Apogee Air & Land Series

APOGEE SERIES makes high accuracy affordable for all surveying companies. On the fields of hydrography, mobile mapping, or remote sensing, the Apogee joins robustness, simplicity to high performance.

SBG SYSTEMS

HIGH QUALITY
HIGH ACCURACY

SBG SYSTEMS manufactures high quality, high accuracy inertial navigation systems from the design to the production. The Apogee benefits from our high level of expertise in integrated design, IMU calibration, testing, and filtering.

Highly Accurate

ATTITUDE AND POSITION - AEROSPACE APPLICATIONS

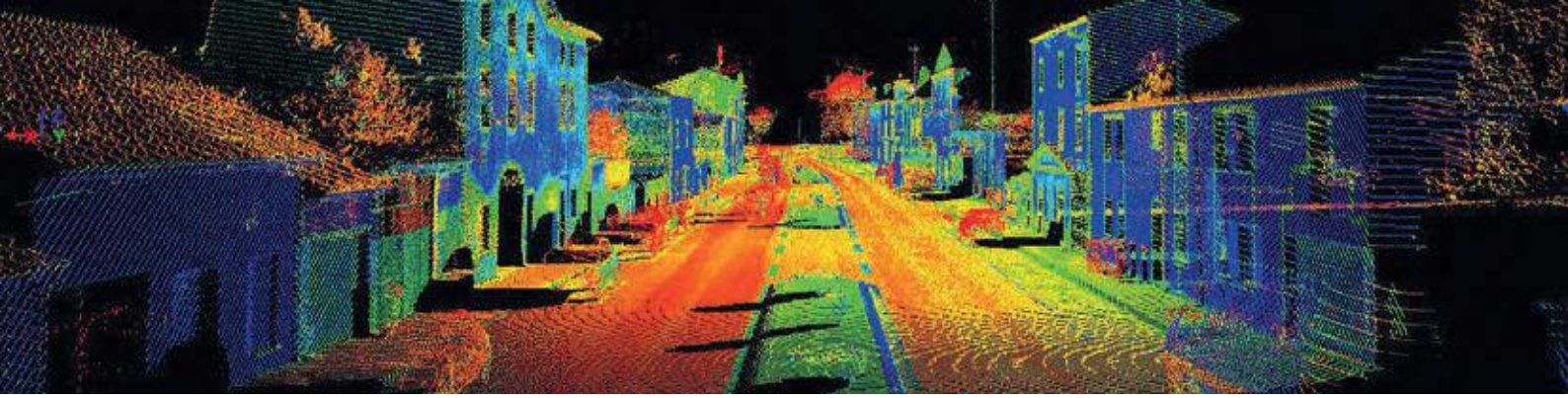
	GNSS L1/L2/L5	RTK*	PPK**
Roll/Pitch	0.01°	0.008°	0.005°
Heading - Dual antenna (2m baseline)	0.03°	0.03°	0.015°
Heading - Dual antenna (4m baseline)	0.015°	0.015°	0.015°
Position (X/Y)	1.0 m	0.01 m	< 0.01 m
Altitude (Z)	1.0 m	0.03 m	< 0.02 m

ATTITUDE AND POSITION - LAND APPLICATIONS***

	GNSS L1/L2/L5	RTK*	PPK**	RTK 60 sec outage	PPK 60 sec outage
Roll/Pitch	0.01°	0.008°	0.005°	0.012°	0.008°
Heading - Single antenna	0.03°	0.03°	0.02°	0.06°	0.025°
Position (X/Y)	1.0 m	0.01 m	< 0.01 m	0.5 m	0.3 m
Altitude (Z)	1.0 m	0.03 m	< 0.02 m	0.1 m	0.05 m

**Real Time Kinematic*
*** Post-processing Kinematic*
****With odometer aiding*

RMS values for typical survey trajectories
Performance may be affected by atmospheric conditions, signal multipath, and satellite geometry.
All specifications subject to change without notice.



Precise Trajectory & Direct Georeferencing

- ACCURATE TRAJECTORY DURING GNSS OUTAGES
- VERY LOW NOISE GYROSCOPES
- LATEST GENERATION OF TRI-FREQUENCY GNSS RECEIVER
- INTERNAL 8 GB DATA RECORDER

LAND MOBILE MAPPING

Robust position in urban canyons, forest, tunnels thanks to:

- Continuous fusion with Inertial and odometer data
- Real time and off-line RTK corrections
- Post-processing software
- Tight GNSS integration for optimal position in multipath environments

AERIAL SURVEY

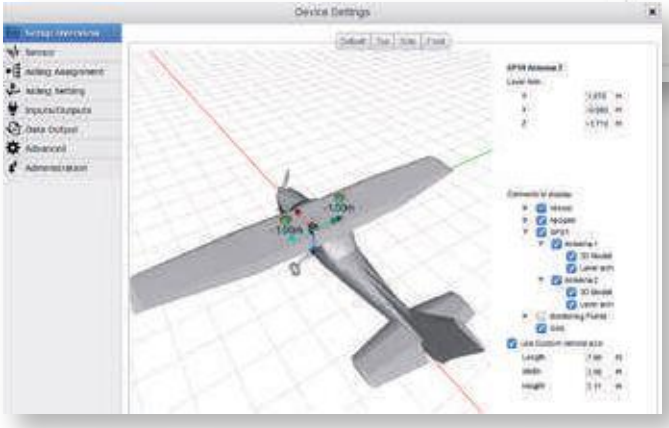
High accuracy real-time external orientation and direct georeferencing thanks to:

- RTK or OmniSTAR corrections
- Low latency (3 ms)
- High resistance to vibrations (can be used on helicopter)
- Post-processing software

Modern and Easy-to-use Inertial Sensors

WEB INTERFACE

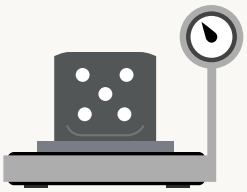
Connect your sensor and configure it throughout the intuitive web interface.



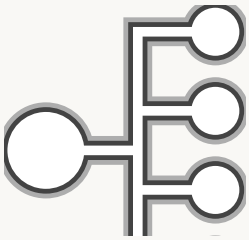
3D VIEW

The new 3D View helps you to check your mechanical installation, especially your sensor position, your alignments, and lever arms.

Easy Integration, Precise Synchronization

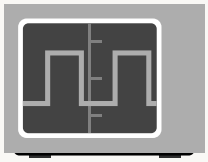


COMPACT,
LIGHTWEIGHT &
LOW POWER



ETHERNET,
RS-232, RS-422, CAN
PROTOCOLS

ACCURATE UTC TIME
STAMPING (1 µs)



UP TO 5 EVENT
INPUT MARKERS

WHY MEMS TECHNOLOGY?

- » Low-power consumption
- » Cost-effective
- » Highly Robust
- » Compact and Light-weight

Versatile Product Line

Model	Apogee-E Externally-aided INS	Apogee-D INS/GNSS
Roll, Pitch, Heading	●	●
Navigation	●	●
GNSS receiver	Connect to any external survey-grade GNSS receiver	Single or Dual Antenna L1/L2/L5 GPS + GLONASS, GALILEO, BEIDOU
Omnistar		○
RTK		●
Post-processing (raw data)**		●
External Aiding	Up to two external GNSS receivers, Odometer (DMI)	

**Subscription available from third party PPP service provider*
***Raw data are compatible with Qinertia post-processing software*

● *Standard* ○ *Option*

CONTINUOUS POSITION

Continuous fusion of inertial data with GNSS information stabilizes the position output, effectively eliminating the impact of multipath and signal outages, when the vehicle is passing in dense urban areas for example.

Specifications

All parameters apply to -20 to 60°C temperature range, unless otherwise stated. Full specifications can be found in the Apogee Hardware Manual available upon request.

PHYSICAL CHARACTERISTICS

Model	Apogee-E	Apogee-D
Weight	< 690 grams 1.52 pounds	< 900 grams 1.98 pounds
Dimensions (L x W x H)	130 x 100 x 58 mm 5.12 x 3.94 x 2.28 ''	130 x 100 x 75 mm 5.12 x 3.94 x 2.95 ''
Consumption	< 3 W	< 5 W Single antenna < 7 W Dual antenna
Supply	9 to 36 VDC	9 to 36 VDC

ENVIRONMENTAL

IP rating Apogee- A/D/E	IP68 (Aluminium)
Specified temperature	-20 to 60 °C / -4 to 140 °F
Operating temperature	-40 to 71 °C / -40 to 160 °F
MTBF (computed)	50,000 hours
Operating vibrations	20 Hz to 2 kHz as per MIL-STD-810G Accelerometer 10 g: 8 g RMS

INTERFACE

Aiding (input)	2x GNSS, RTCM, Odometer
Protocols	Output: NMEA, ASCII, Binary, TSS, Simrad Input: NMEA, Trimble, Novatel, Septentrio, Hemisphere, veripos, Fugro, PD0, PD6
Output rate	0.1 to 200 Hz
Logging Capacity	8 GB or 48 h @ 200 Hz
Serial RS-232/422	Model D - 2 outputs / 4 inputs Model A/E - 3 outputs / 5 inputs
Ethernet	Full Duplex (10/100 base-T)
CAN	1 CAN 2.0 A/B bus up to 1 Mbit/s
Pulses	Inputs: PPS, Event marker up to 1 kHz Outputs: SyncOut, Trigger, PPS 5 inputs / 2 outputs

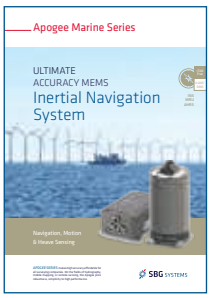
SENSOR PERFORMANCE

	Accelerometers	Gyroscopes
Measurement range	10 g	200 °/s
Bias in-run instability	< 15 µg	< 0.08 °/hr
Random walk	< 75 µg/√Hz	< 0.012 °/√hr

All specifications subject to change without notice.

SBG Systems is a leading supplier of MEMS-based inertial motion sensing solutions. The company provides a wide range of inertial solutions from miniature to high accuracy. Combined with cutting-edge calibration techniques and advanced embedded algorithms, SBG Systems products are ideal solutions for industrial & research projects such as unmanned vehicle control, surveying applications, antenna tracking, and camera stabilization.

PRODUCTS



Apogee Marine

Ekinox Series

Qinertia

VIDEO

Apogee Series

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Ellipse Series

MINIATURE
HIGH PERFORMANCE
Inertial Sensors

3rd GENERATION

0.05° RMS

ITAR Free

IMU
AHRS
MRU
INS
VG

Navigation, Motion & Heave Sensing

ELLIPSE SERIES sets up new standard for miniature and cost-effective inertial systems with an extremely rugged design, cutting-edge sensors, enhanced capabilities, and advanced algorithms.

