User's Manual

GPL Z10000

Natural Gas Odorization System

Patented

GPL Odorizers

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www.LincEnergySystems.com (master distributor)

Do not install, maintain, or operate this equipment without reading, understanding and following the proper GPL Odorizers instructions. Otherwise, injury or damage or both may result.

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Note

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

Contents

Safety Information

Please read the entire manual before attempting to unpack, set up or operate this product. Pay careful attention to all *Warnings, Cautions*, and *Notes*. Failure to do so could result in serious personal injury and/or equipment damage.

Use of Hazard Information

If multiple hazards exist, the signal word corresponding to the greatest hazard shall be used.

Definitions

⚠ DANGER   DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING   WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION   CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE   NOTICE is used to address practices not related to personal injury, but that could lead to property damage.

NOTE: Information that requires special emphasis.

SHALL: This word is understood to be mandatory.

SHOULD: This word is understood to be advisory.

General Safety Precautions

Selection, Installation, and Use

⚠ WARNING   Improper selection, installation, or use can cause personal injury or property damage. It is solely the responsibility of the user, through its own analysis and testing, to select products suitable for their specific application requirements, ensure they are properly maintained, and limit their use to their intended purpose.

Follow proper local, state and federal regulations for proper installation and operational requirements.

Always use caution and common sense when working with any chemical. Read the product label and MSDS carefully and follow the instructions exactly.

Potential Equipment Hazards

WARNING

Hot surfaces! This equipment may have very hot surfaces. If an operator contacts a hot surface, injury may occur. Use protective clothing to prevent injury. If other equipment comes in contact with a hot surface, damage to the equipment may occur. Ensure the area around this equipment is kept clear to prevent damage from occurring.

High pressures! This equipment may contain fluids at very high pressures. Prior to installing, removing or maintaining this equipment, ensure that the equipment is isolated from all connecting piping, the equipment is depressurized, the contents have been drained, and the equipment is cool.

DANGER

When changing any electrical or electronic parts, the power must be turned off, or the warranty is null and void.

Warning Labels

Location	Content
Power Strip	Before connecting power 1. 6A use 2. Wire Sized for 24VDC@6A 3. Isolated from Pipeline 4. Proper power protection 5. Conduit per Class I Division 2 Standards
Storage Tank	*(This tank has been pressure tested at the factory)* Important procedure to follow before filling the tank with odorant: Evacuate air and pressure test prior to filling the tank with odorant.

1. Overview

1.1 Principles of Operation:

The GPL Z10000 automatically calculates and dispenses measured doses of odorant into natural gas pipelines proportional to the gas flow rate.

1. An odorant storage vessel is pressurized to about 25 psi. An upstream regulator or nitrogen source is commonly used.
2. Odorant moves from the vessel probe through the filter to the isolation valve.
3. When pipeline pressure is sufficient to hold open the isolation valve, odorant is allowed to flow to the pump.
4. As the pump operates, a flow meter measures the odorant flow rate.
5. The measured flow rate is communicated to the controller, and the pump speed is adjusted accordingly.
6. The system controller interfaces with the flow meter, gas flow information, local interface, remote interface, etc., to maintain a constant odorant injection proportional to the gas flow rate.

1.2 Continuous Mode

The continuous mode provides a constant flow of odorant into the stream at appropriate proportions. Continuous mode is used for gas flow rates higher than 100 MSCFH.

1.3 Batch Mode

Batch mode periodically provides a small, metered dose of odorant, then shuts until a sufficient volume of gas has flowed to justify another batch to achieve desired injection rates. Batch mode is used for gas flow rates lower than 100 MSCFH.

2. Unit Configuration

There are three (3) different options available for configuring the GPL Z10000:

1. Remote configuration by a GPL Odorizers technician (requires a modem)
2. Configuration on a computer connected to the odorizer (TechView)
3. Configuration using the local display (sold separately)

Regardless of which option is used, there are certain settings which should be defined before putting the GPL Z10000 into service.

2.1 Configuration Settings

The following settings should be configured before putting the odorizer into service.

1. Gas Settings
2. Odorant Settings

2.2 Remote Configuration

To have the GPL Z10000 configured remotely by a GPL Odorizers technician, please contact GPL Odorizers a minimum of one week prior to startup. The following information will be required for remote configuration:

- Planned startup date
- IP address for modem
- Desired configuration settings

2.3 Configuration Using TechView

To configure the GPL Z10000 using TechView, sign on to the software and, from the main screen, select the Settings tab.
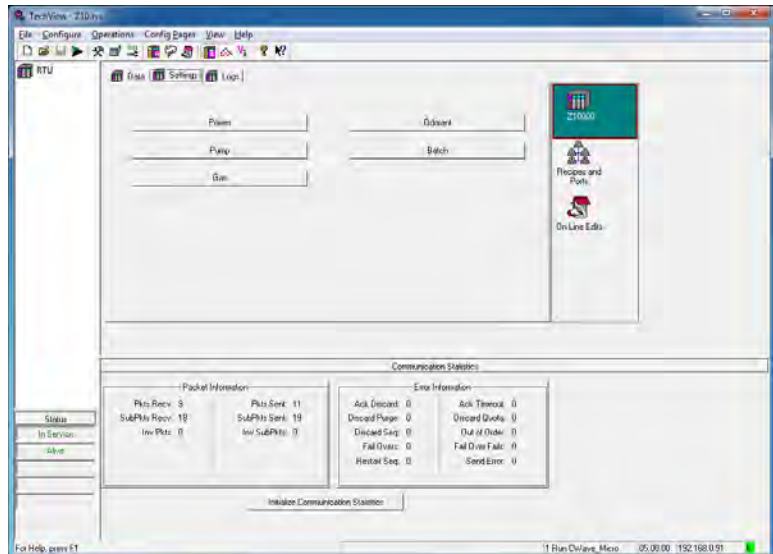
Note

See Section 4: TechView Software for information about how to sign on and navigate in TechView.

2.3.1 Gas Settings

1. From the Settings tab, select the Gas button. The Gas Settings screen will appear.
2. Set the following parameters found under the Common header:
   - Manual/Auto: If there is a flow signal, set to auto. Otherwise, set to Manual. Select whether Manual/ Default gas flow is set to a fixed value or tracks the current gas flow.
   - Gas Max (MMSCFH): If using 4-20mA signal for gas flow, set this as the gas flow at 20mA.
   - Gas Manual/default (MMSCFH): Set as the assumed flow rate if there is no flow signal.
   - Gas Floor (%max): This is the percent of the Gas Max setting at which the odorizer will assume zero flow. Set this value so that a known low flow condition will not be interpreted as zero flow.
   - Gas Signal Source: Select the setting that indicates how the odorizer will receive the flow signal.
3. Set the following parameters found under the indicated gas signal source:

   - Pulse — Rate

       ➢ Max seconds/pulse
       ➢ SCF/pulse

   - Pulse — Batch

       ➢ Minutes to collect
       ➢ SCF/pulse
       ➢ Max time to wait
4. Close the Gas Settings screen.

2.3.2 Odorant Settings

1. From the Settings tab, select the Odorant button. The Odorant Settings screen will appear.
2. Set the following parameters:
   - Injection Rate (#/MSCFH): Set Target to the desired injection rate.
   - Select odorant blend
   - Output (lbs. /pulse): If a pulse is received to track odorant injected, set the number of pounds per pulse.
3. Close the Odorant Settings screen.

3. Common Operations

There are several common operations that may need to be performed on an occasional basis. These procedures are detailed below.

3.1 Change Injection Rate

1. From the GPL Z10000 Settings tab, click the Odorant button to bring up the Odorant Settings screen.
2. Click in the gray field for Target Injection Rate and enter the desired injection rate in #/MMSCFH.
3. Be sure to hit Enter to save the new value.

3.2 Change Manual Flow Rate

1. From the GPL Z10000 Settings tab, click the Gas button to bring up the Gas Settings screen.
2. Click on the Manual/Auto button until it displays Manual.
3. Click in the gray field for Gas Manual/Default (MMSCFH) and enter the desired manual gas flow rate.
4. Be sure to hit Enter to save the new value.

3.3 Clear Alarms

1. From the GPL Z10000 Data tab, click the Alarms button to bring up the Alarms screen. If an alarm is active, the status indicator will be red.
2. Note which alarms have been triggered, and correct the alarm conditions. (See Section 6. Troubleshooting.)
3. Click the Clear button in the upper right-hand corner of the screen to acknowledges and clear all active alarms. This also resets the number of Auto Clears used to 0.
4. Verify that the alarms were cleared. Alarms must be cleared before a restart is possible.
5. Go to the GPL Z10000 Overview page (Section 4.3 GPL Z10000: Data) and click the *Click to Turn On* button. The color indicator next to the button will turn from red to green to show that the unit is ON.

3.4 Fill the Tank

Available from TechView Odorant Usage screen.

