

MOTION REFERENCE UNIT (MRU)



DILABS has developed Motion Reference Units (MRU) to meet requirements from marine and hydrographic applications. MRU is enhanced, high-performance strap down Motion Sensor, that determines Pitch & Roll, Heave, Sway, Surge, Accelerations, Angular rates, Heading, Velocity and Positions for any device on which it is mounted. The DILABS Motion Reference Units utilises solid state 3-axes each of precision accelerometers, magnetometers, gyroscopes and barometric sensors to provide accurate Heave, Sway, Surge, Pitch and Roll of the device under measure. Integration of very low noise gyroscopes output provides high frequency, real-time measurement of the Vessel, Ships, Helidecks, ROV, Marine antennas, Cranes rotation about all three rotational axes. Through a combination of proven sector expertise and a continued investment in technological innovation, DILABS delivers the optimum balance of price and performance ratio solutions for its customers.

KEY FEATURES AND FUNCTIONALITY:

- Kongsberg/Seatex, Teledyne and SMC data formats
- State-of-the-art algorithms for Survey, Vessels, Ships, Active Heave Compensators, Cranes, Helideck, ROV, AUV, DPS, Buoys, Echo Sounders, Offshore Platforms
- 0.02 deg RMS Pitch & Roll dynamic accuracy
- 5% or 5 cm RMS (whichever is greater) Heave accuracy
- 3 cm Oceanix Nearshore Horizontal Position Accuracy, 1-0.05 m VERIPOS Horizontal Position Accuracy
- 0.005 m/sec² linear acceleration accuracy
- NMEA 0183, TSS1 output data formats
- HYPACK software compatibility
- Environmentally sealed (IP67) or Subsea Enclosure (200 meters depth)
- Affordable price

Our MRU's featuring developed few micro g Bias in-run stability Micro Electro Mechanical System (MEMS)-based accelerometers. New generation of DILABS 1 deg/hr Bias in-run stability MEMS-based gyroscopes are an ideal solution for demanding marine applications, with their electronic nature negating the problems associated with expensive mechanical gyro solutions, as well as those based on fiber optic (FOG) technology. DI Labs MEMS gyroscopes set the standard for the industry, with our high-end MRUs featuring gyros that enable sector-leading accuracy and reliability standards.

MEASURED PARAMETER	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-B1 (Heave or Pitch & Roll measurement) and MRU-B2/B22 (Heave, Pitch & Roll measurements) are available

MRU SPECIFICATIONS

PARAMETER	UNITS	MRU-B (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
Basic Output signals		Heave, Heave Velocity, Heave Acceleration, Surge, Sway, Pitch & Roll, Pitch & Roll Rate, Pitch & Roll Velocity, Accelerations, Angular rates, Significant Wave Height, Temperature, Barometric data, Pulse Per Second (PPS)		
Output data formats		Kongsberg/Seatex, Ship Motion Control SMC, Teledyne TSS*		
Additional output signals			Heading / Yaw	Heading/Yaw GPS/GLONASS/GALIELO/ BeiDou/SBAS/DGPS/RTK Positions, Velocity
Compatibility		SBES/MBES: Teledyne; R2Sonic; WAASP; Kongsberg; EdgeTech; NORBIT; IMAGENEX HYPACK, QINSY and Novatel Inertial Explorer software*		
Update rate	Hz	1 ... 200 (user settable)	1 ... 200 (user settable)	1 ... 200 (user settable)
Internal Data Logger			64 GB (optional)	
Start-up time	sec	<1	<1	<1

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HEAVE, SURGE, SWAY	UNITS	MRU-B (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
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)
Delayed Accuracy, RMS	% (meters)	3 (0.03)	3 (0.03)	3 (0.03)
PITCH & ROLL	UNITS	MRU-B (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
Range: Pitch, Roll	deg	±90, ±180	±90, ±180	±90, ±180
Angular Resolution	deg	0.005	0.01	0.01
Dynamic Accuracy	deg RMS	0.02 (MRU-B1, B1.1, B2) 0.01 (MRU-B22)	0.02	0.02
HEADING	UNITS	MRU-B (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
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 ⁽¹⁾	deg RMS		0.1	0.1
POSITIONS, VELOCITY AND TIMESTAMPS	UNITS	MRU-B (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
Horizontal position accuracy (GPS L1), RMS	meters			1.5
Horizontal position accuracy (SBAS), RMS	meters			0.6
Horizontal position accuracy (DGPS), RMS	meters			0.4
Horizontal position accuracy (RTK), RMS	meters			0.01 + 1 ppm
Horizontal position accuracy (Oceanix Nearshore), RMS ⁽³⁾	meters			0.03
Horizontal position accuracy (VERIPOS), RMS ⁽³⁾	meters			1-0.05
Horizontal position accuracy (post processing) ⁽¹⁾	meters			0.005
Velocity accuracy, RMS	meters/sec			0.03
GNSS raw data rate	Hz			20
Timestamps accuracy	nano seconds	20	20	20
GYROSCOPES	UNITS	MRU-B (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
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 (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
Measurement range	g	±8	±8	±8
Bias in-run stability (RMS, Allan Variance)	mg	0.005	0.005	0.005
Noise density	mg√hz	0.025	0.025	0.025
MAGNETOMETERS	UNITS	MRU-B (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
Measurement range	Gauss		±1.6	±1.6
Bias in-run stability, RMS	nT		0.2	0.2
Noise density	nT√hz		0.3	0.3
PRESSURE	UNITS	MRU-B (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
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 (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
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	100,000	100,000	100,000
Vibration		IEC 60945/EN 60945	IEC 60945/EN 60945	IEC 60945/EN 60945
ELECTRICAL	UNITS	MRU-B (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
Supply voltage	V DC	9 to 36	9 to 36	9 to 36
Power consumption	Watts	1 (2 with data logger)	1.4 (2.4 with data logger)	3.5 (4.5 with data logger)
Output Interface		Ethernet, RS-232, RS-422, CAN		
Output data format		Binary, TSS-1, NMEA 0183 ASCII, Kongsberg /Seatex, SMC, Teledyne*		
Compliance to EMCD, immunity/emission		IEC 60945/EN 60945	IEC 60945/EN 60945	IEC 60945/EN 60945
Connector ⁽²⁾		Binder Series 723	Binder Series 723	Binder Series 723 & TNC
PHYSICAL	UNITS	MRU-B (BASIC)	MRU-E (ENHANCED)	MRU-P (PROFESSIONAL)
Size	mm	120 x 50 x 53	245 x 140 x115	120 x 50 x 53
Weight	Gram	220	6570	320
Enclosure		IP-67	Subsea (1000m)	IP-67



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