

LandMark™ 10 AHRS



- **Best-in-Class Performance in Low Cost AHRS Category**
- **Low Noise Silicon MEMS AHRS**
- **Low Gyro Noise** 0.012°/sec/√Hz
- **Low Accel Noise** 0.07mg/√Hz (2g)
- **In-Run Gyro Bias** 25°/hour 1 σ
- **Heading (Yaw) Angles** $\pm 0.5^\circ$ stationary
- **Pitch & Roll Angles** $\pm 0.25^\circ$ stationary
- **Altitude** ± 3 meter 1 σ
- **Fully Temperature Compensated Bias and Scale Factor**
- **Compensated Misalignment** 1mrad 1 σ and **g-Sensitivity** $< 0.03^\circ$ /sec/g 1 σ
- **External Sync Input** (1kHz or 1pps)
- **Low Power** < 520 mW typical
- **Low Voltage** +3.3V (single sided power)
- **Light Weight** 119 grams
- **Small Size** < 72 cm³/4.4in³
- **Turning Error & Acceleration Corrections** (external velocity required)
- **Bandwidth Filtering Capability**
- **RS485 Data Rate** 100 Hz (user selectable)
- **Internal Vibration Isolation**

**Rugged, Low Power, Low Noise
& Low Cost MEMS AHRS**

Export Classification: Commerce ECCN7A994

The all new and improved LandMark™ 10 AHRS features low noise gyros and accelerometers with excellent in-run bias as well as over temperature bias performance with ruggedized environmentally sealed packaging enclosure and a MILSPEC

connector. This **low cost** AHRS is ideal for low cost applications with challenging environmental requirements. Other features include: low power consumption, small size, light weight, long life MTBF and enhanced packaging with environmental sealing and EMI protection. The signature feature of the unit is the **low noise**

gyros and accelerometers. This is combined with an accurate magnetometer for heading, that is calibrated over temperature, as well as pitch and roll angle outputs. The AHRS's performance is optimized with **fully temperature compensated bias and scale factor and compensated misalignment and g-sensitivity.** The unit is highly durable and employs an FEA designed internal vibration isolator that can withstand environmental vibration and shock typically associated with commercial aircraft requirements. LandMark™ IMU's include built-in firmware to accept external velocity as well as an external sync input 1 kHz (or 1pps indication). The unit is well suited for the harsh environments of commercial aircraft, marine, automotive and motorcycle testing, motorsports and yacht racing. Custom ranges available.



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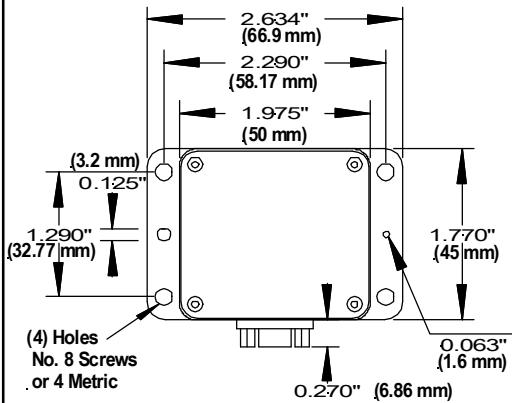
High Performance Inertial MEMS

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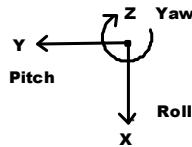
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LandMark™ 10 AHRS



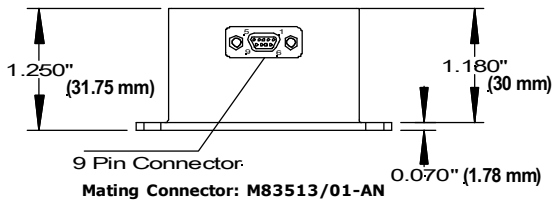
Axes (Top View)
Right Hand Rule



LandMark™ 10 AHRS

LMRK10AHRS-075-02-200
LMRK10AHRS-075-10-200
LMRK10AHRS-150-02-200
LMRK10AHRS-150-10-200
LMRK10AHRS-300-02-200
LMRK10AHRS-300-10-200

Specification



Pin No.	Assignment
1	RS-485 A (+)
2	RS-485 B (-)
3	Power Ground
4	Analog/Digital Input (0V to 5V)
5	+3.1V to +5.5V Input Power
6	External Sync Input (1kHz or 1pps)
7	+5V Regulator Out
8	Signal Ground
9	Self Test

Note: Any unused inputs (Pins 4, 6, 9) must be connected to signal ground (Pin 8).

