**I**ndustrial **C**omputer **P**roducts

**D**ata **A**cquisition **S**ystems

# MQ-7200M Series

# User Manual

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**Edited by Janice Hong**

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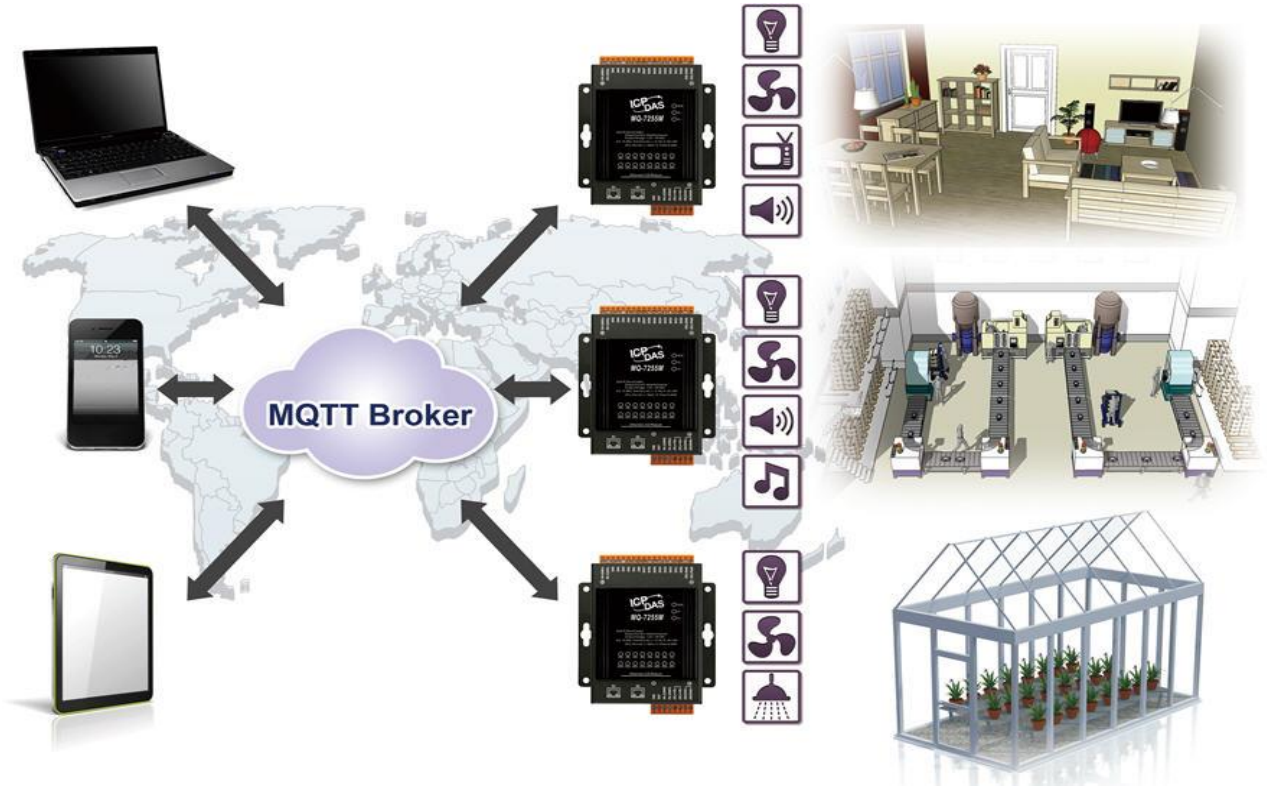
# 1. Introduction

The MQ-7200M series is a web-based Ethernet I/O module equipped with a built-in web server allows the user to configure module and control/monitor the status of digital I/O by simply using a regular web browser.

Support for MQTT protocol makes it easy to connect sensors to Internet of Things (IoT) system via the MQ-7200M series module. Users can simply and effectively control/monitor remote sensors with MQTT client tools on the PC/NB or mobile devices.



# 1.1 Features

The MQ-7200M module offers the most comprehensive configuration focused on meeting specific application requirements. The following details the features designed to simplify installation, configuration and application.

### Support for MQTT Protocol

MQTT stands for Message Queuing Telemetry Transport. It is a machine-to-machine (M2M) /"Internet of Things" connectivity protocol with extremely lightweight publish/subscribe messaging transport. It is useful for mobile applications because of its small size, low power usage, minimized data packets, and efficient distribution of information to one or many receivers.

### Built-in I/O

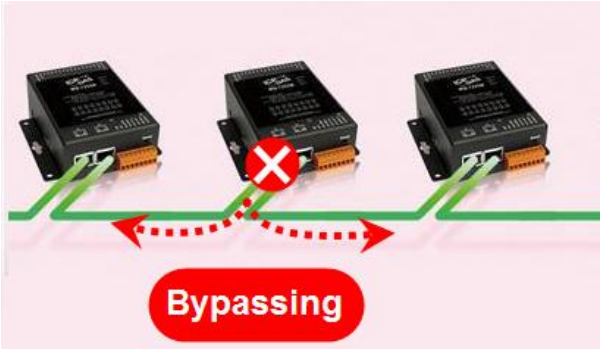
Various I/O components are mixed with multiple channels in a single I/O module, which provides the most cost effective I/O usage and enhances performance of the I/O operations.

### Daisy-Chain Ethernet Cabling

The MQ-7200M Series has a built-in two-port Ethernet switch to implement daisy-chain topology. The cabling is much easier and total costs of cable and switch are significantly reduced.

### LAN Bypass

LAN Bypass feature guarantees the Ethernet communication. It will automatically activate to continue the network traffic if any one of the MQ-7200M loses its power



## Dual Watchdog

The Dual Watchdog consists of a Module Watchdog and a Communication Watchdog. The actions of digital output are also associated to the Dual Watchdog.

**Module Watchdog** is a built-in hardware circuit to monitor the operation of the module and will reset the CPU if a failure occurs in the hardware or the software. Then the Power-on Value of digital output will be loaded.

**Communication Watchdog** is a software function to monitor the communication between the MQTT broker and the MQ-7200M. When the MQ-7200M is disconnected from the MQTT broker for a while, the watchdog forces the digital output to pre-defined Safe Value to prevent unpredictable damage of the connected devices.

## Power-on Value and Safe Value

Power-on value and Safe Value are designed to improve system safety:

**Power-on Value**: The Power-on Value is loaded into the digital output when the module is powered-on or reset by Module Watchdog.

**Safe Value**: When the Communication Watchdog is enabled and a Communication Watchdog timeout occurs, the “safe value” is loaded into the digital output.

## Highly Reliable Under Harsh Environment

Wide Operating Temperature Range: -25 ~ +75°C

Storage Temperature: -30 ~ +80°C

Humidity 10 ~ 90% RH (Non-condensing)

## Reset Button

The reset button is used to restore all settings to factory defaults. It is very useful especially when the user forgets the IP address to access the MQ-7200M module. Pressing and holding the reset button for at least 3 seconds will restore the module to its factory defaults. For more information, see section “7.4. How to restore MQ-7200M to default settings?”.

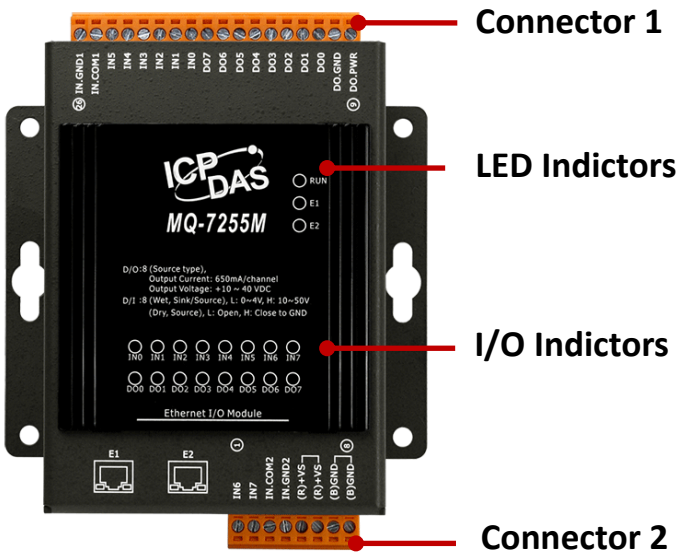
## LED indicators for DIO status

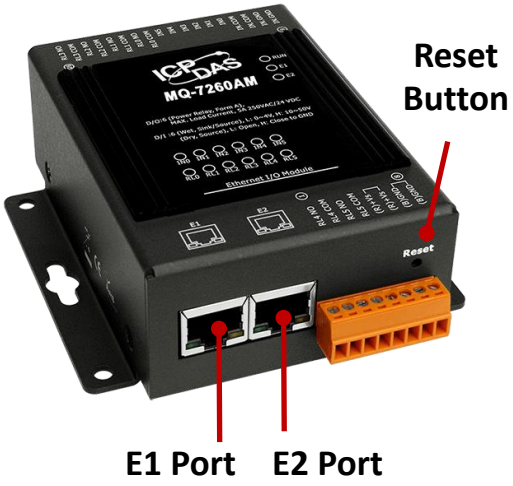
The LED indicators are used to indicate the status of digital I/O on the MQ-7200M.

## Two pair of power input pins

The MQ-7200M has 4 pins as two pairs for the power input to ease the wiring.

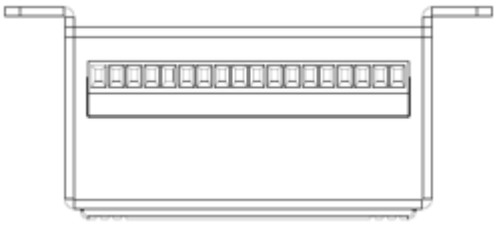
## 1.2 Overview



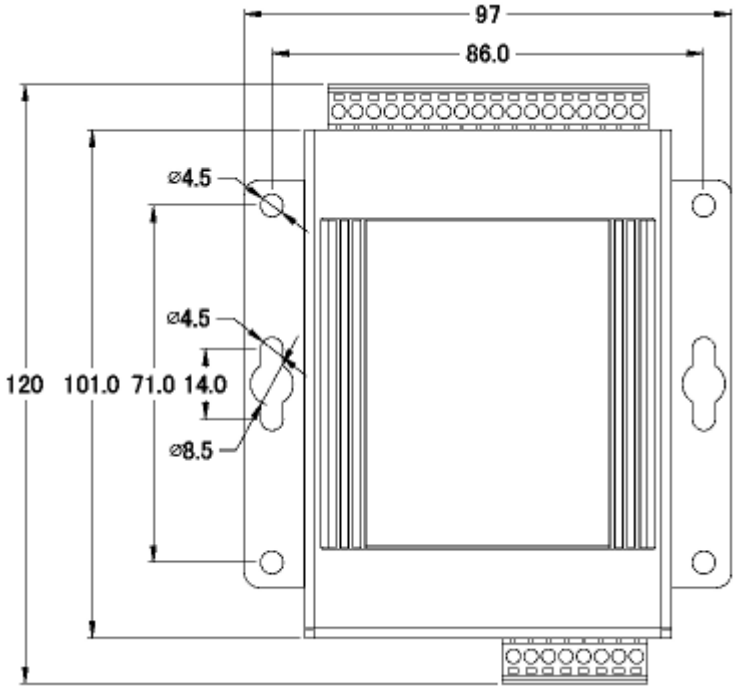

| MQ-7200M | Label | Status | Description |
|---|---|---|---|
| LED Indicators | RUN | Flashing | The unit is turned on and ready. |
| | E1 | On | A link has been established on the E1 port. |
| | | Off | No link is established on the E1 port. |
| | | Flashing | Data is now transferred via the E1 port. |
| | E2 | On | A link has been established on the E2 port. |
| | | Off | No link is established on the E2 port. |
| | | Flashing | Data is now transferred via the E2 port. |
| | I/O Indictors | The number of I/O will vary depending on the module mode | |
| Connector 1 | | The specific design and functionality of the module depend on its specifications. | |
| Connector 2 | | | |
| Reset Button | | Reset the module by pressing the Reset button for 3 seconds | |

## 1.3 Dimensions (Unit: mm)

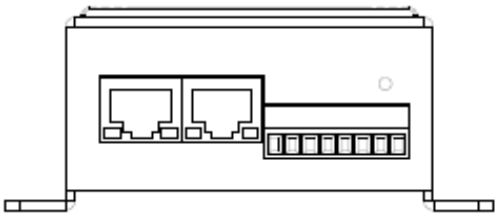


**Top View**

**Left Side View**




**Front View**



**Bottom View**

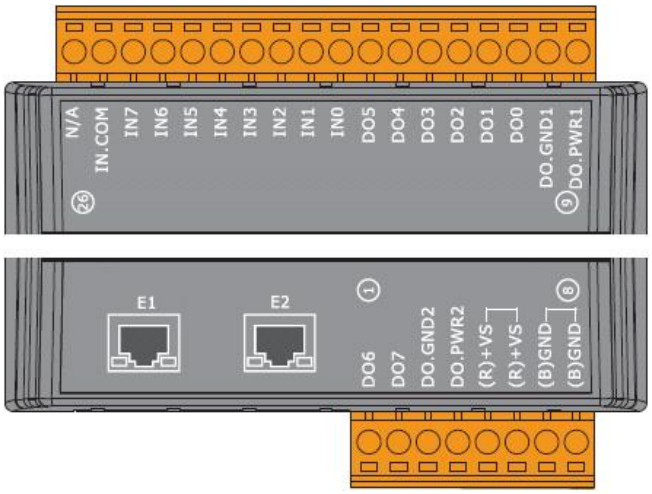
# 2. Hardware Information

## 2.1 MQ-7244M

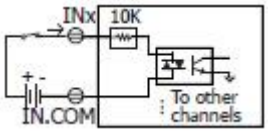
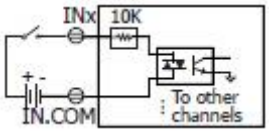
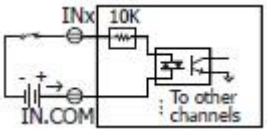
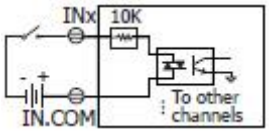
### I/O Specifications

| Digital Input | |
|---|---|
| Channels | 8 |
| Type | Wet Contact |
| Sink/Source (NPN/PNP) | Sink/Source |
| On Voltage Level | +10 $V_{DC}$ ~ +50$V_{DC}$ |
| Off Voltage Level | +4 $V_{DC}$ max. |
| Input Impedance | 10 KΩ |
| Overvoltage Protection | 70 $V_{DC}$ |
| **Digital Output** | |
| Channels | 8 |
| Type | Isolated Open Collector |
| Sink/Source (NPN/PNP) | Sink |
| Max. Load Current | 650 mA/Channel at 25°C<br>Direct Drive Power Relay Module |
| Load Voltage | +3.5 $V_{DC}$ ~ +50 $V_{DC}$ |
| Overvoltage Protection | 60 $V_{DC}$ |
| Overload Protection | 1.4 A |
| Short-circuit Protection | Yes |
| Power-on Value | Programmable |
| Safe Value | Programmable |

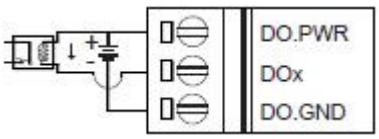
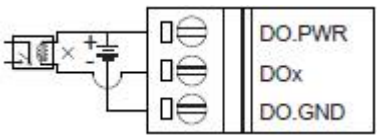
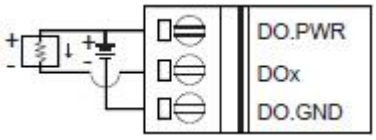
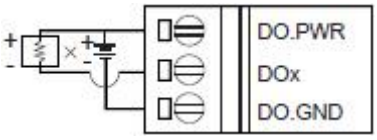
## Pin Assignments




## Wire Connections

| Digital Input | Readback as 1 | Readback as 0 |
|---|---|---|
| | +10 ~ +50 $V_{DC}$ | Open or < 4 $V_{DC}$ |
| Sink |  |  |
| Source |  |  |



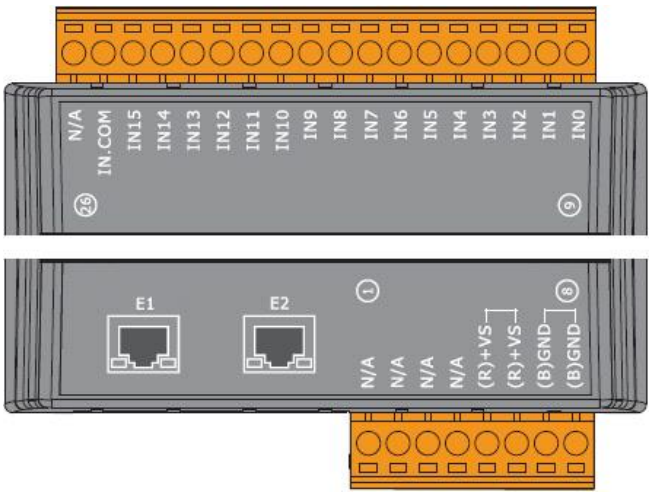
| Digital Output | ON State: Readback as 1 | OFF State: Readback as 0 |
|---|---|---|
| Drive Relay |  |  |
| Resistance Load |  |  |

# 2.2 MQ-7251M

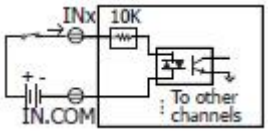
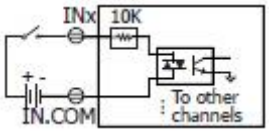
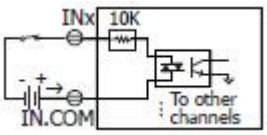
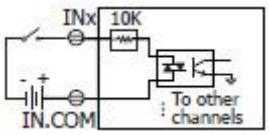
## I/O Specifications

| Digital Input | |
|---|---|
| Channels | 16 |
| Type | Wet Contact |
| Sink/Source (NPN/PNP) | Sink/Source |
| On Voltage Level | +10 $V_{DC}$ ~ +50$V_{DC}$ |
| Off Voltage Level | +4 $V_{DC}$ max. |
| Input Impedance | 10 KΩ |
| Overvoltage Protection | 70 $V_D$ |

## Pin Assignments




## Wire Connections

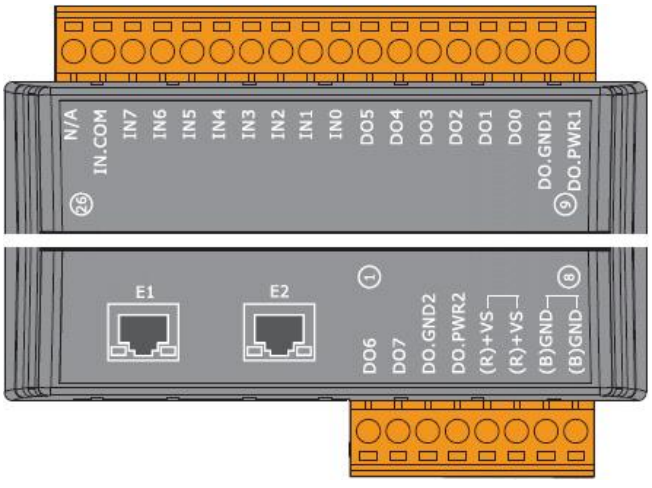
| Digital Input | Readback as 1 | Readback as 0 |
|---|---|---|
| Sink | +10 ~ +50 $V_{DC}$ | Open or < 4 $V_{DC}$ |
| |  |  |
| Source |  |  |

# 2.3 MQ-7252M

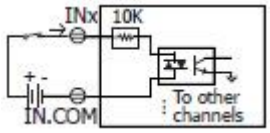
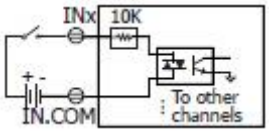
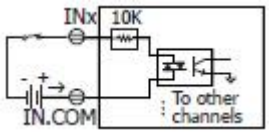
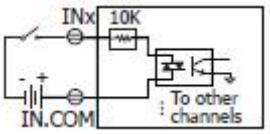
## I/O Specifications

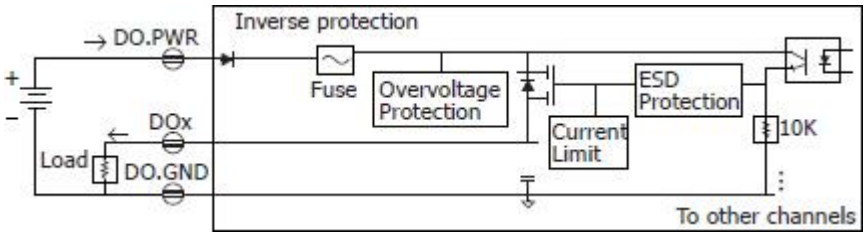
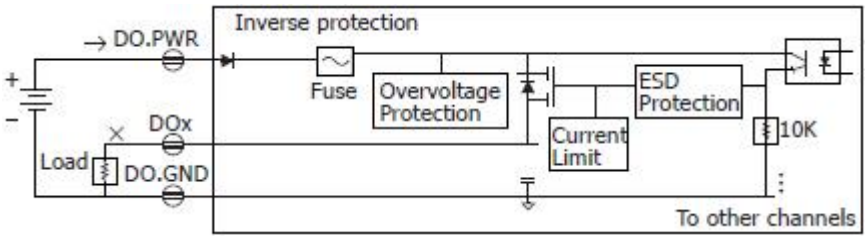
| Digital Input | |
|---|---|
| Channels | 8 |
| Type | Wet Contact |
| Sink/Source (NPN/PNP) | Sink/Source |
| On Voltage Level | +10 $V_{DC}$ ~ +50$V_{DC}$ |
| Off Voltage Level | +4 $V_{DC}$ max. |
| Input Impedance | 10 KΩ |
| Overvoltage Protection | 70 $V_{DC}$ |
| **Digital Output** | |
| Channels | 8 |
| Type | Isolated Open Collector |
| Sink/Source (NPN/PNP) | Source |
| Max. Load Current | 650 mA/Channel at 25°C |
| Load Voltage | +10 $V_{DC}$ ~ +40 $V_{DC}$ |
| Overvoltage Protection | 47 $V_{DC}$ |
| Overload Protection | - |
| Short-circuit Protection | Yes |
| Power-on Value | Programmable |
| Safe Value | Programmable |

## Pin Assignments



## Wire Connections

| Digital Input | Readback as 1 | Readback as 0 |
|---|---|---|
| Sink | +10 ~ +50 $V_{DC}$ | Open or < 4 $V_{DC}$ |
| |  |  |
| Source |  |  |

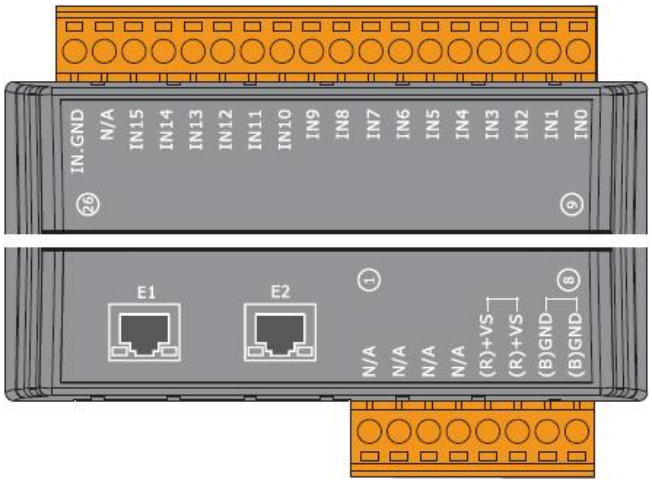
| Digital Output | ON State, Readback as 1 |
|---|---|
| Source |  |
| | **OFF State, Readback as 0** |
| |  |

# 2.4 MQ-7253M

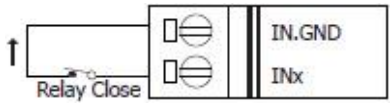
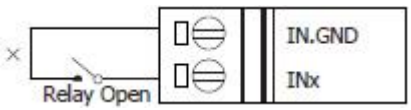
## I/O Specifications

| Digital Input | |
|---|---|
| Channels | 16 |
| Type | Dry Contact |
| Sink/Source (NPN/PNP) | Source |
| On Voltage Level | Close to GND |
| Off Voltage Level | Open |
| Overvoltage Protection | - |
| Effective Distance | 500 M Max. |

## Pin Assignments




## Wire Connections

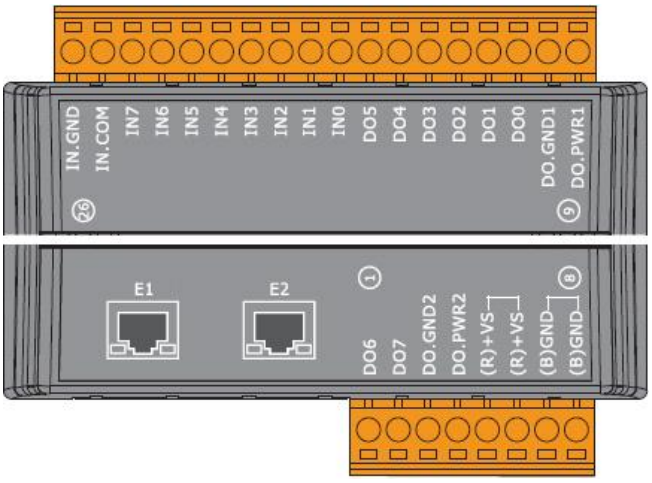
| Digital Input | ON State: Readback as 1 |
|---|---|
| Dry Contact |  |
| | OFF State: Readback as 0 |
| |  |

# 2.5 MQ-7255M

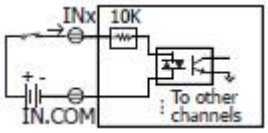
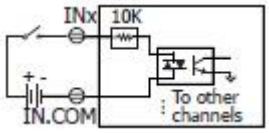
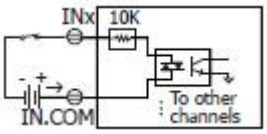
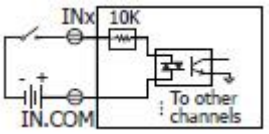
## I/O Specifications

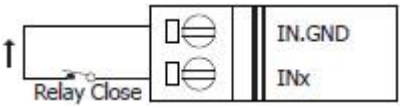
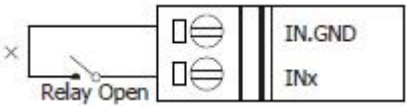
| Digital Input | | |
|---|---|---|
| Channels | | 8 |
| Type | | Dry and Wet Contact |
| Sink/Source (NPN/PNP) | | Dry: Source<br>Wet: Sink/Source |
| Wet Contact | On Voltage Level | +10 $V_{DC}$ ~ +50 $V_{DC}$ |
| | Off Voltage Level | +4 $V_{DC}$ max. |
| Dry Contact | On Voltage Level | Close to GND |
| | Off Voltage Level | Open |
| Input Impedance | | 10 KΩ |
| Overvoltage Protection | | +70 $V_{DC}$ |
| **Digital Output** | | |
| Channels | | 8 |
| Type | | Isolated Open Collector |
| Sink/Source (NPN/PNP) | | Source |
| Max. Load Current | | 650 mA/channel at 25°C |
| Load Voltage | | +10 $V_{DC}$ ~ +40 $V_{DC}$ |
| Overvoltage Protection | | 47 $V_{DC}$ |
| Overload Protection | | - |
| Short-circuit Protection | | Yes |
| Power-on Value | | Programmable |
| Safe Value | | Programmable |

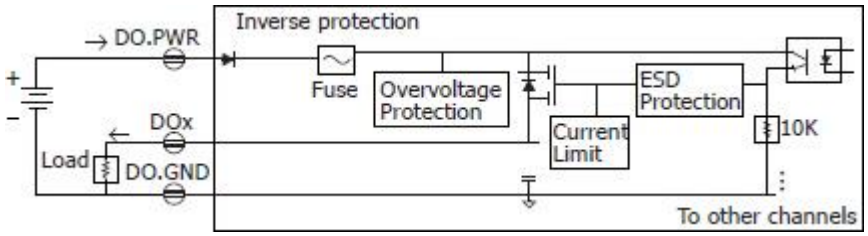
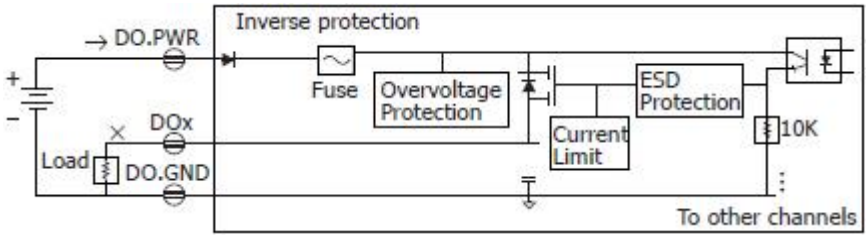
## Pin Assignments



## Wire Connections

| Digital Input | Readback as 1 | Readback as 0 |
|---|---|---|
| Wet Contact (Sink) | +10 ~ +50 $V_{DC}$ | Open or < 4 $V_{DC}$ |
| |  |  |
| Wet Contact (Source) |  |  |

| Digital Input | ON State: Readback as 1 | OFF State: Readback as 0 |
|---|---|---|
| Dry Contact |  |  |

| Digital Output | ON State: Readback as 1 |
|---|---|
| Source |  |
| | **OFF State: Readback as 0** |
| |  |

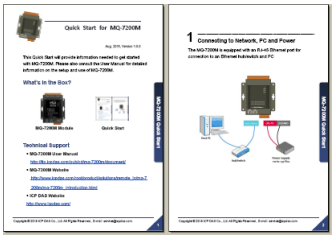
# 3. Getting Started

If the user is new to using the MQ-7200M module, start with this chapter as it includes a guided tour that provides a basic overview of how to install, configure and use the module.

