How to:
Plot CSV files in Excel and Google

<u>Microsoft Excel:</u>

1. Importing your CSV file to Excel

Once you have created your Excel spreadsheet, navigate to **Data -> From Text/CSV,** refer to the Figure 1.

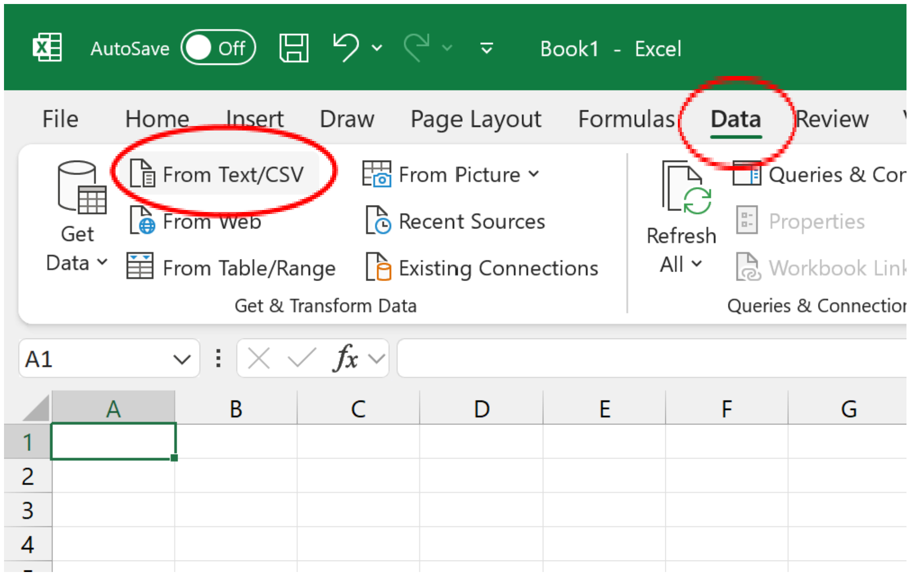


Figure 1

You will have a window pop-up, navigate to the directory where the wanted csv file has been stored, see Figure 2. Once the file has been found, open it in Excel by clicking **Open** at the bottom of the window.

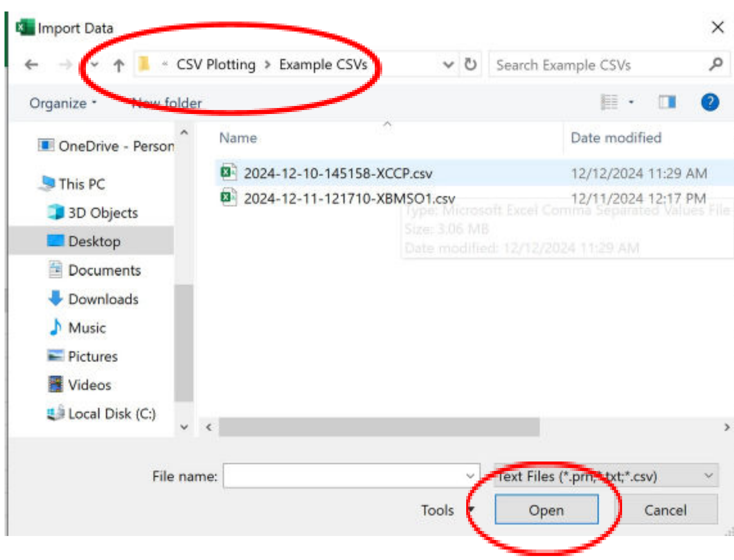


Figure 2

The window shown in Figure 3 should open automatically. Proceed by clicking **Transform Data**. **Note: None of the options need to be changed when transforming data.**

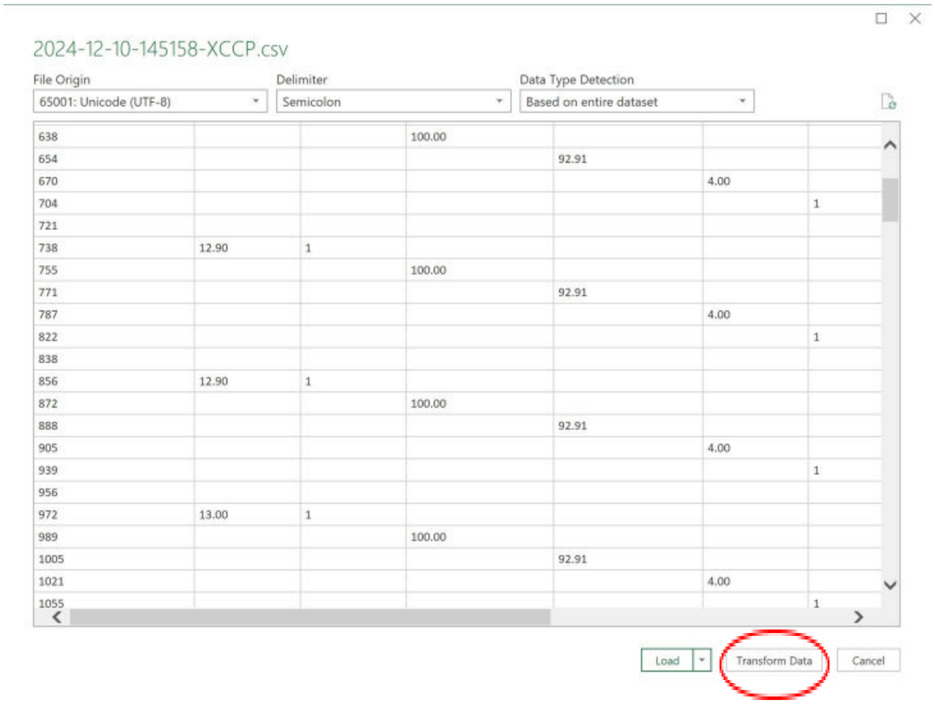


Figure 3

2. Cleaning up data for graphing

The csv files have unimportant information stored at the top of the file. This information will need to be removed. Navigate to **Home -> Remove Rows -> Remove Top Rows.** See Figure 4.

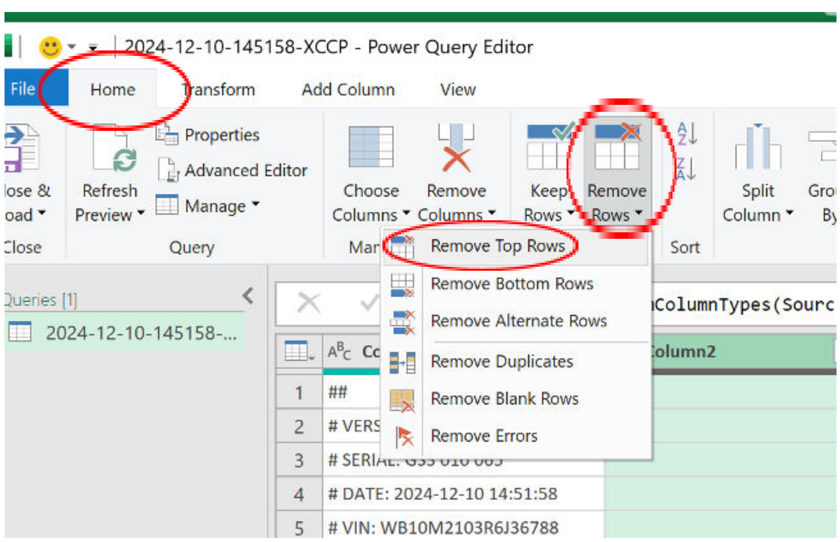


Figure 4

You will be prompted to choose the number of rows you want removed. This is dependent on the CSV file. To determine the number look at the row above the data headings. Once the number has been entered, click **OK.**

