WELKER

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER ESSENTIALS™ INJECTION ODORIZER
WITH XLE CONTROLLER

TABLE OF CONTENTS

IMPORTANT SAFETY INFORMATION
READ ALL INSTRUCTIONS

Notes emphasize information and/or provide additional information to assist the user.

Caution messages appear before procedures that could result in damage to equipment if not observed.

Warning messages appear before procedures that could result in personal injury if not observed.

This manual is intended to be used as a basic installation and operation guide for the Welker OdorEyes Essentials™ Injection Odorizer With XLe Controller. For comprehensive instructions, please refer to the IOM Manuals for each individual component. A list of relevant component IOM Manuals is provided in Appendix A of this manual.

The information in this manual has been carefully checked for accuracy and is intended to be used as a guide for the installation, operation, and maintenance of the Welker OdorEyes equipment described in this manual. Correct installation and operation, however, are the responsibility of the end user. Welker reserves the right to make changes to this manual and all products in order to improve performance and reliability.

BEFORE YOU BEGIN

Read these instructions completely and carefully.

IMPORTANT – Save these instructions for local inspector's use.

IMPORTANT – Observe all governing codes and ordinances.

Note to Installer – Leave these instructions with the end user.

Note to End User – Keep these instructions for future reference.

Installation of this Essentials™ Injection Odorizer is of a mechanical and electrical nature.

Proper installation is the responsibility of the installer. Product failure due to improper installation is not covered under the warranty.

If you received a damaged Essentials™ Injection Odorizer, please contact a Welker representative immediately.

Phone: 281.491.2331
Address: 13839 West Bellfort Street
Sugar Land, TX 77498

1.1 Introduction

We appreciate your business and your choice of Welker products. The installation, operation, and maintenance liability for this equipment becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance* (IOM) *Manuals* prior to installation and operation of this equipment is required for a full understanding of its application and performance prior to use.*

If you have any questions, please call Welker at 1-281-491-2331.

The following procedures have been written for use with standard Welker OdorEyes parts and equipment. Assemblies that have been modified may have additional requirements and specifications that are not listed in this manual.

1.2 Product Description

The Welker OdorEyes *Essentials™ Injection Odorizer With XLe Controller* is a low-cost odorant injection system designed to inject liquid odorant proportional to flow into a natural gas pipeline.

The skid-mounted Essentials™ Injection Odorizer is comprised of a controller with LCD display, Welker SSO-9MED Sample/Injection Pump, and an odorant supply tank. When the controller receives the customer-supplied signal, the solenoid is energized, actuating the SSO-9MED to collect a set volume of liquid odorant from the odorant supply tank; when the solenoid is de-energized, the SSO-9MED injects the collected liquid odorant into the pipeline.

If desired, the odorant supply tank can be supplied with a 110% containment pan sloped to the drain port for easy draining. For Essentials™ Injection Odorizers used in remote locations, a solar panel with battery can be added to limit interruptions to operation.

Welker may custom design the Essentials™ Injection Odorizer With XLe Controller to suit the particular application and specifications of each customer.

1.3 Safety Warning

Wherever hazardous gases or vapor-producing liquids are used, transported, or stored, the potential for an accidental leak exists. Continuous monitoring of these hazards is essential to ensure personnel safety.

1.4 Specifications

The specifications listed in this section are generalized for this equipment. Welker can modify the equipment according to your company's needs. **Please note that the specifications may vary depending on the customization of your equipment.**
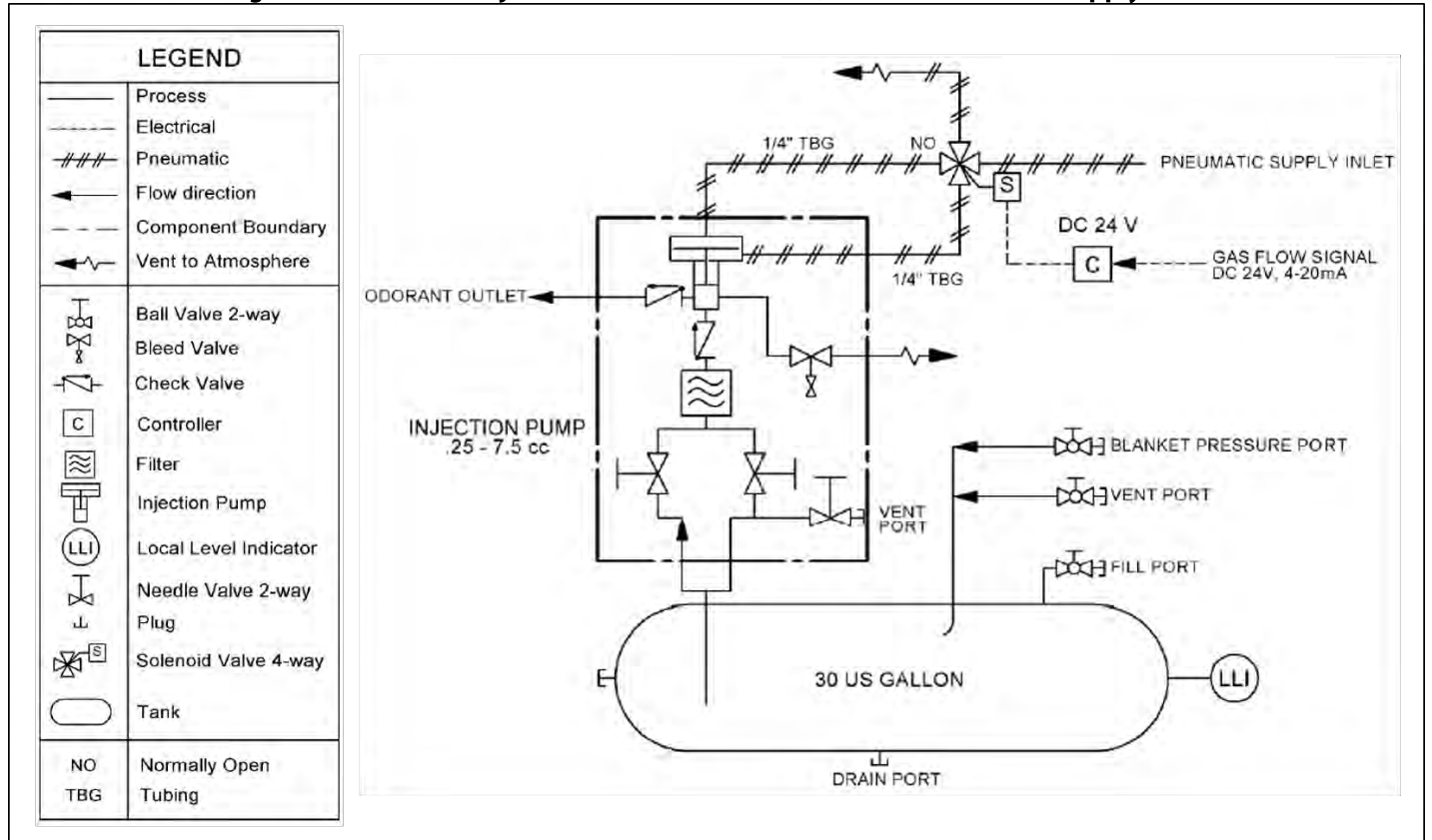
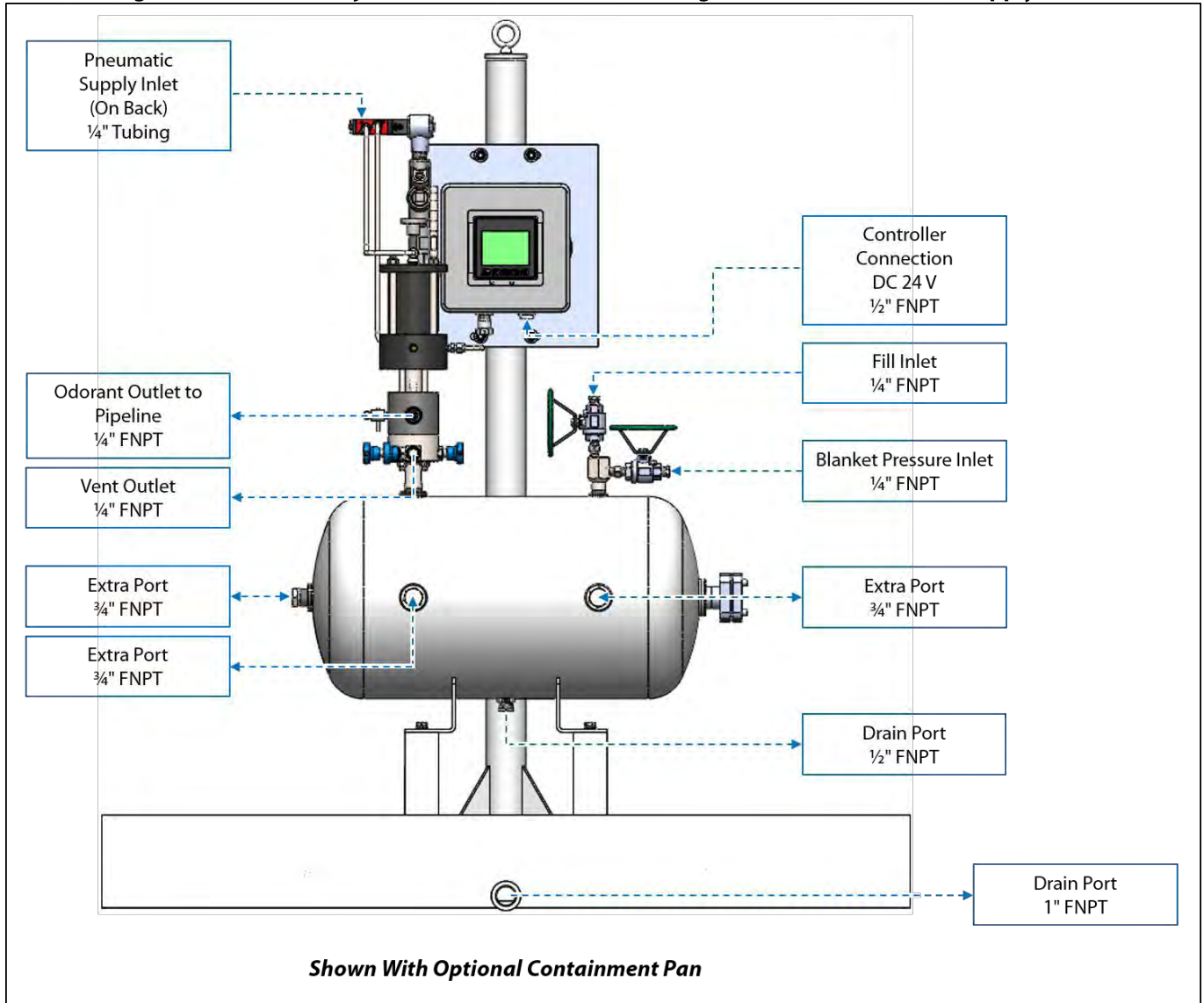| Table 1: Essentials ™ Injection Odorizer Specifications	
Application	Liquid Odorant Injection
Materials of Construction	316/316L Stainless Steel and Painted Carbon Steel
Maximum Allowable Operating Pressure	**Actuation:** 115 psig @ 5 °F to 104 °F (*7 barg @ -15 °C to 40 °C*)
	Odorant Injection: 1480 psig @ -4 °F to 120 °F (*102 barg @ -20 °C to 48 °C*)
	Odorant Tank: 200 psig @ -4 °F to 120 °F (*13 barg @ -20 °C to 48 °C*)
Connections	**Blanket Pressure Inlet:** ¼" FNPT
	Drain Port: ½" FNPT
	Fill Inlet: ¼" FNPT or ¾" FNPT
	Odorant Outlet: ¼" FNPT
	Pneumatic Supply Inlet: ¼" Tubing
	Vent Outlet: ¼" FNPT
Utility Requirements	**Regulated Pneumatic Supply:** To Actuate Solenoid
	Regulated Pneumatic Supply: Blanket Pressure
Electrical Connection	DC 24 V, ½" FNPT
Volume	**Injection Volume:** 0.25–7.50 cc
	Odorant Tank: 10 or 30 US Gallons
Operation	**SSO-9MED:** Piston-Operated
Features	4-Way Solenoid
	Controller With LCD Display
	Odorant Tank Level Gauge
	Welker SSO-9MED Sample/Injection Pump
Options	Containment Pan
	Solar Panel With Battery and Controller Box

