Quick Guide

elements
enabling technologies for Life Science

eONE - connection diagram

Revision History

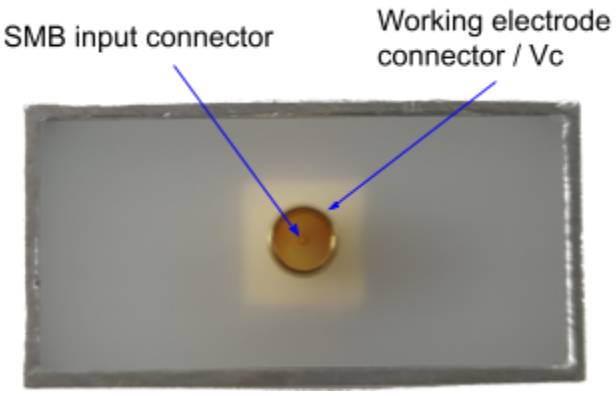
Date	Version	Description
11/10/2021	1.0	New document format

Acronyms

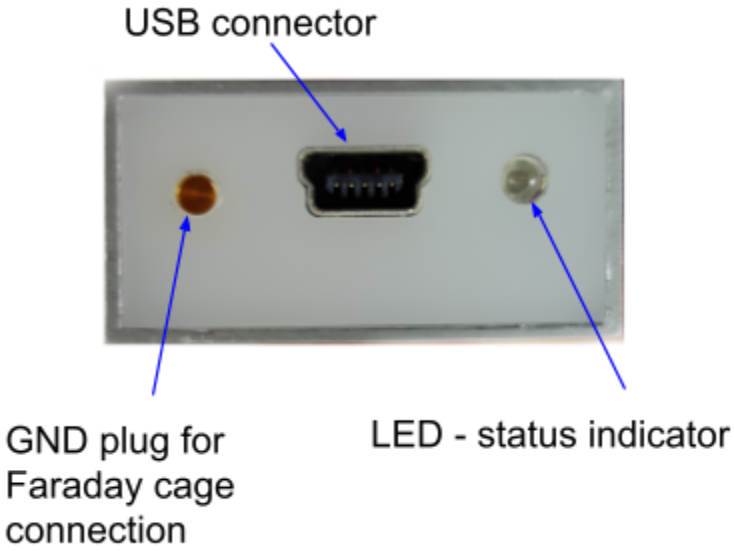
eONE: Elements single channel device family.
e1b: Elements single channel device, “b” version
e1L: Elements single channel device, light version.
e1+: Elements single channel device, plus version.
e1HC: Elements single channel device, high current version.
IN: input pin.
GND: ground. The potential of the Faraday cage.
REF: reference.
DUT: device under test. Usually a flow cell with a membrane or a nanopore, but can also be a model cell with resistors and/or capacitors.
BLM: bi-layer membrane. A membrane composed of 2 layers of phospholipids as happens in cell membranes.
EMI: electro-magnetic interference. Environmental noise affecting the measurements.

