

Modbus / EtherNet/IP Gateway GT100-EI-RS485485

User Manual

V 4.3



SST Automation

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Important Information

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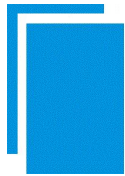
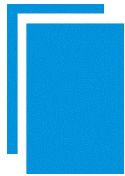


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1 Product Overview

1.1 Product Function

GT100-EI-RS485 is a gateway that can provide a seamless connection between serial (Modbus RTU/ASCII and generic) and EtherNet/IP. It can connect up to 32 Modbus (or other serial protocol) slave devices to an EtherNet/IP network. The Modbus side supports RS-485 serial interfaces and only uses one interface during data communication.

1.2 Product Features

- One RS-485 with independent 1KV photo electric isolation.
- Dual Ethernet ports with built-in Ethernet switching capability, supporting daisy-chain connections.
- Supports static IP configuration and DHCP; assigns a default IP address of 192.168.0.11 automatically if DHCP times out.
- Provides I/O monitoring functionality, enabling online monitoring of gateway input/output buffer data.
- Supports Non-DLR functionality, allowing direct integration into a DLR ring network.
- Easy-to-use configuration software: The GT100-EI-RS485 can be configured by the SST-MI-CFG software easily.

1.3 Technical Specifications

[1] EtherNet/IP network is independent with Modbus network.

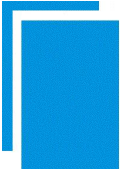
[2] IEEE802.3u 100BASE-T Ethernet 10/100M. Built-in Ethernet switching functionality, supporting cascading connections.

[3] IP address conflict detection.

[4] Supports ODVA standard EtherNet/IP communication protocol.

[5] Serial port parameters:

- ◆ RS485 interface, half-duplex.



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- ◆ Baud rate: 1200, 2400, 4800, 9600, 19200 , 38400, 57600 and 115200 bps.
- ◆ Parity check mode: None, Odd and Even.
- ◆ Stop bits: 1, 2.

[6] Modbus master:

- ◆ Function code: 01H, 02H, 03H, 04H, 05H, 06H, 0FH and 10H.
- ◆ Each master can configure up to 100 Modbus commands.
- ◆ Function codes 03H、04H、06H、10H support "**Word / Byte mapping**" which makes it easy to fix format conversion issues with big endian and little endian data between the two networks. The gateway can connect 32 Modbus slave devices through the RS-485 connection.

[7] User Config: Universal serial communication. Supports character timeout, character number and delimiter control modes. Has an auto sending function.

[8] Serial port has independent 1KV photoelectric isolation.

[9] Max input and output bytes of EtherNet/IP:

- ◆ Max input bytes: 492 bytes (254 bytes under universal mode, including the checksum byte).
- ◆ Max output bytes: 492 bytes (254 bytes under universal mode, including the checksum byte).

[10] Power supply: 24VDC (9~30VDC), 110mA (24VDC).

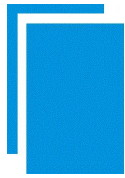
[11] Working temperature: -40°F~158°F(-40°C~70°C), Humidity: 5% ~ 95% (non-condensing).

[12] Dimensions (W*H*D): 1.0 in*4.0 in *3.6 in (25mm*100mm*90mm).

[13] Installation: 1.4 in (35mm) RAIL.

[14] Protection level: IP20.

[15] Test Standards: Compliant with EMC testing standards.

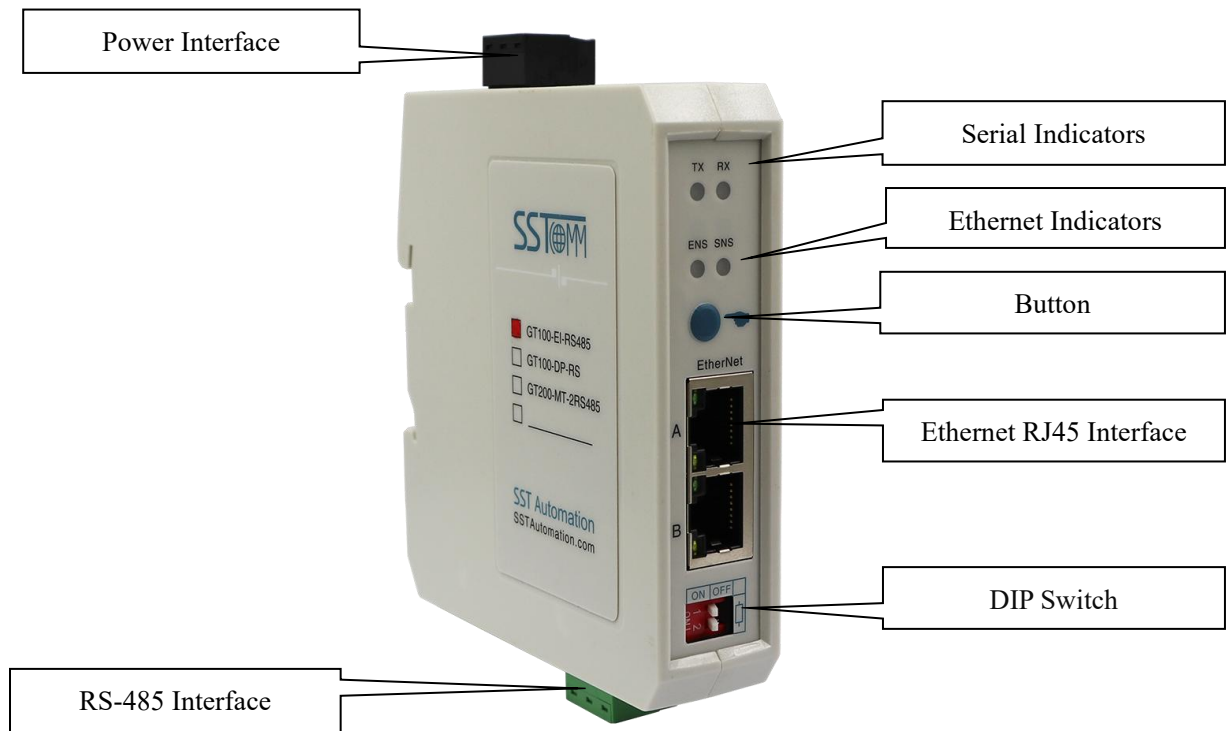


1.4 Revision History

Revision	Date	Chapter	Description
V4.3	11/22/2024	ALL	New release
V2.1	11/25/2022	ALL	Increase the supported Modbus slave devices from 8 to 32. Change the default Assign IP Mode as DHCP. Revised some mistakes. Added connection diagrams to chapter 2.4.3 and chapter 4.
V1.4, Rev D	1/12/2022	ALL	Update the format.
V1.4, Rev C	6/17/2021	Chapter 2.3, 3.1	Revision and picture updated. Change the default IP address to 192.168.0.XXX
V1.4, Rev B	3/18/2018	ALL	Change the default IP address to 192.168.1.XXX
V1.4, Rev A	1/17/2017	ALL	Change the default Assign IP Mode to DHCP
V1.4	12/26/2016	ALL	Revision for GT100-EI-RS485 V1.4
V1.2	7/14/2015	ALL	New release

2 Hardware Description

2.1 Product Appearance



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

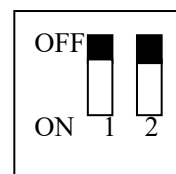
2.2 Indicators

Indicators	Status	Descriptions
ENS	Red off	IP address established
	Red blinking	DHCP
	Green on	EtherNet/IP connection is established, communication is normal
	Green blinking	EtherNet/IP connection is not established
SNS	Green on	The serial port is ready to transmit and receive data after initialization.
ENS and SNS Combined Status	ENS Orange SNS Off	Firmware Update Mode
	SNS Red On and off 500ms	Lock Configuration
	SNS turns red for 300 ms, turns off for 400 ms, and turns red again for 300 ms before turning off.	Unlock Configuration
TX, RX	TX, green blinking	Serial port is sending data
	RX, green blinking	Serial port is receiving data

2.3 DIP Switch

A 2-position DIP switch is used to configure whether the RS485 serial port has a termination resistor.

SW(No.1, No.2)	Pull-Up Resistor	Pull-Down Resistor	Termination Resistor
OFF,OFF	10 k Ω *	10 k Ω *	None*
ON,ON	1.3 k Ω	1.3 k Ω	120 Ω



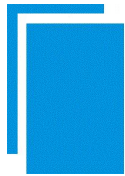
*Indicates Default

2.4 Button

1. Locking and Unlocking Configuration

During device operation, double-click the button. The SNS red light will turn on for 500 ms and then turn off, indicating the configuration has been locked.

Double-click the button again. The SNS red light will turn on for 300 ms, turn off for 400 ms, and then turn on again for 300 ms before turning off, indicating the configuration has been unlocked.



Lock Configuration: When locked, the configuration software can detect the device but cannot upload or download configuration settings.

Unlock Configuration: When unlocked, the configuration software can detect the device and upload or download configuration settings normally.

2. Restoring DHCP Mode

Within 10 seconds after the device completes startup (indicated by the SNS green light being steadily on), press and hold the button for 5 seconds. The SNS green light will start flashing at a frequency of 2 Hz.

Single-click the button within the next 5 seconds: the SNS indicator will turn off, and the device will restore its default configuration and restart automatically. After restoring, the IP configuration will default to DHCP mode.

If the button is not clicked within 5 seconds, the SNS green light will remain steadily on, and the device will resume normal operation.

3. B Process Update

a. Press and hold the button while powering on the device. When the ENS orange light is steadily on and the SNS light is off, the device is ready for the B process update.

b. Open a web browser and enter the IP address `192.168.0.10`. Log in using the provided username and password.

c. Click **Connect** to establish a connection. A prompt will confirm successful connection.

d. Select the BIN file, then click **Download**. Wait for a prompt indicating the download is complete.

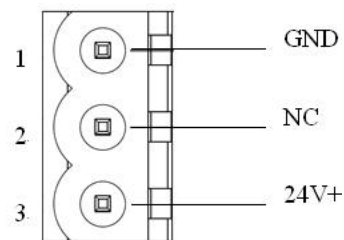
e. Click **Restart** below the download success message. Once restarted, the gateway indicators will return to their operational state, confirming a successful update.

2.4 Interface

2.4.1 Power Interface

GT100-EI-RS485 has one power interface that supports 9~30VDC. It is recommended to use 24VDC power.

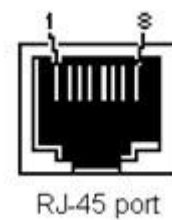
Pin	Function
1	Power GND
2	NC, not connected
3	24V+, DC Positive 24V

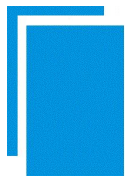


2.4.2 Ethernet Interface

The Ethernet interface uses an RJ-45 connector follows the IEEE802.3u 100BASE-T standard. Its pinout (standard Ethernet signal) is defined as below:

Pin	Signal Descriptions
S1	TXD+, Transmit Data+
S2	TXD-, Transmit Data-
S3	RXD+, Receive Data+
S4	Bi-directional Data+
S5	Bi-directional Data-
S6	RXD-, Receive Data-
S7	Bi-directional Data+
S8	Bi-directional Data-

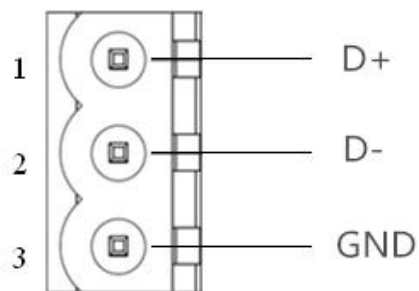




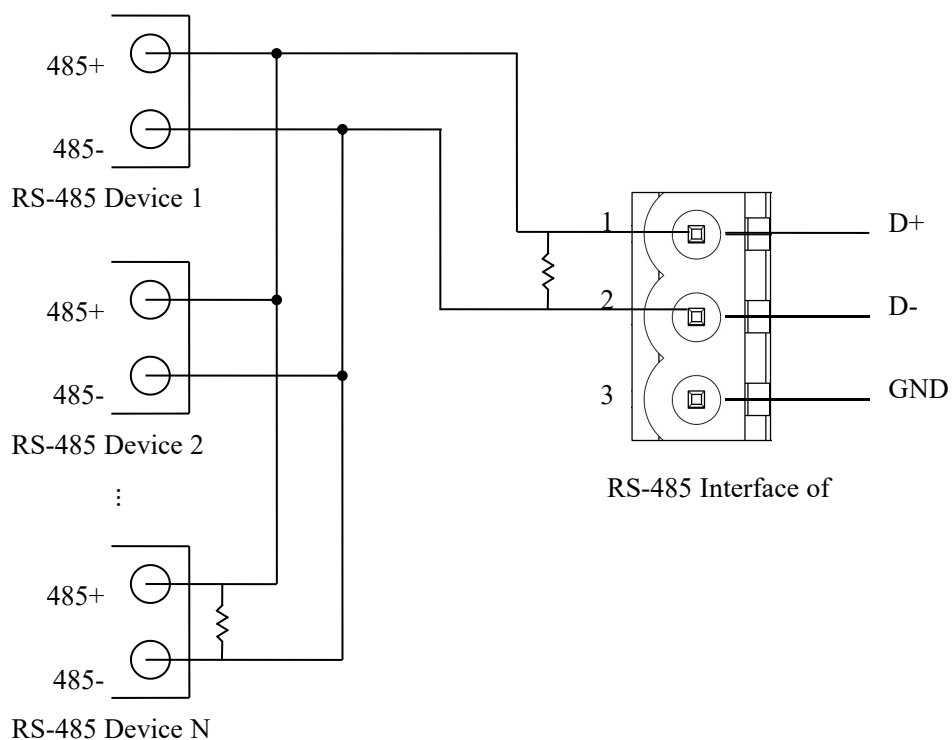
2.4.3 RS-485 Interface

The RS-485 serial interface uses a 3-pin terminal. Its pinout is defined as below:.

Pin	Function
1	D-, RS-485 Transmit Negative
2	D+, RS-485 Transmit Positive
3	GND



When using a multi-point connection, to prevent the reflection and obstruction of signal, it is recommended to use two termination resistor (120Ω 1/2W) in parallel with the 2 data wires at both ends of the bus.



