BS-FU26-8-D1EC Fiber Optical Gyro

User manual

1. Product name

BS-FU26-8-D1EC fiber optic gyroscope.

2. Brief description of basic working principle

Fiber optic gyroscope is a kind of fiber sensor sensitive to angular rate. Its basic working principle is to use the Sagnac effect: In a ring interferometer, the light wave emitted by the light source is divided into two by the beam splitter, and the two beams of light will be along the forward and backward directions respectively. Move counterclockwise and return to the beam splitter. When the interferometer rotates relative to the inertial reference frame at a certain angular velocity, there is a phase difference between the clockwise and counterclockwise beams:

$$\phi_S = \frac{4\pi RL}{\lambda C} \cdot \Omega$$

Where: is the length of the fiber; is the radius of the fiber ring; is the wavelength of light; is the speed of light in vacuum. The advantage of the fiber-optic ring interferometer is that it can use multiple turns of the optical path to enhance the Sagnac phase shift. In this case, the length of the fiber in the above formula is the number of turns of the fiber coil. The rotation angular rate can be calculated by detecting the Saguenaik phase shift.

According to the above principles, the fiber optic gyroscope is composed of two parts: an optical meter and a modulation/demodulation circuit. The former includes a light source, a detector, a coupler, a Y-type multifunctional integrated optical circuit and a fiber coil, as shown in Figure 1.

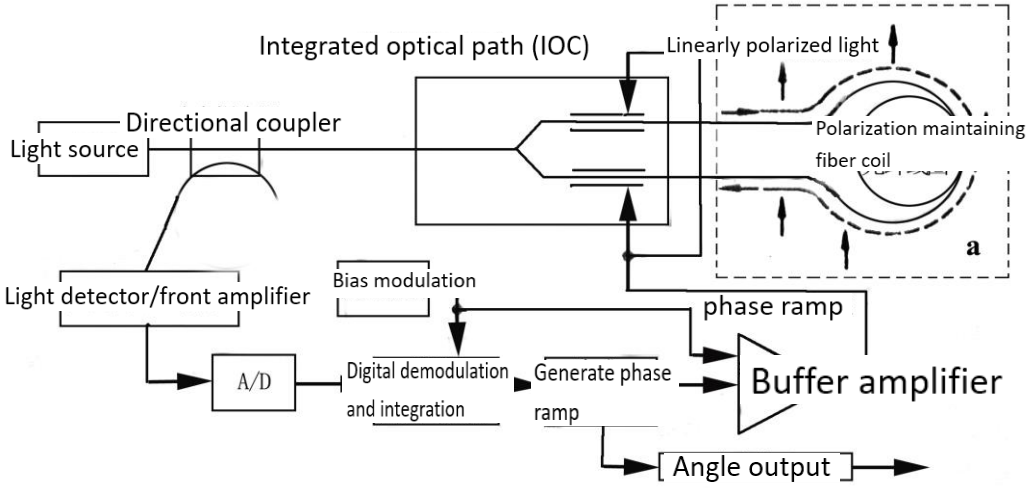


Figure 1

3. Product structure and features

The gyroscope structure adopts a typical optical fiber ring structure design scheme, and from the miniaturization integrated design, structural stability (resistance to shock and vibration), anti-resonance, structural symmetry, ease of installation and thermal design (temperature Characteristics) and other aspects were considered, and the existing structure of the gyro was optimized and designed.

4. Quality level and implementation standard

Civilian grade.

5. Product Usage

The BS-FU26-8-D1EC fiber optic gyroscope has the characteristics of long life, strong shock and vibration resistance, large measurement range, high bandwidth, instant start, no drift caused by acceleration, and wide accuracy coverage. It can be widely used in ships, aircraft, and vehicles and Robot navigation, positioning and orientation, stability control and other fields.

6. main gyro parameters

6.1 Non-linearity scale factor: ≤50ppm (1σ)
6.2 Scale factor asymmetry: ≤50ppm (1σ)
6.3 Scale factor repeatability: ≤50ppm (1σ)
6.4 Dynamic range: ±800°/s (±300°/s optional)
6.5 Zero bias stability: ≤0.05°/h (1σ)
6.6 Zero bias repeatability: ≤0.05°/h (1σ)
6.7 Random walk coefficient: ≤0.005°/√h
6.8 Bandwidth: ≥200Hz
6.9 Weight: ≤250g

7. Application environmental conditions

Operating temperature range: -40℃～+65℃ (- 30℃～+50℃ optional);
Storage temperature range: -55℃～+70℃.

