# BOREAS D70
## GNSS/INS

Boreas D70 is an ultra high accuracy FOG GNSS/INS that provides position, velocity and orientation under the most demanding conditions.

It combines cutting edge Fibre Optic Gyroscopes (FOG) technology, with closed loop accelerometers and a dual antenna RTK GNSS receiver. These are coupled in a sophisticated fusion algorithm to deliver accurate and reliable navigation and orientation.

The system features ultra fast gyrocompassing heading that works under all conditions.

## PERFORMANCE

- 0.01 ° Roll and Pitch
- 0.01 °/hr FOG Gyroscope
- 0.1 ° 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**
- UAV Geopointing
- UAV Lidar
- Stabilisation & Pointing

**LAND**
- Antenna Targeting
- Land Surveying
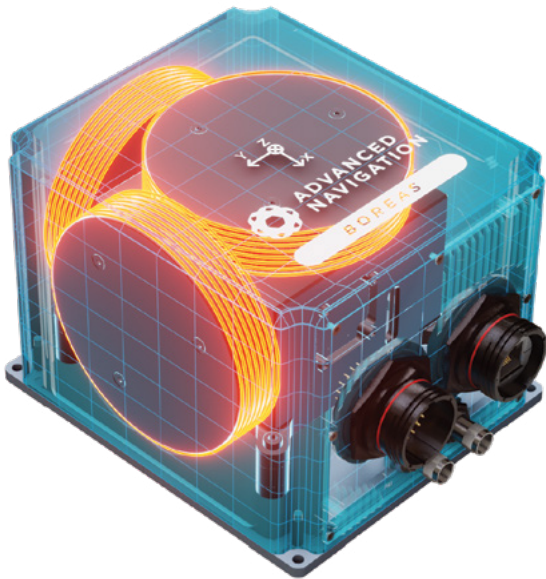- Underground Navigation

**SEA**
- AUV Navigation
- ROV Navigation
- Hydrography

PRELIMINARY

# 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.

**D·FOG**
TECHNOLOGY

## ULTRA FAST NORTH SEEKING

The superior accuracy of the DFOG technology enables Boreas D70 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 D70 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 D70 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 D70 offers a 40% reduction in size, weight, power and cost, when compared to competing systems of similar performance.

## EXTENSIVE PROTOCOLS AND INTERFACES

Boreas D70 features multiple interfaces including Ethernet, CAN, RS232, RS422 and GPIOs.

Boreas D70 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 | 0.01 ° |
| Heading Accuracy (Dual GNSS 1 m separation) | 0.01 ° |
| Heading Accuracy (without GNSS) | 0.1 ° secant latitude RMS |
| Gyrocompassing Alignment | 2 minutes coarse<br>10 minutes fine (typical) |
| Accuracy with Odometer (no GNSS) | 0.05 % 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<br>(whichever is greater) |
| Output Data Rate | 1000 Hz |

## GNSS

| | |
|---|---|
| Model | Advanced Navigation Aries |
| Supported Navigation Systems | GPS L1, L2<br>GLONASS L1, L2<br>GALILEO E1, E5b<br>BeiDou B1, B2 |
| Supported SBAS Systems | WAAS<br>EGNOS<br>MSAS<br>GAGAN<br>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 |

## HARDWARE

| | |
|---|---|
| Operating Voltage | 9 to 36 V |
| Input Protection | -200 to 200 V |
| Power Consumption (Typical) | 12 W with GNSS |
| Operating Temperature | -40 °C to 75 °C |
| Environmental Protection | IP67<br>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 | 2.5 kg |

## COMMUNICATION

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

## SENSORS

| SENSOR | ACCELEROMETERS | GYROSCOPES | PRESSURE |
|---|---|---|---|
| Range | ± 15 g | ± 490 °/s | 10 to 130 kPa |
| Bias Instability | 7 µg | 0.01 °/hr | 8 Pa |
| Initial Bias | < 100 ug | < 0.05 °/hr | < 50 Pa |
| Initial Scaling Error | 340 ppm | 100 ppm | - |
| Scale Factor Stability | 150 ppm | 20 ppm | - |
| Non-linearity | 150 ppm | 10 ppm | - |
| Cross-axis Alignment Error | < 0.001 ° | < 0.001 ° | - |
| Noise Density | 40 ug/√Hz | 0.3 °/hr/√Hz | 0.4 Pa/√Hz |
| Random Walk | 23 mm/sec/√hr VRW | 0.005 °/√h ARW | - |
| Bandwidth | 300 Hz | 400 Hz | 50 Hz |

## HEAD OFFICE

+61 2 9099 3800

sales@advancednavigation.com

Level 12, 255 George Street
Sydney NSW 2000
Australia

## NORTH AMERICA

+1 863 777 0224

usasales@advancednavigation.com

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

## EUROPE

+44 730 899 1057

uksales@advancednavigation.com

25 Old Broad Street
London EC2N 1HN
United Kingdom

## SUBSEA RESEARCH CENTRE

+61 8 6146 5600

78 Guthrie Street
Osborne Park WA 6017
Australia

ADVANCED NAVIGATION