

# KVH DSP-3000

## High-performance Fiber Optic Gyro



### Key Features

- Patented Digital Signal Processing (DSP) FOG design
- True tactical-grade performance
- Scale factor accuracy of 500 ppm
- Exceptional bias stability and linearity—minimal temperature and power-up errors
- Excellent reliability: >55,000 hours MTBF, Ground Mobile
- Reduced noise, high bandwidth
- Smallest KVH FOG
- Robust for a wide variety of applications including gun/turret stabilization
- Modular design for 1-, 2-, or 3-axis configurations
- Digital or analog outputs

### Applications

- IMU, GPS/INS
- AHRS
- Industrial Robotics/Autonomous Vehicles
- Antenna/Radar/Optics Stabilization

### Introducing the KVH DSP-3000 – Offering precision stabilization and control at an affordable price

The new KVH DSP-3000 fiber optic gyro sets a new standard of performance and price. Its reduced package size and robust, modular design make low-cost inertial measurement units (IMUs), integrated GPS/INS, and AHRS a reality. The Digital Signal Processing (DSP) electronics offer significant performance improvements in such critical areas as scale factor and bias versus temperature, scale factor linearity, turn-on to turn-on repeatability, and maximum input rate. Exceptional low noise (ARW), insensitivity to cross-axis error, and shock and vibration robustness make the DSP-3000 a perfect fit for demanding industrial and military applications. This performance, combined with the inherent simplicity and reliability of our mature all-fiber optical circuit, establish the DSP-3000 as the ideal solution for motion sensing, stabilization, navigation, and precision pointing applications.

The DSP-3000 is the second in a series of gyros that employ KVH's patented DSP technology. KVH's breakthrough DSP design overcomes the limitations of analog signal processing, virtually eliminating temperature-sensitive drift and rotation errors. The DSP-3000 achieves these performance breakthroughs while remaining affordable. It is suitable for applications in which gyros and accelerometers are combined to determine vehicle dynamic motions as well as any application that requires precise measurement of rate and turning angle.



# KVH® DSP-3000

## Precision, Performance, and Price

Fabricated from KVH's proprietary E•Core® polarization maintaining fiber, the KVH DSP-3000 delivers superior precision and reliable performance at a lower cost than other comparable fiber optic and mechanical gyroscopes. Its temperature stability and repeatability make it particularly well-suited for precision stabilization, GPS integration, and multi-axis tactical-grade inertial measurement systems.

The noise spectrum of the DSP-3000 is exceptionally flat, lacking the discrete noise components of mechanical gyros. With no moving parts to maintain or replace, the DSP-3000 lasts longer, functions better, and yields significant product life cycle savings.

## Technical Specifications

### Physical

Input Voltage: +5 VDC ±10%  
 Power Consumption: 3 watts (2 watts typical)  
 Weight: 0.6 lbs (0.27 kg)  
 Size: 3.5" x 2.3" x 1.3"  
 (88.9 mm x 58.42 mm x 33.02 mm)

### Output

Digital: Baud 38,400 (RS-232 Asynch)  
 3.072 MHz Synch Serial  
 Analog: ±2 VDC differential  
 Data Rate: Asynchronous: 100/sec  
 Synchronous: 1000/sec<sup>1</sup>  
 Analog: 100/sec  
 Format (selectable): Rate, Incremental Angle,  
 or Integrated Angle

### Environmental

Operating Temperature: -40°C to +75°C  
 Storage Temperature: -50°C to +85°C  
 Shock: Functional sawtooth 40 g, 6-10 msec  
 MTBF: >55,000 hours, Ground Mobile  
 Random Vibration: 20 to 2000 Hz, 8 g rms, operational

### Performance

Maximum Input Rate: ±375°/s  
 Bias:  
 Offset (room temp): ±20°/h  
 Stability (room temp)<sup>2</sup>: 1°/h, 1σ  
 Temp. Sensitivity (<1°C/min): 6°/h, 1σ  
 Angle Random Walk (noise): 4°/h/√Hz  
 0.0667°/√h  
 0.1°/√h  
 Instantaneous Bandwidth (Hz): 50, 500<sup>1</sup>  
 Scale Factor: 20mV/°sec, nominal  
 Linearity (room temp, full scale): 1000 ppm, 1σ<sup>3</sup>  
 500 ppm, 1σ  
 Linearity (room temp, full scale): 500 ppm, 1σ<sup>4</sup>  
 500 ppm, 1σ  
 Temperature Sensitivity: 500 ppm, 1σ  
 500 ppm, 1σ  
 Error (full rate & temp): 1500 ppm, 1σ  
 1000 ppm, 1σ  
 Activation Time (valid data): <5 sec  
 <5 sec

