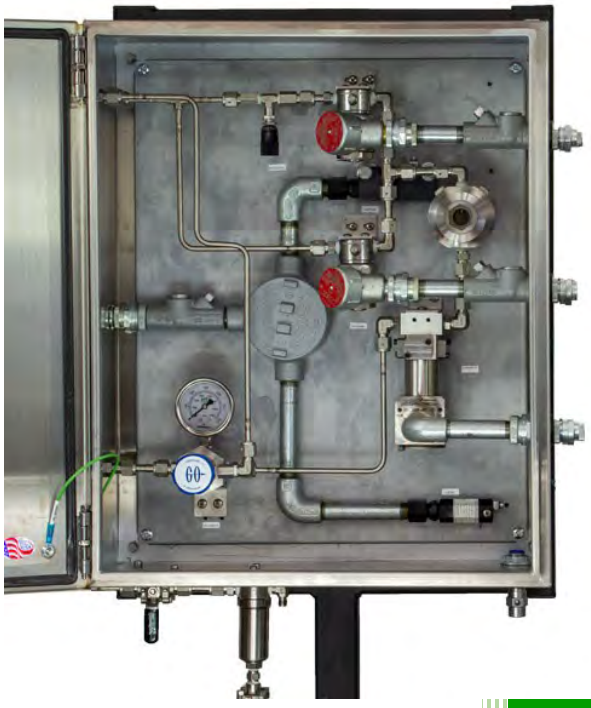
2023

GPL 5000 Users' Guide



This is the users' guide for the GPL 5000 Natural Gas Odorization System.

Patented

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12/11/2023

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Dear Valued Customer,

Thank you for your purchase of the GPL 5000 Natural Gas Odorization System. This document, in its entirety, is the GPL 5000 User's Guide.

Understand that failing to adhere to these instructions may result in the void of warranty, destruction of property, injury, or even death. If you want to learn more about our GPL Odorizers Maintenance Program to ensure your unit remains functioning correctly and how you can protect the warranty coverage, please call us today at (303) 927-7683.

Thank you for your trust in our products.

Jeff Cox

President

GPL Odorizers LLC

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Note

The information contained in this document is subject to change without notice.

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Summary

The GPL 5000 odorizer is an advanced odorant injection system that is ideal for natural gas and propane odorization. The odorizer utilizes proprietary technology and has high rangeability, delivering extraordinarily high and low flow accuracy.

The odorizer relies on two individual flow paths, a high and low flow option, which are actuated depending on the site conditions to achieve this rangeability. One of the most important site conditions for installation and troubleshooting is the pressure at the injection point.

The GPL 5000 odorizer depends on differential pressure to drive mercaptan to the injection point, so the odorant bulk tank supplying the odorizer needs to have an MAOP of at least 30 psi greater than the injection point. If the odorant bulk tank *does not have* a higher pressure than the injection point, odorization does not occur. Successful odorization should occur if pressures conform as described in the Bulk Tank and Odorant Pressure Regulator sections within this document.

The pressure on the bulk tank drives the liquid odorant to the mechanical cabinet of the GPL 5000. Within the mechanical cabinet, the fluid is filtered by an inlet filter to remove debris that may have come from the bulk tank (Figure 1: component 248). Odorant flows through a pressure regulator (component 208), which regulates the pressure to 5-15 PSIG over the injection point. At this point, the fluid flows through a flow meter (220), continuously providing the PLC with data on how much odorant flows to the injection point.

Following the flow meter, the fluid works through a flow indicator (224). The flow indicator provides feedback on when the line is packed with odorant. After the flow meter, the fluid enters a manifold block that is separated into three flow paths. The first flow path is for reduced or controlled flow. This flow path contains a solenoid valve, which opens when a batch is needed, as well as a metering valve for controlling the flow rate of the odorant.

The second flow path contains both a manual valve and a metering valve. During normal operation, the manual valve should always be closed. This flow path is for emergency scenarios where the unit has lost power. This flow path can also be used to help blow down the unit. If the unit needs to be set into a manual drip mode using this flow path, please call the factory to help with the drip calculations.

The last flow path is for maximum flow applications. This path contains a solenoid valve that opens when the first flow path cannot meet batch calculations. Depending on site conditions, the odorization may occur through either the reduced flow or maximum flow pathways.

Login

To log in to the GPL 5000 PLC, the technician must use the below credentials. If multiple logins are required, contact the factory for assistance.

User: Supervisor

Password: Mercaptan

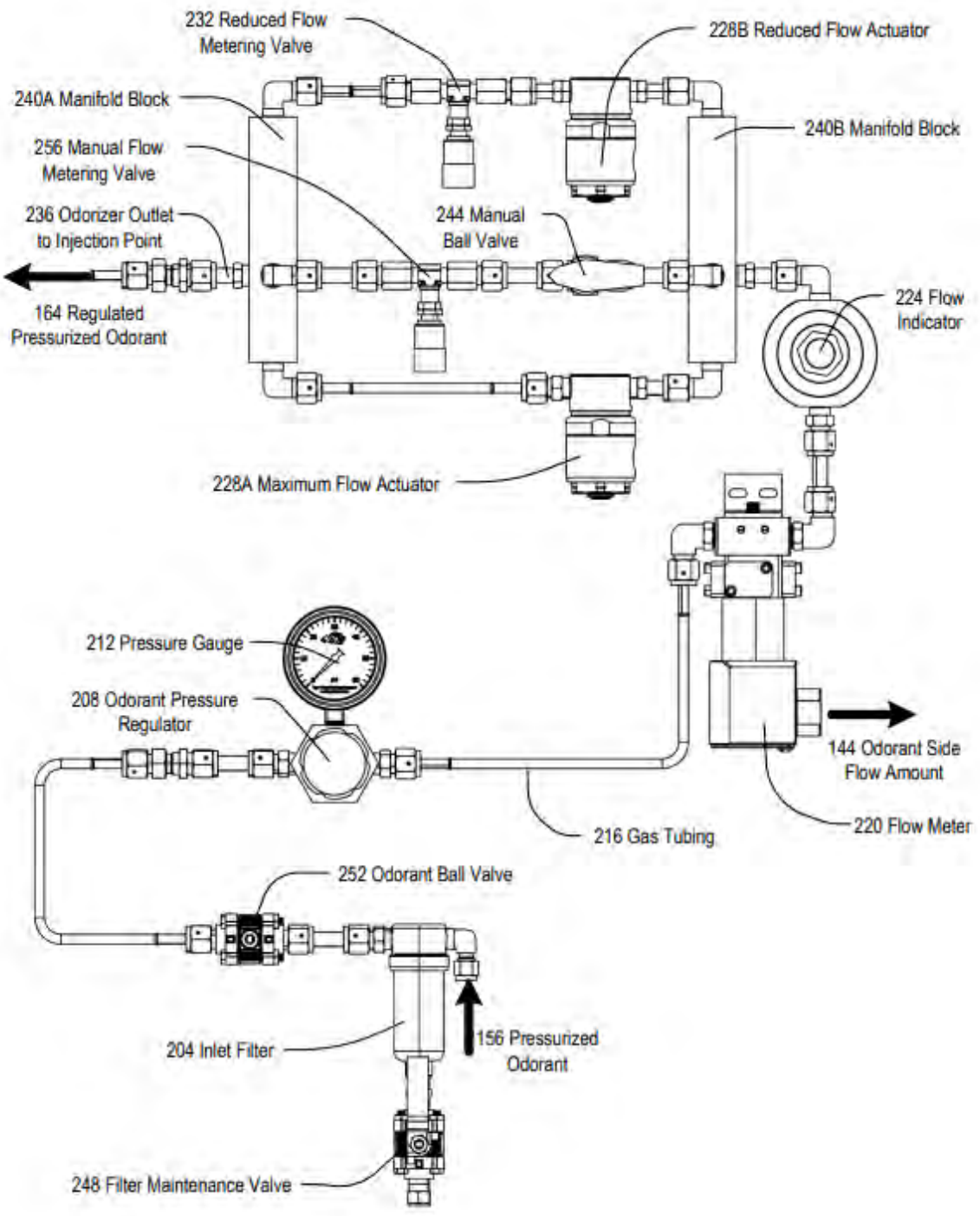

Figure 1: Mechanical components of the GPL 5000

Mechanical Principles of Operation

Bulk Tank

Operation:

A bulk tank is used in most odorization applications to supply odorant or fluid to the GPL 5000 unit. The bulk tank used with the GPL 5000 needs to have an MAOP of at least 30 PSIG greater than that of the MAOP of the injection point. This is because the pressure on the bulk tank drives the liquid to the GPL 5000 and ultimately to its injection point.

Normal Operation:

Normal operation depends on the site application. As a rule of thumb, the bulk tank must be 30 PSIG greater than the injection point's pressure. Please adhere to all industry standards regarding necessary relief for the tank. A float gauge capable of sending an analog signal to the GPL 5000 PLC is an integral part of the odorizer and is required to operate the unit. This is because the flow meter installed in the GPL 5000 is a volumetric meter, and it continues to send flow data to the PLC regardless of the state of the fluid running through it. This means that if the bulk tank runs out of liquid odorant, the odorizer continues to monitor the gas. (The PLC has built-in alarms to catch when gas flows through the flow meter). As a secondary catch, the analog float gauge relays the amount of odorant left in the tank. When the tank falls below a certain percentage, an alarm triggers on the PLC.

Annual Maintenance:

There is no yearly component maintenance. It is the customer's job to determine when the tank needs to be refilled and maintained.

Inlet Filter

Operation:

The filter catches debris coming from the odorant bulk tank. It protects the downstream components (most importantly, the flow meter) from debris that could damage the unit.

Normal Operation:

The filter should be a static component. Please note that filtering the fluid can result in some bubbles, which may be seen in the site glass.

Annual Maintenance:

The filter needs to be flushed once a year. Replace it if the filter is damaged or has substantial wear. Please refer to the Filter Alarms & Responses.

Odorant Ball Valve

Operation:

There is an odorant ball valve on the mechanical box's exterior. This valve is an emergency shut-off valve to stop any flow through the unit. It also is used in the blowdown procedure.

Normal Operation:

During normal operation, this valve should remain open.

Annual Maintenance:

No annual maintenance is needed.

Odorant Pressure Regulator

Operation:

The odorant pressure regulator cuts the blanket pressure from the tank to the desired pressure before injection.

Normal Operation:

In normal operation, the odorant pressure regulator must be set 5-10 PSIG above the injection pressure. This may change depending on the application. In a higher flow application, the end user can set the pressure to 10-20 PSIG above injection, depending on demand. For example, if the injection pressure is 200 PSIG, the odorant pressure regulator must be set to 210 PSIG.

Annual Maintenance:

No annual maintenance is needed.

Flow Meter

Operation:

The flow meter is a positive displacement flow meter that continuously provides feedback to the PLC to ensure the proper amount of odorant is injected.

Normal Operation:

During normal operation, the flow meter continuously sends volumetric feedback to the PLC of what has been injected. An easy way to determine if there is communication between the two is by using the PLC controller. After signing in, press Menu → I/O on the PLC controller. On the I/O screen is an "Odor Count" variable – during a batch, this volume should increase as the odorant moves through the system.

Annual Maintenance:

No annual maintenance is needed.

Flow Indicator

Operation:

The flow indicator provides feedback on when the line is packed with odorant. A solid line pack is needed before the fluid reaches the injection point.

Normal Operation:

During normal operation, you should not see any movement within the flow indicator, as the flow path should be packed with fluid. You may notice some bubbles moving through the system during operation.

Annual Maintenance:

No annual maintenance is needed.

Manifold Block

Operation:

The manifold block routes fluid through the three flow paths. The PLC controls the odorant flow path(s) based on the site parameters.

Normal Operation:

During normal operation, the reduced flow path actuates during batches. If the reduced flow path does not meet the required injection rate, the max flow path actuates to achieve target odorization rates.

Annual Maintenance:

No annual maintenance is needed.

Solenoid Valve

Operation:

There are two solenoid valves in the GPL 5000, and both control a flow path and act as a barrier to allow the GPL 5000 to move fluid to an injection point.

Normal Operation:

Depending on site parameters, the solenoid valves actuate to achieve the target injection rate. During normal operation, the reduced flow solenoid valve actuates when a batch is needed. When the odorant volumetric rate is not enough to meet a required target injection through the reduced flow path, the maximum flow path actuates and creates a greater odorant volumetric flow. The solenoids close when the batches are met to achieve a target injection rate.

Annual Maintenance:

Replace the solenoid valves before reaching 1,000,000 cycles. The maintenance interval depends on the frequency of the batches.

Metering Valve

Operation:

The metering valve regulates the flow rate of the odorant moving to the injection point. There are two metering valves integrated into the GPL 5000.

Normal Operation:

During normal operation, the metering valve of the reduced flow path needs to be set for the site application. This is typically set at startup; however, depending on the unit's alarms and operation, the metering valve may need adjustment. To increase the fluid flow rate, turn the valve counterclockwise. To decrease the fluid flow rate, turn the valve clockwise. This valve has a hex key that allows a technician to lock the valve into place (if desired).

Annual Maintenance:

No annual maintenance is needed.

Screens

The HMI/PLC controls all the operations of the GPL 5000. All inputs/outputs are connected to the PLC (Solenoid Actuation, Flow Meter Ticks, Flow Signal, etc.) The bright LCD and touchscreen allow the end user to control and configure all settings for the odorizer. The following screens outline all the variables found in the controller.

