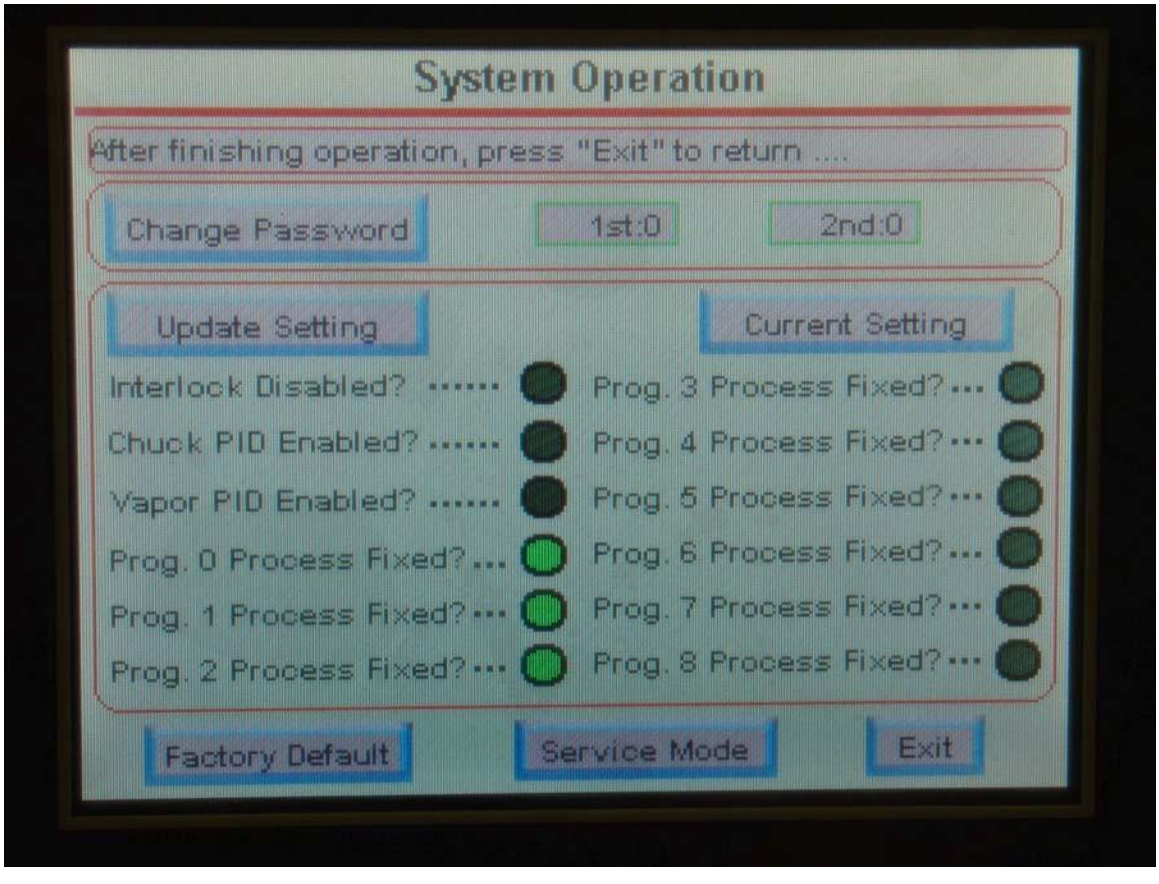
In Emergency, turn Power Switch to OFF position immediately.

Administrator Operations

Administrator operation is provided under “SYST” button on main screen. The operation should be only performed by tool administrator or service personnel. In administrator operation, user can change administrator password, change program settings, restore factory default, and enter service mode.

System Screen

To enter administrator operation, user starts from touching “SYST” button on main screen. Then, user is prompted to input password. Password is a 4-digit number. Default is “0”. When correct password is inputted, user will enter System Screen as shown below.



To change password, user needs to input the same number for new password into frames of “1st: ” and “2nd: ” Then, touch “Change Password” to save the number as new password.

