WT901C485/WT61C485
Digital Attitude Sensor
SPECIFICATION

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Model ：WT901C485 WT61C485

Description ：Inclinometer(Modbus Version)

Production Standard

Enterprise quality system standard: ISO9001:2016

Sensor production standard：GB/T191SJ 20873-2016

Criterion of detection：GB/T191SJ 20873-2016

Revision date：2017.10.19

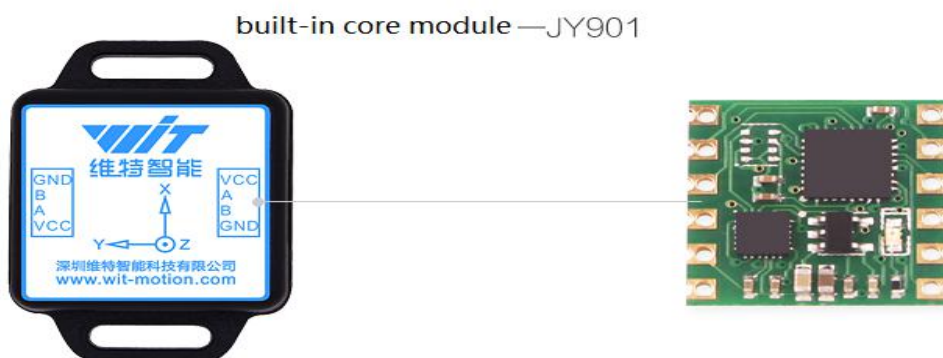| Version	Update content	Author	Date
V1.0	Release	Kelsey	20171019

Catalog

1 Product highlights

✧ Support for 128 device cascades
✧ Using MODBUS protocol
✧ 485 level, transmission distance up to 50m

1.1 Description

The module has its own voltage stabilization circuit , working voltage is 3.3V ~ 5V, pin level is RS485 level, using MODBUS protocol. The WT901C485 built-in module is JY-901.Please refer to JY-901 for a description of the JY901 product:

https://wiki.wit-motion.com/english/lib/exe/fetch.php?media=module:wt901:docs:jy901usermanualv4.pdf

built-in core module —JY901

2 Features

1) Voltage:3.3V~5V
2) Consumption current: <40mA
3) Volume:51.3mm X 36mm X 15mm
4) Measuring dimensions: Acceleration: X Y Z, Angular velocity: X Y Z,
                          Attitude angle: X Y Z   Magnetic: 3D,
5) Range :
Acceleration: ±16g,
Angular velocity:±2000°/s,
Attitude angle:
X,Z(-180°,180) °   Y(-90°,90) °
6) Resolution :Acceleration :6.1e-5g，Angular velocity:7.6e-3°/s
7) Stability: Acceleration：0.01g，Angular velocity: 0.05°/s
8) Precision: Angle X,Y 0.05°

9) Date : time、acceleration、angular velocity、attitude angle、magnetic 、port status

10) Date output frequency:0.1Hz~200Hz(default 10Hz)

11) Baud rate : 9600（default）

3 Axial Direction

As shown in the figure above, the coordinates of the module are indicated, and the upper is the X axis, the left is Y axis, the Z axis is perpendicular to the outside of the surface . The direction of rotation is defined by the right hand rule, that is, the thumb of the right hand is pointed to the axial direction, the bending direction of four fingers is the direction of rotation around the axis

