



ESS



Operator's Manual PT0215

ESS

Electrostatic
Spraying Systems

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OPERATOR'S MANUAL

PTO215

Electrostatic Spraying Systems, Inc.

62 Morrison St. · Watkinsville, GA 30677-2749

CE certification applied for

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This manual last updated May 13, 2014



CONGRATULATIONS!

You have just purchased one of the most advanced spraying systems on the market today. Electrostatic Spraying Systems, Inc.¹ (ESS) is committed to providing you with powerful spraying systems that are easy to operate and maintain.

The products of ESS are the result of the efforts and creativity of many people. In addition to input from engineering, marketing and manufacturing personnel, suggestions from our customers have been implemented into the design of our equipment. We would like to hear your ideas also! If you have any suggestions or comments regarding the products or service of ESS write or call us at:

Electrostatic Spraying Systems, Inc.
62 Morrison St.
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Phone: 706-769-0025
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support@maxcharge.com

Please take time to read this manual before operating the ESS 150SR™. The manual contains important instructions for the operation of this equipment. It includes helpful suggestions to maximize productive use. Several safety precautions are listed for your protection.

Thank you!

We appreciate your business and are proud that you have selected an ESS sprayer for your operation.

Your new sprayer has been thoroughly tested and calibrated at the factory. If you have any problems with it, please get in touch with us immediately. We will be glad to answer any questions you have concerning our equipment or service. ESS intends to support its customers with efficient, helpful and friendly service. We appreciate your business and sincerely hope that Electrostatic Spraying Systems can meet your present and future spraying equipment needs.



We encourage you to make copies of the "Spray Gun Yearly Service" form in the back of this manual. Use this form every year you send your gun in for maintenance and when we service the gun, your warranty will renew for another year. The service will replace the nozzle base, replace air and liquid hoses inside gun housing, replace filters, and recalibrate the gun and thoroughly cleaning the entire spray gun.



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Overview of the PTO215

Air-Assisted Electrostatic Sprayer

The heart of the PTO215 sprayer is the patented MaxCharge™ nozzle. ESS air-assisted electrostatic sprayers produce 35 to 40 micron electronically charged spray droplets that are carried to the plant canopy in a 5.5 to 7 cfm air stream through each nozzle.

Air, liquid, and electricity enter separately at the rear of the nozzle. A positive charge is applied to the electrode in the tip of the nozzle inducing a negatively charged liquid flow. Just before leaving the nozzle, the liquid is sheared by the air atomizing the liquid into many thousands of 35 to 40 micron droplets trapping the negative charge. The charged droplets leave the nozzle and are carried by the 5.5 to 7 cfm air flow to the plant canopy.

The charged droplets are attracted to the plant material by electrostatic forces, up to 75 times the pull of gravity, evenly coat all the plant surfaces, front, back, underside of leaves and stems. The results is uniform spray coverage on hidden areas deep inside the plant canopy where other sprayers miss.

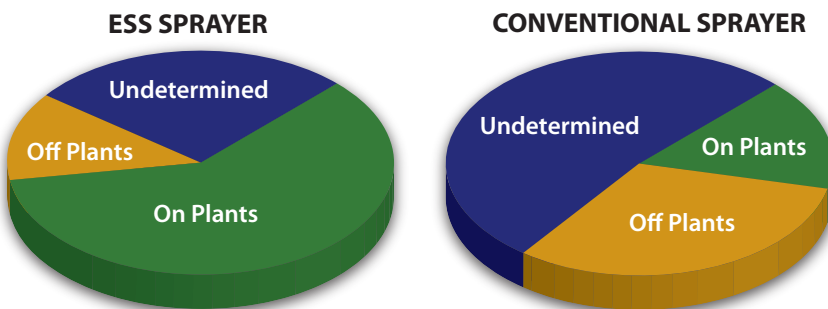
The MaxCharge™ nozzle is easy to clean and corrosion-proof. The interior ceramic outlet resists wear three times better than stainless steel outlets. These features combine to give the best spray coverage on the market.

The comparison of air-assisted electrostatic spraying versus conventional spraying is dramatic.



The MaxCharge™ spray nozzle is what makes ESS the industry leader in the production of electrostatic spraying equipment.

Where Does the Spray Go?






Electrostatically charged droplets are attracted to plant surfaces.

The University of California completed a series of tests to investigate what happens to spray liquid after it leaves the nozzle.

Conclusion: ESS technology places over 4 times the amount of spray onto the plant surface using 1/2 the amount of chemicals. Furthermore, they also reported that ESS sprayers send 2/3 less chemicals to the ground and into the air. Less chemical used overall, less waste and less drift than conventional equipment.
Imagine the environmental benefit!

Safety Information

OPERATOR RESPONSIBILITY AND SAFETY

-  Lack of attention to safety can result in accidents, personal injury or death.
-  Always watch for safety hazards and correct problems promptly.
-  When using any equipment, obey all manufacturers' safety information and labeling.

IMPORTANT!













Read the Operator's Manual! Failure to do so is considered a misuse of the equipment.

It is the responsibility of the user to read the Operator's Manual to understand the safe and correct operating procedures for the sprayer and to maintain the sprayer according to the manufacturer's recommendations. It is the operator's responsibility to ensure that all who are using this equipment read this manual.

The operator is responsible for inspecting the equipment and for repairing and replacing damaged or worn parts to prevent damage or excessive wear to other parts. It is also the operator's responsibility to deliver the machine for service or to replace defective parts which are covered by the standard warranty.







EQUIPMENT SAFETY

Use the following safety tips as a general guide when using the PTO215 sprayer:

-  Before operating any equipment, become familiar with all safety guidelines, cautions and warnings including those provided by the tractor manufacturer.
-  Do not allow children to operate the sprayer. Do not allow adults to operate the sprayer without providing them proper instruction.
-  Do not allow riders on the sprayer or tractor during operation or transport.
-  Keep the area of operation clear of all persons and animals.
-  Sprayer is equipped with a Power Take Off (PTO) driveline. Failure to take proper safety precautions could result in serious injury or death.
-  Keep hands, feet, hair and clothing away from PTO driveline and other moving parts.
-  Do not operate machinery without all guards and shields in place.
-  Always disengage the PTO, stop tractor engine and wait for all moving parts to stop before servicing, adjusting or repairing the sprayer.
-  Do not apply chemicals when weather conditions favor drift from intended treatment area.
-  Never pump flammable or explosive liquids such as gasoline, fuel oil, kerosene, etc. through the ESS sprayer.
-  Turn off the sprayer whenever leaving it unattended.
-  Only unhitch the sprayer from the tractor on firm and level ground.

