ePatch

The world's smallest integrated patch clamp amplifier and data acquisition system for whole-cell and single-channel recordings.

ePatch integrates a low-noise amplifier, pulse generator and a digitizer directly within a small headstage only 42 x 18 x 78 mm that is connected to the USB port of a laptop without the need for any other external bulky digitizer or control unit.

Technical specifications:

- Open input (RMS) noise:115fA rms @ 1kHz; 460 fA rms @ 10 kHz; 3.6pA rms @ 100 kHz
- Current ranges: ±200pA (Gain 2.25GΩ), ±2nA (Gain 225MΩ), ±20nA (Gain 22.5MΩ), ±200nA (Gain 2.25MΩ)
- Voltage pulse generator range of ± 500 mV
- Digital filters: cutoff frequencies in the range between 62,5 Hz and 100 KHz
- Max sampling rate: 200 kS/s
- C-fast – C-slow – R-series – P/N compensations
- C fast compensation range: 0-11 pF
- C Slow compensation ranges: C in 0 - 250 pF, τ in 0 - 3300
- R series correction ranges: R in 0 - gain, τ in 0 - 1000µs
- R series correction ranges: τ in 0 - 1000µs
- Zap pulse
- Auto electrodes voltage offset fine compensation
- USB powered
- Dovetail or rod bar mounting
- Size & Weight: 42 x 18 x 78 mm, 200 g

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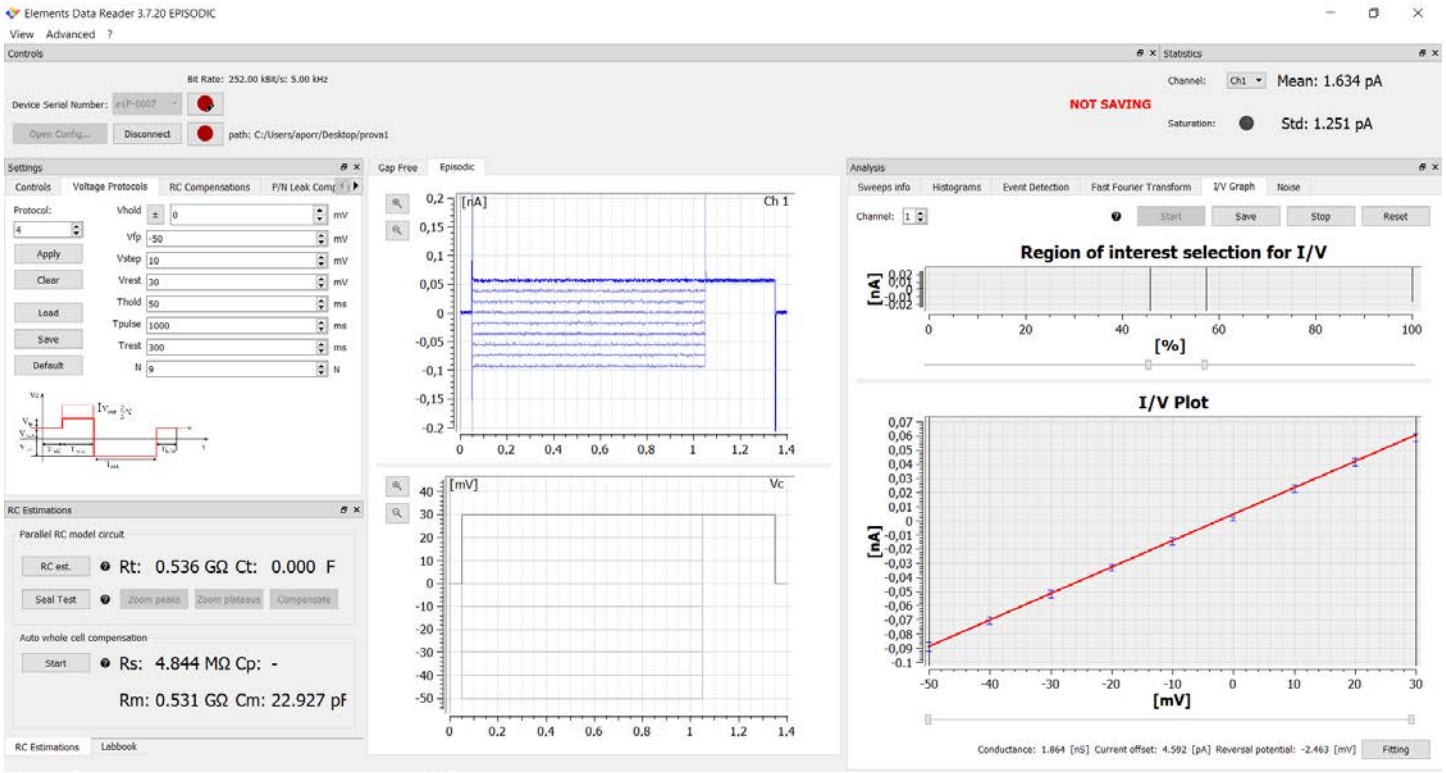
EDR3, Elements data reader software interface

EDR3 software is the patch-clamp electrophysiology software developed and released by Elements for easy control of the ePatch amplifier



The figure shows the EDR3 software interface. The voltage-step applied protocol is designed using the protocol editor on the left side of the screen. The "I/V plot" analysis tool automatically builds in real time the I/V graph of the selected region and fits datawith a linear equation. Both Current/Voltage raw data and fitting results can be exported as .csv file.

