SST Automation GT200-MT-CO Modbus TCP Canopen Gateway User Manual

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Contents

Important Information

Warning
The data and examples in this manual cannot be copied without authorization. SST Automation reserves the right to upgrade the product without notifying users.
The product has many applications. The users must make sure that all operations and results are in accordance with the safety of relevant fields, and the safety includes laws, rules, codes and standards.
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Product Overview

1.1 Product Function

The gateway supports connecting CANopen devices to Modbus TCP network, it can realize data communication between multiple CANopen devices and multiple Modbus TCP Clients.

1.2 Product Feature

- Supports one channel CAN 2.0A.
- CAN interface: 3KV photoelectric isolation.
- Acts as a CAN open Master, supports 100 PDO and 100 SDO commands.
- Supports up to 8 Modbus TCP clients.
- Supports 2 channel, 10M/100M network port..

1.3 Technical Specifications

[1] Ethernet interface:

- Supports 2 10M/100M (auto-negotiating) network ports with a built-in switch.
- Supports Modbus TCP protocol and functions as a Modbus TCP server.
- Supports connecting up to 8 Modbus TCP clients.
- Supports function codes: 03H, 04H, 06H, 10H.
- The starting address of the input register is 0 (stores the received CAN frame), and supports the function code 04H.

- The starting address of the output register is 0 (stores the CAN frames that need to be sent), and supports the function codes 03H, 06H and 16H.
- Supports function code 03 or 04 to read the input/output data area.
- Supports static configuration of IP address and DHCP.

  [2] Communication rate: CAN baud rate: 10kbit/s, 20kbit/s, 50kbit/s, 100kbit/s, 125kbit/s, 250kbit/s, 500kbit/s, 1Mbps.

  [3] CAN interface supports CAN2.0A protocol.

  [4] DS-301 V4.02 and CiA Draft Recommendation 303 compliant.
- Supports maximum 8 bytes TPDO and RPDO.
- Supports maximum 100 PDO commands and maximum 100 SDO commands.
- Supports fast Download SDO and fast Upload SDO.
- The COB-ID of TPDO and RPDO can be set by the user, or the default COBID can be used.
- Supports Clear Data Time for TPDO function.
- Supports SDO response timeout function.
- Supports NMT management.
- Supports SYNC function.
- Supports Guard life function (Life-guarding and Heartbeat protocols).
- Supports RPDO cycle sending function.
- Supports CANopen master delay to start-up function.
- Supports Control Status function.
- NMT_RESET command configurable function.

  [5] Operating temperature: -40 °F~140 °F(-20 °C to 60 °C). Relative Humidity: 5% to 95% (non-condensing).

  [6] Power: 24VDC (11V~30V), 80mA (24VDC).

  [7] External dimensions (W*H*D): 1.0 in*4.0 in *3.6 in (25mm*100mm*90mm).

  [8] Installation: 1.38 in (35mm) DIN RAIL;

  [9] Protection level: IP20.

1.4 Related Products

Related products include:

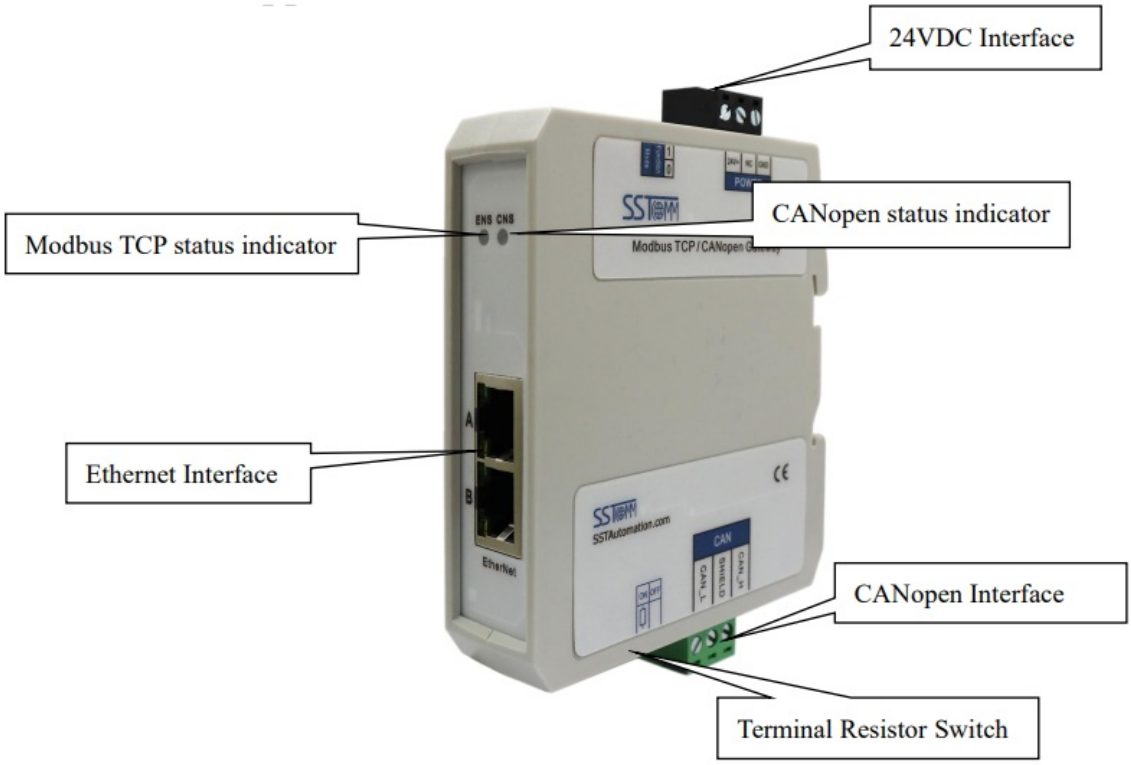
- GT100-CO-RS
- GT200-CO-RS
- GT200-EI-CO
- GT200-PN-CO
- GT200-DP-CO

To ge t more information about related products, please visit our SST Automation website:
www.sstautomation.com

1.5 Revision History

Revision	Date	Chapter	Description
V3.0	02/27/2022	ALL	New Release

Hardware Descriptions



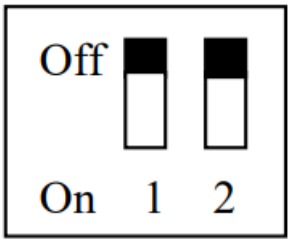
Notes: This picture is for reference only. The product appearance is subject to the actual product.

2.2 LED Indicators

LED	State	State description
I \ S	Green On	Modbus TCP connection is established
	Green Blinking	Modbus TCP connection is not established
	Red Blinking	Modbus TCP connection timeout
	Orange Blinking (Blinking alternately with CNS)	Configuration status
	Orange Blinking	Start status
(NS	Red On	BUS OFF
	Red light on periodically	The error counter of the CAN controller reaches or exc eeds the guard value (too many error frames)
	Green On	Node is in run mode
	Orange Blinking once and off	Start status
	Orange Blinking (Blinking alternately with the ENS)	Configuration status
	Orange On	NMT management. Waiting for BOOTP of all slaves (us ed when NMT is enabled)

2.3 Configuration Switch/Button

The DIP switch is used for setting operating mode of the device.

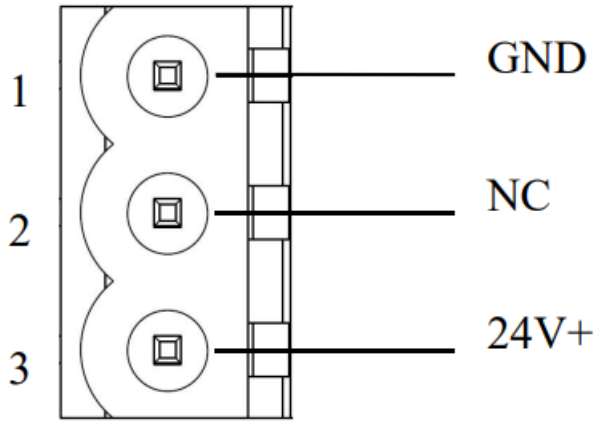


Function(Bit 1)	Mode(Bit 2)	Description
Reserved	Oft	Running mode, prohibits reading and writi ng configuration data
Off	On	Configuration mode, with fixed IP address 192.168.0.10, only can read and write configuration data
on	On	BootLoader mode, with fixed IP address 1 92.168.0.10

Notes: Restart GT200-MT-CO after resetting the configuration to make the configuration take effect!

