Series Gateways

ODOT-S4E2 User Manual

Modbus RTU to Modbus TCP/IP Protocol Converter

Sichuan Odot Automation System Co., Ltd.

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Sichuan Odot Automation System Co., Ltd.

Version information

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DATE	Version number	Modify content	The author
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2016-07-14	V1.1	Software configuration upgrade version	JPL
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Contents

1 Description

1.1 Function

This product, developed by Sichuan Zero Automation System Co., Ltd., is a Modbus RTU to Modbus TCP/IP protocol converter based on market demand and years of experience.

All the Modbus RTU/ASCII slave devices with RS485/RS422/RS232 interface can connect to Modbus TCP/IP network and communicate with TCP clients. Realize high speed data transmission by connecting the low speed serial device to the high-speed Ethernet.This protocol converter has two type working mode , "transparent transmission" and "mapping" , which can achieve the maximum system compatibility.

1.2 Features

◆9-36V wide range voltage input,reverse protection.

◆DC-DC isolated power,3000V isolated voltage.

◆2KV isolated protection, 10M/100Mbps auto adapting 2KV, intelligent MDI/MDIX flipping.

◆Small size, save space.

◆Address mapping mode, fast response to TCP CLP client request.

◆Connect up to 5 clients request.

◆Mapping mode supports function code:0x01,0x02,0x03,0x04,0x05,0x06,0x0F,0x10.

◆Transmission mode supports all public function code and customized function code.

◆6KB huge buffer,data transmission,larger data transmission.

◆RS485 serial ports real time refresh,short scan period, better loading capability.

◆RTU and ASCII mode optional, stronger adaptability.

◆Watchdog can be enabled, watchdog time can be set.

◆Support IAP download, update and upgrade firmware program in product

through network port.

◆ RS485 surge protection, internal terminal resistance and bias circuit enhance stability.

◆The packet sending interval can be adjusted freely, and the use is more flexible.

◆ Self diagnostic, slave devices status live monitoring.

◆ One push to rest button, restore factory setting.

◆ 35mm standard guide rail.

◆ EMC comply EN 55022:2010 & EN55024:2010 international standard.

2. Technical parameters

To make the product works better,please operate it in the range of preference parameter. All the related technical parameters are shown in "Table 1".

Table 1

Environment Parameter	
Operating temperature	-40~85℃
Storage temperature	-45~125℃
Humidity	5%~95% (no condensing)
Power parameter	
Number of power terminal	1 bus
Power range	9~36VDC
Consumption	Max.100mA@24V

Ethernet parameter	
Working mode	Transparent transmission mode, address mapping mode，Modbus TCP protocol
Number of ethernet terminal	2　RJ45，10M/100M auto-adaption router function
Net protocols	ETHERNET、ARP、IP、TCP、ICMP
Number of TCP connection	Max. 5
Serial parameter	
Number of serial	4 RS485/RS232 or 2 RS422
Serial communication mode	RTU mode & ASCII mode
Baud rate	1200~115200 bps
Checking mode	None, odd, even
Number of client	Max.124（without relay）
Mapping mode protocol Function code	0x01、0x02、0x03、0x04、0x05、0x06、0x0F、0x10
Modbus buffer	0xxxx 区（coil）：8192 Bit 1xxxx 区（discrete magnitude）：8192 Bit 3xxxx 区（input register）：2048 Word 4xxxx 区（hold register）：2048 Word 3xxxx 区（system diagnose zone）：263 Word

Hardware description

2.1 Appearance

2.2　Status in LED indicators

There are total 6 LED status indicators.The symbol definition and status indicators are shown in "Table 2".

Table 2

| Symbol	Definition	Status	Description
PWR	power supply indicators	ON	Power is supplied to the unit
		OFF	No power is supplied to the unit
ETH	status indicator	ON	TCP gateway communication error
		OFF	TCP gateway communication normal
TX1	Series port 1 sending indicator	Flashing	Series port 1 is sending data
		OFF	Series port 1 is not sending data
RX1	Series port 1 receiving indicator	Flashing	Series port 1 is receiving data
		OFF	Series port 1 is not receiving data
TX2	Series port 2 sending indicator	Flashing	Series port 2 is sending data
		OFF	Series port 2 is not sending data
RX2	Series port 2 receiving indicator	Flashing	Series port 2 is receiving data
		OFF	Series port 2 is not receiving data

2.3　Terminals definition

Device wiring adopts10Pin 3.81mm gap Plug-in terminals, the terminal definition of RS485 interface are shown in "table 3".

Table3

No.	RS485		RS232	RS422	
	symbol	Wiring definition	Wiring definition	Wiring definition	
1	1R/S-	Serial port 1 RS485-	Serial port 1 RS232_RX	RS422 channel 1	RS422 Send positive end
2	1T/S+	Serial port 1 RS485+	Serial port 1 RS232_TX		RS422 Send negative
3	GND	Shield	Public land		Shield
4	2 R/S-	Serial port 2 RS485-	Serial port 2 RS232_RX		RS422 Positive reception
5	2 T/S+	Serial port 2 RS485+	Serial port 2 RS232_TX		RS422 Negative reception
6	GND	Shield	Public land		Shield
7	3 R/S-	Serial port 3 RS485-	Serial port 3 RS232_RX	RS422 channel 2	RS422 Send positive end
8	3T/S+	Serial port 3 RS485+	Serial port 3 RS232_TX		RS422 Send negative
9	GND	Shield	Public land		Shield
10	4R/S-	Serial port 4 RS485-	Serial port 4 RS232_RX		RS422 Positive reception
11	4 T/S+	Serial port 4 RS485+	Serial port 4 RS232_TX		RS422 Negative reception
12	GND	Shield	Public land		Shield
13	PE	Ground terminal			
14	PE	Ground terminal			
15	V-	Power input negative			

16	V+	power input positive

2.4. Reset switch
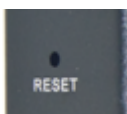
Click the reset button by the paper clips. When all lights flash once,it means successful reset and the technical parameters of the gateway are as follows：

parameter name		Defaults
Ethernet side	Protocol converter IP	192.168.1.254
	Subnet mask	255.255.255.0
	LAN gateway IP	192.168.1.1
	Modbus TCP data port	502
	Configure the port	1024
	Modbus-TCP watchdog time	30S
	The enabling of Modbus-TCP watch dog	enabling

	Gateway work mode	Transtransmission mode
	Gateway station number	247
Serial port side	Serial port mode	Master station mode
	Protocol type of Modbus	Modbus RTU
	Serial port baud rate	9600bps
	Check digit	No check
	Data bits	8bit
	Stop bit	1bit
	Receive character interval	3.5t
	Message sent	0
	Timeout processing	Data retention
	Slave response timeout	500ms

2.5．Size

3 HOW TO USE THE PROTOCOL CONVERTER

3.1．The description of protocol converter

3.1.1．Serial working mode

There are two types of working modes :**Master mode and slave mode**.

When the serial port works in master mode, the serial port can connect up to 31 Modbus RTU/ASCII slave devices without relaying.This mode is mainly used for data communication between Modbus TCP master and Modbus RTU/ASCII

slaves.

When the serial port works in slave mode,the serial port can connect to a Modbus RTU/ASCII master device. This mode can be applied as follows:

(1) Data Communication Between Modbus TCP Client and Modbus RTU/ASCII Master Station.

(2) Data communication between Modbus RTU/ASCII masters.

(3) Modbus TCP client and a Modbus RTU/ASCII master communicate with a Modbus RTU/ASCII slave at the same time.

3.1.2．Gateway working mode

There are two types of working modes: transparent mode and mapping mode .When "Transparent" mode is in a factory setting without data cache nor editing the address mapping table. The gateway directly sends the instructions of the TCP/IP clients to Modbus RTU/ASCII slave station equipment, and waits for a slave station devices response after getting the instructions from the Modbus TCP/IP clients.The data will directly be returned to the TCP clients.

  "Mapping"mode adopts the way of data cache and need to edit the station address mapping table. The gateway polls each of the slave station after power on, and stores the data in the buffer cache. Directly,the gateway will read the data directly from the data buffer, and then returned to the TCP clients after receiving Modbus TCP/IP clients instructions.This method can greatly reduces the waiting time for the client to access to the station and improves the refresh rate.

3.1.3. Data storage area

Data storage is divided into five parts.

Part 1. "**Coil" (DO)** storage area, **8192** points in total.

Part 2. "**Discrete magnitude input" (DI)** storage area,**8192** points in total.

Part 3. **"Input register" (AI)**storage area, **2048** points in total.

Part 4. "**Hold register"(AO)** storage area, **2048** points in total.

Part 5. "**System diagnostic" (DO)** storage area,storage from the station

equipment working condition, 263 points in total. Access to the "**system diagnostic**" area can obtain the slave station's information and used to setting the disconnection alarm.

The distribution of the data storage area and the scope of the address coding are shown in table 5.

Table5

Item	Storage type	Description	Storage capability	Address range
1	Area 0	coil	8192 Bit	0x0000~0x1FFF
2	Area 1	Discrete magnitude input	8192 Bit	0x0000~0x1FFF
3	Area 3	Input register	2048 Word	0x0000~0x07FF
4	Area 4	Hold register	2048 Word	0x0000~0x07FF
5	Area 3	System diagnostic	263 Word	0x2000~0x2106

3.1.4   System diagnostic   area

The diagnosis system is divided into two parts.

The first part: The address 0x2000-0x200F is in total of 16 word that is 256 bits as the "slave station error indicator area". The number 1-247 are respectively corresponding to slave stations 1-247and keep 248-256 bit number. When the error occurres from the station communication, the corresponding bit of the station address is set to 1. The corresponding error indicator bit will be cleared automatically after the slave station to return to normal. Its data encoding format is shown in Table 6.

Table6

	BIT	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
address 0x2000	Bit number	16	15	14	13	12	11	10	9
	BIT	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Bit number	8	7	6	5	4	3	2	1
address 0x2001	BIT	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
	Bit number	32	31	30	29	28	27	26	25
	BIT	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Bit number	24	23	22	21	20	19	18	17
.									
.									
.									
address 0x200F	BIT	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
	Bit number	x	x	x	x	x	x	x	x
	BIT	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Bit number	x	247	246	245	244	243	242	241

The second part :Address 0x2010-0x2106 Word ,total 247 words, as "from the station status indicator" area. Reading the area could obtain the salve stations' current working status, the data encoding format is as shown in Table 7.

Table7

address 0x2010	Slave station1	Byte1	Byte0
		Function code	Error code
address 0x2011	Slave station2	Byte1	Byte0
		Function code	Error code
.			
.			
.			
address0x 2106	Slave station 247	Byte1	Byte0
		Function code	Error code

Each Word is divided into high and low two bytes, Byte1 are the high byte, indicating the current implementation of the mapping to the function code of the slave stations. Byte0 are the low byte, indicating the current error code of the salve stations' communication. The specific meaning of the error code of the slave stations is as shown in table 8.

Table8.

