

HART / EtherNet Gateway

GT200-HT-EI

User Manual

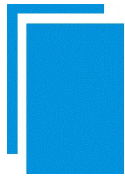
V 3.2



SST Automation

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Important Information

Warning

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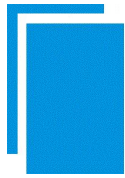
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1 Product Overview

1.1 Product Function

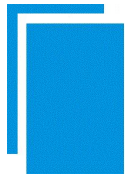
GT200-HT-EI is a gateway that can provide a seamless connection between HART and EtherNet/IP or Modbus TCP Ethernet protocol. It can connect HART slave devices to an EtherNet/IP network or Modbus TCP network and realize bi-directional data exchange easily. The HART side can be configured as a primary or secondary master, and the EtherNet/IP or Modbus TCP side works as a server.

1.2 Product Features

- Easy to use: Users only need to refer to the product manual and application instances and can realize data communication of a gateway in a short time according to the requirements of the configuration.
- Powerful functionality: Support fast acquisition of the HART slave address and modification, point-to-point mode of coexistence of HART communication and 4-20mA data acquisition, HART side supports the primary master and the secondary master.
- Multi debugging functions: The configuration software SST-HI-CFG can provide a visual display of data exchange as well as HART command diagnostics and communication debugging functions that greatly facilitates user communication tests.
- Flexibility: The Ethernet side supports EtherNet/IP or Modbus TCP.

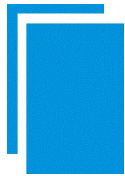
1.3 Technical Specifications

- [1] EtherNet network (EtherNet/IP and Modbus TCP) is independent of HART network.
- [2] IP address conflict detection.
- [3] Supports ODVA standard EtherNet/IP communication protocol in adapter mode.
- [4] Used as a primary or a secondary HART master.
- [5] Supports single-point and multi-point mode at the HART side.
- [6] Support for online scanning of HART devices and modification of address functions.
- [7] Under point-to-point mode, supports data burst operation from slave.
- [8] Supports one HART-channel, under multi-drop mode, support connecting at most 13 HART slaves with gateway internal resistor and support connecting 15 HART slaves with an external resistor (250 Ω).



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- [9] Supports all commands of the HART7 and earlier versions.
- [10] Each HART command can be configured for change-of-state output, polling output, initialization output or disable output.
- [11] HART channels support up to 128 user commands, a mix of basic and advanced modes, with a maximum of 30 commands in advanced mode, HART output data buffers up to 1000 bytes and input data buffers up to 1600 bytes.
- [12] The Ethernet side supports setting static IP or DHCP. the IP will be fixed to 192.168.0.11 after 30s of unsuccessful DHCP assignment.
- [13] Ethernet side can be configured as Modbus TCP server or EtherNet/IP adapter.
- [14] EtherNet/IP supports VendCode modification.
- [15] Max input and output bytes of EtherNet/IP:
Max input bytes: 256 bytes.
Max output bytes: 256 bytes.
- [16] Modbus TCP side supports function codes: 03, 04, 06, 16.
- [17] Modbus TCP side supports 03, 04 function codes for data reading.
- [18] The Modbus TCP side supports a maximum input byte count of 1600 bytes and a maximum output byte count of 1000 bytes.
- [19] Up to 4 TCP connections can be established simultaneously on the Modbus TCP side.
- [20] Power: 24VDC (11V-30V), 70mA (24VDC).
- [21] Operating temperature: -40 °F-140 °F (-40 °C-60 °C). Humidity: 5%- 95% (without condensation).
- [22] Dimensions (W*H*D): 1.0 in * 4.0 in * 3.6 in (25 mm * 100 mm * 90 mm).
- [23] Installation: 35mm DIN RAIL.
- [24] Protection Level: IP20.



1.4 Related Products

Related products include:

- GT200-HT-RS
- GT200-HT-MT
- GT200-3HT-MT
- GT200-3HT-RS
- GT100-EI-RS
- GT200-EI-2RS485

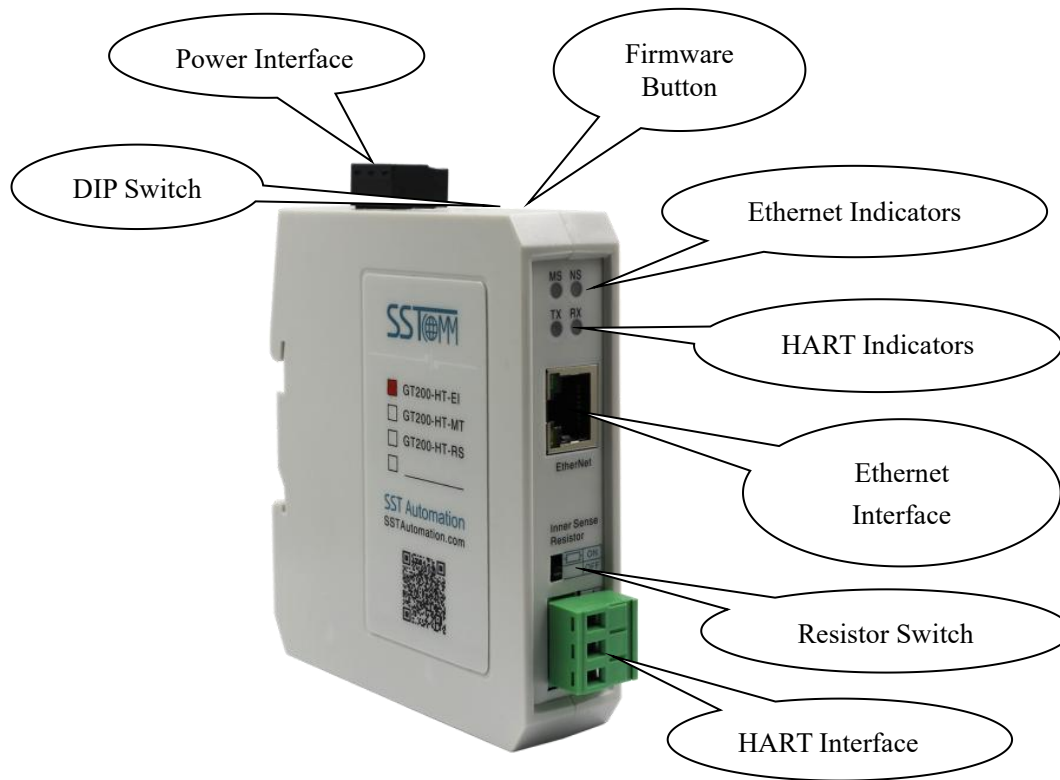
To get more information about related products, please visit SST Automation's website: www.sstautomation.com.

1.5 Revision History

Revision	Date	Chapter	Description
V3.2	8/11/2025	ALL	Support HART 7
V3.0	10/13/2023	ALL	Add Modbus TCP functionality. Cleaned up the multi-drop wiring diagrams.
V1.3, Rev D	8/9/2022	Chapter 1.1, 1.3, 1.4, 2.5, 2.7, 4.1, 4.3, 5.2.2.3, 5.2.2.4, 5.2.3, 6.1, 8.1	Revised some mistakes. Corrected figure in chapter 2.5.
V1.3, Rev C	8/2/2022	PART	Add two wire and four wire multi-drop wiring and replace software screenshot.
V1.3, Rev B	07/01/2022	Chapter 5	Add HART Common Commands (ID 1 and ID 3) to this section.

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 LED Indicators

Indicator	State		Description
TX	Green blinking		HART data sending
	Green off		No data sending
RX	Green blinking		HART data receiving
	Green off		No data receiving
NS	Green on		ModbusTCP/EtherNetIP connection is established. Communication is normal.
	Green blinking		ModbusTCP/EtherNetIP connection is not established.
MS	Static IP	Red off	Module status: IP address starts normally
		Red blinks 3 times	Module status: Static IP initializing
	DHCP	Red blinks 5 times and then goes off	Module status: DHCP allocate address successfully
		Red blinks for 30s and then goes out	Module status: DHCP allocation failed, IP address fixed at 192.168.0.11

2.3 Firmware Button

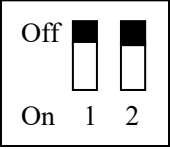
The firmware button is located at the top of the product and used to enter the bootload state to download the firmware .

Action	Description
Hold then power on	Bootload state to update firmware.

Note: Under normal circumstances, please do not press the button!

2.4 Configuration DIP Switch

The configuration DIP switches are located at the top of the product. Turn Function (Bit 1) to Off and Mode (Bit 2) to Off and power on (or reboot) to make the device work properly in Run Mode.

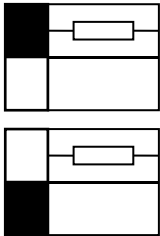


Function (Bit 1)	Mode (Bit 2)	Mode	Description
Off	Off	Run Mode	Allows configuration and communication.
On	Off	Debug Mode	Allows configuration, communication and debugging.
Off	On	Configuration Mode	IP address is fixed at 192.168.0.11. Allows configuration. Prohibits Ethernet and HART communication.
On	On	Run Mode	Allows communication. Prohibits configuration and debugging.

Note: To apply mode switching, please restart the gateway.

2.5 Internal Series Resistor Switch

The GT200-HT-EI has an internal series resistor (270 Ohm /2 W) required for the HART channel. This allows up to 13 HART instruments to be connected. When the power going through the series resistor is more than 2W, you must use an external series resistor (250 Ohm /3 W) which allows the gateway to be connected to up to 15 HART instruments.



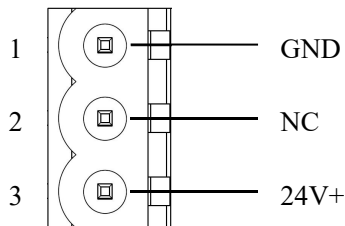
Switch to ON: Using the internal series resistor

Switch to OFF: Using the external series resistor

2.6 Interfaces

2.6.1 Power Interface

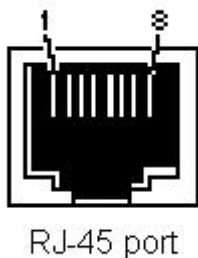
GT200-HT-EI has one power interface, and it is recommended to use a 24V DC power supply.



Pin	Description
1	Power GND
2	NC (Not Connected)
3	24V+, DC

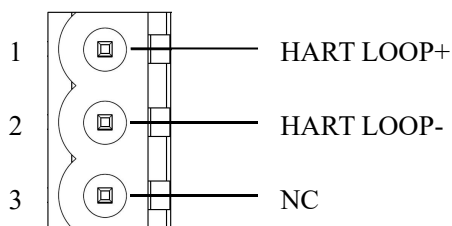
2.6.2 Ethernet Interface

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

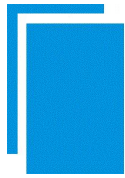


Pin	Description
S1	TXD+, Transmit Data+, Output
S2	TXD-, Transmit Data-, Output
S3	RXD+, Receive Data+, Input
S6	RXD-, Receive Data-, Input
S4,5,7,8	Reserved

2.6.3 HART Interface



Pin	Description
1	Connected to HART signal +
2	Connected to HART signal -
3	NC (Not connected)



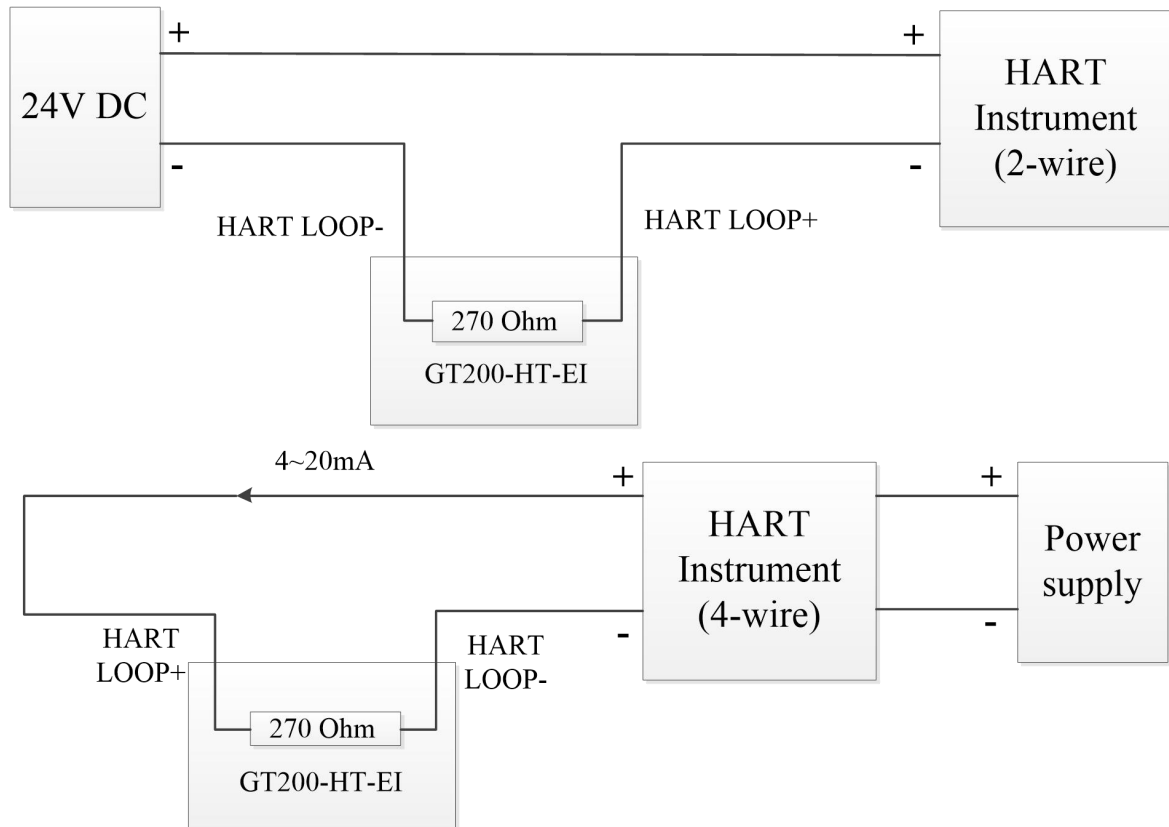
2.7 Topology of GT200-HT-EI and HART Instruments

Notes:

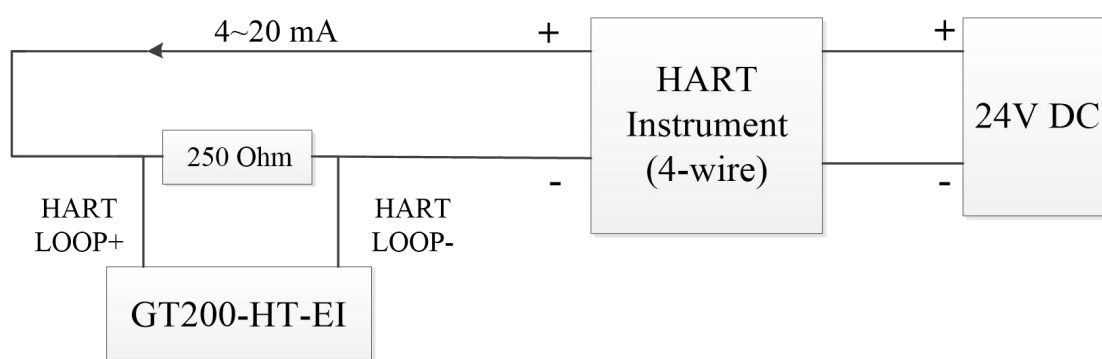
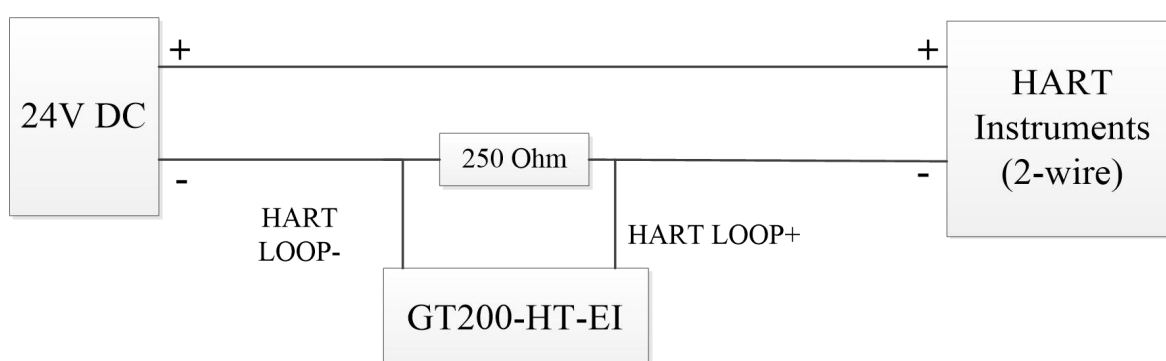
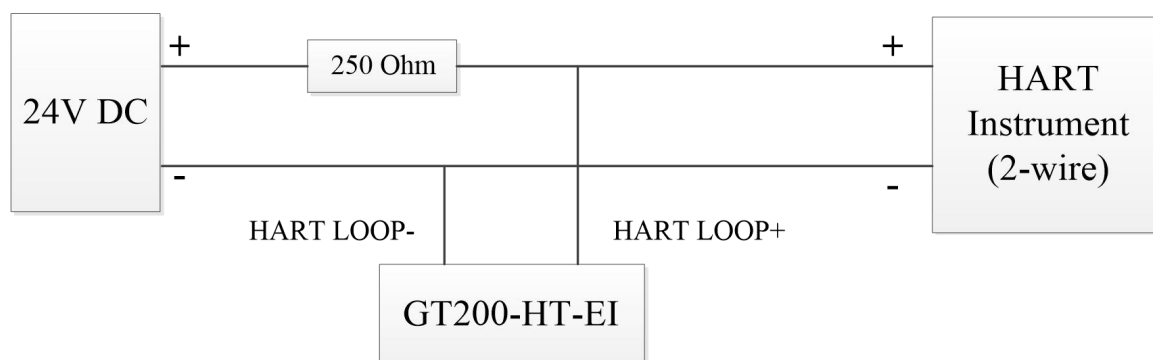
1. Some HART instruments need to perform internal work such as self-test when they are first powered on, and may not communicate with HART at this time. It is recommended to use the separate power supply for the HART instruments and the GT200-HT-EI, to ensure stable communication.
2. To improve the communication efficiency of the field bus, it is recommended not to configure empty nodes or useless commands in the SST-HI-CFG.
3. HART devices are classified into two-wire system and four-wire system. Two-wire system means that HART devices have only two wires both for communication and power supply, and four-wire system means that the power supply and communication lines of HART devices are separated.
4. If there are two or more HART instruments connected in the same network, their HART LOOP wires should be connected parallel with each other.
5. When using Multi-Drop mode, the HART instruments should be configured to Fixed Current mode at 4mA.
6. When connecting more than 13 HART instruments, disable the internal resistor and use an external resistor (250 Ohm /3 W). See [Chapter 2.5](#).

2.7.1 Point-to-Point Wiring

The following are the topologies for two wire and four wire point-to-point wiring.



When using the internal resistor

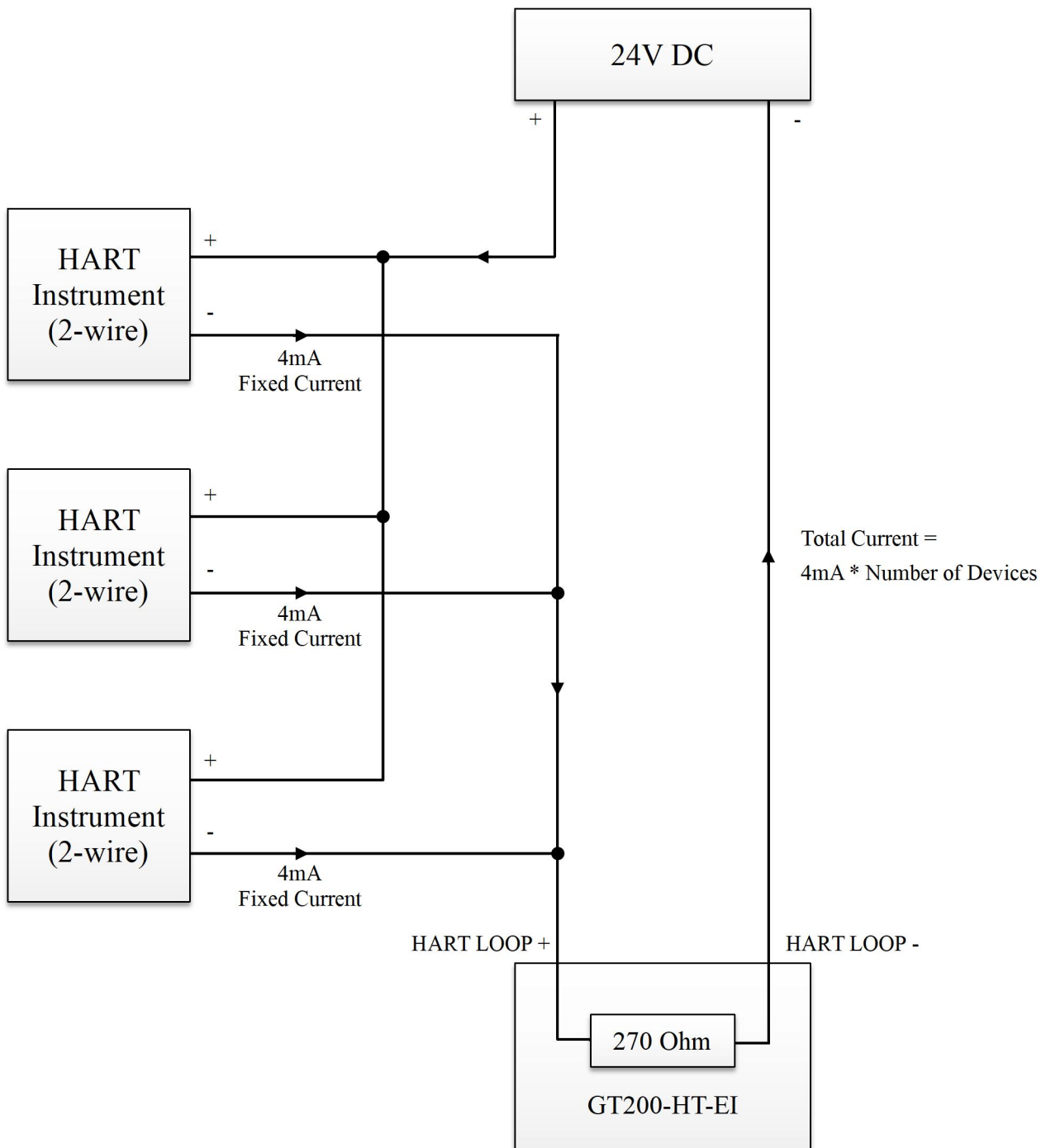


Options when using an external resistor

2.7.2 Multi-Drop Wiring

The following are the topologies for two wire and four wire multi-drop wiring.

