LC TECHNOLOGY SOLUTIONS INC.
2C Fanaras Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
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LC-1 Stand Alone Glovebox with Touch Screen

Operation/Installation Manual

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Table of Contents

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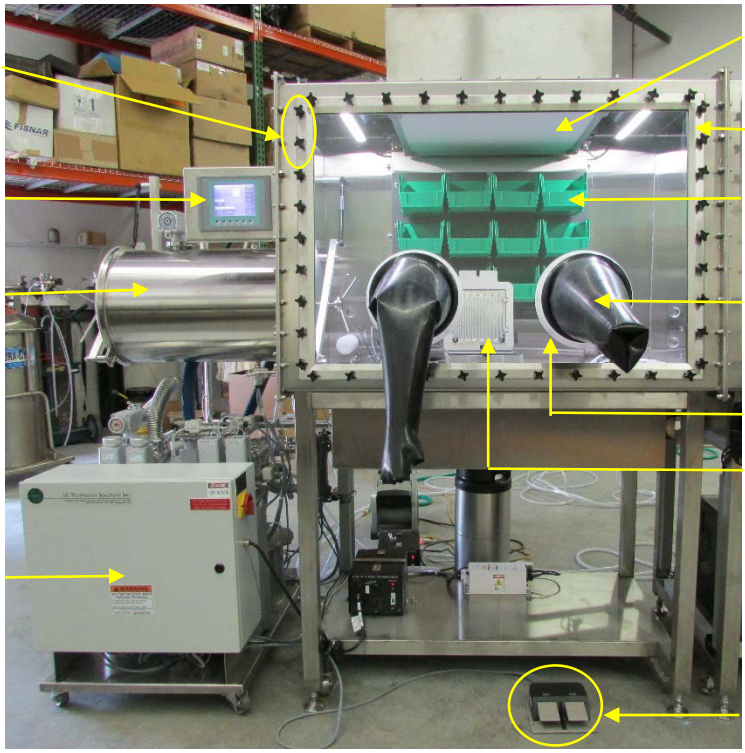
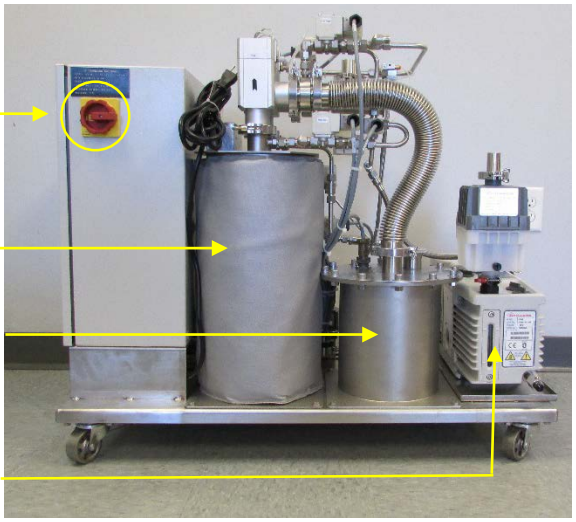
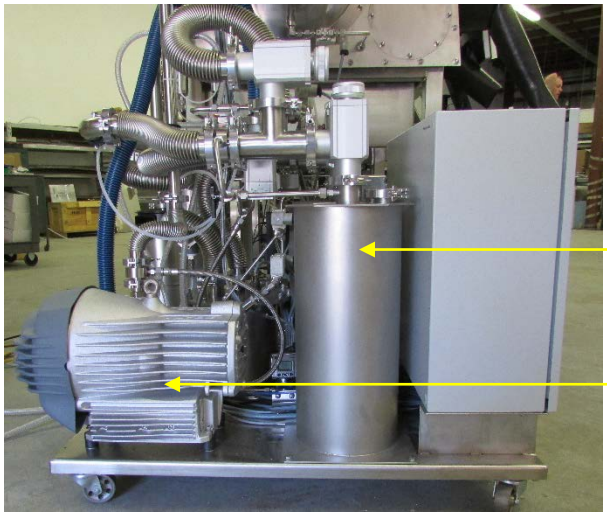
LC-1 Stand Alone Glovebox with Touch Screen Operation Manual

Section 1: System Overview



Gas Purification System





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PLC Control Panel

The Project Number is located on a sticker on the back of your system. Please have this number available when calling for service information.

Section 2: Caution / Warning Information

1. Glovebox system is heavy. Use a fork lift to remove from pallet upon arrival, if available.
2. Make sure inert gas is regulated at 60-80 psi.
3. Make sure regeneration gas is regulated at 15 psi.
4. Common vent line should be vented.
5. It is very important to not run out of gas during purging of the glovebox.
6. Do not over tighten antechamber door handles.
7. Regeneration cycle times are critical to the system running properly. Do not change these settings.
8. Over / under pressure alarms in the system are dangerous and caution should be taken not to reach them.
9. Do not open glovebox with inert gas on.
10. Low oxygen hazard inside glovebox.
11. Make sure glovebox is well ventilated before entering.

Section 3: System Arrival

3.1 Disassembly of Crate

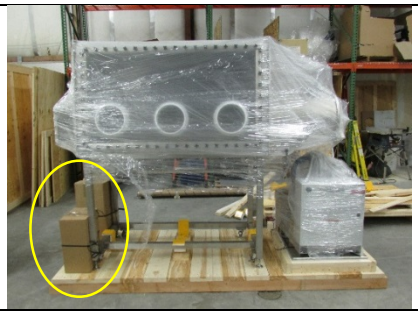
1. System will arrive in a crate.
2. Remove crate panels in the following order.

   a. Top panel
   b. Shipping braces, if applicable
   c. Large left & right panels
   d. Small front & back panels

3. Use a cordless drill with a Phillips head driver bit to remove screws.

4. This is how the system will look inside the crate.

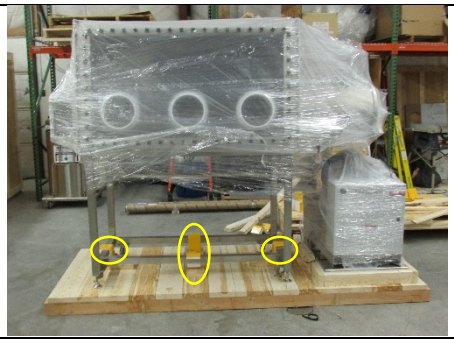
3.2 Remove Loose Parts



1. Cut banding straps and remove boxes containing loose parts for glovebox system.

2. Parts will come packed in bubble wrap. Remove bubble wrap.

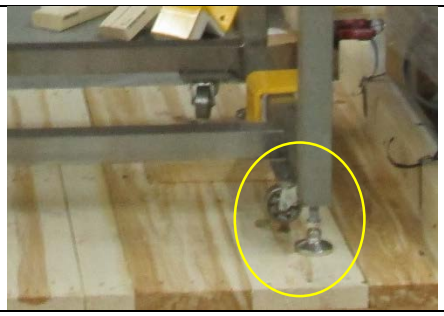
3.3 Remove System from Crate



1. Once sides are off, unbolt lag bolts from Z-brackets using a ¾" wrench.

   OR

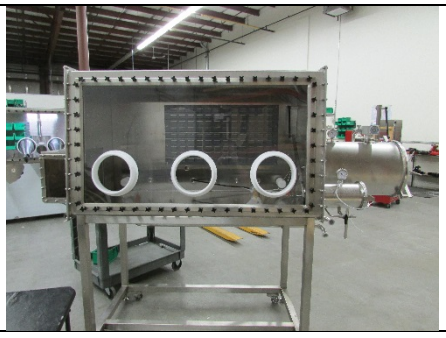
   Remove shipping braces with phillips head screw driver.



2. Lower stand onto its wheels by adjusting leveling feet with wrench.

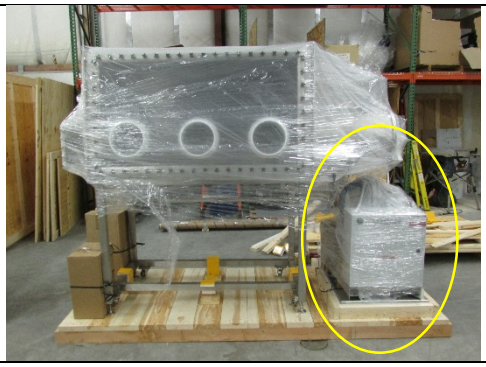
3. Remove system from crate.

   CAUTION: System is heavy. Use a fork lift to remove from pallet, if available.



4. Carefully remove shrink wrap.

3.4 Remove Gas Purifier Cart



1. Remove/cut banding straps.
2. Unscrew 2x4's holding purifier in place. Use a cordless drill with a phillips head driver bit to remove screws.

3. Remove purifier from crate. Use a fork lift to remove from pallet, if available.

4. Carefully remove shrink wrap.

Section 4: Assembly

4.1 Matching Labels

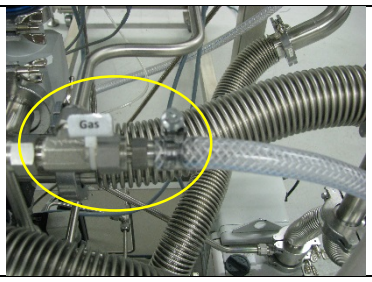
1. Various components of the glovebox will need to be attached to the system. These components have been number labeled to show connection points. Match corresponding numbers (i.e. 1 to 1, 2 to 2, and so on).

   See examples to the left.

Section 5: Hook Up Gas / Power

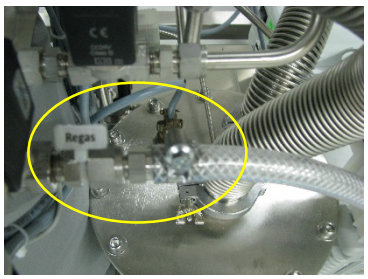
5.1 Gas Connections

System will be supplied with reinforced 3/8" Tygon tubing already attached to the gas purifier.



1. Find the tube labeled Gas and connect this tube to your inert gas (nitrogen or argon) supply.

   NOTE: The ⅜" Tygon tube should be connected to inert gas at 60-80 psi.



2. Find the tube labeled Regas and connect this tube to your regeneration gas supply.

   NOTE: The ⅜" Tygon tube should be connected to regeneration gas at 15 psi.

   Regeneration gas consists of 3-5% hydrogen, balance is nitrogen or argon.

   Regeneration gas flow rate is 15 liters per minute.

5.1 Power Connections

1. System will have 115V/220V power cord coming from the back of the purifier.
2. Plug cord into a standard 115V, 15 Amp outlet or standard 220V outlet for international use.

Electrical Feedthroughs:

US locations plug electrical feedthrough into 115V power supply.

International locations plug electrical feedthrough into 220V power supply.

Vacuum Pump:

LCPW Gloveboxes and gloveboxes with an RGP-050 Gas Purifier: plug the vacuum pump into a standard power outlet.

LC-1 Gloveboxes with an RGP-1 Gas Purifier come prewired into the glovebox system.

Section 6: Venting

Common Vent Line:

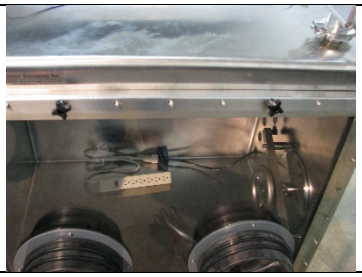
Systems will come with a common vent line. All items on the system will be plumbed to this common vent line. This vent line will have a 1 ½" diameter connection point.

NOTE: It is recommended that this line be vented.

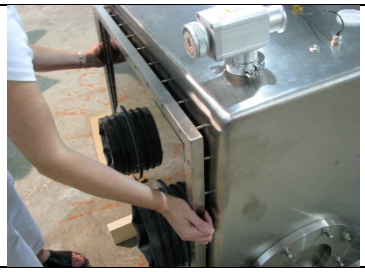
Section 7: Window Removal

NOTE: The window can be removed for placing equipment in the glovebox that is too big to be brought in through the antechamber.

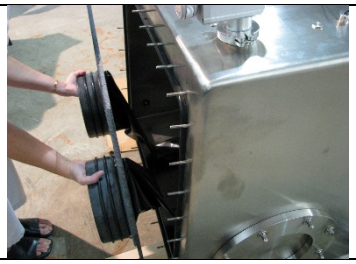
1. Undo all star knobs with the exception of two (2) at the top and two (2) at the bottom.



2. Remove the remaining star knobs being careful not to let the window and window frame fall.

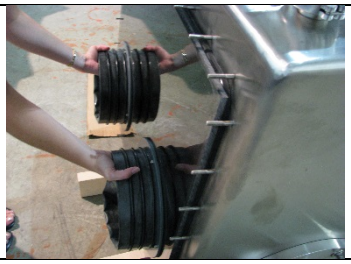


3. Remove the window frame and set aside.

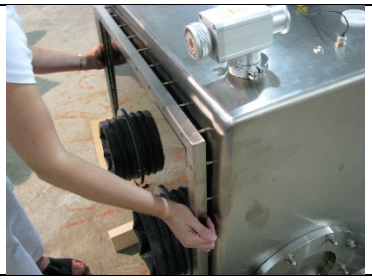


4. Remove window and complete required work.

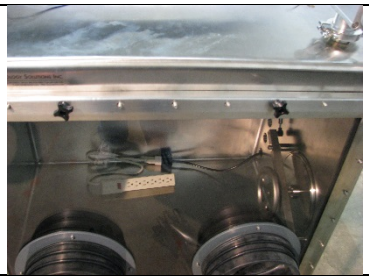
Section 8: Window Replacement



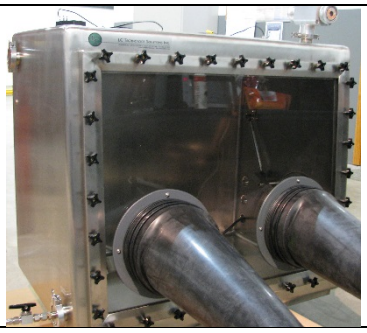
1. Place window on bottom window studs and push window forward into position against gasket.



2. Replace window frame.

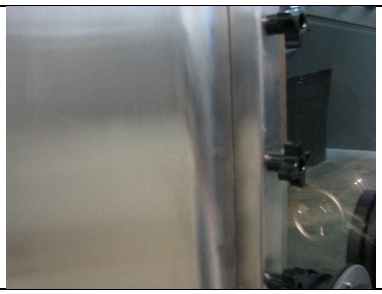


3. Replace top two (2) and bottom two (2) star knobs.



4. Replace remaining star knobs.

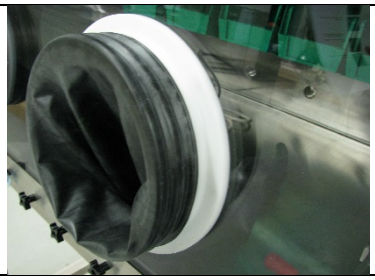
   NOTE: Do not tighten until all knobs have been started.



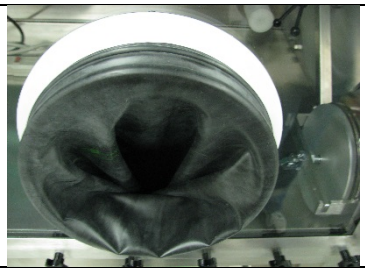
5. Tighten star knobs until window frame contacts glovebox.

Section 9: Glove Attachment

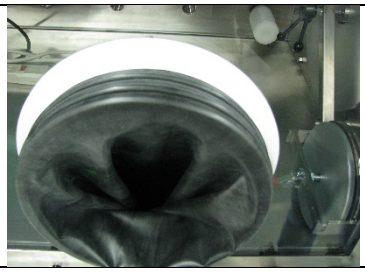
1. Place glove onto glove port.



2. Place hand in glove and align glove hand in a comfortable position with thumbs facing in an upward position.
3. Move the glove forward until it meets the inner most glove port groove.



