KONGSBERG

The roll and pitch motion sensor

This 5th generation MRU 2 is designed for high accuracy roll and pitch measurements in marine applications.

Typical applications

The MRU 2 is typically used for roll and pitch measurements in offshore riser monitoring systems, dynamic positioning systems, telecommunication antenna systems and motion damping systems on high speed crafts.

This unit has to be mounted in a fixed direction relative to the vessel and is best suited for applications with limited range in roll and pitch. If unlimited mounting orientation and/or unlimited mounting range is required, one of the MRU models with sensors in all three axis is recommended.

Function

The MRU 2 incorporates two highly accurate accelerometers and two Micro-Electro-Mechanical-Structures (MEMS) angular rate gyros. This unit achieves high reliability by using solid-state sensors with no rotational or mechanical wear-out parts.

The unit is delivered with Windows based configuration and data presentation software. By configuring the unit with the vector between the MRU and the vessel Center of Gravity (CG), the MRU 2 will output accurate roll and pitch measurements even when it is mounted high up in the vessel, like on the bridge. This is due to the capability to suppress the effect of horizontal acceleration on the roll and pitch performance. This makes the MRU 2 superior to inclinometers, pendulous devices and standard Vertical Reference Units.

Output variables

The MRU 2 outputs static and dynamic roll and pitch angles and corresponding angular rate vectors. The unit outputs surge and sway accelerations.

Digital I/O protocols

MRU data is available through both Ethernet interface and serial lines enabling easy distribution of MRU data to multiple users on board the vessel. Output data are available on two individually configurable serial lines and Ethernet/UDP. Output variables are transmitted as IEEE 32-bit floats (recommended) or as scaled integers. In addition, ASCII-based NMEA 0183 proprietary sentences can be selected as data output protocols.

FEATURES

- 0.015° roll and pitch dynamic accuracy
- Outputs high accuarcy roll and pitch measurements
- Suppression of horizontal acceleration when mounted off the vessel Center of Gravity (CG)
- Outputs on RS-232, RS-422 and Ethernet
- High output data rate (200 Hz)
- High reliability and no mechanical wear-out parts
- Small size, light weight and low power consumption
- Each MRU delivered with Calibration Certificate
- Selectable communication protocols in the Windows based MRU configuration software
- 2-year warranty

Technical specifications

MRU 2

Roll and pitch output

Angular orientation range	±25°
Resolution roll & pitch	0.0001°
Static accuracy[1)]	0.03° RMS
Dynamic accuracy[2)], (for a ±5° amplitude)	0.015 1-sigma

Gyro output

Angular rate range	±150°/s
Angular rate noise	0.015°/s RMS
Scale factor error	0.08 % RMS

Surge and sway acceleration output

Acceleration range	±45 m/s^2
Acceleration noise	0.005 m/s^2 RMS
Scale factor error	0.02% RMS

Electrical

Voltage input	10 - 36 V DC
Power consumption	Max 4.9 W
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 UPD/IP	10/100 Mbps
Data output rate (max)	200 Hz
Timing	< 1 ms

Other data

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

Weights and dimensions

Weight	2.0 kg
Dimensions	Ø 105 × 140 mm (4.134 × 5.525”)

Environmental specifications

Operating temperature	-5 - +55 °C
Storage temperature	-25 - +70 °C
Enclosure protection	IP66
Vibration	IEC 60945/EN 60945

Electromagnetic compatibility

Compliance to EMC, immunity/emission	IEC 60945/EN 60945

1 *When the MRU is stationary over a 30-minute period.*
2 *When the MRU is exposed to a combined two-axis sinusoidal angular motion with 10 minutes duration.*

Specifications subject to change without any further notice.

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