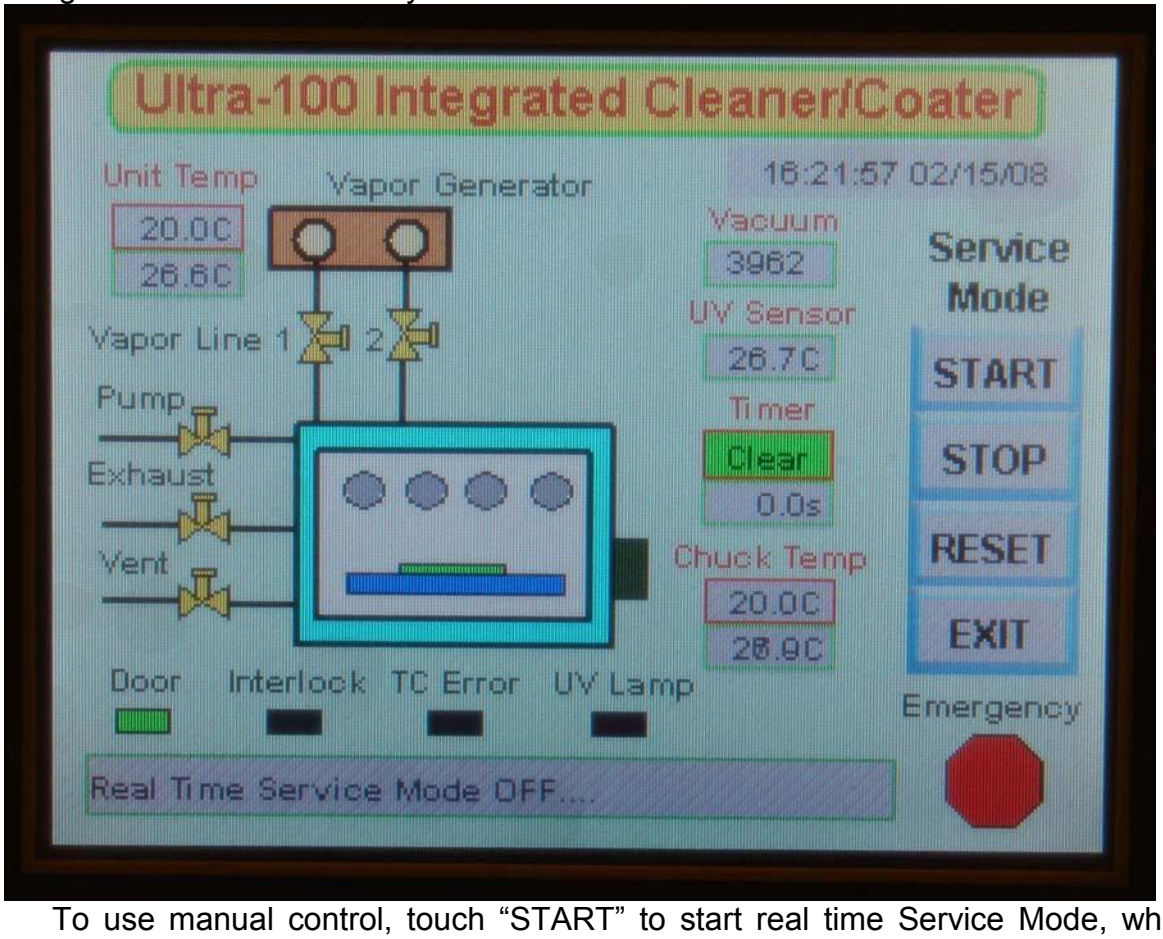
To change program setting, touch circular buttons to toggle between on and off to change setting of each parameter. Anytime touching “current setting” will ignore all changes and restore the setting to current. To save changes of the setting, user should touch “update setting” to save new setting.

To restore factory default, touch “factory default”. After confirmation, all user programs will be erased and related memory will be cleared. Standard programs will be restored to original factory default. Program setting will be also restored to factory default. User must be aware of losing all user programs by doing such operation.

To enter service mode, touch “Service Mode”. Service screen will be shown. User is able to manually control all components of the tool. See next section for Service Mode operations.