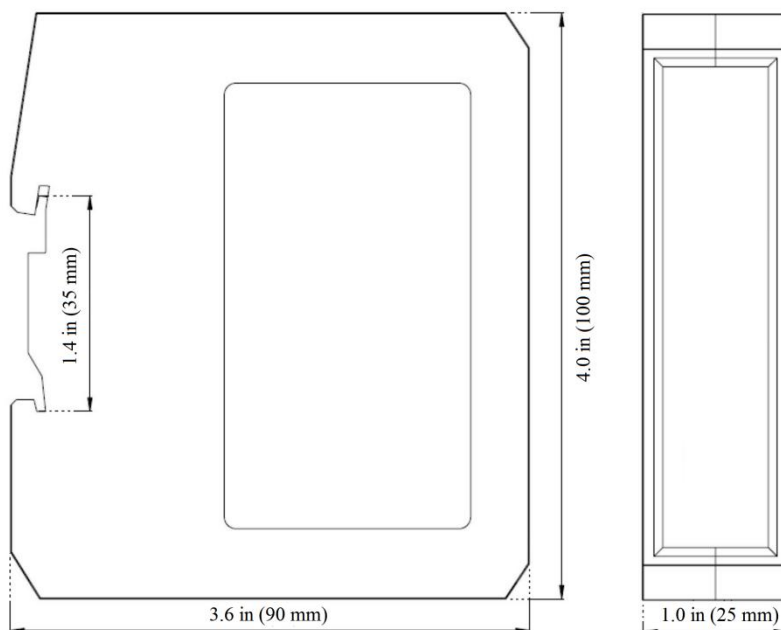
Note: There is no terminal resistor inside RS485 interface of GT100-EI-RS485.

3 Installation

3.1 Machine Dimension

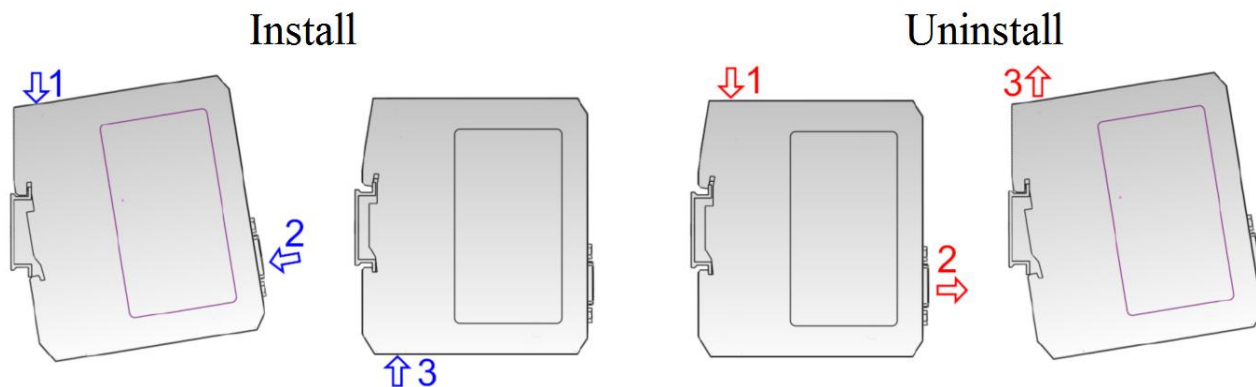
Size (width * height * depth):

1.0 in * 4.0 in * 3.6 in (25 mm * 100 mm * 90 mm)



3.2 Installation Method

Using 1.4 in (35mm) DIN RAIL

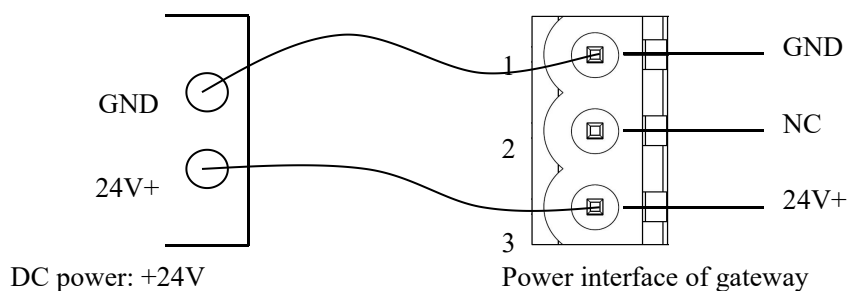


4 Quick Start Guide

Basic steps when configuring GT100-EI-RS485 :

1. Wiring: See also [Chaper 2.4 Interface.](#)

- (1) Connect the network port of the gateway to the PC with a network cable for downloading the configuration.
- (2) Connect the serial port of the gateway to the serial device for communication with the serial device.
- (3) Connect the gateway power supply and power on.



2. Download SST-MI-CFG software from www.sstautomation.com/Download1/ and install it.
3. Download the EDS file for GT100-EI-RS485 from www.sstautomation.com/Download1/.
4. Build your configuration using SST-MI-CFG and download it to the gateway. For more details, see [Chapter 5](#).

If the gateway cannot be searched, please try the following:

- The network factory setting for GT100-EI-RS485 is DHCP. If DHCP fails, the gateway IP will revert back to 192.168.0.11. Please check whether the computer and gateway are on the same network segment.
- Please test the network connection first. Please refer to the note "[How to Use the Ping Command](#)" located on our Support page on the sstautomation.com website.
- If the download fails: Check whether the download configuration is correct, ensure the device is set to the unlocked configuration state, or contact us for technical support assistance.

After downloading the configuration, the device can be restarted either automatically or manually. The downloaded configuration will take effect only after the restart, allowing normal communication.

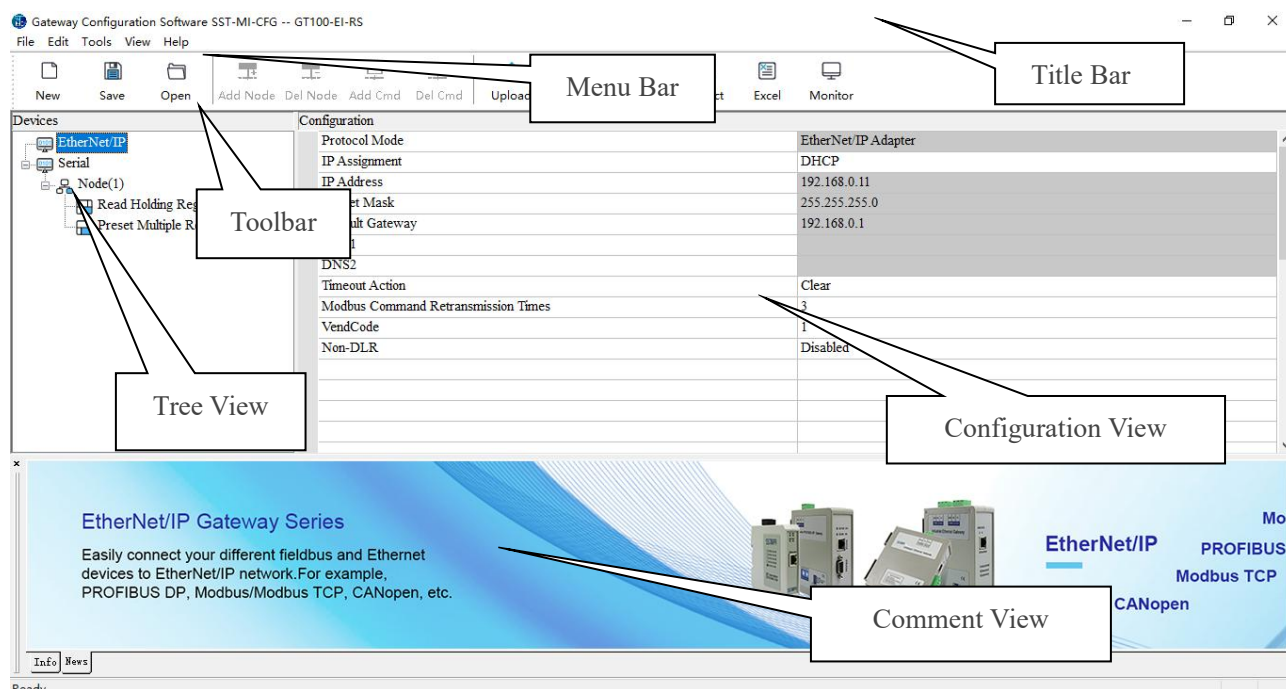
Note: The factory default network setting for the GT100-EI-RS485 is DHCP. In DHCP mode, if the IP address is not assigned within 30 seconds, the gateway will automatically assign the fixed IP address 192.168.0.11.

5 Software Instructions

5.1 Software Interface Description

The SST-MI-CFG configuration software runs on the Windows platform and is used to configure GT100-EI-RS485 through the network interface. It is used to configure the parameters and commands for Modbus and Ethernet.

Double click the software icon on the desktop after installation to enter the configuration interface:



Toolbar interface shown as follows:



New: Create a new configuration project.



Save: Save current configuration.



Open: Open a configuration project.

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Add Node

Add Node: Add a Modbus slave node.



Del Node

Delete Node: Delete a Modbus slave node.



Add Cmd

Add Command: Add a Modbus command.



Del Cmd

Delete Command: Delete a Modbus command.



Upload

Upload: Read the configuration information from the module and shown in the software.



Download

Download: Download the configuration file to the gateway.



AutoMap

Calculate Mapping Address: Used to automatically calculate the mapped memory address without conflict by each command.



Conflict

Mapping Address Conflict Detection: To check whether there are some conflicts with configured commands in the gateway memory data buffer.



Excel

Export EXCEL: Export current configuration to the local hard disk, saved as .xls file.



Monitor

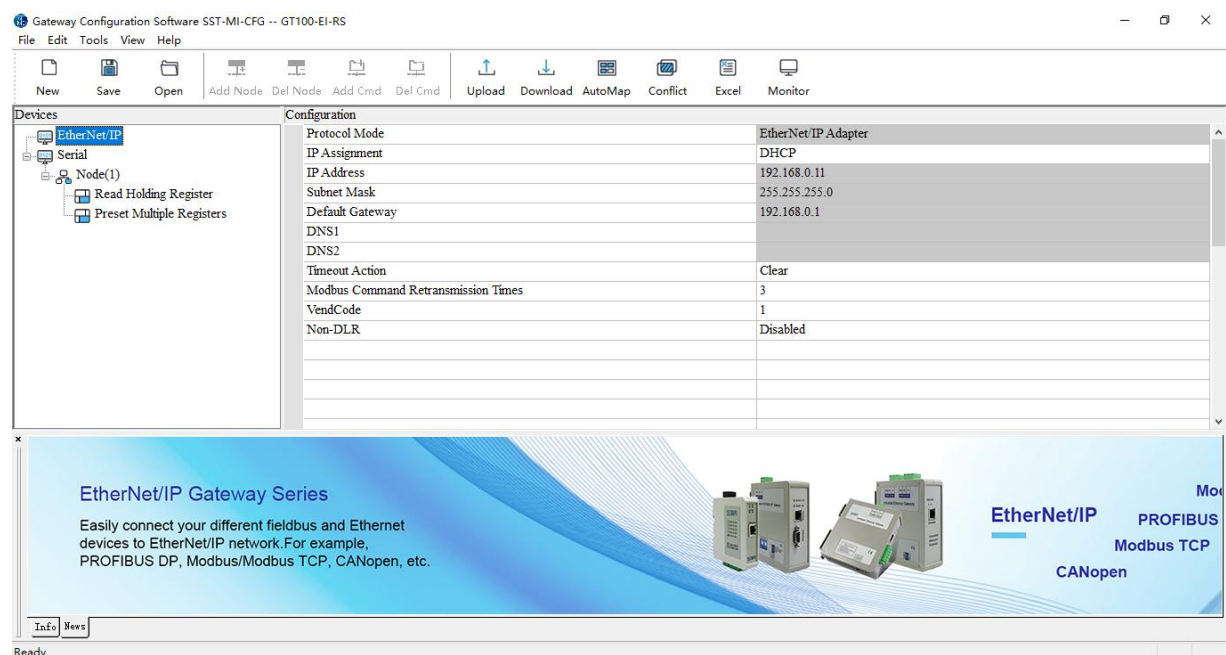
I/O data Monitor: Enables online monitoring of the input/output buffer data of the gateway.

5.2 Device View

5.2.1 Ethernet Configuration View

In the device view interface, click Ethernet. configuration view interface is as below:

1. Modbus Master Mode – EtherNet/IP Configuration Interface:



IP Assignment:Static and DHCP.

Static: Manually assign a static IP address.

DHCP: Automatically receive an IP address from a DHCP server on the network.

IP Address: Sets the IP address of the device.

Subnet Mask:Sets the subnet mask of the gateway's EtherNet/IP interface.

Default Gateway: Sets the gateway address of the device.

Timeout Action: This function determines whether to clear EtherNet/IP input data when the number of Modbus comand response errors equals the number of Modbus command retries set in software.

Clear: Clear the EtherNet/IP input data.

Hold: Hold the last received EtherNet/IP input data.

Modbus command Retransmission Times: Sets the number of times to resend a Modbus command when there is a Modbus response error.

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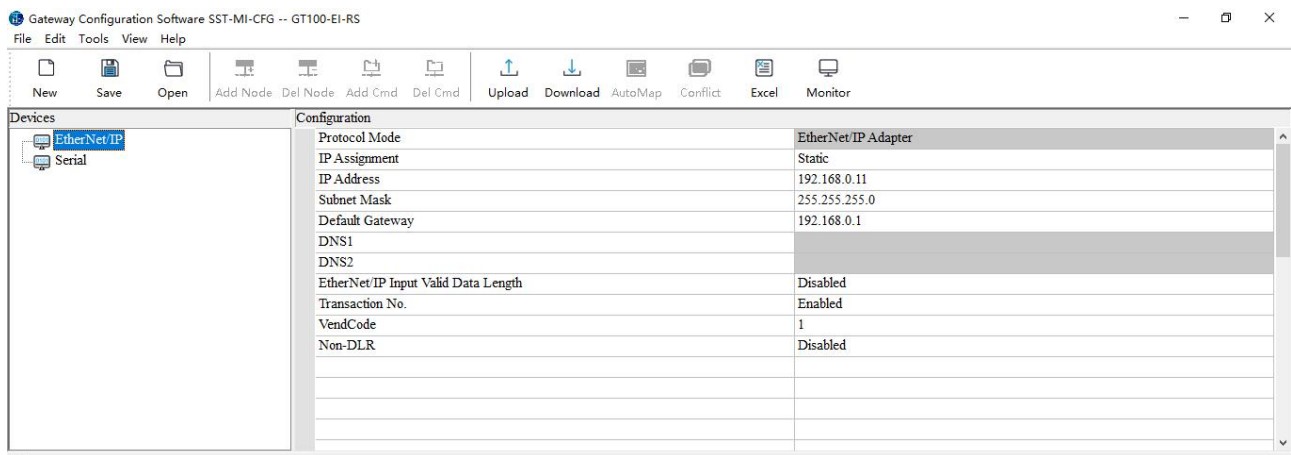
VendCode: VendCode can be modified as required. Range: 1-65535. Default Value: 1. After modification, the corresponding EDS file must also be updated.

