User Manual

Version 2.0.0 Oct. 2025

GW-2139M

(BACnet MS/TP to Modbus TCP Gateway)



Written by Johney

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1. General Information

1.1 BACnet MS/TP Introduction

BACnet (Building Automation and Control Networks) is a communication protocol specifically designed for building automation and control systems.Among its various data link options, BACnet MS/TP (Master–Slave/Token-Passing) is one of the most common sub-protocols, used for data exchange and control message transmission between devices within a building network.

BACnet MS/TP is defined in ANSI/ASHRAE Standard 135, Clause 9, and implements a multi-master, point-to-point communication method based on a token-passing mechanism.

In this architecture, a communication token is circulated among the connected master devices, ensuring that each node obtains transmission permission in sequence, thereby achieving stable and efficient data exchange.

The protocol employs the EIA-485 (RS-485) electrical standard and typically uses shielded twisted-pair (STP) cabling as its transmission medium, supporting baud rates from 9,600 bps to 76,800 bps. This architecture is particularly well-suited for automation networks that require reliable, low-cost communication—such as single-controller environments—offering excellent noise immunity and robust network stability.



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1.2 Modbus TCP Introduction

Modbus TCP is an Ethernet-based extension of the Modbus RTU communication protocol, designed for monitoring and controlling automation devices. Its primary purpose is to enable Modbus messages to be transmitted over TCP/IP networks, allowing communication across both intranet and internet environments.

Modbus TCP is widely used for data exchange between programmable logic controllers (PLCs), remote I/O modules, and various types of gateway devices. Within a system architecture, it allows Ethernet-based devices to directly connect and integrate with fieldbus or I/O networks, enabling real-time data communication across different domains.

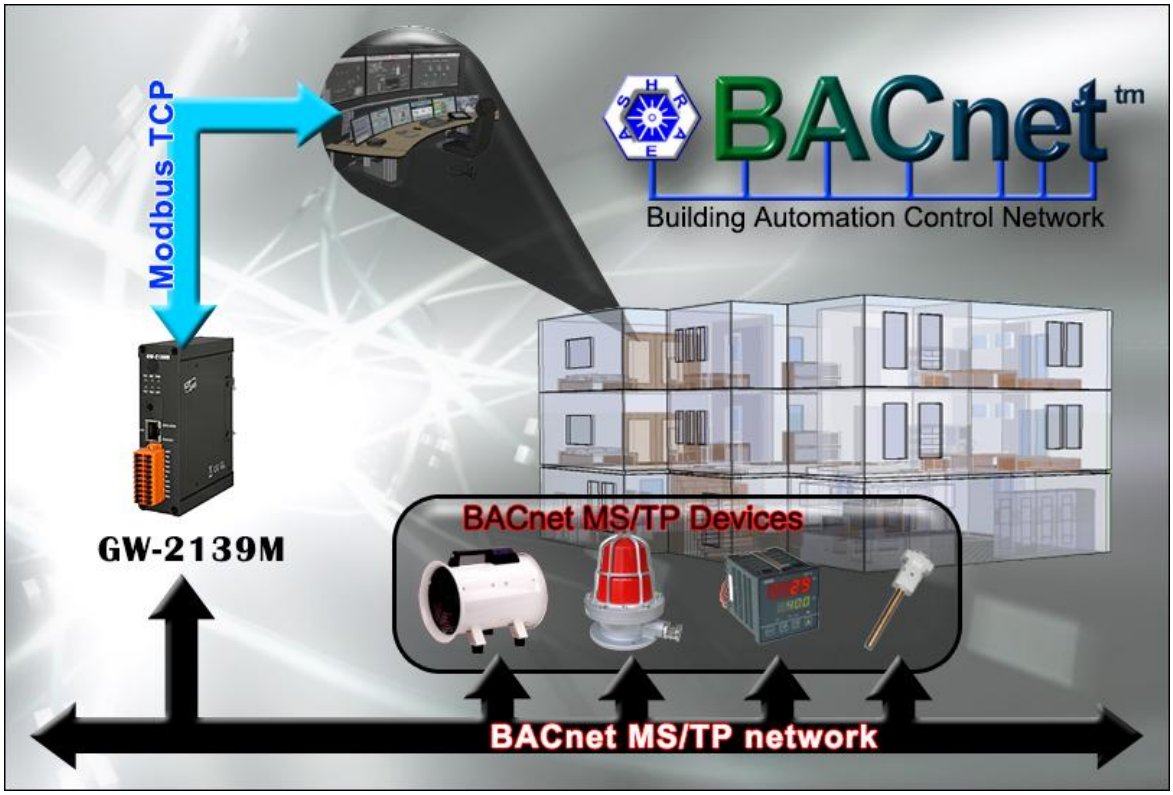
Due to its openness, simplicity, and high interoperability, Modbus TCP has become one of the most commonly adopted communication standards in the field of industrial automation.



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1.3 About GW-2139M

GW-2139M is a network gateway allowing Modbus TCP client devices to be accessed BACnet MS/TP network as a BACnet MS/TP master. The BACnet Master Slave Token Passing (MS/TP) protocol is used to relay and exchange information between building devices. GW-2139M contains a large number of BACnet objects (AI, AO, AV, BI, BO, BV, MSI, MSO, MSV) gives you flexibility in mapping Modbus TCP registers to any combination of BACnet objects. BACnet interoperability building blocks (BBIB) (DS-RP-A, DS-RPM-A, DS-WP-A, DS-WPM-A, DM-DDB-A, DM-DOB-A, DM-DCC-A, DM-RD-A) are Supported. All the data transfer is configurable using GW-2139M Utility.



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1.4 Features

The GW-2139M provides a stable and high-performance communication bridge between BACnet and Modbus protocols, offering the following key features:

- **Cross-Protocol Data Exchange**

  Enables real-time data integration between BACnet and Modbus by allowing Modbus TCP to read and write standard BACnet objects.

- **Flexible Master and Server Configuration**

  Supports configurable BACnet MS/TP Master and Modbus TCP Server modes, accommodating a wide variety of system architectures and application requirements.

