



**Corona | Atmospheric Plasma | Flame
Power Supplies | Ozone Decomposers
Ozone Generators**

www.enerconind.com/treating



Surface Treating Handbook

Applications | Maintenance | Parts

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Online Training

Corona Treater Maintenance Webinar

Minimize downtime and improve productivity by following the industry's best maintenance practices presented in this free webinar. From electrodes to rolls, from power supplies to exhaust blowers get expert advice you can put to use.

Find Out:

- The 3 most common mistakes made by maintenance personnel
- The #1 way to increase the life of your electrodes and rolls
- Industry best practices to reduce scrap and increase productivity

This webinar is part of a series of Enercon's continuing corona education program. A wide range of best maintenance and practices are reviewed with a special emphasis on operation in the high heat and humidity environments.

Access this on demand webinar and white paper by visiting:
www.enerconind.com/ctw



Enercon Manufactures Several Types of Electrodes!

Before you replace the electrodes in your Enercon corona treater make sure you have the correct style. Installing any electrode other than the one specifically designed and manufactured by Enercon for your system can lead to improper treatment and/or system damage! Contact Enercon Customer Service if you have any questions. See pages 6-7 for best practices and usage of electrodes.

The Enercon Industries Surface Treating Handbook

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Ordering / Returning Parts

The information on this page is provided to answer some of the more frequent questions we receive when our customers contact us for replacements parts or to return parts or equipment.

Use the breakdown diagrams in this Handbook, as well as the diagrams in your Enercon equipment manuals to determine the names and part numbers of the components you need to replace.

The model number and serial number of your equipment will help us determine if the part numbers you find here are accurate for your equipment, or if an older / newer part number is required.

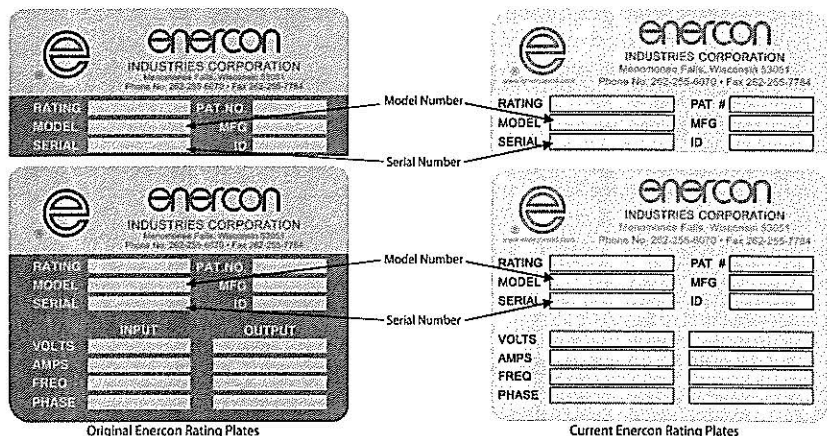
Record the model numbers and serial numbers of your equipment on Page 12 to use as a ready reference when ordering parts or calling for technical assistance.

To order replacement parts, call (262) 250-3140. For your convenience, Fax Order Forms are also available upon request.

For technical assistance or troubleshooting tips call (262) 255-6070.

When ordering parts, please specify the following:

1. The model number of the equipment as shown on the rating plate.
2. The serial number of the equipment as shown on the rating plate.
3. The part number as shown in the parts breakdown drawings and tables and the quantity needed.



When returning parts, please do the following:

1. Ensure you request and receive a **Return Material Authorization (RMA)** for parts or equipment being returned for repair or credit.
2. Write the **RMA** CLEARLY on the outside of all packaging and all associated paperwork.

Enercon Customer Service Department
Phone Numbers:
Parts - (262) 250-3140
Technical Assistance - (262) 255-6070
Fax Number: (262) 255-7784
Parts E-mail: parts@enerconmail.com
Service E-Mail: service@enerconmail.com
Website: www.enerconind.com
24hr Customer Service is available



Service Options

Start Up Made Easy

Enercon has in place a discounted Start Up service for our customers with brand new equipment who are unfamiliar with the installation and operation of surface treating equipment.

As part of the service, an experienced Enercon Field Service Engineer will review your treater installation, making sure that everything has been done correctly. Or, if you prefer, the Field Service Engineer can supervise your installation of the surface treating system.

Once your surface treating system is up and running, the Service Engineer will provide hands on training for your operators, as well as routine care and trouble shooting for your maintenance personnel.

Preventative Maintenance

Routine Preventive Maintenance is at the heart of every successful manufacturing operation. Over the years, our experience has shown that an aggressive preventive maintenance program is the best insurance against downtime and scrap. Solid periodic maintenance will also prolong the life of your equipment. We have in place a preventive maintenance program, our PMV service, which is designed to give you that insurance.

For customers who have signed up for this service, we will supply, at a discounted rate, a Field Service Engineer who will review all of your Enercon equipment. In addition to insuring that your Enercon surface treating systems are tuned up and performing correctly, our Engineer will provide hands-on training for your operators and maintenance personnel. He will also identify critical spare parts, which should be a part of your maintenance inventory, and help you refine your ongoing maintenance program.

To learn more about our Start Up and Preventive Maintenance visits, contact Matt Rajala at (262) 255-6070, or e-mail him at mrajala@enerconmail.com. He is ready to tell you more about these valuable programs and provide you with a comprehensive pricing package.

Field Service

In conjunction with our Start Up and PMV services, Enercon also provides emergency field service that gets consistently high ratings from our customers in the converting and extruding industries. When a problem cannot be resolved by your maintenance department, we will provide a Field Service Engineer to come to your plant and properly diagnose your equipment.

With extensive hands-on experience and direct access to our Engineering Department, our Engineer will be able to ensure that the problem you are experiencing is resolved. He will also be able to determine if anything else in the system may require repair.

For more information on Field Service Visits, contact Matt Rajala at (262) 255-6070, or e-mail him at mrajala@enerconmail.com.

Laboratory Equipment & Capabilities

| | | |
|---------------------------------------|---|--|
| Equipment: | Unwind and Rewind Stands | |
| | Treater Stations (Corona, Atmospheric Plasma and Flame) | |
| Capabilities & Limitations | Narrow Web Stations (Corona and Atmospheric Plasma) | |
| | Power Supplies (Compak™ 2000 and Atmospheric Plasma) | |
| | Plasma Gas Distribution Panel | |
| | Flame Treater Controller and Gas Train Cabinet | |
| | Sheet Treater | |
| | | |
| Capabilities & Limitations | Line Speed: | 10-800 fpm (3-244 mpm) |
| | Treatment: | 1 or 2 Sides |
| | Distance Unwind & Rewind | 75 feet (23 meters) |
| | Core Diameters: | 3" or 6" (75-150mm) |
| | Maximum Roll Diameter: | 30 inches (760mm) |
| | Maximum Roll Width: | 60 inches (1500mm) |
| | Minimum Thread Length Required: | 75 feet (23 meters) |
| | Thickness: | Up to 0.1000" (2.5mm) |
| | Sample Length Required: | 1000 ft minimum (300 meters) |
| | | 2000 ft maximum (600 meters) |
| | Hand Sheet Size: | Consult Enercon. |
| | Minimum Hand Sheets Required: | 25 sheets. |
| Accessory Equipment: | Ion Systems Anti-Static System | |
| | Watt Density Controller | |
| | Nip Roll Capability | |
| | | |
| Testing Capabilities | Contact Angle Test | |
| | Dyne Level Test | |
| | Peel Testing | |
| | | |
| Testing Equipment | Krüss Contact Angle Meter | To perform contact angle measurement test. |
| | Thwing-Albert 180° Friction / Peel Tester | To Perform Ink Adhesion / Peel Test. |
| | ASTM Dyne Solutions | To Perform Dyne Level Test. |
| | Enercon Dyne Pens | |

ttemsa Safety Inspection

| Safety Checks | Requirements |
|---|---|
| Safety Labels | Verify that all Enercon safety labels are in place and readable. If customer has installed their own covers anywhere in the system ensure they are labeled with an appropriate Safety Label. |
| High Voltage Covers | Verify that all High Voltage covers were securely in place upon arrival and that each removable cover has a High Voltage Danger label in place. If removed for inspection / testing ensure they are reinstalled properly. |
| Remote High Voltage Transformer HV Wireways | Verify that the wireways from remotely mounted High Voltage Transformers are secure and meet the requirements specified in the system manuals and drawing lists. Verify customer has installed appropriate Safety Labels on all covers and access points. |
| Remote & Local High Voltage Transformer(s) Grounded | Verify that all High Voltage transformers have an Earth ground wire securely attached to the ground stud on the transformer body. All Remote HV Transformer grounds must be at the same ground potential as the station and power supply grounds. |
| High Voltage Wiring | Verify that all high voltage wiring within the station plenum, or remote high voltage transformers, has a minimum physical clearance of 1" (25mm) from all other wiring and conductive surfaces within Enercon enclosures, or 2" within Non-Enercon enclosures. |
| System Grounds and Ground Brushes | Verify that the Station Frame, Power Supply, and all optional equipment have their own Earth ground wires securely attached to appropriate ground points, and that the station Ground Brush is making good contact with the end of the roll or the roll shaft. System grounds must all be at the same ground potential with each other and any remote high voltage transformer grounds. |
| Interconnection Wiring | Verify that all interconnection wiring is the correct wire type and gauge as noted in the system's connection diagram. Also verify that high frequency output wiring is routed as noted in the system's connection diagram. |
| Electrode Assy Shroud | Inspect electrode shroud for severe damage or missing components. Verify that the outer edges of the shroud are no greater than the factory default settings from the roll face. |
| Electrode Position Interlock(s) | The electrode position interlock(s) stops the power supply when any electrode assembly is rotated out of the treat position. With all other interlocks satisfied, open each assembly, one at a time, and verify that the power supply does not start. |
| Zero Speed Interlock(s) | The zero speed interlock(s) stops the power supply when the ground roll slows or stops. With the ground roll idle, or only one roll turning on a two roll system, verify that the power supply does not start. Repeat this test with the 2 nd roll when required. |
| Air Flow Interlock(s) | The air flow interlock(s) stops the power supply when the blower is turned off. With the blower off, or only one running on a 2 blower system, verify that the power supply does not start. Repeat this test with the 2 nd blower when required. |
| Optional Equipment Interlock(s) | Some system options, such as High Voltage Switching, include interlocks that are connected to your power supply. Refer to the Optional Equipment Section of your power supply manual and perform the interlock tests called out for any options that are included with your system. |
| Customer Installed Interlock(s) | If installed, test all customer interlocks to verify that they stop the power supply, or prevent it from starting when the interlock condition is not satisfied. If not installed, remove the jumper to test the interlock circuit. |


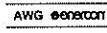
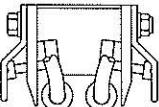
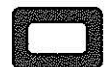
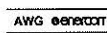
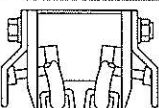
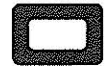

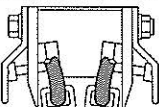
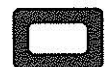

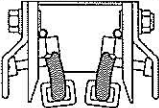


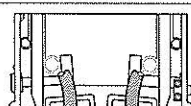
Enercon Ceramic Electrodes Best Practices



Problems Associated with Improper Ceramic Electrode Usage

Enercon ceramic electrodes are configured as part of an integrated system including your power supply, ground roll and exhaust system. Operating the corona treater without the correct type, size and length of electrodes properly installed and active in each electrode assembly will lead to improper treatment and prematurely failed electrodes.

Use the chart below to verify the type of electrode included with your system.

| Power Capacity low to high | Electrode Shape Not to scale | Wire Color Look for the name for genuine Enercon electrodes | Shroud |
|-------------------------------|--|---|--|
| Round |  tabbed |  white |  |
| V |  tabbed |  white |  |
| PV |  tabbed |  purple |  |
| EV |  continuous backbone |  purple |  reversed |
| E ² |  continuous backbone |  purple |  |

Use only genuine Enercon electrodes.

White wire

AWM STYLE 3239 155C 40KVDC VW-1 ROWE IND 16 AWG Enercon

Standard Electrodes - Standard Applications

Purple wire

AWM STYLE 3239 160C 40KVDC VW-1 ROWE IND 16 AWG Enercon

"PV" Electrodes - High Power Applications

Enercon electrodes manufactured prior to 2010 appear as above without the Enercon logo.

EV, E²
continuous backbone

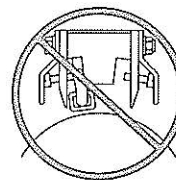
V, PV
tabbed

Unauthorized

Scenario

Result

Reason

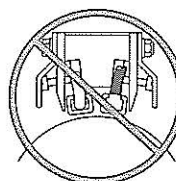


Damaged electrode removed to continue operation.

Premature failure and stress on the remaining electrodes.

Overpower - Power rating of remaining electrode is exceeded.

Overheat - Proper exhaust cooling air pattern is disrupted.



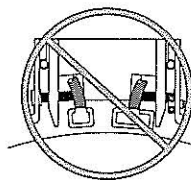
Electrodes with different power ratings, are mixed into a treater station.

Premature failure of either style of electrode.

Overpower - Power rating of either electrode can be exceeded due to a power imbalance.

PV electrodes designed to handle high power levels.

V electrodes, or 3rd party electrodes have a lower power rating.



Enercon with different shapes (or styles) are mixed into a treater station.

Premature failure of either style of electrode.

Overpower - Power rating of either electrode can be exceeded due to a power imbalance.

Overheat - Proper exhaust cooling air pattern is disrupted.



Shorter electrodes are mixed into a treater station.

Premature failure of existing proper length electrode, or shorter length electrode

Overpower - Power rating of either electrode can be exceeded due to a power imbalance.

Overpower - Power rating of remaining electrodes is exceeded.

WARNING!

Enercon never recommends replacing our electrodes with a 3rd party product due to inconsistencies in design, manufacturing techniques, and materials used. Enercon uses only the highest quality components and consistent, repeatable manufacturing techniques in the design and production of our electrodes.

Exhaust Duct Sizing Requirements

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 number of elbows or 45° fittings indicated.
- Smooth wall rigid duct (non-flexible).
- Adhering to the guidelines listed below.

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

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 treater station 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:

$$\text{Power Supply kW} \times 0.073 = \text{Ozone in lbs./hr}$$

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 (86° F) 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.



Watt Density

Enercon's Surface Treating Systems are available with Watt Density Control either as a standard or optional mode of operation. Below is information on how to calculate and verify the Watt Density for your system.

Calculating Watt Density

The Watt Density setpoint represents the watts per square foot required to treat a specific product, and is calculated using the following formulas:

English Units:

$$\text{WD} = \frac{\text{Watts}}{[\text{Treat width (Feet)} \times \text{Line Speed (FPM)} \times \text{Number of Sides Treated}]}$$

Metric Units:

$$\text{WD} = \frac{\text{Watts}}{[\text{Treat width (Meters)} \times \text{Line Speed (MPM)} \times \text{Number of Sides Treated}]}$$

This number normally ranges from 1 to 3 in English Units, or 10 to 30 in Metric Units, but it may be higher at times for some difficult films or special customer request.

Watt Density Verification

Under certain conditions, the calculated Watt Density number may not give you the treatment results you are expecting. Keep in mind that the calculated Watt Density number is a starting point when determining your watt density requirements and could require adjustment up or down.

Before you begin to make adjustments to the WD Setpoint, you should verify if the system is interpreting the Watt Density number correctly. Using the currently entered Watt Density number, the output power level can be calculated by using the following formulas:

English Units:

$$\text{Power} = [\text{Watt Density Number} \times \text{Treat Width (Feet)} \times \text{Current Line Speed (FPM)} \times \text{Number of Sides Treated}]$$

Metric Units:

$$\text{Power} = [\text{Watt Density Number} \times \text{Treat Width (Meters)} \times \text{Current Line Speed (MPM)} \times \text{Number of Sides Treated}]$$

If the Actual KW does not match the calculated output power level ensure that the units of measure and system parameters are entered properly.

If the Actual KW is correct then you may need to increase or decrease the WD Setpoint in small increments until you achieve the treatment results you are expecting for your product.

NOTE:

Your system may include variables, such as adjustable treat width electrodes or non standard materials, which will need to be taken into consideration when calculating the Watt Density. Please contact Customer Service if you are unfamiliar with the use of Watt Density Control.



Enercon's Surface Treating Systems are available with Proportional Speed Control either as a standard or optional mode of operation. Proportional Speed Control produces a control signal that will increase or decrease the output of the power supply proportional to your line speed. The ratio between line speed and output power is fixed by the Proportional Speed Mode settings. Below is a generic description of how to program Proportional Speed for your system.

In Proportional Speed Mode you will need to enter the line speed and proportional output power level that best fits your production requirements. These values are then used to determine the speed/power ratio used by the system.

Example:

In this example we will assume that you have a 5kW power supply and a maximum line speed of 500 fpm. We will also assume that your typical production line speed is 250 fpm, and that you get the best treatment results with an output power level of 2.5kW at that speed.

In this scenario, you would use 250 fpm as the speed setting, and 2.5kW as the power setting.

When you are running production, the system monitors the actual line speed being sent from the station encoder or speed sensor, and then using the speed/power ratio the power supply automatically adjusts the output power level to stay proportional to the actual line speed.

If your line speed is below 250 fpm, the output power level will be below 2.5kW.

If your line speed is at 250 fpm, the output power level will be 2.5kW.

If your line speed is above 250 fpm, the output power level will be above 2.5kW.

