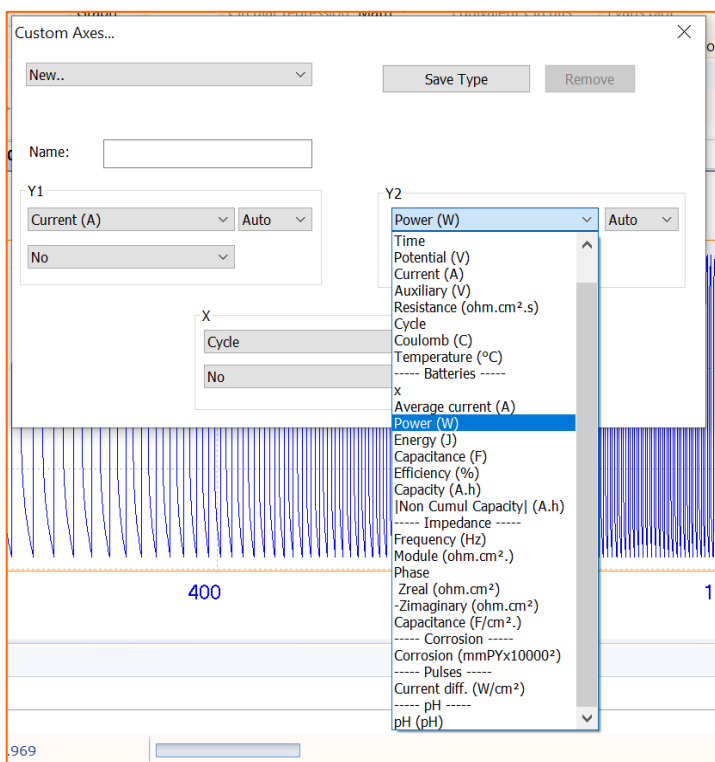


General Electrochemistry AP-ORI07



Customization of the axes and units of a curve



This Application Note describes how to customize the axes of a curve and to create your own curve type. The units by default can also be modified and saved.

INTRODUCTION

The Expert Charge and Discharge Cycle method consists of a first phase where the battery is charged (or discharged depending on the polarity of the current applied) followed by an optional second phase where the battery is discharged (or charged depending on the polarity of the current applied). Each phase can be run several times before moving on to the next phase. The sequence of these two phases can also be repeated several times. More information about the parameters of this method could be found in the application note AP-B01 in the link below:

<https://www.origalys.com/Files/120087/AP-B01-Note-application-Expert-Charge-and-Discharge-Cycle.pdf>

After performing « Expert charge-discharge » method, the graph of potential vs time will be obtained. For qualification analysis of batteries it is needed to gain more data about power, capacity, energy etc. In this text extracting these kind of data from the mentioned curve will be explained.

Curve Ribbon's Important Options for Battery Analysis

Thanks to Curve Ribbon of OrigaMaster software, many analysis could be performed on charge-discharge cycles (figure 1).

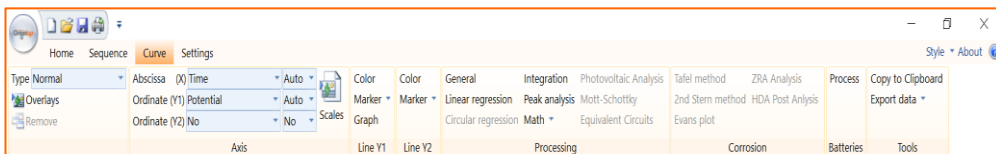


Figure 1: Curve Ribbon of OrigaMaster software



TYPE OF CURVES: NORMAL

In « Type » menu of curve ribbon, for battery analysis by default there are « Normal » profiles available (figure 2). For personalizing curves and data there is an important option in this menu as « Custom ». More explanation about this option is in following pages.

