

# MANUAL

## 1500 / 2500 VA CORONA TREATER

### (Regular model with power control Feature)

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**Note:** New model is having additional two inputs for simplified digital power control by two increase & decrease switches. In this model power control by high power secondary voltage tapping selection is avoided.

Document No. CT-2a  
Update ON: - 16/10/2015

## 1500VA / 2500VA

**Introduction-** The corona Treater is designed with stringent requirement and environmental conditions of woven sack industry. The Treater will continue to give you trouble free service for years to come. The use of microcontroller at the heart of circuit not only gives instantaneous fault protection, but controls all major the functions like on / off, protection, safety, oscillator control etc. and operator attention is not required. The Speed Switch PCB monitors the speed of the silicon roller and switches on the corona when silicon roller starts rotating and switches off the corona in case roller stops rotating. This avoids the excess treatment to fabric, which could result in loss of strength of fabric. The use of IGBT / MOSFET in power inverter stage gives fault tolerant power circuit which can sustain short circuit on HT side also. The operating frequency is about 18 kHz, which gives uniform and powerful corona at electrode, and with no audio noise.

**Construction** - The Corona Treater electronics is housed in sheet metal cubicle panel. The panel contains two separate assemblies for two rollers. These two assemblies are independent and can be run in single if one side treatment is required. The incoming power is connected by one rotary switch with HRC fuses for incoming phase. The incoming voltage is step down Power transformers having multiple taps on secondary. The actual DC voltage fed to Inverter Bridge is selected by another rotary switch for power selection. The increase in DC voltage will increase power to electrode. The Circuit Breakers control the power to electronic unit. When single side treatment is required one the circuit breaker can be kept off. The front panel has two STATUS LAMPS to indicate the status of corona Treater station 1 and 2. The CORONA ON switch is to start the corona and auto / manual switch for selection of auto mode, in which case the corona is enabled only when the roller rotates. The speed of the roller is sensed by a proximity switch mounted in roller station. Outside the panel there are two high frequency high voltage transformer (named as HT transformer) to supply high voltage and high frequency power to electrodes. The HT transformer is oil cooled and housed in a sheet metal box. The high voltage supply is taken out from a HT bushing and connected to electrode. Sufficient clearance is maintained to avoid high voltage break down (75 mm clearance from ground potential).

**Operation-** The operation of corona Treater is made very simple with the help of an intelligent micro-controller. The operational mistakes are taken care of by the micro-controller and electronics is not harmed by improper operation. Ensure that power circuit breaker is ON and corona ON switch is in OFF position. Switch on the power to panel. The status lamp will flash at regular interval indicating that every thing is OK. If status lamp does not flash at regular interval, refer trouble shooting. Now put corona ON switch to ON position. Now start the printing machine and corona will appear at electrode. Adjust the gap (if required) between electrode and silicon rubber roll for uniform corona. If the printing machine is stopped, corona will disappear. If you want the corona to start manually without speed interlock, then make selection of manual mode. In manual mode corona will be ON even if fabric is not moving. Hence this mode is used only for trial and automatic mode should be used in normal operation. If corona is not required then switch OFF the circuit breaker and power to panel also. If auto manual switch is in manual position then corona will appear even if the silicon roller does not rotate. Refer to the schematic as reference wiring diagram.

### DIGITAL INPUTS (I/P) AND OUTPUTS (O/P):

Euro connector PCB is provided with two green LEDs for outputs and five RED LEDs for inputs.

#### GREEN LEDs FOR OUTPUTS:

**Output 1:** Green LED – **Status lamp** output- (open collector)-24VDC Lamp (Current 50mA Maximum).

For more load use additional Relay.

**Output 2:** Green LED – **Fault Buzzer** Output (open collector) – Use 24V DC Buzzer OR 24V DC Relay (Current 50mA Maximum), For more load use additional Relay.

