

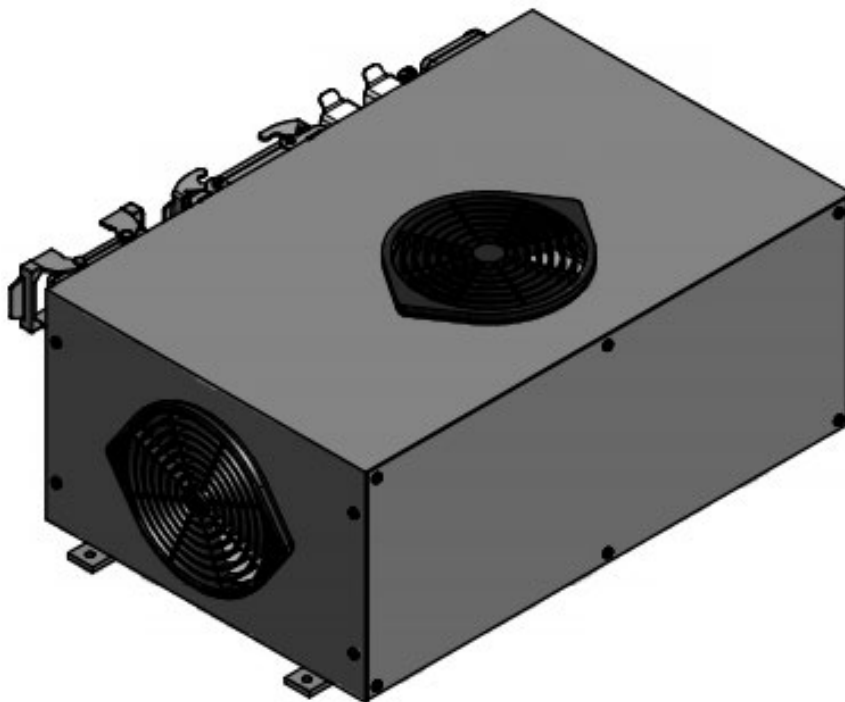


Corona Supplies Ltd
for all your corona needs

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CS 3005-30

POWER SUPPLY



PRODUCT MANUAL

PLC INTERFACE

Requirements

IMPORTANT: *Please read this information BEFORE installing and operating the equipment.*

Intended Users

This manual is to be made available to all persons who are required to install, configure or service equipment described herein, or any other associated operation.

The information given is intended to highlight safety issues, EMC considerations, and to enable the user to obtain maximum benefit from the equipment.

Applications

The equipment described is intended for industrial & commercial surface treatment of various poly and non poly substrates.

Personnel

Installation, operation and maintenance of the equipment should be carried out by competent personnel. A competent person is someone who is technically qualified and familiar with all safety information and established safety practices; with the installation process, operation and maintenance of this equipment; and with all the hazards involved.

Safety

Product warnings



DANGER
RISK OF ELECTRIC SHOCK



CAUTION
REFER TO DOCUMENTATION



DANGER
MOVING MACHINERY
RISK OF CRUSHING



DANGER
RISK OF ENTANGLEMENT
PINCH POINT



DANGER
HEAT SOURCE
RISK OF BURNS

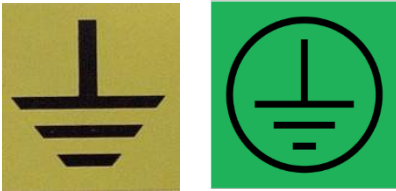


CAUTION
OZONE CONNECTION PORT

Hazards

WARNING!!! Ignoring the following may result in injury or death

1. This equipment can endanger life by exposure to high voltages, heat and rotating machinery.
2. The equipment must be permanently earthed due to the high earth leakage current, and the treater station must be connected to an appropriate safety earth. Earth connection points are shown with the following label.



