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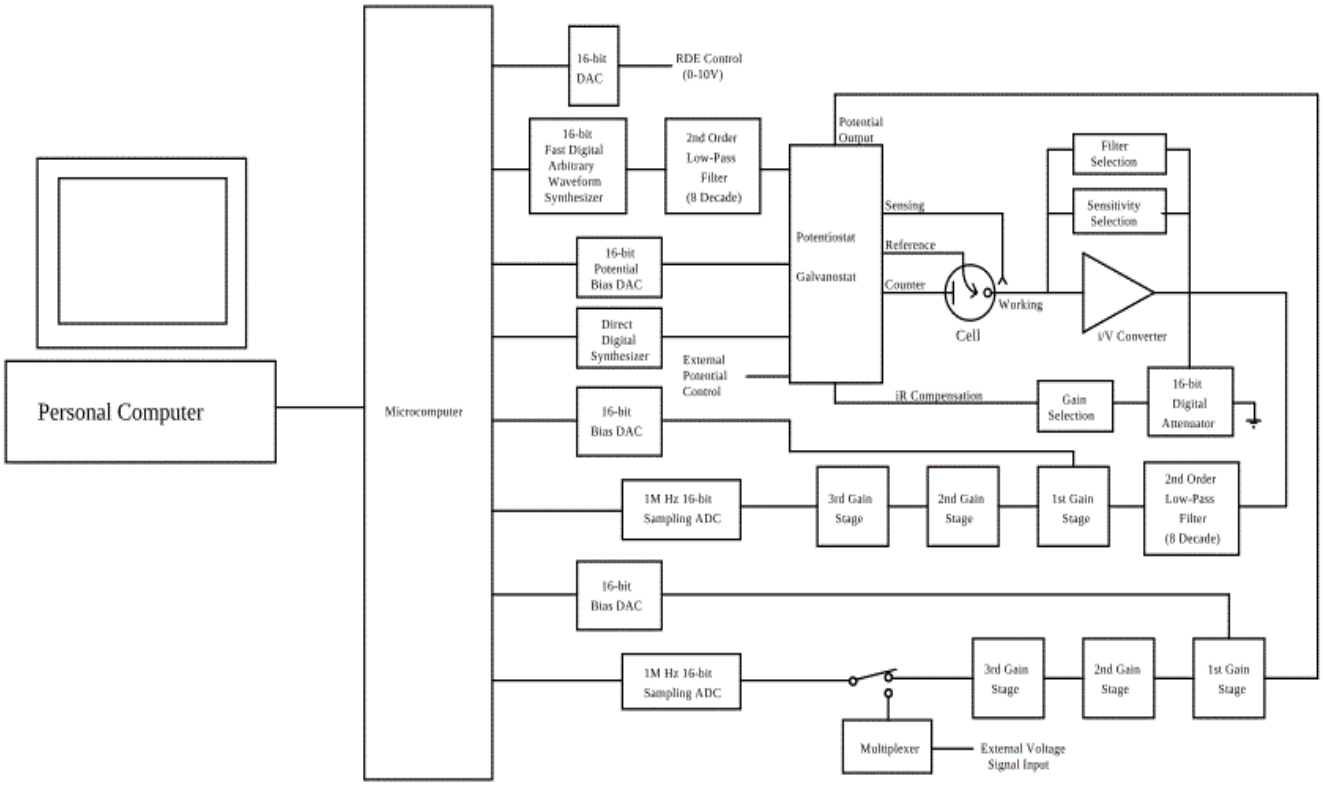
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Model 600E Series Electrochemical Analyzer/Workstation

Overview

The Model 600E series is designed for general purpose electrochemical measurements. The figure below shows the block diagram of the instrument. The system contains a fast digital function generator, a direct digital synthesizer for high frequency ac waveforms, high speed dual-channel data acquisition circuitry, a potentiostat, and a galvanostat (available only in select models). The potential control range is ±10 V and the current range is ±250 mA. The instrument is capable of measuring current down to picoamperes. With the CHI200B Picoamp Booster and Faraday Cage (fully automatic and compatible with the 600E series), currents at sub-picoamperes can be measured. The instrument is very fast. The function generator can update at a 10 MHz rate. Two high speed and high resolution data acquisition channels allow both current and potential (or an external voltage signal) to be sampled simultaneously at a rate of 1 MHz, with 16-bit resolution. The instrument offers a very wide dynamic range of experimental time scales. For instance, the scan rate in cyclic voltammetry can be up to 1000 V/s with a 0.1 mV potential increment or 5000 V/s with a 1 mV potential increment. The potentiostat / galvanostat uses a 4-electrode configuration, allowing it to be used for liquid/liquid interface measurements, and eliminating the effect of the contact resistance of connectors and relays for high current measurements. The data acquisition systems also allow an external input signal (such as spectroscopic) to be recorded simultaneously during an electrochemical measurement.



