User Manual

Version 1.0 May 2024

MDC-211-433

(433MHz Modbus data concentrator)

Important Information

Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year, beginning from the date of delivery to the original purchaser.

Warning

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If you encounter any problems while operating this device, feel free to contact us via mail at: service@icpdas.com .

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1. Product Introduction

This section introduces the functions, features, software, and hardware specifications of the MDC-211-433 Modbus Data Concentrator.

1.1. Introduction

◆ Functions

The MDC-211-433 is a Modbus data concentrator developed by ICP DAS. It features Ethernet, 433MHz wireless communication, RS-232, and RS-485 communication interfaces, and can connect Modbus RTU devices to the Ethernet network. The MDC-211-433 sequentially reads data from Modbus RTU devices according to a user-defined command list and integrates the data from different Modbus RTU devices into a continuous address format. This allows a remote monitoring host to access data from multiple Modbus RTU devices at once via the Ethernet connection to the MDC-211-433.

With the Modbus data centralized management function of the MDC-211-433 and the convenient connection and communication capabilities of Ethernet, a stable remote monitoring system can be quickly established. This simplifies data collection for users and reduces the loading on the Ethernet network, thereby improving system performance.

◆ Advantages

The MDC-211-433 Modbus Data Concentrator not only helps users manage local RS-232/RS-485 Modbus RTU devices but also easily connects to remote and dispersed Modbus RTU devices through the 433MHz wireless network, even in environments where wiring is difficult.

Especially in data acquisition and monitoring systems (Supervisory Control and Data Acquisition, SCADA) widely used in various industries, using the MDC-211-433 Modbus Data Concentrator requires only simple configuration to connect dispersed Modbus RTU devices to the Ethernet network, providing users with a quick setup for remote monitoring systems.

1.2. Features

◆ Supports Modbus RTU Master

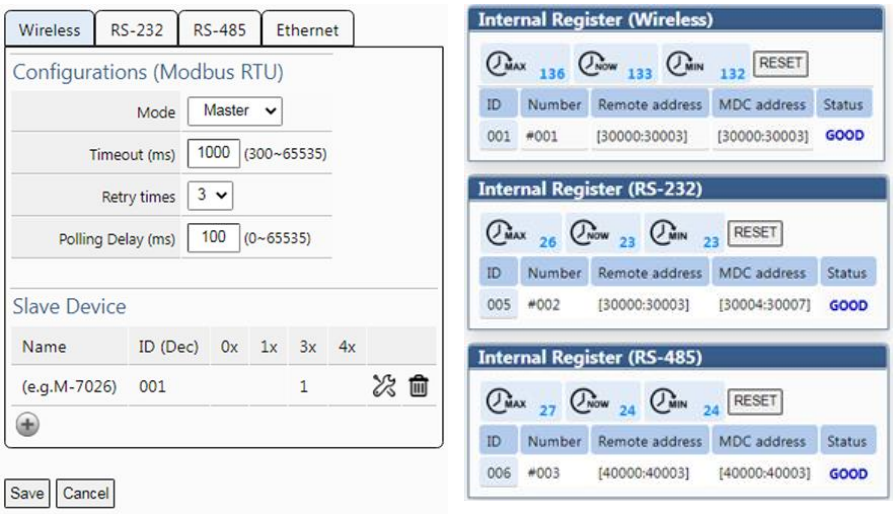
The 433MHz, RS-485, or RS-232 interfaces on the MDC-211-433 can be configured as Modbus Masters. The MDC-211-433 reads data sequentially from Modbus RTU devices according to a user-defined command list and integrates the data from different Modbus RTU devices into a continuous address format for centralized management.

◆ Supports Modbus TCP/RTU Slave

The RS-485, RS-232, or Ethernet interfaces on the MDC-211-433 can be configured as Modbus Slaves, allowing the monitoring host to access data from multiple Modbus RTU devices through the MDC-211-433. By establishing Modbus Master and Slave functionalities, the construction of a Modbus data monitoring system becomes more efficient, stable, and flexible, meeting the needs of various application environments.

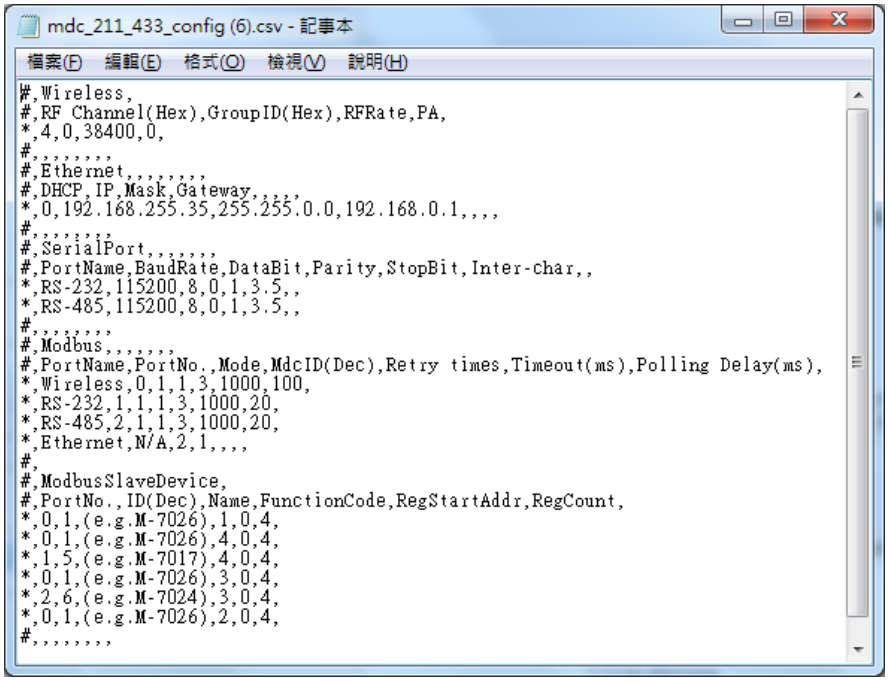
◆ Supports Web-based UI Operation

The MDC-211-433 offers a simple and user-friendly web interface. Users can configure the MDC-211-433 using a computer with internet access via a web browser. It also allows real-time monitoring to check for abnormalities in the connections of each Modbus RTU command and their update frequencies.



◆ Supports CSV (Comma-Separated Values) File Configuration

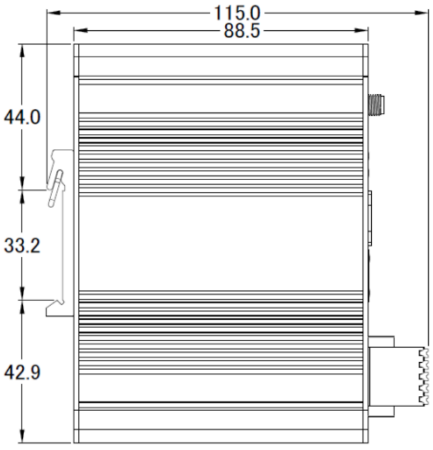
CSV is a text file format that can be edited in spreadsheet software or plain text files, offering ease of use, readability, and maintenance. The parameter settings of the MDC-211-433, including Modbus TCP communication ID and port number, serial port communication parameters, and Modbus RTU command settings, can also be configured in a *.csv file. By importing this file through the web interface, users can begin monitoring data from remote Modbus RTU devices.