- **Customizable Data Mapping Mechanism**

  Allows users to define flexible mappings between BACnet object properties and Modbus registers, simplifying cross-protocol data transfer configuration.

- **Comprehensive Object Support**

  Support multiple BACnet object types, including AI, AO, AV, BI, BO, BV, MSI, MSO, and MSV, as well as Modbus Coils, Discrete Inputs, Input Registers, and Holding Registers.

- **High-Reliability Design**

  Equipped with an isolated RS-485 communication port, 4 kV ESD protection, and a built-in hardware watchdog timer, ensuring reliable and continuous system operation.

- **Status Monitoring Indicators**

  Features multiple LED indicators for real-time display of power, network communication, and connection status, simplifying on-site maintenance and troubleshooting.

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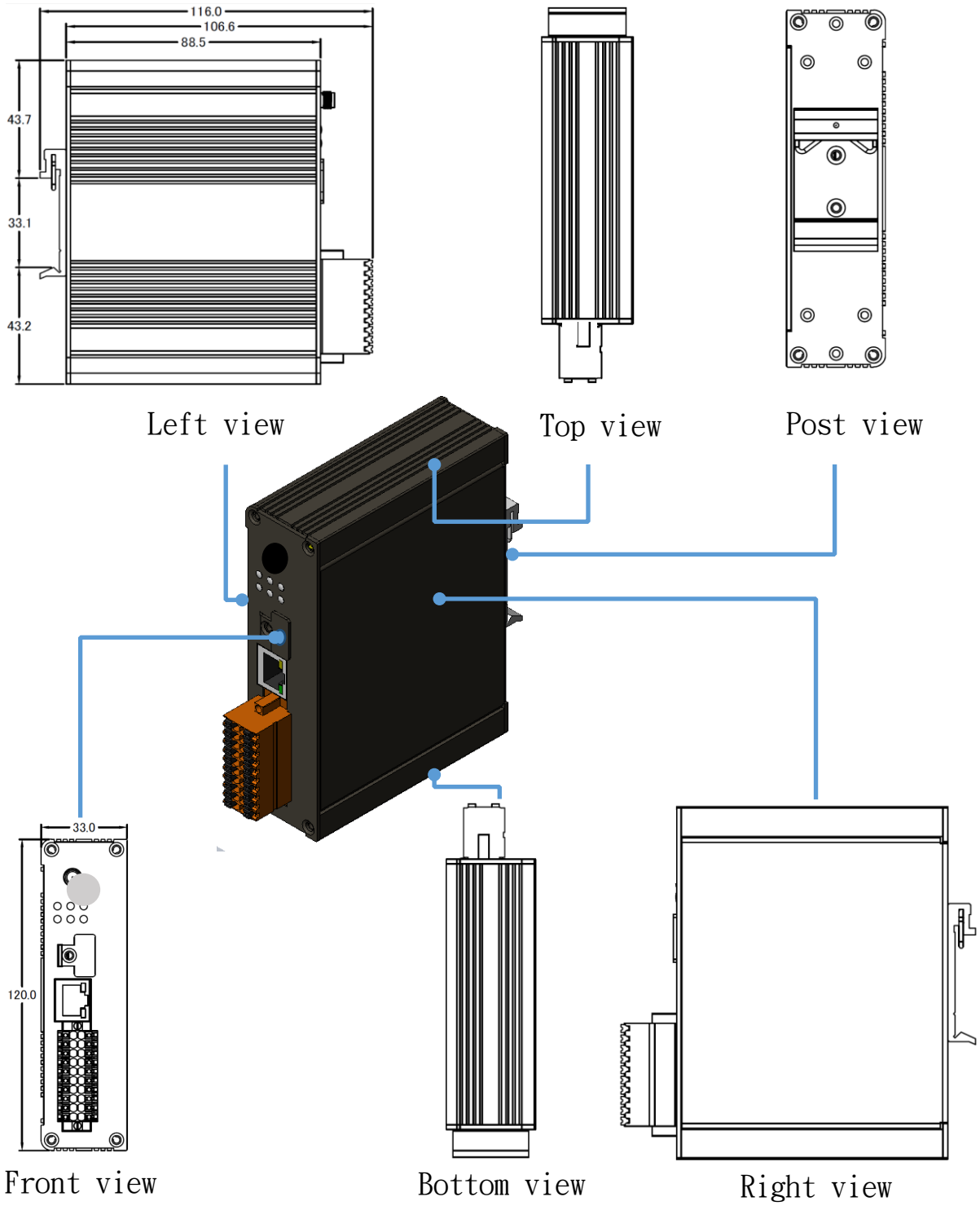
1.5 Specifications

Ethernet	
Controller	10/100Base-TX Ethernet Controller (Auto-negotiating, Auto_MDIX)
Connector	RJ-45 with Ethernet indictor
Protocol	Modbus TCP Server
Max. Connections	8
RS-485 Interface	
Connector	terminal block (D+, D-)
Baud Rate (bps)	9600, 19200, 38400, 57600, 76800
Comm. format	N, 8, 1
Terminator Resistor	Built-in 120 ohm terminator resistor, enabled/disabled via Jump
Isolation	3 kV VDC for DC to DC, 2500 Vrms for photo couple
Protocol	BACnet MS/TP Master
Maximum Connections	32
BACnet Objects	AI, AO, AV, BI, BO, BV, MSI, MSO, MSV
BIBBs	DS-RP-A, DS-RPM-A, DS-WP-A, DS-WPM-A, DM-DDB-A, DM-DOB-A, DM-DCC-A, DM-RD-A
Power	
Protection	Power reverse polarity protection
EMS Protection	ESD, Surge, EFT
Supply Voltage	+10 VDC ~ +30 VDC
Consumption	5 W @ 24 VDC
LED Indicator	
LED (Round)	Power (1), BACnet MS/TP Status (1), BACnet MS/TP Net(1), Modbus TCP TxD / RxD / Link (3)
Ethernet LED	Ethernet LED Ethernet Status (RJ-45) (2)
Mechanism	
Installation	DIN-Rail
Casing	Metal
Dimensions	33 x 120 x 116 mm (W x L x H)
Environment	
Operating Temp.	-25℃ ~ +75℃
Storage Temp.	-30℃ ~ +85℃
Humidity	10 ~ 90% RH, non-condensing

