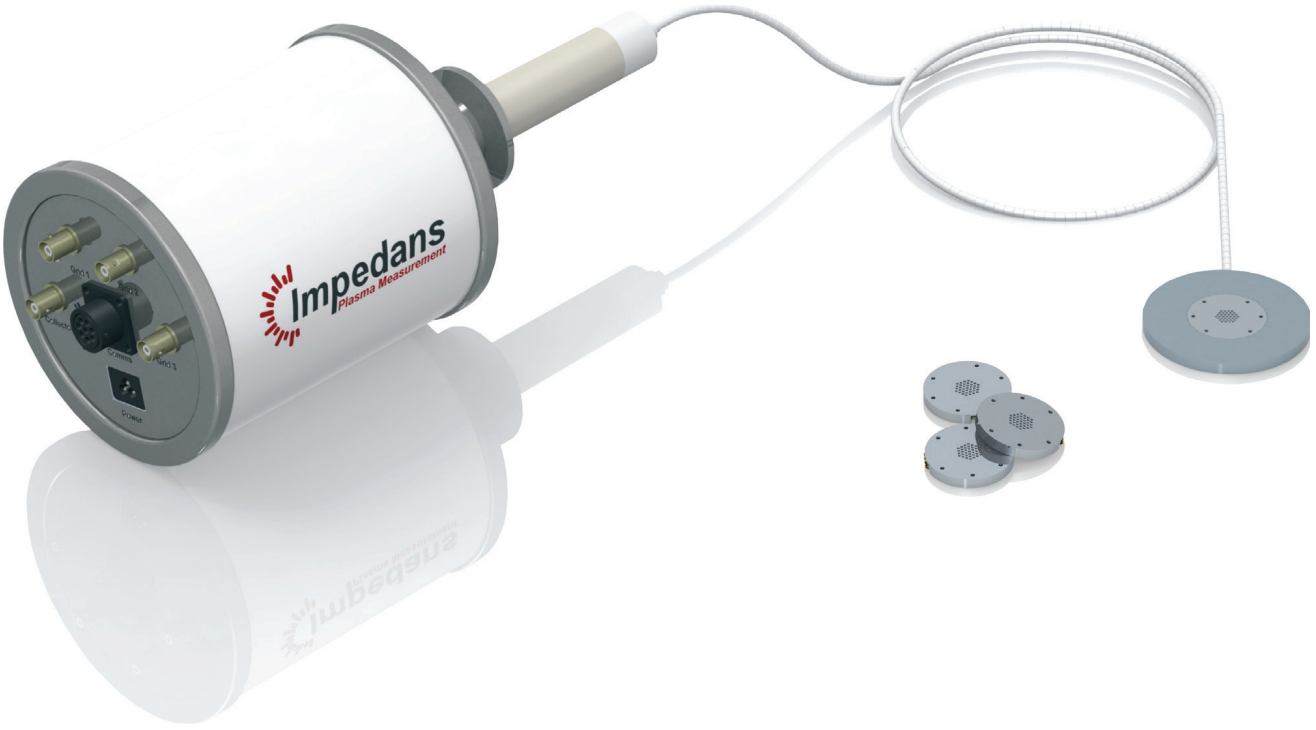
Semion Pulsed DC™

DC Pulsed Plasma Surface Ion Energy Analyser



Impedans
Plasma Measurement

Multi-Grid Retarding Field Energy Analyser
Replaceable Substrate Mounted RFEA
High Speed Time Resolution for Pulsed DC

The **Semion Pulsed DC™** is a precision plasma measurement instrument used to measure the time dependence of ion energies arriving at the surface of a plasma. The **Semion Pulsed DC™** is the key instrument used by engineers and scientists to measure the ion energy and flux arriving at different times in a pulsed plasma process chamber.

The **Semion Pulsed DC™** can be placed on a high voltage biased or grounded surface. Among the key parameters measured are Ion Energy, Ion Flux, Electron Energy, Plasma Potential and Floating Potential. The **Semion Pulsed DC™** provides plasma parameter measurement in ion beam applications and in DC, Microwave, Continuous and Pulsed plasma. The **Semion Pulsed DC™** is the only fully automated retarding field energy analyser with submicron time resolution, using replaceable RFEA sensors.

The **Semion Pulsed DC™** helps the user to understand ion surface interactions and the ion's impact on surface treatment in multiple time periods in pulsed DC plasma. The **Semion Pulsed DC™** is an essential plasma process diagnostic to understand the correlation between plasma inputs and the plasma state. The **Semion Pulsed DC™** reduces process and tool development time, as well as the time to market for new plasma products. Pulsed plasmas are used to tailor the electron or ion energy and The **Semion Pulsed DC™** is an integral part of such a process development.

