

EL System User Guide

Model XXX

Table of Contents

Preface

Copyright	1
Information.....	1
Related Documentation	1
Customer Support.....	2

Safety

Intended Use	3
Examples of Unintended Use of Equipment	3
Regulations and Approvals.....	3
Safety Information.....	3
System Location Environment	3
Personal Safety.....	4
Servicing	4
Qualified Personnel.....	4
Grounding	4
Fire Safety.....	6
General Spray Safety Information.....	6

Getting Started

Overview.....	8
Electrostatic Lubrication System Components	8
Electrostatic Spray Controller.....	8
Oil Reservoir Assembly.....	14

Installing the System

Tools Needed	15
Connecting the Controller to the Reservoir Assembly.....	15
Verifying Set Up.....	18
Powering On the System.....	18

Advanced Operation and Setup of the Controller

Terminal Block Connections.....	19
Potentiometers.....	20
Misuse of Product.....	20

Troubleshooting.....	21
----------------------	----

Technical Specifications

Electrostatic Lubrication System Assembly and Bracket..... 22
 Dimensions 22

Index.....24

Preface

Copyright

©2012 ABC Company All rights reserved.

Printed in U.S.A.

Under copyright laws, this manual may not be reproduced in any form, in whole, or in part, without prior written permission from ABC Company.

This revision supersedes all previous revisions.

Every effort has been made to ensure that the information in this manual is accurate at the time of printing. However, ABC Company assumes no liability for errors or omissions and reserves the right to make changes without notice to any products described herein to improve reliability, function, or design.

Other company and product names may be trademarks of their respective companies.

Information



WARNING: Warns about situations involving the use of electricity and other situations that could result in bodily harm.

CAUTION: Cautions about actions that may create unsafe conditions that could result in damage to the equipment or loss of data.

NOTE: Provides a helpful note related to the current topic.

Related Documentation

In addition to the user guide, a Quick Start Guide is shipped with each unit.

Customer Support

To contact ABC Company Customer Service:

- By phone: 1.XXX.XXX.XXXX
- By fax: 1.XXX.XXX.XXXX
- By web: www.abccompany.com

Safety

Intended Use

Use of ABC Company equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Examples of Unintended Use of Equipment

- Using incompatible materials
- Making unauthorized modifications
- Removing or bypassing safety guards or interlocks
- Using incompatible or damaged parts
- Using unapproved auxiliary equipment
- Operating equipment in excess of maximum ratings

Regulations and Approvals

Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for ABC Company equipment will be voided if instructions for installation, operation, and service are not followed.

All phases of equipment installation must comply with federal, state, and local codes.

Safety Information

The electrostatic lubrication system contains a high voltage power supply (HVPS) that is capable of reaching 20,000 VDC at 1.5 mA on 20 kV models and 30,000 VDC at 1.0 mA.

Extreme care must be used when operating the controller to avoid electrical shock.

Before operating the electrostatic spray controller:

- Always make sure that the electrostatic spray controller is grounded to a physical earth ground.
- Always make sure that the spray target or any object around the electrostatic nozzle is ground to the ground lug on the electrostatic spray controller.
- Do not attempt to touch the nozzle or target while the electrostatic spray controller is energized.

The nozzle and cable can increase the static charge of surrounding objects. Unless these objects are grounded to the electrostatic spray controller, the static charge can rise and unexpectedly discharge.

System Location Environment

The electrostatic lubrication system is intended to be installed in a safe non-hazardous environment.

Personal Safety

- Do not operate or service the equipment unless you are qualified.
- Do not operate the equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly.
- Do not bypass or disarm any safety devices.
- Keep clear of spray. Do not put any part of your body or anything into the spray stream when the system is running.
- Keep clear of moving equipment. Before adjusting or servicing any moving equipment, shut off the power supply and wait until the equipment comes to a complete stop and the nozzles stop spraying.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials and use recommended personal protection equipment.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or guarded.

Servicing

Do not attempt to service or repair the electrostatic lubrication system unless you have been properly trained or authorized. Any damage that affects the performance of the spray nozzle will require replacement of the nozzle. Consult the factory for replacement parts.

For service contact ABC Company at 1-XXX.XXX.XXXX. Only authorized qualified service personnel should attempt to service this unit. Service by unauthorized personnel will void any and all warranties.

Qualified Personnel

Equipment owners are responsible for making sure that the electrostatic lubrication system is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform the service and/or repairs of the electrostatic lubrication system. Qualified personnel shall be familiar with all relevant safety rules and regulations and are physically capable of performing the required tasks

Grounding

The electrostatic spray controller must be grounded to earth ground. The surface being sprayed by the electrostatic lubrication system must be bonded to the electrostatic lubrication spray controller.

NOTE: Make sure the ground connections are clean and tight.



WARNING: Operating faulty electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program. If you receive even a slight electrical shock or notice static sparking or arcing, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.



WARNING: All work conducted inside the spray area or within 3 feet (1 m) of spray nozzle(s) is considered within a Class 1 and 2, Division 1 or 2 Hazardous location and must comply with NFPA 33, NFPA 70 (NEC articles 500, 502, and 516), and NFPA 77, latest conditions.



