

iVRU-FQ-E-FF

Inertial Measurement, Vertical Reference and HeaveUnit with Fiber Optic Gyros and Servo Accelerometers

iVRU-FQ-FF is an attitude heading reference system designed for stabilisation and attitude heading reference tasks. It comes with a fixation flange.

- three rate gyros and three accels
- < 0.003 deg/s bias stability
- high shock resistance due to FOG / Q-Flex technology
- RS422 and RS232 and CAN interfaces
- Sync Input / Output available
- Designed for stabilisation and attitude reference tasks on naval vessels, helicopters, fixed wing airplanes and land vehicles



angle feedback or vehicle velocity measurement. The system provides a digital data transmission (CAN, RS422, RS232). Additionally the system can be connected with an external GPS engine (NMEA GGA / VTG and PPS signal required). As an option the system contains an internal GPS receiver already. As a further option an external magnetometer can be connected. Qualification according to MIL-STD-810F and MIL-STD-461E. A grounding bush and a GORE membrane vent are integrated. The power supply is protected against voltage drops, over-voltage and high voltage lightning.

iVRU-FQ-FF is a three axes system containing rugged fiber optic gyroscopes, three Q-Flex servo accelerometers and as an option one incremental encoder for turret

Technical Data of iVRU-FQ, iVRU-FQ-FF [iVRU-FQ-E, iVRU-FQ-E-FF]:

	Gyro Performance	Accelerometer Performance
Sensor Range:	$\pm 200^\circ/\text{s}$ (other on request)	$\pm 5 \text{ g}$ (option: 2/5/10/20/25 g)
Bias:	$< 0.003^\circ/\text{s}$ (short time stability at const. temp.)	0.1 mg
	$< 0.01^\circ/\text{s}$ (OTR)	2 mg [-E version; otherwise 1 mg]
Resolution:	$< 0.001^\circ/\text{s}$	$< 0.1 \text{ mg}$
Linearity / Scale Error:	$< 0.2\% / < 0.2\%$	$< 0.15\% / < 0.1\%$
Noise (0-100 Hz):	$< 0.1^\circ/\sqrt{\text{h}}$	$< 50 \mu\text{g} / \sqrt{\text{Hz}}$
Bandwidth:	0...200 Hz (internally filtered to 100 Hz)	0...200 Hz (filtered to 100 Hz)
g-Sensitivity:	none	
Sensor Axes Misalignment:	$< 1 \text{ mrad}$	
Attitude / Heading:	$\pm 180^\circ$ Roll, $\pm 90^\circ$ Pitch, $\pm 180^\circ$ relative or magnetic Heading or course over ground	
Attitude Accuracy:	$< 0.1^\circ$ [-E: 0.15°] roll/pitch (static or linear unaccelerated motion, unaided mode)	
	$< 0.2^\circ \dots 1^\circ$ roll/pitch with proper velocity aiding, NoA 2 algor. (GPS / odometer option)	
	$< 0.005^\circ/\text{s}$ relative attitude drift over 10 seconds	
	$< 1^\circ$ rms dynamic flight error (depends on motion conditions)	
Heading Accuracy:	rel. heading: drift $< 0.01^\circ/\text{s}$; mag. heading: depending on magnetometer	
Attitude / Heading Resolution:	$< 0.01^\circ$	
Heave accuracy:	5 % or 5 cm rms, whichever is greater	
Output:	$\omega_x, \omega_y, \omega_z, a_x, a_y, a_z$ (rate and acceleration), Roll, Pitch, rel. or mag. Heading or COG; PBIT, CBIT, IBIT; options: heave output, magnetometer/GPS aiding;	
Digital Resolution:	$> 18 \text{ bit}$ (gyroscope and accelerometer digitalization)	
Digital Interfaces:	RS422 asynchronous, 9.6...115.2 kBd, CAN; Sync-Trigger-Input/Output	
Integrated Options:	Standard L1 GPS; odometer (RS422 level, A/B) and magnetometer interface	
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; MIL-C-38999 III	
Temperature, Shock, Vibration:	-30...+63°C (case temperature; oper.), endurance: 50 g, 11 ms, 6 g rms (10...2000 Hz) option: -40...+71°C (case temperature; operational); -55...+85°C (storage)	
Bonding Performance [-FF]:	$< 2.5 \text{ mOHM}$	
Power, Start-up-Time:	11...34 V DC; approx. 12 W; $< 1 \text{ sec}$	
Size:	120 x 120 x 130 mm [-FF version (flange): 152.4 x 127 x 130 mm]	
Weight, Protection, Qualification:	approx. 1750 grams [-FF: 1850 grams], IP 68, helicopter qualified (MIL-STD 810F)	

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Typical Application of the IMUs and AHRS of type iVRU-Fx:

- Gun Stabilisation Tasks
- Attitude Heading Reference for Missile Attack Warning Systems
- AHRS for Unmanned Aerial Vehicles (UAV)
- Dynamic Motion Analysis of Airborne Vehicles, Power Boats etc.
- Motion Reference for Stabilised Platforms



References:

- EADS
- Rheinmetall
- Bofors
- Oerlikon-Contraves

