

**CORONA TREATING SYSTEM  
BARE-ROLL & UNIVERSAL ROLL STATION  
ML0025-001-02**

**OWNERS REFERENCE MANUAL**



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## SECTION 1 – INTRODUCTION

# WARNING

Please read carefully before installing or servicing.

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

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

## SAFETY AND WARNINGS

Before you install this Corona Treater, you should take the time to carefully read all the instructions contained in this manual.

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

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

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

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

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

### \*\*\* CAUTION \*\*\*

**CAUTION** is used to indicate the presence of a hazard, which *will* or *can cause* minor personal injury or property damage if the warning is ignored.

### \*\*\* WARNING \*\*\*

**WARNING** is used to indicate the presence of a hazard, which *can cause severe* personal injury, death, or substantial property damage if the warning is ignored.

## GENERAL

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

## CORONA TREATING SYSTEM

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

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

If you would like to learn more about corona treating, **Contact Enercon at (262) 255-6070, or visit our web site at [www.enerconind.com](http://www.enerconind.com).** Numerous technical papers and literature are available to you.

The system consists of two major components:

- 1) *The Power Supply, and*
- 2) *The Treater Station*

The **Power Supply** accepts standard 50/60 Hz utility electrical power and converts it into single phase, higher frequency (nominally 10 to 30 kHz) power that is supplied to the treater stations.

The **Treater Station** applies this power to the surface of the material, through an air gap, via a pair of electrodes, one at high potential, and the other, which supports the material, at ground potential. Only the side of the material facing the high potential electrode should show an increase in surface tension.

## INTRODUCTION TO BARE / UNIVERSAL ROLL STATIONS



Figure 1

### **STANDARD FEATURES**

- Electrode Safety Interlocks.
- Zero Speed Switch.
- Integral HV Transformer. (Available)
- Easy Air Gap Adjustment.
- Ozone Resistant Construction.
- Separate Low Voltage Circuitry.
- Duct Connections for Ozone Exhaust.

### **BENEFIT**

- Protect operators.
- Protects web and roll covering on Universal Roll Station.
- No high voltage ducting.
- Precise, consistent treatment.
- Long operational life.
- Long-term reliability.
- Eases user installation.

### **OPTIONAL FEATURES**

- Air Flow Switch.
- Idler Rolls.
- Exhaust Blowers.
- Extended Shafts.
- Drives.
- Ozone Elimination Unit.
- Spare Treater Rolls.
- Skip Treat Control.
- Nip Rolls.

### **BENEFIT**

- Protects equipment and operators.
- Allow wide range of web entry and exit angles.
- Ensures adequate and safe ozone removal.
- Allows driven station.
- Engineered to meet your application requirement.
- Allows ozone free exhaust to atmosphere.
- Reduces down-time due to random roll failure.
- Solves heat seal problems.
- Prevents backside treatment.

**\*Our fully equipped “Tech Center” provides a wide web, high-speed treating lab line capable of duplicating treating conditions on a full range of customer process lines. The Tech Center facility is also available for training customer personnel in the operation and maintenance of Corona Treating Systems and correct procedures in performing dyne level tests. Enercon frequently performs treatment level tests on new materials prior to customer production runs.**

Enercon is the leading manufacturer of Corona Treating equipment and systems. The long-term reliability of the Enercon patented design is further enhanced by the unique airflow, which cools the electrodes, pulls a constant supply of oxygen into the corona, and removes the ozone directly from the air gap.

## Bare / Universal Roll Station Features and Benefits

STATION FEATURES	STATION TYPE	BENEFIT
Station Size and Configurations	Both	<ul style="list-style-type: none"> <li>a) Wide web width capabilities.</li> <li>b) Line Speeds up to 2000 fpm.</li> <li>c) Single or double side treatment Configurations.</li> <li>d) Purging available for use in Hazardous Atmospheres.</li> </ul>
Station Construction	Both	<ul style="list-style-type: none"> <li>a) Rugged Mechanical Construction</li> <li>b) Aluminum shielding to protect electrodes and provide operator safety.</li> <li>c) Components constructed of Steel and Aluminum for long operational life in industrial environments.</li> <li>d) Ozone removal and electrode cooling are integral part of electrode assembly design.</li> </ul>
Metal Ground Roll	Bare Roll	<ul style="list-style-type: none"> <li>a) Eliminates need for dielectric roll covering.</li> <li>b) Saves cost of spare dielectric roll.</li> <li>c) No loss of film or production time due to failure of roll covering.</li> <li>d) Roll size (diameter) is reduced.</li> </ul>
Coated-Roll	Universal Roll	<ul style="list-style-type: none"> <li>a) Universal system – treats wide range of materials.</li> <li>b) No loss of product or production time due to small roll covering pinholes, allowing for more convenient roll repair.</li> <li>c) Roll size (diameter) is reduced.</li> </ul>
Exhaust Configuration	Both	Provides both ozone removal and electrode temperature stabilization.
Ceramic Electrodes	Both	<ul style="list-style-type: none"> <li>a) Substantially increased production life.</li> <li>b) Provide higher treatment levels.</li> <li>c) High degree of operator safety.</li> </ul>
Multiple Electrode Assemblies	Both	Enhanced treatment for hard to treat material.
SYSTEM OPTIONS	SYSTEM TYPE	BENEFIT
Proportional Speed / Watt Density Control	Both	Automatically adjusts output levels, when line speeds increase or decrease.
Remote Control Panel	Both	Allows front panel controls to be remotely mounted from power supply.
Computer Interface	Both	Allows output levels to be controlled from a PLC.
Ozone-Ex™ Ozone Eliminator	Both	Eliminates ozone present in the exhaust air of the station.

## DECALS

This page contains representative examples of decals, which appear on the *Compak™2000 Power Supply*. If for some reason a decal is defaced, painted over or underlying parts are replaced, we recommend that you obtain a replacement decal from Enercon and reapply it at the locations illustrated.



Figure 2

## SECTION 2 – INSTALLATION

### UNPACKING

Carefully open all shipping containers and remove the contents. Each item should be thoroughly inspected for damage.

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

### CONTACT:

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

### IMPORTANT:

If concealed loss or damage is discovered after delivery, notify your carrier at once and request an inspection. This is absolutely necessary for the carrier to consider your claim. If damage is detected, be sure to note it on the freight bill before signing it to acknowledge receipt. The carrier agent should make an inspection and issue a loss or damage report. If you give the carrier a clear receipt for goods that have been damaged or lost in transit, you do so at your own risk and expense.

### NOTE:

The carrier accepted responsibility for this shipment when the carrier signed the bill of lading at the origin of shipment.

### SITE SELECTION

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

### INSTALLATION GUIDELINES

Each system is designed specifically to meet the needs of the user. It is impossible to give detailed installation instructions in this manual. Some general guide lines for installations will be discussed.

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

### TREATER STATION

**Figures 3, 4 and 5 on pages 9, 10 and 11** illustrate typical installations. System components will be discussed later in this section.

### INTERCONNECTION WIRING AND GROUND CONNECTIONS

An interconnection diagram is provided with each system to aid in wiring. Refer to this diagram for proper electrical conductor size and other pertinent information. Local codes will dictate the means of entrance and termination of the wiring.

### OZONE DECOMPOSER (Optional)

The ozone decomposer should be bolted down securely between the treater station and the exhaust blower. The customer supplies the intake and exhaust ductwork. The ozone decomposer option is available with the pressure gauge package. **(See Figure 6)**

### EXHAUST/PURGE AIR DUCT/BLOWER

Convenient terminations for exhaust ductwork are provided for the treater station. If the treater station is located in a hazardous environment, a purge blower is required for maintaining a positive pressure within the treater station. Ensure the blower size meets the specifications provided in the equipment proposal.

All system components must be grounded to a good earthen ground point. Use approved grounding methods dictated by local codes. **Ensure all paint or plating is removed from all ground contact surfaces.**

**\*\*\* CAUTION \*\*\***

IT IS RECOMMENDED THAT THE EXHAUST BLOWER BE MOUNTED OUTSIDE OF THE BUILDING TO MAINTAIN A NEGATIVE EXHAUST PRESSURE AND REDUCE NOISE LEVELS. THE BLOWER MOTORS ARE TEFC AND RATED FOR OUTDOOR USE. IF THE BLOWER IS MOUNTED INSIDE THE BUILDING, MOUNT THE BLOWER AS NEAR AS POSSIBLE TO WHERE THE EXHAUST DUCT EXITS THE BUILDING.

**\*\*\* CAUTION \*\*\***

EXHAUST AND PURGE BLOWERS MUST BE USED AT ALL TIMES WHEN OPERATING THE CORONA TREATING SYSTEM. SEVERE DAMAGE TO THE SYSTEM (AS WELL AS INADEQUATE OZONE REMOVAL) WILL OCCUR IF PROPER AIRFLOW REQUIREMENTS ARE NOT MET AT ALL TIMES. IT IS RECOMMENDED THAT THE BLOWERS ARE INTERLOCKED WITH THE POWER SUPPLY TO ALLOW OPERATION OF THE POWER SUPPLY ONLY WHEN THE BLOWERS ARE RUNNING.

**DON'T:**

- Use galvanized duct. It will quickly corrode and need to be replaced.
- Use flexible duct. It will greatly increase static pressure loss. If flexible duct must be used, select a diameter at least 1.3 times that recommended for smooth duct, and keep the run to a minimum.
- Have any elbows within three (3) duct diameters of the inlet or exit to the blower. They can create turbulence that will affect blower performance between units. Keep the number of elbows to a minimum and keep the length of ducts as short as possible. This will eliminate any unnecessary pressure losses.

**\*\*\* WARNING \*\*\***

DO NOT PLACE DISCHARGE OF EXHAUST DUCT NEAR ANY FRESH AIR INTAKES OR HVAC EQUIPMENT WHERE THE OUTPUT COULD BE RECIRCULATED IN TO THE BUILDING. OZONE IS HEAVIER THAN AIR, AND WIND CONDITIONS MAY CAUSE THE OZONE TO SINK TO ROOF LEVEL, EVEN IF THE EXIT POINT IS ELEVATED.