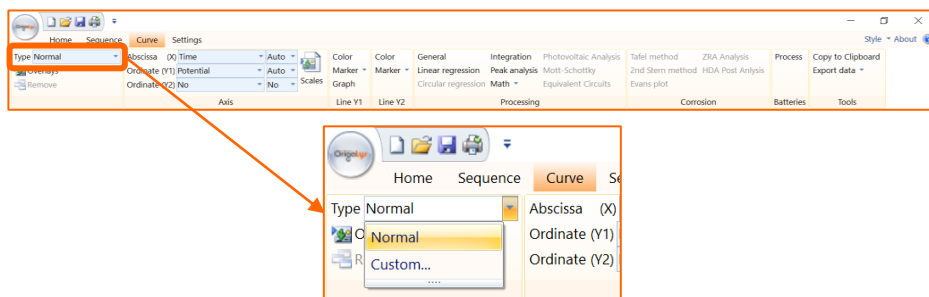


Figure 2: Type menu, to modify the axis of a curve

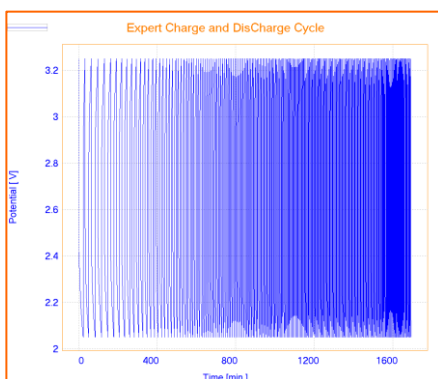


Figure 3: Normal profile of Expert charge and Discharge cycle method
Potential vs Time curve of 200 cycles charge-discharge on Li coin cell

TIPS: Normal Type means raw curve after the experiment. In the case of « Expert Charge and Discharge Cycle », it corresponds to Potential (Y1) vs Time (X).



TYPE OF CURVES: CUSTOM

This is the most important option in « Type » menu through which users can define their own profile and add it in « Type » menu.

In this part definition of new profile with « Custom » window will be explained step by step:

1

By clicking on the “Custom” option in the “Type” menu, the custom window will be opened.

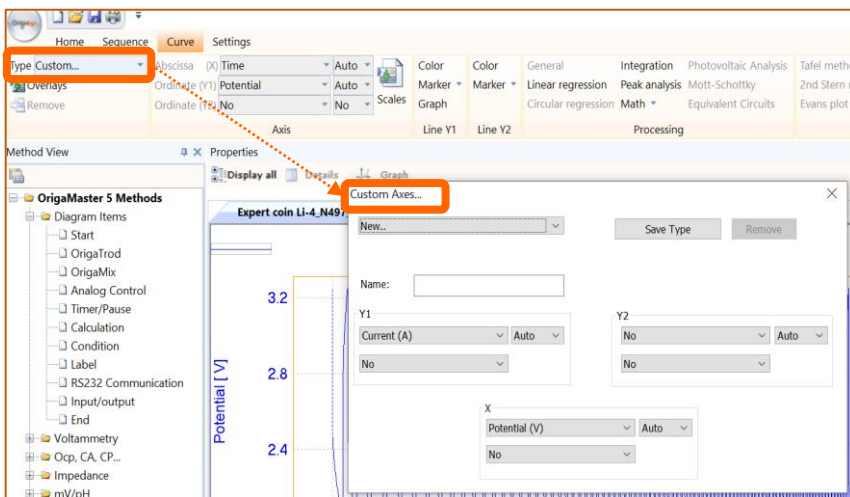


Figure 4: Custom window enables user to define his own profile

TIPS: Normal In the Custom Axis window, the axis X, Y1 and Y2 are displayed as it is displayed on the graph window: Y1 on the left, Y2 on the right and X at the bottom.



2

By selecting "New", a new profile could be defined. The 3 axis can be customized.

NOTE: For each axis, the full list of all the available data are displayed and ranked by applications. You need to select the data fitting your original method. In our case, we selected:

- X = Cycle
- Y1 = Current
- Y2 = Power

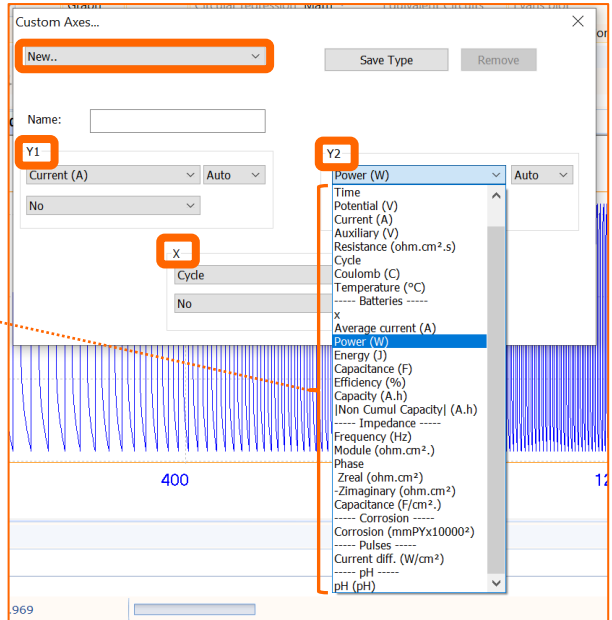


Figure 5: Define new axis with Custom window, all the list is available for all 3 axis

