Quick Guide

elements
enabling technologies for Life Science

EMCR - Protocol generator

Revision History

Date	Version	Description
23/04/2024	1.0	First version of document

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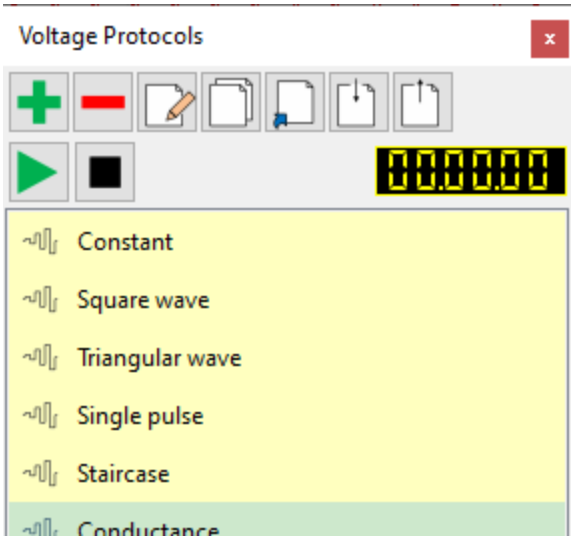
Introduction

This short guide illustrates how to use the protocol editor tool of EMCR software.

The protocol editor contains options for setting up various parameters of data acquisition: the acquisition mode, the trial length and the shape of the command waveform.

When a new acquisition protocol has been configured, this is automatically saved and reopened within the protocol list when a new session of the software is launched.

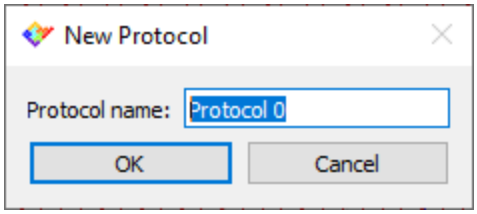
EMCR is equipped with a series of editable commonly used default protocols; alternatively, users can create their own protocols from scratch using the create new protocol button.



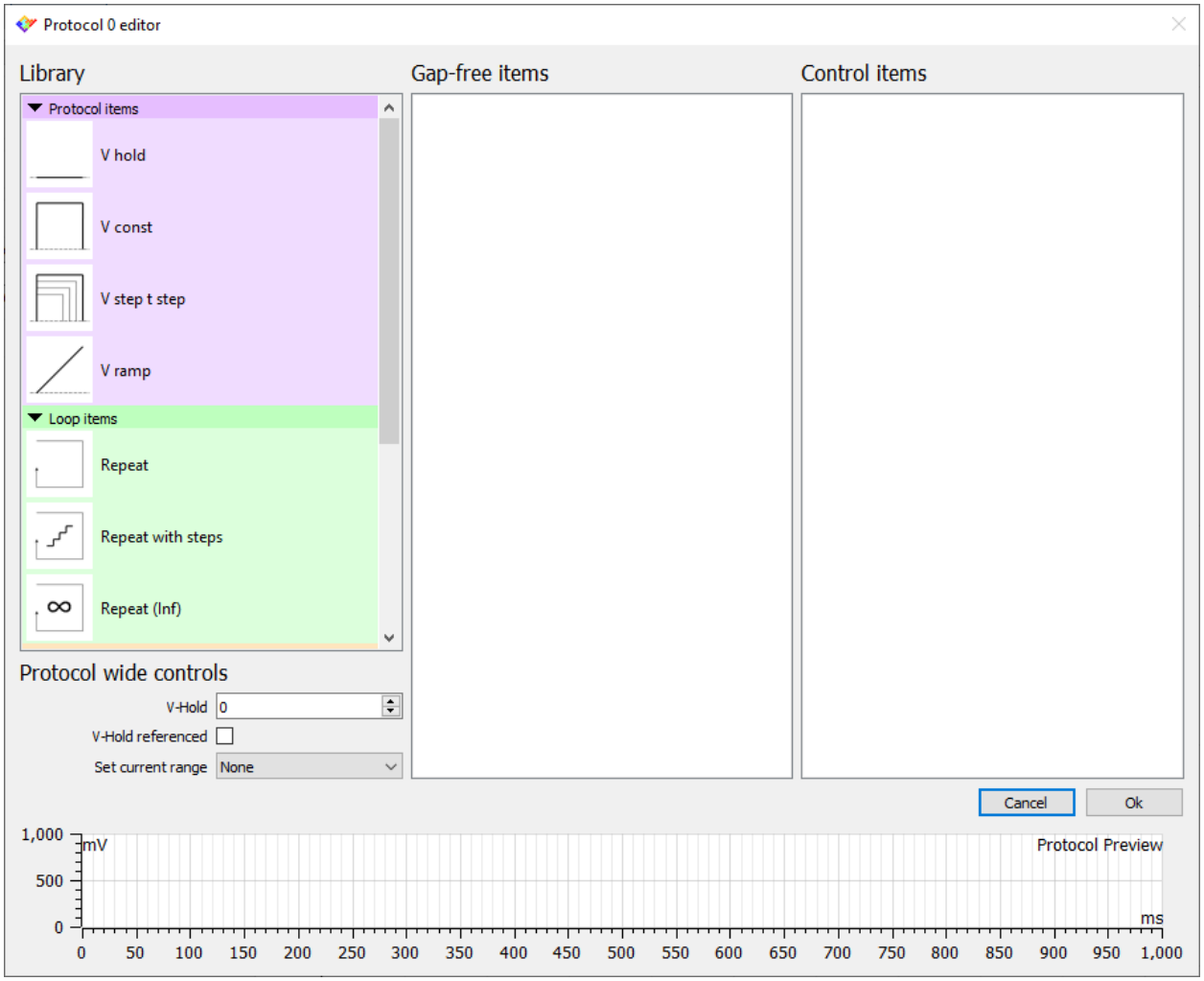
The protocols that are in the list can be modified, duplicated, imported and exported using the dedicated buttons. Place the mouse cursor over the buttons to bring up the pop-up window with a short description of its use.