SBG SYSTEMS

Ellipse Series - High-end Technology in the Smallest Package

Robust L1/L2 RTK
with no extra charge

New 64bit processor
for maximum performance

Best performance and SWaP of its category

OEM version when size and cost matters

Easy integration
Get more out of your Ellipse with Qinertia Post-processing software (INS)

Ellipse Series is a successful line of industrial-grade inertial sensors known for their high level of robustness. This 3rd generation embeds a 64Bit microprocessor running latest generation algorithms. All the INS/GNSS are now provided with multi-band RTK receiver for centimetric position and more accurate orientation.

Product Line

Robust Heading within seconds
Immune to magnetic disturbances
Very short baseline down to 50 cm



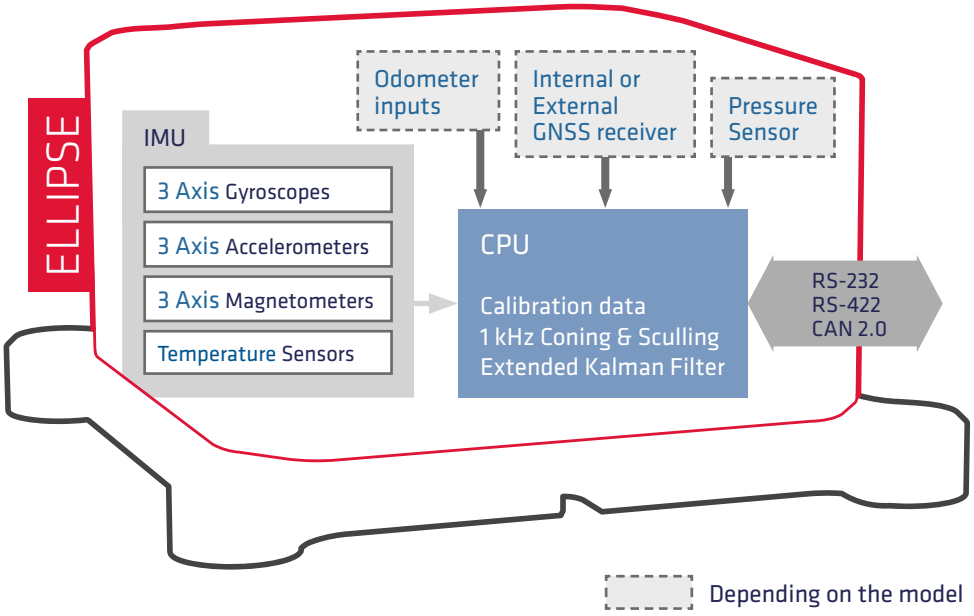

	Ellipse-A	Ellipse-E	Ellipse-N	Ellipse-D
Application	Motion Sensor	INS with your own GNSS receiver	INS for dynamic and automotive applications	INS for low dynamics and robust heading
Heading	Magnetic	Magnetic or GNSS	Magnetic or Mono-antenna GNSS	Dual antenna GNSS
Heave: 5 cm or 5%	●	●	●	●
Odometer aiding		Pulse / CAN OBD-II	Pulse / CAN OBD-II	Pulse / CAN OBD-II
Navigation		Navigation with external GNSS receiver	L1/L2 GNSS receiver 1 cm RTK GNSS Accuracy	L1/L2 GNSS receiver 1 cm RTK GNSS Accuracy
Post-Processing		●	●	●

Motion & Heave Monitoring

Data Georeferencing

Payload Orientation & Positioning

Features Inherited from High End INS/GNSS



2-year Warranty

No Export Restriction

Drivers for:

ROS

PX4 autopilot

Best-in-class IMU | Advanced Algorithms | Easy Integration

- Industrial grade MEMS, superior vibration rejection
- Extensive test and calibration from -40 to 85°C with individual calibration report
- Integrated hard & soft magnetic disturbances calibration tools

- Real-time fusion of inertial with aiding sensors (GNSS, RTK, DMI, DVL,etc.)
- Robust position with invalid GNSS measurements detection and RAIM

- Select your motion profile to automatically adjust Kalman filter and dynamic constraints for optimal performance
- Automatic lever arm estimation (Enter rough lever arms, Ellipse will refine them automatically)

High Accuracy Heave

Ellipse Marine version delivers a 5-cm accurate heave which automatically adjusts to the wave period.

Ellipse is a cost-effective alternative solution for instrumented buoys, helideck, or boat motion monitoring applications.

Autonomous Navigation

Orientation

Pointing & Stabilization

All you need to quickly get started

Development Kit

The Development kit comes with your first Ellipse. It contains:

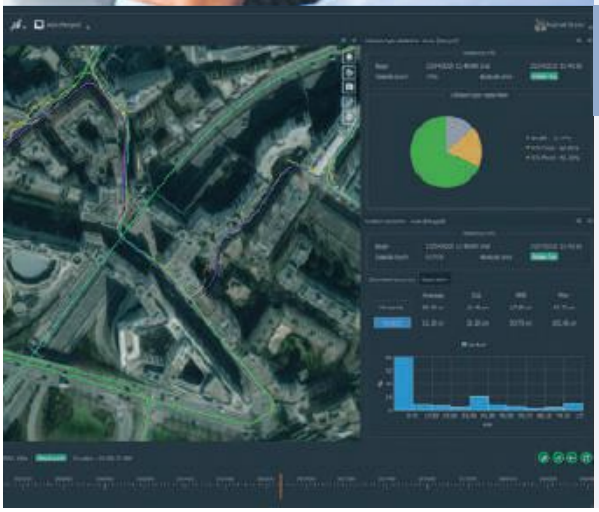
- Your Ellipse sensor calibration report
- A Quick start guide
- All required accessories depending on the chosen model (USB cable, Antenna(s), Development boards)

The SDK contains the sbgcenter which allows visualization, configuration, analysis, and export to Excel, Matlab, Google Earth formats as well as code examples for easy integration.

Services

As expert of inertial navigation, we are at your side, helping you to get the most of your sensor:

- Free technical support by phone and email
- Unlimited firmware updates
- Dedicated support platform (Knowledge center, documentation, etc.)
- Custom remote initiation or on-site training on demand



Qinertia

Get more with your Ellipse INS using Qinertia (in option):

- Detailed analysis after the mission
- Replay the sensor data with different configuration
- Refine the mechanical installation (GNSS lever arm) to the centimeter level for improved real time behavior
- Reach ultimate sensors performance using Forward/ Backward/Merge processing

Dynamics Analysis

Navigation

Autonomous Industrial Vehicles

Specifications

Preliminary

ACCURACY (RMS)

360° sensing in all axes, no mounting limitation

Model	A	E[1] / N / D
Roll / Pitch	0.1°	0.1° SP 0.05° RTK 0.03° PPK[4]
Heading	0.8° Magnetic[2]	0.2° Dual antenna 2m 0.2° Single antenna with dynamics 0.1° PPK[4]
Velocity[3]	-	0.03 m/s
Navigation[3]	-	1.2 m Single Point 1 m SBAS 1 cm RTK / PPK[3] + 1 ppm
Heave accuracy	5 cm or 5% - Valid for Marine version	
Heave period	Up to 15 s - Automatically adjusts to the wave period	

[1] With Supported GNSS receiver
[2] Under homogenous magnetic field
[3] Under good GNSS availability
[4] Optional PPK = Post-processing Kinematic

INTERFACES

Available data	Euler angles, quaternion, velocity, position, heave, calibrated sensor data, delta angles & velocity, barometric data, status, GPS data, UTC time, GNSS raw data (Post-processing), etc.
Aiding sensors	GNSS, Odometer, RTCM
Output rate	200 Hz, 1,000 Hz (IMU data)
Main Serial Interface	RS-232, RS-422, USB - up to 921,600 bps
Serial protocols	Binary eCom, NMEA, ASCII, TSS
CAN interface	CAN 2.0A/B - up to 1 Mbit/s
Pulses	Inputs: Events, PPS, DMI (Direction or quadrature) Outputs: Synchronization (PPS) Model A/N/D: 2 inputs / 1 output Model E: 4 inputs / 2 outputs

SENSORS

	Accelerometers	Gyroscopes	Magnetometers
Gain stability	1000 ppm	500 ppm	< 0.5 %
Non-linearity	1500 ppm	50 ppm	< 0.1 % FS
Bias stability	± 5 mg	± 0.2 °/s	± 1 mGauss
Random walk Noise density	57 µg/√Hz	0.15 °/√hr	3 mGauss
Bias in-run instability[1]	14 µg	7 °/h	1.5 mGauss
VRE	50 µg/g² RMS	1 °/h/g² RMS	-
Alignment error	< 0.05 °	< 0.05 °	< 0.1 °
Bandwidth	390 Hz	133 Hz	22 Hz

[1] Allan Variance, @ 25 °C

MECHANICAL

Box version are IP68, resistant to dust and water.
OEM version are PCB mounted for tight integration.

Model	A	E	N	D
Box				
Size	46 x 45 x 24 mm	46 x 45 x 24 mm	46 x 45 x 24 mm	46 x 45 x 32 mm
Weight	45 g	47 g	49 g	65 g
OEM				
Size	29.5 x 25.5 x 11 mm	29.5 x 25.5 x 11 mm	29.5 x 25.5 x 16 mm	29.5 x 25.5 x 16 mm
Weight	8 g	8 g	17 g	17 g

All parameters apply to full specified temperature range, unless otherwise stated. Full specifications can be found in the Ellipse Hardware Manual available upon request.

ORDERING INFORMATION

Pick one of each category

MODEL

A: AHRS
E: Externally Aided INS
N: INS with integrated RTK GNSS
D: INS with dual antenna RTK GNSS

VERSION

Marine: 8 g – 450°/s
Land Air: 20 g – 450°/s
High Dynamics: 40 g – 1000°/s

PACKAGE

BOX RS-232 / 422
BOX RS-232 / CAN
OEM TTL

INTERNAL GNSS (N & D MODELS)

Features	SBAS, RTK, RAW
Signals	GPS: L1C/A, L2C GLONASS: L1OF, L2OF GALILEO: E1, E5b, BEIDOU: B1/B2
Update rate	5 Hz
Cold start / Hot start	< 24 s / < 2 s

PRESSURE SENSOR (models E/N/D)

Resolution	1.2 Pa / 10 cm / 0.3 ft
Pressure accuracy	± 50 Pa / ± 200 Pa Relative / Absolute

ELECTRICAL & ENVIRONMENTAL

Input voltage	5 - 36 V
Power consumption	A/E: < 300 mW N[1]: < 600 mW D[1]: < 900 mW
Specified temperature	-40 to 85 °C
Shock limit	2,000 g
Operating vibration	8 g RMS (20 Hz to 2 k Hz per MIL-STD 810G)
MTBF	50,000 hours

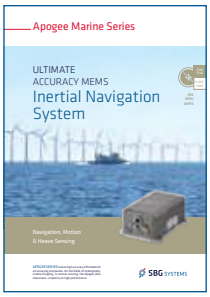
[1] Without GNSS antenna

SBG Systems is a leading supplier of inertial motion sensing solutions. The company provides a wide range of inertial solutions from miniature to high accuracy. Combined with cutting-edge calibration techniques and advanced embedded algorithms, SBG Systems products are ideal solutions for industrial & research projects such as unmanned vehicle control, antenna tracking, camera stabilization, and surveying applications.