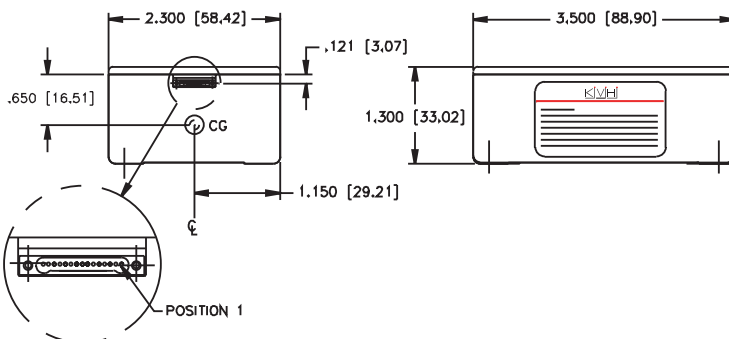
<sup>1</sup>Available as an option with synchronous serial output, other interface options available

<sup>2</sup>Bias Stability and Angle Random Walk determined by Allan variance method

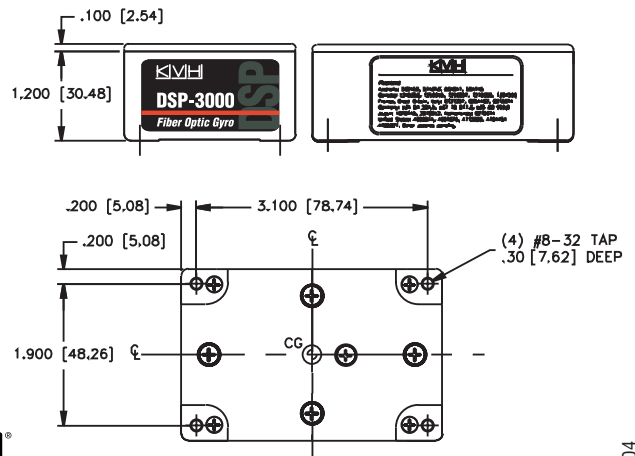
<sup>3</sup>For input rates up to ±375°/s

<sup>4</sup>For input rates up to ±150°/s

## Package Dimensions: inches (mm)



MATING CONNECTOR:  
 KVH p/n: 32-0780 - C/A DUALOBE PIGTAIL, 12"  
 Tyco Electronics p/n: SSL015PC2DCXXXN  
 (XXX indicates length in inches)



Visit [www.kvh.com](http://www.kvh.com)

KVH Industries, Inc.



DSP3000\_5.04

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# KVH DSP-4000

## High-performance Fiber Optic Gyro

PRELIMINARY  
SPECIFICATION

Fiber Optic Products



### Key Features

- Fiber Optic Technology – Patented DSP technology offers long life, stable operation, and insensitivity to vibration from rotation or acceleration in other axes.
- 1 and 2 Axis Packages – Includes compact one and two axis gyro configurations that can be mixed and matched for one, two, and three axis applications.
- Compact Mil-Spec Assembly – Features Mil connectors and weather-resistant gasketing to withstand demanding military environments, including gunfire shock.
- Reduced Life Cycle Cost – Easily integrates into existing mechanical gyro applications with significantly longer life and lower life cycle cost. MTBF >50,000 hours.
- Military Specification Qualified – Fully qualified to military specifications for armored vehicles.

### Applications

- Positioning and Stabilized Pointing
- Gun and Turret Stabilization
- Antenna/Optical/Camera Stabilization

### KVH DSP-4000 Series – The Low-cost, High-performance Alternative

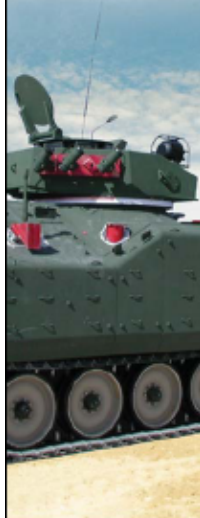
The DSP-4000 series offers both single axis and dual axis fiber optic gyros (FOGs) specifically designed to provide the military with a high-performance, low-cost successor to troublesome mechanical gyros. KVH FOG technology delivers superior stabilization and tracking capabilities for turret, antenna, and optical stabilization systems. The all-fiber design, with no moving parts to wear out or fail, ensures high reliability, superior performance, and exceptional vibration, shock, and acceleration survivability. The DSP-4000 series also features low noise, high bandwidth, improved bias stability, and excellent resolution, making it the optimal economical gyro alternative.

Designed and tested to rigorous military standards, the rugged DSP-4000 series meets or exceeds required military specifications. It has been specifically designed for quick and easy installation as replacement for mechanical gyros. The 4000 series offers the military the next generation of gun and turret stabilization as well as dynamic pointing capabilities.

