

CCF-MWR1 Series Millimeter Wave Radar Sensor Manual

Switch NPN signal output

The sensor model applicable to this manual is CCF-MWR1-NPN



1、 Product Introduction:

- All solid state design, compatible with foreign products of the same specifications;
- Support RS485 interface output;
- Support setting up 3 levels of distance status;
- Support 2-channel switch signal output;
- Support remote setting and debugging of Bluetooth APP;
- Support static target detection that can be turned on or off;
- Support simultaneous output of distance and angle data;
- Support sensitivity and reliability parameter settings, etc;
- Adopting advanced 60G millimeter wave chips, with strong penetration and no fear of dust and smoke;
- Protection level: IP67;
- Industrial grade three proof design, wide voltage, low power consumption;

2、 Electrical parameter description:

- Supply voltage: DC 9-30V;
- Maximum current consumption: 80mA;
- Output interface: RS485 interface;

Communication protocol: Modbus RTU communication protocol;

Output electrical mode: NPN (outputs high level when there is no signal) outputs low level when a valid signal is detected;

Detection distance: 10~450cm;

Detection angle: horizontal 120 °, vertical 120 ° (adjustable);

Response speed: 100ms;

Temperature range for use: -20 °C -+80 °C;

Working humidity: 10% -90% relative humidity;

3、Wiring instructions:

Red: 6-30V

Black: GND

Green: S1 signal output port

Yellow: S2 signal output

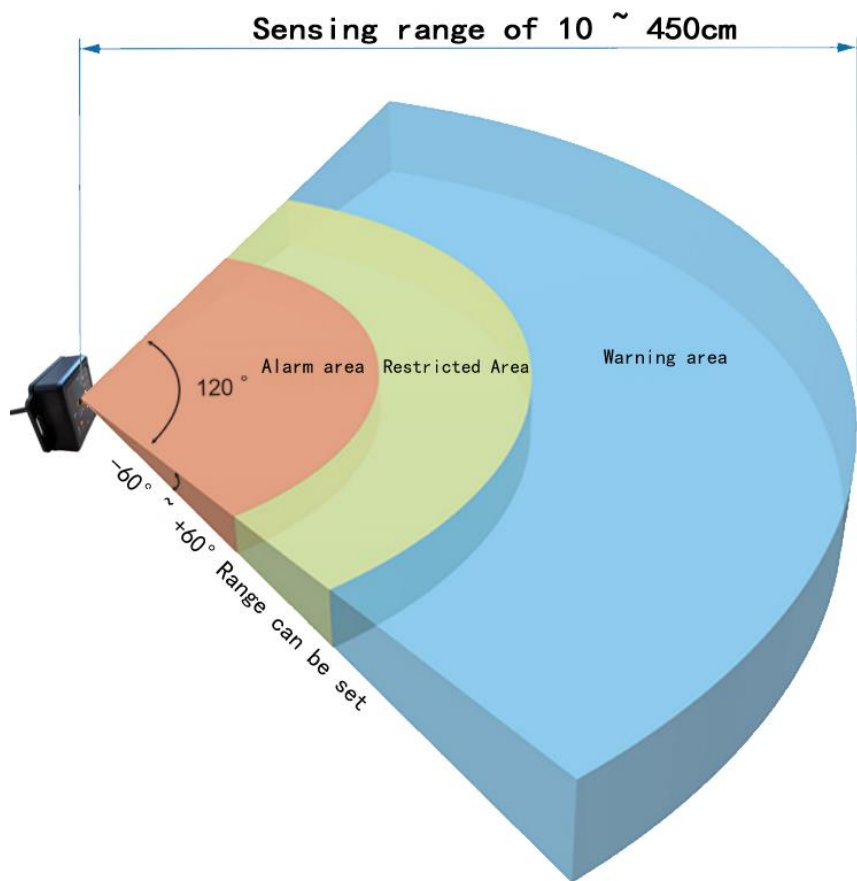
Brown: output high level common terminal com

White: RS485-B (This 485 interface

Blue: RS485-A Use only when reading and setting distances.)