## What's in the BOX?

Before starting any task, please check the package contents. If any of the following items are either missing or damaged, contact the dealer or distributor.

MQ-7200M Module



Quick Start Guide

## Technical Support

- **MQ-7200M User Manual**
  https://www.icpdas.com/en/download/show.php?num=2675

- **MQ-7200M Website**
  https://www.icpdas.com/en/product/guide+Remote__I_O__Module__and__Unit+Ethernet__I_O__Modules+MQ-7200M

- **ICP DAS Website**
  http://www.icpdas.com/

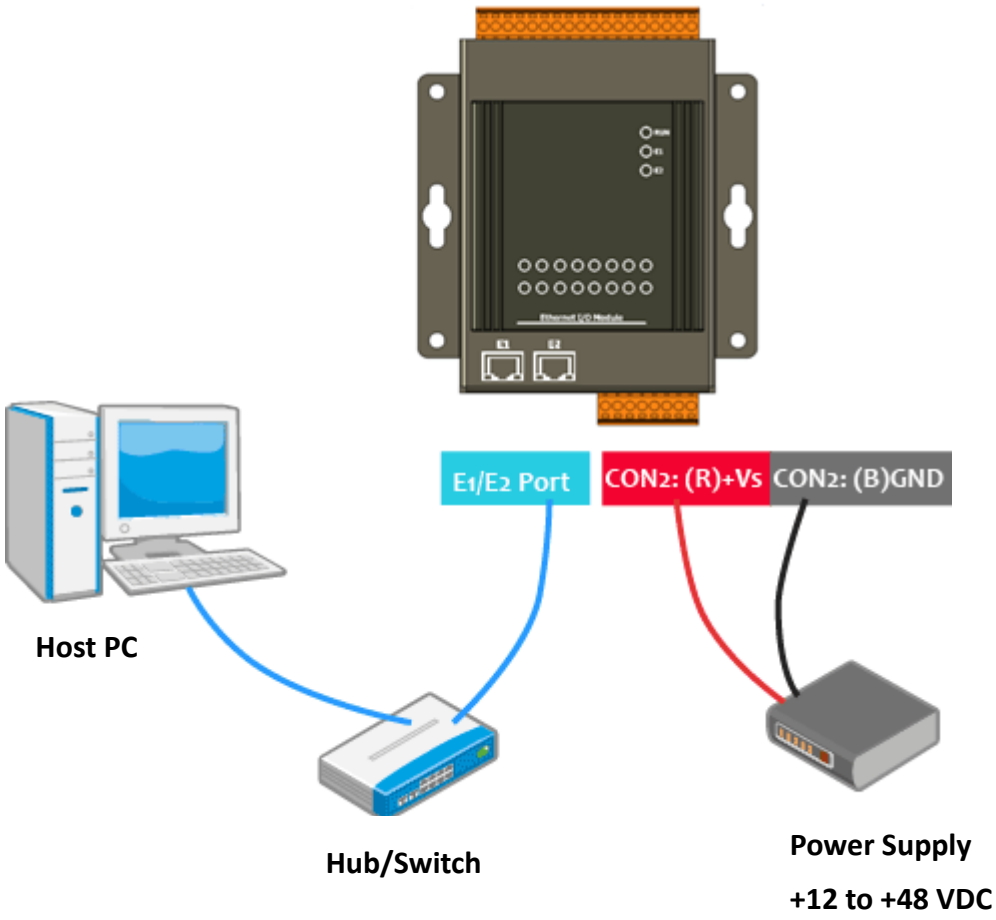
## 3.1 Cabling Power and Network

**Step 1:**

**Connect the computer to the Ethernet Port via the Hub or Switch.**

**Step 2:**

**Connect the positive of the power supply to the terminal marked "(R)+Vs".**
**Connect the negative of the power supply to the terminal marked "(B)GND".**



## 3.2 Installing the MiniOS7 Utility

The MiniOS7 Utility provides a quick and easy way to configure the Ethernet settings, update OS image or firmware file to the MQ-7200M from a computer. After the installation has been completed, a new shortcut for the MiniOS7 Utility will be displayed on the desktop.

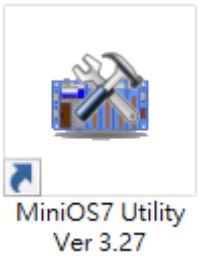
**Step 1: Install the MiniOS7 Utility tool**

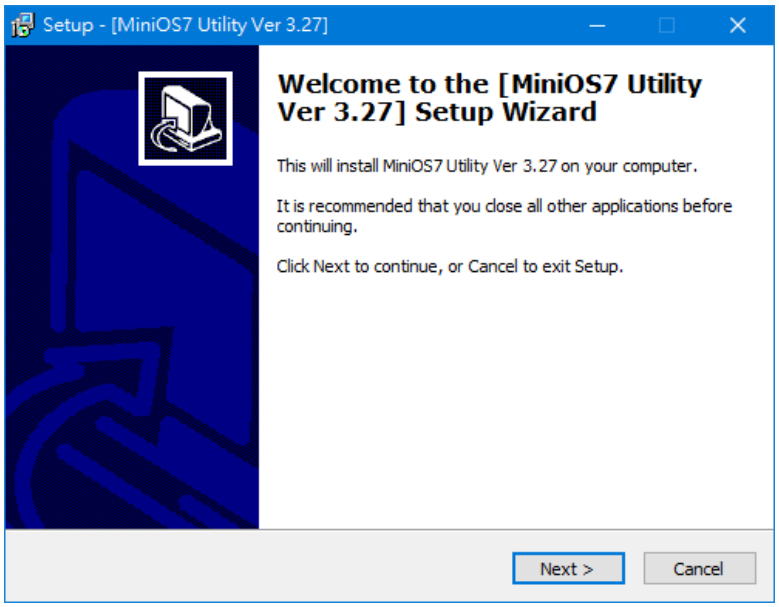
The latest version of the MiniOS7 Utility can be obtained from the ICP DAS website:

https://www.icpdas.com/en/product/guide+Software+Development__Tools+MiniOS7

**Step 2: Follow the instructions in the Setup Wizard to complete the installation**

After the installation has been completed, a new short cut for the MiniOS7 Utility will be displayed on the desktop.



## 3.3 Configuring Network Settings

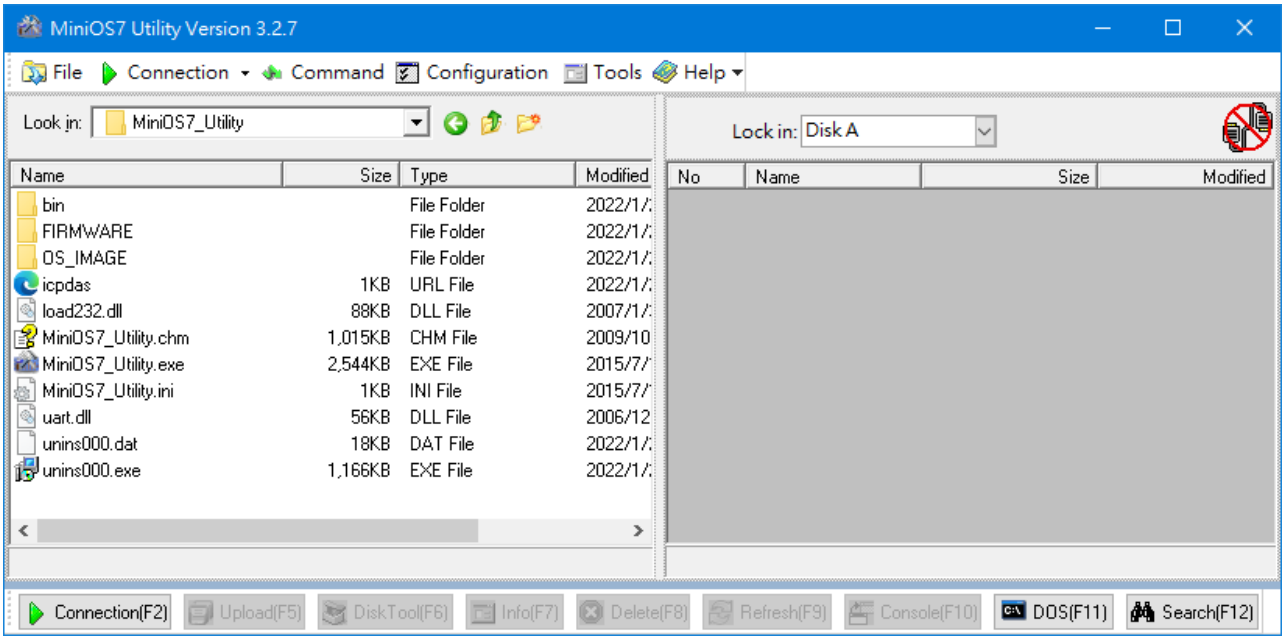
The MQ-7200M comes with default network settings as the table below. Before starting the MQ-7200M, valid network settings for the LAN where the module will operate need be set to the module.

**Default Ethernet Settings**

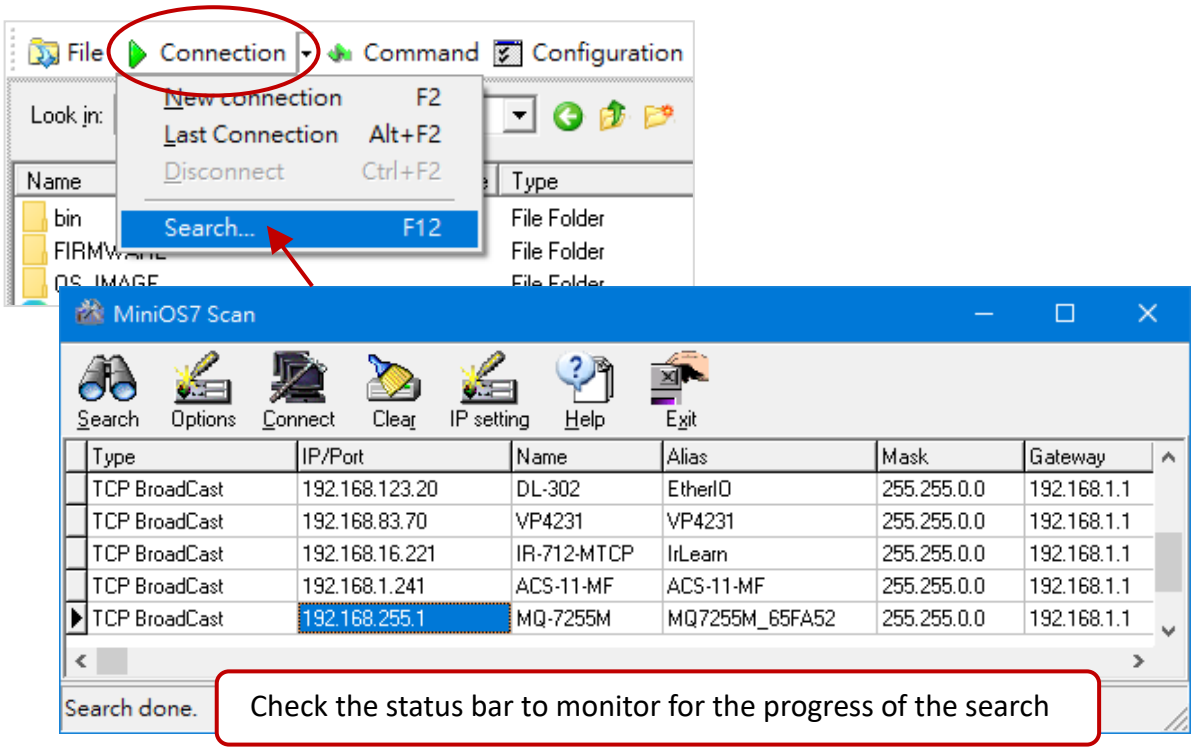
| Item | Default |
|---|---|
| IP Address | 192.168.255.1 |
| Subnet Mask | 255.255.0.0 |
| Gateway | 192.168.0.1 |

### Step 1: Run the MiniOS7 Utility

Double-click the "**MiniOS7 Utility**" shortcut on the desktop.

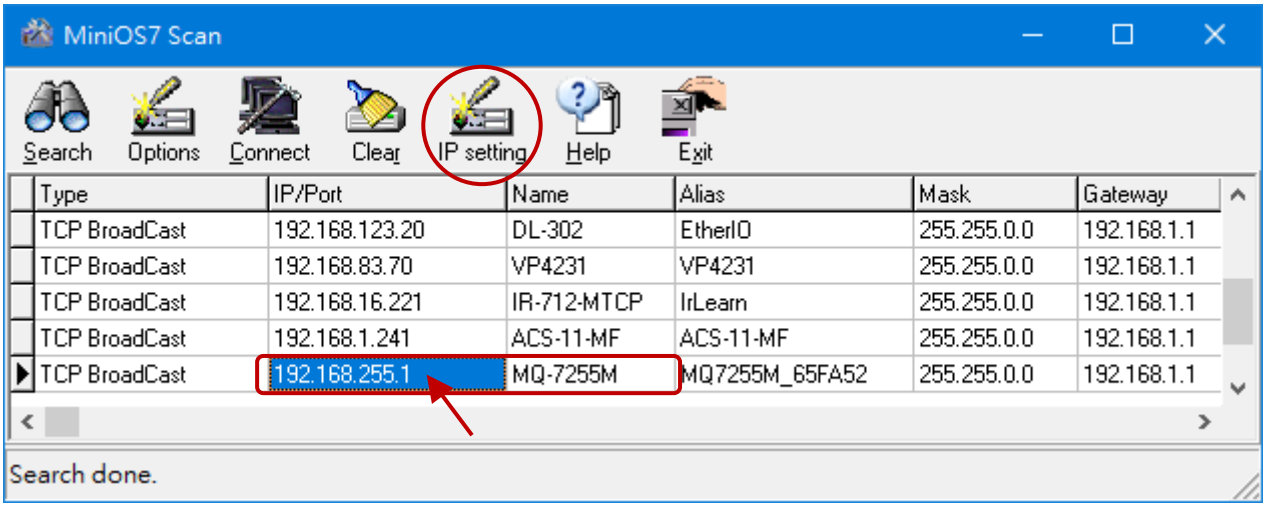


**Step 2: Click the menu "Connection > Search" (or press the "F12" key) to search for the module.**



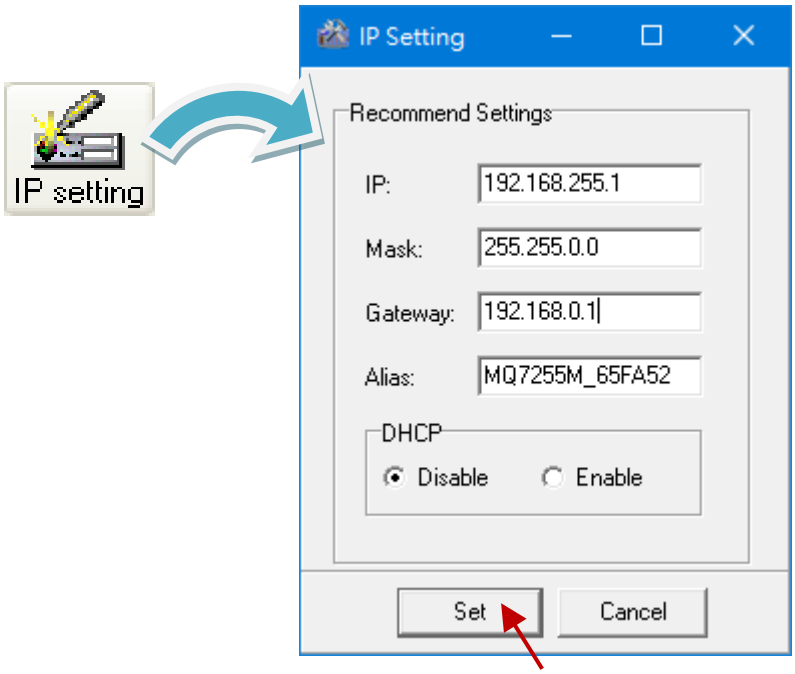

**Step 3: Click the "192.168.255.1" in the IP/Port field and click the "IP Settings" button**

Click the item you want to configure (the default IP= "**192.168.255.1**") and then click the "**IP Settings**" button to display the configuration dialog box.



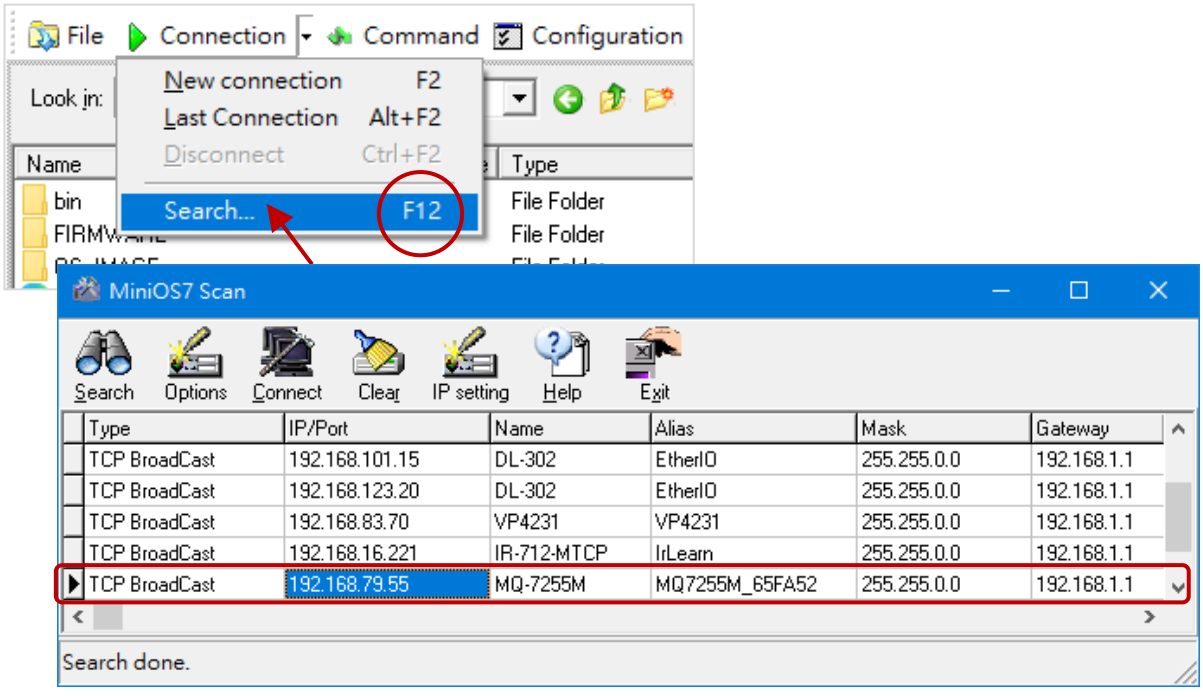
### Step 4: Specify the appropriate IP/Mask/Gateway address

In the **IP Settings** dialog box, the user can manually specify the IP, Mask, Gateway addresses, and alias. Alternatively, the user can enable the DHCP Client function to dynamically obtain an IP address from the DHCP Server. After entering the appropriate values, click the "**Set**" button to update the configuration.




### Step 5: Verify the new settings

Reboot the module and repeat Step 2 by pressing the "F12" key to search for the module again. Confirm that the new settings have been applied.



## 3.4 Logging in to Web Interface

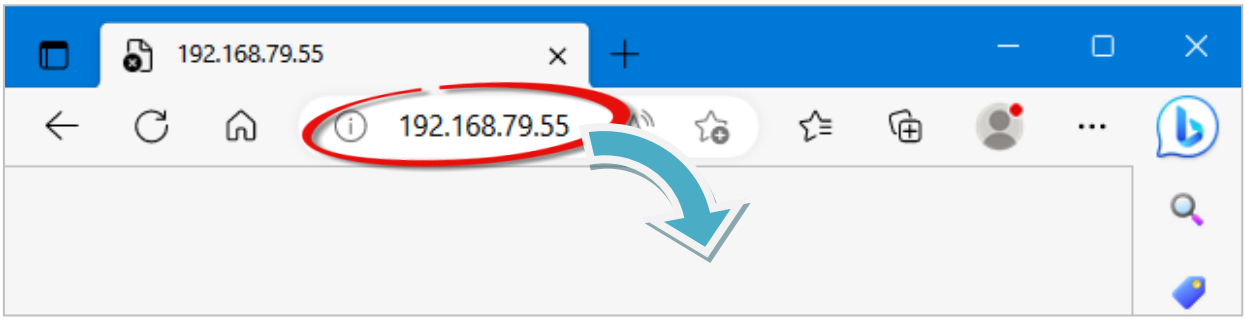
The MQ-7200M series module provides a web-based user interface that allows users to manage the module, access I/O, and monitor the running status through a standard web browser.

**Step 1: Launch the browser**

The user can use a standard web browser such as Mozilla Firefox or Internet Explorer to log in to the MQ-7200M module.

**Step 2: Enter the IP address for the MQ-7200M**

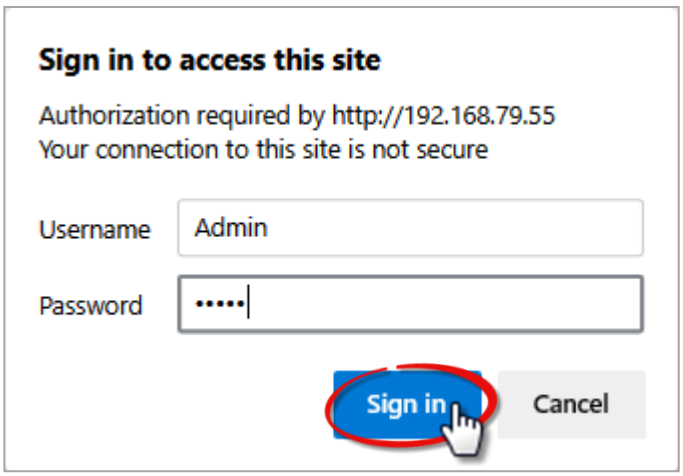
If the user has not changed the default IP address of the MQ-7200M module, refer to Sections 3.2. and 3.3. to configure it.