Home

See Figure 2 for the GPL 5000 controller home screen display. The graphics provide real-time updates and important data regarding the unit's operation and performance. Refer to the corresponding letters in this outline within Figure 2 for more info:

A. System Toggle Button shows whether the GPL 5000 is on or off. The end user may turn the odorizer on or off by pushing this button. Please note that when the technician turns the system on, the GPL 5000 immediately begins a batch.
B. The Alarm Bell flashes red when an alarm is present in the system. When the system is running appropriately, the alarm bell is grey.
C. A long gray pipe represents the injection point, displaying two variables within a pipe. These variables change depending on the fluid type (gas/liquid). The variables displayed in Figure 2 are for a gas operation.
D. The first variable is the Injection Rate, or the rate of odorant being injected compared to the gas rate. This variable is an active rate based on the prior batch.
E. The second variable is the Gas Rate communicated to the GPL 5000 from the pipeline.
F. When pressing Menu or Alarm, the PLC screen changes to the relevant page.

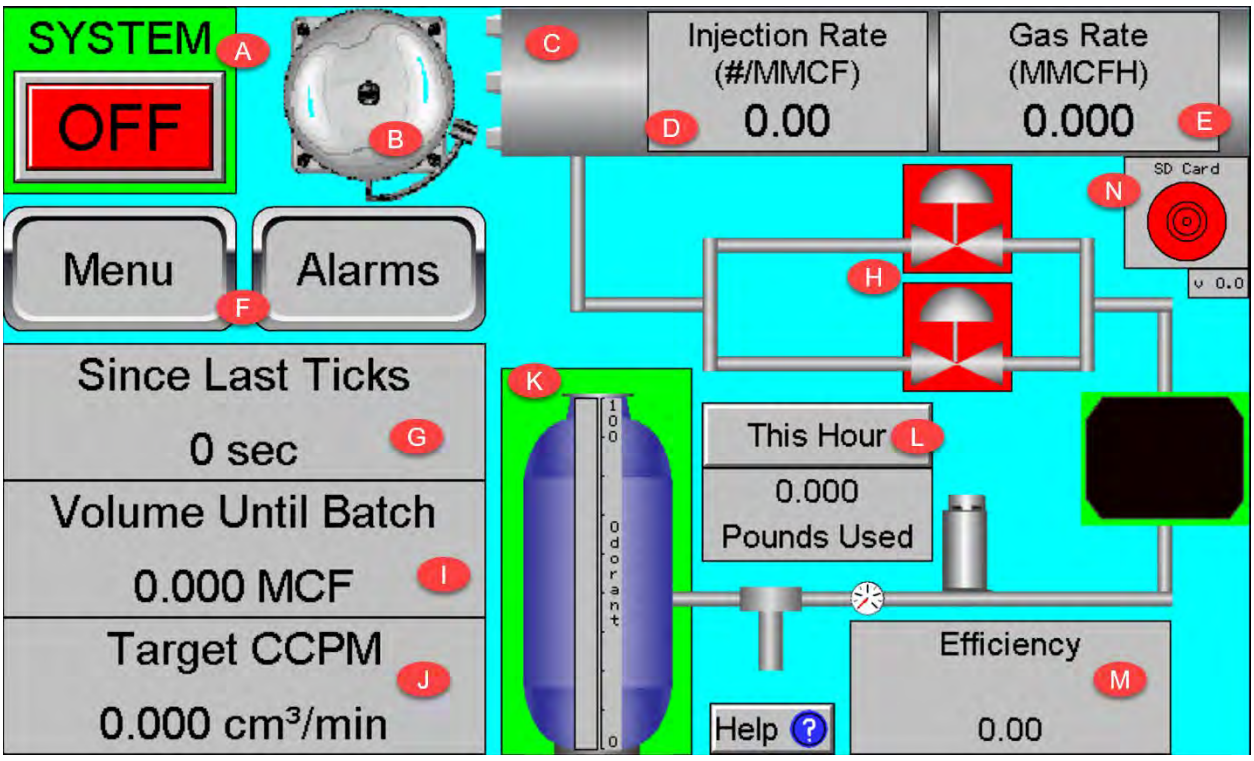

Figure 2: Home Screen

There are three essential troubleshooting devices to monitor the GPL 5000 when in operation: “Since Last Ticks,” “Volume Until Batch,” and “Target CCPM” are on the lower left-hand side of the home screen.

G. The Since Last Ticks variable resets to zero anytime the flow meter sends “ticks,” or a signal to the controller that a volume has been injected. During normal operation, this value resets to zero during a batch and continues to count upwards from zero when the solenoids are closed.
H. An easy way to determine if the GPL 5000 is batching is by looking at the two valve symbols underneath the “Injection Rate” and “Gas Rate” boxes. In Figure 2, a solid red background shows that neither solenoid has actuated and the unit is not batching. The unit is in batch if either of these solenoids’ backgrounds is green. If the solenoids are green, but the “Since Last Ticks” do not reset to zero, turn the system off and continue to the troubleshooting section below.
I. The Volume Until Batch indicates how much flow must occur at the injection point relative to the injection rate. During normal operation, the “Volume Until Batch” counts down to zero. When the unit hits zero, the solenoids should actuate, and the “Volume Until Batch” counts upwards until a batch is fulfilled; at this time, the value should count down to Zero. This process should repeat over and over. If the value becomes negative and continues to decrease, please continue troubleshooting.
J. The Target CCPM below the “Volume Until Batch” indicates the volumetric flow rate of the odorant that is required to meet the current flow injection rate.
K. The odorant tank should display a “100” percentage once set up correctly. Please note that if the odorant tank is partially full, this can be entered by accessing the Usage screen.
L. The This Hour toggle displays odorant injection mass for several different timeframes.
M. The Efficiency variable shows the efficiency of the batches. A perfect efficiency should read 1.00.
N. The SD Card indicator shows red if the microSD device is not inserted into the PLC properly. When installed correctly, the LED displays green. **The hourly data is only recorded to the microSD when the LED shows green**.

Main Menu

The main menu is an on-screen display (OSD), providing paths to other screens with pertinent information when pressed. See Figure 3.

A. The Flow button reveals the flow characteristics of the injection point.
B. The Odor button displays the odorant properties.
C. The Alarms button shows the end user to the alarm configuration.
D. Use the Quick Inject button only in applications where the user wants to move specific volumes to the injection point. This operation does not odorize relative to an active volumetric flow rate from the injection point.
E. The I/O button displays the I/O configuration and MODBUS setpoints.
F. The user may press the Maintenance button to reset maintenance or check cycles on the mechanical components.
G. To log in to the controller, push User.

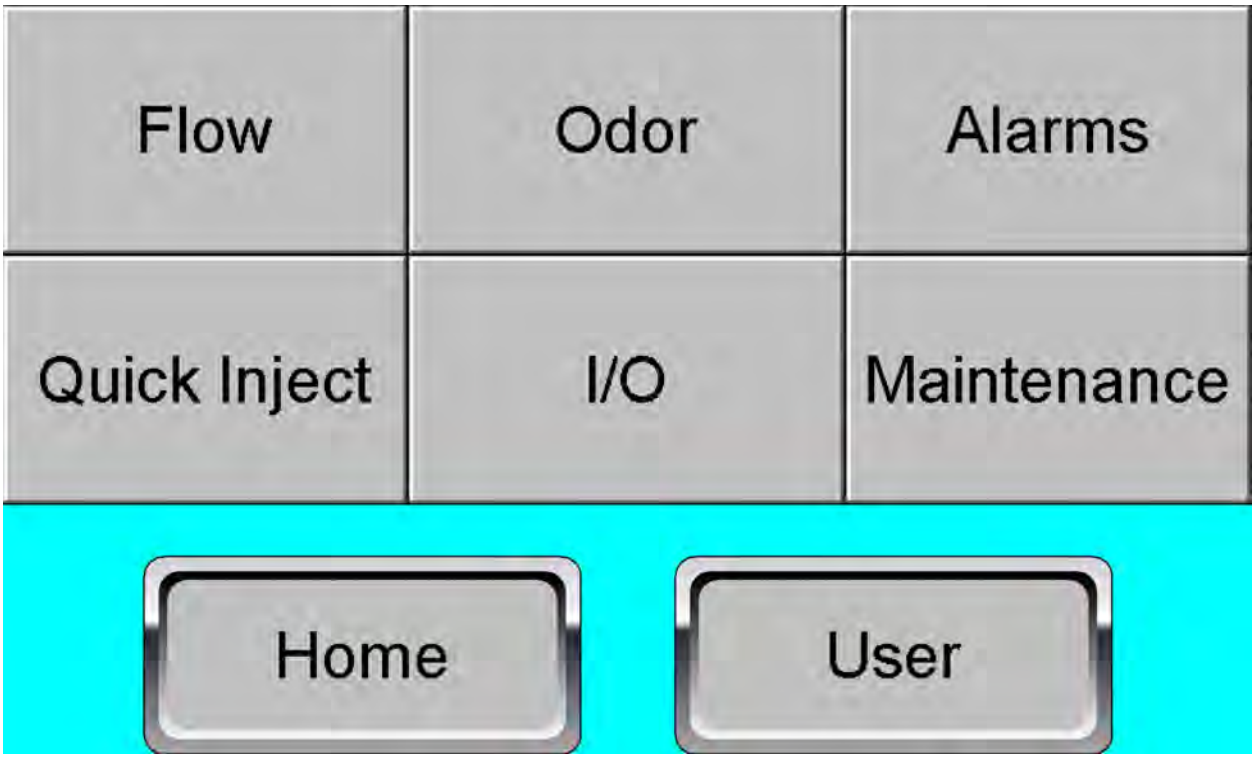

Figure 3: Main Menu Screen

Flow

Please note that the GPL 5000 does not meter the flow rate of the media needing odorization. The odorizer needs to have a flow signal to odorize the fluid.

Refer to Figure 4.

- Select the Flow Type (Gas/Liquid) to set up the flow page (top left-hand corner).
- Ensure that the Flow Units match the flow signal (top right-hand corner).

The flow screen has three primary operations: selecting manual gas mode and flow signal selections (Flow Source) for either pulses or 4-20mA.

1. To operate Manual Gas Mode:
   - Enter a Manual Gas Rate.
   - Touch the Manual Override to toggle on/off. When the toggle is "ON," the odorizer should start a batch. When the "Manual Override" is "OFF," it is best practice to set the "Manual Gas Rate" to 0.00 during normal operation.
2. When selecting Pulses, the display shows a Cubic Feet Per Pulse variable. This variable should match that of the pulse being sent. For example, in a gas application where a corrector is sending 10 ft^3 per pulse, the odorizer should also show 10 ft^3 for this variable.
3. When selecting 4-20mA, as shown in Figure 4. The Min Gas Rate (Do not odorize below) is a threshold that the GPL 5000 cannot odorize below. A gas rate below this threshold is assumed to be zero, and the odorizer does not inject. This is important as most 4-20mA signals have some

"noise" or not a true 4 mA when there is 0 flow. The Max Gas Rate sets the span (full-scale value) of the 4-20mA.

The "Actual Gas Rate" displayed at the top is the live gas rate. Depending on the source, this may change. Please note that if "Pulses" is selected, the "Actual Gas Rate" does not update until a batch is completed.

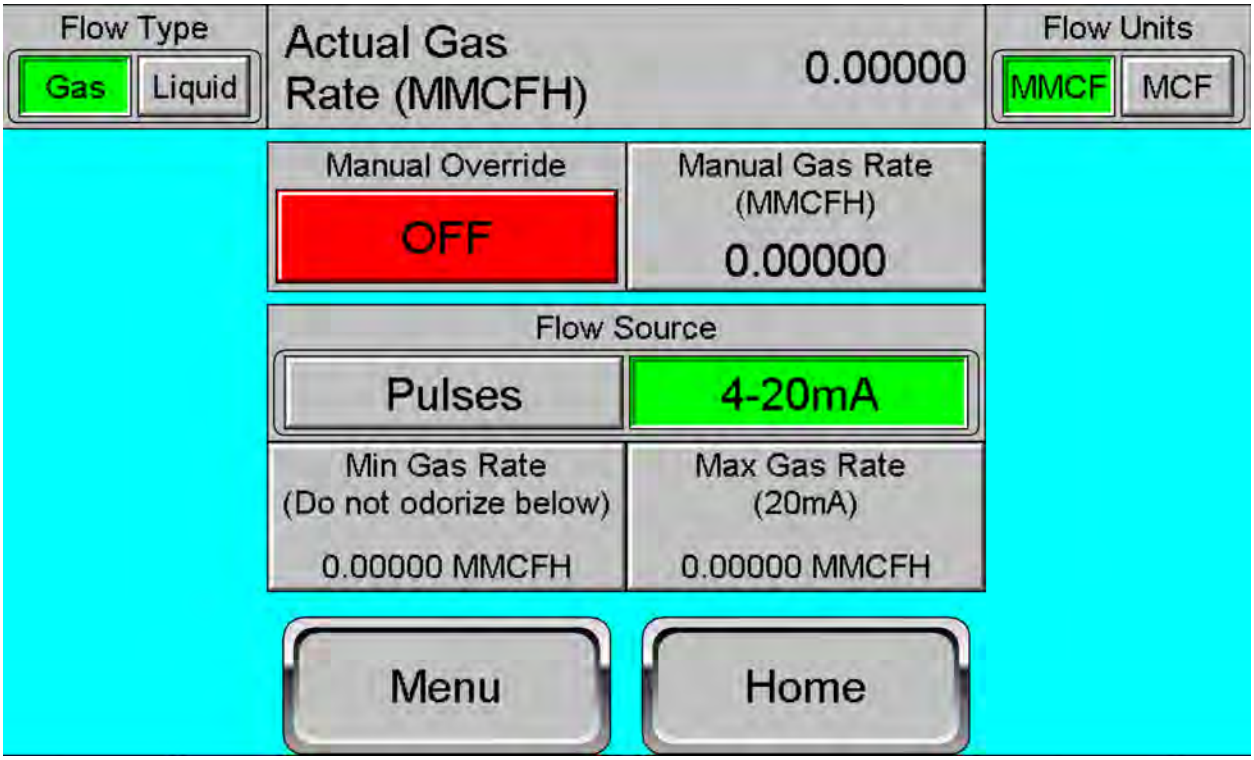

Figure 4: Flow Screen

Odor

The odor screen (shown in Figure 5) sets up all the variables associated with the odorant blend and injection process.

