1000 series

SPACE RATE MEASUREMENT UNIT

Ultra-compact radiation tolerant gyroscope

The 1000 series is a range of radiation tolerant Rate Measurement Unit (RMU) offering accuracy, reliability, and ultra-low-noise (ARW < 0.005°/√Hr) in a new and unique SWaP-C (Size, Weight, Power and Cost) form factor. It has been designed to meet the requirements of launch vehicles, sounding rockets, Earth Observation Satellites, and Attitude and Orbital Control Systems in Low Earth Orbits. Geostationary Orbits can also be considered under specific shielding conditions.

The 1000 series is based on COTS (commercially available off-the-shelf) electronic components with proven space heritage. Its weight is 2 to 3 times less than the competition thanks to IXSENS improved Coriolis Vibratory Gyroscope (CVG) technology, designed, engineered, and manufactured by IXSENS.

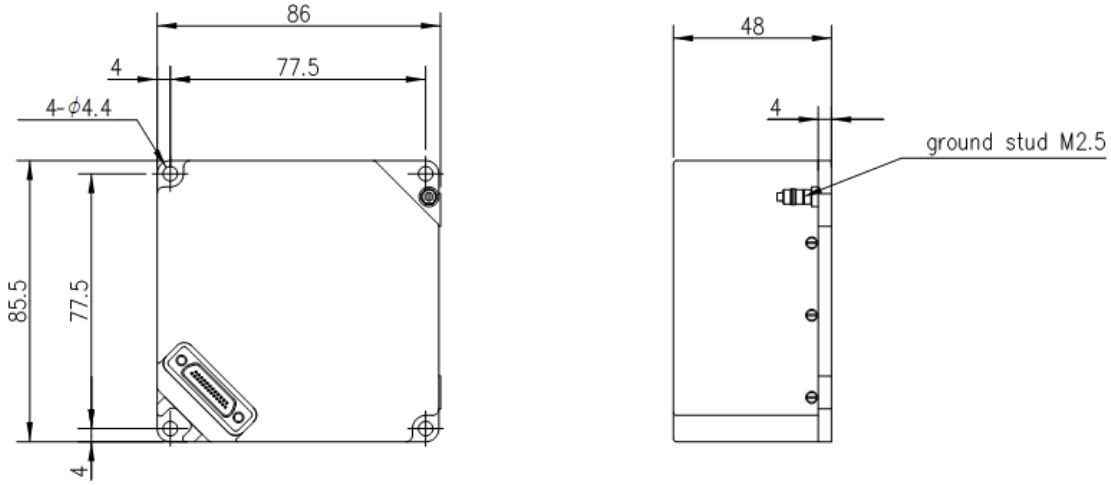
At the heart of the rate measurement unit are three mode-symmetric CVGs operated in a Force to Rebalance (FTR) mechanization with novel in-loop compensation electronics. Each CVG is fitted with a metal vibrating thin shell hermetically packaged under high vacuum. Piezoelectric transduction is used for pick-off-forcers to reduce manufacturing complexity and to achieve low electrical noise and low-rate sense noise.

The 1000 series can be derived in 1-axis, 2-axis or 3-axis gyro modules with customised output format to better suit customer's needs.

FEATURES

- Tolerance to radiations in LEO
- 60°/s measurement range
- 3-axis measurement
- Reflective surfaces for alignment
- ITAR-free
- Ultra-low-noise (ARW ≤ 0.005°/√hr)
- Superior reliability (MTBF ≥ 500,000 hr)
- Digital output (RS422, asynchronous and TM/TC)
- Low weight (550 gr)
- Low power electronics
- Health status

CONFIGURATION DRAWING



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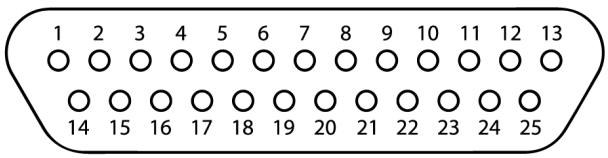
ELECTRICAL INTERFACE

The User connector is a 25 pins Micro-D connector meeting the MIL-DTL-83513 specification for performance and the interface offers both a full duplex RS422 serial line responding to Telecommands in less than 2ms (TM/TC), and an asynchronous unidirectional RS422 serial output for continuous broadcasting operation.