WARNING: All electrically conductive objects in the spray areas shall be electrically connected to ground with a resistance of not more than 1 megohm as measured with an instrument that applies at least 500 volts to the circuit being evaluated.



WARNING: Equipment to be grounded includes, but is not limited to, the floor of the spray area, operator platforms, hoppers, photo eye supports, and blow-off nozzles. Personnel working in the spray area must be grounded.



WARNING: There is a possible ignition potential from the charged human body. Personnel standing on a painted surface, such as an operator platform, or wearing non-conductive shoes, are not grounded. Personnel must wear shoes with conductive soles or use a ground strap to maintain a connection to ground when working with or around electrostatic equipment.



WARNING: Shut off electrostatic power supplies and ground spray nozzle electrodes before making adjustments or cleaning spray nozzles.



WARNING: Connect all disconnected equipment, ground cables, and wires after servicing equipment.

Fire Safety

To avoid a fire or explosion, follow these instructions:

- Never start the system if cables are not in excellent condition and free of any damage or wear.
- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your MSDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray area immediately shut off the spray system and turn off the high voltage system.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.

General Spray Safety Information

Read and follow instructions. All safety related and operating instructions should be read before the system is operated.

NOTE: Follow all operating instructions.



WARNING: It is important to recognize proper safety precautions when using a pressurized system. Fluids under pressure can penetrate skin and cause severe injury and possible death.



WARNING: When dealing with pressure applications, the system pressure should never exceed the maximum of the lowest rated component. Always know your system and all component capabilities, maximum pressures, and flow rates.



WARNING: Before performing any maintenance, make sure all electrical, air, and liquid supply lines to the system or the pump are shut off and relieved of pressure.



WARNING: Do not aim the spray at any person or part of the body. Do not place any part of your body into the spray pattern. Fluids under pressure can penetrate human skin and cause severe injury and possible death. Chemicals may also cause severe burns, injury, and death.



WARNING: ABC Company does not manufacture or supply any of the chemical components used in this equipment and is not responsible for their effects. Because of the large number of chemicals that could be used and their different chemical reactions, the buyer and user of this equipment should determine compatibility of the materials used and any of the potential hazards involved.



WARNING: ABC Company strongly recommends the use of appropriate safety equipment when working with potentially hazardous chemicals. This equipment includes but is not limited to:

- Protective hat
- Safety glasses or face shield
- Chemical-resistant gloves
- Long sleeve shirt and long pants
- Chemical-resistant apron

NOTE: If chemicals are used in the system, remember to read the chemical manufacturer's label and follow all directions.

Chapter 1 Getting Started

Overview

The electrostatic lubrication system uses electrostatic principles to apply lubrication precisely where needed. Some of the benefits of this system include:

- Less oil usage
- Reduced over spray
- Reduced product contamination
- Longer intervals between maintenance
- More uniform coating

Electrostatic Lubrication System Components

The electrostatic lubrication system consists of the following components:

- Electrostatic Spray Controller
- Oil Reservoir with Low Oil Switch
- Filter/Regulator/Air Pressure Switch/Solenoid Assembly
- Injector Pump Assembly
- Spray Nozzle and Nozzle Bracket
- High Voltage Cables

Electrostatic Spray Controller

The electrostatic spray controller is used to electrostatically charge fluids in order to enhance the transfer efficiency of the fluid or the fluid's ability to atomize. The controller contains either a 20,000 VDC (20 kVDC) or a 30,000 VDC (30 kVDC) negative polarity high voltage power supply (HVPS).

The high HVPS provides the high voltage charge to the fluid by an electrode located at the nozzle. The negative high voltage charge increases the electrons number of electrons contained in the fluid's atoms. These added electrons cause the fluid to become negatively charged.

A pump is used to move the fluid from a fluid reservoir to the nozzle where the negative charge is applied to the fluid. As the fluid flows out of the nozzle it begins to separate into droplets. These droplets begin to repel each other as they are all negatively charged (like charges repel each other). The negatively charged droplets can be atomized into smaller droplets by increasing the output voltage of the HVPS. The charged droplets of the fluid will be attracted to a neutral or opposite (positive) charged object.

A typical application is the lubrication of a high speed chain. The fluid that is used is a chain lubricant that is charged with the HVPS. The lubricant is pumped through the nozzle where it exits the nozzle's spray tube as a stream of charged droplets that are attracted to the grounded chain.

Controller Components

The system requires the following components:

- Model XXX Electrostatic Spray Controller
- 24 VDC Power Source (75 Watt minimum)
- High Voltage Cable
- High Voltage Nozzle
- Means to deliver the fluid to the nozzle (pump system)
- Target

24 VDC Supply (Supplied by the User)

The 24 VDC power supply is used to provide power to the controller's circuit board, the solenoid valve connection, and the HVPS:

- The power supply is connected to terminal J3 on the controller's circuit board.
- Terminal J1 is used for the connections of a solenoid coil that can be used to operate an air actuated piston pump.
- The HVPS is fused separately by F2 (2 amps).

High Voltage Cable

The high voltage cable is used to connect the HVPS from the controller terminal block to the nozzle.

High Voltage Nozzle

The high voltage nozzle is where the high voltage charge is introduced to the fluid.

