

iNAV-FJI-001-RAIL

Inertial Navigation System for Advanced Railway Surveying

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

- advanced navigation and surveying system for rail vehicle 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; Odometer, DGPS

The derivation iNAV-FJI-RAIL for advanced railway applications consists of three high precision fiber optical gyroscopes, three servo accelerometers, a powerful strapdown processor and



iNAV-RQH-RAIL is in use with the German Rail (picture: LIMEZ II) and with UK Railway companies

an open and flexible interface, which can be customized.

As an option the modular designed system provides interfaces to (D)GPS, external triggers, speed sensor and external I/Os e.g. for position



markers. Possible outputs are Ethernet, RS232/422 or analog as well as internal data storage on hard-disk or on silicon-disk. 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-RAIL 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 railway surveying specific output data (e.g. inverse radius of curvature, measurement of displacement between boofie and waggon) can be provided.

Technical Data of iNAV-FJI-001-RAIL:

Data Output:	Heading, Roll, Pitch, Angular Velocity, Velocity (body and world), Position, Raw data, internal status information, tbd	
Range:	± 500 ^{*)} deg/s (no angle limitation)	± 10 g (option 2/5/25 g)
True Heading:	< 0.03 deg sec(lat) (moe or less accurate as option)	
Attitude Accuracy:	< 0.01 deg (0.005 deg available as option)	
Position Accuracy:	< 1 m (DGPS / odometer aided); 1 cm with DGPS and postproc iKP+	
Velocity Accuracy:	< 1 mm/s (integrated Kalman based odo scale factor estimator)	
Alignment Time:	< 10 minutes	
Drift stability / Offset:	< 0.003 deg/h (const temp.)	< 5 μ g (const. temp.)
	< 0.01 deg/h (OTR)	< 60/15 [100] μ g (OTR)
Random Walk:	0.001 deg/ \sqrt{h}	< 8 [100] μ g/sqrt(Hz)
Resolution:	< 0.1 μ rad (0.02"), < 0.001 deg/s	< 1 μ g
Nonlinearity / Scalef.:	< 10 ppm (30 ppm scale factor error)	< 20 μ g/g ² (60 [100] ppm)
Data Output Rate:	1...500 Hz (optional 2000 Hz), data with time stamp	
Data Latency:	< 2 ms (time stamp accuracy better 10 μ sec)	
Output (options):	RS232/422, Ethernet (TCP/IP, UDP)	
Inputs:	(D)GPS (option: GPS/GLONASS integrated) , event trigger (option)	
Synchronization:	Input for pulse-per-second [PPS] (if available)	
Power:	11...34 V DC, 35 W	
Temperature:	-5...+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. 10.5 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 reduced accel. performance (see [...]) does require only an European export license.

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



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