
BS-FU40-300-D1ES Fiber Optic Gyroscope

Operation and Maintenance

Manual

1 Scope

This document specifies the requirements and methods for the use and maintenance of BS-FU40-300-D1ES 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

BS-FU40-300-D1ES 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) an optical path assembly;
- B) Detection and control signal circuit board;
- C) Optical fiber ring skeleton, shell and other structural parts;

4.3 Appearance and dimension

The product is cylindrical, with overall dimensions of $\phi 40 \text{ mm} \times 20.5 \text{ mm}$, and 3 M3 threads on the bottom are connected to the outside.

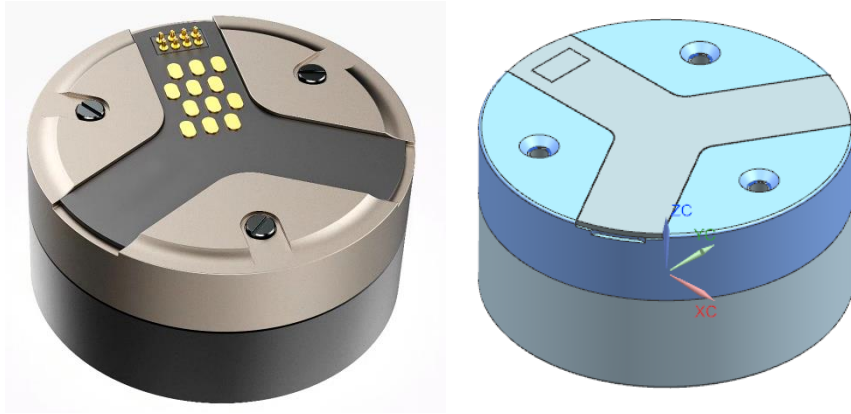


Fig. 1 Outline drawing of BS-FU40-300-D1ES micro-nano fiber optic gyroscope

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.

4.8 Main performance parameters

Table 1 Main Performance Parameters

NO.	Project	Parameters
1	Range (°/s)	±300
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 ^{1/2})	≤0.02
7	Zero-bias stability at full temperature (10s, 1σ, -40 °C ~ +65 °C, °/H)	≤2
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.

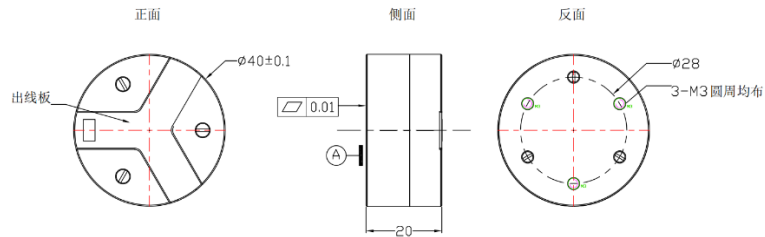


Figure 2 Installation Dimension

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	0.25A

4.9.3 Electrical interface

The BS-FU40-300-D1E5 micro-nano fiber optic gyroscope is electrically connected to the outside through the bonding pad, as shown in the figure. See Table 3 for the definition of the bonding pad.

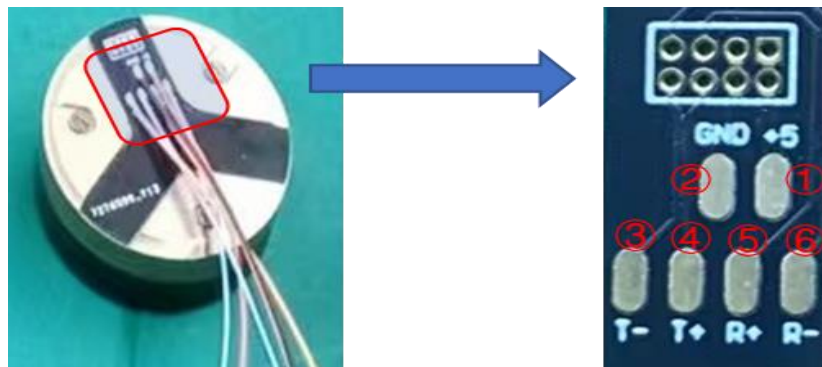


Figure 3 Node Arrangement

Table 3 Node Definition

Number	Definition
1	5V
2	GND

3	RS422 T-
4	RS422 T+
5	RS422 R+
6	RS422 R-

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

4.9.4 Communication protocol

RS422 serial communication

Baud rate: 921 600

Data length: 8 bits

Check: even check

Start bit: 1b it

Stop bit: 1 bit

Data update rate: 2000 Hz

Each packet contains 10 bytes

B1, B2 frame header (0x80, 0x80).

B3 to B6 are gyro outputs, 28 bits in total, represented by 2's complement, the first bit of each byte is 0, and D27-D21/D20-D14/D13-D7/D6-D0 are stored in B3/B4/B5/B6 bytes respectively.

B7 and B8 are temperature signals, 14 bits in total, represented by twos complement, and the first bit of each byte is 0. D13-D7/D6-D0 are stored in B7 and B8 respectively.

Temperature = yard value (0.0625

B9 reserved bytes.

B10 checksum, equal to the sum of B3-B9 bytes.

	High							Low
Byte1	1	0	0	0	0	0	0	0
Byte2	1	0	0	0	0	0	0	0
Byte3	0	D27	D26	D25	D24	D23	D22	D21
Byte4	0	D20	D19	D18	D17	D16	D15	D14
Byte5	0	D13	D12	D11	D10	D9	D8	D7
Byte6	0	D6	D5	D4	D3	D2	D1	D0
Byte7	0	T13	T12	T11	T10	T9	T8	T7
Byte8	0	T6	T5	T4	T3	T2	T1	T0
Byte9	0	0	0	0	0	0	0	0

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.

5.2 Inspection before installation

A) 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

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

B) After the 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;

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 number	Fault symptom	Cause analysis	Exclusion method
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

8.1 Transportation precautions

- A) Place the product in the direction shown in the packing box;
- B) When the temperature range is $-40\text{ }^{\circ}\text{C} \sim +65\text{ }^{\circ}\text{C}$, it is allowed to transport by road, railway, air and water;
- C) Ensure that the packing case is fastened to the carrier and will not move during transportation.

8.2 Storage precautions

- A) The products placed in the packing box shall be stored in the air-conditioned warehouse under the standard atmospheric pressure, and the ambient temperature is $15\text{ }^{\circ}\text{C} \sim 35\text{ }^{\circ}\text{C}$;
- B) The storage life of the product is 15 years.

9 Unpacking and inspection

9.1 Unpacking inspection

- A) Check the appearance of the packing case for physical damage such as collision;
- B) Electrostatic protection shall be carried out when the product is taken out.

9.2 Inspection of supporting delivery documents

- A) Product certificate;
- B) Acceptance report of BS-FU40-300-D1ES micro-nano fiber optic gyroscope;
- C) Instructions for use and maintenance of BS-FU40-300-D1ES micro-nano fiber optic gyroscope (one copy for each batch).