



# High Performance Advanced MEMS Industrial & Tactical Grade Inertial Measurement Units

## IMU-P



- ITAR free (ECCN 7A994 - No License Required)
- Designed for stabilization (S) and guidance (A)
- Affordable price
- 1 deg/hr Gyro Bias in-run stability
- 0.08 deg/vhr Angular Random Walk
- $\pm 40$  g accelerometers dynamic range
- 5  $\mu$ g Accelerometers Bias in-run stability
- 0.015 m/s/vhr Velocity Random Walk
- 0.05 deg Pitch & Roll accuracy



Datasheet  
Rev. 3.2



STANDARD  
MIL-STD  
810G



The **Inertial Labs Inertial Measurement Unit (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:

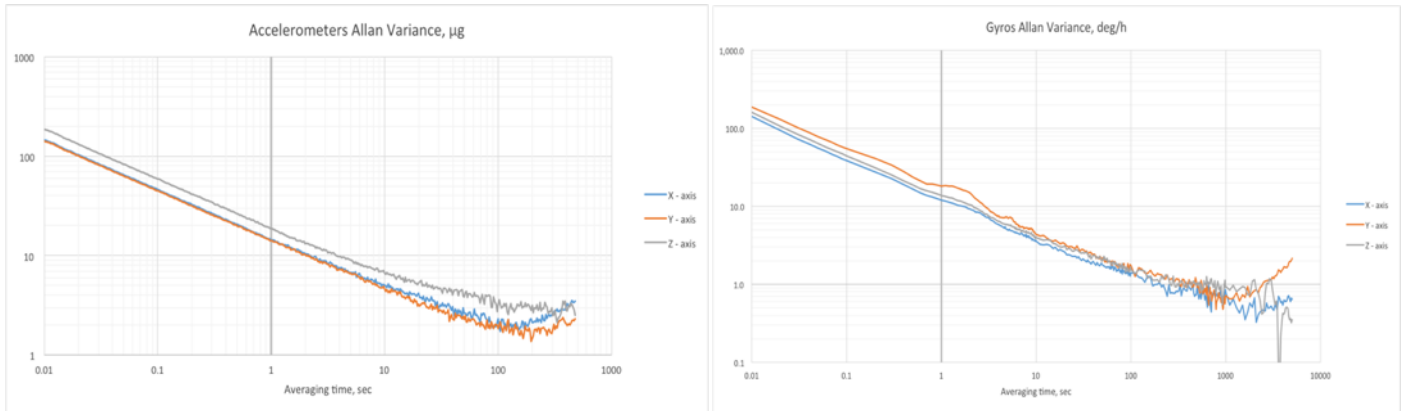
- ❖ Antenna and Line of Sight Stabilization Systems
- ❖ Passengers trains acceleration / deceleration and jerking systems
- ❖ Motion Reference Units (MRU)
- ❖ Motion Control Sensors (MCS)
- ❖ Gimbals, EOC/IR, platforms orientation and stabilization
- ❖ GPS-Aided Inertial Navigation Systems (INS)
- ❖ 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 "Tactical" Standard A	IMU-P "Tactical" Stabilization S	IMU-P "Industrial"
<b>GYROSCOPES (±450 deg/sec range)</b>			
Gyroscopes Bias in-run stability	1 deg/hr	2 deg/hr	3 deg/hr
Gyroscopes Noise - Angular Random Walk	0.2 deg/√hr	0.08 deg/√hr	0.3 deg/√hr
<b>ACCELEROMETERS (±8 g range)</b>			
Accelerometers Bias in-run stability	0.005 mg	0.01 mg	0.01 mg
Accelerometers Noise - Velocity Random Walk	0.015 m/sec/√hr	0.018 m/sec/√hr	0.018 m/sec/√hr
<b>PITCH &amp; ROLL</b>			
Pitch & Roll static accuracy, RMS	0.05 deg	0.05 deg	0.05 deg
Pitch & Roll dynamic accuracy, RMS	0.08 deg	0.08 deg	0.08 deg



## IMU-P Gyroscopes & Accelerometers Key Performance



## Inertial Labs IMU-P key applications



UAV, Loitering Munitions, Glide Bombs



Remote Weapon Stations, EOS stabilization



Aerospace



Autonomous vehicles



Land vehicles navigation systems



Remote sensing (mapping, photogrammetry)





