BEWIS

AgileLight-100C Series

Digital Closed Loop Three Axis Fibre Optic Gyroscope

Technical Manual

AgileLight-100C

Digital Closed Loop Three Axis Fibre Optic Gyroscope

Introduction

As an interference type digital closed-loop Three-axis fiber optic gyroscope, AgileLight-100C has the advantages of low cost, large working bandwidth, high resolution, small zero drift, high linearity, short starting time, impact resistance and vibration resistance, it is an alternative to traditional mechanical gyros.

AgileLight-100C fiber optic gyroscope adopts IntelliProcess technology, which not only greatly eliminates the influence of temperature change on gyroscope performance, but also improves the key indicators of fiber optic gyroscope such as zero bias stability, angular random walk, scale factor linearity and stability.With low bias stability and angular random walk and strong vibration resistance , it is suitable for a variety of industrial applications. The high performance, rugged adaptability, compact construction and competitive price of the AgileLight-100C make it the recommended choice for motion sensing, platform stabilization, navigation and precision targeting.

Features

- All fiber optic technology: Long life, small size, high stability, anti-interference angle sensor.
- IntelliProcess Technology: Built-in high-performance digital signal processing chip for full digital operation and adaptive filtering technology makes the gyro's zero drift and angular velocity random walk 50%-75% lower than similar products.
- Integrated fiber polarization technology: reduces insertion loss, increases extinction ratio, and provides better resistance to temperature, mechanical shock and vibration for optical paths
- Compact and highly stable package: adapt to a variety of harsh environments. Widely applicable to all kinds of civil and military occasions
- QuickLaunch technology：Realize instant start-up ,No external calibration required
- Optimal operating wavelength: sensitivity is increased by nearly 50% with the same structure, size and cost.
- Noise isolation and compression techniques: significantly reduce the angular velocity random walk
- SelfTrack technology：increase the dynamic range of the gyroscope

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Applications

- Motion attitude control
- Servo tracking
- Damping of high speed train swing
- Antenna/Radar/optical platform stabilization
- Monitoring structural deformation
- Inertial north seeking
- Automatic goods trolley
- Robot balance
- Guidance and navigation
- Locking of the aiming system
- Oil drilling
- Miniature IMU, INS

Details

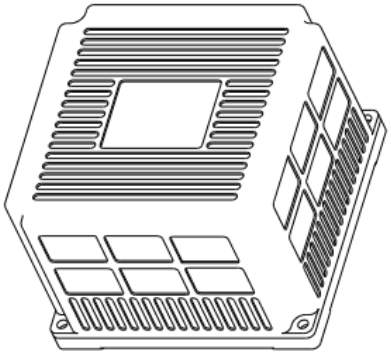
Performance Objective

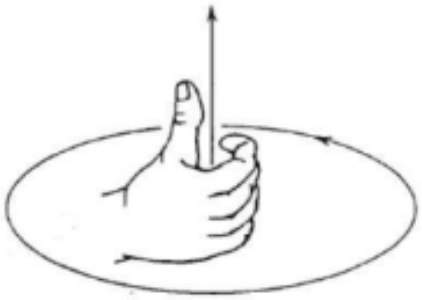
Technical Parameter	Axis	three axis
	Measuring range (°/s)	-450~450
	Bias stability (°/h) , 1σ	≤1
	Bias repeatability (°/h) , 1σ	≤1
	Random walk coefficient (°/ √hr)	≤0.1
	Scale factor nonlinearity (ppm)	≤300
	Scale factor asymmetry (ppm)	≤300
	Scale factor repeatability (ppm) ,1σ	≤300
Physical	Frequency bandwidth (Hz)	≥100
	Start-up time (s)	≤1
	Power Supply (V)	-5~+5
	Power consumption (W)	≤5
	Size(mm)	L108×W108×H76
	Weight (g)	≤400
	Output mode	RS 422
	Working temperature (℃)	-40~+65
	Storage temperature (℃)	-45~+85
	Connector	J30J-9TJL

Mechanical Characteristic

• Gyroscope polar >

The polarity of X, Y, and Z gyros is defined by the right-hand helix rule, and the three axes are orthogonal. The thumb represents the direction of the sensitive axis, and the other fingers represent the direction of the angular velocity.





• Working power supply >

±5V for power supply, power accuracy is ±5% , Power ripple is ≤20mV.+5V power supply is 15W , as well as the -5V is 15W. Steady state power consumption in normal temperature is≤ 12W, while in full temperature the steady state power consumption is ≤ 15W.

