

LC-1 Stand Alone Glovebox with Touch Screen

Operation/Installation Manual



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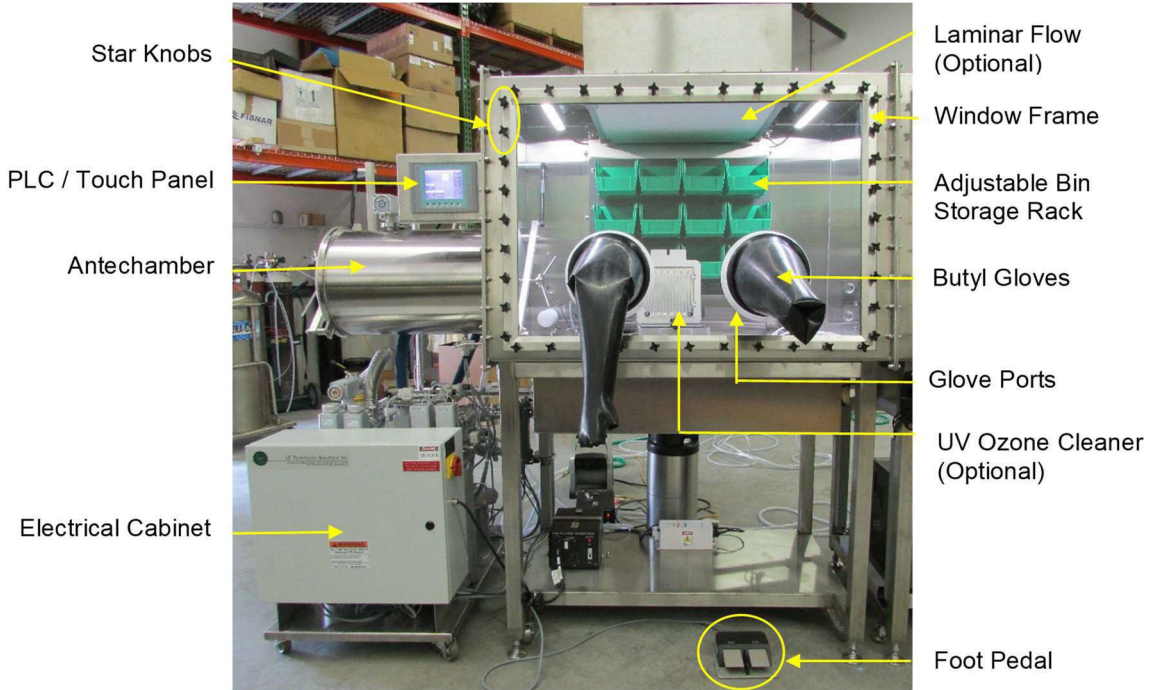
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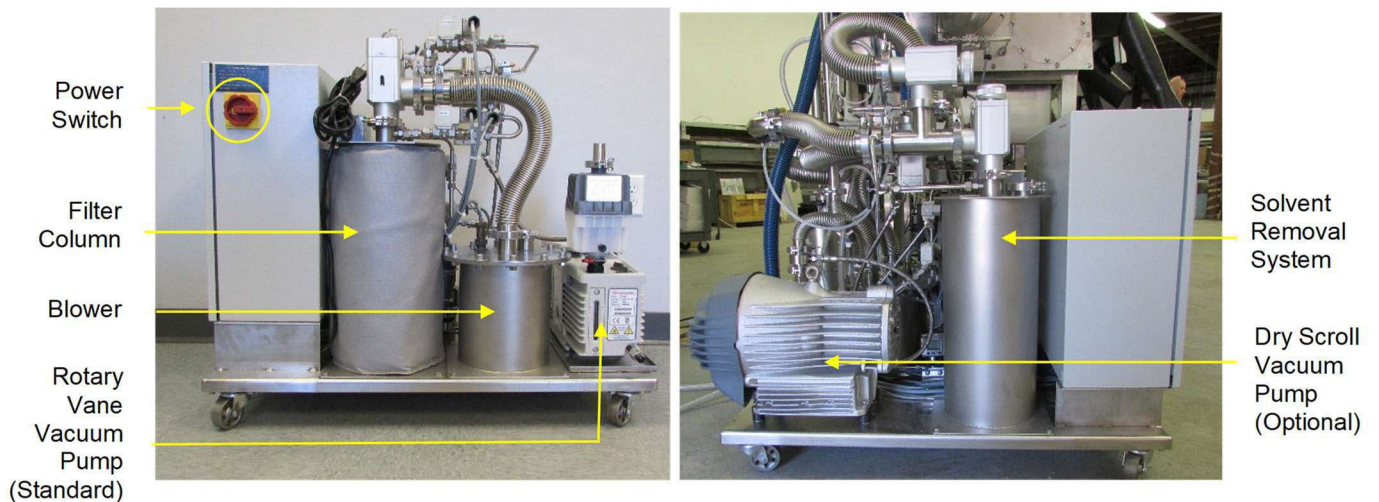


Section 1: System Overview & PLC Panel

1.1 System



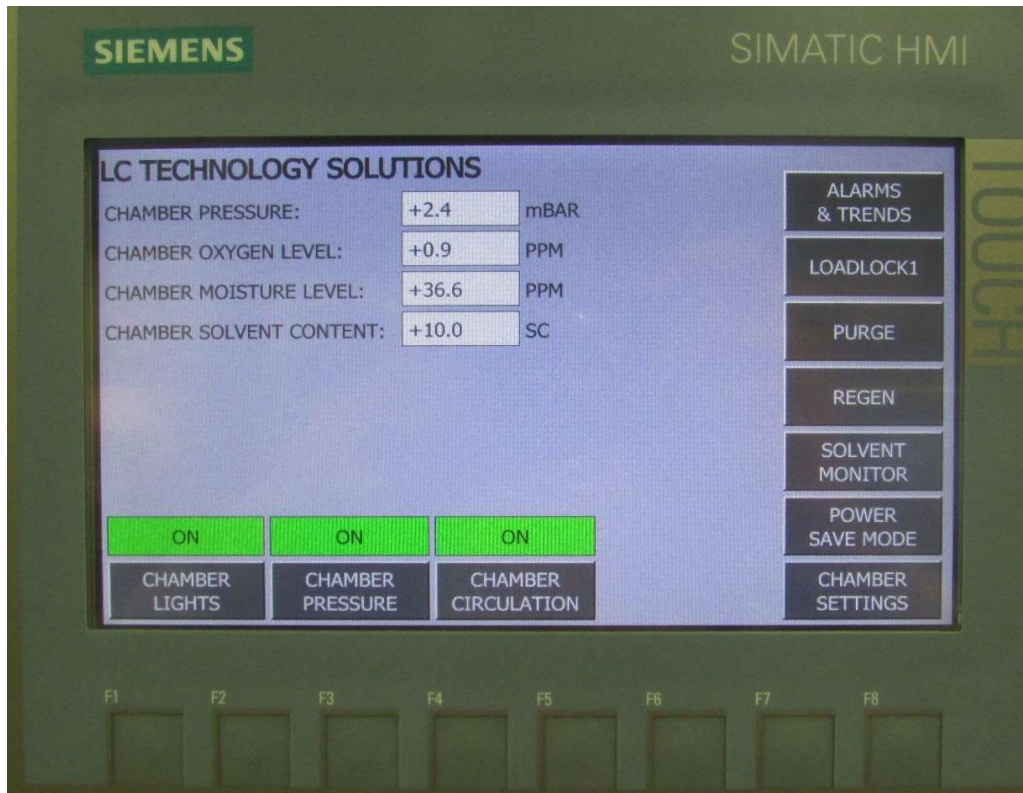
Gas Purification System



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



1.2 PLC Control Panel





Section 2: Caution/Warning Information

2.1 General Information

The manufacturer LC TECHNOLOGY SOLUTIONS, INC. reserves the right for technical and optical modifications, as well as, functional modifications on the systems or systems' components described therein. This technical documentation is not liable to any obligations on the part of the manufacturer.

2.2. Liability

The manufacturer will not be responsible for any liability of object, personal or secondary damage caused by improper use or not following the safety instructions as well as caused by the owner's manual due to missing updates after the system or its software have been modified, nor will the manufacturer take any liability of damages due to loss of data.

Our products are continuously modified and improved due to innovation, legal requirements and standards. Consequently, the information given in this documentation may not directly reflect every detail of the system delivered.

2.3 Warranty

The standard warranty for our equipment is 1 year for the equipment as stated in the order/contract. This warranty will expire in case of:

- Modification of the system without prior consent of the manufacturer
- Improper use of the system
- Insufficient maintenance of the system
- Inappropriate operation of the system
- Incorrect supply requirements
- Application of third-party components to the system without prior consent of the manufacturer
- Alteration of software

⚠ NOTICE This applies to single unit and multi-unit system types.

2.4. Entries Referring to the System

This documentation is part of the system:

- Designation / Type: RGP- Series of Gas Purifiers
- Serial number(s): RGP-050 thru RGP-300
- Person(s) in charge of the system:



2.5 Service Address

LC TECHNOLOGY SOLUTIONS INC.

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2.6. Intended Use

The purpose of the LC TECH gas purification system, together with a glove box, is for enabling and maintaining a pure inert gas atmosphere inside a leak tight enclosure. Materials that are sensitive to moisture and/or oxygen are handled within the enclosure. The system is not intended for personal use.

⚠ NOTICE The system will require certain modifications for working with delicate or dangerous materials. Examples of such cases include:

- **Pharmaceutical or nuclear applications**
- **Working with substances that will lead to dangerous situations if exposed to air in case of a failure of the system**
- **Very expensive materials that might be destroyed if exposed to air in case of a failure of the system**

These application types must be discussed with LC TECH prior to operating the system.



2.7. Safety Instructions





2.7.1. General Information

This manual should be read in its entirety and be in a suitable area near the system to allow for easy reference prior to installation, initialization and operation of the system. Any persons charged with the installation, commissioning, operating, maintenance and/or service of this system must be familiar with the entire contents of this manual.

To ensure safe operation of the system and to maintain a safe working environment, the information contained within this chapter must be adhered to by all users of the system. Advice contained in this chapter is intended to supplement, not supersede, the safety advice given in other chapters of this manual and the general safety regulations and guidelines prevailing in the user's workplace.

In addition to the guidelines and information contained within this manual all internal, local health, safety and environmental guidelines should be followed. Safety instructions plus pertinent information is marked in the following manner:

Table 1.1: Signal Words – Definition

	Indicates an imminently hazardous situation that, if not avoided, will result in death, serious injury or serious damage to the system, other equipment or surrounding environment.
	Indicates a potentially hazardous situation that, if not avoided, could result in death, serious injury or serious damage to the system, other equipment or surrounding environment.
	Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or damage to the system, other equipment or surrounding environment.
	Indicates additional advice or recommendations for using the system or completing a task.

Please consider all instructions, in particular safety instructions, in order to achieve and maintain safe operation of the system.




2.7.2. Operation Guidelines

LC TECH Glove box systems are operated using inert gas enabling the user to handle substances that are sensitive to oxygen and/or moisture. It is the responsibility of the user to follow all local health, safety and environmental guidelines with regards to the handling and disposing of substances that may be injurious to health. This also applies to the disposal of vacuum pump oil and all components and filtering devices that come in contact with the gas flow.


 DANGER There is a risk of suffocation when working with high inert gas concentrations.


The following general safety guidelines must be considered when working with inert gas concentrations:

- The selected location should have a “room” volume that is significantly larger than the glove box interior volume.
- The system should be located in a well-ventilated area. This is especially important during a purging procedure or when opening an active system (i.e. antechambers, etc.).
- All exhaust fumes should be vented through an adequate disposal/ventilation system.

 NOTICE If it is not possible to adhere to all the above recommendations contact LC TECH prior to the acquisition of the system.

It is very important prior to performing maintenance or service, inside an active system, to power off the system and remove one glove to allow a slow equalization of the glove box interior atmosphere with the ambient room air. This will help to ensure that the glove box is at atmosphere before entering the unit.

 CAUTION To better avoid the risk of suffocation, it is necessary for the glove box atmosphere to be completely replaced with ambient room air prior to servicing the interior of an active glove box. A personal oxygen monitor is recommended.

 WARNING Standard LC TECH glove box systems are not designed for the use of strongly poisonous or radioactive substances.



2.7.3. Safety Instructions: General Hazards

This system has been designed and manufactured considering all relevant safety regulations. Improper use or operation by persons not qualified accordingly may result in danger to the:

- Life and health of the operator
- System itself
- Surroundings of the user
- Performance and efficiency of the system

General hazards of the system may arise in the following ways:

- Mechanical hazard caused by squeezing, shearing and cutting, catching and winding, stretching or by freely moving parts
- Thrust caused by kinetic energy of moving mass
- Sharp corners and edges
- Electrical hazard caused by touching live parts (directly or indirectly)
- Thermal hazard causing burns
- Chemical hazard causing poisoning, corrosion and explosion
- Toxic hazard due to inhalation of vapors and gases
- Gases under pressure
- Liquids under pressure
- Combination of hazards caused by:
 - faulty installation
 - incorrect loading
 - breakdown of power or media supply
 - breakdown and/or incorrect arrangement of preventive measures
 - combination of escaping media
- Hazards caused by:
 - human misconduct
 - noise
 - allergies, excitations of mucous membrane, unknown effects caused by media
 - ejection of parts
 - disturbance / malfunction of control system
 - leaking of hoses or pipes
 - combination of atmospheres or vapors
 - fire hazard
 - natural hazards e.g. lightning, flooding, environmental catastrophes etc.

2.7.4. Over and under pressure safety of the box

Under normal operation conditions the box may be operated between -10 mbar and +10 mbar with a safety range of – 15 mbar and + 15 mbar.

In the unlikely case of a valve failure or a pressure sensor failure the box may be exposed to extreme pressures.



The standard safety feature to prevent dangerous situations arising from an over or under pressure malfunction is provided by the glove itself. The fixture of the glove has been designed in a way that the glove will be dismounted before any damage is caused to the box.

⚠ WARNING For standard systems always ensure that at least one glove port remains in normal operation. That means glove fixed and glove port not sealed with an inner or outer glove port cover. The intended use of the inner glove port cover that is available as an option from LC TECH is for sealing a glove port during a glove change. The intended use of the outer glove port cover that is available as an option from LC TECH is for temporarily sealing a glove port.

The addition of a mechanical over pressure safety device is required if the application requires that all glove ports be sealed simultaneously or to ensure that the inner box atmosphere remains protected from exposure to ambient air in the event of a valve malfunction. Please contact **LC TECH** Service Department for further assistance.

This remark also applies to each section of multi-box systems with individual compartments, separated by an antechamber or an intermediate door, as well as for gas purification systems that have a multi-box operation-mode.

2.7.5. Safety Instructions: Mechanical

⚠ WARNING Moving parts may cause squeezing, shearing and cutting, catching and stretching of extremities. Extreme caution should be taken to avoid touching any moving parts of the system during operation.

When handling materials with mechanical, pneumatic or vacuum systems it is possible that materials may be ejected. Extreme caution should be taken to avoid any possible contact with the ejected materials without proper protection.

Only genuine parts supplied by LC TECH should be used in the operation of the system. These parts are constructed in conformance with applicable safety regulations. No liability will be taken by LC TECH in the event of installation of parts manufactured by companies other than LC TECH, which may result in additional and unknown hazards.

In case of the system being operated by two or more persons, operation should be conducted in such a way as to ensure each individual's respective task does not influence other tasks in any way. Simultaneous operation of the system by two or more persons is not recommended as this may cause hazards based on misconduct or mutual misunderstanding.

Safety covers, panels, panes, windows or doors may not be removed at any time, unless there is a need for service. The system may not be opened (i.e. antechambers, etc.) during processing or power failures.



In the case of any safety deficiencies, the system must be decommissioned, and the service personnel informed accordingly. During decommissioning compliance with all local health, safety and environmental guidelines must be followed.

2.7.6. Safety Instructions: Electrical

This system operates under high voltage. Risk of injury caused by high voltages exists anytime the system is connected to the power supply; this includes when the system is powered off. Capacitors within the system may be charged when the system is switched off and disconnected from main power supply.



Electrical hazard

Interchange of current bearing wires can result in electrical hazards such as shock, involuntary muscle reaction, muscle paralysis, burnt tissues and organs, or death.

Connection to the main power supply must be performed by a qualified electrician according to local area guidelines. All neutral and ground wires must be connected accordingly.

Opening the system or removing parts when the system is powered on may result in exposure to live electrical connectors. Extreme caution should be taken to avoid directly or indirectly touching live connectors to avoid possible electric shock.



Prior to performing any electrical service work on the system, ensure the system is powered off and disconnected from the power supply. A lock out/tag out procedure is recommended.

Service required while the system is in operation should only be performed by qualified personnel trained in the knowledge and prevention of all potentially dangerous and hazardous situations.

The system must always be grounded/earthed. Do not remove or cut off any ground wire for the system or its components. In case of insufficient grounding or damaged ground conductor ensure the system will be inoperable and secure it against unauthorized or unintentional operation.



Insufficient grounding can cause electrostatic charging of plastic parts, hoses or pipes, wiring and/or the system as a whole, which could cause solvents and process chemicals to ignite when not within an Inert Gas atmosphere.




Makeshift fuses and/or short circuit fuse holders should never be used in the operation of the system. Only use the same fuses supplied with the system.



2.7.7. Safety Instructions: Handling of Electronic Components

Electrostatic discharges can cause damage to parts. When handling electronic components, the following precautions should be observed:

- Wear a grounded wrist strap or work on a grounded static-dissipating work surface. If this is not possible touch an adjacent earth ground (i.e. central heaters or water pipes) before handling electronic components or printed circuit boards.
- Leave electronic components and printed circuit boards in their original packaging until final installation.
- Handle electronic components by their body or case, avoid touching of leads.
- Keep electronic components and printed circuit boards away from such static generating materials as vinyl, plastic bags, etc.


 **NOTICE** Required maintenance and repair work should only be carried out by LC TECH service or by persons of equivalent qualification.

2.7.8. Safety Instructions: Chemicals and Gases

Chemicals are provided and applied by the system user and are not supplied by LC TECH.

Proper handling of chemicals, corrosives and solvents is the user's responsibility. Materials used may be flammable, explosive or toxic. The user must follow their local rules and regulations for handling chemicals and gases. Below are some guidelines to refer to when handling chemical substances:

- Observe relevant safety regulations as well as material safety data sheets (MSDS) and additional advice provided by the supplier;
- Wear proper protective safety masks, gloves and eyewear whenever working with chemicals, corrosives or solvents;
- Mark all containers and supply lines of chemicals (i.e. containers of media and waste) with appropriate labels and warning signs;
- Ensure proper ventilation and exhaustion of vapors;
- Keep away from ignition sources.

 **CAUTION** Released chemicals may react with each other, leading to unwanted and/ or unknown substances, which may cause additional risks.

Proper handling of gases is the user's responsibility. Gases used may be flammable, explosive or toxic. Below are some guidelines to refer to when handling gaseous materials:

- To avoid risk of suffocation, do not inhale the gas
- Prevent electrostatic charging and beware of ignition sources



⚠ NOTICE When using corrosive, gassing or noxious materials, the safety of all employees must be ensured by whatever means necessary. Specifically, all employees must be trained in the safe handling of the materials to be used. Proper personal protective equipment is recommended.

