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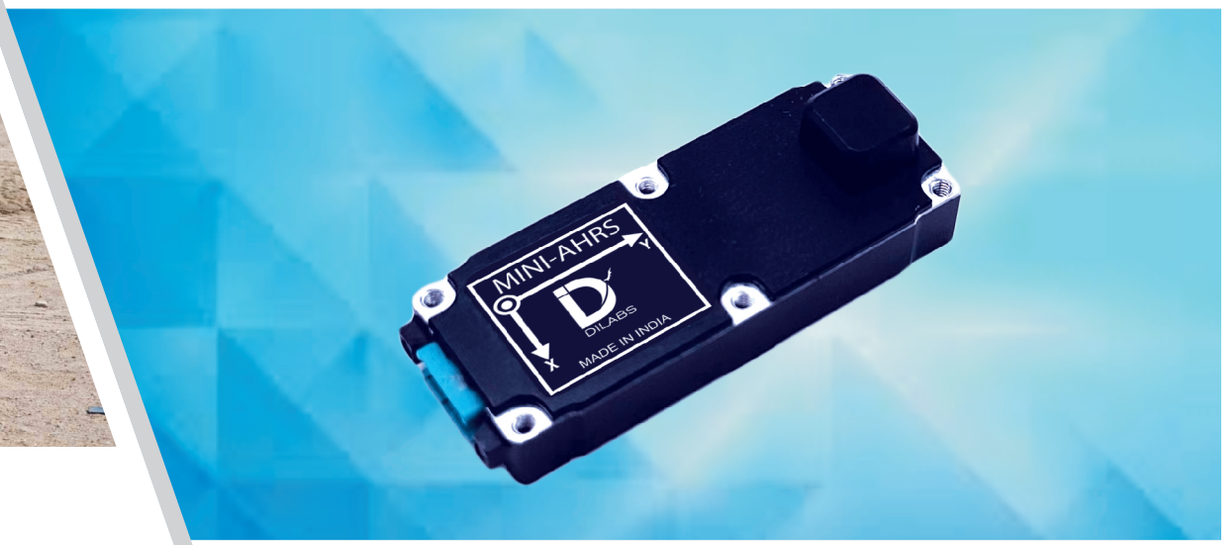
MINIATURE INERTIAL LABS ATTITUDE AND HEADING REFERENCE SYSTEM (MiniAHRS)

DILABS®



The Miniature Attitude and Heading Reference System, MiniAHRS is a high-performance strapdown system that determines absolute orientation (heading, pitch and roll) for any device on which it is mounted. Orientation is determined with high accuracy for both motionless and dynamic applications.

The MiniAHRS utilizes 3-axes each of precision accelerometers, magnetometers and gyroscopes to provide accurate Heading, Pitch and Roll of the device under measure. Integration of gyroscopes' output provides high frequency, real-time measurement of the device rotation about all three rotational axes. Accelerometers and Fluxgate magnetometer measure absolute Pitch, Roll and magnetic Azimuth at AHRS initial alignment as well as providing ongoing corrections to gyroscopes during operation.

PARAMETER	MiniAHRS
Heading static accuracy, RMS	0.3 deg
Heading dynamic accuracy in temperature range, RMS	0.6 deg
Pitch & Roll static accuracy, RMS	0.08 deg
Pitch & Roll dynamic accuracy in temperature range, RMS	0.1 deg
Dimensions	53x19x13 mm
Weight	20 grams
Interface	RS-422

KEY FEATURES AND FUNCTIONALITY

- One model with multiple configurations at an exceptional price performance ratio
- State-of-the-art algorithms for different dynamic motions of Robots, UAV, UUV, UGV, AGV, ROV, Gimbals and Antennas
- Highly accuracy Magneto-Inductive and Fluxgate magnetometers
- Gyro-Stabilized Slaved Magnetic Heading
- Suitable for Primary Attitude Reference
- Advanced Kalman Filter based sensor fusion algorithms
- Embedded 2D and 3D magnetic calibration on hard and soft iron
- All solid-state components (no moving parts)
- Full temperature calibration of all sensing elements
- Environmentally sealed (IP67) and Compact design

AHRS uses mini–Fluxgate Magnetometers which has distinct advantages over commonly used magneto-inductive or magneto-resistive magnetometers. In operation over time and temperature fluxgate magnetometers have superior stability and repeatability. In terms of sensitivity, fluxgate magnetometers provide up to two orders of magnitude increased sensitivity. In addition to the performance advantages, unlike the chip-level magnetometer technology, fluxgate magnetometer technology has been depended on for over 70 years to provide an accurate reference to North. It remains the most reliable magnetic sensor technology for determining an object's heading.

