■ Software operation instructions

一、Open the TD-4000 configuration software through the Start menu shortcut or desktop shortcut. Right click on the serial port on the left side of the software and select Refresh. The software will automatically search for the serial port on the computer and display the serial port number on the interface;

二、By left clicking on the serial port number connected to the module with the mouse, multiple functional areas will appear in the pop-up interface. If the software pops up a prompt box indicating that the serial port cannot be connected, please check if the serial port is normal or if it is occupied by other software;

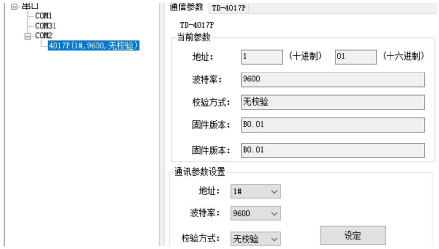
1、Communication configuration is used to set the communication timeout and communication interval of the upper computer. Communication timeout refers to the maximum time that the software waits for the module to return data after sending instructions. If the software fails to receive the returned data within this time, it is considered as a communication failure. Communication interval refers to the time that the software waits for after completing one instruction sending before sending the next instruction. After entering the value to be set, click Apply to proceed;

2. Module search is used to search for module information (device model, communication address, baud rate, verification method). One click search is when the software sends a universal search command to the module (module firmware version must be B0.01 or above, and only one module can be connected to the same serial port). This function can directly obtain module information, Starting the search starts by polling the search module information from the starting address (supporting all firmware versions and multiple modules with different communication addresses can be connected on the same serial port), and automatically stops when the search address is 255. Stopping the search stops the search in advance during the polling search process, and the module information found will be displayed below the serial port number, as shown in the above figure. The information content is: device model, communication address, baud rate, etc Verification method;

3. Adding a new module is used to manually add module information. If the information of the module is already known in advance, select a known module model in the module model, a known module address in the address, a known module baud rate in the baud rate, a known module verification method in the verification method, and click on the new module, the new information will be displayed below the serial port number;

4、 After obtaining module information, the software will automatically connect to the module by clicking on the module information with the left mouse button, and display the communication parameter page and module function page;

1. The communication parameter page is used to view the current address, baud rate, verification method, and firmware version of the module. At the same time, the module's address, baud rate, and verification method can be set. In the communication parameter setting area, select the address, baud rate, and verification method to be modified, and then click the setting button. If the setting is successful, the software will pop up a prompt box, and the module needs to be searched again, If a modification failure prompt box pops up, it is necessary to check if there is a fault.



2、TD-4027 page is used to view the measured values, configuration parameters, and modify configuration parameters of the module

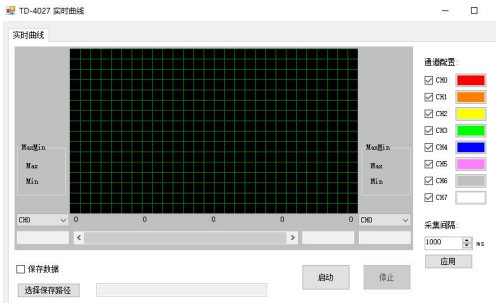
(1) Range configuration: Select the channel you want to configure from the channel dropdown box, select the range you want to configure from the range dropdown box, and then click set range. If you want all channels to be set to the same range, you can check the unified setting and click set range.

(2) To configure the upper and lower limits of engineering values, select the channel you want to configure from the channel drop-down box. In the input box for the upper and lower limits of engineering values, enter the upper and lower limits of the engineering values you want to configure, and click Set Upper and Lower Limits. If you want all channels to be set to the same upper and lower limits of engineering values, you can check the Unified Setting option and click Set Upper and Lower Limits.

(3) Set enable, select the enable status of the corresponding channel in the selection box on the channel enable configuration page (check to enable, uncheck to disable), and then click Set Enable.

(4) Real time curve, click the real-time curve button, and the software will pop up the real-time curve interface.

