The MRU 5+ product is upgraded with the best MEMS based gyro technology available. With exceptional low angle noise and bias stability the product is ideal for integrated INS/GNSS systems and demanding survey applications.

**Unique components**

The MRU 5+ provides documented roll and pitch accuracy of 0.008° and angle noise less than 0.002°. Every unit is delivered with an individual calibration certificate documenting this accuracy. This is made possible by use of accurate inertial sensors including three rate gyros and linear accelerometers. The accelerometers included are of excellent tactical navigation grade performance.

For this upgraded MRU 5+ product a new MEMS based gyro is developed by Kongsberg Seatex AS called MRG5 (Mru Rate Gyro) model 5. The MRG5 is optimized for use in high-end applications. The MRU rate gyro combines very low noise, excellent bias stability and outstanding gain accuracy and is the best MEMS rate gyro available for maritime applications.

Very high reliability is achieved by using solid-state sensors with no moving parts and the proven MRU electrical and mechanical construction.

**PFreeHeave® Algorithm**

The PFreeHeave algorithm uses past measurements to output a correct and phase-free heave from MRU 5+. PFreeHeave has an advantage in long swell conditions and for applications that can utilize a heave signal that is delayed some minutes, typical seabed mapping applications.

**Digital I/O protocols**

MRU data is available through an Ethernet interface enabling easy distribution of MRU 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.

**External communication**

The MRU 5+ accepts external input of speed and heading information on separate serial lines for improved accuracy in heave, roll and pitch during turns and accelerations. For time synchronization the MRU accepts 1-second time pulse (1PPS) input.
FEATURES

- 0.008° roll and pitch accuracy
- Exceptional low angle noise and bias stability
- High output data rate (200 Hz)
- Outputs on RS-232, RS-422 and Ethernet
- Precise heave at long wave periods by use of PFreeHeave® algorithm
- Each MRU delivered with Calibration Certificate
- No limitation in mounting orientation
- Lever arm compensation to two individually configurable monitoring points
- Meets IHO special order requirements
- Small size, light weight, low power consumption
- 2-year warranty

TECHNICAL SPECIFICATIONS

MRU 5+ MK-II

**ORIENTATION OUTPUT**
- Angular orientation range: ±180°
- Resolution in all axes: 0.001°
- Angle noise roll, pitch: 0.002° RMS

**GYRO OUTPUT**
- Angular rate range: ±75°/s
- Angular rate noise: 0.008°/s RMS
- Bias stability (in run bias): 0.003°/h RMS
- Bias stability (absolute bias): 20°/h RMS
- Angle Random Walk: 0.006°/√h (typical)
- Scale factor error: 0.03 % RMS

**ACCELERATION OUTPUT**
- Acceleration range (all axes): ±30 m/s²
- Bias stability (absolute bias): 80 µg RMS
- Acceleration noise: 3.3 µg/√Hz
- Velocity Random Walk: 0.008% RMS
- Scale factor error: 0.03 % RMS

**HEAVE OUTPUT**
- Output range: ±50 m, adjustable
- Heave accuracy for 0 to 25 s motion periods (real-time): 5 cm or 5% whichever is higher (RMS)
- Heave accuracy for 10 s motion period (real-time): 1 cm or 3% whichever is higher (RMS)
- Heave accuracy for 0 to 50 s motion periods (delayed): 2 cm or 2% whichever is higher (RMS)
- Heave velocity accuracy: 0.01 m/s RMS

**ELECTRICAL**
- Voltage input: 10 to 36 V DC
- Power consumption: Max 8 W (typical 7.2 Watts)
- Serial ports: Bidirectional RS-422 from junction box, user configurable RS-232, RS-422
- Analog channels (junction box): # 4, ±10 V, 14 bit resolution
- Ethernet output ports: 5
- Ethernet UPO/IP: 10/100 Mbps
- Data output rate (max): 200 Hz
- Timing: < 1 ms

**INPUT FORMATS**
- NMEA 0183, incl. HDT, HDM, ZDA, GGA, VTG, VHW, VBW or MRU Normal format

**DATA OUTPUT PROTOCOLS**
- MRU normal
- NMEA 0183 proprietary
- Atlas Fansweep
- Seapath binary 23, 25, 26
- PRDID
- PFreeHeave®
- KM binary

**OTHER DATA**
- MTBF (computed): 50000 h
- MTBF (service history based): 100000 h
- Material: Anodised aluminium
- Connector (MIL. spec.): Souriau 881-36RG 16-26S50

**WEIGHT AND DIMENSIONS**
- Weight: 2.2 kg
- Dimensions: Ø 105 x 140 mm (4.134" x 5.525")

**ENVIRONMENTAL SPECIFICATIONS**
- Operational temperature range: -5 °C to +55 °C
- Storage temperature range: -25 °C to +70 °C
- Enclosure protection: IP66
- Vibration: IEC 60945/EN 60945

**ELECTROMAGNETIC COMPATIBILITY**
- Compliance to EMC, immunity/emission: IEC 60945/EN 60945

Specifications subject to change without any further notice.