MINIATURE ATTITUDE AND HEADING REFERENCE SYSTEM, MiniAHRS

MiniAHRS KEY PERFORMANCE

PARAMETER	UNITS	MiniAHRS
Output signals	Euler angles; Quaternion; Relative Altitude; IMU data (angular rates, accelerations); Magnetic field; Pressure; Delta Theta, Delta Velocity	
Update rate	Hz	1 … 200 (user settable)
Start-up Time	Sec	<1
HEADING	**UNITS**	**MiniAHRS**
Range	deg	0 to 360
Angular Resolution	deg	0.01
Static Accuracy in Temperature Range	deg, 1σ	0.3
Dynamic Accuracy	deg RMS, 1σ	0.6
PITCH & ROLL	**UNITS**	**MiniAHRS**
Range: Pitch, Roll	deg	±90, ±180
Angular Resolution	deg	0.01
Static Accuracy in Temperature Range	deg, 1σ	0.05
Dynamic Accuracy	deg RMS, 1σ	0.08
GYROSCOPES	**UNITS**	**MiniAHRS**
Measurement range	deg/sec	±2000
Bandwidth (-3dB)	Hz, 1σ	260
Data Update Rate	Hz, 1σ	2000
Bias in-run stability (RMS, Allan Variance)	deg/hr, 1σ	2
Bias repeatability (turn-on to turn-on, RMS)	deg/hr, 1σ	20
Bias instability (over temperature range, RMS)	deg/hr, 1σ	72
SF accuracy over temperature range	ppm, 1σ	1000
Noise (Angular Random Walk)	deg/√hr, 1σ	0.38
Non-linearity	ppm, 1σ	350
Axis misalignment	mrad, 1σ	0.15
ACCELEROMETERS	**UNITS**	**MiniAHRS**
Measurement range	g	±8, ±15, ±40
Bandwidth	Hz, 1σ	260
Data Update Rate	Hz, 1σ	2000
Bias in-run stability (RMS, Allan Variance)	mg, 1σ	0.01, 0.03, 0.05
Bias instability (in temperature range, RMS)	mg, 1σ	0.7, 1.1, 1.5
Bias one year repeatability	mg, 1σ	1.5, 2.0, 2.5
SF accuracy over temperature range	ppm, 1σ	500, 700, 850
SF one year repeatability	ppm, 1σ	800, 1400, 1700
Noise (Angular Random Walk)	m/sec/√hr, 1σ	0.02, 0.045, 0.06
Non-linearity	ppm, 1σ	340, 800, 1000
Axis misalignment	mrad, 1σ	0.15, 0.15, 0.2
MAGNETOMETERS	**UNITS**	**MiniAHRS**
Measurement range	Gauss	±8.0
Bias in-run stability, RMS	µGauss, 1σ	8
Noise density, PSD	µGauss /√Hz, 1σ	15
SF accuracy	ppm, 1σ	500
ENVIRONMENT	**UNITS**	**MiniAHRS**
Operating temperature	deg C	-40 to +70
Storage temperature	deg C	-50 to +85
Operational Vibration	gRMS, Hz	7g, 20 – 2000 Hz
Operational Shock	g, sec	40g, 0.01 sec
MTBF (GM)	hours	600,000
ELECTRICAL	**UNITS**	**MiniAHRS**
Supply voltage	V DC	5 to 15
Power consumption	Watts	0.5
Output Interface		RS-422
Output data format		Binary, ASCII (in GUI)
PHYSICAL	**UNITS**	**AHRS-II-P**
Size	mm	53 x 19 x 13
Weight	Gram	20

DILABS®

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