4. Place first glove O-ring in center glove port groove.



5. Place second glove O-ring in outer most glove port groove.

Section 10: Changing a Glove without a Glove Port Cover

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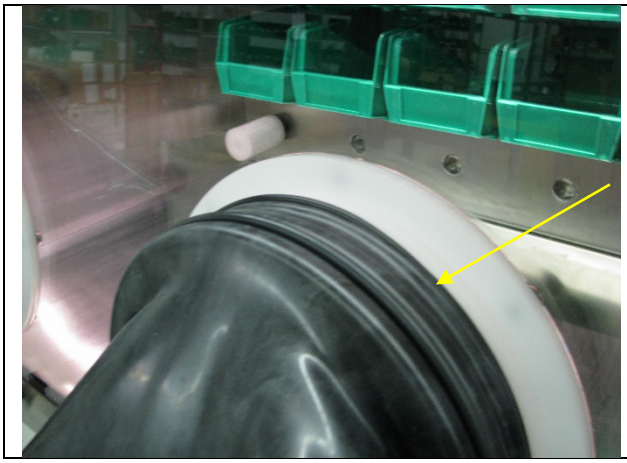
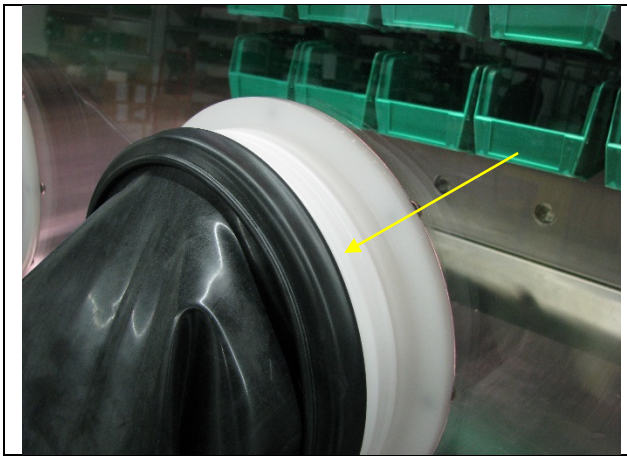
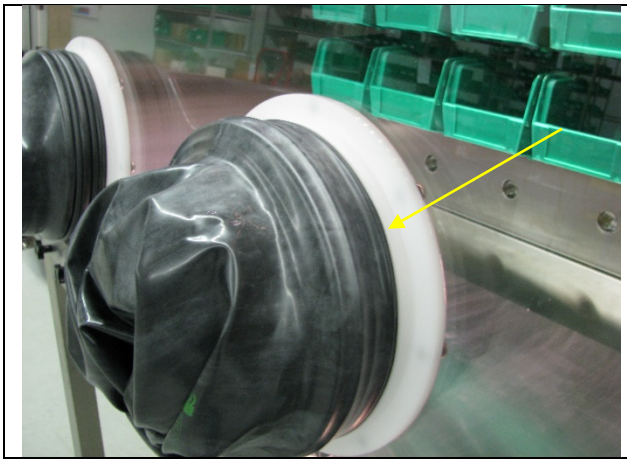
1. Remove O-ring nearest to window.



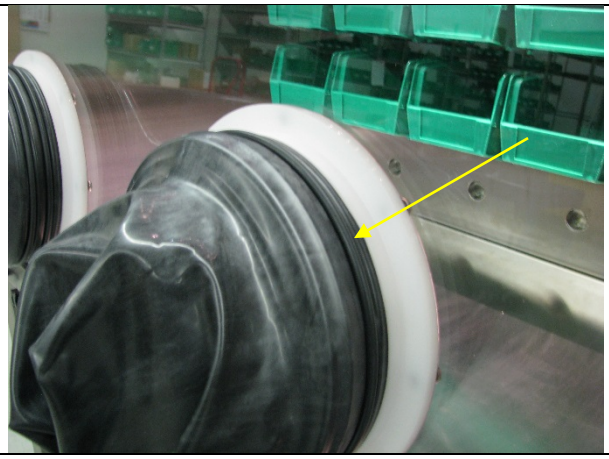
2. Glove with O-ring removed.



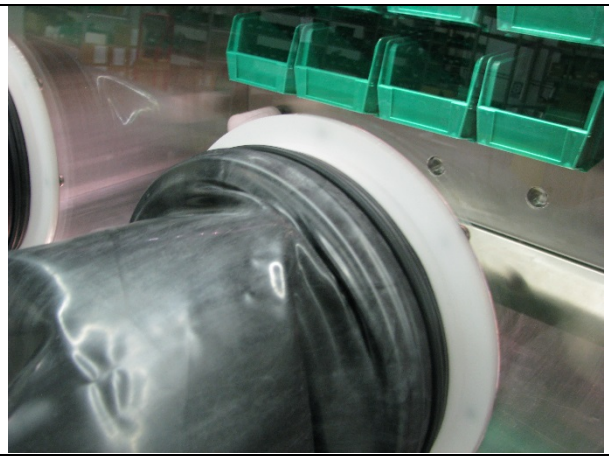
3. Fold glove back over existing O-ring as shown to the left.



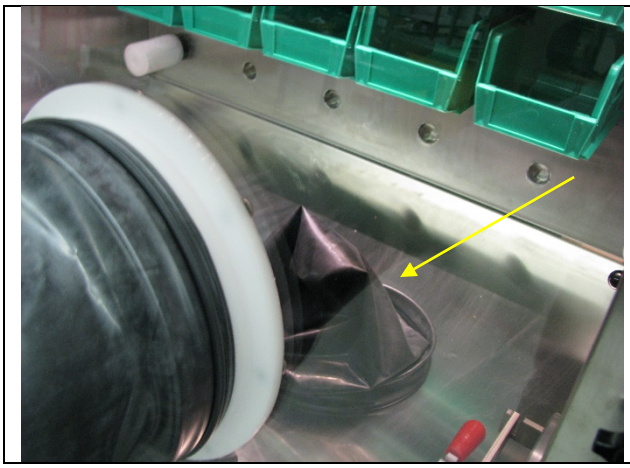
4. Place new glove over the old glove. Make sure the new glove is mounted in O-ring groove.



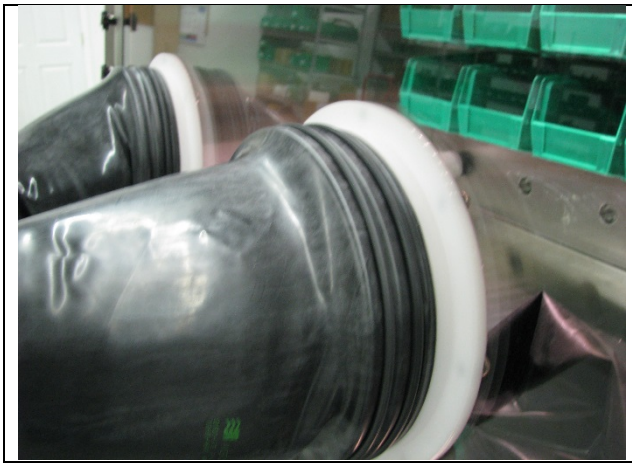
5. Replace O-ring nearest to window.



6. Reach into new glove and carefully grab folded back edge of old glove.



7. Pull folded back edge of old glove until the old glove and O-ring fall into the glovebox.



8. Reattach second O-ring and glove change is complete.

NOTE: It is recommended to have circulation off during this procedure. You will need to purge the system for ten (10) minutes after the glove change is complete. Once purge is complete circulation can be turned back on.

Section 11: Leak Checking

After assembly of glovebox system it is important to leak check the system prior to purging.

NOTE: Leak checking is an important step in making sure your glovebox functions properly.

1. Turn on power to system.

   NOTE: For LCPW gloveboxes and gloveboxes with a RGP-050 gas purifier it is necessary to turn on the vacuum pump as well.

2. To change settings refer to Section 15.1 Set Points.

3. Change Chamber Pressure Control settings to the following set points: 6.5 mBAR high and 2.0 mBAR low set points. These set points are for testing purposes only.

4. Press Return to return to Main Menu. Press Chamber Pressure Control button. ON should be displayed.

5. Gas will begin to flow into the box until the low set point is reached.

6. Using the foot pedal, press gas pedal to increase the pressure to the upper set point.

   NOTE: When the upper set point is reached the vacuum pump will turn on lowering the pressure. Let the glovebox pressure settle for a couple of minutes.

7. After the glovebox pressure has settled, time how fast pressure drops 0.1 mBAR. For a successful test the pressure should not drop more than 0.1 mBAR for three (3) minutes.

   e.g.: When the glovebox is at 2.5 mBAR it should hold between 2.4 and 2.5 mBAR for three (3) minutes.

   NOTE: If the test does not reach the above requirement go through the fittings to check for a leak or any loose fittings. Once fittings have been checked repeat test until successful.

8. After successful leak check return pressure settings to 2.5 mBAR high and 0.5 mBAR low set points.

Section 12: Purging

After successfully leak checking the glovebox it is very important to purge the room air from the system. This will ensure your system works properly.

The chart below shows the recommended purge times and gas needed for each glovebox model at start-up.

Time and Gas Required:		
Glovebox Model No.: LCPW-125	0.5 cylinder, 150 c/f	20 minutes
Glovebox Model No.: LCPW-225	1.0 cylinder, 300 c/f	40 minutes
Glovebox Model No.: LC-100	2.5 cylinder, 750 c/f	2 hours
Glovebox Model No.: LC-150	3.5 cylinder, 1050 c/f	2 hours 30 min
Glovebox Model No.: LC-180	4.0 cylinder, 1200 c/f	3 hours
Glovebox Model No.: LC-200	5.0 cylinder, 1500 c/f	3 hours 30 min

Refer to Section 12.3 Automatic Purge for detailed instructions on how to purge the glovebox.

NOTE: 240 Minutes is the maximum amount of time you can set auto purge to run.

NOTE: You should only set auto purge to 240 minutes if you are using a house supply or dewar of inert gas when purging.

NOTE: You should only set auto purge to 45 minutes if you are using cylinders of inert gas when purging.

NOTE: Nitrogen/Argon has to be 99.995% or better.

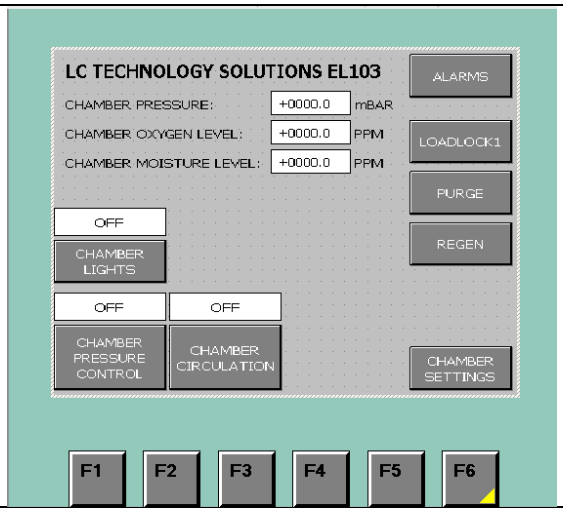
CAUTION: It is very important to not run out of gas during purging of the glovebox.

Section 13: Operational Instructions

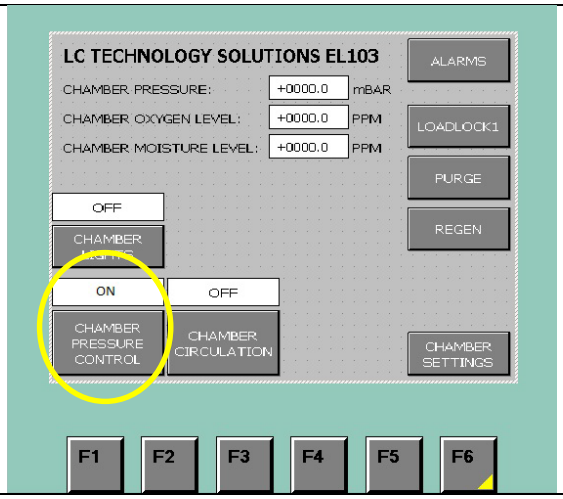
13.1 Main Screen

Chamber Pressure Control ON is the everyday operating mode for the glovebox. Chamber Pressure Control starts the pressure control function and allows for glovebox circulation.

When the system is turned on, the display will show the following screen:



This is the main screen. All glovebox functions can be accessed through this screen.



Press Chamber Pressure Control to enable pressure control and glovebox circulation.

ON will be displayed above the Chamber Pressure Control button.

13.2 Pressure Control

1. From the Main Screen enable Chamber Pressure Control.

2. To enable press Chamber Pressure Control button. ON will be displayed above the Chamber Pressure Control button.

3. Pressure settings have been preset at the factory to a low limit of 0.5 mBAR and a high limit of 2.5 mBAR.

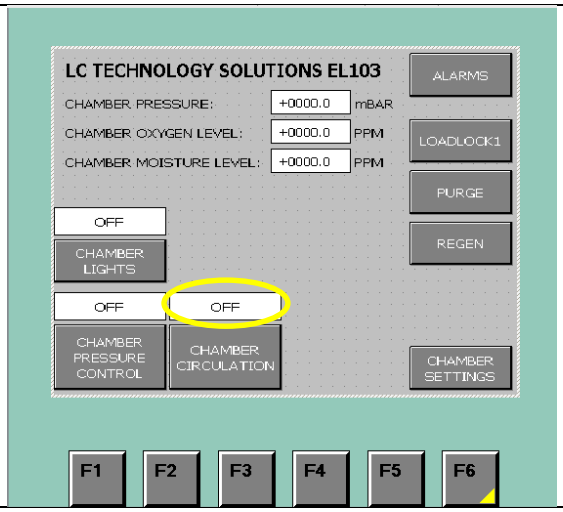
   NOTE: This is a typical pressure range for the glovebox.

4. The system has been supplied with foot pedals to help control the pressure between the high and low set points.

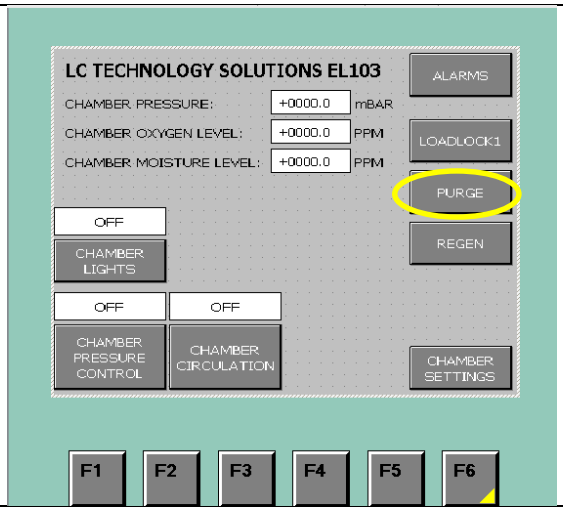
   Use the foot pedals to help control the pressure when inserting and removing hands from gloves.

13.3 Automatic Purge

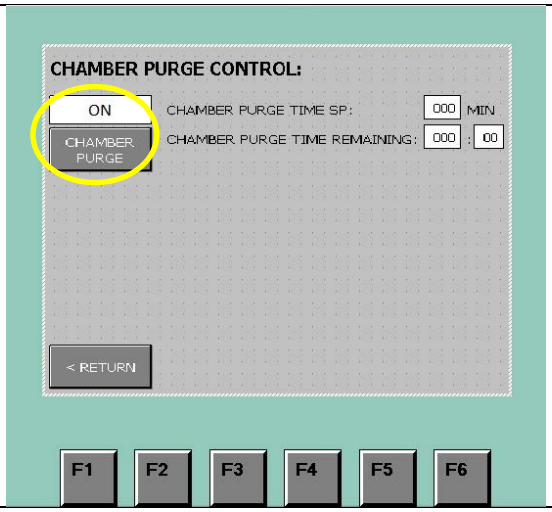
NOTE: For Manual Purge instructions refer to Section 20.



1. From the main screen verify circulation is turned OFF. If circulation is ON press Chamber Circulation button to turn circulation OFF.

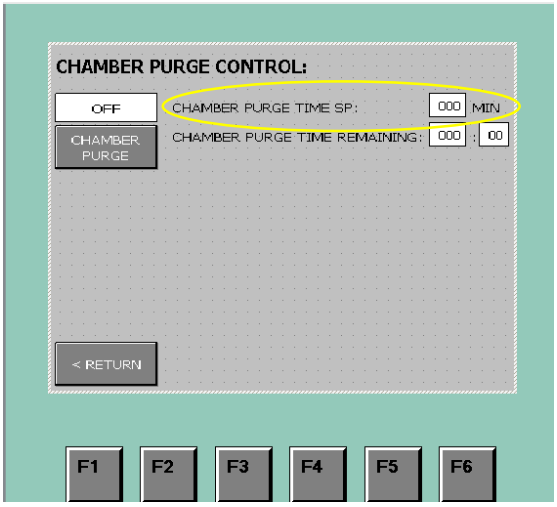


2. From the main menu press the Purge button.



3. Press the Chamber Purge button and the system will begin to purge automatically.

4. The Automatic Purge Function is controlled by time. The purge time is preset at the factory for twenty (20) minutes.

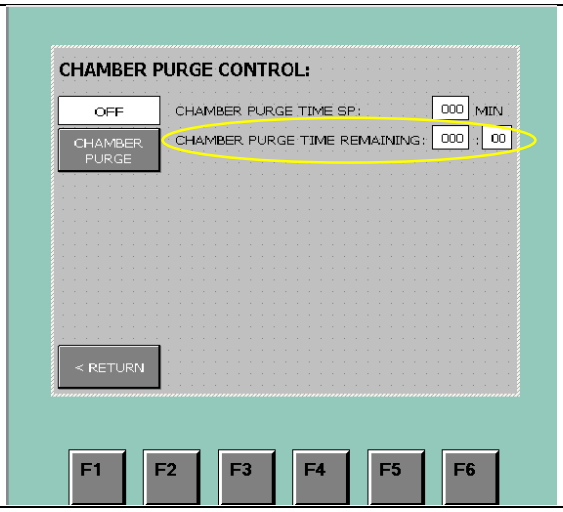


5. From the Chamber Purge Control screen check the purge time.

   To change the length of time follow these steps:
   - Press the white box to the right of Chamber Purge Time SP: MIN
   - Enter desired set point
   - Press Enter
   - Press Return

NOTE: Do not exceed (45) minutes if purging with cylinders.

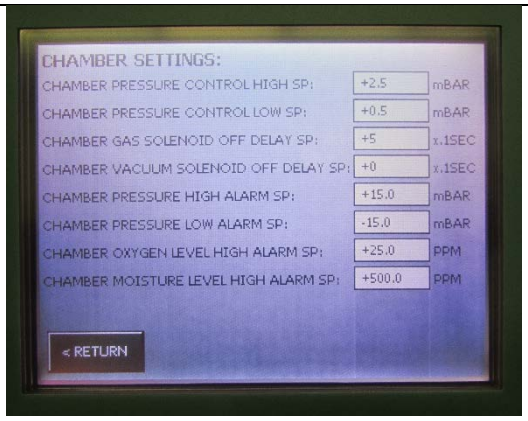
For dewars and house gas supplies refer to Section 11 for purge times.