3. Ensure all incoming supplies are isolated before working on the equipment. Be aware that there may be more than one supply connection to the corona power supply.
4. Allow at least 3 minutes for the corona power supply's capacitors to discharge to safe voltage levels (less than 50V).
5. For measurements use only a meter to IEC 61010 (CAT III or higher). Always begin using the highest range. CAT I and CAT II meters must not be used on this product.
6. Guards, covers & doors must NOT be removed unless the corona power supply has been switched off and the incoming supply isolated.
7. During the corona treatment process a high level of heat is produced at the electrodes which will be transferred to the base roller. Before attempting any maintenance wait at least 10 minutes after switching the machine off to allow electrodes and associated parts to cool down.
8. Ozone generated by the corona process must be removed from the treater station by a suitable extraction system manufactured from corrosion resistant materials.
9. Access Covers and doors that are regularly required to be opened for correct machine setup & cleaning are protected with a safety device which must be checked for correct operation / damage as shown as detailed in the maintenance part of this manual.

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APP.A: ELECTRICAL DIAGRAMS

Machinery data

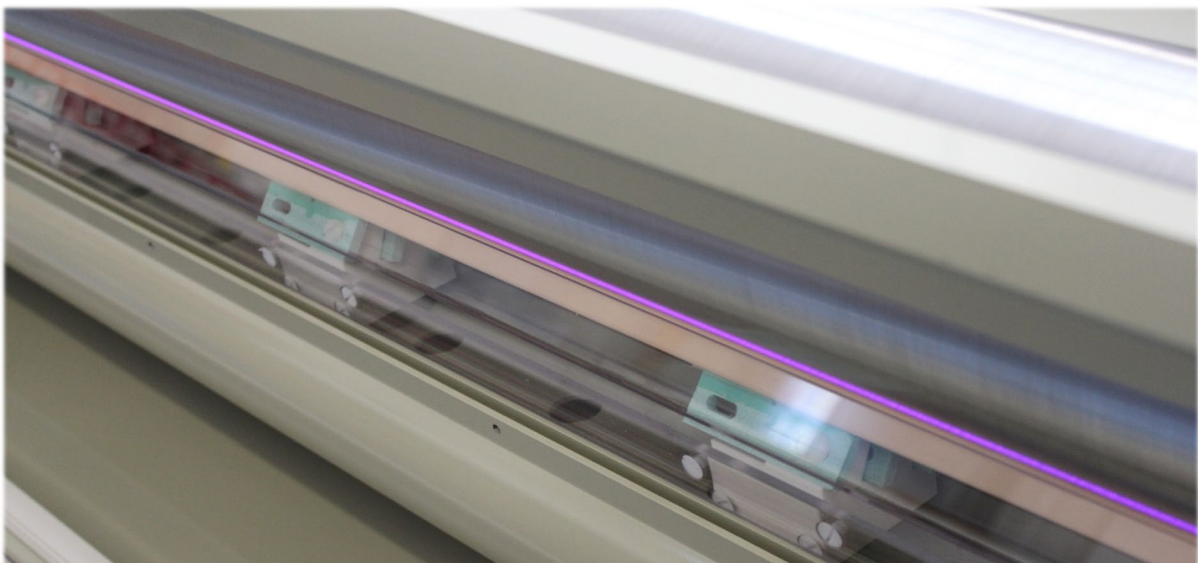
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Insert Machinery data here

Introduction

The corona treating process

Gases are normally very good electrical insulators or dielectrics. In the presence of a very strong electrical field a gas can be forced to break down and lose its insulating capability. During this breakdown the gas molecules begin to ionize. This enables them to provide a conductive path from one molecule to another. In a treating system the strong electrical field is generated across an air gap between the electrode assembly and the treater roll. A conductive path between these two electrodes will be completed when a sufficient quantity of gas (usually ambient room air) has become ionized. A sudden discharge across this path will now occur usually resulting in a bright flash or arc. This is very similar to a lightning flash going to earth or the arc between electrodes in a laboratory experiment. In order to prevent this arc from completely developing a solid dielectric barrier is placed in the path between the electrodes. This barrier partially interrupts the conductive path preventing a complete breakdown of the gas. Instead of a hot localized arc, a cooler diffuse glow will occur. This soft violet colored discharge indicates the incomplete breakdown of the gas and is called a corona. The material the dielectric or barrier is composed of is chosen so that enough current will flow between the electrodes and through it to sustain this corona.



