

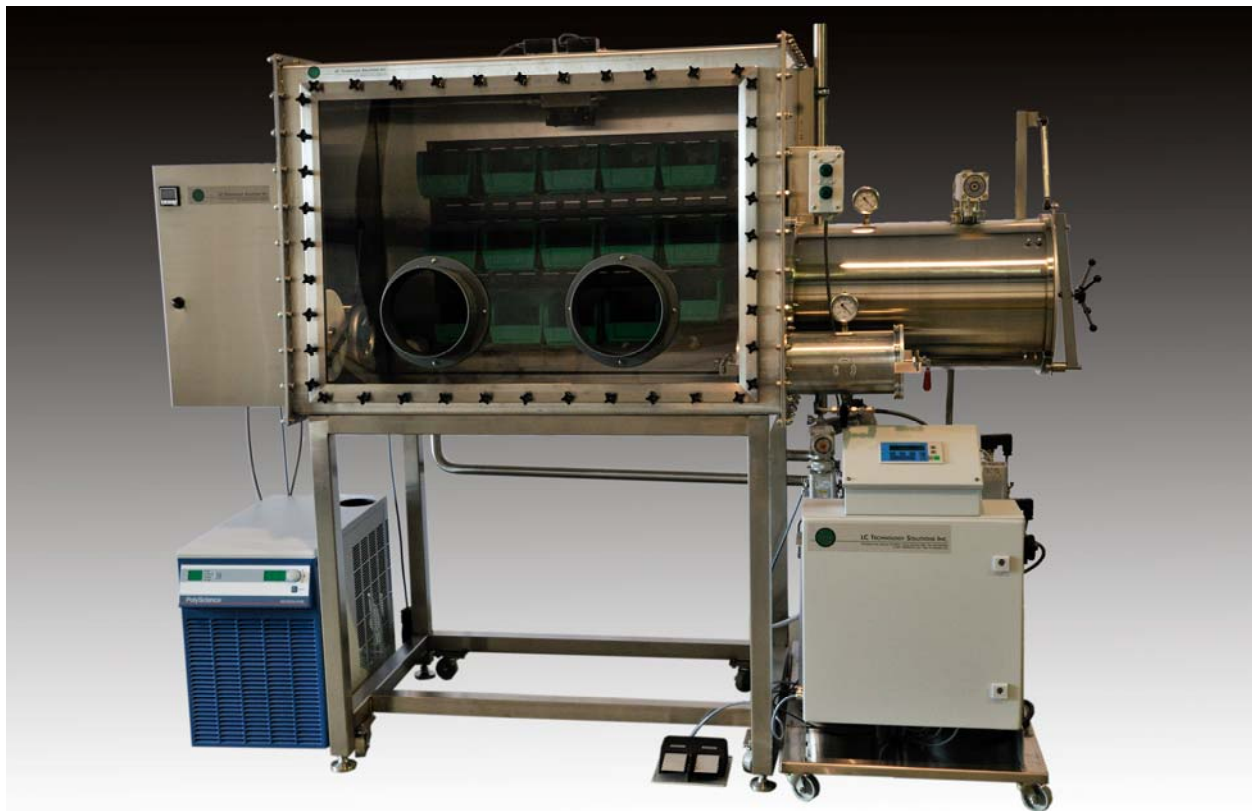


LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

LC-1 Stand Alone Glovebox

Operation Manual





LC TECHNOLOGY SOLUTIONS INC.

2C Fenners Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

Table of Contents

1. System Overview	Page 4
2. Installation Instructions	Page 5 - 8
2.1 Attach Gloves	Page 5
2.2 Glovebox Connections	Page 6 - 8
3. Operational Instructions	Page 9 - 39
3.1 Purge System	Page 9 - 13
3.1.1 Purging without a Purge Valve	Page 9 - 10
3.1.2 Purging with a Manual Purge Valve	Page 11 - 12
3.1.3 Purging with an Automatic Purge Valve	Page 13
3.2 Normal / Circulation Mode	Page 14 - 15
3.3 Antechamber Operation	Page 16 - 25
3.3.1 Antechamber Door Operation for Systems Without an Antechamber	Page 16 - 17
3.3.2 Antechamber Door Operation for Systems With an Antechamber	Page 18 - 21
3.3.2.1 Bringing Items into Glovebox	Page 18 - 20
3.3.2.2 Removing Items from Glovebox	Page 21
3.3.3 Mini Antechamber Operation	Page 22 - 23
3.3.4 Automatic Antechamber Control	Page 24 - 25
3.4 Regeneration Mode	Page 26 - 27
3.5 Service Mode	Page 28 - 32
3.6 Analyzers	Page 33
3.7A Manual Solvent Removal System Operation & Maintenance	Page 34 - 35
3.7.1A Manual Solvent Removal System Operation	Page 34
3.7.2A Manual Solvent Removal System Maintenance	Page 35
3.7B Automatic Solvent Removal System Operation	Page 36 - 37
3.7.1B Automatic Solvent Removal System Operation	Page 36
3.7.2B Automatic Solvent Removal Reactivation	Page 37
3.8 Freezer Operation and Maintenance	Page 38 - 39
3.8.1 Freezer Operation	Page 38
3.8.2 Freezer Maintenance	Page 39
3.9 Box Cooling Operation	Page 40



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.10	Alarm Messages	Page	41 - 42
3.11	Window Removal	Page	43
3.12	Window Replacement	Page	44
3.13	Maintenance Schedule & Recommended Spare Parts	Page	45

