CORONAFLEX™
CE CORONA TREATING SYSTEM

ML0150-501-01

OWNERS REFERENCE MANUAL

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⚠ WARNING!

Please read carefully before installing or servicing.

DO NOT OPERATE THIS EQUIPMENT IN A HAZARDOUS ENVIRONMENT!

HIGH VOLTAGE is present within this equipment. Install according to local electrical codes to ensure personnel safety. When **SERVICING,** technician must ensure that electrical power is disconnected and locked out before working on equipment.

OZONE gas is generated in every corona treating process and therefore **OZONE**, an OSHA restricted air contaminant, is present in the exhaust airflow**. INSTALLATION** of this equipment must be done in accordance with this manual, Enercon installation drawings and local codes to ensure the safety of personnel in the area and in the building.

SAFETY AND WARNINGS

⚠ Before placing this equipment into operation, we strongly recommend that you take the time to carefully read this manual in its entirety to ensure you understand all the safety and operational requirements for using this equipment.

Electricity and electrostatic discharge have the potential to cause severe personal injury or property damage.

Before installing, wiring, starting, operating or making any adjustments, identify the components of the Corona Treater using this manual as a guide.

The operator should use common sense and good working practices while operating and maintaining this unit. Follow all codes, pipe adequately, and understand the starting and stopping sequence. Check the safety devices following the procedures contained in this manual.

Qualified personnel, adequately equipped with proper tools, should do maintenance. Follow the maintenance schedules as outlined in the manual to ensure problem free operation after start-up.

Safety instructions in this manual are bold-faced for emphasis. The signal words **CAUTION**, **WARNING**, and **DANGER** are used to indicate hazard seriousness levels as follows:

⚠ CAUTION!

CAUTION is used to indicate the presence of a potentially hazardous situation which, if not avoided may result in minor personal injury or property damage.

⚠ WARNING!

WARNING is used to indicate a potentially hazardous situation which, if not avoided, *can* result in serious injury or death.

⚠ DANGER!

DANGER is used to indicate an imminently hazardous situation which, if not avoided, *will* result in serious injury or death.

SAFETY PRECAUTIONS

⚠ DANGER!

The use of high voltage is necessarily employed in the operation of this equipment. Precautions have been taken in the design of this equipment to make it as safe as possible for both operator and service personnel. However, since no amount of interlocks and safety devices can be absolutely infallible, precautionary measures must always be taken when working on this equipment.

Do ***not*** reach into the equipment or any electrical enclosure without first removing the power. Never apply power to the unit without the cover on and securely in place.

Capacitors Store Charge: Never trust a capacitor to be bled off completely. A meter or ground strap should be used to check each stud or lead before handling. Some capacitor studs, including those not tied to bus work (not used), may build up a considerable static charge. ***GROUND BEFORE HANDLING!***

Do ***not*** Stand In Water or On Grounded Surfaces or Touch Ground Surfaces while Reaching in any System Enclosure. A piece of wood or other insulating material will act as an additional barrier to stand on.

⚠ WARNING!

Do ***not*** **Tamper With Safety Interlocks:** Under no circumstances should any safety interlocks be defeated nor should any of the safety devices be relied upon for removal of voltage from the equipment**.**

Lockout: Use proper lockout and tag out procedures prior to removing any covers, panels, or cords provided for access. Ensure power cannot be applied before entering. ***Use safety as the first step.***

⚠ CAUTION!

Familiarize Yourself Thoroughly with the Equipment: Never attempt to work on this equipment unless you are completely familiar with it. Never assume that a circuit is dead**. MAKE SURE!!!**

Always Wear Appropriate Protective clothing and Eyewear while working within the enclosure.

Do ***not*** Connect any external control or monitoring equipment, with the exception of appropriate test equipment, to the internal circuits of this equipment. Connecting external equipment in this manner may cause failure of this equipment and create a potential hazard to personnel.

CONTACT:

Enercon Customer Service Department
Phone Number: (262) 255-6070
Fax Number: (262) 255-2462
E-Mail Address: service@enerconmail.com
Website: www.enerconind.com
24hr Customer Service is available.

GENERAL

The advancement of technological improvements in corona treating equipment, as well as our design philosophy of custom engineering each customer installation, can cause differences from system to system. To prepare a complete and detailed installation, operation, and maintenance manual for each individual order is prohibitive from a practical standpoint. For these reasons, this manual may contain information that is not pertinent to your specific installation. It is intended as a reference for the user to gain a solid understanding of the major components incorporated in every Enercon CoronaFlex™ Corona Treating System. This manual should be used in conjunction with the customized system drawings and any addendums, specification sheets or special instructions provided with your system.

CORONAFLEX™ CORONA TREATING SYSTEM DESCRIPTION

The Enercon CoronaFlex™ Corona Treating System is designed to increase the surface tension of plastic films, foils, and paper in order to enhance the wettability and adhesion of inks, coatings, and adhesives. As a result, the materials treated by this equipment will demonstrate improved printing and coating quality and stronger lamination strength.

The CoronaFlex™ Corona Treating System, designed and engineered by Enercon, is one of the simplest and most effective available today. Reliability, safety, efficiency, simplicity, ease of access and appearance are some of the important considerations and benefits of the Enercon CoronaFlex™ Corona Treating System.

If you would like to learn more about Corona Treating, contact Enercon at (262) 255-6070 or visit our website at www.enerconind.com. Numerous technical papers and literature are available to you.

The CoronaFlex™ Corona Treating System consists of 3 major components:

1) *the **Power Supply***
2) *the **High Voltage Transformer***
3) *the **Treater Station***

The **Power Supply** accepts standard 50/60 Hz utility electrical power and converts it into single phase, higher frequency (nominally 60 to 100 kHz) output power that is applied to the high voltage transformer.

The High Voltage Transformer accepts the power supply's higher frequency output power and steps it up to a voltage that is sufficient to break across the air gap between the electrodes and ground roll.

The **Treater Station** applies the transformer high voltage output to the surface of your material, through an air gap of the electrodes and a ground roll. The electrodes are at high potential and the roll, which supports the material, is kept at ground potential. Only the side of the material facing the high potential electrode should show an increase in surface tension.

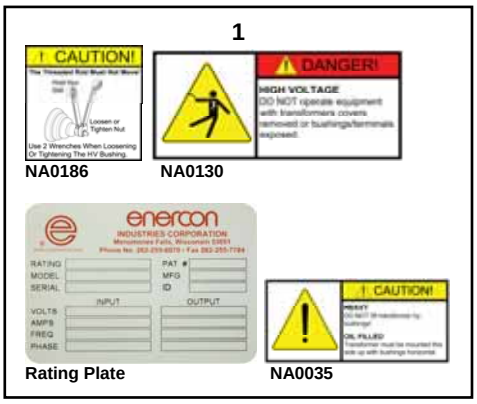
POWER SUPPLY SPECIFICATIONS

Rating	Input Voltage ± 10%	Max Temp / Humidity
1KW	208 - 240VAC 1Ø 50/60 Hz	40°C (104° F) 80% Non-Condensing
2KW	208 - 240VAC 1Ø 50/60 Hz	40°C (104° F) 80% Non-Condensing
3KW	240VAC 1∅ 50/60 Hz	40°C (104° F) 80% Non-Condensing
4KW	240VAC 1∅ 50/60 Hz	40°C (104° F) 80% Non-Condensing
5KW	240VAC 1∅ 50/60 Hz	40°C (104° F) 80% Non-Condensing

Enclosure	Width	Height	Depth
IP32 (Nema 1)	356mm (14")	516mm (20.31")	359mm (14.15")

INFORMATION AND SAFETY LABELS

This page contains representative examples of the typical placement of the labels that appear on your *CoronaFlex™ Corona Treating System* components. These labels are designed to provide technical and safety information required for operation of this equipment. If for any reason a label is removed, defaced, painted over or underlying parts are replaced, we recommend you obtain a replacement label from Enercon and re-apply them in the locations shown.



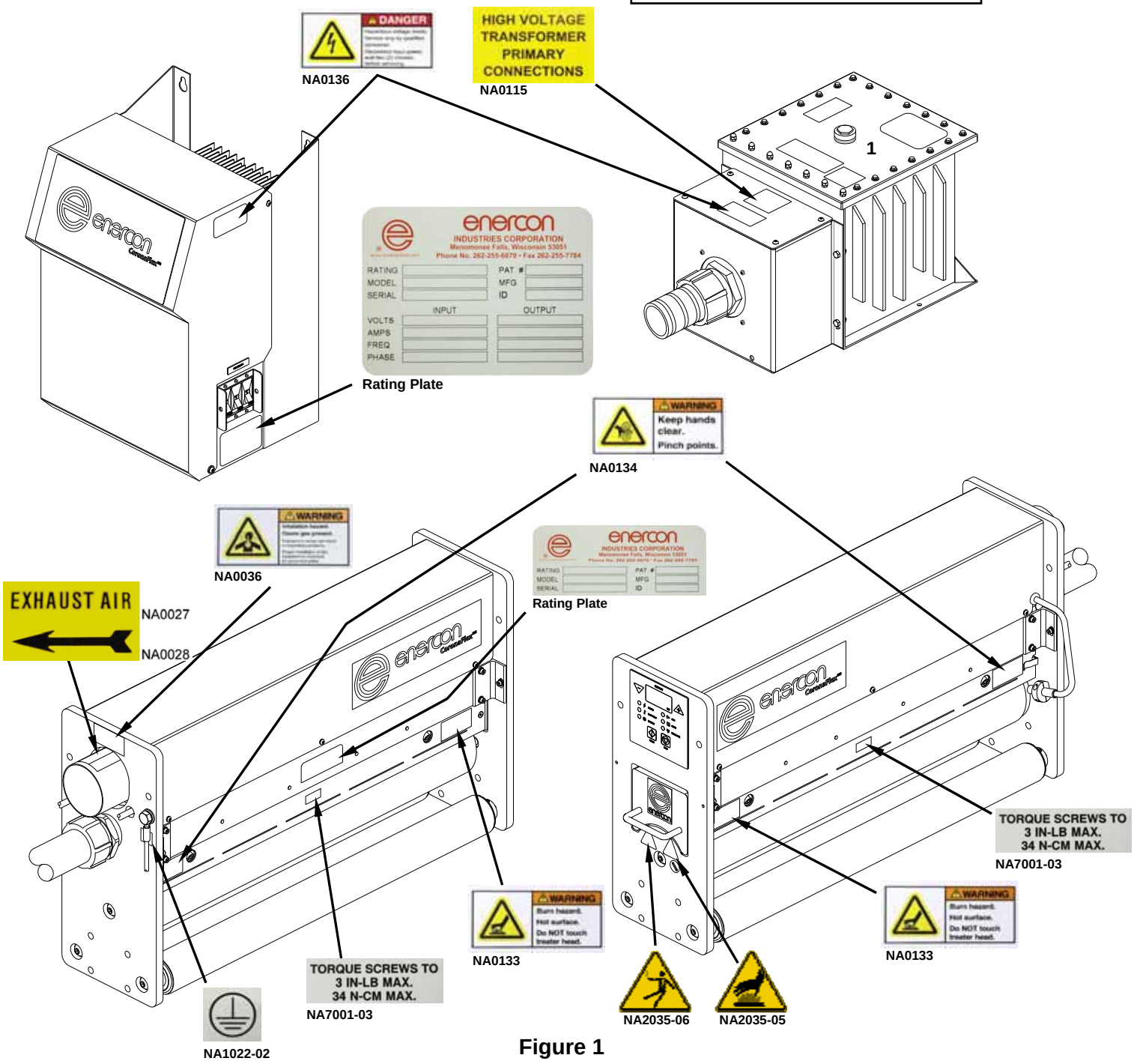


Figure 1

SECTION 2 - INSTALLATION

UNPACKING AND INSPECTION

IMPORTANT: The carrier accepted responsibility for this shipment when the carrier signed the Bill of Lading at the origin of shipment. If external damage to the packaging was detected, it should have been noted on the freight bill before signing it to acknowledge receipt. If you give the carrier a clear receipt for goods that have been damaged or lost in transit, you do so at your own risk and expense. If concealed loss or damage is discovered after delivery, notify your carrier at once and request an inspection. This is absolutely necessary for the carrier to consider your claim. The carrier agent should make an inspection and issue a loss or damage report.

Your *CoronaFlex™ Corona Treating System* may have been shipped in more than one container, so compare the items received with the packing slip to ensure all items that shipped were received. All packages and crating should be carefully opened and all items thoroughly inspected for damage.

NOTE:
Be extra careful if using a sharp instrument when removing the protective wrapping from the equipment. File a claim with the freight carrier for any damage incurred during shipping. Enercon Industries should also be contacted as soon as possible to expedite the shipment of replacement parts.

CONTACT:

Enercon Customer Service Department
Phone Number: (262) 255-6070
Fax Number: (262) 255-2462
E-Mail Address: service@enerconmail.com
Website: www.enerconind.com
24hr Customer Service is available

Enercon Parts Department
Phone Number: (262) 255-6070
Fax Number: (262) 255-2462
E-Mail Address: parts@enerconmail.com

DOCUMENTATION

A system folder was provided with your equipment. The folder contains printed drawings and documents, and a CD-ROM with digital copies of your systems Manual(s) and digital copies of the printed drawings and documents.

OPTIONAL EQUIPMENT

Several options were available for purchase with your *CoronaFlex™ Corona Treating System* and the same care should be used when opening these boxes.

For installation and setup of options included with your system refer to this manual and your system drawings and documents.

SITE SELECTION

Careful consideration must be taken when selecting the site for the equipment. Items such as ventilation space, ambient temperature, and cleanliness should be taken into account. Although the location of most components is often predetermined, it must be verified that all components are installed in accordance within the guidelines of this manual to help ensure safe and proper operation.

INSTALLATION GUIDELINES

Each system is designed specifically to meet the needs of the user. It is impossible to give detailed installation instructions in this manual. Some general guidelines for installations will be discussed; see **Figures 14 & 15** on **Pages 14 & 15** for illustrations of typical installations.

Each system is provided with a custom set of installation diagrams that show proper electrical interconnections of all components (including options). Use these instructions along with the guidelines of this manual to properly install the system.

NOTE:
If the equipment is modified in any way, those changes must be reviewed by Enercon to ensure that those changes have not affected corona generation characteristics.

TREATER STATION

The station is designed to operate in an ambient temperature range of 5º - 40°C (41º - 104°F) @ 80% relative humidity, non-condensing. The station should be mounted in accordance with this manual and the Installation Diagram supplied with your system. The station should be bolted securely utilizing the mounting holes in the station frame and the M8 hardware provided **(See Figure 2)**.

You were supplied with 6 M8 bolts and lock washers for mounting the station. When mounting the station with supports in the front and back you will need to use 4 of the bolts on the back support (**1**) and 2 bolts on the front support (**2**).

The mounting holes in the middle of the back support are counter-sunk (**3**) and you will need to pull the

electrode module out, or remove it, to access these holes.

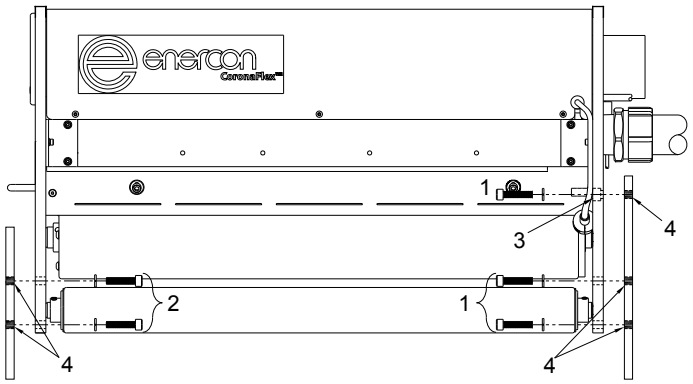


Figure 2

Refer to your system drawings for mounting hole details and ensure they are drilled and tapped for M8 x 1.25P bolts (**4**).

When mounting the station with only a single support, you will need to mount the station by the back support, and cut out an opening (**1**) for the Exhaust Duct, H.V Conduit, and the Remote and Interlock cables **(Figure 3)**.

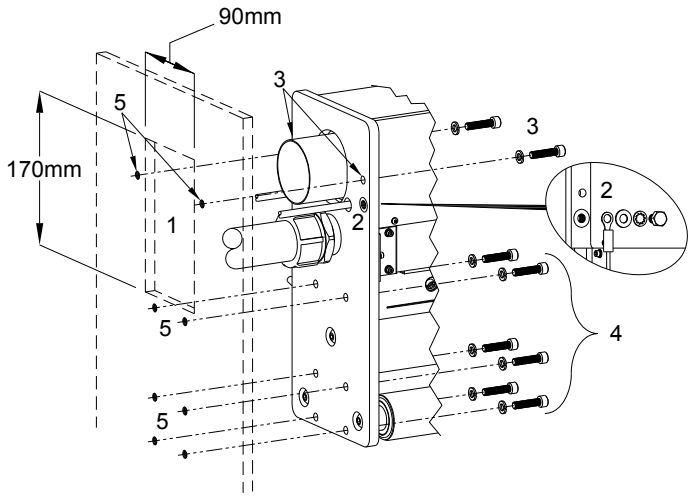


Figure 3

You will also need to move the ground wire from the outside of the frame to the inside (**2**) of the frame.

You can use as few as 4 mounting bolts in this configuration, but it is recommended that you use all 6. The upper 2 mounting holes (**3**) must be used in this configuration. The other mounting holes you choose is optional (**4**), but keep in mind that mounting holes in the middle of the back support are counter-sunk and you will need to pull the electrode module out, or remove it, to access these holes.

Refer to your system drawings for mounting hole details and ensure they are drilled and tapped for M8 x 1.25P bolts (**5**).

Once the station is mounted, verify that the treater rolls are parallel and perpendicular to the web path. The station can be leveled using shims between the supports and the mounting surface. The CoronaFlex™ Corona Treating System allows you to run your web in either direction.

POWER SUPPLY STAND

For convenience, the CoronaFlex™ Treater System is mounted on a stand for the power supply and High Voltage Transformer **(Figure 4)**.

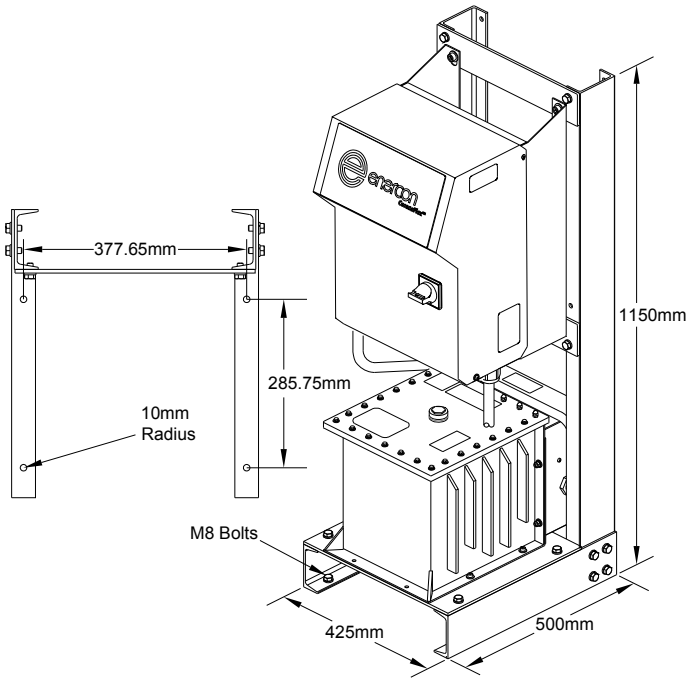


Figure 4

Place the Power Supply Stand as close to the station as possible, keeping in mind that the location cannot exceed the length of the HV conduit and interconnection cables.

It is recommended that you bolt the stand to the floor to prevent movement or tipping. Use the hole pattern shown in **Figure 5** to properly place the mounting holes and anchors in the floor.

⚠ WARNING!

Ensure that all system components are properly grounded.

POWER SUPPLY WITHOUT STAND

Once an appropriate location has been identified you will need to drill mounting holes in the chosen structure and install mounting bolts and flat washers to secure the power supply in place **(See Figure 5)**.

Use the hole pattern shown, and refer to your system drawings for more cabinet details.

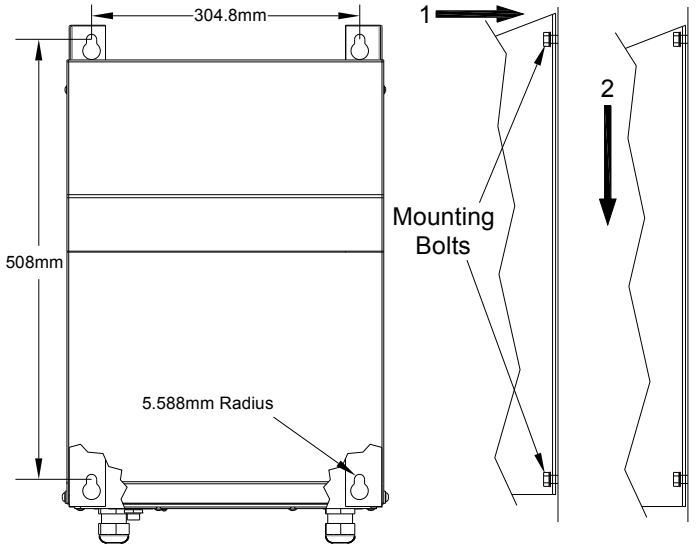


Figure 5

Once the mounting bolts are installed, lift the power supply into place over the bolts and washers (**1**) and slide the power supply down (**2**) to rest on the bolts. Tighten the bolts to secure the power supply to the mounting structure.

REMOTE HIGH VOLTAGE TRANSFORMER

When the CoronaFlex™ Treater System is supplied without a stand, a Remote High Voltage Transformer is supplied with the system. You will need to place the transformer as close to the station and power supply as possible **(Figure 6)**.

WARNING!

OIL FILLED HIGH VOLTAGE TANSFORMER!

THE TRANSFORMER GROUND STUD MUST BE CONNECTED TO THE SAME GOUND POTENTIAL AS THE TREATER STATION!