2.7.9. Safety Instructions: Symbols Used on System

The following symbols refer to LC TECH components and parts. However, components and parts of sub-suppliers may show other symbols, not expressly mentioned or referred to in this manual. The following caution and command symbols may be seen on the system:

Table 1.2: Safety Symbols



General hazard



Electrical hazard



Pressurised gas hazard



Wear safety mask



Wear safety goggles



Wear protective gloves

⚠ NOTICE Regardless of the number of caution symbols and information placed on or around the system, all safety instructions of this manual must be observed! The owner of the system is responsible to place adequate danger signals and labels in suitable places. This applies to signals and labels concerning process chemicals used.

2.7.10. Safety Instructions: Emergencies

In case of an emergency, please observe the following instructions:

1. Immediately shut down the system using the main power switch.
2. Disconnect the system from all gas supplies.
3. Refer to the material safety data sheets for information on treating the emergency. Contact the appropriate emergency response personnel in the area and/or listed on the material safety data sheets.

⚠ CAUTION Do not disconnect the water supply for systems containing components requiring a cooling water source.

Prior to restarting, the system must be fully checked for safety, contact the LC TECH Service Department after the emergency has been rectified.



⚠ NOTICE In addition to the information contained in this manual all local health, safety and environmental guidelines must be followed.

2.7.11. Additional Safety Information

The system is considered unsafe for operation if:

- there is any visible damage
- it fails to perform according to specification
- it has been subject to prolonged storage under unfavorable conditions
- it has been subjected to severe transport stress


If the system meets any or all the above:

- make it inoperable
- secure it against any unauthorized or unintentional operation
- contact the LC TECH Service Department


⚠ CAUTION Do not perform any service or repair of the system or its components other than described in this manual.

⚠ NOTICE Maintenance, repair and service other than described in this manual may only be performed by LC TECH service personnel or properly trained/qualified individuals.

⚠ NOTICE The RGP-1 gas purification system is heavy. Use a forklift to remove from pallet upon arrival, if available.

⚠ WARNING  Pressurised gas hazard Inert gas should be regulated at 60-80 psi. Over-pressurization of the system can cause critical damage to components and bodily harm.

⚠ NOTICE Under-pressurization of the system will cause loss of functionality.

⚠ WARNING  Pressurised gas hazard Regeneration gas should be regulated at 15 psi. Regeneration gas should be considered flammable. Over-pressurization can cause damage to components.

⚠ CAUTION The common vent line should be vented appropriately. The common vent line can exhaust dangerous vapors. Ensure the common vent line is vented appropriately before operation. Do not run out of gas during purging of glovebox.



⚠ NOTICE Loss of gas pressure during purging will cause the purge outlet valve to close, increasing pressure in the box enters overpressure safety mode.

⚠ NOTICE Regeneration cycle times are critical to the system running properly – DO NOT change these settings.

⚠ NOTICE Regeneration gas must be supplied at 15psi and at a flow rate of 15L/min. Verify these parameters before beginning a regeneration cycle.

2.8. Transport, Storage and Site Location

2.8.1. Transport

Prior to installation and operation of the system, the Operating Instructions must be read and observed. Contact the LC TECH Service Department with any questions.

Preparations for transporting an LC TECH system should be carried out by an LC TECH technician only. The transport of the system or any part of a multi-unit system should be performed by a forwarding agency offering specialized transportation services.

⚠ WARNING The system is extremely heavy and awkward, if not handled properly tipping or overturning may occur. Use extreme caution when transporting a system and ensure all parts are securely fastened prior to relocation.

2.8.2. Storage

The system can be stored safely under the following conditions:

- Free of liquids or substances (e.g. process chemicals, etc.);
- Room temperature between +50 F (+10°C) and +105 F (+40°C) with a relative humidity ≤80% and no condensation;
- Protected from dust and contamination.

⚠ NOTICE After moving the system from storage conditions to final site location allow enough time for the system to adapt to the current environment.



2.8.3. Site Location

Selecting the site for an LC TECH system or any part of a multi-unit system should be carried out by LC TECH technicians only.

Prerequisites:

Table 1.3: Prerequisites

Room:	<ul style="list-style-type: none">• Dry atmosphere with a temperature between +60F (+15 °C) and +86F (+30 °C);• Well ventilated.
Surface Conditions:	<ul style="list-style-type: none">• Firmly structured floor;• Level positioning.
Clearance:	<ul style="list-style-type: none">• Minimum distance of 600 mm from surrounding walls• Allow sufficient working area where glove ports, antechambers, etc. require access.

2.9. Modifications

Any unauthorized change or modification to the system will cause the warranty to expire. Changes and/or modifications of any kind to LC TECH systems should be made by LC TECH technicians only. However, exceptions can be made with prior written confirmation from LC TECH.



Section 3: System Arrival

3.1 Disassembly of Crate

	<ol style="list-style-type: none">1. The system will arrive in a crate.2. Remove the crate panels in the following order:<ol style="list-style-type: none">a. Top panel.b. Shipping braces, if applicable.c. Large left and right panels.
	<ol style="list-style-type: none">3. Use a cordless drill with a Phillips head driver bit to remove screws.
	<ol style="list-style-type: none">4. This is how the system will look inside the crate.



3.2 Remove Loose Parts

	<ol style="list-style-type: none">1. Cut the banding straps and remove boxes containing loose parts for the glovebox system.
	<ol style="list-style-type: none">2. Some parts will come packed in bubble wrap and plastic bags. Remove the packaging.



3.3 Remove System from Crate



1. Once sides are off, unbolt lag bolts from Z-brackets using a $\frac{3}{4}$ " wrench.

OR

Remove the shipping braces with a Phillips head driver bit.



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



3. Remove the system from the crate.

CAUTION: The system is heavy. Use a forklift, if available, to remove the system from the pallet.



4. Carefully remove any shrink wrap.



3.4 Remove Gas Purifier Cart

 A photograph showing a gas purifier cart on a wooden pallet. The cart is wrapped in clear plastic shrink wrap and secured with yellow banding straps. The cart has a metal frame and a control panel on the right side.	<ol style="list-style-type: none">1. Remove/cut banding straps.2. Unscrew 2x4s holding purifier in place. Use a cordless drill with a Philips head driver bit to remove screws.
 A photograph showing the gas purifier cart wrapped in clear plastic shrink wrap, resting on a wooden pallet. The cart is positioned in a warehouse setting.	<ol style="list-style-type: none">3. Remove purifier from crate. Use a forklift to remove from pallet, if available.
 A photograph showing the gas purifier cart with the shrink wrap removed. The cart is a complex piece of machinery with various pipes, valves, and a control panel. It is mounted on a metal frame.	<ol style="list-style-type: none">4. Carefully remove shrink wrap.



Section 4: Assembly



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

⚠ WARNING Incorrect assembly will prevent the system from functioning properly and can critically damage components.

See examples to the left.



Section 5: Hook Up Gas/Power

5.1 Gas Connections

The 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



Pressurised gas hazard

Over pressurization of the gas line will damage components and may cause bursting.

NOTICE The 3/8" ID Tygon tubes should be connected to inert gas at 60-80psi.



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

NOTE: The 3/8" ID Tygon tube should be connected to regeneration gas at 15 psi.

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

CAUTION Flammable

NOTICE The 3/8" ID Tygon tube should be connected to regeneration gas at 15 psi.

NOTICE Incorrect regeneration gas pressure or flow will result in a failed regeneration cycle.

Regeneration gas flow rate is 15 liters per minute.



5.2 Power Connections

The system will have a 115V/220V power cord coming from the back of the purifier.

Plug the cord into a standard 115V, 15 Amp outlet or standard 220V outlet for International use.

	<p>Electrical Feedthroughs</p> <p>US locations – Plug electrical feedthrough into 115V power supply.</p> <p>International locations - Plug electrical feedthrough into 220V power supply.</p>
	<p>Vacuum Pump</p> <p>LC-1 Gloveboxes with an RGP-1 Gas Purifier come prewired into the glovebox system.</p>





Section 6: Venting

6.1 Common Vent Line

	<p>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" OD connection point.</p>
	<p>NOTE: It is highly recommended that this line be vented to an exhaust system</p>
	<p>CAUTION Chemicals used during customer processes will be released through the common vent line.</p>
	<p>Vent Line Port</p>







6.2 Preferred Method of Vent Connection

	<p>Vent the glovebox using a loose fit ductwork adapter (snorkel connection).</p> <p>⚠ NOTICE Use of an airtight connection between the common vent line and the customer exhaust system can remove working gas from within the inert gas environment.</p>
	<p>⚠ NOTICE If the system was supplied with an over pressure relief device, DO NOT place the fume hood connection directly on the automatic pressure relief/exhaust valve. Place the connection over the valve as shown.</p> <p>Placing the connection directly on top of the automatic pressure relief valve will cause it to malfunction.</p>





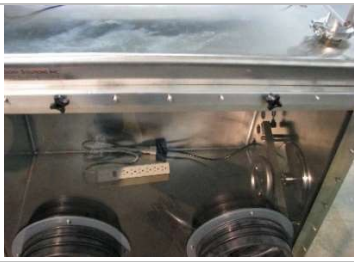
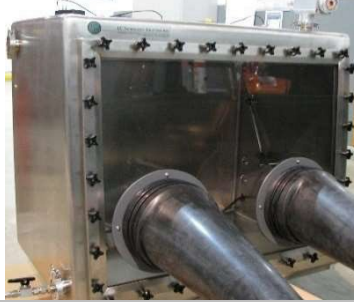

Section 7: Window Removal

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

	<ol style="list-style-type: none">1. Undo all the star knobs with exception of two (2) at the top and two (2) at the bottom. You may choose to remove gloves prior to window removal to decrease chance of damage to the gloves.
	<ol style="list-style-type: none">2. Remove the remaining star knobs, being careful not to let the window and window frame fall.
	<ol style="list-style-type: none">3. Remove the window frame and set aside.
	<ol style="list-style-type: none">4. Remove the window and set aside. Always place window down in a clean area. Complete the required work.







Section 8: Window Replacement

	<ol style="list-style-type: none">1. Place the window on bottom window studs and push the window forward into position against the gasket. Ensure no debris became stuck between gasket and window.
	<ol style="list-style-type: none">2. Replace the window frame.
	<ol style="list-style-type: none">3. Replace the top two (2) and bottom two (2) star knobs.
	<ol style="list-style-type: none">4. Replace the remaining star knobs. <p>NOTE: Do not tighten until all knobs have been started</p>
	<ol style="list-style-type: none">5. Tighten the star knobs until the window frame contacts the glovebox.6. Replace gloves if they were removed.




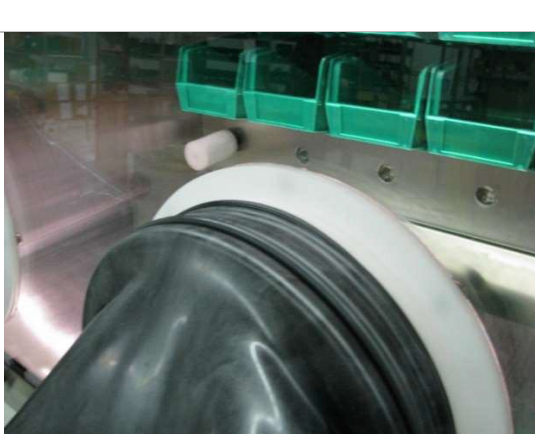

Section 9: Glove Attachment

 A black nitrile glove is being placed onto a circular white glove port on a stainless steel glove box. The glove is partially inside the port.	<ol style="list-style-type: none">1. Place the glove onto the glove port.
 A hand is inserted into the black nitrile glove, which is now fully seated on the white glove port. The hand is positioned with the thumb facing upwards.	<ol style="list-style-type: none">2. Place your hand in the glove and align the glove in a comfortable position, with thumbs facing upwards.3. Move the glove forward until it meets the innermost glove port groove.
 A white O-ring is being placed into the center groove of the black nitrile glove, which is now fully seated on the white glove port.	<ol style="list-style-type: none">4. Place the first glove O-ring in the center glove port groove.
 A second white O-ring is being placed into the outermost groove of the black nitrile glove, which is now fully seated on the white glove port.	<ol style="list-style-type: none">5. Place the second glove O-ring in the outermost glove port groove.



Section 10: Changing a Glove Without A Glove Port Cover

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.

 A close-up photograph showing a person's hand pulling a black O-ring away from a white glove that is attached to a metal port. The background shows green plastic components of the machine.	<p>1. Remove the O-ring nearest to the window.</p>
 A close-up photograph of the white glove on the metal port. The black O-ring has been removed and is lying on the surface next to the glove. The green plastic components are visible in the background.	<p>2. Glove with O-ring removed</p>
 A close-up photograph showing the white glove being folded back over the metal port. The black O-ring is now visible, having been repositioned under the folded edge of the glove.	<p>3. Fold the glove back over the existing O-ring.</p>



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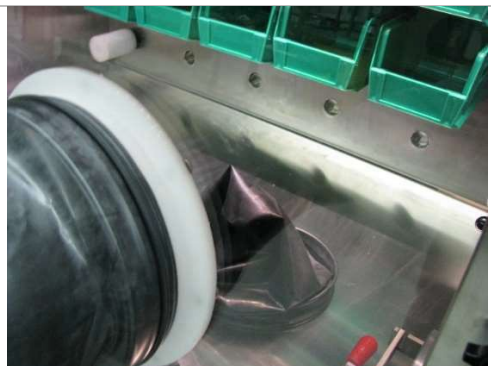
4. Place new glove over the old glove. Make sure the new glove is mounted in the O-ring groove.



5. Replace the O-ring nearest to the window.



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



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



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8. Reattach the second O-ring. The glove change is now complete.




Section 11: Leak Checking

⚠ NOTICE After assembly, it is important to leak check the system prior to purging. This is an important step in making sure the glovebox functions properly.

1. Turn on the power to the system.
2. To change settings, refer to Section 11.1 Set Points
3. Change the Chamber Pressure Control settings to the following set points:
 - a. 4.5mBAR high.
 - b. 2.0mBAR low.

⚠ NOTICE These set points are for testing purposes only.

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

⚠ WARNING  **Ensure the pressure sensor is properly attached before activating Chamber Pressure Control**

5. Gas will begin to flow into the box until the low set point is reached.
6. Using the foot pedal, press the gas pedal to increase the pressure to the upper set point.

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

⚠ NOTICE If you are leak checking your glovebox after your system has been running, turn OFF Circulation for 30 minutes prior to going on to Step 7.

7. After the glovebox pressure has settled, time how fast pressure drops 0.1mBAR. For a successful test, the pressure should not drop 0.1mBAR in three (3) minutes.
e.g.: When the glovebox is at 2.5mBar it should hold between 2.5 and 2.6mBar for three (3) minutes. If it drops to 2.4, reset the timer. Take note of how long it takes to drop each 0.1 mbar. This is your leak rate.

⚠ NOTICE If the test does not reach the above requirement, go over the fittings to check for a leak or any loose fittings. Once fittings have been checked, repeat the test until successful.

8. After a successful leak check, return the pressure settings to the following set points:
 - a. 2.5mBAR high.
 - b. 0.5mBAR low.



Section 12: Purging

Section 12.1 Purging Times

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 recommend purge times and gas needed for each glovebox model at start-up:


Glovebox Model Number	Time and Gas Required
LC-100	2.5 cylinder, 750 c/f 2 hours
LC-150	3.5 cylinder, 1050 c/f 2 hours 30 min
LC-180	4.0 cylinder, 1200 c/f 3 hours
LC-200	5.0 cylinder, 1500 c/f 3 hours 30 min

Refer to Section 13.3 Automatic Purge and Section 22 Manual Purge for detailed instructions on how to purge the glovebox.

NOTES:

1. 240 minutes is the maximum amount of time you can set auto purge to run.
2. You should only set auto purge to 240 minutes if you are using a house supply or Dewar of inert gas when purging.
3. You should only set auto purge to 45 minutes if you are using cylinders of inert gas when purging.
4. Nitrogen/argon must be 99.995% or better.

 **CAUTION** Do not run out of gas during purging of the glovebox.

 **NOTICE** Once you have successfully completed purging your glovebox you can then turn circulation ON (see Section 13). The oxygen and moisture levels displayed are only accurate when circulation is ON. The analyzers are flow sensitive and the circulation blower is used to flow gas through the analyzers to get a sample of gas from the glovebox. When first turning circulation on depending on the size of your glovebox, oxygen and moisture levels can take several hours to a day to read low levels. During this time, they should be trending downward.



Section 12.2 Analyzer Isolation Valves

The system may be equipped with analyzer isolation valves to conserve life during shipping. After installing the system, perform a leak check and purge the system prior to opening the isolation valves. Failure to open the valves will result in incorrect reading.



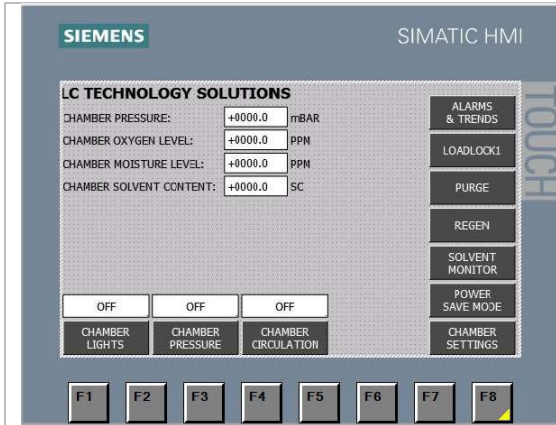


Section 13: Operational Instructions

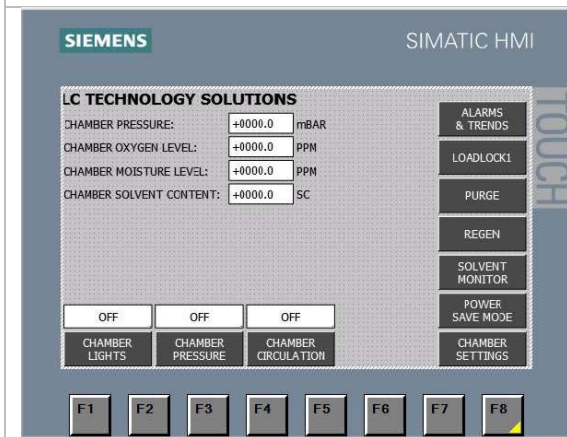
13.1 Main Screen

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 follow 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 and will turn **green**



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 and the button will turn green.
3. **⚠ CAUTION** Pressure within the inert gas environment should be maintained over atmospheric. If the pressure is below atmosphere, then the room air could be introduced to the inert gas environment.
⚠ NOTICE Pressure settings have been preset at the factory to a low limit of 0.5mBAR and a high limit of 2.5mBAR. This is a typical pressure range for the glovebox.

