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	DGPS	RTK*	PPK**	RTK 60 sec outage	PPK 60 sec outage
Roll/Pitch	0.01°	0.01°	0.008°	0.005°	0.01°	0.008°
Heading - Dual antenna (2m baseline)	0.04°	0.04°	0.04°	0.02°	0.05°	0.025°
Heading - Dual antenna (4m baseline)	0.025°	0.025°	0.025°	0.02°	0.04°	0.02°
Position (X/Y)	0.6 m	0.3 m	0.01 m	< 0.01 m	0.4 m	0.15 m
Altitude (Z)	1.0 m	0.5 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

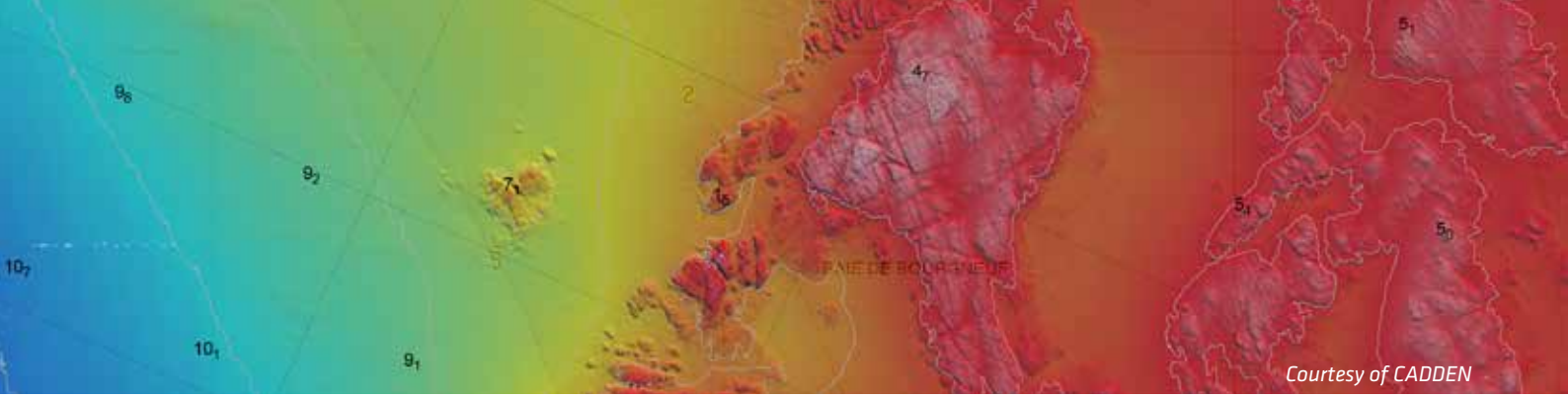
DVL***	< 0.2 % of Travelled Distance

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 to All Hydrographic Surveyors