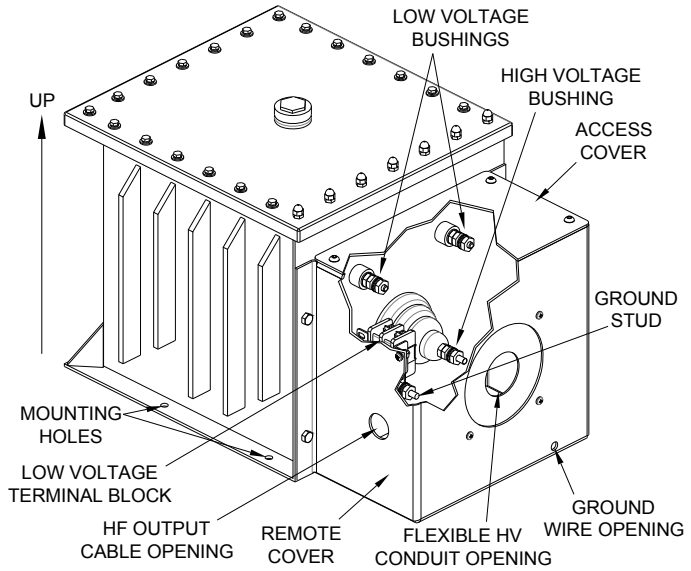


Figure 6

HIGH VOLTAGE TRANSFORMER MOUNTING

The Remote High Voltage Transformer placement will be limited by length of the HV Conduit and HF Power Cable supplied with the system.

When connected, the conduit should have sufficient slack to prevent undue stress on the connection points, while not looping upon itself or around other equipment. The transformer must be mounted upright with the bushings in the horizontal position and bolted securely in place **(Figure 7)**.

The transformer must also be properly grounded, utilizing the earth ground wire supplied. If a longer ground wire is required, ensure the replacement ground wire is at least the same size as the HF output power cables. Refer to your system drawings for wiring details.

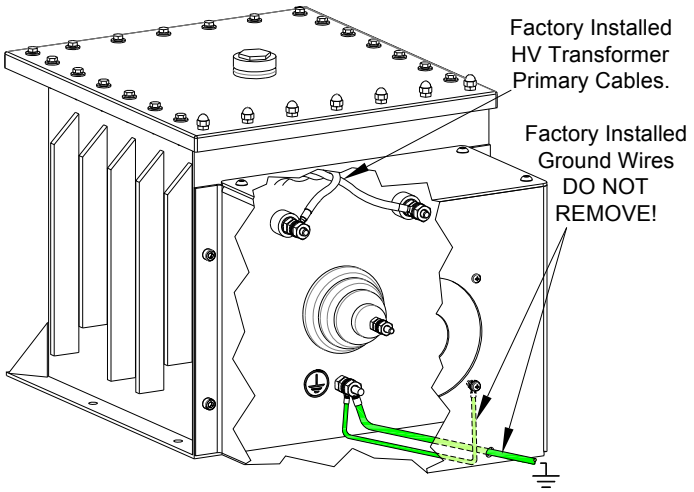


Figure 7

⚠ CAUTION!

Do *not* lift the high voltage transformer by its bushings.

The High Voltage Transformer is designed to be mounted in free air. Do ***not*** place within an enclosure, or stack transformers on top of each other, as this may cause overheating and failure!

If transformers are required to be mounted above one another, placed within an enclosure, or both, external forced air-cooling **must be provided** to prevent transformer failure. Airflow requirements are 244 MPM (800 FPM) per transformer and the airflow must be directed at the cooling fins of the transformer(s).

As the ambient temperature rises, separate the transformers by an increasing distance to allow for

adequate airflow. The minimum separation distance at 40°C (104°F) is 254mm (10”) horizontally and 1254mm (10”) vertically. The maximum permissible operating temperature is 40°C (104°F) ambient.

CONNECTING THE FLEXIBLE HV CONDUIT

This information is intended to be used when installing, modifying, or replacing the Flexible HV Conduit on your CoronaFlex™ Treater System.

On your system, one end of the conduit will be factory installed at the Station, and you will be required to install the loose end of the conduit to the High Voltage Transformer.

The final mounting location of the HV Transformer may result in excessive slack in the conduit run, which will require shortening the conduit. If the conduit is shortened, ensure that the insulation tubing and HV wire are not damaged during the process and install a new wire lug on the HV wire before proceeding, refer to **SHORTENED FLEXIBLE HV CONDUIT**.

Once the conduit has been shortened the insulation tubing must extend a minimum of 25.4mm (1”) from the conduit and be secured in place using a tie wrap.

The openings in the Station HV Plenum and Remote HV Transformer Cover must be free of any dirt, paint, or corrosion to ensure good contact with the conduit cord grip **(Figure 8)**.

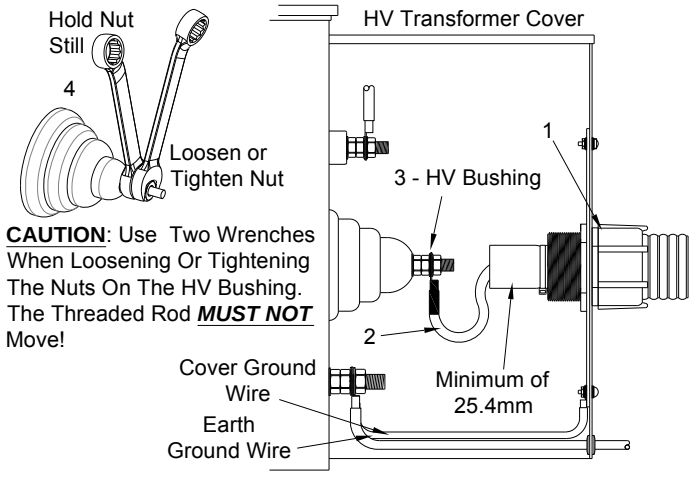


Figure 8

1. Insert the conduit cord grip (**1**) through the opening in HV Transformer Cover and tighten the connector nut.
2. Connect the HV wire (**2**) to the HV bushing (**3**) on the transformer.

NOTE:

The HV wire should be run with minimal slack to ensure adequate clearance from ground or other wiring to prevent arcing.

3. Use 2 wrenches when loosening or tightening the nuts on the HV Bushing (**4**) to prevent damage to the bushing. The threaded rod ***MUST NOT*** move!

NOTE:

The transformer’s bushings and ground stud utilize a three nut configuration to prevent the threaded rods from moving whenever the outer nut is loosened or tightened. A two wrench method must be used whenever you need to loosen or tighten the outer nut on any of the bushings or the ground stud. The front nuts should be torqued to ***6.8 Newton Meters*** *(60 inch/pounds)*.

4. The Earth Ground Wire must be run to a good earth ground at the same potential as the other system ground points.

⚠ CAUTION!

The threaded rods on the transformer bushings must not move!

Use two wrenches when loosening or tightening the nuts on the HV Transformer bushings.

Failure to observe these precautions may result in equipment damage not covered under warranty!

CONNECTING A SHORTENED FLEXIBLE HV CONDUIT

If it was necessary to shorten the flexible HV Conduit to remove excess slack, use the following steps to terminate the HV wire and then connect the conduit to the HV transformer.

1. Ensure that the insulation tubing around the HV wire extends the minimum 25.4mm (1”) from the conduit, but do not shorten the insulation tubing unless it is absolutely necessary **(Figure 8)**.
2. Slide the heat shrink tubing (**1**) over the HV wire **(Figure 9)**.

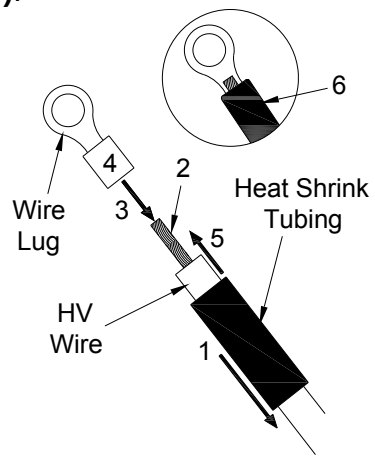


Figure 9

3. Strip approximately 9.525mm (⅜”) of insulation from the end of the HV wire (**2**).
4. Install the wire lug onto the exposed HV wire (**3**).

5. Crimp the lug securely onto the HV wire (**4**).
6. Slide the heat shrink tubing over the insulation of the lug (**5**).
7. Use a heat gun to shrink the tubing onto the lug and wire (**6**).
8. Once the HV wire is properly terminated, finish performing **CONNECTING THE FLEXIBLE HV CONDUIT**.

SYSTEM REQUIREMENTS

Temperature

The *CoronaFlex™ Treater System* is designed to operate in an ambient temperature range of 5º - 40°C (41º - 104°F) @ 80% relative humidity, non-condensing.

Input Voltage

The *Compak™ 2000 Power Supply* requires a 208/240 Volt, single phase, 50/60 Hertz input voltage.

⚠ WARNING!

The power supply should not be operated without a 3-prong or 3-wire grounded line cord connected to a grounded receptacle.

Do *not* by-pass the ground terminal.

A fused disconnect switch must be located between the power source and the power supply. Local codes will dictate the means of entrance and termination of the wiring. Refer to the connection diagram supplied with your system drawing list for any installation or connection questions.

⚠ DANGER!

The potential of electrical shock is present if all system components are not properly grounded.

Grounding

To ensure safe operation, all system components must be grounded to a good Earthen Ground point at the same ground potential. The Power Supply, High Voltage Transformer and Station all include a factory installed ground wire for your convenience.

If a longer ground wire is required ensure the ground wire is at least the same size as the feed wires of the system component being rewired. See your system Drawing List for wiring details.

NOTE:

Ensure all paint or plating is removed from all ground contact surfaces.

CONTROL WIRE CONNECTIONS

The control wiring cables must be run between the station and the power supply and any control or monitoring equipment you are supplying (See **Figures 14** & **15** on **Pages 14 & 15**).

Interlock and Remote Control cables are standard on your system and they are terminated at the station, or the remote control box if included with your system. A Watt Density Control cable will be supplied if this option was included with your system, and the cable will be terminated at the Watt Density Control box.

You will need to run these cables to the power supply and connect them to the appropriate connectors on the bottom of the power supply **(Figure 10)**.

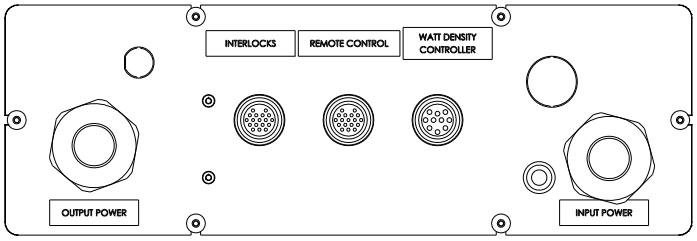


Figure 10

HIGH FREQUENCY OUTPUT POWER CABLES

When the power supply and high voltage transformer are mounted on the stand the High Frequency (HF) output power cable is connected to the HV transformer at the factory.

If the stand is not supplied you will need to run the HF output power cable to the HV transformer (See **Figures 14** & **15** on **Pages 14** & **15**). The HF output power cables of the power supply should be run in a separate aluminum or other non-magnetic conduit.

Insert the cable (**1**) through the cord grip (**2**) on the HV transformer remote cover and connect the wires (**3**) to the terminal block **(Figure 11)**.

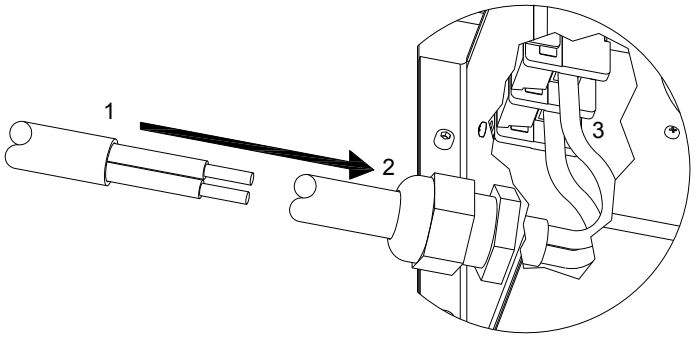


Figure 11

NOTE:

The conductor size used at high frequency will be larger than at 60 Hz due to compensation for skin effect.

CUSTOMER INTERLOCKS

For safe operation of your corona treating system you may wish to add an additional interlock that ties the Treater System's operation with the rest of you production line. A connection point is available on the I/O Board for a customer interlock across TB2 pins 4 & 5. To connect your interlock in series with the standard system interlocks, remove the jumper across TB2 Pins 4 & 5 and install a Normally Open (N.O.) contact that is closed when your interlock is engaged and opens when the interlock is tripped **(Figure 12)**. The contact you supply in line with the interlock circuit must be a dry contact.

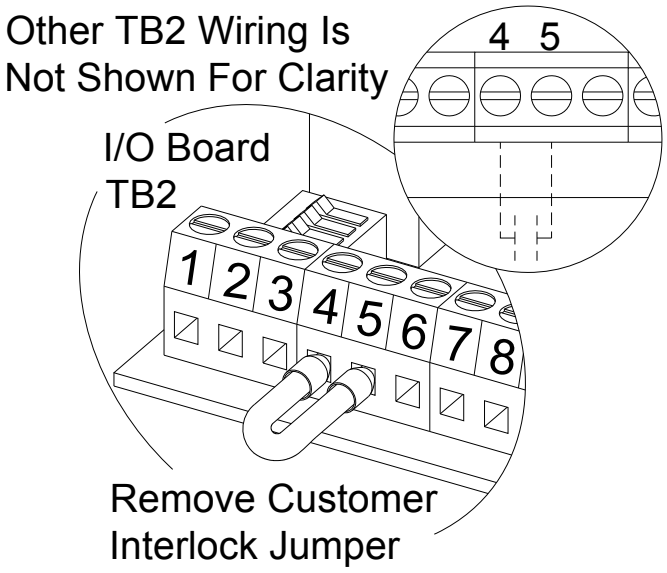


Figure 12

Once power is applied to the system test the interlock, and ensure it illuminates the Station Interlock LED on the front panel and prevents the power supply from being started.

EXHAUST AIR DUCT & BLOWER

The CoronaFlex™ Corona Treating System is ***not*** designed to be operated in a hazardous environment, please contact Enercon if the station is intended to be used in this type of environment.

Convenient terminations for exhaust ductwork are provided for the treater station.

The treater exhaust duct run must be independent of any other duct runs within your plant and must terminate outside of the building. Ensure the blower size meets the specifications provided in the equipment proposal.

NOTE:

The size of the ductwork termination at the station is not an indicator of the required duct size for proper exhaust. Use the Minimum Pipe Diameter vs. Length of Exhaust Duct Run table to help determine the duct size required for your system.

If supplying a 3rd party blower, ensure the blower size meets the specifications provided in the equipment proposal and drawings included with your system.

EXHAUST DUCT SIZING GUIDELINES

The table of recommended exhaust duct sizes is based on the following:

- Total length of duct run does not exceed specified distance (including distance from blower exit to building exit).
- Maximum of number of elbows or 45° fittings indicated.
- Smooth wall rigid duct (non-flexible).
- Adhering to the guidelines listed above.

	Minimum Pipe Diameter vs. Length of Exhaust Duct Run			
Exhaust Air Flow CMM (CFM)	<30m (100') (< 6 Elbows)	<30m (100') (6-10 Elbows)	<45m (150') (< 10 Elbows)	<60m (200') (<10 Elbows)
1 - 5.6 (1 – 199)	100mm (4")	125mm (5")	150mm (6")	150mm (6")
5.7 - 8.5 (200 – 299)	125mm (5")	150mm (6")	150mm (6")	200mm (8")
8.5 - 14.1 (300 – 499)	150mm (6")	200mm (8")	200mm (8")	200mm (8")
14.2 - 25.5 (500 – 899)	200mm (8")	250mm (10")	250mm (10")	250mm (10")
25.5 - 45.3 (900 – 1599)	250mm (10")	300mm (12")	300mm (12")	350mm (14")
45.3 - 70.8 (1600 – 2499)	300mm (12")	350mm (14")	350mm (14")	400mm (16")
70.8 - 85.0 (2500 – 3000)	350mm (14")	400mm (16")	400mm (16")	400mm (16")

NOTE: The above chart is a guideline only. Refer to qualified HVAC contractor for specific sizing and design recommendations. Customer is responsible for final duct design and installation to meet exhaust requirements.

OZONE EMISSIONS AND EXHAUST

Estimating Your Systems Ozone Emissions

To estimate the ozone emissions in pounds per hour, the following formula can be referenced:

Power Supply kW x 0.073 = Ozone in lbs./hr.*

***NOTE:**

The above formula is for estimation purposes only. Since actual ozone emissions are dependent on several other site-specific variables, field ozone measurements are *REQUIRED* for accurate numbers. Enercon makes no representations or warranties regarding any of the emissions characteristics for any of its products, including emissions levels of ozone or other chemicals, temperature, or moisture. Consult an environmental professional to determine how OSHA, Clean Air Act, or other legal requirements may apply to your situation.

Discharge Height Over Ground Level:

We have no specific recommendation. However, we do recommend exhausting be done through the roof.

Caution: Insure that the system exhaust discharge outlet is not located in a position where its output could be recirculated into the plant by HVAC equipment.

Maximum & Minimum Airflow:

We only specify minimum airflow. (See specific airflow and water column pressure in the instructional data delivered with the specific system.)

Exhaust Temperature:

Our equipment under normal operation will raise the temperature of the air taken in approximately 30 Degrees C over ambient. Actual temperature will vary based on site-specific conditions.

Moisture Content:

Our equipment typically does not affect the moisture content of input air, therefore, the moisture content will typically be that of the plant ambient air and no more.

Exhaust Pipe Materials:

The exhaust pipes should be constructed of stainless steel, aluminum, or PVC. Do **not** use galvanized steel as the ozone will attack it and cause leaks within a short time.

Exhaust Duct Run:

The exhaust duct run from your treater station must remain independent of all other duct runs for its entire length.

⚠ WARNING!

Exhaust blowers must be used at all times when operating the corona treating system.

Severe damage to the system (as well as inadequate ozone removal) will occur if proper airflow requirements are not met at all times.

It is recommended that the blowers are interlocked with the power supply to allow operation of the power supply only when the blowers are running.

⚠ WARNING!

It is recommended that the exhaust blower be mounted outside of the building to maintain a negative exhaust pressure and reduce noise levels.

The blower motors are TEFC and rated for outdoor use.

If the blower is mounted inside the building, mount the blower as near as possible to where the exhaust duct exits the building.

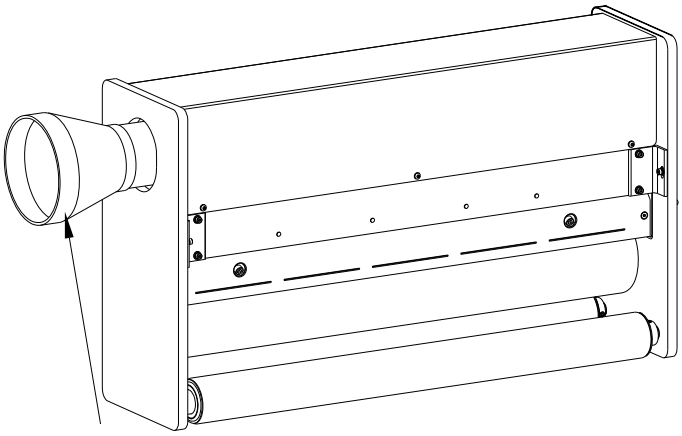
EXHAUST DUCT CONNECTIONS DO'S AND DON'TS.

DO:

- Use as large a duct diameter as possible, but never smaller than the recommended diameter.
- Use PVC, stainless steel, or aluminum duct.
- Keep the number of elbows and other transitions to a minimum.
- Keep all duct runs as short as possible.
- Keep the exhaust duct run independent of all other plant duct runs.
- Seal all duct joints to reduce pressure loss.
- Check to make sure the blower fan is rotating in the correct direction (as indicated on the blower housing). Improper electrical connections can cause the fan to rotate in the wrong direction, greatly decreasing performance.
- Contact Enercon Industries if you have any questions regarding these guidelines (1-262-255-6070).

DON'T:

- Don't use the same size ductwork as the termination at the station. Use the table from the previous page to help determine the duct size required for you system **(Figure 13)**.



A REDUCER MAY BE REQUIRED TO CONNECT DUCT OF THE PROPER SIZE TO THE STATION.

Figure 13

- Don't use galvanized duct. It will quickly corrode and need to be replaced.
- Don't use flexible duct. It will greatly increase static pressure loss. If flexible duct must be used, select a diameter at least 1.3 times that recommended for smooth duct. Keep these runs to a minimum.

Example: A system installation requiring 15.24cm (6") diameter ducting will require a minimum 19.8cm (7.8") diameter flexible duct.

❖ Don't have any elbows within three (3) duct diameters of the inlet or exit to the blower. Elbows that are closer to the blower can create turbulence that will affect blower performance.

Example: A system installation requiring 15.24cm (6") diameter ducting will require any elbows to be a minimum of 45.72cm (18") from the inlet and exit of the blower.

❖ Don't combine the treater exhaust duct run with any other plant duct runs. Treater exhaust ***must be*** an independent duct run.

⚠ WARNING!

Do not place discharge of exhaust duct near any fresh air intakes or HVAC equipment where the output could be recirculated in to the building.

Ozone is heavier than air, and wind conditions may cause the ozone to sink to roof level, even if the exit point is elevated.

INSPECTION

1. Visually inspect the system to ensure that all appropriate installation connections are made for the control interconnection and input/output wiring.
2. All power connections must be tight between the power source, power supply, and high voltage transformer and treater station.
3. Ensure all packaging material used for securing parts for shipment is removed and properly discarded.
4. Ensure the power supply cabinet, high voltage transformer, treater station, and treater roll are properly grounded.
5. Verify the high voltage transformer is mounted with the bushings in the horizontal position.
6. For adequate ventilation, allow twelve inches of air space around the power supply cabinet when determining mounting location.
7. Verify the station has been installed, aligned, and adjusted in accordance with the drawing list and this manual.

VERIFICATION OF PROPER COOLING

Verify that the power supply is being adequately cooled. Check to be sure that all cooling fans are operating properly and clear of dirt and debris. Also ensure sufficient ventilation space is provided around the power supply cabinet to allow unrestricted airflow.

⚠ DANGER!

High voltage is present within the cabinet. Only qualified personnel should be allowed to work on the equipment with the doors open.

For safety purposes, disconnect power and verify all capacitors are discharged before working on the power supply or moving the scope probe.

The DC Bus Capacitors discharge very slowly.

