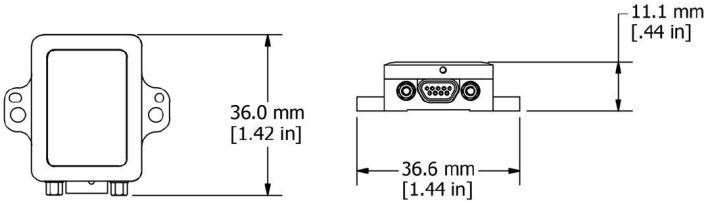
3DM-GX5-15
Vertical Reference Unit (VRU)

The LORD Sensing 3DM-GX5 family of high-performance, industrial-grade inertial sensors provides a wide range of triaxial inertial measurements and computed attitude and navigation solutions.

In all models, the Inertial Measurement Unit (IMU) includes direct measurement of acceleration and angular rate, and are fully temperature-compensated and calibrated over the operating temperature. Micro-Electro-Mechanical System (MEMS) technology allows for highly accurate, small, lightweight devices.

SensorConnect software is a user friendly program for device configuration. MIP Monitor (MicroStrain Internet Protocol) can also be used. Both packages provide for device configuration, live data monitoring, and recording. Alternatively, the MIP Data Communications Protocol (MSCL) is available for development of custom interfaces and easy OEM integration.

The sensor operates independent of computer platform, operating system, or coding language.



PRODUCT HIGHLIGHTS

- Triaxial accelerometer, gyroscope, magnetometer, temperature sensors achieve the optimal combination of measurement qualities
- Dual on-board processors run a new Auto-Adaptive Extended Kalman Filter (EKF) for outstanding dynamic attitude estimates
- Smallest, lightest, highest performance VR in its class

FEATURES AND BENEFITS

BEST IN CLASS PERFORMANCE

- Fully calibrated, temperature-compensated, and mathematically-aligned to an orthogonal coordinate system for highly accurate outputs
- Bias tracking, error estimation, threshold flags, and adaptive noise modeling allow for fine tuning to conditions in each application
- High-performance, low-drift gyros with low noise density and Vibrational Rectification Error.
- Accelerometer noise as low as 20 ug/√Hz

EASE OF USE

- SensorConnect enables simple device configuration, live data monitoring, and recording
- The MSCL API allows easy integration with C++, Python, .NET, C#, Visual Basic, LabVIEW and MATLAB environments.Robust, forward compatible MIP packet protocol
- MIP open byte level communication protocol
- User-defined sensor-to-vehicle frame transformationl

COST EFFECTIVE

- Out-of-the box solution reduces development time
- Volume discounts

APPLICATIONS

- Unmanned vehicle navigation
- Robotics
- Platform stabilization, artificial horizon
- Health and usage monitoring of vehicles

3DM-GX5-15 Vertical Reference Unit (VRU)

Specifications

General		
Integrated Sensors	Triaxial accelerometer, triaxial gyroscope, pressure altimeter, and temperature sensors	
Data Outputs	**Inertial Measurement Unit (IMU) outputs:** acceleration, angular rate, ambient pressure, Delta-theta, Delta-velocity **COMPUTED OUTPUTS** **Extended Kalman Filter (EKF):** filter status, attitude estimates (in Euler angles, quaternion,orientation matrix), bias compensated angular rate, pressure altitude, gravity-free linear acceleration, attitude uncertainties, gyroscope and accelerometer bias, scale factors and uncertainties, gravity models, and more. **Complementary Filter (CF):** attitude estimates (in Euler angles, quaternion, orientation matrix) stabilized, north and up vectors, GPS correlation timestamp	
Inertial Measurement Unit (IMU) Sensor Outputs		
	Accelerometer	**Gyroscope**
Measurement range	±8 g (standard) ±2 g, ±4 g, ±20 g, ±40 g (optional)	300°/sec (standard) ±75, ±150, ±900 (optional)
Non-linearity	±0.02 % fs	±0.02% fs
Resolution	0.02 mg (+/- 8 g)	<0.003°/sec (300 dps)
Bias instability	±0.04 mg	8°/hr
Initial bias error	±0.002 g	±0.04°/sec
Scale factor stability	0.03%	±0.05%
Noise density	20 µg/√Hz (2 g)	0.005°/sec/√Hz (300°/sec)
Alignment error	±0.05°	±0.05°
Bandwidth	225 Hz	250 Hz
Offset error over temperature	0.06% (typ)	0.04% (typ)
Gain error over temperature	0.03% (typ)	0.03% (typ)
Vibration induced noise	--	0.072°/s RMS/g RMS
Vibration rectification error (VRE)	--	0.001°/s/g² RMS
IMU filtering	Digital sigma-delta ADC sampled at 1kHz and 4kHz. 4kHz data averaged to 1kHz nominal sampling rate. Scaled into physical units at 1kHz. User adjustable IIR filter available for 1kHz data. Coning and sculling integrals computed at 1kHz.	
Sampling rate	1 kHz	4 kHz
IMU data output rate	1 Hz to 1000 Hz	
Pressure Altimeter		
Altitude Range	1260-260 mB (hPa) (-500 to 10,000m)	
Resolution	0.01 hPa RMS	
Relative Accuracy	±0.1 mB, over the range 800-1000mB @ T=25°C	
Sampling rate	25 Hz	

Computed Outputs	
Attitude accuracy	EKF outputs: ±0.25° RMS roll and pitch, (typ) CF outputs: ±0.5° roll and pitch (static, typ) and ±2.0° roll and pitch (dynamic, typ)
Attitude heading range	360° about all axes
Attitude resolution	< 0.01°
Attitude repeatability	0.2° (typ)
Calculation update rate	500 Hz
Computed data output rate	EKF outputs: 1 Hz to 500 Hz CF outputs: 1 Hz to 1000 Hz
Operating Parameters	
Communication	USB 2.0 (full speed) RS232 (9,600 bps to 921,600 bps, default 115,200)
Power source	+4 to + 36 V dc
Power consumption	500 mW (typ)
Operating temperature	-40°C to +85°C
Mechanical shock limit	500*g*/1ms
MTBF	557,280 hours (Telcordia method, GM/35C)
Physical Specifications	
Dimensions	36.0 mm x 36.6 mm x 11.1 mm
Weight	16.5 grams
Enclosure material	Aluminum
Regulatory compliance	ROHS, CE
Integration	
Connectors	Data/power output: micro-DB9
Software	SensorConnect and MIP Monitor software included; Windows XP/Vista/7/8/10 compatible
Data Communications Protocol (DCP)	Protocol compatibility across GX3, GX4, RQ1, GQ4, GX5 CX5 and CV5 product families
Software development kit (SDK)	MicroStrain Communication Library (MSCL) open source license includes full documentation and sample code.)

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