

SHANGHAI ONBON TECHNOLOGY INC.

# 6X USER MANUAL

For users only

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## BX-6X USER MANUAL

### 1 Summary

this file only supply some simple instructions toBX-6X .

#### 1.1 Target

this file only give some simpleBX-6X testing instruction here.

### 2 Controller function

functions as bellow:

- ◆ this controller support Ethernet and serial port(9600 and 57600)communication(TW software or MODBUS protocol)
- ◆ support standard MODEBUS slave/host mode ,only support 0X03 and 0x 10 function code ,the LedshowTW can supply the setting and firmware maintenance.
- ◆ maximum support 5 kinds of slave and 30 parameters(need more device and parameters,pls select the 6QX-M)

#### 2.1 MODBUS basic knowledge

All devices in a Modbus network must choose the same transmission mode.

When communicating over the same Modbus network, this protocol determines that each controller needs to know their device address, recognize the information sent by the address, and decide what action to take.If a response is required, the controller generates the feedback and sends it out using the Modbus protocol.

The Modbus protocol specifies a maximum device address of 255.



### 3 Requirements

#### 3.1 Case

- ◆ Application: one of the DCS system update important data
- ◆ 1536\*64 single/dual color screen,update 8 nos of industrial info ,display current time ,the data overlay like this:

main pipe pressure of main steam	Steam traffic	steam pressure	steam temp	03/06/2017 Saturday 08:30:00
main pipe temp of main steam	1#motor power	2#motor power	3# motor power	

- ◆ MODBUS RTU protocol, slave/host ,RS 485,9600 baud
- ◆ response speed is about 100ms

Case show:

<u>main pipe pressure of main steam</u> :7.59MPa	<u>Steam traffic</u> :116.1t/h	<u>steam pressure</u> :0.98MPa	<u>steam temp</u> :250.1℃	03/06/2017 Saturday 08:30:00
<u>main pipe temp of main steam</u> :488.1℃	<u>1#motor power</u> :0.0MW	<u>2#motor power</u> :0.0MW	<u>3#motor power</u> :0.0MW	

Mark: underline word means the data ,blue means the unit.

#### 3.2 Case

Controller selection: to support MODBUS RTU protocol and display important data in real time,BX-6X controller was selected.The controller supports serial and network communication, and can support up to 32 data, as well as two modes of host and slave.In this project, the controllerBX-6X is the slave.

In addition, as theBX-6X serial signal is a 232 signal, an active industrial-grade RS232 to RS485 converter is required to ensure communication.

Secondly, since the successor ofBX-6X controller needs to be connected to the reception card, a certain amount of reception CARDS are needed (BX-V75 can be selected for full color screen, bx-v for single and two-color screen (external hub256-t8 back plug), and a reception card can carry 128 wide and 96 high).

Finally, the use of BX-6X controller needs to configure some parameters, need to use LedshowTW software.[The "temperature" area in the "sensor" drop down box in LedshowTW software \(which may be modified as the universal sensor area in the later stage\)](#) is used to update data, and relevant parameters ([Modbus slave and Modbus parameters](#)) can be set.

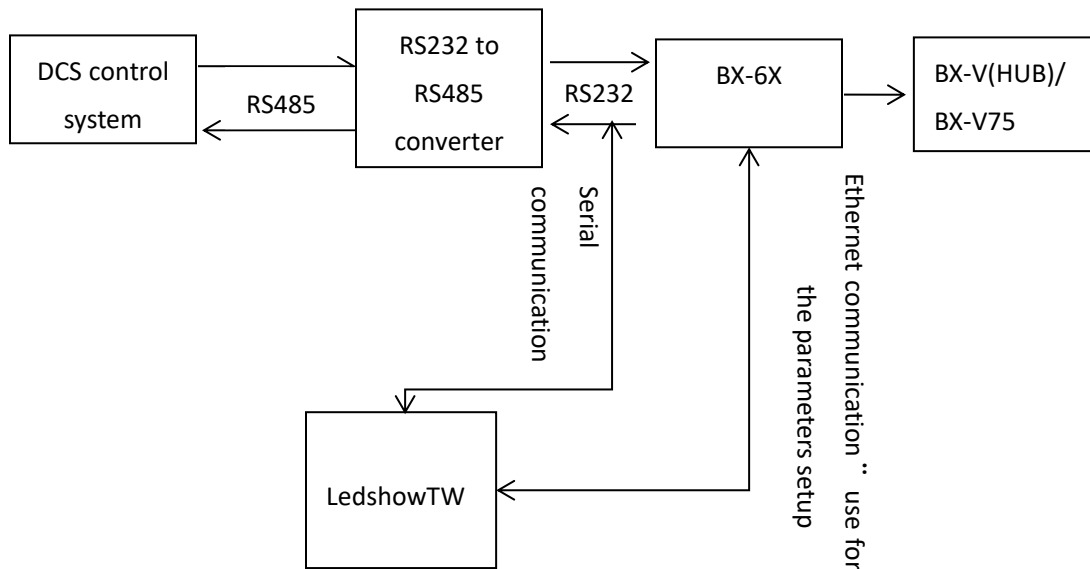
"Temperature" area (late may be modified as universal sensor area) of the Modbus parameters' value should be with Modbus configuration (advanced configuration - Modbus configuration), the parameters in the list of Numbers that can be associated with the parameter list of Modbus configuration which can be understood as Modbus network in equipment to update several groups of data sorting, usually starting at 1.

For the "temperature" area (which may be modified as a universal sensor area at a later stage) : once the meaning part of the data is determined, it will not be changed, so use the "fixed text" in the area.

As to the unit, can use graph text area

Summary: for the updated data of a certain set of equipment, its composition includes "data meaning" part, updated data and unit. In general, the "data meaning" part USES the fixed text part in the temperature area (which may be modified to the universal sensor area at a later stage). As for the number of decimal points to be retained, the mode (integer, floating point number (0.0), floating point number (0.00) option in the temperature area (which may be modified to the universal sensor area at a later stage) can be selected. And to the unit, criterion unified use graph text area.

**3.3 Data flowing**



- ◆ BX-V(HUB) applied to single/dual color screen, BX-V must update to the single/dual color firmware, default is full color;
- ◆ BX-V75 only applied to full color screen

### 3.4 Final solution

#### 3.4.1 Device selection

BX-6X controller ,receiving controller and some HUB,industrial RS232 to RS485 converter and LAN cable.

Mark: because the 6X support Ethernet+ serial port communication,so the overlay of the data will be too bigger ,this can be setup by the Ethernet and serial port .

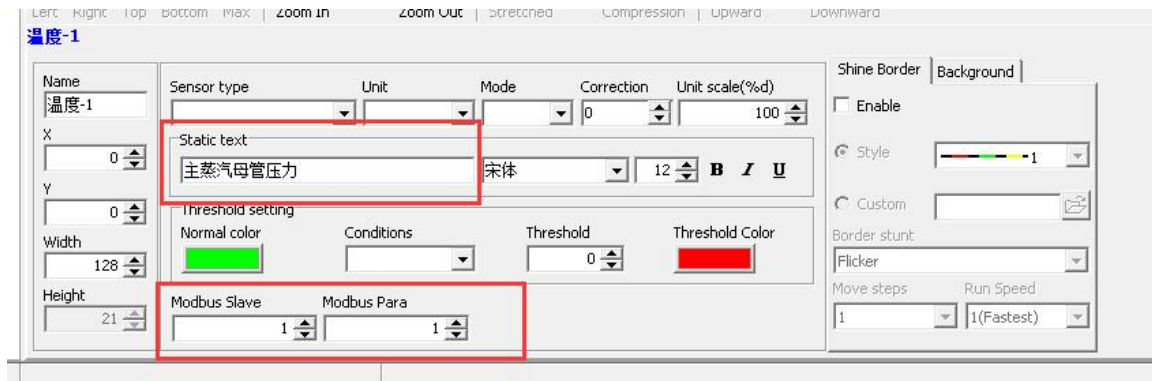
#### 3.4.2 Modbus configuration

About Modbus configuration:

- ◆ Temperature sensor area ( maybe modify as the universal sensor area in future )