Use the Odor Blend button to input the specific odorant blend used on site. Touch the icon and select an odorant blend from a standard list.

- Once the odorant blend is selected, the Density automatically updates to the density of the selection.
- If the user is not using a standard odorant blend, select "User Defined" in the "Odor Blend" and then manually enter the odorant density in the "Density (lb/gal)." Refer to Figure 5.

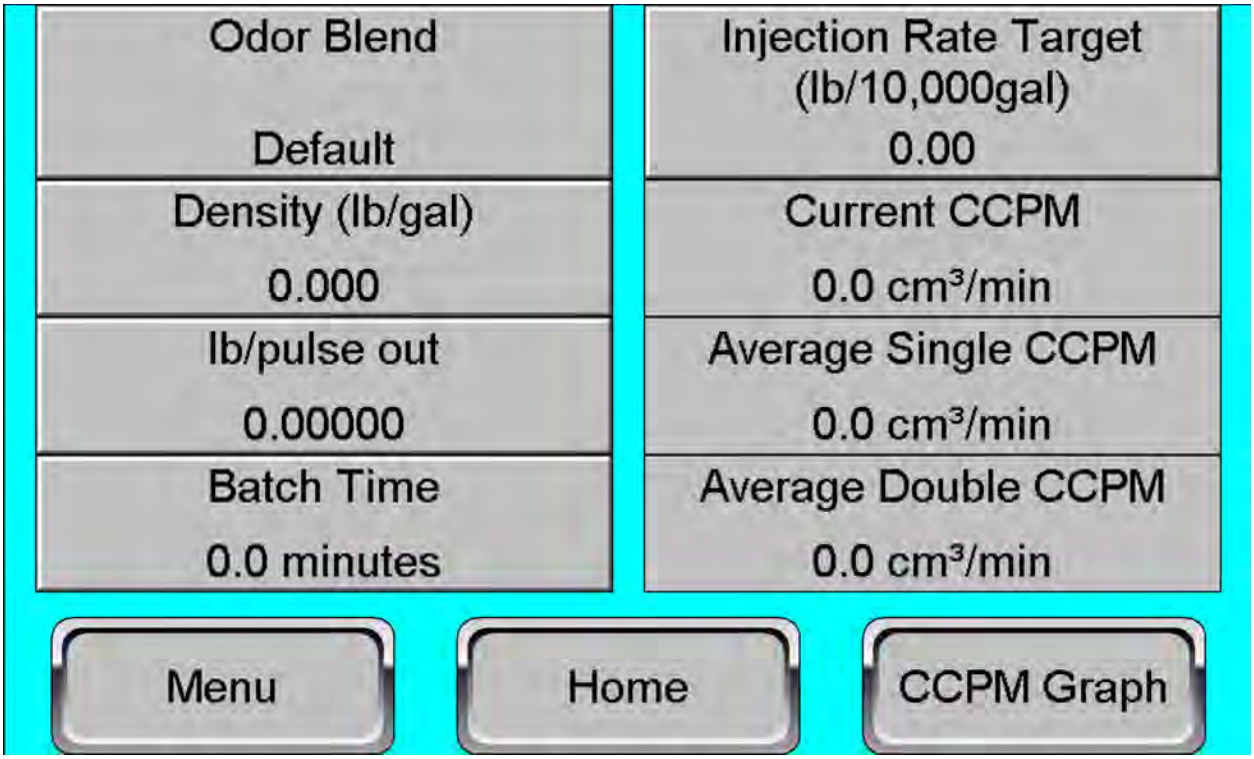

Figure 5: Odor Screen

The lb/pulse out represents the amount of odorant injected before a digital output signal is sent from the odorizer HMI. The end user can change this value depending on the application by selecting the lb/pulse out and changing the value on the screen.

The Batch Time represents the frequency of time (in minutes) that the odorizer will batch. It also represents the number of minutes the odorizer solenoid stays open to try and complete a batch.

The Injection Rate Target represents the desired concentration of fluid to an odorant. To change the target injection rate, touch the variable and enter the desired rate.

Current CCPM, Average Single CCPM, and Average Double CCPM are variables for troubleshooting.

- "Current CCPM" represents the current volumetric flow rate of odorant through the odorizer. When there is no flow, this should show 0.
- "Average Single CCPM" is the average volumetric flow of odorant through the reduced flow path of the odorizer (228B in Figure 1) in $\frac{cm^3}{minute}$.
- "Average Double CCPM" is the average volumetric flow of odorant through both flow paths of the odorizer (228B and 228A in Figure 1) in $\frac{cm^3}{minute}$.

Relating the three variable values to the Target CCPM on the main screen (Figure 2) can help troubleshoot alarms and monitor how well the odorizer is set up for the application.

Touching the CCPM Graph button advances the end user to the "CCPM Graph." See Figure 6.

CCPM Graph

The CCPM graph is a useful troubleshooting screen. It shows the volumetric flow rate over time in $\frac{cm^3}{minute}$ of the GPL 5000 when the first solenoid is open (228B in Figure 1) and when both are open (228B and 228A in Figure 1). This screen shows when the unit is batching, as well as the current state of the unit. It shows if both flow paths are being utilized, which may indicate it is time to adjust the pressure on the regulator.

To return to the "Odor Screen," touch the Back button.

Press the Home button to return to the main menu.

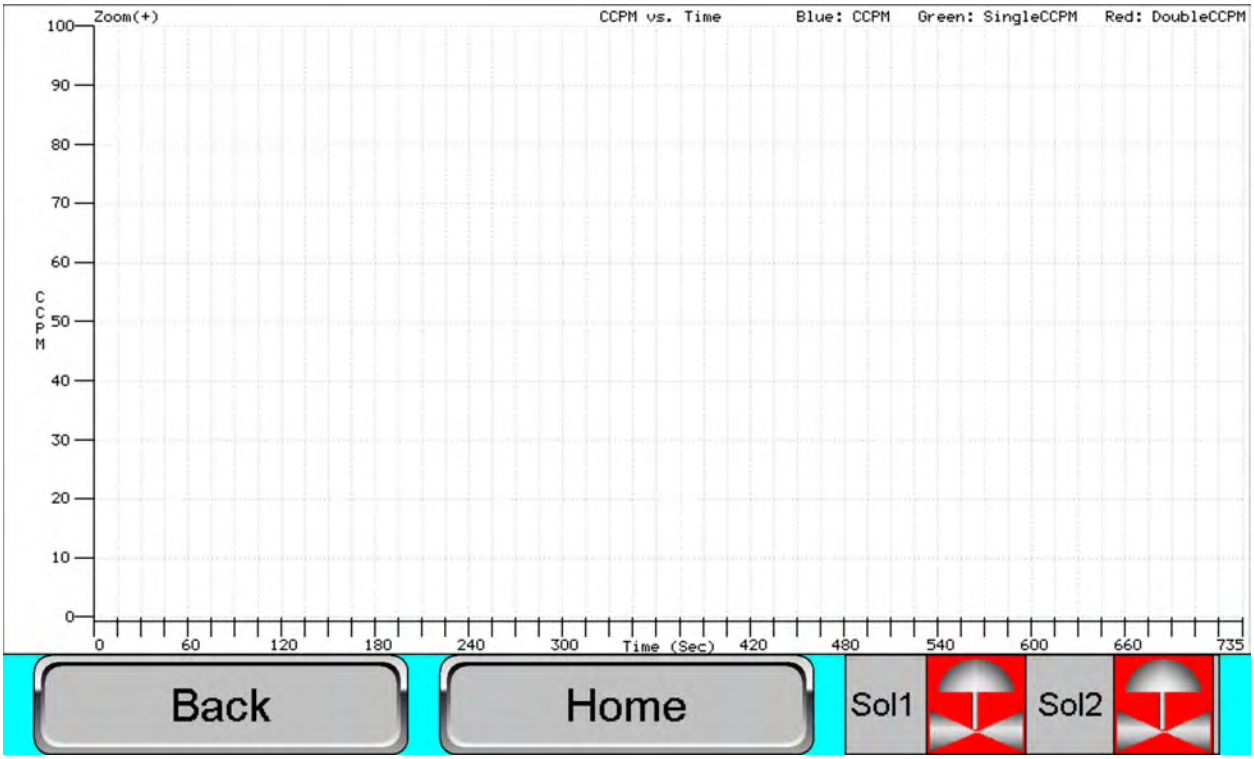

Figure 6: CCPM Screen

Alarms (Configuring Alarms)

See Figure 7 for the alarms screen showing Active Alarms and Alarm Configuration (Alarm Config).

During operation, the screen's left side provides feedback on which alarms are active on the GPL 5000. See step-by-step Alarm & Responses.

The right side of the screen is for navigation of the alarm configuration window. Using the keypad on the right side, the user can scroll up and down to highlight an alarm configuration. Please note that if the user configures any of the alarm set points below, they must hit the ESC button on the right side of the screen before any other navigation can occur.

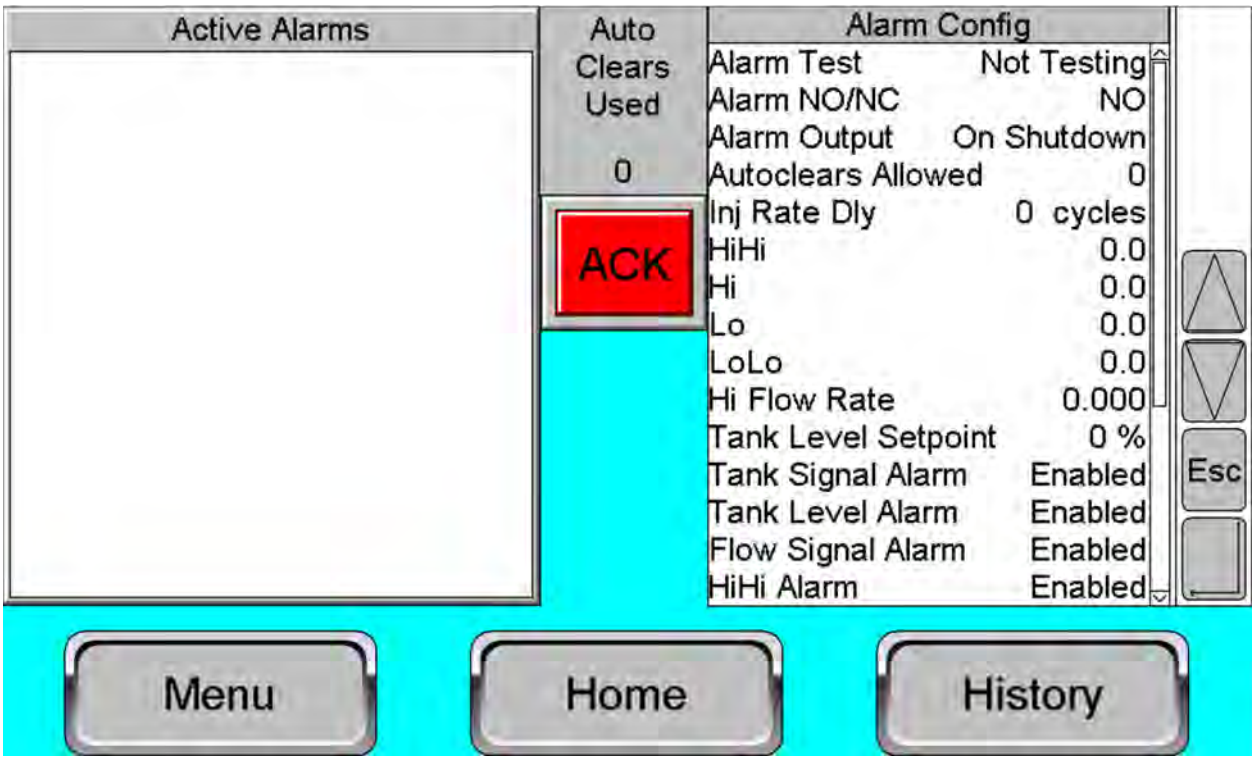

Figure 7: Alarm Screen

Below is a walkthrough of each parameter:

Alarm Test: Normal state is “Not Testing.” Switching this to “Testing” generates a “test alarm” digital output. This is typically used during startup to ensure that “Gas Control” detects an alarm signal from the odorizer.

Alarm NO/NC: This allows the end user to configure the state of the odorizer alarm to either be normally open (Alarm NO) or normally closed (Alarm NC).

Alarm Output: This allows the end user to either send the alarm output when the odorizer system is off (On Shutdown) or only when the odorizer has active critical alarms. (When the config is “Critical Only,” the odorizer does not send an alarm when these alarms are acknowledged and the system is off.)

Autoclears Allowed: The autoclears allowed represent the amount of autoclear cycles that can occur before the odorizer changes to a critical alarm shutdown. For instance, if an odorizer has a LoLo alarm, the system clears the alarm and starts a count of the autoclears used. If the autoclears add up to the autoclears allowed, the system triggers a critical alarm and shuts the unit down. Autoclears can be reset by pressing the red “ACK” button in the middle of the screen.

Inj Rate Dly: Injection rate delay is an internal counter of the number of consecutive batch cycles outside a programmed injection alarm level before an autoclears alarm is triggered.