Non-DLR Function: Supports "Disable" and "Enable," with "Disable" as the default.

If used in a DLR ring network, enable this function.

If used on a non-redundant branch of a DLR system, disable this function.

2. User Config Mode – EtherNet/IP Configuration Interface:



EtherNet/IP Input Valid Data Length: The first byte in Ethernet input data indicates the length of serial receiving data frame.

Transaction No.: Add a byte at the frame header to represent the transaction sequence number, which identifies the data frame, with a cycle of 0-255.

When inputting data on the EtherNet/IP end, input one frame of data with a transaction sequence number plus 1.

When outputting data on the EtherNet/IP end, the transaction sequence number is incremented by 1 to output one frame of data.

For additional parameter details, please refer to the "Modbus Master Mode – EtherNet/IP Configuration Interface."

5.2.2 Subnet Configuration View-Modbus Master

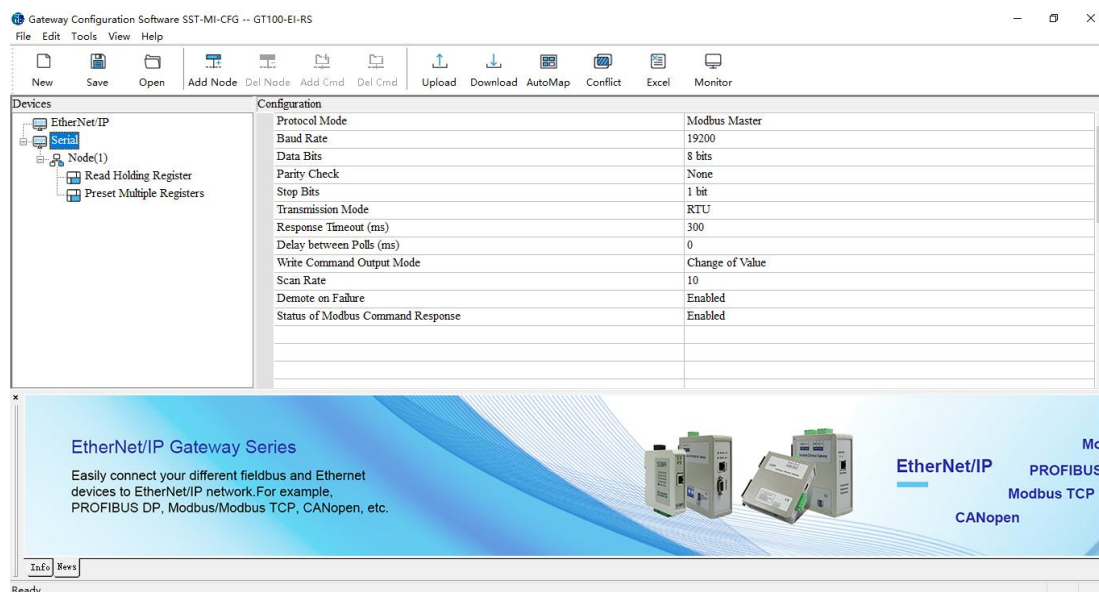
1. Modbus Master configuration view

The "Modbus Master" protocol mode configuration interface is shown below:

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Baud Rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200bps.

Data Bits: 7, 8.

Parity Check: None, Odd, Even.

Stop Bits: 1, 2.

Transmission Mode: RTU or ASCII.

Response Timeout: The amount of time the gateway waits for the Modbus slave's response after the Modbus Master sends a request. Range: 5~60000ms.

Delay between Polls: The amount of time the gateway delays before sending the next request after a response has been received. Range: 0~ 2500ms.

Write Command Output Mode: There are three types of output commands: Cycle, Forbidden and Change of Value.

Cycle: Sends Modbus write commands periodically according to the scan rate.

Forbidden: Disables output of the Modbus write command.

Change of Value: Sends Modbus write commands when the output data changes.

Scan Rate: The ratio of slow scan cycles to fast scan cycles. Each Modbus command can be set to either fast or slow scanning. If this value is set to 10, fast scan commands will be sent 10 times for every 1 slow scan command. Range:1~255.Default Value: 10.

Demote on Failure: Supports "Disabled" and "Enabled".

When Demote on Failure is "Enabled", after N times of command response failures (errors), if the command is a

fast scan, it will be demoted to a slow scan. This parameter is valid for Modbus reading command and cycle writing command.

Status of Modbus Command Response: Supports "Disable" and "Enable," with "Enable" as the default.

When set to "Enable," the device automatically occupies 2 bytes:

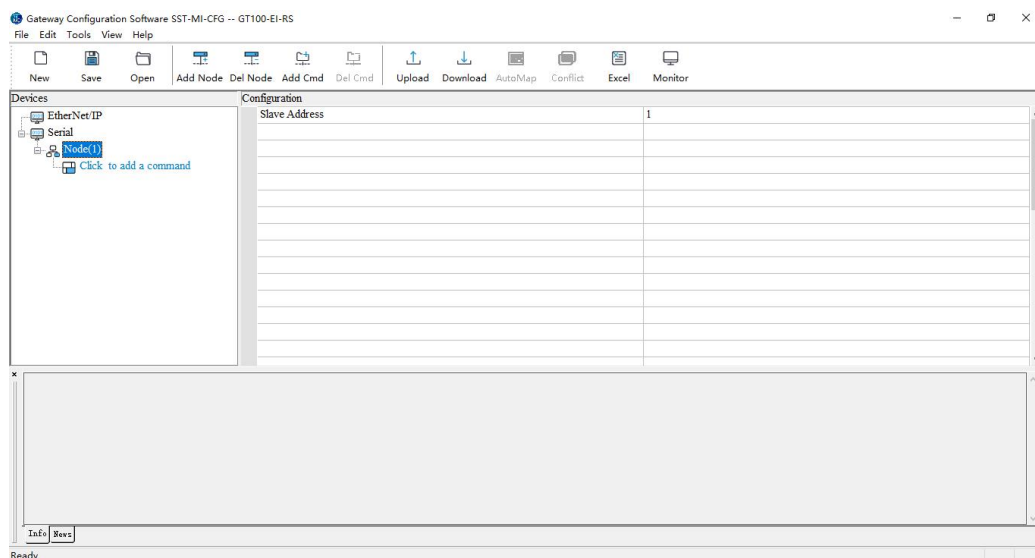
The first byte represents the address of the slave device where the error occurred (repeatedly displayed).

The second byte represents the command identifier where the error occurred (repeatedly displayed).

When communication is normal, both bytes of the Modbus status word are 0.

2. Node Configuration

Under the "Modbus Master" mode, left click on a node and then the configuration interface is shown as below:

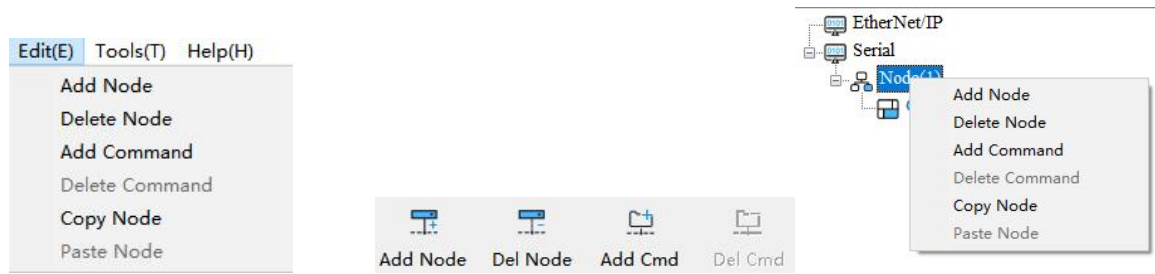


- **Parameter Description:**
 - (1) When "Modbus Master" protocol mode is selected, the node is the Modbus slave station address. The slave address range is from 0 ~ 247.
 - (2) When using RS-485 serial port, up to 32 nodes can be configured.
- **Instructions:** For device view, the software supports three kinds of operation modes: edit menu, edit toolbar, and right-click edit menu.

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(1) Add node: Right click on Subnet or existing nodes, and then perform the operation of adding a new node.

Then there will be a new node named "Node-x" under subnet.

(2) Delete node: Click on the node to be deleted, and then select "Delete Node". The node and all commands will be deleted.

(3) Copy node: Click on the existing node, and then select "Copy Node". The node and all existing commands under the node will be copied.

(4) Paste node: Click and choose any existing node, and then select "Paste Node". A new node and all existing commands will be pasted under the subnet tree. The parameters of new node will have the default settings and will need to be reconfigured.

3. Command Configuration

- Parameter Description: Commands No. supported: 01, 02, 03, 04, 05, 06, 15, 16
- Instructions: The Command Configuration view supports three types of operation: Edit Menu, Edit Toolbar and Right click edit Menu.

(1) Add commands: Left click on the node, and then perform the operation of adding command to add a command for the node.

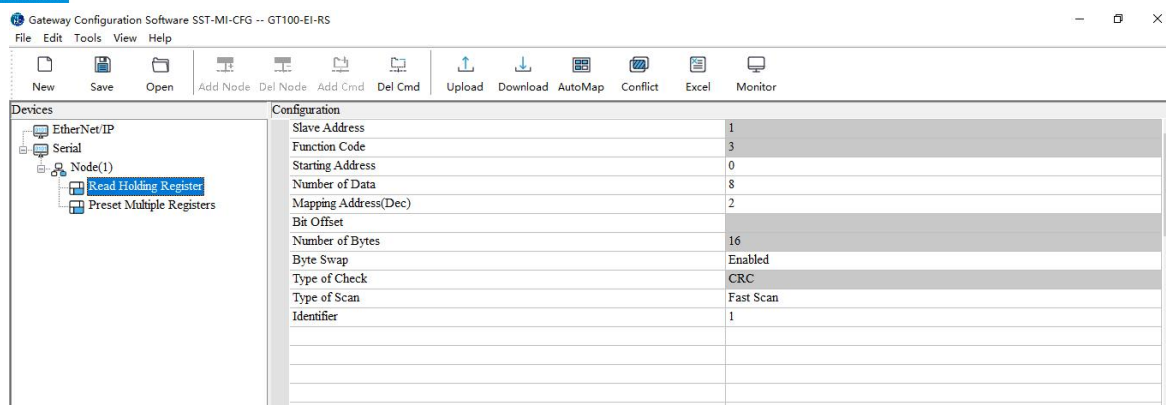
(2) Delete commands: Left-click on the command and perform the operation of deleting command.

Under the "Modbus Master" mode, left click on a command and then the configuration interface is shown as below:

GT100-EI-RS485

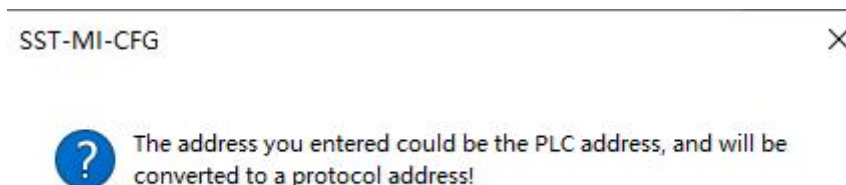
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Starting Address: the starting address of the register/switching value/coil in Modbus slave device. The range of the parameter value is 0 to 65535.

Note: This item of SST-MI-CFG indicates protocol address. When users input PLC address, it will pop up the dialog box below. After clicking OK, the PLC address users input will be converted into the protocol address. Here is the example of PLC address (base 1) and corresponding protocol address (base 0).



Command	PLC Style Address Examples (Base 1)	Corresponding Protocol Style Addresses (Base 0)
Coil Status	00001~00010	00000~00009
Input Status	10001~10010	00000~00009
Holding Register	40001~40010	00000~00009
Input Register	30001~30010	00000~00009

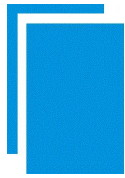
For example, when Modbus command is configured as 03H (read holding register), when users input 40001 in this item (Modbus register starting address), it will pop up the dialog box after confirming. When clicking OK, PLC address 40001 will be converted into 0.

Number of Data: Register/switching value/coil numbers.

Mapping Address (DEC): Data starting address in module memory buffer.

Address range that data is mapped in the module memory.

Read command: 0-491.



Write command: 0-491.

Bit Offset (0~7): Modbus function codes 01, 02, 05, 15 can set the position of the bit address in bytes through this parameter. Range: 0-7.

Number of Bytes: The data bytes of number of data.

Byte Swap: There are two types: Enabled and Disabled.

Disabled: No byte order change is made.

Enabled: The high and low bytes of the 2 bytes are exchanged. For example: 0x1234, convert to 0x3412.

Type of Scan: Scanning method of Modbus command: Fast Scan and Slow Scan optional. Issued at Scan Rate when the command is set to slow scan. Default Value: Fast Scan.

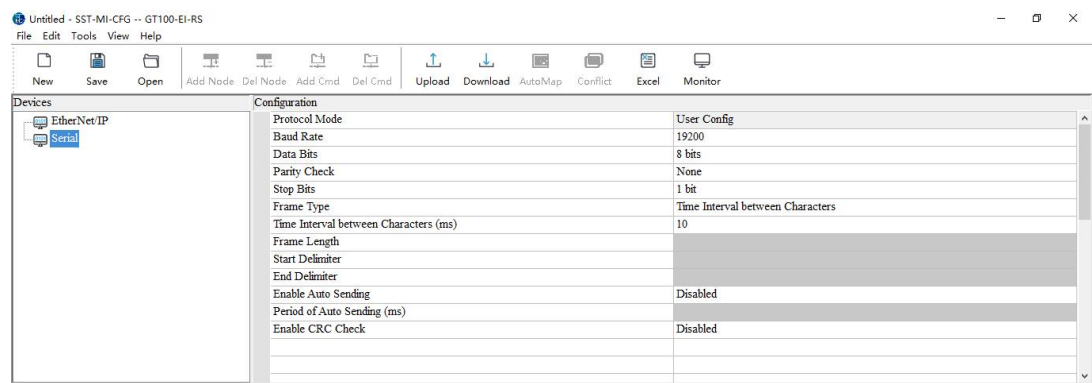
For example: If Scan Rate is set to 10 then every fast scan command will be sent 10 times and those slow commands will be sent once.

Identifier: It is only used to identify each command after the Status of Modbus Command Response is turned on.

5.2.3 Subnet Configuration View-User Config

When you switch the Protocol Mode from “Modbus Master” to “User Config”, you should manually power off and power on the gateway to make the configuration take effect after downloading the configuration.