3.5 Save/Load Recipe File

3.5.1 Save Recipe File (TechView only)

The odorizer's recipe files need to be saved before upgrading the firmware or changing the battery.

1. Open and login to TechView.
2. On the right-hand side of the screen, select the Recipes and Ports page group.
3. On the Recipes tab, click Load/Save Recipes. The GPL Z10000 Recipes screen will appear.
4. On the Recipes screen, click Change Filename.
5. Select the recipe file (*.rcp) you would like to save. If there is no recipe file specific to the location, begin with the default recipe file (Recipe.rcp).

6. Click "Read from File." The recipe file will load in the lower part of the screen.
   • If the filename needs to be changed, do so now, then click "Write to File."
7. Once the file is open, click "Read from RTU."
8. Click "Write to File." A status message at the bottom of the screen will show when "write to file" is successful.

3.5.2 Load Recipe File (TechView only)

1. Open and login to TechView.
2. On the right-hand side of the screen, select the Recipes and Ports page group.
3. On the Recipes tab, click Load/Save Recipes. The GPL Z10000 Recipes screen will appear.
4. On the Recipes screen, click "Change Filename."
5. Use the browser to select the previously saved file for this site, and then click "Read from File." The recipe file will load in the lower part of the screen.
6. Once the file is open, click "Write to RTU."
7. The screen will go gray, then back to normal.

3.6 View Odorant Level

1. From the GPL Z10000 Data tab, click the Odorant Usage button to open the Odorage Usage screen. The Virtual Level Gage section at the bottom of the screen displays odorant level information.
2. Starting Tank Volume is the amount of odorant (in pounds) that was put into the bulk tank.
3. Tank Volume Remaining displays the level in text format, and the blue bar across the bottom acts as a visual gauge.

4. TechView Software

The TechView software package allows a technician to calibrate a transmitter locally or via communication with the transmitter's master controller (RTU), perform basic operations, and collect real- time or historical data.

TechView can be installed on a portable laptop computer to allow the technician to bring it to the site of the RTU/transmitter, or it can be installed on a desktop computer for bench configuration of a transmitter.

4.1 Starting the Software

1. Open TechView. The default location is C:\Z10\Techview\Z10.tvs.
2. Enter the Username and Password in the dialog box that appears, and then click Sign On. The default username is MVZ. The default password is 122654.

4.2 General Navigation
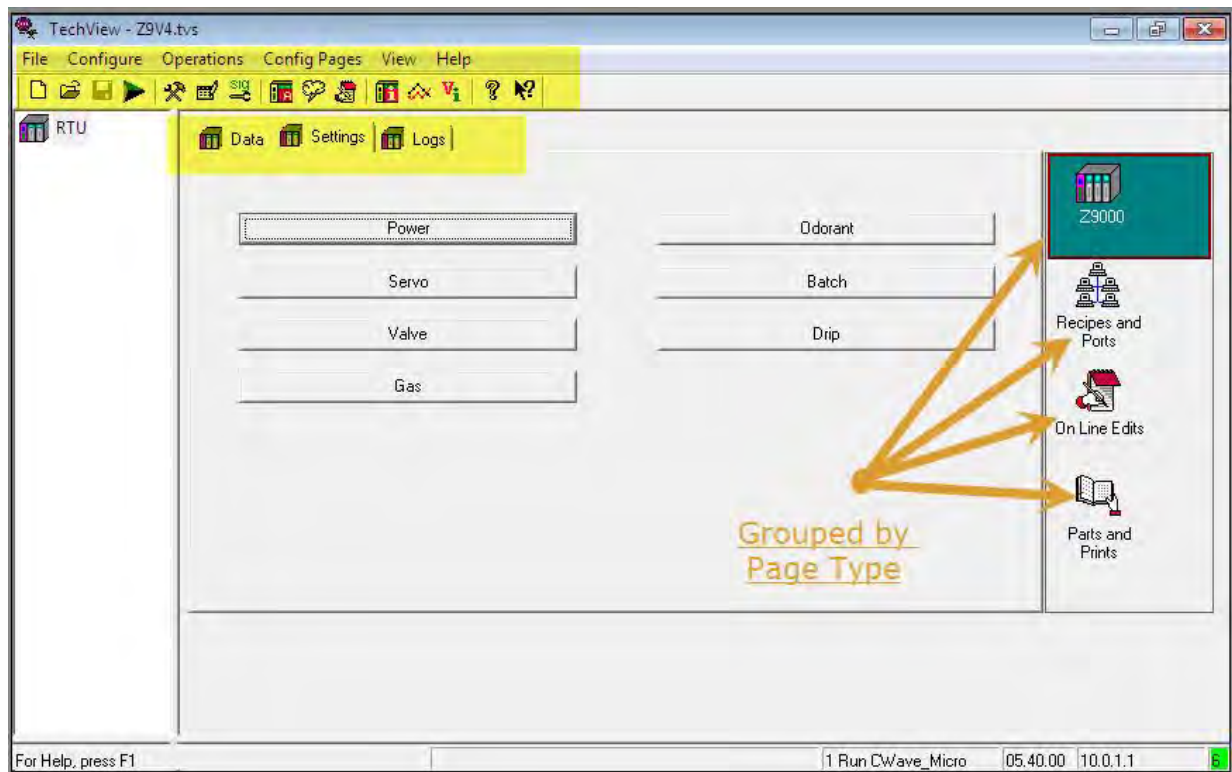
There are several ways to navigate information in TechView:

- Menu bar provides drop-down menus
- Toolbar contains shortcuts for various functions
- Page tabs allow access to different pages within a group
- Buttons provide access to customized TechView screens
- Pages are grouped together by type, and these groups are accessible via icons on the right side of the screen

The TechView screens also contain several different interactive elements. For example, the Gas Settings screen contains:

- A toggle button to switch between Manual and Auto modes of operation
- A button to access a drop-down list to choose between different Gas Signal Sources
- Several fields for entering various parameters (To change the value of a parameter, click into the field to select it, type in the desired value, and then press Enter.)

Note:

It may take a moment for the value of a button or field to refresh after changing a setting.

4.3 GPL Z10000: Data

The Data tab gives the user access to the Overview, Odorant Usage, and Alarms screens.
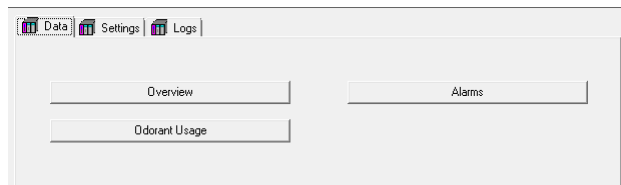
4.3.1 GPL Z10000 Overview Screen

Control

> ***Click to Turn On/Off:*** Toggle button allows users to turn the unit on and off. The color indicator next to the button displays the operational status off the unit. Green is ON. Red is

OFF.

Alarm: An active Alarm status is indicated by a red bar. If the unit is off, the Alarm will be active by default. To view a particular alarm, if present, go to the GPL Z10000 Alarms Screen.

Gas flow rate (MMCFH): In Auto mode, displays the current gas flow rate as measured by an external signal.

Odorant Injection Rate (#/mm):

- Target: Desired injection rate in pounds per million.
- Measured: Actual injection rate of the unit shown in relation to the target injection rate as well as in numeric form below. In batch mode, the measured injection rate will not show up until the first cycle is completed.
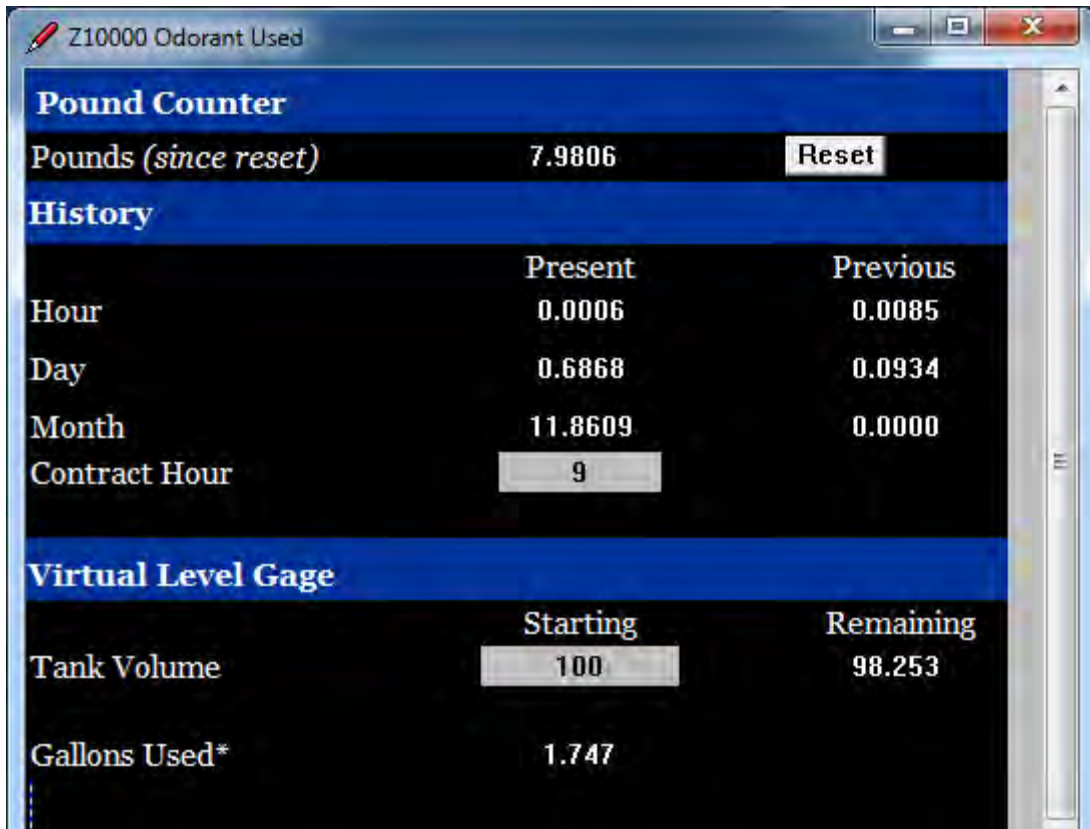
Motor RPM (Actual): Pump motor RPM rate as actually measured.