Error code	indication
0x00	Slave stations operates normally
0x01	Illegal function code

0x02	Illegal data address
0x03	Illegal data value
0x04	Slave station equipment failure
0x06	Busy slave station equipment
0x07	Parity check error
0x09	CRC check error
0x0B	Response timeout from devices
0x0F	Write response error from slave devices

3.2．Default parameters

Parameter name		Defaults
Ethernet side	Protocol converter IP	192.168.1.254
	Subnet mask	255.255.255.0
	LAN gateway IP	192.168.1.1
	Modbus TCP data port	502
	Configure the port	1024
	Modbus-TCP watchdog time	30S

	The enabling of Modbus-TCP watch dog	enabling
	Gateway working mode	Transparent mode
	Gateway station number	247
Serial port side	Serial operating mode	Master mode
	Modbus protocol type	Modbus RTU
	Serial baud rate	9600bps
	Check digit	No check
	Data bits	8bit
	Stop bit	1bit
	Receive character interval	3.5t
	Message sent	0
	Timeout processing	Data retention
	Slave response timeout	500ms

3.3．Typical description of application

3.3.1 Communicate between Modbus TCP client and Modbus RTU/ASCII slave station

3.3.1.1．Application topology

上位机
（TCP客户端）

其他TCP客户端（如PLC）

以太网

ODOT-S2E1

RS485

远程I/O   PLC   仪表   变频器   其他Modbus RTU/ASCII从站设备
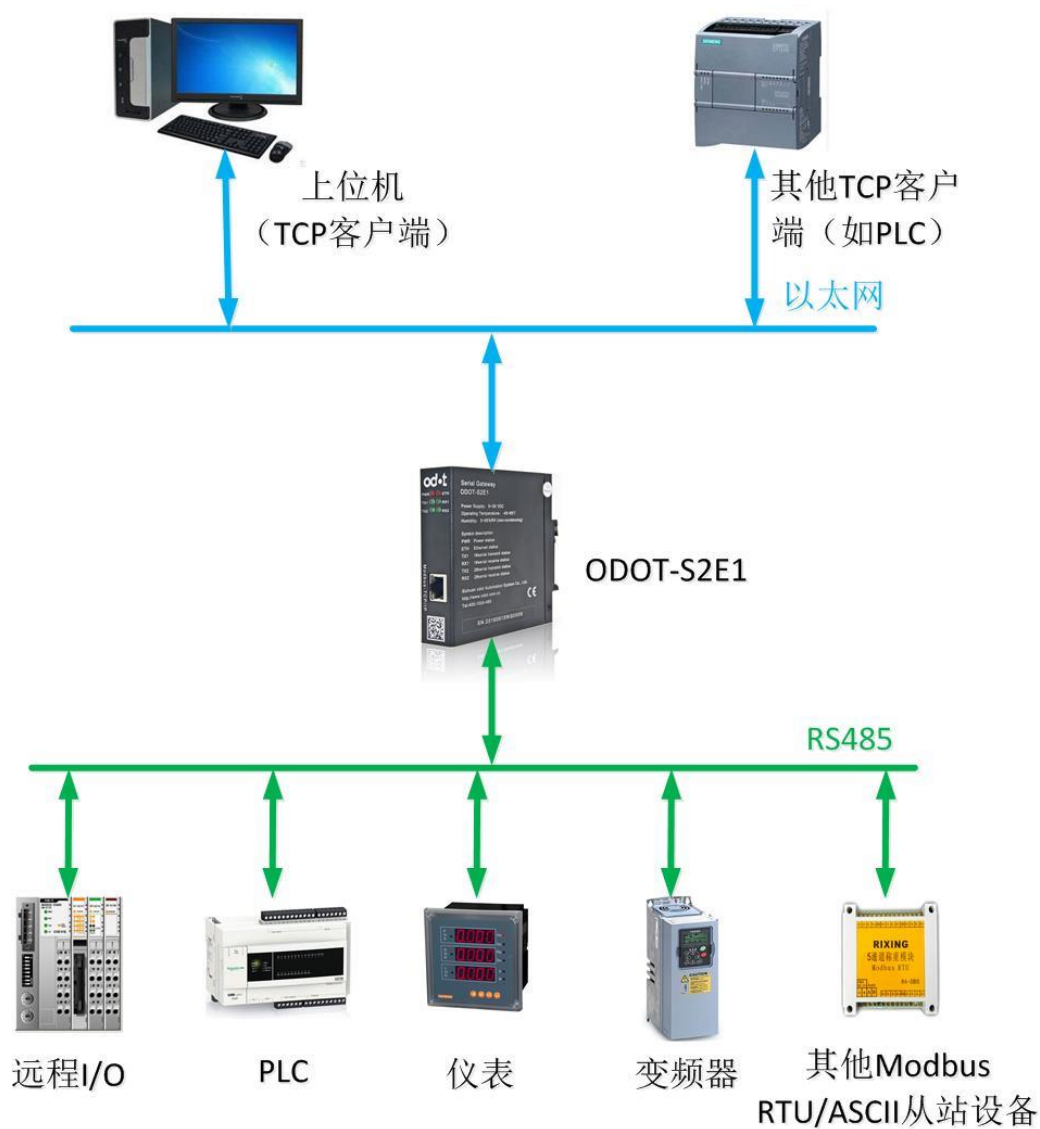
Chart 3.1

3.3.1.2．Transparent transmission mode configuration

1. Open configuration software "odot MGCC Config", Right click the slave configuration page and select "Add Device",Add "ODOT-S4 E2".
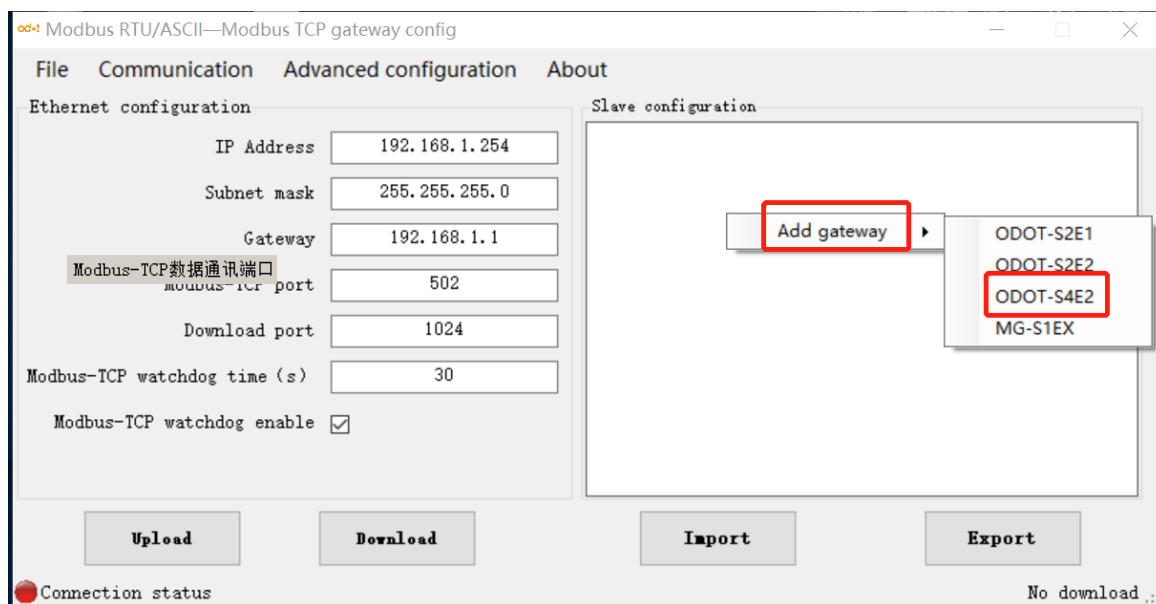
2．Double-click "ODOT-S4E2" or right-click "ODOT-S4E2", Select "common device attributes", Set the gateway working mode to Transparent in the popup page.。
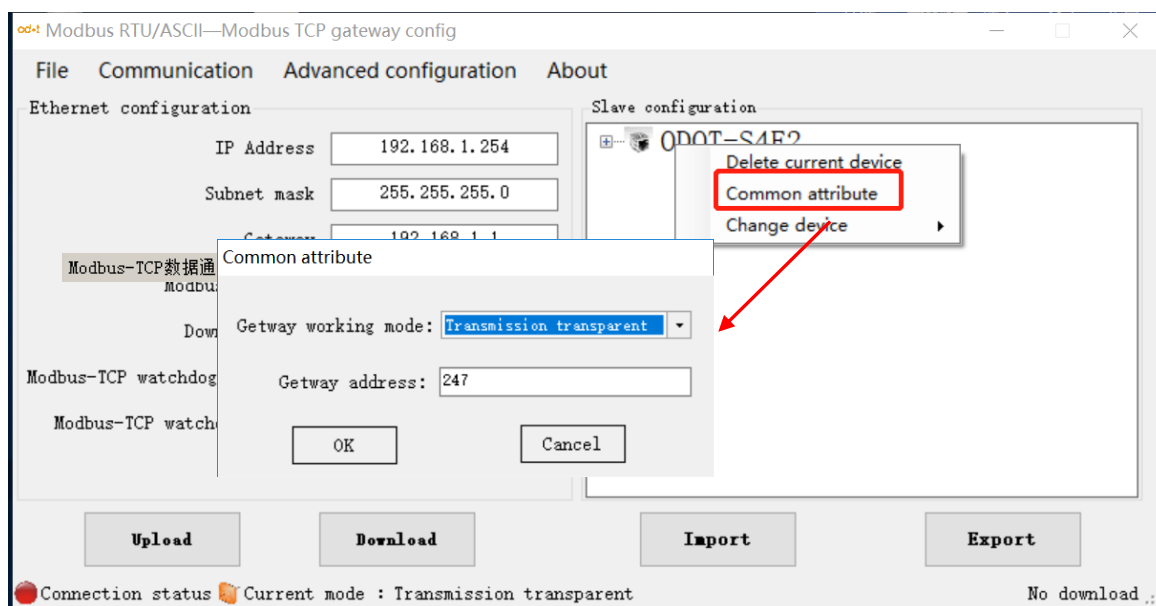
3. Double-click "COM1"，"COM2","COM3"，"COM4"or right-click "COM1"，"COM2","COM3"，"COM4" and click "Serial Properties"，the "Serial Settings" window pops up. After setting the communication parameters, click the "OK" button to save and return. Take COM1 as an example.

The meaning of each parameter is as follows：

Operating mode：

It is used to set up gateway as master station or slave station in the network. Default is master mode.

Modbus protocol type：

it's used to set up the gateway's protocol type of the network between the communication of the serial port and other connected devices.You can choose Modbus RTU or Modbus ASCII. Please keep this parameter in accord with the device that is connected to the serial port.

Baud rate：

Serial port baud rate: optional range is 1200~115200bps and default is 9600bps, Please keep this parameter in accord with the device that is connected to the serial port.

Check Digit：

no parity, odd parity, even parity, no default can be chose. Please keep this parameter in accord with the device that is connected to the serial port.

Stop bit：

You can choose 1 stop bit or 2 stop bits. Default is 1 stop bit. Please keep this parameter   in accord with the device that is connected to the serial port.

Receive character interval：

when receiving packets Frame interval detection time can be chose from 1.5t to 200t. Default is 3.5t. In general, you don't have to change this parameter.

Packet transmission interval：

Interval time for sending Modbus commands (Delayed time from receiving the slave response message to sending the next command) can be set from 0ms-65535ms. Default is 0ms. It is recommended to set 100ms.It can Prevent connected devices from communication failure due to slow response.

Timeout processing：

Read data from slave station. Data processing mode can choose "data clear" or "data retention"if slave station response timeout. Default is "Data Hold mode".This parameter is only valid for Modbus read command. Please set this value according to actual needs.

4. Select "COM1" , "COM2" ,"COM3" , "COM4".Take COM1 as an example .
Right click to select Add Slave, input "Slave Name", fill in "Slave Station Number"
and slave "Response Timeout" time, click "Confirm" to return. The station number
of the slave station cannot be the same and cannot be the same as the station
number of the device. Range of the slave station address is between 1 and
247.The name of slave station can not be the same under the same serial port.
The "Response timeout" time needs to be obtained from the manual of the device.
It is recommended to set up more 500ms.Click "Confirm".

5．Configure the Ethernet parameters of the gateway by configuring the "Ethernet Configuration" on the left half of the software.

Some of the parameters are as follows：

Modbus gateway IP：The device's own IP address;

Subnet mask：Subnet mask of the device;

LAN gateway IP：Gateway IP address of the network where the device resides;

Modbus-TCP data communication port：Generally 502；

Configure the port：The configuration software downloads the configuration to the device through this port of the device；

Modbus-TCP watchdog time：The time interval from when the gateway receives the last Modbus TCP packet to the automatic restart;

Note: Automatic restart of the gateway can release connection resources that have not been used for a long time in time;

Modbus-TCP watchdog enable：Whether the watchdog function is enabled.

6. Set the destination gateway address that you want to download and

download communication port number through

"Communication" — "Communication Configuration". The default is the

gateway factory default IP 192.168.1.254 and port number 1024.

7．Click the button "Download Gateway Configuration ".Download configuration

parameters to the gateway.After the download is successful, the "Download

successful" prompt appears in the Status Bar at the lower right.After the download

is successful, the gateway restarts automatically.then the gateway go into running

state.