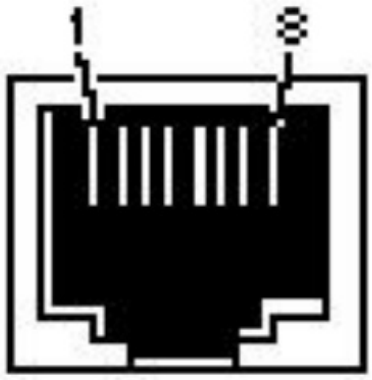
2.4 Interface

2.4.1 Power Interface



Pin	Function
1	Power ground(24V DC-)
2	NC(Not Connected)
3	+24V DC

2.4.2 Ethernet Interface



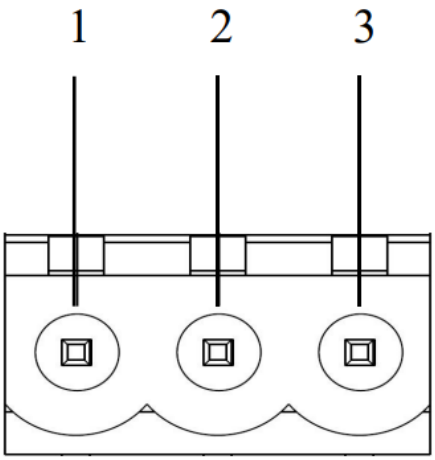
RJ-45 port

The Ethernet interface uses RJ45 interface, follows the IEEE802.3u 100BASE-T standard, with 10/100M autonegotiation. Its pinout (standard Ethernet signal) is defined as below:

Pin	Signal description
1	TXD+, Tranceive Data+, Output
2	TXD-, Tranceive Data-, Output
3	RXD+, Receive Data+, Input
6	RXD-, Receive Data-, Input
4,5,7,8	(reserved)

2.4.3 CAN Port

3-pin connector:



The gateway uses open three-pin connector at the side of CAN:

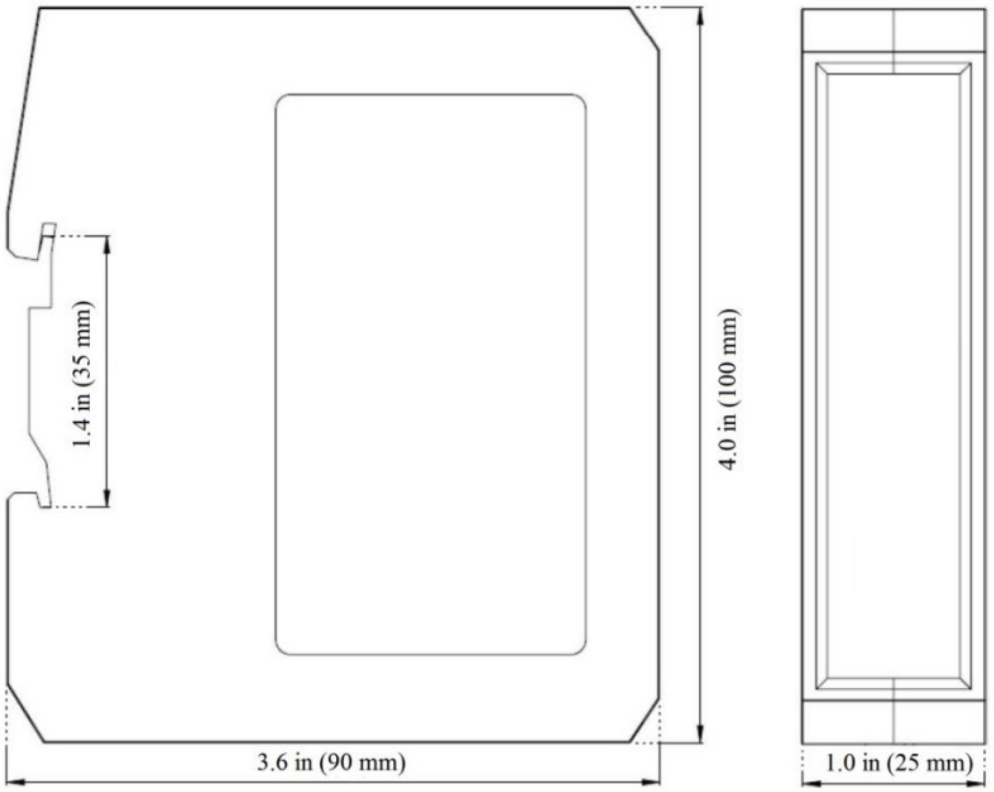
Pin	Connection
1	CAN-L
2	Shield (Optional)
3	CAN-H

2.4.4 Resistor Switch

CAN terminal is equipped with a 120Ω terminal Resistor Switch When the switch is turned on, the terminal resistance is connected; when the switch is turned off, the terminal resistance is disconnected.

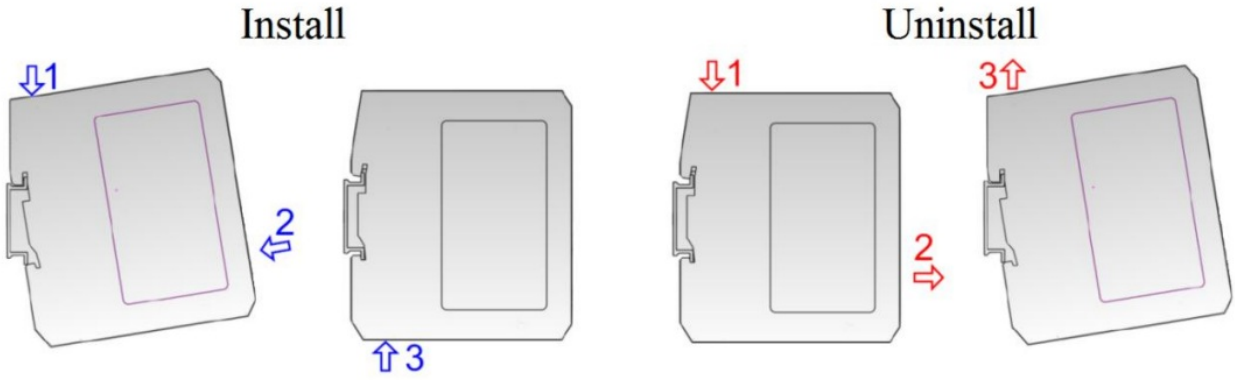
2.5 Mechanical Dimensions

Size (width * height * depth): 1.0 in * 4.0 in * 3.6 in (25 mm * 100 mm * 90 mm)



2.6 Installation Method

Using 1.4 in (35mm) DIN RAIL.



Quick Start Guide

3.1 Gateway Configuration

1. Make sure the GT200-MT-CO is in the appropriate operating mode that allows for configuration. It is recommended to set the gateway to configuration mode (configuration switches Bit 1 OFF and Bit 2 ON) then the IP of the gateway will be fixed at 192.168.0.10.
2. Use an Ethernet cable to connect the GT200-MT-CO to the PC.
3. Connect the CAN instruments by connecting pins 1 and 3 at minimum.
4. Connect the power supply, then power on the device.

5. Run the SST-MTC-CFG software to start the configuration process.
6. In the configuration software, set the CAN baud rate, node ID, and IP address. (See chapters 4.5 and 4.7.4for details).
7. After the gateway has been configured, set the configuration DIP switch Bit 2 OFF. Power on again and the module will go into run mode.

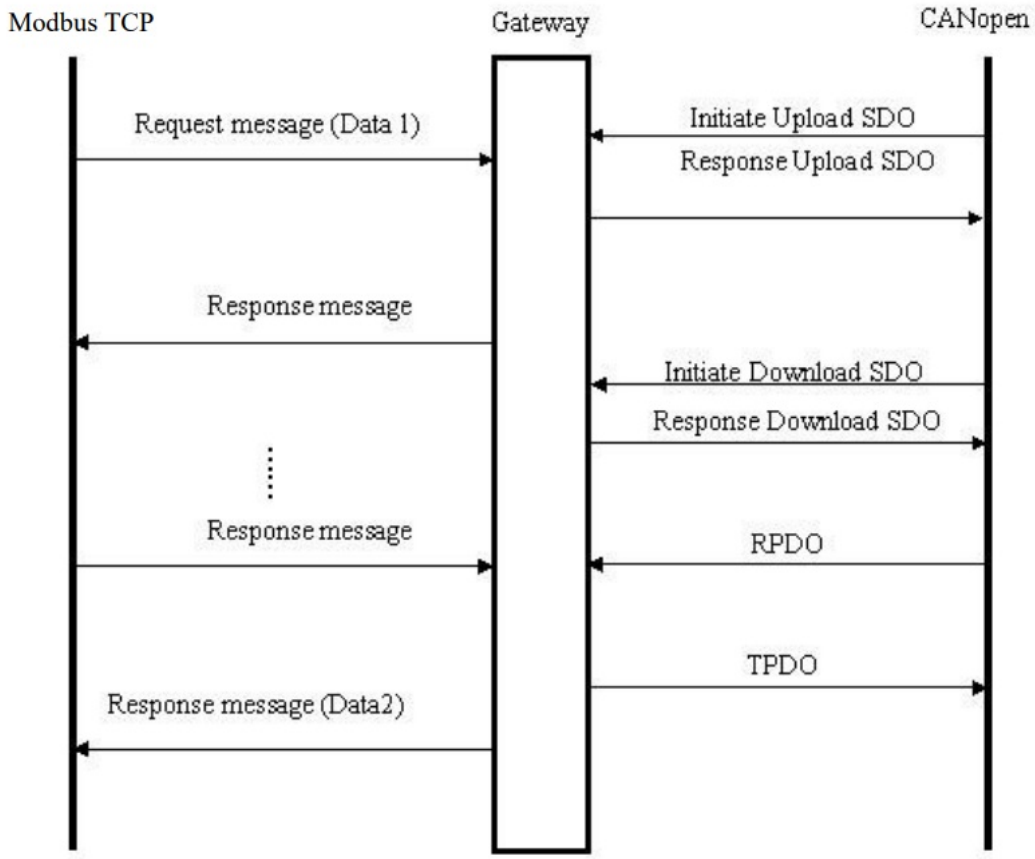
3.2 Software Configuration

Users can connect the gateway to the PC through the RJ-45 port. Users can use SST-MTC-CFG to finish configuring GT200-MT-CO easily, including IP address, baud rate of CANopen port and CANopen commands. There are two ways to set the IP address: Manually Assign and DHCP. Manually Assign means that the user manually sets the IP in the configuration state. When the user chooses to use DHCP, the user must use Ethernet router (gateway, hub, switch) to allocate IP in the running state.