HiHi: The HiHi is a critical alarm set point. This triggers if the odorizer’s injection rate is greater than this value. This value needs to be set higher than the target injection rate. Note that this will not

immediately turn the odorizer off. The odorizer will need to HiHi consecutively greater than the “Inj Rate Dly” and trigger the “Autoclears Allowed” before turning the system off.

Hi: The Hi is a soft alarm set point. This triggers if the odorizer’s injection rate is greater than this value. This value needs to be set higher than the target injection rate.

Lo: The Lo is a soft alarm set point. This triggers if the odorizer’s injection rate is less than this value. This value needs to be set lower than the target injection rate.

LoLo: The LoLo is a critical alarm set point. This triggers if the odorizer’s injection rate is less than this value. This value needs to be set lower than the target injection rate. Note that this will not immediately turn the odorizer off. The odorizer will need to LoLo consecutively greater than the “Inj Rate Dly” and trigger the “Autoclears Allowed” before turning the system off.

Hi Flow Rate: This value represents a ceiling of the gas rate’s normal operating conditions within the pipeline. When a “Hi Gas Rate” alarm occurs, the odorizer shows 0.00MCFH gas flow until the gas rate returns to normal parameters to prevent over-odorization. Set this value higher than the maximum gas rate (20mA) expected at this location.

Tank Level Setpoint: The tank level setpoint is manually entered to alarm once the tank level is lower than the setpoint. The generated alarm is soft and does not shut the unit down.

Tank Signal Alarm: GPL recommends that the odorizer has feedback from the tank to communicate the remaining odorant level. This is important as the flow meter (described in the mechanical principles of operation) meters both liquid and gas. The tank signal is continually monitored to ensure that the odorizer is always metering fluid. This alarm is enabled when there is a tank-level signal being communicated. If the application does not have a tank level signal, the “Tank Signal Alarm” should be set to “Disabled.” If this is not done, the “Tank Signal Alarm” shows active as it has no feedback.

Tank Level Alarm: The tank level alarm allows the end user to disable the alarm if they do not have a level indicator on site or do not want this alarm present. The tank level alarm is soft and does not shut down the odorizer.

Flow Signal Alarm: The flow signal alarm is used when a 4-20mA signal communicates the gas rate. When enabled, it triggers an alarm if the analog signal fails.

HiHi Alarm: Enabled = Alarm is active, Disable = Alarm is Disabled.

Hi Alarm: Enabled = Alarm is active, Disable = Alarm is Disabled.

LoLo Alarm: Enabled = Alarm is active, Disable = Alarm is Disabled.

Lo Alarm: Enabled = Alarm is active, Disable = Alarm is Disabled.

No Odorant Alarm: Enabled = Alarm is active, Disable = Alarm is Disabled.

Solenoid Max Time Open: This register indicates the maximum allowable time for the solenoids to remain open during a batch. If the solenoids remain open for the programmed time (in minutes), the Solenoid Max Time Open” alarm triggers.

Max CCPM: The maximum CCPM is a register that acts in tangent with the “No Odorant Alarm.” If the odorant tank is empty, gas moves through the odorizer instead of a liquid and flows at a much faster volumetric rate. This rate is usually 1000’s of CCPM. The Max CCPM is a programmable variable indicating a ceiling to help trigger a “No Odorant Alarm” if there is no tank level signal. The Max CCPM’s normal value is 1000 CCPM.

Isolation Alarm: Enabled = Alarm is active, Disable = Alarm is Disabled.

Isolation Ticks: This programmable variable controls the odorant volume metered before an isolation alarm is triggered.

Access the alarm history screen by pushing the History button in the bottom right corner of the Alarm Screen in Figure 7.

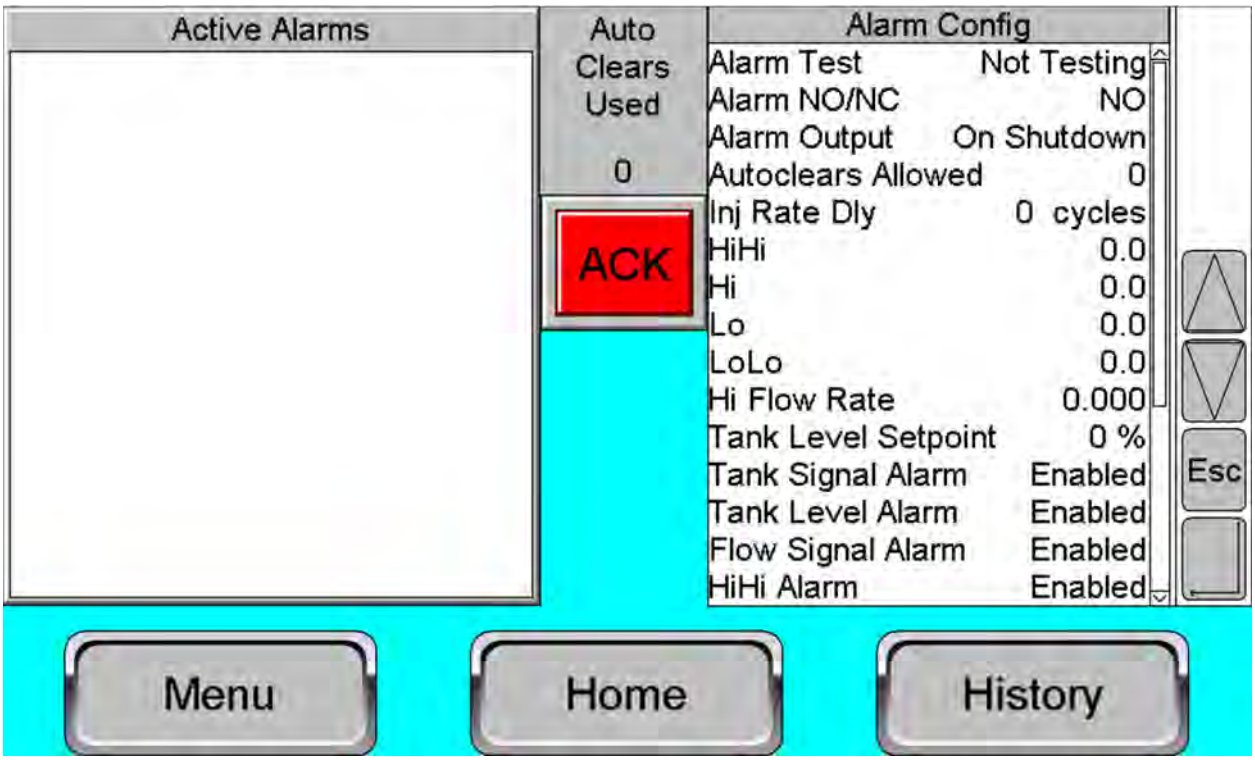

Figure 7: Alarm Screen

Alarm History

The alarm history shown in Figure 8 can be helpful when troubleshooting alarms and odorizer performance.

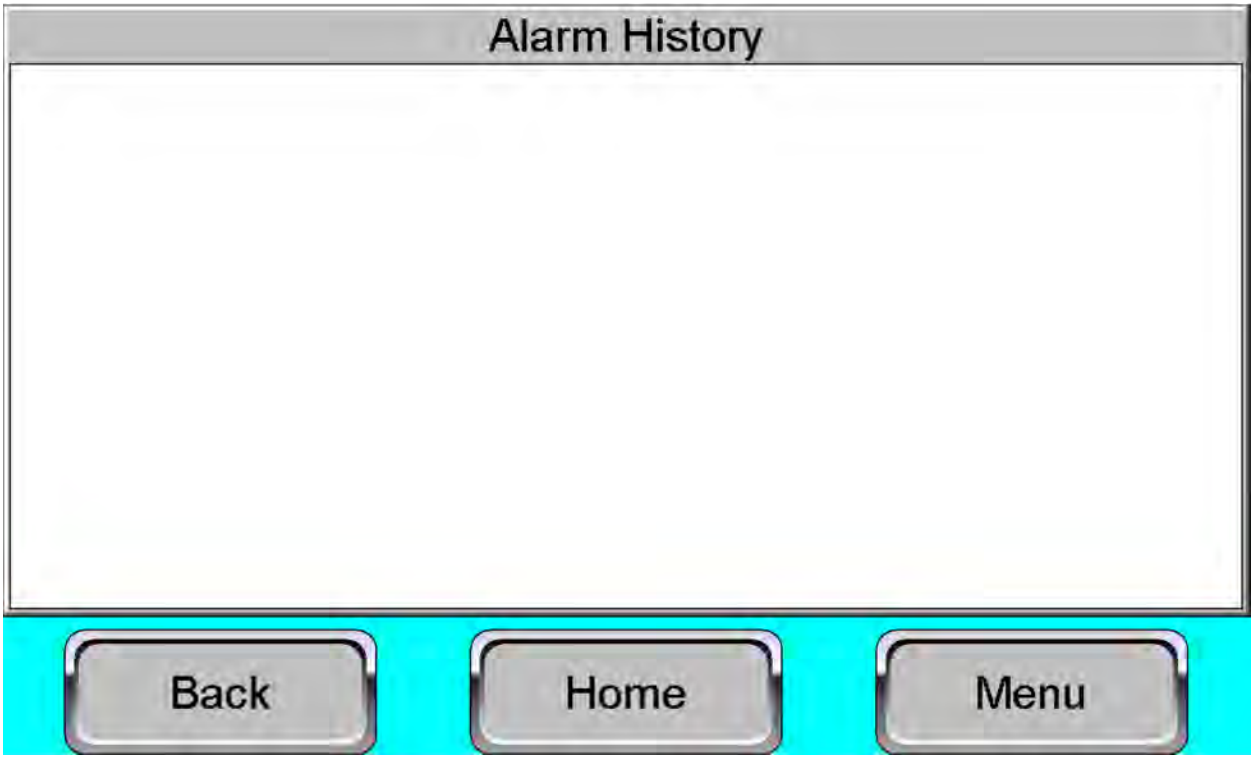

Figure 8: Alarm History Screen

Quick Inject

Use the quick inject screen only in pickling or known injection situations. This injection is not based upon any injection rate data—it is a set volumetric amount.

See Figure 9. Select either pounds or gallons of odorant under “Mass or Volume.”

Enter the “Pounds to Inject” or “Volume to Inject.”

Once the desired mass/volume amount is entered for a quick injection, the solenoid swap over must be entered. A standard swap over % is between 70-90%. The swap-over value indicates the % of injection done utilizing both solenoid valves before the second valve is closed. Once the volume/mass amount and solenoid swap over is entered the system is ready for a quick inject.

By hitting “Pickle System,” the injection begins. The “SPEED PICKLE” toggle can be activated to enable the second solenoid valve. Once the injection % is greater than the solenoid swap over, the second solenoid closes, and the first solenoid valve finishes the injection.

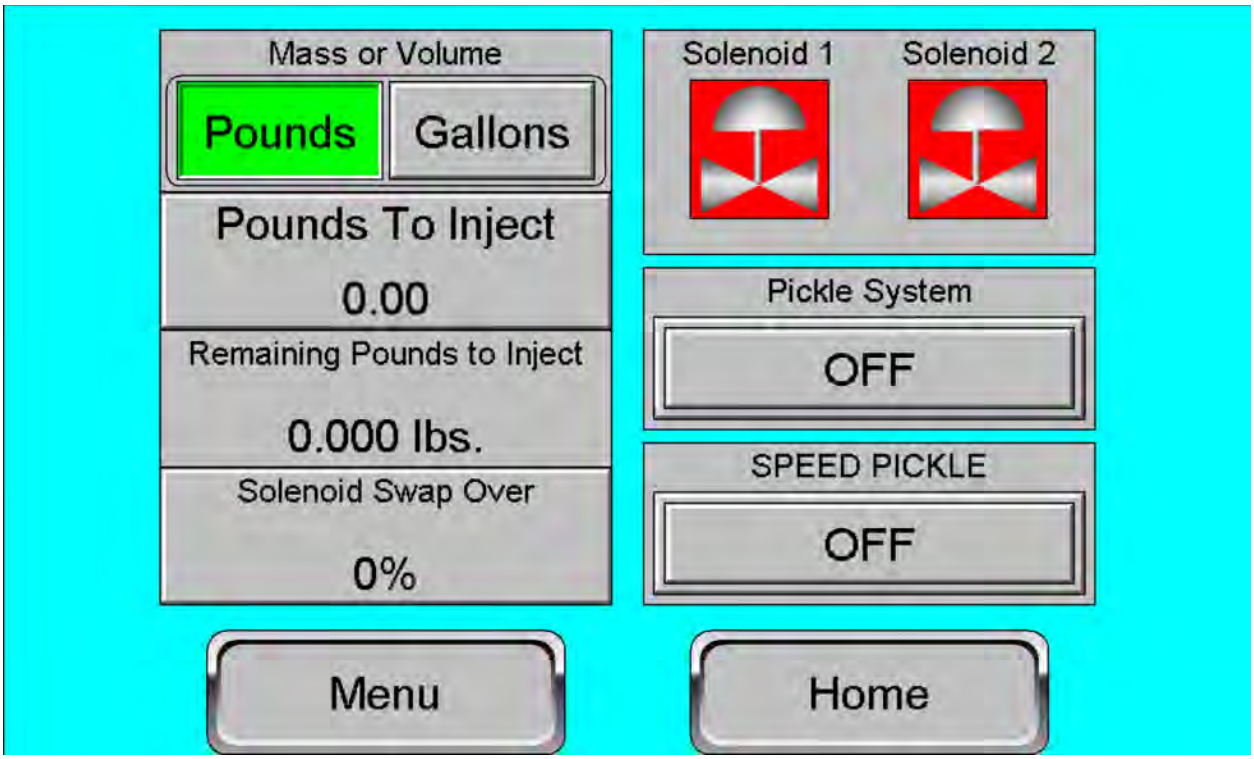

Figure 9: Quick Inject Screen

I/O

The I/O screen shown in Figure 10 is a great troubleshooting page. The screen displays the current state of each input and output and which I/O point they are assigned to.