• Definition of output interfaces >

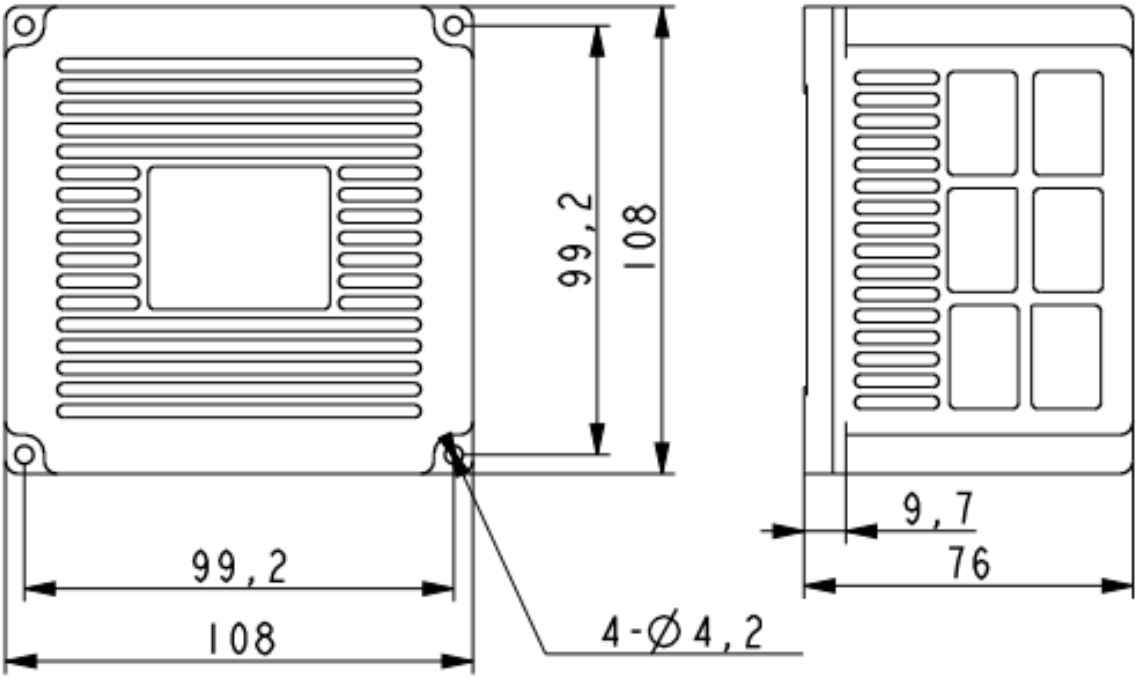
The gyroscope use J30J-9TJL connector, the length is 160mm±20mm long, the definitions of the nodes are seen in Table 1.

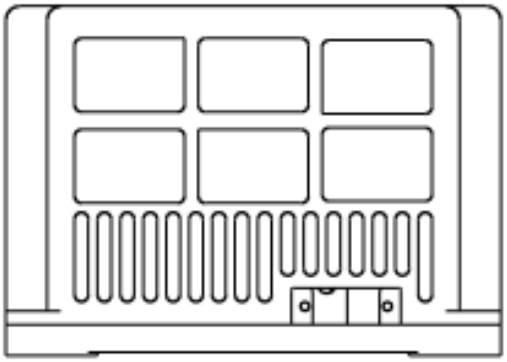
Node number	Definition	Remark
1	+5V	+5V power input
2	-5V	-5V power input
3	±5VGND	GND
4	T1+	X gyroscope output signal+
5	T1-	X gyroscope output signal -
6	T2+	Y gyroscope output signal+
7	T2-	Y gyroscope output signal -
8	T3+	Z gyroscope output signal+
9	T3-	Z gyroscope output signal -

Table 1: definition of J30J-9TJL

Package size

Product Size：L108×W108×H76 （mm)





Protocol

RS-422 digital serial port, use electrical interface standard of asynchronous serial standard duplex RS-422.

- Baud rate: 115.200kbps ;
- Communication frame format , each frame contains 11 bits, the order is:

1 bit for stat bit

8 bits for data bit(send low bit first before the high bit)

1 bit for parity check

1 bit for stop bit

- Communication rule

The gyroscope uses broadcast communication, the data update for 2ms, the data frame formats are shown in Table 2.

Bits	Definition	Bit 7	6	5	4	3	2	1	Bit 0
1	Header	1	0	0	0	0	0	0	0
2	High 8 bits	0	D27	D26	D25	D24	D23	D22	D21
3	Middle 8 bits	0	D20	D19	D18	D17	D16	D15	D14
4	Middle 8 bits	0	D13	D12	D11	D10	D9	D8	D7
5	Low 8 bits	0	D6	D5	D4	D3	D2	D1	D0
6	Frame check	2 to 5 bytes bit by bit XOR							
7	Temp	0	T13	T12	T11	T10	T9	T8	T7
8	Temp	0	T6	T5	T4	T3	T2	T1	T0

Table 2: Frame format of output data

Circumstance

- Working temperature: -40℃ ~ +60℃;
- Random vibration:

  20 ~ 80Hz : 3dB/oct;

  80 ~ 350Hz : 0.04g²/Hz;

  350 ~ 2000Hz : -3dB/oct;

  Vibration time: 3min;

  Vibration direction: two directions of the three orthogonal axises.
- Impact

  Impact waveform: half-sin wave;

  Peak acceleration: 30g; Pulse duration: 6—8ms;

  Impact diretion: two directions of the three orthogonal axises;

  Impact times: two times in each direction.

Executive standard

- Enterprise Quality System Standard: ISO9001:2008 Standard (Certificate No.:10114Q16846ROS)
- CE certification (certificate number: 3854210814)
- ROHS (certificate number: SO81426003)
- GJB 2426A-2004 Fiber Optic Gyro Test Method
- GBT 18459-2001 sensor main static performance index calculation method
- JF 1059-1999 Evaluation and Expression of Measurement Uncertainty
- GBT 14412-2005 mechanical vibration and shock mechanical installation of accelerometer
- General requirements for GJB 450A-2004 equipment reliability
- Quality control of key parts and important parts of GJB 909A
- GJB 899 Reliability Qualification and Acceptance Test
- GJB 150-3A high temperature test
- GJB 150-4A low temperature test
- GJB 150-8A rain test
- GJB 150-12A dust test
- GJB 150-16A vibration test
- GJB 150-18A impact test
- GJB 150-23A Tilt and Swing Test
- GB/T 17626-3A RF electromagnetic radiation immunity test
- GB/T 17626-5A surge (hit) impulse immunity test
- GB/T 17626-8A power frequency magnetic field immunity test
- GB/T 17626-11A voltage dips, short interruptions and voltage changes immunity

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