PRODUCT LINES

Ellipse Micro

Ekinox Series



Apogee Series

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www.sbg-systems.com

Navsight Land & Air Solution

Motion & Navigation Solution

FOR SURVEYING APPLICATIONS

Motion, Navigation, and Geo-referencing

NAVSIGHT LAND/AIR SOLUTION is a full high performance inertial navigation solution designed to make surveyors' mobile data collection easier, whether it is terrestrial or aerial.

SBG SYSTEMS

Reliable Trajectory IN EVERY CONDITION

Navsight Land/Air Solution is an extremely versatile solution. It consists in an Inertial Measurement Unit available at three different performance levels, and connected to Navsight, a rugged equipment embedding the fusion intelligence, the GNSS receiver, and all connections to external equipment such as LiDAR, cameras, computer, etc.

Navsight Processing Unit - Data Fusion and GNSS

Navsight Processing Unit with embedded GPS/GNSS

- Tri-frequency receiver
- Multi-constellations
- RTK
- PPP ready
- Internal logger for Post-processing
- One or two antennas

Navsight can also be used with your own GNSS receiver

Inertial Measurement Unit (IMU) - Several Levels of Accuracy

	Ekinox IMU **Compact & Economical**	**Apogee IMU** **Good Perf/Price Ratio**	**Horizon IMU** **High Accuracy FOG IMU**
Roll/Pitch	0.015°	0.005°	0.004°
Heading Land	0.03°	0.02°	0.008°
Heading Air	0.03°*	0.015°*	0.008°
Position Horizontal	1cm+1ppm	1cm+1ppm	1cm+1ppm
Post-processing Accuracy			

** Dual antenna heading, 2m baseline.*

Continuous Position Continuous fusion of inertial data with GNSS information stabilizes the position output, effectively eliminating the impact of multipath and signal outages, when the vehicle is passing in dense urban areas for example.

ROBUST AND SMOOTH TRAJECTORY

Navsight fuses inertial and GNSS data to offer a robust and smooth trajectory at a high frequency (200 Hz).

MAXIMIZED SIGNAL AVAILABILITY

Four constellations can be used simultaneously to benefit from more satellites and so, more signal availability.

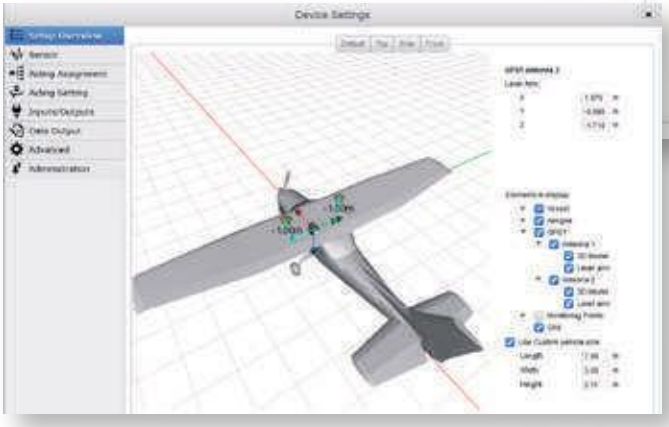
ODOMETER AIDING

Navsight fuses inertial, gnss, and odometer data for an even better performance in harsh conditions.

Modern and Easy-to-use Interface

WEB INTERFACE

Connect your sensor and configure it troughout the intuitive web interface.



3D VIEW

The new 3D View helps you to check your mechanical installation, especially your sensor position, your alignments, and levers arms.

SBG⊕SERVICES

NO Surprise! Navsight solution is based on proven and maintenance-free technologies. Technical assistance is free of charge and firmware upgrades are available during the life of the product without extra cost to secure your day to day operations.

Take advantage of our SBG⊕Services:

Warranty Extension

All SBG inertial sensors come with a 2-year warranty. This warranty can be extended up to 5 years. Secure your budget during 3, 4, or 5 years.

Check & Calibration

The Check & Calibration service includes a quality check, a firmware update, cleaning, and if required, a calibration in temperature and dynamics. A certificate is delivered with the sensor. It guarantees the quality of the sensor data during 3 years.

Back-up System

The back-up system consists in a complete inertial system set delivered in replacement of your sensor during repair operations and during the « check and calibration » service. This service is included into the PREMIUM and ELITE packages.

INS/GNSS Post-processing Software

Qinertia is the SBG Systems' in-house post-processing software. This full-featured software enhances SBG inertial navigation systems performance by post processing inertial data with raw GNSS observables.

The Fastest Processing

Tight Coupling INS/GNSS fusion

Modern & Intuitive User Interface

+ 7,000 Base Stations always up-to-date

Why Post-processing ? By processing all your INS and GNSS raw data forward and backward, Qinertia PPK software greatly increases accuracy, solves GNSS outages, installation errors, etc. Qinertia can save your survey, or allow you to survey in very complicated areas.

Specifications

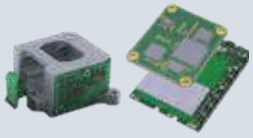
All parameters apply to -20 to 60°C temperature range, unless otherwise stated.
Full specifications can be found in the Navsight Hardware Manual available upon request.

1. CHOOSE YOUR IMU



IMU	Ekinox-I Surface	Apogee-I Surface	Horizon-I Surface Enclosure
size	86 x 100 x 58 mm	130 x 100 x 58 mm	94 x 94 x 177 mm
Weight	425 g	635 g	1.32 kg
Rating	IP68	IP68	IP68

OEM Version Available



EKINOX

	Single Point	RTK	PPK	Land RTK Outage (60 s)	PPK Outage (60 s)
Roll, Pitch	0.03 °	0.02 °	0.015 °	0.1 °	0.03 °
Heading (Land)	0.08 °	0.06 °	0.03 °	0.2 °	0.05 °
Heading (Air), Dual antenna 2m | 4m	0.08° | 0.05°	0.08° | 0.05°	0.03°	-	-
Position Horizontal	1.2m	1 cm + 1 ppm	1 cm + 1 ppm	3 m	0.4 m

APOGEE

	Single Point	RTK	PPK	Land RTK Outage (60 s)	PPK Outage (60 s)
Roll, Pitch	0.01 °	0.01 °	0.005 °	0.012 °	0.008 °
Heading (Land)	0.03 °	0.03 °	0.02 °	0.06 °	0.025 °
Heading (Air), Dual antenna 2m | 4m	0.03° | 0.015°	0.03° | 0.015°	0.015°	-	-
Position Horizontal	1.2 m	1 cm + 1 ppm	1 cm + 1 ppm	0.5 m	0.1 m

HORIZON

	Single Point	RTK	PPK	Land RTK Outage (60 s)	PPK Outage (60 s)
Roll, Pitch	0.007 °	0.007 °	0.004 °	0.01 °	0.005 °
Heading (Land)	0.01 °	0.01 °	0.008 °	0.015 °	0.01 °
Heading (Air) Single | Dual antenna	0.04 ° / 0.01 ° *	0.04 ° / 0.01 ° *	0.008 °	-	-
Position Horizontal	1.2 m	1 cm + 1 ppm	1 cm + 1 ppm	0.30 m	0.05 m

** 4m baseline*

2. CHOOSE YOUR PROCESSING UNIT FUNCTIONALITIES

☐ Navigation with External GNSS Receiver

INTERFACES

Aiding Sensors (input)	2X GNSS, RTCM
Protocols	Output: NMEA, ASCII, Binary, TSS, Simrad Input: NMEA, Trimble, Novatel, Septentrio, Hemisphere, Fugro, PD0, PD6
Logging Capacity	8 GB ≈ 48h, 200 Hz
Ports/Communication	5x RS-232/RS-422 Tx/Rx ports
Synchronization	2x Sync Out (PPS) + 5x Sync In signals
Ethernet	5 virtual serial ports 5x UDP / TCP bidirectional ports Web interface , FTP

☐ Navigation with Embedded GNSS Receiver

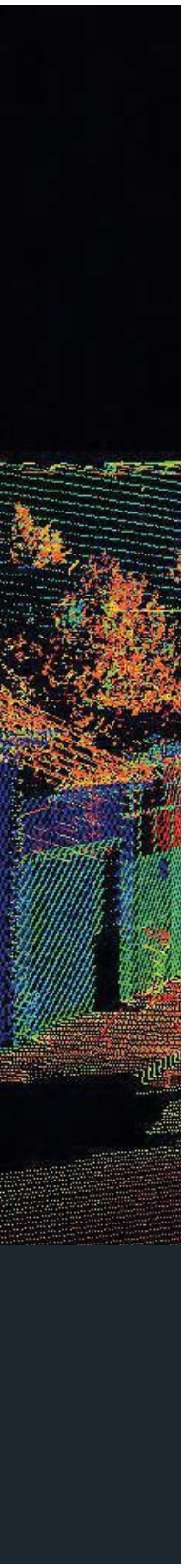
Constellations	Positioning	PPP Ready
☑ GPS & Glonass	☑ L1/L2/L5	☐ Omnistar
☑ Galileo	☑ RTK	
☑ Beidou	☑ Raw	

☑ *Included*

NAVSIGHT PHYSICALS & ENVIRONMENTALS

Size	227 x 156 x 63 mm
Weight	1.9 kg
Wide input voltage range (isolated)	9 – 36V
EN-60945 compliant	Isolated Interfaces and power supply
Power consumption	<3 W, <7W with GNSS
Operating Temperature	-40 to 75°C
MTBF	50,000 hours

RMS values for typical survey trajectories. Performance depends on velocity aiding accuracy and requires frequent turns.
Performance may be affected by atmospheric conditions, signal multipath, and satellite geometry. All specifications subject to change without notice.



