

Force Sensitive Resistor (FSR) Sensor Data Sheet

FSR 01022018

SPECIFICATIONS

- > **Range:** up to 150 Kg (depend on the type)
- > **Response Time:** <1.2ms
- > **Repeatability:** $\sim\pm 2.5\%$ (of full scale)
- > **Drift:** <7%
- > **Consumption:** $\sim 0.4\text{mA}$

FEATURES

- > Thin film technology
- > Pre-conditioned analog output
- > High signal-to-noise ratio
- > Shielded miniaturized cables
- > Medical-grade raw-data output
- > Ready-to-use form factor

APPLICATIONS

- > Biomechanics
- > Kinematics
- > Ergonomics
- > Reaction time measurement
- > Gait analysis
- > Load distribution assessment
- > Human-Computer Interaction
- > Robotics & Cybernetics

GENERAL DESCRIPTION

From reaction time measurement to load distribution in shoe insoles, our thin film force sensors offer uncompromised performance in the most demanding applications. The low profile membrane and miniaturized signal conditioning circuitry are ideal for minimally intrusive setups. Multiple sensing area dimensions and measurement ranges are available, enabling forces up to 150Kg, although other options are also available upon request. Example:

<http://bit.ly/1FnY0aJ>

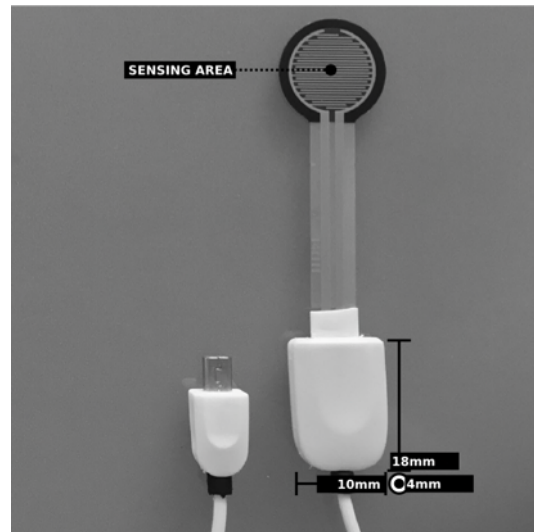


Fig. 1: Example of a Type 3 force sensor.

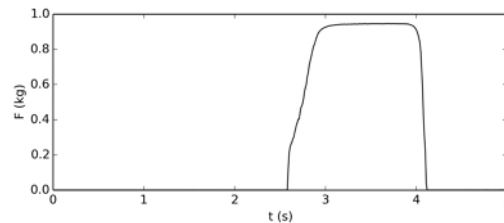


Fig. 2 Typical force data (acquired with biosignals).

biosignalsplux
wearable body sensing platform

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REV B

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TRANSFER FUNCTION

The sensor requires frequent calibrations to provide reliable measurement, a constant transfer function does therefore not exist. Please follow the instructions below to calibrate your sensor and to convert the acquired data.

Step 1: Calculate voltage output of the sensor

$$V_{out} = \frac{3 \times ADC}{2^n}$$

V_{out} – Voltage output of the sensor (V)
 ADC – Value sampled from the channel
 n – Number of bits of the channel¹

Step 2: Calculate sensor conductance

$$G = \frac{V_{out}}{(6 - V_{out}) \times 47}$$

G – Sensor conductance (mS)

Step 3: Acquire calibration signal

Compute the slope of the acquired signal using the sensor conductance computed in step 2.

Step 4: Convert data

The conductance is approximately proportional to the applied force. The force can be computed by the equation below.

$$F_{lb} = \frac{G}{S}$$

F_{lb} – Force weight equivalent in pounds (lb)
 S – Slope of the calibration signal

PHYSICAL CHARACTERISTICS

> **Weight:** 8g

(in cm)	Type 1	Type 2	Type 3	Type 4
W1	0.95	3.80	1.27	0.50
W2	1.40	4.37	1.83	0.76
W3	11.00	7.60	18.3±0.5	6.4±0.5
L1	17.00	4.00	3.60	3.10
Thickness	0.02	0.05	0.05	0.03
A1	105.00			

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.

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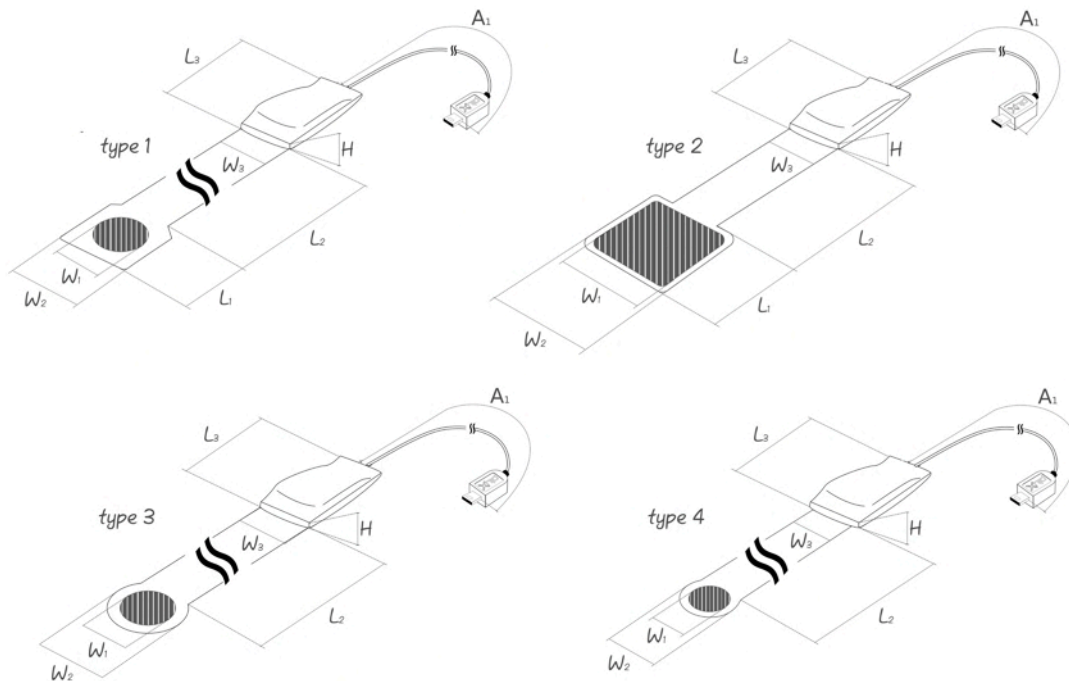


Fig. 3: Available types of FSR sensors.

ORDERING GUIDE

Reference	Package Description
SENSPRO-FSR	Type 3 Force Sensitive Sensor (FSR) sensor (Fig. 1) with standard physical characteristics and a random cable sleeve color.
SENSPRO-FSR1-A1-T-S	Force Sensitive Resistor (FSR) sensor of type T built with custom length A1 and custom sleeve color S; for standard physical characteristics in A1 or S use 0. Examples: > FSR1-200-0-0: Type 3 FSR with 200cm cable A1 and a random sleeve color > FSR1-0-1-Yellow: Type 1 FSR with yellow cable sleeve