Semiconductor Equipment | Spare Parts and Service | CMP Foundry

Entrepix Control System

Software Operations Manual

Revision 1.0

Contents

1. Overview

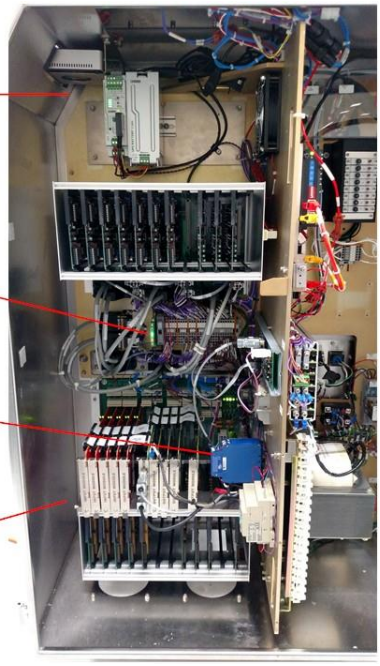
The Entrepix Control System for the OnTrak double sided scrubber replaces the OEM original software and the obsoleted GESPAC computer card cage and interface hardware.
The replacement hardware has 2 major components: Windows based computer and the CPU and I\O card rack. Other peripheral devices are described below.

Windows based computer provides the user interface, stores files, offsets, recipes, and manages the factory host interface. The computer is powered and supported by a DC voltage UPS device.

Time Delay Relay prevents power to the output devices before the CPU is initialized.

Optical isolator provides protection from the legacy communication system and the new CPU card.

New CPU and I\O cards integrated directly into the original interface motherboard eliminating use of dozens of ribbon cables.



2. Screen Layout

2.1. Header Bar

The Header Bar displays generic data related specifically to the machine on which the UI is installed.

System ID – Displays the serial number of the OnTrak, or can be configured with a user system ID.

Login User – ID of the user presently logged into the UI.

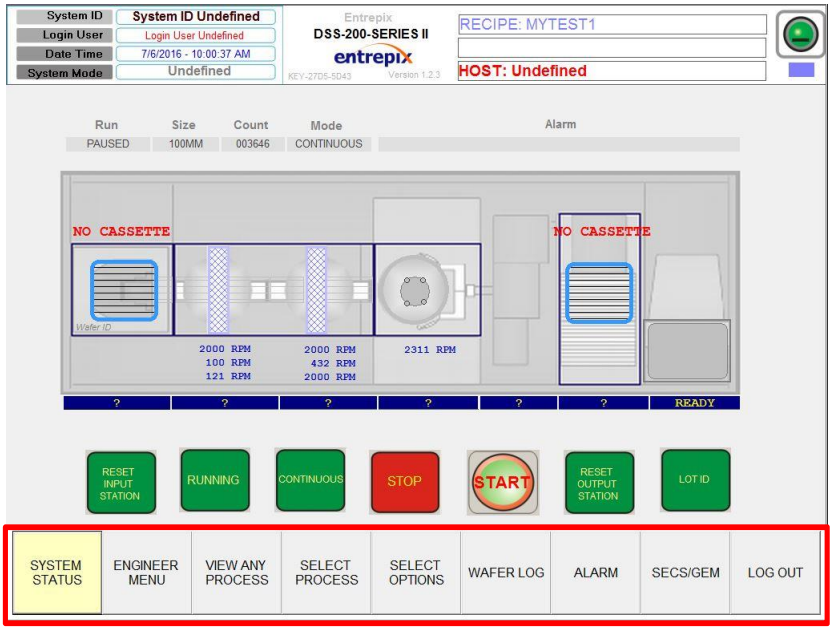
System Mode – Displays if the system is in Continuous or Slot to Slot mode.

Key – Displays the License Key.

Version – Displays the current software version.

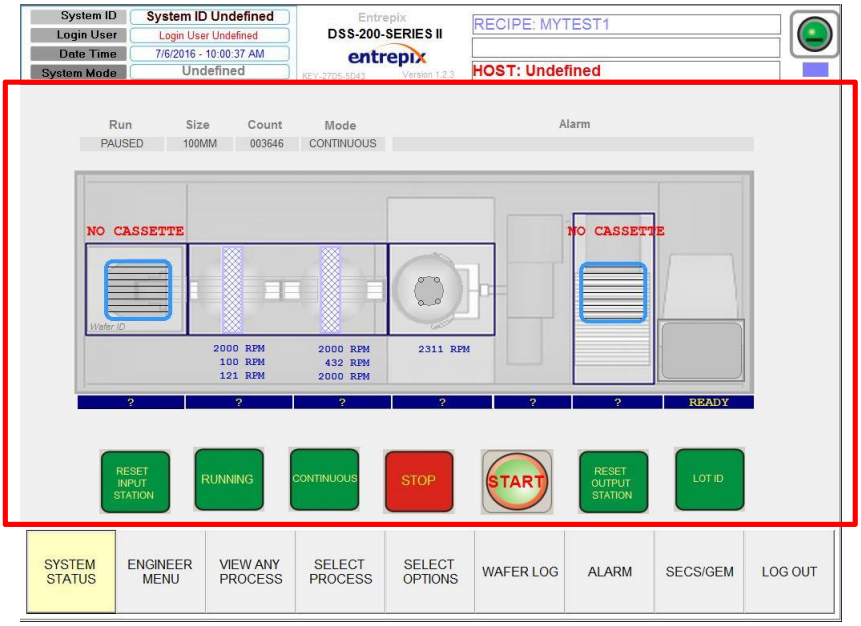
2.2. Navigation Buttons

The buttons along the bottom of the screen are the Navigation Buttons. Each button will display a different Activity Window and often a new set of activity buttons associated with the new screen.



2.3. Activity Display Window

The center portion of each screen is the Activity Display window for the currently selected Navigation button. Each time a Navigation button is selected this screen will update a different interface providing current system information, recipes, teach screens, etc.



3. Screen Descriptions

3.1. System Status

3.1.1. Displays current equipment information such as wafer IDs, station process events, and instructions for processing wafers. There are also several actions buttons for basic equipment operation. Some buttons have 2 states and the action listed on the button will be executed if the button is pressed.