The “User Config” configuration interface of “Protocols Mode” is shown as below:



Frame Type: In "User Config" mode, there are three methods to decide whether a frame is terminated or not: Time Interval between Characters, Frame length and Delimiter.

Time Interval between Characters: To determine the end of one frame serial data by judging the time interval between characters.

Time Interval between Characters: The maximum time interval between characters that is used to determine the end of a frame. Range: 10-60000ms. Default Value: 10ms.

Frame Length: The length of a frame's data that is used to determine the end of a frame. Range: 1-254. Default Value: 111.

Start Delimiter: The starting character of the received data frame.This setting is only valid when the control method is set to "Delimiter".

END Delimiter: The ending character of the received data frame.This setting is only valid when the control method is set to "Delimiter".

Enable Auto Sending:Supports "Disabled" and "Enabled".

Enabled: The gateway will send data periodically according to the "Period of Auto Sending" parameter.

Disabled: Send serial data only when there is a change in the data to be sent.

Period of Auto Sending: User input, the default value is 1000, the range is 10~60000ms. Valid when enable Auto Sending.

Enable CRC Check: Valid when frame type is Time Interval between Characters and frame length. Enable and Disable

For additional parameter details, refer to "Protocol Type: Modbus Master."

5.2.4 Info View

The Comment View displays explanations for the corresponding configuration items. For example, when configuring the "Memory Mapping Start Address," the Comment View displays the following:

Starting Address: Displayed in decimal.
The starting address of the Modbus slave device to start reading/writing commands. Range: 0-65535.
Note:
There are two address formats of Modbus command: protocol address (base 0) and PLC address (base 1). The protocol address (base 0) format needs to be filled in here.
For example:
Function: 03, PLC address: 40006, enter 5 (protocol address format) in here.

5.3 Tools

The "Tools" tab on the menu bar contains the following functions:

- Ethernet Connection
- Upload
- Download
- Calculate Mapping Address
- Mapping Address Conflict Detection
- Export EXCEL
- I/O Monitor

5.3.1 Ethernet Configuration

Before configuring GT100-EI-RS485 parameters, users must first locate the GT100-EI-RS485 device. This configuration software provides two methods for searching the GT100-EI-RS485 device to be configured.

- (1) The default option is to check "use the search function". The users can search all GT100-EI-RS485 gateways on the network.

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No.	Model	IP Address	MAC Address	Firmware Version	State

Download Refresh IP Search Cancel

Searching

(2) Method 2: Search Device by Specified IP Address

Click the "IP Search" button on the device search interface to open a dialog box for entering the IP address to be searched.

Search by fixed IP

OK Cancel

After entering the correct IP address, the software will search for an GT100-EI-RS485 device with that IP address on the network.

Search by fixed IP

192 . 168 . 0 . 11

OK Cancel

Once the device is found, click "OK" to display the device information in the main interface list.

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Search Device

No.	Model	IP Address	MAC Address	Firmware Version	State
1	GT100-EI-RS	192.168.0.11	64-ea-c5-01-03-c6	2.8	Allows remote configuration

Upload

Refresh

IP Search

Cancel

Search completed

Note: If the user selects "IP Search " ensure the entered IP address is correct; otherwise, the device will not be found.

5.3.2 Upload

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

Search Device

No.	Model	IP Address	MAC Address	Firmware Version	State
1	GT100-EI-RS	192.168.0.11	64-ea-c5-01-03-c6	2.8	Allows remote configuration

Upload

Refresh

IP Search

Cancel

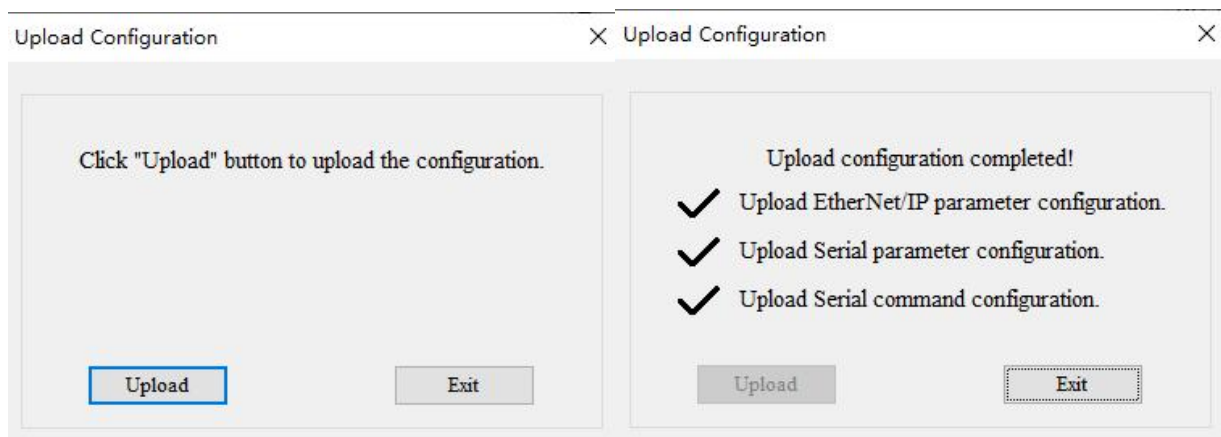
Search completed

Select the device, click Upload.The window displays the uploaded content, and after a short period, the configuration upload is completed.

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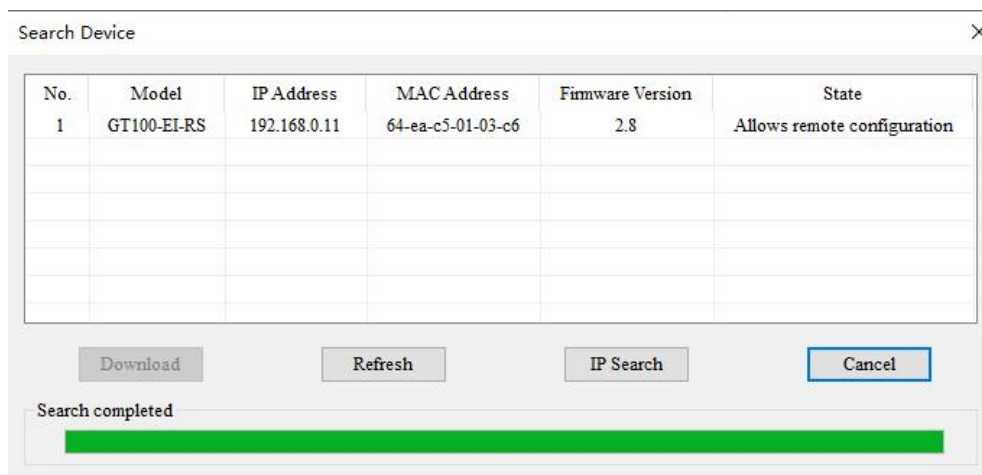


If the gateway cannot be searched:

- Please check whether the computer and gateway are in the same network segment. When using the gateway for the first time, the gateway is in the 192.168.0.X network segment.
- Please test the network connection first. Please refer to the note [“How to Use the Ping Command”](#) located on our Support page on the sstautomation.com website.

5.3.3 Download

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



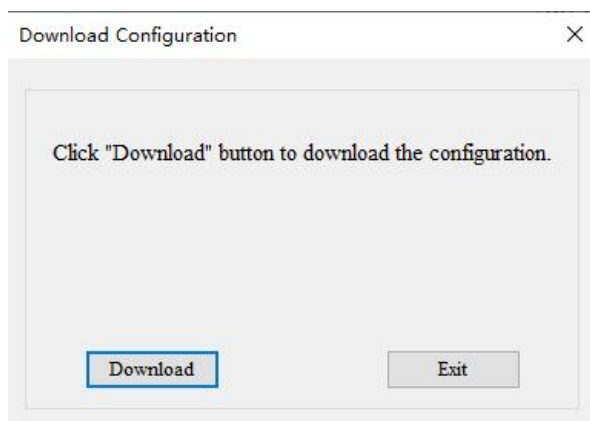
Note:

1. Before downloading, please ensure all configurations are complete and correct.
2. The downloaded configuration requires a gateway restart to take effect.
3. The gateway's default IP configuration mode is DHCP. Once an IP address is automatically obtained via

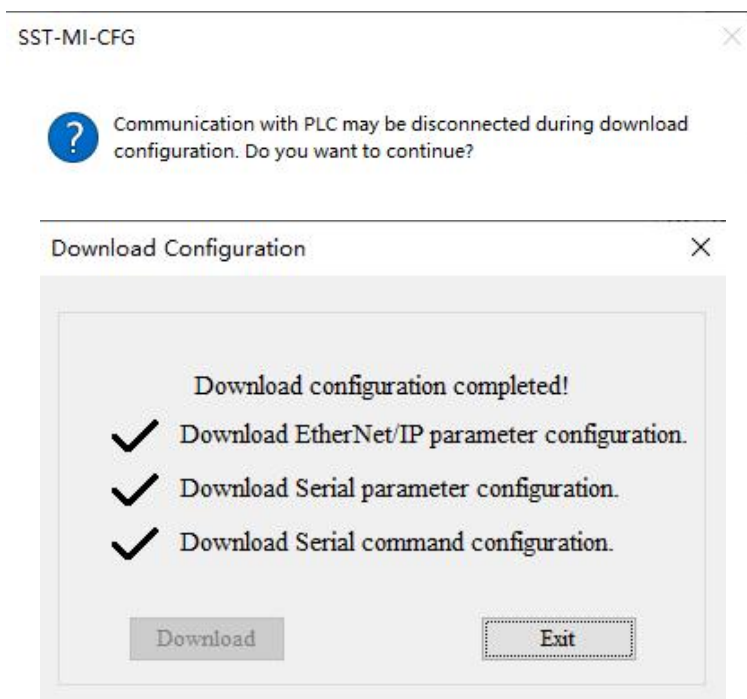
DHCP, the configuration software can detect the gateway device.

4. If there is no DHCP server or switch in the network, and the IP address is not obtained within approximately 30 seconds after powering on or restarting, the gateway will automatically revert to the fixed IP address `192.168.0.11`.

Click "Download," and the window will display the download progress. After a short period, the configuration download will be completed.



After downloading, it will pop up the dialog box as below:

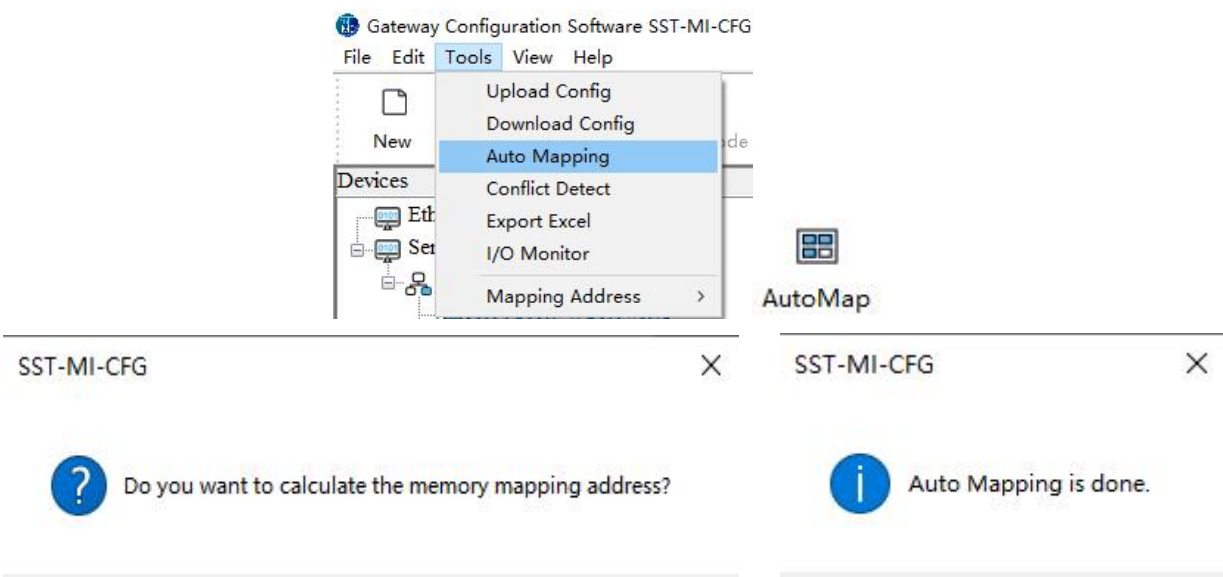


Click OK will restart the gateway remotely.

5.3.4 Calculate Auto Mapping

The automatic mapping function automatically calculates the mapping addresses and fills in the values. Once this function is activated, it will overwrite previously set data with the newly calculated values. After automatic mapping, there are no address conflicts in the mapping buffer. This function is related to the parameter "Number of Data," which must not be left empty.

