

**ALP System™ Advanced Langmuir
Probe for Plasma Characterisation
and Diagnostics**

 **Impedans**
SYSTEMS MADE TO MEASURE

Product Information

The Impedans Automated Langmuir Probe (ALP) System™ provides a powerful diagnostic for measuring key plasma parameters.

Perform High Resolution Plasma Characterisation with the state-of-the-art Langmuir Probe and ALP Control Unit electronics. Using an intelligent pre-scan feature, the optimal plasma parameter measurements are performed easily and repeatedly.

Features

The Impedans ALP System™ provides the following primary plasma parameters in real-time:

- Plasma Density
- Electron Temperature
- Ion current Density
- Plasma Potential
- Floating Potential
- EEDF

Single Probe

The ALP System™ provides plasma diagnostic measurements in DC, pulsed DC, microwave and RF plasmas. The standard probe shaft length is 300mm, and probe shaft lengths up to 1.4m are provided. The probe tip holder is recessed to prevent any increase in probe collection area caused by a sputtered conductive layer.

Probe tips are easily replaced with the “Easy-Fit” probe tip holder design. Probe tip material is tungsten as standard, with molybdenum, platinum and invar available. Custom probe lengths, diameters, materials, and shapes can be supplied on request and easily updated in the software analysis.

Double Probe

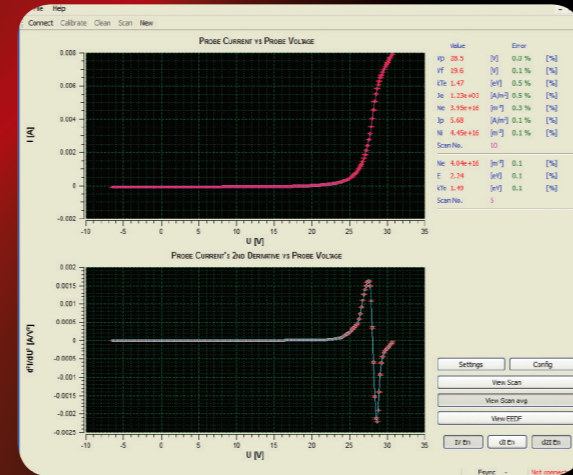
A double probe option is available for applications where a suitable ground reference is not available. A range of Double Probes are available for RF/pRF and DC/pDC plasma applications.

Probe Tip Cleaning

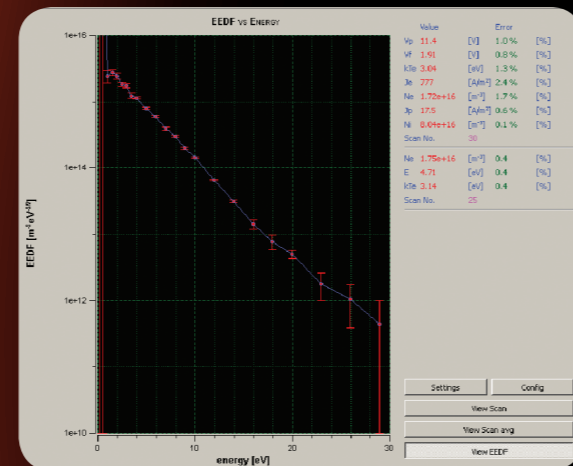
An automated probe tip cleaning feature is provided as standard to facilitate the cleaning of the probe tip. This is especially useful in deposition plasma. Both automated and manual cleaning procedures are supported by the ALP System™ application software.

Time-Resolved Measurements

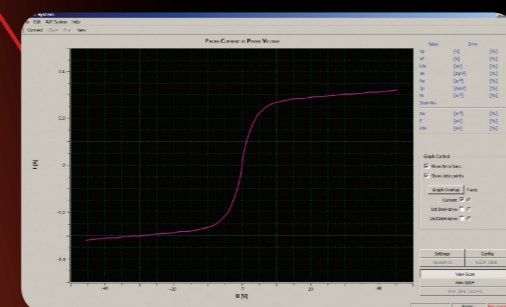
A high-speed “advanced boxcar” mode is available to support high resolution time-resolved measurements with a time-step resolution of 12.5ns. Trigger frequencies up to 1MHz are supported, and a built-in programmable delay allows gating of the probe measurements.



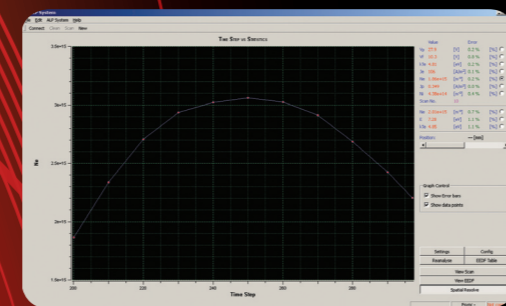
ALP System™ Software



EEDF Plot



Double Probe Trace



Spatial Screenshot

Spatial Profile Measurements

An Automated Linear Drive System may be used to insert the Langmuir Probe in the plasma with a step resolution of 0.025mm. The key plasma parameters can be plotted relative to the probe position to present a clear picture of the plasma properties across the bulk of the plasma.