**EXHAUST DUCT CONNECTIONS DO'S AND DON'TS.**

**DO:**

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

## EXHAUST DUCT SIZING GUIDELINES

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

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

Exhaust Air Flow <b>CFM (CMM)</b>	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.

### OXONE EMISSIONS AND EXHAUST

To calculate the ozone emissions in pounds per hour, use the following formula: *Power Supply KW x 0.073 = Ozone in lbs. /hrs.*

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

### DISCHARGE HEIGHT OVER GROUND LEVEL

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

### MAXIMUM & MINIMUM AIRFLOW

We only specify a minimum airflow. A reasonable amount (say 10 to 20%) over that level should create no problem with the operation of our equipment. (See specific airflow and water column pressure in the instructional data delivered with each specific system.)

### EXHAUST TEMPERATURE

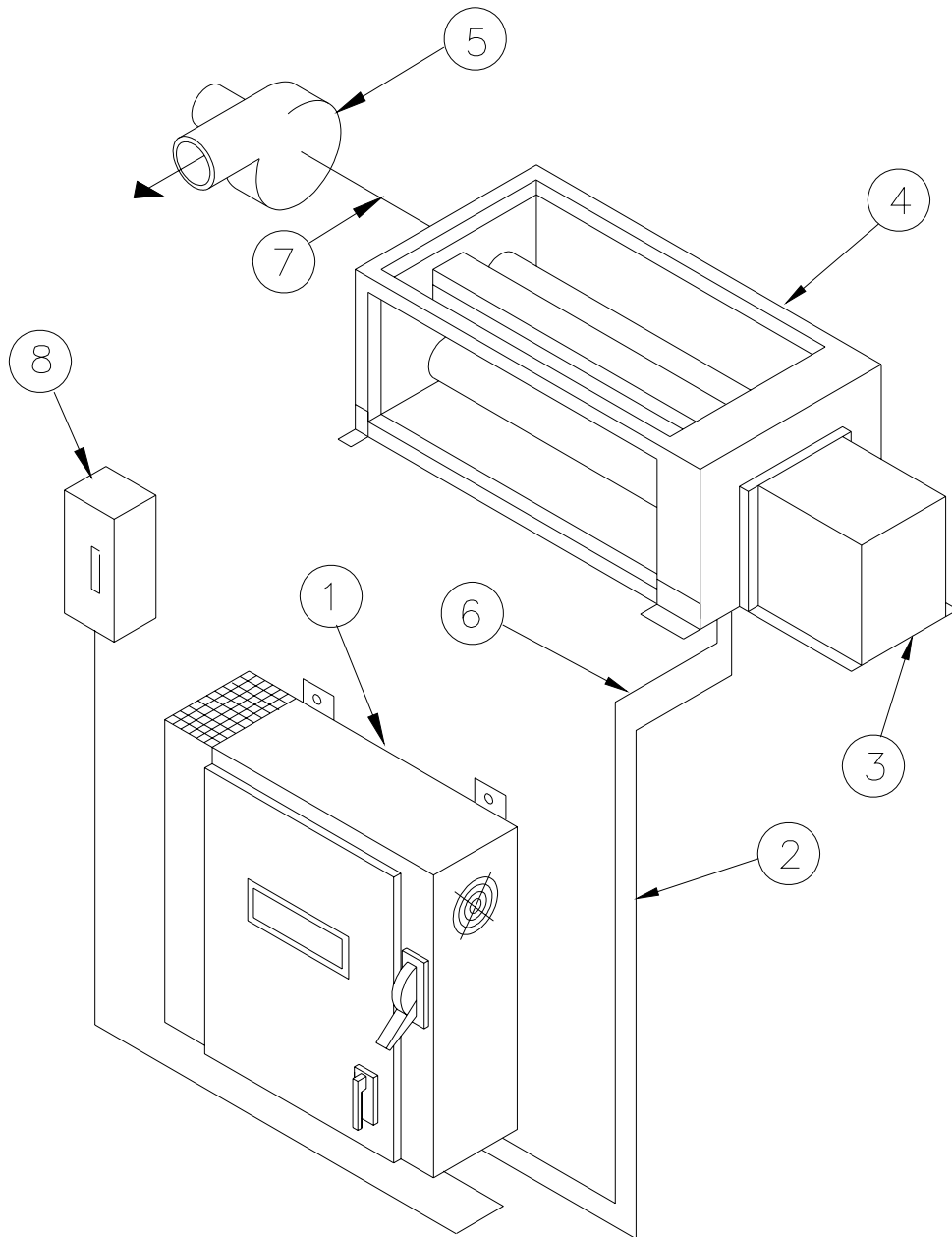
Our equipment under normal operation will raise the temperature of the air taken in approximately 30°C over ambient.

### MOISTURE CONTENT

Our equipment does not affect the moisture content of the air it takes in; therefore, the moisture content will be that of the plant ambient air and no more.

## STANDARD SYSTEM COMPONENT INSTALLATION LAYOUT

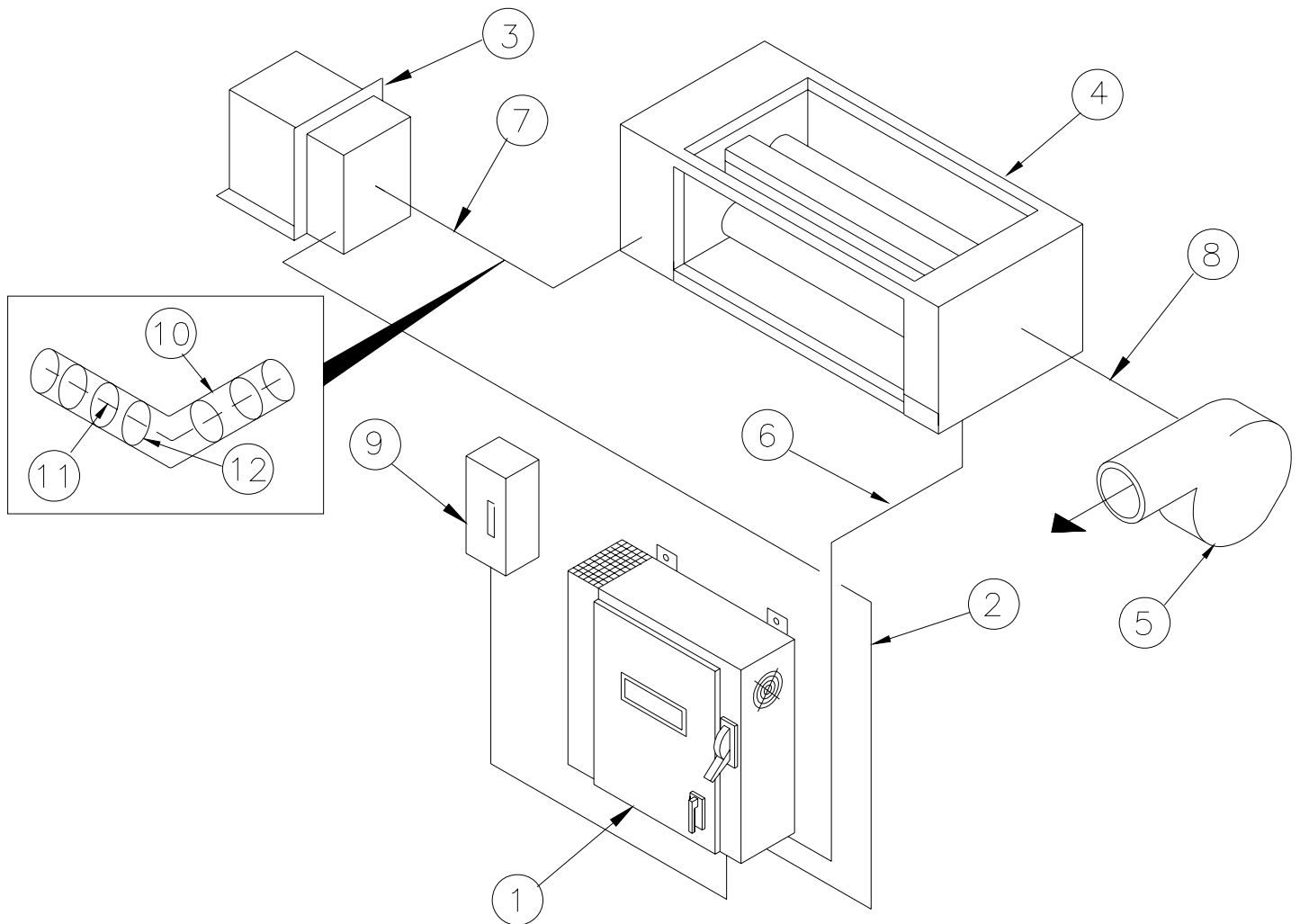
Item #	Description
1	Power Supply (Power Supply Shown May Not Match Your Equipment.)
2	HF Output Cables
3	High Voltage Transformer
4	Treater Station
5	Exhaust Blower
6	Control Wiring
7	Exhaust Ducting
8	Fused Disconnect (Supplied By Customer)