Continuous Mode / Batch Mode: Displays current operational mode which is determined by measured gas flow rate.

Versions

Click to Lock/Unlock: This is the Local Lock to prevent accidental operation of the unit during maintenance or other operations.

4.3.2 GPL Z10000 Odorant Used Screen

Pound Counter

Lbs. (since reset): Pounds of odorant injected since the Reset button was pushed. Resetting the counter does not affect the information displayed in History.

History

Hour:

Present: The number of pounds of odorant used in the past hour (resets on the hour)

Previous: The number of pounds of odorant used during the previous hour

Day:

Present: The number of pounds of odorant used during the current day (starting at midnight)

Previous: The number of pounds of odorant used during the previous day

Month:

Present: The number of pounds of odorant used during the current month (starting on the first day of the month)

Previous: The number of pounds of odorant used during the previous month

Contract Hour: The time when one fiscal day ends and the next begins.

Virtual Level Gage

Tank Volume:

Starting: The empty volume (in gallons) of the odorant bulk storage tank. This value must be entered manually.

Remaining: The remaining volume of odorant currently in the tank.

Gallons Used: The calculated vapor space in the tank. This is calculated and reduced daily, based on pounds of odorant reported by the odorizer.

The blue bar across the bottom acts as a virtual level gage. This is an approximation of the level for convenience and is not intended to replace an actual level gage.

4.3.3 GPL Z10000 Alarms Screen

Acknowledgements

Status Indicator: If the alarm is active, the indicator is RED. If there are no alarms, it is blank.

Clear Button: Clicking button acknowledges and clears all active alarms. Alarms must be cleared before a restart is possible. This also resets the number of Auto Clears used to 0.

Auto Clear (AC):

Allowed: The number of times the GPL Z10000 will automatically reset the Alarm and try *again.*

Delay: The number of seconds between Auto Clears.

Used: The number of times Auto Clear has been used. This value resets when the Clear button is clicked.

> NOTE:
>
> *Some alarms may be disabled. If disabled, the alarm condition will not be monitored. Certain alarms can be allowed to clear automatically. Toggle the AC on/off button to allow/disallow the Auto Clear function.*

Injection Rate

Parameters for these alarms are set under the Odorant Settings page.

LoLo: If the injection rate falls too low for a prolonged period, the Z10000 will activate this alarm. An auto clear will be used. This alarm can be disabled.

Lo: If the injection rate is low but still functional, the GPL Z10000 will trigger an alarm but continue operation and attempt to increase the injection rate. This alarm can be disabled.

Hi: If the injection rate is elevated but functional, the GPL Z10000 will trigger an alarm but continue operation and attempt to decrease the injection rate. This alarm can be disabled.
HiHi: If the injection rate becomes too high, the GPL Z10000 will trip this alarm, and the unit will use an auto clear. This alarm can be disabled.

No Odorant: During operation, if no odorant flow is detected within a given time period, this alarm will trigger, and the unit will use an Auto Clear.

Gas

Manual Gas Alarm: Triggered if the unit remains in Manual mode for more than the allowed length of time.

Hi Gas Alarm: If measured gas flow rate is too high to be acceptable, this alarm triggers. The alarm can be disabled.

Zero Gas Indicator: Triggered when unit shows the gas flow rate of zero. The alarm alerts the technician to check that the odorizer is correct to see zero flow. The alarm will clear when flow returns. This alarm can be disabled.

Gas Signal: The 4-20 mA flow signal has fallen below 4 mA.

If this alarm is triggered, the GPL Z10000 will assume Default Gas flow. The alarm will clear when the signal returns.

Pump

Motor: Alarm triggered when the motor cannot achieve the desired RPM.

Isolation: Occurs when the pump is not moving but too much odorant continues to flow. It is not unusual for a small amount of odorant to flow after the pump stops moving. The volume allowed to flow is fixed at 1 cc. The unit will use an Auto Clear.

Feedback: Motor Feedback signal has been lost. This alarm may be disabled.

Pump Efficiency: The pump is not moving a proper volume of odorant for the speed it is running. This alarm may be disabled.

Startup: Indicates that a startup feature has been left engaged. Either the isolation valve override has been left on or the pump has been left in prime mode. Return those features to the standard operation mode to enable startup.

Pressure: Indicates that the pump is unable to draw odorant. Most likely causes are a lack of blanket pressure on the source tank or a closed valve in the odorant path.
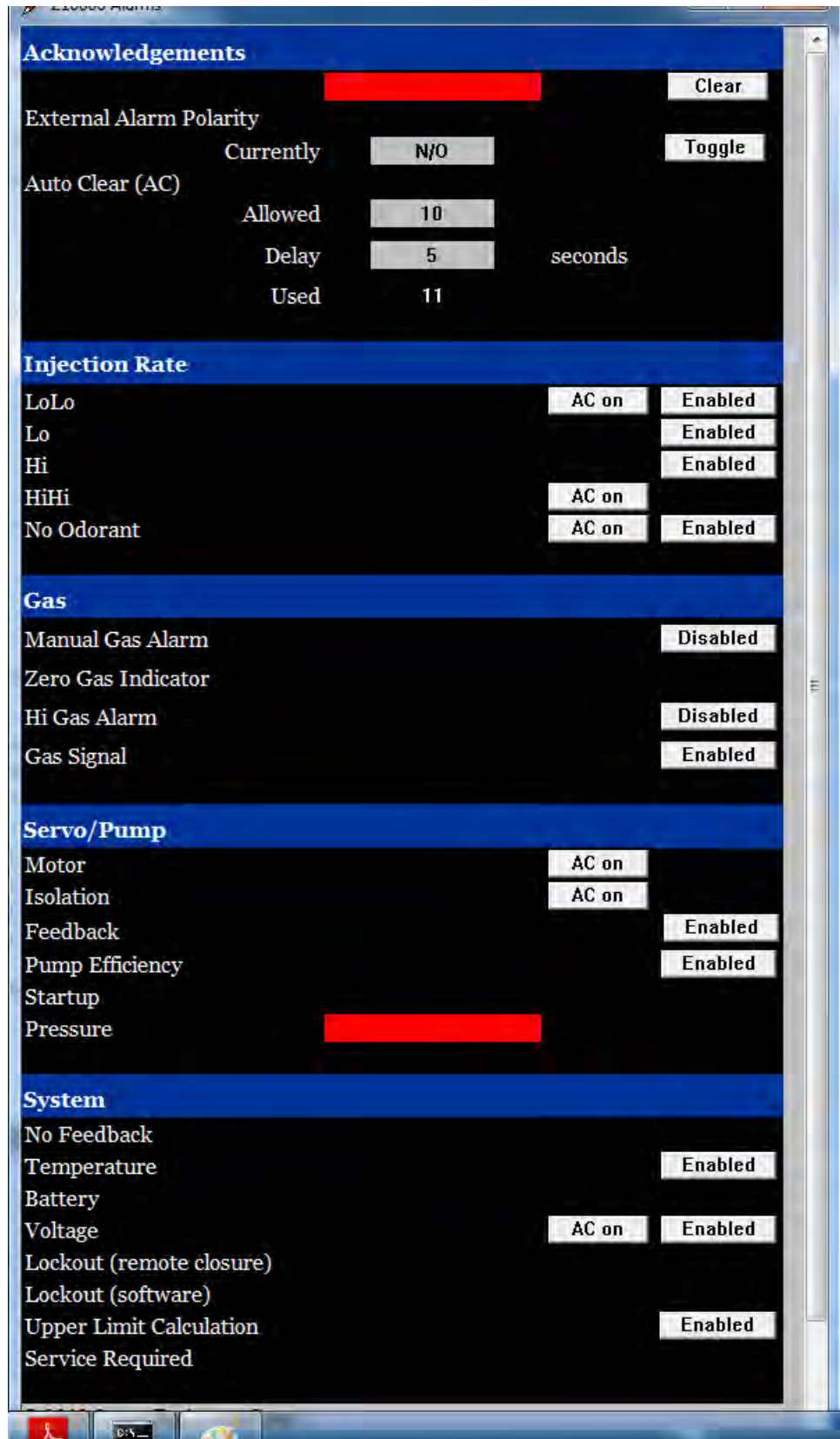
System

No Feedback: Alarm triggered when the pump is being asked to move, but no odorant is being measured, *and* the motor feedback signal has been lost. This alarm cannot be disabled.

