



olixSense™ X1 Pro IMU / AHRS Sensor

Embedded AI Fusion | Triple Redundant | USB Type-C Interface | ROS 2 Native



olixAI™
Embedded AI Sensor Fusion



USB TYPE-C



Triple
3-Axis
Gyroscope



Triple
3-Axis
Accelerometer

Technical Document No. 1790616122 | SKU# OLVX-X1-TIMU-USB-PXX | Revision V0.4 - Sep 2026

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1. Product Overview

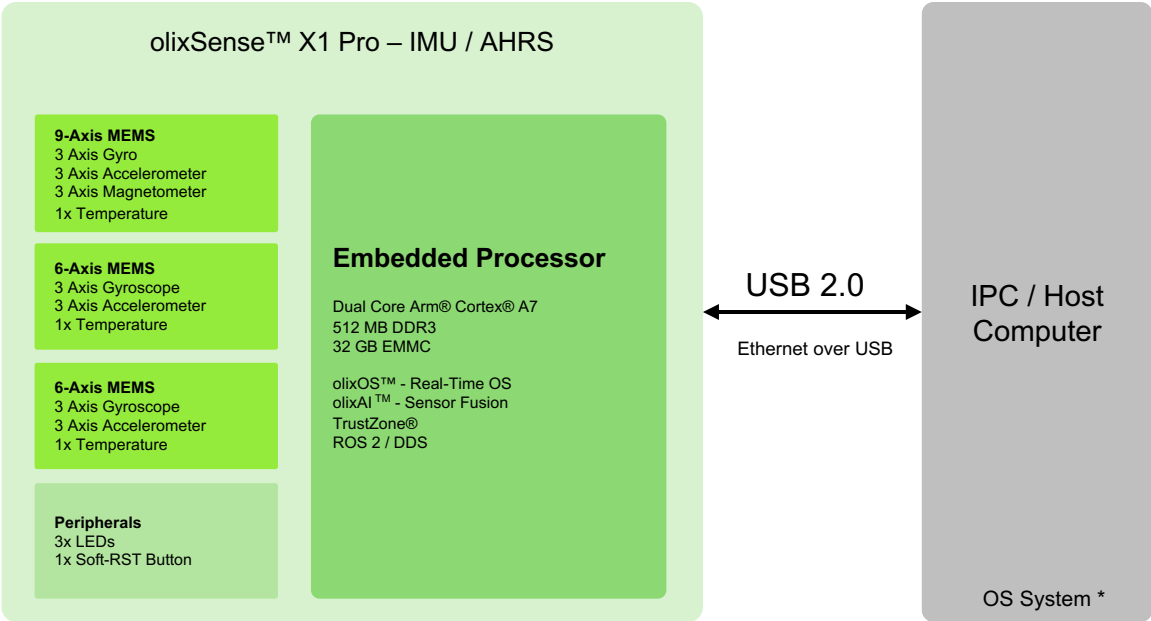
The olixSense™ IMU X1 Pro is a high-performance inertial measurement unit designed for advanced mobile robotics, industrial automation, and autonomous systems. Built with a dual-core embedded processor, real-time Linux kernel (olixOS™), and native ROS 2 integration, it delivers AI-enhanced sensor fusion, robust timing, and low-latency inertial data ideal for high-frequency control and SLAM pipelines.

2. Key Features

- Redundant Inertial Sensing: Triple 3-axis gyroscopes, accelerometers, and a magnetometer
- Real-Time Embedded AI Fusion: Deep fusion with redundancy and failover
- ROS 2 Native: Direct DDS communication, plug-and-play for robotic middleware
- High-Frequency Output (ODR): Up to 1000 Hz
- Low-Latency Ethernet Over USB: Deterministic, real-time data transport
- Onboard Processing: Dual-core Cortex-A7 + 512MB DDR3 RAM
- Industrial-Grade: Vibration and temperature calibrated, 32g, 40x40x10 mm



3. System Architecture



IP Address: 192.168.7.100

IP Address: 192.168.7.XXX

* This device does not require any additional driver installation; please verify Host Computer compatibility before use.