Front and rear view

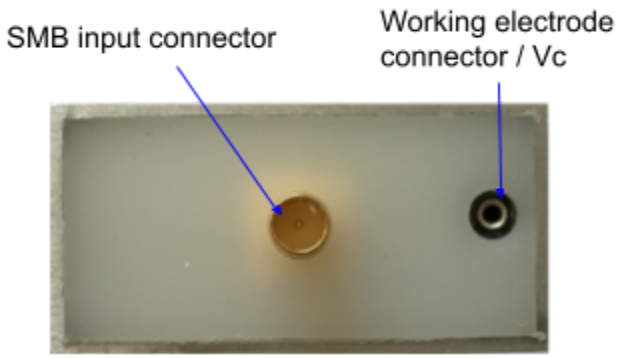
e1L front-side connections



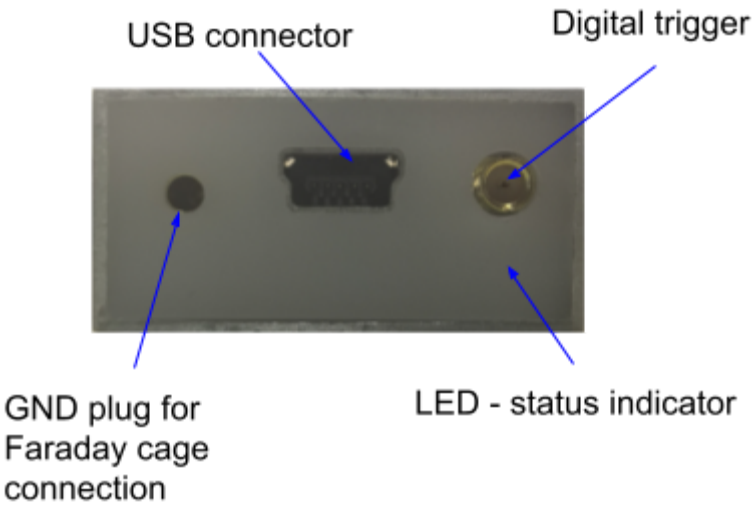
e1L back-side connections



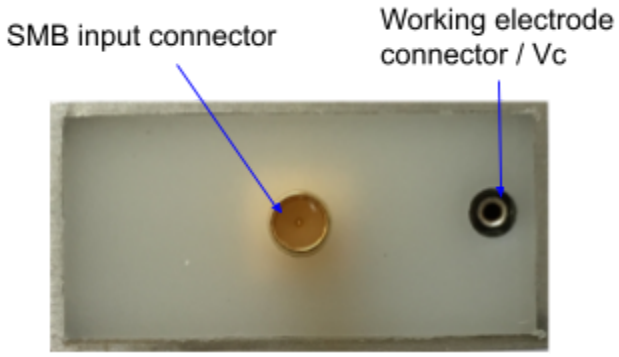
e1+, e1HC front-side connections



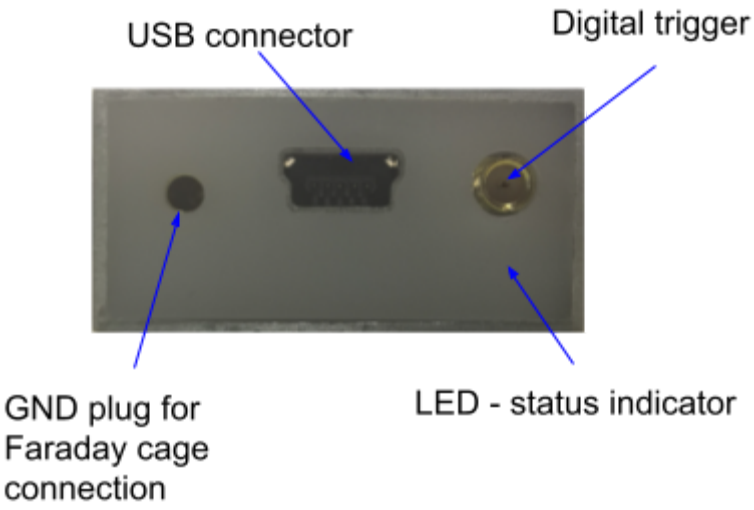
e1+, e1HC back-side connections



e1b front-side connections



e1b back-side connections

