

NEWTON-1

Single antenna high performance GNSS/ GNSS+INS Receiver

Minimal equipment – maximum navigation.

- Multi-constellation multi-frequency GNSS support:
 - GPS L1 (C/A), L2 (C)/L5
 - GLONASS G1 (C/A), G2 (C/A)
 - Galileo E1, E5b/E5a
 - BeiDou B1I, B2I
 - NavIC L5, S-band
 - SBAS L1
- Autonomous, SBAS, PPP, RTK positioning
- GNSS+INS capabilities for Position, Velocity and Attitude (up to 1000 Hz)
- MEMS 3-axis gyro and 3-axis accelerometer
- Ability to connect various types of IMUs: from cost-effective IMU or high-stability IMU to FOG
- User-selectable initialization procedure
- Axis Alignment (Software-Based)
- Rugged single enclosure solution (IP 67) or OEM boards



The Newton-1 products line is represented by the high performance multi-constellation multi-frequency GNSS Receivers that feature PPP, RTK, INS Engines, offering flexible positioning capabilities and expanding the application area: from standard-accuracy GNSS Receiver to high performance high-accuracy GNSS-Aided INS Receiver (GNSS+INS Receiver) with orientation support.

GNSS receivers provide reliable and accurate positioning using multi-frequency multi-constellation GNSS technology. The performance of GNSS receivers is improved by regional Satellite Based Augmentation Systems (WAAS, EGNOS, GAGAN, MSAS, SDCM and other SBAS-compatible services). The RTK and PPP are the powerful technology that are used to provide highly accurate navigation data.

The robust loosely-coupled GNSS+INS integration algorithm allows the real-time fuse of GNSS data and IMU data by Extended Kalman Filter to provide optimal estimates of Position, Velocity, and Attitude. The GNSS+INS Receiver is ideal solution for application requiring continuous positioning even in GNSS-denied environments.

In addition to the increasing positioning availability under the most demanding conditions and high data update rate, the high performance GNSS-aided INS provide full object's orientation – Attitude (Roll, Pitch, Yaw/Heading).

The receiver supports software-based alignment of the IMU axes to the platform's reference frame. This functionality enables the transformation of inertial measurements from the sensor coordinate system into the vehicle or object coordinate system, ensuring accurate navigation and control outputs.

The Newton-1 supports a wide range of MEMS IMUs and can operate with either cost-effective or high-stability IMUs. Additionally, it allows integration with external Fiber Optic Gyroscopes (FOG) for enhanced inertial performance in demanding applications. The use of PPP and RTK Engines makes the position estimation more accurate for such receiver.

The full access to raw GNSS measurements (Pseudoranges measured by code and carrier phase, CNR, Doppler) and IMU data (raw accelerometer, raw gyro, temperature) allows data collection for their post processing (PPK) providing greater device flexibility and more capabilities for the user.

GUI (available for free download) provides a software tool for easy setup, configuration, and data logging or viewing.

For integration into existing equipment, OEM version is available (without enclosure).

Our technical support team will help make using our products as easy and straightforward as possible.

NEWTON-1 TECHNICAL SPECIFICATION

Supported GNSS constellations	GPS L1(C/A), L2(C)/L5; GLONASS G1(C/A), G2(C/A); Galileo E1, E5b/E5a; BeiDou B1I, B2I; NavIC L5, S-band; SBAS L1
GNSS antenna input(s)	1 pc
GNSS Receiver:	
Position Accuracy (RMS), Horizontal / Vertical	
Autonomous	1.1 m / 1.8 m
SBAS	0.6 m / 0.9 m
PPP	0.05 m / 0.1 m
RTK	0.005 m + 0.5 ppm/ 0.008 m + 1.0 ppm
Velocity	0.02 m/s / 0.03 m/s
Output Data Rate	
Position (PVT)	up to 20 Hz
GNSS measurements	up to 20 Hz
Data output format	NMEA-0183 (ver. 2.3, ver. 4.11), NTL Binary, RTCM SC-104 (ver.3.4)
Data input format	RTCM SC-104 (ver.3.4 or 3.X)
Time-To-First-Fix (Cold start)	< 60 s
Re-acquisition ⁽¹⁾	< 3 s
Operation conditions⁽²⁾	
Altitude	up to 18000 m
Velocity	up to 515 m/s
Acceleration	up to 8 g
GNSS+INS Receiver:	
Attitude Accuracy ⁽³⁾(RMS)	
Roll, Pitch, Yaw	< 1°
Output Data Rate	
Position, Velocity & Attitude	up to 1000 Hz
IMU data ⁽⁴⁾	up to 1000 Hz
Data output format	Binary
MEMS IMU:⁽⁵⁾	
Accelerometer Range	± 16 g
Gyroscope Range	± 490 °/s
Interfaces:	
1 x PPS out ⁽⁶⁾	< 20 ns
2 x RS422	Nav. data, GNSS measurements, Attitude, IMU data, RTCM
1 x Ethernet	Nav. data, GNSS measurements, Attitude, IMU data, RTCM
Mechanical/Electrical:	
Operating voltage	9 V ... 36 V DC (24 V typ.)
Power consumption	up to 4.5 W
Environmental protection	IP67
Dimensions ⁽⁷⁾	135 mm x 81 mm x 51 mm
Weight ⁽⁷⁾	450 g
Environmental:	
Operating temperature ⁽⁸⁾	-40 °C ... +71 °C
Storage temperature	-40 °C ... +85 °C

