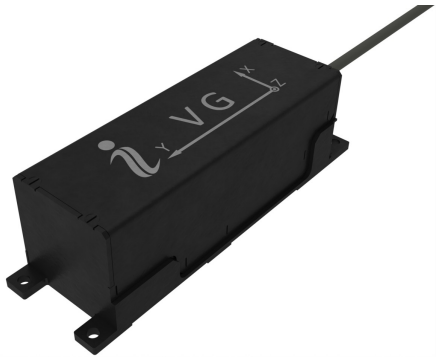
Inertial Labs™ Vertical Gyro System VG

Datasheet

Revision 1.4

Inertial Labs VG Datasheet

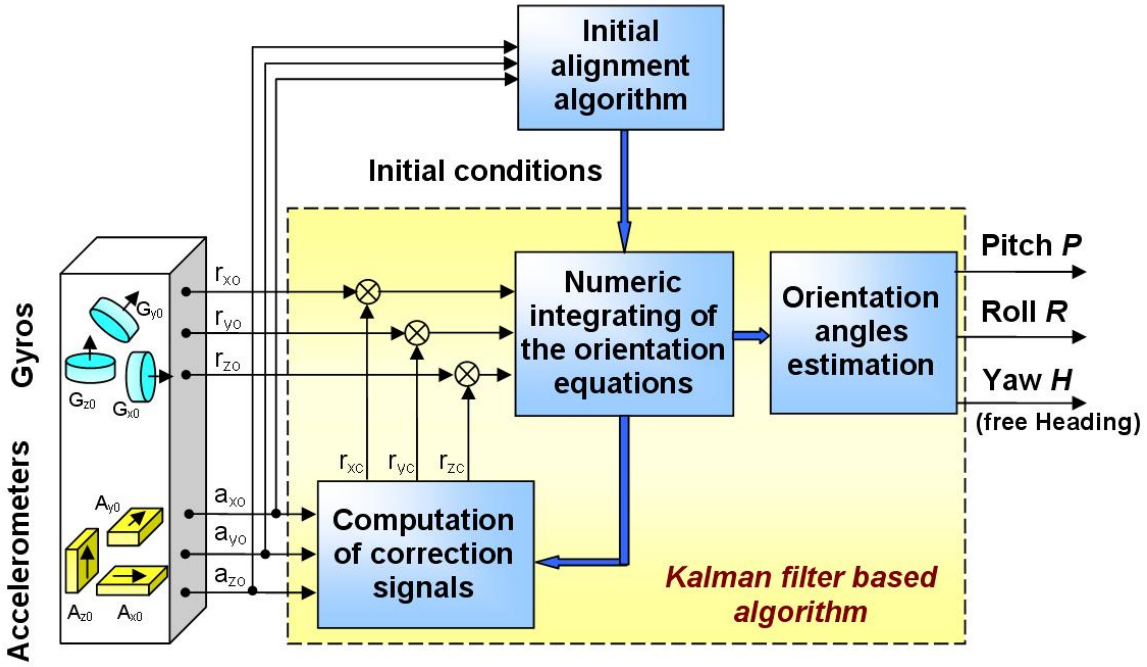
The **Inertial Labs™ Vertical Gyro - VG** is a high-performance strapdown Vertical Gyro system that determines absolute orientation Pitch, Roll and relative Yaw for any device on which it is mounted. It's tilt measurement is performed with high accuracy for both motionless and dynamic applications.



The Inertial Labs™ VG utilizes 3-axes each of precision accelerometers and gyroscopes to provide accurate Pitch, Roll and relative yaw of the device under measure. Integration of gyroscopes' output provides high frequency, real-time measurement of the device rotation about all three rotational axes. Accelerometers measure absolute Pitch and Roll at VG initial alignment as well as providing ongoing corrections to gyroscopes during operation.

KEY FEATURES AND FUNCTIONALITY

- No export restrictions. Export Classification: Commerce ECCN7A994
- State-of-the-art algorithms for different dynamic motions of Robots, UAV, UUV, UGV, AGV, ROV, Gimbals and Antennas
- Advanced, extendable, embedded Kalman Filter based sensor fusion algorithms
- All solid state components (no moving parts)
- Full temperature calibration of all sensing elements
- Up to 100Hz data update rate
- Tested to MIL-STD-810F, MIL-STD-461D and DO-160D standards
- Environmentally sealed (IP67)
- Compact design



