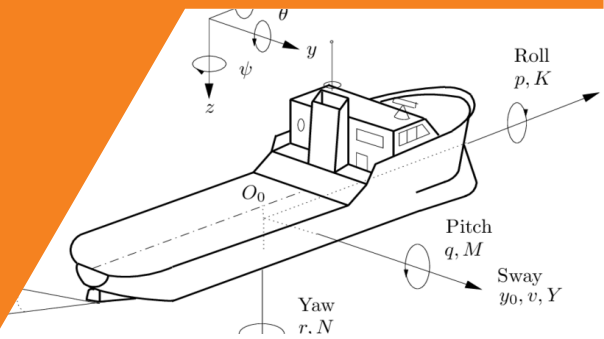
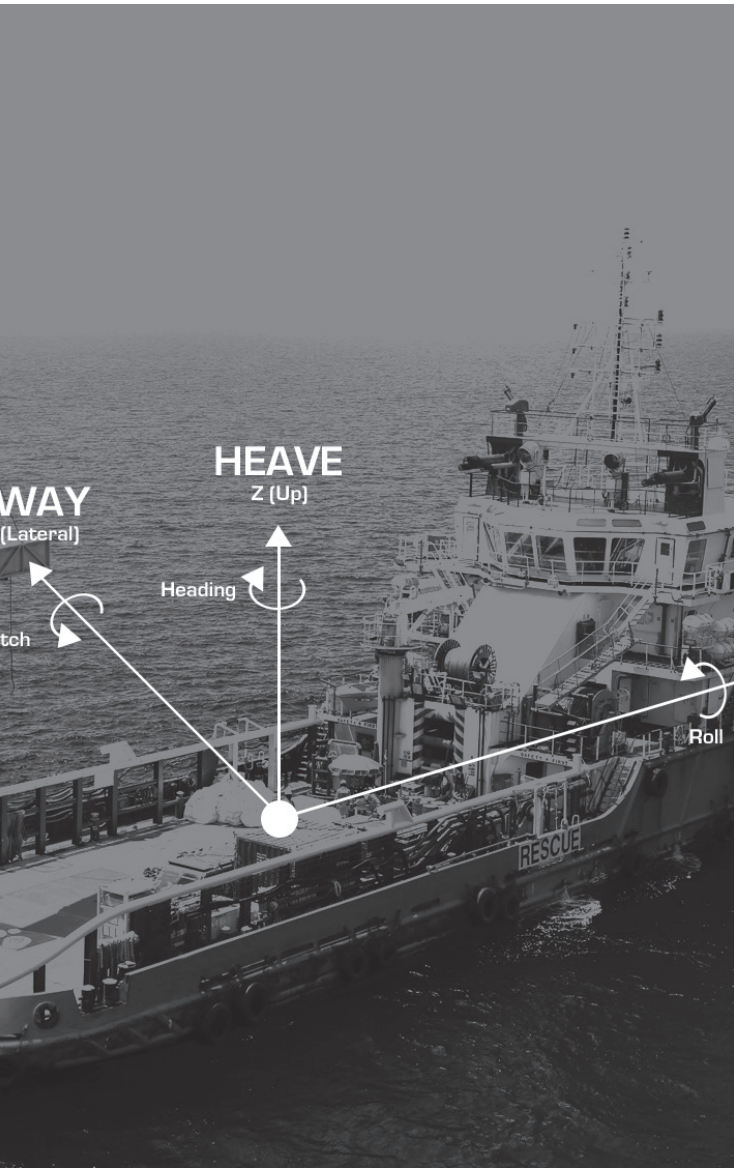
WÄRTSILÄ SMART SENSORS

Wärtsilä Motion Reference Unit

Motion Reference Units for the Marine Industry



The Motion Reference Unit (MRU) utilizes the latest developments in Micro Electro Mechanical Systems (MEMS) technology to provide accurate determination of Pitch, Roll, and Heave for any vessel on which it is mounted. MRUs are suitable for a wide range of marine applications including vessels with dynamic positioning.



