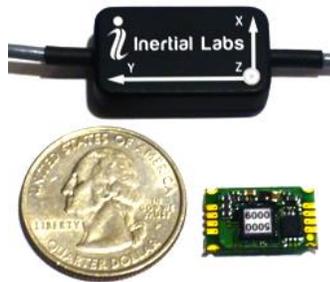


SUB-MINIATURE 3D ORIENTATION SENSOR - OS3DM



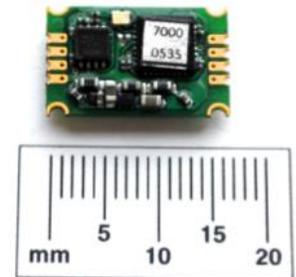
**Datasheet
Revision 1.9**

The **Inertial Labs OS3DM** is a multi-purpose sub-miniature 3D orientation sensor designed for use in real-time orientation tracking applications. It includes three types of sensing elements: tri-axial MEMS Gyroscopes, tri-axial MEMS Accelerometers, and tri-axial magneto-resistive Magnetometers. The **OS3DM** also comes equipped with an onboard processor and embedded orientation algorithms allowing for direct integration into systems without interfacing a PC. Additionally, for PC-based integrations, the system comes with a set of libraries that allow the customer to modify algorithm and/or sensor parameters on-the-fly to more closely match the needs of individual applications.



Applications

- Miniature sonars
- Robots
- Virtual Reality Systems
- Motion Analysis Systems
- Medical Training and Simulation Systems
- Motion Capture and Head Tracking Systems
- Helmets Orientation Systems
- micro UAV and mini Electro Optical Systems



KEY FEATURES AND FUNCTIONALITY

- Real-time Heading, Pitch and Roll orientation information
- Sub-miniature size, lightweight and low power consumption (16×10×3.5 mm; 2 gram; 0.13W)
- Static Accuracy better than 0.5 deg in Pitch/Roll and Heading
- State-of-the-art algorithms for different dynamic motions of Motion Capture, Training, Head Traking and Helmets Orientation Systems, micro UAV and small Electro Optical System
- Ideal solution for Medical Training and Virtual Reality Systems
- Gyro-Stabilized Slaved Magnetic Heading
- Embedded magnetic calibration on hard and soft iron
- Up to 2000Hz output data rate
- OEM version available

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 **OS3DM** 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, **OS3DM** is able to be customer calibrated against soft- and hard-iron interference present in the end application.

OS3DM 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		
Heading				
Range	deg	0 to 360		
Angular Resolution	deg	0.05		
Static accuracy at constant temperature ⁽¹⁾ RMS	deg	0.5		
Static accuracy in whole Operational Temperature Range ⁽¹⁾ , RMS	deg	1.5		
Dynamic Accuracy ⁽²⁾ , RMS	deg	2.0		
Attitude				
Range: Pitch	deg	±90		
Range: Roll	deg	±180		
Angular Resolution	deg	0.1		
Static accuracy at constant temperature, RMS	deg	0.5		
Static Accuracy in whole Temperature Range, RMS	deg	0.7		
Dynamic Accuracy ⁽²⁾ RMS	deg	1.0		
Noise (@100 Hz)	deg	0.05		
Sensors		Gyroscopes	Accelerometers	Magnetometers
Measurement range		±2000 deg/s	±6 g	±2.5 Gauss
In-run Bias Stability (RMS, Allan Variance)		<10 deg/hr	0.3 mg	
Scale Factor Accuracy		0.5 %	0.15 %	0.1 %
Noise density		0.009 deg/sec/√Hz	0.3 mg/√Hz	0.15 mG/√Hz
Axis misalignment		0.05 deg	0.05 deg	0.05 deg
Resolution		0.07 deg/sec	0.07 mg	1. mGauss
Bandwidth		40 Hz	40 Hz	40 Hz
Environment				
Operating and storage temperature range	deg C	-40 to +85		
MTBF	hours	35,000		
Environmentally sealed		IP67		
Electrical				
Supply voltage	V DC	3.3 to 5.5		
Power Consumption	W	0.13		
Output Interface	-	RS-485, UART (application note)		
Baud Rate	bps	2400 – 1000000 (selected by customer)		
Byte Size	bits	8		
Stop Bites	bits	1		
Parity	-	No		
Physical				
Size	mm	26 x 15 x 7.5 (plastic case) 16 x 10 x 3.5 (OEM)		
Weight	gram	2 (OEM), 5 (plastic case)		

Specifications Notes:

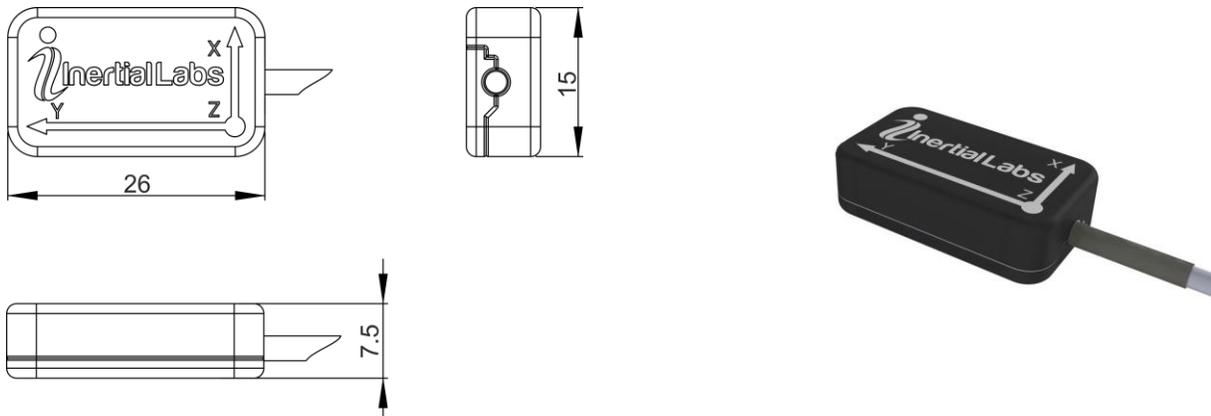
⁽¹⁾ in homogeneous magnetic environment, for latitude up to ±65 deg

