iNAT-FSSG-01

Inertial Measuring System for Navigation Applications with optional Dual-Antenna GNSS supported True Heading

iNAT-FSSG-01 is part of the IMS product family of systems for inertial navigation and guidance, gyro compassing, stabilization, true heading determination and for dynamically motion analysis with fiber optical gyros, that covers applications, which require accuracy, reliability and an open interface to the user.

- GNSS single antenna or dual-antenna (-DA) supported true north referencing, inertial navigation and surveying system for land / surface, airborne, naval and other applications.
- FOG technology with low noise and high angular resolution; self gyro compassing.
- Integrated VMS / odometer interface.
- integrated time synchronisation module and GPS / RTK-GPS with single or dual antenna; SAASM capability as option.
- high data rate, open interface: Ethernet TCP/IP - UDP, CAN, RS422, ARINC, ext. GNSS corrections (option).

iNAT-FSSG-01 consists of three fiber optical gyroscopes with very low random walk and and high gyro angular resolution, three servo accelerometers, a powerful strapdown processor and an open and flexible interface, which can be customized on request.

As an option, the modular designed system provides interfaces to (D)GPS/GLONASS, external trigger/sync input/output and external I/Os, e.g. for camera platform control, stabilization and synchronization. Possible outputs are Ethernet (TCP/IP or UDP), RS232/422, CAN, Dig-I/Os. Furthermore, application specific interfaces can be provided on request.

Due to the modular hardware and software architecture, special adaptation of housing and mechanical dimensions to customer's requirements is possible on demand.

iNAT-FSSG-01 allows autonomous gyro compassing, the optional dual-antenna capability (iNAT-FSSG-01-DA) allows the system to determine true heading also with higher accuracy at standstill conditions.

The baseline (distance) of the both antenna depends on the application – the longer, the higher the GNSS based true north accuracy.

iNAT-FSSG-01 is usually operated in online mode, however, it also provides the possibility of post-processing, e.g. to perform additional reverse Kalman filtering and smoothing.

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 related to UTC/ PPS.

The system is only covered by dual-use export control and not by any ITAR regulations.

Technical Data of iNAT-FSSG-01 and iNAT-FSSG-01-DA (1 sigma values)

Performance: (data fusion)	True Heading:	< 0.1° [RMS] with at least single antenna GNSS and under sufficient motion (no dual antenna required) < 0.5° sec lat [RMS] gyro compassing (without GNSS support required) < 0.5° [RMS] with 1 m baseline between the two GNSS antennas (-DA) < 0.1° [RMS] with 5 m baseline between the two GNSS antennas (-DA)		
	Position accuracy:	< 1…2 m RMS	(GPS, S/A off)	
		< 0.02 m RMS	(RTK mode)	
	Altitude:	< 3 m RMS	(GPS, S/A off)	
		< 0.06 m RMS	(RTK mode)	
	Attitude Accuracy:	< 0.02° / 0.1° [1] RMS	(GPS, S/A off)	
	Heave accuracy:	< 5 cm or 5 % (RMS) whichever is highest		
Alignment Time:	< 2 min. GNSS cold start, < 1 min. GNSS warm start; < 30 sec with stored heading			
Range:	± 450 °/s	(no angle limitation)	±5 g (option: ±10 g or ±20 g)	
Noise:	< 0.01 deg/√h	(gyros)	< 0.05 mg/√Hz	(accels)
Linearity / Scalefactor:	0.02 % / 0.03 %	(gyros)	0.2 % / 0.1 %	(accels)
Drift (unaided) / Offset:	< 0.1°/hr	(gyros)	< 1.5 mg	(accels)
Bias Stability (AV):	< 0.01 °/hr	(gyros)	< 50 µg	(accels)
GNSS Receiver (integrated):	up to L1L2 GPS+GLONASS+GALILEO+BEIDOU, RTK/PPP, L-Band; SAASM capability as hardware option			
Output (options):	RS422 UART, Ethernet TCP/IP / UDP, Dig-I/O / PPT (Pulse Per Time), PPS, CAN, ARINC825, ARINC429, SDLC/HDLC			
Connectors:	MIL-C-38999 III, TNC for GNSS antenna(s)			
Data Output Rate:	1...500 Hz, internal bandwidth 500 Hz, up to 32 GByte memory for internal data storage			
Temperature range:	-40 to +71°C operating, -46 to +85°C storage			
Rel. Humidity:	8...100%, IP67			
Magnetic. insensitivity:	< 500 µTesla (5 Gauss)			
MTBF / MTTR:	35,000 hrs (estimated) / < 30 minutes			
Shock, Vibration:	25 g, 11 ms; 60 g, 5 ms (operating); 20…2'000 Hz, 3 g rms			
Qualification:	MIL-STD-810F, MIL-STD-461E, MIL-STD-704D (DO160E as option)			
Power; Start-up-Time:	10...34 V DC, < 25 W, overvoltage protection up to 60 V ; < 15 sec			
Weight / Size:	4.9 kg / 187 x 128 x 196 mm^3 (without connectors)			
Inputs (options):	internal/external (RTK) GNSS (-DA option: integrated dual-antenna GNSS receiver), event trigger [PPS / SYNC], odometer interface (opto-coupler input up to 32 V, RS422 level compliant, A/B quadrature or counts & direction)			
Software:	iXCOM communication protocol; iXCOM-CMD GUI software under MS Windows and Linux available; INS/GNSS post-proc iWP+ / iIP+; integrated real-time Kalman filter (27+ states); on request customized applications can be integrated			
Installation:	installation in all arbitrary orientations allowed			

iMAR is a designer and manufacturer of inertial navigation, surveying and guidance systems for all application areas. All systems manufactured by iMAR are maintained at iMAR in Europe / Germany.

iMAR uses latest and high reliable gyro technology in its advanced inertial navigation and guidance systems for industrial and defence applications.

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[1] values with (i.e. with GPS and sufficient motion) / without sufficient data fusion state observability