Corona Supplies Ltd

for all your corona needs

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SHEET FED

CORONA TREATER STATION

USER MANUAL

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.

Product warnings

DANGER
HIGH VOLTAGE
RISK OF ELECTRIC SHOCK

CAUTION
REFER TO
DOCUMENTATION

DANGER
PINCH POINT
RISK OF CRUSHING

DANGER
MOVING MACHINERY
RISK OF CRUSHING

DANGER
ROTATING ROLLERS
RISK OF ENTANGLEMENT /
CRUSHING

DANGER
HOT SURFACE
RISK OF BURNS

CAUTION
OZONE CONNECTION PORT

Hazards

DANGER!!! Ignoring the following may result in injury or death.

- This equipment can endanger life by exposure to high voltages, heat and rotating machinery.
- This equipment generates an output at the radio-frequency level. Users who wear a pacemaker, or use other medical electronic devices which might be affected by radio-frequency waves, are advised to consult a physician before using this equipment.
- The equipment must be permanently earthed due to the high earth leakage current, and the treaters station must be connected to an appropriate safety earth. Earth connection points are shown with the following label.

- 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.
- Allow at least 1 minute for the corona power supply's capacitors to discharge to safe voltage levels (less than 50V).
- 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.
- Guards, covers & doors must NOT be removed unless the corona power supply has been switched off and the incoming supply isolated.
- 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
- Ozone generated by the corona process must be removed from the treater station by a suitable extraction system manufactured from corosion resistant materials.
- 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.

Contents

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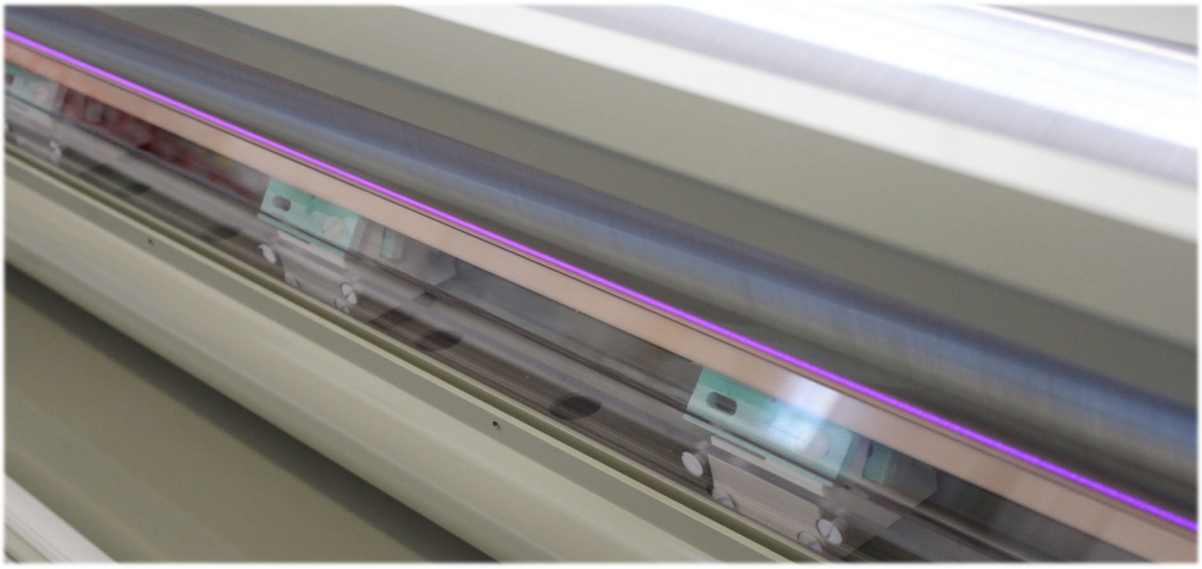
Insert Machinery data here

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.