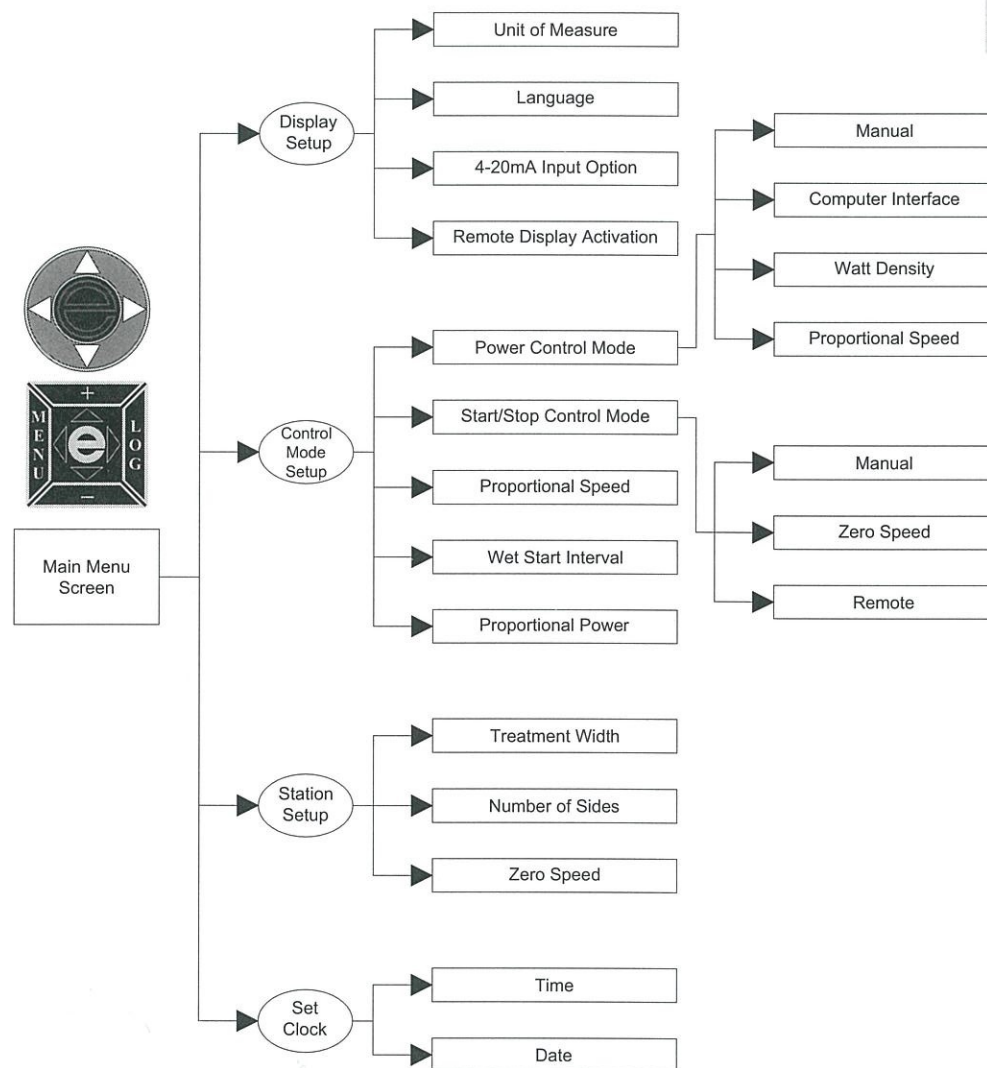
NOTES:

Regardless of your proportional speed and power settings the maximum output power level will still be limited to the maximum output power rating of your power supply.

Proportional speed and proportional power are only available together on the Compak™ 2000 Deluxe and Touchscreen power supplies, and the Compak™ 9000 Touchscreen power supplies.

The Compak™ 2000 Deluxe Power Supply's graphics display utilizes a navigation window and selector ring that allows you to scroll through all of the available setup options for your system.

Below is a flowchart that shows the available setup options for your system and the flow of the screens as you walk through them. This will be accomplished using the selector ring which will correspond to the navigation window on the right hand side of the navigation screen.



Production Information

| Material | Gap | kW Out | Prod. Speed | Min/Max. Speed | WD | Prop Speed/Power |
|----------|-----|--------|-------------|----------------|----|------------------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Maintenance List

Station

Power Supply

Daily Checks

- ☐ Electrode Assembly Gap

Weekly Checks

- ☐ Electrode Assembly Pivot
☐ Interlock Sensors / Switches
☐ Ground Roll / Bearings / Ground Brush
☐ Pneumatics (If Applicable)

Monthly Checks

- ☐ Inspect / Lubricate Roll Bearings

Daily Checks

- ☐ Output Range

Weekly Checks

- ☐ Blow Out Unit
☐ Check / Clean Fans

Monthly Checks

- ☐ Test Options
☐ Inventory Spare Parts

Troubleshooting Information

Enercon offers troubleshooting assistance via phone, email and web chat. To aid the troubleshooting process there are some universal questions that will be asked. If possible, please have the following information available before contacting customer service.

- Equipment Model & Serial Numbers:** The model and serial numbers are printed on the rating plates of your equipment; refer to page 2 for rating plate information.
- Input Voltage:** Please measure the input voltage at the power supply.

Model # _____ Serial # _____ Input VAC _____

Description _____

Model # _____ Serial # _____ Input VAC _____

Description _____

Model # _____ Serial # _____ Input VAC _____

Description _____

Model # _____ Serial # _____ Input VAC _____

Description _____

Model # _____ Serial # _____ Input VAC _____

Description _____

- Power Supply Symptoms:** What do you see on the power supply front panel, or remote control, when you apply input voltage to the power supply? What do you see when the start command is applied by pressing the start button or applying your remote start command?
- Station Symptoms:** What is observed at the station when you attempt to start the system?

Electrode Air Gap Adjustment And Alignment Procedure

Air Gap Adjustment and Electrode Alignment

- Lock Out and Tag-Out your system. Wait 2 minutes to allow voltages to discharge before attempting to work on the system.
 - Verify the air gap is even across the entire length of the electrodes by inserting a .060" (1.5mm), or desired thickness, flexible feeler gauge between the electrode and ground roll along the electrode length (**Figure 1**). Do not slide the feeler gauge across the face of the ground roll as this may scratch the roll surface.
 - If the air gap is either too loose or too tight, loosen the end plate bolts on each end of the electrode assembly to adjust the air gap (**Figure 1**).
 - For a loose gap, turn the adjustment bolt CCW until the electrode comes in contact with feeler gauge.
 - For a tight gap, turn the air gap adjustment bolt CW until the gauge fits into the gap.
- Perform Steps 4 and 5 on both ends of the assembly.
- Once the gap is set, tighten the end plate bolts on each side of the electrode assembly.
 - If there is an uneven gap between electrodes, adjust the electrode assembly stop bolt to achieve an even air gap between each electrode and the ground roll (**Figure 2**).
 - If necessary, loosen the interlock ring set screws and rotate the ring so that the V-notch aligns with the position switch roller when the assembly is in the treat position (**Figure 3**). Retighten the set screws.

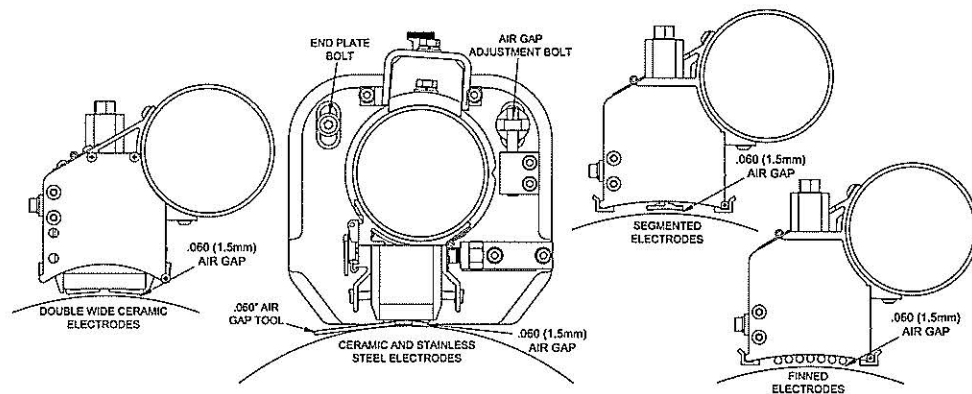


Figure 1

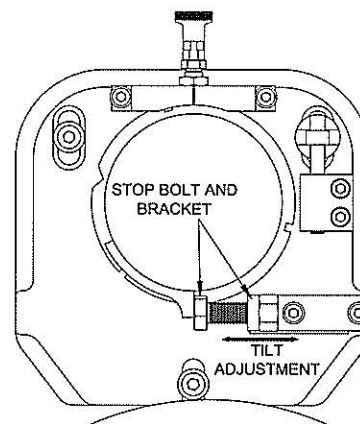


Figure 2

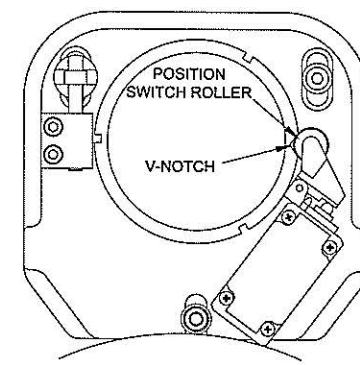


Figure 3

Ground Roll Inspection and Cleaning

Enercon produces 3 main types of corona treating stations; Bare Roll – Metal Ground Roll w/Ceramic Electrodes, Universal Roll – Conductive Covered Roll w/Ceramic Electrodes, and Covered Roll – Non-Conductive Covered Ground Roll w/Metal Electrodes. In each of these configurations, the ground roll provides the support for your substrate and completes the circuit for the high voltage on the electrodes that ionizes the air which results in the corona discharge that treats your substrate as it passes over the ground roll and through the corona.

If contaminants are allowed to buildup on the face of your ground roll they can have adverse affects upon the proper treatment of your substrate. The most common issue is backside treatment, resulting in inconsistent treatment across your web, but over time it can also deteriorate the roll face of a covered ground roll, resulting in poor treatment and possibly even failure of the coating.

Inspection (All Stations)

A weekly visual inspection of your station, in particular the ground roll and its components, is a good practice and will help to identify any build-up of contaminants on the roll and any signs of deterioration of roll coverings. Lock Out and Tag-Out your system. Wait 2 minutes to allow voltages to discharge before attempting to work on the system. Clean the ground roll in accordance with the appropriate instructions listed below.

Cleaning Of Bare Rolls

Aluminum

1. General Cleaning – mild soap and water.
2. Removal of Oxidation – Isopropyl alcohol and a Scotch-Brite™ pad.
3. Do not use caustic solutions.

Cleaning Of Universal Rolls

Do Not Use: 1, 1, 1 Trichloroethane, (MEK's) or xylene and similar products.

Ceramic Roll – General Cleaning

1. For light dust and dirt, use water, a mild soap and a clean cloth.
2. For grease and oil, use Simple Green™ liquid all-purpose cleaner. It is water-based, contains no petroleum, and is non-flammable.
3. For tougher stains, mix a liquid ceramic cleaner and powdered kitchen cleanser (like Comet™) into a paste and scrub with a Scotch-Brite™ pad. Then wipe the surface clean with isopropyl alcohol.

Electroless Nickel Plating

1. General Cleaning – Any non-caustic cleaner can be used.
2. Remove Oxidation – Any commercial silver cleaner/tarnish remover.

4. **Do Not Use:** Strong acidic solutions such as HCL acid and sulfuric acid or any cleaning mechanism using metal, conductive material, or power tools of any kind.

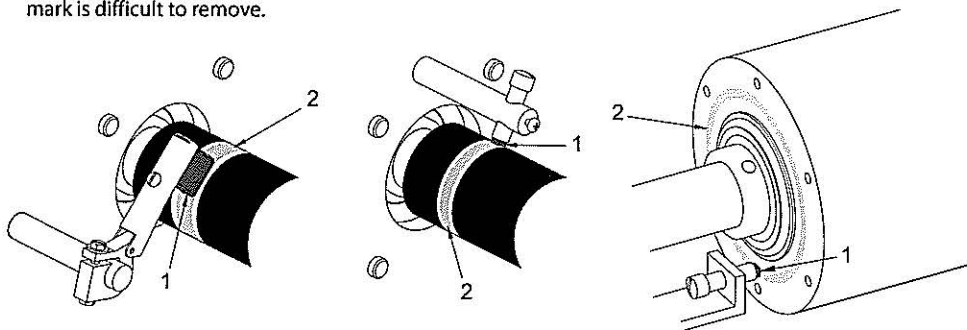
Hypalon Roll – General cleaning

Use: Soap and water or alcohol (methanol, methyl alcohol).

Silicone Roll – General Cleaning

Use: Mild soap and water.

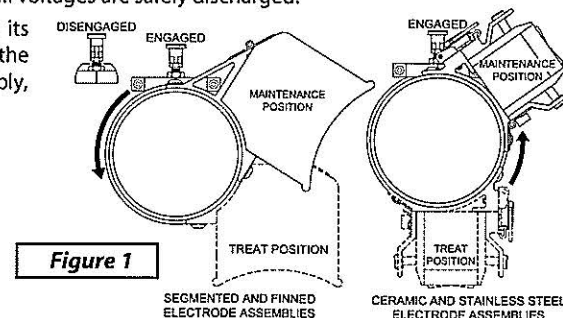
Also ensure that the bearings are in good shape and turning freely. Clean and lubricate the bearings as needed. Inspect the ground brush and ensure it is making good contact (1) with the shaft or end of the roll. The carbon ground brush will wear over time and will leave a mark along the path of the brush (2), clean the wear mark using isopropyl alcohol and a lint free cloth, or a Scotch-Brite™ pad if the carbon mark is difficult to remove.



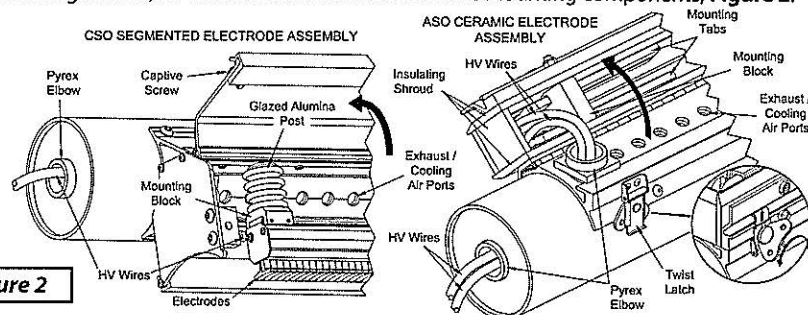
Electrode Assembly Inspection and Cleaning

Turn off, disconnect, and lock out main input voltage and compressed air to the power supply and station. Wait for 2 minutes to ensure all voltages are safely discharged.

Rotate each electrode assembly into its maintenance position and engage the locking pin to secure the assembly, Figure 1.

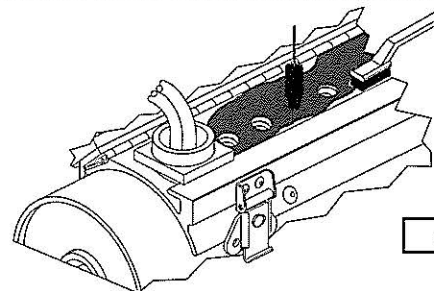


Open the assembly(s) by releasing the captive screws or twist latches and inspect the cooling air ports, insulating shroud, HV wires and the various electrode mounting components, Figure 2.



General Cleaning: Clean the assemblies by blowing them out with compressed air and/or a vacuum. Wipe down the shrouds, Pyrex elbow, mounting blocks, electrodes (including tabs and HV wires) and other surrounding components with isopropyl alcohol and a lint-free cloth.

Extensive Cleaning: If your electrode assembly(s) shows signs of air port blockage, excessive dirt buildup, HV arcing, or carbon tracking you will need to perform a more extensive cleaning of the assembly(s). Use a bore style stiff bristled brush to clear the exhaust / cooling air ports. Use a standard stiff bristled brush for any hard to remove contaminants on the exhaust tube surface, Figure 3.



Scrub any stubborn buildup from the shrouds, Pyrex elbow, mounting blocks, electrodes (including tabs and HV wires) and other surrounding components with isopropyl alcohol and a Scotch Brite™ pad, then wipe down these components and wipe down the surfaces with isopropyl alcohol and a lint free cloth.

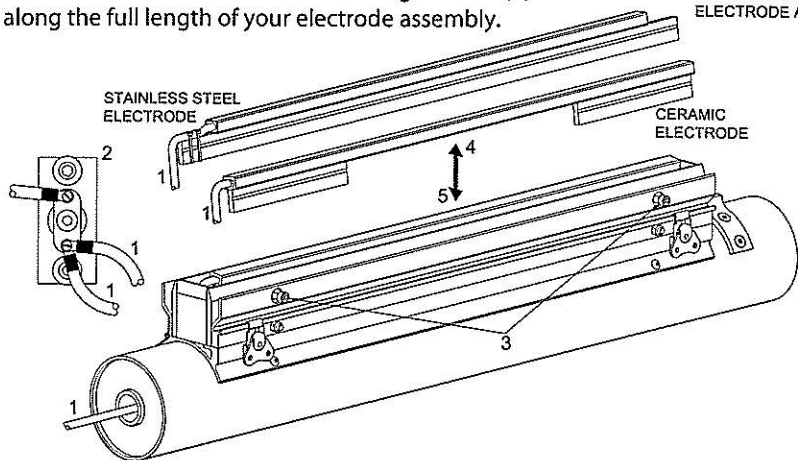
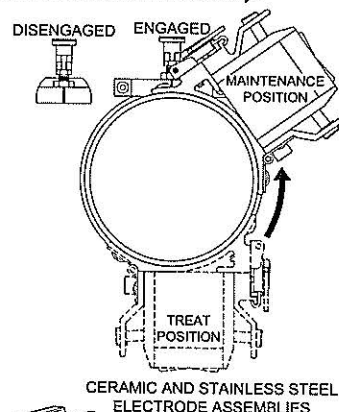
If any severe damage was discovered while cleaning your assembly(s), refer to the Maintenance Section of your station manual for details on cleaning and repairing the components within your assembly(s).

Ceramic and Stainless Steel Electrode Removal

At some point you may need to remove an electrode(s) for cleaning, repair, or replacement. Use the following steps to remove the electrodes from each assembly.

Removal Procedure

1. Lock Out and Tag-Out your system. Wait 2 minutes to allow voltages to discharge before attempting to remove an electrode.
2. Rotate the electrode assembly into the Maintenance position and engage the locking pin to lock it in place.
3. Remove the access cover on the High Voltage end of the station to gain access to the HV Terminal Block within the enclosure.
4. Remove the affected electrode's HV wire (1) from the HV terminal block (2).
5. Loosen all of the electrode mounting screws (3) along the full length of your electrode assembly.



