

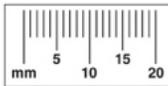


**OS3D-FG  
MINIATURE  
ATTITUDE & HEADING  
REFERENCE SYSTEM**



**Datasheet  
Rev. 2.0**

The **Inertial Labs OS3D-FG** is a multi-purpose miniature 3D orientation sensor – Attitude and Heading Reference System, designed for use in real-time orientation tracking applications. It includes three types of sensing elements: tri-axial MEMS Gyroscopes, tri-axial high precision MEMS Accelerometers, and tri-axial Fluxgate Magnetometers. The **OS3D-FG** also comes equipped with an onboard processor and embedded orientation algorithms allowing for direct integration into systems without interfacing a PC. Additionally, **OS3D-FG** comes with hard and soft 2D and 3D magnetic calibration algorithms make the **OS3D-FG** eliminate the magnetic influence in the magnetic interference environment.



## Applications:

- Digital inclinometers
- Miniature sonars
- Small gimbals and EOS stabilization
- Robots
- Marine antenna stabilization systems
- Motion Capture Systems
- Training, Simulation and Head Tracking Systems
- Helmets Orientation Systems
- Quadrotor Helicopters and micro UAV
- Small Unmanned Underwater Vehicles, ROV

## KEY FEATURES AND FUNCTIONALITY

- Affordable price
- Fully calibrated in operational temperature range
- Real-time Heading, Pitch and Roll orientation information
- Small size, lightweight and low power consumption (45 × 16 × 14.5 mm; 12 gram; 0.15W)
- 1 deg Heading and 0.3 deg Pitch & Roll dynamic accuracy
- State-of-the-art algorithms for different dynamic motions of Robots, micro UAV, small UUV, small Gimbals and Antennas stabilization
- Ideal solution for Free Space Tracking Systems
- Gyro-Stabilized Slaved Magnetic Heading
- Embedded 2D and 3D magnetic calibration on hard and soft iron
- Up to 2000 Hz output data rate
- Environmentally sealed (IP67)

Data from the Gyroscopes, Accelerometers, and Magnetometers, as well as the internal temperature sensor are gathered and processed by the on-board digital signal processor (DSP). The fusion algorithm processes these data and outputs the final orientation solution directly from the sensor. Data of the following types can be requested: raw inertial sensors data and/or quaternion data.

Each **OS3D-FG** module is individually calibrated in a special non-magnetic laboratory where reference accelerations, angular rates, and magnetic fields are applied to the device and measured at constant temperature. Additionally, temperature cycling is performed to obtain temperature calibration parameters for the gyro and accelerometer elements. Once fielded, **OS3D-FG** is able to be customer calibrated against soft- and hard-iron interference present in the end application.