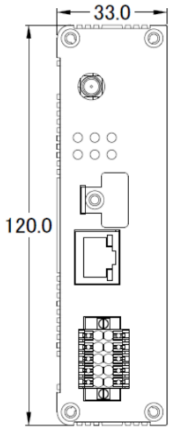
1.3. Specifications

MDC-211-433	
RF	
Antenna	0 dBi Omni directional (RP-SMA connector)
Baud Rate	650, 1200, 2400, 4800, 9600, 19200, 38400, 57600 (bps)
Group ID	0 ~ 65535
Radio Frequency	433.1, 433.2, …, 434.5, 434.6 (MHz) , 16 channels
Transmission Power	Default 10 dBm, Max 19 dBm
Transmission Distance (LoS)	300 m (at 9600 bps RF Rate and 10 dBm Tx Power)
Ethernet Network	
Port	x1, 10/100 Base-TX
Protocol Modbus	Modbus/TCP Slave
COM Ports	
RS-232	1 x 3-wire RS-232
RS-485	1 x 2-wire RS-485
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 (bps)
Data Format	N81, N82, O71, O81, E71, E81, S71, S81, M71, M81
Protocol	Modbus RTU Master / Slave
Polling Definition	250 Modbus command definitions for all 433MHz/RS-232/RS-485 ports
Shared Memory	9600 registers for each of AI, AO, DI and DO data
Power	
Input Range	+10 V_{DC} ~ +30 V_{DC}
Consumption	5 W @ 24 V_{DC}
Mechanical	
Casing	Metal
Dimensions (mm)	33 x 120 x 115 mm (W x L x H, not include antenna)
Installation	DIN-Rail
Environment	
Operating Temperature	-25°C ~ +75°C
Storage Temperature	-30°C ~ +80°C
Humidity	10~90% RH, non-condensing

1.4. Dimensions (Unit: mm)

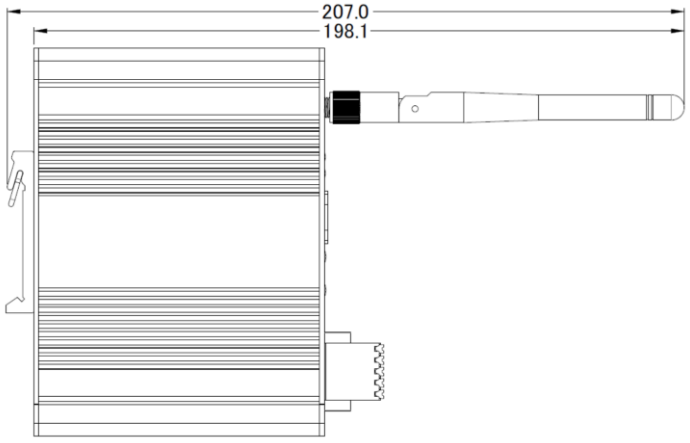


Left view

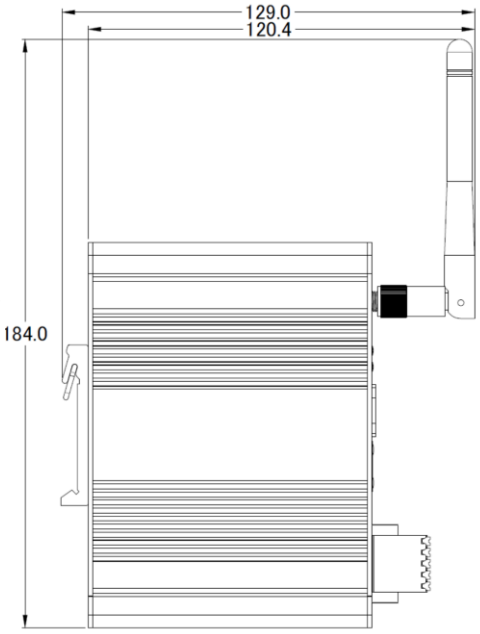


Front view

Product photo

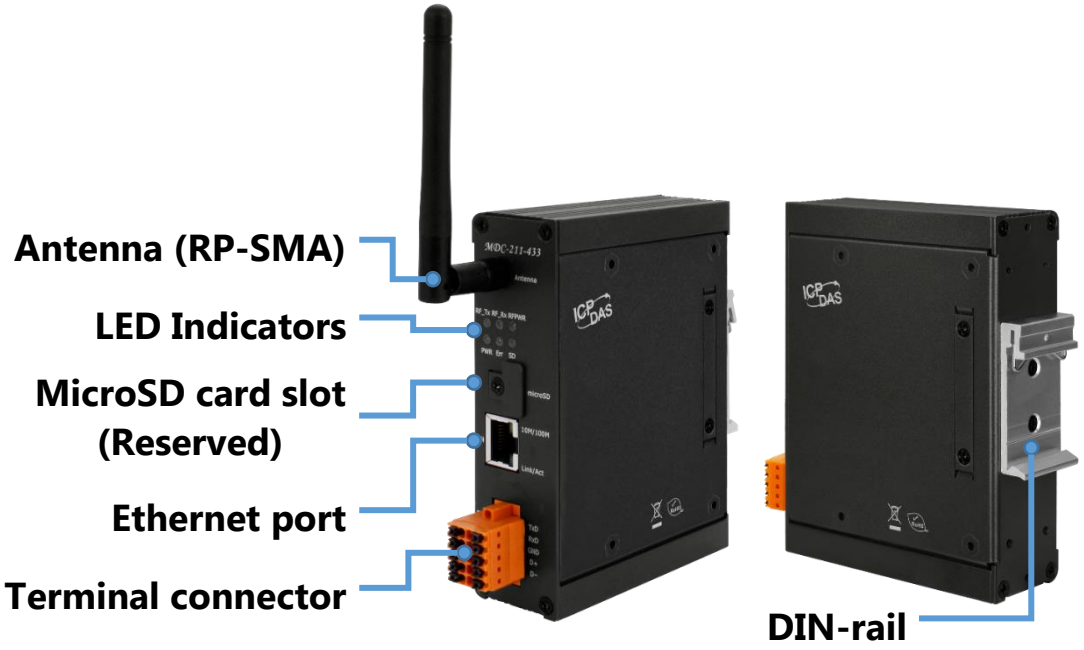


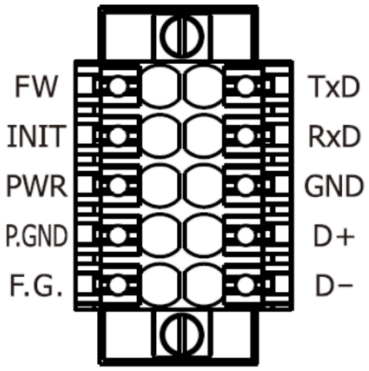
Antenna installation diagram
(0 degrees)



Antenna installation diagram
(90 degrees)

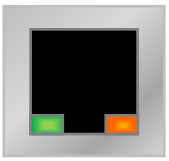
1.5. Appearance and Configuration



Terminal Connector	Pin Name	Description
	FW	Short-circuit GND and power on to enter firmware update mode.
	INIT	Short-circuit it to GND and power on to enter initialization mode.
	PWR	Power，+10V~+30VDC
	P.GND	Power ground.
	F.G	Frame ground.
	TxD	RS-232
	RxD	
	GND	
	D+	RS-485
	D-	

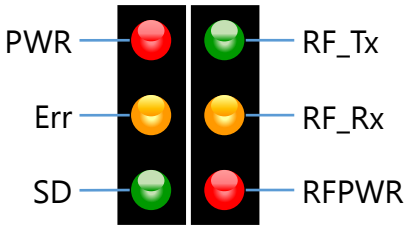
1.6. LED indicators and status

The MDC module has a total of 8 LED indicators, 2 of which are on the RJ-45 connector indicating the communication status of the Ethernet interface. The remaining 6 LEDs, 3 of which indicate the module status, and the other 3 indicating the wireless communication status, are as follows shown in the figure.



