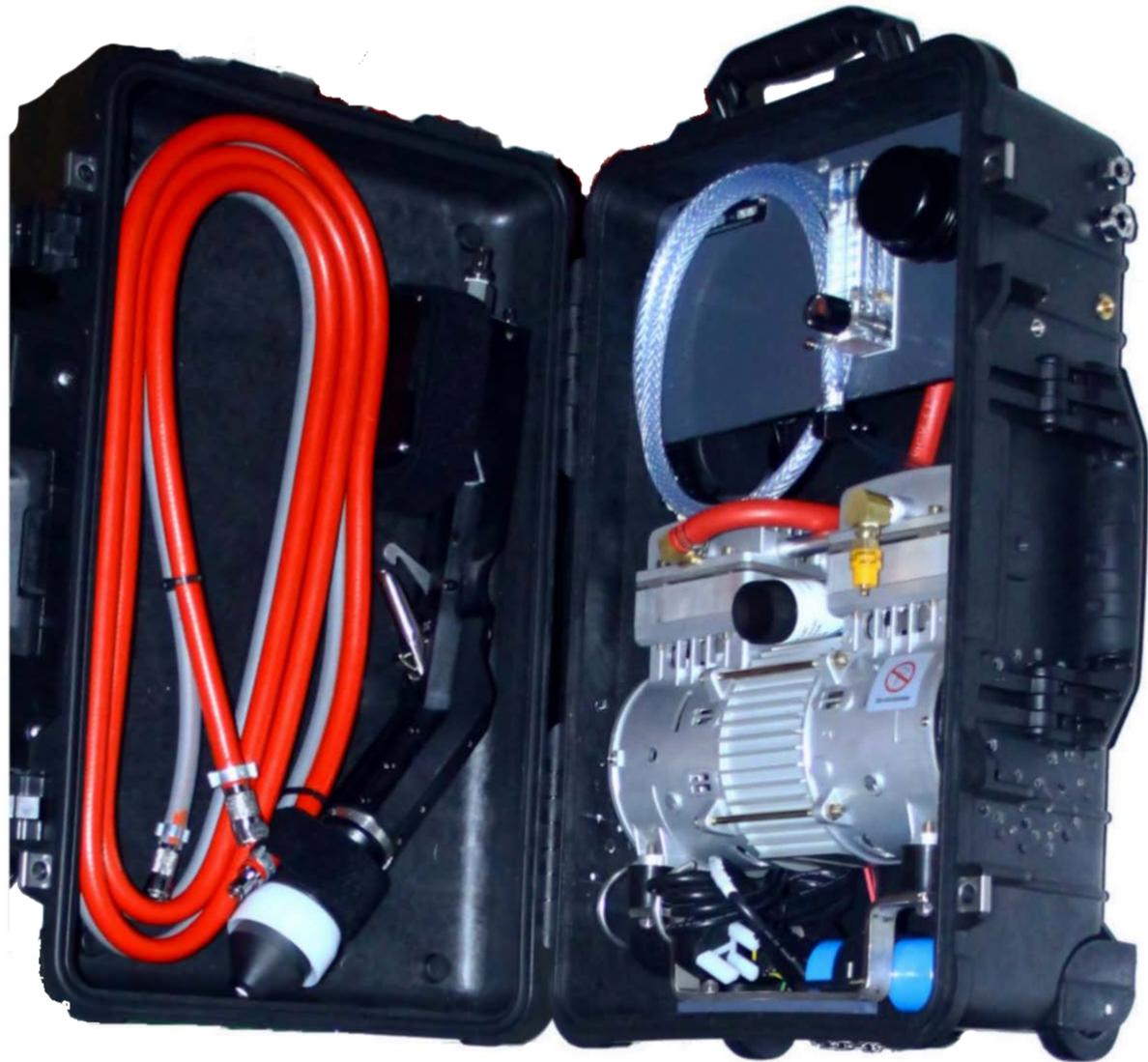


Microbicide® Electrostatic Sprayer Systems

Operator's Manual



TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbicidesprayer.com

TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbecidesprayer.com

CONGRATULATIONS!

You are now operating one of the most advanced electrostatic spraying systems on the market today. **Microbicide**® electrostatic sprayers provide a highly efficient, cost effective nano coating capability and a compact, powerful sprayer system that is easy to operate and maintain.

If you have any requirements or suggestions regarding our products or service please contact us at:

World Changing Technologies Pte Ltd
8 Burn Road
#08-02/03 Trivex
Singapore 369977
Phone: (65) 6449 3928
service@wctinfo.com

Please take time to read this manual before operating the **Microbicide**® electrostatic sprayer. The manual contains important instructions for the safe operation of this equipment. It also includes helpful suggestions to maximize productive use of **Microbicide**® electrostatic sprayers. Essential cleaning instructions should be followed to maintain your system at peak efficiency. Please carefully read and follow all instructions for your own safety and the safety of others around you.

Thank you!

We appreciate your business and are proud that you have selected a **Microbicide**® electrostatic sprayer for your nano coating operations.

The **Microbicide**® electrostatic sprayer has been thoroughly tested and calibrated. 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 equipment or service. We appreciate your business and sincerely hope that **Microbicide**® electrostatic sprayers can meet your present and future nano coating needs.



For your personal records

Use the following to record important information of your system.

Microbicide® Electrostatic
Sprayer System

Model # _____

Serial # _____

Spraygun serial number _____

Date of purchase. _____

Trademarks and brand names shown are the property of their respective owners.

TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbicidesprayer.com

TABLE OF CONTENTS

Overview - Microbicide® Electrostatic Sprayer System Technology	5
Applying Nano Coatings Using The Microbicide® Electrostatic Sprayer	6
Application Technique	6
Air Intake Filter, Flow Rate Gauge, Flow Regulator Control Valve, Liquid Line Input Connector, Air & Liquid Line Output Connectors	8
The Air & Liquid Delivery System	9
The air compressor	9
Liquid and Air Line Quick Connects	9
Quick List: Operating Instructions	10
Microbicide® Low-Voltage Electrostatic Spray Wand	10
Thermal overload switch	11
Quick List: Cleaning Microbicide® Electrostatic Sprayer:	11
The Electrostatic Spray Wand	11
Nozzle assembly	13
Pre-Application Check	14
Post-Application Check	14
Batteries	14
Spray Wand Servicing	15
Setting the Flow Rate	16
Testing the Microbicide® Electrostatic Nozzle Charge	17
.....	17
.....	17
.....	17
.....	17
Troubleshooting	18
Electrostatic sprayer will not turn on:	18
Spray quality problems:	18
Charging Light will not come on:	18
More help is available	18
Troubleshooting Guide	19
Electrostatic Spray Wand Return Form	20
Safe Operation of Microbicide® Electrostatic Sprayer Systems	21
Operator's Responsibility	21
Caution: Shock Hazard	23
Caution: Hot Surface	24
Caution: Coating Safety Precautions	25
Safety Decals	26

Overview - Microbicide® Electrostatic Sprayer System Technology

Microbicide® electrostatic sprayer systems incorporate induction charging nozzle technology. The **Microbicide®** electrostatic sprayer produces electrically charged spray droplets which are carried to a target in a gentle, low pressure air stream.