**Step 3: Enter the User name and Password**

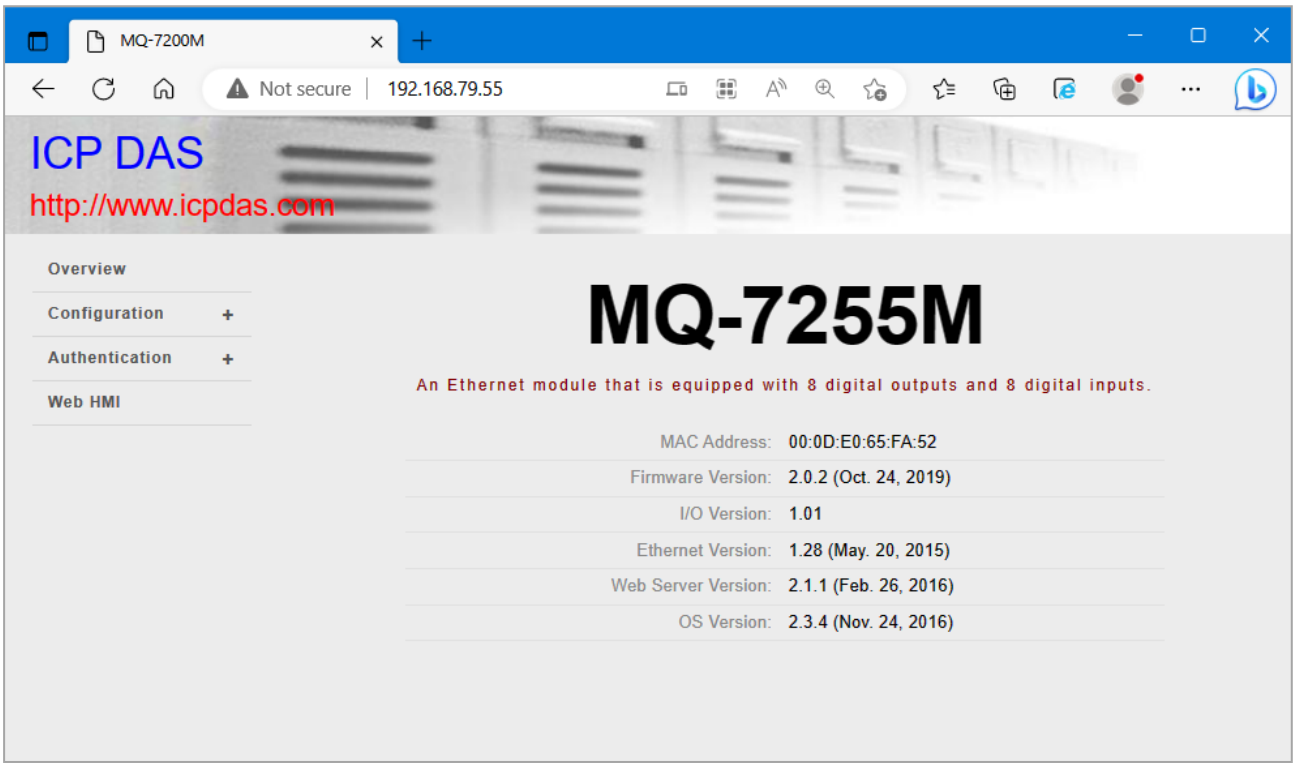
The factory default username and password are as follows:

| Item | Default |
|---|---|
| User name | Admin |
| Password | Admin |



**Step 4: Welcome to the MQ-7200M web interface**

After logging into the module, the Overview page provides a brief description of the module, including its MAC address, the current firmware version, and other relevant information.

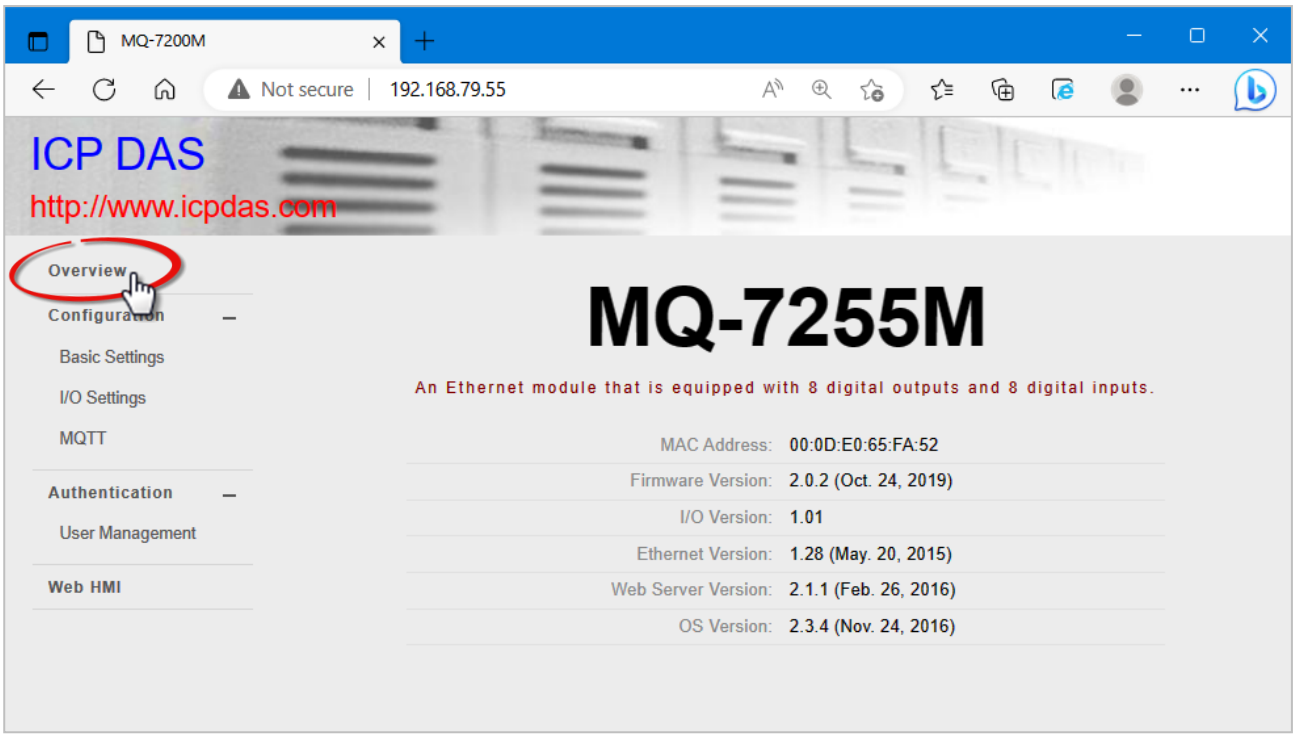


# 4. Configuration

The web-based user interface allows users to configure the module, access and monitor the I/O status through a web browser. Before starting the configuration steps, please refer to **Chapter 3 - Getting Started** to configure and log in to the MQ-7200M module.

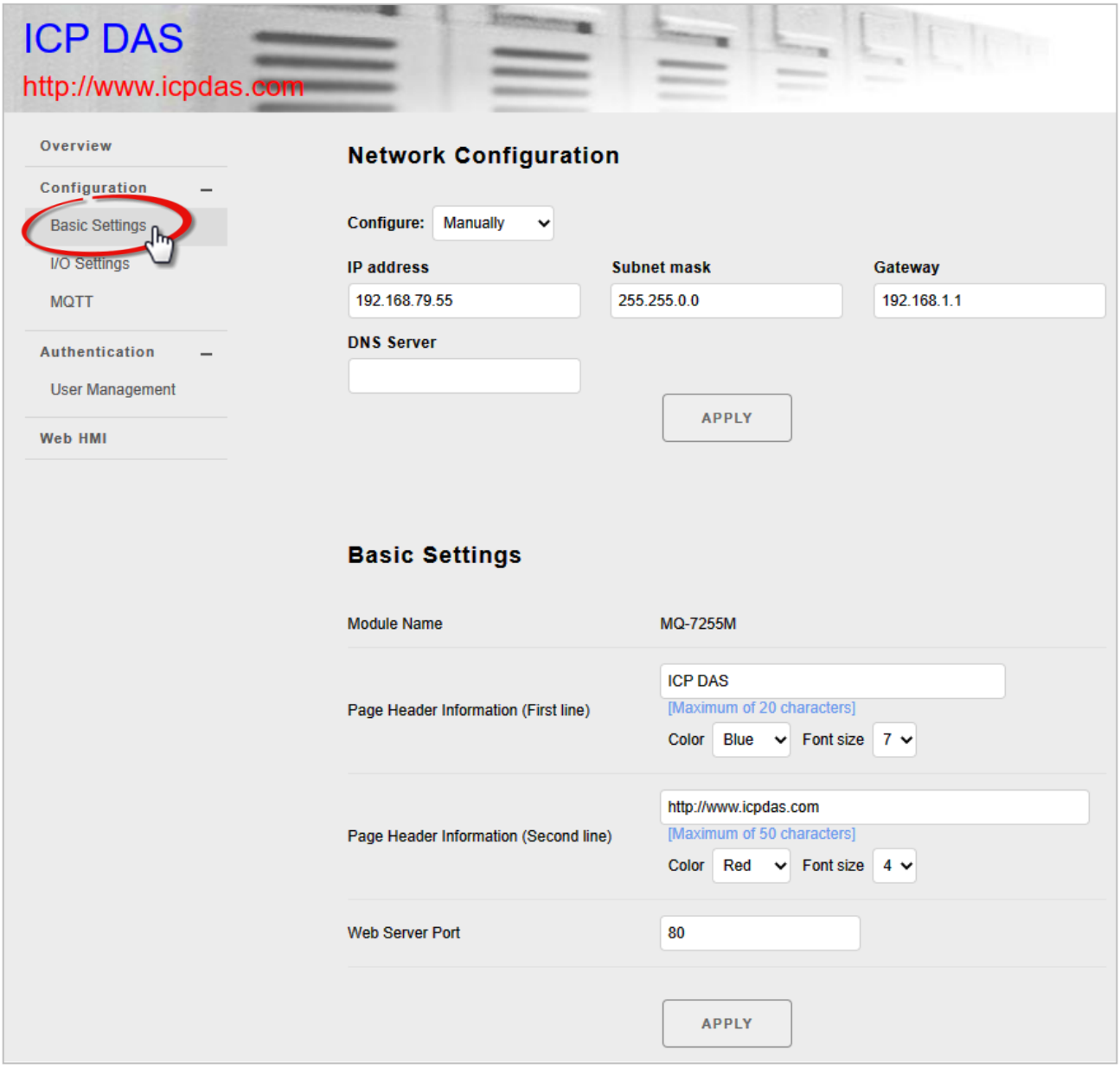
### Step 1: Welcome to the MQ-7200M web interface

After logging into the MQ-7200M web interface, the user will see relevant information about the module on the "**Overview**" page.



# 4.1 Basic Settings

The **Basic Settings** page includes **Network Configuration** and **Basic Settings** sections.




## Network Configuration

In the **Configure** dropdown menu, there are two ways to configure the network:

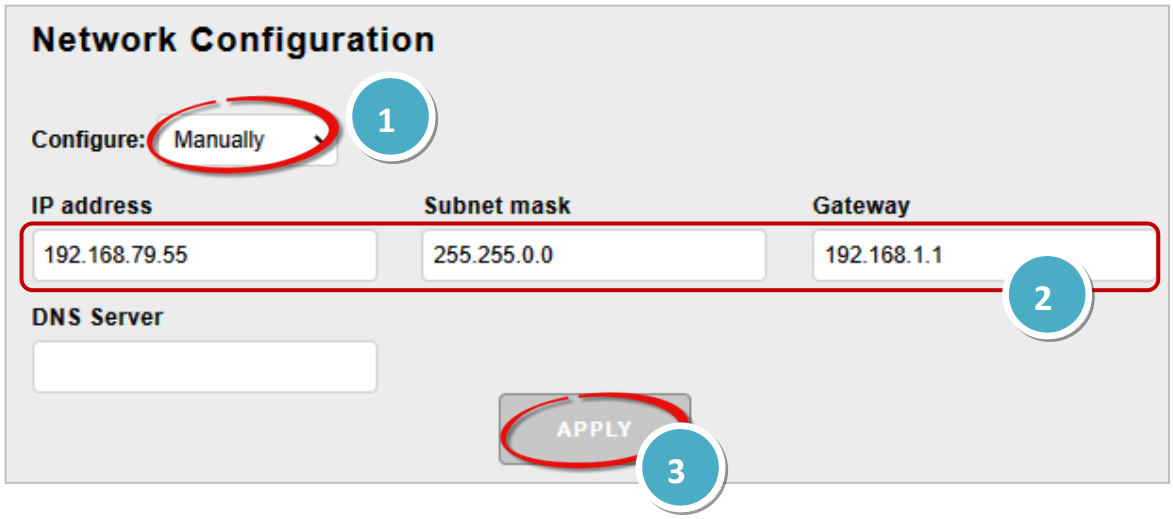
- **Manual configuration – Manually**: If DHCP is not available, you can manually set up the IP address, subnet mask, and gateway addresses for the MQ-7200M module.
- **Dynamic configuration – Using DHCP**: By using DHCP, the MQ-7200M can automatically acquire a network address from the DHCP server.

In general, network settings include the following parameters:

- **IP address**: Each MQ-7200M module needs to be configured with a unique IP address to log in to the module's settings page on the network.
- **A subnet mask**: The subnet mask indicates which portion of the IP address that is used to identify the local network or subnet.
- **Gateway**: A gateway (or router) is a system that is used to connect a network with one or more other networks.
- **DNS Server:** DNS stands for domain name system whose main function is to translate domain names (e.g., www.icpdas.com) to IP addresses and vice versa.

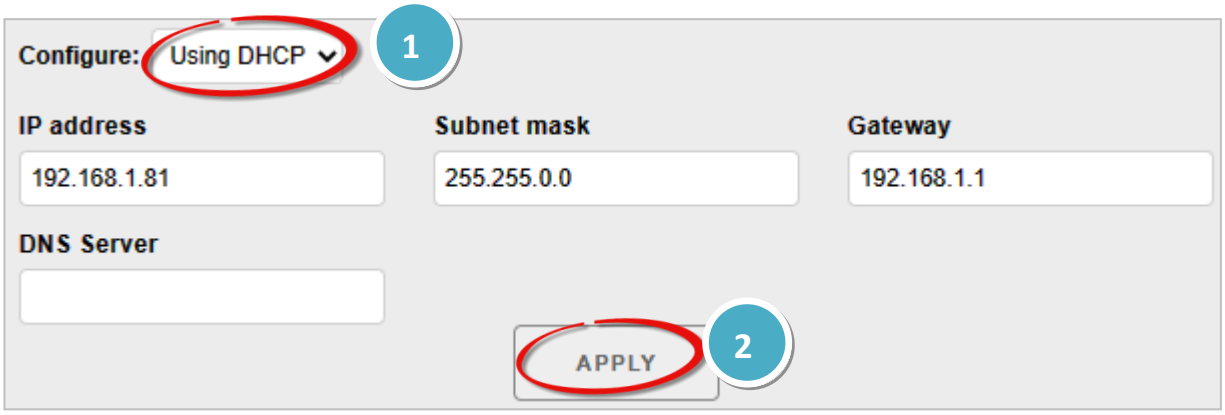
## Manual Configuration

Method: Select the **Manually** in the **Configure** dropdown menu. Enter the appropriate addresses in the respective fields, and then click the **Apply** button to complete the network configuration.




## Dynamic Configuration

Method: Select the **Using DHCP** in the **Configure** dropdown menu and then click the **Apply** button. When utilizing DHCP, the addresses cannot be changed manually.

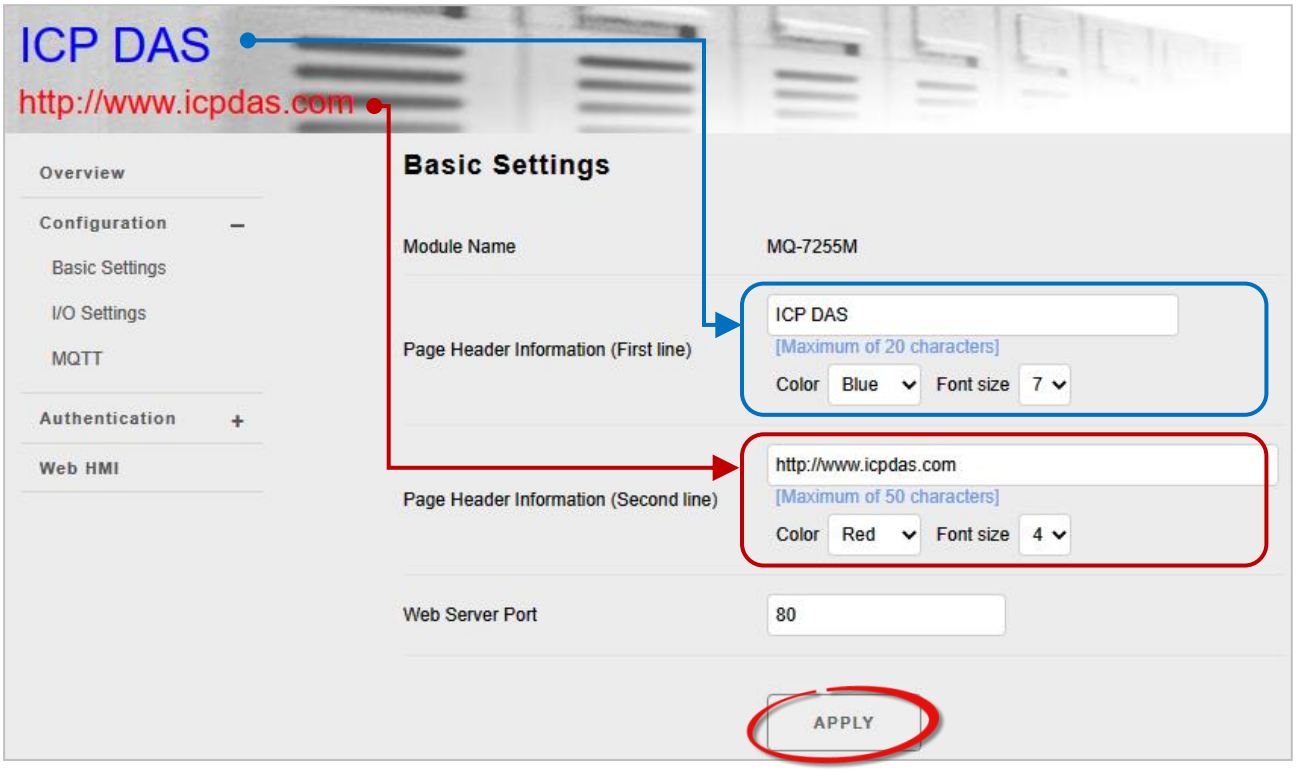


## Basic Settings

This section includes the following items:

- **Module Name**: The initial value for this field will depend on the model of the module and cannot be modified.
- **Page Header Information (First line)** and **Page Header Information (Second line)**: The title of the website that is displayed at the top left-hand corner of the interface, for example the company name and web address as per the example below.
- **Web Server Port**: This option specifies which port is to be used for the web server. By default, the HTTP port is 80.

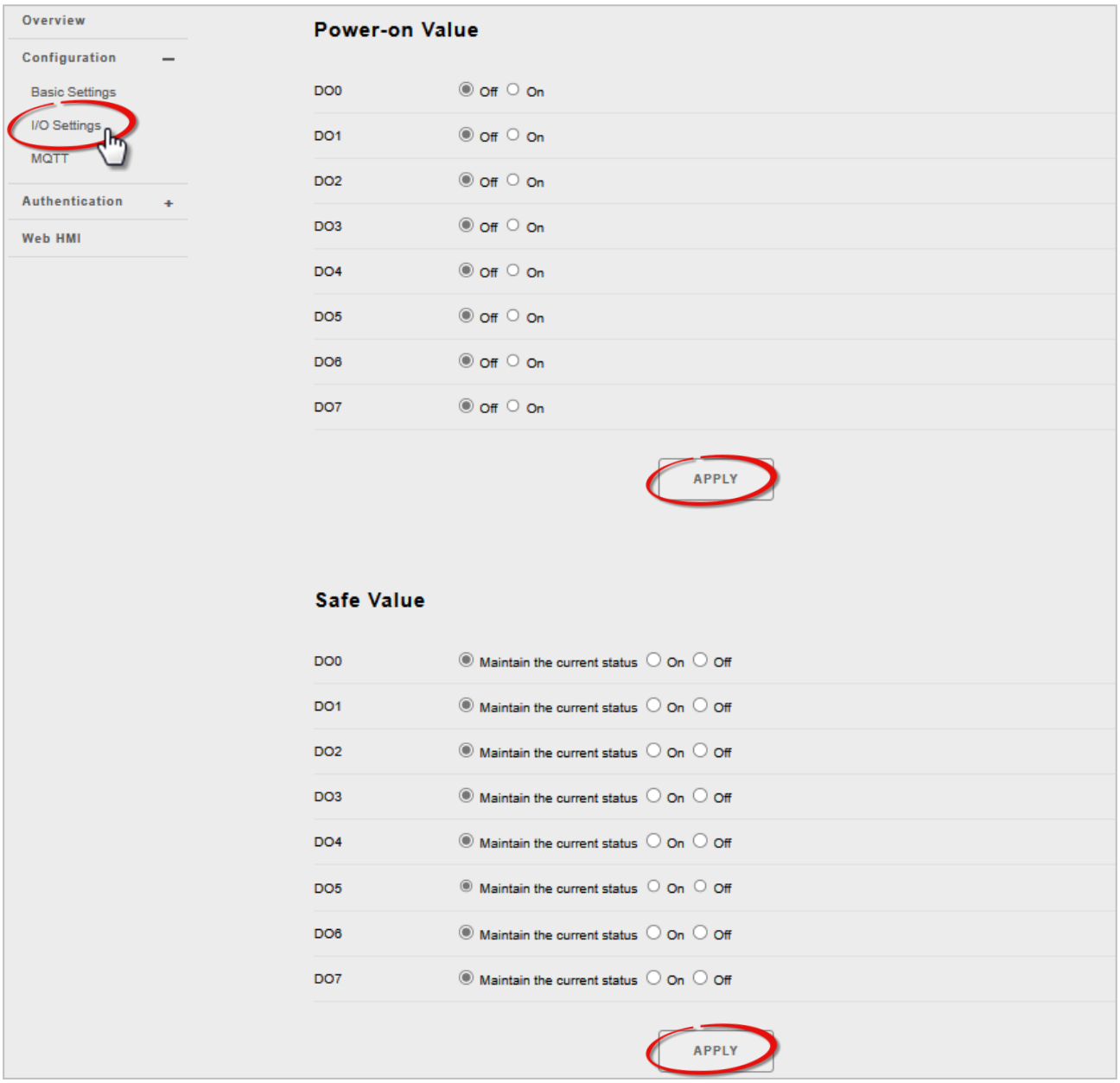
If there are any changes, click the **"Apply"** button to complete the setting. Also, press the Ctrl + R to refresh this page.



## 4.2 I/O Settings

In industrial applications, maintaining a "safe" state for the module's output when power is restored after a power loss caused by either a normal or abnormal event is crucial to prevent accidents. In addition, in the case of host failure or network communication exceptions, it is equally important to output a safety value.

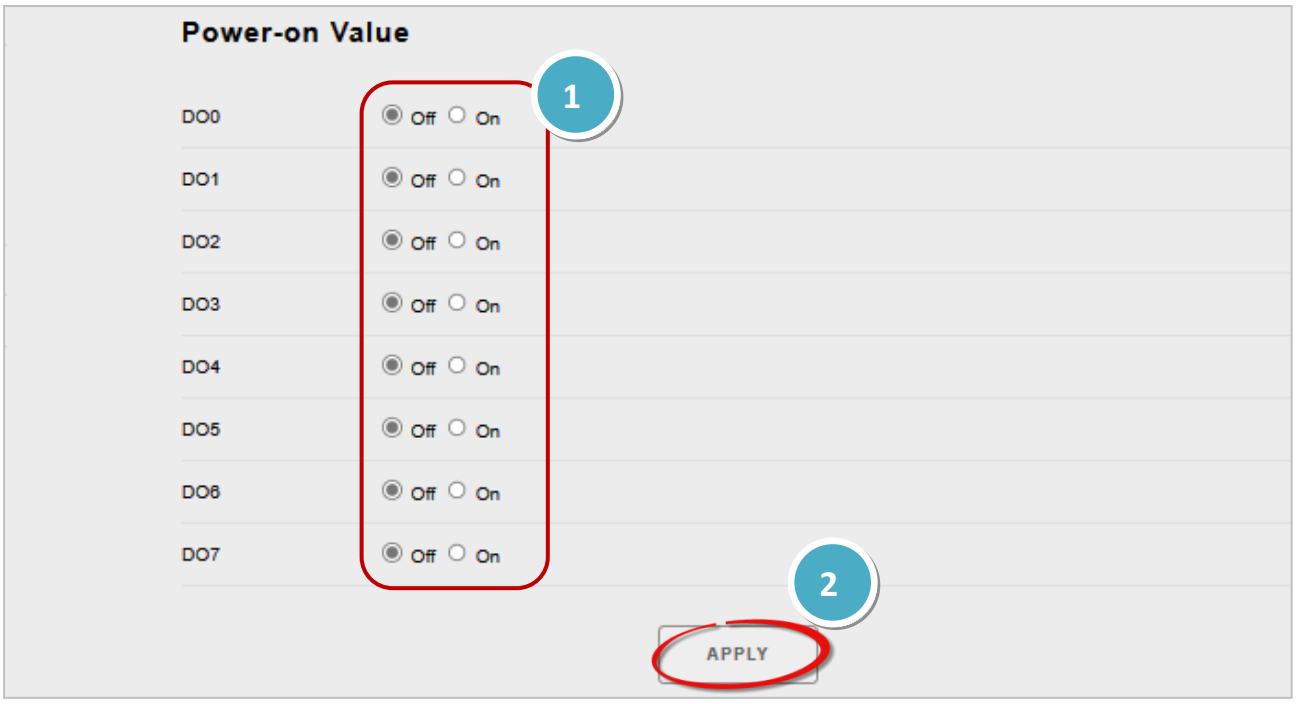
On the **I/O Settings** page, Power-on Value and Safe Value for each output channel can be specified. Remember to click on the "**Apply**" button to update new settings.



## Power-on Value

The user can set the power-on value for each output channel. When the module is powered on normally or reset by the module watchdog, it loads its power-on value.

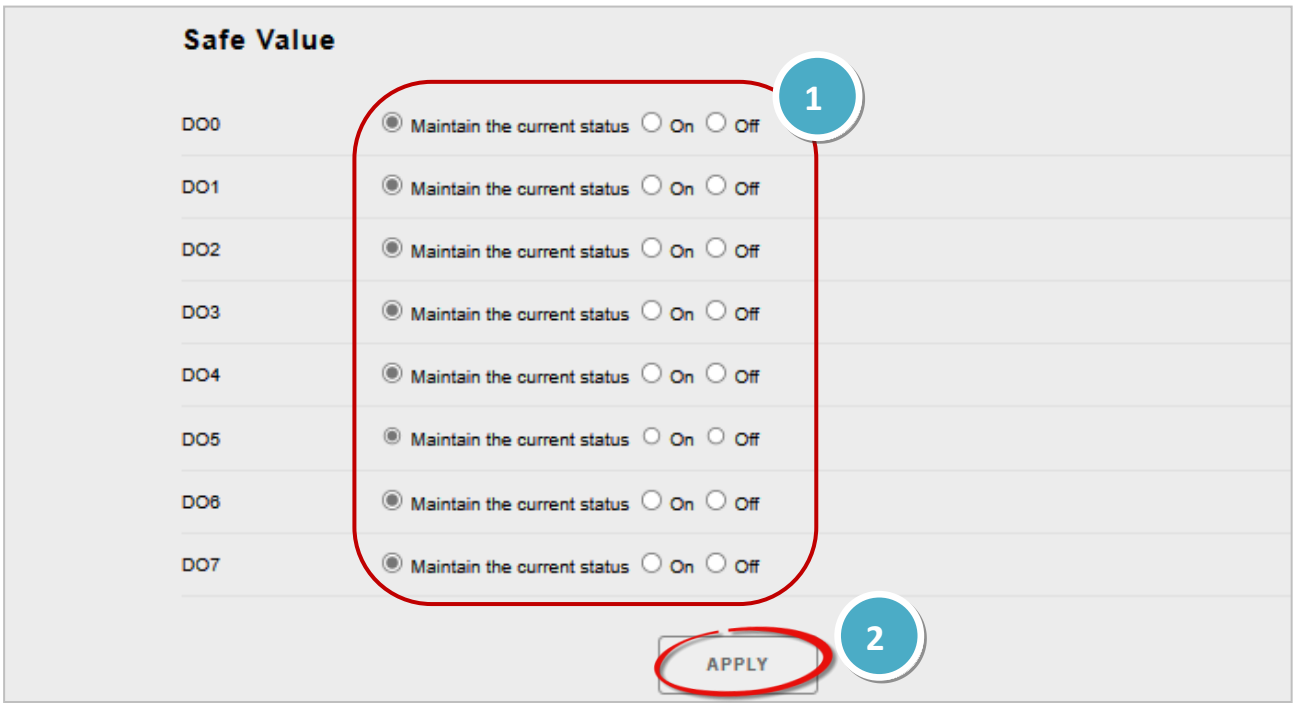
Method: After selecting **On** or **Off**, clicking the **Apply** button to complete the setting.