Two wire:

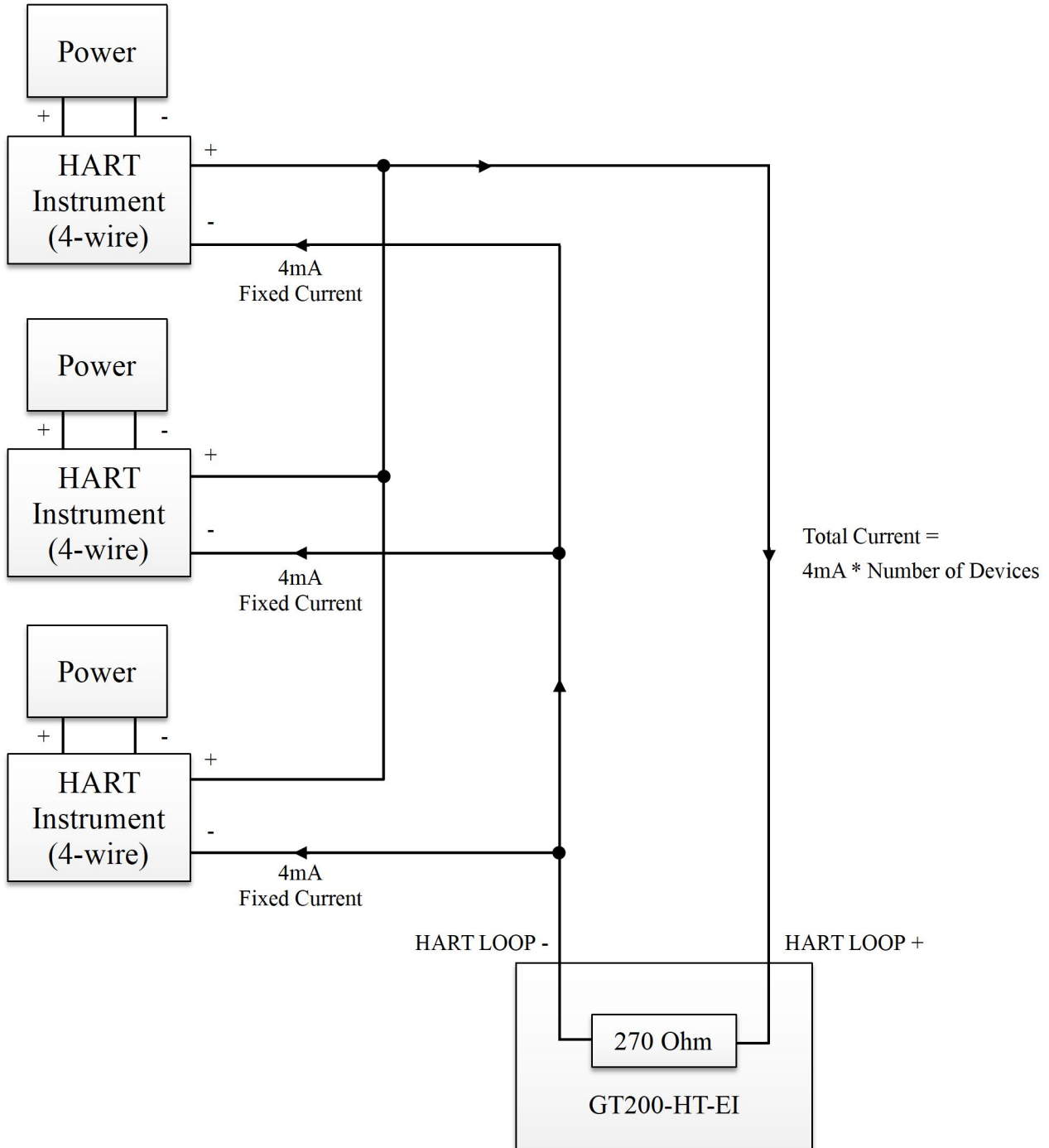


Maximum Cable Length: 450m for 15 Devices



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Four wire:



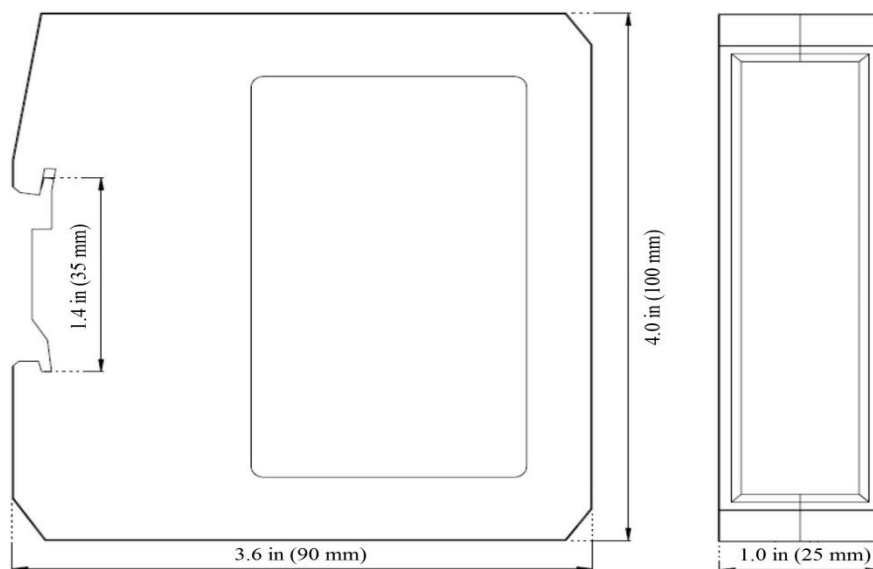
Maximum Cable Length: 450m for 15 Devices

3 Hardware Installation

3.1 Mechanical Dimensions

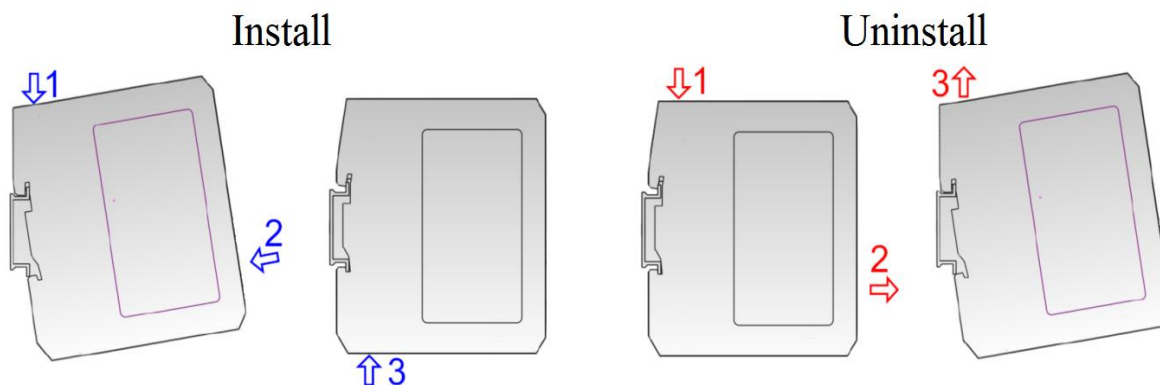
Size (width * height * depth):

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



3.2 Installation Method

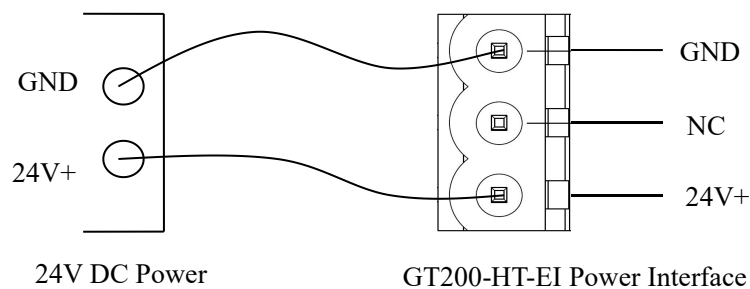
Using 1.4 in (35mm) DIN RAIL.



4 Quick Start Guide

4.1 Hardware Connection

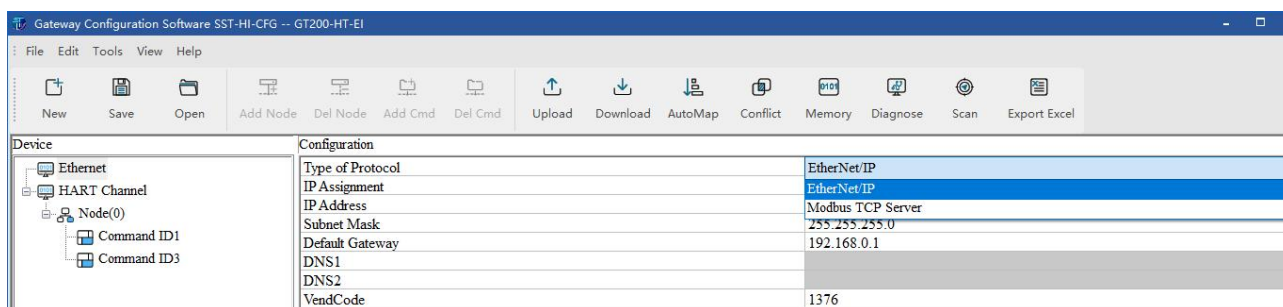
1. Make sure the GT200-HT-RS is in the appropriate operating mode that allows for configuration. Set the gateway to Configuration Mode by settings the DIP switches to 1-OFF, 2-ON while the gateway is powered off.
2. Connect the Ethernet port of the gateway to the network port of the computer with a network cable. Refer to the topology displayed in [Chapter 2.6.2](#).
3. Connect the HART instruments to the GT200-HT-RS. Refer to the wiring diagrams shown in [Chapter 2.7](#).
4. Connect the power supply to the gateway as shown in the figure below.



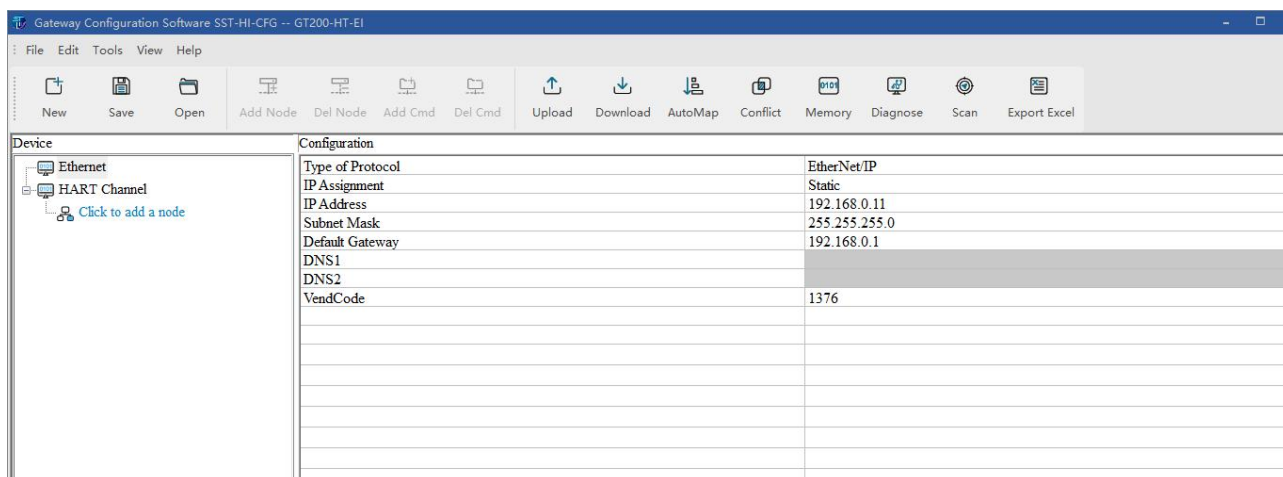
5. Power on the gateway, the gateway will be in Configuration Mode at this time. The IP of the gateway will be fixed to 192.168.0.11, and the IP of the connected computer should be set to a static IP within the 192.168.0.X subnet. Double-click the installed software icon SST-HI-CFG to start the configuration of the gateway.
6. After the gateway has been configured, power off the gateway and set the gateway to Run Mode by setting the DIP switches to 1-OFF, 2-OFF, then power on the gateway.

4.2 Software Configuration

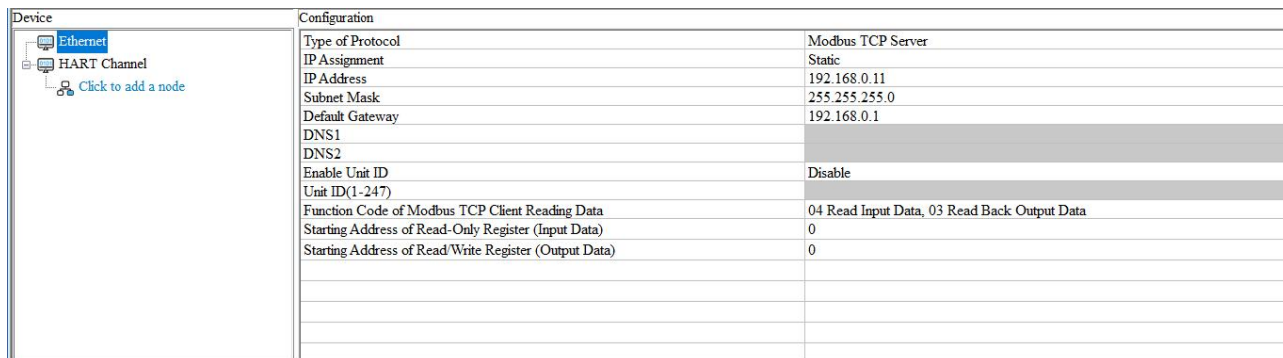
1. Open the SST-HI-CFG software installed in your computer. Click "Ethernet" in the tree view on the left, and the configuration table appears on the right as shown in the figure below, select the Ethernet protocol according to the actual needs.



2. Select "Ethernet" on the left, and set the Ethernet parameters. When EtherNet/IP is selected as the Ethernet protocol, the relevant parameters are configured as follows:



When Modbus TCP Server is selected as the Ethernet protocol, the relevant parameters are configured as follows:

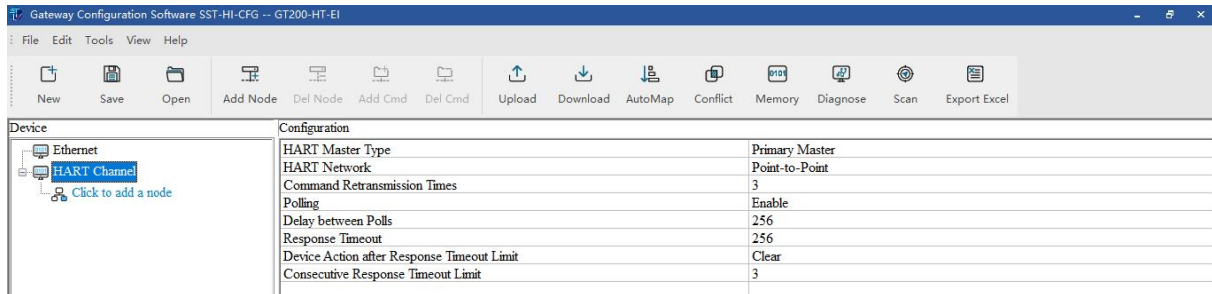


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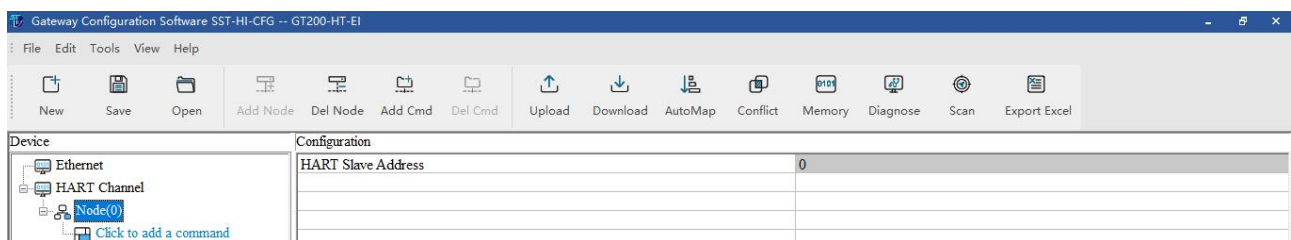
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3. Select "HART Channel" on the left and set the HART channel parameters. As shown below, the GT200-HT-EI is configured as the primary master and using the point-to-point mode.

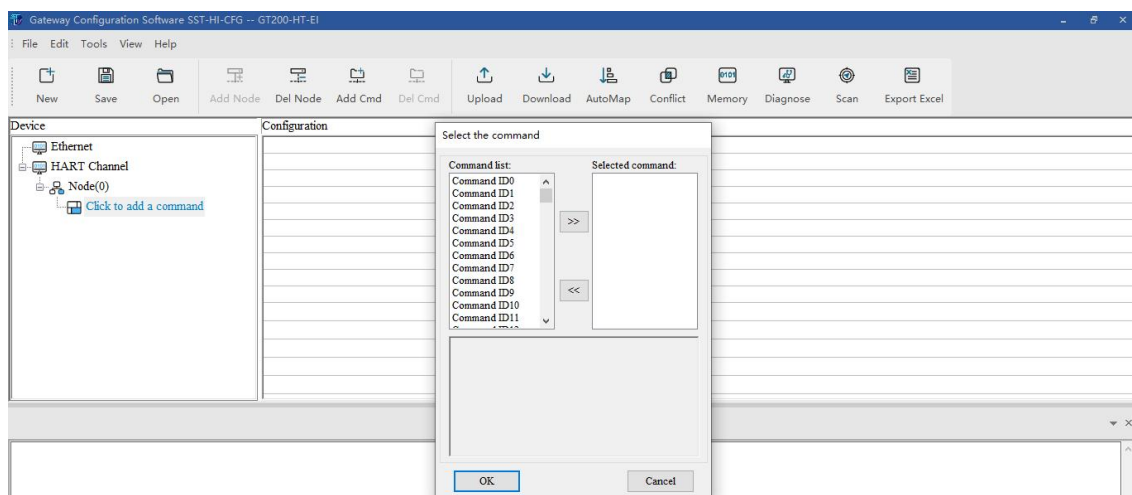


Note: The HART protocol specifies that devices with slave address 0 work in point-to-point mode, when HART signals and 4-20mA are allowed to exist at the same time. Devices with slave addresses from 1 to 63 work in multi-drop mode, when the analog output of the device is the minimum value (such as 4mA), and only HART signal communication is allowed. The protocol also specifies that the factory address of the field device is configured to 0 by default.

4. You can either click "Click to add a node", select "HART Channel" and click "Add Node" on the toolbar, or right-click "HART Channel" and click "Add Node" to add a node to the HART channel.



5. You can either click "Click to add a command", select "Node (0)" and click "Click to add a command" in the toolbar, or right-click "Node (0)" and click "Add command" to add a command in the corresponding node. In the pop-up dialog box, add command ID1 by double-clicking or selecting and clicking ">>", and click OK".



6. Click "Command ID1". The configuration of the HART commands (Basic and Advanced) are shown below:

Bytes 1-4 (primary variable) are selected at the mapping address, and the received data can be selected for register exchange.