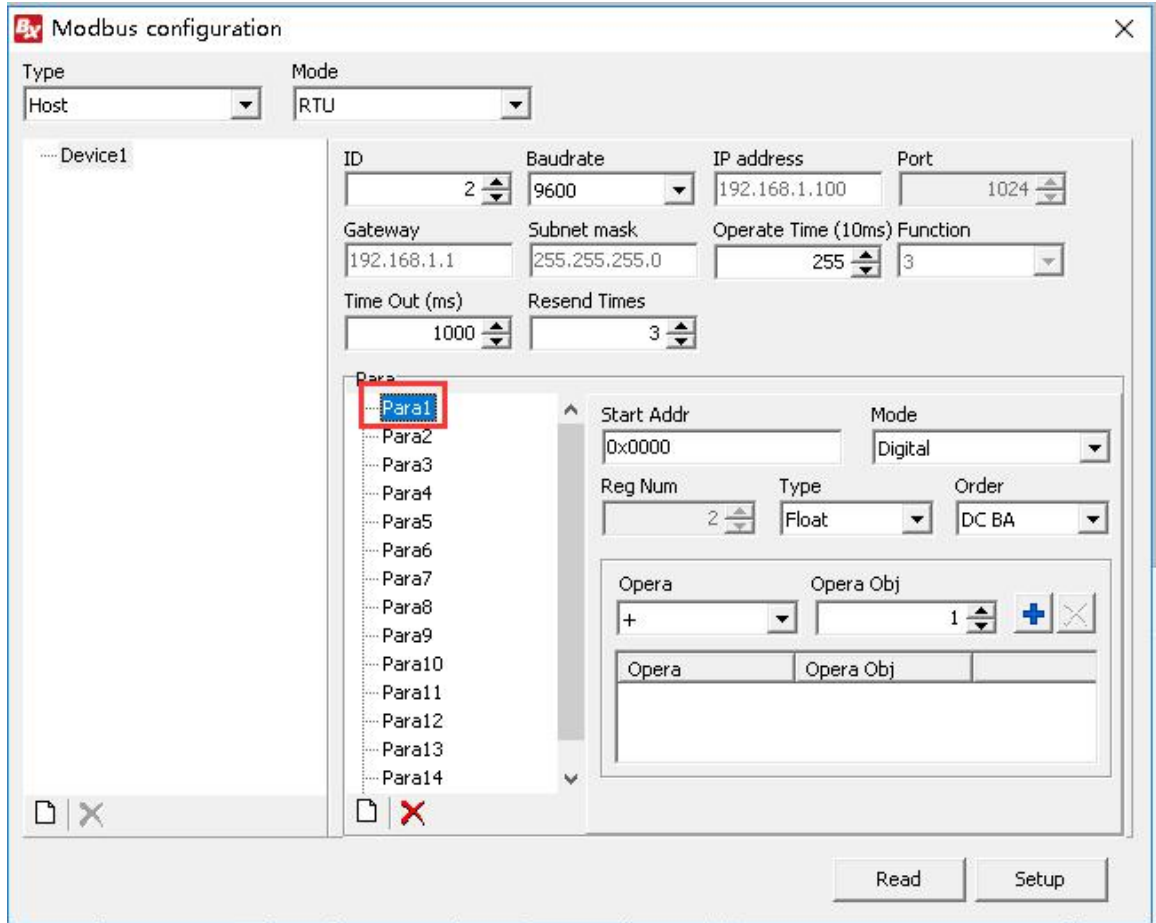
Modbus slave: means the modbus device ID in the LAN of this area

Modbus parameter: means the parameters of the modebus device



- ◆ Modbus configuration ( advanced configuration---》 Modbus configuration )

Pls follow up the [MODBUS configuration](#) , here instruct the device parameter list as following:



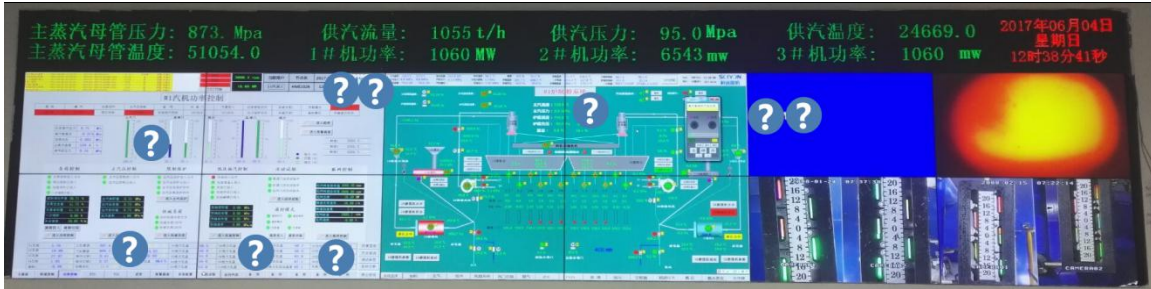
Para1 means parameters 1, Para2 means parameters 2, this value will be connect to the temp sensor area parameters item ( maybe modify as the universal sensor area in future )

The operator can perform some operations on the **real-time updated data**. Currently, the +, -, \* and/or operators are only implemented. Other operators are not supported temporarily

### 3.5 Effect showing





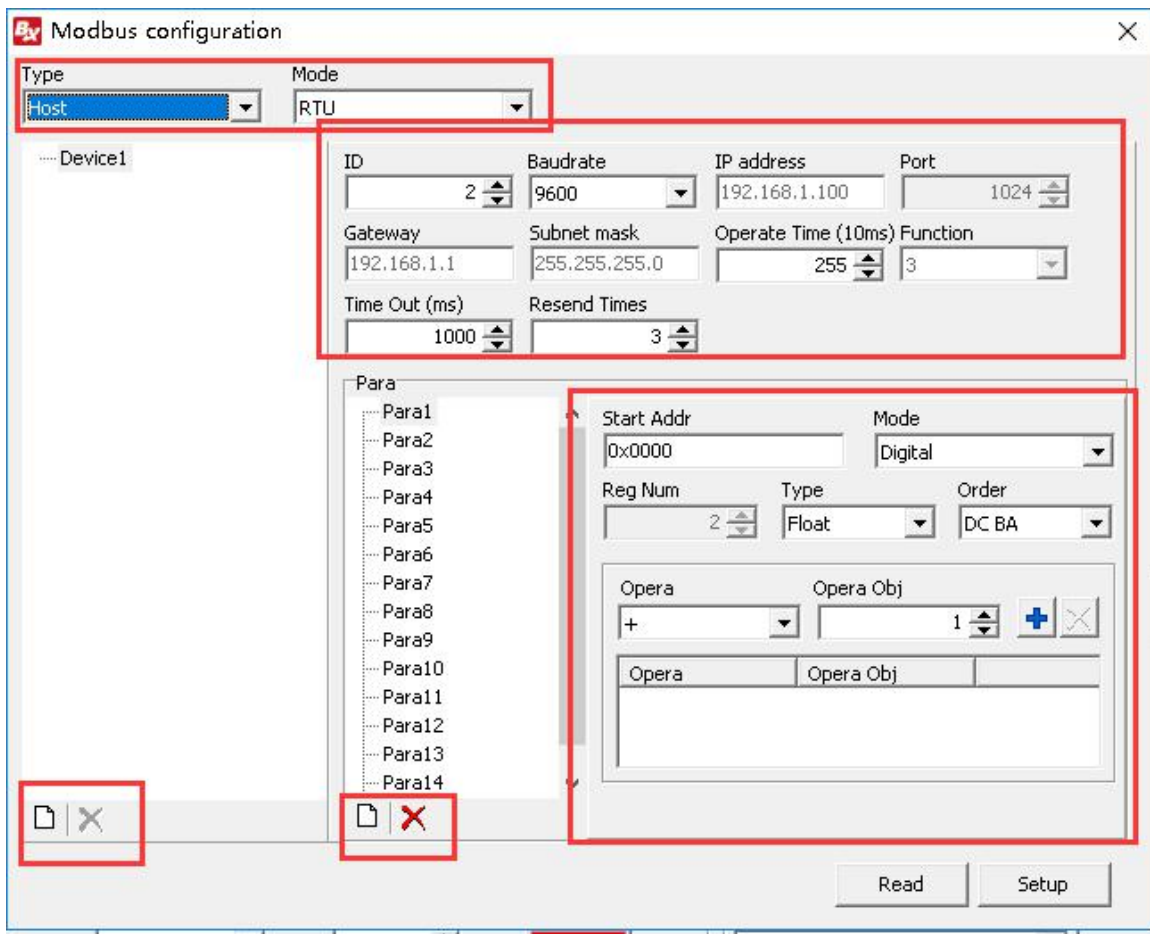


## 4 Parameters

If need some industrial info ,must set the MODBUS configuration ,should use the TW software to send the temp sensor area （maybe modify as the universal sensor area in future）

### 4.1 MODBUS configuration

this operation should use the TW software to make advanced configuration,input password 888 to make setting.



