miniMRU

KONGSBERG

The compact reference unit

The miniMRU is a miniaturised variant of KONGSBERG's established Motion Reference Unit (MRU). The miniMRU is designed for embedded applications and integrated solutions where precise attitude measurements are required. Its compact size and low weight, combined with easy interfacing, makes it a convenient solution for any application that requires motion compensation, such as portable multibeam echo sounders and acoustic positioning transducer heads.

The unit is available in different versions, offering roll and pitch accuracy between 0.005° and 0.1°. The miniMRU range combines 3-axis sensors for linear acceleration and angular rate, complete signal processing electronics and power supply into a single, compact and extremely rugged unit. The system outputs both raw and processed gyro and accelerometer data such as roll, pitch, heave motion, linear acceleration and angular rate.

Product range

The miniMRU series is delivered in the following product range:

- miniMRU 30 with 0.1° roll and pitch dynamic accuracy
- miniMRU 40 with 0.010° roll and pitch dynamic accuracy
- miniMRU 50 with 0.010° roll and pitch dynamic accuracy
- miniMRU 60 with 0.005° roll and pitch dynamic accuracy

Interfaces

The product includes two output and input serial lines and Ethernet communication. For time synchronization, the miniMRU accepts 1-second time pulse (1PPS) input on a TTL line (XIN) or as RS-232/RS-422 signal, or by use of an NTP server.

Function

The miniMRU can both be used as an Inertial Measurement Unit (IMU) or as a sensor for output of processed roll, pitch and heave motion data. The product includes the most accurate MEMS linear accelerometers and angular rate sensors commercially available in the world.

The miniMRU is delivered with a Windows based configuration software (MRC+). The configuration software communicates with the miniMRU via Ethernet.

FEATURES

- Compact size and low weight attitude sensor
- 0.005° - 0.1° roll and pitch dynamic accuracy dependent on miniMRU model
- 5 cm real-time heave output for periods up to 25 seconds
- Precise heave at long wave periods by use of the PFreeHeave® algorithms
- Outputs on RS-232, RS-422 and Ethernet
- Up to 200 Hz data output rate
- Cost-effective and robust MEMS technology
- High-performance inertial product
- Configurable angular rate bandwidth

Technical specifications

miniMRU

Orientation output

Angular orientation range:	
– miniMRU 30 & 40	±45°
– miniMRU 50 & 60	±180°
Resolution in all axes	0.0001°
Static accuracy roll, pitch[1]	
– miniMRU 30	0.2° RMS
– miniMRU 40	0.8° RMS
– miniMRU 50 & 60	0.03° RMS
Dynamic accuracy roll, pitch (for a ±5° amplitude) [2]	
– miniMRU 30	0.1° 1-sigma
– miniMRU 40 & 50	0.010° 1-sigma
– miniMRU 60	0.005° 1-sigma
Angular rate noise (bandwidth 0 - 10 Hz)	
– miniMRU 30	0.03°/s RMS
– miniMRU 40 & 50	0.015°/s RMS
– miniMRU 60	0.010°/s RMS

Heave output

Output range	±50 m, adjustable
Heave accuracy (real-time)	5 cm or 5% whichever is highest (RMS)
Heave period (real-time)	
– miniMRU 30 & 40	0 - 18 s
– miniMRU 50 & 60	0 - 25 s
Heave accuracy for 0 - 50 s motion periods (delayed)	
– miniMRU 50 & 60	1 cm or 1% whichever is highest (RMS)
Heave velocity accuracy	0.01 m/s RMS

Electrical

Voltage input	10 - 36 VDC
Power consumption	Max. 6 W
Serial ports:	
• COM1	Bidirectional, RS-422
• COM2	Bidirectional, RS-422
• COM3 & COM4	Input only, user configurable RS-232, RS-422
• COM5	RS-232 output
Ethernet output ports	5
Ethernet UDP/IP	10/100 Mbps
Data output rate	200 Hz (max)
Timing	< 1 ms

Input formats

NMEA 0183	HDT, HDM, ZDA, VTG, VHW, VBW or MRU normal format

Data output protocols

- MRU normal	- Sounder
- NMEA 0183 proprietary	- EM3000
- Atlas Fansweep	- TSS1
- Seapath binary 23, 25, 26	- PFreeHeave®
- PRDID	- KM binary

Other data

MTBF (computed)	50 000 h
Material	Anodised aluminium
Connector	ITT MDM-255 CBR - A174

Weights and dimensions

Weight	0.5 kg
Dimensions (LxWxH)	100 × 80 × 48 mm

Environmental specifications

Operating temperature range	-5 - 55 °C
Storage temperature range	-25 - 70 °C
Enclosure protection	IP52
Vibration	IEC 60945/EN 60945

Electromagnetic compatibility

Compliance to EMCD, 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-axes sinusoidal angular motion with 10 minutes duration

Specifications subject to change without any further notice.

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