Arcotec GmbH
Rotweg 24
71297 Mönsheim, Germany

Information for use

English version: V4, Datum: 16 June 2025

Important!
Read carefully before use.
Keep this manual clearly visible with the device..

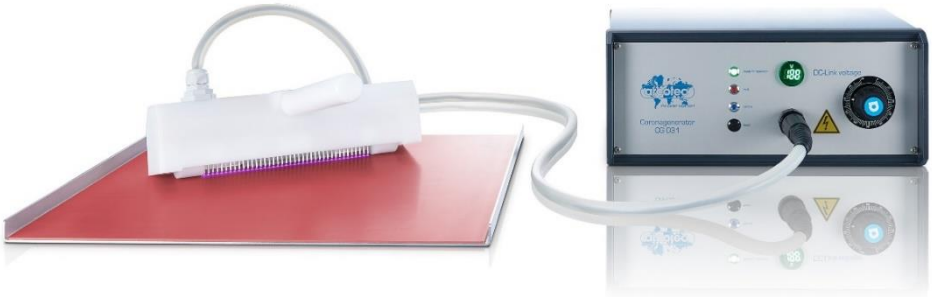
HF Corona Generator arcotreat® CG 031 for replaceable electrodes

Serial no.:

Project no.:

Company:

Hand roller electrode



Optionally with comb electrode

EC Declaration of Conformity

In accordance with Machinery Directive 2006/42/EC, Annex II Part 1, Section A

The manufacturer: **Arcotec GmbH**
Rotweg 24
71297 Mönsheim, Germany

hereby declares that the following product

Product designation:	HF Corona Generator with manual comb electrode roller
Type:	CG 031
Serial number:	
Year of manufacture:	CW xx/2025
Function:	Surface pre-treatment to improve adhesion

complies with all the relevant provisions of EC Machinery Directive 2006/42/EC.
Additionally the product complies with the following EU directives:

2014/30/EU	EMC Directive
2014/35/EU	Low Voltage Directive

The following harmonised standards have been applied:

EN 12100:2011-03/ B1:2013-08	Safety of machinery – general principles for design – Risk assessment and risk reduction
EN 60204-1:2007-06/ A1:2009-10/B1:2010-05	Safety of machinery – Electrical equipment of machines – Part 1: General requirements
EN 60204-11:2001-05/ B1:2010-05	Safety of machinery – Electrical equipment of machines – Part 11: Requirements for HV equipment for voltages above 1000 V

Name and address of the person who is authorised to compile the technical documents:
Jens Peter Schmidt, Arcotec GmbH, Rotweg 24, 71297 Mönsheim, Germany

This declaration is made for and on behalf of the manufacturer by

Mönsheim, 16 June 2025

Sebastian Bloss
CEO of Arcotec GmbH

Table of contents

1 General information

The following symbols are used in this information for use:

 **WARNING**	Indicates a risk that may result in death or serious injury if not avoided.
 **CAUTION**	Indicates a risk that may result in minor injury if not avoided.
	Warning of hazardous voltage
	Warning of hot surfaces
NOTICE	Indicates a warning of material damage that may occur if the information is not complied.
Important!	Indicates important information.
• Instructions that shall be carried out in the specified order.	
→ Result of an instruction	
■ List of instructions in safety and warning information	

2 Safety instructions

2.1 Requirements for the operator and operating personnel

- Only allow qualified and instructed personnel to operate the system.
- Make sure that nobody works with the device without special instructions.
- Operate the system only in a safe and functional condition.
- Comply with all safety and hazard warnings on the device and in the information for use.
- Comply with the relevant national safety regulations.

2.2 Requirements for the installation site

- Put the generator with the hand roller electrode and counter electrode plate on a stable, sufficiently large table, so that the controls are easily accessible.

2.3 Electrical hazards

During operation, the roller electrode is supplied with high voltage. When touching the roller electrode, there is a risk of electric shock, which can be life-threatening.

- Do not touch the electrode (silicone roller/comb pins).
- Before each use, check if the counter electrode plate is connected to earth.
- Do not touch the sample during operation.
- Do not touch the sheathing of the high voltage cable. Due to dielectric effects, you can experience electrical shocks when touching the cable sheath.
- When working with the hand roller/comb electrode, hold the hand switch in one hand and the manual roller electrode in the other hand.
- Only start the high-voltage discharge when the hand roller/comb electrode is moved on the counter-electrode plate continuously.
- Switch off the high-voltage discharge before lifting the hand roller/comb electrode from the treated surface/counter electrode plate.

During operation, there are live high-voltage parts in the housing. There is a risk of electric shock if live high-voltage parts in the housing are touched, which can be life-threatening.

- Do not open the housing during operation.
- Immediately switch off the device in case of a fault in the electrical power supply.