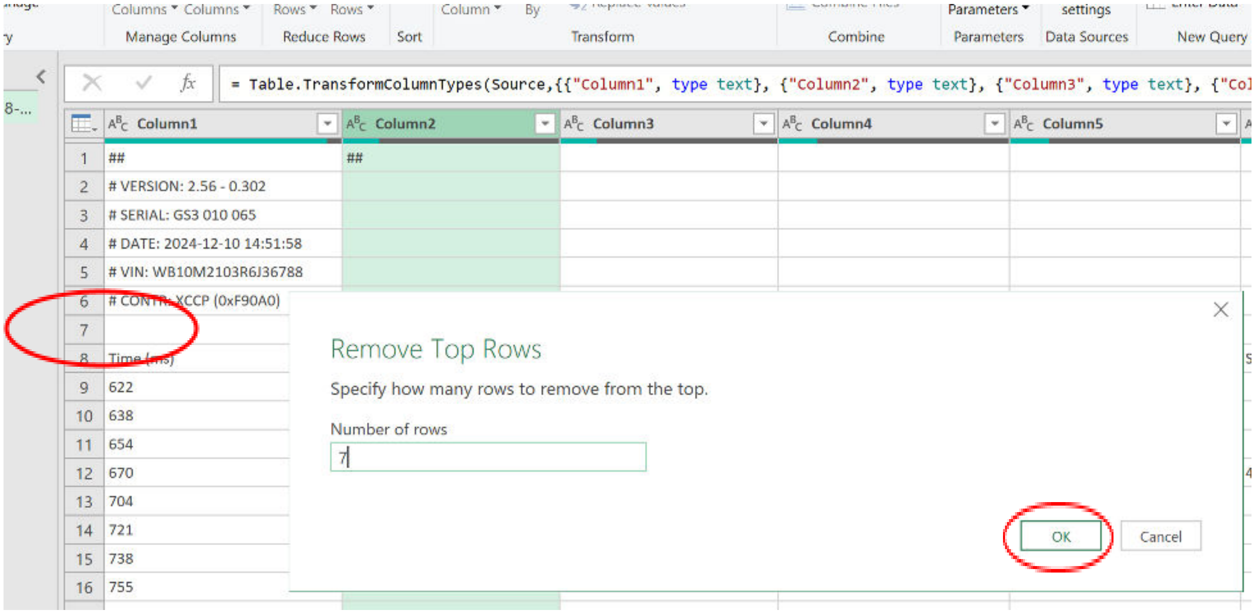
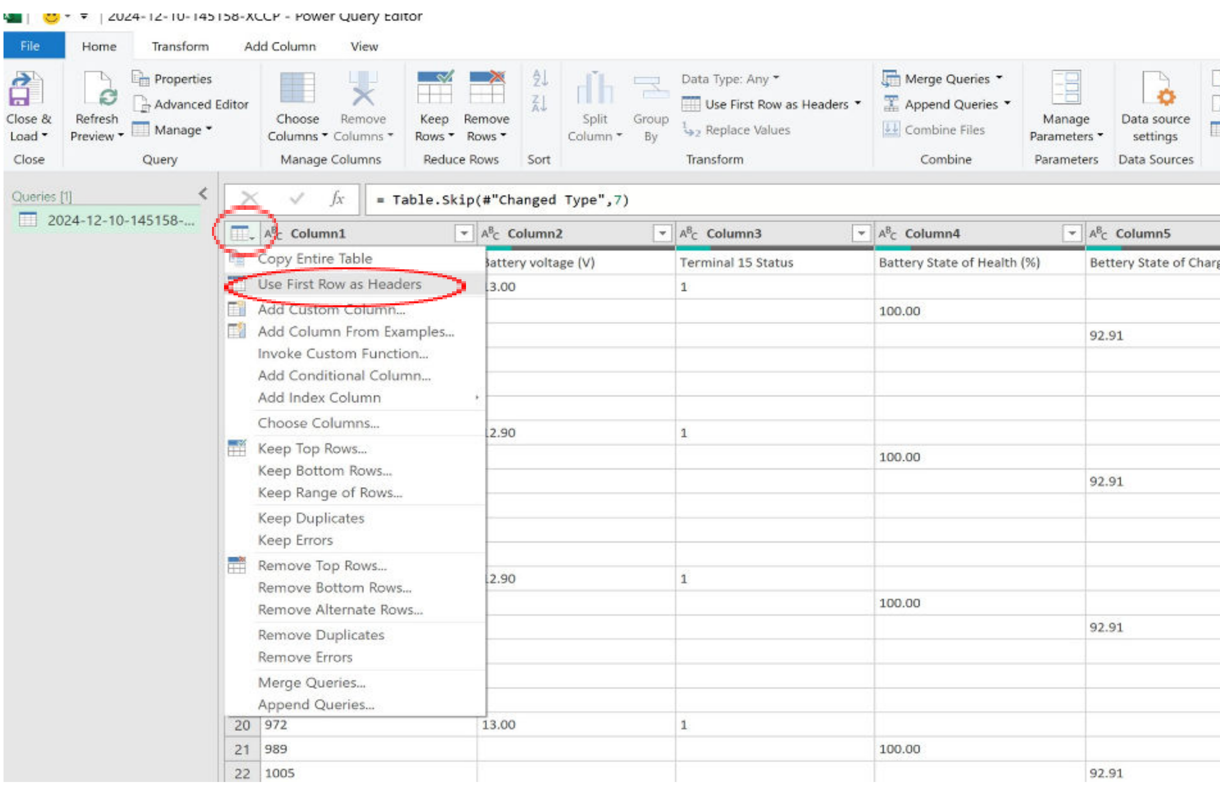


Figure 5

3. Formatting data

The headings for the columns have to be set to the headings found in the csv file. Navigate to the corner of the table (left hand side of Column1) then click on **Use First Row as Headers**. This sets the first entry in each column as the heading. See Figure 6.



The data should now have entries that state the cells are **null**. See Figure 7.