Action Button	Description
Reset Input Station	Returns the Input Cassette Platform to the top (home), turns off DI Spray.
Running | Paused	Running mode is for normal cycling. When pressed wafers will transport through the system. Paused mode, when pressed, will stop cycling wafers at the end of each modules current process. Once all modules have stopped processing doors may be opened, new recipes downloaded, etc.
Continuous | Clearing	Continuous Mode will remove all wafers from the Input Cassette and transfer to the Output Cassette. Clearing Mode will not send any additional wafers from the Input Cassette but will finish processing all other wafers into the Output Cassette. Once all process stations are clear the system will remain idle until placed back into Continuous Mode.
Stop | Resume	Stop will bring all activity and motions in the system to a halt. Some actions may need to complete to ensure proper wafer handling, but all motion should halt within seconds. Some alarms, such as leak and air or water loss, will cause the system to be placed in Stop Mode. Resume will return the system to the running state.
Start	Starts wafer cycling and processing. When Start is pressed if there is a cassette in the Input and Output station the cassettes will be indexed to their first slots. Start can be pressed. For example, if no Output Cassette was present when Start was pressed, the cassette could be loaded and Start pressed again without affecting the wafers in progress.

Action Button	Description
Reset Output Station	Homes the Lifter Blade, Output Carriage, and Wafer Handling Robot. If wafers are in process when this button is pressed then the Start button must be pressed to send the output cassette out.
Lot ID	Manually enter the Operator Name, LOT ID, or both if desired. These entries will display on the log files.

3.2. Engineering Menu

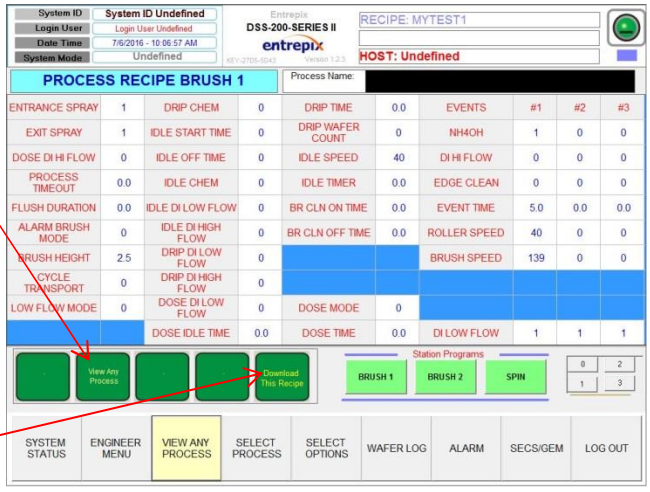
3.2.1. Displays the same buttons that are available from the System Status screen with additional menu buttons on the right side of the screen. There is also a message bar, located under each module, which displays system message information. For additional information regarding the various maintenance screens refer to the Operation and Maintenance Setup sections of this manual.

3.3. View Any Process

3.3.1. The View Process screen can be used to display the process parameters for a selected recipe without making any changes. There is also a button to Down Load a Recipe which can be used to change a recipe when the system is between wafers. It is not advisable to change a recipe while the modules are cycling.

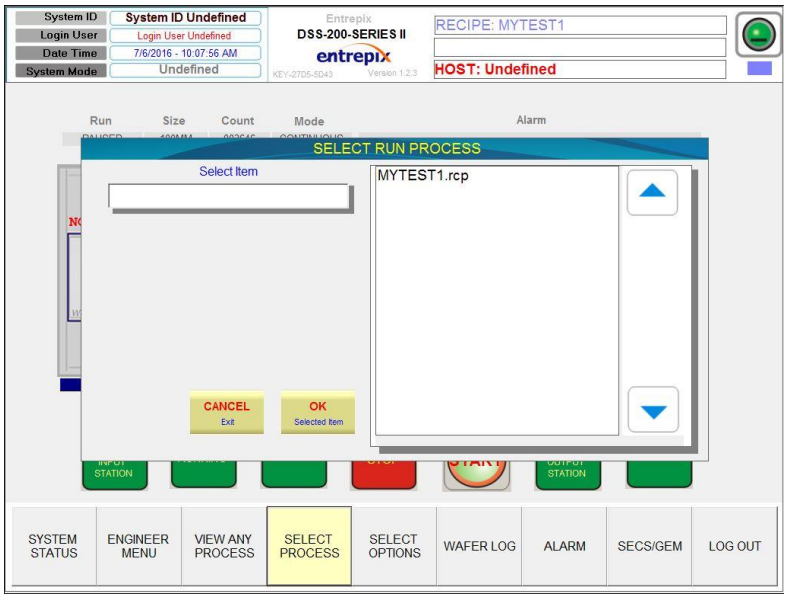
Press the View Any Process button to select the Recipe to display.

Press the View Download This Recipe to change recipes mid-cassette.



3.4. Select Process

3.4.1. Use the Select Process button to choose the recipe for the next cassettes to be loaded. This recipe will be used for the entire cassette.



3.5. Select Options

3.5.1. The Select Options screen allows the user to choose certain options that determine how the system processes wafers.

Option	Description
Output Cassette Mode	Slot to Slot: Each wafer is assigned an ID based on the Input Cassette slot position the wafer was removed from. The Output station will place each wafer into its corresponding slot based on the ID. If a wafer is found in the slot and there is a conflict an alarm is posted and the wafer is put into the next available slot. Continuous: Wafer ID is ignored and wafers is placed into the Output Cassette starting in position 1 and filling each open slot until the cassette is full.
Output Cassette Direction	Front to Back: Wafers will be loaded in the Output Cassette from slot 1 to slot 25. Back to Front: Wafers will be loaded in the Output Cassette starting from slot 25 and load back to slot 1. If the Slot to Slot option is selected the wafer in Slot 1 of the Input will be loaded to Slot 25 of the output, Slot 2 of the Input loaded to Slot 24, etc.
Process Complete Alarm	Enabled or Disabled: Toggles the audible alarm when a lot has finished processing and the cassette is ready to be removed from the Output Station. The alarm will turn off once the cassette is removed.
Brush Motor Alarm	Enabled or Disabled: Toggles the Brush Motor speed monitoring function. If enable d the system will alarm when a brush speed is detected to be +\-10% out of spec.
Input Spray	Function is being updated.
Wafer Size	100mm, 150mm, 200mm: Select the wafer size for the system. Will apply the saved offsets and operate the solenoids and hard coded offsets for processing the wafer size selected.