Fluid Delivery System (Pump)

The fluid delivery system consists of the components that are used to deliver the fluid from the fluid reservoir through the spray tube(s) of the high voltage nozzle.

The fluid delivery system can be an electric or air actuated pump. The electrostatic spray controller provides a pulsed output from terminal J1 that is used to pulse a solenoid coil that operates an air actuated piston pump. Terminal block J2 of the controller's circuit board contains the common, normally open (N.O.), and normally closed (N.C.) contacts of an auxiliary relay that is energized when the controller is in the "spray" condition.

The fluid delivery system should include the necessary tubing through which the fluid will flow from the fluid reservoir to the electrostatic nozzle.

Grounded Target

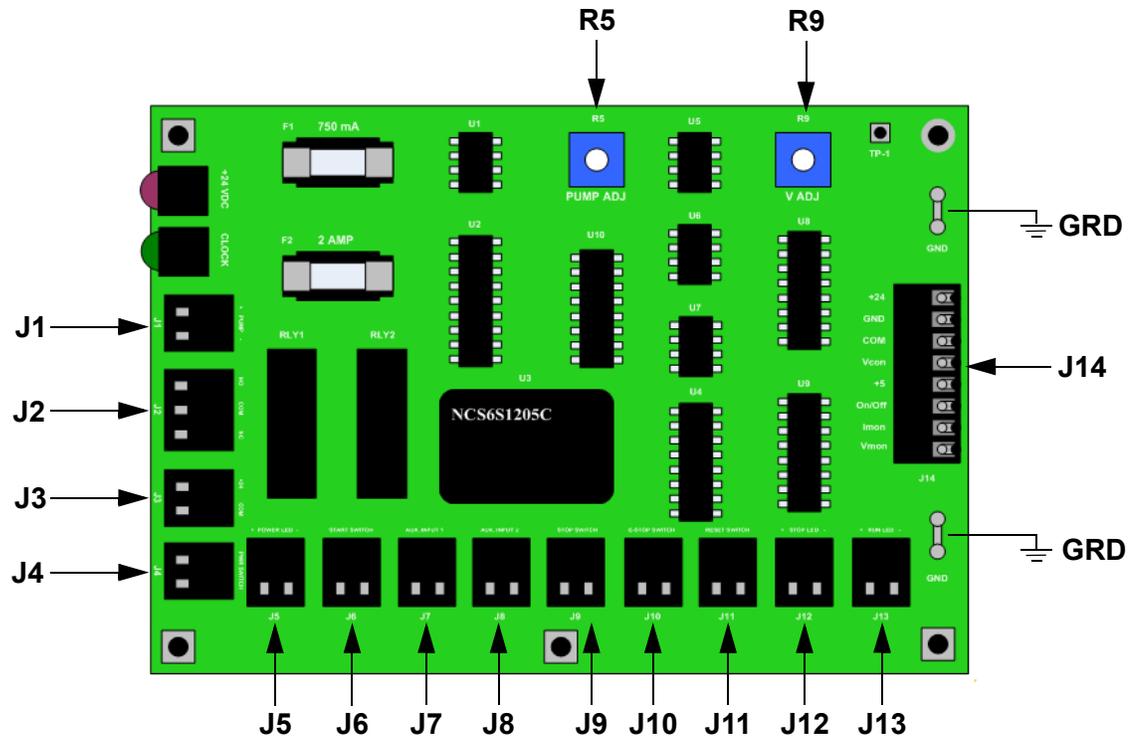
The target is the object or area where the fluid is applied. The target should be grounded to the ground lug provided on the electrostatic controller.

Figure 1 Controller - Outside



A	Bonding Lug
B	Cable Entry Grommet
C	Run (Reset) Button
D	Power On/Off Button
E	Stop Button

Figure 2 Controller - Inside



R5	Pump Adj Pot
R9	Voltage Adj Pot
GRD	Ground
J14	High Voltage Power Supply Connector
J13	Cycle "RUN" LED
J12	Cycle "STOP" LED
J11	Reset Switch
J10	Emergency Stop Switch
J9	Lube Cycle Stop Switch
J8	Auxiliary Input Switch (Air Pressure)
J7	Auxiliary Input Switch (Oil Float)
J6	Lube Cycle Start Switch
J5	Power "ON" LED
J4	Power On/Off Switch
J3	24 VDC Power Source
J2	Auxiliary Relay
J1	Pump