Outputs	Serial Sequence at 100Hz
1, 2, 3	Gyros: Roll (X), Pitch (Y), Yaw (Z)
4, 5, 6	Accelerometers: (X), (Y), (Z)
7	IMU Temperature
8, 9, 10	Magnetometers: (X), (Y), (Z)
11	Pressure
12, 13, 14	Angles: Roll, Pitch, Yaw
15, 16, 17	AC Velocities: (X), (Y) & Vertical Velocity: (Z)
18, 19, 20	Altitude, Temp, Forward Velocity (As Input)

User to provide either analog or external velocity for velocity functions to be enabled (pin 4).

PARAMETER	RATE AXES			ACCEL AXES	
Range	±75°/sec	±150°/sec	±300°/sec	±2 g's	±10 g's
Bias (Over Temp.)	<0.1°/sec 1σ			<3mg 1σ	<5mg 1σ
Bias (In Run Stability)	25°/hour 1σ			0.1mg 1σ	0.25mg 1σ
Scale Factor Error %	≤0.2% (over temperature) 1σ				
Sensor Resolution	0.007°/sec			0.025mg	0.25mg
Angle Random Walk	0.012° /sec/√Hz 1σ			0.07mg /√Hz 1σ	0.15mg /√Hz 1σ
Heading	± 0.5° stationary				
Pitch & Roll	± 0.25° stationary				
Altitude	± 3m 1σ				
Alignment	1 mrad 1σ				
G-Sensitivity	<0.03°/sec/g 1σ				
Self Test On	Δ 50 ± 25°/sec			Δ1.5g ±0.5g	Δ0.6g ±0.4g
Temp Range	Logic 1 = 3V to 5V at Pin 9				
	Operating:	-40° C to +85° C			
	Non-Operating:	-55° C to +85° C			
Update Rate	100 Hz or 10 Hz (user selectable)				
Temp Sensors	3 Internal Temperature Sensors				
Start-up Time	< 0.65 sec AHRS 200Hz				
Input Power	+3.1V to 5.5V Max. Input (single sided)				
Power Consumption	516 mW at 3.3V Typical 800 mW at 3.3V Maximum				
Size	U.S.:	1.97 x 1.77 x 1.25 = 4.4 in ³			
	Metric:	5 x 4.5 x 3.2 = 72 cm ³			
Weight	119 grams				
Mounting	4ea No.8 or M4 Screws				
Shock	500g's ½ sine 30 msec powered				
Vibration	6gRMS (20Hz to 2kHz ~ 10g accelerometers)				
MTBF	31,428 hrs (per MIL-STD-217F, Notice 2 based on AIC environment with ambient temperature at 40°C)				

Specification subject to change without notice



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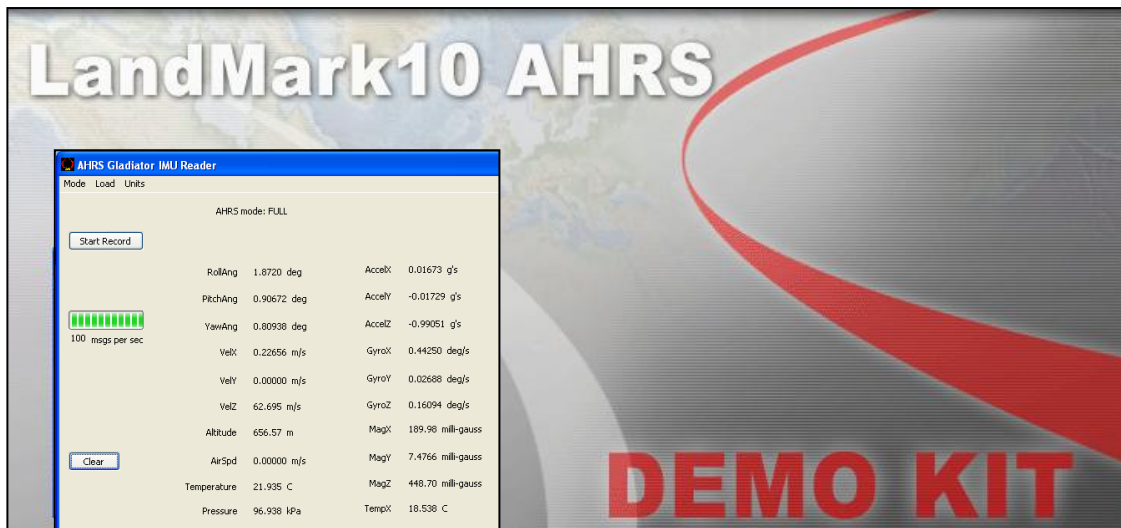
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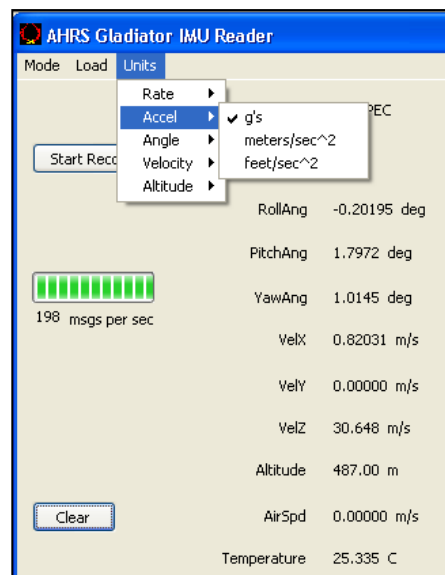
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LANDMARK10 AHRS DEMO KIT