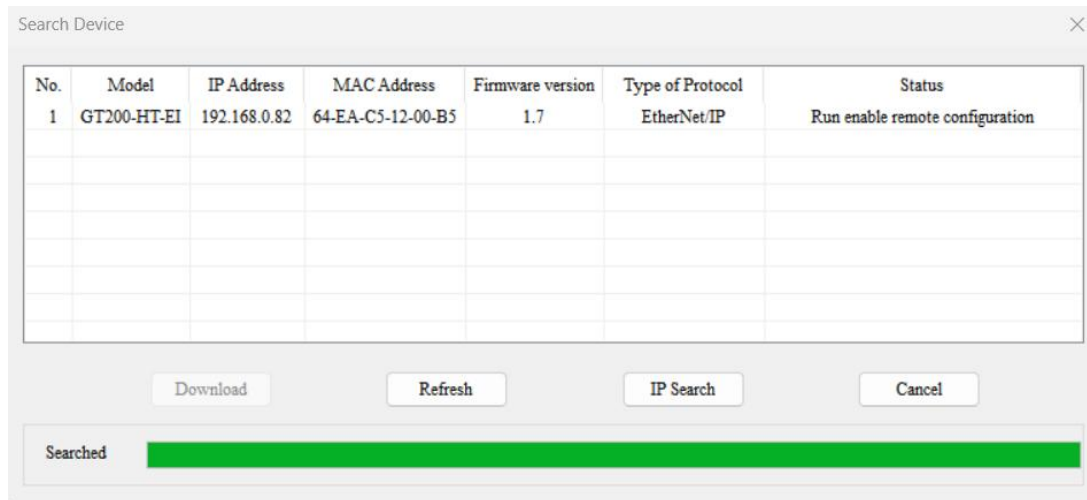


GT200-HT-EI

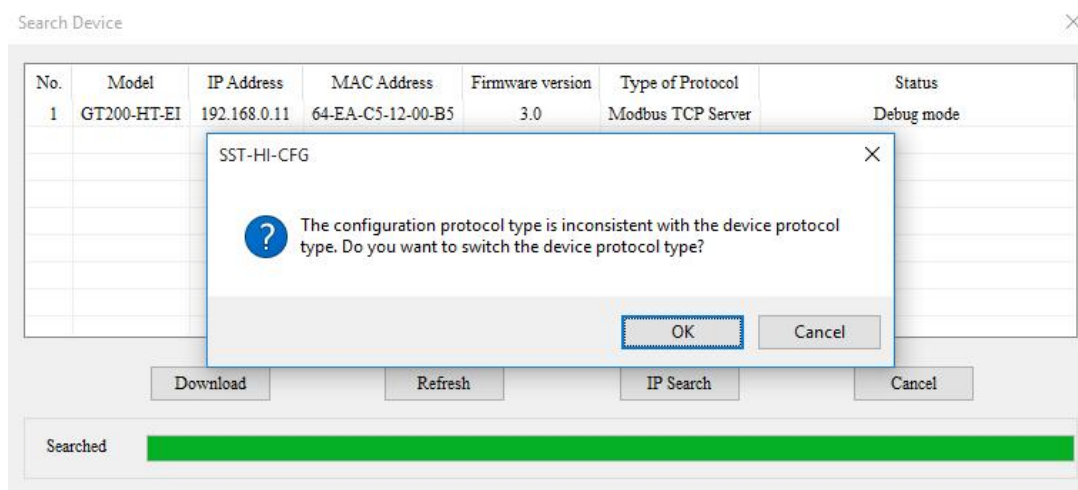
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7. Click on the icon , select the gateway in the pop-up dialog box and click on "Download", then click on "Download Configuration".



If the Ethernet protocol in the configuration is inconsistent with the Ethernet side protocol in the gateway, the download will remind as below. After clicking OK, the device will switch the Ethernet side protocol to match the configuration and reboot, please wait for the device to reboot and click Scan again to download the configuration.



4.3 Common HART Commands

The following is a short list of useful HART commands that can be used for common applications of most HART devices. More information about supported commands is available from FieldComm Group at the following link:

<https://library.fieldcommgroup.org/20127/TS20127/7.2/>

Note: The front two bytes of the actual response data is the status info of the device. The data after that two bytes is the device response data.

Command		Data in Command		Data in Reply			
#	Function	Byte	Data	Type	Byte	Data	Type
1	Read primary variable		None		0	PV units code	Enum-8
					1-4	Primary variable	Float
3	Read current and four (predefined) dynamic variables		None		0-3	Current (mA)	Float
					4	PV units code	Enum-8
					5-8	Primary variable	Float
					9	SV units code	Enum-8
					10-13	Secondary variable	Float
					14	TV units code	Enum-8
					15-18	Tertiary variable	Float
					19	QV units code	Enum-8
					20-23	Quaternary variable	Float
6	Write polling address	0	Polling address	Unsigned-8	0	Polling address	Unsigned-8
		1	Loop current mode	Enum-8	1	Loop current mode	Enum-8

Command 1 (Command ID1): Read Primary Variable

Returns the primary variable value in float data type.

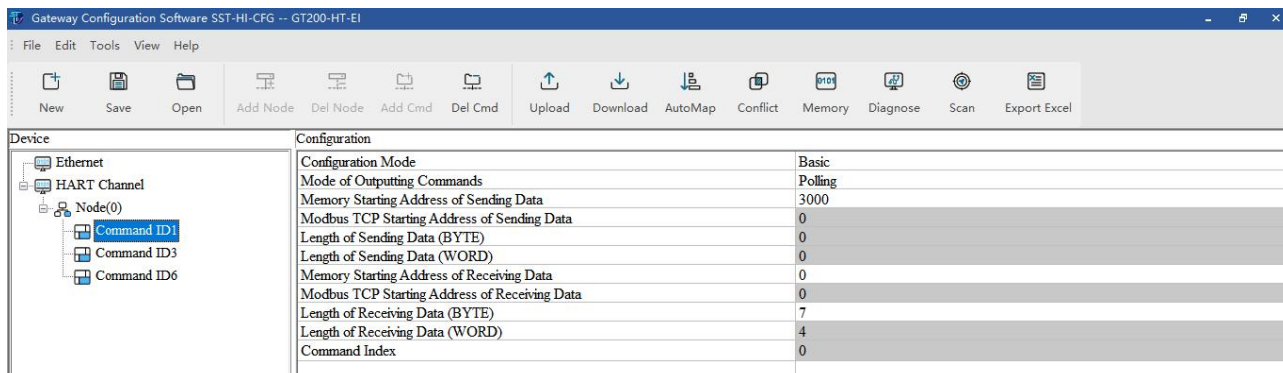
Request: None

Response:

Byte	Description
Byte 0	Primary Variable Units
Byte 1-4	Primary Variable

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An example of this command in the SST configuration software is shown below:



As the request is “None”, the user should fill “0” for the section “Length of Sending Data (BYTE)”.

The “Length of Receiving Data (BYTE)” will be 7, which is the sum of 2 status bytes and 5 device response bytes.

Command 3 (Command ID 3): Read Dynamic Variable and Primary Variable Current

Reads the primary variable current and four (at most) pre-defined dynamic variables. The primary variable current always matches the AO output current of the device. A second, third and fourth variable is defined for each device type, E.g. The second variable can be the sensor temperature, etc.

Request: None

Response:

Byte	Description
Byte 0-3	Primary Variable Loop Current (units of milli-amperes)
Byte 4	Primary Variable Units Code
Byte 5-8	Primary Variable
Byte 9	Secondary Variable Units Code
Byte 10-13	Secondary Variable
Byte 14	Tertiary Variable Units Code
Byte 15-18	Tertiary Variable
Byte 19	Quaternary Variable Units Code
Byte 20-23	Quaternary Variable

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An example of this command in the SST configuration software is shown below:

Device	Configuration
Ethernet	Configuration Mode
HART Channel	Mode of Outputting Commands
Node(0)	Memory Starting Address of Sending Data
Command ID1	Modbus TCP Starting Address of Sending Data
Command ID3	Length of Sending Data (BYTE)
Command ID6	Length of Sending Data (WORD)
	Memory Starting Address of Receiving Data
	Modbus TCP Starting Address of Receiving Data
	Length of Receiving Data (BYTE)
	Length of Receiving Data (WORD)
	Command Index

As the request is “None”, the user should fill “0” for the section “Length of Sending Data (BYTE)”.

The “Length of Receiving Data (BYTE)” will be 26, which is the sum of 2 status bytes and 24 device response bytes.

If the user does not need to map all the variables to the Modbus TCP registers, please follow the guide below. Switch to the “Advanced Configuration Mode”, click the “Configuration” button, and only select the variable(s) needed. In this example, only the “Primary Variable” and the “Secondary Variable” are selected. For more details on Advanced Configuration Mode, please refer to [chapter 5.2.2.7](#).

Ethernet	Configuration Mode	Basic
HART Channel	Mode of Outputting Commands	Basic
Node(0)	Memory Starting Address of Sending Data	Advanced
Command ID1	EtherNet/IP Starting Address of Sending Data	3000
Command ID3	Length of Sending Data (BYTE)	0
Command ID6	Length of Sending Data (WORD)	0
	Memory Starting Address of Receiving Data	0
	EtherNet/IP Starting Address of Receiving Data	0
	Length of Receiving Data (BYTE)	26
	Length of Receiving Data (WORD)	13
	Command Index	1

Advanced Configuration				Response data
Mapping address				Command Status
Bytes	Memory Address	EtherNet/IP Start Address	Byte Swap	Byte0-3
5-8	0	0	No Swap	Byte4
10-13	0	0	No Swap	Byte9
				Byte14
				Byte15-18
				Byte19
				Byte20-23
Primary Variable				

Note: Selected variables are listed in the left table. Variables corresponding to the bytes are listed in the beginning of this chapter.

Command 6 (Command ID6): Write Polling Address

Writes the polling address (HART slave address) to the field device.

Request:

Byte	Description
Byte 0	Polling Address (Between 0-63)
Byte 1 (Only on supported HART devices)	Loop Current Mode (0=Disabled, 1=Enabled)

Response:

Byte	Description
Byte 0	Polling Address (Between 0-63)
Byte 1 (Only on supported HART devices)	Loop Current Mode (0=Disabled, 1=Enabled)

Note: Some HART devices do not support configuring the Loop Current Mode. These devices will only expect to receive Byte 0 of the request.

An example of this command in the SST configuration software is shown below:

Device	Configuration
Ethernet	Configuration Mode
HART Channel	Mode of Outputting Commands
Node(0)	Memory Starting Address of Sending Data
Command ID1	Modbus TCP Starting Address of Sending Data
Command ID3	Length of Sending Data (BYTE)
Command ID6	Length of Sending Data (WORD)
	Memory Starting Address of Receiving Data
	Modbus TCP Starting Address of Receiving Data
	Length of Receiving Data (BYTE)
	Length of Receiving Data (WORD)
	Command Index

If the HART device does not support configuring the Loop Current Mode, the user should fill “1” for the section “Length of Sending Data (BYTE)”.

The “Length of Receiving Data (BYTE)” will be 3, which is the sum of 2 status bytes and 1 device response bytes.

If the HART device does support configuring the Loop Current Mode, the user should fill “2” for the section “Length of Sending Data (BYTE)”.

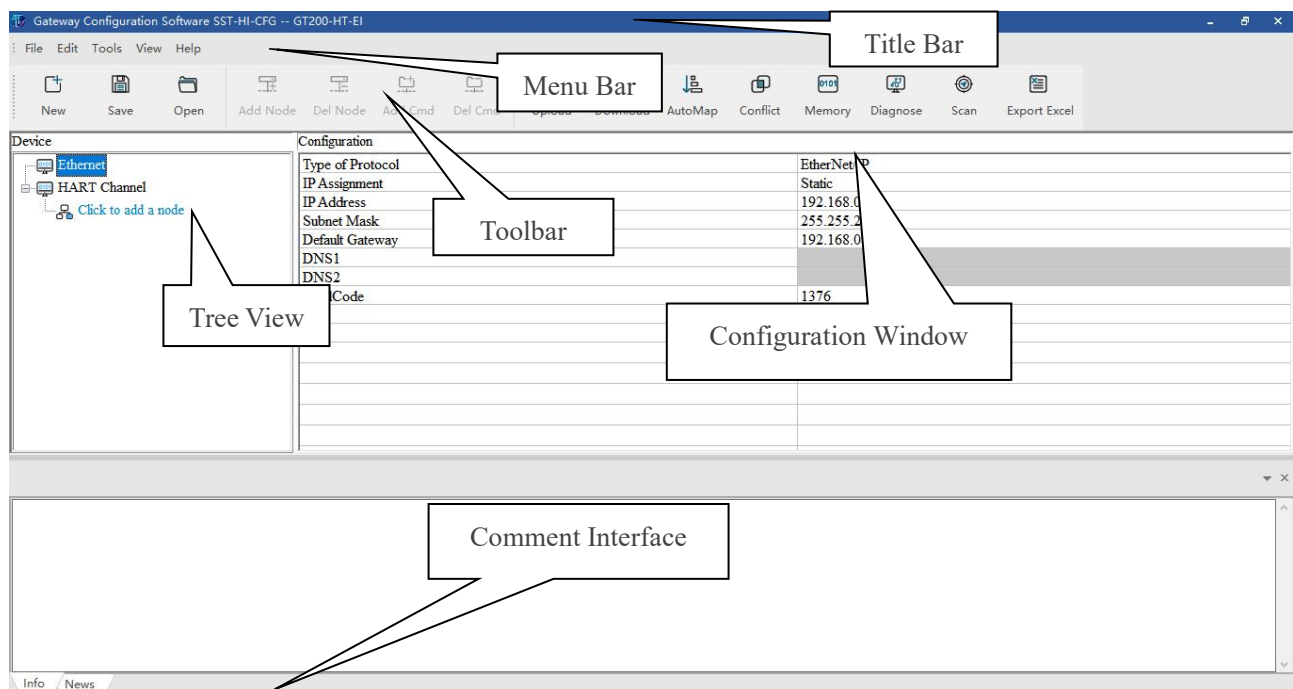
The “Length of Receiving Data (BYTE)” will be 4, which is the sum of 2 status bytes and 2 device response bytes.

5 Software Instructions

5.1 Main Interface

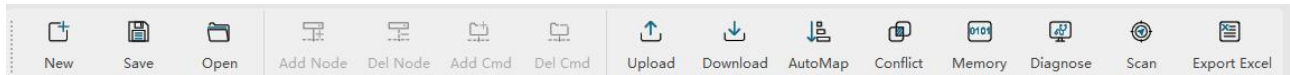
The software interface includes: Title Bar, Menu Bar, Toolbar, Configuration Window and Tree View.

Note: The gray parameters cannot be changed.



5.2 Toolbar

The toolbar is shown as below:

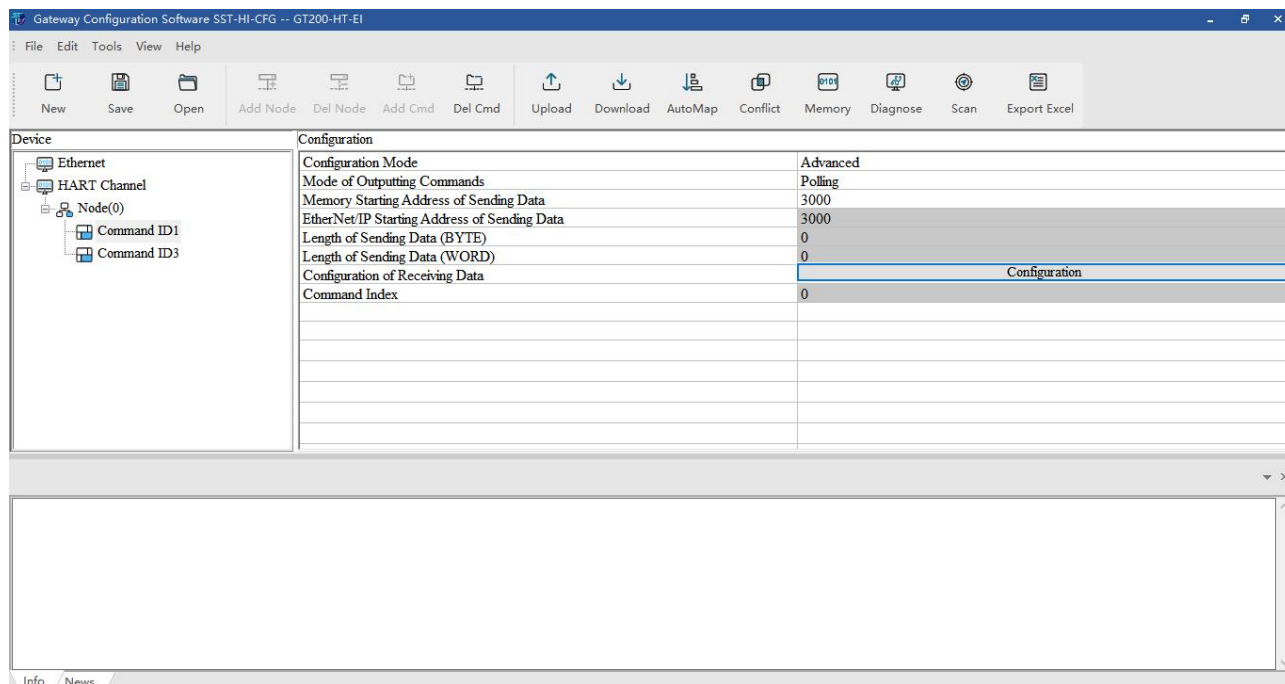


The toolbar provides icon shortcuts to major functions.

	New: Create a new configuration project.
	Save: Save the current configuration.
	Open: Open a configuration project.
	Add Node: Add a HART node.
	Delete Node: Delete a HART node.
	Add Command: Add a HART command.
	Delete Command: Delete a HART command.
	Upload: Upload the configuration from the gateway.
	Download: Download the configuration to the gateway.
	Auto Map: Automatically calculate the mapped data address of each command.
	Conflict: Check the mapping address in the Conflict Detection window.
	Memory: Show the data exchange inside of the gateway.
	Diagnose: This function analyzes the operating condition of fieldbus devices.
	Slave Scan: This function can scan and calculate how many slave devices and relevant slave addresses the HART master is connecting with. This also supports changing slave addresses.
	Export Excel: Export current configuration as a table and save it as *.xls file.

5.3 Comments Interface

The comments interface displays the explanation of the corresponding configuration item. For example, when selecting "Mode of Outputting Commands", the comments interface is as below:

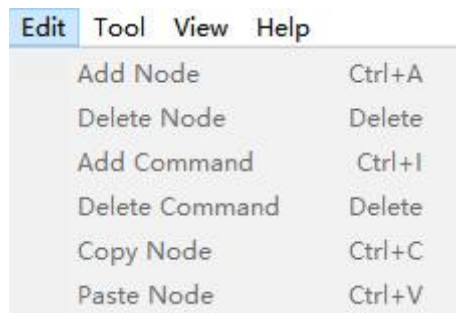


5.4 Tree View Operations

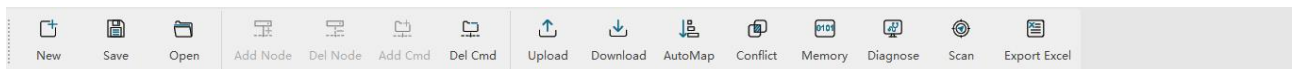
5.4.1 Edit the Items in the Left Tree View

Users can edit the items in the left tree view three different ways:

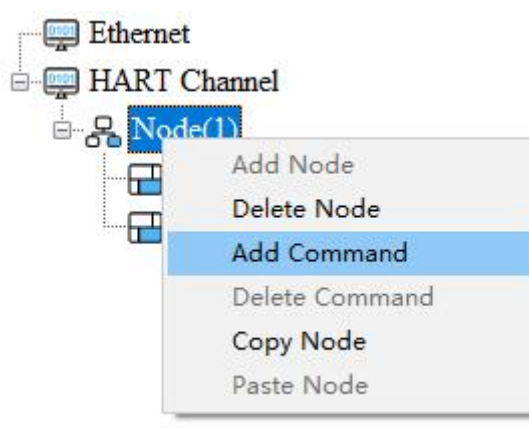
1. Edit with the commands in the menu.



2. Edit with the icon in the toolbar. Please see "[Toolbar](#)" chapter for details.



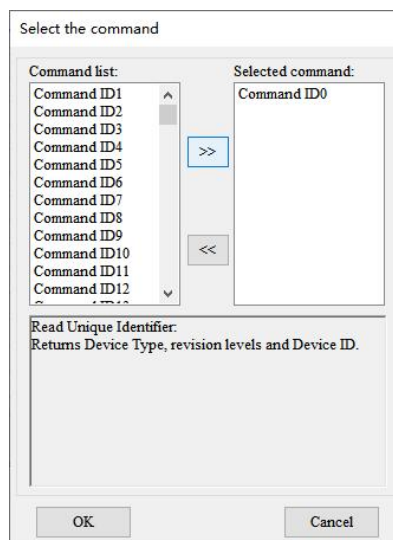
3. Right click on the item.