Benefits

- 0.08 deg RMS Pitch & Roll dynamic accuracy
- 5cm RMS Heave accuracy
- 0.005m/sec² linear acceleration accuracy
- NMEA 0183, TSS1 output data formats
- HYPACK software compatibility
- Environmentally sealed (IP67), compact design

Typical applications

Four variants of MRU available:

- GMRU-H (Heave only)
- GMRU-PR (Pitch and Roll only)
- GMRU-PRH (Pitch, Roll and Heave)
- GMRU-E (Pitch, Roll, Heave and Heading)

MRUs are suitable for a wide range of marine applications including vessels with dynamic positioning.

Measured Parameters	GMRU-H	GMRU-PR	GMRU-PRH	GMRU-E
Heave	✓		✓	✓
Pitch & Roll		✓	✓	✓
Heading				✓

Main data

Parameter	Units	MRU			
		GMRU-H	GMRU-PR	GMRU-PRH	GMRU-E
Output signals	-	Heave, Pitch & Roll, Heading, Accelerations, Angular rates			
Update rate	Hz	1 … 200 (user settable)			
Start-up time	sec	<1			
Full Accuracy Data (Warm-up Time)	sec	10			
Heave	**Units**				
Measurement range	metres	±300	-	±300	±300
Resolution	metres	0.01	-	0.01	0.01
Accuracy	% (metres) RMS	5 (0.05)	-	5 (0.05)	5 (0.05)
Heave rate accuracy	m/s RMS	0.07	-	0.07	0.07
Pitch and Roll	**Units**				
Range: Pitch, Roll	deg	-	±90, ±180	±90, ±180	±90, ±180
Angular Resolution	deg	-	0.01	0.01	0.01
Static Accuracy in whole Temperature Range	deg	-	0.05	0.05	0.05
Dynamic Accuracy	deg RMS	-	0.08	0.08	0.08
Post processing accuracy (1)	deg RMS	-	0.03	0.03	0.03
Heading	**Units**				
Range	deg	-	-	-	0 to 360
Angular Resolution	deg	-	-	-	0.01
Static Accuracy in whole Temperature Range	deg	-	-	-	0.2
Dynamic Accuracy	deg RMS	-	-	-	0.4
Post processing accuracy (1)	deg RMS	-	-	-	0.1
Positions, Velocity and Timestamps	**Units**				
Horizontal position accuracy (GPS L1), RMS	metres	-	-	-	-
Horizontal position accuracy (SBAS), RMS	metres	-	-	-	-
Horizontal position accuracy (DGPS), RMS	metres	-	-	-	-
Horizontal position accuracy (post processing) (1)	metres	-	-	-	-
Velocity accuracy, RMS	metres/sec	-	-	-	-
GNSS raw data rate	Hz	-	-	-	-
Timestamps accuracy	milliseconds	<5			
Gyroscopes	**Units**				
Measurement range	deg/sec	±450			
Bias in-run stability (RMS, Allan Variance)	deg/hr	1			
Noise density	deg/sec√Hz	0.004			
Accelerometers	**Units**				
Measurement range	g	±8			
Bias in-run stability (RMS, Allan Variance)	mg	0.005			
Noise density	mg√Hz	0.015			
Magnetometers	**Units**				
Measurement range	Gauss	-	-	-	±1.6
Bias in-run stability, RMS	nT	-	-	-	0.2
Noise density, PSD	nT√Hz	-	-	-	0.3
Pressure	**Units**				
Measurement range	hPa	300 – 1100			
Bias in-run stability (RMS, Allan Variance)	Pa	2			
Noise density	Pa/√Hz	0.8			
Environment	**Units**				
Operating temperature	deg C	-40 to +70			
Storage temperature	deg C	-50 to +85			
MTBF	hours	55,500			
Vibrationv	-	IEC 60945/EN 60945			
Electrical	**Units**				
Supply voltage	V DC	9 to 36			
Power consumption	Watts	1			1.4
Output Interface	-	RS-232, RS-422, RS-485			
Output data format	-	Binary, TSS-1, NMEA 0183 ASCII characters			
Compliance to EMCD, immunity/emission	-	IEC 60945/EN 60945			
Connector (2)	-	Binder Series 723			
Physical	**Units**				
Size	mm	120 x 50 x 53			
Weight	gram	220			280
Enclosure material	-	Anodized Aluminum			

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