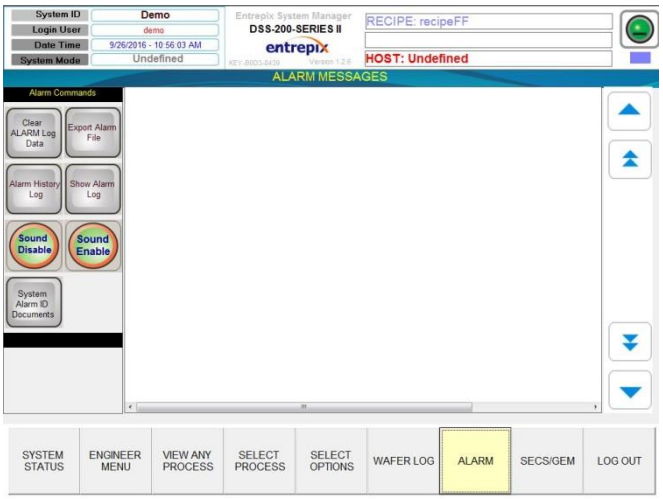
Option	Description
Spin Speed Monitoring	Enabled or Disabled: Toggles the Spin Motor speed monitoring function. If enabled the system will alarm if the motor speed is detected to be +\- 10% out of spec, but only for speeds over 1000RPM.

3.6. Wafer Log

3.6.1. The Wafer Log screen provides users a means to see the details of a particular wafer history or current events for use in troubleshooting. This screen is still under construction although some data is available by selecting the Wafer Count or by pushing the View Event History button of the wafer desired. The log will show events which occurred to process the wafer as well as time summaries.

3.7. Alarm

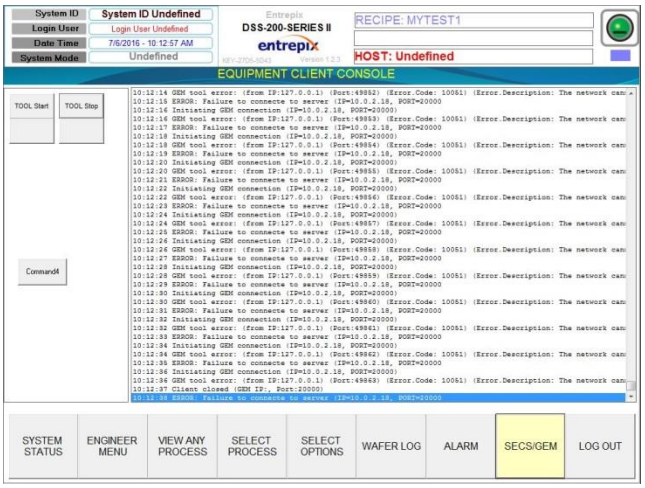
3.7.1. The Alarm screen displays current and past alarms for the current day. Alarms from previous days can be viewed and exported from this screen.



Action Button	Description
Clear Alarm Log Data	Clears the current Alarm Messages window.
Alarm History Log	Allows the user to display alarms from a previous day.
Sound Disable	Turns off the Sonalert for the current lot. The Sonalert will automatically be enabled when the next lot is started.
Sound Enable	Turns on the Sonalert after it has been disabled with the Sound Disable button.
System Alarm ID Documents	Displays a description of each alarm message with more details than is provided in the alarm message. This file is a text file and can be edited by users if there is specific information they would like added.

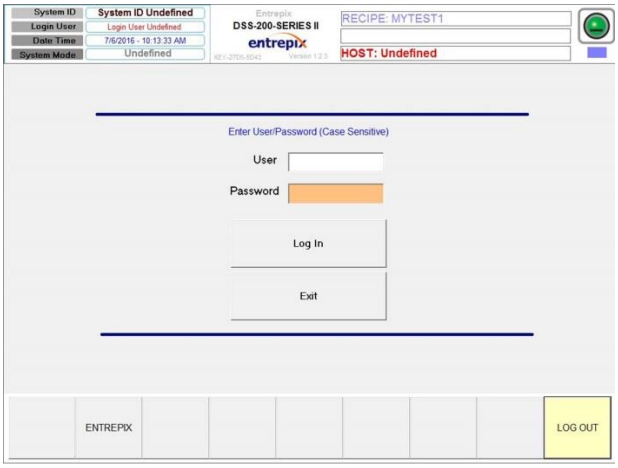
3.8. SECS\GEM

3.8.1. The equipment console for displaying SECS\GEM data. There are no commands on this screen.



3.9. Log Out

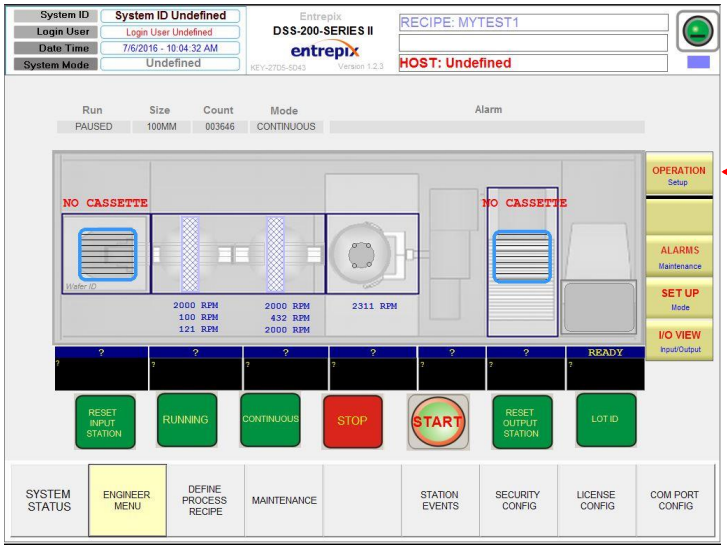
3.9.1. A user can log in or out of the UI. Different access privileges are assigned to each user so it is important to regularly log out of the UI.



4. Engineering Operation and Maintenance Menus

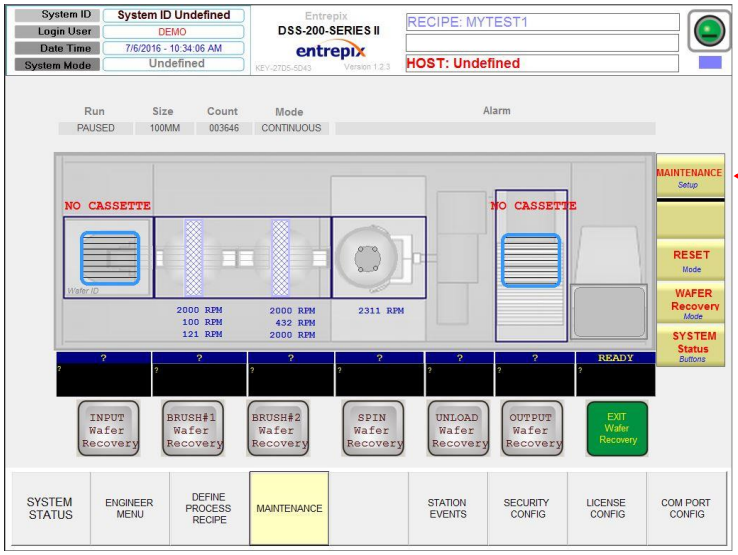
4.1. Description of Operation and Maintenance Buttons

Operation buttons consist of the Reset, Wafer Recover, and System Status. They are located on the right side of the Activity Window when the Engineering Menu is first accessed. These buttons can also be restored by pushing the Operation button at the top of the column. The Operation and Maintenance buttons share the same space and toggle back and forth.



