





MICRO MFOG

V2.4

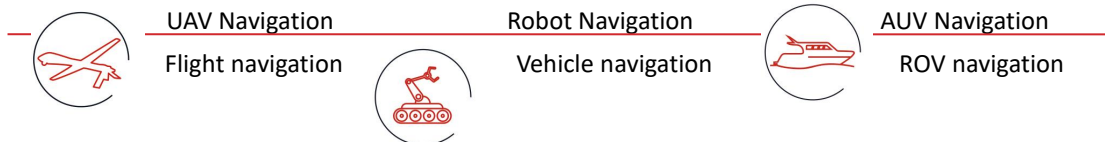
# MFOG-40



## Product characteristics

-  Range:  $\pm 450^{\circ}/s$
-  Bias stability (10s, 1 $\sigma$ ):  $\leq 0.5^{\circ}/H$
-  Zero-bias stability at full temperature (10s, 1 $\sigma$ ):  $\leq 1.5^{\circ}/H$
-  Dimension (mm):  $\phi 40 \times 20.5$

## Field of application



# MFOG-40

## Micro-MFOG fiber optic gyroscope

### Use and maintenance instructions

( pages excluding the cover)

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# Operation and Maintenance Instructions for MFOG-40

## Micro-Nano Fiber Optic Gyroscope

### 1 Scope

This document specifies the requirements and methods for use and maintenance of MFOG-40 micro-nano fiber optic gyroscope (product for short).

### 2 References and Standards

GJB1649-1993 ESD Control Program for Electronic Products

### 3 Definitions

None.

### 4 Product introduction

#### 4.1 Product Overview

MFOG-40 micro-nano fiber optic gyroscope (hereinafter referred to as this product) is an angular rate sensor integrating optics, mechanics and electronics. It is based on the Sagnac effect, integrates a variety of micro-nano fiber devices, and realizes the detection process by detecting, processing and feeding back the phase difference generated by two beams of light propagating in opposite directions.

This product is mainly composed of optical path components, circuit components and structural components. It has the characteristics of simple structure, no moving parts, no wear parts, fast start, small size, light weight and so on. And can be apply to that attitude control and measurement of the carrier.

#### 4.2 composition

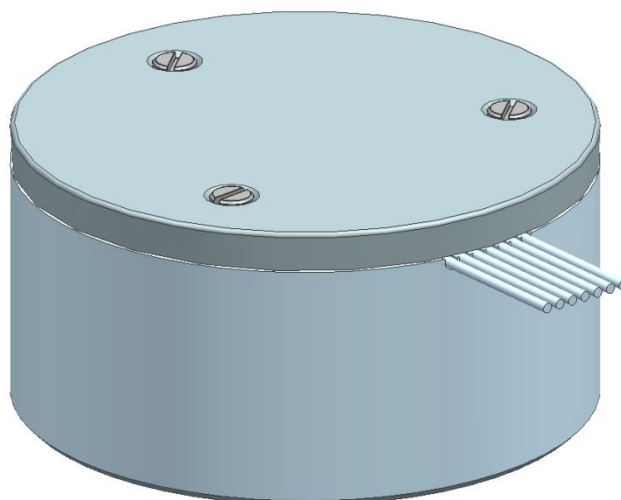
The product is mainly composed of the following components:

- A) light path assembly;
- B) detection and control signal circuit board;
- C) optical fiber ring framework, shell and other structural parts;

#### 4.3 Appearance and dimension

The product is cylindrical, with the external dimension of  $\phi 40 \text{ mm} \times 20.5 \text{ mm}$ , and 3 M3 threads on the bottom surface for external

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connection.

Figure 1 Outline drawing of MFOG-40 micro-nano fiber optic gyroscope

#### 4.4 weight

≤40g。

#### 4.5 operating temperature

-40℃~+65℃。

#### 4.6 Storage temperature

-55℃~+85℃。

#### 4.7 Random vibration

Random vibration level: 20g, frequency range: 20Hz ~ 2000Hz.