Temperature: Indicates loss of signal from odorant temperature probe.

Battery: Battery on the RTU has died. If power is lost, retained variables will reset to defaults.

Voltage: If the voltage to the RTU falls below the allowable limit, this alarm will disable the Servo Motor. The limit is set under the Power Settings page. The unit will use an auto clear. This alarm can be disabled.

> **Note:**
>
> *Keep an extra battery in the cabinet. Make/ store a recipe file to be able to restore lost variables if needed.*

Lockout (remote closure): Prevents unit from being used (red tag lockout).

Lockout (software): Prevents unit from being used (red tag lockout). This signal is toggled on the Overview screen. This prevents accidental operation of the unit during maintenance or other operations.

Upper Limit Calculation: If the user input values exceed the functional capabilities of the GPL Z10000, this alarm will be triggered. The odorizer will continue to deliver odorant, but will be unable to meet demand. This alarm can be disabled.

Service Required: Alarm triggered when a device is due for preventive maintenance. Go to the Maintenance screen to see which devices require maintenance.

4.4 GPL Z10000: Settings

The Settings tab allows the user access to the following screens:

- Power Settings
- Pump Settings
- Gas Settings
- Odorant Settings
- Batch Settings
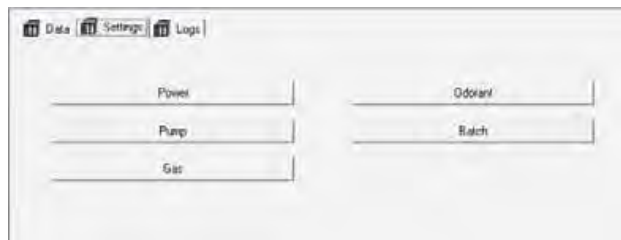
4.4.1 Power Settings Screen

Readings

Voltage: Amount of voltage being supplied to the unit. The color indicator is green when the servo is moving, red when the servo is stopped.

Settings

Low Voltage Limit: Level at which a low voltage alarm will trigger, and the servo will be

disabled.

Voltage Alarm Delay: Length of time (in seconds) the low voltage condition may exist before a low voltage alarm is triggered.

External Alarm Polarity: Select between normally open and normally closed.

4.4.2 Pump Settings Screen

Prime RPM: The RPM rate to run the pump at during priming mode.

Prime Pump: Enable/ Disable priming

Efficiency: Pump efficiency should be somewhere between 0.75 and 1.25. Numbers other than this indicate a potential problem.

Target RPM: Requested motor speed.

Actual RPM: Reported motor speed.

Ticks: Tick count from the flow meter. One thousand ticks equals 1cc. This value will periodically roll over to zero. The measured CCM value will update at rollover.

Measured CCM: Current measured CCM rate, should be approximately twice the RPM rate. Updated at the time the Ticks rollover occurs.

CC Used: CCs used since last reset. Used primarily for diagnostics.

Reset Usage: Clear CC used. Mainly used for diagnostics.

Ticks Since Shut: For GPL Odorizers information purposes only.

4.4.3 Gas Settings Screen
Common

Manual/Auto: Toggle to select Manual or Auto gas flow mode. If Manual, the value chosen for Gas Manual/default is used. If Auto, the Gas Signal Source selected is used to track flow.

 Track/Fixed: Select whether manual/default gas is a set value determined by the user or actual gas flow.

Gas Max (MMSCFH): The maximum flow rate for the site.

Gas Manual/default (MMSCFH): Desired hourly flow rate when using Manual mode.

Manual Gas Alarm Delay: Time (in hours) that the unit may be in Manual mode before the Manual Gas Alarm is triggered.

Gas Floor (% Max): Lower limit flow rate for the site. This value is a percentage of the Gas Max. When the flow rate drops below this point, the unit will shut off.

Gas Signal Source: Source used to determine flow rate. Select source type from drop-down list.
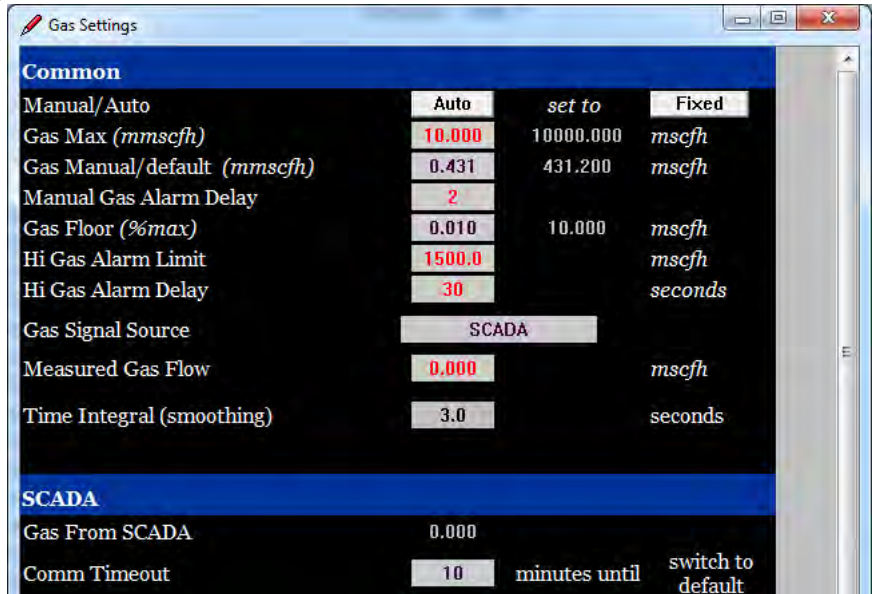
Source Types

SCADA

See Appendix

Rate based Pulses

Used when a site uses individual pulses to determine flow rate.

- *Max seconds/pulse:* Total number of seconds to wait for a pulse before declaring zero gas flow.
- *SCF/pulse:* How much a pulse is equal to in standard cubic feet.
- *Number to Average:* Gas flow rate is an average of this many readings.
- *Filter (noise):* Eliminates noise by filtering out signals where the time between pulses is less than this number of seconds.
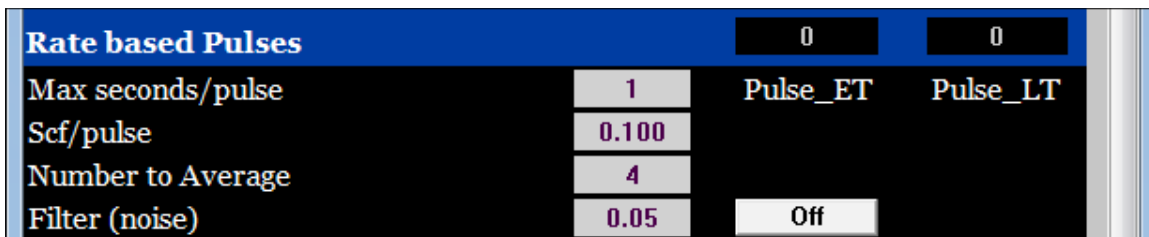
PULSES_BATCH

Used when the site uses a batch of pulses to determine the flow rate.

- *Minutes to collect pulses:* Total time (in minutes) the unit will collect pulses before calculating gas flow.
- *SCF/pulse:* How much a pulse is equal to in standard cubic feet.
- *Maximum Time to wait for a Pulse:* Time (in seconds) to wait for a pulse before declaring zero gas flow
- *Filter noise:* Eliminates noise by filtering out signals where the time between pulses is less than this number of seconds

4–20 mA

Used when the site has a 4-20 ma signal to determine flow rate.

- *Signal Calibration:* Measured analog input
- *Zero:* This value allows you to adjust the 4 mA signal to be a clean zero gas flow.
- *Span:* This value enables you to adjust the 20 mA signal to be a clean 100% gas flow.
- *Time Integral (smoothing):* Analog input is integrated over this many seconds.

4.4.4 Odorant Settings Screen
Parameters

Injection Rate (#/MMSCFH):

- *Target:* Desired injection rate.
- *Actual:* Actual injection rate for the unit.