During the treatment process, the web is passed through a high voltage discharge field and is exposed to the bombardment of high-energy particles. This corona field has the potential to break polymer bonds, cause micro-pitting, and deposit an induced surface charge with extremely high levels of strong oxidizing agents onto the web. Any one of or possibly all of these processes can alter the surface characteristics of the material in a way, which enhances the surface adhesion and its ability to accept printing inks, adhesives, coatings, etc.

Installation

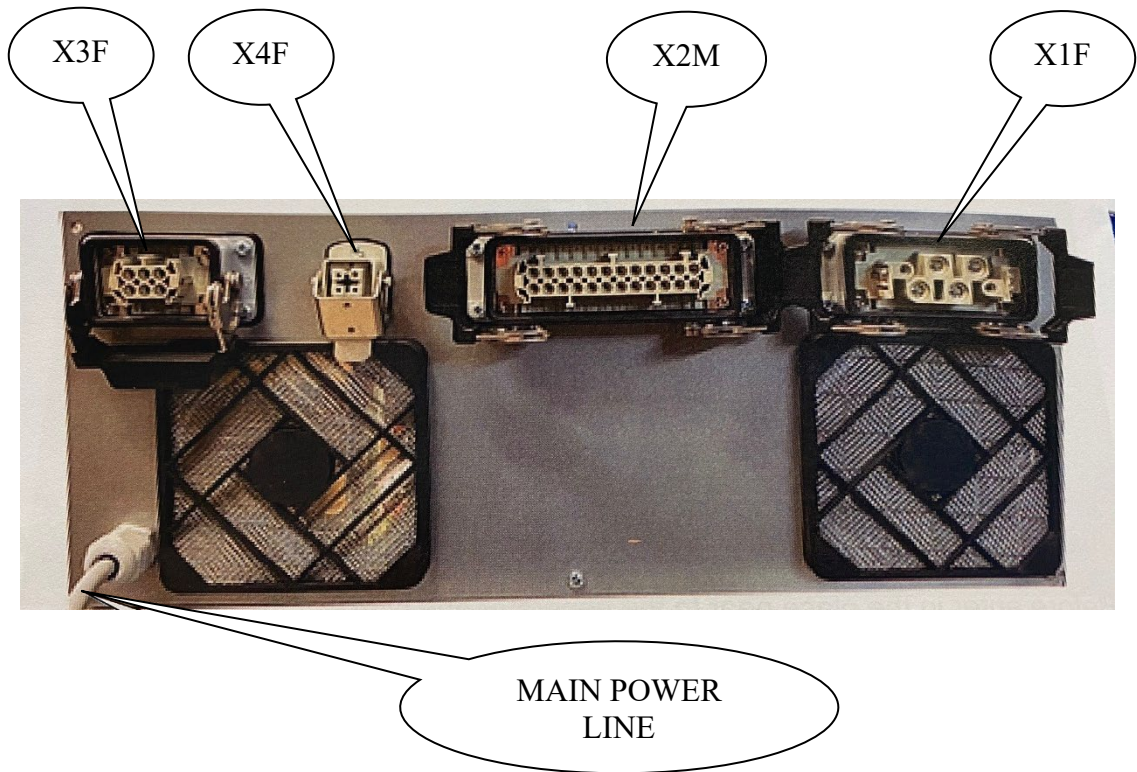
CAUTION!!!

Do not install this equipment in wet environments subject to high humidity.

Generator



- Mount the generator cabinet horizontally or vertically to a flat surface in a position leaving at least 200mm on all sides to allow for sufficient cooling and to allow for periodic checking and maintenance of the fan filters.
- The generator cabinet should be located in a position that does not allow the operator to interfere with the connections while the unit is running, i.e. in locked cabinet.