Operation button: Press to access the Operation screens.

Maintenance buttons consist of Alarms Setup, Setup Mode, and I\O View. These buttons are accessed by pressing the Maintenance button on the right side of the Activity Window. These buttons can also be restored by pushing the Operation button at the top of the column. The Operation and Maintenance buttons share the same space and toggle back and forth.

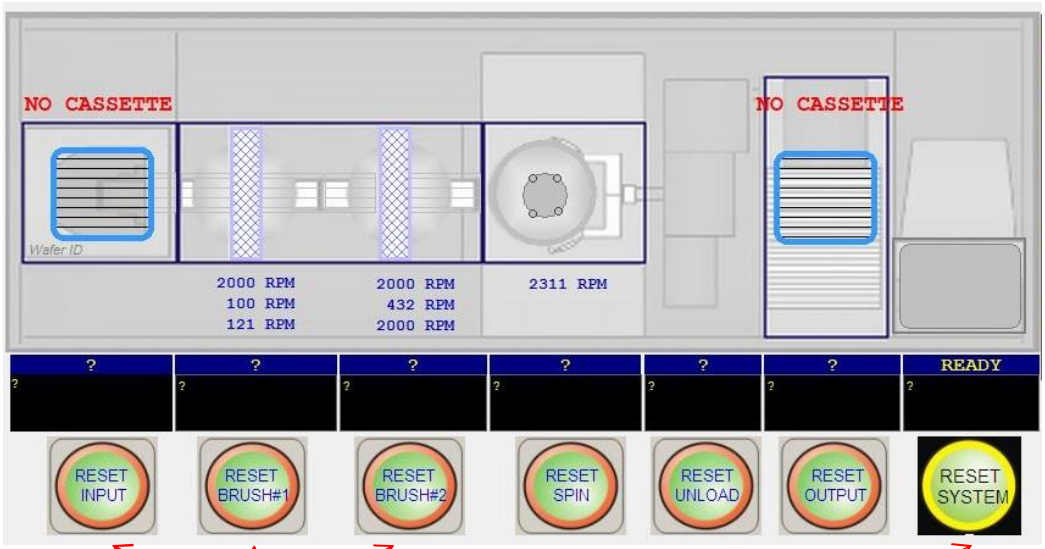


Maintenance button: Press to access the Maintenance screens.

4.2. Operations Menus

4.2.1. Reset Mode

The Reset screen is used to initialize the entire system or to simply reset a specific station. Use the Reset System button when the equipment is powered on. The Reset System button will download offsets, configuration settings, and other parameters that need to be initialized when the equipment is powered on.



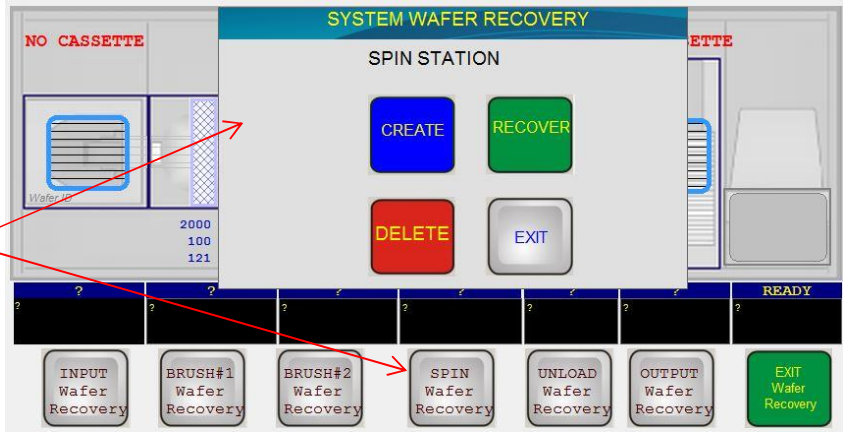
Use the Reset Module buttons to initialize an individual station.

The Reset System button initializes all stations and downloads system parameters.

4.2.2. Wafer Recovery

The Wafer Recovery Mode provides buttons that allow users to assign or delete wafers from specific stations should an event have caused the system to abort wafer cycle. To recover multiple wafers begin with the right-most station and work toward the left. Several scenarios are listed below.

Press the Wafer Recovery button to display the Recovery Screen and select one of the 4 options.



Action Button	Description
Create	Creates a wafer in the system where one is not presently displayed. Enter the Slot ID for the Output Station slot that the wafer should be placed into.
Delete	Removes the wafer from the system and continues to process remaining wafers.
Recover	Bypasses a loop in which the system cannot proceed until a condition is met but the maintenance engineer considers the condition safe to bypass.
Exit	Closes the screen without performing any recovery.

4.2.2.1. Example Recovery Scenarios

Power Up Recovery (wafers in Brush 1, Brush 2, and Spin)

1) Initialize the system.
2) Beginning with the right-most station (Spin), press the Spin Wafer Recovery button.
3) Press Create.
4) Enter the Output Cassette slot ID that the wafer should be placed into then press Start and Exit.
5) Press the Brush 2 Wafer Recovery button.
6) Press Create.
7) Enter the Output Cassette slot ID that the wafer should be placed into then press Start and Exit.
8) Press the Brush 1 Wafer Recovery button.
9) Press Create.
10) Enter the Output Cassette slot ID that the wafer should be placed into then press Start and Exit.
11) Press the Start button on the System Status screen to send the Output Cassette out and begin process of the newly created wafers.

Lost Wafer in Brush Box

1) Press the Brush # Wafer Recovery Button.
2) Press Delete.
3) Exit the Wafer Recovery screen.
4) The Brush Station will return to the Ready for Wafer state.
5) If necessary, press Running and Continuous mode to continue process cycle.

Lost Wafer in Spin Station During Process Cycle

1) Press the Spin Wafer Recovery Button.
2) Press Delete.
3) Exit the Wafer Recovery screen.
4) The Spin Station will return to the Ready for Wafer state.
5) If the system is set to Slot to Slot mode AND the Output Lifter was in the up position waiting for the wafer in the Spin Station:
    a. Press the Output Wafer Recovery button.
    b. Press Delete.
    c. The Output Lifter will move under the cassette and wait for the next wafer slot ID.
6) Press Running and Continuous mode to continue process cycle.