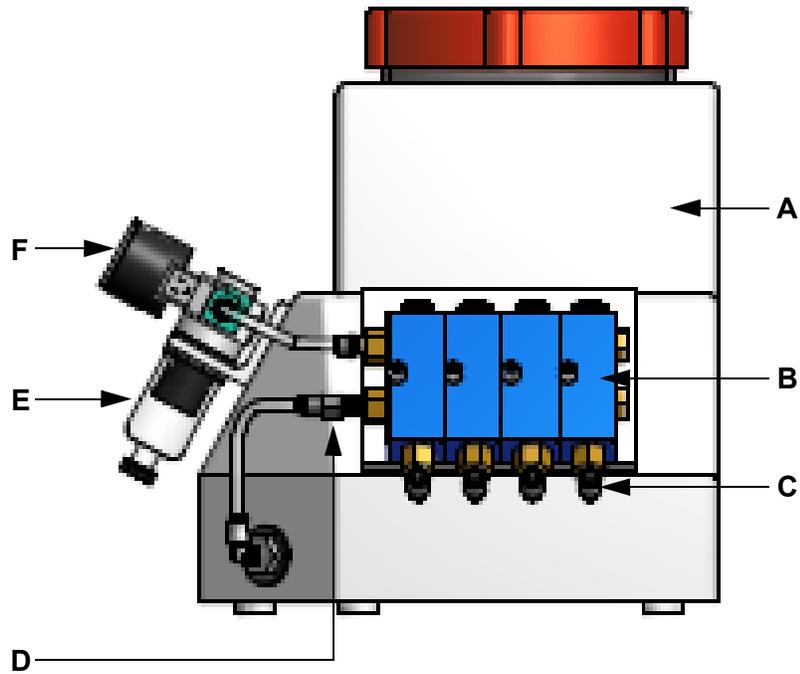
Controller Terminals

See Figure 2 on page 11.

J1	<p>Provides a pulsed output to the pump solenoid valve. The output pulse is adjusted by the pump adjustment potentiometer (R5) on the circuit board. To use this feature, connect a 24 VDC solenoid with coil to terminal block J1. The solenoid should be rated at less than 100 mA.</p> <p>The solenoid valve provides the air pulses necessary to cycle the pneumatically controlled oil injector pumps. Turning potentiometer R5 clockwise will increase the injector pump frequency and turning it counter clockwise will decrease the injector pump frequency.</p>
J2	<p>Contains the common, normally open, and normally closed connections for the auxiliary relay.</p> <p>Connector J2 is a set of dry contacts that contain a common connection, a normally open connection, and a normally closed connection from the auxiliary relay (RLY 2).</p> <p>RLY 2 is energized whenever the system is in lubrication mode (the system is calling for lubrication and both the pump and high voltage power supply are operating).</p> <p>J2 can be used by the customer as a feedback to know that the system is lubricating properly or to trigger other actions that may be necessary during the process.</p>
J3	<p>The connection for the 24 VDC external power source that will power the circuit board and high voltage power supply.</p> <p>J3 requires a 24 VDC power supply rated at no less than 2.5 amperes.</p> <p>J3 is polarity sensitive and the connections should be made according to the polarity symbols at the terminal block on the circuit board.</p>
J4	<p>Connection for a normally open switch that is used to switch the 24 VDC power to the circuit board and high voltage power supply.</p> <p>Terminal J4 is used to make or break electrical power to the controller. It is pre-wired to the "Power On/Off" selector switch.</p> <p>When the selector switch is placed in the "on" position, the control system is active and will begin its normal lubricating operation if all of the other switches are closed (customer start input, auxiliary input 1, auxiliary input 2, etc).</p>
J5	<p>24 VDC GREEN LED that illuminates when 24 VDC power to the board is switched on. It is an indicator that lets the user know the board has been powered on.</p>
J6	<p>Connection for a normally open switch to be connected that is closed to run the lubrication cycle and is opened to stop the lubrication cycle. Must be "jumpered" if not used.</p> <p>Terminal J6 is used by the customer to provide a start signal to the lubrication controller. The customer must connect a set of dry contact such as the common and normally open point of a relay to terminal J6. When the relay points close, the customer will be calling for lubrication and the system will perform accordingly.</p> <p>Note: So long as the customer relay remains energized, the system will continue to lubricate. De-energizing the relay will cause the system to stop lubricating.</p>

<p>J7</p>	<p>Connection for a normally open switch that when open will interrupt the lube cycle and when closed will resume the lube cycle. Must be “jumped” if not used.</p> <p>J7 is typically used to connect a normally open liquid level sensor. When the liquid level is satisfactory, the switch closes and the system will lubricate when requested. If the oil level drops, the switch will open causing the system to stop lubricating. The red “Stop” led will be illuminated.</p>
<p>J8</p>	<p>Connection for a normally open switch that when open will interrupt the lube cycle and when closed will resume the lube cycle. Must be “jumped” if not used.</p> <p>J8 is typically used to monitor the system air pressure. It is used for the connection of a normally open air pressure switch. When closed, the system will lubricate when requested. When the switch is open, there is insufficient air pressure to operate the pumps. The system will stop lubricating and the red “Stop” led will illuminate.</p>
<p>J9</p>	<p>Connection for the normally closed stop switch. When open the lube cycle is stopped.</p> <p>The stop switch is a pre-wired red switch on the front cover of the control panel. It is used to stop the lubrication cycle. If the stop button has been pressed the red “Stop” led will be illuminated, the blue reset button must be pressed to restart the system.</p>
<p>J10</p>	<p>Connection for a normally closed emergency stop switch that will stop the lube cycle when opened. Must be “jumped” if not used.</p> <p>J10 is intended to be used by the customer as an auxiliary stop button or emergency stop feature. It performs in exactly the same manner as terminal block J9.</p>
<p>J11</p>	<p>Connection for a normally open switch to be used as a reset/run input. When closed momentarily it will reset a prior system stop or arc fault generated by the circuit board.</p> <p>J11 is pre-wired to the blue, illuminated reset pushbutton on the control panel's front cover. It is used as a start or reset feature. The blue pushbutton will be illuminated if the system is in active lubrication mode. Whenever the blue LED is illuminated, the system is in lubrication mode.</p>
<p>J12</p>	<p>Connection for 24 VDC LED that illuminates when the lube cycle has been stopped.</p> <p>J12 is pre-wired to the red LED on the control panel's front cover.</p>
<p>J13</p>	<p>Connection for 24 VDC LED that illuminates when the board is in the lubrication (run) state.</p> <p>J13 is pre-wired to the blue LED on the control panel's front cover.</p>