3.3 RUN

3.3.1 Data Exchange Mode

Communication mode between CAN open and Ethernet/IP is asynchronous mode, as shown below:



“Data 1” shows the data transfer process from Modbus TCP to CAN; “Data 2” shows the data transfer process from CAN to Modbus TCP.

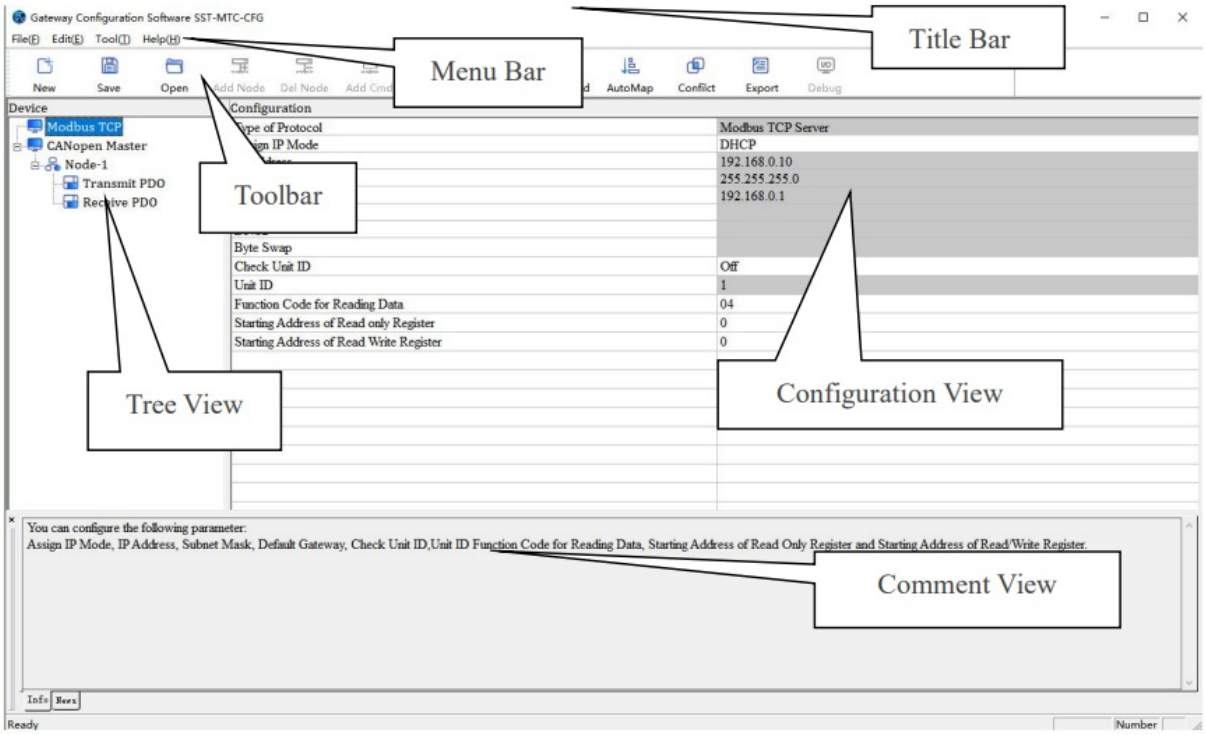
A Modbus TCP I/O output can carry 0 to multiple CAN frame data. After the gateway receives it, it sends the CAN open frame, and then packs the received CANopen response frame into I/O input and sends it to the Modbus TCP Clinet. TPDO and RPDO applies producer/consumer mode, and often be used in the occasion with high requirement about speed; Upload SDO and Download SDO applies client/server mode, the mode can guarantee safety of data, and are often used in occasions with a low speed requirement.

GT200-MT-CO supports Clear Data Time for TPDO: As long as GT200-MT-CO does not receive the TPDO from the device within the set time, GT200-MT-CO will clear the data in corresponding position of the Modbus TCP input buffer.

GT200-MT-CO supports simple NMT function: It supports simple startup of all CAN open slave functions. GT200-MT-CO supports Guard life function and SYNC function.

Software Instructions

The SST-MTC-CFG configuration software runs on the Windows platform and is used to configure GT200-MT-CO through the network interface. It is used to configure the parameters and commands for Modbus TCP and CANopen.
Double click the software icon on the desktop after installation to enter the configuration interface:



4.1 Toolbar

Toolbar is shown as below:

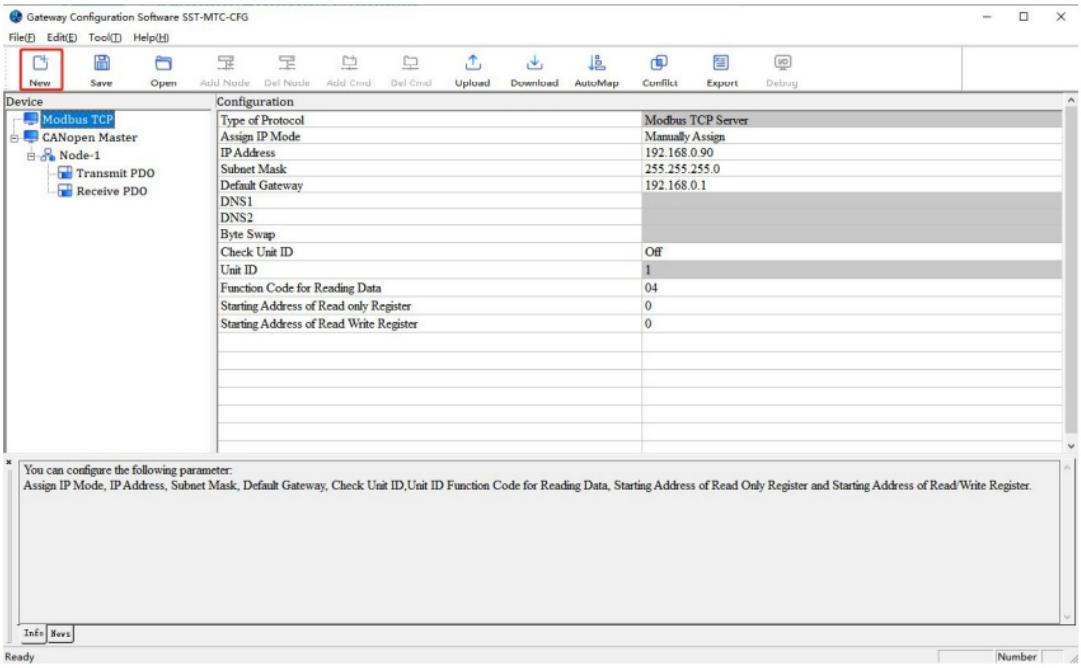
The function of Toolbar: New, Save, Open, Add Node, Delete Node, Add Command, Delete Command, Upload, Download,AutoMap, Conflict and Export EXCEL.

 New	New: Create a new configuration project
 Save	Save: Save current configuration
 Open	Open: Open a configuration project
 Add Node	Add Node: Add a CANopen node
 Del Node	Delete Node: Delete a CANopen node
 Add Cmd	Add Command: Add a CANopen command
 Del Cmd	Delete Command: Delete a CANopen command
 Upload	Upload: Read the configuration information from the module and show it in the software
 Download	Download: Download the configuration file to the gateway
 AutoMap	AutoMap: Used to automatically calculate the mapped memory address without conflict by each command
 Confilct	Confilct: To check whether there are some conflicts with configured commands in the gateway memory data buffer.
 Export	Export EXCEL: Export current configuration to the local hard disk, saved as .xls file.
 Debug	Debug: Reserved

4.2 New Configuration Project

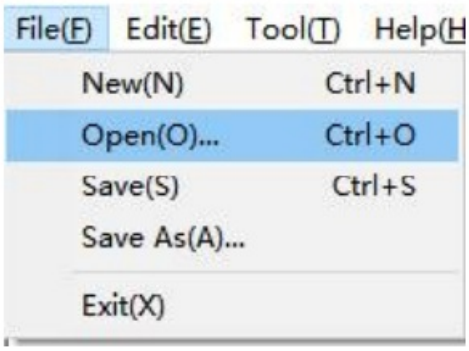
New-initialized parameters to open the configuration interface:

Note: The new function is mainly used for offline configuration, that is, you can use the initialization parameters to open the configuration interface when there is no equipment.