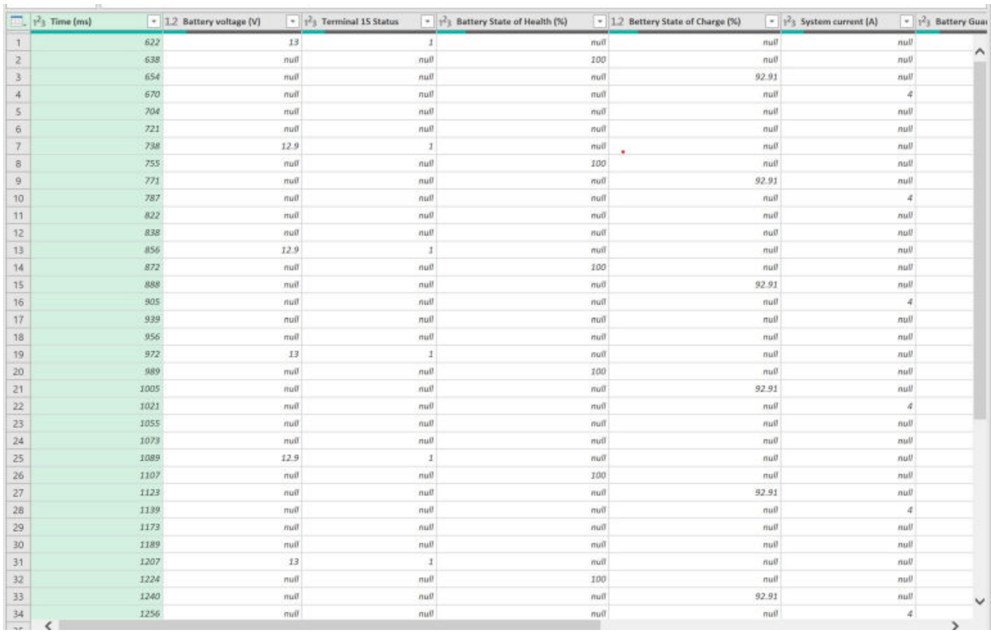


Figure 7

The **null** cells now need to be populated with data that best fits the format of the data, to not alter the results. Select all columns then navigate to **Transform -> Fill -> Down/Up.**
Click on **Down**, and then **Up**. This ensures all cells have the correct data. See Figure 8.

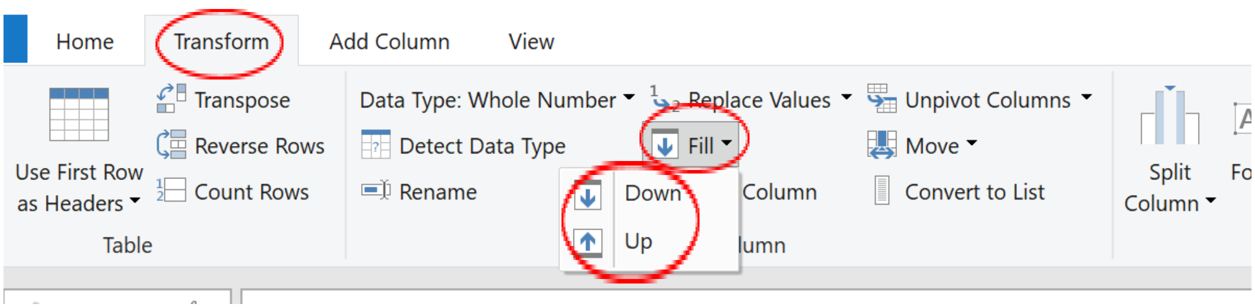


Figure 8

There should no longer be any **null** cells. Now navigate to **Home -> Remove Rows**.

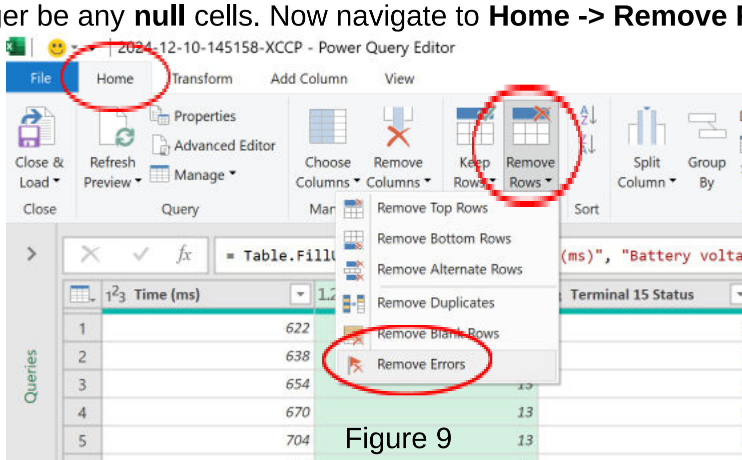


Figure 9

To ensure there is clean data, click on **Remove Errors**, See Figure 9.

To complete the import of the data into an Excel spreadsheet, Navigate to **Home -> Close & Load**, See Figure 10.

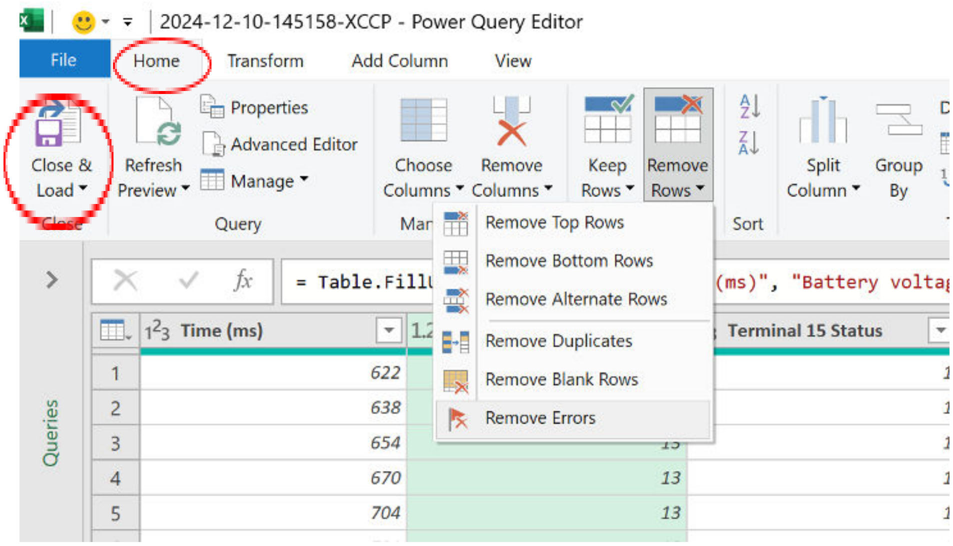
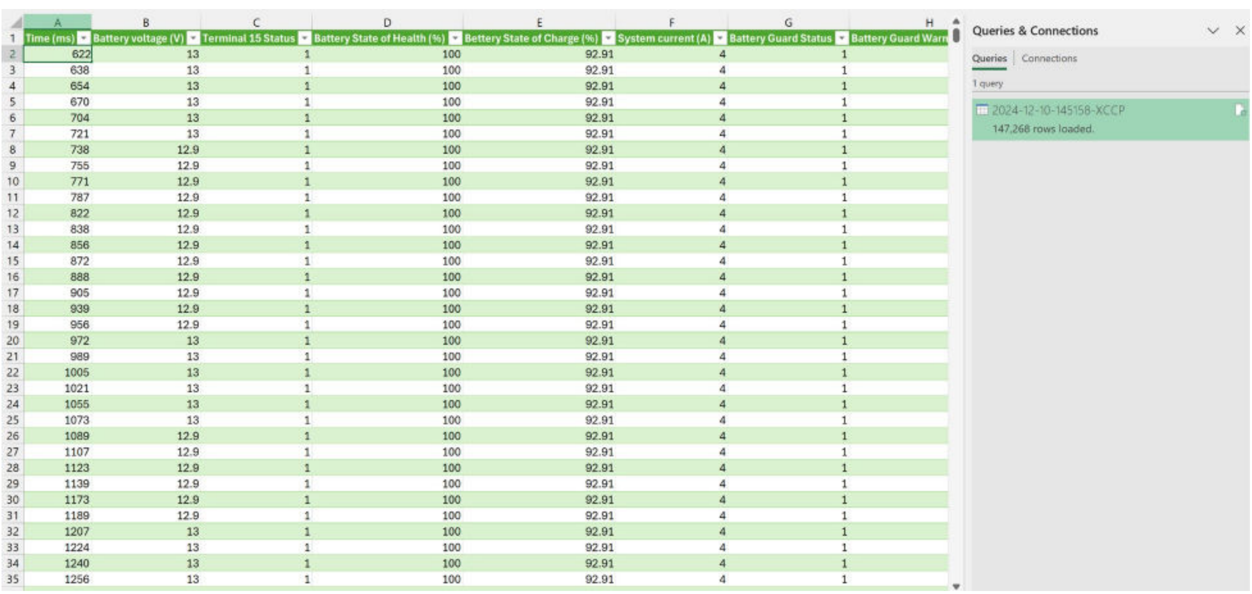


Figure 10

4. Plotting a single set of data

The data should now be in the form of an Excel table as in Figure 11.