Select Odorant Blend: List of commercially available odorant blends in the US. Selecting one will automatically set the correct odorant density @ 60F. The default may be chosen and a "typical" value will be used.

LoLo: Injection rate (in #/mm) at which the unit will go into a LoLo alarm and shut off, and the amount of time (in seconds) the unit is allowed to be in that state before triggering an alarm.

Lo: Settings for Lo alarms

Hi: Settings for Hi alarms

HiHi (Injection Rate): Alarm settings as they pertain to injection rate (in #/mm) and time (in seconds).

HiHi (Maximum Dose): Maximum number of drops that the unit can deliver after the isolation valve has closed in batch mode.

Density: Odorant weight in pounds per gallon.

Temperature: The measured temperature of the odorant

Adjusted Density: Calculated density of odorant based on measured temperature.

Pulse Output: Amount of odorant in pounds per pulse

Pulse Duration: Duration of a pulse in milliseconds
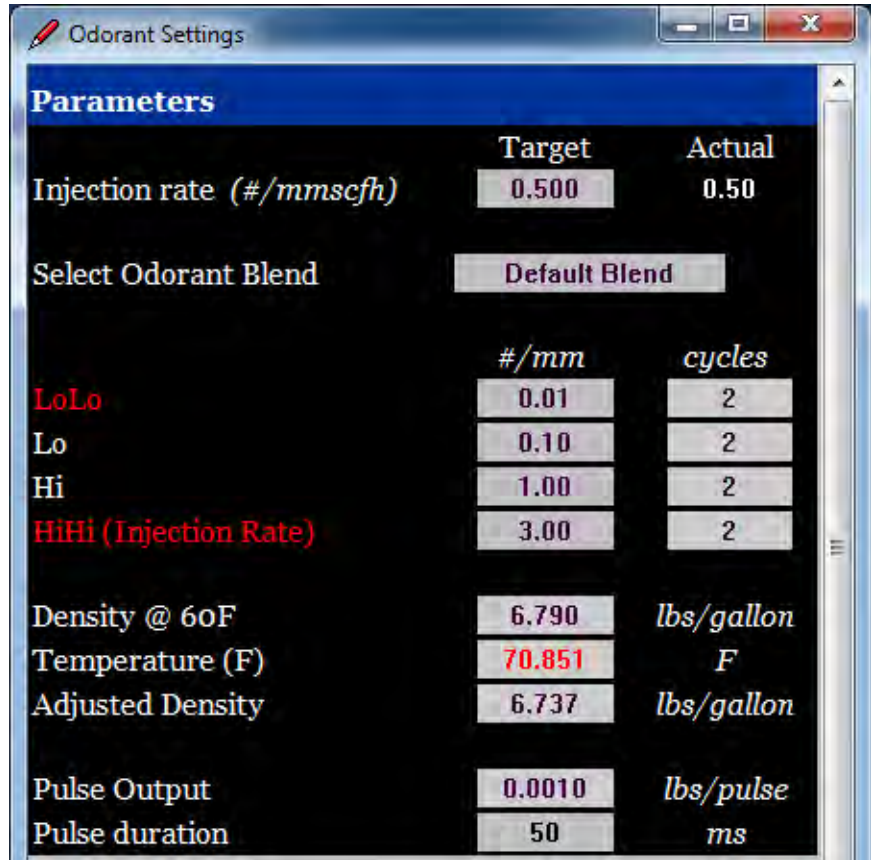
4.4.5 Batch Settings Screen

Batch settings should not be adjusted by the operator. This information is provided for information purposes only.

Transitions

The transitions are calculated values based on the Batch Settings.

- *From Batch to Continuous:* The flow rate (in MSCFH) at which the unit will switch from batch mode to continuous mode.
- *From Continuous to Batch:* The flow rate (in MSCFH) at which the unit will switch from continuous mode to batch mode.

Batch Settings

- *Target CC/Batch:* The desired batch size in CCs. Changing this number changes the flow rates at which the unit will go into and out of a batch cycle.
- *To adjust the above spread*: Deadband for calculated transitions
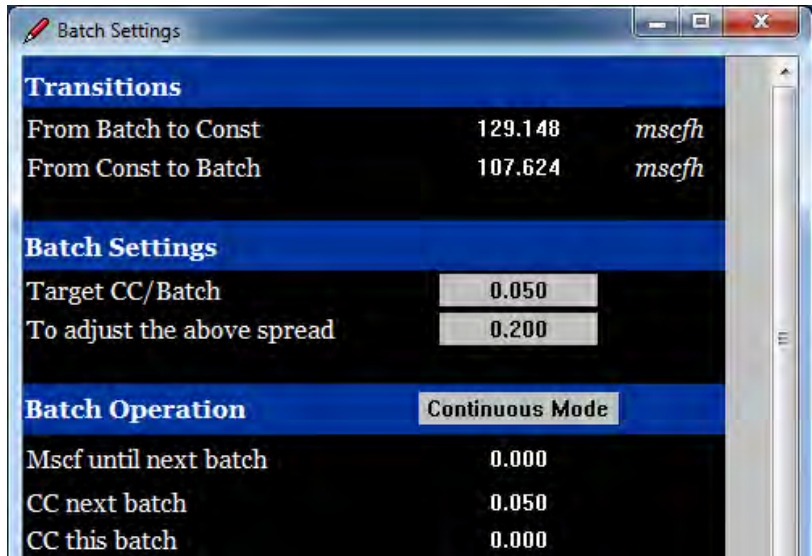
4.5 GPL Z10000: Logs

The Logs tab gives the user access to the View Archives, Collection, and View Audit Trail screens.
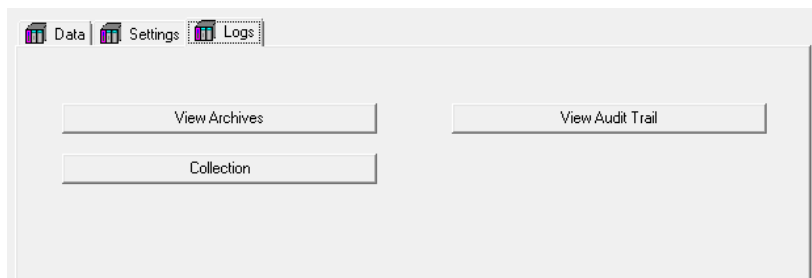
4.5.1 GPL Z10000 Archives Screen

The Archives screen automatically loads the archives into the screen for viewing, but will not collect

and store the archives to the computer.

4.5.2 GPL Z10000 Data Collection Screen

On the Collection screen, clicking the "Start Collection" button will download and store the archives into the folder indicated in the "Storage Folder" field. Clicking the "Convert to CSV" button translates the files into CSV format for viewing with Excel.
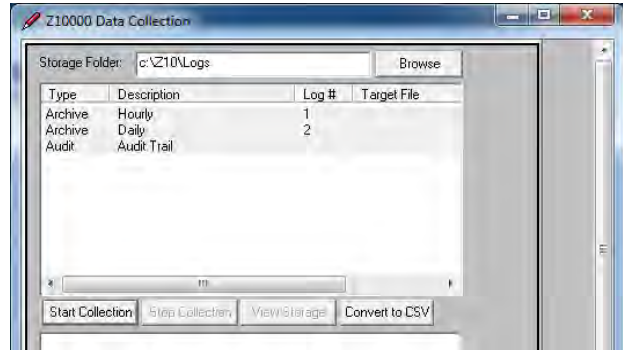
4.5.3 GPL Z10000 Audit Trail Screen