## OS3D-FG Specifications

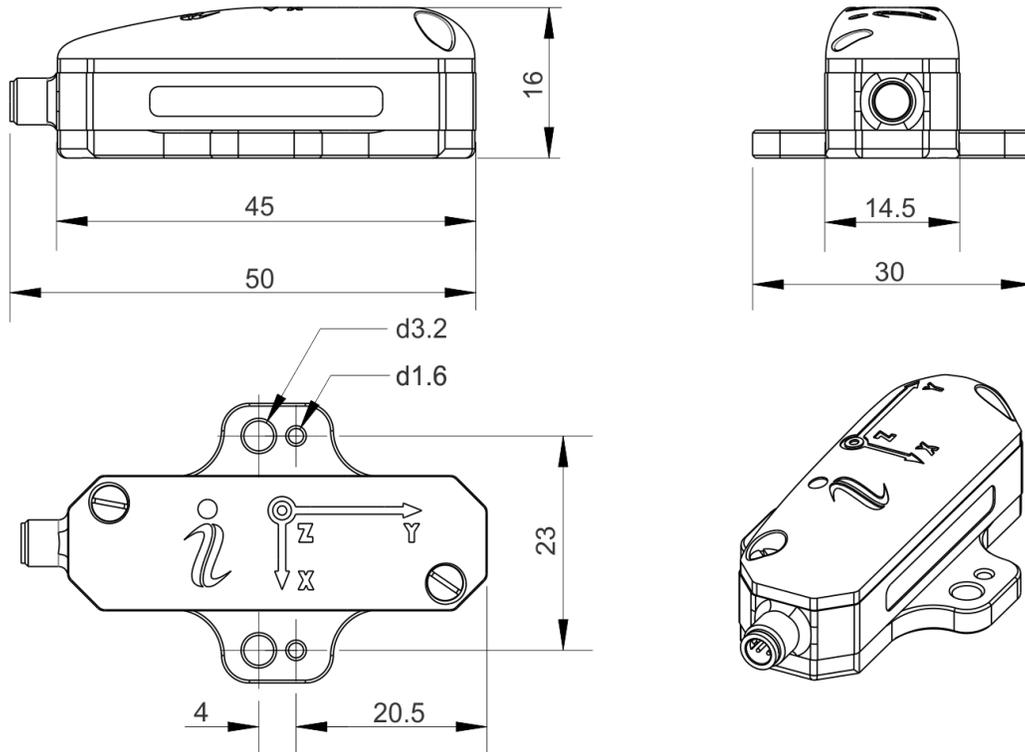
Parameter	Units	Value			
Output signals		Accelerations, Angular rates, Magnetic field, Temperature, Pressure, Quaternion, Heading, Pitch and Roll			
Internal update rate	Hz	500			
Output update rate (auto transmit)	Hz	20 - 2000			
Start-up time	sec	<1			
Latency	msec	2			
<b>Heading</b>					
Range	deg	0 to 360			
Angular Resolution	deg	0.01			
Static accuracy in whole Operational Temperature Range <sup>(1)</sup> , RMS	deg	0.8			
Dynamic Accuracy <sup>(2)</sup> , RMS	deg	1.0			
<b>Attitude</b>					
Range: Pitch	deg	±90			
Range: Roll	deg	±180			
Angular Resolution	deg	0.01			
Static Accuracy in whole Operational Temperature Range, RMS	deg	0.1			
Dynamic Accuracy <sup>(2)</sup> RMS	deg	0.3			
<b>Sensors</b>		<b>Gyroscopes</b>	<b>Accelerometers</b>		<b>Magnetometers</b>
Measurement range		±1864 deg/s	±2 g	±6 g	±8.0 Gauss
In-run Bias Stability (RMS, Allan Variance)		<10 deg/hr	0.15 mg	0.3 mg	
Scale Factor Accuracy		0.5 %	0.3 %	0.4 %	0.05 %
Noise density		0.009 deg/secVHz	0.2 mgVHz	0.3 mgVHz	0.015 mG/VHz
Axis misalignment		0.05 deg	0.05 deg	0.05 deg	0.05 deg
Resolution		0.07 deg/sec	0.05 mg	0.07 deg	0.24 µGauss
Bandwidth		40 Hz	40 Hz	40 Hz	40 Hz
<b>Environment</b>					
Operating and storage temperature range	deg C	-40 to +85			
Storage temperature range	deg C	-45 to +90			
MTBF	hours	55,000			
Environmentally sealed		IP67			
<b>Electrical</b>					
Supply voltage	V DC	3.3 to 5.5 (or up to 42, see note 3)			
Current consumption	mA, V	26 mA @ 5.0V			
Power Consumption	W	0.15			
Connector type	-	Binder 0931117104			
Output Interface	-	RS-232, RS-422, TIA/EIA-485A (half-duplex), UART (note 3)			
Baud Rate	bps	2400 - 3000000			
Byte Size	bits	8			
Stop Bites	bits	1			
Parity	-	No			
<b>Physical</b>					
Size	mm	45 × 16 × 14.5			
Weight	gram	12			