DC Compensation

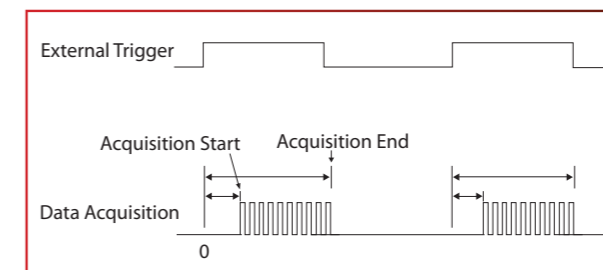
A novel pre-scan feature eliminates the need for a DC compensation electrode. Voltage shifts in the IV characteristic are monitored at various probe current drains. The plasma to ground resistance is determined and the appropriate correction is applied.

RF Compensation

The probe shaft is constructed from metal, coated with a fine layer of ceramic to maximize the coupling of the probe tip to the plasma and eliminate the need for a compensation electrode.

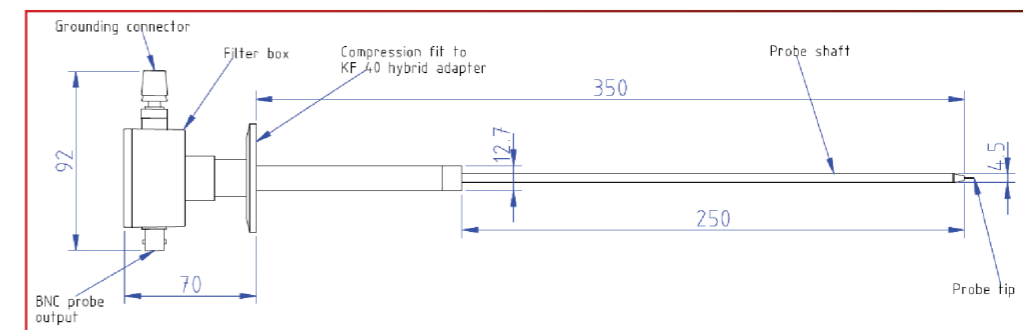
Advanced Boxcar

Capturing data at 80MSPS allows the full capture of the time resolved current at a specified voltage in a single period, dramatically reducing the dead-time. This leads to a major improvement in S/N in time resolved measurements.

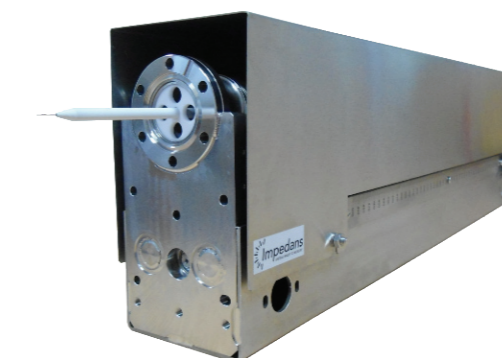


ALP System™ Advanced Boxcar Mode Data Acquisition

Mechanical Specifications

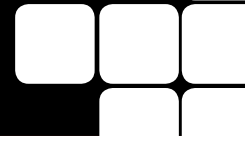


ALP System™ Standard RF Langmuir Probe



ALP System™ Automated Linear Drive System with integrated Stepper Motor

Electrical Specifications



Plasma Parameters

Floating Potential (Vf)	-145V to 145V
Plasma Potential (Vp)	-100V to 145V
Plasma Density (Ne)	10^8 to 3×10^{12} cm ⁻³
Ion Current Density (Ni)	1uA/cm ² - 30mA/cm ²
Electron Temperature (kTe)	0.1 to 15eV
Electron Energy	0-100eV
Distribution Function (EEDF)	

Langmuir Probe

DC, Pulsed DC, Microwave Plasma	Standard Probe
RF Plasma	Broadband Probe 2MHz – 100MHz
Length	300mm to 1.4m, other lengths on request
Diameter	6.5mm standard others on request
Customisation	45° bend, 90° bend, multiple bend
Max. Operating Temperature	230°C standard, up to 1200°C on request

ALP System™ Control Unit

Probe Voltage Scan Range	-150V to +150V
Probe Current Range	15nA to 150mA
Communication	USB 2.0
Sampling Rate	80 MSPS (V,I)
Data Acquisition Resolution	4.5mV 100pA
Time Resolved Step Resolution (Boxcar Mode)	12.5nS
External Trigger	TTL compatible, 10Hz -1MHz

Application Software

Operating System	Windows 2000, XP, Vista, Windows 7
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Automated Linear Drive System

Stroke	300mm, 450mm, 600mm, 900mm, 1.4m, others on request
Maximum Speed	25mm/sec.
Step Resolution	0.025mm
Bakeout Temperature	230° C
Vacuum	Leak Rate better than 1×10^{-10} mbar.l.sec ⁻¹

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