

1775 IMU



Fiber Optic Gyro Inertial Measurement Unit



Key Features

- Highest performing IMU from KVH
- Extremely high bandwidth (≥ 1000 Hz)
- User-programmable update rates from 1 to 5000 Hz
- ≤ 500 μ s Total Motion-to-Output Latency
- User-configurable baud rate from 9.6 kbps to 4.1 Mbps
- Asynchronous RS-422 protocol
- Three magnetometers for magnetic field compensation of gyro bias
- Compact and lightweight (< 0.7 kg (< 1.45 lbs.))

Applications

- Pipeline inspection and maintenance
- Drilling and mining systems
- High-speed gimbal stabilization systems
- Stabilization systems for LIDAR, EO/FLIR
- GNSS-aiding inertial navigation systems
- Manned and unmanned platform stabilization and navigation systems
- Augmented reality and mobile mapping systems
- Guidance and control systems
- Precision pointing and positioning systems

Robust, Precise, FOG-based IMU Provides Premium Performance for the Most Demanding Environments and Applications

The 1775 IMU is the premier commercial off-the-shelf (COTS) inertial measurement unit offered by KVH. Designed to deliver the highest level of performance in KVH's IMU product family, the 1775 IMU is an advanced inertial sensor system that meets the demands of systems requiring superior performance in the most challenging environments. Joining KVH's family of high-performance IMUs, the 1775 IMU leverages the proven technology of the DSP-1750 and DSP-1760 fiber optic gyros (FOGs), the world's smallest high performance FOGs. These FOGs are then integrated with three low noise accelerometers and three axes of magnetometers for automatic gyro bias compensation even in the presence of strong magnetic fields. The high-performance 1775 IMU is designed for systems and applications where very high bandwidth, as well as low latency, noise, and drift are critical to system performance.

Compact Design for Ease of Integration

All KVH high-performance IMUs offer the same compact package designed for drop-in replacement for many available IMUs. The flexible interface and programmable message outputs simplify the integration of the 1775 IMU. The 1775 IMU offers ease of integration for designers of higher-level inertial navigation, guidance, or stabilization systems by offering user-programmable features including an adjustable baud rate so that communication latency can be adjusted to receive accurate, timely data. Ideal applications for the 1775 IMU include those with challenging environments such as drilling, mining, pipeline inspection and maintenance, mobile mapping systems, and stabilization systems for radar, LIDAR, and high-speed gimbals. With its three axes of magnetometers, the 1775 IMU is the ideal choice for applications designed for environments requiring magnetic field compensation.

The Inertial Solution for Demanding Environments

The 1775 IMU features an RS-422 asynchronous interface with user-programmable update rates from 1 to 5000 Hz. The robust design of the 1775 IMU ensures reliable and highly-accurate performance, while KVH's proven fiber optic technology and solid state design provide long life and dependable, consistent operation. The 1775 IMU is KVH's premier inertial measurement unit developed specifically to meet the needs of the most challenging applications and operating environments.



Pipeline inspection gauges require inertial navigation and positioning data from KVH inertial sensors to accurately maneuver through miles of underground pipeline where GPS/GNSS signals cannot be received.

KVH 1775 IMU

Performance Specifications

| | |
|----------------------------------------------------|----------------------------------------------------------------------------------------|
| Input Rate (max) | ±490°/sec |
| Bias Instability (25°C) | ≤0.1°/hr, 1σ (max), ≤0.05°/hr, 1σ (typical) |
| Bias vs. Temp. (≤°C/min) | ≤1°/hr, 1σ (max), ≤0.7°/hr, 1σ (typical) |
| Bias Offset (25°C) | ±0.5°/hr |
| Scale Factor Non-linearity (max rate, 25°C) | ≤50 ppm, 1σ |
| Scale Factor vs. Temperature (≤1°C/min) | ≤100 ppm, 1σ |
| Angle Random Walk (25°C) | ≤0.012°/√hr (≤0.7°/hr/√Hz) |
| Bandwidth (-3 dB) | ≥1000 Hz at data rates of 2300 to 5000 Hz ≥440 Hz at data rate of 1000 Hz (default) |