Lost Wafer in Multiple Stations (ex. Spin and Brush 2)

1) Begin Recovery in the right most station (Spin) following the procedure for Spin Station recovery.
2) Press the Spin Wafer Recovery Button.
3) Press Delete.
4) Exit the Wafer Recovery screen.
5) The Spin Station will return to the Ready for Wafer state.
6) If the system is set to Slot to Slot mode AND the Output Lifter was in the up position waiting for the wafer in the Spin Station:
    a. Press the Output Wafer Recovery button.
    b. Press Delete.
    c. The Output Lifter will move under the cassette and wait for the next wafer slot ID.
7) Press the Brush #2 Wafer Recovery Button.
8) Press Delete.
9) Exit the Wafer Recovery screen.
10) The Brush Station will return to the Ready for Wafer state.
11) If necessary, press Running and Continuous mode to continue process cycle.

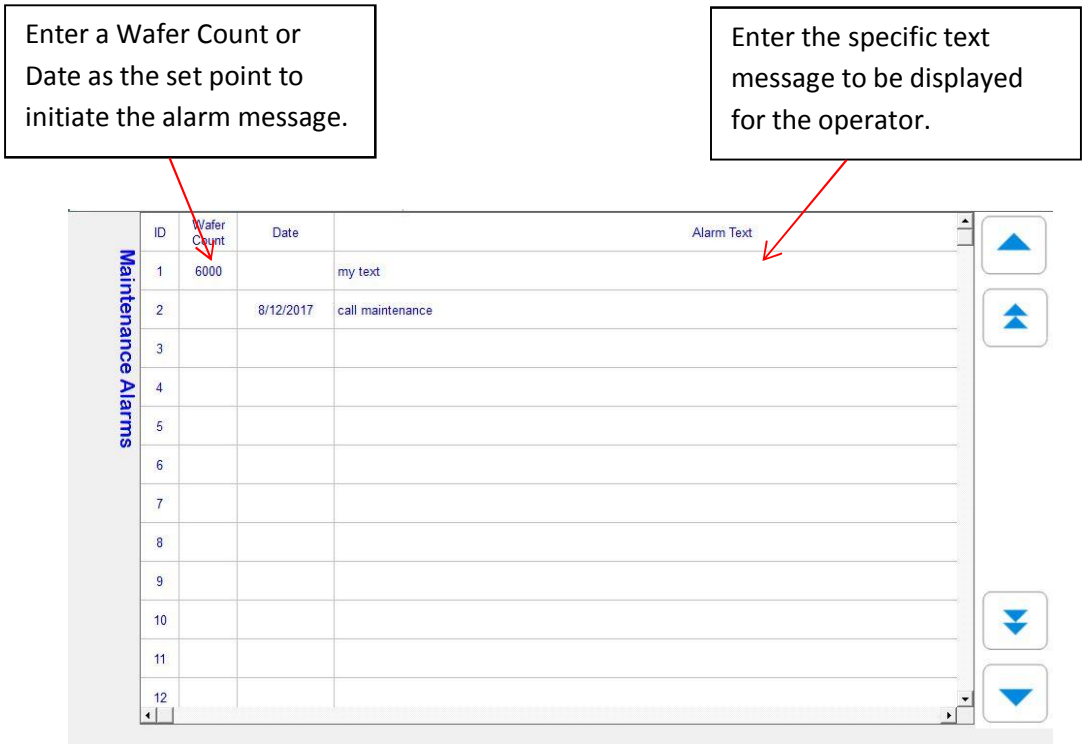
4.2.3. System Status

Simply returns the operation buttons to the bottom of the screen.

4.3. Maintenance Menus

4.3.1. Alarms Maintenance

Alarms Maintenance provides users with ability to assign specific alarms to a wafer count or a date. For example, if a brush change should occur every 3 months or 30,000 wafers, select the Wafer Count or Date field and enter the desired number. Enter the alarm text in the corresponding row to provide the operator with information regarding the specific alarm. Once the set point is reached a message will be displayed on the System Status screen but will not halt equipment operation. The message can only be cleared if someone with access to the Alarms Maintenance screen resets the set point.



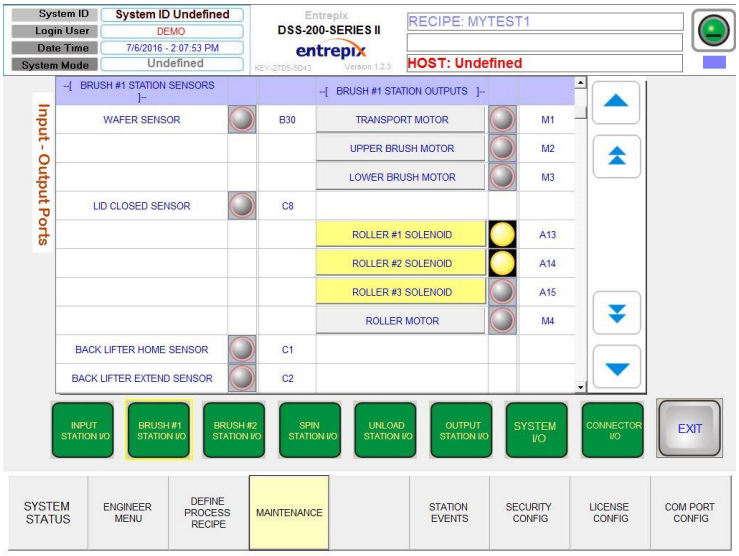
4.3.2. Setup

Setup Menu buttons allow trained personnel to Teach set points and execute non-interlocked macros for resolving maintenance issues.

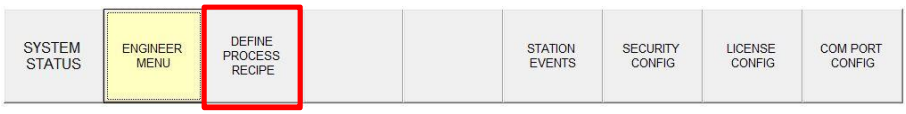
Action Button	Description
Megasonic Setup	Not Implemented at this release.
Maintenance Commands	Provides a list of non-interlocked macros that can be used by trained personnel for system setup, recovery, or maintenance.
Teach Offsets	Used to maintain the offsets used for processing wafers.
Wafer Hander Functions	Presently the same screen as Maintenance Commands.
System Commands	Not implemented at this release.
Gem Configuration	Not implemented at this release. GEM configuration settings are set in a configuration file in the root directory.
Clear Wafer Counter	Will reset the current system wafer count to 0.

