

# BOREAS D90

## FOG GNSS/INS








Boreas combines ground-breaking Digital Fibre Optic Gyroscope (DFOG) and closed-loop accelerometer technologies, with a dual antenna RTK GNSS receiver.

These are coupled in an AI based fusion algorithm to deliver accurate and reliable navigation data.

The system features ultra-fast gyrocompassing, acquiring and maintaining an accurate heading under all conditions with no reliance on GNSS.

### PERFORMANCE

-  0.005 ° Roll and Pitch
-  0.001 °/hr FOG Gyroscope
-  0.01 ° Gyrocompass Heading
-  2 min Gyrocompassing
-  3 Year Warranty

### KEY FEATURES

- Ultra-Fast North Seeking
- AI-Based Algorithm
- Industry Leading SWAP-C
- Multiple Protocols & Interfaces



### APPLICATIONS



AIR

- Aerial Surveying
- Stabilisation & Pointing



LAND

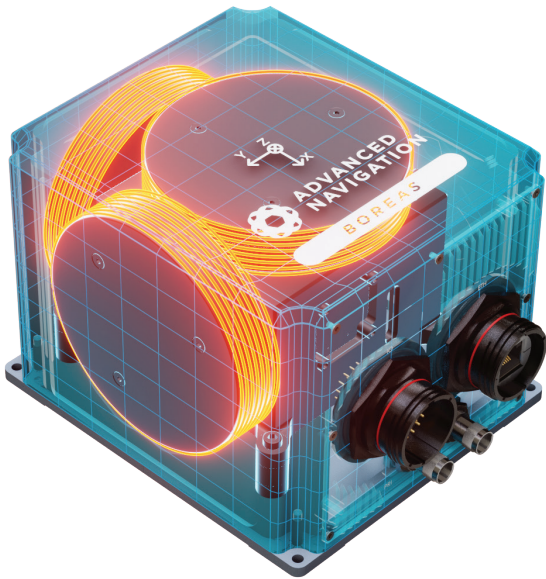
- Land Surveying
- Antenna Targeting



SEA

- AUV Navigation
- ROV Navigation
- Hydrography

# FEATURES



## REVOLUTIONARY DFOG TECHNOLOGY

Boreas takes Fibre Optic Gyroscope (FOG) technology into the next generation with new, patent pending Digital FOG (DFOG) technology, developed over 25 years with 2 research institutions.

This revolutionary DFOG technology combines a specially designed closed loop optical coil with advanced spread spectrum digital modulation techniques that have never been used in a FOG before.

The resulting DFOG offers dramatically improved accuracy, stability and reliability with significantly reduced size, weight, power and cost.



### ULTRA FAST NORTH SEEKING

The superior accuracy of the DFOG technology enables Boreas D90 to rapidly determine its heading, without the need for GNSS or magnetometers.

By sensing the Earth's rotation, Advanced Navigation's revolutionary north-seeking algorithm allows Boreas D90 to acquire an accurate heading within minutes of start up.

This can be achieved in both static and dynamic conditions, as well as at high latitudes.



### RELIABILITY

Boreas D90 has been designed from the ground up for reliability. Both the hardware and software are designed and tested to safety standards.

The precision aluminium enclosure is waterproof and dustproof to the IP67 standard. The system is resilient to shock and vibration, allowing it to be used in the most extreme conditions.

The hardware is designed and tested to MIL standards. The GNSS contains RAIM, which excludes malfunctioning or tampered satellite signals.



### INDUSTRY LEADING SWaP-C

Based on ground-breaking DFOG technology, Boreas D90 offers a 40% reduction in size, weight, power and cost, when compared to competing systems of similar performance.



### EXTENSIVE PROTOCOLS AND INTERFACES

Boreas D90 features multiple interfaces including Ethernet, CAN, RS232, RS422 and GPIOs.

Boreas D90 supports all the industry standard protocols including NMEA, CANopen, NTP, PTP, as well as a wide variety of proprietary protocols.

