# MOVIT SYSTEM

*Technical specifications*

Rev. 02/08/2024


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Capturing Kinematics

# SOMMARIO

# PRODUCT OVERVIEW

The Movit System is the ideal tool for researchers, professionals and specialists in every sector interested in objectively monitoring and quantifying human movements. Easy, fast and usable in any environment, thanks to the network of wearable inertial sensors, it provides a complete and accurate movement analysis. The system can be used both indoors and outdoors. It has no constraints of brightness and environment. No external infrastructure is required. The inertial devices are called Movit G1 and the USB receiver connected to the PC is called Dongle G1.

## APPLICATIONS

- **RESEARCH**
- **ENGINEERING**
- **BIOMECHANICS**
- **REHABILITATION**
- **GAIT ANALYSIS**
- **SPORTS**
- **ERGONOMICS**
- **LIFE SCIENCE**

## HARDWARE

- Movit® G1 inertial motion device
- Dongle G1 USB receiver
- Set of wearable supports
- Calibration base and Calibration map
- Hub for Recharge and Data Transfer

## SOFTWARE

- Motion Studio: configuration and recording software
- Motion Analyzer: editing and analysis software

### DESCRIPTION

The Movit G1 is a small, highly accurate wireless inertial and magnetic sensing unit.
The Movit G1 communicates with the PC using the unique Movit® radio protocol developed by Captiks.
The Movit protocol guarantees very accurate time synchronization between several Movit G1 devices.

The Dongle G1, usb wireless receiver, links up to 16 Movit G1 devices (in a standard configuration) to the PC (USB).
Specially designed body straps improve the efficiency of subject preparation, reducing the overall time needed for measurements

### FEATURES

- Completely wireless
- Portable
- No occlusion or line-of-sight restrictions
- Use anywhere, in any lighting condition
- No external infrastructure is required
- Fast coupling of Movit G1 into the wearable supports
- Intuitive software for real-time view, calibration, logging and export
- CSV (ASCII) export of raw data, joint angles, animation
- Highly sensitive MEMS inertial sensors
- Dongle G1 wireless receiver ensures highly accurate time-synchronized data sampling in all connected Movit G1 devices.
- Internal sampling at 200 Hz and internal pre-processing
- Internal data fusion algorithms ensure highly accurate output
- Movit G1 devices are securely fastened to straps in order to minimize skin and muscle motion artifact



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# MOVIT G1 - TECHNICAL SPECIFICATIONS

## DESCRIPTION

Wireless inertial motion device. Wireless protocol based on IEEE 802.15.4 MAC.
Up to 16 Movit G1 devices in a configurable wireless-area network (standard configuration). ISM 2.4 GHz radio frequency, worldwide license free use
Transmission range up to 30 m. Rechargeable lithium battery

## PHYSICAL PROPERTIES

| | |
|---|---|
| Dimensions | 48 mm x 39 mm x 18 mm |
| Weight | 25 g (including battery) |

## OPERATING TEMPERATURE RANGE

| | |
|---|---|
| Ambient | -10° C – 60° C |
| Specified Performance | 0° C – 50° C |

## POWER SUPPLY

| | |
|---|---|
| Battery | 3.7. lithium battery with protection circuit (overcharge and overdischarge) |