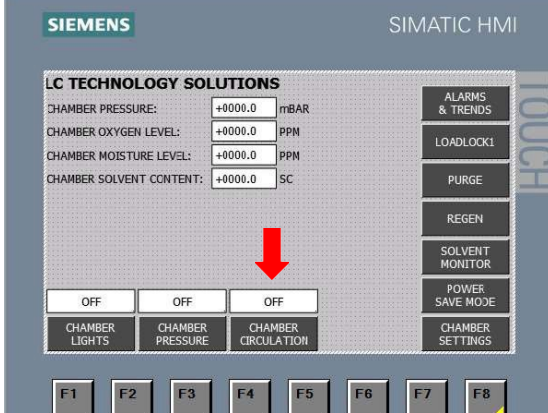
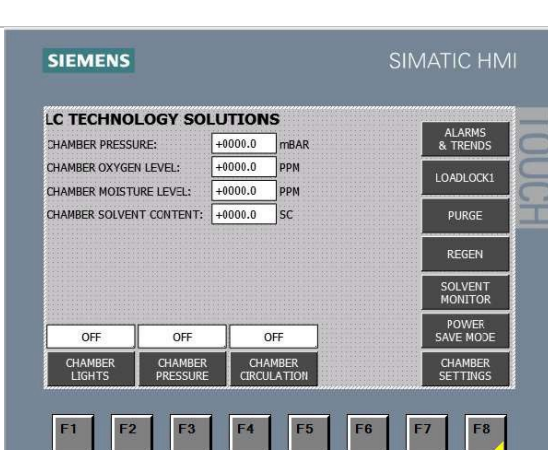

The system has been supplied with foot pedals to help control the pressure between the high and low set points.

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



13.3 Automatic Purge

For Manual Purge instructions, refer to Section 22.

 <p>The screenshot shows the 'LC TECHNOLOGY SOLUTIONS' main menu. It includes fields for Chamber Pressure, Oxygen Level, Moisture Level, and Solvent Content, all set to +0000.0. Below these are three 'OFF' buttons for Chamber Lights, Chamber Pressure, and Chamber Circulation. A red arrow points to the Chamber Circulation button. On the right, there is a vertical menu with buttons for ALARMS & TRENDS, LOADLOCK1, PURGE, REGEN, SOLVENT MONITOR, POWER SAVE MODE, and CHAMBER SETTINGS. At the bottom are function keys F1 through F8.</p>	<p>Confirm gas is properly hooked up with a regulator capable of supplying 60-80 psi of gas pressure at a flow rate of 200 l/m.</p> <ol style="list-style-type: none">From the main screen:<ol style="list-style-type: none">Verify Chamber Pressure Control is ON and it will turn green.Chamber Circulation should be OFF, OFF should be displayed
 <p>This screenshot is identical to the previous one, but the 'PURGE' button in the right-hand vertical menu is highlighted with a yellow background.</p>	<ol style="list-style-type: none">From the main menu, Press the Purge button.
 <p>The screenshot shows the 'CHAMBER PURGE CONTROL' screen. It features a 'CHAMBER PURGE' button, a 'CHAMBER PURGE TIME SP' field set to 000 MIN, and a 'CHAMBER PURGE TIME REMAINING' field set to 00. A '< RETURN' button is at the bottom left. The right-hand vertical menu is partially visible on the right side.</p>	<ol style="list-style-type: none">Press the Chamber Purge button. The system will begin to purge automatically. ON will be displayed and it will turn green, the system will begin to purge automatically.The Automatic Purge Function is controlled by time. The purge time is preset at the factory for twenty (20) minutes



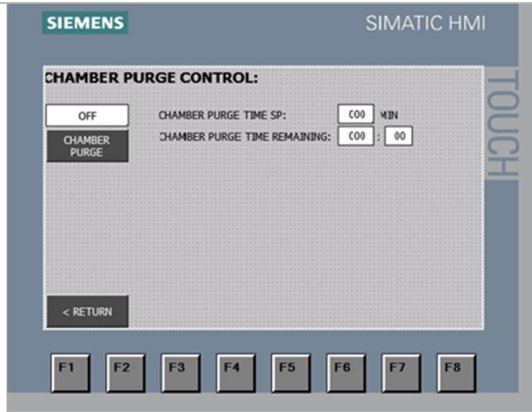
5. From the Chamber Purge Control screen check the purge time.

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.

⚠ NOTICE Do not exceed 45 minutes if purging with cylinders.

For Dewars and house gas supplies, refer to Section 12 for purge times.

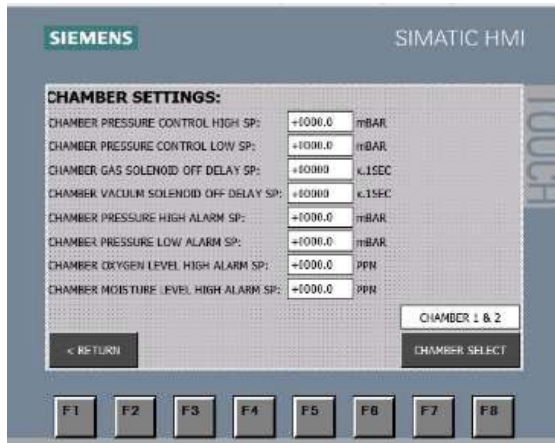


6. Chamber Purge Time Remaining reflects the amount of time remaining in the purge cycle.

⚠ NOTICE Once the purge cycle time ends, the system will stop purging.



13.4 Automatic Purge Function Connected to Oxygen Level

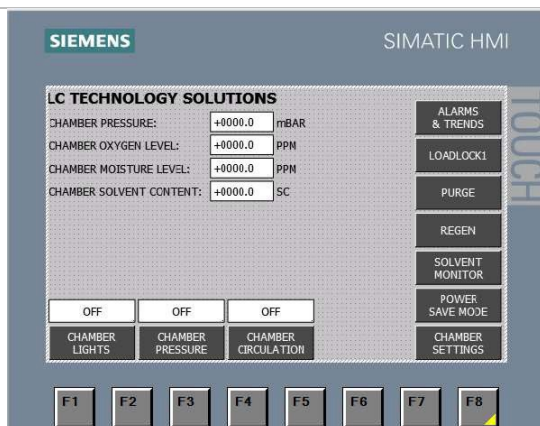


This option allows the user to set the automatic purge function to the alarm levels of the oxygen and moisture inside the glovebox. Most customers use this to automatically purge the glovebox if the oxygen level exceeds the alarm.

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

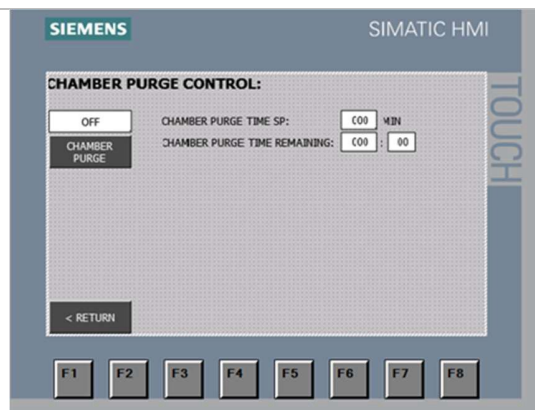
NOTICE This is typically set to 10 ppm.

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



When the oxygen level reaches the alarm set point the system turns OFF circulation and starts to purge the system. The purge button will turn **green** when purging is happening.

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

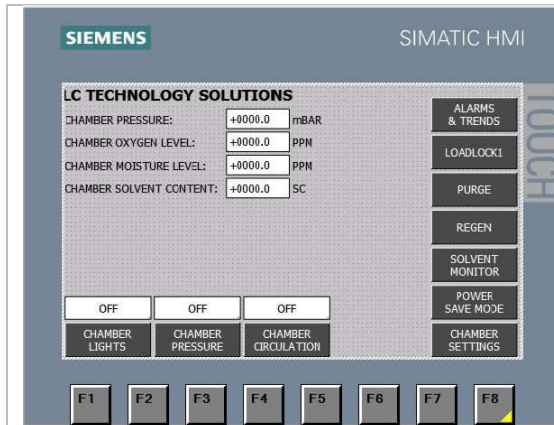


When the alarm is triggered, the automatic purge will activate and run for the amount of time set on the Chamber Purge Control screen. It will continue to purge even after the alarm has cleared for the time set in this function screen.



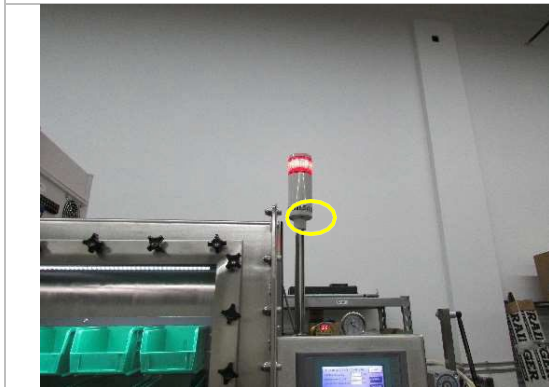
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When the purge time has elapsed, the system will automatically turn circulation ON, **On** will be displayed and it will turn **Green** and purge will now be OFF.

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.



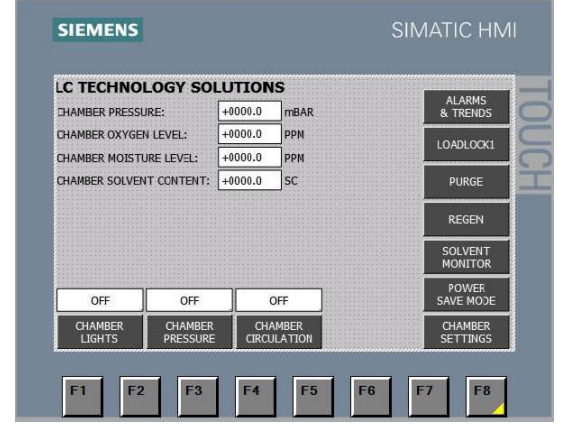
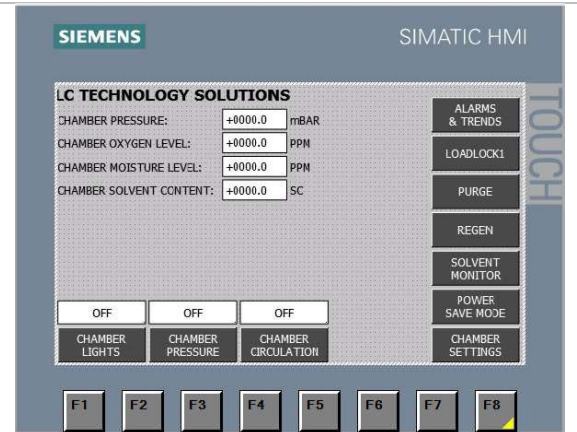
If the system was purchased with an alarm light and/or buzzer, the alarm/buzzer will trigger when the system is in an alarm state.

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.

 <p>The screenshot shows the SIMATIC HMI interface for LC Technology Solutions. The 'CHAMBER CIRCULATION' status is currently 'OFF'. The 'CHAMBER CIRCULATION' button is highlighted in green. The 'CHAMBER LIGHTS' and 'CHAMBER PRESSURE' buttons are also highlighted in green. The 'CHAMBER CIRCULATION' button is highlighted in green.</p>	<ol style="list-style-type: none">1. To start circulation of the glovebox environment through the filter column, Chamber Pressure Control must be ON and it will be green.2. To begin circulation, press Chamber Circulation. ON will be displayed and it will be green.
 <p>The screenshot shows the SIMATIC HMI interface for LC Technology Solutions. The 'CHAMBER CIRCULATION' status is currently 'ON'. The 'CHAMBER CIRCULATION' button is highlighted in green. The 'CHAMBER LIGHTS' and 'CHAMBER PRESSURE' buttons are also highlighted in green. The 'CHAMBER CIRCULATION' button is highlighted in green.</p>	<ol style="list-style-type: none">3. To turn off circulation, press Chamber Circulation. OFF will be displayed.



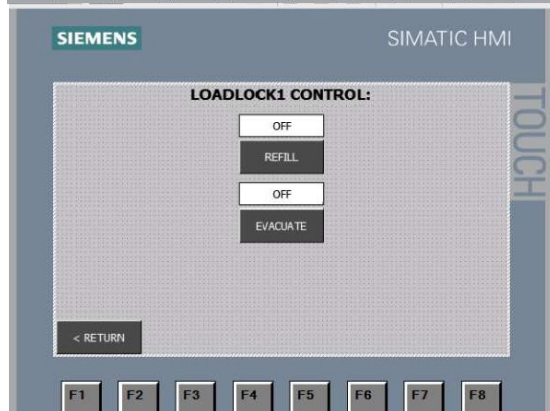
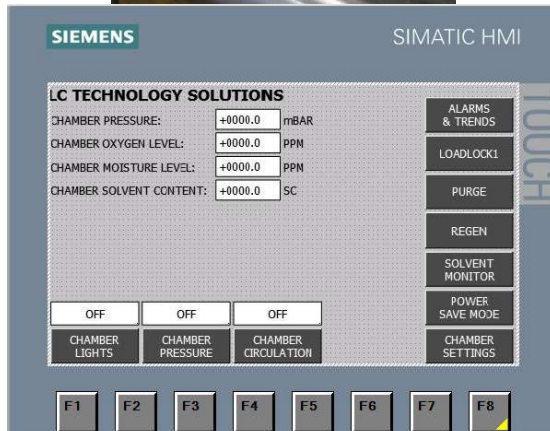
Section 14: Antechamber Operation

14.1 Bringing Items into the Glovebox

	<ol style="list-style-type: none">1. Make sure the antechamber is filled and the vacuum gauge reads zero.2. Open the outside antechamber door.
	<ol style="list-style-type: none">3. Load green bin or sliding tray with desired material. If using a sliding tray place items on the tray nearest to the inside antechamber door.
	<ol style="list-style-type: none">4. Place green bin or sliding tray inside antechamber. The bin should be loaded into the chamber short side first.
	<ol style="list-style-type: none">5. Push the bin all the way into the antechamber until it touches the inside antechamber door. If using a system with a sliding tray, slide tray all the way back into chamber.
	<ol style="list-style-type: none">6. Close the outside antechamber door. <p>CAUTION: DO NOT OVERTIGHTEN.</p>



Evacuation



7. 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 for automatic evacuation

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

Press the Evacuation button. ON will be displayed and it will turn **green**.

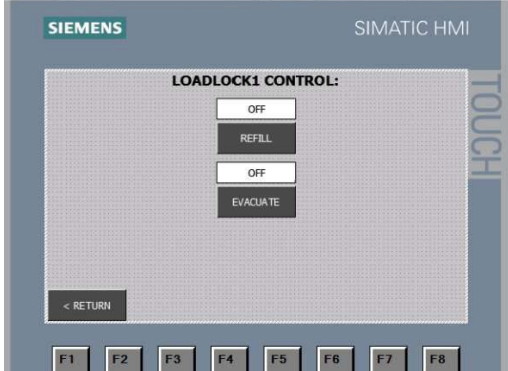
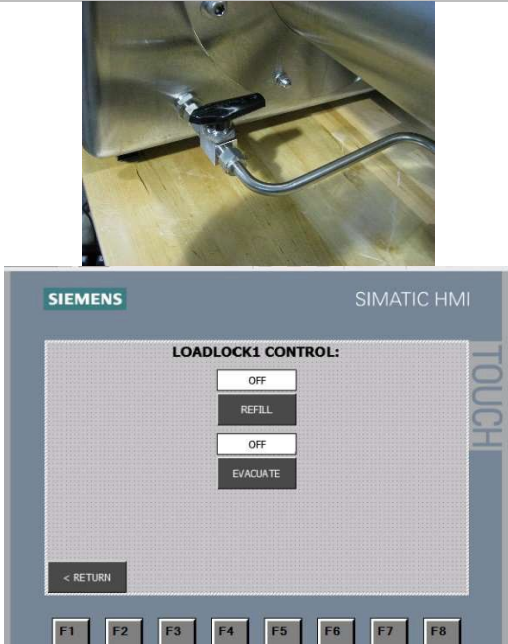


8. Close evacuation valve by turning the evacuation hand valve to the right.

OR

Push the EVACUATE button to stop evacuation. OFF will be displayed.



	
	<p>9. For glovebox models with manual refill, refill antechamber using Swagelok refill valve.</p> <p>Continue to refill until the vacuum gauge reads zero (0).</p> <p>OR</p> <p>Press REFILL button, ON will be displayed and it will turn green. Push the REFILL button to stop, OFF will be displayed.</p>
	<p>10. Repeat the above cycle two (2) more times for a total of three (3) evacuation/refill cycles.</p> <p>NOTE: Before opening the inside door, make sure the vacuum gauge reads zero (0) and evacuation and refill valves are closed/turned off.</p>



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11. Open inside door, remove bin and close antechamber door.

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



14.2 Removing Items from Glovebox

Determine whether there is inert gas or room air in the antechamber.

- If inert gas:
 1. Open the inside antechamber door.
 2. Load green bin/tray into the antechamber.
 3. Close the inside antechamber door.
 4. Open the outside antechamber door.

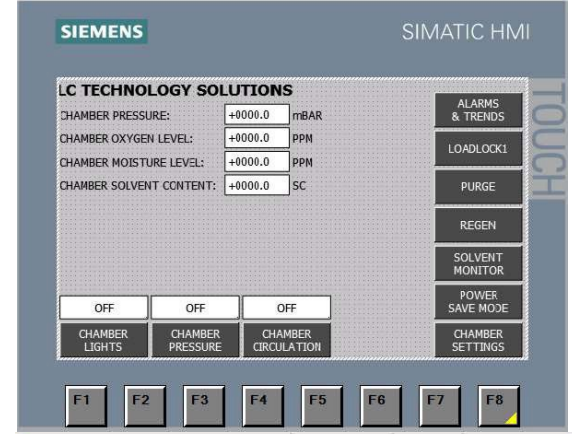
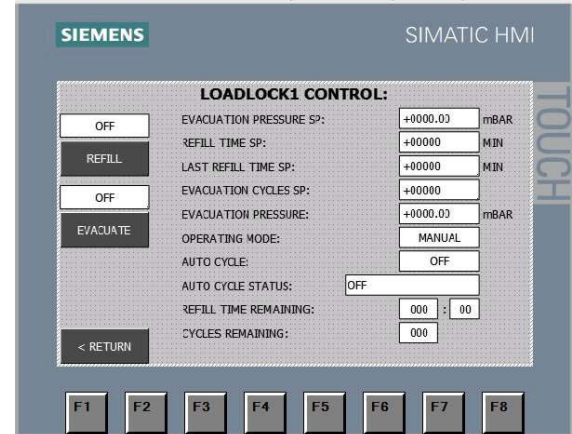
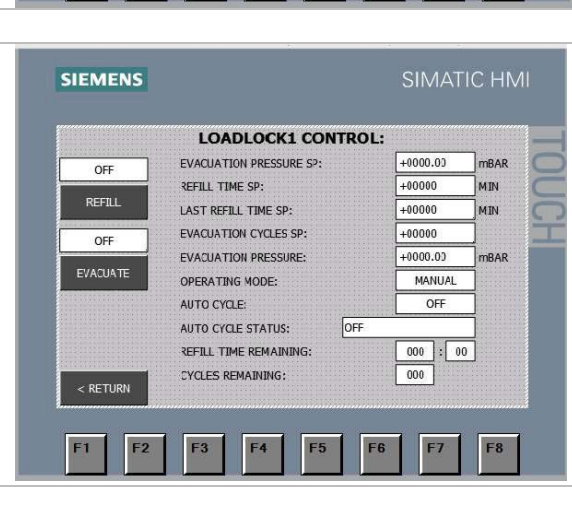
- If room air:
 1. Evacuate and refill the antechamber three (3) times.
 - Refer to Section 14.1 for the evacuation/refill process.

