

Atlans Series

Inertial Navigation Systems for georeferencing applications

Atlans Series is a complete range of North seeking and North keeping Inertial Navigation Systems (INS). Cost-effective, they provide Fiber-Optic Gyroscope (FOG) performance to the full spectrum of land & air mapping applications and offer highly accurate positioning in all conditions, including within GNSS-denied environments.



Atlans A5

BEST-IN-CLASS
EXPORT-FREE INS



Atlans A7

HIGH-GRADE
STANDARD INS



Atlans A9

ULTIMATE INS FOR
NICHE APPLICATIONS

A SCALABLE SOLUTION

- Covering the full range of Land & Air applications
- OEM versions available to meet specific requirements
- Export-free version available: Atlans A5

APPLICATIONS

LAND

- Asset inventory
- Pavement condition survey
- Vehicule automation
- HD mapping
- Automotive testing
- Ground-truth

AIR

- Small area survey (UAS)
- Wide area survey (plane, helicopter)
- Precision pointing

UNRIVALED PRICE-PERFORMANCE RATIO

- Highly accurate positioning (up to 0.01m)
- Accurate heading for long-distance straight lines and GNSS-denied environments
- Cost-effective
- Quick and simple installation

TECHNICAL SPECIFICATIONS

LAND APPLICATIONS

Atlans A5				Atlans A7			Atlans A9		
CHARACTERISTICS									
North seeking				●			●		
Temperature	From -20°C to +55°C			From -20°C to +55°C			From -20°C to +55°C		
Temperature variation	Insensitive to any operational temperature change								
Weight	2.9 kg			2.9 kg			4.5 kg		
Dimensions (mm)	160 x 160 x 113			160 x 160 x 113			180 x 180 x 160		
PERFORMANCE WITH GNSS (in RMS)									
Correction type	PPK	RTK	DGPS	PPK	RTK	DGPS	PPK	RTK	DGPS
Horizontal Position (X,Y) (m)	0.01	0.02	0.30	0.01	0.02	0.30	0.01	0.02	0.30
Vertical Position (Z) (m)	0.01	0.02	0.30	0.01	0.02	0.30	0.01	0.02	0.30
Roll & Pitch (deg)	0.008	0.01	0.01	0.005	0.008	0.008	0.0020	0.0020	0.0025
Heading (single antenna, deg)	0.025	0.04	0.05	0.012	0.015	0.02	0.005	0.008	0.01
PERFORMANCE DURING GNSS OUTAGE 1 min (in RMS)									
Correction type	PPK	RTK	DGPS	PPK	RTK	DGPS	PPK	RTK	DGPS
Horizontal Position (X,Y) (m)	0.15	0.60	0.90	0.08	0.40	0.70	0.04	0.20	0.40
Vertical Position (Z) (m)	0.15	0.60	0.70	0.06	0.40	0.50	0.04	0.20	0.40
Roll & Pitch (deg)	0.008	0.012	0.012	0.005	0.008	0.008	0.0020	0.0020	0.0025
Heading (single antenna, deg)	0.025	0.04	0.05	0.012	0.015	0.02	0.005	0.008	0.01

After dynamic alignment is completed.
Actual performance obtained under operational condition of use.

AIR APPLICATIONS

Atlans A5				Atlans A7			Atlans A9		
CHARACTERISTICS									
North seeking				●			●		
Temperature	From -20°C to +55°C			From -20°C to +55°C			From -20°C to +55°C		
Temperature variation	Insensitive to any operational temperature change								
Weight (kg)	2.9 kg			2.9 kg			4.5 kg		
Dimensions (mm)	160 x 160 x 113			160 x 160 x 113			180 x 180 x 160		
PERFORMANCE WITH GNSS (in RMS)									
Correction type	PPK	RTK	DGPS	PPK	RTK	DGPS	PPK	RTK	DGPS
Horizontal Position (X,Y) (m)	0.01	0.02	0.30	0.01	0.02	0.30	0.01	0.02	0.30
Vertical Position (Z) (m)	0.01	0.02	0.30	0.01	0.02	0.30	0.01	0.02	0.30
Roll & Pitch (deg)	0.008	0.01	0.01	0.005	0.008	0.01	0.0020	0.0020	0.0025
Heading (single antenna, deg)	0.025	0.04	0.05	0.015	0.02	0.03	0.005	0.008	0.01
Heading drift 10 min straight line (deg)	0.03	0.03	0.03	0.008	0.008	0.008	0.002	0.002	0.002
PERFORMANCE DURING GNSS OUTAGE 1 min (in RMS)									
Correction type	PPK	RTK	DGPS	PPK	RTK	DGPS	PPK	RTK	DGPS
Horizontal Position (X,Y) (m)	0.20	1.60	2.70	0.15	1.10	1.80	0.05	0.30	0.60
Vertical Position (Z) (m)	0.20	1.00	1.50	0.10	0.60	1.00	0.05	0.30	0.60
Roll & Pitch (deg)	0.008	0.012	0.012	0.005	0.009	0.01	0.0020	0.0020	0.0025
Heading (single antenna, deg)	0.025	0.04	0.05	0.015	0.02	0.03	0.005	0.008	0.01

After dynamic alignment is completed.
Actual performance obtained under operational condition of use.

Delph INS

Post-Processing software for iXblue's INS-based navigation

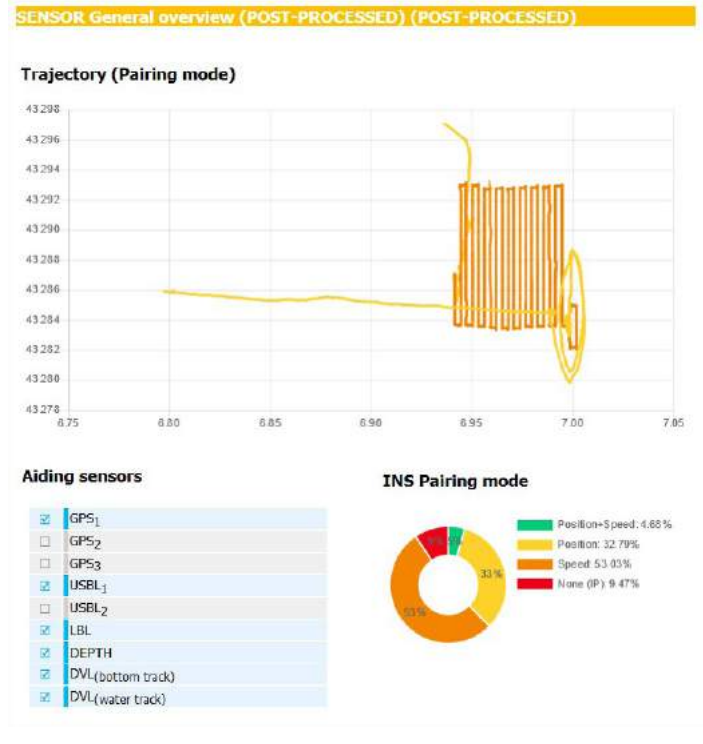
Delph INS is the post-processing and batch productivity tool for the iXblue's INS subsea product range (Phins Subsea, Rovins, Rovins Nano and the Phins Compact Series).

In real-time, it helps you closely monitor your navigation systems (iXblue's and third-party sensors). In post-processing, along with all its previous features, the new version now allows you get the most of a day's work with various enhancement tools like INS/DVL post-mission calibration or QA/QC reports generation. Not only do you have the insurance that you obtain the best from your navigation, but you also get the ability to fix any problem encountered during the survey.

Delph INS will:

- Allow you to post-process your data with custom INS settings
- Integrate data from external sensors that could not be connected to the INS during the survey or provided by a third-party processing tool
- Enhance the quality of the data using dedicated algorithms
- Help you evaluate different positioning scenarios
- Generate QA/QC report for real-time and post-processing navigation
- Allow you to conduct INS/DVL calibration offline and fine tune the results

Available in several versions specifically designed for subsea applications such as ROV, AUV and tow fish applications, Delph INS offers powerful data editing and processing functions together with data export capabilities.



MAIN FEATURES

- QA/QC reports generation (new)
- INS/DVL post-mission calibration (new)
- Customizable map projections (new)
- Automatically computed UTM projections (new)
- 2D plan view (new)
- Specific "Out-of-straightness" data smoothing option (new)
- Export INS configuration (new)
- Forward/backward data processing, edit/modify data, add/remove aiding sensors
- Powerful export tools
- Intuitive and user-friendly man machine interface (MMI)
- Several versions tailored to various market applications

BENEFITS

- Easy and intuitive navigation improvements
- Smooth post-processing integration of your other navigation sensors (GPS, USBL, LBL, DVL, pressure and others)
- Quick and easy integration in processing workflow
- Does not require in-depth INS knowledge
- Cost effective and scalable solution for all applications

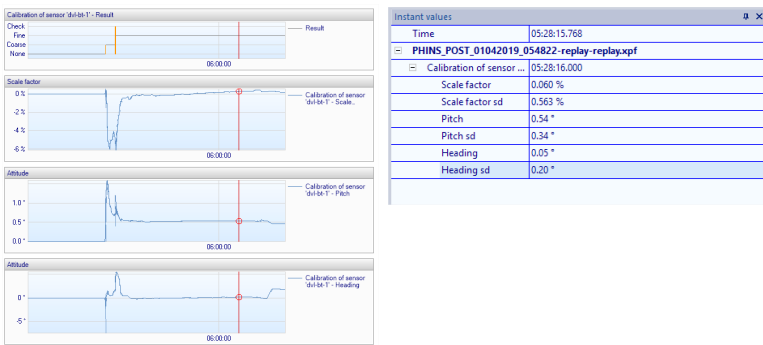
REQUIREMENTS / COMPATIBILITY

Minimum workstation configuration	Microsoft Windows XP SP2, Vista, Windows 7, Windows 10 Intel Core i5 – 2 GHz – 4 Gb RAM
Input file formats	Phins Post-processing protocol Industry standard protocols (GPS, USBL, LBL, DVL, etc)
Output file formats	Industry standard file format (KML, ESRI Shapefile, GML) Plain text file Specific file format on request

MAIN FEATURES

INS/DVL calibration

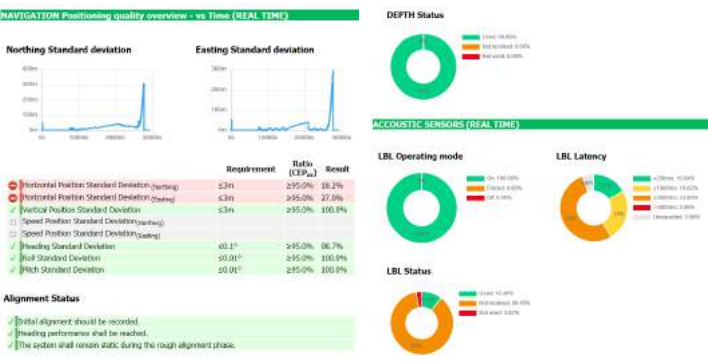
Allows you to make an offline DVL calibration



QA/QC report generation

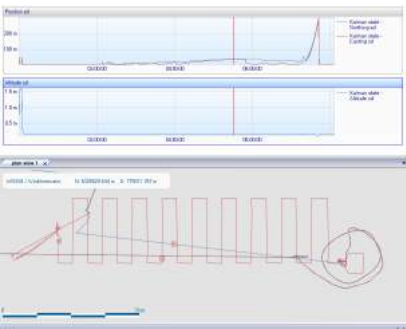
In one click, during or after the mission, generate a full report about the navigation quality and sensors use:

- Report can be generated in real-time and in postprocessing mode
- Quickly get access to a full overview of your mission's quality
- Get a focused report on specific points: USBL, LBL, DVL



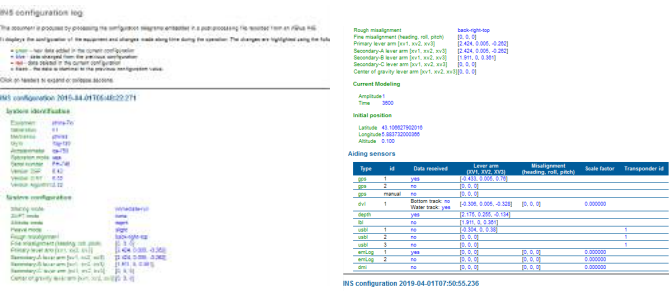
2D plan view

- Easily display vehicle trajectory within Delph INS GUI
- Synchronise time view and plan view for an easier analysis
- Spatial References may be changed
- Distance Travelled by the vehicle
- Position WGS84 or projected



INS configuration

Easy access to the different INS setups throughout changes



Hydrins

A FOG-based navigation-grade INS designed for Hydrographic survey.

