REDEFINING HIGH VALUE ELECTROCHEMISTRY

INTERFACE1000

Potentiostat/Galvanostat/Zero Resistance Ammeter

GAMRY INSTRUMENTS

HIGHLIGHTS

The Interface 1000™ is a research grade Potentiostat/Galvanostat/ZRA for use in general electrochemistry applications. It is ideal for corrosion measurements, battery testing, sensor development, and physical electrochemistry. It is the perfect blend of performance and value.

How do we define value?

By offering you more of the technology you need at a price you can afford.

Flexible

With 9 current ranges and 3 gain stages, you have 11 decades of current measurement at your command. From corrosion to batteries, sensors to supercaps, the Interface 1000 has got you covered.

Affordable

By combining state of the art electronics with expert design, the Interface 1000 is quite simply the best value in potentiostats. A complete Potentiostat/Galvanostat/ZRA/Impedance Analyzer all in one package. Nobody offers you more!

Powerful

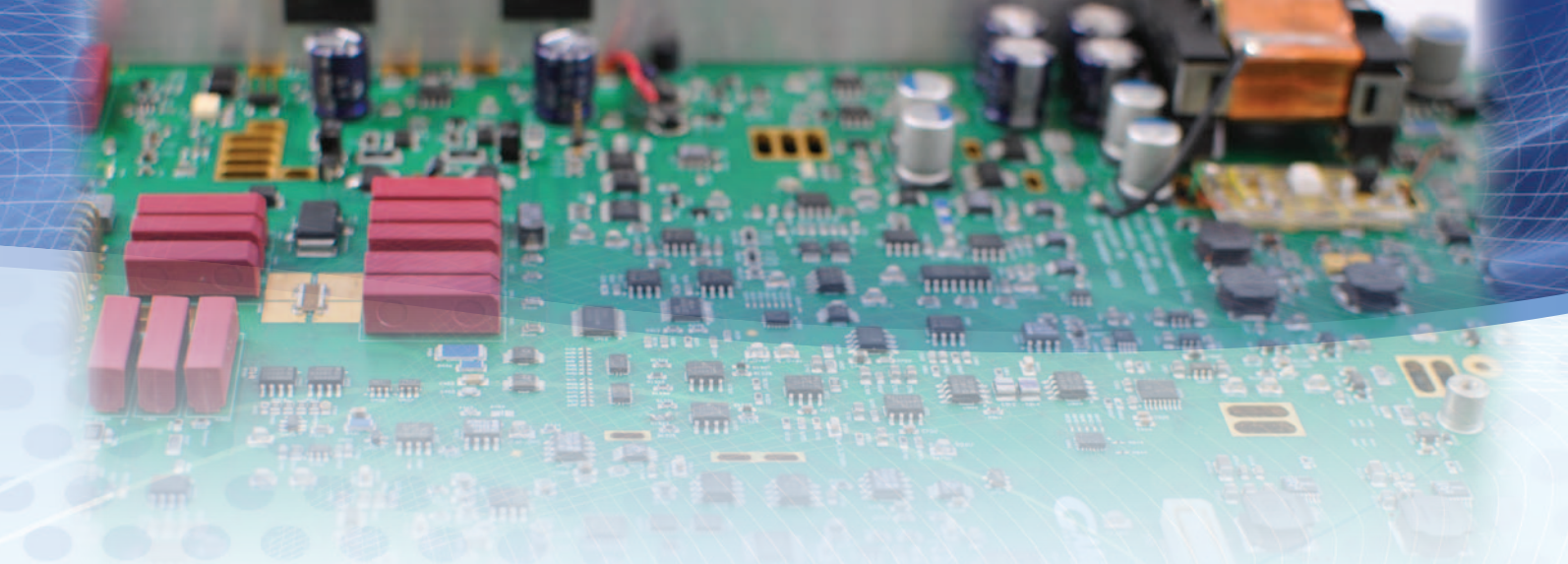
Cycle your batteries. Polarize those large electrodes. The Interface 1000 sports a full 1 Ampere of current up to the compliance limit of +/-20 V.

Performance on the Go

Weighing a mere 2 kg and carried as easily as a book, the Interface 1000 continues Gamry's tradition of pairing capability with portability. Install the software, connect to a USB port and you are ready to start collecting data. It's that simple.