5.4.2 HART Node and Command Operations

Users can edit HART nodes and commands by three operation ways in the "[Tree View Operations](#)" chapter.

1. Add node: Select the "HART Channel" and add a new node. A new node named "Node-X" will be added under the HART Channel. The maximum number of nodes is 63 (Multi-drop).
2. Delete node: When deleting a node, all commands under the node will be deleted.
3. Add command: Select a node and add a command. The pop-up window shows the HART command list. Double click on the command and Selected command, click OK the new command will be added under the node.



Note: The same command can only be configured once in one node.

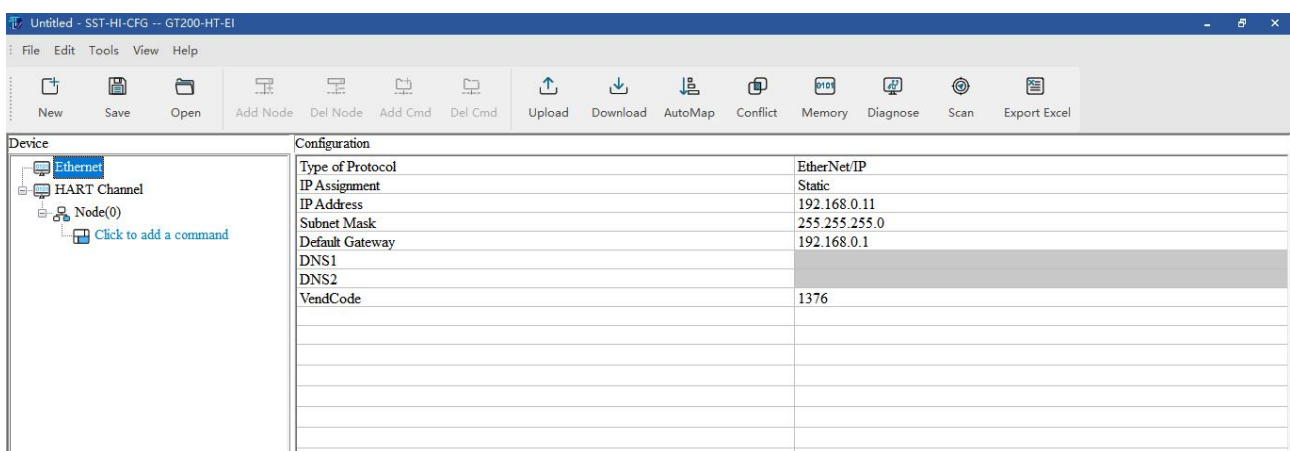
4. Delete command: Select a command and then delete it.
5. Copy node: Select an existing node and copy the node. The commands under the node will be copied at the same time.
6. Paste node: Select the HART Channel or an existing node and paste the node. The pasted node has the same parameters with the copied node.

5.5 The Operation of Configuration Interface

5.5.1 Ethernet Configuration

5.5.1.1 EtherNet/IP

Click the Ethernet in the equipment view interface, this will display the configuration view interface as follows:



IP Assignment: Static, DHCP

IP Address: Set the IP address of the device.

Subnet Mask: Set the subnet mask of GT200-HT-EI.

Default Gateway: Set the gateway address of the device.

DNS1/ DNS2: Reserved.

VendCode: VendCode can be modified according to requirements. The input range is from 1 to 65535. Default value: 1376.

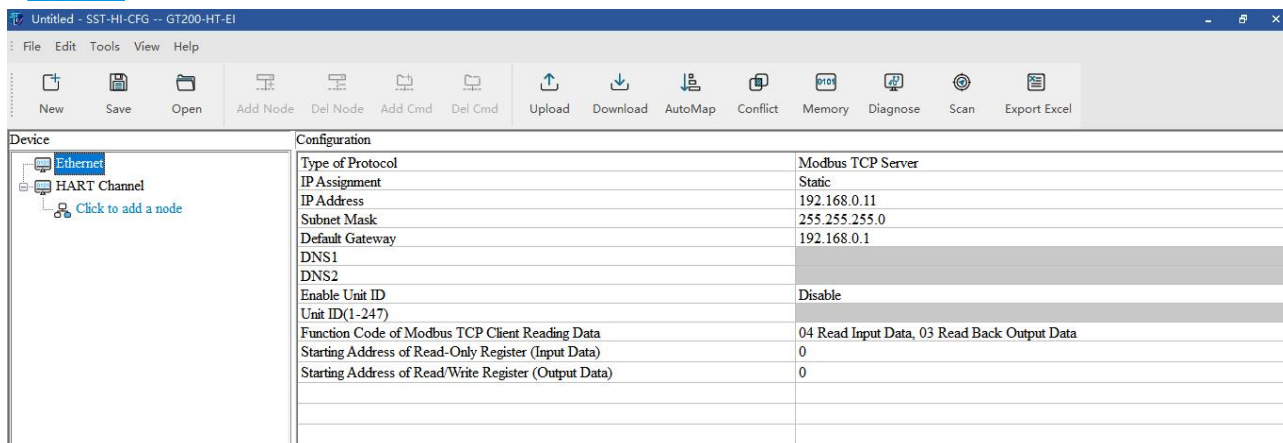
5.5.1.2 Modbus TCP Server

Click the Ethernet in the equipment view interface, this will display the configuration view interface as follows:

GT200-HT-EI

HART/EtherNet Gateway

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IP Assignment: Static, DHCP

IP Address: Set the IP address of the device.

Subnet Mask: Set the subnet mask of GT200-HT-EI.

Default Gateway: Set the gateway address of the device.

DNS1/ DNS2: Reserved.

Enable Unit ID: Enable Or Disable are the 2 available options.

Enable: As a Modbus TCP server device, the gateway can manually set the value of its server ID address.

Disable: The server ID address value of the gateway as a Modbus TCP server device is arbitrary and can be adaptive to the Modbus TCP Client.

Function Code of Modbus TCP Client Reading Data:

Modbus TCP Client equipment can choose to use 04 or 03 function code to read the HART device data (input data) collected through the gateway.

It can also read back the data output to HART (output data).

Starting Address of Read-Only Register (Input Data):

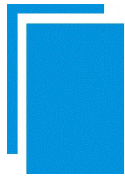
The gateway is used as Modbus TCP server to support the client to read the starting address of the input data using the 04/03 function code.

It is necessary to fill in the protocol address (base 0) format here, and displayed in decimal. Range 0-64736.

For example:

04 function code: The PLC address format is 30001, then you need to fill in it as the protocol address format 0.

03 function code: The PLC address format is 40001, then you need to fill in it as the protocol address format 0.



Starting Address of Read/Write Register (Output Data):

The gateway is used as Modbus TCP server to support the client to write the starting address of the input data using the 06/16 function code. Using the 03/04 function code to read the starting address of the output data.

It is necessary to fill in the protocol address (base 0) format here, and the decimal number is displayed. Range : 0-65036.

For example:

04 function code: The PLC address format is 30001, then you need to fill in it as the protocol address format 0.

03 function code: The PLC address format is 40001, then you need to fill in it as the protocol address format 0.

5.5.2.1 HART Channel Configuration View

Consecutive Response Timeout Limit: This parameter specifies the number of consecutive response timeouts

GT200-HT-EI

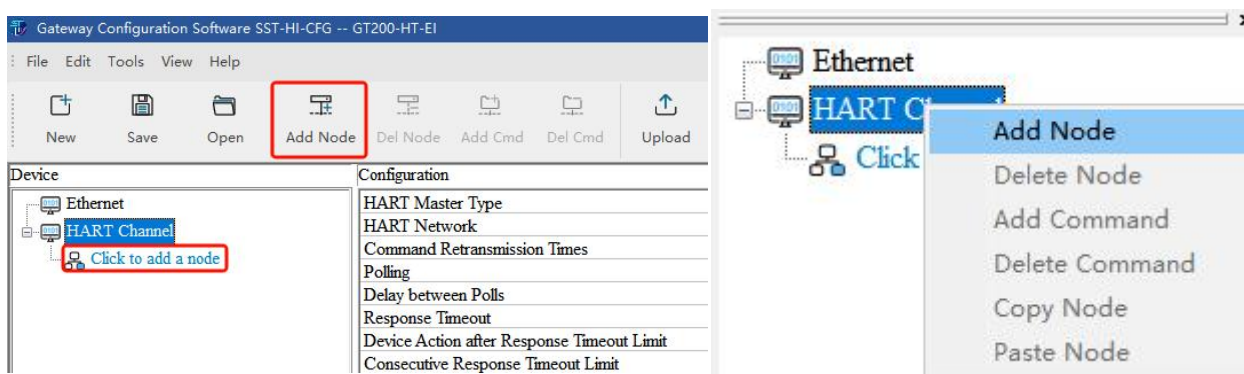
HART/EtherNet Gateway

User Manual

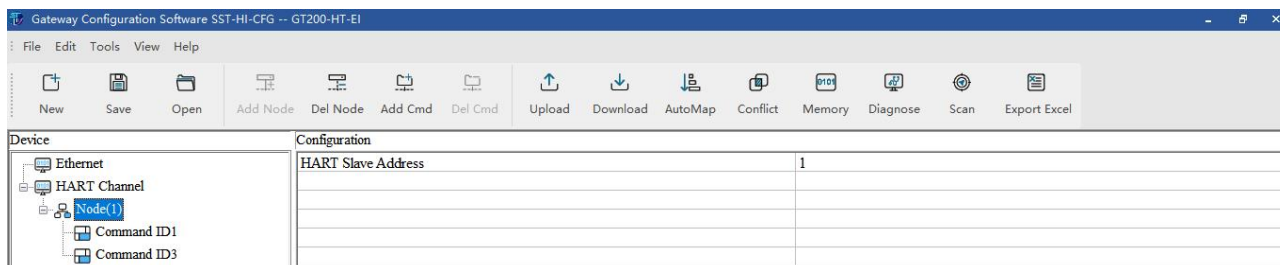
required before clearing the HART input data buffer. It is effective when the value of the "Device Action after Response Timeout Limit" parameter is set to "Clear". Range: 1-14.

5.5.2.2 Node Configuration

Choose to click "Click to add a node" or select "HART Channel" and click "Add Node" in the toolbar, or right-click "HART Channel" and click "Add Node" to add nodes in the HART channel.



In the HART Channel, after adding a node, select the node:

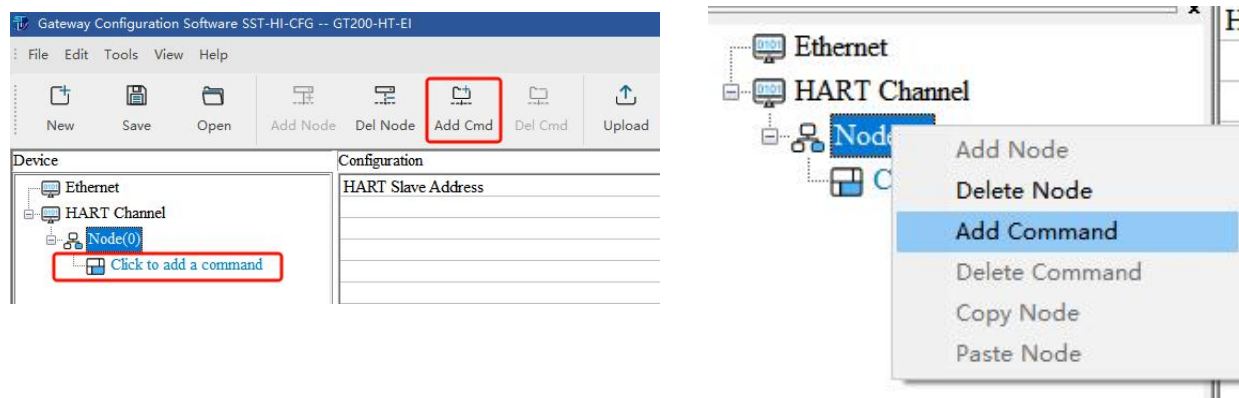


HART Slave Address: "Point-to-Point" mode: The slave address can only be 0.

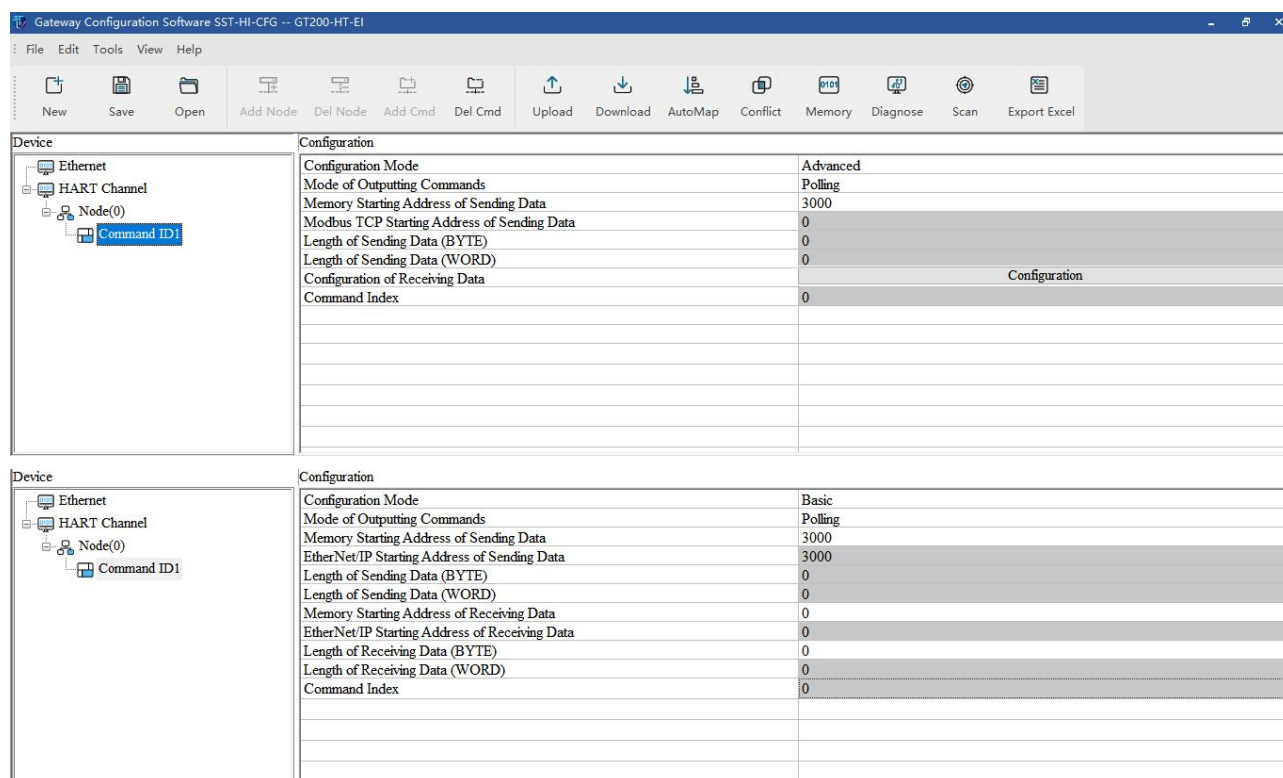
"Multi-drop" mode: The slave address can be 1 to 63.

5.5.2.3 Command Configuration

Choose to click "Click to add a node" or select "HART Channel" and click "Add Node" in the toolbar, or right-click "HART Channel" and click "Add Node" to add nodes in the HART channel.



After adding commands under a node, select the command:



Configuration Mode: Basic and Advanced (2 available options).

Mode of Outputting Commands: Mode of Outputting Command:

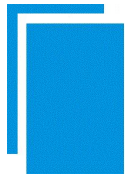
Polling: Send the command periodically.

Change of State: Send the command when the data in the output data buffer changes.

Initialization: Send the command only when power on.

Disable: The command will not be sent.

Memory Starting Address of Sending Data: Set the memory starting address of output data by this command.



the range is 3000-4499.

EtherNet/IP/Modbus TCP Starting Address of Sending Data: The starting address of the EtherNet/IP/Modbus TCP master station to send data: 3000-3255.

Length of Sending Data (BYTE): Used to set the length of output data by this command.

Length of Sending Data (WORD): The property is automatically calculated by the gateway, used for user checking output data length, 1 word=2 byte.

Memory Starting Address of Receiving Data: Set the memory address of input data by this command. The response data only includes data area of the HART frame.

EtherNet/IP/Modbus TCP Starting Address of Receiving Data: The property is automatically calculated by the gateway, used for register addressing.

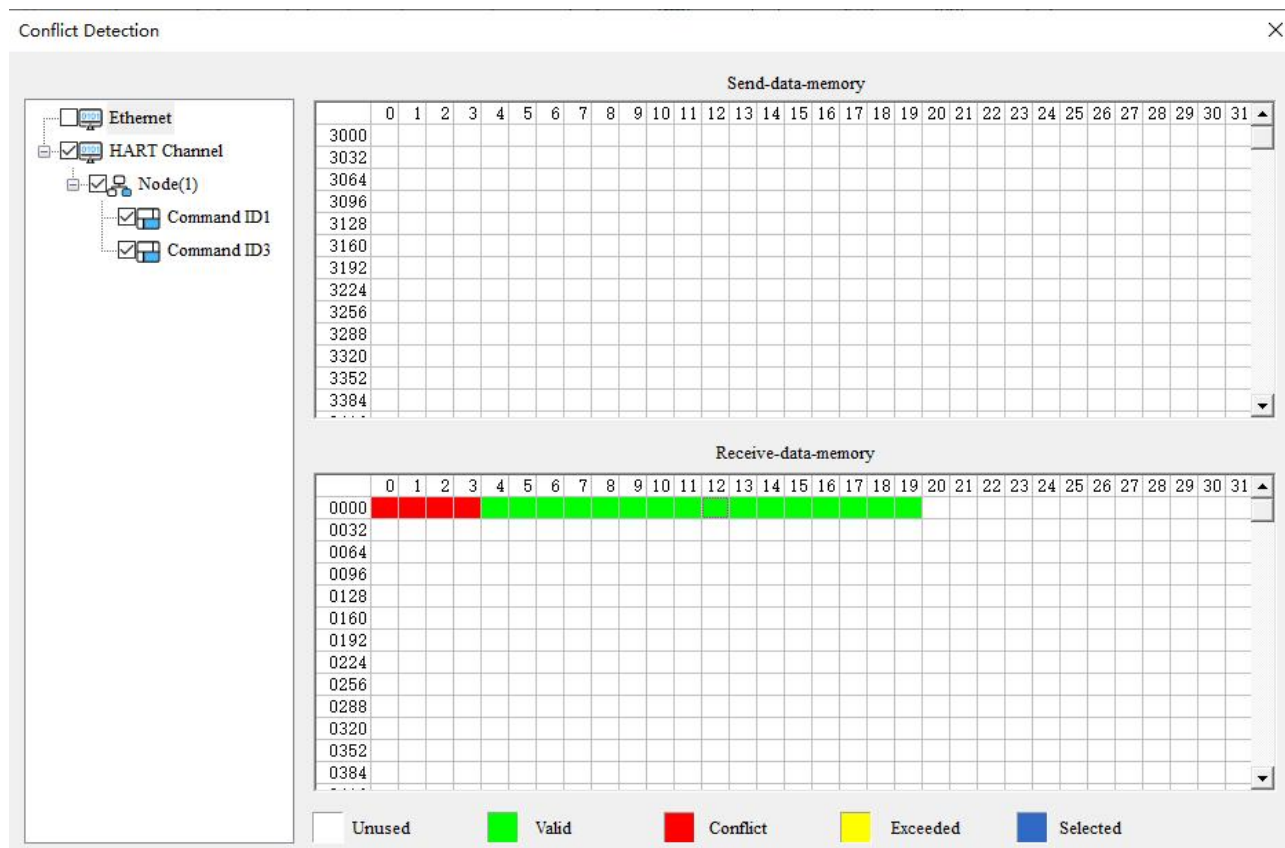
Length of Receiving Data (BYTE): Set the length of input data by this command.

Length of Receiving Data (WORD): The property is automatically calculated by the gateway, used for user checking output data length conveniently, 1 word=2 byte.

Command index: The property is automatically calculated by the configuration software, it indicates the index in the configured command list this command belongs to.

5.5.3 Conflict Detection

The data is stored in the gateway's buffer. To check if there are conflicts in the data mapping address, open the conflict detection window by clicking the "Conflict" icon.



Each grid represents one byte address.

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

Yellow: Write command: When the address mapping area is located in the input area, it will be in yellow without conflict.

Blue: When the address mapping area is located in the output area, it will be in blue without conflict.

Red: In the input area or output area, when different commands occupy the same byte, this byte area will be in red.

5.5.4 Show Memory Data

The Memory function in SST-HT-CFG can show the data exchange inside of the gateway. Users can use this function to debug the HART fieldbus without needing an EtherNet/IP or Modbus TCP device. The operating steps are as follows:

- 1) Ensure that the GT200-HT-EI's function bit of configuration switch is in the ON state and the mode bit of configuration switch is in the OFF state, restart the gateway. Then the GT200-HT-EI is in the debug mode.
- 2) Use a network line to connect the GT200-HT-EI's RJ-45 port and a computer.
- 3) Open the show memory data window by clicking the "Memory" icon.