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PRODUCTS

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SBG Systems North America
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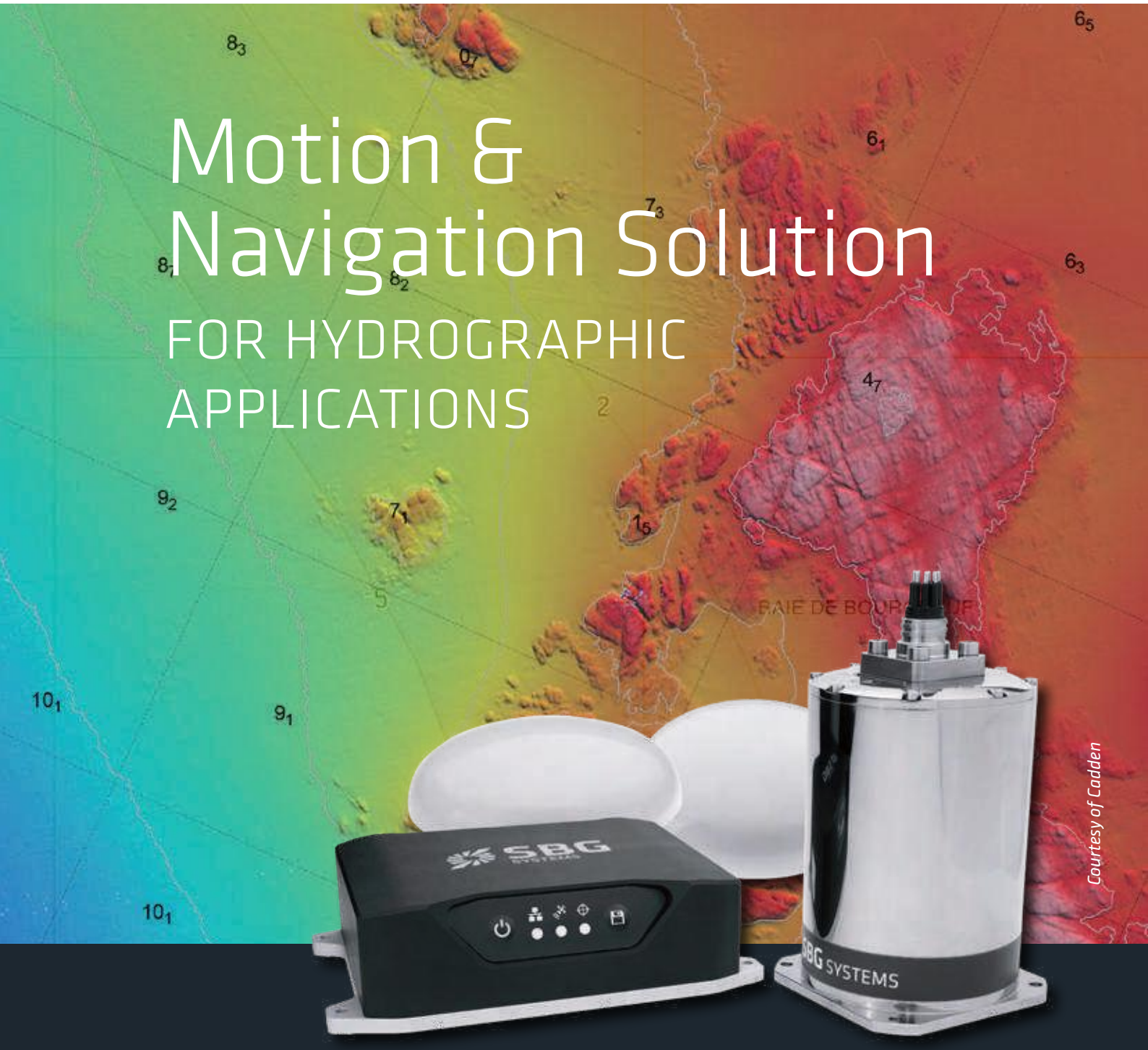
Navsight Marine Solution

Motion & Navigation Solution

FOR HYDROGRAPHIC APPLICATIONS



Courtesy of Cadden

Navigation, Motion & Heave

Extremely easy to set up, and highly versatile, the NAVSIGHT MARINE SOLUTION makes hydrographers' surveying tasks easier on both shallow and deep waters.

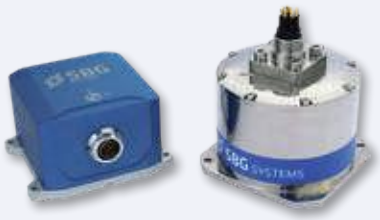
SBG SYSTEMS

STATE-OF-THE-ART
Navsight Marine Solution

Navsight Marine Solution integrates the latest IMU and GNSS technologies to offer a modern, powerful, and easy-to-use motion and navigation solution for Hydrographers.

Scalable Performance for Every Application

EKINOX GRADE



Economic

Ideal for Shallow Water Applications

- 0.02° Roll/Pitch
- 0.05 ° Heading
- 5 cm Real-time Heave
- 2.5 cm Delayed Heave
- Up to 1 cm RTK Position

Low Power Consumption
Compact, Lightweight

APOGEE GRADE

Highly Versatile

Ideal for Challenging Shallow to Deep Water Applications

- 0.008° Roll/Pitch
- 0.015 ° Heading
- 5 cm Real-time Heave
- 2 cm Delayed Heave
- Up to 1 cm RTK Position

Amazing performance under GNSS Outage

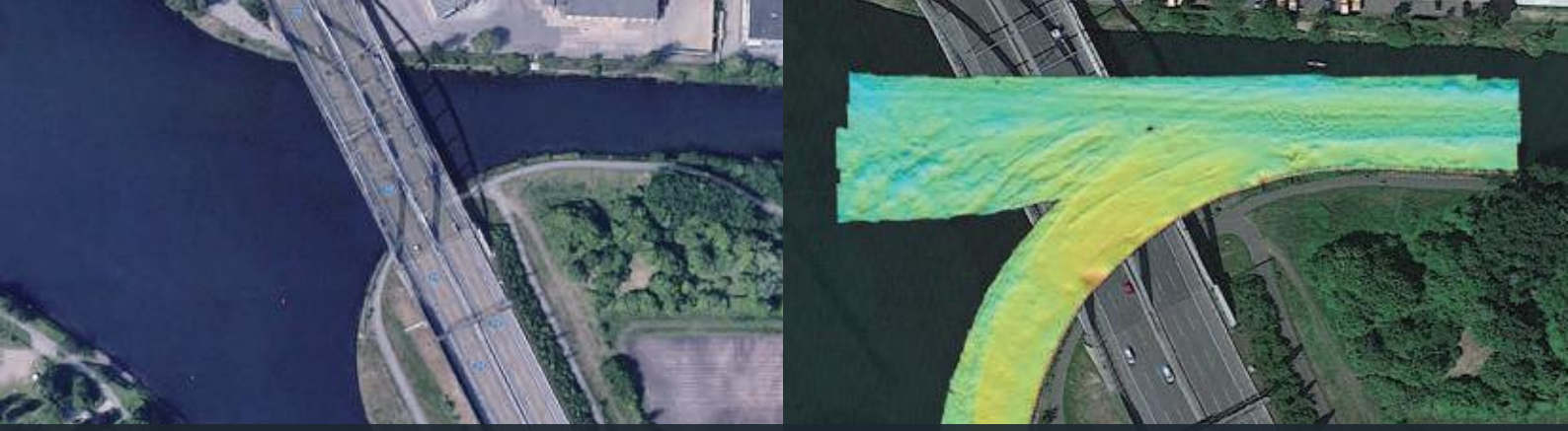
HORIZON GRADE

FOG Technology

Large vessels with low Dynamics and Harsh Conditions

- 0.007° Roll/Pitch
- 0.01 ° Heading
- 5 cm Real-time Heave
- 2 cm Delayed Heave
- Up to 1 cm RTK Position

Very Low Drift
Single antenna Heading Capable



Charting under bridges with the Apogee sensor. The vessel «Spreegrund», property of WSA Berlin, has been equipped by MBT, part of MacArtney group.

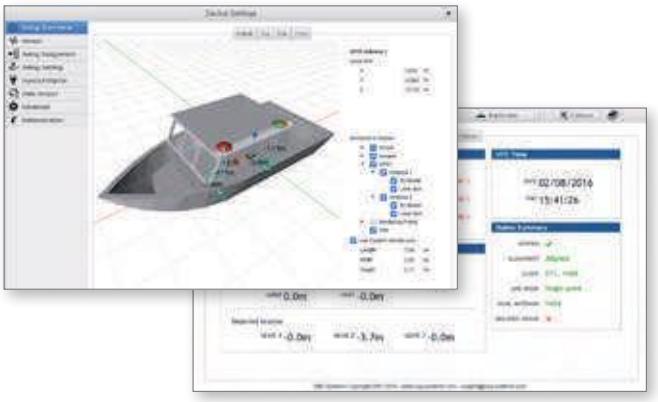
MRU or INS?

Inertial Navigation Systems greatly improves navigation data in all conditions. Position information are fused in real-time with inertial data to provide a robust trajectory when GNSS outages occur (crossing a bridge, surveying a river near several mountains, etc.). In this example, the Apogee sensor is connected to an external GNSS receiver and a DVL for even better performance.

Configuration Made Easy

The interactive web interface helps you configuring the solution and checking in real-time your mechanical installation, especially your sensor position, your alignments, and GNSS main lever arm (the secondary lever arm is automatically calculated).

All configuration settings are then stored for further surveys.



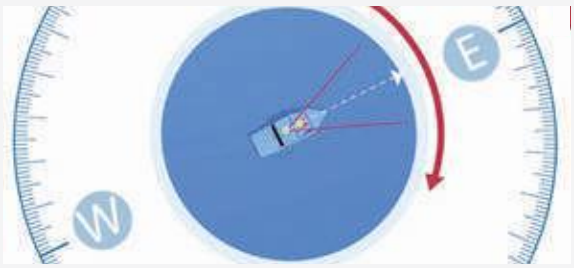
Main Drivers available for

TELEDYNE PDS Everywhereyoulook

QPS a SAAB group company

HYPACK

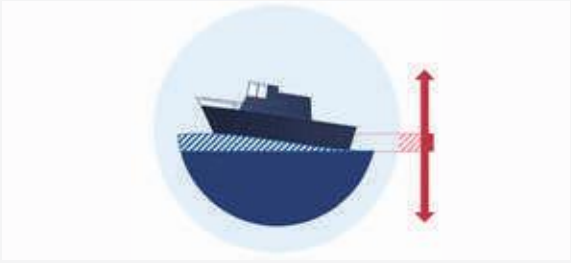
Fast Initialization with GNSS-based Dual-Antenna Heading



Dual antenna GNSS provides accurate heading with fast initialization time, even if the vessel is mooring.

Additionally, it is not subject to latitude scaling faced by gyro-compass technology.

Accurate Data in Rough Sea with Delayed Heave



When wave frequency is erratic or in case of long period swell, the delayed heave feature can save the day by allowing survey in rough conditions.

This specific algorithm allows a more extensive calculation, resulting in a heave accurate to 2 cm computed in real-time with a little delay.

A Full Solution for Hydrographic Applications

INS/GNSS Post-processing Software

Qinertia is the SBG Systems' in-house post-processing software. This full-featured software enhances SBG inertial navigation systems performance by post processing inertial data with raw GNSS observables.

The Fastest Processing

Tight Coupling INS/GNSS fusion

Modern & Intuitive User Interface

+ 7,000 Base Stations always up-to-date

Why Post-processing ? By processing all your INS and GNSS raw data forward and backward, Qinertia PPK software greatly increases accuracy, solves GNSS outages, installation errors, etc. Qinertia can save your survey, or allow you to survey in very complicated areas.

SBG⊕SERVICES

NO Surprise! Navsight solution is based on proven and maintenance-free technologies. Technical assistance is free of charge and firmware upgrades are available during the life of the product without extra cost to secure your day to day operations.

Take advantage of our SBG⊕Services:

Warranty Extension

All SBG inertial sensors come with a 2-year warranty. This warranty can be extended up to 5 years. Secure your budget during 3, 4, or 5 years.

