1. **EIS Functional schema (Fig.1)**

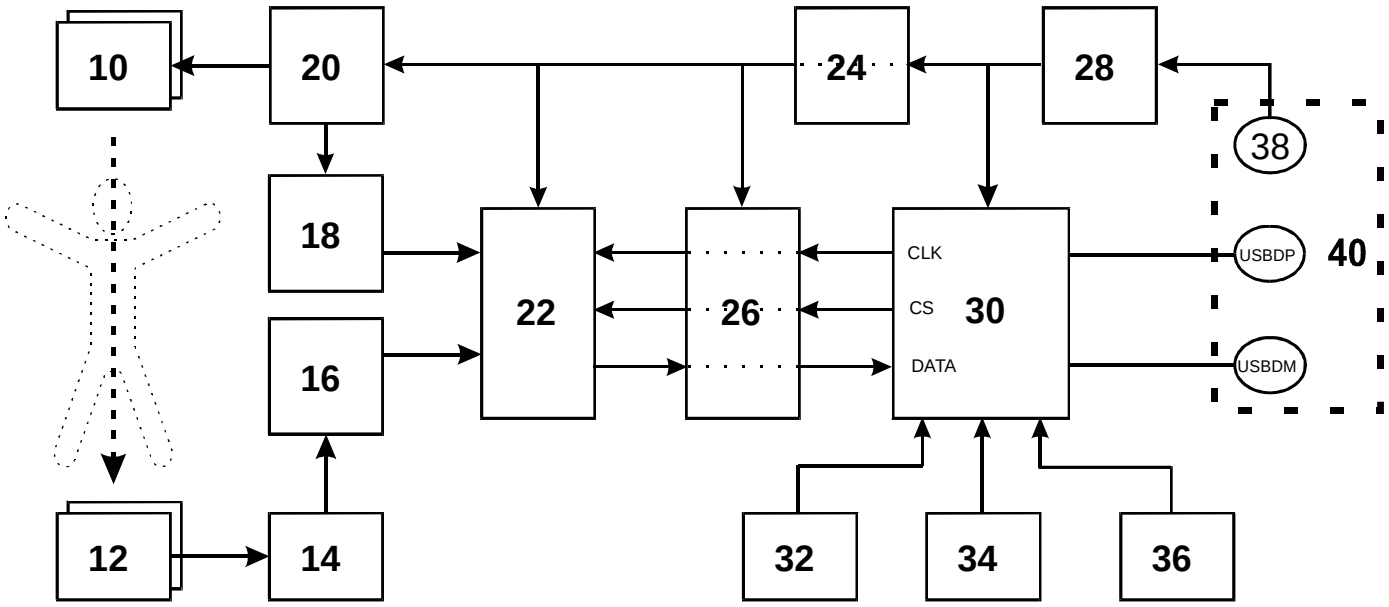


Fig.1

Comments of the figure 1
EIS device has 6 tactile electrodes connected to the patient. Each electrode can be active (10) or passive (12) and it is managed by the software. There is a filter of low frequency (14), repeaters 16, 18, a reference voltage unit (generator) 20, Analog-digital converter (ADC – serial type AD7828) (22), electrically isolation (24), electrical isolation (26) to digital buses, high frequency filter (28), USB-controller (30), generator (32), circuit (34), memory (ROM) (36), power bus (38), connectors (40) for connecting the device to the USB-port of the computer.

Signal pathway:

Block 20 generates the reference voltage signal (1.28 V) that is fed to the active electrode 10, which is connected to the patient. Then the signal passes through the patient and the passive electrode 12. The noise is filtered by pass the filter 14 and then through repeaters 16 providing

galvanic isolation, is released for processing at the analog-digital converter (ADC) 22. ADC converts the signal to digital form (digitizing). The digital code goes through a galvanic isolation (26) to USB controller 30 and then is released for the further processing to the slot 40 of the USB port of the computer.

