

iNAT-CFM-5

Most Miniature FOG Based INS/GNSS/VMS Navigation System

The iNAT-CFM-5 is a most compact Inertial Measurement and Navigation System (IMS/INS) consisting of 3 fiber optical gyros (FOG) of class 5 deg/hr OTR, 3 servo-accelerometers of class 2 mg OTR, a powerful GNSS engine and an advanced strap-down processor with loosely or tightly coupled INS/GNSS/VMS data fusion. The system provides also interfaces to an external magnetometer and air data computer.

velocity, rates, acceleration and standard deviations 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.

- < 5 deg/hr / < 2 mg ove temperature range; 0.5 deg/hr / 0.1 mg bias stability (AllanVariance)
- integrated L1 GPS+GLONASS+Beidou engine, SBAS
- Ethernet, UART RS422, CAN, TRIG/SYNC_IN/OUT
- Wheel sensor interface for land vehicle applications (odometer)
- Designed for Navigation, Guidance & Surveying Tasks
- Made to withstand DO160G / MIL-STD 810G/461G/704F environment; integrated vibration isolators
- no ITAR restrictions, no export restrictions



The iNAT-CFM is manufactured in Germany and designed to be used in industrial and defense applications, it is also used in airborne applications.

iNAT-CFM-5 is provided with a tightly or loosely coupled INS/ GNSS data fusion, using also odometer data, where applicable.

The system is supported by the iXCOM-CMD GUI, offering system configuration, data visualization, moving map navigation and maintenance via network.

The INS is designed for rugged applications. The iNAT-CFM-5 can be operated on an unregulated wide range input supply voltage and is protected against wrong polarity and over-voltage. The system's data as attitude, heading, position,

The communication interface is compatible to those of iMAR's all other iNAT-xxx systems.

The iNAT-CFM-5 is not covered by ITAR or export restrictions.

Technical Data iNAT-CFM-5 (all values rms):

	Angular Rate	Acceleration
Sensor Range:	$\pm 450 \text{ }^\circ/\text{s}$	$\pm 10 \text{ g}$ (option: $\pm 20 \text{ g}$)
Bias (over temperature range):	$< 5 \text{ }^\circ/\text{hr}$	2 mg
Bias Stability (min. AllanVar):	$< 0.3 \text{ }^\circ/\text{hr}$	$< 0.2 \text{ mg}$
Resolution:	$< 0.0001 \text{ }^\circ$	$< 0.1 \text{ mg}$
Linearity / Scale factor error:	$< 0.05 \text{ } \% / 0.05 \text{ } \%$	$< 0.2 \text{ } \% / 0.2 \text{ } \%$
Angular random walk:	$< 0.3 \text{ }^\circ/\sqrt{\text{hr}}$	$< 100 \text{ } \mu\text{g}/\sqrt{\text{Hz}}$
Integrated GNSS engine:	L1 GPS+GLONASS, Beidou, QZSS, SBAS, (external dual-antenna L1L2 GNSS RTK engine available as option - see iDAGOS)	
Output:	INS/GNSS data fusion of advanced 42+ state ext. Kalman filter: position, velocity, RPY/Quat. angular rate vector, acceleration vector, odometer vel./cnts, GNSS data	
System accuracy:	roll / pitch: 0.05° rms heading $< 0.1^\circ$ rms (under sufficient conditions) ¹ lon / lat: $< 0.6 \text{ m}$ [CEP] GNSS+SBAS altitude $< 2 \text{ m}$ [rms] (under sufficient GNSS conditions); lon / lat: $< 2 \text{ m}$ [CEP] GNSS altitude $< 6 \text{ m}$ [rms] velocity: $< 0.1 \text{ m/s}$ position accuracy during short GNSS outages: $< 0.3 \text{ } \%$ of distance travelled [CEP] (with VMS)	
Data Interface:	Ethernet (UDP / TCP/IP), RS422 and RS232 (UART), CAN / ARINC825 / CANaero and status, GNSS PPS, several SYNC / Trigger I/Os; customized I/F on request (e.g. ARINC429)	
Connectors:	MIL-C-38999-III, 37 pin (male); TNC for GNSS antenna	
Odometer Input:	A/B quadrature signal, RS422 level (for land vehicle with wheel / vehicle motion sensor VMS)	
Data rate, bandwidth, storage:	1...500 Hz; gyro bandwidth 500 Hz, accelerometer bandwidth 200 Hz;	
Data storage:	32 GByte internal non-volatile memory available	
Axis Misalignment:	$< 0.5 \text{ mrad}$ between all inertial sensor axes	
Temp., Shock, Vibration, Alt.:	-55...+71 °C (operating, case temperature; +85 °C up to 15 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 $< 0.1 \text{ }^\circ/\text{h}$ / Gauss for operation within spec (for up to 20 Gauss)	
Magnetic Insensitivity:	MIL-STD-810G / -461G / -704F, DO160G; IP66 / 35'000 hrs / < 10 minutes	
Environment / MTBF/ MTTR:	approx. 120 x 128 x 125 mm (plus connector); approx. 2'100 grams	
Size, Weight:	$< 15 \text{ sec}$; 10...34 V DC, protected against wrong polarity and 60 V overvoltage; approx. 16 W	
Start-up-Time; Power Supply:	100 ms hold-over during power drops (according DO160E)	
Software:	iXCOM-CMD GUI (for MS Windows and Linux); internal online 42+ state ext. Kalman filter, based INS/GNSS/VMS data fusion	

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¹ sufficient number of usable satellites (S/A off) and sufficient motion dynamics assumed (i.e. a reasonable number or significant turns in motion after initialization)