6. Chamber Purge Time Remaining reflects the amount of time remaining in the purge cycle.

   NOTE: Once the purge cycle time ends the system will stop purging.

13.4 Automatic Purge Function Connected to Oxygen Level

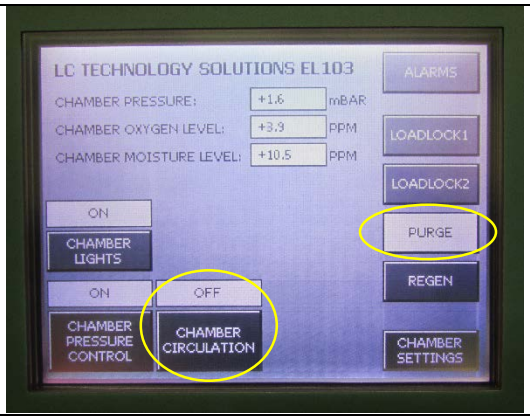


This option allows the user to set the automatic purge function to the alarm levels of the oxygen and moisture inside the glovebox. Most customers use this to automatically purge the glovebox if the oxygen level exceeds the alarm.

1. Set the desired oxygen alarm level on the setting screen.

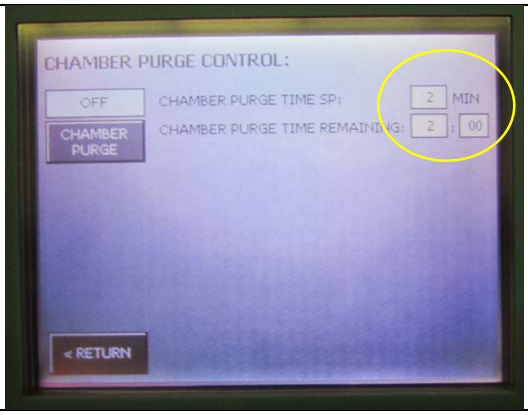
   NOTE: This is typically set to 10 ppm.

   NOTE: To deactivate this function set the alarm level to 1000 ppm.

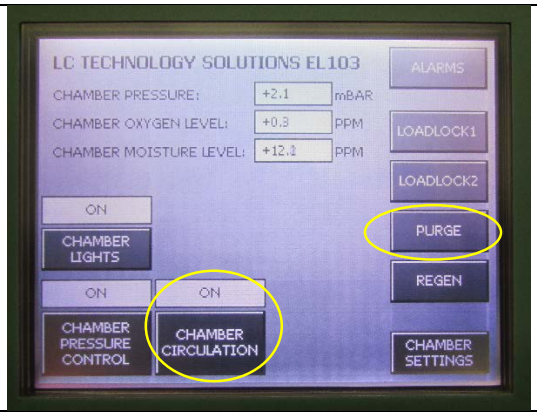


When the oxygen level reaches the alarm set point the system turns off the circulation and starts to purge the system.

It will continue to purge until the oxygen level is below the alarm set point.

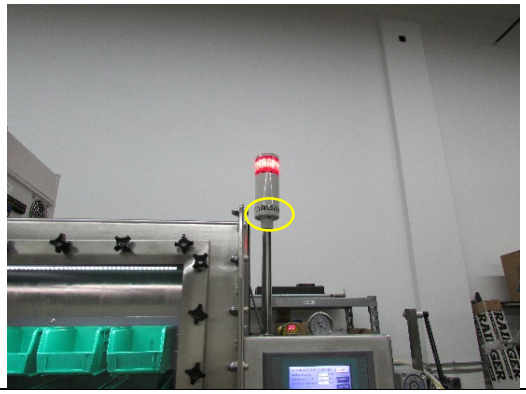


When the alarm is triggered the automatic purge will activate and run for the amount of time set on the Chamber Purge Control screen. It will continue to purge even after the alarm has cleared for the time set in this function screen.



When the purge time has elapsed the system will automatically turn circulation on and purge off.

If the alarm triggers again, it will repeat the above steps until the system is able to maintain an oxygen level below the alarm set point.

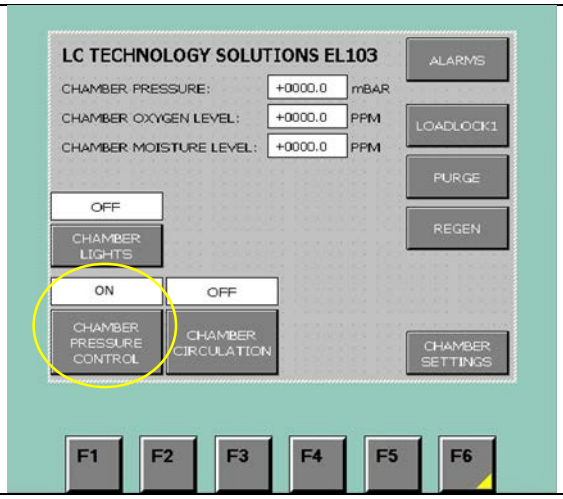


If the system was purchased with an alarm light and/or buzzer, the alarm/buzzer will trigger when the system is in an alarm state.

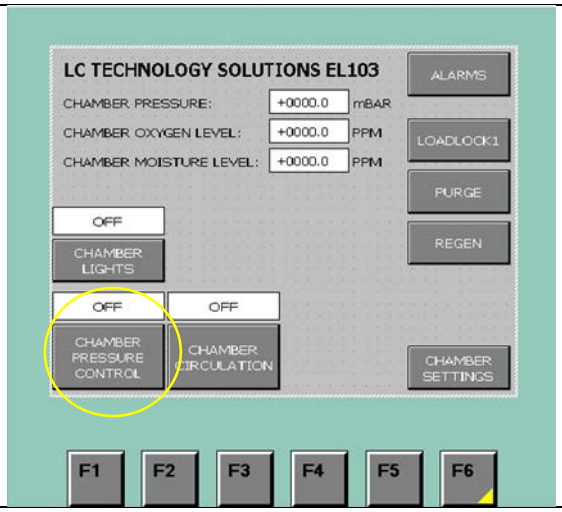
The buzzer has an adjustable volume control lever setting on the front of the light tower.

13.5 Circulation

Before turning on circulation it is very important to make sure the glovebox system has been purged properly.



1. To start circulation of the glovebox environment through the filter column, Chamber Pressure Control must be ON.
2. To begin circulation press Chamber Circulation. ON will be displayed.

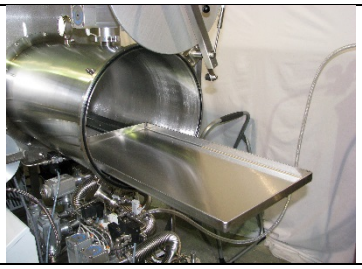


3. To turn off circulation, press Chamber Circulation. OFF will be displayed.

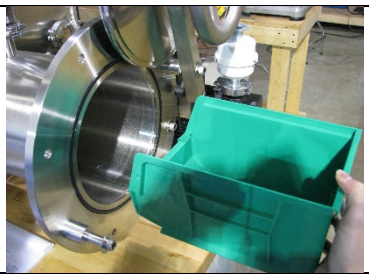
Section 14: Antechamber Operation

14.1 Bringing Items into the Glovebox

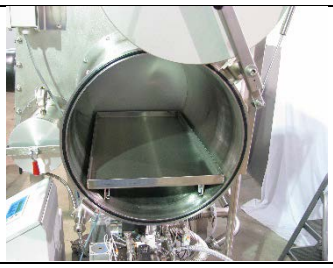
1. Open outside antechamber door.



2. Load green bin or sliding tray with desired material.

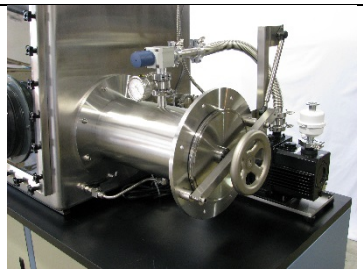


3. Place green bin inside antechamber; bin should be loaded into chamber short side first.



4. Push the bin all the way into antechamber until it touches inside antechamber door.

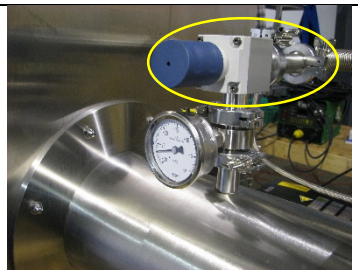
   If using a system with a sliding tray place items on tray nearest to the inside antechamber door.



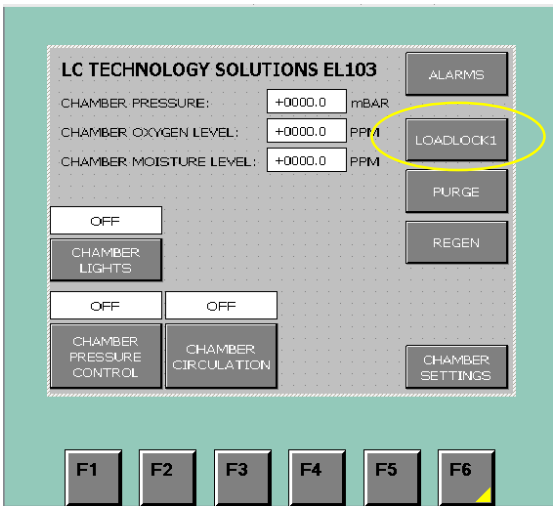
5. Close outside antechamber door.

CAUTION: Do not over tighten.

Manual Evacuation



Evacuation Hand Valve



6. For glovebox models with manual evacuation valves turn the evacuation hand valve, located on top of antechamber, to the left.

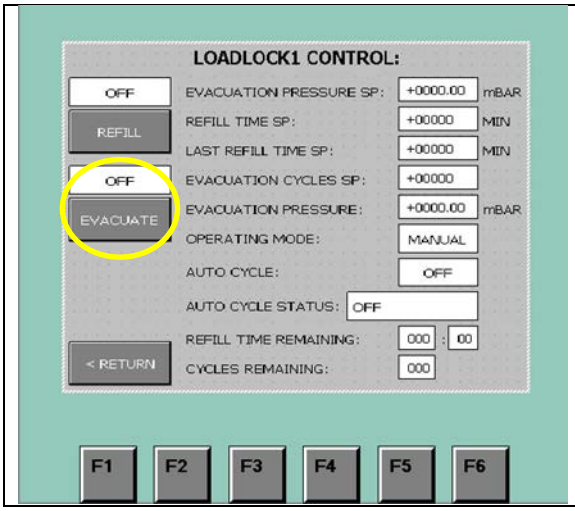
   Antechamber will begin to evacuate.

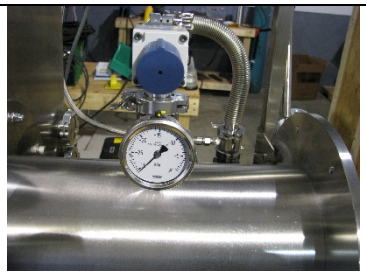
   Continue to evacuate until the vacuum gauge reads -30.

   OR

   From Main Screen press Loadlock. Loadlock Control screen will now be displayed.

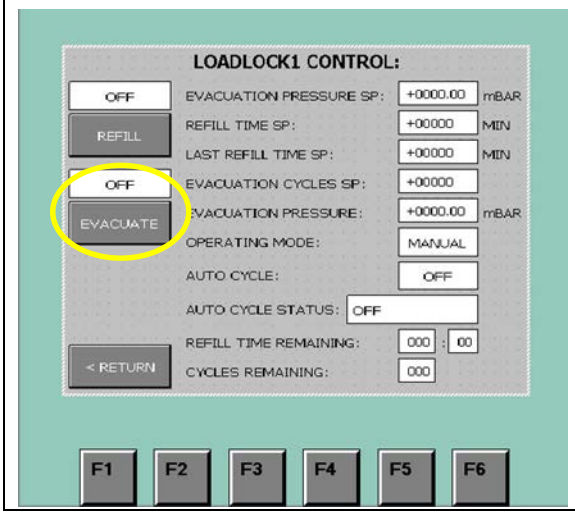
   Press the Evacuation button on glovebox systems with touch screen controls to evacuate the antechamber.





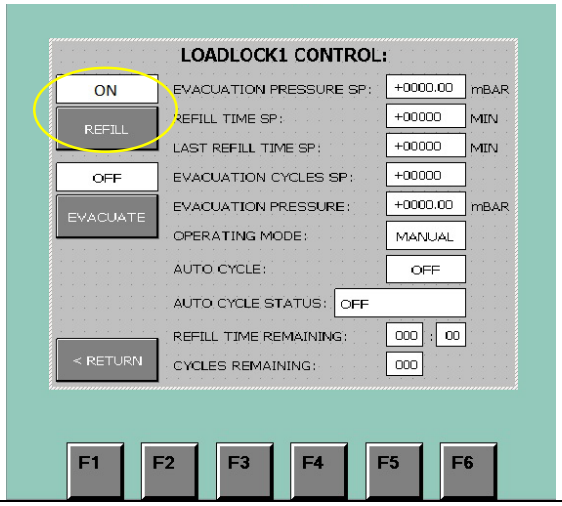
7. Close evacuation valve by turning the evacuation hand valve to the right.

OR



Push the EVAC button to stop evacuation.

Swagelok Refill Valve



8. For glovebox models with manual refill, refill antechamber using Swagelok refill valve.

   Continue to refill until the vacuum gauge reads 0.

   OR

   Press REFILL button on glovebox systems with automatic controls to begin process. Push the REFILL button to stop.

9. Repeat the above cycle two (2) more times for a total of three (3) evacuation/refill cycles.

   NOTE: Before opening the inside door make sure vacuum gauge reads zero (0) & evacuation and refill valves are closed/turned off.

10. Open inside door, remove green bin, and close antechamber door.

    NOTE: When opening the inside door, spin door handle completely until door makes contact with door arm. This is important so door does not make contact with side wall of glovebox and damage the sealing surface.

14.2 Removing Items from Glovebox

Determine whether the antechamber has room air or inert gas in it.

If inert gas follow these steps:

1. Open inside antechamber door.
2. Load green bin/tray into antechamber.
3. Close inside antechamber door.
4. Open outside antechamber door.

If room air follow these steps:

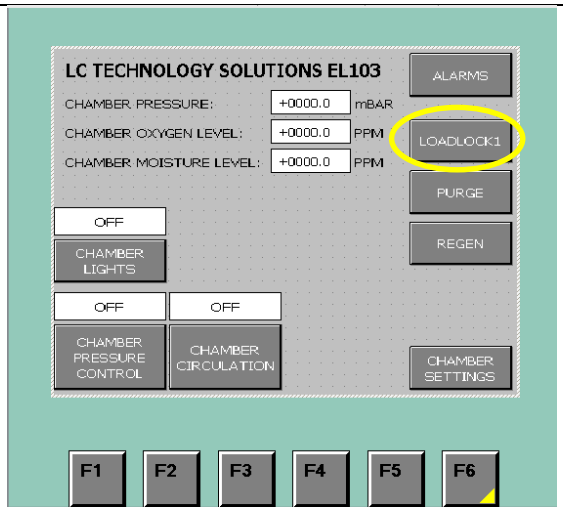
1. Evacuate and refill the antechamber three (3) times.
2. Refer to Section 13.1, Steps 6-9 for the evacuation/refill process.

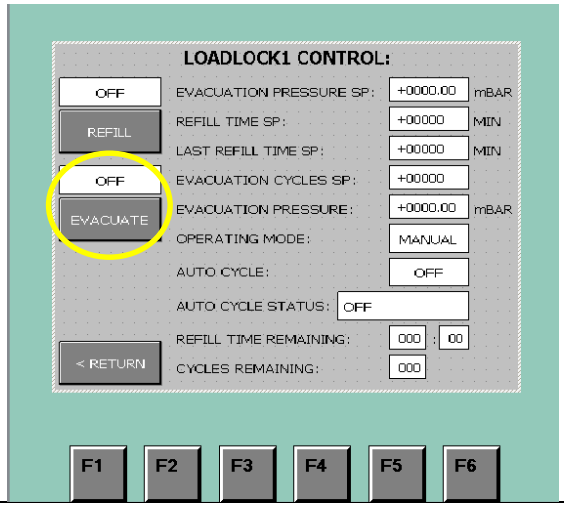
NOTE: This will ensure the antechamber has inert gas in it.

1. Open inside antechamber door.
2. Load green bin/tray into antechamber.
3. Close inside antechamber door.
4. Open outside antechamber door.

14.3 Automatic Antechamber Control / Loadlock

The automatic antechamber control / loadlock function is used to automatically cycle the antechamber between the evacuation function and the refill function. The cycle is controlled by the number of cycles selected and the vacuum level selected.