2. EIS Output signal

EIS has electrical generator (20). It is sending the output **signal waveform. The signal waveform is rectangular, is continuous during 1 second** / per human body segment located between 2 electrodes: EIS active and passive electrodes.
This operation is realized 22 times according to a sequence as shown below in the figure 8 below. The signal is sending to EIS **Active** electrode with Frequency 700 Hz and tension U (output) = 1.28 V and
I (intensity) = 12 µA. (Figure 2)

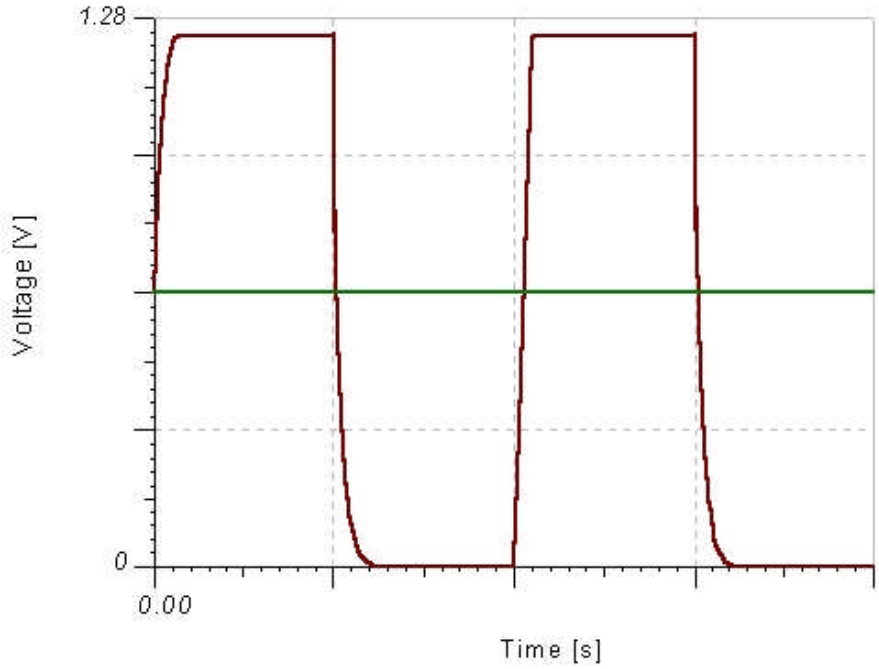


Fig.2 Output Signal waveform

3. EIS Input signal

The signal is transmitted to the EIS Passive electrode and after the passage through the body pathway , the input signal **waveform is rectangular, is continuous during 1 second and the voltage and the intensity had been changed according to the resistance of the traversed body pathway.**

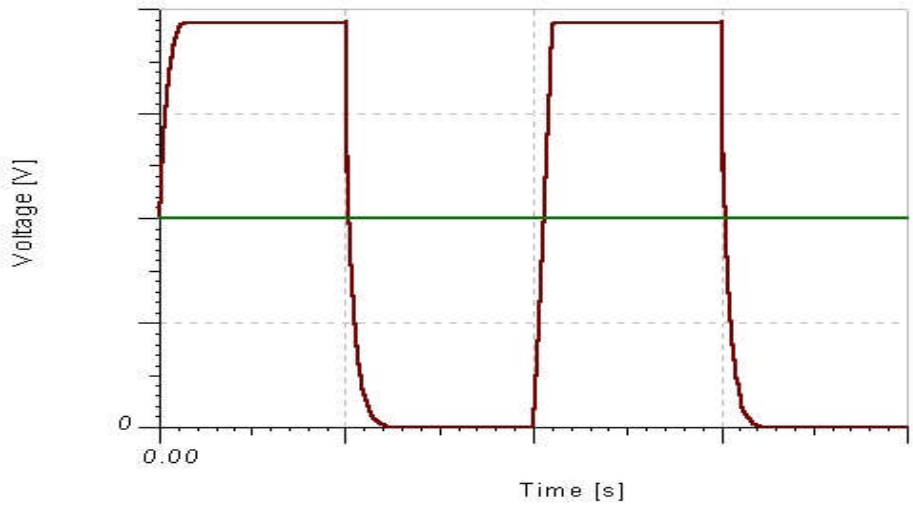


Fig.3 Input Signal waveform

The signal is transmitted to the Analog – Digital Converter ADC.

