



High Performance Advanced MEMS Industrial & Tactical Grade Inertial Measurement Units “IMU-P”



- ITAR-free
- Small size, low weight, low cost
- 1 deg/hr Gyro Bias in-run stability
- 5 μg Accelerometers Bias in-run stability
- 0.05 deg Pitch & Roll accuracy

 **Inertial Labs**
Attitude is Everything

Datasheet
Rev. 2.0



The **Inertial Labs IMU-P** is an Advanced MEMS sensors based, compact, self-contained strapdown, industrial and tactical grade Inertial Measurement Systems and Digital Tilt Sensor, that measures linear accelerations, angular rates, Pitch & Roll with three-axis high-grade MEMS accelerometers and three-axis tactical grade MEMS gyroscopes. Angular rates and accelerations are determined with high accuracy for both motionless and dynamic applications.



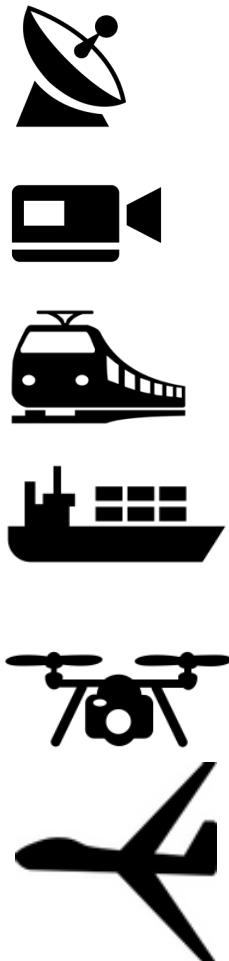
The **Inertial Labs IMU-P** is breakthrough, fully integrated inertial solutions that combine the latest MEMS sensors technology.

Fully calibrated, temperature compensated, mathematically aligned to an orthogonal coordinate system, IMU demonstrate less than 1 deg/hr gyroscopes and 0.005 mg accelerometers bias in-run stability with very low noise and high reliability.

Continuous Built-in Test (BIT), configurable communications protocols, electromagnetic interference (EMI) protection, and flexible input power requirements make the **Inertial Labs IMU-P** easy to use in a wide range of higher order integrated system applications.