2.4 Electrostatic charges

The high voltage cable and the electrodes generate an electrostatic field that can electrostatically charge persons in the direct surroundings.

- Provide a shielding to avoid electrostatic charges.

Also plastic parts, especially foils, can be charged electrostatically by the corona treatment. The following discharge can occur against machine parts and also against persons.

- Use common ionising units to avoid an electrostatic charge of foils.

2.5 Harmful corrosive gases

The corona treatment produces ozone, which can lead to respiratory diseases.

- When applying the corona treatment for a longer time, either work under an air extraction hood or extract the ozone directly from the housing of the hand roller/comb electrode via a suction hose.
- According to local regulations, ozone can be reduced to oxygen with the help of a catalyst.

The respective workplace limits apply.

2.6 Requirements for maintenance and repair

- Only allow qualified electricians, e.g. Arcotec service technicians, to maintain and repair the device.
- Before carrying out repair or maintenance work on the device, switch off the main switch, ensure that there is no voltage and secure the device against being switched on again unintentionally.
- Do not remove any safety devices or put them out of service. If safety devices need to be dismantled for maintenance or repair work, reinstall the safety devices immediately after completing this work.
- After repair, check the operational safety of the device by means of a test run.
- Changes to the device are only permitted after written consultation with Arcotec.
- Only use original spare parts.

2.7 Explosion hazard in the presence of flammable gases

In the presence of flammable gases in the ambient air, there is an explosion hazard due to the high voltage discharge. **The device must not be used in potentially explosive areas.**

- Keep the ambient air free of flammable gases or provide adequate ventilation.

2.8 Avoiding damages to the corona generator

Switching on the generator with the potentiometer turned up (adjusted intermediate circuit voltage) can cause damage to the transformer.

- Always **set the potentiometer to zero before switching on** the corona generator.

2.9 Avoiding damages to the hand roller electrode

Dust and shavings can burn into the silicone.

- Always keep the silicone roller and the silicone layer of the counter electrode plate clean, if necessary, clean it with ethanol.
- Always keep the manual roller/comb electrode in continuous motion during the high voltage discharge. Otherwise, the silicone coating can be damaged.

3 Usage and Technical Specifications

3.1 Intended use

The device is only intended for physical surface treatment of materials lying flat on the counter-electrode plate with treating the surface by means of the hand roller electrode or optional comb electrode to improve the adhesion of printing ink, varnish, glue, foam materials, etc. The device only is intended for use by trained users or qualified personnel.

In order to achieve optimal treatment effects, the necessary power setting has to be determined depending on the material, its sensitivity and its thickness in the experiment.

The treatment effects can be checked with test ink. In individual cases, it has to be checked which ink values are binding for optimal adhesion.

3.2 Improper use

The device must not be used for inappropriate purposes.

Any modifications and changes to the system are not authorised without written permission from Arcotec.

The manufacturer assumes no liability for damage resulting from improper use.

3.3 Technical specifications

Power	230 V, 50 Hz, single phase	
Power input	max.300 VA	
Current consumption	max. 1.5 A	
Effective power	hand roller electrode of 100 mm	100 VA
Treatment width	100 mm (optionally up to 200 mm with HRE 200)	
Output voltage	3–20 kV in correctly adjusted operation (A spark gap in the high-voltage transformer prevents this voltage from being exceeded.)	
Working frequency	25–50 kHz	
Output power	continually adjustable in the range of 20% – 100%, setting not linear	
Length of the high voltage cable	1.5 m	
Counter electrode plate	460 × 460 mm, V2A steel, one-sided silicone coating	
Dimensions (width × height × depth)	340 × 180 × 350 mm	
Weight of the generator	approx. 14 kg	
Hand switch	normally open contact to activate the high voltage discharge	
Ambient air	free from flammable gases	

Subject to change.

4 About the HF corona treatment

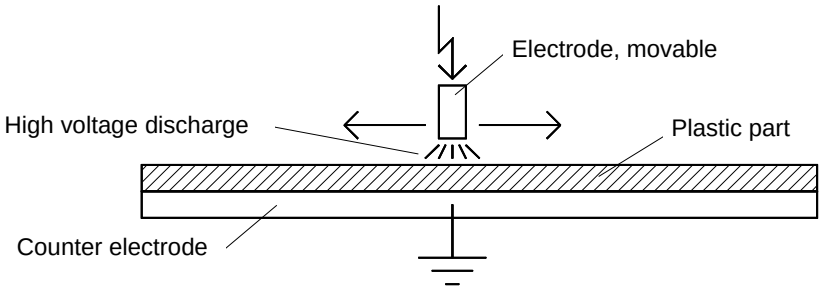
The HF corona treatment is applicable especially for the pre-treatment of plastic surfaces, to enable printing, painting, coating, laminating, gluing, foaming, flocking etc.