3、The real-time curve interface is shown in the figure



(1) The highest end of the curve interface corresponds to the upper range limit, and the lowest end of the curve interface corresponds to the lower range limit;

(2) Check or cancel the channel configuration selection box to choose whether to display the corresponding channel's curve;

(3) Click on the color palette in the channel configuration to select the corresponding curve color for the channel;

(4) Select the channel dropdown box on the left and right sides of the interface to display the measured values and extreme values of the corresponding channel;

(5) Enter the collection interval and click on the application to set the cycle for reading data;

(6) Check the save data selection box to save channel measurement data CSV file (Excel can be opened);

(7) Click the Select Save Path button to reselect the file name and path to be saved;

(8) Click the start button, and the software will start recording data;

(9) Click the stop button to stop the software from recording data;

(10) In the stopped state, slide the scroll bar below the curve to view the recorded data;

■ FAQ

1. Q: After connecting the voltage signal, the measured value is less than the connected voltage signal value?

A: Check if the short-circuit cap of the channel has been disconnected.

2. Q: After connecting the current signal, cannot the current value be measured?

A: Check if the input current signal exceeds the range, such as the 4-20mA range, if the current is less than 4mA, or if the current is negative, this phenomenon may occur.

TD-4027
Eight-Channel Analog Quantity Acquisition Module Instrations(Usage)

■ Profile

TD-4027 supports ranges of 0-10V, 0-5V, 0-2.5V, 0-1V, 0-20mA, and 4-20mA, with eight channels for single ended input. The AD acquisition part is photoelectric isolated, and the application layer adopts the standard MODBUS-RTU protocol, which is suitable for various industrial occasions and automation systems. Convenient communication with the upper computer, enabling fast networking and construction of monitoring systems.

■ Mainly Technical Parameters

Input

Channels: 8

Input range ：0~10V、0~5V、0~2.5V、0~1V、0~20mA、4~20mA

Input method：Eight channel current or voltage single ended unipolar input

Sampling frequency：≤10Hz (total)，(Channel sampling rate=total sampling rate/number of enabled channels, 1.25Hz when all 8 channels are fully enabled)

Accuracy class：≤ 0.1%

Impedance：Current：>100Ω 、voltage：20MΩ

Attention: When the voltage range is open circuit, a certain voltage value will be measured

Output

Signal type: RS-485 digital signal

BAUD： 1200、2400、4800、9600、19200、38400、57600、115200bps

Verification method: No verification, odd verification, or even verification

Data bits:8bits Stop bit:1bit

Communication protocol: Standard MODBUS-RTU

Communication distance：1200m(TYP)

Basic parameter

Power supply: DC24V, voltage range: DC 9~30V

Power consumption: <1.5W @DC 24V

Insulation strength: 3000V DC/1min (between input and output)

Insulation resistance: ≥ 100MΩ (between input and output)

Electromagnetic compatibility: In accord with GB/T 182681 (IEC 6132-1)

Applicable on-site equipment: Configuration software, PLC, touch screen, computer and other devices that support MODBUS RTU protocol

Indicator light status

1、After power on, the indicator light remains on. If it does not light up, it indicates a power failure or poor contact;

2、During normal communication, the indicator light flashes;

3、When there is no communication, the indicator light flashes, indicating a module failure

Default factory parameters

Device Address：1 Baud：9600bps Verification method: No verification

Data bits：8bit Stop bit：1bit

Channel range: All are set to a range of 4-40mA, and the acquisition status is enabled;

Usage environment

(1) There should be no strong vibrations, impacts, high currents, sparks or other electromagnetic induction effects in the surrounding environment. The air should not contain media that corrode chromium, nickel, and silver coatings, and should not contain flammable or explosive substances;

(2) Continuous operating temperature：-40℃~ +85℃;

(3) Relative humidity ： 10 % ~ 90 % R H(No condensation);

■ Range configuration instructions

Each channel can be individually configured with a range, and the input range can be flexibly selected for more convenient customer use. Opening the device casing reveals that there are P1~P7 jumpers located near the device terminals, corresponding to the eight channels of IN0-IN7.

