

Modbus/IEC61850 Gateway

GT850-ES

User Manual

V2.0



SST Automation

Email: support@sstautomation.com

www.SSTAutomation.com



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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Technical Support Contact Information

www.sstautomation.com

E-mail: support@sstautomation.com

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1 Product Overview

1.1 Product Function

The main function of this gateway is to convert Modbus RTU/ASCII and Modbus TCP device data into IEC61850 standard data.

1.2 Product Features

- Supports Modbus RTU/ASCII Master.
- Supports Modbus TCP client/server, allowing Modbus RTU/ASCII and Modbus TCP to be used simultaneously.
- Supports IEC61850-8-1 (MMS) and GOOSE (meeting the mechanism of fast message of substation automation system);
- Supports report service, control service, replace service, GOOSE service and time service;
- Maximum data points: 1200;
- Ethernet Ports: 2 ports for IEC61850 and Modbus TCP, with built-in switch functionality.
- Maximum Modbus Command Count: 200 commands per serial port and Modbus TCP.
- Serial Port Parameters:
 - 2 RS-485 Serial Ports: Each port has independent terminal resistors and pull-up/pull-down resistors switches.
 - Operating Mode: Half-duplex.
 - Baud Rate: Selectable from 300, 600, 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2Kbps.
 - Data Bits: 7 or 8 bits.
 - Parity: None, Odd, Even, Mark, Space.
 - Stop Bits: 1 or 2 bits selectable.

1.3 Technical Specification

- Each mapping group supports scaling and byte swapping functions;
- Byte Swapping: No swapping, 2-byte swap, 4-byte swap, 2-byte exchange.
- Scaling: 0.0001 to 1000.
- Supports timeout reset/hold.
- Data Types: BOOL, INT16, UINT16, INT32, UINT32, INT64, UINT64, FLOAT, DOUBLE.
- Supports debugging functions.
- IEC61850:
 - Supports MMS Server.
 - Supports reporting services, control services, GOOSE services, and time synchronization services.

- Maximum number of connections: 16.
- Maximum number of data sets: 99.
- Maximum number of reports: 99.
- Maximum number of data attributes: 1200.
- Modbus:
 - Supports Master mode.
 - Function Codes: 01H, 02H, 03H, 04H, 05H, 06H, 0FH, 10H, 17H.
 - Format: RTU format, ASCII format.
 - Output Methods: Continuous output, change-based output, output disabled.
 - Supports automatic fallback function.
 - Each master can configure up to 200 Modbus commands.
- Modbus TCP Master:
 - Supports up to 36 Modbus TCP slaves with different IP addresses or ports in the same subnet.
 - Supports function codes 01H, 02H, 03H, 04H, 05H, 06H, 0FH, 10H, 17H.
 - Output command polling modes supported: Change of State, Cycle, and disabled.
 - Supports delay between polls and response timeout settings.
 - Delay between Polls: 0–2500ms; Response Timeout: 300–60000ms.
 - Supports up to 200 command entries.
 - Modbus TCP slave port numbers are configurable, default is 502.
 - Supports input data timeout clearing/holding settings.
- Modbus TCP Slave:
 - Supports up to 36 connections.
 - Function codes: 01H, 02H, 03H, 04H, 05H, 06H, 0FH, 10H, 17H.
 - Supports setting of coil status start address and block size (0x area), start address: 0–65535, block size: 0–512.
 - Supports setting of input status start address and block size (1x area), start address: 0–65535, block size: 0–512.
 - Supports setting of holding register start address and block size (4x area), start address: 0–65535, block size: 0–1024.
 - Supports setting of input register start address and block size (3x area), start address: 0–65535, block size: 0–1024.
 - Supports function code swapping between 1 and 2, and 3 and 4.
 - Supports unit identifier verification.
 - Supports port number configuration, default is 502.
- Provides free configuration software and ICD modeling software;
- Isolated Power Supply: 24VDC (9V – 30V), 250mA (24VDC).
- Operation temp: -4°F–140°F (-20°C–60°C), Humidity: 5%– 95% (non-condensing);



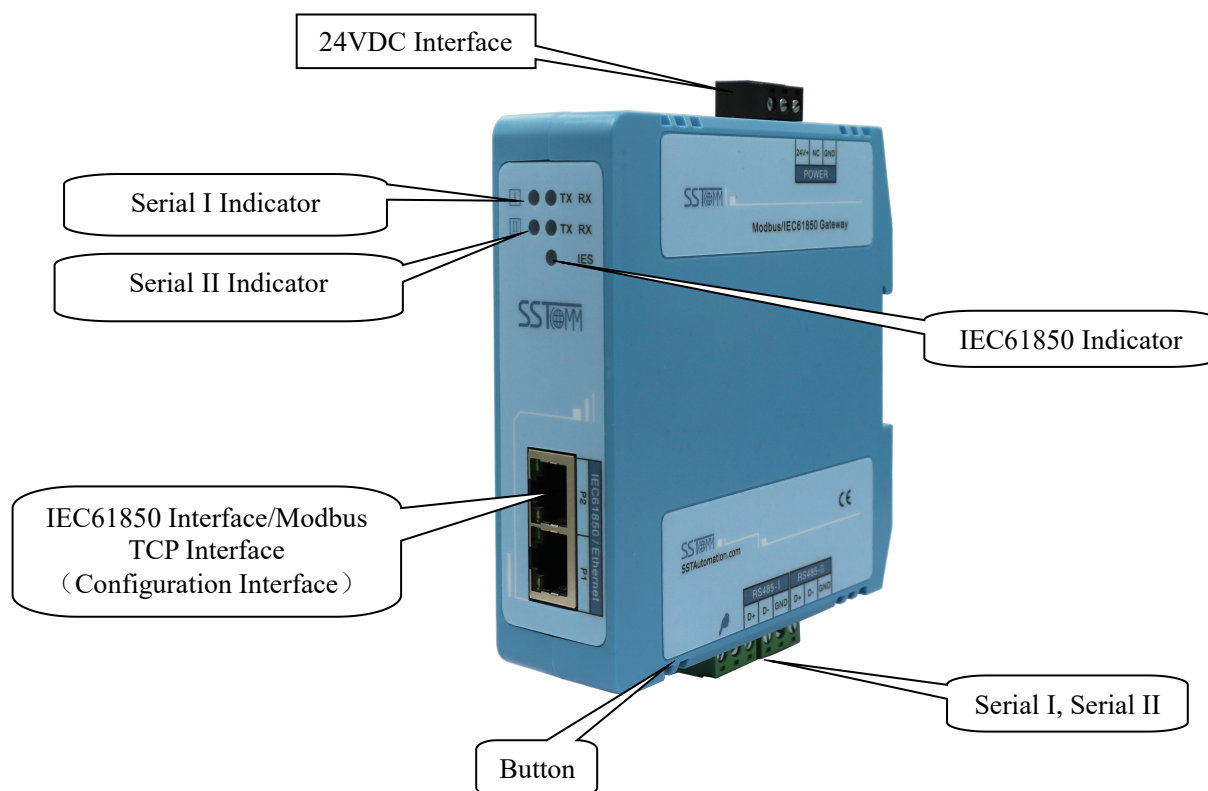
- External dimensions (W*H*D): 1.33 in*4.56 in*4.1 in (34mm*116mm*105mm);
- Protection level: IP20.

1.4 Revision History

Date	Revision	Description
02/11/2026	V2.0	Add Modbus TCP function
12/05/2025	V1.1	New Release

2 Hardware Descriptions

2.1 Product Appearance



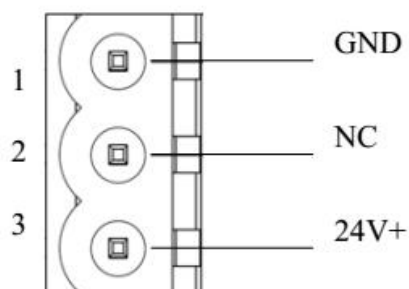
Note: This picture is for reference only. The actual product may differ in appearance.

2.2 Indicators

Indicators		State	Description
Serial Port I	TX	Red blinking	Serial port data sending
		Red off	Serial connection not established or error
	RX	Green blinking	Serial port data receiving
		Green off	Serial connection not established or error
Serial Port II	TX	Red blinking	Serial port data sending
		Red off	Serial connection not established or error
	RX	Green blinking	Serial port data receiving
		Green off	Serial connection not established or error
IES (IES61850 Indicator)		Green Light	IEC61850 connection established
		Red light flashes for 3 seconds.	IEC61850 connection has been disconnected.
		Green blinking	IEC61850 connection not established or the connection has been disconnected

2.3 Interface

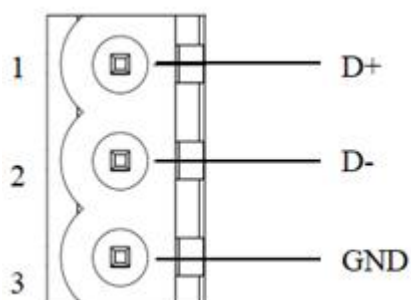
2.3.1 Power Interface



Pin	Function
1	Power GND
2	NC, Not connected
3	24V+, DC Positive 24V, range 9–30V

2.3.2 Serial I/II

RS-485 interface:



Pin	Function
1	D+, Connects to the RS-485 D+
2	D-, Connects to the RS-485 D-
3	GND, Connects to the RS-485 GND



2.4 Button

The button is located on the bottom of the product;

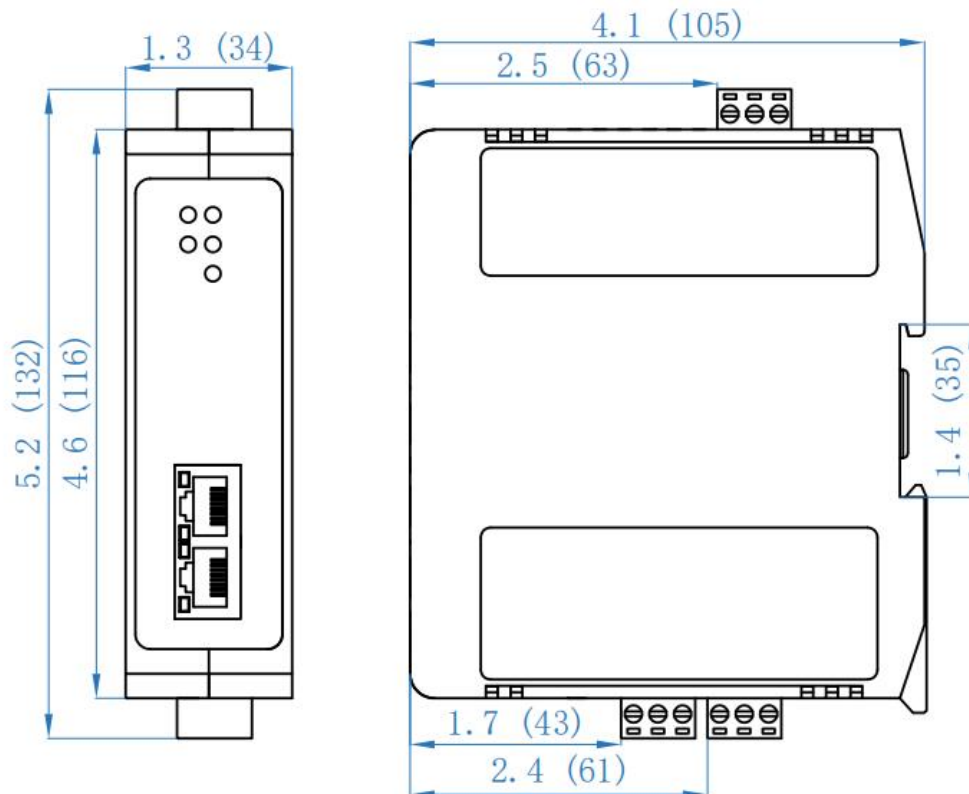
Restore Initialization Configuration: After the device has powered up and the startup is complete (IES indicator light is solid or flashing), within 10 seconds, press and hold the button for 5 seconds. The IES status light will flash orange. At this point, release the button, and within 5 seconds after releasing the button, click the button again. The gateway will restore to factory settings and automatically restart. After a successful reset, the gateway's IEC61850 Ethernet port IP will switch to DHCP mode. If the IP address is not acquired within 30 seconds, the IP address will be fixed to 192.168.0.10.