Electrical/Mechanical

| | |
|-----------------------------------------|---------------------------------------|
| Initialization Time (valid data) | ≤1.5 sec |
| Data Interface | Asynchronous or Synchronous RS-422 |
| Baud Rate | Selectable 9.6 Kbps to 4147 Kbps |
| Data Rate | User Selectable 1 to 5000 Hz |
| Dimensions (max) | 88.9 mm Dia x 73.7 mm H (3.5" x 2.9") |
| Weight (max) | 0.7 kg (1.45 lbs) |
| Power Consumption | 8 W (max), 5 W (typical) |
| Input Voltage | +9 to +36 VDC |

Environment

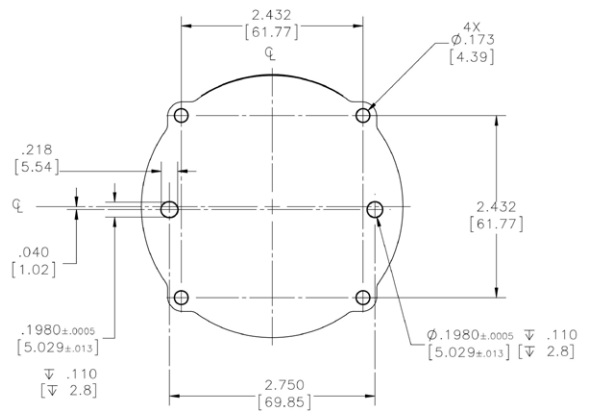
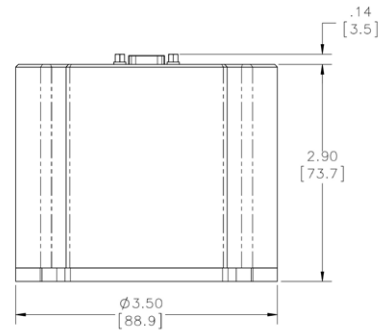
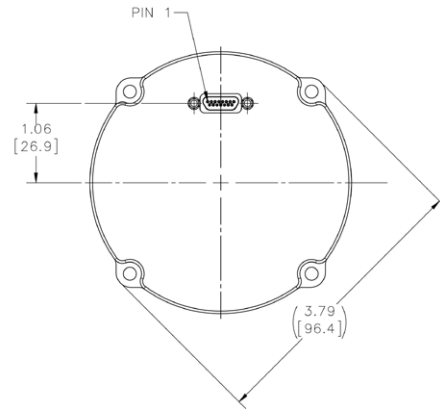
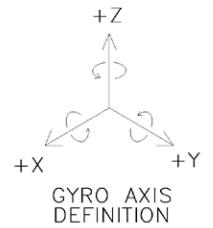
| | |
|--------------------------------|----------------------------------|
| Temperature (operating) | -40°C to +75°C (-40°F to +167°F) |
| Shock (operating) | 9 g, 11 msec, sawtooth |
| Vibration (operating) | 8 g rms, 20-2000 Hz random |

Accelerometers

| | |
|---------------------------------------------|--------------------------------------------------|
| Input Limit (max) | ±10 g |
| Bias Instability (constant temp) | <0.05 mg, 1σ |
| Scale Factor Temperature Sensitivity | ≤500 ppm/°C, 1σ (max) (full scale, full temp) |
| Velocity Random Walk (25°C) | ≤0.12 mg/√Hz (0.23 ft/sec/√hr) |
| Bandwidth (-3 dB) | ≥200 Hz |

Magnetometers

| | |
|-------------------------|-----------------|
| Input Range | ±10 Gauss (max) |
| Bias | ±0.2 Gauss |
| Bias Noise (rms) | <2 mGauss |



For detailed interface control drawings (ICD) and technical manuals on this product, please visit www.kvh.com/1775IMUmil and click on the **Manuals** tab.



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zAdditional patents pending.