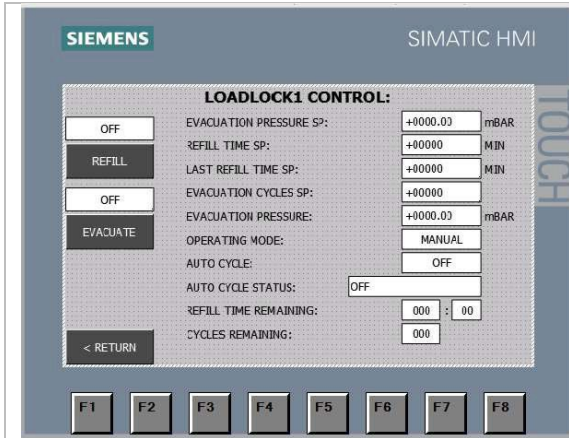
NOTE: This will ensure the antechamber has inert gas in it.
 2. Follow the steps for Inert gas, above.



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.

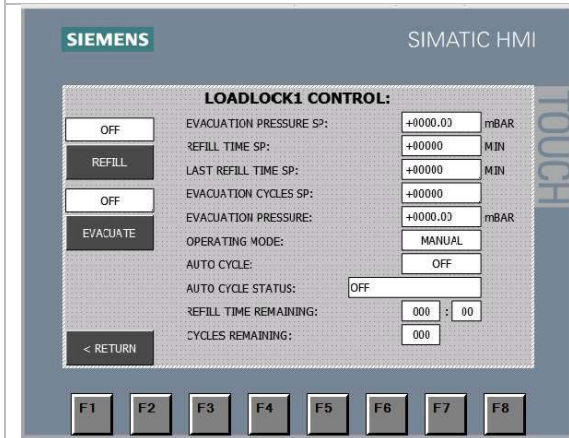
	<p>1. Press the LOADLOCK button from the main screen.</p>
	<p>LOADLOCK1 CONTROL screen will be displayed.</p> <p>Once all settings below have been set, press the EVACUATE button to begin the automatic cycle.</p>
	<p>2. The automatic antechamber control/loadlock settings can be found on this screen.</p> <p>3. To change these set points, press the white box to the right of desired setting. Type in new setting and press Enter.</p>



There are four settings that can be changed in the LOADLOCK1 CONTROL screen:

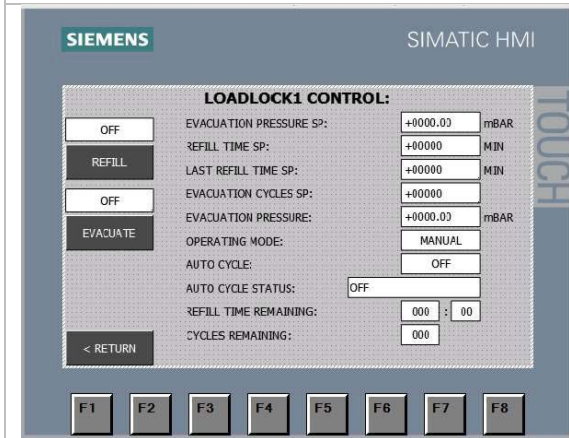
1. Evacuation Pressure SP – this is the evacuation level that will be reached before refilling.

NOTE: 0.9mBar is the recommended Evacuation Pressure SP.



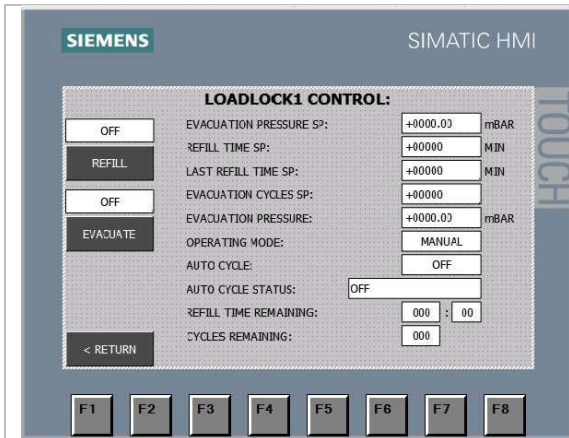
2. Refill Time SP – this is the length of time the chamber will refill before another evacuation cycle is started.

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



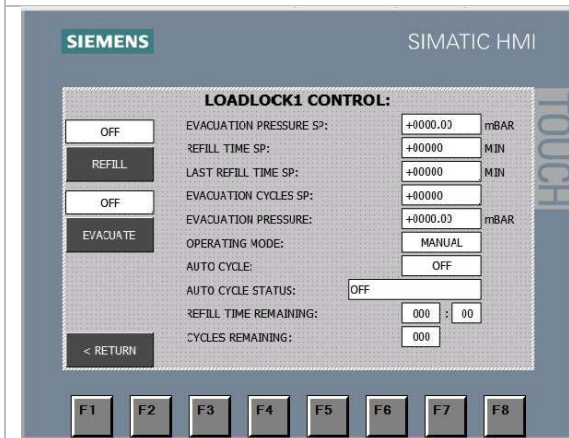
3. Last Refill Time SP = this set point is the final refill cycle and should be longer than the second refill time.

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

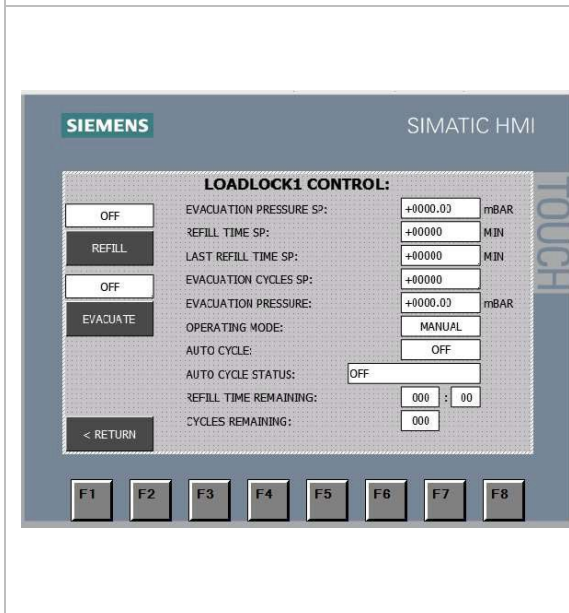


4. Evacuation Cycles SP – this allows the user to set the number of EVAC/Refill cycles the chamber will perform.

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 (ON will be displayed and it will be **green**.)

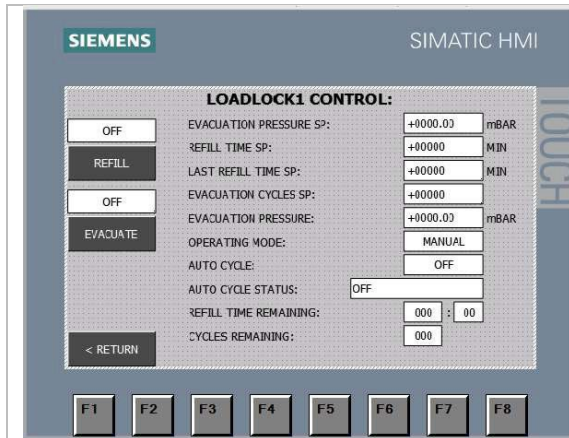
During the automatic cycle, the following information can be found on the LOADLOCK1 Control screen:

- a. Auto Cycle ON – this is the indicator that the auto cycle is running.
- b. Auto Cycle Status: Evac/Refill – this status indicates if the chamber is evacuating or refilling.
- c. Refill Time Remaining – this status indicates the amount of time remaining in the refill process.



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- d. Cycles Remaining – 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 the top of the antechamber and on the PLC screen.




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

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

Operating Mode will now display Manual. Refer to Section 14.1 for operation instructions.







14.4 Manual Purge for Large Antechamber

	<ol style="list-style-type: none">1. Open the outer door and load the large antechamber.
	<ol style="list-style-type: none">2. Close the door.
	<ol style="list-style-type: none">3. Open the vent valve.
	<ol style="list-style-type: none">4. Open the gas valve. NOTE: Connect inert gas to gas valve (5 psi maximum for purging) NOTE: Automatic antechamber control cycles need to be set to zero (0) so that the door locks are disabled during this process.
	<ol style="list-style-type: none">5. Purge for ten (10) minutes.6. Close the gas valve and vent valve.7. Open the inside large antechamber door.




14.5 Mini Antechamber Operation

	<ol style="list-style-type: none">1. Open the outside mini antechamber door by pulling up on the red lever.
	<ol style="list-style-type: none">2. Remove outside mini antechamber door.
	<ol style="list-style-type: none">3. Load green bin with parts.4. Slide green bin all the way into antechamber until it comes into contact with inside antechamber door.
	<ol style="list-style-type: none">5. Replace outside antechamber door and push red lever down into the locked position.
	<ol style="list-style-type: none">6. Turn hand valve to evacuation position.7. Continue evacuating until gauge reaches approximately -30.
	<ol style="list-style-type: none">8. Turn hand valve to refill position.9. Continue to refill until the vacuum gauge reads zero (0)
	<ol style="list-style-type: none">10. Repeat the above cycle two (2) more times for a total of three (3) evacuation/refill cycles




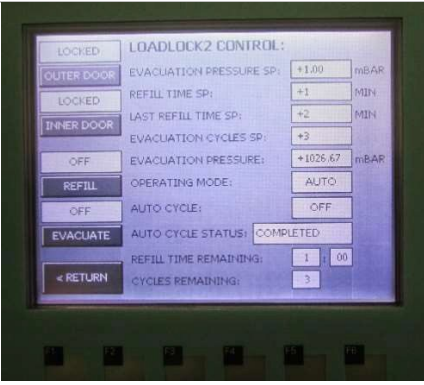


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	<p>11. Return hand valve to up (closed) position.</p>
	<p>12. Remove inside antechamber door.</p> <p>13. Remove green bin and return to chamber when complete.</p> <p>14. Replace inside antechamber door and push red lever into the locked position.</p> <p>15. Refer to Section 14.2 for instructions for Removing Items from Glovebox.</p>



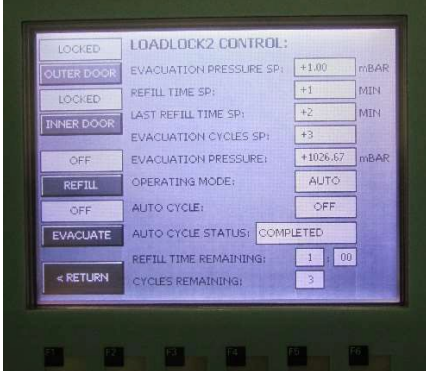
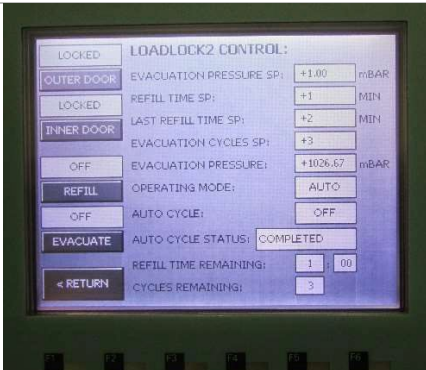
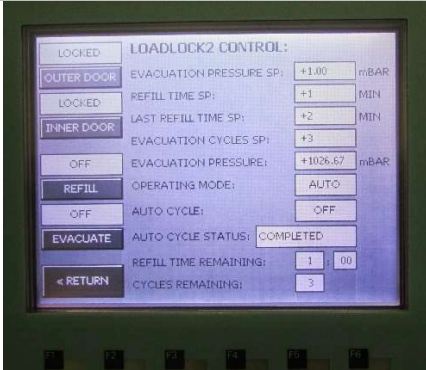
14.6 Antechamber with Automatic Control with Door Locks (large or mini antechamber)

	<p>1. To operate antechamber, press LoadLock2 button.</p>
	<p>2. Push Outer Door button.</p>
	<p>3. Open door and load chamber.</p>
	<p>4. Close door.</p>






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	<p>5. Push Outer Door button.</p>
	<p>6. Push Evacuate button. This will allow it to run for three (3) cycles.</p> <p>NOTE: For setting parameters, refer to Section 14.3 Automatic Antechamber Control/Loadlock.</p>
	<p>NOTE: You can push the Refill button any time to abort a cycle.</p>



14.7 Manual Purge for Mini Antechamber

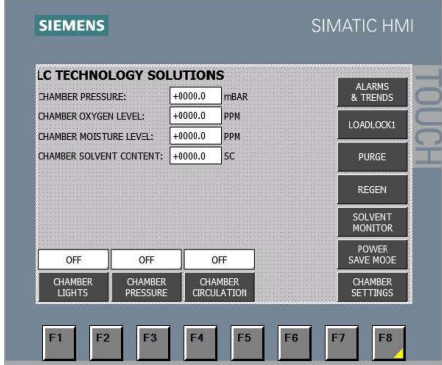
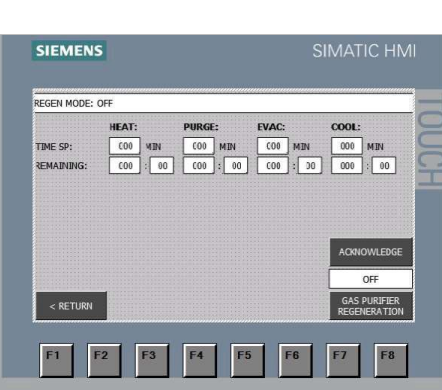
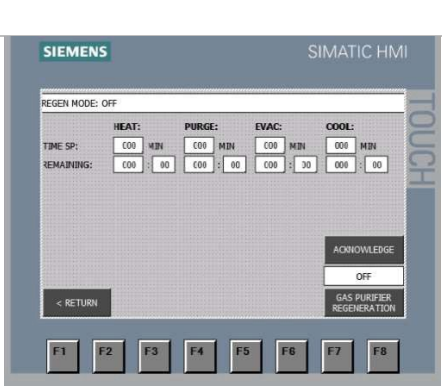
	1. Open outer door and load mini antechamber.
	2. Close door.
	3. Open vent valve
	4. Open gas valve. NOTE: Connect inert gas to gas valve (5psi maximum for purging). NOTE: Automatic antechamber control cycles needs to be set to zero (0) so that the door locks are disabled during this process.
	5. Purge for five (5) minutes.
	6. Close gas valve and vent valve.
	7. Open inside mini antechamber door.

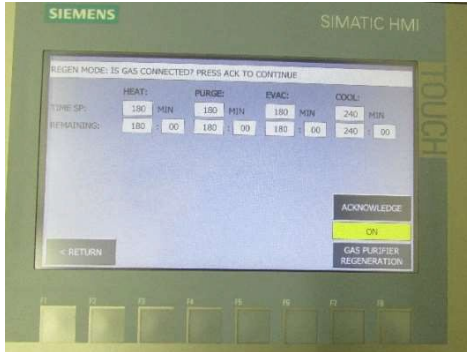


Section 15: Regeneration Mode & Testing

15.1 Regeneration Mode

Regeneration Mode is for reactivating the filter material. It can only be activated if Chamber Circulation is **OFF** and Chamber Pressure is **ON**. Prior to running a regeneration, if Oxygen levels are greater than 250 PPM, purge the glovebox for 20 minutes.

	<ol style="list-style-type: none">1. Turn Circulation OFF.2. Push REGEN button.
	<ol style="list-style-type: none">3. REGEN MODE will now be displayed. <p>CAUTION The regeneration cycle times are critical to the system running properly. Do not change these settings!</p> <p>It is recommended that you contact LC TECH at (978) 255-1620 before making any changes.</p>
	<ol style="list-style-type: none">4. To start the regeneration, press the Gas Purifier Regeneration button. ON will be displayed and it will turn yellow.

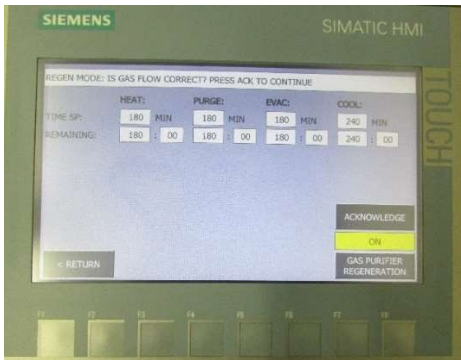


5. The following message will appear:
Is Gas Connected: Press Acknowledge to Continue.

6. Once you have confirmed the regeneration gas is connected to the system press the Acknowledge button.

The regen gas should be set at 15psi with a flow rate of 15 l/m.

NOTICE Improper regeneration gas settings will result in a failed regeneration cycle.



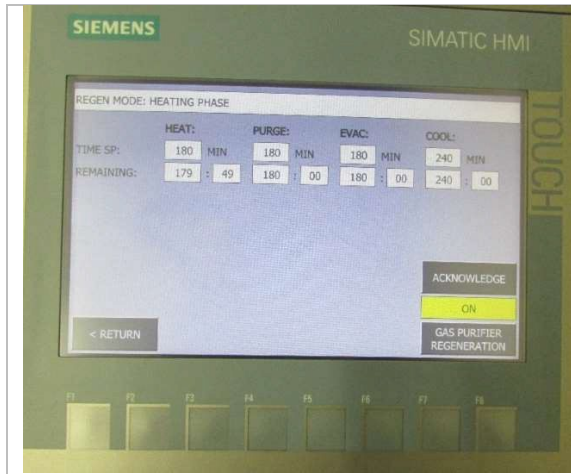
7. The following message will appear:
Is Gas Flow Correct? Press Acknowledge to Continue.

8. The system will open the regen gas valve so you may verify the pressure of 15 psi and the flow rate of 15 l/m at the Regen Regulator.

This is very important; without the correct pressure and flow rate you will not have a successful regeneration.



9. Once the pressure is confirmed at 15 psi and the flow is confirmed at 15 l/m, press the Acknowledgment Button. The regeneration process will now begin.



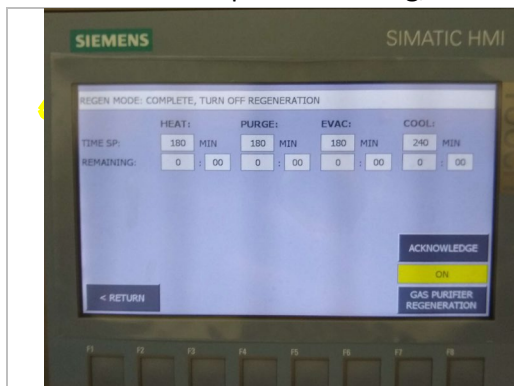
During the regeneration cycle the following information can be found on the Regen Screen:

- Time SP – This indicates the number of minutes for each process: heat, purge, evac, and cool.
- Remaining – This is the number of minutes remaining in each cycle of heating, Purging, evac, and cooling.