4. Applications

- Mobile Robots (AMR, AGV, UAV)
- Industrial Arms & Hands
- Research and SLAM Systems
- Sensor Fusion Systems
- Predictive Maintenance and Vibration Analysis

5. Sensor Specifications

- Sensor Fusion Performance

Parameter / Metric	Value
Roll, Pitch (Stationary, AHRS Mode, ODR 200 Hz)	0.2956° / 0.5475° RMSE
Roll, Pitch (Dynamic, AHRS Mode, ODR 200 Hz)	1.0219° / 1.1204° RMSE
Roll, Pitch (Stationary, IMU Mode, ODR 200 Hz)	0.3298° / 0.3214° RMSE
Roll, Pitch (Dynamic, IMU Mode, ODR 200 Hz)	0.9147° / 1.1090° RMSE
Yaw (Stationary, AHRS Mode, ODR 200 Hz) *	0.4419° RMSE
Yaw (Dynamic, AHRS Mode, ODR 200 Hz) *	1.7747° RMSE
Yaw (Stationary, IMU Mode, ODR 200 Hz) *	0.1307° RMSE
Yaw (Dynamic, IMU Mode, ODR 200 Hz) *	1.3451° RMSE

- Physical and Electrical

Weight	32g
Size	40.0 mm x 40.0 mm x 10.0 mm
Power Consumption	0.9 W (Typical), 1.8 W (Max)
Operating Voltage	4.6 to 5.5 VDC (USB PD 2.0 Standard)
Operating Temperature	-20°C to 80°C
Interface LEDs	3x (Heartbeat, User, System)

- System Performance

Metric	Value
Latency (e2e)	1 ms
Time Sync Error (NTP)	300 µs
OptiTrack Ref	Used 8x PrimeX 22 for GT validation

- MEMS Sensor Performance

Specification	Accelerometer	Gyroscope	Magnetometer
Range	± 2g, 4g, 8g, 16g	125, 250, 500, 1000 , 2000 °/s	X/Y: ±1300 μT Z: ±2500 μT
Resolution	16-bit; 0.061 mg/LSB at ±2 g	16-bit; 0.0038 °/s/LSB at ±125 °/s	0.3 μT device resolution
Sensitivity	2048 LSB/g at ±16 g	262.144 LSB/(°/s) at ±125 °/s	-
Sensitivity error / gain error	±0.4% at 25 °C, ±8 g	±2% at 25 °C	±5% typical; ±8% maximum after API compensation at 25 °C
Zero-g offset	±20 mg at 25 °C	-	-
Zero-rate offset	-	±0.5 °/s at 25 °C	-
Zero-field offset	-	-	±40 μT at 25 °C; typically ±2 μT after fusion-mode calibration
Nonlinearity	0.5% FS at ±2 g, 25 °C	0.01% FS at ±250 or ±2000 °/s, 25°C	1% FS
Noise Density	89.895 μg/√Hz	0.007504 °/s/√Hz	-
Random Walk	VRW: 0.052895 m/s/√hr	ARW: 0.45025 °/√hr	-
Bias Instability	0.0004337 m/s²	4.8645 °/hr	-

