



# PROMOVE-V

## Product Datasheet

Version 2.0  
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### Overview

ProMove-V is a **waterproof and dustproof** wireless Inertial Measurement Unit (IMU). Using Inertia's **high-speed and low-power wireless** technology, a network of tens of ProMove-V's can sample and stream all sensor data at high data rates within **100 ns synchronization accuracy** across all devices.

ProMove-V features a complete set of **ultra-low-noise** digital sensors, offering multi-modal and multi-DoF (degrees of freedom) sensor data:

- 3-D low-range acceleration
- 3-D high-g acceleration
- 3-D turn rate / gyroscope
- 3-D magnetic field intensity / compass
- Barometric pressure (optional)
- GNSS (optional) for localization and tracking

The sensor data is transmitted wirelessly to a central node, the **Inertia Gateway**, which connects to the computer through USB and acts as the master hub for data collection and sensor configuration over-the-air. The **Advanced** version of the Inertia Gateway provides additional features such as synchronized trigger and clock for external systems, as well as Raw Ethernet data transfer support.

The number of devices in the network scales with the sampling rates: for example, a network can have **39 nodes** operating (sampling and communicating) at **200 Hz**, or 19 nodes operating at 500 Hz.

ProMove-V is also equipped with **16 GB** of internal storage. All sensor samples are logged internally, in addition to being sent over-the-air. Any information lost during the wireless transmission can be recovered at the end of each measurement round.

The **Inertia Studio** software (freely available on our website) is the interface for visualizing the incoming data in real-time and configuring all devices in the network and all sensors. Full access to the **raw sensor data** is provided to the user, as well as **3-D orientation information**, expressed as quaternions and Euler angles. C++, Java and Android SDKs, along with examples, are also available for integration with custom applications.

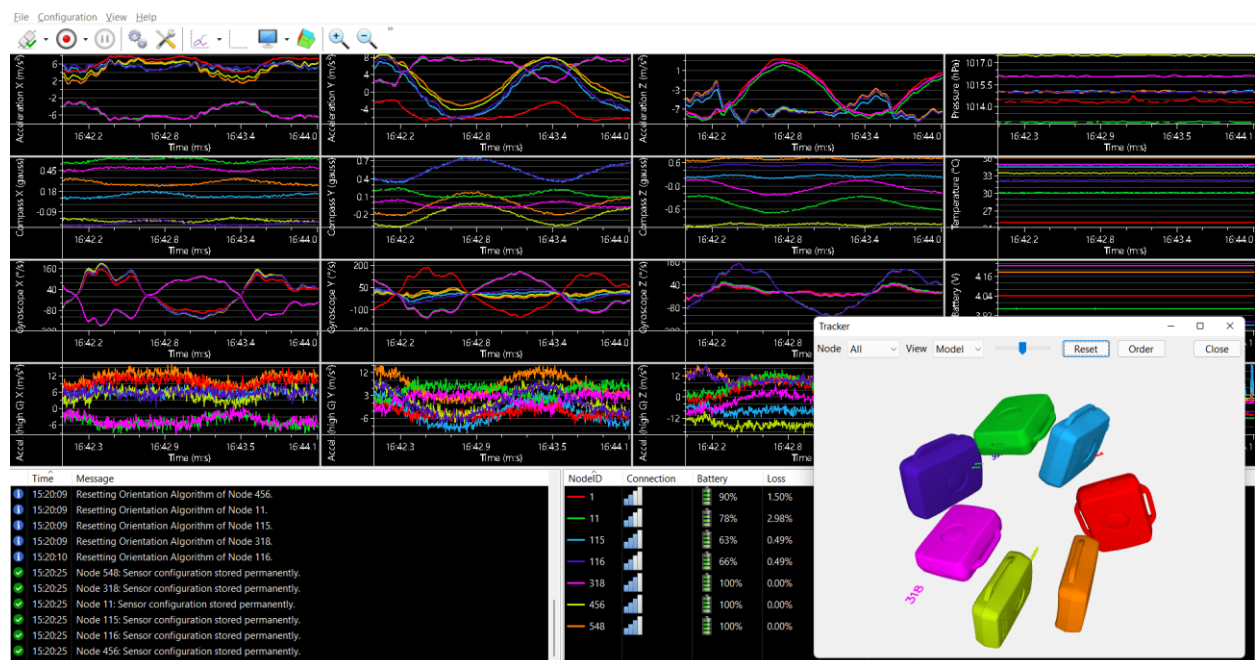
ProMove-V is carefully designed for good ergonomics. The curved design makes mounting and wearing on body parts comfortable, without affecting stability in case of surface mounting.

