

## Bipotentiostat Installation and Setup

### Introduction

Gamry Instruments potentiostats can be used in bipotentiostat configuration for the purpose of rotating ring-disk electrode experiments. Special cables and scripts are required to synchronize the data-acquisition of the potentiostats. In this configuration, one potentiostat is the “master” and the other is the “serf.” The master connects to the disk electrode and the Serf connects to the ring electrode.

### Installing the Bipotentiostat Scripts (Framework Version 6, Windows® 7, 8, and 8.1)

Some manual installation of components is required to set up the bipotentiostat system. This involves copying a small number of files from this installation package into file locations used by Gamry Instruments software. Follow these steps:

- 1) Install Version 6.33 or later of the Gamry Instruments Framework™ and Gamry Echem Analyst™ software. Copy all experiment script files (\*.exp) into the Framework Scripts Folder: C:\ProgramData\Gamry Instruments\Framework\Scripts\
- 2) Copy the Echem Analyst Analysis Script files (\*.GScript) into the Echem Analyst Scripts Folder. C:\ProgramData\Gamry Instruments\Echem Analyst\Scripts
- 3) Copy the file CustomAnalysisScripts.mdb into the Databases folder, overwrite the existing file: C:\ProgramData\Gamry Instruments\Echem Analyst\Databases
- 4) Copy the file BiPstatCollection.dta into your My Gamry Data folder. This is a sample experiment that was run on two resistors to simulate a Ring-Disk Electrode.
- 5) Run the script BiPstatINSTALL.exp by launching the Framework software and selecting **Experiment > Run Named Script...** from the menu. The script should be at the top of the alphabetical listing. This script

package adds the “BiPotentiostat” section to the experiment list and registers the experiment script files.

The new “BiPotentiostat” selection contains three experiments for the bipotentiostat: Collection, CV, and Chronoamperometry. Each also has a looping variant whereby the RDE710 rotator control speed can automatically be incremented. This script set allows you to scan the disk potential while monitoring the current (measured at constant potential) on the ring. The current at both the ring and the disk is recorded as a function of the disk potential.

Each script opens two setup menus in sequence:

- The first allows you to select a data file name, enter experimental notes, and to specify which potentiostat will be connected to the disk (master), and which will be connected to the ring (serf).
- The second menu allows you to specify the disk scan parameters, and the constant ring potential.

### Installing the Bipotentiostat Scripts (Framework Version 7)

- 1) Open the Framework™ software.
- 2) In the menu, select **Experiment > Named Script**.
- 3) Run BiPstat\_INSTALL.exp.

### Connecting the Potentiostats

A BiPotentiostat control cable (986-00063, Reference 600 BiPotentiostat Control Cable; or Interface BiPotentiostat Synchronization Cable, 985-00132) is required to interconnect the potentiostats so that the disk scan is synchronized with the ring data-acquisition. With the Interface cable, you can connect any two Interface family potentiostats.

The Reference™ 600 cable has two high-density 15-pin D-connectors (986-00063). The D-connector, which also has the 3 ft (1 m) wire emanating from it, must be connected to the master potentiostat. The cables plug into the **Misc. I/O** (15-pin high-density) port on the

back of each potentiostat. With this cable, you can connect any two Reference family instruments.

With Framework Version 6 only, the Series G potentiostats require an internal BiPotentiostat Control Cable (986-00057) and the additional of a jumper to J402 on the control board of the *serf* potentiostat. A separate Rotator Control Cable (986-00064) is connected to the master potentiostat's 15-pin **Misc. I/O** port to control the rotator rate of the RDE710. See the supplemental file "Series G BiPstat.pdf" for detailed instructions.

## Cell Connections

The RDE710 has two sets of banana-jack connectors to make contact with the disk and the ring. The disk connections are yellow. Those of the ring are blue. Two contacts are used to minimize brush noise. We recommend that you use a wire to interconnect the two jacks of the same color.

Connect two standard Gamry Instruments Cell Cables between the Rotator and Electrochemical Cell and the Gamry Instruments potentiostats:

There are many wires! Be certain that you do not make unwanted interconnections accidentally!

- 1) Connect the single Reference Electrode to *both* of the white Reference Electrode leads.
- 2) Connect the single Counter Electrode to *both* of the red Counter Electrode banana plugs.

- 3) Connect the blue (Working Sense) and green (Working) leads of the *master potentiostat* to the *yellow banana jacks* of the RDE710 rotator assembly.
- 4) Connect the blue (Working Sense) and green (Working) leads of the *serf potentiostat* should be connected to the *blue banana jacks* of the RDE710 rotator assembly.
- 5) Leave the Counter Sense (Orange) leads of both Gamry Instruments potentiostats disconnected. They are not used.

## USB Potentiostats

The Ground wire ("Floating" ground) or the Ground "jack" of the *disk potentiostat* may be connected together to provide better noise rejection. The Ground wire and Grounding jack of the *ring potentiostat* must both remain unconnected to any other ground or cell lead.

## Series G and PCI4 Potentiostats

The Ground connection wires (the short "Chassis" ground and the long "Floating" ground) of the *ring potentiostat* should both remain *unconnected*. Be sure that they will not make accidental contact with each other or any other conducting material. The equipment will not function properly if either of these wires is connected to a source of ground.

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