PathTrue™
SOLVENT RECYCLER

INSTALLATION AND OPERATING INSTRUCTIONS
2.5 Gallon Benchtop Solvent Recycler

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SPECIFICATIONS FOR 2.5 Gallon Benchtop SOLVENT RECYCLER
Dimensions: 16.5” wide, 36” high, 24” deep
Type of Control: Microprocessor
Necessary Hook-ups: 120 v. grounded outlet
Amps: 10.0 – 15.0

Do not attempt to use or maintain this recycler until you have read and understand these instructions. Do not permit untrained persons to use or maintain this recycler. If you do not fully understand these instructions, contact CBG BIOTECH for more information.

2.5 Gallon Bench Top Solvent Recycler

IMPORTANT SAFEGUARDS

Prior to Using the Recycler:
To reduce the risk of fire, electric shock, and/or injury to persons when using electrical equipment, basic safety precautions should always be followed, including:

- Read all instructions and information in this manual before operating or using the equipment.
- Install, operate and maintain the equipment in accordance with this instruction manual.
- The recycler must be installed on a level surface.
- This recycler is for recycling only the solvent(s) specified.
- Do not exceed the recycler's capacity.
- This recycler is not for use with nitrocellulose.
- Connect the recycler to properly grounded outlets only.
- Do not immerse cord, plugs, or recycler in water or other liquid.
- Do not operate recycler with a damaged cord or plug.
- Do not use recycler for other than intended use.
- Do not use with an extension cord.
- This recycler has a polarized plug. As a safety feature, this plug will fit in a polarized outlet only one way. If it does not fit, contact a qualified electrician. Do not attempt to defeat this safety feature.
- To allow adequate ventilation to the system, top and side vents of the machine must not be obstructed.

While Using the Recycler:
(For additional information, please see sections for helpful hints and troubleshooting)

- Strain the waste to be recycled using the metal strainer provided in the fill container.
- **Monitor** your waste. If you do not get waste with each and every cycle, notify CBG.
- Reclaimed product should be **clear**. Please notify CBG immediately if you notice discoloration.
- The recycler has two different audio signals. The end of cycle signal, a rapid series of three one-second beeps, is heard only at the end of each cycle. A second audio signal may sound at any time the recycler is powered on. This indicates an alarm condition. Notify CBG if you hear this alarm during or at the end of a cycle, or see Additional Display Messages for the probable cause of the alarm condition.
- **If an audio signal is sounding, please note the message on the color touch screen. Press Silence Alarm to clear the audio alarm and follow the directions on color touch screen.**

Non-Serviceable Components:
Customer serviceable items are restricted to the replacement of consumable items mentioned in this manual. The operator of the unit should report any abnormalities, or suspected abnormalities to a CBG Biotech Technical Representative. Under no circumstances should the customer or operator attempt to dismantle the unit to effect repairs.

PRINCIPLE OF OPERATION

The CBG BIOTECH solvent recyclers are designed to reclaim a number of solvents. Each unit is calibrated to recycle one specific solvent or a number of specified solvents.

The CBG BIOTECH recycling process employs **multi-component, fractional distillation** with approximately 10 theoretical stages. The recycler is able to effect multiple boiling and condensation cycles to give product with high purity, and approximately 95% recovery, from the starting material.

Recycled solvent, waste alcohol and waste products are **collected separately and automatically** so that monitoring during the normal cycle is not required. Waste alcohol and paraffin are not purified in this process, may contain trace amount of solvent, and should be disposed of according to your facility's hazardous waste policy.

The recycler uses an **automatic gravity fill** system whereby the solvent to be reclaimed empties into the main tank. To prevent tank overfill, a timer controlling the fill line allows it to remain open for approximately 10 minutes. Typically 5-8 minutes are adequate to fill the tank. The **maximum capacity** of the tank is **2.5 Gallons**.

A **color touch screen** on the front of the recycler provides information regarding how the cycle is proceeding. An internal air circulation system cools and ventilates the interior of the recycler.

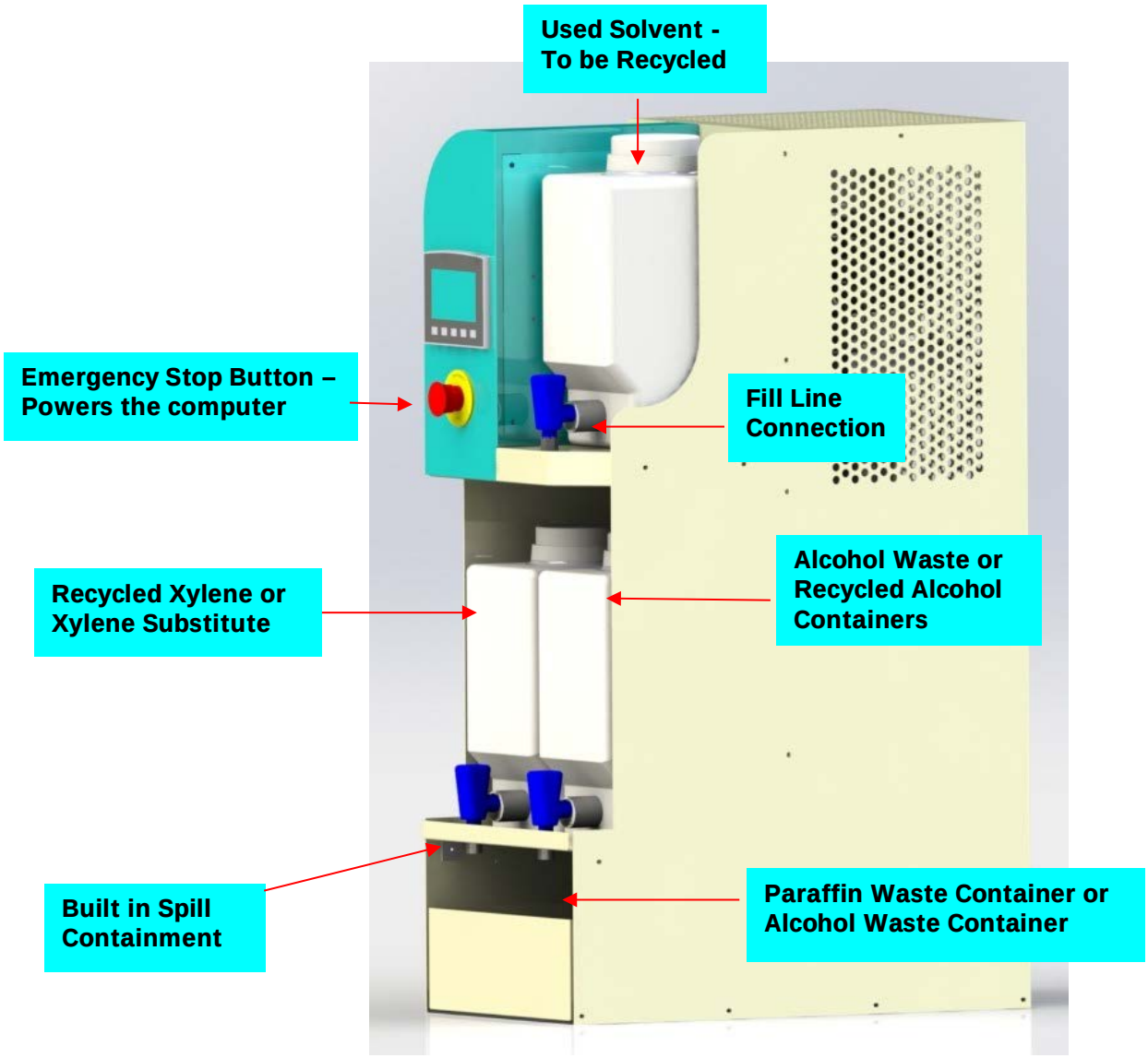
The **Emergency Stop** button serves to cut power to operating devices on the recycler to abort a cycle in the event of an emergency. The color touch screen will not power down in the event of an emergency stop. You will still be able to view and navigate through menus and functions when the Emergency Stop button is engaged. To release the Emergency Stop button, twist in the direction indicated by the arrows on the button and power will be restored to all operating devices.

Two different **audio signals** provide additional information about the recycler operation. One audio signal indicates a cycle has ended and sounds only at the end of each cycle. This **end of cycle** alarm is a rapid series of high-pitched beeps. A second audio signal, which may sound at anytime the recycler is powered on, indicates the machine has been automatically shut down and an **alarm condition** exists. **Check and record the LCD display for alarm type.** See Additional Display Messages for the probable cause of the alarm or contact your Technical Support Representative.

The recycler contains an **Option Menu**. This menu allows the user to control/customize certain functions of the recycler. Each user may choose to change certain settings or leave them at their original factory settings. Your Technical Support Representative will assist you with any changes you wish to make.

Recyclers that are programmed to process multiple solvents will prompt users to flush the system when solvents are changed from clearing agent to clearing agent or to alcohol. The unit **will not** prompt this flushing process when going from alcohol to clearing agent.

2.5 Gallon Bench Top Solvent Recycler General Overview



ACCEPTABLE SOURCES OF WASTE

Each CBG BIOTECH recycler is calibrated specifically for the solvents regularly used in your laboratory. Listed below are waste sources suitable for use with CBG recyclers. No two labs are alike; please contact CBG BIOTECH at 1-800-941-9484 for questions about your solvents or other chemicals, which may be present in your waste stream.

Xylene & Xylene Substitute

Waste Solvent from:

Automated tissue processor	Manual staining set up
Automated stainer	Deparaffinizing or dehydration setup

Xylene or xylene substitute contaminated with ethanol, paraffin, water, or histochemical stains. **Please note that xylene substitutes should not contain any xylene contamination, as separation cannot be achieved.**

Alcohol

Waste alcohol from:

Automated tissue processor	Manual staining setup
Automated stainer	

It is suggested you collect your lower and higher concentrations of alcohol separately. Absolute combined with 95% alcohol recycles to 95-98%, 70-80% alcohol recycles to 85-90%. Absolute collected separately recycles to 99%. It is **strongly** suggested vendor absolute be used in the last station prior to any xylene or substitute. **Do not recycle waste alcohol that has been contaminated with xylene.**

BEFORE YOU BEGIN TO RECYCLE

- Confirm that items listed on the packing list are present.
- Make sure the recycler is located at least 3-6" from any other equipment and is placed in a well-ventilated room where the temperature does not exceed 80ºF.
- Familiarize yourself with the fill system BEFORE you load the waste solvent into the provided fill containers.
- Be sure you are following your facility's safety procedures for working with hazardous solvents.
- Use 120V grounded outlet. Plug the recycler directly into the outlet. **ABSOLUTELY NO ADAPTERS ARE TO BE USED**.
- Please call CBG BIOTECH before making any alterations to the recycler.
- Be sure you are using only the CBG BIOTECH recommended containers. Check to make sure the **SPIGOTS ON THE FILL CONTAINER ARE CLOSED BEFORE** disconnecting from the fill lineconnection. **NOTE:** Use only the CBG BIOTECH waste/fill containers supplied. Waste that drains from the unit is hot and an appropriate container must be used. **Caution:** The vent system will be compromised if waste containers from another supplier are used.
- This recycler is designed for **reclaiming** solvent only. Do not store waste material inside the unit.
- Plug the unit in to a regular 120V outlet; move the main power switch located on the back of the recycler to the "on" position. To release the emergency stop, push in and turn in the direction of the arrows.

HELPFUL HINTS FOR BETTER RECYCLING OF WASTE SOLVENT FROM HISTOPATHOLOGY LABS

Informed personnel

All persons operating this equipment should read this manual thoroughly before attempting to operate the CBG BIOTECH solvent recycler.

Straining waste solvent

Use the metal strainer provided when collecting waste solvent. The strainer conveniently sits in the fill container. Waste solvent and alcohol from a cytology lab may contain very fine particulate material, which may pass through the strainer and impede the fill. You may want to try placing filter paper inside the strainer.

Particulates in waste solvent

When the recycler has finished filling, a small volume of waste solvent will remain in the jug. This is due to a) the location of the spigot and b) gravity. You should not tilt the container to force the remaining solvent to enter the recycler, this last volume of waste solvent may contain particulates, resulting in a slow fill or blocked line. The fill container could require frequent cleaning.

Possible odor of recycled solvent

If you notice an odor associated with your recycled solvent, this smell most likely results from the formation of amines which may occur when formalin reacting with small quantities of nitrogen, present in tissue, is heated under slightly alkaline conditions, i.e. pH > 7.2. Amines are volatile and some may stay with your solvent. Even though they are present in minute amounts, they really smell. To remedy this, we recommend adding a small volume (1/2 to 1 mls) of acid to the waste in the fill container before recycling. Glacial acetic acid is preferred, formic acid is okay, and a sprinkle of citric acid is also acceptable. The acid will lower the pH of the waste solvent so any nitrogen present will not form amines. **Under no circumstances use Sulfuric acid, Nitric acid, Hydrochloric acid or other corrosive inorganic acids**.

Discoloring of solvents

Reclaimed solvent and alcohol should be clear. Please notify CBG BIOTECH immediately of any discoloration. Stains present in waste solvent are collected with the waste paraffin and will cause waste discoloration. Alcohol used in the cytology area could be heavily stained. This could result in misting of dyes at the end of the cycle into the recycled product. This does not affect the quality of the product in any way. There are also temperature settings that can be easily adjusted that will alleviate this problem. Overfilling the unit may also cause tinted recycled product.