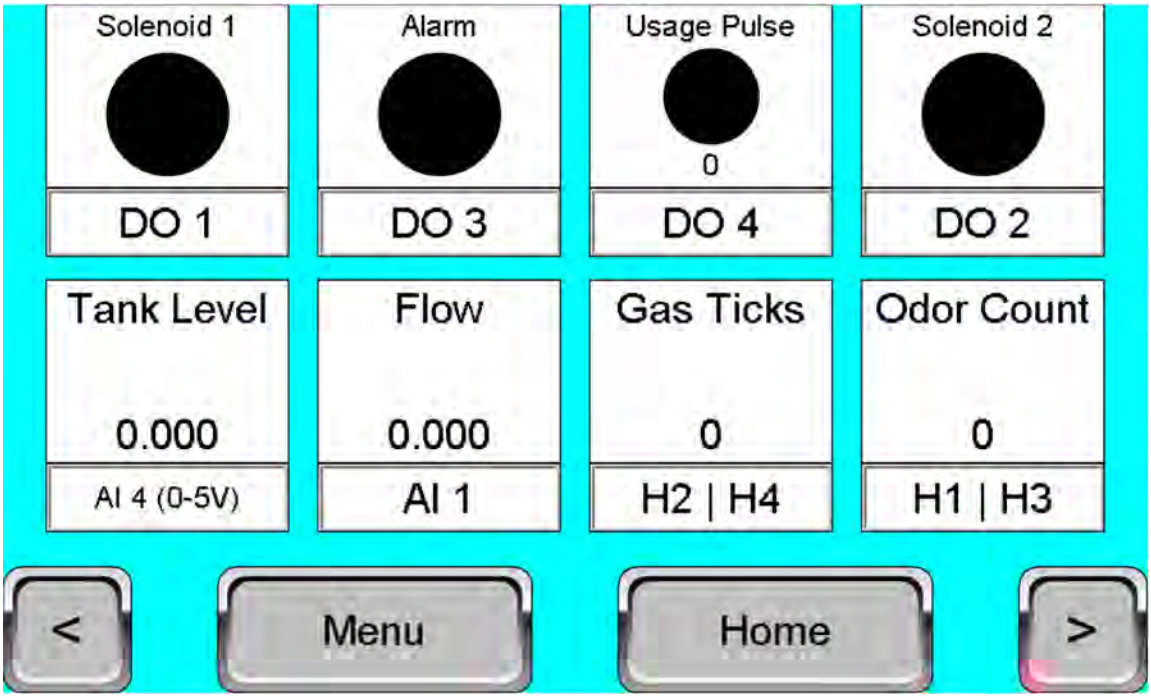

Figure 10: I/O Screen

Soft I/O

The Soft I/O screen displays the current network configuration of the PLC. See Figure 11. The IP Address, IP Mask, and IP Gateway are on the left side. These can be changed to allow for integration with the user's network. On the right side of the screen display are the Modbus settings. For more information, please reference the Modbus Map.

Figure 11: Soft I/O Screen

Maintenance

Figure 12 shows the odorizer's maintenance page, which tracks solenoid life cycles and the previous filter inspection date.

Use this maintenance screen to actuate the solenoid valves. When toggled "ON," the Solenoid 1 Override and Solenoid 2 Override actuate the respective solenoid valves. When on, the unit moves the odorant to the injection point if there is adequate differential across the valves. *Do not* use the solenoid overrides during regular operation.

Below the Solenoid Override toggles is the solenoid cycle counts, as well as a filter age date.

Solenoid 1 Cycles and Solenoid 2 Cycles show running counts of the number of times each solenoid has opened and closed. Keeping track of these values is essential, as GPL recommends replacing the solenoid valves after 1,000,000 cycles.

Once a solenoid is replaced in the field, pressing the Reset button next to the respective solenoid resets the count.

The Filter Age displays the month and year of the last filter maintenance. GPL recommends checking the filter yearly to ensure no debris is present. After cleaning/inspecting the filter, the date resets by pushing the Reset button to the right of the value.

Figure 12: Maintenance Screen

Usage

On the home screen, press the odorant tank to navigate to the odorant usage screen (See Figure 2). The usage screen shown in Figure 13 helps track odorant usage.

At the top of the usage screen, “Usage” is shown for the amount of odorant moved to the injection point for “This Day,” “This Month,” “Last Day,” and “Last Month.”

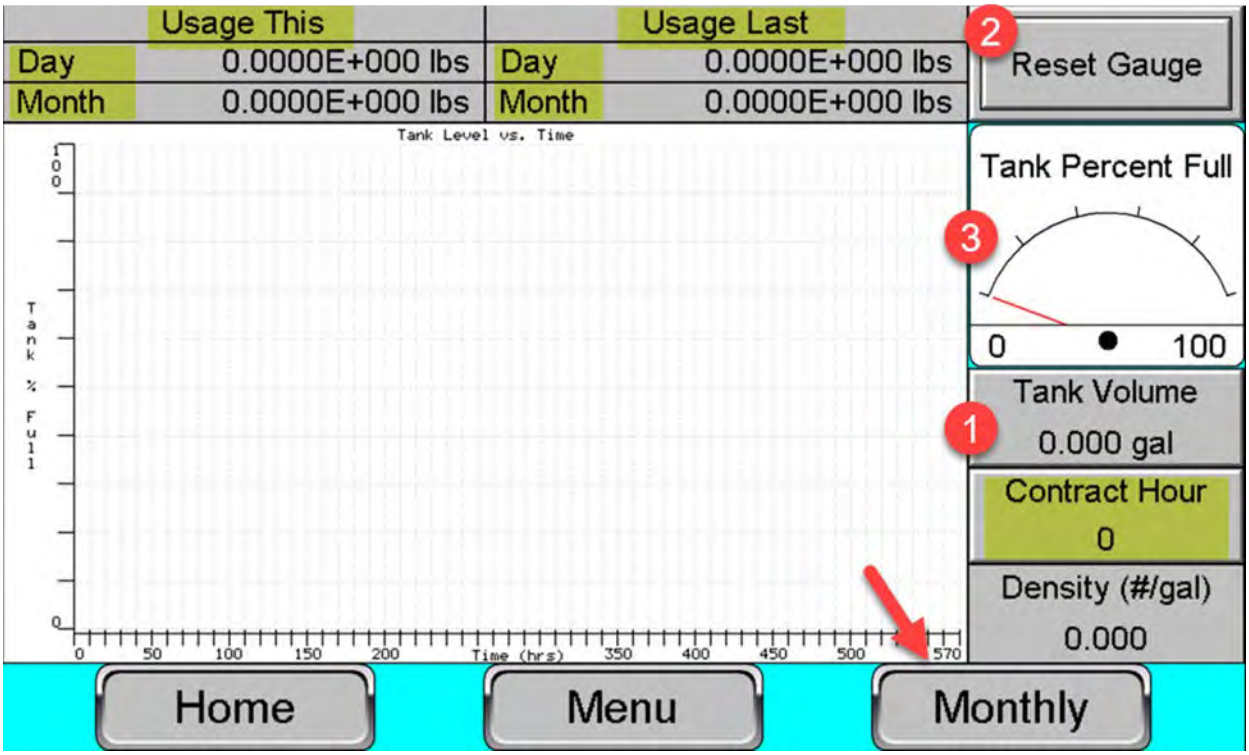

Figure 13: Usage Screen

If the application *does not* have an analog tank signal communicated to the PLC, the end user can manually enter the odorant level of the tank on the usage screen:

1. Push the "Tank Volume" and manually enter the known volume of odorant in the tank.
2. Press the "Reset Gauge" icon.
3. The "Tank Percent Full" resets to show 100%.

Over time, the PLC tracks how much odorant has been injected and decreases the "Tank Percent Full," respectively. A graph of the tank level vs. time populates and decreases relative to the odorant volume moved to the injection point.

The Contract Hour is the hour when the odorizer rolls into a new day, which remains at 0 in most operations, meaning a new day starts at 12:00 AM (midnight).

The Monthly button switches the user screen to the screen shown in Figure 13.

Monthly Usage

The monthly usage screen displays the amount of odorant injected, the volume of unodorized fluid (Figure 14), and the alarms triggered monthly.

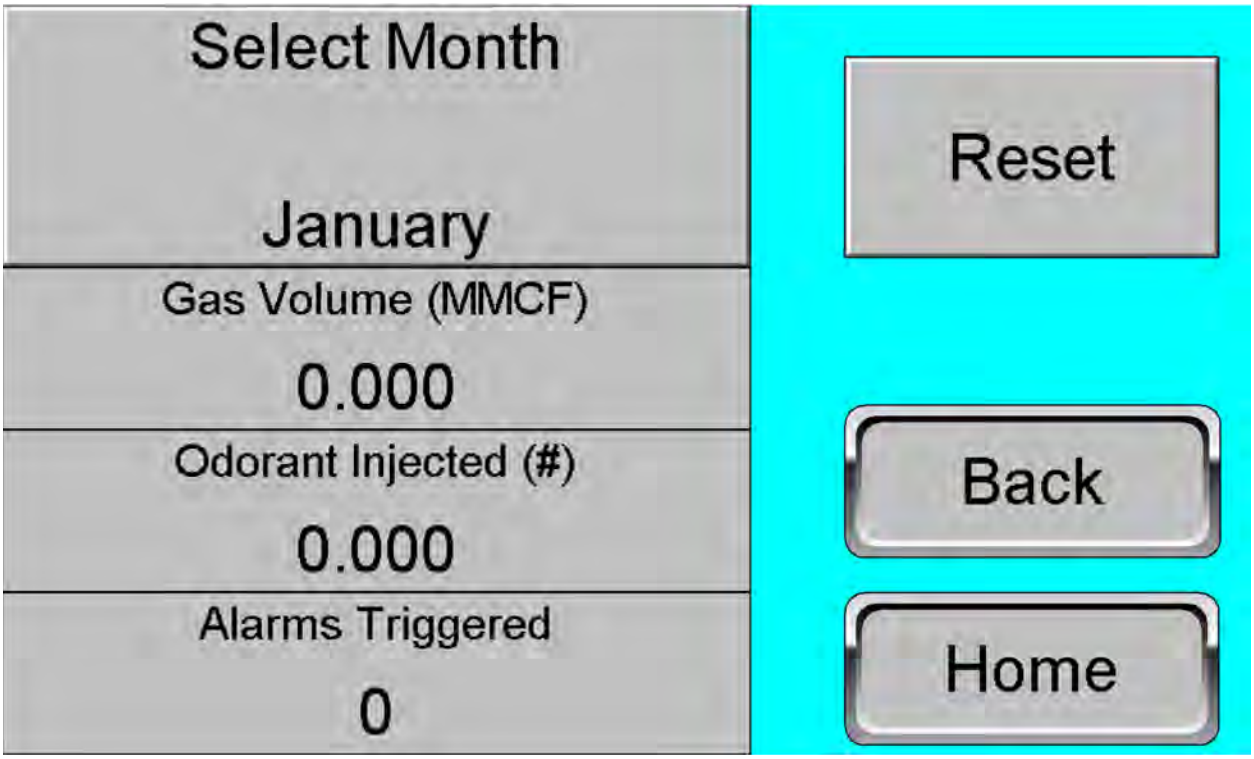

Figure 14: Monthly Usage Screen

The Select Month button permits scrolling through the months of a year. When selecting a month, the "Gas Volume" of the unodorized fluid displays for the month.

In Figure 14, the gas volume displays in $MMft^3$, the mass of odorant injected is in pounds of odorant, and the "Alarms Triggered" shows 0 for January.

Pressing the Reset button resets the calculations.

Startup

Follow the procedure below to start up the GPL 5000. For additional assistance, please call the Service hotline at 303-437-3536.