## COMMUNICATION

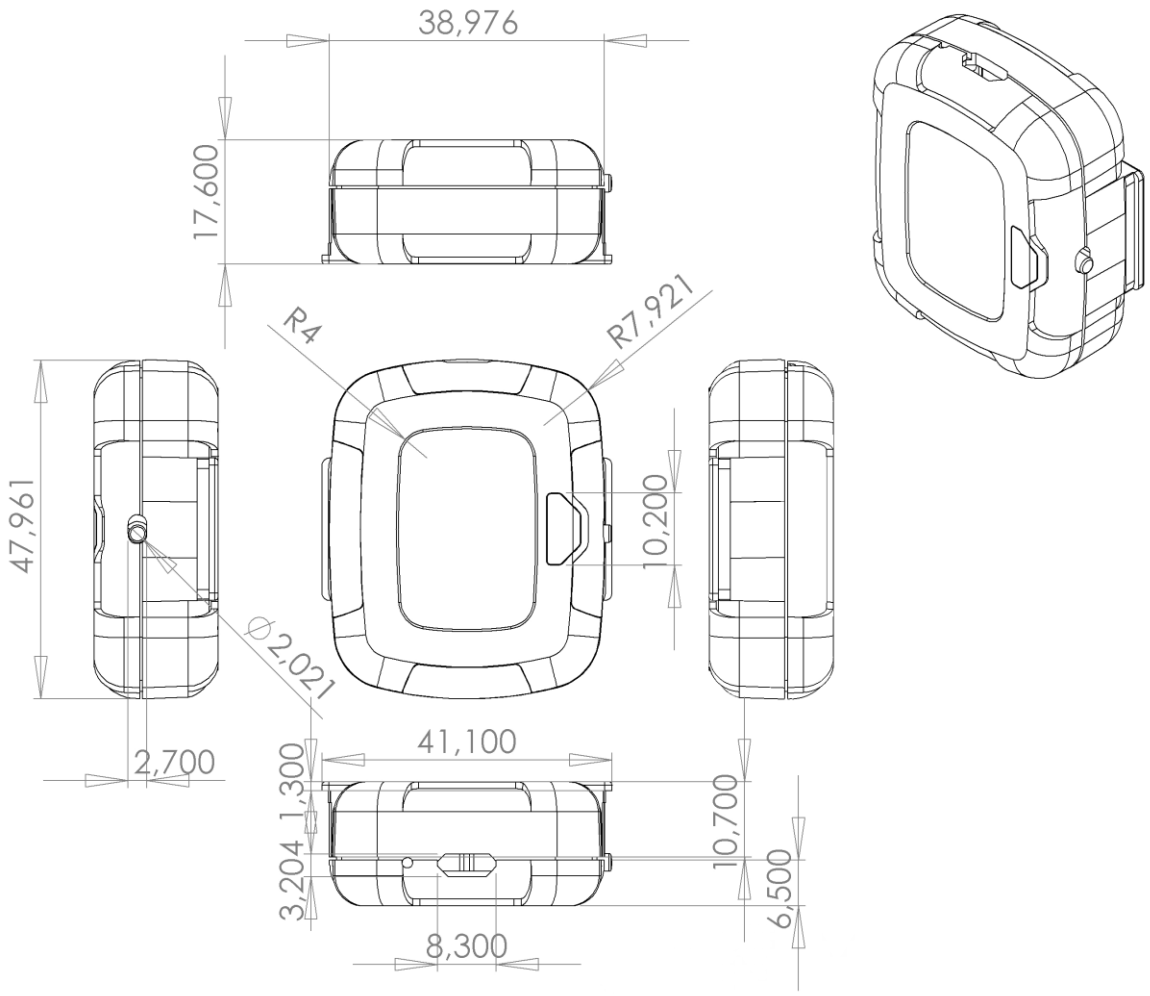
| | |
|---|---|
| Wired Communication | USB 2.0 |
| Wireless Communication | 2.4 GHz – based on IEEE 802.15.4 MAC |
| RF Transceiver | Microchip / Atmel AT86RF233 |
| RF Frequency | 2.405-2.48GHz |
| RF Channels | 5Mhz separation 16ch |
| Output power | 4 dBm max |
| Antenna gain | Average -3.6dBi; (Max gain: 0.9dBi) |

## ORIENTATION PERFORMANCE

| | | |
|---|---|---|
| Dynamic Range | All angles in 3D | |
| Static Accuracy | < 1 deg | |
| Dynamic Accuracy (Roll) | 0.80 deg | 1.15 RMS |
| Dynamic Accuracy (Pitch) | 1.47 deg | 1.70 RMS |
| Dynamic Accuracy (Yaw) | 0.58 deg | 0.85 RMS |
| Angular Resolution | 0.0005 deg | |


## SENSOR DETAILS

| | Gyroscope | Accelerometer | Compass |
|---|---|---|---|
| | **Angular Velocity** | **Acceleration** | **Magnetic Field** |
| **Axes** | 3 axes | 3 axes | 3 axes |
| **Full Scale Range** | ±2000 deg/s | ±16g (156 m/s$^2$) | ±4800 µT |
| **Resolution** | 16 bits | 16 bits | 14 bits |
| **Sensitivity** | 16.4 LSB/dps | 2048 LSB/g | 0.6 µT/LSB |
| **Sample Rate** | 4 to 200 Hz | 4 to 200 Hz | 4 to 100 Hz |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6,500
8,300


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# DONGLE G1 - TECHNICAL SPECIFICATIONS

## DESCRIPTION

The Dongle G1 wireless station can receive data from 16 Movit G1 devices (standard configuration) simultaneously.
Data from multiple Movit G1 devices is time-synchronized with a TDMA protocol developed by Captiks.