- Connect the interlock circuit to socket X3F.
- Connect the speed sensor (BSR) cable to socket X4F (option).
- Connect the remote-control (PLC) to plug X2M (See Remote control (PLC) connection - Socket X2M section below).
- Connect the high voltage transformer (THV) cable to socket X1F
- Cables should be attached to the machine frame or run in cable trays so that they cannot become a trip hazard and are out of operators reach.
- Customer interlocks / line E-Stop circuit should be connected to either pins 8 – 11 socket X2F or pins 1 – 4 plug X3M as shown in the installation diagram.
- Check the power supply voltage and generator plate. Make sure the power supply has a dedicated earth and is protected with a 30mA differential earth breaker.
- Once the above have all been checked, connect the generator to the power supply.

REMOTE CONTROL (PLC) CONNECTION - SOCKET X2M

COMMAND / FAULT / FEEDBACK SIGNAL DESCRIPTIONS

Signal	X2M/F Pin #	Internal wire #
PLC feeding - +24VDC	1	1
PLC ground - 0VDC	2	2
Stop treatment command	4	7
Start treatment command	5	3
Alarm reset command	6	33
Disable treatment signal	7	44
Power off (Output fault)	13	37
Treatment fault (IGBT fault)	14	11
Overload	15	15
Treatment working	16	17
Contactor QCM activated	17	50
Contactor QC1 activated	18	51
+V Reference signal 0-10VDC	23	+V
-V Reference signal 0VDC	24	-V

PLC feeding / Ground

Supply from customer PLC. Supply is used for all commands / fault / feedback signals. The supply also powers relay K1 so that if the signal from the PLC is lost (PLC failure, X2F removed, etc.) the generator will stop.

Stop treatment command

Momentary apply 24VDC (1 second) to stop generator. It is recommended to keep this signal high whenever the treatment is not required.

Start treatment command

Momentary apply 24VDC (1 second) to start generator.

Alarm reset command

Momentary apply 24VDC (1 second) to reset the generator after a fault (treatment / overload fault).

Disable treatment command

Apply 24VDC to pause the generator output (skip treat or standby).

Power off (Output fault)

Indicates:

A low output current (No Load).

Possible causes:

X1M plug not connected – Check X1M plug is correctly inserted and that the connections within the plug are secure.

High voltage cable between HVT and treater station open circuit – Check the condition of the high voltage wire and that it is securely connected at the HVT and treater. Measure the continuity of the wire to check for any breaks.

Excessively large air gap between discharge and ground rollers – Check the air gap between the discharge roller and the ground roller is approximately 3mm.

Open circuit in primary or secondary of high voltage transformer (HVT) – Check the cables to the primary and secondary terminals of the HVT are secure. Replace HVT.

Treatment fault (IGBT fault)

Indicates:

An internal fault within the generator

Possible causes:

High IGBT temperature – Check the cooling fans (x3) are working correctly and the filters are clear from debris.

IGBT fault – Check the IGBT by following the CHECK-IGBT instructions.

G2D, G3ST card fault – Check the circuit boards by following the instruction in the trouble shooting section of the manual.

Overload

Indicates:

High output current.

Possible causes:

Short circuit between electrode and ground in treater station – Check for any damage (pin holes) to the silicon sleeve on the discharge roller.
Check for any arcing between the high voltage connections and the frame of the treater. Check the PTFE insulator blocks are in good condition and clean of any debris.

Short circuit in HVT transformer – Check the connections within the HVT terminals box for any arcing. Replace the HVT.

Treatment working

Indicates:

The inverter is running.

If no signal – Check 24v supply from line PLC to generator is present (relay K1 energised). Check the start signal has been applied. Check the interlock circuit is closed. Check the GREEN LED on the GDM2 card is illuminated.

Contactors QCM activated

Indicates:

The contactor QCM is energised.

If no signal – Check 24v supply from line PLC to generator is present (relay K1 energised). Check the interlock circuit is closed. Check Fuses F1 (x2) are OK. Check the overload (FAM) has not tripped.