4、Schematic Diagram of Detection Range:



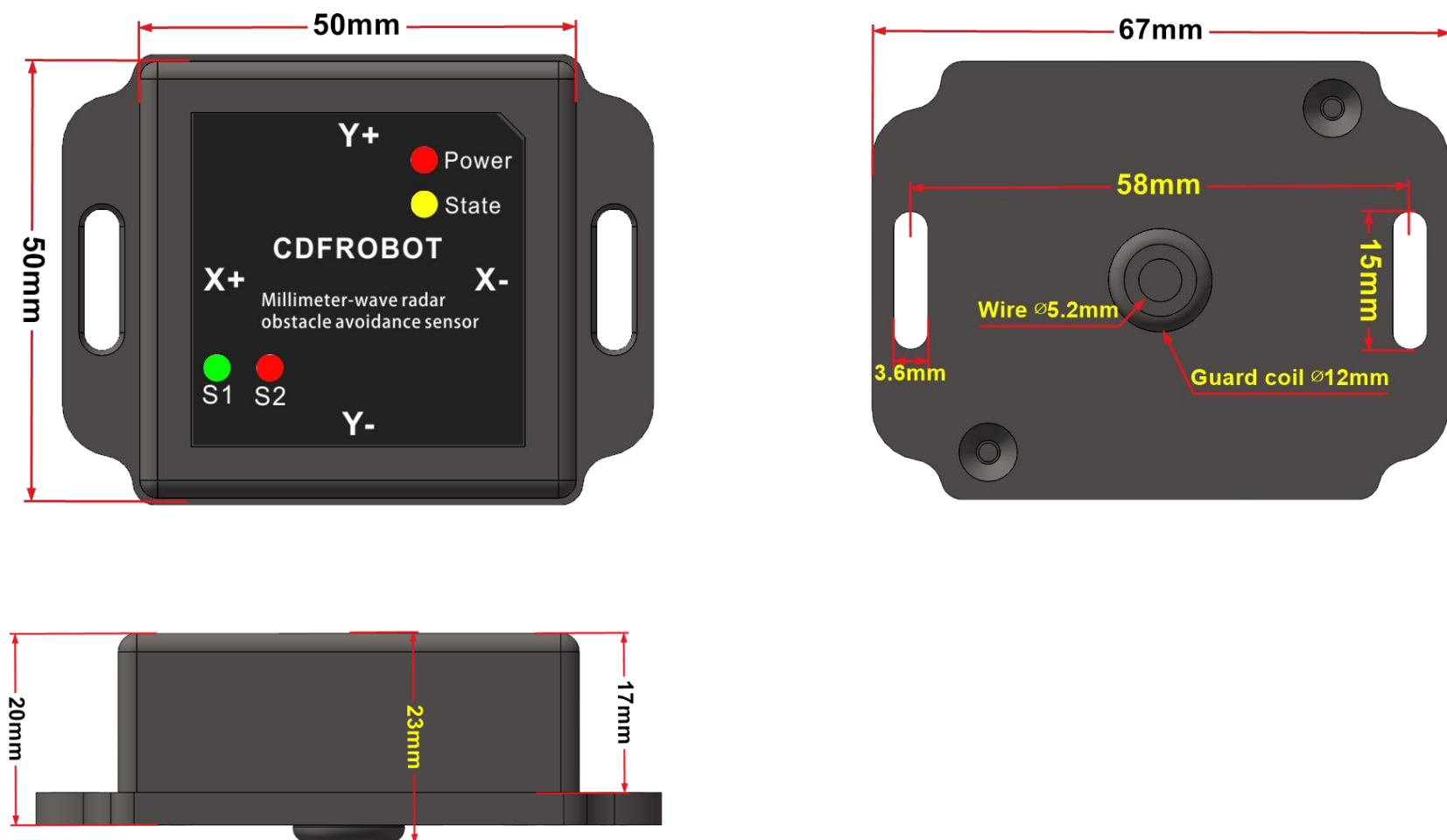
5、Description of working status signals:

Working status	Signal port output (S1 and S2)
1st gear distance < current distance	S1: High level, the same as the COM terminal voltage S2: High level, the same as the COM terminal voltage
1st gear distance ≥ current distance>2nd gear distance	S1: Low level S2: High level, the same as the COM terminal voltage
2nd gear distance ≥ current distance>3rd gear distance	S1: High level, the same as the COM terminal voltage S 2: Low level
3rd gear distance ≥ current distance	S1: Low level S 2: Low level

If the distance values set for the 3rd gear are the same, it will automatically change to 1st gear

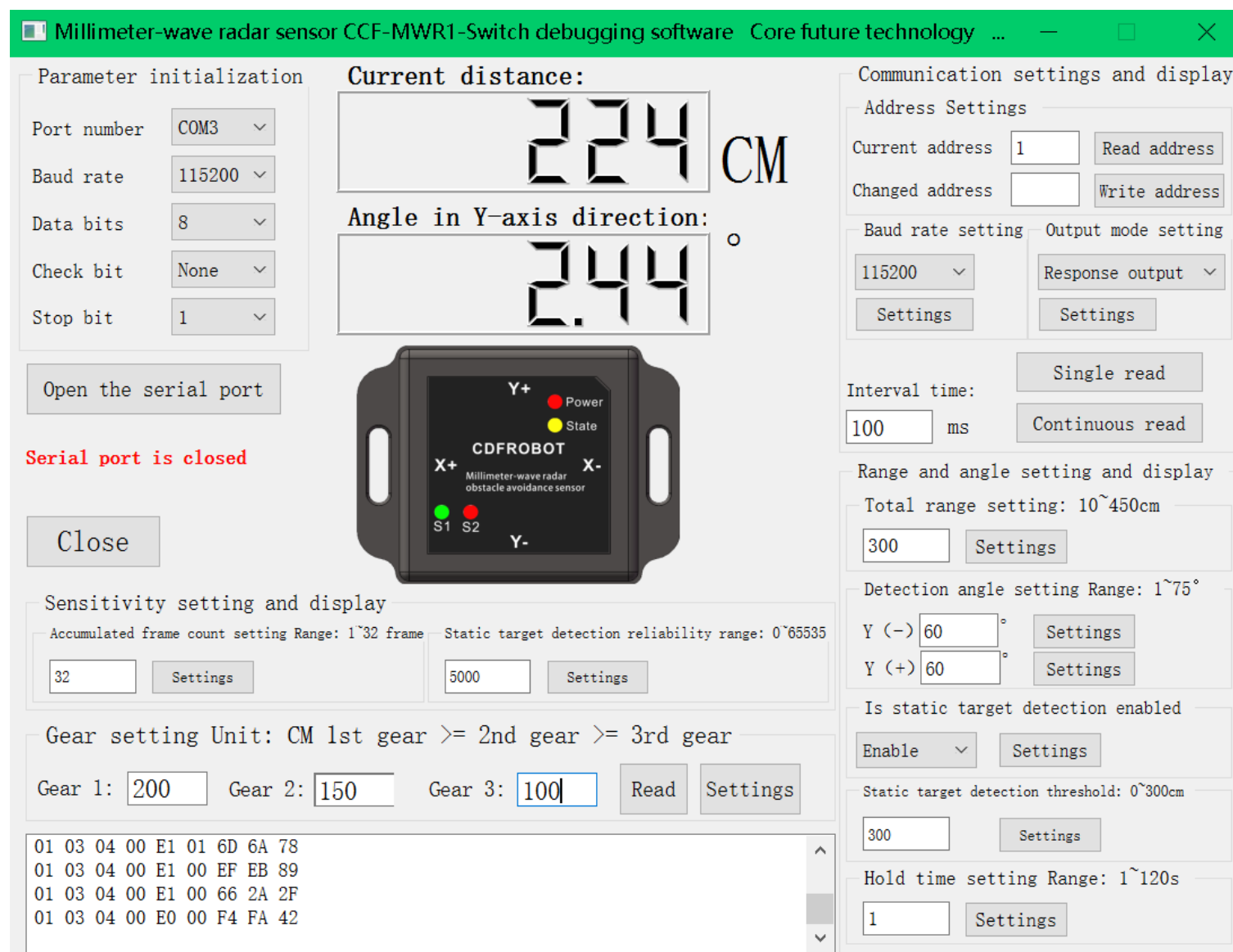
The current distance is less than the set distance, and both S1 and S2 output a low level; When the current distance is greater than the set distance, S1 and S2 simultaneously output a high level;