Paraffin waste

The CBG BIOTECH solvent recycler separates paraffin waste from reclaimed solvent during each cycle. The recycler automatically empties the liquefied paraffin from the recycler at the end of the cycle. The paraffin waste contains traces of solvent and should be disposed of according to your facility's hazardous waste procedures. It is not necessary to empty the paraffin waste bag after each run. The paraffin will

solidify if left in the collection bag. We recommend monitoring the amount of paraffin waste in the collection bag. If you choose not to empty the paraffin waste after each run you should never allow the volume of solid paraffin to exceed half of the volume of the collection bag. If the waste container becomes too full, the paraffin may solidify in the drain tube and damage the recycler. You may liquefy the paraffin waste by placing the waste bag in a hot water bath. The liquefied paraffin may then be poured off into an appropriate waste receptacle. Or if you wish to dispose of the waste bag, additional waste bags may be purchased from CBG BIOTECH. Waste that drains from the unit is **hot** and an appropriate container or collection bag must be used.

Ethanol Waste

The CBG BIOTECH recycler separates ethanol waste from reclaimed xylene or xylene substitutes, and separates waste (which may contain ethanol) from reclaimed ethanol. The unit automatically empties waste from the unit tank at the end of the cycle. The waste should be disposed of according to your facility's waste procedure. **You must monitor the amount of waste in the container and empty when necessary to avoid an over fill of the waste container.**

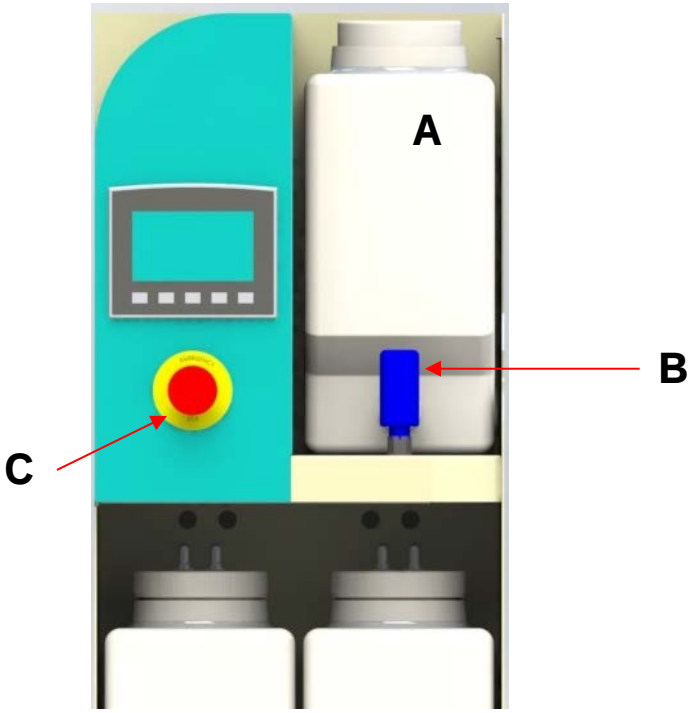
If you have any questions contact Technical Support, 1-800-941-9484

Preparing to Begin a Cycle

Place recycler in desired location. Plug the power cord into a standard 120V outlet. Move the main power switch located on the back of the recycler into the “ON” position, the switch will illuminate.

Container Placement

Fill Container

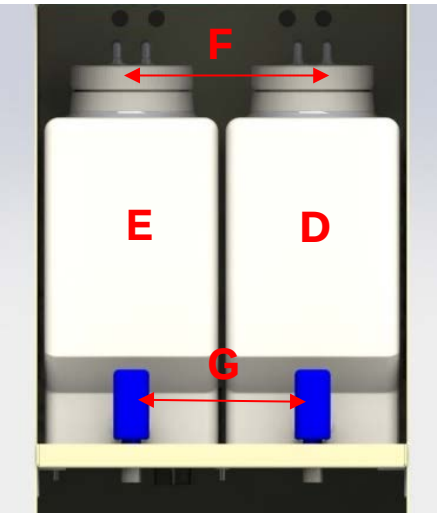


1. Place material to be recycled into Fill Container (A) – must have a volume of at least 4 Liters (One Gallon).

2. Put Fill Container in place on the fill shelf and attach spigot to fill line (B).

3. Release the Emergency Stop Button (C), by turning the red button in the direction of the arrows (right).

Recovery Containers



1. Place the Ethanol Waste/Recycled Alcohol container on the RIGHT side of the recovery shelf (D).

2. Place the Xylene/Xylene Substitute container on the LEFT side of the recovery shelf (E).

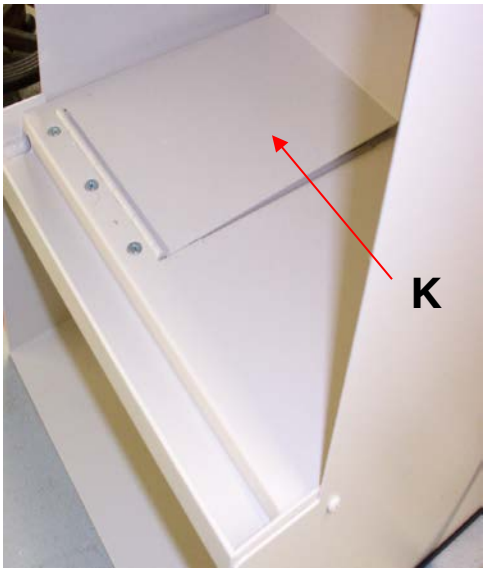
3. Secure lids (F) carefully. Do not allow the tubing to twist and block the flow.

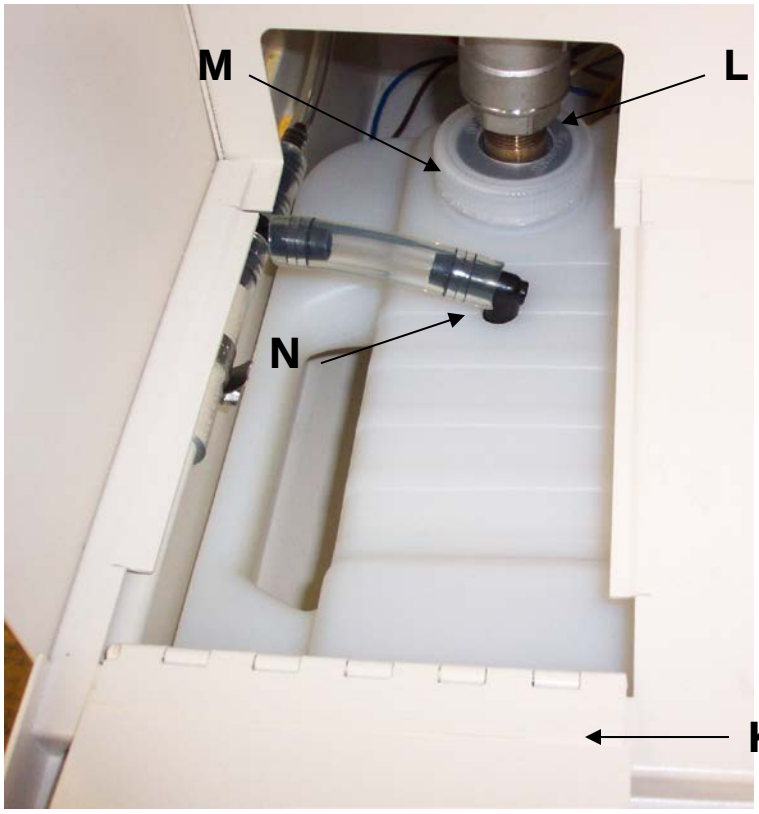
4. Check the spigots (G) to ensure they are in the off position.

5. Be sure spigots (G) are placed above the drip trough. This will provide protection in the event of a leaking spigot. Any drips are routed directly to the waste container.

Waste Container

H





1. To gain entrance to the waste container connection, remove the Recycled Xylene container (E), by loosening lid (F), and sliding forward. If necessary for ease of access, the Ethanol Waste/Recycled Alcohol container (D) may also be removed.

2. Slide the Containment Drawer (H) out and place Paraffin/Alcohol Waste container (I) into containment drawer (H).

3. Slide the containment drawer containing the waste container (H), back into place (J). (*See illustrations)*.

4. With recovery containers removed, entry to the waste drain connection may be accessed through the doorway (K), by lifting upwards. (*See illustrations)*.

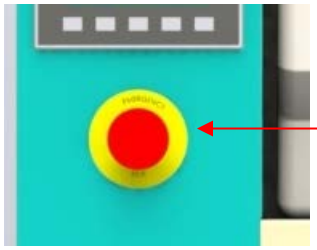
5. Align the opening of the container with the Waste Drain (L), and tighten attached cap (M) to the container.

6. Insert Vent Line (N), into small opening in the waste container.

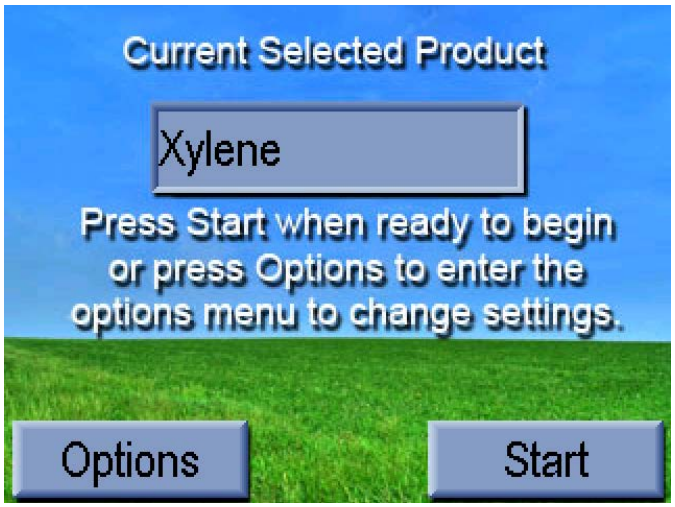
7. Close access door (K).

Starting a Cycle

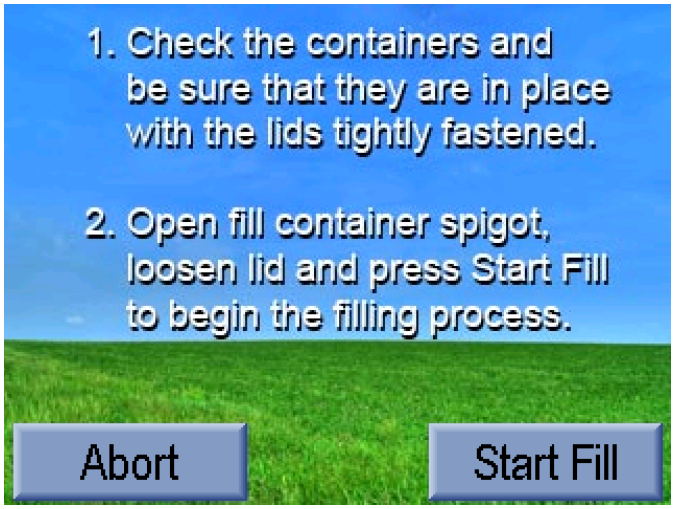
To start a cycle release the Emergency Stop Button by turning in the direction of the arrows (right). Follow the displayed prompts. (See Basic Operation & Display Prompts below)



BASIC OPERATION & DISPLAY PROMPTS

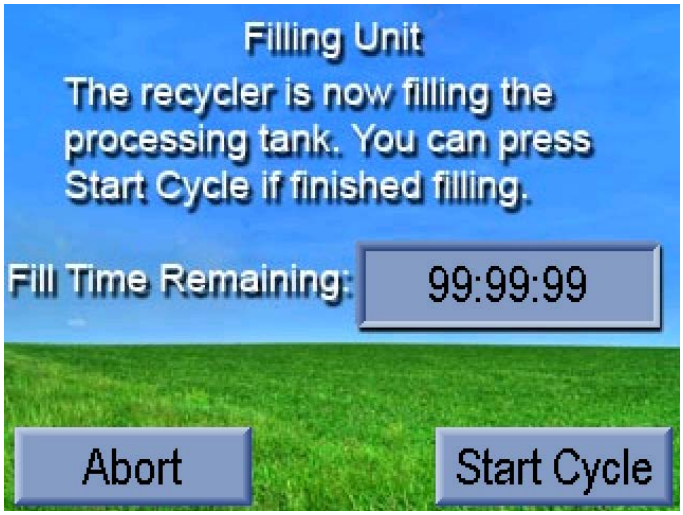


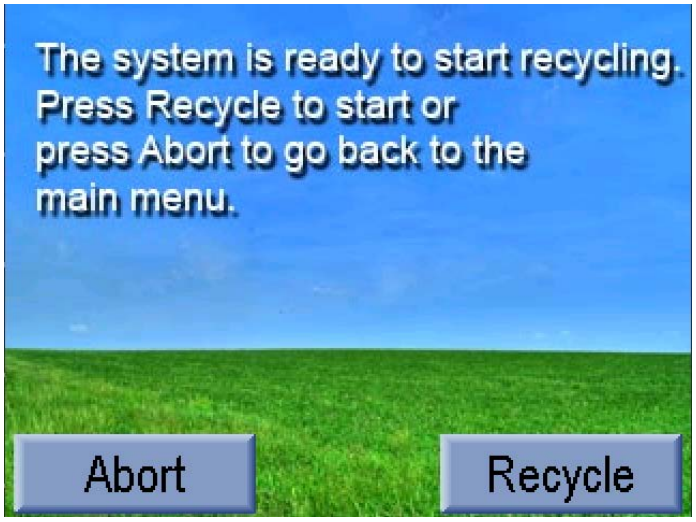
This is the main recycler screen. You can select to enter the Options Menu via pressing the onscreen "Options" button, or you can press "Start" to advance to the prompts that will guide the user through starting a cycle. The current selected product is displayed in the box that is displayed on the screen. If the product being displayed is not the product to be recycled, enter the Options menu to make the appropriate change.



