Electrogastrography (EGG) Sensor Data Sheet

EGG 14052020

SPECIFICATIONS

> Gain[1]: 6114
> Range: ±0.25mV (with VCC = 3.0V)
> Bandwidth: 0.01591-0.1591 Hz
> Consumption: ≈ 3mA
> Input Impedance: > 100 GOhm
> CMRR: 100 dB
> Input Voltage Range: 1.8 - 5.5 V

FEATURES

> Single-channel sensor
> Unobtrusive & lightweight sensor
> Bipolar differential measurement
> Pre-conditioned analog output
> High signal-to-noise ratio
> Ready-to-use form factor
> Medical-grade raw data output

APPLICATIONS

> Bowel motility analysis
> Gastric contractions detection
> Life sciences studies
> Biomedical device prototyping

GENERAL DESCRIPTION

The biosignalsplux Electrogastrography (EGG) sensor has been designed for user-friendly recording of the electrical activity of the stomach. Multiple sensors can be used simultaneously in a cost-effective and straightforward way to assess bowel motility and overall gastric activity, for instance.

The bipolar configuration, with two measurement electrodes, detects the electrical potentials in the specific stomach region of choice, with respect to a reference electrode (placed in an area of low bioelectrical activity). The resulting signal is the amplified difference between these two leads, eliminating the common unwanted signals. Its convenient form-factor enables a discrete application in the typical EGG locations.

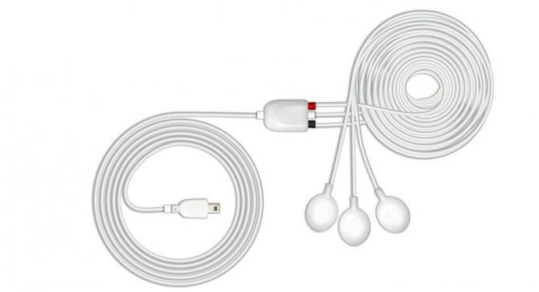

Fig. 1 biosignalsplux Electrogastrography (EGG) sensor (standard version)

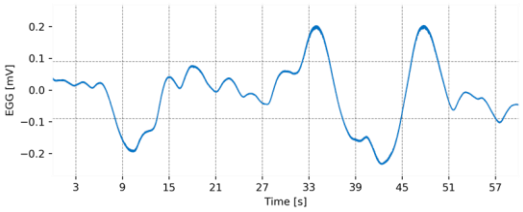

Fig. 2 Typical unfiltered EGG output (with subject at rest and presenting basal gastric activity)

Fig. 2..

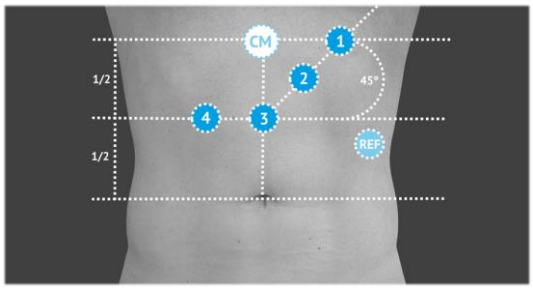

Fig. 3 Recommended EGG electrode placement image based on the graphical resource available *online*

[1] This sensor has a high amplification gain, reason for which it is particularly sensitive to noise resulting electromagnetic and motion sources. For optimal performance, it is therefore recommended that data acquisition is done in an appropriate environment and with the subject in stationary position. Power supplies, lighting and other common household elements are prone to introduce parasite signals. Measurement in dynamic conditions is prone to be affected by motion artifacts.

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APPLICATION NOTES

A possible configuration was proposed by Riezzo et. al.[2] (Fig. 3) can be achieved through the following guidelines:
*"…a main electrode (*electrode 3*) located 2 cm above the mid*-point between the xiphoid process and the umbilicus. Two more electrodes (electrodes 2 and 1) were located on an upper 45 degree angle, with an additional electrode (electrode 4*) located 4 cm to the right of* the central electrode. The common reference electrode (CM) was placed at the cross point of two lines, one horizontal-connecting electrode 1 and the other vertical-connecting electrode 3*. The ground electrode was placed on the left costal margin…"*

TRANSFER FUNCTION

[-0.25mV, 0.25mV]

$$EGG(V) = \frac{\left(\frac{ADC}{2^n - 1} - \frac{1}{2}\right) \times VCC}{G_{EGG}}$$

$$EGG(mV) = EGG(V) \times 1000$$

$VCC = 3V$ (operating voltage - 3V when used with biosignalsplux)
$G_{EGG} = 6114$ (sensor gain)