## Safe Value

The user can set the safe value for each output channel. In the event of a communication interruption between the MQTT Broker and MQ-7200M, the module will output a predefined safe value.

Method: After selecting **Maintain the current status** or **On** or **Off**, clicking the **Apply** button.

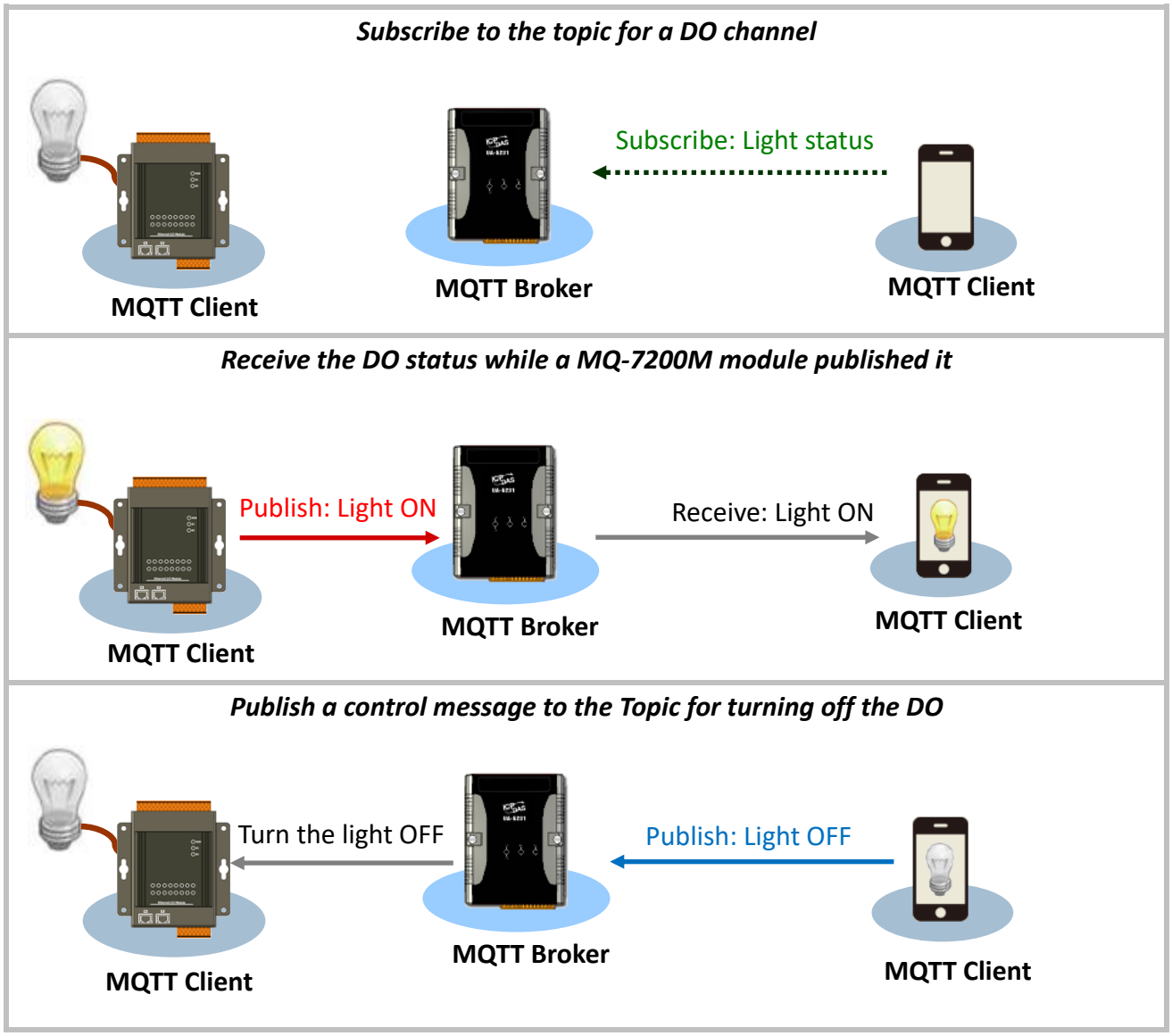


## 4.3 MQTT

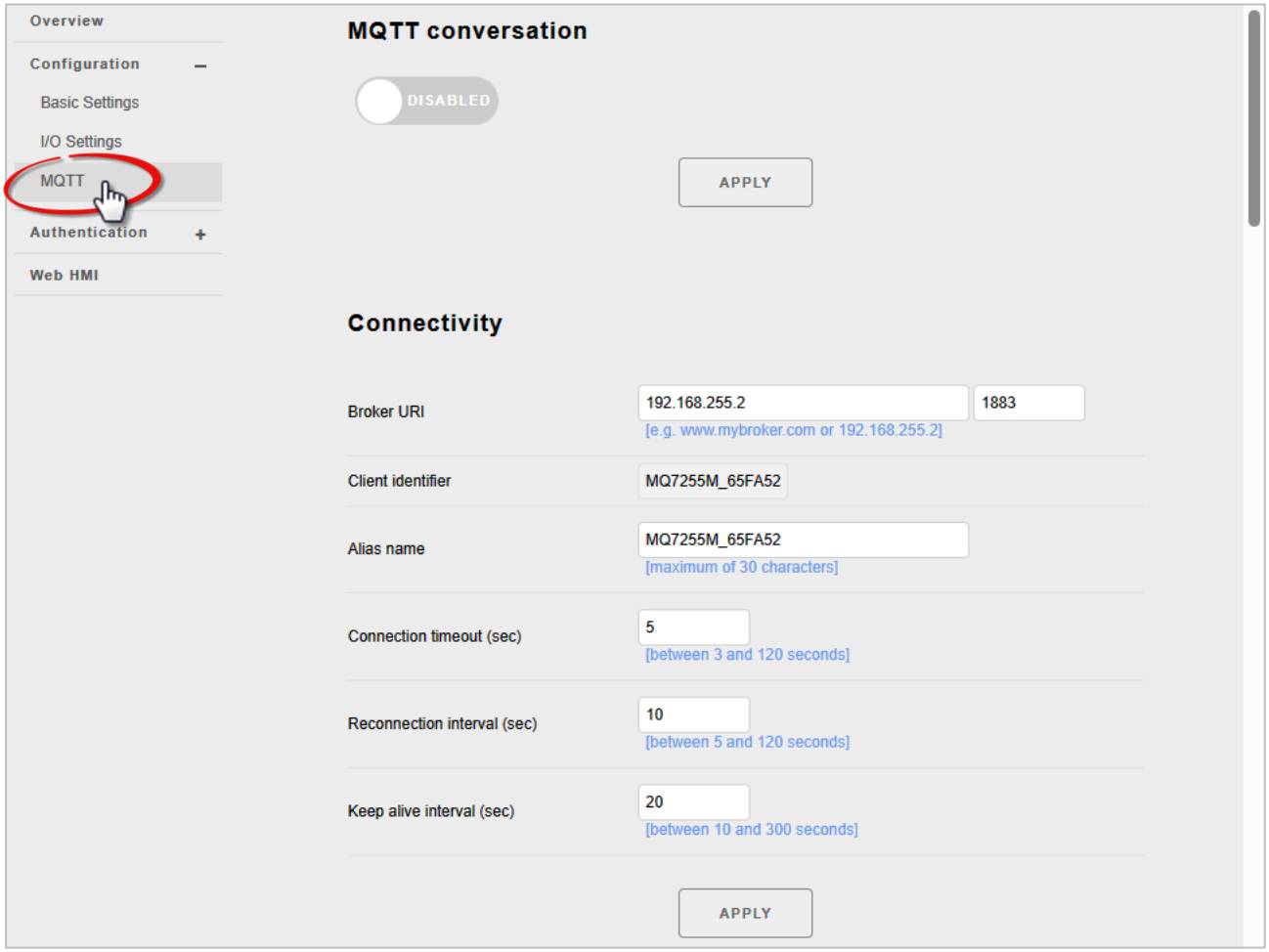
MQTT is a Client Server publish/subscribe messaging transport protocol. It is light weight, open, simple, and designed so as to be easy to implement. These characteristics make it ideal for use in many situations, including constrained environments such as for communication in Machine to Machine (M2M) and Internet of Things (IoT) contexts where a small code footprint is required and/or network bandwidth is at a premium.

*Citation from the official MQTT.org*

The MQ-7200M module, as an MQTT client, can publish messages for DIO status to the broker and subscribe to control messages for DO. Similarly, other MQTT clients also can subscribe to the broker's topics to obtain DIO status or publish messages for controlling DO to the broker.



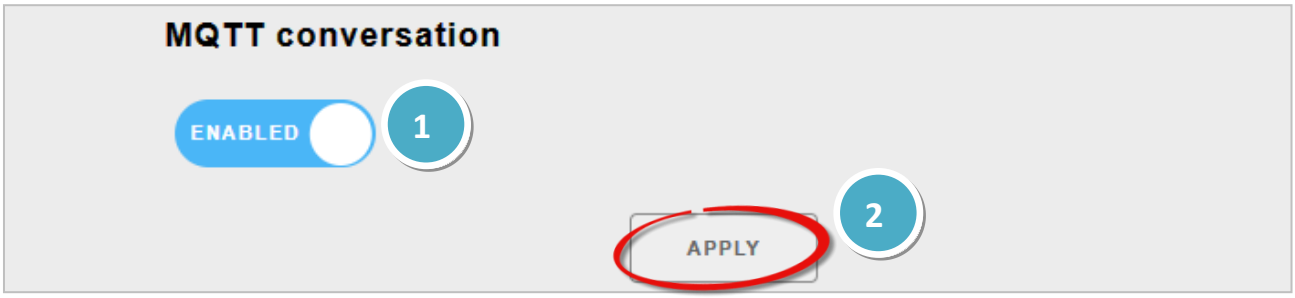
On the **MQTT** page, the user can enable/disable the MQTT function, set the broker information, define the Last Will and Testament for announcing a module's offline message, and obtain the topic names for each I/O.




## MQTT Conversation

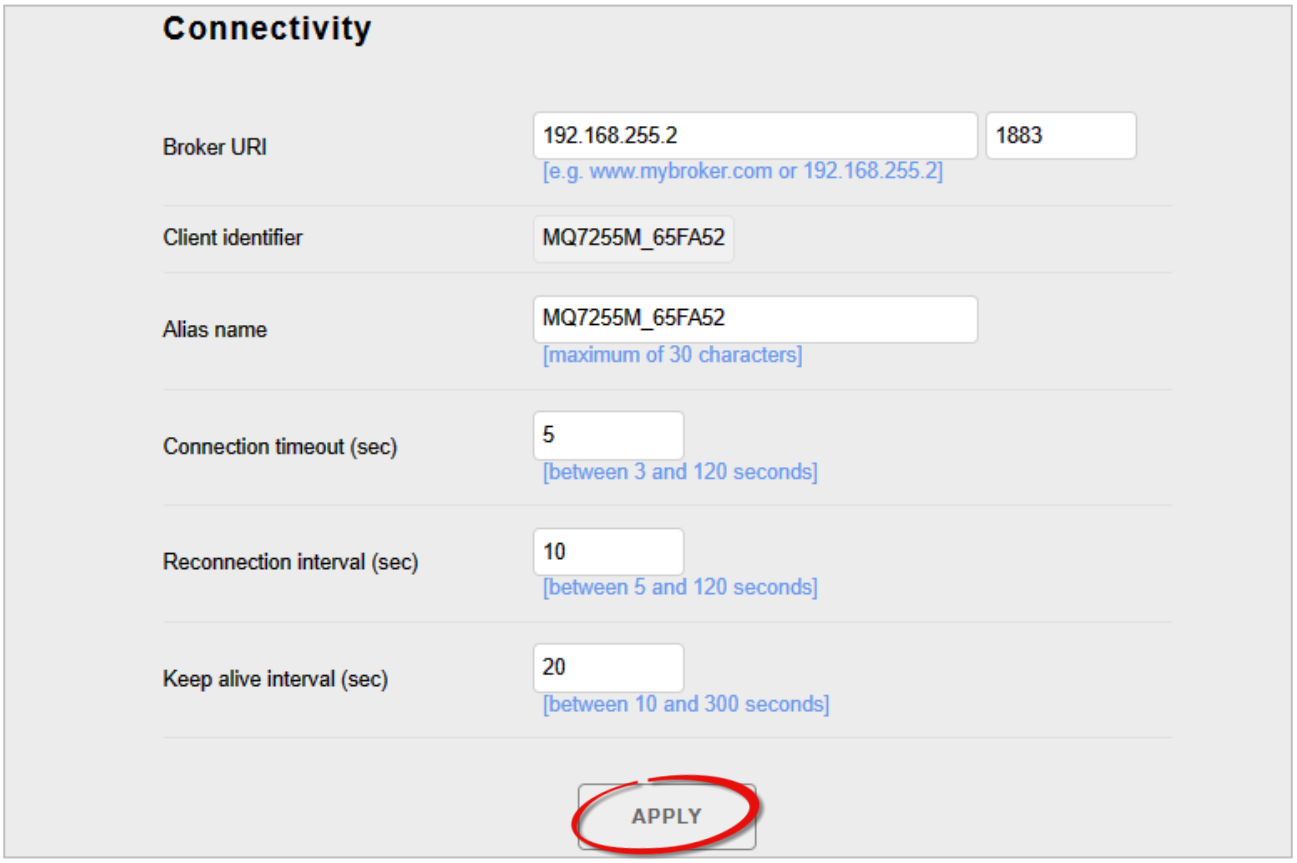
The user can enable/disable the MQTT function. If the **MQTT conversation** is disabled, the module will stop publishing messages.

Method: Switch the toggle to the right to enable this function and click the **Apply** button.



## Connectivity

The user can customize the settings related to the Broker and the connection, and if any changes are made, click the **Apply** button.



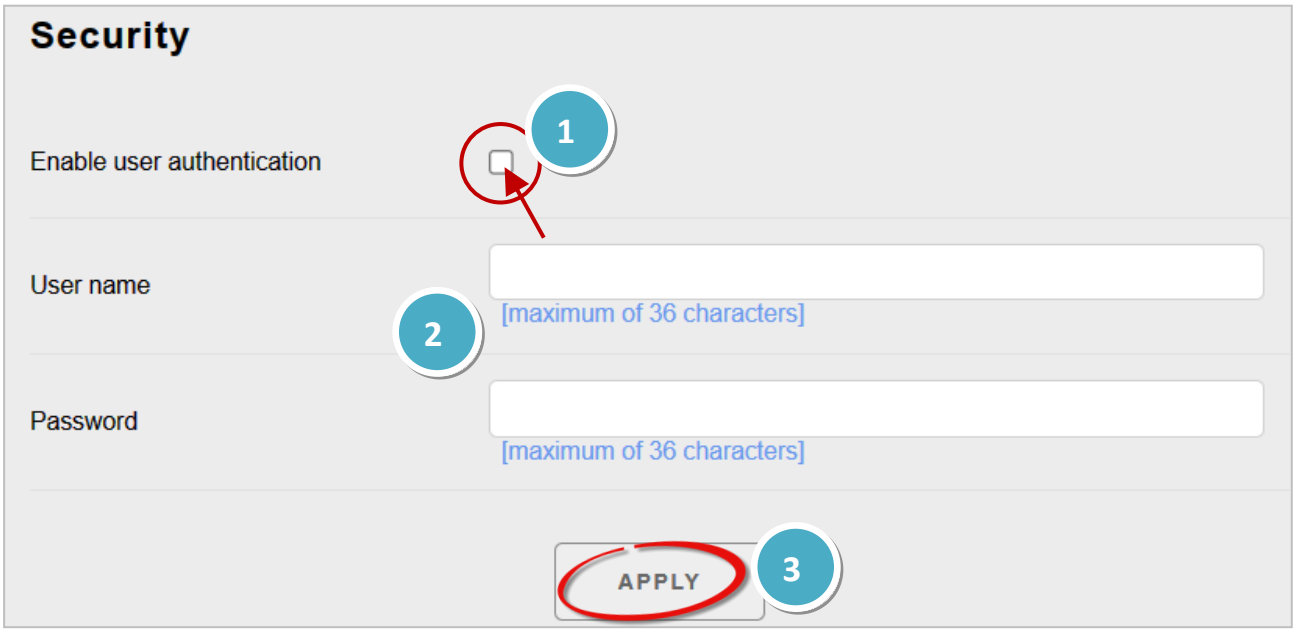

| Item | Description |
|---|---|
| Broker URI | Enter the Broker URI and port for MQTT connection.<br>The Broker URI can be an URL or an IP address. |
| Client identifier | The identifier for each MQTT Client to connect to the MQTT Broker must be unique. It is composed of the module name, the underline character, and the last 6 digits of the MAC address, and cannot be modified. |
| Alias name | The alias of the module must be unique to distinguish it from other modules with the same model. A simple identifier can make the topic easier to read. |
| Connection timeout (Unit: second) | Specify the maximum waiting time for the MQ-7200M module to establish a connection with the MQTT Broke (Default: 30 seconds) |

| | |
|---|---|
| Reconnection interval<br>(Unit: second) | In the event of a connection failure, how long does the MQ-7200M wait before attempting to reconnect to the Broker? |
| Keep alive interval<br>(Unit: second) | The Keep-alive mechanism ensures the availability of both the Client and the Broker for communication purposes. If the Client has no message to send within the specified Keep Alive Interval, it is required to send a PINGREQ packet to the Broker, while the Broker must reply with a PINGRESP packet. If the Client fails to send a PINGREQ or any other message within 1.5 times the Keep Alive Interval, the Broker will disconnect from the Client. (Default: 20 seconds) |

## Security

In certain cases, the MQTT Broker may require the Client to provide authentication through an account and password.

Method: Tick the **Enable user authentication** box, enter the username and password, and then click the **Apply** to update the settings.

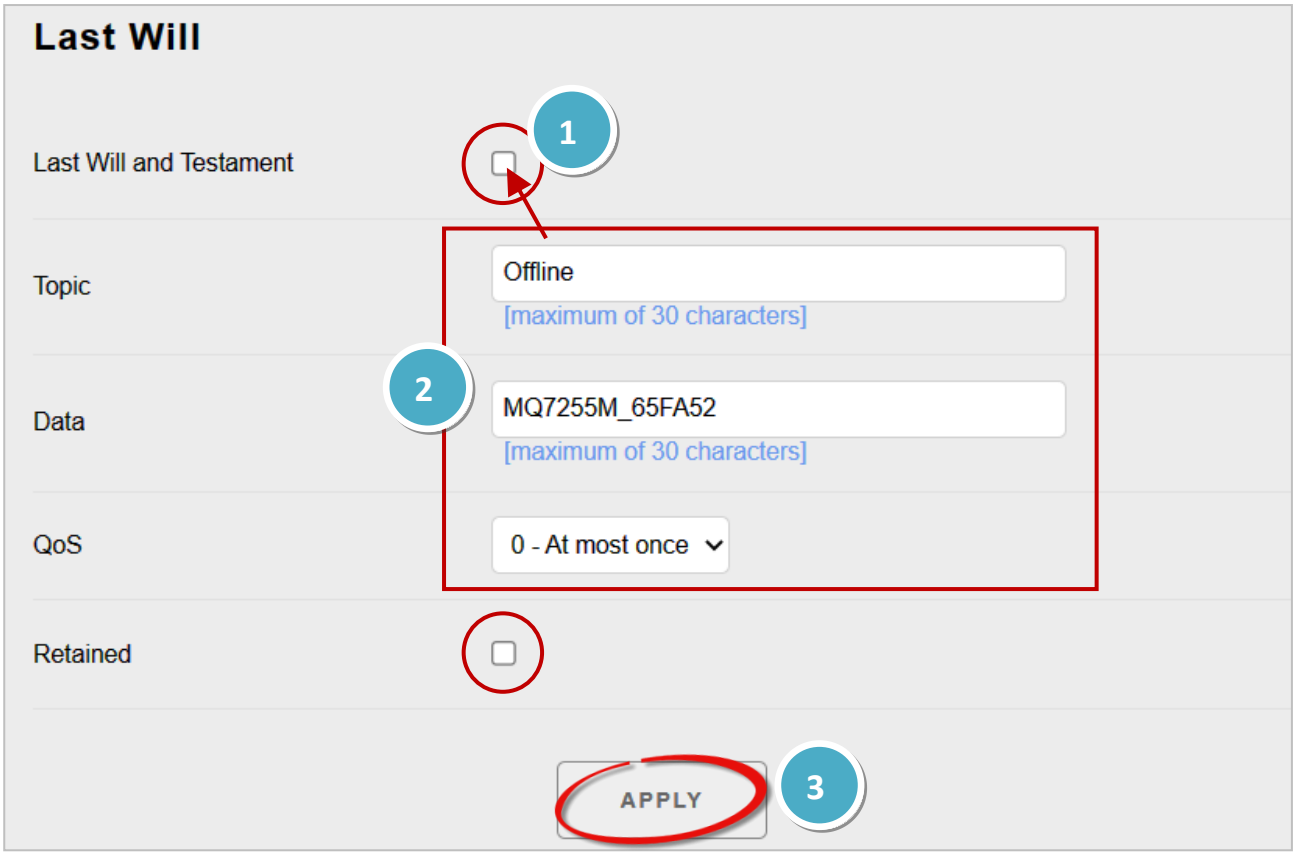


## Last Will

The **Last Will and Testament** (LWT) function notifies other clients when a client disconnects abnormally. The MQ-7200M can retain the Last Will (LWT) message on the Broker. If the MQ-7200M unexpectedly disconnects, the Broker will send the LWT message to all clients that have subscribed to this Offline topic.

Method:

1. To enable this function, tick the **Last Will and Testament** box.
2. Enter the topic name (Topic) and the LWT message (Data), and select the Quality of Service (QoS) for message transmission (default value is 0). If the **Retained** box is checked, it indicates that the LWT message will be stored on the Broker.
3. Click the **Apply** button to update the settings.




### QoS

**0 – At most once:** Send the message only once

**1 – At least once:** Send the message at least once

**2 – Exactly once:** Make sure the message is delivered

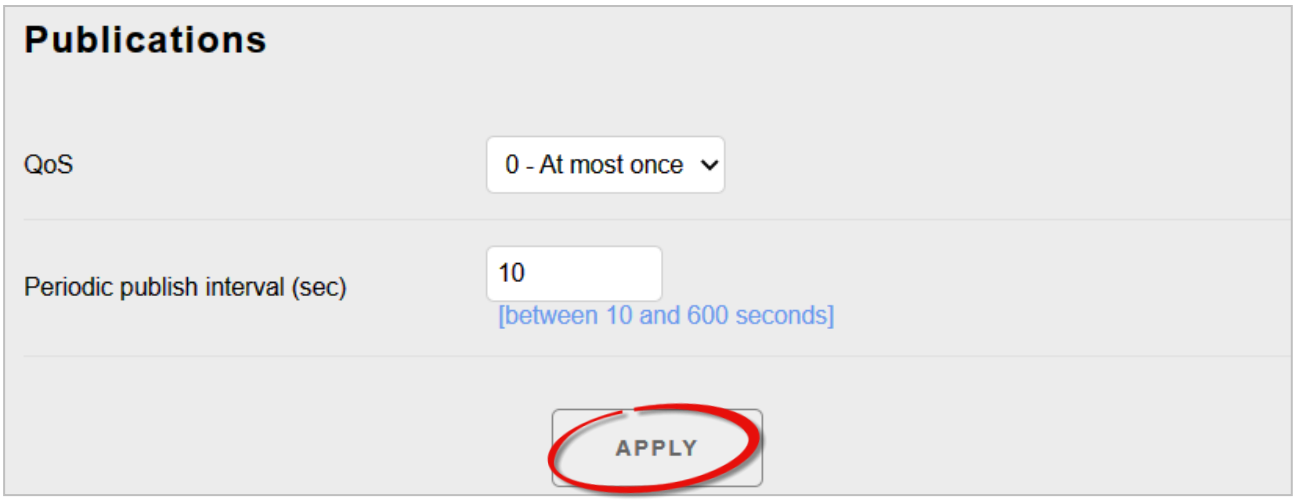
In the publisher/subscriber model, once subscribe to a topic (or I/O channel), the subscriber can receive the information (status) related to that topic. The publisher can periodically send its content to all subscribers of the topic, or whenever there is new information available.

## Publications

The I/O status can be published to topics based on either a time-driven or event-driven approach.

Time-driven: The I/O status is regularly published at specific intervals (10-600 seconds), which can be configured in the "**Periodic publish interval (Sec)**" field.

Event-driven: The I/O status is published when specific conditions are met. The user can learn how to configure the conditions in the subsequent content.




