iPRENA-M-H

Precision Inertial/GNSS/VMS based Navigation System

iPRENA-M-H is part of an INS product family for inertial navigation, gyro compasssing, surveying and dynamic motion measurement with ring laser gyros (RLG), that covers applications, which require highest accuracy and reliability to the user.

- High performance inertial navigation and surveying system for defence, airborne, naval, underwater, surface and railway applications
- True North reference, gyro compassing
- Azimuth, elevation, position and more
- Various interfaces (incl. options): RS422 UART, HDLC, CAN, TCP/IP, UDP, MIL-STD1553B
- Integrated L1L2 GNSS engine (option)
- High bandwidth, fast response
- Option: integrated atomic clock and 2 cm accurate GPS/GLONASS/GALILEO / RTK
- RLG technology with very low angular random walk and long time performance
- Replacement for DRU / MAPS, but additional Ethernet / CAN

iPRENA-M-H consists of three high precision ring laser gyroscopes, three servo accelerometers, a powerful strapdown processor and an interface, which is customized to replace a MAPS / DRU by enclosure / connector and dedicated commands.

The system is operated with the internal GNSS receiver (up to RTK capability) or optionally with an external GNSS receiver. Available output interfaces are Ethernet (TCP/IP, UDP), RS232/422 UART, CAN, HDLC as well as internal data storage on non-volatile memory. Other application specific interfaces can be provided on request.

Powerful data processing (strapdown processing, global or local navigation, gyro compassing, INS/GNSS data fusion (VMS and ZUPT aided)) is performed inside of the iPRENA-M-H.

A data rate of up to 300 Hz, a unique resolution (0.001 degree in roll/pitch/yaw) as well as the outstanding accuracy are unique selling points of iPRENA-M-H.

iPRENA-M-H has been specially designed to become a replacement of obsolete MAPS (Modular Azimuth and Positioning System) DRU systems in the market. This includes performance as well as enclosure, connectors and a dedicated communication interface.

The system is available in three classes of performance: - MP Medium Precision
- HP High Precision
- UP Ultra Precision

Export control for iPRENA-M-H is required according to the dual-use regulations. iPRENA-M-H is covered by ITAR control.

Technical Data of iPRENA-M-H-UP (rms values)

Performance:	True Heading:	0.26 mil (0.015 deg) sec(lat) PE free inertial 0.20 mil (0.010 deg) with GNSS [1] Option: additional dual-antenna GNSS based heading
	Attitude Accuracy:	0.18 mil (0.010 deg) PE free inertial 0.1 mil (0.005 deg) with GNSS [1]
	Position accuracy:	< 2 m [CEP] (under sufficient GNSS visibility, S/A off) < 0.1 m [rms] RTK-GNSS (option) < 0.1 % DT [CEP] during GNSS outages, with VMS
	Altitude:	< 5 m [rms] (under sufficient GNSS visibility, S/A off) < 0.1 % DT [rms] during GNSS outages, with VMS
Drift (unaided):		< 0.06 mil/hr (0.003 °/hr) [bounded by gyro compassing]
Alignment Time:		< 10…20 minutes (land vehicle application)
Sensor Range:	Rate:	± 600 °/s (no angle limitation)
	Acceleration:	± 20 g
Angular Resolution:		1.13 arcsec (< 0.000'31 °)
Output Interfaces:		RS422 UART, HDLC/SDLC, PPS optional: Ethernet TCP/IP / UDP, CAN, MIL-STD-1553B
Data Output Rate:		integer divisor of 300 Hz, internal data rate 1'800 Hz, bandwidth 300 Hz
Input Interfaces:		external GNSS engine (option, e.g. ERGR), event marker / GPIO, SYNC, VMS / odometer / wheel sensor (A/B, opto-coupler input up to 32 V, also operable with RS422 level)
GNSS Receiver:		internal GNSS receiver (L1 or L1L2, GPS / GLONASS / Beidou, SBAS; SAASM etc.)
Connectors:		MIL-C-38999 Series I (FFF to traditional MAPS / DRU); see iPRENA-V for MIL-C-38999 Series III
Temperature range:		-46 to +68°C operating, -51 to +85°C not operating
Rel. Humidity:		8...100%, IP67
Altitude:		up to 4'500 m for air transportation (sealed version), optional up to 20'000 m (with integrated Gore-Vent pressure equalization – option)
Magnetic insensitivity:		< 300 µTesla (3 Gauss)
MTBF / MTTR:		> 20,000 hrs (estimated for surveying applications) / < 30 minutes
Shock, Vibration:		20 g, 11 ms operational; 40 g, 6 ms (endurance); 20…2000 Hz, 6.3 g rms
Qualification:		MIL-STD-810G, MIL-STD-461G, MIL-STD-704F, partially DO160G
Power:		10...35 V DC, < 23 W; 50 ms hold up time according to DO160
Weight / Size:		approx. 16 kg / 383 x 276 x 221 mm³ (LxWxH; without connectors); MAPS FFF
Software:		MAPS protocol for relevant messages; also iXCOM & NMEA183 commun. protocol, iXCOM-CMD GUI; iXCOM-CMD supports easy system configuration and moving map (Linux and Windows)
Data storage:		up to 32 GByte on internal flash memory on board (as data logger, "black-box")
Alignment Methods:		Static Alignment, Dynamic Alignment, Stored & Forced Heading/Position Alignment
Aiding Methods:		GNSS aided, VMS aided, ZUPT aided, Waypoint aided
Part-Number:		00100-00006-0001

iMAR Navigation is manufacturer and designer of inertial navigation, guidance and stabilization systems for more than 25 years now. The facilities are located in Germany.

iMAR uses latest and high reliable ring laser gyro technology inside the iPRENA-M advanced inertial navigation and guidance systems for defence applications.

[1] with sufficient GNSS observations and sufficient trajectory (i.e. with several significant heading changes under motion)