Product Upgrade (Do not operate unless necessary): Before powering on the device, press and hold the button. After powering on, release the button to enter the firmware update process in B-process mode.

3 Hardware Installation

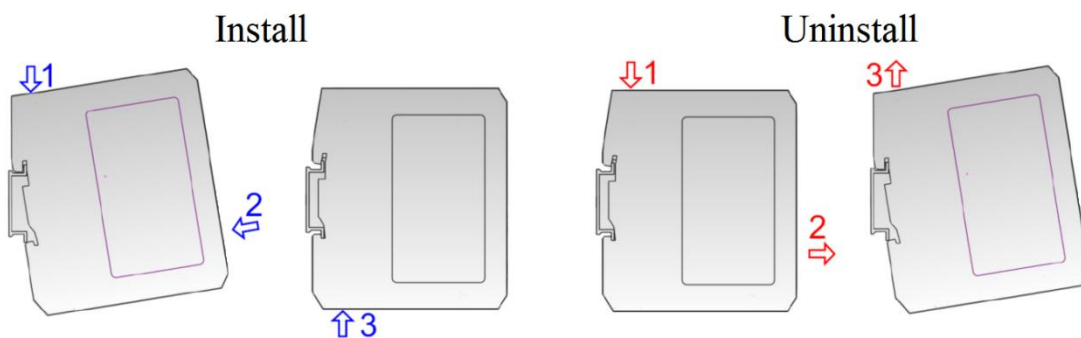
3.1 Mechanical Dimensions

1.33in * 4.56in * 4.21in (34mm * 116mm * 105mm)



3.2 Installation Method

Using 1.4 in (35mm) DIN RAIL.





4 Use Method

4.1 Quick Start Guide

Steps to use the GT850-ES:

- a. Connect the gateway to the network using an Ethernet cable. Note the default IP address of the gateway, which is 192.168.0.10 for IEC61850. For the configuration interface, if there is a network connection issue, you need to modify the PC's network segment, changing it to:
IP: 192.168.0.xx;
Subnet Mask: 255.255.255.0;
Default Gateway: 192.168.0.1.
(Note: xx can be any value except 10 and 11.)
- b. Power on the GT850-ES.
- c. Use ICD modeling software to model your Modbus devices. Use the configuration software SST-IEM-CFG to configure the GT850-ES, mainly for Modbus command configuration and mapping to IEC61850 objects. After the configuration is complete, download it to the GT850-ES gateway, and the configuration will take effect automatically.
- d. After the configuration takes effect, the system will enter normal operation mode.

5 Configuration Software

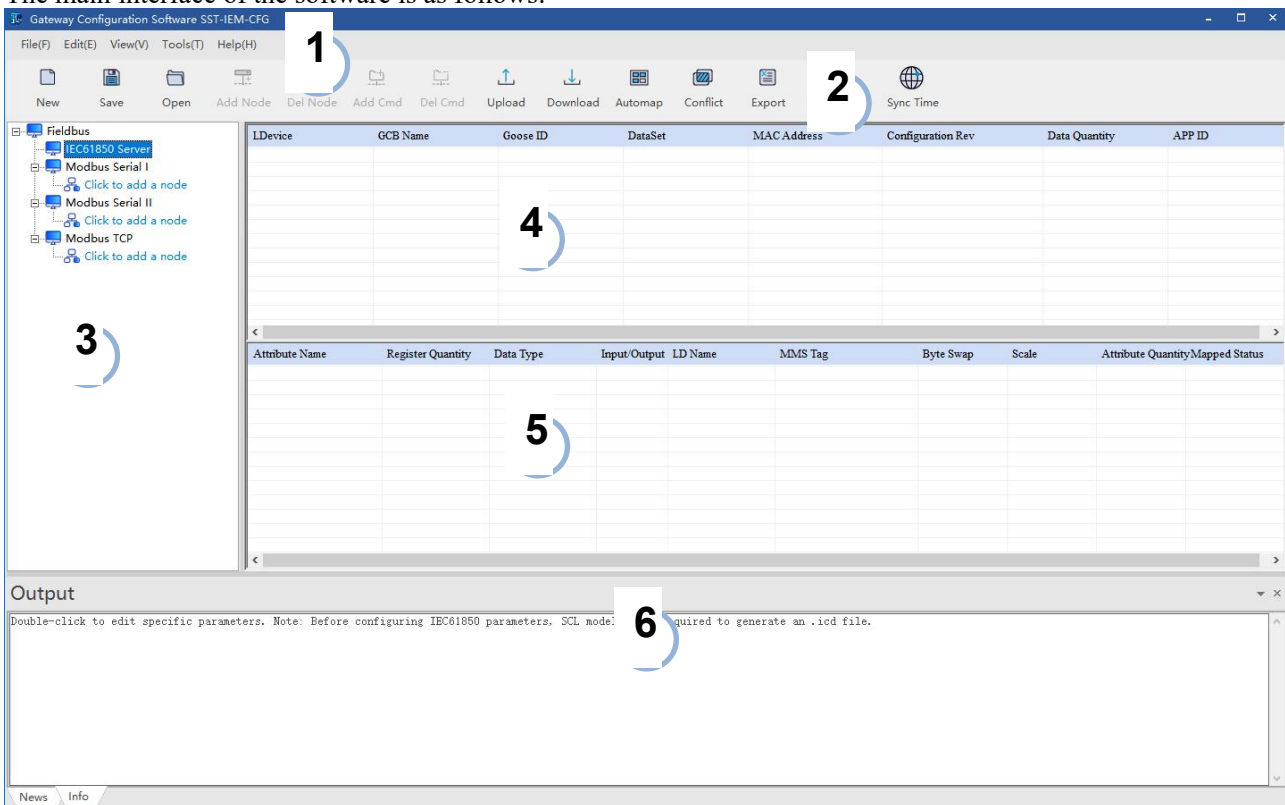
SST-IEM-CFG is a configuration software based on the Windows platform, designed for configuring the GT850-ES gateway product. It can be downloaded by logging into the official website of www.SSTAutomation.com.



After installing SST-IEM-CFG, double-click the desktop shortcut to open the software interface.

5.1 Main Interface

The main interface of the software is as follows:



1: Title Bar and Menu Bar

The title bar displays the software name and version, while the menu bar contains various commands for software operations.

2: Toolbar

Common menu commands can be accessed by clicking the buttons in the toolbar.

3: Tree View

The configuration hierarchy in tree view:

- (1) IEC61850 Server: Used for IEC61850 protocol settings.
- (2) Modbus Serial I/II: Used for Modbus protocol serial port settings. The GT850-ES gateway has two serial ports, and the serial port numbers on the gateway correspond to the Modbus Serial port numbers in the software interface for matching configurations.
- (3) Modbus TCP: Used for Modbus TCP protocol endpoint settings.

4: GCB Settings

Right-click on an empty area to pop up a menu for adding or deleting GCB settings.

5: Mapping Settings

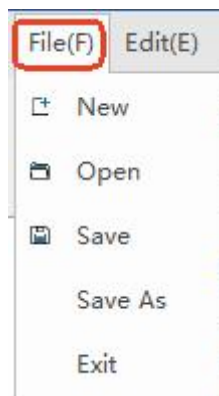
After adding Modbus commands, you can configure the mapping of Modbus data points to IEC61850 attribute points here.

6: Comments and News

By selecting a parameter in the configuration view, its function and setting instructions are displayed. Selecting "News" allows you to view the latest updates about the product.

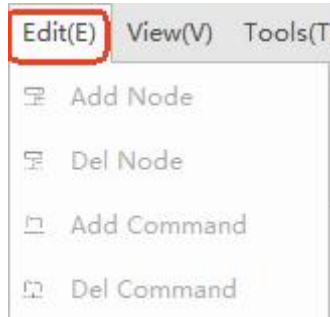
5.2 Menu Bar Button Descriptions

5.2.1 File



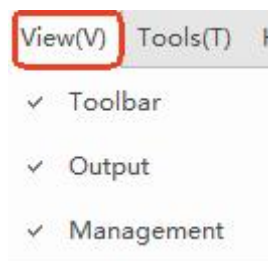
The configuration software has "New, Open, Save, and Save As" operations for project files, which can be accessed via the "File" menu in the menu bar or by clicking the corresponding buttons in the toolbar.

5.2.2 Edit



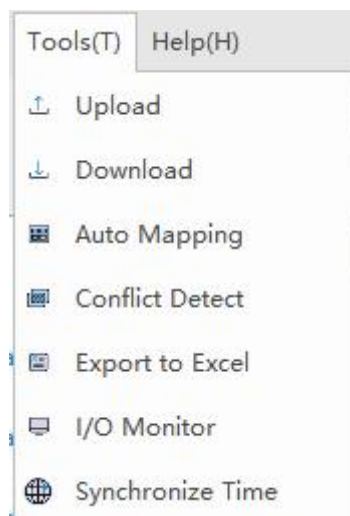
During the configuration process, operations related to nodes and commands can be performed by selecting the buttons under "Edit" in the menu bar. There are also buttons in the toolbar for quick access, or you can right-click on a node or command to bring up a context menu for related operations.

5.2.3 View



Under the "View" menu in the menu bar, all options are selected by default. The software interface will display the "Toolbar", "Output Window", and "Protocol Management" views. When the checkboxes are unchecked, the corresponding view content will not be displayed.

