

Phins

FOG based high-performance inertial navigation system

Phins is an Inertial Navigation System (INS) providing position, true heading, attitude, speed, depth and heave. Its high-accuracy inertial measurement unit is based on Exail's Fiber-Optic Gyroscope (FOG) technology coupled with an embedded digital signal processor that runs an advanced Kalman filter.



FEATURES & BENEFITS

- IMO certified navigation gyro
- All-in-one high-accuracy 3D positioning with heading, roll and pitch
- Compact, light and reliable
- FOG unique strap-down technology
- Multiple aiding available:
DVL, EM log, GPS, USBL, LBL and depth sensor
- Ethernet, web server (GUI)
- NTP synchro capability
- IMU option for high accuracy platform stabilization
- Low latency
- Static and dynamic alignment modes, with and without GNSS
- 4Gb embedded data logger
- Versatile I/O options for an easy integration
- High reliability and maintenance free
- No ITAR component inside
- 24/7 worldwide technical assistance

APPLICATIONS

- Highly demanding civil or defense vessels
- Underwater vehicles

TECHNICAL SPECIFICATIONS

Performance

Heading ⁽¹⁾ (°)	0.01
Roll & Pitch ⁽²⁾ (°)	0.01
Heave/Smart Heave ⁽³⁾	5 cm or 5% / 2 cm or 2%

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)

Operating range/Environment

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
MTBF	150,000 hours (System observed) 500,000 hours (FOG + Accelerometers)
Heading/roll/pitch	0 to +360 deg / ±180 deg / ±90 deg
Shocks	27g / 15ms damper shocks

Physical characteristics

Dimensions (L x W x H)	180 x 180 x 162 mm
Weight in air	5.5 kg
Material	Aluminum

Interfaces

Serial	RS422 or RS232
Ethernet	100 Mbit - UDP / TCP server / TCP client / web server (GUI) / NTP synchro
Pulses	PPS input for < 100µs time synchronization
Inputs/outputs	Configurable 7i / 5o - Pulses 4i / 2o - Configuration port
Baud rates	Up to 460 kbaud
Data output rate	0.1 Hz to 200 Hz real measurements
Power supply/consumption	24 VDC (20-32 V) / 20 W typ. @24V/23°C (unloaded)

(1) Secant latitude = 1/cosine (latitude)

(2) Typical RMS performance

(3) 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.

All specifications subject to change without notice

Hydrins

Navigation-grade INS for hydrographic survey

Hydrins is a high-performance Inertial Navigation System (INS) based on Exail Fiber-Optic Gyroscope (FOG) technology, electronics, and embedded processing. Compact and lightweight, it delivers highly accurate real-time position, heading, attitude and speed data, for direct georeferencing.



FEATURES & BENEFITS

- High-accuracy 3D positioning with heading, roll and pitch.
- Compact, lightweight, and reliable
- Benefiting from FOG (Fiber-Optic Gyroscope) unique strap-down technology
- Compatible with all GNSS receivers
- Simplified Integration with a single GNSS antenna setup
- Automatic GNSS drop-out / multipath management
- Realtime heave and delayed Smart Heave™
- Permanent quality data thanks to Exail Delph INS post-processing software
- Ethernet, web server (GUI)
- Fast alignment (no aiding sensor)
- IMU option for high accuracy platform stabilization
- Low latency for real time control loops
- Static and dynamic alignment modes, with and without GNSS
- 4Gb embedded data logger
- Versatile I/O options for an easy integration
- Maintenance-free
- ITAR-free
- 24/7 worldwide technical assistance

APPLICATION

- Port and harbour maintenance
- Seafloor characterization
- Bathymetric survey
- Platform stabilization
- Offshore construction engineering

TECHNICAL SPECIFICATIONS

Performance

Heading ⁽¹⁾ (°)	0.01					
Roll & Pitch ⁽²⁾ (°)	0.01					
Heave/Smart Heave ⁽³⁾	5 cm or 5% / 2 cm or 2%					
Bias stability (°/h)	0.0065					
ARW (°/√h)	0.003					
Correction type with GNSS⁽⁴⁾	SPS Natural	SBAS	DGNSS	PPP⁽⁵⁾	RTK⁽⁶⁾	PPK⁽⁷⁾
Horizontal accuracy (X,Y) (m)	1.20	0.60	0.30	0.06	0.006 +0.5 ppm	0.006 +0.5 ppm
Vertical accuracy (Z) (m)	1.90	0.80	0.50	0.09	0.01 +1 ppm	0.01 +1 ppm
GNSS outage⁽⁴⁾ of 60 seconds					RTK⁽⁶⁾	PPK⁽⁷⁾
Horizontal accuracy (X,Y) (m)					0.30	0.20
Vertical accuracy (X,Y) (m)					0.30	0.20