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

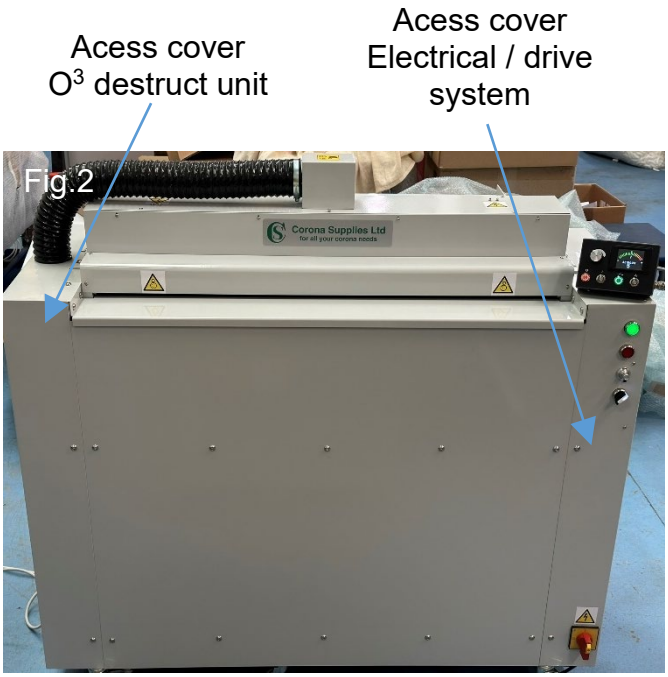
DANGER!!! The sheet fed treater system is heavy, a minimum of two people are required to move the system into position.

Treater System

Location

- The sheet fed treater system is designed to be free standing and located in a suitable position to allow easy access to the infeed, outfeed tables and system controls, Fig. 1.

- The sheet fed treater system should be positioned so that it does not cause a hazard, including tripping (power supply cable) or obstruction. Access to each end of the system for maintenance should also be considered when positioning the sheet fed treater system, Fig. 2.



Handling / Positioning

- The treater system is mounted on 4 lockable castors that allow the unit to be easily moved into position, Fig. 3.

- Once the treater system is in the desired position the 4 castors should be locked to stop any movement of the treater system.

Locable castors fitted to all four corners of the system

- Once the treater system is in position the outfeed table can be attached to the system frame using the 4 x M8 bolts (supplied), Fig. 4.

- Once the table is attached to the frame the support leg should be attached and adjusted so that the table is horizontal.

Electrical

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

Electrical circuits & connections are detailed in the circuit diagram “Circuit diagram treater installation” found at the back of this manual.

- Control circuits on the treater station where possible are 24vDC. These include the interlock and speed sensor circuits.

- Supply circuits to the generator, treater station and aux electrical equipment i.e. Ozone extraction fan will be either 1 phase or 3 Phase AC and will be identified by one or more of the following labels.

- Cables from the generator to the treater station should be attached to the production line framework or run in cable trays so that they cannot become a trip or entanglement hazard and are out of operators reach.

- The treater station must be earthed (grounded) which is made via the high voltage transformer. The ground roller is earthed via a carbon earth brush which is connected to the treater earth. Fig.5.