In the "Tools" bar, select "Auto Mapping" or click the "Auto Mapping" icon to display the following prompt:



5.3.5 Conflict Detect

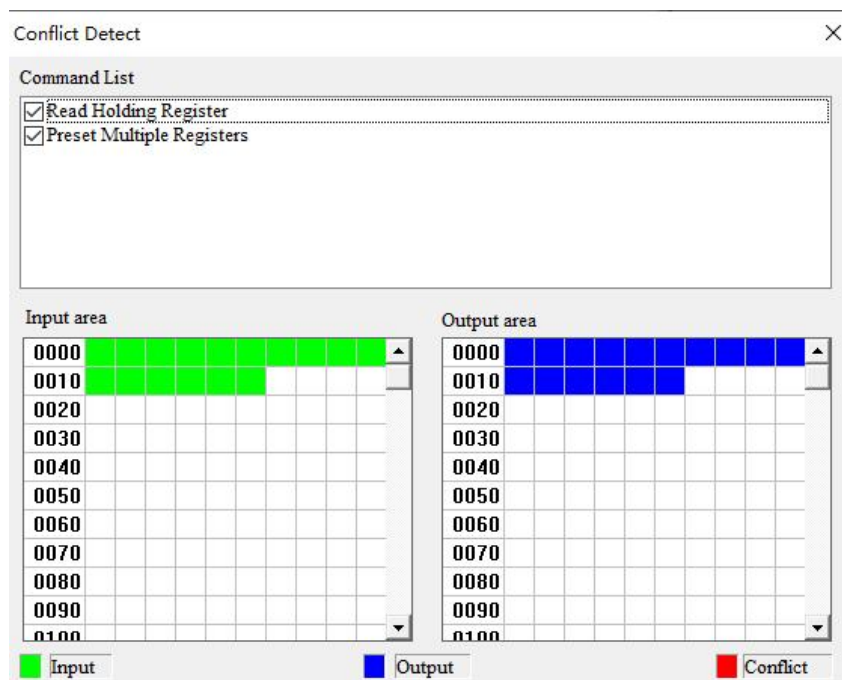
Used to detect whether there are address conflicts in the "Memory Mapping Data." If conflicts are present, the configuration cannot be downloaded to the gateway, and the configuration must be modified promptly. This function is intended for the Modbus Master. In the "Tools" bar, select "Conflict Detect" or click the "Conflict Detect" icon to open the "Conflict Detect" window:

Decimal (DEC) Display

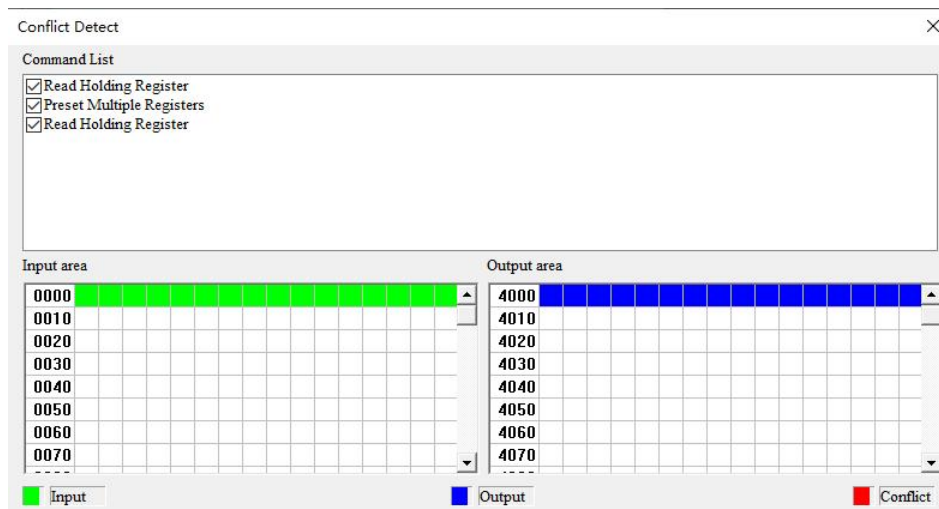
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Hexadecimal (HEX) Display:



(1) Command List Operation

It shows configured command in the command list interface. Check box before each command is used to check the position of this command in memory mapping area. Click one command and check the box, it will show the position where relevant commands occupy in the memory mapping area. Click the command again and uncheck the box, the command will not be shown in the mapping area. This function will be used for confliction detect among commands in memory mapping area.



- <http://www.2009elections.gov>

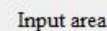
Memory mapping area divides into input area and output area.

Output mapping address range: 0x4000 ~ 0x4 1EB(HEX), 0 ~ 491(DEC)

Green: Read command is shown in input mapping area, it will be in green without conflict.

Red: In input area or output area, different command occupied on the same byte, this byte area will be in red.

Click input/output area grids, each bit of relevant byte in the grid will show whether each bit is occupied. As is shown below:



Output area

[illegible][illegible]

Input

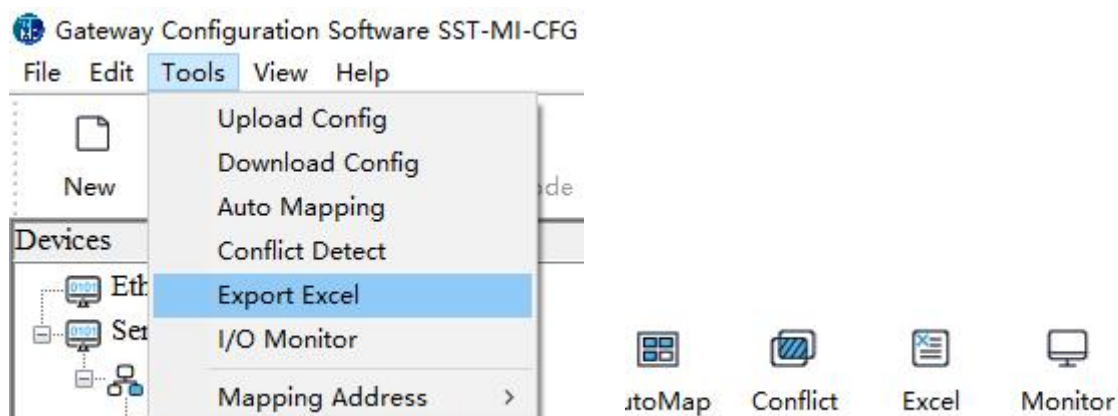
Output

Conflict

5.3.6 Export Excel

Users can use the function to check the gateway configurations.

Select "Export Excel", you can save the configuration with .xls as its extension.

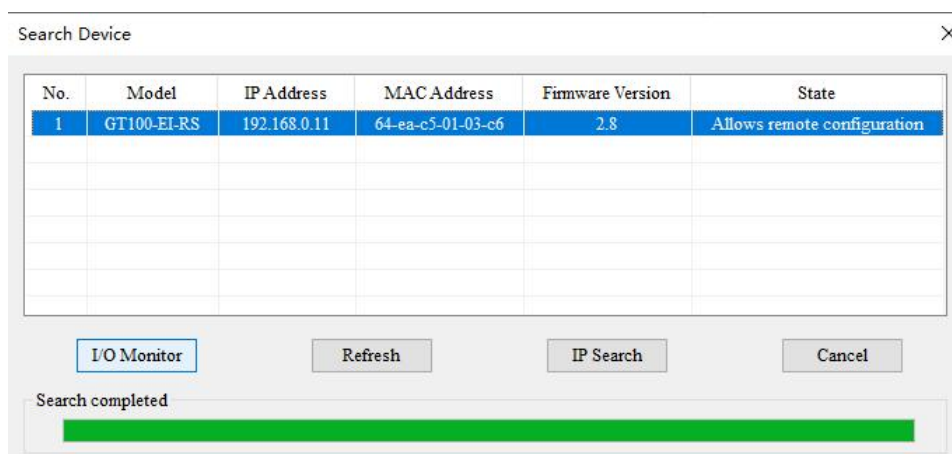


After clicking save, it will open the excel file automatically.

5.3.7 I/O Monitoring

This function is used to monitor the data in the gateway's input/output buffer online.

Click "Monitor" to access the device search interface. Select the device and click "Monitor."



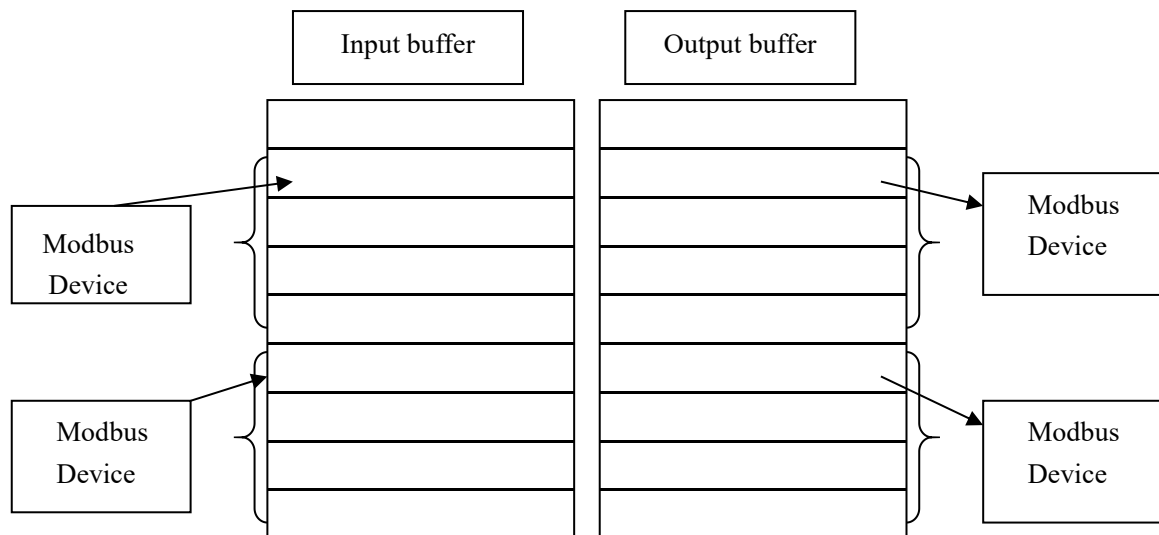
Enter the monitoring interface:



6 Interface Design Description

6.1 Modbus Master

Data exchange of Modbus and EtherNet/IP of GT100-EI-RS485 is set up through "mapping". There are two data buffer areas, one is EtherNet/IP network input buffer and the other is EtherNet/IP network output buffer. Network input and output buffer is all for EtherNet/IP scanner. Modbus read command will write the read data to the network input buffer for EtherNet/IP accessing. Modbus write register command gets data from network output buffer and export to the Modbus slave equipment through write command.

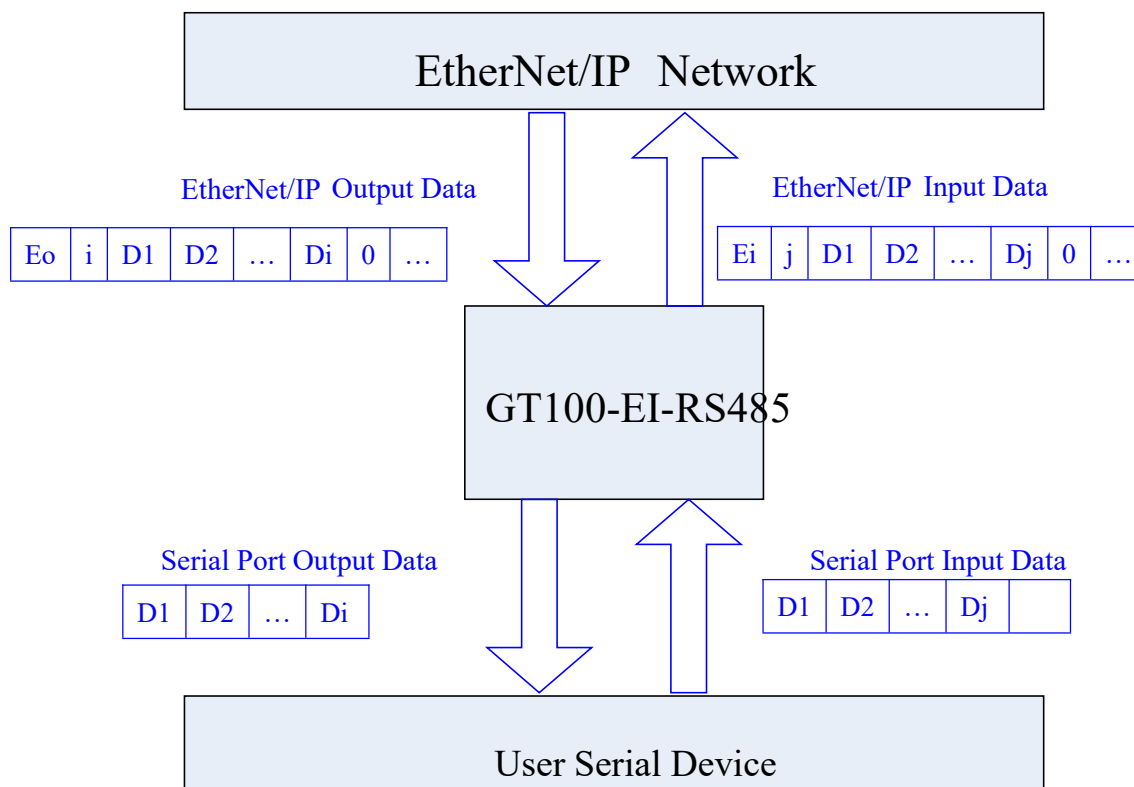


Users can configure at most 48 commands, each one Modbus command can read one group of continuous Modbus registers.

6.2 User Config

1 Data Exchange

This product provides data exchange between EtherNet/IP industrial Ethernet protocol and serial interface. The communication between EtherNet/IP and serial data is bidirectional. The output data of EtherNet/IP can be sent to serial fieldbus through the serial interface and the data received from serial interface is put into input data of EtherNet/IP. Data exchange is shown as follows:



" E_o " is transaction number of EtherNet/IP output data. " i " is serial data number included in output data being transmitted. " D_1 " to " D_i " are data being transmitted by serial. " E_i " is transaction number of EtherNet/IP input data. " j " is serial data number included in input data receiving form serial. " D_1 " to " D_j " are data receiving form serial.



2 Universal Protocol

EtherNet/IP output data format:

[Transaction number]	[Output data length n]	[Output data 1]... [Output data n]	[0x00] ... [0x00]
	-- n --	-- m --	

Note:

The number of EtherNet/IP output byte should be greater than or equal to $n + 2$.

M 0x00 are filling data (also for any number). $n + m + 2$ should be equal to the number of EtherNet/IP output-byte.

Transaction number: When transmitting output data. the transaction number must add 1 to show a new frame data.

Example:

If users select the number of EtherNet input byte and output-byte is 8-byte input and 8-byte output, length of serial output-data is 3, data are 01 02 03. Current transaction number is 0.

The format of output-data is:

[01][03][01][02][03][00][00][00][00]

EtherNet input data format:

[Transaction number]	[Input data length n]	[Input data 1]... [Input data n]	[0x00] ... [0x00]
	-- n --	-- m --	

Note:

The number of EtherNet/IP input byte should be greater than or equal to $n + 2$.

M 0x00 are filling data (also for any number). $n + m + 2$ should be equal to the number of EtherNet/IP input-byte.

Transaction number: The transaction number adds 1 showing a new frame input data.

Example:

If users select the number of EtherNet/IP input-byte and output byte is 8-byte input and 8-byte output, length of serial input-data is 3, data are 04 05 06. Current transaction number is 0.

The format of input data is:

[01][03][04][05][06][00][00][00][00]

7 EtherNet/IP Connection Parameters

Connection parameters the gateway provides are as below:

Parameters	Instance Number	Data Size (Bytes)
Input	102	Range: 5-496 Default: 496
Output	101	Range: 1-492 Default: 492
Configuration	113	10 (Fixed)

The data size of input instance 102 can be configured within the range of 5 to 496 bytes using the SST-MI-CFG configuration software, where the first 4 bytes are reserved for the real-time frame header.

The data size of output instance 101 can be configured within the range of 1 to 492 bytes using the SST-MI-CFG configuration software.