If the download fails, please check out whether the computer's IP address and

gateway IP address are in the same network segment. Then check whether the

gateway IP address is set correctly.If you forget the gateway IP address, you can

reset the gateway through the reset button，After reset, the gateway IP address is

the factory default IP address.

Click "Import Profile" and "Export Profile" to import and save the configuration

file to the local disk.Click "Upload Gateway Configuration" to upload the current gateway configuration to the software.

Note: When downloading and uploading, you need to ensure that the computer and the gateway are in the same network segment.


8．After completing the above settings, the Modbus TCP client can use the Modbus TCP protocol to access the slave device 16DI which the station number is 1 though the gateway IP address 192.168.1.254, the Modbus data communication port 502 and the slave station number 1.

3.3.1.3 Mapping mode configuration

1. Open the configuration software "odot MGCC Config".Right-click on the configuration page of slave station and select "Add Device" ,then add "ODOT-S4E2".
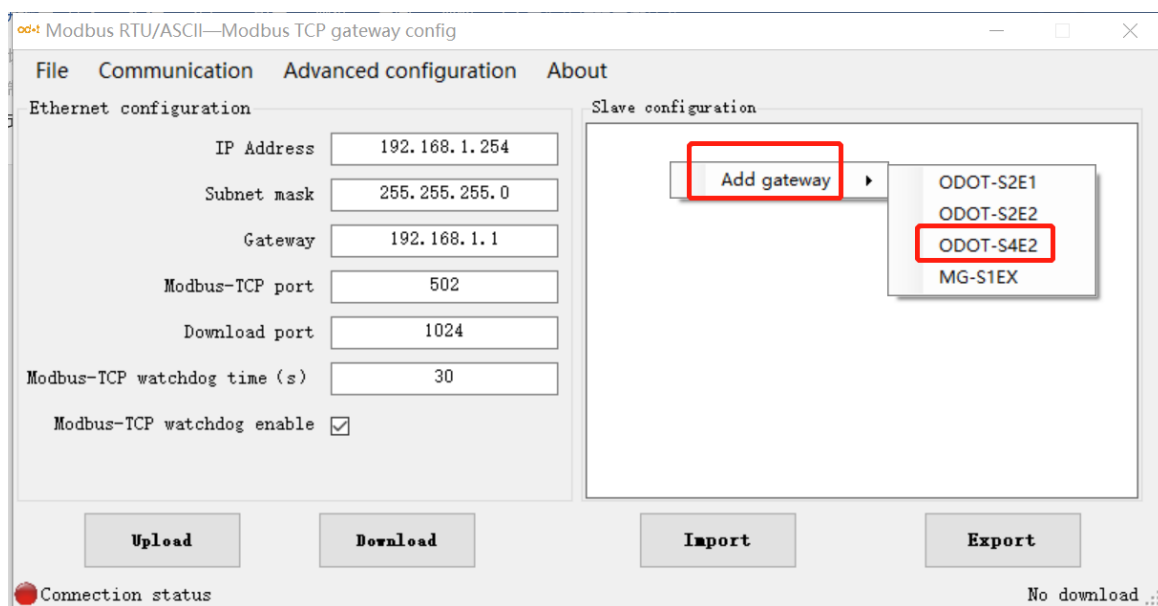
2．Double-click "ODOT-S4E2", or right-click "ODOT-S4E2". Select "Common Properties of Device Serial Port".Set the gateway working mode to "Mapping Mode" in the popup setting page.
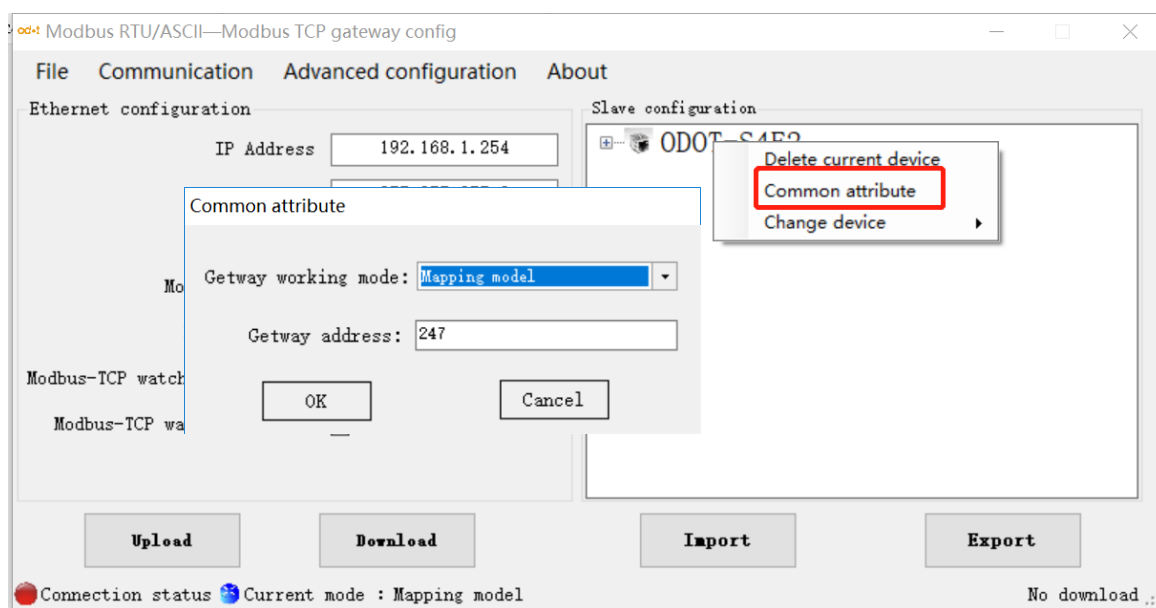
3. Double-click "COM1", "COM2" or right-click "COM1", "COM2" .Click "Serial Properties" to bring up the "Serial Setting" window. Set up the communication parameters,then click the "Confirm" button to save and return.

The meaning of each parameter is as follows：

Operating mode：

It is used to set up gateway as master station or slave station in the network. Default is master mode.

Modbus protocol type：

it's used to set up the gateway's protocol type of the network between the communication of the serial port and other connected devices.You can choose Modbus RTU or Modbus ASCII. Please keep this parameter in accord with the device that is connected to the serial port.

Baud rate：

Serial port baud rate: optional range is 1200~115200bps and default is 9600bps, Please keep this parameter in accord with the device that is connected to the serial port.

Check Digit：

no parity, odd parity, even parity, no default can be chose. Please keep this parameter in accord with the device that is connected to the serial port.

Stop bit：

You can choose 1 stop bit or 2 stop bits. Default is 1 stop bit. Please keep

this parameter   in accord with the device that is connected to the serial port.
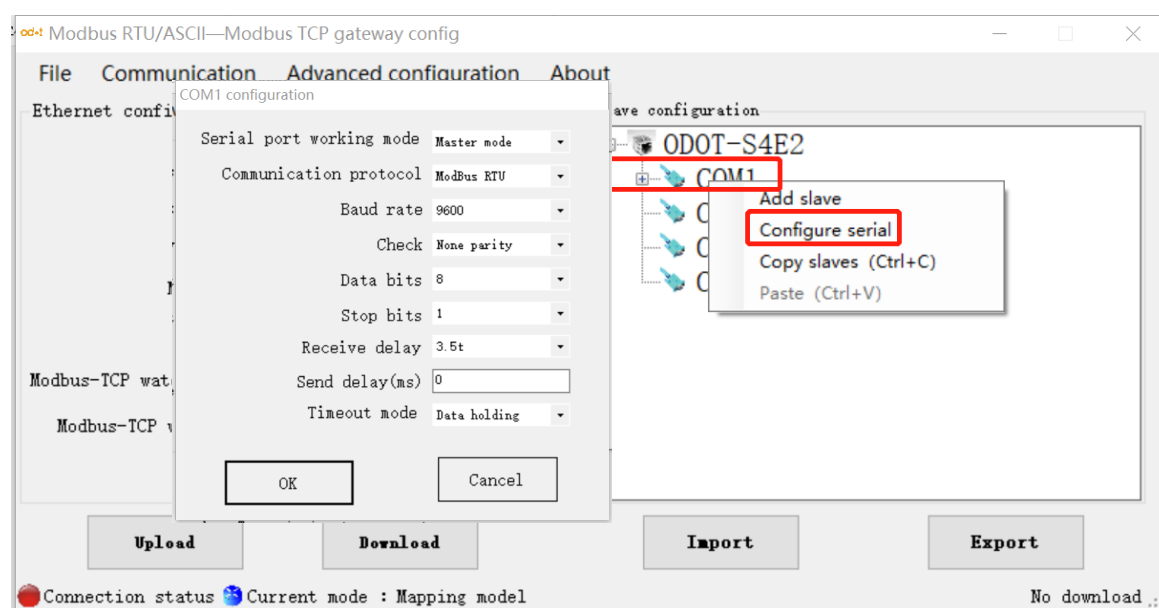
Receive character interval：

when receiving packets Frame interval detection time can be chose from 1.5t to 200t. Default is 3.5t. In general, you don't have to change this parameter.
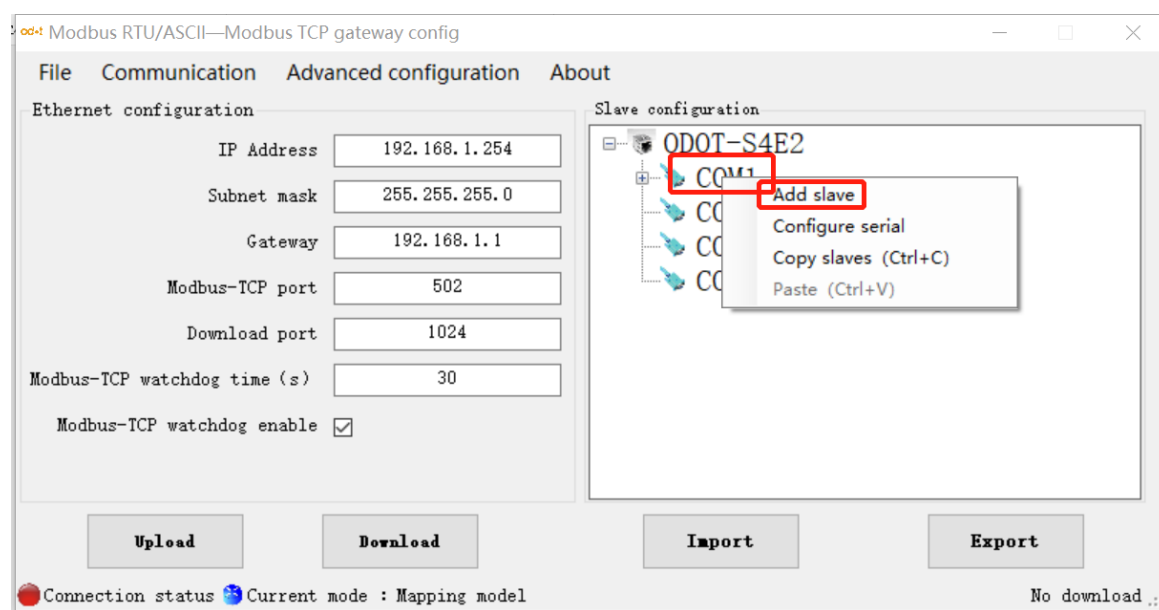
Packet transmission interval：

Interval time for sending Modbus commands (Delayed time from receiving the slave response message to sending the next command) can be set from 0ms-65535ms. Default is 0ms. It is recommended to set 100ms.It can Prevent connected devices from   communication failure due to slow response.

Timeout processing：

Read data from slave station. Data processing mode can choose "data clear" or "data retention"if slave station response timeout. Default is "Data Hold mode".This parameter is only valid for Modbus read command. Please set this value according to actual needs.

4. Select "COM1" or "COM2". Right-click to select "Add Slave".Input "Slave name". fill in "Slave station number".Then configure Modbus function code, start address of slave data, number of data, start address of gateway mapping area and response timeout time and if "event output"(only when the data changes, the gateway will execute this command once) according to the communication manual of slave station equipment. Under the same serial port the station number of the slave station cannot be the same and cannot be the same as the station number of the station. Range of the slave station address is between 1 and 247. Under the same serial port the slave station's name cannot be the same. After completing the settings, click "Save Current Mapping Table Edit".