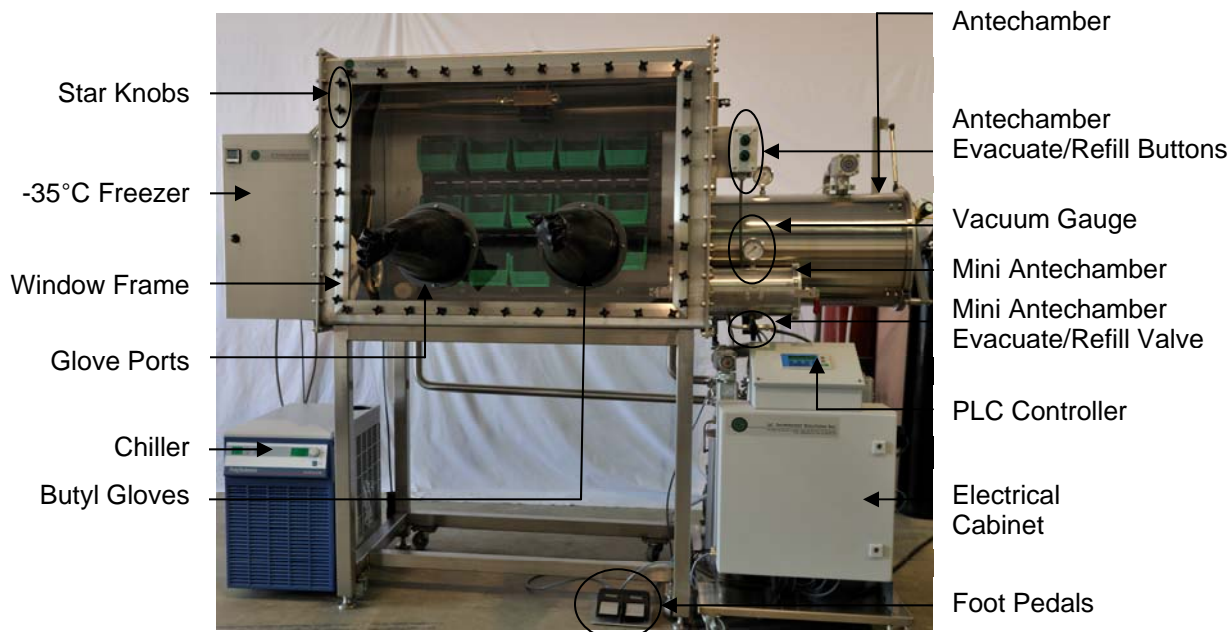


LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

LC-1 Stand Alone Glovebox Operation Manual

Section 1: System Overview



Gas Purification System





LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

Section 2: Installation Instructions

2.1 Attach Gloves



-Place glove onto the glove port.

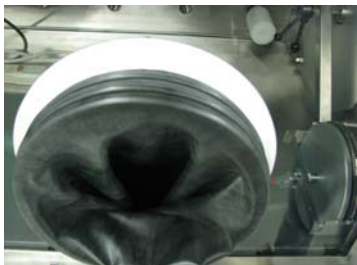


-Move the glove forward until it meets the glove port flange.



-Place hand in glove and align glove hand in a comfortable position (i.e. thumb facing up).

-Place first glove o-ring in first glove port groove.



-Place second glove o-ring in second glove port groove.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

2.2 Glovebox Connections

Gas Connections:

System will be supplied with reinforced Tygon tubing already attached to the gas purifier.



Find the tube labeled Inert Gas and connect this tube to your inert gas supply.

NOTE: $\frac{3}{8}$ " Tygon tube should be connected to inert gas at 60 psi.



Find the tube labeled Regeneration Gas and connect this tube to your regeneration gas supply.

NOTE: $\frac{3}{8}$ " Tygon tube should be connected to regeneration gas at 5 psi. Regeneration gas consists of a 3-5% hydrogen balance with nitrogen or argon. **Regeneration gas flow rate is 15 liters per minute.**

Power Connections:

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

Plug cord into a standard 115V, 15 Amp outlet or standard 220V outlet.



Electrical Feedthrough

Electrical Feedthrough

-US locations plug in electrical feedthrough into 115V power supply.

-International locations plug the electrical feedthrough into 220V power supply.

Vacuum Pump

Plug in vacuum pump to power outlet coming from glovebox system.

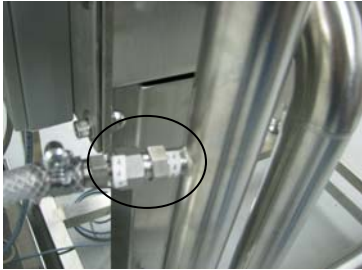


LC TECHNOLOGY SOLUTIONS INC.

2C Farnsworth Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

Some systems will come with the vacuum pump already wired to the system.

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



Vent Connections: Regeneration Out Vent



Bench Top Box Only

When regenerating the system the regeneration gas will vent out a $\frac{3}{8}$ " Tygon tube coming from the bottom of the purifier. This line will be labeled Regeneration Gas Exhaust.

NOTE: It is recommended that this line be vented. LC-1 system will have this line connected to the common vent line.



Vacuum Pump Exhaust

Vacuum Pump Exhaust

Vacuum pump exhaust is located on the top of the vacuum pump. This is a KF25 connection.

NOTE: It is recommended that this line be vented.



Manual Purge Valve

Manual / Automatic Purge Valve

Manual purge valve is located on top of the glovebox. This is a KF40 port (1 $\frac{1}{2}$ " diameter).

Automatic purge valve will be located on the gas purification system. This is a KF40 port (1 $\frac{1}{2}$ " diameter).



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com



Automatic Purge Valve

NOTE: It is recommended that this line be vented.



Common Vent Line:

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

NOTE: It is recommended that this line be vented.



