SensorsX

SX-MGFSC Series

High-Precision Fiber Optic Gyroscope

Motion & Inertial | Single-Axis Fiber Optic Gyroscope (FOG)



±500 °/s Measuring Range	**≤0.05 °/h** Bias Stability (1σ, 10 s, Grade C)	**RS-422** Interface (External Trigger: up to 5,000 Hz)
50 × 50 × 25 mm Dimensions (1.97 × 1.97 × 0.98 in)	**−45 to +65 °C** Operating Temperature (−49 to +149 °F)	**5 V DC / 3 W** Input Voltage / Power

■ PRODUCT OVERVIEW

The SX-MGFSC Series is a single-axis fiber optic gyroscope (FOG) for angular rate measurement in medium- to high-precision inertial navigation systems. It provides a ±500 °/s measurement range, an RS-422 digital interface, and three performance grades. The unit operates from a 5 V DC supply and measures 50 × 50 × 25 mm. Typical system applications include land-based positioning and orientation, vehicle-mounted north finding, airborne attitude and heading, and marine gyrocompassing.



■ KEY FEATURES

◆ High-Precision Single-Axis Fiber Optic Gyroscope	◆ Compact 50 × 50 × 25 mm Design
◆ ±500 ° /s Angular Rate Measurement Range	◆ Fast Startup (<10 s) and External-Trigger Update Rate up to 5,000 Hz

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■ TYPICAL APPLICATIONS

Application Fields

- Land-Based Positioning and Orientation
- Marine Gyrocompasses
- Automated Guided Vehicles (AGVs)
- Vehicle-Mounted North-Finding Systems
- Unmanned Aerial Vehicles (UAVs)
- Unmanned Ground Vehicles (UGVs)
- Airborne Attitude and Heading Systems
- Agricultural Machinery

■ PERFORMANCE SPECIFICATIONS

Parameter	Grade A	Grade B	Grade C	Unit
Measuring Range		±500		°/s
Bias Stability (1σ, 10 s)	≤0.20	≤0.10	≤0.05	°/h
Warm-up Time	<10	<10	<10	s
Bias Repeatability (1σ)	≤0.20	≤0.10	≤0.05	°/h
Full-Temperature Bias Stability (1σ, 100 s)	≤1.0	≤0.5	≤0.3	°/h
Full-Temperature Bias Repeatability (1σ, 100 s)	≤1.0	≤0.5	≤0.3	°/h
Magnetic Sensitivity		≤0.10		°/h/Gs
Scale Factor Nonlinearity (1σ)	≤50	≤20	≤20	ppm
Scale Factor Repeatability (1σ)	≤50	≤20	≤20	ppm
Resolution	≤0.20	≤0.10	≤0.05	°/s
Random Walk	≤0.02	≤0.02	≤0.01	°/√h
Bandwidth		200		Hz

■ ELECTRICAL SPECIFICATIONS

Power	
Input Voltage	5 V DC
Power Consumption	3 W
Output Signal	
Interface	RS-422
Update Rate	Externally triggered, up to 5,000 Hz
Electrical Connection	
Connector	J30-15ZK

■ ENVIRONMENTAL SPECIFICATIONS

Temperature	
Working Temperature	−45 to +65 °C (−49 to +149 °F)
Storage Temperature	−50 to +70 °C (−58 to +158 °F)
Weight & Housing	
Housing Material	Aluminum
Dimension	50.0 × 50.0 × 25.0 mm (1.97 × 1.97 × 0.98 in)
Weight	100 ± 20 g (3.53 ± 0.71 oz)

■ COMMUNICATION PROTOCOLS

UART (RS-422)

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1) Bidirectional serial communication compliant with the RS-422 interface standard.
2) The gyroscope transmits data upon detecting the falling edge of an external trigger signal.
3) The gyroscope measurement data is represented by a 32-bit value.
4) Temperature measurement data is represented by a 14-bit value.
5) The serial communication baud rate is 460,800 bps.
6) Data format:
   - Each UART character consists of 11 bits: one start bit (0), eight data bits, one even-parity bit, and one stop bit.
   - Parity: Even.
   - The gyroscope measurement value is represented by a 32-bit signed field, with the most significant bit used as the sign bit (0 = positive, 1 = negative). The temperature measurement value is represented by a 14-bit signed field, with the most significant bit used as the sign bit (0 = positive, 1 = negative).

Each data packet consists of 10 bytes, organized as follows:

- Byte 1: Frame header (0x80).
- Bytes 2–6: Gyroscope measurement data.
- Byte 7: Gyroscope data checksum, calculated as the bitwise XOR of Bytes 2–6.
- Bytes 8–9: Temperature measurement data.
- Byte 10: Packet checksum (XOR).

