HT-INS-Y MEMS gyroscope north-seeking inclinometer

1. Product overview

HT-INS-Y is the smallest high-precision gyroscope inclinometer at present.

The inclinometer uses high-precision MEMS gyroscope to determine the borehole tilt azimuth by measuring the earth 's rotation component north-seeking method.

The ordinary inclinometer uses the magnetic sensitive element to determine the direction of the borehole by measuring the geomagnetic field. The direction of the borehole in the area and well section disturbed by the magnetic field cannot be determined. Therefore, in the environment of abnormal magnetic field, the azimuth measurement needs to use a gyroscope that can sense the angular velocity of the earth 's rotation. The HT-INS-Y gyroscope north-seeking inclinometer uses a high-precision MEMS gyroscope that can be self-seeking north. Compared with other gyroscopes, the remarkable feature of the MEMS gyroscope is its strong anti-shock vibration ability ; small size and light weight ; low power consumption, is the most ideal equipment for drilling measurement.

The HT-INS-Y gyroscope north-seeking inclinometer has a point

measurement mode (north-seeking mode) and a continuous measurement mode. In the continuous measurement mode, it can quickly and continuously measure the inclination and orientation of the borehole, and can describe the borehole trajectory more accurately and intuitively. Reduce the measurement time of the traditional north-seeking mode, minimize the inclination time, and greatly improve the work efficiency.

2. Product characteristics

1) Built-in gyroscope self-seeking north, without ground alignment, measurement is not disturbed by magnetic field

2) Strong anti-shock vibration ability, stable and reliable work

3) with point measurement mode, continuous measurement mode

4) Measurement angle full coverage, high precision

5) Small size, light weight

6) Low power consumption.

3. Technology index

1) Well deviation angle measurement range : 0 ° ～± 90 °, measurement accuracy : ≤ ± 0.15 ° ;

2) Azimuth measurement range : 0 ° ～ 360 °, measurement accuracy : ≤ ± 2.0 ° (well deviation > 1 °) ;

3) Measurement range of gravity high angle : 0 ° ～360 °, measurement accuracy : ≤ ± 0.3 ° ;

4) Gyro high angle measurement range : 0 ° ～ 360 ° , measurement accuracy : ≤ ± 2.0 ° ;

5) Preheating time : ≤ 3min

6) Self-north-seeking time : ≤ 2min ;

7) Data transmission cycle : ≤ 20ms ;

8) Measurable parameters : deviation angle, azimuth angle, high side angle ;

9) Measurement mode : point measurement mode (north-seeking mode), continuous measurement mode ;

10) Accuracy in continuous measurement mode : deviation measurement accuracy ≤ ± 0.15 ° , heading accuracy ≤ 0.3 ° / h ;

11) Continuous measurement mode dynamic range : angular velocity ≤ ± 150 ° / s, acceleration ≤ ± 8g ;

12) Working temperature : -40 ° C～ + 85 ° C, storage temperature : -50 ° C ～ + 90 ° C ;

13) impact : 800g 0.5ms half sine, vibration : 12g rms (20 ~ 2000Hz) ;

14) Power supply range : 9-36V, power consumption : < 1.5W ;

15) Dimension : Φ28.3mm * 200mm, product weight : < 200g ;

4 Data format

1) Data output protocol

RS232 interface (optional RS422)：Baud=115.2K, no parity, data=8 bits, stop=1;			
Byte offset	Name	description	Size[bit]

0	Frame header	0xC0C0	16
2	Status word	uint8	8
3	X-axis angular velocity	float (deg/s)	32
7	Y-axis angular velocity	float (deg/s)	32
11	Z-axis angular velocity	float (deg/s)	32
15	Angle	float (deg)	32
19	Azimuth angle	float (deg)	32
23	High side angle of gyro	float (deg)	32
27	X-axis angular velocity integral	float (deg)	32
31	Y-axis angular velocity integral	float (deg)	32
35	Z-axis angular velocity integral	float (deg)	32
39	X-axis adder	float (g)	32
43	Y axis addition	float (g)	32
47	Z-axis adder	float (g)	32
51	Gravity high angle	float (deg)	32
55	Checksum	2-54 字节求和	16

2) State word interpretation

status word	0x00	Starting the inclinometer
	0x01	Start normal, can be north-seeking mode
	0x02	Looking North
	0x03	The north-seeking is completed and enters the continuous measurement mode.
	0x04	Calibration position 1 acquisition
	0x05	Calibration position 1 acquisition is completed
	0x06	Calibration position 2 acquisition
	0x11	Start abnormal
	0x21/0x22/0x23	X-axis gyro overload / Y-axis gyro overload / Z-axis gyro overload
	0x24/0x25/0x26	X axis plus overload / Y axis plus overload / Z axis plus overload