The 600E series is the latest upgrade to our very popular 600 series. The major improvements of this series are very stable and accurate potential and current control, and dual channel data acquisition at high speed.

The 600E series has a USB port (default) and a serial port for data communication with the PC. You can select either USB or serial (but not both) by changing the switch setting on the rear panel of the instrument.

The 600E series also includes a true integrator for chronocoulometry.

Two 16-bit highly stable bias circuits are used for current and potential bias, allowing a wider dynamic range in AC measurements. These can also be used to re-zero the DC current output.

The model 600E series can be upgraded to the corresponding model 700E bipotentiostat with an add-on board that includes circuitry for the second channel's potential control, current measurement (including sensitivity switching), two low-pass filters, three gain stages, and channel selection. It is therefore identical to the 600E series when used for single channel measurements. When it is used as a bipotentiostat, the second channel can be controlled at an independent constant potential, to scan or step at the same potential as the first channel, or to scan with a constant potential difference with the first channel. The second channel is available for many voltammetric and amperometric techniques.

The instrument is capable of a wide variety of electrochemical techniques, and is available with integrated simulation and fitting software functions for both impedance and cyclic voltammetry. These features provide powerful tools for both electrochemical mechanistic studies and trace analysis.

We provide several different models in the 600E series. The model comparison table compares the different models. Other than what is listed, the specifications and features of these models are identical. Models 600E and 610E are basic units for mechanistic study and electrochemical analysis, respectively. They are also great for teaching purposes. Models 602E and 604E are for corrosion studies. Models 620E and 630E are comprehensive electrochemical analyzers. Models 650E and 660E are advanced electrochemical workstations.

Specifications

Model 600E Series Specifications - for older series (600A, etc.), contact us.

Potentiostat

- Zero resistance ammeter
- 2- or 3- or 4-electrode configuration
- Floating (isolated from earth) or earth ground
- Maximum potential: ±10 V
- Maximum current: ±250 mA continuous, ±350 mA peak
- Compliance Voltage: ±13 V
- Potentiostat rise time: < 1 µs, 0.8 µs typical
- Applied potential ranges (volts): ±0.01, ±0.05, ±0.1, ±0.65, ±3.276, ±6.553, ±10
- Applied potential resolution: 0.0015% of potential range
- Applied potential accuracy: ±1 mV, ±0.01% of scale
- Applied potential noise: < 10 µV rms
- Measured current range: ±10 pA to ±0.25 A in 12 ranges
- Measured current resolution: 0.0015% of current range, minimum 0.3 fA
- Current measurement accuracy: 0.2% if current range >=1e-6 A/V, 1% otherwise
- Input bias current: < 20 pA

Galvanostat

- Galvanostat applied current range: 3 nA - 250 mA
- Applied current accuracy: 20 pA ±0.2% if > 3e-7A, ±1% otherwise
- Applied current resolution: 0.03% of applied current range
- Measured potential range (volts): ±0.025, ±0.1, ±0.25, ±1, ±2.5, ±10
- Measured potential resolution: 0.0015% of measured range

Electrometer

- Reference electrode input impedance: $1x10^{12}$ ohm
- Reference electrode input bandwidth: 10 MHz
- Reference electrode input bias current: <= 10 pA @ 25°C

Waveform Generation and Data Acquisition

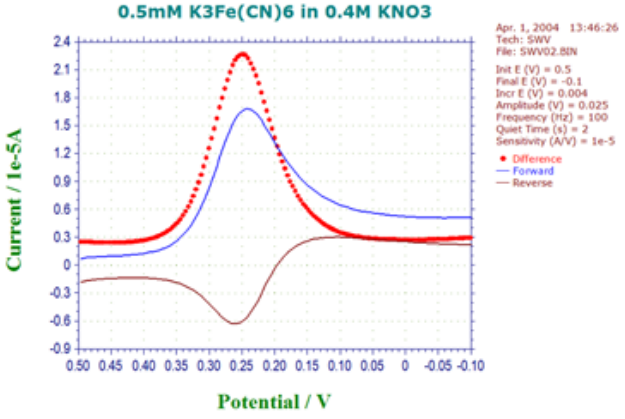
- Fast waveform update: 10 MHz @ 16-bit
- Fast data acquisition: dual channel 16-bit ADC, 1,000,000 samples/sec simultaneously
- External signal recording channel at maximum 1 MHz sampling rate