PRE START-UP INSPECTION

Since all power supplies are fully tested and set up for operation at the factory, a complete *"on-site"* alignment is seldom required.

"ON-SITE" START-UP

If desired, an Enercon service engineer can be called in to assist with the start-up of your system. All equipment should be fully installed before the service engineer arrives on-site.

STANDARD SYSTEM COMPONENT INSTALLATION LAYOUT

Item #	Description
1	Power Supply
2	Treater Station
3	High Voltage Transformer
4	Exhaust Blower (Customer Supplied – Unless Supplied As An Option)
5	Remote Control (Optional)
6	Power Supply / High Voltage Transformer Stand
7	Exhaust Ducting (Customer Supplied)
8	HF Output Cable (Pre-Connected to High Voltage Transformer)
9	Control Wiring (Pre-connected to Station)
10	Remote Control Cable (Standard – Pre-connected to Station)
11	Flexible High Voltage Conduit (Pre-Connected to High Voltage Transformer)
12	Exhaust Duct Run to Exterior or building (Customer Supplied)
13	Fused Disconnect (Customer Supplied)
14	System Ground (All System Components Must Be At The Same Ground Potential)

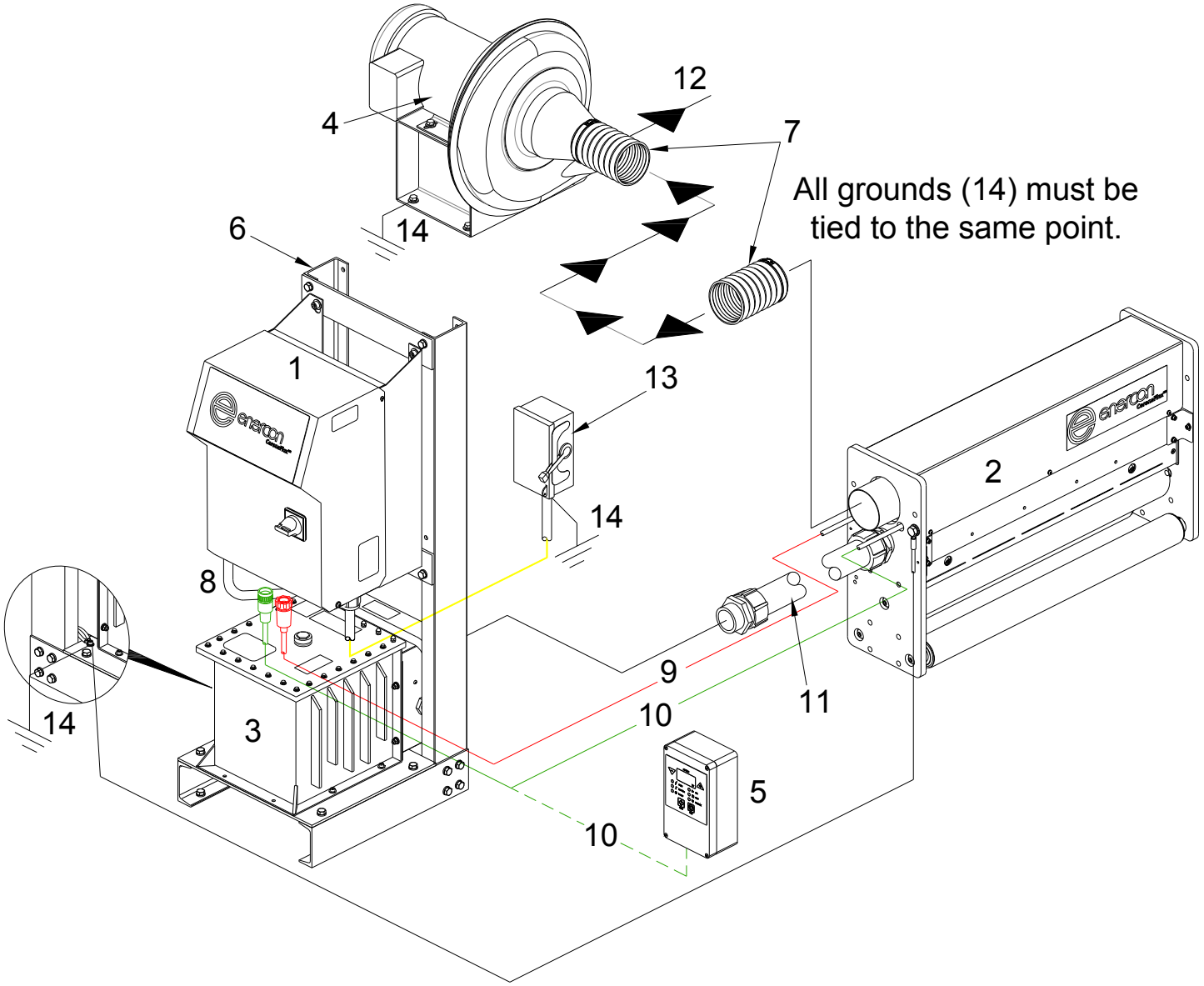


Figure 14

SYSTEM COMPONENT INSTALLATION LAYOUT WITHOUT STAND

Item #	Description
1	Power Supply
2	Treater Station
3	High Voltage Transformer
4	Exhaust Blower (Customer Supplied – Unless Supplied As An Option)
5	Remote Control (Optional)
6	Exhaust Ducting (Customer Supplied)
7	HF Output Cables (Pre-connected to Power Supply)
8	Control Wiring (Pre-connected to Station)
9	Remote Control Cable (Standard – Pre-connected to Station)
10	Flexible High Voltage Conduit (Pre-Connected to High Voltage Transformer)
11	Exhaust Duct Run to Exterior or building (Customer Supplied)
12	Fused Disconnect (Customer Supplied)
13	System Ground (All System Components Must Be At The Same Ground Potential)

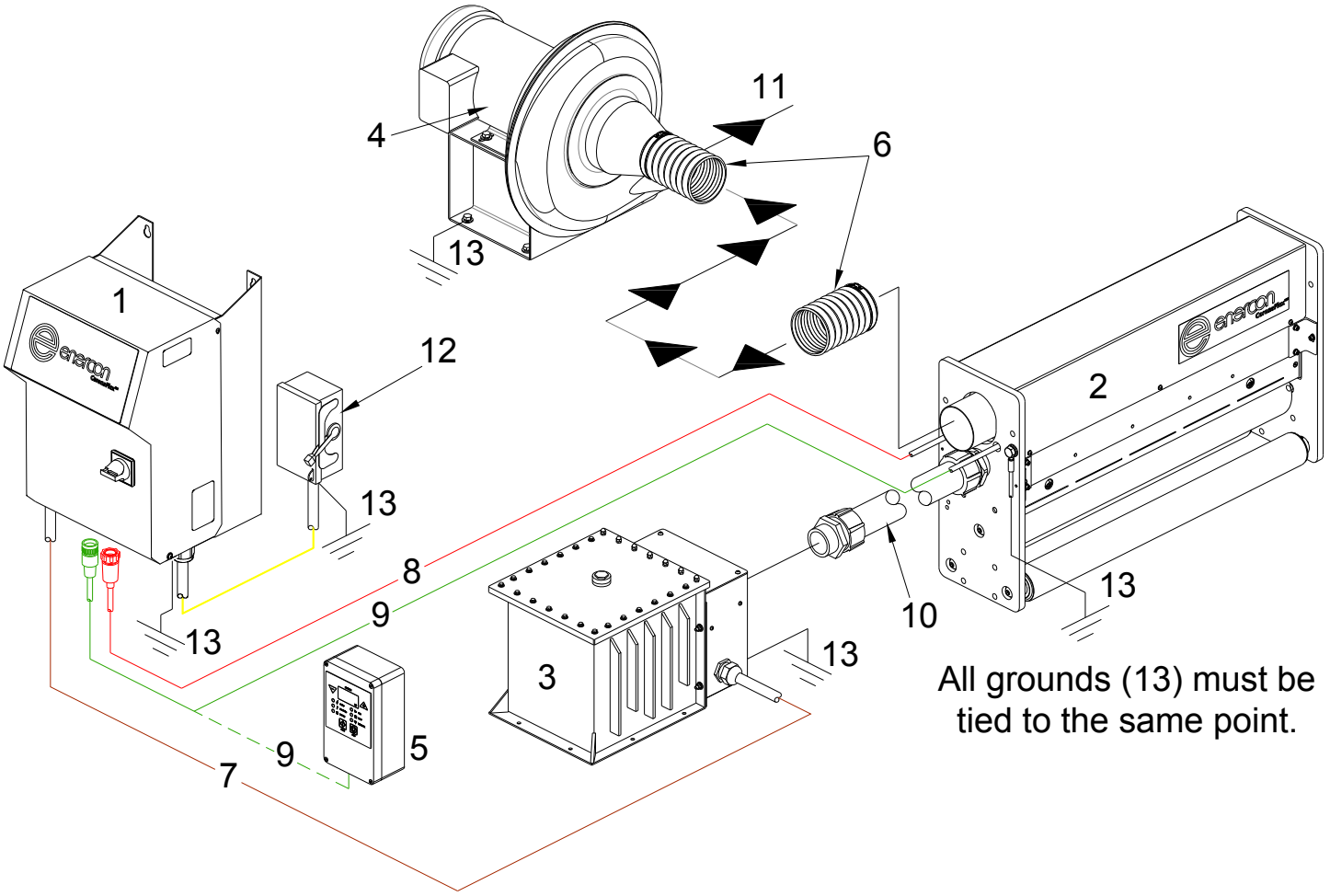


Figure 15

SECTION 3 – PRINCIPLES OF OPERATION

GENERAL

⚠ Before operating this equipment, we recommend reading this section in its entirety to ensure you understand all the safety and operational requirements for using this equipment. Also, please refer to **SECTION 1 – INTRODUCTION**, **Pages 1** and **2**, to become familiar with *all* safety requirements and precautions.

CORONAFLEX™ TREATER SYSTEM

Your *CoronaFlex™ Treater System* consists of a Power Supply, Remote High Voltage Transformer and Treater Station.

The *Power Supply* is designed to automatically match a wide range of load conditions by seeking the ideal operating frequency for a given load. This eliminates the need for the operator to change output, high voltage transformer taps, or internal settings when load conditions change.

The *High Voltage Transformer* is designed to accept the high frequency output of the power supply and step it up to a voltage sufficient to break across the air gap of your load.

The *Treater Station* is designed to accept the high frequency / high voltage output of the high voltage transformer to produce the corona discharge used to treat your product surface.

The following is a list of the major components that make up your CoronaFlex™ System and a description of their functions **(Figure 16)**.

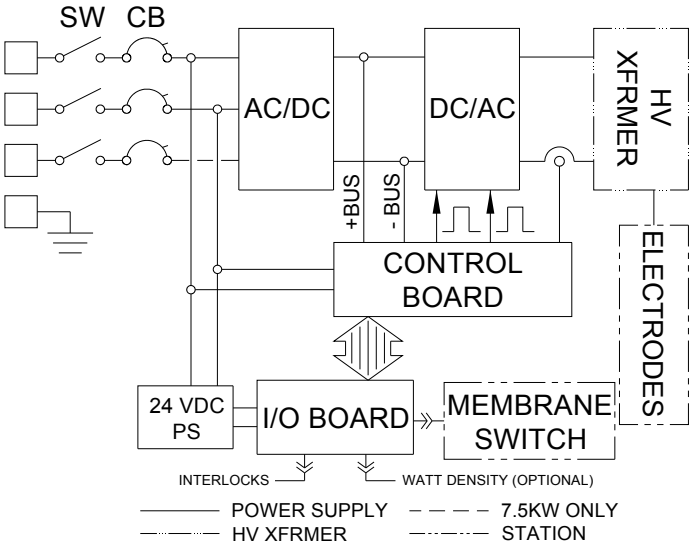


Figure 16

SW

Disconnect Switch: Controls the application and removal of the input voltage to the Power Supply.

CB

Circuit Breaker: Provides short circuit protection for the power circuit semiconductors in a fault condition.

⚠ DANGER!

When the circuit breaker is off, voltage is still present within the power supply.

AC / DC

This section rectifies the input AC voltage to a DC bus and provides filtering.

DC / AC

This section consists of transistors connected across the DC Bus that are alternately switched at a rate that is dependent on the conditions of your load. The control circuits monitor the output feedback signals, and automatically adjust the switching to the ideal frequency for a given load.

Control Board

The control board is the *"brain"* of the power supply. It receives the various AC and DC feedbacks and develops the proper firing pulses to regulate the required high frequency output power.

I/O Board

This board allows communications between the Control Board, Display Board, Membrane Switch, System Interlocks, Customer Interface and Options**.**

24 VDC PS

24 VDC Power Supply: This power supply steps the input voltage down to the 24VDC required by the I/O Board.

Membrane Switch Assembly

This membrane switch provides the means for the operator to control, and monitor power supply operations. A digital meter and status LEDs allow for convenient monitoring of power supply operation.

H.V. Xfrmer

High Voltage Transformer: The HV Transformer steps up the power supply's high frequency output to the voltage level necessary to sustain a corona discharge, at the desired intensity, across the electrodes. This level could vary depending on the application, but is normally in the range of 3-5 KV. Since the power supply automatically matches to various load conditions, the transformer does not require multiple taps.

Electrodes

System Load: The electrodes are located in the treater station and are mounted above the ground roll. The electrodes use the output of the high voltage transformer to ionize the air within the air gap

to produce the corona used for treating your material surface.

REVIEW THE INSTALLATION

Before attempting to run for the first time verify that the system is installed in accordance with **Section 2** of this manual.

⚠ DANGER!

The potential of electric shock is present in a treater station.

Ensure the station is operated with all covers installed and all protective interlocks functional.

If working within station, verify power is locked out in accordance with lockout tag-out procedure.

⚠ WARNING!

Ozone gas is generated in every corona treating process and, therefore, ozone is present in the exhaust airflow.

Installation of this equipment must be done in accordance with local codes to ensure the safety of personnel in the area and in the building.

TREATING CONDUCTIVE MATERIALS

If your narrow web system is equipped with a covered ground roll and you intend to treat a conductive material, you will need to recalculate the maximum output power level of the power supply.

⚠ WARNING!

Failure to *reduce* the output power level of the power supply when treating metalized/conductive film, or thick material, may cause failure of your electrodes and/or ground roll covering.

NOTE:

The following information only applies to narrow web treater stations with ground rolls that have a nonconductive covering. Contact Enercon if you have any questions on the type of covering used on your system's ground roll.

The recalculation of the maximum output power level will be based on the width of the conductive substrate being treated. The width of the substrate will become the systems maximum treat width for the calculations below. The write up below will be using a 203.2mm (8") wide conductive substrate, 355.6mm (14") narrow web treater station, and a power supply with a maximum output power rating of **1.2kW** for the examples and calculations.

By dividing the width of your conductive substrate by the designed maximum treat width of the system, you can calculate the reduction factor for your system.

Example: If you will be treating an 203.2mm (8") wide conductive substrate on a 355.6mm (14") narrow web treater system, the treat width has been reduced by a factor of 0.57 (203.2 ÷ 355.6 = 0.57).

Multiplying your power supply's maximum output power level by the reduction factor will give you the new maximum output power level of the power supply while running the 203.2mm (8") wide conductive substrate.

Example: If your system had an original maximum output power level of 1.2kW, you will need to multiply that by the 0.57 reduction factor which will give you a new maximum power level of 0.68kW (1.2kW x 0.57 = 0.68kW).

If the .85kW is lower than the output power level you are currently running your power supply at, you will need to manually reduce the power supply's output power level to ensure that the electrodes and ground roll covering won't be damage.

If the .68kW is higher than the output power level you are currently running your power supply at, no change will be required. However, in order to maintain a similar watt density you will need to reduce the output power or increase your speed.

NOTE:

Refer to your systems power supply manual for the appropriate procedure to adjust the output power on your system.

TREATING THICK MATERIALS

If you are treating a thick material, such as paperboard, on your *CoronaFlex™ Treater Station*, it may be necessary to reduce the output power level of your power supply to prevent damage to your equipment.

To discuss how to treat thick materials, contact Enercon Sales or Service.

AIR GAP ADJUSTMENT

The air gap on the *CoronaFlex™ Treater Station* is factory set at 1.5mm (.060"). If there is a need to change this setting, due to material thickness or other factors, refer to **SECTION 4 - MAINTENANCE** of this manual for instructions.

STATION THREAD-UP

To thread-up the *CoronaFlex™ Treater Station*, ensure that the input voltage is removed from the power supply using your company's Lock Out / Tag

Out guidelines. At the front of the treater station pull the electrode module out of the station until it stops at its fully extended position **(Figure 17)**.

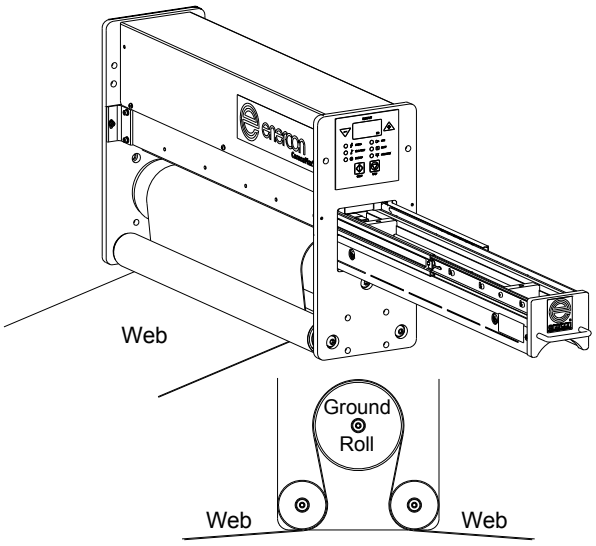


Figure 17

⚠ WARNING!

Burn Hazard! Run the blower for 5 minutes after stopping the power supply before opening the Electrode Module.

NOTE:
With few exceptions, the CoronaFlex™ station does not have a specified web direction.

Thread your web under the entry side idler roll, over the ground roll and back under the exit side idler roll. Ensure that the web lies smoothly against the ground roll with no wrinkling. You may need to take up slack to get the web to lie properly.

Once the web is properly threaded through the station, push the electrode module back into the station ensuring that it is fully seated. You should feel the module seat against the HV Contact.

SYSTEM INTERLOCKS

Your system interlocks are crucial to the safe operation of your *CoronaFlex™ Corona Treating System*.

These interlocks are provided for operator safety and protection of system components. The standard system interlocks include: Exhaust, Electrode, Zero Speed, and a Customer interlock, or a series of customer interlocks **(Refer to CUSTOMER INTERLOCKS – Pg 10)**. There may be additional Interlocks on your system that will be associated with system options.

Regardless of the number, or type, of interlocks on your system, it is critical that you test and verify the function of all interlocks before you put your CoronaFlex™ System into production. Refer to your system drawings to identify your system's interlocks and **SECTION 5 – MAINTENANCE** for test procedures on your system interlocks.

The actuation of any single interlock switch will automatically shut down the system and prevent your power supply from restarting until the problem is resolved. All system interlocks must be satisfied before the power supply's HF output power can be applied to the High Voltage Transformer and Station.

Electrode

The electrode interlock protects the system electrodes, and personnel by preventing the power supply from starting when the electrode module is not fully engaged.

This interlock utilizes a non-contact universal reed switch, where one half of the switch is mounted in the front of the electrode module and the other half is mounted just above the electrode module opening in the station frame.

The electrode module must be securely inserted into the treater station for the electrode interlock to be met.

Zero Speed

The zero speed interlock protects the ground roll and your product by preventing the power supply from starting if the roll is not turning, or is turning too slowly.

This interlock function utilizes a Hall Effect sensor and a magnet wheel, where the wheel is mounted to the ground roll and the sensor is mounted to the station frame.

The ground roll will need to be turning at the minimum speed or higher for the zero speed interlock to be met.

Exhaust

The exhaust interlock protects your electrodes from failure by overheating, and any personnel near the station from exposure to ozone, by preventing the power supply from starting if there is no exhaust airflow.

This interlock function utilizes a Differential Pressure Switch, where the switch is mounted inside station cover monitoring the difference between the plant air pressure and the exhaust air pressure.

The exhaust blower will need to be turned on and pulling air at the minimum CFM for the **EXHAUST** interlock to be met.

Customer Interlock

The customer interlock circuit protects the system and personnel by preventing the power supply from starting if other equipment is not ready to run.

This interlock requires either a dry, normally open contact, which closes when your required conditions are met.

You will need to have either the factory installed jumper across TB2 pins 4 & 5 on the I/O Board, or the N.O. contact you have provided must be closed for the customer interlock to be met.

POWER UP

The initial power up of your CoronaFlex™ *System* should only be attempted once all system components and options have been installed and properly interconnected.

A Disconnect Switch is provided on the unit for energizing the input voltage and a Circuit Breaker is provided for short circuit protection. The system was shipped with the circuit breaker already in the ON position **(Figure 18).**

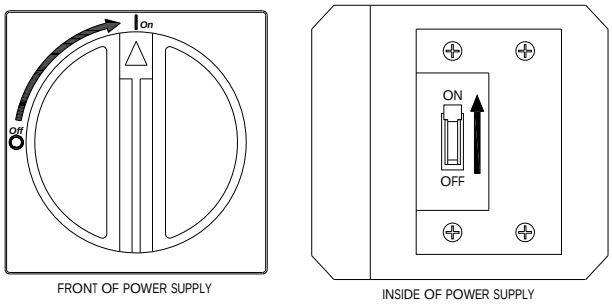


Figure 18

Upon energizing the disconnect switch the 6 front panel LEDs on the membrane switch will illuminate immediately **(Figure 19)**.