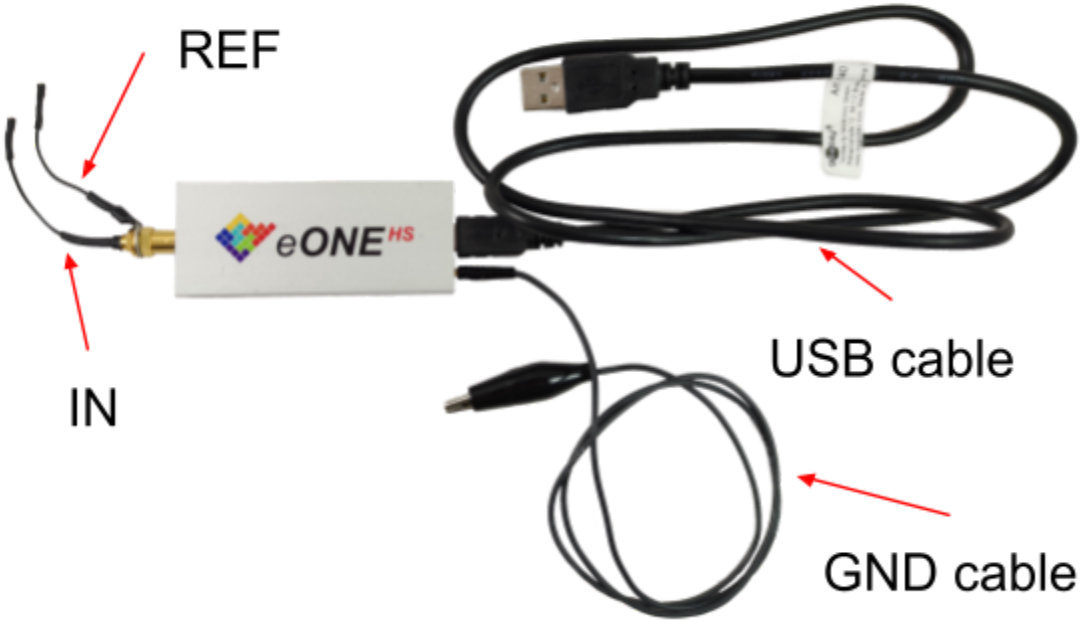


eONE setup

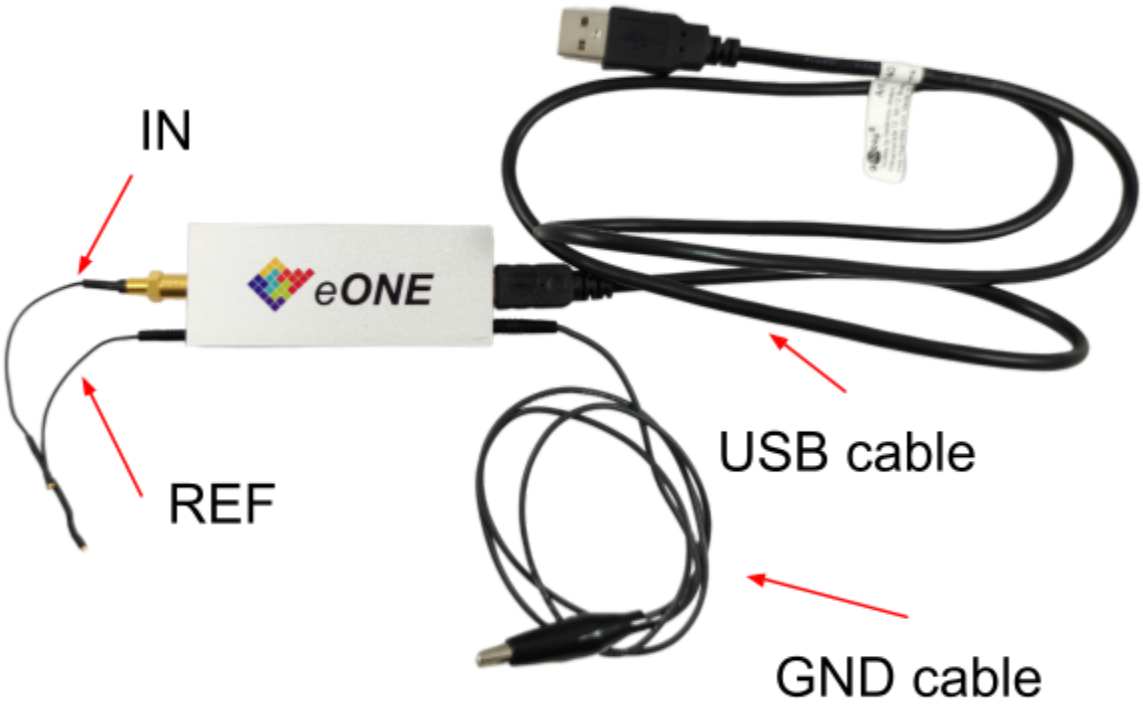
The eONE is directly plugged to the computer via a USB cable and it forms a complete and stand-alone system. The USB cable is used for both data communication and as the power supply.The device should be placed in a Faraday cage that must be connected to the GND plug using the GND cable to shield it from EMI.

