

SSI-MU90

Fiber optic inertial measurement unit



PRODUCTS FEATURES

- Output: RS-422
- Supply voltage: $\pm 5V$ & $\pm 15V$
- Operating temperature: $-45 \sim +65^{\circ}C$
- Product size: L90 X W90 X H90mm
- Weight: $980 \pm 20g$

The SSI-MU90 series of fiber optic inertial measurement units consists of three fully solid-state closed-loop fiber optic gyroscopes, three highly stable quartz accelerometers and a data packing board. It is used to measure the angular velocity and linear acceleration of the carrier motion to provide information for the attitude and navigation control of the carrier, and the measurement results are output through the digital RS422 serial port. The hermetic design, strict process, and various compensations such as nonlinearity, quadrature, and temperature ensure that the fiber optic IMU can accurately provide the angular and linear motion parameters of the carrier under harsh environment, and is widely used in aviation, antenna stabilization platform, navigation and control of vehicles, dynamic measurement of ship attitude, mining, navigation control of small missiles and guided bombs, attitude measurement and control, etc. systems, etc.

1. Product performance indicators

Table 1. Inertial device accuracy indicators..

Fiber optic gyroscopes			
Parameter	MU90A	MU90B	MU90C
Zero bias stability (°/ h)	≤0.1	≤0.2	≤0.3
Zero bias repeatability (°/ h)	≤0.1	≤0.2	≤0.3
Scale factor nonlinearity (ppm)	≤20	≤30	≤50
Repeatability of scale factors (ppm)	≤50	≤30	≤50
Full temperature scale factor repeatability (ppm)	≤1000		
Magnetic field sensitivity (°/ h/Gs)	≤0.10		
Threshold (°/ h)	≤0.3		
Angular rate range (°/ s)	±500		
Bandwidth (Hz)	200		
Size (mm)	90*90*90		
Weight (g)	980±20		
Operating temperature (°C)	-45~+65		
Quartz accelerometer parameters			
Measurement range (g)	≥±30		
Scale factor temperature coefficient (ppm/ °C)	≤100		
Monthly stability of scale factor (ppm)	≤100		
Offset (mg)	≤±7		
Bias temperature coefficient (µg/°C)	≤100		
Stability of bias month (µg)	≤100		
Second-order nonlinear coefficients (µg/g ²)	≤100		
Installation angle (")	≤200		

2. Mechanical dimensions and pin definition

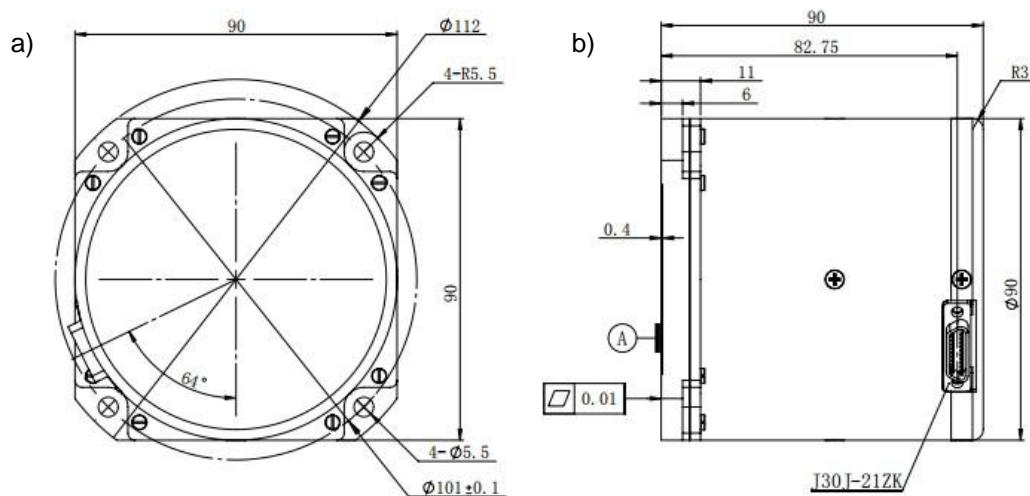


Figure 2.1. Mechanical dimensions 90x90x90 a) Top view b) Side view

Table 2. Wiring Definition

J30J-21ZK	Definition	Remarks	
1,12	+5V	Gyro power supply	
2,13	±5V (ground)		
3,14	-5V		
4,15	+15V	Adding meter power	
5,16	±15V (ground)		
6,17	-15V		
7	T1+	Send+	400HZ
8	T1-	Send-	Inertia group output
9	T2+	Send+	4KHZ
10	T2-	Send-	Gyro Output
18	T3+	Send+	4KHZ
19	T3-	Send-	Add meter output

3. Communication

3.1. Baud rate: 460800, no parity bit, 1 stop bit Sending frequency: 400Hz

Table 3. Transmit data protocol.