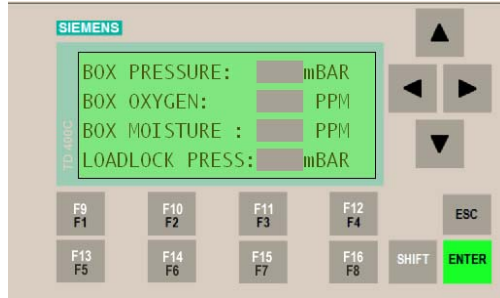
LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

Section 3: Operational Instructions

3.1 Purge System

3.1.1 Purging without a Purge Valve



1. From Normal Operation Mode verify circulation is turned off.

-If circulation is on press F5 to turn circulation off.

2. From Main Menu check pressure settings. Pressure settings should be set to positive values.

To verify settings are positive follow these steps:

-Press Esc

-When PLC shows User Menu press Enter

-When PLC shows Service Mode press Enter

-Arrow down until you reach the Box Pressure Alarm Set Points.

(Low Limit = 0.5, High Limit = 2.0)

-To adjust pressure setting press Enter

-When Password Required displays enter password; password is 2905

-Use the arrow ↑ key to select the first digit then press Enter

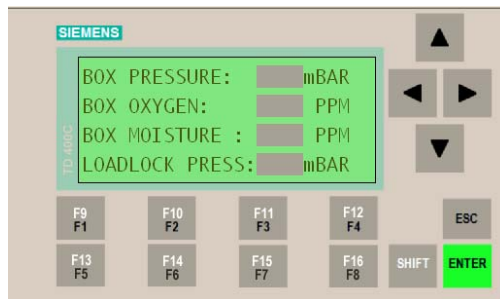
-Repeat the above set until all four digits have been entered

-Adjust set points

-Set Low Set Point using ↑ or ↓ arrow keys to increase or decrease values then press Enter

-Set High Set Point using ↑ or ↓ arrow keys to increase or decrease values then press Enter

-Press Esc. Twice to return to Main Menu





LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com



3. If pressure set points are okay; crack open inside antechamber door.

4. Crack open outside antechamber door.

5. As the outside antechamber door is opened you will hear the gas inlet valve opening and closing.

-Open outside antechamber door until gas inlet valve stays open.

6. If purging at start-up (glovebox is at room air) you will need to purge for approximately 45 minutes and/or 1-1 ½ cylinders of gas before turning on circulation.

7. When purging is complete follow these steps:

-Close inside antechamber door
-Close outside antechamber door
-Start/Restart circulation by pressing Shift F4

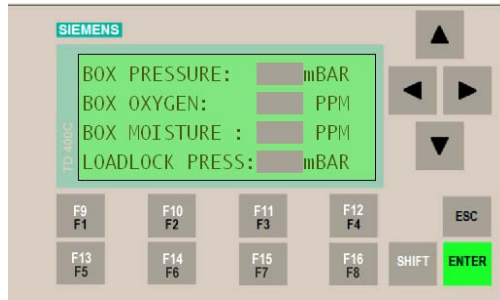


LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.1 Purge System

3.1.2 Purging with a Manual Purge Valve



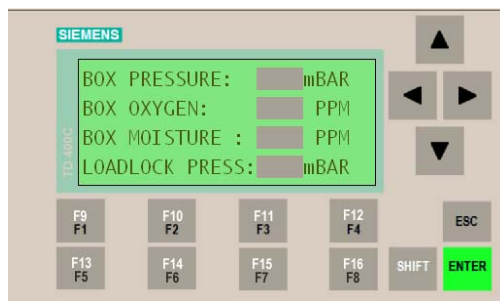
1. From Normal Operation Mode verify circulation is turned off.

-If circulation is on press F5 to turn circulation off.

2. From Main Menu check pressure settings. Pressure settings should be set to positive values.

To verify settings are positive follow these steps:

- Press Esc
- When PLC shows User Menu press Enter
- When PLC shows Service Mode press Enter
- Arrow down until you reach the Box Pressure Alarm Set Points.
(Low Limit = 0.5, High Limit = 2.0)
- To adjust pressure setting press Enter
- When Password Required displays enter password; password is 2905
- Use the arrow ↑ key to select the first digit then press Enter
- Repeat the above set until all four digits have been entered
- Adjust set points
- Set Low Set Point using ↑ or ↓ arrow keys to increase or decrease values then press Enter
- Set High Set Point using ↑ or ↓ arrow keys to increase or decrease values then press Enter
- Press Esc. Twice to return to Main Menu





LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com



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

4. If purging at start-up (glovebox is at room air) you will need to purge for approximately 45 minutes and/or 1-1 ½ cylinders of gas before turning on circulation.

5. When purging is complete follow these steps:

- Close Purge Valve
- Start/Restart circulation by pressing F5

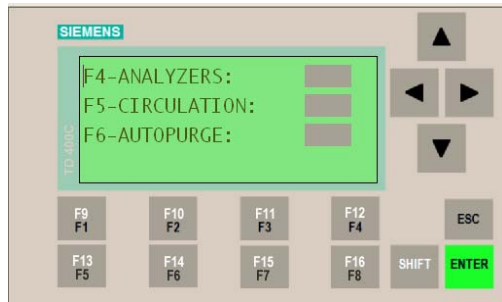


LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.1 Purge System

3.1.3 Purging with an Automatic Purge Valve



1. From Normal Operation Mode verify circulation is turned off.

-If circulation is on press F5 to turn circulation off.

2. From the Main Menu press F6 and the system will begin to purge automatically.
3. The Automatic Purge Function is controlled by time. The time setting is in the Service Mode. The purge time is set at the factory for twenty (20) minutes.
4. From Main Menu check the Purge Time.