## PHYSICAL PROPERTIES

| | |
|---|---|
| Dimensions | 100 mm x 160 mm x 33 mm |
| Weight | 400 g |

## OPERATING TEMPERATURE RANGE

| | |
|---|---|
| Ambient | -10° C – 60° C |
| Specified Performance | 0° C – 50° C |

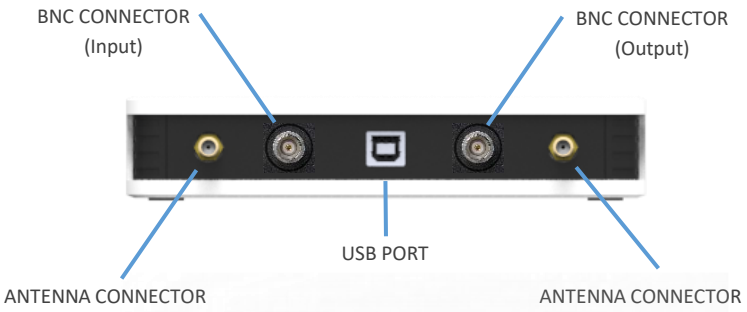
Specifications for non-condensing environment
Avoid wet and humid conditions

## POWER SUPPLY

| | |
|---|---|
| USB | 5 V |

## COMMUNICATION

| | |
|---|---|
| Wired Communication | USB 2.0 |
| Wireless Communication | 2.4 GHz – based on IEEE 802.15.4 MAC |
| RF Transceiver | Microchip / Atmel AT86RF233 |
| RF Frequency | 2.405-2.48GHz |
| RF Channels | 5Mhz separation 16ch |
| Output power | 4 dBm max |
| Antenna gain | Average -3.6dBi; (Max gain: 0.9dBi) |
| Sync | 2 x BNC connector (Input, Output) |