Link/Act 10M/100M

Indicator	Color	Status	Description
Link/Act	Green	Blinking	In communication.
		OFF	No communication.
10M/100M	Yellow	ON	100Mbps.
		OFF	10Mbps or Ethernet is disconnected.



Indicator	Color	Status	Description
PWR (power status)	Red	ON	Entered run mode.
		OFF	Powered off.
		Blinking (0.5 second)	Entered initialization mode.
		Blinking (1second)	Entered firmware update mode, the FW pin is connected to GND, but the Ethernet is not connected.
Err (abnormal state)	Yellow	ON	The RF module failed to initialize.
		OFF	No abnormality.

		Blinking (0.5 second)	There is a command polling timeout for RS-232 or RS-485.
SD (SD card status)	Green	OFF	Function reserved.
RF_Tx (RF transmission status)	Green	Blinking	Transmitting wireless data.
		OFF	Waiting for wireless data to be transmitted.
RF_Rx (RF reception status)	Yellow	Blinking	Receiving wireless data.
		OFF	Waiting to receive wireless data.
RFPWR (RF power status)	Red	ON	The RF module is powered on
		OFF	The RF module is powered off

2. Get started

This chapter mainly explains the working mode and setting process of the module, and how to connect to the module web page through a browser to establish the functions of Modbus master (Master) and Modbus slave (Slave).

2.1. Working mode

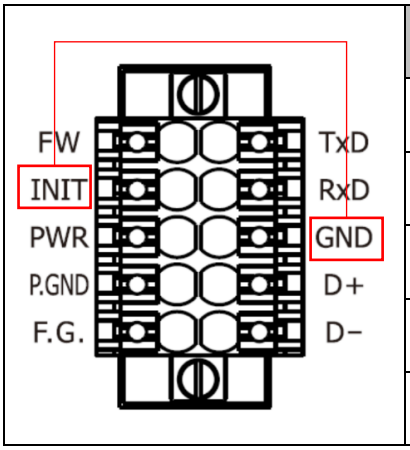
The module supports three working modes, namely run mode, initialization mode and firmware update mode, which are explained as follows:

2.1.1. Run mode

This is the default working mode when the module is powered on. In other words, when the INIT and FW pins of the module are left open and not connected to GND, the module will enter this mode after powering on. Users can set and modify module parameters in this mode. The module will poll the data of the remote Modbus RTU slave according to the settings of each communication interface, and then rearrange it into consecutive addresses. The host computer can send Modbus TCP commands to read back together and speed up data collection. Subsequent chapters will be introduced in this mode.

2.1.2. Initialization mode

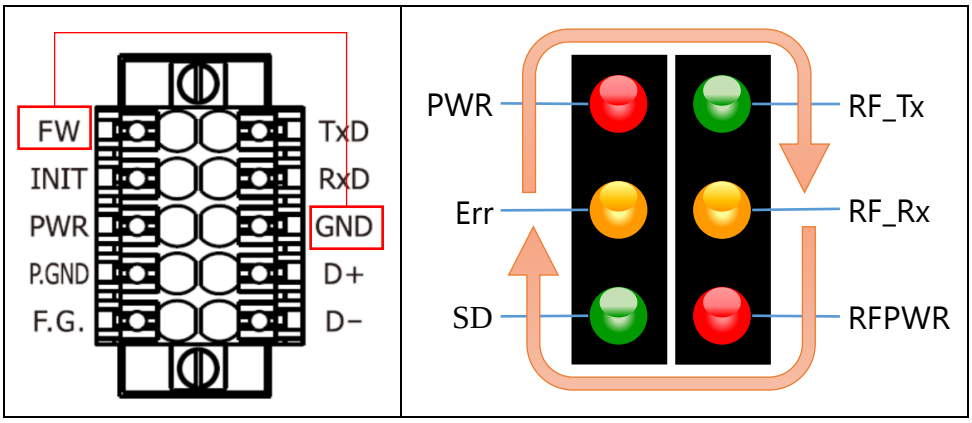
In this mode, the module will stop all polling actions, and the LED status is only PWR LED (red) flashing, RFPWR LED (red) always on, and other indicators are always off. In addition, the IP address and account password will be returned to factory default values. In other words, if the user forgets the IP address or account password of the module that can use this mode at the installation site to enter the module web page for modification. The way to enter this mode is to first power off the module and set the INIT pin short-circuit to the GND pin, and then power on the module again to enter this mode.



Name	Factory default value
IP	192.168.255.1
Mask	255.255.0.0
Gateway	192.168.0.1
Account	admin (case-insensitive)
Password	admin (case-insensitive)

2.1.3. Firmware update mode

In this mode, users can use the software provided by ICP DAS (only supports Windows version) to update the firmware from the Ethernet port of the module. The method of entry this mode, power off the module first and short-circuit FW pin to the GND pin, then power on to enter this mode. At this time, the module's 6 LED indicators will flash clockwise in turn, and the IP address will return to the factory default value.



Name	Factory default value
IP	192.168.255.1
Mask	255.255.0.0
Gateway	192.168.0.1

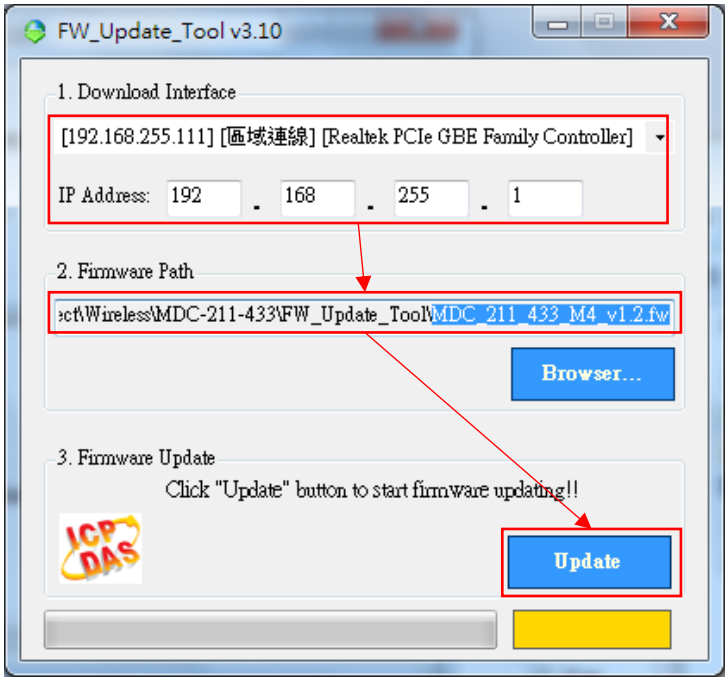
Then, when the module enters this mode, the steps to update the firmware are as follows:

(1) Please go to the file center of the module product website to download the latest version of firmware and software (FW_Update_Tool) to your computer.