5.2.4 Tools

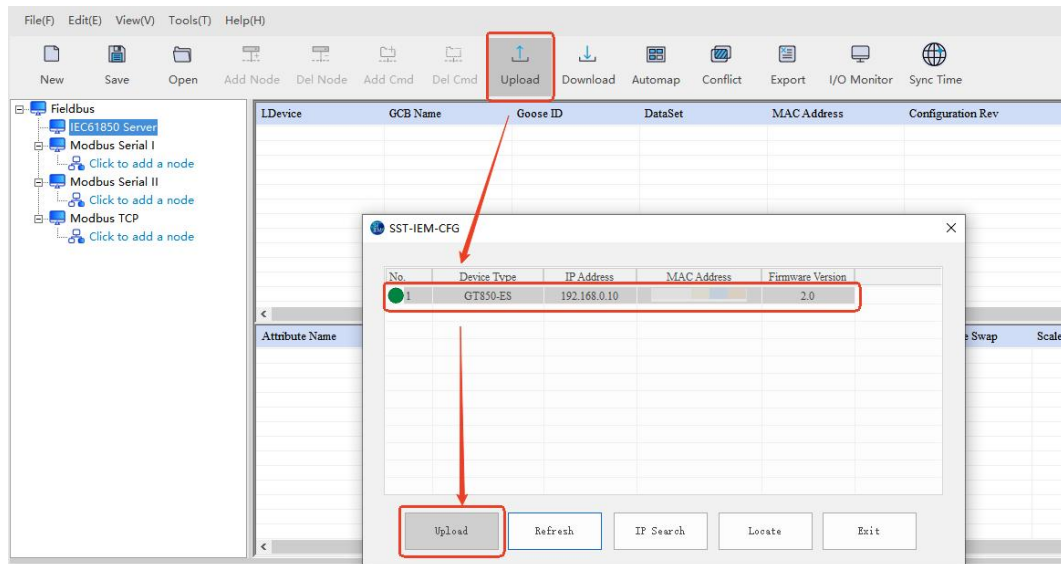


1. Upload

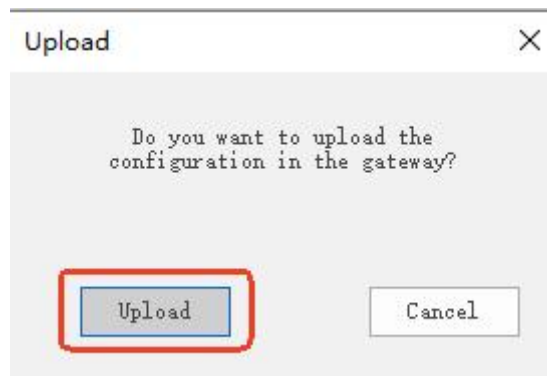
Upload Configuration: Upload the configuration information from the gateway to the configuration software interface for viewing.

The specific steps are as follows:

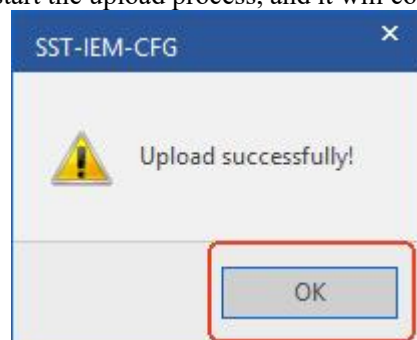
- (1) Click the "Upload" button on the toolbar, and the "Search Devices" interface will pop up.



- If no devices are found during the search, please refer to the FAQ for troubleshooting, "Unable to Search for Device".
- (2) Select the gateway that needs to be uploaded, then click "Upload". The "Upload Configuration" window will pop up.



- (3) Click the "Upload" button to start the upload process, and it will continue until the upload is completed.

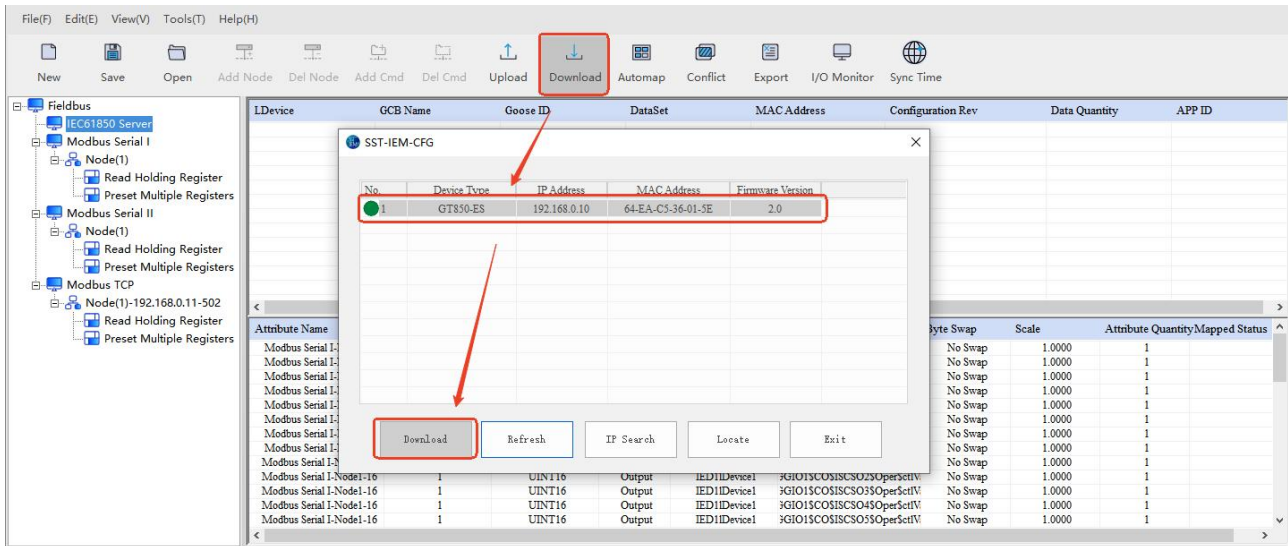


2. Download

Download Configuration: Download the current configuration settings from the software interface to the gateway.

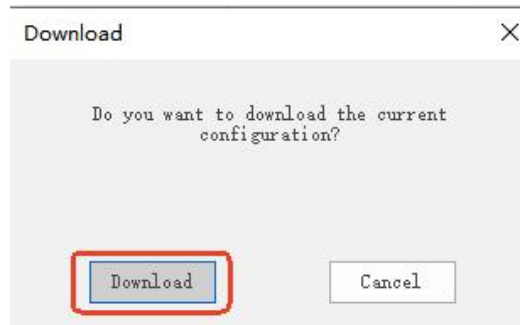
The specific steps are as follows:

- (1) Click the "Download" button on the toolbar, and the "Search Devices" interface will pop up:

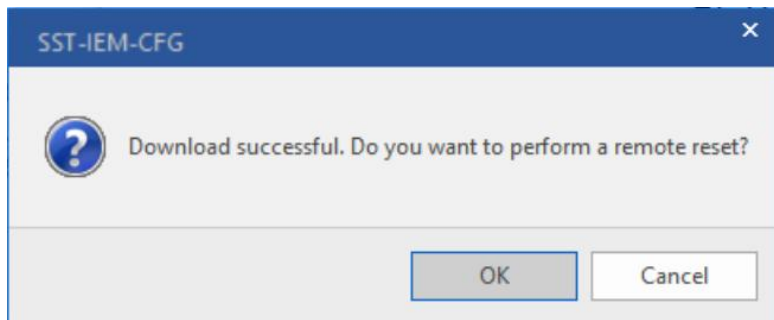


- If no devices are found, please refer to the FAQ, "Unable to Search for Device".

- (2) Select the gateway you wish to download the configuration to, then click "Download" to open the download configuration window.



- (3) Click the "Download" button to begin the download process, and it will continue until the download is successful.



After the download is complete, the gateway must be restarted for the configuration to take effect.

- Click "OK": The gateway will automatically restart, and the downloaded configuration will take effect, enabling communication according to the downloaded settings.
- Click "Cancel": The gateway will not restart. Although the configuration is successfully downloaded, communication will continue based on the previous settings. The gateway needs to be manually restarted for the new configuration to take effect.

(1) After clicking "OK/Cancel", the "Download Complete" message will appear.

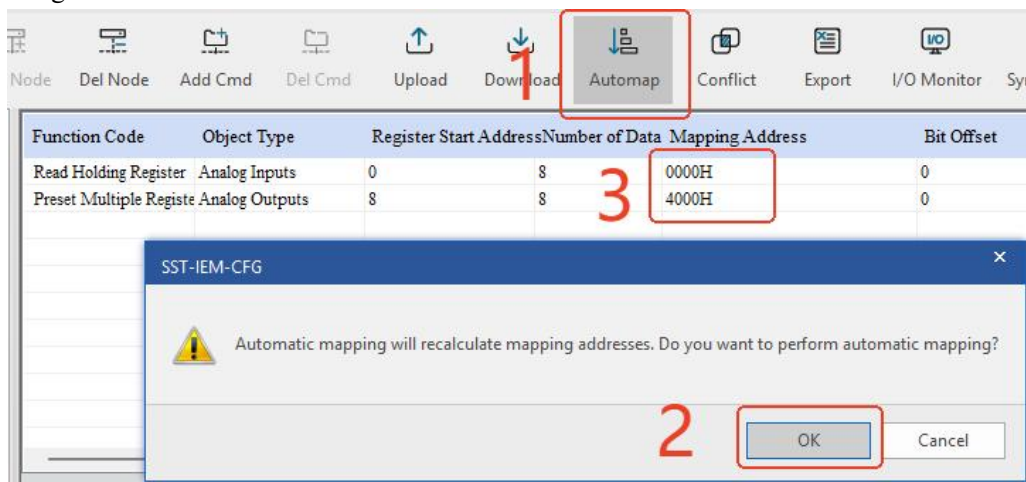


3. Auto Mapping

The Auto Mapping function helps users automatically fill in the "Memory Mapping Starting Address" values in the gateway, effectively preventing address conflicts. The starting address can also be manually entered, but care should be taken to avoid address conflicts.

Operation Instructions:

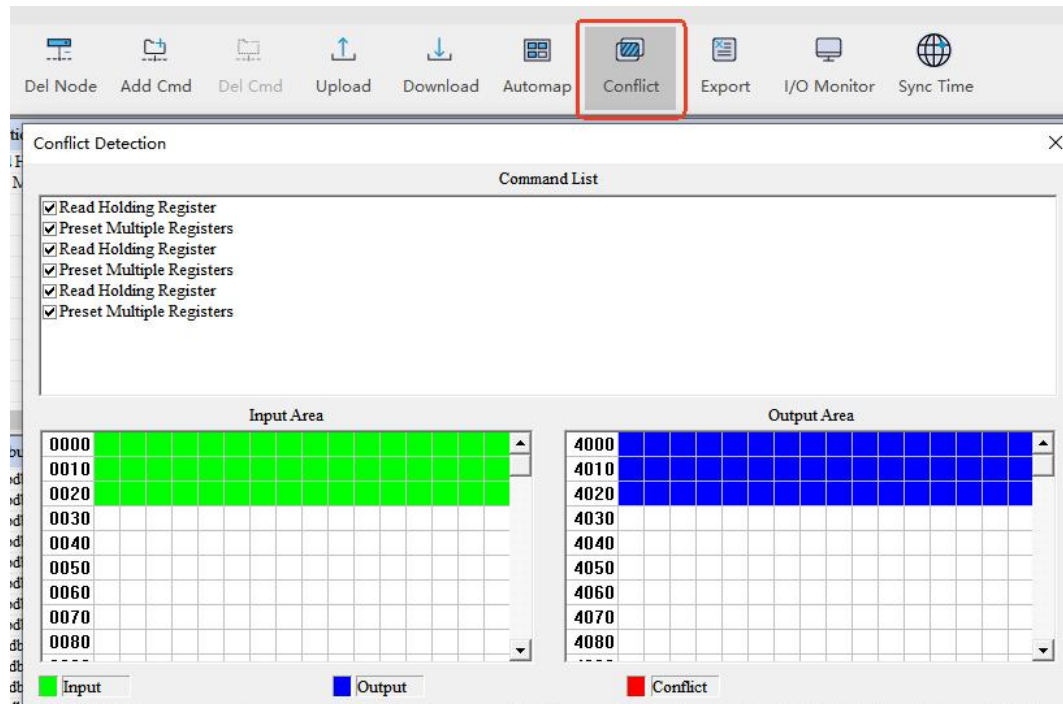
After setting the number of data points for the read/write commands in the Modbus master station, click "Menu Bar - Tools - Auto Mapping" or the "Auto Mapping" button in the toolbar to automatically fill in the memory mapping starting address. As shown below:



4. Conflict Detection

The Conflict Detection function allows you to view the memory mapping address allocation in the gateway and check if there are any conflicts.