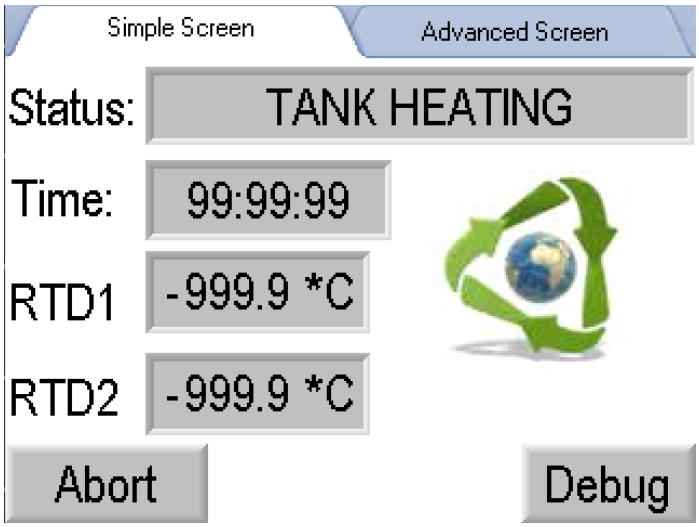
After pressing the "Start" button on the previous screen, the user is then prompted to go through their container checks to be sure that they are in place and that the fill container has the spigot open and the lid loosened. If you press "Abort", the recycler will reset back to the main screen where the user can enter the Options Menu. If the user presses "Start Fill", the recycler will then start the filling process.

During the Fill Process, the recycler will display the amount of time remaining during the fill process. When the timer reaches 0, the screen will automatically advance to the next screen that will prompt



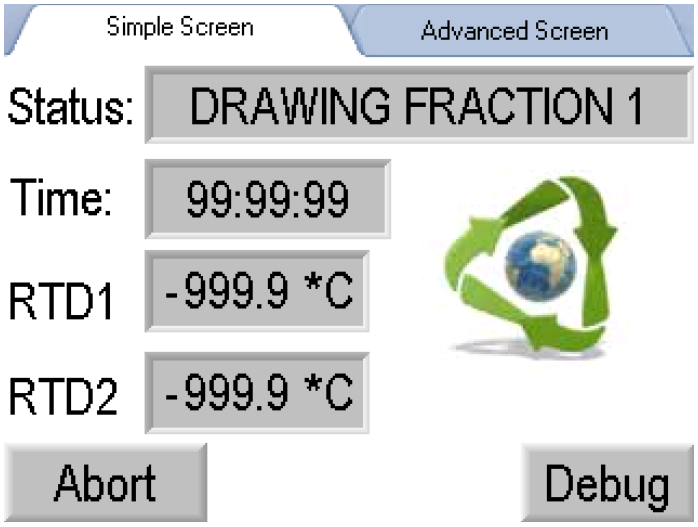


If the Auto-start option is not enabled, this is the next screen that the user will see. The user can press the "Abort" button to return to the main menu or they can press the "Recycle" button to actually start the recycling process. If Auto-start is enabled, the user will not see this screen and the recycler will automatically advance to the recycling process.

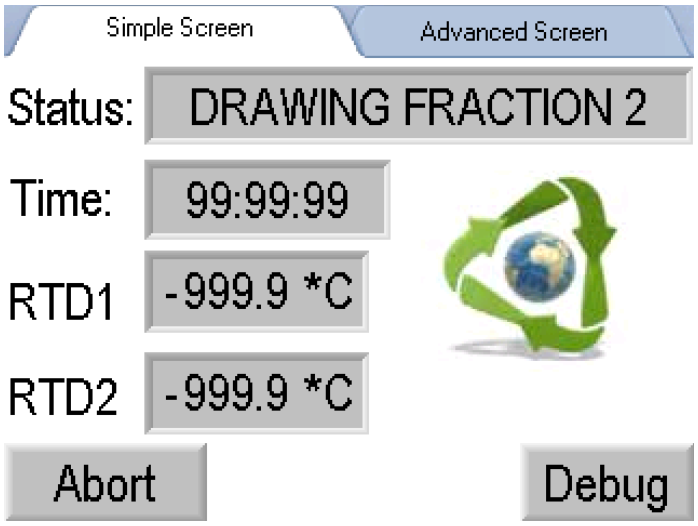


When the recycler starts the recycling process, the user is presented with whichever screen they choose as the default tab display(settable in the Options Menu). Below is the Simple Screen tab with the animated recycling logo.(times and temperatures are there just for a representation and are in no way related to any settings that the user may or may not set.) On this screen, the user can press the "Abort" button to stop the recycling process and return to the Main Menu.

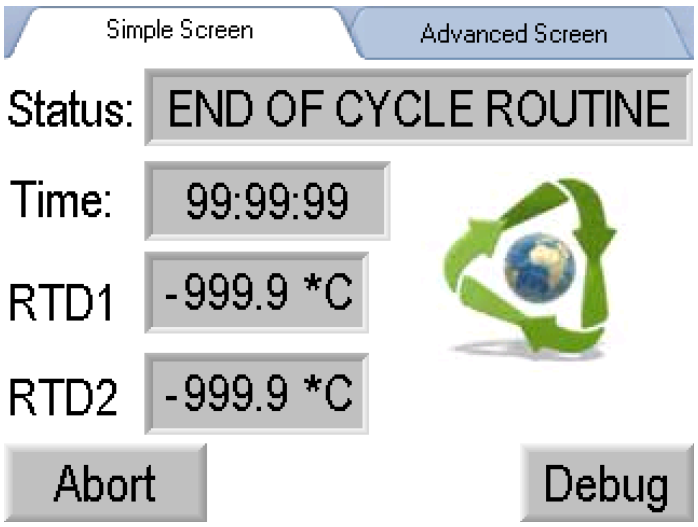
At the top of the display, there are 2 tabs. One says **"Simple Screen"** and the other says **"Advanced Screen"**. The user can press either tab to change to the other display option. On the "Simple Screen" tab, the user will simply see what status the recycler is in(heating, drawing fraction 1, ect...), the elapsed time, and the RTD temperatures. On the "Advanced Screen", in addition to the "Simple Screen" information, the user will see which outputs are on and see the state of the inputs for their recycler along with a live feed graph showing the temperatures in relation to each other while forming a line graph. For further discussion on the "Advanced Screen" tab with examples, please see the **Advanced Screen Tab** section on page 20.



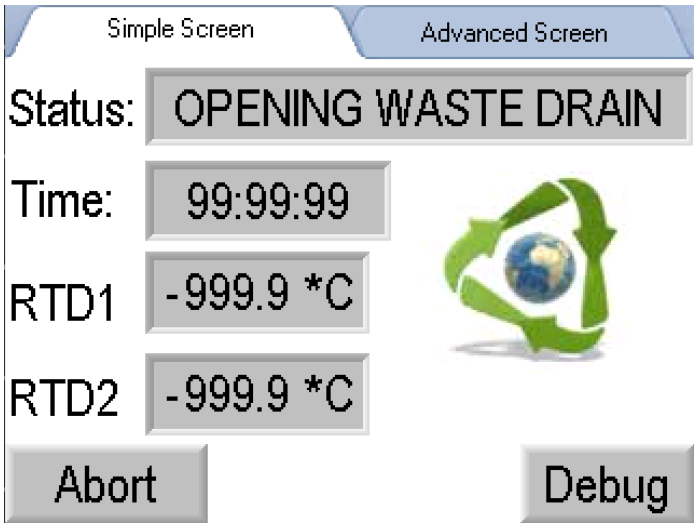
Once the appropriate temperatures are met during the "Tank Heating" process, you will advance to the "Drawing Fraction 1" stage. All of the same info relating to the buttons on this display is still active and it will look like this. This stage of the process will continue until all of the Fraction 1 solvent has been boiled off. If the solvent being distilled is a single fraction then the cycle will end after the “Drawing Fraction 1” stage is finished.



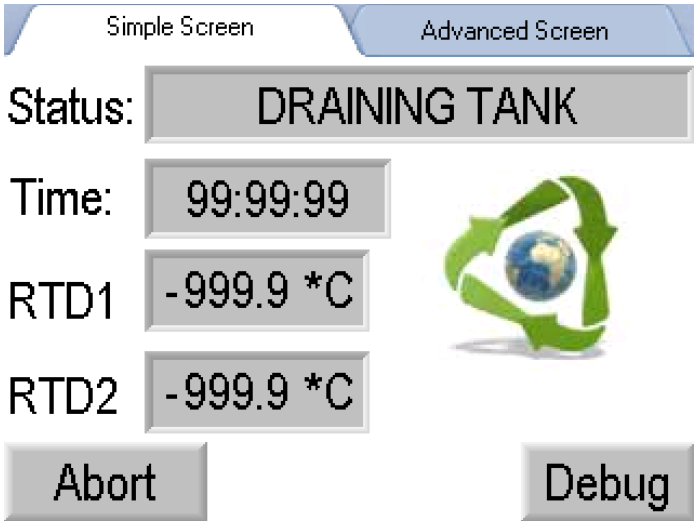
If this is a 2 fraction mixture, the next screen that is displayed is the "Drawing Fraction 2" display. All the buttons function as stated in previous displays.



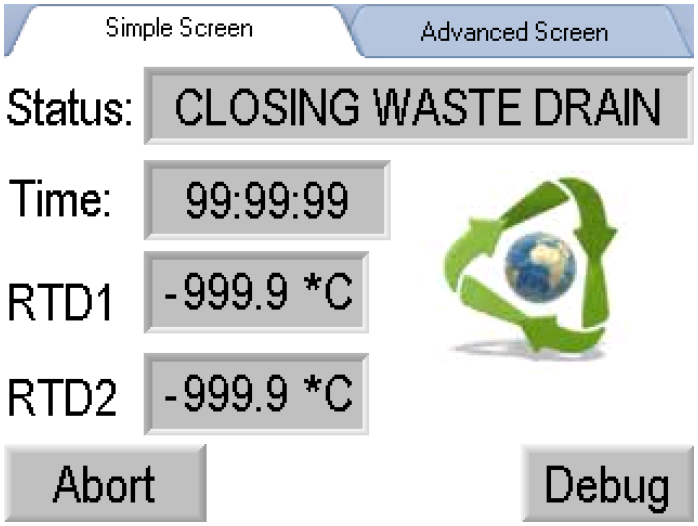
If the tank is hot enough, the recycler will enter the "End of Cycle Routine". During this stage of the recycling process, the system will cool the recycler down until the tank reaches a predefined variable temperature. Currently, that temperature is 150°C. On this display, all buttons function as previously stated.



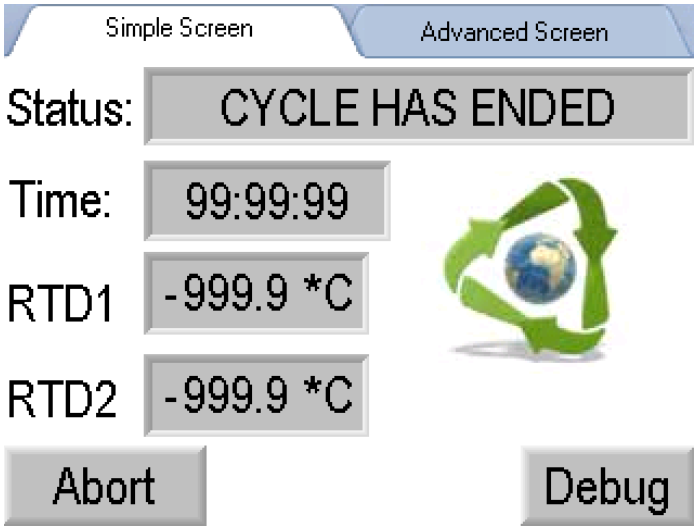
The next stage of the recycling process is the tank drain. This is the screen that the user will see during the drain open process.. All buttons function as previously stated.



In this stage the waste drain is open and the screen says “Draining Tank”. The waste drain will be open for 6 minutes and then will advance to the next screen. All buttons function as previously stated.