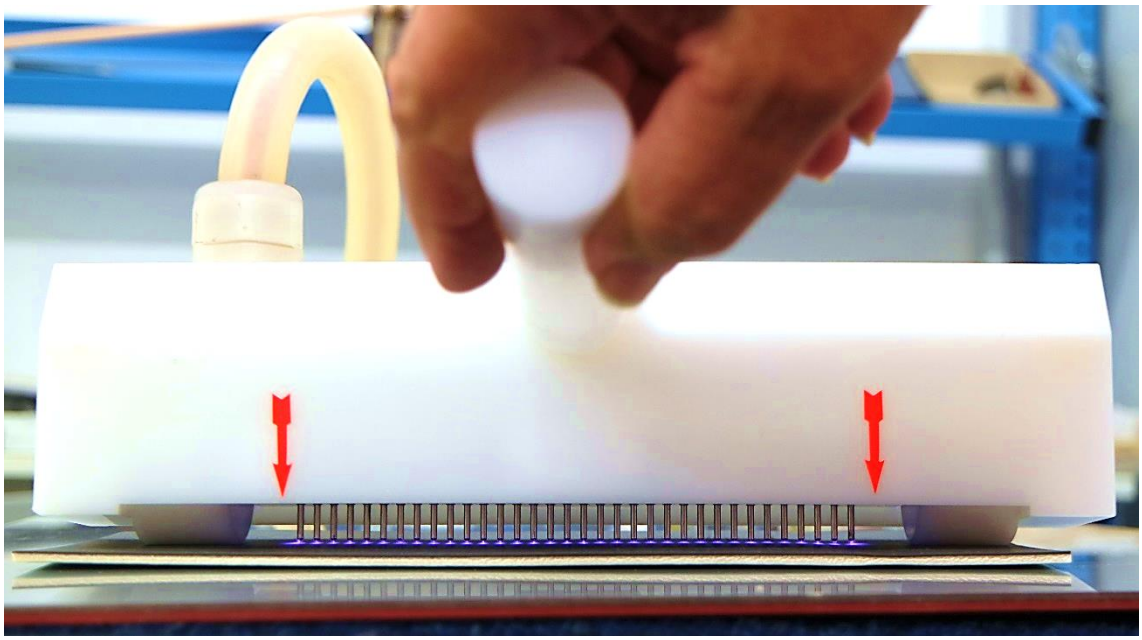
In these cases, a pre-treatment is necessary, because most of the used materials are non-polar, and the adhesion of inks, paints, glues etc. is very low. Here activation of the surface is required to achieve sufficient wettability and thus good adhesion.

The wettability of the surface is determined by the surface energy in mN/m. The higher the value of the surface tension, the better is the wettability.

The corona pretreatment requires an electrode (carrying high voltage) and a counter electrode (reference potential/earth). In case of a hand roller electrode, the electrode is insulated with a silicone hose. If a material is placed between the two system components and the high voltage is activated, an electrical discharge occurs between them, which penetrates the material. The discharge is visually recognizable by a blue/violet glow. This light band generates ozone. It should be noted again at this point that the ozone must be extracted.

The effect of the high voltage discharge on the surface to be treated is that non-polar materials become polar in their upper molecular layers, thus providing bonding for the molecules of printing inks, paints, glues etc.





Optional comb electrode treating a foam material.

5 Short functional description of the generator

The complete system consists of four parts:

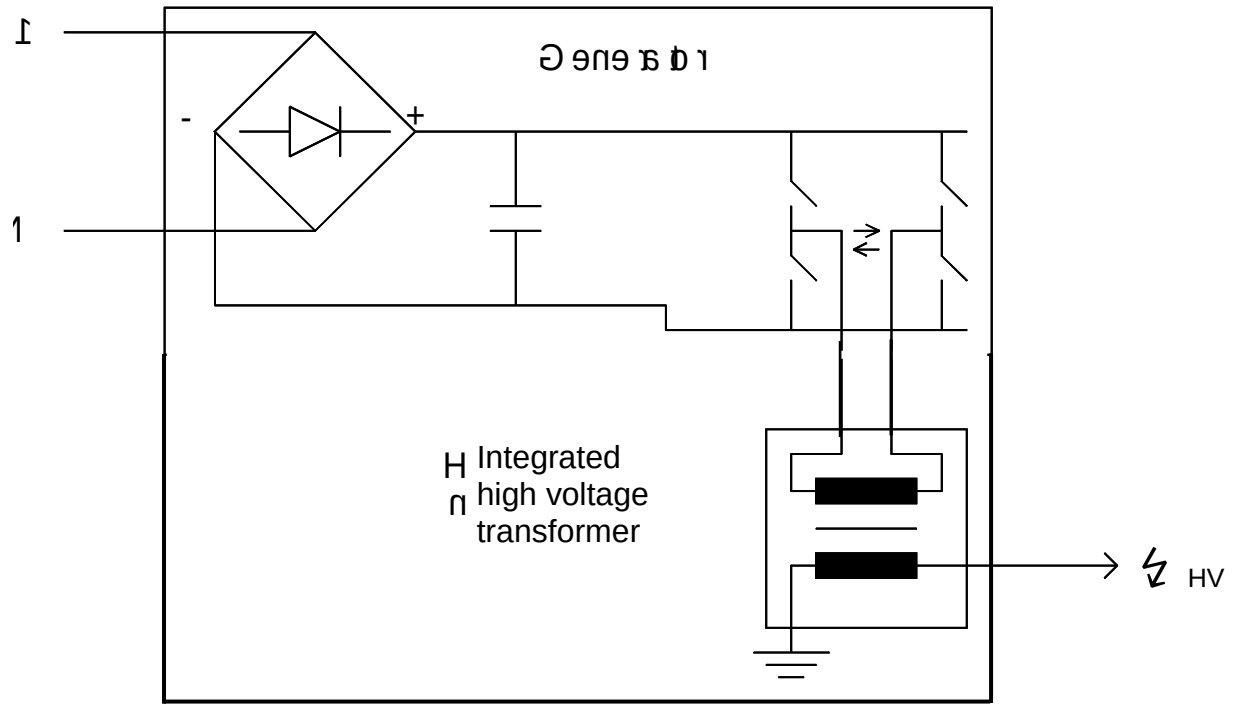
– Generator (CG) with the integrated high voltage transformer

– Hand switch

– Manual roller electrode or optional comb electrode

– Counter electrode plate

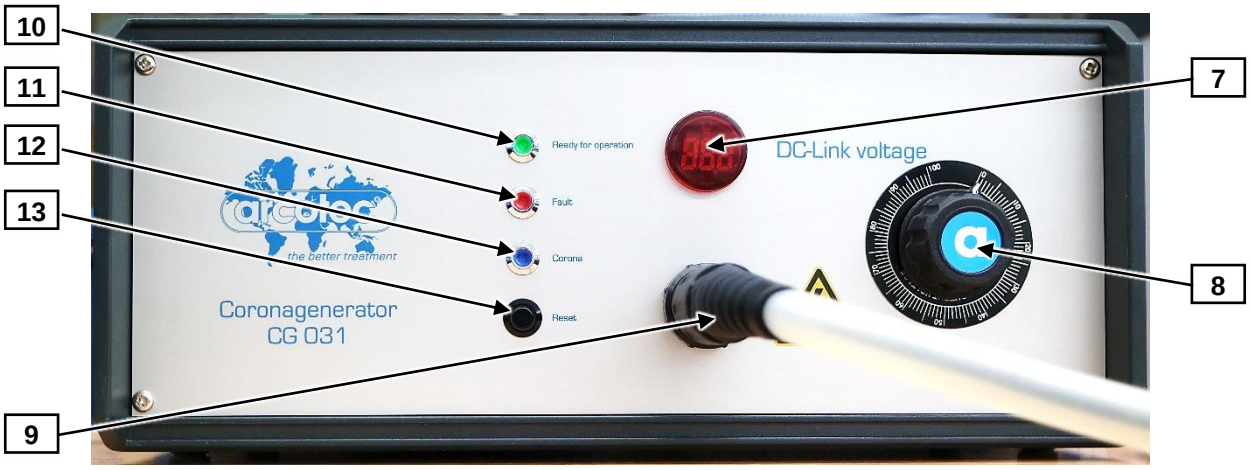
The mains voltage, which is supplied to the generator, is rectified to a direct voltage in the first step. This direct voltage is then applied at a higher frequency to the primary side (input side) of the high-voltage transformer, which then transforms it up and “emits” it to the electrode on the secondary side (output side).



