

# **FuelCell Addendum – 885 PSTAT Support**

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## **Introduction**

This addendum describes the 885 PSTAT experiment implementation in FuelCell Version 4.0d and later.

## **Hardware Support**

890C/890CL/890e/850 unit is required. The 890 and 890B are not supported.

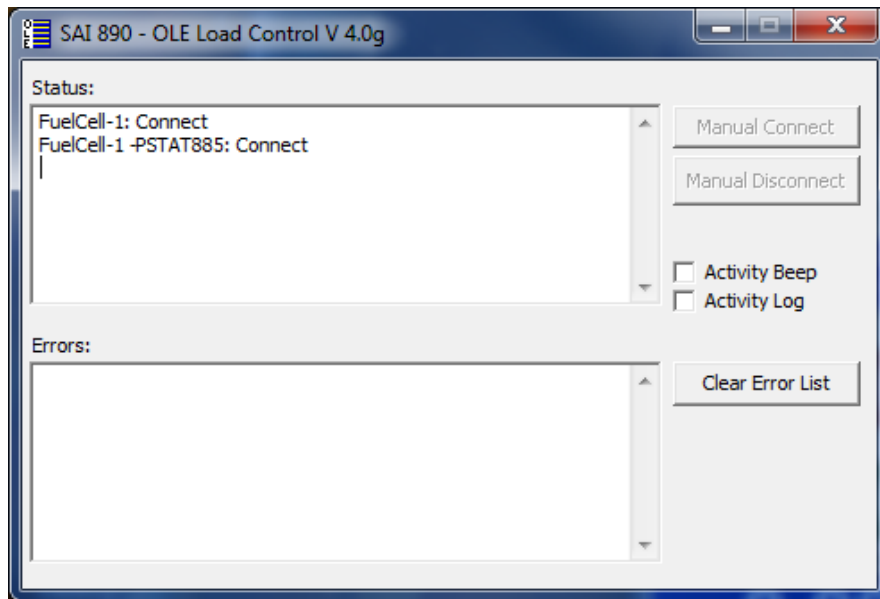
The 885 PSTAT module must be installed onto the main load unit. Cell connections are routed through the 885 module so that it may switch back and forth between traditional Load operation and using the PSTAT.

Contact Scribner Associates for further instructions on making electrical connections to the 885.

## Enabling PSTAT Support

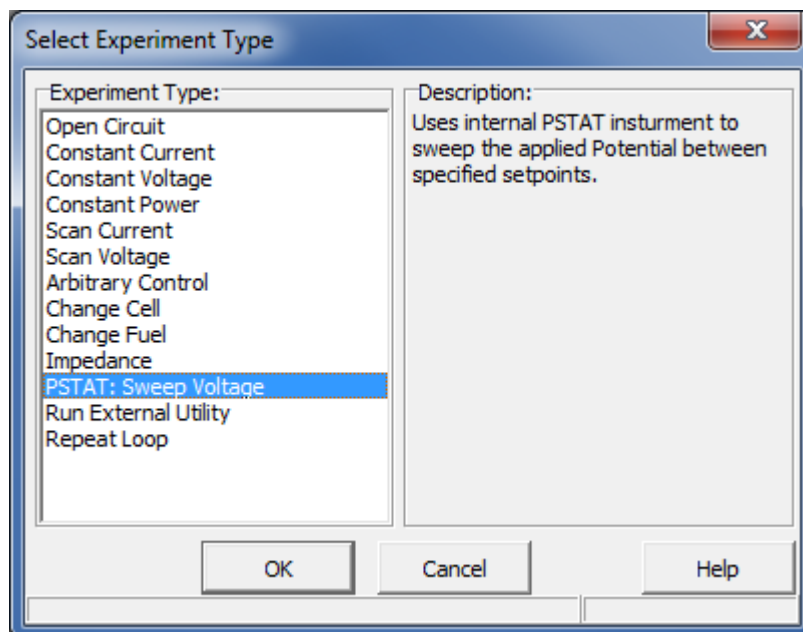
The PSTAT module is automatically detected when present and turned on. The 890/850 load unit must also be connected and turned on.

If the 885 PSTAT is detected, the SAIOLE window will report **FuelCell-1 -PSTAT885: Connect**



## PSTAT: Sweep Voltage Experiment setup screen.

The new experiment type is available in the Select Experiment screen.



The setup parameters for the experiment are shown below.

This experiment step will sweep the applied voltage between specified setpoints using the 885 PSTAT.