6. Carefully lift the electrode up and out (4) of the assembly, taking care to gently pull the HV wire (1) free of the Pyrex tube. If needed, repeat this for the remaining electrode.

Reinstallation Procedure

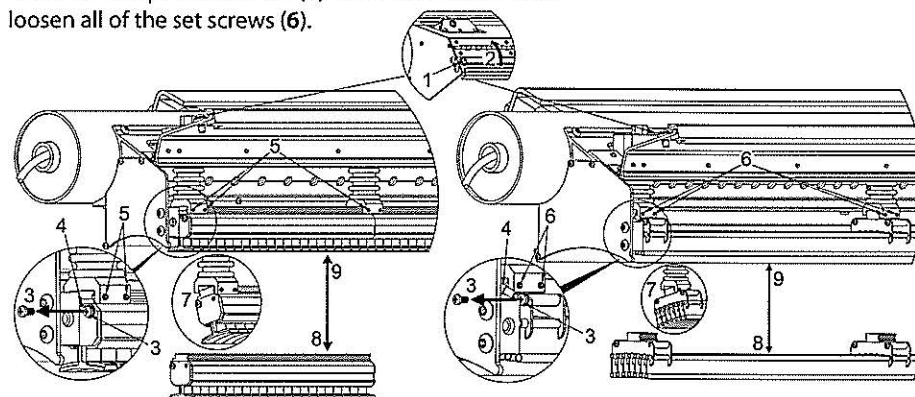
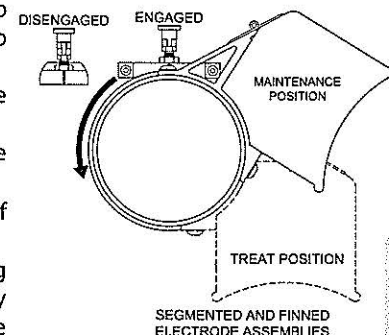
1. Ensure the electrode assembly is still in the maintenance position (See Removal Step 2 if needed) and that your system is still Locked Out and Tagged Out.
2. Reinstall the electrode by carefully placing the electrode (5) into the assembly, aligning the electrode mounting tabs into the electrode mounting blocks. Ensure the electrode mounting tabs are fully inserted into the assembly mounting blocks and aligned the electrode within the assembly.
3. Tighten the electrode mounting screws (3) and torque them to 3 in-lbs. (34 N-cm). Ensure that there is no movement of the electrode once it is installed.
4. Carefully feed the HV wire (1) through the Pyrex elbow and into the station enclosure and reconnect the HV wire to the HV terminal block (2). Ensure the screw is tight and that the HV wire does not move on the terminal block.
5. Reinstall the access cover onto the station enclosure. Disengage the locking pin and rotate the electrode assembly back into the treat position. Do Not lock assembly in treat position.

Segmented and Finned Electrode Removal

At some point you may need to remove an electrode(s) for cleaning, repair, or replacement. Use the following steps to remove the electrodes from each assembly.

Removal Procedure

1. Lock Out and Tag-Out your system. Wait 2 minutes to allow voltages to discharge before attempting to remove an electrode.
2. Rotate the electrode assembly into the Maintenance position and engage the locking pin to lock it in place.
3. Disengage the captive screws (1) on both ends of the assembly and lift the shroud out of the way (2).
4. Remove the screw (3) and HV wire (4) from the end of the assembly.
5. Firmly support the electrode and loosen the mounting block set screws. On a segmented electrode only loosen the set screws that are holding the electrode block that requires removal (5). On a finned electrode loosen all of the set screws (6).



6. Keeping a firm grasp on the electrode, pull the electrode forward (7) to rotate the electrode extrusion clear of the mounting bracket and disengage it from the set screws.
7. Once the electrode is clear of the set screws lower it away from that assembly (8) taking care not to allow the electrode to come into contact with the ground roll.

Reinstallation Procedure

1. Ensure the electrode assembly is still in the maintenance position (See Removal Step 2 if needed) and that your system is still Locked Out and Tagged Out.
2. Keep a firm grip on the electrode and reinstall the electrode (9) by placing the upper portion of the aluminum extrusion into the mounting block (7) into the assembly. Align the electrode within the assembly and ensure the electrode extrusion is fully inserted into the assembly mounting blocks.
3. Tighten the set screws (5 & 6) and ensure that there is no movement of the electrode once it is installed.
4. Reconnect the HV wire (4) using the screw previously removed (3). Ensure the screw is tight and that the HV wire does not move on the block.
5. Close the shroud (2) and reengage the captive screws (1). Disengage the locking pin and rotate the electrode assembly back into the treat position. Do Not lock assembly in treat position.

Proper Termination of High Voltage Wire

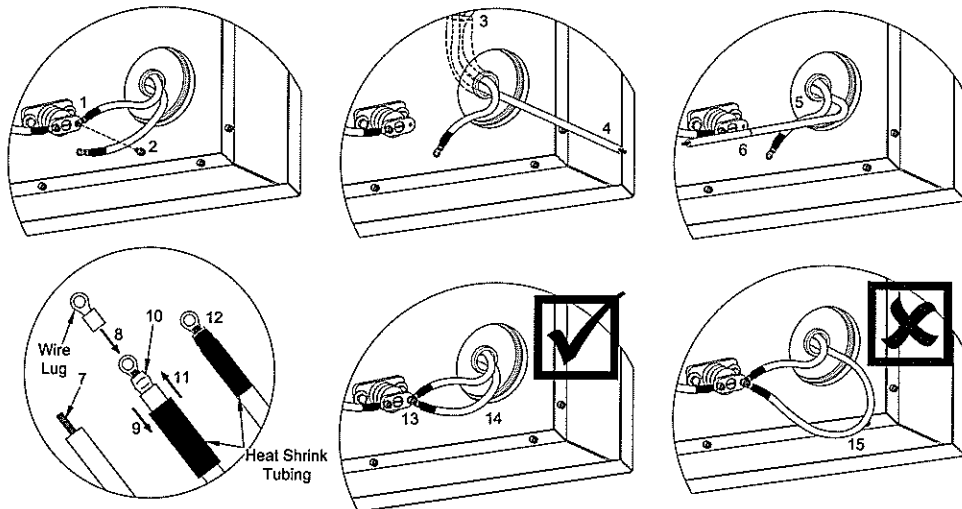
When installing a new electrode, or replacing the HV wire on a segmented or finned electrode assembly, you will need to ensure that the HV wire is the proper length, correctly terminated and connected. In many cases the electrode HV Wire will be cut to the proper length and terminated when it is built. If the HV wire on your electrode was not terminated in this manner, use the following procedure to properly shorten and terminate the HV wire.

1. Lock Out and Tag-Out your system. Wait 2 minutes to allow voltages to discharge before attempting to work on the system.
2. You will need to rotate the assembly into its maintenance position, refer to pages 16 & 17.
3. Disconnect the HV wire (1) of the damaged/old electrode from the HV terminal block (2), and remove the electrode, refer to electrode removal on page 16.
4. Install the new electrode and carefully route the HV wire through the Pyrex elbow (3) ensuring the full length of the HV wire is fed through the elbow (4).
5. For both Ceramic and Stainless Steel electrodes, unlatch and open the electrode shroud to ensure you do not cut the HV wires too short.
6. Route the HV wire to the HV terminal block ensuring the wire run is as short as possible (5) but with enough slack to allow it to be connected properly.

NOTE:

High voltage wiring must be kept clear of control wiring, surrounding metal and grounded surfaces by a minimum of 1" (25.4mm) within an Enercon enclosure, or 2" (50.8mm) within a 3rd party enclosure.

7. Align the HV wire over the screw hole in the terminal block (6) and cut the wire to this length.
8. Terminate the HV wire using an appropriate sized wire lug and a short length of heat shrink tubing. Strip approximately 3/8" of insulation from the end of the HV wire (7) and install the lug (8) and shrink tubing (9) onto the wire. Securely crimp the wire lug (10) and slide the shrink tubing over the lug (11) and shrink it into place using a heat gun (12).
9. Connect the HV wires to the terminal (13) ensuring wire does not move on the terminal block, then close and latch the electrode shroud and check that there is not too much slack in the HV wire (14). If too much slack is left in the HV wire, or if you do not shorten the HV wire (15), the wire will be prone to arcing to the metal in the station and will most likely fail in a short amount of time.



Troubleshooting System Faults

This page contains brief explanations of the fault LEDs that you will find on the front panel of the Compak™ 2000 and Compak™ 2000 Deluxe Power Supplies. For more detailed information on the LEDs and what they mean, refer to your power supply manual or contact Enercon Technical Support.

Compak™ 2000

STATION INTERLOCK –

Symptoms: The **STATION INTERLOCK** LED is lit on the membrane switch and the power supply will not start.

Possible Causes: This is typically caused by any system, customer or option interlock that is open on your treater system. Confirm that the ground roll is turning, the exhaust blower is on and the electrode assembly(s) is in the treat position. Also confirm that any customer or option interlocks are closed.

H.V. TRIP –

Symptoms: The **H.V. TRIP** LED is lit on the membrane switch when the **START** pushbutton is pressed. It typically flashes on and off as the power supply cycles, but can be continuously lit. You may also see a bright flash at your station.

Possible Causes: This is typically caused by a high voltage arc at the station, often due to a dielectric failure or physical damage to your electrodes or ground roll. It can also be caused by arcing to ground from the high voltage wires, moisture within the station or dirt and moisture buildup within your station.

TEMP –

Symptoms: The **TEMP** LED is lit on the membrane switch and the power supply will not start.

Possible Causes: This is typically caused by the inverter temperature exceeding 90° C caused by a dirty heat sink or failed cooling fan. Other causes: damaged sensor wiring, failed sensor or open inverter capacitor.

INVERTER FAULT –

Symptoms: The **INVERTER FAULT** LED is lit on the membrane switch and the power supply will not start.

Possible Causes: This is typically caused by the inverter(s) failing, a control board failure, or a wiring problem between the inverter(s) and the control board.

Compak™ 2000 Deluxe

STATION INTERLOCK –

Symptoms: Only the **STATION INTERLOCK** LED is lit on the front panel as the graphic display scrolls through a list of affected interlocks. The power supply will not start.

Possible Causes: This is typically caused by any system, customer or option interlock that is open on your treater system. Confirm that the ground roll is turning, the exhaust blower is on and the electrode assembly(s) is in the treat position. Also confirm that any customer or option interlocks are closed.

FAULT –

Symptom #1: The **FAULT** LED is lit on the membrane switch when the **START** pushbutton is pressed. It typically flashes on and off as the power supply cycles, but will be continuously lit after the power supply cycles several times. You may also see a bright flash at your station.

Possible Causes: See the causes listed under Compak™ 2000 H.V. Trip.

Symptom #2: The **FAULT** LED is continuously lit.

Possible Causes: Record the information listed on the display screen and contact Enercon.

STATION INTERLOCK – & FAULT –

Symptoms: Both the **STATION INTERLOCK** and **FAULT** LEDs are lit.

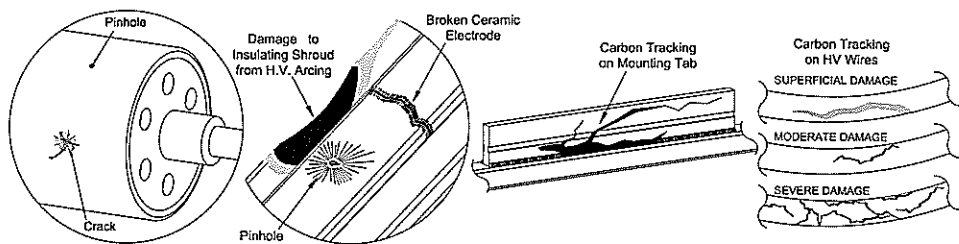
Possible Causes: This is typically caused by an interlock that opens while the power supply is running. Refer to the causes listed under STATION INTERLOCK.

HV Trip Troubleshooting

If your system is experiencing a H.V. Trip (GEN) the power supply will typically cycle on and off, and the trip indication on your control interface will flash on and off. If the H.V. Trip (GEN) indication is a solid display, contact customer service for troubleshooting assistance to resolve this H.V. Trip issue.

Perform the following:

1. Reduce the selected output power (kW) setpoint to minimum and attempt to restart the power supply.
 - a. If the H.V. Trip occurs immediately you most likely have a failed electrode or roll covering.
 - b. If the power supply does not trip, slowly raise the output power setpoint until the H.V. trip occurs or the power supply reaches its full output.
 - i) If the H.V. Trip does not reoccur, you may be dealing with a moisture issue within the station that may be resolved by starting and running at minimum for a few minutes.
 - ii) If the H.V. Trip reoccurs you may have a station cleanliness issue or a wiring issue resulting in H.V. arcing once the output power level reaches a level that will allow the H.V. to arc.
2. Locate the arcing within your station.
 - a. Remove the access covers on the station to allow visual inspection of the H.V. plenum. Ensure the H.V. wiring is in good shape and are of the proper length, refer to Page 18.
 - b. With an observer near the station, start the power supply and allow the H.V. Trip to cycle the power supply while the observer looks over the station. Do *not* place hands or objects within the station frame or plenum while the system is attempting to run!
 - c. Whether you see flashing or not in the station, shut off the power supply and stop your product line. Lock and tag out your treater system to allow safe inspection of the station.
 - i) If a flash was visible within the station or plenum, perform a visual inspection of the station or plenum in the area of the flash to determine what is causing the arc. Look for signs of dirt buildup, carbon tracking on any of the surfaces, broken or pinholed electrodes, and pinholes or cracking of the ground roll surface.
 - ii) If no flash was detected, or if the exact location could not be pinpointed, you will want to do a more thorough inspection of the station frame and plenum which should include opening and inspecting the electrode assemblies.
 - iii) If no evidence of arcing was found during your inspection, contact customer service.



3. Clean, Repair or Replace.

- a. If the damage from the H.V. arcing is superficial, and is being caused by a buildup of dirt or debris, you will only need to clean the station and ensure that any blackening caused by the arcing is completely removed.
- b. If the damage is moderate or if the arcing is being caused by wiring that is too long or out of position you should be able to repair most of the assembly components that have moderate damage. The wiring can often be shortened, rerouted or moved back to their original position.
- c. If the damage is severe you will need to replace the damaged components.

Testing Methods For Surface Tension

Non-porous substrates need to have their surface energies increased for use in a number of packaging applications. There are two commonly accepted methods for determining the surface tension level of a treated substrate. These methods are dyne solution testing and contact angle testing. The following is a brief description of each of these methods.

Dyne Solution Testing

The generally accepted solution to verify dyne levels or surface energy is a mixture of Ethyl Cellosolve and Formamide (Dyne Solution). This solution contains a dye to make it easier to see. When using these wetting tension solutions, all safety precautions as listed on the labels should be observed. These solutions also have a shelf life of only around six months, so they should be properly dated at time of initial use and replaced when the expiration date has been reached. If this isn't done, false dyne information could result, along with a rejection of treated material by the customer.

There are three methods that are generally used to check the surface energy of a substrate using Ethyl Cellosolve and Formamide (Dyne Solution). They are the cotton-swab applicator method, the dyne-pen method, and the draw-down test method. All three of these methods can be performed at the production line, allowing a real time measurement of surface tensions. Please see page 22 for a more detailed description on how to perform these tests.

Contact Angle Testing

This is a method of measuring the surface tension of a non-porous substrate using a contact angle tester and a drop of water. In this test a drop of water is placed on the substrate and measured by projecting the drop onto a background chart and measuring the angle on the chart. Due to the variety of manufacturers of contact angle testing equipment, each manufacturer's testing procedure should be followed on their equipment. Due to the equipment involved, this test is usually performed in a lab environment.

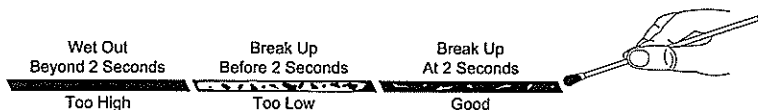
Both of these testing methods are accurate, but they do not translate to each other directly. In other words, a specific contact angle does not equal a specific dyne level. These tests should each be performed as a stand alone test and not as a comparison against each other.

Application Methods For Dyne Solutions

For all of the application methods listed below Dyne Solutions of various levels are placed on the substrate until a solution is found that wets out properly.

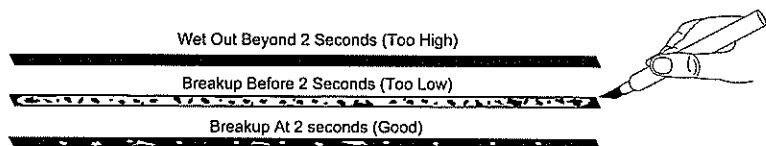
The Cotton Applicator Method:

Place a few drops of a calibrated Dyne Solution onto the tip of a clean cotton applicator, or lightly immerse the applicator tip into the Dyne Solution container. Be aware that if a clean applicator is not used contamination of the solution may result. The solution is spread lightly over approximately one square inch of the test material. Compare your results with the results shown below. Repeat the procedure until a solution is found that breaks up properly on the surface of the material. This method has been a standard for years but is still somewhat subjective and inconsistent because of the variables involved in the application of the fluid to the substrate.



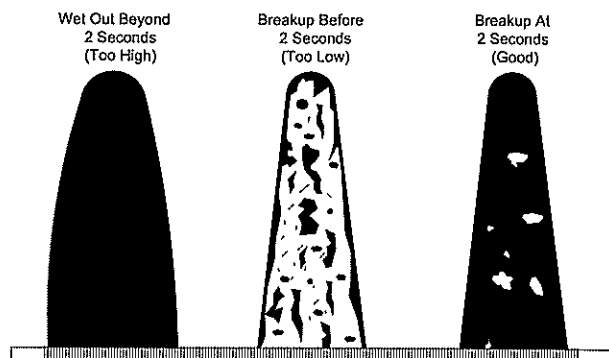
The Dyne-Pen Method:

This method is typically used by the operator as a quick check of the treat level of a substrate. The Pens, resembling felt-tip markers, are pulled across the entire web in a straight line. Compare your results with the results shown below. Repeat the procedure until a solution is found that breaks up properly on the surface of the material. This method can also quickly determine which side is treated or if there is any back-side treatment. This method can be somewhat subjective and inconsistent mainly due to the possible contamination of the pen tip with incorrect use.