#### RED LEDs FOR INPUTS:

Input 1: Red LED -**Temp switch** – (By passed) [0V=Temp. OK, Open=Tem Fault]

Input 2: Red LED -**Safety interlock** – [0V = OK, Open safety Fault]

Input 3: Red LED - Power increase - ['NO' Push button]

Input 4: Red LED - **Corona ON** - [0V = Corona ON, Open = Corona OFF]

Input 5: Red LED- Power decrease ['NO' Push button]

**NOTE:** To activate any input, the input pin connected to isolate 0V DC.

### STATUS LAMP: Output 1

The status lamp gives number of indications for diagnostic purpose. Watch the flashing rates of the lamp. For normal operation the lamp will be flashing at regular interval indicating that Corona Treater is ready. And after the corona has appeared on electrode, then lamp will glow continuously. In between if any fault occurs, the lamp will give a fixed number of flashes with a long pause for OFF condition. The various numbers of flashes indicate following faults.

#### Status lamp indication:

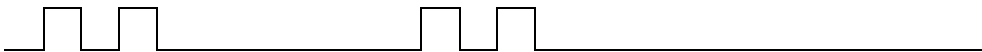
- **Regular Flash** - Ready for operation



- **One flash** - Actually this is not a fault but to indicate that when power is switched on to panel, the corona ON/OFF switch is in ON position. Simply switch OFF the corona ON/OFF switch and status lamp will flash at regular interval to indicate the ready position.



- **Two flashes** - This indicate that any of the safety interlock is open, check for the door switches, close the doors properly.



- **Three flashes** - This is an over current fault to indicate that the current has exceeded a fixed limit. Simply toggle the corona ON/OFF switch to reset the fault. Also refer to trouble shooting if fault persists.



- **Four flashes**- This is due to over temperature of Electronic Module Heat Sinks. The fault will automatically clear when temperature returns to normal value.  
Status lamp indication:



### FAULT INDICATION BUZZER: (Output 2)

In fault condition output 2 will be continuous on till fault is reset.

**Fault Reset:** To reset any fault, simply switch OFF the corona ON/OFF switch and status lamp will flash at regular interval to indicate the ready position.

**Power control:** The Power control is very easy using current control by Increase/Decrease switches. Use increase/ Decrease switches to change the current as required.

Frequency POT is provided & set to 17 KHz maximum. This maximum can be increased up to approximately 19 KHz upper maximum limit. It can be decreased up to 16.5 KHz lower maximum limit. Frequency control is used for Power control. In case of long roller stations of electrode length more than 1.5 meters, you may need to change the maximum frequency limit by setting Frequency POT to lower frequency limit Value.

Our Dispatch setting is 17 KHz maximum limit. Regular Power control is done by increase/ decrease push button switches.

Do not disturb the frequency POT setting. Change only when it required as per above explanation. We suggest you to always discuss with us regarding this.

**Maintenance** - The electronic unit does not require any maintenance. Keep Module dust free. However a few precautions will ensure trouble free operation.

- **Adjust the Voltage Tap Position to get required Current between 10 Amp-15Amp (for 1500VA) & 20 Amp-25Amp (for 2500VA) depending upon line speed, Dynes required etc.**
- The electrode must be kept clean. The deposited dust on electrode must be removed periodically to get the maximum output. Dense and uniform corona is required for good treatment.
- The ventilation of panel and HT transformer should not be blocked. Ensure that fans are working properly.
- Periodically check the oil in HT transformer. If the level is not up to the mark, top up with tested oil.
- Ensure a clear space of 75 mm between high voltage wire and body earth.
- The ozone generated at electrode is harmful to human being, ensure that blower is working when corona is on.
- The PCB carries high voltage, and before touching the PCB waits for 5-10 min and ensures that DC charge LED is completely off. Check by voltmeter.

#### **TROUBLE SHOOTING:**

If the corona fails to appear after starting the unit as given in Operation, the fault finding can be done as per the guide lines given below.

