INSTRUCTION MANUAL

MODEL P5-80, 800W

PRISMTM CORONA SURFACE TREATMENT SYSTEM

COMPANY: ________________________________________________________________

ADDRESS: ______________________________________________________________

_______________________________________________________________________

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*** WARNING ***

Encore technologies shall not be held responsible for any personal injury
and property damage due to improper installation and usage of
the treatment system and any of its components.

*** NOTE ***

All equipment was visually, electrically, and functionally checked prior to
shipment. Please inspect the equipment to ensure that no damage was incurred
during shipment. Notify Encore Technologies immediately for assistance in
determining the extent of the damage and/or estimate for repairs.
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1.0 UNDERSTANDING UNIQUE FEATURES

A quick review and understanding of the following unique features are most beneficial in getting optimum performance from the Prism™ corona treatment system.

1. Wet Start™: in a humid area, water will quickly collect on the rollers and the electrodes after the converting process is shut down. This is due to ammonium nitrate, a corona byproduct, forming inside the treater station and absorbing moisture from the air. By manually removing large droplets of water, the Wet Start™ feature can be relied upon to burn off the remaining moisture inside the treater station. Normal startup can be performed without further delay or problems. Simply start the system in the usual manner and corona will return automatically after all the moisture has been evaporated. A few attempts might be necessary but no difficult labor effort should be necessary.

2. Smart Feedback™: this feature uses a different operating principle as compared to the older vintage, SCR based generators. There is no inductor used and no internal load that requires matching to the treater station. There is very little heat generated inside the P5-80 due to the very high efficiency – reducing power usage. There are fewer components and spare parts required to maintain the P5-80.

3. True Power: the output power, in Watts, as displayed on the front panel meter is a true indication of corona power. Since the amount of power in Watts represents directly how much treatment is being done, the front panel meter can be relied on for reading treatment power going into the film. For example, an 800W reading means twice as much power is being delivered to the film as a 400W reading.

4. Smart Alarm: the alarm is set automatically every time the generator is started. The STOP switch is used to turn the alarm off. The electronic alarm will buzz loudly when the treat level falls below a factory preset level, or when there are problems causing a loss of treatment. With no arming switch, forgetting to turn on the alarm is no longer an operator’s mistake or concern. Waste due to untreated film is reduced.

5. Shutdown Protection: the P5-80 will shut off automatically and turn on the loud alarm when there are problems with short circuits or overloads. Power must be turned off in order to reset the unit. This is done to encourage removing power for troubleshooting, and eliminating hasty actions in trying to restart. Any short circuit or abnormal condition causing an overload must be removed or repaired when the ‘OVERLOAD’ indicator flashes Red.

6. Treat Consistency: special power sensing circuitry ensures that the power level selected by the ‘POWER CONTROL’ knob is not affected by small changes in electrode gaps, line speed, or voltage fluctuation. Once the knob is set, there is no need to change it for startup, etc. This must not be confused with the soft start feature which gradually increases power to the level set by the knob on normal equipment startup.
7. Roller Interlock: the generator has an interface circuit for sensing motion in the roller by using a magnetic switch or an inductive proximity sensor. In the case of the inductive proximity sensor, 12Vdc is supplied to power the sensor. The ‘ROLLER I/L’ indicator on the front panel will light a steady Green to indicate that the roller is in motion. Without this Green indicator, the P5-80 will not start up when ‘START’ is pushed.

NOTES:
(1) There must be a repeated break/make action (or electrical on/off pulses) at the sensor input to indicate that the roller is moving. A normally-closed (NC) or normally-open (NO) contact can not be used.
(2) The P5-80 can be made to ignore the roller interlock as follows: hold down ‘STOP’ while turning power on. Continue to hold down ‘STOP’ for three (3) seconds and the Green ‘ROLLER I/L’ indicator will stay on. Use this mode for troubleshooting purposes only since there is no protection for the roller.

8. The Treater Station: the treater station is designed to maximize the advantage of Wet Start™. The electrodes and all components connected to the high voltage are supported by special Dyne Tek™ insulators that resist tracking and breakdown.

2.0 INSTALLATION INSTRUCTIONS

Due to large differences in machine designs and corona treatment applications, the following mechanical and electrical installation instructions should be used as a guide only.

**CAUTION:** THE PRISM™ CORONA SURFACE TREATMENT SYSTEM IS DESIGNED AND MANUFACTURED FOR OPERATION IN A NON-HAZARDOUS ATMOSPHERE.