Low Noise

Gamry is the world leader in designing low noise potentiostats. The Interface 1000 continues this tradition with an exceptional < 20 µV noise specification. Low noise = Better Measurements!



Impedance on Board

No external modules. No expensive add-ons. The Interface 1000 acquires accurate Impedance measurements up to 1 MHz. Better yet, we actually publish EIS performance via our accuracy contour plot!

Floating

Like all Gamry Potentiostats, the Interface 1000 was designed from the ground up for true floating capability. Whether you need to measure earth grounded working electrodes or multiple electrodes in a shared electrolyte, the Interface 1000 is up to the task.

MULTICHANNEL

Ultimate Flexibility

Today's electrochemists are being asked to perform more tests than ever. When you need a high throughput multichannel system, look no further than Gamry's unique Interface Power Hub. Offering up to 8 channels per chassis, the Interface Power Hub gives you the throughput of a multichannel system with the flexibility of a stand-alone instrument. No longer are you anchored by the position of your multichannel instrument. Undock instruments quickly and easily and bring your instrument directly to your cell.

Dedicated Performance

Unlike other multichannel systems that contain powered down versions of their stand-alone potentiostats, each channel in the Interface Power Hub comes with the same capabilities as an individual potentiostat. No performance limitations, no power limitations, just a bank of Interface 1000s at your command. Simply put: the Interface Power Hub offers more convenience with better results.

Multiple Working Electrodes

Sometimes one working electrode is not enough. For this reason, multiple Interface 1000 instruments can be syncronized in an n-stat configuration. This mode allows for simultaneous data acquisition when using multiple working electrodes. The ability to do this with a shared reference and counter electrode ensures that you truly obtain the results you need.

ELECTROCHEMICAL APPLICATIONS

ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY - EIS

EIS is a powerful tool for a variety of applications. Gamry civilized EIS by combining sophisticated data acquisition with state of the art hardware design. The Interface 1000 maintains these innovations by making EIS easy to use, compact, accurate, and affordable. Gamry's wide range of EIS techniques include potentiostatic, galvanostatic, hybrid, and Mott-Schottky. Our software also includes optimized, power-leveling multisine techniques for both potentiostatic and galvanostiatic EIS.

CORROSION

Electrochemical corrosion testing is a mainstay of Gamry Instrument's potentiostats and the Interface 1000 is no exception. Gamry's impressive collection of corrosion related experiments are all available to run on the Interface 1000. Along with EIS, Gamry offers for corrosion researchers:

DC Corrosion Techniques – 14 Experiments from basic to advanced cover most corrosion testing.

Electrochemical Noise – Different setups for different levels of sophistication, including the most powerful noise software available.

Electrochemical Frequency Modulation – A non-desctructive multisine technique that returns beta constants and a corrosion rate. Casuality factors are automatically calculated to confirm the validity of your data.

Critical Pitting Temperature – ASTM G150. Special hardware is required, but this provides information not available through other techniques.

PHYSICAL ELECTROCHEMISTRY

Gamry offers a complete library of physical and electroanalytical techniques for the Interface 1000. These include techniques such as linear sweep and cyclic voltammetry, chronamperometry, chronocoulometry, chronopotentiometry, differential pulse, and square wave voltammetry. Multiple step or repeating techniques are available for chronoamperometry and chronopotentiometry.

BATTERIES, FUEL CELLS, SUPERCAPACITORS

Research of various electrochemical energy systems combines some tried and true electrochemical techniques like EIS and CV, but also brings unique challenges to the table. Gamry has several specially designed experimental techniques that allow high performance testing of electrochemical energy devices, which are available for use on the Interface 1000.

FILMS AND COATINGS

Materials and corrosion scientists frequently deal with thin films and coatings. EIS is a major part of the electrochemical testing of films and coatings. For some researchers DC corrosion tests may also be applicable while for others physical electrochemistry or energy device type experiments are more appropriate. The Interface 1000 is compatible with all of these options, and the 4-probe setup allows for impedance testing of a membrane without compounding it with electron transfer impedances.

MORE…

Gamry's software capabilities go beyond the set experiments above. A Virtual Front Panel, and eChem Toolkits allow users with some specialty ideas to run different tests, design their own software to control the Interface 1000, or integrate the Gamry system into a setup with other devices.