	Time (ms)	Battery voltage (V)	Terminal 15 Status	Battery State of Health (%)	Bettery State of Charge (%)	System current (A)	Battery Guard Status	Battery Guard Warn
2	622	13	1	100	92.91	4	1	
3	638	13	1	100	92.91	4	1	
4	654	13	1	100	92.91	4	1	
5	670	13	1	100	92.91	4	1	
6	704	13	1	100	92.91	4	1	
7	721	13	1	100	92.91	4	1	
8	738	12.9	1	100	92.91	4	1	
9	755	12.9	1	100	92.91	4	1	
10	771	12.9	1	100	92.91	4	1	
11	787	12.9	1	100	92.91	4	1	
12	822	12.9	1	100	92.91	4	1	
13	838	12.9	1	100	92.91	4	1	
14	856	12.9	1	100	92.91	4	1	
15	872	12.9	1	100	92.91	4	1	
16	888	12.9	1	100	92.91	4	1	
17	905	12.9	1	100	92.91	4	1	
18	939	12.9	1	100	92.91	4	1	
19	956	12.9	1	100	92.91	4	1	
20	972	13	1	100	92.91	4	1	
21	989	13	1	100	92.91	4	1	
22	1005	13	1	100	92.91	4	1	
23	1021	13	1	100	92.91	4	1	
24	1055	13	1	100	92.91	4	1	
25	1073	13	1	100	92.91	4	1	
26	1089	12.9	1	100	92.91	4	1	
27	1107	12.9	1	100	92.91	4	1	
28	1123	12.9	1	100	92.91	4	1	
29	1139	12.9	1	100	92.91	4	1	
30	1173	12.9	1	100	92.91	4	1	
31	1189	12.9	1	100	92.91	4	1	
32	1207	13	1	100	92.91	4	1	
33	1224	13	1	100	92.91	4	1	
34	1240	13	1	100	92.91	4	1	
35	1256	13	1	100	92.91	4	1	

Figure 11

To plot a column, select the column you want to plot as of a graph by clicking on the column letter (eg: A,B…). Navigate to **Insert -> Charts -> Line charts.** Select an option. See Figure 12.

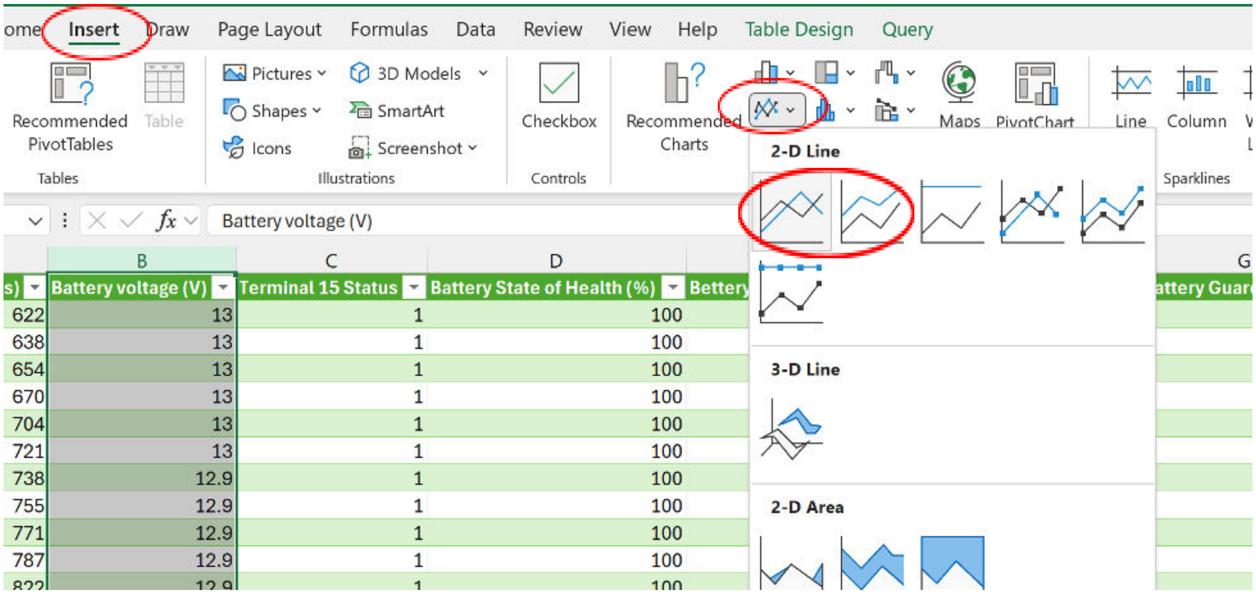


Figure 12

The graph will be made and displayed, with a heading included, see Figure 13.

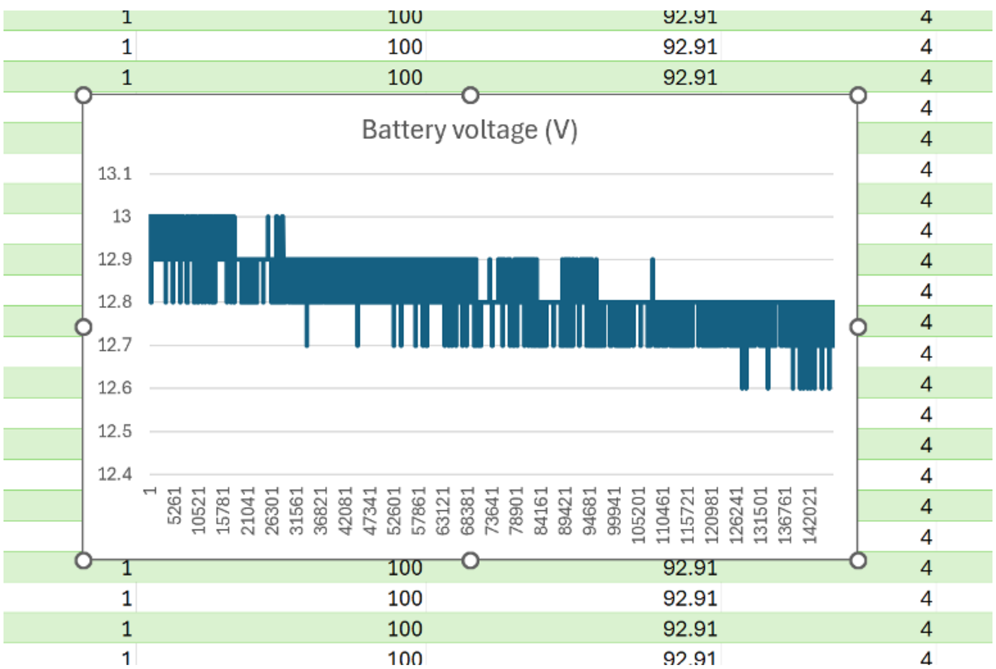


Figure 13

5. Multiple sets of data

The best method to plot a graph containing multiple sets of data, is to plot a single set of data, and then to add additional data sets.