Just before starting this step, the unit will switch from normal Load control to PSTAT control. After the PSTAT experiment is finished, the system is returned to Load control using all previous conditions.

When the experiment is performed, the data will be saved in the file specified by **Data File**. The **Directory** button can be used to display a list of all directories and files. This is particularly useful, if you forget the file names you have already used. Before FuelCell begins performing the first experiment in the experiment list, you will be warned, if the file already exists.

FuelCell automatically appends the suffix '.FCD' to data files, if you do not enter one. Thus, if you specify tutor1, the file tutor1.fcd will be used. If however, you specify tutor1.abc, the file tutor1.abc will be used.

The **Comments** text is saved in the data file. The time, date, and all measurement parameters displayed in this window are automatically saved in the data file, so you do not need to write these into the comment lines.

When an experiment is inside a repeat loop, it will be performed multiple times.

The data from each repetition may be saved in a **Single File** (with multiple data sets in a single file), or it can be saved in **Separate Files**. When separate files are used, new file names are automatically generated to distinguish each repetition. For example, if the file name tutor1.fcd is selected, data files named tutor1\_rp01.fcd, tutor1\_rp02.fcd, tutor1\_rp03.fcd... will be created. When an experiment is inside a repeat loop, it is not necessary to save the data from all repetitions. If 100 repetitions are chosen, and **Save Every n'th Cycle** is 10, only the data from cycles 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, and 100 will be saved.

## Experiment:

Up to 4 separate potentials can be applied during the experiment. The experiment starts at the **Initial Potential**, sweeps to **Vertex #1**, to **Vertex #2**, and then to the **Final Potential**. Click on the **Used boxes** to turn on and off the **Vertex #1** and **Vertex #2** setpoints. If a vertex's **Used box** is not checked, that segment of the sweep will be skipped. For example, if only **Vertex #1** is checked the sweep **Initial --> Vertex #1 --> Final** is performed. If neither vertex is checked, **Initial --> Final** is performed.

If **vs. Open Circuit** is chosen, the specified potential is added to the open circuit potential of the cell. For example -0.1 vs. Open Circuit would apply a potential 0.1 Volts below the measured open circuit potential. When changing between Load and PSTAT control. The cell is switched to Open Circuit for several seconds. The potential measured during this is used as the Open Circuit value.

If **vs. Reference** is used, the selected potential is created between the Working and Reference cell leads.

If **vs. Previous** is used, the potential is changed relative to the potential just prior to the vertex.

The voltage scan can be repeated many times, as specified by **# Cycles**.

**delta-E** (mV per point).

The **Linear Sweep** Scan Type will create a smooth voltage sweep between the specified voltage endpoints. The **Scan Rate (mV/second)** is specified. During a linear sweep, the Data Rate can be specified as a **Fixed Rate** (time between points), or as

The **Stair-Step** Scan Type will create a voltage ramp out of a series of voltage steps. The data is typically measured at the end of each step to allow maximum time for the system to stabilize. The ramp is defined by a **Step Size (mV)** and **Step Time (Seconds)**.

During a stair-step scan, the Data Rate can be specified as a **Fixed Rate** (time between points), or as the number of **Points/Step**. If the Point/Step is equal to 1, the Average % selects when the data is measured. For example, if Step Time is 10 seconds, and Averaging is 10%, the data will be measured during the last 1 second of each voltage step.

The PSTAT contains 3 **Current Ranges**: 2A, 200mA, 20mA. Select the smallest range that can handle the current from your cell.

The Low Bandwidth setting should be used for all standard sweeps.

**Termination/Reversal:**

Select **Reverse Scan** if you want to reverse the scan direction when the current goes outside the specified **Current >** or **Current <** limits. When the reverse scan is triggered, the scan proceeds to the **Final Potential**.

Select **Terminate Scan**, if you want to terminate the PSTAT Sweep step when the current goes outside the specified **Current >** or **Current <** limits.

FuelCell displays a one-line description of each experiment in the experiment list. If a **Description** is entered, it will be used in the list. If no description is entered, FuelCell will create a description from the experimental parameters.

If **AutoPrint Graphs** is selected, after the experiment is finished, any graphs that are displaying experiment data will be printed.

The **OK** button exits the setup window and saves any changes you may have made.

**Cancel** exits the setup window. Any changes you may have made to the parameters are lost.

**Help** accesses the on-line help information on the setting up of this experiment.