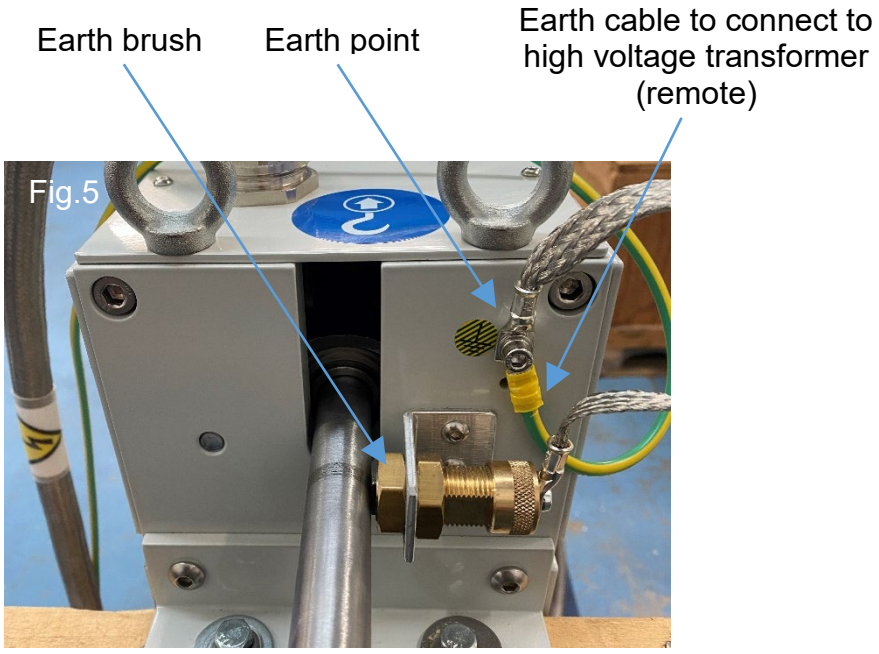


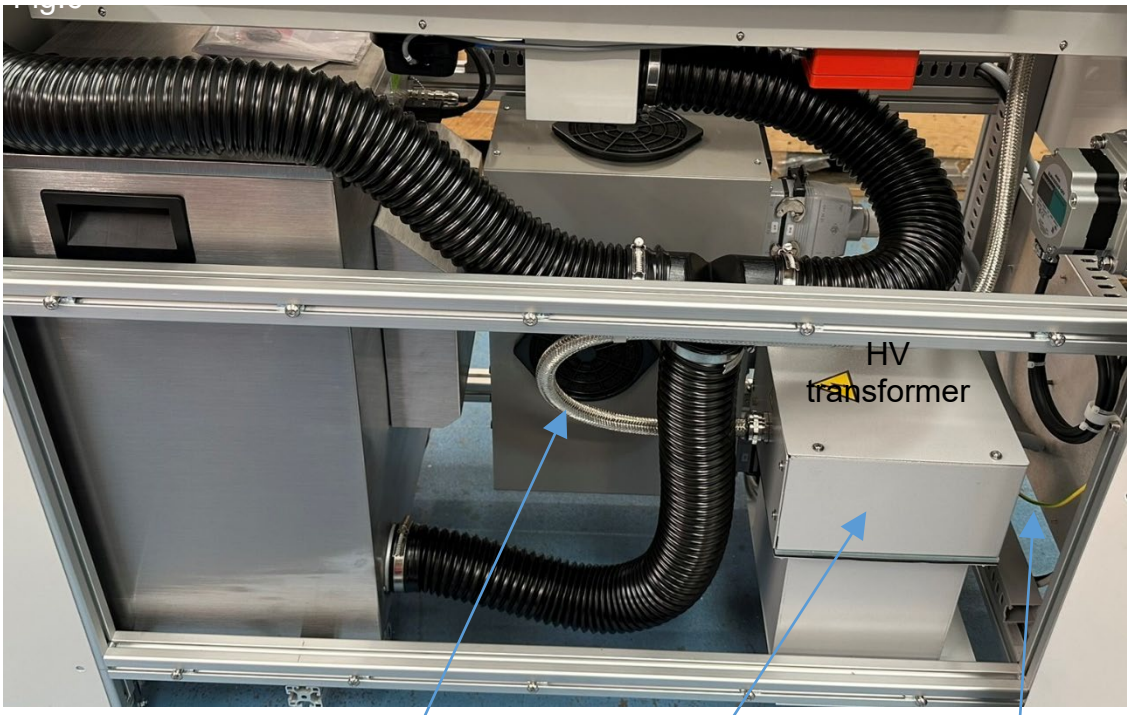
Fig.5

High Voltage transformer

A high voltage transformer (HV) is used to boost the voltage from the generator to a level capable of striking an arc across the air gap between the electrodes and the roller. This voltage varies depending on many factors including air gap, dielectric properties of the material and humidity but is in the region of 5,000 to 10,000 volts.

The HV transformer is mounted within the treater system and its input/output connection enclosed within a terminal cover Fig.6. The transformer is connected to the treater station via a remote HV cable which is a high voltage screened cable which is earthed at both ends either with a flying lead or through EMC type cable glands.

DANGER!!! System and Terminal covers must not be removed unless the generator has been switched off and isolated from the main supply.



The remote HV transformer must be mounted in the upright position.