3) North-seeking command input frame format (a total of 4 bytes)

Byte serial number	Command meaning	Effective bit	remark
0	North Finding	8	Hexadecimal number 24

Byte serial number	Command meaning	Effective bit	remark
1	Command	8	Hexadecimal number 4E
2		8	Hexadecimal number 46
3		8	Hexadecimal number 2A

4) Zero calibration command

Byte serial number	Command meaning	Effective bit	remark
0	Position 1 Acquisition command	8	Hexadecimal number EB
1		8	Hexadecimal number 90
2		8	Hexadecimal number AA
3		8	Hexadecimal number 50
0	Position 2 Acquisition command	8	Hexadecimal number EB
1		8	Hexadecimal number 90
2		8	Hexadecimal number AA
3		8	Hexadecimal number 51

5) Latitude inputg

a.Latitude input enable : EB 90 01 01

b. Latitude input :

Latitude input agreement		
0	0xEB	Frame header
1	0x90	
2	0x02	Mark
3-6	Reservation	
7-10	Reservation	
11-14	Reservation	
15-18	Latitude	float
19	Check	2-18 bytes cumulative sum

5. System working steps

1) Preheating and self-checking

According to the definition of wiring, the system is powered. After the system preheating is completed, the self-test is completed within about 10 s. The state word of the self-test process is 0x00, and the self-test is

completed into the north-seeking state. At this time, the state word is 0x01 ;

2) North-seeking mode (initial alignment)

The system will automatically enter the north-seeking state after self-checking. During the north-seeking process, the carrier needs to be kept static. At this time, the state word is 0x02. After the north-seeking state continues for 2 minutes, the north-seeking is completed (equivalent to completing a point test).

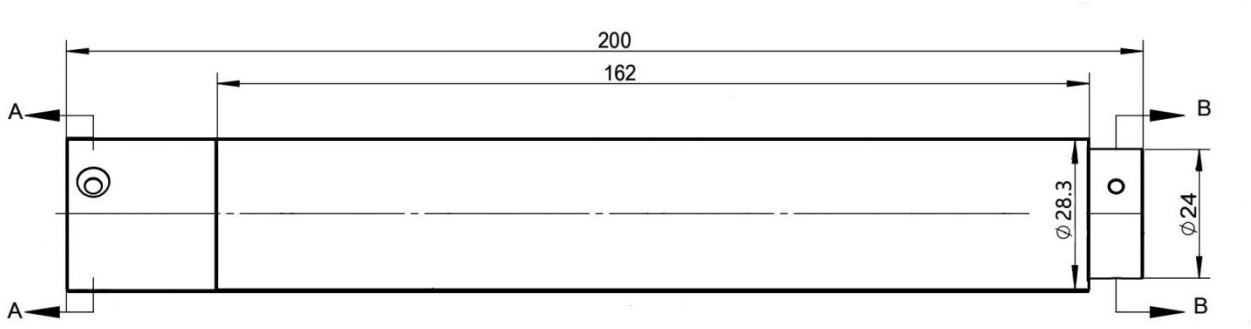
3) Continuous measurement mode

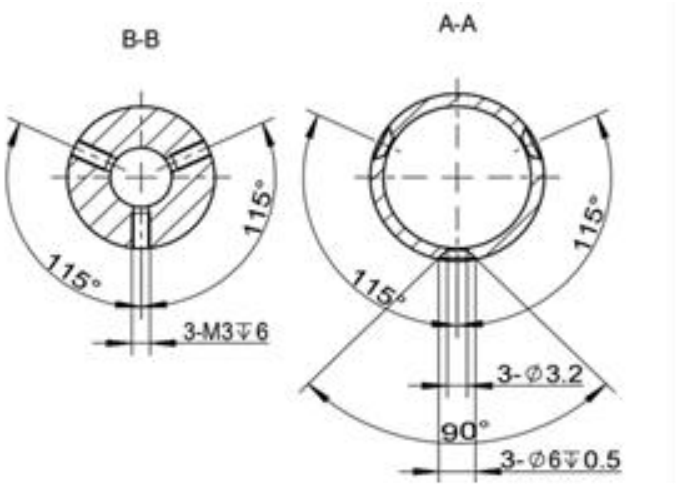
After the north-seeking is completed, the system is transferred from the north-seeking state to the continuous measurement mode. At this time, the state word is 0x03. In the continuous measurement mode, the system can receive north-seeking, zeroing, calibration and other commands. The state of the system can be judged by the state word output by the system.

4) Shut down

In any case, the system can be shut down, and only the system power supply can be turned off.

6 Product Size Chart


200
162
A
A
B
B
∅28.3
∅24


B-B
A-A
115°
115°
3-M3↧6
115°
115°
3-∅3.2
90°
3-∅6↧0.5