2.1 Mechanical Installation

Ensure that a lock washer is used with every fastener to minimize loosening by machine vibration.
2.1.1 Mounting the Treater Station

The figure below shows general location for mounting the treater station for in-line treatment on an extruder.
The treater station has two mounting brackets that can accommodate a wide range of attachment to a machine frame. Ensure that there is sufficient web tension to turn the rollers. If the rollers do not turn or turn too slowly, the generator will shut off. Refer to the illustration below for instruction to ensure that there is good web tension.
2.1.2 Mounting the Generator:

Due to its compact and lightweight characteristics, the P5-80 generator can be simply 'hung' on two bolts before tightening the bolts. A handle is included to make it convenient for lifting the unit. Use the dimensions below:

![Generator Diagram]

2.2 Electrical Installation:

2.2.1 Connecting the Components:

Connect the treater station to the generator with the attached cable. Rotate the plug until it drops down slightly into the receptacle on top of the generator. Turn the metal ring on the plug clockwise many times until it is tight and the plug is fully seated.

2.2.2 Connecting Power to the System:

Connect power to the P5-80 in full compliance with the locally governed electrical codes. Provide **220V, 5A, 50/60 Hz, single phase service with ground** for each P5-80. A main disconnect, fused switch or circuit breakers, is highly recommended and should be installed between the power source and the P5-80.

The P5-80 is equipped with an internationally compatible power socket, and a two-pole breaker/switch. Use the factory supplied matching plug to connect power to the unit. The breaker/switch is used to remove power from the unit and prevent a fire hazard in case of a malfunction.
IMPORTANT NOTE ON GROUNDING

Ensure that the 220V power is equipped with proper grounding. The chassis of the P5-80 and the chassis of the treater station must be connected to a common ground, which is connected to power ground. Improper grounding will cause operational problems and pose a risk to personnel.

2.2.3 Electrical Diagrams:

The diagrams below show the connections inside the treater station and inside the P5-80.
COMPONENT ARRANGEMENT INSIDE THE P5-80 GENERATOR
P5-80 GENERATOR WIRING DIAGRAM

APPLIES TO OFF-BOARD MOUNTED CAPACITORS ONLY
3.0 OPERATING INSTRUCTIONS

In order to eliminate human errors as much as possible, the P5-80 Prism Corona Treatment System has been designed to require little operator instruction.

3.1 Illustrated Instruction for the Treater Station

The treater station is designed to open and close with a single latch on the side. One half is mounted and stationary. The other half pivots on a hinge on one end and slides on a cross brace, which is mounted on the bottom of the other end. The cross brace supports the weight of the swinging half as well as preventing the station from swinging wide open. For this reason, do not remove the bolt holding it to the cross brace.

The electrodes are segmented and the gap can be adjusted from each end by turning the appropriate knob. Each electrode segment has a set screw mounted on the back side that can be loosened to allow the segment to be rotated.

The rollers can be quickly removed for sleeve changes. The roller interlock (I/L) is sensed using a magnetic switch that is mounted opposite one end of the upper roller. A plastic disk with four small magnet pieces impressed in it is mounted on the roller shaft. The magnet pieces are rotated past the magnetic switch and cause the switch to open and close. The plastic disk needs to be adjusted to within 0.03” (0.7mm) of the magnetic switch for it to work properly. See illustration below.

![ROLLER I/L MAGNETIC SWITCH FOR ZERO-SPEED DETECTION](image)

3.2 Illustrated Instruction for the Generator

The illustration below depicts the simple operation for the P5-80. The following characteristics are unique to Encore’s generators:

- **SOFT START**: The P5-80 will automatically start at minimum power and increase slowly to the level set by the ‘Power Control’ potentiometer. The entire soft start takes about eight (8) seconds. Do not do anything in the first ten (10) seconds after pushing ‘Start’.

- **POWER SETTING**: There is no need to change the ‘Power Control’ setting once it has been selected. The same power level will be reached each time the unit is started without any need to adjust the control setting.

- **WET START**: The needle of the power meter will swing wildly from minimum to maximum during a ‘Wet Start’. This is due to the moisture being burned off the film and rollers.
- TRUE OUTPUT POWER: The needle of the power meter will ‘bounce’ back and forth due to its fast response to the film and the roller. Do not be concerned with a small amount of needle bouncing.