Contactors QC1 activated

Indicates:

The contactor QC1 is energised.

If no signal – Check the timing relay on circuit board G3ST is energised (24v supply to QC1 coil).

+V Reference signal 0-10VDC / -V Reference signal 0VDC

Power reference input from customer PLC. Note the reference signal should be between 4VDC = 0% power to 10VDC = 100% power.

Startup

- Turn “ON” the main supply to the generator.
- Apply 24vdc to pin 1 and 0vdc to pin-2 of X2M/F.
- Ensure the interlock circuit is closed. Ozone extraction running, doors / covers closed, treater box closed, E-stop button closed, etc.
- The QCM contactor should activate (Main supply contactor).

ATTENTION!!! The generator will not start if the QCM contactor is not powered.

- The QC1 contactor should be activated after a one second delay (IGBT line contactor).

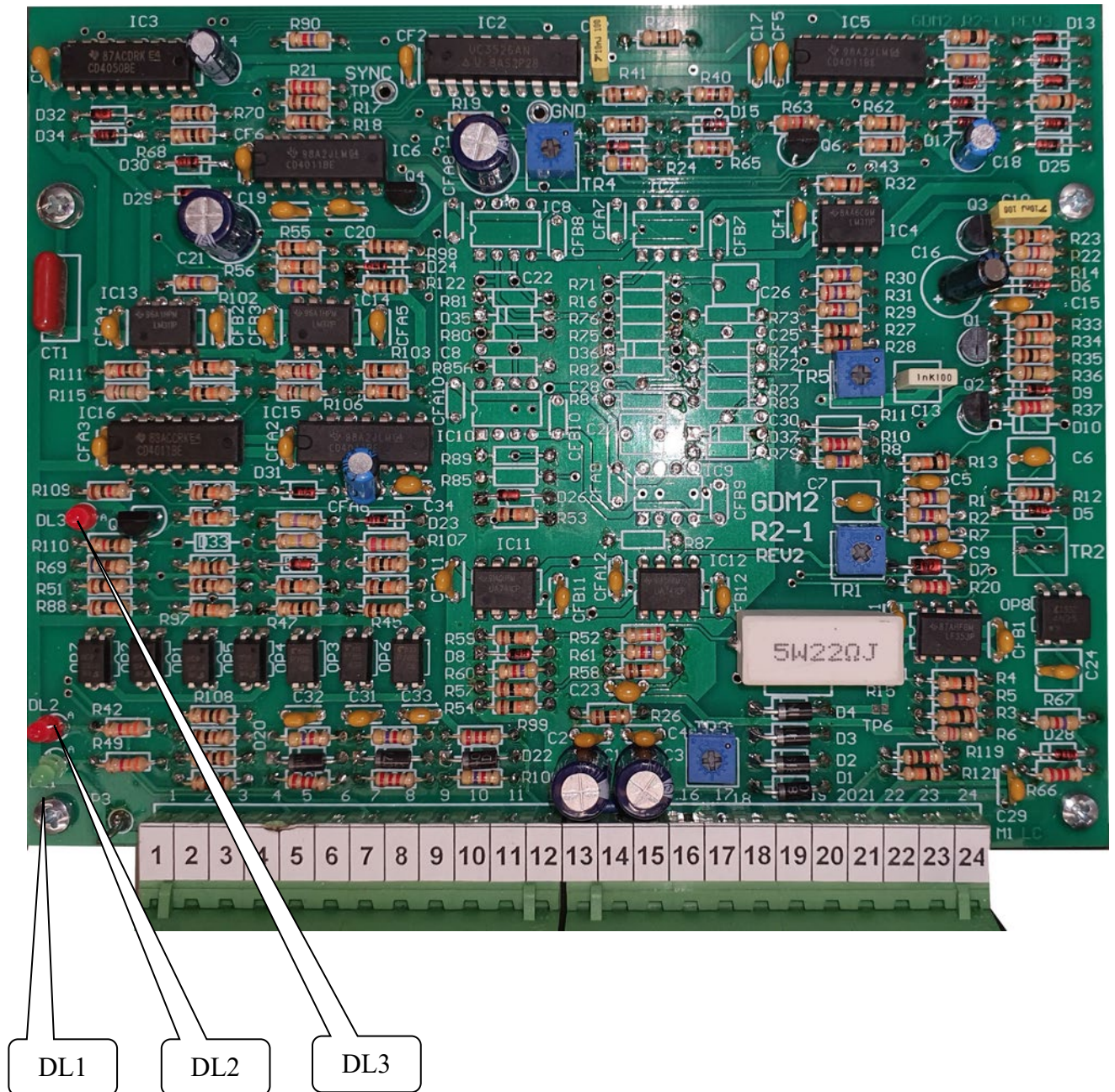
ATTENTION!!! The generator will not start if the IGBT line contactor QC1 is not powered.

