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INERTIAL MEASUREMENT UNIT (IMU-P)

DILABS®

The DILABS 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 DILABS IMU-P is break through, 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 DILABS IMU-P easy to use in a wide range of higher order integrated system applications.

The DILABS 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 A”	IMU-P “TACTICAL S”	IMU-P “INDUSTRIAL”	IMU-P “KERNEL - 100”
GYROSCOPES				
Gyroscopes Bias in-run stability	1 deg/hr	2 deg/hr	3 deg/hr	2deg/hr
Gyroscopes Bias residual error	30 deg/hr	35 deg/hr	50 deg/hr	72 deg/hr
Gyroscopes Angular Random Walk	0.2 deg/√hr	0.08 deg/√hr	0.3 deg/√hr	0.38deg/√hr
ACCELEROMETERS (±8 g range)				
Accelerometers Bias in-run stability	0.005 mg	0.01 mg	0.01 mg	0.01 mg
Accelerometers Bias residual error	0.5 mg	0.5 mg	0.7 mg	0.7 mg
Accelerometers Velocity Random Walk	0.015 m/sec/√hr	0.018m/sec/√hr	0.018m/sec/√hr	0.02m/sec/√hr
PITCH & ROLL				
Pitch & Roll static accuracy, RMS	0.05 deg	0.05 deg	0.05 deg	0.05 deg
Pitch & Roll dynamic accuracy, RMS	0.08 deg	0.08 deg	0.08 deg	0.08 deg

IMU-P SPECIFICATIONS

PARAMETER	UNITS	IMU-P "TACTICAL"			IMU-P "INDUSTRIAL"			IMU-P "KERNEL-100"		
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			2000 Hz		
Start-up time	sec	< 0.02			< 0.02			< 0.02		
Full Accuracy Data (Warm-up Time)	sec	<5 (max)			<5 (max)			<5 (max)		
GYROSCOPES	**UNITS**	**IMU-P TACTICAL**			**IMU-P INDUSTRIAL**			**IMU-P KERNEL-100**		
		Standard A	**Stabilisation S**							
Measurement Range	deg/sec	±450; ±950, ±2000	±450; ±950, ±2000		±450; ±950, ±2000			±2000		
Bandwidth (-3dB)	Hz	260	260		260			260		
Data update rate	Hz	2000	2000		2000			2000		
Bias in-run stability (Allan Variance, RMS)	deg/hr	1	2		3			2		
Bias repeatability (turn-on to turn-on, RMS)	deg/hr	15	20		30			20		
Bias instability (over temperature range, RMS)	deg/hr	30	35		50			72		
SF accuracy (over temperature range)	ppm	1000	3000		4000			1000		
Noise. Angular Random Walk (ARW)	deg/√hr	0.2	0.08		0.3			0.38		
Non-linearity	ppm	100	200		200			350		
Axis misalignment	mrad	0.15	0.15		0.15			0.15		
ACCELEROMETERS	**UNITS**	**IMU-P TACTICAL**			**IMU-P INDUSTRIAL**			**IMU-P KERNEL-100**		
Measurement range	g	±8	±15	±40	±8	±15	±40	±8	±15	±40
Bandwidth (-3dB)	Hz	260	260	260	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	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	0.7	1.1	1.5
Bias one-year repeatability	mg	1.0	1.3	1.5	1.5	2.0	2.5	1.5	2.0	2.5
SF accuracy (over temperature range)	ppm	150	300	500	500	700	850	500	700	850
SF one-year repeatability	ppm	500	1300	1500	800	1400	1700	800	1400	1700
Noise. Velocity Random Walk (VRW)	m/sec/√hr	0.015	0.035	0.045	0.02	0.045	0.06	0.02	0.045	0.06
Non-linearity	ppm	150	150	150	340	800	1000	340	800	1000
Axis misalignment		0.1	0.1	0.15	0.15	0.15	0.2	0.15	0.15	0.2
INCLINOMETER	**UNITS**	**IMU-P TACTICAL**			**IMU-P INDUSTRIAL**			**IMU-P KERNEL-100**		
Measurement range, Pitch / Roll	deg	±90 / ±180			±90 / ±180			±90 / ±180		
Resolution	deg	0.01			0.01			0.01		
Static accuracy, RMS	deg	0.05			0.05			0.05		
Dynamic accuracy, RMS	deg	0.08			0.08			0.08		
ENVIRONMENT	**UNITS**	**IMU-P TACTICAL**			**IMU-P INDUSTRIAL**			**IMU-P KERNEL-100**		
Mechanical shock (MIL-STD-810G)	g, msec	40, 0.011 half-sine pulse			40, 0.011 half-sine pulse			400g, 0.1 ms		
Vibration (MIL-STD-810G)	g RMS, Hz	7, 20 – 2000			7, 20 – 2000			8, 10 – 2000		
Environmental Protection	-	IP67			IP67			IP67		
Operating temperature	deg C	-40 to +85			-40 to +85			-40 to +85		
Storage temperature	deg C	-50 to +90			-50 to +90			-50 to +90		
Low pressure	Pa, min	1750, 30			1750, 30			1750, 30		
Humidity	%	up to 95			up to 95			up to 95		
MTBF (GM @+65degC, operational)	hours	100,000			100,000			100,000		
Life time (operational)	years	10			10			10		
Life time (storage)	years	17			17			17		
ELECTRICAL	**UNITS**	**IMU-P TACTICAL**			**IMU-P INDUSTRIAL**			**IMU-P KERNEL-100**		
Supply voltage	V DC	5 to 30			5 to 30			4 to 15		
Power consumption	Watts	0.8 @ 5V			0.8 @ 5V			0.365 @ 5V		
Output Interface	-	RS-422/RS-232/RS-485			RS-422/RS-232/RS-485			RS-422		
Output data format	-	Binary, ASCII, STIM-300 output format			Binary, ASCII, STIM-300 output format			Binary, ASCII (in GUI)		
PHYSICAL	**UNITS**	**IMU-P TACTICAL**			**IMU-P INDUSTRIAL**			**IMU-P KERNEL-100**		
Size	mm	39 x 45 x 22			39 x 45 x 22			28.5 x 19.5 x 8.5		
Weight	gram	70			70			7		

DILABS®

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