

Microwave Generator and MiniJets for Microwave Plasmas

Characteristics

- **Mini as well as robust plasma jet for the generation of atmospheric plasmas with low temperature**
- **Pure plasma with no trace of electrode erosion**
- **Generator with an output power of up to 10 W at 2.45 GHz**
- **Well suited for decontamination and surface activation**

Description of the MiniJet PM-10.R

The plasma jet MiniJet-R, in combination with the accompanying 10 W MiniJet generator, build up a small device for generating an atmospheric micro-plasma (based on a microwave signal). The plasmas of the MiniJets basically have the same physical characteristics as the larger HHF plasma sources: Since only the light electrons are accelerated rather than the heavy ions, the plasma is comparably cooler. In this case, the low power and the implementation of argon result in a relatively "cold" plasma which can be as cold as 40 °C.

The MiniJet-R system, shown in use in Fig.1, is also characterized by its easy handling: After ignition, the user only needs to adjust the output power.



Fig. 1: Photo of the MiniJet-R with a cold plasma for general applications (no Photoshop, but overexposure of the plasma).

System Description

The MiniJet generator delivers a very constant and reproducible microwave signal at about 2.45 GHz in the ISM frequency band, which can typically be adjusted to a value between 2 and 10W. With this signal, the plasma jet can be operated with argon as process gas.

The LEDs on the front panel depict the operational state: The green LED for normal operation, and the red LED goes on in case of an overheating as the system shuts down for a short time (Fig. 2, left). The newly integrated flow meter provides a good estimation of the actual argon flow.

The connection for the power supply, the main switch, a fuse, and the gas connection are on the backside (Fig. 2, right).



Fig. 1: Front and back views of the actual 10W generator with standard gas flow meter.

The physical properties and temperature of the plasma are directly dependent on the flow rate of argon and the power setting. Hereby, the plasma temperature and size are directly proportional to the microwave power and inversely proportional to the gas flow.

Principal advantages of the resulting plasma are its potential freeness, its reproducibility, as well as its easy ignition without using a high voltage. All these lead to a system that is well suited for a handheld operation. The plasma is furthermore very pure (no erosion of the electrode) and has a high degree of ionization, resulting from the operating frequency of 2.45 GHz.

The system further includes a flexible rf cable (app. 1 m). The gas hose used to supply the jet with argon is integrated in the sheath covering the cable.

Specifications of the Generator

Frequency	2.4	2.45	2.5	GHz	ISM frequency band
Output power	2		10	W	
Power consumption		47		W	
Supply voltage		230		V	Volt AC
Weight		2.4		kg	
Gas flow	0.2		2	sl/min	Argon (connecting hose with standard 4 mm outer diameter)

Dimensions of the generator:

Height: 130 mm
 Width: 160 mm
 Length: 250 mm

Dimensions of the jets:

Length: 155 mm
 Diameter: 33 mm (6 mm at plasma outlet)

Operation of the MiniJet

To ignite the jets, please (Fig. 3, left)

1. Turn on the argon flow.
2. Switch the generator on (backside) and tune to maximum power.
3. Introduce the jet in to the starter box, so that the inner electrode gently touches the wire meshwork within.
4. Set the power to the required level for your application.

In some cases, an arcing can occur between the electrode and the casing (Fig. 3, right). Reducing the power level to around 2 W eliminates the arcing, so you can now set the power level required for your application. Furthermore, increasing the gas flow reduces the probability of arcing.

Please use the attached flow meter to adjust the gas flow for better

The MiniJet system can basically be used

1. To activate surfaces (specially temperature sensitive materials such as foils, Fig. 4).
2. Killing germs, bacteria, decontaminate, etc. on the surface of substances.



Fig. 3: Igniting the plasma using the starter box (left) and eventual arcing after ignition (right).

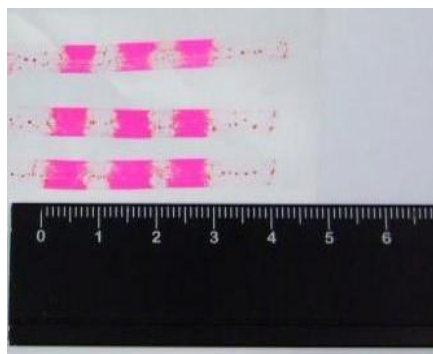


Fig. 4: Foil activated with a MiniJet plasma at 10 W and 0.6 sl/min argon.

Ordering information

Generator und MiniJet-R: **PM-10.R**

Guarantee

1 year from delivery.

Guarantee does not include incorrect operation, for example if the electrode should be damaged when operating without turning on the argon flow.

Contact

Heuermann HF-Technik GmbH

Organization: Auf dem Anger 29, D-52076 Aachen, Germany

Tel.: +49 2408/9379019 (eventually answering machine)

Development and production: Jülicher Straße 236, D-52070 Aachen, Germany

Tel.: +49 241/95451312

General: Mail: info@hhft.de ; Internet: <http://www.hhft.de/> Fax: +49 2408/9379952