- To start the generator, the Stop signal (pin-4 X2M/F) should be set 0Vdc and then the Start signal (pin-5 X2M/F) should be set (momentary) +24Vdc for 1 second or until the generator goes into start condition (pin-16 X2M/F +24Vdc).
- To stop the generator, the Stop signal (pin-4 X2M/F) should be set 24Vdc. For safety when the generator is stopped, the output power reference signal should be placed at 0V. For prolonged periods of stop the main supply should be disconnected.
- After any alarms the Reset signal (pin-6 X2M/F) should set (momentary) +24Vdc for 1 second or until the alarms disappear.
- When the generator goes into an alarm, Treatment fault (pin14), Overload (pin 15) and Output fault (pin 13) the generator should be stopped.
- It is possible to start the generator and then set the corona discharge to stand-by, this is done by setting the Disable Treatment signal (pin-7 X2M/F) to 24vdc.
- The output power should be adjusted as required by altering the reference signal voltage (pin-23 X2M/F) with respect to 0vdc (pin-24 X2M/F).
- The reference signal should be 4V-10V;

ATTENTION!!! IF THE REFERENCE SIGNAL IS UNDER 4V THE DISCHARGE MAY BECOME UNSTABLE.

Troubleshooting

GDM2-R10 PCB status LED's



DL1 = GDM2-R10 card in start condition – Generator running

DL2 = GDM2-R10 card in overload alarm – Output short circuit

DL3 = GDM2-R10 card in low current alarm – Output open circuit

General Faults

Generator does not start:

- Check power supply to generator.
- Check interlocks are closed - INTERLOCK led ON.
- 24Vdc failed – Check fuses F1 & F2.
- Check QC1 contactor is energised.
- Check QCM contactor is energised – Check overload (FAM).

Interlock circuit open (Interlock status LED OFF)

- Electrode carriage is fully home (SBP1 closed).
- Check Ozone extraction fan is running and ducting from the treater unit to the extraction fan is OK (pressure switch closed).
- Check E-stop buttons have not been pressed.
- Check interlock safety relay (KE).

Generator does not treat:

- Check Start button has been pressed and LED is ON & steady.
- Check Fault LED is OFF.
- Check DL1 led is ON – GDM2-R10 PCB in start condition.
- Check DL2 led is OFF – GDM2-R10 PCB in overload alarm .
- Check DL3 led is OFF – GDM2-R10 PCB low output current alarm.
- Check the treater roller is rotating, (start button LED ON steady) – See rotation detection section.