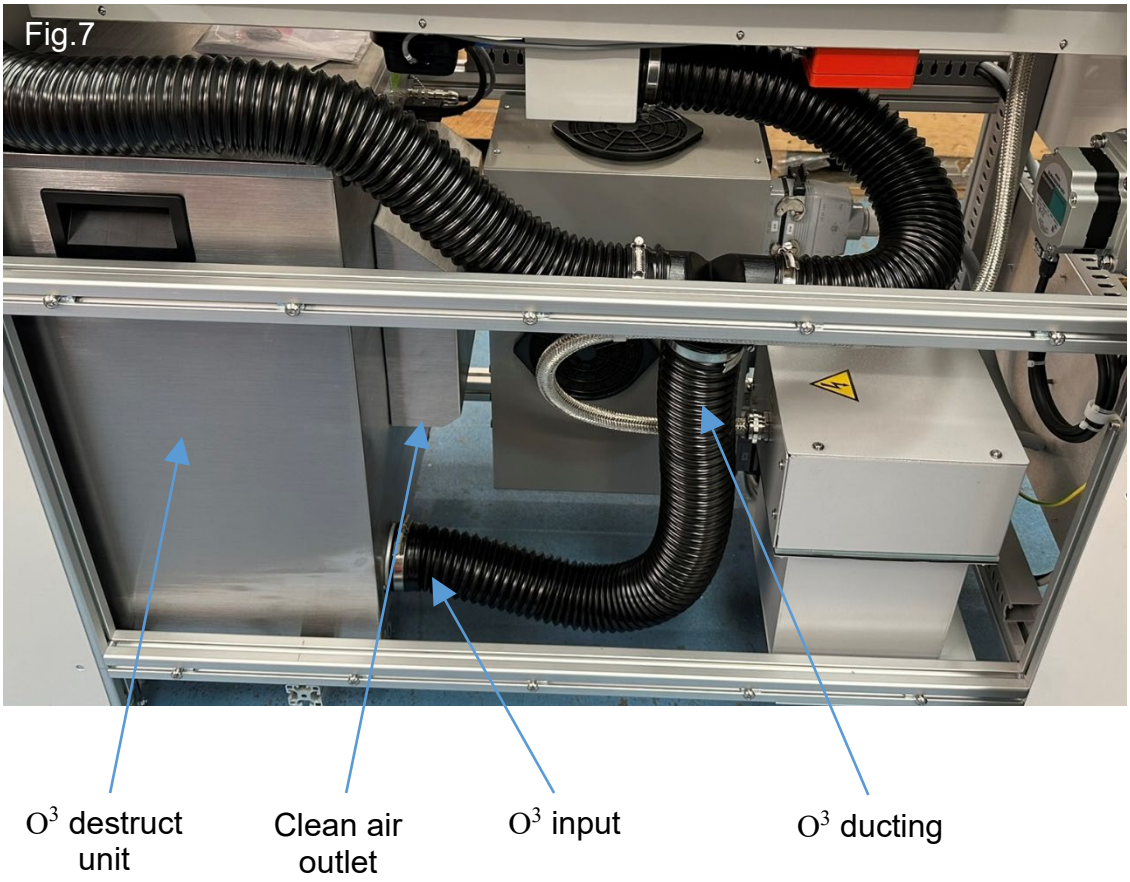
Ozone (O^3) Extraction

DANGER!!! The ozone produced by the corona treatment process is highly toxic and must be removed. If the smell of ozone is present the machine must be stopped immediately, and the source investigated.

The sheet fed corona treater system has an integrated O^3 destruct unit installed which breaks down the O^3 back into oxygen. This removes the need for a dedicated O^3 extraction fan that is ducted to atmosphere. The built in O^3 destruct unit enables the corona treatment system to be located anywhere within the factory without the need to be connected to fixed ducting. Fig. 7.

The O^3 destruct unit uses a chemical filter to convert the O^3 back into oxygen. The lifetime of the filter depends upon the amount of use of the system along with the power levels used (ozone concentration). Filter information is displayed on the control panel on the O^3 destruct unit, and the unit will alarm when the filter requires replacing. See O^3 destruct manual at the back of this manual for more information.

Fig.7



The O^3 destruct unit is controlled from the sheet fed treater system control panel, Fig. 13. and must be running before the treater interlocks will close.

To replace the O^3 destruct chemical filter or access the control panel, the O^3 access cover needs to be removed Fig 2.

Fig.8

For further guidance on the O^3 destruct unit please refer to the dedicated manual at the back of the manual.

Air-gap setting

DANGER!!! Before adjusting the distance between the discharge roller and the ground roller, switch off the generator and disconnect from the main supply. Allow the electrodes / rolls to cool for a minimum of 10 minutes.

The gap between the discharge roller and the ground roller is an important part of the corona treating process. The air gap must be large enough for the material to pass through but keep a small air gap above the material (0.5mm min) but not so large that the corona discharge becomes uneven.

