## Introduction to the Biopac system

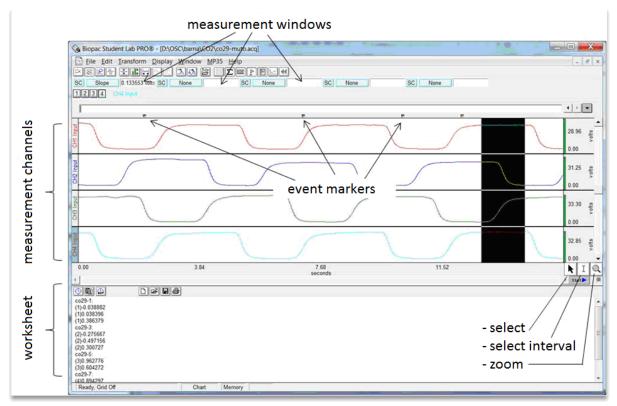
### I. Aims of the practical

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

#### 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-todigital 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).

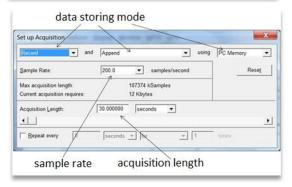
4. Data acquisition



5. Data display settings



	Set up Channel		Let	×
		Data Label on Screen nable Value Display	Presets	View/Change Parameters
analogue input		ANALOG INPUT CHAN	INELS	
-	মেম্ম্ দেও	CH1 Input	1000	-4
channel –	CH2 FFF	CH2 Input		4
aattinga	OG FFF	CH3 Input		
settings	CH4 FFF	CH4 Input		
digital input		DIGITAL INPUT CHANN	ELS	
digital input	D1 111	D1 - Digital Input		
channel -	02 11	D2 - Digital Input		
on anner	03 666	D3 - Digital Input	_	
settings	D4 FFF	D4 - Digital Input		
121 121 121 12	- 11	CALCULATION CHAN	<b>ELS</b>	
calculation	C1 111	C1 - calculation - OFF		
channel –	2 FFF	C2 - calculation - OFF		-42
channer –		C3 - calculation - OFF		
settings	C4 FFF	C4 - calculation - OFT		1 -0 1



6. Data evaluation

💊 Biopa	ac Student Lab PRO® -	[D:\O
🟦 File	Edit Transform Di	splay
	⇙⇙ङ॒Щ⋈ष	
SC S	Slope ****	SC
12	None	1
	Value	
st	Delta	
<b>—</b>	Р-Р	
ŧ	Max	
CH1 Input	Min	
5	Mean	
	Stddev	
	Integral	
±	Area	
<u> </u>	Lin_reg	
CH2 Input	Slope	
	Median	
	X-axis: T	
t	Delta T	
CH3 Input	Freq	
EB	BPM	
	Samples	
	Delta S	
	T @ Median	
D	T @ Max	
<u><u></u><u></u><u></u><u></u></u>	T @ Min	
	Calculate	
0.0	Correlate	
0.0		

1.		Channel selection (1, 2, etc, or SC: selected channel)
2.		Evaluation of parameters:
	0	None: no parameter read
	0	Value: the value at the position of cursor I
	0	Delta: the difference between the endpoints of the interval
	0	p- $p$ : peak-to-peak value within the selected interval
	0	Max: maximum value within the selected interval
	0	Min: minimum value within the selected interval
	0	Mean: mean of the values in the selected interval
	0	Stddev: standard deviation of the values in the selected interval
	0	Integral: area under the curve between the endpoints
	0	Area:the area above the line connecting the endpoints
	0	<i>Lin_reg:</i> the slope of the best fit line
	0	Slope: the slope of the line connecting the endpoints
	0	Median: the median of the selected interval
	0	X-axis $T$ : the position of the cursor along the time axis
	0	Delta T: the length of the selected interval
	0	Freq: the frequency of a periodic signal
	0	BPM: recurrences per minute
	0	Samples: cursor position expressed as a sample index
	0	Delta S: the length of the selected interval as sample count
	0	T @ Median, Max, Min: the times associated with the median,
	0	maximum or minimum, respectively
	0	Calculate: calculation using a custom formula
	0	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