The Draw-Down Test Method:

This is the most accurate of the surface-energy measurement tests. Cut a substrate sample, approximately 8 1/2 x 11 inches, and clamp it to a clipboard. Horizontally across the top of the sample place single drops of three different level dyne solutions that bracket the desired treat level. A wire wound metering rod is placed just above the drops and pulled down. The tester will look for the proper breakup results of all 3 as described previously. This test tends to be more

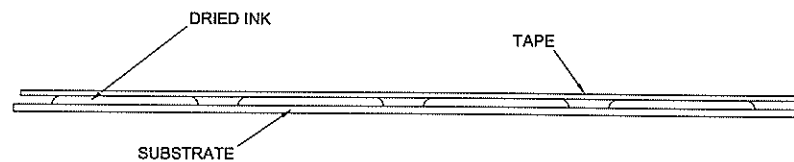


Backside / Low Treatment Test

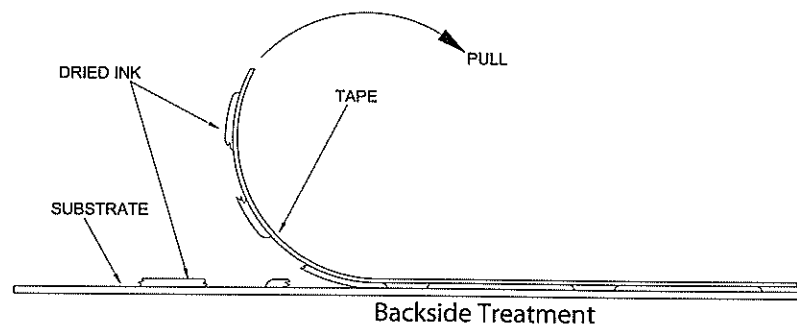
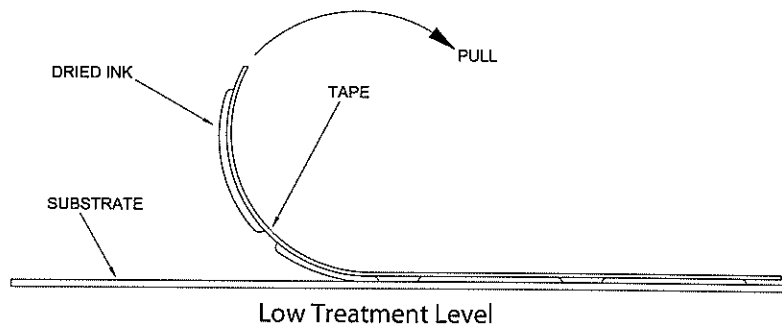
Low treatment levels often cause problems with the adhesion of inks and laminates for the entire length and width of the web. Backside treatment will often cause spotty adhesion problems occurring randomly across the entire length and width of the web.

Laminates often do not adhere to the surfaces or delaminate easily in product testing when the treatment level is low. Backside treatment can cause the final product to look spotty when delamination occurs at the point where backside treatment has occurred, often showing air pockets between the laminated layers. Visual inspection and performing a pull test of the laminated layers is often the best way to test for either of these problems.

Inks can bead up during the printing process, or will pull away from the substrate after they have dried. Low treatment levels will often cause the ink to bead or pull away across the entire web, but backside treated areas will often only pull away in the spots that have been exposed to backside treatment. A pull test can aid in determining if a product has a low treatment level or has been exposed to backside treatment. This is done by placing tape across the web on top of the dried ink.



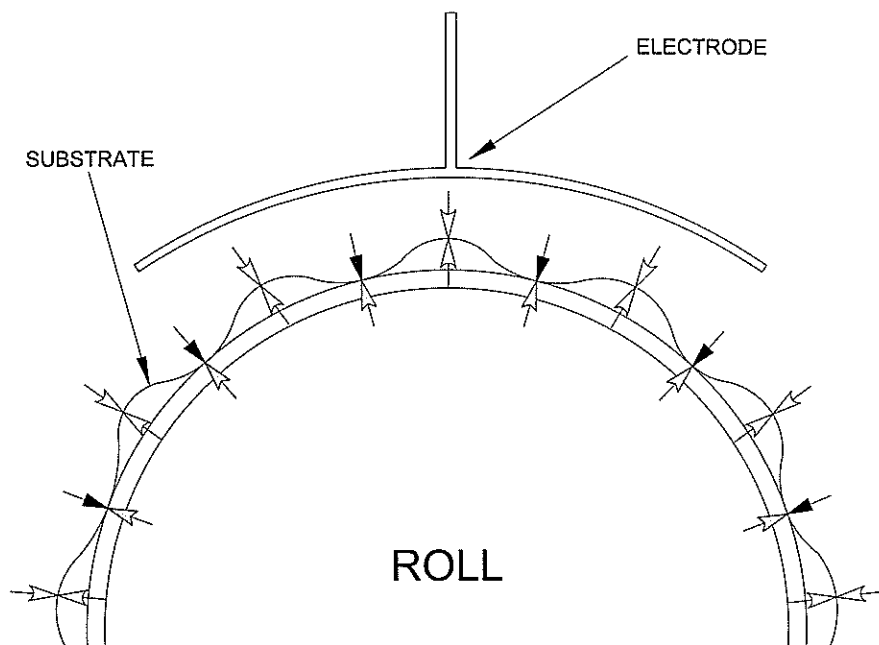
Once the tape is firmly attached across the web, pull the tape off of the substrate and observe the results of the test.



If you observe low treatment level results, increasing your output appropriately should take care of this problem. If you observe backside treatment results see page 24 for a more detailed explanation of possible causes and how to correct them. If the tape is pulled away clean then the treatment is at a good level.

Backside Treatment Troubleshooting

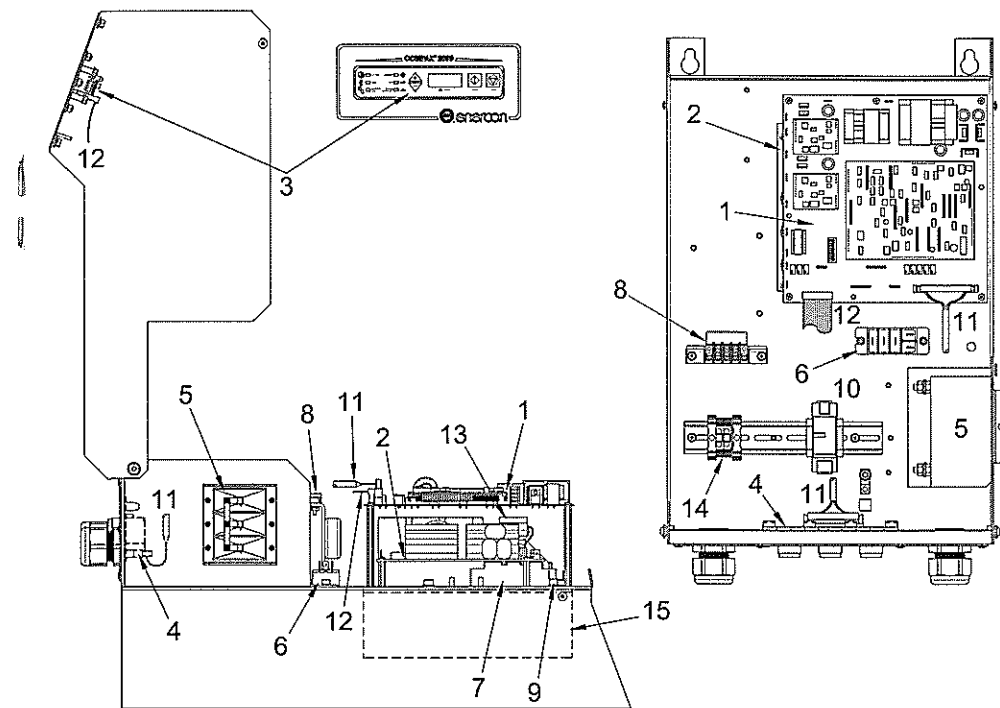
Backside Treatment occurs when air is trapped between the backside of the web and the ground roll. The air beneath the web is ionized and the backside of the web is corona treated. This condition not only treats the backside of the web, but decreases the treatment to the front side of the web. Several conditions may cause air to be trapped behind the web, see the table below for troubleshooting tips.



↑ HIGH TREATMENT (100%)
 ↑ LOW OR NO TREATMENT (0-5%)
 ↑ 50% TREATMENT

| Causes | Solutions |
|---------------------|---|
| Wrinkles In Film | 1. Nip the web on entry into the ground roll. 2. Increase the wrap of web around ground roll. |
| Line Speed Too Fast | 1. Decrease your line speed. |
| Dirty Ground Roll | 1. Clean the ground roll. 2. Include cleaning of the ground roll on your company's maintenance program. |
| Low Web Tension | 1. Ensure the web is threaded properly. 2. Increase the number of idler rolls in the web path to increase web tension. |

1 - 3 kW Compak™ 2000

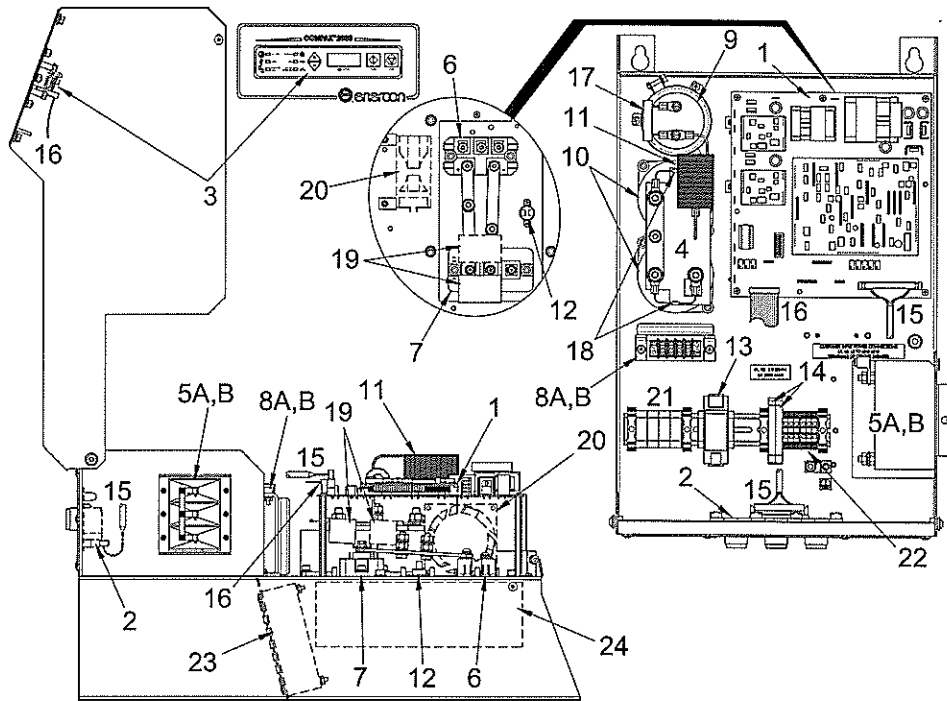


| Item # | Part # | Description | Qty. |
|--------|-----------|---------------------------------|------|
| 1 | LM4027-** | Control Board | 1 |
| 2 | LM3415-** | Power Board | 1 |
| 3 | LM3497-06 | Membrane Assembly | 1 |
| 4 | LM3958-** | Modular 2000 Treater I/O Module | 1 |
| 5 | CB0275 | Circuit Breaker | 1 |
| 6 | BR0013 | Rectifier | 1 |
| 7 | LM3589-02 | Inverter Power Module | 1 |
| 8 | LM4167-01 | Current Transformer | 1 |
| 9 | SE0158 | Temperature Sensor Switch, TASI | 1 |
| 10 | EM0256 | 24V DC Power Supply | 1 |
| 11 | CA1050 | Ribbon Cable (40 Pin) | 1 |
| 12 | CA1014 | Ribbon Cable (13 Pin) | 1 |
| 13 | LM4041-01 | Snubber Capacitor Assembly | 1 |
| 14 | TB0537 | Output Terminal Block | 2 |
| 15 | FD5373-03 | Power Supply Heat Sink | 1 |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

PART BREAKDOWN

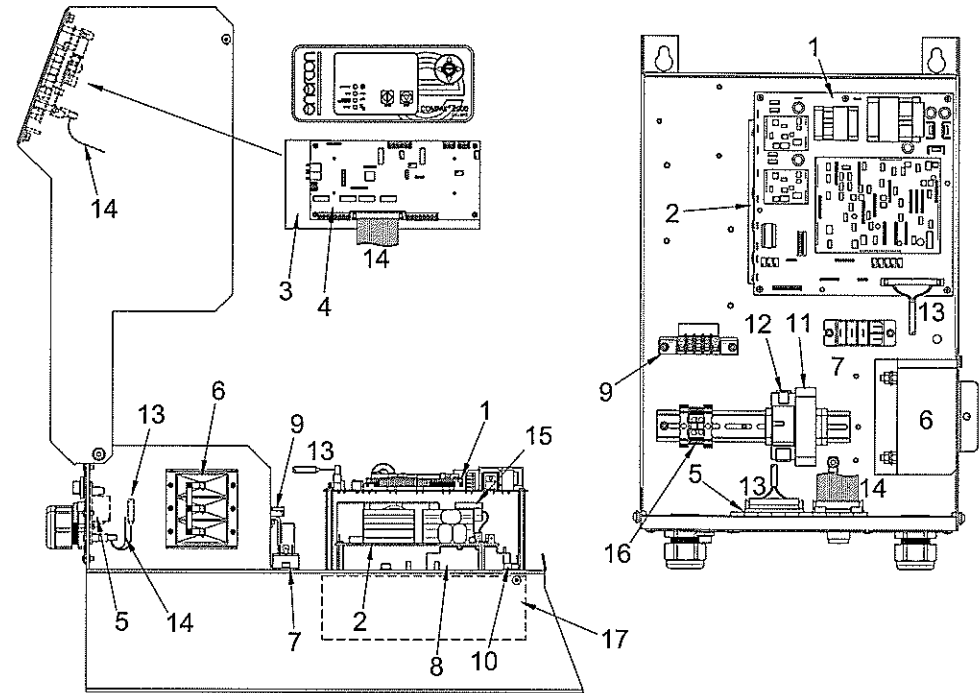
4 - 10 kW Compak™ 2000



| Item # | Part # | Description | Qty |
|--------|-----------|----------------------------------|--------------------|
| 1 | LM4027-** | Control Board | 1 |
| 2 | LM3958-** | Modular 2000 Treater I/O Module | 1 |
| 3 | LM3497-06 | Membrane Switch Assembly | 1 |
| 4 | LM5756-01 | Capacitor Trip Board | 1 |
| 5A | CB0278 | Circuit Breaker (4 - 5KW) | 1 |
| 5B | CB0276 | Circuit Breaker (7.5 - 10KW) | 1 |
| 6 | BR0015 | Bridge Rectifier | 1 |
| 7 | LM3751-03 | Inverter Power Module | 1 |
| 8A | LM1982-17 | Output CT - Multi-Tap (4-7.5KW) | 1 |
| 8B | LM1982-33 | Output CT - Multi-Tap (10KW) | 1 |
| 9 | CP1282 | DC Bus Capacitor | 1 |
| 10 | CP0200 | Capacitor 100uf 800 VDC | 2 |
| 11 | FD5339-04 | Inductor Coil | 1 |
| 12 | SE0158 | Temperature Sensor Switch, TASI | 1 |
| 13 | EM0256 | 24V DC Power Supply | 1 |
| 14 | TB0110 | Fused Terminal Block, 250V 2 Amp | 2 |
| 15 | CA1050 | Ribbon Cable (40 Pin) | 1 |
| 16 | CA1014 | Ribbon Cable (13 Pin) | 1 |
| 17 | LM4043-02 | Bleeder Resistor Assembly | 1 |
| 18 | RE0735 | Resistor | 2 |
| 19 | CP0070 | Snubber Capacitor | 1 (4-7.5) / 2 (10) |
| 20 | FA0086 | Cooling Fan (10KW Only) | 1 |
| 21 | TB0546 | Output Terminal Blocks | 4 |
| 22 | - - | Terminal Blocks | Varies |
| 23 | FA0030 | Cooling Fan | 1 |
| 24 | FD5373-03 | Power Supply Heat Sink | 1 |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

1 - 3 kW Compak™ 2000 Deluxe



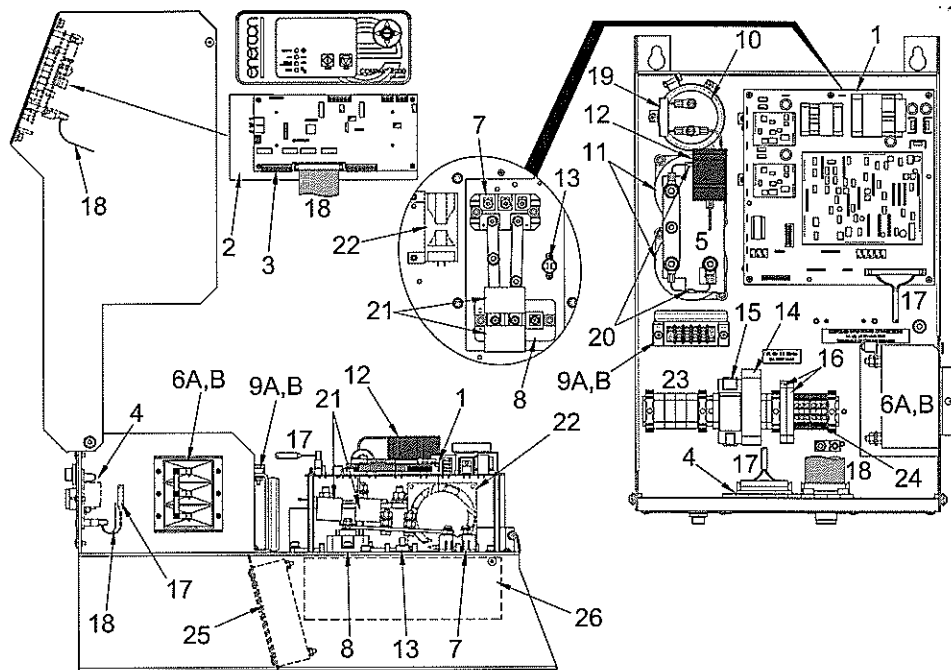
| Item # | Part # | Description | Qty. |
|--------|-----------|---------------------------------|------|
| 1 | LM4027-** | Control Board | 1 |
| 2 | LM3415-05 | Power Board | 1 |
| 3 | LM4867-01 | Keypad Board | 1 |
| 4 | LM4823-** | HF Display Board | 1 |
| 5 | LM5095-01 | Deluxe 2000 Treater I/O Module | 1 |
| 6 | CB0275 | Circuit Breaker | 1 |
| 7 | BR0013 | Rectifier | 1 |
| 8 | LM3589-02 | Inverter Power Module | 1 |
| 9 | LM4167-01 | Current Transformer | 1 |
| 10 | SE0158 | Temperature Sensor Switch, TASI | 1 |
| 11 | EM0054 | 5V DC power Supply | 1 |
| 12 | EM0256 | 24V DC Power Supply | 1 |
| 13 | CA1050 | Ribbon Cable (40 Pin) | 1 |
| 14 | CA1005 | Ribbon Cable (34 Pin) | 1 |
| 15 | LM4041-01 | Snubber Capacitor Assembly | 1 |
| 16 | TB0537 | Output Terminal Blocks | 2 |
| 17 | FD5373-03 | Power Supply Heat Sink | 1 |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