The ADC (AD 7828) converts the input Tension (U) and the Intensity (I) to a Digital code in numeric form from 0 to 100.

Data transmitted to the software from the ADC:

The above data from the table 1 are transmitted to the software via the USB port from the device to the computer.
According to the Ohm's law: U=R.I, the software converts the data (Voltage and intensity) in Resistance R= U/I and then in conductivity C= 1/R .

Then the software converts the data in graph for each segment, the graph could be represented by an exponential graph corresponding in ordinate with the recorded 32 conductivities values in one second and in abscissa the time in ms.
The first point is named SPA (start point or first value) and the last point EPA (end point or last value)

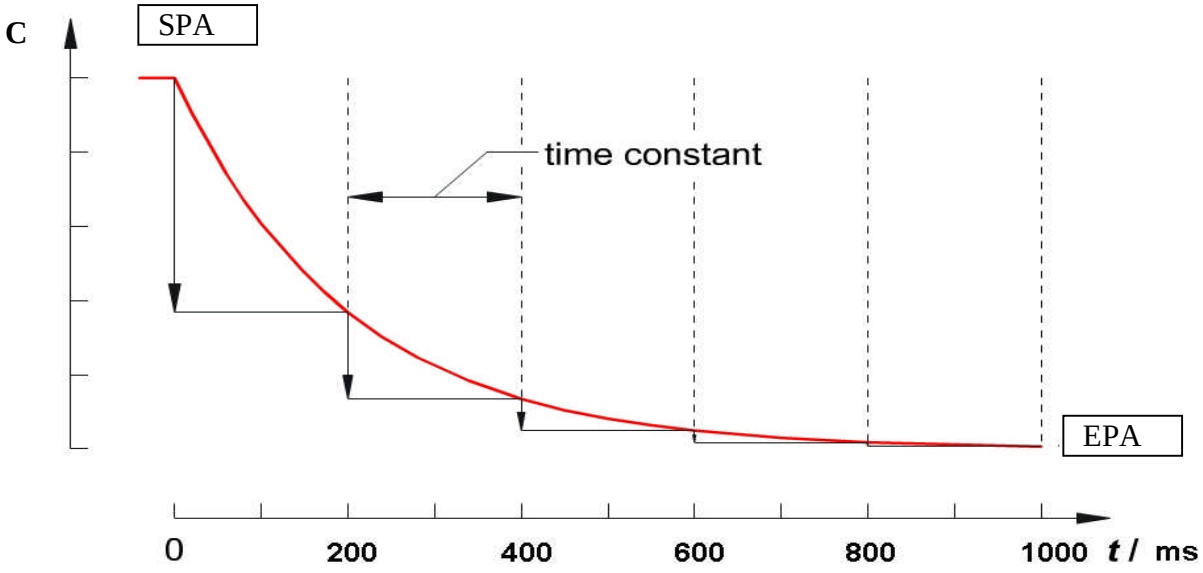


Fig.4 Graph generate by the software for each segment.

3. EIS general scheme of signals

EIS Output signal (From device) EIS Active	EIS Input signal (to device) EIS Passive electrode	ADC (AD7818)	Graph generate by the software for each segment