⁽¹⁾ When the GNSS signals are interrupted for less than 10 s and then restored.

⁽²⁾ Contact us for more information.

⁽³⁾ If GNSS solution is available.

⁽⁴⁾ Raw accelerometer, raw gyro, temperature.

⁽⁵⁾ The default range for cost-effective MEMS. Available MEMS options: accelerometer range (optional): ±4; ±8; ±32; ±40; gyroscope range (optional): ±125; ±250; ±1000; ±2000; ±4000. Contact us for more information.

⁽⁶⁾ One sigma, clear sky view, standalone (absolute) mode.

⁽⁷⁾ It depends on MEMS type (Cost-effective IMU or High Stability IMU).

⁽⁸⁾ -40 °C to +85 °C (industrial-grade) available upon request.

High Stability IMU Parameters

Parameter	Accelerometer	Gyroscope
Input Range	± 40 g	± 490 °/s ⁽¹⁾
Bias Instability	6 μ g	0.8 °/h
Bandwidth	480 Hz	480 Hz
Random Walk	0.02 (m/s)/ $\sqrt{h}$	0.08 °/ $\sqrt{h}$
One-year bias repeatability	1,500 μ g	250°/h

⁽¹⁾2000°/s version is export controlled. Contact us for more information.

Cost-effective IMU Parameters

Parameter	Accelerometer	Gyroscope
Input Range	± 16 g ⁽¹⁾	± 500 °/s ⁽²⁾
Linear acceleration zero-g level offset accuracy	± 10 mg	
Angular rate zero-rate level		± 1 °/s

⁽¹⁾Optional range: ± 2 g; ± 4 g; ± 8 g; ± 32 g

⁽²⁾Optional range: ± 125 °/s; ± 250 °/s; ± 1000 °/s; ± 2000 °/s, ± 4000 °/s

If you would like more information about this product, please contact us by completing our GET QUOTE form at <https://kosminis-vytis.lt/product/newton-1/>

NEWTON-2

Dual antenna high performance GNSS/ GNSS+INS Receiver

Dual antenna – double confidence in yaw.

- Multi-constellation multi-frequency GNSS support:
 - GPS L1 (C/A), L2 (C)/L5
 - GLONASS G1 (C/A), G2 (C/A)
 - Galileo E1, E5b/E5a
 - BeiDou B1I, B2I
 - NavIC L5, S-band
 - SBAS L1
- Autonomous, SBAS, PPP, RTK positioning
- GNSS+INS capabilities for Position, Velocity and Attitude (up to 500 Hz)
- Dual-antenna heading alignment
- Ability to connect various types of IMUs: from cost-effective IMU or high-stability IMU to FOG
- User-selectable initialization procedure
- Axis Alignment (Software-Based)
- Rugged single enclosure solution (IP 67) or OEM boards



The Newton-2 products line is represented by the high performance multi-constellation multi-frequency GNSS Receivers that feature PPP, Dual RTK, and INS Engines. These receivers offer flexible positioning capabilities and support a wide range of applications – from standard-accuracy GNSS receivers with heading determination to high performance high-accuracy GNSS-Aided INS Receiver (GNSS+INS Receiver) providing full orientation even when static.

GNSS receivers provide 2D orientation of the antenna system (True North Heading + Pitch) along with the reliable and accurate positioning using multi-frequency multi-constellation GNSS technology. The performance of GNSS receivers is improved by regional Satellite Based Augmentation Systems (WAAS, EGNOS, GAGAN, MSAS, SDCM and other SBAS-compatible services). The PPP and RTK are the powerful technology that are used to provide highly accurate navigation data.