Main performance parameters of 4.8

Table 1 Main Performance Parameters

NO.	Project	Performance indicators
1	Range (°/s)	±450
2	Scale Factor (LSB/ ° /s)	3600
3	Scale factor nonlinearity (ppm)	≤300
4	Zero-bias stability (10s, 1σ, °/H)	≤0.5
5	Zero-bias repeatability (1σ, °/H)	≤0.5
6	Angular random walk (°/H <sup>1/2</sup> )	≤0.05
7	Zero-bias stability at full temperature (10s, 1σ, -40 °C ~ + 65 °C, °/H)	≤1.5
8	3dB Bandwidth (Hz)	≥400
9	Power supply (V)	5±0.15
10	Power Consumption (W)	≤1.5
11	Dimension (mm)	φ40X20.5

#### 4.9 Mechanical and electrical interfaces

##### 4.9.1 mechanical interface

The bottom surface of the product is the mounting surface, with 3 M3 threads and external mechanical connection.

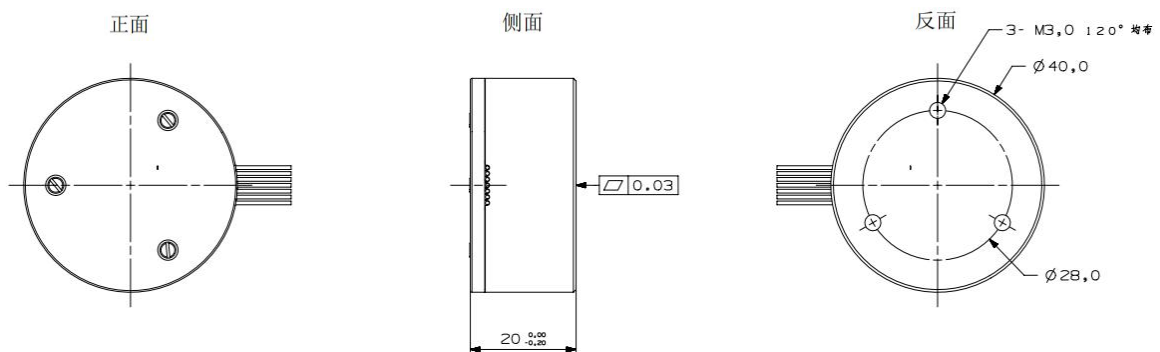


Figure 2 Installation Dimension

##### 4.9.2 power requirements

The external power supply to the product has two circuits, and the requirements are shown in Table 2:

Table 2 External Power Supply Requirements

	+5V
Voltage	4.85V~5.15V
Ripple	20mV
Electric current	0.2A

#### 4.9.3 electrical interface

MFOG-40 micro-nano fiber optic gyroscope is electrically connected to the outside by J30-9 TJ. See Table 3 for the definition of solder joint.

Table 3 Node Definition

Node number	Color	Definition
1	Tangerine	RS422 R-
2	Blue	RS422 R+
3	Green	RS422 T+
4	Yellow	RS422 T-
5	Black	GND
6	Black	GND
7	Red	5V

Take anti-static measures every time you connect or touch the plug terminal of the product.

#### 4.9.4 communication protocol

The product is RS422 serial output.

- 1) Bidirectional serial communication, in line with RS-422 interface standard;
- 2) External synchronous output. When RS422 interface receives byte B1, it sends the current data. The maximum update rate is 4KHz.
- 3) The effective data of the gyroscope is 28 bits;
- 4) Valid temperature data is 12 bits;
- 5) The baud rate of data transmission is 921 600 bps;
- 6) Data format:

a)Data transmission format: each frame of data is 11 bits, including: the first bit is the start

