



Agilelight-500A Series

Single Axis Fiber Optic Gyroscope

Technical Manual

V4.0



Introduction

Agilelight-500A is a single axis high-precision fiber optic gyroscope, which adopts optoelectronic integration and fully digital closed-loop control technology. The product has good anti magnetic field ability, temperature, and vibration performance

Applications

It is suitable for airborne navigation, load positioning and orientation systems, and can be widely used in military fields such as unmanned aeroplanes, ships, land positioning and orientation, as well as civil fields such as ships, aviation, and track detection.

Specifications



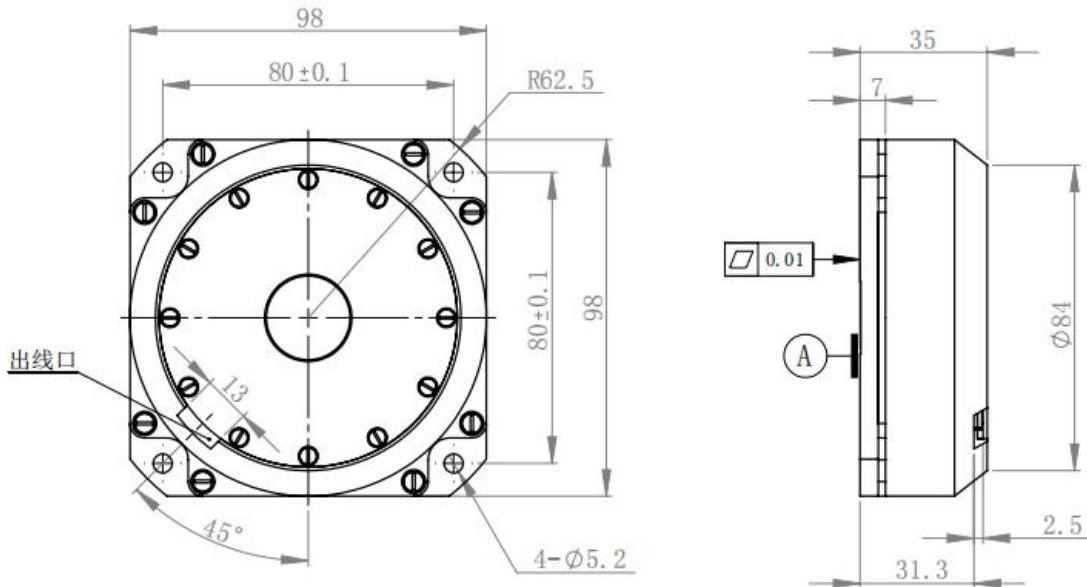
Performance Specifications

Item	Agilelight-500A- (1310)	Agilelight-500A (1550)
Zero bias stability($^{\circ}$ /hr(10,10s))	≤ 0.01	≤ 0.01
Zero bias stability($^{\circ}$ /hr(10,100s))	≤ 0.005	≤ 0.005
stabilization time(s)	< 10	< 10
zero bias repeatability($^{\circ}$ /hr(1o))	≤ 0.01	≤ 0.01
full temprature zero bias repeatability($^{\circ}$ /hr)	≤ 0.1	≤ 0.1
random walk coefficient($^{\circ}$ /Vh)	≤ 0.001	≤ 0.001
the scale factor of nonlinearity(ppm)	≤ 15	≤ 10
the scale factor of repeatability(ppm)	≤ 15	≤ 10
fulltemprature scale factor repeatability(ppm)	≤ 300	≤ 100
dynamic range($^{\circ}$ /s)	± 500	± 500
magnetic field sensitivity($^{\circ}$ /hr/Gs)	≤ 0.005	≤ 0.005
working temprature($^{\circ}$ C)	-40 to +70	-40 to +70
storage temprature($^{\circ}$ C)	-50 to +70	-50 to +70
random vibration	4.2g(20-2000hz)	4.2g(20-2000hz)



Package size

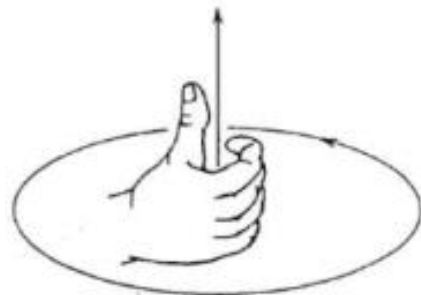
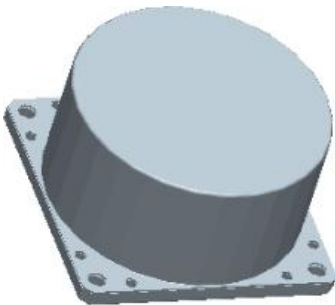
Product Size: $\Phi 98 \times H35$ (mm)



Mechanical feature

Gyro Polarity:

The X, Y, and Z gyro polarities are defined according to the right-hand spiral rule, and the three axes are orthogonal. As shown in the figure, the thumb represents the direction of the sensitive axis, and the other fingers represent the direction of angular velocity.