**QoS (Quality of Service)**

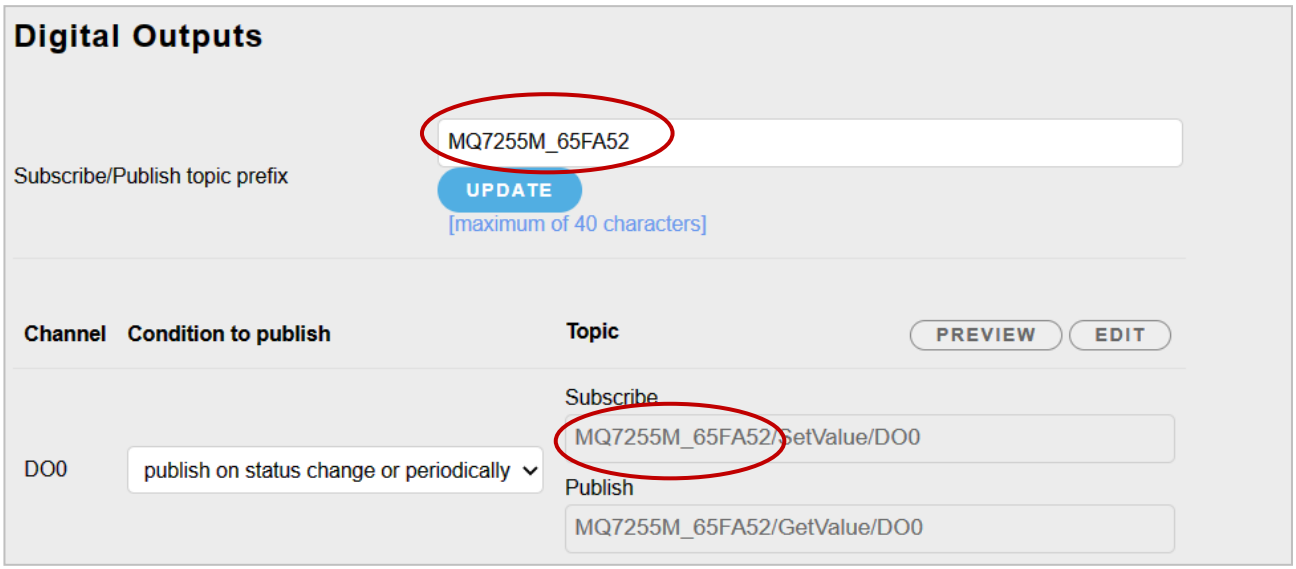
**0 – At most once:** Send the message only once

**1 – At least once:** Send the message at least once

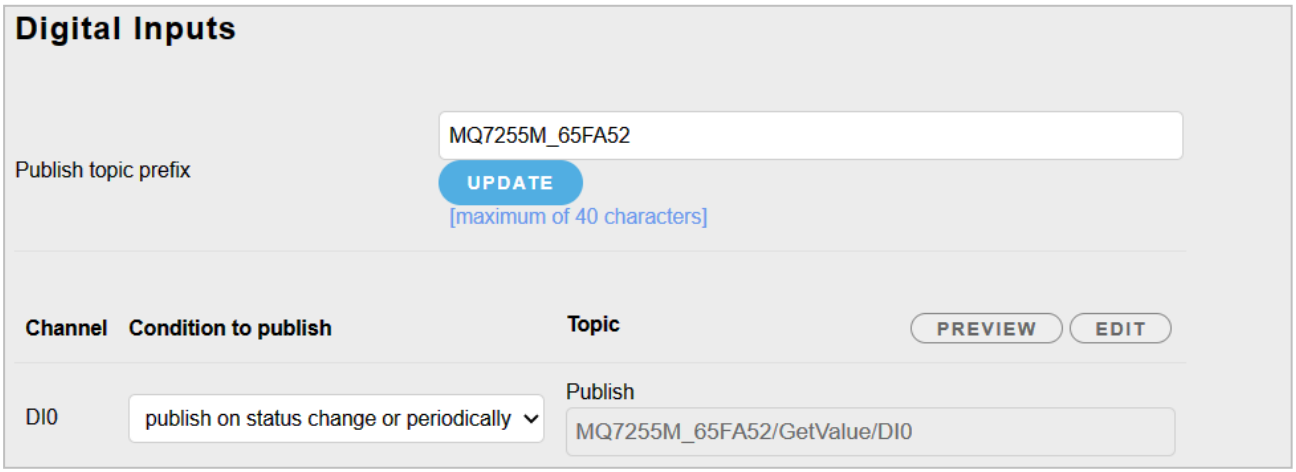
**2 – Exactly once:** Make sure the message is delivered

The user can customize the topic name and published conditions for each I/O. If the MQTT conversation feature is enabled, the MQ-7200M will automatically subscribe to all DO topics upon startup.

## Digital Outputs

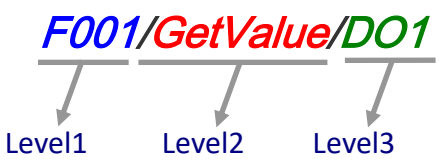



## Digital Inputs




A topic for each I/O channel on a MQ-7200M module consists of 3 topic levels; each topic level is separated by a forward slash (/):

For example



**Level 1**: The default is the name specified in the **"Connectivity - Client identifier"** field.

| Level 1 | |
|---|---|
| Client identifier | The default is the module name followed by the MAC address. |
| Topic prefix | The user can set topic level one |

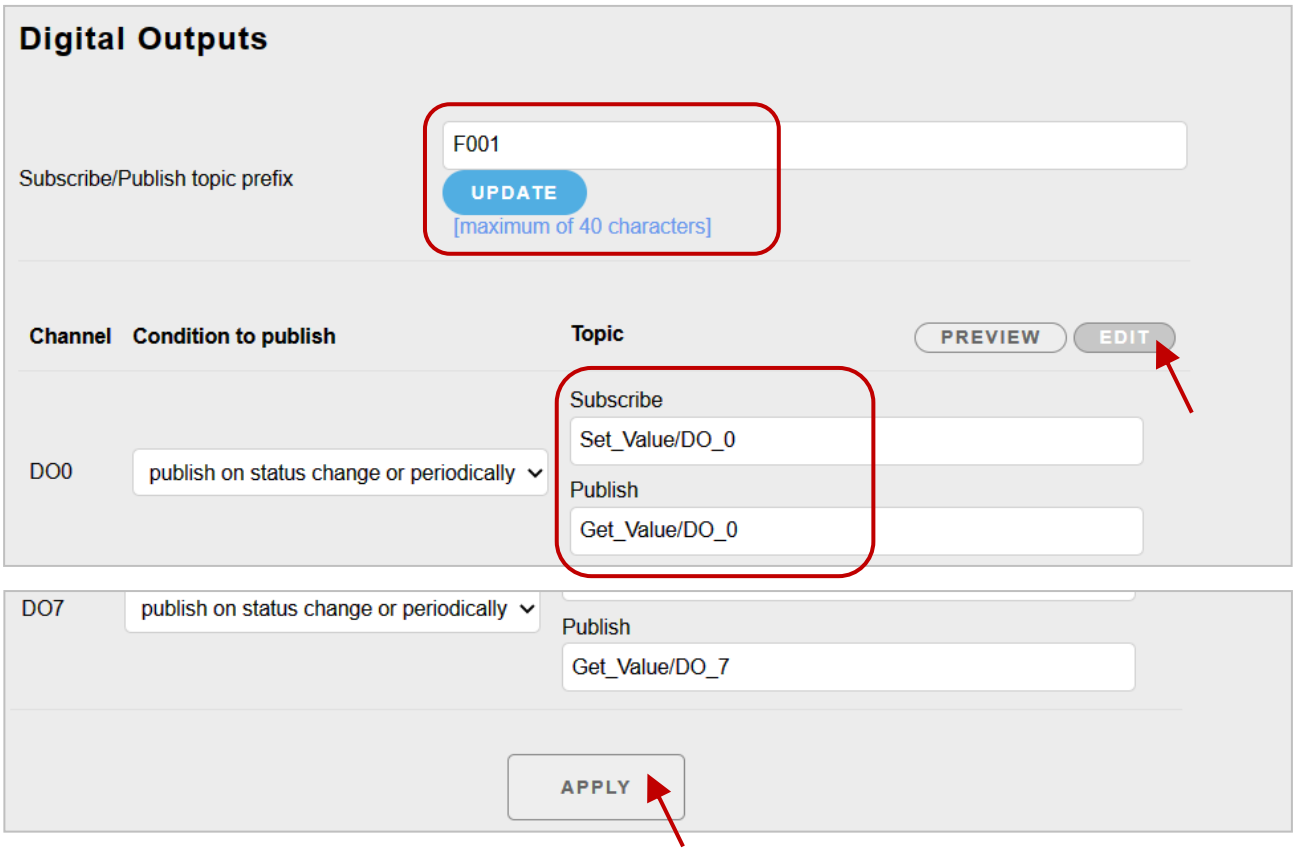
**Level 2**: To get or set the I/O status

| Level 2 | |
|---|---|
| SetValue | Subscribed topic: The MQTT client will send a message to control the output, and the MQ-7200M will carry out the output command. |
| GetValue | Published topic: The client can subscribes to this topic to receive the I/O status published by the MQ-7200M. |

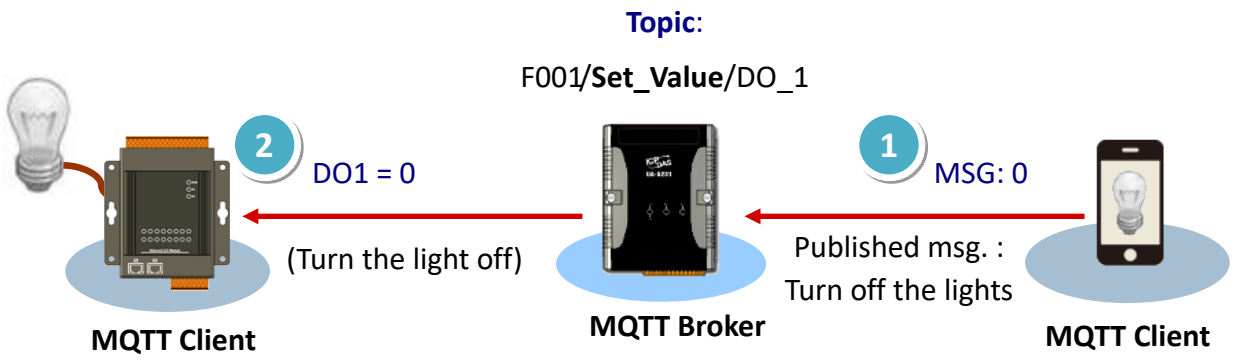
**Level 3:** The I/O name. Up to 16 characters, and each name must be unique.

**Configure the Published/Subscribed Topic:**

1. Enter a name for the topic at level 1 in the "**...Topic prefix**" field and then click the **Update** button.
2. Click the **Edit** button to modify the name for the topic at level 2, 3 and click the **Apply** button to update the settings.



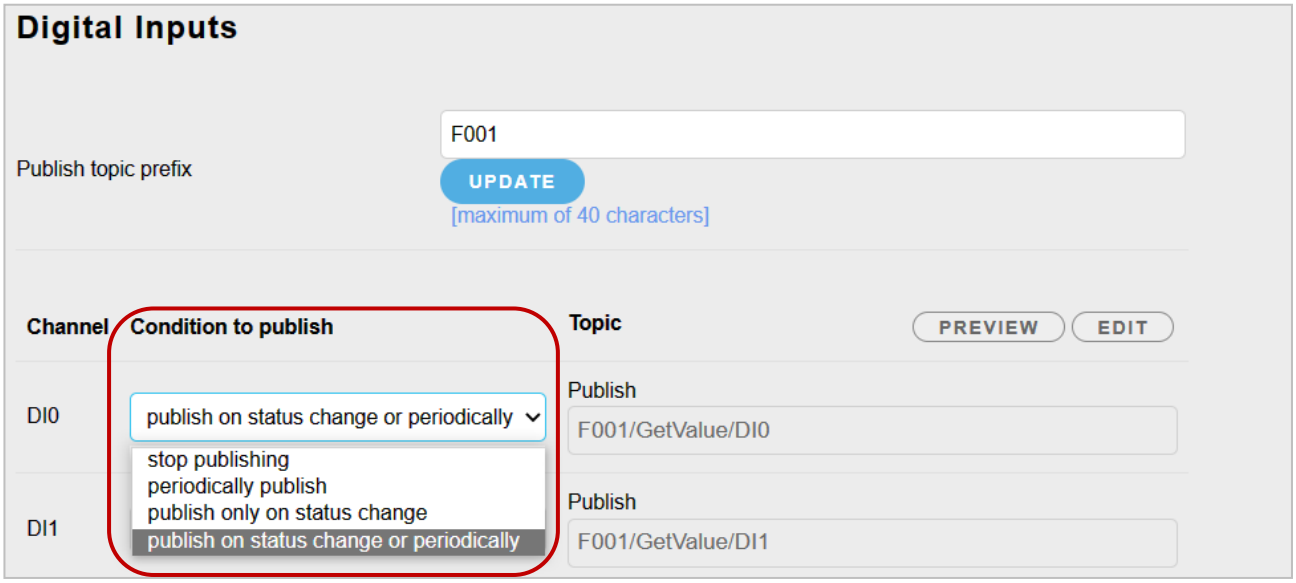
The DO operation can be divided into two steps, for example, the steps to turn off the lights (DO1) are as follows:




1. The MQTT client publishes a control message of "0" to the Broker on the topic "F001/Set_Value/DO_1" to request turning off the lights.
2. The broker delivers the message to the subscriber MQ-7200M, and then the MQ-7200M sets DO1 to "0".

**Configure the Published Condition:**

The user can configure the published condition for each I/O.




**Stop publishing:** Stop publishing the I/O status.

**Periodically publish:** The I/O status will be published periodically

**Publish only on status change:**

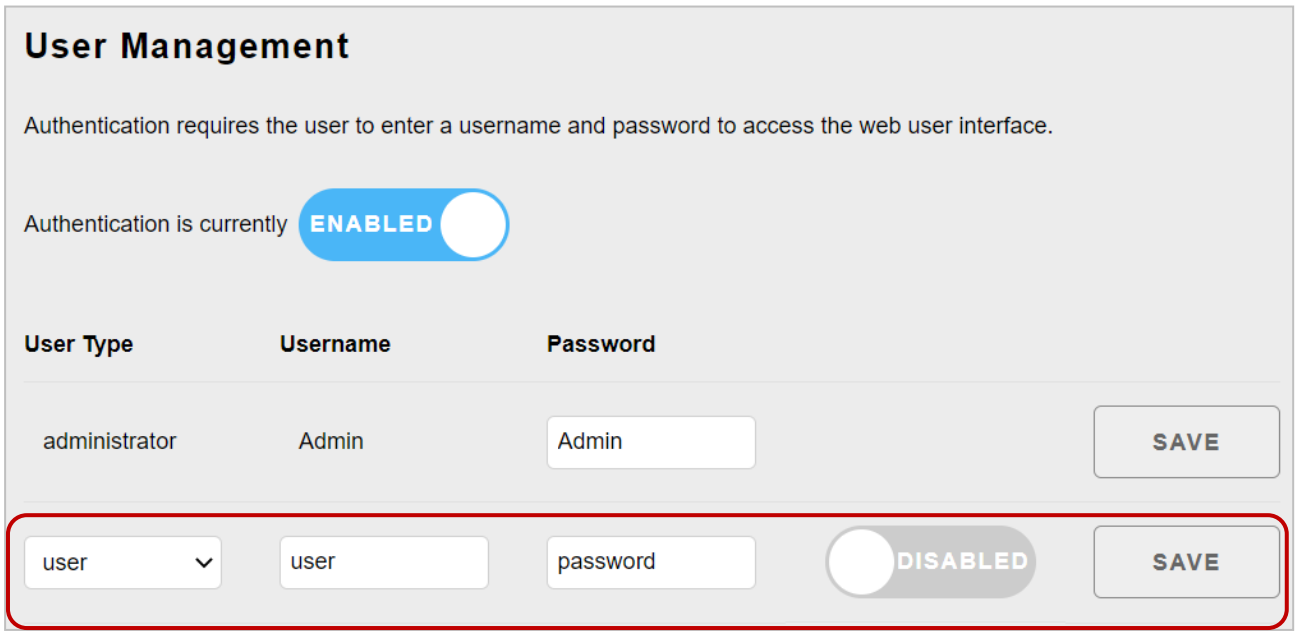
The I/O status is published only when there is a change in the status. After selecting this item, the time interval set in the Publications section will become invalid.

**Publish on status change or Periodically:**

The I/O status is published either when the status changes or periodically.

# 5. Authentication

To ensure secure access to the MQ-7200 web interface, authentication is implemented as a requirement. When attempting to connect to the web interface, users are prompted to provide both a username and password. Authentication is enabled by default.




## User Management

The factory default employs the administrator account, and you can establish an additional administrator or user account.

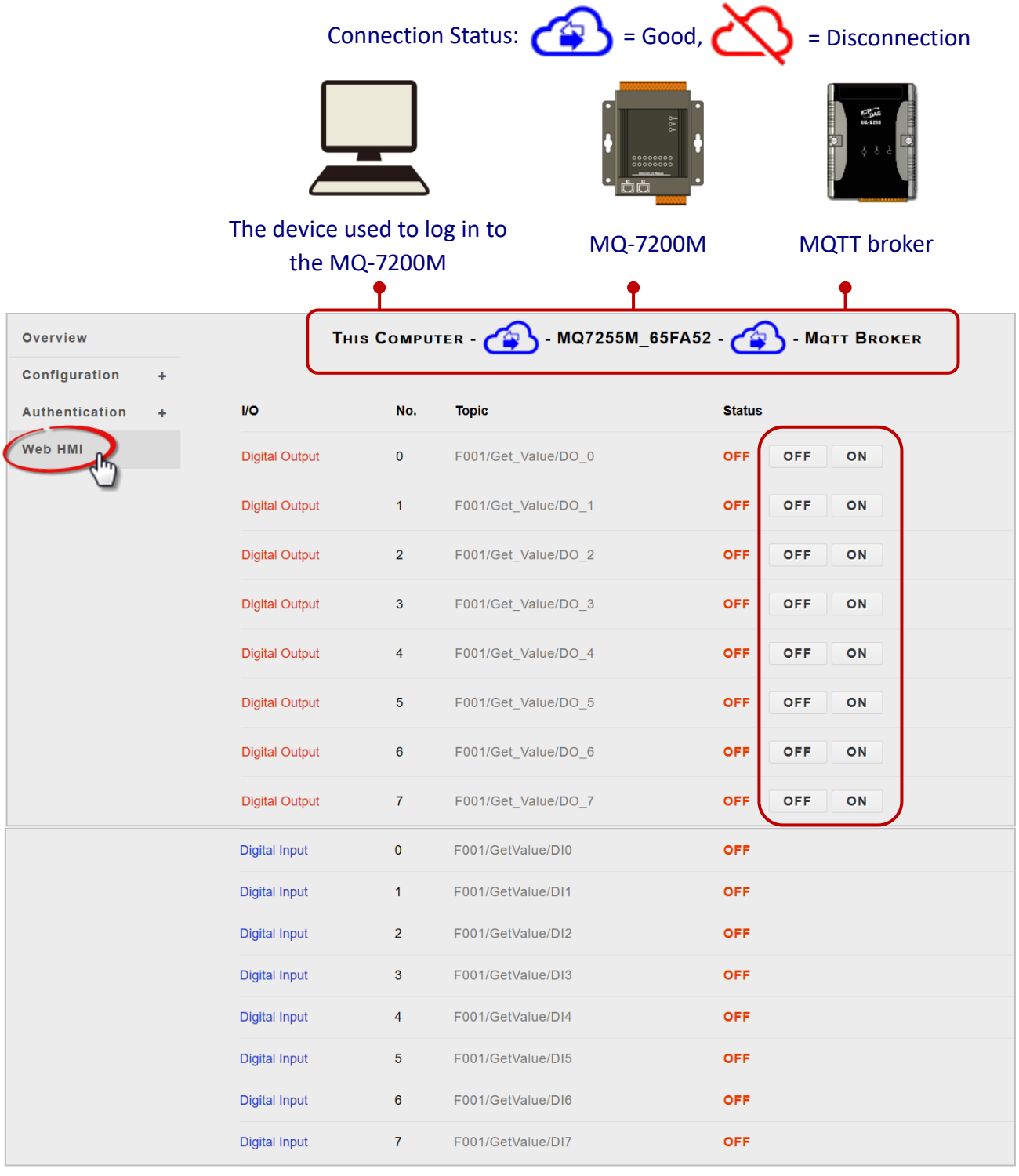
Method

Select the User Type (administrator/user), enter a username/password, move the toggle to the right to set it to enable, and then click the save button. Next time, the user can log in to the web interface by using the new account.

# 6. Web HMI

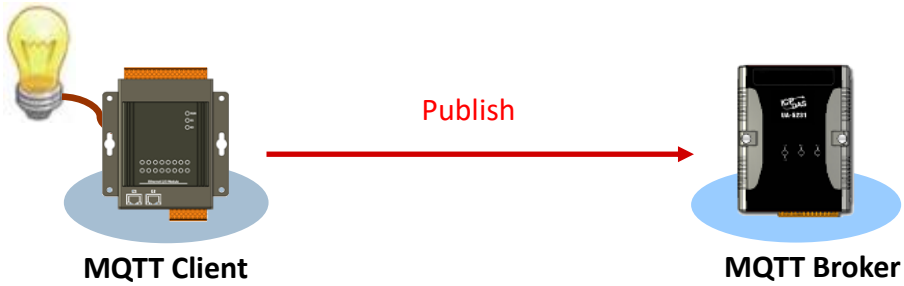
On this Web HMI page, the user can get the following information:

1. Connection status between the PC and the MQ-7200M module,
2. Connection status between the MQ-7200M module and the broker you set,
3. The status of each I/O channel. The user can control the output channels by clicking the **On** or **Off** button.

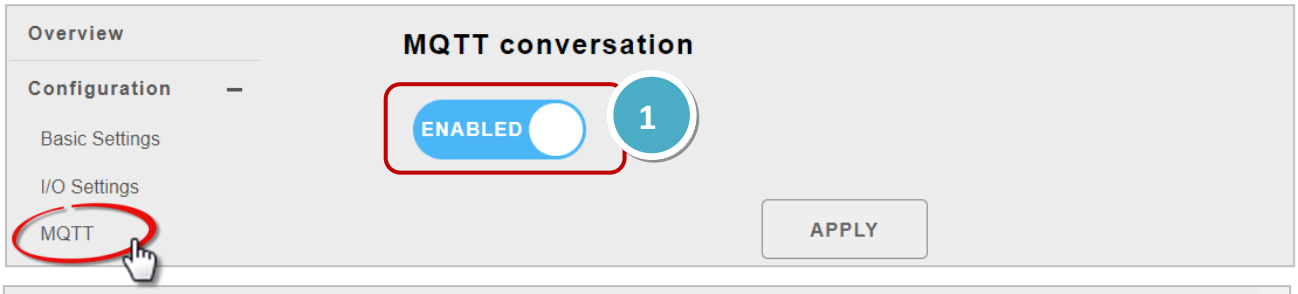


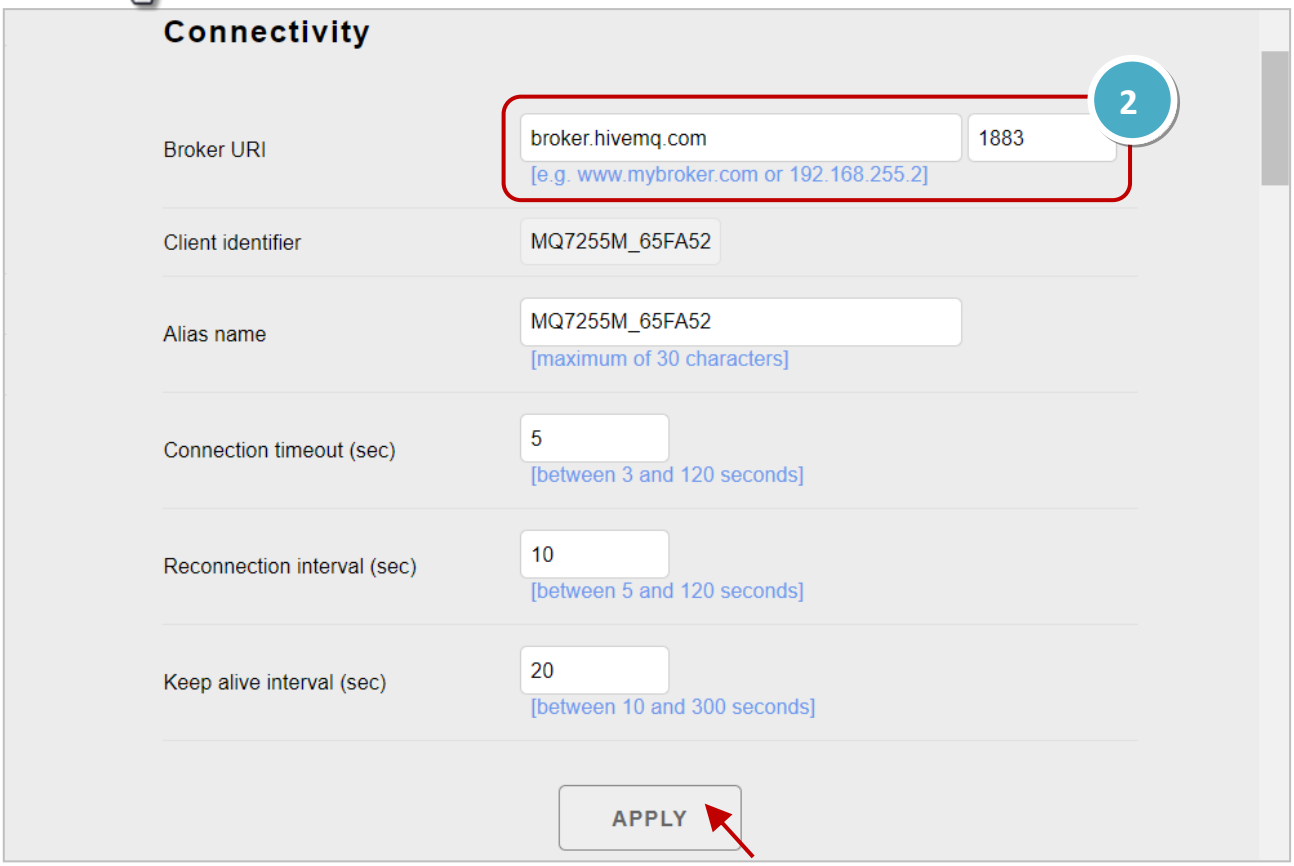
# 7. Example: MQTT Publish/Subscribe I/O Status