PART BREAKDOWN

PART BREAKDOWN

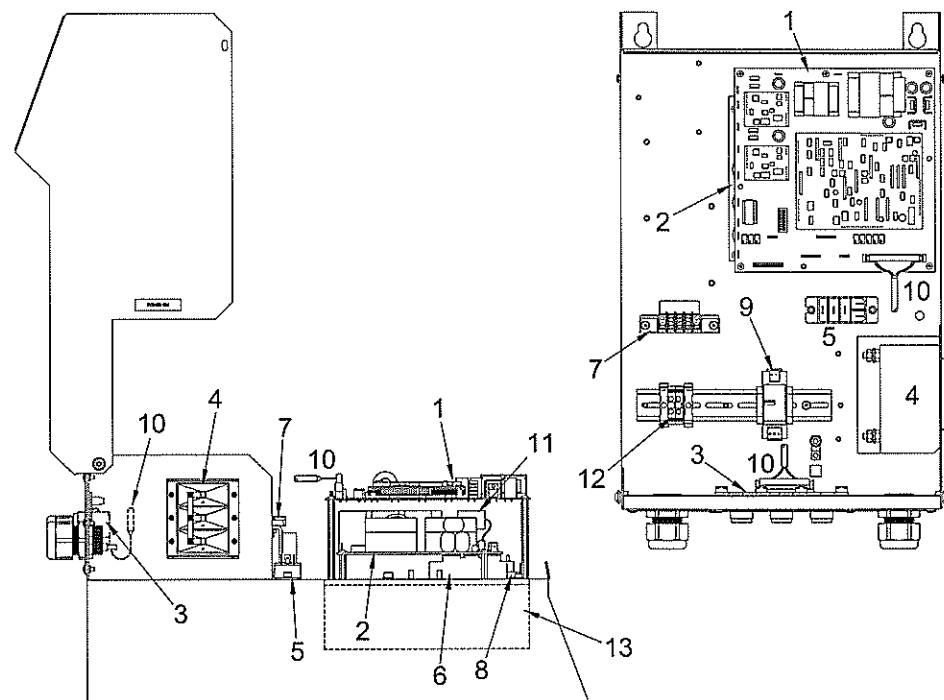
4 - 10 kW Compak™ 2000 Deluxe



| Item # | Part # | Description | Qty |
|--------|-----------|----------------------------------|--------------------|
| 1 | LM4027-** | Control Board | 1 |
| 2 | LM4867-01 | Keypad Board | 1 |
| 3 | LM4823-** | HF Display Board | 1 |
| 4 | LM5095-01 | Deluxe 2000 Treater I/O Module | 1 |
| 5 | LM5756-01 | Capacitor Trip Board | 1 |
| 6A | CB0278 | Circuit Breaker (4-7.5KW) | 1 |
| 6B | CB0276 | Circuit Breaker (10KW) | 1 |
| 7 | BR0015 | Bridge Rectifier | 1 |
| 8 | LM3751-03 | Inverter Power Module | 1 |
| 9A | LM1982-32 | Output CT - Multi-Tap (4-7.5KW) | 1 |
| 9B | LM1982-33 | Output CT - Multi-Tap (10KW) | 1 |
| 10 | CP1282 | DC Bus Capacitor | 1 |
| 11 | CP0200 | Capacitor 100uf 800 VDC | 2 |
| 12 | FD5339-04 | Inductor Coil | 1 |
| 13 | SE0158 | Temperature Sensor Switch, TASI | 1 |
| 14 | EM0054 | 5V DC power Supply | 1 |
| 15 | EM0256 | 24V DC Power Supply | 1 |
| 16 | TB0110 | Fused Terminal Block, 250V 2 Amp | 2 |
| 17 | CA1050 | Ribbon Cable (40 Pin) | 1 |
| 18 | CA1005 | Ribbon Cable (34 Pin) | 1 |
| 19 | LM4043-02 | Bleeder Resistor Assembly | 1 |
| 20 | RE0735 | Resistor | 2 |
| 21 | CP0070 | Snubber Capacitor | 1 (4-7.5) / 2 (10) |
| 22 | FA0086 | Cooling Fan (10KW Only) | 1 |
| 23 | TB0546 | Output Terminal Blocks | 4 |
| 24 | -- | Terminal Blocks | As Required |
| 25 | FD5373-03 | Power Supply Heat Sink | 1 |
| 26 | FA0030 | Heat Sink Cooling Fan | 1 |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

1 - 3 kW CoronaFlex™ Power Supply



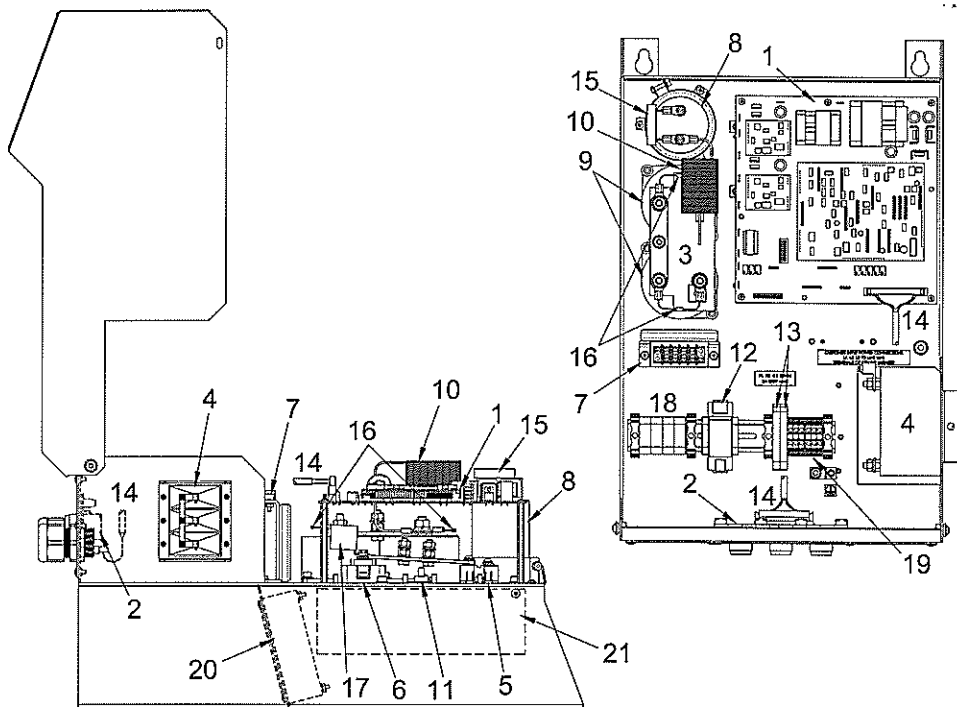
| Item # | Part # | Description | Qty. |
|--------|-----------|---------------------------------|------|
| 1 | LM4027-04 | Control Board | 1 |
| 2 | LM3415-05 | Power Board | 1 |
| 3 | LM3958-06 | 2000 Treater I/O Module | 1 |
| 4 | CB0275 | Circuit Breaker | 1 |
| 5 | BR0013 | Rectifier | 1 |
| 6 | LM3589-02 | Inverter Power Module | 1 |
| 7 | LM4167-01 | Current Transformer | 1 |
| 8 | SE0158 | Temperature Sensor Switch, TASI | 1 |
| 9 | EM0256 | 24V DC Power Supply | 1 |
| 10 | CA1050 | Ribbon Cable (40 Pin) | 1 |
| 11 | LM4041-01 | Snubber Capacitor Assembly | 1 |
| 12 | TB0537 | Output Terminal Blocks | 2 |
| 13 | FD5373-03 | Power Supply Heat Sink | 1 |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

PART BREAKDOWN

PART BREAKDOWN

4 - 5 kW CoronaFlex™ Power Supply

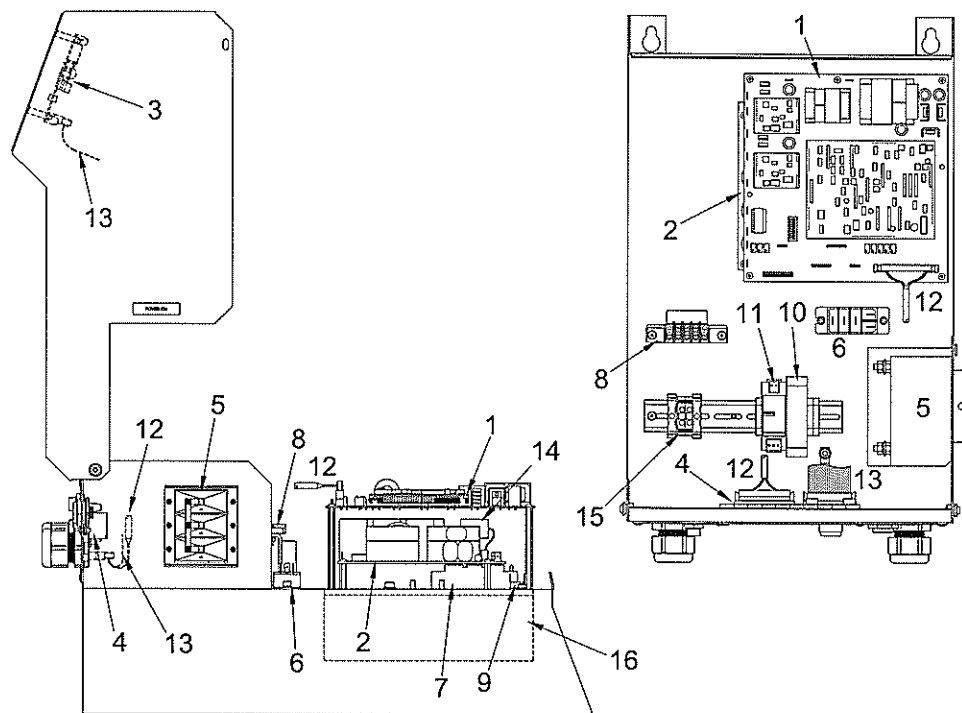


PART BREAKDOWN

| Item # | Part # | Description | Qty |
|--------|-----------|----------------------------------|-------------|
| 1 | LM4027-** | Control Board | 1 |
| 2 | LM5095-01 | 2000 Treater I/O Module | 1 |
| 3 | LM5756-01 | Capacitor Trip Board | 1 |
| 4 | CB0278 | Circuit Breaker | 1 |
| 5 | BR0015 | Bridge Rectifier | 1 |
| 6 | LM3751-03 | Inverter Power Module | 1 |
| 7 | LM1982-32 | Output CT - Multi-Tap | 1 |
| 8 | CP1282 | DC Bus Capacitor | 1 |
| 9 | CP0200 | Capacitor 100uf 800 VDC | 2 |
| 10 | FD5339-04 | Inductor Coil | 1 |
| 11 | SE0158 | Temperature Sensor Switch, TASI | 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 | LM4043-02 | Bleeder Resistor Assembly | 1 |
| 16 | RE0735 | Resistor | 2 |
| 17 | CP0070 | Snubber Capacitor | 1 |
| 18 | TB0546 | Output Terminal Blocks | 4 |
| 19 | - - | Terminal Blocks | As Required |
| 20 | FA0030 | Heat Sink Cooling Fan | 1 |
| 21 | FD5373-03 | Power Supply Heat Sink | 1 |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

1 - 3 kW CoronaFlex™ Deluxe Power Supply

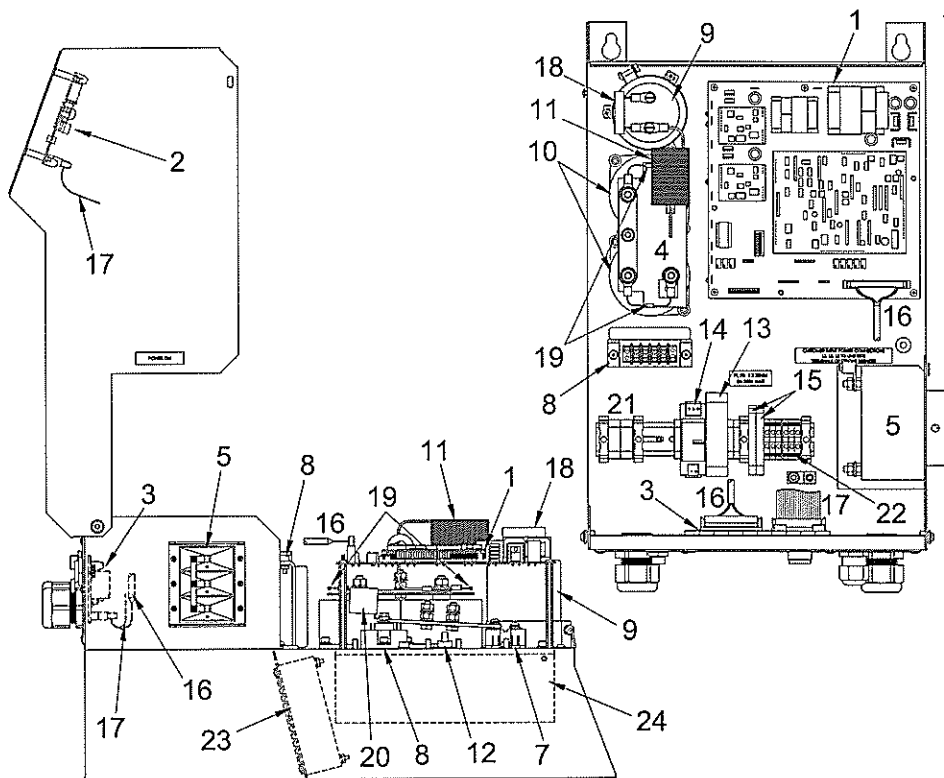


PART BREAKDOWN

| Item # | Part # | Description | Qty. |
|--------|-----------|---------------------------------|-------------|
| 1 | LM4027-** | Control Board | 1 |
| 2 | LM3415-05 | Power Board | 1 |
| 3 | LM4823-** | HF Display Board | 1 |
| 4 | LM5095-01 | Deluxe 2000 Treater I/O Module | 1 |
| 5 | CB0275 | Circuit Breaker | 1 |
| 6 | BR0013 | Rectifier | 1 |
| 7 | LM3589-02 | Inverter Power Module | 1 |
| 8 | LM4167-01 | Current Transformer | 1 |
| 9 | SE0158 | Temperature Sensor Switch, TASI | 1 |
| 10 | EM0054 | 5V DC power Supply | 1 |
| 11 | EM0256 | 24V DC Power Supply | 1 |
| 12 | CA1050 | Ribbon Cable (40 Pin) | 1 |
| 13 | CA1005 | Ribbon Cable (34 Pin) | 1 |
| 14 | LM4041-01 | Snubber Capacitor Assembly | 1 |
| 15 | TB0537 | Output Terminal Blocks | As Required |
| 16 | FD5373-03 | Power Supply Heat Sink | 1 |

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4 - 5 kW CoronaFlex™ Deluxe Power Supply