Hydrins is lightweight Inertial Navigation System (INS) which combines iXblue Fiber-Optic Gyroscopes (FOG), electronics and embedded processing design in one single unit. This offers the most compact position, orientation and direct georeferencing system.



FEATURES & BENEFITS

- High-accuracy 3D positioning with heading, roll and pitch.
- Uses any kind of GNSS receiver
- Simplified Integration with a single GNSS antenna setup
- Automatic GNSS drop-out / multipath management
- Smart Heave™
- Permanent quality data thanks to the associated iXblue post-processing software APPS
- 1 year warranty
- 24/7 Worldwide Technical assistance
- No ITAR component inside

APPLICATIONS

- Port and harbour maintenance
- Seafloor characterization
- Water depth mapping
- Offshore construction engineering

TECHNICAL SPECIFICATIONS

PERFORMANCE | IMU⁽¹⁾

Bias stability (deg/hr)	0.0065
ARW (deg/sqrt(hr))	0.003

PERFORMANCE | SEA APPLICATIONS⁽¹⁾

With GNSS⁽²⁾

Correction type	SPS Natural	SBAS	DGNSS	PPP*	RTK**	PPK***
Position Horizontal (X,Y) (m)	1.20	0.60	0.30	0.06	0.006 + 0.5 ppm	0.006 + 0.5 ppm
Position Vertical (Z) (m)	1.90	0.80	0.50	0.09	0.01 + 1 ppm	0.01 + 1 ppm
Heading ⁽³⁾ (deg)				0.01		
Roll & Pitch (deg)				0.01		
Heave / Smart Heave ⁽⁴⁾				5 cm or 5% / 2 cm or 2 %		

During GNSS outage⁽²⁾

Outage duration	RTK** 60 sec	PPK*** 60 sec
Horizontal (X,Y) (m)	0.30	0.20
Vertical (Z) (m)	0.30	0.20
Heading ⁽³⁾ (deg)	0.01	
Roll & Pitch (deg)	0.01	
Heave / Smart Heave ⁽⁴⁾	5 cm or 5% / 2 cm or 2%	

Characteristics

Weight	4.5 kg
Material	Aluminium
Size	180 mm x 180 mm x 160 mm
Power	24 VDC (20 - 32 V) / < 20 W
Operating temperature	-20°C to 55°C
Storage temperature	-40°C to 80°C
MTBF	Environmental 100,000 hours
IP Rating	IP 66

INTERFACES

Output refreshing rate	Up to 200 Hz
Latency	< 3 ms
Time tagging	PPS output
Ethernet	UDP / TCP Client / TCP server
Serial RS232 or RS422	5 inputs / 5 outputs / 1 configuration port
Input / Output formats	Industry standards: NMEA0183, ASCII, BINARY
Pulses	4 inputs and 2 outputs
Options & accessories	APPS (Post Processing Software) External GNSS Septentrio Receiver

(1) Typical RMS performance.

(2) Actual results depending on the quality of the GNSS system used, satellite configuration, atmospheric conditions and other environmental effects.

(3) Secant latitude = 1 / cosine latitude.

(4) Whichever is greater for wave periods up to 30 seconds. Smart Heave is delayed by 100 s fixed value. Real-time heave accuracy is 5 cm or 5% whichever is greater for period up to 25s.

*PPP: Precise Point Positioning (requires service subscription).

**RTK: real-time kinematic, up to 40km from base station.

***PPK: Post Processing Kinematic using Advanced Post-Processing Software (smart coupling of INS and GNSS in forward / backward).

All specifications subject to change without notice

Octans

Fifth Generation Survey-Grade Surface Gyrocompass and Motion Sensor



The fifth generation Octans is an all-in-one product for diverse challenging applications. Octans raises the industry standard in measurement accuracy for roll, pitch, heave, IMO-HSC and certified. Octans is built on iXblue's trusted and unique ultimate-performance Fiber Optic Gyroscope (FOG) technology with thousands of units manufactured).

FEATURES

- Improved heading, Smart Heave™ and real-time heave (30sec period)
- State-of-the-art iXBlue FOG (no spinning elements)
- Ethernet, web-based GUI compatible with survey software suites
- IMO and IMO-HSC certification
- ITAR free (CJ) and O&G license eligibility

APPLICATIONS

- Vessel navigation
- Dredging
- Dynamic positioning

BENEFITS

- Highly accurate real-time output even in no GPS/GNSS environment
- Industry's best performance-value backed by 5 year warranty
- Ease-of-use and integration
- Robust heading performance for high-speed vessel with high rate-of-turn
- Ease of export

TECHNICAL SPECIFICATIONS

PERFORMANCE

Heading Accuracy ^{(1) (2)}	0.1° seclat (Autonomous) / 0.05° seclat (with GPS input)
Roll/Pitch Accuracy	0.01 deg RMS
Settling time (typical)	5min
Heave / Surge / Sway Accuracy	5 cm or 5% (whichever is greater)
Delayed Heave	2.5 cm or 2.5% (whichever is greater)

OPERATING RANGE / ENVIRONMENT

Rotation rate dynamic range	Up to 750 deg/s
Acceleration dynamic range	±15 g
MTBF	150,000 hours (System observed) 500,000 hours (FOG + Accelerometers)
Operating / storage temperature	-20 °C to +55 °C / -40 °C to +80 °C
Heading / roll / pitch	0 to +360 deg / ±180 deg / ±90 deg
Special conditions	No warm-up effects, shock and vibration proof

PHYSICAL CHARACTERISTICS

Dimensions (L x W x H)	275 x 136 x 150 mm
Weight in air	4.5 Kg
Water proof	IP66 & IPx7
Material	Aluminum

INTERFACES

User interface	Web based Graphical User interface
Serial RS232 / RS422 port	3 outputs / 2 inputs / 1 configuration port
Ethernet port ⁽³⁾	UDP / TCP client / TCP server
Pulse port	PPS input for < 100µs time synchronization
Input / Output formats	Industry standards: NMEA0183, ASCII, BINARY
Data output rate	0.1 Hz to 200 Hz real measurements
Power supply	24 VDC
Power consumption ⁽⁴⁾	18 W

(1) Secant latitude = 1 / cosine latitude

(2) RMS values

(3) All input /output serial ports can be duplicated on Ethernet ports

(4) Typical value @24 V and ambient temperature

Octans Nano

Compact subsea gyrocompass and attitude sensor

Octans Nano is the smallest and most adept state-of-the-art 4,000 m depth rated attitude and heading reference system (AHRS). It is built on iXBlue's renowned fiber-optic gyroscope (FOG) technology and offshore instrumentation expertise. Octans Nano offers an outstanding price/performance solution, with rugged titanium housing, meeting the most challenging requirements of subsea applications.



FEATURES

- Smallest all-in-one subsea gyrocompass and attitude sensor
- Leading FOG strap-down technology
- Ethernet and serial interfaces with sensor input rebroadcast capability

APPLICATIONS

- ROV navigation
- Fish, Plow, Trencher navigation
- Attitude monitoring of subsea structures

BENEFITS

- High-performance sensors with real-time computation of true heading, roll, pitch and rates of turn, in a compact six-liter housing
- High reliability and low maintenance
- Reduced cabling for advanced architectures and maintaining flexibility for older designs
- Free of ITAR components

TECHNICAL SPECIFICATIONS

Performance

Heading dynamic accuracy ⁽¹⁾⁽²⁾	0.5 deg secant latitude
Roll / pitch dynamic accuracy ⁽¹⁾	0.1 deg
Settling time (ready to nav)	< 5 mn
Full accuracy settling time (all conditions)	< 30 min
Resolution	0.01 deg

Operating range / Environment

Operating / storage Temperature	-20 °C to +55 °C / -40 °C to +80 °C
Rotation rate dynamic range	Up to 500 deg/s
Acceleration dynamic range	±5 g
Heading / roll / pitch	0 to +360 deg / ±180 deg / ±90 deg
MTBF	100,000 hours (System observed) 500,000 hours (FOG + Accelerometers)
Robust to harsh environment, shock and vibration proof	

Physical characteristics

Depth rating	4,000 m
Dimensions (Ø x H))	178 x 237 mm (7.01 x 9.33 in)
Weight (air / water)	9.5 / 5 kg (20.94 / 11.02 lb)
Material	Titanium
Connector	SEACON MINM - 26#22, option Seagnet or CS-MS

Interfaces

Ethernet port	100 Mbits, UDP / TCP Client / TCP server / web sever (GUI)
Serial RS232 / RS422 port	2 inputs / 2 outputs independent ports / 1 config. port
Pulse port	1 input for PPS time synchronization
Input / output formats	Industry standards: NMEA0183, ASCII, BINARY
Data output rate	Up to 200 Hz
Power supply / consumption	24 VDC (20 - 32V) / < 12 W ⁽³⁾

(1) RMS values - (2) Secant latitude = 1 / cosine latitude - (3) Typical value @24V and ambient temperature

Octans Subsea

High-performance subsea gyrocompass and motion sensor

Octans Subsea is a subsea survey-grade gyrocompass and complete motion sensor for water depths up to 3,000 m. Based on iXBlue's FOG technology it outputs heading, roll, pitch, heave, rate of turn and acceleration. Octans Subsea can be easily upgraded to full INS mode (i.e. Rovins).



FEATURES

- Complete gyrocompass and motion sensor
- Smart Heave™
- Fiber-optic gyroscope (FOG), unique strap-down technology
- Ethernet, web-based man-machine interface (MMI)
- Titanium made, small, portable plug and play system
- Optional full featured inertial navigation system

APPLICATIONS

- ROV and offshore survey
- MBES and sonar motion reference
- Dredging
- Marine construction

BENEFITS

- High-performance real-time outputs of true heading, roll, pitch, heave, surge, sway, acceleration and rate of turn
- No spinning element hence maintenance free
- Lightweight corrosion free housing for water depth up to 3,000 m, easy to integrate and interface, saves valuable mobilization time
- Obtain INS-class system with simple software upgrade

TECHNICAL SPECIFICATIONS

Performance

Heading	
Accuracy ⁽¹⁾⁽²⁾	0.1 deg secant latitude
Resolution	0.01 deg
Full accuracy settling time (all conditions)	< 5 min
Heave accuracy ⁽³⁾	2.5 cm or 2.5% (whichever is greater)
Roll / Pitch	
Dynamic accuracy ⁽²⁾	0.01 deg
Resolution	0.001 deg

Operating range / Environment

Operating / storage Temperature	-20 °C to +55 °C / -40 °C to +80 °C
Follow-up speed	Up to 750 deg/s
Acceleration dynamic range	±15 g
Heading / roll / pitch	0 to +360 deg / ±180 deg / ±90 deg
MTBF (computed/observed)	40,000 hours / 80,000 hours
No warm-up effects, insensitive to thermal shocks	
Shock and vibration proof	

Physical characteristics

Depth rating (m)	3,000
Material	Titanium
Weight (air / water) kg	15 / 6.2
Housing dimensions (Ø x H mm)	213 x 375
Connector	5 x SEACON MI-CON
Mounting	6 Ø 6.6 holes

Interfaces

Serial RS232 / RS422 port	5 inputs / 5 outputs / 1 configuration port
Ethernet port ⁽⁵⁾	UDP / TCP client / TCP server
Pulse port ⁽⁶⁾	3 inputs / 2 outputs
Sensors supported	GPS, speed log
Input / output formats	Industry standards: NMEA0183, ASCII, BINARY
Baud rates	600 bauds to 115.2 kbaud
Data output rate	0.1 Hz to 200 Hz
Power supply	24 VDC
Power consumption	< 20 W

(1) secant latitude = $1 / \cosine \text{ latitude}$ - (2) RMS values - (3) Smart Heave™ - (4) All input /output serial ports are available and can be duplicated on Ethernet ports - (5) Input of GPS PPS pulse for accurate time synchronization of Octans 3000 - (6) Maximum error = 3 or RMS error

Phins

FOG-based high-performance inertial navigation system

Phins is an inertial navigation system providing position, true heading, attitude, speed, depth and heave. Its high-accuracy inertial measurement unit is based on iXblue's fiber-optic gyroscope technology coupled with an embedded digital signal processor that runs an advanced Kalman filter.