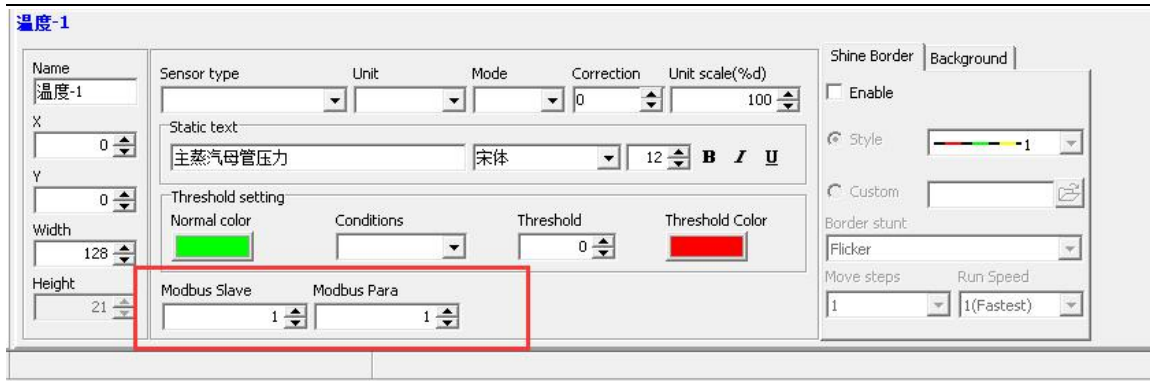
- ◆ Type:means the controller is in the mode of host or slave.The host mode indicates that the controller needs to take the initiative to obtain data.Slave machine means that the controller does not need to take the initiative to obtain data, and there is no initiative.
- ◆ Mode:support the RUT and TCP mode only ,not support the SCII. RUT stands for MODBUS serial communication, and TCP stands for MODBUS TCP communication

- ◆ ID: means the device ID ,When the controller is in slave mode, it represents the device address of the controller itself, and when the controller is in host mode, it represents the device address specified in the Modbus network.
- ◆ Baud: Support 9600 and 57600. when the RTU/ASCII is valid ,if TCP will be not valid.
- ◆ IP address, port, gateway, subnet mask: valid when the mode is TCP; if the type is slave, it represents the IP parameters of the controller; if the type is host, it represents the device parameters in the Modbus network
- ◆ Operation time: represents the interval between controller operations (read/write) at the specified address.
- ◆ Function: represents the function code.The function code is 0x03 in the host mode and 0x10 in the slave mode.
- ◆ Timeout: represents the timeout time (valid in host mode) that the device responds to in the Modbus network.
- ◆ Resend times: represents the maximum number of times the device has attempted to send (valid in host mode) for a response after timeout.The above parameters represent the basic parameters of equipment communication
- ◆ Starting address: represents the starting register address in the MODBUS frame structure
- ◆ Mode: represents analog quantity/digital quantity, and mainly USES table to lock program
- ◆ Operator: symbol indicating the operation to be performed on a register address, such as addition, subtraction, multiplication, and division
- ◆ Operand: the operand that represents the address of a register to perform an operation.  
The above parameters represent the configuration of each parameter in the parameter list
- ◆ Settings: click the Settings button to configure the parameters
- ◆ Read back: click the "read back" button to read the MODBUS data currently set
- ◆ Add parameters: add the configuration of MODBUS parameters in the universal sensor area, and multiple groups of parameters can be added
- ◆ Delete parameters: the configuration of MODBUS parameters in the universal sensor area can be deleted, and multiple groups of parameters can be deleted
- ◆ Add device: add device configuration in Modbus network
- ◆ Device removal: remove the device configuration in the Modbus network

#### 4.2 Universal sensor area

Function orientation: the function of this area is mainly used to display some industrial information, such as pressure, air pressure, etc

Click "universal sensor area (temperature sensor)" in the sensor



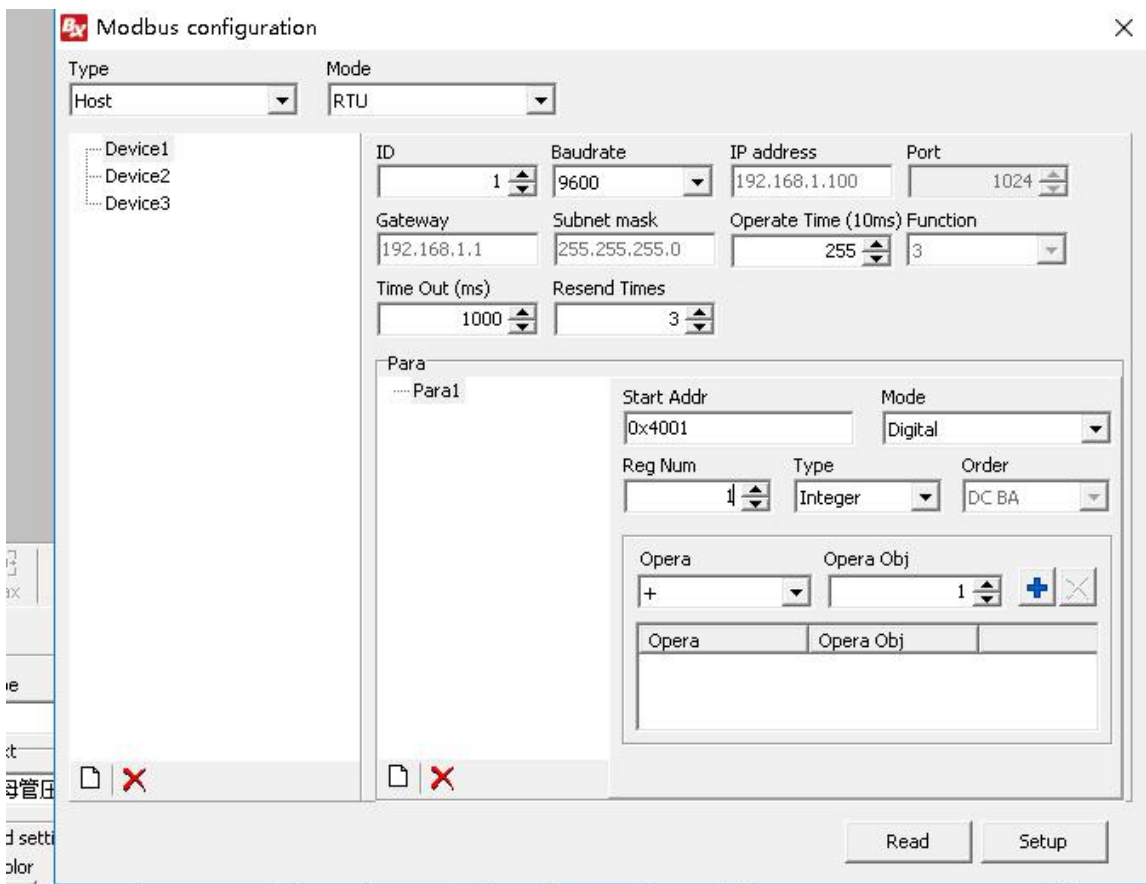
- ◆ Mode:
  - Integer: does not show the decimal point
  - Floating point (0.0) : retains one decimal point
  - Floating point (0.00) : retains two decimal places
- ◆ Modbus slave: Used to correlate device addresses in the MODBUS network
- ◆ Modbus parameters: Used to correlate parameter numbers in a MODBUS configuration

## 5 FUNCTION TESTING

To facilitate the unified test below, the configuration of MODBUS parameters is unified