4 Hardware Connection

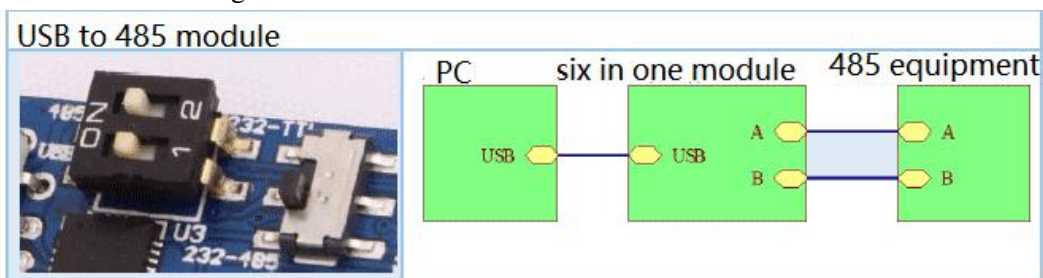## 4.1 Serial Connection

4.1.1 Connect to a computer

When connected to the computer, you need a USB-485 level module. Recommend the following USB-485 module.

https://www.aliexpress.com/store/product/Free-shipping-usb-converter-cp2102-usb-ttl-485-232-3-3v-and-5v-output-Six-multifunctional/2029054_32607767675.html

The method of connecting the USB serial module with WT901C485 module are: The dial code switch 1 of the USB serial port and the dial code switch 2 to ON, switch S1 dial down (above figure near 232-484 screen prints). A connects A , B connects B, GND connects GND,+5V/3V3 connects VCC.

Dial code switch diagram:

PC - serial port - module connection diagram:
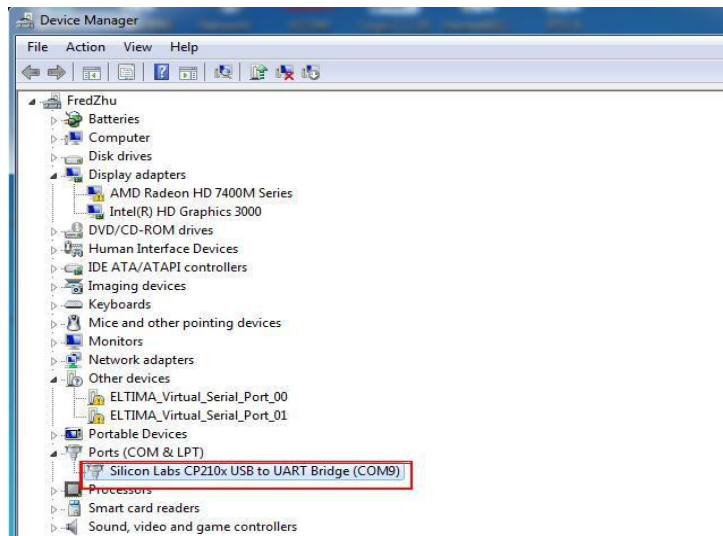

5 Software Methods

5.1 Basic operation

First, the module is connected via serial module to the computer, After installing the drive of the serial module, device manager can query corresponding serial number, as shown in

the figure:

Open the software, first select the module model, model selection JY901M(six axis module select JY61PM)

1、 click the serial port selection, open the serial port.

2、 click the baud rate menu and select the baud rate of the module, which is set to 9600 by default.

3、 click the Search button to find the device.

