



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER ESSENTIALS™ INJECTION ODORIZER
WITH WELKER 4P SAMPLE FREQUENCY CONTROLLER



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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 Welker 4P Sample Frequency 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

SECTION 1: PRODUCT INFORMATION

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 Welker 4P Sample Frequency 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 Welker 4P Sample Frequency Controller, Welker SSO-9MED Sample/Injection Pump, and an odorant supply tank. When the 4P 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.

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 Welker 4P Sample Frequency 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)
Digital Input	DC 1–5 V Square Wave Dry Contact and Open Collector
Connections	Blanket Pressure Inlet: ¼" FNPT Drain Port: ½" FNPT Fill Inlet: ¼" 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
Volume	Injection Volume: 0.25–7.50 cc Odorant Tank: 10 US Gallons
Operation	SSO-9MED: Piston-Operated
Features	4-Way Solenoid Odorant Tank Level Gauge Welker 4P Sample Frequency Controller Welker SSO-9MED Sample/Injection Pump
Option	Solar Panel With Battery and Controller Box

1.5 Equipment Diagrams

Figure 1: Essentials™ Injection Odorizer Schematic

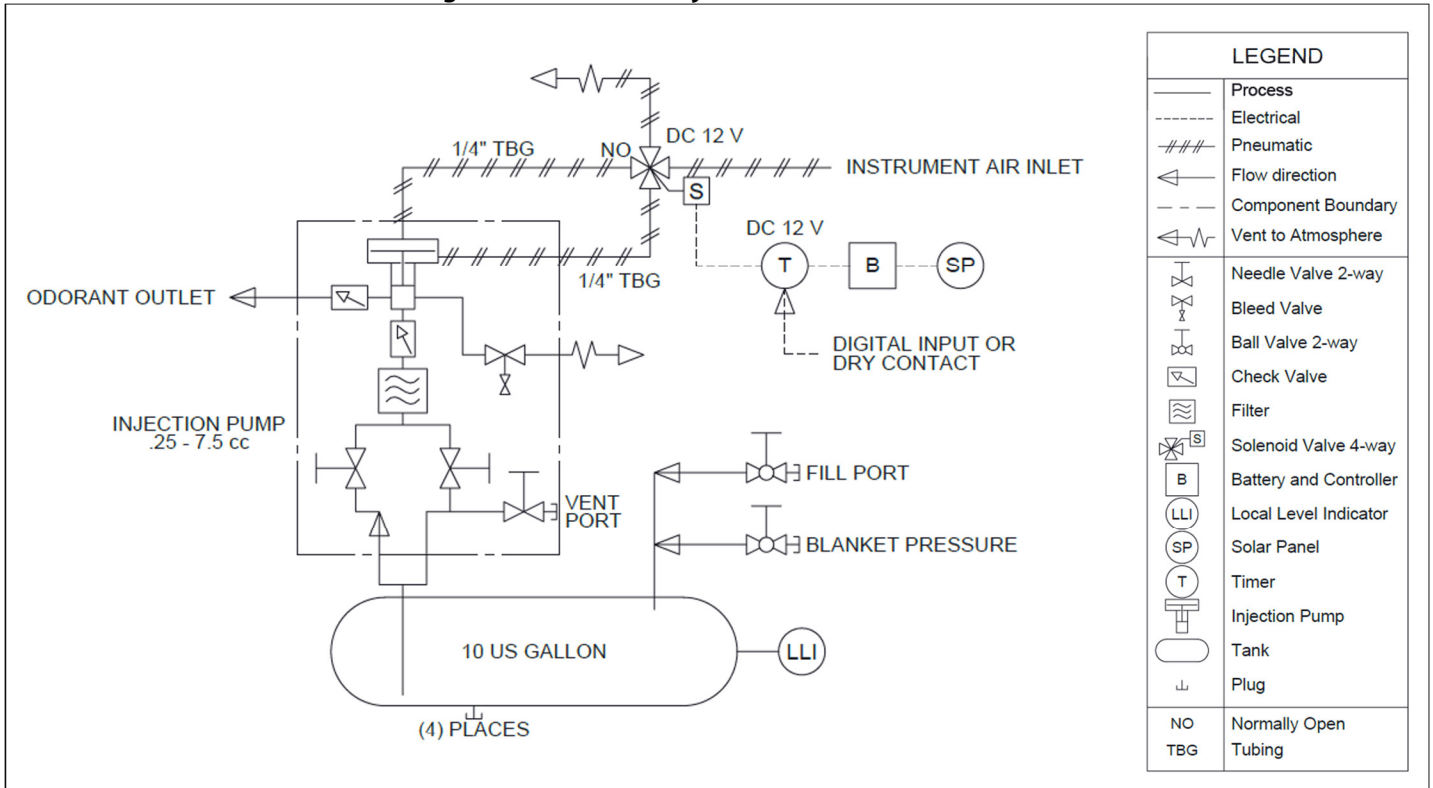


Figure 2: Essentials™ Injection Odorizer Connections Diagram

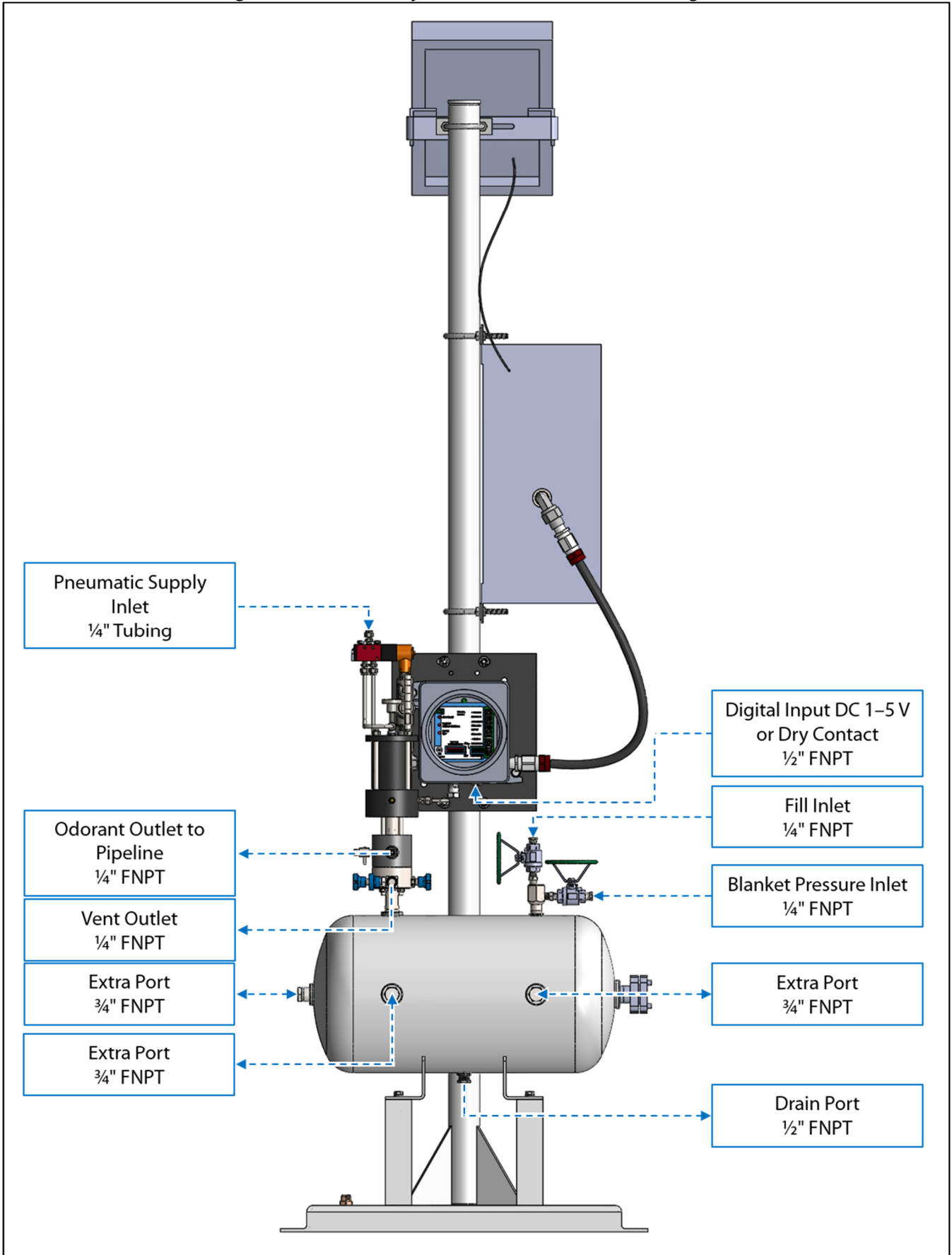
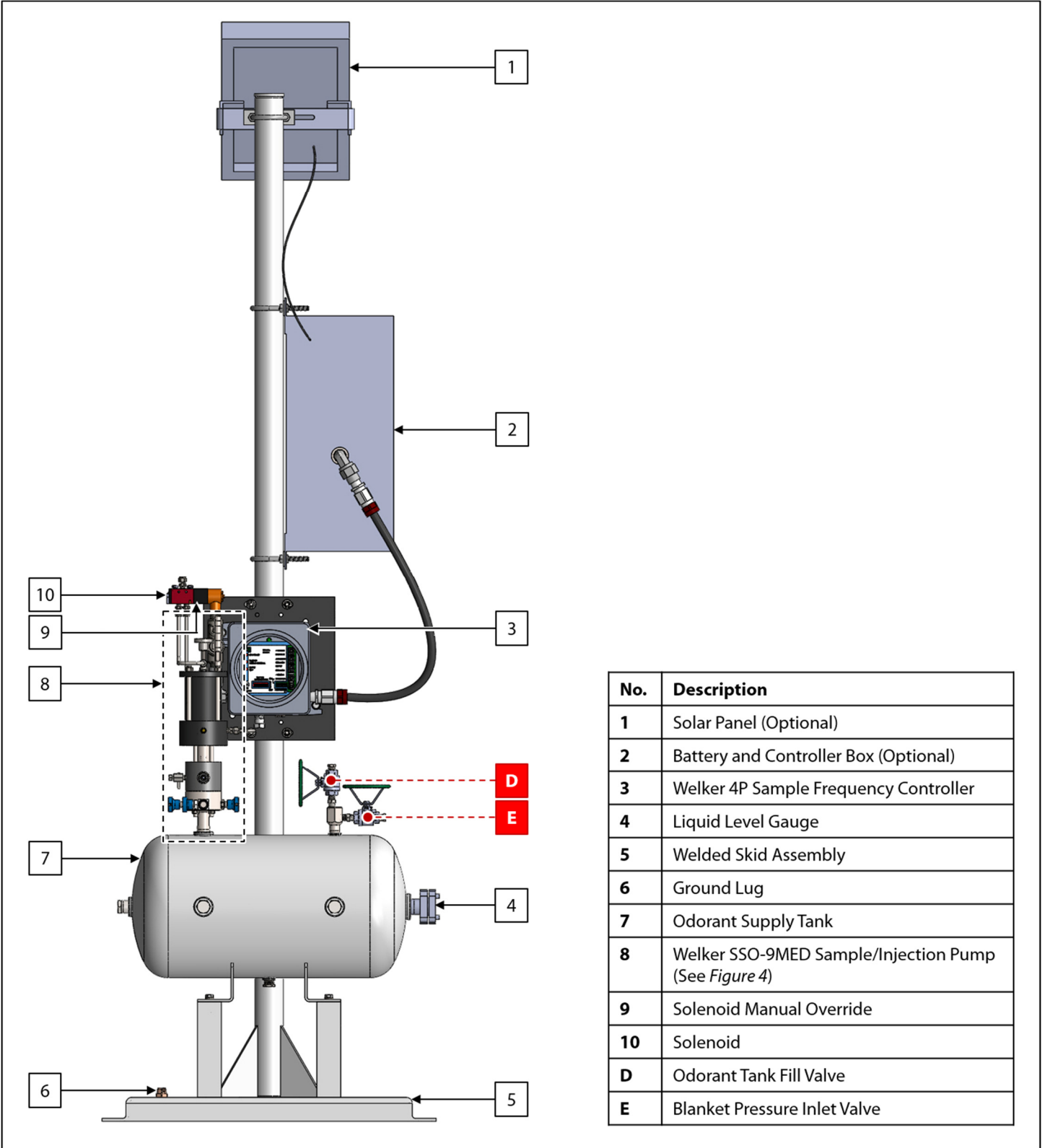
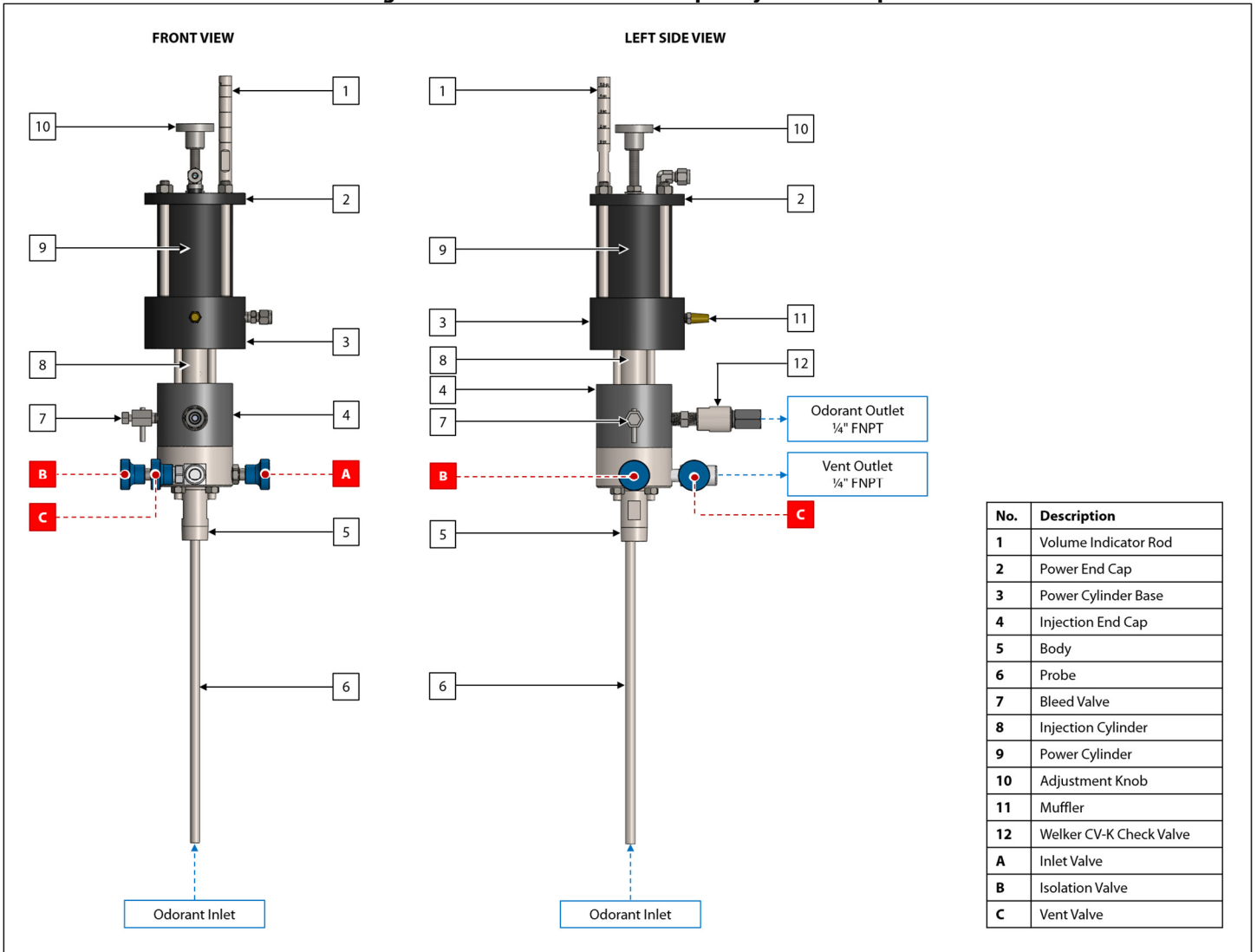


