

Product Introduction, Technical Data and Market Application of Laser Gyro

一、 Overview

Laser gyro is a technology that has been studied since the 1960s. Its main advantage is its high accuracy and its price is lower than that of mechanical gyroscopes with the same accuracy. The cost of fiber optic gyroscope appeared after the 1970s is lower than that of ring laser gyroscope, but limited by its design principle, it is still inferior to the former in the field of pursuing high precision. The cost of modern MEMS gyroscope is very low, and its accuracy can meet the needs of the general field, and it can be integrated into the microchip, so it has become the mainstream gyroscope in the current civil field. However, in the military field, laser gyroscopes and fiber optic gyroscopes are still the mainstream products, especially in the fields of medium and long range missile guidance, aviation, navigation, aerospace and so on. This is mainly because the accuracy of MEMS gyroscopes is still not up to the level of laser gyroscopes, including satellite-guided bombs, short-range ballistic missiles and other weapons can use MEMS gyroscopes for guidance, but they must be corrected by satellite positioning, while long-range weapons are difficult to use MEMS gyroscopes because of excessive cumulative errors. Especially in the submarine, the high-precision laser gyroscope is of great significance. The submarine has been underwater for a long time, and can not correct the accumulated error of its inertial navigation system through satellite positioning, so its inertial measurement components must have extremely high precision to meet the requirements of use.

Laser gyro is an instrument based on Sagnac effect, which can obtain the angular velocity of carrier relative to inertial space by measuring the frequency difference of bidirectional traveling waves in the ring laser resonator. Its main function is to measure the angular velocity and angle of the carrier. It has the advantages of high precision, high reliability, long life, short start-up time, large dynamic range and excellent environmental stability. It is widely used in inertial

navigation and guidance, attitude measurement and control, positioning and orientation, dynamic angle measurement and so on.

Laser gyro, accelerometer and corresponding control circuit constitute an inertial navigation system, which can provide information for attitude control, guidance and navigation applications of moving carriers.

二、 Equip objects

Laser inertial navigation system

三、 BS-GL90-4-D laser gyroscope



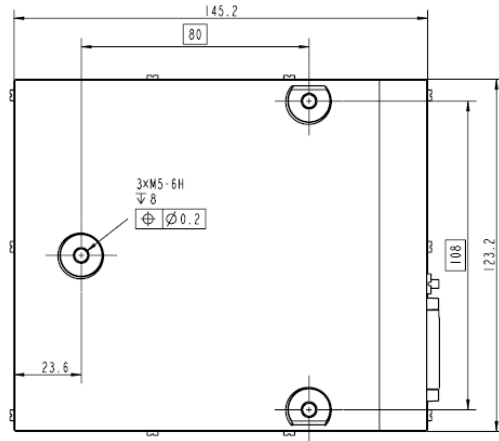
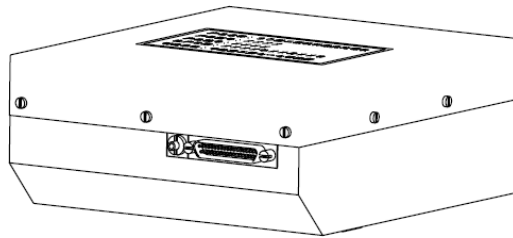
Image of BS-GL90-4-D laser gyroscope

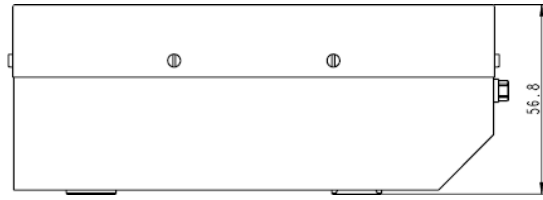
(1) Main technical indicators

Main technical indicators		Level 1 accuracy	Secondary accuracy	Level 3 accuracy
Performance	Zero-bias stability ($^{\circ}/H$) (1σ)	≤ 0.003	≤ 0.005	≤ 0.008
	Zero-bias repeatability ($^{\circ}/H$) (1σ)	≤ 0.002	≤ 0.003	≤ 0.005
	Random walk coefficient ($^{\circ}/\sqrt{H}$)	≤ 0.0005	≤ 0.001	≤ 0.0015
	Scale factor stability (1σ)	≤ 2 ppm		
	Dynamic range	$\geq \pm 400^{\circ} /s$		
	Start time	$\leq 10s$		

	MTBF	≥ 10000 h
	Once-through continuous working time	Unlimited
Physics and Electrical	Gyroscope form factor	$(148 \pm 1) \times (126 \pm 1) \times (57 \pm 1)$ mm
	Weight	≤ 2 Kg
	Power consumption	≤ 4 W
Environment	Operating ambient temperature	$-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$
Adaptability	Storage temperature	$-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$

(2) Overall dimension and external interface





The J30JM-ZKP37 37-core electrical connector is used to connect the power supply, output signal and the temperature sensor in the gyroscope. The specific wiring definitions of RLG 90 are shown in the following table.