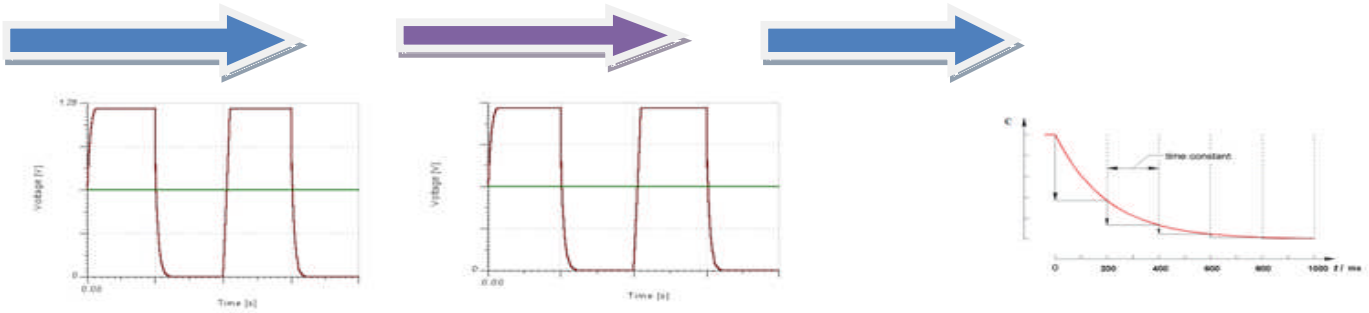
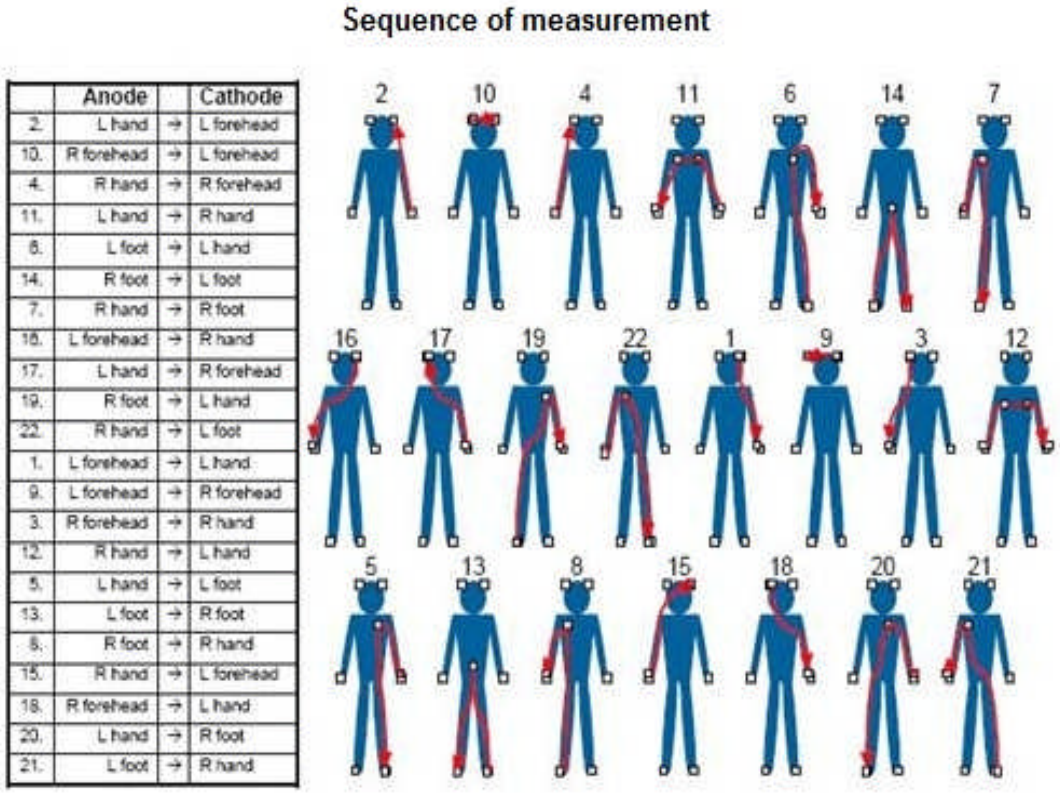


Fig.5 General Scheme

4. Sequence of the EIS measurement

EIS device makes the measurement of the conductivities between Active and Passive electrode during 1 second / 1 human body segment
It records 22 segments according to the sequence Figure 6.