Select the searched device 0x50, click on the icon to display the waveform, click on the data to display the data.
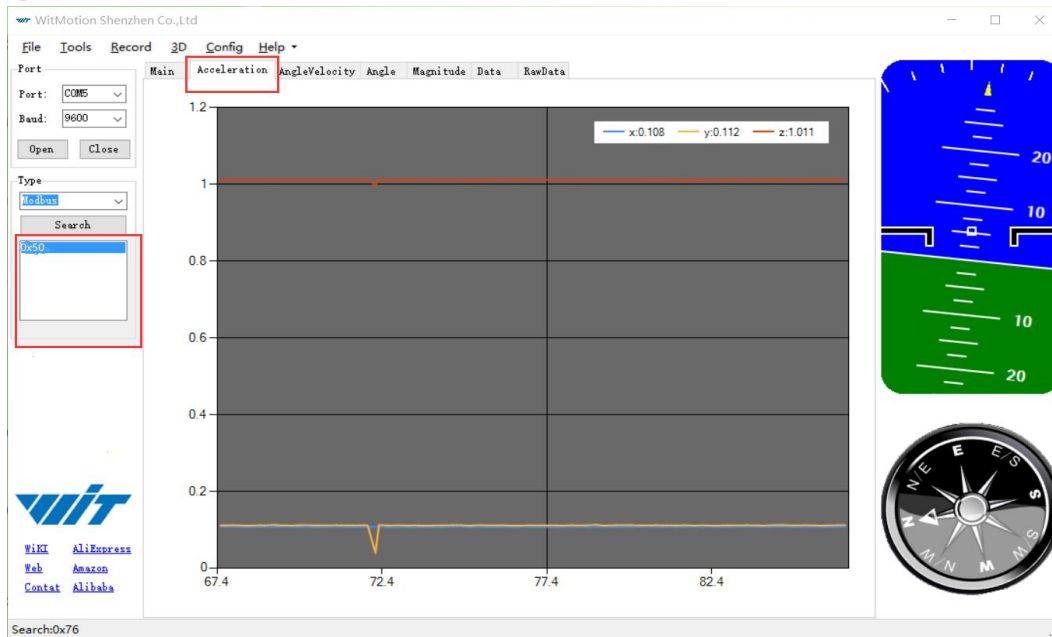
5.2 Set MODBUS address

The default address is 0x50 and can be changed via software. Enter the new hexadecimal modbus address in the modbus address text box on the Configuration tab, then click the Change button.
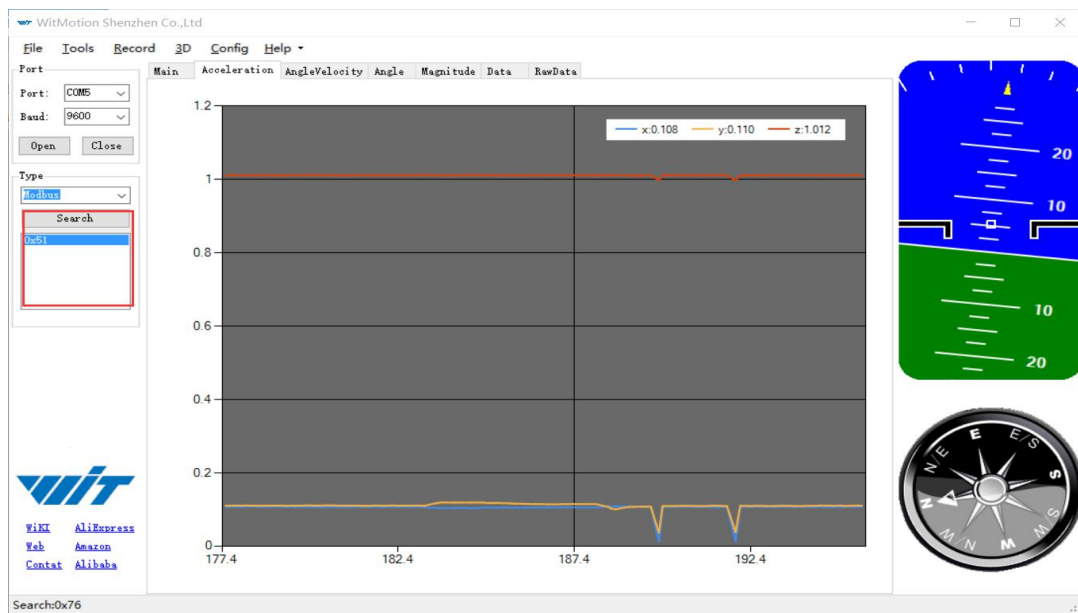
Note: After the change, the modbus address will be not changed immediately and the device address will need to be searched again to take effect.
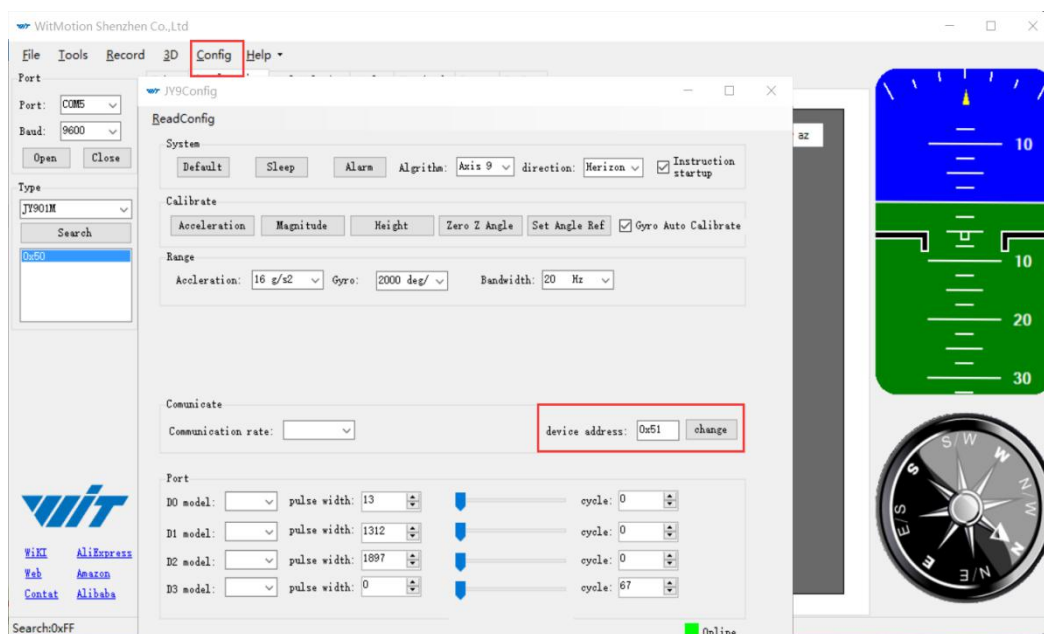
5.3 Multiple module cascades

