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VG

FIBER OPTIC VERTICAL GYRO SYSTEM

- Fiber Optic Gyro Stability < 20°/hr
- Fully Compensated Angular Rate and Linear Acceleration Outputs
- SAE (Earth Coordinate) Navigation Frame
- Automotive Compatible 10-30 VDC Input Supply

Applications

- Automotive Testing

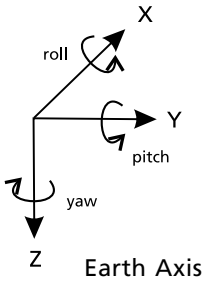
VG700AA

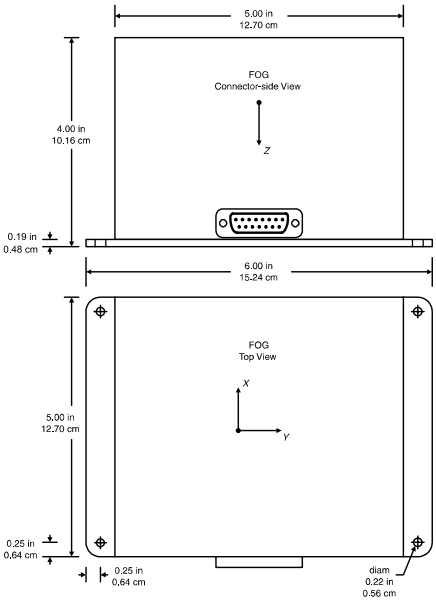
The Crossbow VG700AA is designed specifically for automotive test applications. It combines Crossbow's second generation high performance fiber optic gyros with the latest in silicon micro-machined (MEMS) accelerometer technology to provide a highly accurate dual function Vertical Gyro (VG) and Inertial Measurement Unit. The new second generation FOG sensor provides excellent bias stability of <20°/hr (constant temp.) and low noise.

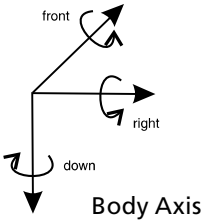
The VG700AA is available in two configurations: earth coordinates or body coordinates. The VG700AA-201 provides roll and pitch angle; roll, pitch and yaw angular rate; and X,Y, Z tangential acceleration (earth coordinate) in accordance with SAE Navigation Frame definition. The VG700AA-202 provides roll and pitch angle; roll, pitch and yaw angular rate; and X, Y, Z body-axis acceleration.

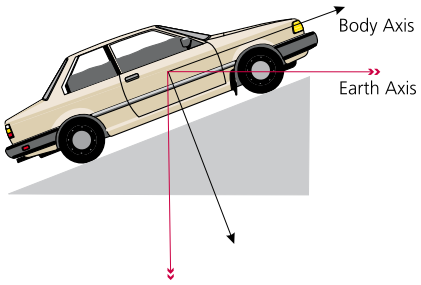
The VG700AA consists of three fiber-optic rate gyros, three silicon accelerometers, a high-performance DSP and automotive power supply all packaged in one small (6" x 5" x 4") aluminum housing. Fully compensated angular rate and linear acceleration outputs are provided in addition to the roll and pitch angles. Data is available in both analog and digital (RS-232) formats.

Each Inertial System comes with a User's Manual offering helpful hints on programming, installation, and product information. In addition, Crossbow's GYRO-VIEW software is included to assist you in system development and evaluation, and allows you to perform data acquisition.