⁽²⁾ dynamic accuracy may depend on type of motion

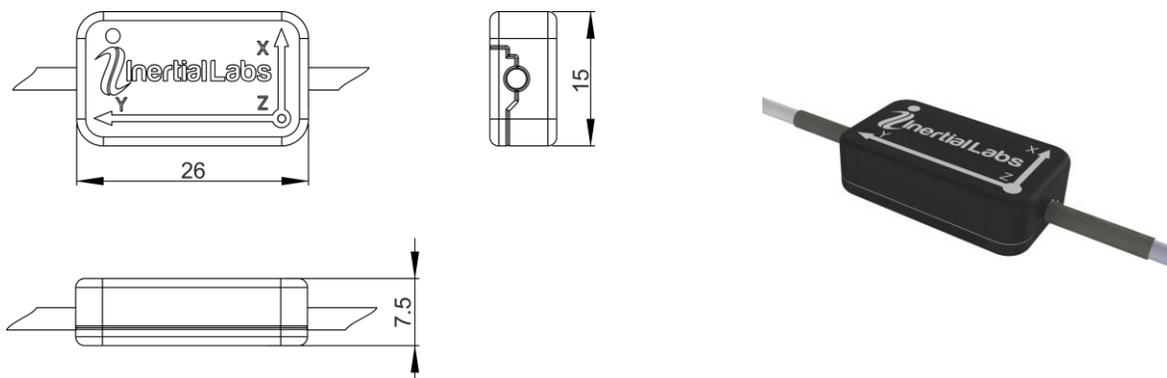
OS3DM available versions (different part numbers)

Type of sensor	Temperature calibration	Type of case	Accelerometers measurement range	Connector	Interface type
OS3DM OEM	Temperature calibrated Temperature non-calibrated	Plastic Without case	± 6 g	Single-ended Double-ended	RS-485 UART

OS3DM with single-ended connector mechanical interface drawing (mm)

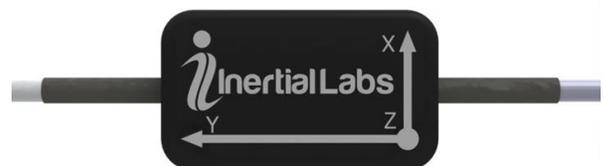
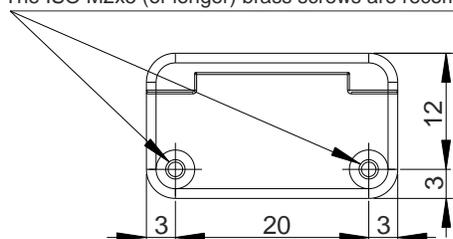


OS3DM with double-ended connector mechanical interface drawing (mm)

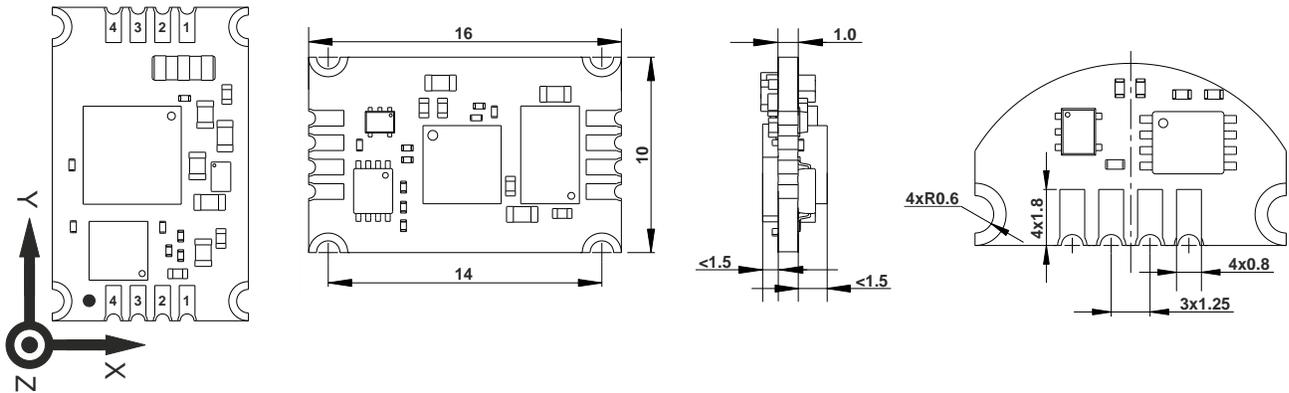


OS3DM mounting holes mechanical interface drawing (mm)

These two holes can be used to mount the sensor to an object
The ISO M2x5 (or longer) brass screws are recommended



OS3DM OEM mechanical interface drawing (mm)



OS3DM (all versions) electrical interface description

No.	Name	Value	Parameters
1	PWR	supply voltage	3.2V to 5.5V
2	GND	ground, shield	-
3	A	A RS-485	1 Mbps, 120 Ohm
4	B	B RS-485	1 Mbps, 120 Ohm

OS3DM Connector (Binder 0931117104)

