

iNAV-FJI-001-AUV

Inertial Navigation System for Advanced Underwater Applications

iNAV-FJI is an INS product family for inertial navigation, gyro compassing and dynamically motion measurement with advanced fiber optical gyros that covers applications, which require high accuracy, reliability and an open interface to the user.

- high accurate inertial navigation and surveying system for AUV / RPV applications
- FOG technolog with very low angular random walk and high angular resolution
- very high bandwidth, fast response
- integrated time synchronisation module and GPS
- Interfaces: Ethernet TCP/IP, CAN, RS232
- Sensor interfaces: DVL, CTD, GPS, Pressure

The derivation iNAV-FJI-AUV for advanced AUV and towed-fish applications consists of three high precision fiber optical gyroscopes, three servo accelerometers, a powerful strapdown processor and an open and flexible interface, which can be customized.



As an option the modular designed system provides interfaces to (D)GPS, EM-Log, DVL, external triggers and external I/Os. Possible outputs are Ethernet, RS232/422, CAN or analog as well

as internal data storage on optional flash-disk (up to 4 GByte). Furthermore application specific interfaces can be realized on request.

Due to the modular hardware and software architecture special adaptation of housing and mechanical dimensions to customer's requirements is also possible even if only small quantities shall be purchased. Data processing (strap-down algorithms, global or local navigation, north-seeking, north keeping or motion monitoring and control) inside of the iNAV-FJI-AUV is as well possible as data transmission of pure or corrected raw data.



A key feature is its high available data rate of up to 1000 Hz and its unique resolution (< 0.001 degree in roll/pitch/ yaw) as well as superior accuracy. As an option special designed algorithms processed in parallel HPST² mode allow to output most stable angular and position information during definable time windows e.g. for precise synthetic aperture sonar applications also under difficult motion conditions.

Picture: NATO towed-fish, equipped with iMAR's iNAV-RQH-AUV for advanced SAS applications.

Technical Data of iNAV-FJI-001-AUV (values in [] for lower grade accelerometers):

Data Output:	Heading, Roll, Pitch, Angular Velocity, Velocity (body and world), Position	
Range:	± 500 ^{*)} deg/s (no angle limitation)	± 10 g (other as option)
True Heading:	< 0.03 deg sec(lat) (0.02 deg sec(lat) as option, depends on motion)	
Attitude Accuracy:	< 0.01 deg	
Position Accuracy:	ca. 0.5 [3] nm/hr (unaided); 7 mtr/hr (aided only with DVL with 0.2% error and velocity assumed to be 1 m/s)	
Alignment time:	< 15 minutes (at sea), < 10 minutes (dockside)	
Drift stability / Offset:	< 0.003 deg/h (const temp.)	< 5 μ g (const. temp.)
	< 0.01 deg/h (OTR)	< 60 [100] μ g(OTR)
Random Walk:	0.001 deg/ \sqrt{h}	0.005 [0.06] m/s/ \sqrt{h}
	i.e. 0.06 deg/h/ \sqrt{Hz}	i.e. < 8 [100] μ g/ \sqrt{Hz}
Resolution:	< 0.01 μ rad (0,002"), < 0.001 deg/s	< 1 μ g
Nonlinearity / Scalef.:	< 10 ppm (30 ppm scale factor error)	< 20 μ g/g ² (60 [100] ppm)
Axis Misalignment:	< 30 μ rad	< 50 μ rad
Data Output Rate:	1...500 Hz (optional 1000 Hz)	
Data Latency:	< 1 ms (sensor data sampling accuracy / time tag better ± 1 μ s)	
Output (options):	RS232/422, Ethernet, coarse/fine synchro or custom specific; MIL connectors (MIL-C-38999 III)	
Inputs:	(D)GPS, DVL / EM-Log, CTD, APS, Pressure (RS232/422) (option)	
Synchronization:	Input for pulse-per-second [PPS] or other trigger (if available)	
Power:	11...34 V DC , < 30 W	
Temperature:	-10...+50 °C (operating, standard temp. range)	
	-40...+50 °C (oper. with selected option of internal heating at low temp.)	
	-40...+71 °C (operating with degraded specification)	
	-40...+85 °C (storage)	
Rel. Humidity:	8...100 %, IP67	
MTBF / BITE / MTTR:	> 25,000 hrs (estimated) / Build In Test capability / < 30 minutes	
Shock:	25 g, 11 ms ; 60 g, 5 ms (operating)	
Weight:	approx. 12.5 kg (depends on housing; light weight version on request)	
Size:	IMU: approx. 370 x 213 x 180 mm (other on request)	

iMAR has extended longtime experience in the manufacturing and development of inertial navigation and guidance systems for all application areas. All systems manufactured by iMAR are maintained at iMAR in Europe / Germany.

iMAR's systems of family iNAV-FJI with the option mar-



ked with [...] only require an European export license, the version with high-grade accelerometers requires an US export license for those sensors.

Please do not hesitate to contact us for further information or for a demonstration.

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