For applications requiring full orientation (roll, pitch, yaw), the loosely-coupled GNSS+INS integration can be used. The GNSS+INS integration capability allows the real-time fuse of GNSS data (including Heading) and IMU data by Extended Kalman Filter. Using two GNSS antennas allows to receive reliable heading information and quickly align the combined GNSS+INS. Dual-antenna heading alignment is a solution that provides high-precision orientation (yaw) regardless of whether the object is moving or static.

The receiver supports software-based alignment of the IMU axes to the platform's reference frame. This functionality enables the transformation of inertial measurements from the sensor coordinate system into the vehicle or object coordinate system, ensuring accurate navigation and control outputs.

The access to GNSS measurements (Pseudoranges measured by code and carrier phase, CNR, Doppler) and IMU data allows raw data collection for their post processing (PPK) providing more capabilities for the user.

GUI (available for free download) provides a software tool for easy setup, configuration, and data logging or viewing.

For integration into existing equipment, OEM version is available (without enclosure).

Our technical support team will help make using our products as easy and straightforward as possible.

NEWTON-2 TECHNICAL SPECIFICATION

Supported GNSS constellations	GPS L1(C/A), L2(C)/L5; GLONASS G1(C/A), G2(C/A); Galileo E1, E5b/E5a; BeiDou B1I, B2I; NavIC L5, S-band; SBAS L1
GNSS antenna input(s)	2 pcs
GNSS Receiver:	
Position Accuracy (RMS), Horizontal / Vertical	
Autonomous	1.1 m / 1.8 m
SBAS	0.6 m / 0.9 m
PPP	0.05 m / 0.1 m
RTK	0.005 m + 0.5 ppm/ 0.008 m + 1.0 ppm
Velocity	0.02 m/s / 0.03 m/s
Angles Accuracy (RMS)⁽¹⁾	
Pitch	0.15°
Heading	0.06°
Output Data Rate	
Position (PVT)	up to 20 Hz
Heading	up to 20 Hz
GNSS measurements	up to 20 Hz
Data output format	NMEA-0183 (ver. 2.3, ver. 4.11), NTL Binary, RTCM SC-104 (ver.3.4)
Data input format	RTCM SC-104 (ver.3.4 or 3.X)
Time-To-First-Fix (Cold start)	< 60 s
Re-acquisition ⁽²⁾	< 3 s
Operation conditions⁽³⁾	
Altitude	up to 18000 m
Velocity	up to 515 m/s
Acceleration	up to 8 g
GNSS+INS Receiver:	
Attitude Accuracy ⁽⁴⁾(RMS)	
Roll, Pitch, Yaw	< 1°
Output Data Rate	
Position, Velocity & Attitude	up to 500 Hz
IMU data	up to 1000 Hz
Data output format	Binary
MEMS IMU:⁽⁵⁾	
Accelerometer Range	± 16 g
Gyroscope Range	± 490 °/s
Interfaces:	
1 x PPS out ⁽⁶⁾	< 20 ns
2 x RS422	Nav. data, GNSS measurements, Attitude, IMU data, RTCM
1 x Ethernet	Nav. data, GNSS measurements, Attitude, IMU data, RTCM
Mechanical/Electrical:	
Operating voltage	9 V ... 36 V DC (24 V typ.)
Power consumption	up to 5.0 W
Environmental protection	IP67
Dimensions ⁽⁷⁾	135 mm x 81 mm x 51 mm
Weight ⁽⁷⁾	450 g
Environmental:	
Operating temperature ⁽⁸⁾	-40 °C ... +71 °C
Storage temperature	-40 °C ... +85 °C

⁽¹⁾ Baseline length ~2 m.

⁽²⁾ When the GNSS signals are interrupted for less than 10 s and then restored.

⁽³⁾ Contact us for more information.

⁽⁴⁾ If GNSS solution is available.

⁽⁵⁾ The default range for cost-effective MEMS. Available MEMS options: accelerometer range (optional): ±4; ±8; ±32; ±40; gyroscope range (optional): ±125; ±250; ±1000; ±2000; ±4000. Contact us for more information.

⁽⁶⁾ One sigma, clear sky view, standalone (absolute) mode.

⁽⁷⁾ It depends on MEMS type (Cost-effective IMU or High Stability IMU).