5．Configure the Ethernet parameters of the gateway by the "Ethernet Configuration" on the left of the software.

Some of the parameters are as follows：

Modbus gateway IP：The device's own IP address;

Subnet mask：Subnet mask of the device;

LAN gateway IP：Gateway IP address of the network where the device resides;
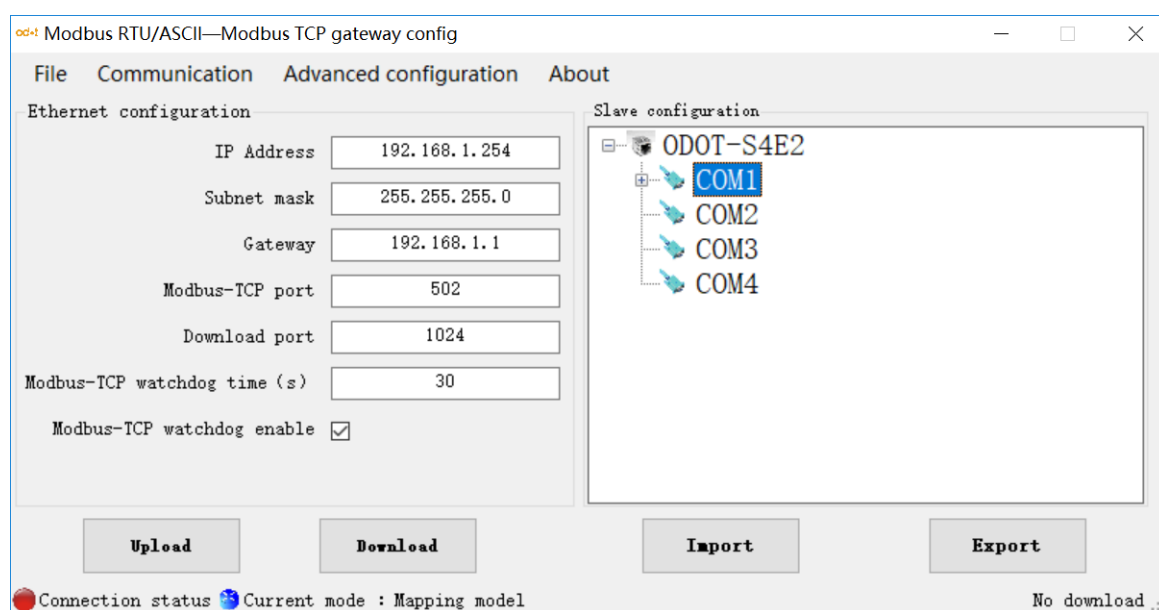
Modbus-TCP data communication port：Generally 502；

Configure the port：The configuration software downloads the configuration to the device through this port of the device；

Modbus-TCP watchdog time：The time interval from when the gateway receives the last Modbus TCP packet to the automatic restart;
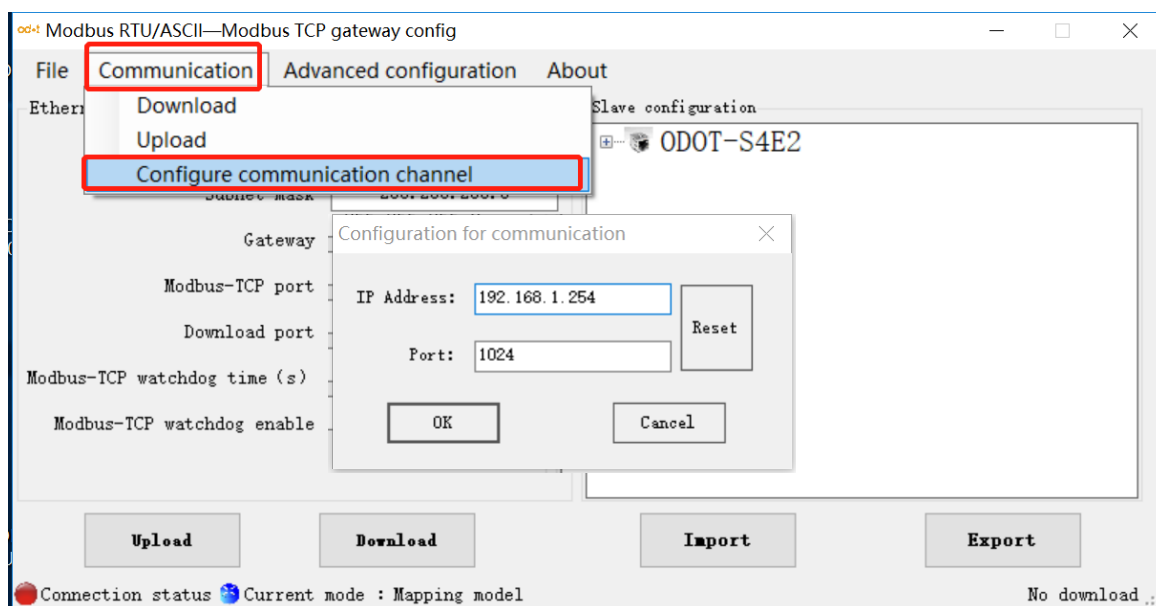
Note: Automatic restart of the gateway can release connection resources that have not been used for a long time in time;

Modbus-TCP watchdog enable：Whether the watchdog function is enabled.

6. Set the destination gateway address that you want to download and download communication port number through

"Communication" — "Communication Configuration". The default is the gateway factory default IP 192.168.1.254 and port number 1024.
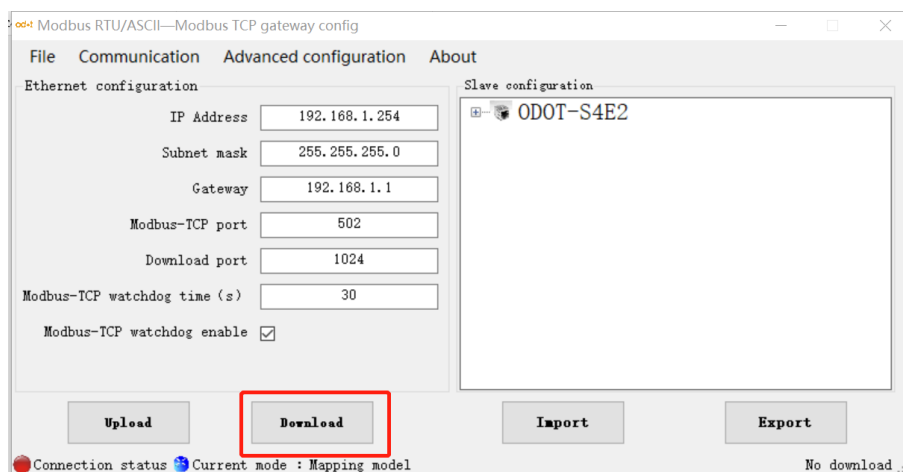
7．Click the button "Download Gateway Configuration ".Download configuration parameters to the gateway.After the download is successful, the "Download successful" prompt appears in the Status Bar at the lower right.After the download is successful, the gateway restarts automatically.then the gateway go into running state.

If the download fails, please check out whether the computer's IP address and gateway IP address are in the same network segment. Then check whether the gateway IP address is set correctly.If you forget the gateway IP address, you can reset the gateway through the reset button，After reset, the gateway IP address is the factory default IP address.

Click "Import Profile" and "Export Profile" to import and save the configuration file to the local disk.Click "Upload Gateway Configuration" to upload the current gateway configuration to the software.

Note: When downloading and uploading, you need to ensure that the computer and the gateway are in the same network segment.

8．After completing the above settings, the Modbus TCP client can use the Modbus TCP protocol to access the slave device 16DI which the station number is X(0<X<248 and X cannot be the device station number for the gateway) though the gateway IP address 192.168.1.254, the Modbus data communication port 502 and the slave station number 1.

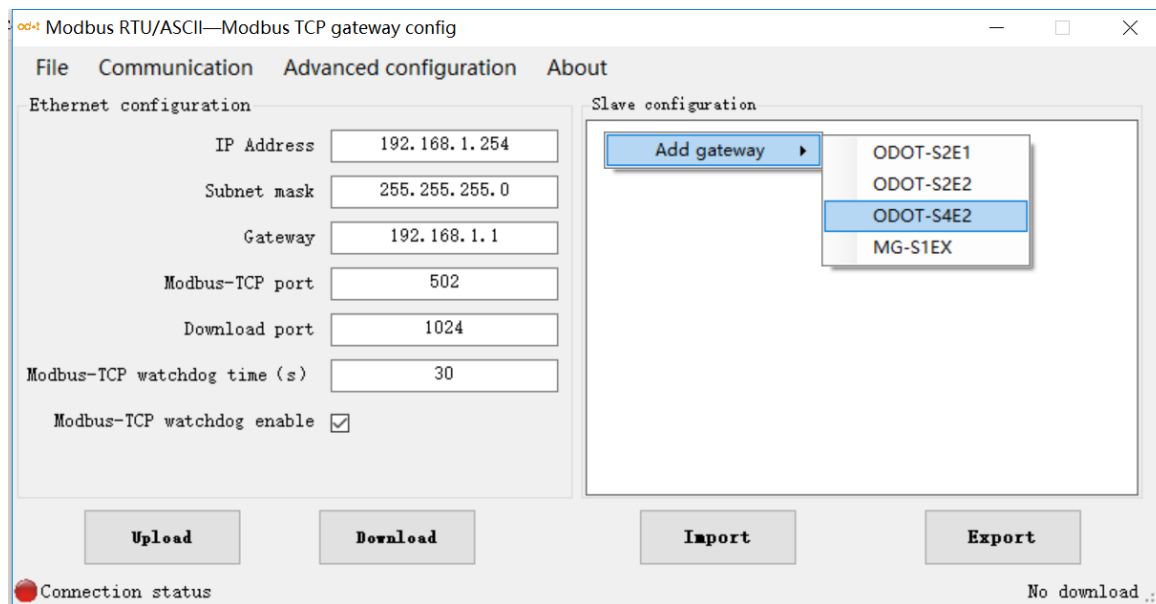3.3.2．Realize Modbus TCP Client and Modbus RTU/ASCII Master Station Communication

3.3.2.1．Application
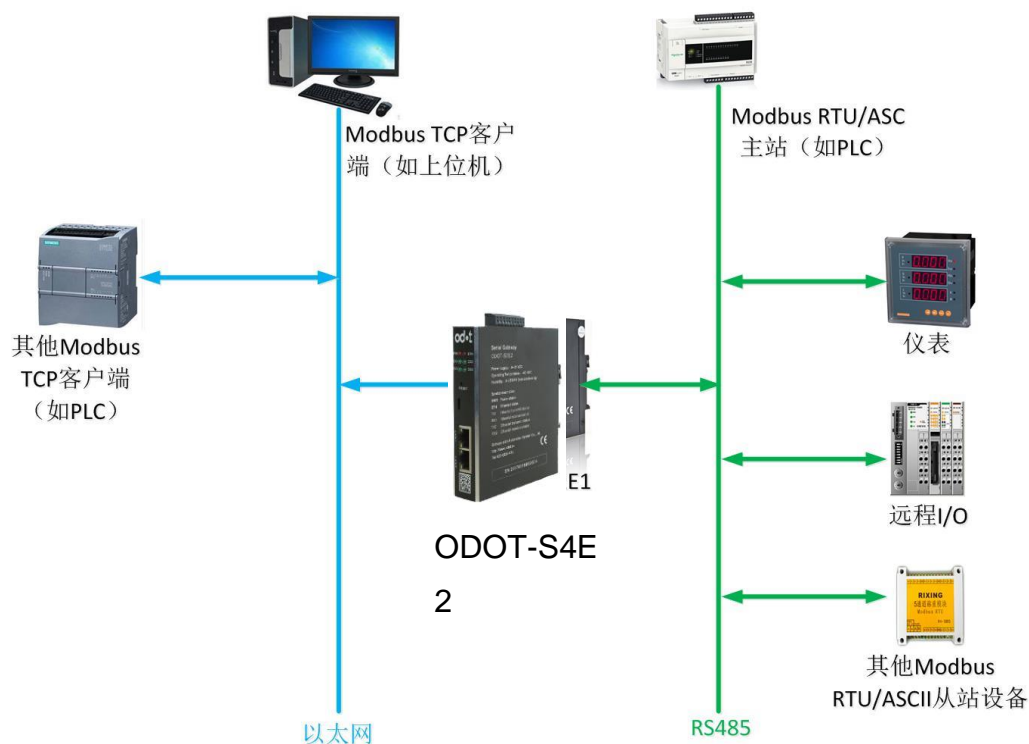
Pic. 3.16Application

3.3.2.2．Setup

1. Open the configuration software "odot MGCC Config".Right-click on the configuration page of slave station and select "Add Device" ,then add "ODOT-S4E2".