Check & Calibration

The Check & Calibration service includes a quality check, a firmware update, cleaning, and if required, a calibration in temperature and dynamics. A certificate is delivered with the sensor. It guarantees the quality of the sensor data during 3 years.

Back-up System

The back-up system consists in a complete inertial system set delivered in replacement of your sensor during repair operations and during the « check and calibration » service. This service is included into the PREMIUM and ELITE packages.

Specifications

All parameters apply to -20 to 60°C temperature range, unless otherwise stated.
Full specifications can be found in the Navsight Hardware Manual available upon request.

IHO Compliant

INERTIAL MEASUREMENT UNIT (IMU)





IMU	Ekinox-I Surface	Ekinox-I Subsea Enclosure	Apogee-I Surface	Apogee-I Subsea Enclosure	Horizon-I Surface
Size	86 x 100 x 58 mm	94 x 94 x 112 mm	130 x 100 x 58 mm	94 x 94 x 177 mm	150 x 168 x 215 mm
Weight	425 g	1 kg	635 g	1.32 kg	4.29 kg
Rating	IP68	200 m Depth	IP68	200 m Depth	IP68

OEM Versions available upon request

EKINOX ACCURACY

	RTK**	PPK***	RTK Outage (30 s)	PPK Outage (30 s)
Roll, Pitch	0.02 °	0.015 °	0.05 °	0.04 °
Heading* - 2 m / 4m	0.08 ° / 0.05 °	0.03 ° / 0.03 °	0.15 ° / 0.13 °	0.05 ° / 0.05 °
Position (X,Y) / Altitude (Z)	0.01 m / 0.02 m	0.01 m / 0.02 m	3 m / 0.75 m	1 m / 0.3 m

APOGEE ACCURACY

	RTK**	PPK***	RTK Outage (60 s)	PPK Outage (60 s)
Roll, Pitch	0.008 °	0.005 °	0.012 °	0.008 °
Heading* - 2 m / 4 m	0.03 ° / 0.015 °	0.015 ° / 0.015 °	0.05 ° / 0.04 °	0.025 ° / 0.025 °
Position (X,Y) / Altitude (Z)	0.01 m / 0.02 m	0.01 m / 0.02 m	4 m / 0.75 m	0.15 m / 0.05 m

HORIZON ACCURACY

	RTK**	PPK***	RTK Outage (60 s)	PPK Outage (60 s)
Roll, Pitch	0.007 °	0.004 °	0.01 °	0.005 °
Heading* - 2 m	0.01 °	0.008 °	0.015 °	0.01 °
Position (X,Y) / Altitude (Z)	0.01 m / 0.02 m	0.01 m / 0.02 m	1 m / 0.5 m	0.1 m / 0.05 m

HEAVE

	Ekinox	Apogee / Horizon	Wave period	Remarks
Real-time Heave	5 cm	5 cm	up to 20 sec	Automatic adjustment to the sea state
Delayed Heave	2.5 cm	2 cm	up to 40 sec	Internal computation

VELOCITY AIDED POSITIONING

DVL	< 0.2 % Travelled distance

NAVSIGHT PROCESSING UNIT

Rugged Version

Rack Version

Three modes available:

MRU | INS with GNSS | INS + external GNSS

PHYSICAL & ENVIRONMENTAL

Size (Rugged / Rack)	227 x 156 x 63 mm / 422 x 204 x 44 mm
Weight (Rugged / Rack)	1.9 kg / 1.95 kg
Wide input voltage range (isolated)	9 – 36V
EN-60945 compliant	Isolated Interfaces and power supply
Power consumption	<3 W, <7W with GNSS
Operating Temperature	-40 to 75°C
MTBF	50,000 hours

INTERFACES

Aiding Sensors (input)	2X GNSS, RTCM, DVL
Protocols	Output: NMEA, ASCII, Binary, TSS, Simrad Input: NMEA, Trimble, Novatel, Septentrio, Hemisphere, Fugro, PD0, PD6
Logging Capacity	8 GB ≈ 48h, 200 Hz
Ports/Communication	5x RS-232/RS-422 Tx/Rx ports
Synchronization	2x Sync Out (PPS) + 5x Sync In signals
Ethernet	5x UDP / TCP bidirectional ports Web interface , FTP

INTERNAL GNSS

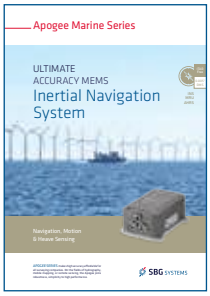
Internal GNSS Receiver	GPS, GLONASS, GALILEO, BEIDOU, L1/L2/L5, RTK, RAW
PPP Ready	PPP Ready Omnistar/Marinestar

**Baseline, dual antenna **Real Time Kinematic ***Post-processing Kinematic*
RMS values for typical survey trajectories. Performance depends on velocity aiding accuracy. Performance may be affected by atmospheric conditions, signal multipath, and satellite geometry. All specifications subject to change without notice.

SBG Systems is a leading supplier of MEMS-based inertial motion sensing solutions. The company provides a wide range of inertial solutions from miniature to high accuracy. Combined with cutting-edge calibration techniques and advanced embedded algorithms, SBG Systems products are ideal solutions for industrial & research projects such as unmanned vehicle control, surveying applications, antenna tracking, and camera stabilization.

PRODUCTS

Qinertia



Apogee Marine

Ekinox Series

Ellipse Series

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Apogee Marine Series

ULTIMATE ACCURACY MEMS

Inertial Navigation System

ITAR Free

0.005° RMS

INS
MRU
AHRS

Navigation, Motion & Heave Sensing

APOGEE SERIES makes high accuracy affordable for all surveying companies. On the fields of hydrography, mobile mapping, or remote sensing, the Apogee joins robustness, simplicity to high performance.

SBG SYSTEMS

HIGH QUALITY
HIGH ACCURACY

SBG SYSTEMS manufactures high quality, high accuracy inertial navigation systems from the design to the production. The Apogee benefits from our high level of expertise in integrated design, IMU calibration, testing, and filtering.

Highly Accurate

ATTITUDE AND POSITION

	GNSS L1/L2/L5	RTK*	PPK**	RTK 60 sec outage	PPK 60 sec outage
Roll/Pitch	0.01°	0.008°	0.005°	0.01°	0.008°
Heading - Dual antenna (2m baseline)	0.03°	0.03°	0.015°	0.05°	0.025°
Heading - Dual antenna (4m baseline)	0.015°	0.015°	0.015°	0.04°	0.02°
Position (X/Y)	0.6 m	0.01 m	< 0.01 m	3 m	0.15 m
Altitude (Z)	1.0 m	0.03 m	< 0.02 m	0.7 m	0.05 m

Delayed Heave: Accurate Data in Rough Sea

When wave frequency is erratic or in case of long period swell, the delayed heave feature can save the day by allowing survey in rough conditions. This specific algorithm allows a more extensive calculation, resulting in a heave accurate to 2 cm displayed in real-time with a little delay.

HEAVE

	Accuracy	Wave Period	Remarks
Real-time Heave	5 cm or 5 %	Up to 20 seconds	Automatic adjustment to every sea conditions
Delayed Heave	2 cm or 2 %	Up to 40 seconds	Internal computation

VELOCITY AIDED POSITIONING

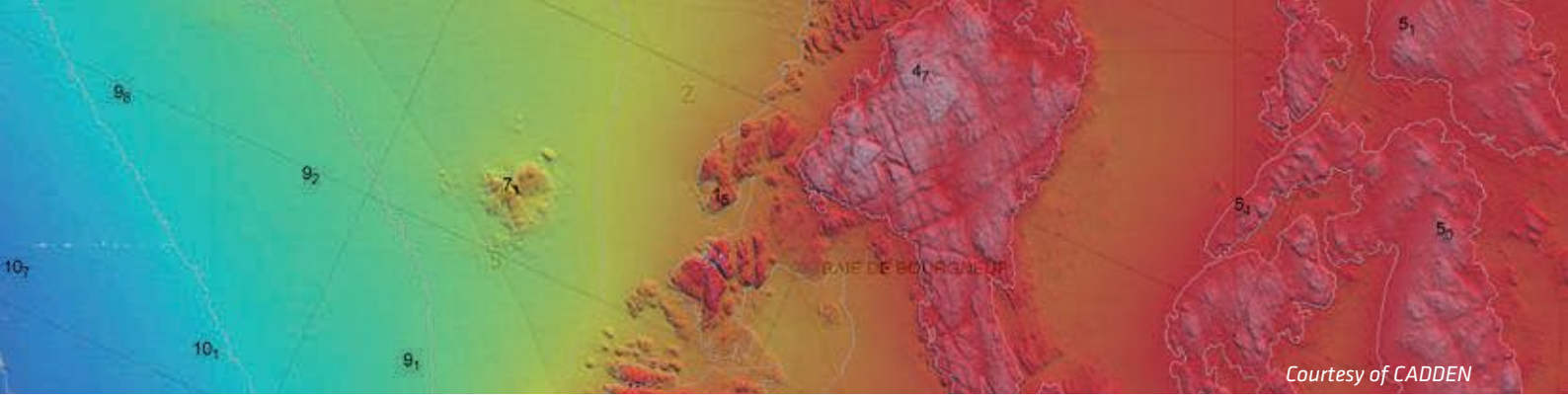
DVL***	< 0.2 % of Travelled Distance

Driver available for

Others upon request

*Real Time Kinematic
** Post-processing Kinematic
***Depends on velocity aiding accuracy

RMS values for typical survey trajectories
Performance may be affected by atmospheric conditions, signal multipath, and satellite geometry.
All specifications subject to change without notice.



The Highest Accuracy Affordable in Powerful Models

APOGEE-E IP68

FOR ALL HYDROGRAPHIC SURVEYORS

Ideal to mount on the center of gravity of the boat, the Apogee-E connects to any survey grade GNSS receiver for navigation, and aiding equipment such as odometer or DVL.

APOGEE-A IP68

FOR SHIP MOTION MONITORING

Ideal for ship motion monitoring, the Apogee-A is a Motion Reference Unit (MRU). Allowing GNSS* input, they provide high accuracy roll, pitch, heading, and heave.

**Dual Antenna GNSS input for the best performance.*

APOGEE-D IP68

FOR UNMANNED SYSTEMS

Especially fitted for Unmanned Marine Vessels, Apogee-D is a very compact INS with embedded tri-frequency GNSS receiver. It allows RTK and Omnistar/ Marinestar corrections.