Click "Menu Bar - Tools - Conflict Detection" or the "Conflict Detection" button in the toolbar to open the conflict detection window, as shown below:



Each square represents one byte. When you click on a square with the left mouse button, the occupancy of the 8 bits in that byte will be displayed.

Green: Input buffer address allocation, typically for read commands. When there is no conflict, it is displayed in green.

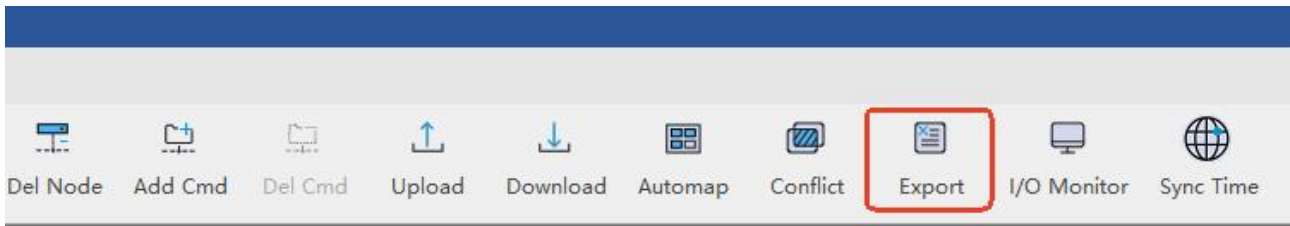
Blue: Output buffer address allocation, typically for write commands. When there is no conflict, it is displayed in blue.

Red: If there is a memory mapping address conflict in the input or output area, the area will be shown in red.

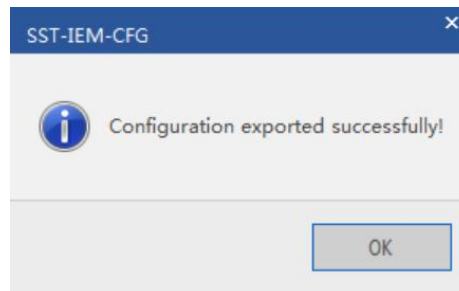
5. Export to Excel

The Export to Excel function allows you to save the configuration information as an Excel document for easier review.

Click "Menu Bar - Tools - Export to Excel" or the "Export to Excel" button in the toolbar to open the "Save As" window:



Select the appropriate path, enter a file name, and click Save. A successful configuration export prompt will pop up.



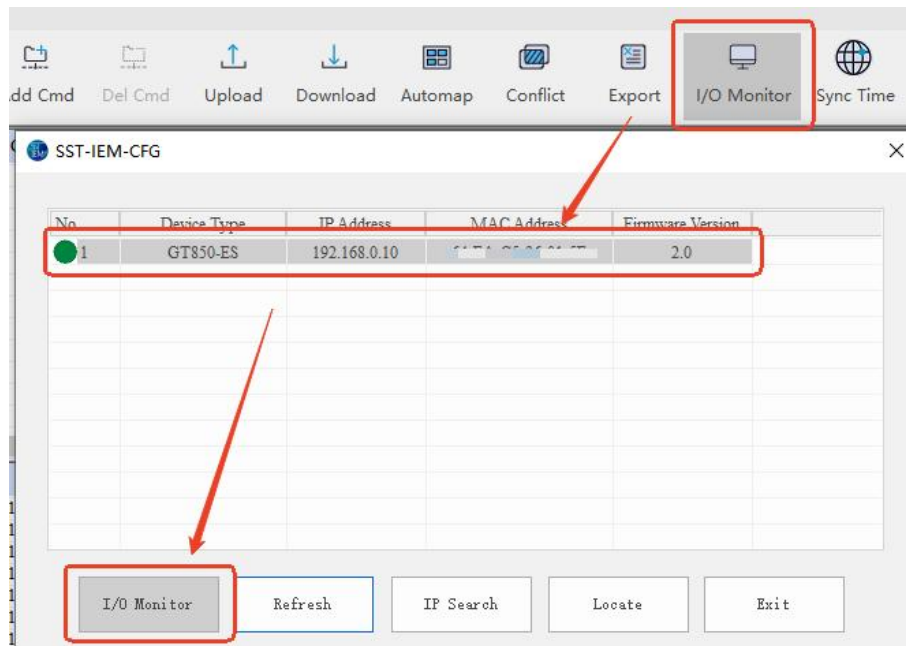
Click OK. The Excel file will automatically open, and you can select different sheets to view the specific configuration details.

	A	B	C	D	E	F	G	H	I	J	K
1	Attribute Name	Register Quantity	Data Type	Input/Output	ID Name	RMS Tag	Byte Swap	Scale	Attribute Quantity	Whether to Map	
2	Modbus Serial	2	INT32	Input	IED1Device1	661028ST13PC303\$stVal	No Swap	1	1	Yes	
3	Modbus Serial	2	INT32	Input	IED1Device1	661028ST13PC303\$stVal	No Swap	1	1	Yes	
4	Modbus Serial	2	INT32	Input	IED1Device1	661048ST13PC303\$stVal	No Swap	1	1	Yes	
5	Modbus Serial	2	Float	Input	IED1Device1	661048ST13PC303\$stVal	No Swap	1	1	Yes	
6	Modbus Serial	2	INT32	Output	IED1Device1	661028ST13PC303\$operCtrlVal	No Swap	1	1	Yes	
7	Modbus Serial	2	INT32	Output	IED1Device1	661028ST13PC303\$operCtrlVal	No Swap	1	1	Yes	
8	Modbus Serial	2	Float	Output	IED1Device1	661048ST13PC303\$operCtrlVal	No Swap	1	1	Yes	
9	Modbus Serial	2	Float	Output	IED1Device1	661048ST13PC303\$operCtrlVal	No Swap	1	1	Yes	
10	Modbus Serial	1	bool	Output	IED1Device1	661018PC303\$operCtrlVal			1	Yes	
11	Modbus Serial	1	bool	Output	IED1Device1	661018PC303\$operCtrlVal			1	Yes	
12	Modbus Serial	1	bool	Output	IED1Device1	661018PC303\$operCtrlVal			1	Yes	
13	Modbus Serial	1	bool	Output	IED1Device1	661018PC303\$operCtrlVal			1	Yes	
14	Modbus Serial	1	bool	Output	IED1Device1	661028PC303\$operCtrlVal			1	Yes	
15	Modbus Serial	1	bool	Output	IED1Device1	661028PC303\$operCtrlVal			1	Yes	
16	Modbus Serial	1	bool	Output	IED1Device1	661028PC303\$operCtrlVal			1	Yes	
17	Modbus Serial	1	bool	Output	IED1Device1	661028PC303\$operCtrlVal			1	Yes	
18	Modbus Serial	1	bool	Input	IED1Device1	661028ST13PC303\$stVal			1	Yes	
19	Modbus Serial	1	bool	Input	IED1Device1	661028ST13PC303\$stVal			1	Yes	
20	Modbus Serial	1	bool	Input	IED1Device1	661028ST13PC303\$stVal			1	Yes	
21	Modbus Serial	1	bool	Input	IED1Device1	661028ST13PC303\$stVal			1	Yes	
22											
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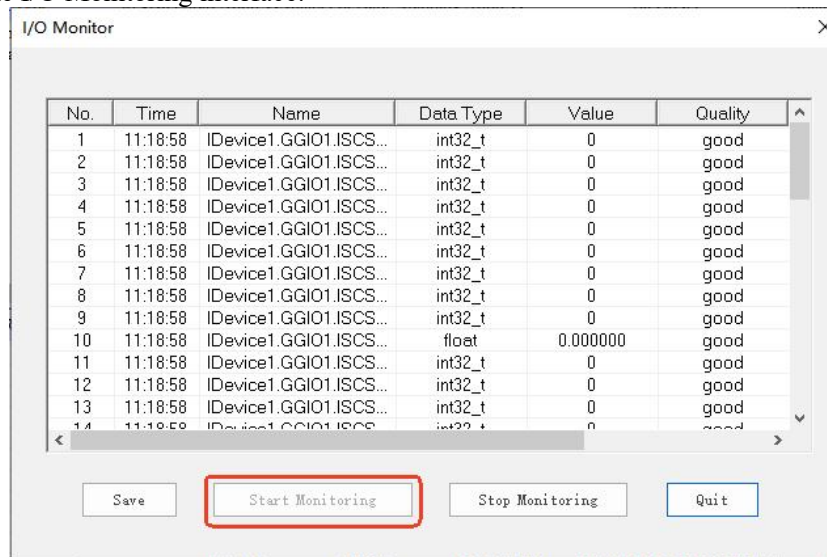
6. I/O Monitor

Select "I/O Monitor", then select the device in the "Search Devices" interface and click "I/O Monitor":

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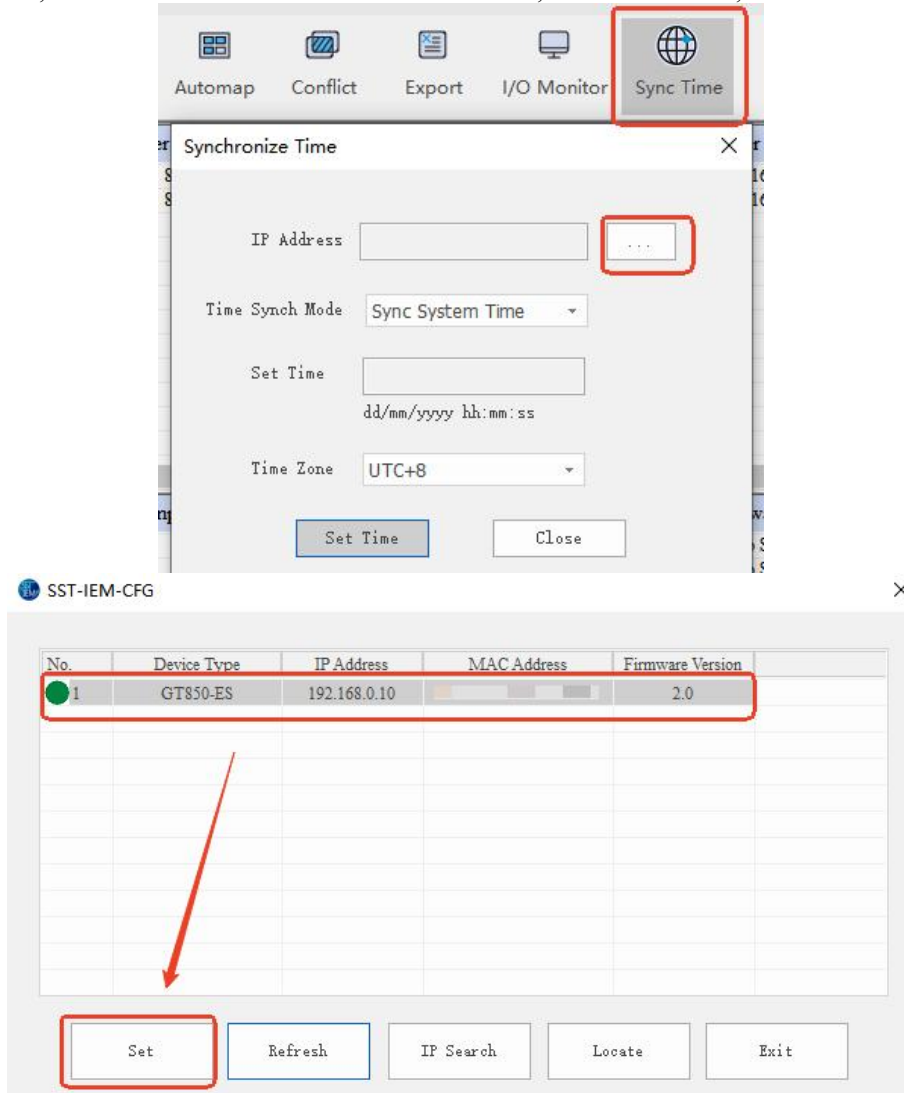
This will open the I/O Monitoring interface:



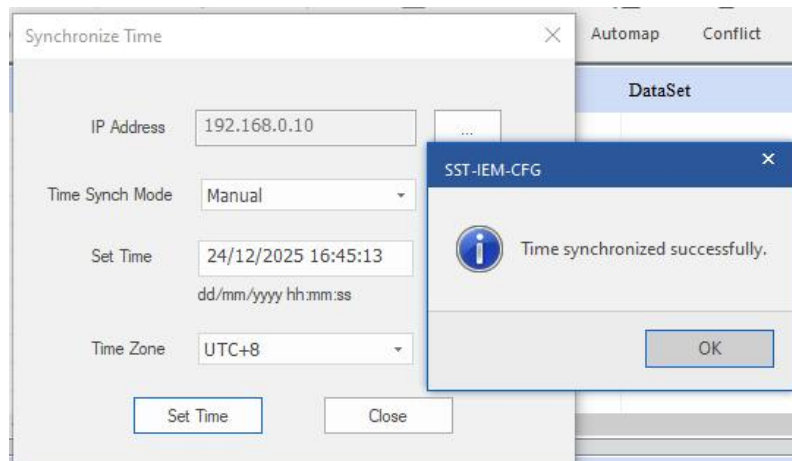
- Time:** The PC's time when monitoring data communication.
- Name:** The name of the IEC61850 endpoint mapped data.
- Data Type:** The data type of the IEC61850 endpoint mapped data.
- Current Value:** The current data value.
- Quality:** "Good" indicates that the current value is normal, and "Bad" indicates that the current value was not successfully retrieved.
- Update Count:** The number of updates for the IEC61850 endpoint mapping.
- Start Monitoring:** Begin monitoring data communication.
- Stop Monitoring:** Stop monitoring data communication.
- Start/Stop Saving:** The software allows users to save monitored data to the local hard drive in ".csv" format. When saving is complete, click "Stop Saving" to finalize the save. The "Start/Stop Saving" button is only functional when "Start Monitoring" is active.
- Exit:** Exit the monitoring interface.

7. Sync Time

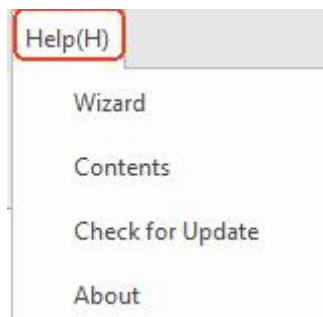
Select "Sync Time", click "..." in the "Search Devices" interface, select the device, and click "Set":



After selecting the device, you can perform the time synchronization operation. The software supports manually setting the time or synchronizing with the system time, allowing real-time setting of the IEC61850 timestamp (only effective during operation and will be lost after the gateway is restarted).



5.2.5 Help



1. Contents

Click "Contents" to open the software manual and view the usage instructions for the software.

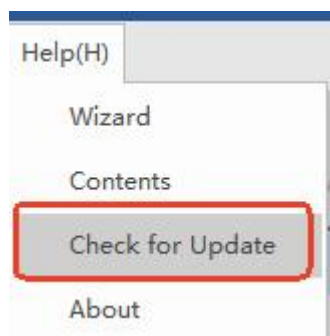
2. About

Click "About" to view information about the specific version of the configuration software.

3. Check for Update

The Check for Update function allows the configuration software to be updated to the latest version online.

When the computer running the configuration software is connected to the internet, click "Menu Bar - Help - Check for Update" to check whether the current version of the software is the latest and whether any new versions are available.



You can choose from three options: "Ignore this version", "Remind me later", and "Install Updates".

Click "Install Updates" to enter the process of uninstalling and then installing the updated version. Follow the prompts to complete the operation.

5.3 IEC61850 Server Configuration Instructions

The GT850-ES gateway serves as an IEC61850 server and communicates with IEC61850 client devices. The setup instructions using the SST-IEM-CFG configuration software are as follows:

1. Set IEC61850 Server

Double-click the IEC61850 Server tree node to open the basic parameter configuration interface: set up the network configuration and protocol configuration.

(1) Set Network Configuration

Parameter Configuration

Network Config Protocol Config

EtherNet: IEC61850

IP Assignment: Static

IP Address: 192.168.0.10

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.0.1

DNS1: 208.67.222.222

DNS2: 208.67.220.220

OK Cancel

In this interface, set the IP address for the gateway to function as the IEC61850 server.

(2) Set Protocol Configuration

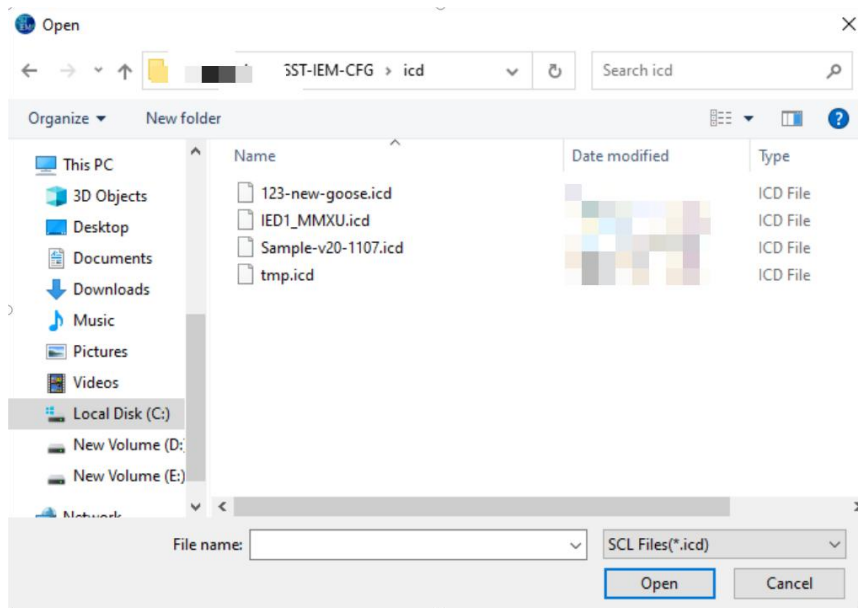
Parameter Configuration

Network Config Protocol Config

Protocol Mode	IEC61850 Peer Server
SCL File	Sample-v20-1107.icd
IED Name	IED1
Access Point Name	accessPoint1
Protocol Version	2
Keep-alive Interval (0-6000s)	0
Keep-alive Timeout (1-100s)	3
Keep-alive Retry Count (1-10)	3
Report Buffer Size (1-50KB)	10
Time Sync Mode	Sync System Time
SNTP Mode	
SNTP Server (IP/Domain)	
Manual Settings	
Time Zone	UTC+8

OK Cancel

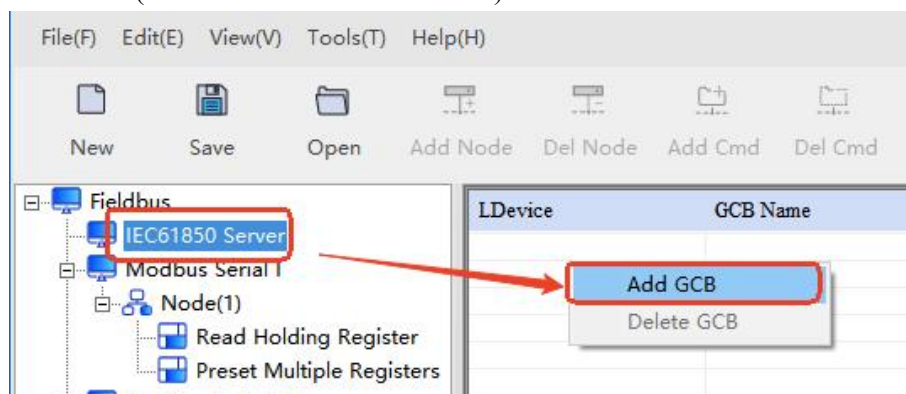
1. Click the button next to "SCL File" to open the file dialog. Select an SCL file (this software only supports .icd files) and click "Open". The SCL file name will be displayed here.



2. IED Name: After selecting the SCL file, left-click on the parameter area to display available options and select the appropriate one. This information is sourced from the SCL file.
3. Access Point Name: After selecting the SCL file, left-click on the parameter area to display available options and select the appropriate one. This information is also sourced from the SCL file.
4. Other Parameters: These can be set according to communication requirements. If there are no special requirements, the default settings are sufficient.

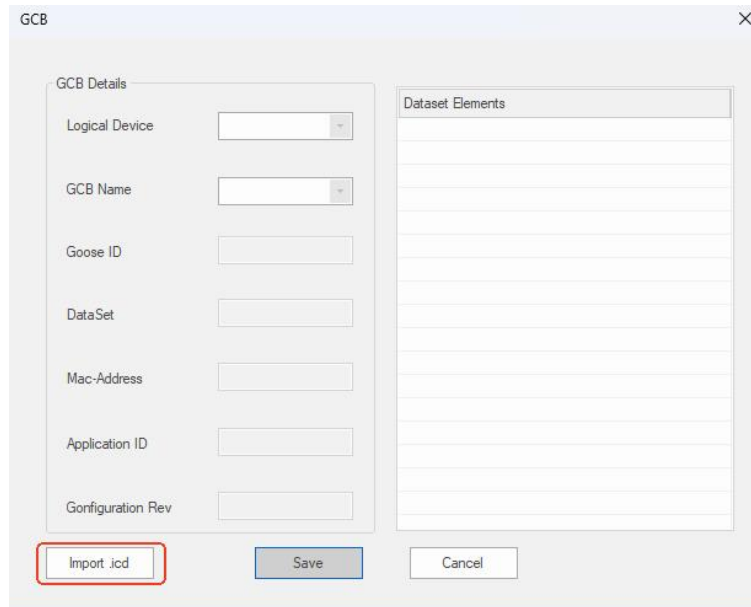
2. Add/Delete GCB

Left-click the IEC61850 Server tree node. In the upper-right area, right-click on an empty space to bring up a menu to add or delete GCB (Generic Communication Block).