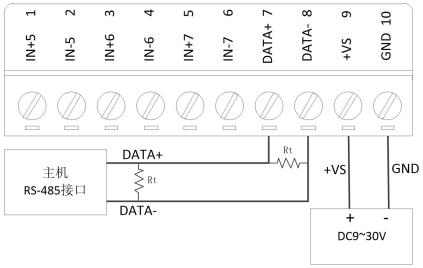
①INx When measuring the voltage signal, the jumper Px of the corresponding channel is disconnected, as shown in the left figure below;

②INx When measuring the current signal, the corresponding channel's jumper Px is closed, as shown in the figure on the right;

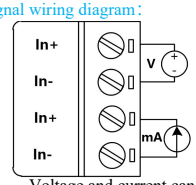
■ Wiring Instructions

Communication and power wiring diagram：

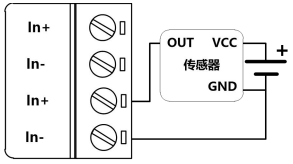
The RS485 communication line is connected hand in hand. If a star connection is required, please add a splitter. The terminal resistor Rt can be added at both ends of the communication line as needed.



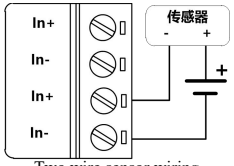
Input signal wiring diagram：



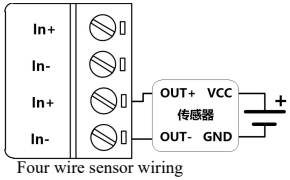
Voltage and current can be input simultaneously



Three wire sensor wiring



Two wire sensor wiring



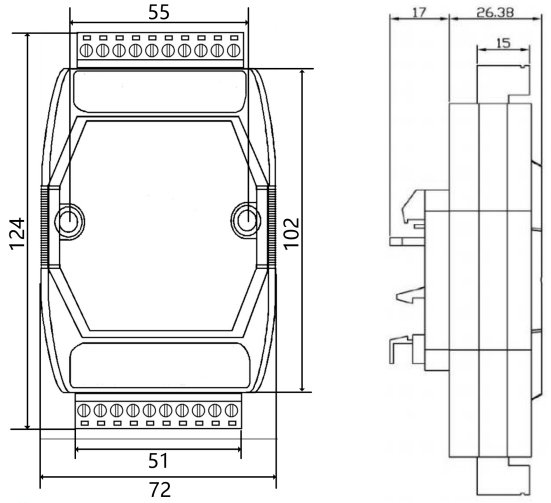
Four wire sensor wiring

■ Wiring Terminal Description

Terminal number	Terminal name	Text Description
1	IN5+	Analog input 5-channel positive terminal
2	IN5-	Analog input 5 channel negative terminal
3	IN6+	Analog input 6-channel positive terminal
4	IN6-	Analog input 6-channel negative terminal
5	IN7+	Analog input 7-channel positive terminal
6	IN7-	Analog input 7-channel negative terminal
7	DATA+	RS-485 Positive end of communication interface
8	DATA-	RS-485 Negative end of communication interface
9	+VS	External power supply positive terminal (9~30V)
10	GND	External power supply negative terminal (grounded)
11	IN0+	Analog input channel 0 positive end
12	IN0-	Analog input channel 0 negative terminal
13	IN1+	Analog input channel 1 positive end
14	IN1-	Analog input channel 1 negative terminal
15	IN2+	Analog input channel 2 positive end
16	IN2-	Analog input channel 2 negative terminal
17	IN3+	Analog input 3-channel positive terminal
18	IN3-	Analog input 3-channel negative terminal
19	IN4+	Analog input 4-channel positive terminal
20	IN4-	Analog input 4-channel negative terminal