1.5 Equipment Diagrams

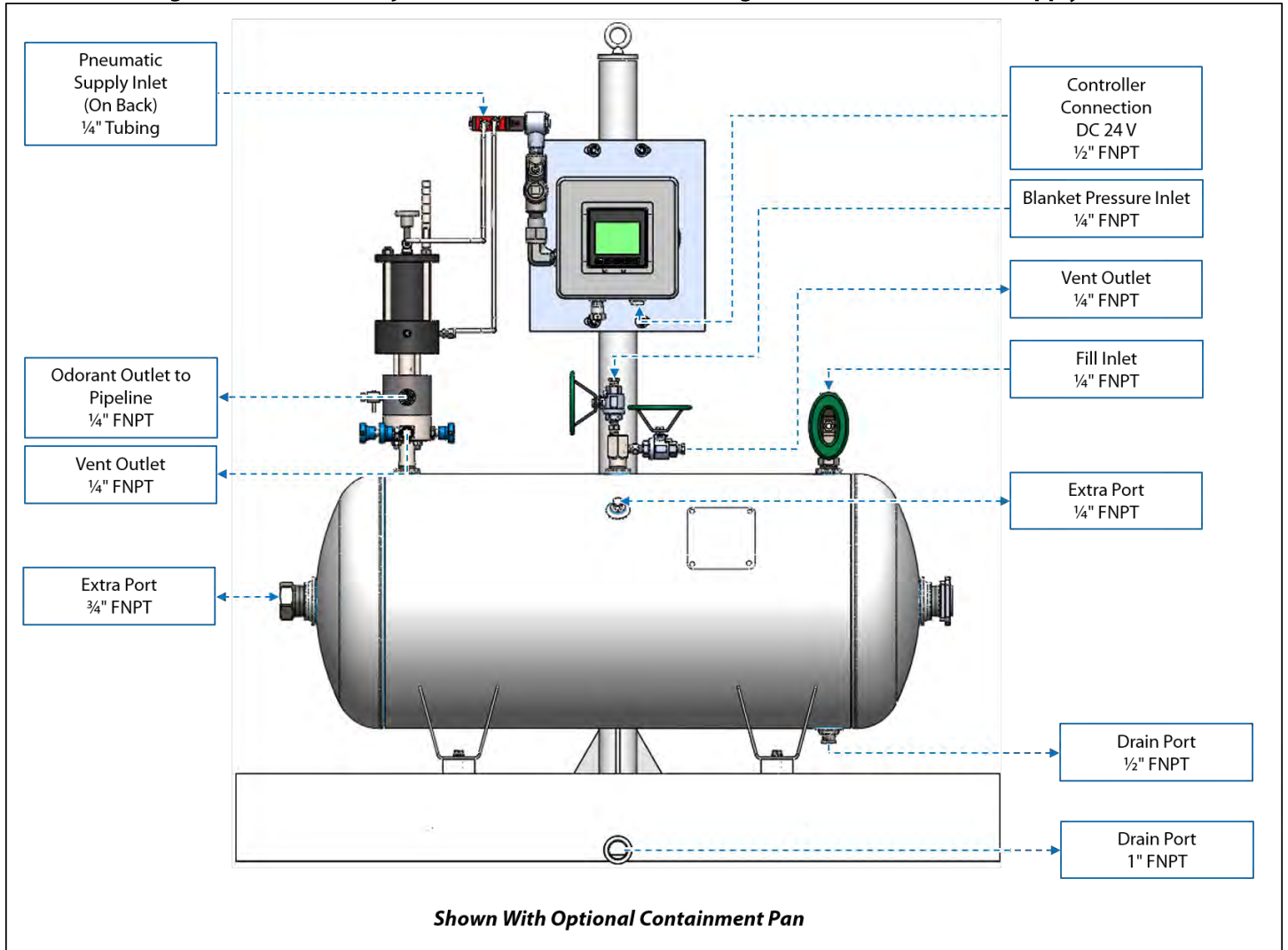### Figure 1: Essentials™ Injection Odorizer Schematic, 10-Gallon Odorant Supply Tank
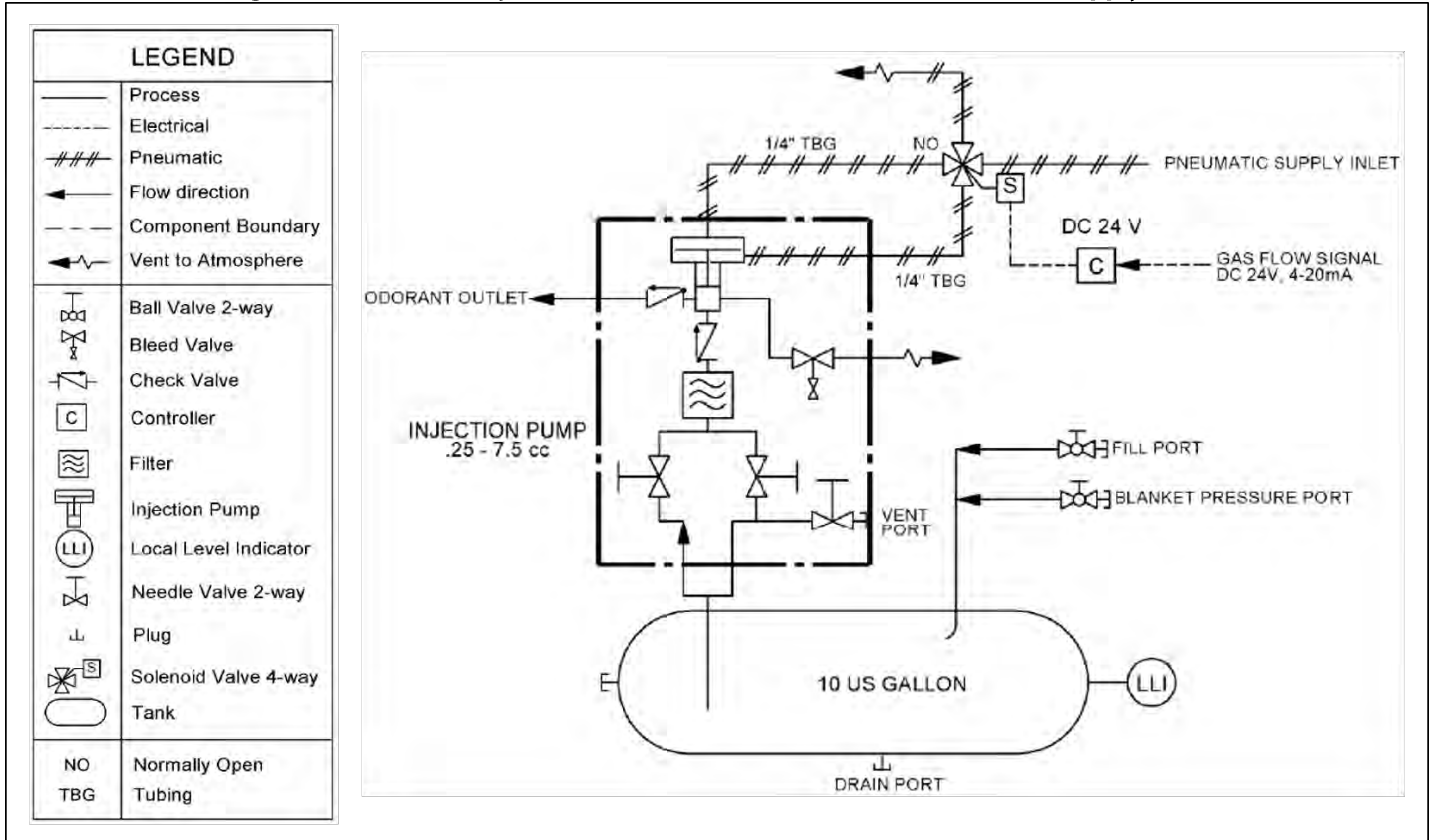
Figure 2: Essentials™ Injection Odorizer Schematic, 30-Gallon Odorant Supply Tank

Figure 3: Essentials™ Injection Odorizer Connections Diagram, 10-Gallon Odorant Supply Tank

Pneumatic Supply Inlet (On Back) ¼" Tubing

Controller Connection DC 24 V ½" FNPT

Fill Inlet ¼" FNPT

Odorant Outlet to Pipeline ¼" FNPT

Blanket Pressure Inlet ¼" FNPT

Vent Outlet ¼" FNPT

Extra Port ¾" FNPT

Extra Port ¾" FNPT

Extra Port ¾" FNPT

Drain Port ½" FNPT

Drain Port 1" FNPT

Shown With Optional Containment Pan

Figure 4: Essentials™ Injection Odorizer Connections Diagram, 30-Gallon Odorant Supply Tank

Pneumatic
Supply Inlet
(On Back)
¼" Tubing

Controller
Connection
DC 24 V
½" FNPT

Blanket Pressure Inlet
¼" FNPT

Vent Outlet
¼" FNPT

Odorant Outlet to
Pipeline
¼" FNPT

Fill Inlet
¼" FNPT

Vent Outlet
¼" FNPT

Extra Port
¼" FNPT

Extra Port
¾" FNPT

Drain Port
½" FNPT

Drain Port
1" FNPT

Shown With Optional Containment Pan

Figure 5: Essentials™ Injection Odorizer Diagram, 10-Gallon Odorant Supply Tank

No.	Description
1	Controller With Enclosure
2	Liquid Level Gauge
3	Welded Skid Assembly With Optional Containment Pan
4	Odorant Supply Tank
5	Welker SSO-9MED Sample/Injection Pump (See Figure 7)
6	Solenoid Manual Override
7	Solenoid
8	Ground Lug
D	Odorant Tank Fill Valve
E	Blanket Pressure Inlet Valve
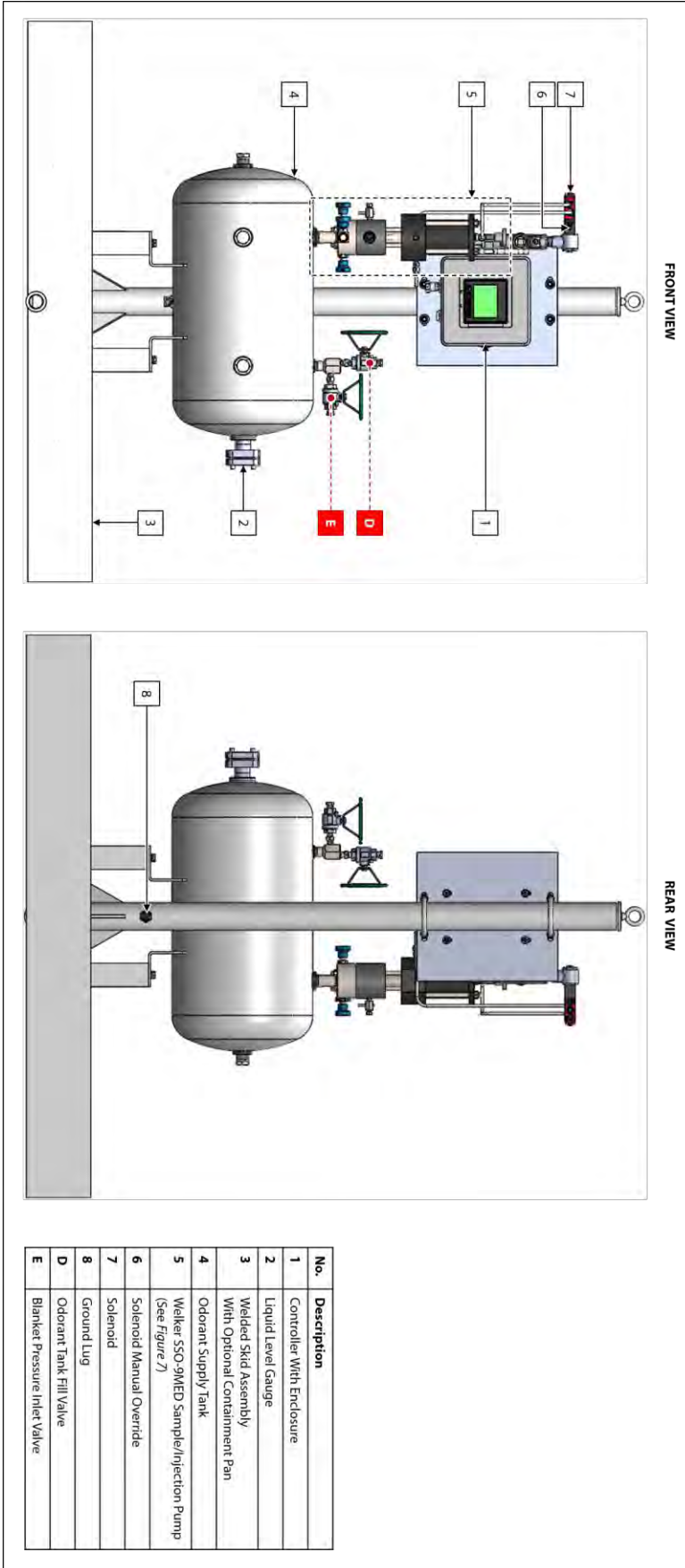
Figure 6: Essentials™ Injection Odorizer Diagram, 30-Gallon Odorant Supply Tank

