

OPERATING INSTRUCTIONS

Type: Plasma R

Serial number: 11xxxxxx



Please read through these operating instructions carefully before using your plasma system.

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Operating instructions for low-pressure plasma systems of the series

Plasma R

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1.0 Components supplied and their description

1.1 Basic device

Comment:

The basic device consists of standard wiring, electrical components, tubing, ... In addition, the height of the basic device may vary with several additional options!

Dimensions

Width:	approx. 210 mm
Depth:	approx. 420 mm
Height:	approx. 342 mm
Chamber:	Aluminium/Stainless steel
Cover:	Aluminium and glass
Ø	approx. 60 x 60 mm
Length:	approx. 60 mm

1.2 Gas supply

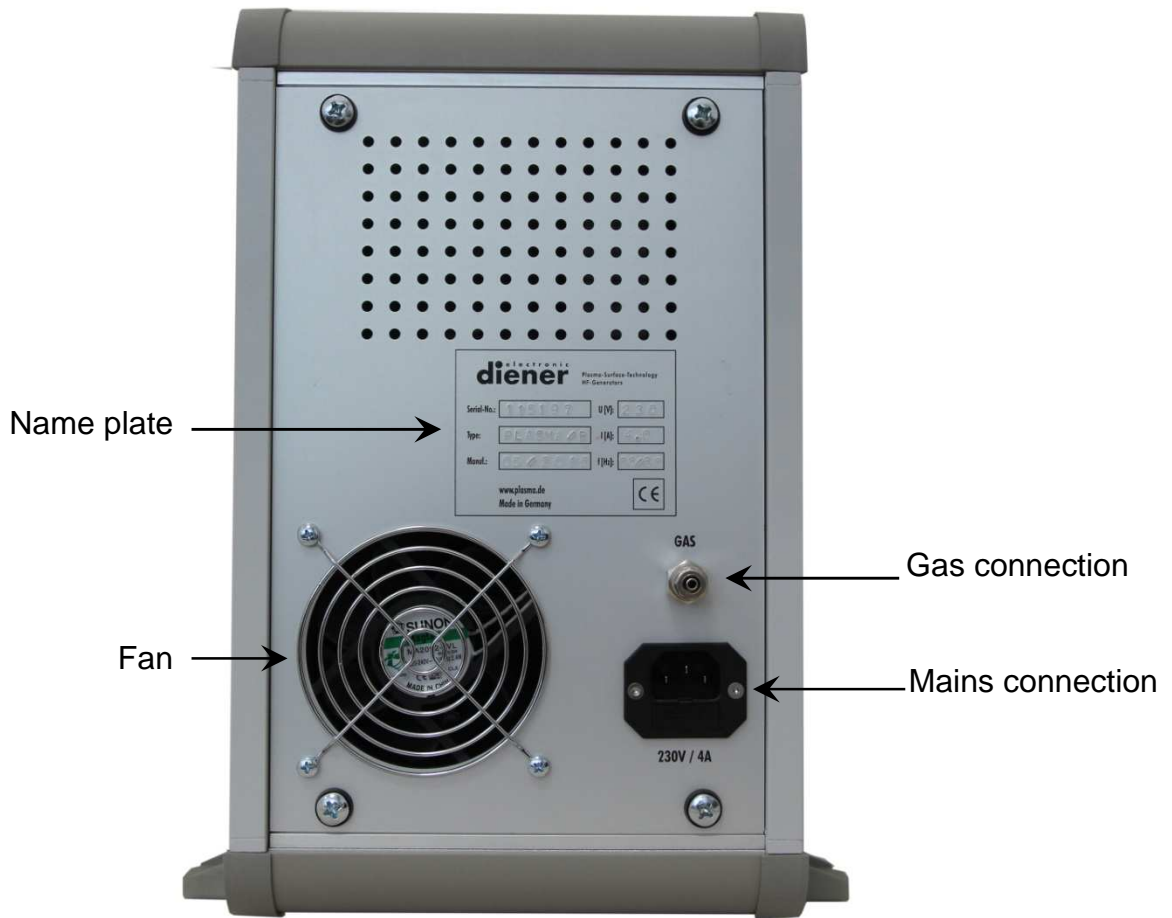
Yocto

Operating pressure	approx. 1.5 mbar
Gas	Air, oxygen, Argon
Pressure	max. 0.5 bar

The system is not suitable for corrosive gases and fluids!!!

Not supplied by Sweden & Martina

1.3 Connection



1.4 Generator

Type A

Frequency	100kHz
Power	0-16W
Impedance matching	Solid

The system for dental use is provided with power set to 16 watts.