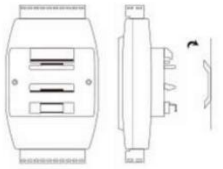
Note: The negative end of the analog input for 8 channels is internally connected together

■ External dimensions



■ Install

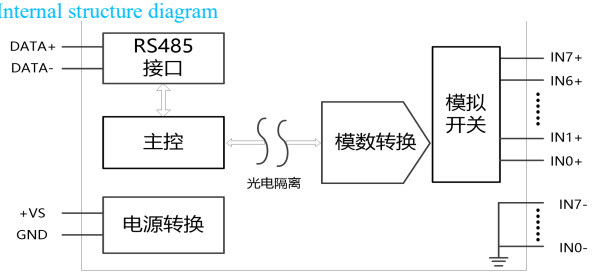
TD-4027 adopts DIN35mm guide rail installation method. The guide rail should comply with the installation dimension specifications of TH35-7.5 guide rails in the national standard GB/T19334-2003. This standard is equivalent to the international standard of the International Electrotechnical Commission (IEC 60715-1981). The installation must be stable and firm.



DIN-Rail Mounting

Overlay installation

■ Internal structure diagram



■ Communication point table

point table	attribute	Function Description	Value range and description
40001 40002 40003 40004 40005 40006 40007 40008	16 bit unsigned Read-only register	Corresponding to 40001~40008 Measurement digital values for channels 0 to 7	0-4095 corresponds to the lower and upper limits of the input range, For example, 4-20mA range: 0 corresponds to 4mA, 4095 corresponds to 20mA, showing a linear relationship,
40009 40010 40011 40012 40013 40014 40015 40016	16 bit signed Read-only register Firmware version only: Effective for B0.01 and above	Corresponding to 40009-40016 Measurement raw values for channels 0 to 7	-32768~32767, corresponding to measured values: 1000 times the voltage value from 0 to 1V 1000 times the voltage value from 0 to 2.5V 1000 times the current value from 0 to 20mA 1000 times the current value of 4-20mA 1000 times the voltage value from 0 to 10V 1000 times the voltage value from 0 to 5V For example, if the range is 0-10V and the reading value is 9857, the actual value is 9.857V
40017 40018 40019 40020 40021 40022 40023 40024	16 bit signed Read-only register Firmware version only: Effective for B0.01 and above	Corresponding to 40017-40024 Measurement engineering values for channels 0 to 7	-32768~32767 Related to the upper and lower limits of engineering values and measurement values For example, in a 4-20mA range, the upper limit of the engineering value is 1000, The lower limit of the engineering value is 0. When connected to a current of 10mA, The engineering value is 375
40101 40102 40103 40104 40105 40106 40107 40108 40109 40110 40111	16 bit unsigned Read and write registers Power failure storage Firmware version only: Effective for B0.01 and above	Lower limit of engineering value for channel 0 Channel 0 engineering value upper limit Lower limit of engineering value for channel 1 Channel 1 Engineering Value Upper Limit Lower limit of engineering value for channel 2 Upper limit of engineering value for channel 2 Lower limit of engineering value for channel 3 Upper limit of engineering value for channel 3 Lower limit of engineering value for channel 4 Channel 4 Engineering Value Upper Limit Lower limit of engineering value	-32768~32767, The lower limit of engineering value corresponds to the lower limit of measurement range The engineering value upper limit corresponds to the range upper limit For example: 4~20mA range, sensor range is 0~1.6Mpa, then the lower limit of the engineering value can be set to 0, and the upper limit of the engineering value can be set to 16000. When the engineering value of the corresponding channel is read as 3954, the actual value is 0.3954Mpa

		for Channel 5	
40112		Channel 5 Engineering Value Upper Limit	
40113		Lower limit of engineering value for channel 6	
40114		Channel 6 Engineering Value Upper Limit	
40115		Lower limit of engineering value for channel 7	
40116		Channel 7 Engineering Value Upper Limit	
40201 40202 40203 40204 40205 40206 40207 40208	16 bit Read and write registers Power failure storage	The input range for channels 0 to 7 corresponding to channels 40201-40208	0 ~ 1V Code is 0x0004; 0 ~ 2.5V Code is 0x0005; 0 ~ 20mA Code is 0x0006; 4 ~ 20mA Code is 0x0007; 0 ~ 10V Code is 0x0008; 0 ~ 5V Code is 0x0009;