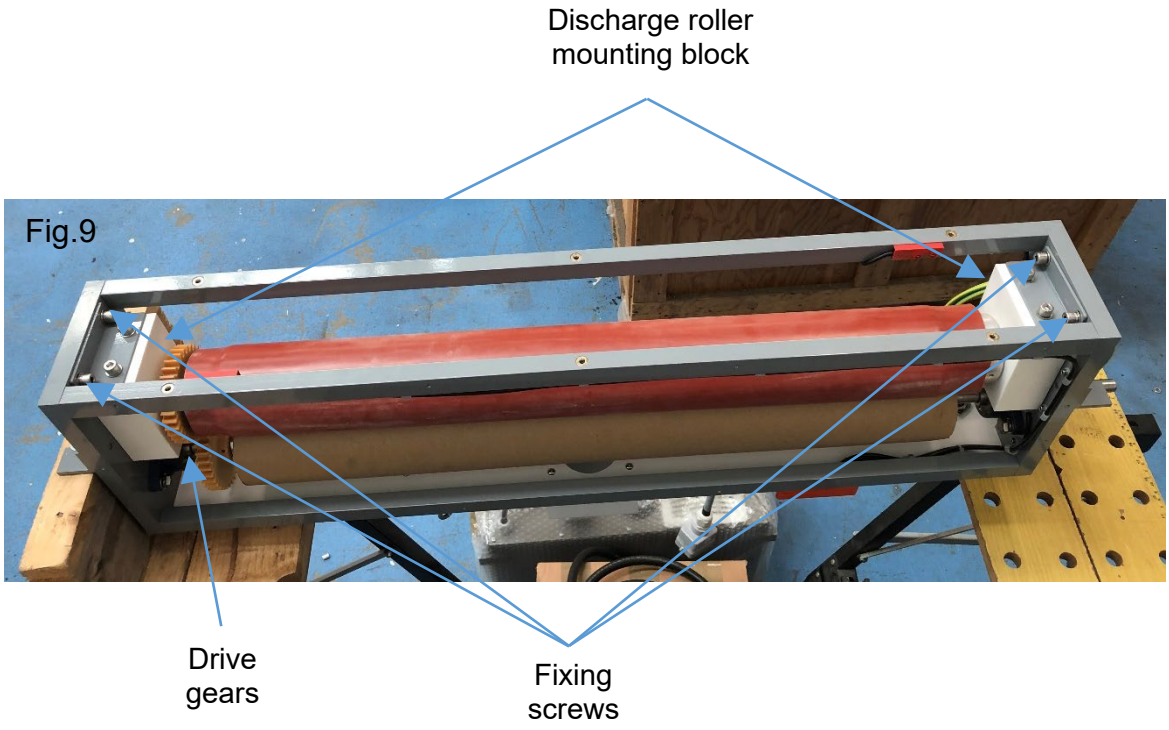
ATTENTION!!! IF THE AIR GAP IS TOO LARGE THE DRIVE GEARS WILL FALL OUT OF MESH AND THE DISCHARGE ROLLER WILL NOT TURN. ENSURE BOTH ROLLERS ROTATE CORRECTLY AFTER SETTING THE AIR GAP.

Prior to delivery, the treater system is fully tested and the air gap set to approximately 3mm which is the optimal gap for this type of corona treater system.

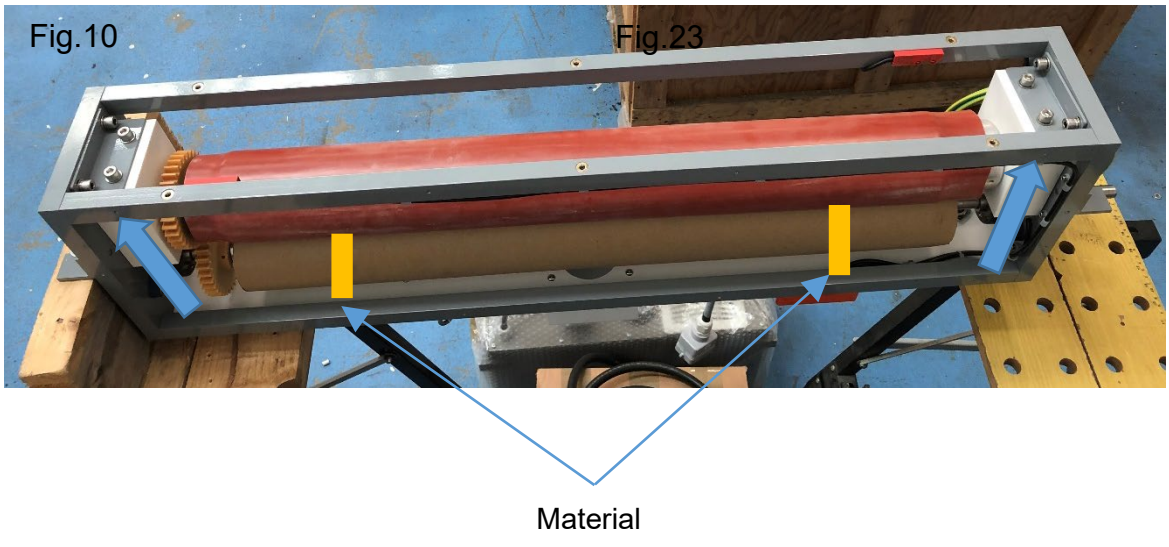
However, the distance between the discharge roller and the ground roller (air gap) should be checked before first use once the treater station has been mounted on the customers machine and at regular intervals (see maintenance guide). For optimal performance, the air gap should be approximately 3mm.