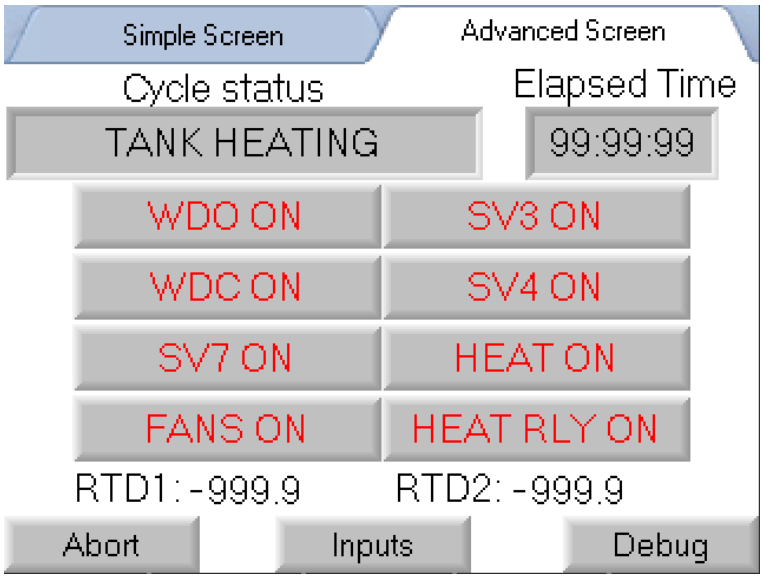
After the tank drain timer times out, the recycler will automatically advance to the this display that will alert the user that the waste drain is now closing. The recycler will attempt to close the waste drain for 10 seconds. Once the drain has been closed, the recycler will automatically advance to the next stage. All buttons function as previously stated.



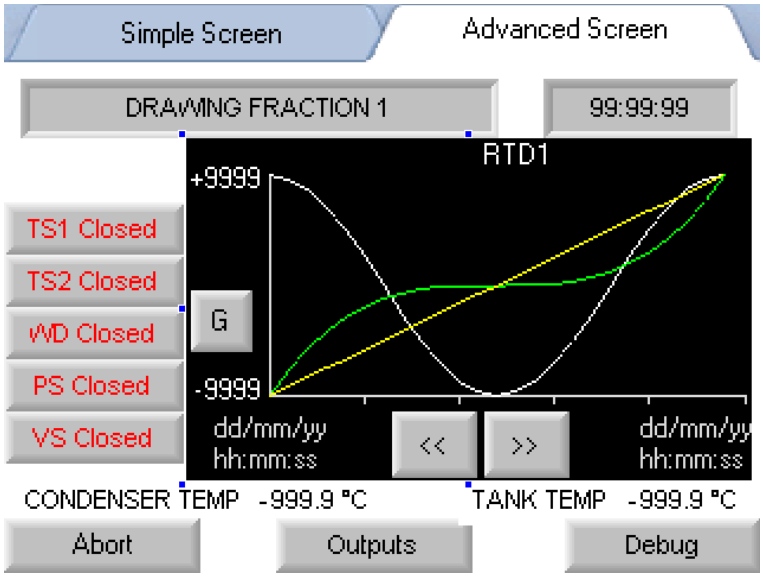
Once the cycle has completed, the alarm will sound 3 times to alert the user that the cycle has ended. The animated image will stop spinning to symbolize that the recycling process has ended and the timer stops and holds its total cycle time. All buttons function as previously stated. At this point, you can press the "Abort" button and the recycler will return to the main menu where the user can start another cycle or they can enter the Options Menu to change solvents.

Advanced Screen Tab

The screen descriptions in this section do not depict any cycle operations, this is only a description of what you can do and what is available in the “Advanced Screen” tab.

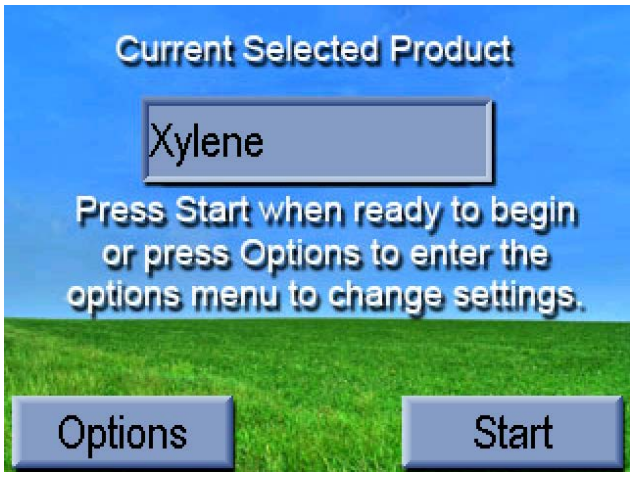


This is a representation of what the "Advanced Screen" looks like. When the user presses the tab labeled **Advanced Screen**, this is what they will see. On this screen, the user can press the **Simple Screen** tab to return to the "Simple Screen" display, **Abort** to stop the recycling process and return to the main menu, **Inputs** to change the display to the Advanced Screen with inputs being displayed instead of the outputs. When changing to the Advanced Screen the **Outputs** are displayed first by default.

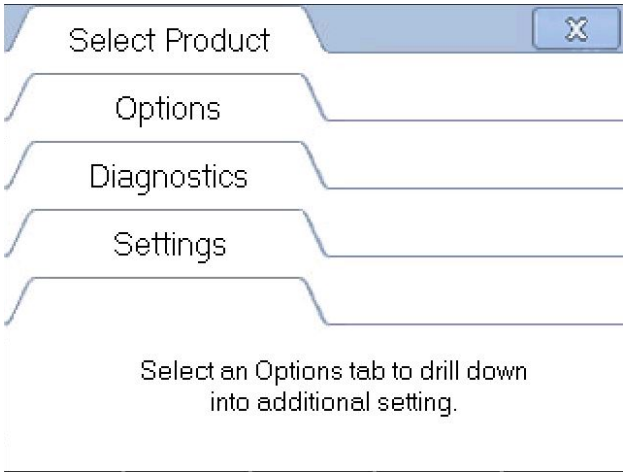


This is the display the user would see when they press the **Inputs** button on the **Advanced Screen** tab. Temperatures and all input status are displayed on this screen, along with a live running line graph to show the temperature relationship as the cycle runs. The user can press **Abort** to stop the recycling process and return back to the main menu, **Outputs** to change the display back to the outputs Advanced Screen.

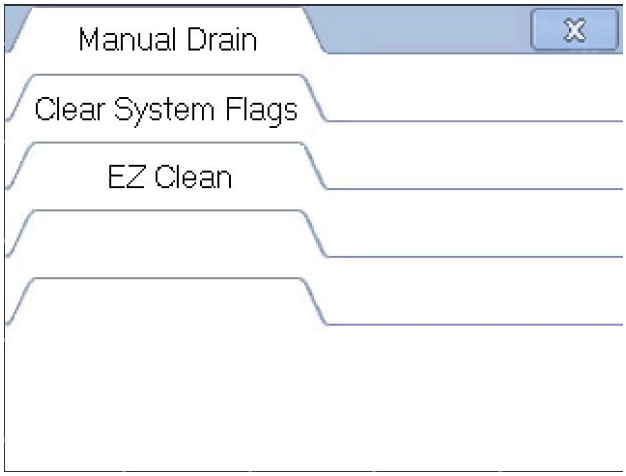
OPTIONS MENU



From the Main Recycler screen, press the **Options** button.



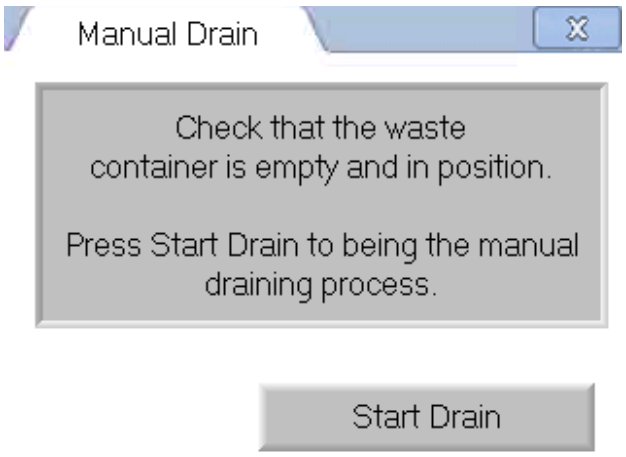
Select the **Options** Tab.



Three options are available on this screen.

Manual Drain to drain the tank manually
Clear System Flags to restart a Fill, Cycle or Flush
EZ Clean for the EZ Clean Process.

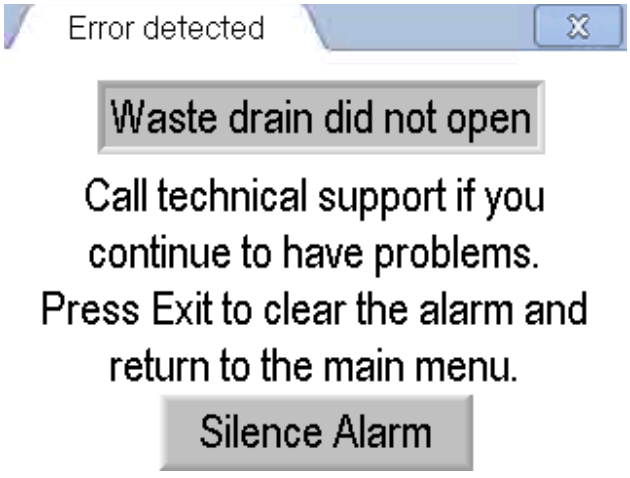
Manual Drain



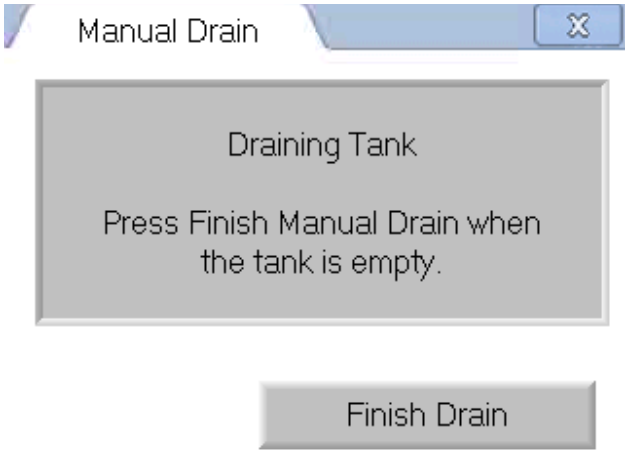
Check that the waste bag is empty and in position.

Press **Start Drain** to begin the Manual Draining Process

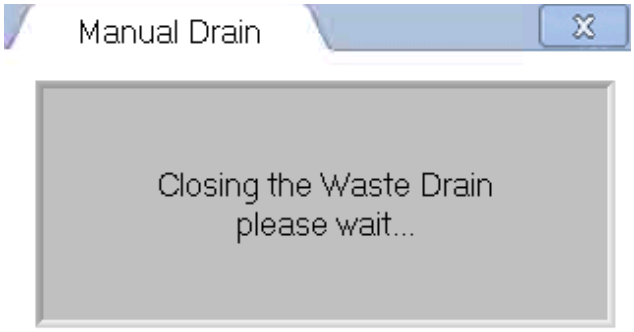
The next screen is only a prompt to wait for the waste drain to open.



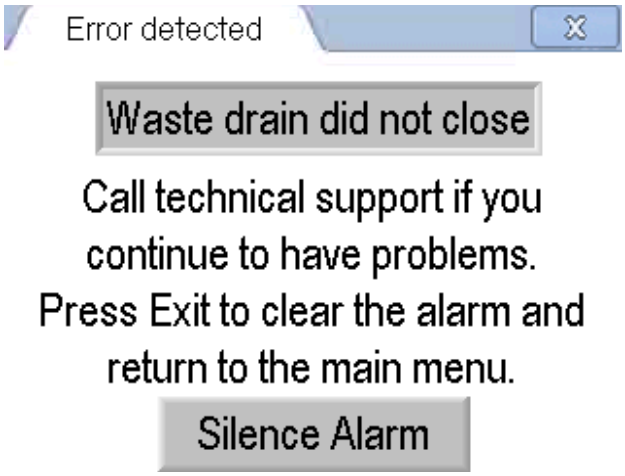
If the waste drain does not open, the Error screen is shown with the Waste Drain Did Not Open error. Please call our technical support if you continue to have issues.



After the waste drain has opened, this screen appears. The user may press the **Finish Drain** button to finish the draining process.

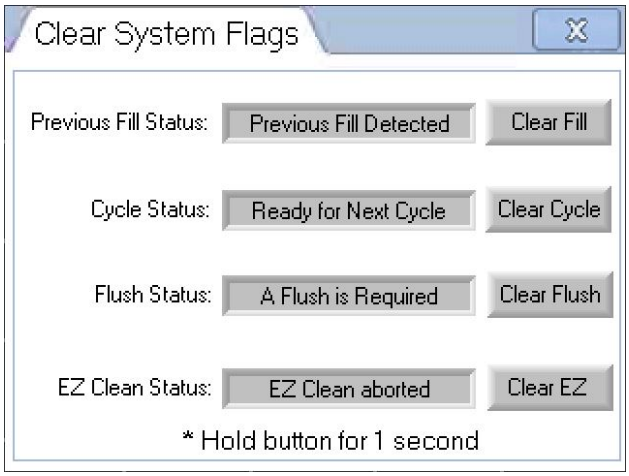


The next screen is only a prompt to wait for the waste drain to close.



If the waste drain does not close, the Error screen is shown with the Waste Drain Did Not Close error. Please call our technical support if you continue to have issues.

Clear System Flags



To reset the Fill Status, press the **Clear Fill** button. Do this if a fill was aborted early.

To reset the Cycle Status, press the **Clear Cycle** button. Do this if a cycle was aborted and it is needed to start a new cycle.

To reset the Flush Status, press the **Clear Flush** button. Do this if a flush was aborted and it is needed to start a new flush cycle.

