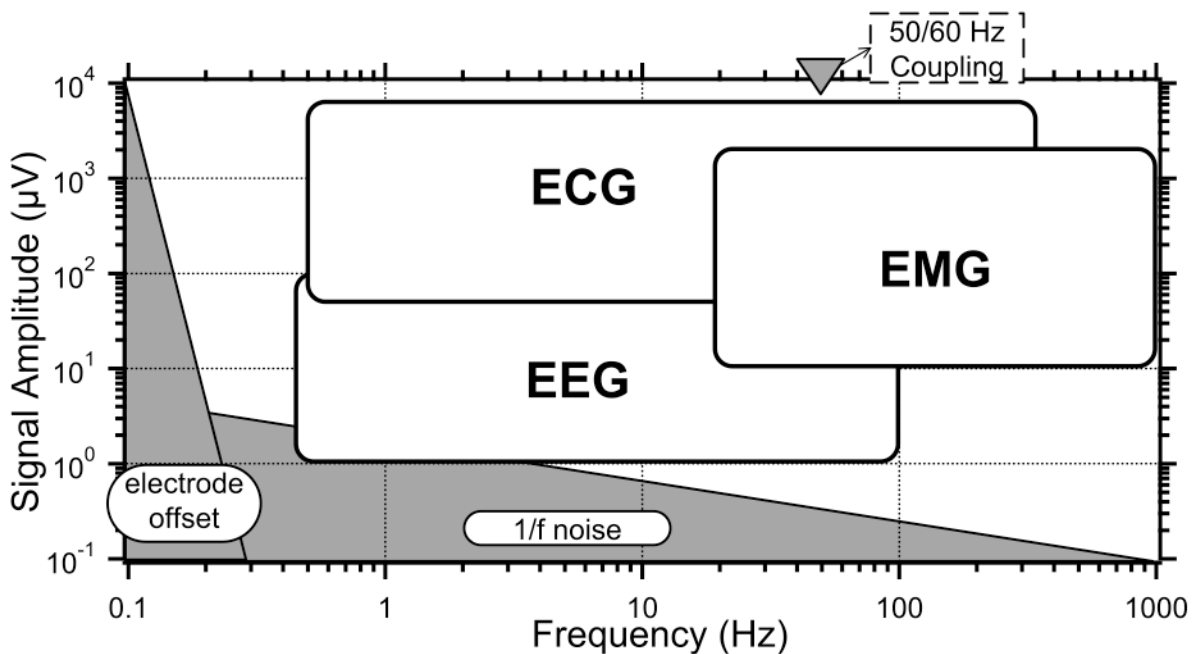


Biopotentials

Biopotential	Frequency Range	Signal Amplitude	Electrode
Electrocardiogram (ECG)	0.05 – 150 Hz (diagnostic) 0.5 – 40 Hz (monitoring)	0.1 – 5 mV	Surface
Electromyogram (EMG)	25 – 5,000 Hz	0.1 – 100 mV	Surface, needle
Electroencephalogram (EEG)	0.1 – 100 Hz	0.025 – 0.1 mV	Surface
Action potential of neurons	0 – 10 KHz	50 – 100 mV	Glass pipette



(Excerpt from Yazıcıoğlu RF, van Hoof C, Puers R. Biopotential Readout Circuits for Portable Acquisition Systems, 2009, Springer Science, ISBN: 978-1-4020-9092-9)

Figure shows the frequency and amplitude characteristics of EEG, ECG, and EMG waves, when recorded by surface electrodes. In order to extract the biopotential signals, the correlating signals, such as the 1/f noise of the CMOS transistors, the interference from the mains, and the DC differential electrode offset voltage between the biopotential electrodes, must be rejected or filtered by the readout circuit.