2．Double-click "ODOT-S4E2" or right-click "ODOT-S4E2", Select "common device attributes", Set the gateway as the station number of the Modbus RTU/ASCII slave on the popup setup page.
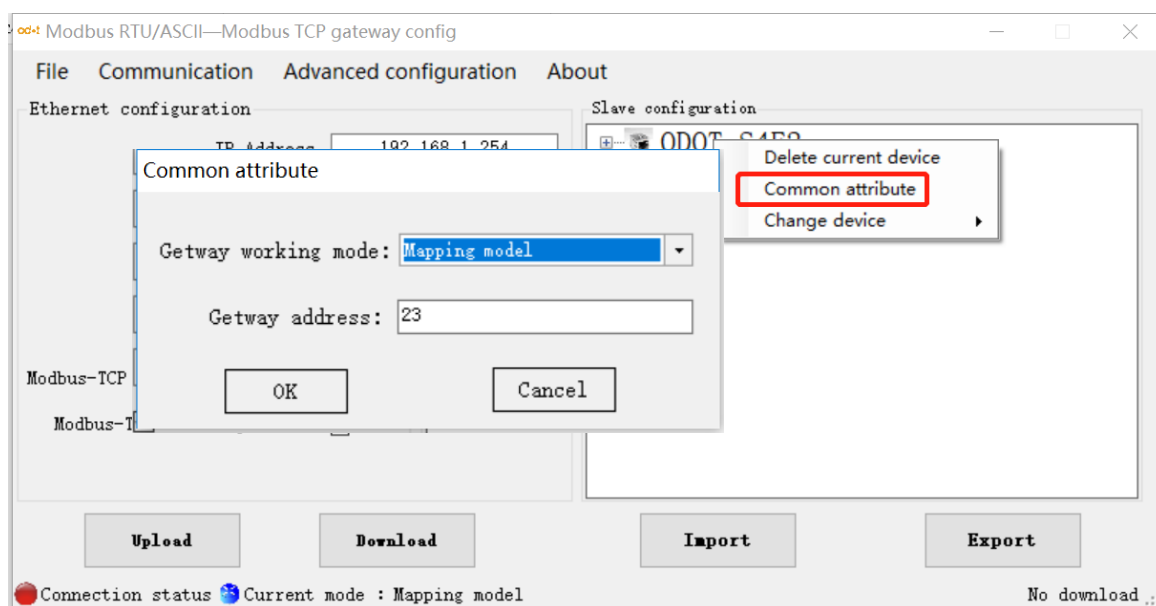
3. Double-click "COM1", "COM2" ,"COM3", "COM4" or right-click "COM1", "COM2" ,"COM3", "COM4".Click "Serial Properties" to bring up the "Serial Setting" window. Set up the communication parameters,Set serial operating mode as slave mode. Then click the "Confirm" button to save and return.

The meaning of each parameter is as follows：

Operating mode：

It is used to set up gateway as master station or slave station in the network. Default is master mode. Here is set up slave mode.

Modbus protocol type：

it's used to set up the gateway's protocol type of the network between the communication of the serial port and other connected devices.You can choose Modbus RTU or Modbus ASCII. Please keep this parameter in accord with the device that is connected to the serial port.

Baud rate：

Serial port baud rate: optional range is 1200~115200bps and default is 9600bps, Please keep this parameter in accord with the device that is connected to the serial port.

Check Digit：

no parity, odd parity, even parity, no default can be chose. Please keep this parameter in accord with the device that is connected to the serial port.
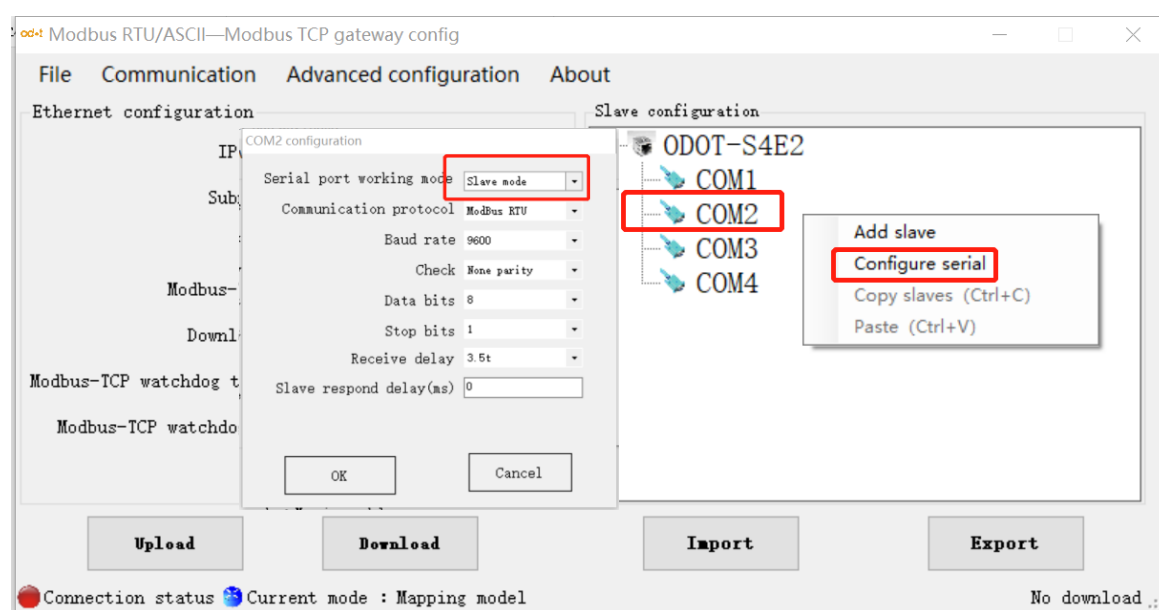
Stop bit：

You can choose 1 stop bit or 2 stop bits. Default is 1 stop bit. Please keep this parameter in accord with the device that is connected to the serial port.

Receive character interval：

When receiving packets Frame interval detection time can be chose from 1.5t to 200t. Default is 3.5t. In general, you don't have to change this parameter.

Slave response delay：

The gateway acts as a Modbus RTU/ASCII slave, from the time it receives a message from the master to when it sends a reply. This parameter relates to the performance of the master.

4．Configure the Ethernet parameters of the gateway by the "Ethernet Configuration" on the left of the software.

Some of the parameters are as follows：

Modbus gateway IP：The device's own IP address;

Subnet mask：Subnet mask of the device;

LAN gateway IP：Gateway IP address of the network where the device resides;

Modbus-TCP data communication port：Generally 502；

Configure the port：The configuration software downloads the configuration to the device through this port of the device；

Modbus-TCP watchdog time：The time interval from when the gateway receives the last Modbus TCP packet to the automatic restart;

Note: Automatic restart of the gateway can release connection resources that have not been used for a long time in time;

Modbus-TCP watchdog enable：Whether the watchdog function is enabled.

5. Set the destination gateway address that you want to download and download communication port number through

"Communication" — "Communication Configuration". The default is the gateway factory default IP 192.168.1.254 and port number 1024.

6．Click the button "Download Gateway Configuration ".Download configuration parameters to the gateway.After the download is successful, the "Download successful" prompt appears in the Status Bar at the lower right.After the download is successful, the gateway restarts automatically.then the gateway go into running state.

If the download fails, please check out whether the computer's IP address and gateway IP address are in the same network segment. Then check whether the

gateway IP address is set correctly.If you forget the gateway IP address, you can reset the gateway through the reset button，After reset, the gateway IP address is the factory default IP address.
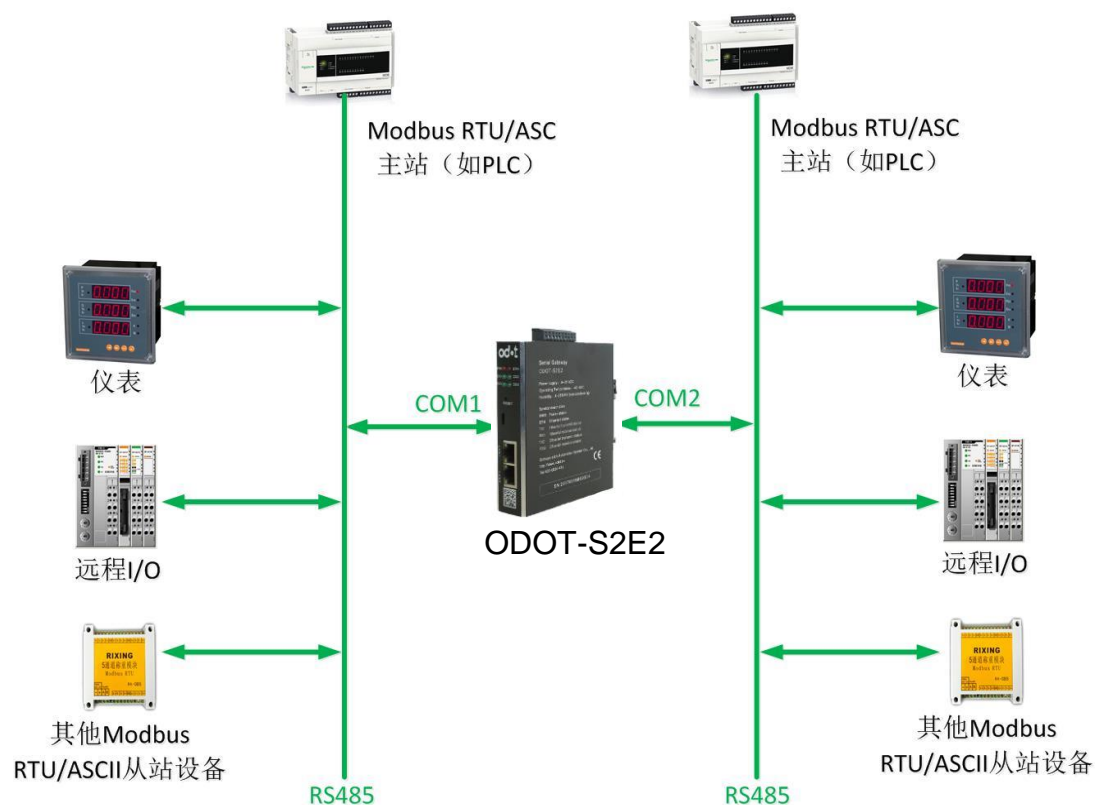
Click "Import Profile" and "Export Profile" to import and save the configuration file to the local disk.Click "Upload Gateway Configuration" to upload the current gateway configuration to the software.

Note: When downloading and uploading, you need to ensure that the computer and the gateway are in the same network segment.

