SELENE MARINE

FIBER OPTIC GYRO

MARITIME NAVIGATION REDEFINED

All solid state gyroscope without moving parts

FOG will roll out on Q1 2026

Endorsed with Global Accreditations

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Introduction to Fiber Optic Gyroscopes (FOG)

→ FOG PRINCIPLES

Fiber Optic Gyroscopes (FOG) operate on the Sagnac effect. They measure rotation by splitting a light beam into two counter-propagating beams within a fiber coil.

→ ADVANTAGES OF FOG

FOGs are designed without moving parts, which enhances their reliability. They are maintenance-free for the first five years, leading to significant cost savings.

→ SAFETY ENHANCEMENTS

FOGs deliver precise and stable heading information, essential for safe maritime navigation. Their durability ensures consistent performance in challenging sea conditions.

→ MARITIME NAVIGATION ROLE

FOGs are vital for accurate navigation, directly influencing vessel safety and efficiency. They adjust to changes in ship load and sea conditions, optimizing fuel use and minimizing emissions.

What is a Gyro in the Shipping Industry?

01 Gyro Functionality

Gyroscopes deliver precise heading information crucial for vessel navigation.

02 Voyage Planning

Gyros provide essential data to autopilot systems for effective voyage planning and fuel savings

03 Operational Necessity

A gyro compass is mandatory for every vessel to operate safely at sea.

04 Navigation Accuracy

Gyros offer enhanced precision compared to traditional magnetic compasses.

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Comparison: Conventional Gyro vs. Fiber Optic Gyro

Conventional Gyro

- Conventional gyroscopes incur high annual maintenance costs due to their mechanical components, averaging around $7,000 per unit.
- Frequent maintenance makes conventional gyros an impractical and uneconomical choice for vessel operators
- Conventional gyroscopes are prone to wear and can fail without proper upkeep, posing risks to vessel safety.

Fiber Optic Gyro

- Fiber optic gyroscopes are maintenance-free for the first five years, significantly reducing operational expenses and lower overall costs
- Long-term savings from reduced maintenance make fiber optic gyros a more economical choice for vessel operators.
- Fiber optic gyroscopes, with no moving parts, eliminate wear and minimize failure risks, offering a highly reliable and low-maintenance solution for vessel safety.

Parameter	Fiber Optic Gyro (FOG)	Conventional Gyro (Spinning Mass / Mechanical)	Value to Operator
Core Technology	Uses the Sagnac effect with light interference in optical fibers; no moving parts.	Relies on a spinning rotor suspended in gimbals; mechanical bearings involved.	FOG is more robust and future-proof (no wear-and-tear from moving parts).
Accuracy & Precision	High accuracy (drift as low as 0.001°/hr in advanced units). Very stable heading reference.	Accuracy degrades over time due to friction, wear, and temperature variations.	More precise navigation, especially critical for Dynamic Positioning offshore drilling, and defense vessels.
Maintenance Needs	Low maintenance: no magnetron, no mechanical bearings, fewer calibrations.	High maintenance: requires periodic lubrication, alignment checks, and eventual rotor replacement.	Lower OPEX for FOG; reduced downtime and service calls.
Service Life	10–15 years with minimal service; stable performance.	5–7 years before major overhaul needed.	Longer lifecycle means better ROI for FOG.
Environmental Robustness	Performs well under vibration, shock, and extreme temperatures.	Sensitive to mechanical shocks, vibration, and bearing wear.	FOG is more reliable in harsh sea states and defense applications.

Parameter	Fiber Optic Gyro (FOG)	Conventional Gyro (Spinning Mass / Mechanical)	Value to Operator
Cost (CapEx)	Higher initial purchase price.	Lower upfront cost.	FOG pays back via lifecycle savings (maintenance + downtime).
Integration	Easily interfaces with modern navigation systems (ECDIS, INS, DP) via digital outputs.	Older analog signals; requires converters for IBS integration.	FOG is future-ready for smart ship/automation.
Size & Weight	Compact and lighter; easier to integrate into bridge/IBS.	Bulkier due to mechanical gimbals and heavy rotors.	Saves space on modern vessels with digital bridges.
Startup & Warm-Up Time	Instant/near-instant startup (few seconds).	Requires warm-up/calibration time (can take minutes).	Quicker readiness → critical in emergencies.
Power Consumption	Lower, stable consumption.	Higher, due to motorized rotor spinning continuously.	FOG contributes to energy efficiency goals (IMO 2050 compliance).
Operational Reliability	MTBF (Mean Time Between Failures) significantly higher, often >100,000 hrs.	MTBF lower, subject to wear.	Reduced failures = better safety and lower long-term cost.

SELENE MARINE & A.R.U Angila Ruskin University UK

Selene Marine has joined forces with the renowned R&D team at Anglia Ruskin University to bring a cutting-edge navigation technology into the maritime sector. Fiber Optic Gyro (FOG), is already trusted in industries such as aerospace and defence. FOG has proven its reliability in some of the most demanding environments. Our collaboration is driven by a shared commitment to adapt this proven innovation for the unique challenges of marine navigation.

