



# CERTUS MEMS GNSS/INS

Certus is a dual antenna GNSS aided Inertial Navigation System (INS) that provides accurate position, velocity, acceleration and orientation. It offers reliable data and 1 cm RTK position accuracy. Low Swap-C (Size, Weight, Power and Cost) and multiple communication interfaces make for easy integration. It is available in both OEM and rugged packages.



## PERFORMANCE

0.1 ° Roll and Pitch

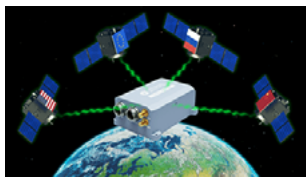
1 cm RTK Positioning

1000 Hz Update Rate

0.1 ° Heading

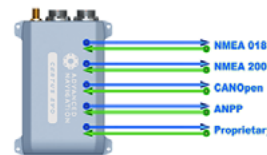
3 °/hr MEMS Gyroscope

## FEATURES



### MULTI CONSTELLATION RTK

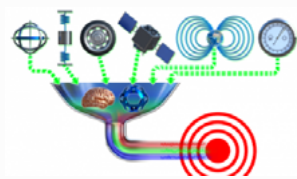
Certus contains a dual frequency RTK GNSS receiver that provides up to 8mm accuracy positioning and supports all of the current and future satellite navigation systems, including GPS, GLONASS, GALILEO, BeiDou and QZSS.



### MULTI-PROTOCOLS AND INTERFACES

Certus features multiple interfaces including Ethernet, CAN, RS232, RS422 and GPIOs. Certus supports all the industry standard protocols

including NMEA 0183, NMEA 2000, TSS, PASHR, Simrad as well as a wide variety of proprietary protocols. Full access to all functions and data is provided via an embedded web interface.



### ADVANCED FILTER

Certus contains Advanced Navigation's revolutionary sensor fusion filter. The filter is more intelligent than the typical extended kalman filter and is able to extract significantly

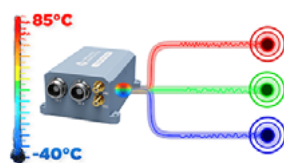
more information from the data by making use of human inspired artificial intelligence. It was designed for control applications and has a high level of health monitoring and instability prevention to ensure stable and reliable data.



### DUAL ANTENNA HEADING

Certus features dual antenna moving baseline RTK. This allows it to provide highly accurate heading while both stationary and moving. It is an excellent choice for applications where magnetic

heading is not usable due to interference or where additional accuracy is required. An added benefit is the ability to accurately measure vehicle slip angle.



### CALIBRATED DYNAMIC RANGING SENSORS

Certus contains very high performance MEMS inertial sensors. These are put through Advanced Navigation's intensive calibration

process to increase their performance further still and provide consistently accurate data over an extended temperature range of -40°C to 85°C. Advanced Navigation's custom calibration process is the only full sensor calibration that can provide dynamic ranging, allowing the user to select a sensor range for high accuracy or high accelerations on the fly. As part of this calibration, every Certus unit spends 8 hours in our specially built rotating temperature chamber.



### RELIABILITY

Certus rugged's precision marine grade aluminium enclosure is waterproof and dirtproof to the IP67 standard and shockproof to 2000g, allowing it to be used in the most extreme conditions. Its minimal size, weight and power requirements allow

for easy integration into almost any system. The rugged hardware is protected from reverse polarity, overvoltage, surges, static and short circuits on all external interfaces. The GNSS contains RAIM, which excludes both malfunctioning, and tampered satellite signals.



## TIME SYNCHRONISATION

Certus contains a GNSS disciplined oscillator that can act as the primary time source within a distributed time system, enabling access to ultra-accurate system

time using PTP or NTP network time sync. Certus also has a high-accuracy 1PPS and frequency output.