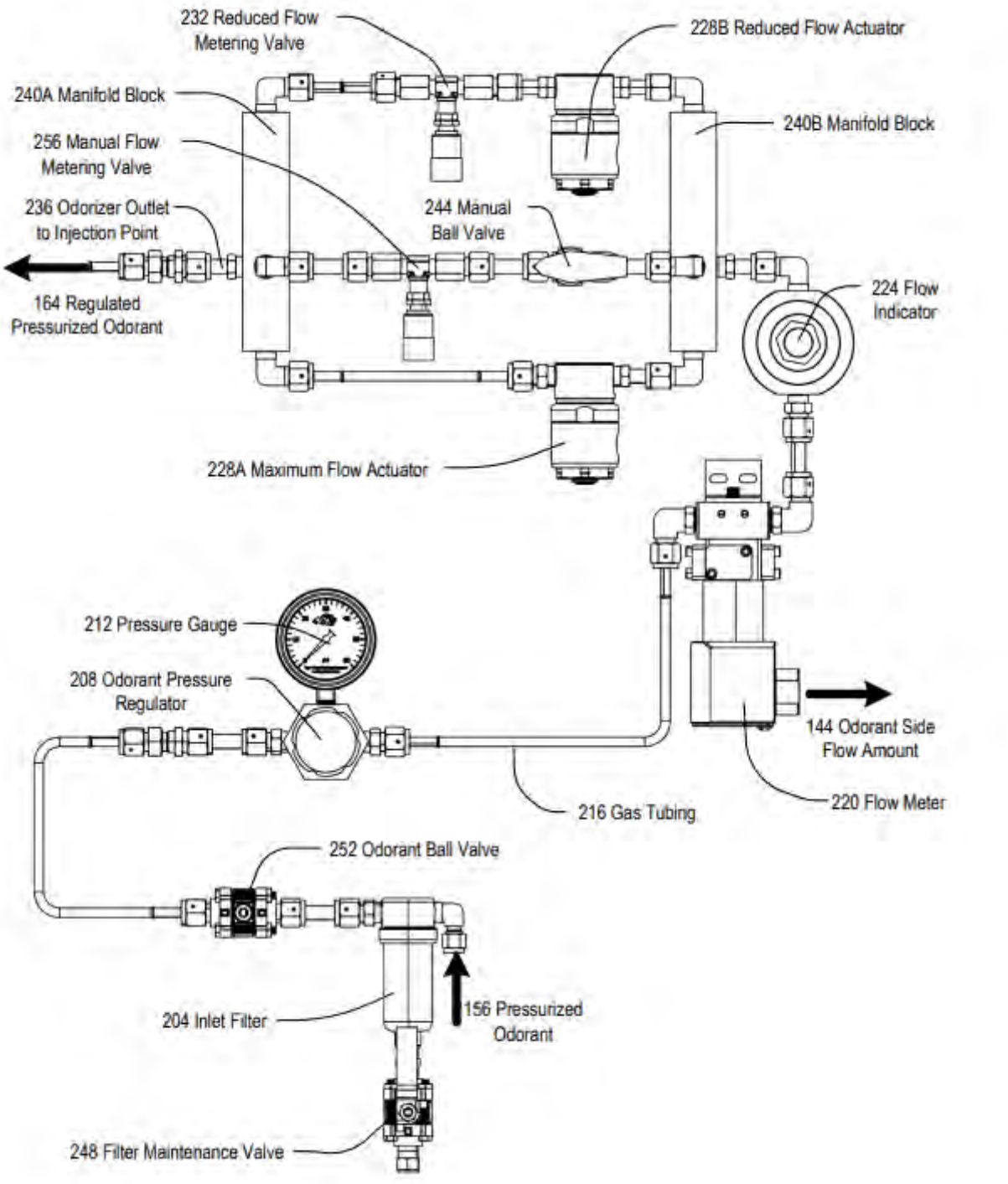

Figure 15

Completing the checklist below is recommended before moving the odorant to the GPL 5000.

1.	Ensure that all new tubing has passed the required pressure tests.
2.	The odorant bulk tank has been filled.
3.	The odorant float gauge outputs a level signal to the GPL Odorizer, or the tank level has been manually entered on the “Usage Screen” (Figure 13).
4.	Ensure that the “Flow Screen” is set up correctly. Confirm that a flow signal is being accurately read if in 4-20mA. If odorizer is receiving pulses, confirm that the odorizer is receiving pulses by checking the I/O screen and watching the gas ticks. If the odorizer is in manual gas, ensure that the manual gas page is set up correctly.
5.	If the user’s model of the GPL 5000 has a manual override knob on the solenoids, ensure the solenoid override knobs (228B and 228A in Figure 15) are closed. (The arrow on the knobs should point to the C position.)
6.	Close the metering valves (232 & 256 in Figure 15) by turning the handles clockwise.
7.	The ball valves (252 and 244 in Figure 15) should be closed.
8.	Back the regulator (208 in Figure 15) out fully by turning the handle counterclockwise fully.
9.	Walk through all screens of the PLC and ensure the odorizer is programmed to standards.
10.	If a GPL 5000 Injection Panel is installed, make sure that the valves reflect the Red/Green Open/Closed positions in Figure 16
11.	GPL recommends using a GPL Odorizers Pipeline Tap Kit at the injection point. This ball valve should be closed.

With the initial checklist complete, the odorant can now be moved up to the injection point.

1. Starting at the odorant tank, ensure adequate pressure on the tank for the application. Normal operation depends on the site application. The bulk tank must be 20-30 PSIG greater than the injection point’s pressure. For example, if the injection point is 70 PSIG, the tank should be set to 90-100 PSIG. Please adhere to all industry standards regarding necessary relief for the tank. If the tank has adequate pressure, continue to step 2.
2. Open the tank supply valve, which allows the odorant to move from the tank to the supply line. Ensure that there are no leaks before moving forward. If the supply line feeds a GPL Injection Panel, move to step 3. If the supply line leads directly to the odorizer, move to step 4.

3. The injection panel is shown below in Figure 16. Open valves V1, V2, and V3 slowly. Ensure there is no leak after opening each valve. Once the valves are opened, the result should look similar to Figure 16, where Red = Closed and Green = Open.

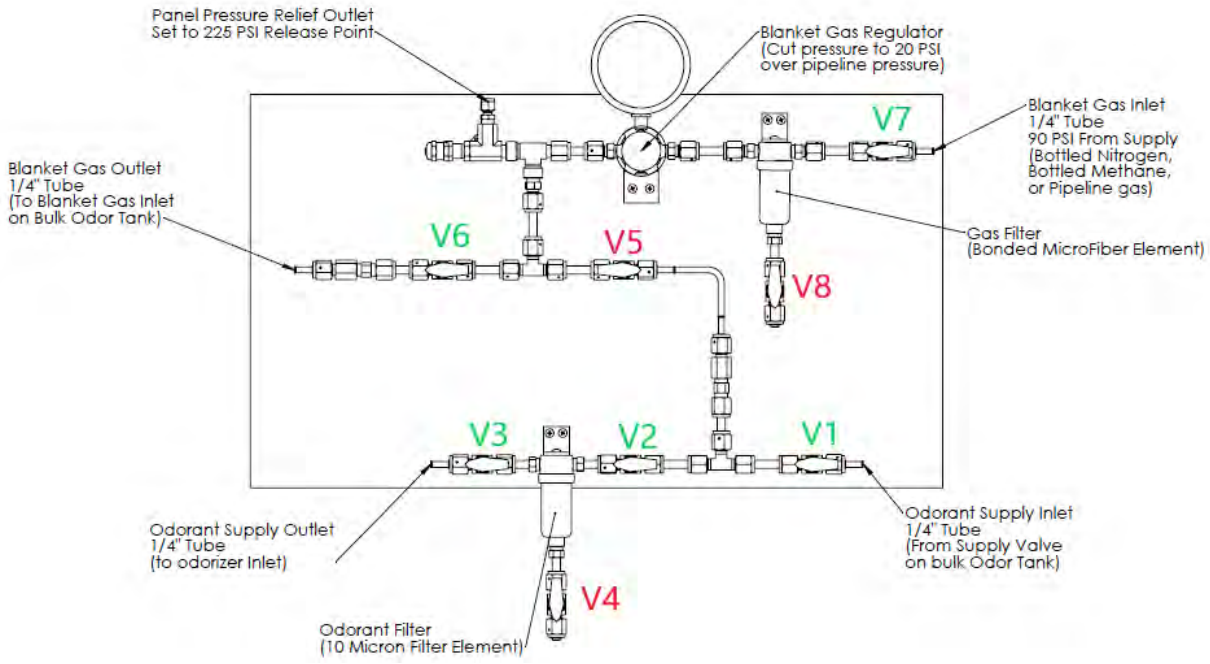

Figure 16: Injection Panel after the odorant supply has been opened.

4. Following the supply tubing to the mechanical cabinet of the GPL 5000, there is a valve located at the exterior of the box (252 in Figure 17). Open this valve slowly and check for leaks before continuing to step 5.
5. If not already open, open the mechanical enclosure. The odorant is now pressurized up to the pressure regulator in this cabinet. In regular operation, the odorant pressure regulator must be set to 5-10 PSIG above the injection pressure. This changes depending on the application. Depending on demand, the end user can set the pressure to 10-15 PSIG above injection in a higher-flow application. If the injection pressure is 70 PSIG, the odorant pressure regulator must be set to 75 PSIG. Adjust the odorant pressure regulator (208 in Figure 17) by turning the handle clockwise slowly. Turn the handle until the pressure gauge (212) reads 5 PSIG greater than the pipeline. Ensure there are no leaks before moving to step 6.

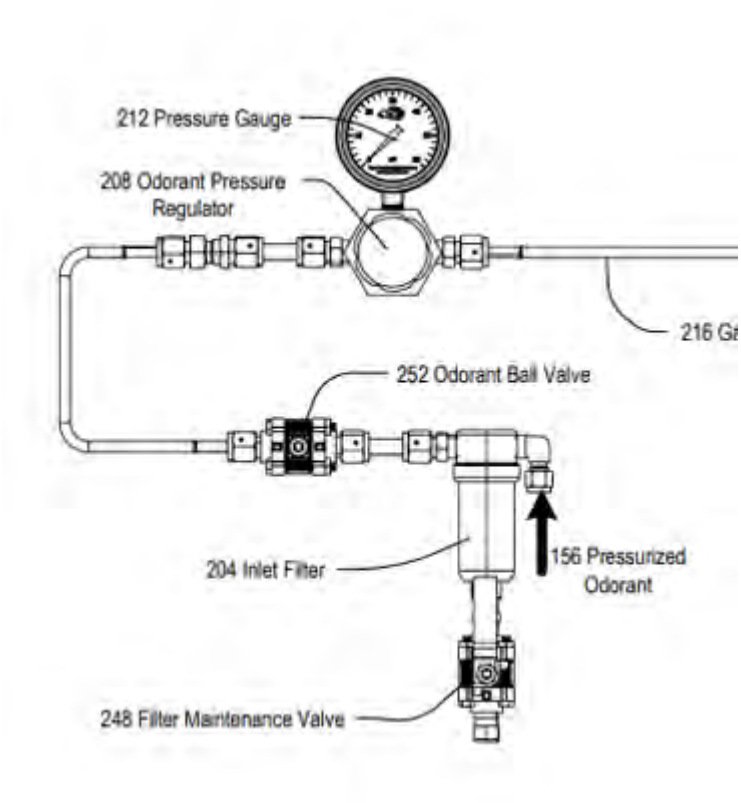

Figure 17 Shows the odorant supply ball valve and pressure regulator.

6. **Double-check that the ball valve at the injection point is closed before continuing.** Open the electrical cabinet and log into the PLC using the username/password provided. (Refer to Login Section for credentials). Once logged in, press Menu → Maintenance, the screen should show the Usage Screen in Figure 18. Press the "Solenoid 1 Override" and "Solenoid 2 Override" so the screen shows "ON." In the mechanical cabinet, open the metering valve one complete turn (counterclockwise). Inspect the line and make sure that there are no leaks. Next, inspect the regulator gauge in the mechanical cabinet (208 in Figure 17). Adjust the regulator to 5 PSI over the injection pressure if the pressure has decreased. Once it is determined that there are no leaks in the line up to the pipeline tap assembly, close the metering valve that was just opened (clockwise). Next, turn the "Solenoid 1 Override" and "Solenoid 2 Override" to "OFF."

Figure 18: Usage Screen

7. Open the ball valve at the injection point. Inspect for leaks. If none are present, continue to 8.
8. Access the alarms page of the PLC by pressing Menu → Alarms. Acknowledge all active alarms by hitting the "RED ACK" in the middle of the page. Return to the main screen.
9. The odorizer is now ready to be turned on. On the home page, push the "System" button. It should turn green and read "ON." The solenoid should click, and the first valve, in Figure 19, turns green, indicating that a batch is in progress.
    a. If the unit is receiving a 4-20mA signal of the unodorized media or is being run in "Man Gas/Fluid," the "Volume Until Batch" is the best troubleshooting indicator of how to set the metering valve. At the start of the batch, the unit should start counting down, decreasing from 0. While the unit counts down (negative numbers), open up the reduced flow metering valve (232 in Figure 15) until the "Volume Until Batch" counts up instead of down. The "Volume Until Batch" should ultimately become a positive number and meet the required batch volume. The solenoid turns off now, and the valves shown in Figure 19 are red for closed. At this point, ensure that the pressure regulator still shows 5 PSIG over the pipeline, that the "Volume Until Batch" counts upward to a positive number and then repeats counting down to zero. During a batch, it is also a good idea to ensure the fluid is moving into the pipeline by looking at the site glass of the pipeline tap kit.