To change the length of time follow these steps:

- Press Esc
- When PLC shows User Menu press Enter
- When PLC shows Service Mode press Enter
- Arrow down until you reach the Purge Time Menu.
- To adjust purge time press Enter
- When Password Required displays enter password; password is 2905
- Use the arrow ↑ key to select the first digit then press Enter
- Repeat the above set until all four digits have been entered
- Adjust set point
- Set Purge Time using ↑ or ↓ arrow keys to increase or decrease time then press Enter
- Press Esc. Twice to return to Main Menu



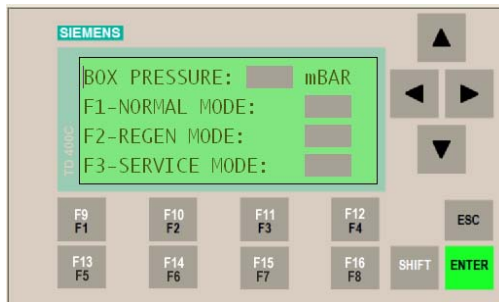
LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

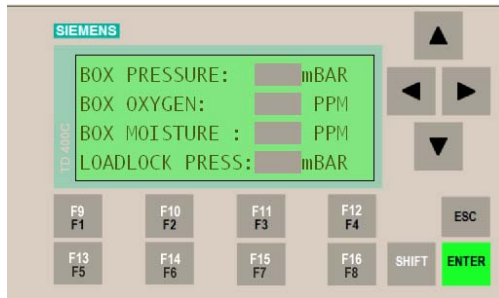
3.2 Normal / Circulation Mode

-Normal mode is the everyday Normal Mode for the glovebox. Normal Mode starts the pressure control function and allows for glovebox circulation.

-When the systems power is turned on the display will show the following screen:



-To enter Normal Mode push the F1 key. To exit Normal Mode push the F1 key again.



-Screen displayed once user enters Normal Mode.

Pressure Control

1. Press F1 to enter Normal Mode
2. Pressure settings have been preset at the factory to a Low Limit of .5 mbar and a High Limit of 3.0 mbar.

NOTE: This is a typical pressure range.

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

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



LC TECHNOLOGY SOLUTIONS INC.

2C Farnas Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

Circulation Mode

1. To start circulation of the glovebox environment through the filter column press F5.
2. To turn off circulation mode press F5.

Systems supplied with double filter columns can circulate the environment through either Filter Column 1 or Filter Column 2. It will circulate the environment through which ever column has been selected as the active filter column. To set the active filter column refer to Section 3.5 Service Mode.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.3 Antechamber Operation

3.3.1 Antechamber Door Operation for Systems Without an Antechamber



1. Place right hand in glove and turn door handle counter clockwise.

2. Spin door handle completely until door makes contact with door arm.

NOTE: This is important so door does not make contact with side wall of glovebox and damage sealing surface.



3. Push door arm upwards until door shock pulls door open.



4. Pass required material/parts through the access port.

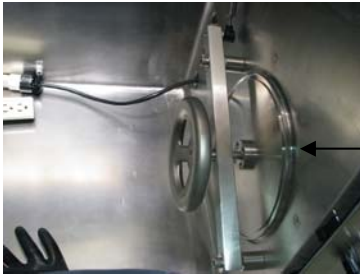


5. Grasp door handle and pull in a downward motion until door arm meets door pin.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com



6. Turn door handle clockwise until it meets door gasket.

CAUTION: Do not over tighten.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.3 Antechamber Operation

3.3.2 Antechamber Door Operation for Systems With an Antechamber

3.3.2.1 Bringing Items into Glovebox



1. Open outside antechamber door.



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



3. Place green bin inside antechamber.

Bin should be loaded into chamber short side first.



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

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



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com



5. Close outside antechamber door.

CAUTION: Do not over tighten.



Evacuation Hand Valve

6. Turn 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

Press the EVAC button on systems with push button controls to evacuate the antechamber.

OR

Systems with Automatic Antechamber Control, press the EVAC and the system will automatically perform the Evac/Refill cycles. To set automatic cycles refer to Section 3.5 Service Mode (Loadlock).



Evacuation Button

NOTE: It is best to let the antechamber evacuate for at least 2-3 minutes for each evacuation cycle.

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

OR

Pull the EVAC button out to stop evacuation.





LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com



Swagelok Refill Valve

8. Refill antechamber using Swagelok refill valve.

Continue to refill until the vacuum gauge reads 0.

OR

Press REFILL button on systems with automatic controls to begin process. Pull the REFILL button out to stop.



Refill Button

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

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

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

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





LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.3 Antechamber Operation

3.3.2 Antechamber Door Operation

3.3.2.2 Removing Items from Glovebox

1. Determine whether the antechamber has room air or inert gas in it.
2. If inert gas follow these steps:

- Open inside antechamber door.
- Load green bin/tray into antechamber.
- Close inside antechamber door.
- Open outside antechamber door.

3. If room air follow these steps:

- Evacuate and refill the antechamber three (3) times.

Refer to Section 3.3.1, Steps 6-9 for the evacuation/refill process.

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

- Open inside antechamber door.
- Load green bin/tray into antechamber.
- Close inside antechamber door.
- Open outside antechamber door.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.3 Antechamber Operation

3.3.3 Mini Antechamber Operation



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

2. Remove outside mini antechamber door.

3. Load green bins with parts.



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

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



6. Turn hand valve to evacuation position.

-Continue evacuating until gauge reaches approximately -30.



7. Turn hand valve to refill position.

-Continue to refill until the vacuum gauge reads 0.

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



LC TECHNOLOGY SOLUTIONS INC.