Construction equipment motion control



Antenna stabilization



Precision Agriculture

Parameter	Units	IMU-P TACTICAL			IMU-P INDUSTRIAL		
							
Output signals		Accelerations, Angular rates, Pitch, Roll, Relative Heading, Temperature, Synchronization output					
Available colors of enclosure		Black, Desert Tan or Green					
Data update rate	Hz	2000 Hz			2000 Hz		
Start-up time	sec	< 1			< 1		
Full Accuracy Data (Warm-up Time)	sec	<5 (max)			<5 (max)		
<b>Gyroscopes</b>		<b>IMU-P (Tactical)</b>			<b>IMU-P Industrial</b>		
		<b>Standard A</b>		<b>Stabilization S</b>			
Measurement range	deg/sec	±450; ±950		±450; ±950	±450; ±950		
Bandwidth (-3dB)	Hz	260		260	260		
Data update rate	Hz	2000		2000	2000		
Bias in-run stability (Allan Variance, RMS)	deg/hr	1		2	3		
Bias repeatability (turn-on to turn-on, RMS)	deg/hr	15		20	30		
Bias instability (over temperature range, RMS)	deg/hr	30		35	50		
SF accuracy (over temperature range)	ppm	1000		3000	4000		
Noise. Angular Random Walk (ARW)	deg/√hr	0.2		0.08	0.3		
Non-linearity	ppm	100		200	200		
Axis misalignment	mrad	0.15		0.15	0.15		
<b>Accelerometers</b>		<b>IMU-P (Tactical)</b>			<b>IMU-P (Industrial)</b>		
Measurement range	g	±8	±15	±40	±8	±15	±40
Bandwidth (-3dB)	Hz	260	260	260	260	260	260
Bias in-run stability (RMS, Allan Variance)	mg	0.005	0.02	0.03	0.01	0.03	0.05
Bias instability (in temperature range*, RMS)	mg	0.5	0.7	1.2	0.7	1.1	1.5
Bias one-year repeatability	mg	1.0	1.3	1.5	1.5	2.0	2.5
SF accuracy (over temperature range)	ppm	150	300	500	500	700	850
SF one-year repeatability	ppm	500	1300	1500	800	1400	1700
Noise. Velocity Random Walk (VRW)	m/sec/√hr	0.015	0.035	0.045	0.02	0.045	0.06
Non-linearity	ppm	150	150	150	340	800	1000
Axis misalignment	mrad	0.1	0.1	0.15	0.15	0.15	0.2
<b>Inclinometer</b>		<b>IMU-P (Tactical)</b>			<b>IMU-P (Industrial)</b>		
Measurement range, Pitch / Roll	deg	±90 / ±180			±90 / ±180		
Resolution	deg	0.01			0.01		
Static accuracy, RMS	deg	0.05			0.05		
Dynamic accuracy, RMS	deg	0.08			0.08		
<b>Environment</b>		<b>IMU-P (Tactical)</b>			<b>IMU-P (Industrial)</b>		
Mechanical shock (MIL-STD-810G)	g, s	40, 0.011 half-sine pulse			40, 0.011 half-sine pulse		
Vibration (MIL-STD-810G)	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 <sub>m</sub> @+65degC, operational)	hours	100,000			100,000		
<b>Electrical</b>		<b>IMU-P (Tactical)</b>			<b>IMU-P (Industrial)</b>		
Supply voltage	V DC	5 to 30			5 to 30		
Power consumption	Watts	0.8 @ 5V			0.8 @ 5V		
Output Interface	-	RS-422/RS-232			RS-422/RS-232		
Output data format	-	Binary, ASCII characters, STIM-300 output format			Binary, ASCII characters, STIM-300 output format		
EMC/EMI/ESD		MIL-STD-461G			MIL-STD-461G		
<b>Mechanical</b>		<b>IMU-P (Tactical)</b>			<b>IMU-P (Industrial)</b>		
Size	mm	39 x 45 x 22			39 x 45 x 22		
Weight	gram	70			70		
IMU version using customized case & connector	custom	Available			Available		