No.	Description
1	Controller With Enclosure
2	Liquid Level Gauge
3	Welded Skid Assembly With Optional Containment
4	Odorant Supply Tank
5	Welker SSO-9MED Sample/Injection Pump (See Figure 7)
6	Solenoid Manual Override
7	Solenoid
8	Ground Lug
D	Odorant Tank Fill Valve
E	Blanket Pressure Inlet Valve
F	Vent Valve
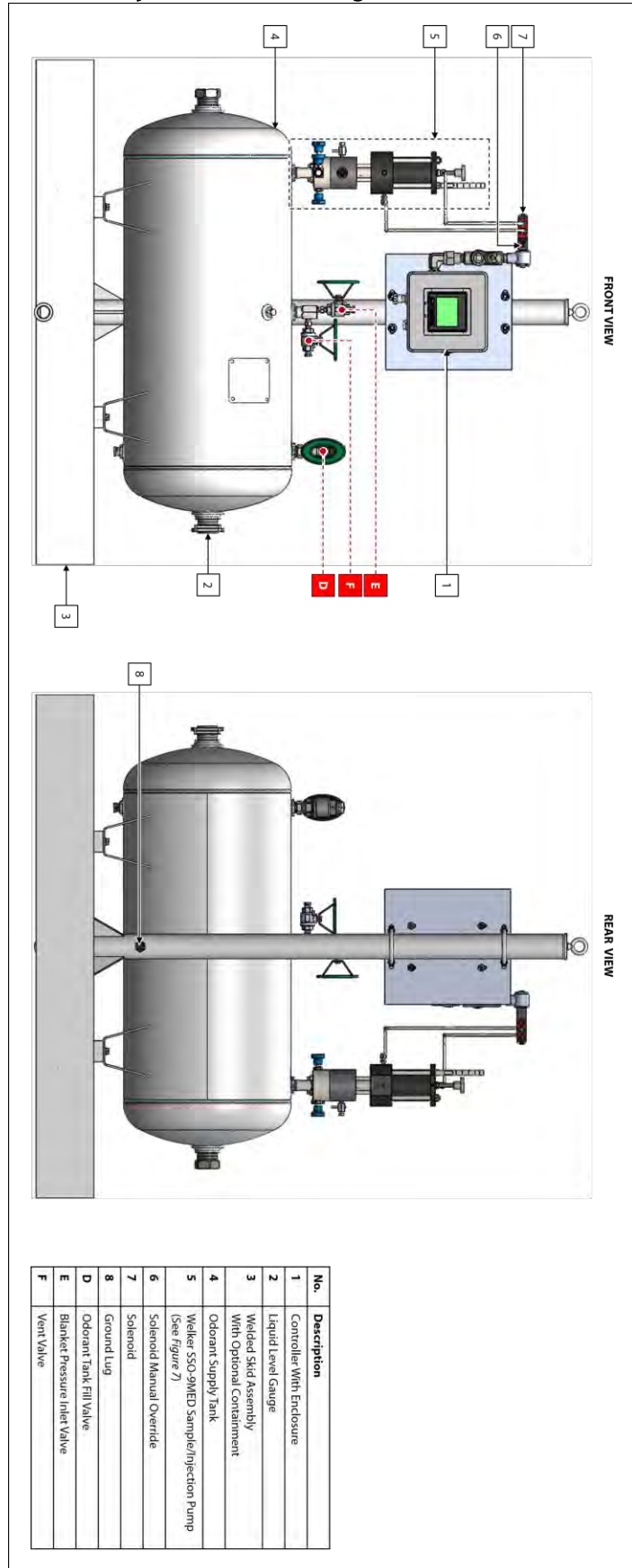
Figure 7: Welker SSO-9MED Sample/Injection Pump

FRONT VIEW

1 — Volume Indicator Rod
10 — Adjustment Knob
2 — Power End Cap
9 — Power Cylinder
3 — Power Cylinder Base
8 — Injection Cylinder
7 — Bleed Valve
4 — Injection End Cap
B — Isolation Valve
A — Inlet Valve
C — Vent Valve
5 — Body
6 — Probe

Odorant Inlet

LEFT SIDE VIEW

1 — Volume Indicator Rod
10 — Adjustment Knob
2 — Power End Cap
9 — Power Cylinder
3 — Power Cylinder Base
11 — Muffler
8 — Injection Cylinder
4 — Injection End Cap
12 — Welker CV-K Check Valve
7 — Bleed Valve
Odorant Outlet ¼" FNPT
Vent Outlet ¼" FNPT
B — Isolation Valve
C — Vent Valve
5 — Body
6 — Probe

Odorant Inlet

No.	Description
1	Volume Indicator Rod
2	Power End Cap
3	Power Cylinder Base
4	Injection End Cap
5	Body
6	Probe
7	Bleed Valve
8	Injection Cylinder
9	Power Cylinder
10	Adjustment Knob
11	Muffler
12	Welker CV-K Check Valve
A	Inlet Valve
B	Isolation Valve
C	Vent Valve

2.1 Before You Begin

After unpacking the unit, check the equipment for compliance and any damage that may have occurred during shipment. Immediately contact a Welker representative if you received damaged equipment.

When sealing fittings with PTFE tape, refer to the proper sealing instructions for the brand used.

The Essentials™ Injection Odorizer will ship skid-mounted and "hard-tube" connected with manufacturer-supplied fittings and hardware. However, the customer will need to supply some tubing and fittings in order to complete the installation of the system.

2.2 Installation

Pipeline Injection Point

1. If the Essentials™ Injection Odorizer will be connected to a Welker OdorEyes SFA Sight Flow Assembly at the pipeline, install the SFA to the desired injection point. Refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the SFA for installation instructions.
2. If the Essentials™ Injection Odorizer will be connected to a Welker SP-DP Diffusing Probe at the pipeline, install the SP-DP to the desired injection point. Refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the SP-DP for installation instructions.

System Skid

3. Mount the skid in accordance with the bolting pattern to a flat, level surface, such as a concrete slab (*Figure 8*).

Figure 8: Bolting Pattern

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED
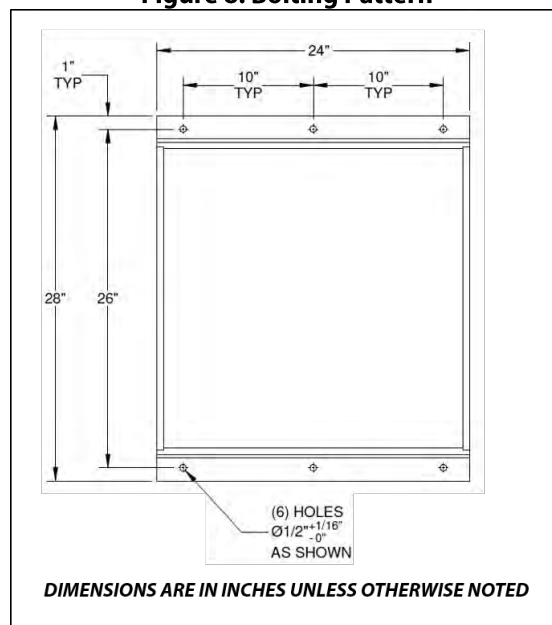
4. Connect a grounding wire to the ground lug to safely ground the system (*Figure 5* or *Figure 6*).

5. If the Essentials™ Injection Odorizer is equipped with the optional solar panel, install the solar panel to the top of the center post.

> The solar panel must face the direction of the sun and cannot be shaded during daylight hours. Any shading of the solar panel could greatly reduce the output of the solar panel and inhibit the battery from charging.

6. If the Essentials™ Injection Odorizer is equipped with the optional solar panel, install the battery to the battery and controller box, and then connect the solar panel to the battery.

System Connections

7. Using appropriately sized customer-supplied tubing, connect from the odorant outlet on the Welker SSO-9MED Sample/Injection Pump to the injection point (e.g., the inlet of the SFA or SP-DP) (*Figure 3* or *Figure 4*).
8. Using ¼" customer-supplied tubing, connect a customer-supplied pneumatic supply to the solenoid (*Figure 3* or *Figure 4*).
9. Using ¼" customer-supplied tubing, connect a customer-supplied regulated pneumatic supply to the blanket pressure inlet (*Figure 3* or *Figure 4*).

> ⚠ A minimum blanket pressure of 25 psig (*1.7 barg*) is required. Do not exceed the maximum allowable operating pressure of the odorant supply tank.

> Welker recommends a gauge be installed to monitor the pressure of the odorant supply tank.

10. If desired, use ¼" customer-supplied tubing to tube away from the vent outlet on the SSO-9MED and the odorant supply tank, if applicable, to an area away from personnel and equipment (*Figure 3* or *Figure 4*).

> If the vent outlet tubing will terminate outdoors, Welker recommends installing a screen or muffler to prevent dust and insects from entering the tube and restricting flow.

11. If desired, install a valve to the drain port on the odorant supply tank (*Figure 3* or *Figure 4*).
12. Ensure that all valves on the system are closed.
13. Ensure that all fittings, connections, and bolts are tightened.

Electrical Connections

| STOP | Turn OFF the electrical supply prior to making electrical connections. |

14. Connect a DC 24 V electrical supply to the controller (*Figure 3* or *Figure 4*). Refer to the industry standards for appropriate electrical connections to interface with the controller.

| STOP | For systems used in hazardous locations, sealing compound is required to seal all fittings to restrict the passage of gases, vapors, or flames. |

15. Connect the customer gas flow signal device to the termination block.

| 📝 | The controller can accept analog, pulse, or Modbus input. |

2.3 Start-Up Procedures

Odorant Supply Tank

1. Fill the odorant supply tank in accordance with company policy and procedure, taking care not to exceed 80% of the total volume of the supply tank.

| STOP | Never fill the odorant supply tank above 80% of its capacity. Allow at least 20% for product expansion, should the tank be exposed to increased temperatures. |

2. Check the odorant supply tank for leaks and repair as necessary.

Venting the SSO-9MED

3. Slowly open vent valve C to purge the SSO-9MED body and odorant supply tank of any trapped air (*Figure 7*).
4. Once all air has been purged, close vent valve C.

| 📝 | Welker recommends plugging this valve when not in use. |

Blanket Pressure

5. Open blanket pressure inlet valve E (*Figure 5* or *Figure 6*).
6. Open the regulated external blanket pressure supply source.
7. Check the blanket pressure connections for leaks and repair as necessary.

Valve Configuration

8.   Slowly open inlet valve A (*Figure 7*).
9.   If the Essentials™ Injection Odorizer is connected to an SFA or an SP-DP at the pipeline, slowly open any valves between the odorant outlet on the SSO-9MED and the SFA or SP-DP.
10.   Check for leaks and repair as necessary.

Purging the SSO-9MED

11.   Using a wrench, slowly loosen the cap on the bleed valve to purge the injection chamber of any trapped air (*Figure 7*).

> **STOP** Take the necessary precautions and wear appropriate personal protective equipment (PPE) to protect from potential harm caused by exposure to the injection chemical.

> If desired, a small hose may be connected to the bleed valve to collect any chemical that may appear at the purge outlet.

12.   Once all air has been purged from the injection chamber, tighten the bleed valve cap.
13.   As necessary, adjust the injection volume.

> Loosen the jam nut on the adjustment screw.
> To increase the injection volume, turn the adjustment knob counterclockwise.
> To decrease the injection volume, turn the adjustment knob clockwise.
> Tighten the jam nut on the adjusting screw to secure the adjusting screw at the desired volume.

14.   Open the valve on the inlet of the SFA or SP-DP, if applicable, or any valve(s) restricting the flow of odorant from the Essentials™ Injection Odorizer to the pipeline.