## 7.1 Publishing the I/O status of MQ-7200M

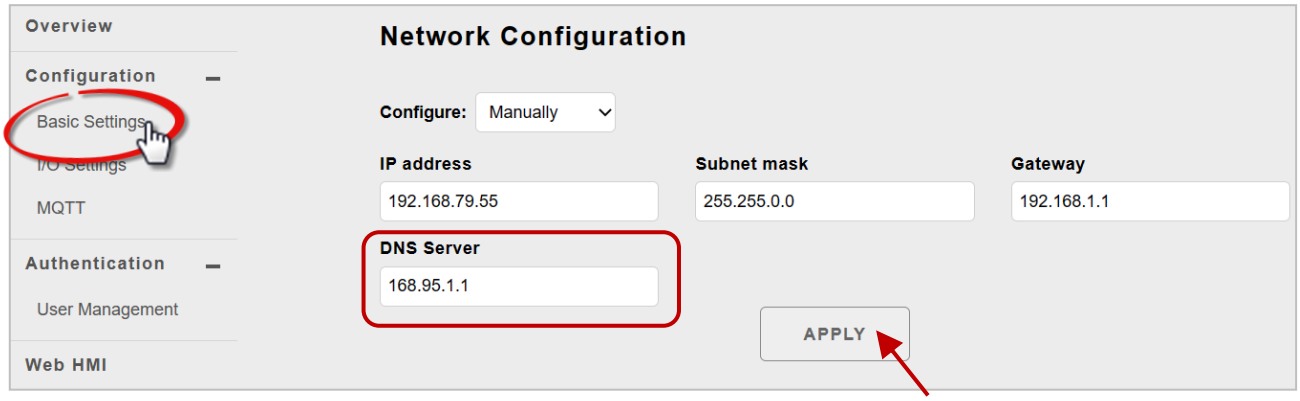



1. On the **MQTT** page, make sure that the MQTT function is enabled.
2. Enter both the URL and port number of the Broker, and click the **Apply** button to update the settings. In the example, we use the HiveMQ Broker, visit to https://www.mqtt-dashboard.com/ (**Host: broker.hivemq.com, TCP Port: 1883**)



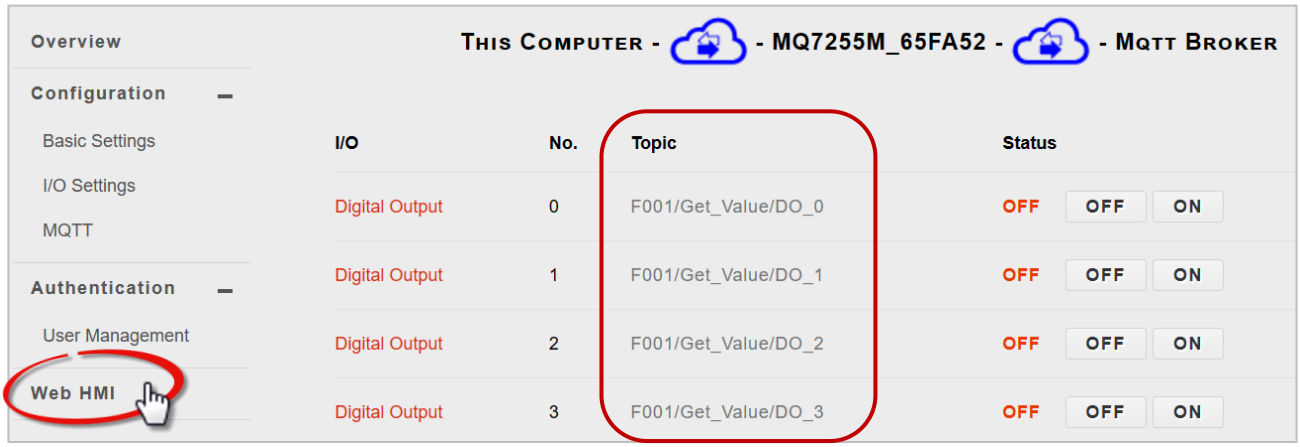



3. On the **Basic Settings** page, make sure that the DNS Server has been configured properly.



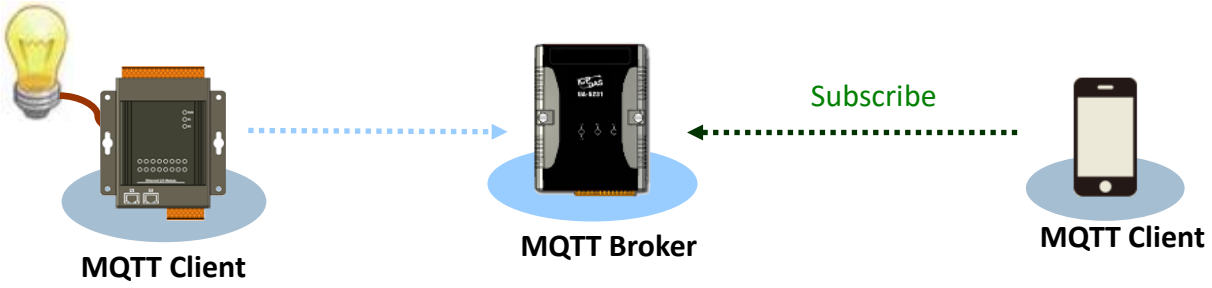

4. On the **Web HMI** page, the user can verify if the connection is successful.

Connection Status: = Good, = Disconnection



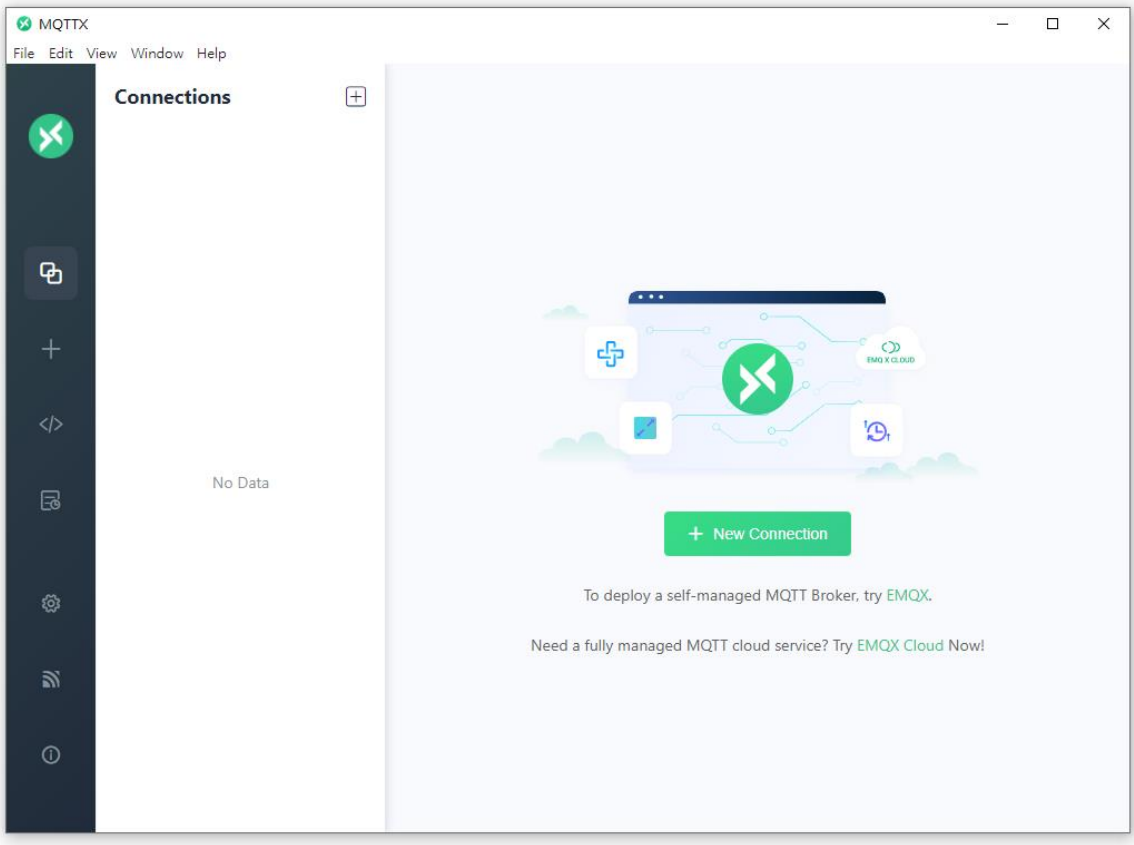

If the connection between the MQ-7200M and the MQTT broker is established successful, all the topics listed on this page will automatically be published to the Broker. For more information, please refer to Section 4.3 on MQTT.

## 7.2 Subscribing the I/O Status of the MQ-7200M

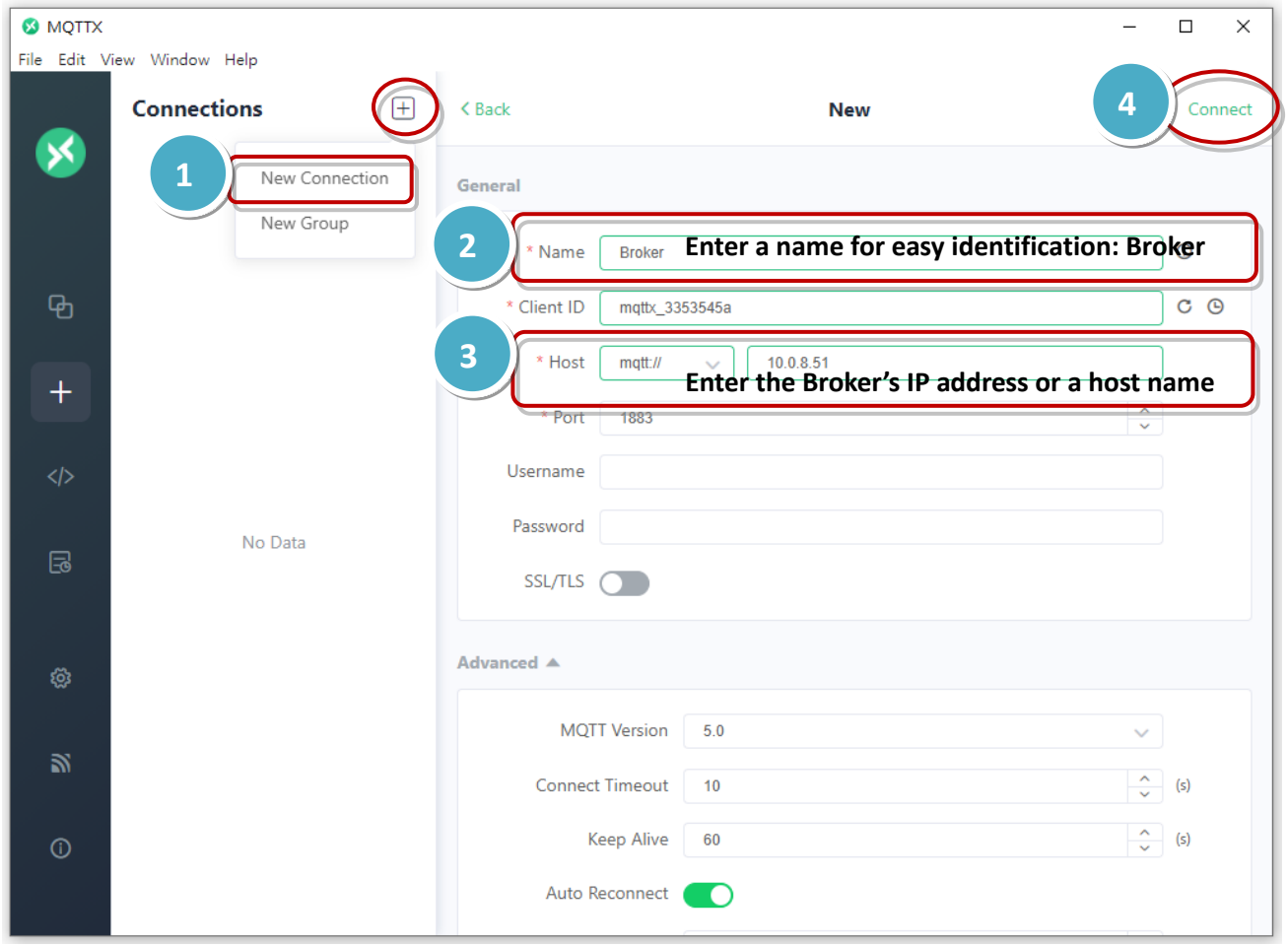



Before proceeding with the testing of the I/O subscription function, it is essential to install the MQTT client on your PC. **MQTTX** is an open source, cross-platform MQTT 5.0 desktop client originally developed by EMQ, which can run on macOS, Linux and Windows. MQTTX allows users to publish messages to an MQTT broker, subscribe to MQTT topics, and receive messages.

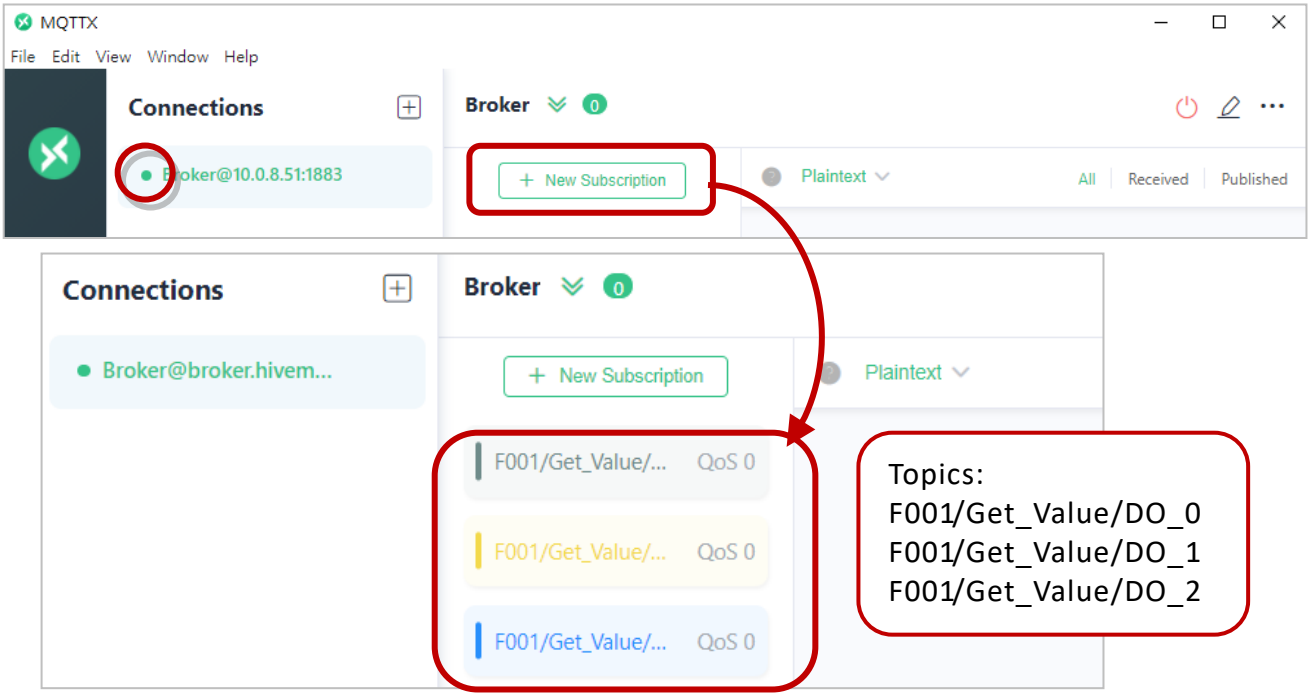
1. Download and execute the installation file (V1.9.4) from the MQTTX website. (https://mqttx.app/)
2. After the installation is complete, MQTTX will be automatically opened, and the user can also double-click the shortcut on the desktop to open the software.



3. Click the "+" button and then click **New Connection** to establish a connection. Enter the Broker's name and URL address (Host: broker.hivemq.com, refer to Section 7.1), and then click the **Connect** button.

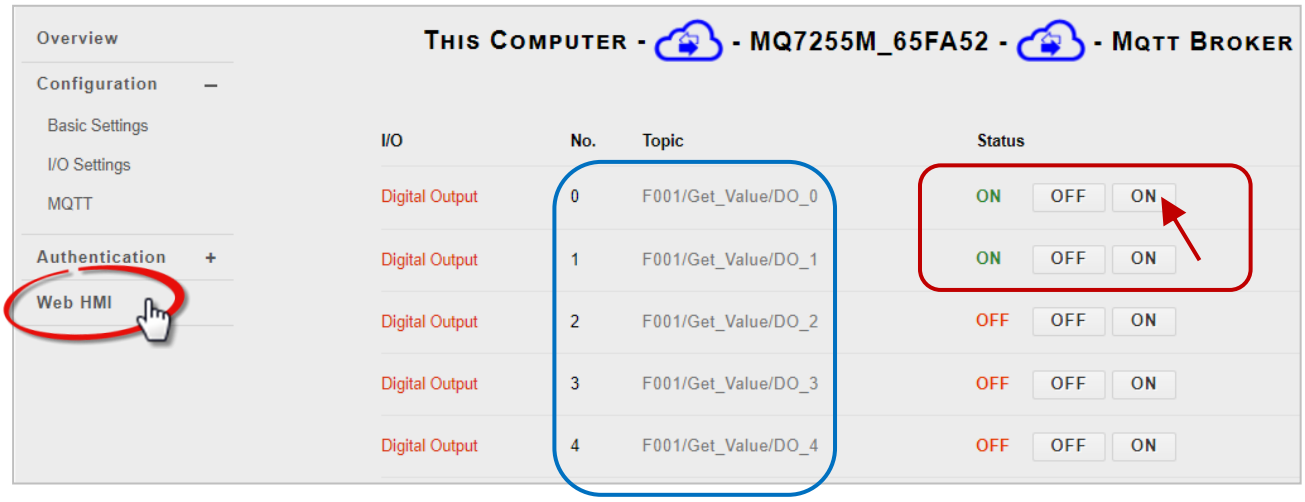



4. If the connection is available, the green light will be displayed.

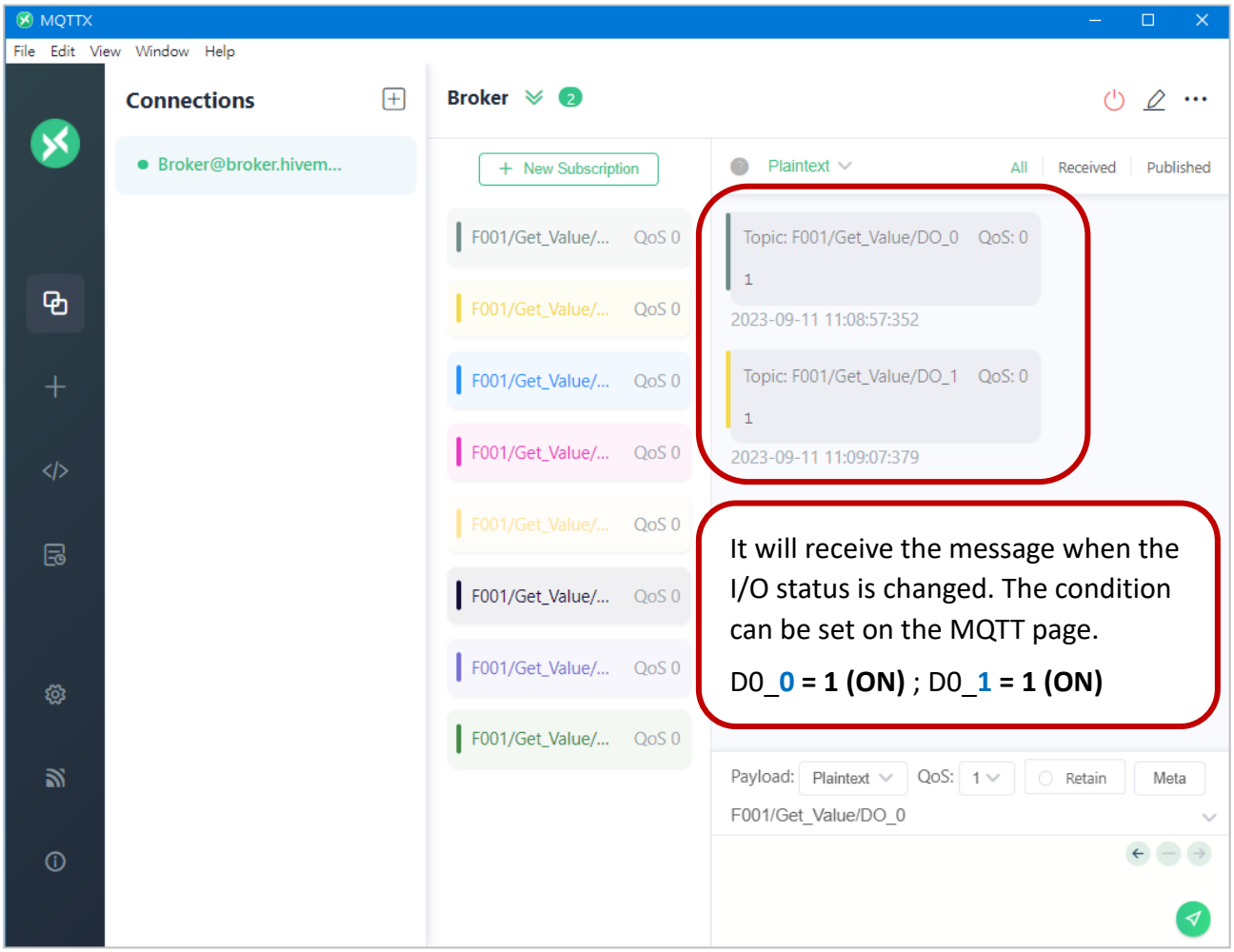


5. Users can view all subscribed/published topics listed on the **Web HMI** page. Afterward, click the **ON/OFF** button to change the I/O status, and then observe the subscribed messages in MQTTX.

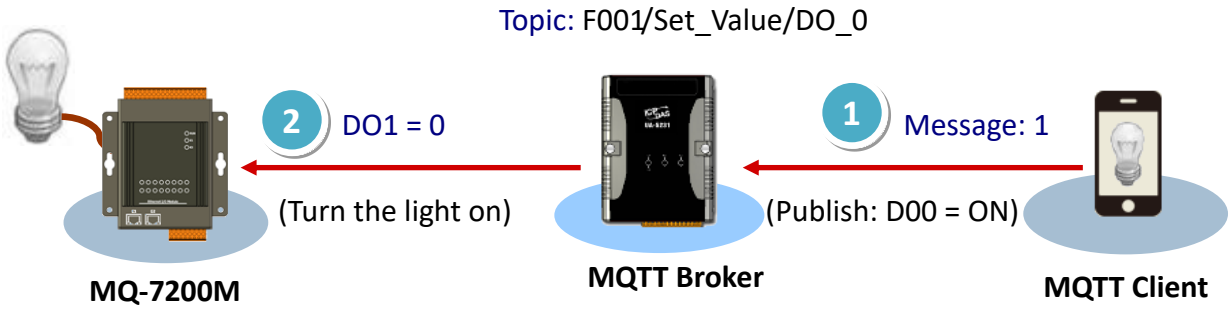
Change the status of the I/O



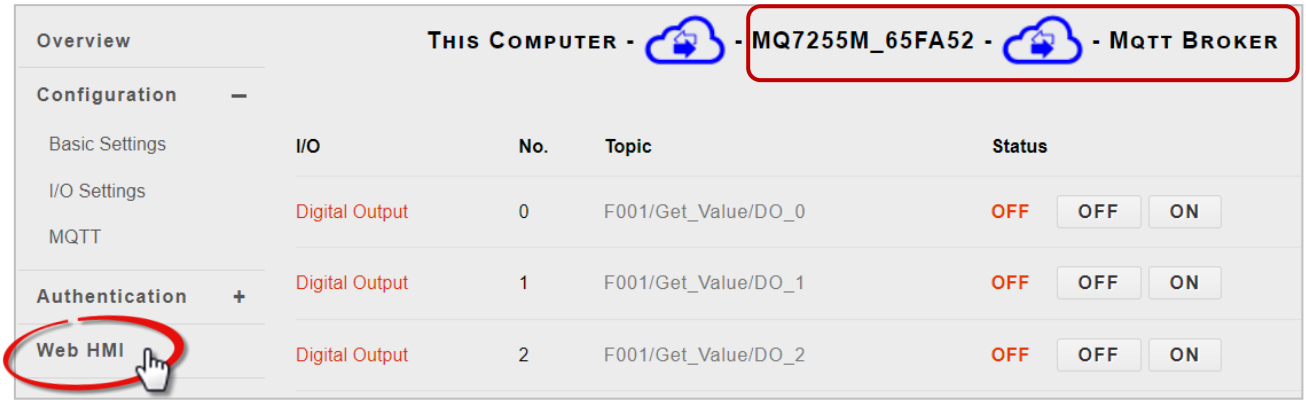

Review the subscribed messages



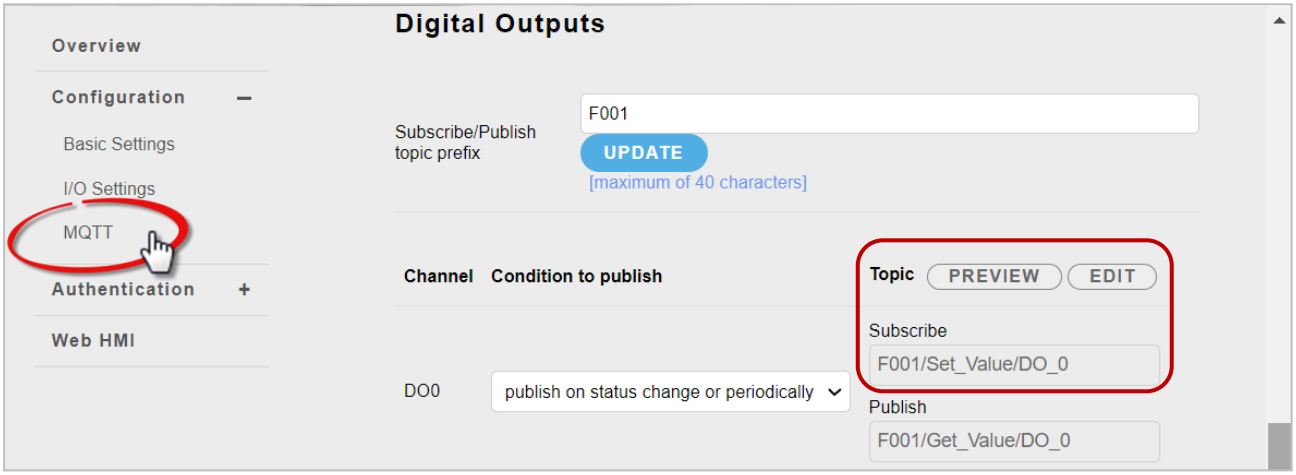
# 7.3 Controlling the DO Status of the MQ-7200M



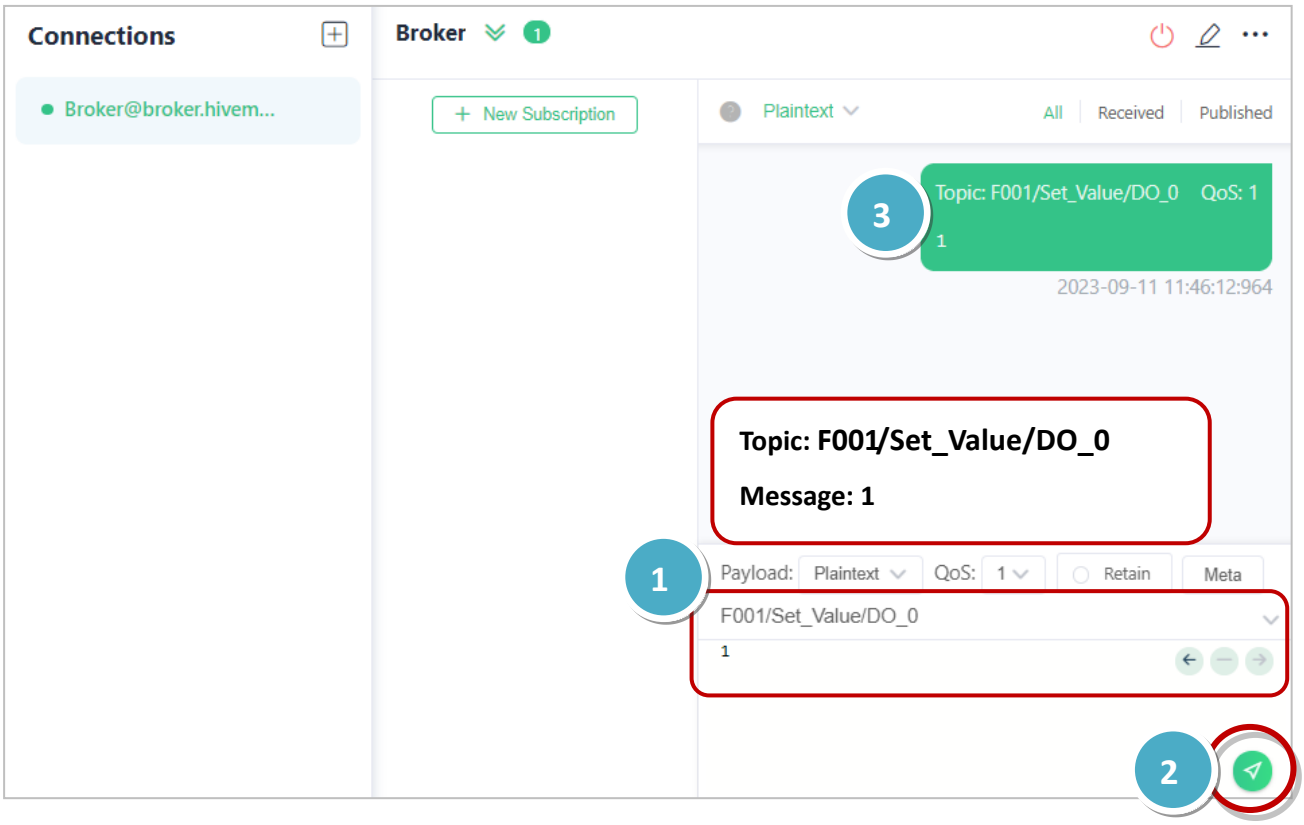

1. Ensure that the MQTT function is enabled and the broker is correctly configured on the **MQTT** page of the MQ-7200M module. Refer to Section 7.1 – Steps 1 to 4.
2. Verify the **Web HMI** page to confirm that the connection between the MQ-7200M and the broker has been established.