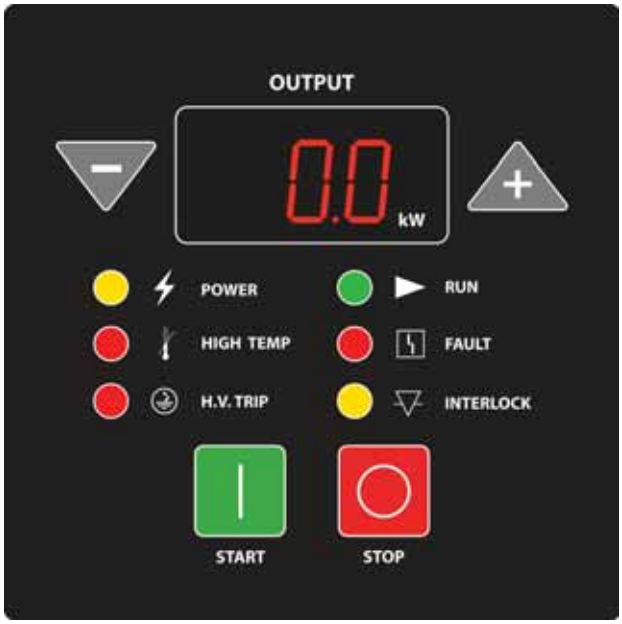


Figure 19

After a brief delay the **HIGH TEMP**, **H.V. TRIP**, **RUN**, **FAULT**, and **INTERLOCK** LEDs should extinguish, leaving only the **POWER** LED illuminated.

If any of the system interlocks are not met, the **STATION INTERLOCK** LED will remain illuminated until they are satisfied.

CONTROL FUNCTIONS

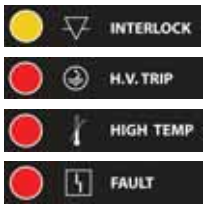
The *CoronaFlex™ System* utilizes a graphic front panel Membrane Switch with **START** / **STOP** and **UP** / **DOWN** pushbuttons to control the power supplies output, and status LEDs to display the power supply's status.

Control LEDs

Amber – Circuit Breaker ON.

Green – Power Supply Running.

Fault LEDs



Amber – Interlock open.

Red – High Voltage Short.

Red – Temperature Fault.

Red – Inverter Failure.

Digital Output Meter

The output meter displays the power supply output power level in Kilowatts (**KW**). The output should be a steady display of the output KW value and should remain constant during normal operation.

Output Power Controls

START Button – Press to Start the Power Supply

STOP Button – Press to Stop the Power Supply

UP Arrow – Increases the requested output power level.

DOWN Arrow – Decreases the requested output power level.

The **STOP** pushbutton also acts as the reset function for clearing any faults.

INITIAL START-UP

The steps contained in the initial startup procedure will only need to be performed when starting the power supply for the first time, or when restarting the power supply after an extended shut down.

The initial startup is performed to reduce the output power level the system initially starts at in case of damage to any system components from shipping.

1. Start your production line and increase the line speed to at least equal to your system's zero speed setpoint, typically 1.5 mpm (5 fpm).

2. At the membrane switch, press and hold the **DOWN** arrow for 5 seconds to ensure the selected output power level is at minimum.

NOTE:
The output power level displayed will not change from 0.0 if the power supply is not running, but the reference signal at the control board will be pulled down to its minimum value.

3. Press the **START** pushbutton and the power supply should start and run at its minimum output power level. The **RUN** and **POWER** LEDs will be lit and the **OUTPUT** meter will display the actual output power level in **kW**.

NOTE:
The minimum output power level will vary from system to system due to variations in a system's load.

4. Next, press and hold the **UP** arrow to increase the output power level to maximum. This will be the maximum rated output power level for your power supply, or the maximum output power level your system load can sustain. Refer to the rating plate on your power supply for this information **(Refer to Figure 1 – Pg 4)**.
5. Next, press the **DOWN** arrow to reduce the output power level back down to minimum.

NOTE:
You can leave the output power level at minimum or repeat **Step 4** and set the output to the power level of your choice.

6. Press the **STOP** pushbutton to stop the power supply. When the power supply is stopped, the **RUN** LED will extinguish, but the **POWER** LED will remain lit.

SEQUENCE OF OPERATION

Local Control

Standard control of the *CoronaFlex™ System* is performed using the membrane switch mounted on station, unless your system has certain control options such as a remote control.

1. Lift the circuit breaker into the **ON** position and ensure the membrane switch illuminates. If any Fault LEDs are lit, correct the fault condition before proceeding.

NOTE:
If your line is not moving, the **INTERLOCK** LED will be lit until you start the line and it reaches a speed above the zero speed setpoint.

2. Ensure that your line is moving at your production speed, or at least above the system's zero speed setpoint.
3. Press the **START** pushbutton and the power supply should start and run at the output power level that was last set. The **RUN** LED will be lit green and the output meter will display the actual output power level.
4. Raise or lower the output power level as required to achieve the treat results you are expecting.
5. Once you are done with production, press the **STOP** pushbutton to stop the power supply.
6. When you have ceased production ensure you turn the circuit breaker to the **OFF** position. The membrane switch should extinguish.

NOTE:
If your system was supplied with a Remote Control, you will need to follow the **Local Control SEQUENCE OF OPERATION**, as the Remote Control replaces the membrane switch normally installed in the station.

Remote Start/Stop Control

The ability to utilize Remote Start/Stop control is available on all *CoronaFlex™ Systems*. You will need to connect two momentary, N.O., dry contacts across TB2 pins 2 & 3 on the I/O Board, using pin 1 as the common **(Figure 20)**.

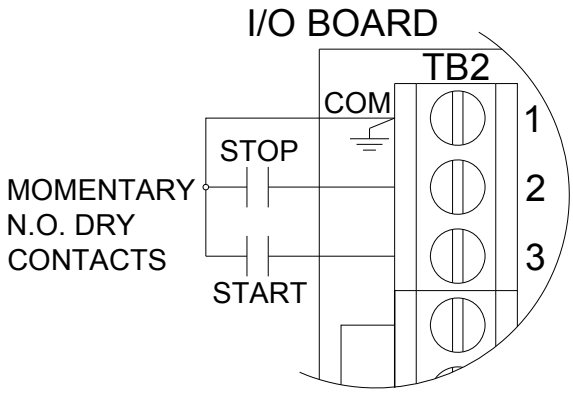


Figure 20

1. Once the contacts are wired into the system, lift the circuit breaker into the **ON** position, and ensure the membrane switch illuminates correctly and that there are no fault LEDs lit.
2. Close the momentary START contact across pins 1 & 3 on the I/O Board and the power supply should start and run.
3. Close the momentary contact across pins 1 & 2 on the I/O Board and the power supply should stop.

NOTE:
Both momentary contacts should only be held for 1 to 2 seconds maximum. If the STOP contact is

closed when the START contact is closed, the unit will not start or it will only run while the START contact is being held. In the same manner, if the START contact is closed when the STOP contact is closed, the power supply will not stop or it will only remain stopped while the STOP contact is held.

4. As with Local Control, the output power level can only be raised + and lowered − from the membrane switch assembly unless an output control option is included with your system.

LOSS OF TREATMENT INDICATOR

Your system provides two Loss of Treatment Indicator circuits (LTI 1 & LTI 2) that consist of a N.O. and a N.C. contact **(Figure 21)**.

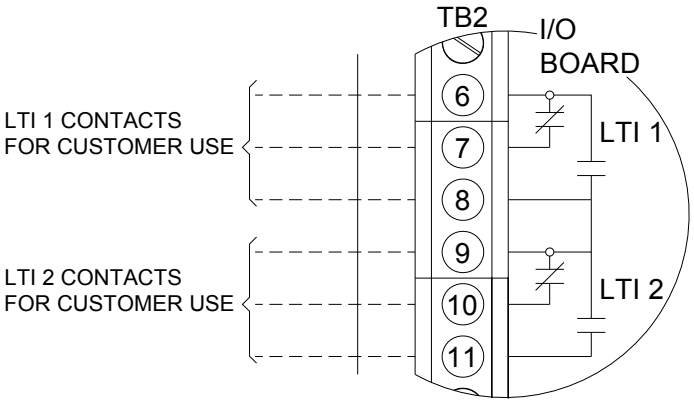


Figure 21

The contacts will allow you to drive an alarm circuit or monitor the Power Supply's output status. When the power supply is not running, or the output level falls below the level set by the control limit, the contacts will be in their de-energized state (Open / Closed). When the power supply is running and the output is at or above the level set by the control limit, the contacts will change to their energized state (Open to Closed / Closed to Open).

Typically the N.C. contacts will be used to drive an alarm light or audible alarm and the N.O. contacts can be used to drive an interlock or as an indication to a PLC or other monitoring system. The contacts are rated at 230 VAC 3 Amps.

SECTION 4 – OPTIONAL EQUIPMENT

GENERAL

⚠ Before installing or operating the optional equipment covered in the section, we recommend reading this section in its entirety to ensure you understand all the safety and operational requirements for using this equipment. Also, please refer to **SECTION 1 – INTRODUCTION**, **Pages 1** and **2**, to become familiar with ***all*** safety requirements and precautions.

The *CoronaFlex™ Corona Treating System* has several standard options that can be included with your corona treating system.

Standard Options Include:
Remote Control
High Voltage Switching
Skip Treat Control
Ozone Decomposer

REMOTE CONTROL

The Remote Display option provides the ability to control and monitor the system from a location convenient to the operator, refer to **Figures 14** & **15** on **Pages 14** & **15** for interconnection details. The operation of the system is identical to the operation called out under **Local Control** in **SECTION 3 – PRINCIPLES OF OPERATION** in this manual **(Figure 22)**.

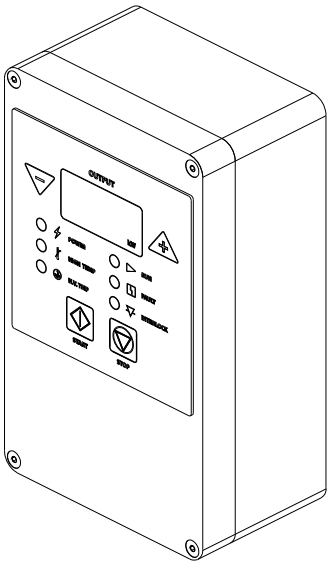


Figure 22

HIGH VOLTAGE SWITCHING

In certain applications you may be required to switch between treating the front side, back side, or both sides of your web. The High Voltage Switching option gives you this flexibility by allowing you to switch the high voltage side (Secondary) of your transformer.

⚠ CAUTION!

Many times on a two-sided treating system, the power supply is sized so that full power should only be used when treating both sides of the web.

When running "One Side", the power supply output should be adjusted to 50% of maximum output.

The High Voltage Switch is mounted in a standalone High Voltage Switching box that is typically mounted remotely from the treating equipment **(Figure 23)**.

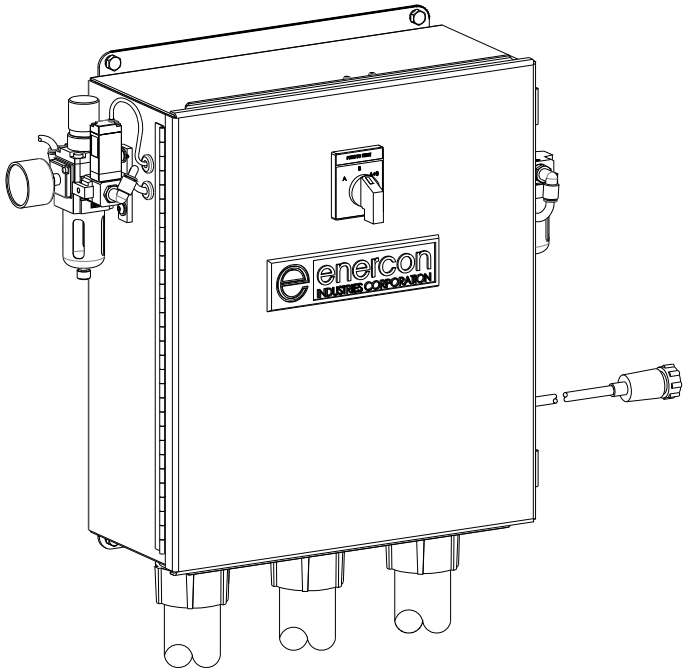


Figure 23

The installation information in this overview pertains to the High Voltage Switching Box, but the operational information will pertain to any variation of the High Voltage Switching option.

To reduce the length of the high voltage run, the box must be mounted as close to the stations and high voltage transformer as possible. The maximum distance will be dictated by the length of the flexible HV conduits.

Typically the Flexible HV Conduit will be pre-connected to the station and transformer, and the HV Switching ends will be left loose. Refer to **CONNECTING A SHORTENED FLEXIBLE HV CONDUIT** on **Pages 8** & **9**, if you need to shorten the conduit for proper installation.

Once the box is securely mounted, install the Flexible HV Conduits through the openings in the

bottom of the box and terminate them to the HV Contacts **(Figure 24)**.

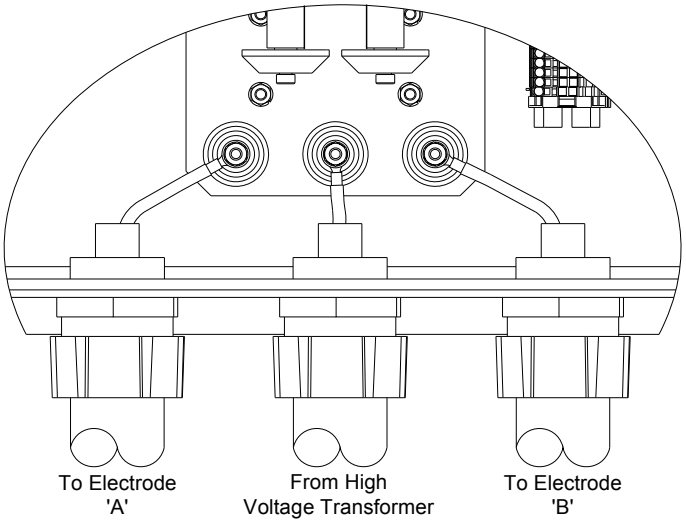


Figure 24

You will also need to run the Interlock Cable from the box to the power supply and plug the connector into the **INTERLOCKS** connector on the bottom of the power supply **(Refer to Figure 10)**.

You will also need to run the Interlock cables from each of the stations and plug them into the connectors on the box **(Figure 25)**.

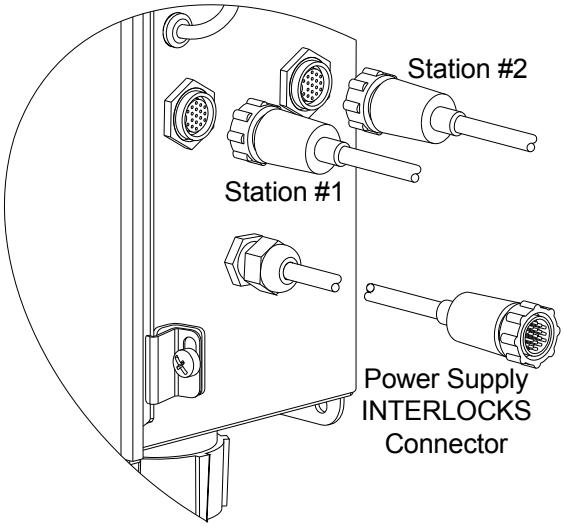


Figure 25

You will next need to run clean, dry, compressed air to the HV Switching Box. Refer to your system drawings for details on the compressed air requirements for your system.

3 Position Switch Operation

The 3 position selector switch allows you to select between position **A** for treating only the front side of your web, position **B** for treating only the back side, and position **A + B** for treating both sides of your web **(Figure 26)**.

When either position **A** or **B** are selected on the 3 position switch, feedback is provided to the power supply to activate the power reduction circuits. This is due to the fact that only the **A + B** position is rated to handle the full output power level of the power supply.

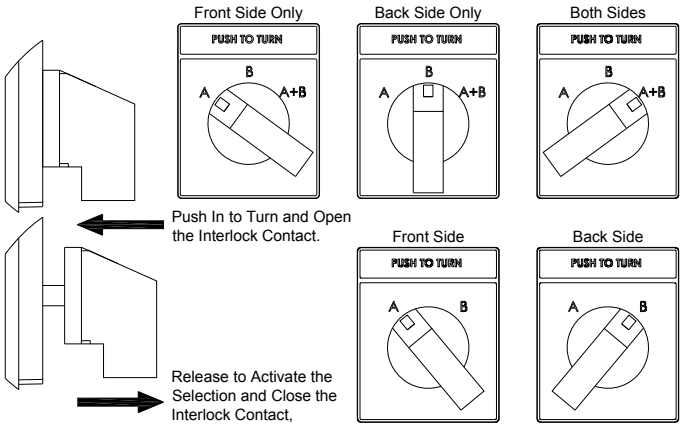


Figure 26

The Power Reduction circuits will reduce the maximum available output power level of the power supply to 50% of its full rating listed on the power supply rating plate **(Refer to Figure 1 – Pg 4)**. The power reduction circuit is factory set and should not require any field adjustments.

2 Position Switch Operation

The 2 position selector switch allows you to select between position **A** for treating only the front side of your web, and position **B** for treating only the back side of your web **(Figure 26)**.

In this configuration the power reduction circuit is not required as both positions **A** and **B** will allow you to achieve full output of the power supply. This is due to the power supply being sized to the maximum rating of the electrodes in each of the stations.

⚠ WARNING!

Do *not* attempt to change the selector switch position while the power supply is running.

Changing Switch Position

Before attempting to change the High Voltage Selector Switch position, ensure that the power supply is not running. Press the **STOP** pushbutton on the station mounted membrane switch, or remote membrane switch.

Once the power supply is not running, change the position of the selector switch by simply pressing the switch handle in, pneumatics drop out, and turning the handle to the desired position. Releasing the

switch will reactivate the pneumatics and the configuration of the HV Contacts will change to accommodate your new selection.

NOTE:
If power is not present at the High Voltage Switching Box when you change the selector switch position, the configuration of the HV Contacts will change once power is reapplied.

High Voltage Switching Interlocks

The High Voltage Switching Box includes 3 interlock circuits; an air pressure interlock, door interlock, and a selector switch interlock. These circuits will prevent the power supply from starting and they will stop the power supply if it is running when they are triggered.

Though the selector switch interlock will stop the power supply when the selector switch is pushed in, it is strongly recommended that you do ***not*** rely on the interlock to stop the power supply.

SKIP TREAT CONTROL

The Optional Skip Treat function allows control of the treater output in such a manner that treatment can be started and stopped along the length of the web resulting in material that is treated and untreated in specific intervals. If Skip Treat has been included with your system, refer to the Skip Treat manual, ML0027-001-XX, more detailed information on the installation, operation, and maintenance.

OZONE DECOMPOSER

The Ozone Decomposer is used to “scrub” the ozone from the exhaust air of your treater system. The exhaust/cooling air can then be safely released into the atmosphere. Refer to your Ozone Decomposer manual ML0035-001-XX for more detailed information on the more detailed information on the installation, operation, and maintenance of the Ozone Decomposer.

SPARE PARTS KITS

These kits contain various parts to facilitate quick repairs without the loss of valuable production time caused by random failure.

SECTION 5 - MAINTENANCE

GENERAL

⚠ Before performing maintenance on this equipment, please read this section completely. Also, please refer to **SECTION 1 – INTRODUCTION**, **Pages 1** and **2**, to become familiar with *all* safety requirements and precautions for this equipment.

The *CoronaFlex™ Corona Treating System* is designed to require minimal maintenance. However, to ensure long-range reliability, it is a good practice to have a planned maintenance program. This section will include recommended preventative and corrective maintenance procedures.

PREVENTATIVE MAINTENANCE

It is recommended that a Preventative Maintenance Program is established and followed to ensure proper system operation.

⚠ DANGER!

Before doing any work within the equipment, remove all electrical power to the power supply using your company's Lock Out / Tag Out procedures.

TEST SYSTEM INTERLOCKS

It is critical to the safe operation of your system to test and verify that all system interlocks are functional on a regular basis. Use the following information to test your system interlocks.

⚠ DANGER!

Do *not* attempt to bypass any of your system interlocks, as this will compromise safe operation of the equipment.

To test your system interlocks you will need to trip each interlock and verify that each interlock indicator changes to red from green. You will then need to verify that the power supply does not start.

Ensure that all of the other system interlocks are satisfied for the test to be valid. This includes all standard, optional and customer supplied interlocks.

Electrode:

Remove the input voltage from the system and pull the electrode module out of the station frame.

Reapply the input voltage to the system and verify on the membrane switch that the **INTERLOCK** LED is lit. Verify that the power supply does not start.

Once it is verified that the interlock works, remove the input voltage from the system and slide the electrode module back into the treat position.

Reapply the input voltage and verify that the **INTERLOCK** indicator is extinguished, and verify that the power supply starts.

Zero Speed:

With the input voltage applied to the system, ensure that the ground roll is not turning, or turning at a speed below the zero speed setpoint.

Verify on the membrane switch that the **INTERLOCK** LED is lit and that the power supply does not start.

Start your line and increase your line speed to the zero speed setpoint or higher. Verify that the **INTERLOCK** LED extinguishes, and that the power supply starts.

Exhaust:

With the input voltage applied to the system, ensure the exhaust blower is off.

Verify on the membrane switch that the **INTERLOCK** LED is lit and that the power supply does not start.

Turn on the exhaust blower and verify that the **INTERLOCK** LED extinguishes, and that the power supply starts.

Customer Interlock:

Since the testing of the customer interlock does not require manipulation of any CoronaFlex™ system components, you do not need to remove the input voltage from the power supply.

Depending on the equipment your external interlock(s) is attached to, you may need to remove the input voltage from that equipment to open its interlock contact.

When the contact is open, Verify on the membrane switch that the **INTERLOCK** LED is lit and that the power supply does not start.

Once it is verified that the interlock works, close your customer interlock, and verify that the **INTERLOCK** LED extinguishes and that the power supply starts.

Perform this test for each customer interlock you have connected to the system.

VISUAL INSPECTION

A weekly visual inspection is a good practice that will often identify issues before they affect the equipment. One should check for dust and corrosive buildup on the system and its hardware. Some equipment may be located in corrosive environments that make a daily inspection necessary.

POWER SUPPLY CABINET

Inspect the power supply cabinet for excessive dirt or dust buildup and signs of corrosion on the cabinet and hardware.

Compressed air can be used in most instances for removing contaminates that may have accumulated on, or in, the cabinet. If using compressed air is not an option, or fails to remove contaminates, then isopropyl alcohol and a lint free cloth should be used to clean the interior and exterior of the system instead.

NOTE:

The *CoronaFlex™ Power Supply* enclosure is rated Nema 1 (IP32), so it will not prevent moisture intrusion in a wash down environment. Do ***not*** expose the power supply to water wash down!

