

iNAT-CFM-5+

INS/GNSS Miniature FOG Based Inertial Navigation System

The iNAT-CFM-5+ is a compact Inertial Measurement and Navigation System (IMS/INS) consisting of 3 closed-loop fiber optical gyros (FOG) of class 5 deg/hr OTR (day-to-day), 3 precise accelerometers of class 1.5 mg OTR, a powerful GNSS engine and an advanced strapdown processor with advanced INS/GNSS/ODO data fusion. The system provides also interfaces to an external magnetometer and air data computer.

- < 5 deg/hr / < 1.5 mg bias day2day OTR; up to 1 kHz data
- 0.3 deg/sqrt(hr) ARW, < 0.1 deg/h bias stability (AllanVar)
- consumer-grade integrated L1 GPS+GLONASS+GAL engine with SBAS (option: all-frequ./all-constellation RTK)
- Ethernet TCP/IP / UDP, UART RS422 / RS232, CAN
- Wheel sensor interface for land vehicle applications
- Interfaces to provide PPS and PPT
- Made for navigation, guidance & surveying tasks
- qualified to DO160-G / MIL-STD 810G / 461G / 704F environment
- fully protocol compatible to all iNAT / iTraceRT-MVT / iSULONA / iCOMBANA / iPRENA / iATTHEMO systems
- no ITAR restrictions, no export restrictions

The iNAT-CFM is designed for ruggedized applications. It can be operated on an unregulated wide range input supply voltage

and is protected against wrong polarity, over-voltage and lightning. The system's data as attitude, heading, position, velocity,



rates and acceleration are sent with up to 500 Hz via Ethernet or RS422 (UART) or CAN bus with time stamp and related to UTC/PPS. All signals are fed via a robust connector of type MIL-C-38999-III.

The iNAT-CFM is manufactured in Germany, designed to be used in industrial and aviation applications and used also in defense applications. It is not covered by any ITAR or export

restrictions.

iNAT-CFM contains an internal storage capability of INS and GNSS and odometer raw data for up to 128 GByte.

Technical Data iNAT-CFM-5 (rms):

	Angular Rate	Acceleration
Sensor Range:	± 450 °/s	± 10 g (option: ± 20 g, ± 30 g)
Bias (over temperature range):	3 °/hr	1.5 mg
Bias Stability (min. AllanVar):	0.1 °/hr	< 0.05 mg
Resolution:	< 0.000'04 °/LSB	< 0.1 mg/LSB
Linearity / Scale factor error:	< 0.05 % / 0.05 %	< 0.2 % / 0.2 %
Angular random walk:	< 0.3 °/√h	< 30 µg/√Hz
Integrated GNSS engine:	L1 GPS+GLONASS µBlox NEO-M8T (option all-frequ./all-constellation RTK, factory set)	
Output:	attitude / heading (RPY, quat., RCM), velocity, position, 3 x angular rate, 3 x acceleration, odometer vel./cnts, GNSS data, time, status, PBIT, CBIT, IBIT	
Data fusion accuracy:	roll / pitch < 1 ° rms dynamic flight, typ. 0.1 °; heading < 1 deg rms under sufficient ¹ GNSS aiding; lon / lat with SBAS: < 0.6 m, altitude < 1 m rms (under sufficient GNSS conditions); lon / lat with standard GNSS aiding: < 2 m; velocity accuracy: < 0.2 m/s	
Digital Interface:	Ethernet (UDP / TCP/IP), RS422 and RS232 (UART), CAN / ARINC825 and status, GNSS PPS, several SYNC / Event / Trigger I/Os; communication protocol compatible to each other iNAT / iSULONA / iCOMBANA... device	
Odometer Input:	A/B quadrature signal, RS422 level (for land vehicle with wheel sensor)	
Data rate, bandwidth:	1...500 Hz; gyro bandwidth 500 Hz, accelerometer bandwidth 200 Hz	
Connector:	MIL-C-38999-III, 37 pin (male), type D38999/24WD35PN; TNC	
Axis Orthogonality:	< 0.5 mrad between all inertial sensor axes	
Temp., Shock, Vibration, Alt.:	-55...+71 °C (operating, case temperature; +85 °C up to 30 minutes); -56...+85 °C (storage) Shock: 20 g / 11 ms; vibration 10...2'000 Hz, 4.8 g rms (op.) / 6.3 g rms (endurance); 60'000 ft ²	
Magnetic Insensitivity:	< 0.1 °/h / Gauss for operation within spec (for up to 20 Gauss)	
Environment / MTBF/ MTTR:	IP68 / 35'000 hrs / < 10 minutes; qual. to DO160G, MIL-STD810G, MIL-STD461G, MIL-STD704F	
Size, Weight (HxWxD):	approx. 130 x 128 x 153 mm (plus connector), mass approx. 2'200 grams	
Start-up-Time; Power Supply:	< 30 sec; 10...34 V DC, protected against wrong polarity and 60 V overvoltage; approx. 16 W 100 ms hold-over during power drops (DO160G)	
Software:	internal online 42+ state Kalman filter, iXCOM; HMI / GUI for user: iXCOM-CMD ; Python scripts available for easy integration	

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¹ sufficient number of available satellites and sufficient motion dynamics to provide reasonable observability

² qualified up to 40'000 ft, designed for up to 60'000 ft