Gamry can also provide custom solutions for non-standard experimental techniques that users may need. Call us to discuss your application.

PERFORMANCE

The Interface 1000™ is Gamry's high performing value Potentiostat/Galvanostat/ZRA. It is the ideal instrument for labs on a budget doing fundamental electrochemical studies. The performance/cost ratio makes it the best choice for multichannel setups where performance cannot be sacrificed for higher throughput.

Low Noise

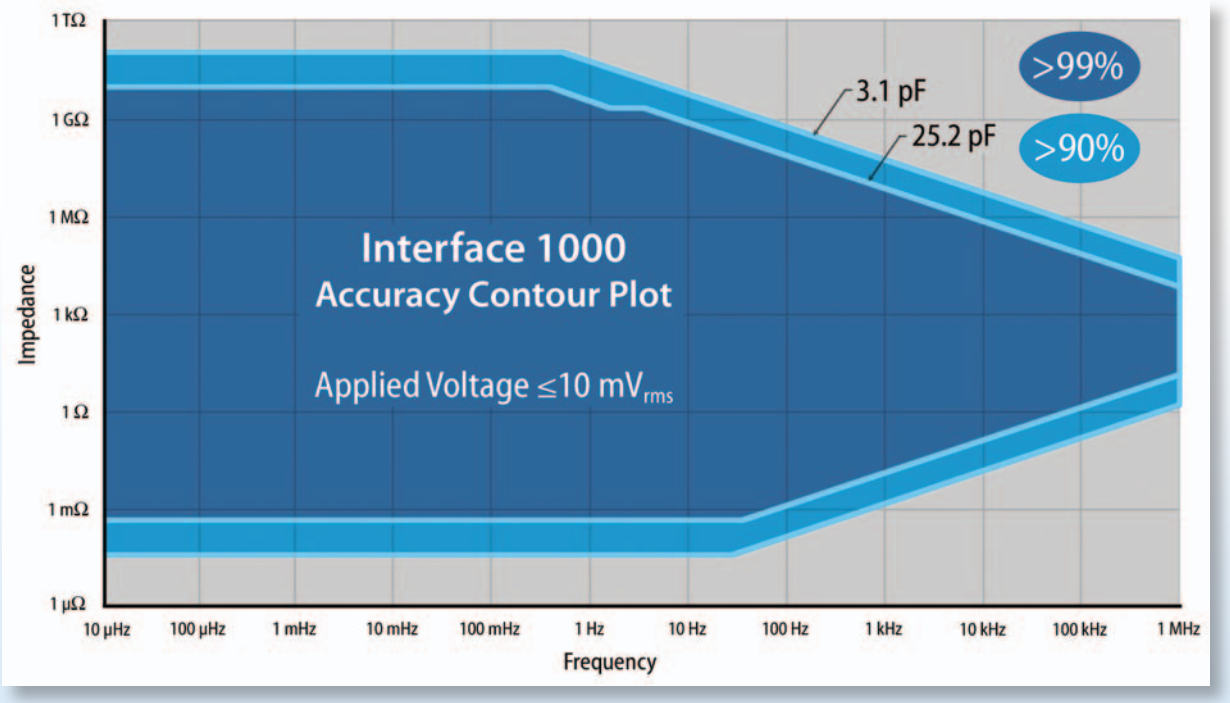
While every potentiostat has some intrinsic noise level due to electronic components and the laws of physics, board layout and well-designed filtering can reduce its impact on your measurements. Gamry's engineers have designed the Interface 1000 with one of the lowest noise specifications available.

DSP Mode

By acquiring data at 60 kHz, the Interface 1000 is able to massively oversample for the best signal to noise ratio in the industry. Combine DSP acquisition with the low intrinsic noise in the instrument, and you will see how Gamry brings new meaning to the term low noise.

Impedance Done Right

Every Interface 1000 is equipped to perform EIS without requiring an expensive FRA or expansion modules. The built-in Direct Digital Synthesis circuitry generates a pure sine wave that is ideal for electrochemical applications. Adding our Electrochemical Impedance Spectroscopy Software enables EIS from 10 µHz to 1 MHz . Thanks to the wide range of currents that can be measured, the Interface 1000 can accurately measure impedances from 10^{10} ohms to 0.001 ohms.