- Product web page: https://www.icpdas.com/tw/product/MDC-211-433

(2) Adjust your computer's network domain to be the same as the module's factory default network domain, for example: 192.168.255.111, and use an Ethernet line to connect the computer and module.

(3) Open the software (FW_Update_Tool.exe) and execute it in sequence as shown below. The update time will take about a few minutes.



A. Select the network port connected to the module in【1. Download Interface】and enter the module's IP address 192.168.255.1.

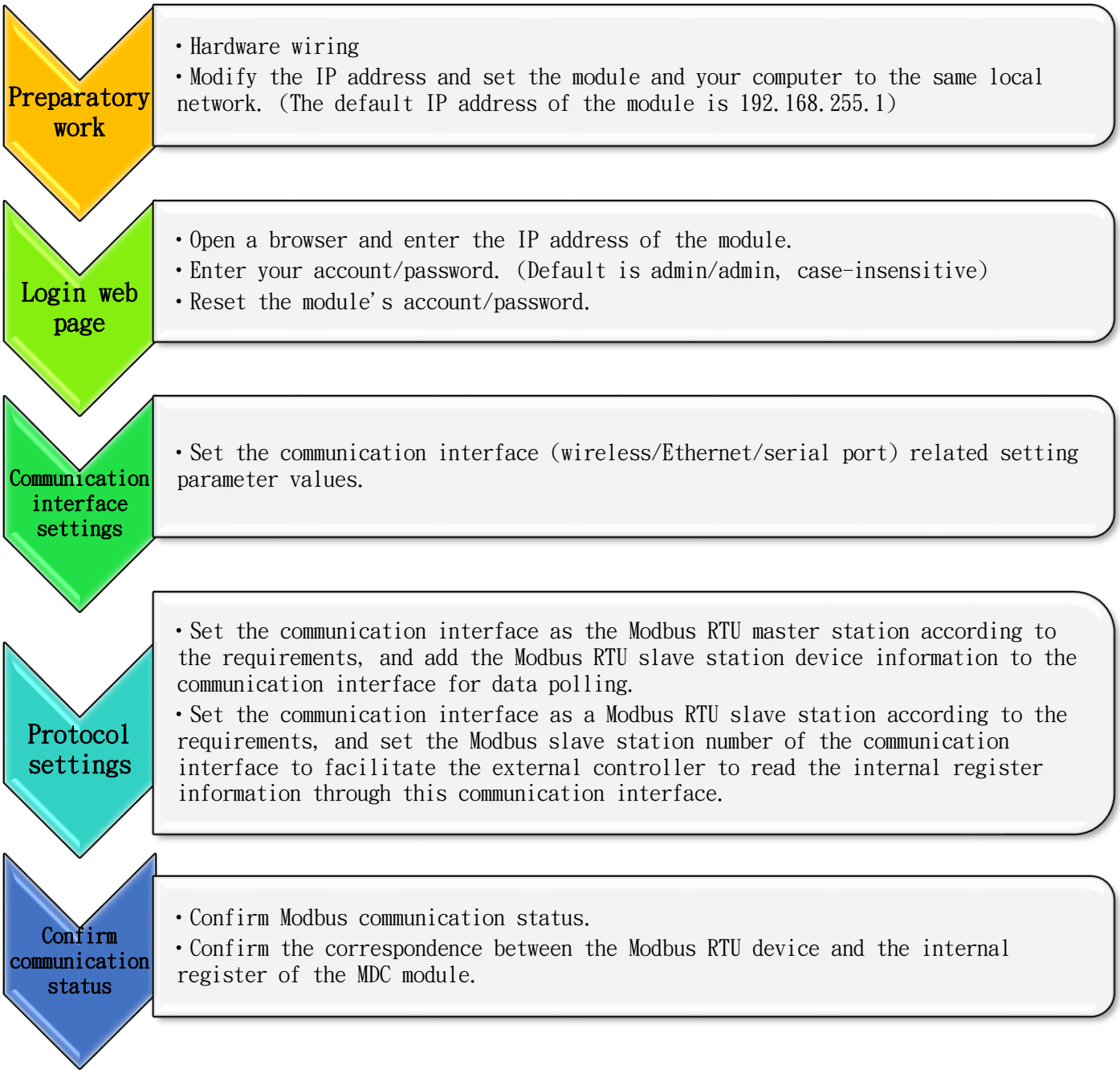
B. Select the latest firmware burning file (MDC_211_433_M4_vx.x.fw) in【2. Firmware Path】.

C. Click Update in【3. Firmware Update】to start updating the firmware. During the process, the update status will be displayed as shown below until "Update OK" is displayed, the firmware update has been completed.

D. Finally, power off the module and disconnect the FW and GND pins, then power on the module again. At this time, the module will execute the new firmware and restore the IP address that before updating the firmware to the setting.

2.2. Setting flow chart

This section mainly briefly describes the setting process in sections 2.3 to 2.8, so that users who get the module for the first time can quickly understand the setting and use of the module. Please refer to each section for detailed setting methods.



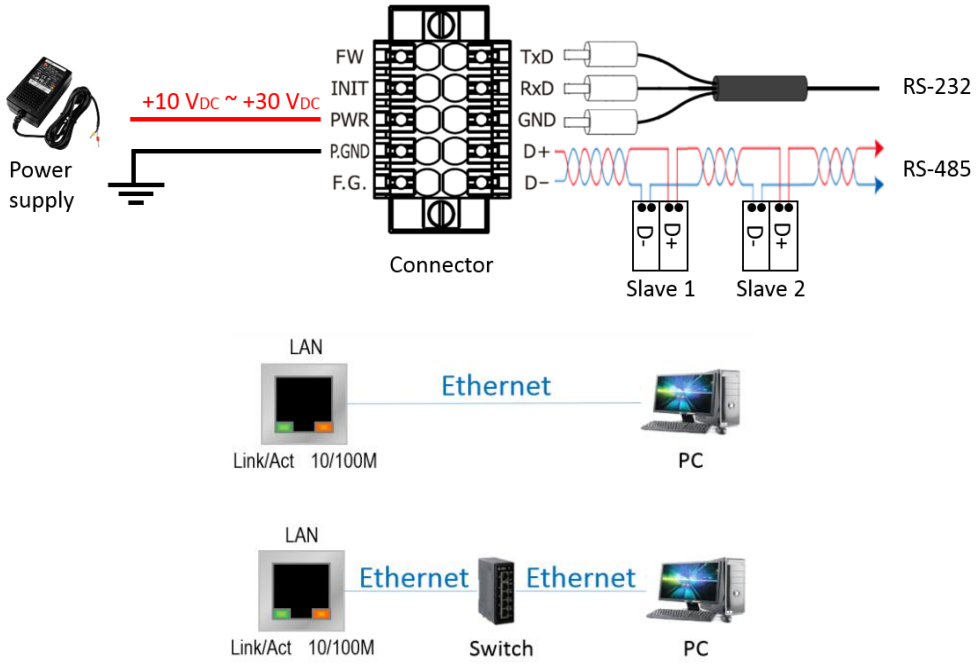
2.3. Preparatory work

This section mainly explains the hardware wiring and IP address settings of the module before use. After completion, you can log in to the module web page to modify the account/password and other parameter settings.