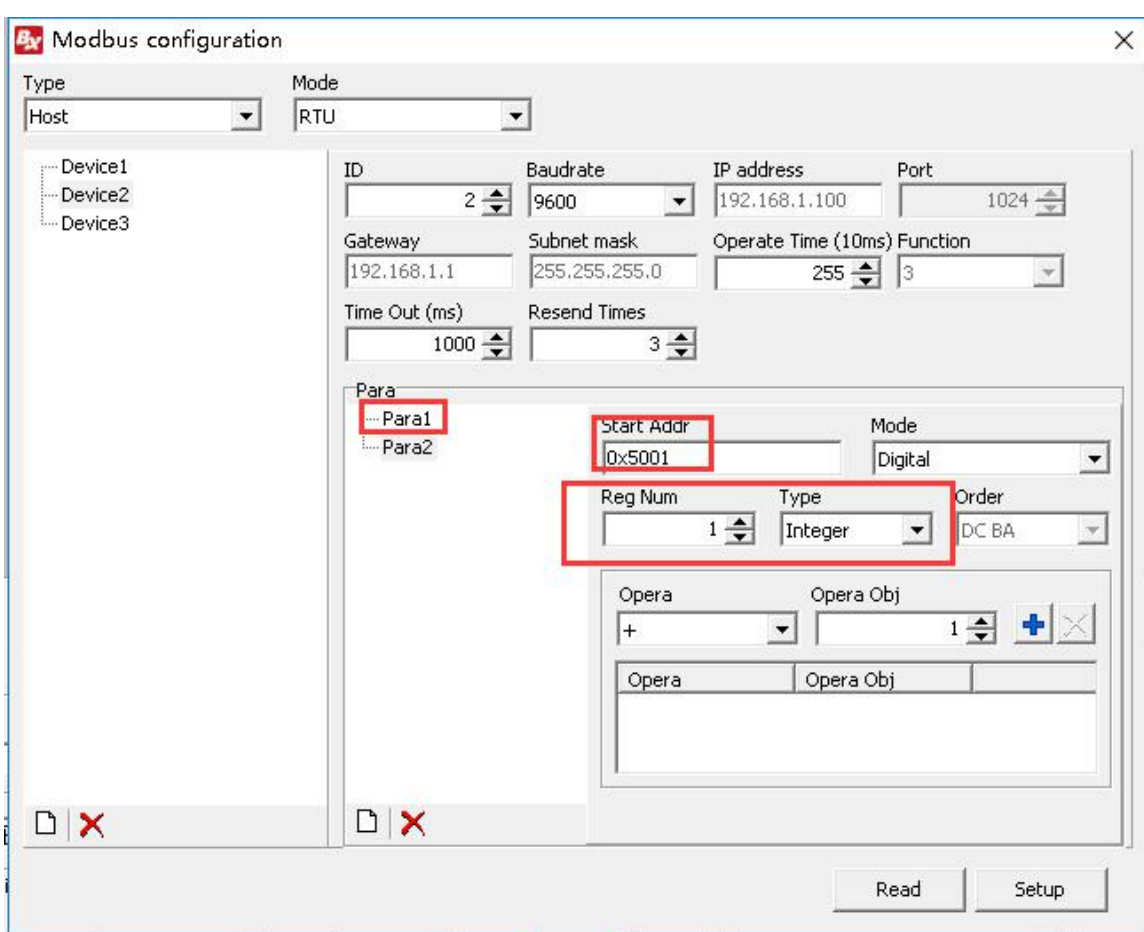
### 5.1 Test the host device mode: (RTU mode)

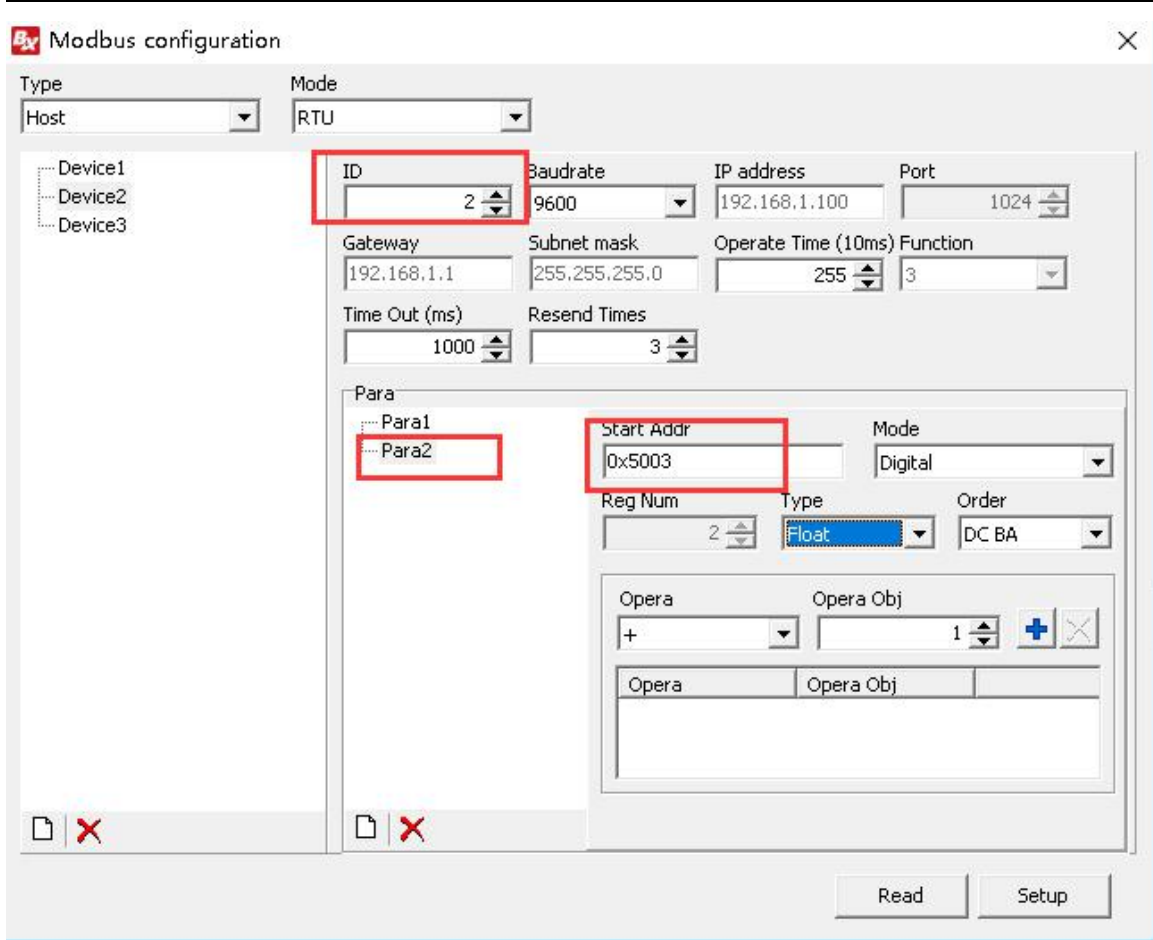
Slave machine 1 setting:

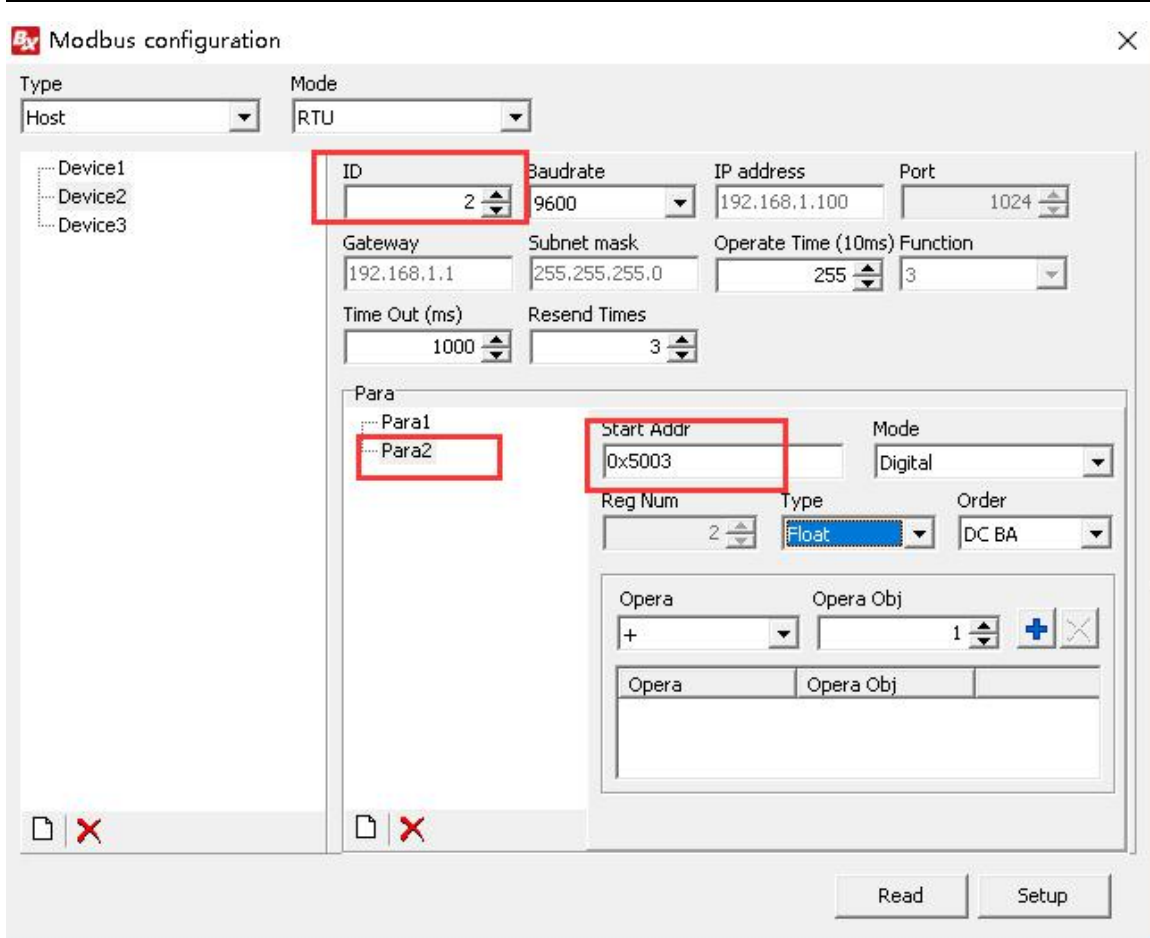


Slave 2 setting:

Parameters 1:

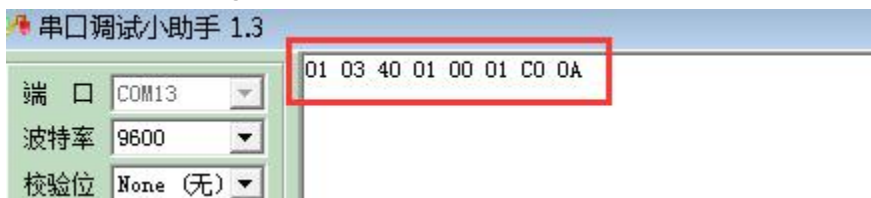






Note that the following data only shows the updated value of the slave machine's specific parameters. The display part depends on the specific bound slave machine and parameters in a certain area

receive the following data



analysis:

01 represents ID, namely MODBUS address field, which can be modified according to the actual situation

03 represents function code. Host mode only supports function code 03 and cannot be modified

4001 represents the starting address (0x4001), which is the smallest starting address in the entire parameter list



0001 represents the number of registers. Because of the example, the total number of registers in the entire parameter list is 1

C00a stands for MODBUS comparison

replay the following data

01 03 02 00 05 78 47

analysis:

The 01 ID, or MODBUS address field, is modified according to the actual situation

03 represents function code. Host mode only supports function code 03 and cannot be modified

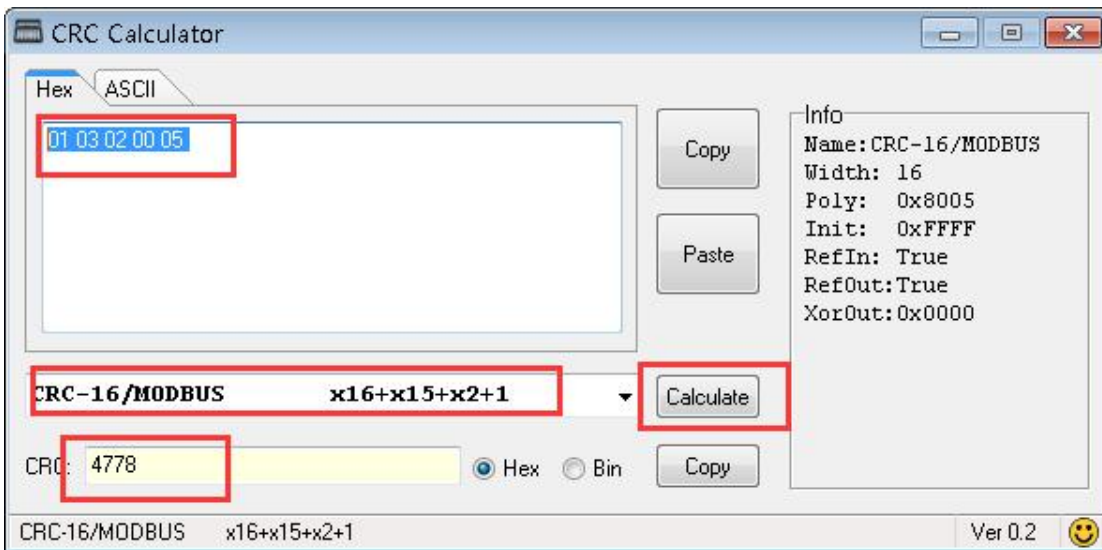
02 represents the number of bytes to be sent

0005 represents each register data

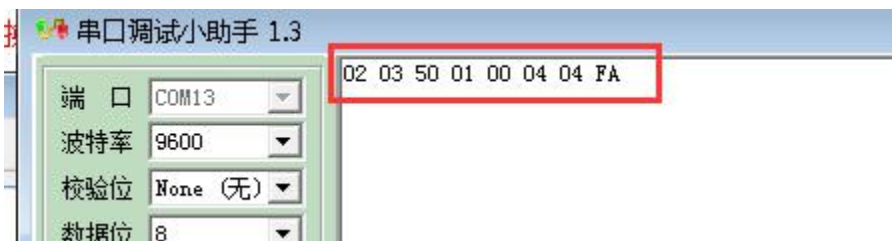
78. 47 represents MODBUS comparison

Indicates that the array of the slave 1 argument 1 is 05

Note: the checksum value needs to be transposed in byte order (the same below)



receive the following data



analysis:

02 represents ID, namely MODBUS address field, which can be modified according to the actual situation

03 represents function code. Host mode only supports function code 03 and cannot be modified

5001 represents the starting address (0x5001), which is the smallest starting address in the entire parameter list

0004 represents the number of registers. Because of the example, the total number of registers in the entire parameter list is 1

FA stands for MODBUS comparison

Reply to the following data:

02 03 08 00 06 00 00 3F 9D 70 A4 45 12

analysis:

02 represents ID, namely MODBUS address field, which can be modified according to the actual situation

03 represents function code. Host mode only supports function code 03 and cannot be modified

08 represents the number of bytes to be sent

00 06 00 00 3F 9D 70 A4 represents each register data

00 06 represents the value of register 5001, which is parameter 1 of slave 2

00 represents the value of register 5002

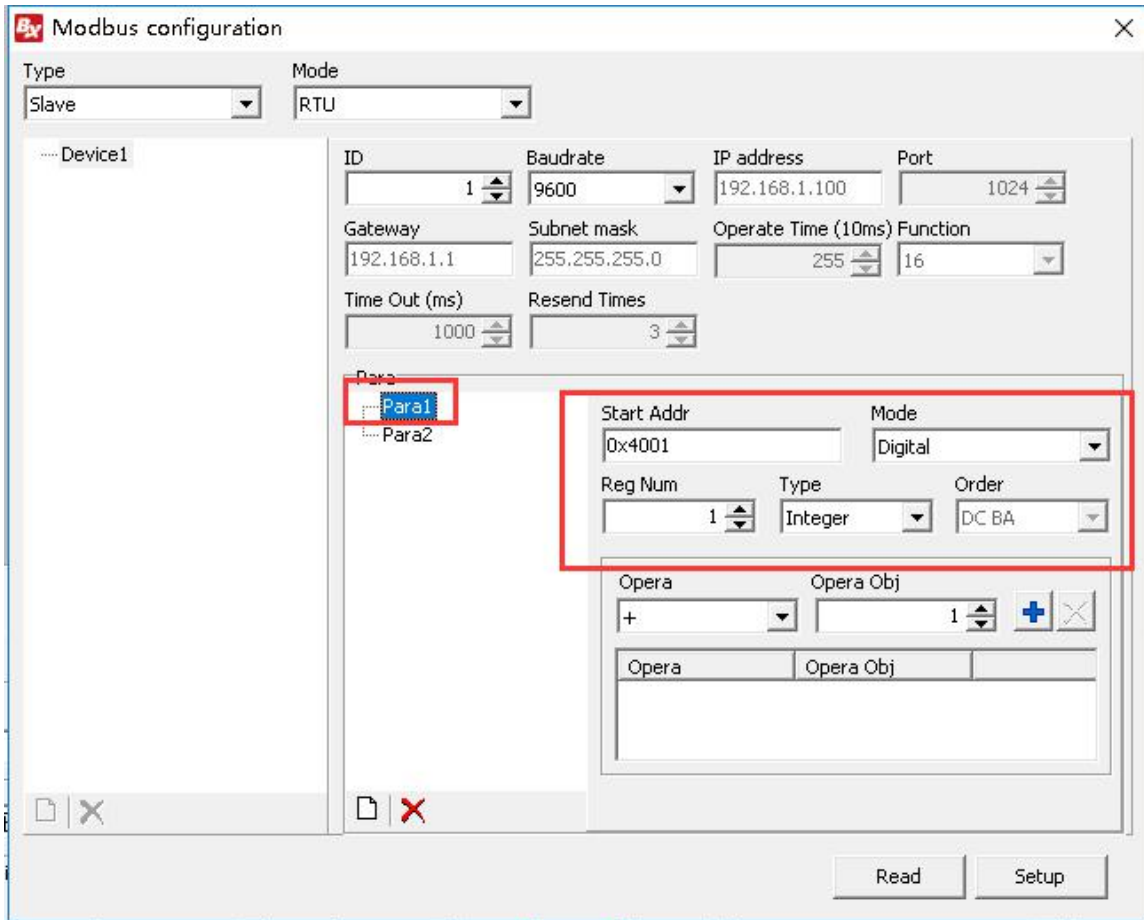
3F 9D represents the value of register 5003, and register 5004 constitutes parameter 2 of slave 2