Oil Reservoir Assembly



A	Reservoir
B	Oil Pump Assembly
C	Pump Outlet
D	Replaceable Strainer
E	Air Regulator Assembly Air Gage
F	Air Gage

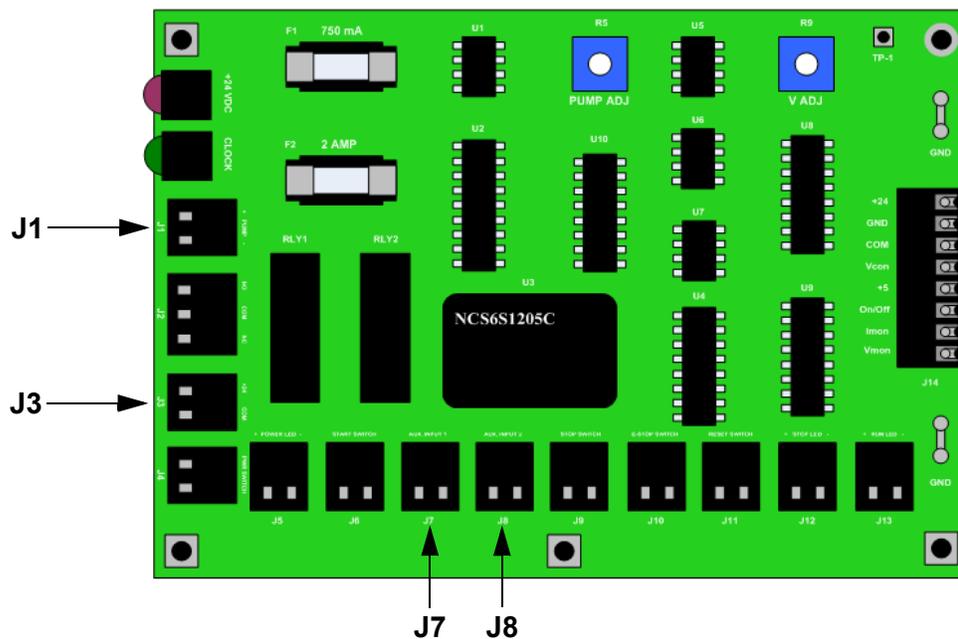
Chapter 2 Installing the System

Tools Needed

- Adjustable wrench
- 1/8 inch slotted screwdriver
- Philips head screwdriver
- Wire strippers

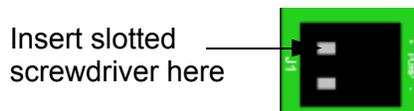
Connecting the Controller to the Reservoir Assembly

1. Make the following electrical connections:



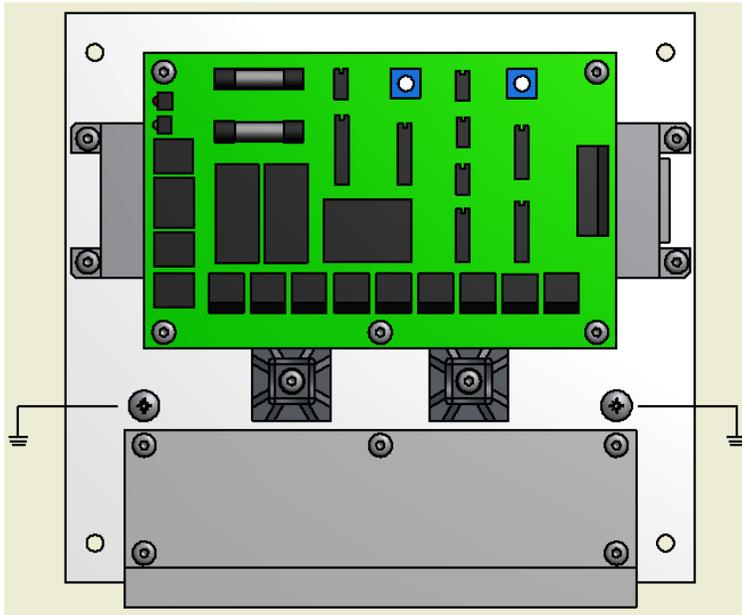
- J1 terminal (solenoid cable) and confirm polarity
- J3 terminal (24 VDC Input) and confirm polarity
- J8 terminal (Air Pressure Switch)
- J7 terminal (Low Oil Switch)

NOTE: Use a 1/8 inch slotted screwdriver to press down in the slot on top of the terminal block so that you can push in the cable wire into the corresponding side slot.