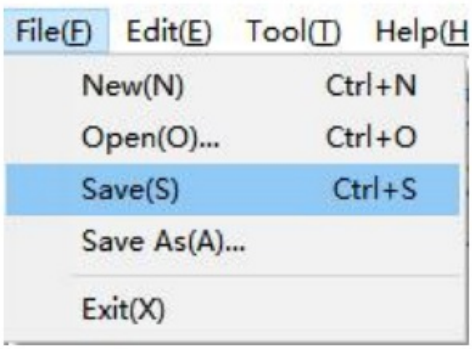


4.3 Open and Save Configuration

Select “Open”, you can open the configuration project that you have saved.



Select “Save” or “Save as”, you can save the configuration project with .chg as its extension.

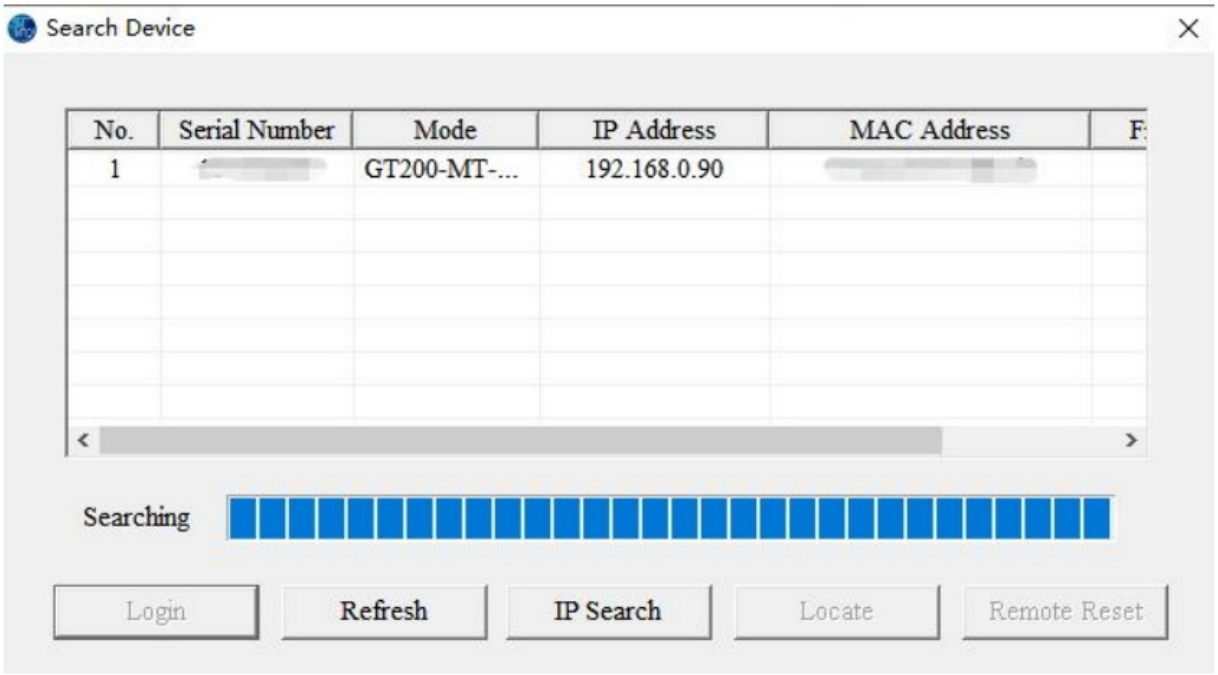


Click icon  on the tool bar to save the configuration with .xls as its extension.

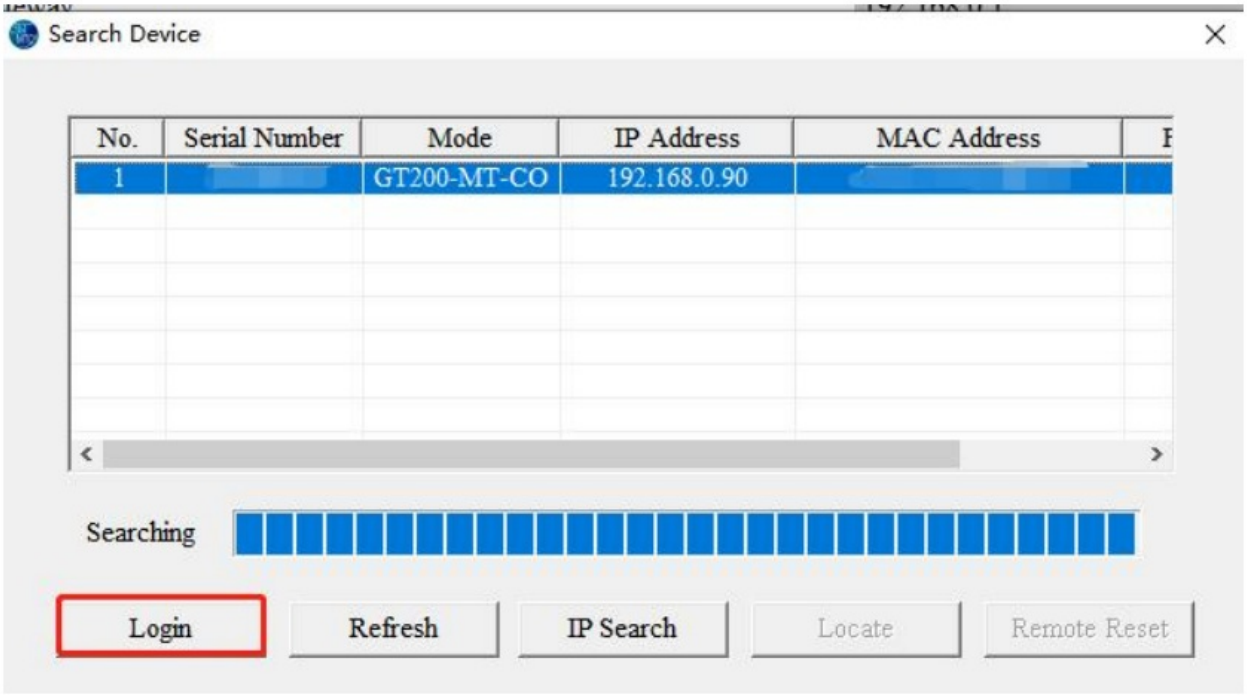
Note: After saving the parameters as a file, the data in the file can be changed by the user, but please ensure the correctness of the changed data, otherwise the incorrect data will be processed according to the default value. Please do not change the keywords of the data, please do not add spaces.

4.4 Upload and Download

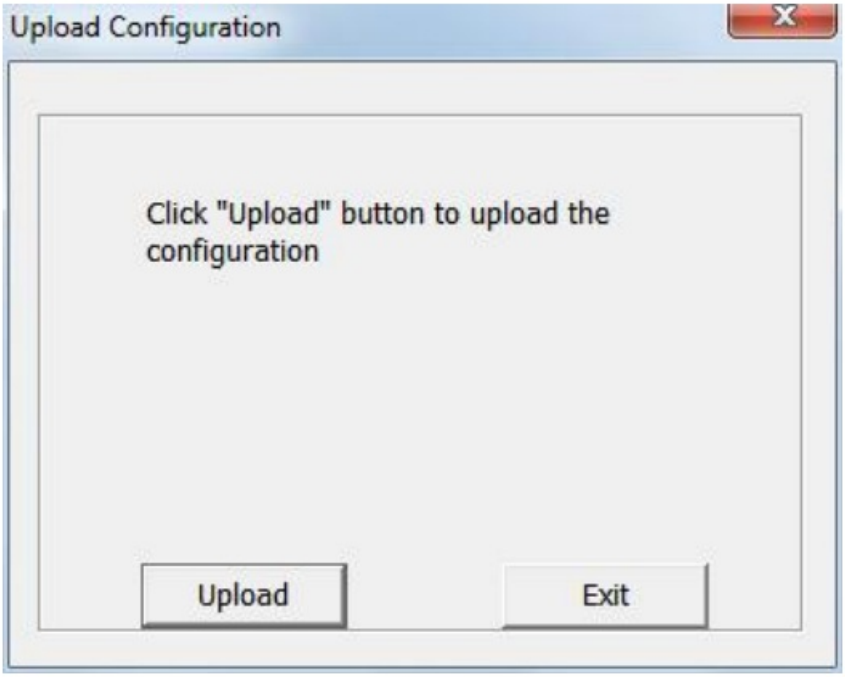
Select “Upload”, it will read configurations form the gateway, and the interface is shown as below:



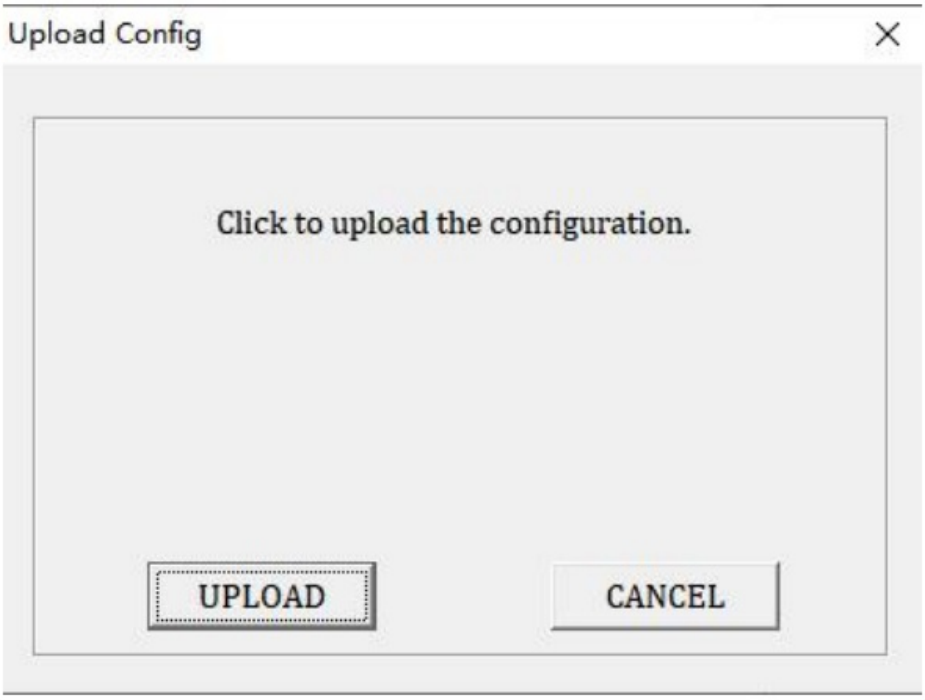
Select the device, click Sign In.



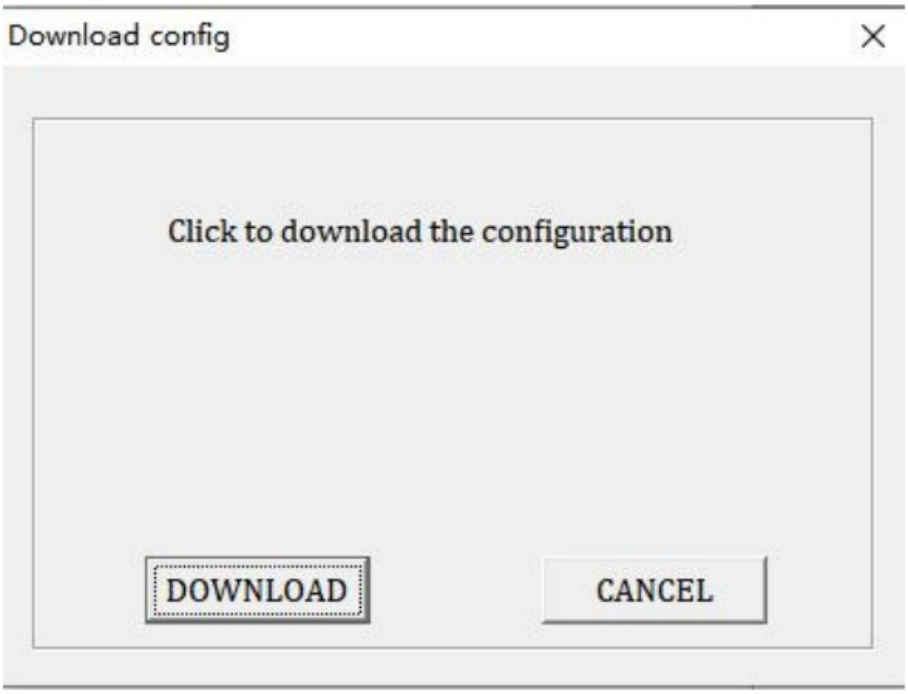
Click Upload.



Select “Upload”, it will read the configuration applied from the gateway, and the interface is shown as below:



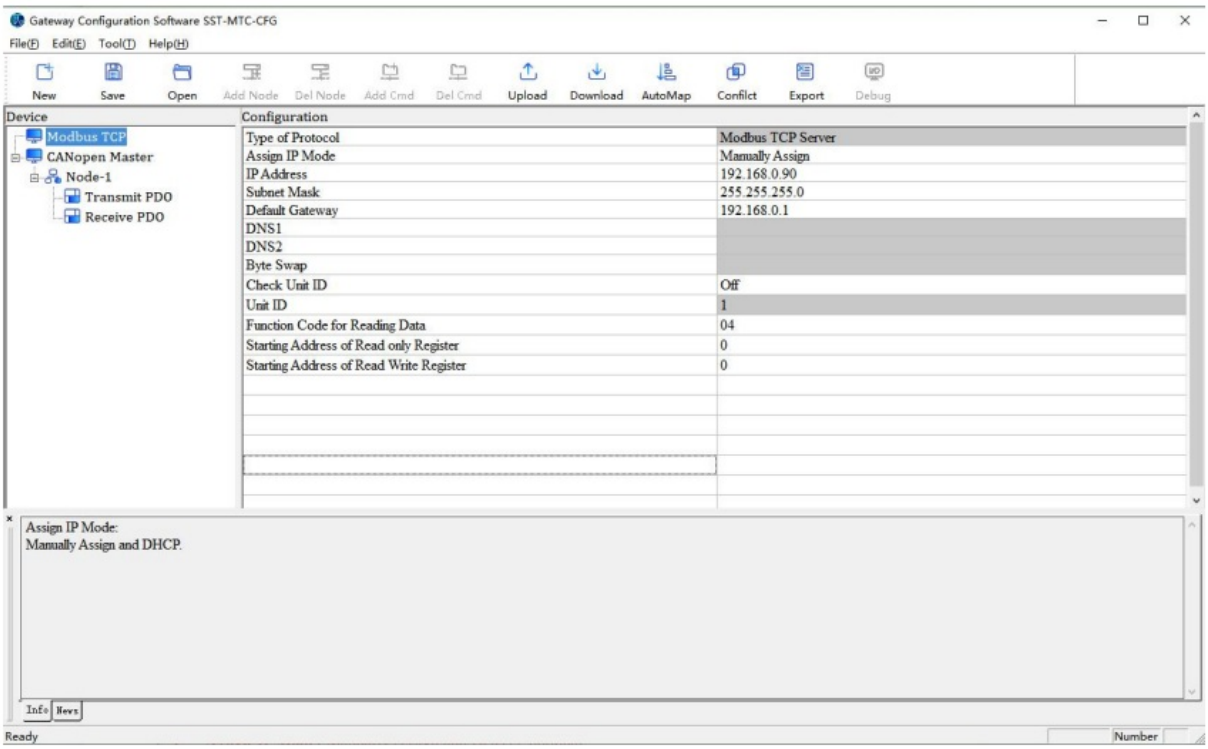
Select “Download”, it will download the configurations to the gateway, and the interface is shown as **below:**



Note: The IP address is fixed at 192.168.0.10 in GT200-MT-CO configuration mode.

4.5 Modbus TCP Configuration Parameters

Modbus TCP configuration interface is shown as below:

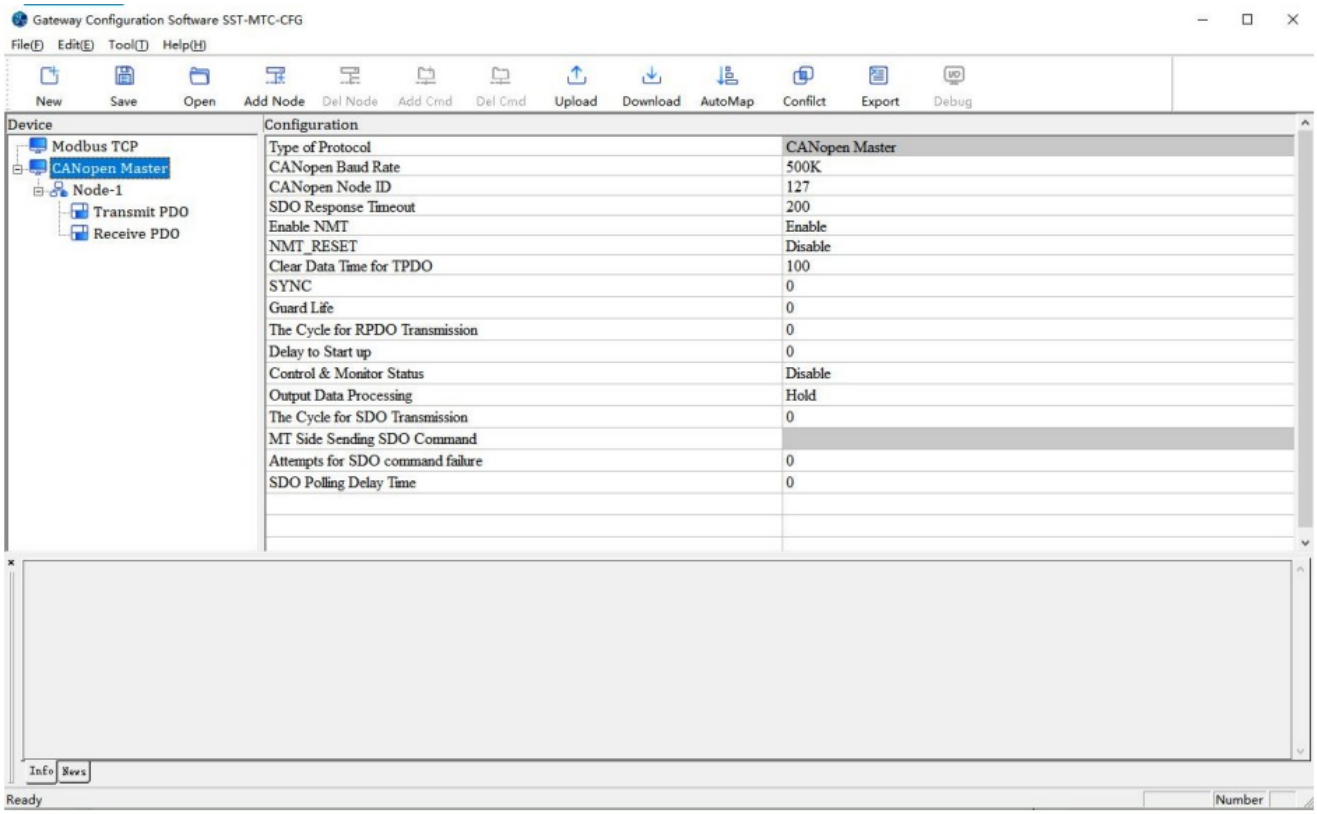


In the above parameters, the detailed information is shown as below:
Assign IP Mode: Manual Assign and DHCP optional.
IP Address: IP address of GT200-MT-CO
Subnet Mask: Subnet mask of GT200-MT-CO
Default Gateway: Gateway address GT200-MT-CO is located in LAN
Check Unit ID: Check Unit Identifier: On or Off. When you open it, you can set the gateway as the station address of the Modbus TCP Server
Unit ID:The gateway as the station address of the Modbus TCP server. The Unit ID is enabled when the “Check Unit ID” is On, the range: 1 to 247, the default value is 1.
Function Code for Reading Data: 04/03 function code reads the input data: Modbus TCP Client can select 04 or 03 function code, and read the CANopen device data collected through the gateway.

Starting Address of Read only Register: The gateway is used as Modbus TCP server to support the client to read the starting address of the input data using the 04/03 function code. It is necessary to fill in the protocol address format here, and the decimal number is displayed. the range : 0 to 65023. Starting Address of Read Write Register: The gateway is used as Modbus TCP server to support the client to write the starting address of the input data using the 06/16 function code. Using the 03/04 function code to read the starting address of the output data. It is necessary to fill in the protocol address format here, and the decimal number is displayed. The range : 0 to 65023.

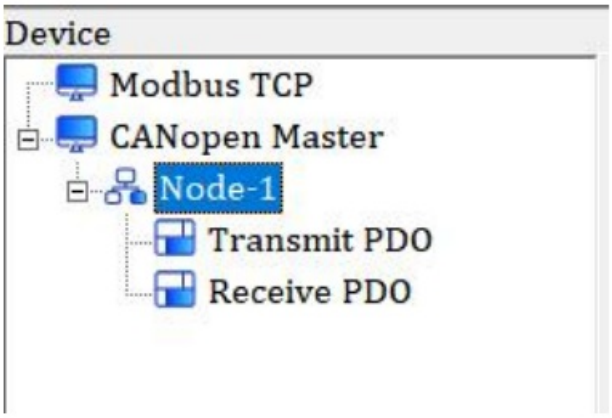
4.6 CAN open Configuration Parameters

Configure CANopen network parameters including CAN open Baud Rate, CAN open Node ID, SDO Response Timeout, Enable NMT, Clear Data Time for TPDO, SYNC, Guard Life, The Cycle for RPDO Transmission, 5Delay to Start up, Control & Monitor Status, Output Data Processing, The Cycle for SDO Transmission, MT Side Sending SDO Command, Attempts for SDO command failure and SDO Polling Delay Time. CANopen configuration interface is shown as below:



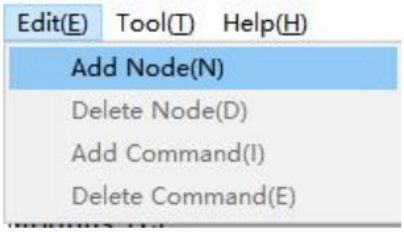
4.7 Device View Interface

4.7.1 Device View Interface

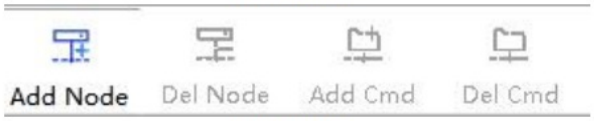


4.7.2 Operation Mode

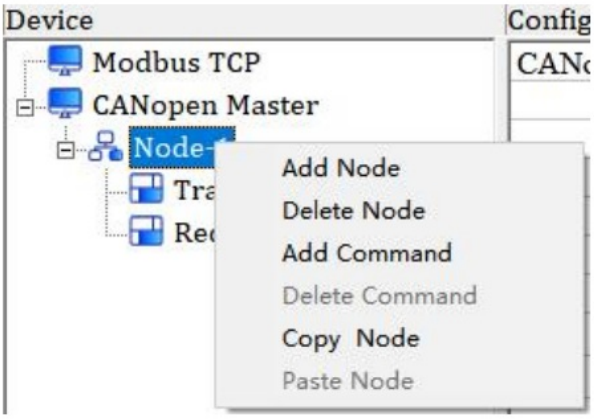
Supports three kinds of operation modes: edit menu, edit toolbar, and edit menu by right-click.



