

Introduction to the Biopac system

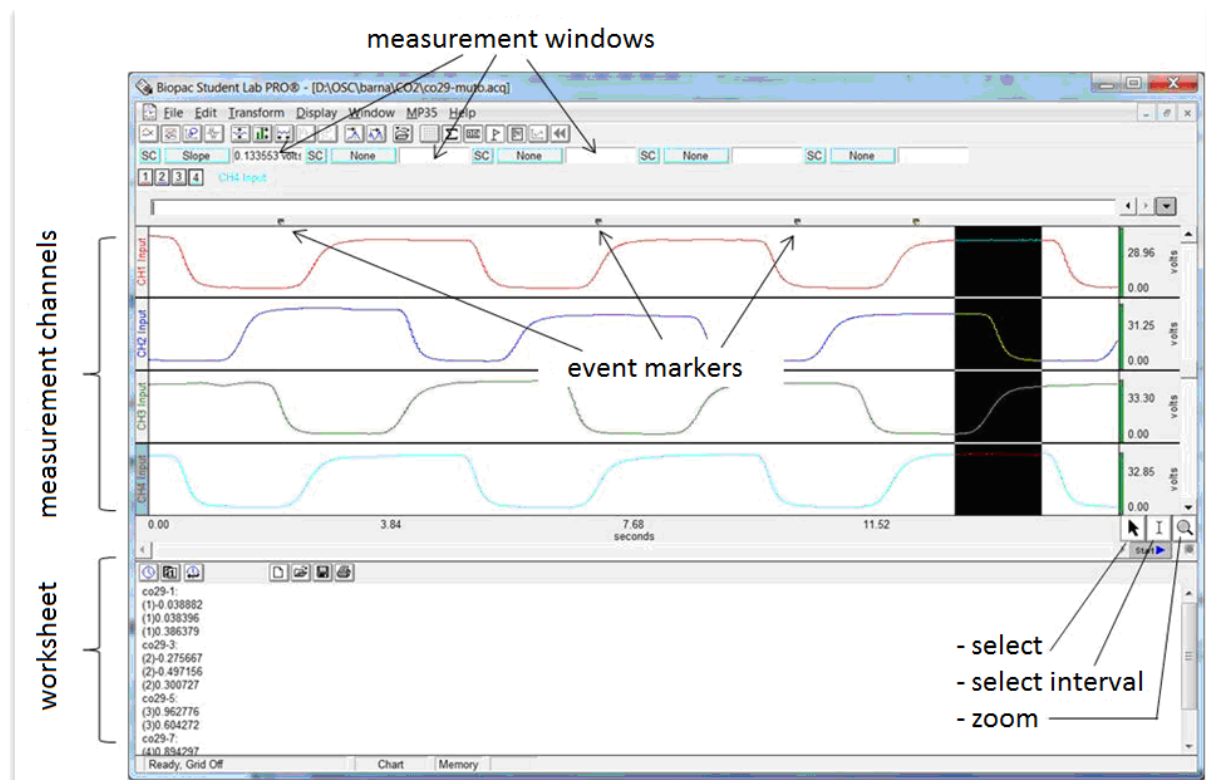
I. Aims of the practical

Getting acquainted with the use and basic functions of the *Biopac* measurement system.

II. Getting acquainted with the basic functions of a data acquisition and processing computer system

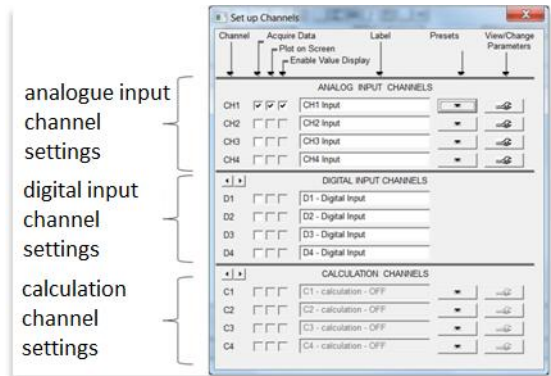
A detailed manual of the Biopac system can be found at <http://www2.szote.u-szeged.hu/dmi/downloads/fizika/Handouts/BSL%20PRO%20User%20Manual.pdf>. For practice, we recommend the free version of the software, which can be downloaded from <http://www.biopac.com/BSL-Analysis.asp>.

1. User interface of the Biopac Student Lab Pro program



2. Defining the input channels (MP36/Set up channels ...)

In the Biopac data acquisition system, we can choose between three types of input channels. There are four *analogue* channels associated with the analogue-to-digital converters; through these, we can acquire electrophysiological signals, pressure or flow signals, or the signals of dynamometers or analogue microphones. *Digital* input channels receive digital signals directly. In *calculation channels*, we can record signals derived from the signals of primary input channels (such as the heart rate derived from an ECG recording).