CHEMICAL SAFETY

Read and follow all instructions on the chemical manufacturer's label. Make note of the following requirements for:

-  **Personal Protective Equipment (PPE)** to be worn when handling, mixing and applying the chemical, including: protective clothing such as boots, gloves, apron or hat; eye protection such safety glasses, goggles or a face shield; and respiratory protection such as a mask, cartridge or respirator.
 -  **Directions for use.** This includes handling, mixing and applying as well as storage and disposal of the chemical.
 -  Environmental and physical or chemical **hazards**.
 -  **First aid** in case of chemical exposure.
 -  **Mandatory waiting periods** between application time and worker reentry (i.e. 'Re-entry Interval' - REI) and crop harvest (i.e. 'Pre-harvest Interval' - PHI).
 -  Proper visual and/or verbal **notification** to workers and/or the public regarding areas sprayed.
- Always follow the prevailing laws of the area in which chemicals will be used.

PLEASE NOTE:

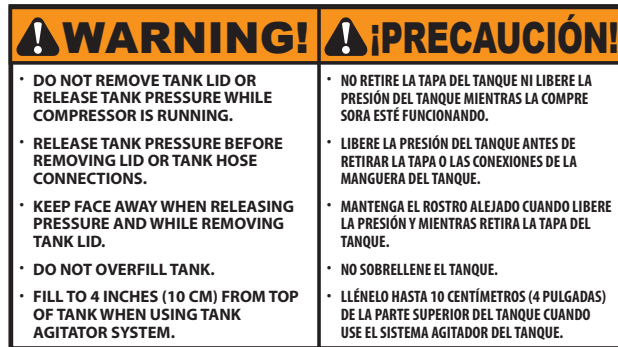
Additional safety guidelines associated with specific operating and maintenance procedures are mentioned throughout this manual.

SAFETY DECALS

ESS places several decals¹ on the PTO215 to remind equipment operators of proper equipment use and possible safety hazards. Even if these decals are missing or hidden from view always follow safe practices when operating ESS machinery. Replace them if they become worn or damaged and can no longer be read.

Please make sure to:

1. Note the original locations of the decals on the equipment.
2. Replace decals if they become worn or damaged and can no longer be read. Extra decals may be ordered from ESS or an authorized ESS dealer.



CAUTION:

The stainless steel tank operates under pressure.

This decal describes important information on correct use of the tank and its agitator.



This warning decal is located near all the shield locations under which the PTO drive components are located.



Do not operate the PTO 215 without the proper safety shielding in place.

¹ ESS is currently redesigning the warning labels for the sprayers. There may be minor changes in the layout and/or wording of the warning decals on your sprayer.

DANGER!

TIPPING HAZARD DEATH OR INJURY CAN OCCUR

Booms are in the folded position, support both spray booms with the legs provided, or by other means

The greatest hazard is during connection or disconnection from the tractor



DO NOT
EXCEED
400 RPM, PTO



NO SOBREPASA
400 RPM, TOME
DE FUERZA

Store machine empty and on level ground. Due to the amount of liquid that the PTO215 can hold, it is top heavy. There is a risk of tipping if not stored properly.

Never exceed 400 RPM when operating the PTO 215.

Installing the Sprayer For the First Time

The PTO215 sprayer is fully assembled and tested at Electrostatic Spraying Systems before it is shipped. After testing, the unit may be partially disassembled for shipment. When you have unloaded the sprayer, some components may require reassembly before operation. Make sure to remove all parts that may have been stored inside the unit for shipping.

Installing the ESS Supplied Driveline

Your sprayer comes with an ESS supplied Bondioli & Pavesi driveline. This driveline connects the tractor PTO shaft to the sprayer input shaft. To prevent damaging the sprayer it is necessary to follow specific installation steps. In addition to reading the instructions below in this PTO215 operator manual, please make sure to read the Bondioli & Pavesi manual supplied with the driveline prior to beginning installation.



WARNING! DO NOT STAND BETWEEN TRACTOR AND SPRAYER WHILE TRACTOR IS BEING BACKED TO HITCH.



WARNING! ADDITIONAL BALLAST MAY BE NEEDED ON THE FRONT OF THE TRACTOR FOR STABLE OPERATION AND TRANSPORT OF THE SPRAYER. SEE TRACTOR OPERATOR'S MANUAL FOR RECOMMENDED WEIGHTS.



READ THE MANUAL SUPPLIED WITH YOUR BONDIOLI & PAVESI DRIVELINE BEFORE INSTALLING.

INSTALLATION STEPS:

FIRST: Determine proper driveline length

First, determine if the driveline is the correct length. Begin by mounting the sprayer on the tractor's 3-point hitch per the tractor operator manual, but **DO NOT** install the driveline at this time. Due to normal tractor equipment and implement variations the driveline may need to be shortened per the following steps:

NEXT: Shorten the driveline (if needed)

1. **Determine shortest distance the driveline will span:** Raise the sprayer until the tractor PTO shaft and the sprayer shaft are level. This represents the shortest distance the driveline will span
2. **Determine tractor to sprayer distance:** Measure the distance from the groove on the tractor PTO shaft to the groove on the sprayer input shaft. Record this number.
3. **Determine driveline length:** Lay the fully collapsed driveline out on a flat, even surface and measure the distance from the center of the implement yoke retaining pin to the retaining ring (i.e. groove to groove). Record this number.

NOTICE

If the measurement taken in Step 3 is less than that of Step 2, the driveline WILL NOT HAVE TO BE CUT. Otherwise, proceed to Step 4.

4. **Determine length to cut:** Subtract the measurement from #2 (*tractor to sprayer distance*) from the measurement from #3 (*length of driveline*) and add 1 inch (25 mm) to insure there is adequate driveline movement allowance. This is the length of the driveline that will need to be cut. PLEASE NOTE: this length must be cut from **BOTH** sides of the driveline to shorten it for proper use.

Which is the left side?

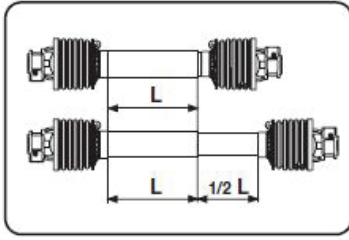
In this manual, all references to left and right are with the viewer standing at the rear of the sprayer looking forward over the sprayer, as it would be mounted on the tractor.

NOTICE

FAILURE TO USE THE ESS SUPPLIED DRIVELINE WILL VOID THE WARRANTY



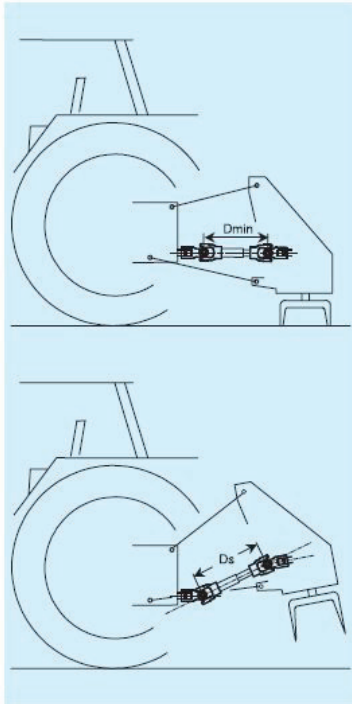
Your Bondioli and Pavesi manual is fastened to the sprayer's driveline.