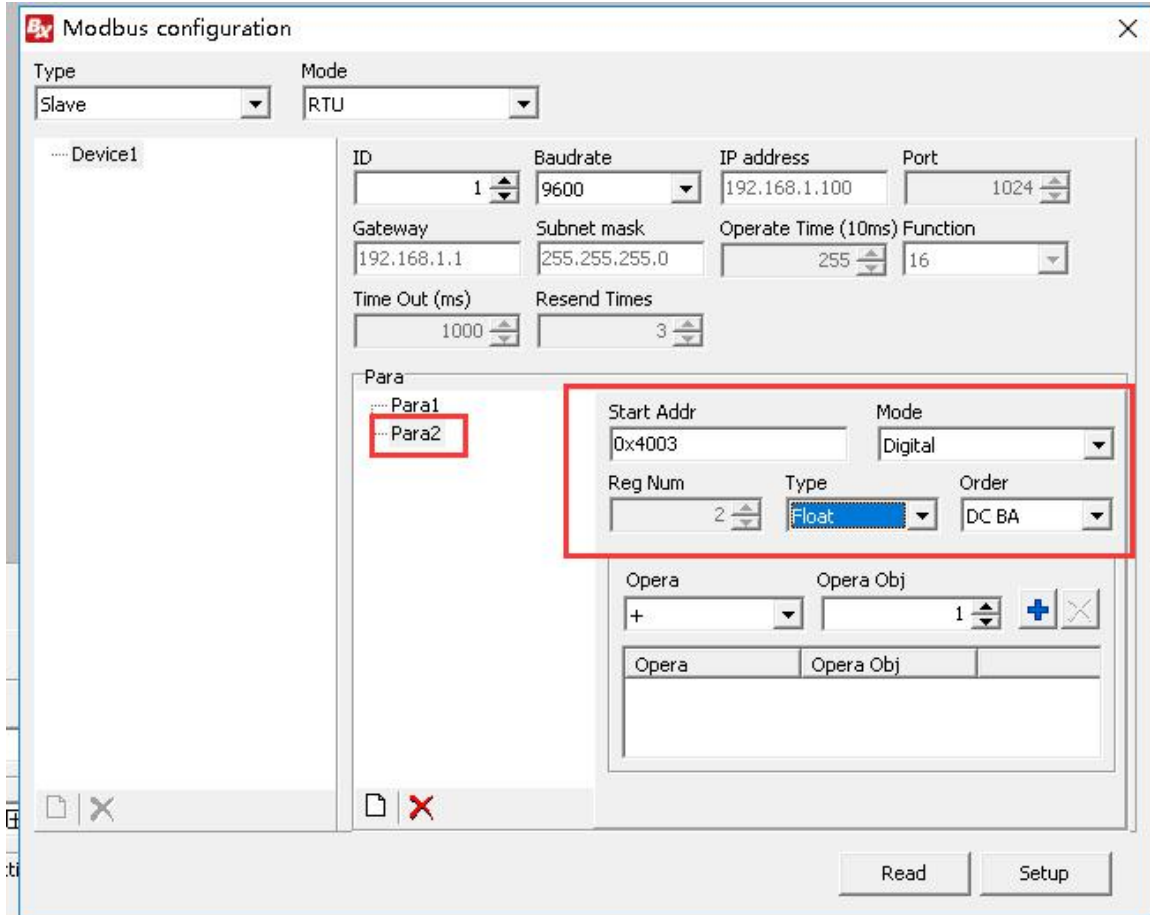
The 70 A4 represents the value of register 5004, and register 5003 constitutes parameter 2 of slave 2

45. 12 represents MODBUS comparison

Represents updating the value of slave 2 parameter 1 is 6, and the value of slave 2 parameter 2 is 1.23

## 5.2 Testing slave mode: (RTU mode)





send the following data

01 10 40 01 00 04 08 00 01 00 00 3F 9D 70 A4 1C 38

analysis:

01 represents ID, namely MODBUS address field, which can be modified according to the actual situation

10 represents function code. Slave mode only supports 10 function code and cannot be modified

4001 represents the starting address (0x4001), which is the smallest starting address in the entire parameter list

0004 represents the number of registers. Because of the example, the total number of registers in the entire parameter list is 4

08 represents the number of registers to be sent, that is, 00 01 00 00 3F 9D 70 A4, a total of 8 data

00 01 ..... 70 A4 represents each register data, every two bytes represents a register value, and the register address is summed accordingly

0001 ----> represents the data at address 0x4001 is 0x0001, which is the host parameter 1

0000 --> means 0x4002 address and the data is 0x0000

3F 9D --> represents 0x3F9D on address 0x4003, and register 4004 constitutes host parameter

