

## Water Cooled Movable RF Substrate Holder for Six Inch Wafers – RBS 150/100



Fig. 1: RBS 150/100

### Working Principle

#### Rf biasing

The standard dc-bias method is not applicable when electrically non conducting substrates are being processed or when insulating films such as SiO<sub>2</sub> or non conducting polymers are deposited at the substrate surface. Therefore the RBS 150/100 is rf powered at a frequency of 13.56 MHz. In this case a negative dc bias develops which is proportional to the rf-power fed into the system. It can be exactly controlled for electrically conducting as well as non conducting substrates.

#### Base plate

The substrate is clamped to a water-cooled substrate base plate. Good thermal contact to the substrate is achieved by a specially treated highly planar base plate surface.

#### Clamping system

A mechanical clamping system is based on a bayonet principle. The clamping ring is fixed with three screws to the radio frequency biased base plate. With different rings it is possible to fix substrates with diameters of up to 150 mm (6 inch wafer).

#### Matching network

To minimize the reflected power of the substrate holder, an impedance matching is needed. Therefore an optional compact gamma type matching network can be included to the system. Rf-power coupling of up to 300 W is possible. Due to an optimized substrate holder geometry and the corresponding tuning components (inductance L and variable capacitors C<sub>load</sub> and C<sub>tune</sub>) the reflected power can be kept close to zero for atomic and molecular gases (i.e. argon, oxygen, nitrogen, hydrogen) for a broad pressure range.

#### Dark space shield

To avoid the generation of unwanted plasma at the backside of the base plate and the connection rod a dark space shield is used. This is mandatory for an efficient use of the rf-power for biasing the substrate holder.

#### Base plate position

The connection rod length and thus the substrate position can be varied continuously up to 100 mm (about 4 inches) maximum. This can be done while the system is under vacuum and the substrate holder is powered.

Fig. 2: front view of the RBS 150/100

- 1 rf biased base plate
- 2 clamping ring
- 3 dark space shield
- 4 edge welded bellows
- 5 mounting flange
- 9 connection rod



Fig. 3: back view of the RBS 150/100

- 6 matchbox
- 7 connection for cooling water
- 8 rf connection
- 10 z-linear translator



---

Plasma Consult

**JE PlasmaConsult GmbH**  
**Rainer-Gruenter-Str. 21, Geb. FN**  
**42119 Wuppertal**  
**Germany**

Tel. ++49-202-28397-0  
Fax ++49-202-28397-123

[contact@plasmaconsult.de](mailto:contact@plasmaconsult.de)  
[www.plasmaconsult.com](http://www.plasmaconsult.com)