2C Farnas Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com



9. Return hand valve to Closed position.

10. Remove inside antechamber door.

11. Remove green bin with parts and return when complete.

12. Replace inside antechamber doors and push red lever into the locked position.

13. Refer to Section 3.3.2.2 for instructions for Removing Items from Glovebox.



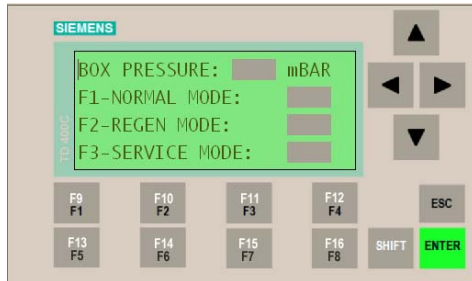
LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.3 Antechamber Operation

3.3.4 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.



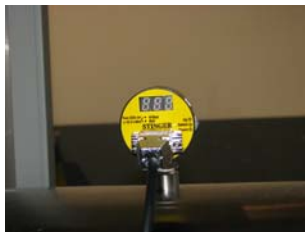
The set points for the automatic antechamber control / loadlock are located in the Service Menu.

Select desired vacuum level; .5 mbar is the recommended vacuum level set point.

Select the number of cycles up to nine (9). Three (3) is the recommended number of cycles.

Once selections have been made you can use this function by simply pushing the evacuate button.

Once the evacuate button is pushed the cycle starts automatically and pumps/refills the antechamber to set point selected.



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

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



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

The antechamber can be run in manual mode by setting the cycles in the Service Menu to zero "0". The evacuation/refill buttons will work by pushing which ever button the operator would like to use.



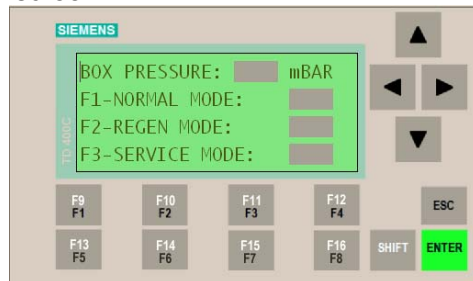
LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.4 Regeneration Mode

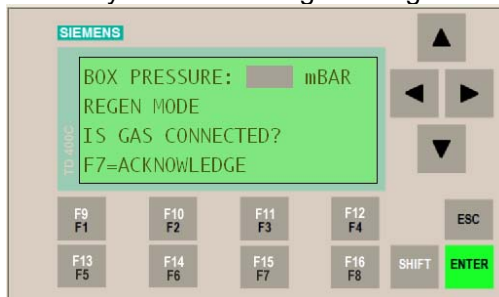
-Regeneration Mode is for reactivating the filter material. It can only be activated if the system is not in one of the other modes.

From the main screen:



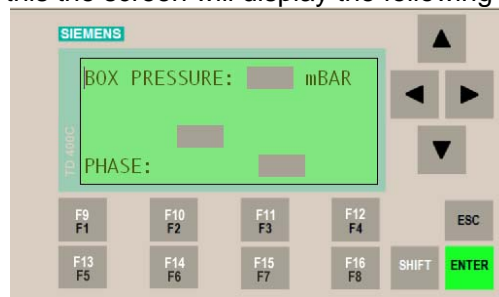
-Push F2 to enter the Regeneration Mode.

The screen will show you the following message:



-Once you have connected your regeneration gas you need to confirm this message by pressing the F7 key.

Once you do this the screen will display the following message:



Displays Service or Regeneration mode and regeneration phase. When the regeneration cycle is finished, press the F3 key if in Regeneration mode or the F3 key if in Service mode. This will allow the operator to return to Normal Operation Mode.

The regeneration process takes (14) hours and has (4) phases. Each phase will be displayed as the program progresses from one phase to the other.

The first phase is the heating phase which lasts (3) or (4) hours depending on the system.

NOTE: You may smell a slight odor at this time. This is normal.

The second phase is the purging phase which lasts (3) hours.

The third phase is the evacuation phase which lasts (3) hours.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

The fourth phase is the cooling phase which lasts (4) hours.

When the regeneration is complete the display will show a message that the regeneration has been completed. Press the F3 key to exit.

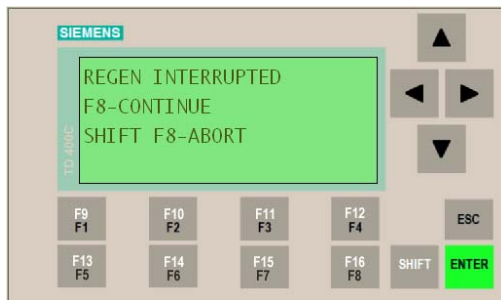
This will bring you back to the Main Menu.

To interrupt the regeneration process, press the F2 key at any time. Caution should be used at this time.

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

If the system has pasted the heating phase, the system should cool for (6) hours before restarting the regeneration.

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



This shows that the regeneration has been interrupted due to the system being shut down during the regeneration cycle. Pressing the F8 button allows the cycle to continue while Shift F8 exits the interrupted cycle and the Regeneration mode.

Note: Systems supplied with double filter columns will only automatically regenerate the deactivated column. To select the active/deactivated column refer to Section 3.5 Service Mode, Enable Filter Selection Menu.

To regenerate the deactivated filter column while in Normal Mode and circulating through the active filter column the following steps should be followed.

- Step 1: Press Shift F1 to bring you to the start menu.
- Step 2: Press F2 to start the regeneration on the deactivated filter column.
- Step 3: The screen will display the regeneration phases for the deactivated filter column that is being regenerated.
- Step 4: Press Shift F2 and then F1 to return to the Normal Mode screen to see box pressure and analyzer readings.
- Step 5: Press Shift F1 and then F2 to see the regeneration phase status.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.5 Service Mode

The Service Mode is where all of the user and system set points are located. These set points have been preset at the factory and care should be taken when altering the set points.

All settings are password protected. The password for your system is 2905.