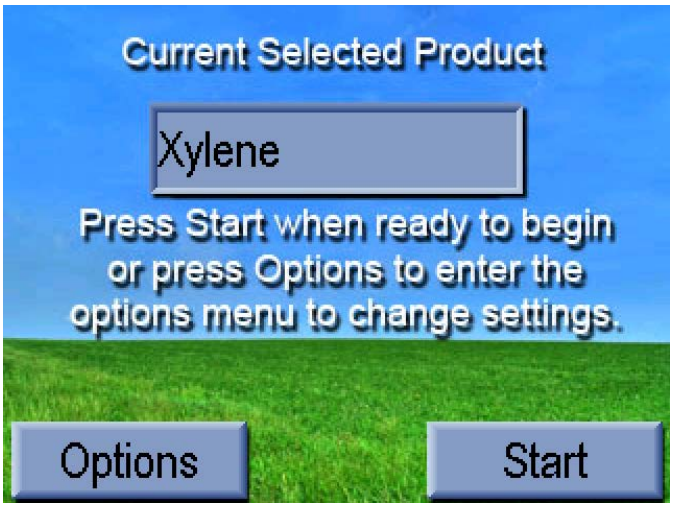
To reset the EZ Clean Status, press the **Clear EZ** button. Do this if an EZ Clean cycle was aborted and it is need to start a new EZ Clean cycle

Press the **X** in the top right corner to exit this screen

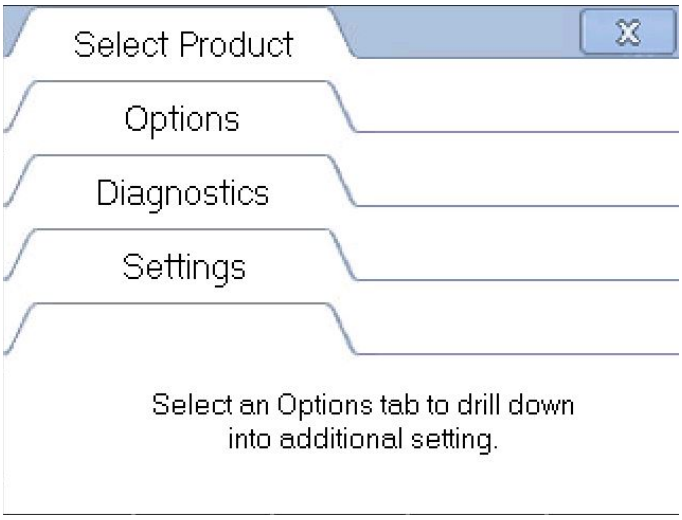
EZ Clean

[RESERVED]

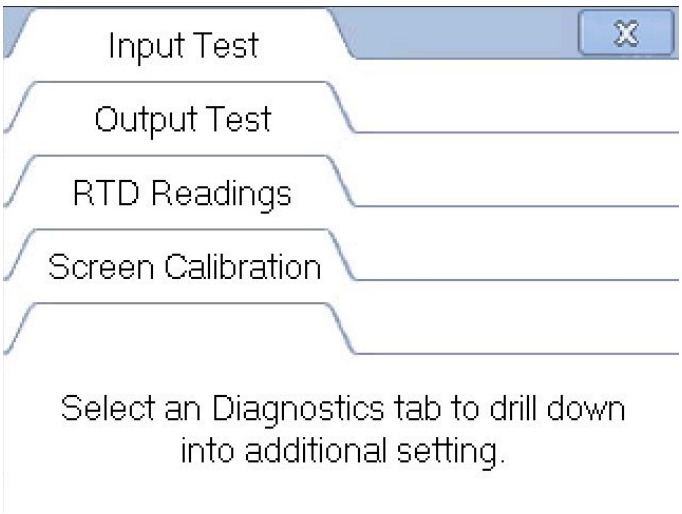
DIAGNOSTICS



From the Main Menu screen, press the **Options** button



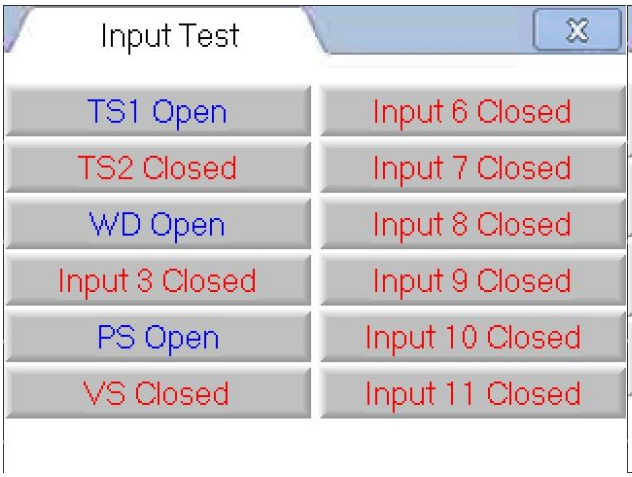
Select the **Diagnostics** Tab



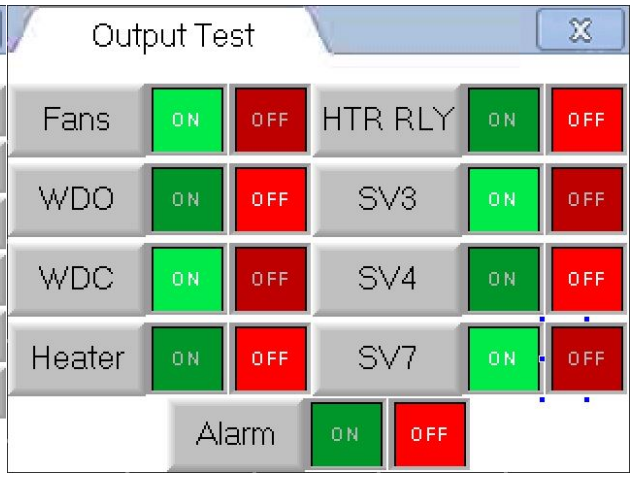
Four options are available on this screen.

Page 26 of this manual shows all four options and their screens. Select any of the tabs and refer to their descriptions on the next page.

Diagnostics Screen Tabs



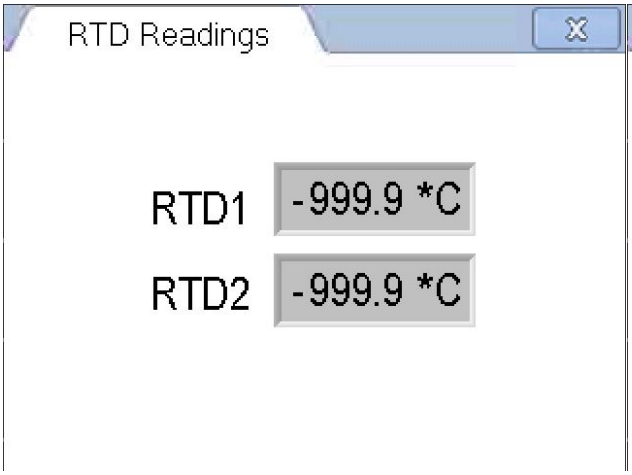
This screen shows the status of the Inputs
TS1 = Condenser Overtemp Switch
TS2 = Tank Overtemp Switch
WD = Waste Drain Closed Switch
PS = Pressure Switch
VS = Vapor Sensor
Red text indicates input sensed (Closed)
Blue text indicates no input sensed (Open)



This screen enables the user to turn on and off each output

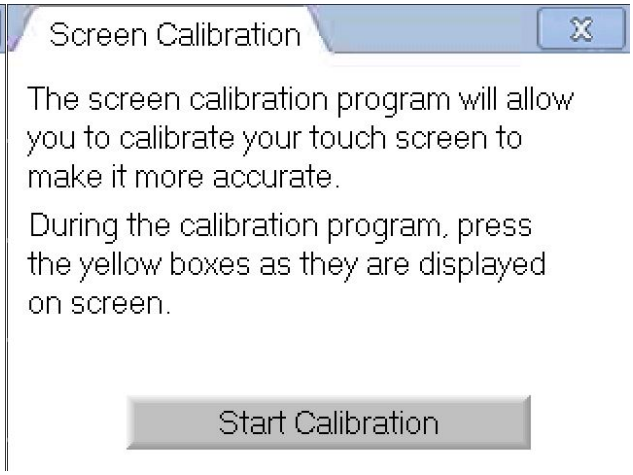
Fans = Cooling Fans On/Off
WDO = Waste Drain Open
WDC = Waste Drain Close
Heater = Heat On/Off
HTR RLY = Heat Timer
SV3 = Fraction 1 Valve
SV4 = Fraction 2 Valve
SV7 = Fill Valve
Alarm = Horn On/Off

Touch the grey buttons to actuate output



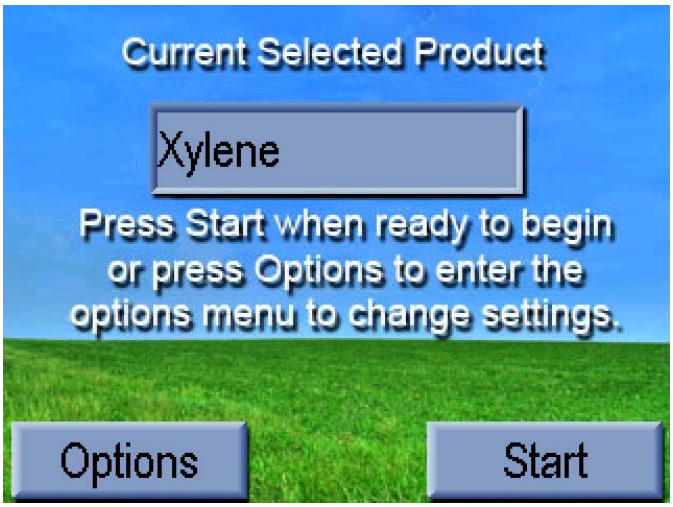
This screen shows the temperature the RTD sensors are currently reading.

RTD1 = Condenser Temperature
RTD2 = Tank Temperature

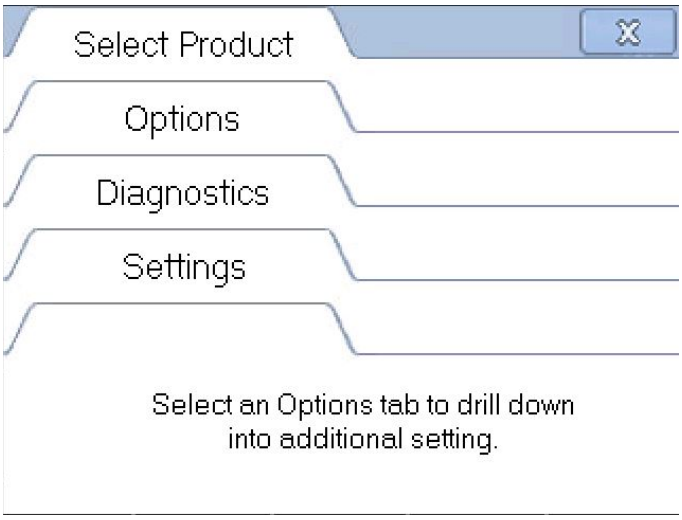


If it seems the screen is having trouble sensing your finger to press buttons, this screen enables the user to calibrate the touch screen. Press the Start Calibration button and a black screen with yellow box appears. Press the consecutive yellow boxes and the screen will then be calibrated to the user's touch.

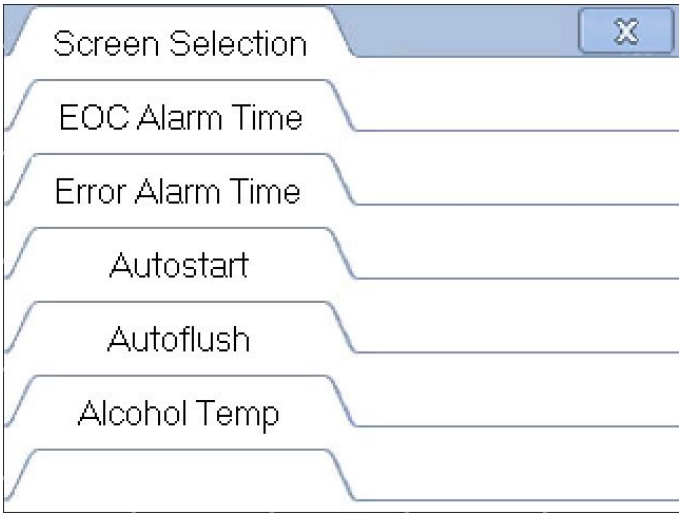
SETTINGS MENU



From the Main Menu screen, press the **Options** button



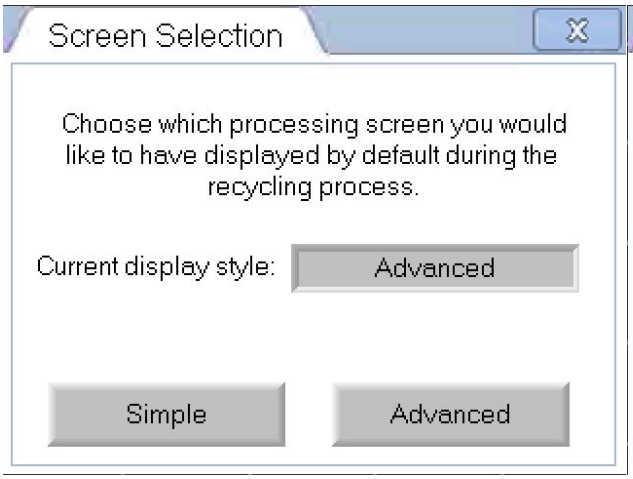
Select the **Settings** Tab



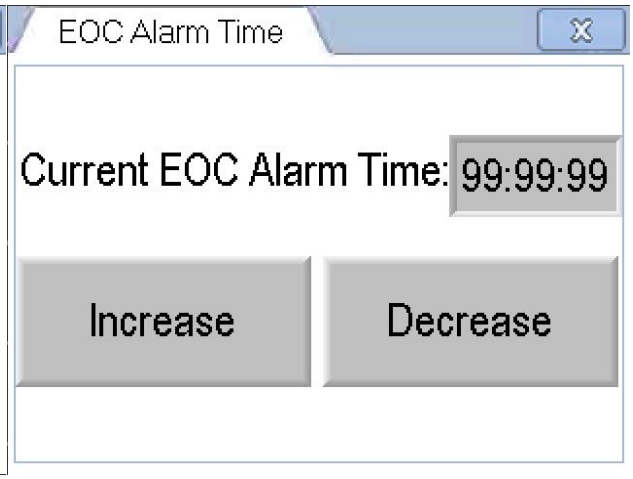
Six options are available on this screen.

