

## LandMark™ 20 Vertical Gyro (VG)



- **Low Noise Silicon MEMS Vertical Gyro**  
*Pitch & Roll Angles  $\pm 0.25^\circ$  stationary (No Mags)*
- **Low Gyro Noise**  $0.01^\circ/\text{sec}/\sqrt{\text{Hz}}$  ( $75^\circ/\text{sec}$ )
- **Low Accel Noise**  $0.05\text{mg}/\sqrt{\text{Hz}}$  ( $2g$ )
- **In-Run Gyro Bias**  $15^\circ/\text{hour } 1\sigma$
- **Velocity Input Port** (*Analog or Digital*)
- **Rugged Environmentally Sealed Packaging & MILSPEC Connector**
- **Fully Temperature Compensated Bias and Scale Factor**
- **Compensated Misalignment**  $1\text{mrad}$  and **g-Sensitivity**  $<0.02^\circ/\text{sec}/g$   $1\sigma$
- **External Sync Input** ( $1\text{kHz}$  or  $1\text{pps}$ )
- **Low Power**  $<400$  mWatt typical
- **Low Voltage**  $+3.3\text{V}$  (*single sided power*)
- **Light Weight**  $105$  grams
- **Small Size**  $< 72\text{cm}^3/4.4\text{in}^3$
- **Bandwidth Filtering Capability**
- **RS485 Data Rate**  $100$  Hz (*user selectable*)
- **Internal Vibration Isolation**
- **Precision Alignment**
- **Internal Temperature Sensors**

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

Export Classification: Commerce ECCN7A994

The latest model of the LandMark™ 20 VG is our mid-performance version of our small LandMark™ VG family and is 10/20/40 form, fit and function interchangeable.. The unit outputs pitch & roll angles and features low noise gyros and accelerometers with exceptional over temperature bias performance as well as ruggedized environmentally sealed packaging and a MILSPEC connector. Velocity input is built-in with 2 formats, analog 0 to 5V or digital pulse counts supplied by the customer. The unit also features low power consumption, small size, light weight and long life MTBF. The **signature feature** of the VG is the **low noise gyros and accelerometers**, which enable precision measurement. 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™ VG's also 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 automotive and motorcycle testing, motorsports racing, commercial aircraft and sea applications that require both low cost and high performance as well as rugged durability. Other standard ranges available (consult factory).

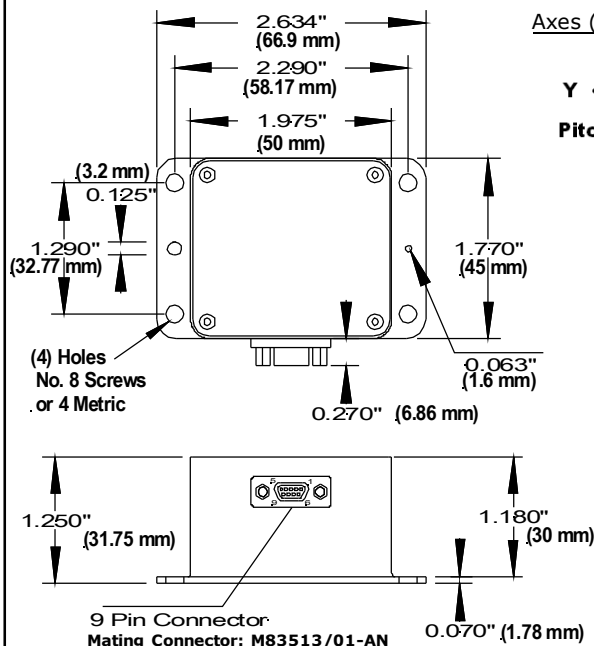


**Gladiator Technologies**  
High Performance Inertial MEMS

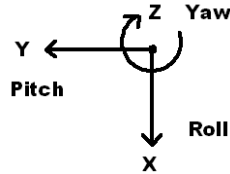
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Rev. 12Oct08  
SN: 150

## LandMark™ 20 Vertical Gyro (VG)



Axes (Top View) Right Hand Rule



### LandMark™ VG

LMRK20VG-075-02-100 or -10  
LMRK20VG-150-02-100 or -10  
LMRK20VG-300-02-100 or -10

## Specification

PARAMETER	RATE AXES			ACCEL AXES	
	±75°/sec	±150°/sec	±300°/sec	±2 g's	±10 g's
Range	±75°/sec	±150°/sec	±300°/sec	±2 g's	±10 g's
Bias (Over Temp.)	<0.05°/sec <i>typical</i>			< 1.0mg <i>1 σ</i>	< 1.5mg <i>1 σ</i>
Bias (In Run Stability)	15°/hour <i>1 σ</i>			0.02mg <i>1 σ</i>	0.1mg <i>1 σ</i>
Scale Factor Error %	≤0.1% (over temperature)				
Resolution	0.005°/sec			0.025mg	0.08mg
Angle Random Walk (Typical)	0.01°/ /sec/√Hz <i>1 σ</i>			0.05mg/ /√Hz <i>1 σ</i>	0.16mg/ /√Hz <i>1 σ</i>
Pitch & Roll Angles	± 0.25° <i>typical</i>				
Alignment	1mrad <i>typical</i>				
G-Sensitivity	<0.02°/sec/g <i>typical</i>				
Self Test On	Δ 50 ± 25°/sec			Δ 1.5 ±0.5g	Δ 0.3 ±0.2g
	Logic 1 = 3V to 5V at Pin 9 (open = off)				
Temp Range	Operating: -40°C to +85°C Non-Operating: -55°C to +85°C				
Pitch & Roll	± 0.25° <i>typical</i>				
Update Rate	100 Hz (user selectable)				
Temp Sensors	Internal Temperature Sensors				
Start-up Time	< 0.65 sec AHRs 200 Hz Spec Mode				
Input Power	<b>+3.1V to 5.5V Max. Input (single sided)</b>				
Power Consumption	400 mW at 3.3V <i>typical</i> 450 mW at 3.3V <i>maximum</i>				
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)				

Pin No.	Assignment
1	RS-485 A (+)
2	RS-485 B (-)
3	Power Ground
4	Analog/Digital Input (0V to 5V)
5	+3.3V ± 0.2V Input Power
6	External Sync Input (1kHz)
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)

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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