2

70 A4 --> represents 0x4004 address data is 0x70A4, and register 4003 constitutes the host parameter 2

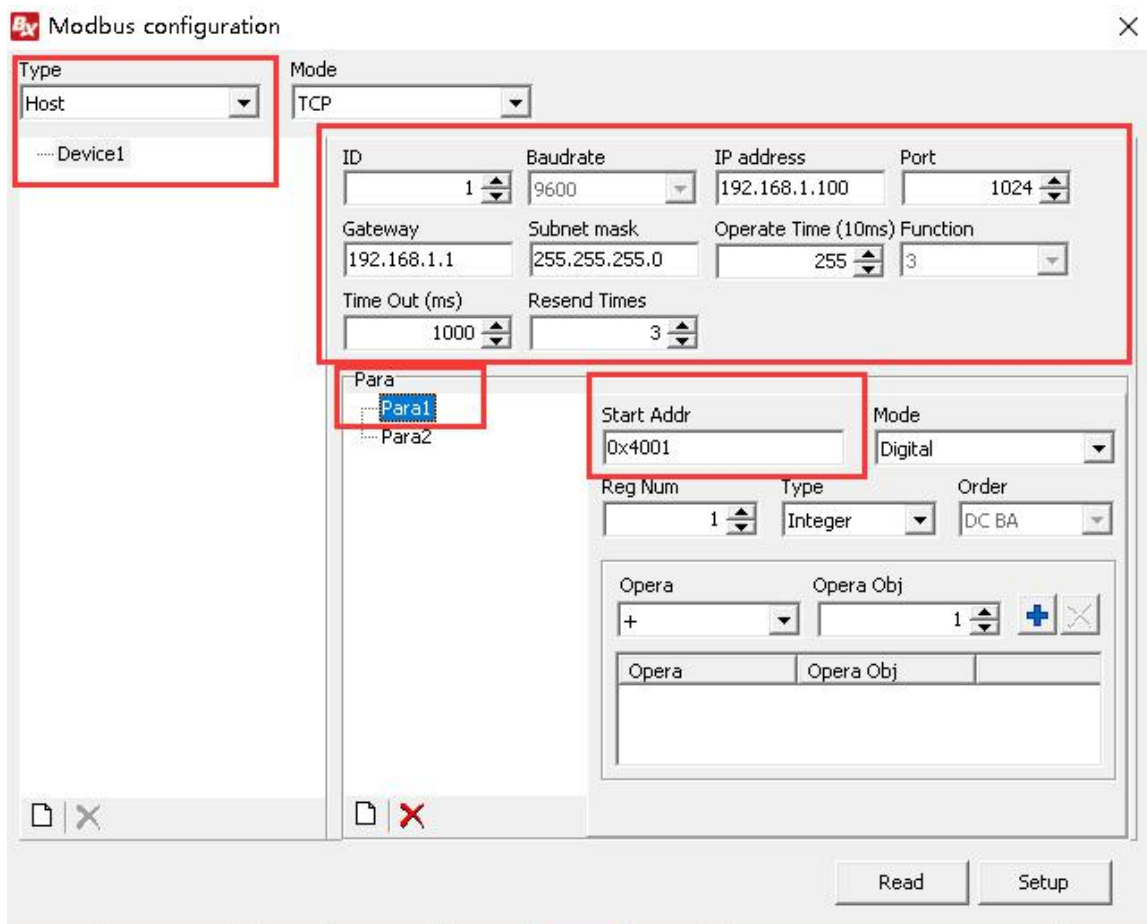
1C 38 represents MODBUS comparison,

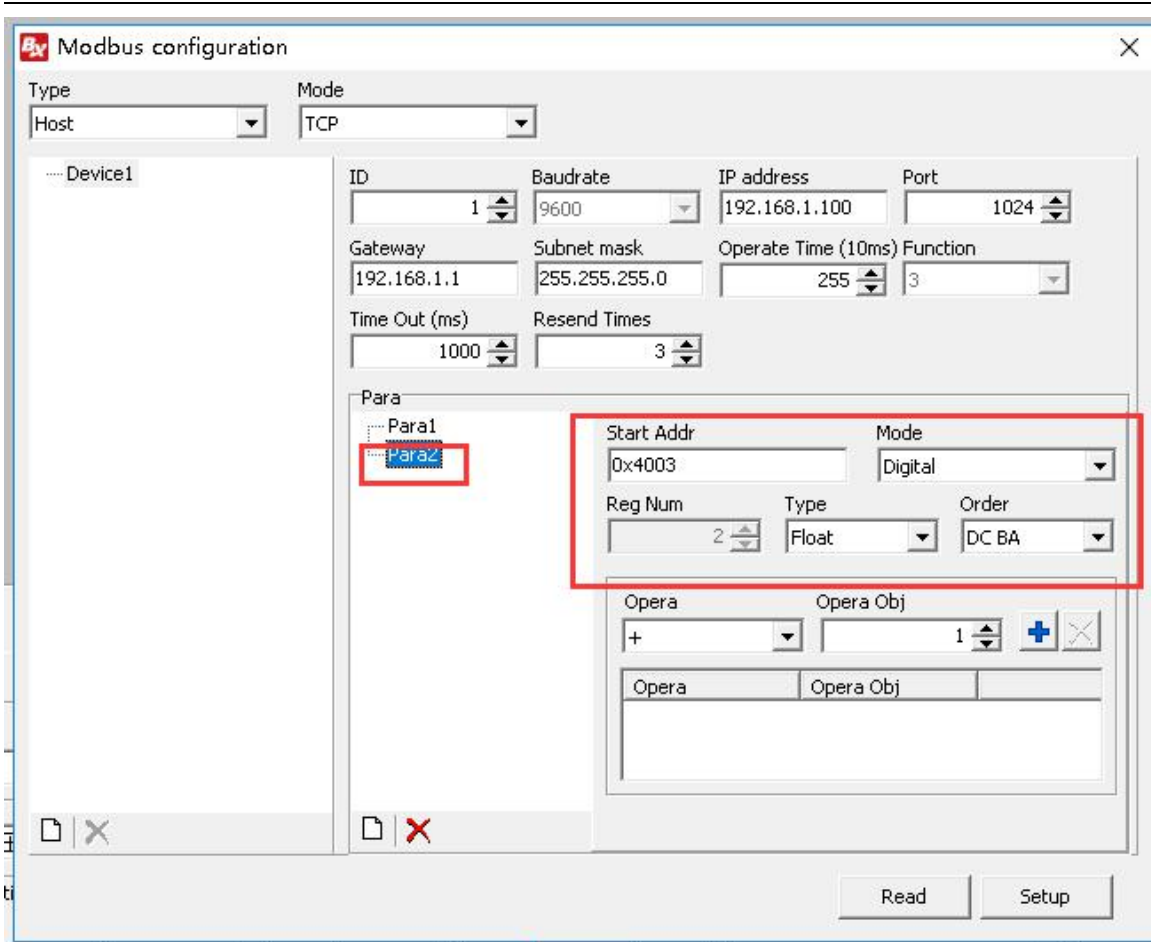
Represents the value of host parameter 1 as 1, and the value of host parameter 2 as 1.23

### 5.3 Test the host mode of TCP

( here is the IP of 16 segment ,user can decide as own requirements

parameters is 1 for the device 1





note that the PC use the Ethernet adjustment manual.

Create TCP Server



receive the data package

00 01 00 00 00 06 FF 03 40 01 00 04

analysis:

0001 can be adjusted according to the actual situation

00 00 cannot be modified

0006 represents the length of the data from FF to the end of the command sequence 07, a total of 21 bytes

FF suggests no change

03 represents function code. Host mode only supports function code 03 and cannot be modified

4001 represents the starting address (0x4001), which is the smallest starting address in the entire parameter list

00 04 is the number of registers

Reply the following data

**0001 0000 0B FF 03 08 0001 0000 3F 9D 70 A4**

analysis

0001 can be adjusted according to the actual situation

00 00 cannot be modified

00 0B represents the data length from FF to the end of the command sequence A4, a total of 11 bytes

FF suggests no change

03 represents function code. Host mode only supports function code 03 and cannot be modified

08 represents the number of registers to be sent, i.e. 0001...So 70 A4 is 8 pieces of data

00 01...70 A4 represents each register data, every two bytes represents a register value, and the register address is summed accordingly

**0001** ----> represents the data at address 0x4001 is 0x0001, indicating that the value of parameter 1 is 1

0000 ----> means 0x4002 address and the data is 0x0000

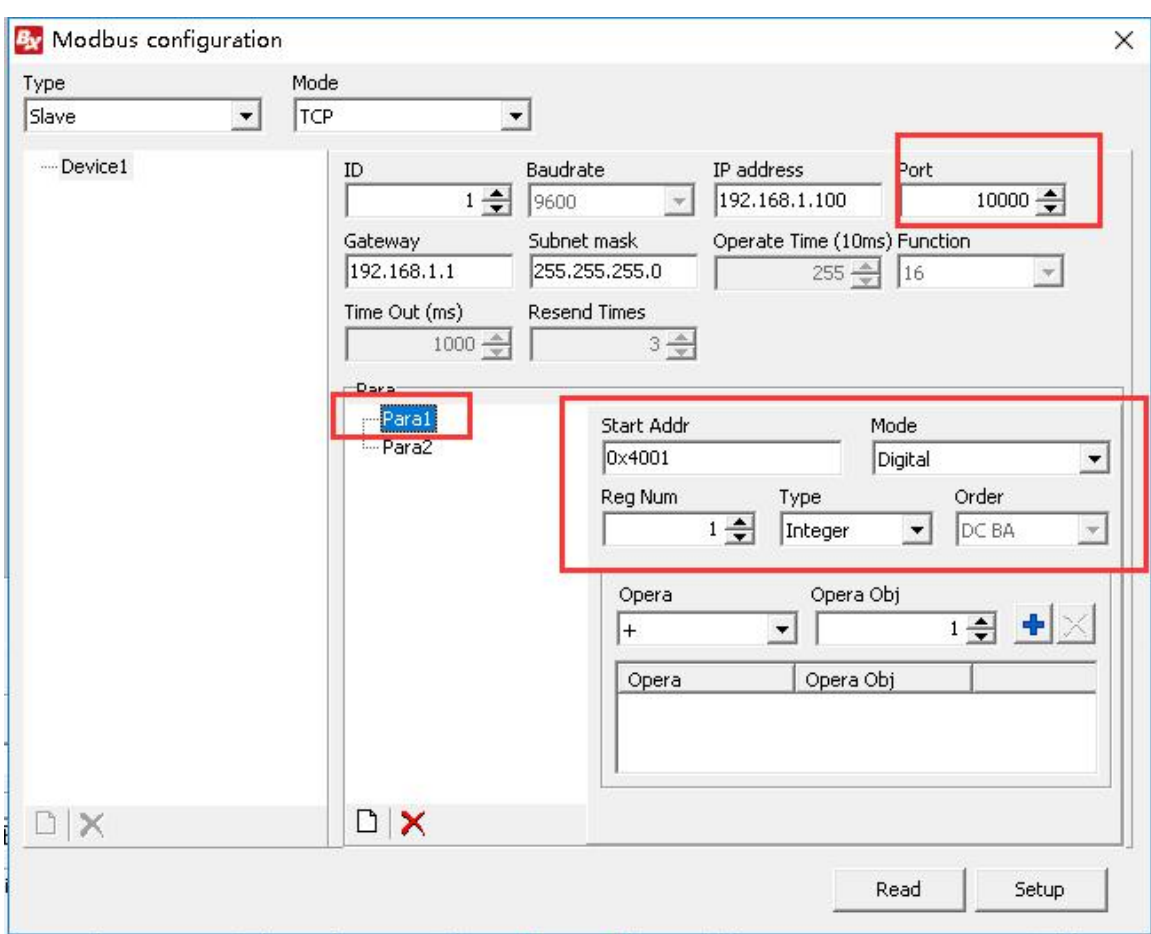
**3F9D** --> represents 0x4003 address data is 0x3F9D and register 4004 constitutes parameter 2

