Motion Reference Units

OCEAN
INNOVATIONS

- IP-67 sealed
- 5% / 5 cm Heave accuracy
- 0.03 m/sec Velocity accuracy
- 0.05 deg Pitch and Roll accuracy
- 0.005 m/sec^2 Acceleration accuracy
- 0.0002 deg/sec Angular rate accuracy
- NMEA 0183 and TSS1 output data format
- 40 cm DGPS real-time horizontal position accuracy
- 5 cm post processing (PP) horizontal position accuracy
- 1 cm + 1 ppm RTK real-time horizontal position accuracy

MRU-B (Basic)
MRU-E (Enhanced)
MRU-P (Professional)

Measured Parameters	MRU-B Basic	MRU-E Enhanced	MRU-P Professional
Heave, Surge, Sway (% / cm)	+	+	+
Pitch & Roll (deg)	+	+	+
Heading/Yaw (deg)		+	+
Velocity (meters/sec)			+
DGPS/RTK Positions (meters)			+

MRU Specifications

Parameter	Units	MRU-B (Basic)	MRU-E (Enhanced)	MRU-P (Professional)
Update rate	Hz	1 … 200 (user settable)	1 … 200 (user settable)	1 … 200 (user settable)
Start-up time	sec	<1	<1	<1
Full Accuracy Data (Warm-up Time)	sec	10	10	30
Heave	**Units**	MRU-B	MRU-E	MRU-P
Measurement range	meters	±300	±300	±300
Resolution	meters	0.01	0.01	0.01
Accuracy, RMS	% (meters)	5 (0.05)	5 (0.05)	5 (0.05)
Pitch and Roll	**Units**	MRU-B	MRU-E	MRU-P
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	deg RMS	0.03	0.03	0.03
Heading	**Units**	MRU-B	MRU-E	MRU-P
Range	deg	-	0 to 360	0 to 360
Angular Resolution	deg	-	0.01	0.01
Static Accuracy in whole Temperature Range	deg	-	0.3	0.2
Dynamic Accuracy	deg RMS	-	0.6	0.4
Post processing accuracy	deg RMS	-	0.1	0.1
Positions, Velocity and Timestamps	**Units**	MRU-B	MRU-E	MRU-P
Horizontal position accuracy (DGPS), RMS	meters	-	-	0.4
Horizontal position accuracy (RTK), RMS	meters	-	-	0.01 + 1 ppm
Velocity accuracy, RMS	meters/sec	-	-	0.03
GNSS raw data rate	Hz	-	-	20
Timestamps accuracy	milliseconds	<5	<5	<5
Gyroscopes	**Units**	MRU-B	MRU-E	MRU-P
Measurement range	deg/sec	±450	±450	±450
Bias in-run stability (RMS, Allan Variance)	deg/hr	1	1	1
Noise density	deg/sec√Hz	0.004	0.004	0.004
Accelerometers	**Units**	MRU-B	MRU-E	MRU-P
Measurement range	g	±8	±8	±8
Bias in-run stability (RMS, Allan Variance)	mg	0.005	0.005	0.005
Noise density	mg√Hz	0.015	0.015	0.015
Magnetometers	**Units**	MRU-B	MRU-E	MRU-P
Measurement range	Gauss	-	±1.6	±1.6
Bias in-run stability, RMS	nT	-	0.2	0.2
Noise density, PSD	nT√Hz	-	0.3	0.3
Pressure	**Units**	MRU-B	MRU-E	MRU-P
Measurement range	hPa	300 − 1100	300 − 1100	300 − 1100
Bias in-run stability (RMS, Allan Variance)	Pa	2	2	2
Noise density	Pa/√Hz	0.8	0.8	0.8
Environment	**Units**	MRU-B	MRU-E	MRU-P
Operating temperature	deg C	-40 to +70	-40 to +70	-40 to +70
Storage temperature	deg C	-50 to +85	-50 to +85	-50 to +85
MTBF	hours	55,500	55,500	55,500
Vibration		IEC 60945/EN 60945	IEC 60945/EN 60945	IEC 60945/EN 60945
Electrical	**Units**	MRU-B	MRU-E	MRU-P
Supply voltage	V DC	9 to 36	9 to 36	9 to 36
Power consumption	Watts	1	1.4	2.6
Output Interface	-	RS-232, RS-422, RS-485	RS-232, RS-422, RS-485	RS-232, RS-422, RS-485
Output data format	-	Binary, TSS-1, NMEA 0183 ASCII characters	Binary, TSS-1, NMEA 0183 ASCII characters	Binary, TSS-1, NMEA 0183 ASCII characters
Compliance to EMCD, immunity/emission		IEC 60945/EN 60945	IEC 60945/EN 60945	IEC 60945/EN 60945
Physical	**Units**			
Size	mm	120 x 50 x 53	120 x 50 x 53	120 x 50 x 53
Weight	gram	220	280	320
Enclosure material		Anodized Aluminum	Anodized Aluminum	Anodized Aluminum

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