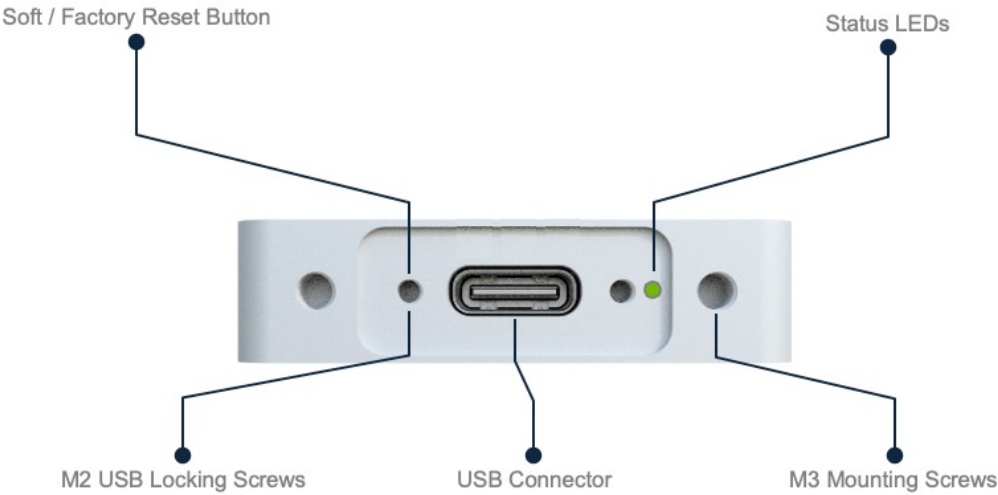
- Communication Interface / ODR

Interface Connector	USB Type-C
Communications Protocol	Ethernet over USB 2.0 (RNDIS / ECM)
Output Data Rate (Raw and Fused Data)	1-1000 Hz
Middleware / Protocols (DDS)	- rmw_fastrtps_cpp - rmw_cyclonedds_cpp - rmw_zenoh
ROS 2 Distribution	- Humble - Jazzy

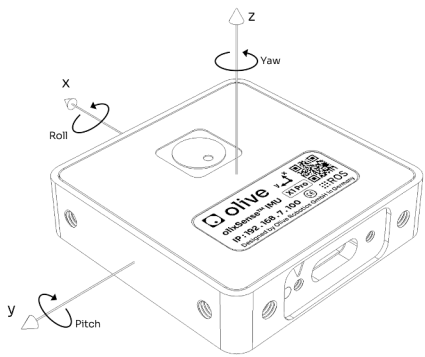
- ROS 2 Native Messages

Topic/Service Name	Type	Description
/imu	sensor_msgs/Imu	Acc, Gyro, Quaternion
/acceleration	geometry_msgs/msg/AccelStamped	Gravity Compensated Accel
/magneticfield	sensor_msgs/MagneticField	Magnetic Field
/velocity	geometry_msgs/msg/TwistStamped	Relative Velocity
/temperature	sensor_msgs/msg/Temperature	Sensor Temperature
/status	diagnostic_msgs/msg/DiagnosticStatus	Sensor Status