- READY TO START: Both the ‘Power’ indicator and the ‘Roller I/L’ indicator must be ON in order to start treat. The ‘Roller I/L’ will turn on when the roller is turning or when the P5-80 is manually set to ignore the zero-speed switch.

- OVERLOAD PROTECTION: The P5-80 will shut off automatically and flash a Red ‘Overload’ indicator. Power must be turned off and back to on to reset it. Do not attempt to restart without investigating to see what caused the overload condition.

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POWER: ELECTRONICS ON
ROLLER I/L: ON WHEN ROLLER
IS TURNING
OVERLOAD: POWER SHUTDOWN,
ABNORMAL CONDITION

OUTPUT RECEPTACLE
PUSH TO START TREAT

PUSH TO:
1. STOP TREAT
2. TURN OFF ALARM

HOLD DOWN 3 SECONDS
WHILE TURNING POWER
SWITCH FROM OFF TO ON
TO IGNORE ZERO SPEED
SENSING (ROLLER I/L ON)

1 = POWER ON (LIGHTED)
0 = POWER OFF (NO LIGHT)

220V, 50/60HZ POWER IN

ALARM BUZZER
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4.0 TROUBLESHOOTING

The LED’s on the front panel of the generator provide a very effective diagnostic means to help determine and correct most typical operational problems.

4.1 ‘POWER’ Indicator

The ‘POWER’ indicator should light a steady Green to indicate that input power is present. If input power is verified to be 220V at the plug but there is no ‘POWER’ indicator, the unit must be disassembled to examine for problems. There is no internal fuse used. Look for bad indicator, broken wires, broken power receptacle or a bad breaker/switch.

4.2 ‘OVERLOAD’ Indicator

The ‘OVERLOAD’ indicator will flash Red and the alarm will sound when abnormal conditions occur during operation. Shut power down by pushing the breaker/switch to ‘0’ and unplug the power cord. When an overload condition occurs during normal operation, it is almost certain that a fault has occurred somewhere. Perform a thorough inspection of the entire treating system to locate the fault(s) as follows.

4.2.1 Generator Overload Test

Perform a test on the generator alone to determine if there is any internal fault that requires factory service. If found to have an internal overload problem, the generator can be repaired by replacing any failed component with factory parts or shipped to Encore for factory repair.

1. Disconnect the output cable to the treater station and turn power on.
2. Ensure that the ‘ROLLER I/L’ indicator is ON (by turning the roller or by setting the P5-80 in the bypass mode to ignore the magnetic switch).
3. Push ‘START’ and verify that only the audio low power alarm goes off but the ‘OVERLOAD’ indicator stays OFF.
4. If the ‘OVERLOAD’ indicator flashes Red, an internal overload has developed internally to the generator.

4.2.2 System Inspection

If the generator passes the Overload test, the fault exists somewhere else in the treater system. The following inspection points need to be checked and verified:

1. Installation problems that short out the output: This could be caused by wire insulation that has been damaged, or wire breakage shorting to ground or to another wire.
2. Insulation breakdown in the high voltage cable connecting the transformer to the treater station: Look and listen for arcing purple sparks and hissing sound along the entire length of the high voltage path.
3. Insulation breakdown in the high voltage cable connecting the two electrodes: Look for high voltage cable rubbing against a sharp edge or touching the metal sides. This will cause high voltage to arc to ground and create an overload.
4. Breakdown of the insulators that support the electrodes inside the treater station: Look for surface tracking that burns black marks into the insulators, which support the electrodes. The surface tracking will form an electrical path from the electrodes to ground and create an overload. Damaged insulators will need to be replaced.

5. Excessive water condensation or contamination deposits on the rollers and the electrodes: Water condensation by ammonia nitrate and contamination in the form of metal dust and oil residues can cause an overload. Ammonia nitrate is a white power substance that forms due to electrical discharge (corona) in air. It can form dendrites or spikes, which absorb moisture and become conductive. All powdery substance and dendrites need to be removed from the electrodes, rollers and insulators to eliminate electrical paths from the high voltage to ground.

6. Holes in roller: Roller covering materials will develop holes and cracks sooner or later. The holes need to be repaired or the damaged roller needs to be replaced to remove an overload condition.

7. Roller wear to the metal core: Roller covering materials such as silicone will wear even if they don't develop holes or cracks. When the wear is excessive, it will create an overload due to the thinness of the material. In which case, the rollers will have to be recovered or replaced.