Fault LED illuminated:

Overload fault (Short circuit)

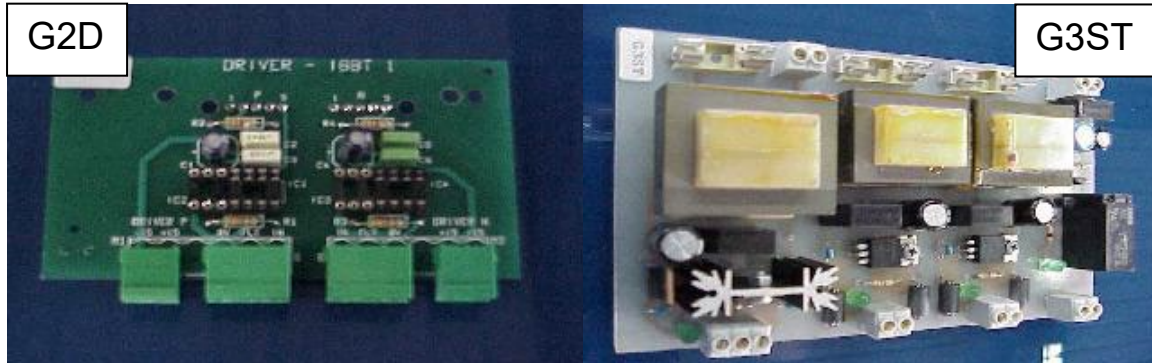
- Check insulators inside treater unit are clean and free from moisture & contamination, clean if necessary.
- Check Ceramic electrodes and mounting flags are clean and free from moisture & contamination, clean if necessary.
- Check ceramic electrodes are not damaged (cracked or pin holed).
- Check the condition of the flexible high voltage cable.
- Check high voltage transformer (THV) – See testing the high voltage transformer section.

Low current fault (Open circuit)

- Check plug X1M is connected and locked in place.
- Check the electrode carriage is fully home.
- Check for continuity from the secondary of the high voltage transformer to the ceramic electrodes.
- Check high voltage transformer (THV) – See testing the high voltage transformer section.

Treatment fault (IGBT)

- Check cooling fans are operational and filters are clear.
- Check 15V present on G2D PCB.
- Check 15V & 12V present on G3ST PCB.
- Check IGBT