Memory data
✕

Input data

Addr	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
0000	BF	F5	44	69	BF	F5	44	69	FF	FF	41	A7	00	1C	42	C8
0016	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0032	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0048	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0064																

Save
Stop

Output data

Addr	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
3000	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
3016	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
3032	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
3048	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
3064																

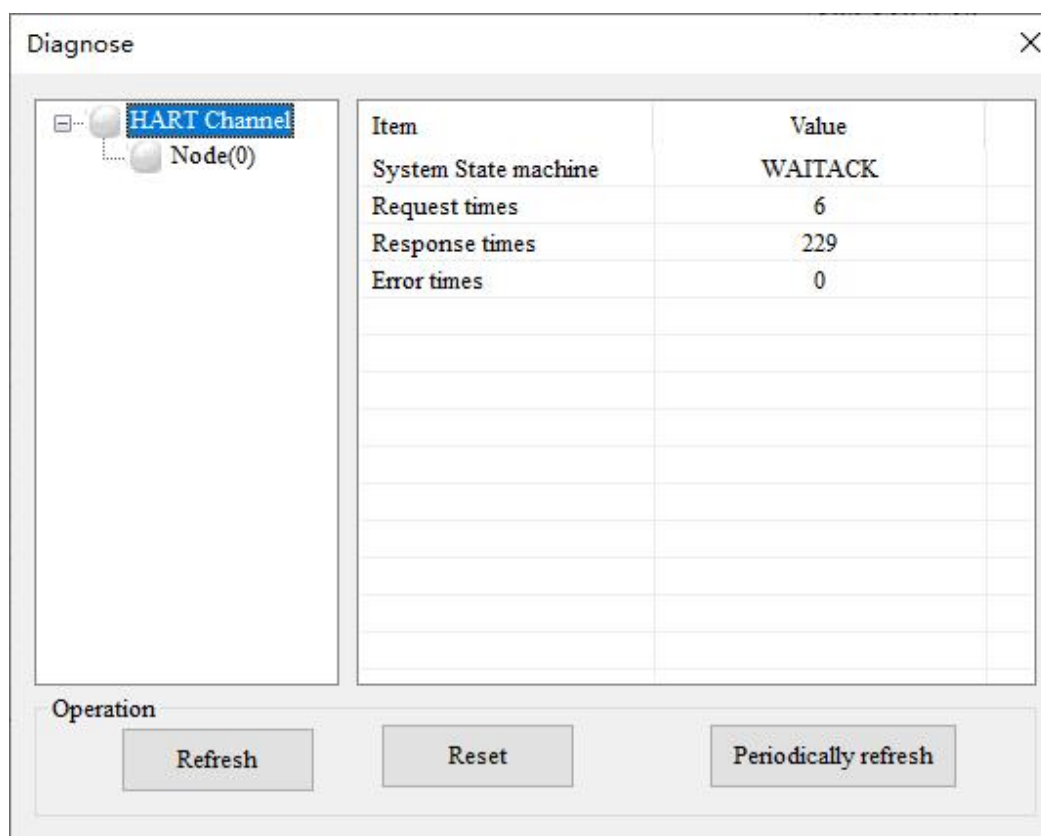
Save
Load
Send
Stop

5.5.5 Diagnose

Through this function, users will know which device is not communicating. The execution condition of configured commands, data transmission of the gateway and the displays of certain command's operating. Steps are as follows:

- 1) Ensure that the GT200-HT-EI's function bit of configuration switch is in the ON state and the mode bit of configuration switch is in the OFF state, restart the gateway. GT200-HT-EI is in the debug mode.
- 2) Use a network line to connect the GT200-HT-EI's RJ-45 port and a computer.
- 3) Open the Diagnose window by clicking the "Diagnose" icon.

Click on the "HART Channel" in this interface, it will show the status of the HART fieldbus part on the right. Press the "Refresh" button, this will update the data once. Click on "Periodically refresh", to have the software update the data every 500ms.



GT200-HT-EI

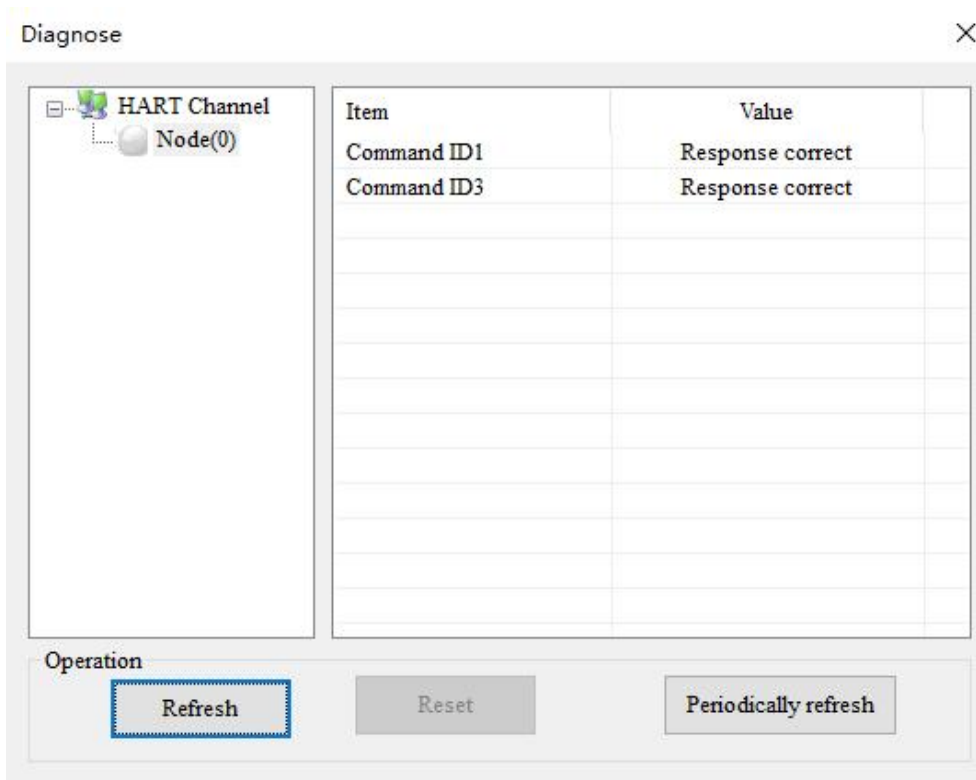
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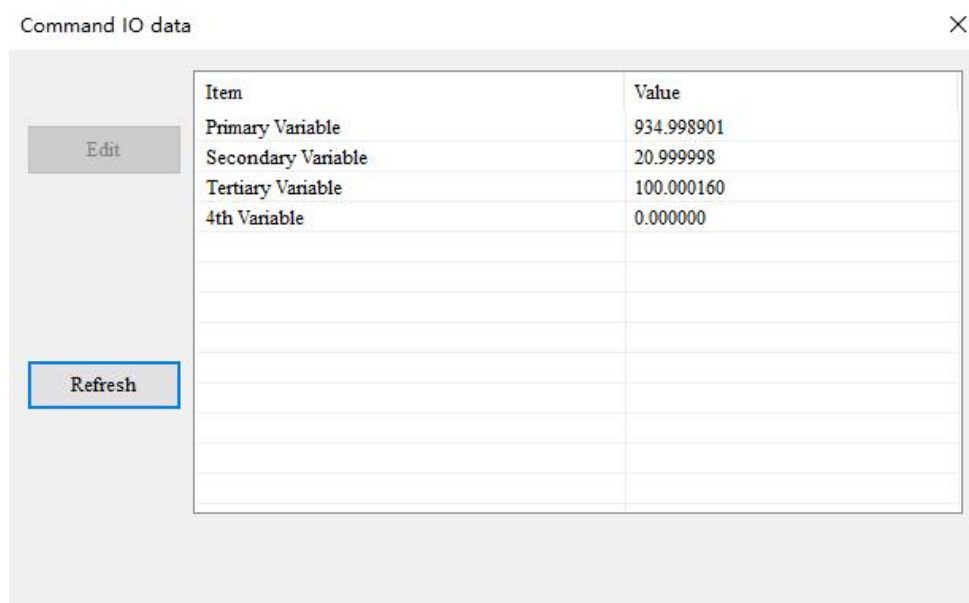
Click Node (x), it is shown as below:

It shows the response status of the configured commands.

Click "Refresh" this will refresh these command status, "Periodically refresh" will refresh the command status once.



Double clicking the commands will show their command information, command ID03 can start data input.



5.5.6 Scan

The slave scan function can help users to check the HART slave address and modify the slave address. Steps are as follows:

- 1) Set the configuration DIP switch on the GT200-HT-EI to 1-ON 2-OFF, which will set the gateway into debug mode.
- 2) Use a network cable to connect the GT200-HT-EI to a computer.
- 3) Open the slave scan window by clicking the "Scan" icon.

Slave Scan

Scan range: 0 to 63

Slave Address	Long Address	Company ID
63	45-C7-00-59-05	69

Attention: When scanning for slave devices, please ensure that only one master is connected to the network.

The scan is complete!

Stop

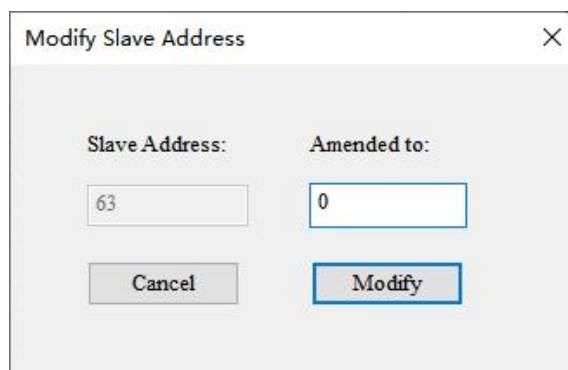
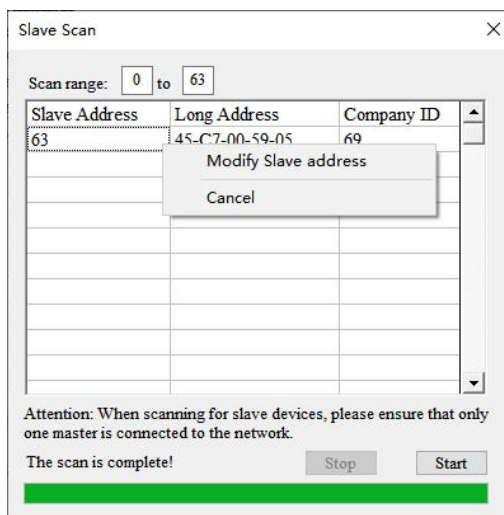
Start

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Click "Start" in "Slave Scan" interface, it will show the short address, long address and ID of HART slave devices which are connected to the gateway.

Move to the relevant device and right click it, and click "Modify Slave Address" will show the "Modify slave address" interface, input the address you want to change in the "Modified to" text.



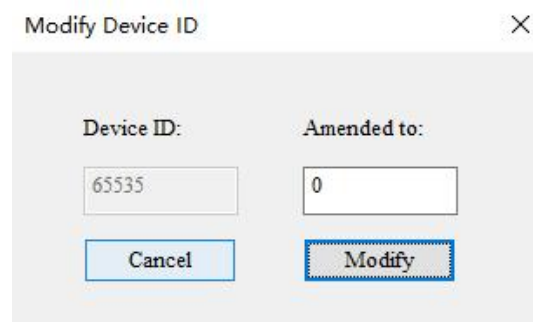
After modification, the HART slave address has been modified, the gateway must be restarted.



5.5.7 Modify Device ID

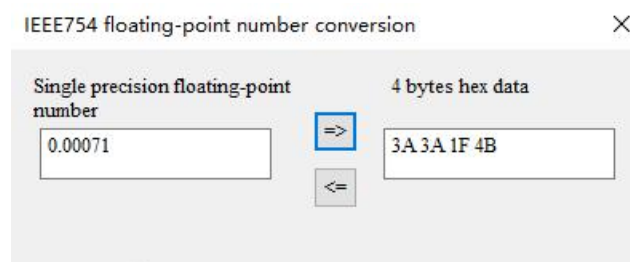
The modify device ID function can help users to check the Device ID, let the user know the currently selected GT200-HT-EI device ID value, and can modify the value. Steps are as follows:

- 1) Turn the GT200-HT-EI configuration (operation) DIP switch to "ON", and then power on again. At this point the GT200-HT-EI is running in configuration (run) mode.
- 2) Connect the network card interface of GT200-HT-EI to the computer.
- 3) Click "Tools -> Modify Device ID", and the device search interface will pop up.



5.5.8 Conversion Tools

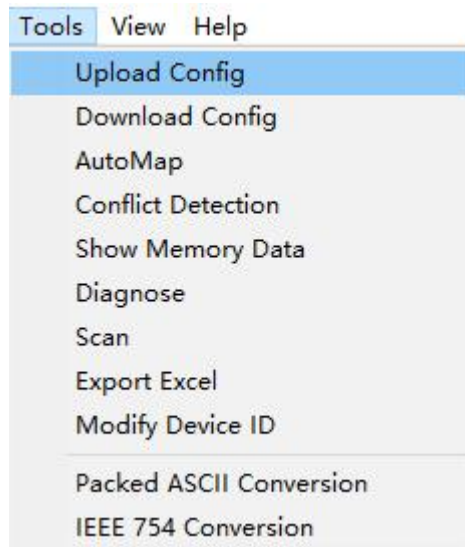
In the "Tools" menu, there are two practical tools: They are used to switch between IEEE754 and PACKED ASCII conveniently.



5.5.9 Hardware Communication

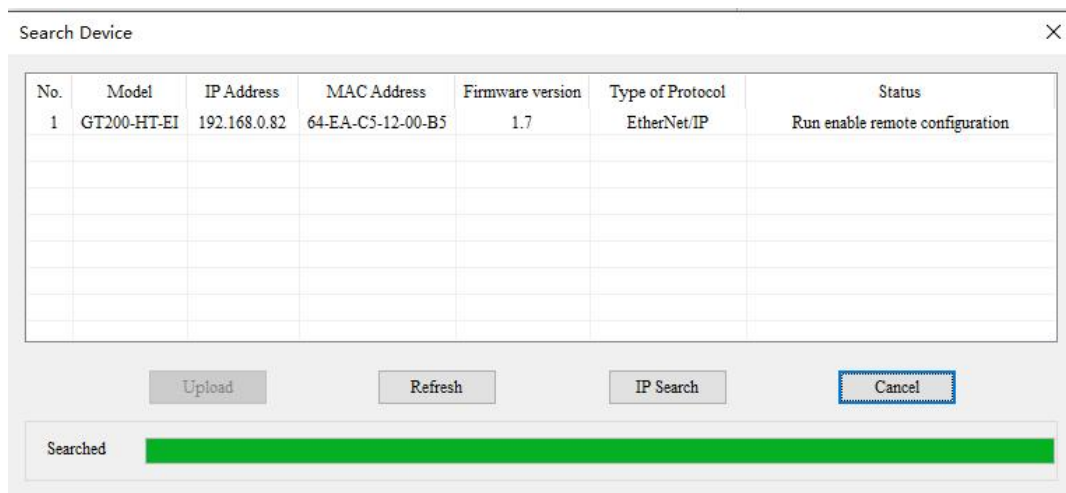
5.5.9.1 Ethernet Configuration

The hardware communication menu items are as follows:



5.5.9.2 Upload Configuration

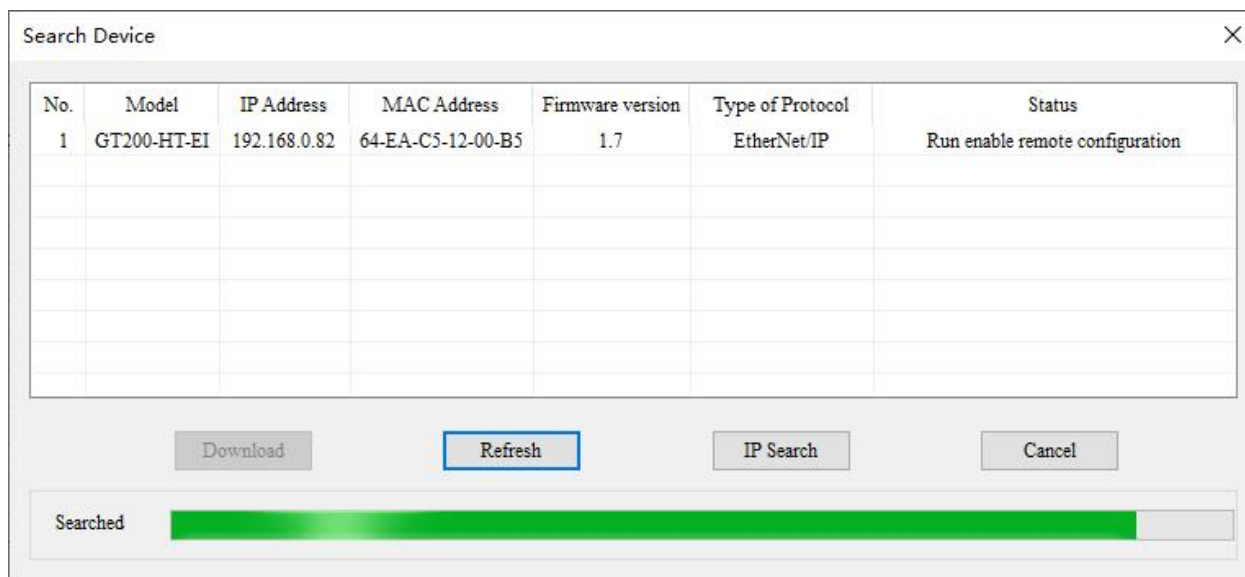
Choose upload configuration, it will pop up the dialog box of searching equipment:



Select the equipment you want to configure and click "Sign In" to enter into the upload dialog box. Upload the configuration information from the equipment to the software as shown below:

5.5.9.3 Download Configuration

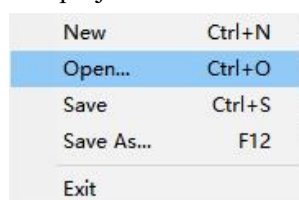
The operation of download configuration is the same as upload configuration:



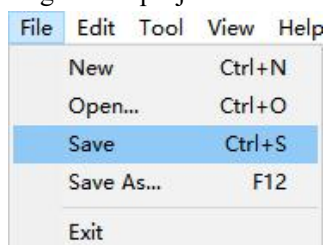
Note: Before downloading, please confirm all configurations have been completed and right.

5.5.10 Open/Save Project

Select "Open" to open an existing configuration project:



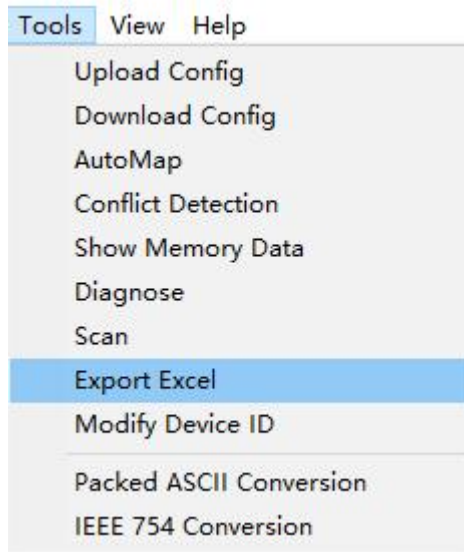
Select "Save" or "Save As..." to save the configuration project as a *.xml file.



5.5.11 Export Excel

The configuration can be exported as a table.

Please confirm that Microsoft Excel is installed on your computer before using this function.