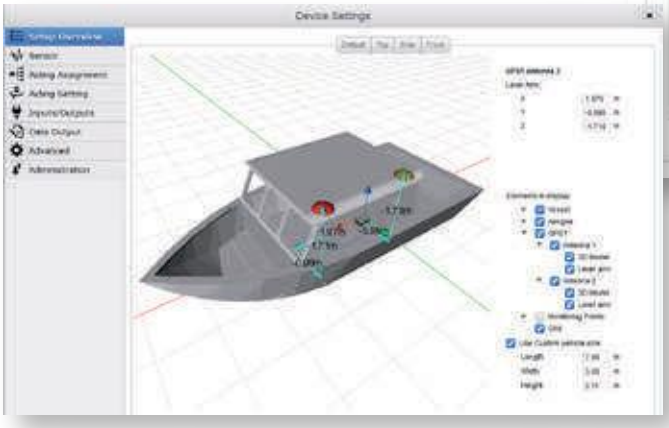
WHY MEMS TECHNOLOGY?

- Low-power consumption
- Cost-effective
- Highly Robust
- Compact and Light-weight

Modern and Easy-to-use

WEB INTERFACE

Connect your sensor and configure it throughout the intuitive web interface.



3D VIEW

The new 3D View helps you to check your mechanical installation, especially your sensor position, your alignments, and lever arms.

INS/GNSS Post-processing Software

Qinertia is the SBG Systems' in-house post-processing software. This full-featured software enhances SBG inertial navigation systems performance by post processing inertial data with raw GNSS observables.

- The Fastest Processing
- Tight Coupling INS/GNSS fusion
- Modern & Intuitive User Interface
- + 7,000 Base Stations always up-to-date

Why Post-processing ?

By processing all your INS and GNSS raw data forward and backward, Qinertia PPK software greatly increases accuracy, solves GNSS outages, installation errors, etc.
Qinertia can save your survey, or allow you to survey in very complicated areas.

Specifications

All parameters apply to -20 to 60°C temperature range, unless otherwise stated.
Full specifications can be found in the Apogee User Manual available upon request.

PHYSICAL CHARACTERISTICS

Model	Apogee-A/E	Apogee-D
Weight	< 690 grams 1.52 pounds	< 900 grams 1.98 pounds
Dimensions (L x W x H)	130 x 100 x 58 mm 5.12 x 3.94 x 2.28 ''	130 x 100 x 75 mm 5.12 x 3.94 x 2.95 ''
Power Consumption	< 3 W	< 7 W
Supply Voltage	9 to 36 VDC	9 to 36 VDC

INTERFACE

Aiding Sensors (input)	2x GNSS, RTCM, DVL
Protocols	Output: NMEA, ASCII, Binary, TSS, Simrad
	Input: NMEA, Trimble, Novatel, Septentrio, Hemisphere, Fugro, PD0, PD6
Output rate	0.1 to 200 Hz
Logging Capacity	8 GB or 48 h @ 200 Hz
Serial RS-232/422	Model D - 2 outputs / 4 inputs
	Model A/E - 3 outputs / 5 inputs
CAN	1 CAN 2.0 A/B bus up to 1 Mbit/s
Ethernet	Full Duplex (10/100 base-T)

ENVIRONMENTAL

IP rating Apogee-A/D/E	IP68 (Aluminium)
Specified temperature	-20 to 60 °C / -4 to 140 °F
Operating temperature	-40 to 71 °C / -40 to 160 °F
MTBF (computed)	50,000 hours
Operating vibrations	20 Hz to 2 kHz as per MIL-STD-810G
	Accelerometer 2 g: 1 g RMS

SENSOR PERFORMANCE

	Accelerometers	Gyroscopes
Measurement range	2 g	200 °/s
Bias in-run instability	< 2 µg	< 0.08 °/hr
Random walk	< 15 µg/√Hz	< 0.012 °/√hr

Subscription available from third party PPP service provider
RMS values for typical survey trajectories. Performance may be affected by atmospheric conditions, signal multipath, and satellite geometry.

CONTINUOUS POSITION

Continuous fusion of inertial data with GNSS information stabilizes the position output, effectively eliminating the impact of multipath and signal outages, when the vessel is passing underneath bridges for example.

ROBUST HEADING

Apogee is 20 to 30 times faster than traditional gyrocompasses to align heading angle. It provides the same quality of data, whatever the latitude is. By fusing GNSS and IMU data, it provides a robust and accurate heading in any conditions.

SBG Systems is a leading supplier of MEMS-based inertial motion sensing solutions. The company provides a wide range of inertial solutions from miniature to high accuracy. Combined with cutting-edge calibration techniques and advanced embedded algorithms, SBG Systems products are ideal solutions for industrial & research projects such as unmanned vehicle control, antenna tracking, camera stabilization, and surveying applications.

PRODUCTS

Ekinox Series

Navsight Marine

Qinertia

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Ekinox Series

TACTICAL GRADE MEMS
Inertial Systems

ITAR Free

0.02° RMS

IMU
AHRS
MRU
INS
VG

Motion Sensing & Navigation

AEROSPACE GROUND MARINE

EKINOX SERIES R&D specialists usually compromise between high accuracy and price. The Ekinox Series has been designed to bring robust and cost-effective MEMS solutions to the FOG technology's level of accuracy. Ekinox Series opens a new world of opportunities.

SBG SYSTEMS

Ekinox Series

Brings robust and cost-effective MEMS to the Tactical Grade

Ekinox Series is a product range of high accuracy inertial systems. It has been designed to bring robust, maintenance free, and cost-effective MEMS to the tactical grade. Thanks to a drastic selection of high end MEMS sensors, an advanced calibration procedure, and powerful algorithm design, the Ekinox Series achieves 0.02° attitude accuracy.

- High Performance Inertial Systems
- ITAR Free
- Cost-effective & Robust MEMS technology
- Maintenance Free

KEY FEATURES

- Up to 4 connected equipment
- Survey Grade GNSS receiver (Ekinox2-D)
- 8 GB Data Logger
- IP68 Enclosure
- Web Interface & Ethernet
- 200 Hz Output Rate

Accuracy

3D ORIENTATION

Roll, Pitch	0.03° 0.02° 0.015°	GNSS aiding RTK aiding Post-Processing
Heading	0.08° 0.05° 0.03°	Dual Antenna GNSS (baseline < 2 m) Dual Antenna GNSS (baseline < 4 m) Post-Processing

POSITION

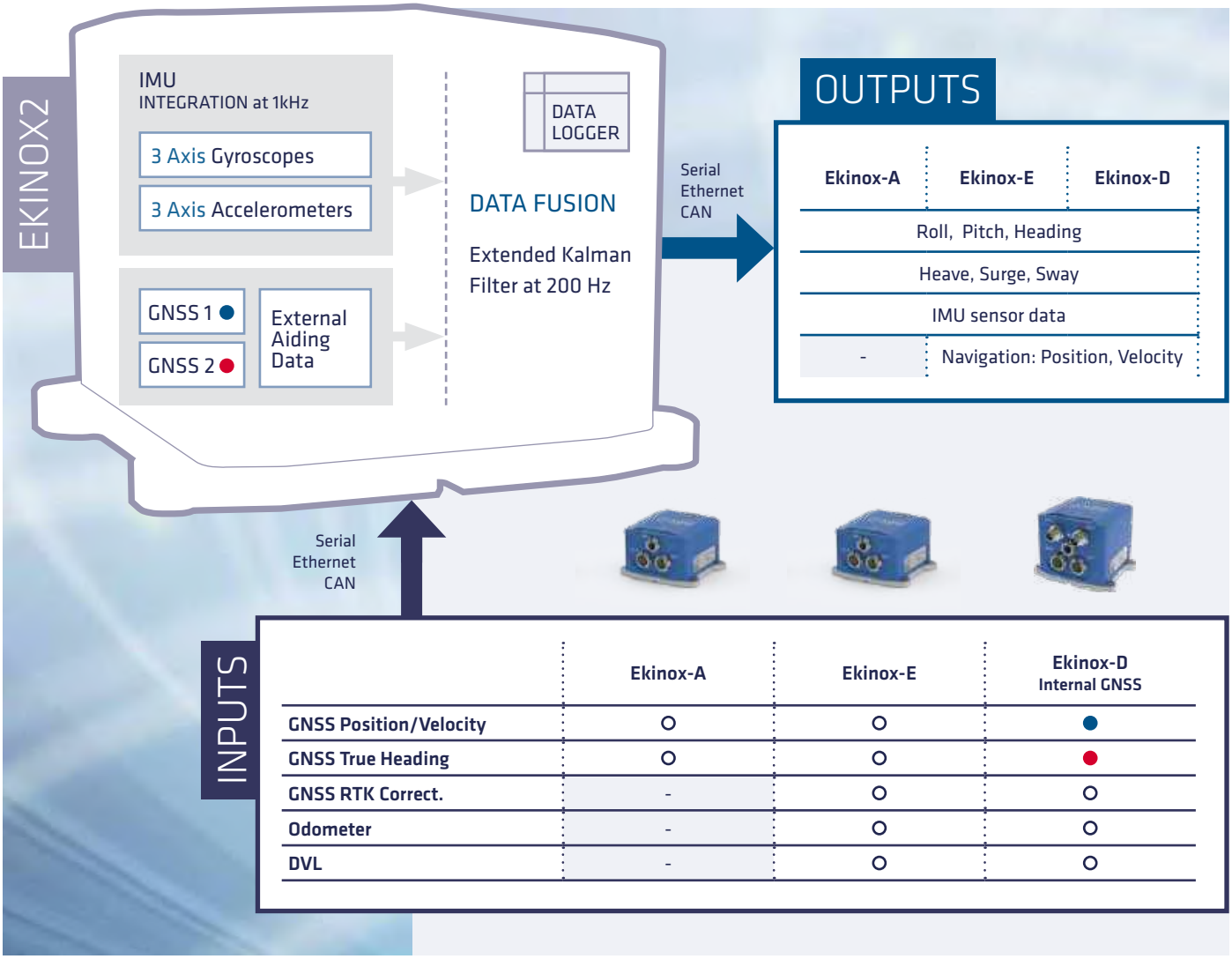
Single Point L1/L2	1.2 m	
SBAS	0.6 m	
DGPS	0.4 m	
RTK	0.01 m	
RTK 30s Outage	3 m	Marine conditions
RTK 60s Outage	0.2% TD 3 m	Marine conditions, DVL* aided Automotive mode - With odometer
PPK**	0.02 m	3 m

HEAVE

Real-time	5 cm or 5%	Whichever is greater, velocity aided
Wave period	0 to 20 s	Auto-adjusting
Delayed	2.5 cm or 2.5%	Whichever is greater, velocity aided
Wave period	0 to 40 s	

** Depends on DVL performance. - TD: Travelled Distance.- Typical RMS values*
***Post-processing Kinematic*

A Cutting-Edge Architecture



	Ekinox-A	Ekinox-E	Ekinox-D Internal GNSS
GNSS Position/Velocity	○	○	●
GNSS True Heading	○	○	●
GNSS RTK Correct.	-	○	○
Odometer	-	○	○
DVL	-	○	○

● *Included* ● *Included* ○ *External Aiding Required*

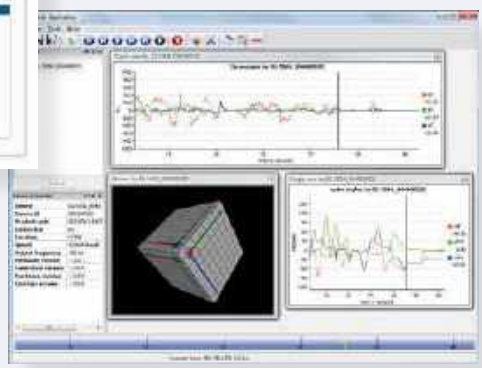
Software

CONFIGURATION, REAL-TIME DISPLAY & REPLAY

Configuration is made easy through our intuitive embedded web interface where all parameters can be quickly displayed and adjusted.