Operating range/Environment

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
MTBF	150,000 hours (System observed) 500,000 hours (FOG + Accelerometers)
Heading/roll/pitch	0 to +360 deg / ±180 deg / ±90 deg
Special conditions	No warm-up effects, shock and vibration proof
Shocks	27g / 15ms damper shocks

Physical characteristics

Dimensions (L x W x H)	180 x 180 x 162 mm
Weight in air	5.5 kg
Material	Aluminum

Interfaces

Serial	RS422 or RS232
Ethernet	100 Mbit - UDP / TCP server / TCP client / web server (GUI) / NTP synchro
Pulses	PPS input for < 100µs time synchronization
Inputs/outputs	Configurable 7i / 5o - Pulses 4i / 2o - Configuration port
Baud rates	Up to 460 kbaud
Data output rate	0.1 Hz to 200 Hz real measurements
Power supply/consumption	24 VDC (20-32 V) / 20 W typ. @24V/23°C (unloaded)

(1) Secant latitude = 1/cosine (latitude)

(2) Typical RMS performance.

(3) 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.

(4) Actual results depending on the quality of the GNSS system used, satellite configuration,

atmospheric conditions and other environmental effects.

(5) Precise Point Positioning (requires service subscription).

(6) Real-Time Kinematic, up to 40km from base station.

(7) Post Processing Kinematic using Delph INS 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 Exail's trusted and unique ultimate-performance Fiber-Optic Gyroscope (FOG) technology with thousands of units manufactured.



BENEFITS

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

FEATURES

- Improved heading, Smart Heave™ and real-time heave (30 sec period)
- State-of-the-art Exail 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

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)	5 min
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	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

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.



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

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

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 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

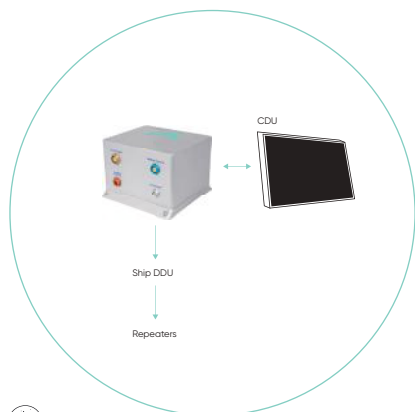
The return of experience on Exail iFOG technology shows a MTBF of more than 150,000h, without any kind of maintenance (neither on board nor with factory return), and a life expectation that has already proven to be superior to 15 years. All this combined makes Quadrans a true install and forget equipment 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

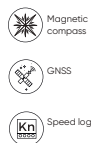
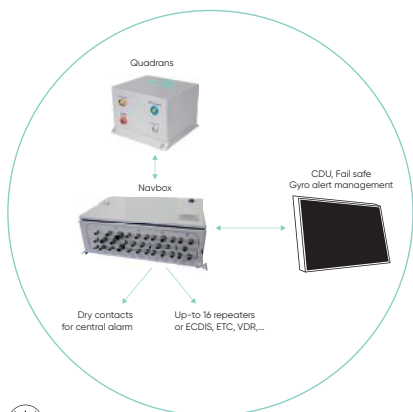
The Quadrans solution, as every Exail product, is an opened architecture, ready to interface with any other component. It includes, in addition to standard NMEA, a large library of open source protocols, to give autonomy to the user in the integration of the Quadrans in the life of the ship.

TYPICAL CONFIGURATIONS

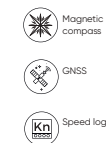
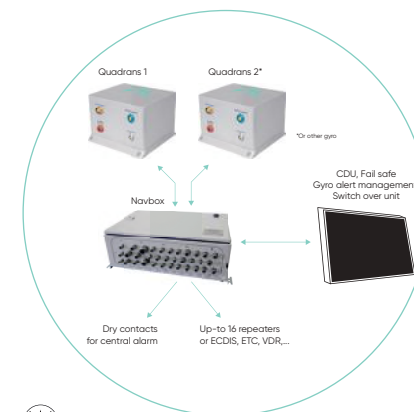
Quadrans standalone configuration



Gyro (with TMC or not) IMO approved configuration



Dual Gyro with TMC IMO approved configuration



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 the 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

(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

TECHNICAL SPECIFICATIONS

	Quadrans	Navbox
Performance		
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/Environment

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	2.8 kg	19 kg
Dimensions (L x W x H)	160 x 160 x 113 mm	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 outputs 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 ⁽⁴⁾	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

Atlans A7

Navigation grade INS
for land and air georeferencing
applications

Atlans A7 is a high performance all-in-one position & orientation system for both land and air applications. It benefits from smart coupling techniques between Exail Inertial Navigation Systems (INS) based on FOG (Fiber-Optic Gyroscope) and Septentrio GNSS receiver embedded. Atlans A7 is a robust and cost-effective north-finding inertial navigation solution that provides continuous data even in the most challenging applications.