The following pages show all six options and their screens. Select any of the tabs and refer to their descriptions on the next two pages.

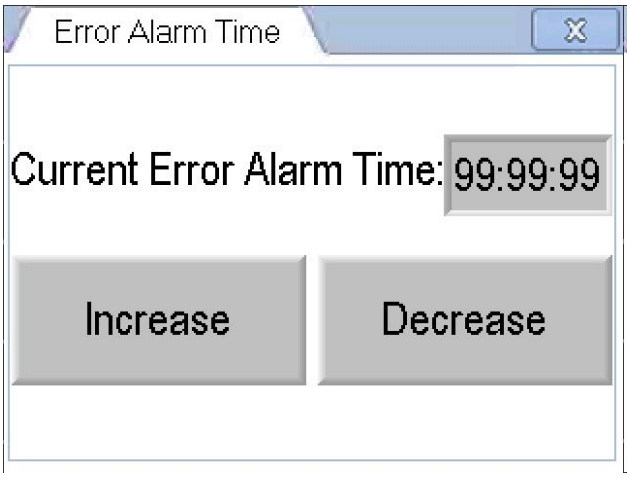
The Alcohol Temp Tab only appears if the current product selected is Alcohol.



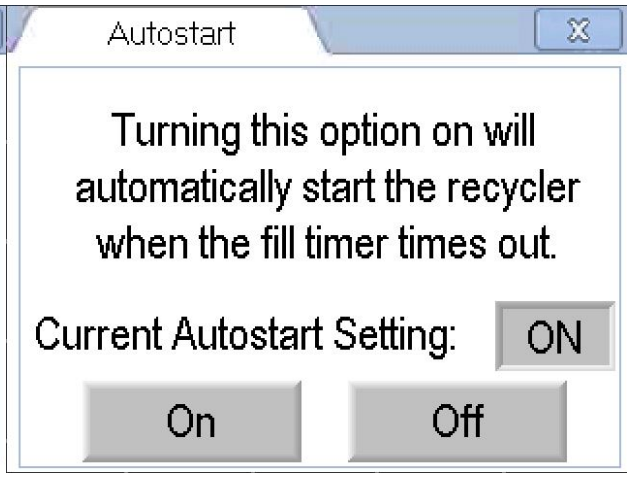
The user may choose which screen the machine will default to during a cycle. Press **Simple** to default to the Simple layout. Press **Advanced** to default to the Advanced layout.



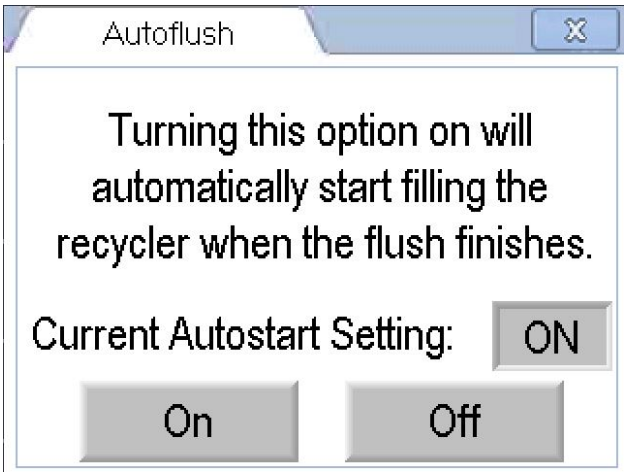
At the End of Cycle (EOC) the machine will sound the alarm once per second. The default setting is 3 seconds (or three alarm sounds). The user may increase or decrease this time. If wanted to hear the alarm more than three times press the **Increase** button; if wanting less, press the **Decrease** button.



When an error occurs, the alarm will sound continuously for a period of time. This screen allows you to increase or decrease the amount of time the alarm will sound. Default is set to 4 minutes. If needing to hear the alarm for a longer period of time press the **Increase** button; if wanting a shorter period of time press the **Decrease** button.

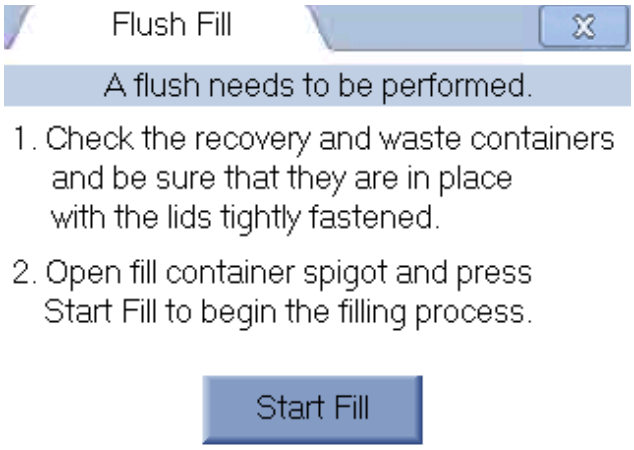


To have the machine start a cycle automatically after the filling routine ends this option needs to be turned on. If needing the Autostart option enabled press the **On** button, if not wanting to Autostart the machine press the **Off** button. (**If this option is turned off the user will need to press manually start the cycle after the fill process has ended**)



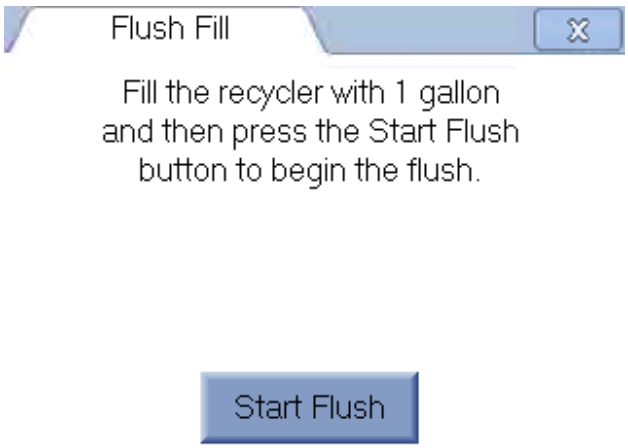
When changing between different solvents, a flush needs to be performed to prevent contamination between cycle runs. The AutoFlush option allows the computer to run the flush cycle automatically when starting a new cycle with a different solvent from the previous cycle. Press the **On** button to enable this option, press the **Off** button to disable. If AutoFlush is turned off then the Flush cycle must be started manually.

FLUSHING THE RECYCLER

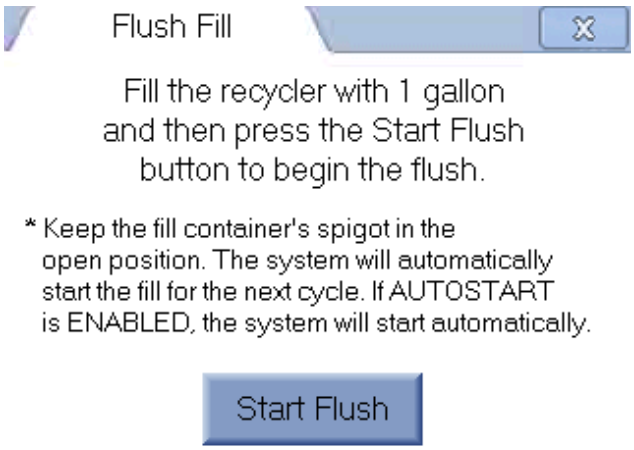


The user will be auto prompted for a flush if a switch between solvents has been performed.

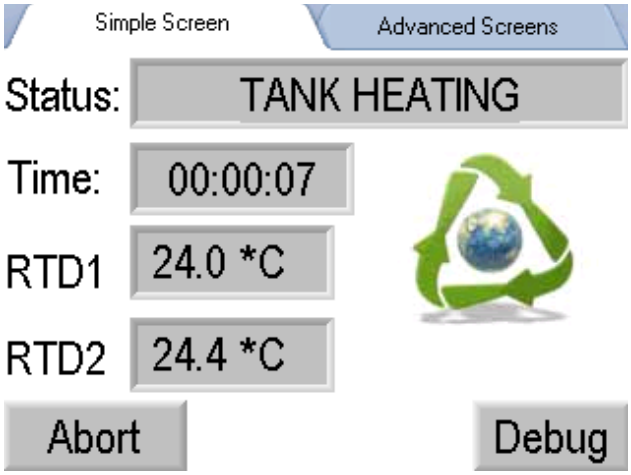
Follow the instructions on screen then press the **Start Fill** button.



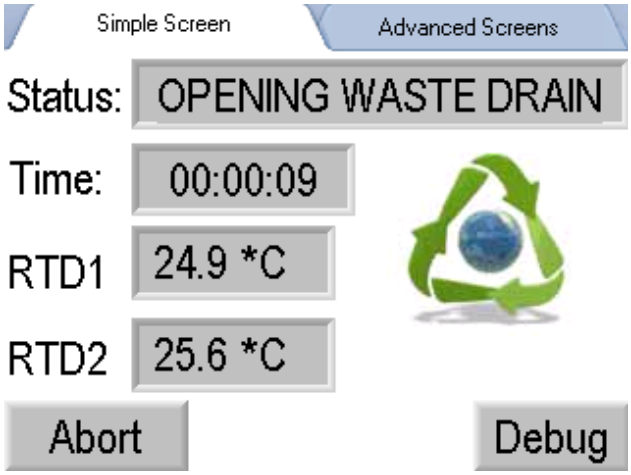
Follow the instructions on screen. Fill the recycler with **1 liter** of the new solvent and then press the **Start Flush** button. This screen appears as shown with the AutoFlush enabled. Below shows the screen shown with AutoFlush disabled.



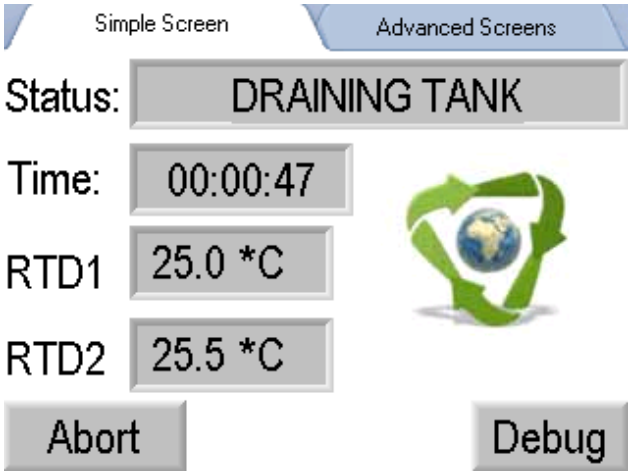
This screen is displayed if the AutoFlush option is disabled.



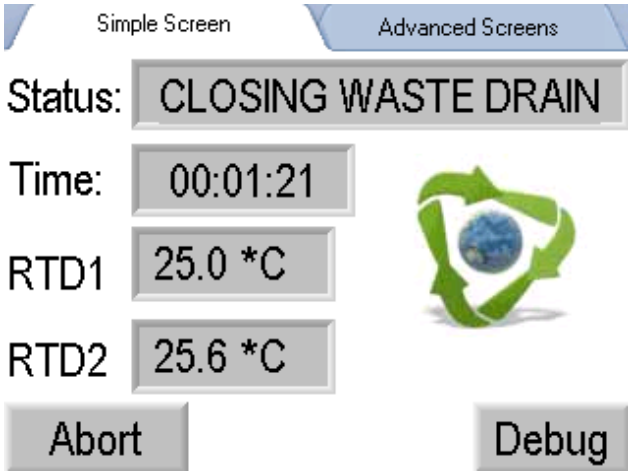
The Flush Cycle runs as an ordinary cycle will run. The user may swap between simple and advanced screens, if desired. Press **Abort** to stop the Flush Cycle.