(1) Add GCB

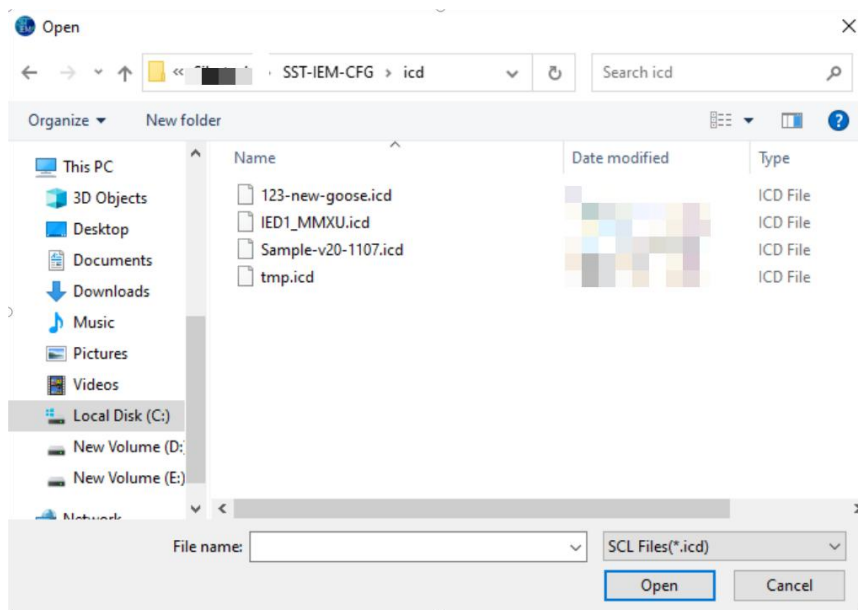
Click the "Add GCB" button to pop up the settings interface as follows:



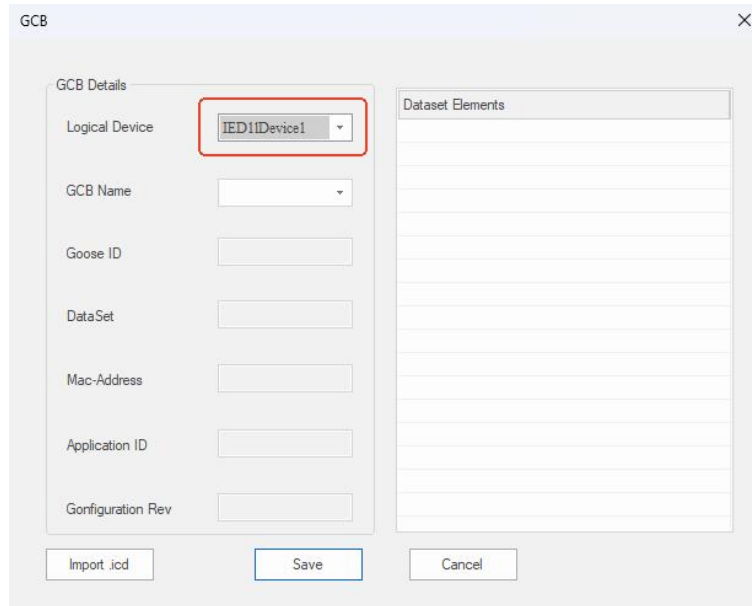
The screenshot shows a dialog box titled "GCB" with a close button (X) in the top right corner. The dialog is divided into two main sections. The left section, labeled "GCB Details", contains several input fields: "Logical Device" (a dropdown menu), "GCB Name" (a dropdown menu), "Goose ID" (a text box), "DataSet" (a text box), "Mac-Address" (a text box), "Application ID" (a text box), and "Configuration Rev" (a text box). The right section, labeled "Dataset Elements", contains a table with multiple empty rows. At the bottom of the dialog, there are three buttons: "Import .icd" (highlighted with a red rectangle), "Save", and "Cancel".

The operation steps are as follows:

1. Click the "Import ICD File" button, which will pop up the "Open File" dialog. Select an .icd file and click the "Open" button to complete the import:

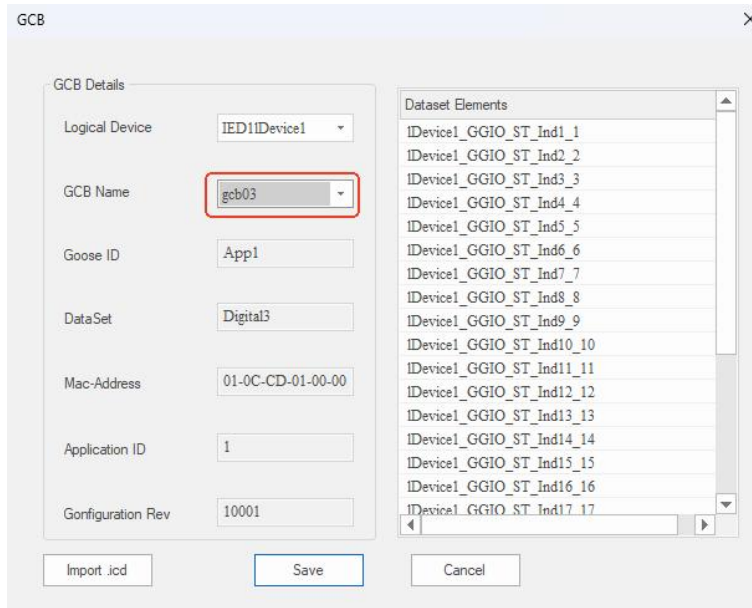


2. Logical Device: Select the logical device from the dropdown menu in the ICD file:



The screenshot shows the 'GCB' configuration window. On the left, under 'GCB Details', the 'Logical Device' dropdown menu is highlighted with a red rectangle and shows 'IED1Device1'. Other fields like 'GCB Name', 'Goose ID', 'DataSet', 'Mac-Address', 'Application ID', and 'Configuration Rev' are empty. On the right, the 'Dataset Elements' list is empty. At the bottom are 'Import .icd', 'Save', and 'Cancel' buttons.

3. GCB Name: Select the dataset name from the dropdown menu in the ICD file. After selecting, the relevant parameters will be automatically populated below:



The screenshot shows the 'GCB' configuration window after selecting a dataset name. The 'GCB Name' dropdown menu is highlighted with a red rectangle and shows 'gcb03'. The 'Dataset Elements' list on the right is now populated with 17 items, all starting with 'IDevice1_GGIO_ST_Ind'. The other fields in 'GCB Details' are also populated: 'Goose ID' is 'App1', 'DataSet' is 'Digital3', 'Mac-Address' is '01-0C-CD-01-00-00', 'Application ID' is '1', and 'Configuration Rev' is '10001'. The 'Import .icd', 'Save', and 'Cancel' buttons are at the bottom.

- [illegible]

(2) Delete GCB

To delete a GCB, right-click on the corresponding GCB row to pop up the operation menu and select the "Delete GCB" button to remove it.

LDevice	GCB Name	Goose ID
IED1Device1	gcb03	...

Add GCB
Delete GCB

5.4 Modbus Setup Instructions

The GT850-ES gateway has two serial ports. The serial port numbers on the gateway correspond to the Modbus Serial port numbers in the software interface for configuration. Additionally, it includes Modbus TCP settings.

5.4.1 Modbus Master Mode

The setup steps for Modbus master mode are as follows:

1. **Double-click the protocol name Modbus Serial/Modbus TCP:** This opens the basic parameter configuration interface:

a) **Double-click Modbus Serial**

Protocol Config	
Protocol Mode	Modbus Master
Baud Rate	19200
Data Bits	8 Bits
Parity Check	None
Stop Bits	1 Bit
Communication Mode	RTU
Response Timeout (ms)	300
Delay Between Polls (ms)	0
Write Command Output Mode	Change of State
Scan Rate	10
Demote on Failure	Disable
Timeouts to Demote	
Demotion Period (ms)	
Pull-Up/Pull-Down Resistor Switch	47K
Termination Resistor	Disable

✧ For the function descriptions of relevant parameters, refer to the "Annotations" in the software interface.

- (1) **Protocol Type:** Select "Modbus Master" to make the gateway act as the Modbus master, allowing it to connect to multiple Modbus slave devices.
- (2) **Set Serial Port Parameters:** Configure the serial port parameters, including baud rate, data bits, parity, stop bits, and communication transmission mode.
- (3) **Set Other Parameters:** Additional parameters can be configured according to the communication requirements.

b) Double-click Modbus TCP

Parameter Configuration

Network Config
Protocol Config

EtherNet: IEC61850/Modbus

IP Assignment: Static

IP Address: 192.168.0.10

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.0.1

DNS1:

DNS2:

OK
Cancel

Parameter Configuration

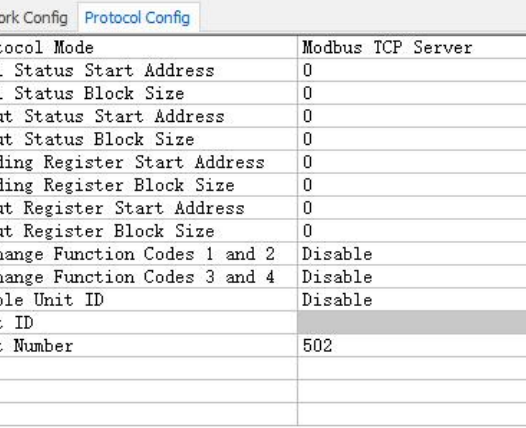
Network Config
Protocol Config

Protocol Mode	Modbus TCP Client
Response Timeout (ms)	300
Delay between Polls (ms)	0
Write Command Output Mode	Change of State
Command Output Mode	Serial Output
Timeout Action	Clear

OK
Cancel

✧ *For the function descriptions of relevant parameters, refer to the "Annotations" in the software interface.*

- (1) **Network Configuration:** Used to configure the network port IP address and other information. Since the same network port is shared with IEC61850, the network port parameters must be configured in the IEC61850 section.
- (2) **Protocol Configuration:** Customers can select Master or Slave based on communication needs and configure other parameters accordingly.
- (3) **Modbus TCP Slave:** Slave configuration is as follows, no need to configure node or command.



Parameter Configuration

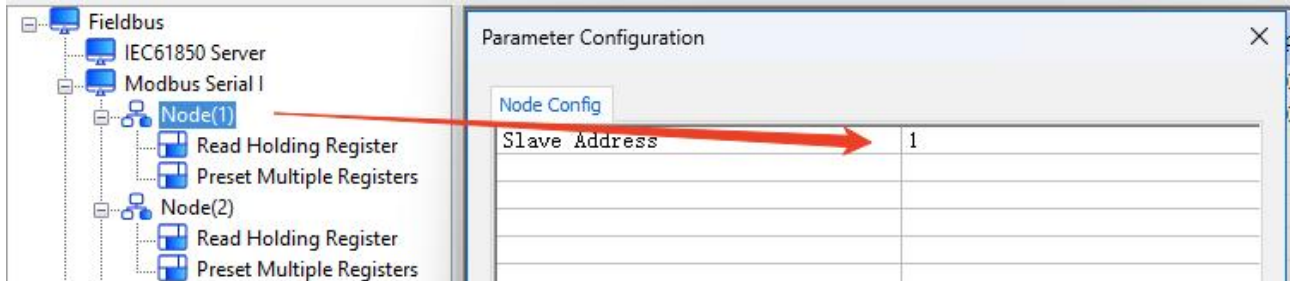
Network Config Protocol Config

Protocol Mode	Modbus TCP Server
Coil Status Start Address	0
Coil Status Block Size	0
Input Status Start Address	0
Input Status Block Size	0
Holding Register Start Address	0
Holding Register Block Size	0
Input Register Start Address	0
Input Register Block Size	0
Exchange Function Codes 1 and 2	Disable
Exchange Function Codes 3 and 4	Disable
Enable Unit ID	Disable
Unit ID	
Port Number	502

OK Cancel

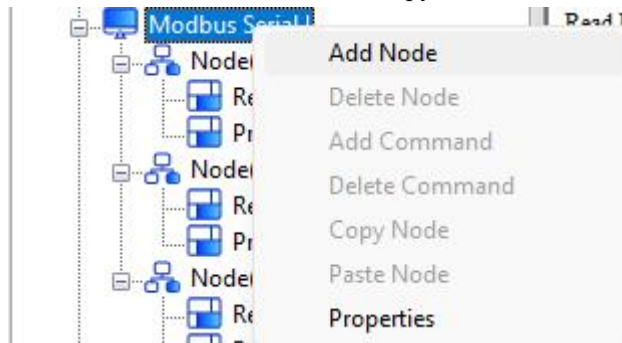
2. Add/Delete Nodes:

The gateway, as a Modbus master, can connect to multiple Modbus slave devices, with each node representing a slave device. Double-click Node to open the setup interface, where the slave device address can be filled in the "Slave Address" field.