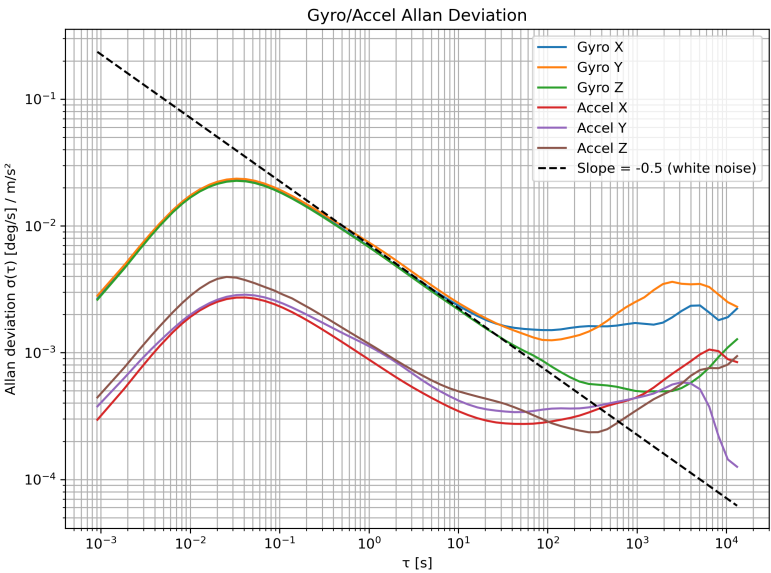
- Sensor Interface / Peripherals



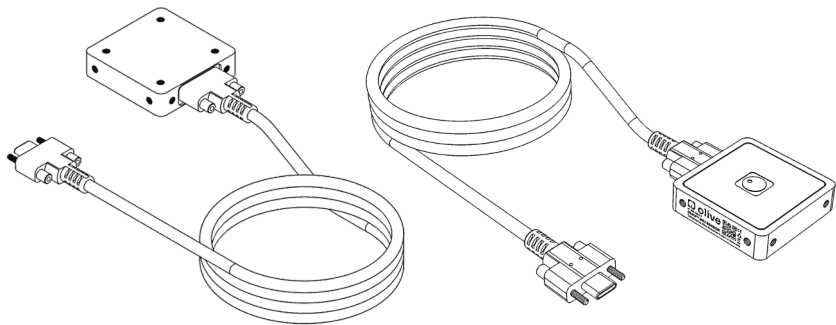
- Coordinate Frame / Axis



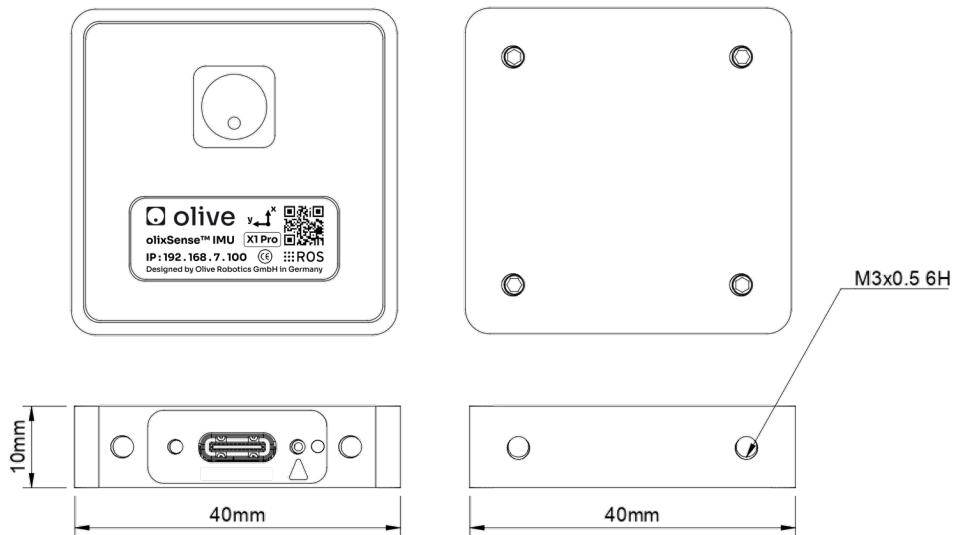
- Performance Test / Allan Deviation Plot



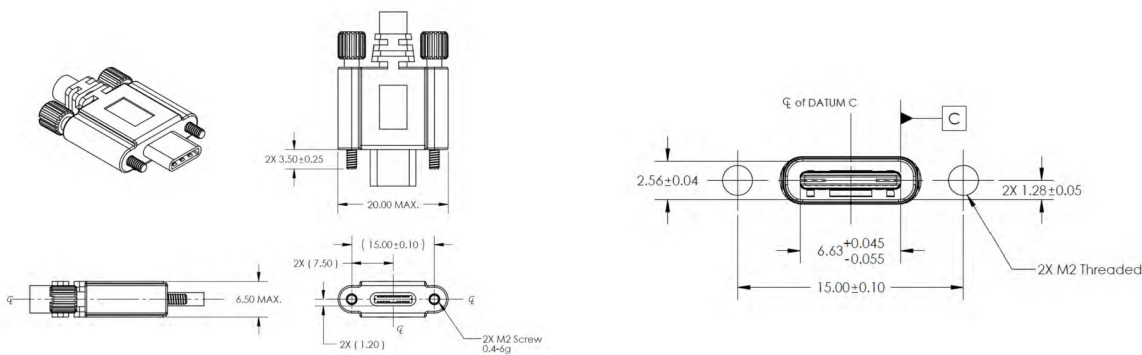
- Mechanical Overview



- Physical Dimensions



- USB Connector Specification





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