FEATURES

- All-in-one high-accuracy 3D positioning with heading, roll and pitch
- FOG, unique strap-down technology
- Multiple aiding available:
(DVL, EM log, GPS, USBL, LBL and depth sensor)
- Compact, light and reliable
- Ethernet, web server (GUI)

BENEFITS

- High grade INS performance
- High reliability and maintenance free
- Ease of use and quick installation
- Perfectly silent
- Small power consumption
- Low latency
- Small power consumption

APPLICATIONS

Highly demanding civil or defense surface vessels or autonomous underwater vehicles

TECHNICAL SPECIFICATIONS

Performance

Position accuracy	
With GPS	Three times better than GPS
With USBL / LBL (subsea applications)	Three times better than USBL / LBL
With DVL	0.1% of traveled distance (CEP 50)
No aiding for 2 min / 5 min	3 m / 20 m (CEP 50)
Pure inertial mode	0.6 nm / hour (CEP 50)
Attitude accuracy	
Heading with GPS / USBL / LBL	0.01 deg secant latitude RMS ⁽¹⁾
Roll and pitch dynamic accuracy (no aiding)	0.01 deg RMS
Heave accuracy (Smart Heave) ⁽²⁾	2.5 cm or 2.5% RMS

Operating range/enviroment

Operating / storage temperature	-20°C to 55 °C / -40°C to 80 °C
Rotation rate dynamic range	Up to 750 deg/s
Acceleration dynamic range	± 15 g
Heading / roll / pitch	0 to +360 deg / ±180 deg / ±90 deg
MTBF	150,000 hours (System observed) 500,000 hours (FOG + Accelerometers)

Physical characteristics

Dimensions (L x W x H)	180 x 180 x 162 mm
Weight in air	4.5 kg
Waterproof	IP66

Interfaces

Serial	RS422 or RS232
Ethernet	100 MBit - UDP / TCP server / TCP client / web server (GUI)
Pulse	PPS, Trigger
Inputs / outputs	Configurable 7i / 5o - Pulse ⁽³⁾ 4i / 2o - Configuration port
Baud rates	Up to 460 kbaud
Data output rate	0.1 Hz to 200 Hz
Power supply / consumption	24 VDC (20 - 32 V) / < 20 W

(1) Secant latitude = 1/cosine latitude

(2) Whichever is greater for periods up to 30 seconds. Smart heave is delayed by 100 s fixed value
Real-time heave accuracy is 5 cm or 5% whichever is greater for period up to 25s.

(3) Use GPS PPS pulse for accurate time synchronization of Phins

Phins Subsea

FOG-based high-performance subsea inertial navigation system for deep water

Phins Subsea is a subsea inertial navigation system providing position, true heading, attitude, speed, depth and heave. Its high-accuracy inertial measurement unit is coupled with an embedded digital signal processor that runs an advanced Kalman filter.

Phins Subsea can be pre-assembled and pre-calibrated with a doppler velocity log version, making the system easy to install and ready to use for more precise navigation.



FEATURES

- All-in-one high-accuracy 3D positioning with heading, roll and pitch
- FOG, unique strap-down technology
- Multiple aiding sensors available: (DVL, USBL, LBL, RAMSES, GPS, depth sensor)
- Options: DVL or RAMSES easy coupling
- Ethernet, web server (GUI)

BENEFITS

- High grade INS performance
- High reliability and maintenance free
- Rugged design for water depths up to 6,000 m
- Ultimate sub-metric performance using sparse array transponders and on-the-fly calibration
- Ease of use and quick installation

APPLICATIONS

- AUV navigation
- Towfish navigation
- Metrology
- Precise positioning
- Out-of-straightness survey

TECHNICAL SPECIFICATIONS

Performance / Characteristics

Position accuracy⁽¹⁾	
With GNSS/USBL/LBL	Three times better than GNSS / USBL / LBL
DVL-Aided straight line performance	0.05 %TD (CEP 50)
DVL-aided optimal performances in typical conditions	0.01 %TD (CEP 50)
No aiding for 60s / 120s	0.06m / 0.3m (CEP50)
Heading accuracy⁽²⁾⁽³⁾	
With GNSS (or USBL/LBL) & DVL	0.010 deg secant latitude RMS
With GNSS or DVL or USBL/LBL	0.025 deg secant latitude RMS
Roll and pitch dynamic accuracy (no aiding)	0.01 deg RMS

Operating range / Environment

Operating / storage temperature	-20 to 55°C/-40 to 80°C
Rotation rate dynamic range	Up to 750° /Sec
Acceleration dynamic range	+/-30g
Heading /roll/ pitch ranges	0 to +360 deg / ±180 deg / ±90 deg
MTBF	150,000 hours (System observed) 500,000 hours (FOG + Accelerometers)
Robust to harsh environment, shock and vibration proof	Robust to harsh environment, shock and vibration proof
Depth rating	6,000 m

Physical Characteristics

Material	Titanium
Weight in air /water	23 / 13 kg
Mounting (Ø in mm)	6 Ø 6.5 holes
Dimensions (Ø x H in mm)	Ø 255 x 288 mm
Connector	3 x 12 pins, 1 x 19 pins, 1 x 26 pins SEACON

Interfaces

Sensors	GNSS / USBL / LBL / DVL / EMLOG / DEPTH / CTD / SVP
Serial	5 ports : RS422 or RS232
Ethernet	10/100 Mbits, UDP/TCP (client / server) / web server (GUI)
Pulse	3 inputs / 2 outputs
Input/ output	Configurable 7i / 5o Industry standards: NMEA, ASCII, IXBLUE STD BIN etc... more than 130 output protocols
Baud Rate	Up to 460 kbaud
Data output rate	0.1 Hz to 200 Hz
Power supply / consumption ⁽⁵⁾	24 VDC (20 - 32 V) / < 20 W

(1) Secant latitude = 1/cosine latitude

(2) Input GPS PPS pulse for accurate time synchronization of PHINS 6000

Quadrans

IMO grade gyrocompass & attitude reference system

Quadrans, is a fully strapdown gyrocompass and attitude reference system. **IMO and IMO-HSC** certified, it provides all the necessary data for demanding navigation and control applications. High customizability and Ethernet/Serial connectivity provides a very easy integration on any platform. Based on a state-of-the-art interferometric fiber-optic gyroscope technology (iFOG*), Quadrans does not require any maintenance during its unlimited service life. Quadrans is the ideal replacement for any mechanical gyro for whom is focused on total cost of ownership and maximizing availability and safety of their ships.



FEATURES

- Compact and plug & play system
- AHRS: All in one Gyrocompass & MRU
- Unique strap-down technology, interferometric FOG (iFOG*)
- Embedded Man Machine Interface (no proprietary CDU)
- IMO Certification
- Heave, Surge, Sway measurement

BENEFITS

- Fast settling time
- Maintenance-free
- Easy integration
- Stabilization and pointing capability
- Automatic speed and latitude correction
- Works in high sea state
- Allows restart at sea

Sea proven technology

Quadrans is based on a unique iFOG design* which has been in use in the **harshest environment for 15 years**.

From land application to space environment through all main European navies first ranks platforms.

Quadrans has been in use for 5 years in many **navies** (French, Chile, UK, Portugal,...) and multiple **DP operators**.

In addition, Quadrans has also been the obvious choice for most competitors in the **America's cup** and the **Vendée Globe**, proving its performances in any sea state and its reliability.

Reliability and through life cost

The **return of experience** on iXblue iFOG technology shows a **MTBF** of more than **150.000h**, without any kind of maintenance (neither on board nor with factory return), and a **life expectation** that have already proven to be superior to 15 years. All this combined makes Quadrans a true **install and forget** equipment with an unbeaten low cost through the life of your ship. As a token of our confidence, Quadrans comes with a **5 years warranty**.

An opened architecture

The Quadrans solution, as every iXblue product, is an opened architecture, ready to interface with any other component. It includes, in addition to standard NMEA, a large library of open source protocols, to give autonomy to the user in the integration of the Quadrans in the life of the ship.

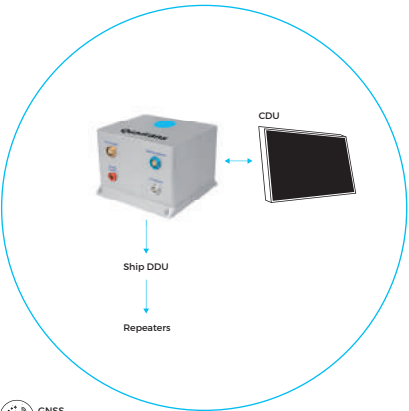
*discover more on iXblue iFOG on our website

contact@ixblue.com | www.ixblue.com
EMEA +33 1 30 08 88 88 | Americas +1 781 937 8800 | APAC +65 6747 4912

iXblue

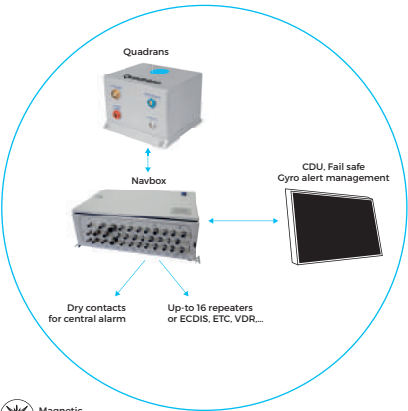
TYPICAL CONFIGURATIONS

Quadrans standalone configuration



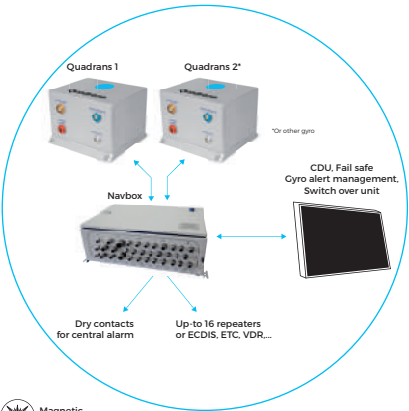
- GNSS
- Speed log

Gyro (with TMC or not) IMO approved configuration



- Magnetic compass
- GNSS
- Speed log

Dual Gyro with TMC IMO approved configuration



- Magnetic compass
- GNSS
- Speed log

REPEATERS



Digital Compass



Tape Compass



Steering



Pelorus Bearing



Rate of turn indicator

Other brands and models are available.

TYPE APPROVAL

	Quadrans	Navbox
	Quadrans has been approved by Bureau Veritas in accordance with Marine Equipment Directive (MED) and fulfills the following:	Quadrans + Navbox + Repeaters various configurations have a type approval certificate emitted by Bureau Veritas for the following:
MED	2014/90/EU	
IMO	A.424 (XI) - A.821 (19) - A.694 (17)	
ISO	ISO 8728 - ISO 16328	
MSC	MSC.36(63) - MSC.97(73) - MSC.191(79)	
IEC	IEC 60945 - IEC 61162-1 & -2	IEC 60945 - IEC 61162-1 & -2

TECHNICAL SPECIFICATIONS

Quadrans

Navbox

Dynamic & Static performances

Heading accuracy	0.15 deg secant latitude RMS ^(*)
Roll/Pitch accuracy	0.1 deg RMS
Settling time	< 30mn (all conditions) , 0.7° in 15mn
ROT	0.01 deg / sec
Heave	10 cm / 10% whichever is higher

Operating range/enviroment

Heading/Roll/Pitch	0 to +360 deg/±180 deg/±90 deg	
Latitude	+/- 85°	
Max Rate	250°/s	
Operating/Storage Temperature	-20°C to 55°C /-40°C to 80°C	-20°C to 55°C /-40°C to 80°C
Humidity	IP66	IP66

Physical characteristics

Weight	2.8kg	19kg
Dimensions (LxWxH)	160 x 160 x 113mm	600 x 417 x 235 mm
Connections	Fisher connectors	Cable Glands

Interfaces

Inputs ^(**)	2 inputs serial or Ethernet 1 configuration port	2 gyro input/1 magnetic compass / 3 aiding devices (GNSS, speed log,...)
Outputs ^(**)	2 ouputs serial and/or 5 on Ethernet	16 outputs serial / 8 outputs Ethernet
Pulse port	4 inputs and 2 outputs, 5V (TTL Level)	
Alerts		5 dry contacts
Input/Output formats	Industry standards: NMEA 0183, ASCII, BINARY	
Data output rate	0,1 Hz to 200 Hz	
Power supply	24 VDC (15 to 32VDC)	24 VDC (15 to 32VDC)
Power consumption	15 W	42 W

Support

MTBF	150.000 hours	40.000 hours
Warranty	5 years	1 year
Calibration interval	None required	None required

(*) Applicable for Quadrans with a manufacturing date after the 1st of December 2020 (included)

(**) All input/output serial ports are available and can be duplicated on Ethernet ports

Rovins Nano

Compact and cost effective
inertial navigation system
for ROV navigation

Rovins Nano merges the established high-grade iXblue inertial navigation system with our competitive IMU. It is built on iXblue's renowned FOG solid state technology and offshore instrumentation expertise. Rovins Nano offers the unbeatable stability and accuracy of the inertial position while simplifying the operation with its autonomous external sensor management. Rovins Nano is the navigation solution you can rely on, bringing an additional level of safety in case of deficient aiding sensors.