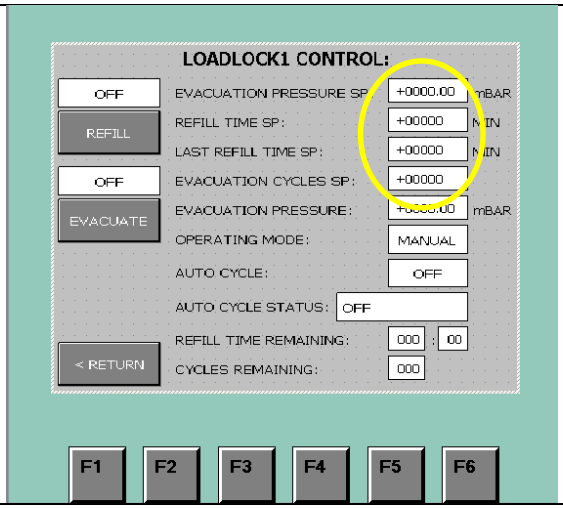




1. Press the Loadlock button from the main screen.

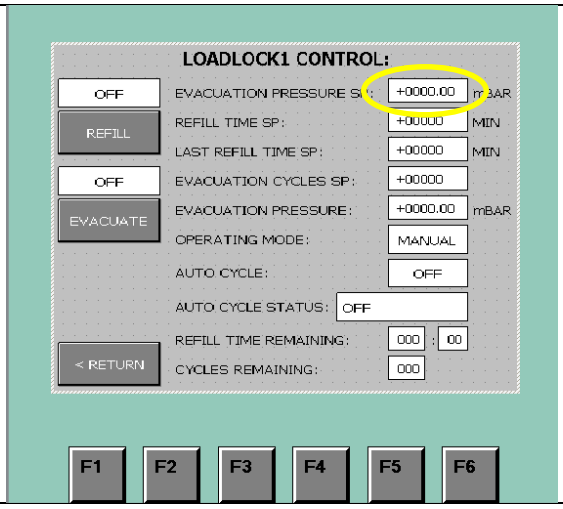
   Loadlock Control screen will be displayed.

   Once all of the settings below have been set, press the Evacuate button to begin the automatic cycle.



2. The automatic antechamber control / loadlock settings can be found on this screen.

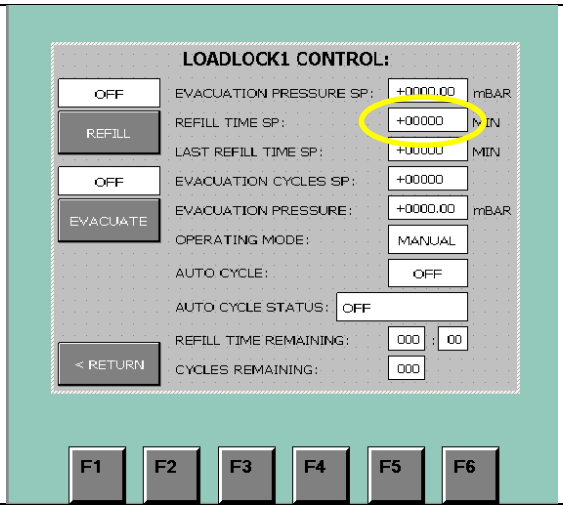
3. To change these set points, press the white box to the right of desired setting. Type in new setting and press Enter.



There are four settings that can be changed in the Loadlock1 Control screen.

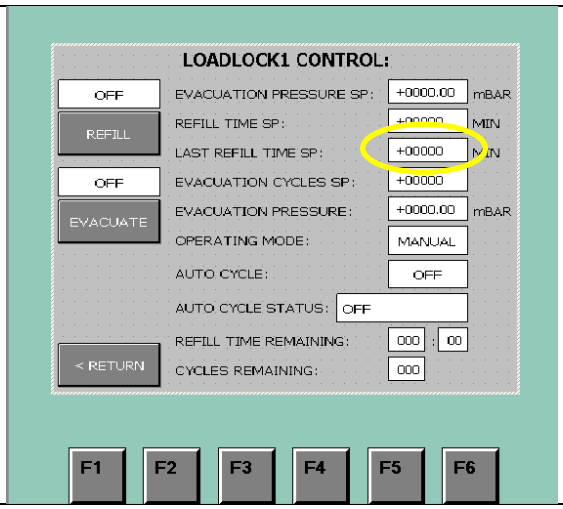
1. Evacuation Pressure SP - This is the evacuation level that will be reached before refilling.

   NOTE: 0.5 mBAR is the recommended Evacuation Pressure SP.



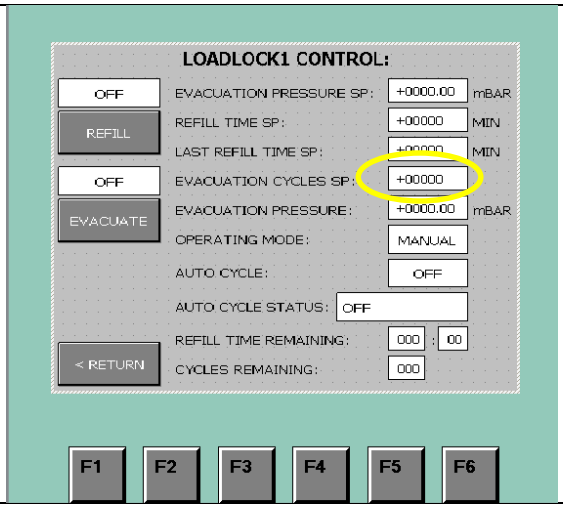
2. Refill Time SP - This is the length of time the chamber will refill before another evacuation cycle is started.

   NOTE: +1 Minute is the recommended Refill Time SP.



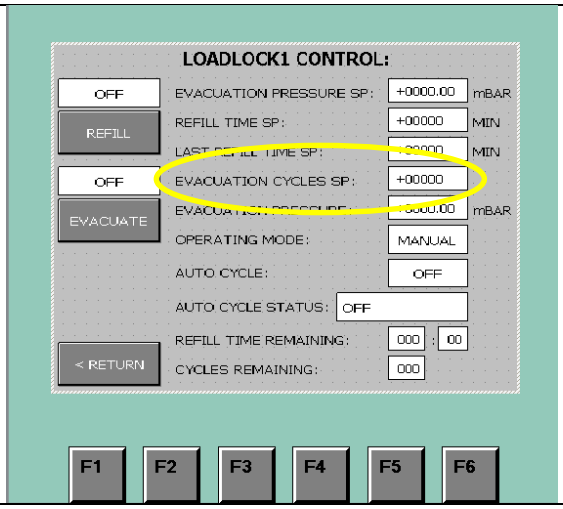
3. Last Refill Time SP - This set point is the final refill cycle and should be longer than the second refill time.

   NOTE: +2 Minutes is the recommended Last Refill Time SP.



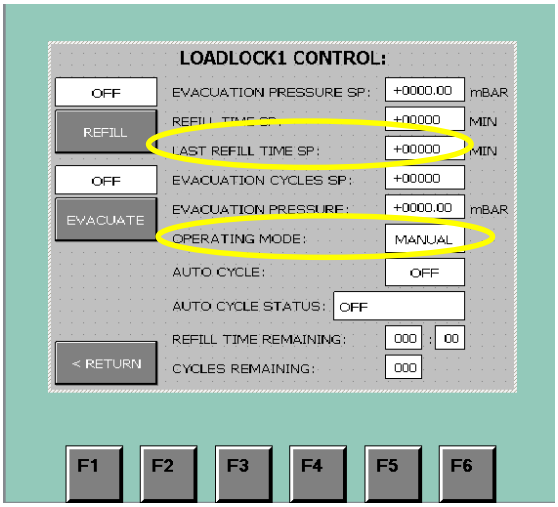
4. Evacuation Cycles SP - This allows the user to set the number of EVAC/Refill cycles the chamber will perform.

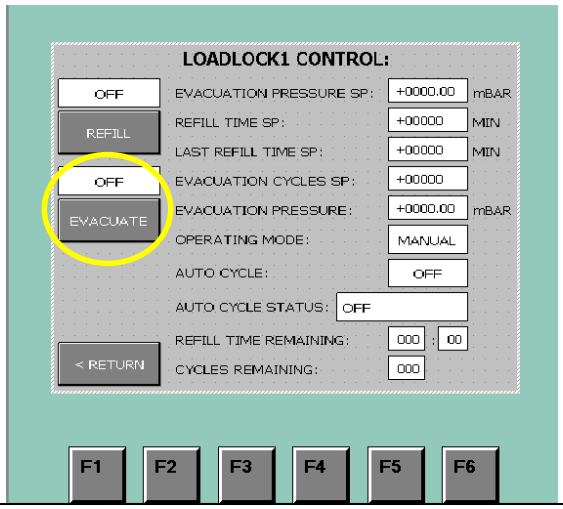
   NOTE: The recommended number of cycles is three (3).



5. To begin automatic antechamber control change the Evacuation Cycles SP: to 3 by pressing the white button to the right.

6. Enter the set point and press Return.





The Operating Mode will change from Manual to Auto.

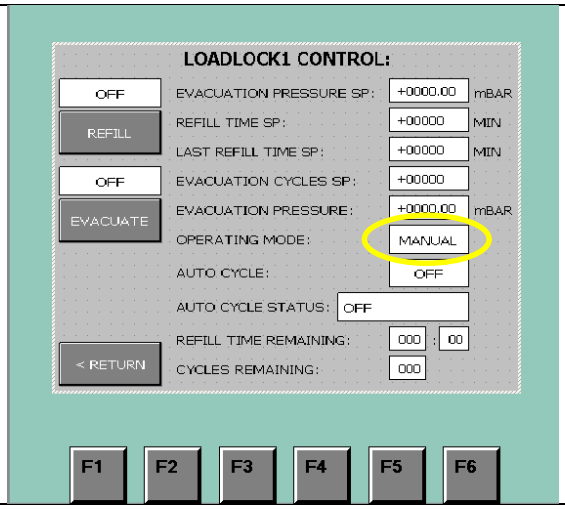
7. Next press the Evacuate button to begin the automatic cycle.

   During the automatic cycle the following information can be found on the Loadlock1 Control screen.

   a. <u>Auto Cycle: ON</u> – This is the indicator that the auto cycle is running.
   b. <u>Auto Cycle Status: Evac/Refill</u> – This status indicates if the chamber is evacuating or refilling.
   c. <u>Refill Time Remaining</u> – This status indicates the amount of time remaining in the refill process.
   d. <u>Cycles Remaining</u> – This status indicates the number of cycles remaining. The number of cycles will count down from 3, 2, 1, 0.

The vacuum level is shown on the gauge mounted on top of the antechamber and on the PLC screen.

Once the cycle is complete the evacuation and refill cycles will turn off.

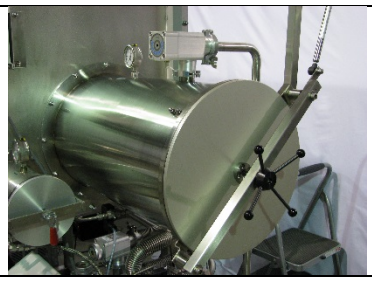


NOTE: System can also be operated in manual mode by setting Evacuation Cycles SP to zero (0).

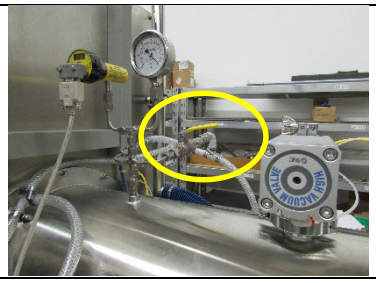
Operating Mode will now display Manual. Refer to Section 13.1 Bringing Items into the Glovebox, Manual Evacuation for operational instructions.

14.4 Manual Purge for Large Antechamber

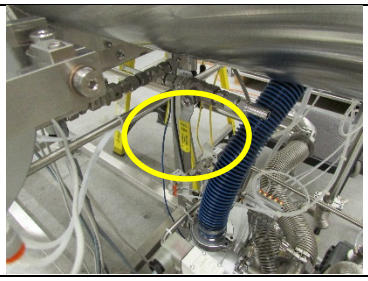
1. Open outer door and load large antechamber.



2. Close door.



3. Open vent valve.



4. Open gas valve.

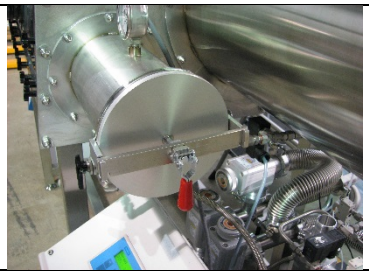
   NOTE: Connect inert gas to gas valve. (5 psi maximum for purging.)
   NOTE: Automatic antechamber control cycles needs to be set to Zero so that the door locks are disabled during this process. See page 44.

5. Purge for 10 minutes.

6. Close gas valve and vent valve.

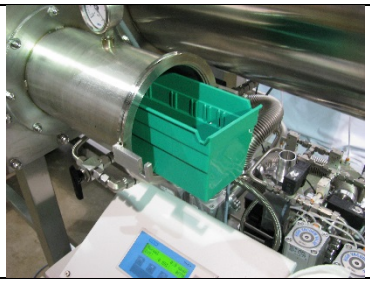
7. Open inside large antechamber door.

14.5 Mini Antechamber Operation



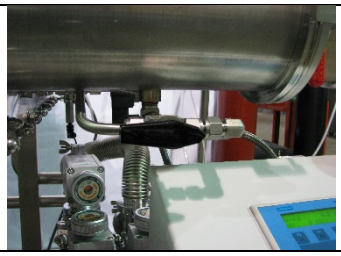
1. Open outside mini antechamber door by pulling up on red lever.

2. Remove outside mini antechamber door.

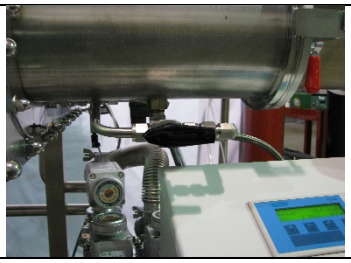


3. Load green bin with parts.
4. Slide green bin all the way into antechamber until it comes into contact with inside antechamber door.

5. Replace outside antechamber door and push red lever down into the locked position.

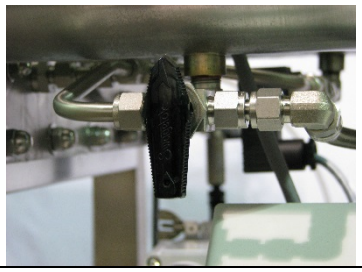


6. Turn hand valve to evacuation position.
7. Continue evacuating until gauge reaches approximately -30.



8. Turn hand valve to refill position.
9. Continue to refill until the vacuum gauge reads 0.

10. Repeat the above cycle two (2) more times for a total of three (3) evacuation/refill cycles.



11. Return hand valve to up (closed) position.

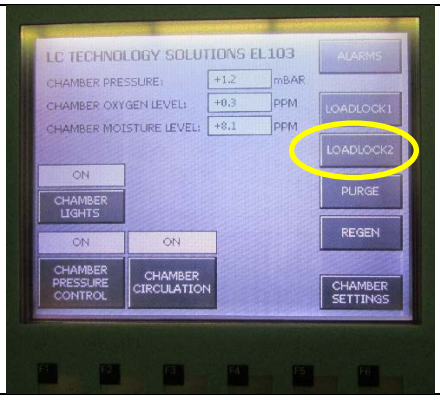
12. Remove inside antechamber door.

13. Remove green bin and return to chamber when complete.

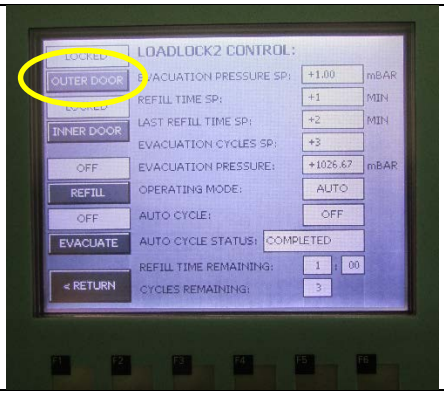
14. Replace inside antechamber door and push red lever into the locked position.

15. Refer to Section 13.2 for instructions for Removing Items from Glovebox.

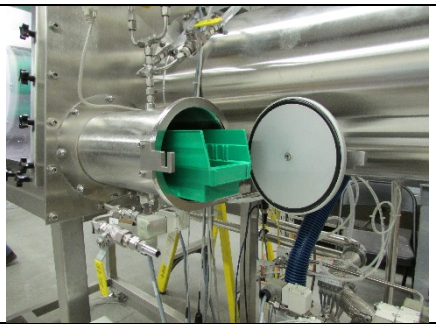
14.6 Mini Antechamber with Automatic Control for Door Lock



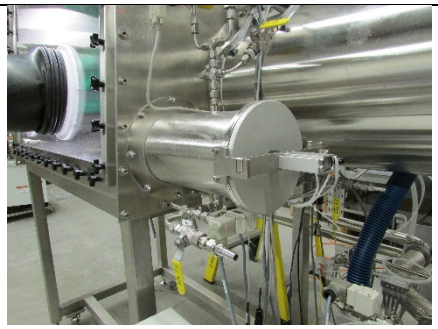
1. To operate mini antechamber press LoadLock2 button.



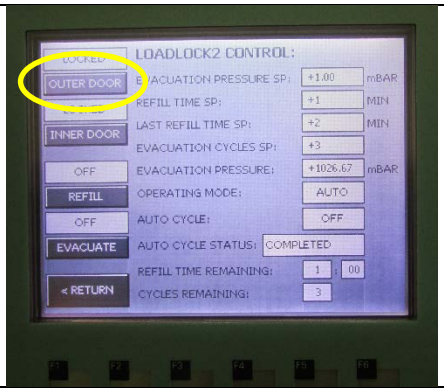
2. Push Outer Door button.