6、 Size Description:



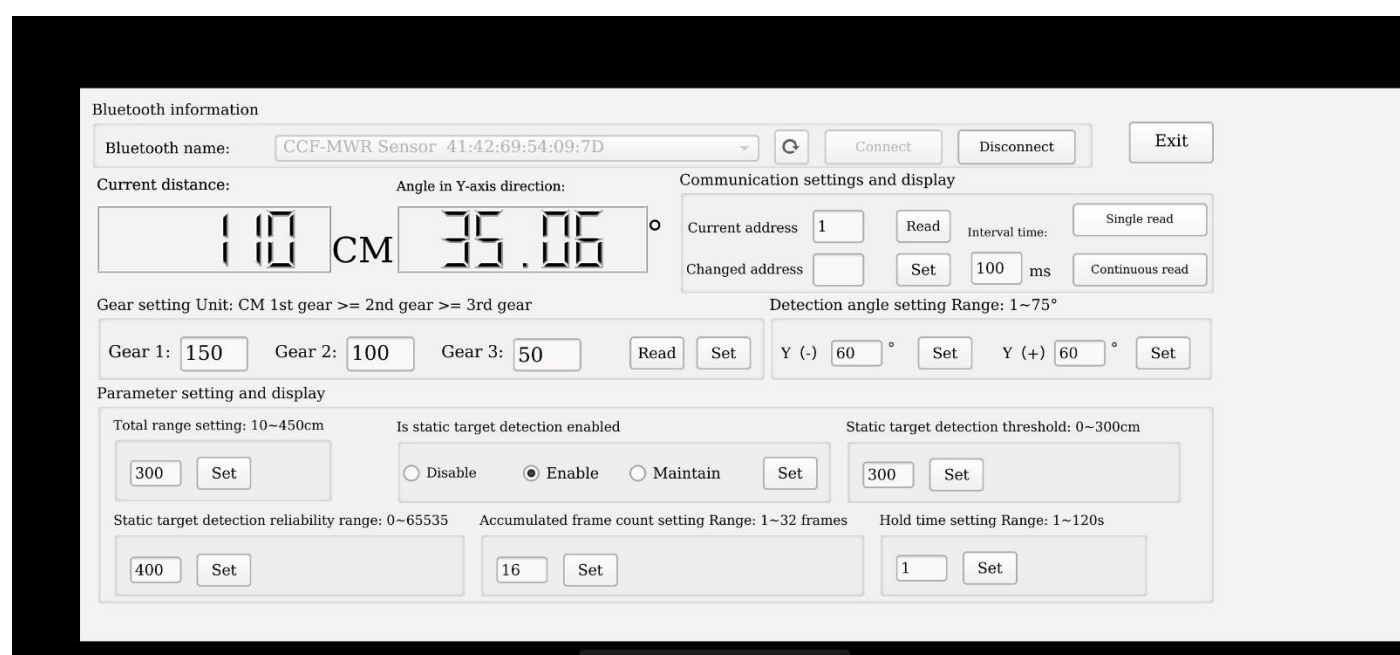
7、 Instructions for using the upper computer setting software:

1. The computer serial port software requires the connection of an RS485 to USB module, and the interface is as follows:



- Parameter initialization: default as shown in the figure;
- Open/Close Serial Port: Select the correct COM port number to open the serial port normally, otherwise an error message will be generated; Before plugging or unplugging the USB serial port cable, the serial port should be turned off first;
- Current address: Click the read address button to display the current address of the sensor (the physical address of the sensor, which serves as the slave address of the slave);
- Current address: Click the read address button to display the current address of the sensor (the physical address of the sensor, which serves as the slave address of the slave);
- Baud rate setting: Select the baud rate to be set, click the setting button to change the baud rate of the sensor;
- Output mode setting: Select the mode to be set, click the setting button to change the output mode of the sensor;
- Single read: Click once to read data and display it;
- Continuous reading: Enter the interval time in the interval time text box, click the continuous reading button, and the data will be read continuously at the current interval time and displayed in real time;
- Total range setting: Enter the distance to be set, click the setting button to change the sensing distance of the sensor;
- Angle detection setting: Only for angles in the Y-axis direction, enter the angle to be set and click the setting button;
- Static object detection settings: Select the corresponding option and click the settings button. If you choose to turn off, static objects will not be recognized. If you choose to turn on, static objects will be recognized. If you choose to hold, the distance and angle of the nearest object detection will be maintained according to the set holding time;
- Static target detection threshold: After setting, only static targets are recognized within this range;
- Hold time setting: This means that the holding time is valid when the static target holding function is enabled;
- Accumulated frame rate setting: The larger the value, the more sensitive the sensing will be, but the response speed will be slower;
- Reliability of static object detection: The smaller the value, the more sensitive the induction, but it is prone to signal interference;
- Gear set: Enter the distance to be set, click the setting button to successfully set it, and click the read button to read the currently set gear distance;
- **Note: After all the above functions are successfully set, the sensor will automatically save the latest settings when powered on again;**

2. The mobile Bluetooth app software currently only supports the Android system. The software interface is as follows:



- Firstly, ensure that the Bluetooth and positioning of the phone are turned on, otherwise the Bluetooth signal will not be searchable;
- Upon completion of the initial installation, it is necessary to agree to obtain location and Bluetooth permissions, otherwise Bluetooth functionality cannot be used;

- The Bluetooth name of this sensor is CCF-MWR Sensor. After searching, it will automatically display and filter out other unrelated names. Different sensors can be distinguished by the MAC address after the name;
- Click the Bluetooth connection button to automatically connect. After successful connection, the corresponding sensor status indicator light will turn into a slow flashing state;
- For the use of other buttons, please refer to the instructions for the serial port software settings in Method 1;

8、Communication format and protocol description:

1. Communication format: (8-bit data bit, 1-bit stop bit, no checksum, default rate 115200)

This product adopts the standard Modbus RTU communication protocol and supports the 03、06、10 function code. The address can be set from 1 to 254 (the factory default address is 1).

2.Host requests sensor data

For example, the host requests the current distance and angle data of the sensor with address 1

Host request: Send data as 01 03 00 00 02 C4 0B (note: corresponding to PLC register 40001 address)								
01	03	00	00	00	02	C4	0B	
Device address	function code	Start register address high byte	Start register address low byte	High number of read registers in bytes	Low number of read registers in bytes	CRCL	CRCH	
Slave response: The returned data is 01 03 04 01 18 0A 17 3D 66								
01	03	04	01	18	0A	17	3D	66
Device address	function code	The number of bytes corresponding to the number of registers	Current distance high byte	Current distance low byte	Current angle high byte	Current angle low byte	CRCL	CRCH