FEATURES

- True north, roll & pitch, rotation rates
- DVL & Depth sensor available as options
- Optimized interface with Ramses for extending operations
- Web GUI and legacy serial control commands
- Stand-alone, small and light weight

APPLICATIONS

- ROV OP & Navigation
- IRM
- MWSK
- Survey
- Dredging

BENEFITS

- Inertial position & velocity, available with and without DVL
- Open architecture; for all 3rd party sensors brands: DVL, USBL, LBL, Depth sensor ...
- Sparse Array enhancement to your existing LBL network
- Identical interfacing to Rovins, Phins, Octans
- ITAR-free, fast export under O&G regulations
- Cost effective: better ROI, lower TCO

TECHNICAL SPECIFICATIONS

Performance / Characteristics

Position accuracy⁽¹⁾	
With GNSS/USBL/LBL	Three times better than GNSS / USBL / LBL
DVL-Aided straight line performance	0.20 %TD (CEP 50)
DVL-aided optimal performances in typical conditions	0.04 %TD (CEP 50)
No aiding for 60s / 120s	0.6m / 2.2m (CEP50)
Heading accuracy⁽²⁾⁽³⁾	
With GNSS (or USBL/LBL) & DVL	0.10 deg secant latitude RMS
With GNSS or DVL or USBL/LBL	0.15 deg secant latitude RMS
Roll and pitch dynamic accuracy (no aiding)	0.05 deg RMS

Operating range / Environment

Operating / storage temperature	-20 to 55°C/-40 to 80°C
Rotation rate dynamic range	Up to 250° /Sec
Acceleration dynamic range	+/-5g
Heading /roll/ pitch ranges	0 to +360 deg / ±180 deg / ±90 deg
MTBF	150,000 hours (System observed) 500,000 hours (FOG + Accelerometers)
Robust to harsh environment, shock and vibration proof	Robust to harsh environment, shock and vibration proof
Depth rating	4,000 m

Physical Characteristics

Material	Titanium
Weight in air /water	10 / 5.5 kg
Mounting (Ø in mm)	8 Ø 6.5 holes
Dimensions (Ø x H in mm)	Ø178 x 266 mm
Connector	3 x 12 pins, 1 x 26 pins SEACON

Interfaces

Sensors	GNSS / USBL / LBL / DVL / EMLOG / DEPTH / CTD / SVP
Serial	5 ports : RS422 or RS232
Ethernet	10/100 Mbits, UDP/TCP (client / server) / web server (GUI)
Pulse	1 input for PPS
Input/ output	Configurable 7i / 5o, Industry standards: NMEA, ASCII, IXBLUE STD BIN etc... more than 130 output protocols
Baud Rate	Up to 460 kbaud
Data output rate	0.1 Hz to 200 Hz
Power supply / consumption ⁽⁵⁾	24 VDC (20 - 32 V) / < 14 W

(1) CEP, 50% Circular Error Probability, (2) Typical performances, dependent on external sensor characteristics, (3) RMS Values, (4) Secant Latitude= 1/Cosine Latitude, (5) ROVINS' own power consumption, not taking into account external sensors consumption, typical value @24V and ambient temperature.

Rovins

FOG-based high-performance
inertial navigation system
for subsea vehicles

Rovins is a combined survey-grade full featured inertial navigation system for water depths up to 3,000 m. Designed specifically for offshore survey and construction works, Rovins, thanks to its advanced Kalman filter, improves the efficiency of all operations where accurate position, heading and attitude are key benefits. Rovins is offered in stand alone or «DVL ready».



FEATURES

- All-in-one high-accuracy 3D positioning with heading, roll and pitch, ROT and 3D speeds
- Unique FOG strap-down technology
- Multiple interfaces (DVL, USBL, LBL, Ramses, GPS, depth sensor)
- Solution DVL Ready
- Octans footprint compatible
- Post-processing software option
- OEM version available (C5, see Phins Compact Serie)

APPLICATIONS

- ROV positioning
- Multibeam sonar
- Out-of-straightness
- Subsea construction

BENEFITS

- Accurate georeferenced position and attitude at high frequency
- High reliability and low maintenance
- Flexible and scalable configuration for all deployment scenarios and mission sequences
- Immediate availability for all vehicles
- Ultimate sub-metric performance using sparse array
- Outstanding image georeferencing

TECHNICAL SPECIFICATIONS

Performance / Characteristics

Position accuracy⁽¹⁾	
With GNSS/USBL/LBL	Three times better than GNSS / USBL / LBL
DVL-Aided straight line performance	0.1%TD (CEP 50)
DVL-aided optimal performances in typical conditions	0.02 %TD (CEP 50)
No aiding for 60s / 120s	0.2m / 0.6 m (CEP50)
Heading accuracy⁽²⁾⁽³⁾	
With GNSS (or USBL/LBL) & DVL	0.04 deg secant latitude RMS
With GNSS or DVL or USBL/LBL	0.07 deg secant latitude RMS
Roll and pitch dynamic accuracy (no aiding)	0.01 deg RMS

Operating range / Environment

Operating / storage temperature	-20 to 55°C/-40 to 80°C
Rotation rate dynamic range	Up to 750° /Sec
Acceleration dynamic range	+/-30g
Heading /roll/ pitch ranges	0 to +360 deg / ±180 deg / ±90 deg
MTBF	150,000 hours (System observed) 500,000 hours (FOG + Accelerometers)
Robust to harsh environment, shock and vibration proof	Robust to harsh environment, shock and vibration proof
Depth rating	3,000 m

Physical Characteristics

	Stand alone	«DVL ready»
Material	Titanium	Titanium
Weight in air /water	15 / 6.2 kg	29.2-32.6 / 13.6-16.3 kg
Mounting (Ø in mm)	6 Ø 6.5 holes	
Dimensions (Ø x H in mm)	Ø 213 x 375 mm	Ø 225-298 x 629 mm
Connector	3 x 12 pins, 1 x 19 pins, 1 x 26 pins SEACON	5 x SEACON

Interfaces

Sensors	GNSS / USBL / LBL / DVL / EMLOG / DEPTH / CTD / SVP
Serial	5 ports : RS422 or RS232
Ethernet	10/100 Mbits, UDP/TCP (client / server) / web server (GUI)
Pulse	3 inputs / 2 outputs
Input/ output	Configurable 7i / 5o, Industry standards: NMEA, ASCII, IXBLUE STD BIN etc... more than 130 output protocols
Baud Rate	Up to 460 kbaud
Data output rate	0.1 Hz to 200 Hz
Power supply / consumption ⁽⁵⁾	24 VDC (20 - 32 V) / < 18 W

(1) CEP: 50% circular Error Probability. DVL aiding position accuracy is dependent on DVL performances. - (2) RMS values - (3) Secant latitude = 1/cosine latitude - (4) Smart Heave™ - (5) Input of GPS PPS pulse for accurate time synchronization of ROVINS

ELECTRONICS & DEFENSE



BLUENAUTE®

ULTRA-HIGH RELIABILITY GYROCOMPASS, AHRS & INS

- Best value maintenance-free system
- Outstanding reliability
- Latest state-of-the-art HRG technology
- Immune to severe environmental conditions

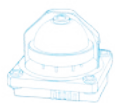


BLUENAUTE®

Ultra-high reliability gyrocompass, AHRS & INS

Capitalizing on Safran Electronics & Defense's 70-year experience in inertial technologies, BlueNaute® is a compact strap-down navigation system from AHRS to INS (including Gyrocompass system). Based on advanced HRG (Hemispherical Resonator Gyros), BlueNaute® is maintenance-free and its MTBF provides unrivalled operational availability.

Thanks to HRG performances, BlueNaute® widely exceeds IMO (International Maritime Organization) performances standards for marine gyrocompass and does not require GPS aiding to deliver full accuracy.



The HRG makes use of a miniature thin solid-state hemispherical shell which is driven to resonance. The gyroscopic effect is obtained from the inertial properties of standing waves inside the miniature shell. Thanks to its extreme simplicity and its low number of parts, HRG exhibits disruptive ultra-high reliability.

- Latest generation of maintenance free gyrocompass
- Non GPS dependent
- True strapdown technology
- Ultra robust system
- Unrivalled lifetime performance

Easy to integrate on any platforms, BlueNaute® is tailored for maritime operations

COMMERCIAL



SERVICE VESSELS



PARA MIL



Technical specifications

SWaP

- Size: 208 x 275 x 136mm
- Weight: < 4.7kg
- Power: < 28W under 24 VDC

Observed MTBF > 200,000 hours

Environments

- Operational : -20°C +60°C
- Shocks: 50g / 11ms
- Waterproofness: IP66
- IEC60945

Interfaces

- Ethernet
- RS422
 - 5 inputs
 - 8 outputs



IMO and IMO-HSC certified

Performances

	BlueNaute Compass	BlueNaute Premium	BlueNaute Titanium	BlueNaute Platinum
POSITION (TDRMS)				1Nm/1h
HEADING (seclat RMS)	0.4 deg	0.2 deg	0.08 deg	0.08 deg
ROLL & PITCH (RMS)	0.01 deg	0.01 deg	0.01 deg	0.01 deg
HEAVE/SURGE/SWAY		5 cm	5 cm	5 cm

Safran Electronics & Defense
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POWERED
BY TRUST

Safran Electronics & Defense
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92659 Boulogne-Billancourt Cedex - France
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safran-electronics-defense.com



ELECTRONICS & DEFENSE



NAVAL NAVIGATION SYSTEMS

A game changer for naval superiority



YOUR REQUIREMENTS INDEPENDANCE & DISCRETION

ALL YOUR MISSIONS
require precise navigation,
autonomy & endurance.