IMPORTANT NOTE: do not connect the Faraday cage to any part of the device other than the GND plug in order to avoid short circuits. A good strategy is to add a layer of insulating material (e.g. tape) to the internal surface of the Faraday cage.

e1L

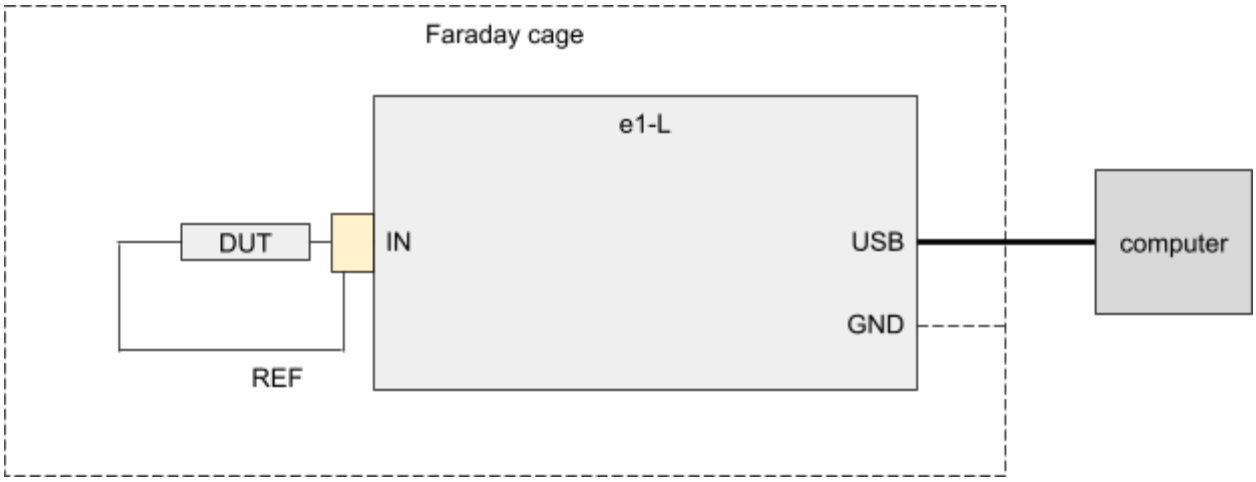