Support multiple to module cascades, the PC software will shows all the device.
Tip: Before cascading, you first need to change the module's MODBUS address to a different address. Refer to 5.1 and 5.2.
Change address can only be a single connection, then change the address

5.3.1 Hardware Connection diagram
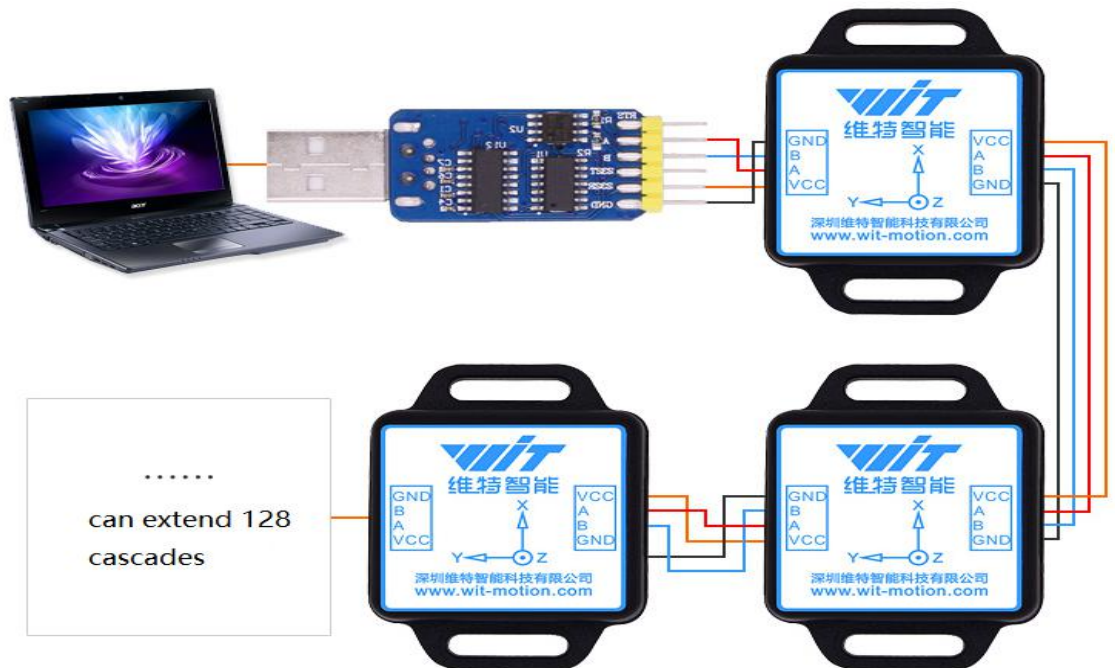
Note: when multiple cascades, check carefully for correct wiring between modules (VCC-VCC A-A   B-B   GND-GND).