⁽⁸⁾ -40 °C to +85 °C (industrial-grade) available upon request.

High Stability IMU Parameters

Parameter	Accelerometer	Gyroscope
Input Range	± 40 g	± 490 °/s ⁽¹⁾
Bias Instability	6 μ g	0.8 °/h
Bandwidth	480 Hz	480 Hz
Random Walk	0.02 (m/s)/ $\sqrt{h}$	0.08 °/ $\sqrt{h}$
One-year bias repeatability	1,500 μ g	250°/h

⁽¹⁾2000°/s version is export controlled. Contact us for more information.

Cost-effective IMU Parameters

Parameter	Accelerometer	Gyroscope
Input Range	± 16 g ⁽¹⁾	± 500 °/s ⁽²⁾
Linear acceleration zero-g level offset accuracy	± 10 mg	
Angular rate zero-rate level		± 1 °/s

⁽¹⁾Optional range: ± 2 g; ± 4 g; ± 8 g; ± 32 g

⁽²⁾Optional range: ± 125 °/s; ± 250 °/s; ± 1000 °/s; ± 2000 °/s, ± 4000 °/s

If you would like more information about this product, please contact us by completing our GET QUOTE form at <https://kosminis-vytis.lt/product/newton-2/>

NEWTON-3

Triple-antenna high performance GNSS Receiver

Satellite orientation. No inertia. No compromises.

- Multi-constellation, multi-frequency GNSS support:
 - GPS L1(C/A), L2(C)
 - GLONASS G1(C/A), G2(C/A)
 - Galileo E1, E5b
 - BeiDou B1I, B2I
 - NavIC L5, S-band
- Triple-antenna GNSS receiver with Dual RTK Engines
- High-accuracy 3D orientation based on GNSS signals
- Autonomous positioning
- Axis Alignment (Software-Based)
- Single enclosure system
- Rugged single enclosure solution (IP 67) or OEM boards



The Newton-3 is the standard accuracy GNSS Receiver with full orientation capability (roll, pitch, yaw). The GNSS receiver provides reliable and accurate positioning using multi-frequency multi-constellation GNSS technology.

The triple-antenna GNSS receiver has the powerful RTK technology and can determine the object 3D orientation (heading, pitch and roll) by analyzing the RTK positions of the three GNSS antennas.

This method is preferred for applications and tasks that require high precision and high accuracy full object orientation.

The receiver supports software-based alignment of the IMU axes to the platform's reference frame. This functionality enables the transformation of inertial measurements from the sensor coordinate system into the vehicle or object coordinate system, ensuring accurate navigation and control outputs.

GUI (available for free download) provides a software tool for easy setup, configuration, and data logging or viewing.

For integration into existing equipment, OEM version is available (without enclosure).

Our technical support team will help make using our products as easy and straightforward as possible.

NEWTON-3 TECHNICAL SPECIFICATION

Supported GNSS constellations	GPS L1(C/A), L2(C); GLONASS G1(C/A), G2(C/A); Galileo E1, E5b; BeiDou B1I, B2I; NavIC L5, S-band
GNSS antenna input(s)	3 pcs
Position Accuracy (RMS), Horizontal / Vertical	
Autonomous	1.1 m / 1.8 m
Velocity	0.02 m/s / 0.03 m/s
Angles Accuracy (RMS) ⁽¹⁾	
Roll	0.2°
Pitch	0.2°
Heading	0.1°
Output Data Rate	
Autonomous (PVT)	up to 20 Hz
Roll, pitch, heading	up to 20 Hz
Data output format	Binary
Time-To-First-Fix (Cold start)	< 60 s
Re-acquisition ⁽²⁾	< 3 s
Operation conditions ⁽³⁾	
Altitude	up to 18000 m
Velocity	up to 515 m/s
Acceleration	up to 8 g
Interfaces:	
1 x GNSS PPS out ⁽⁴⁾	< 20 ns
1 x RS422	Nav. data
1 x Ethernet	Nav. data
Mechanical/Electrical:	
Operating voltage	9 V ... 36 V DC (24 V typ.)
Power consumption	up to 8.0 W
Environmental protection	IP67
Dimensions	141 mm x 81 mm x 51 mm
Weight	500 g
Environmental:	
Operating temperature ⁽⁵⁾	-40 °C ... +71 °C
Storage temperature	-40 °C ... +85 °C

⁽¹⁾ Baseline length ~2 m.