The bit assignments for each byte are shown in the Data Stream Definition table below.

Protocol Parameters

UART RS-422 Parameters	
Start Bit	1
Data Bits	8
Stop Bit	1
Parity	Even
Baud Rate	460,800 bps

Data Stream Definition

Each packet of data consists of 10 bytes, which are described as follows:

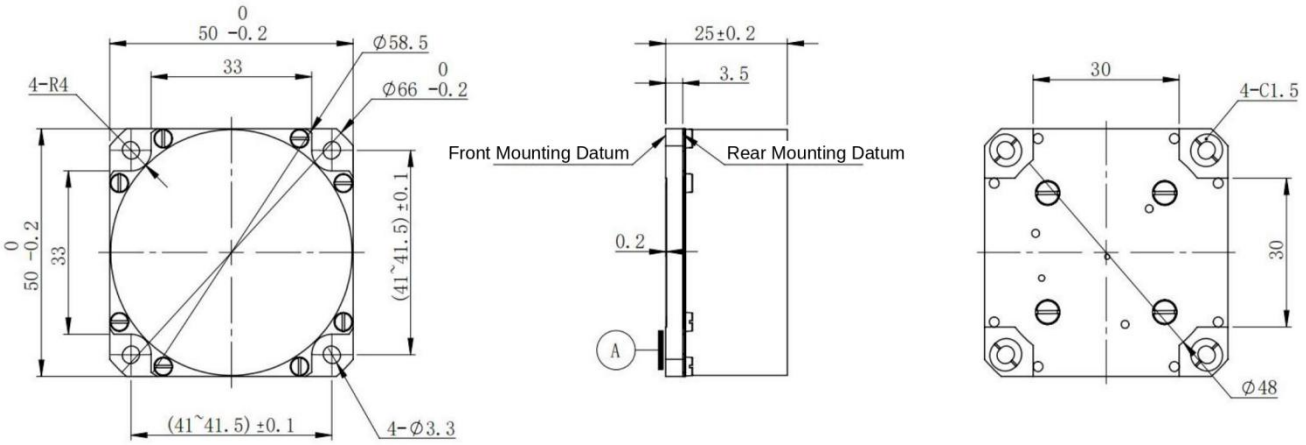
Byte	High (bit 7)	6	5	4	3	2	1	Low (bit 0)
1	1	0	0	0	0	0	0	0
2	0	D6	D5	D4	D3	D2	D1	D0
3	0	D13	D12	D11	D10	D9	D8	D7
4	0	D20	D19	D18	D17	D16	D15	D14
5	0	D27	D26	D25	D24	D23	D22	D21
6	0	0	0	0	D31	D30	D29	D28
7	0	X	X	X	X	X	X	X
8		T6	T5	T4	T3	T2	T1	T0
9		T13	T12	T11	T10	T9	T8	T7
10		X	X	X	X	X	X	X

Note: D0–D31 represent gyroscope measurement data bits, and T0–T13 represent temperature measurement data bits.

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■ MECHANICAL DIMENSIONS

Outline Drawing — Unit: mm



Note: The outline drawing is provided for reference only. Detailed mechanical drawings are available upon request.

■ CONNECTOR PIN ASSIGNMENTS

J30-15ZK Pin Assignments

The fiber optic gyroscope uses a J30-15ZK connector. Pin assignments are provided in the table below.

Pin No.	Name	Color	Definition
1	TX+	Yellow	RS-422 T+
2	TX-	Orange	RS-422 T-
3	RX+	Blue	RS-422 R+
4	RX-	Green	RS-422 R-
5	+5 V	Red	Power +5 V
6	GND	Black	Power Ground
7	GND	Black	Power Ground
8	DNC		None
9	DNC		None
10	DNC		None
11	DNC		None
12	DNC		None
13	+5 V	Red	Power +5 V
14	DNC		None
15	DNC		None

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■ ORDERING INFORMATION

Complete model number example: SX-MGFSC-5003B

Measurement Range	
500	±500 °/s
Output	
3	RS-422
Performance Grade	
A	Grade A
B	Grade B
C	Grade C
Customization Options	
D	Custom configuration — specify requirements when ordering

Example: SX-MGFSC-5003BD — SX-MGFSC Series with a ±500 °/s measurement range, RS-422 interface, Grade B performance specifications, and customized configuration. Refer to the Performance Specifications section for the detailed specifications of Grades A, B, and C.

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