NOTICE

Telescoping tubes must always overlap by at least 1/2 of their length in normal operation and at least 1/3 of their length in all working conditions. **VERIFY THIS BEFORE CUTTING DRIVELINE.**

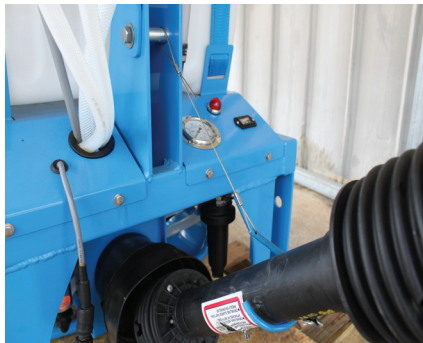
5. **Shorten the driveline:** Refer to the Bondioli & Pavesi manual (which comes fastened to the driveline) for instructions on the proper technique for cutting the driveline.
6. **Attach reassembled driveline** to tractor PTO shaft and sprayer input shaft and check fit. Note one end of the driveline shield tube is marked with a tractor symbol to indicate the end that attaches to the tractor.
7. **Install the driveline shield restraint chains** per the manual supplied with your Bondioli & Pavesi driveline.



Proper driveline angle



Driveline shield restraint chain installed



Driveline holding cable

NOTICE

Driveline angles should not exceed 25 degrees.

Operating Instructions

Air System

Briefly inspect the oil site glass on the rear of the compressor block before each operation. Oil level should be visible at the middle of the site glass.

With the tractor just above idle speed, engage the PTO and increase the tractor speed to 400 RPM PTO, do not exceed. Air will then be supplied to each of the hose reels.

Never turn on the tractor with the PTO system engaged.



NOTE

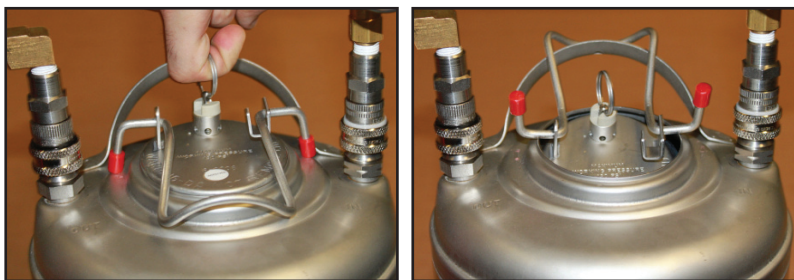
Stainless Steel Tanks

Since the PTO215 uses a stainless-steel pressure vessel for its liquid supply, it is important for the operator to understand how to safely use this component. Before attempting to open, the operator should always check for pressure inside the tank. Located on top of the tank lid is a pressure relief valve, with a key ring attached. To release pressure, pull up on the key ring, and then twist to lock in the upright position; the tank is depressurized when no hissing sound is heard. Once depressurized, pull up on the latch to release the tank lid; it may be necessary to bump the lid to release the seal from the inside of the tank. To remove the lid, rotate the handle and allow the end of the lid to drop slightly. After filling the tank and affixing the lid, pull the latch down centered and flush with the top of the tank. Restore the pressure relief valve to its original orientation. The tank should be thoroughly cleaned after each use with warm soapy water or tank cleanser.

Be aware that even when the relief valve is in the down position, a quieter hissing sounds will be heard during operation. Air flowing out of the tank is necessary to provide sufficient agitation for each pressure vessel.

**DO NOT
OVERFILL
THE TANK**

ESS recommends that the tank not be filled past the full level mark, since the force of agitation may cause liquid to escape through the air bleed hole in the tank lid.



Tank Quick Connects

All quick connects should be firmly in place during operation. The quick connects are identified separately for either air or liquid and delineated by:

Air -

Socket: white band

Plug: indented hex

Liquid -

Socket: black band

Plug: standard hex



Adjusting Liquid Pressure

The PTO215 is equipped with two 15 gallon pressure vessels. The tanks use a small portion of the provided air supply to push liquid to the sprayguns as well as agitate the chemical mixture.

It is important to understand that flow rates can be affected by two ways: first by increasing or decreasing the pressure allowed into the tank and secondly by changing the flow disk size in the Flow Regulator assemblies (refer to illustration below). The system will be calibrated at the factory to achieve a nominal 150 mL/min flow ($\pm 10\%$) out of each spraygun. Adjusting the liquid rate excessively will negatively effect electrostatics. If lower rates are desired, air pressure can be reduced.

To set the tank pressure:

With the unit at operating RPM locate the tanks pressure regulator and gauge assembly. Pull adjustment knob outward to adjust pressure.

Turn left (counter-clockwise) to decrease pressure.

Turn right (clockwise) to increase pressure.

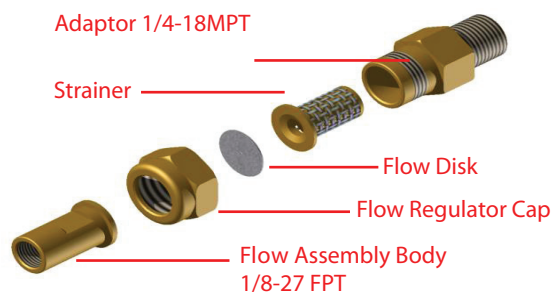
For an accurate setting start with the regulator below the desired pressure, then adjust higher. Once the desired pressure is reached, push the adjustment knob inward to lock



Tank Pressure Regulator

Flow Regulator Assembly

The illustration below shows the flow regulator assembly. Located on the liquid leader on each spraygun, the assembly is used to regulate the liquid supply by varying orifice diameter. Unlike the air pressure adjustment, the advantage of adjusting the flow regulator assembly will allow for independent flow rates for each spraygun. Since chemical build up and clogging can drastically effect the performance of the unit it is imperative that these assemblies are checked and cleaned regularly. Using a 13/16" and 11/16" wrench, separate the regulator cap from the adaptor, being cautious not the lose the flow disk. After cleaning reassemble in the orientation shown below; be cautious not to over-tighten, as you may damage the assembly.