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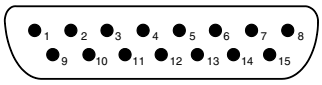
Specifications	VG700AA-201 VG700AA-202	Remarks
Performance		
Update Rate (Hz)	> 100	Continuous Update Mode
Start-up Time Valid Data (sec)	< 1	
Attitude		
Range: Roll, Pitch (°)	± 180, ± 90	
Static Accuracy (°)	<± 0.5	
Dynamic Accuracy (° rms)	2.5	
Resolution (°)	< 0.1	
Angular Rate		
Range: Roll, Pitch, Yaw (°/sec)	± 200	
Bias: Roll, Pitch, Yaw (°/hr)	< ± 20	Constant temp.
Bias: Roll, Pitch, Yaw (°/sec)	< ± 0.03	Over temp. (typical)
Scale Factor Accuracy (%)	< 2	Over temp. (typical)
Non-Linearity (% FS)	< 1	< 100 °/sec
Resolution (°/sec)	< 0.025	
Bandwidth (Hz)	> 100	-3 dB point
Random Walk (°/hr$^{1/2}$)	< 0.4	
Acceleration		
Range: X/Y/Z (g)	± 2	
Bias: X/Y/Z (mg)	< 8.5	
Scale Factor Accuracy (%)	<± 1	
Non-Linearity (% FS)	<± 1	
Resolution (mg)	<± 1	
Bandwidth (Hz)	> 10	-3 dB point
Random Walk (m/s/hr$^{1/2}$)	< 0.1	
Environment		
Operating Temperature (°C)	-40 to +71	
Non-Operating Temperature (°C)	-55 to +85	
Non-Operating Vibration (g rms)	6	20 Hz - 2 KHz random
Non-Operating Shock (g)	1000	1 ms half sine wave
Electrical		
Input Voltage (VDC)	10 to 30	
Input Current (A)	< 0.75	
Power Consumption (W)	< 8	At 15V DC
Digital Output Format	RS-232	"See Digital Data Format"
Analog[1] Range (VDC)	± 4.096	Pins 8, 9, 10, 12, 13, 14
	0 to 5.0	Pins 5, 6, 7
Physical		
Size (in)	5.0 x 6.0 x 4.0	Including mounting flanges
(cm)	12.70 x 15.24 x 10.16	Including mounting flanges
Weight (lbs)	< 3.5	
(kg)	< 1.6	
Connector	15 pin sub-miniature "D" male	

Notes
[1]All DAC analog outputs are fully buffered and are designed to interface directly to data acquisition equipment
Specifications subject to change without notice

15 Pin "D" Connector Male Pinout



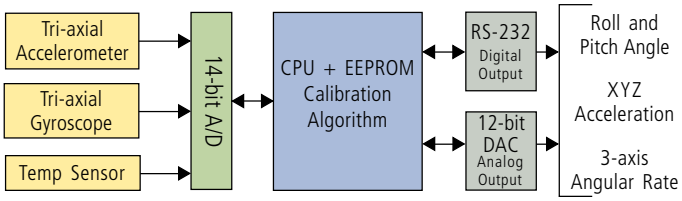
Pin	Function
1	RS-232 Transmit Data
2	RS-232 Receive Data
3	Input Power
4	Ground
5	X-axis accel analog voltage[1]
6	Y-axis accel analog voltage[1]
7	Z-axis accel analog voltage[1]
8	X-axis tangent accel scaled analog voltage[3]
9	Y-axis tangent accel scaled analog voltage[3]
10	Yaw rate analog voltage[2]
11	NC - Factory Use Only
12	Roll angle analog voltage[3]
13	Pitch angle analog voltage[3]
14	Z-axis tangent accel scaled analog voltage[3]
15	NC - Factory Use Only

Notes
1 The accelerometer voltage outputs are taken directly from the accelerometers without compensation or scaling. They represent acceleration in body axis coordinates.
2 The angular rate analog outputs are scaled to represent degrees/second. These outputs are created by a D/A converter.
3 Actual output depends on VG measurement mode. The pinout shown is for angle mode. In angle mode pin 12 is roll angle, pin 13 is pitch angle, pin 8 is X-axis acceleration Nav frame, pin 9 is Y-axis acceleration Nav frame, and pin 14 is Z-axis acceleration Nav frame. See manual for details.

Navigation Frame is defined as the axis system that is in the same plane as the earth coordinate system.

VG700AA-201 Pin Diagram*

*For VG700AA-202 refer to VG700CA-200 body coordinate pin diagram



VG Block Diagram

inertial systems

Ordering Information

Model	Description	Gyro (°/sec)	Accel (g)	Axis Coordinates
VG700AA-201	Fiber Optic Vertical Gyro	± 200	± 2	Earth
VG700AA-202	Fiber Optic Vertical Gyro	± 200	± 2	Body

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