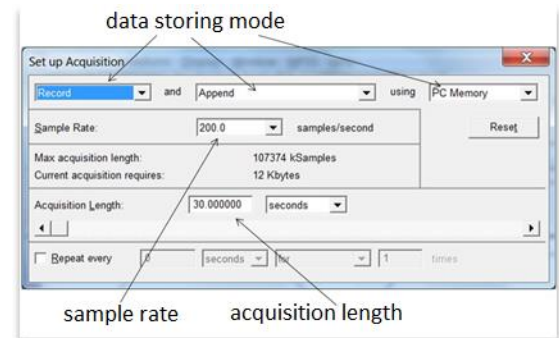


3. Setting up data acquisition parameters (MP36/Set up acquisition)

Data storing mode: in memory or on hard disc.

Sample rate: should be greater than twice the maximum frequency within the signal.

Acquisition length (data acquisition can be aborted before its completion).



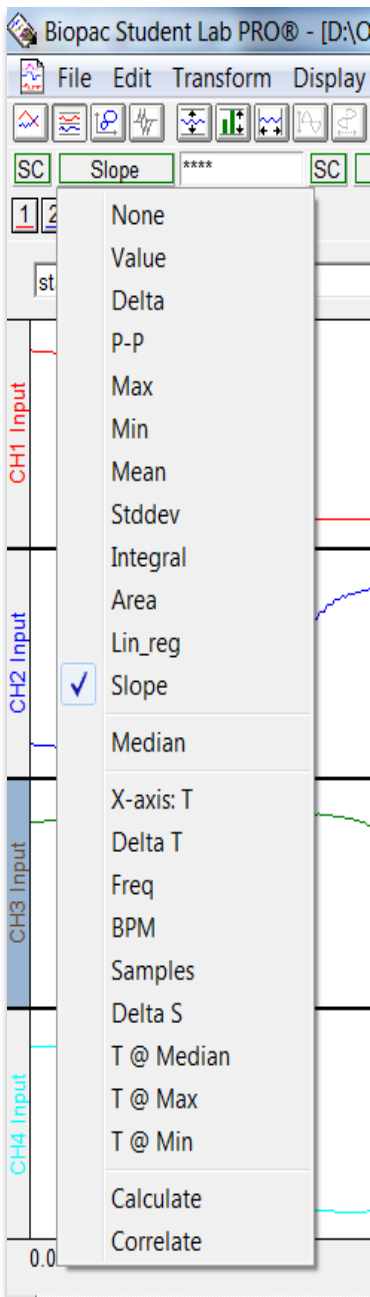
4. Data acquisition



5. Data display settings



6. Data evaluation



1. Channel selection (1, 2, etc, or SC: selected channel)
2. Evaluation of parameters:
 - *None*: no parameter read
 - *Value*: the value at the position of cursor I
 - *Delta*: the difference between the endpoints of the interval
 - *p-p*: peak-to-peak value within the selected interval
 - *Max*: maximum value within the selected interval
 - *Min*: minimum value within the selected interval
 - *Mean*: mean of the values in the selected interval
 - *Stddev*: standard deviation of the values in the selected interval
 - *Integral*: area under the curve between the endpoints
 - *Area*: the area above the line connecting the endpoints
 - *Lin_reg*: the slope of the best fit line
 - *Slope*: the slope of the line connecting the endpoints
 - *Median*: the median of the selected interval
 - *X-axis T*: the position of the cursor along the time axis
 - *Delta T*: the length of the selected interval
 - *Freq*: the frequency of a periodic signal
 - *BPM*: recurrences per minute
 - *Samples*: cursor position expressed as a sample index
 - *Delta S*: the length of the selected interval as sample count
 - *T @ Median, Max, Min*: the times associated with the median, maximum or minimum, respectively
 - *Calculate*: calculation using a custom formula
 - *Correlate*: correlation between channels

III. Measurement tasks

1. Start BSL PRO 3.7.3 and open the file C:\Temp\Measure\1-Biopac.acq. Using this file, perform the tasks below and enter the results in the Excel sheet C:\Temp\Measure\1-Biopac.xlsm.
2. Zoom in on the segment approximately between 6 s and 10 s, read the following quantities at the times indicated and enter the values in the table.
 - ECG [mV] at the peak at 6.593 s
 - Mean heart rate (integer) [BPM] between markers A and B
 - Minimum of ECG [mV] between markers A and B
 - Maximum of heart rate (integer) [BPM] between markers A and B

3. Zoom out, then zoom closely in on the peak at marker D. Read the following quantities and enter them in the table.

- Peak-to-peak distance in ECG [mV] between markers C and F
- Change in heart rate (integer) [BPM] between markers C and F
- Change in ECG [mV] between markers D and E
- Time duration [ms] between markers D and E
- Average ECG slope [V/s] between markers D and E
- Time instant of ECG peak [min] before marker D