Air gap adjustment after machine installation (installation of a replacement discharge roller sleeve).

- Remove / open the access cover.
- Loosen off the four fixing screws securing the discharge roller mounting blocks. Fig.9.



- Lift the discharge roller mounting block at each end and insert a piece of material 3mm thick between the discharge roller and the ground roller at each end of the treater, Fig.10. When treating thicker substrates, the gap will need to be set larger to accommodate.



- Lower the discharge roller onto the ground roller sandwiching the pieces of material in between. Ensure the discharge roller mounting blocks are square to the machine frame before tightening up the fixing screws. Fig.11.

- Remove the pieces of material from the machine by simply pulling them out. Replace the access cover.

Fig.11

Electrical Interlocks

During Commissioning the treater station interlocks must be checked for correct operation before the system is put into production. The interlocks can be checked by testing the continuity of the interlock circuit using a multimeter (see circuit diagram) or by connecting the treater station to the generator and monitoring the interlock status on the remote panel. To test the interlock circuit, ensure the following is met.

- Access covers / doors closed
- Ozone extraction fan running
- E-stop button disengaged

The interlock circuit should now be closed with continuity in the circuit or the interlock status on the remote panel showing the interlock circuit closed.

- Access cover / door switches should be checked by opening covers / doors one by one. The interlock circuit should open immediately.

- The Air flow switch should be checked by switching the ozone extraction fan off. The interlock circuit should open within 30 seconds of the fan being switched off.

- The E-stop button (option) should be depressed to ensure the interlock circuit opens immediately.

DANGER!!! If any of the above fail to operate correctly the machine should not be put into production and Corona Supplies service dept should be contacted for advice.

CAUTION!!! In the event of a material jam, the system must be stopped immediately by pressing the process stop button and the system switched off at the isolator. Wait for a minimum of 10 minutes to allow the electrodes / rollers to cool before opening the top access cover. The trapped material should then be removed. If the material continues to jam the air gap should be checked (see air gap setting) to ensure it is large enough for the material being processed. The material guides within the treater and the outfeed table should be checked to ensure they are all level.

DANGER!!! When manually feeding the material / sheets through the treater keep hands well clear of the in feed / outfeed rollers.

CAUTION!!! The speed adjustment dial should not be set below 0.5 (3m/min) to ensure the rollers are rotating when the treatment is on. If the rollers are stationary when the treatment is on the silicon sleeve on the discharge roller will be damaged. NOTE: the start button on the generator remote panel has been deactivated to ensure the treatment cannot start before the drive motor has been activated.

ATTENTION!!! To stop the treatment but keep the rollers rotating the stop button on the generator remote control panel can be pressed. This can be useful when checking the material passes through the treater without issue before starting production. To restart the corona, press the process start button again. NOTE: the start button on the generator panel has been deactivated.

Once commissioning is complete the treater station can be put into production.

- Connect the treater system to a suitable power supply – see rating plate for power requirements Fig. 12. Note, the supply should be protected with a suitable fuse or circuit breaker with a D curve trip characteristic.

- Switch the treater system on at the isolator, Fig. 12.

Fig.12

- Switch on the ozone extraction unit using the ozone Extraction on / off switch, Fig. 13. The switch will illuminate green to indicate the unit is running. If the ozone extraction unit is blocked or the filter is nearing its end of life, the unit will go into alarm and start beeping and the on / off switch will illuminate yellow Fig. 16. See dedicated ozone destruct manual for further information

Fig.13

- Ensure the generator interlock LED illuminates on the generator control panel (see generator manual). The power setpoint will now be displayed on the meter and can be adjusted as required using the dial (see generator manual), Fig. 13.

