



# BOREAS A90




## FOG IMU/AHRS

The Boreas A series offers accurate and reliable IMU/AHRS solutions with an industry-leading reduction in SWaP-C. Boreas combines ground-breaking Digital Fibre Optic Gyroscope (DFOG) and closed-loop accelerometer technologies with the latest AI-based fusion algorithms.

With ultra-fast north-seeking capability, the unit offers accurate heading without reliance on magnetometers or GNSS. This makes Boreas the ideal choice for demanding GNSS-denied scenarios where a cost-effective, high performance, solution is required.

The Boreas A Series can optionally be upgraded to full INS functionality and combined with an external GNSS input.

### 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 Fusion Algorithm
- Industry-Leading SWaP-C
- Multiple Protocols & Interfaces



### APPLICATIONS



AIR

- High-Precision Surveying
- Gimbal Stabilisation
- Unmanned Aerial Vehicles



LAND

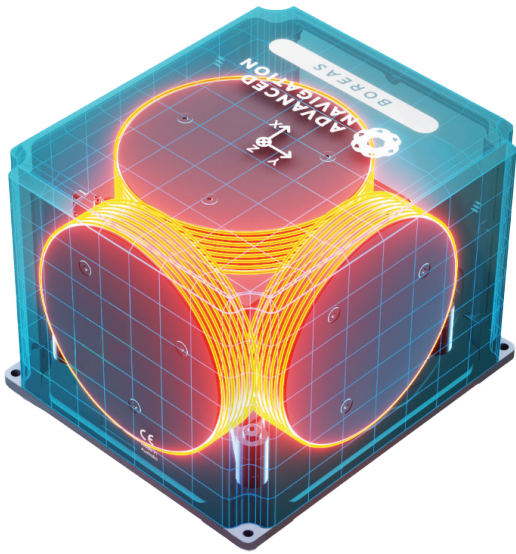
- Autonomous Vehicles
- Tunnelling and Mining
- Structural Monitoring



SEA

- Subsea Navigation
- Infrastructure monitoring
- 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 two 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.

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 the Boreas A90 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 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

The Boreas A90 has been designed from the ground up for reliability. Both the hardware and software are designed and tested to demanding safety standards.

The precision aluminium enclosure is waterproof and dustproof to IP67. 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.



## INDUSTRY LEADING SWaP-C

Based on ground-breaking DFOG technology, the Boreas A90 offers significant reductions in size, weight, power and cost when compared to competing systems of similar performance.



## EXTENSIVE PROTOCOLS AND INTERFACES

The Boreas A90 features multiple interfaces including Ethernet, CAN, RS232, RS422 and GPIO.

Boreas 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 one year of data logging.



# SPECIFICATIONS

## NAVIGATION

Roll and Pitch Accuracy	0.005 °
Heading Accuracy (Gyrocompass, no 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 (external RTK GNSS aided)	0.01 m
Vertical Position Accuracy (external RTK GNSS aided)	0.015 m
Velocity Accuracy (external GNSS aided)	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 75 °C
Environmental Protection	IP67
MTBF	> 70,000 hrs
Shock Limit	50 g 11 ms MIL-STD-810H
Vibration	8 g RMS (20-2000 Hz random)
Dimensions	160x140x115.5 mm
Weight	2.5 kg

## 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

## 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 µg	< 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 µg/√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



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