The Audit Trail screen automatically displays logged alarms. Clicking the "Search Criteria" button brings up the Select Data 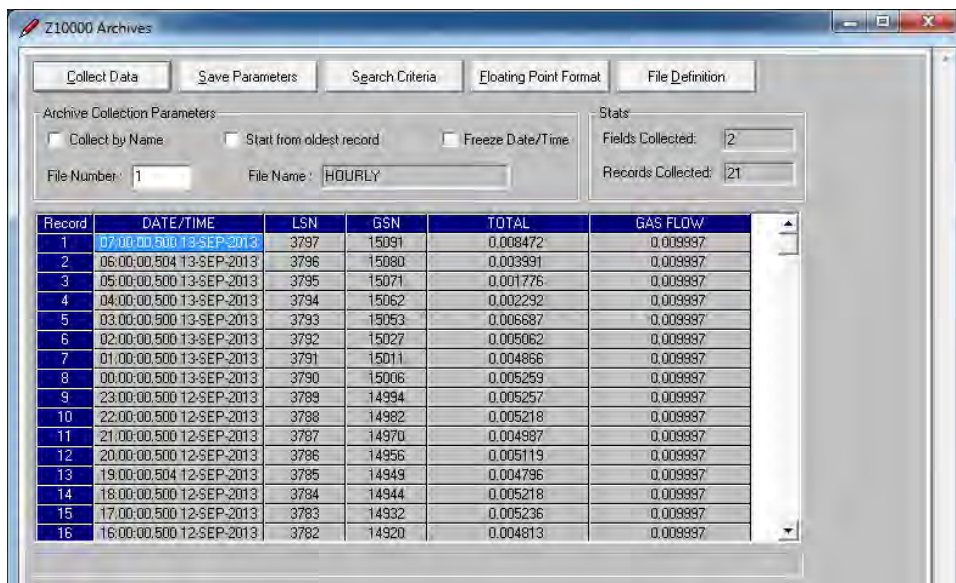Collection Criteria dialog. Under Records, choose "Both Alarms & Events" to display configuration settings that have changed, as well as alarms and other information that can be helpful in troubleshooting the root cause of a problem.
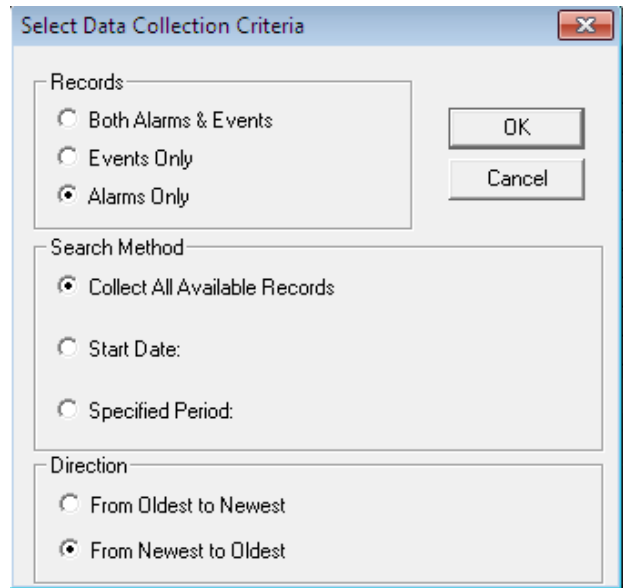
4.6 Recipes and Ports: Recipes

The Recipes and Ports Group gives the user access to the Recipes, Ports, and Date Time tabs.

The Recipes tab allows access to the GPL Z10000 Recipes screen.

4.6.1 GPL Z10000 Recipes

Clicking Load/Save Recipes opens the GPL Z10000 Recipes screen.
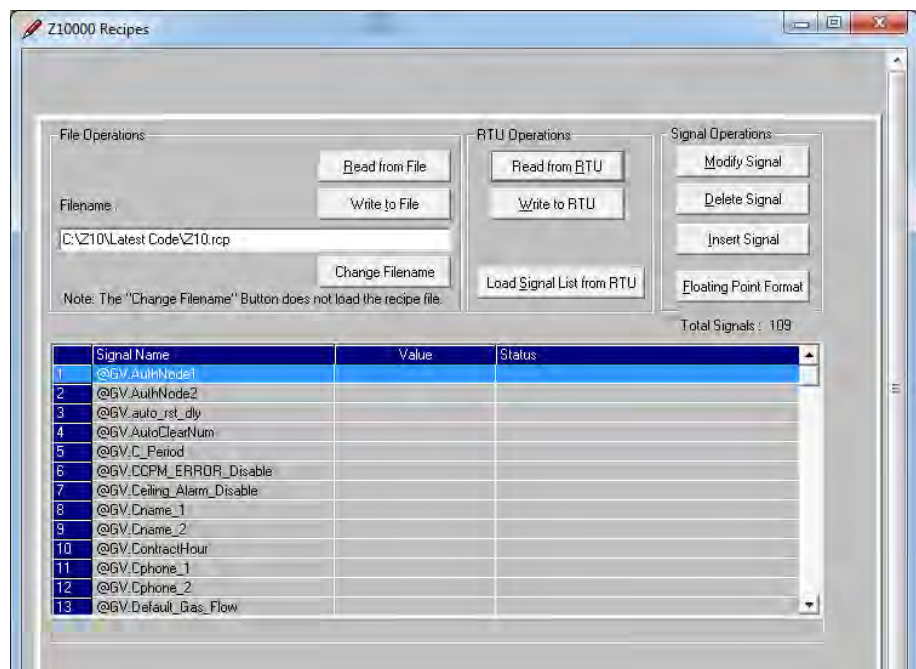
4.7 Recipes and Ports: Ports

The Ports tab allows the user to access the Port Status screen.

4.7.1 GPL Z10000 Port Status Screen

On the Port Status screen, click in the "Monitor Port" field and enter the port number you wish to view activity on. The "Transmit" and "Receive" fields will display incoming and outgoing traffic on that port.

- *Modbus Port:* Choose port to act as Modbus slave
- *Modbus address:* Assign slave address
- *Auth Node 1:* This address will be allowed permission to act as BSAP master
- *Auth Node 2:* This address will be allowed permission to act as BSAP master
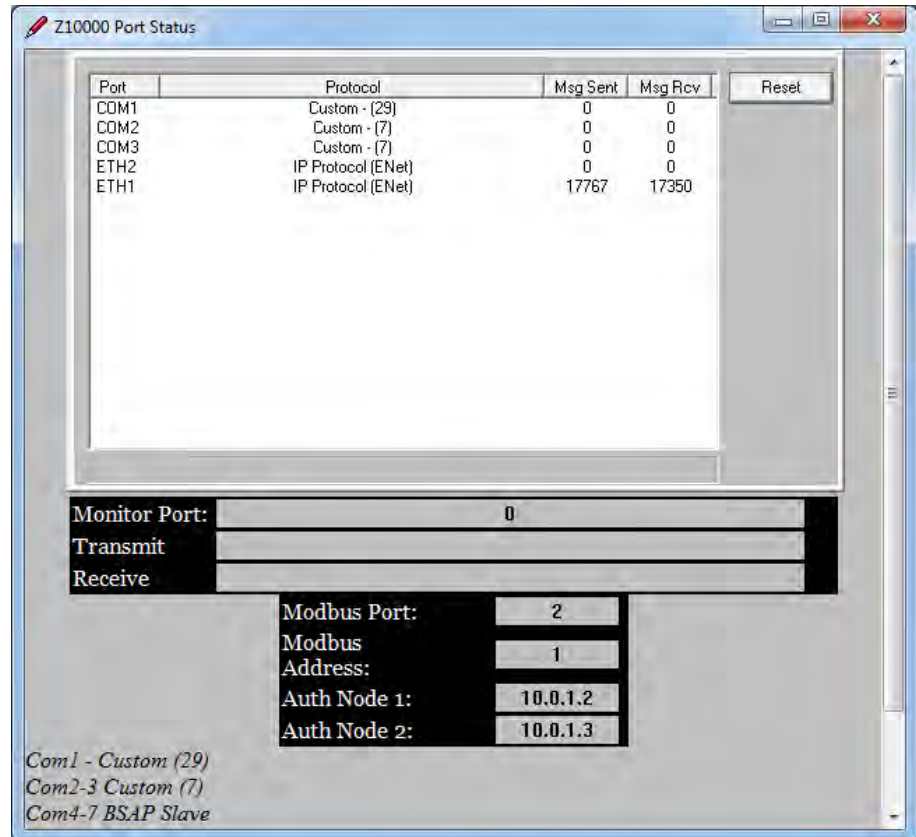
4.8 Recipes and Ports: Date Time

The Date Time tab allows the user to access the Date and Time Settings screen.

4.8.1 Date and Time Settings Screen

Each field on the Date and Time Settings screen can be clicked on and modified. The RTU is not updated until the "Write to RTU" button is clicked. "Get from RTU" populates the fields with the current date/time.
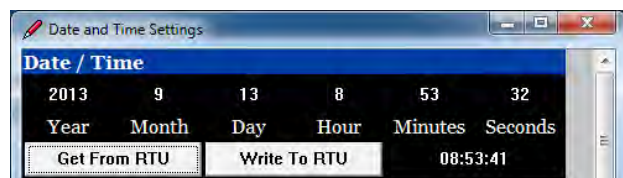
4.9 On Line Edits

The On Line Edits Group should not be used without first consulting GPL Odorizers.