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

WARNING During the regeneration process, the filter column will become hot.

- **CAUTION** During the regeneration process any solvents, etc., used during customer processes which were collected by the filter media will be released.
- The first phase is **heating**, which lasts three (3) hours depending on the system. You may smell a slight odor at this time which is normal.
- The second phase is **purging**, which lasts three (3) hours.
- The third phase is **evacuation**, which lasts three (3) hours.
- The fourth phase is **cooling**, which lasts four (4) hours.



After 13 hours the Regeneration Cycle will be complete.

1. Press the Gas Purifier Regeneration Button to turn off the Regeneration Function. **Complete, Turn Off Regeneration** will be displayed.
2. Return to the main screen and restart circulation by pressing Circulation. **ON** should be displayed and it will turn **green**.

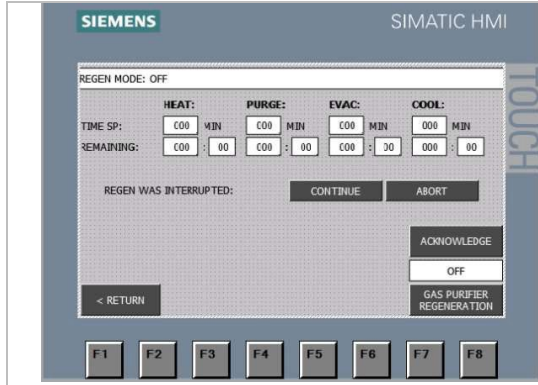
To interrupt the regeneration process, press the Gas Purifier Regeneration button at any time. Caution should be used at this time.

WARNING Failure to follow these principles in the event of an interrupted regeneration cycle can result in the overheating of the filter column.



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

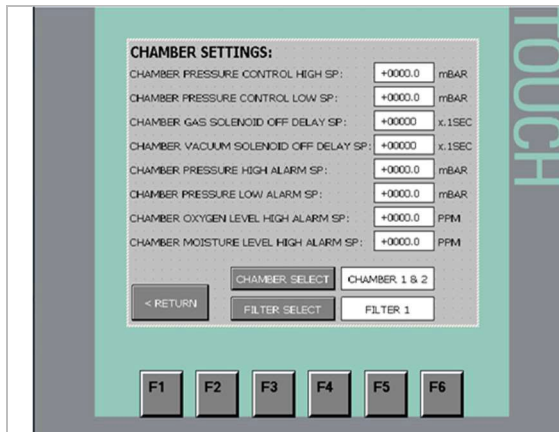


This screen shows that the regeneration has been interrupted due to the system being shut down during the regeneration cycle.

Pressing the Continue button allows the cycle to continue.

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

15.2 Regeneration of a Dual Filter Column System



If your system was configured with dual filter columns, you can circulate your system and regenerate the other filter column at the same time. The system automatically regenerates the filter column that is not being used for circulation mode. In the chamber settings menu, filter 1 is selected for circulation therefore filter 2 will be regenerated. Please follow the instruction in Section 15.1 to regenerate your filter column.



15.3 Testing the Regeneration Process



IMPORTANT: To test the regeneration process, follow these steps:

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. A normal regeneration yields 50 milliliters of water. If the water is less, it could mean something is wrong.

⚠ NOTICE It is recommended to change your vacuum pump oil after 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 pre-set at the factory and care should be taken when altering the set points.

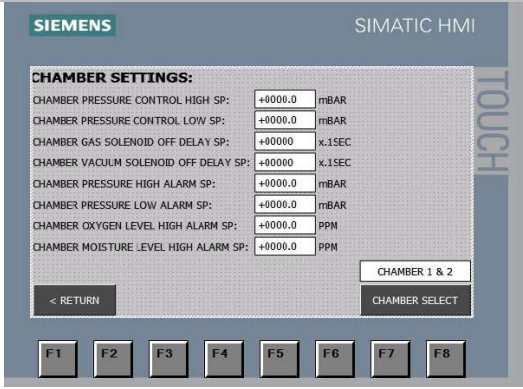
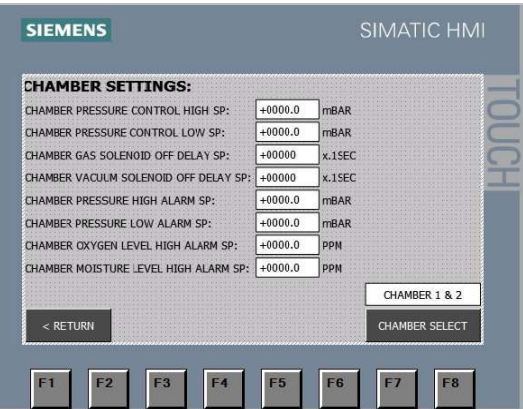
To enter Chamber Settings:

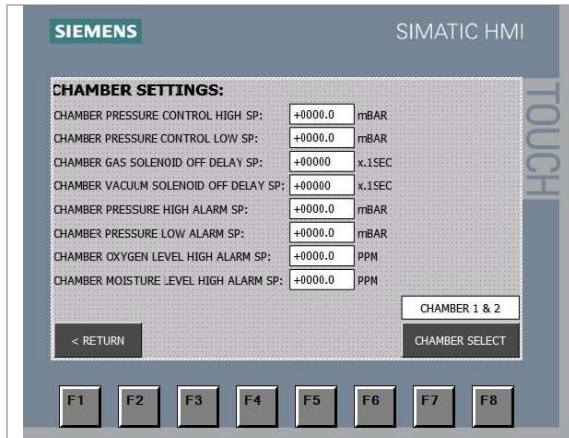
1. Press Chamber Settings button.
2. Select Set Point you wish to change.
3. Enter new Set Point.

In Set Points you can change the following settings:

- Chamber Pressure Control High/Low
- Chamber Pressure High/Low Alarm
- Chamber Oxygen Level High Alarm
- Chamber Moisture Level High Alarm

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

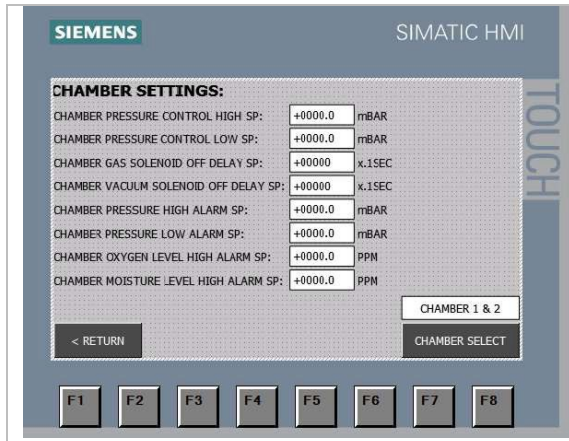
	<h3>Chamber Pressure Control High & Low Set Points</h3> <p>This screen allows the user to select the box pressure ranges that are needed for your application. Typical settings are 0.5mBAR for low limit and 2.5mBAR for high limit.</p> <p>The system will maintain the pressure in the glovebox between these two values. The foot pedals will only adjust the pressure in the glovebox between these ranges.</p>
	<p>Chamber Pressure High Alarm Set Point: This allows the user to input the High-Pressure alarm set point. The factory default is +15.0mBAR.</p> <p>Chamber Pressure Low Alarm Set Point: This allows the user to input the Low-Pressure alarm set point. The factory default is -15.0mBAR.</p>



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.

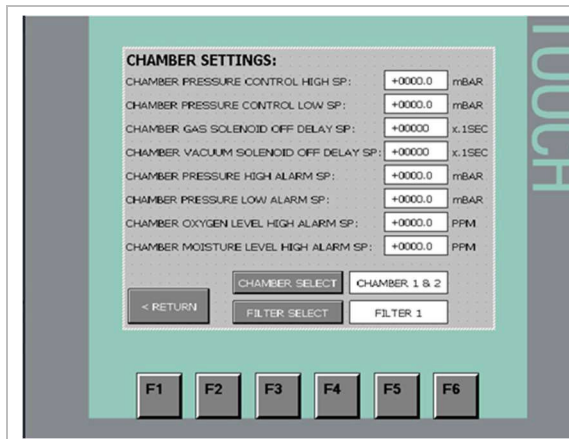
16.2 Enable/Disable



1. Customers with 2 separate boxes that are ran 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.

NOTICE You may only have one box.

16.3 Dual Filter Columns

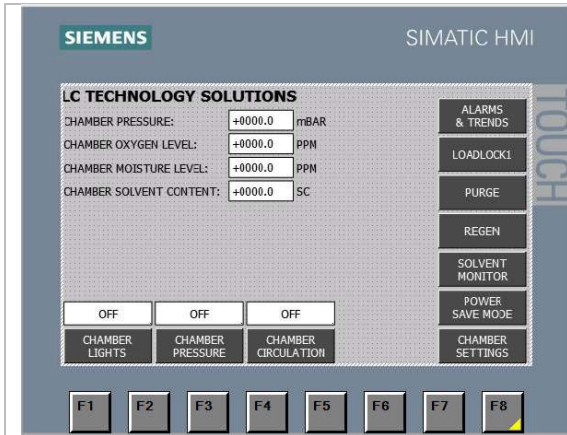


1. For systems supplied with 2 filter columns, you will need to select the active filter column. The activated filter column is the column that you wish to use to circulate the glovebox environment. The other column will be in standby mode.
2. Press Filter Select to select desired filter (Filter 1 or Filter 2).

NOTICE Do not switch filter column while running a regeneration.

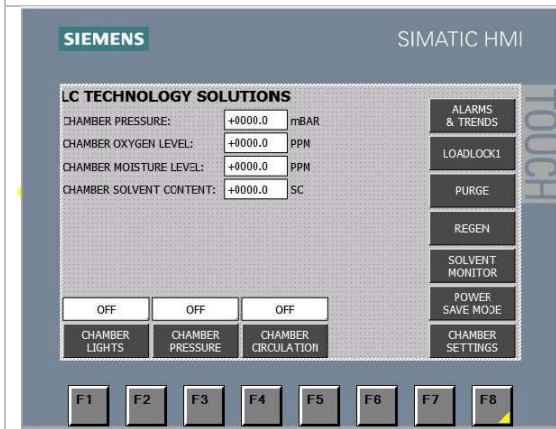


Section 17: Analyzers



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

(Optional) If your system is provided with a Solvent Sensor, this screen would provide the solvent level inside the chamber.



If you purchased an optional Solvent Sensor, this screen would provide the content of vapor 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.

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 always be maintained, otherwise serious damage may occur to the system.



Either valve 1 (bypass) or valves 2 and 3 (circulate) must be opened at all times. If all three valves are shut simultaneously, the flex pipes on the system will be damaged and potentially burst.

<p style="text-align: center;">Valve 1</p>  <p style="text-align: center;">Valves 2 & 3</p> 	<p>Active Mode</p> <p>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.</p> <p>To put the system into Active Mode, Valve 1 should already be open. Open Valves 2 and 3 and close Valve 1.</p>
<p style="text-align: center;">Valve 1</p>  <p style="text-align: center;">Valves 2 & 3</p> 	<p>Bypass Mode:</p> <p>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.</p> <p>Open Valve 1 and close Valves 2 and 3.</p> <p>To put the system back into Active Mode, open Valves 2 and 3, then close Valve 1.</p>



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.



WARNING




Wear protective gloves

Wear safety goggles

Wear safety mask

The activated carbon will be saturated in solvents. Proper use of PPE (respirator, gloves, goggles) is strongly recommended.


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 10lbs of material. Do not fill with more than this amount.
	5. Replace KF40 cover and clamp on top of solvent filter.



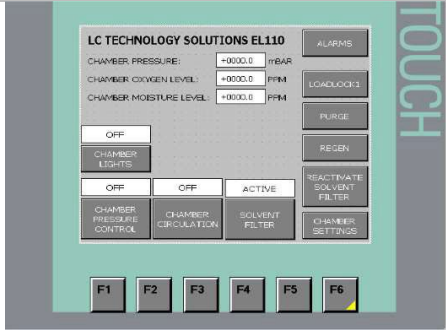
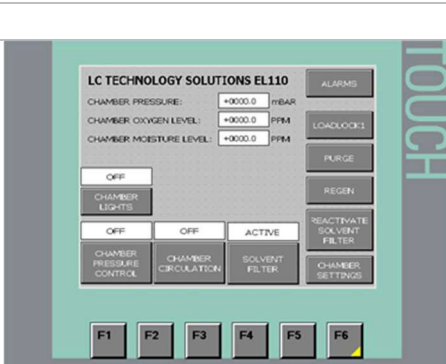
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	<p>6. Using Valve 4 mounted on the back of the system evacuate the solvent removal system for approximately 24hrs by turning Valve 4 to the left.</p> <p>⚠ NOTICE Failure to fully evacuate the solvent filter column will introduce room air into the inert gas environment.</p>
	<p>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.</p> <p>8. Return Valve 4 to the center position.</p> <p>9. Put the system back into active mode.</p>

18.3 Automatic 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.

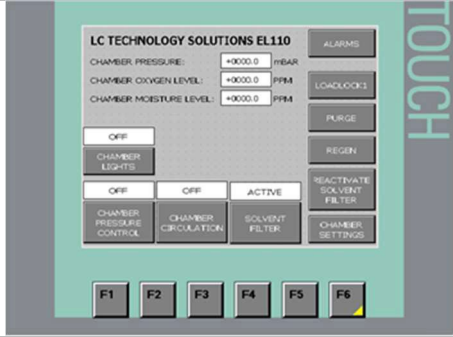
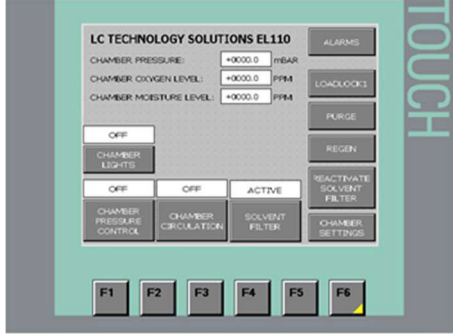
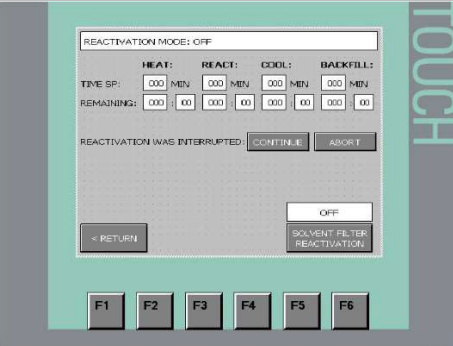
	<p>To put the Solvent Removal System into Active Mode, Press the Solvent Filter button, ACTIVE will be displayed. This will allow the solvent removal system to remove solvents from the glovebox environment.</p>
	<p>To Bypass Solvent Removal filter push Solvent Filter button and it should say BYPASS. The Bypass function is used when you need to reactivate the solvent removal filter material. In Bypass mode the system will not be removing solvent from the glovebox environment.</p>



18.4 Automatic Solvent Reactivation

The reactivation process should be run every three months.

NOTICE Insufficient use of the reactivation process can shorten the life of the filter media.

	<p>1. Put system in Bypass by Pressing Solvent Filter button, should say BYPASS</p>
	<p>2. Press Reactivate Solvent Filter button.</p>
	<p>3. Press Solvent Filter Reactivation button. ON should be displayed. This will start the reactivation process.</p>

The Solvent Reactivation is going to go through 4 phases.

The First is Heating which lasts 3 hours.

CAUTION During the reactivation process the solvent removal column will be hot.



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The Second Phase is Reactivation which lasts 2 hours. During the reactivation phase the system will purge inert gas through the solvent removal filter. The process will use approximately 150 cubic feet of gas during the reactivation. The inert gas is supplied by the inert gas connection already on the gas purifier cart and is factory set for 15 l/min. There are currently two different models. There is no need to connect a separate gas supply for this process or to adjust this valve shown below (older systems).



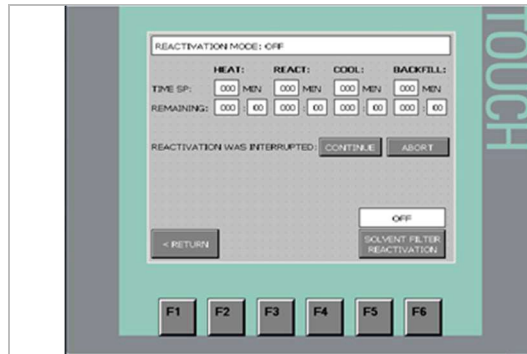
Newer models will have a regulator and flow meter (pictured below on the left). The regulator will come factory set at 20 psi and the flowmeter will also come factory set for 15 l/min. The flow meter will not display its flow rate until the reactivation phase. (Pictured below on the right).





The Third is Cooling which lasts 4 hours.

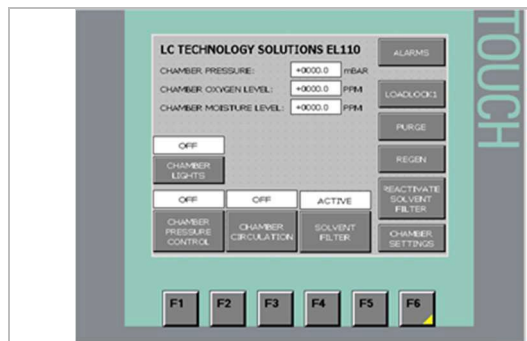
The Fourth is Backfill which lasts one minute.



After 9 hours the Reactivation Cycle will be complete the system will say **COMPLETE**,

Press the Solvent Filter Reactivation button to turn the process off. **OFF** should be displayed.

Then hit the Return button to go back to the Main Menu



At the Main Menu put the system back in Active Mode by pressing the Solvent Filter button. **ACTIVE** should be displayed.



WARNING Failure to follow these principles in the event of an interrupted reactivation cycle can result in the overheating of the solvent filter column.

To stop the reactivation process, press the Solvent Filter Reactivation button at any time. Caution should be used at this time.

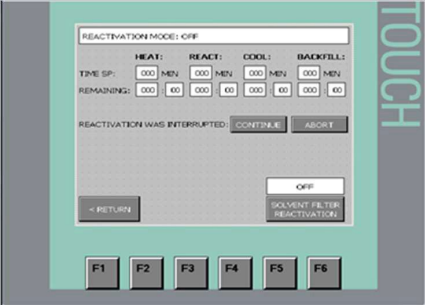
- If the system has been heating for over (1) hour, the system should be allowed to cool for at least two (2) hours before the reactivation is restarted.
- If the system has past the heating phase, the system should cool for six (6) hours before restarting the reactivation.

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



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REACTIVATION MODE: OFF

	HEAT:	REACT:	COOL:	BACKFILL:
TIME SP:	000 MIN	000 MIN	000 MIN	000 MIN
REMAINING:	000 00	000 00	000 00	000 00

REACTIVATION WAS INTERRUPTED:

SOLVENT FILTER REACTIVATION

F1 F2 F3 F4 F5 F6

TOUCH

This screen shows that the Reactivation process has been interrupted due to a power outage during the reactivation process.




Pressing the Continue button allows the cycle to continue.