- bit (0), the second to ninth bits are data bits, the tenth bit is the even parity bit, and the eleventh bit is the stop bit;
- b) Verification mode: even verification;
  - c) The effective data of gyroscope is 28 bits (the most significant bit is the sign bit, 0 is "+", 1 is "-"), and the effective data of temperature is 12 bits (the most significant bit is the sign bit, 0 is "+", 1 is "-");
  - d) Data packet format: each transmission includes 10 bytes, the first byte is the frame header (80H); the second byte is the first byte data of the gyroscope (high byte); the third byte is the second byte data of the gyroscope; the fourth byte is the third byte data of the gyroscope; the fifth byte is the fourth byte data of the gyroscope (low byte); The 6th byte of data is the gyro temperature (high byte), the 7th byte of data is the gyro temperature (low byte), and the 8th byte of data is the sum of the first 7 bytes (gyro data) in the data packet;
  - e) Data storage method.

		H						Low
Word	1	1	0	0	0	0	0	0
2nd		0	D	D	D	D	D	D
Byte		0	D	D	D	D	D	D
Byte		0	D	D	D	D	D	D
Byte		0	D	D	D	D	D	D
Byte		0	0	0	T	T	T	T
Byte		0	T	T	T	T	T	T



Byte

0	X	X	X	X	X	X	X
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## 5 Installation of the product

### 5.1 Installation requirements

The user shall be responsible for the installation and disassembly of the product. During this process, the product shall not be impacted, and the outer surface of the product shall not be machined.

Inspection of 5.2 before installation

A) to check the appearance of the product for physical damage such as collision;

### 5.3 Inspection after installation

Check whether each mounting screw is secure.

## 6. Product maintenance

Before the a) product is loaded into the carrier, it is required to electrify the product at least once a year for 3600 s, and it is not required to detect the electrical parameters of the product when electrifying.

After the b) product is loaded into the carrier, the product is required to be electrified at least once a year, the one-time electrification time is 3600s, and each electrical parameter of the product is not required to be detected when the product is electrified;

## 7 Common fault phenomena and troubleshooting methods

This product is in a fully sealed state, and cannot be repaired on site after any failure of the user, and needs to be returned to the production unit for maintenance. The following only lists some fault phenomena that may occur other than the product itself, see Table 5. If other technical problems occur during the use of the product, please contact the product manufacturer.

Table 5 Common Faults and Troubleshooting

Serial num	Fault symptom	Cause analysis	Exclusion method
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ber			
1	When the product is powered on, the current indication of the + 5V ammeter is basically 0	The product is not supplied with power or the power supply current is too small	Check the power supply and power supply circuit, and restore the power supply of the product
2	When the product is powered on, the current indication of the + 5V ammeter is normal, but the computer acquisition program does not work.	Abnormal acquisition system of test equipment	Check the connection cable and equipment power supply
3	The product is powered on, and the current indication of the + 5V ammeter is abnormal	There may be a short circuit inside the test equipment	Check the test equipment

## 8 Transportation and storage requirements of products

### Precautions for 8.1 transportation

The a) places the products according to the direction shown in the packing box;

When the temperature of b) is  $-40\text{ }^{\circ}\text{C} \sim +65\text{ }^{\circ}\text{C}$ , it is allowed to be transported by road, railway, air and water.

Ensure that the box is secured to the carrier and does not move during transport c).

### Considerations for storage of 8.2

The products placed in the packing case a) shall be stored in an air-conditioned warehouse at  $15\text{ }^{\circ}\text{C} \sim 35\text{ }^{\circ}\text{C}$  under standard atmospheric pressure;

The shelf life of b) products is 15 years.

## 9 Unpacking and inspection

### Unpacking inspection of 9.1

Check the appearance of the packing case a) for physical damage such as collision;

B) should be protected against static electricity when taking out the product.



## 9.2 Inspection of supporting delivery documents

Certificate of conformity of a);

Acceptance Report of b) MFOG-40 Micro-Nano Fiber Optic Gyroscope;

C) MFOG-40 Micro-Nano Fiber Optic Gyroscope Operation and Maintenance Manual (one copy for each batch).

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