Point table	Attribute	Function Description	Value range and description
40211	16 bit Read-only register	Type 1	0X4027
40212		Type 2	0X0000
40213		Firmware version	0X0000~0XFFFF
40215	16 bit Read and write registers Power failure storage	Device communication address	0X0001~0X00FF Address representing the device
40216		BAUD	0：standard for 1200bps 1：standard for 2400bps 2：standard for 4800bps 3：standard for 9600bps 4：standard for 19200bps 5：standard for 38400bps 6：standard for 57600bps 7：standard for 115200bps
40217		Parity	0：No parity 1：Odd check 2：even parity check

■ Formula for calculating numerical values

Range	Calculation formula (D is a numerical value, 16 bit unsigned integer)
0~1V	D / 4095 * 1 (V)
0~2.5V	D / 4095 * 2.5 (V)
0~20mA	D / 4095 * 20 (mA)
4~20mA	D / 4095 * 16 + 4 (mA)
0~10V	D / 4095 * 10 (V)
0~5V	D / 4095 * 5 (V)

TD-4027
Eight channel analog signal acquisition module

User Manual (Programming Section)

⚠ 注意

- Please check whether the outer packaging of the product, the model and specification of the product label are consistent with the order contract;
- Read this manual carefully before installation and use, if you have any questions, please contact the company's technical support hotline;
- The product should be installed in a safe place;
- The instrument supplies 24V DC power supply, and it is strictly forbidden to use 220V AC power supply;
- It is strictly forbidden to disassemble and assemble the instrument without permission to prevent the instrument from failing or malfunctioning.
- The company reserves the right to change the product without prior notice to the user, and if there is any discrepancy between the content of the instructions and the information on the website, samples, etc., this manual shall prevail.

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■ MODBUS-RTU Agreement

Profile

The MODBUS-RTU protocol stipulates a variety of function codes to achieve different functions, TD-4000 series products only support some of the function codes, this manual only explains the function codes used, TD-4000 series products support function codes are: 0X01, 0X03, 0X04, 0X06, 0X05, 0X0F, 0X10, of which TD-4027 does not support function codes 0X01, 0X05 and 0X0F, The following table describes the address and function of the dot table corresponding to the function code:

Feature codes	Point table	Feature description
0X01	0XXXX	Read the status of multiple coils (single bit data).
0X05	0XXXX	Write single coil (single bit data) status (0X0F can be replaced)
0X0F	0XXXX	Write multiple coils (single bit data) status
0X03	4XXXX	Read the values of multiple registers
0X04	4XXXX	Read the value of multiple registers (0X03 can be substituted)
0X06	4XXXX	Write a single register value (0X10 can be substituted)
0X10	4XXXX	Write multiple register values

Feature codes 0X01

1、The structure of the request packet sent by the host, in which the start address and the number of coils are represented in big-endian mode, and the start address must be reduced by one from the point table address, for example, the address of 00016 is 0X000F,

Description	Number of bytes	Value range
Device address	1Byte	0X0001~0X00FF
Feature codes	1Byte	0X01
Start address	2 Bytes	0X0000~0XFFFF
Number of coils	2Bytes	0X0001~0X0040
CRC check	2Bytes	0X0000~0XFFFF

2、The slave returns a packet structure, where each bit of the coil state represents a coil state 1 = ON and 0 = OFF, and the LSB (least significant bit) of the first data byte represents the coil state of the start address. The other coils and so on up to the highest bit of this byte, and in the following bytes from low to high.

