

# VG1000

## High Performance Vertical Gyro



### Main Features

- Precision 6 DoF MEMS Vertical Gyro
- Heading: Diverging 0.1°/hour
- Attitude Accuracy: Static <math>< 0.2^\circ(1\sigma)</math>, Dynamic <math>< 0.5^\circ</math>
- Range: Acc  $\pm 2g$ , Gyro  $\pm 300^\circ/s$ , (ODM supported)
- Wide Input Power Range: 5~18VDC
- Military Level Casing, High Survivability
- Compact and Lightweight: 50 x 45 x 21mm, 70grams
- Wide Working Temperature:  $-40^\circ C \sim +85^\circ C$

VG1000 Vertical Gyro is a standalone fully-integrated entry-level vertical gyro system that utilizes 6 DoF MEMS-based inertial sensors to provide unmatched value in terms of both price and performance. The VG1000 is a miniature factory-calibrated module to provide consistent performance through the extreme operating environments.

VG1000 Vertical Gyro provides a complete dynamic measurement solution in a miniature environmentally protected package. The VG1000 offers a highly-effective solution for cost-sensitive demanding applications. It adopts advanced MEMS components, which reduces the cost deeply. The system enjoys small size and light weight, it is widely applied in UAV Flight Control, Unmanned Vehicle Control, Platform Stabilization, Robotics Control, Antenna Stabilization, etc.

- ✓ 12-Step Quality Control, Super Reliability, More Functions
- ✓ Adopting Original Big Brand Component, High-class Material, Competitive Price

- ✓ Real Actual Precise after Calibration, Perfect Performance
- ✓ Successful Applications in Tens of Fields, More than 1000 Customers are Using

### Typical Applications



AGV



Antenna Pointing



Industrial Control



UAV Flight Control

### Super Reliability & Performance

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Focus on MEMS Measurement & Control Technologies, Products include:

MEMS Acc	MEMS Gyro	IMU	Vertical Gyro	AHRS
INS	GNSS/INS	E-compass	Inclinometer	FOG

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## High Performance Vertical Gyro

### Technical Specifications

Technical Specs		
Parameter	Value	Comments
<b>Heading</b>		
Range	±180°	
Accuracy	0.1°/hour	it is diverging with time, diverging speed is 0.1°/hour
Resolution	0.2°	
<b>Attitude</b>		
Range: Roll, Pitch	±180°, ±90°	
Accuracy	< 0.2°(1σ)	
Dynamic Accuracy	< 0.5°(RMS)	
Resolution	0.1°	
<b>Gyro</b>		
Range: Roll, Pitch, Heading	±300°/s ±75°/s, ±150°/s, ±900°/s	default setting optional
Noise	< 0.3°/s(RMS)	
Zero Error (25°C)	< 0.2°/s	
Bias Instability	24°/h (75°/s range) 40°/h (900°/s range)	typical value, Allen Variance
Bias Temperature Error	±3°/s	
Zero Drift Repeatability	0.14°/s(RMS)	
Scale Factor Non-linearity	0.2%	
Bias Acceleration Sensitivity	0.077°/s/g (typical) 0.17°/s/g (max)	
Rate Noise Density	0.025°/s/sqrHz	
Angle Random Walk Coefficient	0.28°/h	Allen Variance
Bias Vibration Sensitivity	0.001°/s/g2rms (typical) 0.003°/s/g2rms (max)	12g (RMS), 10Hz ~5kHz, random
Bandwidth	5~160Hz	

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### Technical Specifications

Technical Specs		
Parameter	Value	Comments
<b>Accelerometer</b>		
Range: X, Y, Z	±2g, ±6g	
Noise	< 5mg (RMS) (Max)	
Zero Error	±16mg (typical)	including calibration error, working drift
Bias Full Temperature Stability	±70mg (max)	including calibration error, working drift, power jitter and full temperature error
Bias Full Temperature Error	±30mg (max)	-40~+125°C
Scale Factor Error	±0.5% range (max)	
Scale Factor Temperature Drift	±0.8% range (max)	-40~+125°C
Resolution	0.5%	12bit
Bandwidth	30~55Hz	-3dB
<b>Environment Condition</b>		
Working Temperature	-40~+85°C	
Protection Level	IP67	
Electromagnetic compatibility	Compatible with EN61000 and GBT17626	
MTBF	≥5000hours	
Vibration Resistance	10grms, 10~1000Hz	
Shock Resistance	100g@11ms, 3 axes, (half sine wave)	
<b>Power Supply</b>		
Input Voltage	5~18VDC	
Current	60mA@9VDC	
<b>Communication Protocol</b>		
Default Interface	RS232	
Baud rate	115200	
Data Update Rate	100Hz	
<b>Physical Parameter</b>		
Dimension	50mm*45mm*21mm	
Weight	around 70 grams	
Connector	5 pin mini aviation connector	
Location Hole	4 holes	

