

# HI-WAVE

## Collisional Plasma Source

HI-WAVE microwave collisional plasma source has been designed to sustain microwave plasma from  $10^{-2}$  mbar to a few  $10^{-1}$  mbar and from a few watts microwave power, whatever the gas.

HI-WAVE collisional coaxial plasma source was designed to avoid inside power-losses and has proved to be matched, i.e. no reflected power with no additional impedance matching system over 1 pressure decade, depending on the plasma gas. Moreover, plasma density higher than  $10^{12}$   $\text{cm}^{-3}$  could be easily obtained in multisource configuration at a few cm from the sources.

When combined with our solid-state microwave generator, it is possible to control the power transmitted to the plasma Watt by Watt. Low mismatching that may appear in the operating conditions can be balanced due to the variable frequency of the solid-state generator and thus permits to extend the operating condition range of the HI-WAVE.

HI-WAVE is designed to be used equally in R&D laboratories and industry for a very large range of applications.



## MAIN APPLICATIONS

### PLASMA APPLICATION

- Reactive Ion Etching & Deep Etching
- PECVD
- Creation of radicals & reactive species
- ALD
- Nanocrystalline diamond
- Surface treatment: nitriding...
- Sterilization via reactive species / UV / ionic bombardment

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### KEY BENEFITS

#### DESIGN

- Distribution in the desired configuration, matrix, crown, hexagonal, straight line
- **No limitation** in the number of sources or dimension
- DN40 KF flange – available in all CF flange
- Electrodeless: independent target and substrate bias voltage

#### TECHNOLOGY

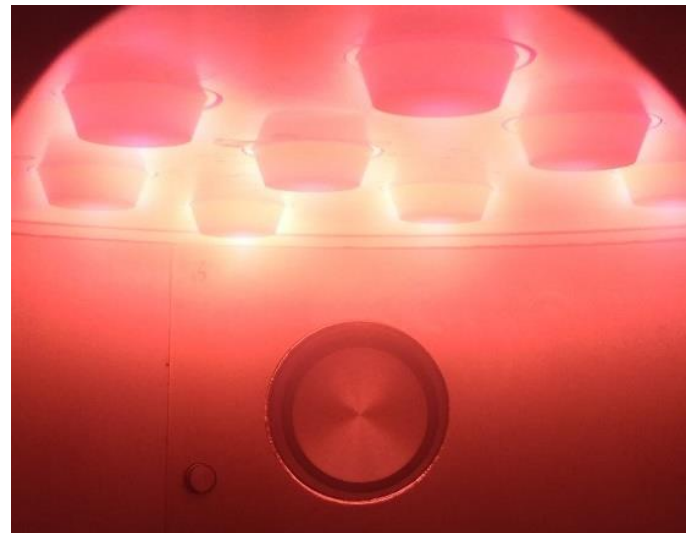
- Matched plasma sources: **no impedance tuner required**<sup>1</sup>
- **Automatic impedance adjustment**<sup>2</sup> using the variable frequency, allowing extension of the operating condition range

#### CONTROL

- **Automatic control on the transmitted MW power to the plasma** whatever the number of sources
- Each plasma source is connected to its own microwave generator
- Output power adjustable from 0 W to 450 W, with 1 W increment

#### PERFORMANCES

- **Over dense plasmas**, high ion & high active species densities
- **Uniform plasma without limitation in terms of areas**
- Wide operating condition range: several decades in pressure from a few W to full power



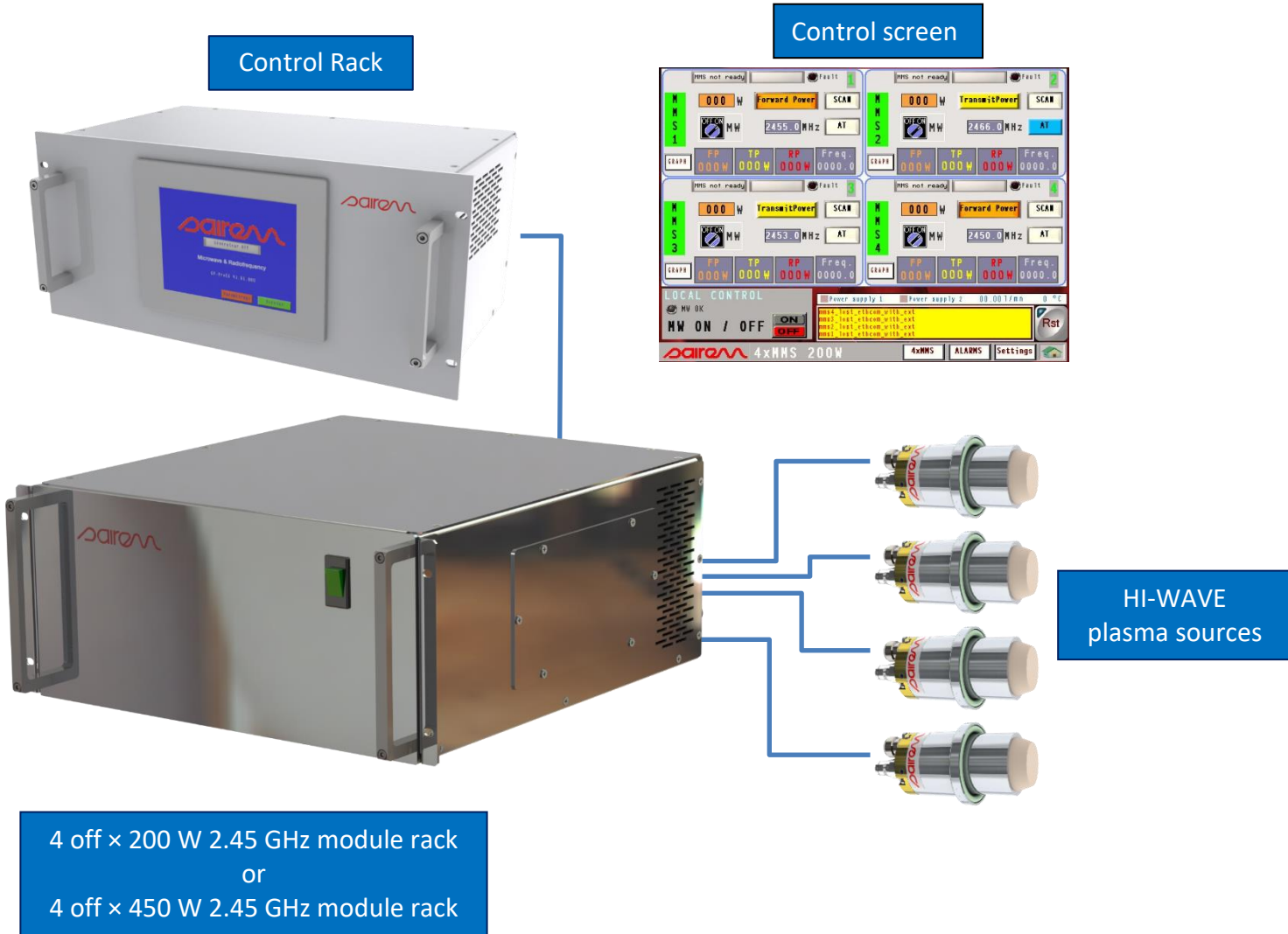
<sup>1</sup> SAIREM patents WO 2017/060611 & WO 2017/060612

<sup>2</sup> SAIREM patent WO 2012/146870

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## SETUP

The 4xMMS control rack allows to control up to 4 HI-WAVE with 1 W step.





To get the complete data sheet :

- full specifications
- technical drawings

**CONTACT US !**

