

Navigator

The Navigator is a GPS/INS navigation system that combines a GPS receiver and a six degree-of-freedom IMU in a miniature sensor package. The GPS and IMU measurements are fused by an Extended Kalman Filter (EKF) to provide optimal estimates of the platform's position, velocity, and attitude, regardless of GPS solution availability. Applications include fixed-wing aircraft, helicopters, lighter-than-air, land vehicles, water surface vessels, and static platforms.



Key Features

- Light-weight, small form factor
- EMI-shielded carbon fiber enclosure
- Single 37-pin vehicle interface micro-D connector
- Programmable output rate up to 60 Hz
- Position/velocity output in ECEF or geodetic frame
- Attitude output as quaternion or Euler angles
- Total-state EKF algorithm
- Optional, platform-specific, non-holonomic constraints (NHC) for improved attitude accuracy
- Interface to optional external magnetometer for improved heading observability

Specifications

Mechanical

- Size: 130 x 59 x 19 mm (5.1 x 2.34 x 0.76 inches)
- Weight: 80 grams

Electrical

- Supply Voltage: 4.8 to 20 V
- Power Consumption: 2 W

Data I/O: Communication: RS-232

Output Rate: User-configurable: max 60 Hz

Position

- Output Type: User-configurable: ECEF or geodetic
- Accuracy SEP1 : 5.0 m
- Resolution: 0.03 m

Velocity

- Output Type: User-configurable: ECEF or NED
- Accuracy (1 σ)2: 0.5 m/s
- Resolution: 0.01 m/s

Acceleration

- Output Type: XYZ vehicle frame
- Random Walk: 0.06 m/s/ \sqrt{h}
- Bias Instability: 4 m/s/h
- Resolution: 0.003 m/s²

Attitude

- Output Type: User-configurable: quaternion or Euler angles
- Roll and Pitch Accuracy: (1 σ)3: 0.6 ° with platform specific NHC. 1.0 ° unconstrained

Heading Accuracy (1 σ)4: 1.8 ° with platform-specific NHC. 2.4 ° unconstrained

Resolution: 0.006 °

Angular Rate

- Output Type: XYZ vehicle frame
- Random Walk: 2.5 °/ \sqrt{h}

Bias Instability: 80 °/h

Resolution: 0.01 °/s

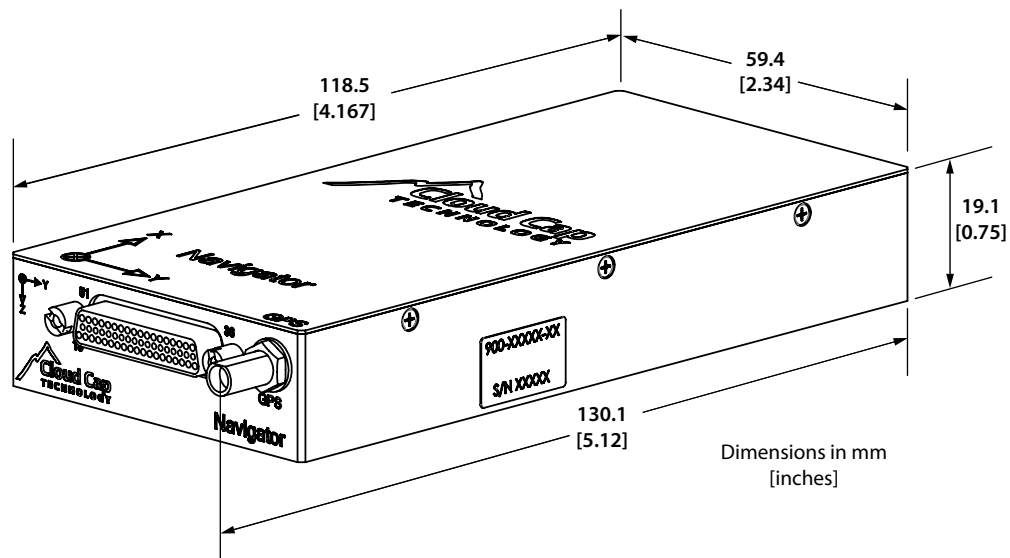
Operational Limits

- Temperature Range: -40 ° C to +70 ° C
- Altitude: 50,000 m

Speed: 515 m/s

Angular Rate: 300 °/s

Acceleration: 60 m/s²



1 Position accuracy when GPS solution is available, given as spherical error probable. In case of temporary GPS outage, position accuracy is subject to velocity random walk.

2 Velocity accuracy when GPS solution is available. In case of temporary GPS outage, velocity accuracy is subject to acceleration random walk and attitude accuracy.

3 Attitude accuracy when GPS solution is available. In case of temporary GPS outage, attitude accuracy is subject to acceleration and angular rate bias instability.

4 Heading accuracy when GPS solution is available and the vehicle is accelerating. If the vehicle is not accelerating, or in case of temporary GPS outage, heading accuracy is subject to angular rate random walk.

5 Angular rate biases are consistently removed when GPS solution is available and the vehicle is accelerating.