Verifying Pump Operation

15.   Pump operation can be verified by energizing the solenoid to actuate the SSO-9MED. To energize the solenoid, press and hold the manual override on the solenoid (*Figure 5* or *Figure 6*).
16.   As the SSO-9MED strokes, verify liquid odorant is being injected into the pipeline.

> Welker recommends a minimum of ten (10) actuations to verify the sample volume.

> The injection of liquid odorant into the pipeline can be verified a number of ways.
> - If an SFA is used, product flow can be observed by visually examining the incorporated Welker SG-4 Sight Glass.
> - If an SP-DP is used, product flow can be indicated by a sight glass or pressure gauge. If the SP-DP is equipped with a Welker SG-4 Sight Glass, the Visual Flow Indicator (a.k.a. Spinner Wheel) should spin. If a pressure gauge is installed upstream of the inlet check valve, the pressure gauge will spike as pressure builds to overcome the check valve.

Controller Configuration

17.   Verify that the customer set points have been correctly set by the manufacturer.
18.   Once the collection and injection of liquid odorant have been confirmed, the Essentials™ Injection Odorizer is operational.
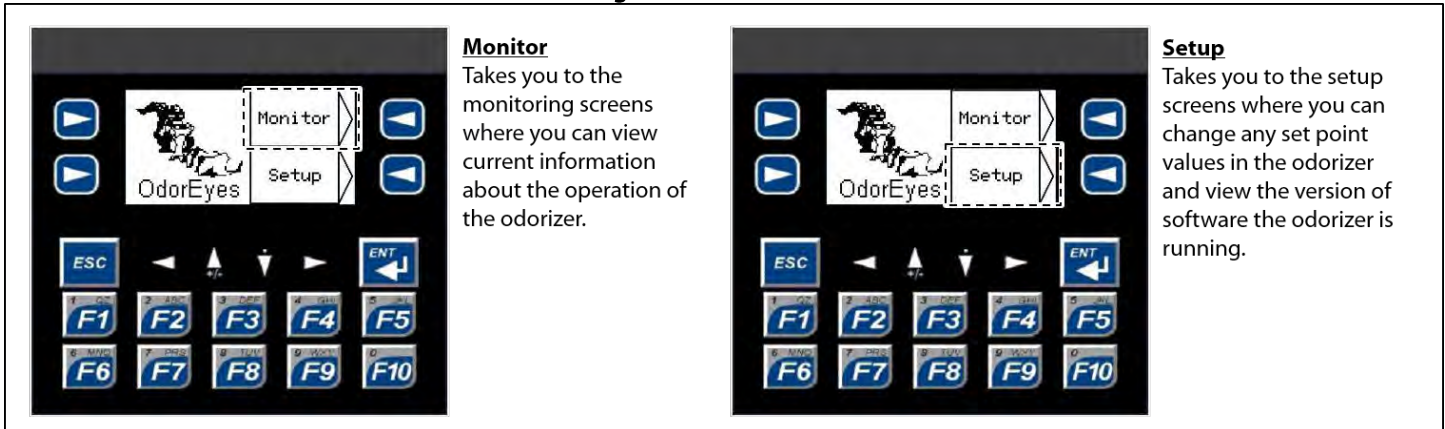
3.1 Understanding the Display

> The controller is used to modify system parameters and view current system information and current alarm status.

> The controller is a menu-driven system. The home screen is the top screen in the menu tree (*Figure 9*).

Figure 9: Home Screen

Monitor
Takes you to the monitoring screens where you can view current information about the operation of the odorizer.

Setup
Takes you to the setup screens where you can change any set point values in the odorizer and view the version of software the odorizer is running.

> From the home screen, the user can access three (3) types of screens:
> - **Menu**-from this type of screen, the user can access submenus.
> - **Informational**-from this type of screen, the user can monitor the odorizer and view current operating conditions.
> - **Setup**-from this type of screen, numeric and/or text values that affect the setup of the odorizer can be changed.

Navigating the Display

Figure 10: Controller Toolbar

Top Arrows
Press to select the on-screen button directly next to the arrow.

Left Arrow
Press to scroll backward.

Right Arrow
Press to scroll forward.

Bottom Arrows
Press to select the on-screen button directly next to the arrow.

Up Arrow
Press to move up on the screen.

Down Arrow
Press to move down on the screen.

ESC
Takes you back one (1) level in the menu tree to the previous screen.

Press to discard unwanted changes.

ENT
Press to select a value to edit.

Press to save changes made.

F Keys
Use the numerical values of the F keys to change numerical values in the odorizer.

If no buttons or arrows are pressed for a certain amount of time, the sleep function will cause the backlight on the screen to turn off. To wake up the controller, press one of the buttons or arrows.

3.2 Navigating the Monitor Menus

> Through the Monitor menu, the user can access the System Status, Current Alarms, Audit Trail, and Alarms Log to view current information for the odorizer.

> Monitor screens are informational screens: no values can be changed from these screens.

Figure 11: Monitor Menu Submenus

Monitor Menu
View current information about the operation of the odorizer.

System Status Menu
Submenus display an overview of system performance.

Audit Trail
Screen displays the audit trail, which is stored in the system internal memory and to the SD card if SD Card Data Logging is enabled.

Current Alarms
Active alarms will be displayed here. Inactive alarms will not be displayed.

All alarms are automatic; there is no way to reset any of the alarms manually.

Alarms Log
Screen displays the alarms log, which is stored in the system internal memory and to the SD card if SD Card Data Logging is enabled

System Status

📝	The System Status submenus provide the user with an overview of system performance.

Figure 12: System Status Submenus

System Status Menu
Submenus display an overview of system performance.

Rates & Totals
Screen displays an overview of system performance.

Pump Stats
Enter this submenu to view the current pump statistics.

Stroke Frequency
Screen displays the pump in service, current cycle time, and a countdown to the next pump stroke.

Tank Level
Enter this submenu to view the current level of odorant in the tank.

Rates & Totals

Figure 13: System Status – Rates & Totals
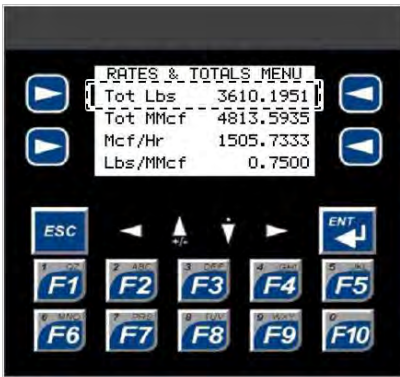
Tot Lbs
The total number of pounds that have been injected into the pipeline since the system was last reset.

This value must occasionally be manually reset at a time interval determined by the user.

Mcf/Hr
The current volume of gas flowing in the pipeline relative to time.

Tot MMcf
The total amount of gas flow the odorizer has seen since the system was last reset.

This value must occasionally be manually reset at a time interval determined by the user.

Lbs/MMcf
The current odorant usage by the system relative to gas flow (lb/MMcf) (a.k.a. injection rate).

Stroke Frequency

Figure 14: System Status – Stroke Frequency

Pump In Service
This indicates which pump is currently injecting odorant into the pipeline.

Note this system has one (1) pump.

Next Pump Stroke In
This is a countdown timer until the next stroke of the pump. The countdown time is given in seconds.

Pump Cycle Time
This indicates the current cycle time (in seconds) of the pump.

Pump Stats

Figure 15: System Status – Pump Stats
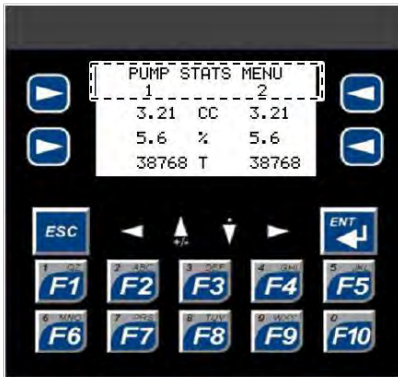
Pump
The (1) column displays statistics for the first pump.

The (2) column displays statistics for the second pump, if applicable.

Note this system has one (1) pump.
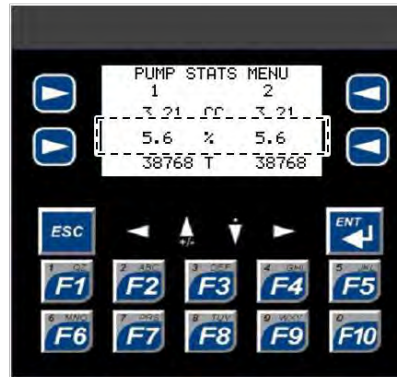
%
The 10-stroke average deviation of the pump from the user's set point.

If the pump is below its set point, it will show a negative percentage.

If the pump is above its set point, it will show a positive percentage.
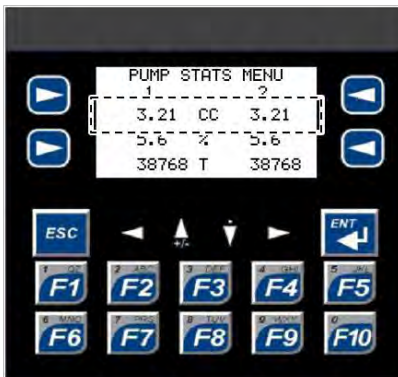
CC
The volume of odorant the pump injected on its last stroke. The volume is given in cubic centimeters (cc).

T
The total number of strokes for the pump since the system was last reset by the user.

This should be reset after performing pump maintenance.

Tank Level

Figure 16: System Status – Tank Level

This screen displays the amount of odorant remaining in the odorant supply tank in inches, US gallons, and pounds.

These values will either be from a level transmitter or a calculation based on odorant usage.

Current Alarms

Figure 17: Current Alarms

Current Alarms
Active alarms will be displayed here. Inactive alarms will not be displayed.

All alarms are automatic; there is no way to reset any of the alarms manually.

Table 2: Current Alarms	
Analog Flow	Can only be active if Analog Input method is selected.
Pulse Flow	Can only be active if Pulse Input method is selected.
Constant Rate	Can only be active if Constant Rate mode is specified as the desired fail mode. The controller will enter this gas flow fail mode when there is a gas flow signal loss.
Shutdown Mode	Can only be active if Shutdown Mode is specified as the desired fail mode. The controller will enter this gas flow fail mode when there is a gas flow signal loss.
Fixed Rate	Can only be active if Fixed Mode is enabled.
Tank Level	Can only be active if an electronic level transmitter is used to track the odorant tank level and the controller loses the 4–20 mA signal from the transmitter. **NOTE:** If this alarm is active, the controller will automatically switch to the odorant flow method to track the odorant tank level. The controller will use the value of odorant in the tank and subtract the appropriate volume with each stroke.
Tank Low Level	Active if the odorant tank level has dropped below the specified value.
P1 Overflow	Active if the pump output for the last ten (10) strokes exceeds the allowable average deviation.
P1 Low Flow	Active if the pump output for the last ten (10) strokes is below the allowable average deviation.
P1 No Flow	Active if after ten (10) strokes there is no output from the pump.
SD Card Error	Active if SD Card Data Logging is enabled but no micro SD card is installed.

Audit Trail

📝	From the Audit Trail submenu, the user can access the audit trail records stored on internal memory. Up to 600 audit trail records can be stored and viewed.

📝	If SD Card Data Logging is enabled, the audit trail records will also be stored on the installed micro SD card. The micro SD card is equipped with 2 GB of storage.

Figure 18: Audit Trail

Audit Trail
Screen displays the audit trail, which is stored in the system internal memory and to the SD card if SD Card Data Logging is enabled.

Press the left or right arrow to scroll through the audit trail records.

Up to 600 audit trail records can be stored on the system's internal memory.

If SD Card Data Logging is enabled, these records will also be stored to the SD card.

MMcf
Total amount of gas flow the odorizer saw during the user-defined time frame.

The time the audit trail record was captured.

The date the audit trail record was captured.

The audit trail record number.

Lbs/MMcf
Total odorant usage by the system relative to gas flow (lb/MMcf) (a.k.a. injection rate) during the user-defined time frame.

Pounds
The amount of odorant in pounds that was injected during the user-defined time frame.

Gal Remaining
Total amount of odorant remaining in US gallons at the end of the user-defined time frame.

Alarms Log

> From the Alarms Log submenu, the user can access the alarms log records stored on internal memory. Up to 428 alarms log records can be stored and viewed.

> If SD Card Data Logging is enabled, the alarms log records will also be stored on the installed micro SD card. The micro SD card is equipped with 2 GB of storage.

Figure 19: Alarms Log

Alarms Log
Screen displays the alarms log, which is stored in the system internal memory and to the SD card if SD Card Data Logging is enabled

Press the left or right arrow to scroll through the alarms log records.