Air and liquid enter separately at the rear of the nozzle. Just before leaving the nozzle, the air hits the liquid stream to make many thousands of tiny spray droplets that pass through the charging ring.

An electrical charge is applied to the spray droplets by the charging ring. The charged spray droplets are blown out of the nozzle and move onto the target where they are attracted to surfaces by electrostatic forces.

The electrostatic charge induced by the induction charged nozzle is strong enough to allow the droplets to move in any direction to cover surfaces, even defying gravity to coat the back side of target objects and the underside of leaves.

The result is uniform coverage on hidden surfaces that other applicators miss. Air-assisted electrostatic sprayers give more than twice the deposition efficiency of hydraulic sprayers and non-electrostatic types of air-assisted sprayers.

The operator benefits in terms of significant reductions in application costs and optimized nano coating coverage, sanitization and disease control.

The induction charged 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 nano coating coverage on the market. This quality product is virtually maintenance-free, and assures you of savings in the application of coatings.



The induction charged spray nozzle is what makes **Microbicide®** electrostatic sprayers the industry leader in electrostatic applications.

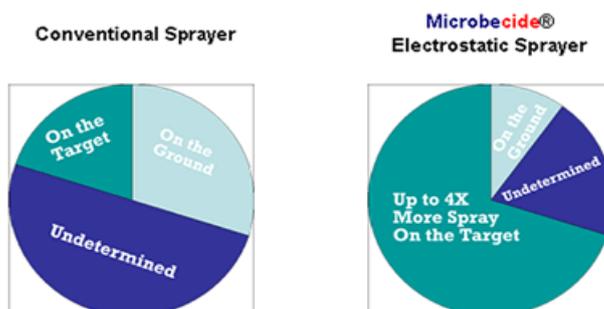


Electrostatically charged droplets are attracted to plant surfaces.



In the above test fluorescent dye has been sprayed on two round knobs. The left knob was sprayed with the electrostatic system ON; the right knob was sprayed with the same applicator, but with the electrostatic system OFF. Note how even the coverage is on the left knob with electrostatics ON.

Where Does The Spray Go?



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

Conclusion: Electrostatic technology places over 4 times the amount of coating onto target surfaces using ½ the amount of solution. **Microbicide®** electrostatic sprayers send 2/3 less solution to the ground and into the air. Less solution used overall, less waste than conventional equipment.

Improved operator productivity and significant cost savings!

Applying Nano Coatings Using The **Microbicide**® Electrostatic Sprayer

Note: When using unfamiliar equipment or coatings, always test on a small area before treating the entire surface.

Application Technique

As in spray painting, the goal is to achieve even coverage over the surface. The **Microbicide**® electrostatic sprayer is designed to help you do just that – by controlling the rate of flow of coating liquid and by propelling the coating solution with a gentle 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 nano coating droplets are very, very fine - about 40 microns each. If you are used to working with a conventional applicator, 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.*

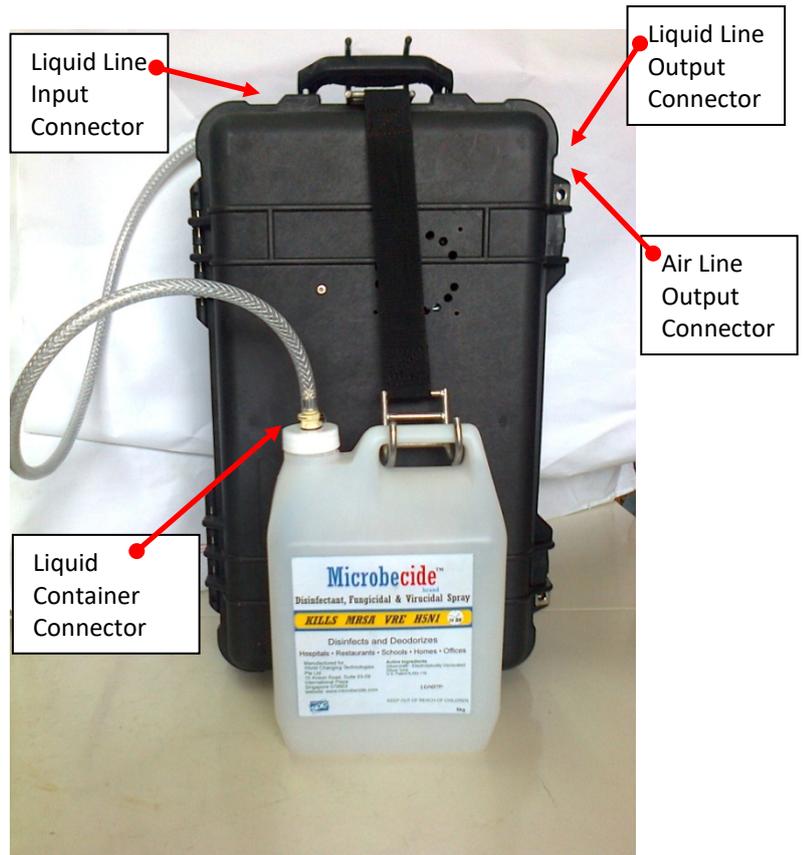
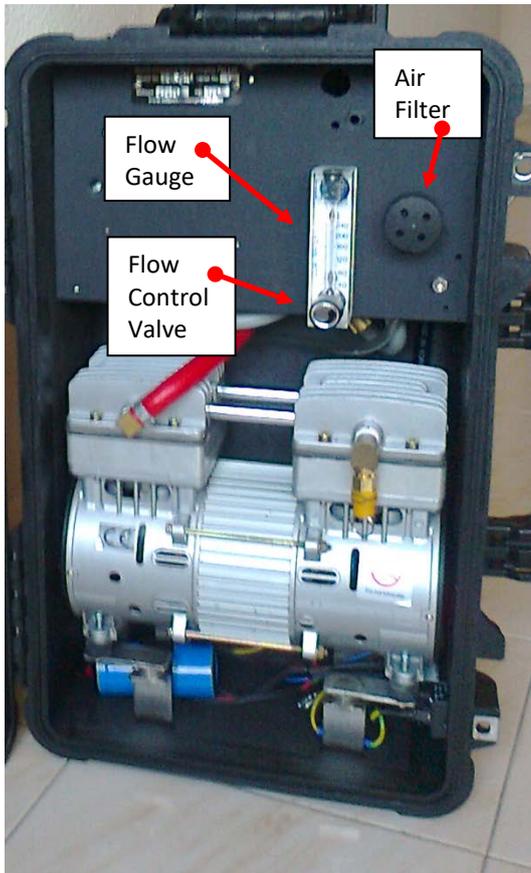
Here are some tips to achieve the best possible coverage with the **Microbicide**® electrostatic sprayer.