- Set the required speed by adjusting the speed adjustment potentiometer. The number shown around the dial correlates to the speed shown in the table below.

Dial setting	1	2	3	4	5	6	7	8	9	10
Speed m/min	6	12	18	24	30	36	42	48	54	60

- To start the treatment, press the Process Start button, the rollers will start rotating and the corona will start, Fig. 13. Note that pressing the process start button also starts the generator (treatment)

- The sheets of material can now be manually fed through the treater system, Fig. 14. Surface energy measurements should be taken from the treated material to ensure the level of treatment is high enough for the intended application.

- To stop the treatment, press the process stop button, the rollers will stop rotating and the treatment will stop, Fig. 13. Note that pressing the process stop button will also stop the generator (treatment).

- Ensure the material does not get caught on the incoming or outgoing framework.

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 sheet fed treater system.

Metal electrodes reach temperatures in excess of 150 ºC 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 10 minutes before the electrode extrusions are opened and any covers removed.

If in any doubt contact Corona Supplies service department for assistance

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Treater Station

ELECTRODE & GROUND ROLLERS

The electrode & ground rollers should be cleaned regularly to maintain system efficiency and to achieve maximum operational life. When handling or cleaning the rolls great care should be taken not to damage the silicon rubber or ceramic coating.
NEVER USE KNIVES NEAR SILICON OR RUBBER COATED ROLLERS

MONTHLY	6 MONTHLY
Check roll coverings for signs of damage, wear or build-up of contamination. Ceramic coverings can be cleaned with a light solvent. Silicon rubber coverings can be cleaned with a soap & water solution. Using an airline or stiff brush remove any build-up of dust and debris from around the rolls and PTFE support blocks. Inspect for signs of arcing around the PTFE support blocks. Arcing should be removed using emery/sand paper. Bearings should be checked and replaced if worn. Check the condition of the grounding brush or bearing. Worn brushes or brushes with little material remaining should be replaced.	Check rolls are rotating concentrically. If the rolls are moving laterally in the vertical axis the bearings or PTFE support blocks may need replacing. Worn or damaged silicon sleeves should be replaced. Check air gap between electrodes and base roll and adjust as required to achieve an even gap along the length of the rollers. SEE “SHEET TREATER SLEEVE REPLACEMENT INSTRUCTIONS” AT THE BACK OF THE MANUAL.

COVERS & WINDOWS

It is important to make sure all of the machine covers are correctly fitted so that access to the high voltage and rotating rollers is not possible. Build-up of contamination on the inside of the covers may also lead to contamination of the web if it was to come loose.