5. Troubleshooting

Alarm	Issue	Action
Red light on unit is solid	Unit is off	Check for alarms, acknowledge them, and restart the unit.
Red light on unit is flashing	Unit is currently in an alarm	Check for alarms and acknowledge them.
Analog lost	4-20mA flow signal has fallen below 4mA	Check for voltage on pin 7 (+) and pin 3 (-) on TB2 of Mixed IO card. Check to verify source is supplying analog signal.
Battery	Battery on RTU is dead	Replace battery. Ensure recipe has been saved from unit first, as the configuration will be lost when power is cut.
Motor Feedback	No communication between RTU and servo	1. Check for 1-5V between pin 6 & 7 on TB2 of Mixed IO card. 2. If there is still no communication with the servo, remove it and send it to GPL Odorizers for testing.
Hi	High injection rate	1. Check to see if the unit alarmed due to high injection rate. 2. Clear the alarm and restart the unit. 3. Make any necessary adjustments to the Hi alarm settings or the valve settings.
HiHi	High injection rate	1. Check to see if the unit alarmed due to high injection rate. 2. Clear the alarm and restart the unit. 3. Make any necessary adjustments to the HiHi alarm settings or the valve settings.
Isolation	Valve closed but too much odorant flowed	Pump check valves may have failed.
Lo	Low injection rate	1. Check to see if the unit went into alarm due to injection rate or time. 2. Clear the alarm and restart the unit. 3. Change the Lo settings or the valve settings as necessary. 4. Check blanket pressure, pressure to iso valve, valve positions, filter.
Lockout (remote closure)/Remote Lock	Red tag lockout	No action required
Lockout (software) / Local Lock	Red tag lockout	No action required.

Alarm	Issue	Action
LoLo	Low injection rate	1. Check to see if the unit went into alarm due to injection rate. 2. Clear the alarm and restart the unit. 3. Change the LoLo settings or the valve settings as necessary. 4. Check blanket pressure, pressure to iso valve, valve positions, filter.
Manual Gas Alarm / ManGas	Gas Mode left in Manual mode for more than the allowed number of hours	When flow signal is restored, switch from Manual to Auto.
Motor	Motor cannot achieve desired RPM	Check valve positions.
NoOdor	No odorant flow detected while unit is operational	1. Check the pressures on the unit; be sure that the blanket pressure on the odorant tank is between 15 and 30 psi. 2. Check the level on the odorant tank. 3. Clear the alarm and restart the unit.
Power Loss	Unit turned off due to interruption in power supply	Verify integrity of power supply.
UpperLimit Calculation / Upper Limit	Settings exceed functional capabilities of the unit.	Adjust Gas or Odorant Injection Rate settings, or disable alarm.
Voltage	Voltage to RTU has fallen below allowable limit	Check power source voltage.
Zero Gas Indicator	Unit shows gas flow rate of zero	Check to make sure that active flow is not below gas floor level. Check flow source to ensure it is reporting flow correctly.
Odorant Temperature	Failure of odorant temperature sensor.	Replace odorant temperature sensor.
Hi Gas	Abnormally high flow rate reported by flow computer.	Check flow computer for accuracy. Check flow computer outputs for proper function.
Motor Feedback	Motor is not reporting its actual speed.	Clear alarms. If problem continues, replace motor controller.
Efficiency	Pump is not operating within normal efficiency range.	Check filter for free flow. Run in prime mode to establish baseline efficiency.
No Feedback	Both the odorant flow meter and the motor speed feedback have failed. It is impossible to verify actual injection rate.	Replace failing components.

6. Standard Warranty

GPL Odorizers ("Seller") warrants products manufactured by it and supplied hereunder to be free from defects in workmanship and, to the extent materials are selected by Seller, to be free from defects in materials, in each case for a period as defined in the table below:

Product Line	Warranty Period
GPL Odorizers	Eighteen months from date of shipment

If within such period any such products shall be proved to Seller's satisfaction to be defective, such products shall be repaired or replaced at Seller's option. Seller's sole obligation and Buyer's exclusive remedy hereunder shall be such repair and replacement and shall be conditioned upon Seller's receiving written notice of any alleged defect within 10 days after its discovery and, at Seller's option, return of such product to Seller, FOB GPL Odorizers' factory or provision of evidence (e.g., photographs) of such defect satisfactory to Seller.

Warranty Conditions & Limitations

This Warranty shall not apply to any GPL Odorizers entry product which, in the opinion of GPL Odorizers, has been (a) altered or repaired in a manner affecting the efficiency or performance of the unit or (b) incorrectly installed or operated or (c) damaged in shipment or (d) damaged by flood or fire or (e) if the serial number is missing, altered or defaced.

Any materials required to be used by Seller as provided in customer specifications or instructions are excluded from the foregoing warranty and customer assumes sole responsibility for the selection of such materials. Customer further acknowledges and agrees that, to the extent Customer requests that GPL Odorizers make any recommendations with respect to materials to be used

in connection with products, Seller may rely on published reference literature, that any references based on third-party studies may not correlate directly with the end user's intended usage or process (i.e., chemical composition, concentrations, temperatures, etc.), and that Customer is solely responsible for the final determination with respect to which materials are to be used in connection with the products.

EXCEPT FOR THE LIMITED WARRANTIES SET FORTH HEREIN, SELLER HEREBY DISCLAIMS ANY AND ALL WARRANTIES AND REPRESENTATIONS (EXPRESS OR IMPLIED, ORAL OR WRITTEN), INCLUDING ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE WHETHER OR NOT SELLER KNOWS, OR HAS REASON TO KNOW, HAS BEEN ADVISED, OR IS OTHERWISE IN FACT AWARE OF ANY SUCH PURPOSE, WHETHER ALLEGED TO ARISE BY LAW, BY REASON OF CUSTOM OR USAGE IN THE TRADE, OR BY COURSE OF DEALING OR PERFORMANCE. Without limiting the generality of the foregoing, Seller makes no warranty regarding ability of products sold hereunder to withstand erosion or corrosion, or regarding material compatibility of elastomers in specific services, and no warranty made hereunder shall apply to products which have been subjected to adverse storage.

The owner shall be responsible for maintenance of his equipment. Wear or damage caused by lack of

normal maintenance or misuse of equipment shall not be considered as defective workmanship and material.

If a part requires replacement during the warranty period, the part must be returned to GPL Odorizers for credit or the customer will be responsible for paying for the replacement part(s).

GPL Odorizers and its subsidiaries reserve the right to make product design changes or improvements without notice and without imposing any obligation upon itself to install these changes or improvements on its products previously manufactured.

This warranty is for the sole benefit of the original purchaser and is not transferable unless agreed to in writing by GPL Odorizers.

Receiving Shipments (including loss or damage by transportation)

It is the customer's responsibility to check for missing cartons and sign of damage to cartons. If found, the customer should note missing and/or damaged boxes on the delivery receipt and have a delivery receipt signed by the representative of the transportation company. If unpacking discloses concealed damage from rough handling, the customer should request a concealed damage inspection from the transportation company.

The GPL Odorizers Customer Service Department will aid your organization in any claim proceeding for shortages or damages in shipment, but it is the receiver's responsibility to file a claim with the carrier for damage or loss.

Liability Limitation

IN NO EVENT, WHETHER FOR BREACH OF WARRANTY OR OTHER CONTRACT BREACH, NEGLIGENCE OR OTHER TORT, OR ON ANY STRICT LIABILITY THEORY, SHALL GPL ODORIZERS., ITS SUBSIDIARIES OR ITS SUPPLIERS BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER (INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOSS OF PROFITS, BUSINESS INTERRUPTION, LOSS OF INFORMATION, OR OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF, OR INABILITY TO USE, THE PRODUCTS, EVEN IF GPL ODORIZERS. OR ANY OF ITS SUBSIDIARIES, HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Customer Actions for Claims on Products during the Warranty Period

1. Contact the Customer Service Department, GPL Odorizers, Wheat Ridge, CO, Telephone: 303-927-7683, to obtain a Return Material Authorization (RMA) number.
2. You will be sent an "RMA" and a "Decontamination Statement" that is required to be filled out and returned with the equipment.
3. The following information must appear on the outside of the package:
   - RMA number is marked on the outside of the box.
   - Decontamination Statement filled out and attached to the outside of the box.
4. Return defective equipment FREIGHT PREPAID. Collect shipments will be refused.
5. The factory will not process warranty claims until the customer has properly accomplished the above items.

6. The GPL Odorizers factory may accept the entire claim, a part of the claim or none of the claim if our inspection of returned parts proves the failure was for reasons other than defective material or factory workmanship.

Important Notes:

1. *GPL Odorizers will not be responsible for damage incurred during the return shipment.*
2. *All returns subject to inspection and a minimum $100.00 evaluation fee for any products found not to be defective.*
3. *This RMA is not authorization for credit. Credits and/or replacements will be issued upon evaluation of returned goods.*
4. *RMA is valid for thirty (30) days from issue date.*

7. Factory Assistance

GPL Odorizers manufactures environmentally-friendly odorant injection systems for natural gas and other gases.

Please do not return any equipment before discussing your application problem with a GPL Odorizers representative and obtaining a Return Authorization.

GPL Odorizers has a dedicated staff of trained Service Department associates to assist customers with any problems. Please call GPL Odorizers at 303.927.7683 and request a service representative.

For other sampling applications, your GPL Odorizers representative is eager to help you. Please feel free to call your representative or contact GPL Odorizers to discuss your application.