● Node Setup Instructions:

There are four operations for nodes: Add Node, Delete Node, Copy Node, and Paste Node.

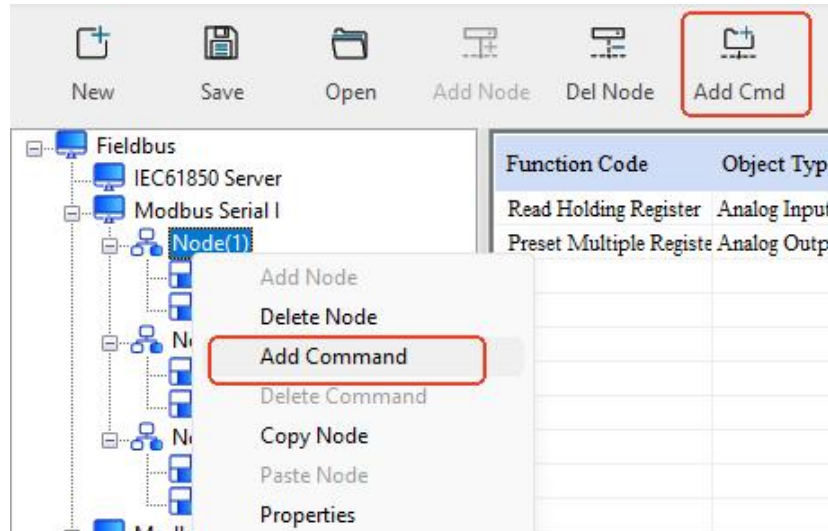


- **Add Node:** Right-click "Modbus Serial" and choose "Add Node" from the menu to add a node, or click "Menu Bar - Edit - Add Node" / "Toolbar - Add Node" to perform this operation.
- **Delete Node:** There are several ways to delete a node:
 1. Right-click the node to be deleted and choose "Delete Node" from the menu.
 2. Right-click the node to be deleted and choose "Delete Node" from the menu.
- **Copy Node:** Right-click the node to be copied and choose "Copy Node" from the menu to complete the operation.
- **Paste Node:** After copying a node, right-click an existing node and select "Paste Node" to complete the operation.

3. Add/Delete Commands:

The gateway needs to add commands based on the Modbus commands supported by the slave device.

3.1 Commands have two operations: Add Command and Delete Command.



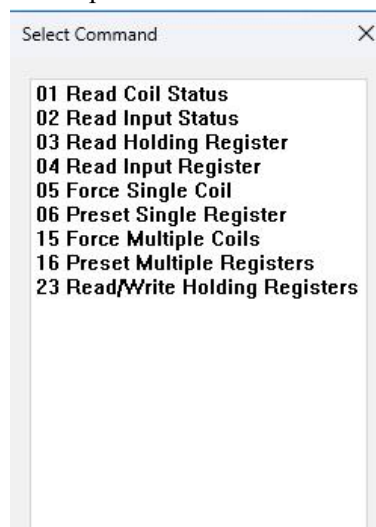
- **Add Command:** Right-click the node to which the command is to be added, then select "Add Command" from the menu. A command options dialog will pop up, where you can double-click the desired command to add it. Alternatively, you can click "Menu Bar - Edit - Add Command" / "Toolbar - Add Command" to perform this operation.
- **Delete Command:** There are several ways to delete a command:
 1. Right-click the command to be deleted and choose "Delete Command" from the menu.
 2. Click "Menu Bar - Edit - Delete Command" / "Toolbar - Delete Command" to perform this operation.

3.2 Modbus Command Setup Instructions

The Modbus master supports the following command function codes: 01, 02, 03, 04, 05, 06, 15, 16, 23.

When the "Add Command" function is selected, the command options dialog will pop up, as shown below:

Double-click the desired command to complete the addition.



The Modbus command configuration interface is shown below:

Command Config	
Function Code	3
Object Type	Analog Inputs
Modbus Register Start Address	0
Number of Data	8
Mapping Address	0010H
Bit Offset	0
Number of Bytes	16
Parity Check	CRC
Scan Mode	Fast Scan
Fast Output	
Timeout Action	Clear

OK Cancel

✧ For function descriptions of related parameters, refer to the "Annotations" in the software interface.

Basic Parameters for Modbus Command Setup:

- **Modbus Register Starting Address:** The starting address of the command. Modbus protocol has two address formats, and here it uses a zero-based address format in decimal.
- **Data Count:** The number of data items for the command, specified in decimal.
- **Memory Mapping Starting Address:** The starting address of the input/output buffer where the data for this command is stored within the gateway. This address is specified in hexadecimal. This address can be entered manually or automatically filled in by clicking the "Auto Mapping" button after entering the "Data Count."
- **Memory Mapping Bit Offset:** This setting is valid for command codes 01, 02, 05, and 15. It specifies the bit offset within the byte where the data starts, typically set to 0 (no offset).
- If there are no special requirements, the default settings can be kept.

3.3 "Modbus Register Starting Address" Parameter Setup Instructions

- (1) Modbus command addresses have two formats: one is based on 0, and the other is based on 1. Examples of these two address formats are as follows:

This software uses the 0-based address format, displayed in decimal numbers.

Command Function Code	Address Display Based on 1	Address Display Based on 0
Coil Status (Function Code: 01, 05, 15)	00001–00010	00000–00009
Input Status (Function Code: 02)	10001–10010	00000–00009
Holding Register (Function Code: 03, 06, 16, 23)	40001–40010	00000–00009
Input Register (Function Code: 04)	30001–30010	00000–00009

- (2) Modbus Command Setup Example:

Users need to read communication data from a Modbus slave device using the gateway, as shown below:

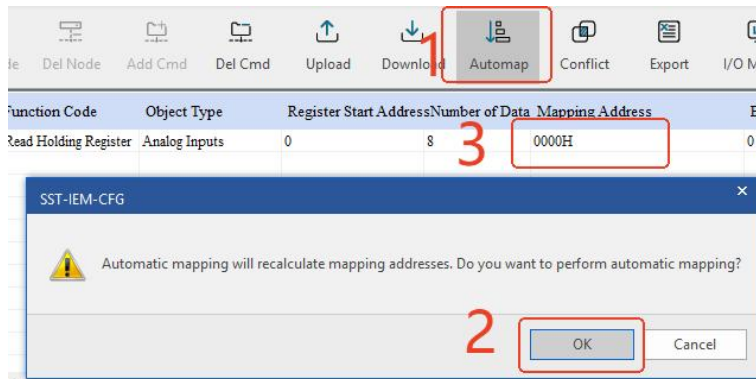
Command Function Code	Address Display Based on 1	Data Length
1	0X0001–0X0002	2
2	1X0058	1
3	4X0004–4X0013	10
4	3X0025	1

The settings in SST-IEM-CFG should be configured as follows:

Command Function Code	Modbus register starting address (zero-based address)	Number of data (decimal number)
1	0	2
2	57	1
3	3	10
4	24	1

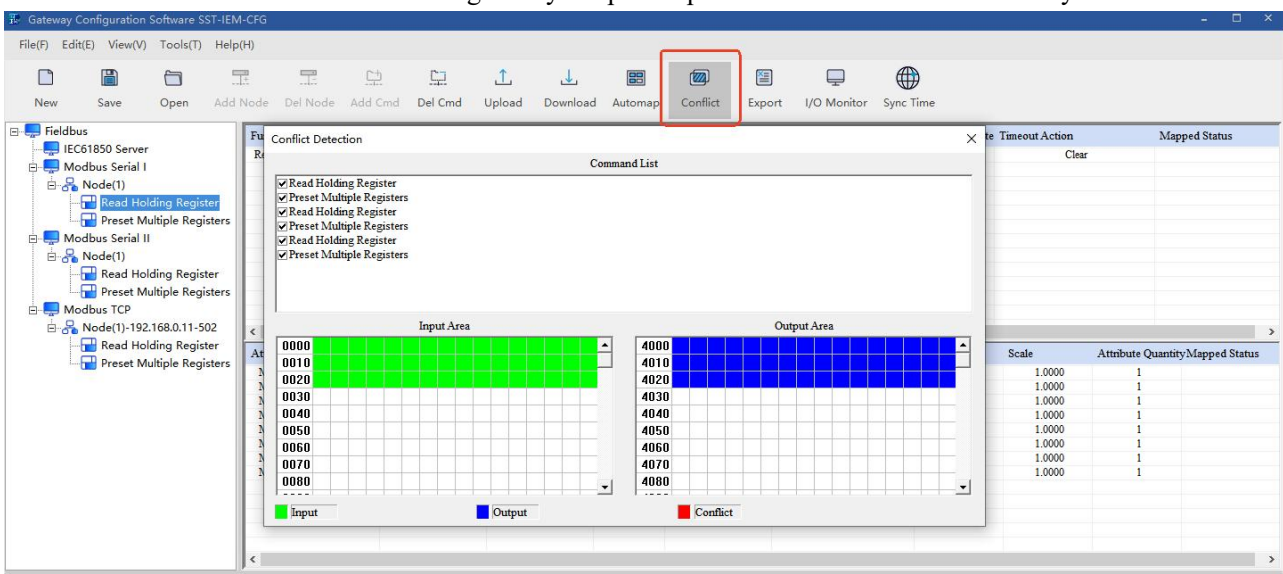
4. Auto Mapping: Set Gateway Memory Mapping Address

After completing node and command setups, click the "Auto Mapping" button on the toolbar to automatically allocate the "Memory Mapping Starting Address" for Modbus read/write commands. This address represents the starting point of the input/output buffer where the data is stored inside the gateway. The address can be automatically assigned or manually entered.



