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 /E6[1]/L6[1]	RTK[2]	PPK[3]	RTK 60 sec outage	PPK 60 sec outage
Roll/Pitch	0.01°	0.008°	0.005°	0.012°	0.008°
Heading - Dual antenna (2m baseline)	0.02°	0.02°	0.01°	0.05°	0.025°
Heading - Dual antenna (4m baseline)	0.01°	0.01°	0.01°	0.04°	0.025°
Position (X/Y)	1 m	0.01 m + 0.5 ppm	0.01 m + 0.5 ppm	4 m	0.15 m
Altitude (Z)	1.0 m	0.015 m + 1 ppm	0.015 m + 1 ppm	0.75 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

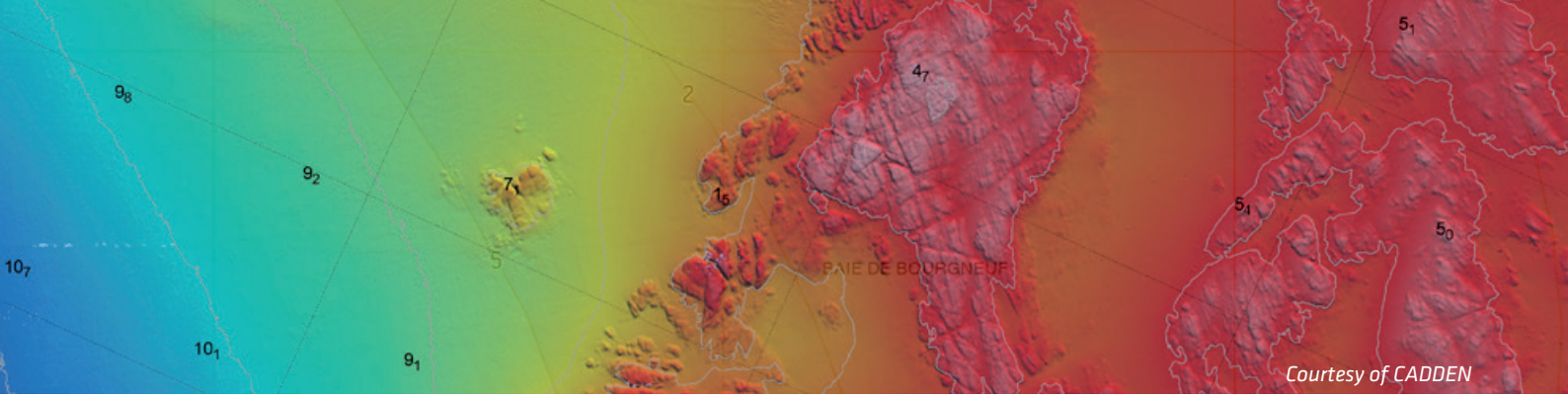
DVL[4]	< 0.2 % of Travelled Distance

Driver available for

[1] GNSS Board variant dependent
[2] Real Time Kinematic
[3] Post-processing Kinematic
[4] 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.

Others upon request



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 with Precise Time Protocol (PTP) for Time Synchronization.



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 MARINESTAR™*, CLAS* corrections with Precise Time Protocol (PTP) for Time Synchronization.

WHY MEMS TECHNOLOGY?

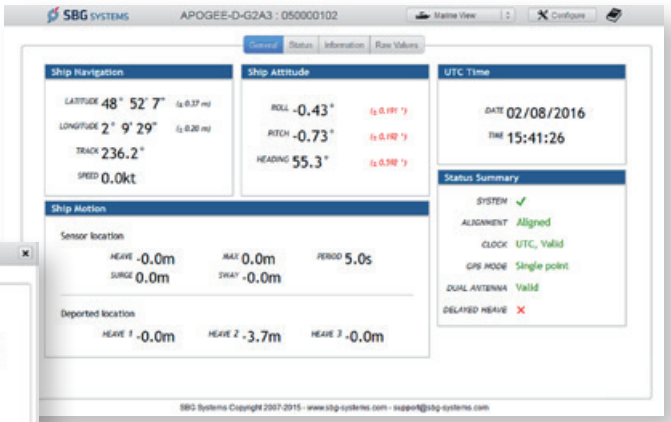
- Low-power consumption
- Cost-effective
- Highly Robust
- Compact and Light-weight

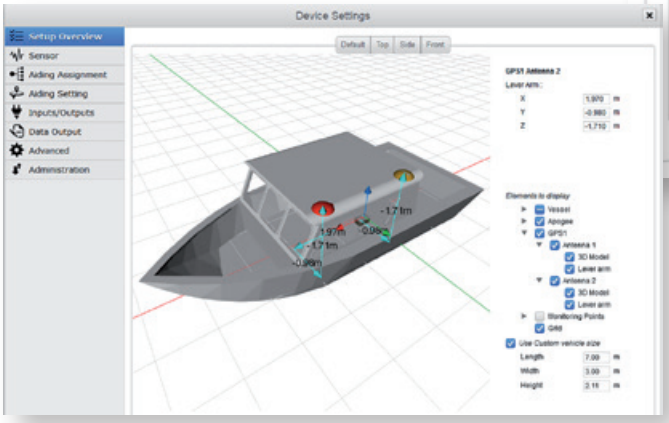


Modern and Easy-to-use

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
- + 8,000 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	< 6 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) PTP Grand Master Clock NTRIP v1/v2 client

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 Accelerometers : 8 g RMS

SENSOR PERFORMANCE

	Accelerometers	Gyroscopes
Measurement range	10 g	200 °/s
Bias in-run instability	< 7 µg	< 0.05 °/hr
Random walk	< 30 µg/√Hz	< 0.012 °/√hr

** GNSS board variant dependant*
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.

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