Quick Guide - Elchem

February 2, 2022

1 Introduction

1.1 Objects in Elchem

There are tow main objects in Elchem, charts and lines. The charts correspond to a graph in a tab, containing useful functionalities, that hold lines (data points). The user can have as many charts as necessary. To create a new chart select **MAKE UNIQUE** and upon a new **RUN** a new tab will appear on the **DATA VISUALIZATION** panel.

Lines are the actual data acquired by the potentiostat sent to the software. Lines contain the voltage and current points of a measure and are displayed in charts. Multiple lines can lay in the same chart, the amount of lines per chart is user controlled.

Every time a new chart or line is created, it is added to the tree view. The user can use the tree to handle line, like deleting and moving lines across charts. It is also possible to rename the lines, so the user can track easily the data.

There are two ways to create lines and charts. The first is the same mentioned above, through a measure (by pressing **RUN**). And the second is by loading data in the software using **LOAD DATA** in the menu.

1.2 Main window

The main window is the first window displayed when the software starts running, see figure 1. The potentiostat will be controlled from here and all the functionalities offered by the software are accessed through this main window.
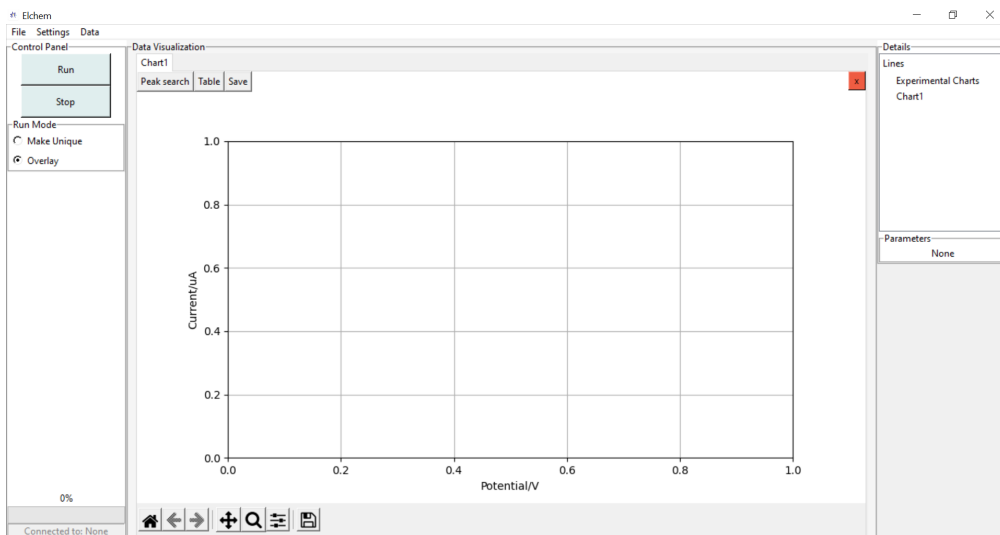

Figure 1: Main window. Left: Control Panel, Middle: Data Visualization, Right: Details

The main window is divided in three major sections. On the left is the **Control Panel**, where the user can control the activity of the potentiostat, create new charts and follow the progress of

the measurements. The second section is the **DATA VISUALIZATION** panel. All the charts are displayed in this panel, the user can travel among tabs to visualize his charts and data. Basically, is where the graphs are shown. And the third panel is at the right side of the main window, the **DETAILS** panel shows all the lines and charts arranged in a tree. The user can use this tree to manage his data. Also, in **DETAILS** panel, the current parameters of the measure are shown, bellow the tree.

1.2.1 Control Panel

The **RUN** button tells the hardware to start the measure. While the **STOP** button can be used to abort the measure. Note that, this action can take a few seconds to complete.