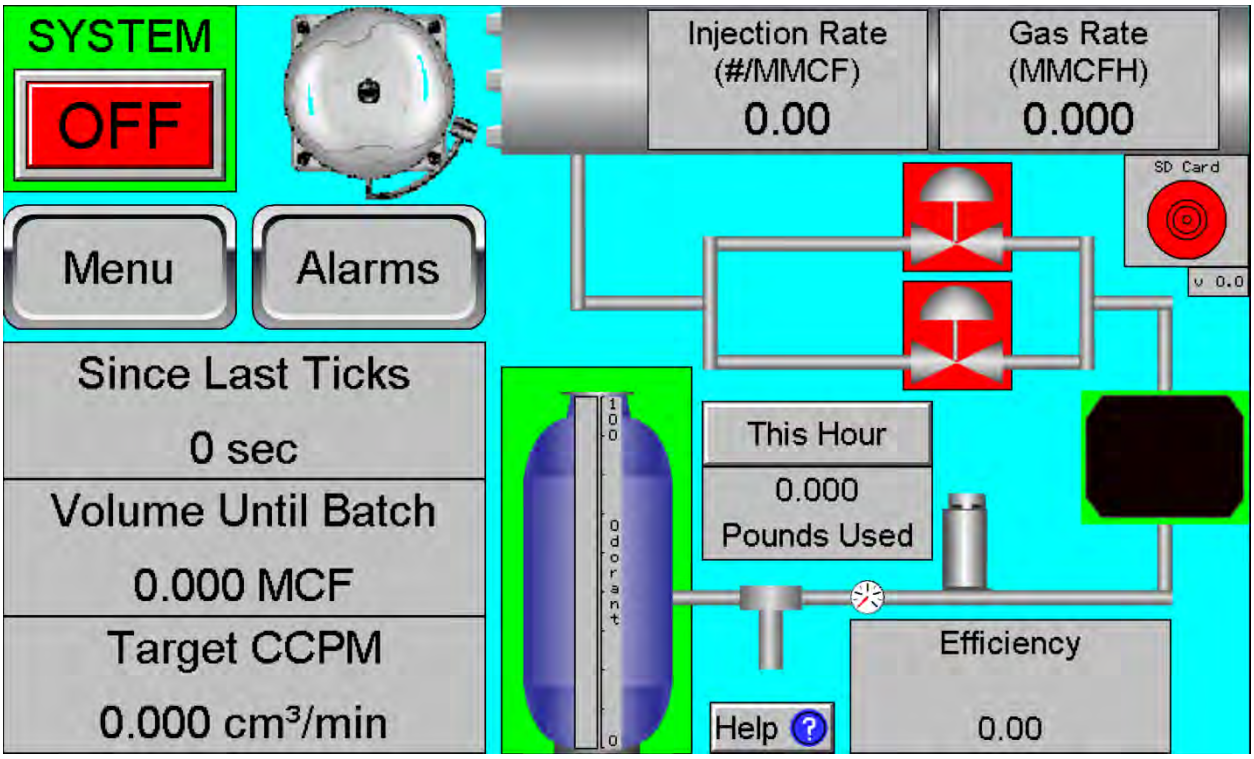
SYSTEM
OFF
Menu
Alarms
Since Last Ticks
0 sec
Volume Until Batch
0.000 MCF
Target CCPM
0.000 cm³/min
Injection Rate
(#/MMCF)
0.00
Gas Rate
(MMCFH)
0.000
SD Card
v 0.0
This Hour
0.000
Pounds Used
Odorant
100
0
Help
Efficiency
0.00

Figure 19

Alarms & Responses

Injection Rate Alarms – These alarms are triggered when the odorizer is not meeting injection rates correctly.

HiHi and Hi

HiHi – The injection rate is unacceptably high. This is a shutdown alarm, and the odorizer shuts off after all autoclears are used.

Hi – Warning alarm that the injection rate is higher than expected for the last batch.

Alarm	Issue	Response
HiHi & Hi	The injection rate has exceeded the programmed limit.	1. Log into the PLC by entering username and password on the login screen. 2. Access the alarm page from the PLC. (Menu → Alarms) 3. Clear the alarm by hitting the “Red ACK” button in the middle of the alarms page. 4. Check that the pressures at the bulk tank (20-30 PSI over pipeline pressure) and mechanical regulator (5-10 PSIG over pipeline pressure) are within normal ranges. If the regulator is outside the normal range, adjust the spring by turning the handle. Counterclockwise decreases the differential; clockwise increases the differential. A HiHi is more likely to occur when the pressure is higher than normal. 5. Return to the PLC home screen and restart the unit by pushing the “System” button on the top left corner of the screen. Monitor the batches to ensure proper odorization. If the unit hits another HiHi or autoclear, please continue to step 6. 6. Once the operator has restarted the unit, the best troubleshooting aids for the HiHi are the “Volume Until Batch” variable and the two solenoid valve indicators on the home screen. A red box surrounding the valve indicates that the valves are closed, and a green box surrounding the valve indicates that the valve/valves are open. During a typical batch, the “Volume Until Batch” should count down to 0. When the volume reaches 0, the unit begins to batch. Depending on the Site 1 Solenoid or both solenoids, the box or boxes turn green around the valve. When the batch actuates, the "Volume Until Batch” should continue to increase until the batch completes. When the batch is complete, the solenoids’ boxes should

		turn red, and the "Volume Until Batch" should begin its count down to 0 again. If the batch completes very quickly, the technician may need to close the metering valve, restricting the odorant flow path and decreasing the volumetric flow rate. To do so, turn the black-handled knob clockwise. 7. A solenoid may be stuck open if the "Volume Until Batch" counts upwards after a batch is complete and the solenoids are red. Check that the manual override knobs (on each solenoid face for *some* configurations of the GPL 5000) are not in an "Open" position. To do so, ensure the arrow on this knob points toward the C. If it's pointing toward the O, use a flat-head screwdriver to correct this. 8. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

LoLo and Lo

Lo – Warning alarm that the injection rate is lower than expected for the last batch.

LoLo – The injection rate is unacceptably low. It is a shutdown alarm; the odorizer shuts off after all autoclears are used.

Alarm	**Issue**	**Response**
LoLo & Lo	The injection rate has fallen below the programmed limit.	1. Log into the PLC by entering username and password on the login screen. 2. Access the alarm page from the PLC. (Menu → Alarms) 3. Clear the alarm by hitting the Red ACK button in the middle of the alarms page. 4. Check that the pressures at the bulk tank (20-30 PSI over pipeline pressure) and mechanical regulator (5-10 PSIG over pipeline pressure) are within normal ranges. If the regulator is outside the normal range, adjust the spring by turning the handle. Counterclockwise decreases the differential and clockwise increases the differential. A LoLo is more likely to occur when the pressure is lower than normal. 5. Return to the home screen of PLC and restart the unit by pushing the "System" button in the top left corner of the screen. If the problem does not reoccur in the first few batches, it may be okay to let the unit run as is. (If the unit hits

		another LoLo or autoclear, please continue to step 6. 6. Once the operator has restarted the unit, the best troubleshooting aids for the LoLo are the "Volume Until Batch" variable and the two solenoid valve indicators on the home screen. A red box surrounding the valve indicates that the valves are closed, and a green box surrounding the valve indicates that the valve/valves are open. During a normal batch, the "Volume Until Batch" should count down to 0. When the volume reaches 0, the unit begins to batch. Depending on the site 1 solenoid or both solenoids, the box or boxes turn green around the valve. When the batch actuates, the "Volume Until Batch" should continue to increase until the batch completes. When the batch is complete, the solenoids' background on the screen should turn red, and the "Volume Until Batch" should begin its count down to 0 again. If the "Volume Until Batch" continues to decrease below 0, the technician may need to open the metering valve. Doing so increases the volumetric flow rate. To do so, turn the black-handled knob counterclockwise. 7. If the Volume Until Batch continues decreasing after a batch is complete and the solenoids' backgrounds are both green, there may be a communication issue with the flow meter. Ensure the flow meter's wiring connections are correctly landed at the terminal blocks. An easy way to determine if there is communication between the flow meter and the PLC is to access the I/O menu on the PLC. Press Menu → I/O. On the I/O screen, there is an "Odor Count" variable. During a batch, this volume should increase as the odorant moves through the system. If there is no increase of the odor ticks when a batch is open, and the pressures all look okay, continue to step 8. 8. **Warning electrical shock hazard. Serious or fatal injury may occur. Access should only be completed by trained and authorized personnel. Before opening the electronics lid, ensure that there is no moisture or fluids that can come in contact with the electrical components**. The flow meter has an LED indicator within the internals of the system.

		Access this indicator by using a 1/8" hex drive on the screw at the base of the flow meter. Once the screw is removed, remove the lid by spinning it counterclockwise. In the flow meter, there should be an LED indicator. Flashing 8x per second indicates the magnet is not detected. An alternating blue/green LED indicates that the circuit is detecting a magnet and provides an output signal. A steady or flashing red LED indicates a problem with the transmitter. 9. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

Solenoid Valves

Solenoid 1 Override – The low-flow solenoid valve is in electrical override (open position)

Solenoid 2 Override – The high-flow solenoid valve is in electrical override (open position)

Alarm	Issue	Response
Solenoid 1 Override Solenoid 2 Override	The solenoid valve is in an electrical override.	1. Log into the PLC by entering your username and password on the login screen. 2. Access the maintenance screen by pushing Menu → Maintenance. 3. Push the Solenoid Override toggle to turn Override Off. 4. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

Solenoid 1 Maintenance – Replace the low-flow Solenoid Valve at 1,000,000 cycles.

Solenoid 2 Maintenance – Replace the high-flow Solenoid Valve at 1,000,000 cycles.

Alarm	Issue	Response
Solenoid 1 Maintenance Solenoid 2 Maintenance	The solenoid valve has reached 1,000,000 cycles and needs to be replaced.	1. Turn the System off by pushing the "SYSTEM" button in the top left corner of the home page. Once the unit is off, use the pipeline tap to blow the unit back and clear all odorant from the injection line. Once the odorant is clear of the line, use the ball valve at the base of the mechanical cabinet to isolate the mechanical cabinet. Please use caution. Having an Odor EVAC on hand is best to limit false leak calls. Use a wrench to loosen the VCO nuts and swap the used solenoid out with a new valve. Tighten the VCO nuts. Ensure the solenoid and

		connections pass a pressure test before introducing any odorant to the line. 2. Log into the PLC by entering username and password on the login screen. 3. Access the maintenance screen by pushing Menu → Maintenance. 4. Push the Reset toggle to the right of the respective solenoid to refresh the maintenance date. The alarm clears once the date is reset. 5. Return to the PLC home screen and turn "SYSTEM" back "ON." 6. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

Filter

Filter Maintenance – Check and flush the filter of any debris yearly, as it is important to protect the downstream components and ensure the odorant has a clear path to the injection point.

Alarm	**Issue**	**Response**
Filter Maintenance	The filter has been used for one year and must be checked.	1. Turn the system off by pushing the "SYSTEM" button of the home page. Once the unit is off, close the valve at the base of the mechanical cabinet. Hook up nitrogen at the filter connection. Pressurize the line and open the filter valve so that the odorant pushes back into the tank. Once the odorant clears the line, use a wrench to loosen the filter body. This can be done by turning the body counterclockwise. To limit leak calls, performing this operation with an Odor EVAC is recommended. Please **use caution** during this work. Remove the filter housing and inspect the filter. Cleanse it of debris and ensure there is no damage. The filter does not need replacement unless there is damage. After inspecting the filter, reinstall it by screwing the body (clockwise motion). Please ensure the filter and connections pass a pressure test before introducing any odorant back to the line. 2. Log into the PLC by entering username and password on the login screen. 3. Access the maintenance screen by pushing Menu → Maintenance. 4. Push the "Reset" toggle to the right of the "Filter Age" to refresh the maintenance date. The alarm clears once the date is reset.

		5. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

Manual Gas

The Manual Gas alarm is a soft alarm showing when the unit operates in manual gas mode. It is important as it is not tracking live gas/fluid values.

Alarm	Issue	Response
Manual Gas	The unit is in manual gas mode, not tracking live gas values.	1. Log into the PLC by entering username and password on the login screen. 2. On the Home screen, press Menu → Config Gas. To clear this alarm, turn "Manual Gas" off on the Config Gas page. 3. If the station does not have a gas/liquid flow meter or a flow meter functioning correctly, set the unit in manual gas mode and lengthen the number of hours the unit waits before alarming by changing the Manual Gas Delay. This can be done by pushing Menu → Alarms → Config Alarms (Scroll to Manual Gas Delay). 4. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

Solenoid Max Time Open

A solenoid valve has been open too long for a batch. This is a soft alarm and does not shut the unit down.

Alarm	Issue	Response
Max Time Open (MTO)	The solenoid valve has been open too long during a batch.	1. Log into the PLC by entering your username and password on the login screen. 2. Press Menu → Odor → and confirm the "Batch Time" is in minutes. Factory Default is 3 minutes. Shorter batch times are more prone to MTO alarms. If the batch time is below one minute, increasing the time may help. 3. It is important to observe the unit when it is injecting a batch of odorant. If the "Volume Until Batch" on the main screen stays constant, decreasing, or is a negative number, this causes the unit not to close out the batch and triggers an MTO alarm. Often, this leads to a LoLo. 4. Open up the metering valve by turning the handle counterclockwise. This allows a greater volumetric odorant flow to the injection point. 5. Observe the "Volume Until Batch" value on the main HMI screen for several batches to ensure

		the MTO alarm is resolved. This number should steadily increase when the unit is injecting odorant. 6. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

I/O Assignment

The I/O Assignment is a critical alarm that shuts down the unit. This alarm triggers if multiple outputs/inputs are sharing the same points.

Alarm	Issue	Response
I/O Assign Alarm	IO Points have been reassigned to conflicting points.	1. IO points should only be changed only under the guidance of a GPL-certified technician. Contact GPL odorizers before attempting to reassign IO points and clear this alarm. GPL Service hotline (303-437-3536)

High Flow

High flow alarm is a soft alarm and does not shut the unit down. This alarm triggers if the odorizer receives a gas flow rate greater than the maximum for the station.

Alarm	Issue	Response
High Flow Alarm	Odorizer has detected a flow rate for the gas/fluid that is greater than the possible flow rate for the station. (Please note that the flow rate resets to 0 during this alarm to avoid over-odorizing gas.	1. Log into the PLC by entering your username and password on the login screen. 2. Press Menu → Alarms → Config Alarms → scroll to high flow alarm. Check that this value is set slightly above the highest possible flow the station can see. 3. If the station uses a 4-20mA signal for the flow, ensure that the 4-20mA output on the pipeline flow meter functions correctly. 4. If using Pulse, ensure that the pulse k factor is correct, the meter is pulsing, and the odorizer sees the pulses. These can be seen by pushing Menu → I/O The D/O Labeled Usage Pulse has a running count below the indicator. This value counts up when a pulse is received. To check that the odorizer has the same pulse factor, push Menu → Flow → Pulse. 5. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

No Odorant

No odorant alarm is a critical alarm that shuts down the unit. This alarm triggers if the odorizer tries to inject but does not see any movement in the flow meter for an extended period.