1. Unpack all the parts and charge up the batteries in the Spray Wand, it normally takes a few hours.
2. Before spraying expensive materials, first train yourself to use the electrostatic sprayer, using water as a spray material.
3. Set the flow rate between 80 and 120 on the flow control valve. Check the setting from time to time as the flow rate changes with the operating temperature of the sprayer, as well as the temperature and humidity of the areas in which you are spraying. If there is a buildup of bubbles in the flow control gauge, open the control valve up fully and flush the bubbles through.
4. Train yourself inside a building or shop before trying to spray outside. You should notice a plume created by the spray wand. The objective is to run this plume along the surface you are trying to coat. Let the electrostatics pull the plume onto the surface. You do not really spray the coating onto the target, the electrostatics does the work.
5. Note: A simple indication the electrostatic charge is not being applied to the plume is the nozzle will be dry. You will need to recharge or possibly replace the batteries.
6. Note also the plume size will change depending on materials you are spraying. Before each job, ensure that the **Microbicide**® electrostatic sprayer is in good working order (see the pre-applicator checklist in this manual).
7. The optimal spraying distance from the target surface is about 1m (39 inches); a spraying distance from the target surface of 0.9m to 1.2m (36 to 48 inches) provides the most even coating. This gives the charged mist space to develop into a chaotic cloud that will be attracted to the target surface.
8. Hold the spray wand at right angles to the target surface. Starting at the highest point and using zig-zag horizontal strokes about 1 meter (3 ft.) wide, apply the nano coating down to the lowest point. Try to have each stroke overlap the previous stroke by about 50%.



9. 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.
10. When moving to the next section, allow it to overlap the previous section by a few centimeters. Do not leave a gap.
11. The target surface should just barely glisten with the nano coating. Do not over-saturate the surface; if you see runs or puddles it means you are wasting coating. Check to make sure the newly-coated surface is very slightly damp.
12. Be careful to keep the spray wand barrel as level as possible. If you allow the nozzle to point down too much, it may drip occasionally.
13. Unlike spray painting, you don't have to stop the application on every return stroke. Just engage the trigger lock and concentrate on the regular pattern of coating. Periodically check to make sure the red light is illuminated on the spray wand.

Air Intake Filter, Flow Rate Gauge, Flow Regulator Control Valve, Liquid Line Input Connector, Air & Liquid Line Output Connectors



ALWAYS TRIGGER SPRAY WAND WHEN SPRAYER IS RUNNING!

Always ensure liquid is flowing through the sprayer when power is applied. Failure to keep liquid flowing through sprayer may result in liquid pump overheating.

Cautions:

Always trigger spray wand when sprayer is running.

We recommend you use an outlet with a Ground-Fault Circuit Interrupter (GFCI).

Do not operate the electrostatic sprayer in standing water.

Do not immerse the electrostatic sprayer's compressor.

The Air & Liquid Delivery System

The air compressor

The air compressor plugs into an electrical source to produce compressed air which atomizes and propels the coating liquid. Use the **Microbicide®** electrostatic sprayer with an extension cord of no more than 50 feet and rated for no less than 10 amp service. The On/Off switch is on the top of the case.

CAUTIONS:

Always ensure the spray wand is triggered and liquid is flowing through the spray wand when the **Microbicide®** electrostatic sprayer is operating. Failure to trigger the spray wand for an extended time may result in the liquid pump overheating.

The **Microbicide®** electrostatic sprayer's compressor becomes hot during normal operation. **DO NOT TOUCH.**

The compressor has a built-in thermal overload switch. If the **Microbicide®** electrostatic sprayer overheats, the compressor will cut off. If this should happen, let the unit cool for one hour with the case open.



Liquid and Air Line Quick Connects

There are 3 chromed quick connect connectors at the **Microbicide®** electrostatic sprayer trolley case and 2 chromed quick connect connectors at the spray wand.

1. Container Liquid Line Input Connector (on the top or left side of the case)
2. Liquid Line Output Connector (on the top or right side of the case)
3. Air Line Output Connector (on the top or right side of the case)
4. Spray Wand Liquid Line Input Connector (at spray wand)
5. Spray Wand Air Line Input Connector (at spray wand)

To connect the quick connects of the **Microbicide® electrostatic sprayer:**

1. Push the liquid and air plugs into their respective sockets until you feel it latch. They are different sizes and cannot be cross-connected.
2. Pull gently to make sure it is properly seated.

To disconnect the quick connects of the **Microbicide® electrostatic sprayer:**

1. Release the plug.
2. Pull the plug out of the socket.



TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

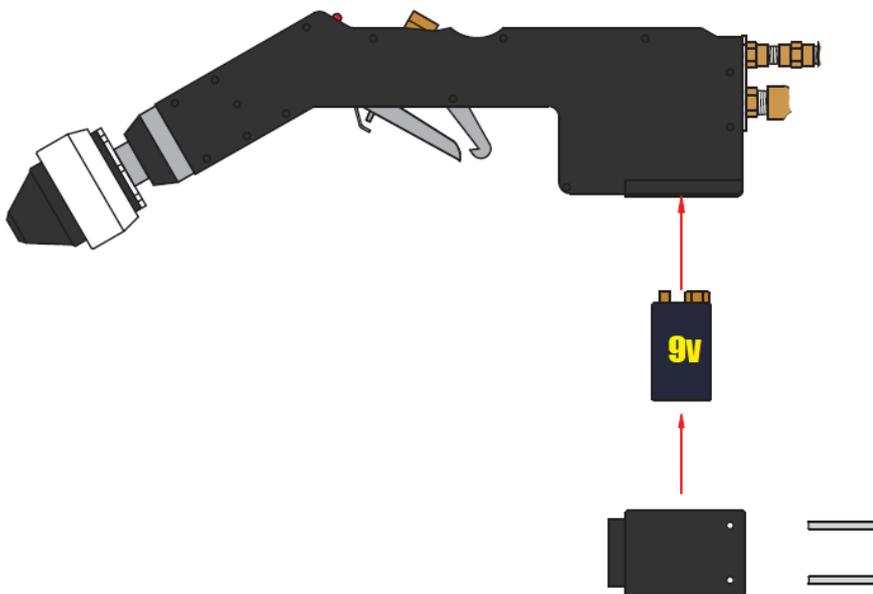
8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbicide.com

Quick List: Operating Instructions Steps for Operation

1. Prepare the coating liquid to be applied.
2. Connect the liquid input line to the liquid container.
3. Connect the liquid input line to the liquid input connector at the sprayer.
4. Connect the twin line hose to the liquid and air output connectors at the sprayer.
5. Connect the twin line hose to the liquid and air connectors on the spray wand.
6. Plug the power cord into an appropriate receptacle.
Turn on the air compressor.
7. Engage the trigger and allow sprayer to draw coating liquid to spray wand nozzle.
8. Observe flow rate gauge and adjust flow rate control valve to desired rate of flow.
9. Begin spraying operations.