### Specifications Notes:

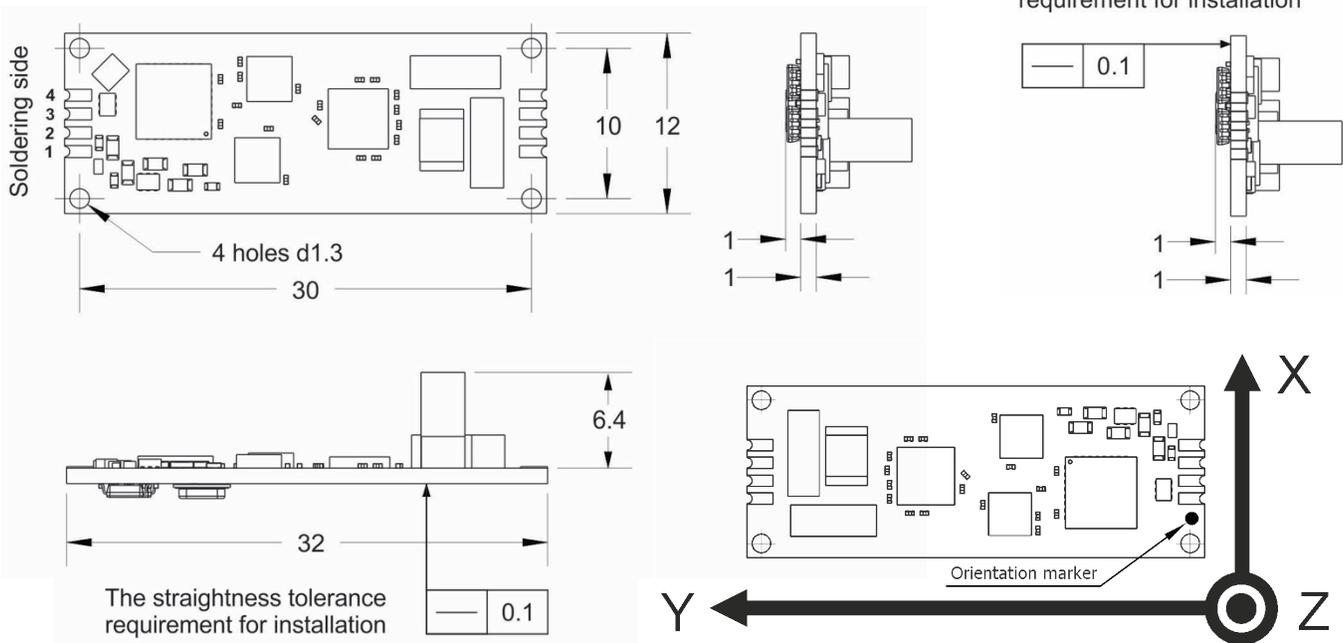
<sup>(1)</sup> in homogeneous magnetic environment, for latitude up to ±65 deg