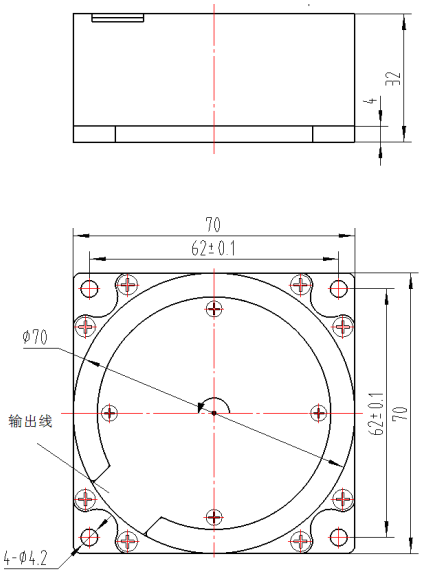
8. Gyro working power supply

±5V power supply, power supply accuracy 5%, power supply ripple not more than 20mV. The maximum impulse current of the full temperature power supply is 1.5A. The steady-state power consumption at room temperature is not more than 2.5W, and the steady-state power consumption at full temperature is not more than 5W.

9. Dimensions, polarity and interface

9.1 Dimensions

BS-FU26-8-D1EC fiber optic gyroscope shape size: 70mm×70mm×32mm, installation size: 62mm×62mm, see Figure 2 for details.



Note: Unmarked dimensional tolerances are implemented in accordance with GB/T1804-2000 grade C.

Figure 2 Gyro outline and installation dimensions

9.2 Gyro Polarity

The polarity of the top is perpendicular to the mounting surface upward.

9.3 Interface

9.3.1 Interface definition

The gyro output adopts J30-15T connector, the wire length is about 20cm, and the node definition is shown in Table 1.

Table 1J30-15T definition

Node number	Definition	Remark
1	+5V	+5V power input
2	+5V	+5V power input
3	-5V	-5V power input
4	-5V	-5V power input
5	±5VGND	Power ground (Note: must not be connected to the gyro shell)
6	±5VGND	Power ground (Note: must not be connected to the gyro shell)
7	T+	Gyro output signal+
8	T-	Gyro output signal-
the remaining	Disable	

9.3.2 Interface type

RS-422 digital serial port adopts asynchronous serial standard duplex RS-422 electrical interface standard.

9.3.3 Communication protocol

The baud rate is 614.4kbps. The communication format is 11 bits of data per frame, including: 1 start bit, 8 data bits, 1 even parity bit, 1 stop bit, and the data update cycle is 0.5ms.

Gyro effective data is 32 bits (32-bit signed integer). The data packet transmits a total of 7 bytes of data: the first byte is the frame header 80H; the second to sixth bytes are gyro data; the seventh byte is the parity bit (the parity bit is the second to sixth byte XOR value of data).

Data Format:

The first byte (frame header) is 80H:

1	0	0	0	0	0	0	0

The second byte is gyro data D6～D0:

0	D6	D5	D4	D3	D2	D1	D0

The third byte is gyro data D13～D7:

0	D13	D12	D11	D10	D9	D8	D7

The 4th byte is gyro data D20～D14:

0	D20	D19	D18	D17	D16	D15	D14

The fifth byte is gyro data D27～D21:

0	D27	D26	D25	D24	D23	D22	D21

The 6th byte is gyro data D31～D28:

0	0	0	0	D31	D30	D29	D28

The 7th byte (check digit) is the exclusive OR value (XOR) of the 2nd to 6th byte data

0	X	X	X	X	X	X	X

10. Use operating procedures and precautions

10.1 Product installation

Make the gyro installation reference surface on the carrier according to the dimensions given in the installation diagram 2. The area of the gyro installation reference surface should not be less than 73mm×73mm, the flatness should be less than 0.02, and the roughness should not be greater than 0.8.

Use four M4 pan-head screws to firmly fix the product on the gyro installation datum surface of the carrier. The four screws should be evenly tightened. It is strictly forbidden to knock or collide during the installation process to avoid damage to the gyro.

10.2 Product connection

Connect to the host computer and the power supply according to the wiring definition given in Table 1. Check to make sure that all the connections are correct. Pay special attention to the power polarity and voltage of the gyro. Reverse power or excessive voltage may cause damage or even damage to the gyro. Spinning top.

10.3 Product testing

Perform product testing according to Figure 3.

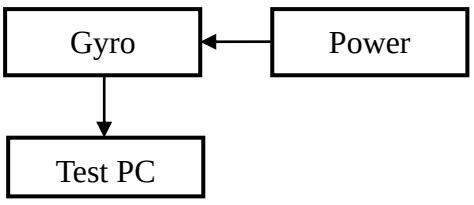


Figure 3 Test block diagram

11. Maintenance and maintenance

After the gyro is installed, fixed and connected according to the operating procedures, the gyro can work after power-on. The gyro will enter the working state after the start-up time is over. The product generally does not require special maintenance and maintenance during use. However, if the gyro is used in a bare environment, a rain cover must be installed on the gyro. In order to avoid rain erosion, in order to extend the service life of the top.

12. Transportation and storage

12.1 Transportation requirements

This product can be transported by any means of transportation such as cars, trains, ships, airplanes, etc. However, the product should be placed in a special packaging box before transportation, and it should be protected from heat, water and severe vibration during transportation.

12.2 Storage requirements

This product should be stored in a dry, ventilated, and non-corrosive warehouse at a temperature of -10℃～40℃.