7．After setting up, connect the gateway to Modbus TCP network by Ethernet and connect to the Modbus RTU/ASCII network by the corresponding serial port (routine configuration is COM2). The gateway acts as a Modbus TCP server in the Modbus TCP network and as a slave in the Modbus RTU/ASCII network. Modbus TCP client can read and write" gateway internal data storage area" through Modbus TCP protocol. Modbus RTU/ASCII master can also read and write "gateway internal data storage area "through Modbus RTU/ASCII protocol.The gateway realize communication between the Modbus TCP client and the Modbus RTU/ASCII master by taking the role of a data relay.
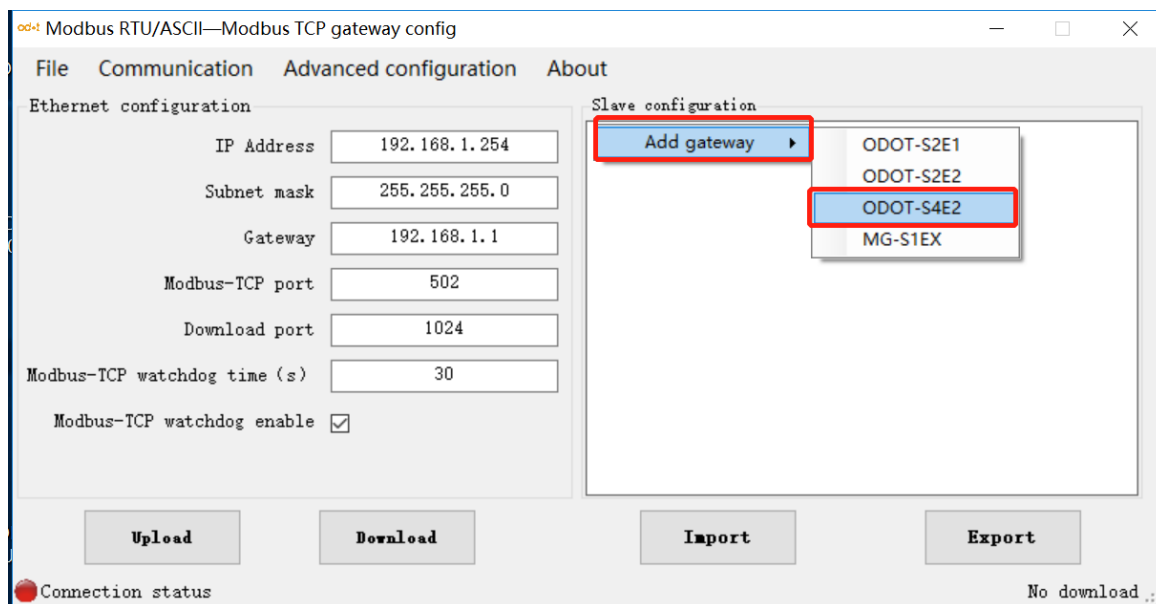
3.3.3．Realize communication between Modbus RTU/ASCII master stations

3.3.3.1．Application

Modbus RTU/ASC 主站（如PLC）　　　　Modbus RTU/ASC 主站（如PLC）

仪表　COM1　ODOT-S2E2　COM2　仪表

远程I/O　　　　远程I/O

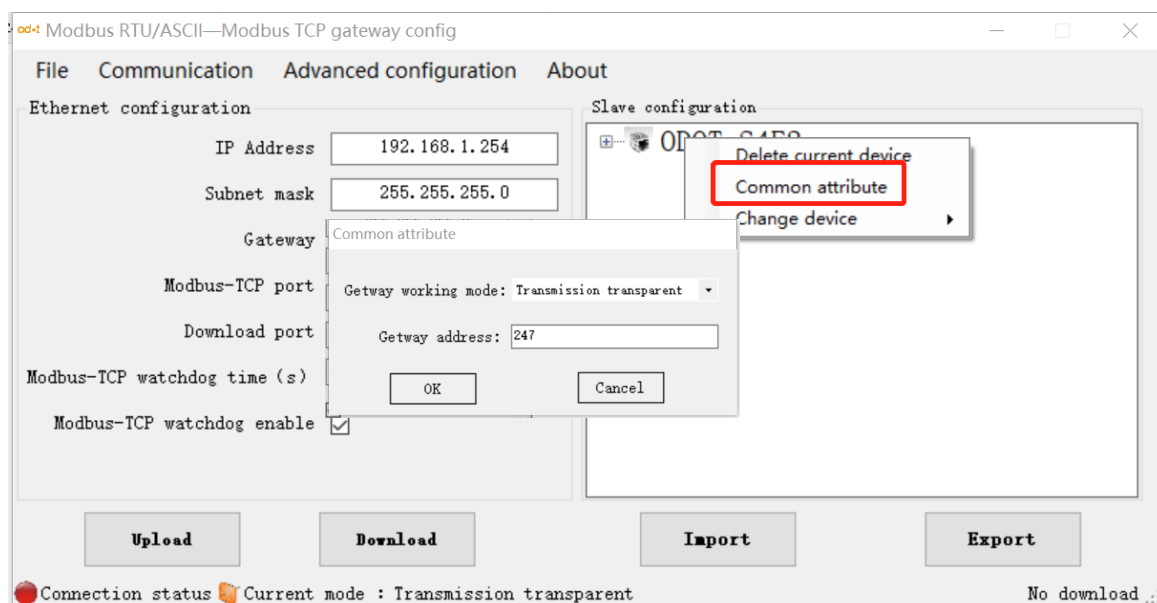其他Modbus RTU/ASCII从站设备　RS485　　　RS485　其他Modbus RTU/ASCII从站设备

3.3.3.2．Setup

1. Open the configuration software "odot MGCC Config".Right-click on the configuration page of slave station and select "Add Device" ,then add "ODOT-S4E2".

2．Double-click "ODOT-S4E2" or right-click "ODOT-S4E2". Select "common device attributes", Set the gateway as the station number of the Modbus RTU/ASCII slave on the popup setup page.

3.Double-click "COM1", "COM2" ,"COM3", "COM4" or right-click "COM1", "COM2" ,"COM3", "COM4" .Click "Serial Properties" to bring up the "Serial Setting" window. Set up the communication parameters, Set two serials' operating mode as slave mode. Then click the "Confirm" button to save and return.

The meaning of each parameter is as follows：

Operating mode：

It is used to set up gateway as master station or slave station in the network. Default is master mode. Here is set up slave mode.

Modbus protocol type：

it's used to set up the gateway's protocol type of the network between the communication of the serial port and other connected devices.You can choose Modbus RTU or Modbus ASCII. Please keep this parameter in accord with the device that is connected to the serial port.

Baud rate：

Serial port baud rate: optional range is 1200~115200bps and default is 9600bps, Please keep this parameter in accord with the device that is connected to the serial port.

Check Digit：

no parity, odd parity, even parity, no default can be chose. Please keep this parameter in accord with the device that is connected to the serial port.

Stop bit：

You can choose 1 stop bit or 2 stop bits. Default is 1 stop bit. Please keep
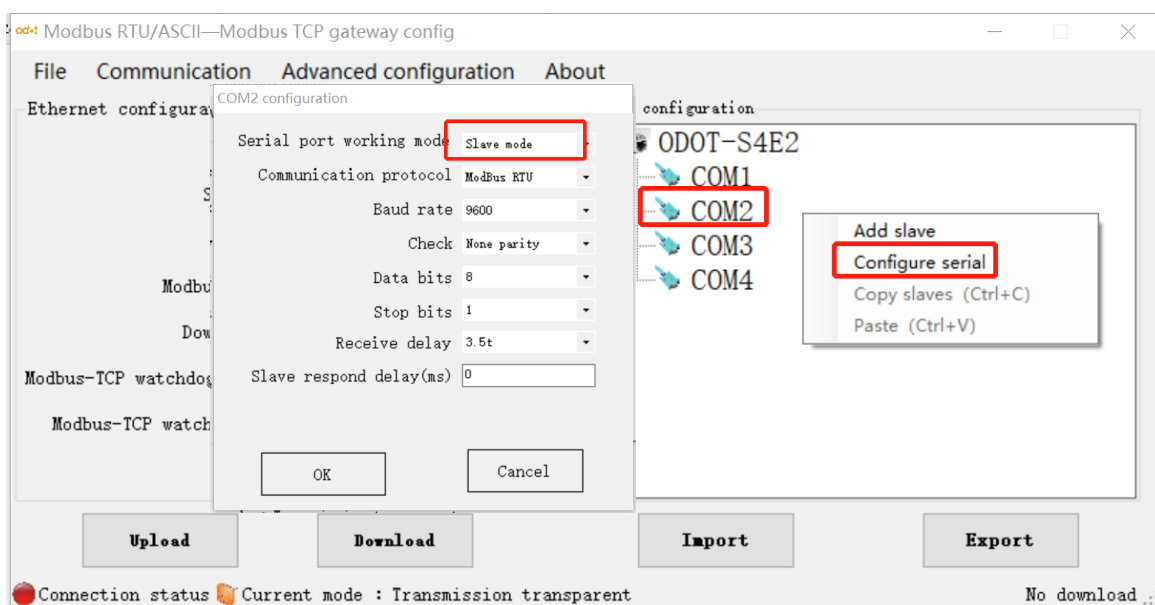
this parameter in accord with the device that is connected to the serial port.

Receive character interval：

when receiving packets Frame interval detection time can be chose from

1.5t to 200t. Default is 3.5t. In general, you don't have to change this parameter.

Slave response delay：

The gateway acts as a Modbus RTU/ASCII slave, from the time it receives a

message from the master to when it sends a reply. This parameter relates to the

performance of the master.

4．Configure the Ethernet parameters of the gateway by the "Ethernet Configuration" on the left of the software.

Some of the parameters are as follows：

Modbus gateway IP：The device's own IP address;

Subnet mask：Subnet mask of the device;

LAN gateway IP：Gateway IP address of the network where the device resides;

Modbus-TCP data communication port：Generally 502；

Configure the port：The configuration software downloads the configuration to the device through this port of the device；

Modbus-TCP watchdog time：The time interval from when the gateway receives the last Modbus TCP packet to the automatic restart;

Note: Automatic restart of the gateway can release connection resources that have not been used for a long time in time;

Modbus-TCP watchdog enable：Whether the watchdog function is enabled.

5. Set the destination gateway address that you want to download and download communication port number through

"Communication" — "Communication Configuration". The default is the gateway factory default IP 192.168.1.254 and port number 1024.

6．Click the button "Download Gateway Configuration ".Download

configuration parameters to the gateway.After the download is successful, the "Download successful" prompt appears in the Status Bar at the lower right.After the download is successful, the gateway restarts automatically.then the gateway go into running state.

If the download fails, please check out whether the computer's IP address and gateway IP address are in the same network segment. Then check whether the gateway IP address is set correctly.If you forget the gateway IP address, you can reset the gateway through the reset button，After reset, the gateway IP address is the factory default IP address.
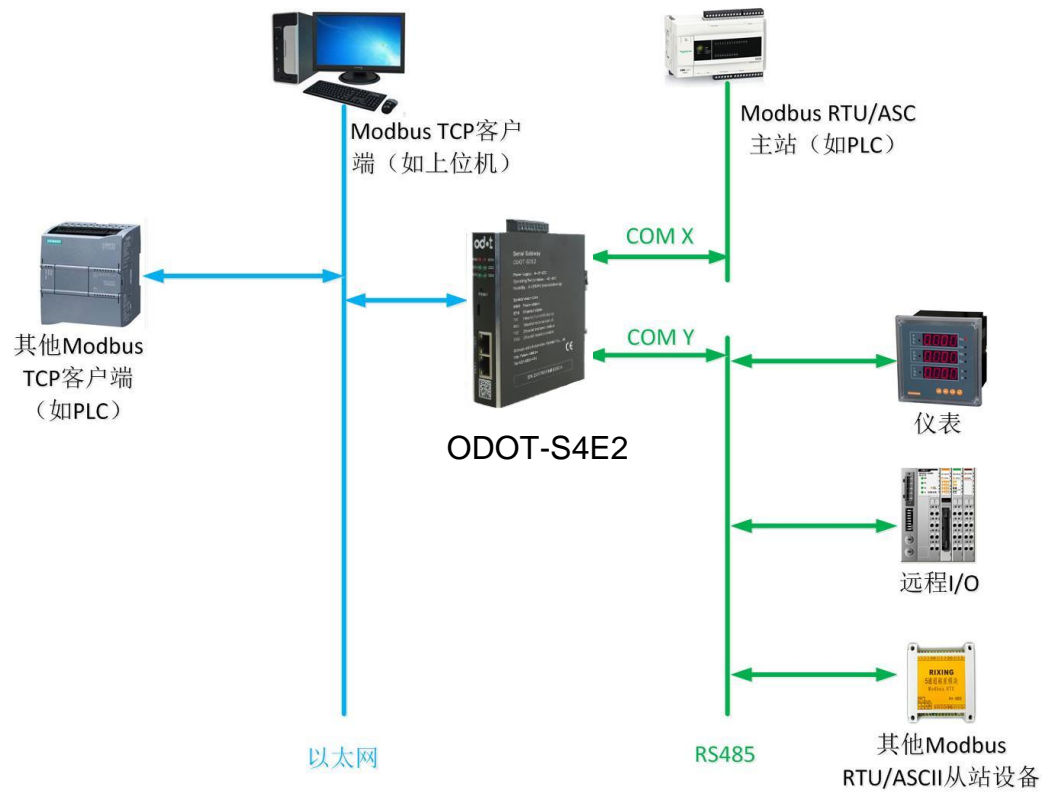
Click "Import Profile" and "Export Profile" to import and save the configuration file to the local disk.Click "Upload Gateway Configuration" to upload the current gateway configuration to the software.