The sbgCenter offers all the tools for real-time visualization (200 Hz) and replay of the records stored in the internal data logger.

Embedded Web Interface



sbgCenter

Specifications

SENSORS PERFORMANCE

	Accelerometers		Gyroscopes
	A2	**A3**	
Measurement range	8 g	14 g	300 °/s
Random walk	7 µg/√Hz	30 µg/√Hz	0.14°/√hr
Bias in-run instability	2 µg	5 µg	< 0.5 °/hour

INTERFACE

Aiding Sensors	2x GNSS, RTCM, DVL, Odometer, Gyro-compass
Protocols	Output: NMEA, ASCII, Binary, TSS, Simrad Input: NMEA, Trimble, Novatel, Septentrio, Hemisphere, Veripos, Fugro, PD0, PD6
Output Rate	1 to 200 Hz
Logging Capacity	8 GB or 48h @ 200 Hz
Serial RS-232/422	Model D - 2 outputs / 4 inputs Model A/E - 3 outputs / 5 inputs
CAN	1 CAN 2.0 A/B bus up to 1 Mbit/s
Pulses	Inputs: PPS, Event marker up to 1 kHz Outputs: SyncOut, Trigger 5 inputs / 2 outputs
Ethernet	Full Duplex (10/100 Base T)

ENVIRONMENTAL SPECIFICATIONS

Operating Vibrations	20 Hz to 2 kHz as per MIL-STD-810G Accelerometer 8 g: 3 g RMS Accelerometer 14 g: 8 g RMS
IP Rating	IP68
Operating Temperature	-40 to 75°C / -40 to 167°F
MTBF	50,000 hours
EMC	EN60945

PHYSICAL CHARACTERISTICS

	Ekinox-A/E	Ekinox-D
GPS	-	L1/L2 Single or Dual Antenna GNSS receiver
		448 channels, GPS, GLONASS, GALILEO, BEIDOU
Weight	400 grams 0.88 pounds	600 grams 1.32 pounds
Dimensions (L x W x H)	10 x 8.6 x 5.8 cm 3.9 x 3.4 x 2.2 ”	10 x 8.6 x 7.5 cm 3.9 x 3.4 x 2.9 “
Power Consumption	< 3 W	< 5 W
Supply Voltage	9 to 36 VDC	9 to 36 VDC

Typical RMS values. All specifications subject to change without notice.

PRODUCT CODE INS

▪ *standard product options*

EKINOX-#-G4A#-####-V3

MODEL
A: AHRS
E: INS
D: INS with internal GNSS

GYROSCOPES
4: 300 °/s ▪

ACCELEROMETERS
2: 8 g
3: 14 g

Other ranges available upon request

GNSS OPTIONS

Applications

AEROSPACE

Mid-sized & large UAV
Avionics
LiDAR
Gyro-stabilized camera
Flight data recorder

- Ready-to-use INS/GPS (Ekinox-D)
- Designed for harsh environments
- Temperature calibrated (-40 to 75°C)
- Unmatched precision in high vibration conditions (MIL-STD-810G)
- Robust IP68 enclosure

LAND

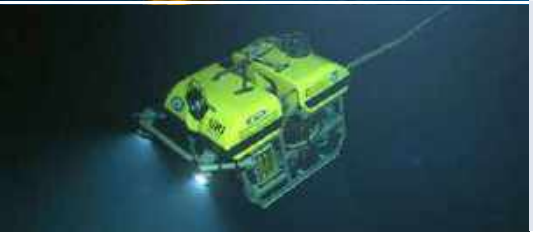
Car motion
Unmanned Ground Vehicle
Camera and 3D scanner
SATCOM antenna
Machine Control

- All-in-one solution with Dual Antenna GPS, RTK GNSS, and odometer
- Ethernet & CAN connectivity
- Precise GPS UTC synchronization
- Low latency (2 ms)
- Very low noise on Attitude & Navigation data

MARINE

Hydrography
Motion monitoring
Performance sailing
Offshore
Targeting system

- Integrated Dual Antenna GPS for True Heading (Ekinox-D)
- Real-time Auto adjusting heave on 4 monitoring points
- NMEA, TSS & Simrad protocols
- Ethernet & Web interface



SUBSEA

AUV, ROV
SONAR, LiDAR, Camera

- Compact and low-power consumption
- Real-time data fusion with DVL, etc.
- Up to 4 simultaneously connected equipment

Seamless Integration

STARTING BOX

The selected Ekinox model is shipped with a quick start guide and its own calibration report.

A set of software tools is included such as the sbgCenter application, API C libraries with code examples, etc.

A robust and waterproof transport case is fitted to contain other ordered items such as cables, GNSS antennas, etc.

NEED A CUSTOM PACKAGE?

Every industry has its own constraints. Our Sales Engineers will work with you to recommend the right solution for your project, or for an entirely custom design.

SBG SYSTEMS SERVICES

Support – Training - Custom Design

SBG Systems is a leading supplier of inertial motion sensing solutions. The company provides a wide range of inertial solutions from miniature to high accuracy. Combined with cutting-edge calibration techniques and advanced embedded algorithms, SBG Systems products are ideal solutions for industrial & research projects such as unmanned vehicle control, antenna tracking, camera stabilization, and surveying applications.

TEST RESULTS

Marine

Hydrography

Automotive

Aerospace

PRODUCTS

Navsight Marine

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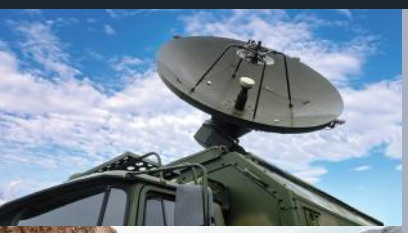
Ekinox Micro

GNSS aided Inertial Navigation System

MADE IN FRANCE

High-Performance Compact INS for Mission Critical Applications

ITAR **No Export Restriction**



Ekinox Micro combines a high-performance MEMS inertial sensor with quad-constellation, multi-frequency dual-antenna GNSS receiver to provide unmatched accuracy even in the most challenging applications. Designed to operate in the harshest conditions, Ekinox Micro is military standard compliant, making it the ideal choice for any mission critical application.

Key Features

Compact yet Rugged

Ekinox Micro is small and lightweight, yet tough enough to be used in the toughest environments, with conformance to Military standards MIL-STD-461G, MIL-STD-1275E and MIL- STD-810H.

Optimal performance everywhere

Ekinox Micro includes pre-configured motion profiles for all land, air and sea applications enabling fast tuning of the sensor for optimum performance in every situation.

Ease of use & integration

With Ethernet connectivity and user-friendly connectors and configuration interface Ekinox Micro is fully plug and play. Developers can also integrate it using the REST API for configuration, and multiple input/ouput formats.

Single/dual antenna heading

Ekinox Micro can be used in single antenna mode and reach its maximum performance. However, for applications with low dynamics it also operates as a dual antenna GNSS compass.

Specifications

MIL-STD 461G | MIL-STD 1275E | MIL-STD 810H | IP-68

Each of our sensors is subjected to a thorough **calibration and testing process** accross its entire operating temperature range, at our manufacturing facilities. This guarantees all delivered products will meet their specifications for their entire lifetime **without the need for a recalibration.** The specifications provided are minimum performances for typical applications and are based on multiple in field tests and real-world applications.

SYSTEM PERFORMANCE

1 sigma error over the full temperature range for a typical land application

Parameter	Single Point	RTK	PPK
Roll/Pitch	0.03°	0.015°	0.015°
Heading Single/dual antenna	0.08°	0.05°	0.035°
Velocity	0.05 m/s	0.02 m/s	0.01 m/s
Position	1.2 m	1 cm + 1 ppm	1 cm + 1 ppm

INTERFACES

Aiding sensors	GNSS, RTCM, NTRIP, Odometer, DVL
Protocols	NMEA, ASCII, sbgECom (binary), REST API
Datalogger	8 GB or 48 h @ 200 Hz
Output rate	200Hz (IMU, INS)
Ethernet	1x Ethernet Full duplex (10/100 base T) PTP / NTP, NTRIP, Web interface, FTP
Serial ports	4x serial I/O up to 921,600 bps
CAN	1x CAN 2.0 A/B bus, up to 1 Mbps
Sync I/O	4x Sync Inputs (RS232 levels) 2x Sync out (1x RS232 + 1x TTL levels)
Connectors	2x ODU AMC High-Density (maix/aux) 2x SMA connectors (antennas)

TIMING SPECIFICATIONS

Timestamp accuracy	< 200 ns
PTP accuracy	< 1 µs
PPS accuracy	< 1 µs (jitter < 1 µs)
Drift in dead reckoning	1 ppm

MECHANICAL SPECIFICATIONS

Weight	165 g
Dimensions (LxWxH)	4.2 x 5.7 x 6.0 cm

GNSS

Features	SBAS, RTK, PPK	
Signals	GPS: L1 C/A, L2C GLONASS: L1OF, L2OF	GALILEO: E1, E5b BEIDOU: B1I, B2I
Update rate	PVT: 5 Hz, RAW: 1 Hz	
Time to first fix (cold start)	< 24 s	
Jamming/Spoofing	Mitigation and advanced indicators	

HEAVE PERFORMANCE

Available in marine motion profile

Accuracy	5 cm or 5% of swell	Whichever is greater
Wave period	0 to 20 s	Auto-adjusting

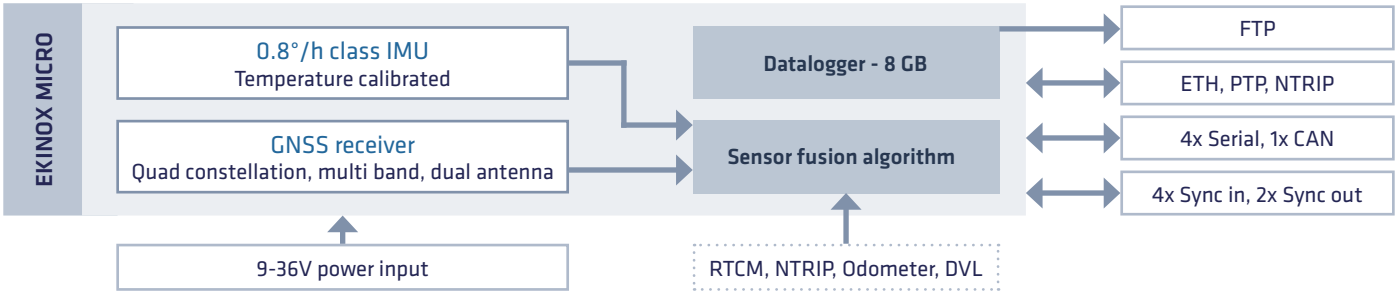
ENVIRONMENTAL SPECIFICATIONS & OPERATING RANGE

Operating Temperature	-40 to 71°C
Storage temperature	-40 to 85°C
IMU Range	± 490°/s, ± 40 g
GNSS range	500 m/s and 80 km altitude
Vibrations & Shocks	MIL-STD-810H
Ingress protection	IP-68 rated (1.5 m, 2 hours) Kerosene projections resistant
MTBF (computed)	246 000 h

ELECTRICAL SPECIFICATIONS

Power consumption	< 5.1 W with 2 survey grade antennas < 3.6 W without antennas
Supply Voltage	9 V - 36 V DC +/- 5%
Antenna power	5 V DC – max 150 mA per antenna Gain: 17 - 50 dB
Power Supply / EMC	RED (Radio Equipment Directive) IEC6100 MIL-STD 461G MIL-STD 1275E

FUNCTIONAL BLOCK DIAGRAM



Free Technical Support | Unlimited Firmware Updates | 2-year Warranty

SBG SYSTEMS

Contact our Experts: **www.sbg-systems.com/contact**

Qinertia

Qinertia

THE NEXT GENERATION INS/GNSS POST-PROCESSING SOFTWARE



For all mobile surveying applications

Survey Efficiently, Survey Anywhere, Survey Serenely. QINERTIA has been designed to help surveyors get the most of their surveys with simplicity.