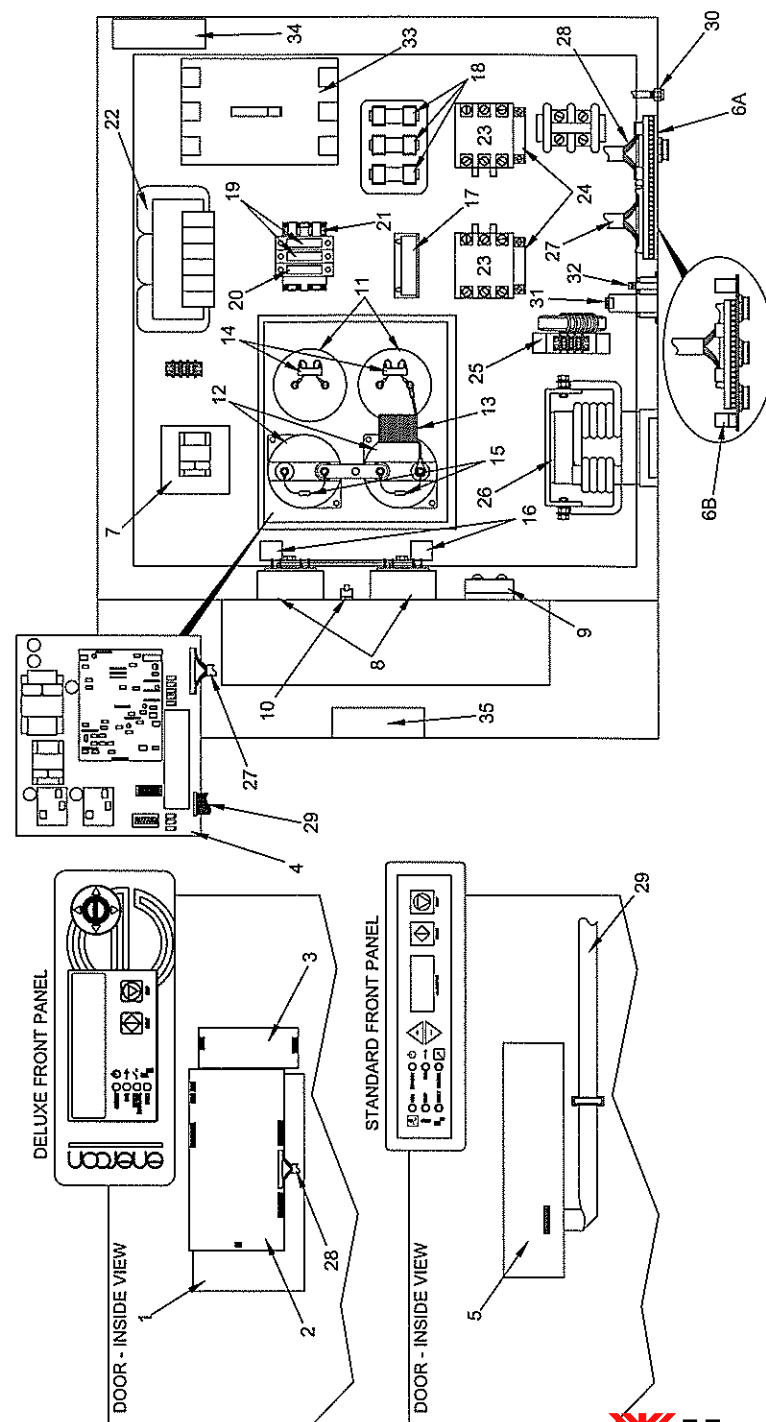


PART BREAKDOWN

| Item # | Part # | Description | Qty |
|--------|-----------|----------------------------------|-------------|
| 1 | LM4027-** | Control Board | 1 |
| 2 | LM4823-** | HF Display Board | 1 |
| 3 | LM5095-01 | Deluxe 2000 Treater I/O Module | 1 |
| 4 | LM5756-01 | Capacitor Trip Board | 1 |
| 5 | CB0278 | Circuit Breaker | 1 |
| 6 | BR0015 | Bridge Rectifier | 1 |
| 7 | LM3751-03 | Inverter Power Module | 1 |
| 8 | LM1982-32 | Output CT - Multi-Tap | 1 |
| 9 | CP1282 | DC Bus Capacitor | 1 |
| 10 | CP0200 | Capacitor 100uf 800 VDC | 2 |
| 11 | FD5339-04 | Inductor Coil | 1 |
| 12 | SE0158 | Temperature Sensor Switch, TASI | 1 |
| 13 | EM0054 | 5V DC power Supply | 1 |
| 14 | EM0256 | 24V DC Power Supply | 1 |
| 15 | TB0110 | Fused Terminal Block, 250V 2 Amp | 2 |
| 16 | CA1050 | Ribbon Cable (40 Pin) | 1 |
| 17 | CA1005 | Ribbon Cable (34 Pin) | 1 |
| 18 | LM4043-02 | Bleeder Resistor Assembly | 1 |
| 19 | RE0735 | Resistor | 2 |
| 20 | CP0070 | Snubber Capacitor | 1 |
| 21 | TB0546 | Output Terminal Blocks | 4 |
| 22 | - - | Terminal Blocks | As Required |
| 23 | FD5373-03 | Power Supply Heat Sink | 1 |
| 24 | FA0030 | Heat Sink Cooling Fan | 1 |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

12 - 15 kW Compak™ 2000



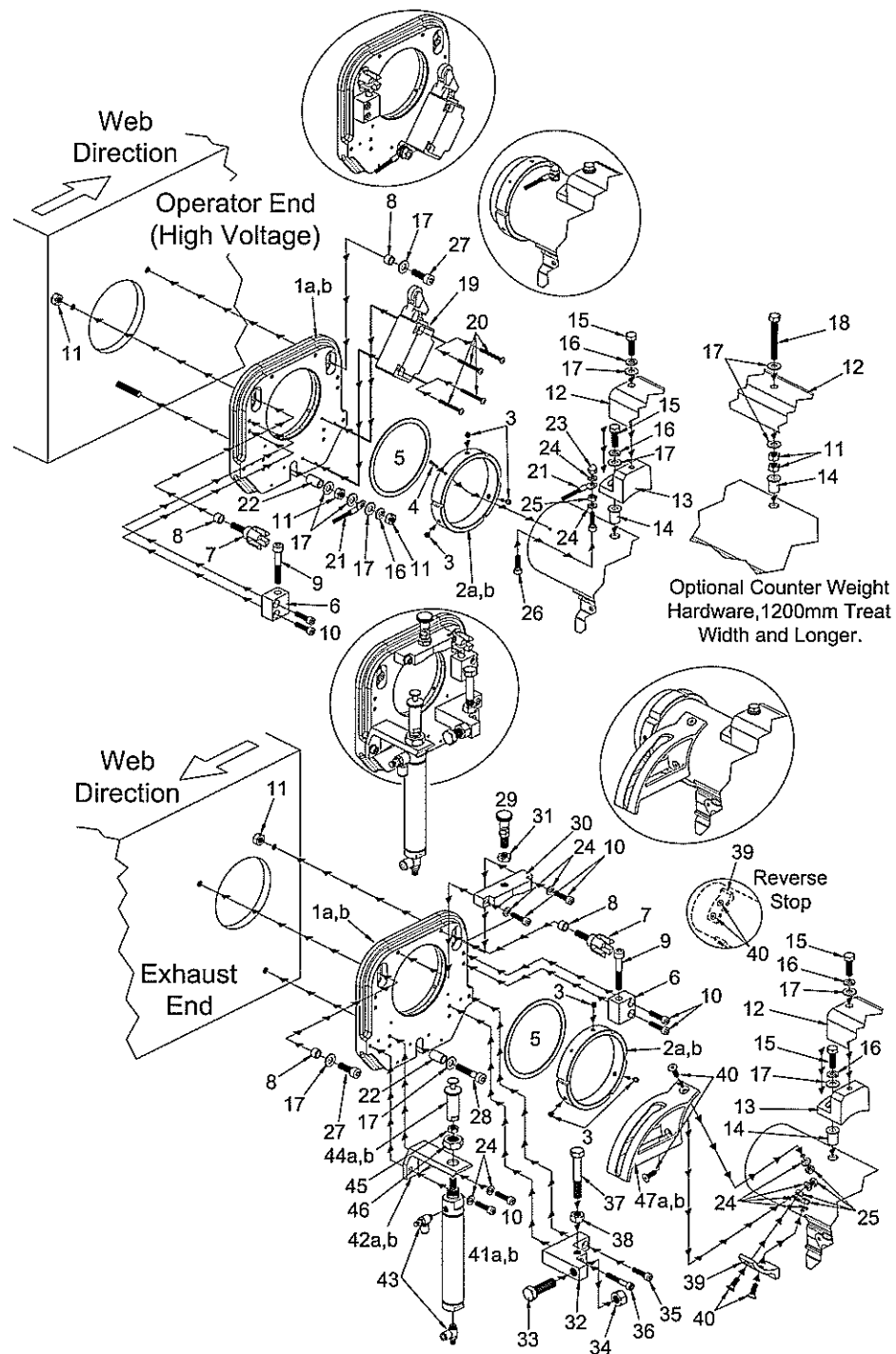
PART BREAKDOWN

12 - 15 kW Compak™ 2000

| Index # | Part # | Description | Qty |
|---------|------------------|---|-----|
| 1 | LM4867-01 | Keypad Board (Deluxe 2000 Only) | 1 |
| 2 | LM4823-06 | HF Display Board (Deluxe 2000 Only) | 1 |
| 3 | EM0053 | 5V DC power Supply (Deluxe 2000 Only) | 1 |
| 4 | LM4027-** | Control Board | 1 |
| 5 | LM3497-06 | Membrane Switch Assembly (Standard 2000 Only) | 1 |
| 6A | LM5095-01 | Deluxe 2000 I/O Board | 1 |
| 6B | LM3958-03 | Standard 2000 I/O Board | 1 |
| 7 | LM4106-02 | Soft Start Board | 1 |
| 8 | LM3936-** | Inverter | 1 |
| 9 | BR0015 | Rectifier | 1 |
| 10 | SE0158 | Temperature Sensor | 1 |
| 11 | CP1282 | DC Bus Capacitor | 2 |
| 12 | CP0200 | Output Capacitor | 2 |
| 13 | FD5339-05 | Inductor Coil | 1 |
| 14 | LM4043-02 | Bleeder Resistors | 2 |
| 15 | RE0735 | Resistor | 2 |
| 16 | CP0070 | Snubber Capacitor | 2 |
| 17 | RE4902 | Soft Start Resistors | 3 |
| 18 | FU0586 | Fuse 40A, 600V | 3 |
| 19 | FU0361 | Fuse 2A | 2 |
| 20 | FU0360 | Fuse 1.5A | 1 |
| 21 | TF0146 | Control Transformer | 1 |
| 22 | LF0020 | Line Choke | 1 |
| 23 | *Contact Enercon | Contactor | 2 |
| 24 | *Contact Enercon | Auxiliary Contactor | 2 |
| 25 | LM1982-11 | Output CT | 1 |
| 26 | LM4682-** | Output Reactor – Not included in all Power Supplies | 1 |
| 27 | CA1050 | Ribbon Cable 40-pin 17" Long | 1 |
| 28 | CA1068 | Ribbon Cable 34-pin 48" Long (Deluxe 2000 Only) | 1 |
| 29 | CA1018 | Ribbon Cable 13-pin 32" Long (Standard 2000 Only) | 1 |
| 30 | LM5260-08 | Remote Control Connector (Deluxe 2000 Only) | 1 |
| 31 | EM0256 | 24V DC Power Supply (Deluxe 2000 Only) | 1 |
| 32 | RL0065 | Relay module, N.O. Contact (Deluxe 2000 Only) | 1 |
| 33 | CB0092 | Circuit Breaker | 1 |
| 34 | FA0080 | Cooling Fan | 1 |
| 35 | FA0050 | Cooling Fan | 1 |

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Electrode Assembly Common Parts



PART BREAKDOWN

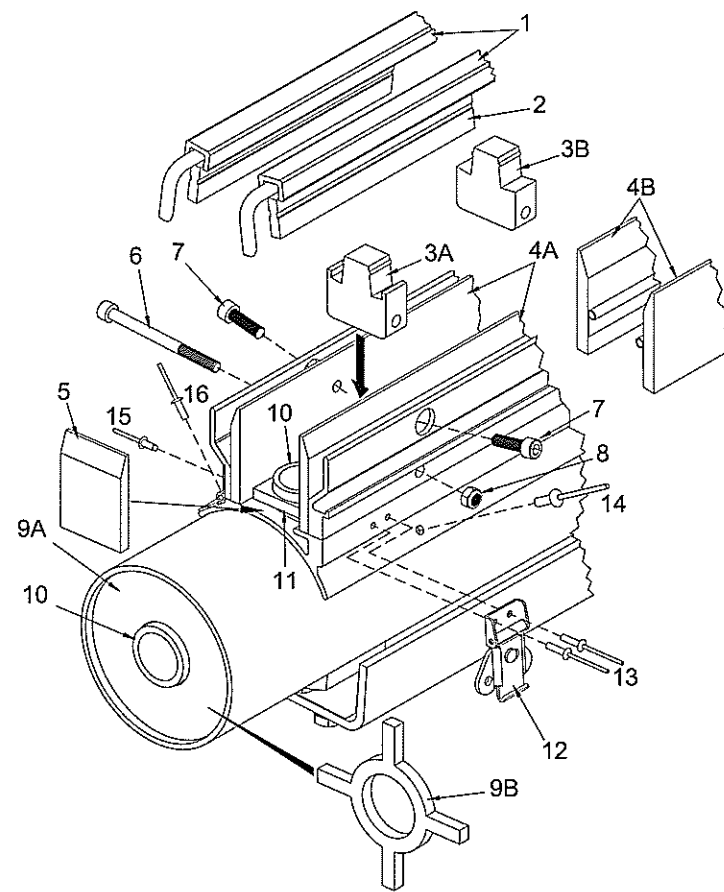
PART BREAKDOWN

Electrode Assembly Common Parts

| Item # | Part # | Description | Qty |
|--------|------------------|---|---------|
| 1a | LM4728-04 | Plastic Bearing Replacement Kit | 2 |
| 1b | LM4791-03 | Plastic Bearing Retrofit Kit (Includes item 1a and item 5) | -- |
| 2a | FD3914-01 | Aluminum Ring With Notch | 2 |
| 2b | LM5693-01 | Aluminum Ring Assembly (Includes 1 of Item 2a & 3 of item 3) | -- |
| 3 | MS7420 | Socket Head Set Screw | 6 |
| 4 | SP0052 | Spring Pin 1/8 x 3/4" | 1 |
| 5 | FD5975-01 | Bushing Ring | 2 |
| 6 | FD4109-04 | Adjustment Block | 2 |
| 7 | FD4110-04 | Adjustment Stud | 2 |
| 8 | FD4027-01 | Bearing Housing Spacer | 4 |
| 9 | MM080-125S050S-0 | Socket Head Screw M8 x 1.25P x 50 | 2 |
| 10 | MM060-100S025S-0 | Socket Head Screw M6 x 1.0P x 25 (Standard - Optional Qty) | 6 - 8 |
| 11 | NU2001 | Hex Nut M8 x 1.25P (Standard - Optional Qty) | 4 - 6 |
| 12 | FD6389-xxxx | Counter Weight (Lengths Vary) | 1 |
| 13 | FD5611-06 | Counterweight Adjustment Block | 2 |
| 14 | NU7379 | Rivet Nut M8 x 1.25P (Standard - Optional Qty) | 2 - 3 |
| 15 | MM080-125H025S-0 | Hex Head Screw M8 x 1.25P x 25 | 4 |
| 16 | WA1600 | Lock Washer | 5 |
| 17 | WA4056 | Flat Washer (Standard Qty - Optional Qty) | 10 - 12 |
| 18 | MM080-125H060S-0 | Hex Head Cap Screw M8 x 1.25P x 60 (Optional) | 1 |
| 19 | SW7010 | Interlock Switch | 1 |
| 20 | MM040-070P040S-0 | Fillister Screw M4 x 0.7P x 40 | 4 |
| 21 | LM3772-01 | Ground Strap | 1 |
| 22 | FD4027-02 | Bearing Housing Spacer | 2 |
| 23 | NU0030 | Acorn Nut M6 x 1.0P | 1 |
| 24 | WA1555 | Lock Washer (Standard - Optional Qty) | 8 - 12 |
| 25 | NU2000 | Hex Nut M6 x 1.0P (Standard - Optional Qty) | 3 - 5 |
| 26 | MM060-100S020S-0 | Socket Head Screw M6 x 1.0P x 20 | 3 |
| 27 | MM080-125S025S-0 | Socket Head Screw M8 x 1.25P x 25 | 2 |
| 28 | MM080-125S040S-0 | Socket Head Screw M8 x 1.25P x 40 | 1 |
| 29 | HW7090 | Locking Pin Indexing Plunger | 1 |
| 30 | FD4761-01 | Locking Pin Holder | 1 |
| 31 | HW7092 | Indexing Plunger Jam Nut M10 x 1.0P | 1 |
| 32 | FD4108-26 | Electrode Assembly Stop Bracket (Frame) | 1 |
| 33 | MM120-175H040S-0 | Hex Head Cap Screw, M12 x 1.75P x 40 | 1 |
| 34 | NU7321 | Hex Nut M12 x 1.75P | 1 |
| 35 | MM060-100S030S-0 | Socket Head Screw M6 x 1.0P x 30mm | 1 |
| 36 | MM060-100S040S-0 | Socket Head Screw M6 x 1.0P x 40mm | 1 |
| 37 | MM100-150H065S-0 | Hex Head Cap Screw, M10 x 1.5P, 65mm (With Reverse Stop Only) | 1 |
| 38 | NU2020 | Hex Nut M10 x 1.5P (With Reverse Stop Only) | 1 |
| 39 | FD4107-01 | Electrode Assembly Stop Bracket (Tube [Standard - Reverse Stop]) | 1 - 2 |
| 40 | MM060-100F018S-0 | Flat Socket Head Cap Screw M6 x 1.0P (Standard / Reverse Stop / Optional Qty) | 2 - 6 |
| 41a | PN7027 | Air Cylinder - 90° Option (Pneumatics Option - Shown) | 1 |
| 41b | PN7016 | Air Cylinder - Standard (Pneumatics Option - Not Shown) | 1 |
| 42a | FD3984-xx | Mounting Bracket - 90° Option (Pneumatics Option - Shown) | 1 |
| 42b | FD3984-xx | Mounting Bracket - Standard (Pneumatics Option - Not Shown) | 1 |
| 43 | PN1500 | Flow Control 1/8 NPT TO 1/4" (Pneumatics Option Only) | 2 |
| 44a | LMS465-02 | Rod Fitting - 90° Option (Pneumatics Option - Shown) | 1 |
| 44b | FD3590-01 | Rod Fitting - Standard (Pneumatics Option - Not Shown) | 1 |
| 45 | NU7022 | Jam Nut 5/16 x 24 (Pneumatics Option) | 1 |
| 46 | NU0141 | Low Profile Nut 5/8 x 18 (Pneumatics Option) | 1 |
| 47a | FD4283-xx | Lift Bracket - 90° Option (Pneumatics Option - Shown) | 1 |
| 47b | FD4213-xx | Lift Bracket - Standard (Pneumatics Option - Not Shown) | 1 |