Note: When downloading and uploading, you need to ensure that the computer and the gateway are in the same network segment.

7．After setting up, two different Modbus RTU/ASCII networks are accessed through the corresponding serial ports. The gateway acts as slave station in both Modbus RTU/ASCII networks. The Modbus RTU/ASCII master stations in both networks can both read and write the gateway's" internal gateway data storage area" the Modbus RTU/ASCII protocol. The gateway realize communication between the Modbus TCP client and the Modbus RTU/ASCII master by taking the role of a data relay.
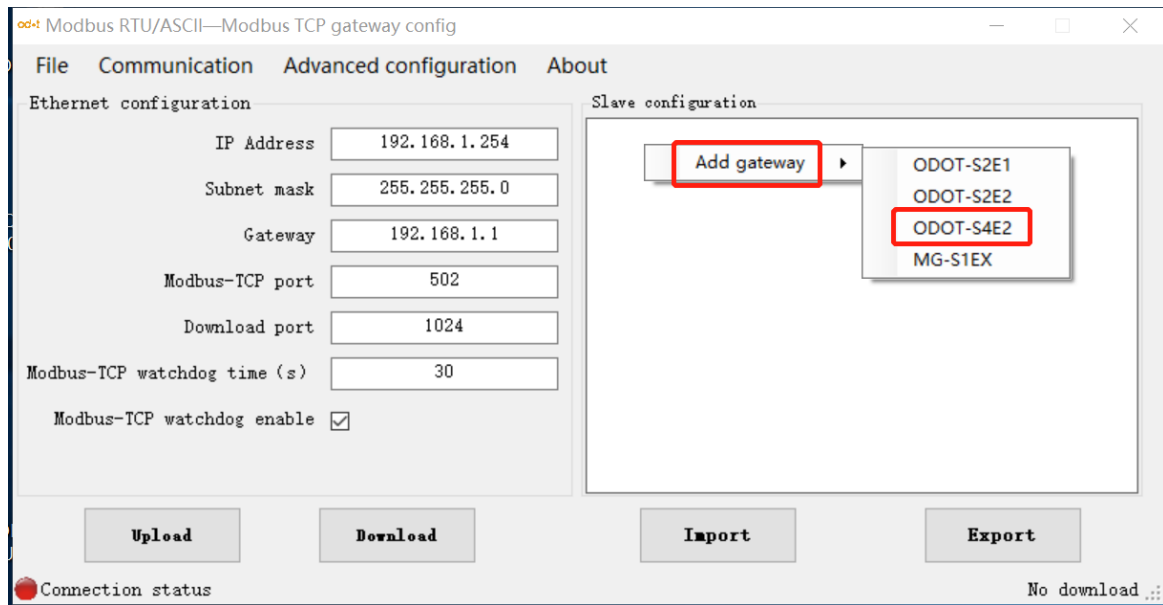
3.3.4 Implementing Modbus TCP Client and Modbus RTU/ASCII Master Simultaneously Accessing One Modbus RTU/ASCII Slave Station
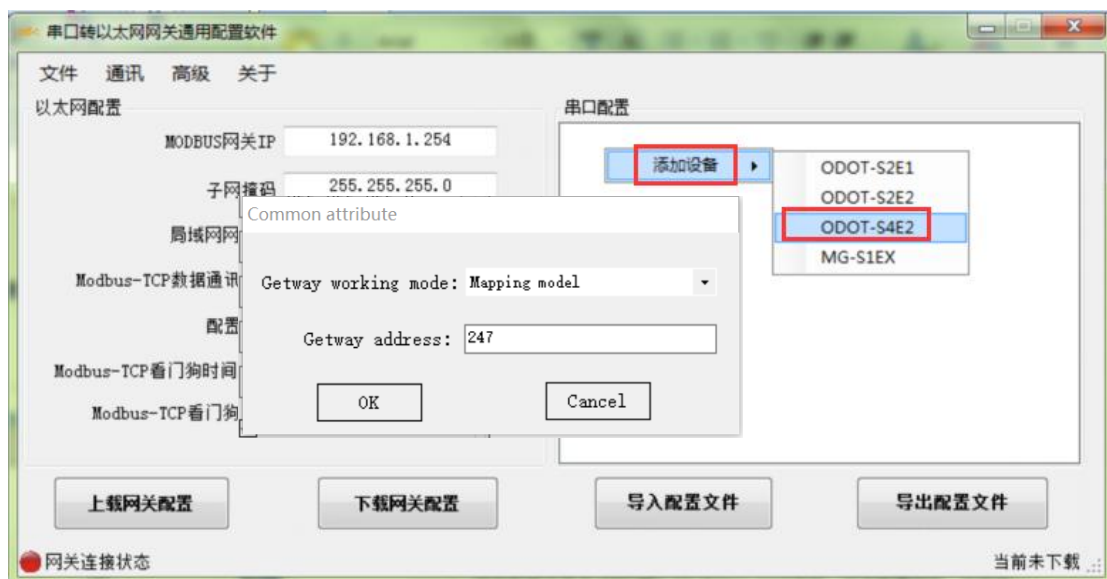
3.3.4.1．Application topology

3.3.4.2．Simple configuration

1. Open the configuration software "odot MGCC Config".Right-click on the configuration page of slave station and select "Add Device" ,then add "ODOT-S4E2".

2．Double-click "ODOT-S4E2" or right-click "ODOT-S4E2", Select "common device attributes". Set the gateway as the station number of the Modbus RTU/ASCII slave on the popup setup page.

3. Double-click "COM1", "COM2","COM1", "COM2" or right-click "COM1", "COM2","COM1", "COM2" .Click "Serial Properties" to bring up the "Serial Setting" window. Set up the communication parameters,Set two serials' operating mode to

slave mode. Then click the "Confirm" button to save and return.

The meaning of each parameter is as follows：

Operating mode：

It is used to set up gateway as master station or slave station in the network. Default is master mode. Here is set up slave mode.

Modbus protocol type：

it's used to set up the gateway's protocol type of the network between the communication of the serial port and other connected devices.You can choose Modbus RTU or Modbus ASCII. Please keep this parameter in accord with the device that is connected to the serial port.

Baud rate：

Serial port baud rate: optional range is 1200~115200bps and default is 9600bps, Please keep this parameter in accord with the device that is connected to the serial port.

Check Digit：

no parity, odd parity, even parity, no default can be chose. Please keep this parameter in accord with the device that is connected to the serial port.
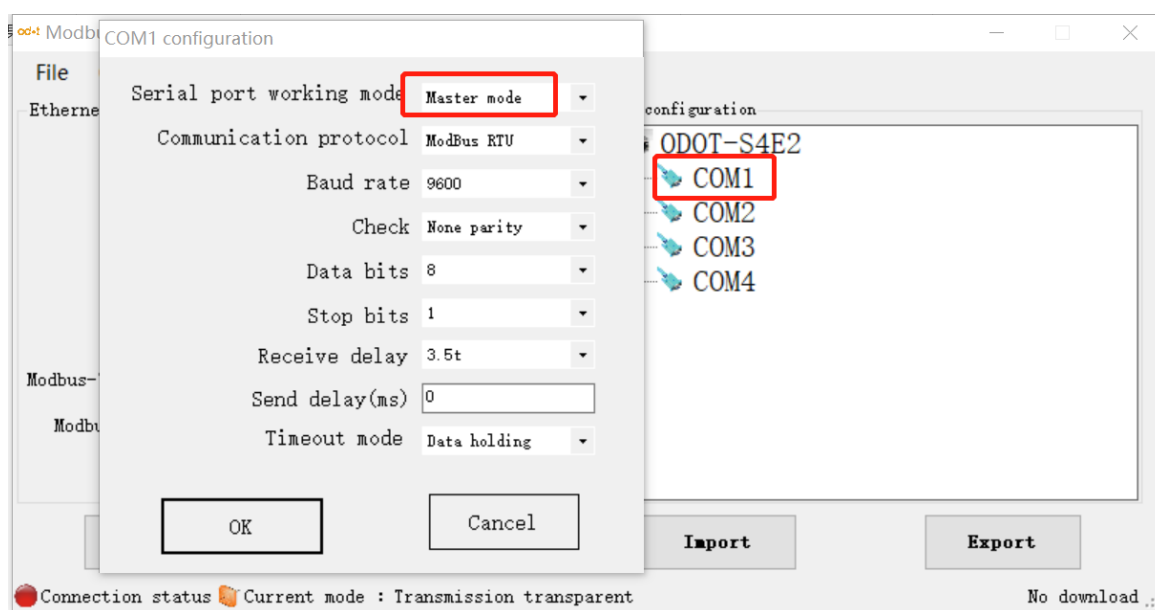
Stop bit：

You can choose 1 stop bit or 2 stop bits. Default is 1 stop bit. Please keep this parameter in accord with the device that is connected to the serial port.

Receive character interval：

when receiving packets Frame interval detection time can be chose from 1.5t to 200t. Default is 3.5t. In general, you don't have to change this parameter.
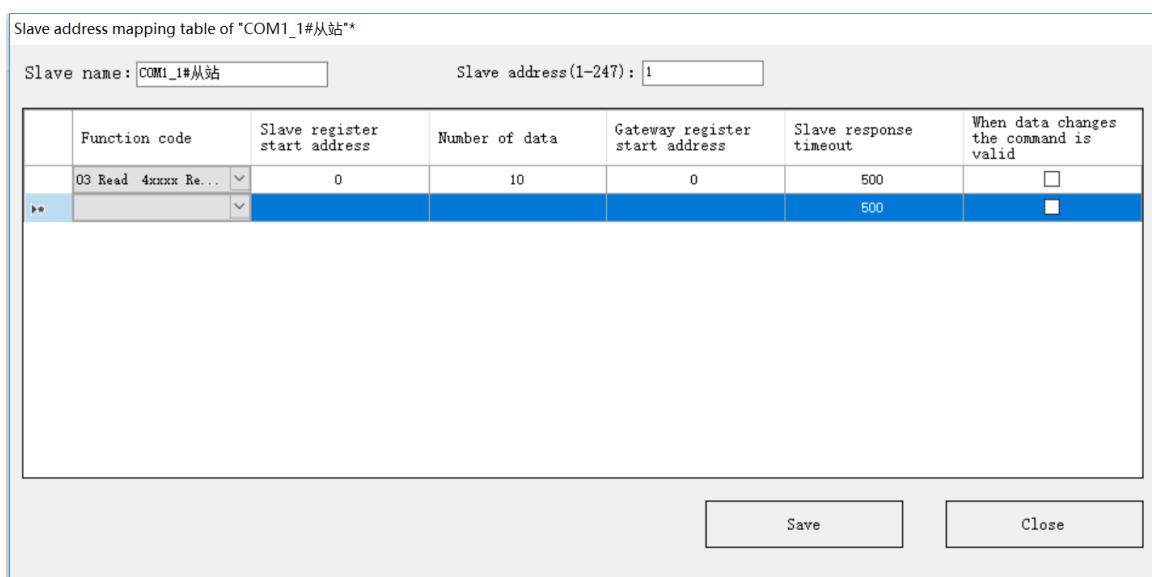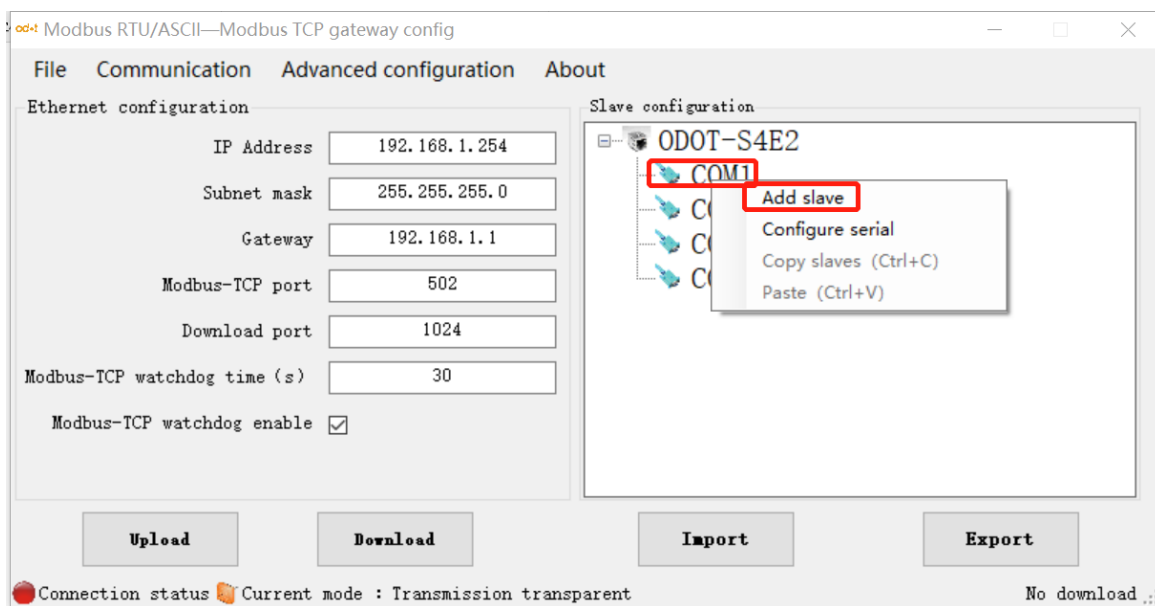
`Slave response delay：`