Pressing the Abort button exits the interrupted cycle and the reactivation 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 twelve (12) and should be changed once per month. The filters are labeled 1-12, one for each month of the year.


	<ol style="list-style-type: none">1. Bring the new filter into the glovebox.2. Pull the old filter out of the socket and discard.
	<ol style="list-style-type: none">3. Replace the old filter with the new one by pushing it into place in the socket. <p>⚠ NOTICE The new filter goes on the inlet side to the gas purifier. The correct filter will be labeled with a number.</p>
	<p>⚠ NOTICE Repeat every month. Filters are labeled 1-12, one for each month of the year.</p>




Section 20: Freezer Operation and Maintenance

20.1 Freezer Operation (Keypad and PLC controlled models)

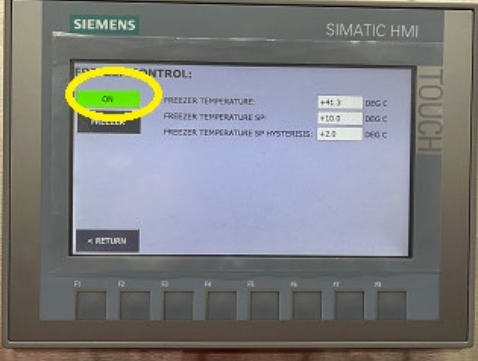
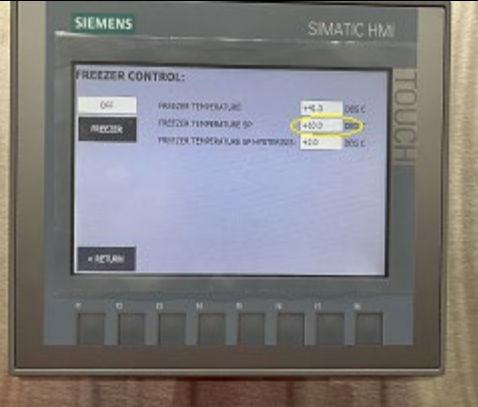
	<p>NOTE: Verify freezer is plugged in.</p> <ol style="list-style-type: none">1. Turn freezer on by pressing the switch to the ON position.2. Turn freezer off by pressing the switch to the OFF position. <p>NOTE: Freezer is preset to 35°C by the factory.</p>
---	---

	<p>To adjust the Set Point:</p> <ol style="list-style-type: none">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. <p>NOTE: Do not change any other settings on the temperature controller without first contacting LC Technology.</p>
--	--

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

	<p>NOTE: Verify freezer is plugged in.</p> <ol style="list-style-type: none">1. Turn freezer on/off by first selecting the Freezer button on the PLC screen.
---	---



	<p>2. Press 'Freezer' to turn freezer ON/OFF. When freezer is on button will change to green and display 'On'</p> <p>NOTE: Freezer is preset to -25°C by the factory.</p>
	<p>To adjust the Set Point:</p> <ol style="list-style-type: none">1. Select the box next to Freezer Temperature SP2. Manually enter desired temperature. Press Enter Press Return.

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.

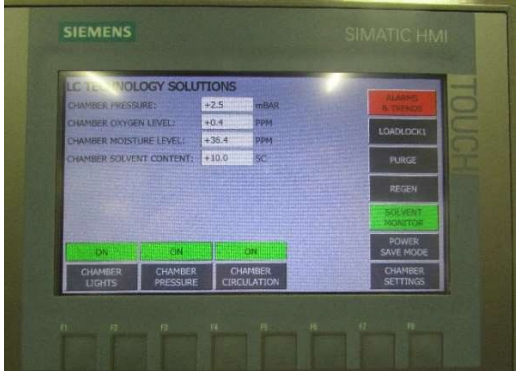
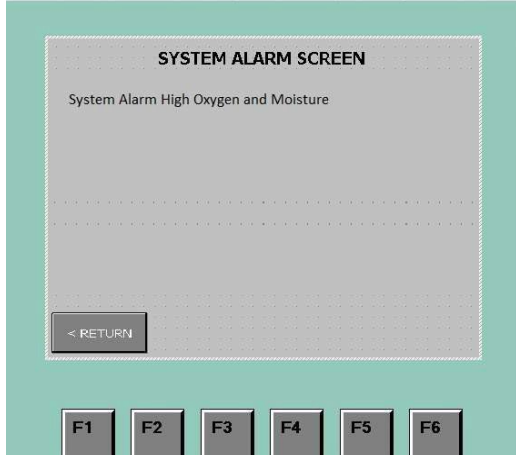

Freezer maintenance, other than cleaning the cooling fins, should be performed by a qualified refrigerator repair person.



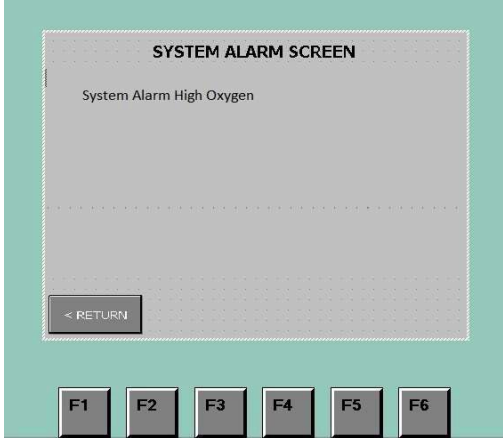
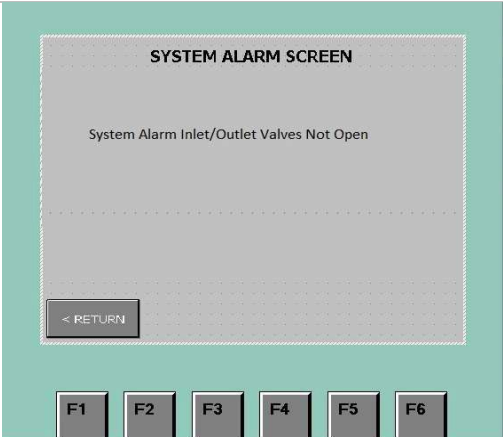
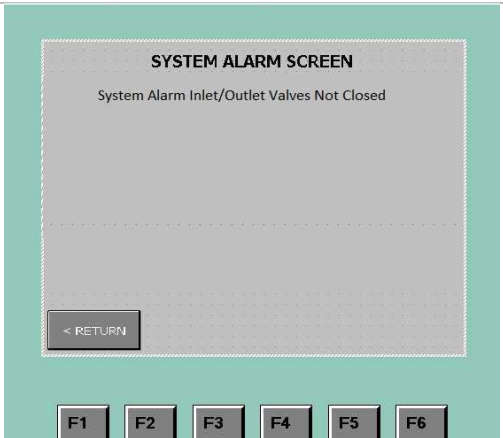
Section 21: Alarm Messages & Trends

21.1 Alarm Messages

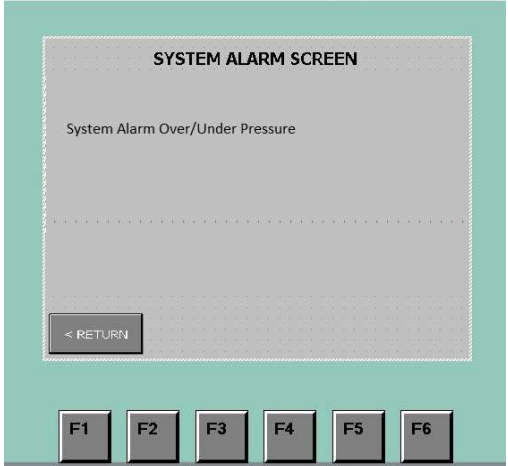
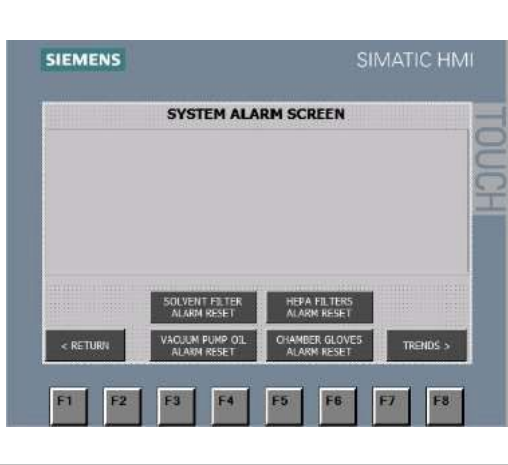
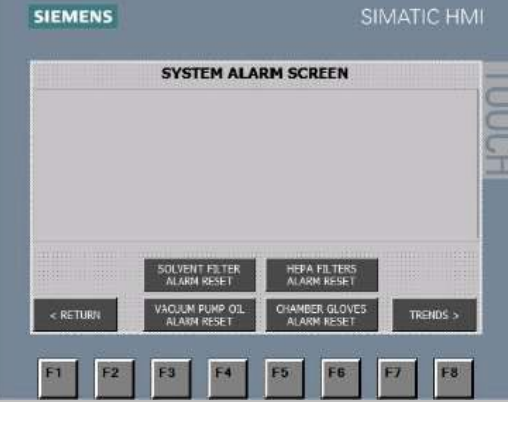
The alarm levels are set in the Chamber Settings for both the oxygen and moisture analyzers. If the reading on the PLC is above the alarm set point it will display the following messages:

	<p>When there is an alarm present, the Alarm & Trends button will turn RED. Pressing this button will display the current alarm(s).</p>
	<p>This alarm displays when oxygen and moisture levels are above the alarm set point.</p>
	<p>The moisture level high alarm displays when the moisture level in PPM is above the alarm set point.</p> <p>Once the level of H2O is below the alarm level, the message will automatically clear.</p>



	<p>The oxygen level high alarm displays when the oxygen level in PPM is above the alarm set point.</p> <p>Once the level of O₂ is below the alarm level, the message will automatically clear.</p>
	<p>This alarm means that the electro-pneumatic valves on top of the filter column are not opening properly.</p> <p>This is almost always caused by low gas pressure or an empty gas cylinder.</p> <p>Check the gas supply and make sure the system has at least 60psi going to it.</p>
	<p>This means the valves on top of the filter column are not closed and you will be unable to perform the regeneration.</p> <p>Call LC Technology for more information</p>

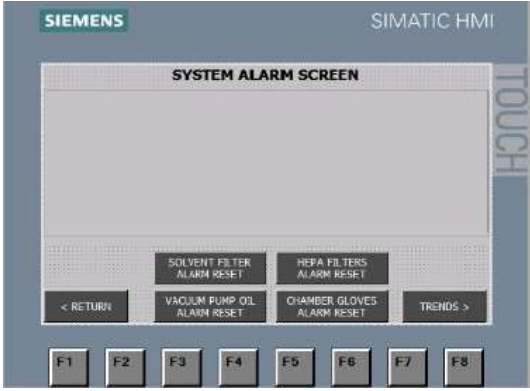

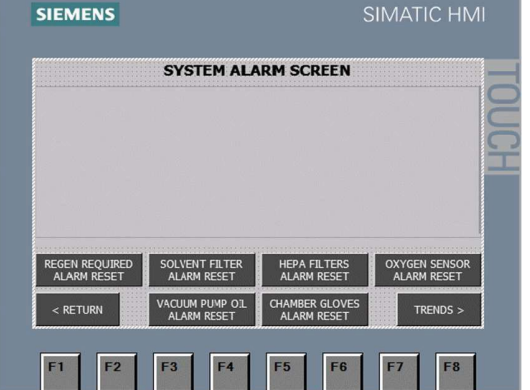


	<p>The Low-Pressure Alarm means the system is under pressurized. Once the glovebox goes above the low-pressure safety point set, it will shut off.</p> <p>The High-Pressure Alarm means the system is over pressurized. Once the glovebox goes below the high-pressure safety set point it will shut off.</p> <p>⚠ CAUTION This is a dangerous situation and caution should be taken.</p>
	<p>This alarm means it is time to replace solvent filter material.</p> <p>For systems with a Manual Solvent Removal system, you should change the activated carbon (refer to Section 18.2)</p> <p>For systems with Internal Solvent Removal system, it is time to replace the Solvent Filter (refer to section 19)</p> <p>Once you have replaced the above, you may press the Solvent Filter Alarm Reset. This clears the alarm.</p>
	<p>This alarm means it is time to replace the inlet/outlet HEPA filters. Maintaining these filters will ensure the blower motor will work properly.</p> <p>Once you have replaced the filters, press the HEPA Filter Alarm Reset. This will clear the alarm.</p>



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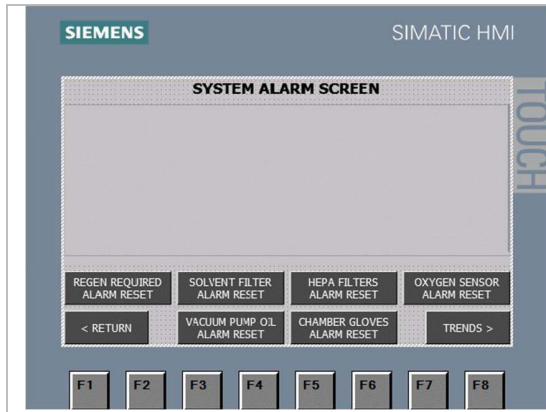
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	<p>This alarm means it is time to change the vacuum pump oil. It is recommended you do this every three (3) months and after every regeneration.</p> <p>⚠ CAUTION Vacuum pump oil may be hot. It is recommended to allow the pump to cool before draining the used oil from the pump.</p> <p>Once you have replaced the oil you may press the Vacuum Pump Oil Alarm Reset. This will clear the alarm.</p>
	<p>This alarm means it is time to replace the gloves and O-rings. Gloves should be replaced every three (3) to six (6) months, depending on usage.</p> <p>Once you have replaced the gloves and O-rings you may press the Chamber Gloves Alarm Reset. This will clear the alarm.</p>
	<p>This alarm means that it is recommended to change the oxygen sensor at this time. It is most likely reaching the end of its expected lifetime.</p>



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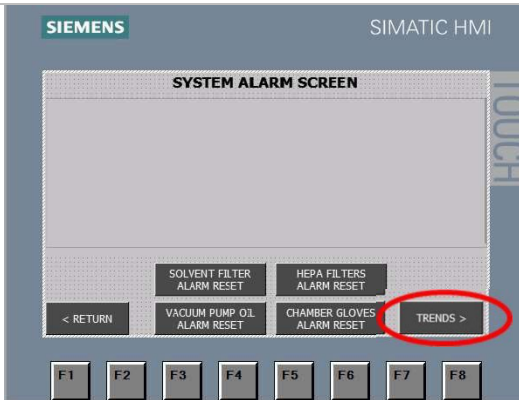
This alarm indicates that it is recommended to run a regeneration at this time. The filter column on your system is most likely reaching capacity and will need to be regenerated soon.



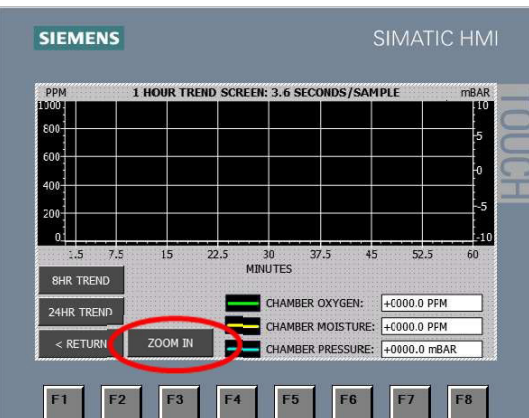
21.2 Trends



To view the Chamber Pressure, Moisture, and Oxygen Trend, press the Alarms & Trends button.



Press the Trends button.



The one (1) hour trend screen will be displayed.

To see the 8hr or 24hr trend, press the corresponding button.

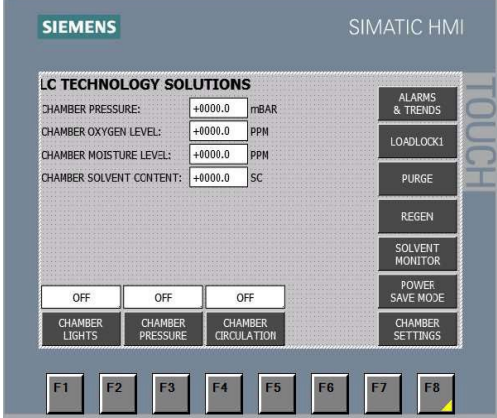
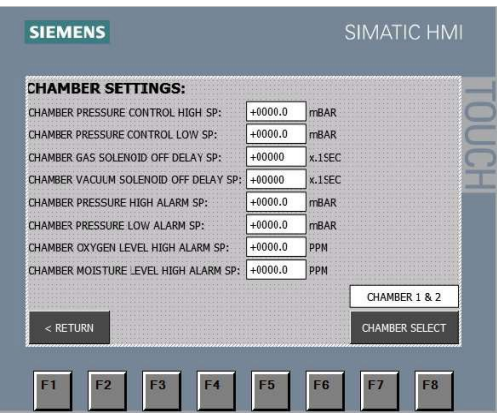

To zoom in or out, press the appropriate button to change the scale (1000, 100, 10ppm)

To return to the main screen, press Return on this screen and on the System Alarm.



Section 22: Manual Purge

Purging with a Manual Purge Valve

 <p>The screenshot shows the SIMATIC HMI Main Screen for LC Technology Solutions. It displays chamber parameters: Chamber Pressure (+0000.0 mBAR), Chamber Oxygen Level (+0000.0 PPM), Chamber Moisture Level (+0000.0 PPM), and Chamber Solvent Content (+0000.0 SC). There are three 'OFF' buttons for Chamber Lights, Chamber Pressure, and Chamber Circulation. A vertical 'TOUCH' bar on the right contains buttons for Alarms & Trends, Loadlock1, Purge, Regen, Solvent Monitor, Power Save Mode, and Chamber Settings. At the bottom are function keys F1 through F8.</p>	<ol style="list-style-type: none">1. From the Main Screen verify Chamber Circulation is turned off. OFF should be displayed.
 <p>The screenshot shows the SIMATIC HMI Chamber Settings screen. It lists various set points: Chamber Pressure Control High SP (+0000.0 mBAR), Chamber Pressure Control Low SP (+0000.0 mBAR), Chamber Gas Solenoid Off Delay SP (+00000 x.1SEC), Chamber Vacuum Solenoid Off Delay SP (+00000 x.1SEC), Chamber Pressure High Alarm SP (+0000.0 mBAR), Chamber Pressure Low Alarm SP (+0000.0 mBAR), Chamber Oxygen Level High Alarm SP (+0000.0 PPM), and Chamber Moisture Level High Alarm SP (+0000.0 PPM). There are buttons for Chamber 1 & 2, Chamber Select, and Return. The 'TOUCH' bar and function keys are also visible.</p>	<ol style="list-style-type: none">2. From the Main Screen, press Chamber Settings to check pressure settings. Pressure settings should be set to positive values. <p>To verify settings are positive, follow these steps:</p> <ol style="list-style-type: none">1. Press Chamber Settings button2. Make sure chamber pressure set points are set to 5mBar high and 2mBar low.
 <p>A photograph showing a manual purge valve mounted on top of a stainless steel chamber. The valve has a circular handle and a pressure gauge.</p>	<ol style="list-style-type: none">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 12.
	<ol style="list-style-type: none">5. When purging is complete, follow these steps:<ol style="list-style-type: none">1. Close purge valve.2. Return pressure set points to 2.5mBAR high and 0.5mBAR low.