4.3.3.I\O View

Provides users with visual feedback on the state of various input and output signals. Motor speed can also be turned on and off from these screens.



4.4. Engineer Menu\Define Process



4.4.1. Create, Edit, or Delete a Process

Action Button	Description
New Process	Creates a new process recipe from a template. Enter the name of the recipe in the black colored Process Name: field on top of the screen, enter parameters and press Save when complete.
Open A Process	Opens an existing process for editing.
Save	Saves the currently displayed process parameters.
Save as New Process Name	Save the displayed process but with a new name. After pressing this button a keyboard will display prompting for the new name.
Delete Process	Opens a selection box and allows users to delete selected process recipes.

4.4.2. Brush Box Process Description

Not all parameters shown are available in every system.

PROCESS RECIPE BRUSH 2				Process Name:					
ENTRANCE SPRAY	1	DRIP CHEM	0	DRIP TIME	0.0	EVENTS	#1	#2	#3
EXIT SPRAY	1	IDLE START TIME	0	DRIP WAFER COUNT	0	NH4OH	1	0	0
DOSE DI HI FLOW	0	IDLE OFF TIME	0	IDLE SPEED	40	DI HI FLOW	0	0	0
PROCESS TIMEOUT	0.0	IDLE CHEM	0	IDLE TIMER	0.0	EDGE CLEAN	0	0	0
FLUSH DURATION	0.0	IDLE DI LOW FLOW	0	BR CLN ON TIME	0.0	EVENT TIME	5.0	0.0	0.0
ALARM BRUSH MODE	0	IDLE DI HIGH FLOW	0	BR CLN OFF TIME	0.0	ROLLER SPEED	40	0	0
BRUSH HEIGHT	2.5	DRIP DI LOW FLOW	0			BRUSH SPEED	139	0	0
CYCLE TRANSPORT	0	DRIP DI HIGH FLOW	0						
		DOSE DI LOW FLOW	0	DOSE MODE	0				
FLAT FINDER SPEED	0.0	DOSE IDLE TIME	0.0	DOSE TIME	0.0	DI LOW FLOW	1	1	1

Parameter	Description
Entrance Spray	Toggles on or off the Entrance Spray for Brush Box 1. A setting of 1 will enable the spray while the wafer is transferred into the Brush Box.
Exit Spray	Toggles on or off the Entrance Spray for Brush Box 1 and 2. A setting of 1 will enable the spray while the wafer is transferred out of the Brush Box.
Dose DI High Flow	When is set to 1 the DI High Flow valve will be opened while Dosing is active. Brush dosing continues for the time set in the Dose Time.
Process Timeout	Process Timeout and Flush Duration work together. Process Timeout is a programmable timeout alarm (Alarm #158) for Brush Station #1. Once the Brush Station completes the process cycle the timer begins to count down. If the Process Timeout value is reached then the Alarm will be posted and the flush initiated. If Alarm Brush Mode is also set to 1 then the Brushes will be lifted off of the wafer surface. To disable this function set the Process Timeout to 0.
Flush Duration	Process Timeout and Flush Duration work together. Flush Duration controls the amount of time DI High Flow will be on to flush the brush/wafer once the Process Timeout has expired. Enter 0 to disable this function.
Alarm Brush Mode	A value of 1 will cause the brushes to be raised off the wafer surface if an alarm is posted in the Brush Station. A value of 0 disables this function. This function is recommended for acid systems only.

Parameter	Description
Brush Height	The distance between the upper and lower brushes. The value reflects the distance the upper brush will move downwards toward the fixed bottom brush. The upper most position of the Upper Brush is 0.0 mm. A value of 1 mm would move the Upper Brush downwards 1 mm. A larger value increases the pressure on the wafer. Range is 0-5 mm.
Cycle Transport	Every 15 minutes that the Brush Stations are idle the transport belts will cycle for 10 seconds in order to keep the orings from developing a “memory” or flat spots. A value of 1 will enable, 0 will disable.
Flat Finder Speed	Brush 2 only. A value greater than 0 will enable the flat finder function which takes place after the last process step in Brush 2. The wafer will rotate at the selected RPM value until the Flat Finder Sensor detects the flat. Once the flat is detected the wafer is released into the Spin Station.
Drip Chem	Once the number of wafers in the Drip Wafer Count field is reached, processing halts and the Drip Chem flow turns ON/OFF so that the brushes can be cleaned. Brush cleaning continues for the time set in the Drip Time field.
Idle Start (On) Time	Sets the length of time that the chemistry flow is open to the brushes during idle cleaning.
Idle Off Time	Defines the time intervals that the chemistry flow is closed to the brush during idle cleaning.
Idle Chem	When enabled (set to 1) the chemistry will be dispensed during the Idle Start (On) Time. This is not advised when using Hi Toxic chemistries, such as acid, but only with Lo Toxic cleaning chemistry such as NH4OH.
Idle DI Low Flow	When enabled (set to 1) the Low Flow valve will be closed, restricting DI Water to the Brushes during the Idle Start (On) Time. When used with the Idle Chem setting and the Low Flow valve is closed the chemistry is not as diluted before entering the brushes.
Idle DI Hi Flow	When enabled (set to 1) the Hi Flow valve will be open allowing a larger volume of DI Water to the Brushes during the Idle Start (On) Time. When used with the Idle Chem setting the chemistry is diluted before entering the brushes.
Drip DI Low Flow	When enabled (set to 1) once the number of wafers in the Drip Wafer Count field is reached, processing halts, and the Low Flow valve turns ON (closing the valve) so that the brushes can be cleaned. When used with the Drip Chem setting and the Low Flow valve is closed the chemistry is not as diluted before entering the brushes. Brush cleaning continues for the time set in the Drip Time field.