e1b, e1+, e1HC

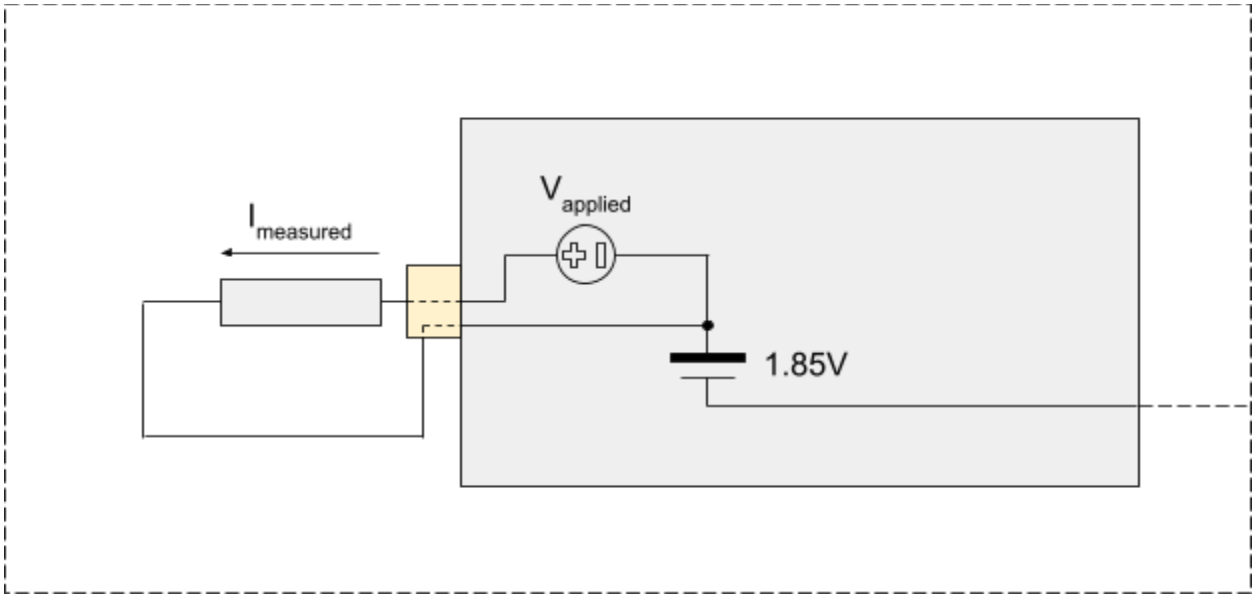


e1L

The figure below shows how to connect the e1L to the DUT, to the Faraday cage and to the computer.

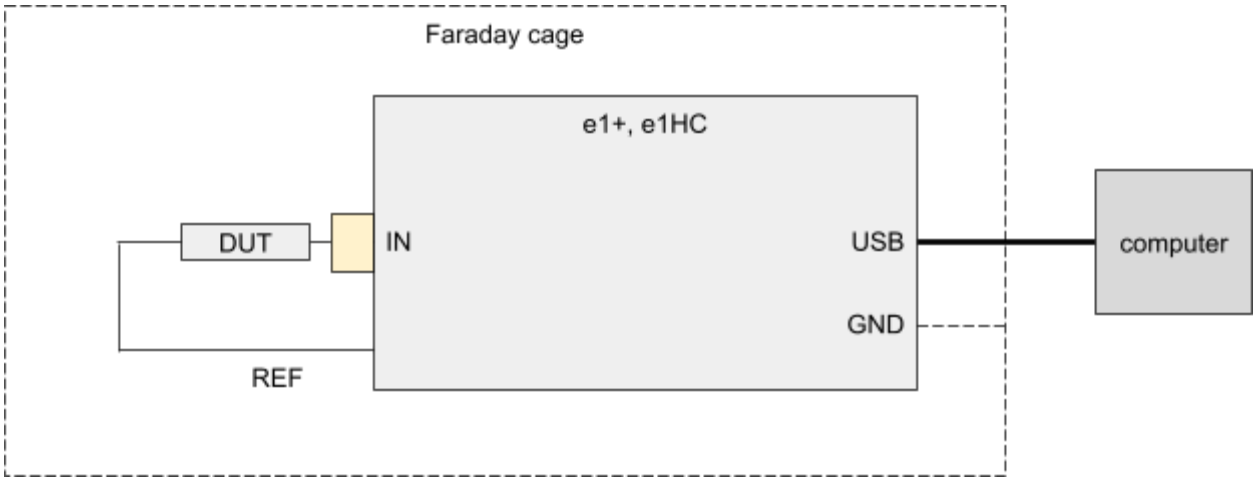


The scheme below shows how the control voltage is applied and the polarity of the acquired current.