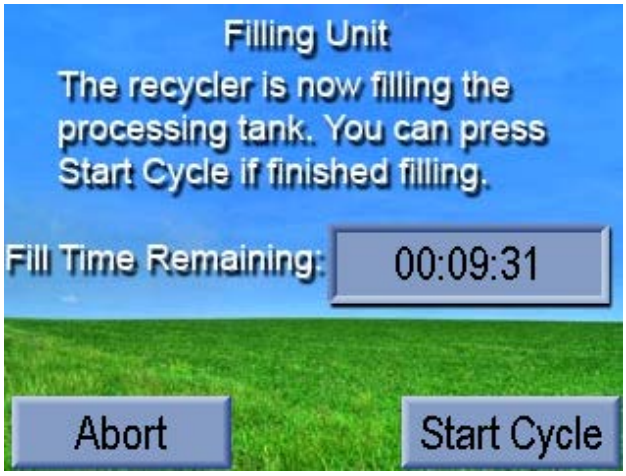
Once the Flush Cycle ends, the waste drain will open and this screen will be shown.



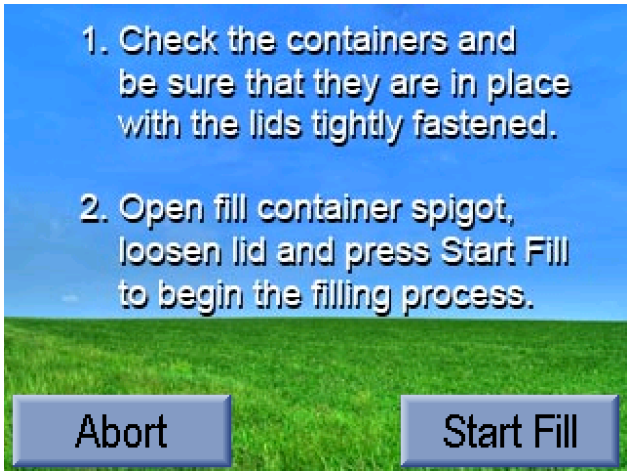
While the tank is draining, this screen will be shown.



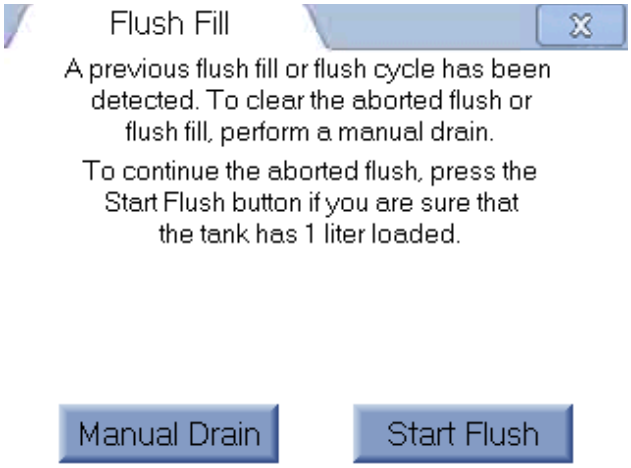
When the draining time has ended the waste drain will close.



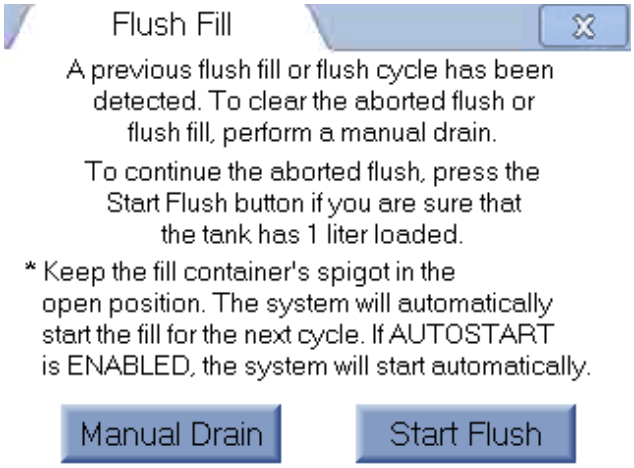
If **AutoFlush** is <u>enabled</u>, the recycler will automatically start to fill with the current solvent that was just flushed through the machine.



If **AutoFlush** is <u>disabled</u>, the user will be prompted to <u>manually</u> start the fill. Press abort to return to the main recycler screen.



If **AutoFlush** is <u>disabled</u>, this screen will be displayed in the event of an aborted flush cycle. Follow the on screen instructions. The user may press **Start Flush** to restart the flush cycle or **Manual Drain** to drain the boiling tank.



If **AutoFlush** is <u>enabled</u>, this screen will be displayed in the event of an aborted flush cycle. Follow the on screen instructions. The user may press **Start Flush** to restart the flush cycle or **Manual Drain** to drain the boiling tank.

Xylene/Xylene Substitute Purity Test Procedure

Note: The recommended and most accurate method of determining the purity of the recycled xylene is by GC analysis. The following method can be used to obtain an acceptable confidence level in the purity of the recycled xylene.

Prepare a standard, especially when testing xylene substitutes. Perform the testing procedure on your unused vendor product to obtain a standard to compare with your recycled product. This procedure only needs to be performed once to ascertain the separation point of the clearing agent of choice.

How to prepare calibration control mixture

Establish a 1% calibration mixture. Add 5 ml of Absolute Alcohol to 495 ml of xylene to establish this mixture. Since this procedure has a number of variables, the calibration mixture will be used as a standard for the person who has to perform the procedure. By testing this standard mixture the person performing the procedure can see how a 1% contamination level reads and can have confidence that all of the readings that they obtain using this method are accurate. **The testing procedure may also be performed using fresh vendor product as a control**.

Testing Procedure

1. To a clean, dry 100 ml mixing cylinder graduate (KIMAX 20039-100 or equivalent), add sufficient recycled xylene so that the bottom of the meniscus is aligned with the top edge of the 85 ml mark on the graduate cylinder.

2. Add DH_20 to the graduate until the bottom of the meniscus aligns with the top edge of the 100 ml mark on the graduate.

   At this point, 15 ml of water will have been added to 85 ml of recycled xylene.

3. Stopper the graduate, invert the mixture, and return to the upright position. Allow the mixture to settle, making sure all of the water settles to the bottom of the graduate. No water should remain clinging to the sides of the graduate above the xylene/water separation point. This separation point should be near the 15 ml level of the graduate. (Note: xylene floats on top of the water.)

4. Carefully inspect and record the point of separation between the water and xylene using the bottom of the meniscus as the separation point.

5. Subtract 15 ml from the quantity of water indicated in step 5. The remainder plus an additional 0.1 correction factor equals the percentage of recovered xylene impurities.

EXAMPLE:

Xylene/Water separation point is indicated to be 15.5 ml.
(15.5 - 15) + 0.1 = 0.6%, impurities. Therefore, the recovered xylene is 99.4% pure.

If you have questions, please Technical Support at 1-800-941-9484.

USING A HYDROMETER

Important Hints

A hydrometer is provided to check the concentration of your recycled alcohol. It is very important to check each batch of alcohol to ensure accurate use of the recycled product. The hydrometer has a wide weighted end and a thin section with a graduated scale. The scale has both a Proof and Tralle's section. The Tralle side of the scale is where the concentration of the alcohol is read.

Temperature is another important factor when using a hydrometer. Most standard hydrometers are calibrated at 60° F to obtain an accurate reading. It is important to allow your recycled alcohol to cool before checking your results. The alcohol collected from the recycler is slightly warm and should stand at room temperature overnight. Included is a temperature correction chart for your hydrometer.

Procedure

Pour your cooled alcohol into a clear vessel taller than the hydrometer by a few inches. A 1000 ml glass graduated cylinder is suggested. There must be enough volume in the vessel to allow the hydrometer to float. Place the hydrometer into the solution, weighted end first. Allow the hydrometer to stop moving, then read the scale at the fluid level on the Tralle side of the graduated scale. Be sure that you have temperature corrected this reading. You may dilute with water to make lower concentrations of alcohol. (See dilution chart provided).

Troubleshooting

If your alcohol results are not what you expect, use the hydrometer to check the waste alcohol before recycling. This will confirm the concentration of the alcohol collected prior to recycling.

If upon dilution, the recycled alcohol clouds up or turns milky, this indicates the alcohol was contaminated with xylene or xylene substitute at collection. Alcohol should be tested for contamination before recycling by taking a small sample of waste to be recycled, then mixing with the same volume of distilled water. If contamination is present, discard and recollect. If contamination is discovered after recycling, all containers will need to be cleaned thoroughly.

If you should have any questions or concerns regarding alcohol recycling, contact Technical Support at 1-800-941-9484.

TEMPERATURE CORRECTION CHART
FOR 70-100 PERCENT ETHANOL (PURE)

General approximation: 10 ° F = 1.5 percent

Recycled Alcohol (Temp° F)	add (+)	subtract (-)	Add or subtract this % ↓
100°		-	6.0 %
97°		-	5.5%
93°		-	5.0 %
90°		-	4.5 %
87°		-	4.0 %
83°		-	3.5 %
80°		-	3.0 %
77°		-	2.5 %
73°		-	2.0 %
70°		-	1.5 %
67°		-	1.0 %
63°		-	0.5%
60°	NO CORRECTION NEEDED *		---0---
57°	+		0.5 %
53°	+		1.0 %
50°	+		1.5 %

HYDROMETER IS CALIBRATED AT 60 ° F

Example: Hydrometer reading is 98 % and the temperature is 73 °
98 x .020 = 1.96 Then 98 - 1.96 = 96.04 = corrected reading

ALCOHOL DILUTION CHART

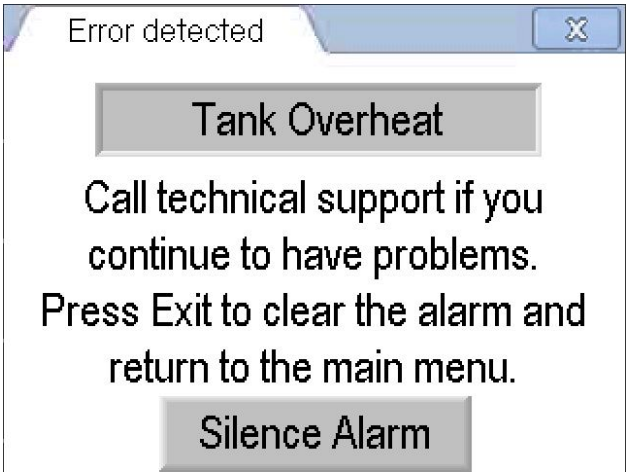
% recycled alcohol	Desired Concentration		
	95%	80%	70%
	ml of water added to 1 liter of alcohol		
99%	42	238	414
98%	32	225	400
97%	21	213	386
96%	11	200	371
95%	---	188	357
94%	---	175	343
93%	---	163	329
92%	---	150	314
91%	---	138	300
90%	---	125	286
89%	---	113	271
88%	---	100	257
87%	---	88	242
86%	---	75	228
85%	---	63	213
84%	---	50	199
83%	---	38	184
82%	---	25	170
81%	---	13	155
80%	---	---	141

Purity measurements are important. Determine the alcohol concentration by using the hydrometer supplied with the recycler. Standard Hydrometers are calibrated at 60°F. Consistent results are achieved by making all measurements at 60°F. Alcohol at warmer temperatures will read higher than the actual concentration. You may determine the correction factor by standardizing against vendor absolute alcohol at room temperature or using the temperature correction chart provided.

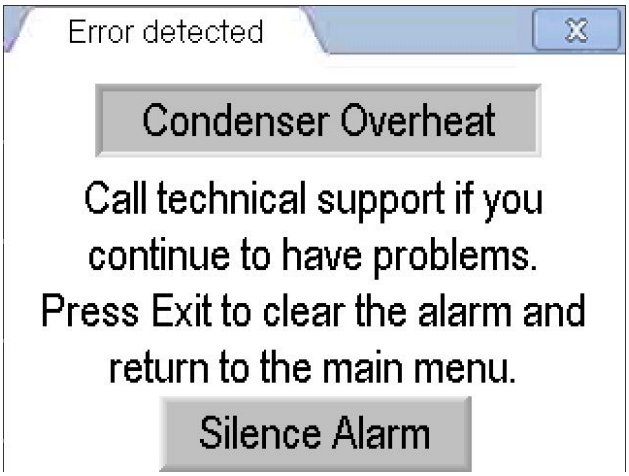
ADDITIONAL DISPLAY MESSAGES

There are several messages that may be displayed at any time during the distillation process. Each of the following messages will be accompanied by an audible alarm, and the recycling process will be automatically stopped.

System Overheat



A **Tank Overheat** Error means that the boiling tank has reached a critically high temperature and the cycle has been aborted and the machine has been shut down. You can silence the alarm by pressing the **Silence Alarm** button; this will turn the alarm off for a period of time before sounding the alarm again. Press the **X** in the top right corner to exit the screen and cancel the alarm from sounding again. Allow the tank to cool significantly before trying to start another run but it is recommended the user call our technical support before continuing any further.



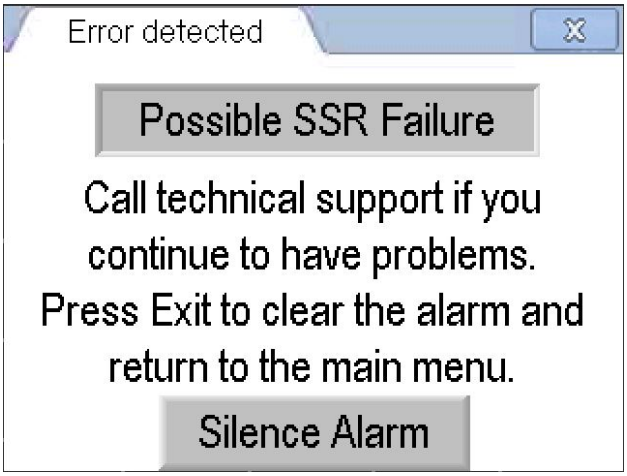
A **Condenser Overheat** Error means that the condenser has reached a critically high temperature and the cycle has been aborted and the machine has been shut down. You can silence the alarm by pressing the **Silence Alarm** button; this will turn the alarm off for a period of time before sounding the alarm again. Press the **X** in the top right corner to exit the screen and cancel the alarm from sounding again. Allow the tank to cool significantly before trying to start another run but it is recommended the user call our technical support before continuing any further.