Bellow the control buttons is the **RUN MODE** panel, where the user can select to run the new measure in the current chart (**OVERLAY**) or to run in a new chart (**MAKE UNIQUE**, see figure 2.
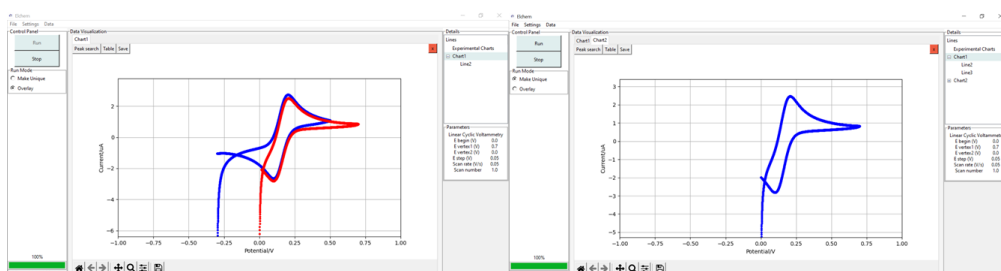

Figure 2: Overlay vs Make Unique mode.

If **OVERLAY** is selected than, the acquired points will be plotted in the current chart (red line in figure 2), while if **MAKE UNIQUE** is chosen, a new chart will be created and the measured points will be plotted in this new chart (note that, in right window there are two charts, that can be accessed by selecting the desired tab under **DATA VISUALIZATION** panel).

On the bottom of the control panel, a progress bar is shown. While the measure is taking place, the progress bar continuously fills until reaching 100, indicating that the measure is complete. This bar will automatically reset every time a measure takes place.

1.2.2 Data Visualization panel

The acquired data is displayed in charts. Each chart contains lines, that are the actual data points (x and y pairs). Every measure is stored in a chart (creating a line) and the user is free to chose which charts to use to store the data. In figure 3, three charts were created. The charts can be accessed, by selecting the desire tab on the top side of the **DATA VISUALIZATION** panel.
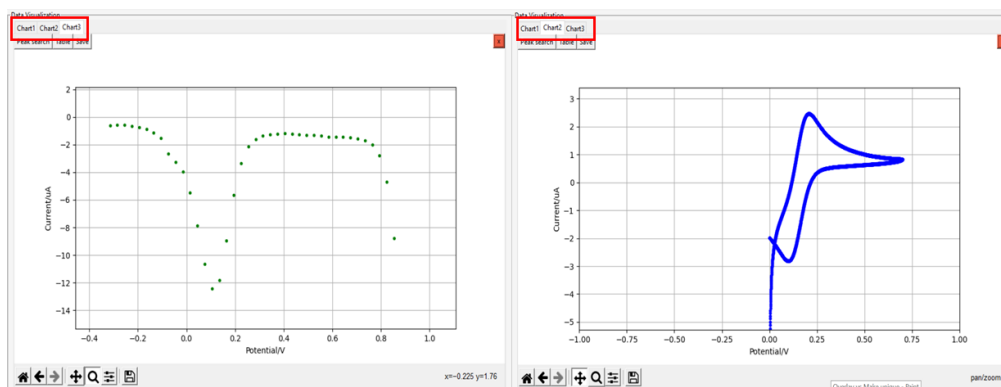

Figure 3: Selecting different charts.