- **Distance calculation formula:** $0x0118=280\text{cm}$;
- **Angle calculation formula:** (1) If the current angle value is less than $0x1770$, it represents a positive angle, which can be directly divided by 100 to obtain the current actual angle, for example: $0x0A17/100.00=2583/100.00=25.83^\circ$; (2) If the current angle value is greater than $0x1770$, it represents a negative angle, calculated as: $(0 - (65536 - \text{angle value}))/100.00$, for example: $(0 - (65536 - 0xF78C))/100.00=-2164/100.00=-21.64^\circ$;

3. Host requests sensor's 3rd gear distance

For example, the host requests distance data for three gears of the sensor with address 1;

Host request: Send data as 01 03 00 0D 00 03 94 08 (note: corresponding to PLC register 40014 address)										
01	03	00	0D	00	03	94	08			
Device address	function code	Starting register address high byte	Starting register address low byte	High number of read registers in bytes	Low byte number of registers read	CRCL	CRCH			
Slave response: The returned data is 01 03 06 00 C8 00 64 00 32 00 AF										
01	03	06	00	C8	00	64	00	32	00	AF
Device address	function code	The number of bytes corresponding to the number of registers	1st gear distance high byte	1st gear distance low byte	2nd gear distance high byte	2nd gear distance low byte	3rd gear distance high byte	3rd gear distance low byte	CRCL	CRCH

4. Set the sensor's 3rd gear distance.

For example, set the three distances of the sensor with device address 1 to 200cm, 100cm, and 50cm respectively;

Host request: Send data as 01 10 00 0D 00 03 06 00 C8 00 64 00 32 56 A0 (note: corresponding to PLC register 40014 address)														
01	10	00	0D	00	03	06	00	C8	00	64	00	32	56	A0
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	High number of registers in bytes	Low number of registers in bytes	byte count	1st gear distance high byte	1st gear distance low byte	2nd gear distance high byte	2nd gear distance low byte	3rd gear distance high byte	3rd gear distance low byte	CRCL	CRCH
Slave response: The returned data is 01 10 00 0D 00 03 11 CB														
01	10	00	0D	00	03	11	CB							
Device address	function code	Pre register address high-order byte		Pre register address low-order byte		Register quantity high byte		Register quantity low byte				CRCL	CRCH	

5.The address range from 1 to 254 can be set (default factory address is 1). Address modification requires re powering on the sensor to take effect. After the address is modified, a new address is required for communication.

For example, changing the sensor address 1 from device address 1 to address 2

Host request: Send data as 01 06 00 02 00 02 A9 CB (address 1 changed to 2) (note: corresponding to PLC register 40003 address)							
01	06	00	02	00	02	A9	CB
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH
Slave response: The returned data is 01 06 00 02 00 02 A9 CB							
01	06	00	02	00	02	A9	CB
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

6. When modifying the baud rate, the current module's baud rate should be used for communication first. After modifying the baud rate, the sensor needs to be powered on again to take effect. At present, it supports a baud rate of 48009600192003840057600115200230400460800, and the default baud rate for the module at the factory is 115200; 4800 corresponds to 0x0001; 9600 corresponds to 0x0002; 19200 corresponds to 0x0003; 38400 corresponds to 0x0004; 57600 corresponds to 0x0005; 115200 corresponds to 0x0006; 230400 corresponds to 0x0007; 460800 corresponds to 0x0008;

For example, change the baud rate of the sensor with device address 1 to 57600 (57600 corresponds to 0x0005)

Host request: Send data as 01 06 00 03 00 05 B9 C9 (note: corresponding to PLC register address 40004)							
01	06	00	03	00	05	B9	C9
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH
Slave response: The returned data is 01 06 00 03 00 05 B9 C9							
01	06	00	03	00	05	B9	C9
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

7.Modify the sensor output mode. Response output corresponds to 0x0001; Continuous output corresponds to 0x0002;

For example, changing the sensor with device address 1 to responsive output mode (responsive output corresponds to 0x0001)