Click on “create a new protocol” button to start to design the new protocol.

The first step is to type the name of the protocol. Click ok and proceed with the creation of the waveform.



The protocol editor tool consists of a series of items (grouped in the library box) that can be used to assemble the desired waveform.

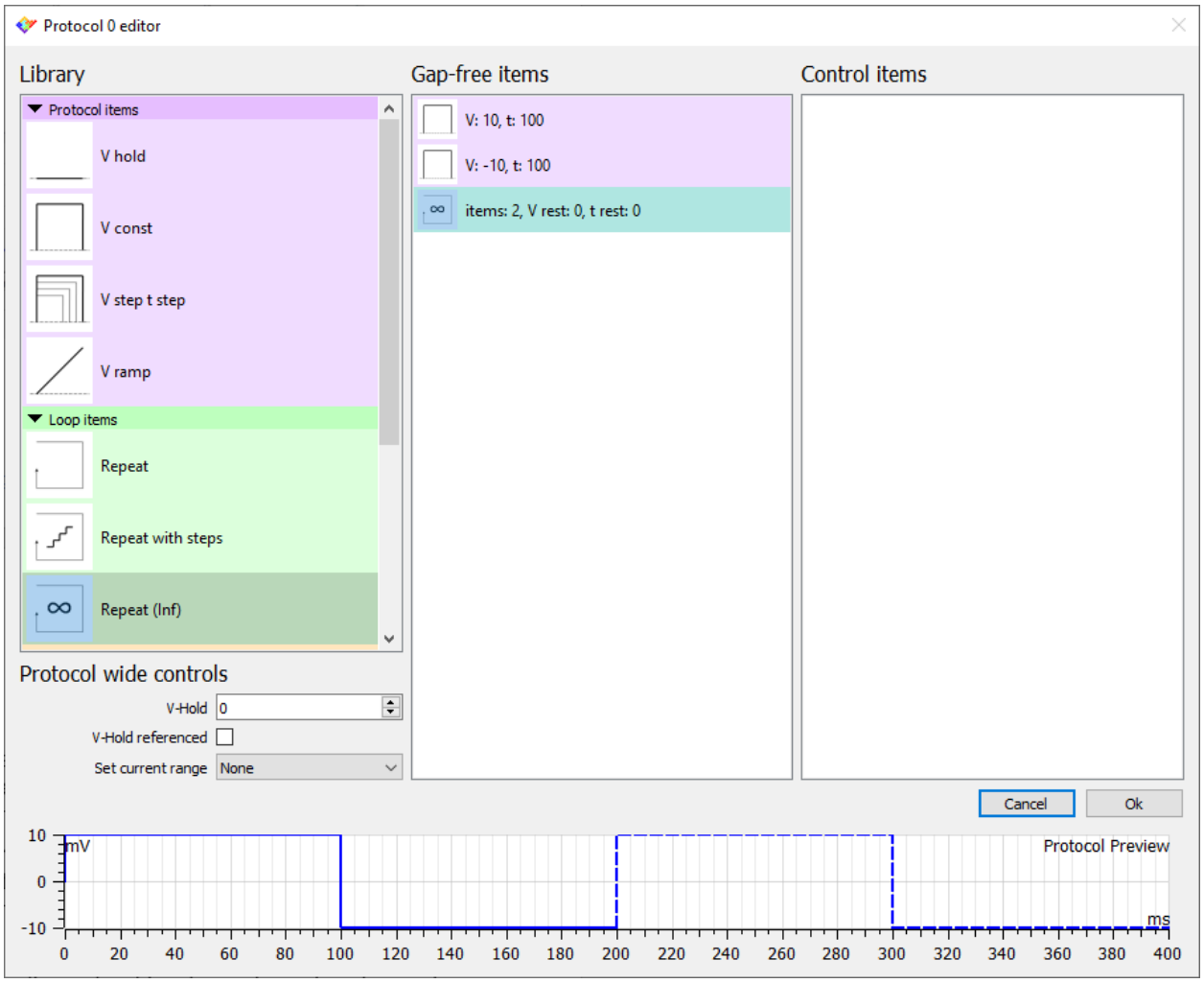


The items consist of a holding potential, a constant potential, a series of steps with variable voltage and duration, and a ramp. The items of the library must be dragged into the “Gap-free items” and “control items” boxes to start to set the waveform.

The protocol wide control section allows to set the holding voltage, as well as to associate a current range to the protocol. If needed, check the V-hold referenced box to make all the voltage values of the protocol connected to the set holding potential.