	3. Start/restart circulation by pressing Chamber Circulation button. ON should be displayed.
--	--

Section 23: Maintenance Schedule & Recommended Spare Parts

23.1 Maintenance Schedule

- The gloves and glove O-rings should be changed once every six (6) months or as needed based on the condition of the gloves.
- Vacuum pump oil should be changed at least every three (3) months and after regeneration.
- The inlet/outlet filters should be replaced every six (6) months.
- The small and large antechamber door O-rings should be replaced as needed.
- Internal solvent trap should be changed every month (if applicable).
- The Oxygen Sensor should be replaced every 2-3 years.



23.2 Spare Parts Listing

Part No.	Description	Price	Maintenance Schedule
GL-003 Or GL-009	Gloves, Left/Right, 1 pair (Universal can be used in any Glovebox) Gloves, Ambidextrous, 1 pair (Universal can be used in any Glovebox)	\$375.00/pair.	6 Months
OR-028	Glove O-Rings (4 per pair of gloves)	\$20.00 ea.	6 Months
SR-101	Internal Charcoal Trap (Set of 12)	\$495.00/set	Every Month
OR-111	Large Antechamber Door O-Ring (2 per door) (LC-1 Glovebox Systems)	\$75.00 ea.	As Needed
OR-110	Small Antechamber Door O-Ring (2 per door) (LC-1 Glovebox Systems)	\$13.00 ea.	As Needed
FL-102	Inlet/Outlet HEPA Filter	\$58.00 ea.	6 Months
FM-018	Activated Carbon for Solvent Removal System (10lbs per column) Sold in 20lb bags.	\$20.00/lb.	3 Months
FM-900	LC-1 Complete Filter Column Change	\$795.00/charge	As Needed
AN-023	Replacement Sensor for Oxygen Analyzer for Model OXY-IQ	\$350.00 ea.	2 – 3 years



Section 24: How to Change the Oil in an Edwards Vacuum Pump

24.1 Draining the Edwards Vacuum Pump

	<p>1. Turn the power to the pump OFF</p> <p>CAUTION Vacuum pump oil may be hot. It is recommended to allow the pump to cool before draining the used oil from the pump.</p>
 A photograph of an Edwards vacuum pump unit, which is a white rectangular device with various ports and a black cap on top, mounted on a metal base.	<p>2. Remove the black cap at the end of the drain. Place a container under the drain to capture the oil.</p>
 A close-up photograph of the Edwards vacuum pump unit, showing two circular oil fill plugs on the front panel.	<p>3. Remove one of the oil fill plugs.</p>



4. To open the drain valve, use a flat head screwdriver and turn the screw. The oil will start to flow out of the vacuum pump. When it is empty, return the screw to the closed position.



5. Replace the black cap at the end of the drain.

24.2 Refilling the Edwards Vacuum Pump



1. Remove one of the oil fill plugs.

2. Fill with vacuum oil until it reaches the MAX level mark.

⚠ NOTICE If the oil level goes above the MAX level mark, drain the excess per the instructions in section 24.1.



	3. Replace the oil fill plug.
	4. You may now turn the power back on.

Section 25. Changing the HEPA Inlet/Outlet Filter

25.1 Removing the Filter





1. Grasp filter firmly with hand.



2. Pull filter out of base.



25.2 Replacing the Filter

 A close-up photograph showing a person's hand holding a white, cylindrical filter cartridge with a black top. The filter is being held against a curved, stainless steel surface, which is the base of the equipment. The background is slightly blurred, showing more of the stainless steel structure.	<ol style="list-style-type: none">1. Take new filter and align to base.
 A close-up photograph showing the same hand and filter cartridge as in the previous image. The filter is now being pushed into the stainless steel base. The filter is partially inserted, and the hand is applying pressure to push it further in.	<ol style="list-style-type: none">2. Push filter until it is flush with base.



NOTICE There is no closed position on this valve.

Section 27: Optional Accessories

27.1 Laminar Flow



1. From Main Screen press Laminar Flow Units button.



2. Laminar Flow Units Control screen will display.

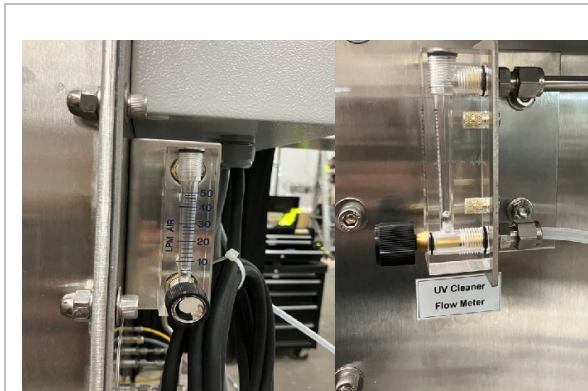


3. Push Laminar Flow Unit button to turn laminar flow ON or OFF.



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

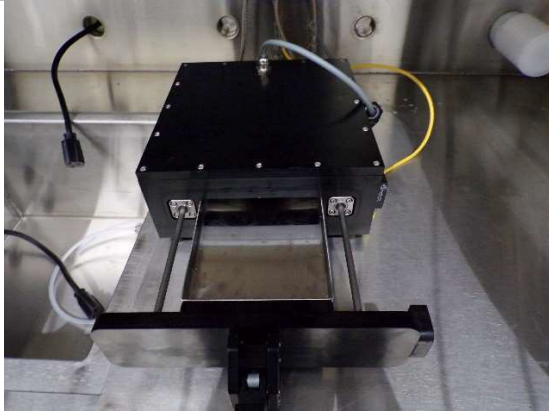
27.2 UV Ozone Cleaner





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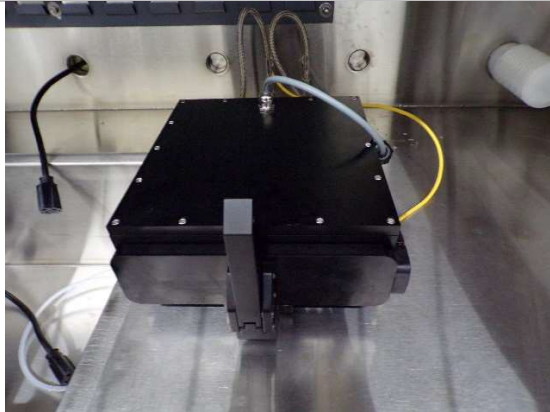
1. Open door.

2. Place substrate in UV ozone cleaner.



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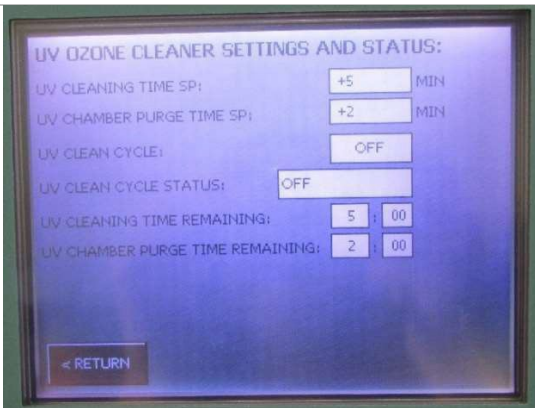


3. Close door and secure with handle.



4. From main screen press UV Ozone Cleaner button.

UV Ozone Cleaner Settings and Status screen will display.



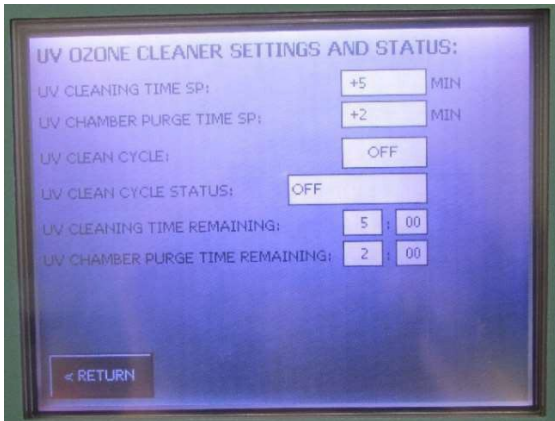
5. Set desired cleaning and purging time by pressing the white box to right of set point.

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

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



6. Press foot pedal for UV ozone cleaner to start process.



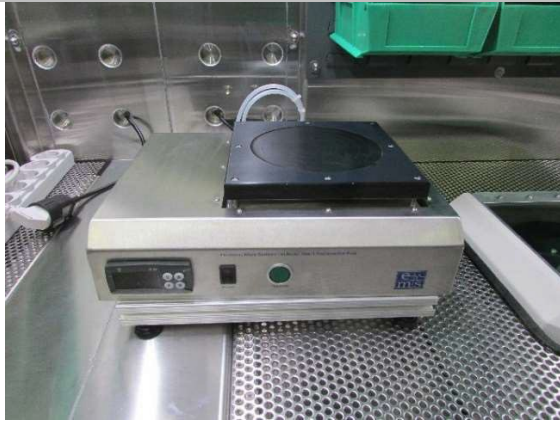
During the UV cleaning cycle the following information can be found on the UV Ozone Cleaner Settings And Status screen.

- 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.



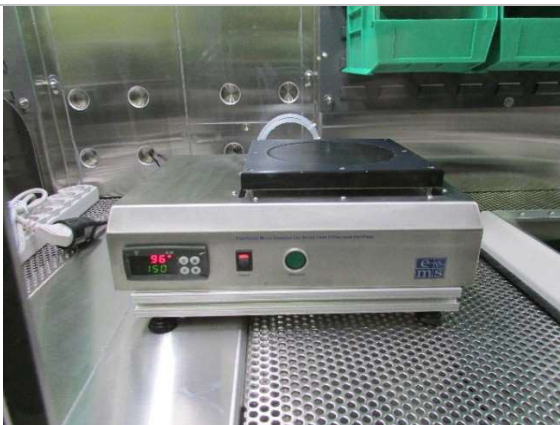
27.3 Precision Hot Plate



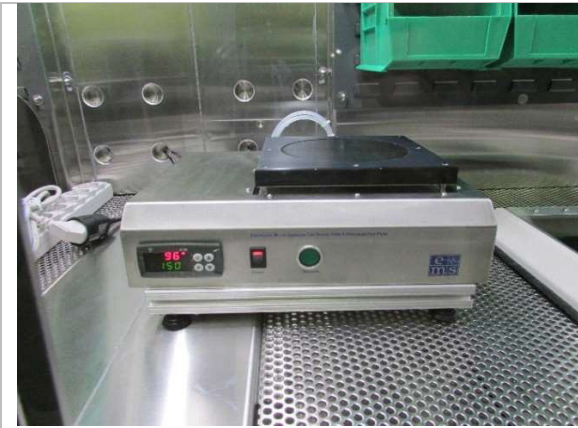
1. Place substrate on the hot plate.



2. Turn power on by pushing switch down.



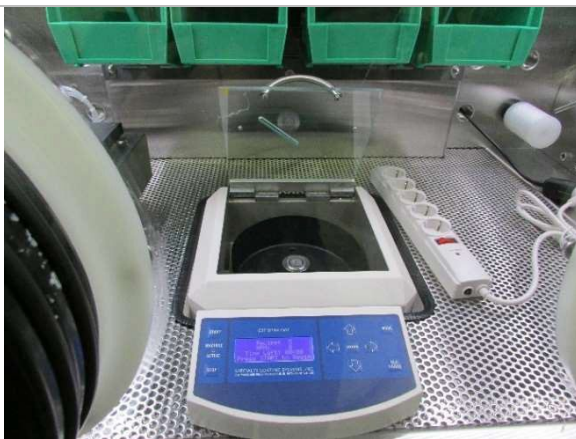
3. Press vacuum button to vacuum substrate down.



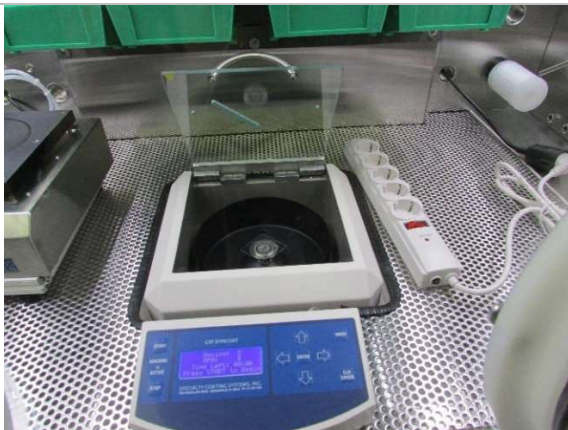
4. To adjust the temperature press and hold down the down arrow key.
5. SP1 will flash.
6. Set SP1 using the up and down arrow keys.
7. Once desired setting has been reached press P key.

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

27.4 Spin Coater



1. Open lid.



2. Place substrate on spin coater chuck.

3. Close lid.



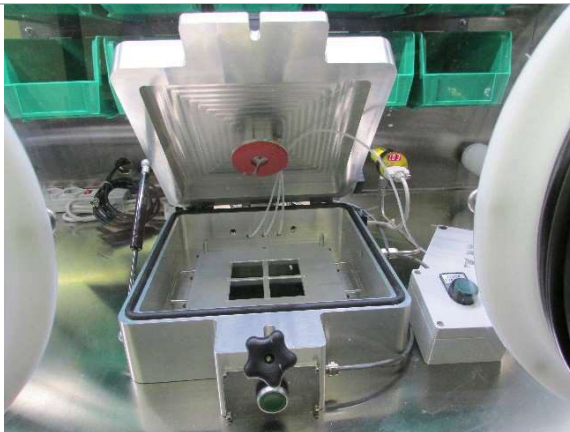
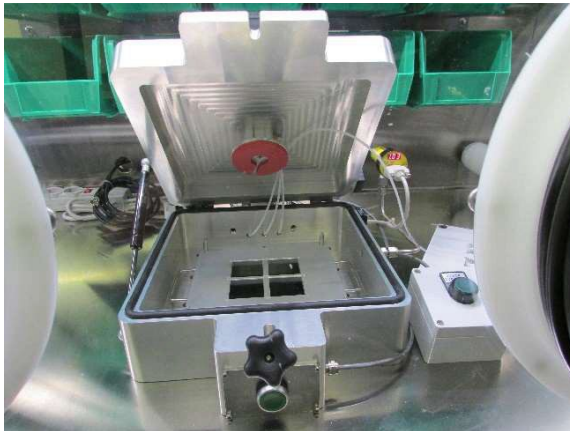
4. Press start to run.

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

27.5 UV Press



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

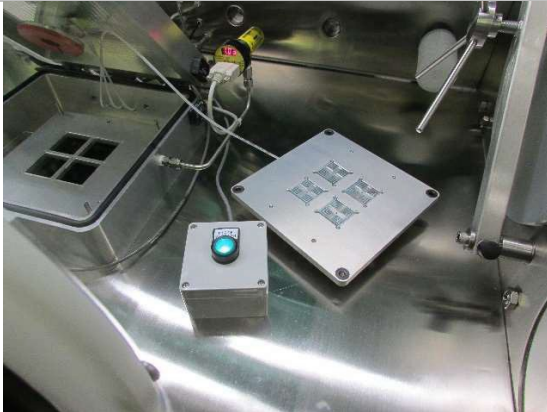


3. Load substrate into substrate holder.

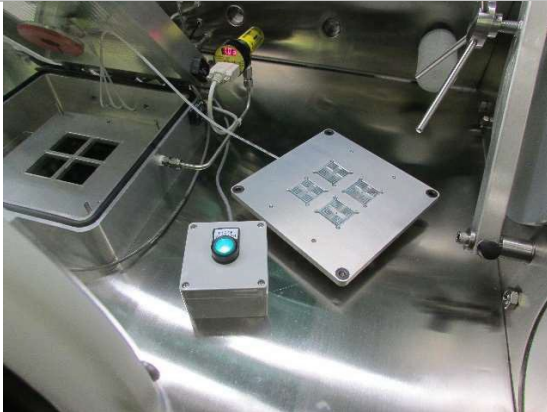


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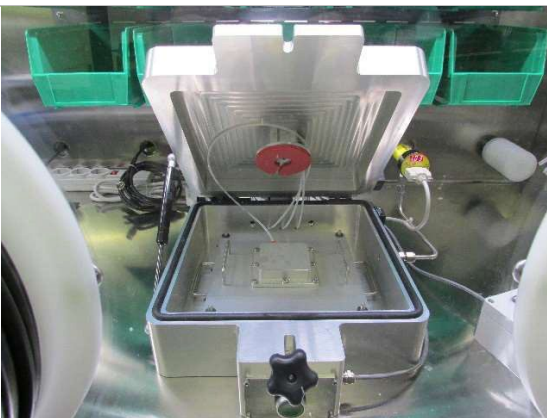
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4. Turn on suction.



5. Place cover glass in vacuum chuck.

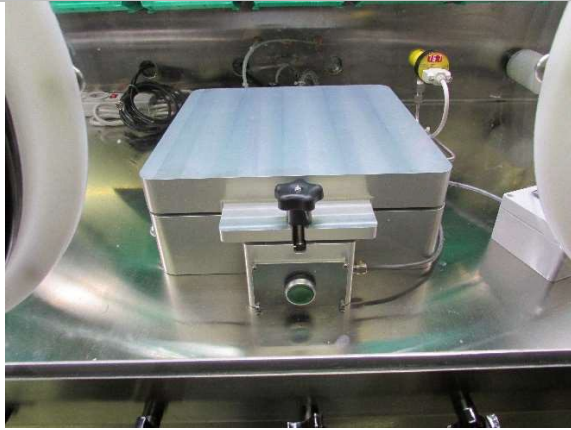


6. Place vacuum chuck in press.



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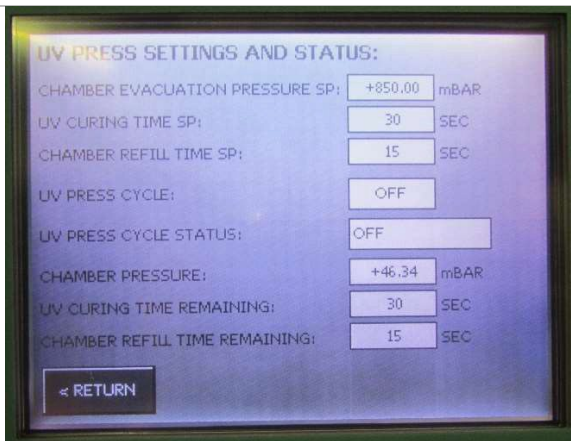
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7. Close cover.