PRECISE NAVIGATION
IN AN ENVIRONMENT
WITHOUT LANDMARK

ACCURATE **WEAPON &
SENSORS** STABILIZATION

LONG **ENDURANCE**

ACCURATE & AUTONOMOUS
LOCALIZATION IN GNSS
DENIED ENVIRONMENT

NAVIGATION
SOLUTIONS INTEGRITY



70 YEARS OF EXPERIENCE
AS A MARKET LEADER



PERFORMANCE & RELIABILITY
AT YOUR SERVICE



TAILORED TO YOUR
REQUIREMENTS



COMBAT PROVEN



OPTIMIZED LIFE CYCLE COST

SAFRAN INERTIAL NAVIGATION SYSTEMS PORTFOLIO:
DESIGNED TO MEET THE REQUIREMENTS
OF ALL NAVAL PLATFORMS



HRG Crystal™ embedded



IMO Certified + Wheelmark

Product range
Position (TDRMS**)
Heading (° seclat RMS)
Roll & Pitch (° RMS)
MTBF
Heave/Surge/Sway

MARITIME			
BLUENAUTE®			
BLUENAUTE® COMPASS	BLUENAUTE® PREMIUM	BLUENAUTE® TITANIUM	BLUENAUTE® PLATINIUM
			1Nm/1h
0.4	0.2	0.08	0.08
0.01			
200,000 hrs			
5 cm			

SURFACE VESSELS*

ARGONYX™

ARGONYX™ SP	ARGONYX™ HP	ARGONYX™ XP
1Nm/4h to 1Nm/16h	1Nm/24h	1Nm/48h to 1Nm/72h
0.01		
0.01		
200,000 hrs		

SUBMARINES*

BLACK-ONYX™

BLACK-ONYX™ DUAL CORE

BLACK-ONYX™ SP	BLACK-ONYX™ HP	BLACK-ONYX™ XP	BLACK-ONYX™ DUAL CORE SP	BLACK-ONYX™ DUAL CORE HP
1Nm/4h to 1Nm/16h	1Nm/24h	1Nm/48h to 1Nm/72h	1Nm/96h	1Nm/120h
0.01				
0.01				
200,000 hrs				

* Subject to French export license approval
**Time Distance Root Mean Square (TDRMS)

ARGONYX™ FAMILY

ACCURACY & COST EFFECTIVENESS FOR SURFACE APPLICATIONS

- **Scalability:** from small patrol boats to aircraft carriers.
- **Operational efficiency:** accurate attitudes & precise localization for sensors stabilization & weapons employment, even in GNSS denied environments.
- **Reliability:** Argonyx™ offers the highest MTBF of the market, and is maintenance free thanks to HRG Crystal™.
- **Easy interchangeability** with Sigma 40.

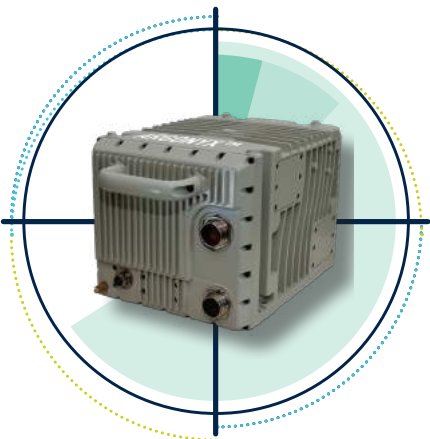
BLACK-ONYX™ FAMILY

TECHNOLOGICAL REVOLUTION FOR SUBMARINE APPLICATIONS

- **Submergibility & Autonomy:** Black-Onyx™ offers the highest autonomous navigation performance ever reached in the non strategic submarines market. With Black-Onyx™ Dual Core family those performances are multiplied, reaching navigation accuracies for the most submarines demanding applications.
- **Stealth:** totally silent inertial navigation systems.
- **Reliability:** Black-Onyx™ family offers the highest MTBF of the market and is maintenance free thanks to HRG Crystal™.
- **Easy interchangeability** with Sigma 40.

ARGONYX™

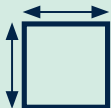


Trustful navigation



MTBF :
200,000 hrs
5 year warranty

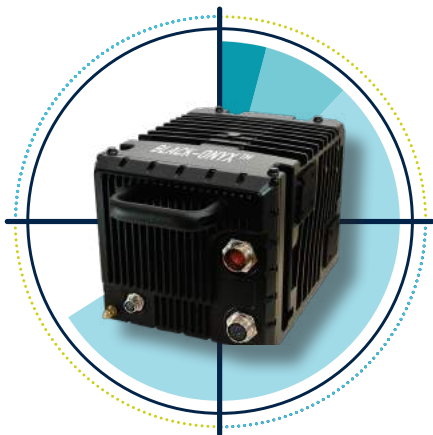


ITAR free

 Optimized architecture	 Flexible interfaces	 Full naval MIL SPEC certified
The world's lightest naval INS	New user friendly HMI ¹	Shock: MIL STD 810 & MIL S 901
Weight < 14 kg	Optimized interface with CMS ²	Vibration (w/o external dampers): IEC 60945 & MIL STD 167-1
Dimensions (mm) 253 x 262 x 414		Electromagnetic: MIL STD 461
Consumption < 25 W	Flexible interface library	Temperature: -15°C to +55°C (operation) -40°C to +70°C (storage)

BLACK-ONYX™

Unlimited autonomy



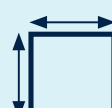


MTBF :
200,000 hrs
5 year warranty



ITAR free



Unrivalled submergibility performance

 Optimized architecture	 Flexible interfaces	 Full naval MIL SPEC certified
The world's lightest submarine INS	New user friendly HMI ¹	Shock: MIL STD 810 & MIL S 901
SWAP: Weight < 18 kg for Black-Onyx (< 25 kg for Dual Core)	Optimized interface with CMS ²	Vibration (w/o external dampers): IEC 60945 & MIL STD 167-1
Dimensions (mm) 253 x 262 x 414		Electromagnetic: MIL STD 461
Consumption < 25 W (<50 W for Dual Core) Strapdown, no moving parts Immune to magnetic stress Stealthy	Flexible interface library	Temperature: -15°C to +55°C (operation) -40°C to +70°C (storage T°C)

¹ Human Machine Interface
² Combat Management System

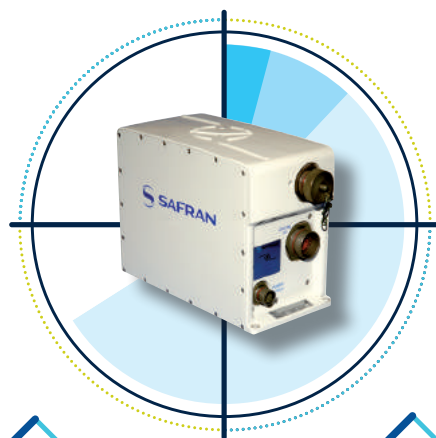
BLUENAUTE® FAMILY

COMPETITIVENESS FOR MARITIME OPERATIONS

- Best value maintenance free system.
- Outstanding reliability.
- Latest state of the art HRG technology.
- Immune to severe environmental conditions.

BLUENAUTE®

Robust & reliable
gyrocompass, AHRS & INS



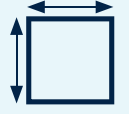


MTBF :
200.000 hrs



in house



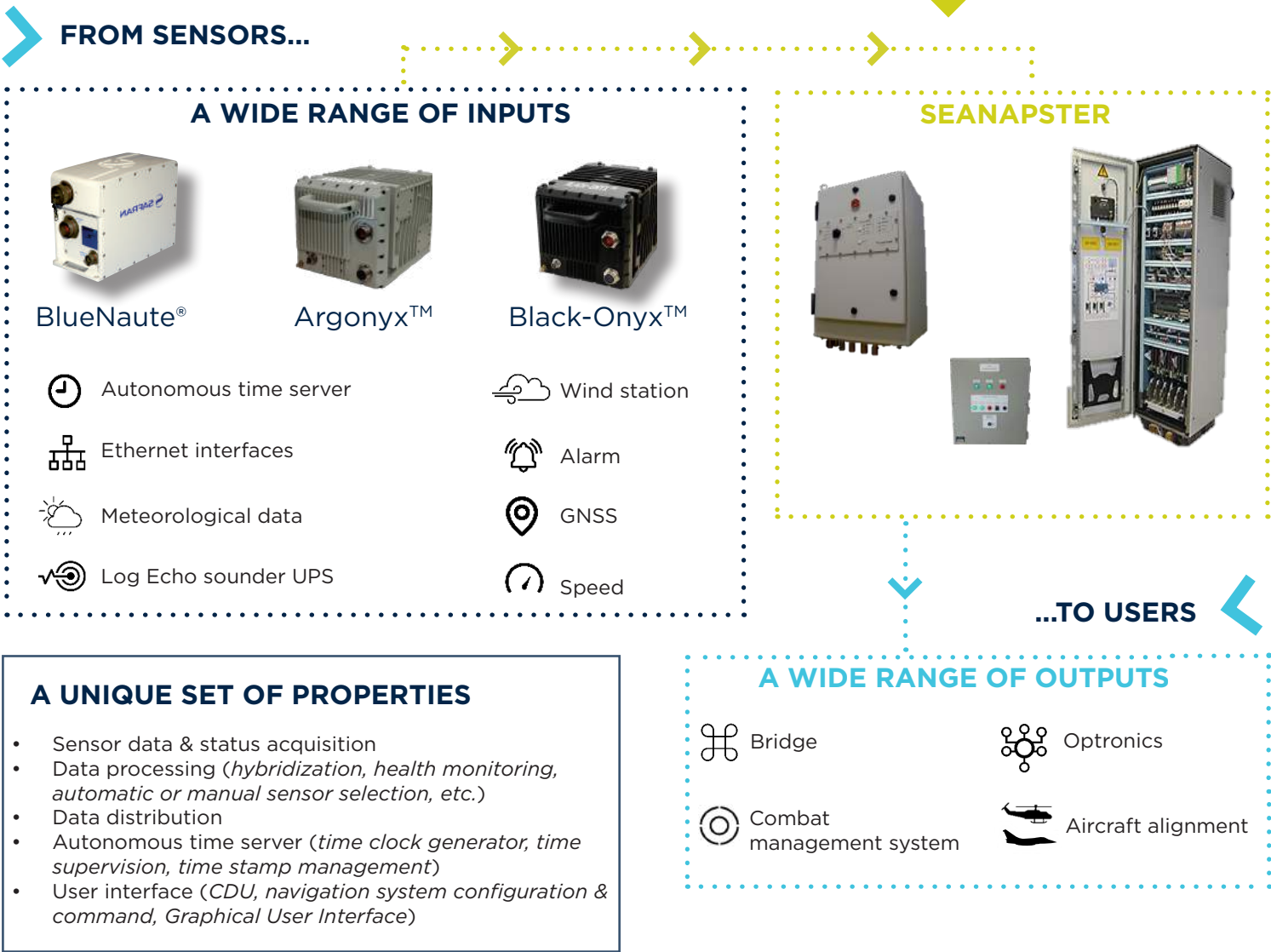
IMO & IMO HSC
certified

 Optimized architecture	 Robustness	 User friendly
Weight < 4.7 kg	Operational : -20°C to +60°C	COTS
Dimensions (mm) 208x275x136	Waterproofness : IP66	Easy installation
Consumption < 28 W		Maintenance free

