

BiPotentiostat Installation and Setup

Introduction

Gamry 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 will connect to the Disk electrode and the Serf will connect to the Ring electrode.

Installing the BiPotentiostat Scripts

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. Follow these steps:

- 1) Install Version 5.63 or later of the Gamry Framework and Gamry Echem Analyst software. Copy all Experiment Script files (*.exp) into the Framework Scripts Folder:
Windows XP: C:\Document and Settings\All Users\Application Data\Gamry Instruments\Framework 5\Scripts\
Windows 7: C:\ProgramData\Gamry Instruments\Framework\Scripts\
Windows 7: C:\ProgramData\Gamry Instruments\Echem Analyst\Scripts\
Windows 7: C:\ProgramData\Gamry Instruments\Echem Analyst\Scripts
- 2) Copy the Echem Analyst Analysis Script files (*.GScript) into the Echem Analyst Scripts Folder.
Windows XP: C:\Document and Settings\All Users\Application Data\Gamry Instruments\Echem Analyst\Scripts\
Windows 7: C:\ProgramData\Gamry Instruments\Echem Analyst\Scripts
- 3) Copy the file CustomAnalysisScripts.mdb into the Databases folder, overwrite the existing file.
Windows XP: C:\Document and Settings\All Users\Application Data\Gamry Instruments\Echem Analyst\Databases\

Windows 7: 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 will add the "BiPotentiostat" section to the experiment list and register the experiment script files.

The new "BiPotentiostat" selection will contain 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 will be recorded as a function of the Disk potential.

Each script will bring up 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.

Connecting the Potentiostats

A BiPotentiostat Control Cable (986-00047, PCI4 BiPotentiostat Control Cable, 986-00063, Reference 600 BiPotentiostat Control Cable) is required to interconnect the potentiostats so that the Disk scan is synchronized with the Ring data acquisition.

The **Reference 600** cable has two high-density 15-pin D connectors (986-00063). The D connector which also has the 3 ft wire emanating from it must be connected to the Master Potentiostat. The cables plug into the miscellaneous I/O (15 pin high density) port on the back of each potentiostat.

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 miscellaneous I/O port to control the rotator rate of the RDE710. See the supplemental file "Series G BiPstat.pdf" for detailed instructions.

The **PCI4/FAS2** cable has two high-density 15-pin D connectors (986-00047), but is not the same as the Reference 600 BiPotentiostat Control Cable. The D connector which also has the 3 ft wire emanating from it must be connected to the Master Potentiostat. The cables plug into the miscellaneous I/O (15-pin high density) port on the back of each control board.

The 3 ft wire terminates in a Green and a Black banana plug. These are to be connected to the RDE710 Rotator Control Box "Control Input" connections. A voltage is produced by the Master potentiostat to set the speed of the rotator. Other rotated electrode controllers should have similar connections for external control of the rotation speed.

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. It is recommended that a wire be used to interconnect the two jacks of the same color.

Two standard Gamry Cell Cables are be used to connect to the Rotator and Electrochemical Cell to the Gamry Potentiostats. There are many wires! Be certain that unwanted interconnections are not made accidentally!

The single Reference Electrode should be connected to BOTH of the White, Reference Electrode pin jack sockets. The single Counter Electrode should be connected to BOTH of the Red, Counter Electrode banana plugs. Banana-to-Alligator or Pin Jack-to-Alligator adapters may be useful here.

The Blue (Working Sense) and Green (Working) leads of the **Master potentiostat** should be connected to the **Yellow Banana Jacks** of the RDE710 rotator assembly.

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.

The "Counter Sense" (Orange) leads of both Gamry Potentiostats should be left disconnected. They are not used.

Reference 600:

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.

PCI4/Series G:

The Ground connection wires (the short "Chassis" ground and the long "Floating" ground) of the **Disk Potentiostat** may be connected together to provide better noise rejection.

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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