Key Indicators

Substrate mounted Retarding Field Energy Analyser Probes

- In-situ measurement of:
  - Ion Energy Distribution
  - Ion Flux
  - Ion Current
  - Electron Flux and Energy
- Measurement of Ion Energies up to 800eV
- Easy to install, no chamber retrofit required
- Portable system allowing analysis in multiple chambers using single system

Benefits

- Robust and Easy to Install
- Easy to Use Software
- Real Time Measurements
- Replaceable Sensors
- Sensor holder sits on a high voltage bias or grounded surface
- Fully automated software analysis
- Custom holder materials available

Specifications

Semion Pulsed DC	
Ion Energy Range	0 to 800eV *
Ion Current	2mA DC max
Ion Flux	0.1 - 20mA/cm²
IEDF Resolution	± 1eV nominal

**dependant on DC bias*

RFEA Probe	
Probe Configuration	3-grid
Button Probe Diameter	33mm
Holder Diameter	300mm (12”) as standard
Holder Thickness	5mm
Max Operating Temperature	200°
Mounting	RFEA Probe holder mounted on electrode
Probe Enclosure Material	Aluminium, anodized aluminium, stainless steel & Al2O3
Probe Holder Material	Aluminium, anodized aluminium, stainless steel & Al2O3
Max Applied Voltage	400V (peak to peak)
RFEA Probe Cable Length	500mm standard (custom available)

Feed-through Assembly	
Flange type	KF40 standard, CF40

Control Unit Electronics	
Voltage Range	-600V to +600V (suppression voltage)
	-425V to +425V (grid voltages)
Current range	100pA to 2.4mA
Connectivity	USB 2.0

Application Software	
Operating System	Windows 2000/XP/Vista/Windows 7 Compatible

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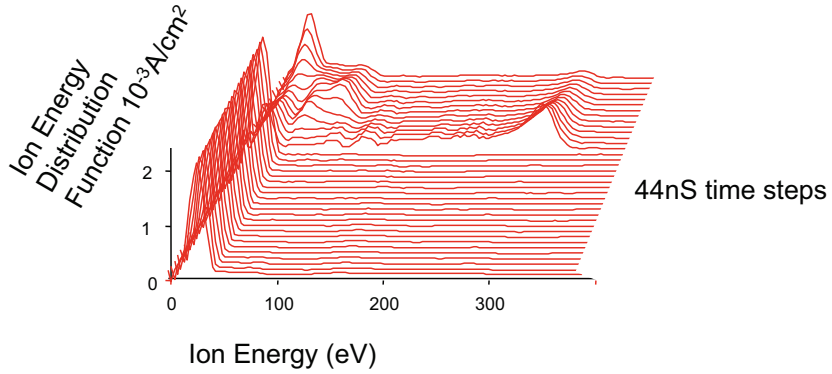
Product Operating Parameter Table

High	> 10^5Pa	>760 Torr	> 5000°	> 10^{14} cm^{-3}	SiH_4	Microwave (3 GHz - 20 GHz)	> 100 KeV
	1000Pa - 10^5Pa	10 - 760 Torr	5000°	10^{12} - 10^{14} cm^{-3}	$C4F_8$, SF_6	Microwave (1 GHz - 3 GHz)	10 - 100 KeV
	100Pa - 1000Pa	1 - 10 Torr	1000°	10^{10} - 10^{12} cm^{-3}	CHF_3	UHF (100 MHz - 1 GHz)	2500 - 10,000 eV
Medium	10Pa - 100Pa	0.1 - 1 Torr	500°	10^8 - 10^{10} cm^{-3}	Cl	RF (1 MHz - 100 MHz)	800 - 2,500 eV
	1Pa - 10Pa	10 - 100 mTorr	200°	10^6 - 10^8 cm^{-3}	O_2	MF (0 - 1 MHz)	400 - 800 eV
	0.1Pa -1Pa	1 - 10 mTorr	100°	10^4 -$10^6$$cm^{-3}$	N_2	pDC (0 - 350 kHz)	100 - 400 eV
Low	< 0.1 Pa	< 1 mTorr	20°	< 10^4 cm^{-3}	Ar, He	DC (0 kHz)	0 - 100 eV
	Pressure (Pascal)	**Pressure (Torr)**	**Gas Temperature**	**Density**	**Gas Reactivity**	**Power Frequency**	**Ion Energy**

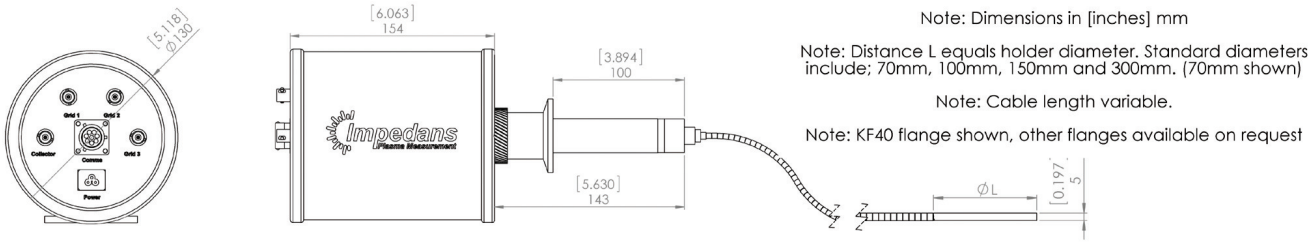
System Operating Parameters Beyond Operating Parameters

Graphical Data

Ion Energy Measured at Substrate in Pulsed DC Magnetron



Product Dimensions



Note: Dimensions in [inches] mm

Note: Distance L equals holder diameter. Standard diameters include; 70mm, 100mm, 150mm and 300mm. (70mm shown)

Note: Cable length variable.

Note: KF40 flange shown, other flanges available on request

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