<sup>(2)</sup> dynamic accuracy may depend on type of motion

OS3D-FG mechanical interface drawing



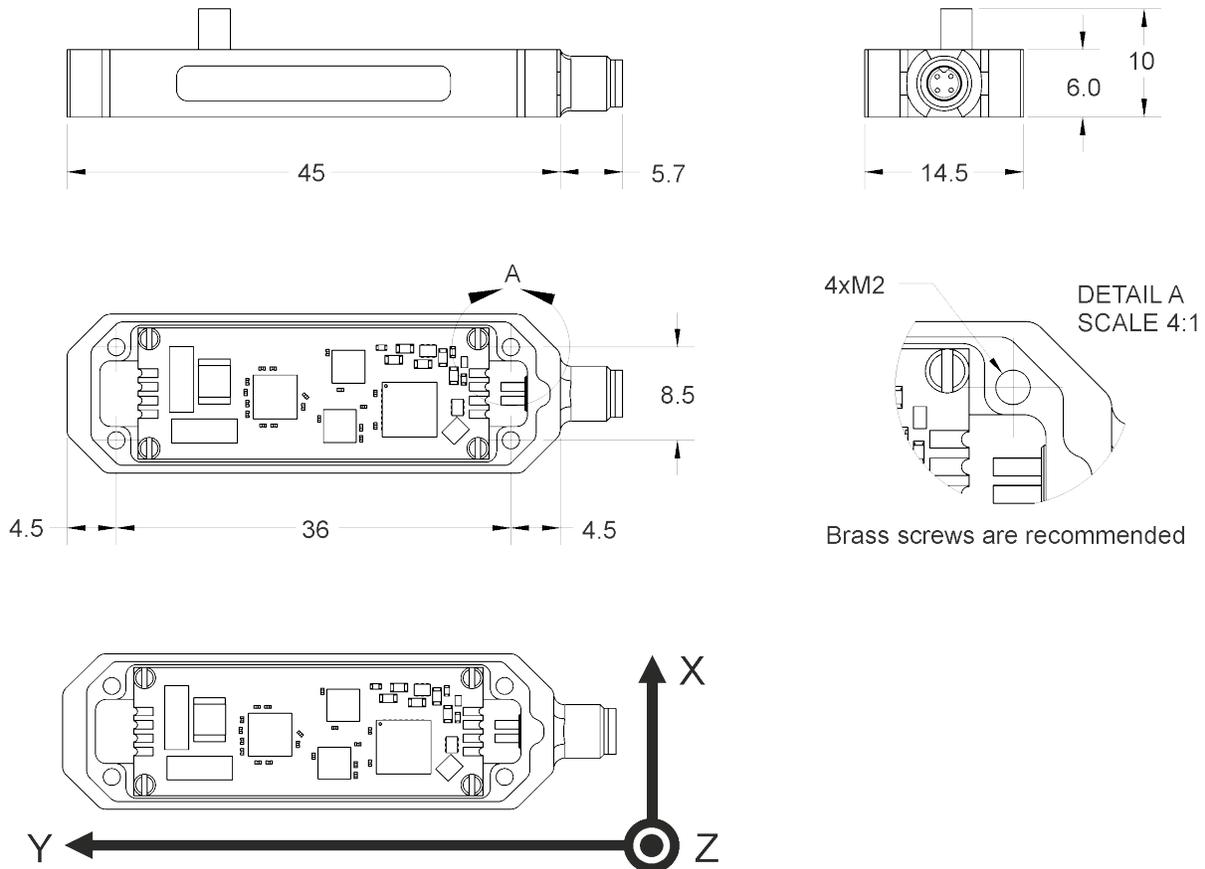
OEM version of OS3D-FG mechanical interface drawing



**Note 1:** All dimensions are in millimeters.

**Note 2:** All dimensions within this drawing are subject to change without notice. Customers should obtain final drawings before designing any interface hardware.

OEM version of OS3D-FG, installed in half case mechanical interface drawing



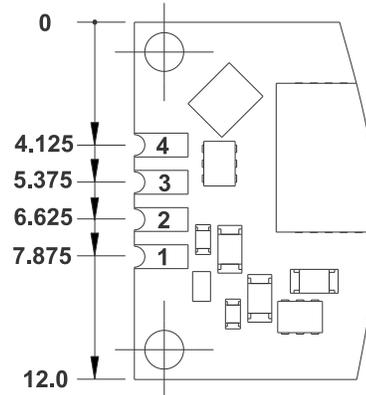
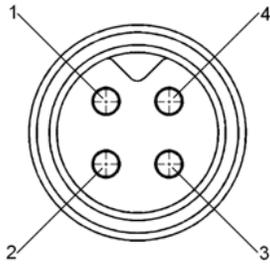
### OS3D-FG electrical interface description

No.	Name	Value	Parameters
1	PWR	supply voltage	3.3V to 5.5V
2	GND	ground, shield	-
3	A	A-RS-485	0.024 - 1 Mbps, 120 Ohm
4	B	B-RS-485	0.024 - 1 Mbps, 120 Ohm

### OEM version of OS3D-FG electrical interface description

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1	PWR	supply voltage	3.3V to 5.5V
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## OS3D-FG Connector (Binder 0931117104)



**Note 3:** The wider supply voltage range (4.5V to 42V) and other interface types (RS-232, RS-422, TTL UART) are available, when using the OS3D-FG multiple interfaces cable (see the picture below).

## OS3D-FG multiple interfaces cable