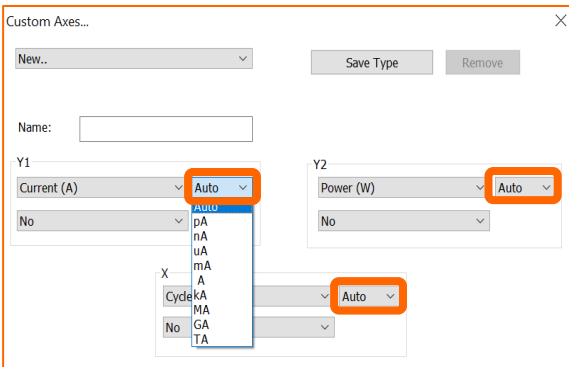


Figure 6: Unit of each axis could be defined through these boxes

NOTE: The unit of the data for all 3 axes could be selected and defined by default. For instance: current in Ma instead of A.



3

In the box below the data of the axes, a dedicated treatment or calculation can be defined.

For General treatments, the options are:

- \sqrt{x}
- $1/\sqrt{x}$
- $1/X$
- $\log |X|$
- $1/(X)^2$
- $|X|$

For Battery analysis, three options are available:

- Charge only: which only shows data correspond to charging the battery
- Discharge only: related only to data of discharging the battery
- Max. Val by Cycle: this item only shows the maximum value of each cycle.

After selection the item, all the curves of the current graph are plotted with the new value. This process can be repeated for X and Y2 axes (Figure 7).

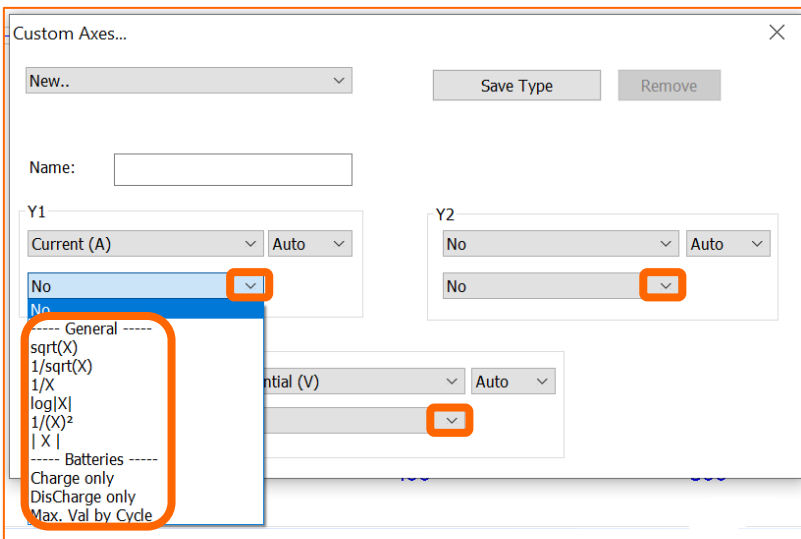


Figure 7: Type of treatment which could be defined for each axes



4

In the "Name" box, define a name for your customized type. Then, save it by clicking on "Save Type".

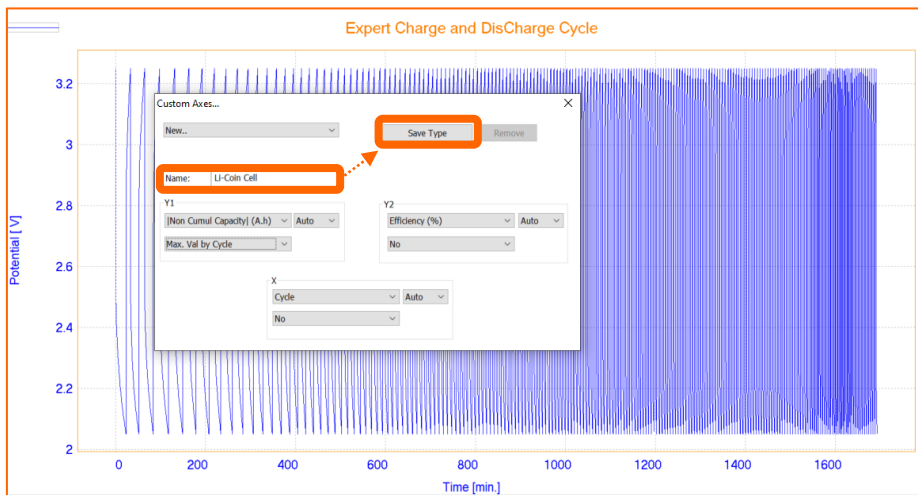


Figure 8: Define a name and save the new customized type of curve

5

Now the new curve type is available in the "Type" menu. It can be selected at any time.