Up to 428 alarms log records can be stored on the system's internal memory.

If SD Card Data Logging is enabled, these records will also be stored to the SD card.

The date and time the alarm occurred or cleared.

The alarm code

The alarms log record number.

The name of the alarm.

3.3 Navigating the Setup Menus

Through the Setup menu, the user can access the System Setup, Controller Options, History Logging, and System I/O submenus and change numeric and/or text values that alter the parameters and features of the odorizer.

Changing numeric and/or text values in the Setup submenus will alter how the system operates.

Figure 20: Setup Menu Submenus

System Setup
Access submenus to configure all items related to the operation and performance of the odorizer.

History Logging
Set up and reset the local data logs stored by the odorizer.

Controlr Options
Customize the odorizer for communications and screen operation.

System I/O
Screen displays the current status of the digital inputs, digital outputs, and analog inputs in the system.

Changing Values on Setup Screens

> If a mistake is made while entering a new value or if the value does not need to be changed, press ESC to discard unwanted changes (*Figure 10*).

Numeric Values

1. To change a numeric value, use the appropriate arrow on the side of the screen to select the value to be changed (*Figure 10*).
2. Once the value is highlighted, press ENT to edit the value.
3. Using the numbers on the F keys, type in the new numeric value.
4. Once the new numeric value has been entered, press ENT to save the changes.

> If the new value entered is outside the range of allowable values, the value will revert to the previous value once ENT is pressed.

Text Values

5. To change a text value, use the appropriate arrow on the side of the screen to select the field to be changed (*Figure 10*).
6. Once the value is highlighted, press ENT to edit the value.
7. Scroll through the value's options using the up and down arrows.
8. Highlight the desired text value, and then press ENT to save the changes.

System Setup

> Through the System Setup menu, the user can configure all items related to the operation and performance of the odorizer.

Figure 21: System Setup Submenus
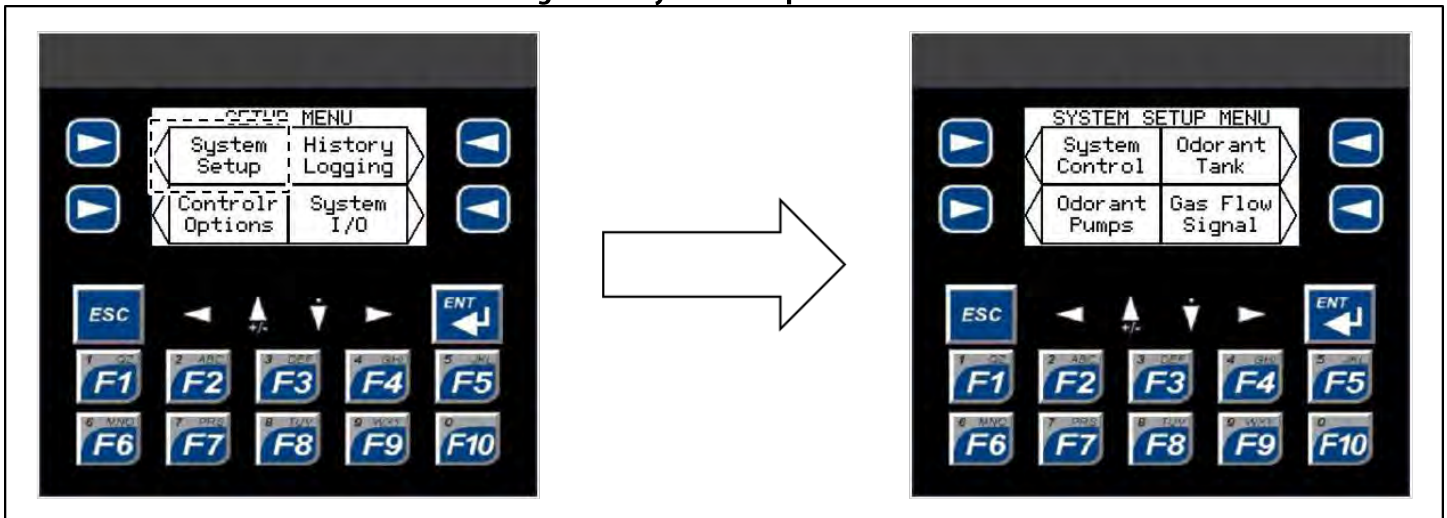
System Control

> Through the System Control submenu, the user can set the general parameters for the odorizer.

Figure 22: System Setup – System Control

Lbs/MMcf Rate
This is the injection rate the user would like the system to maintain.

The system will stroke the pump faster or slower in order to odorize proportional to flow and to maintain this injection rate.

Reset Totals
Toggling this field to "Yes" causes the gas flow and odorant flow totals to be reset.

Once reset, this field will automatically revert to "No."

Odorant Meter
For systems equipped with an odorant meter, the user would enter this submenu to enable or disable the odorant meter and to view the pump deviation and K value.

This submenu is not applicable for this system.

The Odorant Meter submenu is not applicable for this system.

Figures 23: System Control – Odorant Meter
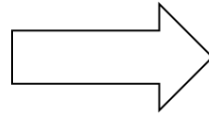
Meter
When enabled, each stroke of the pump is measured, monitored, and recorded, and the pump stroke frequency will adjust based on this value.

When disabled, each stroke of the pump is assumed to be at its set value.

Deviation Alarm %
This is the allowable deviation the pump can work in before it will alarm for low flow or pump overflow.

The smaller this value, the more closely the user must monitor the pump and the less tolerant the system will be of pump output variations.
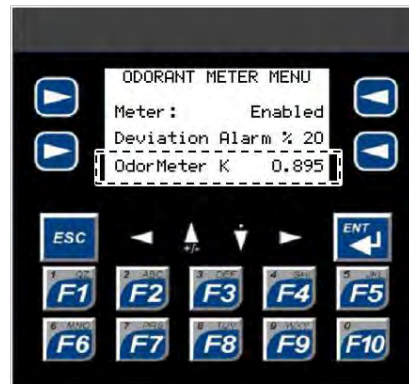
Odor Meter K
This value is factory-set for the odorant flow meter. This value represents how many revolutions of the meter it takes to equal 1 cc of liquid.

Odorant Pumps

Through the Odorant Pumps submenu, the user can input information for the injection pump.

Figure 24: System Setup – Odorant Pumps

Pump 1 Setup
Set the known output of the pump, manually stroke the pump, reset the total number of pump strokes, and reset the pump alarms.

Pump Config
View and change the current operation of the pump.

Advanced Setup
Set the minimum cycle time of the pump.

Figure 25: Odorant Pump Setup
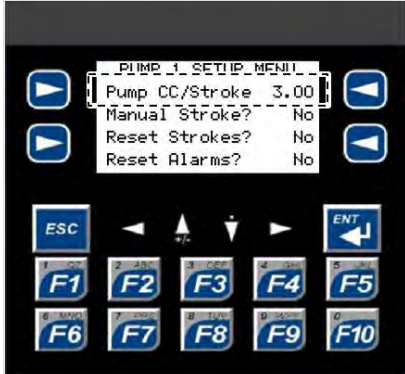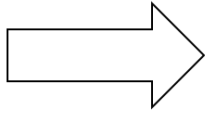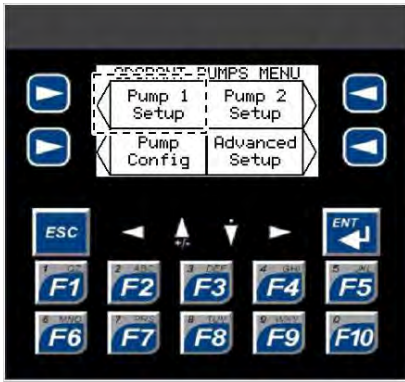
Pump CC/Stroke
Set the known output of the pump in cubic centimeters (cc).

Reset Strokes
Pressing this button will reset the total number of strokes for the pump. This option is to assist in the tracking and scheduling of pump maintenance. After being reset, this field will revert to its normal state.

Manual Stroke
Manually stroke the pump.

When the pump is set to stroke it will be highlighted until the first available opportunity, at which time it will stroke the pump. After a manual pump stroke, this field will revert to its normal state.

Reset Alarms
Pressing this button will reset the pump alarms, which also resets the average deviation to 0%. Alarms are typically reset after maintenance has been performed on the pump and it is put back into service. After being reset, this field will revert to its normal state.

Figure 26: Odorant Pumps – Pump Configuration

P1 / P2
View the current operation of the pump.

Note this system has one (1) pump.

Change Pump Operation
Change the current operation of the pump as displayed above.

The pump can be set up according to the Pump Operation Configurations table.

Note this system has one (1) pump.

Pump Operation Configurations	
Pump 1	**Pump 2**
None	None
Primary	None

Figure 27: Odorant Pumps – Advanced Setup

Min Sol Off Time
The minimum amount of time required to reset the pump before the next stroke.

This value is factory-set.

Min Sol Dwell
The minimum amount of time required to stroke the pump.

This value is factory-set.

Allow Dual Pump Stroke
This option is factory-set to disabled, as the system has one (1) pump.

Odorant Tank

Through the Odorant Tank submenus, the user can input information for the odorant tank.

Figure 28: System Setup – Odorant Tank

Method
Toggle between the two (2) methods for tracking the odorant tank level:
1. odorant flow
2. electronic level transmitter

Odorant Flow
Enter this submenu to view the tank volume settings.

Low Level Alarm %
The low level alarm set point is a percent value at which the system will trigger an alarm for low odorant level in the tank.

Transmitter
Enter this submenu to set up the parameters for how the tank level will operate.

Odor Lbs/Gal
The odorant density will vary according to the odorant used.

The odorant density should be published by the manufacturer in pounds/US gallon at 60 °F.

When using an electronic level transmitter to track the odorant tank level, the Method should be set to Transmitter.
When estimating the odorant tank level based on odorant usage, the Method should be set to Odorant Flow.

Figure 29: Odorant Tank – Odorant Flow
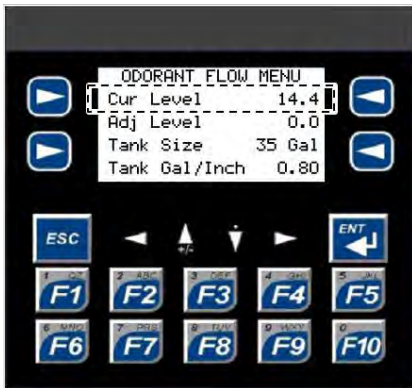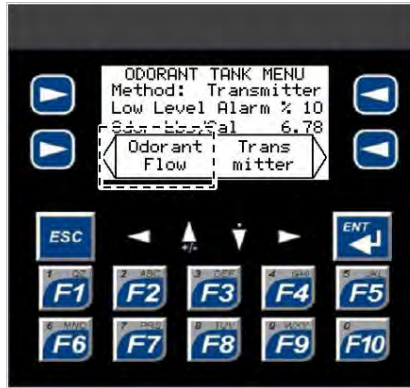
Cur Level
View the current level of the tank in US gallons.
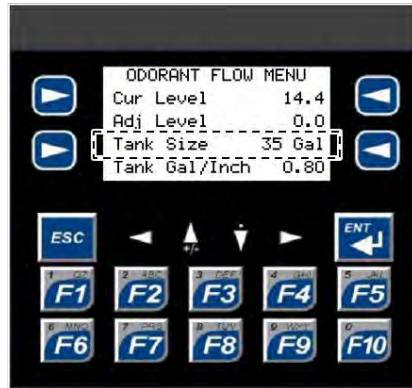
Tank Size
This is the volume of the tank in US gallons.
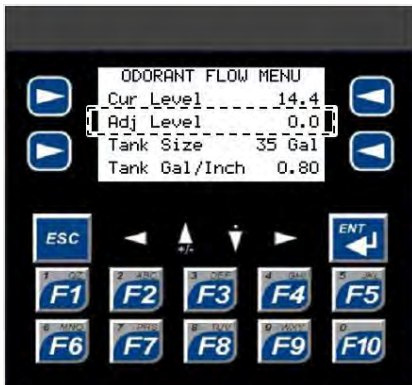
Adj Level
If the odorant flow method is used, the current tank level can be manually adjusted.
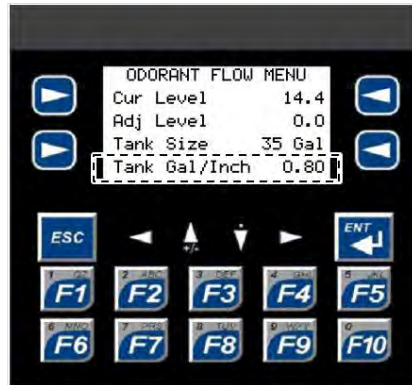
Tank Gal/Inch
This value is used to convert between US gallons and inches.