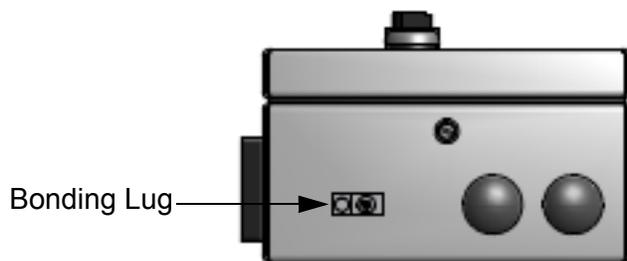


2. Ground and bond ring terminals in the terminal block.

NOTE: All grounding and bonding need to be ring terminals and grounded to an earth ground.



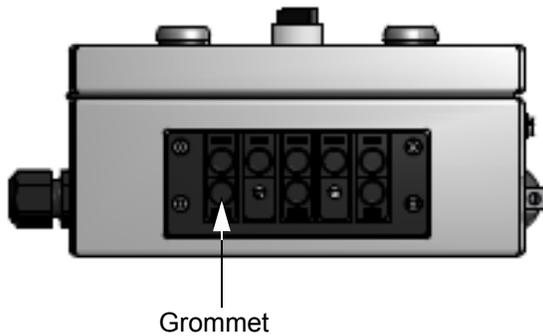
3. Bond the equipment being lubricated to the controller's bonding lug.



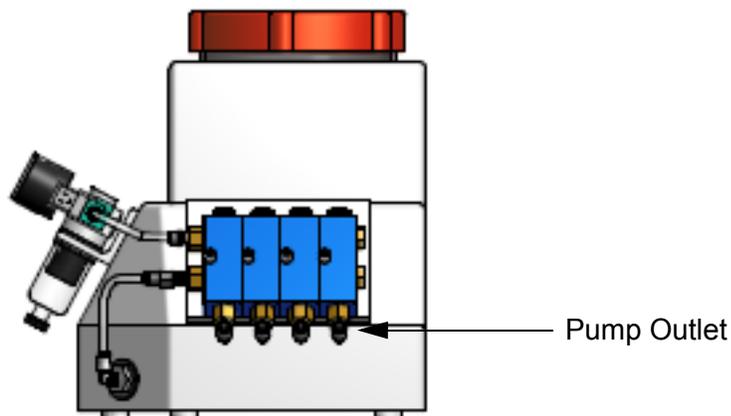
4. Connect the nozzle.

NOTE: The nozzle must be located 1/2 inch to 3/4 inch (12.7 mm to 19 mm) directly above the lubrication point.

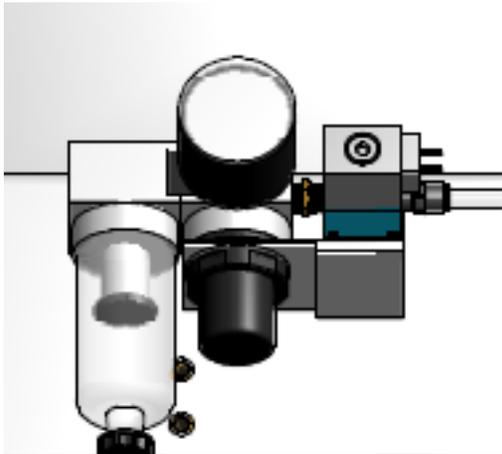
5. Connect the high voltage cable by:
 - a. Sliding the wire end of the high voltage cable through the cable entry grommet on the outside of the controller.



- b. Connecting the cables to the high voltage terminal block.
 - c. Attach a wire tie around the cable and one of the cable entry grommet tab.
 - d. Connect the boot shaped end of the high voltage cable to the nozzle, making sure it "clicks" into place.
 - e. Run 1/4 inch tubing from the pump outlet to the nozzle liquid inlet.
6. Connect the air inlet to the 1/8 inch NPT female on the filter.



7. Adjust the regulator by removing the clear cap and by turning adjustment screw to 40 psi (2.75 bar). Reinstall the clear cap when complete.



8. Add oil to the reservoir.

Verifying Set Up

Check that the following have been completed:

- 24 VDC has been connected to terminal J3.
- The fluid delivery system is complete.
- The high voltage cable is connected from the electrostatic spray controller to the nozzle.
- The target is grounded to the ground lug located on the electrostatic spray controller.
- Either the electrostatic spray controller or the target is connected to an “earth” ground.

Powering On the System

1. Turn power selector switch to ON (green button illuminates).
2. To speed up oil delivery, turn pump adjustment screw counter-clockwise until it stops.
3. In the control box, turn pump potentiometer clockwise until it stops
4. Run pump on Full Open until oil reaches the nozzle.
5. Set pump adjustment screw to desired position (1 1/2 to 2 turns) for desired flow rate.

WARNING: When unit is on, do not touch any high voltage connections including the high voltage cable, terminal block, and nozzle.

CAUTION: Do not power unit on without the terminal block cover in place.