- Turn-Key Solution for LandMark10 AHRS on User's PC
- All Software, Cabling, Interface Connectors Included and Ready for Use
- Easy Integration of Direct AHRS RS485 to PC's RS232 or USB Interface
- Extensive PC Display Software
- Data Record Capability
- User Selectable Bandwidth Settings and Data Output Rate
- User Selectable Units of Measure
- User Loading of Coefficients for System Optimization
- Self-Contained Power Supply with either Battery or User Supplied Power
- Battery Supply Has 24 Hours of Operating Life *Typical*
- Self-Test Capability



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LANDMARK10 AHRS DEMO KIT

LandMark10 AHRS DEMO Kit
 LMRK10AHRS-DEMO-110

The LandMark 10 Demonstration Kit is an optional product to assist first time users of the LandMark10 in order to facilitate a rapid setup, test and use of the unit (P/N: LMRK10AHRS-DEMO-110). Please contact the factory or your local Gladiator Representative for in-country service and support at www.GladiatorTechnologies.com.

The LandMark 10 Demonstration Kit includes all cabling required to interface directly from the AHRS's RS485 interface to a PC's RS232 or USB interface. Also included is a RS485 to RS232 converter, cabling and mating connectors. The converter cable includes battery powered power supply (there is also wiring on the cable to enable the user to supply their own + 3.3V (+ 1.3V, -0.3V) power and a self-test switch. The battery power supply uses three 1.5 Volt AA batteries (included with shipment) and supplies user battery power on the AHRS for about 24 hours typical. In addition, PC display software is included which enables the user to display each channel of rate and acceleration, each axis' angle output, altitude, temperature as well as to monitor Self Test Pass parameters and magnetic calibration capability. The software also enables the user to record data sets of their choosing in .CSV format for export in Excel or other user database. Many other features allow user selectable setting of the bandwidth filter, output data rate and units of measure.

The image displays four screenshots of the AHRS Gladiator IMU Reader software interface with callouts:

- Self Test is Active:** Points to a green progress bar and a "Start Record" button in the main data display window.
- User Defined Units of Measure:** Points to a dropdown menu showing options for Rate, Accel (g's), Angle (meters/sec^2), Velocity (feet/sec^2), and Altitude.
- Data Record Capability and Select Data Rate:** Points to a "Start Record" button and a data rate indicator showing "198 msgs per sec".
- Load Coefficients Capability to Optimize System Performance:** Points to the "Upload AHRS Coefs" dialog box, which contains fields for Coef Revision, Filter K, Wheel Diameter, Airspeed Offset, Mag Deviation, Initial Altitude, and various scaling factors (Roll, Pitch, Yaw, XVel, YVel, ZVel).
- User Selectable:** Points to a "Set Filter" dropdown menu with options ranging from 75Hz to 1Hz, and buttons for "Load AHRS Coefs" and "Zero Out Airspeed".

Specification subject to change without notice.



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