Microbicide® Low-Voltage Electrostatic Spray Wand

For operator safety, the power supply for the **Microbicide®** electrostatic spray wand is separate from the power supply for the **Microbicide®** electrostatic sprayer's compressor. The spray wand is powered by 9-volt batteries in the handle of the spray wand. This low-voltage charge is not enough to harm an operator.



TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbicide.com

Occasionally a slight “tingling” or mild shock may be felt when applying a nano coating in an enclosed area. These static shocks, although sometimes unpleasant, are **not at all** dangerous to operators. When charged particles are directed onto other objects, some of the charge gets on the operator, or else an opposite charge may be drawn up from the ground, depending on the circumstances.

To minimize static discharges, make sure that the **Microbicide®** electrostatic sprayer is properly grounded. The **Microbicide®** electrostatic sprayer has a short stainless steel chain attached to the bottom of its housing. This chain adds to the grounding of the sprayer, if the chain is broken or missing, replace it.

Try misting the floor of the room or greenhouse with plain water before applying nano coatings.

Pay attention to the exact conditions in which the shocks happen. Operators may find that they can prevent them by maintaining contact with the metal trigger of the **Microbicide®** electrostatic spray wand, rather than just holding its plastic body. If the shocks happen only when an operator subsequently touches a piece of equipment, try touching a painted or plastic part of it before touching metal.

Also the operator may try wearing a different type of shoe. Leather will conduct better than rubberized soles and may lessen the problem.

Operators should avoid touching sensitive electronic equipment such as computers, printers, or cell phones while operating the **Microbicide®** electrostatic sprayer, a static discharge could damage sensitive electronic equipment.

Thermal overload switch

The **Microbicide®** electrostatic sprayer’s compressor has a built-in thermal overload switch. If the compressor overheats, the compressor will cut off. If this should happen, let the unit cool for one hour with the case open.

Quick List: Cleaning **Microbicide®** Electrostatic Sprayer:

1. Clean the exterior of the **Microbicide®** electrostatic sprayer’s trolley case with a damp cloth.
2. Fill liquid container with 1 to 2 liters ($\frac{1}{2}$ - $\frac{3}{4}$ gal) of clean water.
3. Turn on the air compressor and engage the trigger to flush the spray wand lines with the clean water. Check the nozzle for a good spray pattern while flushing. Allow air to flow for 30 seconds after the water has been sprayed.
4. Apply lubricating grease to all quick connect fittings. Lubricating grease can be ordered from our website. [Click here](#) for ordering lubricating grease. Detailed instructions on maintaining each of the **Microbicide®** electrostatic sprayer’s components follow in the next sections.

The Electrostatic Spray Wand

The electrostatic spray wand is held by the operator when applying a nano coating. Activation of the trigger causes the coating solution to be directed toward the target. User serviceable parts of the spray wand are the nozzle assembly, and the batteries. Except for the batteries, which are accessed

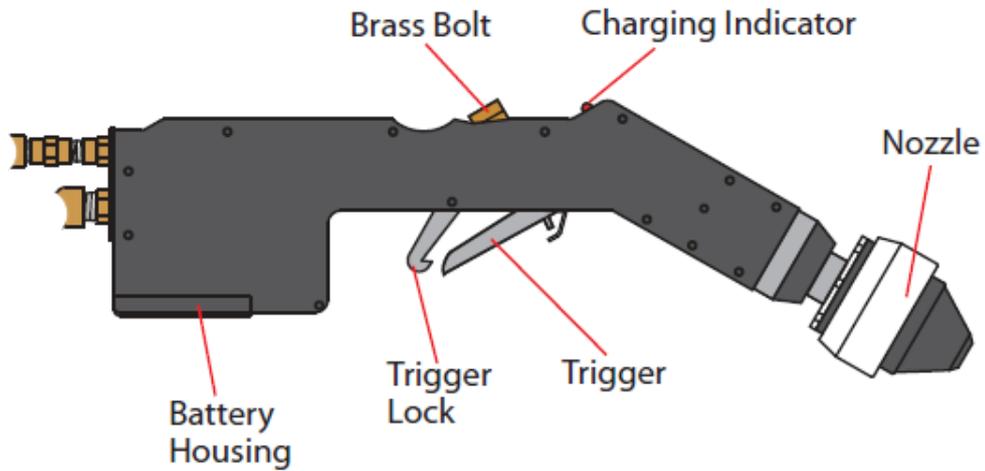
TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbicide.com

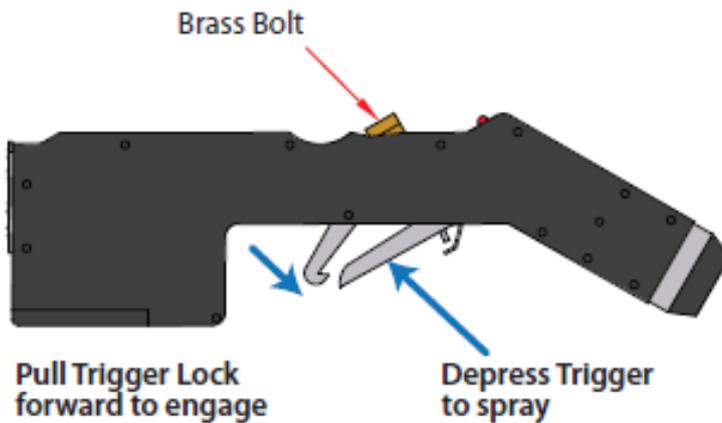
by removing the battery cover, nothing inside the spray wand shell is user-serviceable.

Do not open the spray wand shell; doing so will void the warranty on the spray wand.



Trigger

The trigger controls the on and off application of the nano coating solution. It can be continuously held on for operation or it can be locked in place.



To engage/disengage the trigger:

1. Depress the trigger up towards the body of the spray wand to start applying a coating.
2. For continuous application, either keep holding the trigger or lock it in place by pulling up

the lock and hooking the trigger.