GPL Odorizers LLC
11919 W. I-70 Frontage Rd. North Unit #119
Wheat Ridge, Colorado 80033
Phone: 303.927.7683
E-mail: info@gasodorizer.com

Appendix A: Modbus Map

Use Comm Port 2, configured as Modbus RTU, baud rate of 19200,8,N,1.

Registers:

00002 @GV.LBS_PER_MMSCF	00082 @GV.rDummy
00004 @GV.CALCULATED_GAS_FLOW	00084 @GV.Gas_SCADA_in
00006 @GV.GAS_FLOW_MSCFH	00086 @GV.INJECTIONRATE
00008 @GV.ClearedAlarms	00088 @GV.MAX_GAS_FLOW
00010 @GV.AutoClearNum	00090 @GV.DEFAULT_GAS_FLOW
00012 @GV.CUR_HOUR_TOT	00092 @GV.FLOOR
00014 @GV.PREV_HOUR_TOT	00094 @GV.GAS_SMOOTH_INTEGRAL
00016 @GV.CUR_DAY_TOT	00096 @GV.USAGE_PULSE_RATE
00018 @GV.PREV_DAY_TOT	00098 @GV.USAGE_PULSE_WIDTH
00020 @GV.CUR_MONTH_TOT	00100 @GV.DENSITY
00022 @GV.PREV_MONTH_TOT	00102 @GV.METER_ALARM_DROP_COUNT
00024 @GV.LBS_USED	00104 @GV.INJECT_LOLO
00026 @GV.Bat_2_Reading	00106 @GV.INJECTLO
00028 @GV.Tank_Left	00108 @GV.INJECTHI
00030 @GV.Tank_Pct_Left	00110 @GV.INJECTHIHI
00032 @GV.Tank_Used	00112 @GV.STORELOLO
00034 @GV.BULK_LEVEL	00114 @GV.STORELO
00036 @GV._Local_Address	00116 @GV.LV_LALRM_STPT
00038 @GV.Target_RPM	00118 @GV.Allowable_CCPM_Error
00040 @GV.Motor_Fdbk	00120 @GV.INJECT_LOLO_DELAY
00042 @GV.VERSION	00122 @GV.INJ_LO_ALRM_DELAY
00044 @GV.FW_VERSION	00124 @GV.INJ_HI_ALRM_DELAY
00046 @GV.SerialNum	00126 @GV.INJ_HIHI_ALRM_DELAY
00048 @GV.FLOOR_MSCFH	00128 @GV.MOTOR_ALRM_DELAY
00050 @GV.C_PULSES_LAST	00130 @GV.Hi_Gas_DLY
00052 @GV.C_PERIOD_ET	00132 @GV.Man_Gas_DLY
00054 @GV.MAX_PULSE_ET	00134 @GV.CONTRACTHOUR
00056 @GV.GASFLOWPULSE_LD	00136 @GV.GASFLOW_SOURCE
00058 @GV.GASFLOWPULSE_ET	00138 @GV.C_PERIOD
00060 @GV.rDummy	00140 @GV.GASFLOW_VOL_FACTOR
00062 @GV.rDummy	00142 @GV.GASFLOWSTACK
00064 @GV.rDummy	00144 @GV.Tank_Volume
00066 @GV.rDummy	00146 @GV.AutoClearNum
00068 @GV.rDummy	00148 @GV.MB_PORT
00070 @GV.rDummy	00150 @GV.MB_Slave_Addr
00072 @GV.rDummy	
00074 @GV.rDummy	
00076 @GV.rDummy	
00078 @GV.rDummy	
00080 @GV.rDummy	

Coils

00001 @GV.Shutdown
00002 @GV.Callout_Alarm
00003 @GV.Alarm_Present
00004 @GV.Inject_LoLo_Alarm
00005 @GV.Inj_Lo_alrm
00006 @GV.Inj_Hi_alrm
00007 @GV.Inj_HiHi_alrm
00008 @GV.No_Feedback_alarm
00009 @GV.No_Odorant_Alarm
00010 @GV.Meter_Valve_Alarm
00011 @GV.Motor_Alarm
00012 @GV.Motor_Feedback_Fail
00013 @GV.CCPM_Error_Alarm
00014 @GV.Gas_Flow_Alarm
00015 @GV.Power_Loss_Alarm
00016 @GV._BAT_OK
00017 @GV.Man_Gas_Alarm
00018 @GV.Hi_Gas_Alarm
00019 @GV.LV_Alarm
00020 @GV.Temperature_Alarm
00021 @GV.Parameter_Alarm
00022 @GV.NoFlow
00023 @GV.Ceiling_Alarm
00024 @GV.Prime_Mode
00025 @GV.Lockout
00026 @GV.bDummy
00027 @GV.bDummy
00028 @GV.bDummy
00029 @GV.bDummy
00030 @GV.bDummy
00031 @GV.Man_Auto
00032 @GV.Local_Standby

00033 @GV.Remote_Standby
00034 @GV.Usage_Count_Reset
00035 @GV.Ext_Alarm_Polarity
00036 @GV.batch_Mode_en
00037 @GV.Motor_Alarm_Ack
00038 @GV.Warm_Start
00039 @GV.Ceiling_Alarm_Disable
00040 @GV.Floor_Alarm_Disable
00041 @GV.Gas_Flow_alrm_disable
00042 @GV.LV_ALARM_DISABLE
00043 @GV.Man_Gas_Dis
00044 @GV.Hi_Gas_Dis
00045 @GV.Inj_Hi_Alrm_Disable
00046 @GV.Inj_Lo_Alrm_Disable
00047 @GV.Inject_LoLo_Disable
00048 @GV.Motor_Alrm_Disable
00049 @GV.No_Feedback_Alarm_Disable
00050 @GV.No_odorant_alarm_disable
00051 @GV.CCPM_Error_Disable
00052 @GV.Temperature_alarm_Disable
00053 @GV.Motor_Feedback_Disable
00054 @GV.Feedback_Auto
00055 @GV.HiHi_Auto
00056 @GV.LoLo_Auto
00057 @GV.LV_Auto
00058 @GV.MeterValve_Auto
00059 @GV.Motor_Auto
00060 @GV.NoOdor_Auto
00061 @GV._TS_inhib
00062 @GV._TS_RE

Appendix B: Optional HMI

HMI Structure

Overview screen (5 minute timeout takes you here)

Menu screen – Access from Overview screen or by holding ESC/ Menu button for 5 seconds.

Menu:

1. Status
   a. On/Off
   b. Actual Injection rate
   c. Alarm Status
   d. Links to Active Alarms and Menu
2. History
   a. # used
   b. Reset
   c. Curr Hour
   d. Last Hour
   e. Curr Day
   f. Last Day
   g. Curr Month
   h. Last Month
   i. Contract Hour
   j. Tank Vol Init
   k. Tank Vol Left
   l. Gallons Used
3. Alarms
   a. Active (Also link from Overview screen and from Alarm History)
   b. Enable
   c. Autoclear
   d. History (Also link from Active Alarms)
4. Pump
   a. Efficiency
   b. Targ RPM
   c. Act RPM
   d. Man/Auto
   e. Man RPM
   f. Mode
5. Gas
   a. General
      i. Current Measured
      ii. Source
      iii. Smoothing
      iv. ManAuto
      v. Track/Fixed
      vi. Default
      vii. Man Alarm Dly
      viii. Max
      ix. Floor
      x. Hi Alarm
      xi. Hi Alarm Dly
      xii. SCADA Timeout
      xiii. Links to Pulse Rate Config and Pulse batch config
   b. Pulse Rate
      i. Pulse ET
      ii. Pulse LT
      iii. Max ET
      iv. SCF/Pulse
      v. Num to Avg c.
   c. Pulse Batch
      i. Pulse ET
      ii. Pulse LT
      iii. Max ET
      iv. SCF/Pulse
      v. Collect Time
6. Odorant
   a. #/MM
   b. Density
   c. #/pulse
   d. HiHi Stpt
   e. Dly
   f. Hi Stpt
   g. Dly
   h. Lo Stpt
   i. Dly
   j. LoLo Stpt

          k.   Dly

7. Maintenance

    a.   Motor Status

         i.   Cycles
         i.   Hours
         ii.   Reset
         iii. Next

    b. Pump Status

         i.   Cycles
         ii.   Serviced
         iii. Reset
         iv. Next

               c. Sol Status:

                 i.   Cycles
                 ii. Serviced
                 iii. Reset
                 iv. Next

8. System

    a. Node Addr
    b. MB Addr
    c. MB Port
    d. Phone
    e. Firmware
    b. Code Rev
    c. NetStat 1
    d. NetStat2
    e. NetStat3
    f. NetStat4

9. Startup

    a. Sol Ovrd
    b. Pump Ovrd
    c. Man RPM
    d. Efficiency
    e. Inj Rate
    f. Usage
    g. Gas Flow
    h. Gas Settings Link

10. Flash (access only under direction of tech support)