In the Service Mode you can change the following settings:

- Analyzer Alarm Set Points
- Regeneration Cycle Time Set Points
- Analyzer Functions
- Pressure Set Points
- Purge Time
- Box Selection
- Loadlock Set Points
- Active Circulation Filter
- Manual Regeneration Procedure

-To enter the Service Mode press either Esc from Normal Mode or F3 from the Main Menu.

-When the PLC shows User Menu press Enter.

-When the PLC shows Service Mode press Enter.

-Press the Down Arrow Keys.

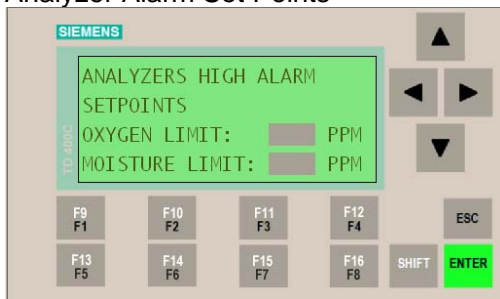
-Oxygen and Moisture set points will appear.

-To alter the set points press Enter and then the Password.

-Use the ↑ and ↓ arrow keys to enter the value.

Service Mode Displays:

- Analyzer Alarm Set Points



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

- Regeneration Cycle Time Set Points



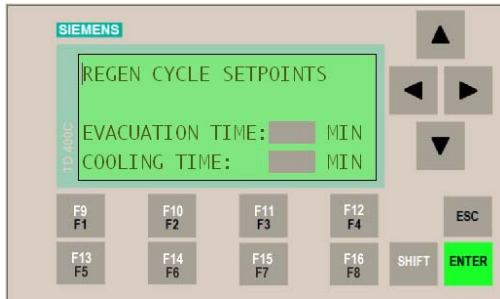
This screen allows the user to adjust the regeneration cycle times. It is not recommended to change these settings without contacting LC Technology.

Caution: The regeneration cycle times are critical to the system running



LC TECHNOLOGY SOLUTIONS INC.

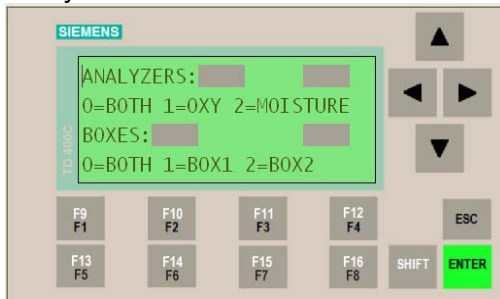
2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com



properly. Do not change these settings without first contacting LC Technology at (978) 255-1620.

This screen allows the user to select the analyzer configuration for the system.

c. Analyzer Functions



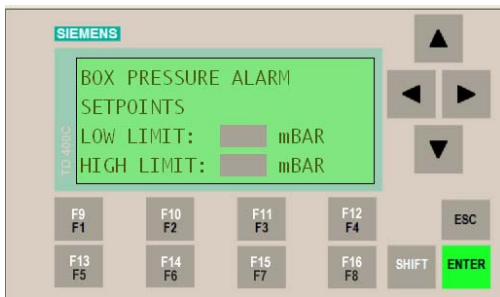
0 = Both oxygen and moisture analyzers are installed.
1 = Oxygen only
2 = Moisture only

This is preset at the factory.

Caution: The analyzer functions are critical to the system running properly. Do not change these settings without first contacting LC Technology at (978) 255-1620.

This screen allows the user to select the box pressure ranges that are needed for your application. Typical settings are .5 MBAR for low limit and 2 MBAR for high limit.

d. Pressure Set Points



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.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

This screen allows the user to select the purge time for the system.

e. Purge Time

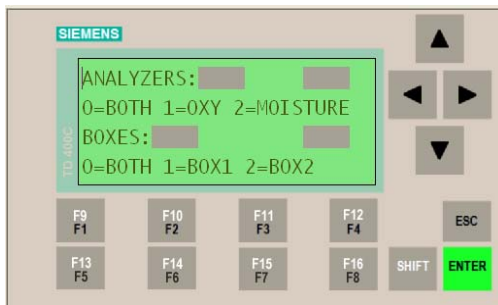


When auto purge is activated it will automatically shut off after the selected number of minutes.

When initially purging the system a recommended time of sixty (60) minutes is suggested.

During regular operation, if purging is needed, a time of twenty (20) minutes is recommended.

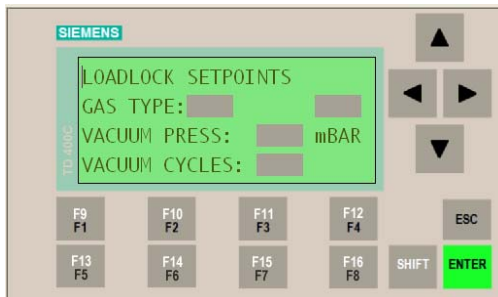
f. Box Selection



This screen allows the user to select the active box for the gas purification system. If the system is supplied with one gas purifier and bypass isolation valves for two gloveboxes this feature allows the user to select which glovebox is active (circulating through the gas purifier).

0 = Both Box 1 & Box 2 active
1 = Box 1 active
2 = Box 2 active

g. Loadlock / Antechamber Set Points



The loadlock set points are used to control the loadlock/antechamber function if the system was purchased with this feature.

First, select the type of gas being used in the system, nitrogen/argon. This is important for the vacuum gauge to function properly.

The vacuum pressure is the level of vacuum that you want the loadlock to reach before it refills. The recommended



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

level is .5 mbar.

The vacuum cycles is the number of evacuate/refill cycles that you want the loadlock to perform. This can be set from 1 to 9 cycles. We recommend using 3 cycles.

The automatic cycling of the antechamber is started by pressing the evacuate button that is mounted above the antechamber. Once the evacuate button is pressed the system will automatically evacuate/refill the antechamber to the set number of cycles to the vacuum level selected. Once the cycle is complete both the evacuate and refill button lights will be off.