For vertical tanks, this value is based on the average US gallons/inch for the entire tank.

The Cur Level numeric value cannot be directly changed. Instead, the user must enter a value in the Adj Level field to increase or decrease the Cur Level by the specified amount.
- To decrease the Cur Level, enter the volume to be subtracted from the current level as a negative number in the Adj Level field, and then press ENT to save the changes. The Cur Level should have decreased by the amount entered, and the Adj Level field should have reverted to 0.0 Gal.
- To increase the Cur Level, enter the volume to be added to the current level in the Adj Level field, and then press ENT to save the changes. The Cur Level should have increased by the amount entered, and the Adj Level field should have reverted to 0.0 Gal.

Note this system is not equipped with a level transmitter.

Figure 30: Odorant Tank – Transmitter
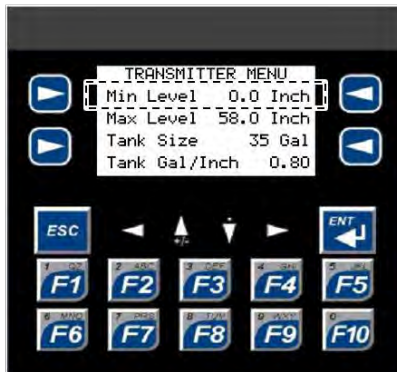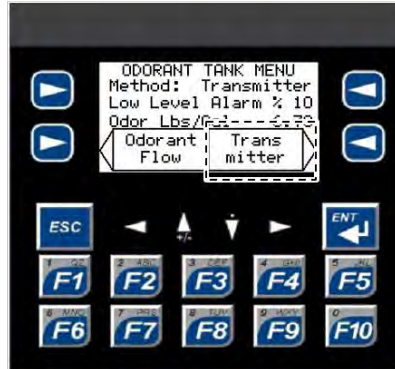
Min Level
If the electronic level transmitter method is used, this value is the 4 mA signal.

This value is typically factory-set at 0.0 inches.

Tank Size
This is the volume of the tank in US gallons.

Max Level
If the electronic level transmitter method is used, this value is the 20 mA signal.

Tank Gal/Inch
This value is used to convert between US gallons and inches.

For vertical tanks, this value is based on the average US gallons/inch for the entire tank.

Gas Flow Signal

> Through the Gas Flow Signal submenus, the user can set up the parameters of the odorant gas flow input signal.

Figure 31: System Setup – Gas Flow Signal Submenus
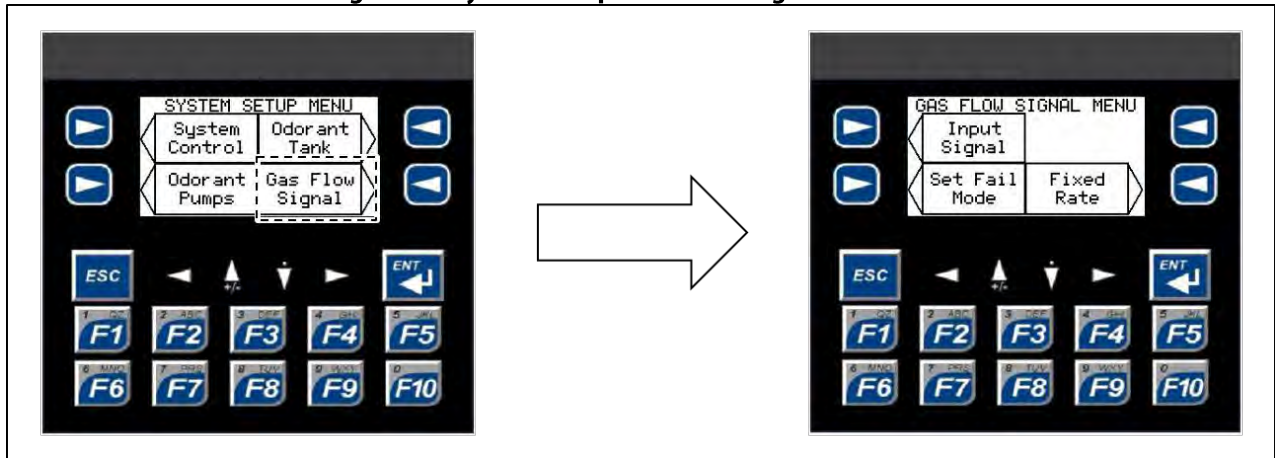
Figure 32: Gas Flow Signal – Input Signal

Method
Toggle this field to switch between the three (3) methods for the gas flow input signal:
1. analog input
2. pulse input
3. Modbus input

Pulse Input
If the pulse input method is used, enter this submenu to set up the applicable parameters.

See *Figure 34*.

Analog Input
If the analog input method is used, enter this submenu to set up the applicable parameters.

See *Figure 33*.

Figure 33: Gas Flow Signal – Analog Input

Max Flow
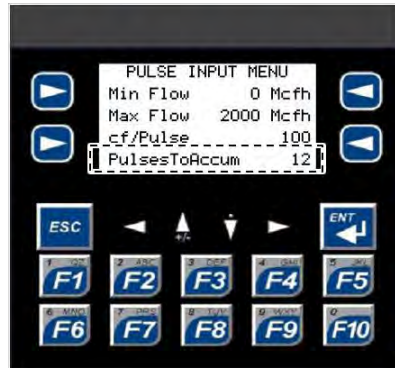If the analog input method is used, this value is the 20 mA signal.

Min Flow
If the analog input method is used, this value is the 4 mA signal.

In most cases, this value comes factory-set to zero (0) Mcf/h.

Zero Flow
This value is only active if the analog input method is used.

Any value below this gas flow low cutoff value (in milliamps) will be treated as zero gas flow (0 Mcf/h).

DL Mcfh
If the Modbus input method is used, this is the value the Modbus is downloading for the flow rate (Mcf/h).

> If the gas flow signal will be analog, the analog signal must be 4–20 mA powered by the user.

Figure 34: Gas Flow Signal – Pulse Input
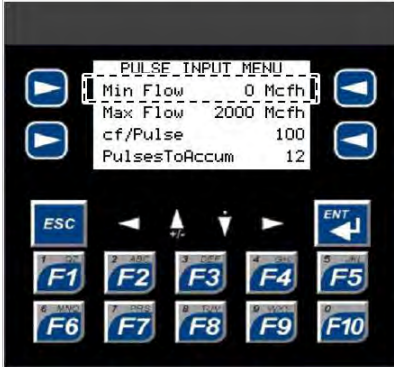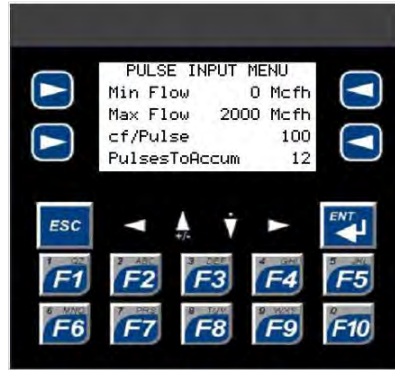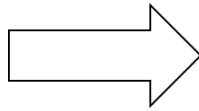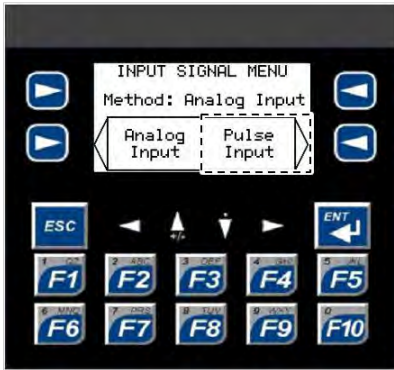
Min Flow
If the pulse input method is used, this value is the minimum actual gas flow.

In most cases, this value comes factory-set to zero (0) Mcf/h.
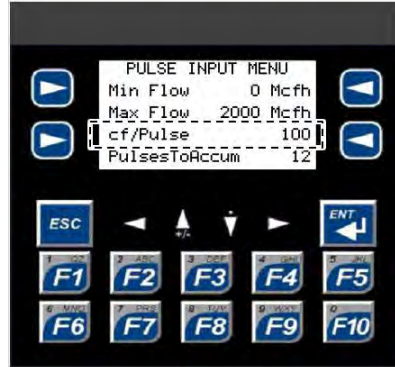
cf/Pulse
This value is the total cubic feet of gas that each pulse input to the controller represents.

This value is used for the pulse input method only.
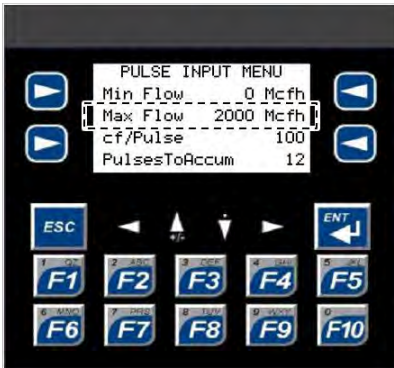
Max Flow
If the pulse input method is used, this value is the maximum actual gas flow.

PulsesToAccum
The system automatically calculates how many gas flow input signal pulses it will accept before the pump is stroked.

This value is used for the pulse input method only and is not a changeable value.

✎ If the gas flow signal will be a pulse, the pulse will be a digital pulse powered by the controller.

Figure 35: Gas Flow Signal – Set Fail Mode

Fail Mode
This value tells the controller how you want the system to react in the event of a gas flow signal loss.

The system can fail in shutdown or constant rate mode.

PI or DL Cutoff
The amount of time (in seconds) the system will wait between pulse inputs or changes of the downloaded Modbus value before it will determine there is a gas flow signal loss.

ConRate
This value is only active if the fail mode is set to constant rate mode.

In the event of a gas flow signal loss, the system will continue to odorize at the constant rate set here (Mcf/hr).

Setting the Fail Mode to Shutdown will halt odorization until the alarm is cleared.
Setting the Fail Mode to Constant Rate will allow odorization to continue at the specified rate.

If the gas flow value does not change during the PI or DL Cutoff, the system will alarm for loss of flow and will enter the specified Fail Mode. The alarm will clear on the next pulse input or change in Modbus gas flow, and the system will resume normal operation.

Figure 36: Gas Flow Signal – Fixed Rate Setup

Fixed Mode
When disabled, the system will odorize proportional to flow.

When enabled, the rate entered will be the assumed gas flow in the system and will override any other input parameters. The Fixed Rate Alarm will be active on the Current Alarms screen.

Rate
When Fixed Mode is enabled, the flow rate (Mcf/h) must be manually set. The system will odorize based on this rate until Fixed Mode is disabled.

Controller Options

Through the Controller Options submenus, the user can customize the screen operation and set up communication for the controller.

Figure 37: Controller Options Submenus

Auto Scroll
Enter this submenu to customize screen operation.

Date & Version
Enter this submenu to change the date and time values and view the version of software the controller is running.

Modbus Setup
If the Modbus input method is used, enter this submenu to configure the Modbus input and view the current status of the Modbus.

Compact Flash
If a micro SD card is installed to the system, its contents can be viewed from this screen.

Auto Scroll

Figure 38: Controller Options – Auto Scroll

When Auto Scroll is enabled, the controller will scroll through eight (8) pre-set screens.

See *Figure 39*.

Start Timeout
The length of controller inactivity (in seconds) after which the controller's sleep function will be enabled.

Screen Switch Time
The length of time (in seconds) each pre-set screen will display when Auto Scroll is enabled.

The Screen Switch Time can be set by the customer to the desired length of time.

