



CODEVINTEC

Tecnologie per le Scienze della Terra e del Mare

Ultimate accuracy MEMS – Apogee Series Inertial Navigation System



Motion Sensing and Georeferencing

- > **INS**
- > **MRU**
- > **AHRS**

ITAR free
0,005° RMS

Apogee Series

High quality, high accuracy

Hydrography

- > Motion Compensation and Data Georeferencing
- > Smooth Workflow

Mobile Mapping

- > Precise Trajectory and Direct Georeferencing
- > Easy Integration
- > Precise Synchronization



High quality, high accuracy

SBG Systems manufactures high quality, high accuracy inertial navigation systems from the concept to the production. The Apogee benefits from our high level of expertise in integrated design, IMU calibration, testing, and filtering. Apogee makes high accuracy affordable for all surveying companies.



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°	0.005°
Heading - Single antenna	0.05°	0.05°	0.02°	0.015°	0.02°	0.015°
Heading - Dual antenna (2m baseline)	0.02°	0.02°	0.02°	0.015°	0.02°	0.015°
Heading - Dual antenna (4m baseline)	0.01°	0.01°	0.01°	0.01°	0.02°	0.01°
Position (X/Y)	0.6 m	0.3 m	0.01 m	< 0.01 m	0.3 m	0.1 m
Altitude (Z)	1.0 m	0.5 m	0.03 m	< 0.02 m	0.1 m	0.07 m

Heave (Marine)

	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	On board computation

Velocity

Odometer (DMI)***	< 0.1 % of Travelled Distance
DVL***	< 0.2 % of Travelled Distance

* 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.



Hidrography

Motion Compensation & Data Georeferencing

Very accurate Multibeam Sonar motion compensation

Robust position during GNSS outages

Delayed heave for difficult sea conditions

Seamless post-processing workflow

River & coastal survey

Georeferencing ashore or near the coast with:

- > TerraStar
- > OmniSTAR (Through SplitBox)
- > RTK corrections
- > Post-processing
- > DVL input for river and canal

Marine deep water survey

Georeferencing offshore with:

- > Marinestar (Through SplitBox)
- > Compatible with Veripos, C-Nav, and Seastar (Through external receiver)
- > Post-processing

Smooth Workflow



Easy connections

Web configuration

Compatible with all hydrographic software

Post-processing



CODEVINTEC

Tecnologie per le Scienze della Terra e del Mare

© 2019 - Codevintec Italiana srl, Milano

Mobile mapping

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, TerraStar, or OmniSTAR corrections
- > Low Latency (3 ms)
- > High resistance to vibrations (can be used on helicopter)
- > Post-processing software

Easy Integration, Precise Synchronization



Compact, lightweight & low power



Ethernet, rs-232, rs-422, can protocols



Accurate utc time stamping (1 μ s)



Up to 5 event input markers



CODEVINTEC

Tecnologie per le Scienze della Terra e del Mare

Inertial Navigation System Specifications – Preliminary

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.

Product line



Model	Apogee-A Motion Sensor	Apogee-E INS & SplitBox GNSS	Apogee-N INS/GNSS	Apogee-D INS/Dual GNSS
Roll, Pitch, Heading	●	●	●	●
Heave (Marine)	●	●	●	●
Navigation		●	●	●
GNSS		receiver SplitBox GNSS with Dual antenna L1/L2/L5 GPS + GLONASS Option: GALILEO, BEIDOU	Single-antenna L1/L2/L5 GPS + GLONASS Option: GALILEO, BEIDOU	Dual-antenna L1/L2/L5 GPS + GLONASS Option: GALILEO, BEIDOU
DGPS		●	●	●
Omnistar / Marinestar*		●		
Terrastar*		○	○	○
RTK 30/30		●		
RTK 10/10		○		
RTK		○	○	○
Post-processing (raw data)**		○	○	○
External Aiding	GNSS for optimal orientation, heave, and navigation perf.	Up to two external GNSS receivers, Odometer (DMI), DVL, Depth Sensor, and USBL***		

● Standard ○ Option

Physical characteristics

Model	Apogee-A/E	Apogee-N/D
Weight	< 690 g	< 900 g
Dimensions (L x W x H)	130 x 100 x 58 mm	130 x 100 x 75 mm
Consumption	< 3 W	< 5 W / < 7 W
Supply	9 to 36 VDC	9 to 36 VDC

Sensor performance

	Accelerometers		Gyroscopes
Measurement range	2 g	10 g	100 °/s
Bias in-run instability	< 2 µg	< 15 µg	< 0.08 °/hr
Random walk	< 15 µg/√Hz	< 75 µg	< 0.012 °/√hr

Interface

Aiding Sensors (input)	2x GNSS, RTCM, Odometer, DVL, Depth, USBL***
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 N/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

Environmental

IP rating	IP68
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 Accelerometer 10 g: 8 g RMS

* Subscription available from third party PPP service provider

** Raw data are compatible with Novatel Inertial Explorer® software

*** For USBL support, please contact us

Inertial Explorer® is a registered trademark of NovAtel Inc. All trademarks are property of their respective owners.

All specifications subject to change without notice