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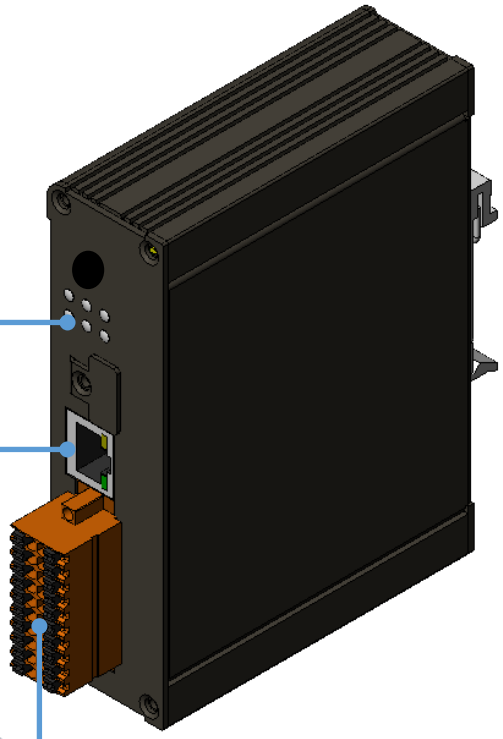
2. Hardware

2.1 Size (Unit : mm)

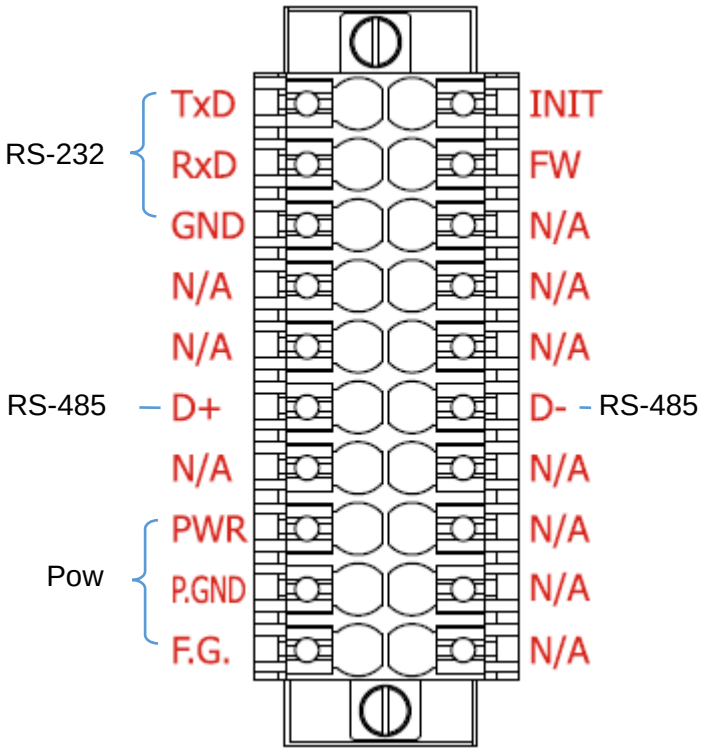


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2.2 Appearance



The GW-2139M is equipped with a RJ45 port for Ethernet LAN connection. When 100BASE-TX is operating, the 10/100M LED is lit orange. When 10BASE-T is operating or the machine is not connected to the network, it is turned off. When an Ethernet link is detected and an Ethernet packet is received, the Link/Act LED is lit green.



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2.3 LED Indicator

There are six LEDs to indicate the various states of the GW-2139M. The following is the illustration of these six LEDs.

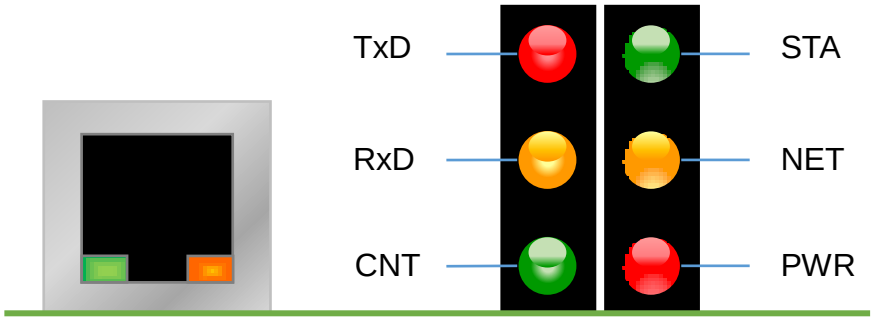


Figure 2.1 LED position of the GW-2139M

LED Name	GW-2139M Status	LED Status
ALL LEDs	FW Updating Mode	LED will be twinkled sequentially.
	Initial Mode	All LEDs blink once every 500ms.
PWR (Module)	Power On	On
	Power Failure	Off
NET (MSTP)	Connect at least one device	On
	No devices are connected	Blink per 200 ms
STA (MSTP)	Connect all device	On
	Some devices are not connected	Blink per 200 ms
CNT (Modbus)	Connected by least one client.	On
	No clients connect	Blink per 200 ms
RxD (Modbus)	Data reception	On
	No Data reception	Off
TxD (Modbus)	Data transmission	On
	No Data reception	Off

Table 2.1 LED indication of the GW-2139M

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3. Getting Started With GW-2139M

This chapter mainly describes the operation process of the GW-2139M.

