# SMS Motion™

## *Autonomous and retrofittable motion and vibration sensor*

## *Technical Data Sheet*

SMS Motion™ is an autonomous subsea sensor and data logger containing a 3-axis MEMS accelerometer and a 3-axis MEMS gyroscope, rated for 3000 m water depth. The sensor can be figured to operate at frequencies from 10Hz up to 1024 Hz, depending on the application. The sensor's low power consumption allows for continuous logging at 10 Hz 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. 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.

**Vibration Monitoring**
SMS Motion™ can be used for vibration monitoring and applications include vortex induced low frequency vibration (VIV) of pipelines and risers, flow induced vibration (FIV), flow induced pulsation (FIP/FLIP), and slugging on subsea jumpers.

**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 Motion™**, **SMS Strain™**, **SMS Magic Hand™**, **SMS Gateway™**, **SMS ComCentral™**, and **SMS Guard™**. Technology applications include monitoring of wellhead integrity, risers, mooring lines, subsea spools and manifolds, as well as monitoring of pipelines and subsea structures for oil & gas and offshore wind sub-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°

**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, Temperature
Logging mode Continuous (no inactive periods)
Sampling/logging frequency 10 Hz -1024 Hz
Storage capacity 32 GB
Typical logging time 68 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)

**Environmental**
Operating temperature 0° C to 40° 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, 10 Hz)
Optional battery pack 6 x double D-cell (36 months service life)

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 2σ + ε 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.

*4Subsea - Share ideas, move forward*


*Contact*
+47 66 98 27 00
contact@4subsea.com
www.4subsea.com

*Asker (HQ)*
Hagaløkkvn 26
1383 Asker
Norway

*Bergen*
Nordåsdalen 25
5235 Rådal
Norway

*Kristiansand*
Narviga 21
4633 Kristiansand
Norway

*Stavanger*
Luramyrveien 40
4313 Sandnes
Norway

*Rio de Janeiro*
Av. Rio Branco 89,
Room 802 -Centro
RJ 20040-004 Brazil

*Macaé*
Rua Sergio R Franco,
Quadra 3 S/N - Macaé
RJ 27932-354 Brazil