SBG SYSTEMS

Qinertia

The Next Generation INS/GNSS Post-processing Software

Qinertia is the SBG Systems in-house post-processing software. Full-featured, Qinertia enhances SBG inertial navigation systems performance by post processing inertial data with raw GNSS observables.

Qinertia

ALL-IN-ONE SOLUTION

INS/GNSS Tight Coupling Post-processing

Static and Kinematic GNSS Post-processing

KEY FEATURES

- Tightly coupled solution for unmatched accuracy and reliability
- Centimetric position using offline RTK corrections or Precise Point Positioning
- Seamless Integration of Odometer and Dual Antenna GNSS Receiver
- Multi-Constellation Support (GPS, GLONASS, GALILEO, BEIDOU)
- Support of third-party IMUs and any GNSS receivers

Qinertia, the PPK Software for All your Projects

Open to third-party IMUs

Qinertia has been designed to help surveyors get the most of their survey very easily with a simple workflow. Because park of sensors could be heterogeneous, Qinertia supports third-party Inertial Measurement Unit (IMU). Several IMU and INS have already been successfully integrated with Qinertia including LN-200, LCI-100 and µIMU. You can contact us to study how you can integrate your IMU in Qinertia's workflow.

Open to all GNSS receivers

Qinertia post-process data from any GNSS receiver through RINEX, and with binary files from Novatel, Septentrio, Trimble and Ublox for a straight-forward workflow. In the same way, the VBS feature is able to compute virtual networks from various GNSS receivers, including different models, configurations or constellations, and even with different coordinate systems. Qinertia automatically adjusts the VBS network to compensate for any base station position inaccuracy and provides full quality control indicators to assess the expected accuracy and reliability.

Powerful Base Station Management

» 2 modes available:
  - Single Base Station
  - Virtual Base Station
» Drag & drop user's base station (binary or RINEX format)
» Preview trajectory and base stations on a map
» Virtual Base Station computation using both permanent and user's base stations
» Visualization of expected accuracy and quality
» Base station position review with PPP computation

Intuitive Base Station Explorer

» Access to more than 7,000 base stations over 164 countries
» Always up-to-date database
» Automatic download and quality check
» Web-based pre-mission visualization

Fast and Simple Workflow

IMPORT

Easily import SBG inertial data
Compatible with industry standard GNSS receivers (RINEX)
Native support of Septentrio, Novatel, Trimble, and Ublox.

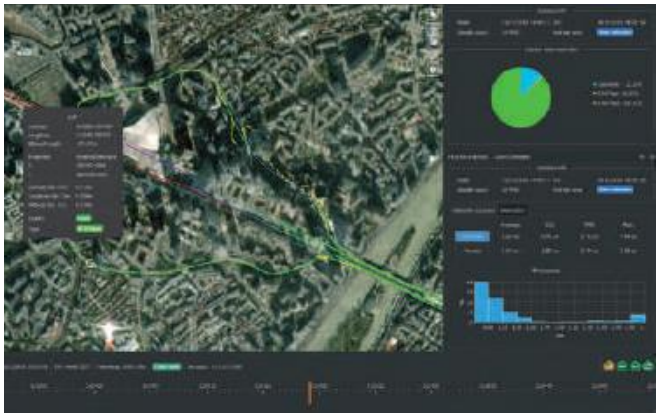
1 Download or import Base stations

2 Review mechanical installation

3 Launch Processing

Processing Made Easy

» Motion Profiles selection to tune sensor behavior to the application dynamics
» Seamless Integration of aiding equipment with specific error models
» Advanced multipath and rejection filters
» Automatic Lever arm and alignment estimation



Fast & Modern Technology

» Less than 3 minutes for a 6-hour log thanks to Forward and Backward computation at the same time
» Handle very large logs thanks to modern 64-bits design
» Cross-platform support:
  - Windows
  - Mac OS X*
  - Linux*

Extensive Quality Indicators

» Interactive quality indicators assessment
» Display of advanced parameters (separation, standard deviation, bias, scale factor, lever arm)
» Statistics report generation (RMS, min/max)

** Will be available in the next major update for users under valid maintenance plan*

4 Review Quality Indicators

EXPORT

Define and export your own custom text format
Open to industry standards (SBG, SBET, Google Earth)
Handle datum & projections

Export based on different events:
- Time interval
- Distance interval
- Event markers

Create and re-use your own export preset

Qinertia - Your Full-featured Post Processing Solution

Qinertia *GNSS*

GNSS ONLY

All applications

Post-processing of GNSS Static and Kinematic data.

Qinertia *UAV*

ECONOMICAL PPK FOR UAV*

UAV applications

Processing trajectory within a 3km radius limit.
GNSS Only included.

Qinertia *LITE*

ENTRY-LEVEL PPK WITH ELLIPSE SENSORS

Land/Air applications

Full processing with Ellipse sensors in Land/Air applications.
GNSS Only included.

Qinertia *PRO*

FULL-FEATURED PPK

All applications

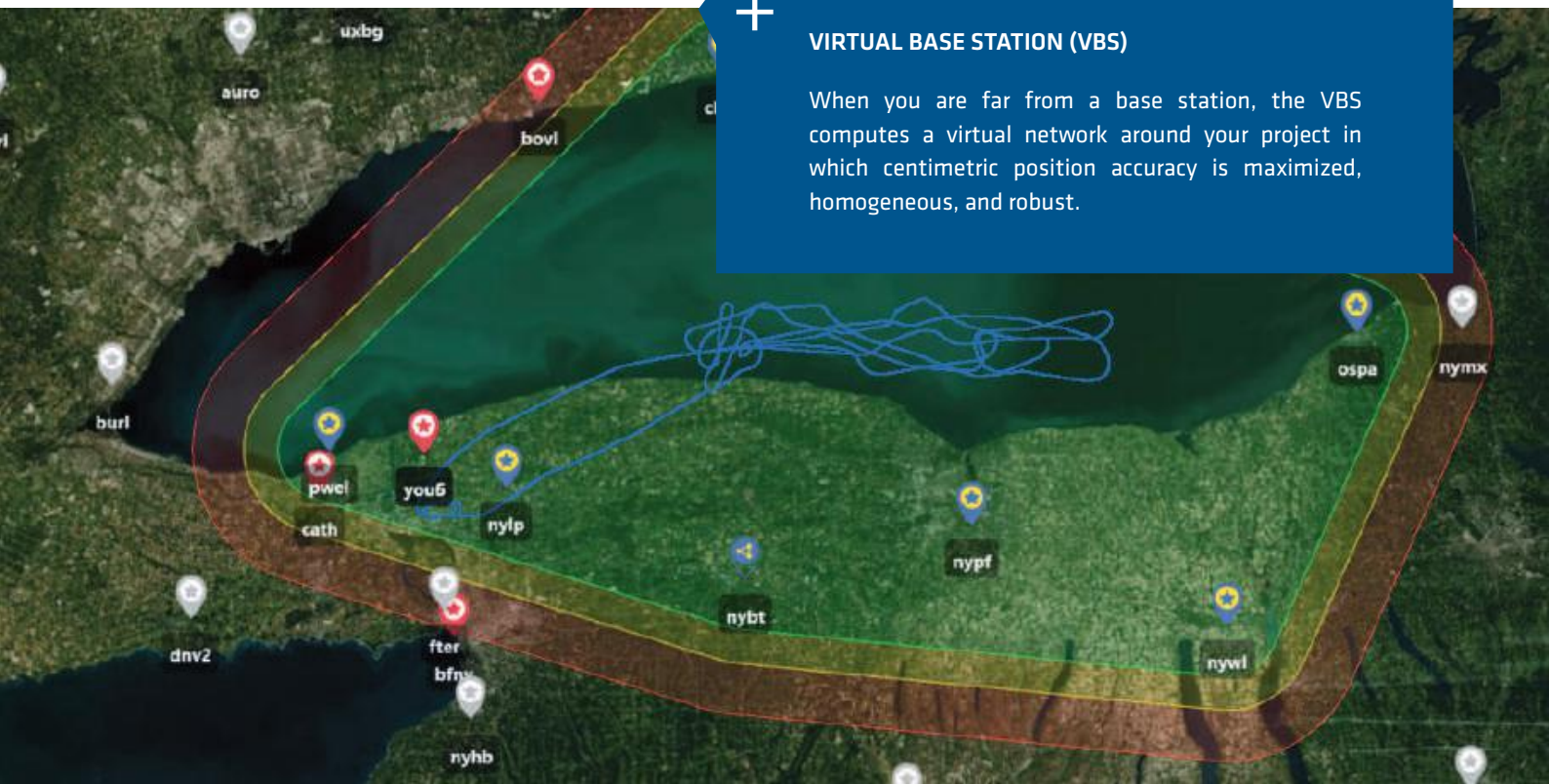
Full processing with any IMUs and GNSS receiver.
GNSS Only included.

FLEXIBLE LICENSING

Easily share your floating license with your team. We offer flexible licensing options (perpetual or subscription) to best fit your needs.

PERPETUAL LICENSE	SUBSCRIPTION	
Initial purchase + yearly maintenance	1 Month	12 Months

** Processing trajectory within a 3km radius limit. 1 year free subscription when buying a Quanta solution.*



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VIRTUAL BASE STATION (VBS)

When you are far from a base station, the VBS computes a virtual network around your project in which centimetric position accuracy is maximized, homogeneous, and robust.

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