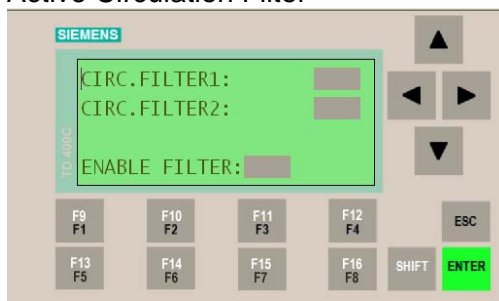
This function is for systems with two (2) filter columns. The active filter column is the one that will have the environment circulated through it.

In the enable filter set point select one of the following.

- 1 = Filter 1 Active
- 2 = Filter 2 Active

The system will only regenerate the deactivated filter.

h. Active Circulation Filter



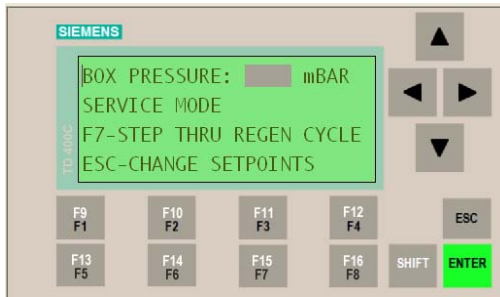
i. Manual Regeneration Procedure

If you suspect a problem with the regeneration function or if you want to manually regenerate the system you can use the F7 key to manually step through the regeneration process. It is recommended that you contact LC Technology at



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com



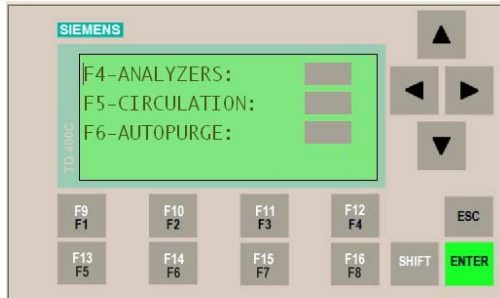
(978) 255-1620 before using
this function.



LC TECHNOLOGY SOLUTIONS INC.

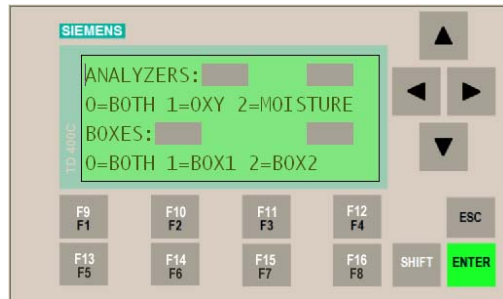
2C Fenaros Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.6 Analyzers



Your system may be equipped with oxygen and moisture analyzers. If it is equipped with analyzers you can activate them by pressing the F4 key.

The display will read as follows:



Normal operation screen with the analyzers enabled. Pressing the F4 key will disable the analyzers and bring up the Normal Mode Enable Analyzers screen.

To exit Normal Operation Mode to enter Service or Regeneration Mode, press the F1 key while in Normal Operation Mode.

The analyzers will display a value between 0 and 1000 ppm. Since the system does not have a decimal point it uses rounding of these values. So a value of 1 means that the system is running at less than 1 ppm.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.7A Manual Solvent Removal System Operation and Maintenance

3.7.1A 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) operations modes: active mode and bypass mode.

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



Valve 1



Valve 2 and 3



Valve 1



Valve 2 and 3

Active Mode:

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

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

Bypass Mode:

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

-Open valve1 and close valves 2 and 3.

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



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.7A Manual Solvent Removal System Operation and Maintenance

3.7.2A Manual Solvent Removal System Maintenance

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

Follow the steps below to change the activated carbon:

1. Put the solvent removal system in Bypass Mode.



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

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

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



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



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

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

8. Put system back into active mode.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.7B Automatic Solvent Removal System Operation

3.7.1B Automatic Solvent Removal System Operation

The automatic solvent removal system (ASRS) is used to remove solvent vapor from the glovebox environment. The ASRS uses 13X molecular sieve to absorb the solvent vapor.

The ASRS has two operational modes: circulation and bypass.

Circulation mode is used when the operator wants the ASRS to remove solvent vapor from the glovebox environment.

To put the ASRS into circulation mode follow these steps.

1. Press Esc.
2. Select User Menu, Enter
3. Select Solvent Filter, Enter
4. Go to the Service Menu, set the ASRS value to zero "0".



Bypass mode is used when the operator does not want the ASRS to remove solvent vapor. This mode is typically used when the ASRS is being reactivated.

To put the ASRS into bypass mode, go to the Service Menu, set the ASRS value to one "1".





LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.7B Automatic Solvent Removal System Operation

3.7.2B Automatic Solvent Removal System Reactivation

After some time the ASRS material will become saturated with solvent vapor and will need to be reactivated.

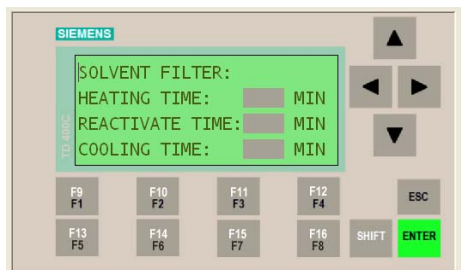
To reactivate the ASRS:



Set the ASRS value in the Service Menu to one "1" (Bypass Mode).

From the Main Menu in Normal Mode press Shift F5 (F13).

To see the status of the solvent reactivation, press down arrow twice from Main Menu.



The ASRS will go through three steps.

1. Heating for 180 minutes
2. Purging for 180 minutes
3. Cooling for 240 minutes

Then the reactivation will be complete and the operator can put the ASRS into circulation mode.