Description	Number of bytes	Value range
Device address	1Byte	The address of the module
Feature codes	1Byte	0X01
The number of coil state bytes	1Byte	N
Coil status	NBytes	Big-endian mode, with high bytes first
CRC check	2Bytes	0X0000~0XFFFF

Note: N=number of coils / 8, if the remainder is not equal to 0, then N=number of coils / 8 + 1

3、For example, read the status of 24 coils of module 00001~00024 with address 1.

Packets sent by the host: (The packets are in hexadecimal format)

01	01	00	00	00	17	3C	00
Module address	Feature codes	The start address is high bytes	The start address is low bytes	The number of coils is high bytes	The number of coils is low in bytes	CRC check	CRC check

Slave Return Packet: (Packet in hexadecimal format)

01	01	03	01	03	07	2C	BC
Module address	Feature codes	The number of coil state bytes	Coil status bytes 0	Coil status bytes 1	Coil status bytes 2	CRC check	CRC check

The 3-byte coil status byte in the packet returned by the slave machine is as follows:

Byte 0: 0X01 The binary is 0000 0001, from right to left (i.e. from the lowest bit of byte to the highest byte) represents 00001~00008 The state is ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF,

Byte 1: 0X03 The binary is 0000 0011, from right to left (i.e. from the lowest bit of byte to the highest byte) represents 00009~00016 The state is ON, ON, OFF, OFF, OFF, OFF, OFF, OFF,

Byte 2: 0X07 The binary is 0000 0111, from right to left (i.e. from the lowest bit of byte to the highest byte) represents 00017~00024 The state is ON, ON, ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF,

Feature codes 0X0F

1、For example, the address of 00008 is 0X0007, each bit of the coil state represents a coil state 1 = ON and 0 = OFF, and the LSB (least significant bit) of the first data byte represents the coil state of the start address. The other coils and so on up to the highest bit of this byte, and in the following bytes from low to high.

Description	Number of bytes	Value range
Device address	1Byte	0X0001~0X00FF
Feature codes	1Byte	0X0F
Start address	2Byte	0X0000~0XFFFF
Number of coils	2Byte	0X0001~0X0040
The number of coil state bytes	1Byte	N
Coil status	NBytes	
CRC check	2bytes	0X0000~0XFFFF

Note: N=number of coils/8, if the remainder is not equal to 0, then N=number of coils/8+1

2、The structure of the slave return packet is equivalent to the first 6 bytes of the host packet plus 2 bytes of CRC check.

Description	Number of bytes	Value range
Device address	1Byte	0X0001~0X00FF
Feature codes	1Byte	0X0F
Start address	2Bytes	0X0000~0XFFFF
Number of coils	2Bytes	0X0001~0X0040
CRC check	2Bytes	0X0000~0XFFFF

3、For example, if the address 1 module 00017~00024 is addressed, the status of 8 coils is set to: ON, OFF, ON, OFF, OFF, OFF, OFF, OFF;

Packets sent by the host: (The packets are in hexadecimal format)

01	0F	00	10	00	08	01	05	FF	55
Module address	Feature codes	The start address is high bytes	The start address is low bytes	The number of coils is high bytes	The number of coils is low in bytes	The number of coil state bytes	Coil status bytes 0	CRC check	CRC check

Coil state byte 0:0X05 binary is 0000 0101, from right to left (i.e. from the lowest bit of the byte to the highest bit) represents 00017~00024 state is ON, OFF, ON, OFF, OFF, OFF, OFF, OFF,

Slave Return Packet: (Packet in hexadecimal format)

01	0F	00	10	00	08	55	C8
Module address	Feature codes	The start address is high bytes	The start address is low bytes	The number of coils is high bytes	The number of coils is low in bytes	CRC check	CRC check

Feature codes 0X03

1、The structure of the request packet sent by the host, in which the start address and the number of registers are represented in big-endian mode, and the start address must be removed from the beginning of the dot table address 4 and then subtracted by one, for example, the address of 40017 is 0X0010.

