

AsteRx RBi3 Pro+

Rugged GNSS/INS positioning and heading receiver



Construction



Logistics & Port
Operations



Mining



Automation



AsteRx RBi3 Pro+ GNSS/INS multi-frequency receiver delivers reliable centimeter-level positioning together with orientation. It is designed for machine control under the harshest of working environments in terms of temperature, corrosion as well as shock and vibration. It offers flexibility of installation with no performance compromises.

KEY FEATURES

- ▶ Rugged and durable IP69K housing
- ▶ High-accuracy RTK positioning with all-in-view, GNSS multi-frequency satellite tracking
- ▶ Inertial sensor provides heading, pitch, roll angles
- ▶ Sub-degree GNSS heading with dual antenna
- ▶ Flexibility to be used either as a rover or a base station
- ▶ GNSS+ algorithms ensure reliable performance in difficult environments
- ▶ Update rate up to 100 Hz

Reliable positioning in harsh environments

Ultra-rugged housing combined with multi-frequency tracking and GNSS+ algorithms make AsteRx RBi3 Pro+ the ideal GNSS receiver for applications that require accurate position in chemically aggressive environments, harsh temperatures and high mechanical stress. Its high-update rate and low-latency output means quick feedback loops during rotation or movement.

Most reliable operation with the INS

The integrated INS (Inertial Navigation System) ensures the highest positioning performance and orientation data. Continuity of positioning is maintained even during short GNSS outages when the line-of-sight to satellites is lost due to obstructions. In dual-antenna configuration, AsteRx RBi3 Pro+ also provides precise, position-independent heading, which is available immediately at the start of operation.

Ease of integration

The AsteRx RBi3 Pro+ integrates seamlessly into any system thanks to fully documented interfaces, commands and data messages. Septentrio's open interfaces and software tools (WebUI, RxTools) make it easy to integrate, configure and control the AsteRx RBi3 Pro+ receiver.

FEATURES

GNSS signals

544 Hardware channels for simultaneous tracking of most visible signals:

- ▶ GPS: L1 C/A, L1C, L2C, L2 P, L5
- ▶ GLONASS: L1 C/A, L2C/A
- ▶ BeiDou: B1I, B2I, B3I
- ▶ Galileo: E1, E5a, E5b, E5 AltBOC
- ▶ QZSS: L1C/A, L2C, L5
- ▶ SBAS: EGNOS, WAAS, GAGAN, MSAS, SDCM

Septentrio's patented GNSS+ technologies

- ▶ **AIM+** industry leading anti-jamming, anti-spoofing interference monitoring & mitigation technology
- ▶ **APME+** a posteriori multipath estimator for code and phase multipath mitigation
- ▶ **LOCK+** superior tracking robustness under heavy mechanical shocks or vibrations
- ▶ **IONO+** advanced scintillation mitigation
- ▶ **RAIM+** (Receiver Autonomous Integrity Monitoring)

Formats

Septentrio Binary Format (SBF), fully documented with sample parsing tools

NMEA 0183, v3.01, v4.0

RTCM v2.x, v3.x (MSM messages included)

CMR v2.0 and CMR+ (CMR+ input only)

Connectivity

2 x RS232

USB full speed (device)

CAN/CAN-FD

Ethernet 10/100Mbps

2 x Event markers

xPPS out

16 GB internal memory

Dead reckoning positioning and attitude accuracy^{2,8}

GNSS/INS

Duration (s)	Horizontal (m)	Vertical (m)	Heading (deg)	Pitch/roll (deg)
5	0,106	0,04	0,35	0,04
10	0,306	0,06	0,35	0,06
30	3,006	0,25	0,4	0,1

PERFORMANCE

Integrated position accuracy^{1,2}

	Horizontal	Vertical
Standalone	1.2 m	1.9 m
SBAS	0.6 m	0.8 m
DGPS	0.4 m	0.7 m

RTK-INS^{1,2,3}

Horizontal accuracy	0.6 cm + 0.5 ppm
Vertical accuracy	1 cm + 1 ppm
Initialisation	7 s

Integrated attitude accuracy^{1,2,3}

	Non RTK mode	RTK mode
Heading, dual antenna	0.3°	0.15°
Heading, single antenna	0.3°	0.2°
Pitch/roll, dual antenna	0.04°	0.02°

INS velocity^{1,2,3}

	Non RTK mode	RTK mode
Velocity	0.05 m/s	0.02 m/s

IMU performance

Gyroscope performance

Input range	± 500°/s
Bias in-run instability	2.7°/hr
Random walk / noise density	0.15 - 0.2°/√hr

Accelerometer performance

Input range	±30 g
Bias in-run instability ⁴	2.7 - 4.4 µg
Random walk / noise density ⁴	17.0 - 24.8 µg/√Hz

Maximum update rate

Integrated position	100 Hz
Latency ⁷	<20 ms
GNSS measurements	2 Hz
IMU raw data	200 Hz

Time precision

xPPS out ⁹	5 ns
Event accuracy	< 20 ns

Time to first fix

Cold start ⁵	< 45 s
Warm start ⁶	< 20 s
Re-acquisition avg.	avg 1 s

Tracking performance (C/N0 threshold)

Tracking	20 dB-Hz
Acquisition	33 dB-Hz

PHYSICAL AND ENVIRONMENTAL

SWaP

Size	168 x 118 x 51 mm
Weight	850 g
Input voltage	9 to 32 VDC

Power consumption

GPS/GLO L1/L2	1.1 W
All signals, all GNSS constellations	1.3 W
Maximum	2.5 W

Connectors

Antenna	2 x TNC
IO interfaces	23-pin TE AmpSeal

Antenna LNA power output on TNC

Output voltage	5 VDC
Maximum current	150 mA

Environmental

Operating temperature:	-40°C to +70°C
Ingress protection: IP69K (ISO20653) with mated connectors	
Vibration:	ISO16750-3
Test VII — Commercial vehicle, sprung mass (vehicle body) RMS 57,9m/s ²	
Test IX — Commercial vehicle, unsprung mass 150-300m/s ²	
Shock:	ISO16750-3
Shock II — Test for devices on rigid points on the body and on the frame	

Certification

RoHS, WEEE, CE, FCC



¹ Open sky conditions

² RMS level

³ Baseline < 40 Km

⁴ Z-axis (lower value is for X & Y)

⁵ No information available (no almanac, no approximate position)

⁶ Ephemeris and approximate position known

⁷ 99.9%

⁸ RTK fix before outage

⁹ Including software compensation of sawtooth effect

EMEA

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