Figure 39: Auto Scroll Pre-Set Screens
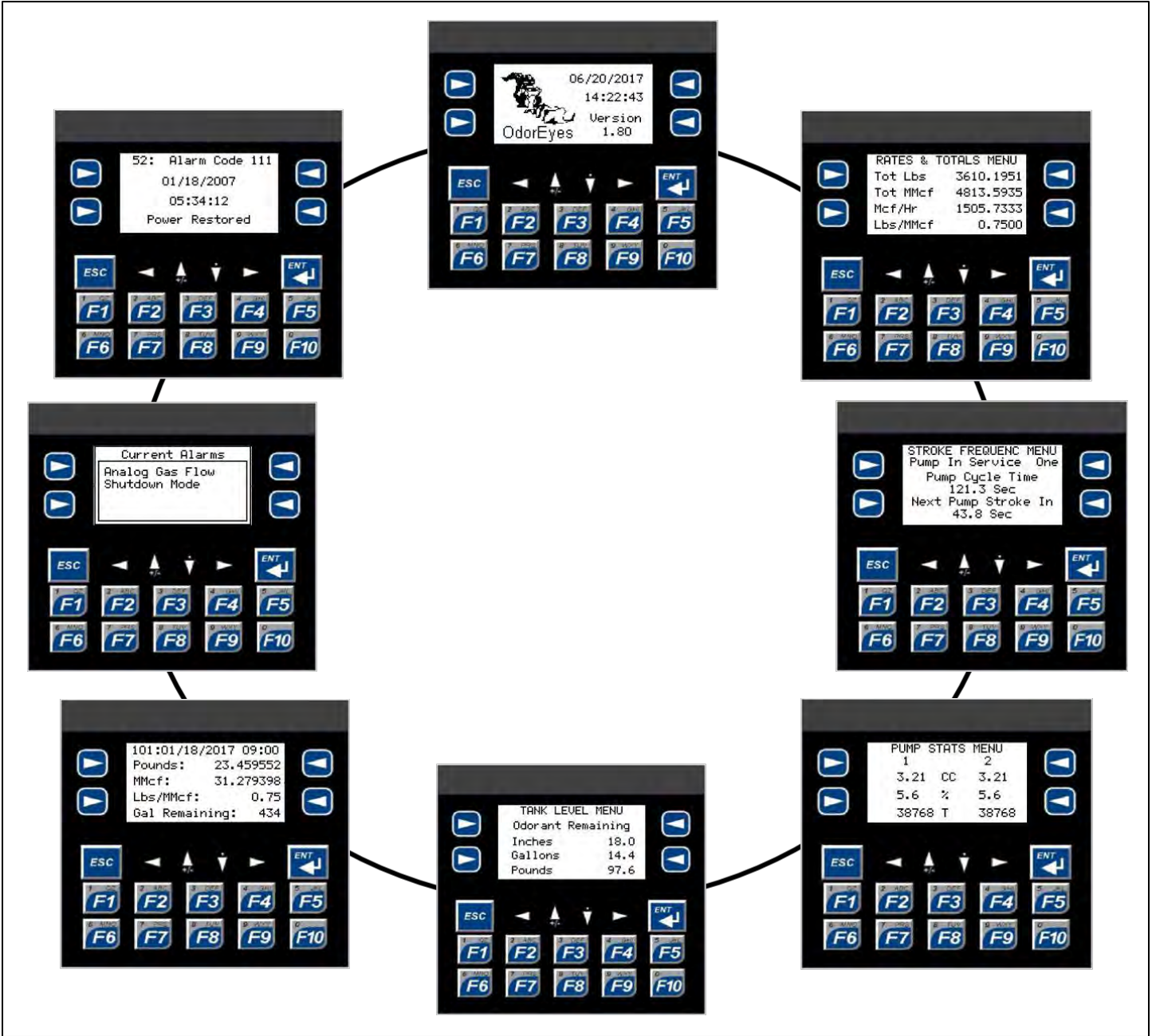
Modbus Setup

Figure 40: Controller Options – Modbus Setup

Modbus Communication
If Modbus input is used, Modbus Communication should be enabled.

Status
Enter this submenu to view the current status of the Modbus.
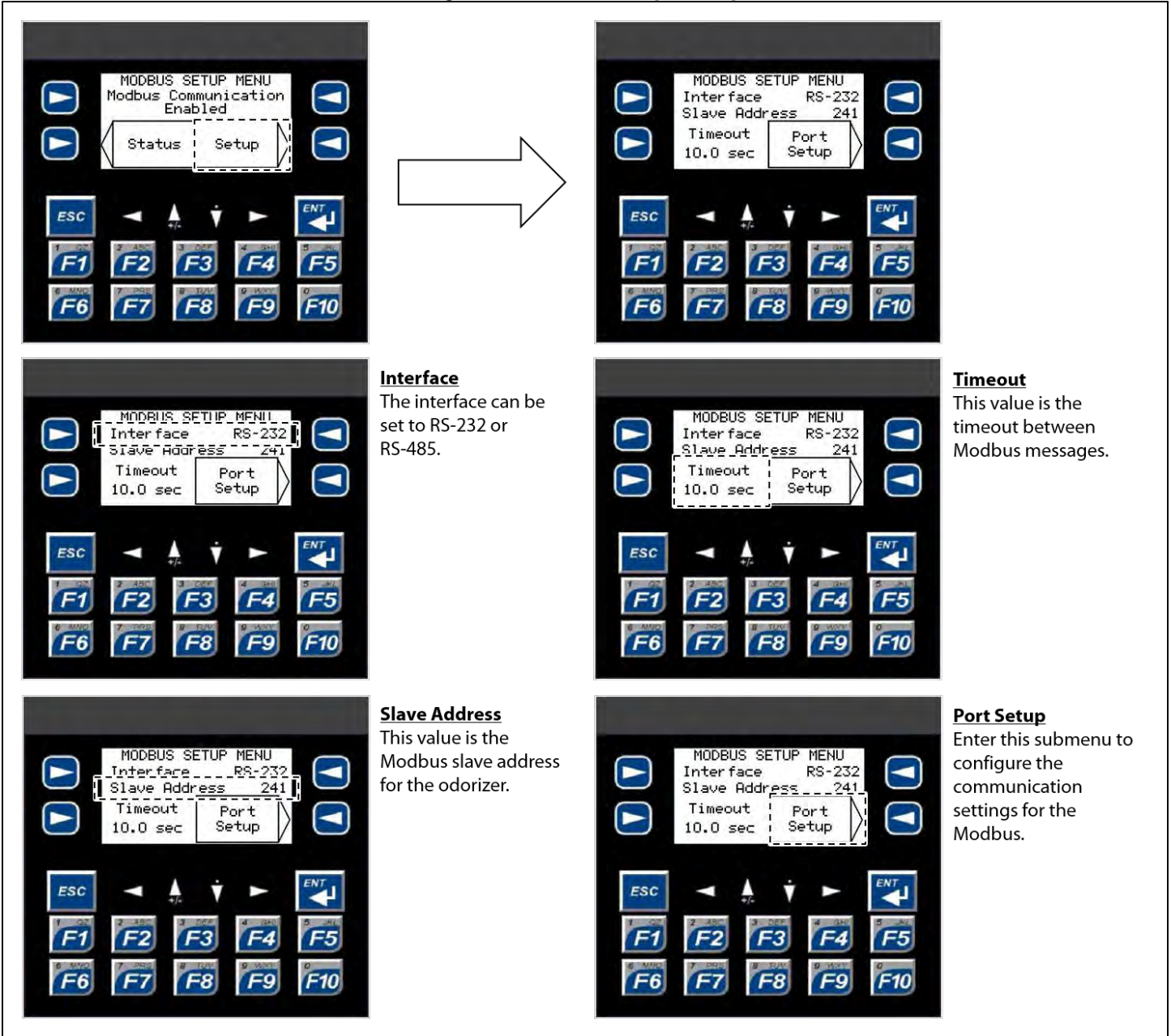
Setup
Enter this submenu to configure the Modbus input.

Figure 41: Modbus Setup – Status
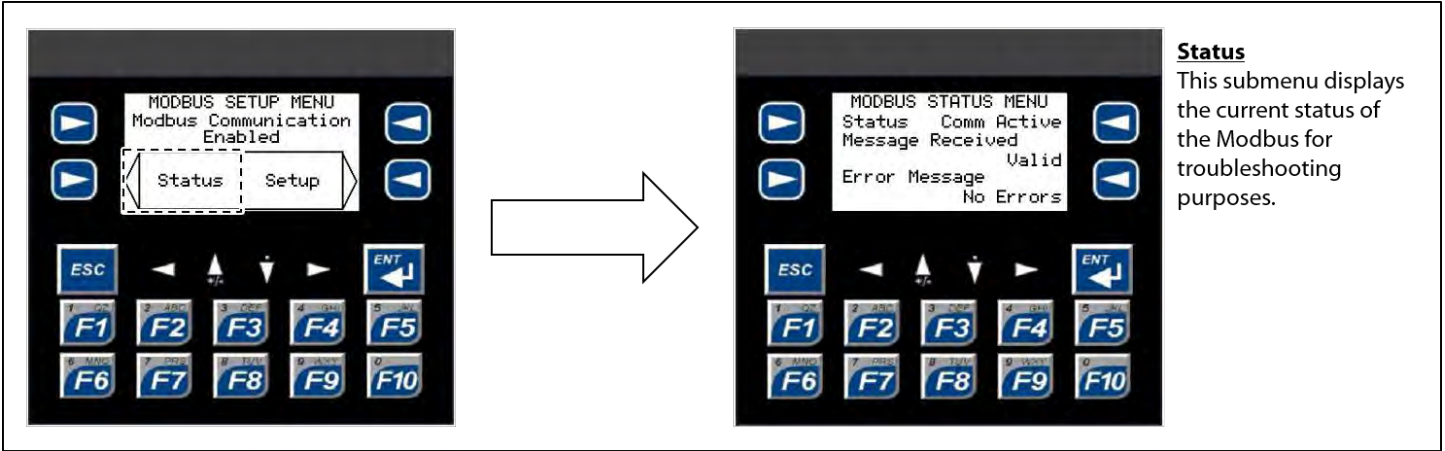
Status
This submenu displays the current status of the Modbus for troubleshooting purposes.

Figure 42: Modbus Setup – Setup

Interface
The interface can be set to RS-232 or RS-485.

Timeout
This value is the timeout between Modbus messages.

Slave Address
This value is the Modbus slave address for the odorizer.

Port Setup
Enter this submenu to configure the communication settings for the Modbus.

Figure 43: Setup – Port Setup

Protocol
The protocol is set to Modbus RTU.

Mode
The characters of this value correspond to the Parity, Data Bits, and Stop Bits.

N = Parity None
8 = Data Bits
1 = Stop Bits

Port
View the assigned Modbus port.

RS-232
The current interface is displayed here. This value can be either RS-232 or RS-485.

Baud
The available baud rate ranges from 300 to 115200.

Handshake
The required handshake depends on the current interface.

For RS-232, the available option is No Handshake.

For RS-485, the available option is Half-duplex.

Date & Version

Figure 44: Controller Options – Date & Version

Change the current time here.

The backup battery ensures that the current date and time will not be lost.

Note that the clock does not account for daylight saving time.

Change the current date here.

Version
This is the version of software the controller is currently running.

Compact Flash

Figure 45: Controller Options – Compact Flash

Compact Flash
If a micro SD card is installed to the system, its contents can be viewed from this screen.

History Logging

Through the History Logging submenu, the user can set up and monitor the data logs stored on the installed micro SD card.

If a micro SD card is installed, data will be automatically logged to the installed card when SD Card Data Logging is enabled.

Figure 46: Setup Menu – History Logging

Alarms Log
Enter this submenu to view the alarms log, which is stored in the system's internal memory and to the SD card if SD Card Data Logging is enabled.

SD Card Setup
Enter this submenu to enable or disable data logging to the SD card and monitor the status of the SD card.

Audit Trail
Enter this submenu to view the audit trail, which is stored in the system's internal memory and to the SD card if SD Card Data logging is enabled.