Sine sweep vibration

The gyroscope is fixed on the vibration table by the tooling according to the vibration direction. The

gyroscope performs sinusoidal scanning in three directions, corresponding to the X-axis, Y-axis, and Z-axis directions respectively.

Vibration steps : add excitation to the vibration table, power on the gyroscope, and after a certain preheating time (gyroscope start-up time), test the gyroscope output value for about 5 minutes; perform sinusoidal vibration.

Vibration conditions: 20Hz-2000Hz, scanning time 5min, amplitude 4.2g . During the vibration, the gyroscope output was recorded.

Random vibration

Vibration frequency: 20Hz~2000Hz

Vibration time: 5 minutes for each axis

Vibration direction: X, Y, Z axis

Vibration spectrum: see attached figure 1

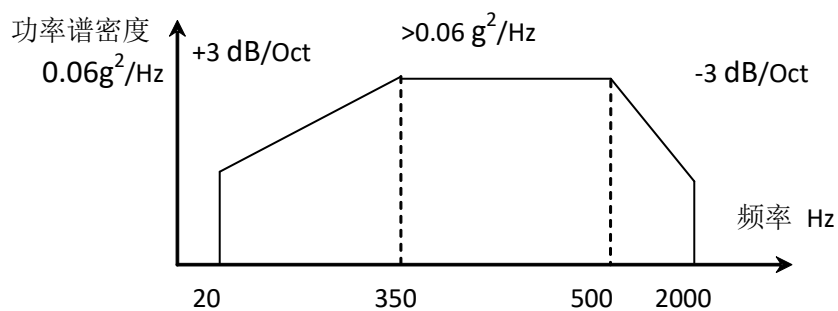


Figure 1 Vibration spectrum

Index requirements:

The fiber optic gyroscope has no resonance when the sine frequency sweep is performed in the range of 20HZ to 2000Hz;

Random vibration: The absolute value of the zero deviation at the center of vibration and the average value of the zero deviation before and after vibration is required to be less than $0.005^\circ/h$.

Mechanical shock shall be in accordance with the requirements of Table 2.

Table 2 Impact test conditions

Peak acceleration (g)	30
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Duration (ms)	10
Number of impacts	3 times in each direction
Waveform	Half sine wave
direction	X, Y, Z
Note: The interval between two impacts should not be less than 1.5s .	

During the impact process, the product is powered on. After the mechanical impact is completed, the product should be able to work normally, and the zero position change before and after the impact should be less than $0.005^{\circ}/h$.

The fiber optic gyroscope is connected to the J30-15 ZKP socket. The contact definitions are shown in the following table :

Contact No.	Contact Definition	mark	Yan color
1	Serial Port T+	TX+	yellow
2	Serial port T-	TX-	Orange
3	Serial port R+	RX+	blue
4	Serial port R-	RX-	green
5 , 13	Power supply +5V	+5V	red
6 , 7	Power Ground	GND	black

Communication Protocol

RS-422 mode (bidirectional)

- 1) Bidirectional serial communication, in line with RS-422 interface standard;
- 2) External trigger signal, 1000HZ square wave;
- 3) After the gyroscope detects the falling edge of the external trigger signal, it starts to send data outward;
- 4) The effective data of the gyroscope is 32 bits;
- 5) The effective temperature data is 14 bits;
- 6) The data transmission baud rate is 460.8kbps;
- 7) 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) Check mode: even check;
 - c) The effective data of gyroscope is 32 bits (the highest bit is the sign bit, 0 is "+", 1 is "-"), and the effective data of temperature is 14 bits (the highest bit is the sign bit, 0 is "+", 1 is "-");
 - d) Data packet format: Each transmission includes 10 bytes in total. The first byte is the

frame header (80H); the second byte is the first byte data of the gyroscope (low 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; the sixth byte is the fifth byte data of the gyroscope (high byte); the seventh byte is the check bit, which is the XOR value of the first 5 bytes (gyroscope data) in the data packet; the eighth byte is the low byte of the temperature data; the ninth byte is the high byte of the temperature data; the tenth byte is the check bit, which is the XOR value of the first 8 bytes (gyroscope data) in the data packet;

e) Data storage method.

	high				low			
Byte 1(frame header):	1	0	0	0	0	0	0	0
Byte 2:	0	D6	D5	D4	D3	D2	D1	D0
Byte 3:	0	D13	D12	D11	D10	D9	D8	D7
Byte 4:	0	D20	D19	D18	D17	D16	D15	D14
Byte 5:	0	D27	D26	D25	D24	D23	D22	D21
Byte 6:	0	0	0	0	D31	D30	D29	D28
Byte 7:	0	X	X	X	X	X	X	X

Byte 8:

0	T6	T5	T4	T3	T2	T1	T0
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Byte 9:

0	T13	T12	T11	T10	T9	T8	T7
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Byte 10:

0	X	X	X	X	X	X	X
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