2.3.1. Hardware wiring

Please refer to the diagram and wiring methods below:

1. Input voltage: PWR is connected to the positive pole of the input power supply, and P.GND is connected to the ground wire of the input power supply. The input voltage range is +10 VDC ~ +30 VDC.
2. RS-485: Please use daisy chain wiring, D+ is connected to D+, D- is connected to D-.
3. RS-232: Please connect the three-wire RS-232 to the module.
4. Ethernet: Please connect the module's LAN and computer through a network cable (or through an Ethernet Switch/Hub).



2.3.2. Modify IP address

This module requires parameter settings through the web page, so you need to first confirm that the module and the computer have been set to the same local network. If the two are on different local networks, the network parameters of the module can be modified through the following software. The factory default values of the network parameters of the module are shown in Table 2.1.

Table 2.1 Factory default values of network parameters

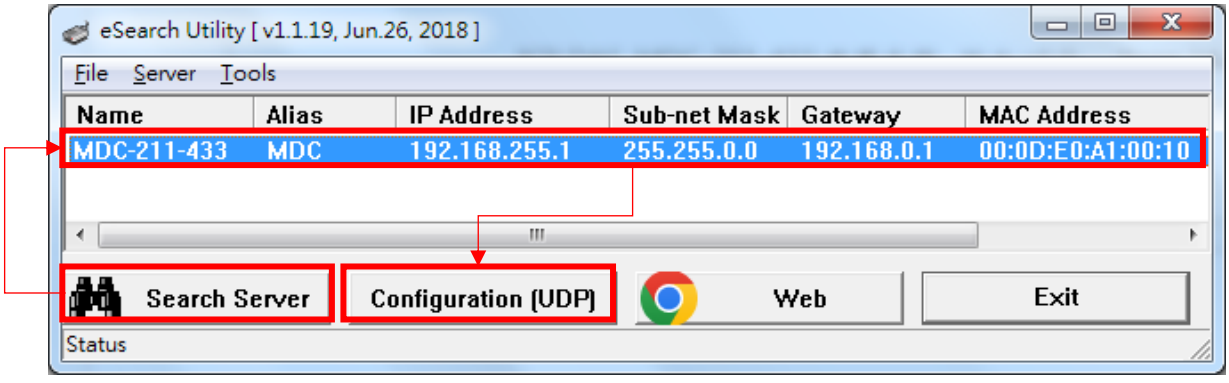
IP	192.168.255.1
Mask	255.255.0.0
Gateway	192.168.0.1

eSearch Utility software download link:
https://www.icpdas.com/tw/product/guide+Software+Utility_Driver+eSearch__Utility

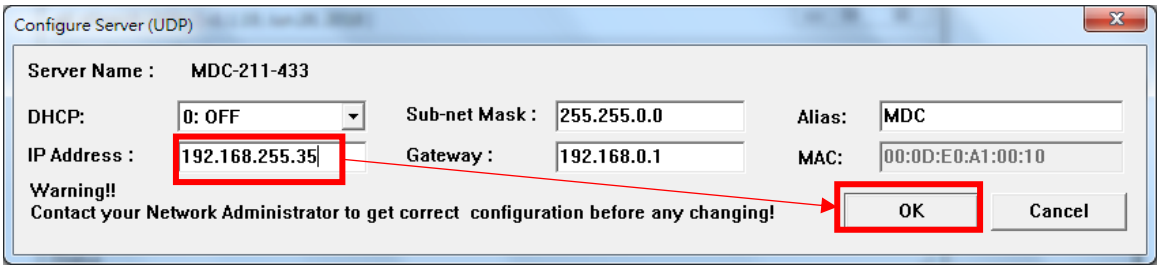
The following describes the steps to use eSearch Utility to search for modules and modify network parameters:

Step 1 Click [Search Server] to search for modules.

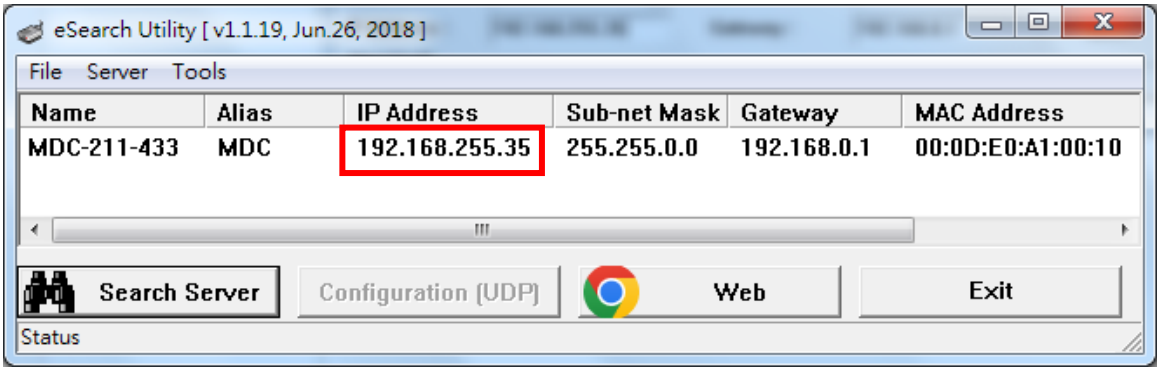
Step 2 After selecting [MDC-211-433] with the mouse, click the [Configuration (UDP)] button.



Step 3 A setting window will pop up, allowing the user to adjust the network parameter settings. After completion, click the [OK] button to modify the network parameters.



Step 4 Click [Search Server] again to search the module and confirm whether the network parameters have been modified successfully.



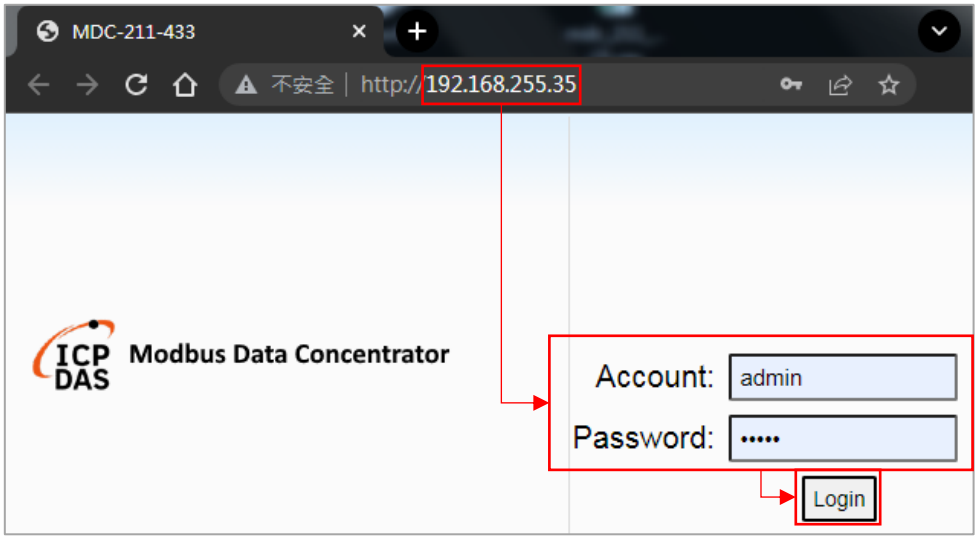
2.4. Login web page

This section mainly explains the steps to log in to the module web page after the module and the computer are set in the same local network.