The generator is secured with an air-break switch and only starts when the door is closed.

1.5 Control

Starting the plasma system:

1. Connect 230 V
2. Load system

Attention: the parts to be treated must never come into contact with the perimeter walls of the room. This may cause a short circuit between the chamber walls and the electrode due to electrically conductive materials. The non-conductive materials do not cause a short circuit.

3. Close door
4. Turn on main switch:
After being turned on via the main switch, the electronics waits 2 sec. and only then the switching on clears via the Start button
5. Time base table in the Appendix
6. Turn on Start button
7. The process control is performed automatically:
 - a. Automatic ventilation off
 - b. Gas feed on
 - c. Vacuum pump is turned on
 - d. Generator turns on after 20-30 seconds run time and then runs 3 minutes to 3 hours according to setting
8. The plasma process can be interrupted by repeatedly pressing the Start button.
9. After the time interval, the generator turns off and the system is ventilated, so that the parts can then be removed

This type of control should be handled with particular ease through single button operation.



1.6 Vacuum pump

Vacuum pumps are used to generate vacuum in the recipient of the plasma system.

The system has a permanently installed oil-free pump.

1.7 Options

Pressure reducer

- For connection to the gas flask 200bar
- Available: Pressure of 200bar
- Different gases require different pressure reducers
- Pressure reducer for noble gases, H₂, O₂, N₂, CF₄, C₄F₈
- Pressure reducer for NH₃



Anschl.-Nr.	zugelassene Gasarten	Gewinde
1	Methan, Silan, Wasserstoff	W 21,80 x 1/14" LH
3	Acetylen	Anschluss für Spannbügel
5	Kohlenstoffmonoxid	1" LH
6	Ammoniak, Argon, Helium, Hexafluorethan, Kohlenstoffdioxid, Schwefelhexafluorid, Tetrafluormethan	W 21,80 x 1/14"
8	Chlorwasserstoff, Stickstoffdioxid	1"
9	Sauerstoff	G 3/4"
10	Stickstoff	W 24,32 x 1/14"

Process gas flask

- Oxygen - flask for connection as a process gas
- Argon - flask for connection as a process gas

Purity of the gases:

Generally, gases with technical purity are used. If you would like to handle parts with especially high requirements for surface cleanliness, choose a high purity.

This is particularly relevant for semiconductor front end processes or for system applications (SEM, ...).

Gas flask holder

- To be fastened to the shelves, wall bars or on the work table
- Width 70 mm
- Tension belt secures with no room for play
- Suitable for all flask sizes



Test ink set

- Test ink for simple analysis of the surface tension
- 28, 38, 56, 64, 72 and 105 mN/m are contained in the set
- Other values can be provided on request



Documentation in the country's language

- Documentation according to Machinery Directive 89/392 / EEC
- Not valid for German and English
- This option is not automatically included in the system and must be ordered separately

2.0 Connection of the system

1. Connect system to the mains.
2. Connect gas lines on system and gas flask.
3. Set a maximum primary pressure of 0.5 bar on the gas flask!
4. For information on operating the system, refer to the chapter "Control".
Anyway, operate in the following order:
 - a. Load chamber
 - b. Close door
 - c. Turn on main switch
 - d. Set the time base (see table)
 - e. Press the Start button and the process starts automatically. If the system does not start immediately, press the button again. Generally wait approx. 12 seconds after turning on the main switch before pressing the start button.
 - f. The process automatically stops after the pre-set time interval
5. Diener electronic GmbH accepts no warranty for defects caused by incorrect operation

After treatment the room can be very hot.

Depending on the power settings, the room can reach temperatures up to 110°C for a treatment time of approx. 6 minutes (with the power set to 16W, in the device provided for dental use, with a complete treatment of approx. 8 minutes, the maximum temperature reached inside the chamber does not exceed 70°C.).

Table for jumper

Poti position	Jumper 1 time [s]	Jumper 2 time [s]	Jumper 3 time [s]
0	2	20	200
50	12	120	1200
100	21	210	2100
200	34	340	3400
300	49	490	4900
400	62	620	6200
500	70	700	7000
600	80	800	8000
700	86	860	8600
800	93	930	9300
900	99	990	9900
1000	105	1050	10500

The specified values are approximate values.
The current values can deviate up to +/- 10%.

PLASMA R in its standard configuration is set on Jumper 2.

3.0 Safety instructions

Voltage

The voltage of the open-circuit at the generator can be up to about 1,000 V! Therefore, increased caution is required here!