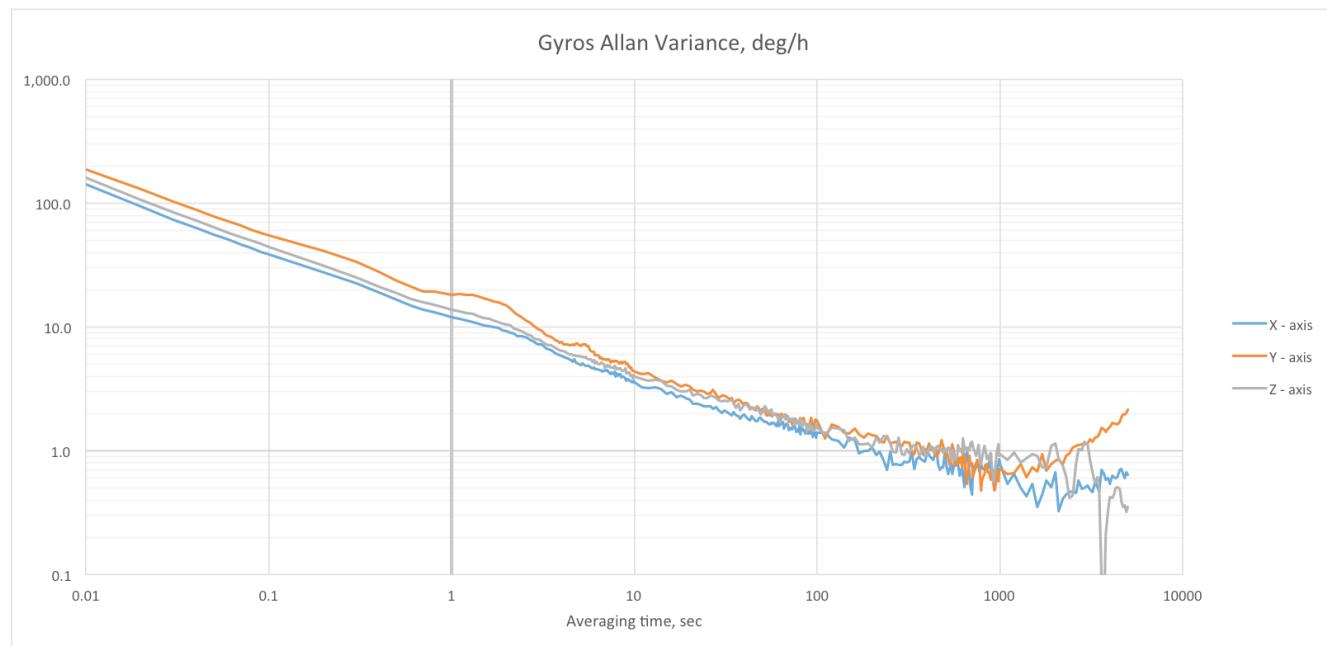
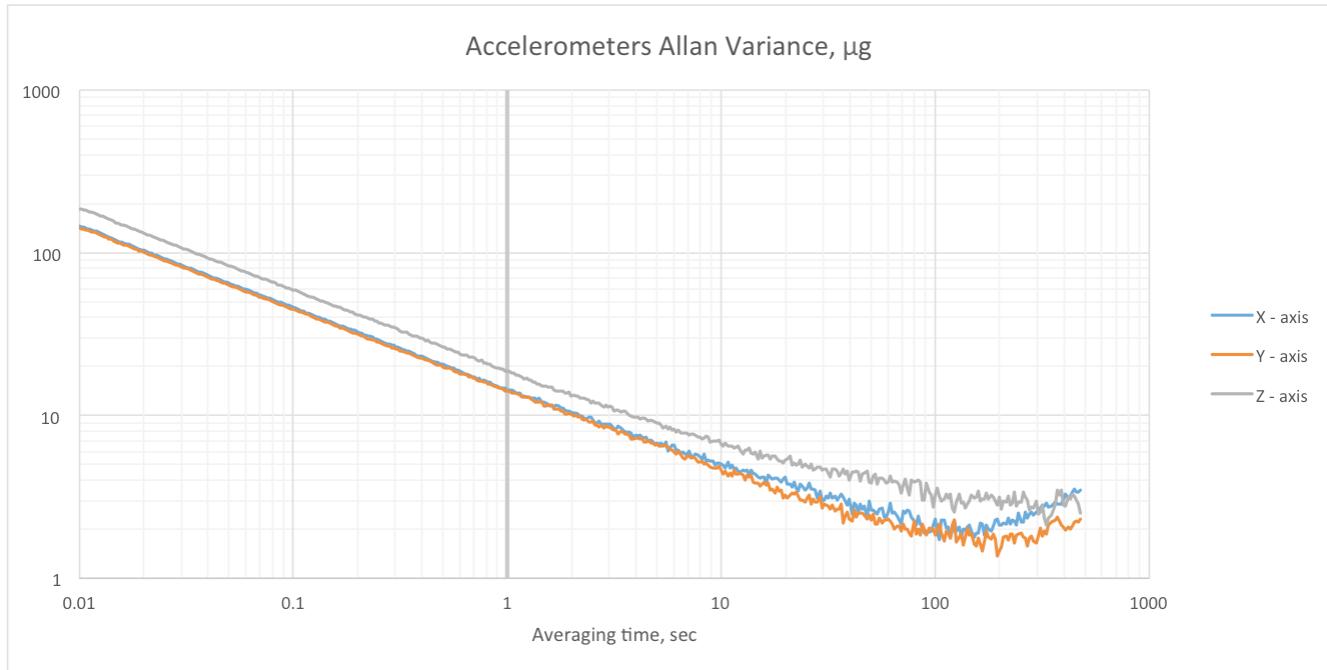
The **Inertial Labs IMU-P** was designed for applications, like:

- ❖ Antenna and Line of Sight Stabilization Systems
- ❖ Passengers trains acceleration / deceleration and jerking systems
- ❖ Motion Reference Units (MRU)
- ❖ Motion Control Sensors (MCS)
- ❖ Gimbals, EOC/IR, platforms orientation and stabilization
- ❖ GPS-Aided Inertial Navigation Systems (INS)
- ❖ Attitude and Heading Reference Systems (AHRS)
- ❖ Land vehicles navigation and motion analysis
- ❖ Buoy or Racing Boat Motion Monitoring
- ❖ UAV & AUV/ROV navigation and control



