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iNAT-M200  
for new projects!**



GESELLSCHAFT FUER INERTIALE MESS-,  
AUTOMATISIERUNGS- UND REGELSYSTEME MBH  
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## iVRU-SNQ

### Inertial Measurement Unit

#### with MEMS Gyros and Closed Loop Servo Accelerometers

iVRU-SNQ is an attitude heading reference system designed for stabilization, surveying and dyn. heave determination. It is fitted with a mounting flange. As an option it is available in a cylindrical housing.

- three rate gyros and three accelerometers
- < 0.0003 deg/s bias stability (Allan Var.)
- high shock resistance and long life time due to MEMS technology
- RS232/RS422 and CAN interface
- Sync Input / Output available
- Designed for stabilization, heave control and as attitude heading reference on naval vessels, helicopters, fixed wing airplanes and land vehicles



measurement. The system provides digital data transmission (CAN, RS232). Additionally, the system can be connected with an external GPS engine (NMEA

GGA / VTG and PPS signal required). Optionally, the system contains an internal L1 or L1L2 GPS receiver already, on request with dual antenna support for advanced true heading. As a further option an external magnetometer can be connected. Design according to MIL-STD-810F and MIL-STD-461E. iVRU-SNQ provides a grounding bush. The power supply is protected against voltage drops, over-voltage and high voltage

lightning. The system iVRU-SNQ is free of export license requirements.

iVRU-SNQ is a three axes system containing rugged MEMS gyroscopes, three servo accelerometers and as an option one incremental encoder for turret angle feedback or vehicle velocity

#### Technical Data of iVRU-SNQ (all values 1 sigma):

	Gyro Performance	Accelerometer Performance
Sensor Range:	$\pm 400^\circ/\text{s}$	$\pm 5 \text{ g}$ (option: 2/5/10/20/25 g)
Bias (initial):	< 0.05 $^\circ/\text{s}$	< 2.0 mg (at $\pm 5 \text{ g}$ range)
Bias Stability (OTR):	< 0.006 $^\circ/\text{s}$ (plus const. initial bias)	within absolute 2 mg
Bias Short Time:	< 0.0003 $^\circ/\text{s}$ (short time stability at const. temp.)	0.1 mg
Resolution:	< 0.001 $^\circ/\text{s}$	< 0.1 mg
Linearity / Scale Error:	< 0.2% / < 0.2%	< 0.2% / < 0.2%
Noise (0-100 Hz):	< 0.2 $^\circ/\sqrt{\text{h}}$	< 100 $\mu\text{g} / \sqrt{\text{Hz}}$
Bandwidth:	0...200 Hz	0...200 Hz
g-Sensitivity:	< 0.005 $^\circ/\text{s/g}$	
Sensor Axes Misalignment:	< 0.5 mrad	
Attitude / Heading Range:	$\pm 180^\circ$ Roll, $\pm 90^\circ$ Pitch, $\pm 180^\circ$ relative Heading	
Attitude Accuracy:	< 0.05 $^\circ$ rms roll/pitch (static or linear unaccelerated motion, unaided mode) < 0.2...1 $^\circ$ rms roll/pitch (GPS aided and sufficient dynamic); < 1 $^\circ$ rms dynamic flight < 0.003 $^\circ/\text{s}$ relative attitude drift over 10 seconds (after sufficient KF aiding)	
Attitude / Heading Resolution:	< 0.01 $^\circ$	
Track over Ground Drift:	< 0.005 $^\circ/\text{s}$ (since outage of GPS)	
True Heading Accuracy:	<ul style="list-style-type: none"> <li>• without dual-antenna (std.): depending of external aiding performance va NMEA VHW / VBW / VTG</li> <li>• 0.1<math>^\circ</math> at 2 m resp. 0.2<math>^\circ</math> at 1 m antenna distance (if dual-antenna L1L2 GPS option is selected)</li> <li>• 0.15<math>^\circ</math> at 2 m resp. 0.3<math>^\circ</math> at 1 m antenna distance (if dual-antenna L1 GPS option is selected)</li> </ul>	
Dyn. Heave Motion Output:	Periods 0.5...30 sec; Dyn. Accuracy: 5 cm or 5% of range (whichever is larger); Range adjustable	
Data Output:	$\omega_x, \omega_y, \omega_z, a_x, a_y, a_z$ (rate and acceleration), rel. heave, Roll, Pitch, Yaw (attitude, rel. or abs. heading; option:magnetometer/GPS aiding); BIT (PBIT, CBIT, IBIT after reset);	
Data Format:	iMAR proprietary (see user hmanual), NMEA 0183, customized (DVL, echo sounders etc.)	
Digital Interfaces:	RS232 asynchronous, 9.6...115.2 kBd, CAN (up to 1 Mbit/s); Sync-Trigger-Input/Output	
Integrated Options:	Standard L1 GPS; option: odometer interface; dual-antenna GPS (L1 or L1L2)	
Analog Interface (Option)	0...5 V or $\pm 5 \text{ V}$ or $\pm 10 \text{ V}$ (range is factory set; compensated output)	
Output Data Rate, Connector:	200 Hz via RS422 / Rs232 / CAN; MIL-C-38999 III	
Temperature, Shock, Vibration:	-40...+71 $^\circ\text{C}$ (case temperature), 50 g, 11 ms, 6 g rms (10...2000 Hz) endurance -55...+85 $^\circ\text{C}$ (storage)	
Bonding Performanc]:	< 2.5 mOHM	
Power, Start-up-Time:	11...34 V DC; approx. 7 W; < 1 sec (additional 4 W for true heading GPS option)	
Size:	152.4 x 127 x 130 mm (standard case) or as an option cylindrical case	
Weight, Protection, Qualification:	approx. 1'850 grams [+ 260 grams for dual-antenna GPS option]; IP 68	

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