POWER SUPPLY HEAT SINK AND COOLING FAN

The 4 – 5kW power supplies utilizes a cooling fan and heat sink for cooling the internal power devices. Inspect the cooling fan and ensure it is clean and that the rotation is correct and up to speed. Inspect the heat sink to ensure that the fins are clear of any dirt, debris or blockages. Clean the heat sink as needed with compressed air and a soft bristled brush.

EXTERNAL CONNECTIONS

Inspect the cables and connectors attached to your system for damage or deterioration. Also inspect any cable runs to ensure they are free of damage, corrosion, or excessive dirt build up.

TREATER STATION INSPECTION

Due to the fact that the treater station pulls plant air through the electrodes for cooling and exhaust, it is possible that moisture, dirt and product debris may be pulled into the assembly.

Inspect the exterior of the treater station for signs of excessive dust or dirt buildup and corrosion on the station parts and hardware. Excessive corrosion on the station hardware can be an indication of an ozone leak.

⚠ WARNING!

Burn Hazard! Run the blower for 5 minutes after stopping the power supply before opening the Electrode Module.

ELECTRODE MODULE INPSECTION

The Electrode Module is easily removed for inspection and maintenance, but removal is not required for a general inspection.

Pull the electrode module out of the station frame until it stops. Look for dirt buildup or debris on the module surfaces and in the airflow opening between the electrodes.

For light dirt buildup you can use compressed air and isopropyl alcohol and a lint free cloth to clean the electrodes and components.

ELECTRODE MODULE REMOVAL

If the electrodes or module components show signs of excessive dirt buildup and debris, or if you see signs of overheating or carbon tracking it is recommended that you remove the electrode module for closer inspection, cleaning or repair.

Remove the electrode module by pulling the module out of the frame until it stops (**1**). Lift the left hand release up (**2**) and push the right hand release down (**3**) to release the module from the guide tracks.

Continue pulling the module out until it comes free of the guides (**4**) and can be lifted out of the station **(Figure 27)**.

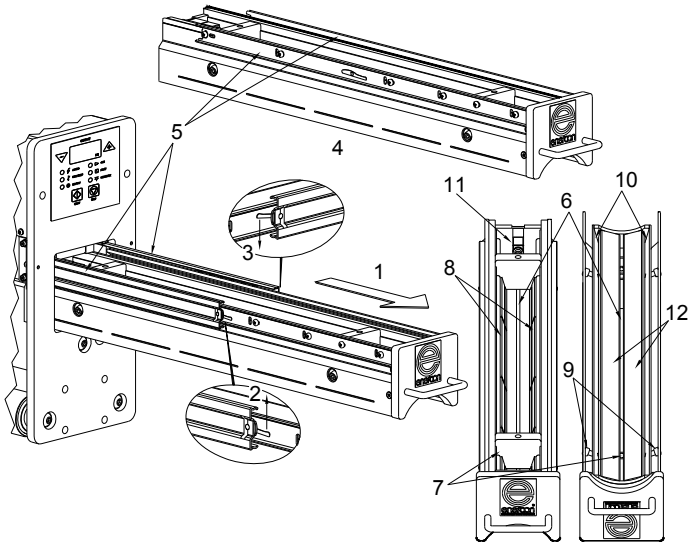


Figure 27

Ensure the module is properly supported when lifting it free of the guides.

Inspect the module for general cleanliness, carbon tracking and physical damage. Look for corrosion or damage on the module guides (**5**) if the module is difficult to remove or insert.

Ensure that the space between the electrodes (**6**) is clear of any blockages or excessive dirt buildup. This opening is the main path of the cooling / exhaust air and any reduction in air flow between, or around, the electrodes may result in overheating and failure of the electrodes.

Inspect both electrode mounting blocks (**7**), the electrode mounting tabs (**8**), mounting screws (**9**) and insulating shroud with P-strip (**10**) and ensure they are clean and show no signs of physical damage or carbon tracking. Inspect the electrode

high voltage wire connection and contact point (**11**) and ensure they are tight and show no signs of overheating or carbon tracking.

Inspect the faces of both electrodes (**12**) and ensure they are clean and show no signs of chips, cracks, or blackening from high voltage arcing.

For excessive buildup, carbon tracking, or physical damage it is recommended that you remove the electrodes from the module if needed.

If the electrodes have loose or damaged mounting tabs it is recommended you replace or re-install the tabs using the **ELECTRODE TAB REPLACEMENT** procedure.

If any of the high voltage wires are damaged, the type and amount of damage will determine if the wire can be cleaned, repaired, or if the wire or electrode must be replaced **(Figure 28)**.

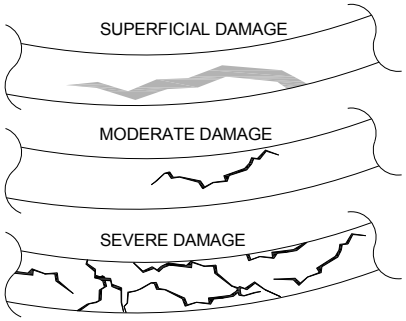


Figure 28

Superficial Damage
This should only require the cleaning of the HV wire, refer to **HV WIRE CLEANING**.

Moderate Damage
This will require either the repair or replacement of the HV wire, or replacement of the electrode if the repair fails, refer to **HV WIRE REPAIR**.

Severe Damage
This will require replacement of the HV wire or replacement of the electrode. To replace HV wires refer to **PR1024-01 High Voltage Wire Repair Procedure**. Contact Enercon Customer Service for a copy of **PR1024-01**.

WEEKLY CHECKS

GROUND ROLL INSPECTION/CLEANING

Visually inspect an aluminum ground roll for deposits of foreign matter, heavy scratching, or gouging of the roll surface. Visually inspect a covered ground roll for foreign materials, and deterioration of the dielectric covering. Clean or repair the ground roll in accordance with the instructions in this manual.

Storing (All rolls)

- Always cover the roll during storage and do ***not*** store in a harsh environment.
- Do ***not*** rest the roll face directly on the floor or storage rack.
- Support the roll on 2x4 (See **Figure 48** on **Page 35**).
- If roll must be stored on the floor without supports, check the area for nuts, bolts, stones, etc.

CLEANING OF ROLLS

Roll Handling (All Rolls)

- Always lift a roll by its journals if possible.
- Lift rolls without journals by the body of the roll using a clean, fabric sling strap to prevent damage to the roll face.
- Never use chains or wire rope when lifting by the body of the roll.
- Cover the roll face when handling to avoid damage and contaminants like oil and grease.

ALUMINUM ROLL

For general cleaning, use a mild soap and water with a clean cloth or sponge.

To remove oxidation a Scotch-Brite™ pad with a mild soap and water, or a very fine emery board can be used.

Severe oxidation may require turning down the roll face by a few thousandths.

Do ***not*** use any caustic solutions.

⚠ CAUTION!

The maximum allowable depth for turning down the face must not exceed 0.76 mm (0.030").

CERAMIC ROLL

For light dust and dirt, use a clean cloth or sponge with water and a mild soap, a solvent such as Hubbard Hall Safety Solvent™, or mineral spirits. Wipe the surface with isopropyl alcohol to evaporate any moisture.

For grease and oil use Simple Green™ liquid all-purpose cleaner with a clean cloth or sponge. It is water-based, contains no petroleum, and is non-flammable.

For tough stains, mix a liquid ceramic cleaner and powdered kitchen cleanser (like Comet™) into a paste and scrub with a Scotch-Brite™ pad (#7446, #7447 or equal). Then wipe the surface clean with isopropyl alcohol.

For tougher stains, a 3M diamond lapping film (45 micron) or 400 grit emery cloth with water or solvent can be used.

⚠ CAUTION!

This method will remove minimal amounts of ceramic base material as well.

Do ***not*** use strong acidic solutions such as HCL acid and sulfuric acid, any cleaning mechanism using metal or conductive material, or power tools of any kind.

RELEASE COATED PLASMA GROUND ROLLS
(Listed in the order of suggested use)
If using water-based materials such as water-based adhesives, latexes and starches, general cleaning should consist of cleaning with a warm water and soap solution with a clean sponge or rag or low-pressure spray (3,000 psi or less). If needed, use a Scotch Brite™ pad.

If using solvent-based adhesives and oil-based materials, general cleaning should consist of cleaning with mineral spirits, isopropyl alcohol, and trichloroethylene, with a clean sponge or rag. Clean the surface then rinse with clean water.

If needed, the surface may be doctored with a fiber of soft blade. Since this is a release coating, low pressure should be adequate.

If solvents must be used, minimize exposure of coating to solvent by applying with a clean sponge or rag. Do ***not*** soak rag in a bath solution. Rinse with clean water and allow the surface to dry. Solvents will be absorbed and swell the coating. This interaction with solvents will reduce release and make the coating more susceptible to damage.

Do ***not*** use caustics. A pH of 9 or greater may result in a peeling or blistering effect to the coating. If exposed, rinse thoroughly with clean water. Acceptable pH range is 4.5 to 8.5 plasticizers, such as DOP, will also have an adverse effect on the coating.

NOTE:
Wipe the roll surface with a clean cloth after cleaning to remove liquids, abrasives, or loose contaminants.

QUARTERLY CHECKS

INTERNAL INSPECTION
Inspect the interiors of the Power Supply and Station for loose, overheated, or damaged connections and components, as well as excessive corrosion on the hardware and components. Excessive corrosion on the system hardware can be an indication of an ozone leak.

STATION COMPONENTS / CONNECTIONS
The Station cover must be removed for inspection or troubleshooting **(Figure 29)**.

Remove the input voltage from the system and remove the 6 cover screws and washers (**1**), 3 on each side of the station frame. Lift the cover (**2**) taking care to slide the grommet (**3**) for the speed sensor cable out of the cover.

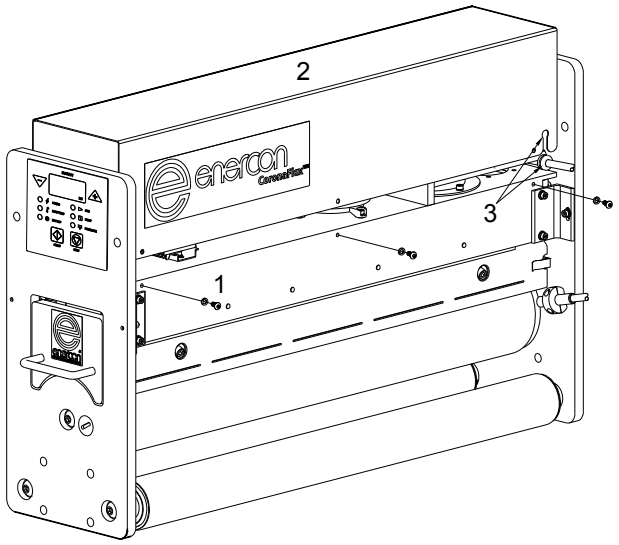


Figure 29

Inspect the internal components, for dust or dirt buildup or signs of overheating. Check the wiring for loose or overheated connections, loose connections may often be identified by discoloration of the wires, connections, or associated parts. Tighten any loose connections and replace any damaged wires or components. Do ***not*** over-torque connections.

GROUND BRUSH INSPECTION
The purpose of the ground brush is to provide a solid ground for the treater ground roll. If the roll is not properly grounded through the brush, grounding will occur through the bearings causing premature bearing failure and lower treatment levels.

Remove the ground brush assembly by unscrewing it from the station frame (**1**) using a standard screwdriver and inspect the ground brush (**2**) for wear and damage to the spring. Reinstall the ground brush assembly if the brush is longer than 6.35mm (¼") **(Figure 30)**.

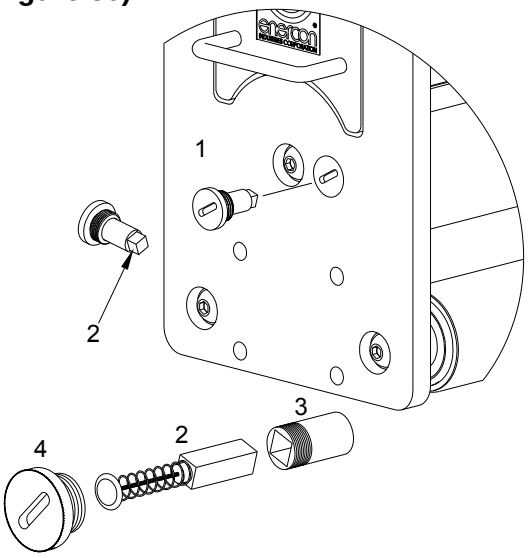


Figure 30

NOTE:
The ground brush assembly should not be disassembled unless the ground brush is being replaced.

If the length of the ground brush is shorter than 6.35mm (¼"), it will need to be replaced. Unscrew the holder (**3**) from the cap (**4**), and remove the old ground brush. Insert the new ground brush through the holder, and screw the holder back into the cap.

Reinstall the ground brush assembly into the station frame.

MAINTENANCE RECORD
A table is provided for the logging of maintenance for this equipment in **SECTION 8 - MISCELLANEOUS**. Regularly record the maintenance performed on this equipment in this table including any issues found and their resolution.

CORRECTIVE MAINTENANCE
The following information is provided as an aid in maintaining your corona treating station. The procedures and diagrams are intended to serve as a general reference. Refer to the drawings supplied with your station for added details.

AIR GAP
CHECKING THE AIR GAP
The station provided with CoronaFlex™ Corona Treating System was designed to have a fixed air gap between the electrodes and ground roll. If you are having issues such as physical damage to electrodes or inconsistent treatment across your web, you should check the air gap to ensure it has not changed. It is also a good idea to check the air gap if you have removed and reinstalled them for cleaning, or if you have installed a replacement electrode(s).

If needed, use the following to check the air gap.

You will need the curved Gap Gauge that was provided with your system, or a 1.5mm (0.060") gap gauge of your own design, to check and/or set the system air gap. Contact Enercon Customer Service or Parts Departments to obtain a replacement gap gauge.

You will only be able to access the lower, exposed, section of the ground roll. Place the gap gauge (**1**) on the lower, exposed, portion of the ground roll (**2**) and rotate the ground roll (**3**) so that the tool is positioned between the electrodes and ground roll (**4**) **(Figure 31)**.

NOTE:
If the tool will not fit between the electrodes and roll you will need to adjust the gap.

With the gapping tool positioned between the electrodes and ground roll, attempt to wiggle or lift the tool. There should be very little movement of the tool if the gap is set properly. Move and reinsert the tool along the entire length of the ground roll while wiggling the tool. You should be able to insert the tool along the entire length of the roll without difficulty. You should also not experience excessive movement of the tool when between the roll and electrodes.

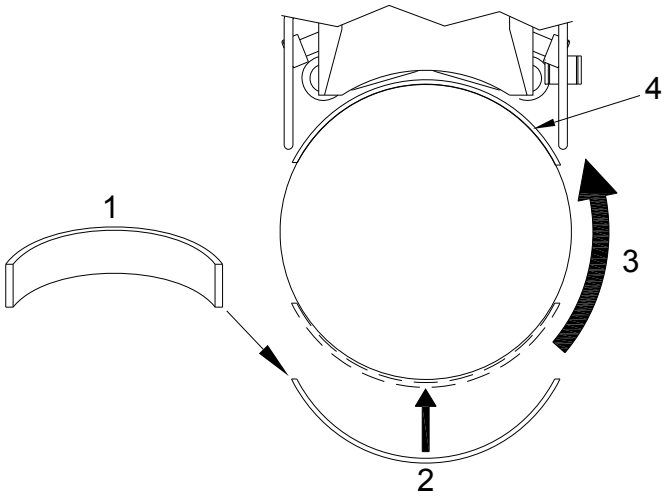


Figure 31

If the air gap check shows that the gap is not set properly, reset the gap.

SETTING THE AIR GAP
Loosen the locking bolts (**1**) in the electrode module support assembly's mounting brackets, 2 on each end of the electrode module support assembly **(Figure 32)**.

Once the locking bolts are loose, raise (**2**) the entire module support assembly to open the gap (**3**). Place 2 gap gauges on the lower, exposed, portion of the ground roll (**4**) and rotate the ground roll (**5**) so that the tool is positioned between the electrodes and ground roll (**6**).

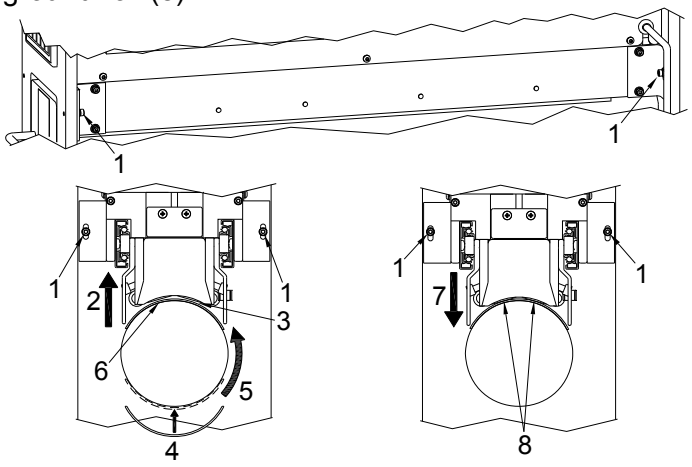


Figure 32

With the gap gauges in position, carefully lower (**7**) the assembly until the electrodes contact the gap gauges (**8**). Tighten the locking bolts on both ends of the assembly.

Remove the gap gauges by turning the ground roll in either direction. Double check the gap it movement is detected in the assembly when the gauges are removed.

Do ***not*** allow the Electrode Module to drop onto the gauges or roll face.

NOTE:
Using 2 gap gauges allows the gap to be set easier, but if only 1 gap gauge is available you will want to lower the assembly in small increments, switching between the front and rear of the assembly. You will need to double check the gap at each end before tightening the bolts.

ZERO SPEED SENSOR GAP

The Zero Speed Sensor utilizes an Hall Effect Sensor and Magnetic Wheel to detect the movement of the ground roll. The air gap between the sensor and magnetic wheel can be no larger than 1mm (0.04") maximum. If your system is experiencing difficulty in detecting ground roll movement, check the air gap between the sensor and wheel.

Using a 1mm (0.04") gap gauge, slide the gauge between the zero speed sensor, mounted to the station frame, and the magnetic wheel, mounted to the rear of the ground roll. If the gauge is loose within the gap then you should reset the gap. If the gauge does not fit within the gap, then the gap is probably set within tolerances. Ensure that the sensor and wheel are not making contact.

To set the gap you will need a 1mm (0.04"), or smaller, gap gauge. Loosen the two screws (**1**) securing the sensor within the mounting bracket to allow movement of the sensor within the bracket **(Figure 33)**.

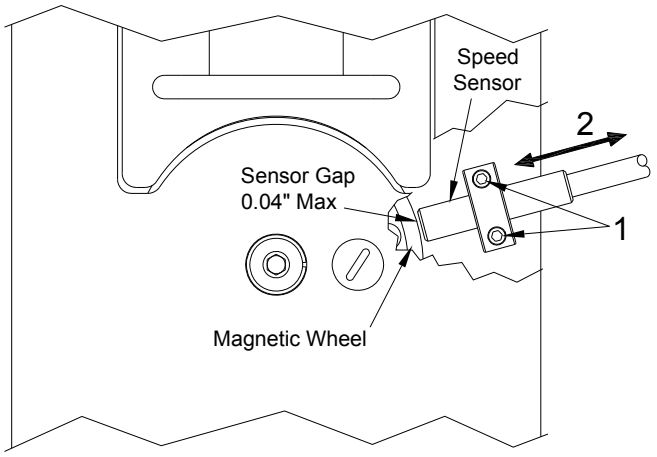


Figure 33

Place the gap gauge between the sensor and wheel. If needed, slide the sensor away from the wheel (**2**) to make room. Slide the sensor towards the wheel (**2**) until it makes contact with the gauge and then tighten the two screws.

Test the zero speed function and ensure that the sensor is now detecting ground roll movement.

ELECTRODE REMOVAL

If your electrodes require cleaning, you will first need to remove the module from the station, refer to **ELCTRODE MODULE REMOVAL** on **Page 26**. Once the module has been removed, move the module to a clean, dry surface before removing the electrodes.

To remove either of the electrodes first, disconnect the HV wires (**1**) from the HV contact block (**2**) **(Figure 34)**.

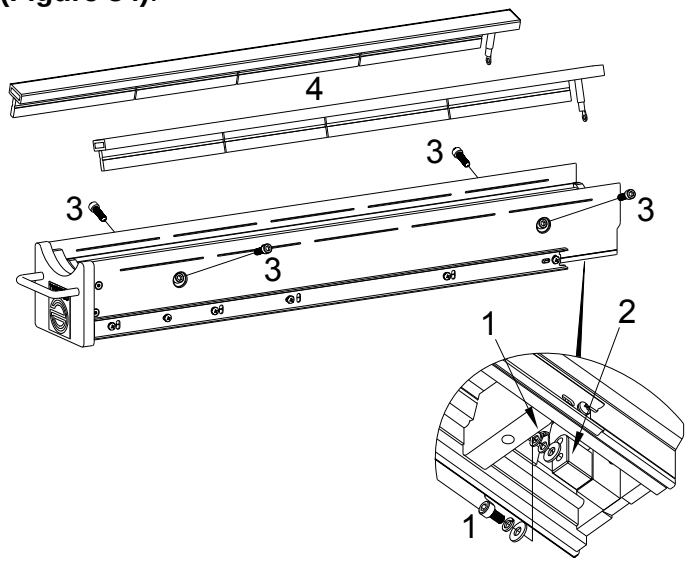


Figure 34

Next, remove the electrode mounting screws (**3**) and lift the electrodes out of the module (**4**).

Thoroughly inspect the electrodes for signs of physical damage, high voltage arcing, and damage to the HV wire and mounting tabs.

CLEANING THE ELECTRODES

If the electrodes require cleaning, first attempt to clean the surface using isopropyl alcohol and a Scotch-Brite™ pad. Wipe off any residue left on the surface with isopropyl alcohol and a lint free cloth.

For extremely dirty electrodes, it is use isopropyl alcohol or a mild detergent, such as Simple Green, and a Scotch-Brite™ pad to clean the electrodes. Wipe off any residue left on the surface with isopropyl alcohol and a lint free cloth.

For tougher stains, mix a liquid ceramic cleaner and powdered kitchen cleanser (like Comet™) into a

paste and scrub the electrode surface and tabs with the paste and a Scotch-Brite™ pad. Wipe off any residue left on the surface with isopropyl alcohol and a lint free cloth.

