

## LandMark™ 10 Vertical Gyro (VG)



- **Low Cost & Rugged Vertical Gyro**
- **Vertical Gyro** (No Magnetometers)  
*Pitch & Roll Angles  $\pm 0.25^\circ$  stationary*
- **Low Gyro Noise**  $< 0.012^\circ/\text{sec}/\sqrt{\text{Hz}}$   $1\sigma$
- **Low Accel Noise**  $< 0.07\text{mg}/\sqrt{\text{Hz}}$   $1\sigma$
- **In Run Gyro Bias**  $25^\circ/\text{hour}$   $1\sigma$
- **Fully Temperature Compensated Bias and Scale Factor**
- **Compensated Misalignment**  $1\text{mrad}$   
**and g-Sensitivity**  $< 0.03^\circ/\text{sec}/g$   $1\sigma$
- **Low Power**  $300\text{ mW}$  typical
- **Low Voltage**  $+3.1$  to  $+5.5\text{V}$  (single sided)
- **Light Weight**  $< 102$  grams
- **Small Size**  $< 72\text{cm}^3/4.4\text{in}^3$
- **Wide Sensor Bandwidth**  $140\text{ Hz}$
- **Bandwidth Filtering Capability**
- **RS485 Output**  $100\text{ Hz}$  (user selectable)
- **External Sync Input** ( $1\text{ kHz}$  or  $1\text{pps}$ )
- **Internal Vibration Isolation**
- **Precision Alignment**
- **3 Internal Temperature Sensors**
- **Self Test & Shock Resistant**

**Low Noise & Excellent Bias  
Rugged Vertical Gyro**

Export Classification: Commerce ECCN7A994

The all new LandMark™ 10 VG "LN Series" builds upon the extensive LandMark™ 10 IMU and AHRS product lineage and is now offered with a substantially improved upgrade employing our latest low noise gyro technology for improved bias and with improved environmental sealing and MIL-SPEC connector. It provides internally temperature compensated RS485 output of delta velocity and delta theta as well as VG pitch and roll angle outputs. This VG is ideal for applications requiring **low cost**, ultra low power consumption, rugged packaging, small size, light weight and no inherent wear out modes



for long life. The signature feature of the unit is the **accurate pitch & roll angle** performance, which is optimized with **fully temperature compensated bias and scale factor, 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™ VG's include built-in firmware to accept external velocity as well as an external sync input  $1\text{ kHz}$  (or  $1\text{pps}$  indication). This VG is well suited for low cost flight control, land vehicle stabilization, platform and antenna stabilization, general aviation as well as laboratory use where low gyro noise, small size, low power, light weight and low cost are required.



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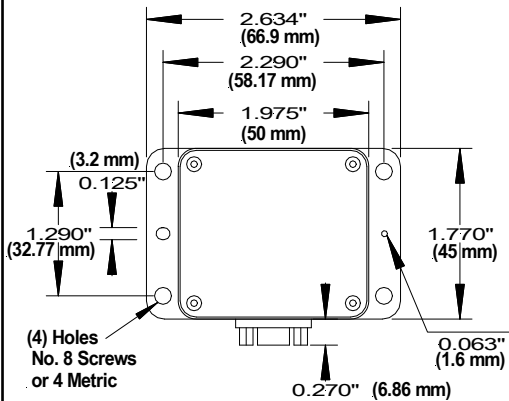
High Performance Inertial MEMS

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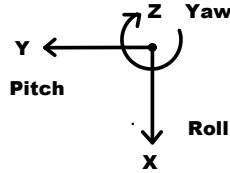
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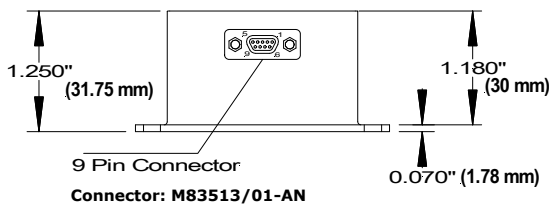
Axes (Top View)  
Right Hand Rule



### LandMark™ 10 VG

LMRK10VG-075-02-100 or -10  
LMRK10VG-150-02-100 or -10  
LMRK10VG-300-02-100 or -10

## Specification



9 Pin Connector  
Connector: M83513/01-AN

Pin No.	Assignment
1	RS-485 A (+)
2	RS-485 B (-)
3	Power Ground
4	Analog/Digital Input (0V to 5V)
5	<b>+3.1V to +5.5V Max Input Power</b>
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	No Magnetometers: (X), (Y), (Z)
11	No Pressure
12, 13, 14	Angles: Roll, Pitch, Zero Yaw
15, 16, 17	AC Velocities: (X), (Y) & Vertical Velocity: (Z)
18, 19, 20	No Altitude, Temp, Forward Velocity (As Input)

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			0.035mg	0.25mg
Angle Random Walk	0.012° /sec/√Hz 1σ			0.07mg /√Hz 1σ	0.15mg /√Hz 1σ
Pitch & Roll	± 0.25° stationary				
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
	Logic 1 = 3V to 5V at Pin 9				
Temp Range	Operating: -40°C to +85°C Non-Operating: -55°C to +85°C				
Update Rate	100 Hz (VG Full Mode)				
Temp Sensors	3 Internal Temperature Sensors				
Start-up Time	< 0.65 sec VG 100 Hz				
Input Power	<b>+3.1V to 5.5V Max. Input (single sided)</b>				
Power Consumption	440 mW at 3.3V Typical 500 mW at 3.3V Maximum				
Size	U.S.:	1.97 x 1.77 x 1.25 = 4.4 in <sup>3</sup>			
	Metric:	5 x 4.5 x 3.2 = 72 cm <sup>3</sup>			
Weight	≤ 105 grams				
Mounting	4ea No.8 or M4 Screws				
Shock	500g's ½ sine 30 msec powered				
Vibration	6gRMS (20Hz to 2kHz ~ 10g accelerometers)				
MTBF	55,279 hrs (per MIL-STD-217F, Notice 2 based on AIC environment with ambient temperature at 40°C)				

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

Specification subject to change without notice



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