Alarm	Issue	Response
No Odorant	The flow meter has not sent any pulses to the PLC, indicating no odorant has been injected. Please confirm that the odorant tank has sufficient volume before troubleshooting.	1. Log into the PLC by entering username and password on the login screen. 2. Press Menu → Alarms → Red ACK button to clear out the alarms. Return to the main menu and turn the system back on. 3. Go to the pipeline tap kit and ensure the odorant moves through the site glass. 4. If the odorant is present and being injected, ensure that the flow meter communicates with the PLC. Confirm that the flow meter's wiring connections are landed correctly at the terminal blocks. [An easy way to determine if there is communication between the flow meter and the PLC is to access the I/O menu on the PLC. Press Menu → I/O. On the I/O screen, there is an Odor Count variable. This volume should increase during a batch as the odorant moves through the system. If there is no increase of the odor ticks when a batch is open, and the pressures all look acceptable, continue to step 5.] 5. **Warning Electrical shock hazard. Serious or fatal injury may occur. Access should only be completed by trained and authorized personnel. Before opening the electronics lid, ensure that there is no moisture or fluids that can come in contact with the electrical components.** The flow meter has an LED indicator within the internals of the system. Access this indicator by using a 1/8" hex drive on the screw at the base of the flow meter. Once the screw is removed, remove the lid by spinning it counterclockwise. In the flow meter, there should be an LED indicator. Flashing 8x per second indicates the magnet is not detected. An alternating blue/green LED indicates that the circuit is detecting a magnet and provides an output signal. A steady or flashing red LED indicates a problem with the transmitter. 6. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

Gas Signal

The gas signal alarms if the PLC has no feedback from the meter. Specifically for the case where a flow was being communicated from the injection point via a 4-20mA signal.

Alarm	Issue	Response
Gas Signal Alarm	The PLC has no feedback from the meter communicating the flow rate.	1. Log into the PLC by entering username and password on the login screen. 2. From the home screen, press Menu → Flow, and confirm that the 4-20mA signal is selected and set up correctly. 3. Check the wiring and ensure the 4-20mA signal has been properly landed in the correct terminals. 4. If the alarm is still present, check the meter sending the analog signal and ensure it is sending an analog signal and that the meter is not damaged. 5. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

Tank Level

The tank level alarm indicates that the odorant tank is low. It is a soft alarm and does not shut down the unit.

Alarm	Issue	Response
Tank Level Alarm Tank Signal Alarm	The tank level alarm indicates that the bulk tank is low on odorant. The tank signal alarm indicates the PLC has no feedback from the float gauge.	1. Check the bulk tank float gauge. If the tank is below 25% full, it is recommended to refill the tank. 2. Log into the PLC by entering username and password on the login screen. 3. On the home screen, press Menu → Alarms → Config alarms. If the Tank Signal Alarm is enabled, the tank has an analog float gauge. Check the wiring and ensure the 4-20mA signal has been properly landed in the correct terminals. Filling the tank should correct this alarm. 4. If the Tank Signal Alarm is Disabled, Press the Tank Icon on the home page. The tank volume percentage should show on the screen. If the tank volume is different than shown on the screen, enter the estimated volume of odorant in gallons (to the right of the graph) and hit reset. This sets the tank volume to 100% of the entered volume. 5. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

Memory Battery

The memory battery alarm is a soft alarm that indicates the controller's internal battery is dead. The battery saves the parameters. If the controller is power cycled, all the end user's set-up parameters reset to factory standards.

Alarm	Issue	Response
Memory Battery	The PLC's internal memory battery is dead. If the controller is power cycled, the controller defaults to factory standards.	1. Take pictures of all screens on the PLC, as you need this for step 7. 2. Ensure you have the correct battery to replace the memory battery. Have available a BAT00019 on hand. 3. Turn the system off and remove the 24V fuse from the terminal block located in the electrical cabinet. 4. Take the PLC off of the DIN rail. There is a safety latch directly underneath the PLC, which anchors it to the DIN rail. To disconnect the PLC from the din rail, use a flat-head screwdriver to move the latch down and remove the controller from the cabinet. 5. Call the GPL service hotline for instructions to take the PLC apart (303-437-3536) and replace the battery. 6. Return the controller to the DIN rail, lock the safety latch, and plug the fuse into the DIN rail. 7. When the controller boots up, you must load all the previous parameters onto the PLC. Refer to the pictures taken in Step 1. 8. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

Isolation

The isolation alarm is a critical alarm that shuts the unit down. The isolation alarm occurs when the flow meter registers additional ticks when a batch is *not* occurring.

Alarm	Issue	Response
Isolation Alarm	PLC registers odorant volumetric flow when the solenoid valves are closed.	1. Check the blanket gas pressure on the odorant tank (set point 20-30 PSI above pipeline pressure) and odorant regulator (inside the mechanical box, set point 5-10 PSI above pipeline pressure). 2. Turn the "SYSTEM ON" and observe the batch behavior. If the "Volume Until Batch" continuously increases even when a batch is complete (both solenoid valves displayed on

		the Home Screen are RED), move to the next step. 3. Check to see if the solenoid valve(s) has/have a manual override knob on the face of the coil. If there is an override knob, ensure that the knob is closed. The knob arrow should be pointing to C, not O. 4. If steps 1-3 do not correct this issue, the solenoid valve may need replacement. Under normal operation, the solenoid should not allow more than 1000 ticks after it shuts (depending on the differential pressure). 5. If it is impossible to replace the solenoid valve immediately, lower the pressure of the odorant inside the cabinet using the regulator to help the solenoid seal. If the low-flow actuator is the failed solenoid valve, the metering valve can help control the seal. 6. If the problem does not resolve, call the GPL Service hotline (303-437-3536)

Modbus Map

Protocol: Modbus RTU, Port MJ2, 9600 Baud, 8N1

COIL BLOCKS

6101 Shutdown;

6102 HiHi Alarm;

6103 Hi Alarm;

6104 Lo Alarm;

6105 LoLo Alarm;

6106 Man Gas Alarm;

6107 Solenoid 1 Override;

6108 Solenoid 1 Maintenance Alarm;

6109 Solenoid 2 Override;

6110 Solenoid 2 Maintenance Alarm;

6111 Max Time Open Alarm;

6112 IO Assign Alarm;

6113 Hi Gas Alarm;

6114 Filter Maintenance Alarm

6115 No Odorant Alarm; Registers:

Registers:

* Pull the 6 Registers below to read the first (3) *

43600 Programmed Injection Rate

43601 Actual Injection Rate

43602 Gas Rate

43603

43604

43605

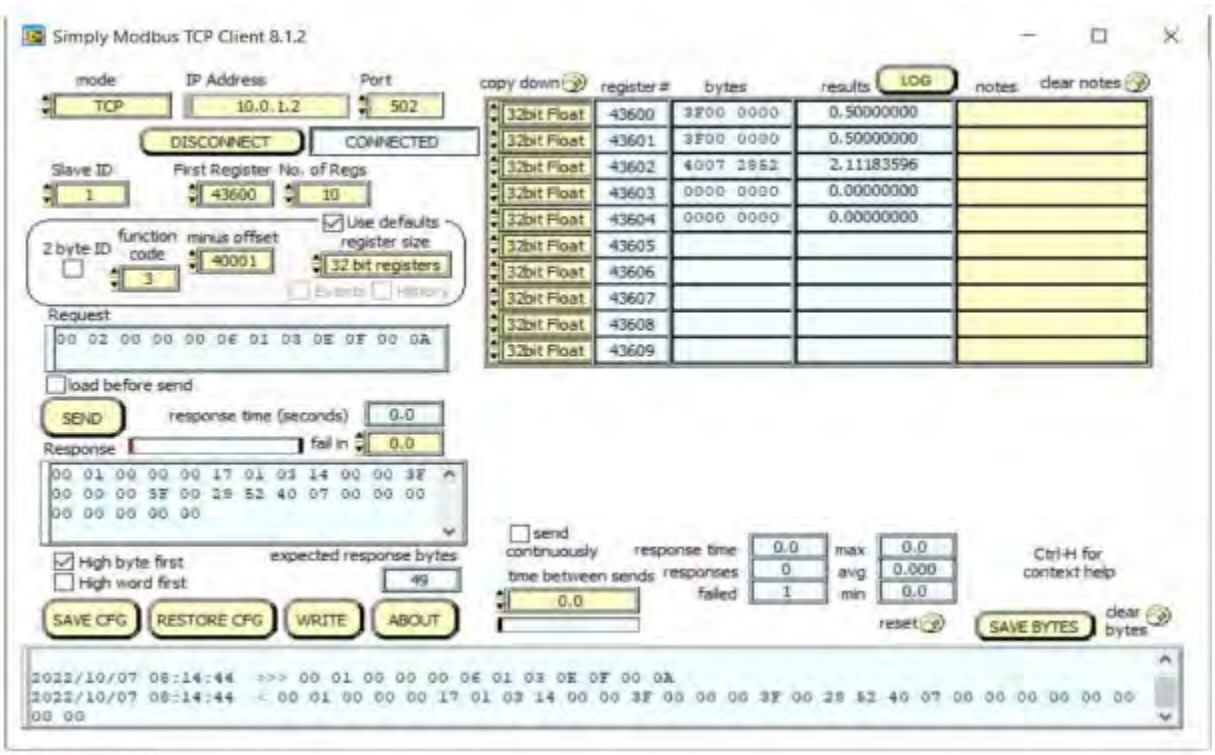

Figure 20: Simply Modbus display of the Modbus Registers. Displaying 43600 - 43605

```
101   (*map registers into Reg_Block*)
102   Reg_Block[0] := target_inj_rate   0.5 ;
103   Reg_Block[1] := Actual_inj_Rate 0.499993 ;
104   Reg_Block[2] := Gas_Rate 2.11387 ;
```

Figure 21: PLC display of Registers

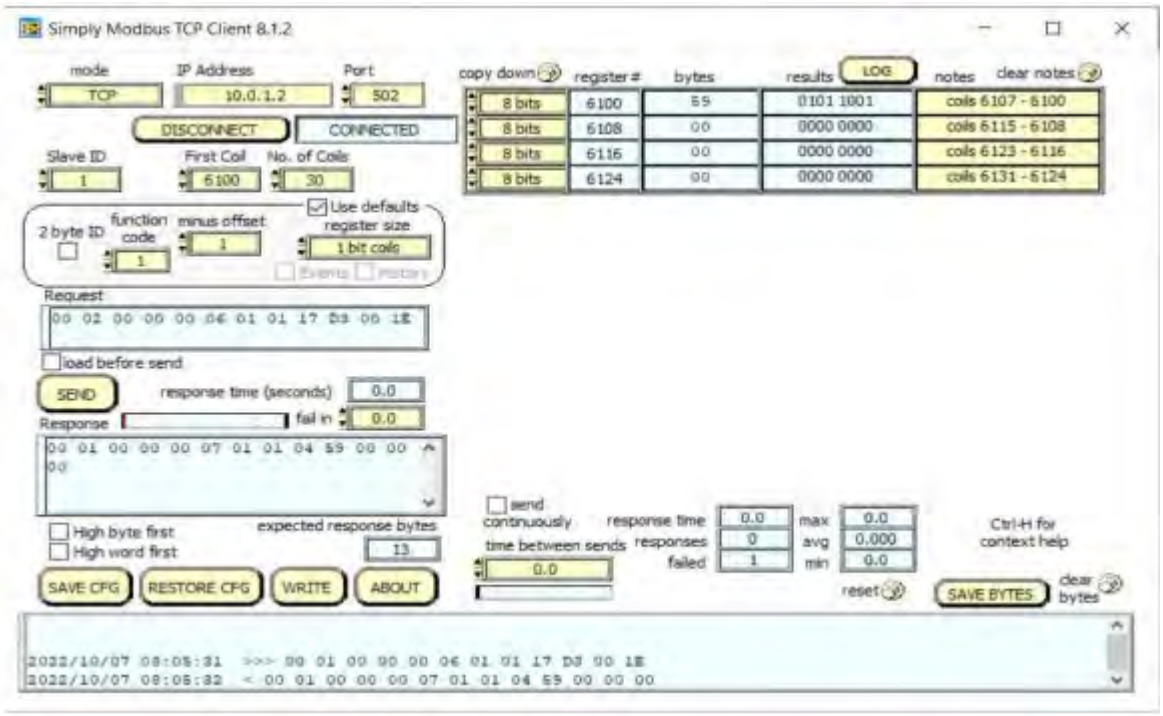

Figure 22: Simply Modbus display of the Modbus Coil Blocks

```
84   Coil_Block[0] := Alarm_Present TRUE ;
85   Coil_Block[1] := Shutdown FALSE ;
86   Coil_Block[2] := HiHi_Alarm FALSE ;
87   Coil_Block[3] := Hi_Alarm TRUE ;
88   Coil_Block[4] := Lo_Alarm TRUE ;
89   Coil_Block[5] := LoLo_Alarm FALSE ;
90   Coil_Block[6] := Man_Gas_Alarm TRUE ;
91   Coil_Block[7] := Sol_ovrd FALSE ;
92   Coil_Block[8] := Sol_Maint_Alarm FALSE ;
93   Coil_Block[9] := Sol2_Ovrd FALSE ;
94   Coil_Block[10] := Sol2_Maint_Alarm FALSE ;
95   Coil_Block[11] := MTO_Alarm FALSE ;
96   Coil_Block[12] := IO_Assign_Alarm FALSE ;
97   Coil_Block[13] := Hi_Gas_Alarm FALSE ;
98   Coil_Block[14] := Filter_Maint_Alarm FALSE ;
99   Coil_Block[15] := No_Odorant_Trigger FALSE ;
```

Figure 23: PLC Display of Coil Blocks

Web Pages

Web pages are currently being developed for the GPL 5000. Please contact GPL Odorizers for more information regarding them and accessing the HMI data via cellular.