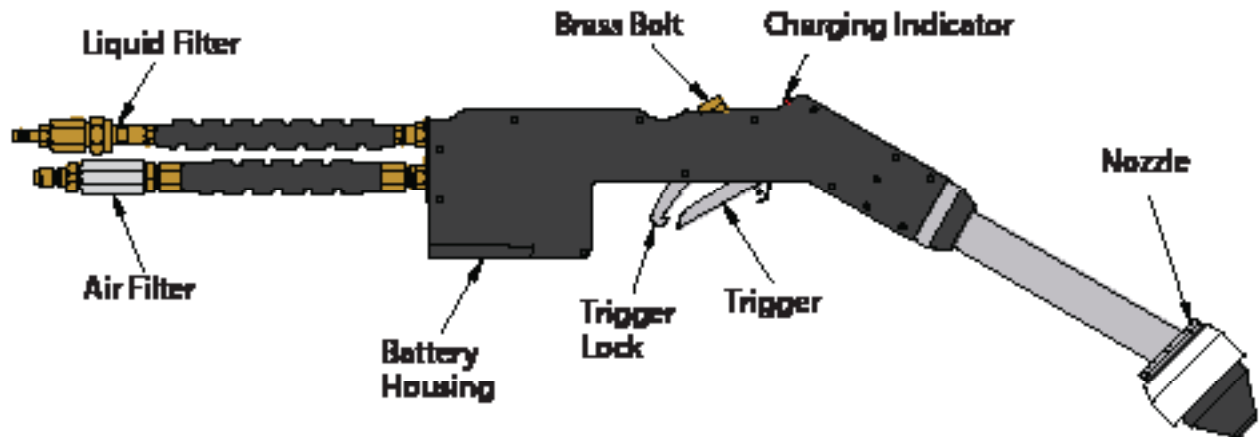


*An exploded view of the
disassembled flow disk assembly
Please take note of the correct order.*

Spraygun Operations

The Spraygun is held by the operator during spraying. Activation of the trigger causes liquid to spray. The Spraygun has the following user-serviceable parts: the air filter, the liquid filter assembly, the nozzle assembly, and the batteries. Except for the batteries, which are accessed by removing the battery cover, nothing inside the Spraygun shell is user-serviceable. **Do not open the spraygun shell**; doing so will void the warranty on the spraygun.

NOTE



The Spraygun

OPERATING THE SPRAYGUN

Before turning the unit on, it is necessary to have all spraygun connections well-seated.

To connect:

1. Slide the sleeve off the quick connect socket
2. While holding the sleeve up, push the socket onto the quick connect plug
3. Release the sleeve
4. Pull on the socket body to ensure that it is properly seated and cannot be pulled off the plug when the sleeve is down

To disconnect:

1. Slide the sleeve off the quick connect socket
2. While holding the sleeve up, pull the socket off the quick connect plug

Unravel the hose length needed for the application, making sure to avoid kinks and pulling the hose over sharp edges. Once air is present, the red LED on the top of the spraygun will illuminate, indicating that the electrostatics are operating. Depress the trigger to allow liquid to flow through the spraygun, it may take a moment for the liquid hose on the reel to fill completely. It is recommended that the charge is tested before each use, refer to Testing Nozzles on page 9.

Spray Technique

As in spray painting, the goal is to achieve even coverage over the surface. The ESS MaxCharge™ spray gun is designed to help you do that by propelling the chemical spray with an assisted air flow, you can stay well away from the target surface and let the electrostatic attraction do the rest of the work.

Please note: the spray droplets are very, very fine—about 40 microns each. If you are used to working with a conventional sprayer, you may make the mistake of thinking the target is not wet enough because you do not see large beads of liquid. In fact, after a pass with the spraygun, the surface of the target should just barely glisten with moisture. The fine droplets will evaporate quickly.

Here are some tips to achieve the best possible coverage:

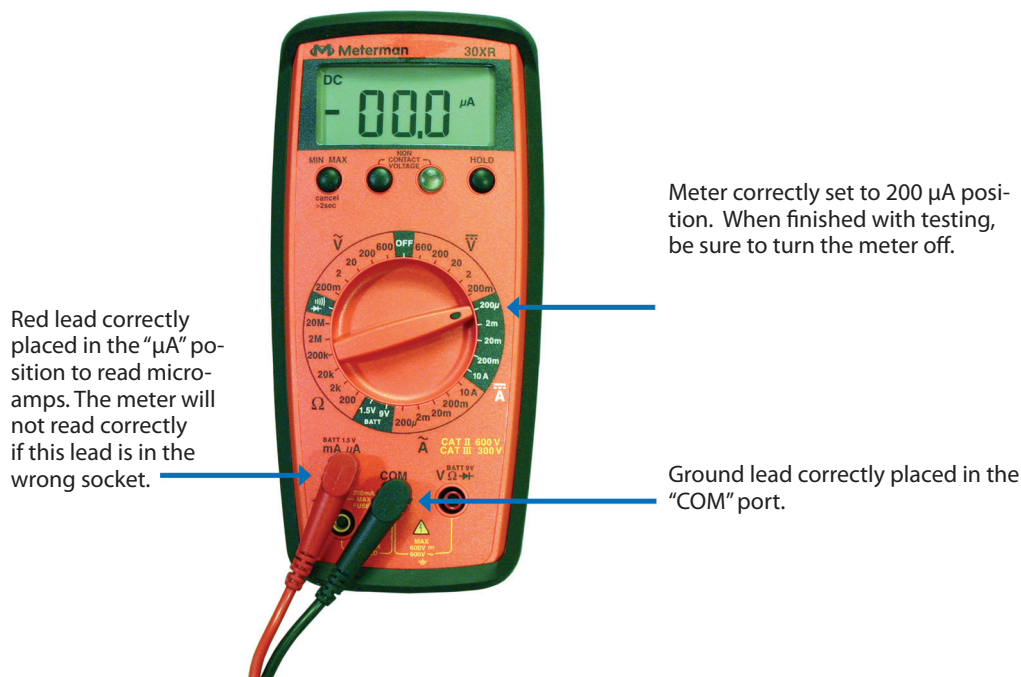
1. Before each job, ensure that your sprayer is in good working order (see Testing Nozzles on page 9).
2. The optimal spraying distance is at least 30 inches away from the target surface, however 36 to 48 inches may provide a more broad coverage. This gives the fine mist more room to develop.
3. Hold the spraygun at right angles to the target surface. Starting at the highest point and using zig-zag horizontal strokes about 1 meter (3 ft.) wide, spray down to the lowest point. Try to have each stroke overlap the previous stroke by about 50%.
4. You can use vertical strokes if it suits the area better. Just make sure to work in a methodical pattern and let your strokes overlap.
5. When moving to the next section, allow it to overlap the previous section by a few inches. Do not leave a gap.
6. The target surface should just barely glisten with the spray. Do not over-saturate the surface; if you see runs or puddles it means you are wasting chemicals. Do check to make sure the newly-sprayed surface is very slightly damp.
7. Be careful to keep the spray gun barrel as level as possible. If you allow the nozzle to point down too much, it may drip occasionally.
8. Unlike spray painting, you don't have to stop the spray on every return stroke. Just engage the trigger lock and concentrate on the regular pattern of spraying.
9. Periodically check to make sure the red light is illuminated on the spray gun.