3.1 Wiring Preparation

Before setting up the GW-2139M, please complete the necessary preparation about wiring. Please follow Figure 2.1 wiring diagram, to wire the following items:

1. Power Supply : +10 VDC ~ +30 VDC
2. RS-485：D+ & D- (MSTP wiring)
3. RS-232：TxD / RxD / GND (Debug Port ; N, 8, 1 ; 115200 baud rate)
4. Ethernet：Connect the GW-2139M and computer into the same LAN through cable or Ethernet Switch/Hub.
5. INIT：Connect to GND to initial mode. (Address IP:192.168.255.1)
6. FW：Connect to GND and insert RJ45 to download mode. (LED will be twinkled.)

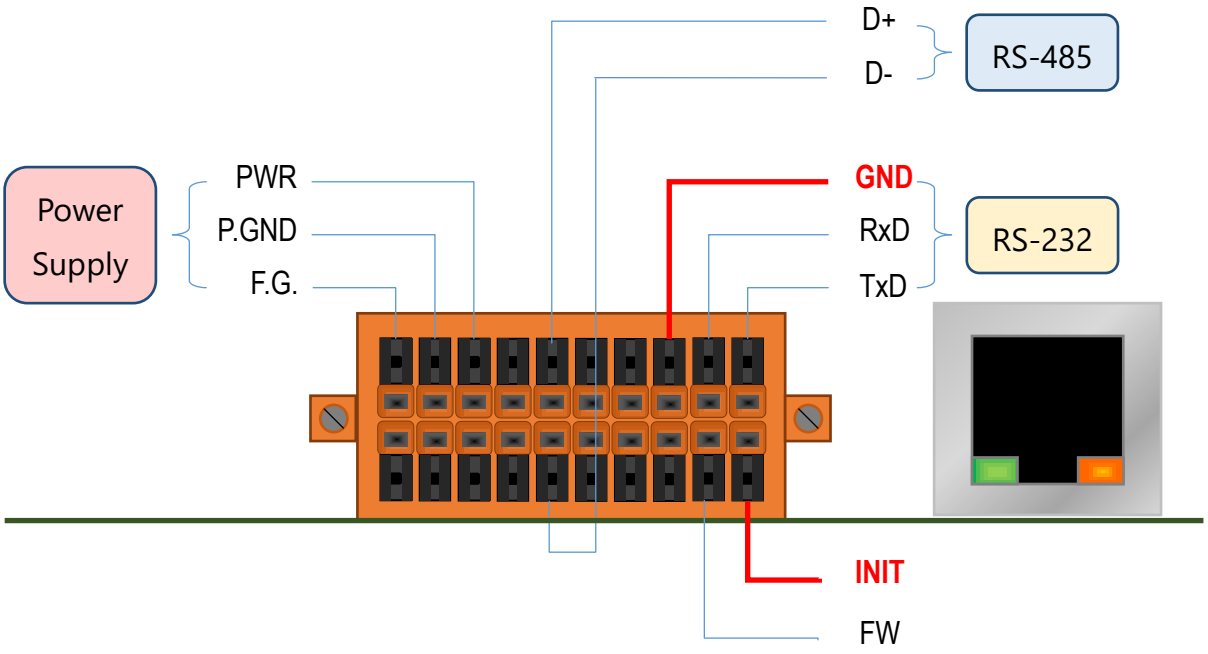


Figure 3.1 GW-2139M Wiring Diagram

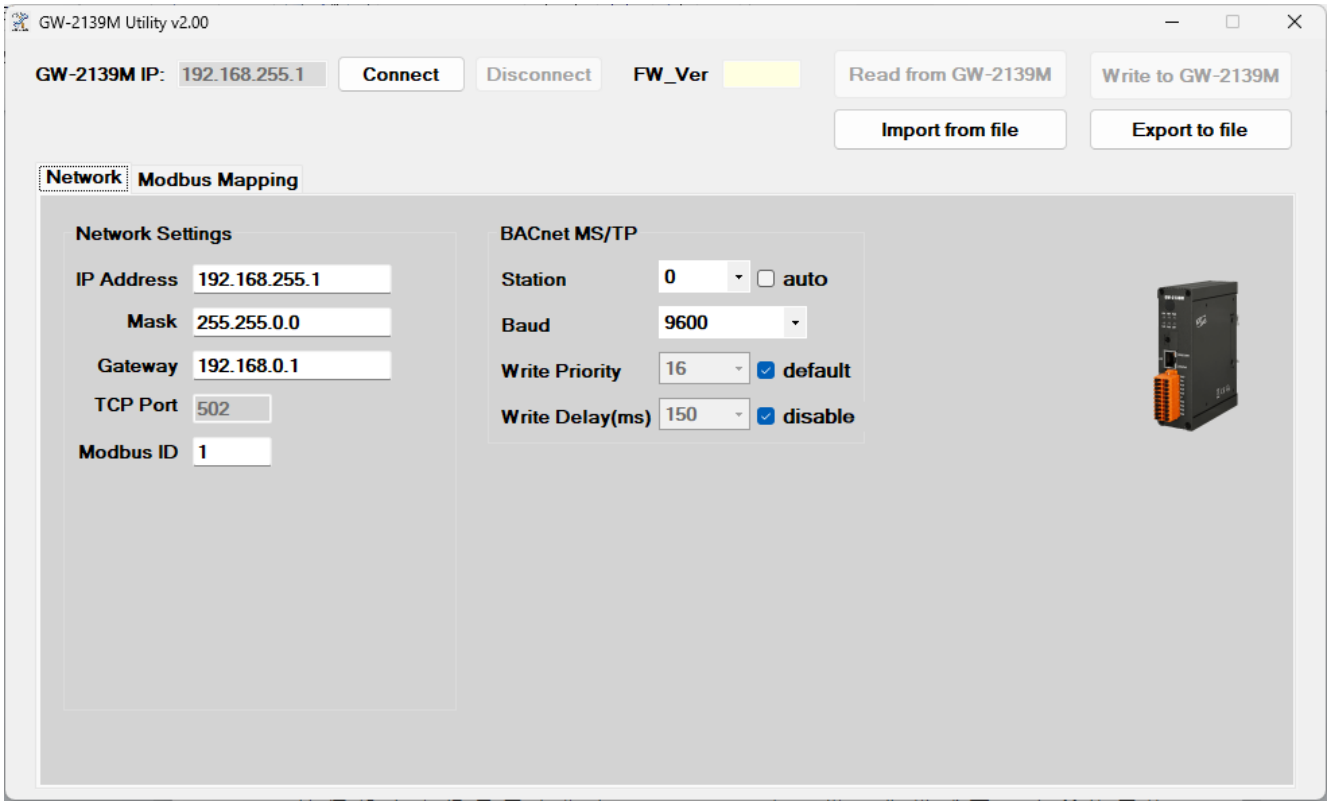
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3.2 GW-2139M Utility

The GW-2139M Utility provides an offline configuration editing capability, allowing users to create or modify configuration files without connecting to the device. The software supports configuration file import and export, enabling convenient backup and transfer of settings between multiple GW-2139M units.