Take configuration parameters of RSLogix5000 as an example:

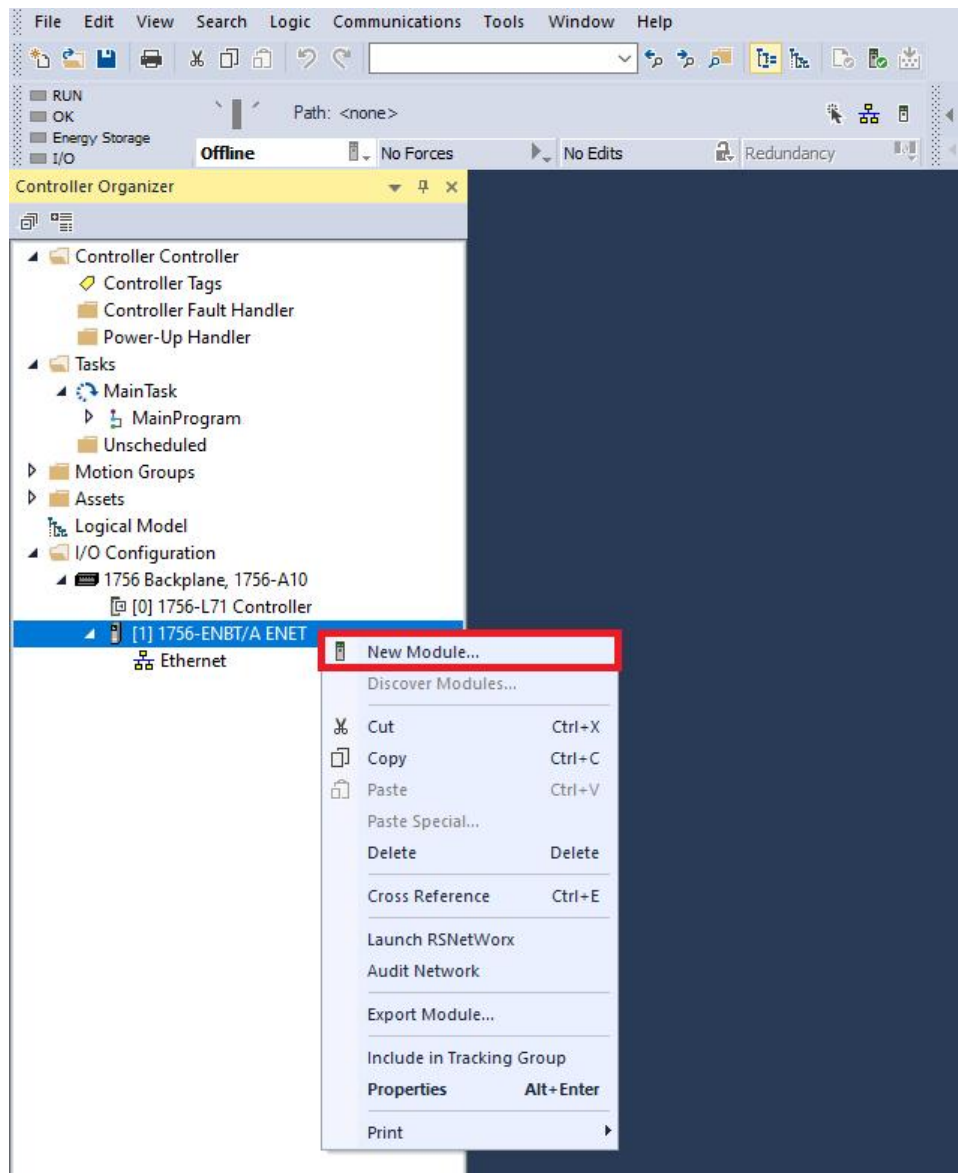
Note: The following example shows how to enter the configuration parameters in Studio 5000 Logix:

The data size configured in Studio 5000 Logix must match the data size configured in the SST-MI-CFG configuration software. For example, if the input data size configured in the SST software is 496 bytes, and if Studio 5000 Logix is using DINT (32-bit), then the input data size must be set to 124 ($496 \times 8/32 = 124$).

7.1 Implicit I/O Messaging Connection Method (Recommended)

The following Studio 5000 Logix example will show how to connect using Implicit I/O Messaging.

First, right click on the EtherNet/IP scanner module and click "New Module", as shown below:

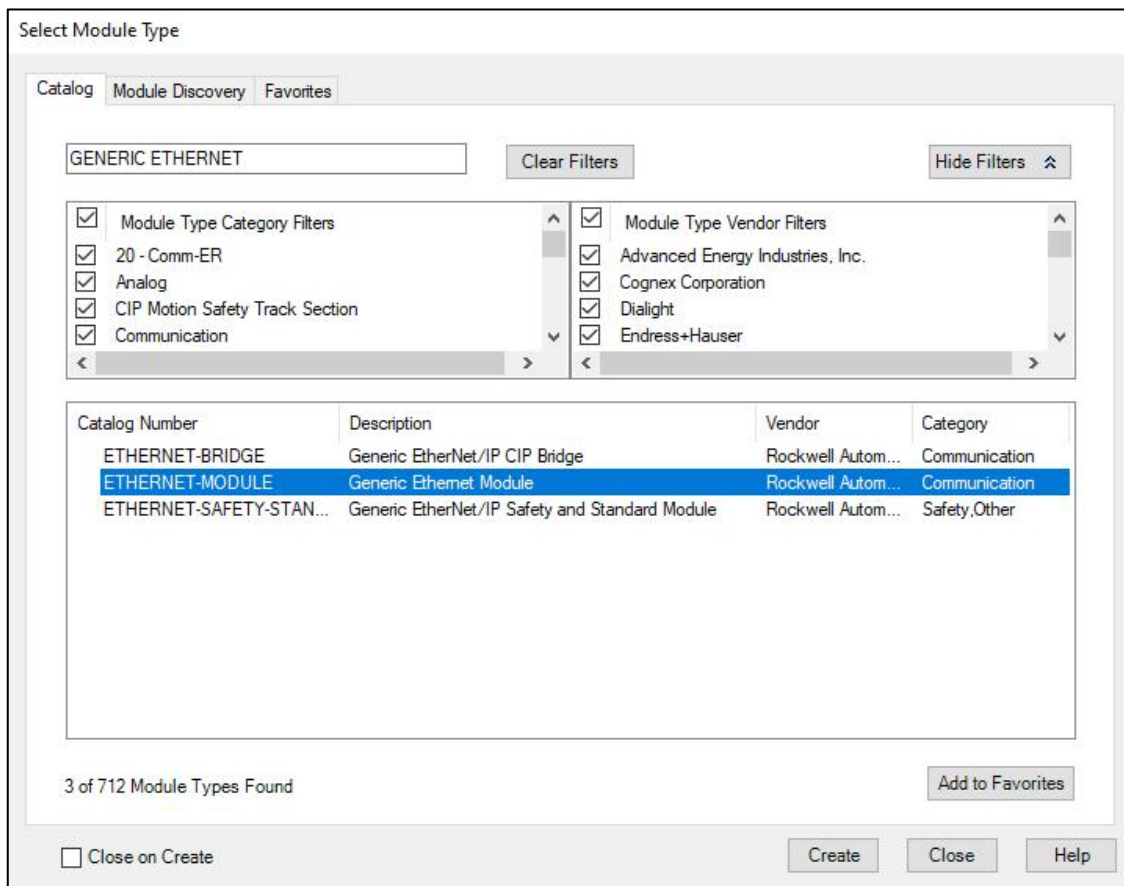


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In the pop-up dialog box, search for "GENERIC ETHERNET", choose "ETHERNET-MODULE", and click "Create" as shown below:



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Configure relevant information of GT100-EI-RS485 in the pop-up window, as shown below:

New Module

Type: ETHERNET-MODULE Generic Ethernet Module
Vendor: Rockwell Automation/Allen-Bradley
Parent: ENET
Name: SSTGateway
Description:
Comm Format: Data - DINT
Address / Host Name
☒ IP Address: 192 . 168 . 0 . 10
☐ Host Name:
☒ Open Module Properties

Connection Parameters
Input: 102 124 (32-bit)
Output: 101 123 (32-bit)
Configuration: 113 10 (8-bit)
Status Input:
Status Output:
Assembly Instance:
Size:
Set Communication Parameters. Please refer to [Chapter 7](#).

Set the device name.

IP address of the SST gateway.

OK Cancel Help

In the above picture, the module information needs to be configured includes:

Name: The name of the added EtherNet/IP device module.

Comm Format: Configure data types such as DINT, INT, SINT, REAL and etc. After confirmation, this cannot be changed. To change data types, a new module must be created.

IP Address: Set the IP address of the added EtherNet/IP device module (The IP address of GT100-EI-RS485, which is configured by the software SST-MI-CFG).

Connection Parameters: Set the Connection Parameters for communication. For more details, please refer to the beginning of [Chapter 7](#).

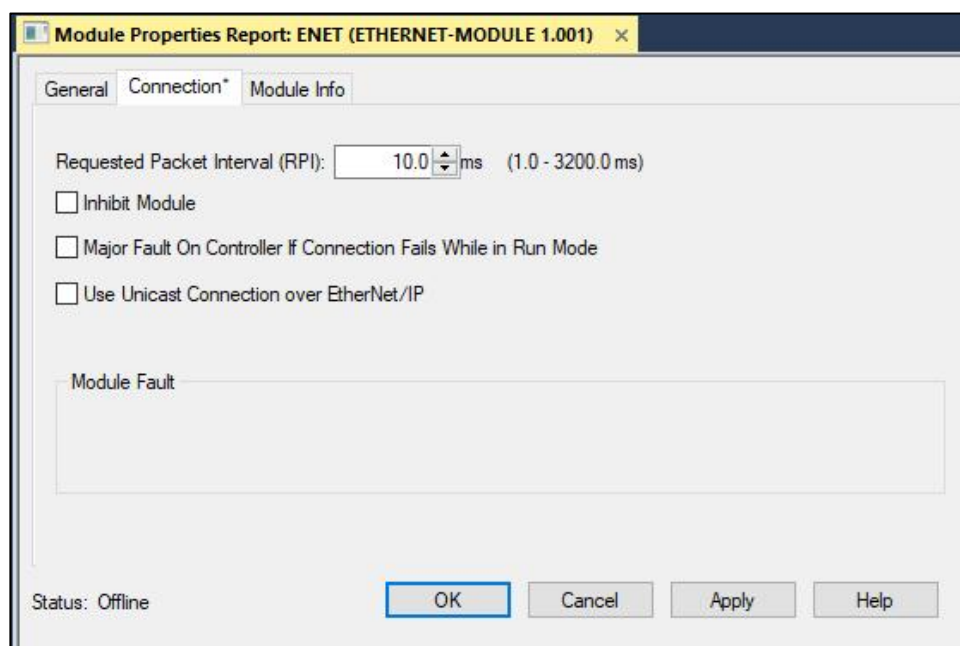
Note: "Size" (configured bytes) in the image above should be the consistent with relevant input and output bytes of the instance in the above chapter.

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Click "OK", set scanner polling time interval in the pop-up dialog box, the default is 10ms, as shown below:



After setting this interval, click "OK" to save.

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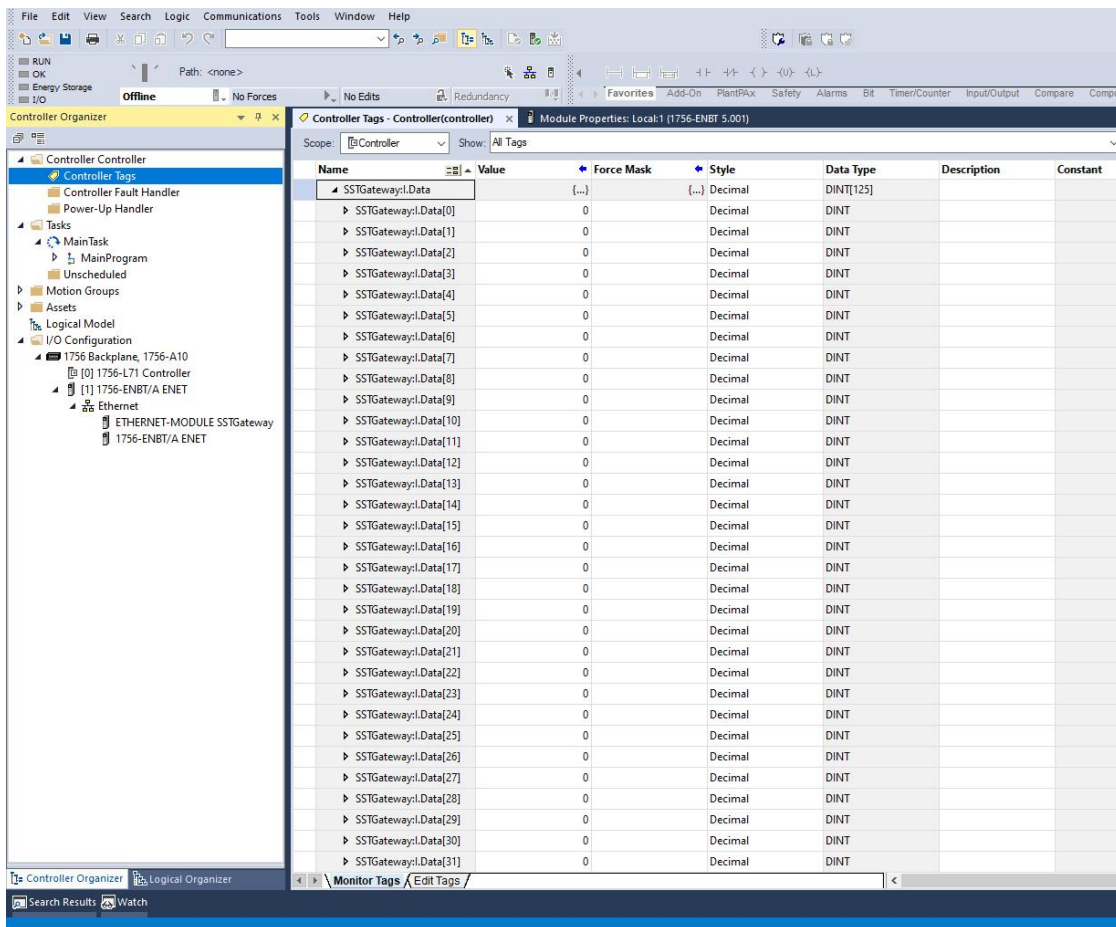
To view the output data, first double click the "Controller Tags" tree. Then expand the "SSTGateway:O" tag as shown below:

Name	Value	Force Mask	Style	Data Type	Description	Constant
SSTGateway:C	{...}	{...}	{...}	AB:ETHERNET_MODU...		☐
SSTGateway:I	{...}	{...}	{...}	AB:ETHERNET_MODU...		☐
SSTGateway:O	{...}	{...}	{...}	AB:ETHERNET_MODU...		☐
SSTGateway:O.Data	{...}	{...}	{...}	DINT[124]		
SSTGateway:O.Data[0]	0			DINT		
SSTGateway:O.Data[1]	0			DINT		
SSTGateway:O.Data[2]	0			DINT		
SSTGateway:O.Data[3]	0			DINT		
SSTGateway:O.Data[4]	0			DINT		
SSTGateway:O.Data[5]	0			DINT		
SSTGateway:O.Data[6]	0			DINT		
SSTGateway:O.Data[7]	0			DINT		
SSTGateway:O.Data[8]	0			DINT		
SSTGateway:O.Data[9]	0			DINT		
SSTGateway:O.Data[10]	0			DINT		
SSTGateway:O.Data[11]	0			DINT		
SSTGateway:O.Data[12]	0			DINT		
SSTGateway:O.Data[13]	0			DINT		
SSTGateway:O.Data[14]	0			DINT		
SSTGateway:O.Data[15]	0			DINT		
SSTGateway:O.Data[16]	0			DINT		
SSTGateway:O.Data[17]	0			DINT		
SSTGateway:O.Data[18]	0			DINT		
SSTGateway:O.Data[19]	0			DINT		
SSTGateway:O.Data[20]	0			DINT		
SSTGateway:O.Data[21]	0			DINT		
SSTGateway:O.Data[22]	0			DINT		
SSTGateway:O.Data[23]	0			DINT		
SSTGateway:O.Data[24]	0			DINT		
SSTGateway:O.Data[25]	0			DINT		
SSTGateway:O.Data[26]	0			DINT		
SSTGateway:O.Data[27]	0			DINT		
SSTGateway:O.Data[28]	0			DINT		

The SSTGateway:O data tag represents the corresponding output data addresses of the SST Gateway.