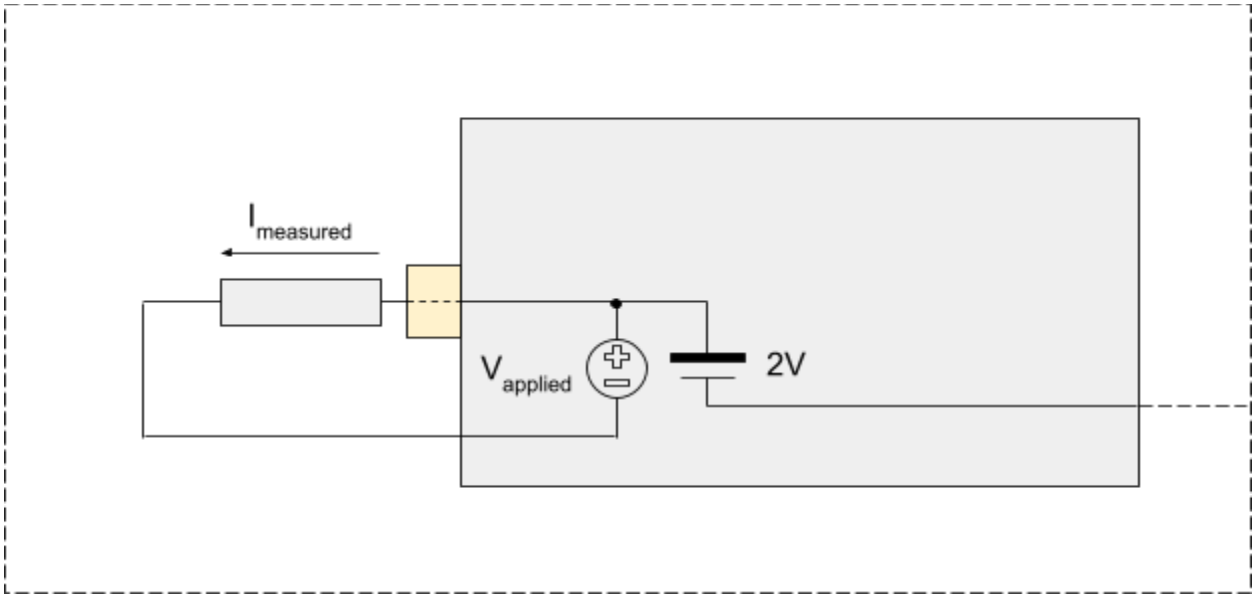


e1+, e1HC

The figure below shows how to connect the e1+ and e1HC to the DUT, to the Faraday cage and to the computer.