Once you have followed all the steps in **4.Plotting a single set of data**. Click on the current graph then on the small spout of the right hand side of the graph and finally on **Select Data**. See Figure 14.

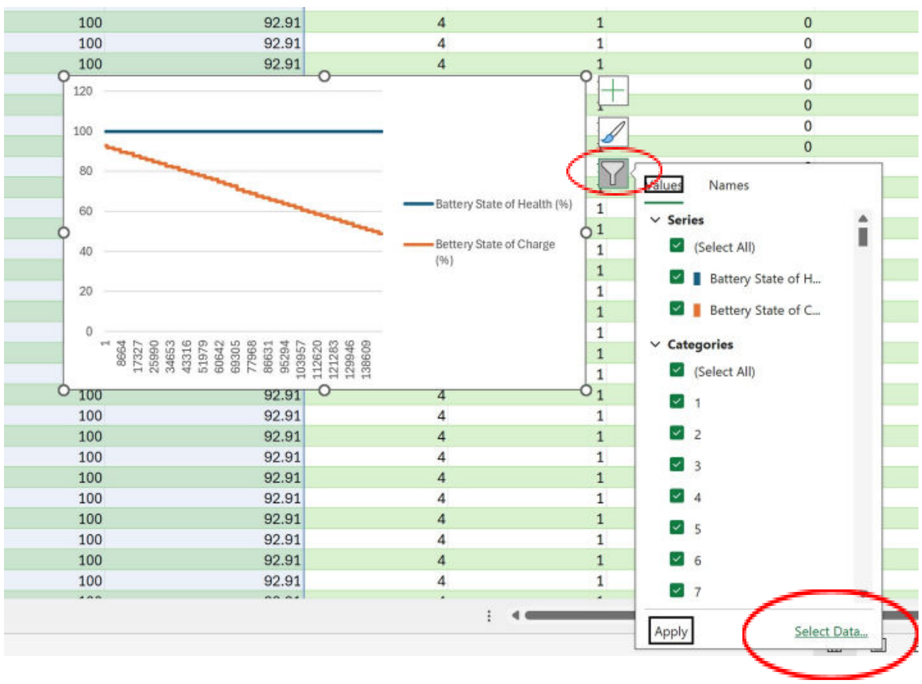


Figure 14

A window will be opened similar to the window shown in Figure 15 below.

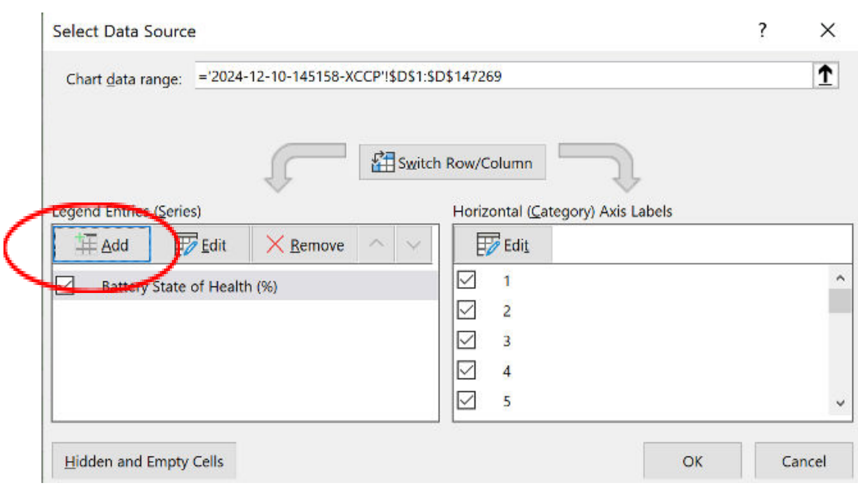


Figure 15

To add new data, click on **Add** (In Legend Entries), this will open a new window seen in Figure 16.

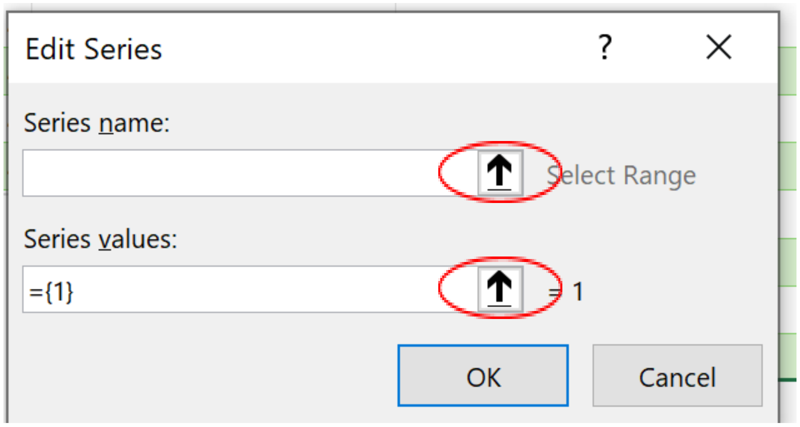


Figure 16

This is where the heading, as well as the associated data, can be added to the graph.
To select the heading, click on the arrow next to **Series name,** and select the heading you want to plot. In this example it is ‘Battery State of Charge (%)’. See Figure 17.

Once the heading is selected click the blue arrow in the **Edit Series** window. Shown in Figure 17.

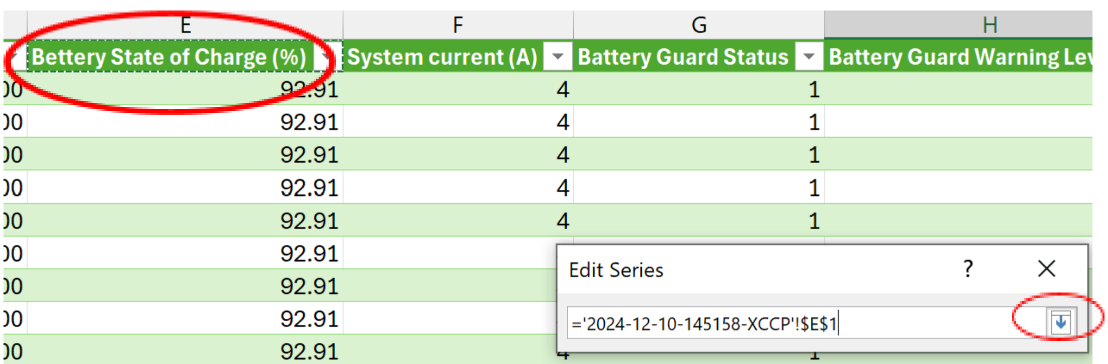


Figure 17

The window in Figure 16 will be shown again but now with text in the **Series name** field. To include the associated data, click on the arrow next to the **Series values** field, see Figure 16. A similar process is followed as for the heading. Select the column of data.