NOTE:
The cleaning process should remove all dirt buildup, but there may be some superficial staining left on the electrodes. This should not affect the performance of the electrodes.

HIGH VOLTAGE WIRE CLEANING

Clean the HV wire with isopropyl alcohol and a lint free cloth to remove any marks from dirt or carbon tracking. If the marks are difficult to remove, a mild abrasive should be used. Do ***not*** scrape the insulation from the wire! If the marks cannot be completely removed by cleaning, the HV wire will need to be repaired or replaced.

NOTE:
When High Voltage arcing occurs, there is often additional damage along the HV wires path from carbon tracking caused by HV arcing. Ensure all signs of carbon tracking are completely removed from any components and the station frame as they may allow the HV arcing to reoccur. Replace any components that cannot be cleaned, ***all blackening must be removed!***

ELECTRODE REPAIR PROCEDURES

HIGH VOLTAGE WIRE REPAIR

If the damage is moderate, it may be possible to repair the HV wire. The repair will require a utility knife, clear RTV silicone rubber (General Electric RTV 108, or equivalent), a heat gun, and 13mm (½") shrink tubing that will extend approximately 13mm (½") beyond each end of the repair.

Use the utility knife to carefully remove the damaged insulation, taking care not to cut into the wire. All blackened insulation must be removed from around the wire or failure of the wire may reoccur **(Figure 35)**.

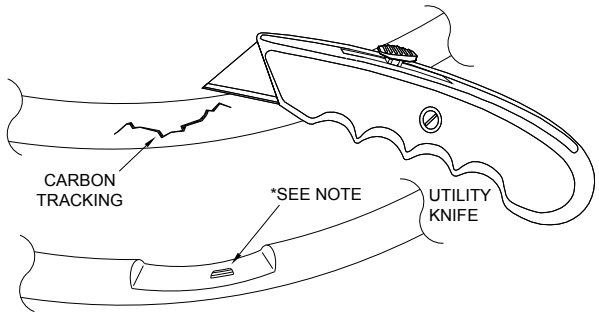


Figure 35

NOTE:
*Carbon tracking typically starts as a pinhole that extends through the insulation to the wire. Once the wire is exposed do ***not*** attempt to cut away the blacken wire, clean with an abrasive pad (Scotch Brite) or a stiff bristled nylon brush.

Once the damaged insulation and blackening are removed, fill the cut out with a clear RTV silicone rubber (General Electric RTV 108, or equivalent). Ensure the RTV fills the entire void to ensure good insulation of the wire **(Figure 36)**. Allow the RTV to cure 24hrs before the next step.

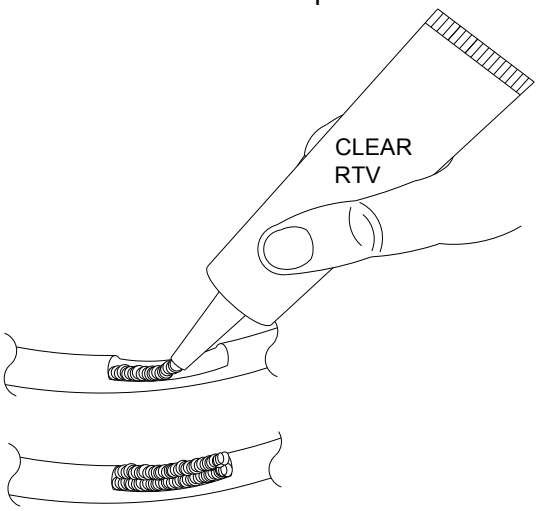


Figure 36

NOTE:
The use of RTV and Heat Shrink Tubing is required for all HV wire repairs. The RTV ***must cure for 24hrs*** and be dry to the touch before installing the shrink tubing or applying high voltage to the repaired HV Wire!

Place the heat shrink tubing over the HV wire so that it covers the RTV and extends about 13mm (½") on both sides of the cut out area. Use a heat gun to shrink the tubing on the HV wire and make sure the tubing affixes securely to the wire **(Figure 37)**.

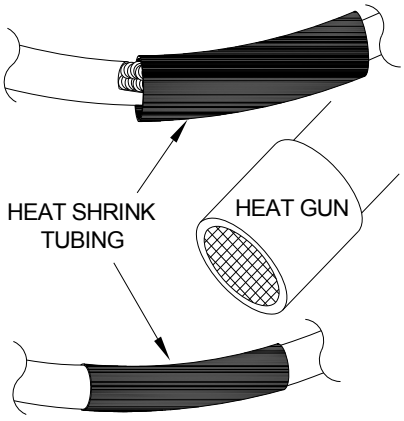


Figure 37

ELECTRODE TAB REPLACEMENT

Use the following procedure to remove and replace damaged electrode mounting tabs using Enercon's adhesive and primer kit, **LM3650-01**.

If the electrodes are still in the module, refer to **ELECTRODE REMOVAL** to remove the electrodes from the module. Take care not to damage the electrodes as you remove them from the module.

Mark the position of the damaged tab on the electrode (**1**) before removing it **(Figure 38)**.

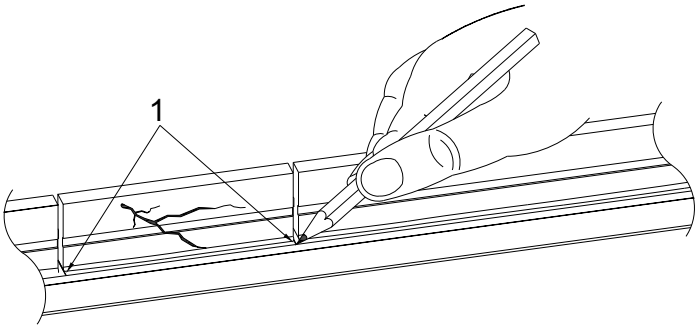


Figure 38

Do *not* use a black permanent marker, it may cause future damage due to the carbon content.

Remove the damaged tab by holding firmly to the electrode body (**2**) and tab (**3**). Pull, or rock (**4**) the tab to one side until it breaks free of the RTV, and lift the tab free of the electrode body (**5**) **(Figure 39)**.

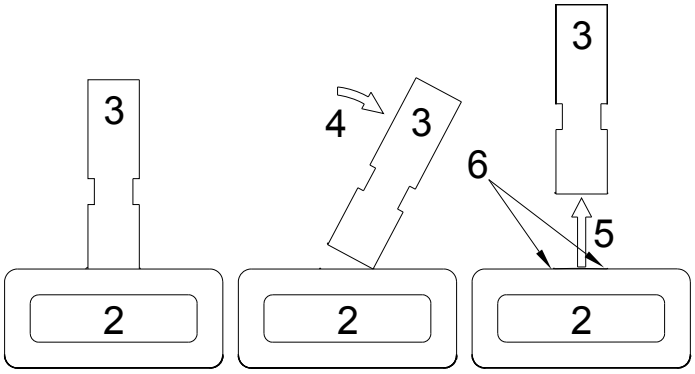


Figure 39

Clean the surface of the electrode. Use a razor knife to remove any residual RTV (**6**) and scrub the surface using isopropyl alcohol and a Scotch-Brite™ pad. After the surface has been scrubbed, wipe down the surface using isopropyl alcohol and a lint free cloth.

Coat the area marked on the electrode with the primer provided with the adhesive and primer kit. Then apply a thin coat of the primer to the contact edge (**7**) of the tab **(Figure 40)**. Allow the primer to dry for 30 minutes.

NOTE:
The groove is not centered on the tab. The short side of the tab is the contact edge and must be placed against the electrode body.

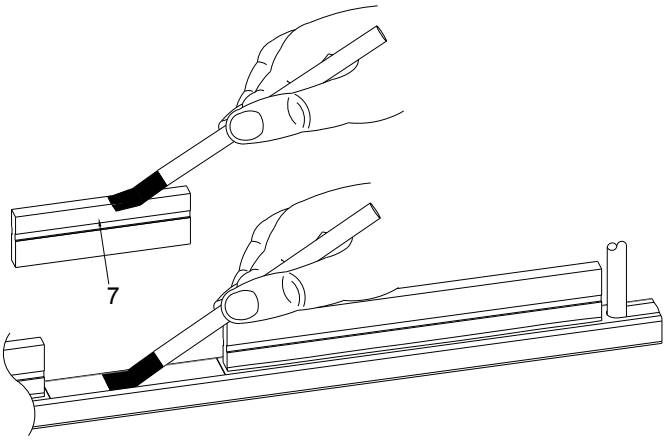


Figure 40

Run a bead of RTV (provided w/kit) along the contact edge of the tab and mount the new tab to the electrode, with the contact edge against the electrode body **(Figure 41)**.

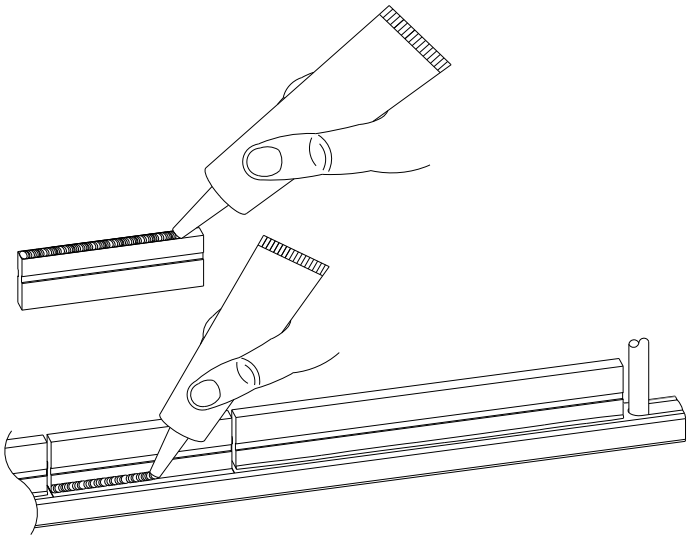


Figure 41

Align the tab with the other tabs and the marks you made previously. Seat the tab by firmly pressing down on the tab and ensure it remains aligned with the other tabs and your position marks. The tab must be centered on the electrode and mounted at a 90˚ angle to the electrode surface.

Run a bead of RTV along both sides of the tab and use your finger to press and smooth the RTV against the tab. Take care not to allow any movement of the tab while smoothing the RTV.

If replacing more than one tab, sight down the length of the electrode to ensure the tabs are in a straight line along the entire length of the electrode body.

NOTE:
Allow the RTV to cure for 24 hours before reinstalling the electrode into the assembly.

CERAMIC AND EPOXY COVERED ROLL PATCH PROCEDURE

The *CoronaFlex™ Corona Treating System* may employ a ceramic or epoxy covered roll face that, depending on usage and care, may develop pinholes that will affect the way the system operates. If pinholes do develop use the following steps to patch the holes.

This procedure is intended to allow you to temporarily repair pinholes in the ceramic or epoxy coating that is covering your Ground Roll. This procedure covers all Enercon supplied ceramic or epoxy covered rolls.

The procedure will not work if the roll covering is cracked, so you should first determine if the roll covering can be patched. If cracks are not obvious to the naked eye, a machinist dye can be used to determine if there are hidden cracks in the roll covering. If your ceramic or epoxy coating is cracked, contact Enercon Customer Service to order a replacement ceramic or epoxy coated roll.

Apply a small amount of dye to the affected area and then wipe the dye off of the roll surface. This will highlight any cracks that exist on the roll surface **(Figure 42)**.

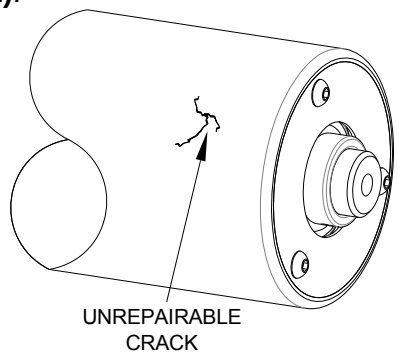


Figure 42

If cracks are found in the roll covering, do ***not*** attempt to patch the roll. Contact Enercon Customer Service to discuss recovering or replacing your ground roll.

If no cracks are visible, then proceed with this procedure using the following steps to patch your roll covering.

Clean the pinhole of any contaminates such as melted steel or aluminum from the roll substrate and carbon tracking **(Figure 43)**. This can be accomplished using a diamond tipped abrasive cone and rotary tool (like a Dremmel Tool) and should leave an .125mm (1/8”) to .19mm (3/16”) diameter hole for the patch.

Use compressed air to remove any loose material from the pinhole.

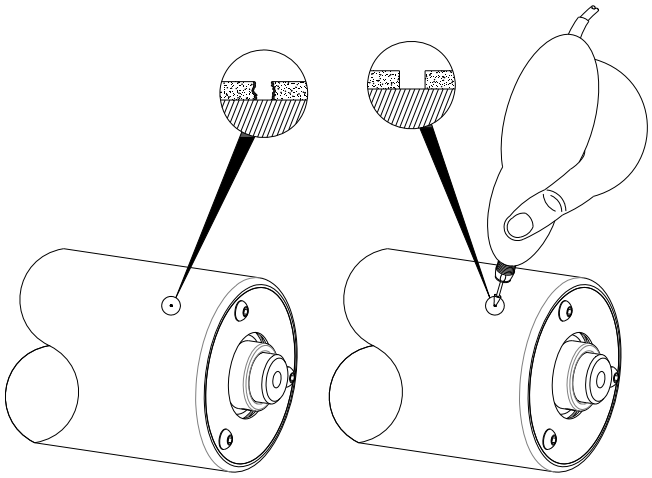


Figure 43

NOTE:

Apply the epoxy to clean surfaces only. See the epoxy manufacturer’s instructions for more details. If the pinhole is not completely cleaned out, the remaining materials will cause premature failure of the patch.

Thoroughly mix a small amount of equal lengths of an epoxy patch (**Enercon # CM0200**) on a clean, flat surface **(Figure 44)**.

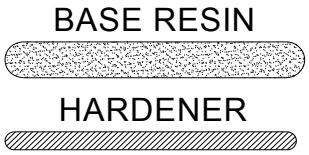


Figure 44

Fill the hole with the mixed epoxy leaving a little excess material (rounded top) to help ensure epoxy does not shrink below opening of hole when cured **(Figure 45)**.

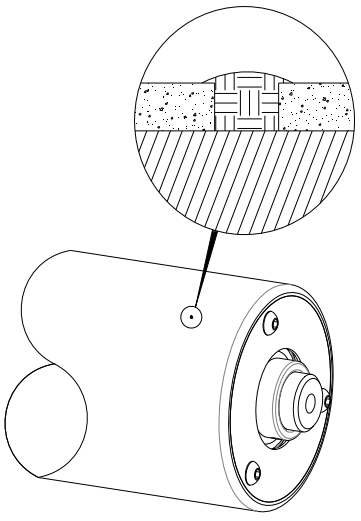


Figure 45

Wait from 2 hours, at 60° C (140° F), to 24 hours, at 25° C (77° F), to allow the epoxy to fully cure. Verify

the cures time with the times listed on the epoxy resins packaging.

⚠ WARNING!

Do *not* breath the dust produced by sanding the patch, as it is considered a carcinogen.

Use a breathing mask or respirator when sanding the patch.

Refer to the MSDS sheet provided for more information.

NOTE:
The reduced cure times can be achieved by applying heat to the patched surface. Heat can be applied by moving the flame of a torch continuously over the patched area.

Do *not* let the flame rest in one spot, or let the temperature of the patched area exceed 65° C (150° F).

Allow epoxy to completely cure!

Do ***not*** use a metal file or steel wool on the patch or roll covering.

Once the patch is completely cured, sand the patch smooth using sandpaper or emery cloth only. This will help prevent damage the roll covering. Smooth the patch to the contours of the roll **(Figure 46)**.

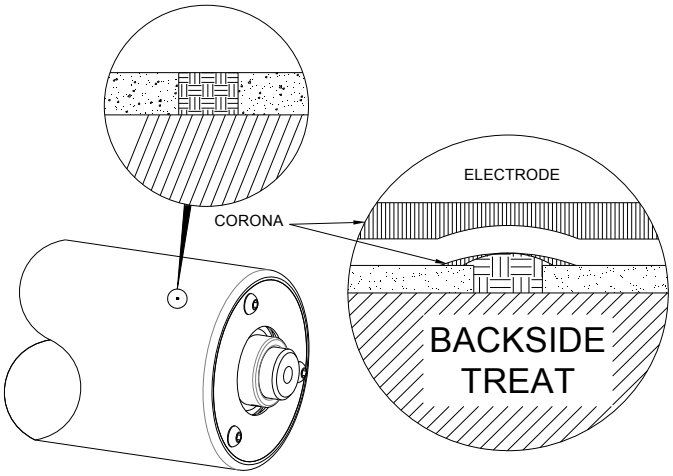


Figure 46

NOTE:
If the patch is not smoothed to the contours of the roll, backside treat may occur.

GROUND AND IDLER ROLL REMOVAL

IDLER ROLL REMOVAL

If your intention is only to remove the ground roll, you will still need to remove both idler rolls clear room for the ground roll.

Ensure the weight of the idler rolls (**1**) is properly supported. Due to the light weight of the idler rolls they can typically be supported by hand. Remove the 2 mounting bolts (**2**) that support each idler roll in the station frame **(Figure 47)**.

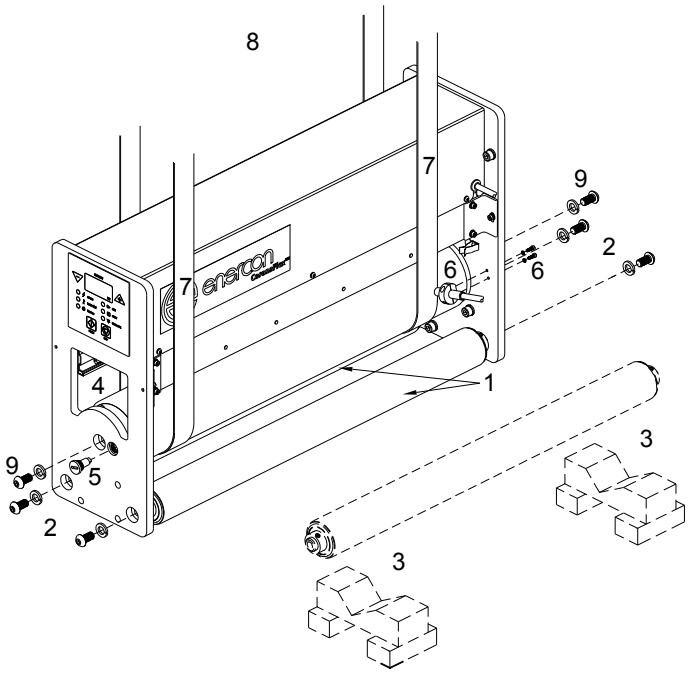


Figure 47

Once the idler roll is free of the frame, place the roll on wooden supports (**3**) to prevent the roll face from being damaged by contact with the ground or other work surfaces.

Repeat this procedure for the remaining idler roll if it is to be removed as. Clean or repair the idler roll(s) using the **Aluminum Roll** information on **Page 27**.

Replace the idler roll(s) as needed using the installation procedure that follows in this manual.

GROUND ROLL REMOVAL

The removal of the ground roll may cause damage to the idler rolls, electrodes, ground brush and speed sensor. It is recommended that you first remove the idler rolls (**1**), the electrode module (**4**), ground brush (**5**) and the Zero speed sensor and bracket (**6**).

Refer to **ELCTRODE MODULE REMOVAL** on **Page 26**.

To remove the ground roll you will need to remove *both* idler rolls.

NOTE:
The zero speed sensor and bracket will remain attached to the station by the sensor cable. Move the sensor and bracket out of the way and tape them to the frame to prevent damage to the sensor or ground roll during removal.

Before removing the mounting bolts, the weight of the ground roll will need to be properly supported using a sling strap (**7**) and chain fall (**8**) – Not Shown.

Do ***not*** use a metallic sling strap as this may damage to the roll face. With the ground roll properly supported, remove the 2 mounting bolts (**9**) that support the ground roll.

Carefully lower the ground roll out of the station frame and move to a safe location. Lower the roll onto wooden supports (**3**) to prevent the roll face from being damaged by contact with the ground or other work surfaces **(Figure 48)**.

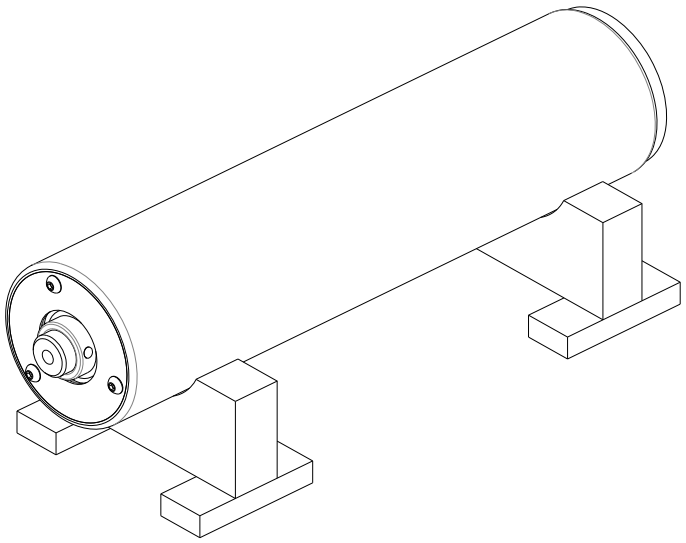


Figure 48

Clean and/or repair the ground roll using the appropriate procedure described in this section of the manual. Reinstall the ground roll using the installation procedure that follows.

GROUND AND IDLER ROLL INSTALLATION

GROUND ROLL INSTALLATION

Using a sling strap (**1**) and chain fall (**2**) – not shown, move the ground roll into position beneath the station frame, and carefully lift it into place within the frame **(Figure 49)**.

Align the bearing bolt holes with the holes in the station frame, and insert the 2 mounting bolts (**3**) to secure the roll to the frame. Verify that the roll turns easily by hand, with no hesitation or wobble. Do ***not*** over tighten the mounting bolts.

Once the ground roll is installed properly, reinstall the ground brush (**4**) and the zero speed sensor (**6**). These components do not need to be reinstalled in any particular order, but ensure that the items are installed properly and that the all hardware is tight.