5.3.2 Software operation

Open PC software, select the model, serial port, baud rate (9600) and click search button to find the device. You can search for the cascade device address.

Select the device address to search, you can see the data situation of different modules.

Note: If connect to many modules, the module can be find when change the status of the module

6 MODBUS Communication Protocol

Level: RS485 level (non RS232 level, if the module is wrong to the RS232 level may cause damage to the module)

Baud rate: 2400, 4800, 9600 (default), 19200 38400, 57600, 115200, 230400, 460800, 921600, stop bit and parity bit 0

WT901C485 module can be accessed entirely through 485, the default address is 0x50, can be changed by serial port instruction or MODBUS write address. Multiple WT901C485 modules can be connected on the 485 bus, but the MODBUS address of the module should be modified to different address first.

1、MUDBUS write format

Device address	0x06	Reg H	Reg L	Data H	Data L	CRCH	CRCL
0x50（default）	Write	Register high	Register low	Date high	Date low	CRC check high(0x00)	CRC check low (0x00)

Note: device address(MODBUS address) can be changed according to 5.2, default is 0x50,it can be changed according to their own needs, device address range:0x00-0xFF.

According to this date format, the baud rate, return rate and other data can be changed.

1）Set return rate

    Data H:0x00

    Data L:

        0x01：0.1Hz

        0x02：0.5Hz

        0x03：1Hz

        0x04：2Hz

        0x05：5Hz

        0x06：10Hz（default）

        0x07：20Hz

        0x08：50Hz

        0x09：100Hz

        0x0a：200Hz

        0x0c：single

        0x0d: Not output

Example：0x50 0x06 0x00 0x03 0x00 0x08 0x00 0x00 set the return rate to 50HZ

       0x50 0x06 0x00 0x03 0x00 0x05 0x00 0x00 set the return rate to 5HZ

2) Set baud rate

 Data H:0x00

Data L

0x00：2400

0x01：4800

0x02：9600（default）

0x03：19200

0x04：38400

0x05：57600

0x06：115200

0x07：230400

0x08：460800

0x09：921600

Example：

0x50 0x06 0x00 0x04 0x00 0x02 0x00 0x00　set the baud rate to 9600；

0x50 0x06 0x00 0x04 0x00 0x01 0x00 0x00　set the baud rate to 4800；

To change other data format, please refer to the modbus write format, dataL data content consistent with WT901C485 communication protocol settings.

2　MUDBUS read format:

Device address	0x03	Reg H	Reg L	regNumH	regNumL	CRCH	CRCL
0x50 （default）	Read	Reg H(First Reg)	Reg L(First Reg)	Register number high	Register number low	0x00	0x00

Example:

Read X Y Z angle

0x50 0x03 0x00 0x3d 0x00 0x03 0x00 0x00

Slave feedback data format

0x50	0x03	0xN	Data H	Data L	...	CRCH	CRCL
Device address	Read function	Register Number= (0-0xFF)	Fist date high position	First date low position	...N date	CRC check high position	CRC check low position