Note: Ensure first row (the name of the column) is not selected

After the data has been selected, see Figure 18, click **OK** until all windows have closed. The graph should now be updated with multiple plots.

Note: Excel is unable to identify different data types. To ensure logical plots, plot data with the same unit.

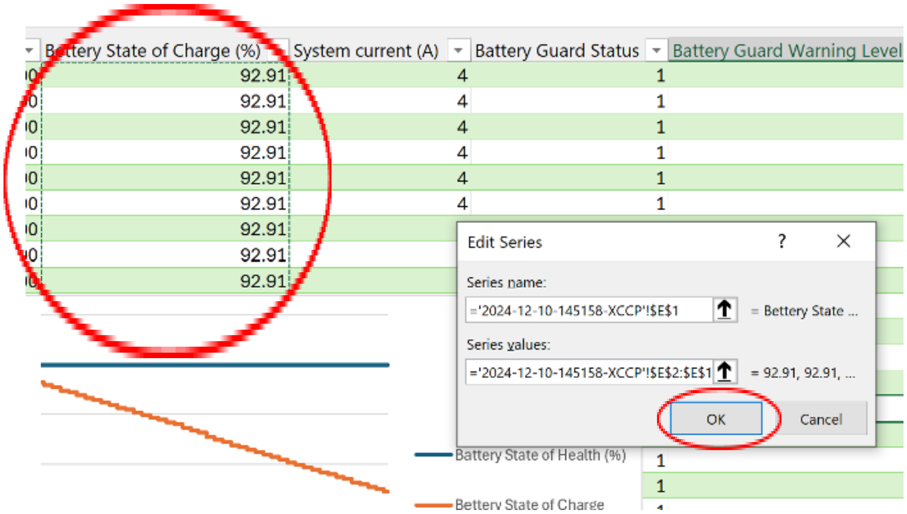


Figure 18

Google Sheets:

1. Importing your csv file

Start by creating a google sheet document. Navigate to **File -> Import**. See Figure 19

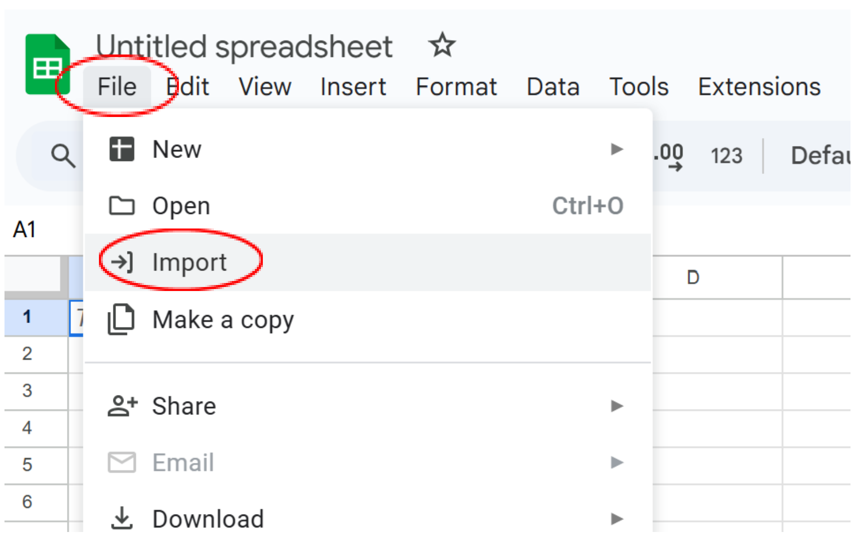


Figure 19

Navigate to the directory of the csv file you wish to import. Once selected, click **Open.** See Figure 20.

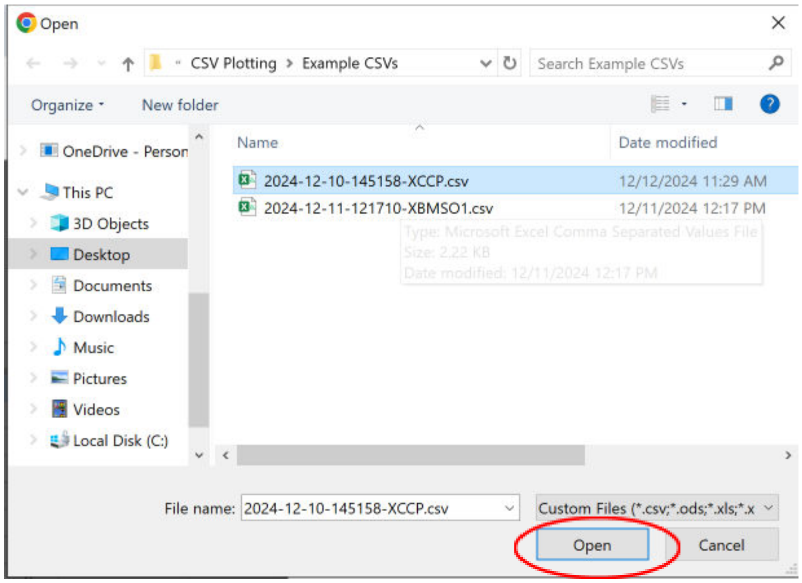


Figure 20

A window will open asking for some information.

From the dropdown options, select **Replace spreadsheet** for **Import location**, **Detect automatically** for **Separator type,** and check **Convert text to numbers, dates, and formulas**. See Figure 21.

Finally click **Import data**.

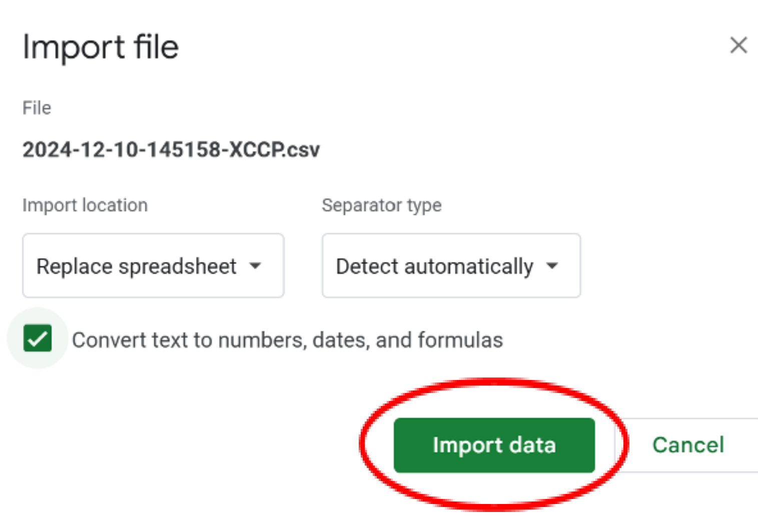
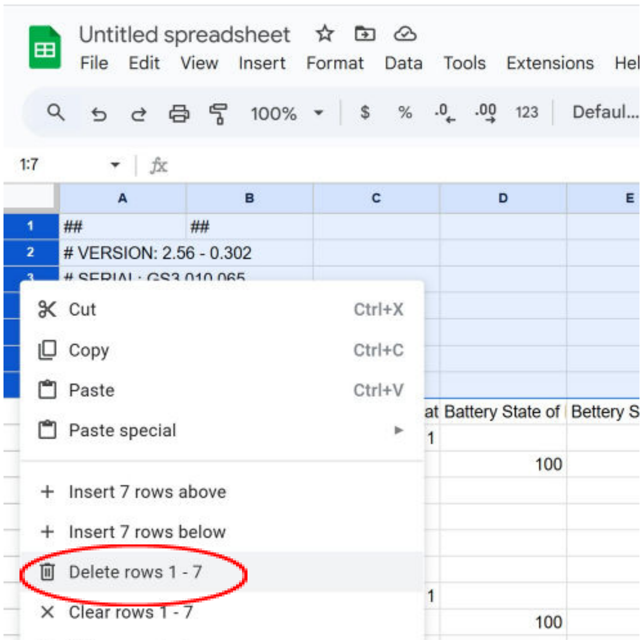


Figure 21

Your csv file, with all its data, will now be imported into your spreadsheet.