Our Vision for FOG in Maritime Navigation

At Selene Marine, our vision is to make high-precision navigation **accessible and cost-effective for every vessel**—whether it's a Smaller ship or an advanced fleet. With statutory regulations and IMO safety measures driving demand for reliable positioning systems, we aim to commercialise our own in-house developed FOG for both the maritime and defence sectors. Our approach focuses on reducing production costs without compromising performance, creating an affordable yet world-class navigation solution for the future.

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Our Competitive Edge

Cost-Optimized

Designed with lower production costs, yet no performance trade-off.

100% In-House

Our FOG is built from scratch, not rebranded.

Certified Quality

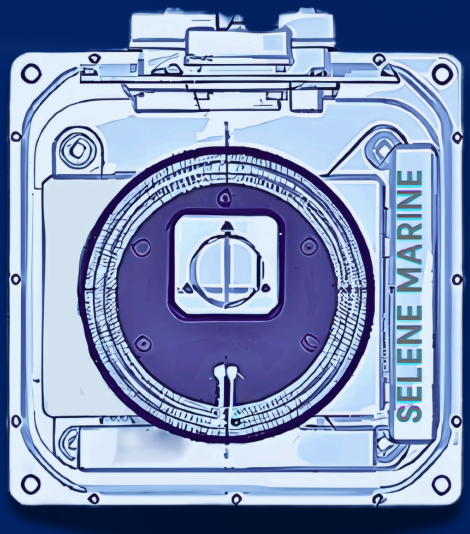
BSI & CE approvals guarantee global trust.

Strong R&D

Backed by Anglia Ruskin University UK for continuous innovation..

FOG redefines maritime navigation with unmatched precision with more cost saving as maintenance free equipment with enhanced fuel efficiency graph for vessel propulsion

Managing Director of Selene Marine



Our Protype Image of FOG Gyro Developed by Selene Marine

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KEY FEATURES OF SELENE MARINE FIBER OPTIC GYRO

Maintenance-Free Operation

The Fiber Optic Gyro requires no maintenance for the first five years. This feature significantly lowers operational costs and increases reliability.

Compact Design

The FOG is 15 times smaller than traditional gyros, simplifying installation. Its compact form factor does not compromise performance, making it versatile for various vessels.

Hull Stress Monitoring

In-built hull stress monitoring enhances safety during operations. This feature helps ensure the vessel's structural integrity is maintained.

Extended Autopilot System

The FOG enhances navigation accuracy with its advanced autopilot support. This system optimizes the vessel's course and reduces the need for manual adjustments.

Fuel Efficiency Optimization

The gyro adjusts to changes in load and sea conditions to minimize fuel usage. This results in lower emissions and reduced operational expenses over time.

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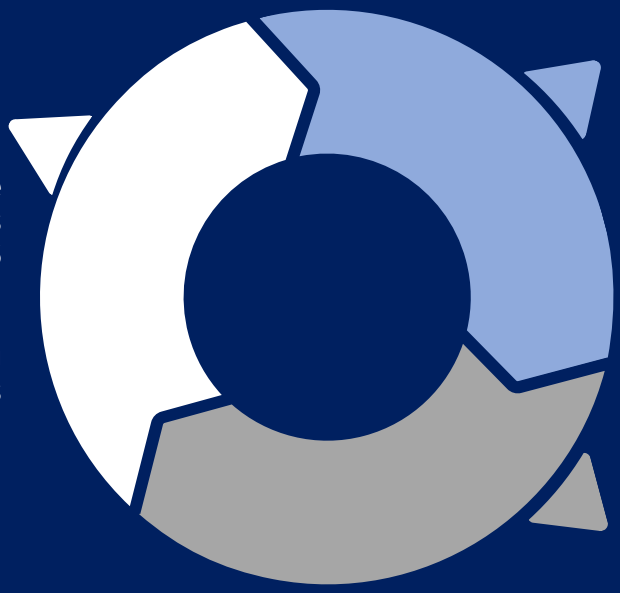
TYPES OF FOG

SINGLE-AXIS FOG

High Precision, Solid-state without any moving parts with **TYFG70S**

Type, Single Axis technical configuration and Setting time of 20s



DUAL-AXIS FOG

Low Precision, solid-state without any moving parts with **F2X64**

Type, Dual Axis technical configuration and Setting time of 10s

THREE-AXIS FOG

A solid-state without any moving parts with **TYFG80T**

Type, Three Axis technical configuration and Setting time of 10s

Technical Indicators of FOG

BASIS	SINGLE- AXIS FOG	DUAL- AXIS FOG	THREE-AXIS FOG
TYPE	TYFG70S	F2X64	TYFG80T
TECHNICAL SYSTEM	Single-Axis	Dual-Axis	Three-axis
SETTING TIME	20s	10s	10s
MEASURING RANGE	±400°/s	±500°/s	±600°/s
ACCURACY	0.01/0.015/0.02 (°/)h	0.1~1 (°/h)	≤0.3~1 (°/h)
POWER SUPPLY	±5V	±5V	+5V
POWER CONSUMPTION	≤ 3W	5W	≤ 5W
DATA OUTPUT	RS-422	RS-422	RS-422
SIZE	70mm×70mm×32mm	80mm×80mm×50mm	80mm×80mm×50mm
WEIGHT	≤300g	<400g	≤500g