The ASRS will flow nitrogen during the reactivation process.

This flow has been preset at the factory to 15 liters per minute.

This flow is set by the needle valve pictured to the left. The flow rate can be adjusted if needed.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.8 Freezer Operation and Maintenance

3.8.1 Freezer Operation



NOTE: Verify freezer is plugged in.

1. Turn freezer on by turning switch to the right.
2. Turn freezer off by turning switch to the left.

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



3. To adjust set point press the second key to the left on the temperature controller.

Use the ↑ or ↓ arrows to change set point.

Press the second key to the left again to complete.

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



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.8 Freezer Operation and Maintenance

3.8.2 Freezer Maintenance

Freezer maintenance should be performed by a qualified refrigerator repair person.

NOTE: There are no user serviceable items on the freezer.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.9 Box Cooling Operation



NOTE: Verify unit is plugged in.

1. Turn on circuit breaker located on back of PolyScience chiller.



2. Press power switch on front of cooling unit.



3. Temperature will be displayed in the right hand display.



4. Flow rate will be displayed on the left hand display.



5. To adjust temperature setting press in round dial.

Turn dial ↑ or ↓ to adjust to desired temperature.

Press round dial again to enter new set point.

NOTE: For more detailed instructions refer to PolyScience operation manual.

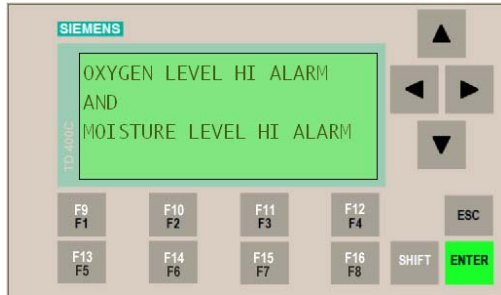


LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.10 Alarm Messages

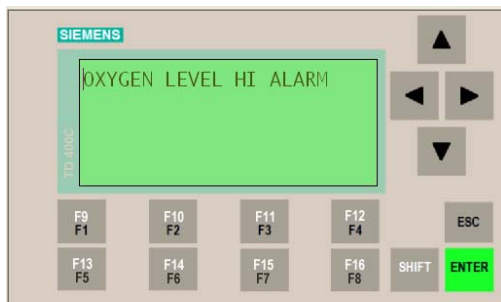
The alarm levels are set in the Service Mode for both the oxygen and moisture analyzers. If the reading on the PLC is above the alarm set point it will display the following messages.



This alarm displays when both levels are too high.



The moisture level high alarm displays when the moisture level in PPM is over the alarm setpoint.



The oxygen level high alarm displays when the oxygen level in PPM is over the alarm setpoint.

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

Inlet/Outlet Valves Not Open



This means the gas pressure to the system is set too low.

NOTE: This may also mean you have run out of gas.

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

This is almost always caused by low gas pressure or an



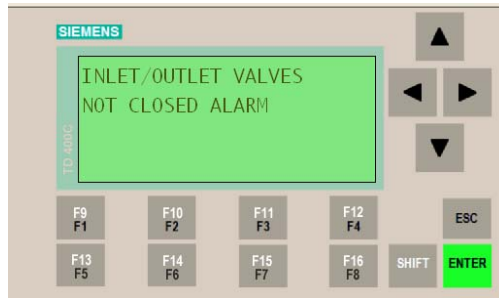
LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

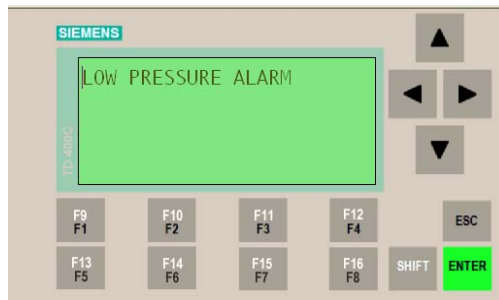
empty gas cylinder.

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

Inlet/Outlet Valves Not Closed



Over or Under Pressure Alarm



This means the pressure in the system has reacted to the safety pressure settings.



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



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.11 Window Removal



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



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



6. Remove the window frame and set aside.



7. Remove window and complete required work.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.12 Window Replacement



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



2. Replace window frame.



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



4. Replace remaining star knobs.

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



5. Tighten star knobs until window frame contacts glovebox.



LC TECHNOLOGY SOLUTIONS INC.

2C Fenwick Drive, Salisbury, MA 01952 • Phone: 978-255-1620 • Fax: 978-428-0222
E-mail: info@lctechinc.com • Web: www.lctechinc.com

3.13 Maintenance Schedule & Recommended Spare Parts

1. The gloves and glove o-rings should be changed once every three (3) months or as needed based on the condition of the gloves.
2. Vacuum Pump oil should be changed at least every three months.
3. The Inlet/ Outlet filters should be replaced every six months.
4. The large antechamber door o rings should be replaced every year.
5. The small antechamber door o rings should be replaced every year.
6. If the system is equipped with a solvent removal system please follow the schedule below.
 - a. Internal solvent removal trap change every month.
 - b. External solvent removal trap change charcoal every six (6) months.

NOTE: With heavy solvent usage change the charcoal more frequently.

Spare Parts Listing

<u>Part No.</u>	<u>Description</u>
GL-003	Gloves, Left/Right, 1 pair
OR-028	Glove O-Rings
FL-102	Inlet/Outlet HEPA Filter
OR-111	Large Antechamber Door O-Ring
OR-110	Small Antechamber Door O-Ring
FM-018	Activated Carbon for Solvent Removal System (20 lbs)
FM-002	Copper Catalyst (4.5 kg)
FM-015	Molecular Sieve (12 lbs)
AN-009	Replacement Sensor for Oxygen Analyzer