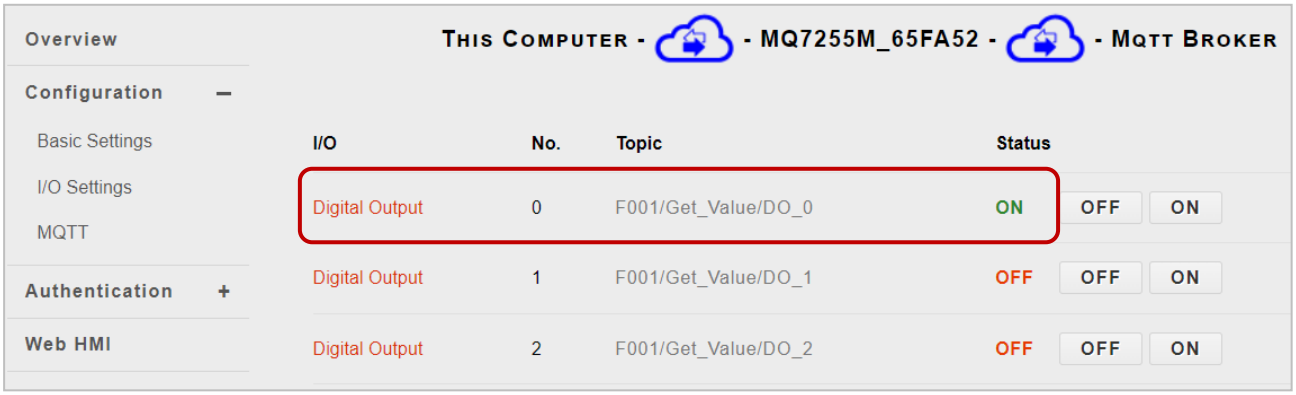

3. Confirm that the MQTT Client software - **MQTTX** has been installed and the connection between it and the broker has been established. Refer to Section 7.2.
4. When the MQTT function is enabled, all DO topics of the MQ-7200M will be automatically subscribed. The user can review topics in the **Digital Outputs** section on the **MQTT** page.



5. In the MQTTX, enter the message to be published for the specific topic, and click the button in the right corner to send the message.




Now, the user can observe that the DO0 indicator of the MQ-7200M has been switched on, and the status of DO0 on the Web HMI page reflects as "ON."



# 8. Frequently Asked Question (FAQ)

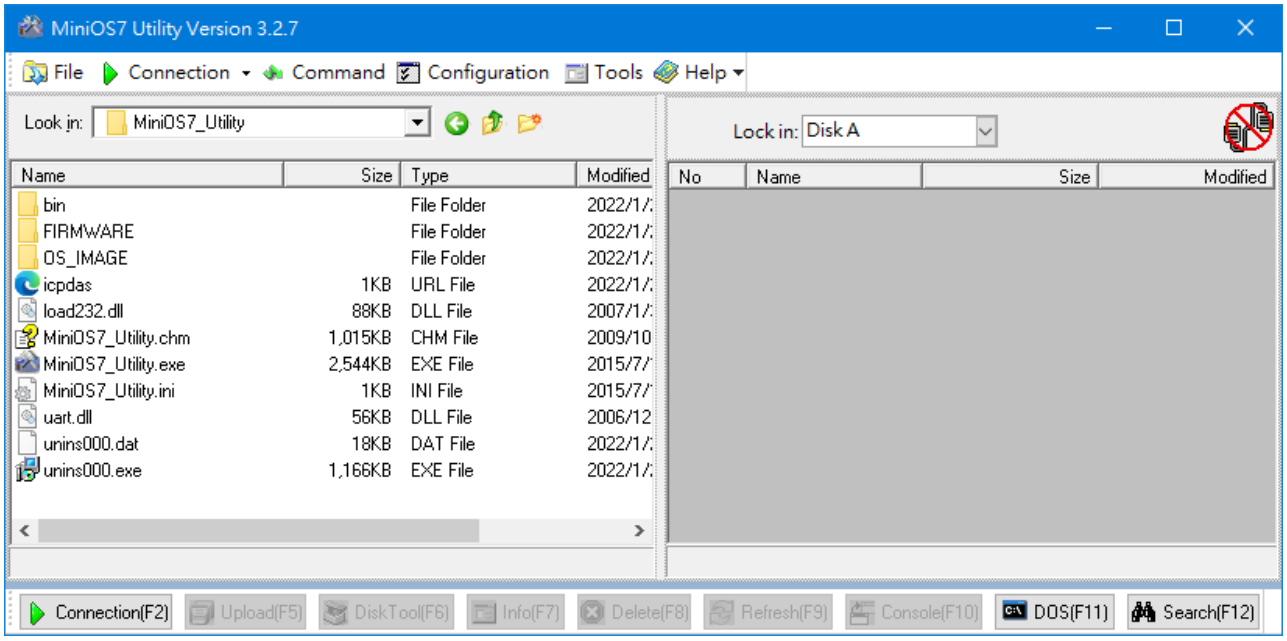
## 8.1 Establishing a Connection by Using MiniOS7 Utility

MiniOS7 Utility is a tool for uploading firmware to flash memory and updating the OS to the MQ-7200M module embedded with MiniOS7 with easiness and quickness. If the MiniOS7 Utility is not yet installed on the system, installation of the MiniOS7 Utility should be the first step. Please refer to section “3.2 Installing the MiniOS7 Utility” to install it.

To upload firmware or update the OS to MQ-7200M module, the user must first establish a connection between the PC and the MQ-7200M module.

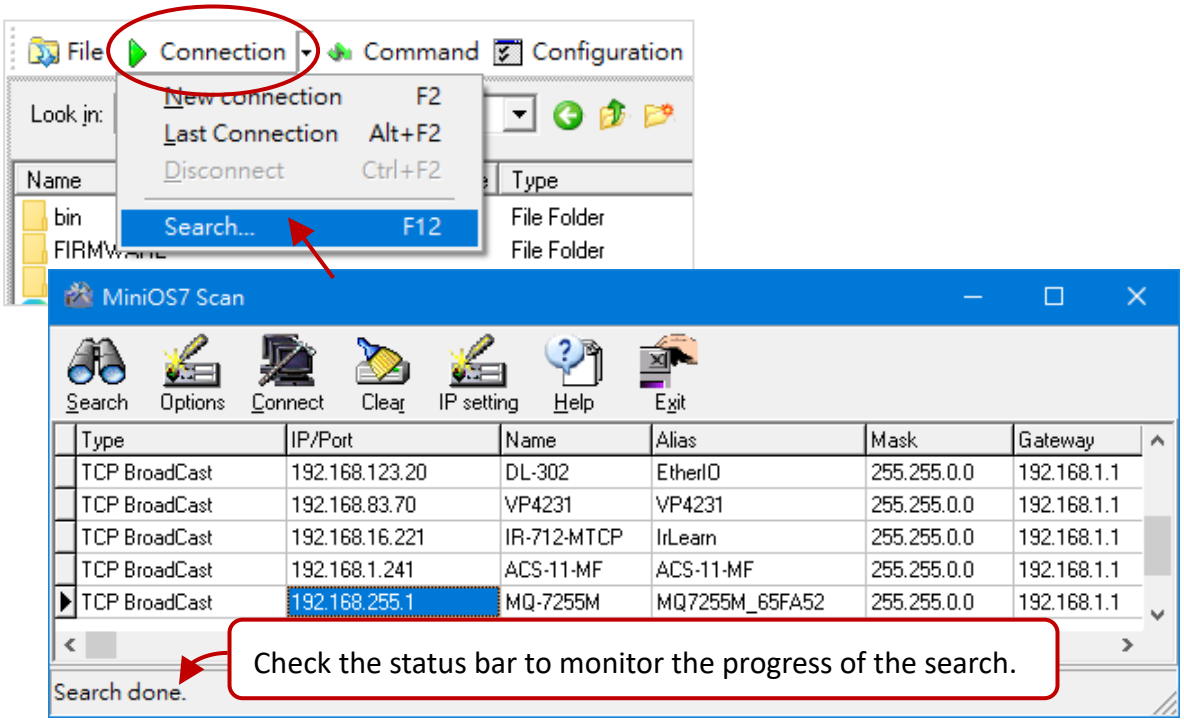
**Step 1: Run the MiniOS7 Utility**

Double-click the “**MiniOS7 Utility**” shortcut on the desktop.



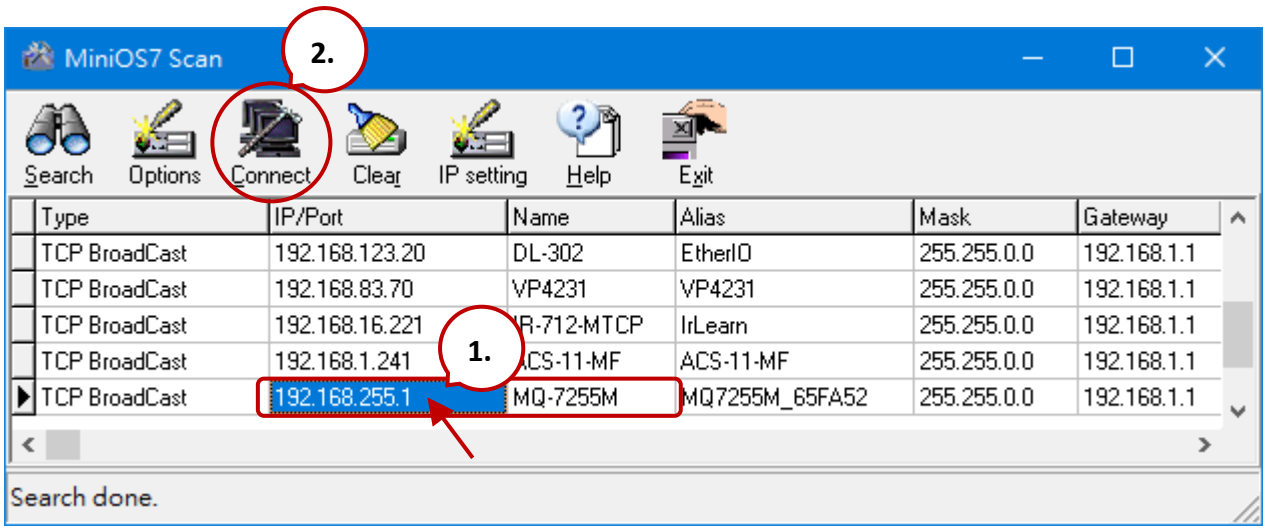
**Step 2: Press the "F12" key or choose the "Search" option from the "Connection" menu**

After pressing the "**F12**" key or choosing the "**Search**" option from the "**Connection**" menu, the MiniOS7 utility performs a search of all modules on the network.



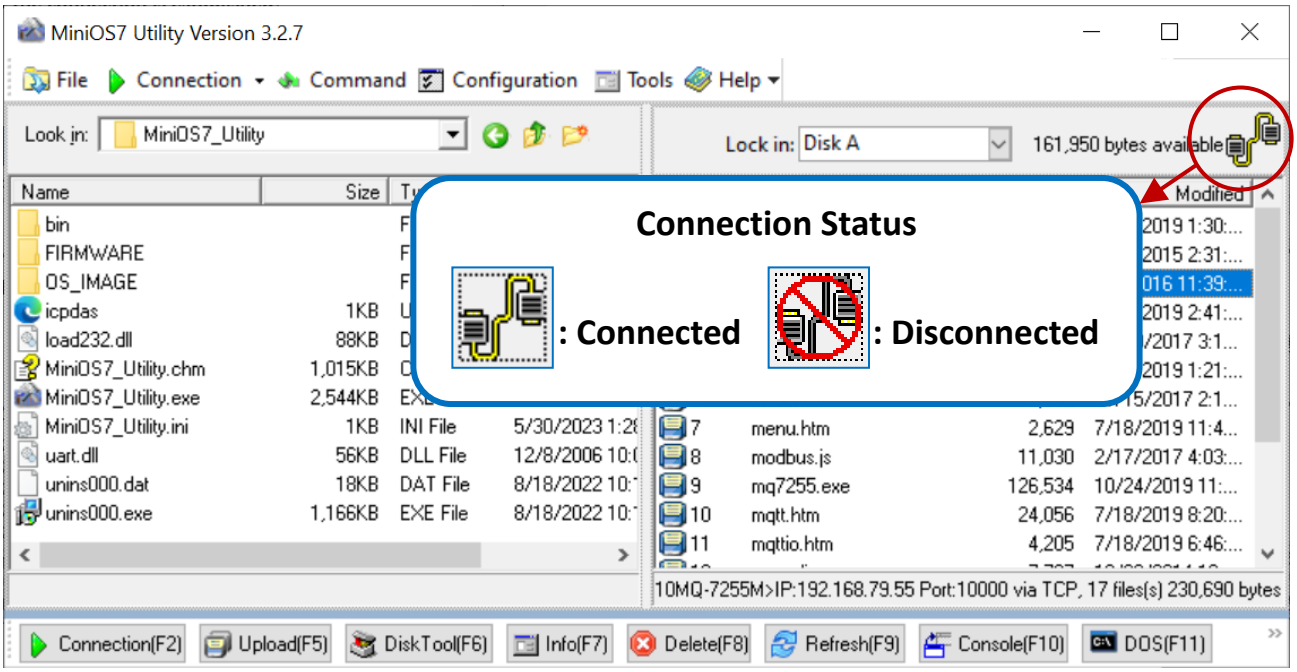

**Step 3: Click the IP address in the IP/Port field list and then click the "Connect" icon in the toolbar.**

After the search has been completed, click the IP address for the MQ-7200M module in the IP/Port field list and then click the "**Connect**" icon in the toolbar to connect to the MQ-7200M.



**Step 4: Check the connection symbol to make sure that the connection is established**

Check the connection symbol status in the top right side to make sure the connection has been established.



## 8.2 Exchanging the Protocol (TCP/IP to UDP)

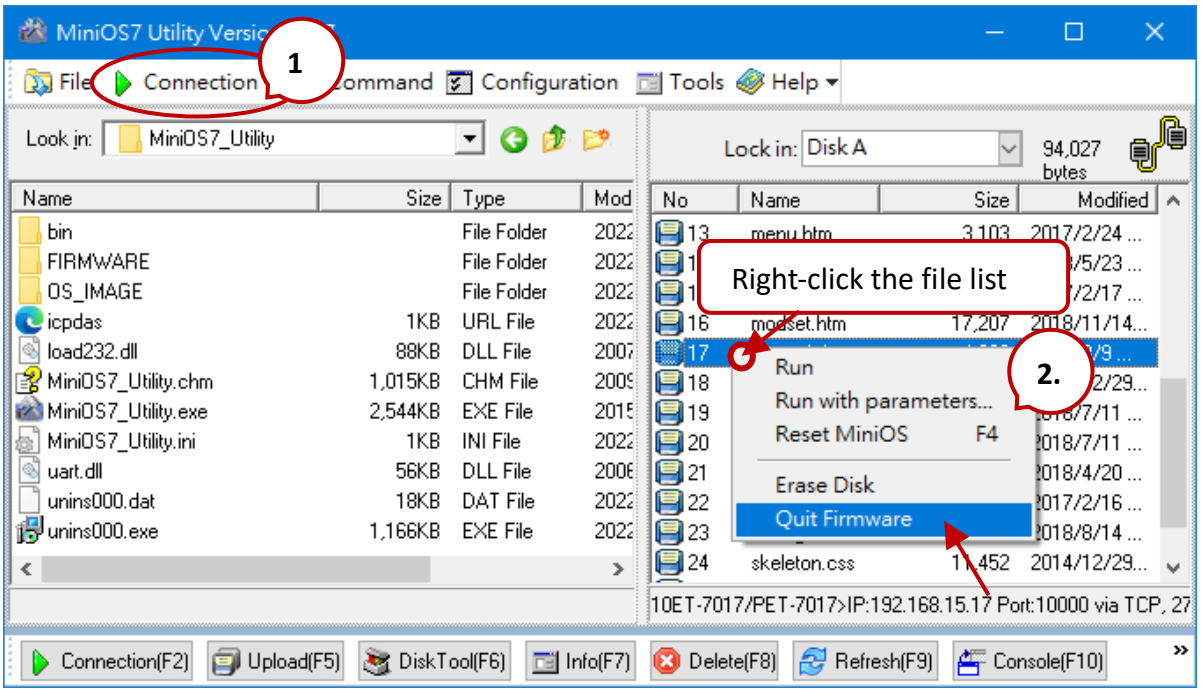
MiniOS7 Utility supports both UDP and TCP protocols. For MiniOS7 Utility, the TCP/IP is the default protocol for communicating with MQ-7200M, and the UDP is used to update the OS. **Hence, if the user wants to update the operating system, please change the communication protocol to UDP.**

### Step 1: Establish a connection to the MQ-7200M

Refer to section "8.1. Establishing a Connection" for more information.

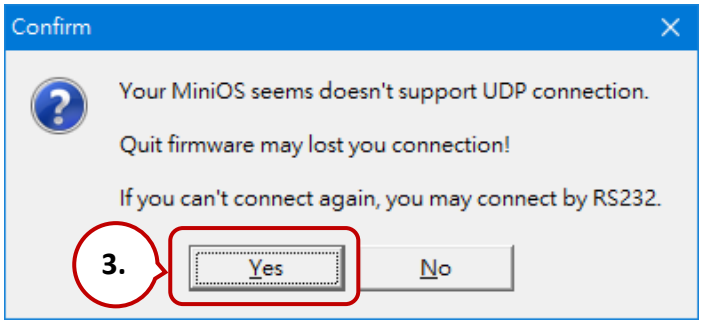
### Step 2: Stop the firmware running

Right-click the file list of the right side windows, and then choose "**Quit Firmware**" to stop the firmware running and exchange TCP/IP protocol to UDP protocol.




### Step 3: Click the "Yes" button to continue and the settings will take effect

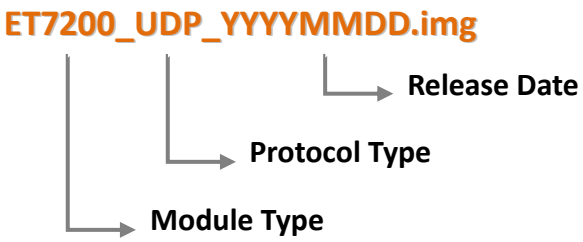
After executing the Quick Firmware command, the "Confirm" dialog will appear, and then click the "Yes" button to continue and stop the firmware running.




Note: The MQ-7200M support to update the firmware via the UDP connection.

## 8.3 Updating the MQ-7200M OS

Additional features to MQ-7200M OS will continue to be added in the future, so we advise the user to periodically check with ICPDAS web site for the latest updates. The latest version of the OS image can be obtained at: http://www.icpdas.com/en/download/show.php?num=2678



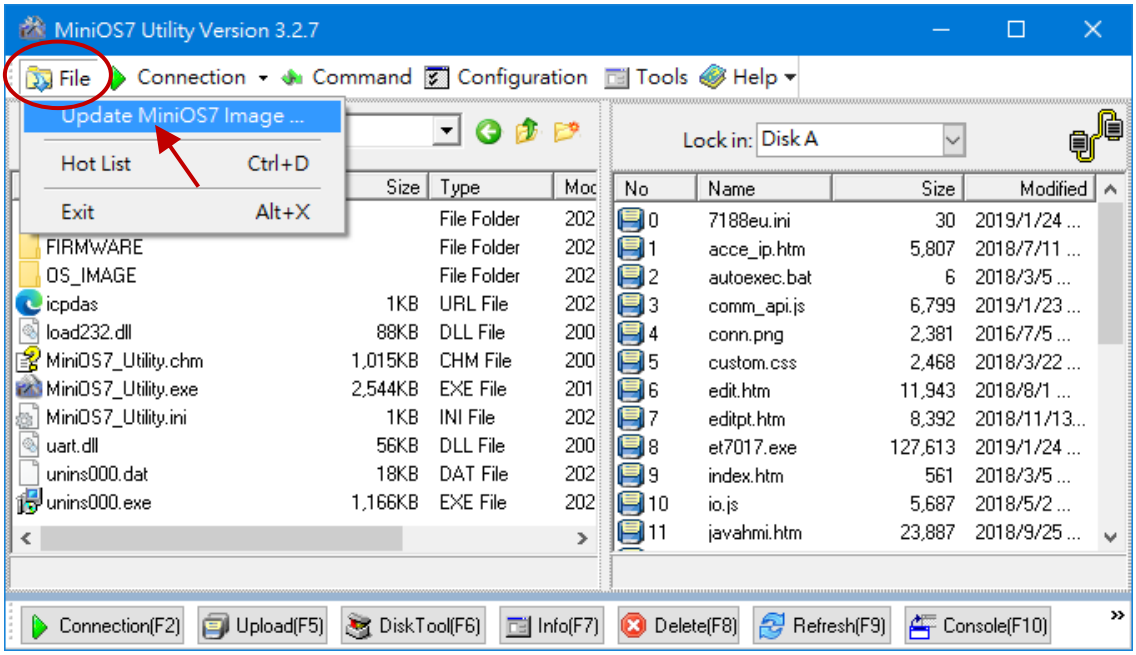

### 8.3.1 Using the MiniOS7 Utility

**Step 1: Establish a connection to MQ-7200M.**

Be sure that the MiniOS7 Utility is connecting with the MQ-7200M using the UDP connection. For a more detailed description of this instruction, refer to the section “8.2. Exchanging the Protocol (TCP/IP to UDP)”.

**Step 2: Choose “Update MiniOS7 Image” from the “File” menu**

Choose “**Update MiniOS7 Image**” from File menu to start the update procedure.

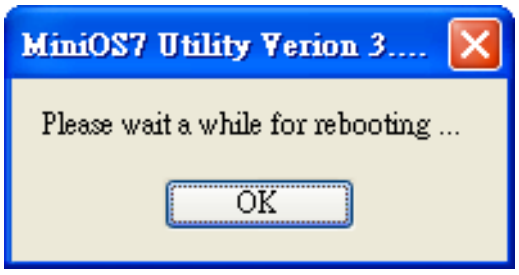


### Step 3: Select the latest version of the MiniOS7 OS image

After choosing the **update MiniOS7 Image** command, a dialog box titled "**Select MiniOS7 Image file**" will appear. Please select the most recent version of the MiniOS7 OS image.

### Step 4: Click “OK” to finish the procedure

After confirming the command, the user just need to wait awhile until the following dialog appear, and then click “OK” button to finish the procedure.



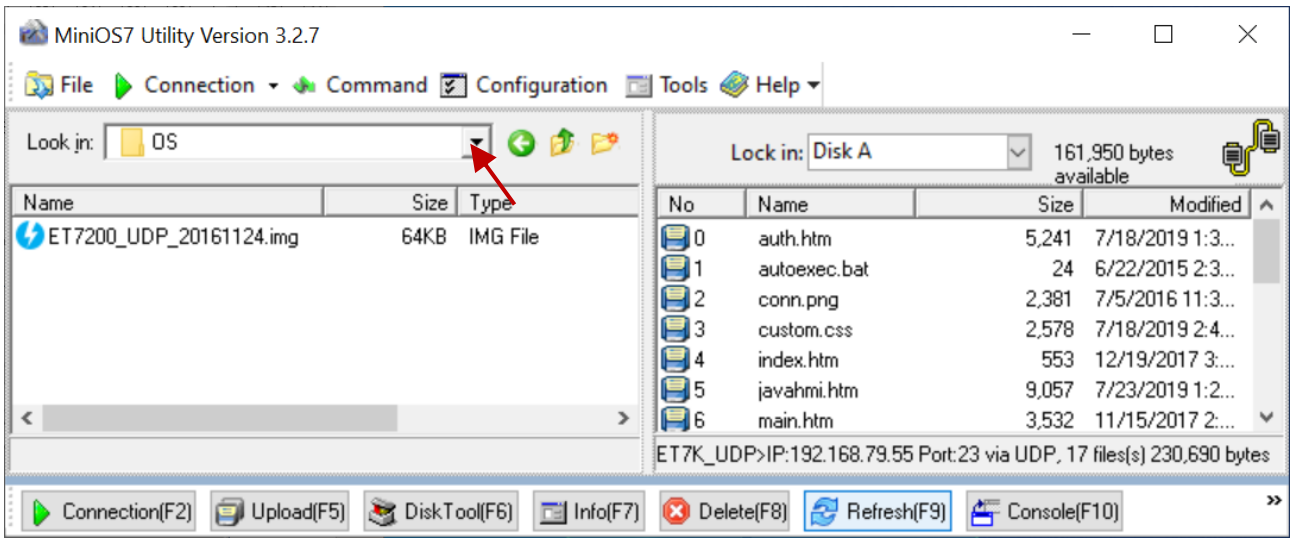

Note: If you are unable to perform the update, please refer to the next chapter for instructions on updating the OS using the Command Line.

