



AgileLight-420B Series

**Digital Closed Loop Dual Axis Fibre
Optic Gyroscope**

Technical Manual



Introduction

As an interference type digital closed-loop dual-axis fiber optic gyroscope, AgileLight-420B 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-420B 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-420B 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

Applications

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

Specifications

Performance Specifications

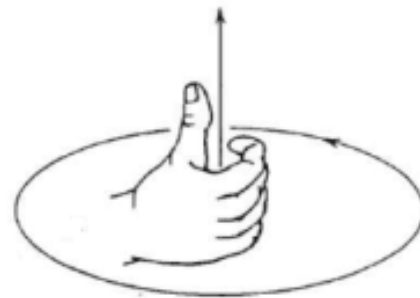
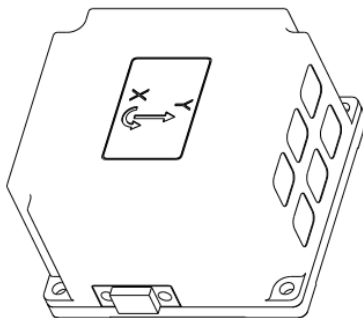
| Technical Parameter | Axis | dual axis |
|---------------------|--------------------------------------|--------------------------------------|
| | Measuring range (°/s) | -1000~+1000 |
| | Bias stability (°/h) , 1σ | ≤0.5 |
| | Bias repeatability (°/h) , 1σ | ≤0.5 |
| | Random walk coefficient (°/√hr) | ≤0.05 |
| | Scale factor nonlinearity (ppm) | ≤70 |
| | Scale factor asymmetry (ppm) | ≤70 |
| | Scale factor repeatability (ppm) ,1σ | ≤70 |
| | Data refresh rate (Hz) | 200~2000 |
| | Baud rate (bps) | 115200~921600 |
| Physical | Frequency bandwidth (Hz) | > 200 |
| | Start-up time (s) | ≤1 |
| | Power Supply (V) | -5~+5 |
| | Power consumption (W) | ≤15 |
| | Size (mm) | L112×W112×H77.5 |
| | Weight (g) | ≤700 |
| | Output method | broadcast(default)/triggered(custom) |
| | Output mode | RS 422 |
| | Vibration (Hz, g2/Hz) | 20 ~ 2000,0.06 |
| | Shock (g, ms) | 30,11 |
| | Working temperature (°C) | -40~+65 |
| | Storage temperature (°C) | -45~+85 |
| | Connector | J30J-15TJL |



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.



• Definition of output interfaces:

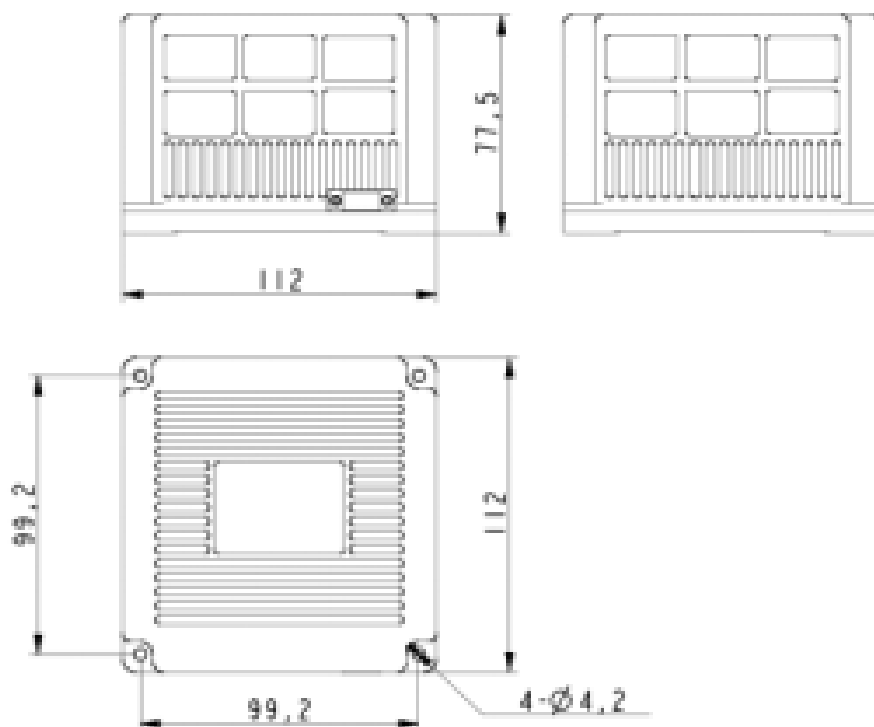
The definitions of the nodes are seen in Table 1.

| Node number | Definition | Node number | Definition |
|-------------|------------|-------------|----------------|
| 1 | +5V | 6 | $\pm 5V_{GND}$ |
| 2 | +5V | 7 | $\pm 5V_{GND}$ |
| 3 | -5V | 8 | T1+ |
| 4 | -5V | 9 | T1- |
| 5 | T2+ | 10 | T2- |

Table 1 J30J-15TJL Definition

Package size

Product Size: L112×W112×H77.5 (mm)



Note: Unfilled dimensional tolerances are performed in accordance with GB/T1804-2000 Class C.

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

Circumstance

- Working temperature: -40°C ~ +60°C;

- 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 axes.

- Impact

Impact waveform: half-sin wave;

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

Impact diretion: two directions of the three orthogonal axes;

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
- GB/T 2423.22-2012 Environmental testing Part 2:test method Test N:temperature change (IEC 60068-2-14:2009,IDT)
- GB/T 10125-2012Artificial atmosphere corrosion test Salt spray test (ISO 9227:2006,IDT)

AgileLight-420B

Digital Closed Loop Dual
Axis Fibre Optic Gyroscope

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