Possible Heater Failure

The most common cause for the **Possible Heater Failure** error condition includes inadequate voltage, electrical drop or spike of an unknown origin, or overfilling the recycler. The recycler will alarm because the required temperature was not reached with in a specified time frame.

Press **Silence Alarm** to silence or exit this screen to cancel the alarm.

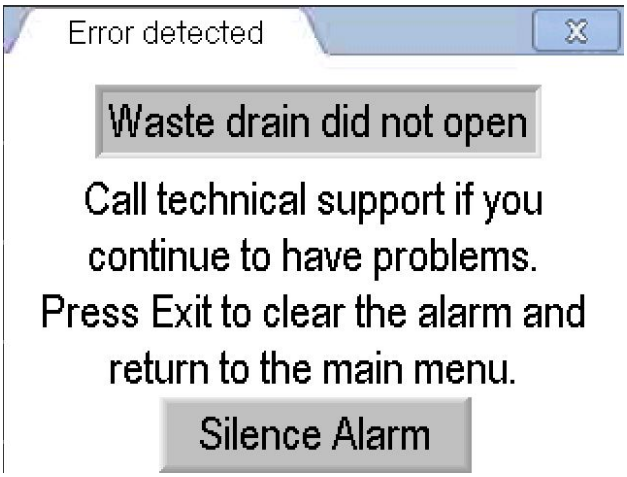
Possible SSR Failure



Record the exact message on the display. Call CBG Technical Support.

Press **Silence Alarm** to silence or exit this screen to cancel the alarm.

Waste Drain Not Open

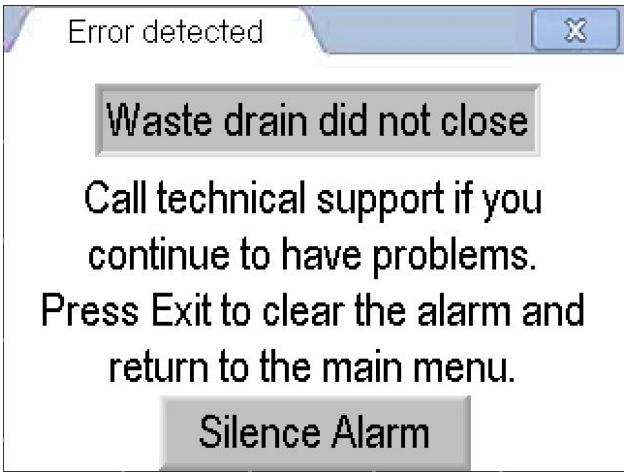


The waste drain failed while trying to open. The most common cause is an interruption in the power supplied to the recycler.

Press **Silence Alarm** to silence or exit this screen to cancel the alarm.

Perform a **Manual Drain** from the **Options** Menu. If the drain does not open call Technical Support.

Waste Drain Not Closed

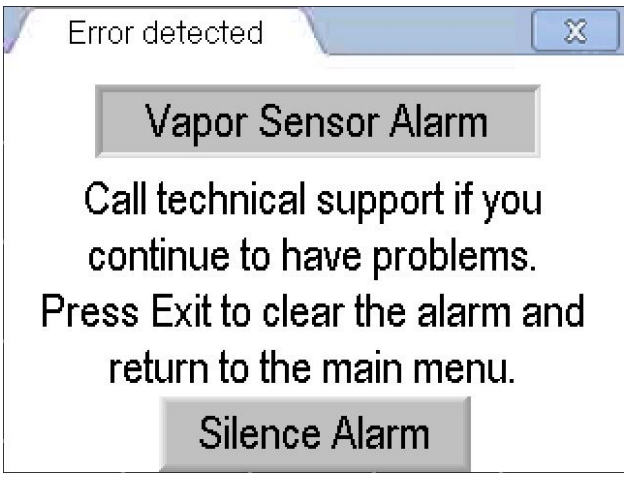


The waste drain failed while trying to close. The most common cause is an interruption in the power supplied to the recycler.

Press **Silence Alarm** to silence or exit this screen to cancel the alarm.

Perform a **Manual Drain** from the **Options** Menu. If the drain does not open call Technical Support.

Vapor Sensor Alarm - Optional



This alarm would only be displayed if a Vapor Sensor is installed and fumes around the recycler exceed the limit of the sensor.

Check the area. Close any open solvent containers tightly or clean up any solvent spill. Wait while the alarm condition clears and the sensor resets.

Press **Silence Alarm** to silence or exit this screen to cancel the alarm.

CLEANING THE RECYCLER

The finish on your CBG Biotech recycler is able to withstand exposure to many solvents, alcohols, and corrosive fluids. The machine may be cleaned using a cloth dampened with a mild detergent solution.

In the event of a spill, be sure that you are following your facility's safety procedures for working with hazardous materials. Replace lids on opened containers and tighten lids to limit exposure to vapors. Return all unused materials to the proper storage area when not in use.

CLEANING THE CONTAINERS

The fill container for each solvent should be cleaned periodically to remove any sediment that may collect in the bottom of the container. Over time, this sediment material collects and may cause a slow or blocked fill line. It is recommended to clean these containers at least once every 3-4 months. Discard the remaining fluid in the container bottom and rinse with a small amount of solvent or alcohol to remove any collected sediment.

If you experience contaminated product, each exposed container must be cleaned with hot water containing a mild detergent to remove the contamination. Each container should then be rinsed well with hot water to remove all detergent remains. Allow each container to dry completely overnight, a small amount of absolute alcohol may be used to rinse the container and absorb any remaining water.

VENT FILTER

The Vent Filter assembly consists of a carbon filter with associated tubing and fittings.

The purpose of the Vent Filter assembly is to reduce any odor from the collection vessels during the recycling process. Any fumes created while xylene or alcohol is being processed will be carried out via the clear plastic tubing into the carbon filter, thus preventing escape into the room.

VENT FILTER REPLACEMENT

1. Locate the Vent Filter inside the access door on the left side of the unit.
2. Locate the 2" copper tubing with the vent tubing attached.
3. Remove the vent tubing from the copper line.
4. Insert new filter into the vent line tubing.
5. Place the filter back into the recycler for use.
6. Discard the old filter in accordance with your local waste disposal procedures.

This filter should be changed every 12-18 months, depending on use

COMMON INQUIRIES

The unit will not turn on – No Color Touch Screen display

Be sure the recycler is plugged in, and the main power switch is in the “ON” position and illuminated.

Check the outlet. It could be bad or tripped a breaker. Move the recycler to a different power source with adequate voltage.

The power switch may be faulty, must be replaced.

The computer may be faulty, must be replaced.

The unit will not fill – Fill container still full

Note the message on the Color Touch Screen display.

Check the fill container to ensure it was allowed to empty completely.

Confirm lid on the fill container is loose to prevent a vapor lock.

Confirm fill container spigot is open.

Close the spigot on the fill container and lift off fill line. Dry the connector and gently set the spigot back in place allowing the weight of the container to make the connection. Open the spigot and restart the fill process. If necessary, use the “Extra Fill Option” in the Options Menu.

Use the Relay Test Option to open and close the internal fill valves (SV 7) several times in succession. If the valve does not sound crisp upon opening, it may need replaced, contact Technical Support.

With the internal fill valve open, use compressed air or a large syringe of warm water to flush through the valve. Valve may need replaced.

Confirm the unit is not already filled. Drain the internal boiling tank using the Manual Drain Option. Be sure to use an empty waste container to prevent a spill.

The recycler is not starting Automatically

Note the message on the Color Touch Screen display.

The fill is on a timer and not a volume sensor. The timer remains open for 10 minutes. Start a cycle and monitor the fill time. Confirm the cycle progresses to the Unit Operating message in the expected amount of time.

Enter the Options Menu and verify the Auto Start Option is turned “ON”.

Computer may need to be reinitialized – Contact Technical Support.

The recycled product is not colorless

Note the message on the Color Touch Screen display.

Confirm the recycler was not overfilled. The fill container should never be filled above the zero mark on the fill container or tipped forward to allow the remaining material below the spigot fill into the recycler.

Check to be sure the recovery container was not soiled prior to the cycle. Remove the recycled material, clean the container, then recycle the discolored solvent again.

Look at the waste container and drain tube to ensure there has been waste collected at the end of every cycle and that the waste has not backed up into the tubing or interior boiling tank.

If recycling alcohol, there may be a high concentration of dyes that mist into the recycled product at the end of the cycle. Check the Alc Temp setting in the Settings Menu and lower 2-3 degrees if possible. You may also add a few milliliters of NaOH prior to recycling, or just simply omit the first station of alcohol after the stain. This is more commonly seen in cytology alcohol that is heavily stained.

If recycling xylene, there may be a station of iodated xylene collected in the waste to be recycled. This station should be omitted from the collection for recycling.

If adding Acetic Acid to prevent an amine odor, verify the amount added is not excessive – no more than ½ - 1 ml. It is best to start with 0.2 ml and increase slowly, if necessary.

Computer may need to be reinitialized - Contact Technical Support.

The product is coming out in the wrong place

Verify containers are properly placed.

Run a short cycle, no less than one gallon to ensure proper operation of the recycler.

Check the recovery lines to ensure nothing is constricted, blocked or twisted in some way. Pay special attention to the waste container and tubing to be sure the there is no paraffin blocking the tube or backed up into the interior tank.

Fill the unit with 1 liter of material and immediately drain to flush the tank and verify it has not been overfilled or if the waste drain is blocked with solid waste. An empty waste container should be used.

Computer may need reinitialized - Contact Technical Support.

The product volume is less than expected

Verify the cycle completed with “End of Cycle, Total Time”.

Check the Color Touch Screen display message. An alarm condition may have occurred or a power interruption was experienced. If an alarm condition is displayed, follow up based on the specific alarm. If a power interruption occurred, determine if the cycle should be continued, or abort the current cycle and drain the interior tank before starting a new cycle.

Check the collection. Poor results may be a result of poor collection.

Monitor another cycle. Inspect the waste drain tubing and the vent line during the fill process, while the unit is operating, and during the drawing phases. If there is material coming out of the waste drain, open and close the drain in the Options Menu. If material is observed in the vent line, there may be a clog within the system, the waste drain may be backed up into the interior tank, the valve may not be opening or closing properly, or the condenser may be clogged – Contact Technical Support.

Isopropyl and lower concentrations of alcohol may cause a reduction in recovered product and a large increase in the waste at the end of the cycle. Raise the Alc Temp in the Options Menu when distilling this material.

Computer may need reinitialized - Contact Technical Support.

There is no waste at the End of Cycle

Check to be sure the cycle ended and there is a message “End of Cycle, Total Time” on the display.

In an alarm condition the drain does not open, check the Touch Screen display. Proceed based on the specific alarm condition.

Check the waste drain tubing for a visible blockage, if present clear the blockage. Fill the recycler with one liter of solvent. Immediately abort the cycle and drain the recycler to verify the volume filled into the recycler is recovered in the waste container.

If nothing drains from the unit, a hot flush or cleaning of the tank may be required (contact Technical Support). Repeat if waste material drained is dark or contains solids. If blockages become frequent, contact Technical Support to help alter your settings.

The cycle did not finish

Check the Color Touch Screen display for an Alarm Condition. Determine the appropriate action based on the specific alarm displayed.

Screen is dark – no display. Verify the main power switch is in the “ON” position. Check the power source, move recycler to another outlet.

Previous Run not Finished displayed. Verify the fill container has indeed filled the full volume into the interior tank of the recycler. Inspect the recovery containers to determine how much solvent, if any, was recovered. Determine that at least one gallon remains in the interior tank of the recycler, at that time the operator can restart the cycle. If the volume of solvent left in the interior tank cannot be determined, drain it contents into the waste container located on the cart bottom and start over.

Nonsense or blank boxes displayed. Computer surged and must be reinitialized – contact Technical Support.

The unit smells like solvent during operation

Change the vent filter and monitor the next few cycles for odor.

Check all containers. Verify that all lids on recovery containers are tight and spigots are off. Check the waste container to ensure the drain and vent tubing is in the proper place.

Check for evidence of a spill in the area or remaining solvent left in the pump hose.

Check for plumbing and tank leaks.

Explore other sources of open solvent.

2.5 Gallon SOLVENT RECYCLER

PHONE: 1-800-941-9484 * email - supplies@cbgbiotech *** web orders www.cbgbiotech.com**

Common Supply items:

Item Number	Description
CN100S1	2.5 Gallon Spigotted (Standard)
CN100T1	2.5 Gallon Spigotted (Teflon)
CN10002	10 Liter Product Collection
MIS1005	Fine Mesh Strainer
MIS1003	Hydrometer
CN10018	Teflon Lined Spigot
CN20018	Standard Spigot
CN30001	Pour Spouts for 10 Liter Container
FLT3001	Vent Filter
TU10002	Recovery Line Tubing (2.5 ft.)