FEATURES & BENEFITS

- Simplified integration with its all-in-one housing and single GNSS antenna setup
- Predefined vehicle modes: plane, car, train
- North-finding even in GNSS-denied environment
- Dynamic alignment with GNSS
- INS/GNSS smart coupling
- Compatible with Exail Delph INS post-processing software
- ROS driver available
- 24/7 worldwide technical assistance
- Free of ITAR Component

APPLICATIONS

- Asset management
- Land mobile mapping
- Aerial mobile mapping
- Pavement condition survey
- Tunnel mapping
- Railway survey
- Vehicle control and guidance
- Autonomous vehicles
- Ground truth
- Automotive
- Precision pointing

TECHNICAL SPECIFICATIONS

Performance⁽¹⁾ | LAND APPLICATIONS (WITH DMI)

With GNSS

Correction type	SPS / Natural	SBAS	RTK*	PPK**
Position Horizontal (X,Y) (m)	1.200	0.600	0.006 + 0.5 ppm	0.006 + 0.5 ppm
Position Vertical (Z) (m)	1.900	0.800	0.010 + 1 ppm	0.010 + 1 ppm
Heading (deg)	0.050	0.030	0.015	0.012
Roll & Pitch (deg)	0.020	0.015	0.008	0.005

During GNSS outage (1 min / 2 min)

Correction type	SPS / Natural	SBAS	RTK*	PPK**
Horizontal position drift (m)	0.70 / 1.40	0.70 / 1.40	0.40 / 0.80	0.08 / 0.20
Vertical position drift (m)	0.50 / 1.00	0.50 / 1.00	0.40 / 0.80	0.06 / 0.15

AIR APPLICATIONS

With GNSS

Correction type	SPS / Natural	SBAS	RTK*	PPK**
Position Horizontal (X,Y) (m)	1.200	0.600	0.006 + 0.5 ppm	0.006 + 0.5 ppm
Position Vertical (Z) (m)	1.900	0.800	0.010 + 1 ppm	0.010 + 1 ppm
Heading (deg)	0.050	0.030	0.015	0.012
Roll & Pitch (deg)	0.020	0.015	0.008	0.005
Heading drift 10min straight line (deg)	0.008	0.008	0.008	0.008

During GNSS outage (1 min / 2 min)

Correction type	SPS / Natural	SBAS	RTK*	PPK**
Horizontal position drift (m)	1.80 / 3.60	1.80 / 3.60	1.10 / 2.20	0.15 / 0.50
Vertical position drift (m)	1.00 / 2.00	1.00 / 2.00	0.60 / 1.20	0.10 / 0.30

Characteristics

Weight	2.96 kg
Material	Aluminium
Dimensions (L x W x H)	160 mm x 160 mm x 113 mm
Power supply / consumption	24VDC (12 – 33V) / <22W
Operating temperature	-20°C to 55°C
Storage temperature	-40°C to 80°C
Logging capacity	48 hours (INS and GNSS data)
MTBF	Environmental 100,000 hours
Standard	IP 66
GNSS supported signals	GPS: L1 C/A, L1C, L2C, L2 P(Y), L5 GLONASS: L1 C/A, L2C/A, L3, L2P BeiDou : B1I, B1C, B2a, B2I, B2b, B3I GALILEO: E1, E5a, E5b, E6 QZSS: L1 C/A, L1 C/B, L2C, L5 NavIC: L5 SBAS: EGNOS, WAAS, GAGAN, MSAS, SDCM
RTCM Support	RTCM v2.2, 2.3, 3.0, 3.1 – NTRIP

Interfaces

Data output rate	0.1 Hz to 200 Hz
Latency	< 3ms
Serial	RS422 or RS232
Ethernet	UDP / TCP Client / TCP server
Inputs / outputs	Configurable 2i / 2o – predefined 2o – configuration port
Pulses	3i + PPS in*** / 2o + PPS out
Options & accessories	DMI (odometer) Delph INS (post processing software)
GNSS interface embedded	
Serial or Ethernet link to the embedded GNSS	

(1) Typical RMS performance

* RTK: Real-Time Kinematic, up to 40km from base stations

** PPK: Post processing Kinematic using Delph INS post-processing software (smart coupling of INS with GNSS in forward/backward)

*** PPS input for <100µs time synchronisation

All specifications subject to change without notice