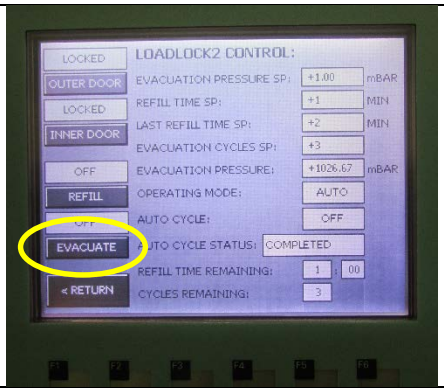
3. Open door and load chamber.



4. Close door.



5. Push Outer Door button.



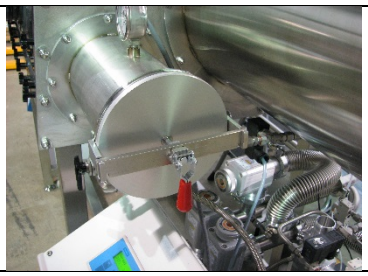
6. Push Evacuate button. This will allow it to run for 3 cycles.

NOTE: For setting parameters refer to Section: 14.4 Automatic Antechamber Control / Loadlock.

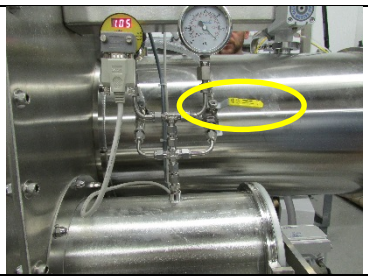
NOTE: You can push the Refill button any time to abort a cycle.

14.7 Manual Purge for Mini Antechamber

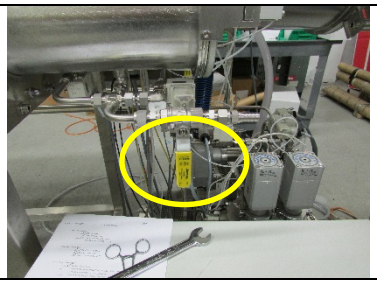
1. Open outer door and load mini antechamber.



2. Close door.



3. Open vent valve.



4. Open gas valve.

   NOTE: Connect inert gas to gas valve. (5 psi maximum for purging.)
   NOTE: Automatic antechamber control cycles needs to be set to Zero so that the door locks are disabled during this process. See page 44.

5. Purge for 5 minutes.

6. Close gas valve and vent valve.

7. Open inside mini antechamber door.

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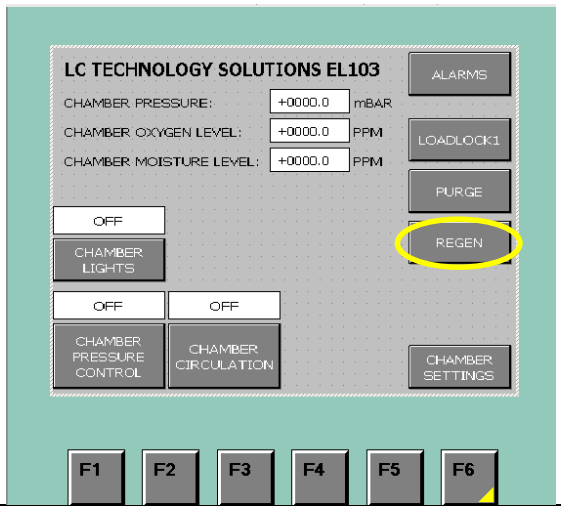
Section 15: Regeneration Mode

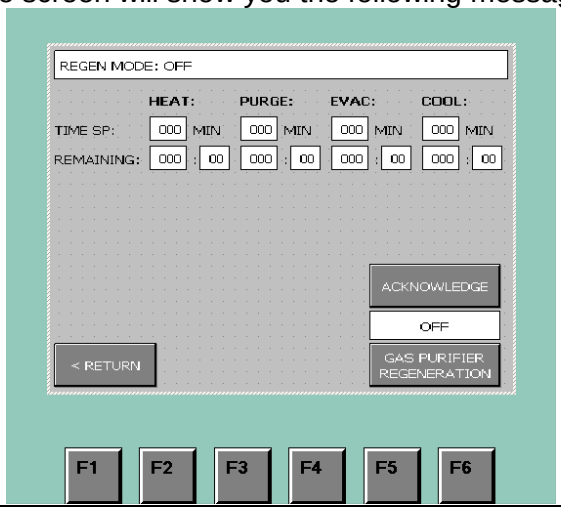
Regeneration Mode is for reactivating the filter material. It can only be activated if Chamber Circulation is off.

From the main screen:



1. Push REGEN button.

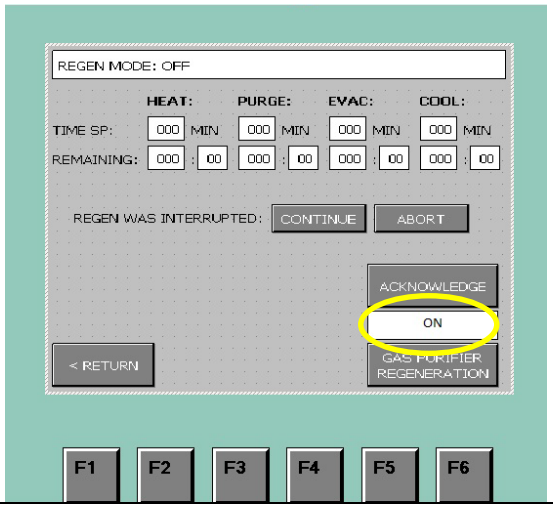
The screen will show you the following message:



2. REGEN MODE will now display.

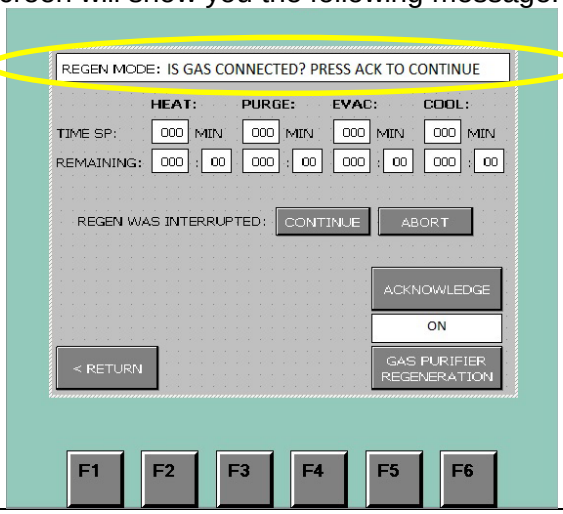
Caution: The regeneration cycle times are critical to the system running properly. Do not change these settings!

It is recommended that you contact LC Technology at (978) 255-1620 before making any changes.

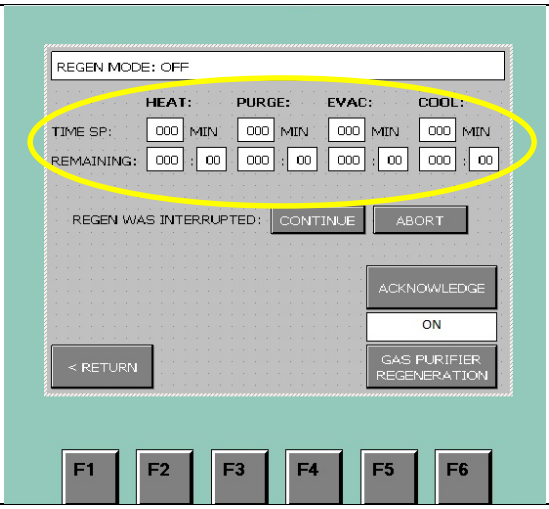


1. To start a regeneration press the Gas Purifier Regeneration button. ON will be displayed.
2. To change the set points for heat, purge, evac, or cool press the appropriate white box to the right of the Time SP. Enter the number of minutes for the cycle and press Return.

The screen will show you the following message:



3. Once you have connected your regeneration gas you need to confirm this message by pressing the Acknowledge button.



During the regeneration cycle the following information can be found on the Regen screen.

A. Time SP – This indicate the number of minutes for each process, heat, purge, evac, and cool.
B. Remaining – This is the number of minutes remaining in each cycle of heating, purging, evacuating and cooling.

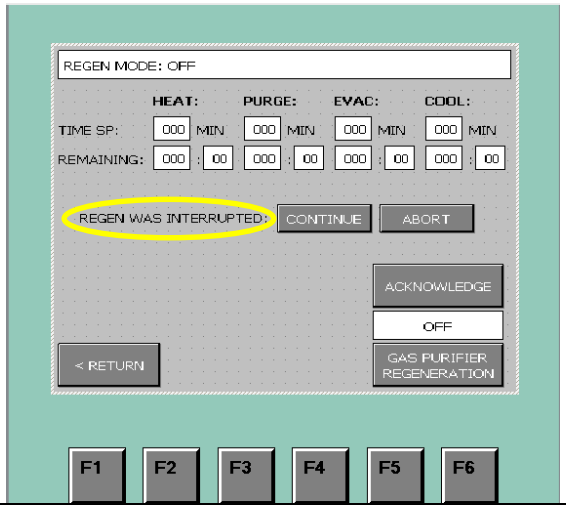
The regeneration process takes (13) hours and has (4) phases. Each phase will be displayed as the program progresses from one phase to the other.

- The first phase is heating which lasts (2) or (3) hours depending on the system.
    - **NOTE:** You may smell a slight odor at this time. This is normal.
- The second phase is purging which lasts (3) hours.
- The third phase is evacuation which lasts (3) hours.
- The fourth phase is cooling which lasts (4) hours.

To interrupt the regeneration process, press the Gas Purifier Regeneration button at any time. Caution should be used at this time.

- If the system has been heating for over (1) hour, the system should be allowed to cool for at least (2) hours before the regeneration is restarted.
- If the system has past the heating phase, the system should cool for (6) hours before restarting the regeneration.

Please call LC Technology at (978) 255-1620 if you have any questions about interrupting the regeneration or restarting the regeneration process.



This screen shows that the regeneration has been interrupted due to the system being shut down during the regeneration cycle.

Pressing the Continue button allows the cycle to continue.

Pressing the Abort button exits the interrupted cycle and the regeneration mode.

15.1 Testing the Regeneration Process

IMPORTANT:

To test the regeneration process follow the steps below:

1. After the regeneration process has completed empty the drain portion of the common vent line by removing the capping nut that is located at the bottom of the common vent pipe.

2. Measure the amount of water collected.

NOTE: A normal regeneration yields 50-75 milliliters of water. If the water is less it could mean something is wrong.

NOTE: It is recommended to change your vacuum pump oil after a regeneration.

Section 16: Chamber Settings

16.1 Set Points

All user and system set points are located in Chamber Settings. These set points have been preset at the factory and care should be taken when altering the set points.

To enter Chamber Settings:

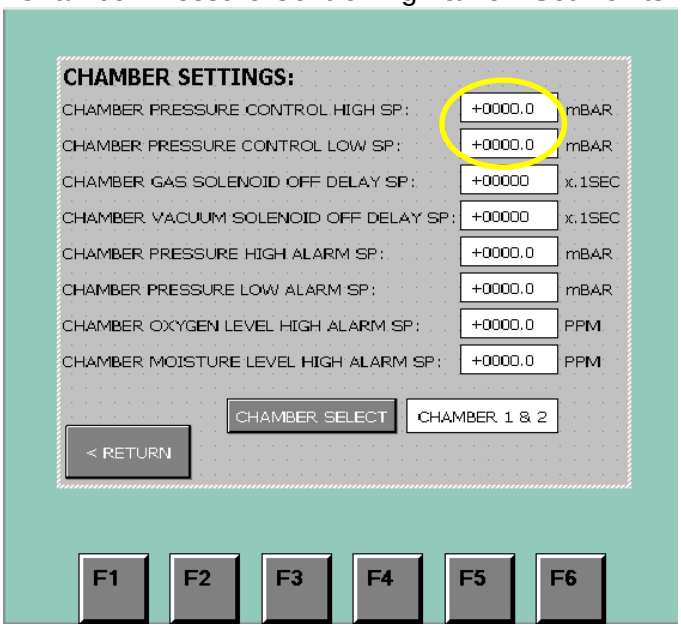
1. Press Chamber Settings button.
2. Select Set Point you wish to change.
3. Enter new Set Point.

In Set Points you can change the following settings:

1. Chamber Pressure Control High/Low SP
2. Chamber Gas / Vac Solenoid Delay SP
3. Chamber Pressure High/Low Alarm SP
4. Chamber Oxygen Level High Alarm SP
5. Chamber Moisture Level High Alarm SP

To alter the set points press desired Set Point and enter new Set Point.

Chamber Pressure Control High & Low Set Points



This screen allows the user to select the box pressure ranges that are needed for your application. Typical settings are 0.5 mBAR for low limit and 2.5 mBAR for high limit.

The system will maintain the pressure in the glovebox between these two values. The foot pedals will only adjust the pressure in the glovebox between these ranges.

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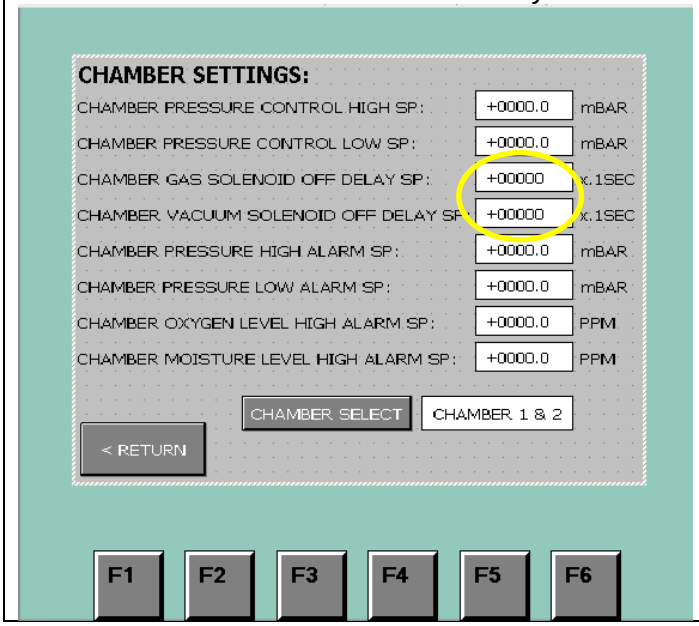
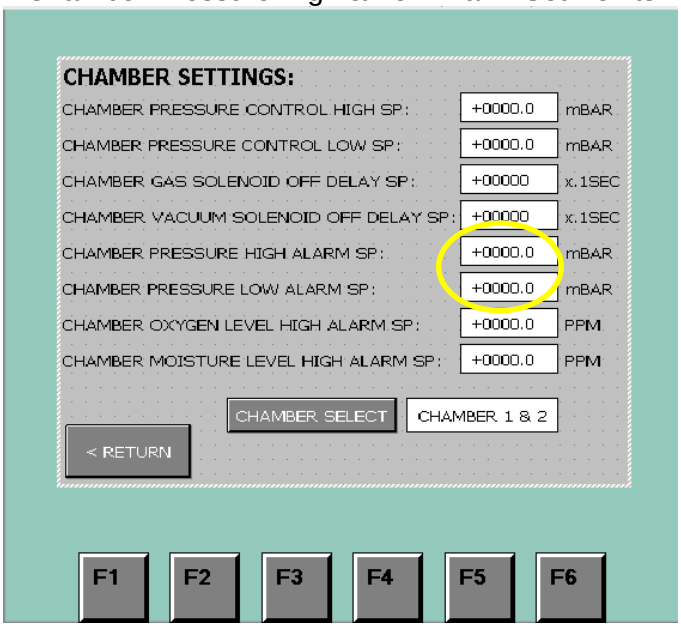
Chamber Gas & Vac Solenoid Off Delay Set Points



This set point allows the user the ability to set a delay on how long the gas and/or vac valves stay open when triggered.

The typical setting is 5 for the Chamber Gas Solenoid Off Delay SP and the Chamber Vacuum Solenoid Off Delay SP.

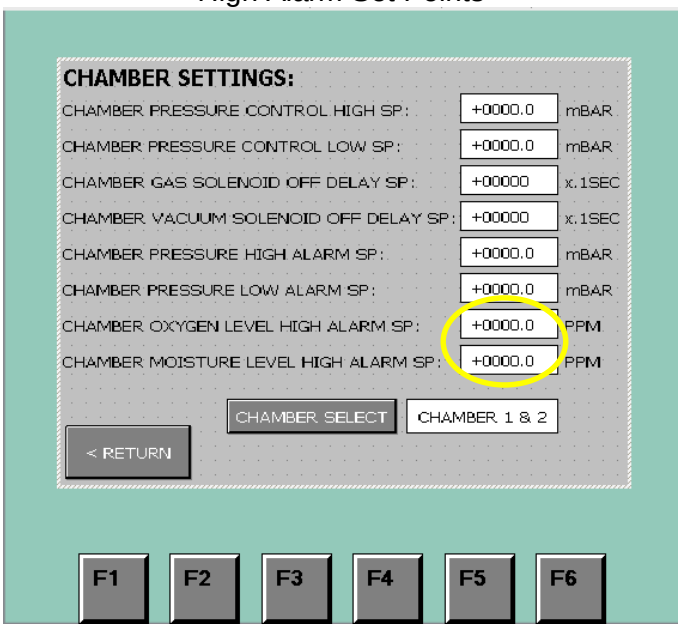
Chamber Pressure High & Low Alarm Set Points



Chamber Pressure High Alarm Set Point: This allows the user to input the high pressure alarm set point. The factory default is +15.0 mBAR.

