Respiration (PZT)
Sensor Datasheet

SPECIFICATIONS
> **Gain:** 1
> **Range:** ±1.5mV
> **Bandwidth:** 0.059-1Hz
> **Consumption:** 35uA
> **CMRR:** ≥ 106 dB [TYP: 130 dB]

FEATURES
> Piezoelectric film technology
> Displacement measurement
> Adjustable elastic chest strap
> High signal-to-noise ratio
> Raw data output
> Unobtrusive & lightweight sensor
> Pre-conditioned analog output
> Ready-to-use form-factor

APPLICATIONS
> Thoracic or abdominal respiration monitoring
> Sleep studies
> Biofeedback
> Life science studies
> Respiratory cycles measurement
> Biomedical research
> Psychophysiology
> Biomedical device prototyping

GENERAL DESCRIPTION
The biosignalsplux piezoelectric Respiration (PZT) sensor is an entry-level and affordable solution for basic respiration data acquisition. This sensor consists of a wearable chest-belt with an integrated localized sensing element that measures displacement variations caused by the volume changes of the thorax or abdomen during respiratory cycles (inhaling/exhaling). The elastic chest-belt can be adjusted in length to be applicable on different anatomies (e.g. male and/or female), body locations (e.g. thorax and/or abdomen), and thorax/abdomen circumferences. Typical applications of this sensor include respiration monitoring to determine respiration cycles, rates, relative amplitudes, and other features.
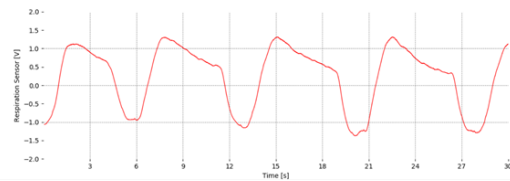

Fig. 1. Respiration (PZT) sensor.

Fig. 2. Typical raw Respiration (PZT) data (acquired with biosignals).

REV B

TRANSFER FUNCTION
[-1.5V, 1.5V]

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

PZT (V) – EMG value in Volt (V)
G_{PZT} – Sensor gain (1 | not amplified)
ADC – Value sampled from the channel
VCC – Operating Voltage (3V when used with biosignalsplux)
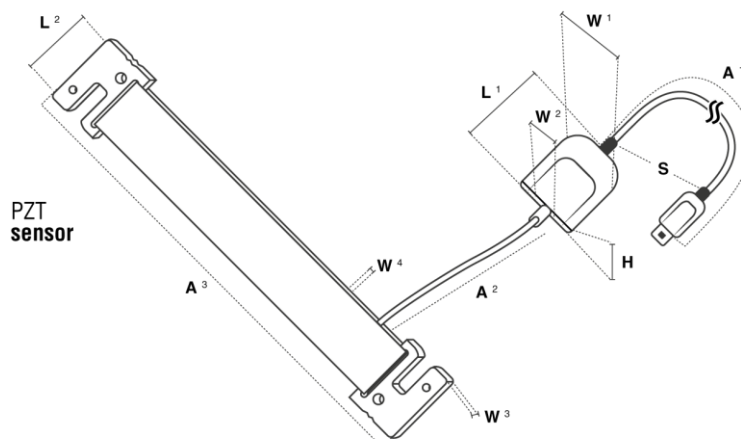n – Number of bits of the channel[1]

The previous absolute value in V can also be converted to a relative measure ([-50, 50] %), intended to present (through a percentual value) the degree of extension/compression of the chest band during inhalation/exhalation.

For this, replace the VCC value (in V) by the percentual upper threshold (100%):

$$PZT(\%) = \frac{\left(\frac{ADC}{2^n - 1} - \frac{1}{2}\right) \times 100\%}{G_{PZT}} \tag{2}$$

PHYSICAL CHARACTERISTICS

> W1 x L1 x H:	1.6cm x 2.2cm x 0.5cm	**> W2:**	1.0±0.1cm
> W3:	0.4±0.1cm	**> W4:**	0.2±0.1cm
> L2:	2.6±0.1cm	**> A1:**	105.0±0.5cm
> A2:	7.0±0.1cm	**> A3:**	15.3±0.1cm
> S:	0.3±0.1cm		

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

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[1] 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.

ORDERING GUIDE

SKU Reference	PLUX Code	UPC
SENSPRO-PZT1	820201208	641945696271
Description		
Piezoelectric respiration sensor for respiratory analysis in a wide range of applications. It has a localized sensing element that measures displacement variations induced by inhaling or exhaling and can be adjusted in length.		