**Figure 3**

## SYSTEM COMPONENT INSTALLATION LAYOUT W/REMOTE H.V. TRANSFORMER

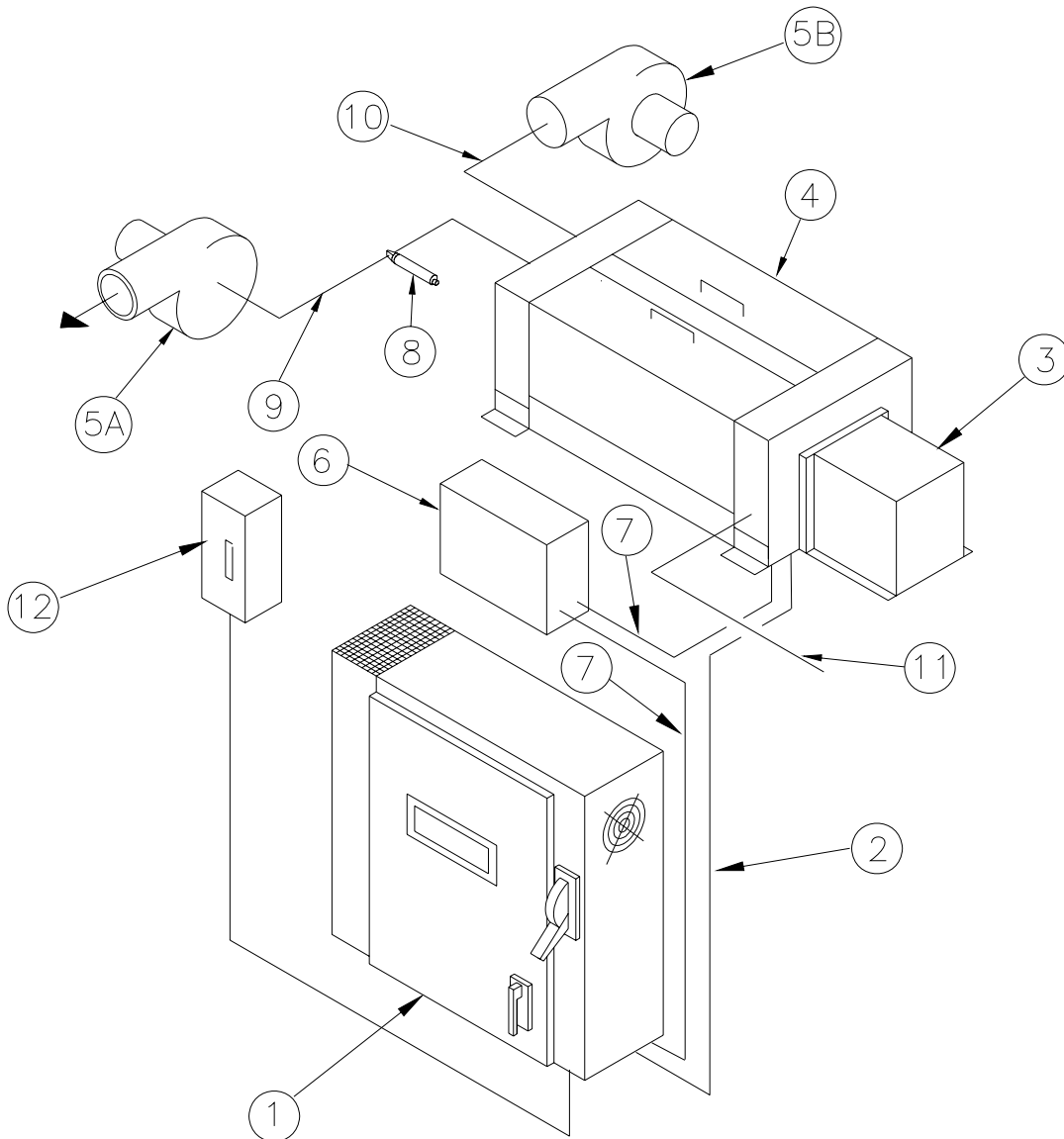
Item #	Description
1	Power Supply (Power Supply Shown May Not Match Your Equipment.)
2	HF Output Cables
3	Remote Mounted High Voltage Transformer
4	Treater Station
5	Exhaust Blower
6	Control Wiring
7	High Voltage Cable Run
8	Exhaust Ducting
9	Fused Disconnect (Supplied By Customer)
10	4" Diameter or 4" Square Metal Conduit
11	High Voltage Cable
12	Insulators to Center H.V. Cable in Conduit



**Figure 4**

## PURGED SYSTEM COMPONENT INSTALLATION LAYOUT

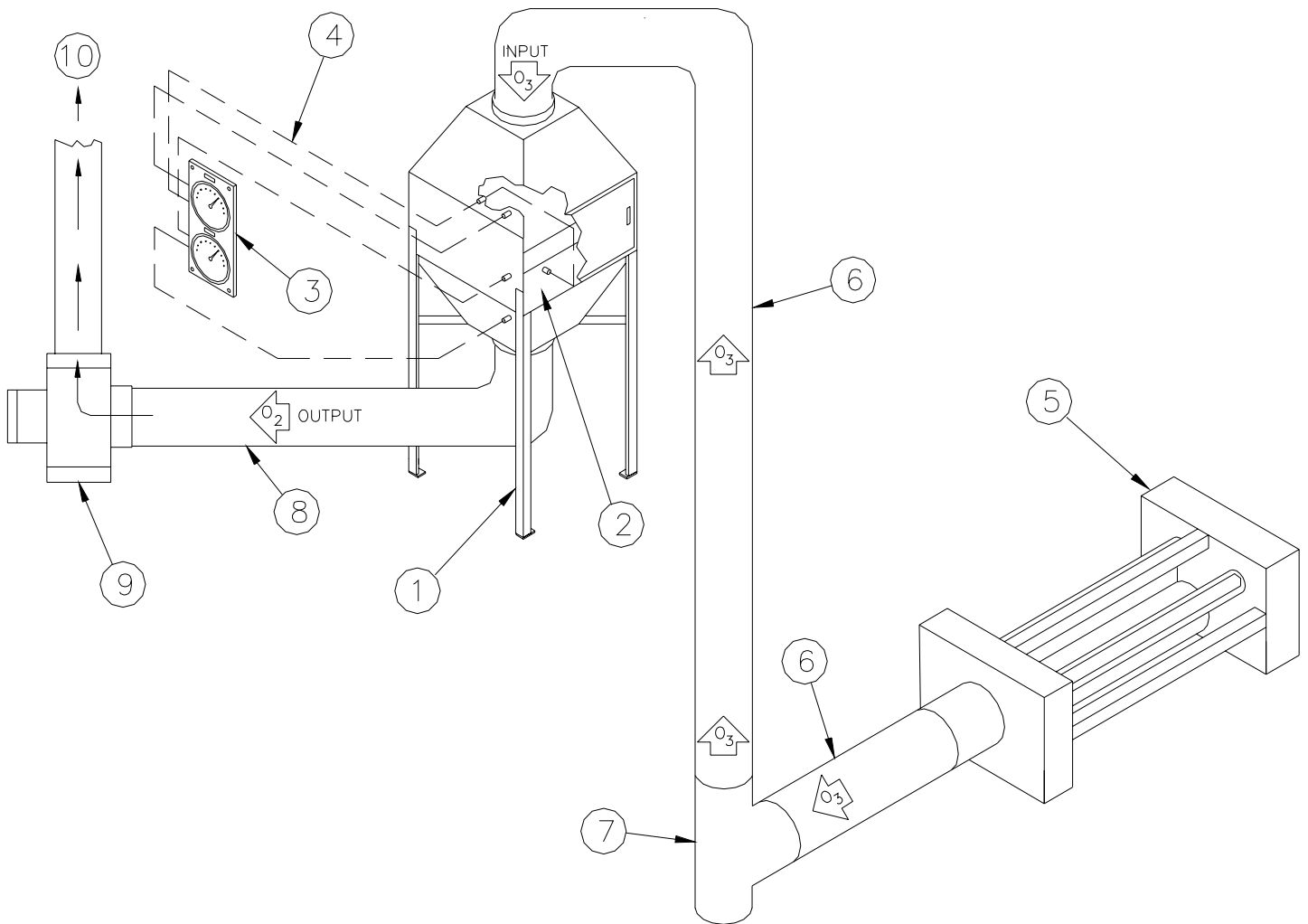
Item #	Description
1	Power Supply (Power Supply Shown May Not Match Your Equipment.)
2	HF Output Cables
3	High Voltage Transformer
4	Treater Station
5A	Exhaust Blower
5B	Purge Blower
6	Purge Control Box
7	Control Wiring
8	Remote Air Flow Switch
9	Exhaust Ducting
10	Purge Air Input Ducting
11	Pressure Sensing Tube (Run To Non-Hazardous Environment)
12	Fused Disconnect (Supplied By Customer)



**Figure 5**

## OPTIONAL OZONE DECOMPOSER INSTALLATION LAYOUT

Item #	Description
1	Ozone Decomposer
2	Catalyst Basket
3	Pressure Gauges (Optional)
4	Interconnection Tubing (Use Tubing and Connectors Furnished with Equipment.)
5	Treater Station
6	Treater Exhaust Duct
7	Exhaust Collection Trap
8	Air Outlet Duct
9	Exhaust Blower
10	Exhaust Air – To Outside of Building



**Figure 6**

**\*\*\* WARNING \*\*\***

**THE POTENTIAL OF ELECTRICAL SHOCK IS PRESENT IF ALL SYSTEM COMPONENTS ARE NOT PROPERLY GROUNDED INCLUDING THE HIGH VOLTAGE TRANSFORMER CASE.**

### **CONTROL WIRE CONNECTIONS**

Control wiring must be run in accordance with the interconnection diagram that is provided with the system. A separate conduit run for control wiring is required. Locate the conduit entrance as close to the interconnection terminal block as possible.

#### **NOTE:**

**SHIELDED CABLE AND TWISTED WIRE MUST BE USED WHERE SHOWN ON THE INTERCONNECTION DIAGRAM.**

### **OUTPUT POWER CONNECTIONS**

The single-phase output of the power supply should run in a separate aluminum or other non-magnetic conduit. The output leads should be twisted with approximately 3 turns per foot. Failure to do so could result in the induction heating of conduit or adjacent metals. Refer to the Interconnection Diagram for proper conductor size.

### **TREATER STATION**

The station is designed to operate in a maximum ambient temperature of 104°F (40°C) @ 80% relative humidity, non-condensing. The station should be positioned in accordance with the Installation Diagram and bolted down securely. Once in position, verify that the treater rolls are parallel and perpendicular to the web path. The station can be leveled with shims beneath the mounting angles.

Ensure that the web direction is proper. Directional arrows are located on the station for your convenience.