SD Card Access
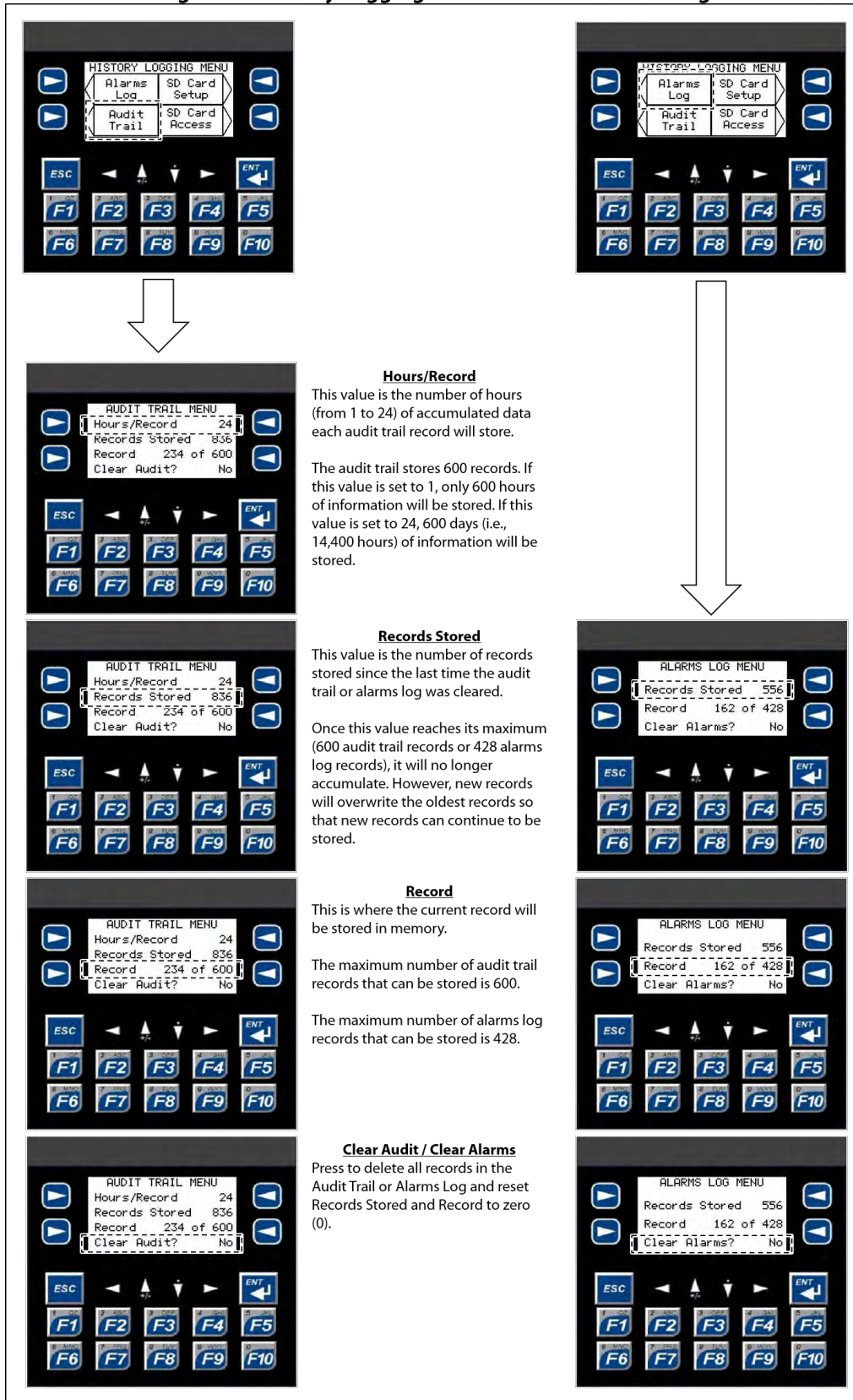If a micro SD card is installed to the system, its contents can be viewed from this screen.

If the micro SD card needs to be removed, first disable SD Card Data Logging. Failure to disable SD Card Data Logging prior to removing the micro SD card will trigger the SD Card Error alarm.

Figure 47: History Logging – Audit Trail and Alarms Log

Hours/Record
This value is the number of hours (from 1 to 24) of accumulated data each audit trail record will store.

The audit trail stores 600 records. If this value is set to 1, only 600 hours of information will be stored. If this value is set to 24, 600 days (i.e., 14,400 hours) of information will be stored.

Records Stored
This value is the number of records stored since the last time the audit trail or alarms log was cleared.

Once this value reaches its maximum (600 audit trail records or 428 alarms log records), it will no longer accumulate. However, new records will overwrite the oldest records so that new records can continue to be stored.

Record
This is where the current record will be stored in memory.

The maximum number of audit trail records that can be stored is 600.

The maximum number of alarms log records that can be stored is 428.

Clear Audit / Clear Alarms
Press to delete all records in the Audit Trail or Alarms Log and reset Records Stored and Record to zero (0).

Through the SD Card Setup submenu, the user can set up and monitor the data logs stored on the installed micro SD card.

If a micro SD card is installed, data will automatically be logged to the installed card when SD Card Data Logging is enabled.

Figure 48: History Logging – SD Card Setup

SD Card Data Logging
Must be enabled for the system to automatically log information to the installed SD card.

SD Card Percent Full
Monitor the storage capacity of the installed SD card.

If the micro SD card needs to be removed, first enter SD Card Setup to disable SD Card Data Logging. Failure to disable SD Card Data Logging prior to removing the micro SD card will trigger the SD Card Error alarm.

To continue data logging, insert a new micro SD card, and then enable SD Card Data Logging through the SD Card Setup.

Figure 49: History Logging – SD Card Access

SD Card Access
If a micro SD card is installed to the system, its contents can be viewed from this screen.

System I/O

The System I/O submenu provides the user with an overview of the current status of digital inputs, digital outputs, and analog inputs in the system.

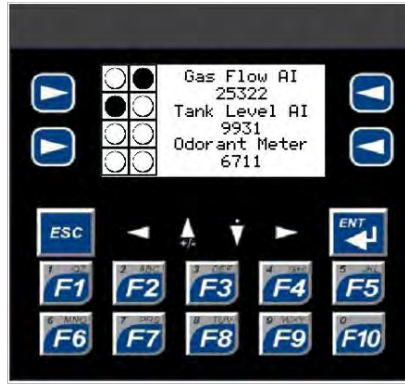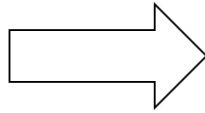**Figure 50: Setup Menu – System I/O, 1 of 2**

This will close when the customer meter on the pipeline transmits a gas flow signal, if applicable.

This will close when the pump is injecting odorant.

This will close when the second customer meter on the pipeline transmits a gas flow signal.

This indicates the alarm status.

The alarm status is normally closed.

This analog signal is the raw count coming into the odorizer after the signal has been converted from milliamps. This value will vary according to the output from the customer gas flow meter.

Analog Input Conversion	
Signal (mA)	Raw Count
4	6400
20	32000
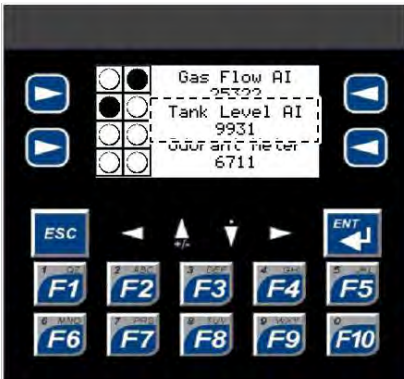
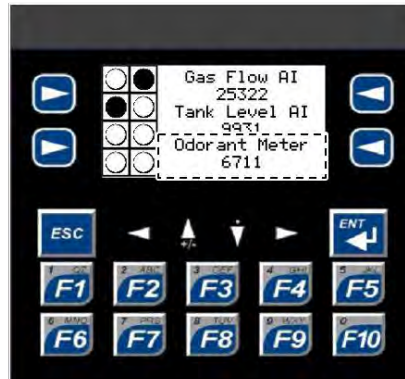This analog signal is the raw count coming into the odorizer after the signal has been converted from milliamps. This value will vary according to customer specifications.

This is not applicable for this system.

This value indicates how many high-speed pulses were received from the odorant flow meter. This value appears after each pump stoke and reverts to zero (0) after two (2) seconds.

This is not applicable for this system.

4.1 Before You Begin

1.   **Refer to** *Appendix B, Maintenance Schedule,* **for the itemized Welker recommended maintenance schedule for the Essentials™ Injection Odorizer.**
2.   Prior to maintenance or disassembly of the unit, it is advisable to have a repair kit available for repairs of the system in case of unexpected wear or faulty seals.

⚠️ New seals supplied in spare parts kits should be lightly lubricated before being installed to ease the installation of the seals and reduce the risk of damage when positioning them on parts. Wipe excess lubricant from the seals, as it may adversely affect analytical instrument results.

📝 For sample-exposed seals, Welker recommends non-hydrocarbon-based lubricants, such as Krytox®.
For non-sample-exposed seals, Welker recommends either non-hydrocarbon-based lubricants or silicone-based lubricants, such as Molykote® 111.

📝 After the seals are installed, the outer diameter of shafts and inner diameter of cylinders may be lubricated to allow smooth transition of parts.

3.   All maintenance and cleaning of the unit should be performed on a smooth, clean surface.
4.   Welker recommends having the following tools available for maintenance. Please note that the exact tools required may vary by model.
        a.   Adjustable Wrench
        b.   Crescent Wrench
        c.   Flat Head Screwdriver
        d.   Hex Key Set
        e.   Phillips Head Screwdriver
        f.   Seal Pick

4.2 Maintenance

1.   During injection, monitor the system for leaks. If leaks are present, halt operation and repair as necessary.
2.   Occasionally, a system component may need to be repaired or replaced for manufacturer recommended maintenance. To perform maintenance on components:
        a.   Turn OFF all electrical power to the system.
        b.   Depressurize the system and close all valves.
        c.   Disconnect the tubing and remove individual system components for maintenance.
        d.   For complete and proper maintenance on individual system components, refer to their respective *Installation, Operation, and Maintenance* (IOM) *Manual.* A list of component *Installation, Operation, and Maintenance* (IOM) *Manuals* is available in *Appendix A, Referenced or Attached Documents,* in this manual.
        e.   After performing necessary maintenance on system components, reconnect all instrument tubing.
        f.   Reinstall the system according to the instructions in *Section 2.2, Installation,* and *Section 2.3, Start-Up Procedures.*

4.3 Troubleshooting

Table 3: Essentials™ Injection Odorizer Troubleshooting		
Issues	**Possible Causes**	**Solutions**
Nothing is happening.	The battery is dead or not charging.	Ensure that the solar panel has been connected to the battery. As necessary, adjust the solar panel so that it faces the direction of the sun and is not shaded.
	Power input wires may be loose or disconnected.	Ensure power input wires are properly and securely connected in terminal blocks and that power is being supplied.
The SSO-9MED is not actuating properly.	The pneumatic supply may be too high, too low, or not operating.	Inspect the pneumatic supply. As necessary, regulate the pneumatic supply to ensure air is supplied at the appropriate pressure.
	The solenoid may not be actuating properly.	Use the manual override button to check the solenoid and ensure proper operation. If the solenoid is operating improperly, refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the solenoid.
The SSO-9MED is not injecting the correct amount of odorant.	The SSO-9MED is not set to the desired injection volume.	Adjust the injection volume. See *Section 2.3, Start-Up Procedures*, for instructions on adjusting the injection volume.

Welker *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for use with this unit:

- IOM-101: Welker PP-1, PP-1W, PP-2, and PP-3 Pitot Probes
- IOM-175: Welker SSO-9MED Sample/Injection Pump
- IOM-187: Welker OdorEyes SFA Sight Flow Assembly
- IOM-203: Welker SP-DP Diffusing Probe

Other *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for use with this unit:

- Ameresco, Inc. 10W Photovoltaic Module 10J (Welker IOM-V345)
- Horner APG, LLC XLe/XLt OCS Modules (Welker IOM-V377)
- Inline Industries, Inc. 201F Ball Valve (Welker IOM-V222)
- Morningstar Corporation SunSaver™ Solar Controller (Welker IOM-V346)
- Rochester Gauges, Inc. 6200 Series Magnetic Liquid-Level Gauges for LP Gas Service (Welker IOM-V344)
- Versa Products Company, Inc. C Series Solenoid Valves (Welker IOM-V041)

Welker drawings and schematics suggested for use with this unit:

- System Drawing: PSYS0051 (Essentials™ Injection Odorizer With 10-Gallon Odorant Supply Tank)
- System Drawing: PSYS0052 (Essentials™ Injection Odorizer With 30-Gallon Odorant Supply Tank)

Welker recommends keeping high-wear parts on hand and replacing these parts immediately when worn or damaged.

Refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for each component for maintenance instructions.

Table B1: Essentials™ Injection Odorizer Maintenance Schedule		
Action	**Every 12 Months**	**As Necessary**
Rebuild the SSO-9MED using a Welker repair kit. • **Replace the seals.** • **Maintain the check valves.** • **Inspect the seat, screen, wiper, and power and injection cylinders for damage or wear.**	**X**	
Verify the pneumatic supply pressure and blanket pressure.		**X**
View the controller's current alarms.		**X**
Inspect the SSO-9MED, tubing, valves, and fittings on the system for leaks.		**X**
Maintain the solenoid.		**X**

13839 West Bellfort Street
Sugar Land, TX 77498
Phone: 281.491.2331

welker.com