Part number 2203-1000-030		
Pin	**Function**	**Characteristics**
1, 14	Power Supply	+5 V DC
2, 12, 15, 24	GND	GND
3, 16	Power Return	0 V DC
4, 11, 17	-	Do not connect to these pins
5, 18	RS422-RX-	Receive data (RX-), TM/TC mode
6, 19	RS422-RX+	Receive data (RX+), TM/TC mode
7, 20	RS422-TX-	Transmit data (TX-), TM/TC mode
8, 21	RS422-TX+	Transmit data (TX+), TM/TC mode
9, 22	RS422-TX-	Transmit data (TX-), Broadcasting mode
10, 23	RS422-TX+	Transmit data (TX+), Broadcasting mode
13, 25	GND-M	GND (mechanical)

Part number 2203-1000-032		
Pin	**Function**	**Characteristics**
1, 14	Power Supply	30 V DC +/- 1 V DC
2, 12, 15, 24	GND	GND
3, 16	Power Return	0 V DC
4, 9, 10, 11, 17, 22, 23	-	Do not connect to these pins
5, 18	-	Do not connect to these pins
6, 19	-	Do not connect to these pins
7, 20	RS422-TX-	Transmit data (TX-), Broadcasting mode
8, 21	RS422-TX+	Transmit data (TX+), Broadcasting mode
13, 25	GND-M	GND (mechanical)



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PERFORMANCE AND KEY CHARACTERISTICS

Performance	2203-1000-030 Asynchronous and TM/TC	2203-1000-032 TM/TC
Number of axes	3	3
Input Range	±10 °/s (fine) ±60 °/s (coarse)	±10 °/s (fine) ±60 °/s (coarse)
Bias offset	≤30 °/hr	≤30 °/hr
Bias stability (FTR)	≤10 °/hr (1σ)	≤10 °/hr (1σ)
Bias stability (over 1 orbit in LEO)	≤0.3 °/hr (3σ)	≤0.3 °/hr (3σ)
Bias in-run (RT)	≤0.1 °/hr (1σ)	≤0.1 °/hr (1σ)
Bias gravitational sensitivity	≤0.5 °/hr/g (3σ)	≤0.5 °/hr/g (3σ)
Angular Random Walk	≤0.005 °/√hr	≤0.005 °/√hr
Rate noise (one sided PSD)	≤725 (°/hr)²/Hz, 0.1 Hz to 5 Hz	≤725 (°/hr)²/Hz, 0.1 Hz to 5 Hz
Scale factor stability (FTR)	≤3,500 ppm (1σ)	≤3,500 ppm (1σ)
Scale factor stability (over 1 orbit in LEO)	≤2,000 ppm (1σ)	≤2,000 ppm (1σ)
Scale factor non-linearity error	≤1,500 ppm (fine)	≤1,500 ppm (fine)
Axis misalignment	≤3.5 mrad	≤3.5 mrad
Axis misalignment stability (FTR)	≤0.5 mrad	≤0.5 mrad
Resolution	≤0.1 °/hr	≤0.1 °/hr
Bandwidth (-3dB)	≥25 Hz	≥300 Hz
Environment		
Operating Temperature Range	-20 to +55 °C	-20 to +55 °C
Qualification Temperature Range	-30 to +65 °C	-30 to +65 °C
Vibration Peak Sine	20 g, 1 Hz to 100 Hz	20 g, 1 Hz to 100 Hz
Random vibrations	18.2 grms, 1 Hz to 2 kHz	18.2 grms, 1 Hz to 2 kHz
SRS shocks	1,500 g, 1 kHz to 10 kHz	1,500 g, 1 kHz to 10 kHz
Radiations (LEO)	975 km 55° 10 years 500 km 98° 5 years	975 km 55° 10 years 500 km 98° 5 years
Electrical		
Quiescent Power (+5 V DC)	≤7 W	≤7 W
Input Voltage	+5 V DC ±0.1 V DC	30 V DC +/- 1 V DC
Baud rate	115,200 bps	115,200 bps
Output format	RS422 bi-directional (TM/TC) RS422 asynchronous unidirectional (50Hz)	RS422 asynchronous unidirectional (800 Hz)
Physical		
Weight	≤550 grams	≤550 grams
Dimensions	85.5 mm × 86 mm × 48 mm	85.5 mm × 86 mm × 48 mm
Case Material	Aluminium	Aluminium

FTR: Full Temperature Range; EOL: End of Life; RT: Room Temperature; TM/TC: Telemetry / Telecommand

Additional product specifications, outline drawings, block diagrams, and test data are available on request.

DISCLAIMER:
Specifications are subject to change without notice. IXSENS does not assume any liability arising out of the application or use of the product.

FOR INFORMATION:
1000 series not subject to Export Control.

For More Information:
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