Now, select the first 7 rows, right-click and select **Delete rows 1 - 7**. Do the same for the rows at the bottom of the sheet. See Figure 22



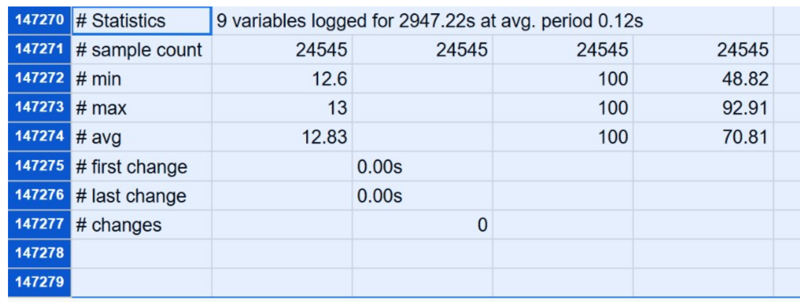


Figure 22

2. Plotting the data

Start by selecting the data you wish to plot. Make sure to also select the corresponding data axis column. In this example, the ‘Time(ms)’ column. See Figure 23.

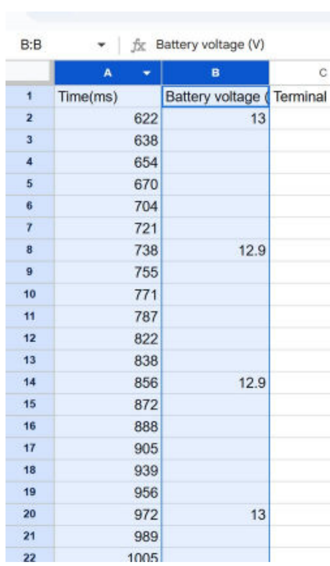


Figure 23

NOTE: Selecting too many rows can cause performance issues/Bad quality graphs.

Once the data has been selected, navigate to **File -> Insert Chart.** See Figure 24

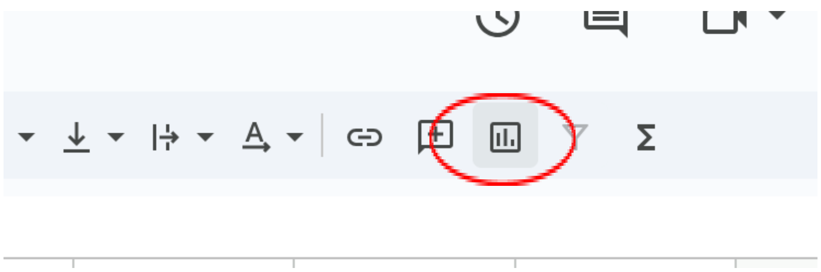


Figure 24

A graph will be automatically generated. The graph should not look correct and will require some changes to its settings, to represent a correct graph.

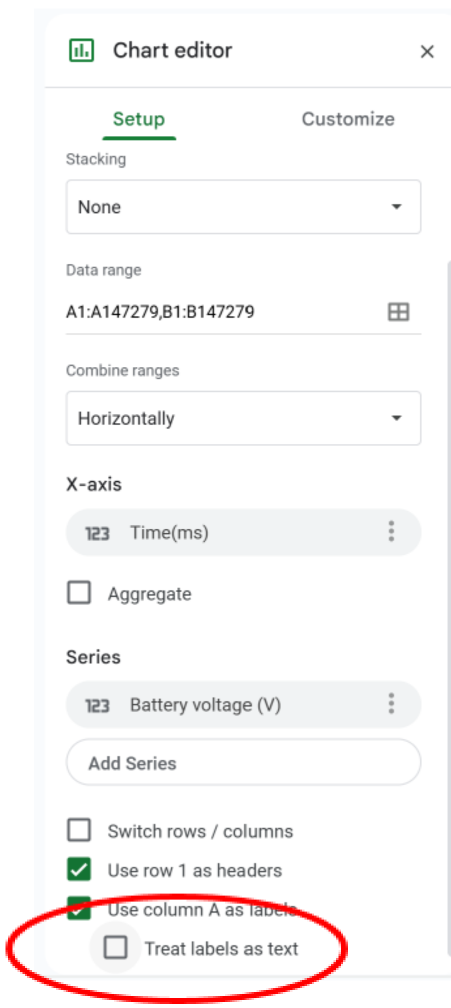


Figure 25

If the chart editor is currently not shown, it can be opened by double clicking on the graph. Navigate to **Setup -> Use row 1 as headers/Use column A as labels**. Check both of these boxes. If **Treat labels as text** is checked, you can uncheck it. See Figure 25, above.

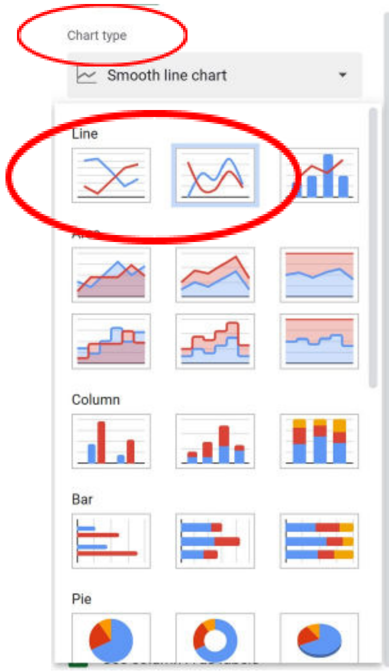


Figure 26

The type of graph can also be changed, at the top of **Setup**. Click on **Chart type** and select a chart type. Usually line graphs are best suited. See Figure 26.

Finally, navigate to **Customize -> Chart style**. Check the box labelled **Plot null values**. This will ensure the line chart is a smooth plot and not points. See Figure 27.

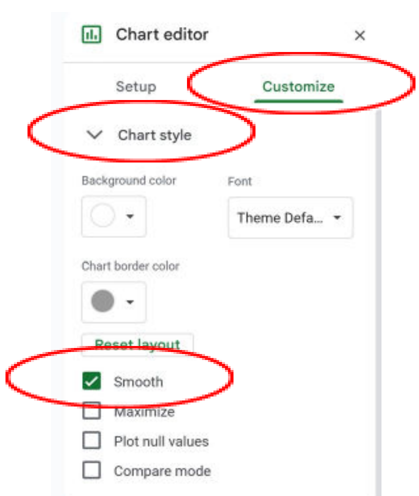


Figure 27

In this case, the vertical axis scaling is off.
This can be changed by navigating to **Customize -> Vertical Axis.** By adjusting the Min and Max field values, the graph can be made easier to read. See Figure 28 and 29.