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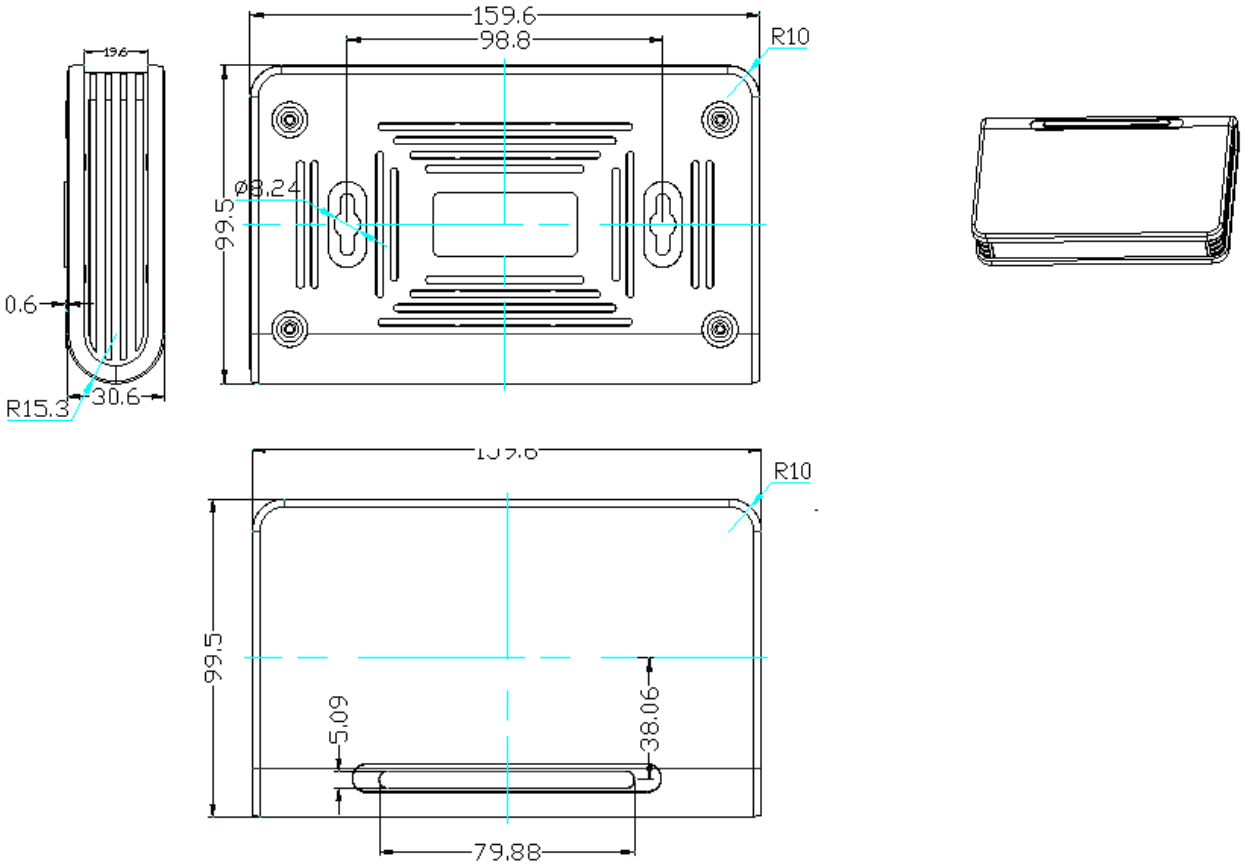
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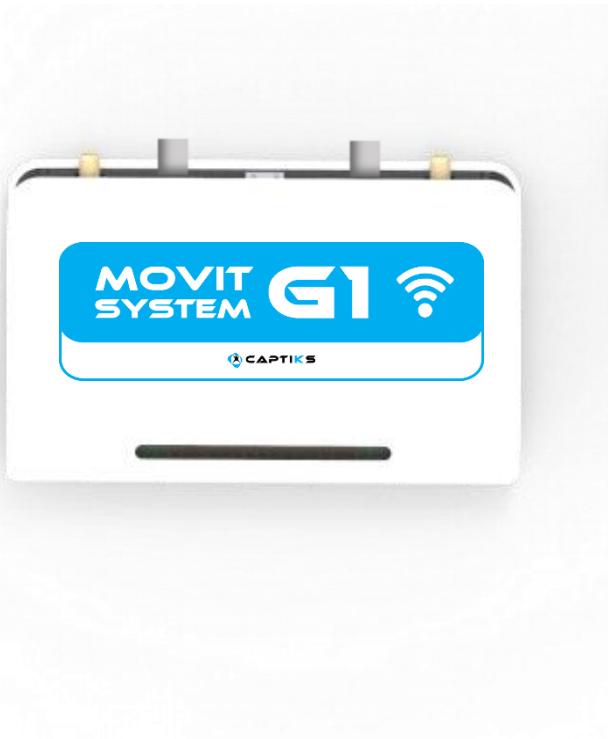
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SYSTEM
G1
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# MOVIT SYSTEM – TECHNICAL SPECIFICATIONS

## CERTIFICATION – DECLARATION OF CONFORMITY

The system is compliant to CE directives and standards and it has the CE certification. CE marking indicates that a product has been assessed by the manufacturer and deemed to meet EU safety, health and environmental protection requirements. It is required for products manufactured anywhere in the world that are then marketed in the EU

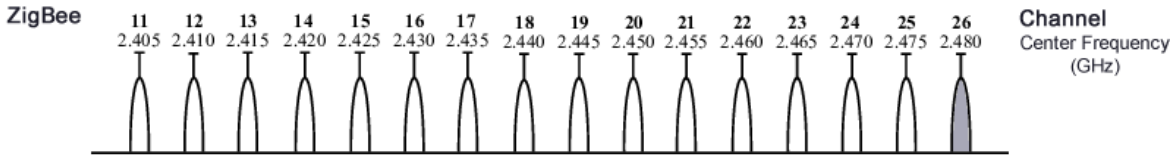
## RF SPECIFICATIONS

The Movit System devices embody an Atmel/Microchip Inc. AT86RF233 Zigbee/IEEE 802.15.4 type Transceiver, with a digital control interface, Low Power, High Performance RF-CMOS 2.4GHz Transceiver for ZigBee, RF4CE, IEEE 802.15.4, 6LoWPAN, and ISM Applications. Receiver sensitivity -101dBm, Programmable TX output power from -17dBm up to +4dBm.

