EDR4 - Current offset compensation

Revision History

| Date	Version	Description
26/04/2022	1.2	Updated to software version 1.0.19
05/07/2021	1.1	Updated to software version 1.0.9
15/04/2021	1.0	First version of document

Introduction

In the very low current range in which Elements amplifiers usually work, even few tens of uV due to internal opamp offsets or unwanted electrode potentials can give rise to a not negligible current (considering a typical DUT resistance in the tens of kΩ or MΩ range). To compensate these currents Elements devices have some compensation and correction methods: Automatic digital offset compensation and manual offset corrections.

Automatic digital offset compensation

To compensate for the voltage offset due to internal opamp offsets or unwanted electrode potentials, Elements devices have an internal calibration procedure that can be activated by pressing the Digital Compensation button .

The digital offset compensation circuit modifies the voltage applied to the device under test in order to compensate for electrode voltage offset. This way, when the user applies 0 V the actual potential applied on the DUT is slightly different so that the net current flowing is as close as possible to 0. The range of voltage compensation varies depending on the particular Elements device.
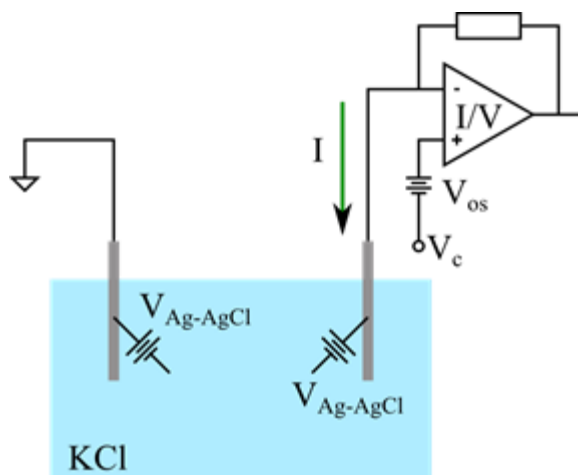

Notice that, in order to successfully compensate the offset, a conductive path must be present on the input, e.g. a DUT with a non infinite resistance. Trying to compensate for the voltage offset with an open input will result in a significant offset applied to the voltage while the current stays fixed.

The compensation usually needs only a few seconds and during the compensation procedure it is not possible to apply any voltage protocol. To return to normal operation, uncheck the Digital Compensation button. The compensation value remains stored internally and added to the Control Voltage Vc.
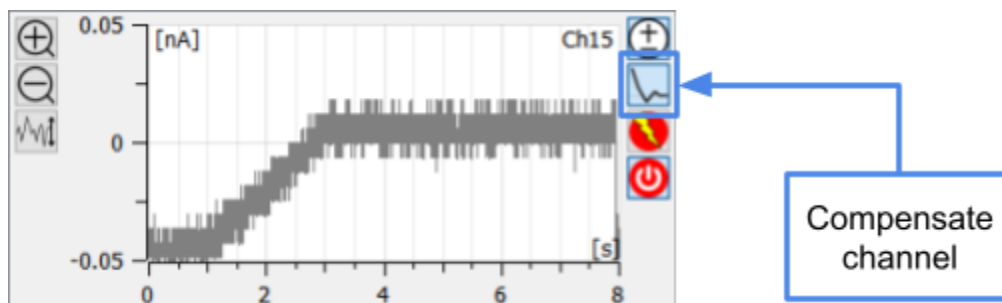
Manual offset corrections (for multichannel devices only)
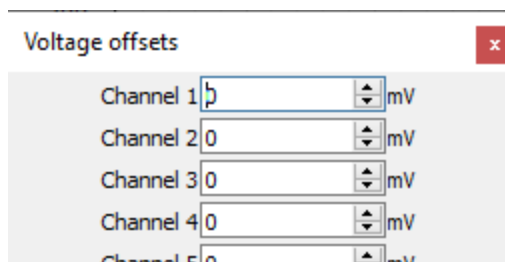
The Voltage offsets widget contains the controls to individually and manually adjust the voltage offsets of the different input channels to reduce as much as possible the small offset differences between the channels that can be still present after the automatic digital compensation.

The selected values are added to the value applied by the automatic digital offset compensation function described before.

Notice that this feature can be also used to add a constant voltage to a specific channel while a voltage protocol is applied to all the channels.

NOTE: these values do not affect the voltage value displayed on the plot, used for the analyses or saved during recordings, exactly as the voltage applied by the digital offset compensation does.

For some devices the offset voltage panel also contains the values applied by digital offset compensations

Voltage offsets			x
	manual		auto
Ch.1	0		-5.4 mV
Ch.2	0		-1.2 mV
Ch.3	0		-5.4 mV
Ch.4	0		+4.8 mV
Ch.5	0		-1.4 mV
Ch.6	0		+5.4 mV

The contribution of the digital offset compensation is shown as a text and it is updated if the

digital offset compensation button [icon] is clicked.