If the high voltage transformer is mounted on the station, the station must be mounted to allow for the transformer to be in the upright position to avoid leakage.

If the station is located in a hazardous environment, the tube connected to the low pressure side of the differential pressure switch must run outside the Class I, Division 1 or 2 hazardous area. If a tube is not connected, use 3/8" I.D. or larger.

### **HIGH VOLTAGE TRANSFORMER**

Whenever possible, the High Voltage Transformer is mounted directly on the treater station to minimize the high voltage wiring run.

### **REMOTE MOUNTING – HV TRANSFORMER**

The transformer supplied by Enercon Industries is oil-filled so it is important to ensure it is mounted upright with the bushings in the horizontal position. **(See Figure 7)** Also, it is designed to be mounted in free air with no enclosure around the transformer. **Do Not** mount transformers on top of one another. If transformers are required to be mounted above one another and placed in an enclosure, external forced air-cooling must be used to prevent transformer failure. Airflow requirements are 800 FPM (244 MPM) per transformer directed at the cooling fins. Again, it is not recommended to mount transformers above one another and in an enclosure. As the ambient temperature rises, separate the transformers by an increasing distance to allow for adequate airflow. The minimum separation distance at 104°F (40°C) is 10" (254mm) horizontally and 10" (254mm) vertically. The maximum permissible operating temperature is 104°F (40°C) ambient.

### **HIGH VOLTAGE WIRING**

High voltage wiring must be kept clear of control wiring, metal and grounded surfaces. If the high voltage transformer is remotely mounted, the high voltage wire must be routed in a grounded conduit or duct at least 4" in diameter. The wire must be centered within this conduit or duct with insulating material. The connection studs on each bushing are double nutted to prevent the stud from turning. **Use two wrenches when making electrical connections to prevent stud from turning or bushing from cracking.** One wrench should be used to hold back nut in place while torquing the front nut to 60 inch/pounds.

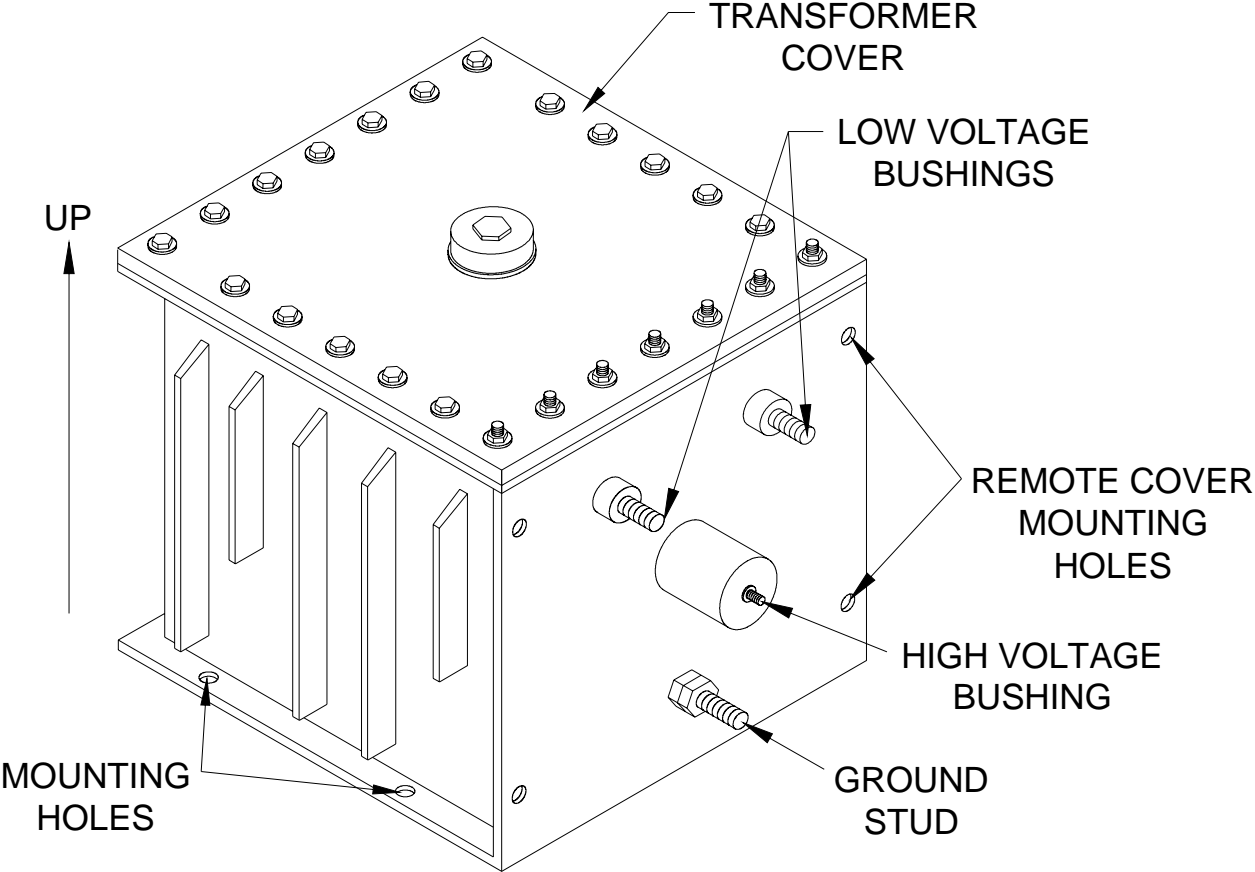
The case of the transformer must be properly grounded.

**\*\*\* CAUTION \*\*\***

**DO NOT LIFT THE HIGH VOLTAGE TRANSFORMER BY ITS BUSHINGS.**

**WARNING!**  
OIL FILLED TRANSFORMER

TRANSFORMER MUST BE MOUNTED IN THE ORIENTATION SHOWN  
INCORRECT MOUNTING WILL RESULT IN FAILURE OF THE TRANSFORMER



MOUNT WITH HIGH VOLTAGE BUSHING AND  
TRANSFORMER COVER IN A HORIZONTAL POSITION

**Figure 7**

## SECTION 3 – OPERATING INSTRUCTION

### GENERAL

Enercon Industries Corporation offers a wide variety of treating stations to meet your specific needs. Each station has been designed for ease of operation and long-term reliability. Easy thread-up and air gap adjustment is featured on all treating stations.

#### \*\*\* CAUTION \*\*\*

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

**OZONE gas is generated in every corona treating process and, therefore, OZONE is present in the exhaust airflow. INSTALLATION of this equipment must be done in accordance with local codes and is important to ensure the safety of personnel in the area and in the building.**

#### \*\*\* WARNING \*\*\*

**THE POTENTIAL OF ELECTRIC SHOCK IS PRESENT IN A COVERED-ROLL STATION. ENSURE THE STATION IS OPERATED WITH ALL PROTECTIVE DOORS CLOSED AND ALL PROTECTIVE INTERLOCKS FUNCTIONAL. IF WORKING WITHIN STATION, VERIFY POWER IS LOCKED OUT IN ACCORDANCE WITH LOCK-OUT/TAG-OUT PROCEDURE.**

### THREAD-UP

All Enercon electrode assemblies retract for easy thread-up. Retract the electrode assembly(s) by either actuating the pneumatic cylinder(s) or by manually moving the assembly out of treatment position.

### INTERLOCKS

A system of interlocks is provided for operator safety and protection of station components. Ensure all interlocks are functional and all doors and covers are in place before operating the station. The actuation of any of these interlock switches will automatically interrupt the corona

discharge and prevent the power supply from restarting. Listed below are the interlocks provided on Enercon Treater Stations and their purpose.

### ZERO SPEED SWITCH – USED ON ALL STATIONS

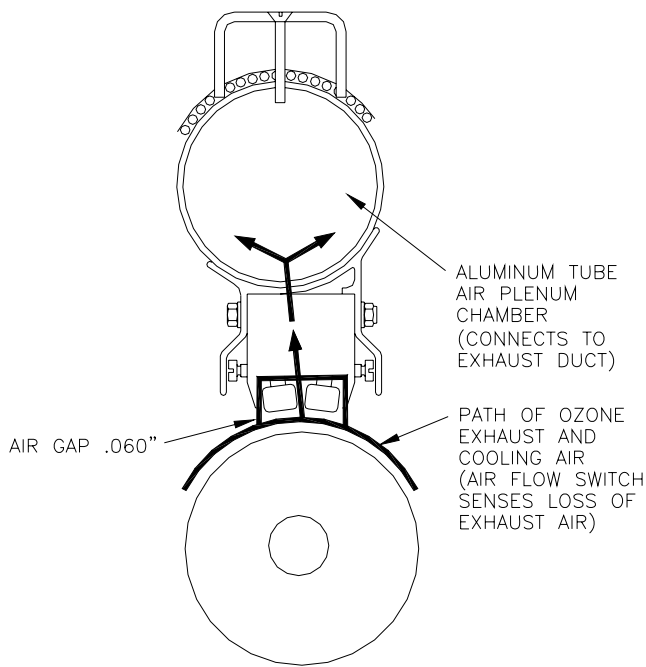
Ensures the treater roll is turning before treater power supply can start. This protects the treater roll from failing due to power being applied to a stationary roll.

### AIRFLOW SWITCH (Optional)

Provides protection against loss of cooling and ozone exhaust air. This interlock is available as an option on all stations to ensure ozone exhaust blower is on before starting.

### ELECTRODE ASSEMBLY PIVOT

Protects against the power supply starting with an electrode assembly pivoted out of the treatment position. The Bare/Universal Roll Stations feature a pivoting electrode assembly, housing two ceramic-covered or metal electrodes mounted over the ground roll. **See Figure 8** for illustration of the cooling method these electrode assemblies. The electrodes are mounted so that the air passes over and around the active surface of the each electrode as it is exhausted. Since the exhaust blower is sized to adequately cool the electrode as well as exhaust the ozone, the electrode temperature can be stabilized at the proper level.