Figure 3: Essentials™ Injection Odorizer Diagram



No.	Description
1	Solar Panel (Optional)
2	Battery and Controller Box (Optional)
3	Welker 4P Sample Frequency Controller
4	Liquid Level Gauge
5	Welded Skid Assembly
6	Ground Lug
7	Odorant Supply Tank
8	Welker SSO-9MED Sample/Injection Pump (See Figure 4)
9	Solenoid Manual Override
10	Solenoid
D	Odorant Tank Fill Valve
E	Blanket Pressure Inlet Valve

Figure 4: Welker SSO-9MED Sample/Injection Pump



SECTION 2: INSTALLATION & OPERATION

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

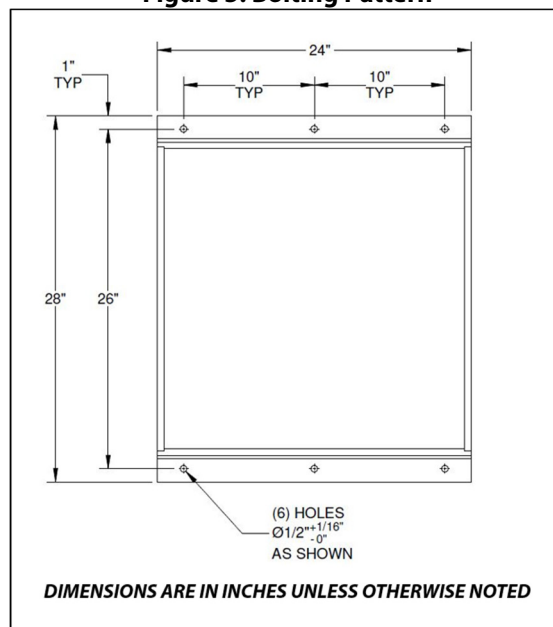
Pipeline Injection Point

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 5*).

Figure 5: Bolting Pattern



4. Connect a grounding wire to the ground lug to safely ground the system (*Figure 3*).

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 2*).
8. Using ¼" customer-supplied tubing, connect a customer-supplied pneumatic supply to the solenoid (*Figure 2*).
9. Using ¼" customer-supplied tubing, connect a customer-supplied regulated pneumatic supply to the blanket pressure inlet (*Figure 2*).



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 to an area away from personnel and equipment (*Figure 2*).



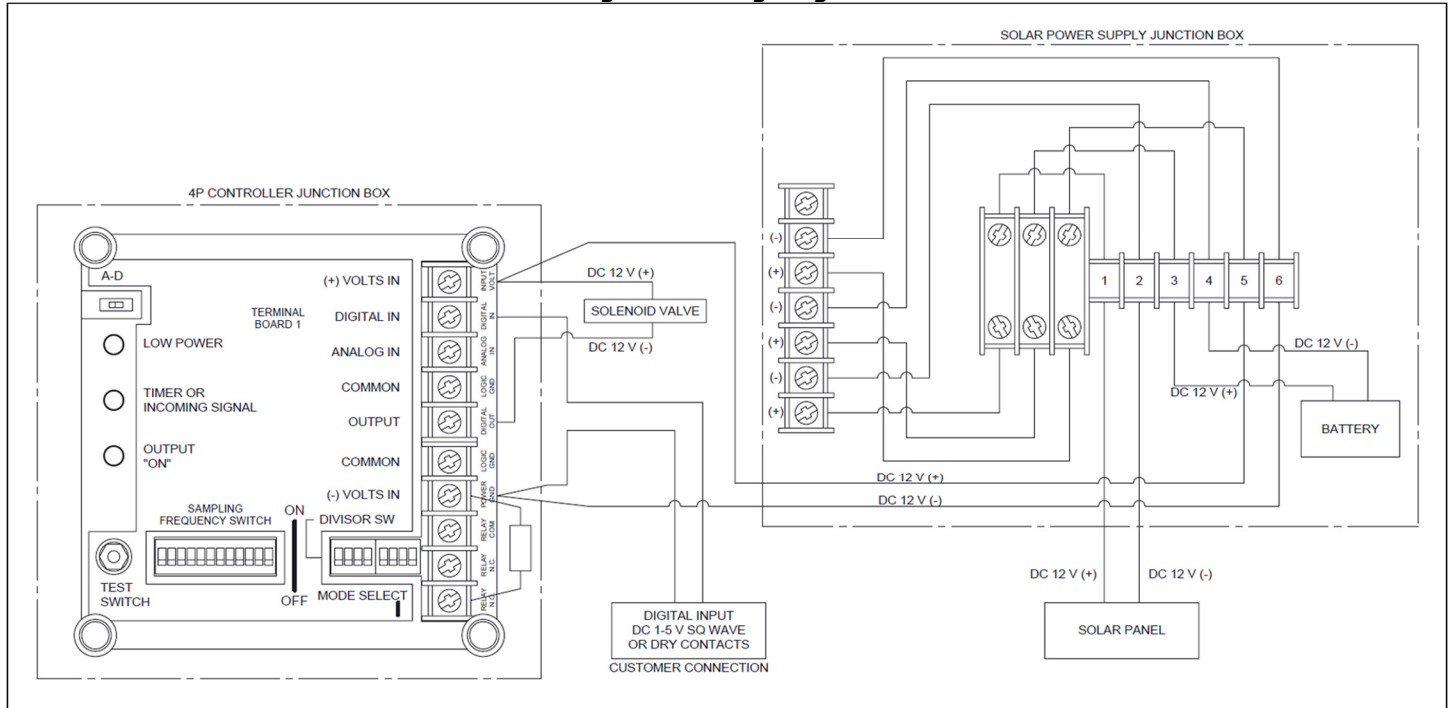
If the vent outlet tubing will terminate outdoors, Welker recommends installing a screen or muffler to prevent dust and insects from entering the tube and restricting flow.