Bytes	Name	Value	Conversion	Type
0	Frame header bytes 1	0xAA		uchar
1	Frame header bytes 2	0xAA		uchar
2	Data sending count	1~200		uchar
3	Self-test bytes	255		uchar
4~7	X Axis gyro	32bit Low in front of high in back		signed int32
8~11	Y Axis gyro	32bit Low in front of high in back		signed int32
12~15	Z Axis gyro	32bit Low in front of high in back		signed int32
16~19	X Axis plus table	32bit Low in front of high in back		signed int32
20~23	Y Axis plus table	32bit Low in front of high in back		signed int32
24~27	Z Axis plus table	32bit Low in front of high in back		signed int32
28,29	X Axis gyro temperature	16bit Low in front of high in back	1/16	signed int16
30,31	Y Axis gyro temperature	16bit Low in front of high in back	1/16	signed int16
32,33	Z Axis gyro temperature	16bit Low in front of high in back	1/16	signed int16
34,35	X Axis plus table temperature	16bit Low in front of high in back	1/16	signed int16
36,37	Y Axis plus table temperature	16bit Low in front of high in back	1/16	signed int16
38,39	Z Axis plus table temperature	16bit Low in front of high in back	1/16	signed int16
40	Checksum	4~39 Byte XOR		uchar
41	End of frame	0xBB		uchar

3.2. RS422.

Baud rate: 921600bps;

Data output frequency: 4000Hz.

Data format: 1 start bit, 8 data bits, 1 even parity bit, 1 stop bit.

The first byte of frame header is 0x80, the second byte to the fourth byte is X gyro data, the fifth byte to the seventh byte is Y gyro data, the eighth byte to the seventh byte is Y gyro data.gyro data from byte 2 to byte 4, Y gyro data from byte 5 to byte 7, Z gyro data from byte 8 to byte 10; frame checksum in byte 11.

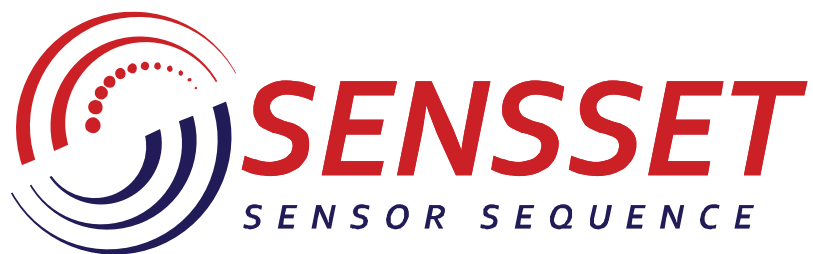
Table 4.

Serial number	Meaning	Data Type	Length	Value
1	Packet header	Unsigned integer	1Bytes	0x80
2~4	X Gyro Data	Unsigned integer	3Bytes	1LSB=4.8e-5Degree/sec,Unit: degree/sec
5~7	Y Gyro Data	Unsigned integer	3Bytes	1LSB=4.8e-5Degree/sec,Unit: degree/sec
8~10	Z Gyro Data	Unsigned integer	3Bytes	1LSB=4.8e-5Degree/sec,Unit: degree/sec
11	Calibration	Unsigned integer	1Bytes	2~10 XOR bytes

Gyro data in 24-bit complementary binary format, with D23 as the sign bit.
 The frame check byte is an XOR of 9 data bytes (2~10 bytes).

Table 5. Data format

Frame header	1	0	0	0	0	0	0	0
xH8	xD23	xD22	xD21	xD20	xD19	xD18	xD17	xD16
xM8	xD15	xD14	xD13	xD12	xD11	xD10	xD9	xD8
xL8	xD7	xD6	xD5	xD4	xD3	xD2	xD1	xD0
yH8	yD23	yD22	yD21	yD20	yD19	yD18	yD17	yD16
yM8	yD15	yD14	yD13	yD12	yD11	yD10	yD9	yD8
yL8	yD7	yD6	yD5	yD4	yD3	yD2	yD1	yD0
zH8	zD23	zD22	zD21	zD20	zD19	zD18	zD17	zD16
zM8	zD15	zD14	zD13	zD12	zD11	zD10	zD9	zD8
zL8	zD7	zD6	zD5	zD4	zD3	zD2	zD1	zD0
Verification	C7	C6	C5	C4	C3	C2	C1	C0



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