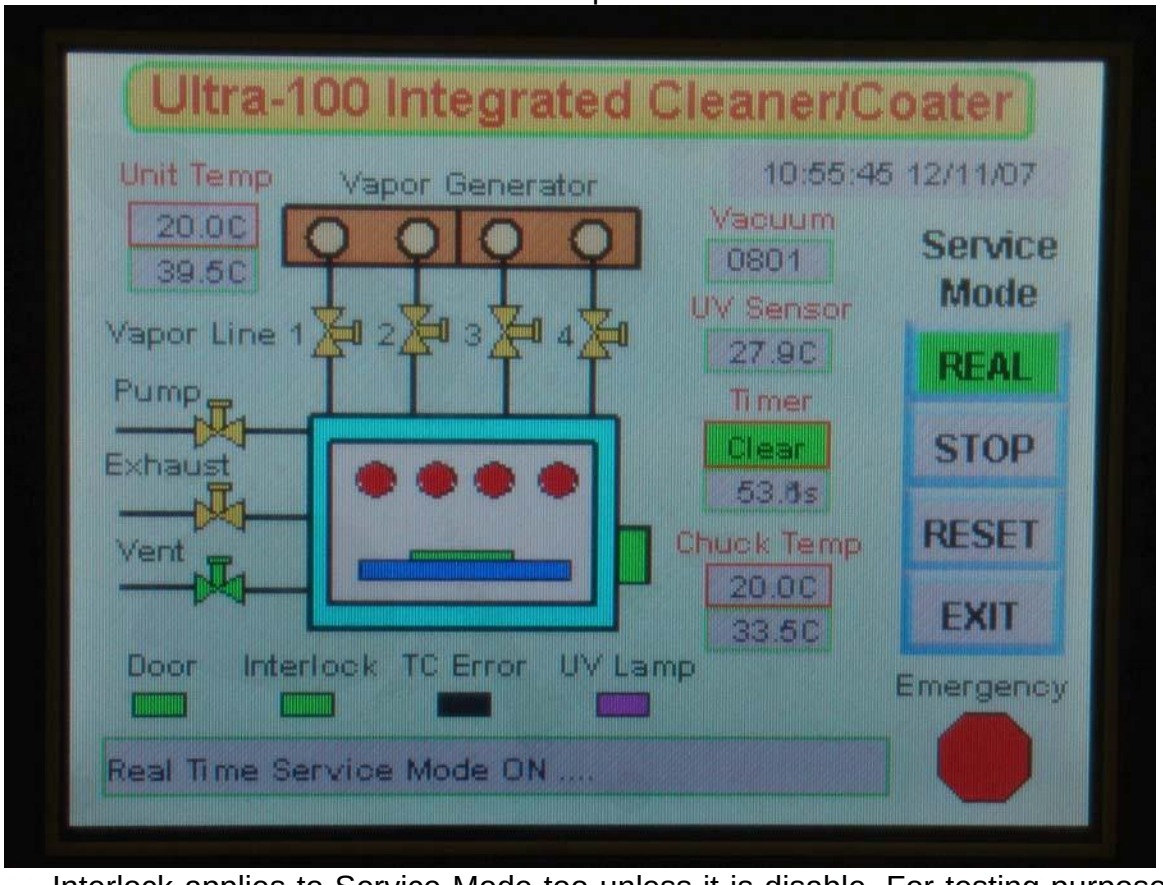
Service Mode

Service mode is developed for testing and servicing tool. Administrator must fully understand tool operations before entering service mode. Enter Service Screen by touching “Service Mode” from System Screen as below.



To use manual control, touch “START” to start real time Service Mode, which means that system status is shown in real time and tool responds to touching in real time. When real time Service Mode is on, user can see valves status, temperature control status, sensor status. User can turn on/off valves and UV lamps by touching respective icon. To change temperatures, user can change temperature set-points. Program will automatically heat and maintain temperatures.

Underneath image gives an example of Service Mode operation, where “vent” valve and UV lamp are turned on.



Interlock applies to Service Mode too unless it is disable. For testing purpose, if you need to disable interlock, go to program setting and choose to disable. Remember to update setting to save the change.

Administrator can touch “RESET” button to close all valves and heater relays to make tool safe. Administrator can touch “STOP” to stop real time Service Mode.

No user is allowed to touch the “Service” mode.

Appendix II: Spectrum of UV Lamp