Parameter	IMU-P "Industrial"	IMU-P "Tactical"
GYROSCOPES		
Gyroscopes Bias in-run stability, RMS	3 deg/hr	1 deg/hr
Gyroscopes error over temperature, RMS	<100 deg/hr	<30 deg/hr
Gyroscopes Angular Random Walk, RMS	0.36 deg/ $\sqrt{\text{hr}}$	0.24 deg/ $\sqrt{\text{hr}}$
ACCELEROMETERS		
Accelerometers Bias in-run stability, RMS	0.01 mg	0.005 mg
Accelerometers error over temperature, RMS	0.7 mg	0.5 mg
Accelerometers Velocity Random Walk	0.017 m/sec/ $\sqrt{\text{hr}}$	0.015 m/sec/ $\sqrt{\text{hr}}$
PITCH & ROLL		
Pitch & Roll static accuracy, RMS	0.05 deg	0.05 deg
Pitch & Roll dynamic accuracy, RMS	0.08 deg	0.08 deg

IMU-P key performance



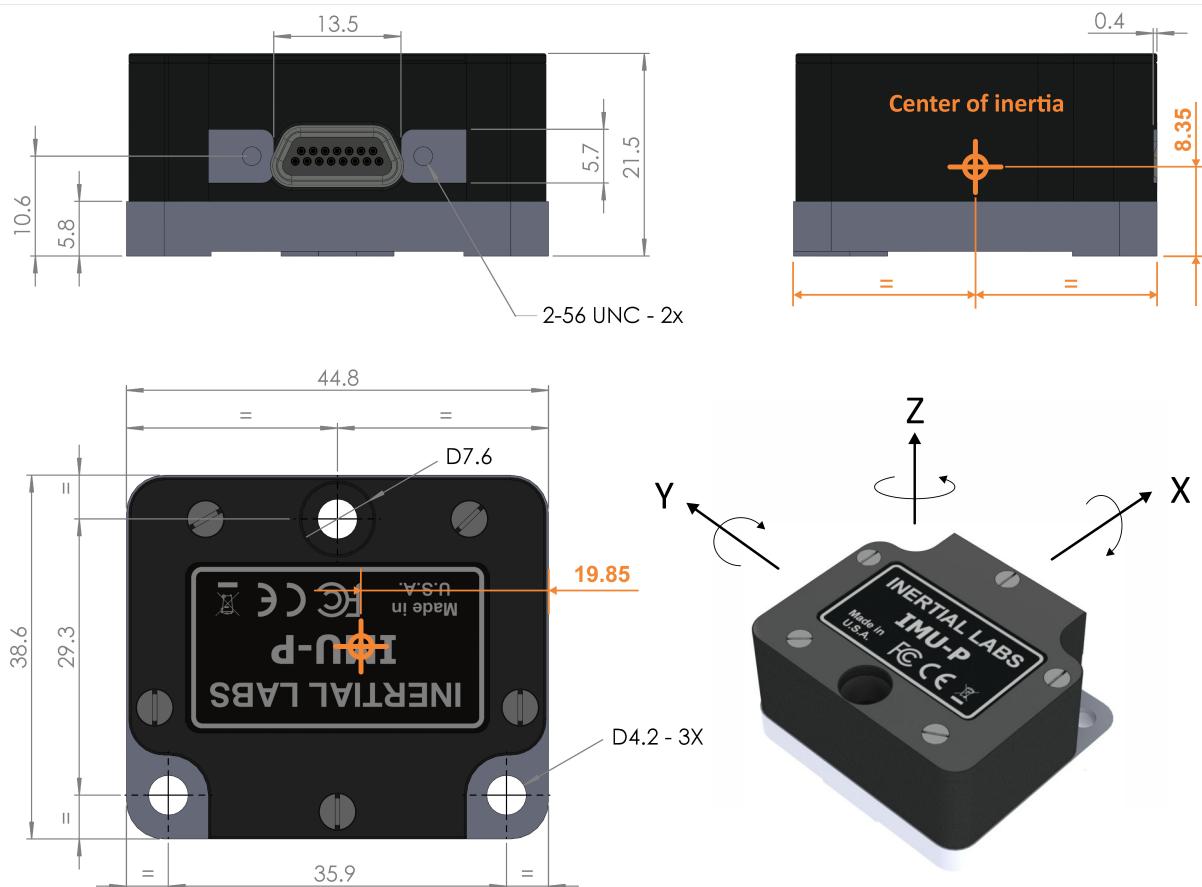
IMU-P Specifications

Parameter	Units	IMU-P (Industrial)	IMU-P (Tactical)
Output signals		Accelerations, Angular rates, Inclinometer (Pitch, Roll) Temperature, Synchronization output	
Update rate	Hz	1 ... 800 (user settable)	1 ... 800 (user settable)
Start-up time	sec	< 1	< 1
Full Accuracy Data (Warm-up Time)	sec	10	10
Gyroscopes		IMU-P (Industrial)	IMU-P (Tactical)
Measurement range	deg/sec	±450, ±950	±450, ±950
Bandwidth	Hz	50, 200	50, 200
Bias in-run stability (Allan Variance, RMS)	deg/hr	3	1
Bias repeatability (turn-on to turn-on, RMS)	deg/hr	<50	<15
Bias instability (in temperature range*, RMS)	deg/hr	<100	<30
SF accuracy	%	0.05	0.05
Noise density	deg/sec/√Hz	0.006	0.004
Angular random walk	deg/√hr	0.36	0.24
Non-linearity	%	0.02	0.01
Axis misalignment	mrad	0.15	0.15
Accelerometers		IMU-P (Industrial)	IMU-P (Tactical)
Measurement range	g	±8*	±8*
Bandwidth	Hz	50	50
Bias in-run stability (RMS, Allan Variance)	mg	0.01	0.005
Bias instability (in temperature range*, RMS)	mg	0.7	0.5
SF accuracy	%	0.05	0.01
Noise density	mg/√Hz	0.03	0.025
Velocity random walk	m/sec/√hr	0.017	0.015
Non-linearity	%	0.05	0.05
Axis misalignment	mrad	0.1 mrad	0.1 mrad