Edit Menu



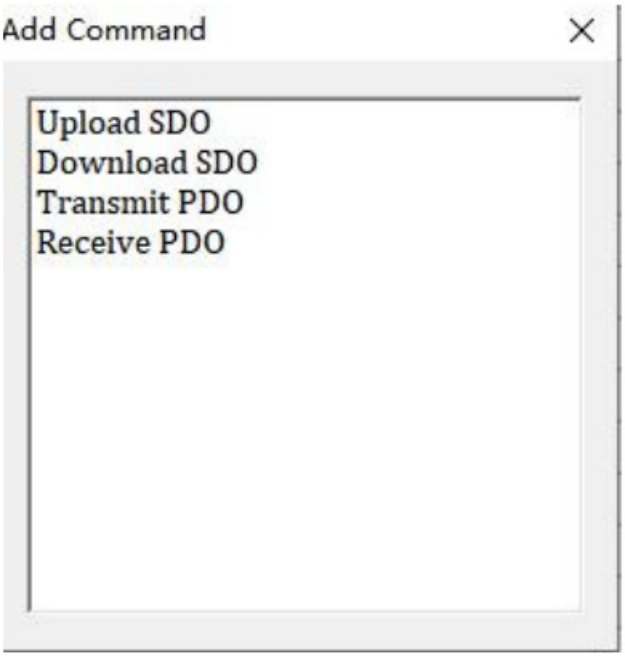
Edit Toolbar



Edit Menu by Right Click

4.7.3 Operation Types

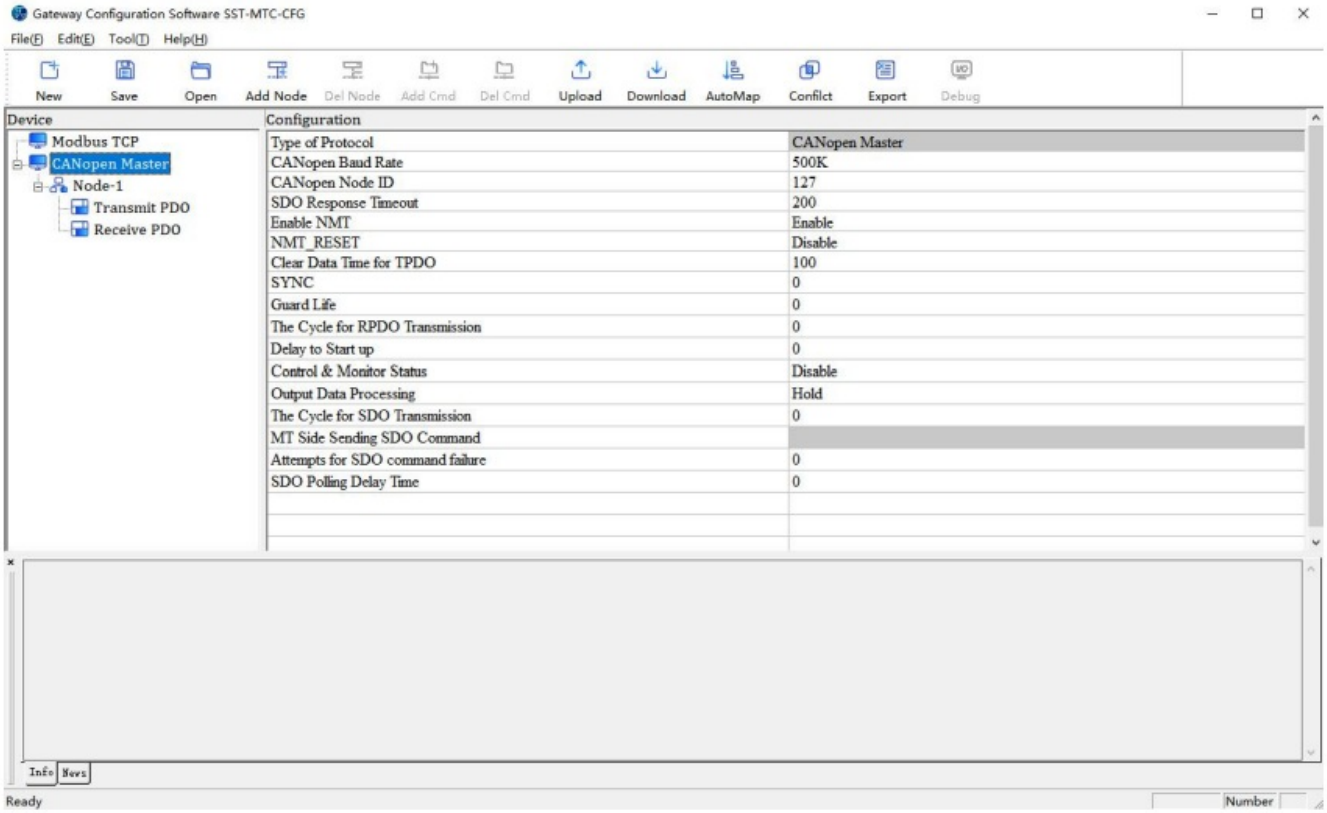
- Add node: Left click on CANopen Networks or existing nodes, and then perform the operation of adding a new node. Then there will be a new node named “New node” under CANopen Network (The newly added node has no address. Nodes without addresses are invalid. Please enter the address of the node. Node address cannot be repeated).
- Delete node: Left click on the node to be deleted, and then perform the operation of deleting node. The node and all commands will be deleted. Add commands: Left click on the node, and then perform the operation of adding command to add a command for the node. The command selecting dialog box will pop up for users to choose from. Shown as below:
  Commands: Upload SDO->ENet In, Download SDO <- ENet Out, Transmit PDO-> ENet In, Receive PDO<- ENet Out
- Select commands: Double click a command.



- Delete command: Left click a command and you can delete it.
- Copy node: Left click on the existing node, choose the node and execute the operation of copying nodes (include all commands under the node).
- Paste node: Left click and choose any existing node, execute the operation of pasting a node. Then under the CANopen Network tree you can see the new node (include all commands under the node). The parameters of the new node is default setting, it needs to be reset.

4.7.4 CANopen Networks Configuration Interface

Configurable parameters are shown as below:
CAN open Baud Rate, CAN open Node ID, SDO Response Timeout, Enable NMT, NMT_RESET, Clear Data Time for TPDO, SYNC, Guard Life, The Cycle for RPDO Transmission, Delay to Start up, Control & Monitor Status, Output Data Processing, The Cycle for SDO Transmission, Attempts for SDO command failure and SDO Polling Delay Time.
CAN open configuration interface is shown as below:



CAN open Baud Rate: 50K, 100K, 125K, 250K, 500K, 1M can be selected; the default value is 250K
Canoe Node ID: 1 to127, the default value is 127
SDO Response Timeout: This parameter is based on 10 milliseconds. The range of the parameter value is 1 to 200. Default value is 200
Enable NMT: Whether to start all CAN open nodes on the network or not, the default is disable

Clear Data Time for TPDO: TPDO timeout value
0: Do not use the function;
Nonzero value: Use timeout function and the timeout value is nonzero integral multiple of 10 milliseconds, the range is 0 to 200, the default is 0

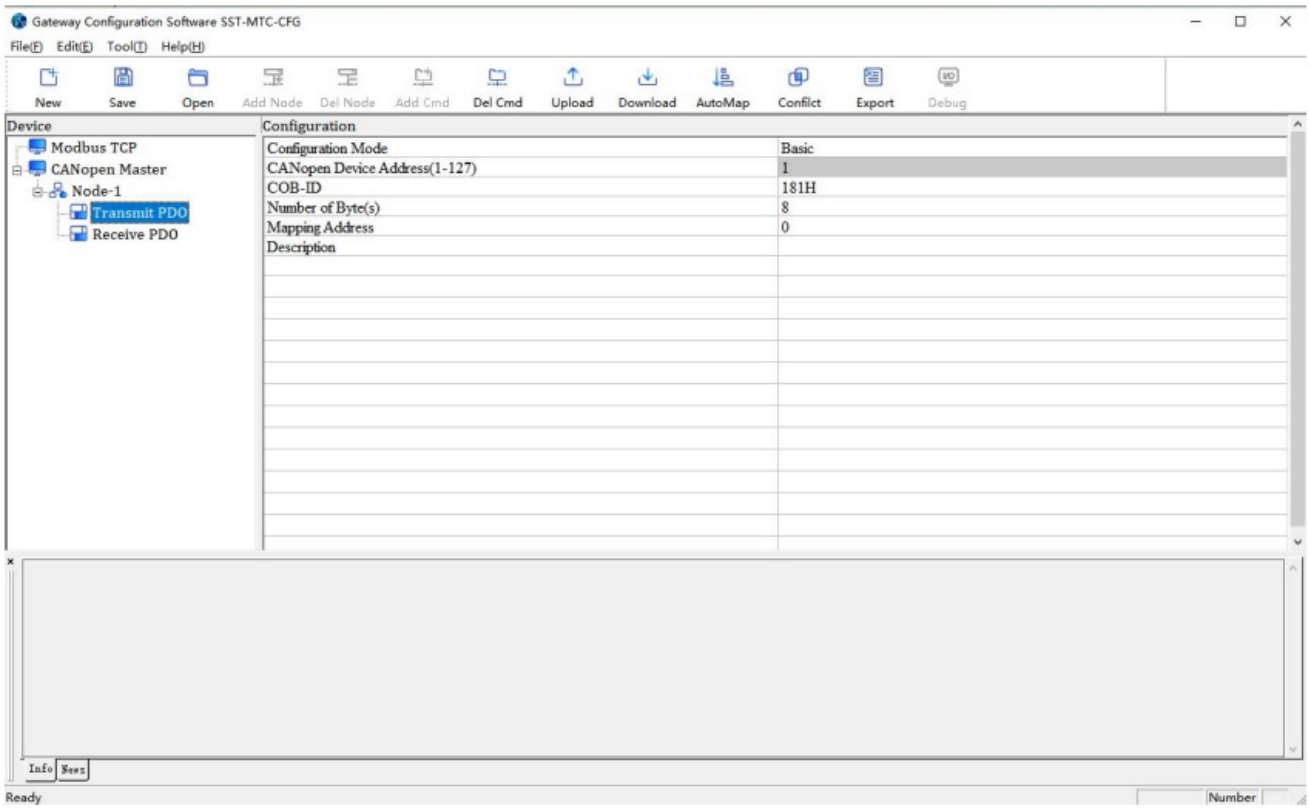
NMT_RESET: Whether to send the NMT_RESET command. This item can only be configured when NMT is enabled, the default is Disable.
SYNC: Synchronizing cycle
0: Do not use synchronizing cycle function
Nonzero value: Use the function, and the synchronizing cycle is nonzero integral multiple of 1 milliseconds, the range is 0 to 6000, the default is 0.

Guard Life: It uses Guard life when input value is non 0, else uses heartbeat. The default is 0, which adopts the heartbeat protocol (range from 0 to 2000).
The Cycle for RPDO Transmission: The cycle for RPDO Transmission is based on 1ms. Zero means to use the mode of change of value output; non-zero means to send all RPDO according to the cycle. Sending cycle equals setting value, the default value is 0. The range: 0~60000. Note: This parameter and CAN baud rate are relevant with RPDO command numbers. If the system focuses on real-time performance, it is recommended to set this value to 0, that is, change of value output.
Delay to start up: Delay value
0: Do not use the function;
Nonzero value: Use the function, and delay value is nonzero integral multiple of 1 milliseconds, the range is 0 to 60000, the default is 0.
Control& Monitor Status: The first two bytes of output buffer is used as status byte of CANopen slave. The first byte of this two byte is address of CANopen salve, and the second byte is the command which controls CANopen slave(e.g., enter pre-operation state, enter operation state, enter stop state, reset node, reset application, reset communication, etc.). Selecting “Enable”, SST-ETC-CFG will minus two bytes when calculating mapping address automatically and this two byte are saved in the front of buffer, the default is “Disable”.