# VG1000

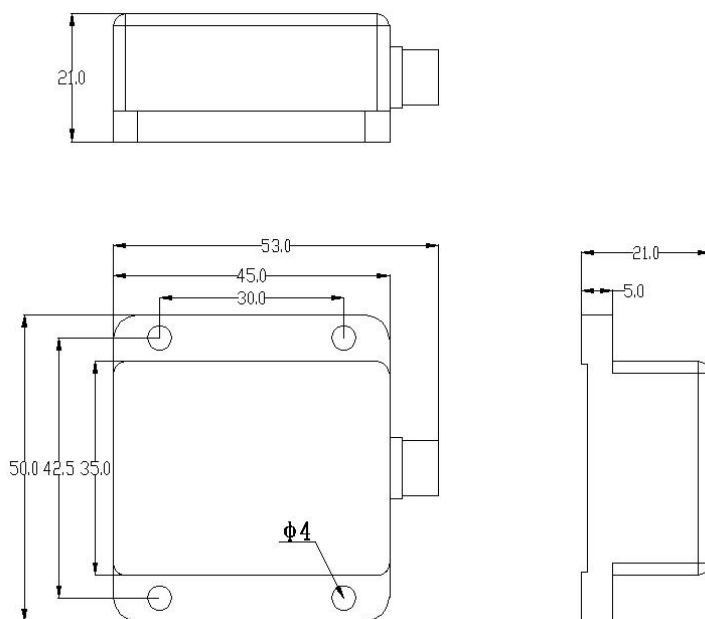
## High Performance Vertical Gyro

### Pins Definition

#### Pins Definition

Pins No.	5 pin mini aviation connector Line Color	Name	Description
1	Brown	Vcc	power positive pole
2	Black	GND	power ground
3	White	RS232_TX	RS232 data transmitting
4	Blue	RS232_RX	RS232 data receiving
5	Gray	RS232_GND	RS232 signal ground (short circuit with power ground inside the sensor)
6	-	-	disabled
7	-	-	disabled
8	-	-	disabled
9	-	-	disabled

### Dimension & Package



three-view drawing with 5 pin mini aviation connector

### Super Reliability & Performance

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## High Performance Vertical Gyro

### Communication Protocol

the electronic parameters of RS232 communication protocol are as follows:

- Baud rate: 115200
- Data bit: 8
- Stop bit: 1
- Check bit: none

#### VG mode:

the data string is sent out every 10ms, and each data string includes 58 bytes, the detailed description see as follows:

Data String Definition		
Name	Byte Length	Description
Initial Code	4	0x4E 0x4A 0x35 0x91
X axis of accelerometer	4	float mode floating number, 4 bytes, high byte in front, unit: g
Y axis of accelerometer	4	float mode floating number, 4 bytes, high byte in front, unit: g
Z axis of accelerometer	4	float mode floating number, 4 bytes, high byte in front, unit: g
X axis of gyro	4	float mode floating number, 4 bytes, high byte in front, unit:deg/s
Y axis of gyro	4	float mode floating number, 4 bytes, high byte in front, unit:deg/s
Z axis of gyro	4	float mode floating number, 4 bytes, high byte in front, unit:deg/s
X axis of magnetic sensor	4	0
Y axis of magnetic sensor	4	0
Z axis of magnetic sensor	4	0
Temperature	4	float mode floating number, 4 bytes, high byte in front, unit: °C
Heading Angle (divergence)	4	float mode floating number, 4 bytes, high byte in front, unit:deg
Roll Angle	4	float mode floating number, 4 bytes, high byte in front, unit:deg
Pitch Angle	4	float mode floating number, 4 bytes, high byte in front, unit:deg
Sum Check	2	high byte in front, low byte in behind, the sum of all the front data

Remarks: during turning on the sensor, please keep the sensor in static status, and after turning on the sensor, please keep the sensor in static status more than 10 seconds

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### Order Information



**VG1000:** model name

**XXX:** Gyro Measurement Range:  
 300 = ±300°/sec (Default)  
 075 = ±75°/sec  
 150 = ±150°/sec  
 900 = ±900°/sec

**XX:** Accelerometer Measurement  
 Range: 02= ±2g (Default)  
 06= ±6g

For example, VG1000-900-02-J means that the VG1000 with gyro range: ±900°/sec, accelerometer range: ±2g and it adopts J30J-mini DB9 connector.