Inclinometer		IMU-P (Industrial)	IMU-P (Tactical)
Measurement range, Pitch	deg	±90	±90
Measurement range, Roll	deg	±180	±180
Resolution	deg	0.01	0.01
Static accuracy**, RMS	deg	0.05	0.05
Dynamic accuracy**, RMS	deg	0.08	0.08
Environment		IMU-P (Industrial)	IMU-P (Tactical)
Mechanical shock, any direction	g	1500	1500
Vibration	g, Hz	7, 5 - 2000	7, 5 - 2000
Operating temperature	deg C	-40 to +85	-40 to +85
Storage temperature	deg C	-50 to +90	-50 to +90
MTBF (G _M @ +65degC)	hours	100,000	100,000
Electrical		IMU-P (Industrial)	IMU-P (Tactical)
Supply voltage	V DC	5 to 30	5 to 30
Power consumption	Watts	0.8 @ 5V	0.8 @ 5V
Output Interface	-	RS-422	RS-422
Output data format	-	Binary, ASCII characters	Binary, ASCII characters
Mechanical		IMU-P (Industrial)	IMU-P (Tactical)
Size	mm	39 x 45 x 22	39 x 45 x 22
Weight	gram	70	70

* version with ±15g accelerometers measurement range is available

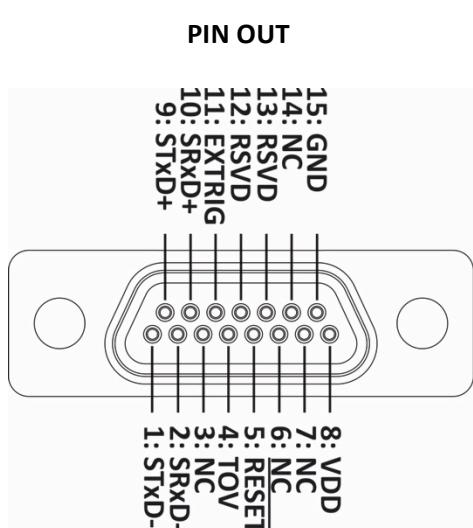
** in operational temperature range with 1 degC/minute temperature gradient

IMU-P mechanical interface description



Notes:

1. All dimensions are in millimeters.
2. All dimensions within this drawing are subject to change without notice.
3. Customers should obtain final drawings before designing any interface hardware.



Pin	Name	Description
1	STxD-	RS422 inverted output
2	SRxD-	RS422 inverted input
3	NC	Do not connect
4	TOV	Time of Validity output. Leave floating if not used. Open drain output pulled up to VDD via 10K.
5	RESET	Reset input. Leave floating if not used. Active low input, pulled up to VDD.
6	NC	Do not connect
7	NC	Do not connect
8	VDD	Power input
9	STxD+	RS422 non-inverted output
10	SRxD+	RS422 non-inverted input
11	EXTRIG	External trigger input. Pulled up to VDD via 10K, leave floating if not used.
12	RSVD	Reserved for future use
13	RSVD	Reserved for future use
14	NC	Do not connect
15	GND	Supply and signal ground