Output Data Processing:When TCP side is off, the RPDO data of TCP output buffer will Clear or Hold;
Clear means to set the data to zero;
Hold means to keep the data unchanged before TCP is off.
The Cycle for SDO Transmission:The cycle for SDO Transmission, is based on 1ms. Zero means Download SDO uses mode of change of value output, Upload SDO uses the mode of non-stop reading slave data; non-zero means to send all SDO according to the cycle. Sending cycle equals setting value, the default value is 0. The range: 0 to 60000.
Attempts for SDO command failure:The CANopen Master station sends an SDO request, but does not receive a response from the device station. The master station will repeatedly send this SDO request. The number of repetitions is the value set by this parameter, range: 0 to 5, default: 0.
SDO Polling Delay Time:The CANopen Master station sends the SDO request and receives the response from the device station. The master station needs to delay a period of time before sending the next SDO request. This period of time is the SDO Polling delay time.Unit: ms, range : 0 to 60000, default: 0.

4.7.5 Command Configuration

In the device interface, left click on a command and then the configuration interface is shown as below:



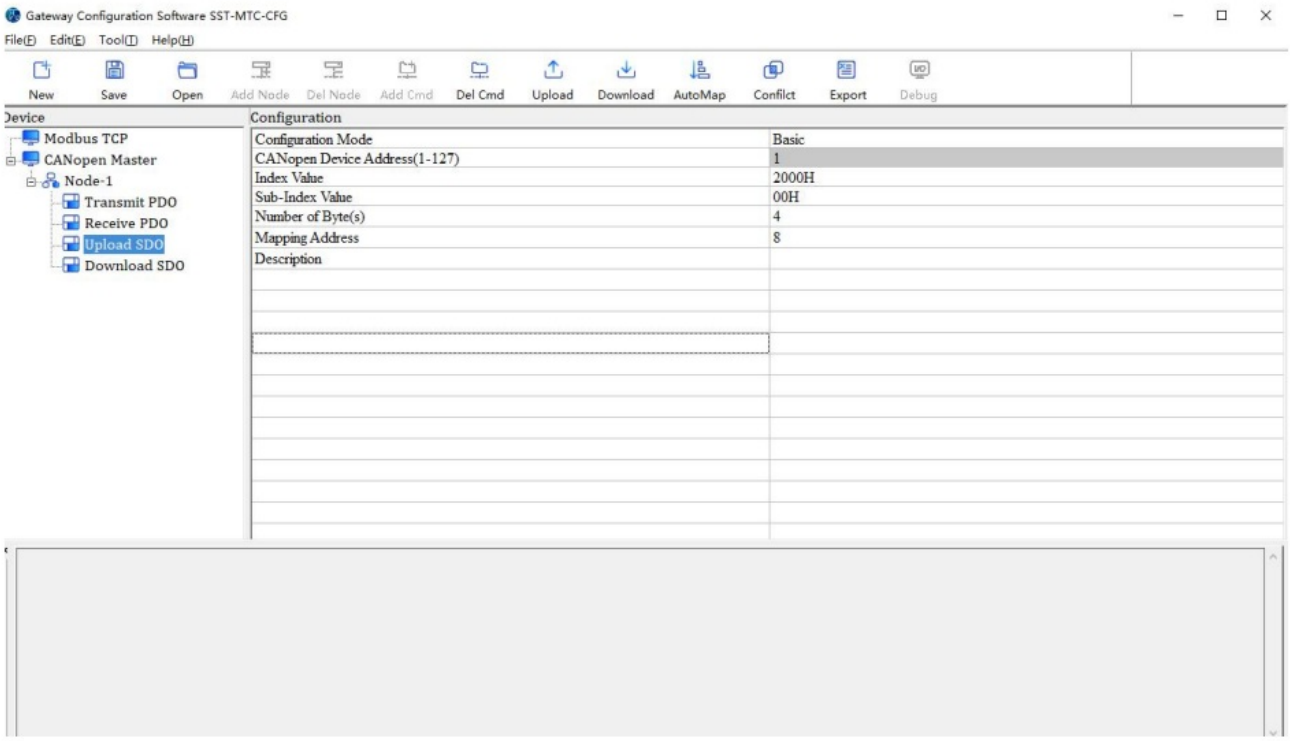
- CANopen Device Address : CANopen Device address, the range is 1 to 127.
- COB-ID: The CAN ID (decimal) of CANopen PDO:

  Default value of Transmit PDO command: 384(0x180) + node ID or 640(0x280) + node ID or 896 (0x380) + node ID or 1152(0x480) + node ID.

  Default value of Receive PDO: 512(0x200) + node ID or 768(0x300) + node ID or 1024 (0x400) + node ID or 1280 (0x500) + node ID.

  If users want to fill in a custom value, please fill in the required value directly when Customized item is selected in the drop – down option box.The range is(1~127) & (257~1408) & (1664~1791) & (1920~2046).
- Number of bytes: The number of data byte(s). Range: 1~8.
- Mapping address: Mapping address of the internal memory address of the gateway (decimal). Range: 0-1999.The mapping address can be filled in manually or automatically by the automatic mapping function.
- Description: Users can enter descriptive descriptions of project configuration items here.These are not actually downloaded to the gateway device, which can help users distinguish their functions, such as “status” etc. And

can not be used.

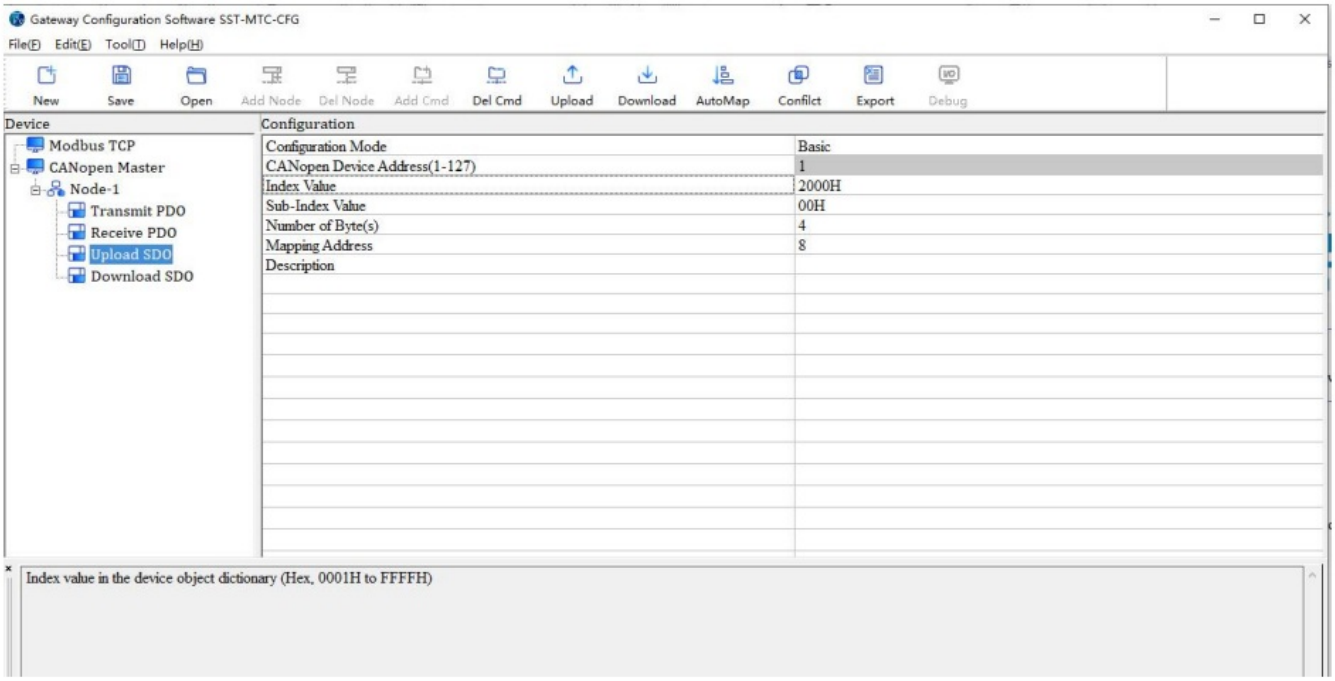


- Index value:Index value in the device object dictionary (Hex, 0001H to FFFFH).
- Sub-Index value:Sub-Index value in the device object dictionary (Hex, 00H to FFH).
- Number of bytes: Number of Bytes: must be 1 or 2 or 4.
- Mapping address: Mapping address of the internal memory address of the gateway (decimal). Range: 0-1999.The mapping address can be filled in manually or automatically by the automatic mapping function.

Note: Max PDO commands ≤ 100
Max SDO commands ≤ 100

4.7.6 Comment Interface

Comment interface displays the explanation of relevant configuration item. When the configuration item is “Index value”, the comment interface is shown as below:



SST Automation
Email: support@sstautomation.com
www.SSTAutomation.com

Documents / Resources

	SST Automation GT200-MT-CO Modbus TCP Canopen Gateway [pdf] User Manual GT200-MT-CO Modbus TCP Canopen Gateway, GT200-MT-CO, Modbus TCP Canopen Gateway, TCP Canopen Gateway, Gateway

References

- SST SSTCOMM | Enable industrial connectivity
- SST SSTCOMM | Enable industrial connectivity
- User Manual