Experimental Parameters

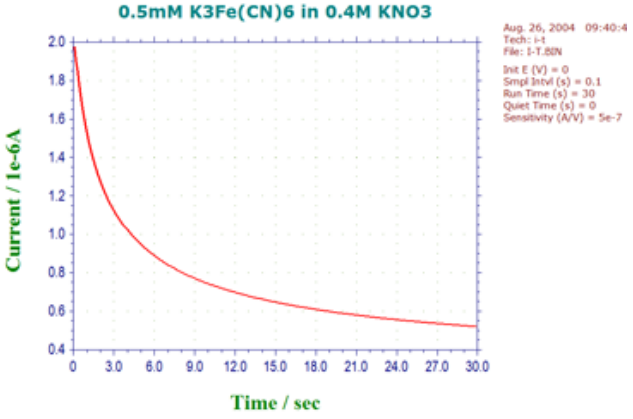
- CV and LSV scan rate: 0.000001 to 10,000 V/s
- Potential increment during scan: 0.1 mV @ 1,000 V/s
- CA and CC pulse width: 0.0001 to 1000 sec
- CA and CC minimum sample interval: 1 µs
- True integrator for CC
- DPV and NPV pulse width: 0.001 to 10 sec
- SWV frequency: 1 Hz to 100 kHz
- i-t sample interval: minimum 1 µs
- ACV frequency: 0.1 Hz to 10 kHz
- SHACV frequency: 0.1 Hz to 5 kHz
- FTACV frequency: 0.1 Hz to 50 Hz, simultaneously acquire 1st, 2nd, 3rd, 4th, 5th, and 6th harmonics ACV data
- IMP frequency: 0.00001 Hz to 1 MHz
- IMP amplitude: 0.00001 V to 0.7 V rms

Other Features

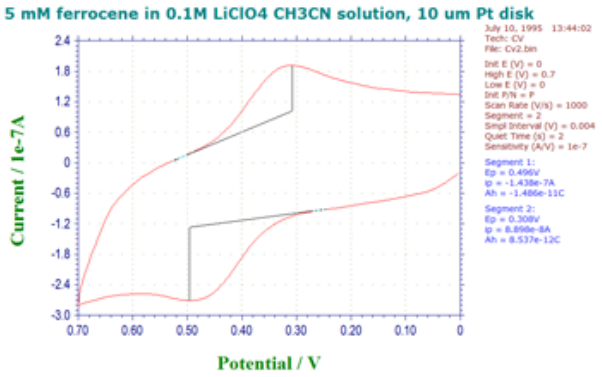
- Automatic and manual iR compensation
- Current measurement bias: full range with 16-bit resolution, 0.003% accuracy
- External potential input
- Potential and current analog output
- Programmable potential filter cutoff: 1.5 MHz, 150 KHz, 15 KHz, 1.5 KHz, 150 Hz, 15 Hz, 1.5 Hz, 0.15 Hz
- Programmable signal filter cutoff: 1.5 MHz, 150 KHz, 15 KHz, 1.5 KHz, 150 Hz, 15 Hz, 1.5 Hz, 0.15 Hz
- RDE control output (selected models): 0-10 V (corresponding to 0-10000 rpm), 16-bit, 0.003% accuracy
- Digital input/output lines programmable through macro command
- Flash memory for quick software update
- Serial port or USB selectable for data communication
- Cell control: purge, stir, knock
- CV simulation and fitting program, user-defined mechanisms
- Impedance simulation and fitting program
- Maximum data length: 256K-16384K selectable
- Dimensions: 14.25”(W) x 9.25”(D) x 4.75”(H)
- Weight: 12 lb.