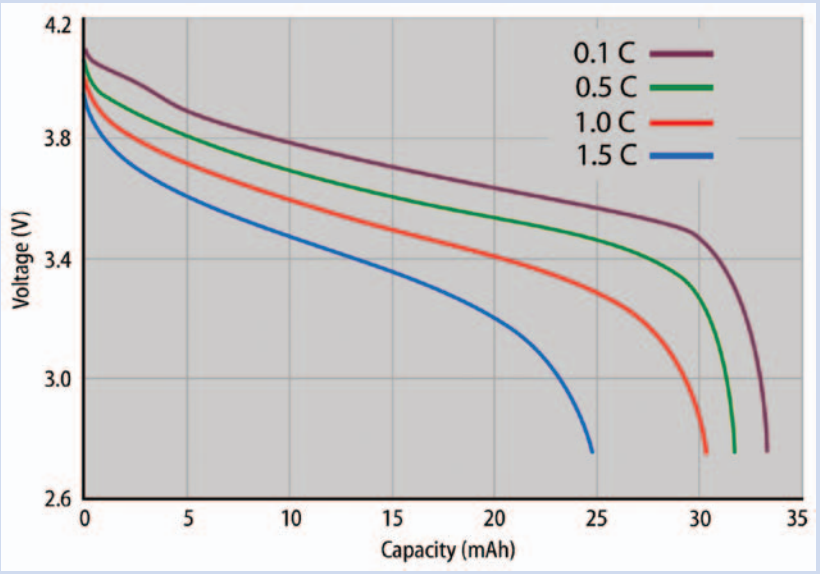


Filters

The Interface 1000 employs a combined total of ten active filters for the Voltage and Current channels. These filters allow for optimal rejection of external signals and noise which can adversely impact your sensitive measurements. The Interface 1000 automatically selects the best filter for the acquisition mode, while still offering expert users the choice for manual adjustments.

Smart Cell Cables

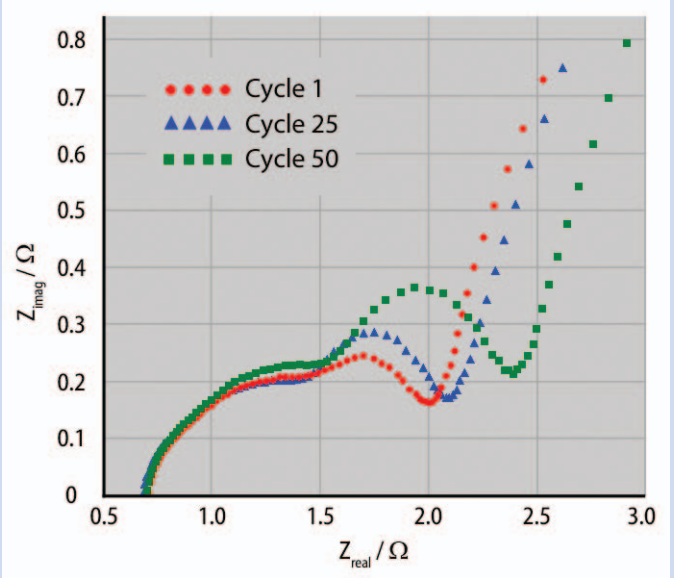
Even the cell cables for the Interface 1000 are impressively engineered for high performance. The standard cell cable has been optimized for low stray capacitance and high resistance isolation between the internal conductors and the shields. You get better EIS results for high impedance samples and truer signals for high speed experiments. A special low Z cable is available to extend the inductive limit when performing EIS on batteries and supercaps.



Discharge Curves for a Lithium Ion 2032 Coin Cell Battery. 40 mAh rated capacity.

Multi- Stage Cell Switch

A sophisticated two stage cell switch is utilized in the Interface 1000 design. The first stage is a relay which insures pure electrical isolation. The second stage consists of an ultra-fast MOSFET switch with zero contact bounce. This second stage allows for better signal application with minimal spikes, as well as the ability to perform current interrupt iR compensation.



Selected EIS spectra after charging steps for Lithium Ion 2032 Coin Cell Battery. 40 mAh rated capacity. 10 mA rms.