Features:

- Customizable user-friendly Windows-format interface
- Real-time display of voltage and current digitized data
- Parametric voltage protocols editor
- Automatic or manual control of compensation settings
- Membrane parameters estimation to keep track of cell health
- Continuous C-membrane and R-seal monitoring during the recording
- Real-time data analysis (I/V graph, event detection, dwell time, FFT, etc.)
- Digital LabBook
- Two data output saving formats: .dat and .abf
- Available for Windows and Mac OS

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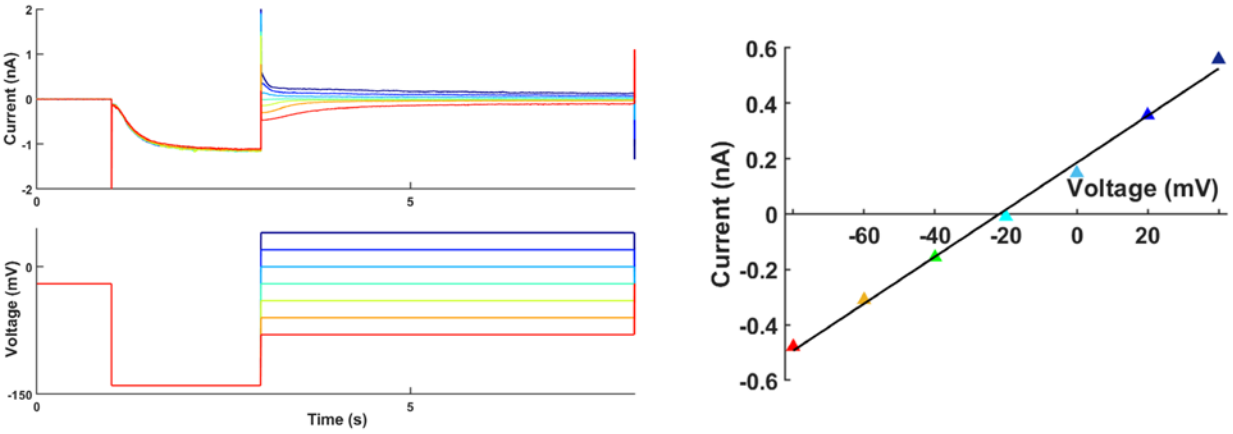
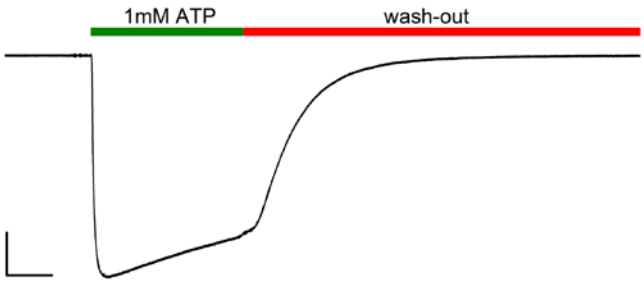
Case studies

Calculating the reversal potential of HCN2 channel



HCN2 channel currents activated by hyperpolarizing prepulse to −120 mV, followed by a test pulse to potentials between −110 and −60 mV (left panel). Data were saved in .dat format and analyzed off-line using Matlab software (The MathWorks, USA). Plotting the current at the beginning of the test pulse against the test pulse potential provides the instantaneous current–voltage relation. Fitting data with a linear regression yields the reversal potential of -21,88 mV (right panel), in agreement with the experimental conditions (25 C°; $[K^+]_{in}$ 130mM; $[K^+]_{out}$30mM; $[Na^+]_{in}$ 10mM; $[Na^+]_{out}$ 110mM) and the published P_{Na}/P_K (Biel et al., Physiological reviews; 2009, 89:3, 847-885).

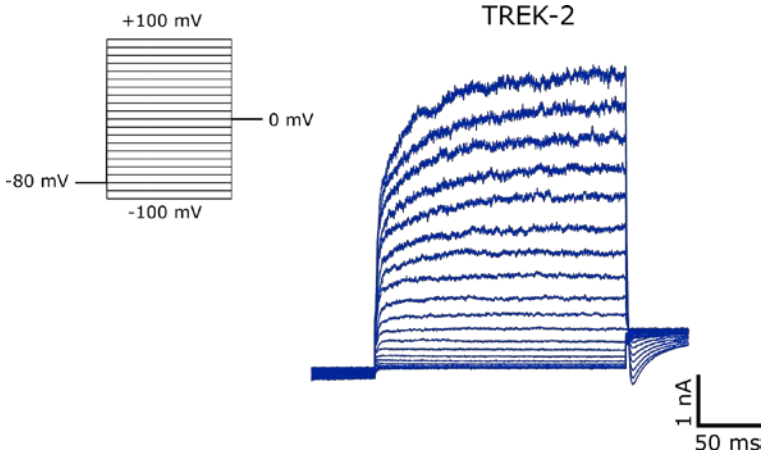
Investigating ATP response in P2X2 receptor



ATP-evoked inward current of P2X2 receptor transiently expressed in mammalian HEK293T cells. The cell was held at -40mV under the whole-cell configuration. Scale bar 500 ms/1nA. ATP was delivered to the cell for ~ 1.5 s by means of an automated pinch valve prefusion system and then rapidly washed out (green and red bar respectively). The experiment was performed at RT; recording solutions were prepared as in Habermacher et al 2016 (eLife, 5:e11050). Data courtesy of Dr F. Gasparri and Prof A. Moroni, University of Milan, Italy

Recording human TREK-2 currentsinexcised patch

Macroscopic current recording of TREK-2 K2P K^+channel obtained in voltage clamp mode from an inside-out patch of HEK293 cellstransiently transfected with a vector expressing TREK-2.The recording solutions contained 140mM K^+ and 3mM Na^+ in thepipette, and 140mM K^+ in the bath. Data courtesy of Dr M. Arcangeletti and Prof S. Tucker, University of Oxford, UK.



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