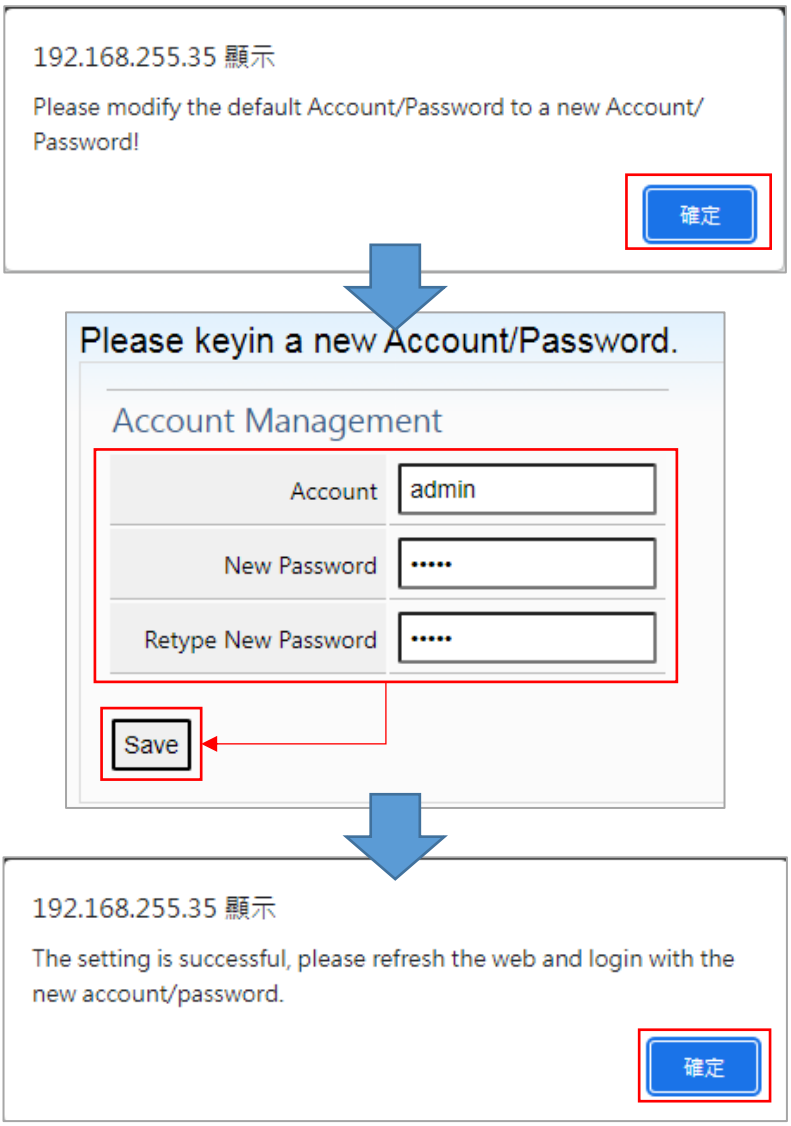
Step 1 Please enter the IP address of the module in the browser and connect to the login page as shown below. Then enter the factory default account password (not case sensitive) and click the Login button.

(Note) It is recommended to use IE11 / Chrome / Firefox as a browser with a resolution of 800 x 600 or above.

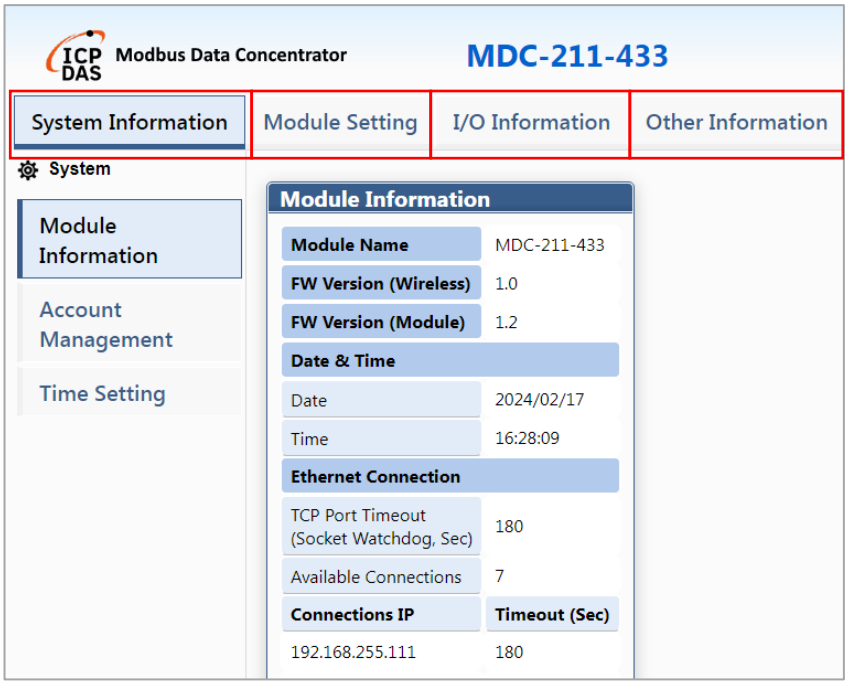
Name	Factory default value
Account	admin (case-insensitive)
Password	admin (case-insensitive)



Step 2 When you log in using the default account and password, you will be prompted to enter a new account and password and jump to another page. After you complete the input and click the Save button, you will be prompted again to refresh the web page and click Log in with new account and password.



After logging in to the module web page, you can see 4 tabs including System Information, Module Setting, I/O Information and Other Information, as shown below. The subsequent chapters will introduce the parameters in each tab in order.

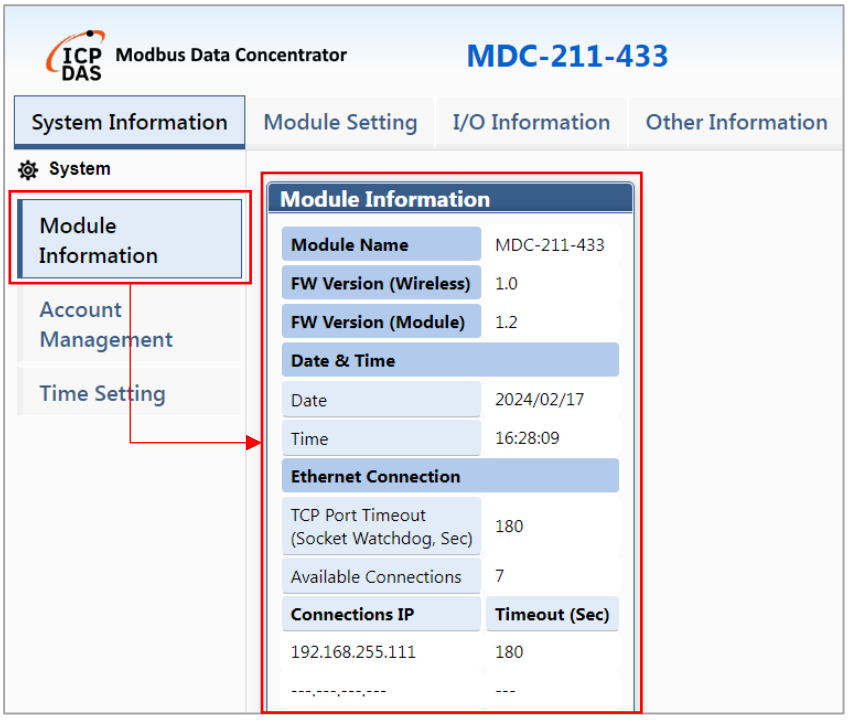


2.4.1. System Information

The System block in the System Information tab mainly includes items such as Module Information, Account Management, and Time Setting. The following is for each parameters are described.