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To view the input data, expand the "SSTGateway: I" tag as shown below:



The SSTGateway:I data tag represents the corresponding input data addresses of the SST Gateway.

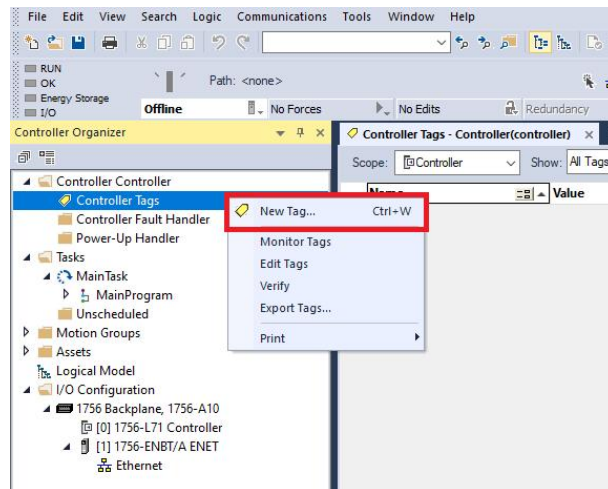
Please note that the first 4 input bytes are used to display the status bytes of the SST Gateway. See [Chapter 6](#) for more details.

7.2 Explicit MSG Connection Method

The following Studio 5000 Logix example will describe how to read/write EtherNet/IP data using explicit MSG messaging.

7.2.1 Read MSG Instruction Block

To start, create a new project in "Offline" mode. Then under "Controller Tags", add two new tags named "ReadTag" and "ReadData" as shown below:



Set the data type of "ReadTag" as "MESSAGE":

New Tag

×

Name:ReadTag

Create

Description:

Cancel

Usage:<controller>

Help

Type:Base

Connection...

Alias For:

Data Type:MESSAGE

...

Parameter Connection:

Scope:Controller

External Access:Read/Write

Style:

☐ Constant

☐ Sequencing

☐ Open MESSAGE Configuration

☐ Open Parameter Connections

Select Data Type

Data Types:

MESSAGE

MESSAGE

MINIMUM_CAPTURE

MMC

MODULE

MOTION_GROUP

MOTION_INSTRUCTION

MOVING_AVERAGE

MOVING_STD_DEV

MULTIPLIED

Array Dimensions

Dim 2

Dim 1

Dim 0

0

0

0

☐ Show Data Types by Groups

OK

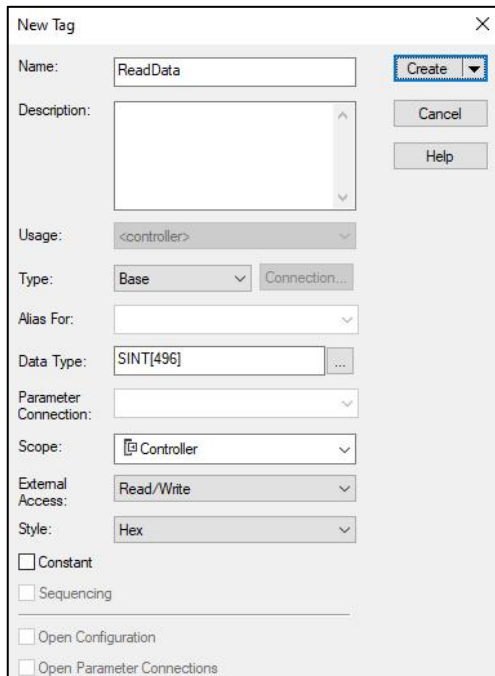
Cancel

Help

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Set the data type of "ReadData" as "SINT", then set the Array Dimension "Dim 0" to match the Input Data Size.

Refer to the connection parameters from the beginning of [Chapter 7](#):



New Tag

Name: Create

Description:

Usage:

Type: Connection...

Alias For:

Data Type: ...

Parameter Connection:

Scope:

External Access:

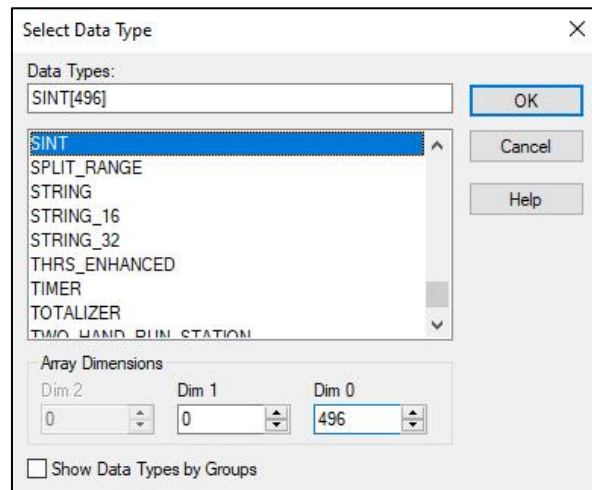
Style:

☐ Constant

☐ Sequencing

☐ Open Configuration

☐ Open Parameter Connections



Select Data Type

Data Types: OK

Cancel

Help

Help

Help

Help

Help

Help

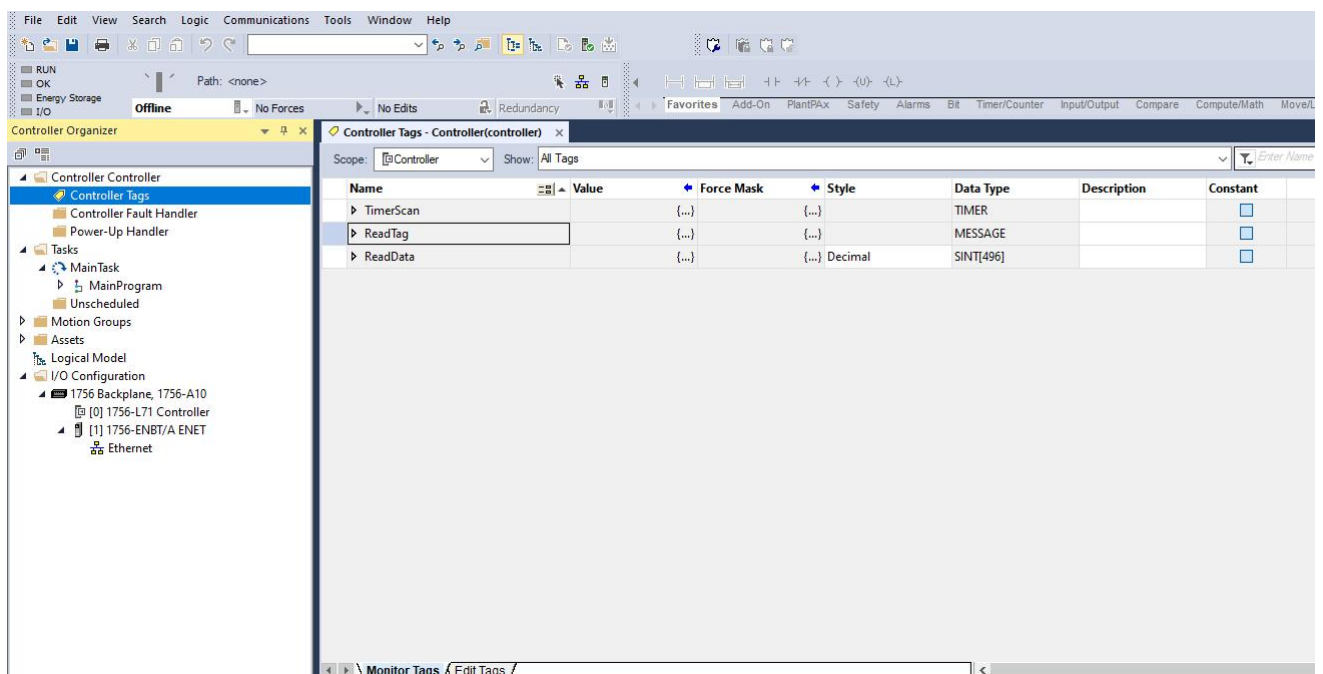
Help

Help

Array Dimensions

Dim 2: Dim 1: Dim 0:

☐ Show Data Types by Groups



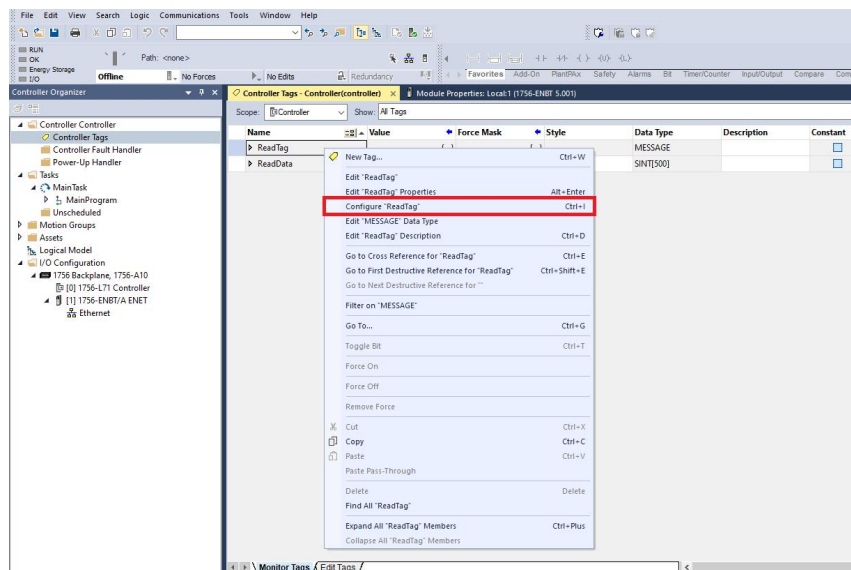
The screenshot shows the software interface with the following components:

- Controller Organizer:** A tree view on the left showing the hierarchy of the controller. The selected path is: Controller Controller > Controller Tags > ReadData.
- Controller Tags - Controller(controller):** A table showing the configuration of the ReadData tag.

Name	Value	Force Mask	Style	Data Type	Description	Constant
TimerScan	{...}	{...}	{...}	TIMER		☐
ReadTag	{...}	{...}	{...}	MESSAGE		☐
ReadData	{...}	{...}	{...} Decimal	SINT[496]		☐

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Right click on "ReadTag", select "Configure 'ReadTag'" as shown below:



In pop-up window, configure the following settings:

- Message Type:** CIP Generic.
- Service Type:** Select "Get Attribute Single". The relevant service code will become "e (Hex)".
- Class:** 4 (Hex)
- Instance:** 102
- Attribute:** 3 (Hex)
- Destination:** Select the "ReadData" tag. The obtained data will be saved in this tag.

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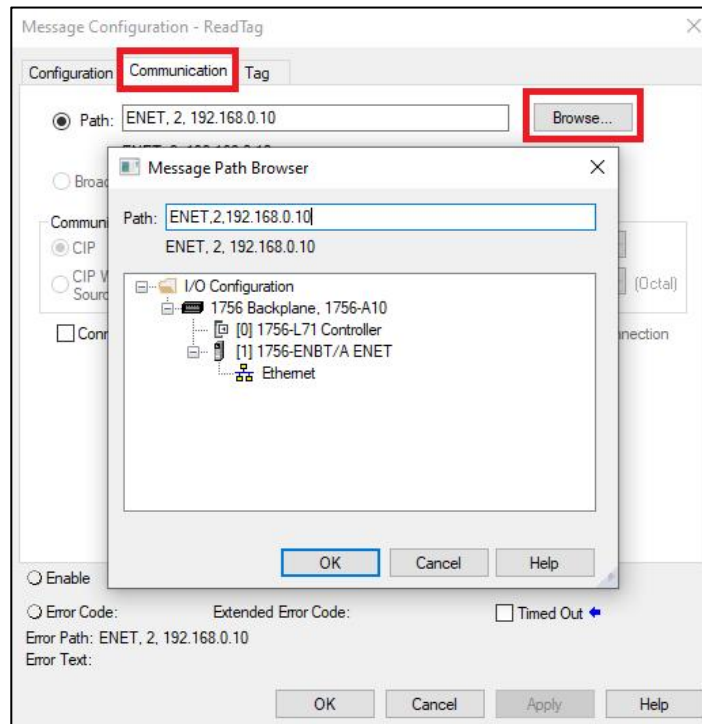
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Select the "Communication" tab and click the "Browse" button. Then input the network path to connect to the GT100-EI-RS485.