A rich, responsive embedded web interface provides full access to all of the device's internal functions and data. Internal storage allows for up to 1 year of data logging.



# SPECIFICATIONS

## NAVIGATION

Roll and Pitch Accuracy	0.005 °
Heading Accuracy (Dual GNSS 1 m separation)	0.006 °
Heading Accuracy (without GNSS)	0.01 ° secant latitude
Gyrocompassing Alignment	2 minutes coarse 10 minutes fine (typical)
Accuracy with Odometer (no GNSS)	0.01 % distance travelled
Horizontal Position Accuracy (RTK or PPK)	0.01 m
Vertical Position Accuracy (RTK or PPK)	0.015 m
Horizontal Position Accuracy (SBAS)	0.5 m
Vertical Position Accuracy (SBAS)	0.8 m
Velocity Accuracy	0.005 m/s
Heave Accuracy	2 % or 0.02 m (whichever is greater)
Output Data Rate	1000 Hz

## HARDWARE

Operating Voltage	9 to 36 V
Input Protection	-200 to 200 V
Power Consumption (Typical)	12 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 65 °C (v1.0) -40 °C to 75 °C (v1.1 & later)
Environmental Protection	IP67 MIL-STD-810H
MTBF	> 70,000 hrs
Shock Limit	50 g 11 ms
Vibration	8g rms (20-2000 Hz random)
Dimensions	160x140x115.5 mm
Weight	2.8 kg

## SENSORS

SENSOR	ACCELEROMETERS	GYROSCOPES	PRESSURE
Range	± 15 g	± 490 °/s	10 to 130 kPa
Bias Instability	7 µg	0.001 °/hr	8 Pa
Initial Bias	< 100 ug	< 0.01 °/hr	< 50 Pa
Initial Scaling Error	340 ppm	80 ppm	-
Scale Factor Stability	100 ppm	10 ppm	-
Non-linearity	150 ppm	10 ppm	-
Cross-axis Alignment Error	< 0.001 °	< 0.001 °	-
Noise Density	30 ug/√Hz	0.06 °/hr/√Hz	0.4 Pa/√Hz
Random Walk	17 mm/s/√hr VRW	0.001 °/√h ARW	-
Bandwidth	300 Hz	400 Hz	50 Hz

## 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	Up to 20 Hz
Hot Start First Fix	2 s
Cold Start First Fix	30 s
Horizontal Position Accuracy	1.2 m
Horizontal Position Accuracy (SBAS)	0.5 m
Horizontal Position Accuracy (RTK)	0.01 m
Velocity Accuracy	0.05 m/s
Timing Accuracy	20 ns
Acceleration Limit	4 g

## COMMUNICATION

Interface	Ethernet RS232/RS422 CAN 1PPS
Speed	100Mbit 4800 to 4M baud serial
Protocol	AN Packet Protocol NMEA CANopen
Peripheral Interface	2x GPIO 1x Auxiliary RS232
GPIO Level	5 V (RS232) 3.3 V
GPIO Functions	1PPS input/output Odometer input DVL/USBL input Air Data input Zero Velocity input MEA input/output Novatel GNSS input Trimble GNSS input AN Packet Protocol CAN/CANopen



## HEAD OFFICE

+61 2 9099 3800

[sales@advancednavigation.com](mailto:sales@advancednavigation.com)

Level 12, 255 George Street  
Sydney NSW 2000  
Australia

## NORTH AMERICA

+1 863 777 0224

[usasales@advancednavigation.com](mailto:usasales@advancednavigation.com)

1420 Kettner Blvd, Suite #100  
San Diego CA 92101  
United States

## EUROPE

+44 20 3875 3118

[emeasales@advancednavigation.com](mailto:emeasales@advancednavigation.com)

One Kingdom Street, Paddington Central  
London, W2 6BD  
United Kingdom

## SUBSEA RESEARCH CENTRE

+61 8 6146 5600

245 Balcatta Road,  
Balcatta WA 6021  
Australia