11. If desired, install a valve to the drain port on the odorant supply tank (*Figure 2*).
12. Ensure that all valves on the system are closed.
13. Ensure that all fittings, connections, and bolts are tightened.

Controller Connections

- Connect a DC 1–5 V digital input signal or dry contact to the 4P (Figure 6).

Figure 6: Wiring Diagram



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.



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 4*).
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 3*).
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 4*).
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

- Using a wrench, slowly loosen the cap on the bleed valve to purge the injection chamber of any trapped air (*Figure 4*).



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.

- Once all air has been purged from the injection chamber, tighten the bleed valve cap.
- 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.

- 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

- Pump operation can be verified by energizing the solenoid to actuate the SSO-9MED. To energize the solenoid, press the test switch on the 4P or press and hold the manual override on the solenoid (*Figure 3*).
- 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.

4P Configuration

- Prepare the 4P for proportional to flow chemical injection. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the 4P for instructions.
- Determine the injection rate required for the customer flow conditions (i.e., switch factor), and then set the sample frequency switch on the 4P to the desired switch factor. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the 4P for instructions.
- Once the 4P has been configured and the pump operation has been verified, the Essentials™ Injection Odorizer is operational.

SECTION 3: MAINTENANCE

3.1 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

3.2 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*.

3.3 Troubleshooting

Table 2: Essentials™ Injection Odorizer Troubleshooting

Issues	Possible Causes	Solutions
<p>Nothing is happening.</p>	<p>The battery is not connected to the 4P.</p>	<p>Ensure that the battery has been installed to the battery and controller box and that it has been connected to the circuit breaker.</p>
	<p>The circuit breaker switches are off.</p>	<p>Ensure that the circuit breaker switches have been turned ON.</p>
	<p>The battery is dead and not charging.</p>	<p>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.</p>
<p>The SSO-9MED is not actuating properly.</p>	<p>The pneumatic supply may be too high, too low, or not operating.</p>	<p>Inspect the pneumatic supply. As necessary, regulate the pneumatic supply to ensure air is supplied at the appropriate pressure.</p>
	<p>The solenoid may not be actuating properly.</p>	<p>Use the manual override button to check the solenoid and ensure proper operation. If the solenoid is operating improperly, refer to the <i>Installation, Operation, and Maintenance (IOM) Manual</i> for the solenoid.</p>
<p>The SSO-9MED is not injecting the correct amount of odorant.</p>	<p>The SSO-9MED is not set to the desired injection volume.</p>	<p>Adjust the injection volume. See <i>Section 2.3, Start-Up Procedures</i>, for instructions on adjusting the injection volume.</p>
	<p>The 4P may be set to an injection frequency slower or faster than desired.</p>	<p>Adjust the 4P to actuate the SSO-9MED at the desired rate. Ensure that the calculations used to determine the injection frequency are correct. Refer to the <i>Installation, Operation, and Maintenance (IOM) Manual</i> for the 4P for instructions.</p>
	<p>The dwell time of the 4P is too short or too long.</p>	<p>Adjust the dwell time of the 4P so that the SSO-9MED is able to make a full stroke. Refer to the <i>Installation, Operation, and Maintenance (IOM) Manual</i> for the 4P for instructions.</p>

APPENDIX A: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-001: Welker 4P Sample Frequency Controller
- 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)
- 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)
- Versa Products Company, Inc. CSG-4222-LA-XX-D012 4-Way Solenoid Valve (Welker IOM-V071)

Welker drawings and schematics suggested for use with this unit:

- System Drawing: PSYS0047

APPENDIX B: MAINTENANCE SCHEDULE



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. <ul style="list-style-type: none"> • 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, blanket pressure, and battery.		X
Inspect the SSO-9MED, tubing, valves, and fittings on the system for leaks.		X
Maintain the solenoid.		X

