

SMS Gyro™

Autonomous and retrofittable motion and vibration sensor



Technical Data Sheet

SMS Gyro™ is an autonomous subsea sensor and data logger containing a 3-axis MEMS accelerometer and a 3-axis MEMS gyroscope. The sensor is pressure rated to 3000 meter. SMS Gyro™ has extremely low power consumption and can log six degrees of freedom IMU data continuously with 10Hz sampling frequency for more than 360 days.

Wireless Configuration and Data Transfer

The sensor can be configured via the SMS Magic Hand™ optical modem during mobilization, and raw data and statistical data can easily be transferred to a topside computer during a logging campaign by letting an ROV hold the SMS Magic Hand™ modem in front of a sensor.

Retrofit Solution

Easy installation by ROV and easy retrieval of sensors to topside if service and/or memory card download is necessary.

Sensors in Network

Two or more sensors can be connected by cable on the proprietary RS485-based SenseBus, facilitating synchronized data sampling and logging. One sensor is configured as BusMaster (any sensor on the bus can take this role) and a topside computer can via a ROV-carried SMS Magic Hand™ download data, reconfigure the sensor or upgrade firmware. Any sensor on the bus can be reached from one single access point, the BusMaster.

Individual Sensor Calibration

Each sensor is individually calibrated in a precise motorized jig and in a temperature chamber, and key parameters are stored in a lookup table. In use the sensor measures the chip temperature, reads data from the lookup table, and compensates all measurements to bring offset and gain error to a minimum over the specified temperature range of the sensor.

Acceleration Sensor

Range +/-2g (optional +/-4, 8 or 16)

Noise level, Ax, Ay 0.00052g rms @ 5Hz bandwidth

Noise level, Az (vertical) 0.00087g rms @ 5Hz bandwidth

Gyroscope Sensor

Range +/- 250°/s

Noise level, Gx, Gy, Gz 0.012°/s rms @ 5Hz bandwidth

4Subsea helps operators reduce cost of operations and maximise life of assets using autonomous sensors in combination with data analytics and specialist engineering competence. Products in the Smart Monitoring Sensors (SMS) range are **SMS Gyro™**, **SMS Vibration™**, **SMS Strain™**, **SMS Magic Hand™**, **SMS Gateway™**, **SMS Pressure™**, and **SMS Satellite™**. Technology applications include monitoring of wellhead integrity, risers, mooring lines, subsea spools and manifolds, as well as monitoring of pipelines and subsea structures.

Used as Pitch and Roll Inclinometer

Angular orientation range +/- 90°
Calibrated range +/- 5°
Frequency range 0Hz (stationary) to 0.5Hz
Pitch and Roll noise level 0.012° rms (fs=10Hz)
Resolution (1) 0.024° (fs=10Hz)
Static accuracy (2) 0.072°

Topside Communication Port

Use Configuration, setup, data transfer (via hot stab)
Type RS485, half duplex (two signal wires)
Baud rate Max 115200
Power input +5.0V to +26V

SenseBus Communication Port

Use Communication with other sensors & modules
Type RS485, half duplex (two signal wires)
Baud rate 115200
Power input +3.6V

Optical Communication Port

Use Configuration, setup, data transfer via ROV
Optical modem SMS Magic Hand™
Range 0.5m to 1.0m in water (6m in air)
Baud rate 115200
Mode of operation Half duplex
Wavelength 890 nm
Eye safety Class 1 (IEC60825-1), i.e. eye-safe under all operating conditions

Logging Features

Logged data Ax, Ay, Az (acceleration), Gx, Gy, Gz (gyroscope), Roll, Pitch
Logging mode Continuous (no inactive periods)
Sampling/logging frequency 5 Hz -1024 Hz
Storage capacity 8 GB (optional 30GB)
Typical logging time 18 months of continuous logging of 6 DOF @ 10Hz frequency



Downloading Speed

Raw data 15 min. for 24h of raw data sampled at 10 Hz

LED Indicator

Type Red LED heartbeat indicator

Housing

Material Stainless steel 316L
Length 393 mm
Diameter 114 mm (top section)
Weight in air 9.4 kg (with two batteries)
Weight in water 7.4 kg (with two batteries)
Sealing 2 x O-rings (axial)
Optical window Polycarbonate
Safety No risk of building up dangerous pressure

Environmental

Operating temperature 0° C to 30° C
Storage temperature -5° C to 50° C
Pressure rating 3000m water depth

Battery Operation

Standard batteries 2 x double D-cell 3.6V Lithium
Can operate with one battery
Battery capacity 68000mAh (nominal at 25° C and 10mA)
Battery capacity 52000mAh (nominal at 0° C and 10mA)
Current consumption < 6mA
Typical service life 12 months (2° C)
Optional battery pack 6 x double D-cell

1) Resolution is defined as 2σ where σ is the standard deviation or rms value of the sensor noise level (which depends on the bandwidth).
2) Accuracy is defined as $2\sigma + \epsilon$ where σ is defined in 1) and ϵ is the total error over the entire angle- and temperature range.



A funnel-shaped receptacle allows precise and repeated placement by ROV

4Subsea is a leading provider of technology and services that help operators maintain production from subsea oil and gas fields and offshore wind farms. By combining expert engineering competence, practical experience and a digital service, we ensure the integrity of assets all the way from reservoir to deck.

The company was established in 2007 and clients include all the major oil and gas operators as well as the large suppliers of subsea equipment. 4Subsea is headquartered in Asker, Norway with additional offices in Bergen, Kristiansand, Stavanger, Macaé, and Rio de Janeiro, and with local presence in Aberdeen and Perth. More info at www.4subsea.com.

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