Building on the success of KVH's proven DSP-5000 and DSP-3000 series, the 4000 series delivers superior bias and scale factor performance. The gyro is exactly manufactured to measure angular rates with extreme precision and provide either a digital or analog output.

Unlike mechanical gyros, the DSP-4000 series is insensitive to cross-axis motion and inertia. Its high bandwidth makes it particularly suitable for armored vehicle gun stabilization. With no moving parts to maintain or replace, the 4000 series lasts longer than its mechanical predecessors, performs better, and yields significant savings over the life of the product.

KVH® DSP-4000



## Precision, Performance, and Value

The DSP-4000 performance can also be optimized for specific applications on an individual basis. For optimum flexibility, the 4000 series is available in both dual and single axis configurations, which may be combined to provide strapdown 3-axis rate sensing capabilities. Fabricated from KVH's proprietary E-Core® polarization

maintaining fiber, the KVH DSP-4000 delivers superior precision and reliable performance at a lower cost than other comparable fiber optic and mechanical gyroscopes. Its temperature stability and repeatability make it particularly well-suited for precision stabilization, and pointing applications.

## Preliminary Technical Specifications

Physical		Performance	Digital	Analog
Input Voltage:	18-32 VDC (MIL 1275B)	Maximum Input Rate:	$\pm 375^\circ/\text{s}$	$\pm 100^\circ/\text{s}^e$
Power Consumption:	9 watts (max dual axis)	Bias:		
Weight:	<5 lbs (dual axis)	Offset (room temp):	$\pm 20^\circ/\text{h}$	$\pm 100^\circ/\text{h}$
Size:	5.68" x 6.41" x 3.5" (144.3 mm x 162.8 mm x 88.0 mm)	Stability (room temp) <sup>f</sup> :	1°/h, 1 $\sigma$	3°/h, 1 $\sigma$
		Temp. Sensitivity (<1°C/min):	6°/h, 1 $\sigma$	20°/h, 1 $\sigma$
		Angle Random Walk (noise):	4°/h $\sqrt{\text{Hz}}$	6°/h $\sqrt{\text{Hz}}$
			0.0667°/h	0.1°/h
<b>Output</b>		Instantaneous Bandwidth (Hz):	50, 500 <sup>g</sup>	100 (3dB BW 45° Phase)
Digital:	Baud 38,400 (RS-232 Async) 3.072 MHz Synch Serial	Scale Factor:		100mV <sup>h</sup> /sec, nominal
Analog:	$\pm 10$ VDC differential <sup>*</sup>	Linearity (room temp, full scale):	1000 ppm, 1 $\sigma^i$	1000 ppm, 1 $\sigma$
Data Rate:	Asynchronous: 100/sec Synchronous: 1000/sec <sup>h</sup> Analog: 100/sec	Linearity (room temp, full scale):	500 ppm, 1 $\sigma^i$	
Format (selectable):	Rate, Incremental Angle, or Integrated Angle	Temperature Sensitivity:	500 ppm, 1 $\sigma$	1000 ppm, 1 $\sigma$
		Error (full rate & temp):	1500 ppm, 1 $\sigma$	2000 ppm, 1 $\sigma$
		Activation Time (valid data):	<5 sec	<5 sec
		Dual axis misalignment	8 mrad	8 mrad

<sup>a</sup> Other options available

<sup>b</sup> Available as an option with synchronous serial output, other interface options available

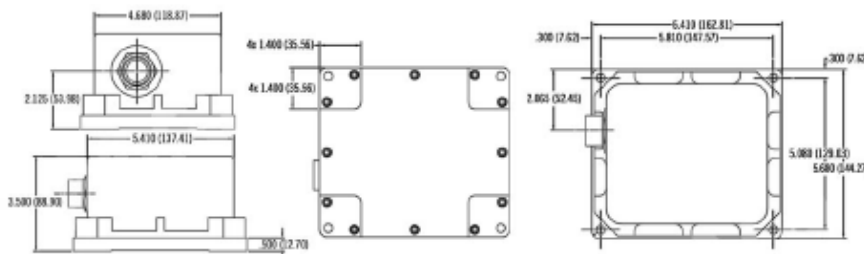
<sup>c</sup> Can be scaled from  $\pm 20$  to  $\pm 120^\circ/\text{s}$

<sup>d</sup> Bias Stability and Angle Random Walk determined by Allan variance method

<sup>e</sup> For input rates up to  $\pm 375^\circ/\text{s}$

<sup>f</sup> For input rates up to  $\pm 150^\circ/\text{s}$

## Dual Axis Package Dimensions: Inches (mm)



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