3. To stop applying when the trigger is not locked, let go of the trigger.

Nozzle assembly

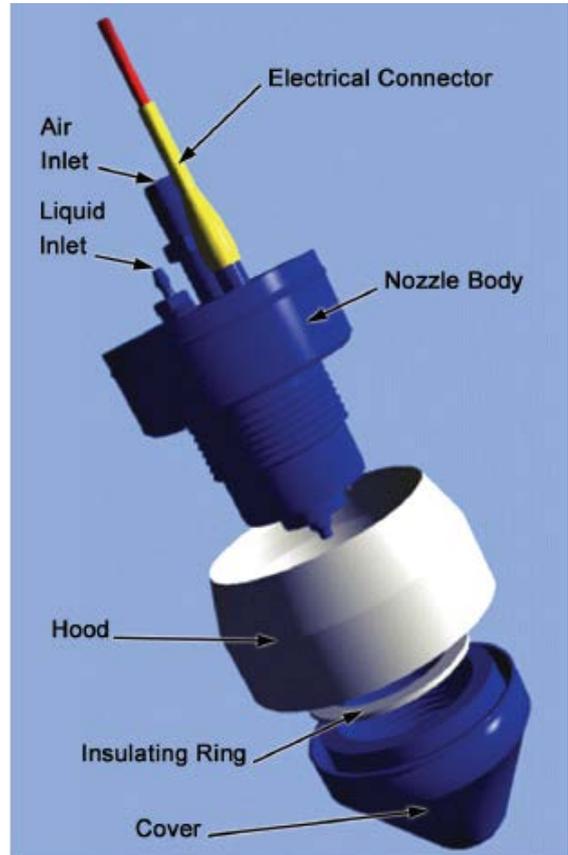
It is very important to follow all the maintenance and cleaning procedures to ensure the **Microbicide®** electrostatic sprayer will function properly. Although the induction charging nozzle will outperform all electrostatic spray technology on the market, regular cleaning will ensure peak operating performance.

The nozzle assembly is located at the end of the spray wand. It is composed of a nozzle body, internal o-ring, Teflon ring, cover, external o-ring, and a hood (see labeled drawing at right). To access the nozzle components, just unscrew the nozzle cover by hand.

Cleaning the spray wand

Always flush the spray wand out with clean soapy water after every day's operation. That is the most important thing you can do to ensure trouble free operation of the **Microbicide®** electrostatic sprayer. By cleaning after each and every working day you will avoid the long-term coating buildup that could eventually cause clogs, poor spray patterns and shortens nozzle life.

Establish maintenance intervals to disassemble and clean the nozzle. Your nozzle maintenance schedule will vary depending on the types of coatings used and adherence to pre- and post-spray checks.



In general it is sufficient to thoroughly clean nozzles every 50 hours.

To clean the nozzle assembly

1. Slide the hood over the nozzle cover.
2. Unscrew the cover from the nozzle base and remove the Teflon ring. Clean any debris from around the nozzle tip.

Note: There is a small o-ring in the nozzle around the base of the tip – take care that it doesn't fall off. If it does, clean it and press back into place. Also, take care not to damage the nozzle tip when the cover is removed.

3. Soak the ring, cover, and hood in a mild detergent solution. Use a small brush (soft or mild bristle) to clean the inside of the cover and the hole through it. Also, be sure to clean the hood. It is important to clean inside the hood and the two cavities. Rinse thoroughly.
4. Scrub the nozzle base with the detergent solution using a soft bristle brush. Clean the ceramic outlet. Be sure to thoroughly clean the base cavity and take care not to damage the nozzle tip. Rinse and make sure the small o-ring is in place.

TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbicide.com

5. Reassemble nozzle by placing the Teflon ring on the base and screwing the cover on **hand tight**. Next, slide the hood over the nozzle and seat it securely against the external o-ring. Wipe clean the exterior of all hoses and fittings connected to the nozzle. **The electrode cover should be hand tight. Never use pliers or other tools to tighten it. The insulating ring should be loose.**

Pre-Application Check

1. Inspect Nozzle
Check nozzle cover to make sure it is on hand tight (do not over tighten or use a wrench). Make sure the hood is seated firmly to the nozzle base and against the external o-ring.

Post-Application Check

After each application it is essential that the **Microbicide**® electrostatic sprayer, liquid line hoses and the spray wand be flushed with clean soapy water. This will help prevent coatings build-up that could clog the liquid hose line and nozzle. Also, it is recommended that the nozzle exterior (black portion of nozzle) and nozzle hood be cleaned with soapy water at this time.

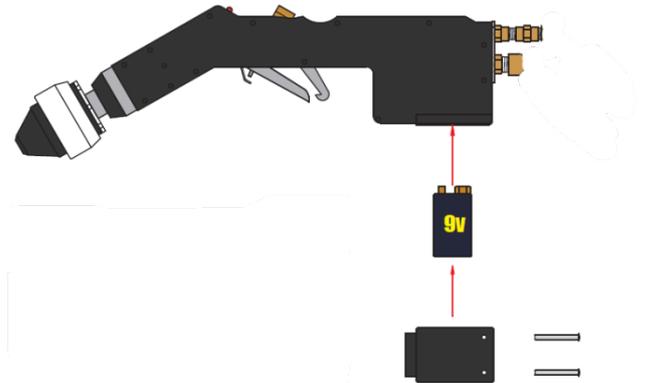
Batteries

The spray wand's induction charging nozzle operates on two 9-volt rechargeable batteries which are located in the base of the spray wand. Under normal conditions, the batteries will last 5 to 8 hours of operation on a charge. They should be recharged when the charging indicator on top of the spray wand shell doesn't glow when air is going through the spray wand.

After approximately 800 to 1000 hours of service the battery pack will no longer be able to hold an adequate charge and will need to be replaced. Replace with Nickel-Hydride rechargeable batteries. Order a Replacement Battery Pack from us, S/N # 4512.

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 wand before attempting to use it.



Spray Wand Servicing

For a service charge plus the cost of replacement parts, we will thoroughly clean the spray wand, replace any worn parts and recalibrate the electronics and nozzle. Periodic servicing will increase spraying performance and prolong the life of your spray wand.

Bring the spray wand to our office in Singapore or contact us to schedule spray wand services. If shipping the spray wand to us, package the spray wand securely since it can be damaged in shipment. Ship the spray wand in its original packing material if possible. If the original packing is not available, wrap the spray wand in bubble wrap, place it in a strong cardboard box and surround the gun handle with foam packing. Include a return shipping address and a telephone number.

Ship the spray wand to:

World Changing Technologies Pte Ltd
8 Burn Road
#08-02/03 Trivex
Singapore 369977
Tel: (65) 6449 3928
e-mail: service@wctinfo.com

For parts that need to be replaced, we will contact you for authorization before replacement. Upon completion of servicing, the spray wand will be returned to you. Shipping charges will apply to spray wand return.

Payment for servicing may be by TT, bank draft, company check or credit card. We accept PayPal and process all credit card transactions through PayPal.

Periodic servicing will increase spraying performance and prolong the life of your spray wand.



TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbicide.com

Setting the Flow Rate

The flow rate setting is determined by:

1. Coverage Desired (the amount of coating material you desire to apply to a given area)
2. Operator Speed (the time required for an operator to spray a given area. An experienced operator can adequately spray one square meter in 3 seconds)

As an example, suppose you wish a flow rate setting to apply one litre of material to cover 200 square meters of area (5ml of nano coating material per square meter).