8. High voltage bushing on corona transformer arcing to ground: The bushing could develop crack and surface tracking due to the heat and aging. When that happens, the bushing can no longer sustain the high voltage and will break down causing an overload. The bushing will have to be replaced.

9. Too much electrode area: It is possible to overload the generator by increasing the electrode area. If additional electrodes are installed, the generator will drop its operating frequency to compensate. However, excessive electrode areas will draw large enough current that even at the lowest frequency the generator still can overload. Reduce the electrode area or request us to lower the operating frequency range of the generator if the additional electrode area is deemed necessary.

10. Bad high voltage transformer: The high voltage transformer will become damaged if the fan stops, the grills are blocked, or there is excessive heat or aging. Bad transformer is usually indicated by an electrical burned smell, or by poor visual appearance. The transformer needs to be replaced or sent back to the factory for rebuild.

11. Excessive high voltage: If the rollers are changed out from a silicone or epoxy type to a ceramic, the transformer will have to be changed out also. Silicone or epoxy operates at a substantially higher voltage that will cause an overload when the same transformer is used on ceramic covered rollers. Contact the factory for a transformer specifically built for ceramic.
4.3 ‘ROLLER I/L’ Indicator

The ‘ROLLER I/L’ indicator should light a steady Green to indicate that the roller inside the treater station is turning and the generator is ready to be started. If the rollers are turning but there is no indicator, check the spacing between the head of the magnetic switch and the plastic disk carrying the small magnets. It should be adjusted to within 0.03" (0.7mm) for proper sensing.

5.0 MAINTENANCE

Periodic maintenance is the key to long life and trouble free operation of your Prism components. In general, we recommend that dusting with a vacuum cleaner once every month for the generator, the transformer and the treater station. Shop air can also be used to blow out accumulated dirt and dust. Without a vacuum cleaner or shop air, simple wiping with a dry or slightly damped rag will go a long way in keeping the equipment clean.

5.1 Treater Station

Some of the byproducts created by corona treatment include ozone and ammonium nitrate. Ozone will eat, corrode or pit the surface of most anything it comes into contact with: screws will rust, plastics will become dull and brittle, etc. Frequent cleaning and vacuuming will greatly prolong the life of the treater station. However, part replacement will become necessary over time.

Ammonium nitrate forms clear white/yellow crystals in the form of whiskers on electrodes and rollers. These crystals will create short circuit paths to ground and cause the generator to shut down. The problem is much worse in a hot and humid environment. Thorough cleaning of the electrodes and rollers is a must, especially if the station has been idled for a while. Wet rags will easily remove the whiskers that tend to collect on the underside of the electrodes and insulators like small spikes.

5.2 Generator

The generator uses an internal fan that circulates air inside. The inside needs to be dusted at least once every six months. We recommend that the generator be removed from service at least once every six months for cleaning and general maintenance. A technician who is familiar with electrical/electronic equipment must do the following procedure.

Remove the cover and vacuum the inside thoroughly. The fan blades sometimes will collect heavy accumulation of dust that must be cleaned off with a rag. Use the proper screwdrivers to re-tighten ALL screw connections. Look for loose push-in terminals and lugs. A loose connection will generate heat that will turn wire insulation a brownish color. It may be necessary to re-tighten the push-in terminals or it may require complete replacement.
5.3 Transformer

The transformer sees a very hostile environment being mounted usually up high. The cooling fan tends to pull hot and humid air plus dirt, dust and oil droplets right through the transformer coils. If the fan fails or the perforated sides become clogged, the transformer will fail rather quickly due to heat buildup.

It is vital that the perforated sides of the transformer enclosure are cleaned weekly or when they appear dirty. Do this by first turning the generator off then clean with a rag or a vacuum cleaner.

Ozone will corrode the connector and the electrical connections inside the transformer. Wire insulation can become brittle over time and break due to vibration. The transformer housing can be easily removed to allow inspection of the internal components. The fan and its blades need to be thoroughly cleaned and vacuumed. The transformer can be dusted with shop air to blow out accumulated dust and dirt. Air gaps are built in around the transformer coil to allow air to carry the heat away from the windings. These air gaps will become clogged with dust that needs to be blown out with shop air.

6.0 FACTORY SUPPLIED ACCESSORIES

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Part Number and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Plug only for 220V, 50/60Hz</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Optional Items: matching output plug</td>
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