Design a gap-free protocol

As an example, let's design a continuous square wave pulse having a 20mV amplitude that oscillates uniformly about the holding level. Click on "create new protocol" and select the gap-free modality.



From the protocol items list drag two "V const" items into the "gap-free items" box. Once they are in the box, double click on them to set the duration and the amplitude of each. Set the first constant voltage to +10 mV and set the other to -10 mV in order to define the 20mV amplitude of the square wave. Then, scroll the library to find the "loop items" list. The loop items allow to

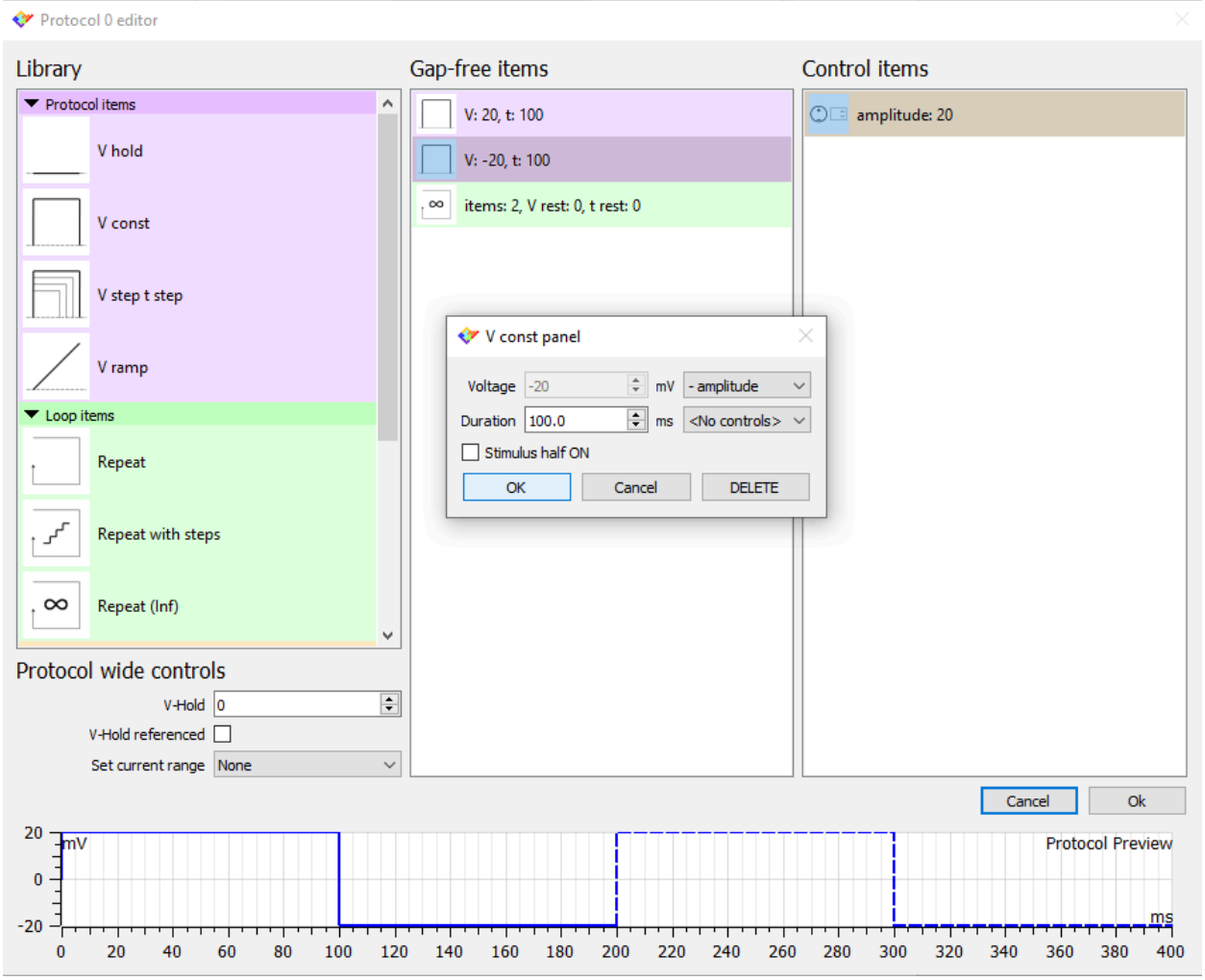
repeat a set of items either for defined or undefined times. Drag a “repeat (inf)” item in the sweeps item box and double click on it to set the number of items that you need to repeat indefinitely (in this example set 2).