**Figure 8**

**Purge – All Stations (If located in hazardous environment)**

This interlock will not allow the power supply to start until after a positive pressure has been maintained within the station for a predetermined period of time.

**AIR GAP ADJUSTMENT**

The electrode air gap on all Enercon stations is factory present at approximately .060'. If there is a need to change this setting, turn to **Section 4** of this manual for instructions.

**TREATMENT WIDTH ADJUSTMENT**

Since the electrode is a continuous extruded tube, a very uniform treatment level can be achieved across the web. To strip treat, a removable shroud is clipped on at the area where no treatment is desired. No width adjustment is necessary with the Bare-Roll/H Stations.

**PNEUMATICS (Optional)**

Pneumatic cylinders can be provided for retracting the electrode assemblies from treatment position or the opening of the station for threading the line or allowing thick splices to pass through the station. A switch provided by the customer is used to control the cylinders.

**NIP ROLL (Optional)**

When specified, a nip roll is provided to aid in eliminating the possibility of backside treatment. This option is used typically when treating light gauge materials at high line speeds with light web tensions. The solenoid for the pneumatically actuated nip is controlled by a customer supplied switch.

**\*\*\* WARNING \*\*\***

**THE UNIT MUST BE SHUT OFF BEFORE THE TEMPERATURE IS MONITORED BECAUSE HIGH VOLTAGE IS PRESENT ON THE ELECTRODE WHEN RUNNING.**

**VERIFICATION OF PROPER COOLING**

1. Start the power supply and run at 50% of rated power. After 10 minutes, shut down and verify the electrode temperature is below 150°F.
2. Restart the power supply and increase the output to rated power. Shutdown and recheck the electrode temperature after 30 minutes. The temperature should not exceed 185°F.

## SECTION 4 – MAINTENANCE

### GENERAL

The Enercon *Bare/Universal Roll Corona Treating Stations* are designed to require minimal maintenance. However, to ensure long-range reliability, it is a good practice to have a planned maintenance program. This section will include recommended preventative and corrective maintenance procedures.

### PREVENTATIVE MAINTENANCE

It is recommended that a preventative maintenance program is set up and followed to ensure proper system operation.

**\*\*\* WARNING \*\*\***

**NEVER ATTEMPT TO PERFORM MAINTENANCE ON THE STATION UNTIL ELECTRICAL POWER IS LOCKED OUT AND TAGGED OUT.**

### SAFETY PRECAUTIONS (NOTES, CAUTIONS, WARNINGS)

1. **WARNING:** The use of high voltage is necessarily employed in the operation of this equipment. Precautions have been taken in the design of this equipment to make it as safe as possible for both operator and service personnel. However, since no amount of safety devices can be absolutely infallible, precautionary measures must always be taken when working on this equipment.
2. **KEEP AWAY FROM LIVE CIRCUITS:** Do not reach into the equipment or any electrical enclosure without first removing the power. Never apply power to the unit without all covers on and securely in place.
3. **OBSERVE EXTREME CAUTION WHEN SERVICING EQUIPMENT:** Do not connect any apparatus external to the enclosure to circuits internal to the equipment. Connecting the apparatus in this manner, in addition to being a great hazard can also cause failure to the equipment itself.

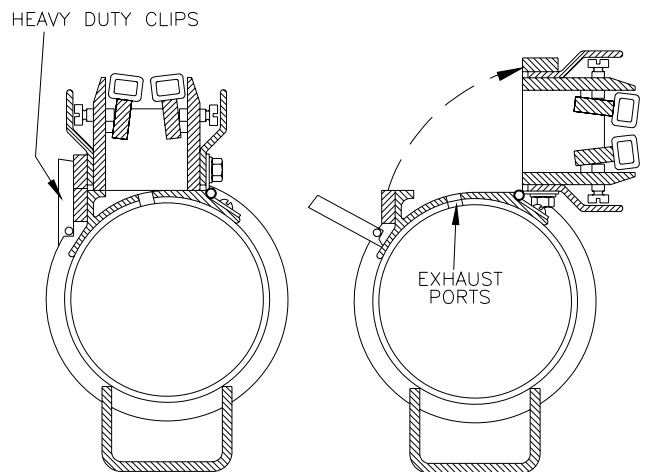
### WEEKLY CHECKS

#### 1. **Electrode Assembly Inspection (All Stations)**

Each electrode assembly should be inspected for general cleanliness and all insulators should be checked for signs of carbon tracking. Ensure all cooling ports are clean. Clean in accordance with the applicable cleaning procedure on **Page 16**.

#### 2. **Hinged Electrode Assembly (Optional)**

The shroud containing the electrodes is affixed to the exhaust portion of the assembly with a hinge. To clean the exhaust ports in the electrode assembly, simply flip the electrode shroud out of the way. This eliminates the need for complete electrode assembly removal for cleaning. During operation, the shroud is clipped securely to the electrode assembly, which maintains the air gap. **(Figure 9)**



**Figure 9**

## ELECTRODE CLEANING PROCEDURE

Each electrode assembly should be inspected on a weekly basis, checking for general cleanliness and signs of carbon tracking. If required, clean each electrode assembly in accordance with the following procedure:

### NOTE:

**ENSURE ALL SYSTEM POWER IS TURNED OFF AND PROPERLY TAGGED.**

1. Remove the electrodes from the electrode assembly by:
  - a) Disconnecting the electrode from high voltage end of the station.
  - b) Pivot the electrode assembly for proper access.
  - c) Loosen the electrode mounting screws and carefully remove the electrodes.
2. Thoroughly inspect the electrodes for loose or carbon tracked mounting tabs, deterioration of the high voltage wire and general cleanliness of the electrode.
  - a) Replace or re-adhere electrode mounting tabs with silicone adhesive (Enercon Part #TS3220) per the instructions provided with the adhesive.
  - b) Electrodes that require High Voltage Wire replacement should be sent to Enercon for repair. Temporary repair can be made by removing any carbon residue, fill void in wire with General Electric RTV Silicone rubber (RTV 108) or equivalent, and taping with high voltage tape.
  - c) Clean electrodes with isopropyl alcohol.
3. Inspect the electrode assembly to ensure all cooling ports are clear and that the insulating shroud is free of carbon tracking.
  - a) Loosen residue from cooling ports with a stiff bristled brush and remove by using compressed air or a vacuum cleaner. A water-dampened sponge will remove remaining residue.
  - b) Repair or replace insulating shroud as necessary. To repair shroud, remove bolts that mount the insulating shroud to the outer aluminum housing, remove the electrode mounting blocks and the insulating shroud. If carbon tracking is minor, remove carbon with file or suitable tool, spray with Krylon (crystal clear #1301) or equivalent nonconductive coating, and reinstall shroud. Otherwise, it is

recommended that the insulating shroud be replaced.

4. Inspect PVC elbow at high voltage end of electrode assembly for deterioration and replace as necessary.
5. Reassemble electrode assembly and reconnect electrodes at high voltage end of station.

## TREATER ROLL INSPECTION

### 1. Visual Inspection (All Stations)

Visually inspect the treater roll for deposits of foreign matter or the deterioration of the dielectric covering. Clean roll in accordance with instructions listed below.

### 2. Handling (All Rolls)

- Always lift by journals.
- Never use slings, chains, or wire rope on the roll face.
- Cover the roll face when handling to avoid damage and contaminants like oil and grease.

## CLEANING OF ROLLS

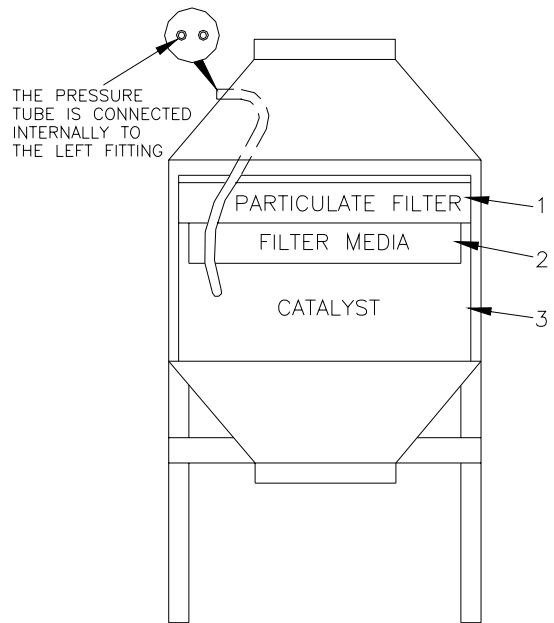
### a) Aluminum

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

### b) Ceramic Roll – General Cleaning and Removal of Oxidation

- 1) For light dust and dirt, use water, a mild soap and a clean cloth.
- 2) For grease and oil, use Simply Green™ liquid all-purpose cleaner. It is water-based, contains no petroleum, and is non-flammable.
- 3) For tougher stains, use a common, powdered kitchen cleanser (like Comet™) and a Scotch-Brite™ pad and then wash, rinse and dry.
- 4) **Do Not Use:** Strong acidic solutions such as HCL acid and sulfuric acid or any cleaning mechanism using metal or conductive material or power tools of any kind.

- c) **Hypalon Roll – General cleaning**
- 1) **Use:** Soap and water or alcohol (methanol, methyl alcohol) work well
  - 2) **Do Not Use:** 1, 1, 1 Trichloroethane, (MEK's) or xylene and similar products.
- d) **Silicone Roll – General Cleaning**
- 1) **Use:** Mild soap and water
  - 2) **Do Not Use:** 1, 1, 1 Trichloroethane, (MEK's) or xylene and similar products.
- e) **Electroless Nickel Plating**
- 1) **General Cleaning:** Any non-caustic cleaner can be used.
  - 2) **Remove Oxidation:** Any commercial silver cleaner/tarnish remover.



**Figure 10**

**STORING (All Rolls)**

- Always cover the roll during storage and do not store in a harsh environment.
- Do not rest the roll face directly on the floor or storage rack.
- Support the roll by its journals or rest on 2x4's.
- If storing on the floor, check the area for nuts, bolts, stones, etc.