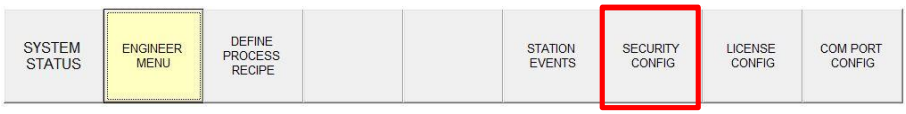
Parameter	Description
Drip DI High Flow	When enabled (set to 1) the Hi Flow valve will be open allowing a larger volume of DI Water to the Brushes during the Drip Time. When used with the Drip Chem setting the chemistry is diluted before entering the brushes.
Dose DI Low Flow	When enabled (set to 1) once Dosing is started, processing halts, and the Low Flow valve turns ON (closing the valve) so that the brushes can be cleaned. When used with the Dose Chem setting and the Low Flow valve is closed the chemistry is not as diluted before entering the brushes. Brush cleaning continues for the time set in the Dose Time field.
Dose Idle Time	Defines the system idle time allowed before the Brush Station brushes require an initial dose of chemical to prepare them for processing an incoming wafer. Works with the Dose Mode field and is only enabled when Dose Mode is set to "1st Wafer".
Drip Time	Defines the length of time that processing is halted for the brush clean procedure. During this time chemistry drips onto the top brush. This time is initiated when the Drip Wafer Count is reaches 0.
Drip Wafer Count	Sets the number of wafers that pass through the Brush Station before processing is halted so the brushes can be cleaned. The feature is designed for use on product that cannot use chemistry. The purpose is to allow the brushes to be cleaned will not dispensing water on the product wafer.
Idle Speed	Sets the speed at which the Brushes will rotate when the system is Idle to prevent water from building up on only one side of the PVA brush. 40 RPM is standard.
Idle Timer	Sets the time that elapses before the brush cleaning cycle begins. Set 0 to disable.
Brush Clean On Time	Sets the length of time that the brush cleaning process is on. When the process is on chemistry flows through the brushes and Hi and Low flow valves are operated according to the setting in the Idle DI Hi Flow and Idle DI Low Flow fields.
Brush Clean Off Time	Sets the length of time that the brush cleaning process is off. When the process is off chemistry valves are closed, Hi Flow valve is closed, and the Low Flow valve returns to the state of the valve defined in the last step of the current recipe that was used.

Parameter	Description
Dose Mode	The 1st Wafer selection enables the Dose Idle Time and Dose Time variables for the first wafer only. A wafer will be considered the 1st Wafer if the system has been idle for a period longer than the value set in Dose Idle Time. A small value set in Dose Idle Time can create a situation in which all wafers are the 1st Wafer. The All Wafers selection enables the Dose Time variables for all wafers.
Dose Time	Defines the length of time that the Dose settings are applied.
NH4OH (Chemical)	This field name is configurable. Press on the existing name and the keyboard will appear allowing users to change the name to any chemistry preferred. A value of 1 for this parameter will request the chemistry be dispensed for the length of the Event Time.
DI Hi Flow	For systems with the Hi Flow installed a value of 1 for this parameter will enable a higher volume of DI Water to be dispensed through the brushes for the length of time set in the Event Time field.
Edge Clean	For systems with Edge Clean installed a value of 1 will enable the Edge Clean spray nozzles for the length of time set in the Event Time field.
Event Time	Defines the length of the Event Step.
Roller Speed	Defines the speed at which the wafer will rotate for the current Event Step.
Brush Speed	Defines the speed at which the brushes will rotate for the current Event Step.
DI Low Flow	For systems with the Lo Flow installed a value of 1 for this parameter will turn off DI water to the brushes for the length of time set in the Event Time field. If Hi Flow is set to 0 and Low Flow is set to 1 there will be no water to the brushes during the current recipe step. **Note:** If Low Flow is set to 1 in the final step of the recipe there will be no water flowing to the brushes while the system is idle unless the Idle parameters are enabled. This method allows for water conservation during idle periods on systems equipped with the Low Flow valves.

4.4.3.Spin Process Description

Parameter	Description
Upper Rinse	Enables the Upper Spray Rinse valves for the length of time defined in the Time field.
Lower Rinse	Enables the Upper Spray Rinse valves for the length of time defined in the Time field.
N2 Blow Off	Positions the blowoff arm and enables the N2 blow off valves for the length of time defined in the Time Field.
Heat Lamp	Enables the Heat Lamp for the length of time defined in the Time field.
Megasonic Generator	Enables the Megasonic Generator for the length of time defined in the Time field. Works with the Megasonic Sweeps and Seconds\Sweep fields.
Time (sec)	Defines the length of time for the current Event step.
Speed (RPM)	Defines the speed at which the spindle will rotate for the current event step. Maximum recommended speed is 1800 RPM.
Megasonic Sweeps	Defines the number of times the Megasonic Nozzle will sweep across the radius of the wafer. Works with Seconds\Sweep.
Seconds\Sweep	Enter a value in seconds which will determine the speed at which the Megasonic Nozzle sweeps across the radius of the wafer.

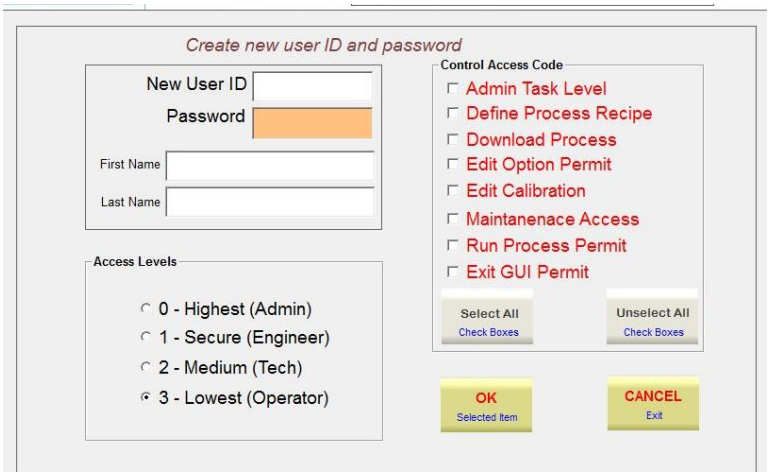
4.5. Engineer Menu\Security Config



4.5.1.Create, Edit, Delete Users

Button	Description
Create New User	Displays a New User Entry profile screen.
Change Use Info	Opens the profile for the selected user.
Delete User	Removes the user profile from the system.
Import User Data File	Imports the list of user profiles from external media.
Export User Data File	Exports the list of user profiles to external media.