Note: When using unfamiliar equipment or chemicals, always test on a small area before treating the entire surface. Do not use a chemical with the ESS sprayer if the label prohibits use in low-volume sprayers.

Testing Nozzles

Test the nozzle for charging using the image below to ensure that the meter is properly set to measure the current of the spray cloud in micro-amps (μA).



NOTICE

Make sure to test your nozzle liquid charges at standard operating liquid and air pressures.

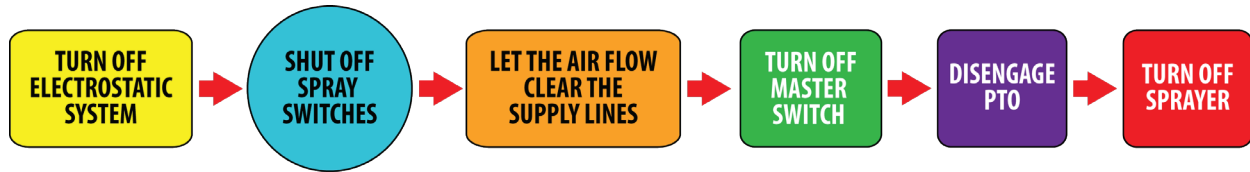
To test your spray charge with the multimeter

1. Turn the meter on and set it to the 200 μA range.
2. Ground the multimeter's black lead to the spray bar or by pinching the metal probe between the forefinger and thumb of your hand.
3. Hold paddle on the red lead about 1 inch (2.4 cm) from the tip of nozzle outlet while it is spraying and the electrostatics are turned on. Read the charge on the meter.

Ideally the spray charge will be above 10 μA . In the image above the nozzle spray has an excellent reading of 26 μA . If the charge is below 10 μA you will not achieve good electrostatic 'wraparound'. For optimal performance, clean any nozzles that are below 10 μA by following the procedures outlined in the Cleaning and Maintenance section.

Shutting Down the Sprayer

It is important to shut the sprayer down correctly so that the liquid lines will be purged of chemical.



First turn off the liquid flow by shutting off the spray switches and the electrostatic switch. Let the air flow purge the remaining liquid from the supply lines in the boom. Wait a few seconds until the nozzles quit spraying. They may spit intermittently, but this is normal. When the liquid has cleared from the boom supply lines, you should turn off the PTO drive. Then shut down the tractor..

NOTE: Failure to disengage the PTO before shutting down the tractor can cause damage to the supercharger.



Follow the section on Draining and Flushing the Sprayer for additional post-use maintenance.

Cleaning and Maintenance

It is very important to follow all the maintenance and cleaning procedures to ensure that the electrostatic sprayer will function properly. Although the MaxCharge™ nozzle will outperform all electrostatic spray technology on the market, regular cleaning will ensure peak operating performance. The sprayer can be washed down with a pressure washer prior to any individual component being cleaned; take extreme caution around sensitive components. As a precaution, apply dielectrical silicone grease to all connections. This will prevent water damage to the electrical system.

Cleaning Nozzles

Disassemble the nozzle by unthreading the electrode cover. Pull the hood off. The nozzle consists of eight main components:

- | | |
|--------------------|-----------------------------|
| 1. Hood | 5. Nozzle Base |
| 2. External O-ring | 6. Liquid Inlet |
| 3. Nozzle Cover | 7. HV Electrical Connection |
| 4. Insulator Ring | 8. Air Inlet Piping |

The nozzles are mounted to the air tube using two brass nipples and two swivel connectors. This allows the operator to aim the nozzles in directions that are appropriate for travel speeds and wind conditions. The wiring harnesses and liquid lines are mounted inside PVC protective covering that protects parts from chemical and physical damage.

Disassemble the nozzle by unthreading the electrode cover. Pull the hood off. The nozzle consists of eight main components. The diagram on the right page identifies the nozzle components and the air, liquid, and electrical connections.

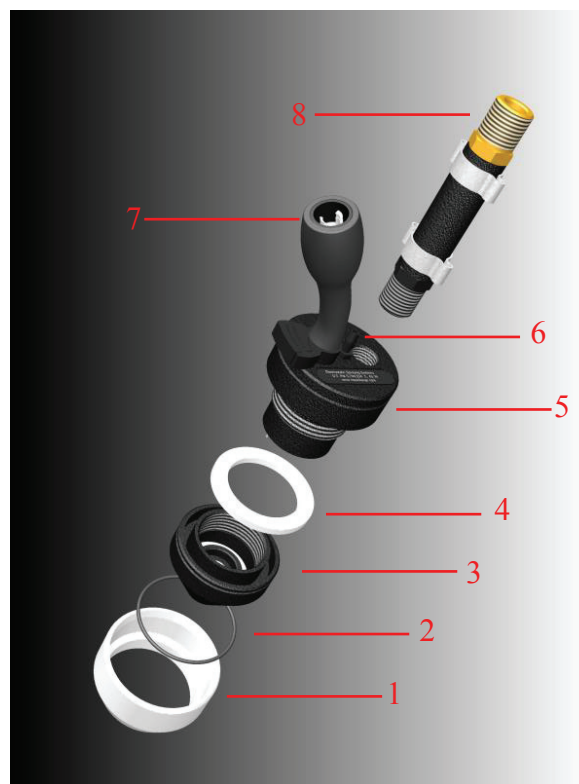
Simple cleaning of the nozzle interior and exterior with soap and water after each day of use is the most important thing you can do to ensure trouble free operation. Cleaning each day avoids long-term chemical buildup that eventually causes clogs, poor spray patterns and shortens nozzle life. After each day's use, remove the nozzle cover and clean any debris from around the nozzle tip. Clean the ceramic outlet and all interior and exterior surfaces. It is important to clean inside the hood and the two cavities. Wipe clean the exterior of the wires and all hoses and fittings connected to the nozzle. Put dielectric silicon grease on any electrical components.

After cleaning, make sure the internal (located in the nozzle base) and external o-rings are still in place. Put the insulator ring back on the nozzle base and screw the nozzle cover back. Replace the hood, pushing it up against the external o-ring.

The nozzle cover should be hand tight. Never use pliers or other tools to tighten it. The insulator ring should be loose.



Apply enough dielectric silicone grease to coat the metal pin and socket connections of the nozzles. Also use dielectric silicone grease to protect the low-voltage circular connectors.