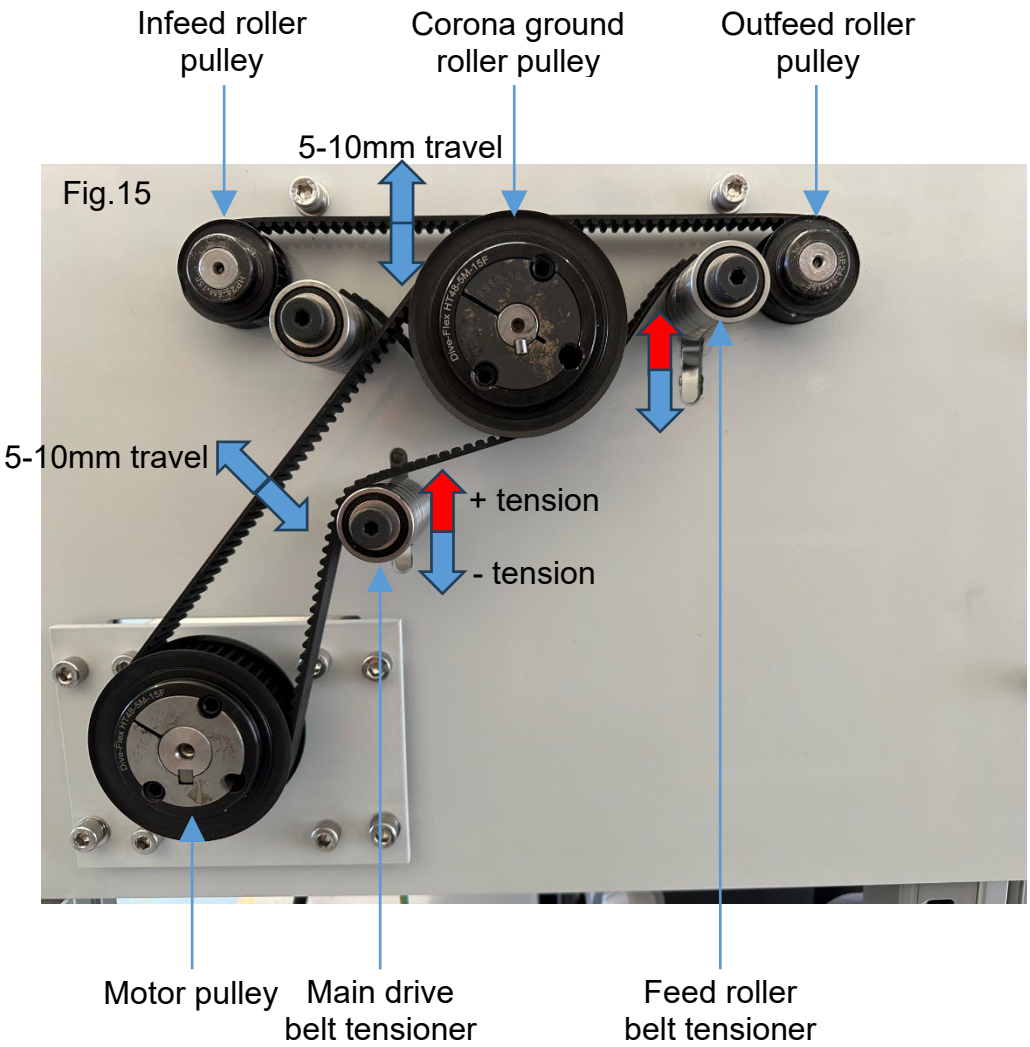
MONTHLY
Check covers and windows are correctly fitted and all fixing screws are in place. Remove any build up debris using a stiff brush. Clean viewing windows. Check interlock switches operate correctly, are in a good condition and are securely fastened to the frame work.

DRIVE BELTS & PULLEYS

DANGER!!! Before removing the drive gear access cover, switch off the sheet fed corona treater system at the isolator and disconnect from the main supply.

Drive belts and pulleys should be checked to ensure all of the rollers are rotating correctly and at the same speed. Failure to do this may cause excessive material jams.

MONTHLY	6 MONTHLY
Check rollers are rotating in the correct direction, at the same speed and that the material passes through the treater smoothly.	Remove the drive cover and check the condition of the belts and pulleys ensuring the belts are in good condition, are not worn and have good tension. Check the pulleys are not worn and are securely fastened to the roller shafts, Fig. 15.



SAFETY INTERLOCKS

The interlock circuit should be checked regularly to ensure correct and safe operation of the corona system. Failure to carry out these checks may leave the system unsafe.

MONTHLY
Check each interlock switch is working correctly and is securely fastened to the corona treater framework, door or window. When an interlock switch is opened the corona should stop immediately. Switches are fitted to opening doors & windows and the ozone extraction system), there may also be an emergency stop button mounted close to the corona treater station. Note that the ozone extraction airflow switch will only stop the corona and NOT the rotating rollers. SEE “CIRCUIT DIAGRAM - TREATER INSTALLATION” DRAWING THAT WAS SUPPLIED WITH YOUR CORONA SYSTEM FOR MORE INFORMATION.

OZONE EXTRACTION SYSTEM

The ozone extraction system not only removes the ozone produced during the corona treatment process but also cools the rollers during operation. It is important to keep the extraction system running efficiently to avoid over heating of the rollers which will lead to premature failure and to eliminate the risk of ozone leaking back into the work area.

ATTENTION!!! If the ozone extraction control switch indicates an alarm (yellow) the ozone destruct control panel should be checked for filter status.

6 MONTHLY
Check for blockages in the extraction ducting. Stray material can be easily sucked into the extraction system, reducing the air flow. Check the ozone destruct unit control panel for filter condition and replace if required. SEE “OZONE DESTRUCT MANUAL” AT THE BACK OF THE MANUAL.

Ozone Extraction
OK
(Green)

Fig.16

Ozone Extraction
Alarm
(Yellow)

Warranty & Aftersales Service

All our products are warranted for 12 months from invoice date within the underwritten 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