The device may only be connected to a power grid whose voltage matches the specifications on the name plate. Diener electronic GmbH & Co. KG assumes no liability for damages that arise from improper use (e.g. short circuit from improper power grids)!



Vacuum

Attention!!! Stay away from openings at the vacuum chamber, valves and connections to the pump during operation!
Danger of being sucked in!



Damp rooms

The plasma system must not be used in damp rooms.



Process gas

Before operation, check that all inlets and outlets are gas-tight. No explosive gas mixtures may be produced in the chamber. The machine must not be operated with flammable gases. Exception: A safety valve is installed (see 1.10.21). Please note the relevant regulations (TRG) of the respective process gas.



Exhausts

All exhausts must be evacuated into the outside air.
The output must not be closed, otherwise the pump will be destroyed.



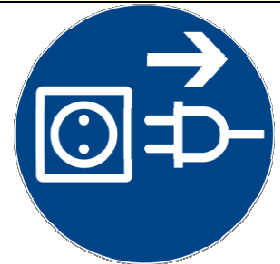
Aggressive liquids

The gas regulator and other parts of the system can be damaged by aggressive liquids (e.g. formic acid).



Power plug

Do not pull the power plug on the connection cable from the socket. If the connection cable of the plasma system is damaged, it must be replaced immediately to avoid hazards.
Pull out the power cord before opening the housing.



Living beings

No living beings may be trapped in the plasma system!



Contamination

Avoid any contaminants such as dust, dirt, glass and metal splinters before and during operation. This may permanently damage the device as well as change the effect of the plasma treatment.

Pacemaker

Forbidden for persons with pacemakers
In rare cases, electromagnetic fields emanating from devices can cause temporary interference with the pacemaker. Signs of a possible fault may be: Dizziness, palpitations or an irregular pulse.
For more detailed information on electromagnetic fields, see BGV B11 "Electromagnetic fields" www.bgn.de/9418



Maintenance and repair

Maintenance must be performed every 6 months by Diener electronic GmbH + Co. KG.
Pumps may only be used with oil appropriate for them.
Do not perform any unauthorised changes to the system.
Repairs to this device may only be performed by professionals from Diener electronic GmbH + Co. KG.
Otherwise, the warranty expires.



Other manuals

Please also note any information in the accompanying handbooks!



4.0 Maintenance

4.1 Pump

- Maintenance-free

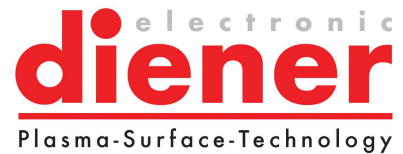
4.2 Cleaning

- The plasma system may only be cleaned from the outside with a slightly damp cloth. Never use solvents!
- The inner part of the chamber can be cleaned with a cloth moistened with a solution of water and ethanol.
- The stainless steel vacuum chamber can be cleaned very well with chrome polish. But the electrode must be removed for this.

4.3 Sealings

- The door seal should be wiped daily and replaced every six months.

5.0 EC Declaration of conformity



Diener electronic GmbH & Co. KG
Nagolder Str. 61
D – 72224 Ebhausen

We hereby declare that our low-pressure plasma systems

Plasma R – Serial number 11XXXX

in the design that has been brought to the market by us comply with the basic protection requirements. This declaration loses its validity if any changes not approved by us are performed.

Applicable EC guidelines: EC Machinery Directive (2006/42/EC)
 EC EMC Directive (2004/108/EC)
 EC Low Voltage Directive (2006/95/EC)

Applied, harmonised standards: DIN EN ISO 12 100:2010
 DIN EN 62 311:2008-09
 DIN EN 60 204-1:2011-01
 DIN EN 61 000-4-2:2009-12
 DIN EN 61 000-4-4:2012

Applied national standard: VDE 0848

Ebhausen, the 30/08/16

A handwritten signature in black ink, consisting of the letters 'C. Diener' followed by a stylized flourish.

Diener electronic GmbH + Co. KG
Christof Diener
Managing director

6.0 Warranty

The warranty is 1 year and begins on the date of invoice.

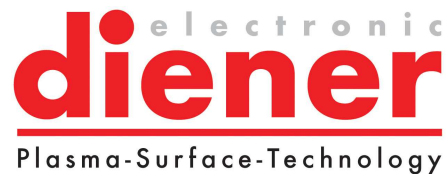
If you have problems with your plasma system, please contact us over the phone:
Tel.: 00 49 (0) 74 58 / 999 31 – 0 or by email at info@plasma.de

Any abusive and improper handling, use of force and interventions not performed by us will void the warranty.

For repair purposes, please send the well-packaged plasma system to:



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