**OZONE DECOMPOSITION FILTER & CATALYST CHECKS**

The filter and catalyst replacement period will vary with each application. Replace catalyst when ozone concentration of the exiting air stream is at or above the OSHA compliance level of 0.1 PPM. The following procedure should be followed when checking the particulate filter or catalyst.

- a) Open the access door located on the front of the ozone decomposer.
- b) Disconnect the pressure tube from the basket to allow removal of the particulate filter (1) **Figure 10**.

- c) Remove the particulate filter (1) and check for excessive clogging. Replace if necessary.
- d) If the filter media (2) and/or catalyst (3) need to be replaced, remove the basket from the decomposer prior to replacement of the particulate filter.
- e) The filter media is held in a separate, smaller basket that can be removed from the catalyst basket out of the opening the particulate filter was taken from. Replace the filter media if necessary.
- f) With the filter media basket removed, the catalyst can be replaced if necessary.
- g) With the new catalyst in the catalyst basket, replace the filter media basket.
- h) Reinstall the catalyst basket.
- i) Reinstall the particulate filter.
- j) Reconnect the pressure tube to the basket.
- k) Close the access door prior to operation.

**\*\*\* CAUTION \*\*\***

Ozone gas is generated in EVERY Corona Treating process and, therefore, ozone is present in the exhaust airflow. Installation of this equipment MUST BE DONE IN ACCORDANCE WITH LOCAL CODE and is important to ensure the safety of personnel in the area and in the building.

The exhaust airstream from this unit should NOT be released into the plant environment. Venting the exhaust into atmosphere is permissible only if the exhaust airstream does not contain legally restricted emissions. Properly maintained, this unit will reduce ozone emissions to an environmentally safe level. However, it is the user's responsibility to ensure that no other gases, vapors, or other emissions that are subject to environmental restriction are present. Other contaminants (gases, vapors or particulates) in the airstream may mask contaminate or block the ozone catalyst and, over a period of time make it ineffective. It is the responsibility of the user to ensure that other dangerous or undesirable gases, vapors, or particulates, that may be present in the exhaust, are removed.

**MONTHLY CHECKS – See Lubrication Table**

Lubricate all roll bearings (all stations) in accordance with the following:

**1. Non-Driven Ground Rolls & Idlers:**

Lubrication Type: Mobile SAE 10 oil or equivalent. Inspect oil cups weekly.

**2. Driven Ground Rolls:**

- a) For best results, bearing should be relubricated while in operation provided personal safety is assured. Add grease slowly with shaft rotating until a slight bead forms at the seals.
- b) If necessary, relubrication can be done while bearings are stationary.
- c) Relubrication is generally accompanied by a temporary rise in operating temperature. Excess grease will be purged at seals.
- d) For abnormal operating conditions of high temperature or abnormal environments, consult Enercon.

**NOTE:**

For normal operation conditions, relubricate with grease conforming to NLGI No. 2 penetration, free from chemical impurities such as dust, rust, metal particles or abrasives.

<b>LUBRICATION TABLE</b>			
<b>SPEED</b>	<b>TEMPERATURE</b>	<b>CLEANLINESS</b>	<b>INTERVAL</b>
100 FPM	Up to 120° F	Clean	6-12 Months
500 FPM	Up to 150° F	Clean	2-6 Months
1000 FPM	Up to 210° F	Clean	2 Weeks – 2 Months`
1500 FPM	Over 120° F	Clean	Weekly
Any Speed	Up to 150° F	Dirty	1 Week – 1 Month
Any Speed	Over 150° F	Dirty	Daily – 2 Weeks
Any Speed	Any Temperature	Very Dirty	Daily – 2 Weeks
Any Speed	Extreme Conditions	Extremely Dirty	Daily – 2 Weeks

### 3. Electrode Pivoting

Verify the electrode assembly pivots freely.  
Lubricate bearings if necessary.

## QUARTERLY CHECKS

### 1. Treating Station (All Stations)

- Remove end covers and inspect station for excessive dust build-up. Clean if required. Check all high voltage terminals, insulators, and leads for signs of deterioration. Repair or replace if necessary.

\*\*\* WARNING \*\*\*

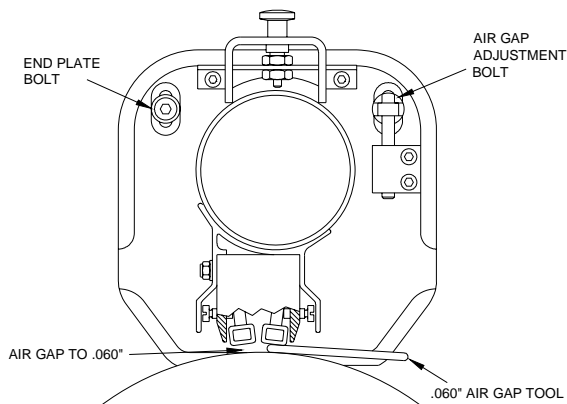
**TAG AND LOCKOUT POWER IN ACCORDANCE WITH STANDARD PROCEDURES BEFORE ANY MAINTENANCE IS PERFORMED.**

## CORRECTIVE MAINTENANCE

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

### 1. Air Gap Adjustment

- Loosen end plate bolts on each end of the electrode assembly. **(Figure 11)**



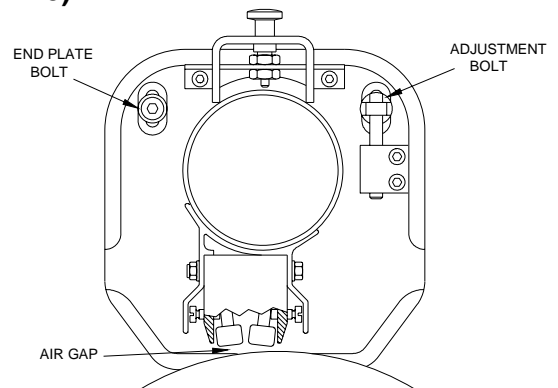
**Figure 11**

- Insert a .060" (or desired thickness) flexible feeler gauge between the roll and electrode on each end of the assembly.
- Turn the electrode assembly adjustment bolt on each end of the assembly until the electrode comes in contact with gauge. **(Figure 11)**
- Tighten the end plate bolts on each side of the electrode assembly.

- Verify the air gap is even across the surface of the roll by sliding the gauge from one end to the other.

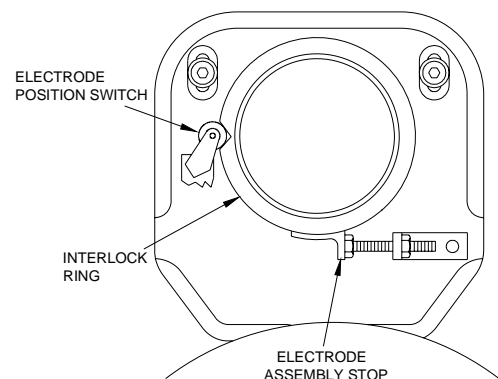
### 2. Electrode Assembly Alignment

- Check the air gap of each electrode by inserting a flexible feeler gauge between the electrode and the treater ground roll. **(Figure 11)**
- If the electrode assembly is misaligned **(Figure 12)**, adjust the electrode assembly stop to achieve an even air gap between each electrode and the ground roll. **(Figure 13)**



**Figure 12**

- If necessary, adjust the electrode assembly interlock ring so that the switch roller is in the ring notch when the electrode assembly is in the treating position. **(Figure 13)** To rotate the ring, loosen the setscrews and rotate to the desired position and retighten the screws.



**Figure 13**

### 3. **Electrode Replacement**

- a) Remove High Voltage access cover.
- b) Disconnect the applicable high voltage lead at the terminal block.
- c) Swing the electrode assembly out of the treating position to allow for easy removal of the electrodes.
- d) Loosen the mounting screws and remove the electrode.
- e) Temporary HV wire repair can be made by removing any carbon residue. Fill void in wire with General Electric RTV Silicone rubber (RTV 108) or equivalent and covering with shrink tubing.
- f) Carefully install the replacement electrode by guiding the high voltage wire through the Pyrex elbow and placing the electrode so that the groove in the mounting tab is aligned with the protrusion on the mounting block. Retighten the mounting screws.
- g) Connect the high voltage lead to the terminal block on the high voltage end of the station. Keep the length of the lead to a minimum to prevent it from leaning against the frame or covers of the station. A minimum of 1" clearance from ground is recommended.
- h) Reinstall the high voltage access cover.

#### **NOTE:**

**Failed electrodes and electrodes that require high voltage wire replacement should be returned to Enercon to be evaluated for possible repair or credit. Electrodes should be returned in original packaging.**

## SECTION 5 – TROUBLESHOOTING

SYMPTOM	FAULT ISOLATION
<b>Electrode Failures</b>	1. Determine if the failure is due to mechanical shock. (i.e. Ensure the web or a splice has not struck the electrode causing a break).
	2. Check to ensure the exhaust fan is functioning.
	3. Check and verify the exhaust fan rotation is correct.
	4. Check the exhaust passages for obstruction.
	5. Check and verify the electrode air gap is .060”.
	6. Check the steady state operating temperature of the electrode. The electrode should not exceed 180°F.
	7. Verify the exhaust airflow meets the station requirements. Refer to the station ID drawing for the correct CFM rate.
	8. Contact Enercon’s Service Department for further advice.
<b>Uneven Treatment</b>	1. Check to ensure the electrode air gap is consistent across the web. The recommended air gap is .060”.
	2. Check the electrode pitch for the assembly. Each electrode should be an equal distance away from the ground roll.
	3. Verify the ground roll is clean and free of debris or residue.
	4. Check the ground brush to ensure good contact is made with the roll shaft and the contact point is not oxidized.
<b>Electrode Assembly Pivot</b>	1. Check to ensure the position indication interlock collar is not binding or contacting the bearing housing.
	2. Check to ensure the binding is not associated with any obstruction on the end plate or the ground roll.
	3. Lubricate the bearings.
	4. Clean the electrode assembly bearing. The bearing is located inside the bearing housing assembly.
<b>Wrinkles in the Web</b>	1. Verify the station alignment is correct.
	2. Check the ground brush to ensure good contact is made with the roll shaft and the contact point is not oxidized.
	3. Check the tension of the web.
	4. Check the ground roll bearings. Lubricate as necessary.
	5. Check the idler roll bearings. Lubricate as necessary.
	6. Verify the ground roll is clean and free of debris or oxidation.
<b>High Voltage Arcing</b>	1. Verify the insulating shrouding is clean and free of debris.
	2. Verify the insulating shrouding is not carbon tracked.
	3. Inspect the High Voltage wire for insulation breakdown.
	4. Ensure the High Voltage wire is isolated from any ground surface or other low voltage wires by at least two inches.
	5. Isolate each electrode assembly to locate a possible failed electrode. Refer to the above “Electrode Failure” analysis.
	6. Moisture condensation forming during shutdown periods may result in high voltage arcing. To prevent, operate the system exhaust blowers before production is scheduled.