After clicking “OK” the second half of the waveform preview becomes dashed to indicate the portion of the waveform that will be repeated indefinitely (if you cannot see the whole waveform preview right click on it with the mouse to autoscale the graph).

In the “protocol wide control”, tick the V-hold referenced checkbox: in doing so, any change in the holding voltage is reflected in all the voltage values of the waveform. On the contrary, when unchecked, the holding voltage that is set in the V-hold box is automatically applied only when the “stop recording” button is pressed.

The control items

The “protocol wide controls” are always quickly accessible by double clicking on the name of the protocol within the protocols list. The same can also be set for all the other parameters of the waveform by using the control items. In other words, the control items can be associated with the Gap-free items in order to quickly modify the desired parameters without opening the protocol editor.



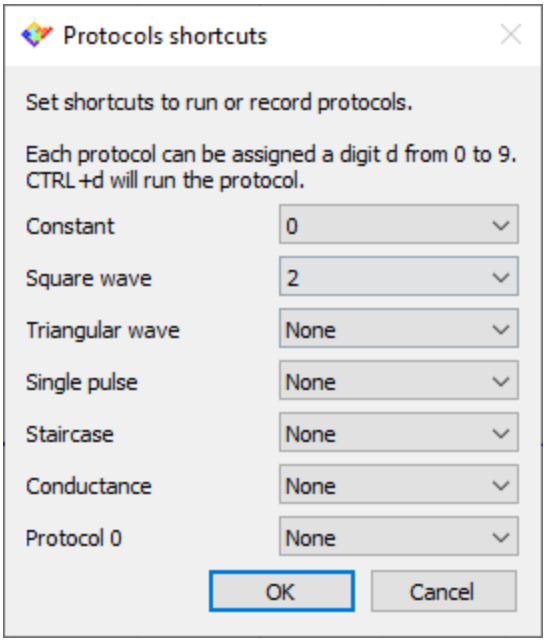
As an example, let's add a control item in order to rapidly change the amplitude of the square wave of the previous example. Drag the voltage control item in the control item list, and double click to rename it and change its value.

Then double click on the "V const" items (within the "Gap-free items" list) and link the value of their Voltage parameter to the newly created control item. Now the control of the amplitude can be quickly set by double clicking on the protocol name (within the protocols list), without the need to open the protocol editor.

Run a protocol with a keystroke action

The shortcuts tool lets you run a protocol with a keystroke action. Click on the "set protocol shortcuts" button and assign a number to the desired protocol.

The assigned number appears in parenthesis next to the protocol name. To run the protocol, press the control key on your keyboard together with the associated number.



Import and export protocols

If you have accidentally deleted a default protocol from the protocol list use the “import protocol” command to call it back.

Click the “import protocol” and then the “browse” buttons and select the “default.yaml” file located in the path user > EMCR > Protocols. Tick the checkbox of the protocol that you need to call back and press OK.

The protocols included within the protocol list (i.e both the default protocol customized by the user and those created from scratch) can be saved as a .yaml file using the “export protocol” command. In this way if you accidentally remove a protocol that is not in the default list you can simply call it back by applying the procedure described above.