Stretching the limits of electrochemical testing

1280Z

Electrochemical Test System

The Solartron 1280Z Electrochemical Test System offers a high accuracy, wide bandwidth potentiostat / galvanostat and a frequency response analyzer (FRA) in a single compact unit.

Measurement Integrity

Central to the measurement capability of 1280Z are two high resolution digital voltmeters which provide simultaneous voltage and current measurements. Using Solartron's patented pulse width conversion technique, they have high accuracy, stability and linearity throughout the entire range of the instrument.

The 1280Z has excellent measurement resolution and accuracy down to 1µV for the reference electrodes and 1pA for the working electrode, which makes it an ideal choice for measurements where signal levels are extremely low.

The 1280Z 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 1280Z 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 and fuel cells, enabling lead resistance and impedance effects to be minimised

Applications

The 1280Z is used in numerous electrochemical and materials based research and development fields including:

- Corrosion and inhibitor studies
- Sensor research
- Battery / fuel cell development
- Electrosynthesis / electrodisposition
- Civil engineering, concrete / metals
- Dielectric materials, LCDs / ceramics / polymers
- Bioanalytical research, plants / soils

Impedance

Electrochemical Impedance Spectroscopy (EIS) is widely used to enhance the information about reaction mechanisms available from DC techniques. 1280Z was designed to carry out both DC and impedance (AC) tests, providing a complete measurement solution.

Solartron 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 1280Z it is possible to characterize cells over a wide range of impedance.

When making high frequency impedance measurements, Solartron's driven shield technology minimizes the unwanted effects of cable impedance enabling 1280Z to be used over a 1mHz to 20kHz frequency range.

Electrochemistry Software

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

- Impedance
- Step / pulse 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.

1280Z Electrochemical Test System Specification

Measurement Configuration	
Cell connections	2-, 3- or 4-terminal, all floating
Working electrode	current measurement resistor (R_s) range: 0.1 Ω to 1MΩ full scale current ranges: 2A to 200nA, max. resolution 1pA limit of error: 0.1% ±0.05% of range
Counter electrode	output voltage, wrt LO: >±20V current, subject to thermal protection limits: 2A slew rate, potentiostatic control: >10V/µs
Reference electrodes	input impedance: >10G Ω, capacitance: 50pF max. resolution: 1µV limit of error: 0.1%±100µV
DC polarization	voltage range: ±14.5V limits of error: V<3.2V: 0.2%±200µV V>3.2V: 0.2%±1.6mV max. resolution: 100µV Current range: ±2A limit of error: 0.2% ±0.1% of range max. resolution: 100pA
DC sweep: (continuous and stepped ramp)	ramp rate: 10µV/s to 100V/s
Bias Rejection	
Voltage	range: ±14.5V limit of error: 0.2%±10mV resolution: 5mV
Current	ranges (full scale): 200nA to 2A limit of error: 0.2%±1% of range resolution: 1% of range
AC polarization	
Waveform	sine
Frequency	range: 1mHz to 20kHz resolution: 1 part in 4000
Amplitude ranges	0 to 10V peak: 10mV resolution 0 to 100mV peak: 100µV resolution
Distortion	<1%
Integration time	0.1 to 10^5s
Power supply	90 to 110V, 108 to 132V, 198 to 242V, 216 to 264V, 48Hz to 65Hz
Power consumption	240VA
Dimensions (w x h x d)	437mm x 198mm x 457mm (17.2in x 7.8in x 18in)
Weight	18.5kg (41lb)
Operating temp. range	0 to 50˚C (32 to 122˚F)

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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