

## The Gamry Difference

### Introduction

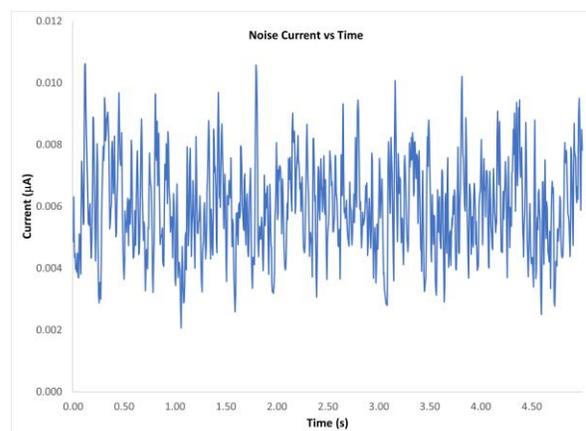
When you purchase an instrument built by Gamry Instruments, Inc., you receive the finest electronics available in the field of electrochemistry. This article tells you about “the Gamry difference,” that is, what makes a Gamry Reference™ 620 series potentiostat a Gamry.

### Channel-to-channel Isolation

Electrochemical measurements necessarily require multiple signal channels from the various electrodes in your cell or test equipment. Each of these signal channels ideally should not affect another channel, that is, the channels are isolated from one another. To solve this problem, Gamry Instruments uses only low-profile components, to drastically lower any electromagnetic interference, and places a conductive fence between channels.

### Ultimate Resolution

For the best possible analog-to-digital resolution, Gamry Instruments starts with a 20-bit A/D converter. We add to this controllable noise filters to remove any noise in the channels. Then we run the signal through controllable amplifiers with a gain of up to  $\times 100$ , which is nearly  $2^7$ , or almost an extra 7 bits of resolution. When we add this gain to the A/D converter, we get an ultimate resolution of almost 27 bits that is noise-free!



The above graph is actual noise data from an Reference 620 over time, taken with our signature [Framework™ software](#), run on a 200  $\Omega$  resistor (potential 0.0 vs reference; IE range 60 nA full-scale; filters: 1 kHz, CA Speed Normal). Analysis gives a peak–peak current of 10.7 nA. With this 200  $\Omega$  resistor, we can calculate from Ohm’s law that peak–peak voltage is only 2.13  $\mu$ V. Note that there is no power line (60 Hz) component.

### Frequency Resolution

In electronics, the frequency resolution  $\partial f$  can be defined as the inverse of the sampling time. For Gamry Instruments, with our 32-bit direct-digital synthesis clock, we boast a frequency resolution of  $1/2^{32}$ . (For more information about frequency resolution, see our Application Note “[Waveform Generation and Frequency Resolution](#)”.)

## **Trim Potentiometers**

The Reference 620 potentiometer has no trim potentiometers for fine-tuning its performance. In fact, almost nothing inside the chassis needs trimming. Rather, practically all of the adjustments are performed in software, and returns for trim-calibration are rarely needed. Trim components are hugely susceptible to mechanical shock and variations in temperature. With nothing to trim, therefore, you need no technicians, and calibration is easier and cheaper.

## **Only Surface-mounted Components**

Gamry Instruments uses only surface-mounted electronic components in its potentiostats. Surface-mounted components mean a smaller volume, and less fluctuation in temperature, which gives you less drift and more accuracy when you take data.

## **No Cables, Harnesses, or Interconnects**

The Reference 620 contains no cables, harnesses, or interconnects inside its chassis. This means that the Reference 620 has superior mechanical reliability (no connections to become loose), less stray EMF interference, and fewer chances for internal corrosion at contacts. Minimizing such metal-to-metal contacts provides our instruments with lower drift and overall better stability.

## **Low-noise Power Supply**

Potentiostats made by Gamry Instruments use a low-noise primary switching power supply.

This kind of power supply eliminates EMF interference with your desired signal. It is also a high-efficiency supply, which means there is less heat generated, and a greener usage-profile.

## **Specially Designed Chassis**

Our potentiostats use a custom-designed chassis has been optimized to maintain a constant temperature which helps reduce instrument drift. Even the chassis contributes to the Reference 620 potentiostat's low drift, high accuracy, and stable measurement conditions!

## **Green Construction**

To help protect the environment, all Gamry Instruments potentiostats are fully China RoHS-compliant, so you can be sure that the Reference 620 is lead-free, mercury-free, and cadmium-free. Gamry Instruments potentiostats are contained within a recyclable aluminum chassis as well.

## **Summary**

Given all the advantages listed for Gamry Instruments potentiostats, why would you choose another instrument for your electrochemical work?



C3 PROZESS- UND  
ANALYSENTECHNIK

Peter-Henlein-Str. 20  
D-85540 Haar b. München  
Telefon 089/45 60 06 70  
Telefax 089/45 60 06 80  
info@c3-analysentechnik.de  
www.c3-analysentechnik.de



www.gamry.com