As it was mentioned before, each chart can store an unlimited number of measures. Taking the example above, the user can select **CHART2** in the **DATA VISUALIZATION** panel and **RUN** new measurements that will be stored in this chart as lines (green and black lines in this example). If the user have selected **CHART3** instead, the line would have been added to this chart. See figure 4.
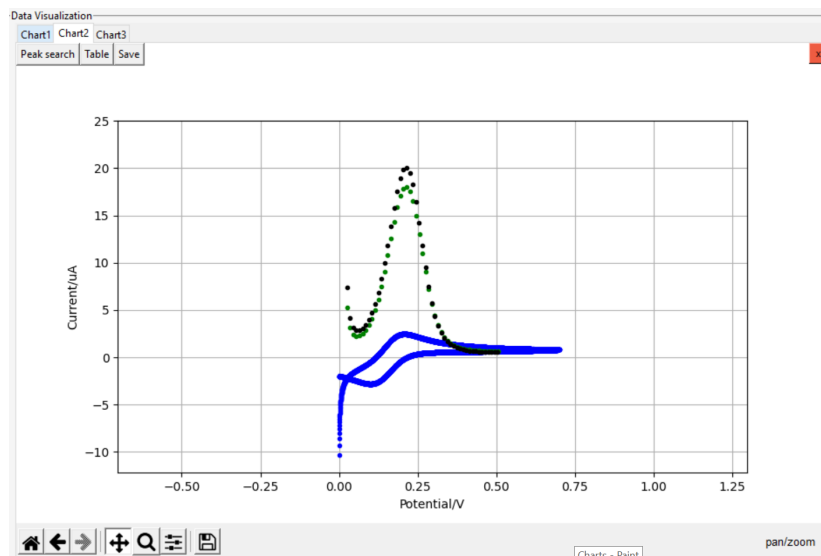

Figure 4: Overlay multiple lines in the same chart.

Each chart have a simple tool bar to control the graph. This tool bar allows the user to re-scale the axes limits or to move across the plane. Also, a quick screenshot functionality is incorporated in the tool bar (floppy disk icon), allowing the user to take a picture of the current chart and save it.

1.2.3 Details panel

The **DETAILS** panel is where all the charts and lines are summarized. It offers a quick and simple view of the user data arranged in a tree view. Every time a new chart or line is created, the software updates the tree with the new objects. Bellow the tree-view, the **PARAMETERS** of the last electrochemical technic used are displayed (figure 5).
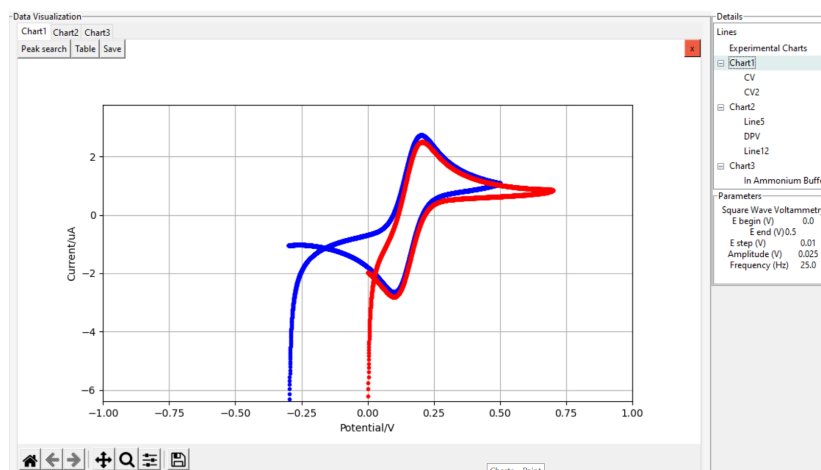

Figure 5: Details panel (right side).

The **DETAILS** panel offers some functionalities for data handling. The user can change the name of the lines and is able to move lines across different charts. By clicking right-mouse button, a

temporary menu is displayed, with several options to accomplish this, see figure 6. A option to delete a line is also available, by clinking it, the selected line will be permanently removed from the charts.
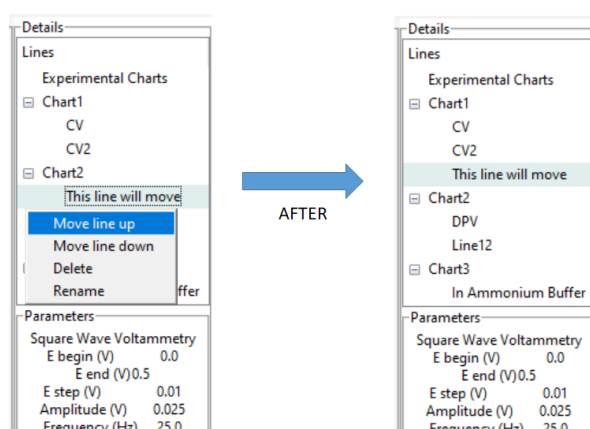

Figure 6: Functionalities of the lines.

