MGC® R2

Gyro compass and Inertial Navigation System (INS)

A new family of products with motion sensing and gyro compass functionality is introduced. The MGC R2 product includes three Ring Laser Gyros and three linear accelerometers.

Typical applications

The MGC (Motion Sensor & Gyro Compass) product is a fully Inertial Navigation System (INS). It can output heading, roll, pitch, heave and position. Acceleration and velocity of linear motions, as well as angular rates, are output from the unit. The MGC product outputs both processed and raw (gyro and accelerometer) sensor data.

The MGC product can be used as a stand-alone unit or as an Intertial Measurement Unit (IMU) in other systems. The product is designed for high-precision maritime applications such as offshore operations and seabed mapping.

The product includes integrated navigation algorithms with input from a GNSS receiver for output of aided position and heading data. The proven PFreeHeave® algorithms are part of the navigation algorithms that enable down to 2 cm accuracy in delayed heave output and 5 cm accuracy in real-time heave output. The linear position and velocity measurements can be output in up to four different points on the vessel.

The mounting bracket has been specially designed to enable easy alignment to the vessel axes or the axes of the system on which the unit shall measure the motion. This will ensure that you get precise measurements from the unit when it is installed.

Function

The MGC can operate in AHRS mode and Inertial Navigation mode. In AHRS mode, input of speed is required. In this mode the product will output heading, roll, pitch and heave accurately. In Inertial Navigation mode, input of speed, position and PPS from a GNSS receiver is required (VTG, GGA, ZDA). In this mode the product will output heading, roll, pitch, heave and position.

The unit is delivered with Windows based configuration and data presentation software, the MRC+. In this software vector arms from where the MGC is mounted to the center of gravity (CG) and two individually configurable monitoring points (MPs), can be defined. The heave measurements can be output in four different locations (the MGC itself, CG, MP1 and MP2) simultaneously on serial lines or Ethernet ports. A typical measurement point is the echo sounder transducer head.

Variables output

The MGC outputs heading, roll and pitch and corresponding angular rate vectors. The unit outputs relative (dynamic) heave position, velocity and acceleration. In the Inertial Navigation mode it also outputs position in north and east direction in addition to height above the ellipsoid.

Digital I/O protocols

MGC data is available through both Ethernet interface and serial lines, enabling easy distribution of data to multiple users on board the vessel. Output protocols for commonly used survey equipment are available on two individually configurable serial lines and Ethernet/UDP.

FEATURES

- 0.02° static roll and pitch accuracy
- 0.1° heading accuracy GNSS aided
- Includes INS capability
- Outputs on RS-232, RS-422 and Ethernet
- Hight output data rate (200 Hz)
- Precise heave at long wave periods by use of PFreeHeave® algorithms
- Lever arm compensation to two individually configurable monitoring points
- Small size and low power consumption
- Each MGC delivered with a Calibration Certificate
- Selectable communication protocols in the Windows based configuration software

Technical specifications

MGC® R2

Orientation output

Angular orientation range	±180°
Resolution in all axes	0.0001°
Static roll, pitch accuracy (unaided)	0.02° RMS
Dynamic roll, pitch accuracy (unaided)	0.005° 1-sigma
Heading accuracy	0.15° RMS sec. lat
Heading accuracy (GNSS aided)	0.1° RMS sec. lat
Heading settling time to data available	<5 min from start-up
Heading settling time to full accuracy (typical)	17 min from start-up

Gyro output

Angular rate range	±125 °/s

Acceleration output

Acceleration range (all axes)	±45 m/s^2

Heave output

Output range	±50 m, adjustable
Periods (real-time)	0 - 25 s
Periods (delayed)	0 - 50 s
Heave accuracy (real-time)	5 cm or 5 % whichever is highest
Heave accuracy (delayed)	2 cm or 2 % whichever is highest

Position output

Free inertial drift (GNSS aided)	5 nm/h

Electrical

Voltage input	24 VDC nominal (18 - 32 VDC)
Power consumption	12 W max (11 W typical)
Serial ports:	
COM1	Bidirectional RS-422
COM2	Bidirectional RS-422 from junction box, user configurable RS-232/RS-422
COM3 & COM4	Input only, user configurable RS-232/RS-422
Analog channels (junction box)	# 4, ±10 V, 14-bit resolution
Ethernet output ports	5
Ethernet UDP/IP	10/100 Mbps

Digital output variables	24 max, serial or Ethernet
Data output rate	200 Hz max
Timing	< 1 ms

Input formats

NMEA 0183, incl. GGA, VBW, VTG, ZDA or MRU Normal format

Output formats

- MRU Normal	- Sounder
- NMEA 0183 proprietary	- EM3000
- Atlas Fansweep	- TSS1
- Seapath binary 23, 25, 26	- PFreeHeave®
- KM binary	- MDL Trim Cube
- RDI ADCP	- Tokimec PTVG
- NMEA GGA, GLL, GST, HCR, HDT, ROT, THS, VER, VTG	

Other data

MTBF (computed)	50000 h
MTBF (service history based)	100000 h
Material	Anodised aluminium
Connector (MIL spec)	Souriau 851-36RG 16-26S50

Weight and dimensions

Weight	8 kg
Dimensions	189.9 × 189.5 × 189.5 mm

Environmental specifications

Operation temperature	-15 °C - +55 °C
Storage temperature	-25 °C - +70 °C
Vibration	IEC 60945/EN 60945
Ingress protection	IP66

Electromagnetic compatibility

Compliance to EMCD, immunity/emission	IEC 0945/EN 60945

Specifications subject to change without any further notice.