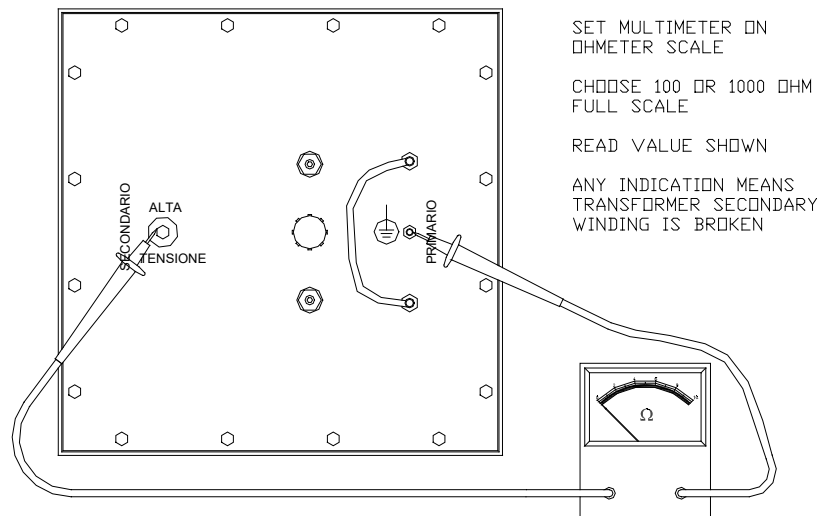


Testing the high voltage transformer (THV) - Continuity check

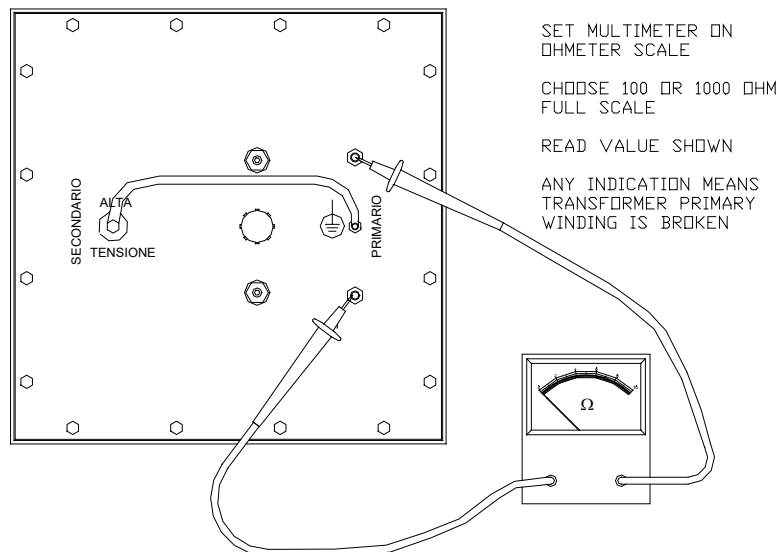
CAUTION!!! The following tests should only be carried out by a competent person.

CAUTION!!! Turn off the main power line to the generator and disconnect the high voltage transformer cable from the generator (X1M)

Disconnect high voltage cable, make a bridge between the primary winding terminals as shown and take the ohmmeter reading



Disconnect the power supply wires from primary winding terminals, make a bridge between the high voltage terminal and ground as shown then take the ohmmeter reading.



Maintenance

To ensure the trouble free operation of your corona treater some regular maintenance is required. This will extend component life and lead to less down time.

! Warning !



The voltages inside the corona treater can exceed 10,000 volts; the generator must therefore be switched off & isolated from the mains supply before any work is carried out on the corona treater or generator.



Ceramic electrodes and electrode rollers can reach temperatures in excess of 150 °C during operation. Any work inside the corona treater station should only be carried out after the electrodes have had time to cool. The corona must be stopped and the extraction fan left running for approximately 5 minutes before any work commences.

If in any doubt contact Corona Supplies service department for assistance

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GENERATOR

EXHAUST / COOLING FANS / FILTERS

Fans and filters should be kept clean to ensure the power supply does not overheat

MONTHLY	6 MONTHLY
Check filters are clean. Remove any contamination with a vacuum or remove the filter media from its housing and blow out contamination with a compressed airline.	Check exhaust / cooling fans are rotating freely. Fans that are “noisy” or rotating slowly should be replaced. Remove any build up of contamination from inside the power supply enclosure using a soft brush or compressed airline.

SUGGESTED SPARE PARTS

We would suggest you keep a minimum stock of parts that normally are subjected to wear (or easily damaged), to quickly solve any maintenance issues.

Part #	Description	Quantity
A.955000056	F1 Fuse 2A	1
A.954000000	Exhaust / Cooling Fan ø150 x 38	1
A.954000002	Exhaust / Cooling Fan ø120 x 38	1
A.968000078	GP1 IGBT Module	1
A.950000601	G2D IGBT Driver PCB	1
A.950000910	GDM2 IGBT Driver Control PCB	1
A.950000704	G3ST Power Supply PCB	1

Warranty & Aftersales Service

All our products are warranted for 12 month from invoice date within the underwrite conditions:

Complete replacement of any mechanics or electrics parts not properly functioning.

This replacement will be accomplished only to the following condition:

- a)** We are quickly informed by phone or email about a fault on our machinery, specifying equipment plate data and if possible component characteristic and identifier.
- b)** The faulty and/or malfunctioning material to be returned to our office within 30 days from receiving new spare parts. If within this time we don't receive the faulty part we will be obliged to charge the required.
- c)** Will be verified by our technicians that the component is truly faulty. Otherwise if the damage is caused by improper equipment use or there is evidence of tampering with tools and/or unauthorized personnel or the equipment has not been used in accordance with the instruction manual, we will not be liable for damages and parts will be charged.
- d)** The freight will be charged to customer.

The warranty doesn't cover technician's costs for replacement and/or spare parts installation supplied, so this cost will be charged and invoiced in the usual way.

THIS EQUIPMENT WAS SUPPLIED TO YOU BY:



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**FOR FURTHER ASSISTANCE, PARTS OR SERVICE
PLEASE CONTACT US IMMEDIATELY**

THANK YOU