Using the Flow Rate Table below, find the square meters desired to be covered per litre of coating material or the desired amount of coating material to be applied per square meter. Read across to the flow gauge setting. Engage the TC-320 spray wand trigger (liquid spraying from the nozzle) adjust the flow rate regulator to the desired setting. For this example, set the flow rate to 100. At a setting of 100, coverage will be 200 square meters covered per one litre of coating material at a spraying time of 10 minutes.

With a flow regulator setting of 100, a skilled operator can apply a 5ml/sqm nano coating to an area of 1,200 square meters in one hour. The flow rate can be adjusted to meet your desired coverage. Other factors to consider could be operator experience, label recommendations or particular coatings.

Because electrostatic spraying is a much more effective coating method, we recommend you experiment to find the optimum coating coverage.

Easy Clean Up

After spraying a coating material, thoroughly flush the **Microbicide®** electrostatic sprayer, liquid hose line and spray wand.

Disconnect the liquid input line from coating container and connect to a one litre or larger "flush bottle" filled with warm water and a soapy detergent or cleaner.

Engage the spray wand trigger allowing the liquid detergent or cleaner to flow through the sprayer, liquid hose line and spray wand.

Open the flow control valve fully allowing the maximum rate of flow.

Flush one litre or more of soapy detergent or cleaner to thoroughly flush out the **Microbicide®** sprayer.

Gauge Setting	Coverage			Operator Speed (3 Sec / M ²)		Flow Rate		Application Time Mins/Litre
	M ² / Litre	Ft ² / Litre	Ft ² / Gal	ml Applied/M ²	mg Applied/Inch ²	ml/Min	Litre/Hr	
240	83.3	896.7	3393.9	12.0	0.00774	240	14.40	4.17
230	87.0	935.7	3541.4	11.5	0.00742	230	13.80	4.35
220	90.9	978.2	3702.4	11.0	0.00710	220	13.20	4.55
210	95.2	1024.8	3878.7	10.5	0.00677	210	12.60	4.76
200	100.0	1076.0	4072.7	10.0	0.00645	200	12.00	5.00
190	105.3	1132.6	4287.0	9.5	0.00613	190	11.40	5.26
180	111.1	1195.6	4525.2	9.0	0.00581	180	10.80	5.56
170	117.6	1265.9	4791.4	8.5	0.00548	170	10.20	5.88
160	125.0	1345.0	5090.8	8.0	0.00516	160	9.60	6.25
150	133.3	1434.7	5430.2	7.5	0.00484	150	9.00	6.67
140	142.9	1537.1	5818.1	7.0	0.00452	140	8.40	7.14
130	153.8	1655.4	6265.6	6.5	0.00419	130	7.80	7.69
120	166.7	1793.3	6787.8	6.0	0.00387	120	7.20	8.33
110	181.8	1956.4	7404.8	5.5	0.00355	110	6.60	9.09
100	200.0	2152.0	8145.3	5.0	0.00323	100	6.00	10.00
90	222.2	2391.1	9050.4	4.5	0.00290	90	5.40	11.11
80	250.0	2690.0	10181.7	4.0	0.00258	80	4.80	12.50
70	285.7	3074.3	11636.2	3.5	0.00226	70	4.20	14.29
60	333.3	3586.7	13575.5	3.0	0.00194	60	3.60	16.67
50	400.0	4304.0	16290.6	2.5	0.00161	50	3.00	20.00
40	500.0	5380.0	20363.3	2.0	0.00129	40	2.40	25.00
30	666.7	7173.3	27151.1	1.5	0.00097	30	1.80	33.33
20	1000.0	10760.0	40726.6	1.0	0.00065	20	1.20	50.00

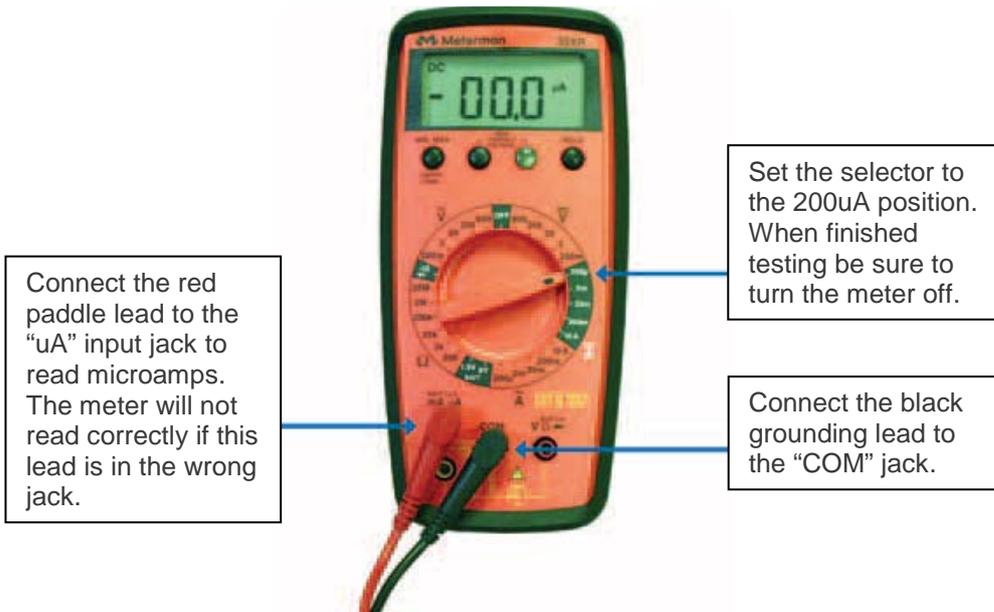
TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbicide.com

Testing the Microbicide® Electrostatic Nozzle Charge

Note: The **Microbicide®** Electrostatic Tester can be ordered from our website. [Click Here](#) for ordering information.