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

## SECTION 6 – PARTS LIST

### GENERAL

This manual, which contains an illustrated parts breakdown, has been prepared as an aid in identifying and ordering parts in the treater. All of the parts listed in the parts breakdown are manufactured with the same precision as the original equipment.

### DESCRIPTION

The illustrated parts breakdown illustrates the various assemblies, sub-assemblies, and detailed parts that make up this particular Treater Station. A series of illustrations show each part clearly and in its correct location relative to the other parts in the illustration.

The description and quantity required per station is listed in numerical order on the following pages.

### HOW TO USE THIS PARTS LIST

1. Turn to the *Parts Section* to locate the desired illustrations.
2. Locate the part on the illustration by visual identification and the *Index Number*.
3. Find the *Index Number* on the tabulated page, along with the description.

### HOW TO ORDER PARTS

In order that all avoidable errors are eliminated when ordering parts, please specify the following:

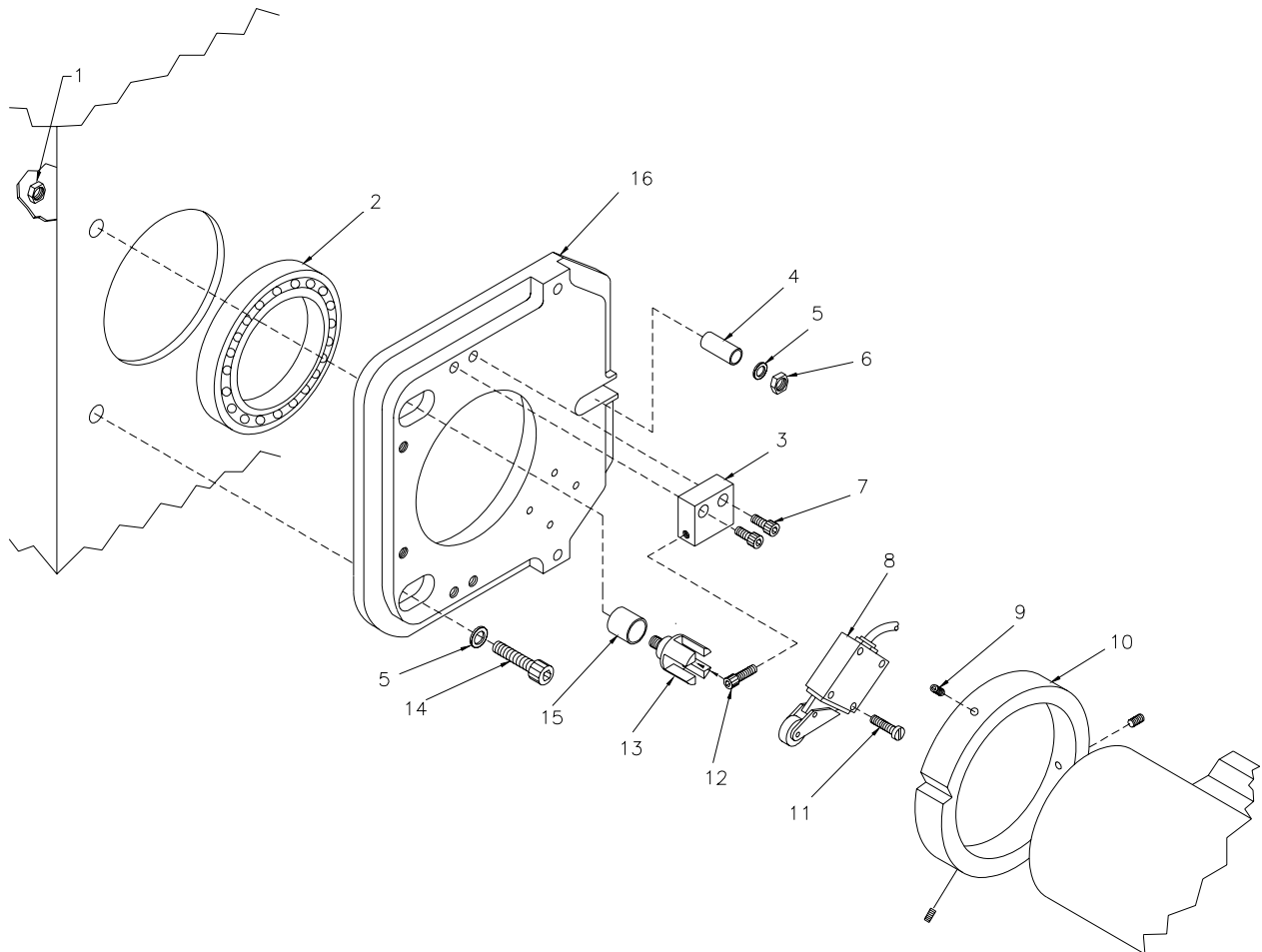
1. The *Model Number* of the unit as shown on the Treater Station Data Plate.
2. The *Serial Number* of the unit as shown on the Treater Station Data Plate.
3. The *Form Number* of this manual located on cover.
4. The *Part Number*, page, and dates (located on the lower left-hand corner of the cover sheet), description and quantity needed exactly as listed on parts breakdown drawings.

To order, contact:

**Enercon Customer Service Department**  
**Phone Number: (262) 255-6070**  
**Fax Number: (262) 255-2462**  
**E-Mail Address: [info@enerconind.com](mailto:info@enerconind.com)**  
**Website: [www.enerconind.com](http://www.enerconind.com)**  
**24hr Customer Service is available.**

## BEARING HOUSING ASSEMBLY PARTS BREAKDOWN – INTERLOCK END

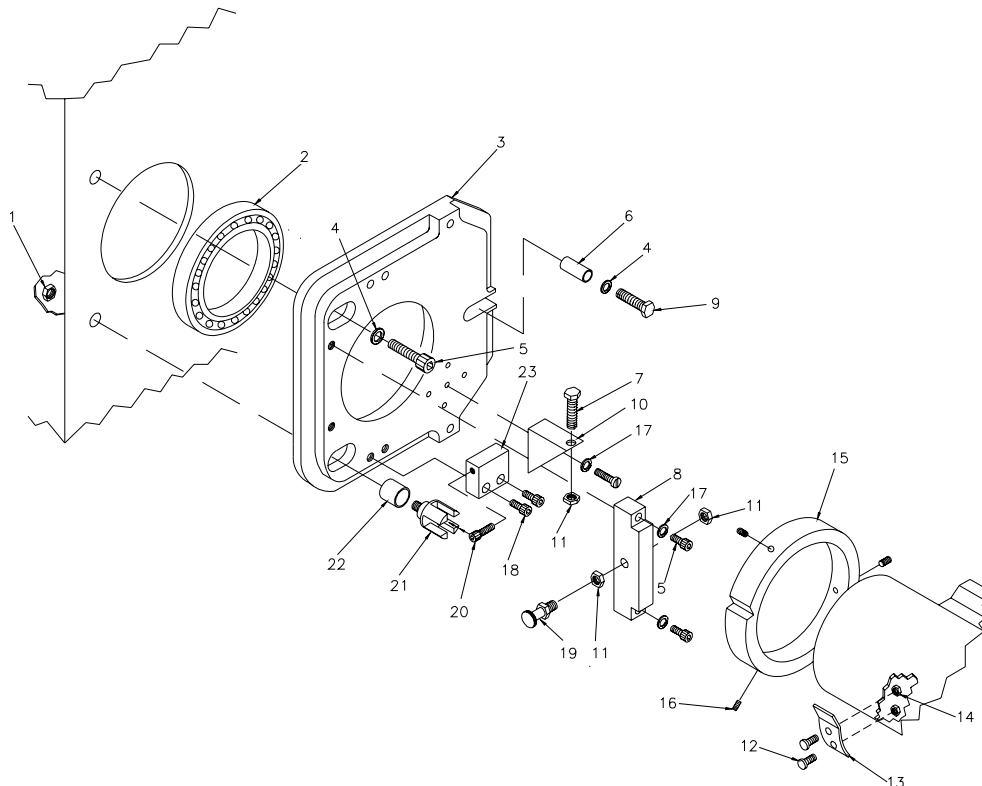
INDEX NO.	PART NO.	DESCRIPTION	QTY.
1	NU7250	Nut, M8	1
2	BG7510	Bearing Seal	1
2	BG7500	Exhaust Tube Bearing	1
3	FD4109-01	Adjustment Block	1
4	FD4027-02	Bearing Housing Spacer	1
5	WA7210	Flat Washer, M8	2
6	NU7250	Hex Nut, M8	1
7	MS7030	Socket Head Cap Screw, M6 x 25	2
8	SW7010	Interlock Limit Switch	1
9	MS7420	Socket Head Set Screw, M6 x 6	3
10	FD3914-01	Aluminum Ring with Notch	1
11	MS7790	Fillister Head Screw, M4 x 40	4
12	MS7460	Socket Head Cap Screw, M8 x 50	1
13	FD4110-01	Adjustment Stud	1
14	MS7090	Socket Head Cap Screw, M8 x 25	1
15	FD4027-01	Spacer	1
16	FD3912-01	Bearing Housing	1