## Key features & Benefits

- Supports large networks (tens of devices)
- Fully synchronized sampling (better than 100 ns)
- Up to 1 kHz sampling and communication rate per sensor axis
- Full 3-D acceleration (low-g and high-g), turn rate and magnetic field intensity measurements
- Full 3-D orientation information (quaternions and Euler angles)
- High-g accelerometer
- Barometric sensor (optional)
- GNSS (optional)
- RF transceiver in the 2.4 GHz band
- On-board flash memory for data storage
- High-capacity internal rechargeable battery with extended temperature operating range
- Integrated USB-C interface
- Waterproof and dustproof - IP67
- Customized casing for good ergonomics

## Inertia Studio

The Inertia Studio software enables real-time visualization and configuration of sensors and wireless parameters. All data retrieved by the Inertia Studio software is logged for post-analysis. Inertia Studio retains compatibility with the older sensor version, ProMove-mini.



## First Generation (G1) vs. Second Generation (G2)

The second generation ProMove-V (G2) is an upgrade over G1 in several aspects: the maximum range of the gyroscope increases to  $\pm 4000$  °/s, the range of the low-g accelerometer reaches  $\pm 32$  g, the resolution of the high-g accelerometer is improved, and the battery capacity is extended.

## Specifications

Accelerometer	G1	G2
Selectable range	±2, ±4, ±8, ±16 g	±2, ±4, ±8, ±16, ±32 g
ADC resolution	16 bits	16 bits
Maximum sampling rate	1000 Hz	1000 Hz
Noise power spectral density	60 µg/√Hz	70 µg/√Hz
Zero-g level change vs. temperature	±0.15 mg/°C	±0.15 mg/°C
Sensitivity change vs. temperature	±0.005 %/°C	±0.01 %/°C
Zero-g level offset accuracy	±20 mg	±10 mg
Gyroscope		
Selectable range	Up to ±2000 °/s	Up to ±4000 °/s
ADC resolution	16 bits	16 bits
Maximum sampling rate	1000 Hz	1000 Hz
Noise power spectral density	0.0038 (°/s)/√Hz	0.0038 (°/s)/√Hz
Zero-rate level change vs. temperature	±0.02 °/s/°C	±0.005 °/s/°C
Zero-rate level offset accuracy	±0.5 °/s	±0.3 °/s
Compass		
Selectable range	±4, ±8, ±12, ±16 gauss	
ADC resolution	16 bits	
Maximum sampling rate	100 Hz	
RMS noise	3.2 mgauss X and Y axes, 4.1 mgauss Z axis	
Zero-gauss level offset accuracy	±1 gauss	
High-g accelerometer		
Selectable range	±100, ±200, ±400 g	±32, ±64, ±128, ±256, ±320
ADC resolution	12 bits	16 bits
Resolution	49 mg @ ±100 g range	3.9 mg @ ±128 g range
Maximum sampling rate	1000 Hz	1000 Hz
Barometer (optional)		
Range	260 to 1260 hPa	
ADC resolution	24 bits	
Maximum sampling rate	100 Hz	
RMS noise	0.007 hPa	
GNSS (optional)		
Maximum sampling rate	10 Hz	
Constellations	GPS, GLONASS, GALILEO	
Inertia Wireless Network Protocol		
Frequency band	2.4 GHz	
Data rate	4 Mbps	
TX power	10 dBm	
Range	30 m line-of-sight, no interference	
Data collection and storage		
Maximal number of nodes in a single network	39 nodes at 200 Hz each 19 nodes at 500 Hz each 9 nodes at 1 kHz each	
Inertia Gateway	Central hub for synchronized data collection	
Synchronization	< 100 ns	
Wired interface	USB-C	
Storage	16 GB flash memory	
Software		
Inertia Studio	Real-time data visualization, acquisition and configuration. Runs on Windows, macOS and Linux.	
Electrical characteristics		
Battery runtime from full charge	20 h; GNSS version: 7 h	30h; GNSS version: 7 h
Miscellaneous		
Weight	29 g; GNSS version: 28.5 g	31.2 g; GNSS version: 28.5 g
Dimensions	52.5 x 48.6 x 17.6 mm	
Attachments	Strap attachment	
Waterproof and dustproof	IP67	

## Further information

All technical documents, user manuals, software, examples and other useful resources can be found on our website at the link below:

<https://inertia-technology.com/downloads/>

## Applications

- Multi-point inertial data acquisition
- Fine-grained, synchronized motion capture
- Multi-person, multi-object 3-D tracking
- Activity monitoring and recognition
- Virtual reality and gaming
- Inertial navigation
- Vibration analysis

## Design

The ergonomic design of ProMove-V allows for easy strap attachment and body mount.



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