##### **A) No power and status lamp is off**

- Check incoming power supply with respect to neutral. The neutral is essential.
- Check control fuse / MCB.
- Check AC supply on control transformer primary.
- Check AC supply on control transformer secondary that should be 9V AC and 18V AC.: Check Fuses provided on control Transformer.

##### **B) Status lamp with 1 flash.**

- Safety interlock is open.
- Check the covers of roller assembly.
- Check the doors of panel.
- Check if LED Input 2 is on.

##### **C) Status lamp with 3 flashes.**

- Check if it trips in morning in rainy & moist weather. It may take very high current while start & may trip also. Clean the roller station (Silicon Roller) completely, make it dry & then start.
- Check if trip instantly:
  - a. 18V AC to module disconnected OR Fuse blown
  - b. Module Faulty:
    - 1) Control circuit faulty: Discuss and send module for repair if required.
    - or
    - 2) Power circuit faulty: Discuss and send module for repair if required.
  - c. Check if HT wire touching ground
  - d. Check HT transformer secondary winding for breakdown while not connected to electrodes
  - e. Check shorting of wires at HT Transformer primary side
- Check if tripping in just few seconds (2 - 3 second)
  - a. Silicon Roller may be puncture: Check puncture by very slowly rotating roller and observe the puncture spark. Repair puncture temporarily and replace the silicon tube for long term problem solving.
  - b. Check heavy dust / oil on silicon Roller
  - c. Check heavy dust on HT Transformer and other places like HT wire entering Roller Station, etc.
- Check if trips randomly
  - a. 18V AC to module Loose connection
  - b. Over current tripping if pick current exceed above 15 Ampere
  - c. If HT wire near ground. (Insufficient clearance)

#### **D) Status lamp with 4 flashes**

- Over temperature fault. (Check Temperature switch).
- Check if the fans in panel are running.
- Check if fans near HT transformer are running.
- Check if LED on Input - 2 is on.
- Reduce the current by tap position or power control switch, to avoid overheating.

#### **E) Status lamp is continuously ON but no corona:**

- Check if Power LED is ON and status Lamp is also continuously ON
- If power LED is OFF then check if Power circuit breaker is ON and Voltage is OK (about 70 – 100V AC)
- Check for cable connection from electronic Module to HT transformer primary.
- Check for connection from secondary of HT transformer to electrode.
- Clean the electrode and adjust gap between electrode & silicon roller to as minimum as required .
- Check 100E, 5W resistor near relay. If it is hot, replace the relay.

**Relay specification: (for 1500VA): 'GOODSKY' Make, 16 / 20A current rating, 24V DC coil supply, Model: GZ-SH-124L.**

**Relay specification: (for 2500VA): 'LEONE' Make, Model: P38F C-3C/40A/24VDC/250VAC**

#### **F) Frequent tripping on over current.**

- Reduce the current by tap position OR Power control push button. (for new Model)
- Check if silicon roll is punctured.
- Check for if HV wire to electrode is not touching the ground.
- The clearance of minimum 75 mm between HT wire and ground.
- Check if ferrite core is loose, tighten it.
- **Check paper gap in core - Single paper ( 0.11 mm) (for 1500VA)**
- **Check paper gap in core - Double paper ( 0.22 mm) (for 2500VA)**

#### **G) Power is insufficient.**

- **Increase the tap position.(Current approx. 5A – 10A) (for 1500VA)**
- **Increase the tap position.(Current approx. 15A – 20A) (for 2500VA)**
- Check if ferrite core is loose, tighten it.
- Check if ferrite core is broken, Replace it.

#### **NOTE:**

1. **Maximum current on panel should not exceed 12 Amps.(for 1500) 24 Amps.(for 2500)**
2. When you have two separate modules, it is possible to detect and isolate faulty unit by interchanging Electronic Module or HT Transformer. This should be done by experienced Electronic/Electrical Engineer. Please consult us.
3. Remove wires going from module to HT Transformer and switch ON the corona, if tripping on three flashes still continue, this indicates fault in Electronic Module and you can send the Electronic Module for repairs immediately. Check MOSFET and replace, if found faulty.
4. For Double Sided Corona Treater :-In case of double sided corona treaters. Either two separate panels are provided or two separate units are fitted in one panel.  
We provide complete separate units for double-sided corona station. Thus our system includes 2 units of following items.