Description	Number of bytes	Value range
Device address	1Byte	0X0001~0X00FF
Feature codes	1Byte	0X03
Start address	2Bytes	0X0000~0XFFFF
Number of registers	2Bytes	0X0001~0X0040
CRC check	2Bytes	0X0000~0XFFFF

2、The slave returns a message structure, each register occupies 2 bytes, for each register, the first byte is the register high byte, and the second byte is the register low byte (i.e., big-end mode);

Description	Number of bytes	Value range
Device address	1Byte	The address of the module
Feature codes	1Byte	0X03
Number of bytes of register value	1Byte	2*N
Register value	2*N Bytes	Big-endian mode, with high bytes first
CRC check	2 Bytes	0X0000~0XFFFF

Note: N = number of registers

3、For example, if you read the values of the two registers of the module 40009~40010 with address 1,

Packets sent by the host: (The packets are in hexadecimal format)

01	03	00	08	00	02	45	c9
Module address	Feature codes	The start address is high bytes	The start address is low bytes	The number of registers is high bytes	The number of registers is low in bytes	CRC check	CRC check

Slave Return Packet: (Packet in hexadecimal format)

01	03	04	F1	03	F7	FF	3E	BF
Module address	Feature codes	Number of bytes of register value	Register bytes 0	Register bytes 1	Register bytes 2	Register bytes 3	CRC check	CRC check

The register value of the 4-byte total in the packet returned by the slave is as follows:

Bytes 0 and 1 are the values of register 40009, hexadecimal is 0XF103, converted to 16-bit unsigned number is 61699, converted to 16-bit signed number is -3837, byte 2 and byte 3 are the value of register 40010, hexadecimal value is 0Xf7ff, converted to 16-bit unsigned number is 63487, converted to 16-bit signed number is -2049.

Feature codes 0X10

1、The structure of the request packet sent by the host, in which the starting address and the number of registers are represented in big-endian mode, and the starting address needs to be removed from the beginning of the dot table address 4 and then subtracted by one, for example, the address of 40004 is 0X0003, and each register occupies 2 bytes, for each register, the first byte is the high byte of the register, and the second byte is the low byte of the register (i.e., the large-endian mode);

Description	Number of bytes	Value range
Device address	1Byte	0X0001~0X00FF
Feature codes	1Byte	0X10
Start address	2Bytes	0X0000~0XFFFF
Number of registers	2Bytes	0X0001~0X0040
Number of bytes of register value	1Byte	2*N
Register value	2*N Bytes	Big-endian mode, with high bytes first
CRC check	2Bytes	0X0000~0XFFFF

Note: N = number of registers

2、The structure of the slave return packet is equivalent to the first 6 bytes of the host packet plus 2 bytes of CRC check.

Description	Number of bytes	Value range
Device address	1Byte	The address of the module
Feature codes	1Byte	0X10
Start address	2Bytes	0X0000~0XFFFF
Number of registers	2Bytes	0X0000~0X0040
CRC check	2Bytes	0X0000~0XFFFF

3、For example, in module 40002~40003 with address 1, the values of the two registers are set to 0XF003 (16-bit unsigned: 65283, 16-bit signed: -4093), 0X0007 (16-bit unsigned: 7, 16-bit signed: 7);

The host sends packets:

01	10	00	01	00	02	04
Module address	Feature codes	The start address is high bytes	The start address is low bytes	The number of registers is high bytes	The number of registers is low in bytes	Number of bytes of register value

F0	03	00	07	B0	A1	
Register value bytes 0	Register value bytes 1	Register value bytes 2	Register value bytes 3	CRC check	CRC check	

The host sends packets:

01	10	00	01	00	02	10	08
Module address	Feature codes	The start address is high bytes	The start address is low bytes	The number of registers is high bytes	The number of registers is low in bytes	CRC check	CRC check