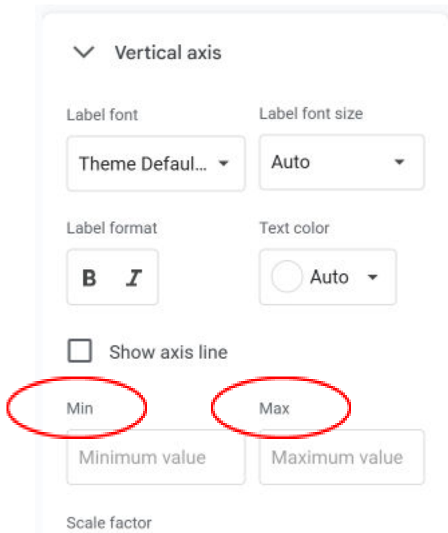


Figure 28

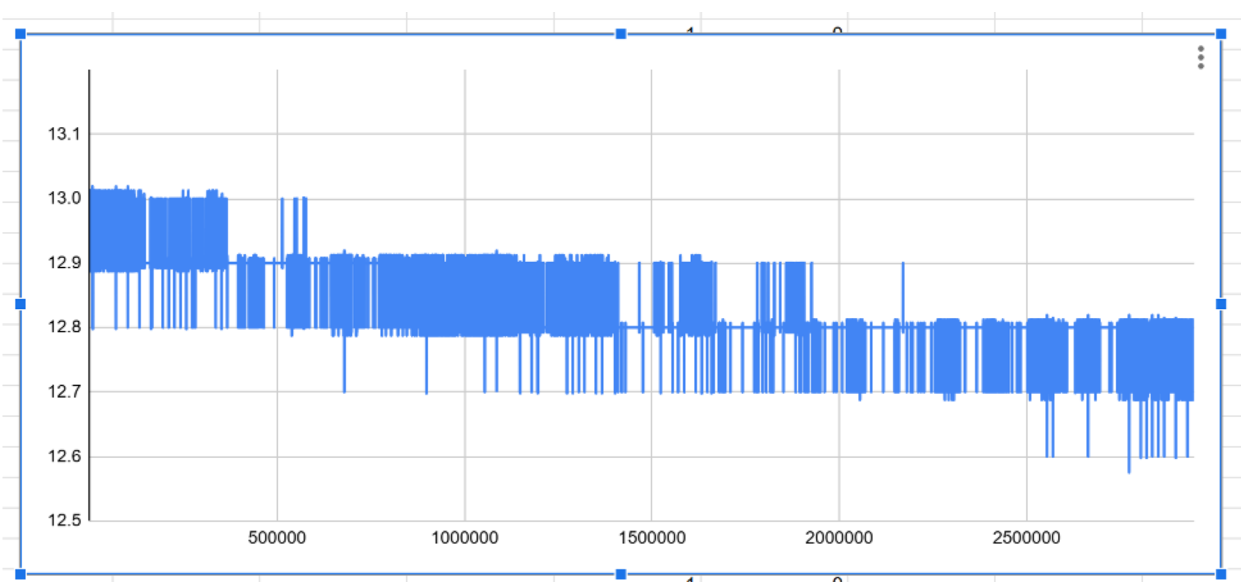


Figure 29

3. Adding multiple sets of data

This is done in a similar fashion as in Excel. Once the first graph has been made and plotted, a second set of data can be added by navigating to **Setup -> Series.** See Figure 30

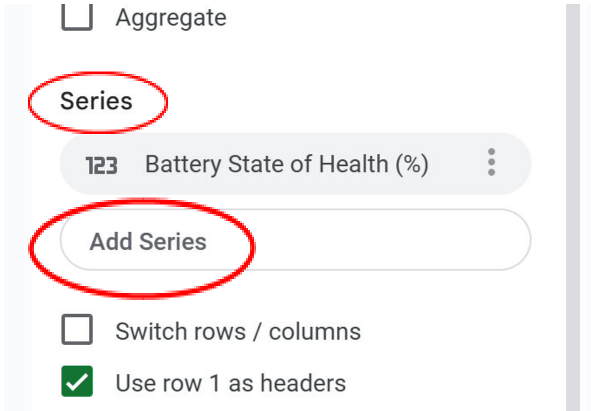


Figure 30

Click on Add Series, and then on the 2x2 grid in the top left corner. See Figure 31.

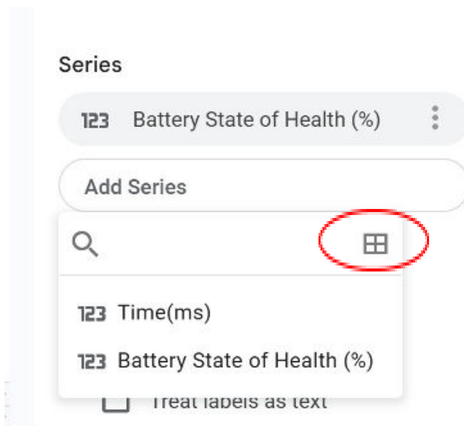


Figure 31

A window will open asking for a range of data’. See Figure 32

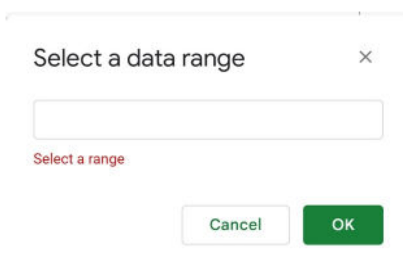


Figure 32

Select the set of data you want to add to the graph. Then press **OK.**

NOTE: The new data should be of a similar range (same number of rows) as the initial data set.

The new set of data will now be added to the current graph as seen in Figure 33.

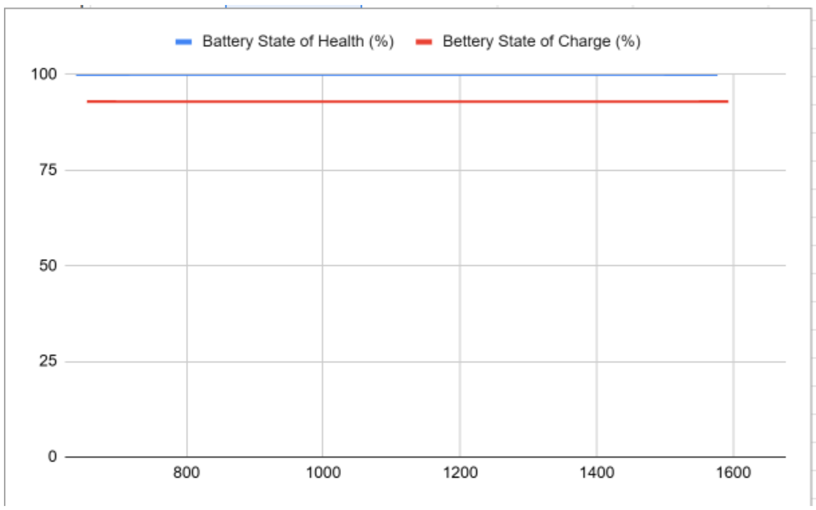


Figure 33