DATA DISTRIBUTION & PROCESSING CENTER FAMILY

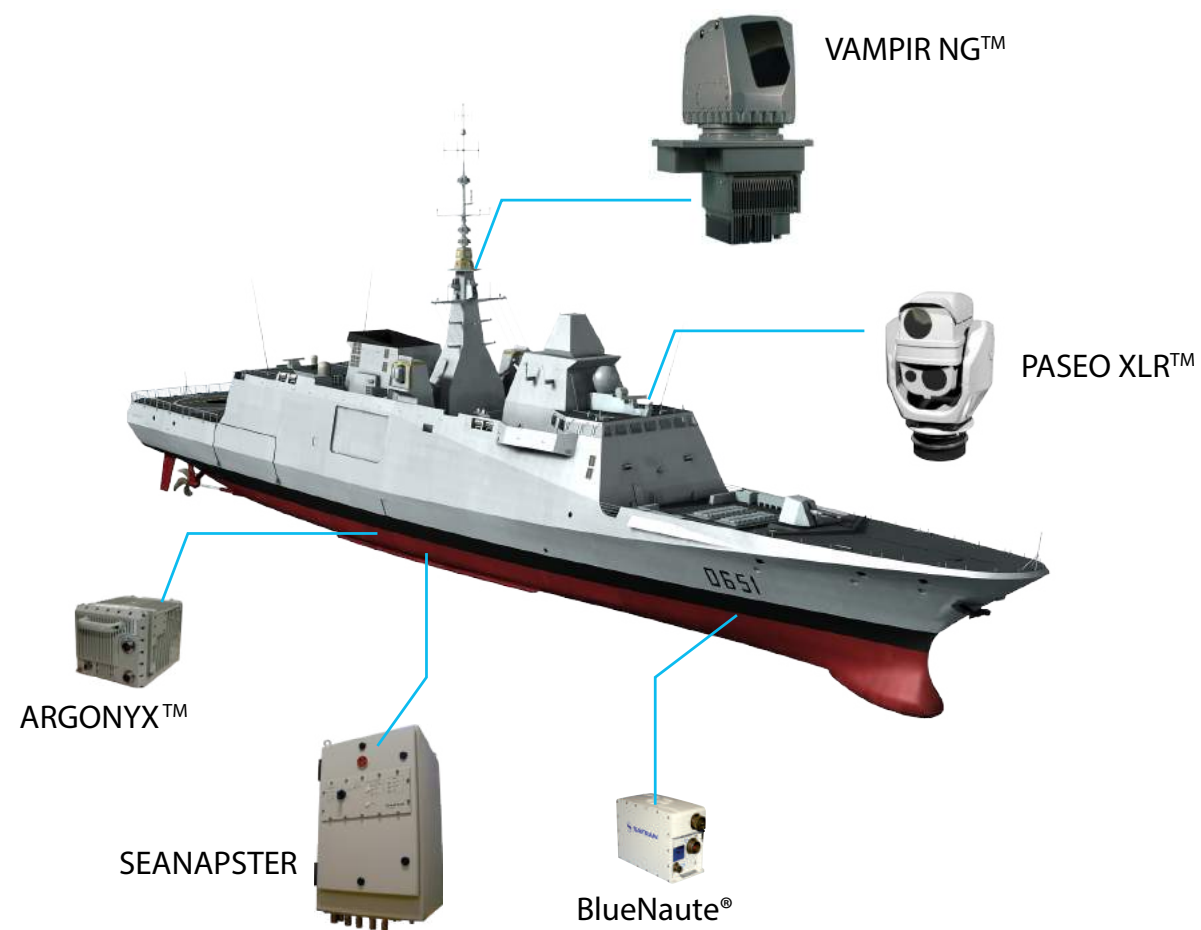
SMART DATA ANALYSIS FOR NAVAL APPLICATIONS

Extracting the right information from a growing volume of data available onboard is increasingly challenging and time-consuming. Always attentive to its customers and partners, Safran has worked hard to offer new robust and capable Data Distribution & Processing Center, able to take up this new challenge. Because many ships require bespoke information distribution solutions, Seanapster is able to suit a large panel of military ships from patrol boats to frigates and submarines, and collects, processes & prioritizes real time data from various sensors. Seanapster then distributes the consolidated information to the relevant systems across your ship.

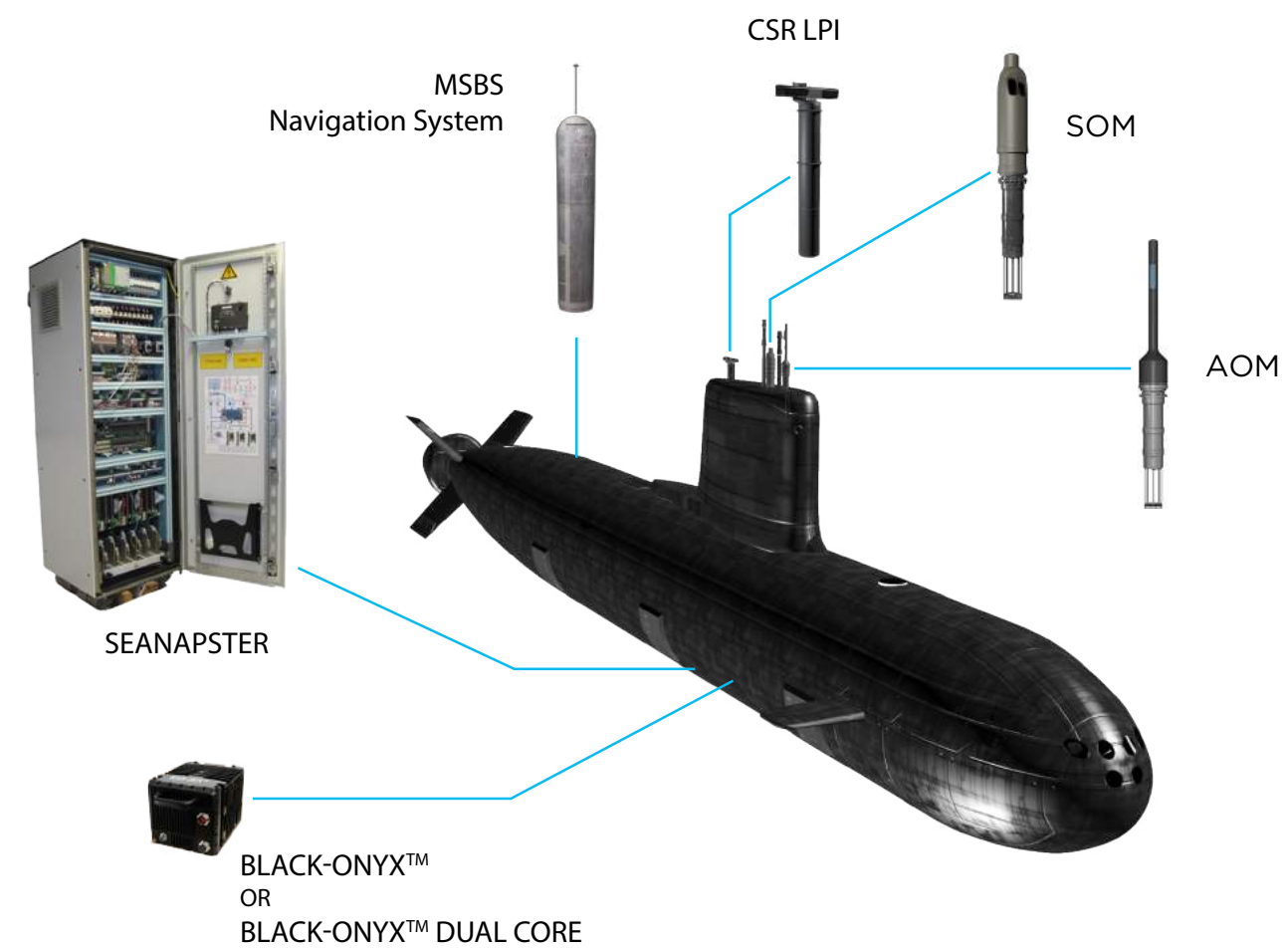


SAFRAN'S FULL SPECTRUM OF NAVIGATION SYSTEMS FOR COMBAT MISSIONS SUCCESS

FROM SURFACE
VESSELS



TO
SUBMARINES



OUR SUPPORT SOLUTIONS

Thanks to HRG Crystal™ reliability, Argonyx™, Black-Onyx™ and Black-Onyx™ Dual Core families have the best life-cycle costs on the market. This allows Safran to propose innovative support solutions that will boost your vessels and submarines' availability rate.

Safran offers flexible training programs and cost effective service support to assist you in your operations.



SIGMA 40, MAINTAINING THE NAVAL INS REFERENCE

For decades, Sigma 40 has been the world reference in naval applications. Safran will keep manufacturing and supporting Sigma 40 in order to meet costumers' requirements.

Since flexibility is part of Safran's culture, interchangeability between Sigma 40 and Argonyx™ & Black-Onyx™ is ensured to provide customers a wide range of options and prepare the integration of the disruptive new Inertial Navigation Systems families.

OUR NAVAL REFERENCES

40 navies equipped with Safran's inertial systems worldwilde



Datasheet

Lodestar Subsea AHRS



Description

Lodestar is a solid-state Attitude and Heading Reference System (AHRS) highly optimised for cost, size, weight, and power (C-SWaP).

The instrument is a turn-key solution comprised of carefully selected high-grade and highly reliable inertial sensors integrated into a Sonardyne in-house designed inertial measurement unit (IMU).

The selected inertial sensors are the standard for commercial aviation with a proven 20+ year track record. These sensors have a highly desirable characteristic being insensitive to vibration, temperature changes and having very limited initial errors. The result is a system which is highly suitable for the marine environment where performance, robustness and data integrity need to be available from initialisation, even during the harshest conditions.

Lodestar requires no external aiding and settles robustly in dynamic conditions in less than 5 minutes.

On-board data storage and backup battery functionality ensures continued operation and eliminates the risk of data-loss even if communications or external power is lost.

Power-pass through to external aiding sensors is supported to ease integration requiring only a single cable for comms and power.

If a full INS solution is required, the Lodestar can easily be field upgraded to a SPRINT system.

This makes the Lodestar a flexible and future proof solution for both ROV guidance and survey applications.

Lodestar has a proven track record spanning more than 10 year in the field in diverse applications from ROV guidance and autopilot to demanding survey applications.

The instrument is available in 4,000 and 6,000 metre depth ratings with a variety of connector options and configurations.

Applications Include

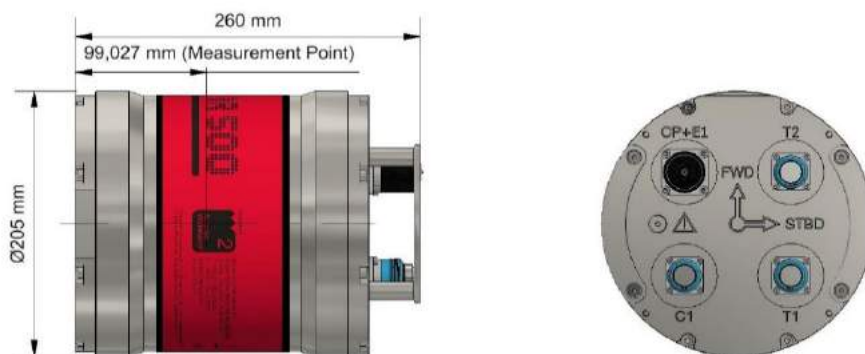
- ROV Control & Guidance
- Offshore construction

Key Features

- Turn-key solution for motion sensor and gyrocompass
- Up to 0.08 ° heading accuracy
- 0.01° roll and pitch accuracy
- 5 minute AHRS settling time
- Fast follow up speed of 900°/sec
- MTBF inertial sensors (gyros and Accelerometers) > 400,000 hours
- Choice of depth ratings: 4,000 and 6,000 metres
- Choice of connectors: Seacon (standard) or Seacnet® (for use with FMC Schilling Robotics ROV)
- Transport approved rechargeable lithium battery back-up as standard
- 8 GB internal memory allows post processing and remote diagnostics
- Ethernet and serial interfaces
- Export is not ITAR controlled
- Lodestar AHRS can be remotely upgraded to SPRINT INS

Specifications

Lodestar Subsea AHRS



Performance	Lodestar 300	Lodestar 500	Lodestar 700
Heading	0.2°	0.1°	0.08°
AHRS Settle Time	<5 minutes in dynamic conditions		
Roll and Pitch	0.01°		

Power

Power Requirement	20–50 V dc, 15 W nominal, 35 W max
Power Pass Through	3 x for external aiding sensors (up to 3A per sensor)
Back Up Battery Type/Life	Li-ion/5 minutes

Data/Comms

Data Storage	8 GB internal memory
Serial Ports/Protocol	4x RS232 or RS485
Other Ports	1 x Ethernet, 4 Triggers
Output Rate	Up to 100 Hz
Output Telegrams ¹	Industry standard AHRS/INS telegrams including acceleration and rotation rates

Mechanical

Connectors options	4 x Seacon / Seacnet® 1 x Seacon / Seacnet®
Mechanical Construction	Titanium
4,000 m (Seacon)	Ø205 x 260 mm
6,000 m (Seacon)	Ø205 x 280 mm
4,000 m (Seacnet)	Ø205 x 250 mm
Weight in Air	4,000 m 18.5/11.5 kg
/Water ²	6,000 m 22/14 kg

Environmental

Depth Rating	4,000/6,000 metres
Temperature	-20 to +55°C (operating), -20 to +60°C (storage)
Shock Rating	22 g, 11 ms half sine

¹ Specific outputs may be limited below quoted performance for reasons of export classification and control and should not be used as IMU data.

² Estimated Weights

Datasheet

Lodestar-Nav 200

All-in-one Subsea Navigation



Description

Lodestar-Nav 200 provides all-in-one navigation for subsea vehicles and survey operations by combining solid state Attitude Heading Reference System (AHRS), a Syrnix Doppler Velocity Log (DVL) and a high accuracy pressure sensor in a single housing. The Lodestar-Nav is upgradable to SPRINT-Nav Acoustically Aided Inertial Navigation System [AAINS].

The unit is comprised of three high grade, high reliability, commercially available, Ring Laser Gyros (RLG) and accelerometers. The sensors are also the standard for commercial aviation with a proven 15+ year track record. It is also fitted with a Syrnix DVL that provides a large altitude range and high precision at all altitudes; this combines the best of 300 and 1200 kHz DVLs.