4.5.2.User Security Profile Setup Screen



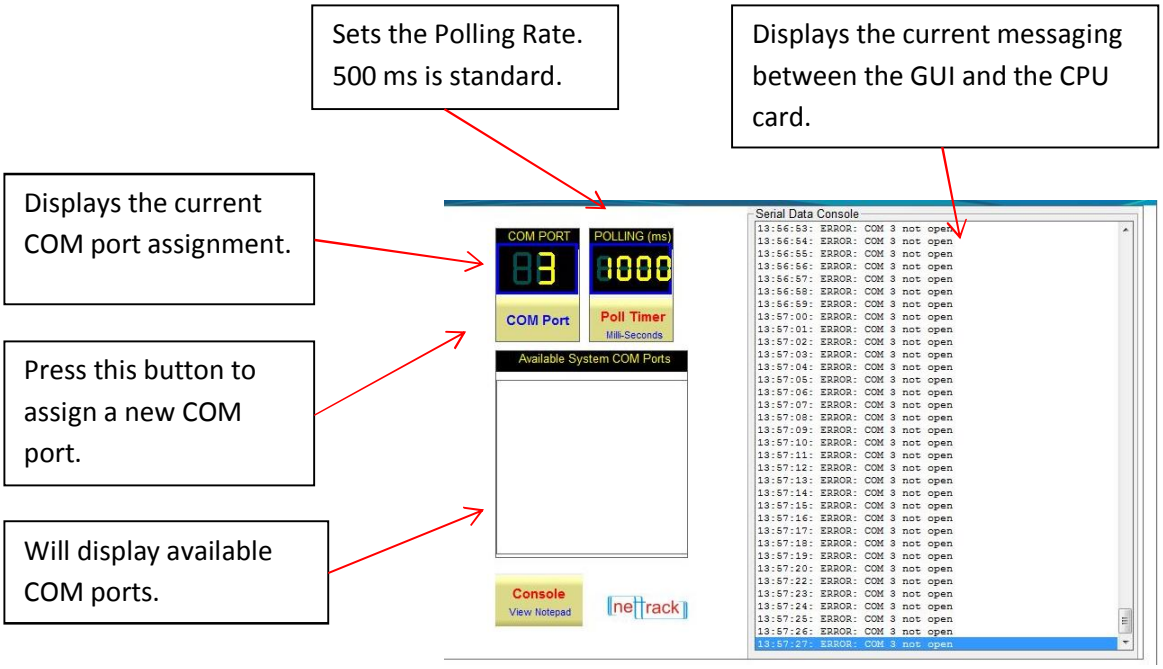
Parameter	Description
New User ID	ID for use when logging into the UI.
Password	Password for use when logging into the UI.
First Name	Optional first name of the user ID.
Last Name	Optional last name of the user ID.
Access Levels	Not implemented at this time.
Admin Task Level	A check indicates administrative rights for the user.
Define Process Recipe	A check indicates the user can modify process recipes.
Download Process	A check indicates the user can select and change the process.
Edit Option Permit	A check indicates the user can modify system options.
Edit Calibration	A check indicates the user can change calibration date.
Maintenance Access	A check indicates the user can access the maintenance screen. This includes non-interlocked wafer handling macro screens.
Run Process Permit	A check indicates the user can cycle wafers.
Exit GUI Permit	A check indicates the user can exit the GUI and access the Windows directories and files.

4.6. Engineering Menu\License Config

4.6.1.This screen is for use by Factory Engineers to update licensing files. If there are license issues contact Entrepix service personnel.

4.7. Engineering Menu\Com Port Config

4.7.1. This screen is used to set the com port that the UI uses to communicate with the CPU card in the electrical cabinet. As Windows may reassign a com port if a USB cable is removed use this screen to select the new port.



5. Appendix

5.1. **A1 - Touch Screen Calibration**

5.1.1. To calibrate the touchscreen exit the GUI to the Windows Desktop.

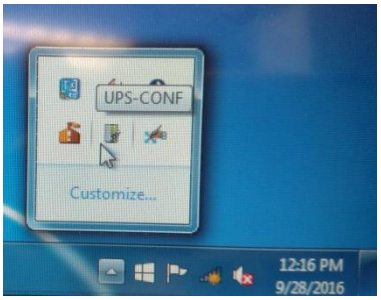
5.1.2. Press the ELO Config Shortcut.

5.1.3. Press the Align Elo Touch Monitors button and follow the on-screen prompts.

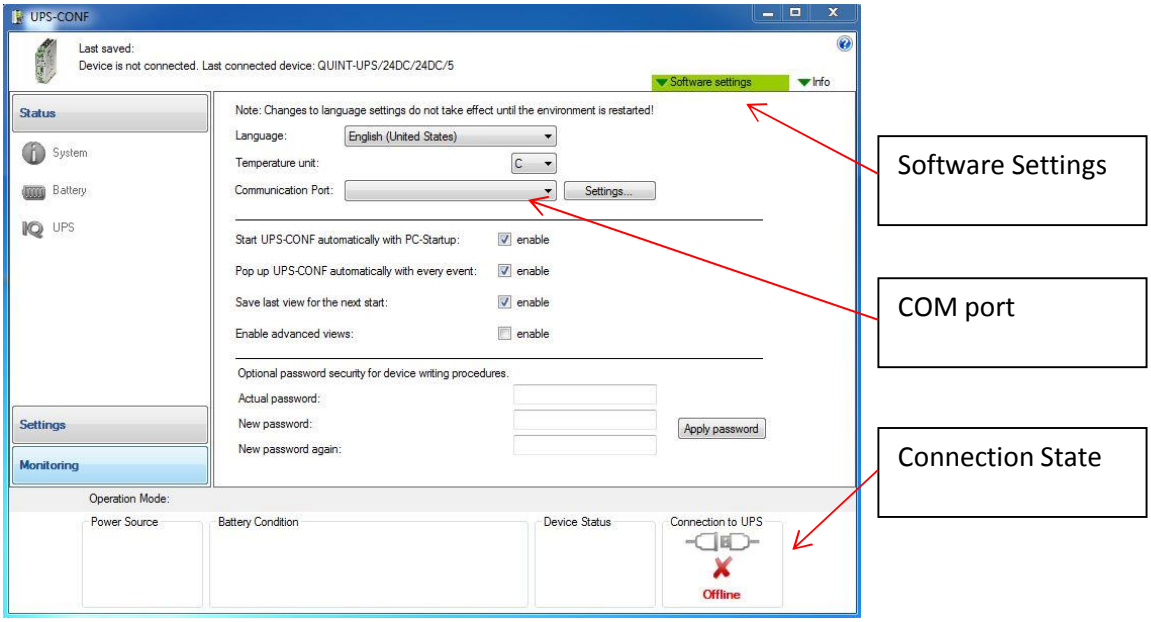
5.2. **A2 – UPS Software Configuration**

5.2.1. To setup the UPS software exit the GUI to the Windows Desktop.

5.2.2. From the Windows Task bar select the UPS-CONF icon.



5.2.3. After the UPS configuration software has opened select the software settings drop down. Select the COM port for the UPS. If the correct COM port is selected the Connection State should change from Offline to Online.



5.2.4. Select the Settings Menu and enable the Time Based Shut Down Delay. Set the delay to 15 minutes.