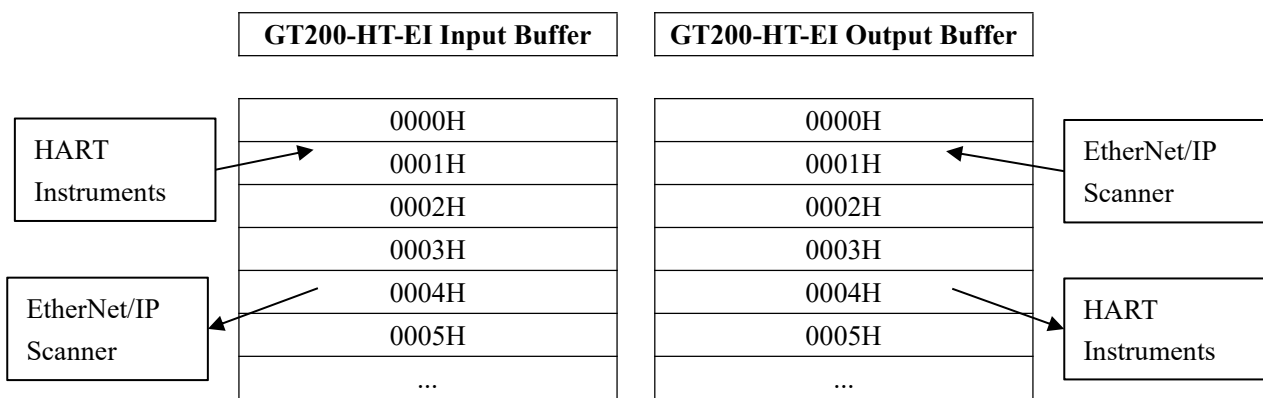


6 Working Principle

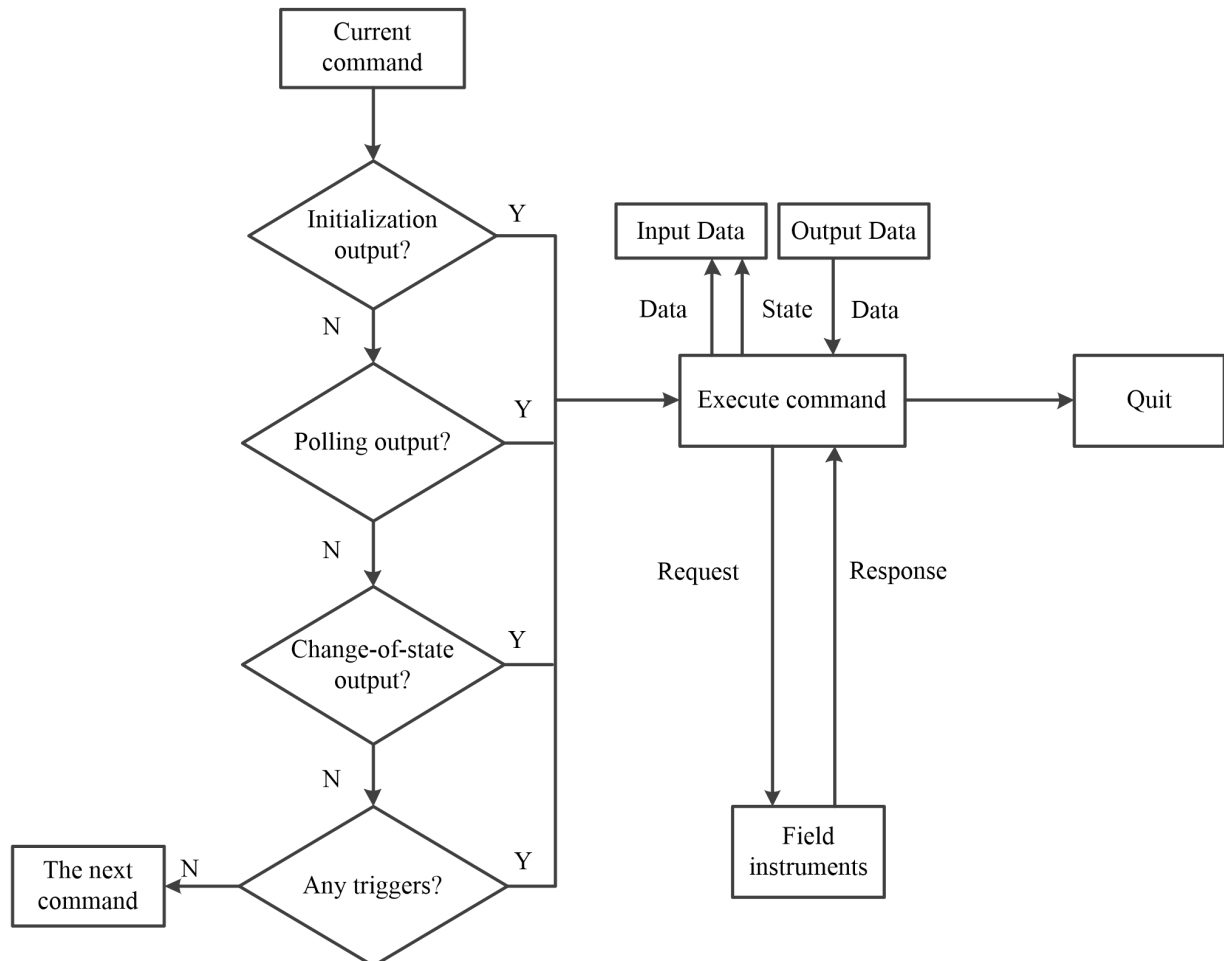
6.1 Data Exchange

Data exchange between HART and EtherNet/IP or Modbus TCP via GT200-HT-EI is established based on “mapping”. There are two data buffer areas in the GT200-HT-EI: One is the EtherNet/IP or Modbus TCP network input buffer and the other is the EtherNet/IP or Modbus TCP network output buffer. The received data from the HART instruments will be mapped to the input buffer for the EtherNet/IP or Modbus TCP scanner reading. The output data from EtherNet/IP or Modbus TCP scanner will be mapped to the output buffer, then the GT200-HT-EI will write the output data to the HART instruments.

For more details and examples, please refer to [Chapter 5.5.3](#).



6.2 Flowchart of Executing One HART Command



7 EtherNet/IP Connection Parameters

Connection parameters the adapter provides are as below:

Parameters \ Data Size	64 Bytes	128 Bytes	256 Bytes
Input Instance	102	112	122
Output Instance	101	111	121
Configuration Instance	103	113	123

Notes: The Input data size should include a 4-byte status. For example, when using the 256-byte parameters, the input size should be 260 bytes.

Take configuration parameters of Studio 5000 Logix as an example:

New Module [X]

Type: ETHERNET-MODULE Generic Ethernet Module
 Vendor: Rockwell Automation/Allen-Bradley
 Parent: ENET
 Name:
 Description:
 Comm Format: Data - DINT
 Address / Host Name
☒ IP Address: . . .
☐ Host Name:
Connection Parameters
 Input: (32-bit)
 Output: (32-bit)
 Configuration: (8-bit)
 Status Input:
 Status Output:
☒ Open Module Properties [OK] [Cancel] [Help]

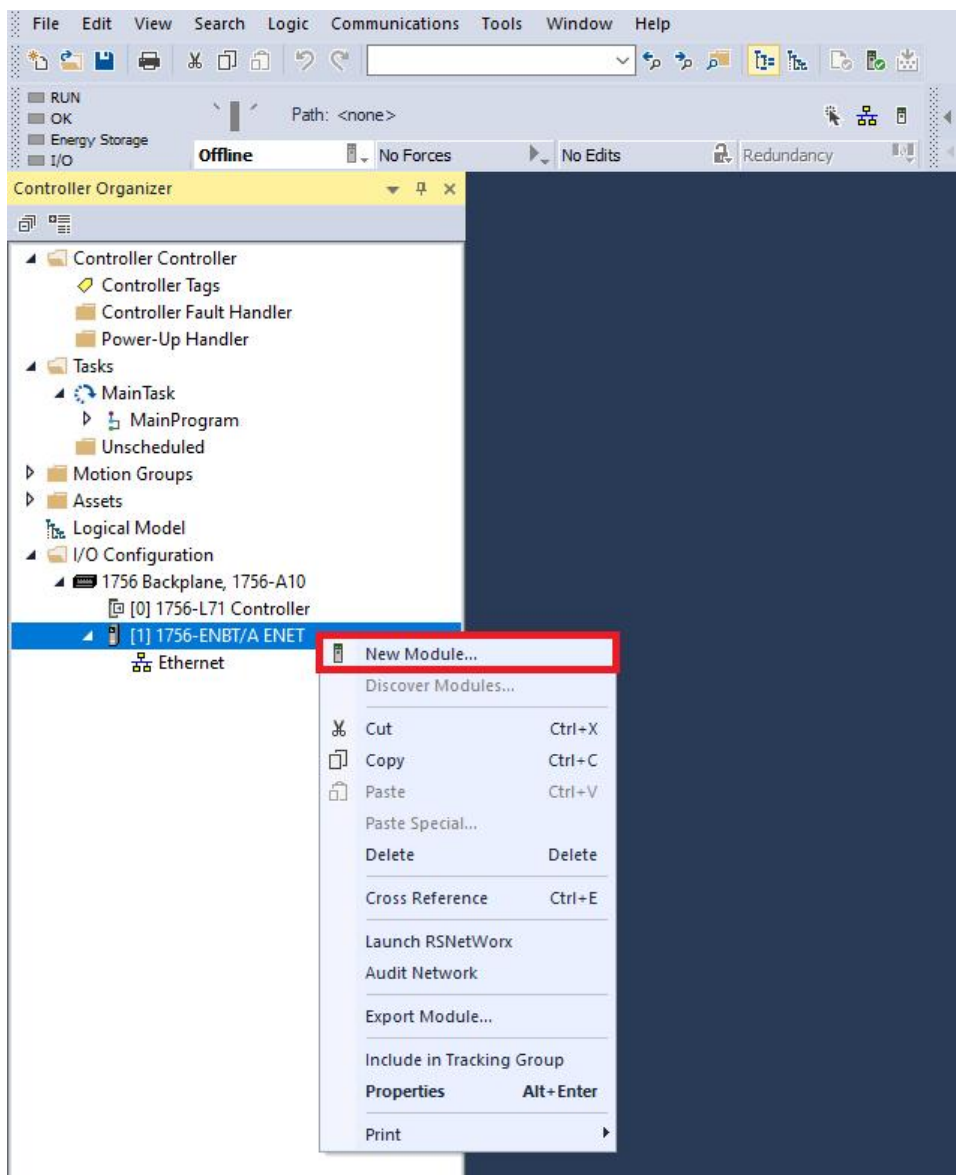
8 How to Read/Write I/O Data

The following RSLogix 5000 example will describe how to read/write I/O data.

8.1 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:

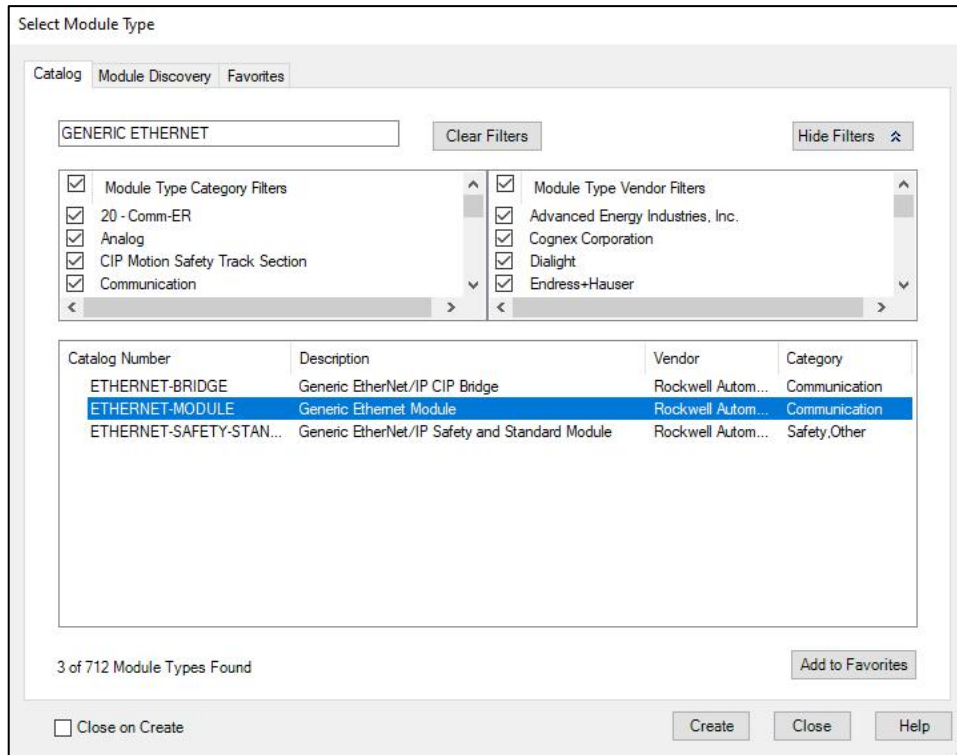


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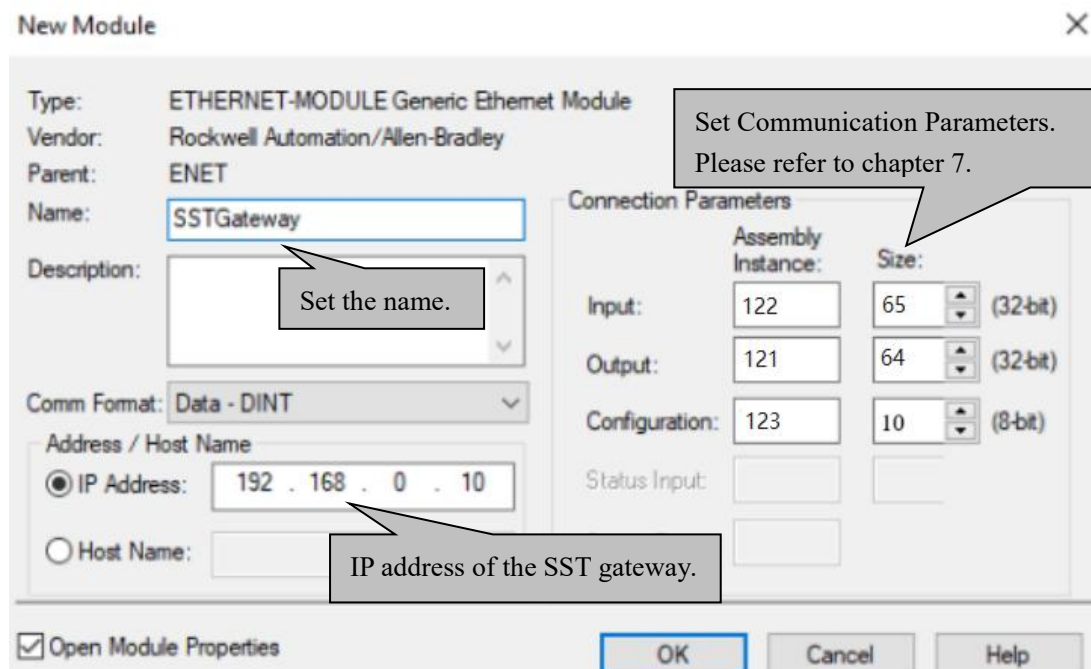
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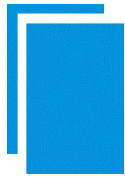
In the pop-up dialog box, search for "GENERIC ETHERNET", choose "ETHERNET-MODULE", and click "Create" as shown below:



Configure relevant information in the pop-up window, as shown below:



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



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

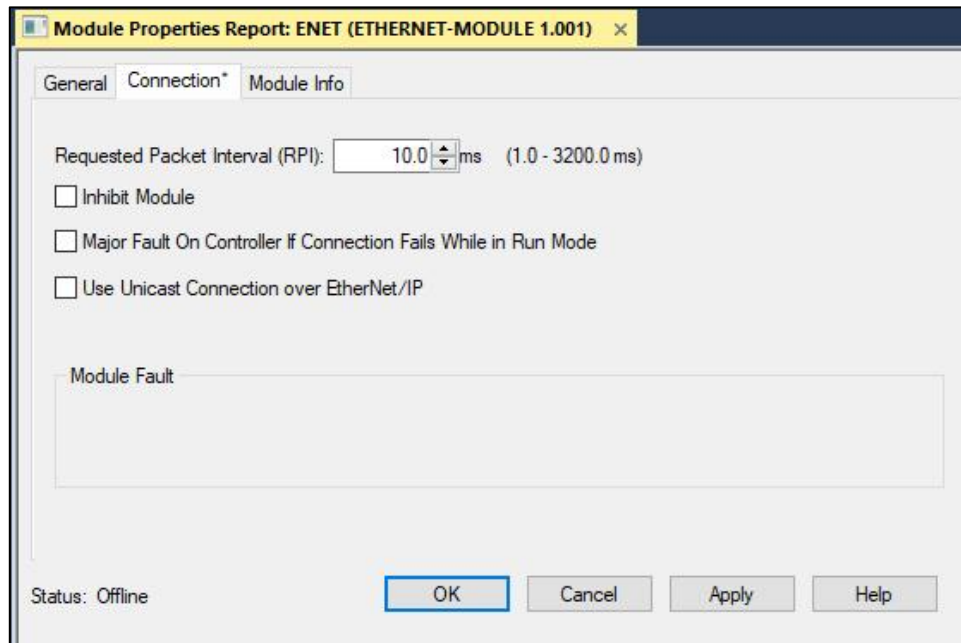
Name:	The name of the added EtherNet/IP device module.
Comm Format:	Configure data types such as DINT, INT, SINT, REAL and etc. After confirmation, this cannot be changed. To change data types, a new module must be created.
IP Address:	Set the IP address of the added EtherNet/IP device module (The IP address of GT200-HT-EI, which is configured by the software SST-HI-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 the 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:

The screenshot displays the SST Automation software interface. On the left, the 'Controller Organizer' tree shows the hierarchy: Controller Controller > Controller tags > SSTGateway:O. The main window shows a table of tags for 'SSTGateway:O.Data'.

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			Decimal	DINT[124]		
SSTGateway:O.Data[0]	0		Decimal	DINT		
SSTGateway:O.Data[1]	0		Decimal	DINT		
SSTGateway:O.Data[2]	0		Decimal	DINT		
SSTGateway:O.Data[3]	0		Decimal	DINT		
SSTGateway:O.Data[4]	0		Decimal	DINT		
SSTGateway:O.Data[5]	0		Decimal	DINT		
SSTGateway:O.Data[6]	0		Decimal	DINT		
SSTGateway:O.Data[7]	0		Decimal	DINT		
SSTGateway:O.Data[8]	0		Decimal	DINT		
SSTGateway:O.Data[9]	0		Decimal	DINT		
SSTGateway:O.Data[10]	0		Decimal	DINT		
SSTGateway:O.Data[11]	0		Decimal	DINT		
SSTGateway:O.Data[12]	0		Decimal	DINT		
SSTGateway:O.Data[13]	0		Decimal	DINT		
SSTGateway:O.Data[14]	0		Decimal	DINT		
SSTGateway:O.Data[15]	0		Decimal	DINT		
SSTGateway:O.Data[16]	0		Decimal	DINT		
SSTGateway:O.Data[17]	0		Decimal	DINT		
SSTGateway:O.Data[18]	0		Decimal	DINT		
SSTGateway:O.Data[19]	0		Decimal	DINT		
SSTGateway:O.Data[20]	0		Decimal	DINT		
SSTGateway:O.Data[21]	0		Decimal	DINT		
SSTGateway:O.Data[22]	0		Decimal	DINT		
SSTGateway:O.Data[23]	0		Decimal	DINT		
SSTGateway:O.Data[24]	0		Decimal	DINT		
SSTGateway:O.Data[25]	0		Decimal	DINT		
SSTGateway:O.Data[26]	0		Decimal	DINT		
SSTGateway:O.Data[27]	0		Decimal	DINT		
SSTGateway:O.Data[28]	0		Decimal	DINT		

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

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The screenshot displays the SST Automation software interface. On the left is the 'Controller Organizer' tree, showing a hierarchy from 'Controller' down to '1756-ENBT/A ENET'. The main window shows a table of 'Controller Tags' for the '1756-ENBT/A ENET' module. The table has columns for Name, Value, Force Mask, Style, Data Type, Description, and Constant. The 'Name' column lists tags from 'SSTGateway:I.Data[0]' to 'SSTGateway:I.Data[31]'. The 'Value' column shows '0' for all tags. The 'Data Type' column shows 'DINT[125]' for the first tag and 'DINT' for the others. The 'Style' column shows 'Decimal' for all tags. The 'Description' and 'Constant' columns are empty.

Name	Value	Force Mask	Style	Data Type	Description	Constant
SSTGateway:I.Data[0]	0		Decimal	DINT[125]		
SSTGateway:I.Data[1]	0		Decimal	DINT		
SSTGateway:I.Data[2]	0		Decimal	DINT		
SSTGateway:I.Data[3]	0		Decimal	DINT		
SSTGateway:I.Data[4]	0		Decimal	DINT		
SSTGateway:I.Data[5]	0		Decimal	DINT		
SSTGateway:I.Data[6]	0		Decimal	DINT		
SSTGateway:I.Data[7]	0		Decimal	DINT		
SSTGateway:I.Data[8]	0		Decimal	DINT		
SSTGateway:I.Data[9]	0		Decimal	DINT		
SSTGateway:I.Data[10]	0		Decimal	DINT		
SSTGateway:I.Data[11]	0		Decimal	DINT		
SSTGateway:I.Data[12]	0		Decimal	DINT		
SSTGateway:I.Data[13]	0		Decimal	DINT		
SSTGateway:I.Data[14]	0		Decimal	DINT		
SSTGateway:I.Data[15]	0		Decimal	DINT		
SSTGateway:I.Data[16]	0		Decimal	DINT		
SSTGateway:I.Data[17]	0		Decimal	DINT		
SSTGateway:I.Data[18]	0		Decimal	DINT		
SSTGateway:I.Data[19]	0		Decimal	DINT		
SSTGateway:I.Data[20]	0		Decimal	DINT		
SSTGateway:I.Data[21]	0		Decimal	DINT		
SSTGateway:I.Data[22]	0		Decimal	DINT		
SSTGateway:I.Data[23]	0		Decimal	DINT		
SSTGateway:I.Data[24]	0		Decimal	DINT		
SSTGateway:I.Data[25]	0		Decimal	DINT		
SSTGateway:I.Data[26]	0		Decimal	DINT		
SSTGateway:I.Data[27]	0		Decimal	DINT		
SSTGateway:I.Data[28]	0		Decimal	DINT		
SSTGateway:I.Data[29]	0		Decimal	DINT		
SSTGateway:I.Data[30]	0		Decimal	DINT		
SSTGateway:I.Data[31]	0		Decimal	DINT		

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

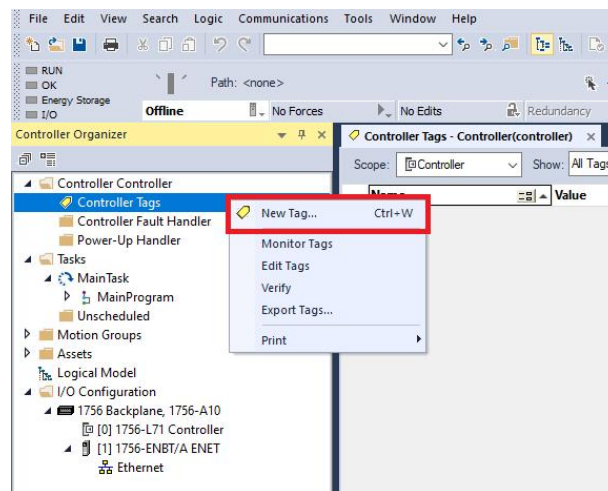
Please note that the first 4 input bytes are used to display the status bytes of the SST Gateway. See [Chapter 6](#) for more details.

