

iVRU-FCAI-E

Vertical Reference Unit, AHRS and Heave Control Unit with Closed-loop Fiber Optic Gyros and Servo Accelerometers

The iVRU-FCAI is a small size IMS consisting of 3 very low-noise fiber optical gyros (FOG) in closed-loop technology of class 2 deg/hr and 3 servo-accelerometers of class 2 mg.

- 2 °/hr, 2 mg, 200 Hz
- low ARW, < 0.02 °/√hr
- exceptional short time bias stability of < 0.02 deg/hr and 10 µg
- odometer interface
- internal or external GPS receiver
- higher MTBF than tactical RLG based systems
- Stabilization tasks, heave control, AHRS / VRU
- INS/GPS navigation
- Surveying applications
- Guidance and Control



operated on a unregulated wide range input supply voltage and is protected against wrong polarity, EMC and over-voltage. An SYNC input signal can be used to time stamp the output data which are sent via UART RS422 or RS232. As an option the system can be delivered with an integrated odometer interface and with an integrated L1 GPS receiver. All signals are provided via an robust connector of type MIL-C-38999-III.

The iVRU-FCAI is manufactured in Germany. The version with angular rate < 500 deg/s and accel-

The iVRU is designed for ruggedized applications in surveying and control. The iVRU-FCAI-E can be

eration < 10 g does not require a German export license ("E" version).

Technical Data of iVRU-FCAI-E:

	Angular Rate	Acceleration
Sensor Range:	± 450 °/s (option: +/- 1'000 deg/s or more)	± 5 g (option: +/- 10g, 20 g)
Bias:	2 deg/hr (1 sigma, OTR)	2 mg
Bias stability:	< 0.02 °/hr (short time, const. temp.)	< 10 µg
Resolution (increments):	4.8E-06 deg / LSB (internal: 32/24 Bit)	1.2E-04 m/s / LSB
Resolution (rates, accel., RPY):	float (32 Bit)	float (32 Bit)
Linearity / Scale factor error:	< 0.03 % / 0.05 % (1 sigma)	< 0.03 % / 0.15 %
Angular random walk /Noise:	< 0.02 °/√h	< 20 µg/√Hz
Bandwidth:	500 Hz	100 Hz (option: 200 Hz)
Magnetic Sensitivity:	< 0.3 °/h / Gauss	
Output:	Roll, pitch, relative or magnetic aided heading or GPS aided course over ground; angular rates and accelerations; inertial/GPS smoothed velocity / position and heave	
Attitude Accuracy:	0.1 deg roll / pitch in static conditions < 1 ° roll/pitch under dynamic flight condition, using NoA ² algorithm, GPS aided	
Heading Accuracy:	2 deg/hr rel. heading drift (without aiding, known latitude)	
Axis Misalignment:	< 0.5 mrad between all sensor axes	
Digital Interface:	CAN (up to 1 MBd), RS232 (UART, up to 115.2 kBd); option: RS422 instead of RS232	
Trigger (SYNC input):	externally triggered time stamping of free running output; resolution of time stamp: 1 µs	
Odometer input:	RS422 level, A/B	
GPS Interface:	integrated L1 GPS engine or externally connected GPS engine (RS232, NMEA)	
Connector:	Standard: MIL-C-38999-III, 37 pin (male), type D38999/24WC35PA	
Data rate:	0...200 Hz (free running; option: 400 Hz); gyro bandwidth 500 Hz, accelerometer bandwidth 200 Hz	
Temperature:	-40...+71 °C (operating, case temperature) -45...+85 °C (storage); Temperature gradient up to 3 K / min	
Shock, Vibration:	60g / 11ms; 3 g rms (operation), 6.3 g rms (endurance) @ 20...2'000 Hz	
Environment / MTBF/ MTTR:	IP67 / 25.000 hrs (estimated, surveying environment) / 10 minutes	
Size, Weight:	approx. 140 x 115 x 137 mm (plus connector), approx. 2'300 grams	
Power, Start-up-Time:	11...34 V DC ; approx. 15 W; < 3 sec; reverse-voltage protection	

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Measurements of Allan variance and Linearity of iVRU-FCAI-E:

At constant temperature the gyro bias is stable over > 1'000 s with < 0.02 deg/hr, which provides exceptional advantages for INS/GPS coupled systems.