In addition, the tool allows users to write configuration data directly to the module or read existing settings from the device, offering a complete and user-friendly configuration management solution.

The illustration below shows the full interface of the GW-2139M Utility Software.

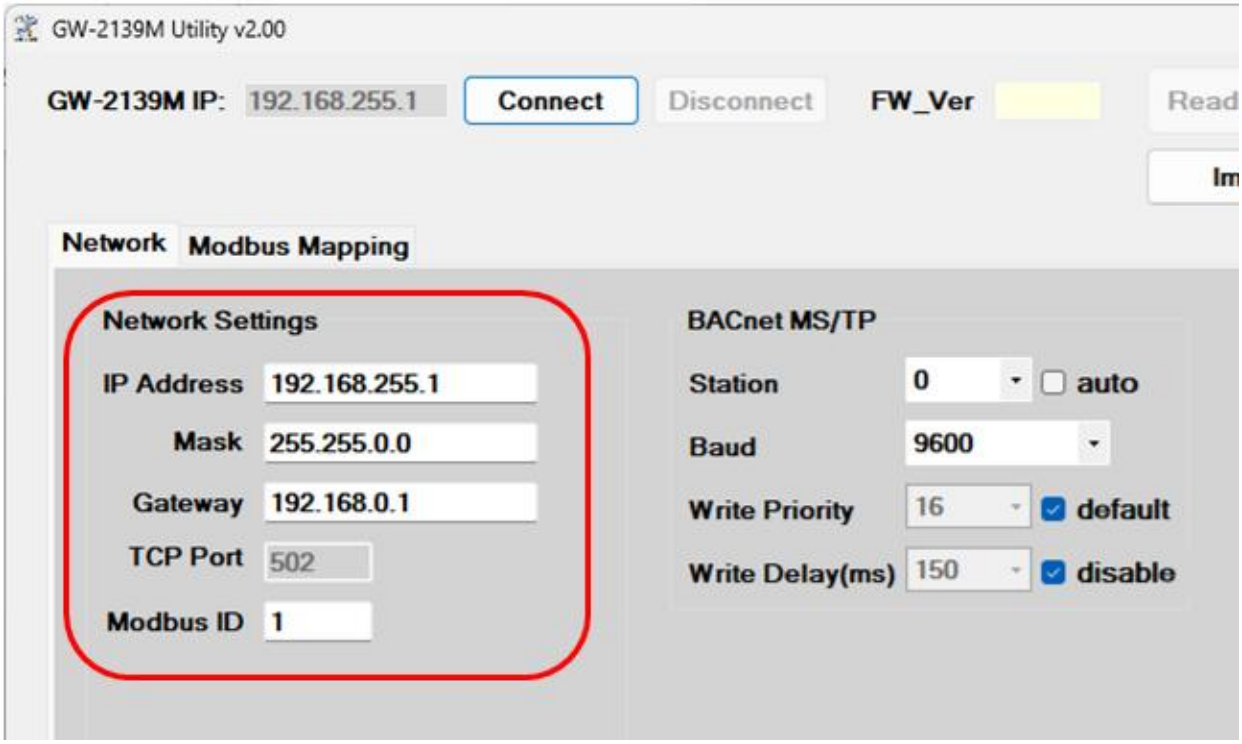


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3.2.1 NetworkSettings Section

The 【Network Settings】 section is used to configure the network parameters of the GW-2139M during normal operation. It includes the IP Address, Subnet Mask (Mask), Default Gateway, and Modbus Communication ID (Modbus ID).

These parameters define how the module is identified and communicates within the network, making them essential for proper system integration and reliable operation.



Parameter Descriptions：

- IP Address

  Set the GW-2139M network address for communication with Modbus TCP clients or other supervisory control systems. Ensure that the IP address is unique within the same subnet to avoid address conflicts with other devices.If multiple gateways exist within the system, fixed IP addresses should be pre-assigned by the network administrator to simplify configuration management and maintenance.

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- Mask (Subnet Mask)

Defines the subnet mask range, which is used to determine whether a target device belongs to the same network segment. For example, a mask of 255.255.0.0 indicates that the first two octets represent the network identifier.

- Gateway

Specifies the default gateway for network packet routing. When the GW-2139M communicates with external networks—such as remote servers or cloud systems—data will be transmitted through this gateway. If the device operates within a closed local network, the gateway can remain at its default value or be set to the upper-level router corresponding to the local IP address.

- TCP Port

The Modbus TCP communication port number, which is fixed at 502 (the standard Modbus TCP port).