## 8.3.2 Using the 7188EU.exe and Command Line

**Step 1: Establish a connection to MQ-7200M.**

Be sure that the MiniOS7 Utility is connecting with the MQ-7200M using the UDP connection. For a more detailed description of this instruction, refer to the section “8.2. Exchanging the Protocol (TCP/IP to UDP)”.

**Step 2: Choose the location where the MinisOS7 image file is stored.**

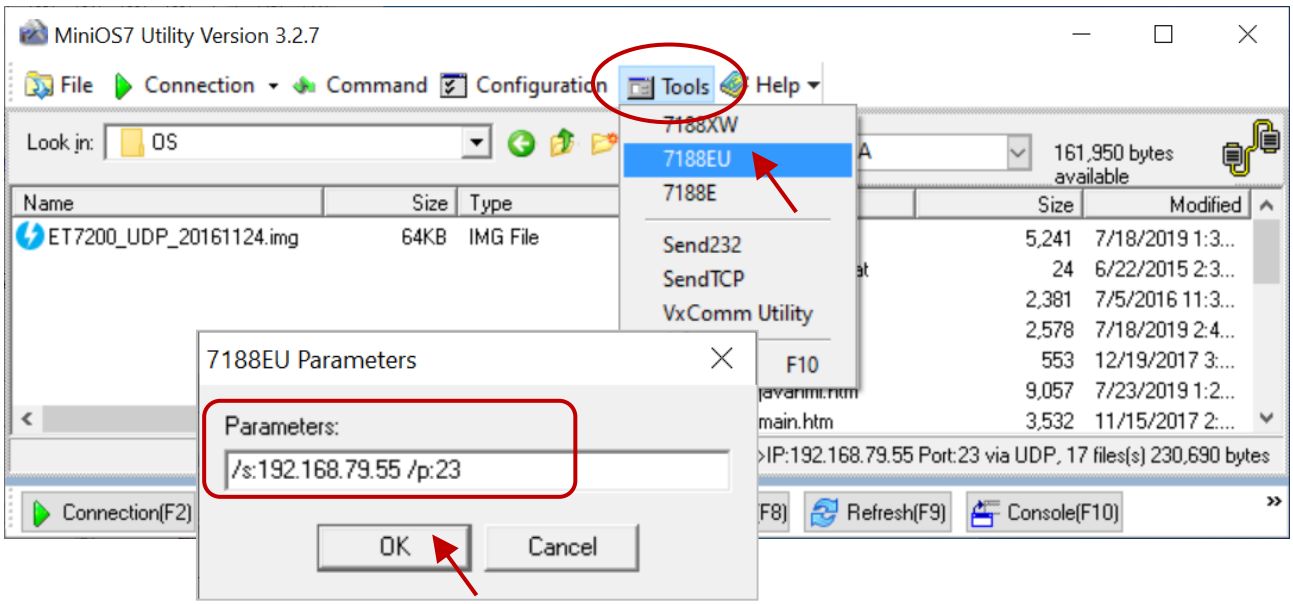



**Step 3: Connect to the module by using UDP**

Click **Tools > 7188EU** on the menu bar and enter “/s: IP address of the module /p:23” in the “**Parameters**” dialog.

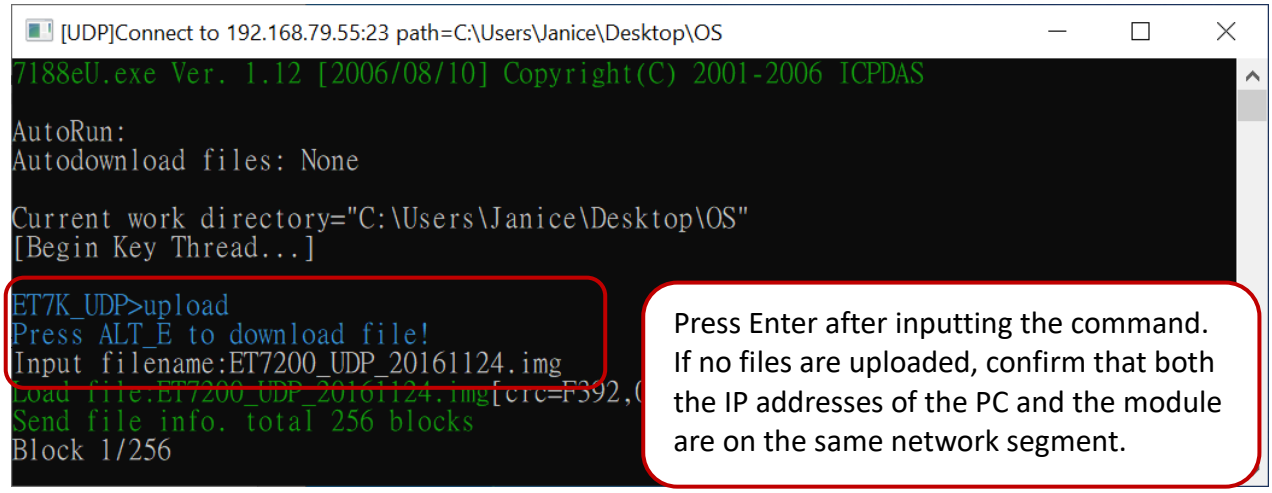
Description of parameters:

**/s:192.168.255.1** → IP address of the module **/p:23** → UDP Port 23 (fixed)



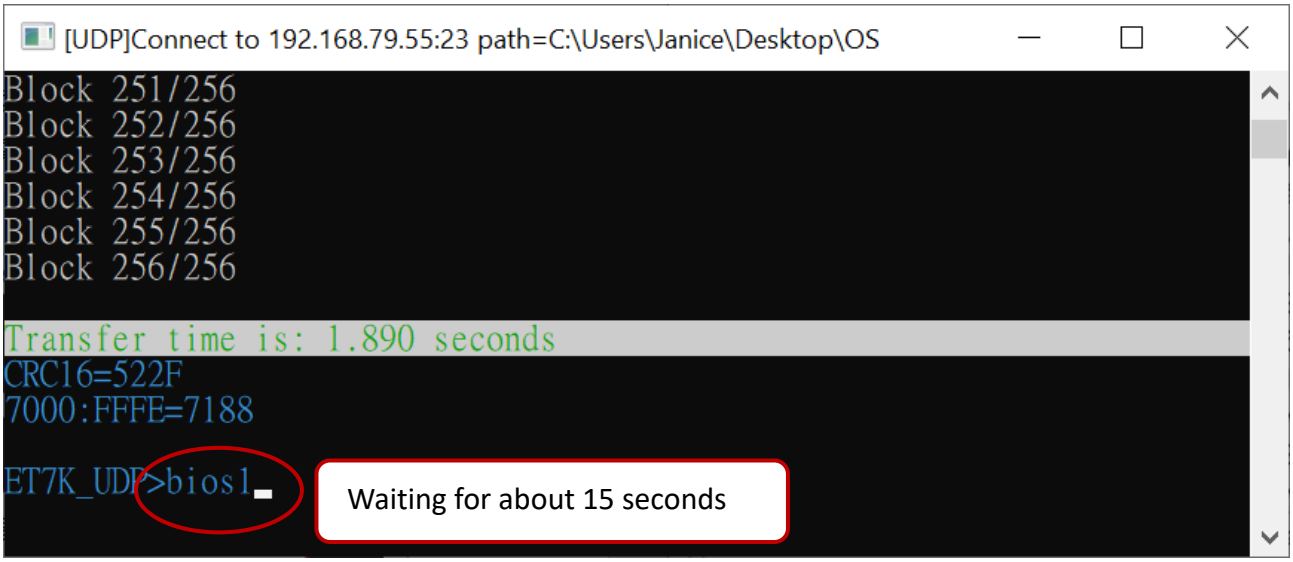
### Step 4: Upload the MiniOS7 image

Press **Enter** to see "ET7K_UDP>" in the window and input the **upload** command, then press Enter. Also, press **ALT + E** and enter the full name of the image file (e.g., **ET7200_UDP_20161124.img**)




### Step 5: Update the OS image file to a Flash

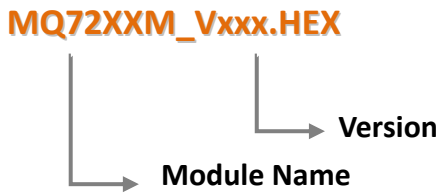
Enter the **bios1** command to update the image to the flash. The MQ-7200M will automatically restart after the update is completed. The user can perform another search for the module to check if the TCP connection has been re-established.




**Note:** The user can log in to the MQ-7200M's web interface to view the firmware version.

## 8.4 Updating the MQ-7200M Firmware

The firmware is stored in flash memory and can be updated to fix functionality issues or add additional features, so we advise the user to periodically check the ICP DAS web site for the latest updates.




The latest version of the MQ-7200M firmware can be obtained from:

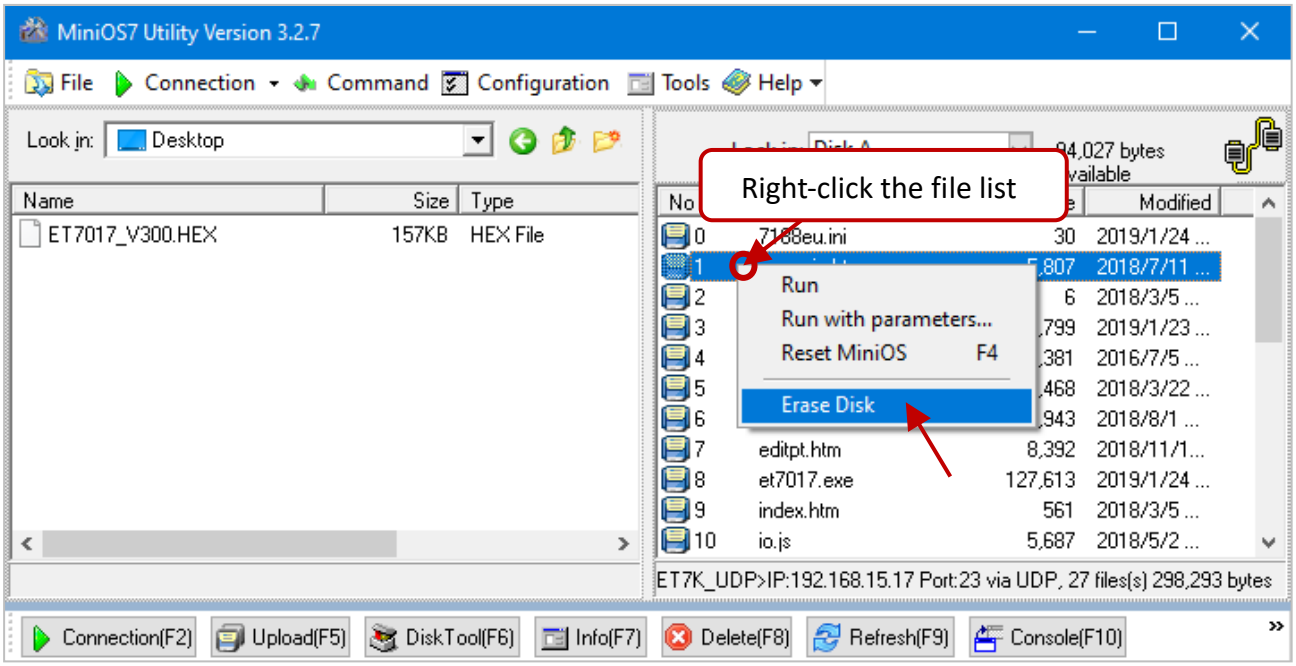
http://www.icpdas.com/en/download/show.php?num=2677

**Step 1: Establish a connection to connection to the MQ-7200M.**

Be sure that the MiniOS7 Utility is connecting with the MQ-7200M using the UDP connection. For a more detailed description of this instruction, refer to the section “6.2. Exchanging the Protocol (TCP/IP to UDP)”

**Step 2: Choose “Erase Disk” from the “Command” menu**

After establishing a UDP connection, then choose “**Erase Disk**” from **Command** menu (or right-click on the right of window) to delete all files from the flash memory.

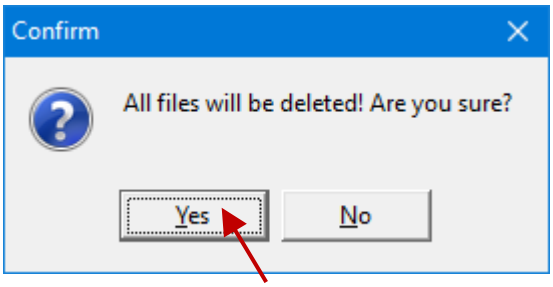


**Tips & Warnings**

The user has to delete all files existed on the MQ-7200M before uploading the firmware.

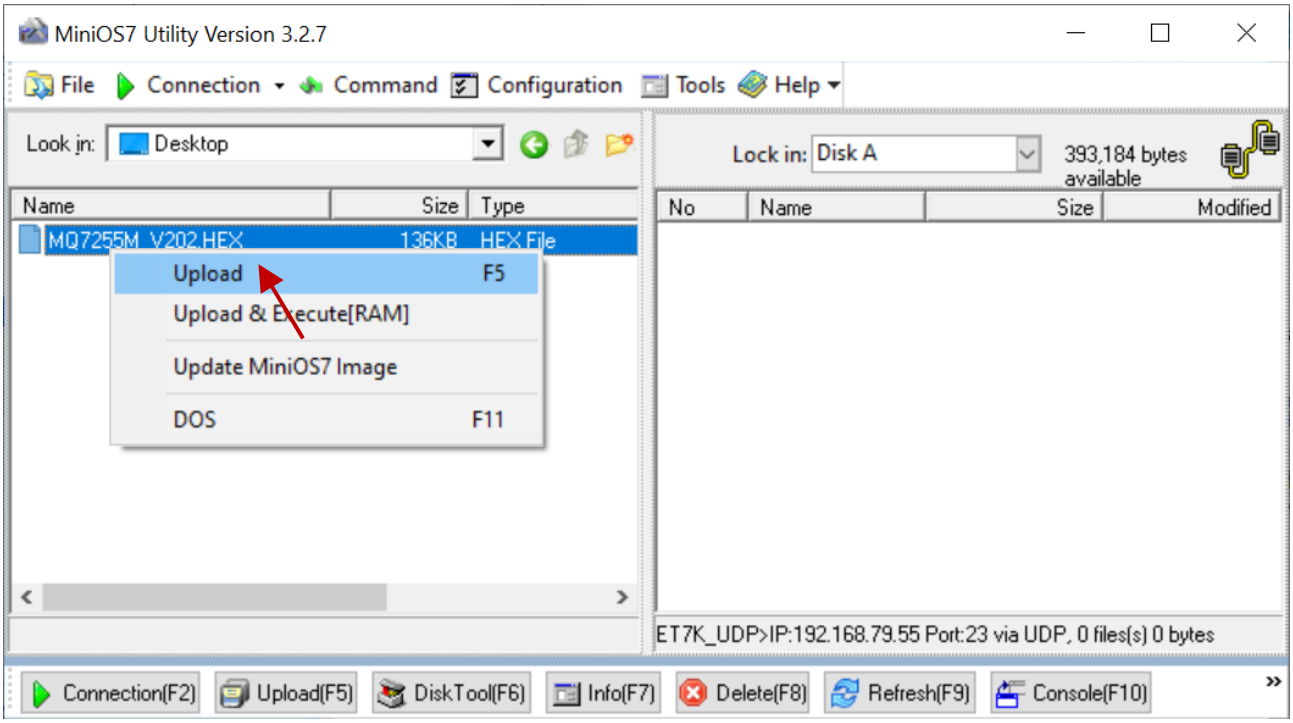
**Step 3: In the Confirm dialog box, click the "Yes" button to continue.**

After executing the Erase Disk command, the Confirm dialog will appear, and then click "Yes" button to continue erasing the memory contents.



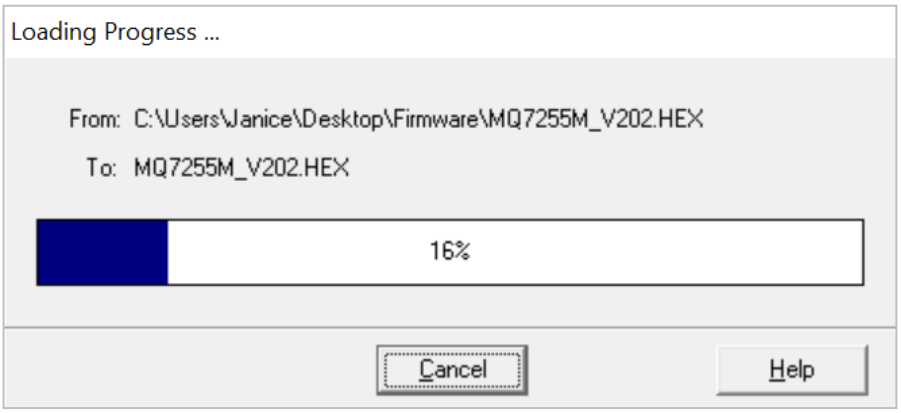

**Step 4: Select the latest version of the firmware.**

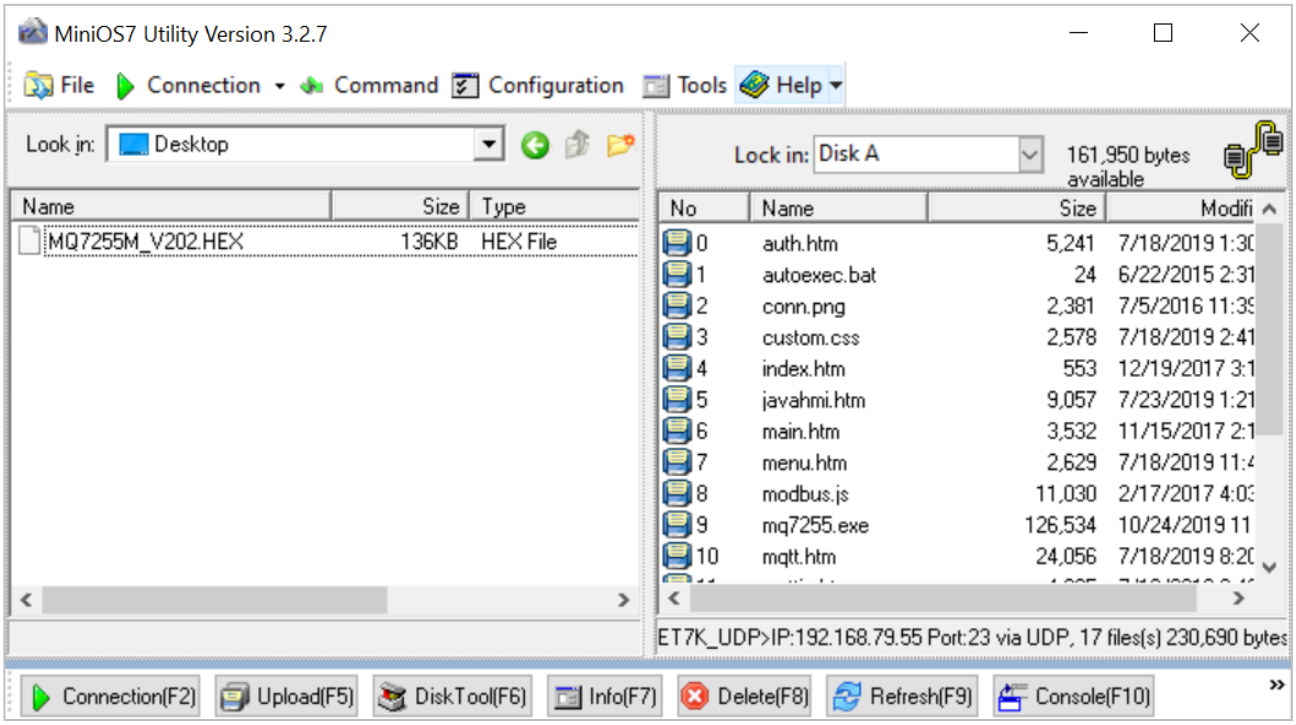
Right-click on the firmware which is downloaded on the computer and select **Upload** to start the upload process.



**Step 5: Reboot the module.**

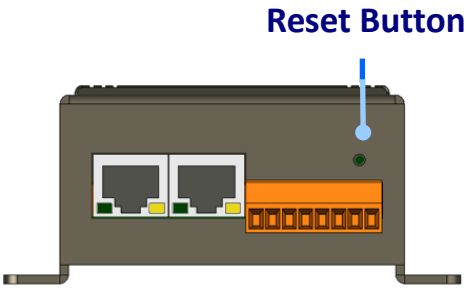
After the update is completed, reboot the module.



## 8.5 Restoring the MQ-7200M to Default Settings

If the network configuration on the MQ-7200M is lost, press and hold the reset button for at least 3 seconds can restore the MQ-7200M to default factory settings.




The following configuration will be restored:

**Network Configuration**

| Item | Factory Default Settings |
|---|---|
| **IP Address** | 192.168.255.1 |
| **Gateway** | 192.168.0.1 |
| **Subnet Mask** | 255.255.0.0 |
| **DNS Server** | Empty |
| **DHCP** | Disabled |

**Web Configuration**

| Item | Factory Default Settings |
|---|---|
| **Module Name** | Depends on the name of the module |
| **Page Header Information (First line)** | ICP DAS |
| **Page Header Information (Second line)** | https://www.icpdas.com |
| **Web Server Port** | 80 |
| **Modbus TCP Port** | 502 |

**I/O Settings**

The information displayed on the settings page varies depending on the model number.

**Digital Output**

| Item | Factory Default Settings |
|---|---|
| **Power-on Value** | OFF |
| **Safe Value** | OFF |

# 9. Modbus Register Table

**Coils (0xxxx)**

| Register | | Points | Description | Settings | Attribute | Factory Value |
|---|---|---|---|---|---|---|
| DEC | HEX | | | | | |
| 00000 : 00005 | 0000 : 0005 | 6 | DO value | 0: Off<br>1: On | R/W | - |
| 00032 | 0020 | 1 | Clear 1-ch historical DI max. value | 1: Clear | W | - |
| 00033 | 0021 | 1 | Clear 1-ch historical DI min. value | 1: Clear | W | - |
| 00064 : 00069 | 0040 : 0045 | 6 | DI value | 0: Off<br>1: On | R | |
| 00126 | 007E | 1 | Reset the I/O settings to the factory default state | 1: Reset | W | - |
| 00133 | 0085 | 1 | Reboot the module | 1: Reboot | W | - |
| 00235 : 00240 | 00EB : 00F0 | 6 | Enable/Disable the DO power-on value function | 0: Disable<br>1: Enable<br>(Default: 0) | R/W | 0 |

**Discrete Inputs (1xxxx)**

| Register | | Points | Description | Data Format | Attribute |
|---|---|---|---|---|---|
| DEC | HEX | | | | |
| 10000 : 10005 | 0000 : 0005 | 6 | DI value | 0: Off<br>1: On | R |
| 10032 : 10037 | 0020 : 0025 | 6 | Read DI “high latch” status | 0: Normal<br>1: Latched | R |
| 10064 : 10069 | 0040 : 0045 | 6 | Read DI “low latch” status | 0: Normal<br>1: Latched | R |

**Input Register (3xxxx)**

| Register | | Points | No. Per Point | Description | Data Format | Attribute |
|---|---|---|---|---|---|---|
| DEC | HEX | | | | | |
| 30100 | 0064 | 1 | 1 | Number of the DI channel | 6 | R |
| 30110 | 006E | 1 | 1 | Number of the DO channel | 6 | R |
| 30150 | 0096 | 1 | 1 | OS image version | 0x123 means version 1.2.3 | R |
| 30151 | 0097 | 1 | 1 | Firmware version | 0x123 means version 1.2.3 | R |
| 30153 | 0099 | 1 | 1 | I/O version | 0x123 means version 1.2.3 | R |

**Holding Register (4xxxx)**

| Register | | Points | No. Per Point | Description | Data Format | Attribute | Factory Value |
|---|---|---|---|---|---|---|---|
| DEC | HEX | | | | | | |
| 40255 | 00FF | 1 | 1 | Read the module reset status | 1: Power-on<br>2: Module Watchdog<br>3: Software Reset Command | R | - |
| 40256 | 0100 | 1 | 1 | Read the boot count of the module<br>The factory default value is 0 when the settings are set to the factory default values. | 1 to 32767 | R | - |
| 40260 | 0104 | 1 | 1 | Read the module name | 0x7260 | R | - |
| 40271 | 010F | 1 | 1 | Set the module identification (Modbus NetID) | 1 to 255 | R/W/E | 1 |

# 10. Troubleshooting

A number of common problems are easy to diagnose and fix if the user knows the cause.

| Symptom/Problem | Possible cause | Solution |
|---|---|---|
| The Run LED doesn't light | Internal power has failed | Return the module for repair. |
| The Run LED indicator is ON (light), but not flashing. | The module has possibly crashed. | Reboot the module |
| Cannot communicate via the Ethernet port, but the MQ-7200M is still operating. | The IP/Mask/Gateway address isn't within the IP address range of the LAN. | Change the IP/Mask/Gateway address to match the LAN, or ask the MIS administrator for assistance. |
| | There are more than 30 TCP/IP connections. | Reboot the module. |
| Able to explore the web page through using a web browser, but the connection to broker can not be established. | Port 1883 has been restricted by the firewall. | Consult the MIS administrator for assistance. |

# Revision History

The table below shows the revision history.

| Revision | Date | Description |
|---|---|---|
| 1.1 | Sep, 2023 | Revise Section 7.2, Section 7.3 (p46-50) using the MQTTX |
| 1.0.1 | May, 2023 | Adjust the order of chapters, add or modify some chapter content and screenshots. |
| 1.0.0 | Aug, 2016 | Initial issue |