Steps for Measuring The Electrostatic Charge

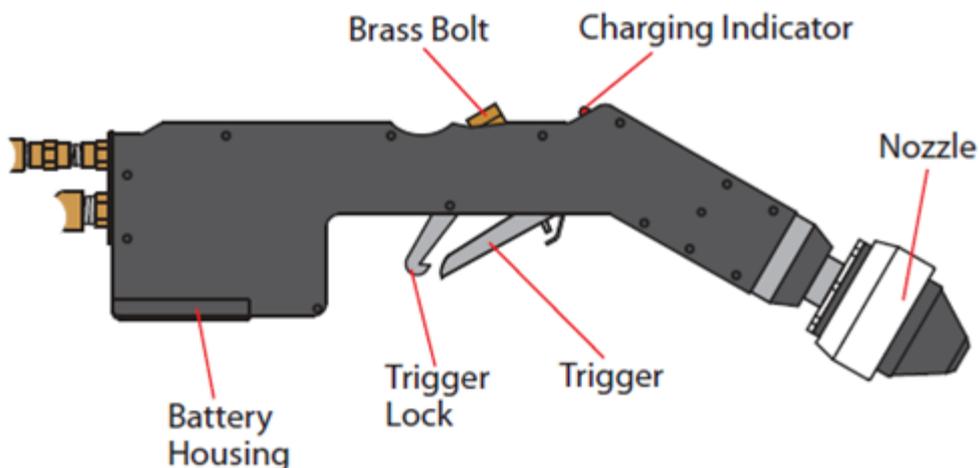
1. Apply power to the electrostatic sprayer and engage the trigger of the spray wand (see diagram below).
2. Adjust the rate of flow on the flow gauge to 80-120.
3. Ground the black lead against the metal bolt of the spray wand.
4. Hold the paddle of the red lead in the spray stream about 3cm (1 inch) from the tip of the nozzle.
5. Read the charge on the electrostatic tester.

To test the **Microbicide®** spray wand for charging, first ensure the batteries are fully charged. Low battery output will reduce the electrostatic charge induced onto spray droplets.

The reading will vary depending upon the coating material being sprayed, rate of flow, distance paddle is from nozzle, temperature, humidity and other factors.

A reading of -6 uA or greater indicates an adequate electrostatic charge on the droplets.

Check the batteries and clean any nozzles that register a reading below -6 uA.



TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbicide.com

A note about operating temperatures

The **Microbicide**® electrostatic sprayer should always be operated at temperatures above 10° Celsius (50° Fahrenheit). When the ambient temperature is colder than this, the evaporative cooling caused as the solution is atomized will freeze the nozzle opening. Nozzle freeze-up can also occur when the liquid to be applied is colder than 10° C (50° F).

IMPORTANT

Water temperature must be at least 10° C (50°F). When the liquid and air meet in the nozzle, the temperature of the liquid decreases. As a result, water at temperatures below 10° C (50°F) may freeze and clog the nozzle.

Troubleshooting

Electrostatic sprayer will not turn on:

- Is the electrostatic sprayer plugged in securely to the socket and the case?
- Is the electrical outlet faulty?
 - Try a different outlet.
- Is the GFCI (Ground Fault Circuit Interrupter) set properly?
 - Reset if necessary.
- Has the compressor overheated?
 - Be careful, it may be hot.
 - Let the electrostatic sprayer cool with the case open.
 - Try again in about one hour.

KEEP FILTERS CLEAN!

The number one cause of poor sprayer performance is a clogged or dirty filter.

Spray quality problems:

- The electrostatic sprayer and filters should be cleaned and rinsed with water each day after use.
- Check that all hose quick connect “O-rings” are intact and well lubricated.
- 2 from hose to handgun
- 2 from hose to case
- Is the compressor air filter clogged?
- Is the nozzle cover dirty?
- Unscrew the nozzle cover.
- Wash inside nozzle cover with water.
- Is the liquid or ambient temperature too cold?
- The nozzle can freeze up when the ambient temperature or the solution is less than 50°.

Charging Light will not come on:

- If the red LED on the handle of the spray gun does not come on, it indicates that the spray is not receiving an electrostatic charge.
- Make sure the batteries are charged.
- Fully charged batteries will last for 5 - 8 continuous hours of use.
- Replace the rechargeable batteries with new ones when necessary.

More help is available

- Also see the “Troubleshooting Guide” in the Operator’s Manual.
- If you are still experiencing problems after exhausting the troubleshooting guides, please call World Changing Technologies Pte Ltd at (65) 6449 3928 for assistance.

Troubleshooting Guide

When you encounter the problems listed below, use the suggested trouble-shooting methods. If you cannot solve the problem or have a problem with the spray wand that is not addressed in this manual, contact us.

Symptom	Possible Problem(s)	Corrective Action
Air pressure of coating appears low	<ul style="list-style-type: none"> · Air connectors are damaged 	<ul style="list-style-type: none"> Inspect for damaged O-rings on quick connects – Spray connectors with soapy water – replace O-rings of connectors that bubble
<ul style="list-style-type: none"> · No spray from nozzle or the spray from nozzle is erratic or spits 	<ul style="list-style-type: none"> · Liquid connectors are damaged · Debris in the nozzle · Spray is freezing due to evaporative cooling · Low liquid level in the container · Over tightened nozzle cover 	<ul style="list-style-type: none"> · Inspect for damaged O-rings on quick connects – Spray connectors with soapy water – replace O-rings of connectors that bubble · Clean nozzle according to instructions · Make sure that water temperature is at least 50° (10°C) · Refill coating container · Loosen cover. It should only be finger-tight
<ul style="list-style-type: none"> · Charging indicator (LED) blinks or goes out during operation 	<ul style="list-style-type: none"> · Batteries are exhausted · Dirty nozzle 	<ul style="list-style-type: none"> · Recharge batteries If problem persists, replace battery pack · Clean nozzle according to instructions
<ul style="list-style-type: none"> · Air compressor cuts off during operation 	<ul style="list-style-type: none"> · Compressor has overheated 	<ul style="list-style-type: none"> · Let unit cool for approximately 1 hour with case open
<ul style="list-style-type: none"> · Electrostatic sprayer will not start 	<ul style="list-style-type: none"> · No power · Electrostatic sprayer is not switched on · Tripped power breaker 	<ul style="list-style-type: none"> · Make sure the unit is plugged into an appropriate electrical receptacle · Make sure the power switch is on · Turn power switch off and then on

Electrostatic Spray Wand Return Form

When returning a spraygun for warranty or repair services to World Changing Technologies Pte Ltd, please pack it securely and include the following form with your spray wand.

Spray Wand Serial Number: _____

Returned from:

Company: _____

Contact person: _____

Phone number: _____

Shipping address:

Mailing address (If different):

Date last serviced:

Problems with the Spray wand (if any):

Send to:
World Changing
Technologies Pte Ltd
8 Burn Road
#08-02/03 Trivex
Singapore 369977

Tel: (65) 6449 3928
e-mail: service@wctinfo.com

World Changing
Technologies Pte Ltd
recommends sending your
spray wand via a carrier with
tracking if you are sending
from outside of Singapore.

Payment for return of spray wand may be by TT, bank transfer, company check, COD or Credit Card processed through PayPal.

OPERATOR'S RESPONSIBILITY

Read the Owner's Manual.

It is the responsibility of the operator to read the Operator's Manual, to understand the safe and correct operating procedures which pertain to the operation of the product, and to maintain the product according to the Operator's Manual.

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 the operator's responsibility to deliver the machine for service or replacement of defective parts which are covered by the standard warranty.

Lack of attention to safety can result in reduction of efficiency, accident, personal injury, or even death.