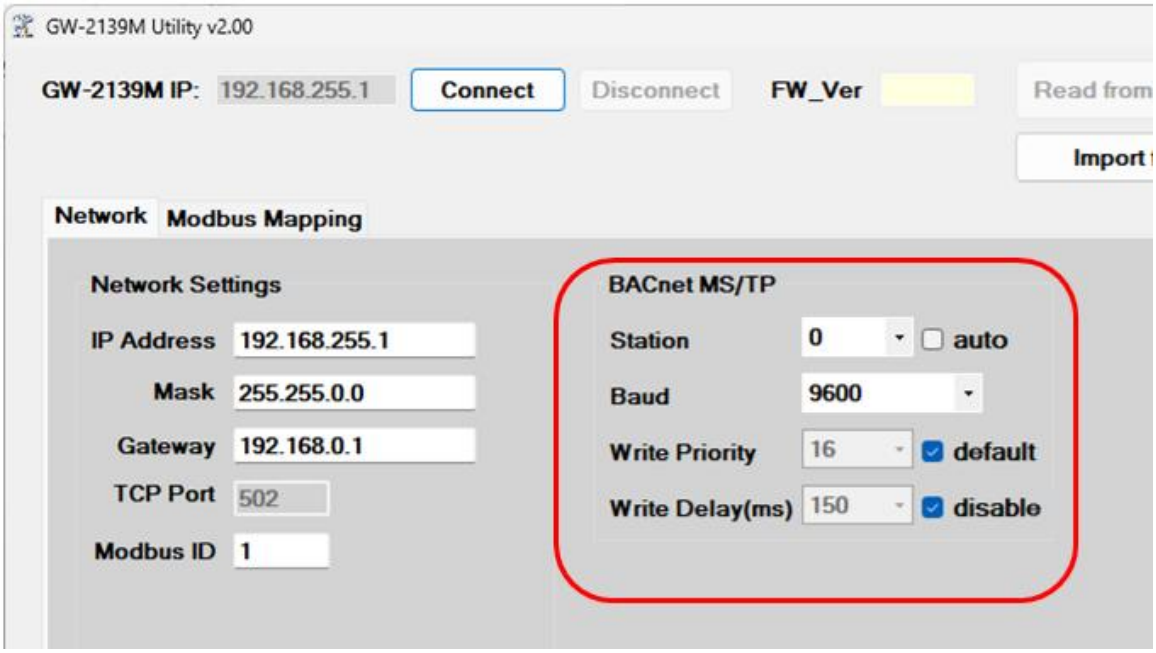
- Modbus ID

This parameter defines the Modbus Server ID of the GW-2139M. In systems with multiple gateways, it is recommended to assign a unique Modbus ID (range: 1–247) to each GW-2139M to prevent misidentification by the Modbus master.

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3.2.2 BACnet MS/TP Section

The 【BACnet MS/TP】section is used to configure the communication parameters of the GW-2139M when operating as a BACnet MS/TP Master. Proper configuration ensures that the module can communicate reliably with field BACnet MS/TP devices, such as controllers, sensors, and I/O modules, enabling stable and efficient data exchange.



Parameter Descriptions：

- Station

Sets the BACnet MS/TP Station Number for the GW-2139M, with a valid range of 0–127. This value must be unique and non-duplicated within the same MS/TP network to prevent communication conflicts. If the “auto” option is enabled, the system will automatically search for an available station number.This mode is recommended during initial testing or in small-scale installations.

For formal deployment, it is advised to assign a fixed station number and verify that no other device on the network uses the same ID.

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- Baud (Baud Rate)

Sets the communication baud rate (bps) for the BACnet MS/TP RS-485 bus. Available options include 9600, 19200, 38400, and 76800 bps.This setting must match the baud rate of all BACnet MS/TP devices on the same network; otherwise, communication will not be established.If the field devices support Auto Baud Detection, the default value of 9600 bps can be used temporarily for testing purposes.

- Write Priority

The “Write Priority” parameter controls the priority level for data write operations, ensuring that high-priority control commands (e.g., emergency shutdown) can override lower-priority ones (e.g., routine configuration changes). This mechanism allows the device to process write requests from multiple sources according to their importance. The valid range is 1–16, where a lower number indicates a higher priority. The default value is 16, which is recommended for general applications. For integration with specific building automation or control logic systems, the value may be adjusted as required.

- Write Delay (ms)

Sets the delay time (in milliseconds) between two consecutive write operations to BACnet objects. This function helps prevent MS/TP bus congestion or device response timeouts during high-speed data exchanges. If the “disable” option is selected, the delay control function will be turned off. For general applications, it is recommended to keep the default value of 150 ms. In networks with multiple nodes or heavy traffic, the delay time

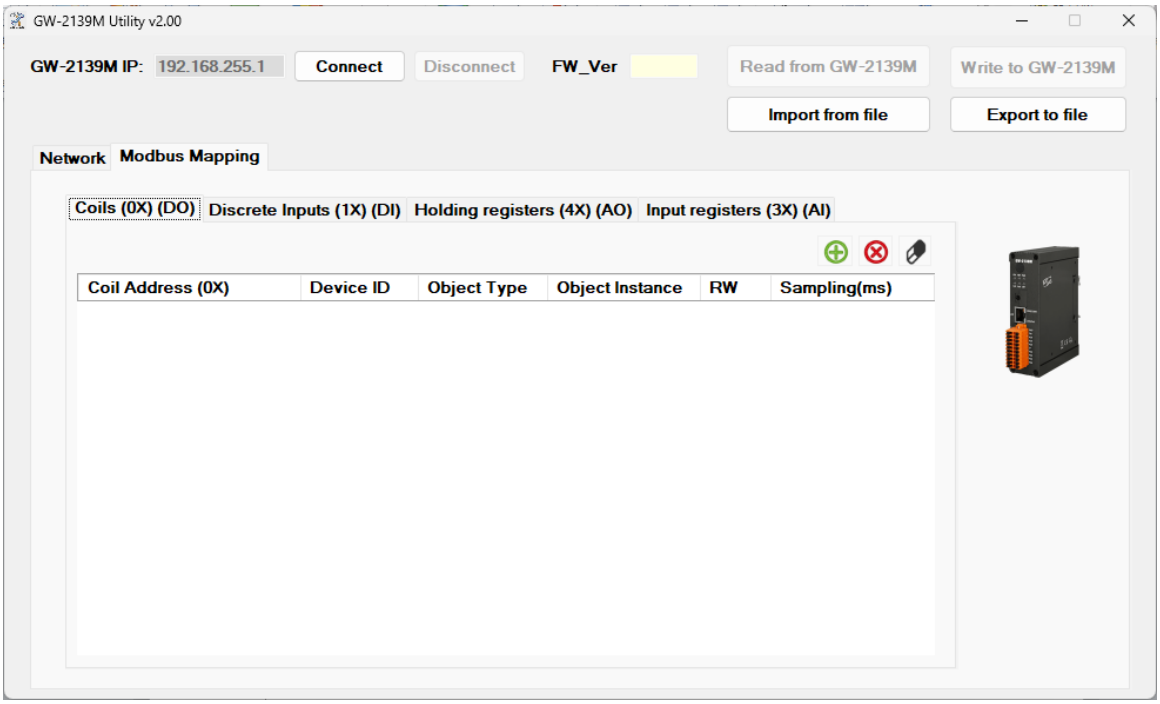
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may be increased slightly to ensure stable communication performance.