APOGEE-E
IP68

Ideal to mount on the center of gravity of the boat

OR

APOGEE-U
200m Depth

Ideal to mount close to the SONAR head

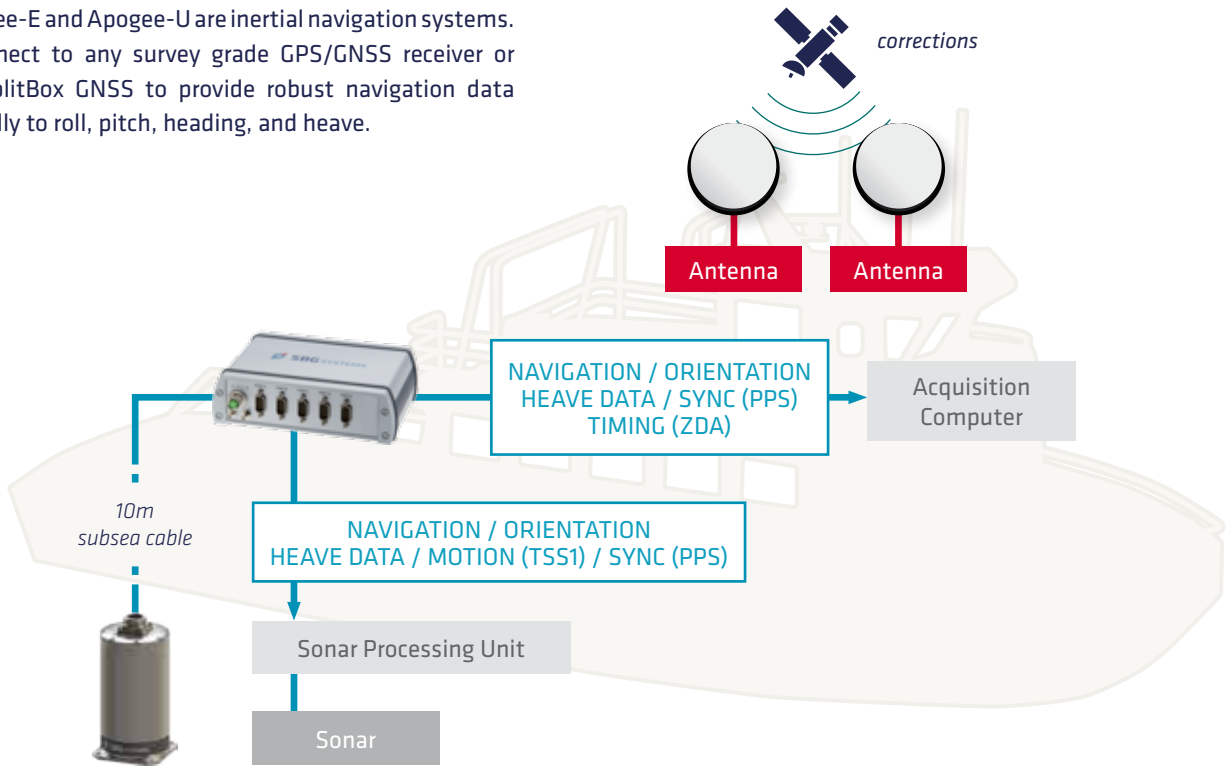
NEW

SPLITBOX GNSS
L1/L2/L5 GNSS Receiver

- DGPS
- OmniSTAR / Marinestar
- TerraStar / Veripos
- RTK
- Post-processing

The SplitBox also provides a simplified interface with standardized connectors for easy connection.

The Apogee-E and Apogee-U are inertial navigation systems. They connect to any survey grade GPS/GNSS receiver or to the SplitBox GNSS to provide robust navigation data additionally to roll, pitch, heading, and heave.



Powerful Models for Ship Motion Monitoring and Unmanned Systems

NEW

APOGEE-M
200m Depth

APOGEE-A
IP68

APOGEE-D
IP68

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

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

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

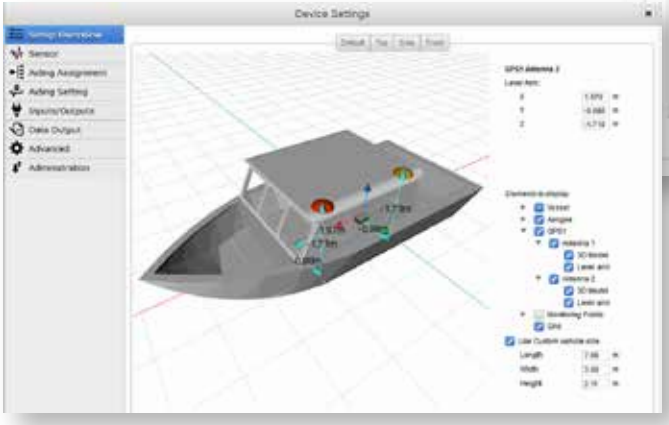
WHY MEMS TECHNOLOGY?

- » 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.

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

Model	Apogee-M/U
Weight in air Weight in water	2.1 kg / 4.63 pounds 0.95 kg / 2.09 pounds
Diameter Height	92 mm / 3.62 '' 170 mm / 6.69 ''
Power Consumption	< 3 W
Supply Voltage	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, 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 Model U/M - 3 outputs / 5 inputs
Ethernet	Full Duplex (10/100 base-T)

ENVIRONMENTAL

Depth Rating Apogee-M/U	200m (Titanium)
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	100 °/s
Bias in-run instability	< 2 µg	< 0.08 °/hr
Random walk	< 15 µg/√Hz	< 0.012 °/√hr

POSITIONING PERFORMANCE - SPLITBOX GNSS

	Feature	Accuracy
Single Point L1/L2/L5	✓	1.2 m
DGPS	✓	0.4 m
OmniSTAR* / Marinestar*	✓	0.1 m
TerraStar* / Veripos*	option	0.1 m
RTK	option	1 cm + 1 ppm
RTK 10/10	option	0.1 m
RTK 30/30	✓	0.3 m
Raw Data**	option	Post-processing

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.

**Subscription available from third party PPP service provider*
***Raw data are compatible with Novatel Inertial Explorer® software*
RMS values for typical survey trajectories. Performance may be affected by atmospheric conditions, signal multipath, and satellite geometry.

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

Ekinox Subsea Series

SplitBox Series

VIDEO

Apogee Series

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