$EGG(V)$ – EGG value in Volt (V)
$EGG(mV)$ – EGG value in millivolt (mV)
ADC – Value sampled from the sensor/channel (digital value)
n – Sampling resolution[3]

ELECTRODE CONNECTIONS

Sleeve Color	Red	Black	White
Electrode Cable	+	-	reference

[2] G. Riezzo, F. Russo, and F. Indrio, "Electrogastrography in adults and children: The strength, pitfalls, and clinical significance of the cutaneous recording of the gastric electrical activity," Biomed Res. Int., vol. 2013, 2013.
[3] The number of bits for each channel depends on the resolution of the Analog-to-Digital Converter (ADC); in biosignalsplux the default is 16-bit resolution ($n = 16$), although 12-bit ($n = 12$) and 8-bit ($n = 8$) may also be found.

PHYSICAL CHARACTERISTICS

> W1 x L1 x H1:	1.6cm x 2.2cm x 0.5cm	> W2 x L2 x H2:	1.4cm x 1.7cm x 0.5cm
> W3:	1.1 ± 0.1cm	> L3:	0.6 ± 0.1cm
> A1:	105.0 ± 0.5cm	> A2:	28.0 ± 0.1cm
> A3:	8.0 ± 0.1cm	> D:	0.4 ± 0.1cm
> S:	0.3 ± 0.1cm		

> Available sleeve colors: White, Black, Blue, Green, Red, Yellow, Gray, and Brown

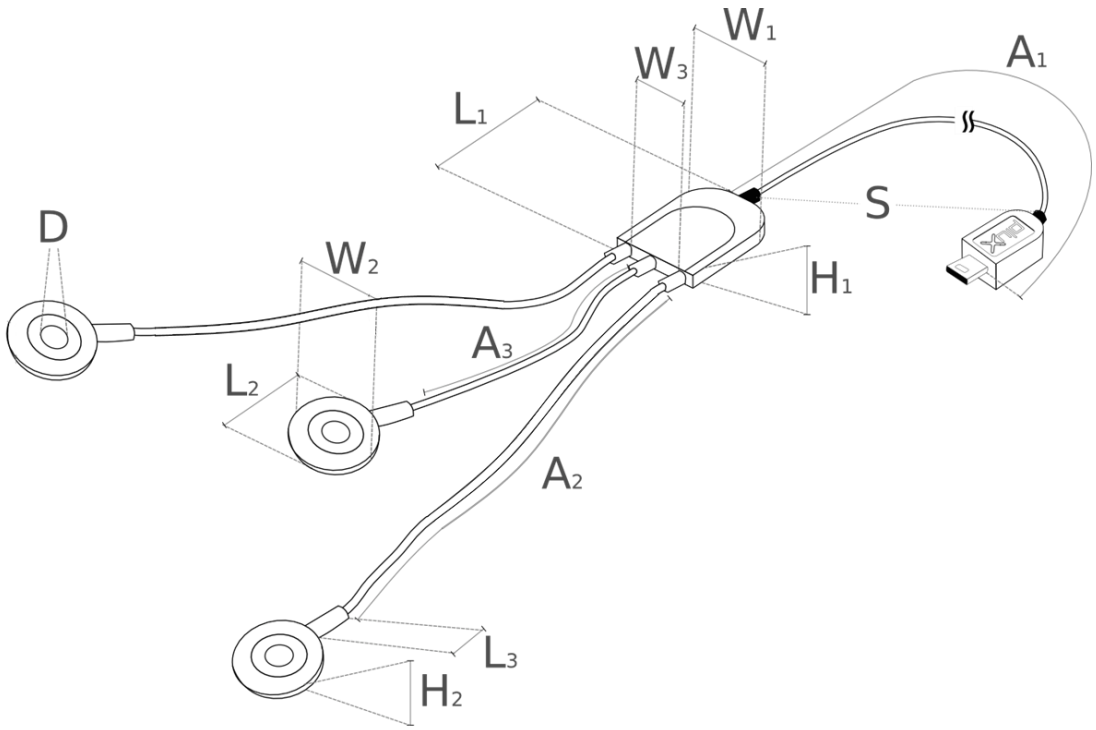

Fig. 4 Physical characteristics of the standard EGG sensor.

ORDERING GUIDE

SKU Reference	PLUX Code	UPC
SENSPRO-EGG	820201233	785614265150
Description		
Gastric activity specialized measurement sensor.		