2   Tutorial - Starting a measure

To start a measure, a few thing need to be done before clicking the **RUN** button. First is, establish connection to the hardware. The user must connect the computer to the potentiostat before anything. To do that, click **SETTINGS** then **CONNECTION** and a new window will pop up. In this window a list of all available ports are shown, the user must select the port related to the potentiostat (it should be "(...)USB Serial(...) port"), see figure 7.
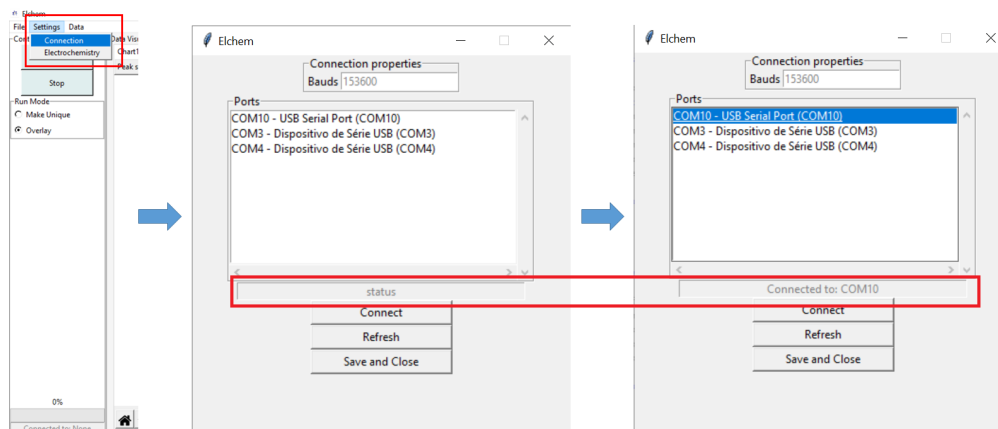

Figure 7: Establish connection.

After selecting the port, click **CONNECT** button and the small label under the list-box should change from "status" to "Connected to:(...)" if the connection was successful. If it is not the case, try to disconnect and connect the USB cable again, or to restart the software. With the connection done click **SAVE AND CLOSE** to exit to the main window again. **REFRESH** will update the list of ports, if the desired port is not appearing in the list click this button to refresh the list.

Now the next action, is to define the actual parameters of the measure. For that, head to **SETTINGS** and chose **ELECTROCHEMISTRY**. Again, a new window will pop up (figure 8). The left side allows the user to choose the desired voltammetric technic and to define the parameters, while the right side displays a graph that shows the voltage vs time profile. After setting up the correct values, the user can plot the profile using **PLOT** button and if everything is fine the **SAVE** button will store the parameters in the software files, to be used during the next measures. Note that is not mandatory to press **PLOT**, the **SAVE** button will automatically plot the profile if the user doesn't do it before.
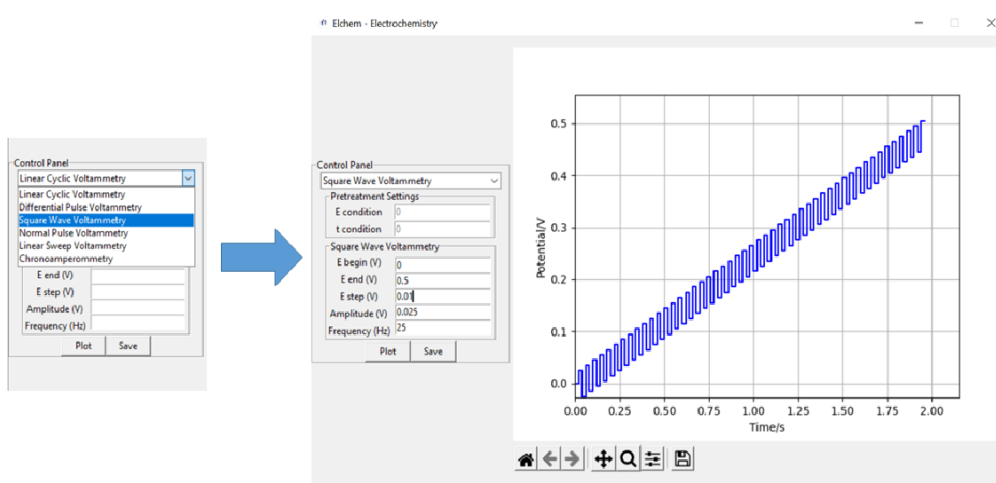
Figure 8: Setting up parameters.