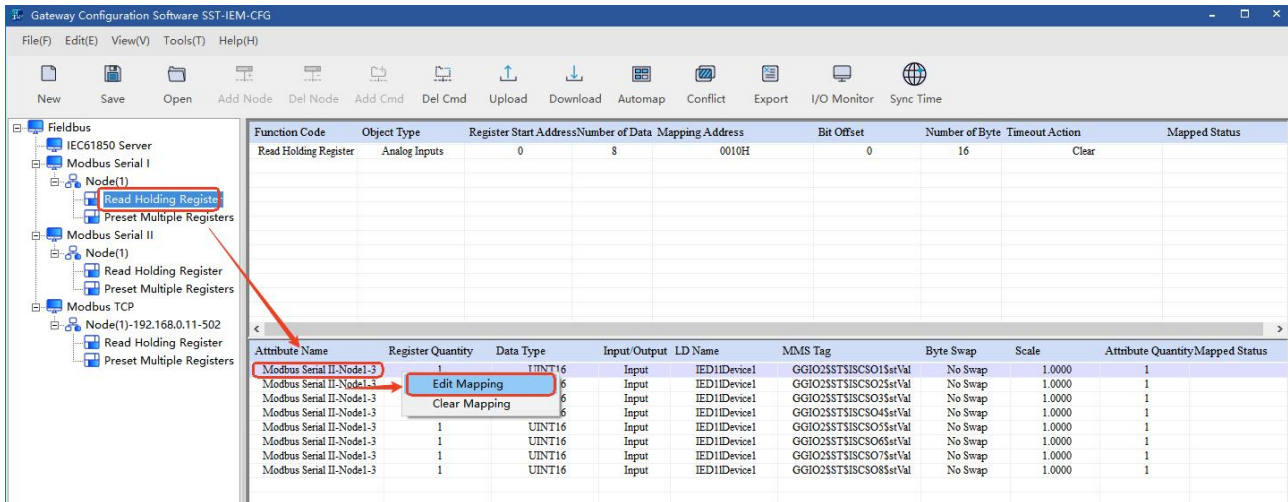
5. Conflict Detection:

After setting the "Memory Mapping Starting Address," click the "Conflict Detection" button on the toolbar to check the address allocation status of the gateway's input/output buffers and see if there are any address conflicts.

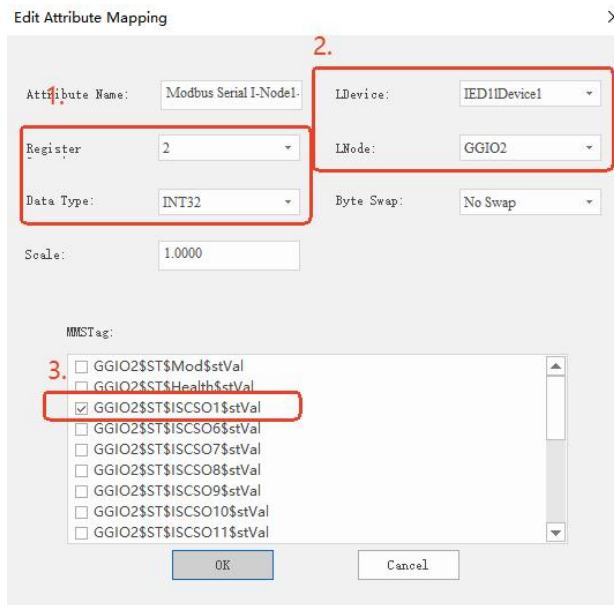


6. Add/Clear Mapping

After adding Modbus commands, in the tree view, select a Modbus command. In the lower-right section, it will show whether the mapping exists. Double-click a mapping row, or right-click the row and select "Edit Mapping" to make edits.



For example, double-clicking a mapping row will open the configuration interface as follows:



Setup Instructions:

- (1) Attribute Name: Generally, keep the default settings. If manually modified, it supports uppercase and lowercase letters, numbers, and can contain 1-32 characters.
- (2) Register Count and Data Type: Select the appropriate number of registers and set the data type accordingly. Set this according to the communication requirements.
- (3) LDevice: Click the right-side arrow to display a dropdown option, from which you can choose a logical device from the ICD file.
- (4) LNode: Click the right-side arrow to display a dropdown option, from which you can choose a logical node from the ICD file.
- (5) MMS Tag: After selecting the LNode, this section will show all attribute names under this logical node in the ICD file. Select the attributes as required for communication.

GT850-ES

Modbus / IEC61850 Gateway

User Manual

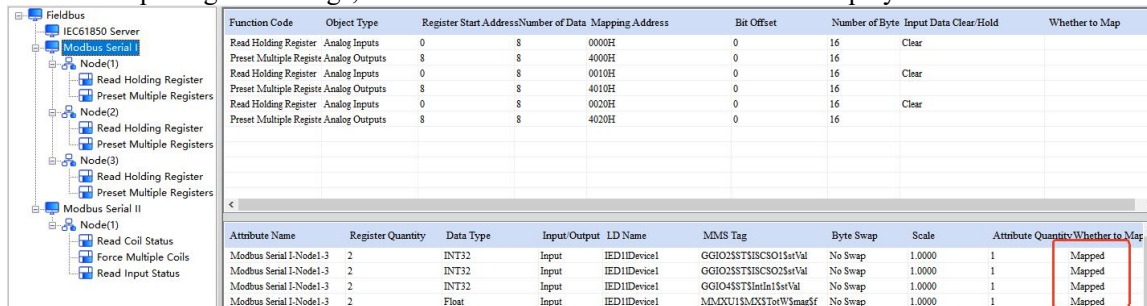
Modbus Commands and Corresponding IEC61850 Attribute Points Mapping Example:

Command Function Code	Mappable data points
Read Coil Status (Function Code: 01)	GGIOX\$ST\$SPCSOX\$stVal
Write Coil Status (Function Code: 05, 15)	GGIOX\$CO\$SPCSOX\$Oper\$stVal
Read Input Status (Function Code: 02)	GGIOX\$ST\$SPCSOX\$stVal
Holding Registers (Function Code: 03)	GGIOX\$ST\$ISCSOX\$stVal
Floating Point Data Input (Function Code: 03)	GGIOX\$MX\$AnInX\$mag\$f
Holding Registers (Function Code: 06, 16, 23)	GGIOX\$CO\$ISCSOX\$Oper\$stVal
Floating Point Data Output (Function Code: 16)	GGIOX\$CO\$AnOutX\$Oper\$stVal\$f
Input Registers (Function Code: 04)	GGIOX\$ST\$ISCSOX\$stVal

X as the Specific Attribute Point Number

(1) Scaling and Byte Swap: Set according to communication requirements.

After completing the settings, click “OK.” The software interface will display as follows:



Function Code	Object Type	Register Start Address	Number of Data	Mapping Address	Bit Offset	Number of Byte	Input Data	Clear/Hold	Whether to Map
Read Holding Register	Analog Inputs	0	8	0000H	0	16		Clear	
Preset Multiple Register	Analog Outputs	8	8	4000H	0	16			
Read Holding Register	Analog Inputs	0	8	0010H	0	16		Clear	
Preset Multiple Register	Analog Outputs	8	8	4010H	0	16			
Read Holding Register	Analog Inputs	0	8	0020H	0	16		Clear	
Preset Multiple Register	Analog Outputs	8	8	4020H	0	16			

Attribute Name	Register Quantity	Data Type	Input/Output	LD Name	MMS Tag	Byte Swap	Scale	Attribute Quantity	Whether to Map
Modbus Serial I-Node1-3	2	INT32	Input	IED11Device1	GGIO2\$ST\$ISCSO1\$stVal	No Swap	1.0000	1	Mapped
Modbus Serial I-Node1-3	2	INT32	Input	IED11Device1	GGIO2\$ST\$ISCSO2\$stVal	No Swap	1.0000	1	Mapped
Modbus Serial I-Node1-3	2	INT32	Input	IED11Device1	GGIO4\$ST\$IntIn1\$stVal	No Swap	1.0000	1	Mapped
Modbus Serial I-Node1-3	2	Float	Input	IED11Device1	MMXU1\$MX\$TotW\$mag\$f	No Swap	1.0000	1	Mapped

Clear Mapping: Right-click the row and select “Clear Mapping” to delete the mapping information for the attribute point.

Attribute Name	Register Quantity	Data Type	Input/Output	LD Name	MMS Tag	Byte Swap
Modbus Serial I-Node1-3	2	INT32	Input	IED11Device1	GGIO2\$ST\$ISCSO1\$stVal	No Swap
Modbus Serial I-Node1-3	2	INT32	Input	IED11Device1	GGIO2\$ST\$ISCSO2\$stVal	No Swap
Modbus Serial I-Node1-3	2	INT32	Input	IED11Device1	GGIO4\$ST\$IntIn1\$stVal	No Swap
Modbus Serial I-Node1-3	2	Float	Input	IED11Device1	MMXU1\$MX\$TotW\$mag\$f	No Swap

7. Download Configuration:

After completing the required configurations, click the “Download” button on the toolbar to download the configuration to the gateway. Once the download is complete, restart the gateway as prompted for the configuration to take effect.

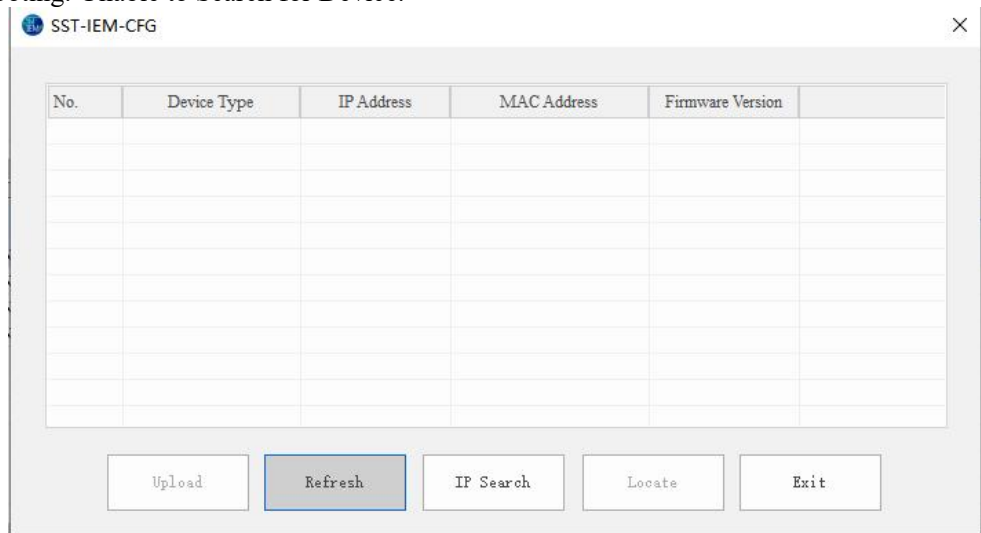
• For details on the download configuration operation, please refer to Section 5.2.4 Tool “2. Download.”

If you wish to confirm the configuration of the gateway, click the “Upload” button on the toolbar to view the configuration in the gateway.

• For details on the upload configuration operation, please refer to Section 5.2.4 Tool “1. Upload.”

6 FAQ

1. Troubleshooting: Unable to Search for Device.



If the gateway cannot be found, the following troubleshooting steps can be performed:

- (1) If the device cannot be found, click the “Refresh” button to search again. Sometimes there might be a delay, and a second search will resolve it.
- (2) Ensure the network cable connecting the PC to the gateway is functioning properly.
- (3) The factory-configured IP is 192.168.0.10. Ensure that the PC and gateway are in the same network segment.
- (4) Click the “Specify IP Search” button and enter the gateway’s IP address to search via a specified IP.
- (5) If the gateway’s IP address is unknown, use the button to restore the initial configuration. At this point, the gateway will have a fixed IP address of 192.168.0.10. Set the computer to the “192.168.0.X” network segment and search the gateway again, or use the “Specify IP Search” function to locate the gateway.

Note: Restoring the initial configuration will erase all configuration data in the gateway. Please use this feature with caution.

Button Operation Method:After the gateway has powered on and the IES indicator light is either solid or blinking (within 10 seconds), press and hold the button for 5 seconds. When the IES status light blinks orange, release the button. After releasing, click the button again within 5 seconds. The gateway will restore its factory settings and automatically restart.After successful reset, the IP address of the gateway’s IEC61850 port will switch to DHCP mode. If no IP address is acquired within 30 seconds, the IP address will be fixed to 192.168.0.10.