#### **ONE UNIT CONSISTS OF:**

1. Control Transformer with PCB (Isolated 24V DC and speed switch circuit).
2. **Power Transformer (1.5KVA) (for 1500VA), (2.5KVA) (for 2500VA)**
3. **Electronic Module CT 1500 – 8 (for 1500VA), CT 2500 – 12 (for 2500VA)**
4. Euro connector PCB with cables Harness.
5. Electronic Module to HT Transformer cable (max. length 5 Ft, 4 - 6sq. mm cable Multi stranded)
6. HT Transformer in Tank, Please arrange for fresh and filtered HT Transformer oil.

Separate MCB one each for control and power are provided to each station. Thus it is possible to keep one unit OFF, if you need only one station in working. But as only one speed switch is used, keep control MCB of both units ON, and you can switch off power MCB for the station which is not required.

Even though both units are independent, the isolated 0V DC is made common to both units. And only one speed switch circuit is used to connect proximity switch. The output of speed switch circuit is connected to AUTO / MANUAL switch which are common to both stations.

Ensure following check points to get required results of Corona Treatment:

- Fabric should be tightly rolling over the silicon roller. It is essential.
- Corona discharge should be uniform and dense. For this keep electrodes and silicon roller clean and maintain uniform gap between them.
- Current setting should be adjusted between **10Amp to 15Amp (for 1500VA), 20Amp to 25Amp (for 2500VA) to get required results.**
- Many other factors like line speed, ink and reducer quality & mixing, drying of ink use of diesel or oil in loom, etc. affect desired results of dyne and tape test.

### **Trouble-Shooting Checkpoints for Corona Electronics Module and HT Transformer System:-**

The service person should be very well used to the panel wiring and complete system of Corona Treater. He should be able to find problem inside the Electronics Module or problem inside the HT Transformer or in the panel wiring, etc. OR any other outside the Electronics Module and HT Transformer.

#### **The system is divided into following functional areas-**

1. Control Transformer, 24 VDC isolated supply cum Speed Switch PCB
2. Electronic Module
3. HT Transformer
4. Complete Control wiring
5. HT wire and roller station

The total system is / must be throughout checked while manufacturing before dispatch. Service Engineer is / must be properly trained to check and identify/locate the various problems associated with Corona Treater System:

a) Puncture Roller

b) Correctly identify connection to Primary of HT Transformer between **COM and 7T / 8T turns. (For 1500VA) & COM and 8T, 9T, 10T turns. (For 2500VA)**

c) Clearing of HT wire path. Dust around HT wire will result in tripping due to high voltage discharge.

d) In rainy weather or hummed weather the roller and electrode cleaning is must, while start up.

e) If tripping observed, disconnect HT Transformer from Module and again check on Corona ON. If found OK then connect HT Transformer and disconnect HT wire and again check on power Corona ON. If OK then check roller station for high voltage discharge or roller puncture.

#### **HT TRANSFORMER**

- 1) Identify **COM, - 7T, 8T (for 1500VA) OR COM, - 8T, 9T, 10T (for 2500VA)** wires. Lower number of turns will give more voltage and vice versa.
- 2) HT wire should be sufficiently away from the ground wire( 75mm clearance from ground)
- 3) HT coil must be dipped fully in HT grade filtered oil. Change oil periodically.

#### **Check Points for HT Transformer assembly:**

- Gap between cores as recommended and mentioned above.
- Silicon rubber isolation between cores and mounting clamps
- HT coil should be 10mm away from the core.
- Ground and HT connection should be sufficiently tight.

In case, the problem is still not solved, call our service department at:

**For emergency services please call on**

Mobile: + 91 9763711367