All onboard sensors are optimally integrated to provide seamless operation and unprecedented levels of performance compared with standalone instruments from different vendors.

The unit requires no calibration for all

but the most demanding applications with ultra-tight mechanical alignment.

The Lodestar 200 AHRS provides heading, pitch, roll accuracy and settle time that is class leading in the low-cost north seeking subsea AHRS category. It requires no external aiding and can settle in <15 minutes or less in dynamic conditions.

Syrnix DVL utilises both Doppler and Correlation technology to gain performance advantages in environments where each technology is best suited. Each DVL transducer is fitted with a full depth rated water block to ensure protection of the internal components.

Lodestar-Nav can be interfaced via a single connection and/or the DVL can be interfaced separately depending on requirements. Continuous on-board data storage supports post-mission diagnostics and post-processing.

Applications Include

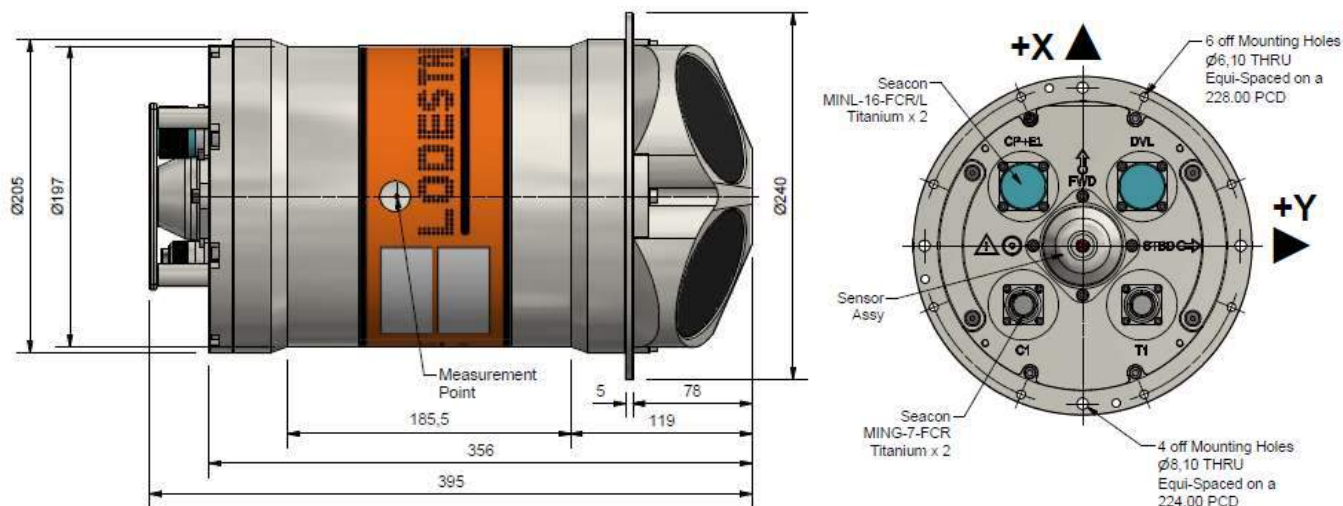
- Ideally suited for Station-Keeping applications of ROVs and Hover Capable AUVs
- Manned submersibles
- Survey and construction

Key Features

- All-in-one subsea navigation
- Lodestar-Nav provides AHRS and DVL output capability for multi-use
- 0.4° (Lodestar)secant latitude heading accuracy
- 0.01° roll and pitch accuracy
- <10 minute AHRS settling time
- Small form factor – easier mounting
- Proven long life inertial sensors from trusted long term US supplier
- Remote diagnostics and performance verification using on-board logging
- Lodestar-Nav AHRS can be remotely upgraded to SPRINT-Nav INS providing commercial and operational flexibility
- Class leading 600 kHz DVL combining the benefits of 300 and 1200 kHz instruments in one
- Fully water blocked DVL endcap protecting internal electronics
- 0.01% full scale removable pressure sensor module
- 0.4–175 m DVL operating range
- Choice of depth ratings: 4,000 and 6,000 metres

Specifications

Lodestar-Nav 200



Features		Lodestar-Nav 200 (4,000)	Lodestar-Nav 200 (6,000)
Depth Rating		4,000 metres	6,000 metres
Size (Diameter x Length)		Ø240 x 395 mm	Ø240 x 405 mm
Weight in Air/Water*		23.9/13.1 kg	28.1/17.2 kg
Mechanical Construction		Titanium	Titanium
Connectors		2 x Seacon (MING-7-FCR)/2 x Seacon (MINL-16-FCL/L)	
Performance			
AHRS	AHRS Heading Accuracy (Secant Latitude)	0.4°	
	AHRS/INS Roll and Pitch Accuracy	0.01°	
	AHRS/INS Settle Time	<10 minutes in dynamic conditions (AHRS)	
DVL	DVL Bottom Velocity	±0.22 cm/s	
	DVL Min/Max Altitude	0.4/175 m	
	DVL Long Term Accuracy	±0.12% ±0.1 cm/s	
	DVL Velocity Range	>10 m/s	
	Minimum/Maximum Altitude	0.4/175 m	
	Velocity Resolution	0.01 cm/s	
Pressure Sensor		0.01% FS removable module	
Upgrades			
Lodestar-Nav 200 AHRS can be remotely upgraded to SPRINT-Nav 300 INS			
Data/Comms			
Onboard Data Storage	AHRS 8 GB/ DVL 32 GB		
Digital Ports/Protocol	up to 4 digital ports/RS232 or RS485		
Other Ports	2 x Ethernet, 4 Triggers		
Output Rate	Up to 100 Hz (AHRS), Up to 25 Hz (DVL), Up to 15 Hz (pressure)		
Output Telegrams	Industry standard AHRS/DVL/pressure telegrams including acceleration/rotation rates and temperature**		
Environmental			
Operating Temperature	-5 to 50°C		
Storage Temperature	-25 to 55°C		
Shock Rating	22 g, 11 ms half sine		
Power			
Power Requirement	20–50 V dc, 27 W nominal, 63 W max		
Power Pass Through	2 x for external aiding sensors (up to 3A per sensor)		
INS Battery Type/Life	Li-ion/5 minutes		

*Estimated Weights

**Specific outputs may be limited below quoted performance for reasons of export classification and control and should not be used as IMU data.

Datasheet

SPRINT Subsea INS



Description

SPRINT is an Aided Inertial Navigation System (AINS) highly optimised for cost, size, weight, and power (C-SWaP).

The instrument is a turn-key solution comprised of carefully selected high-grade and highly reliable inertial sensors integrated into a Sonardyne in-house designed inertial measurement unit (IMU).

The selected inertial sensors are the standard for commercial aviation with a proven 20+ year track record. These sensors have a highly desirable characteristic being insensitive to vibration, temperature changes and having very limited initial errors. The result is a system which is highly suitable for the marine environment where performance, robustness and data integrity need to be available from initialisation, even during the harshest conditions.

SPRINT's dual AHRS & INS algorithm capability is unique in the market and allows for automatic on-board integrity checking between algorithms as well as having instantaneous INS start up with north alignment from the on-board AHRS. This capability allows for simultaneous use from one instrument, e.g. AHRS plus DVL for ROV piloting

and INS plus DVL for survey operations.

Internal battery backup provides continuous on-board navigation and data storage supporting post-mission diagnostics and post-processing, even throughout brownout periods.

SPRINT INS interfaces to aiding sensors such as USBL, DVL, pressure sensor and sound speed.

Power-pass through to aiding sensors is supported to ease integration enabling the SPRINT to be interfaced using a single connection.

SPRINT has a proven track record spanning 10 years in the field in diverse applications from ROV guidance and autopilot to demanding survey applications such as multibeam Out-Of-Straightness surveys and sparse-LBL using tightly coupled 6G acoustics.

The instrument is available in 4,000 and 6,000 metre depth ratings and as an OEM version and is one of the smallest form factor subsea inertial instruments available.

Applications Include

- Vehicle guidance & control
- Station keeping and autopilot including mid-water applications

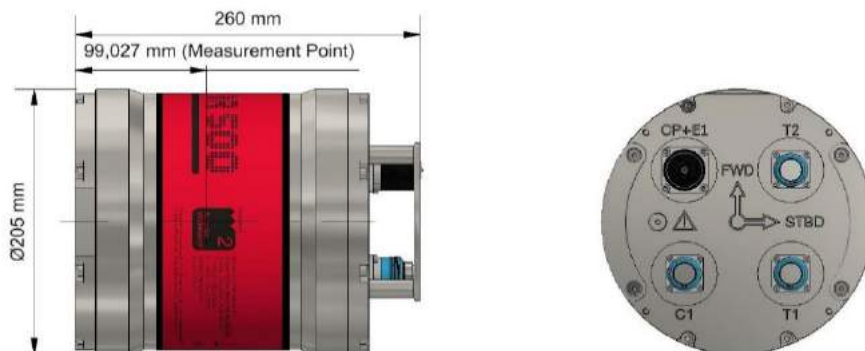
- USBL aided INS survey
- DVL aided relative navigation
- AUV's
- ROV and tow fish positioning
- Hydrographic survey
- Offshore construction
- As-laid and out of straightness
- Multibeam survey
- Touchdown monitoring
- Structure placement

Key Features

- Turn-key solution for motion sensor, gyrocompass and INS
- SPRINT provides concurrent AHRS and INS capability for dual use
- Fast follow up speed of 900°/sec
- Choice of depth ratings: 4,000 and 6,000 metres
- Choice of connectors: Seacon (standard) or Seanet® (for use with FMC Schilling Robotics ROV)
- Transport approved rechargeable lithium battery back-up as standard
- 8 GB internal memory allows post processing and remote diagnostics
- Export is not ITAR controlled
- Ethernet and serial interfaces

Specifications

SPRINT Subsea INS



Performance	SPRINT 300	SPRINT 500	SPRINT 700
Heading	0.05° Secant Latitude	0.04° Secant Latitude	0.02° Secant Latitude
INS initialisation	Instantaneous		
Roll and Pitch	0.01°		
INS Aiding Supported	USBL, Depth, DVL, Zero Velocity, Manual Position, LBL, GNSS		
USBL/LBL Aided	3x precision improvement	3.5x precision improvement	4.5x precision improvement
USBL/LBL and DVL Aided	3 to 7 x precision improvement	4 to 10 x precision improvement	6 to 13 x precision improvement
LBL/DVL Aided	3 cm confined area, 20 cm wide area (dynamic)		
DVL Aided ^{1, 2}	Typical Survey	0.05%	0.02%
	Distance From Origin	0.15%	0.08%
DVL Aiding Loss/Drift ¹	1.2 m over 1 min, 5 m over 2 mins	0.8 m over 1 min, 3.2 m over 2 mins	<0.5 m over 1 min, 2 m over 2 mins
Station Keeping	<1 m over 24 hours (Syrinx DVL)		

Power

Power Requirement	20–50 V dc, 15 W nominal, 35 W max
Power Pass Through	3 x for external aiding sensors (up to 3A per sensor)
Back Up Battery Type/Life	Li-ion/5 minutes

Data/Comms

Data Storage	8 GB internal memory
Serial Ports/Protocol	4x RS232 or RS485
Other Ports	Ethernet, 4x Triggers
Output Rate	Up to 100 Hz

Mechanical

Connectors options	4 x Seacon / Seanet® 1 x Seacon / Seanet®
Mechanical Construction	Titanium
4,000 m (Seacon)	Ø205 x 260 mm
6,000 m (Seacon)	Ø205 x 280 mm
4,000 m (Seanet)	Ø205 x 250 mm
Weight in Air/	4,000 m 18.5/11.5 kg
Water ³	6,000 m 22/14 kg

Environmental

Depth Rating	4,000/6,000 metres
Temperature	-20 to +55°C (operating), -20 to +60°C (storage)
Shock Rating	22 g, 11 ms half sine

¹ CEP50 (Assumes use of a high performance DVL such as the Sonardyne Syrinx 600)

² SPRINT-Nav performance achievable by co-locating with Syrinx DVL

³ Estimated Weights

Datasheet

SPRINT-Nav



Description

SPRINT-Nav is the world's highest performing all-in-one hybrid navigator for all subsea vehicles and survey operations and is available in two frequencies: 600 kHz or 400 kHz for higher altitude tracking.