The gateway acts as a Modbus RTU/ASCII slave, from the time it receives a message from the master to when it sends a reply. This parameter relates to the performance of the master.

4. Select "COM1" or "COM2". Right-click to select "Add Slave".Input "Slave name". fill in "Slave station number".Then configure Modbus function code, start address of slave data, number of data, start address of gateway mapping area and response timeout time and if "event output"(only when the data changes, the gateway will execute this command once) according to the communication manual of slave station equipment. Under the same serial port the station number of the slave station cannot be the same and cannot be the same as the station number of the station. Range of the slave station address is between 1 and 247. Under the same serial port the slave station's name cannot be the same. After completing

the settings, click "Save Current Mapping Table Edit".

5. Double-click "COM1", "COM2" ,"COM1", "COM2" or right-click"COM1", "COM2" ,"COM1", "COM2"   .Click "Serial Properties" to bring up the "Serial Setting" window. Set up the communication parameters,Set two serials' operating mode to slave mode. Then click the "Confirm" button to save and return.

The meaning of each parameter is as follows：

Operating mode：

It is used to set up gateway as master station or slave station in the network. Default is master mode. Here is set up slave mode.

Modbus protocol type：

it's used to set up the gateway's protocol type of the network between the communication of the serial port and other connected devices.You can choose Modbus RTU or Modbus ASCII. Please keep this parameter in accord with the device that is connected to the serial port.

Baud rate：

Serial port baud rate: optional range is 1200~115200bps and default is 9600bps, Please keep this parameter in accord with the device that is connected to the serial port.

Check Digit：

no parity, odd parity, even parity, no default can be chose. Please keep this parameter in accord with the device that is connected to the serial port.
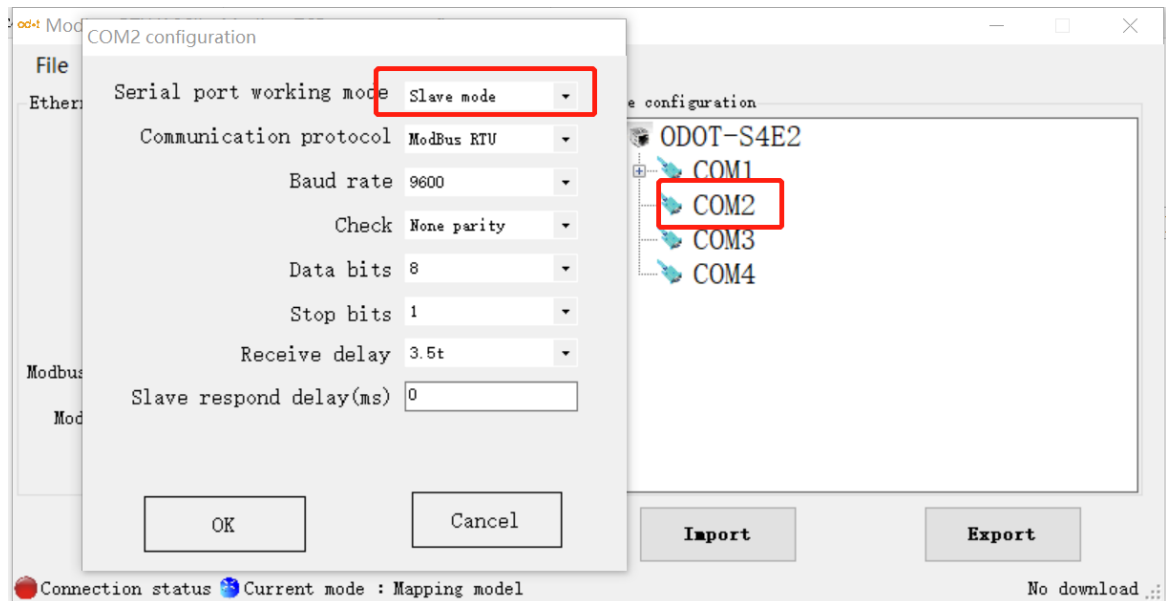
Stop bit：

You can choose 1 stop bit or 2 stop bits. Default is 1 stop bit. Please keep this parameter in accord with the device that is connected to the serial port.

Receive character interval：

when receiving packets Frame interval detection time can be chose from 1.5t to 200t. Default is 3.5t. In general, you don't have to change this parameter.

Slave response delay：

The gateway acts as a Modbus RTU/ASCII slave, from the time it receives a message from the master to when it sends a reply. This parameter relates to the performance of the master.

6．Configure the Ethernet parameters of the gateway by configuring the "Ethernet Configuration" on the left half of the software.

Some of the parameters are as follows：

Modbus gateway IP：The device's own IP address；

Subnet mask：Subnet mask of the device；

LAN gateway IP：Gateway IP address of the network where the device resides；

Modbus-TCP data communication port：Generally 502；

Configure the port：The configuration software downloads the configuration to the device through this port of the device；

Modbus-TCP watchdog time：The time interval from when the gateway receives the last Modbus TCP packet to the automatic restart;

Note: Automatic restart of the gateway can release connection resources that have not been used for a long time in time;

Modbus-TCP watchdog enable：Whether the watchdog function is enabled.

7. Set the destination gateway address that you want to download and download communication port number through

"Communication" — "Communication Configuration". The default is the gateway factory default IP 192.168.1.254 and port number 1024.

8．Click the button "Download Gateway Configuration ".Download configuration parameters to the gateway.After the download is successful, the "Download successful" prompt appears in the Status Bar at the lower right.After the download is successful, the gateway restarts automatically.then the gateway go into running state.

If the download fails, please check out whether the computer's IP address and gateway IP address are in the same network segment. Then check whether the gateway IP address is set correctly.If you forget the gateway IP address, you can reset the gateway through the reset button，After reset, the gateway IP address is the factory default IP address.

Click "Import Profile" and "Export Profile" to import and save the configuration file to the local disk.Click "Upload Gateway Configuration" to upload the current gateway configuration to the software.

Note: When downloading and uploading, you need to ensure that the computer and the gateway are in the same network segment.

9．After completing the above settings, connect a Modbus RTU/ASCII slave to COM1 and a Modbus RTU/ASCII master to COM2，Connect Modbus TCP Client to Gateway via Ethernet，Gateway will automatically refresh the underlying Modbus RTU/ASCII slave data from COM1，The Modbus RTU/ASCII master and Modbus TCP clients indirectly access the Modbus RTU/ASCII slaves by accessing the gateway's internal gateway data store.

4 Simple application in Siemens 1500

The simple configuration of the gateway ODOT-S4E2 is as follows：

　　The gateway adopts mapping work mode，The gateway IP address is: 192.168.1.4， RS485 side COM1 port parameters：Modbus RTU、9600、N、8、 1, slave station ID=1, Use function code No. 03 to read 6 numbers.
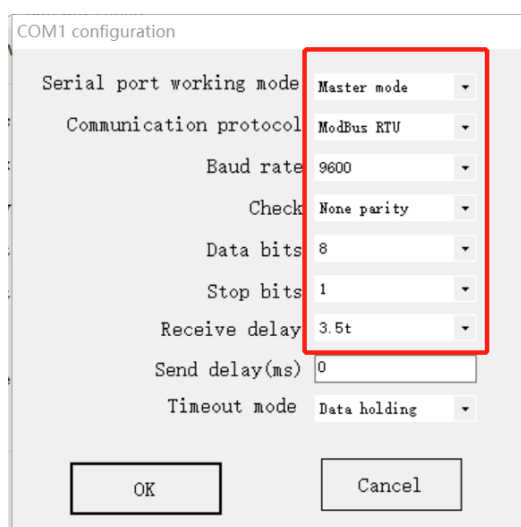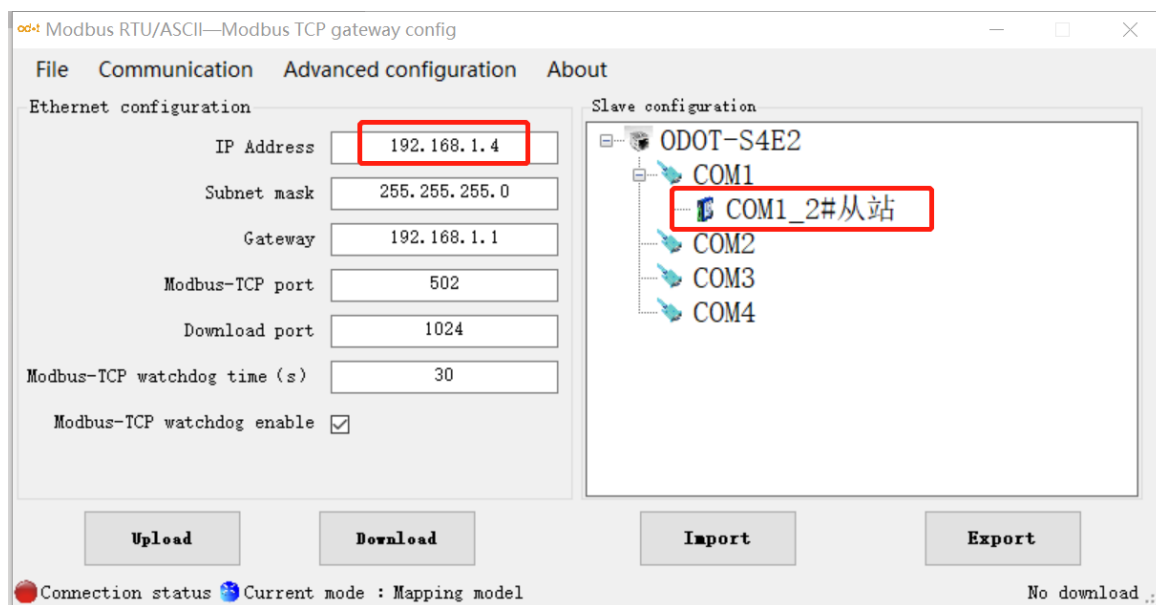
Slave address mapping table of "COM1_2#从站"*

Slave name: COM1_2#从站　　　　Slave address(1-247): 2

	Function code	Slave register start address	Number of data	Gateway register start address	Slave response timeout	When data changes the command is valid
▶	04 Read 3xxxx Re... ▾	0023	6	0000	500	☐
*	▾					☐

Save　　　　Close

5.2．Simple application in Botu software.

Programming function block MB-CLIENT is programmed in OB1 software organization block OB1. First create the data blocks DB2, DB10, DB2: pointers to the Modbus data registers, and DB10: establish all the address parameters required to set up the connection.