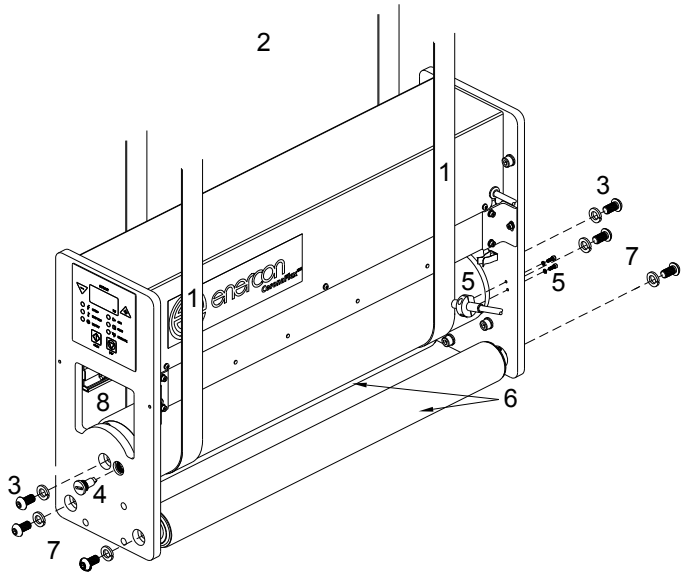


Figure 49

When the zero speed sensor has been remounted, refer to **ZERO SPEED SENSOR GAP** on **Page 33**, to check the gap between the speed sensor and the magnetic wheel. Adjust the gap as needed for proper operation of the zero speed interlock circuit.

IDLER ROLL INSTALLATION

Carefully lift the idler roll(s) into position within the station frame (**6**), aligning the bearing bolts holes with the holes in the station frame. Insert the mounting bolts (**7**) to secure the roll(s) to the frame. Verify that the roll(s) turns easily by hand, with no hesitation or wobble. Do ***not*** over tighten the mounting bolts. Once the rolls are installed, install the electrode module (**8**).

STORING ROLLS

- Always cover the roll during storage and do ***not*** store in a harsh environment.
- Do ***not*** store with the roll face directly on the floor or storage rack, support the roll by its journals on wooden supports.
- Check the area around the roll for nuts, bolts, stones, or any item that may damage the roll surface.

SECTION 6 – TROUBLESHOOTING

GENERAL

⚠ Before performing troubleshooting on this equipment, please read this section completely. Also, please refer to **SECTION 1 – INTRODUCTION**, **Pages 1** and **2**, to become familiar with ***all*** safety requirements and precautions for this equipment.

It is a natural tendency to adjust internal settings when electronic equipment is not functioning properly **– AVOID THIS TEMPTATION**! The Enercon *CoronaFlex™ Power Supply* is specifically designed to eliminate the need of making any internal adjustments. The control circuitry provided automatically compensates for a change in external conditions.

The following steps are provided to aid in the troubleshooting of your equipment. If these steps do not resolve your problem, please contact the Customer Service for assistance.

THE LOCAL OR REMOTE MEMBRANE SWITCH IS BLANK

Symptoms:

The Local, or optional Remote, Membrane Switch is blank.

Possible Causes:

The fault could be caused by the Circuit Breaker being off or failed, no Input Voltage available at the breaker, a defective membrane switch assembly, a bad ribbon cable or connection. In the case of a Remote Membrane Switch, all of the issues listed above apply with the addition of the interconnect cable and its connection at the power supply and Remote Control Box.

Solutions:

- Ensure the circuit breaker is in the ON position.
  a) Turn breaker ON if needed.
- If the power supply breaker is on, check the feed voltage fused disconnect to ensure the disconnect switch is on and that the fuses are all good.
  a) Turn the disconnect switch ON
  b) Replace any failed fuses as needed.
- Check the input voltage source to ensure that voltage is available to the power supply.
- Check the cable connections at the membrane switch in the station and the cable and ribbon cable at the I/O Board and Control Board in the power supply, ensuring they are connected and seated properly.
  a) Reconnect/Replace the cable at the station or power supply.
  b) Reseat/Replace the ribbon cable in the power supply.
- Verify the colored stripe on the power supply ribbon cable is connected to Pin 1 on both the control board and I/O board.
  a) Reverse the ribbon cable if needed.
- For a Remote Control Membrane Switch, check the connector on the bottom of the power supply, the condition of the cable, the wiring at the terminal on the Remote Membrane Switch and whether the terminal is properly seated. Correct the issues found as needed.
- Check that the +5 VDC supply is present at the control board. Use a DC Voltmeter for the voltage checks at the control board. Connect the positive lead to TB2 Pin 1, and connect the common lead to ground TB2 Pin 24.
  a) If the +5 VDC is present at the terminal on the control board, replace the membrane and/or ribbon cable.
  b) If the +5 VDC is not present, check to verify the 120 VAC/240 VAC is present at E1 and E2 on the control board.
     i) If the 120 VAC/240 VAC is present, replace the control board.
     ii) If the 120 VAC/240 VAC is not present at E1 and E2, check for the voltage at the control transformer and the load side of the Circuit Breaker.
- If none of the above steps resolve the issue, contact Customer Service for assistance.

INTERLOCK – 

Symptoms:

The **INTERLOCK** LED is lit on the Membrane Switch and the power supply will not start.

Possible Causes:

This fault could be caused by an open interlock at your station, an incorrectly connected or damaged Interlock cable, failed or damaged I/O Board, missing 24VDC, or a failed or damaged interlock component.

Solutions:

Perform the following checks and refer to **TEST SYSTEM INTERLOCKS** in the **MAINTENANCE SECTION** as well as the information in the **OPTIONS SECTION** when troubleshooting an interlock fault.

- Check the Interlock cable connections at the power supply and station, and check the cable run for damage.
  i) Reconnect the cable at the power supply.
  ii) Reconnect or repair any wiring issues at the station; refer to your system drawings for station wiring details.

- **Electrode** – Check your electrode module and ensure it is fully inserted into the station. and that the electrode position interlock switch's roller is properly seated in the V-notch on the electrode assembly locking ring.
  a) Refer to your treater station manual for details on electrode interlock issues.

- **Zero Speed** – Check that your system ground roll is turning at minimum speed or greater.
  a) Check that your Zero/Prop Speed sensor or Encoder is installed and wired properly, and free of damage.
     i) Correct installation.
     ii) Rewire as needed.
     iii) Replace the sensor as needed.
  b) Ensure that your Zero/Prop Speed sensor is gapped properly.
     i) Reset the sensor gap to 0.25mm (0.010") maximum, ensure the sensor does not contact the bolt heads or gear teeth.
  c) Refer to your treater station manual for more details on speed interlock issues.

- **Exhaust** – Check that your system's blower(s) is running and that blower rotation is correct and at the proper speed. Check that the Airflow Sensor has power and is positioned correctly in the exhaust air stream.
  a) Apply input voltage to your blower. Check the feed voltage and any motor starter circuits and components if it does not turn on.
  b) Reverse two phases of the input voltage to the blower if it is rotating the wrong direction.
  c) Contact the blower manufacturer if the blower is not rotating at the proper speed.

- **Optional Equipment Interlocks** – Refer to the Connection Diagram supplied with your system drawings to determine if any of your system options include an interlock contact.
  a) Ensure that the option interlocks are wired in series with your other system interlocks.
  b) Refer to your system drawings and any manuals provided with your options for more details on these interlocks issues.

- **Customer Interlocks** – Your system's design allows for the inclusion of custom interlocks.
  a) Refer to any drawings your company has created to determine if you have wired an interlock contact into the power supplies interlock circuit.
  b) Ensure that the interlock contact is wired in series with the power supply's interlock circuit.
  b) Ensure that the interlock condition is met and that the interlock contact is closing.

- If none of the above steps resolve the issue, contact Customer Service for assistance.

FLASHING H.V. TRIP – 

Due to the nature of a Corona Treating System, high voltage arcing to ground can be a very common problem. The High Voltage being fed to the electrodes is, essentially, looking for the easiest path to ground. When conditions affecting the High Voltage path present an easier path to ground the High Voltage will arc to that ground point instead of the system's ground roll.

Symptoms:
The most common symptom you will see with a high voltage arc is the **H.V. TRIP** LED on the membrane switch flashing on and off when the power supply is started or running. Typically the LED will continue to flash until the STOP button is pressed. This is often accompanied by a bright flash at the station.

The following procedures cover the most commonly seen causes for High Voltage Trips in Enercon's Corona Treating Systems. Refer to **Figure 50** for all of the H.V. Trip troubleshooting covered in this manual.

Possible Causes:
The most likely cause for a H.V. TRIP is a high voltage arc at the station. This is often due to a dielectric failure on ceramic electrodes, arcing to ground from the High Voltage Wires, or dirt and moisture buildup within the electrode assembly(s) on your station. It is also possible that the arcing can be occurring within your HV Transformer, especially with Remote Mounted transformers.

Before you begin troubleshooting, perform an inspection to ensure that the H.V. Wires are isolated by a minimum spacing of 1 inch from all other wiring and grounded surfaces along any H.V. Wire run. Also ensure that the local or remote mounted H.V. Transformers are properly grounded at the same potential as the station frame.

NOTE:
If you disconnect an electrode from the load the output power must be ***reduced*** by the percentage of

the load that the single electrode represents, i.e. 1 of 2 = a 50% power reduction, or 1 of 4 = a 25% power reduction. This ensures that running the system will not overpower and fail the remaining electrodes in the assembly. If possible, do ***not*** physically remove the failed electrode from the assembly until a replacement electrode can be installed, but ensure that the electrode's H.V. wire is isolated from the high voltage path. Removing the electrode will change the cooling and exhaust air patterns through the assembly and may cause the remaining electrode to fail due to overheating.

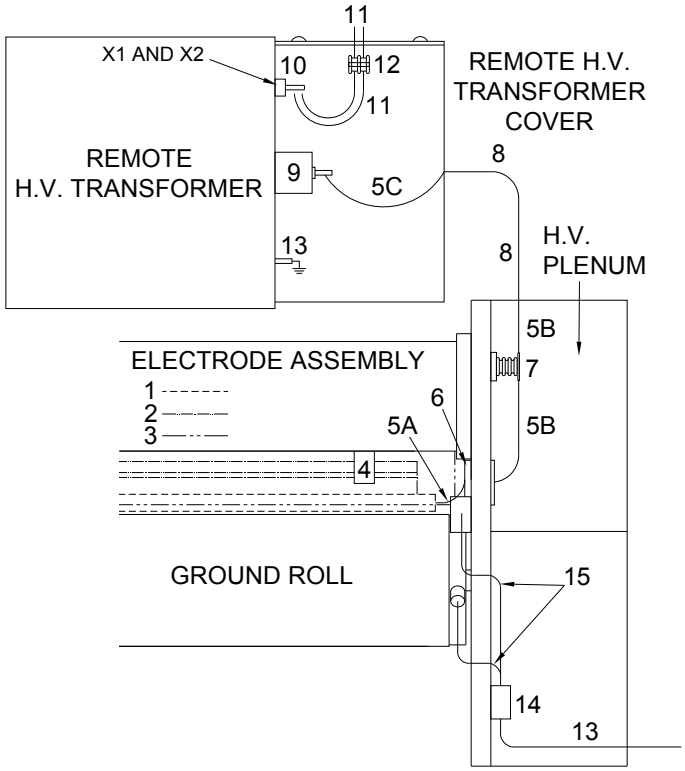


Figure 50

Solutions:

- **Moisture** – If the **H.V. TRIP** LED only occurs when the power supply is initially started each day and the cycling soon stops, the trip is likely being caused by moisture buildup from the station sitting overnight.
  a) Wet Start Cycle – When starting the power supply for the first time each day, reduce the output power level to minimum before starting.
     i) If the H.V. Trip does not occur, run the power supply at minimum output for several minutes before raising the output power to your production level.
     ii) If the H.V. Trip <u>*does not*</u> reoccur when you raise the output, then you will need to perform the Wet Start Cycle each day to prevent more extensive damage to the electrode assembly(s) form continues arcing.
     iii) If the H.V. Trip does reoccur then you will need to continue with the rest of the troubleshooting covered here.

- **ELECTRODE FAILURE** – The electrode (**1**) functions as the dielectric in the Treater Station and they share the output of the H.V. Transformer under normal operations. If an electrode is pinholed or broken the H.V. output of the transformer will arc through that point to the ground roll, and surrounding components, causing the trip LED to come on. This trip is often accompanied by a very bright flash each time the system attempts to start.

  If the flash cannot be seen you will need to disconnect the electrodes one at a time to determine which of the electrodes is failed. Removing the H.V. Wire (**5A**) at the H.V. contact assembly (**6**) will isolate that electrode from the high voltage path, and the system should run if this is the electrode that failed. Repeat this for all your system's electrodes until the failure is found, or all electrodes are proven to be good. A failed electrode will need to be replaced since a broken or pinholed electrode cannot be repaired.

- **CARBON TRACKING** – Carbon tracking can be caused by dirt build up, damage to electrode assembly components, excessive moisture, or a combination of these items. This problem can occur at the Electrode Mounting Tabs (**2**), Insulating Shroud (**3**), Electrode Mounting Block (**4**), and the H.V. wires (**5A**) run within the assembly, plenum (**5B**), HV Transformer cover (**5C**), or the Flexile HV Conduit (**8**). Carbon tracking will typically be accompanied by a very bright flash each time the system attempts to start. The flash is often very easily seen when it occurs in the Electrode Assembly, but since the H.V. Plenum and Remote H.V. Transformer must be closed under normal operation, you will need to remove the access covers to see if the flash exists in these areas. When inspecting the system for carbon tracking you will be looking for blackening, which often resembles a lightning bolt pattern, in the area of the flash.

- **REMOTE MOUNTED H.V. TRANSFORMER CARBON TRACKING** – In addition to the H.V. Wire (**5C**) run, carbon tracking can also occur inside of the cover along and around the H.V. Bushing (**9**), Low Voltage Bushings (**10**), Low Voltage Wiring (**11**) & Terminal Block (**12**), and

the transformer ground stud (**13**). In most cases, with the exception of the H.V. Bushing, this will occur when the H.V. Wire has been run too close to any of these points. As previously described, the access cover on the transformer will need to be removed to see if the flash is occurring in this area.

- **GENERAL HIGH VOLTAGE ARCING** – The H.V. Wire can also arc to the control wiring (**13**), control terminal block (**14**), and sensor wiring (**15**) in the station if there is too much slack in the wires or cables allowing less than the minimum 1 inch of clearance. These items will need to be cleaned or replaced as the situation dictates.

  Cleaning is the best way to remedy carbon tracking and you will need to ensure that all black is removed from the electrode assembly components. Refer to the appropriate Cleaning and/or Repair procedures in **SECTION 4 – MAINTENANCE** to take care of the carbon tracking you find in the assembly.

SOLID H.V. TRIP – 

Symptoms:
The **H.V. Trip** LED comes on and stays lit when the unit is started or running, and does not extinguish until the stop button is pressed.

Due to the nature of a Corona Treating System, high voltage arcing to ground can be a very common problem. The High Voltage being fed to the electrodes is, essentially, looking for the easiest path to ground. When conditions affecting the High Voltage path present an easier path to ground the High Voltage will arc to that ground point instead of the system's ground roll.

Possible Causes:
The most likely cause for a solid H.V. TRIP is either a hard short to ground, an issue with the system low voltage wiring or a failed high voltage transformer.

Solutions:
- **HARD SHORT TO GROUND** – This is typically associated with an Electrode (**1**) or H.V. Wire (5**A, 5B, 5C**) touching a grounded surface or component directly. You will need to inspect the electrode assembly, station plenum, and remote H.V. transformer for damage. If nothing is obvious upon inspection you should begin by disconnecting the H.V. Wires. Start by disconnecting the electrodes one at a time and working your way back to the H.V. Bushing (**9**) of the Transformer to determine where the problem exists. If damage is found, repair it if possible, but otherwise you will need to replace the damaged items found.

- **FAILED H.V. TRANSFORMER** – When you are troubleshooting the hard short to ground, if the **H.V. TRIP** LED still comes on and stays on with all of the H.V. Wires disconnected at the H.V. Transformer's H.V. Bushing, it is possible that the H.V. Transformer is failed. Disconnect the Low Voltage Wires (**11**) from the low voltage bushings (**10**) of the H.V. Transformer and see if the trip goes away. If the **H.V. TRIP** does not come on, then you will need to replace the H.V. Transformer.

- **LOW VOLTAGE WIRING PROBLEM** – If the **H.V. TRIP** LED does not go out when the low voltage wires are disconnected at the H.V. Transformer, continue working back from the Transformer by disconnecting the Low Voltage Wring (**11**) at the Terminal Block (**12**) and then back at the terminal block in the power supply.
  a) Replace/repair the wiring if the **H.V. TRIP** LED goes out when wiring is disconnected.
  b) If the **H.V. TRIP** LED still does not go out, even when the wiring is disconnected at the power supply, contact customer service.

HIGH TEMP – 

Symptoms:
The **HIGH TEMP** LED is lit on the Membrane Switch and the power supply will not start.

Possible Causes:
This fault could be caused by the Inverter temperature exceeding 90º C, Temperature Sensor wiring damage, a failed Temperature Sensor, an open Inverter Capacitor, or a failed control board.

Solutions:
- Check the temperature at the inverter heat sink to determine if the inverter temperature is exceeding 90º C.
  a) If the temperature is exceeding 90º C:
     i) Ensure the ambient temperature is not above 40º C (104º F), and that there is sufficient space around power supply for proper cooling. Correct as needed.
     ii) Ensure that the heat sink fins are clean and that the cooling fans are clean, turning at the proper speed, and not obstructed. Correct as needed.
     iii) Ensure the inverter mounting hardware is tight and that there is not excessive thermal compound being used. Correct as needed.
  b) If the temperature is ***not*** exceeding 90º C:

i) Inspect the temperature sensor wiring between the sensor and the control board to ensure there is no damage to the wires or disconnected wiring at the sensor or control board. Correct as needed.
ii) Replace the Temperature Sensor.
iii) Replace the Control Board.

c) Check the Inverter Capacitors to see if either of the capacitors is open.
i) Remove the inductor, bus bar and bleeder resistors and using a capacitance checker, measure across the terminals on each capacitor. You should read 100µf if the capacitor is good.
ii) Replace the failed capacitor(s).

❖ If none of the above steps resolve the issue, contact Customer Service for assistance.

FAULT – 

Symptoms:
The **FAULT** LED is lit on the Membrane Switch and the power supply cannot be started.

Possible Causes:
There are protective circuits in the inverter firing circuit to indicate a fault if the inverter device fails or the firing circuit on the control board fails.

Solutions

❖ The fault may be a result of an Inverter failure. Perform the Inverter Ohm Check Procedure on **Page 32**.
a) If an Inverter fails the ohm check, replace the Inverter and the gate leads.
b) If the Inverter passes the ohm check, proceed to the next troubleshooting step.

❖ Check the gate lead connections between the main control board and the inverter device. Verify the wiring is correct in accordance with your system's power supply wiring diagram.

❖ Replace the control board.

❖ If none of the above steps resolve the issue, contact Customer Service for assistance.

⚠ CAUTION!

When a defective Inverter device is replaced, ensure the associated gate leads are replaced at the same time. If not, the lead may result in additional device failures.

UNABLE TO CONTROL THE POWER LEVEL
Symptoms:
The power supply is running, but the output power level does not change when the Up / Down pushbuttons are pressed. In some cases D2 on the control board may be lit.

Possible Causes:
The fault could be attributed to a loose or damaged ribbon cable, a failed membrane switch, a failed control board, or the system being in a voltage or current limit.

Solutions:

❖ Check the ribbon cable connections on the main control board.
a) Ensure the 13 pin ribbon cable is seated properly at the membrane switch and control board. Correct as needed.
b) Ensure the blue striped on the ribbon cable is connected to Pin 1 of the main control board connector and that it is connected to the pin closest to the outside edge of the membrane switch. Correct as needed.
c) If the membrane is remotely mounted, ensure the wires are connected properly to the terminal block on the membrane switch and that all the connections are tight. Correct as needed.

❖ Using a DC Voltmeter, check the reference voltage at TB2 on the I/O Board. Connect the meter across TB2 pins 2 (-) and 12 (+) for the Up Arrow and TB2 pins 2 (-) and 13 (+) for the Down Arrow.
a) Press the appropriate pushbutton and verify that the voltage switches from 5v to 0v.
i) If the voltage does switch then the membrane switch and ribbon cable are good.
ii) If the voltage does not switch from 5v to 0v for either of the pushbuttons, replace the membrane switch and / or ribbon cable.

❖ Using a DC Voltmeter, check the command voltage at TB2 on the I/O Board. Connect the meter across TB2 pins 24 (-) and 21 (+).
a) Press the Up and Down Arrow pushbuttons and verify that the command voltage increases and decreases when they are pressed. If the control voltage does not change, replace the Control Board.
b) If the control voltage does change, press and hold the Up and Down Arrows and verify that the command voltage is adjustable over its full 0v-5v range. If the voltage in not adjustable over the full 5v range, replace the Control Board.
c) Take note of the output power level while pressing the down arrow to see if you gain

control of the output power level as the command voltage drops.

i) If you do not gain control of the output power level, replace the control board.
ii) If the output power level begins to drop as the command voltage is lowered, your system is possibly in a Frequency, Voltage, or Current Limit.
iii) Contact Customer Service for assistance.

- ❖ If none of the above steps resolve the issue, contact Customer Service for assistance.

OUTPUT POWER LEVEL IS LOW

Symptoms:

The output power level of the power supply cannot be adjusted up to the full rated output of the power supply (Refer to the Rating Plate on the power supply, **Figure 1 – Page 4**).

Possible Causes:

This issue can be caused by the power supply being limited at the factory due to load conditions, a low input voltage to the power supply, or the power supply being in a Frequency, Voltage, or Current limit due to problems at the load.