Chamber Pressure Low Alarm Set Point: This allows the user to input the low pressure alarm set point. The factory default is -15.0 mBAR.

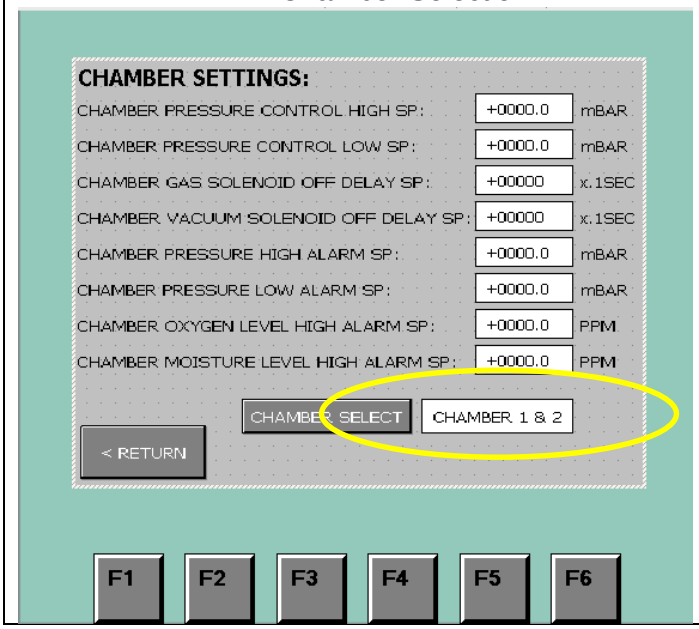
Chamber Oxygen & Moisture Level High Alarm Set Points



This allows the user to input the oxygen and moisture alarm set points. The factory default is 50 ppm.

16.2 Enable / Disable

Chamber Selection



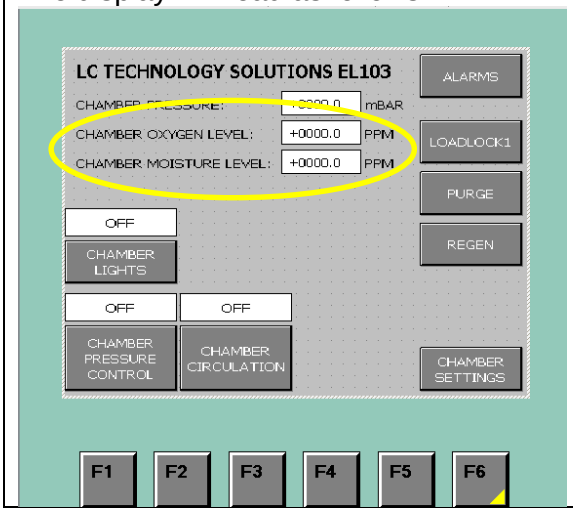
1. Customers with 2 separate boxes that are run off of one purifier cart are capable of disabling or enabling one or both boxes by using bypass isolation valve.

2. Press Chamber Select to select desired chamber.

   Note: You may only have one box.

Section 17: Analyzers

The display will read as follows:



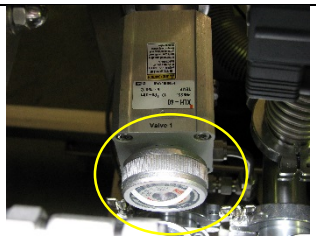
The main screen provides the current PPM level of oxygen and moisture inside the chamber.

Section 18: Solvent Removal Systems, Operation and Maintenance

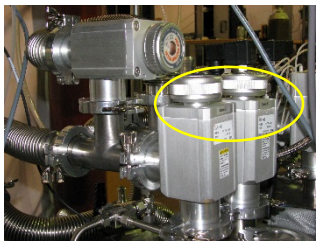
18.1 Manual Solvent Removal System Operation

The solvent removal system is for the removal of solvent vapors from the glovebox environment. The system has two (2) operation modes: active mode and bypass mode.

NOTE: There are three (3) main valves on the top of the solvent removal system. The valves are labeled 1, 2 and 3. It is very important these valves are not all closed at the same time. An open path from the gas purification system to the glovebox must be maintained at all times, otherwise serious damage may occur to the system.



Valve 1

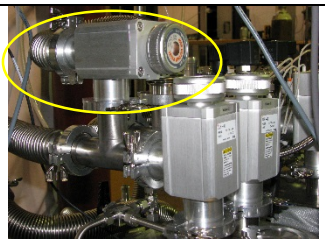


Valve 2 and 3

Active Mode:

This is the mode the system will normally be in. This will allow the glovebox environment to circulate through the solvent removal system so it can trap solvent vapor.

To put the system into Active Mode, valve 1 should already be open. Open valves 2 and 3 and close valve 1.



Valve 1

Valve 2 and 3

Bypass Mode:

This mode is only used for maintaining the solvent removal system. The system should only be put in Bypass Mode so that the activated carbon in the solvent removal system can be changed.

Open valve1 and close valves 2 and 3.

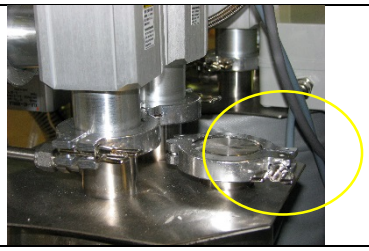
To put the system back into Active Mode, open valves 2 and 3, then close valve 1.

18.2 Manual Solvent Removal System Maintenance

Approximately every 3-6 months the activated carbon in the solvent removal system will have to be changed.

Follow the steps below to change the activated carbon:

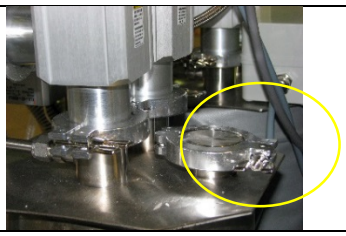
1. Put the solvent removal system in Bypass Mode.



2. Remove KF40 clamp and cover on the fill/empty port on top of solvent removal system.

3. Using a shop vac and solvent extraction tool suck all of the used activated carbon out of the solvent trap.

4. Using a funnel refill the solvent removal system with fresh activated carbon. It will hold 10 lbs of material. Do not fill with more than this amount.



5. Replace KF40 cover and clamp on top of solvent filter.

6. Using Valve 4 mounted on the back of the system evacuate the solvent removal system for approximately 24 hrs by turning Valve 4 to the left. The valve should be pointing towards the line that goes to the vacuum pump.

7. Using Valve 4 refill the solvent trap with inert gas by turning Valve 4 to the right. The solvent trap will fill with inert gas from the glovebox.

8. Put system back into active mode.

Section 19: Internal Charcoal Trap

The internal charcoal trap is used for trapping small amounts of trace solvent. The internal charcoal trap comes in a set of (12) and should be changed once per month.

NOTE: The filters are labeled 1 – 12, one for each month of the year.

1. Bring new filter into the glovebox.

2. Pull old filter out of the socket and discard.

3. Replace old filter with the new one by pushing it into place in the socket.

NOTE: The new filter goes on the inlet side to the gas purifier.

The correct filter will be labeled with a number.

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NOTE: Repeat every month. Filters are labeled 1-12, one for each month of the year.

Section 20: Freezer Operation and Maintenance

20.1 Freezer Operation

NOTE: Verify freezer is plugged in.

1. Turn freezer on by pressing the switch to the ON position.

2. Turn freezer off by pressing the switch to the OFF position.

NOTE: Freezer is preset to -35°C by the factory.

To adjust the Set Point:

1. Press the second key to the left on the temperature controller.

2. Use the ↑ or ↓ arrows to change set point.

3. Press the second key to the left again to complete.

NOTE: Do not change any other settings on the temperature controller without first contacting LC Technology.

NOTE: The maximum operating temperature is -35°C. The recommended every day operating temperature is -25°C.

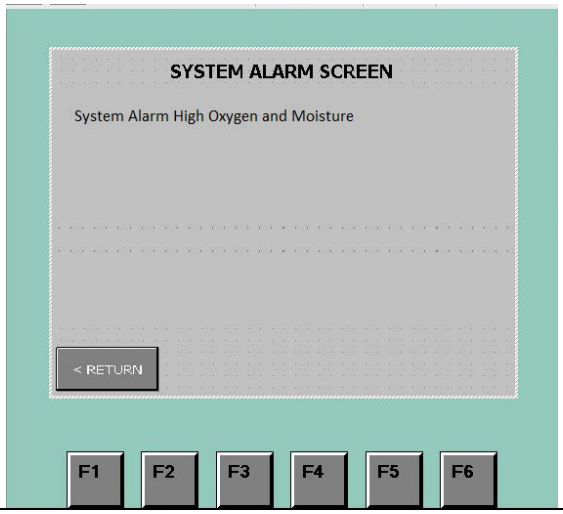
20.2 Freezer Maintenance

The only user serviceable maintenance item for the freezer is cleaning the cooling fins on the compressor. This will keep dust and other particles from building up on the unit.

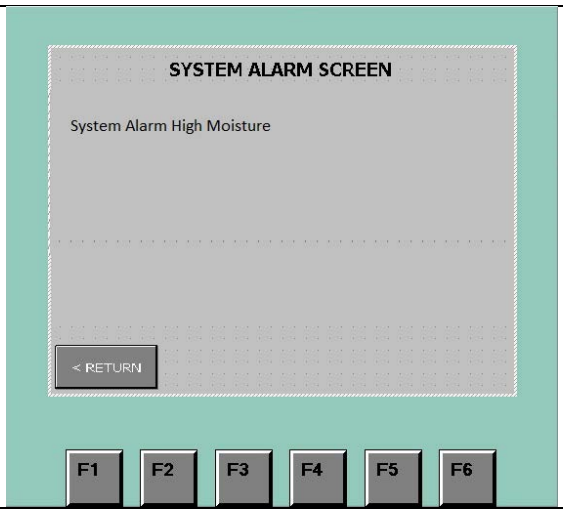
Freezer maintenance, other than cleaning the cooling fins, should be performed by a qualified refrigerator repair person.

Section 21: Alarm Messages

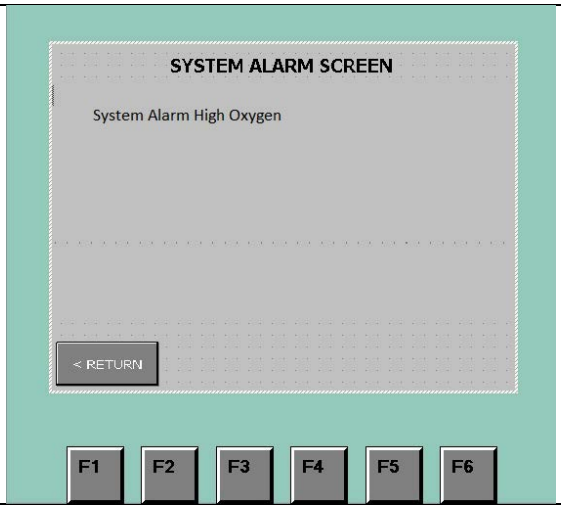
The alarm levels are set in the Chamber Settings for both the oxygen and moisture analyzers. If the reading on the PLC is above the alarm set point it will display the following messages.



This alarm displays when oxygen and moisture levels are above the alarm set point.



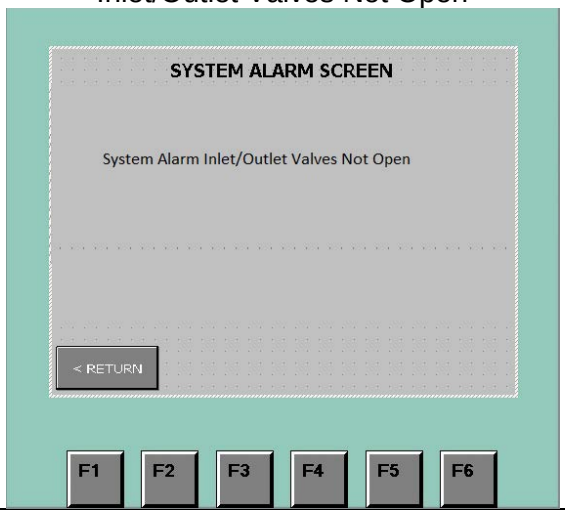
The moisture level high alarm displays when the moisture level in PPM is above the alarm set point.



The oxygen level high alarm displays when the oxygen level in PPM is above the alarm set point.

Once the level of H2O and O2 is below the alarm level the messages will automatically clear.

Inlet/Outlet Valves Not Open

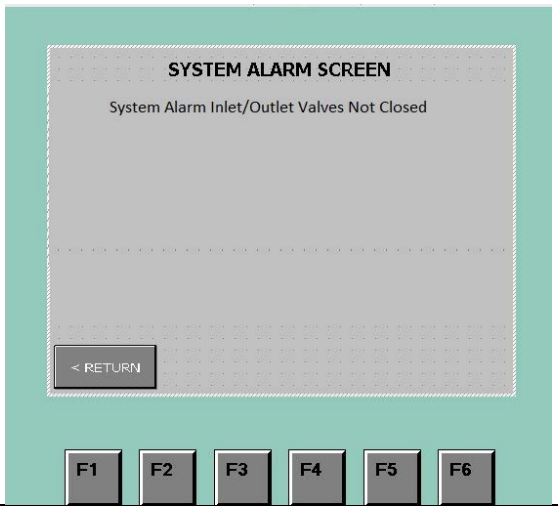


This alarm means that the electro-pneumatic valves on top of the filter column are not opening properly.

This is almost always caused by low gas pressure or an empty gas cylinder.

Check the gas supply and make sure the system has at least 60 psi going to it.

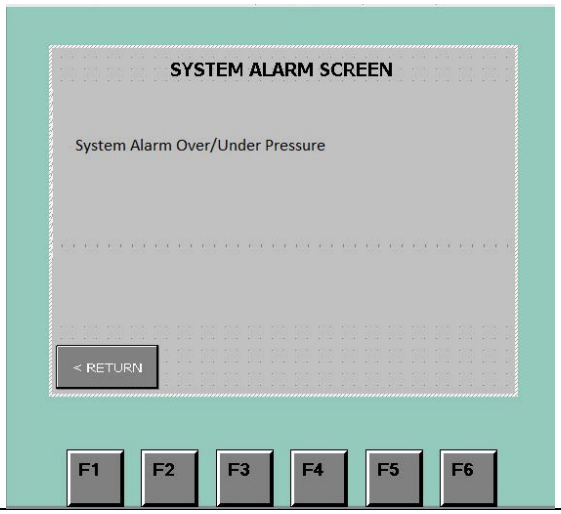
Inlet/Outlet Valves Not Closed



This means the valves on top of the filter column are not closed and you will be unable to perform the regeneration.

Call LC Technology for more information.

Over or Under Pressure Alarm



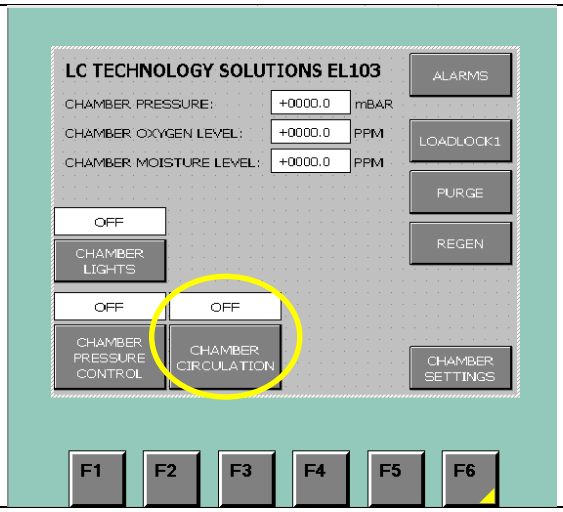
The Low Pressure Alarm means the system is under-pressurized. Once the glovebox goes above the low pressure safety set point it will shut off.

The High Pressure Alarm means the system is over-pressurized. Once the glovebox goes above the high pressure safety set point it will shut off.

NOTE: This is a dangerous situation and **caution** should be taken.

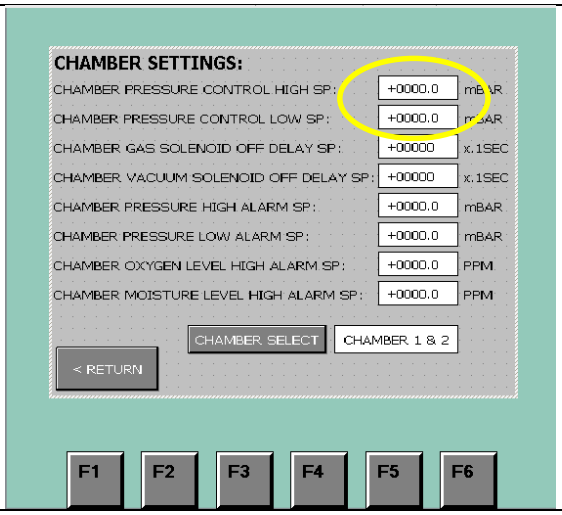
Section 22: Manual Purge

Purging with a Manual Purge Valve



1. From Main Screen verify circulation is turned off.

   If circulation is on press Chamber Circulation button to turn circulation off.