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Ceramic Electrode Assembly



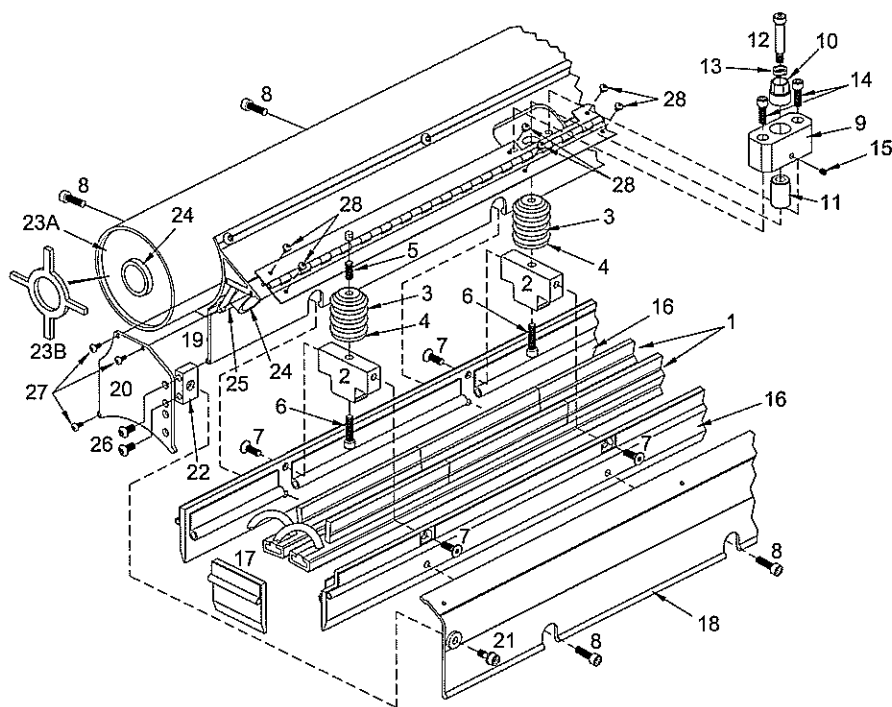
| Item # | Part # | Description | Qty |
|--------|------------------|--|---------|
| 1 | *** | Electrode | 2 |
| 2 | FD4150-01 | Electrode Mounting Tab (Included with Electrode) | As Req. |
| 3A | FD4104-01 | Standard Electrode Mounting Block | As Req. |
| 3B | FD4104-06 | EV Electrode Mounting Block | As Req. |
| 4A | *** | Standard Insulating Shroud | 2 |
| 4B | *** | EV Insulating Shroud | 2 |
| 5 | FD5376-0040 | Insulating Shroud End Piece (One at each end) | 2 |
| 6 | MM060-100S075S-0 | M6 Hex. Head. Cap Screw | As Req. |
| 7 | MS7900 | Electrode Mounting Screw | As Req. |
| 8 | NU2054 | M6 Locknut w/Nylon Insert | As Req. |
| 9A | IN7210-03 | Round Insulator for Pyrex Tube | 1 |
| 9B | IN7140-03 | Star Insulator for Pyrex Tube | 1 |
| 10 | FD4997-** | Pyrex Elbow | 1 |
| 11 | FD5700-01 | Pyrex Elbow Insulator | 1 |
| 12 | HW7060 | Twist Latch | As Req. |
| 13 | RV0125-376-500 | Blind Rivet, 1/8, .376-.500 Grip, Closed End | As Req. |
| 14 | RV0188-126-250 | Blind Rivet, 3/16, .126-.250 Grip, Closed End | As Req. |
| 15 | RV0125-032-062 | Blind Rivet, 1/8, .032-.062 Grip | As Req. |
| 16 | RV0125-126-187 | Blind Rivet, 1/8, .126-.187 Grip, Closed End | As Req. |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

PART BREAKDOWN

PART BREAKDOWN

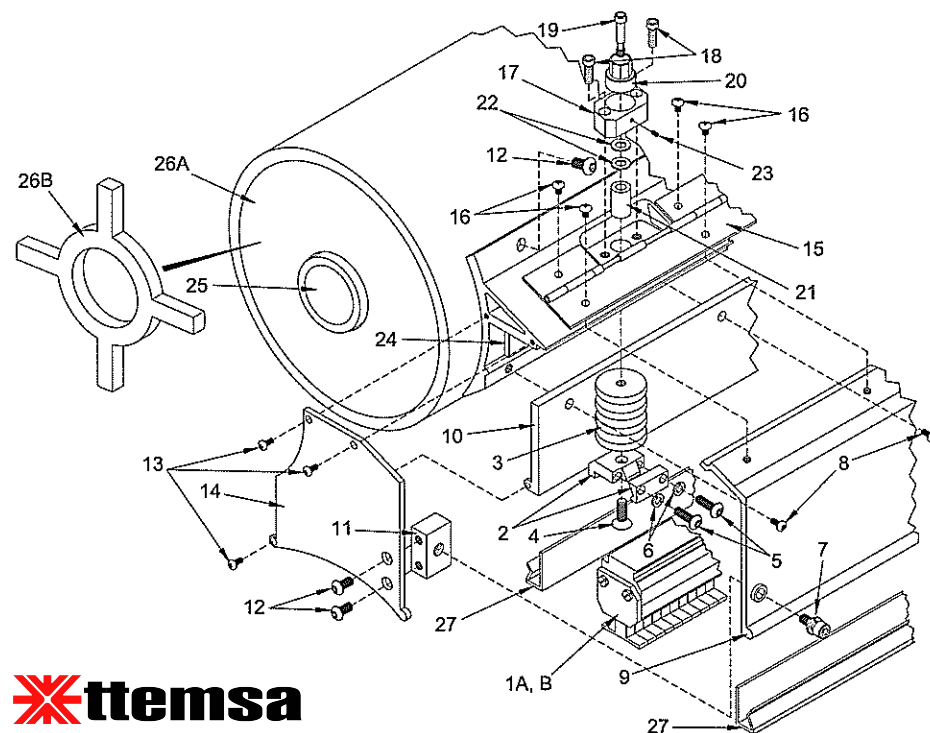
Double Wide Ceramic Electrode Assembly



| Item # | Part # | Description | Qty. |
|--------|------------------|--|---------|
| 1 | LM5405-* | Double Wide (E ²) Electrode | 2 |
| 2 | FD4105-06 | Electrode Mounting Block | As Req. |
| 3 | IN0012-02 | Glazed Alumina Post | As Req. |
| 4 | FD5255-11 | Electrode Mounting Spacer | As Req. |
| 5 | FD1127-63 | Threaded Rod, Brass | As Req. |
| 6 | MS025-20S0875S-0 | SS Socket Head Cap Screw 1/4-20 x 7/8 | As Req. |
| 7 | MM060-100F018S-0 | SS Flat Socket Head Cap Screw M6 x 1P | As Req. |
| 8 | MS0079 | Electrode Mounting Screw | As Req. |
| 9 | FD5658-01 | Fine Adjustment Mount Block | As Req. |
| 10 | FD5658-02 | Fine Adjustment Screw | As Req. |
| 11 | FD5658-03 | Fine Adjustment Spacer | As Req. |
| 12 | MS0099 | SS Socket Head Shoulder Bolt 1/4-20 x 5/16 x 1-1/4 | As Req. |
| 13 | WA0027 | Wave Washer | As Req. |
| 14 | MS025-20S0750S-0 | SS Socket Head Screw 1/4-20 x 3/4 | As Req. |
| 15 | MS0101 | SS Set Screw Flat Point Nylon Tip 10-32 x 3/16 | As Req. |
| 16 | FD5376-* | Insulating Shroud | 2 |
| 17 | FD5376-* | Insulating Shroud End | 2 |
| 18 | AL7146-02-* | Alum Shroud Offset Leg, Long | 1 |
| 19 | AL7146-03-* | Alum Shroud Offset Leg, Short | 1 |
| 20 | FD5212-06 | Side Plate Offset Shroud | 2 |
| 21 | FD5263-03 | Shroud Clamp Block | 2 |
| 22 | HW7207 | Captive Panel Screw Assy | 2 |
| 23A | IN7210-* | Round Insulator Pyrex Elbow | 2 |
| 23B | IN7140-* | Star Insulator Pyrex Elbow | 1 |
| 24 | FD4997-* | Pyrex Elbow | 1 |
| 25 | FD5700-01 | Insulator For Pyrex Elbow | 1 |
| 26 | MM060-100B012S-0 | SS Button Head Screw M6 x 1.0P x 12 | 4 |
| 27 | MM035-060P008S-0 | SS Pan Head Screw M3.5 x 0.6P x 8 | 6 |
| 28 | MM035-060P005S-0 | SS Pan Head Screw M3.5 x 0.6P x 5 | As Req. |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

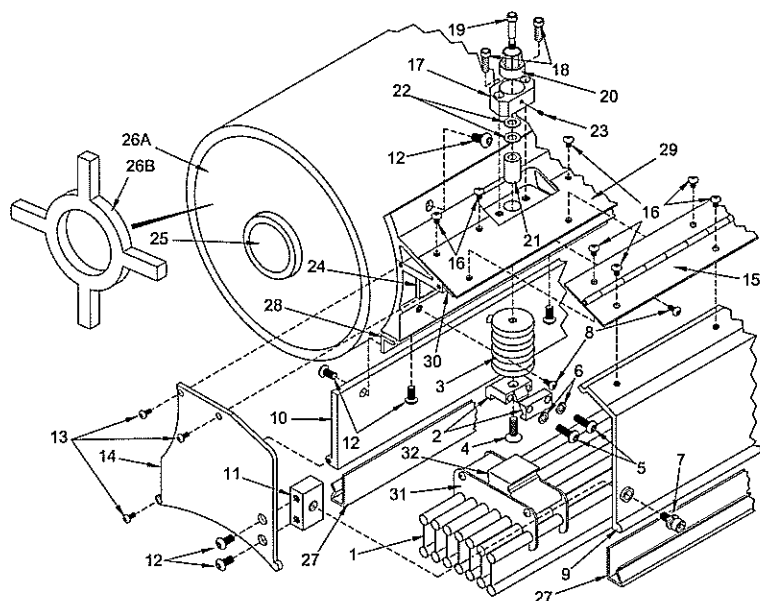
Segmented Electrode Assembly



| Item # | Part # | Description | Qty |
|--------|-------------------|--|---------|
| 1A | LM4096-*** | Electrode Sub Assembly - 1/4" Segments | As Req. |
| 1B | LM4164-*** | Electrode Sub Assembly - 1/2" Segments | As Req. |
| 2 | LM6007-01 | CSO Clamp Block Assembly (Includes Items 5 & 6) | As Req. |
| 3 | IN0012-02 | Glazed Alumina Post | As Req. |
| 4 | MS0025-20F0625S-0 | Flat Head Cap Screw, 1/4"-20 x 5/8" | As Req. |
| 5 | MM050-080B016S-0 | SS Button Head SCREW M5 x 0.8P x 16 | As Req. |
| 6 | WA1550 | SS Lock Washer | As Req. |
| 7 | HW7036 | Captive Panel Screw Assembly | 2 |
| 8 | MS0006-32P0250S-0 | Pan Head Machine Screw #6-32 x 1/4" | As Req. |
| 9 | AL7146-02 | Aluminum Shroud, Offset Leg, Long | 1 |
| 10 | AL7146-03 | Aluminum Shroud, Offset Leg, Short | 1 |
| 11 | FD5263-01 | Shroud Clamp Block | 2 |
| 12 | MS0025-20B0500S-0 | Button Head Cap Screw, 1/4"-20 x 1/2" | As Req. |
| 13 | MS006-32P0313S-0 | Pan Head Machine Screw, #6-32 x 5/16" | 6 |
| 14 | FD5212-01 | Side Plate, Offset Shroud | 2 |
| 15 | HW7000 | Piano Hinge | As Req. |
| 16 | MS006-32P0188S-0 | Pan Head Machine Screw, #6-32 x 3/16" | As Req. |
| 17 | FD5658-01 | Fine Air Gap Adjustment Block | As Req. |
| 18 | MS025-20S0750S-0 | Socket head Cap Screw 1/4"-20 x 1/2" | As Req. |
| 19 | MS0099 | Bolt 5/16" x 1-1/4 SH SS Shoulder 1/4"-20 | As Req. |
| 20 | FD5658-02 | Fine Adjustment Screw | As Req. |
| 21 | FD5658-03 | Fine Adjust Spacer | As Req. |
| 22 | WA0027 | Washer, Wave | As Req. |
| 23 | MS0101 | Screw #10-32 x 3/16" Set SH SS Flat Pt Nylon Tip | As Req. |
| 24 | FD5700-01 | Pyrex Elbow Insulator | 1 |
| 25 | FD4997-04 | Pyrex Elbow | 1 |
| 26A | IN7210-03 | Round Insulator for Pyrex Tube | 1 |
| 26B | IN7140-03 | Star Insulator for Pyrex Tube | 1 |
| 27 | IN0059 | Wear Strip | As Req. |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

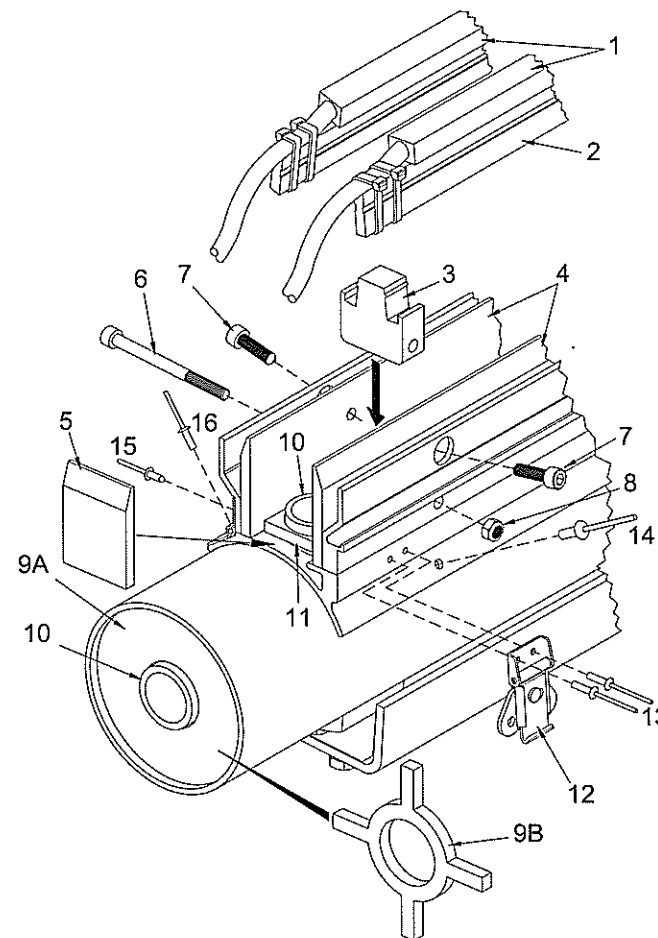
Finned Electrode Assembly



| Item # | Part # | Description | Qty |
|--------|-------------------|--|---------|
| 1 | FD6089-*** | Finned Electrode | As Req. |
| 2 | LM6007-01 | CSO Clamp Block Assembly (Includes Items 5 & 6) | As Req. |
| 3 | IN0012-02 | Glazed Alumina Post | As Req. |
| 4 | MS0025-20F0625S-0 | Flat Head Cap Screw, 1/4"-20 x 5/8" | As Req. |
| 5 | MM050-080B016S-0 | SS Button Head SCREW M5 x 0.8P x 16 | As Req. |
| 6 | WA1550 | SS Lock Washer | As Req. |
| 7 | HW7036 | Captive Panel Screw Assembly | 2 |
| 8 | MS0006-32P0250S-0 | Pan Head Machine Screw #6-32 x 1/4" | As Req. |
| 9 | AL7146-02 | Aluminum Shroud, Offset Leg, Long | 1 |
| 10 | AL7146-03 | Aluminum Shroud, Offset Leg, Short | 1 |
| 11 | FD5263-01 | Shroud Clamp Block | 2 |
| 12 | MS0025-20B0500S-0 | Button Head Cap Screw, 1/4"-20 x 1/2" | As Req. |
| 13 | MS0006-32P0313S-0 | Pan Head Machine Screw, #6-32 x 5/16" | 6 |
| 14 | FD5212-04 | Side Plate, Offset Shroud | 2 |
| 15 | HW7000 | Piano Hinge | As Req. |
| 16 | MS006-32P0188S-0 | Pan Head Machine Screw, #6-32 x 3/16" | As Req. |
| 17 | FD5658-01 | Fine Air Gap Adjustment Block | As Req. |
| 18 | MS025-20S0750S-0 | Socket head Cap Screw 1/4"-20 x 1/2" | As Req. |
| 19 | MS0099 | Bolt 5/16" x 1-1/4 SH SS Shoulder 1/4"-20 | As Req. |
| 20 | FD5658-02 | Fine Adjust Screw | As Req. |
| 21 | FD5658-03 | Fine Adjust Spacer | As Req. |
| 22 | WA0027 | Washer, Wave | As Req. |
| 23 | MS0101 | Screw #10-32 x 3/16" Set SH SS Flat Pt Nylon Tip | As Req. |
| 24 | FD5700-01 | Pyrex Elbow Insulator | 1 |
| 25A | FD4997-04 | Pyrex Elbow | 1 |
| 25B | IN7210-03 | Round Insulator for Pyrex Tube | 1 |
| 26 | IN7140-03 | Star Insulator for Pyrex Tube | 1 |
| 27 | IN0059 | Wear Strip | As Req. |
| 28 | AL0010 | Aluminum Angle | As Req. |
| 29 | AL0035 | 2 x 1/8" Aluminum Rectangle | As Req. |
| 30 | AL7007 | 3/4 x 1/8" Aluminum Rectangle | As Req. |
| 31 | FD6059-500 | Fin Electrode Holder | As Req. |
| 32 | FD6075-01 | Fin Electrode Mount Block | As Req. |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