Enter the network path in the following format:

[EtherNet/IP Interface Name], 2 (Ethernet Communication), [GT100-EI-RS485 IP Address]

Then click "OK" to confirm:



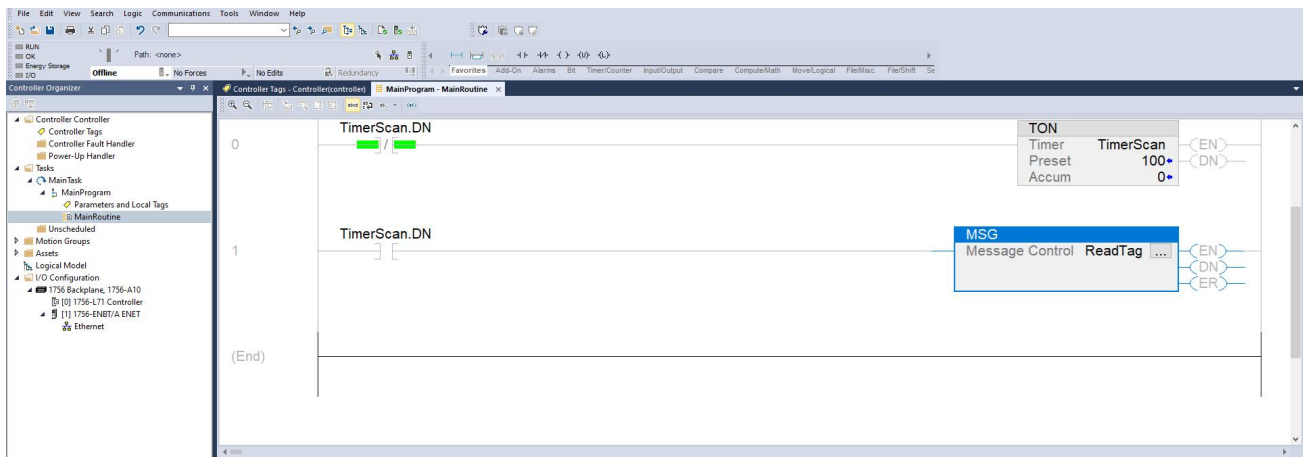
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Add a "MSG" command and select "ReadTag" as "Message Control" in the "MainRoutine" of "MainProgram" as shown in the image below. This is a simple command which can send a read request. The user still needs to add some logic commands to trigger this command in common program. For further details, please refer to Studio 5000 Logix reference material.

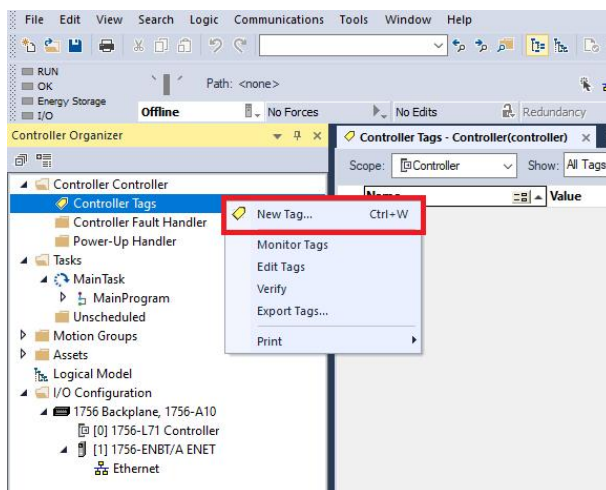
Download the program to the PLC and set PLC into "Online" state.



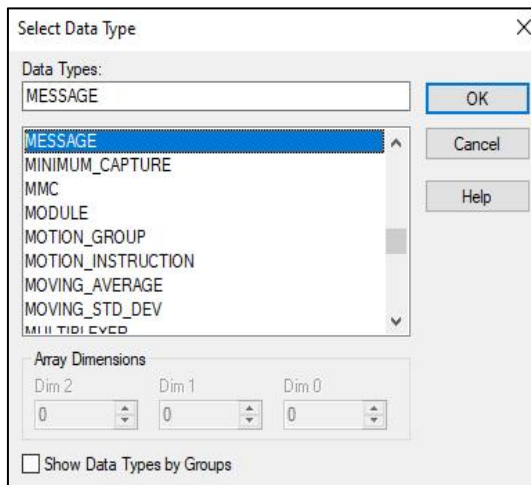
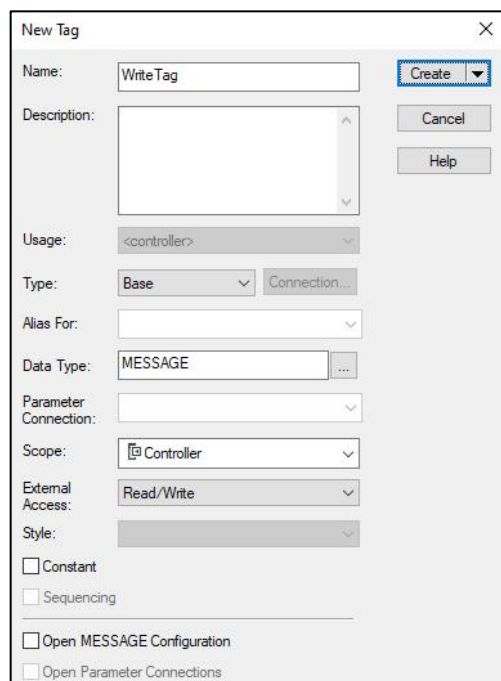
Click "Control Tags" and select "Monitor Tags". Expand "ReadData" to see that PLC can read Modbus TCP data through the GT100-EI-RS485 gateway.

7.2.2 Write MSG Instruction

Switch to "Offline" mode and add two new tags "WriteTag" and "WriteData", under the "Controller Tags". Define the type of "WriteTag" as "MESSAGE" and "WriteData" as "SINT[500]" as shown below:



Set the data type of "WriteTag" as "MESSAGE":



Set the data type of "WriteData" as "SINT", then set the Array Dimension "Dim 0" to match the Output Data Size. Refer to the connection parameters from the beginning of [Chapter 7](#):

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New Tag

Name: WriteData Create

Description:

Usage: <controller>

Type: Base Connection...

Alias For:

Data Type: SINT[492] ...

Parameter Connection:

Scope: Controller

External Access: Read/Write

Style: Hex

☐ Constant

☐ Sequencing

☐ Open Configuration

☐ Open Parameter Connections

Select Data Type

Data Types:

SINT[492]

SINT

SPLIT_RANGE

STRING

STRING_16

STRING_32

THRS_ENHANCED

TIMER

TOTALIZER

TWO_HAND_BUM_STATION

Array Dimensions

Dim 2: 0 Dim 1: 0 Dim 0: 492

☐ Show Data Types by Groups

OK Cancel Help

File Edit View Search Logic Communications Tools Window Help

Path: <none>

Offline No Forces No Edits Redundancy Favorites Add-On Alarms Bit Timer/Counter Input/Output Compare Compute/Math Move/Logical File/Misc.

Controller Organizer

- Controller Controller
 - Controller Tags
 - Controller Fault Handler
 - Power-Up Handler
- Tasks
 - MainTask
 - MainProgram
 - Parameters and Local Tags
 - MainRoutine
 - Unscheduled
 - Motion Groups
 - Assets
 - Logical Model
 - I/O Configuration
 - 1756 Backplane, 1756-A10
 - [0] 1756-L71 Controller
 - [1] 1756-ENBT/A ENET
 - Ethernet

Scope: Controller Show: All Tags

Name	Value	Force Mask	Style	Data Type	Description	Constant
TimerScan		(...)	(...)	TIMER		☐
ReadTag		(...)	(...)	MESSAGE		☐
ReadData		(...)	(...) Decimal	SINT[496]		☐
WriteTag		(...)	(...)	MESSAGE		☐
WriteData		(...)	(...) Decimal	SINT[492]		☐

Monitor Tags / Edit Tags

GT100-EI-RS485

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Enter into the "Monitor Tags" interface and input some data in the "WriteData" tag. This data will be outputted to GT100-EI-RS485 through PLC. As shown in the image below, 0x10, 0x20, 0x30, 0x40, 0x50, 0x60, 0x70, 0x80 and 0x90 are the data that will be outputted.

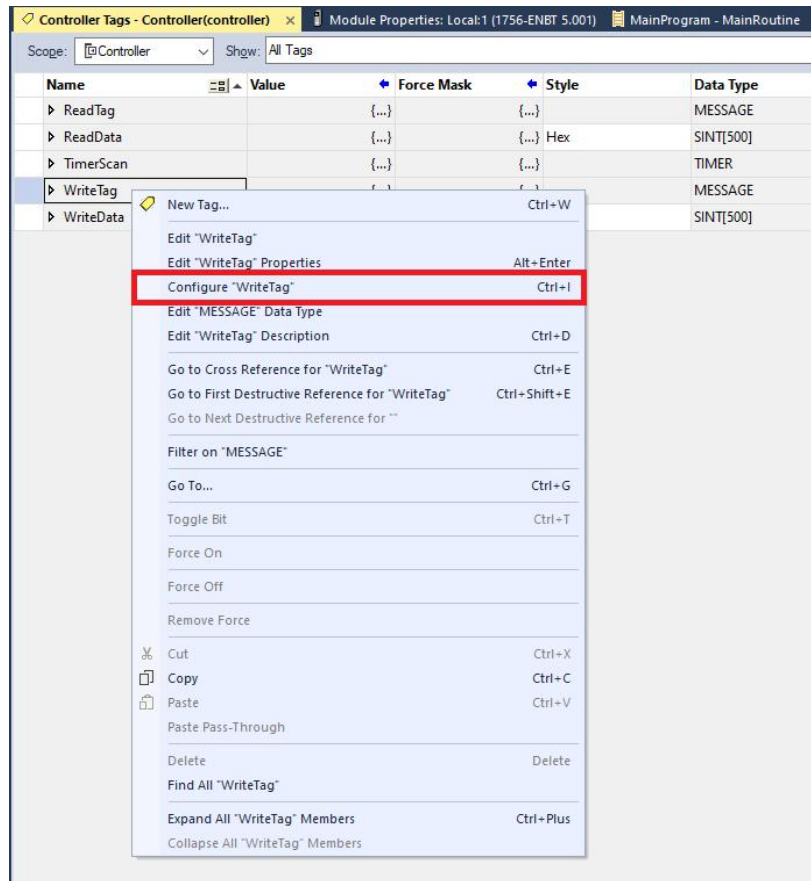
Controller Tags - Controller(controller) x MainProgram - MainRoutine						
Scope: @Controller		Shgw: All Tags				
Name	Value	Force Mask	Style	Data Type	Description	
▶ TimerScan	{...}		{...}	TIMER		
▶ ReadTag	{...}		{...}	MESSAGE		
▶ ReadData	{...}		{...} Hex	SINT[496]		
▶ WriteTag	{...}		{...}	MESSAGE		
▲ WriteData	{...}		{...} Hex	SINT[492]		
▶ WriteData[0]	16#10		Hex	SINT		
▶ WriteData[1]	16#20		Hex	SINT		
▶ WriteData[2]	16#30		Hex	SINT		
▶ WriteData[3]	16#40		Hex	SINT		
▶ WriteData[4]	16#50		Hex	SINT		
▶ WriteData[5]	16#60		Hex	SINT		
▶ WriteData[6]	16#70		Hex	SINT		
▶ WriteData[7]	16#80		Hex	SINT		
▶ WriteData[8]	16#90		Hex	SINT		
▶ WriteData[9]	16#00		Hex	SINT		
▶ WriteData[10]	16#00		Hex	SINT		

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Right click "WriteTag" and select "Configure "WriteTag" as shown below:



In the new pop-up window, configure the following settings:

Message Type:	CIP Generic
Service Type:	Select "Set Attribute Single", and the relevant Service Code will become "10 (Hex)"
Class:	4 (Hex)
Instance:	101
Attribute:	3 (Hex)
Source Element:	Select "WriteData" tag, indicating that the data in the "WriteData" tag will become the data PLC outputs.
Source Length:	Use byte as unit, and this value should be less than or equal to the currently selecting bytes which instance represents (Configured bytes number in SST-MI-CFG).

Message Configuration - WriteTag

Configuration* Communication Tag

Message Type: CIP Generic

Service Type: Set Attribute Single

Source Element: WriteData

Source Length: 492 (Bytes)

Service Code: 10 (Hex) Class: 4 (Hex) Instance: 101 Attribute: 3 (Hex)

Destination Element:

New Tag...

☐ Enable
 ☐ Enable Waiting
 ☐ Start
 ☐ Done
 Done Length: 0

☐ Error Code:
 Extended Error Code:
 ☒ Timed Out

Error Path:

Error Text:

OK Cancel Apply Help

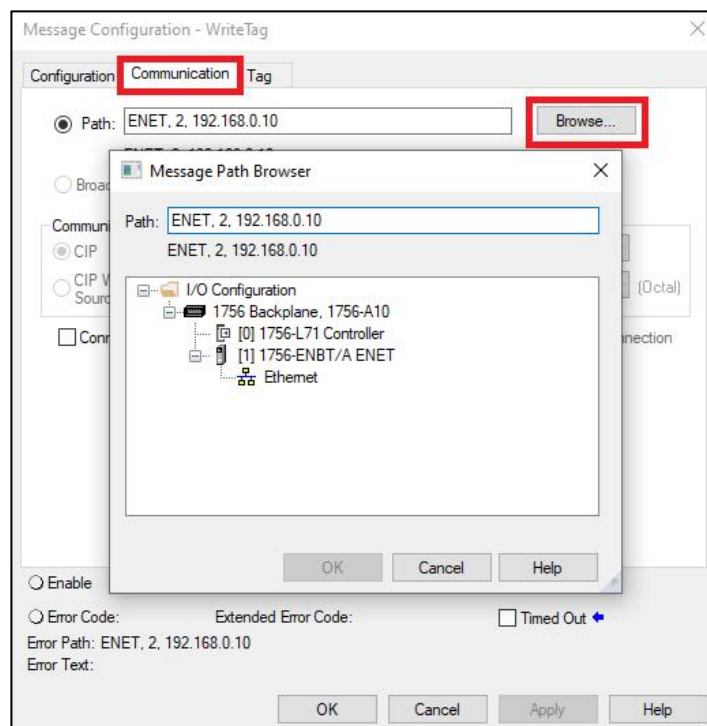
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Select the "Communication" tab and click the "Browse" button. Then input the network path to connect to the GT100-EI-RS485.

Enter the network path in the following format:

[EtherNet/IP Interface Name], 2 (Ethernet Communication), [GT100-EI-RS485 IP Address]

Then click "OK" to confirm:



Add a "MSG" command in the "MainRoutine" of "MainProgram" and select "WriteTag" as "Message Control" as shown below.

Download the PLC program to the PLC and set PLC to "Online" state,. The data in "WriteData" will be outputted to Modbus TCP master or server through GT100-EI-RS485.