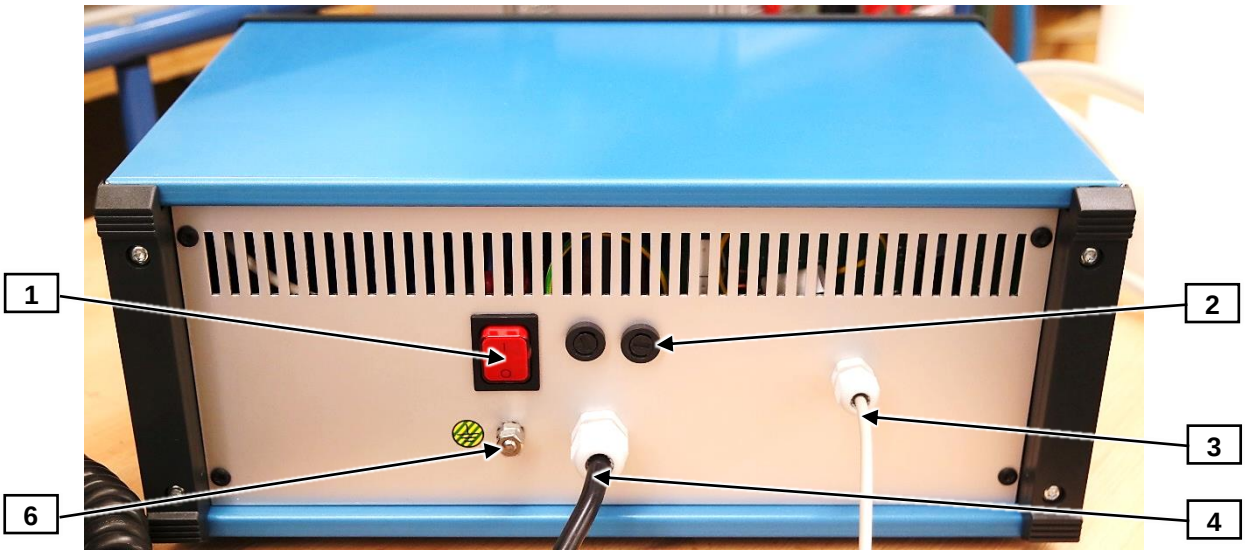
The minimum and maximum adjustable power of the generator is dimensioned at the factory for the relevant application.

6 Device description

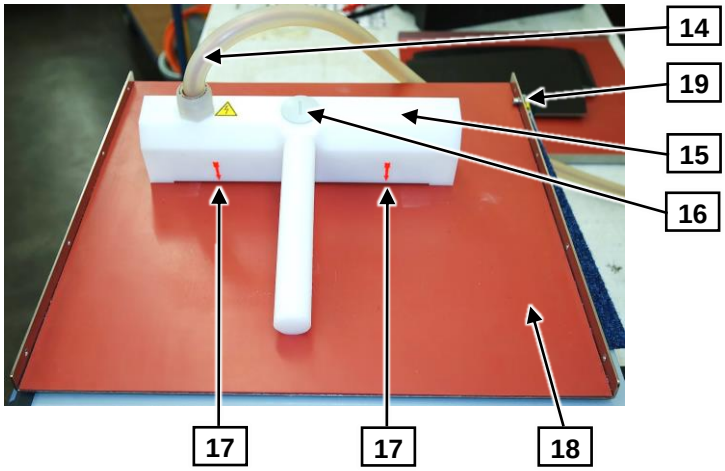
6.1 Corona generator



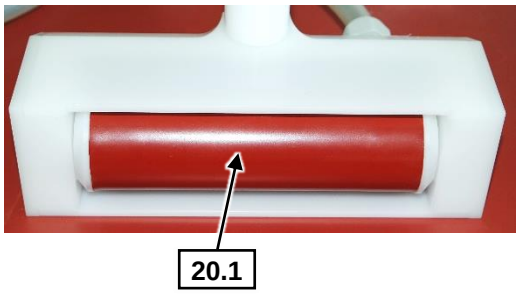
1 Main switch (rear)
2 Fuses (rear)
3 Connection cable for hand switch
4 Power cable
6 Grounding connection
7 Display of the intermediate circuit voltage
8 Potentiometer for the intermediate circuit voltage
9 High-voltage plug
10 Operational readiness indicator light
11 Fault warning light
12 Corona indicator light
13 Reset button



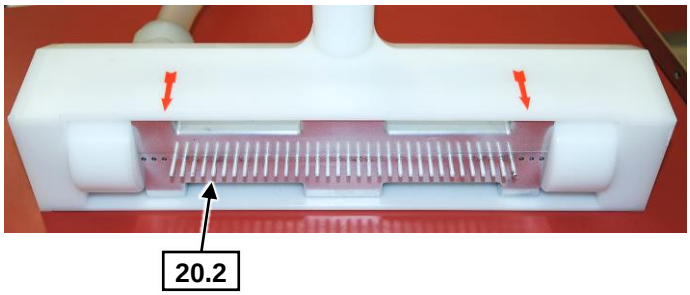
6.2 Hand roller/comb electrode with hand switch



Hand roller electrode



Comb electrode (optional)



5 Hand switch
14 High voltage cable
15 Replaceable roller electrode
16 Optional connection for air extraction
17 Treatment width
18 Counter electrode plate
19 Grounding connection
20.1 Silicone-coated roller electrode
20.2 Electrode pins