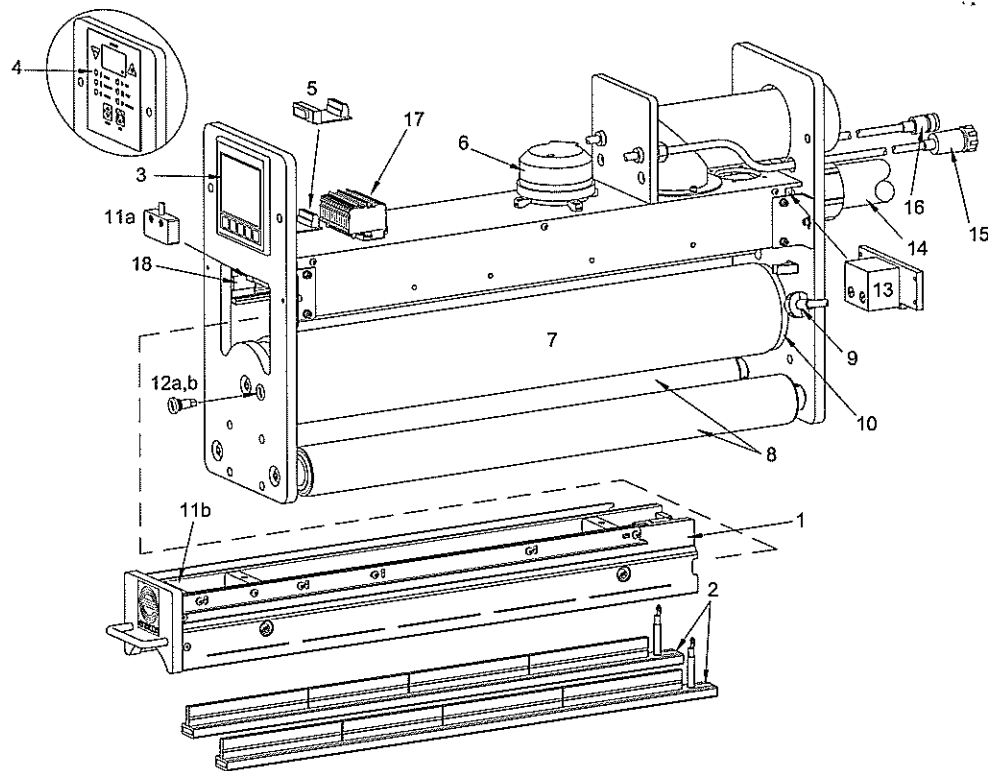
Stainless Steel Electrode Assembly



| Item # | Part # | Description | Qty |
|--------|------------------|--|---------|
| 1 | SS2120-*** | Electrode | 2 |
| 2 | FD4150-03 | Electrode Mounting Tab (Included with Electrode) | As Req. |
| 3 | FD4104-01 | Standard Electrode Mounting Block | As Req. |
| 4 | *** | Standard Insulating Shroud | 2 |
| 5 | FD5376-0040 | Insulating Shroud End Piece (One at each end) | 2 |
| 6 | MM060-100S075S-0 | M6 Hex. Head. Cap Screw | As Req. |
| 7 | M57900 | Electrode Mounting Screw | As Req. |
| 8 | NU2054 | M6 Locknut w/Nylon Insert | As Req. |
| 9A | IN7210-03 | Round Insulator for Pyrex Tube | 1 |
| 9B | IN7140-03 | Star Insulator for Pyrex Tube | 1 |
| 10 | FD4997-** | Pyrex Elbow | 1 |
| 11 | FD5700-01 | Pyrex Elbow Insulator | 1 |
| 12 | HW7060 | Twist Latch | As Req. |
| 13 | RV0125-376-500 | Blind Rivet, 1/8, .376-.500 Grip, Closed End | As Req. |
| 14 | RV0188-126-250 | Blind Rivet, 3/16, .126-.250 Grip, Closed End | As Req. |
| 15 | RV0125-032-062 | Blind Rivet, 1/8, .032-.062 Grip | As Req. |
| 16 | RV0125-126-187 | Blind Rivet, 1/8, .126-.187 Grip, Closed End | As Req. |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

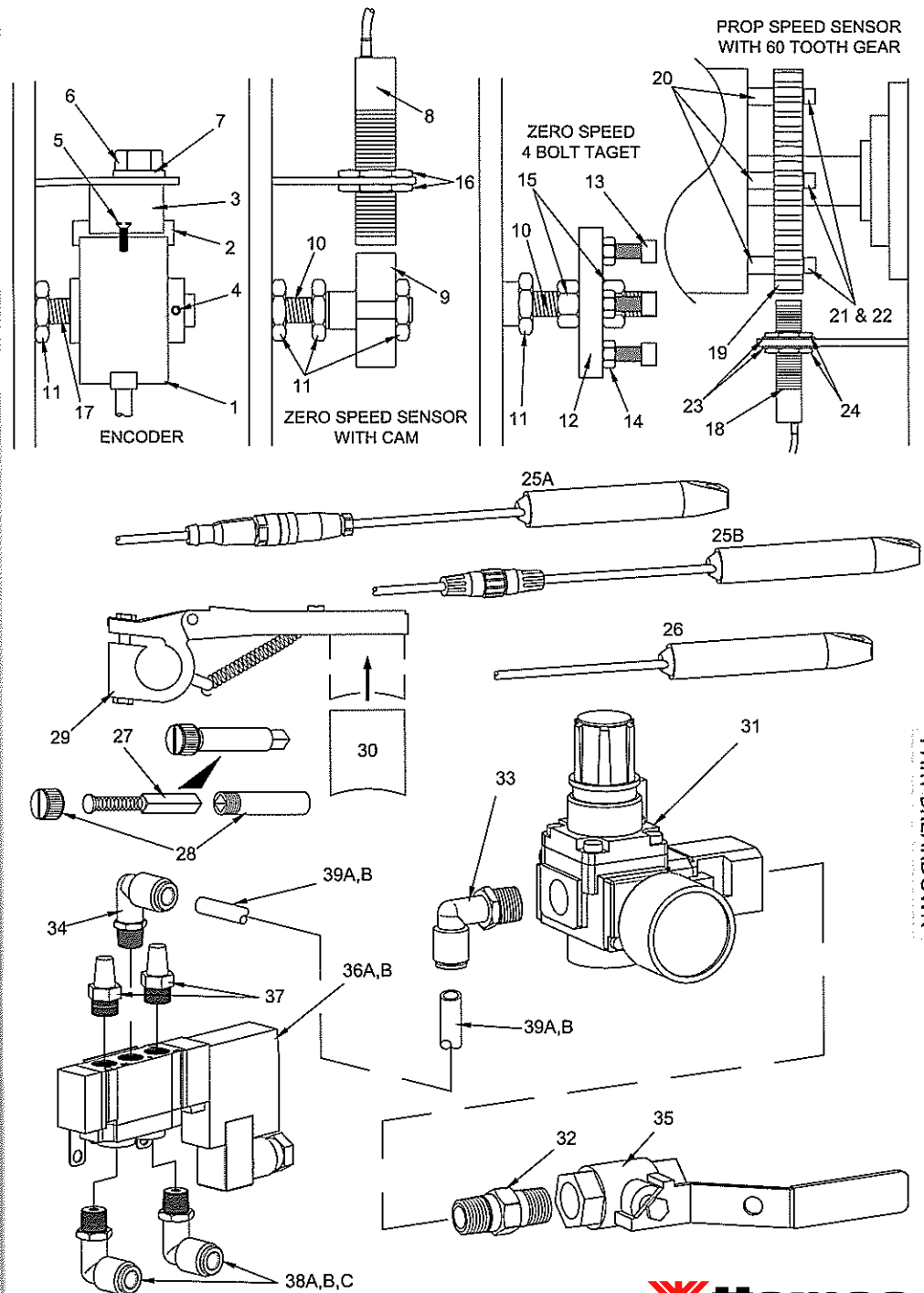
CoronaFlex™ Station



| Item # | Part # | Description | Qty. |
|--------|------------|---|--------|
| 1 | LM5801-XX | Electrode Assembly Drawer | 1 |
| 2 | -- | Electrodes | 2 |
| 3 | EM0385 | 4" Color Touch Screen (CoronaFlex™ Deluxe) | 1 |
| 4 | LM5794-01 | Membrane Switch Assembly (CoronaFlex™) | 1 |
| 5 | EM0381 | 15 Pin D-Sub Port Adapter for RS485 | 1 |
| 6 | SW0291 | Differential Pressure Switch | 1 |
| 7 | -- | Ground Roll | 1 |
| 8 | -- | Idler Roll | 1 |
| 9 | SE7019 | Speed Sensor | 2 |
| 10 | SE0175 | Magnet Wheel | 4 |
| 11a | SW0470-SW | Universal Reed Switch – Switch Mechanism (Hidden Inside Drawer) | 2 |
| 11b | SW0470-ACT | Universal Reed Switch – Magnetic Actuator | 1 |
| 12a | LM3289-113 | Ground Brush Assembly | 1 |
| 12b | BH7004 | Ground Brush | 1 |
| 13 | LM5807-01 | High Voltage Connection Assembly | 1 |
| 14 | LM5199-XX | Flexible High Voltage Conduit | 1 |
| 15 | LM5243-XX | System Interface / Interlock Cable | 1 |
| 16 | LM5263-XX | Remote Control Cable | 1 |
| 17 | -- | Terminal Blocks | Varies |
| 18 | -- | Electrode Drawer Slide | 2 |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

Miscellaneous Station Parts



PART BREAKDOWN

Miscellaneous Station Parts

| Item # | Part # | Description | Qty. |
|--------|------------------|--|-------------|
| 1 | SE7011 | Encoder | 1 |
| 2 | FD5260-02 | Mounting Yoke | 1 |
| 3 | FD5260-04 | Mounting Yoke | 1 |
| 4 | -- | 6 - 32 Set Screw - Supplied with Item #1 | 1 |
| 5 | MS004-40F0438S-0 | 4 - 40 x 7/16" Flat head Machine Screw | 1 |
| 6 | MS044-14H0750S-0 | 7/16 - 14 x 3/4" Hex Head Cap Screw | 1 |
| 7 | WA1611 | 7/16" Lock Washer | 1 |
| 8 | SE7022 | Zero Speed Sensor | 1 |
| 9 | FD4217-01 | Zero Speed Cam | 1 |
| 10 | RD6001 | M10 Threaded Rod | 1 |
| 11 | NU7020 | M10 Jam Nut | As Required |
| 12 | FD3314-01 | Ground Disc | 1 |
| 13 | MM060-100S025S-0 | M6 Socket Head Cap Screw | 4 |
| 14 | NU2000 | M6 Hex Nut | 4 |
| 15 | NU7270 | M10 Hex Nut | 2 |
| 16 | -- | Supplied with Item # 8 | 2 |
| 17 | FD5259-01 | Shaft Adapter | 1 |
| 18 | SE7020 | Proportional Speed Sensor | 1 |
| 19 | FD4344-XX | 60 Tooth Gear | 1 |
| 20 | FD4027-02 | Aluminum Spacers | 4 |
| 21 | MS025-20S2000S-0 | 1/4 - 20 x 2" LG Socket Head Cap Screw | 4 |
| 22 | WA1555 | 1/4" Lock Washer | 4 |
| 23 | WA7070 | 3/8" Nylon Washer | 2 |
| 24 | -- | Supplied with Item # 18 | 2 |
| 25A | LM3921-**- | Station Mounted Air Flow Sensor | As Required |
| 25B | | Remote Mounted Air Flow Sensor | As Required |
| 26 | SE7027 | Air Flow Sensor | As Required |
| 27 | BH7000 | Ground Brush | 1 |
| 28 | BH7390 | Ground Brush Holder | 1 |
| 29 | BH7001 | Ground Brush Holder | 1 |
| 30 | BH7002 | Ground Brush | 1 |
| 31 | PN7055 | Regulator w/Gauge, Bracket and Port Adapter | 1 |
| 32 | FT0025 | Hex Nipple, 1/4" NPT | 1 |
| 33 | FT3051 | Elbow 1/4" NPT to 1/4" Tube | 1 |
| 34 | FT3050 | Elbow, 1/4" NPT to 1/4" Tube | 1 |
| 35 | PN7002 | Lockout Valve | 1 |
| 36A | PN7120-01 | 120V Solenoid Valve | 1 |
| 36B | PN7120-02 | 24V Solenoid Valve | 1 |
| 37 | PN0051 | Exhaust Silencer, 1/8" NPT | 2 |
| 38A | FT3050 | 11V Station: Elbow, 1/8" NPT to 1/4" Tube | 2 |
| 38B | FT3100 | 21V Station: Male Run Tee, 1/8" NPT to 1/4" Tube | 2 |
| 38C | FT7390 | 31V or Greater Station: Manifold | 2 |
| | FT3050 | Elbow, 1/8" NPT to 1/4" Tube | 2 |
| 39A | TU7090 | Black Polyethylene Tube, 1/4" | As Required |
| 39B | TU7094 | White Polyethylene Tube, 1/4" | As Required |

NOTE: To insure the correct parts are supplied please have the model and serial number of the system available.

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2017 Calendar

| January | | | | | | | February | | | | | | | March | | | | | | |
|---------|----|----|----|----|----|----|----------|----|----|----|----|----|----|-----------|----|----|----|----|----|----|
| S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 | 26 | 27 | 28 | | | | | | | | | | | |
| 29 | 30 | 31 | | | | | | | | | | | | | | | | | | |
| April | | | | | | | May | | | | | | | June | | | | | | |
| S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 | 28 | 29 | 30 | 31 | | | | 25 | 26 | 27 | 28 | 29 | 30 | |
| 30 | | | | | | | | | | | | | | | | | | | | |
| July | | | | | | | August | | | | | | | September | | | | | | |
| S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 | 27 | 28 | 29 | 30 | 31 | | | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 30 | | | | | | | | | | | | | | | | | | | | |
| October | | | | | | | November | | | | | | | December | | | | | | |
| S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 | 26 | 27 | 28 | 29 | 30 | 31 | | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
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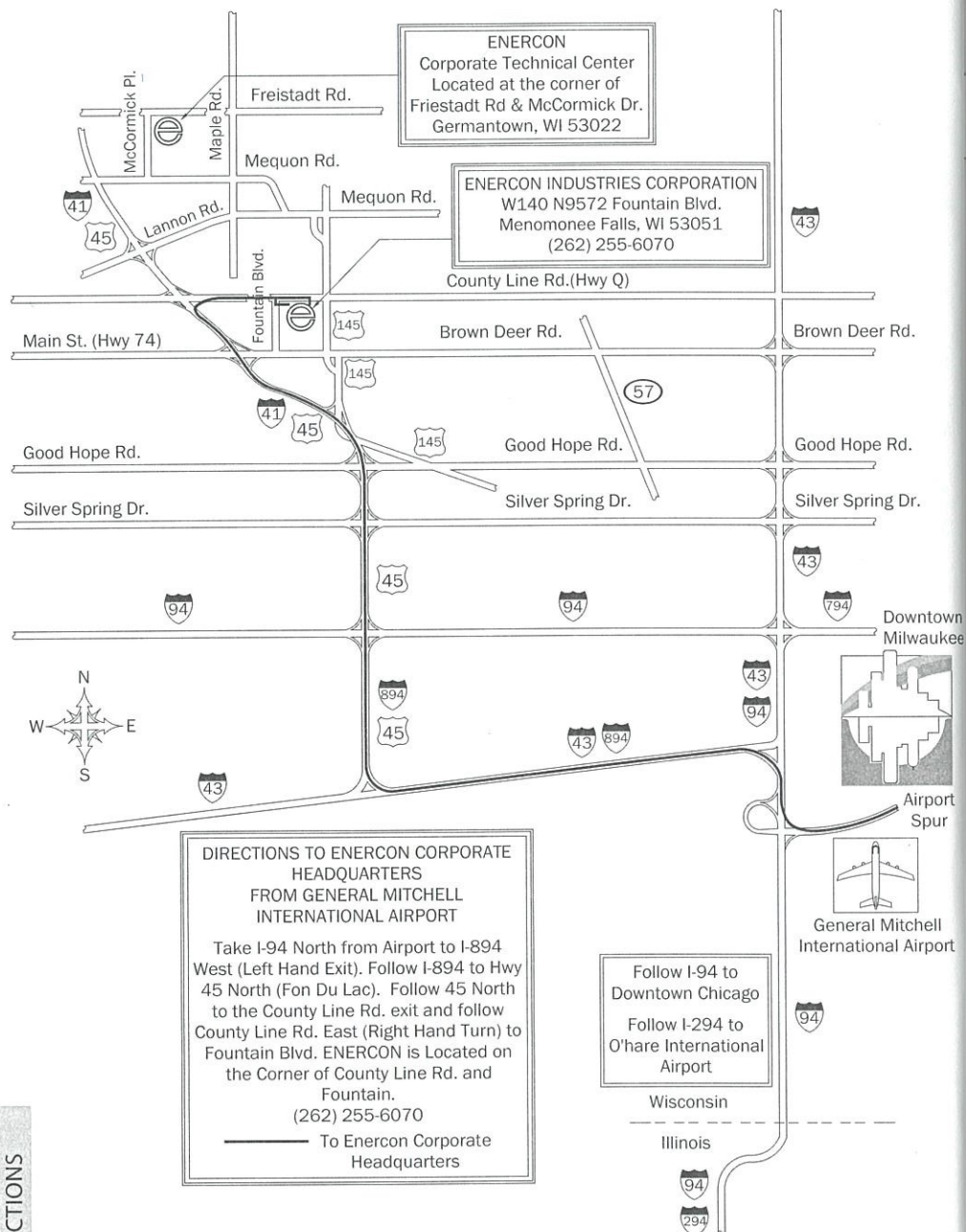
2018 Calendar

| January | | | | | | | February | | | | | | | March | | | | | | |
|---------|----|----|----|----|----|----|----------|----|----|----|----|----|----|-----------|----|----|----|----|----|----|
| S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 28 | 29 | 30 | 31 | | | | 25 | 26 | 27 | 28 | | | | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| April | | | | | | | May | | | | | | | June | | | | | | |
| S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
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| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 | 27 | 28 | 29 | 30 | 31 | | | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 29 | | | | | | | | | | | | | | | | | | | | |
| July | | | | | | | August | | | | | | | September | | | | | | |
| S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
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| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 | 27 | 28 | 29 | 30 | 31 | | | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 29 | | | | | | | | | | | | | | | | | | | | |
| October | | | | | | | November | | | | | | | December | | | | | | |
| S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S | S | M | Tu | W | Th | F | S |
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| 28 | 29 | 30 | 31 | | | | 25 | 26 | 27 | 28 | 29 | 30 | | 23 | 24 | 25 | 26 | 27 | 28 | 29 |

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