2. From Main Screen, press Chamber Settings to check pressure settings. Pressure settings should be set to positive values.

   To verify settings are positive follow these steps:

   a. Press Chamber Settings button.
   b. Make sure chamber pressure set points are set to positive values.

3. Open manual purge valve until you hear gas inlet valve come on and stay on.

4. For initial purging (glovebox is at room air) refer to Section 11 for the amount of time and gas.

5. When purging is complete follow these steps:

    a. Close Purge Valve.
    b. Return pressure set points to 2.5 mBAR high and 0.5 mBAR low.
    c. Start/Restart circulation by pressing Chamber Circulation button.

Section 23: Maintenance Schedule & Recommended Spare Parts

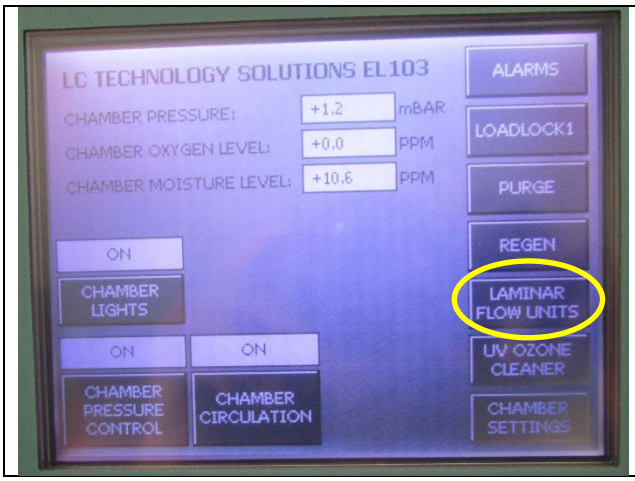
1. The gloves and glove O-rings should be changed once every three (3) months or as needed based on the condition of the gloves.
2. Vacuum pump oil should be changed at least every three (3) months and after a regeneration.
3. The inlet/outlet filters should be replaced every six (6) months.
4. The large antechamber door O-rings should be replaced every year.
5. The small antechamber door O-rings should be replaced every year.
6. If the system is equipped with a solvent removal system please follow the schedule below.
    a. Internal solvent removal trap change every month; Part No. SR-101.
    b. External solvent removal trap change charcoal every three (3) months; Part No. FM-018.
    NOTE: With heavy solvent usage change the charcoal more frequently.

Spare Parts Listing

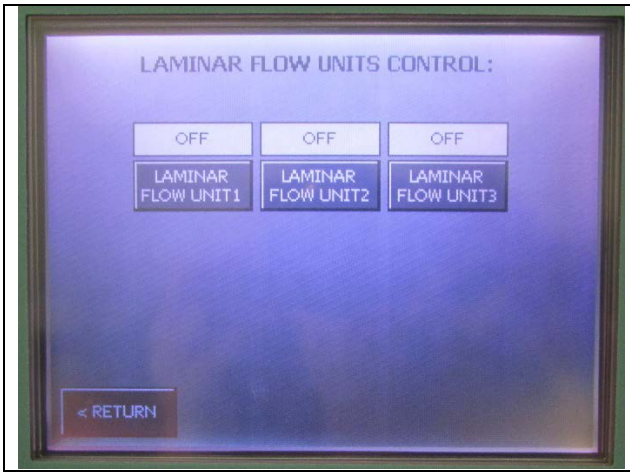
Part No.	Description	Qty	Price
GL-003	Gloves, Left/Right, 1 pair	1 Pair	$165.00 ea.
OR-028	Glove O-Rings	4	$15.00 ea.
FL-102	Inlet/Outlet HEPA Filter	2	$39.95 ea.
OR-109	8” Antechamber Door O-Ring (LCBT & LCPW Glovebox Systems)	2	$10.00 ea.
OR-111	Large Antechamber Door O-Ring (LC-1 Glovebox Systems)	2	$25.00 ea.
OR-110	Small Antechamber Door O-Ring (LC-1 Glovebox Systems)	2	$10.00
FM-018	Activated Carbon for Solvent Removal System	10 lbs	$10.00/lb
FM-900	LC-1 Complete Filter Column Charge	1	$595.00/charge
FM-950	LCPW Complete Filter Column Charge	1	$300.00/charge
AN-009	Replacement Sensor for Oxygen Analyzer for Model 02X1	1	$495.00 ea.
AN-023	Replacement Sensor for Oxygen Analyzer for Model OXY-IQ	1	$300.00 ea.
SR-101	Internal Charcoal Trap (Set of 12)	1 Set	$450.00/set

Section 24: Operational Accessories

24.1 Laminar Flow



1. From Main Screen press Laminar Flow Units button.

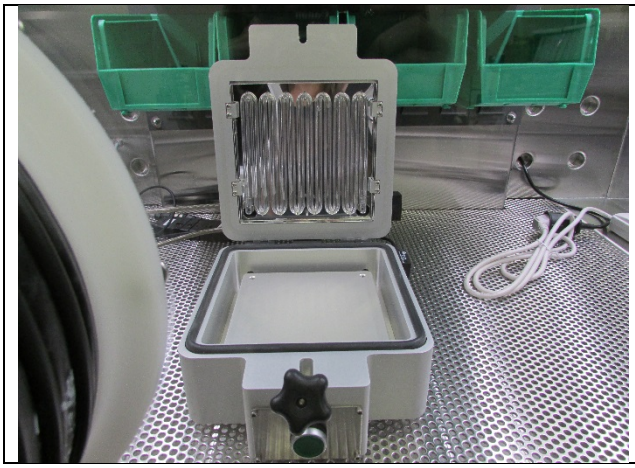


2. Laminar Flow Units Control screen will display.

3. Push Laminar Flow Unit button to turn laminar flow ON or OFF.

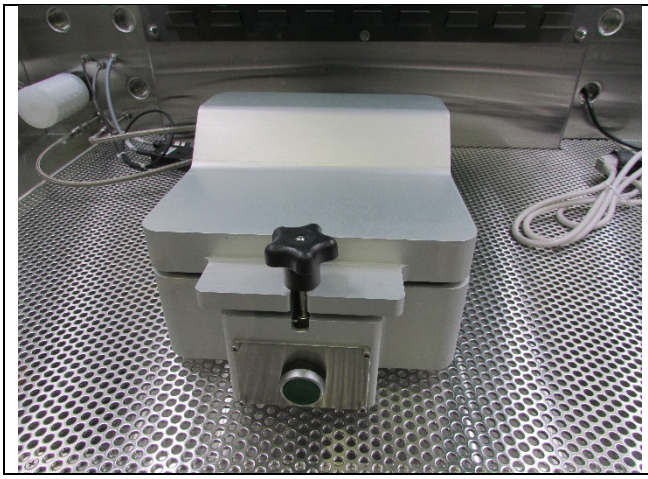
4. Press Return button to return to the main screen.

24.2 UV Ozone Cleaner



1. Open lid.

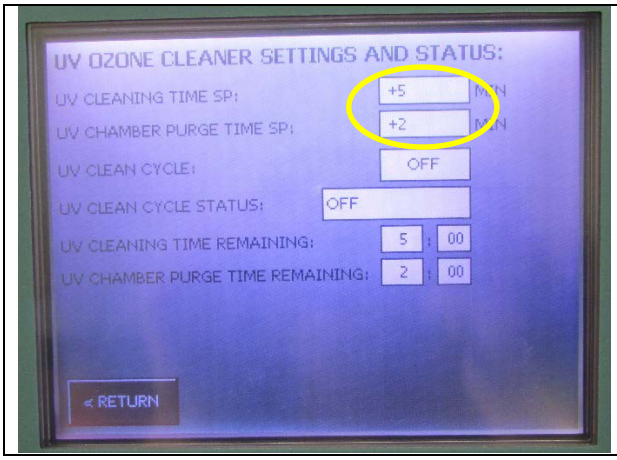
2. Place substrate in UV ozone cleaner.



3. Close lid and secure with knob.

4. From main screen press UV Ozone Cleaner button.

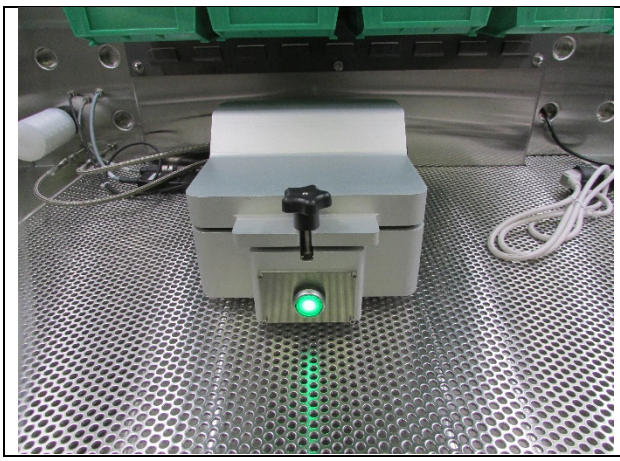
   UV Ozone Cleaner Settings and Status screen will display.



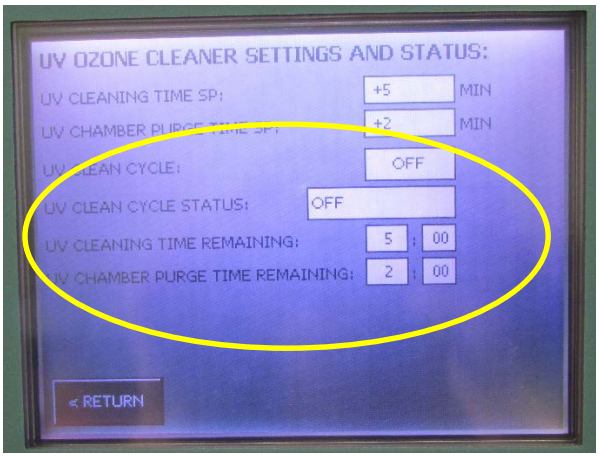
5. Set desired cleaning and purging time by pressing the white box to right of set point.

   The factory default for UV Cleaning Time SP: is +5.

   The factory default for UV Chamber Purge Time SP: is +2.



6. Press green button on front of UV ozone cleaner to start process. Button will illuminate.

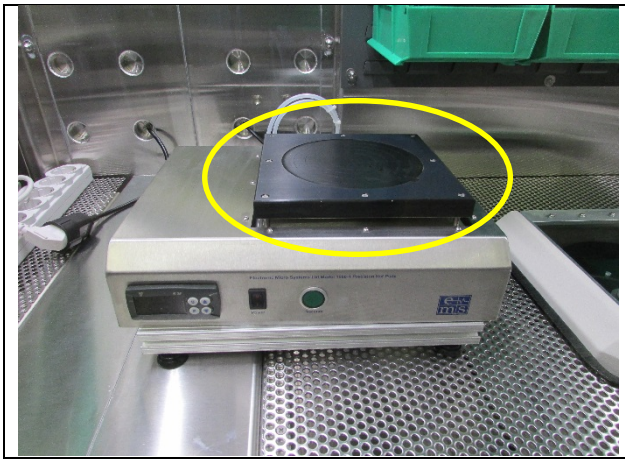


During the UV cleaning cycle the following information can be found on the UV Ozone Cleaner Settings And Status screen.

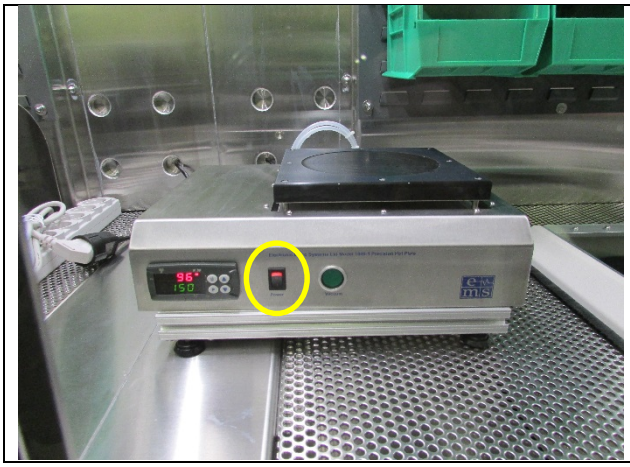
A. UV Clean Cycle – This indicates if the cycle is ON or OFF.
B. UV Clean Cycle Status – This is the current cycle; Cleaning or Purging.
C. UV Cleaning Time Remaining – This is the amount of time remaining in the cleaning process. The time will tick down until it reaches zero.
D. UV Chamber Purge Time Remaining – This is the amount of time remaining in the purge process. The time will tick down until it reaches zero.

Once the system reaches zeros (0) you have reached the end of the cycle and the process will automatically turn off.

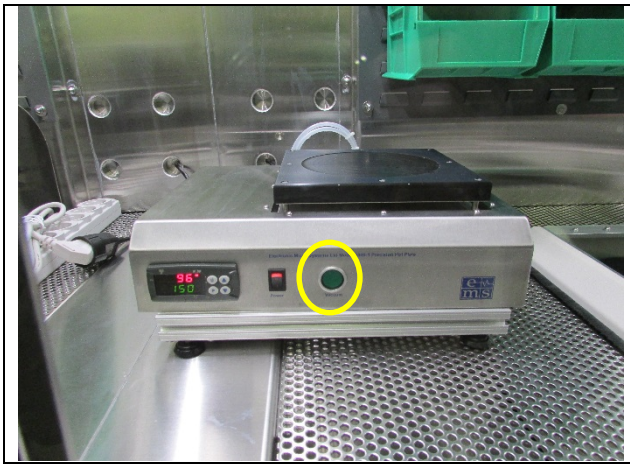
24.3 Precision Hot Plate



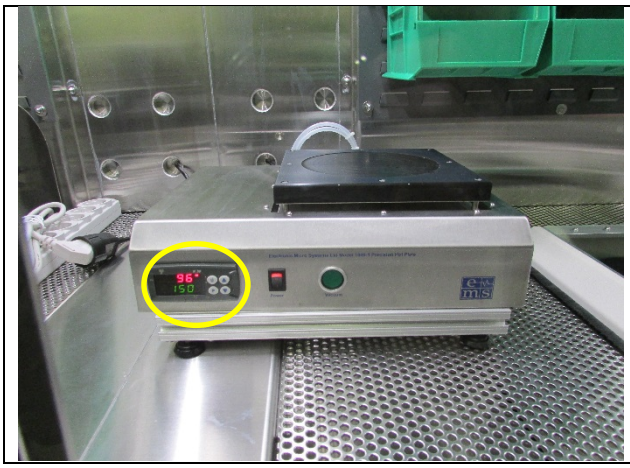
1. Place substrate on the hot plate.



2. Turn power on by pushing switch down.



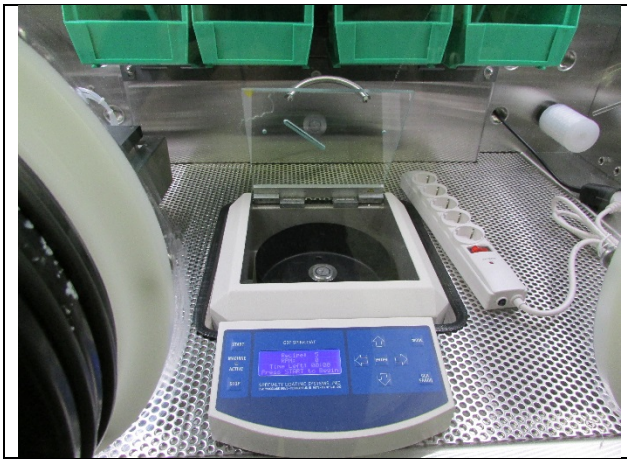
3. Press vacuum button to vacuum substrate down.



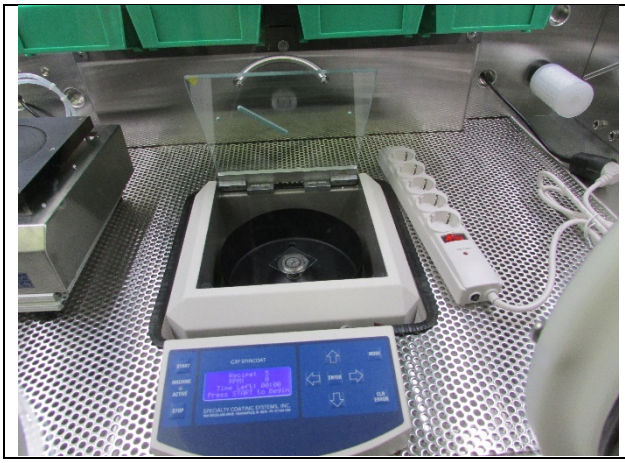
4. To adjust the temperature press and hold down the down arrow key.
5. SP1 will flash.
6. Set SP1 using the up and down arrow keys.
7. Once desired setting has been reached press P key.

NOTE: For advanced setting information refer to the vendor supplied manual located in the documentation package.