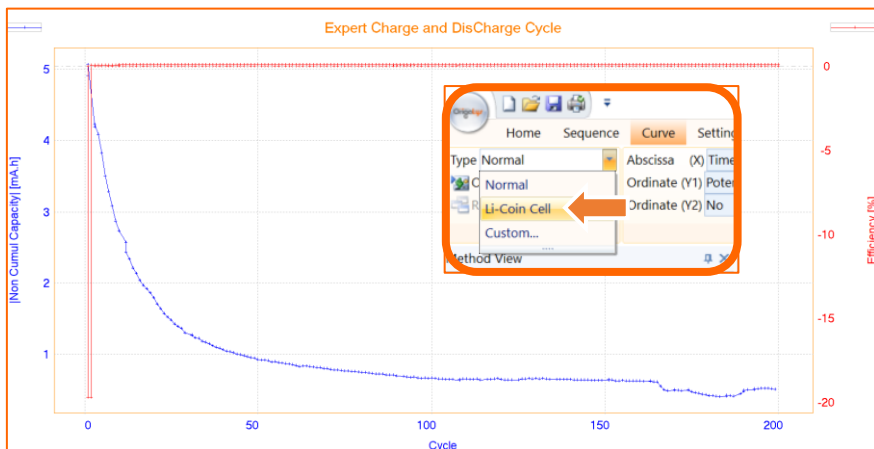


Figure 9: New curve type available in « Type » menu



AXES OF CURVE RIBBON

In the axis part of curve ribbon there are three menu for three axes (X, Y1 and Y2) too. For each axes, it is possible to change the data as it is show in figure 10.

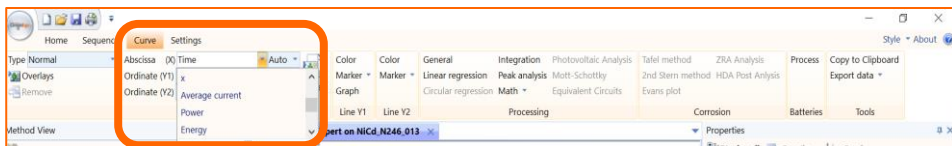


Figure 10: Axis part of Curve ribbon

For example, figure 11 shows curve of Time versus Energy for Li-coin cell after 200 cycles of charge-discharge.

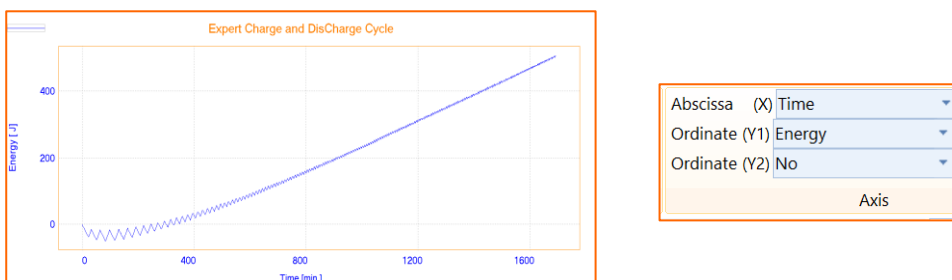


Figure 11: Curve of time vs Energy for Li-coin cell after 200 cycles of charge-discharge

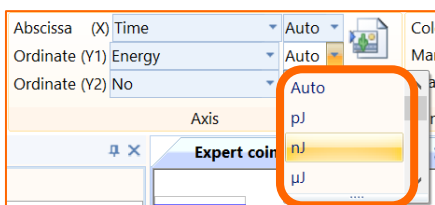


Figure 12: Changing the units of axes

TIPS: It is also possible to change the unites of each axis through the front box of each axes (Figure 12).



INSTRUMENT AND ELECTRODES



Figure 13: OrigaFlex OGF500

Electrode setup

Battery	Li-coin cell 3V, 65 mAh
Electrode system	2 electrodes
Instrument	OrigaFlex OGF500
Software	OrigaMaster



Figure 14: Li-coin cell

CONNECTION: The battery was connected to OGF500 thanks to battery cell holder as it is shown in figures 13 and 14.

Consult us to get more information on these accessories.

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