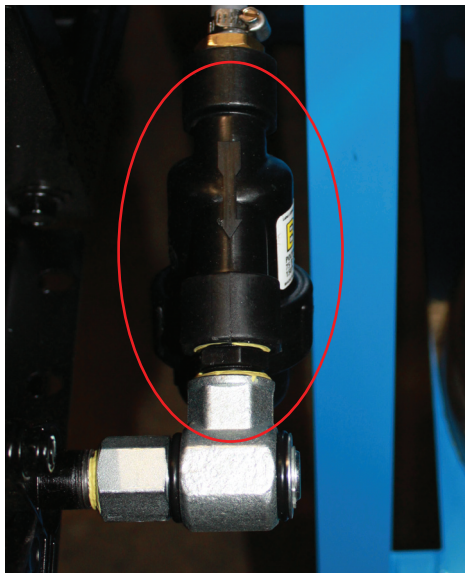
NOTE

Draining and Flushing the Sprayer

To drain the PTO215 unit, remove the latching tank straps from each pressure vessel. Disconnect each quick connect and remove tanks. Properly disposing of any remaining spray solution; flush the PTO 215 tanks with a mixture of warm water and a cleaning agent.

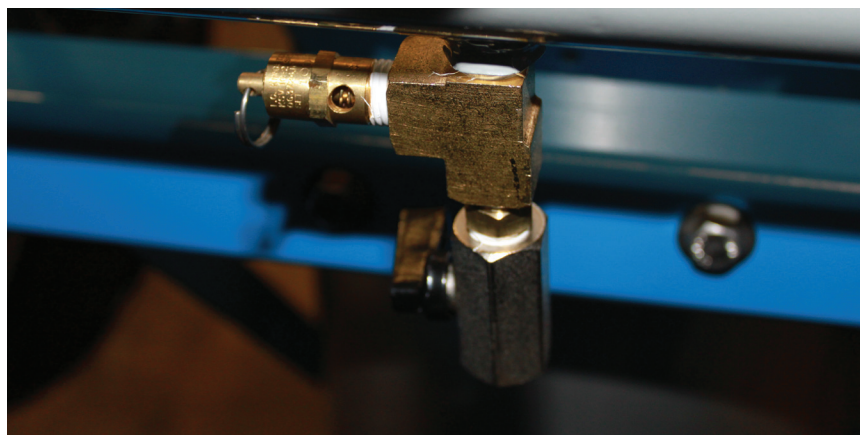
ESS recommends the use of NUTRA-SOL cleaner which can be purchased from ESS.

Nutra-Sol cleaner is an excellent neutralizer of chemical deposits in your tank and liquid lines. The use of this product will keep your equipment operating at peak performance. The recommended mixing ratio is 4 ounces in 12.5 gallons of water (113 grams in 47 liters of water). Disassemble each inline strainer on the reel assemblies and clean the screens. Before and after each use disassemble the flow disk assemblies and clean the enclosed screens.



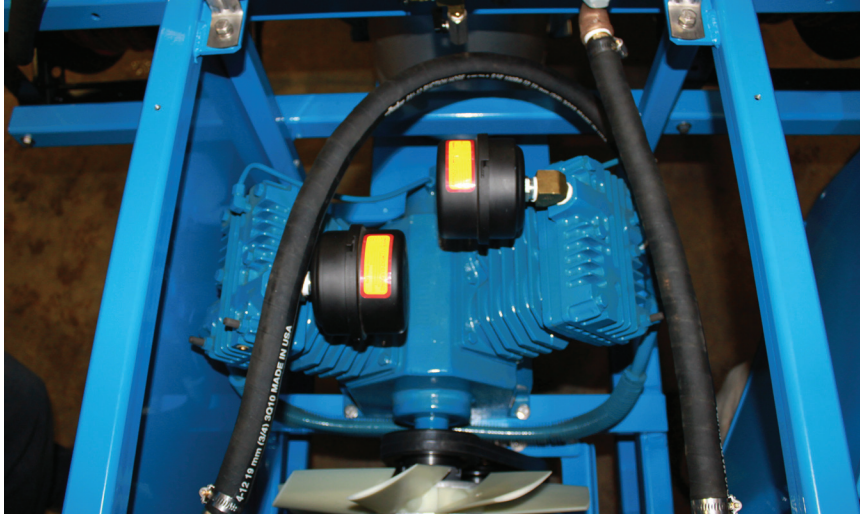
The two inline strainers are located between the reel assemblies and the tanks

It is also recommended to drain moisture buildup from the air system by actuating the ball valve, located underneath the air manifold. This should be done with the unit at operating RPM.



Compressor

The PTO215 compressor supplies the air necessary to atomize a droplet small enough to maintain an effect electrostatic charge. As one of the most important principle components on the PTO215, the compressor requires regular internal maintenance and exterior care.

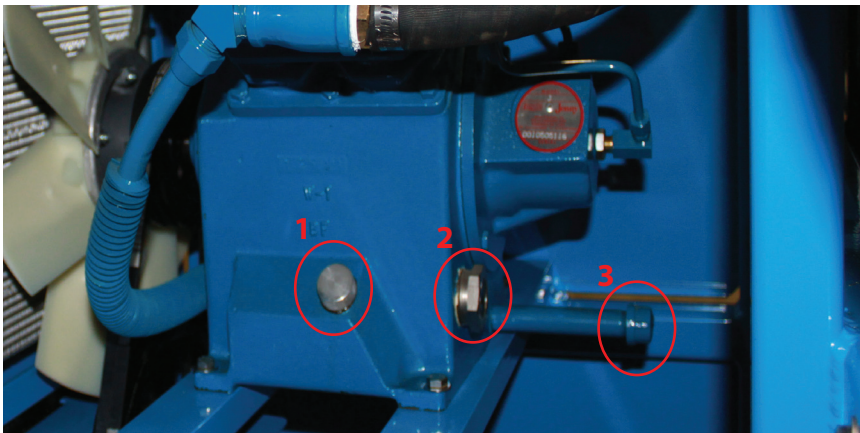


OIL REQUIRED

**1.5qts 20W Synthetic
Non-detergent**

It is in the operator's best interest to verify proper oil level before each spray session. This compressor requires 1.5 quarts 20W Synthetic Non-detergent, which would reach the middle of the site glass. There are threaded fill ports on either side of the compressor (refer to image below).

To drain the compressor, remove the threaded cap on the spout, located next to the site glass. Drain used oil into a catch basin and dispose appropriately. Oil change schedules are determined by the type of oil used. The compressor manufacturer recommends using Jenny Ultimate Blue and changing the oil every 2000 hours of operation. If an alternative oil is used it is recommended to change the oil every 1000 hours.



- 1. Fill Port**
- 2. Site Glass**
- 3. Drain Spout**

*Side view of compressor as
seen with side panel open*

Filter and Heat Exchanger

The two filters for the compressor are accessed by removing the top panel. It is recommended that each filter is inspected and cleaned on a weekly basis; replace filters with every oil change. When air filters are left clogged, the compressor will work harder to pull in air. Overheating can result in component failure.