Pin	Signal definition	Explain
7	Bsin	Two-channel analog signal output
20, 26	GND	
8	Asin	
9, 27	BTTL	Two digital level outputs
10, 18	GND	
11, 29	ATTL	
12	PT-1	4 platinum resistors and their common terminals (for temperature monitoring)
30	PT-2	
13	PT-3	
31	PT-4	
14, 32	PT-COM	
15, 33	GND	\pm 5V POWER INPUT
16, 34	+5V	
19, 37	-5V	
17, 35	+15V	+ 15 V supply input
18, 36	+15V_GND	
1, 2, 3, 4, 5, 6, 21, 22, 23, 24, 25	Keep it for yourself	Leave the test port blank

(3) Maintainability

If the laser gyro fails, it shall be returned to the factory for repair.

(4) Storage

The laser gyro shall be stored at normal temperature and in a dry and dustproof environment.

四、BS-GL50-4-D laser gyroscope



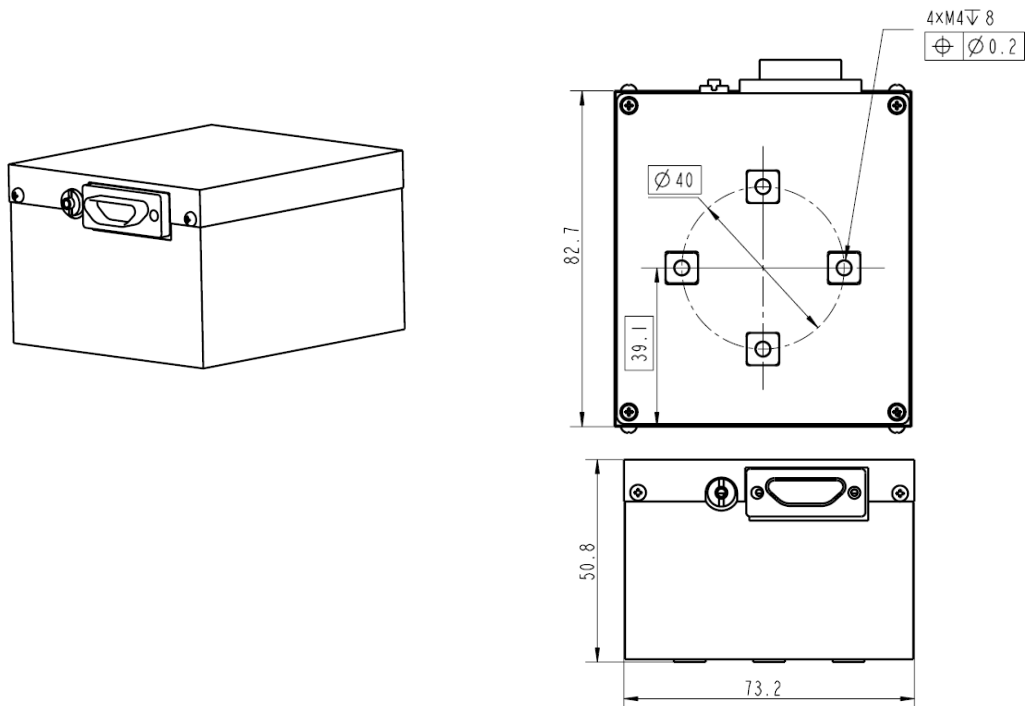
Image of Laser Gyroscope BS-GL50-4-D

(1) Main technical indicators

Main technical indicators		Level 1 accuracy	Secondary accuracy	Level 3 accuracy
Performance	Zero-bias stability (°/H) (1σ)	≤0.01	≤0.03	≤0.05
	Zero-bias repeatability (°/H) (1σ)	≤0.01	≤0.03	≤0.05
	Random walk coefficient (°/√H)	≤0.002	≤0.005	≤0.009
	Scale factor stability (1σ)	≤5 ppm		
	Dynamic range	≥±400°/s		
	Start time	≤10s		
	MTBF	≥5000 h		

	Once-through continuous working time	Unlimited
Physics and Electrical Performance	Gyroscope form factor	$(85 \pm 1) \times (75 \pm 1) \times (52 \pm 1)$ mm
	Weight	≤ 650 g
	Power consumption	≤ 3 W
Environment Adaptability	Operating temperature	$-40^{\circ}\text{C} \sim +65^{\circ}\text{C}$
	Storage temperature	$-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$

(2) Overall dimension and external interface



The 25-core J30JM-ZKP25 connector is used to connect the power supply, the output signal and the temperature sensor in the gyroscope. The specific wiring definitions of the BS-GL50-4-D are shown in the following table.

Pin	Signal definition	Explain
1、 14	+15V	Power supply of high voltage power board
2、 15	+15V_GND	
6、 19	+5V	Power supply of main control circuit board
4、 17	GND	
7、 20	-5V	
8、 21	ATTL	Readout signal
9、 22	BTTL	
23	GND	
10	Temperature sensor 1 output	Temperature signal
12	Temperature sensor 2 output	
13	Temperature sensor 3 output	
11	Temperature sensor common	
24、25、18、5、16、3	Keep it for yourself	Leave the test port blank

(3) Maintainability

If the laser gyro fails, it shall be returned to the factory for repair.

(4) Storage

The laser gyro shall be stored at normal temperature and in a dry and dustproof environment.