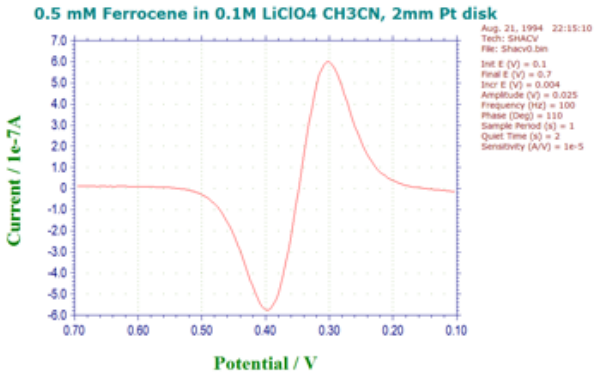
Square wave voltammogram



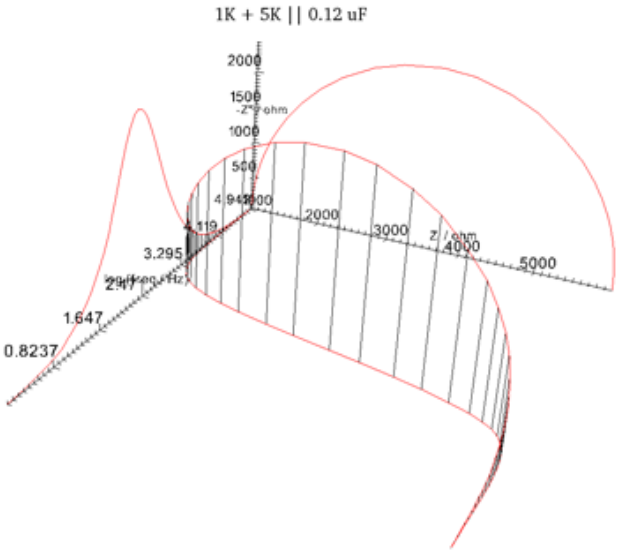
Amperometric i-t Curve



Cyclic voltammogram at 1000V/s.



Phase selective second harmonic AC voltammogram.



Interactive 3D plot - Z"-Z' log-freq

Model Comparison

Functions	600E	602E	604E	610E	620E	630E	650E	660E
Cyclic Voltammetry (CV)	●	●	●	●	●	●	●	●
Linear Sweep Voltammetry (LSV) [&]	●	●	●	●	●	●	●	●
Staircase Voltammetry (SCV) [#,&]						●	●	●
Tafel Plot (TAFEL)		●	●			●	●	●
Chronoamperometry (CA)	●	●	●		●	●	●	●
Chronocoulometry (CC)	●	●	●		●	●	●	●
Differential Pulse Voltammetry (DPV) [#,&]				●	●	●	●	●
Normal Pulse Voltammetry (NPV) [#,&]				●	●	●	●	●
Differential Normal Pulse Voltammetry (DNPV)[#,&]								●
Square Wave Voltammetry (SWV) [&]					●	●	●	●
AC Voltammetry (ACV) [#,&,$]						●	●	●
2nd Harmonic AC Voltammetry (SHACV) [#,&,$]						●	●	●
Fourier Transform AC Voltammetry (FTACV)								●
Amperometric i-t Curve (i-t)						●	●	●
Differential Pulse Amperometry (DPA)								●
Double Differential Pulse Amperometry (DDPA)								●
Triple Pulse Amperometry (TPA)								●
Integrated Pulse Amperometric Detection (IPAD)								●
Bulk Electrolysis with Coulometry (BE)	●	●	●		●	●	●	●
Hydrodynamic Modulation Voltammetry (HMV)							●	●

Sweep-Step Functions (SSF)							●	●
Multi-Potential Steps (STEP)							●	●
AC Impedance (IMP)			●				●	●
Impedance - Time (IMPT)			●				●	●
Impedance - Potential (IMPE)			●				●	●
Chronopotentiometry (CP)								●
Chronopotentiometry with Current Ramp (CPCR)								●
Multi-Current Steps (ISTEP)								●
Potentiometric Stripping Analysis (PSA)								●
Electrochemical Noise Measurement (ECN)								●
Open Circuit Potential - Time (OCPT)	●	●	●	●	●	●	●	●
Galvanostat								●
RDE control (0-10V output)						●	●	●
Full version of CV simulation and fitting program						●	●	●
Limited version of CV simulation and fitting program	●	●	●	●	●			
Impedance simulation and fitting program			●				●	●
iR Compensation	●	●	●	●	●	●	●	●
External Potential Input	●	●	●	●	●	●	●	●
Auxiliary Signal Measurement Channel	●	●	●	●	●	●	●	●

#: Corresponding polarographic mode can be performed.

&: Corresponding stripping mode can be performed.

$: Phase selective data are available.

Order 600E Series

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