Chapter 3 Advanced Operation and Setup of the Controller

Terminal Block Connections

J1	Provides a 24 VDC pulsed output to a solenoid coil. The output frequency is adjustable from 20 to 60 cycles per minute.
J2	The connections for the auxiliary relay that is energized while the controller is in the “spray” or “run” mode.
J3	Connection for the 24 VDC power supply.
J4	“Power On” connection. When open, the spray controller is “off.” When closed, the spray controller is “on.”
J5	Green LED located on the center of the electrostatic spray controller’s front cover. The LED is illuminated when the “power on” switch is closed. This is used to alert the operator that the system is enabled.
J6	Contacts for the “Start Cycle” switch. When this switch is closed, the electrostatic spray controller is in the “run” mode.
J7	Connections for an auxiliary switch such as a float switch. The connection is intended to be used for a device such as a liquid level float switch. When the switch is closed, the system operates in “run” mode. If the switch is opened, the “run” mode is interrupted and the “run” cycle is suspended until the switch is closed.
J8	Connections for an auxiliary switch such as an air pressure switch. When the switch is closed, the system operates in the “run” mode. If the switch is opened, the “run” mode is interrupted and the “run” cycle is suspended until the switch is closed.
J9	Connection for the normally closed stop switch. When open the lube cycle is stopped.
J10	Connection for a normally closed emergency stop switch that will stop the lube cycle when opened. Must be “jumpered” if not used.
J11	Connection for a normally open switch to be used as a reset/run input. When closed momentarily it will reset a prior system stop or arc fault generated by the circuit board.
J12	Connection for 24 VDC RED LED that illuminates when the lube cycle has been stopped.
J13	Connection for 24 VDC BLUE LED that illuminates when the board is in the lubrication (run) state.

Potentiometers

The pump adjust (PUMP ADJ) potentiometer is used to increase or decrease the output frequency provided by terminal J1. The output frequency is adjustable from 15 to 60 cycles per minute. Rotating the potentiometer adjustment slot counter-clockwise decreases the output frequency. Rotating the adjustment slot clockwise increases the output frequency.

The voltage adjustment (V ADJ) potentiometer is used to vary the output voltage of the HVPS. Rotating the potentiometer adjustment slot:

- Counter-clockwise decreases the output voltage.
- Clockwise increases the output voltage.

Misuse of Product

This product is designed to be used as a system as outlined in the user guide.

Misuse includes, but is not limited to the following:

- Using the high voltage components as an ignition source.
- Using the high voltage component with any other nozzles other than ABC Company nozzles specifically designed to be used with the electrostatic spray controller.

