

iNAT-M200/MLI

Economic MEMS Based Inertial Navigation System with Tightly or Loosely Coupled INS/GNSS Data Fusion

iNAT-M200/MLI are members of the advanced iNAT series (iMAR Navigation and Timing) and one of the smallest powerful MEMS based INS/GNSS inertial navigation, measurement, surveying and control systems on the market for applications on the surface (land/sea) and in the air. It provides all kinematic measurements like acceleration, angular rate, attitude, true heading, velocity and position of the target vehicle in real-time with an data update rate of up to 400 Hz.

- robust, compact, light weight system, 600 grams
- based on MEMS gyro & accel technology and L1 GNSS (GPS + GLONASS + Beidou + QNZZ); EGNOS / WAAS capability
- odometer / wheel sensor aiding capability
- output of position, velocity, angular rate, acceleration, attitude, true heading, CoG in real-time with up to 400 Hz (modes: INS/GNSS, dead-reckoning)
- interfaces: UART RS232 & RS422 / CAN / Ethernet / USB for real-time data output and RS232 for DGPS correction input; minimum latency
- up to 32 GByte internal memory ("black-box")
- easy to use, easy to configure; powerful GUI

The [iNAT-M200/MLI](#) is the economic version of the iNAT-M200/SLN, iNAT-M200/SLC and iNAT-M200/

SLD. For land vehicles additionally an odometer aiding capability is available. The iNAT-M200 is designed for standard tasks of navigation, guidance and control for cars, trucks, naval vessels and UAVs, optimized towards low cost with reasonable performance.



The internal data fusion is based on a 42+ state Kalman filter, including automatic odometer scale factor estimation, misalignment estimation and on-the-fly alignment

without any need to perform any extensive "calibration drives".

The iNAT-M200 is delivered with the MS Windows based configuration software iXCOM-CMD, which is also available under Linux and MacOS. All output data can be displayed and stored online on the user's notebook, tablet or process computer. The iNAT-M200/MLI is fully interface compatible with all other systems of iNAT-M200 family.

Technical Data of iNAT-M200/MLI (rms values)

	Angular Rate ¹	Acceleration ¹
Sensor Range:	± 250 °/s [500 / 1'000 / 2'000 °/s]	± 8 g [4 / 16 g]
Bias accuracy (INS/GNSS filtered):	< 0.02 °/s	< 5 mg
Bias Stability (AllanVar):	< 10 °/h (@ const.temp)	< 2 mg (@ const. temp.)
Bias day-to-day (OTR, unfiltered):	< 1 °/s (typ. < 0.3 °/s)	< 15 mg (typ. < 8 mg)
Resolution [@ range]:	< 0.001 °/s [@ 250 °/s]	< 0.1 mg [@ 4 g range]
Linearity / Scale error:	< 0.2 % / < 1 %	0.5 % / < 0.5 %
Angular random walk, Noise:	0.015 °/s/√Hz	< 1 mg/√Hz
g dependent Drift (comp.):	< 0.01 °/s/g	
Data Rate / Bandwidth / Latency / Jitter:	up to 400 Hz / 200 Hz / < 3 ms / 1 ms	
Pos / Vel (INS/GNSS fusion):	Lon / Lat: typ. < 2 m ; < 0.15 m/s (with sufficient GNSS aiding)	
	< 3 % Distance Travelled during short GNSS outages (Dead Reckoning; only if odometer is available)	
Roll / Pitch / Yaw accuracy:	< 0.3° roll/pitch, < 0.5° heading (under sufficient motion dynamics and GNSS aiding available)	
	< 0.1° heading also initially at standstill with dual-antenna (@ 2 m baseline) with version iNAT-M200/SLD-DA	
GNSS engine (integrated):	version /MLI: L1 GPS+GLONASS, SBAS, Beidou, QZSS (commercial grade)	
Inertial Axis Misalignment:	< 2 mrad between all inertial sensor axes (calibrated)	
Digital Interface:	UART RS422 / RS422 (up to 921.6 kBd), CAN, ARINC825, CANaero, USB, Ethernet TCP/IP / UDP;	
	INS/GNSS/ODO data and calibrated sensor data up to 400 Hz; /SLI can serve also as NTRIP caster (option)	
Connector:	MIL-C-38999 III for data and power, M12 for Ethernet, SMA for active GNSS antenna	
SYNC:	RS422 level PPS output	
Data Latency:	< 1 ms (sampling accuracy better 1 µs, time-stamped according to PPS; jitter < 1 ms)	
Temperature:	-40...+71 °C (operating, case temperature), -45...+85 °C (storage)	
Shock, Vibration, Altitude:	60 g, 11 ms ½ sine saw-tooth (endurance), 10...2'000 Hz 5 g rms vibration (endurance); alt. < 30'000 ft;	
	10...2'000 Hz 2 g rms (operation) ; shock / vibration may affect performance, especially if sensor ranges exceeded	
Environment / MTBF/ MTTR:	IP67 (temp., humid., EMI/EMC compl. MIL-STD-810G, MIL-STD-461G) / > 35.000 hrs (estimated) / < 300 s	
Size, Weight:	approx. 102 x 112 x 65 mm (plus connector), approx. 600 grams (metal enclosure)	
Power / Start-up-Time / protection:	9...34 V DC ; approx. < 6 W @ 34 V (iNAT-M200/MLI) / < 20 sec / reverse-voltage protection;	
	two independent and isolated inputs available; overvoltage protection;	
Software:	iXCOM-CMD user software; open iXCOM protocol; SDK; internal 42+ state Extended Kalman Filter plug&play	

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¹ Systems with different sensor performance available on request (iNAT-M200, iNAT-FSSG, iNAT-CFM etc.)

