iMAR

GESELLSCHAFT FUER INERTIALE MESS-,
AUTOMATISIERUNGS- UND REGELSYSTEME mbH
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iNAV-RQH-10018

Inertial Navigation System for Advanced Applications

iNAV-RQH is an INS product family for inertial navigation, gyro compassing, surveying and dynamic motion measurement with ring laser gyros, that covers applications, which require highest accuracy, reliability and an open interface to the user.

- high performance inertial navigation and surveying system for airborne, naval, underwater, surface and railway applications
- RLG technology with very low angular random walk and much better bias stability than at FOG based systems
- high bandwidth, fast response
- integrated time sync. and 2 cm accurate GPS/GLONASS/GALILEO
- Interfaces: Ethernet TCP/IP, UDP, CAN, RS232 / RS422 UART, ext. DGPS, RTK-GPS, MIL-STD1553B

The iNAV-RQH for advanced airborne, naval, AUV, UAV, ROV, surface and railway applications consists of three high precision ring laser gyroscopes, three servo accelerometers (Q-Flex), a powerful strapdown processor and an open and flexible interface, which can be customized.

The system contains RTK-GNSS, external triggers and external I/Os (e.g., for up to 3 odometers, laser altimeter, DVL or camera / antenna platform control). Possible outputs are Ethernet (TCP/IP, UDP), RS232/422 UART, CAN or analog as well as internal data storage on solid-state flash-disk. Furthermore application specific interfaces can be provided on request (e.g., ARINC 429).

Data processing (strapdown algorithms, global or local navigation, north-seeking, north keeping or motion monitoring) is performed inside of the iNAV-RQH, and also data transmission of pure or corrected raw data is available.

A key feature is its high data rate of up to 300 Hz and its unique resolution (0.001 degree in roll/pitch/yaw) as well as its superior accuracy (e.g., for stabilization tasks). As an option, special designed algorithms processed in parallel HPST² (High Precision Short Time Tracking) mode allow to output most stable

angular and position information during definable time windows also under difficult motion conditions (e.g., for SAR or LIDAR applications).

The user software NavCommand allows the user full control of the system as well as data storing and to perform maintenance activities (e.g., download of stored data). Furthermore, with the software iWP+, a powerful postprocessing tool is available for advanced surveying applications.

The system iNAV-RQH has autonomous north seeking capability and is export / ITAR controlled. With iNAV-FJI-001 a form-fit-function (FFF) compatible system is provided on FOG technology, which is not ITAR controlled. With iNAV-FMS-E-DA a FFF compatible system with dual-antenna GNSS technology is provided, which does not require any export license. With iNAV-RQT a FFF compatible system (dual use, not ITAR controlled) is provided.

Technical Data of iNAV-RQH-10018

Data Output:	Heading, Roll, Pitch, Angular Velocity, Velocity (body and world), Position, Raw data, internal statuis information, odo and GPS inf.
True Heading:	< 0.025° sec(lat) free inertial; 0.01° with DGPS, 0.005 ° postproc RTK
Attitude Accuracy:	< 0.01° free inertial (< 0.005° with DGPS, 0.002° postproc with RTK aiding)
Position Accuracy:	0.6 nm/hr free inertial; < 1 m GPS (S/A off) and < 10 cm RTK online, < 30 cm DGPS and 2 cm RTK/INS postproc, < 0.1 % distance travelled (with odometer and GPS, applic. depend.) < 0.2 % dist.trav. on underwater vehicles (incl. RDI DVL interface)
Velocity Accuracy:	5 mm/s (aided with L1/L2 RTK GPS receiver, < 2 mm/s postproc RTK)
Alignment Time:	< 10 minutes on-shore, < 25 minutes off-shore
Range:	$\pm$ 400 °/s (no angle limitation) $\quad\quad\quad$ $\pm$20 g
Drift (unaided) / Offset:	< 0.002 °/hr $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ < 25 µg
Bias Stability:	< 0.002 °/hr (const. temp.) $\quad\quad\quad\quad$ < 10 µg
Random Walk / Q:	< 0.0015 °/$\sqrt{h}$ $\quad\quad\quad\quad\quad\quad\quad\quad$ < 8 µg/sqrt(Hz)
Resolution:	0.0003 ° (1,13"), < 0.001 °/s $\quad\quad\quad$ < 5 µg (depends on data rate)
Scale/Linearity Error:	< 5 ppm / < 5 ppm $\quad\quad\quad\quad\quad\quad$ < 100 ppm / < 20 µg/g²
Axis Misalignment:	< 25 µrad
Data Output Rate:	1...300 Hz, internal bandwidth 300 Hz
Data Latency:	< 3 ms
Data storage:	up to 16 GByte on internal flash memory (option)
Output (options):	RS232/422 UART, Ethernet TCP/IP / UDP, PPT (Pulse Per Time), PPS, CAN, MIL-STD1553B
Inputs (options):	internal/external (RTK)GNSS (standard: GPS/GLONASS/GALILEO integrated), marker event trigger, 3 x odometer (RS422 level), [PPS / SYNC]
Connectors:	MIL-C-38999 III
Temperature (case):	-40...+65°C operating, (+71°C opt.), -46...+85°C not operating
Rel. Humidity:	8...100%, IP67
Magnetic. insensitivity:	< 500 µTesla (5 Gauss)
MTBF / MTTR:	> 25,000 hrs (estimated for surveying applications) / < 30 minutes
Shock, Vibration:	25 g, 11 ms ;60 g, 5 ms (operating); 20…2000 Hz, 3 g rms
Qualification:	MIL-STD-810F, MIL-STD-461E, MIL-STD-704D, DO160E
Power:	11...34 V DC, < 45 W; 50 ms hold up time according to DO160E
Weight / Size:	9.0 kg / approx. 299 x 213 x 179 mm (without connectors)
Software:	internal online Kalman filter, NavCommand, INS/RTK-GPS postproc. (option)

iMAR is 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 use latest and high reliable ring laser gyro technology in its advanced inertial navigation and guidance systems for industrial and defence applications.

[1] post-proc, depends on environment