⁽²⁾ When the GNSS signals are interrupted for less than 10 s and then restored.

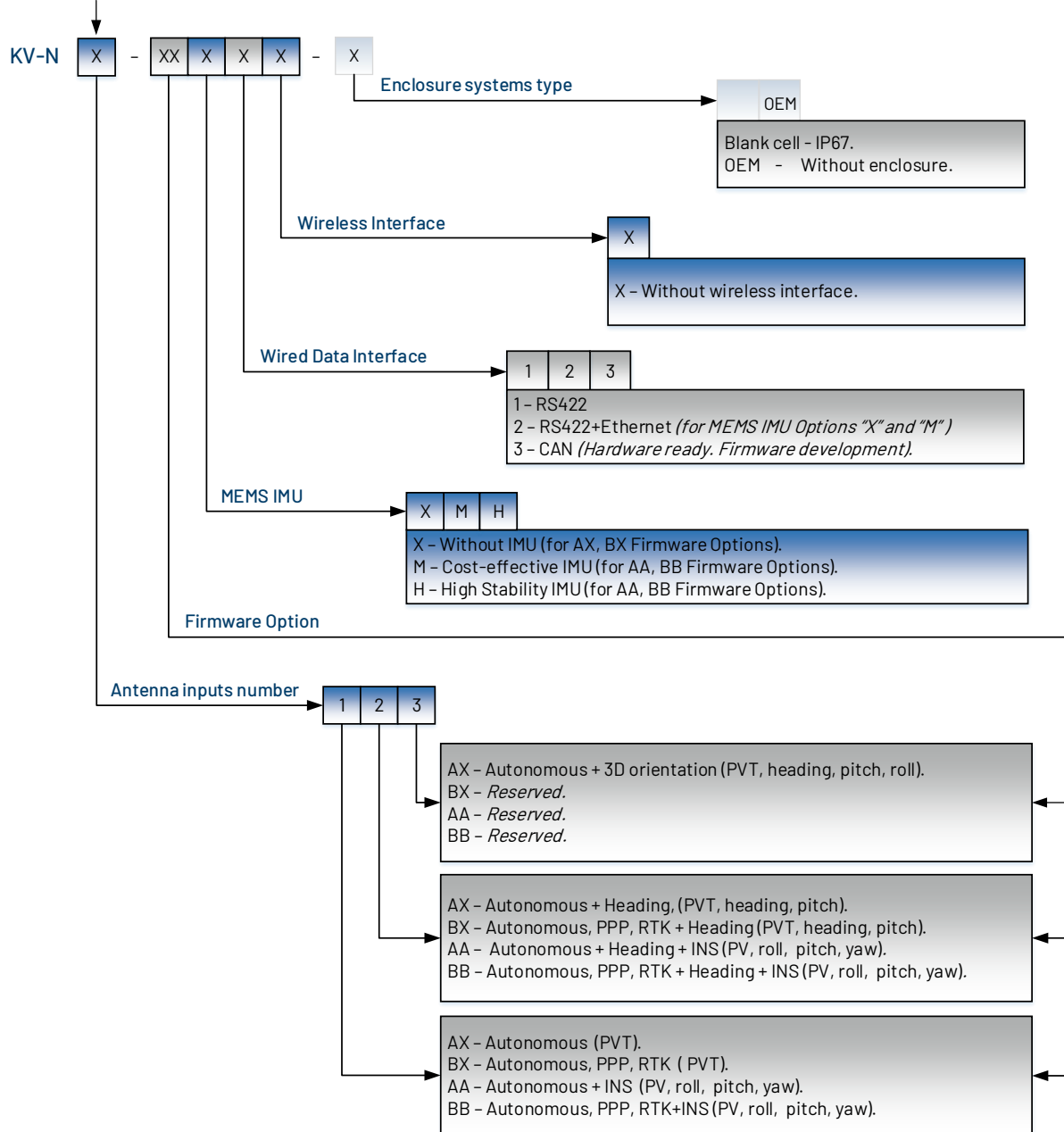
⁽³⁾ Contact us for more information.

⁽⁴⁾ One sigma, clear sky view, standalone (absolute) mode.

⁽⁵⁾ -40 °C to +85 °C (industrial-grade) available upon request.

If you would like more information about this product, please contact us by completing our GET QUOTE form at <https://kosminis-vytis.lt/product/newton-3/>

NEWTON-X Part Number Ordering Guide



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Information is subject to change without notice.
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