

MOVESENSE MEDICAL SENSOR

Movesense MD is a wireless, programmable, wearable sensor, used as an ECG and movement signal measurement device to provide data for medical applications and host devices for analysis. Movesense MD is capable of measuring and sending processed derivatives of the measurement data wirelessly to smartphones, tablets, and other compatible host devices via Bluetooth LE. Open APIs enable the development of unique on-device apps to tailor the sensor functionality to the exact needs of each specific use case.

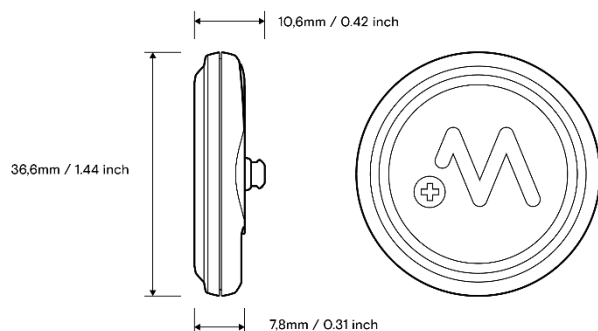


- Clinical grade single channel ECG measurement
- Clinical grade motion measurement
- Direct access to unprocessed raw sensor data
- Full control over storing measured data
- Swim and shock proof construction, suitable for daily use and independent operation by patients
- User replaceable coin cell battery
- State of the art ultra-low power design
- Developed, designed, and manufactured in Finland in accordance with the ISO 13485 quality system
- Available with custom branding

TECHNICAL HIGHLIGHTS

- Single channel ECG, heart rate, R-R intervals, BLE heart rate service
- 9-axis motion sensing: accelerometer, gyroscope, magnetometer
- Data logging memory
- Bluetooth Low Energy radio
- Open API for integration with existing health applications and electronic health record systems
- Tools for developing custom applications that run on the sensor
- Software libraries for developing compatible mobile applications
- Wireless firmware update capability
- Size, weight, and operation optimized for wearability and user experience
- Can be operated by the end user - enables use in remote patient monitoring
- Certified as a Class IIa Medical Device according to the EU Medical Device Regulation

TECHNICAL BRIEF (SW VERSIONS 1.9.5.1 AND 2.1.5)



DIMENSIONS

- 36.6mm/1.44" diam. x 10.6mm/0.42" thickness
- Weight 9.4g / 0.33oz with battery
- Water resistant to 30m/100ft

I / O

- Red led on the front, SW controllable
- Interface via Movesense studs, stud center-to-center distance: 27.0mm/1.06"

SENSORS

- Single channel ECG
 - Sampling frequency: 125/128/200/250/256/500/512Hz
 - Measurement bandwidth: 0.5Hz-40Hz as defined in IEC 60601-2-47
 - Dynamic range 60mVp-p, max offset: 500mV, resolution: 15 bits
 - Heart rate: 20BPM-240BPM, resolution: 1BPM, accuracy: ± 1 BPM
 - R-R intervals¹: 250ms-3000ms, resolution: 1ms, timing accuracy: ± 1 ms
- Acceleration (16-bit output resolution)
 - Range: $\pm 2/\pm 4/\pm 8/\pm 16g$, output unit: m/s^2 , accuracy: $\pm 2\%$
 - Sampling frequency: 12.5/26/52/104/208Hz
- Angular velocity/gyroscope (16-bit output resolution)
 - Range: $\pm 125/\pm 245/\pm 500/\pm 1000/\pm 2000^\circ/s$, output unit: $^\circ/s$, accuracy: $\pm 2\%$
 - Sampling frequency: 12.5/26/52/104/208Hz

- Magnetic field
 - ± 49 gauss, $1.5 \pm 10\%$ mgauss /LSB, output unit: mgauss
- Non-medical, device internal temperature
 - Accuracy $< \pm 0.5^\circ C$, $0^\circ C$ to $+65^\circ C$

LOGGER MEMORY

- 3Mbit EEPROM

SOFTWARE

- SDK for developing apps for the sensor
- Sensors and peripherals controllable via API incl. Bluetooth advertising, power schemes
- Easy to use C++ Movesense Device API
- iOS and Android mobile libraries with wireless sensor firmware update capability, custom GATT for connecting with other operating systems
- GNU toolchain for embedded ARM

MCU

- Nordic Semiconductor nRF52832
- 32-bit ARM® Cortex®-M4
- 64kB on-chip RAM²
- 512kB on-chip FLASH²
- Bluetooth Low Energy radio

BATTERY

- CR 2025 Lithium coin cell battery (operating time: 7 days of continuous ECG measurement at 256Hz sample rate)

APPROVALS AND COMPLIANCES

- CE, FCC, IC, C-Tick, CMIIT
- REACH and RoHS
- Bluetooth Low Energy radio

PATENTS

US 13/071,624, US 13/832,049, US 13/832,598, US 13/917,668, US 13/397,872, USD 667,127, US 8,386,009, US 8,750,959, US 8,814,574, US 8,886,281, others pending

¹ Modified Pan-Tompkins algorithm used for R-peak detection, 1ms R-R resolution only available simultaneously with 125Hz ECG sampling rate. With other ECG sampling rates, R-R resolution is 8ms.

² Shared between the Movesense OS and the custom user application