Example：

Read X Y Z angle:180° 90° 30°

0x50 0x03 0x03 0x80 0x00 0x40 0x00 0x15 0x55 0x00 0x00

3 The data in each address of the module is 16 bits of data, 2 bytes. The address and meaning of the register are as follows

Address	Symbol	Meaning
0x00	SAVE	Save
0x01	CALSW	Calibration
0x02	RSW	Return data content
0x03	RATE	Return data Speed

0x04	BAUD	Baud rate
0x05	AXOFFSET	X axis Acceleration bias
0x06	AYOFFSET	Y axis Acceleration bias
0x07	AZOFFSET	Z axis Acceleration bias
0x08	GXOFFSET	X axis angular velocity bias
0x09	GYOFFSET	Y axis angular velocity bias
0x0a	GZOFFSET	Z axis angular velocity bias
0x0b	HXOFFSET	X axis Magnetic bias
0x0c	HYOFFSET	Y axis Magnetic bias
0x0d	HZOFFSET	Z axis Magnetic bias
0x0e	D0MODE	D0 mode
0x0f	D1MODE	D1 mode
0x10	D2MODE	D2 mode
0x11	D3MODE	D3 mode
0x12	D0PWMH	D0PWM High-level width
0x13	D1PWMH	D1PWM High-level width
0x14	D2PWMH	D2PWM High-level width
0x15	D3PWMH	D3PWM High-level width
0x16	D0PWMT	D0PWM Period
0x17	D1PWMT	D1PWM Period
0x18	D2PWMT	D2PWM Period
0x19	D3PWMT	D3PWM Period
0x1a	IICADDR	IIC address
0x1b	LEDOFF	Turn off LED
0x1c	GPSBAUD	GPS baud rate
0x30	YYMM	Year、Month
0x31	DDHH	Day、Hour
0x32	MMSS	Minute、Second
0x33	MS	Millisecond
0x34	AX	X axis Acceleration
0x35	AY	Y axis Acceleration
0x36	AZ	Z axis Acceleration
0x37	GX	X axis angular velocity
0x38	GY	Y axis angular velocity
0x39	GZ	Z axis angular velocity
0x3a	HX	X axis Magnetic
0x3b	HY	Y axis Magnetic
0x3c	HZ	Z axis Magnetic
0x3d	Roll	X axis Angle
0x3e	Pitch	Y axis Angle

0x3f	Yaw	Z axis Angle
0x40	TEMP	Temperature
0x41	D0Status	D0Status
0x42	D1Status	D1Status
0x43	D2Status	D2Status
0x44	D3Status	D3Status
0x45	Pressure L	Pressure Low Byte
0x46	Pressure H	Pressure High Byte
0x47	Height L	Height Low Byte
0x48	Height H	Height High Byte
0x49	Lon L	Longitude Low Byte
0x4a	Lon H	Longitude High Byte
0x4b	Lat L	Latitude Low Byte
0x4c	Lat H	Latitude High Byte
0x4d	GPS Height	GPS Height
0x4e	GPS Yaw	GPS Yaw
0x4f	GPSVL	GPS speed Low byte
0x50	GPSVH	GPS speed High byte
0x51	Q0	Quaternion Q0
0x52	Q1	Quaternion Q1
0x53	Q2	Quaternion Q2
0x54	Q3	Quaternion Q3

8 Application Area

Agricultural machinery
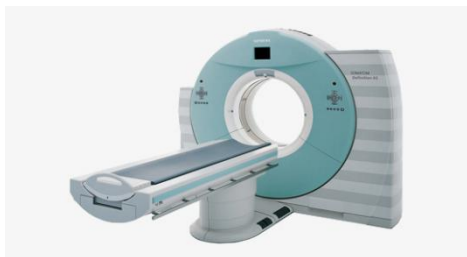
Internet of things

Solar energy

Power monitoring

Medical instruments

Construction machinery

Geological monitoring

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WT901C485/WT61C485 Attitude Angle Sensor

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