The SPRINT-Nav is a turn-key solution combining carefully selected inertial sensors, a Syrinx Doppler Velocity Log (DVL) and a high accuracy pressure sensor into a single housing.

The result is not only the highest performing hybrid navigator but also one of the smallest navigation instruments on the market.

All onboard sensors are optimally integrated to provide seamless operation and unprecedented levels of performance compared with standalone instruments from different vendors.

The unit comes pre-calibrated and requires no additional calibration to achieve unprecedented performance with minimal operational complexity.

SPRINT-Nav's inertial dual AHRS & INS algorithm capability is unique in the market and allows for automatic on-board integrity checking between algorithms as well as instantaneous INS start up with North alignment from the on-board AHRS. This capability allows for simultaneous use from one instrument,

e.g. AHRS plus DVL for ROV piloting and INS plus DVL for survey operations.

Tight beam-level DVL aiding for the on-board INS with optimal timing and use of proprietary QC metrics provides higher performance and more reliable navigation in demanding bottom-lock environments. Furthermore, the tight integration also enables unconventional mounting arrangements, i.e. tilting the SPRINT-Nav, enabling vehicle integration previously not possible.

Each DVL transducer is fitted with a full depth-rated water block to ensure protection of the internal components. Combined with beam level aiding the SPRINT-Nav will continue to function even if one of the DVL transducers has been damaged.

SPRINT-Nav can be interfaced using a single connection and/or the internal sensors can be interfaced separately depending on requirements.

Internal battery backup provides continuous on-board navigation and data storage supporting post-mission diagnostics and post-processing, even throughout brownout periods.

Export of SPRINT-Nav is simplified as compared to other separate DVL and INS units. For example, shipping from outside the USA does not require a re-export licence.

Applications

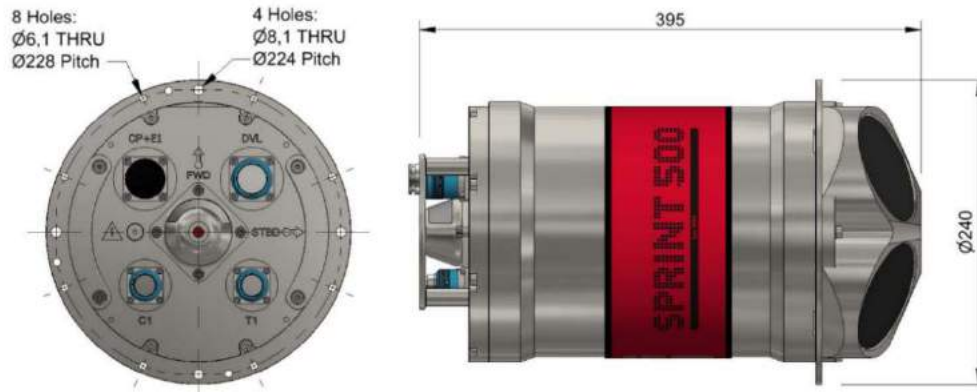
- Any subsea vehicle including AUV, AIV, ROV, Towfish & ROTV
- Ideally suited for autonomous and resident vehicles
- Survey and construction

Features

- World's highest performing hybrid navigator
- All-in-one turn-key solution
- Dual concurrent AHRS, INS and DVL output capability for multi-use
- Instantaneous INS initialisation from AHRS with no alignment procedure required
- Dual AHRS & INS algorithms enabling internal health check of orientation
- Proven long life and high MTBF inertial sensors from trusted long-term US supplier
- Remote diagnostics and performance verification
- Fully water blocked DVL endcap protecting internal electronics
- Two DVL Frequencies available: 600 kHz or 400 kHz HA (High Altitude)
- Export is not ITAR controlled

Specifications

SPRINT-Nav



Performance		SPRINT-Nav 300	SPRINT-Nav 500	SPRINT-Nav 700
DVL Aided ¹	Typical Survey	0.04%	0.02%	0.01%
	Distance from Origin	0.12%	0.07%	0.05%
	High Altitude Option (HA) ²	0.12%	0.08%	0.06%
Altitude	Standard		0.4 m / 175 m	
Min / Max	High Altitude Option (HA) ²		0.4 m / 230 m	
USBL & DVL Aided	Precision Improvement	Better than 3 times	Better than 4 times	Better than 6 times
Station Keeping		<1 m over 24 hours	<1 m over 24 hours	<1 m over 24 hours
LBL/DVL Aided		3 cm confined area, 20 cm wide area (dynamic)		
INS/AHRS Heading (Secant Latitude)		0.05° (INS)	0.04° (INS)	0.02° (INS)
		0.20° (AHRS)	0.10° (AHRS)	0.08° (AHRS)
AHRS/INS Roll and Pitch			0.01°	
Pressure Sensor			0.01% FS removable module	
ADCP	Profiling Range	Standard	0.4–80 m	
		HA ²	0.4–120 m	
	Vel Range & RMS (along beam)		Up to ±11.2 m/s ±0.4% of measured value	
	Maximum Number of Cells		255	
	Maximum Ping Rate		4 Hz (ADCP) or 2.5 Hz (DVL+ADCP)	
Power				
Power Requirements			20–50 V dc, 15 W nominal, 35 W max	
Internal Battery Backup			Li-ion/5 minutes	
Physical / Comms				
Data Storage			8 GB internal memory	
Serial Ports/Protocol			4x RS232 or RS485	
Other Ports			Ethernet, 4 Triggers	
Construction			Titanium	
Diameter x Height (incl connectors and mounting ring)	4,000 m		Ø240 x 395 mm	
	6,000 m		Ø240 x 405 mm	
Weight Air/Water ³	4,000 m		23.9/13.1 kg	
	6,000 m		28.1/17.2 kg	
Environmental				
Depth Rating			4,000/6,000 m	
Operating Temperature			-5 to 50°C	
Storage Temperature			-25 to 55°C	

¹ CEP50

² High Altitude DVL 400 kHz

³ Estimated Weights

Datasheet

SPRINT-Nav Mini



SPRINT-Nav Mini 300 m



SPRINT-Nav Mini 4,000 m

Description

SPRINT-Nav Mini is the world's smallest hybrid acoustic-inertial navigator. Built on years of experience with the SPRINT-Nav, it is designed to provide precise and robust orientation, velocity, altitude and depth updates for unmanned maritime systems, remotely operated vehicles and manned submersibles.

The SPRINT-Nav Mini combines carefully selected inertial sensors, a Syrinx Mini Doppler velocity log (DVL) and a high accuracy pressure sensor into a single housing and is optimised for size, weight and power consumption. It replaces separate attitude heading reference system (AHRS), DVL and depth sensors. Like all SPRINT-Nav products, the SPRINT-Nav Mini uses information from all the sensors optimally to provide seamless operation and unprecedented levels of performance compared with standalone instruments. SPRINT-Nav Mini comprises highly accurate gyroscopes and accelerometers which are not affected by magnetism and provides a true north seeking gyrocompass.

Tight integration with the DVL and pressure sensor enables

SPRINT-Nav Mini to provide velocity, depth and altitude which is free from noise and immune to short term DVL acoustic outages. Being able to provide these messages, including quality metrics, at a constant output rate of up to 200 Hz drastically improves vehicle control.

SPRINT-Nav Mini is supplied with two connectors making retrofitting into existing control systems simple.

The compact form factor is significantly smaller and lighter than any other combination providing orientation, velocity, altitude and depth information available in the market.

The unit comes pre-calibrated and requires no additional calibration offering minimal operational complexity.

The SPRINT-Nav Mini provides a single message containing all the information typically required for vehicle guidance and control reducing complexity of integration and operation.

It offers an easy to use Web UI which provides an intuitive dashboard viewer as well as configuration and detailed status pages for integration and troubleshooting.

Applications

- Ideal for observation-class ROVs, light work-class ROVs, USVs, manned submersibles and diver navigation boards
- Ideally suited for ROV control and guidance

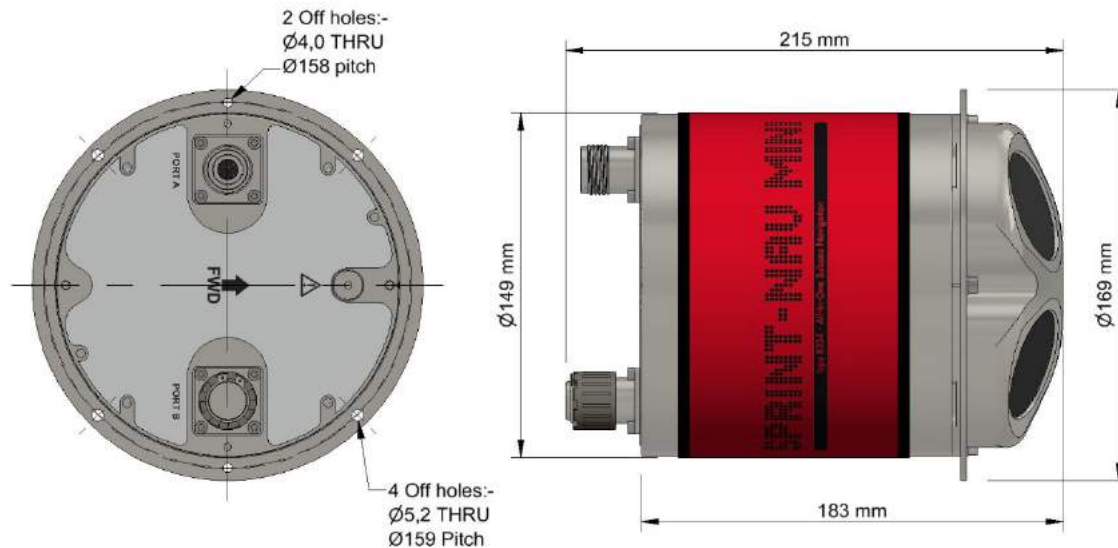
- True North seeking

Features

- World's smallest hybrid acoustic-inertial navigator
- Minimal sensitivity to vehicle dynamics or wave motion
- All-in-one turn-key solution
- Highly optimised size, weight and power
- 300 m and 4,000 m variants
- Concurrent orientation, velocity, altitude and depth output
- Fixed frequency, continuous and robust vehicle control and guidance outputs
- Factory calibrated
- 500 kHz DVL
- 0.3–200 m bottom track operating altitude
- Intuitive Web UI
- Export is not ITAR controlled

Specifications

SPRINT-Nav Mini



SPRINT-Nav Mini 4,000 Shown Above

Performance		Type 8334-0712 (300 m)	Type 8334-4512 (4,000 m)
Heading Accuracy ¹			0.5° (sec lat)
Pitch Roll Accuracy ¹			0.1°
Angular Rate Range			$\pm 450^\circ/\text{s}$
Angular Rate Precision ¹			$< 0.01^\circ/\text{s}$
Velocity Precision ^{1, 2} (<2 m/s at 50 m altitude)			$< 0.4 \text{ cm/s}$
Altitude Range			0.3 m to 200 m
Altitude Precision ^{1, 2}			$< 1 \text{ cm}$
Altitude Accuracy ¹			$< 1\%$
Depth Range			0 to 4000 m
Depth Precision ^{1, 2}			$< 0.2 \text{ cm}$
Depth Accuracy ¹			0.1% FS
Power			
Power Requirements			24 V dc, 10 W nominal
Physical / Comms			
Interface	Ethernet Serial Trigger		UDP/TCP, WebUI 3x RS232 2 x trigger inputs (1PPS/DVL trigger) 200 Hz (user selectable)
Data output rate			
Construction		POM-C	Titanium
Housing Diameter x Height (including connectors)		$\varnothing 149 \times 215 \text{ mm}$	$\varnothing 149 \times 215 \text{ mm}$
Weight Air/Water ³		3.6/0.7 kg	7.1/4.2 kg
Environmental			
Depth Rating		300 m	4,000 m
Operating Temperature			-5 to 50°C
Storage Temperature			-25 to 55°C

¹ Standard Deviation

² Precision/noise, dynamic performance, robust configurable rate enhanced or enabled by hybrid integration

³ Estimated Weights