- Compliant to EN 300 328/440, FCC-CFR-47 Part 15, ARIB STD-66, RSS-210
- Compliant to IEEE 802.15.4 2003/2006/2011

The ATZB-RF-233-1-C Module based on the Atmel/Microhip AT86RF233 chip, has **FCC ID**: **VW4A091729**.

The control driver firmware is configured for RF operations in the Band 2.405 to 2.480 GHz under 47CFR Part15.247. **Channel 26 disabled for 47CFR Part15.247.**



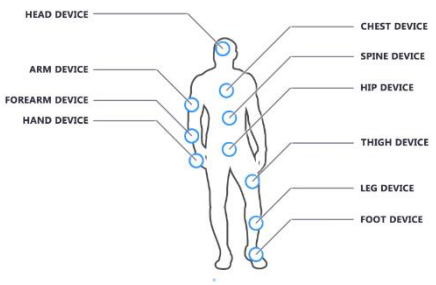

## MOTION STUDIO SOFTWARE

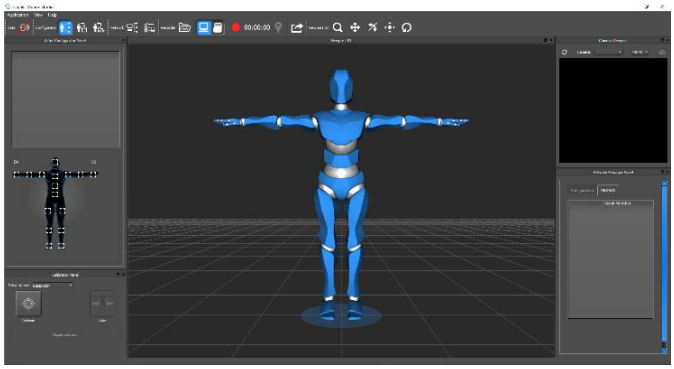
- Intuitive user interface
- Drag & Drop configuration
- Patient / User Database
- Wireless synchronization button
- Configure wireless network settings and update rates
- Real-time graphical data visualization and export of:
- 3D angular velocity (deg/s)
- 3D acceleration (m/s²)
- 3D earth magnetic field (a.u.)
- 3D orientations (Quaternions)
- Export orientation as Quaternions
- Export BVH file animation
- Export Video file synced with data
- Record and save data with ease
- Export data as ASCII text (CSV) for further processing
- Slave Mode Sync (TTL 3.3 V and 5 V protocol)
- Master Mode Sync (TTL 3.3 V and 5 V protocol)
- Passthrough Mode Sync (TTL 3.3 V and 5 V protocol)
- Battery level indicator
- Wireless channels indicator

## MOTION ANALYZER SOFTWARE

- Intuitive user interface
- Re-open data recorded
- Edit data recorded
- Load raw data
- Load animation data
- Load video recorded with Motion Studio
- Load external video
- Synchronize all video, data, animation tracks
- Export edited / sub session Raw data
- Export edited / sub session Joint angles
- Export edited / sub session Animation
- Export edited / sub session Video file
- Analyze specific protocols implemented
- Generate PDF report files for specific protocols

Captiks Softwares are Windows 7, 8, 10 and 11 compatibles.





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## HUB STATION

For recharge and download data up to 8 Movit G1 simultaneously

- Power Supply: 220 Volts / 12 Volts
- Recharge up to 8 Movit G1

## CALIBRATION BASE AND MAP

The calibration base is designed to dock and calibrate up to 16 Movits simultaneously. The calibration map is an additional hardware that allows you to insert the calibration base in different preset positions so as to make the calibration objective, easy, fast and correct

## STRAPS SPECIFICATIONS

Breathable elastic straps

- Fast and easy coupling system to securely insert Movit G1 into body straps
- Dryflex biocompatible material
- More sizes to fit each body part


## PACKAGING

The system is supplied enclosed in a comfortable and sturdy ABS case

- Strong and durable
- Suitable as hand-luggage
- Shipping weight ~4 Kg

## REQUIREMENTS

| | |
|---|---|
| Operating system | Windows 7/8/10/11 |
| Processor | Quad core or higher (2.0 GHz or faster) |
| RAM | 8 GB |
| Hard Disk space | 500 MB |
| USB Ports | 1 USB port 2.0 each Dongle G1 |
| Graphic card | Hardware acceleration for DirectX 9 / OpenGL |
| | with 1 GB or more of dedicated memory |

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