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3.2.3 Modbus Mapping Section

The【Modbus Mapping】configuration allows users to customize the data exchange logic by mapping data points from BACnet devices to the read/write areas of Modbus TCP. This enables seamless cross-protocol data integration and centralized monitoring between BACnet and Modbus networks.



Functional Description：

1. Pages Selection（Tabs）

   The top of the page contains four sub-pages corresponding to the Modbus regions:

   - Coils (0X)：Corresponding to BACnet Binary Output (BO) or Binary Value (BV) objects, used for switch-type output control.

   - Discrete Inputs (1X)：Corresponds to the BACnet Binary Input (BI) object for switching input monitoring.

   - Holding Registers (4X)：Corresponds to the BACnet Analog Output (AO) or Analog Value (AV) object for readable and writable analog output values.

   - Input Registers (3X)：Corresponds to the BACnet Analog Input (AI) object for analogue

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input monitoring.

2. Mapping Table

The table shows all the mappings that have been created, with each column corresponding to a group of BACnet objects associated with a Modbus register. The columns are described as follows：

- Coil Address (0X)：Modbus register address (varies by page type)。
- Device ID：BACnet device ID number to identify the target device.
- Object Type：BACnet object type（AI、AO、AV、BI、BO、BV、MSI、MSO、MSV）。
- Object Instance：BACnet object instance number.
- R/W：Read/Write Attribute, which indicates whether the item is readable (R) or writable (W).
- Sampling (ms)：Data sampling or enquiry time interval (milliseconds).

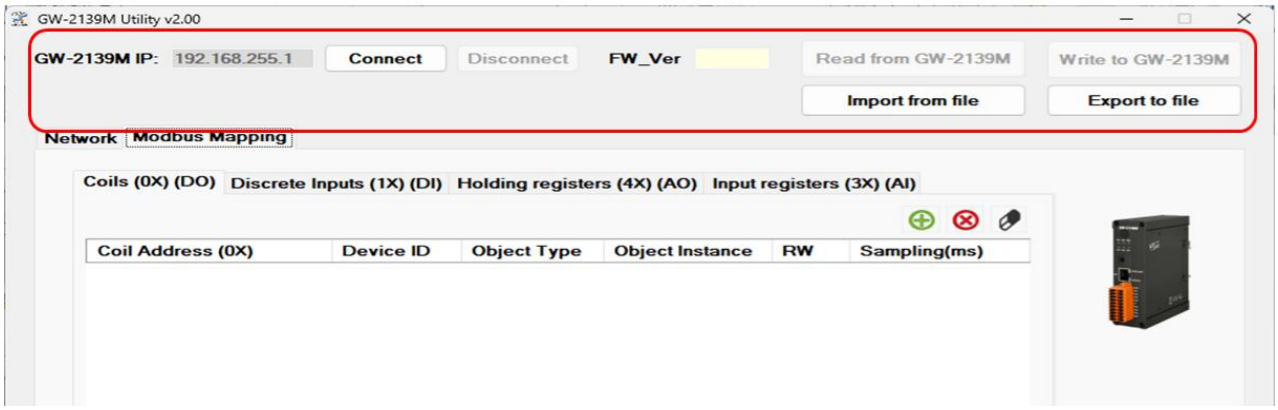
3. Functional Buttons

- ：Add a new corresponding item.
- ：Delete the selected Item。
- ：Clear all items.

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3.2.4 Connectivity, Export, Import and Read/Write Modules

The buttons at the top of the GW-2139M Utility provides the most commonly used options for connection and configuration operations. From this section, users can quickly connect to the module, read configuration data from the device, or write modified settings back to the module. There also includes import and export functions for configuration files, allowing users to easily back up existing settings or import saved configurations.



Button Description :

●GW-2139M IP

This field displays the IP address of the GW-2139M that the user intends to connect to. During configuration, the GW-2139M operates with a fixed IP address of 192.168.255.1, which cannot and does not need to be modified. Before clicking【Connect】 to establish communication with the module, the user must set the PC's IP address to the 192.168.x.x subnet and ensure that the device is in INIT mode.

●Connect / Disconnect

- 【Connect】: Establish a connection to the module with the specified IP address. If the connection is successful, the system will display the firmware version (FW_Ver) and enable the related buttons.

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-【Disconnect】：Disconnect and return to the offline status.

●FW_Ver（Firmware Version）

Displays the firmware version of the currently connected module, so that you can check whether it is the latest version. If it is blank, it means that it is not connected or cannot read the version information correctly.

●Read from GW-2139M

Reads the current settings from the connected module and loads them into the software interface. This function can be used to back up the field settings or to confirm the actual running parameters in the device. It is recommended to perform this action before making any changes to avoid overwriting existing settings.

●Write to GW-2139M

Write the edited setting data from the software into the module. This operation will overwrite the original settings of the module, so it is recommended to run 【Export to file】 to back up the setting file before proceeding. Please do not disconnect the power or network connection during the writing process to prevent incomplete data.

●Import from file / Export to file

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-【Import from file】: Import a previously saved configuration file (.txt) to quickly transfer or copy settings to multiple modules.

-【Export to file】: Export the current settings to a file for backup or transfer.