**Figure 14**

## BEARING HOUSING ASSEMBLY PARTS BREAKDOWN – STOP END

INDEX NO.	PART NO.	DESCRIPTION	QTY.
1	NU7250	Nut, M8	1
2	BG7510	Bearing Seal	1
2	BG7500	Exhaust Tube Bearing	1
3	FD3912-01	Bearing Housing	1
4	WA7210	Flat Washer	2
5	MS7090	Socket Head Cap Screw, M8 x 25	3
6	FD4027-02	Spacer	1
7	MS7270	Hex Head Cap Screw, M12 x 40	1
8	FD4761-01	Bracket	1
9	MS7230	Hex Head Cap Screw, M8 x 40	1
10	FD4108-01	Electrode Assembly Stop (Frame)	1
11	HW7092	Nut, M12	2
12	MS7510	Oval Head Machine Screw, 1/4-20 x 3/8"	3
13	FD4107-01	Electrode Assembly Stop (Tube)	1
14	NU7010	Nut, 1/4-20	2
15	FD3914-01	Aluminum Ring with Notch	1
16	MS7420	Socket Head Set Screw, M6 x 6	3
17	WA7690	Lock Washer, M6	3
18	MS7030	Socket Head Cap Screw, M6 x 25	2
19	HW7090	Locking Pin Indexing Plunger	1
20	MS7460	Socket Head Cap Screw, M8 x 50	1
21	FD4110-01	Adjustment Stud	1
22	FD4027-01	Spacer	1
23	FD4109-01	Adjustment Block	1



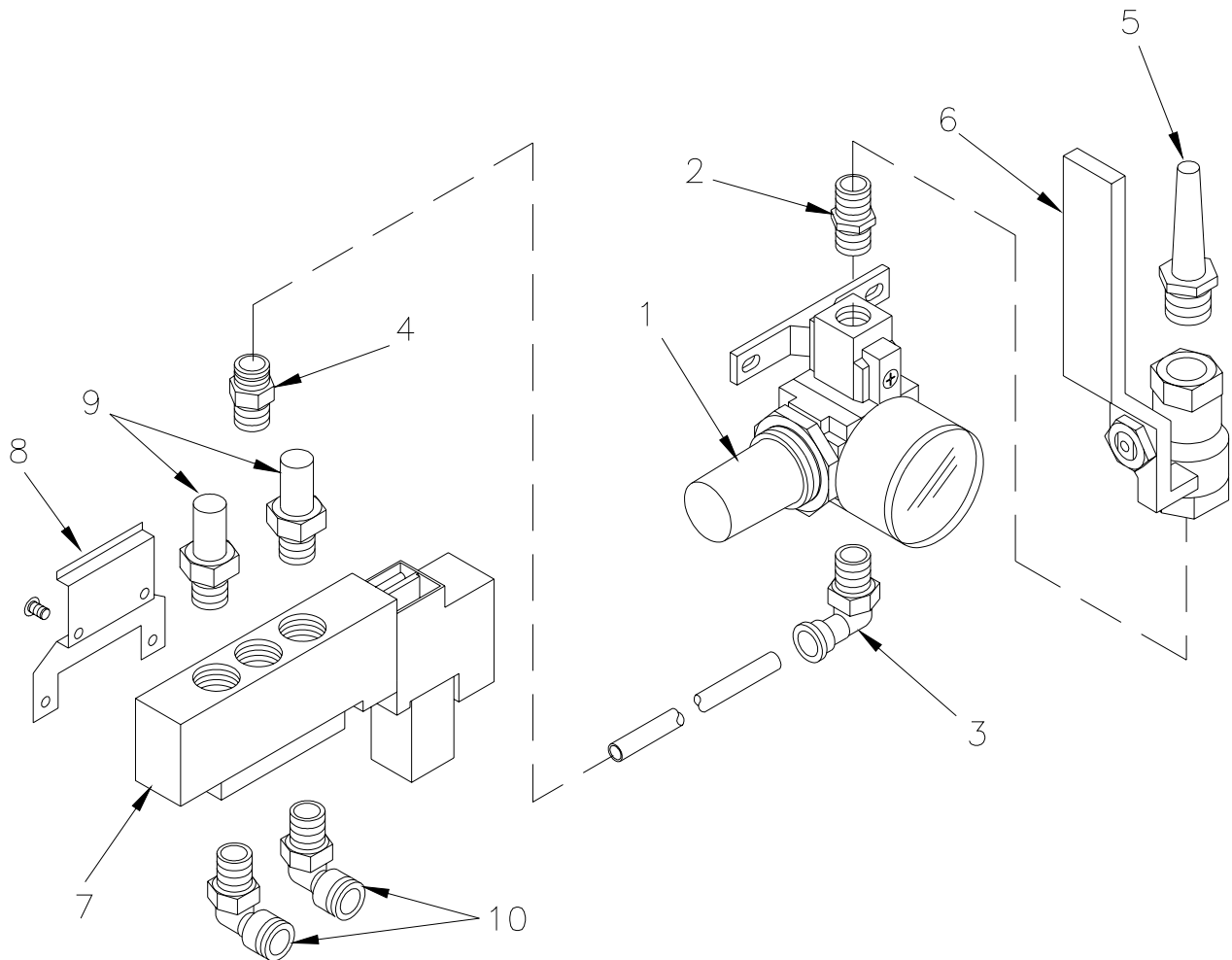
**Figure 15**



## PRESSURE GAUGE ASSEMBLY PARTS BREAKDOWN

INDEX NO.	PART NO.	DESCRIPTION	QTY.
1	PN7055	Regulator w/Gauge, Bracket and Port Adapter	1
2	FT0025	Hex Nipple, 1/4 NPT	1
3	FT3051	Elbow, 1/4 NPT	1
4	FT3000	Straight Connector, 1/8" NPT	1
5	FT7540	Hose Barb, 1/4 NPT	1
6	FT7002	Lockout Valve	1
7	PN7120-01	Solenoid Valve	1
8	PN7119	Bracket for Solenoid Valve	1
9	PN0051	Exhaust Silencer, 1/8" NPT	2
10	FT3050	11V Station: Elbow, 1/8" NPT	2
	FT3100	21V Station: Male Run Tee, 1/8" NPT	2
	FT7390	31V or Greater, Station: Manifold	2
	FT3050	Elbow, 1/8" NPT	2
*	TU7090	Black Polyethylene Tube, 1/4" DIA	As Req.
*	TU7094	White Polyethylene Tube, 1/4" DIA	As Req.

**\*Contact Enercon Customer Service for tube required.  
Specify location of tube for length required.**



**Figure 17**

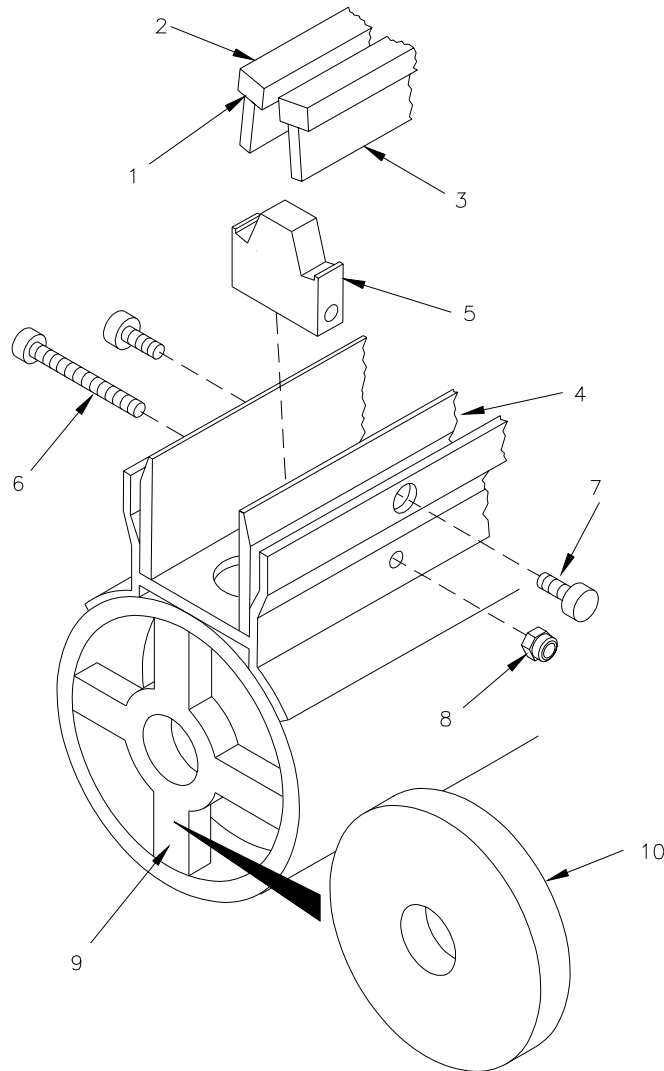
## ELECTRODE ASSEMBLY PARTS BREAKDOWN

INDEX NO.	PART NO.	DESCRIPTION	QTY.
1	LM3650-01	Adhesive with Primer	As Req.
2	***	Electrode	2
3	FD4150-01	Electrode Mounting Tab	As Req.
4	***	Insulating Shroud	2
5	FD4104-01	Electrode Mounting Block	As Req.
6	MS7190	M6 Hex. Head. Cap Screw	As Req.
7	MS7900	Electrode Mounting Screw	As Req.
8	NU7190	M6 Locknut w/Nylon Insert	As Req.
**9	IN7140-01* IN7140-03	Star Insulator for PVC Tube Star Insulator for Pyrex Tube	1
**10	IN7210* IN7210-03	Round Insulator for PVC Tube Round Insulator for Pyrex Tube	1

***\*Used on older models.***

***\*\*Replace with same insulator that is in your unit.***

***\*\*\*Contact Enercon customer service for length required and specify the COLOR of the electrode lead wire.***



**Figure 18**