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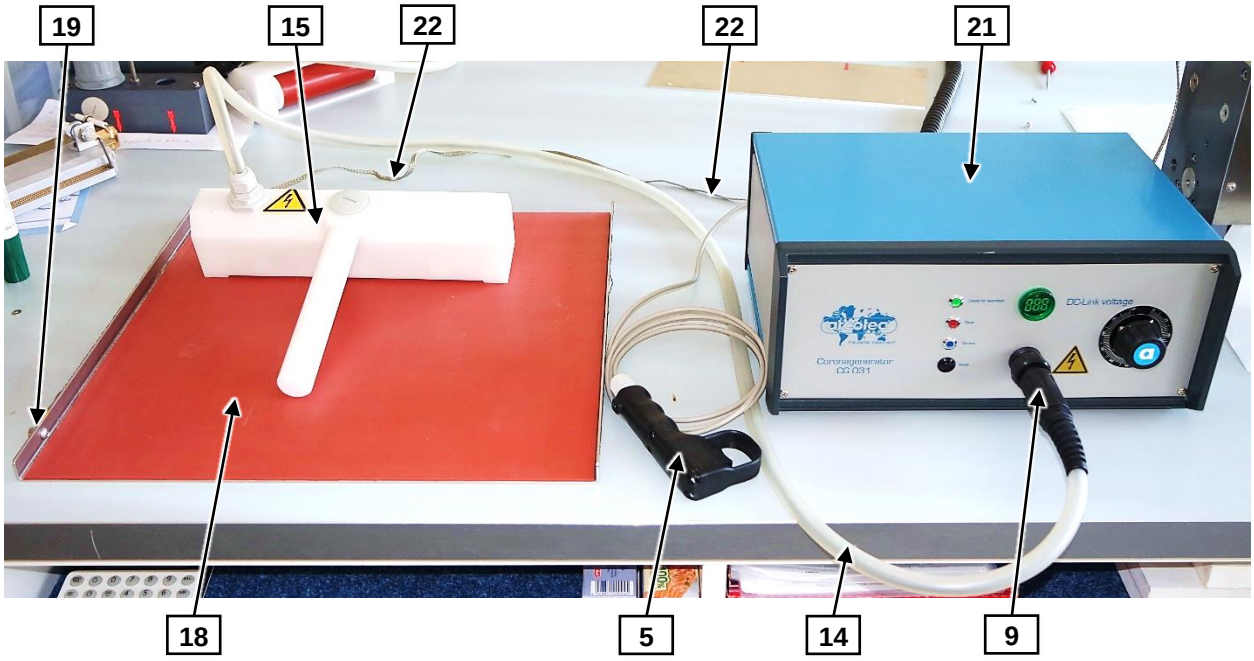
6.3 Arrangement



5 Hand switch
9 High voltage plug
14 High voltage cable
15 Hand roller/comb electrode
18 Counter electrode plate
19 Grounding connection
21 Corona generator CG031
22 Grounding strap

6.4 Indicator lights

Ready for operation	This LED lights up green when a signal is applied to activate the high voltage discharge.
Fault	This LED lights up red when a short circuit has occurred directly between the hand-rolled electrode and the counter electrode, i.e. without an insulating layer.
Corona	This LED lights up blue when high voltage discharge is activated.

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7 Packaging, Transport and Scope of Delivery

7.1 Packaging

- Dispose of the used packaging in accordance with the official local regulations.

7.2 Transport

- Only allow instructed personnel to transport the device.
- When transporting the system, be careful not to damage it.
- Comply with the accident prevention regulations.
- Report transport damages immediately.

7.3 Scope of delivery

Pos.	Quantity	Item	Designation
1	1		HF Corona Generator CG031
2	1		Hand roller electrode 100 mm with high voltage cable (1.5 m)
3	1	61776	Hand switch for switching the high-voltage discharge
4	1	61777	Ground plate as counter electrode 460 × 460 mm, V2A steel, one-sided silicone coating
5	1	64827	Technical documentation in English

8 Installation/commissioning

NOTICE

- Do not kink, shorten, or extend the high-voltage cable, which is enclosed in a hose, leading to the hand-rolled electrode/comb electrode. Otherwise, malfunctions may occur.
- Do not cover the air inlet slots of the generator.
- Leave enough space of approximately 100 mm for the connectors and the ventilation on the rear of the generator.

8.1 Setting up the generator

- Put the generator and the counter electrode plate on a stable, sufficiently large table so that the operating elements are easily accessible.