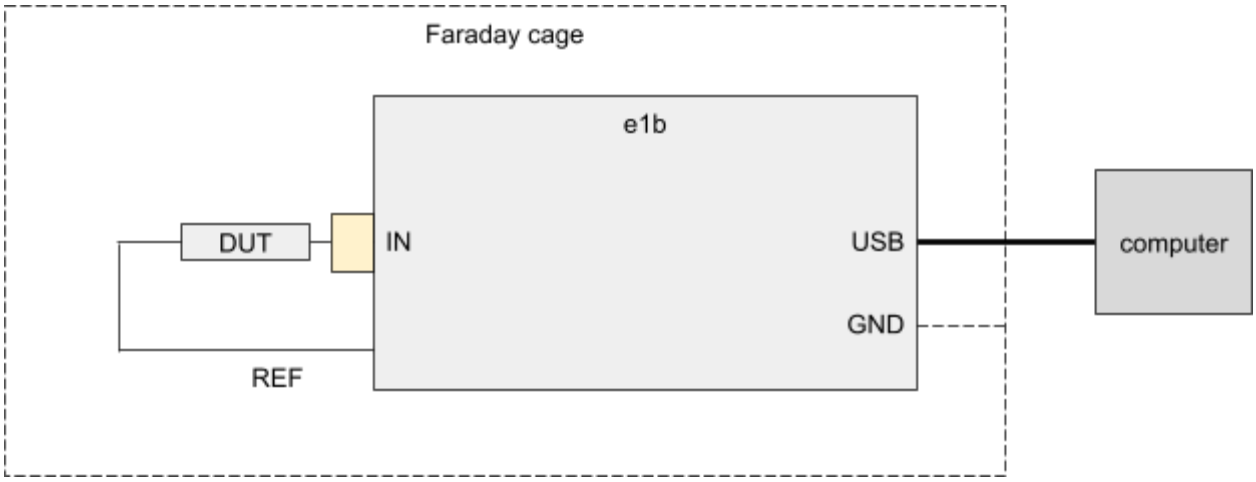


The scheme below shows how the control voltage is applied and the polarity of the acquired current.