8. Press UV Press button on main screen.

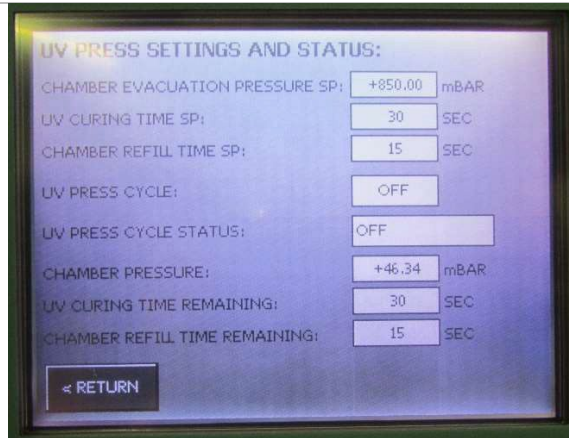


9. UV Press Setting and Status screen will be displayed.



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

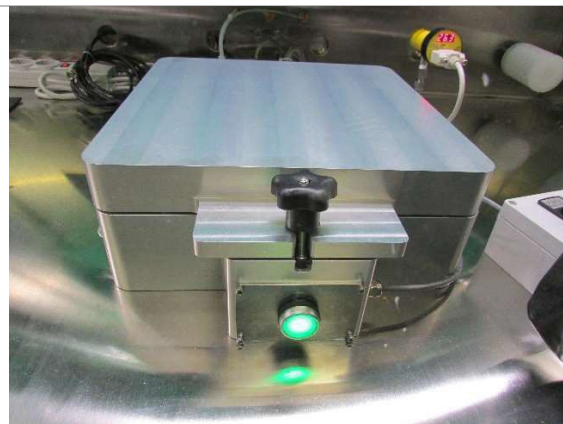
The factory default setting for the Chamber Evacuation Pressure SP is 750 mBAR.

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

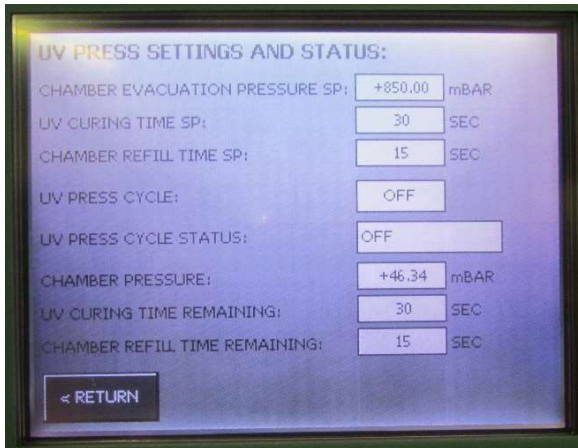
The factory default setting for the Chamber Refill Time SP is 30 SEC.



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.
- A. Chamber Pressure – This is the actual chamber pressure readout. Once the chamber reaches the set point it will change steps.
- B. UV Curing Time Remaining – This is the amount of time remaining in the curing process. The time will tick down until it reaches zero.
- C. 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.

27.6 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.



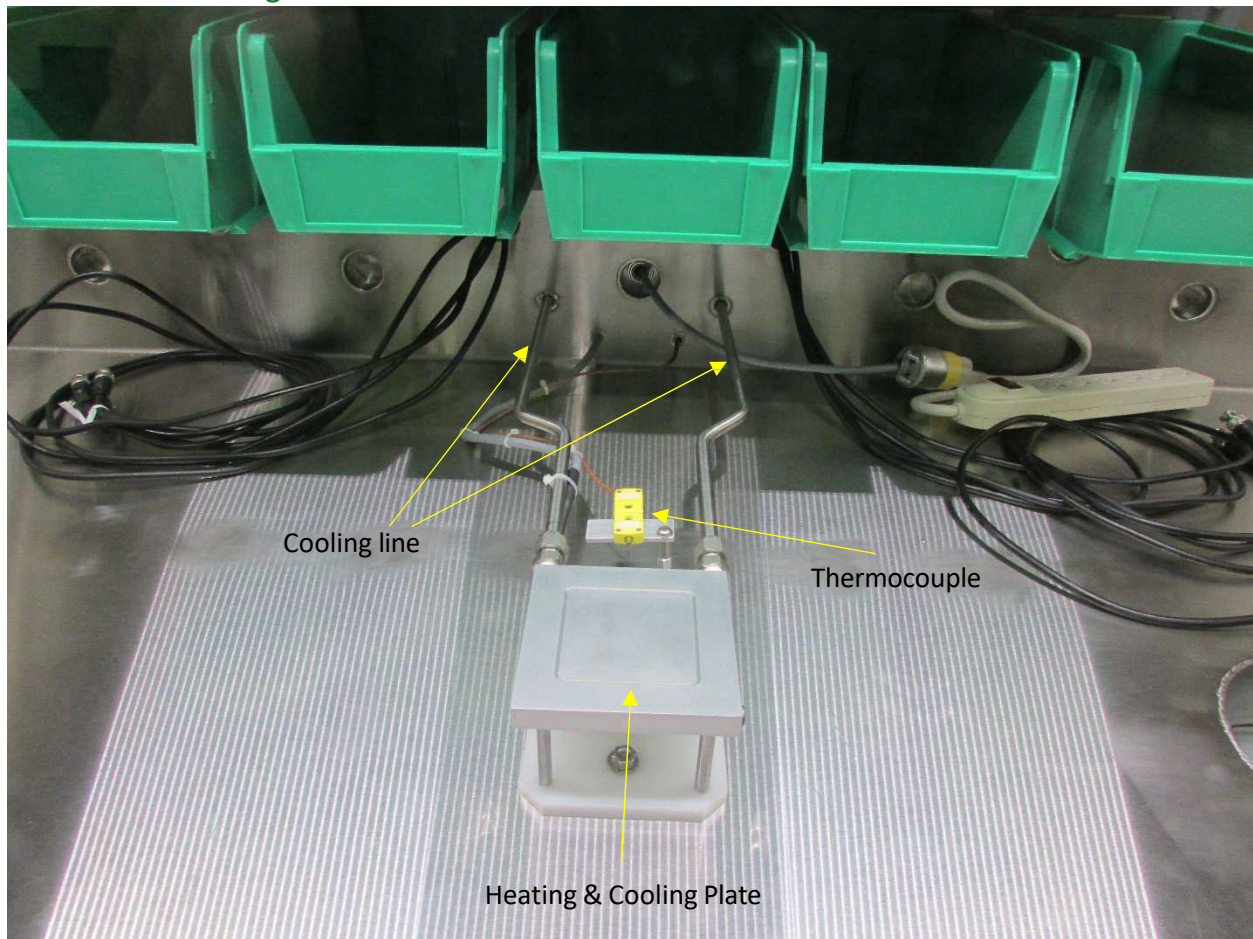
27.7 Fisnar Glue Dispensing Robot



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

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

27.8 Heat & Cooling Plate





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1. Turn on by pressing the switch to the ON position.
2. Turn off by pressing the switch to the OFF position.



To adjust the Set Point:

3. Press the  key on the temperature controller.
4. Use the  or  arrows to change set point.
5. 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.






27.9a Heated Tray



	<ol style="list-style-type: none">1. Load items into the antechamber, for instructions see Section 14.
	<ol style="list-style-type: none">2. Once items are in the antechamber and the antechamber is evacuated, you can turn Heated Tray Control Power switch to the ON position.
	<ol style="list-style-type: none">3. Press the run process button on the oven controller. See Oven Controller Setup Instructions below for more information.
	<ol style="list-style-type: none">4. Once process is complete, refill the antechamber prior to opening the door. <p>CAUTION! Contents will be hot.</p>



27.9 b Heated Tray Controller Set Up

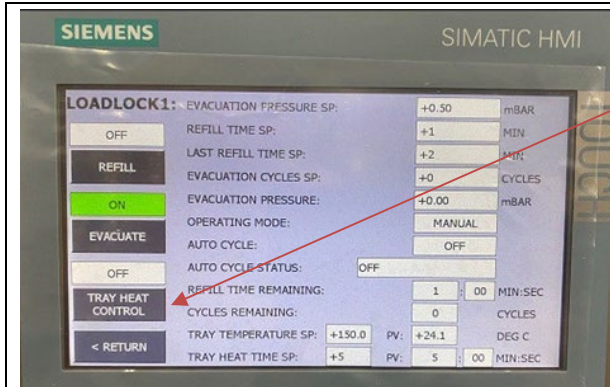
	<ol style="list-style-type: none"> 1. Turn power on. <p>NOTE: This is a ramp and hold programmable controller. It has nine (9) program segments. To program them follow the steps below.</p> <ol style="list-style-type: none"> 2. Press scroll button.
	<ol style="list-style-type: none"> 3. A green #1 will appear on the left side of this screen. Select desired temperature by using the ↑ and ↓ arrows. This is your first temperature set point.
	<ol style="list-style-type: none"> 4. Press scroll button. 5. Set desired time to reach required temperature. Use ↑ and ↓ arrows. This is your first ramp rate. <p>NOTE: When setting time, hours are to the left of decimal point and minutes are to the right.</p> <ol style="list-style-type: none"> 6. Press scroll button.
	<ol style="list-style-type: none"> 7. A green #2 will appear on this screen. You will once again select desired temperature using the ↑ and ↓ arrows. The same temperature should be used that was used in step 3. This is your first bake time.
	<ol style="list-style-type: none"> 8. Press scroll button. Select the desired amount of time you wish to bake items. Use ↑ and ↓ arrows.



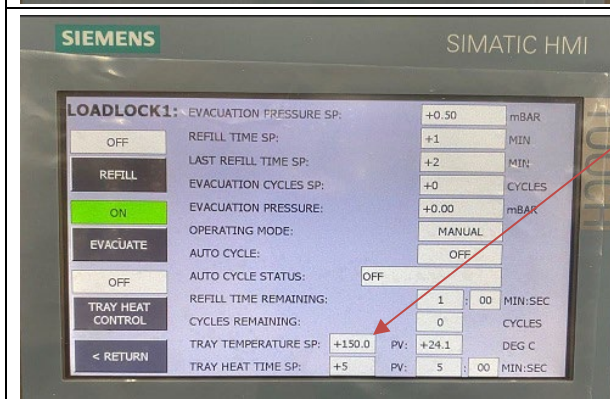
	<p>9. Press Scroll Button.</p> <p>10. There are nine (9) set values that can be utilized, if necessary. They follow the same pattern. If you were to use them the third set value would be a ramp up time and the fourth set value would be a bake or soak time.</p> <p>11. If only set values 1 and 2 are needed, leave zeros (0) for the other set values. You will cycle through these set values by using the scroll button.</p>
 <p>A digital display unit labeled "HEATED TRAY CONTROL" showing a red LED display with the number "28.3". The display has several buttons below it: a left arrow, a right arrow, a scroll button, and a power button.</p>	<p>12. To save settings and return to main screen, press and hold the scroll button until a solid red number is displayed. This is the current temperature inside the oven.</p>
 <p>A digital display unit labeled "HEATED TRAY CONTROL" showing a red LED display with the number "28.3". The display has several buttons below it: a left arrow, a right arrow, a scroll button, and a power button.</p>	<p>13. You are now ready to run the oven.</p> <p>NOTE: To cancel run process, press and hold run button until the green number on the left side of screen vanishes.</p>



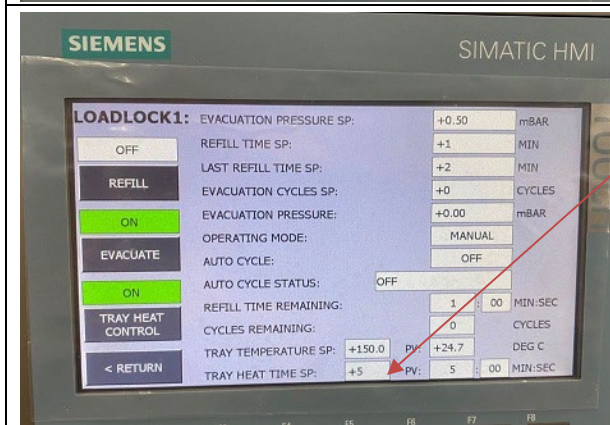
27.9 c Heated Tray Touch Screen Set Up



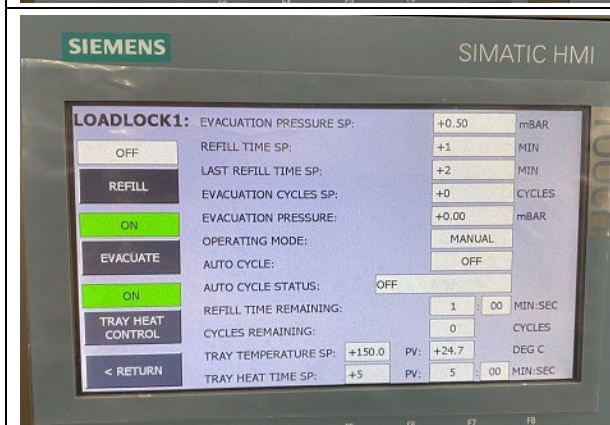
To turn the heated tray function on/off press the “tray heat control” button. The heated tray can be used under vacuum or inert conditions. The heated tray functions are not connected to the automatic functions of the antechamber



To set the desired temperature press the “tray temperature SP box”. A menu will appear, and you can enter temperature from 20-150C.



To set the time that you would like the heated tray to run press the “tray time SP box”. A menu will appear, and you can enter the number of minutes from 1-999. Once the heated tray reaches temperature the timer will start to run and then shut off when the time has expired.



If you want to run the heated tray for a longer period of time you can enter a times et point of zero and the heated tray will turn on and off using the “tray heat control” button. For example, if you have the time set to zero and turn on the heat control the heated tray will heat to the tray temperature set point and will stay on until you turn off the tray heat control.



27.10 Solvent Sensor



If you purchased the optional solvent sensor, your gas purifier will have a solvent sensor attached to it. (Pictured to the left)

The solvent sensor is designed to sense solvent vapor within the glovebox. The indication on the sensor is used to determine the condition of the activated carbon/ molecular sieve material used in your solvent removal system.

The sensor is sensitive to a variety of solvent vapors.

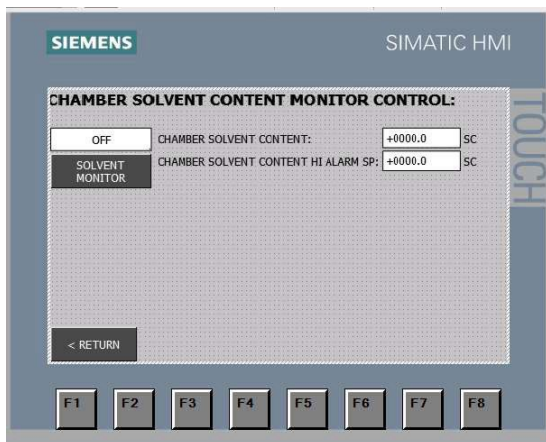


The content of solvent vapor is continuously displayed on the main PLC screen shown left.

The typical reading is 0.0.

If the reading is higher than 0.0 this is an indication that you need to change your activated carbon or reactivate the molecular sieve in the solvent removal filter column.

Note: We still recommend changing the filter material every 3 months regardless of the sensor reading.



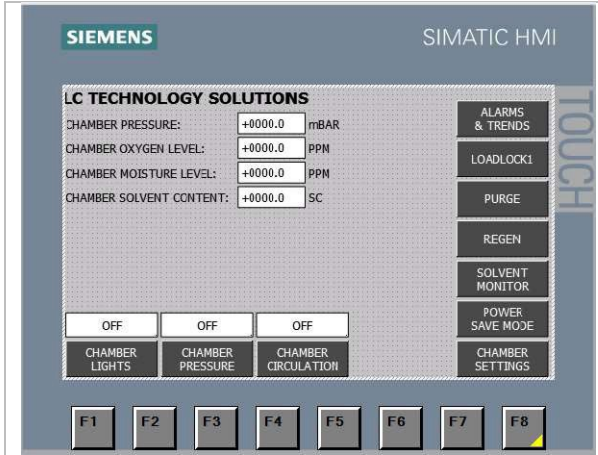
By pressing the button on the main screen that says Solvent Monitor you will see the screen to the left. It displays the current solvent content inside the glovebox. It also displays the user adjustable set point for the solvent sensor alarm. This is typically set to 0.1 as you will want to get an alarm as soon as there is excess solvent vapor inside the glovebox.

You must press the Solvent Monitor to Activate, ON will be displayed, and the button will turn **green**. The Solvent Monitor button will turn **green** on the Main Screen when activated.



If the solvent content is above the alarm set point it will trigger an alarm on the alarm screen. This is an indication that you need to replace or reactivate the solvent removal filter column material.

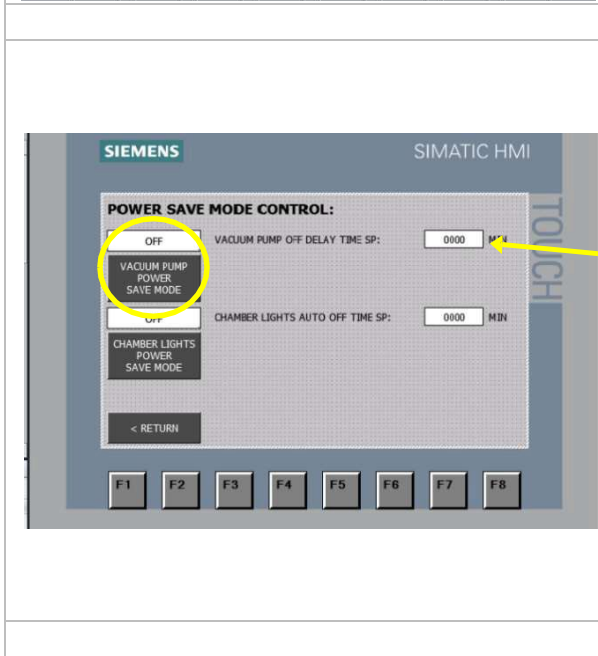
27.11 Power Saver Mode



The power saver mode is designed to switch off the vacuum pump and/or lights when they are not needed to run the system. This saves both energy and cuts down on noise.

To turn on power saver mode press the display button labeled Power Save Mode.

This will take you to the below screen.



Once in this screen Press the Vacuum Pump Power Save Mode to start this feature. ON will be displayed and the button will turn green.

The pump should turn off, (this is normal). Then you should enter the time that you want the pump to run for (off delay time). Typically, this would be set to 60 Minutes.

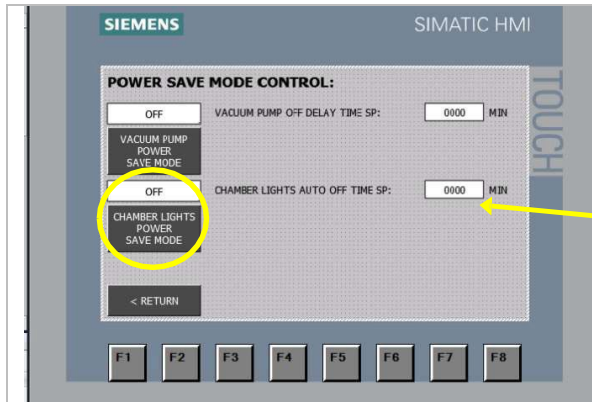
The system will continue to monitor the pressure in the glovebox to determine if the pump needs to be activated.

The pump should turn off automatically once it has reached the preset vacuum level.



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Press the Chamber Lights Power Save Mode to start this feature. ON will be displayed and the button will turn green.

Then you should enter the time that you want the lights to run for (off delay time).



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