**70A4** --> represents 0x4004 address data is 0x70A4 and register 4003 constitutes parameter 2

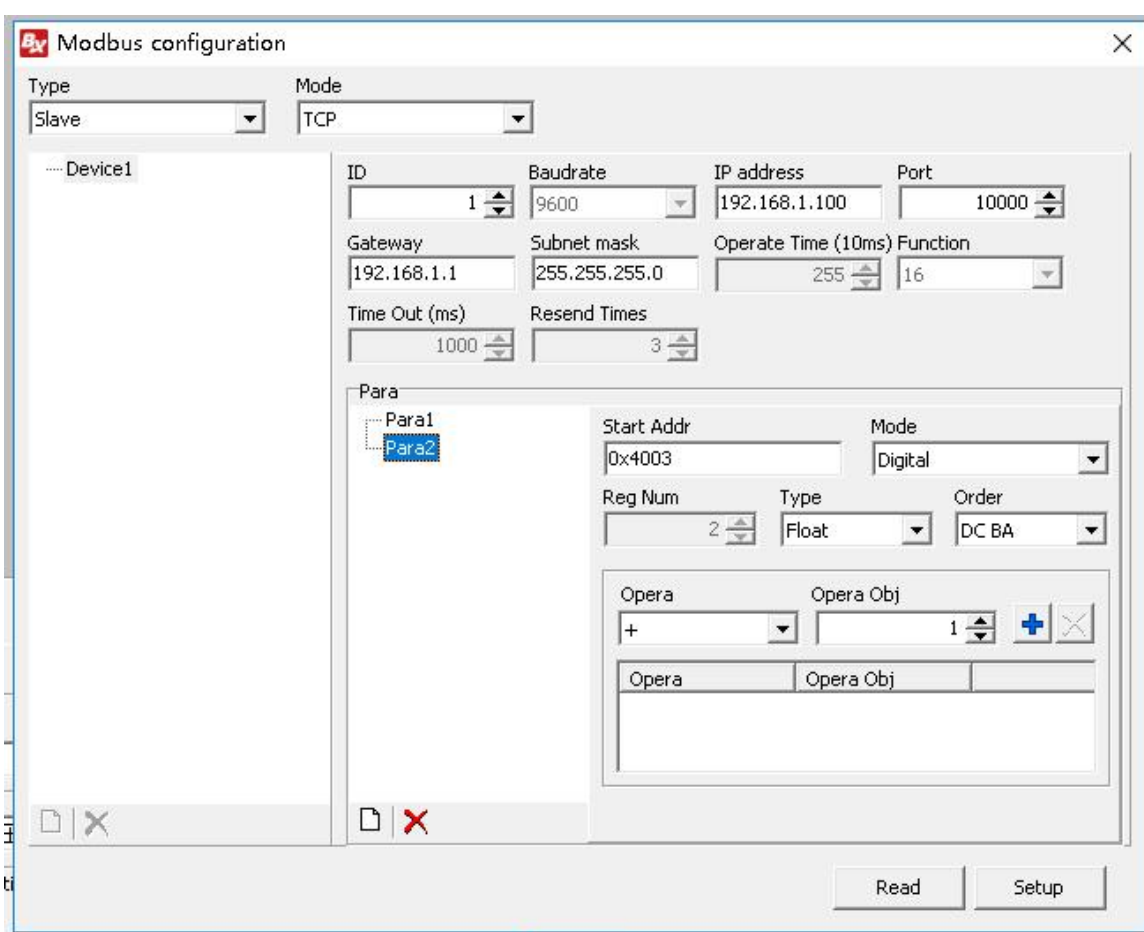
Represents parameter 1:1, parameter 2:1.23

## 5.4 Test the slave mode of the TCP

( here the IP is 16 segment,user can decide as own requirements)







send data

Use the PC Ethernet adjustment manual, create TCP Client



00 01 00 00 00 0F FF 10 40 01 00 04 08 00 01 00 00 3F 9D 70 A4

analysis:

0001 can be adjusted according to the actual situation

00 00 cannot be modified

00 0F represents the length of the data from FF to the end of the command sequence A4, a total of 15 bytes

FF suggests no change

10 represents function code. Slave mode only supports 10 function code and cannot be modified

4001 represents the starting address (0x4001), which is the smallest starting address in the entire parameter list

0004 represents the number of registers. Because of the example, the total number of registers in the entire parameter list is 4

08 represents the number of registers to be sent, i.e. 0001...So 70 A4 is 8 pieces of data

00 01...70 A4 represents each register data, every two bytes represents a register value, and the register address is summed accordingly

0001 ----> represents the data at address 0x4001 is 0x0001, indicating that the value of parameter 1 is 1

0000 ----> means 0x4002 address and the data is 0x0000

3F9D --> represents 0x4003 address data is 0x3F9D and register 4004 constitutes parameter 2

70A4 --> represents 0x4004 address data is 0x70A4 and register 4003 constitutes parameter 2

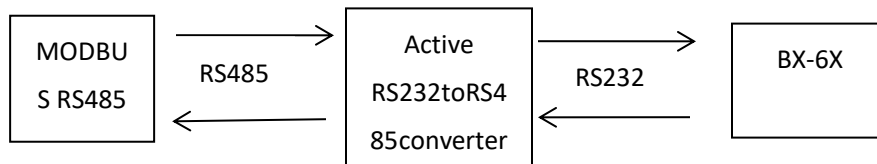
Represents parameter 1:1, parameter 2:1.23

## 6 Platform contact

if can't communicate to the platform and BX-6X or no data update from LED screen ,users can check from the following steps:

### 6.1 Communication

MODBUS 485 diagram:



Communication problems:

- ◆ Strictly check whether the terminals of the active 232 to 485 converter are connected correctly (the TX and RX lights of the active RS232 to RS485 converter will blink)
- ◆ Whether the connection lines of all devices are normal ([MODBUS RS485 is transferred from active RS232 to RS485 converter and RS232 to BX-6X controller](#)), and the data after MODBUS RS485 is

transferred from active RS232 to RS485 converter can be connected to PC, and the serial port debugging project is used to see whether the data is printed normally. The communication between RS232 and BX-6X controller can be connected to PC, and LedShowTW software is used to click "relatively" command in serial communication mode to see whether the normal communication can be achieved

- ◆ Check the transmission baud rate of MODBUS 485 platform and the BX-6X controller serial port. Of course, it is also related to the transmission data structure, that is, whether it is 8-bit data bit, 1-stop bit and no comparison

### 6.2 check platform data and MODBUS configuration

After normal communication is ensured, if no data is updated, the platform data can be checked to see if it matches [the MODBUS configuration](#)

Platform data can be printed out by the serial debugging tool for testing, mainly to check the base address of register in the platform sending command, and the base address issued by the platform can be found to be 0x0000

- ◆ Please make sure that the configuration of the serial debugging tool is the same as that of the platform, pls make sure select the HEX
- ◆ The base address issued by the platform can refer to the sample [serial communication command](#)



MODBUS pls check the [MODBUS configuration 配置](#)

---

## 7 Suggestions

- ◆ AsBX-6X supports serial communication and network communication, try to connect the two communication modes during site construction to facilitate later maintenance
- ◆ Please try to save relevant parameters of the controller (number of receiving CARDS, scanning, screen parameters, etc.) during on-site construction.

### **Precautions for construction**

- ◆ If the screen is single/dual color screen, be sure to upgrade the receiving card to a color program
- ◆ Before debugging platform data formally, please make sure that the screen can display other data normally (such as sending a graphic area for testing).
- ◆ When LedshowTW is used for serial port test, it is suggested that the line of the platform after 485 converter should be broken first, which may be affected due to the simultaneous effect of platform data and LedshowTW data