

## GENERAL INFORMATION

### 1.1. Product description



## Physilog® 4 Datasheet

### Overview

The **Physilog®** is a **Swiss-made wearable standalone measurement unit** containing inertial sensors.

The technology was born 10 years ago out of translational research collaborations between Lausanne's University Hospital (CHUV) and the Swiss Institute of Technology of Lausanne (EPFL). Physilog® provides objective and quantitative assessment of movement disorders and performance.



The last generation designed in 2013 by Gait Up, the Physilog® 4 Silver, comes with 10D sensing capabilities, USB charging and wireless functionalities. Physilog® 4 Gold has one more recording channel: either GPS or ECG module. In 2013, Physilog® sensors have been worn by more than 3000 subjects worldwide and validated for various applications in scientific publications.

### Physilog®4: Advantages

#### ✓ Ease of use:

- Small size and light weight, thinnest standalone sensor on the market (<1cm)
- Long-term recording without constraint and optimal patient's confort
- Simple battery charging and data transfer with USB
- Dedicated analysis software

#### ✓ Accuracy:

- Wireless synchronization between modules
- Adaptable sensor ranges and sampling rate for each application
- Validated against gold standards
- Robust to pathological conditions

**Gait Up Sàrl**  
 Avenue d'Ouchy, 17  
 1006 Lausanne, Switzerland  
 ☎ tel. +41 79 101 19 90  
 ✉ mail. [contact@gaitup.com](mailto:contact@gaitup.com)  
 🌐 web. [www.gaitup.com](http://www.gaitup.com)

## PRODUCT SPECIFICATIONS

### Sensor Characteristics

Sensor Specifications	10 D Measurement				Additional features	
	3D Accelerometer	3D Gyroscope	3D Magnetometer	Barometer	GPS	Other (ECG, Force, ...)
Physilog®4 <i>Gold</i>	◆	◆	◆	◆	◆	◆
Physilog®4 <i>Silver</i>	◆	◆	◆	◆		
Measure	Linear acceleration	Angular Velocity	Magnetic field strength	Atmospheric pressure	Localisation	Heart rate, Force, ...
Programmable range of measurement	±2g, ±4g, ±8g and ±16g	±250, ±500, ±1000, and ±2000°/sec	±1000 µT	10 mBar 1200 mBar		
Approximative precision				Altitude: 10cm	Horizontal: 2.5m *	
Sampling rate	Programmable from 100 to 500 Hz					
Wireless Synchronisation	Radio frequency synchronization - up to 16 Physilog® sensors synchronised					

\*Depending on satellite availability

### File formats & compatible softwares

- Files generated by Physilog® are .bin files
- Files can be analysed with MATLAB, Octave or Gait Up softwares
- Physilog® is compatible with both Mac and PC

### Certifications

- CE marked
- FCC certified
- RoHS compliant

**Gait Up Sàrl**  
Avenue d'Ouchy, 17  
1006 Lausanne, Switzerland  
 *tel.* +41 79 101 19 90  
 *mail.* [contact@gaitup.com](mailto:contact@gaitup.com)  
 *web.* [www.gaitup.com](http://www.gaitup.com)

### Hardware Mechanical Characteristics

For both Physilog®4 <i>Gold</i> and <i>Silver</i>	
Dimensions	50 x 37 x 9.2 mm Anatomical curved shape
Weight	19 grams (with battery)
Internal Storage	4 Gb
Battery	Rechargeable Lithium Ion Polymer Battery life >15 hours*
Supply Voltage	4.2 V – min: 125mA max:250mA
Port	Micro-USB for charging and data transfer
Operating Temperature	From -40°C to 45°C
Fixation	Double side Velcro Or optional buckles with elastic straps
Material	ABS plastic (same as LEGO®)
Button	Start/stop membrane switch with dual-color LED

\*Depending on Physilog® model and programming



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Avenue d'Ouchy, 17  
1006 Lausanne, Switzerland  
 » tel. +41 79 101 19 90  
 » mail. [contact@gaitup.com](mailto:contact@gaitup.com)  
 » web. [www.gaitup.com](http://www.gaitup.com)

## 1.2. Tested System Details

The **EUT** is wearable standalone measurement unit containing inertial sensors. Physilog provides objective and quantitative assessment of movement disorders and performance. Gold version have 2 ECG sensors added, full option, it will be version tested and presented in this test report.

### Auxiliary equipment (AE) used for testing:

- Laptop of laboratory for setting configurations

### Input/output:

- 2 x ECG sensors, unshielded cable, length: 20cm

### Software identification:

- Software version: 4.2

### Equipment information:

- Operating frequency range: [2400.0-2483.5]MHz
- Annex REC7003: Annex 1 (h)
- Number of channel: 77 channels
- Channel separation: 1MHz
- Modulation technology: ☐ FHSS ☐ Spread spectrum ☒ Non Spread spectrum
- -6dB Channel bandwidth: ☐ Up to 20MHz ☒ Up to 1MHz ☐ Other: ....MHz
- Transmit operating mode: ☐ Multiples antenna without beam forming  
☐ Multiples antenna with beam forming  
☒ Single antenna
- Number of transmit chains: ☒ 1 ☐ 2 ☐ 3 ☐ 4  
☐ Symmetrical ☐ Asymmetrical
- Number of receiver chains: ☒ 1 ☐ 2 ☐ 3 ☐ 4
- Antenna type: ☒ Integral ☐ External
- Antenna gain: 2.0dBi (Peak)
- Type of power source: ☒ Battery (Lithium-Ion Polymere) ☐ Internal power supply  
☐ External power supply ☐ Car Charger
- Test sequence/test software used: See 2.2. Running Mode
- Unmodulated mode: ☐ Yes ☒ No
- Equipement type: ☒ Representative production model ☐ Pre-production model
- Channel plan:

Channel	Frequency (MHz)
<b>Cmin:</b>	2404
<b>Cnom:</b>	2438
<b>Cmax:</b>	2480

The EUT is set in the following modes during tests:

- Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
- Permanent reception on a fixed channel
- Permanent link between Master and Slave EUT, for blocking test.

Following commands with the specific test software "FLIP v3.4.7" are used to set the product.

If EUT is plugged to USB port, RF is OFF and load mode begins, see EMC test report for this configuration.

### **1.3. Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-2003, FCC Part 15 Subpart C.

Radiated testing was performed at an antenna to EUT distance of 10 meters. During testing, all equipment's and cables were moved relative to each other in order to identify the worst case set-up.

### **1.4. Test facility**

Tests have been performed on from 5th to 10th, 2014.

This test facility has been fully described in a report and accepted by FCC as compliant with the radiated and AC line conducted test site criteria in ANSI C63.4-2003 in a letter dated March 25<sup>th</sup>, 2008 (registration number 94821).

This test facility has also been accredited by COFRAC (French accreditation authority for European Union test lab accreditation organization) according to NF EN ISO/IEC 17025, accreditation number 1-1633 as compliant with test site criteria and competence in 47 CFR Part 15/ANSI C63.4 and EN55022/CISPR22 norms for 89/336/EEC European EMC Directive application. All pertinent data for this test facility remains unchanged.