Differential Electrometer

High Impedance and low input current are hallmarks of a Gamry Differential Electrometer. High impedance ensures no stray current will leak through the measurement circuit. Low input current means that it can detect small variations in voltage. The Interface 1000 employs not just one electrometer, but a second for the Zero Resistance Ammeter. Gamry Potentiostats are simply the best choice for electrochemical noise and galvanic corrosion measurements.

Dual DAC Signal Generation

Two 16 bit Digital-to-Analog converters (DACs) are used to provide the best signal generation possible. By using the Bias DAC to set a DC level and the Scan DAC to provide the scanning signals, we can optimize the resolution and accuracy of the output signal.

THE GAMRY DIFFERENCE

Solving the needs of our customers comes first and foremost at Gamry. By stressing innovation, performance, and reliability, we ensure that our instruments meet your needs both today and in the future. While our confidence in our instruments allows us to offer one of the strongest warranties in the industry, it's really the people at Gamry that make the difference. Call us, email us, or simply visit us at a show. Our highly educated support staff and electrochemists are available to discuss your applications, assist you with data analysis, or just offer advice on how to get the most out of your Gamry. Let us put our Electrochemical Expertise to work for you.

SPECIFICATIONS

Potentiostat	Yes
Galvanostat	Yes
Zero Resistance Ammeter	Yes
Cell Connections	2, 3, or 4
Floating (Isolated from Earth)	Yes

System

Maximum Current	±1 A
Current Ranges	9 (10 nA – 1 A)
Current Ranges (including internal gain)	11 (100 pA – 1 A)
Minimum Voltage Resolution	1 µV
Minimum Current Resolution	3.3 fA
Maximum Applied Potential	±12V
Rise Time	<1 µs
Noise and Ripple	<20 µV rms
Minimum Timebase	10 µs
Maximum Timebase	715 s
Minimum Potential Step	12.5 µV
Analog/Digital Converters	16 bit

EIS Measurement

Frequency Range	10 µHz – 1 MHz
Impedance Accuracy	See Accuracy Contour Plot
Maximum AC Amplitude	2.33 V rms
Minimum AC Amplitude	17.8 µV rms

Control Amplifier

Compliance Voltage	±20V
Output Current	> ±1 A
Speed Settings	5
Unity Gain Bandwidth (typical)	980, 260, 40, 4, 0.4 kHz

Electrometer

Input Impedance	$>10^{12}$ Ω
Input Current	< 20 pA
Bandwidth (-3 dB) (typical)	> 15 MHz
Common Mode Rejection Ratio	> 80 dB (10 kHz), > 60 dB (1 MHz)

Applied Potential

Accuracy	±1 mV ± 0.2% of setting
Resolution	12.5 µV, 50 µV, 200 µV/bit
Drift	< 20 µV/°C
Potential Scan Range	±0.4 V, ±1.6V, ±6.4V

Measured Potential

Accuracy	±1 mV ±0.3% of reading
Full Scale Ranges	±12 V, ±3 V, ±300 mV, ±30 mV
Resolution	400 µV, 100 µV, 10 µV, 1 µV/bit
Offset Range	±12 V, ±3 V

Applied Current

Accuracy	±5 pA ± 0.3% of setting
Resolution	0.0033% full-scale/bit

Measured Current

Accuracy	±5 pA ± 0.3% of reading
Resolution	0.0033% full-scale/bit
Bandwidth (Current Range Dependent)	> 10 MHz (1A – 100 µA ranges)
	> 1.5 MHz (10 µA range)
	> 150 kHz (1 µA range)
Stability Settings	3
Post Offset Gain	1X, 10X, 100X
Offset Range	±1X full-scale

iR Compensation

Mode	Current Interrupt
Minimum Interrupt Time	33 µs
Maximum Interrupt Time	715 s

Physical Dimensions

Weight	2 kg
Size	24 (W), 6 (H), 27 (D) cm
Cable	0.6m (std), 1.5m, 3m, 10m (opt)
	1.5m Low Impedance Kit

GAMRY INSTRUMENTS

734 Louis Drive | Warminster, PA 18974 USA | +215-682-9330 | Fax: +215-682-9331 | info@gamry.com | www.gamry.com