Host request: Send data as 01 06 00 04 00 01 09 CB (note: corresponding to PLC register address 40005)							
01	06	00	04	00	01	09	CB
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH
Slave response: The returned data is 01 06 00 04 00 01 09 CB							
01	06	00	04	00	01	09	CB
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

8.Set up static object detection function. Close the corresponding 0x0003; Enable corresponding 0x000B; Maintain corresponding 0x0007;

For example, set the static object detection of the sensor with device address 1 to enabled;

Host request: Send data as 01 06 00 05 00 0B D8 0C (note: corresponding to PLC register address 40006)							
01	06	00	05	00	0B	D8	0C
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH
Slave response: Return data is 01 06 00 05 00 0B D8 0C							
01	06	00	05	00	0B	D8	0C
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

9.Set the static object detection distance.

For example, set the static target detection distance of the sensor with device address 1 to 300;

Host request: Send data as 01 06 00 06 01 2C 69 86 (note: corresponding to PLC register address 40007)							
01	06	00	06	01	2C	69	86
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH
Slave response: The returned data is 01 06 00 06 01 2C 69 86							
01	06	00	06	01	2C	69	86
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

10.Set the reliability of static object detection.

For example, set the static object detection reliability of the sensor with device address 1 to 200;

Host request: Send data as 01 06 00 07 00 C8 39 9D (note: corresponding to PLC register address 40008)							
01	06	00	07	00	C8	39	9D
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

Slave response: The returned data is 01 06 00 07 00 C8 39 9D							
01	06	00	07	00	C8	39	9D
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

11. Set cumulative frames.

For example, set the cumulative frame of the sensor with device address 1 to 16;

Host request: Send data as 01 06 00 08 00 10 09 C4 (note: corresponding to PLC register address 40009)							
01	06	00	08	00	10	09	C4
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH
Slave response: The returned data is 01 06 00 08 00 10 09 C4							
01	06	00	08	00	10	09	C4
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

12. Set the Y (-) angle value.

For example, set the Y (-) angle value of the sensor with device address 1 to 30;

Host request: Send data as 01 06 00 09 00 1E D9 C0 (note: corresponding to PLC register 40010 address)							
01	06	00	09	00	1E	D9	C0
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH
Slave response: The returned data is 01 06 00 09 00 1E D9 C0							
01	06	00	09	00	1E	D9	C0
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

13. Set the Y (+) angle value.

For example, set the Y (+) angle value of the sensor with device address 1 to 30;

Host request: Send data as 01 06 00 0A 00 1E 29 C0 (note: corresponding to PLC register 40011 address)							
01	06	00	0A	00	1E	29	C0
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH
Slave response: The returned data is 01 06 00 0A 00 1E 29 C0							
01	06	00	0A	00	1E	29	C0
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

14. Set retention time.

For example, set the holding time of the sensor with device address 1 to 5;

Host request: Send data as 01 06 00 0B 00 05 38 0B (note: corresponding to PLC register 40012 address)							
01	06	00	0B	00	05	38	0B

Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH
Slave response: The returned data is 01 06 00 0B 00 05 38 0B							
01	06	00	0B	00	05	38	0B
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

15. Set the total range.

For example, set the total range of the sensor with device address 1 to 200;

Host request: Send data as 01 06 00 0C 00 C8 48 5F (note: corresponding to PLC register 40013 address)							
01	06	00	0C	00	C8	48	5F
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH
Slave response: The returned data is 01 06 00 0C 00 C8 48 5F							
01	06	00	0C	00	C8	48	5F
Device address	function code	Pre register address high-order byte	Pre register address low-order byte	Insert the high-order byte of the data	Insert the low-order byte of the data	CRCL	CRCH

16. If you forget to set the address, you can use the unconditional address query command, which is a special command. The sensor and computer must be connected separately during use.

Obtain the address information of the module

Frame format: Send

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	CRCL	CRCH
FF	03	00	02	00	01	30	14

Return

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	CRCL	CRCH
FF	03	02	00	ADDR	*	*

=====END=====