With the all settings done, select the desired **RUN MODE** on the main window and press **RUN**, the progress bar bellow the **CONTROL PANEL** will show the remaining progress to complete the measure. Meanwhile, the LED on the hardware should change from grenn to a continuous red light when performing a measure, indicating it is working correctly. If the LED is emitting a intermittent red light, something went wrong, and to fix this disconnect and reconnect the potentiostat (Not forgetting to establish the connection again, using the **SETTINGS** menu).

The acquired data during the measure is displayed on the selected chart and assigned as a line, stored in the tree view under the **DETAILS** panel. To save this data, select the corresponding line (in the tree view) and press **SAVE** (see figure 9). The data must be saved in a ".txt" file. Each line needs to be saved separately, so to save "measure1", the same process applies: select "measure1" in the tree view, then press **SAVE** and save your data as a ".txt" file.
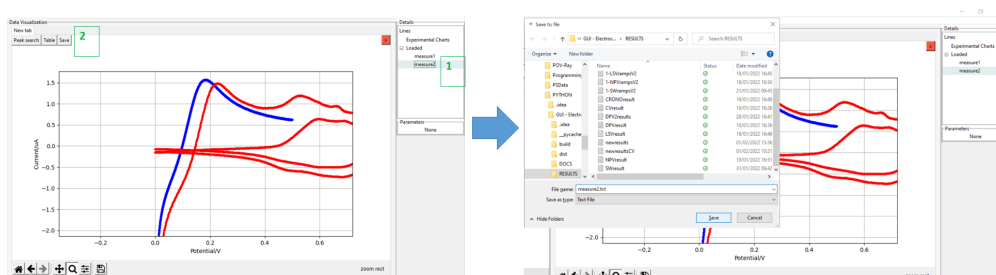

Figure 9: Saving data. Right side: 1) Selecting the desired line; 2) Pressing SAVE. Left side: save as a ".txt" file.

To load previous data to the software, press **DATA** and then **LOAD DATA** on the menu, see figure 10. Note that only data saved from the software can be loaded. By selecting **OVERLAY** or **MAKE UNIQUE**, the user can control where to load the data. When loaded, the data is handled as a line, and all the functionalities of lines (same as lines from measures) apply to the loaded data.
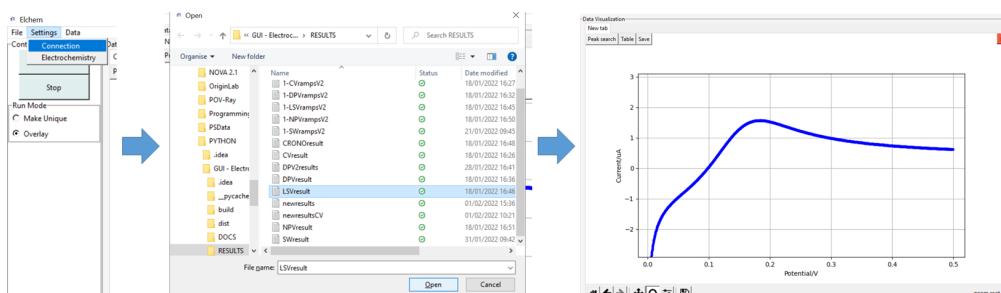
Figure 10: Loading data.