Solutions

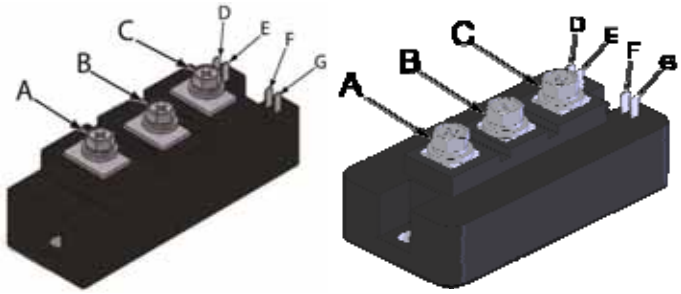
- ❖ Verify the input voltage is at ± 10% of the rated input on the power supply rating plate located inside the power supply door. Corrected as needed.
- ❖ If you are not sure if your system load required limiting of the power supply's maximum output power level, contact customer service with the system serial number for verification.
- ❖ With the power supply running at the maximum achievable output power level, verify whether D2 on the Control Board is lit.
  a) If D2 is lit, this is an indication that your power supply may be in an upper limit, press and hold the Down arrow pushbutton to lower the output power level to see if D2 goes out.
     i) If D2 does not go out, replace the control board.
     ii) If D2 does go out, check the treater station to verify the load is correct.
        - Ensure the electrode bar area is sufficient for the power supply. On bare roll stations, the standard ceramic electrode is capable of 60 watts per inch for the pair of electrodes in the assembly.
        - For covered roll stations, the electrode area is determined by the roll dielectric covering. Contact Customer Service with the system serial number to determine if your covered roll can handle your power supply's full output level.
- ❖ If none of the above steps resolve the issue, contact Customer Service for assistance.

INVERTER OHM CHECK PROCEDURE

- Any “Zero” ohm reading will constitute a bad Semi-Conductor.
- Gate leads must be replaced with devices.
- Meter Required: Standard Analog VOM-or-DVOM with Diode Test.

⚠ DANGER!

Ensure all power is disconnected and locked out from unit before performing ohm check procedures.



⚠ CAUTION!

Always use the *NEW* Gate Leads supplied with the replacement Inverter Device.

Always apply an EXTREMELY thin layer of thermal compound to the base of the device before mounting it to the heat sink.
A packet of compound is attached the inverter.

Apply a dab of thermal compound to the center of the base of the device and spread the compound around the entire surface of the device.

Wipe away any excess compound as this can be detrimental, and may cause device failure.

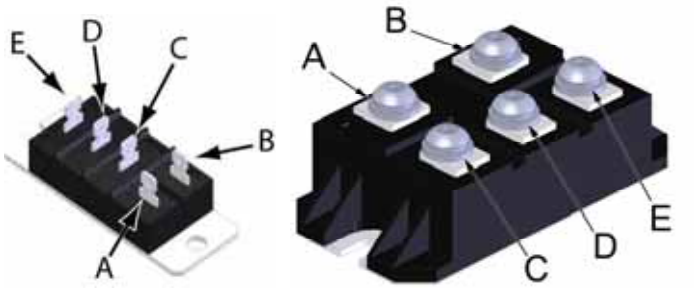
Mount the inverter device securely to the heat sink and torque the bolts to 30 in/lbs (3.39 N-m).

Meter Lead Hook-Up	VOM (RX1 Scale)	DVOM (Diode Test)
(+)A to (-)B	OPEN	OPEN
(-)A to (+)B	≈ 20	.4V
(+)A to (-)C	≈ 20	.4V
(-)A to (+)C	OPEN	OPEN
(+)B to (-)C	≈ 40	.8V
(-)B to (+)C	OPEN	OPEN
*(+)D to (-)E	Slight Deflection, Then OPEN	OPEN
*(+)G to (-)F	Slight Deflection, Then OPEN	OPEN

(+)=Positive (black) meter lead. (-)=Negative (red) meter lead.
**Measure with gate leads disconnected, meter at its highest resistance scale.*

BRIDGE RECTIFIER OHM CHECK PROCEDURE

- Any “Zero” ohm reading will constitute a bad Semi-Conductor.
- Meter Required: Standard Analog VOM-OR-DVOM with Diode Test.



⚠ CAUTION!

Always apply an EXTREMELY thin layer of thermal compound to the base of the device before mounting it to the heat sink.

A packet of compound is attached the bridge rectifier.

Apply a dab of thermal compound to the center of the base of the device and spread the compound around the entire surface of the device.

Wipe away any excess compound as this can be detrimental, and may cause device failure.

Mount the bridge rectifier device securely to the heat sink and torque the bolts to 30 in/lbs (3.39 N-m).

METER HOOK-UP	VOM (RX1 SCALE)	DVOM (DIODE TEST)
(+) A to (-) C, (-) D & (-) E	OPEN	OPEN
(-) A to (+) C, (+) D & (+) E	≈ 10	.4V
(+) B to (-) C, (-) D & (-) E	≈ 10	.4V
(-) B to (+) C, (+) D & (+) E	OPEN	OPEN

(+)=Positive (black) meter lead. (-)=Negative (red) meter lead.

Enercon Customer Service Department
Phone Number: (262) 255-6070
Fax Number: (262) 255-2462
E-Mail Address: service@enerconmail.com
Website: www.enerconind.com
24hr Customer Service is available.

SECTION 7 – PARTS BREAKDOWNS

GENERAL

This Section of your manual contains illustrated part breakdowns of the various components that make up your *CoronaFlex™ Corona Treating System*. If standard options are offered with your system they will be represented with parts breakdown illustrations as well, but special order options typically will not.

The illustrations, and their associated part tables, are primarily provided for replacement part identification, but can also be useful in locating items that are identified as being required for operation, or requiring maintenance or adjustment.

HOW TO USE THE PART BREAKDOWNS

1. Refer to the illustrated part breakdowns to identify the desired illustration.
2. Visually locate the desired part in the illustration and identify the parts ***Item #.***
3. Refer to the part table and find the ***Item*** # to identify the Enercon ***Part*** #, ***Description***, and ***Quantity***.

HOW TO ORDER PARTS

Due to possible changes in the part numbers and quantities in your system, we request that you have all of the following information available when placing an order. We do understand that some information may be unavailable, but be aware that this may cause delays in shipping your order.

1. Locate the ***Model Number*** and ***Serial Number*** of your unit on the system ***Rating Plate***; refer to **Figure 1** on **Page 4** of this manual.
2. *The* ***Part Number*** and ***Date*** of this manual; both are located on front cover of this manual. The ***Part Number*** is also located in the footers on each page of the manual.
3. The ***Part Number*** of the desired part, the page number it was found on, and the parts ***Description***.

NOTE:
All of the replacement parts provided are manufactured with the same precision as the parts supplied with the original equipment.

4. To place a part order contact:

Enercon Parts Department
Phone Number: (262) 255-6070
Fax Number: (262) 255-2462
E-Mail Address: parts@enerconmail.com

SHIPPING INSTRUCTIONS FOR RETURNS

Enercon has 2 facilities that perform repairs and process credits. Before shipping parts or equipment back, contact Enercon's Customer Service Department for a **Return Material Authorization (RMA)** number, the proper shipping address, and any special shipping instructions.

If possible, use the original packaging material the parts or equipment were shipped with. If that is not available, use a fiberboard and adequate packing materials to support the item's weight and prevent movement during shipping.

Ensure both the shipper and receiver addresses are clearly printed on top of package along with the **RMA** number.

Parts must be sent **Prepaid**.

1 – 3kW COMPAK™ 2000 CE POWER SUPPLY PARTS BREAKDOWN

Item #	Part #	Description	Qty.
1	LM4027-04	Control Board	1
2	LM3415-05	Power Board	1
3	LM3958-02	2000 Treater I/O Module	1
4	LM1982-35	Output CT	1
5A	SW0207	Disconnect Handle	1
5B	SW0210	Disconnect Switch Body 3 Pole, 20A	1
6	CB0116	Circuit Breaker, 2 Pole 15A	1
7	EM0080	Line Filter, 20A	1
8	LM3598-02	Inverter Power Module	1
9	BR0013	Bridge Rectifier	1
10	SE0158	Temperature Sensor Switch	1
11	CP0070	Snubber Capacitor	1
12	EM0256	24V DC Power Supply	1
13	TB0110	Fused Terminal Block, 250V 2 Amp	2
14	CA1050	Ribbon Cable (40 Pin)	1
15	TB0537	Output Terminal Blocks	2
16	– –	Terminal Blocks	Varies
17	FD5695-33	Control Board Safety Shield	1
18	FD5373-03	Power Supply Heat Sink	1

NOTE: *Part numbers and quantities may change, please have your equipment serial number available when ordering parts.*

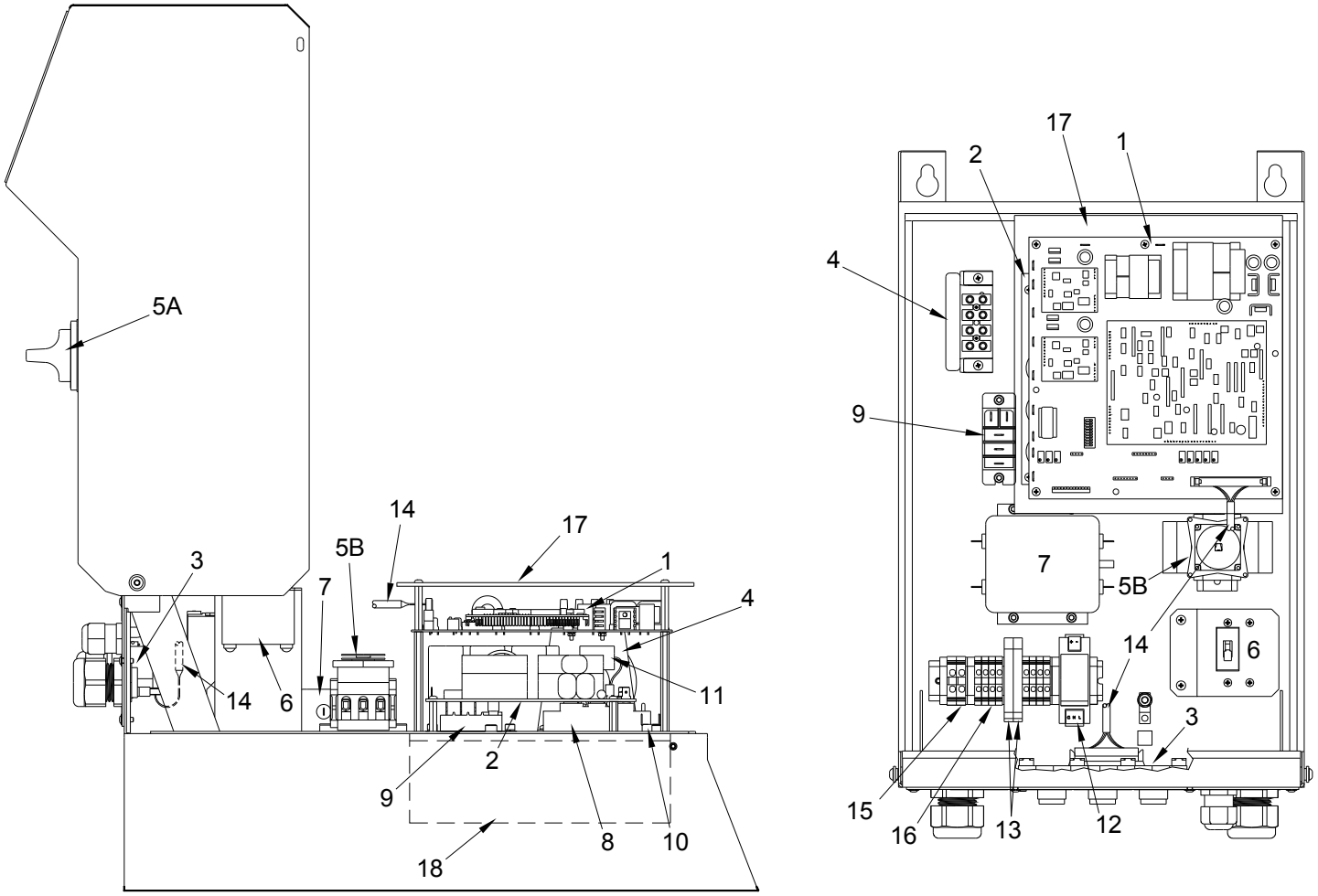


Figure 51

4 – 5kW COMPAK™ 2000 CE POWER SUPPLY PARTS BREAKDOWN

Item #	Part #	Description	Qty.
1	LM4027-04	Control Board	1
2	LM3415-06	Power Board	1
3	LM3958-02	2000 Treater I/O Module	1
4	LM1982-32	Output CT	1
5	SW0170	Disconnect Switch	1
6	CB0119	Circuit Breaker, 2 Pole 40 Amp	1
7	EM0242	Line Filter 30A	1
8	LM3751-03	Inverter Power Module	1
9	BR0015	Bridge Rectifier	1
10	SE0158	Temperature Sensor Switch	1
11	CP0070	Snubber Capacitor	1
12	EM0256	24V DC Power Supply	1
13	TB0110	Fused Terminal Block, 250V 2 Amp	2
14	CA1050	Ribbon Cable (40 Pin)	1
15	FA0086	Cooling Fan 230V	1
16	FA0030	Heat Sink Cooling Fan 230V	1
17	TB0546	Output Terminal Blocks	4
18	– –	Terminal Blocks	Varies
19	FD5695-33	Control Board Safety Shield	1
20	FD5373-03	Power Supply Heat Sink	1

NOTE: *Part numbers and quantities may change, please have your equipment serial number available when ordering parts.*

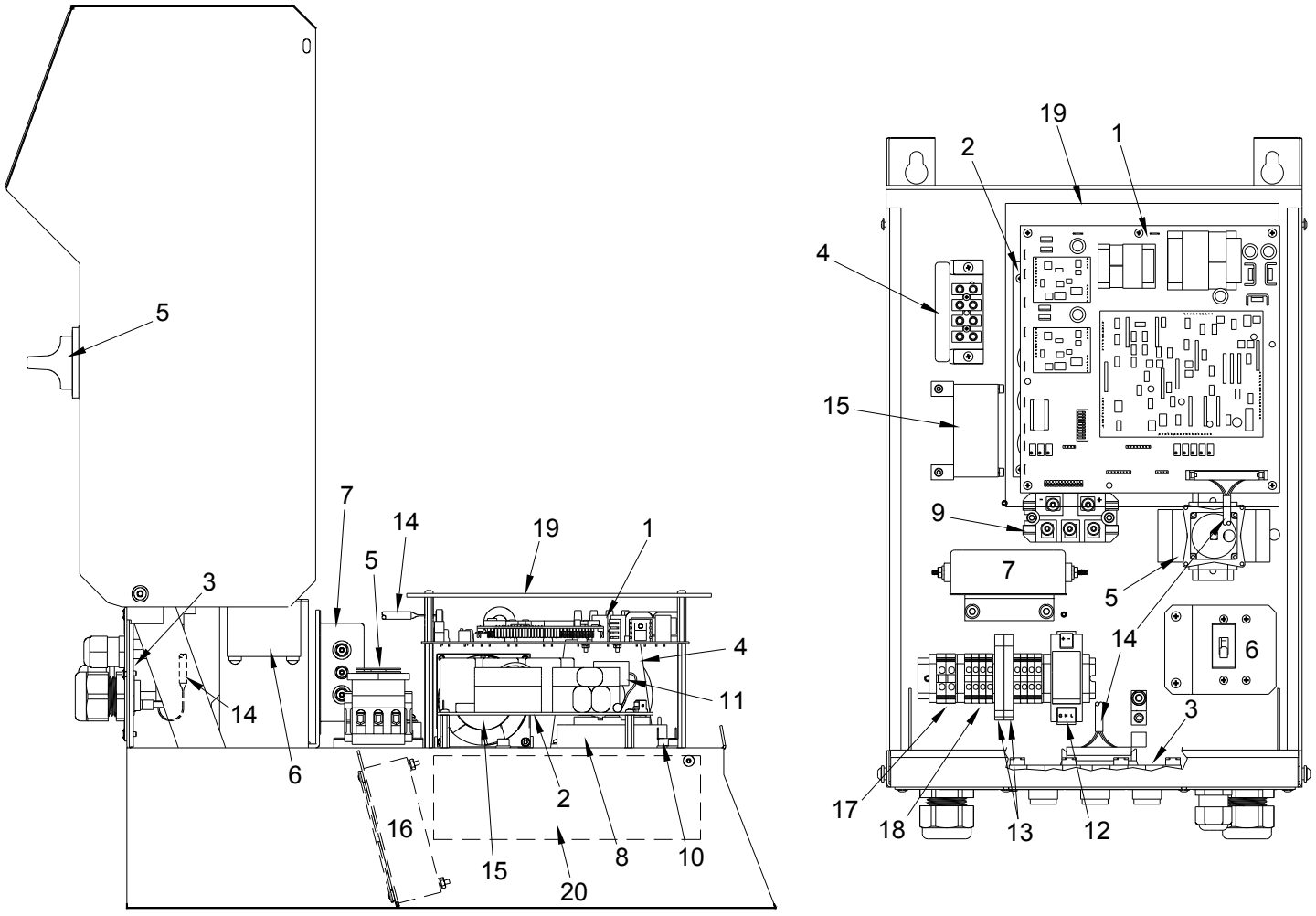


Figure 52

STATION PARTS BREAKDOWN

Item #	Part #	Description	Qty.
1	LM5801-XX	Electrode Assembly Drawer	1
2	– –	Electrodes	2
3	LM5794-01	Membrane Switch Assembly	1
4	SW0291	Differential Pressure Switch	1
5	– –	Ground Roll	1
6	– –	Idler Roll	1
7	SE7019	Speed Sensor	1
8	SE0175	Magnet Wheel	4
9a	SW0470-SW	Universal Reed Switch – Switch Mechanism (Hidden Inside Drawer)	2
9b	SW0470-ACT	Universal Reed Switch – Magnetic Actuator	1
10a	LM3289-113	Ground Brush Assembly	1
10b	BH7004	Ground Brush	1
11	LM5807-01	High Voltage Connection Assembly	1
12	LM5199-XX	Flexible High Voltage Conduit	1
13	LM5243-XX	System Interface / Interlock Cable	1
14	LM5263-XX	Remote Control Cable	1
15	– –	Terminal Blocks	Varies
16	– –	Electrode Drawer Slide	2

**NOTE: Part numbers and quantities may vary depending on the size of station you were supplied. To insure the correct parts are supplied please have the model and serial number of the system available.*

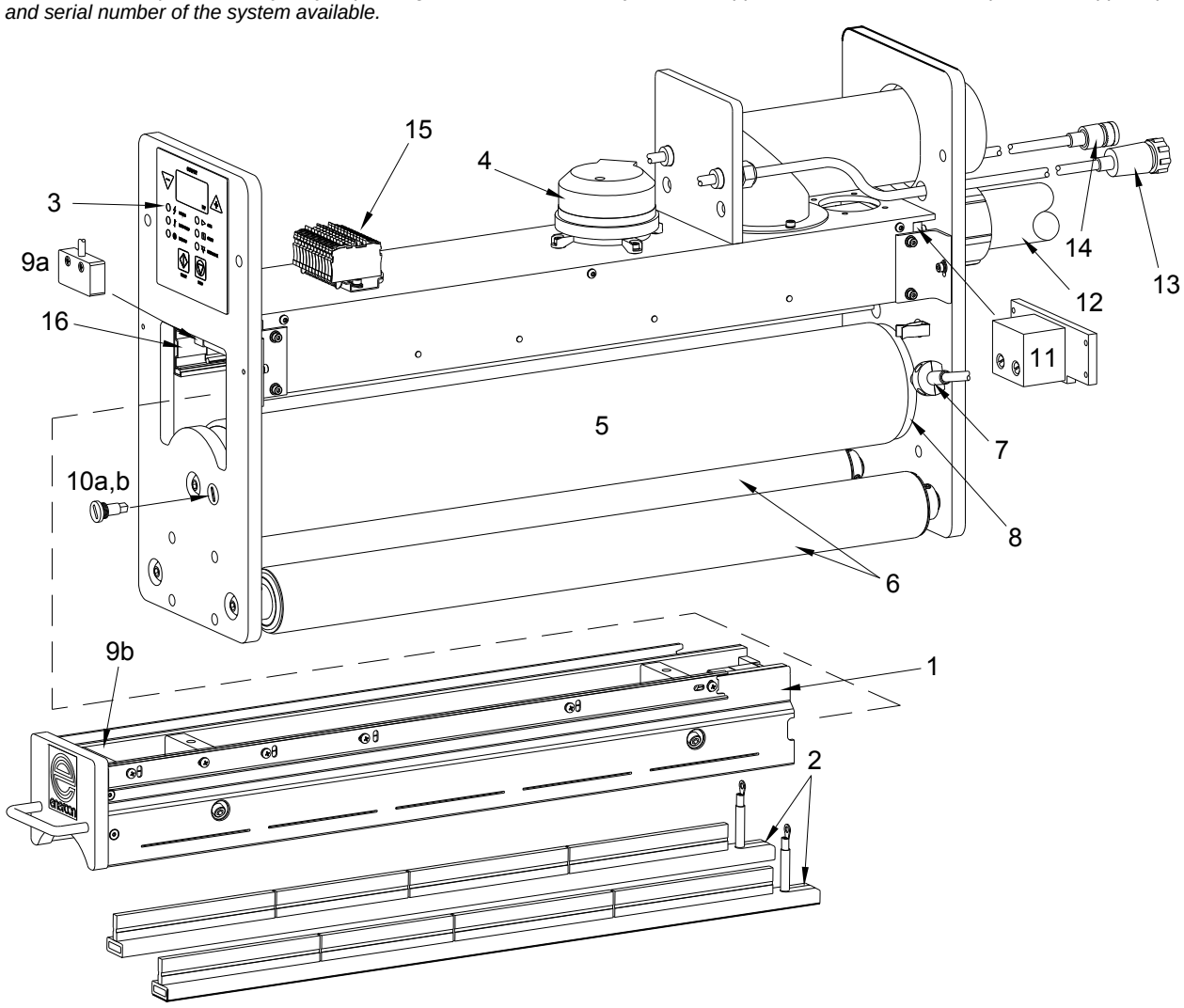


Figure 53

SECTION 8 – MISCELLANEOUS

MAINTENANCE RECORD			
Date	**Issues Found**	**Corrective Action Required**	**Performed By**

MAINTENANCE RECORD			
Date	**Issues Found**	**Corrective Action Required**	**Performed By**

PRODUCTION INFORMATION

Product	Air Gap	Min. Line Speed	Max. Line Speed	Actual Line Speed	Output kW Level	Watt Density

PRODUCTION INFORMATION

Product	Air Gap	Min. Line Speed	Max. Line Speed	Actual Line Speed	Output kW Level	Watt Density

NOTES

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