Inertial Labs™ VG Block Diagram

Vertical Gyro Specifications

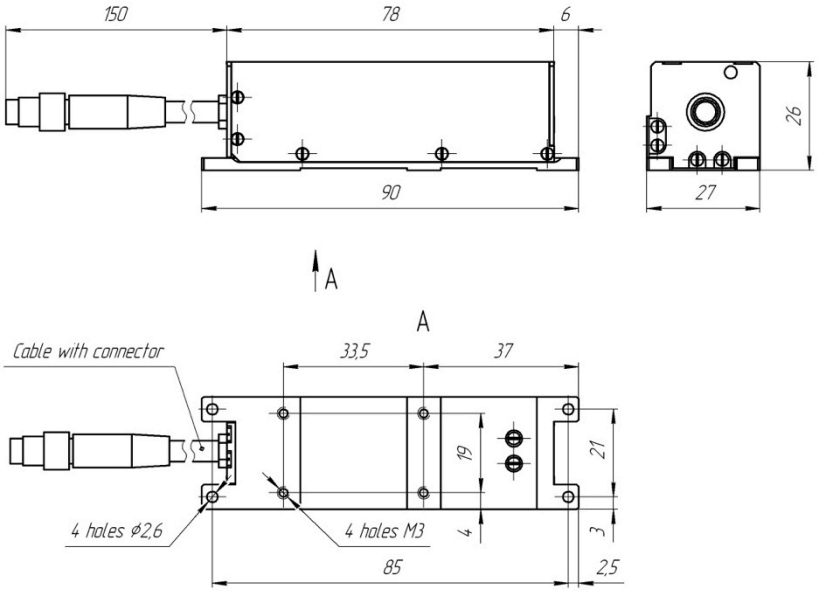
Parameter	Units	Vertical Gyro part numbers	
		VG-G300-A2-TGA-C1-V1.1	VG-G300-A6-TGA-C1-V1.1
Output signals		Euler angles; Quaternion; Accelerations; Angular rates; Delta Theta and Delta Velocity	
Update rate	Hz	1 … 100 (user settable)	
Start-up time	sec	< 1	
Full Accuracy Data (Warm-up Time) [1]	sec	30	
Attitude		VG-G300-A2-TGA-C1-V1.1	VG-G300-A6-TGA-C1-V1.1
Range: Pitch, Roll	deg	±90, ±180	
Angular Resolution	deg	0.01	
Static Accuracy in whole Temperature Range	deg	0.1	0.2
Dynamic Accuracy [2]	deg RMS	0.3	0.5
Noise (@100 Hz)	deg RMS	0.02	0.02
Angular Rate		VG-G300-A2-TGA-C1-V1.1	VG-G300-A6-TGA-C1-V1.1
Gyroscopes measurement range [3]	deg/s	±300	±300
In-run Bias Stability (RMS, Allan Variance)	deg/hr	30	30
Scale Factor Accuracy	%	0.1	0.1
Gyroscopes noise	deg/sec√Hz	0.035	0.035
Axis misalignment	mrad	0.15	0.15
Resolution	deg/sec	0.01	0.01
Bandwidth	Hz	50	50
Linear Acceleration		VG-G300-A2-TGA-C1-V1.1	VG-G300-A6-TGA-C1-V1.1
Accelerometers measurement range	g	±2	±6
In-run Bias Stability at Constant Temperature	mg RMS	0.05	0.1
Bias Stability in whole Temperature Range	mg RMS	1	2
Bias turn-on, turn-on repeatability	mg RMS	0.1	0.1
Scale Factor Accuracy	%	0.1	0.2
Accelerometers noise	mg√Hz	0.04	0.09
Axis misalignment	mrad	0.15	0.15
Resolution	mg	0.1	0.2
Bandwidth	Hz	50	50
Environment		VG-G300-A2-TGA-C1-V1.1	VG-G300-A6-TGA-C1-V1.1
Operating temperature	deg C	-40 to +70	
Storage temperature	deg C	-50 to +85	
Non-operating vibration [4]	g, Hz	10-50Hz, 0.15mm/55-500Hz 2.0g	
Non-operating shock [5]	g, ms	50g, 11ms, half sine wave	
MTBF	hours	55500	
Electrical		VG-G300-A2-TGA-C1-V1.1	VG-G300-A6-TGA-C1-V1.1
Supply voltage	V DC	+5.5 to +6.5	
Current draw in readiness mode	mA	85	87
Current draw in sleep mode	mA	15	15
Connector	-	6-Pin Binder 718 (Female)	
Output Interface [6]	-	RS-232	
Physical		VG-G300-A2-TGA-C1-V1.1	VG-G300-A6-TGA-C1-V1.1
Size	mm	90 × 27 × 26	
Weight	gram	70	

[1] including time of initial alignment, it may be decreased on request
[2] dynamic accuracy may depend on type of motion
[3] VG modification with ±1,000 deg/sec gyro measurement range is also available
[4] MIL-STD 810F. Method 514.5. Procedure I
[5] MIL-STD 810F. Method 516.5. Procedure I
[6] VG modification with NMEA protocol is also available

Inertial Labs Vertical Gyro Systems available models and part numbers

VG part number	Gyroscopes measurement range (±deg/sec)	Accelerometers measurement range (±g)	Interface	Attitude accuracy (deg)	
				Static	Dynamic
VG-G300-A2-TGA-C1-V1.1	300	2	RS-232	0.1	0.3
VG-G300-A2-TGA-C1-V1.2	300	2	RS-232-NMEA	0.1	0.3
VG-G300-A6-TGA-C1-V1.1	300	6	RS-232	0.2	0.5
VG-G300-A6-TGA-C1-V1.2	300	6	RS-232-NMEA	0.2	0.5
VG-G1000-A2-TGA-C1-V1.1	1,000	2	RS-232	0.1	0.3
VG-G1000-A2-TGA-C1-V1.2	1,000	2	RS-232-NMEA	0.1	0.3
VG-G1000-A6-TGA-C1-V1.1	1,000	6	RS-232	0.2	0.5
VG-G1000-A6-TGA-C1-V1.2	1,000	6	RS-232-NMEA	0.2	0.5

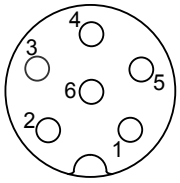
VG mechanical interface drawing



Notes:

1. All dimensions are in millimeters.
2. All dimensions within this drawing are subject to change without notice. Customers should obtain final drawings before designing any interface hardware.

VG electrical interface description



Inertial Labs VG
Binder Series 718 Female 6-Pin Connector Pin Out

Pin	Signal
1	Do not connect
2	Tx
3	Rx
4	GND
5	V_{DD}
6	Do not connect

For electrical connection of Inertial Labs VG to the host system, a Binder Series 718 male 6 pins cable connector (cordset), part # 79-3465-52-06 or compatible, should be used (see http://www.binder-usa.com/psearch_detail.php?pid=28850).