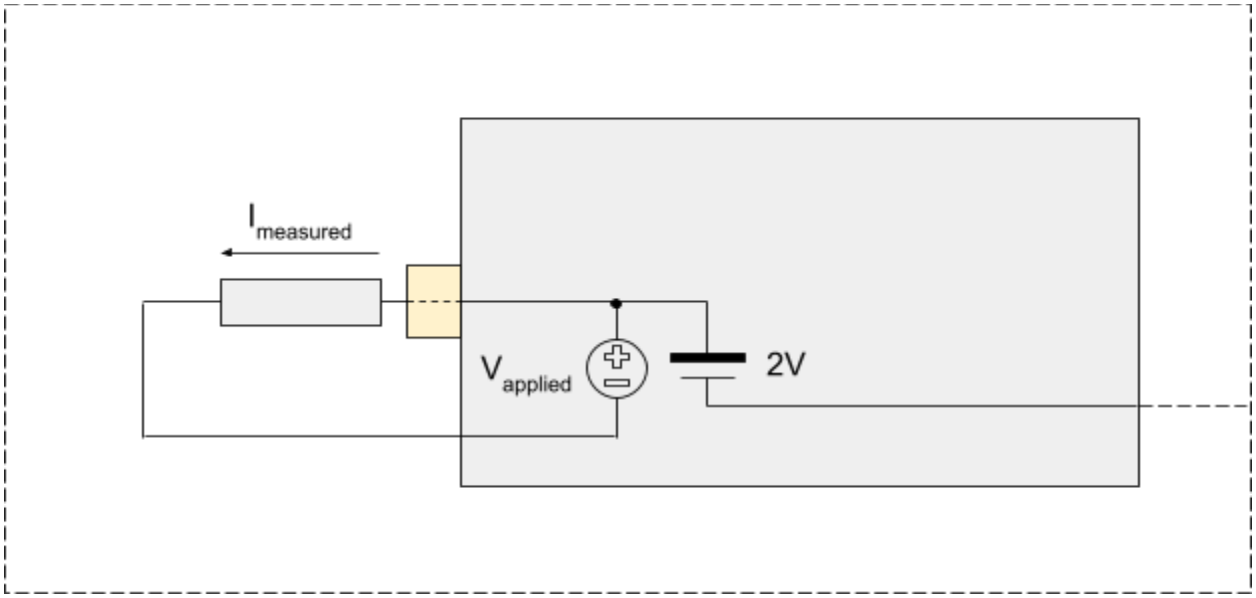


e1b

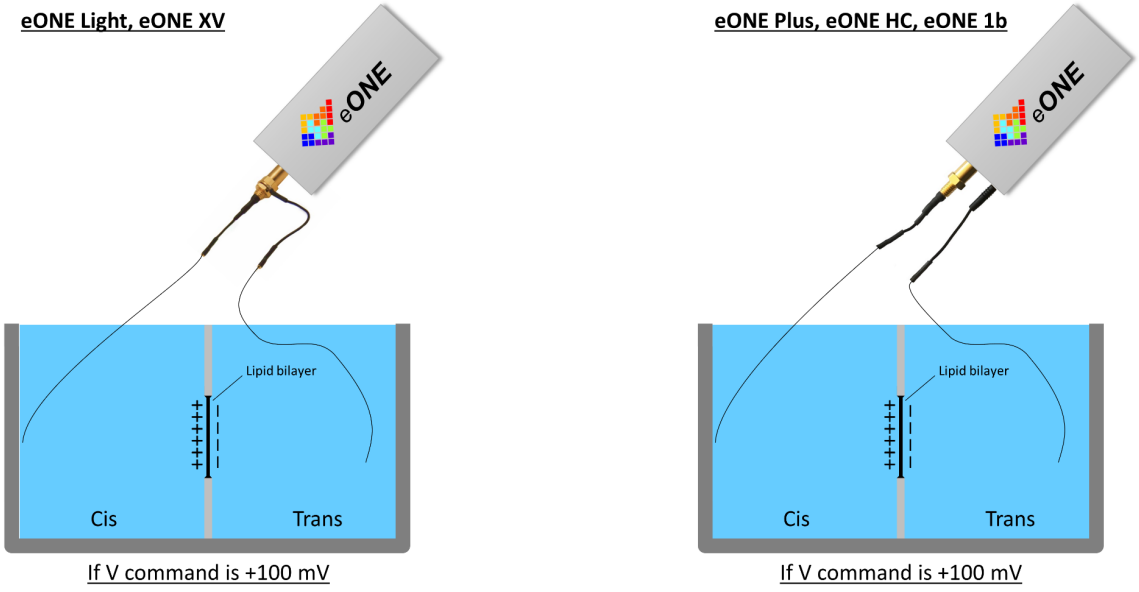
The figure below shows how to connect the e1b to the DUT, to the Faraday cage and to the computer.



The scheme below shows how the control voltage is applied and the polarity of the acquired current.



The figure below shows the polarity of the lipid bilayer membrane when a +100 mV bias voltage is applied.



Connections best practices

The way the experiment is setup greatly affects the final quality of the measurements, especially in terms of signal to noise ratio.
In the following some best practices are described to help you get the most out of your device.

- **Shielding with a Faraday cage**. It is strongly recommended to enclose the device and the DUT in a Faraday cage that encloses the whole experimental setup. The ELEMENTS Faraday box (item 000760) has been designed for this purpose. The Faraday cage must be connected to the GND plug, using the provided GND cable.
  Important note: the GND connector pin must fit completely within the eONE amplifier's GND plug, otherwise the connection won't be good enough to provide proper grounding:

- **Avoid coupling with the Faraday cage**. If you are using a Faraday cage try to keep the device, the DUT and the cables connecting them as far as possible from the Faraday cage to minimize the possible creation of stray capacitances.
- **Reduce the length of cables connecting the DUT**. The longer the cables, the more likely they will collect EMI or create stray capacitances with nearby conductive surfaces (such as the Faraday cage).
- **Avoid other instruments within the Faraday cage**. If you are using a Faraday cage, the eONE is not shielded against the EMI from other instruments within the same Faraday cage. So, if possible, remove them or keep them off to reduce the noise as much as possible.
- **Select instruments within the Faraday cage**. If you need to add other instruments within the same Faraday cage proceed as follows: check the noise level in standard

conditions (i.e. with the Faraday cage closed and only the eONE amplifier inside). Afterwards, add one additional device at a time, turn it on, and check if and how the noise is affected. These checks should be performed with the eONE configured as it is during the experiment (especially by setting the same current range and sampling rate) and with the faraday cage closed.

- **Proper grounding**. If you are using a desktop computer, be sure to power it up with a grounded power outlet or power strip. If you are using additional instruments within the Faraday cage be sure to power them up from a common power outlet or power strip.