- **2.4.1.1. Module Information**

  When you click this item, the web page will read and display module-related information.

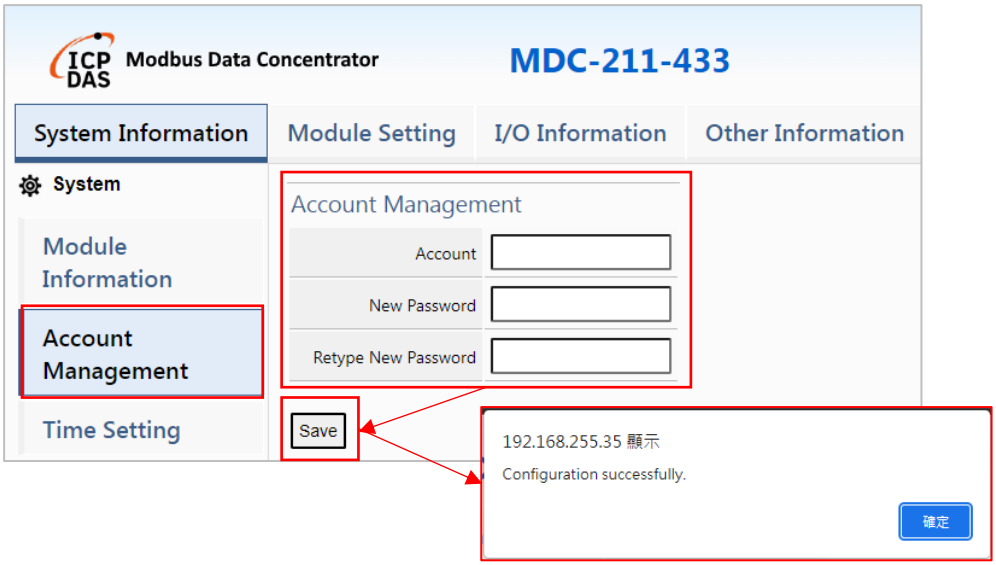


Parameter name	Description
Module Name	Module name.
FW Version (Wireless)	Firmware version of 433MHz wireless module.
FW Version (Module)	Firmware version of this module.
Date	The date of this module is in the format of year/month/day and can be set in Time Setting.
Time	The time of this module is in the format of hours : minutes : seconds and can be set in Time Setting.
TCP Port Timeout (Socket Watchdog, Sec)	The setting value of the Modbus TCP connection timeout time. When the Modbus TCP Client does not communicate with the module for more than this interval, the module will automatically disconnect the connection. The default value is 180 seconds.

	(Note) This value can be modified using Modbus commands, please refer to Section 2.10.
Available Connections	The number of Modbus TCP Client connections allowed, the maximum number is 8.
Connections IP	The IP address of the Modbus TCP Client currently connected to the module.
Timeout (Sec)	The connection time of the Modbus TCP Client currently connected to the module exceeds the time. If the communication has been interrupted, the time will start to count down to 0 and the connection will be automatically disconnected.

- **2.4.1.2. Account Management**

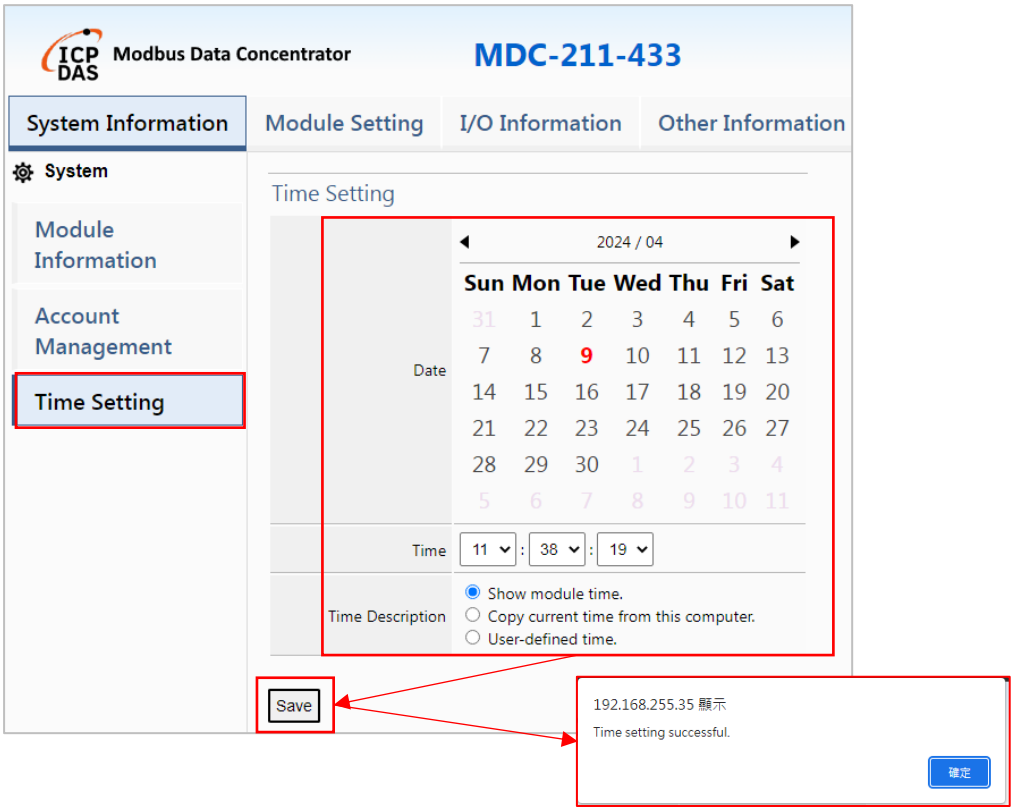
When you click this item, you can modify the account and password used to log in to the module web page.



Parameter name	Description
Account	The new account only supports 1 set of ASCII numbers, English or symbols with a maximum length of 12 characters.
New Password	The new password only supports 1 set of ASCII numbers, English or symbols with a maximum length of 12 characters.
Retype New Password	Enter the new password again, which must be the same as the new password.

- **2.4.1.3. Time Setting**

When this item is clicked, the module date and time can be modified from the web page.



Parameter name	Description
Show module time	Displays the current date and time of the module.
Copy current time from this computer	Displays the current date and time of the computer. Clicking the Save button will write this information to the module.
User-defined time	The date and time set by the user will be written to the module after clicking the Save button.