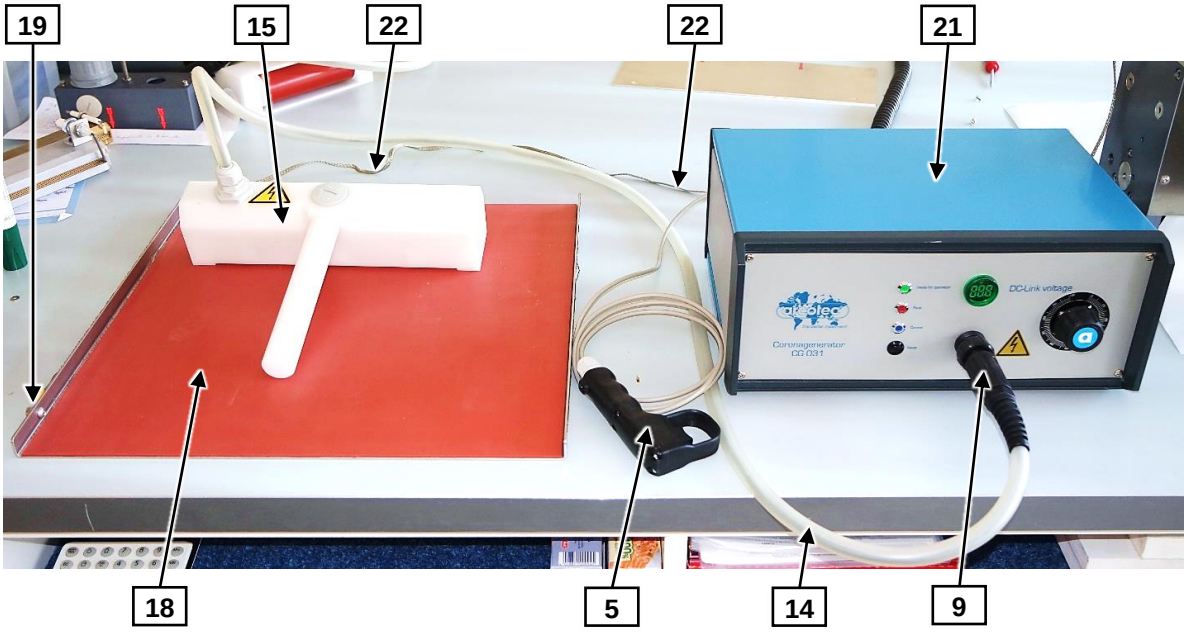
Since the high voltage discharge generates ozone, use an air extraction for longer treatment periods. For shorter treatment periods, the generated amount of ozone is so low, that an air extraction is not necessary.

- Use the device under an air extraction hood or extract the ozone directly from the housing of the hand roller/comb electrode.

8.2 Electrical connections

WARNING of high voltage! Risk of electric shock.

- Before each use check if the counter electrode plate is connected to earth, otherwise high voltage can be diverted to other objects. Ensure proper earth connections.



5	Hand switch	**18**	Counter electrode plate
9	High voltage plug	**19**	Grounding connection
14	High voltage cable	**21**	Corona generator CG031
15	Hand roller/comb electrode	**22**	Grounding strap

- Connect the power supply (230 V, 50 Hz) using the mains plug.
- Connect the counter electrode plate (18) to the ground connection using the grounding strap (22).
- Connect the high-voltage cable (14) to the corona generator (21) via the high-voltage plug (9).

9 Operation

WARNING of high voltage! Risk of electric shocks.

During operation, the manual roller electrode is supplied with high voltage. Electric shocks can be life-threatening.

- Do not touch the electrode (silicone roller/electrode pins).
- Before each use, check if the counter electrode plate is connected to earth, otherwise high voltage will spread out to other objects.
- The high voltage can spread in the material. Do not touch the sample during the treatment.
- Do not touch the sheathing of the high voltage cable. Due to dielectric effects, you can experience electrical shocks when touching the cable sheath.
- When working with the manual roller electrode, hold the hand switch in one hand and the hand roller comb electrode in the other hand.
- Only activate the high-voltage discharge when the hand roller/comb electrode is continuously moved on the counter electrode plate.
- Do not lift the handroller/comb electrode from the surface until the high-voltage discharge is switched off again.

9.1 Basic rules when working with the manual roller electrode

1. Before each use, check if the counter electrode plate is connected to earth and if the silicone roller/ electrode pins and the silicone layer are clean. Use ethanol for cleaning.
2. Only activate the high-voltage discharge with the hand button when the hand roller/ comb electrode on the counter electrode plate is moved continuously.
3. Switch off the high voltage discharge (release the hand switch), before lifting off the hand roller/comb electrode again.
4. During the active high voltage discharge, keep the hand roller/comb electrode in continuous motion, otherwise the silicone and the material to be treated can burn through.
5. Do not touch the material during the corona treatment.
6. The high voltage of the corona generator increases with the distance between the silicone roller and the counter electrode plate. If this voltage exceeds a critical value, the internal short-circuit detection will interrupt the high voltage discharge.
7. Due to different material properties, it is not always possible to use the full range of power setting (potentiometer 0 ... 10) to achieve a continuous high voltage discharge. The optimum has to be determined in experiments.