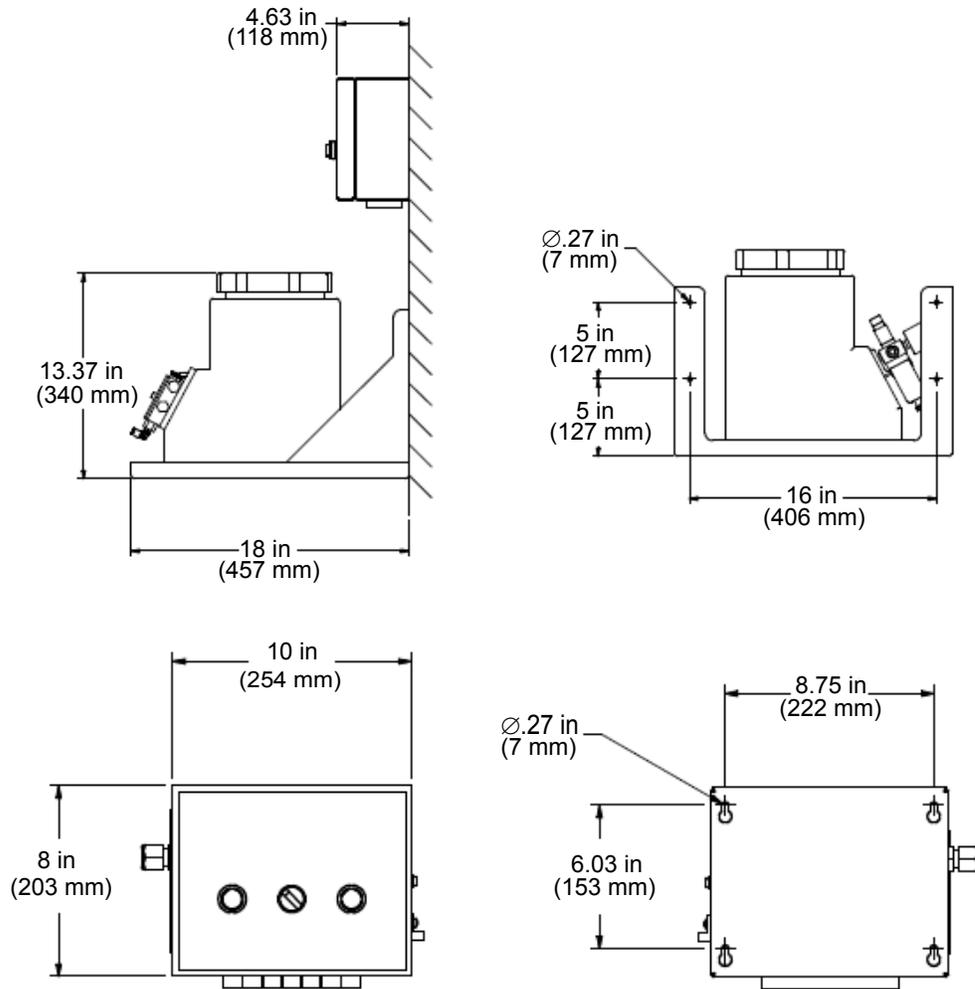
Chapter 4 Troubleshooting

PROBLEM	SOLUTION
Malfunction	<p>If the system or any equipment in the system malfunctions, shut off the system immediately and perform the following steps:</p> <ul style="list-style-type: none"><li data-bbox="867 520 1442 552">• Disconnect and lock out electrical power.<li data-bbox="867 579 1471 646">• Close pneumatic shutoff valves and relieve pressures.<li data-bbox="867 674 1463 741">• Identify the reason for the malfunction and correct it before restarting the equipment.

Chapter A Technical Specifications

Electrostatic Lubrication System Assembly and Bracket

Dimensions



Specifications	Description
Electrical Characteristics	
Power Source	The control system should be operated only from the type of power source indicated on the electrostatic lubrication system's builders tag. If you are not sure of the power source consult an electrician or qualified service personnel.
Water and Moisture	The control panels are rated NEMA 12 unless otherwise specified. The control panels are not designed to be hosed down with either low or high-pressure water or chemicals.
Oil	
Recommended brands	<ul style="list-style-type: none"> • Castrol Lubecon HTCL • Summit High Temperature Chain Oils • Hangsterfer's Hard Cut • Mobil Synthetic Oven Lube • Most synthetic lubricants with Silicone/PAG PhosphateEsters/PAO/Polyolesters base
Lubricant viscosity range NOTE: Most petroleum and/or synthetic oils spray well as long as they are in the viscosity range, contain no particulates or solids, and are not flammable.	50 to 1000 SUS
Operating temperature	150°F (66°C) Maximum

Index

Numerics

24 VDC BLUE LED	19
24 VDC GREEN LED	12
24 VDC RED LED	19
24 VDC Supply	9

A

Adjusting Regulator	17
Adjustment Screw	17
Air	
Gage	14
Regulator Assembly Air Gage	14
Air Inlet, Connecting	17
Approvals	3
Assembly	
Oil Pump	14
Oil Reservoir	14

B

Bonding	16
Lug	10, 16
Safety	4

Buttons

Blue	10
Power On/Off	10
Red	10
Reset	10
Stop	10

C

Cable Entry Grommet	10
Cable, High Voltage	9
Cautions	18
Connecting Controller to Reservoir Assembly	15
Contact Information	2
Controller	8
24 VDC Supply	9
Components	9

Grounded Target	10
High Voltage Cable	9
High Voltage Nozzle	9
Illustration of the Inside	11
Illustration of the Outside	10
Pump	9
Terminals	11, 12, 19

Customer Support	2
------------------------	---

D

Dimensions	22
------------------	----

E

Electrical Characteristics	23
Electrostatic Lubrication System	
Assembly	22
Bracket	22
Components	8
Controller	8
Installing	15
Powering On	18
Electrostatic Spray Controller	8

F

Fire Safety	6
Fluid Delivery System	9

G

Getting Help	2
Getting Started	8
GRD	11
Grommet	10
Grounded Target	10
Grounding	16
Safety	4

H

Help	2
------------	---

H		N	
High Voltage		Nozzle	
Cable	9	Connecting	16
Cable, Connecting	17	High Voltage	9
Nozzle	9	Location	16
Nozzle, Connecting	16		
I		O	
Inserting Cable Wire	15	Oil	
Inside the Controller	11	Lubricant Viscosity Range	23
Installation	15	Pump Assembly	14
Intended Use	3	Recommendations	23
		Reservoir Assembly	14
J		Operating Temperature	23
J1	11, 12, 13, 19	Outside of the Controller	10
J10	11, 19	Overview of System	8
J11	11, 13, 19		
J12	11, 13, 19	P	
J13	11, 19	Personal Safety	4
J14	11	Phone Number	2
J2	11, 12, 19	Potentiometers	20
J3	12, 19	Power On/Off Button	10
J4	11, 12, 19	Power Source	23
J5	11, 12, 19	Powering on System	18
J6	11, 12, 19	Pump	9
J7	11, 13, 19	PUMP ADJ	20
J8	11, 13, 19	Pump Outlet	14, 17
J9	11, 13, 19		
L		Q	
Lug, Bonding	10, 16	Qualified Personnel	4
M		R	
Malfunction	21	R5	11
Misuse of System	20	R9	11
Moisture	23	Regulations	3
		Regulator	17
		Replaceable Strainer	14
		Reservoir	14
		Run (Reset) Button	10

S

Safety

Fire	6
General Spray Information	6
Information	3
Personal	4
Servicing	4
Specifications	22
Stop Button	10
Strainer, Replaceable	14
Support, Customer	2
System Location Environment	3

T

Target	10
Technical Specifications	22
Terminal Block Connections	19
Tools	15
Troubleshooting, Malfunction	21

U

Unintended uses	3
URL	2

V

V ADJ	20
Verifying Set Up	18

W

Warnings	5, 6, 18
Water	23
Website support	2