1287A

Electrochemical Interface

The Solartron Analytical 1287A Electrochemical interface is a high accuracy, wide bandwidth potentiostat/galvanostat which offers a full range of AC/DC test capabilities; when coupled with a frequency response analyzer.

Measurement Integrity

Central to the measurement capability of 1287A are two high resolution digital voltmeters which provide simultaneous voltage and current measurements. Using Solartron Analytical's patented pulse width conversion technique, they have high accuracy, stability and linearity throughout the entire range of the instrument.

The 1287A has excellent measurement resolution and accuracy down to 1 µV for the reference electrodes and 1 pA for the working electrode, which makes it an ideal choice for measurements where signal levels are extremely low.

The 1287A uses floating measurements on all connections: it is equally at home measuring corrosion rates on grounded oil pipelines as it is in the laboratory. For safety reasons, it is often necessary to ground laboratory equipment such as autoclaves, a major problem if your instrumentation is not capable of floating measurements.

The 1287A offers complete flexibility for cell connection: 2-, 3- or 4-terminal measurements can be made with equal ease.

- 2-terminal techniques for general materials/electrochemical testing
- 3-terminal techniques for corrosion/coating applications
- 4-terminal techniques for accurate characterization of batteries/fuel cells, enabling lead resistance and impedance effects to be minimized

Impedance

Electrochemical Impedance Spectroscopy (EIS) is widely used to enhance the information about reaction mechanisms available from dc techniques. Designed with impedance testing very much in mind, the 1287A's performance is unsurpassed; no other electrochemical interface matches the flatness and linearity of its frequency response.

Solartron Analytical FRAs use a single sine correlation algorithm which offers excellent noise and harmonic rejection. The technique is particularly powerful for electrochemical applications since signal levels are usually very low (of the order of millivolts), and are inevitably buried in noise. With the 1287A/1260A combination it is possible to characterize cells with a very wide range of impedance.

When making high frequency impedance measurements, Solartron Analytical's driven shield technology minimizes the unwanted effects of cable impedance enabling 1287A to be used over a full 10 µHz to 1 MHz frequency range.

1287A was designed to carry out both DC tests and AC impedance tests: an externally generated waveform from a frequency response analyzer or spectrum analyzer can be added to the polarization signal.

Impedance

CorrWare and ZPlot packages are specifically designed to run a wide range of electrochemical tests including:

- Impedance
- Potentiostatic/galvanostatic techniques
- Cyclic voltammetry

CorrWare and ZPlot are an ideal tool for corrosion analysis, battery/ fuel cell research, and general electrochemistry. The software provides, real-time analysis, multiple display formats and curve fitting routines.

1287A Electrochemical Interface Specification

Measurement Configuration

Cell connections	2-, 3- or 4-terminal, all floating
Working electrode	Current measurement resistor range: 0.1 Ω to 1 MΩ Full scale current ranges: 2 A to 200 nA Limit of error: 0.1% ±0.05% of range
Counter electrode	Output voltage, wrt LO: >±30 V Current, subject to thermal protection limits: 2 A Slew rate, potentiostatic control: >10 V/µs
Reference electrodes	Input impedance: >10 GΩ, capacitance: 50 pF Current: <1 nA Limit of error: 0.1%±100 µV Rejection: f<10 kHz: 75 dB, f<1 MHz: 40 dB

Measurement Configuration

DC Polarization	Voltage range: ±14.5 V Limits of error: V<3.2 V: 0.2%±200 µV V>3.2 V: 0.2%±2 mV Max. resolution: 100 µV Current range: ±2 A Limit of error: 0.2% ±0.1% of range Max. resolution: 100 pA
DC sweep: analog ramp	Ramp rate (voltage): 6 mV/min to 6000 V/min Segment duration: 10 ms to 10^5 s
DC sweep: stepped ramp	Step height: 5 µV / 5 pA to 29 V / 4 A Step duration: 10 ms to 10^5 s
AC input	Voltage range: ±10 V, gain: x1. x0.01, impedance: 10 kΩ

Control loop Bandwidth, 100 Ω resistive load, unity gain

Potentistatic mode, type C stability: >1 MHz
Galvanostatic mode, type B stability: >100 kHz

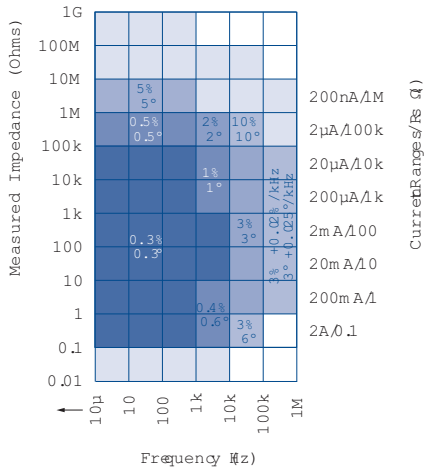
Digital Meters

Resolution	3 1/2, 4 1/2, 5 1/2 digits
Maximum resolution	1 µV/ 1 pA

Bias Rejections

Voltage	Range: ±14.5 V Limit of error: 0.2%±10 mV Resolution: 5 mV
Current	Ranges (full scale): 200 nA to 2 A Limit of error: 0.2%±1% of range Resolution: 1% of range
Power supply	90 to 110 V, 108 to 132 V, 198 to 242 V, 216 to 264V, 48 Hz to 65 Hz
Power consumption	150 VA
Dimensions (w x h x d)	432 mm x 108 mm x 472 mm (17 in x 4.25 in x 18.5 in)
Weight	11 kg (24 lb)
Operating temp. range	0 to 50ºC (32 to 122ºF)

Impedance Measurement Limits of error (for a unity gain cell $Z_c=R_s$, measured with LO grounded) and no error due to reference electrode bandwidth. RE1 and RE2 input capacitance must be corrected to obtain accuracy at high frequency and impedance.



Solartron Analytical is a world leader in instrumentation and software for the characterization of materials and electrochemical systems using precision electrical measurement techniques.

These techniques find particular use in the fields of corrosion, battery and fuel cell research, dielectric analysis and electrochemistry. The product portfolio includes industry standard frequency response analyzers, potentiostats, electrochemical software (Zplot and CorrWare) and battery test equipment.

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