9.2 Using the device

NOTICE

Switching on the generator with the potentiometer turned up (adjusted intermediate circuit voltage) can cause damage to the transformer.

■ Always **set the potentiometer to zero before switching on** the corona generator.

- **Set the potentiometer** for the intermediate circuit voltage **to zero before switching on**.
- Switch on the main switch (1) on the back of the device.
  → The main switch (1) lights up red.
  → The corona generator is ready for operation and the green “Ready for operation” indicator light (10) is illuminated.
  → The housing fan is running.
- Adjust the intermediate circuit voltage of the generator using the potentiometer (8) in the range from 20% to 100%..
  → The intermediate circuit voltage can be read in volts on the display (7).
- Lay the material to be treated flat and level on the counter electrode plate (16).
- Press the hand switch (5) in one hand to activate the high-voltage discharge and at the same time move the hand roller electrode/comb electrode (15) continuously over the material with the other hand.
  → The high-voltage discharge is active, the “Corona” indicator light (12) lights up blue.
- Release the hand switch (5) to stop the high voltage discharge.

NOTICE

■ Do not lift the hand roller electrode before the high voltage discharge is switched off.

9.3 Switching off the device

- Release the hand switch (5) to stop the high voltage discharge.
- Switch off the main switch (1).

9.4 Error shutdown

In case of a fault (e.g. a short circuit due to a defective silicone tube of the roller electrode or switching off because of a too thick material), the high voltage discharge will be stopped. The operational readiness of the generator expires.

- Press the main switch (1) to switch the generator back into operation readiness.
  → The main switch (1) lights up red. The generator is ready for operation again.
  → Now the high voltage discharge can be switched on again.

9.5 Basic procedure for experiments with the manual roller electrode

This is a laboratory application. The necessary parameters must be determined in experiments.

The approach described below refers to simple materials such as plastic films or metal foils. The definition “simple” refers to the nature of the materials, with the films having the same thickness and the same material quality at all points. The following points therefore expressly do **not** apply to sandwich structures (several different layers of material) and foam materials or even sandwich structures with foam materials.

The procedure is as follows, always starting with minimum power:

1. La the material to be treated on the non-insulated (blank) side of the counter electrode.
2. Carry out the first run with the lowest power setting.
3. Then check the material to see if there is any damage on the material, which depends on the material sensitivity and thickness.
4. Check whether the required surface energy value has been achieved.
5. If the required surface energy has not been reached, increase the power slightly and perform another run.
6. Repeat steps 3 to 5 until the desired surface energy is reached or the power cannot be increased any further.
7. If the desired surface energy cannot be achieved despite maximum power, carry out several treatment cycles.
8. If there is damage to the material (burn marks or burn holes) on the non-insulated side of the counter electrode, place the material on the insulated (silicone) side of the counter electrode plate and perform steps 2 to 7.

The side of the counter electrode to be used depends not only on the type of material (conductive / non-conductive / sandwich construction), but primarily on the thickness and sensitivity of the material.

If sandwich structures (with or without foam materials) or foam materials are to be pre-treated, please only do this in consultation with Arcotec GmbH. Otherwise, there is a risk of property damage or personal injury.

10 Maintenance

WARNING of high voltage. Risk of electric shock.

- Do not touch the roller electrode / electrode pins, when the high voltage discharge is active.

There are live high-voltage parts inside the housing during operation.

- Always switch off the device before maintenance and cleaning.

10.1 Cleaning the silicone roller / electrode pins and silicone layer

NOTICE

Risk of burning in of dirt or shavings in the silicone coating of the hand roller electrode and the counter electrode plate.

- Before each use, clean the silicone roller of the hand roller electrode with ethanol.
- If the electrode pins of the comb electrode are dirty, clean the electrode pins with ethanol.
- Before each use, clean the silicone layer of the counter electrode plate with ethanol.

10.2 Checking the cable connections

- Regularly check all outer cable connections for proper contact and good conditions.

11 Troubleshooting

WARNUNG of high voltage. Risk of electric shock.

The exact fault diagnosis and any intervention in the generator technology may only be carried out by qualified electricians after consultation with the manufacturer Arcotec.

- Switch off the main switch and disconnect the power supply before opening the device.
- Be careful when the device is switched on again with open front panel for troubleshooting.
- Do not touch live high voltage parts inside the device.

NOTICE

Changes to the factory-set configuration may only be made by qualified electricians after consultation with the company Arcotec. The manufacturer assumes no responsibility for damage to the device caused by unauthorized, incorrect settings of the user.

NOTICE

The maximum output power is set at the factory depending on the high-voltage transformer and the electrode system used.

- Do not change the maximum output power.

- When replacing fuses, only use fuses of the same type with the same value.