8.2 Explicit MSG Connection Method

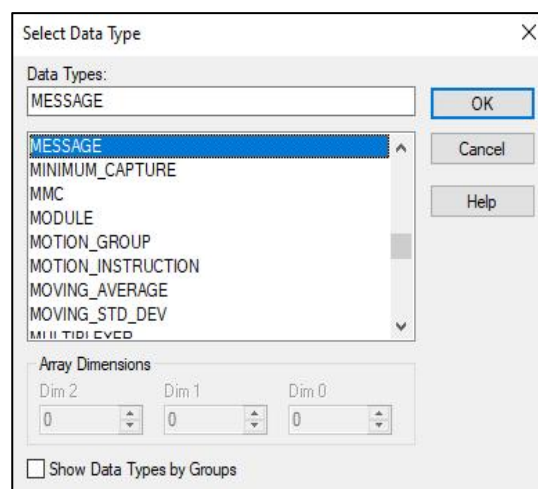
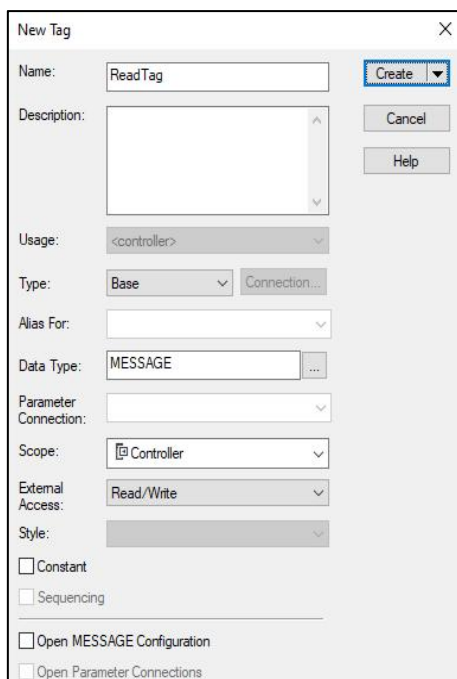
The following Studio 5000 Logix example will describe how to read/write EtherNet/IP data using explicit MSG messaging.

8.2.1 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:



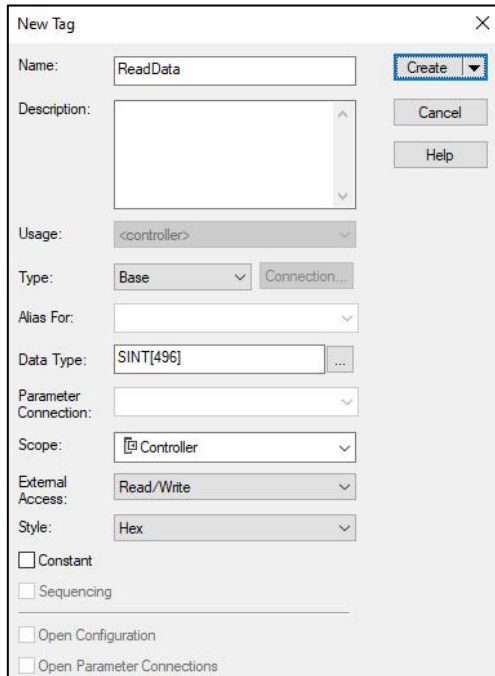
Set the data type of "ReadTag" as "MESSAGE":



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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 Cancel Help

Description:

Usage:

Type: Connection...

Alias For:

Data Type: ...

Parameter Connection:

Scope:

External Access:

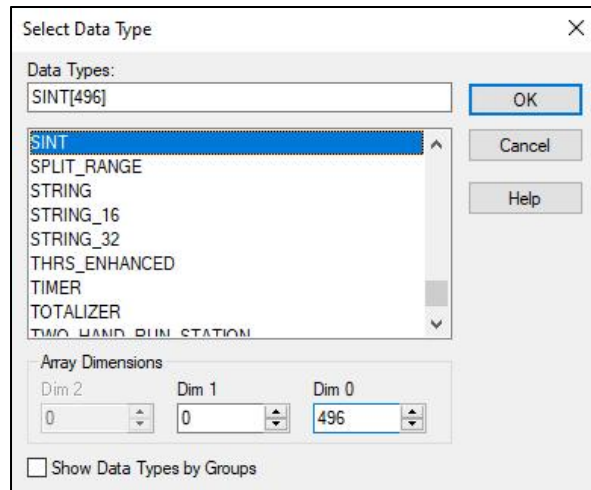
Style:

☐ Constant

☐ Sequencing

☐ Open Configuration

☐ Open Parameter Connections



Select Data Type

Data Types: OK Cancel Help

...

SPLIT_RANGE

STRING

STRING_16

STRING_32

THRS_ENHANCED

TIMER

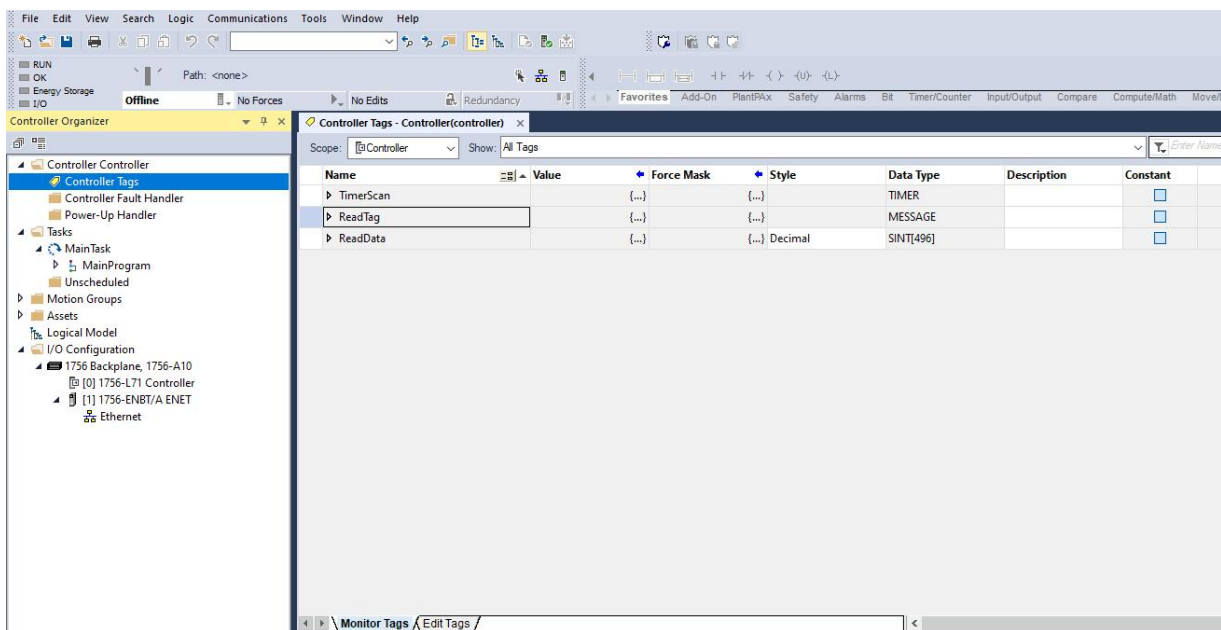
TOTALIZER

TWO HAND RUN STATION

Array Dimensions

Dim 2: Dim 1: Dim 0:

☐ Show Data Types by Groups

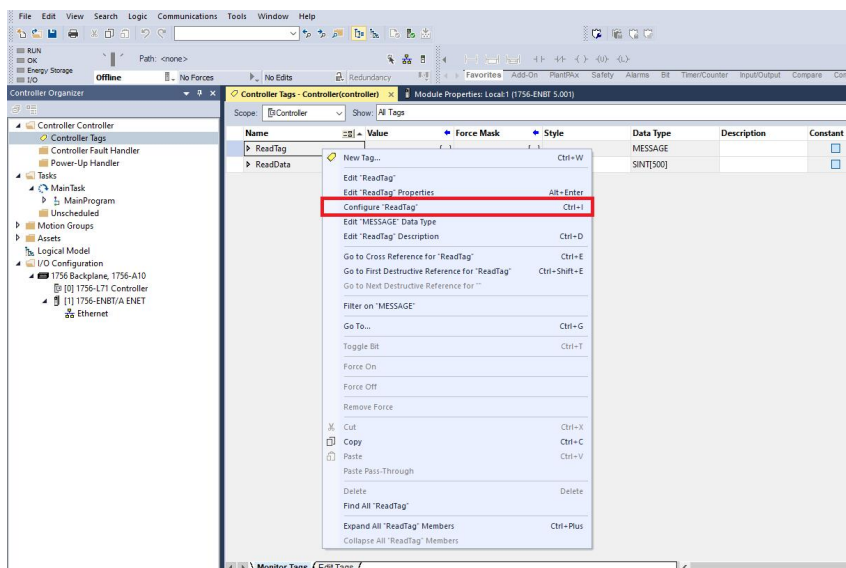


The screenshot shows the SST Automation software interface. The **Controller Organizer** pane on the left displays a tree structure of the controller configuration. The **Controller Tags - Controller(controller)** pane on the right shows a table of tags.

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

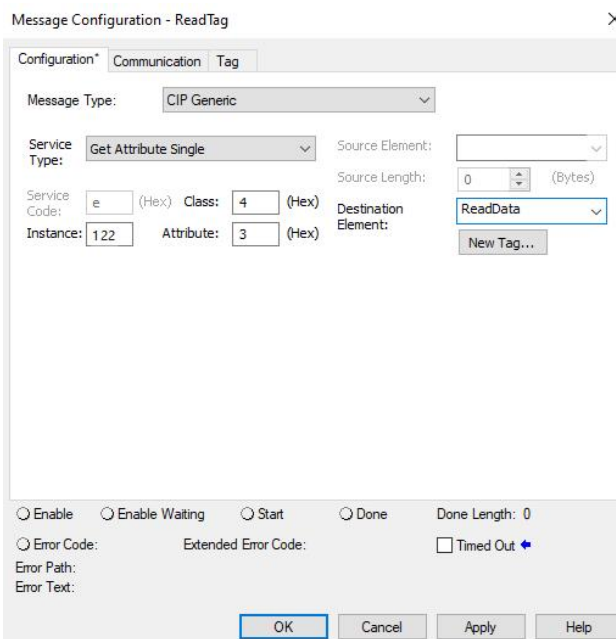
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Right click on "ReadTag", select "Configure 'ReadTag'" as shown below:



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:** 122
- Attribute:** 3 (Hex)
- Destination:** Select the "ReadData" tag. The obtained data will be saved in this tag.



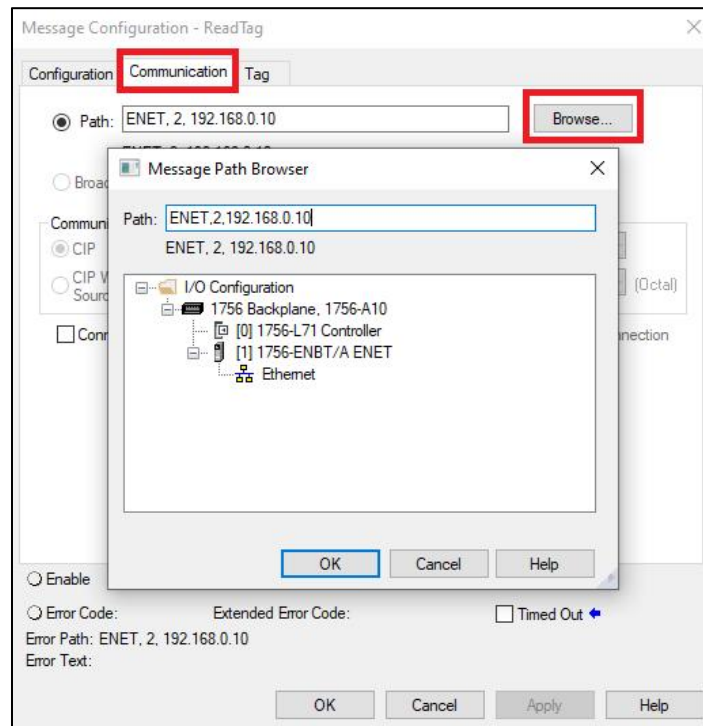
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Select the "Communication" tab and click the "Browse" button. Then input the network path to connect to the GT200-HT-EI.

Enter the network path in the following format:

[EtherNet/IP Interface Name], 2 (Ethernet Communication), [GT200-HT-EI IP Address]

Then click "OK" to confirm:



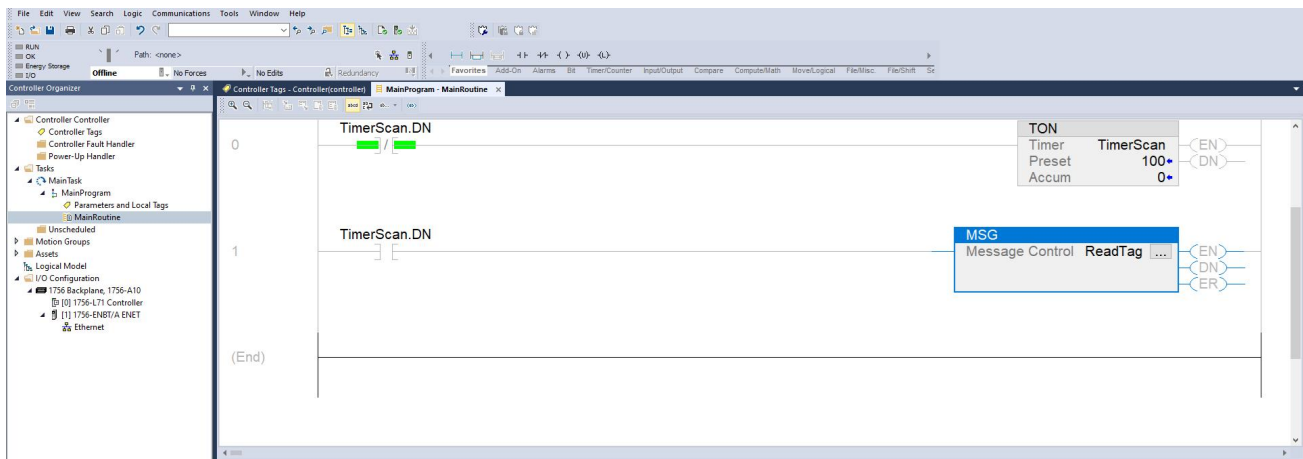
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Add a "MSG" command and select "ReadTag" as "Message Control" in the "MainRoutine" of "MainProgram" as shown in the image below. This is a simple command which can send a read request. The user still needs to add some logic commands to trigger this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

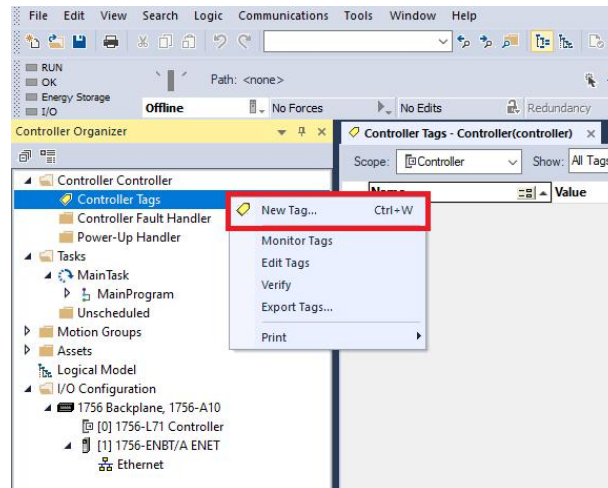
Download the program to the PLC and set PLC into "Online" state.



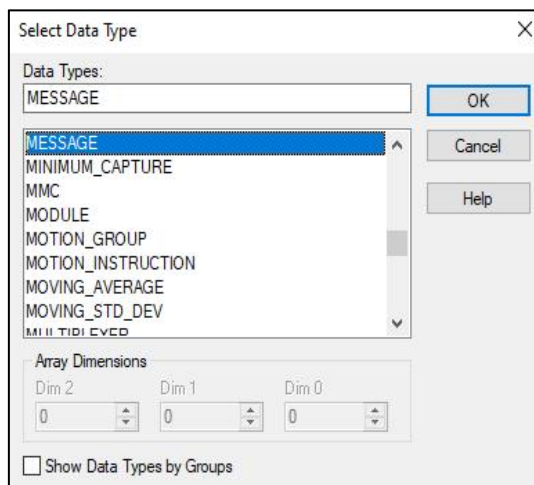
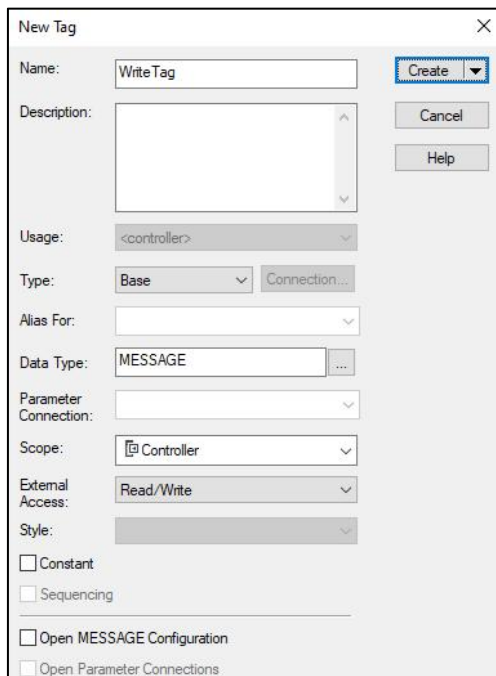
Click "Control Tags" and select "Monitor Tags". Expand "ReadData" to see that PLC can read Modbus TCP data through the GT200-HT-EI gateway.

8.2.2 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: 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

File Edit View Search Logic Communications Tools Window Help

Path: <none>

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

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

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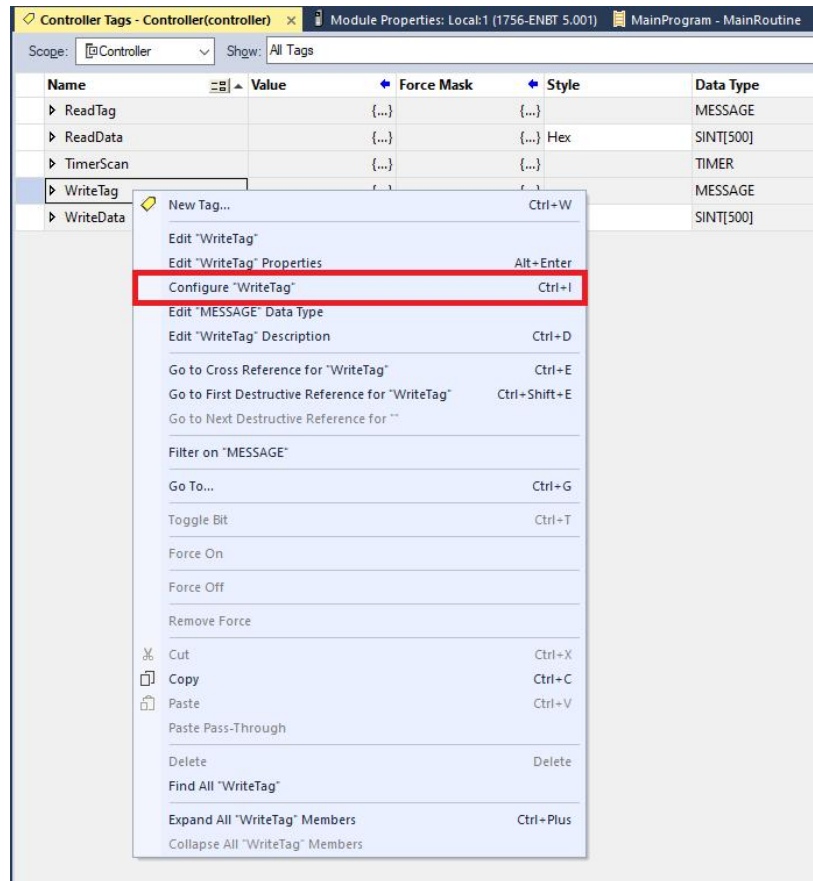
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Enter into the "Monitor Tags" interface and input some data in the "WriteData" tag. This data will be outputted to GT200-HT-EI through PLC. As shown in the image below, 0x10, 0x20, 0x30, 0x40, 0x50, 0x60, 0x70, 0x80 and 0x90 are the data that will be outputted.