Watch for safety hazards and correct deficiencies promptly.

Use the following safety precautions as a guide when using this applicator.

Operator's Responsibility

- ▶ Read the Operator's Manual. Failure to read the manual is considered a misuse of the equipment.
- ▶ Use the **Microbicide**® electrostatic sprayer ONLY for its intended use as described in this manual.
- ▶ Do not allow a child to operate the **Microbicide**® electrostatic sprayer. Do not allow adults to operate the **Microbicide**® electrostatic sprayer without proper instruction.
- ▶ Use extra care when applying nano coatings on stairs. Do not place the **Microbicide**® electrostatic sprayer on stairs.
- ▶ Store the **Microbicide**® electrostatic sprayer in a dry place. Do not expose to freezing temperatures.

IMPORTANT INFORMATION

1. **LIQUID PUMP:** Always ensure the spray wand is triggered and liquid is flowing through the spray wand when the electrostatic sprayer is operating. Failure to trigger the spray wand for an extended time may result in the liquid pump overheating.
2. **CLEANING:** The trolley case, spray wand and hose should be cleaned and rinsed with water regularly, and the sprayer flushed out after use. Failure to clean these on a regular basis will cause the system to malfunction and could negate the warranty. Even clear or green solutions will tend to collect and clog the air filter, hoses, connectors and spray wand.
3. **AIR FILTERS:** The air filter on the compressor must be checked each week and if clogged it must be cleaned. Failure to clean the compressor air filter will cause problems with air pressure and possible hose failure.
4. **SLIGHT SHOCK:** Be aware that with an electrostatic sprayer, the operator may experience a slight shock.
5. **NOZZLE DRIP:** The nozzle will drip at times due to the accumulation of charged droplets.
6. **LED LIGHT:** If the LED on the handle of the spray wand is not lit, it indicates the spray is not receiving an electrostatic charge. On rare occasions the light may be burned out. Check to ensure the batteries are properly charged.
7. **COMPRESSOR HEAT:** The compressor will heat up with use. Use caution when reaching into the compressor compartment at the bottom of the case.
8. **AIR LINE HEAT:** The pressurized air lines will heat up. The thumb push quick connectors can become very hot to the touch, exercise caution when handling the air lines.
9. **COLD TEMPERATURES:** The nozzle can freeze up when ambient temperature is less than 10⁰ C (50⁰ F).
10. **BATTERIES:** Ensure the batteries are charged. Fully charged batteries will provide approximately five (5 hrs) hours of continuous use. If in doubt remove the cover from the spray wand battery compartment and temporarily replace the two rechargeable 9-volt batteries with regular 9-volt batteries for testing purposes only! **CAUTION:** Remove the regular batteries and replace with new 9-volt rechargeable batteries before plugging the spray wand into the charger.
11. **TROUBLESHOOTING:** There is a troubleshooting guide included in this manual. Refer to the Table of Contents for the guide.

Caution: Shock Hazard



BE SAFETY CONSCIOUS!

Follow safety procedures for electrical equipment and tools.

CAUTION: SHOCK HAZARD

Microbicide® electrostatic sprayer systems have been engineered to be very safe during normal operation. However, as with all line-powered electrical equipment and tools, certain safety procedures need to be followed.

- ▶ Use a GFCI (Ground Fault Circuit Interrupter) power outlet whenever possible.
- ▶ If an extension cord is necessary, use a three-wire extension cord with a 3-prong grounding type plug.
- ▶ Turn off applicator before unplugging.
- ▶ Unplug the **Microbicide®** electrostatic sprayer when not in use.
- ▶ Always unplug by grasping the plug. Do not unplug by pulling on the cord.
- ▶ Never pull plug with wet hands.
- ▶ Do not pull or carry the **Microbicide®** electrostatic sprayer by its power cord.
- ▶ Do not crimp the cord or cause it to be damaged by straining it around sharp edges.
- ▶ Keep power cord away from heat sources.

TC-320 Operator Manual

Microbicide® Electrostatic Sprayer Systems

8 Burn Road #08-02/03 Trivex Singapore 369977 • Tel: (65) 6449 3928 • Website: microbicide.com

- ▶ Do not use the **Microbicide**® electrostatic sprayer with a damaged power cord. Call us for a replacement.

Caution: Hot Surface



COMPRESSOR IS HOT!

The sprayer's compressor becomes hot during normal operation.

DO NOT TOUCH.

CAUTION: HOT SURFACE

Be aware that the compressor becomes hot enough to burn you.

- ▶ The compressor becomes hot to the touch during normal use. Do not touch the **Microbicide**® electrostatic sprayer's compressor after it has been running.
- ▶ Stay clear of the hot compressor when making adjustments inside the **Microbicide**® electrostatic sprayer's case.
- ▶ The **Microbicide**® electrostatic sprayer's compressor is equipped with a thermal overload switch. If it overheats, the compressor will stop running. Unplug the **Microbicide**® electrostatic sprayer and let it stand for one hour with the door open. The unit should then be able to restart.

Caution: Coating Safety Precautions



PROTECT YOUR LUNGS PROTECT YOUR EYES

*READ AND FOLLOW THE
CHEMICAL MANUFACTURER'S
INSTRUCTIONS CAREFULLY.*

*Follow all manufacturers'
recommended chemical safety
precautions.*

COATING SAFETY PRECAUTIONS

Read and follow all instructions on the coating manufacturer's label.

- ▶ Use protective clothing, eye protection and gloves when mixing coatings to be applied with the **Microbicide**® electrostatic sprayer.
- ▶ Always use a respirator and eye protection when applying nano coatings.
- ▶ Follow the chemical manufacturer's recommendations in handling, mixing, applying, storing and disposing of coatings.
- ▶ Be aware of decontamination methods in case a person, clothing, or equipment is accidentally sprayed.
- ▶ Be aware of poisoning symptoms and know the appropriate first aid.
- ▶ Know the length of time needed to pass before allowing people and pets to go back into the sprayed area.

Safety Decals

Appropriate safety decals are placed on equipment in order to alert the operator to possible dangers. If any decal is missing or damaged, please contact us immediately for a replacement decal.



PROTECT YOUR LUNGS PROTECT YOUR EYES

*READ AND FOLLOW THE CHEMICAL
MANUFACTURER'S INSTRUCTIONS
CAREFULLY.*

*It is extremely important for the
owner/operator's safety as well as the
safety of other people in the vicinity that
all chemical safety precautions are
followed.*

*This label is placed on top of the Bio
Electrostatic Applicator.*



COMPRESSOR IS HOT!

*The applicator's compressor becomes hot
during normal operation.*

DO NOT TOUCH.



KEEP FILTERS CLEAN!

*This label is wrapped around the hose to
remind you to clean the filters regularly.
The number one cause of poor applicator
performance is a clogged or dirty filter.*