It is recommended that you always export the configuration file to preserve the original configuration before making any extensive changes.

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3.3 How to update the firmware

GW-2139M can update the firmware via a software tool (Windows) by the following:

1) Download the latest version of the firmware program and update Tool (FW_Update_Tool) on the GW-2139M product page and store it in a computer that you want to connect to GW-2139M.

- **Update Tool:** Please refers to ->

  http://www.icpdas.com/en/download/index.php?model=GW-2139M

2) Short the FW with GND of GW-2139M and turn on the power. When the six LEDs of GW-2139M turn blinking alternately, the GW-2139M is successfully entered the firmware updating mode.

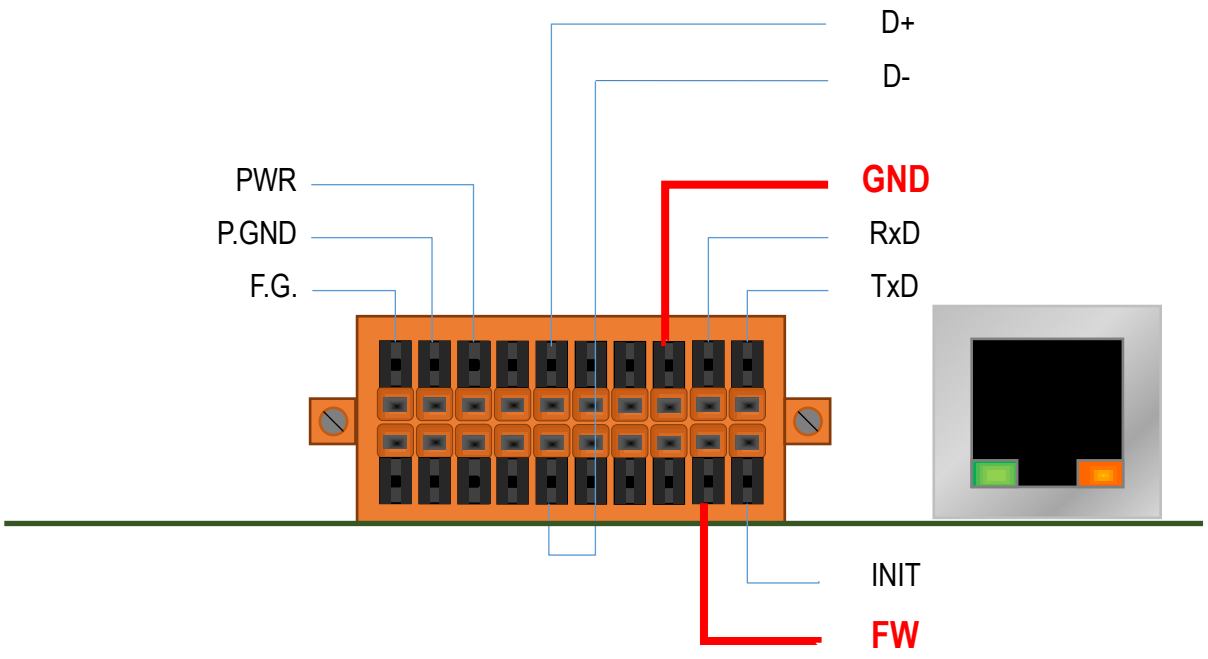


Figure 3.2 GW-2139M FW & GND Pin

3) Execute “FW_Update_Tool.exe” with the administrator privileges ( ) and follow the steps as

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Figure 3.3:

In "Download Interface", select a network port for connecting to GW-2139M

In "Firmware Path", select the latest firmware update file (GW2139M_xxxx.fw).

In "Firmware Update", click “Update” to start the firmware updating.

4) When the update is completed, “Update OK” will be displayed in the “FW_Update_Tool” window to indicate that the firmware updating is successful. Next, remove the short connection between FW and GND, and reboot the power supply, then check the current firmware version on the Web interface.

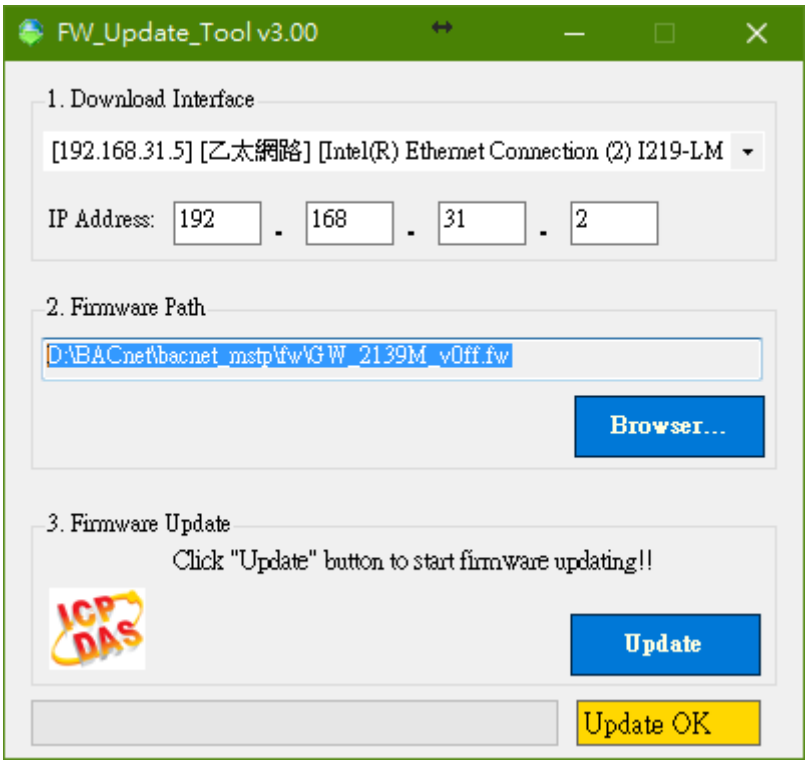


Figure 3.3 FW_Update_Tool firmware update steps

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