To remove the filter element rotate the filter housing cap clockwise until it comes to a stop. Remove the filter, being careful not to introduce any foreign debris. Using compressed air, blow air from the clean side of the filter out. Reinstall filter and cap.

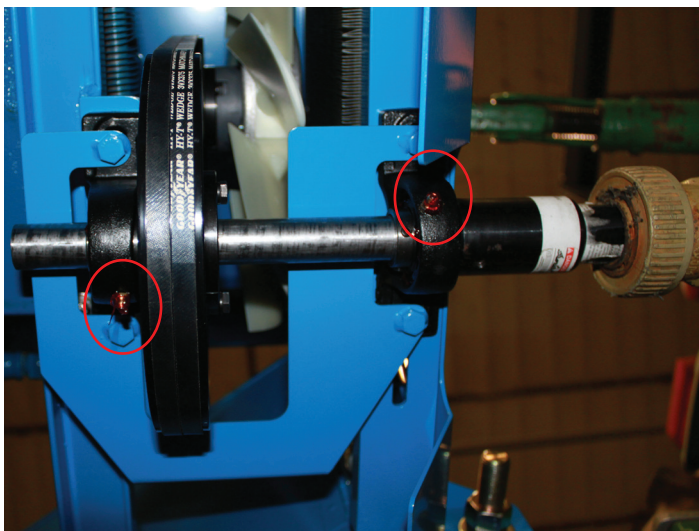


View from the top with panel removed

Located in front of the fan, the unit utilizes an air-to-air heat exchanger to cool the compressed air produced by the compressor. It is important to keep the component clean, as it requires unobstructed air flow to function properly. Use a high pressure air or water supply to clean the heat exchanger, be mindful not to damage cooling fins.

Belts

If you should need to replace or adjust the belt be aware of how the belts are tensioned. There are four bolts holding the pillow block bearings that support the PTO shaft to the underside of the frame. Loosen each bolt slightly and slide the assembly as necessary. To replace a belt, loosen the set screws located on each pillow block bearing. Then loosen the sheave and bushing assembly and remove the PTO jack shaft. Replace belt and reassemble in reverse order.

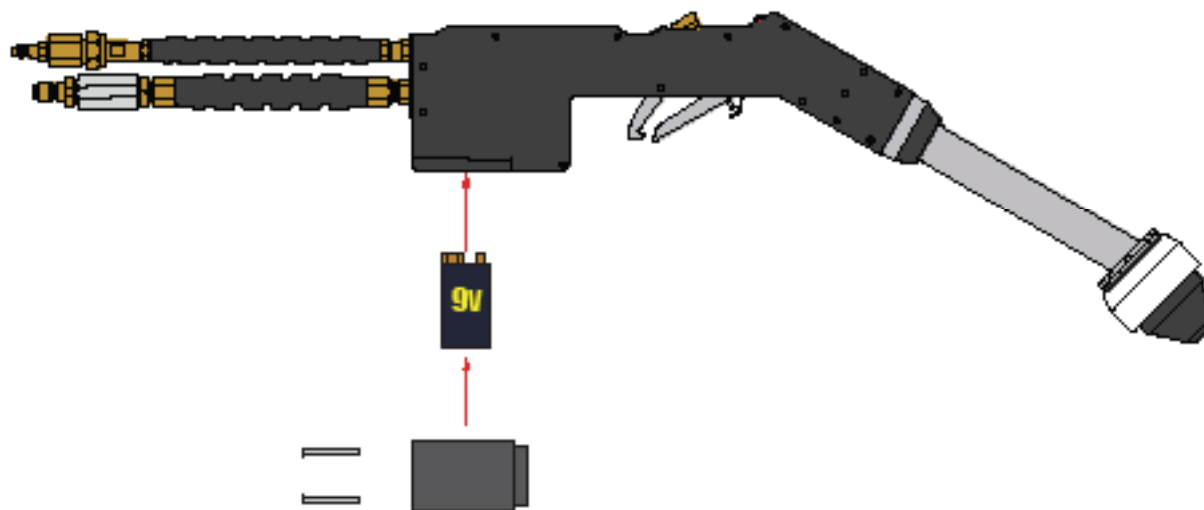


Each pillow block has 2 user-serviceable grease fittings (shown circled). Service every 200 hours of operation.

Belt adjustment and pillow blocks as viewed from underneath

Batteries

The nozzle charging operates on two 9-volt rechargeable batteries which are located in the base of the spray gun. In average conditions, the batteries will last 6-8 hours of operation on a charge. Batteries should be recharged when the charging indicator on top of the spray gun shell is not illuminated with air present in the spray gun. It is recommended that batteries are sourced solely through ESS as they have a uniquely high milliamp hour(mAh) rating. Non-rechargeable batteries may be substituted; be sure not to connect to the charger with these in place as this can damage the spray gun.



To change the batteries:

1. Unscrew the two 6-32 x 1/2" Phillips head machine screws which hold the battery cover in place.
2. While holding the leads in one hand, gently disconnect the batteries from the leads. Be careful not to tear the leads off the wires or tear the lead wires out of the power supply.
3. Connect the fresh battery pack to the leads.
4. Replace the battery cover. Screw the two 6-32 x 1/2" Phillips head machine screws back in to secure the battery cover.
5. Charge the spray gun before attempting to use it.

Remember to charge the spray gun batteries after every work session

Maintenance Schedule

Daily

- ☐ Verify oil level is at middle of site glass
- ☐ Verify that heat exchanger is free of debris and that air can pass through unobstructed
- ☐ Check belts for wear or damage
- ☐ Check strainer body liquid filters on reel assemblies
- ☐ Verify that all power supply indicators are illuminated while unit is running at operating RPM.
- ☐ Test nozzle charges
- ☐ Reference Spraygun Maintenance below
- ☐ Purge liquid system of remaining chemical after each operation

Annual

- ☐ Apply dielectric silicone grease to electrode at nozzle base
- ☐ Thoroughly clean liquid system and nozzles with Nutra-Sol™ by following the procedure outlined in the Cleaning and Maintenance section (p. 9).
- ☐ Replace compressor air filters
- ☐ Change compressor oil
- ☐ Service PTO jack shaft bearing assembly



AGS Dielectric Silicone Grease



It's important to keep your MaxCharge™ nozzles clean and working efficiently.

Spraygun Maintenance

Please observe the recommended maintenance schedule for your Spraygun in order to preserve spray quality and the working life of the unit. If you use heavy wettable powders to spray or if you operate the Spraygun in a dusty environment, you may need to clean liquid and air filters more often than these recommendations. Visually inspect the nozzle and trigger assembly often and clean as necessary.

