Water Electrodes

info@biopac.com
support@biopac.com
www.biopac.com

Completely new type of EEG sensor that measures using just plain water!

Developed during the European BRAIN project, after a period of profound research

Use with MOBITA-EEG-W *wearable physiological signal amplifier system* for 32 channels of *high-fidelity* wireless EEG data with 3D accelerometer and trigger channel

Benefits of New Water-based Electrodes

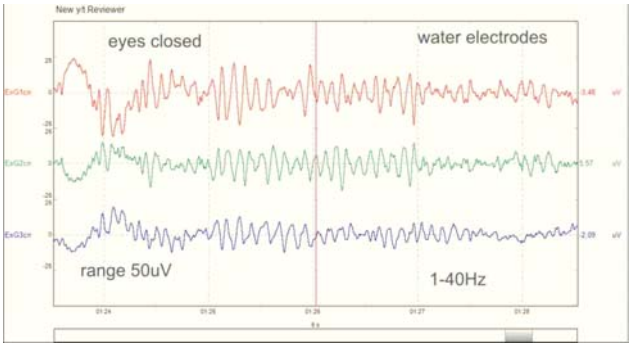
- Water electrodes perform very well.
- Water electrodes are not sensitive for movement artifacts when properly applied/secured.
- No blood flow artifacts are measured.
- Noise figures are better than commercially available electrodes.
- DC characteristics are comparable or better than commercially available electrodes.
- Water electrodes are not light sensitive.
- Portability is excellent
- Cap is easy to handle, comfortable to wear, and provides excellent signal quality.
- Less artifacts due to better placement and fixation on the head by using a sensor carrier.
- 6-8 hours minimal measurement.
- Comfortable for long term (> 8 hours) recordings

Water Electrode Housing

Rubber sensor carriers are integrated into the cap…and sensors are applied to the carrier in the cap. A special housing with integrated AgCl pellet electrode was used to be the main components of the new sensor. Electrode and sensor housing are shown below, as well as the procedure of applying the sensor inside the carrier:

The sensor housing can contain a sponge that is soaked with water. The sponge and the water make contact with the skin to measure EEG. In order to increase comfort and decrease motion artifacts, the sensor housing is inserted in a rubber carrier, integrated into a type of headcap. The rubber ring prevents the sensor from drying out quickly and, more importantly, prevents sensor movement with respect to the skin. The carrier is produced from a soft type of rubber, and is very comfortable to wear.

EEG Measurement in a Noisy Environment



The new water electrodes were compared with standard Ag/AgCl in a simulation environment. A towel soaked with seawater was used to measure the noise of electrodes and amplifier. The noise of the amplifier was known, allowing a good impression of the noise specifications of the water electrodes and the DC stability of the offset of the electrodes. Tests have shown that the DC stability of the water electrodes is slightly better than the EEG cup electrodes, and the noise is a little bit lower. In the frequency band 1-300 Hz, noise was 0,79 µVrms. Impedance of both types of electrodes was measured, with no difference between the two. Without any skin preparation, impedance measured about 20 kΩ.

In Vivo tests

The system was also extensively tested in vivo, for more than 8 hours, without having encountered any trouble concerning comfort or convenience. During these 8 hours no decrease of signal quality was encountered. To have an indication about the quality in a normal (''noisy'') measurement environment a 3 channel EEG measurement placed on the occipital area was performed.