	Anode		Cathode
2.	L hand	→	L forehead
10.	R forehead	→	L forehead
4.	R hand	→	R forehead
11.	L hand	→	R hand
6.	L foot	→	L hand
14.	R foot	→	L foot
7.	R hand	→	R foot
16.	L forehead	→	R hand
17.	L hand	→	R forehead
19.	R foot	→	L hand
22.	R hand	→	L foot
1.	L forehead	→	L hand
9.	L forehead	→	R forehead
3.	R forehead	→	R hand
12.	R hand	→	L hand
5.	L hand	→	L foot
13.	L foot	→	R foot
8.	R foot	→	R hand
15.	R hand	→	L forehead
18.	R forehead	→	L hand
20.	L hand	→	R foot
21.	L foot	→	R hand

Fig.6 EIS Sequence of measurement

5. Software signal of the 22 segments in real time

Therefore, according to the description of the measurement between each pair of electrodes as shown above, in the full cycle of the measurement, the hardware will transmit 32 X 22 = 704 measures of Resistance to the software via the USB interface.
And the software will manage 22 measurements of conductivity in numeric form, and 22 measurements of delta conductivity (EPA- SPA).
Figure 7

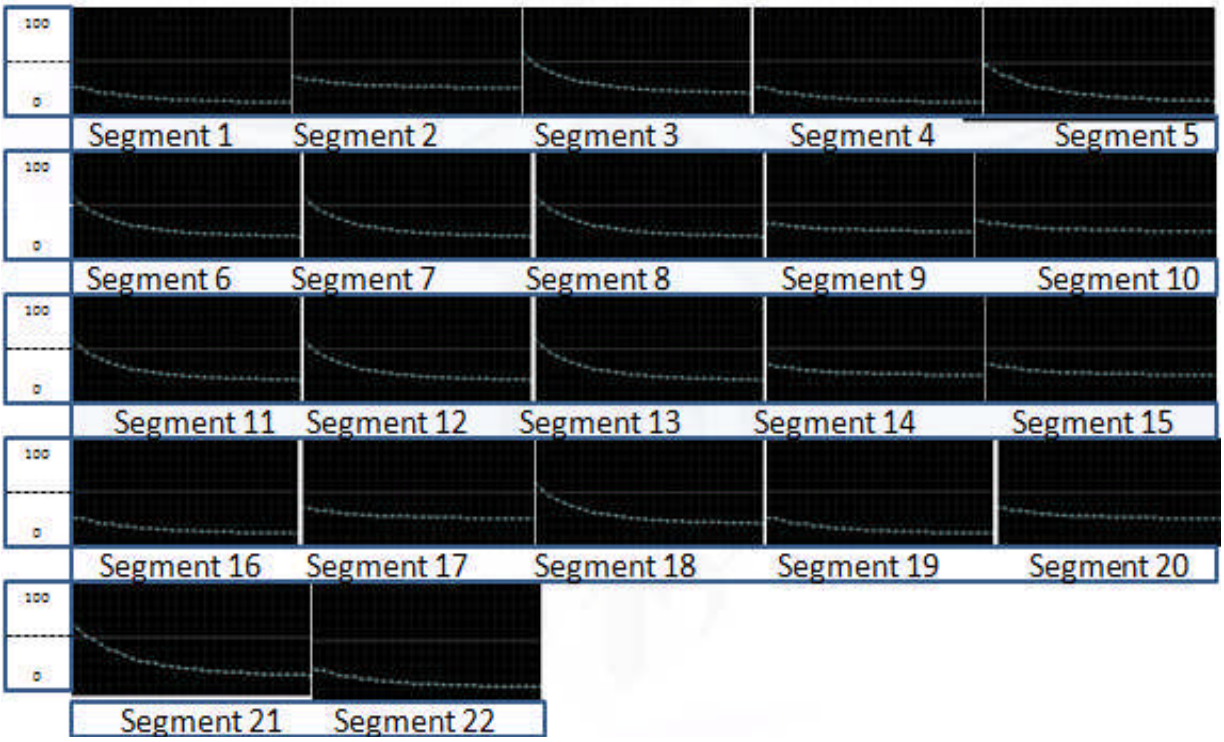


Figure 7