24.4 Spin Coater



1. Open lid.



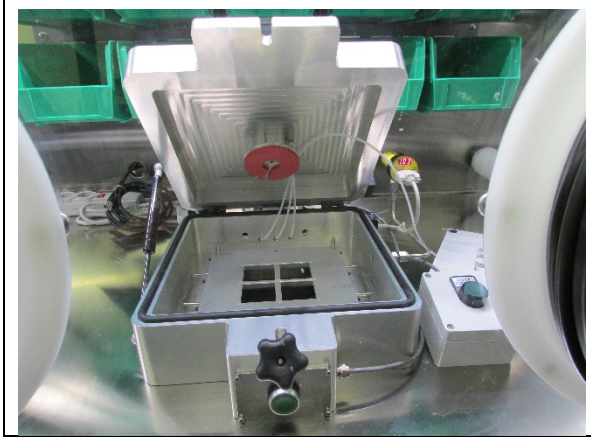
2. Place substrate on spin coater chuck.

3. Close lid.

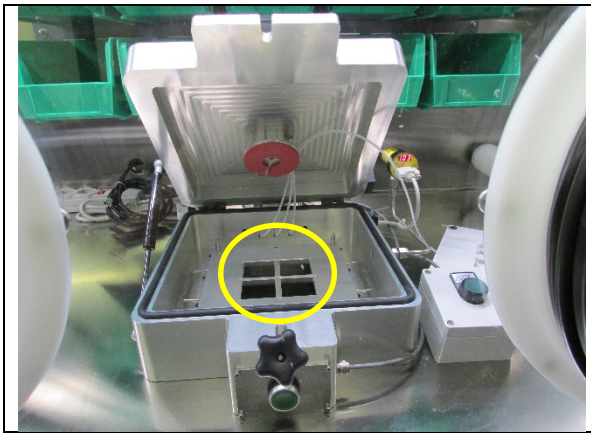
4. Press start to run.

NOTE: For detailed operating instructions refer to the vendor supplied manual located in the documentation package.

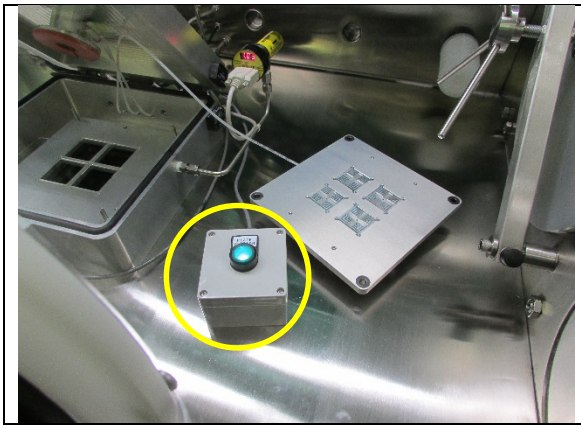
24.5 UV Press



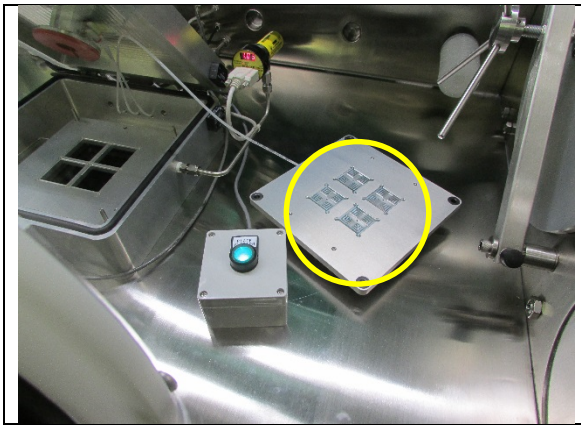
1. Turn light source on.
2. Open UV press lid.



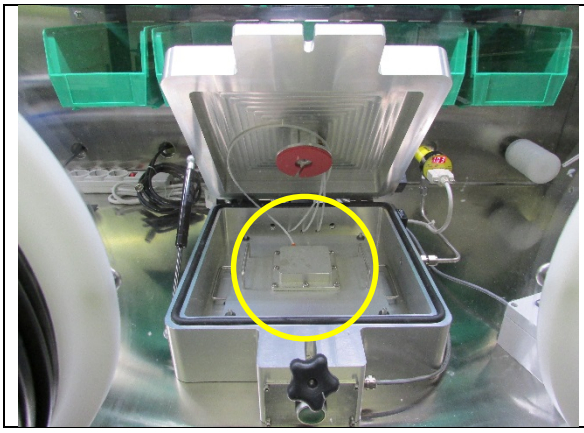
3. Load substrate into substrate holder.



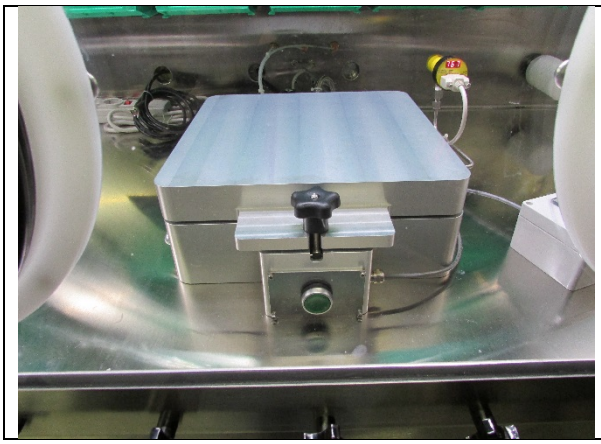
4. Turn on suction.



5. Place cover glass in vacuum chuck.

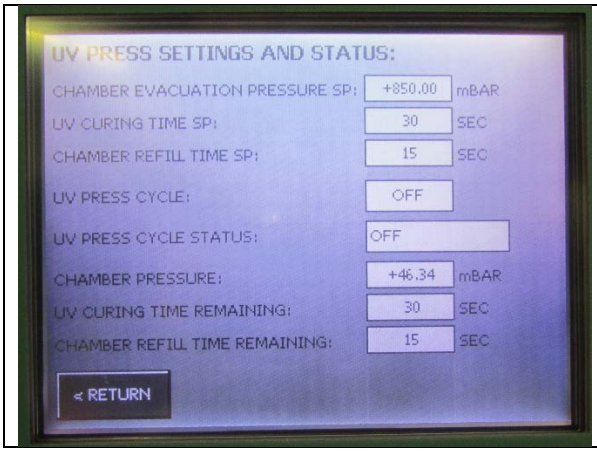


6. Place vacuum chuck in press.

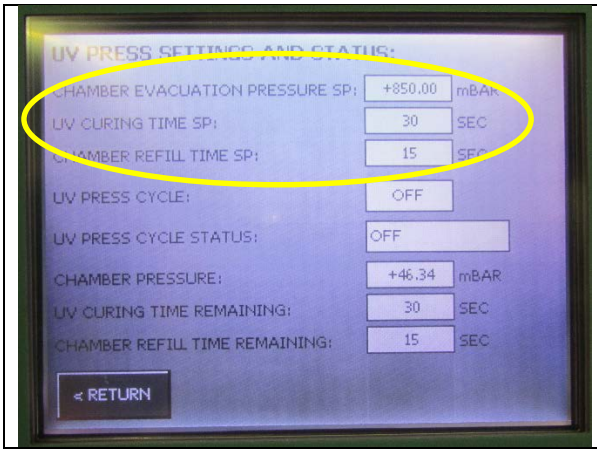


7. Close cover.

8. Press UV Press button on main screen.



9. UV Press Setting and Status screen will be displayed.



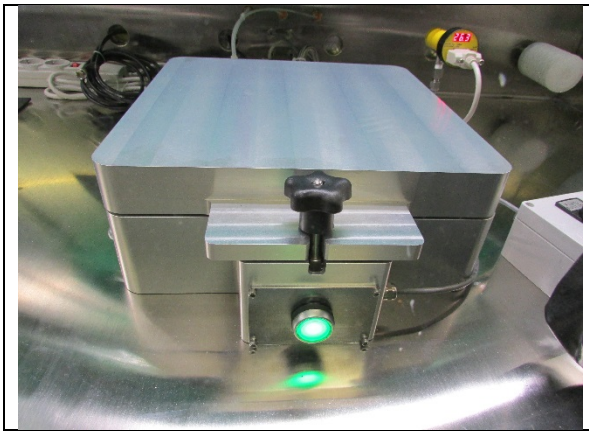
10. Set desired set point by pushing white box to the right of set point.

    The factory default setting for the Chamber Evacuation Pressure SP is 750 mBAR.

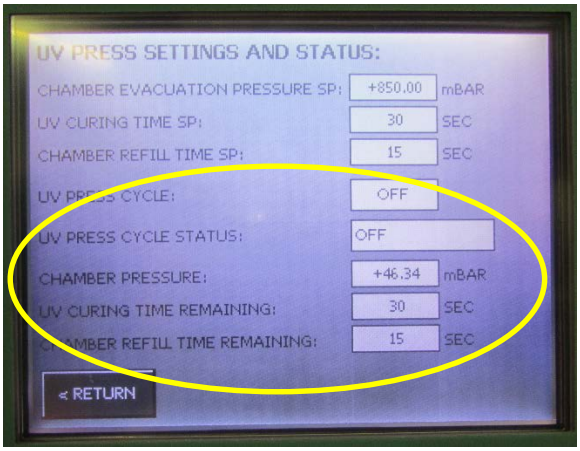
    The factory default setting for the UV Curing Time SP is 120 SEC.

    The factory default setting for the Chamber Refill Time SP is 30 SEC.

11. Verify UV press clamping pressure is set at 30 psi.



12. Press green button on front of UV press to start process.



During the UV press cycle the following information can be found on the UV Press Settings And Status screen.

A. UV Press Cycle – This indicates if the cycle is ON or OFF.
B. UV Press Cycle Status – This is the current cycle; EVAC, Clamp, Curing, Refilling, Off.
C. Chamber Pressure – This is the actual chamber pressure readout. Once the chamber reaches the set point it will change steps.
D. UV Curing Time Remaining – This is the amount of time remaining in the curing process. The time will tick down until it reaches zero.
E. Chamber Refill Time Remaining – This is the amount of time remaining in the refill process. The time will tick down until it reaches zero.

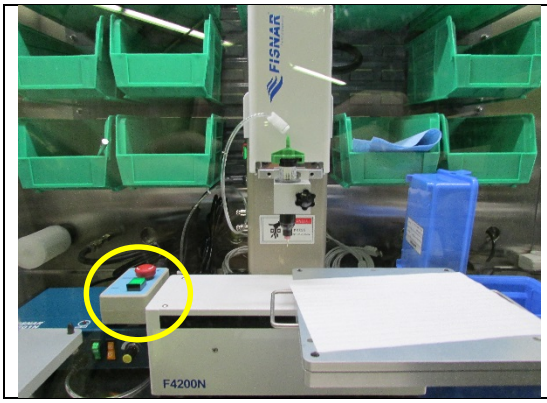
Once the system reaches zeros (0) you have reached the end of the cycle and the process will automatically turn off.

24.6 FUJIFILM Dimatix Materials Printer

1. To operate printer turn power on.

NOTE: For detailed operating instructions refer to the vendor supplied manual located in the documentation package.

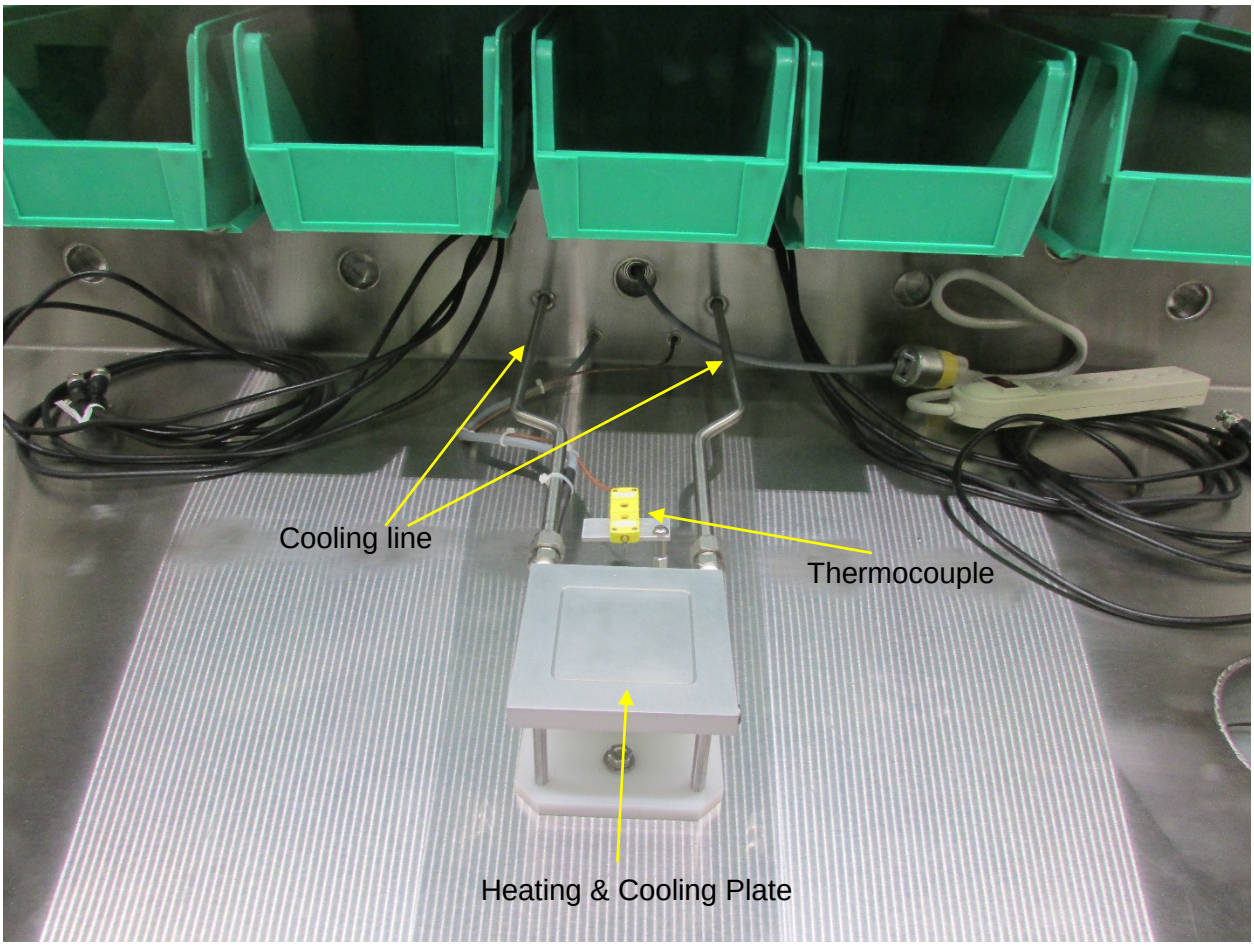
24.7 Fisnar Glue Dispensing Robot



1. To operate the glue dispensing report turn power on.

NOTE: For detailed operating instructions refer to the vendor supplied manual located in the documentation package.

24.8 Heat & Cooling Plate



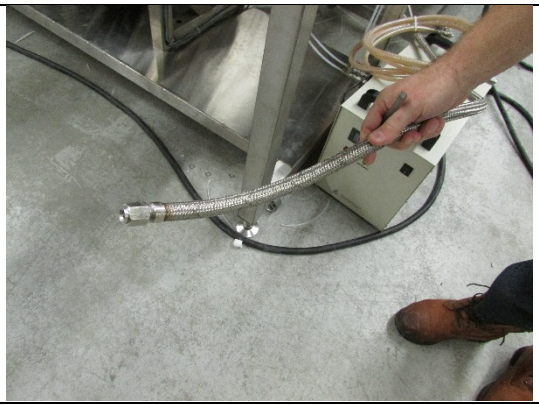
3. Turn on by pressing the switch to the ON position.
4. Turn off by pressing the switch to the OFF position.

To adjust the Set Point:

4. Press the ⬭ key on the temperature controller.
5. Use the ▲ or ▼ arrows to change set point.
6. Press the ⬭ key again to complete.

NOTE: Do not change any other settings on the temperature controller without first contacting LC Technology.

NOTE: The maximum operating temperature is 40°C to -100°C.



NOTE: Liquid nitrogen must be connected to the liquid nitrogen feed line for the plate to cool.

NOTE: Liquid nitrogen must not exceed 60 psi.

Section 25: Technical Support Contact Information from LC Technology Solutions & Partners

LC TECHNOLOGY SOLUTIONS INC.

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Cell: (978) 992-1729
Fax: (978) 428-0222
Email: tkapsimalis@lctechinc.com
Web: www.lctechinc.com

It helps to provide your Project #, which can be found on the back of your glovebox.

AGILENT
(Scroll & Vacuum Pumps)

Alan Bird
Tel: (978) 387-3035
Email: alan.bird@agilent.com

Ray Hula
Tel: (800) 882-7426, #3 for Tech Support
Email: ray.hula@agilent.com

James Ramsden
Tel: (800) 882-7426, #3 for Tech Support
Email: james.ramsden@agilent.com
Web: www.agilent.com

EDWARDS
(RV3, 12 Vacuum & Scroll Pumps)

Randy Morse
Tel: (800) 848-9800 Ext. 3459

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FISNAR
(Robotic Components)

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(Printers & Robotic Components)

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GARDNER DENVER (Welch Vacuum)
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GE SENSING
(Moisture & Oxygen Analyzers)

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Web: www.ge.com

SCS - Specialty Coating Systems
(Spin Coaters & Hot Plates)

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TROVATO
(Evaporation Systems)

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