Controller Tags - Controller(controller) x MainProgram - MainRoutine						
Scope: Controller		Show: All Tags				
Name	Value	Force Mask	Style	Data Type	Description	
▶ TimerScan	{...}		{...}	TIMER		
▶ ReadTag	{...}		{...}	MESSAGE		
▶ ReadData	{...}	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		

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:	121
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-HI-CFG).

Message Configuration - WriteTag
✕

Configuration*
Communication
Tag

Message Type: CIP Generic

Service Type: Set Attribute Single

Service Code: 10 (Hex)

Instance: 121

Source Element: WriteData

Source Length: 256 (Bytes)

Class: 4 (Hex)

Attribute: 3 (Hex)

Destination Element: New Tag...

☐ Enable

☐ Error Code:

Error Path:

Error Text:

☐ Enable Waiting

Extended Error Code:

☐ Start

☐ Done

☐ Timed Out

Done Length: 0

OK
Cancel
Apply
Help

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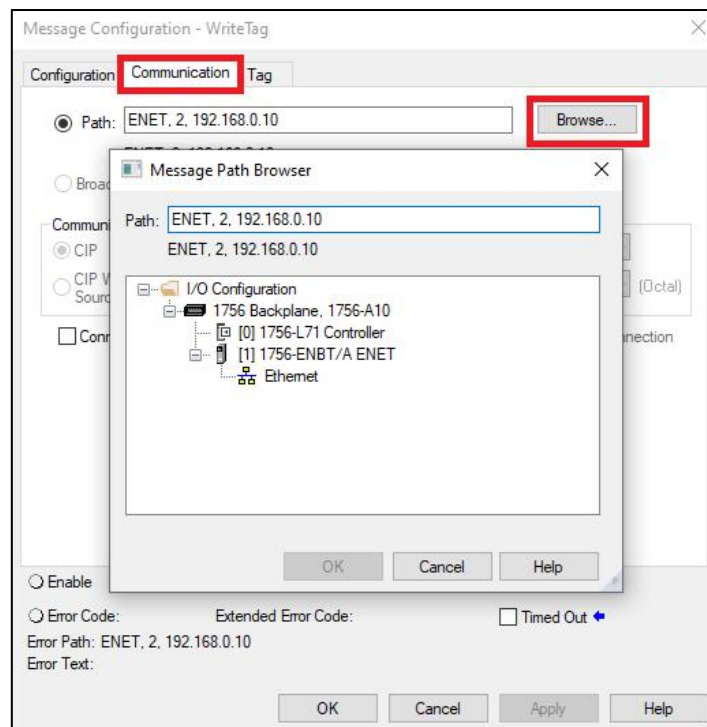
User Manual

Select the "Communication" tab and click the "Browse" button. Then input the network path to connect to the GT200-HT-EI.

Enter the network path in the following format:

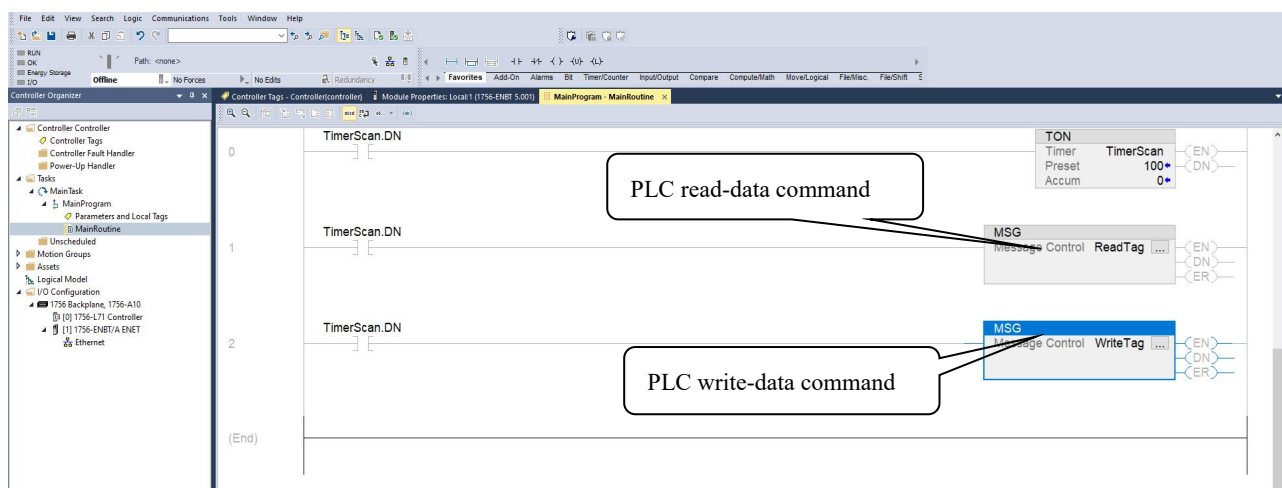
[EtherNet/IP Interface Name], 2 (Ethernet Communication), [GT200-HT-EI IP Address]

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 GT200-HT-EI.



9 Modbus TCP Client Communication

GT200-HT-EI Gateway provides a solution for HART instruments to communicate with Modbus TCP Client through Modbus TCP network, the gateway acts as Server, the following example illustrates how the gateway communicates with Modbus Poll (Modbus TCP Client emulation software).

1. Configure point-to-point mode (HART address is 0) with HART Commands ID1, ID3 and ID6. The common HART command format can be found in Appendix B, and the configuration is as follows:
 - (1) When configuring HART Command ID1, the response is 2 bytes more than the actual one (command state) because HART Command ID1 is without request. In the command state, byte 0 (primary variable unit) and the primary variable are 7 bytes in total, and after mapping to 4 Modbus register addresses, there will be 1 byte extra, resulting in the last 3 bytes of the primary variable being placed in the last 2 Modbus registers, and the actual primary variable value cannot be read. So it should be configured to advanced mode to extract the primary variable for direct acquisition.

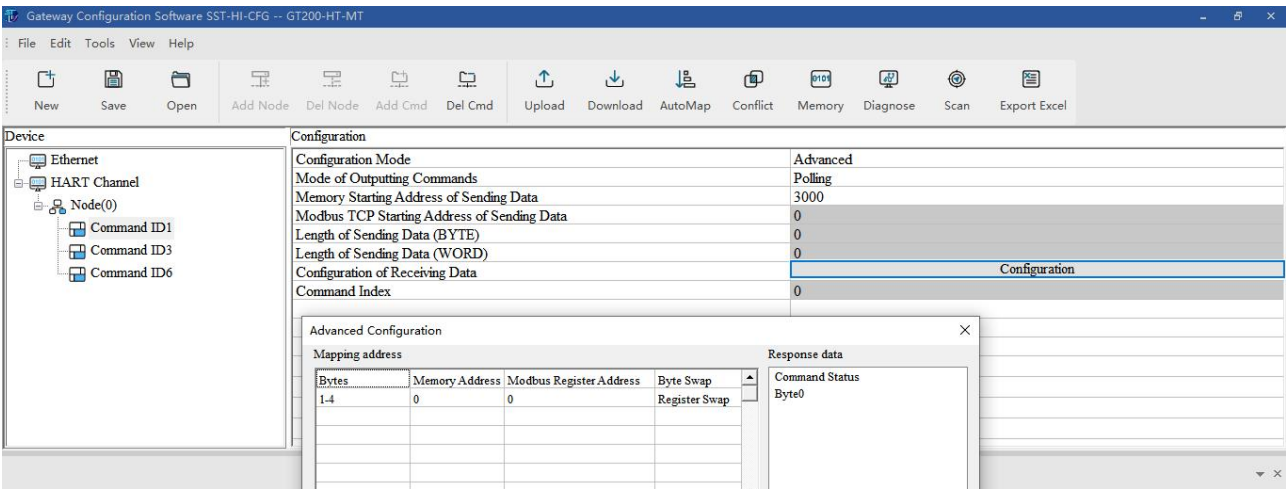
Command ID1: Read primary variable (PV)

Returns the value of the primary variable as a floating-point type

Request: None

Response:

Byte	Description
Byte 0	Primary Variable Units
Byte 1-4	Primary Variable



- (2) When configuring HART command ID3, use the advanced function to configure the primary variable (PV), the secondary variable (SV), and the tertiary variable (TV).

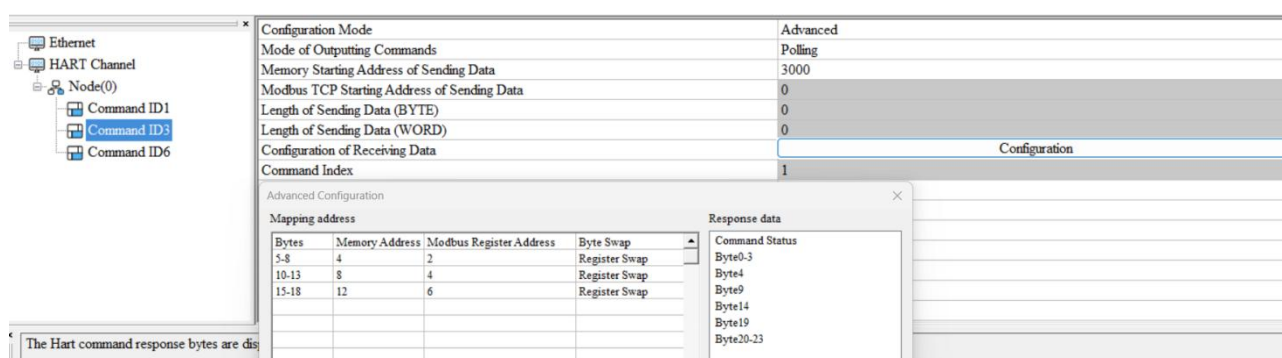
Command ID3: Reads four (predefined) dynamic variables and the primary variable current

Reads the primary variable current and 4 (at most) pre-defined dynamic variables, the primary variable current always matches the device's AO output current. primary, secondary, tertiary and quaternary variables defined for each device type.

Request: None

Response:

Byte	Description
Byte 0-3	Primary Variable Loop Current (units of milli-amperes)
Byte 4	Primary Variable Units Code
Byte 5-8	Primary Variable
Byte 9	Secondary Variable Units Code
Byte 10-13	Secondary Variable
Byte 14	Tertiary Variable Units Code
Byte 15-18	Tertiary Variable
Byte 19	Quaternary Variable Units Code
Byte 20-23	Quaternary Variable



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(3) The configuration of HART Command ID6 is used to modify the address of the HART device.

Command ID6: Write POLLING address

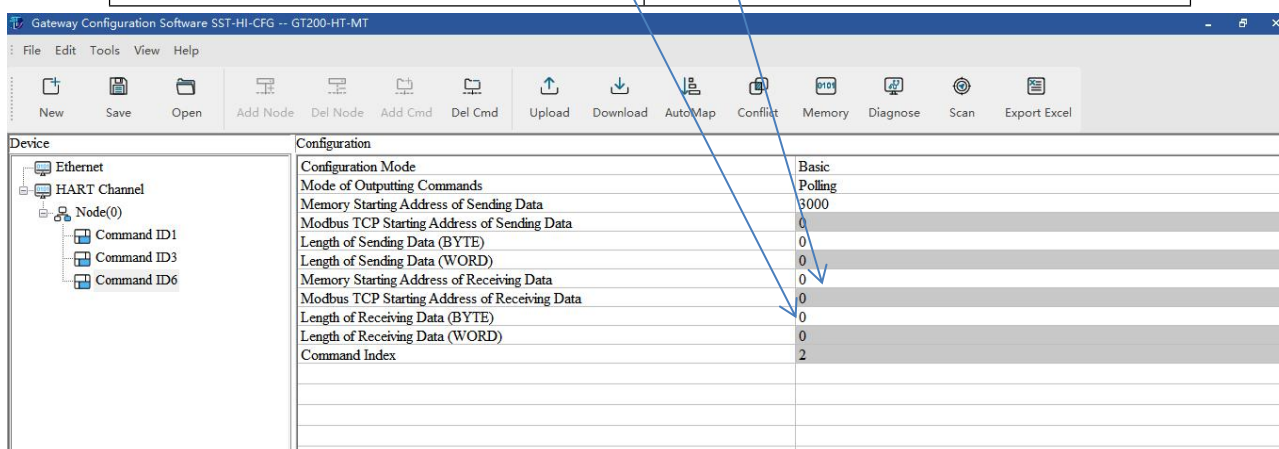
This is the data link layer management command. This command writes the Polling address and loop current mode to the field device.

Request:

Bytes	Description
Byte 0	Polling Address (Between 0-15)
Byte 1 (Only on supported HART devices)	Loop Current Mode (0=Disabled, 1=Enabled)

Response:

Bytes	Description
Byte 0	Polling Address (Between 0-15)
Byte 1 (Only on supported HART devices)	Loop Current Mode (0=Disabled, 1=Enabled)



2. Click **Conflict**, through **AutoMap**, to view the mapping address of the command in the gateway buffer. The primary variable of HART Command ID1 corresponds to gateway input buffer 0-3, Command ID3 corresponds to 4-15, Command ID6 request corresponds to output buffer 3000-3001, and response corresponds to 16-19. as follows:

Modbus TCP Client uses 04 function code, using 3x0001-3x0002 corresponding to the primary variable of HART Command ID1, 3x0003-3x0008 corresponding to the primary variable of HART Command ID3, the secondary and tertiary variables. 3x0009-3x0010 corresponds to the command status of HART Command ID6, the Polling address and loop current mode of the device with the 06/16 function code. The use of 4x0001 should correspond

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to the Polling address and loop current mode of the requested device of HART Command ID6.

The screenshot displays the software interface for the GT200-HT-EI HART/EtherNet Gateway. The left pane shows the configuration tree with 'Ethernet', 'HART Channel', 'Node(0)', and 'Command ID6' selected. The right pane shows the 'Receive-data-memory' table, which is divided into two sections: 'Receive-data-me' and 'Receive-data-memory'.

Receive-data-me Table:

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
3000																	
3032																	
3064																	
3096																	
3128																	
3160																	
3192																	
3224																	
3256																	
3288																	
3320																	
3352																	
3384																	

Receive-data-memory Table:

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0000																	
0032																	

The 'Receive-data-memory' table shows data for addresses 0000, 0032, and 0064. The data for address 0000 is 0000, and for address 0032 is 0032. The data for address 0064 is 0064.

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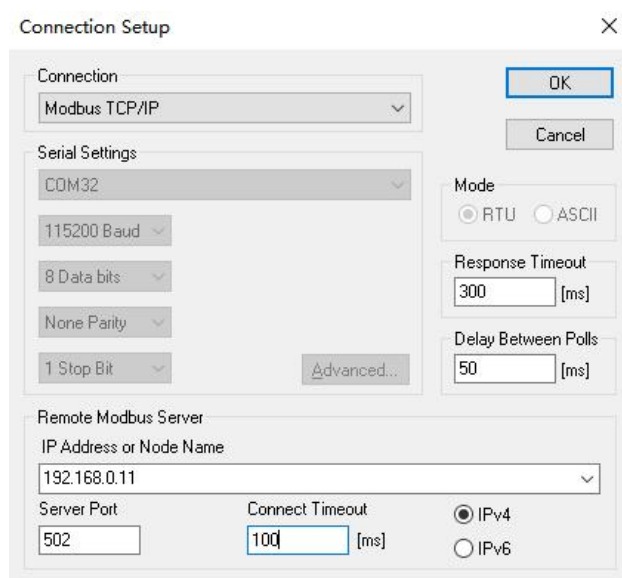
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3. Use Modbus Poll and the gateway to connect and read/write data with the following configuration:

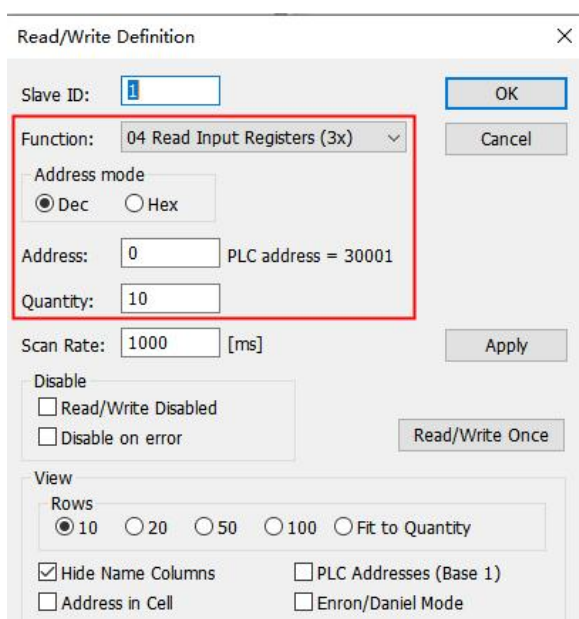
Note: The gateway acts as Modbus TCP Server, use Modbus Client to connect with the gateway, support 04/03 function code (configured in software) to read data from HART device, support 06/16 function code (preset single/multiple registers) to write data to HART device, 03/04 function code can read the data written back to HART device.

Function Code of Modbus TCP Client Reading Data	04 Read Input Data, 03 Read Back Output Data
Starting Address of Read-Only Register (Input Data)	04 Read Input Data, 03 Read Back Output Data
Starting Address of Read/Write Register (Output Data)	03 Read Input Data, 04 Read Back Output Data



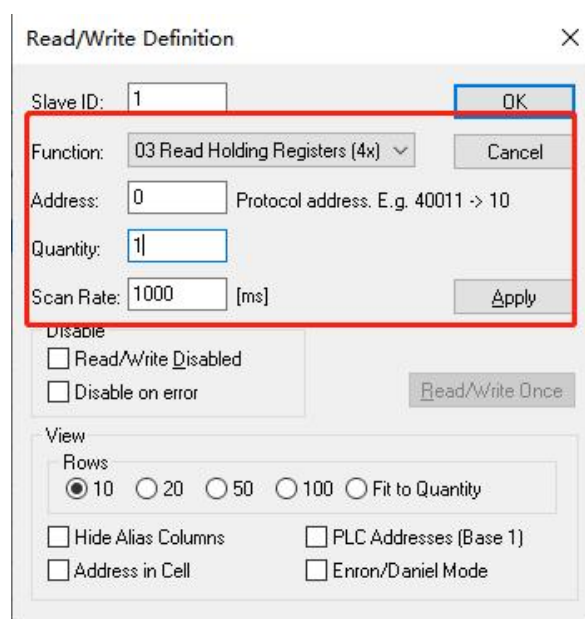
The Connection Setup dialog box is used to configure the Modbus connection. It includes the following fields:

- Connection:** Modbus TCP/IP
- Serial Settings:** COM32, 115200 Baud, 8 Data bits, None Parity, 1 Stop Bit
- Mode:** RTU (selected), ASCII
- Response Timeout:** 300 [ms]
- Delay Between Polls:** 50 [ms]
- Remote Modbus Server:** IP Address or Node Name: 192.168.0.11, Server Port: 502, Connect Timeout: 100 [ms], IPv4 (selected), IPv6



The Read/Write Definition dialog box (Left) is used to define the data to be read or written. It includes the following fields:

- Slave ID:** 1
- Function:** 04 Read Input Registers (3x)
- Address mode:** Dec (selected), Hex
- Address:** 0, PLC address = 30001
- Quantity:** 10
- Scan Rate:** 1000 [ms]
- Disable:** Read/Write Disabled, Disable on error
- View:** Rows: 10 (selected), 20, 50, 100, Fit to Quantity; Hide Name Columns, Address in Cell, PLC Addresses (Base 1), Enron/Daniel Mode



The Read/Write Definition dialog box (Right) is used to define the data to be read or written. It includes the following fields:

- Slave ID:** 1
- Function:** 03 Read Holding Registers (4x)
- Address:** 0, Protocol address. E.g. 40011 -> 10
- Quantity:** 1
- Scan Rate:** 1000 [ms]
- Disable:** Read/Write Disabled, Disable on error
- View:** Rows: 10 (selected), 20, 50, 100, Fit to Quantity; Hide Alias Columns, Address in Cell, PLC Addresses (Base 1), Enron/Daniel Mode

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4. Use Modbus POLL to read data (3x0001-3x0010) and write data via 4x0001. The data in the gateway buffer

can be viewed in  **Memory** (refer to [Chapter 5.5.4](#)) and the actual floating-point data of the HART device can be viewed via  **Diagnose** (refer to [Chapter 5.5.5](#)).