## NAVIGATION

Horizontal Position Accuracy	1.2 m
Vertical Position Accuracy	2.0 m
Horizontal Position Accuracy (with SBAS)	0.5 m
Vertical Position Accuracy (with SBAS)	0.8 m
Horizontal Position Accuracy (with RTK or Kinematic PPK)	0.01 m
Vertical Position Accuracy (with RTK or Kinematic PPK)	0.015 m
Velocity Accuracy	0.05 m/s
Roll & Pitch Accuracy	0.1 °
Heading Accuracy (1m Antenna Separation)	0.1 °
Roll & Pitch Accuracy (Kinematic post processing)	0.03 °
Heading Accuracy (Kinematic post processing)	0.06 °
Slip Accuracy	0.1 °
Heave Accuracy	5 % or 0.05 m
Range	Unlimited
Hot Start Time	500 ms
Internal Filter Rate	1000 Hz
Output Data Rate	Up to 1000Hz

## HARDWARE

Operating Voltage (Rugged)	9 to 36 V
Operating Voltage (OEM)	9 to 30 V (or 5 V)
Input Protection (Rugged only)	-40 to 100 V
Power Consumption (typical)	2.64 W
Hot Start Battery Capacity	> 48 hrs
Hot Start Battery Charge Time	30 mins
Hot Start Battery Endurance	> 10 years
Operating Temperature	-40 °C to 85 °C
Environmental Protection (Rugged only)	IP67 MIL-STD-810G
MTBF	140,000 hrs
Shock Limit	2000 g
Dimensions (Rugged)	73 x 115 x 34 mm
Dimensions (OEM)	75 x 101.5 x 24 mm
Weight (Rugged)	280 grams
Weight (OEM)	110 grams

## SENSORS

SENSOR	ACCELEROMETERS	GYROSCOPES	MAGNETOMETERS	PRESSURE
Range (dynamic)	± 2 g ± 4 g ± 16 g	± 250 °/s ± 500 °/s ± 2000 °/s	± 2 G ± 4 G ± 8 G	10 to 120 KPa
Bias Instability	20 µg	3 °/hr	-	10 Pa
Initial Bias	< 5 mg	< 0.2 °/s	-	< 100 Pa
Initial Scaling Error	< 0.06 %	< 0.04 %	< 0.07 %	-
Scale Factor Stability	< 0.06 %	< 0.05 %	< 0.09 %	-
Non-linearity	< 0.05 %	< 0.05 %	< 0.08 %	-
Cross-axis Alignment Error	< 0.05 °	< 0.05 °	< 0.05 °	-
Noise Density	100 µg/√Hz	0.004 °/s/√Hz	210 µG/√Hz	0.56 Pa/√Hz
Bandwidth	400 Hz	400 Hz	110 Hz	50 Hz



## INTERNAL DATA LOGGING

Certus contains 256GB internal storage, allowing the user to log up to 1 year of navigation data without a requirement for any external systems or accessories.

## GNSS

Model	Advanced Navigation Aries
Supported Navigation Systems	GPS L1, L2 GLONASS L1, L2 GALILEO E1, E5b BeiDou B1, B2
Supported SBAS Systems	WAAS, EGNOS MSAS, GAGAN QZSS
Update Rate	10 Hz
Hot Start First Fix	3 s
Cold Start First Fix	30 s
Horizontal Position Accuracy	1.2 m
Horizontal Position Accuracy (with SBAS)	0.5 m
Horizontal Position Accuracy (with RTK)	0.01 m
Velocity Accuracy	0.05 m/s
Timing Accuracy	20 ns
Acceleration Limit	4 g

## COMMUNICATION

Interfaces (Rugged)	Ethernet, RS232 / RS422, CAN
Interfaces (OEM)	Ethernet, UART, CAN
Speed	100 Mbit 4800 to 4M baud serial
Protocol	AN Packet Protocol NMEA0183 NMEA2000
Peripheral Interface	2x GPIO 1x Auxiliary RS232
GPIO Level	5 V Or RS232
GPIO Functions	1PPS input / output Odometer Stationary Air data input NMEA input / output Novatel GNSS input Trimble GNSS input AN Packet Protocol CAN / CANopen Event trigger