Clean the liquid filter assembly	After every spray application
Clean the nozzle	When spray pattern is not a uniform conical shape
Recharge batteries in spraygun	When charging indicator does not light during operation (about every 6 operational hours)
Replace batteries in spraygun	When batteries no longer hold a sufficient charge to complete a 8-hour work session or show other signs of battery deterioration

Sprayer Maintenance Warnings

Please take special note of the following maintenance precautions as they could adversely affect your sprayer performance, sprayer parts life and warranty guarantees.

Failure to disengage PTO or failure to use ESS-supplied driveline:

1. ALWAYS disengage the PTO before turning off the tractor.
 - If you fail to disengage the PTO before turning off the tractor, the motor has the potential to spin in reverse. This can cause serious damage to the gear-box!
2. ALWAYS use the driveline supplied with this sprayer.
 - This driveline is equipped with an overrunning clutch to help prevent damage due to PTO backlash.
 - PLEASE NOTE: Failure to use the ESS supplied driveline will void the super-charger warranty.

Warranty Information:

- PLEASE NOTE: You *must* return the warranty card at the back of this Operator's Manual in order for the equipment to be covered by the warranty.

Troubleshooting Guide

Possible Problem(s)

Air pressure is low

PTO speed too low	Increase tractor RPM
Air fittings are loose	Spray fittings with soapy water—tighten ones that bubble
Air fittings are too tight causing washers or seals to be pinched crushed	Check fittings for damage. Replace damaged seals
Hoses unattached	Inspect for loose hoses and reattach
Hoses cracked or cut	Inspect for failed air lines—replace damaged lines
Pop off valve may be open	Inspect pop off valve for trash in inlet

Spray from nozzle is erratic or spits

Debris in the nozzle	Clean nozzle according to Operator's Manual
Liquid filters are clogged	Clean main filter and liquid filters in the flow setups
Low liquid level in the tank	Increase liquid level in tank above two or three gallons
Loose liquid fitting near nozzle	Inspect to see if black hose is pulled from back of nozzle. Reattach hose
Liquid control lever in 'OFF' position.	Verify that liquid control lever is in the 'ON' position to open ball valve
Ball valves not open	Verify that power supply switch is on

Liquid will not turn on or off

Main power switch turned off before liquid control switches	Verify that power supply switch is on so that ball valve will turn off correctly
Fuse blown on liquid control	Replace fuses found inside back of control box

Charging indicator (LED) light is out

Dirty nozzles	Clean nozzle according to instructions
LED bulb is blown	First, test to see if liquid is producing a charge reading. using the multimeter. If it is, you may need to replace the LED bulb.
Bad or loose ground wire	Ensure that green ground wires are connected to battery and sprayer
Bad power supply	Inspect power supply for electrical output. Replace if needed
Wire has been cut or broken	Inspect for cut or damaged wires. Replace if needed
Bad air switch	Jump air switch by putting the two wires together.

Low charge on one or more nozzles

Incorrect air flow	Adjust PTO speed
Incorrect liquid flow	Adjust Liquid Pressure
Leaky connections	Check all air, liquid connections
Dirty nozzles	Clean nozzle according to instruction-
Bad power supply	Inspect power supply for output
Cut or damaged wire	Inspect for cut or damaged wirescon-

Nozzle charging is low or zero on ALL nozzles

Bad or loose ground wire	Check that the green ground wires are connected to battery and sprayer
Bad Power Supply	Inspect power supply for electrical output. Replace if needed
Blown fuse	Replace power supply fuse inside control box and/or in power supply harness
No input power	Inspect for 12-volt DC current to power supplies
Bad multimeter or multimeter leads	Inspect meter for blown fuse or leads that have been cut or shorted. Change batteries
Dirty nozzles	Clean nozzles according to Operator's Manual

Nozzles drip when the sprayer is off

Turned off sprayer without following correct procedure	Restart unit and turn off liquid control then turn off main power switch. Turn off spray switch cycle and master switch
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Liquid pressure too high

Throttle valve setting incorrect	Adjust pressure down by opening throttle valve
Blocked liquid return line	Inspect for blocked return line to tank



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Email: support@maxcharge.com · www.maxcharge.com

ESS Warranty

Electrostatic Spraying Systems, Inc. warrants to the original purchaser of any Electrostatic Spraying Systems equipment that the equipment shall be free from defects in material and workmanship for a period of one year after date of delivery or 1000 hours of operation. The electrostatic power supply warranty form must be returned for verification of date of purchase.

Disclaimer of Implied Warranties and Consequential Damages

Electrostatic Spraying Systems' obligation under this warranty, to the extent allowed by law, is in lieu of all warranties, implied or expressed, including implied warranties of merchantability and fitness for a particular purpose and any liability for incidental and consequential damages with respect to the sale or use of the items warranted. Such incidental and consequential damages shall include, but not be limited to: transportation, charges other than normal freight charges, cost of installation other than cost approved by Electrostatic Spraying Systems, Inc., duty, taxes, charges for normal service or adjustments, loss of crops or any other loss of income, expenses due to loss, damage, detention or delay in the delivery of equipment or parts resulting from acts beyond the control of Electrostatic Spraying Systems, Inc.

THIS WARRANTY SHALL NOT APPLY:

1. To vendor items which carry their own warranties such as, but not limited to, engines, air compressors, and liquid pumps. Electrostatic Spraying Systems, Inc. shall supply replacement parts at list price pending the warranty investigation of the vendor item. Vendor item parts such as air compressors, liquid pumps, solenoids, and other such items must be returned before warranty credit.
2. If the unit has been subject to misapplication, abuse, misuse, negligence, fire or other accident.
3. If parts not made or supplied by Electrostatic Spraying Systems, Inc. have been used in connection of the unit, if, in the sole judgement of Electrostatic Spraying Systems, Inc. such parts affect its performance, stability or reliability.
4. If the unit has been altered or repaired in a manner which, in the sole judgement of Electrostatic Spraying Systems, Inc. such alteration or repair affects its performance, stability or reliability. This shall include but not be limited to opening of the handgun shell by anyone not authorized by Electrostatic Spraying Systems, Inc. to do so.
5. All drivelines and all input bearing and input seal failures on gearboxes
6. **To normal maintenance, service and replacement items such as, but not limited to, engine lubricant, filters, or to normal deterioration of such things as, but not limited to, belts and exterior finish, due to use and exposure.**

NO EMPLOYEE OR REPRESENTATIVE OF
ELECTROSTATIC SPRAYING SYSTEMS, INC.
IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY
OR GRANT ANY OTHER WARRANTY
UNLESS SUCH CHANGE IS MADE IN WRITING
AND IS SIGNED BY A CORPORATE OFFICER OF
ELECTROSTATIC SPRAYING SYSTEMS, INC.