2.5. Communication interface

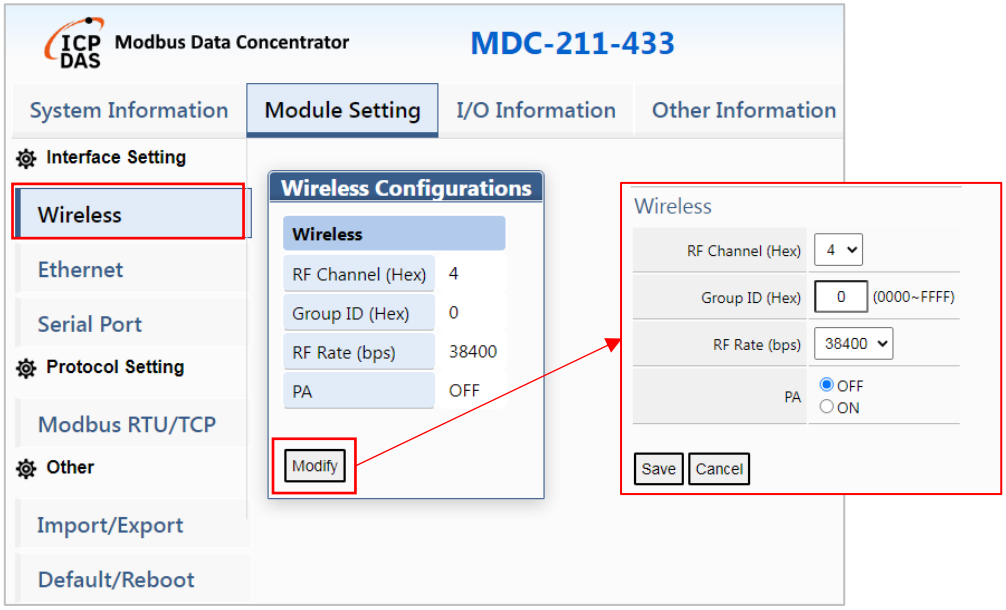
MDC-211-433 provides a Wireless, Ethernet, RS-232 and RS-485 communication interface. The relevant parameters and settings of these communication interfaces in the Module Setting tab will be introduced later.

2.5.1. Module Setting – Interface Setting

The Module Setting tab contains three sections: Interface Setting, Protocol Setting and Other. This section mainly focuses on the Interface Setting. The Interface Setting block is explained, including three items including Wireless, Ethernet and Serial Port.

- **2.5.1.1. Wireless**

When this item is clicked, the web page will read and display the current wireless parameters of the module. When the user clicks the Modify button, it will switch to the parameter modification page. After the modification is completed, the user can click the Save button to save it, and the parameters will take effect immediately. In addition, if you want to give up the modification, you can click the Cancel button and leave the modification page.

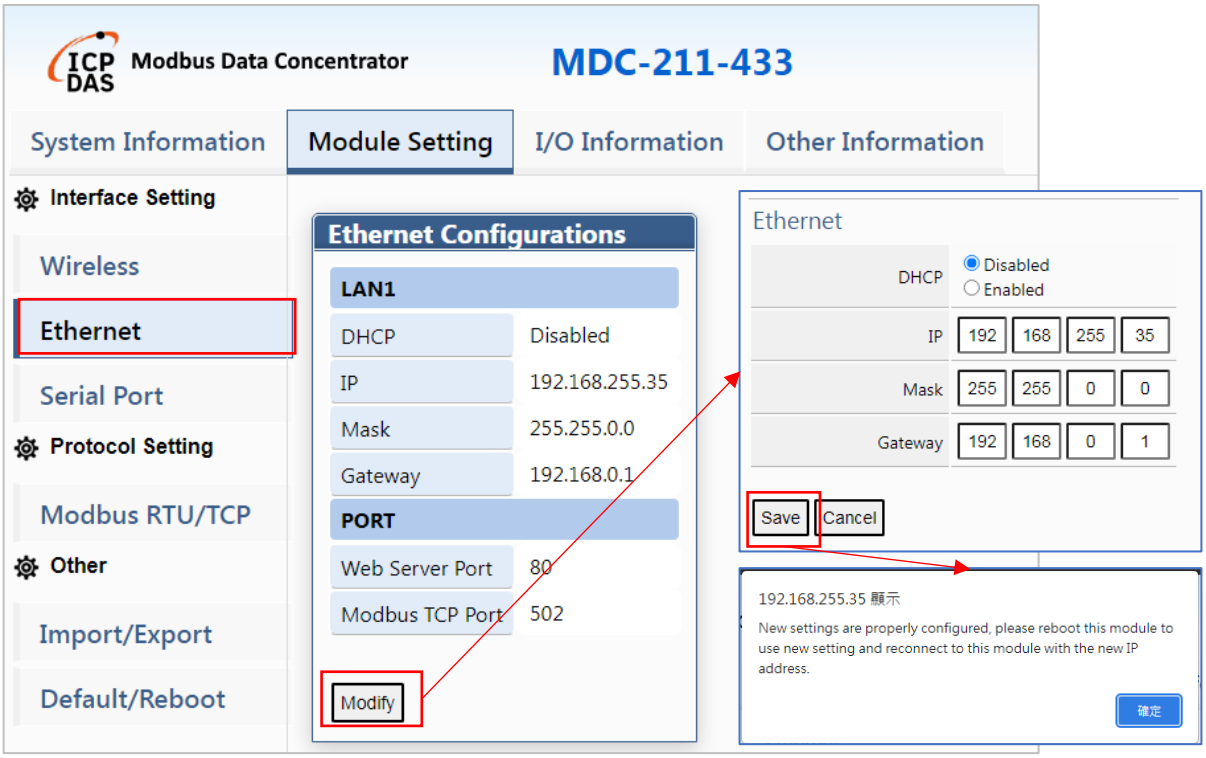


<table>
<tr><th>Parameter name</th><th colspan="8">Description</th></tr>
<tr><td rowspan="5">RF Channel (Hex)</td><td colspan="8">Wireless channel, the value range is 0x00~0x0F (decimal 0~15), corresponding to the following frequencies (MHz), the default value is 4.</td></tr>
<tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>433.1</td><td>433.2</td><td>433.3</td><td>433.4</td><td>433.5</td><td>433.6</td><td>433.7</td><td>433.8</td></tr>
<tr><td>8</td><td>9</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr>
<tr><td>433.9</td><td>434.0</td><td>434.1</td><td>434.2</td><td>434.3</td><td>434.4</td><td>434.5</td><td>434.6</td></tr>
<tr><td>Group ID (Hex)</td><td colspan="8">Group number, the value range is 0x0000~0xFFFF (decimal 0~65535), mainly subdivided into different small groups in the wireless channel, the default value is 0x0000.</td></tr>
<tr><td>RF Rate (bps)</td><td colspan="8">Wireless communication baud rate, the value range is 650, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and the default value is 38400.</td></tr>
<tr><td>PA</td><td colspan="8">Wireless output power, OFF is about 9±1dBm, ON is about 18±1dBm, the default value is OFF.</td></tr>
</table>

(Note) The three wireless parameters including RF Channel, Group ID and RF Rate must be the same as other 433MHz modules to enable communication.

- **2.5.1.2. Ethernet**

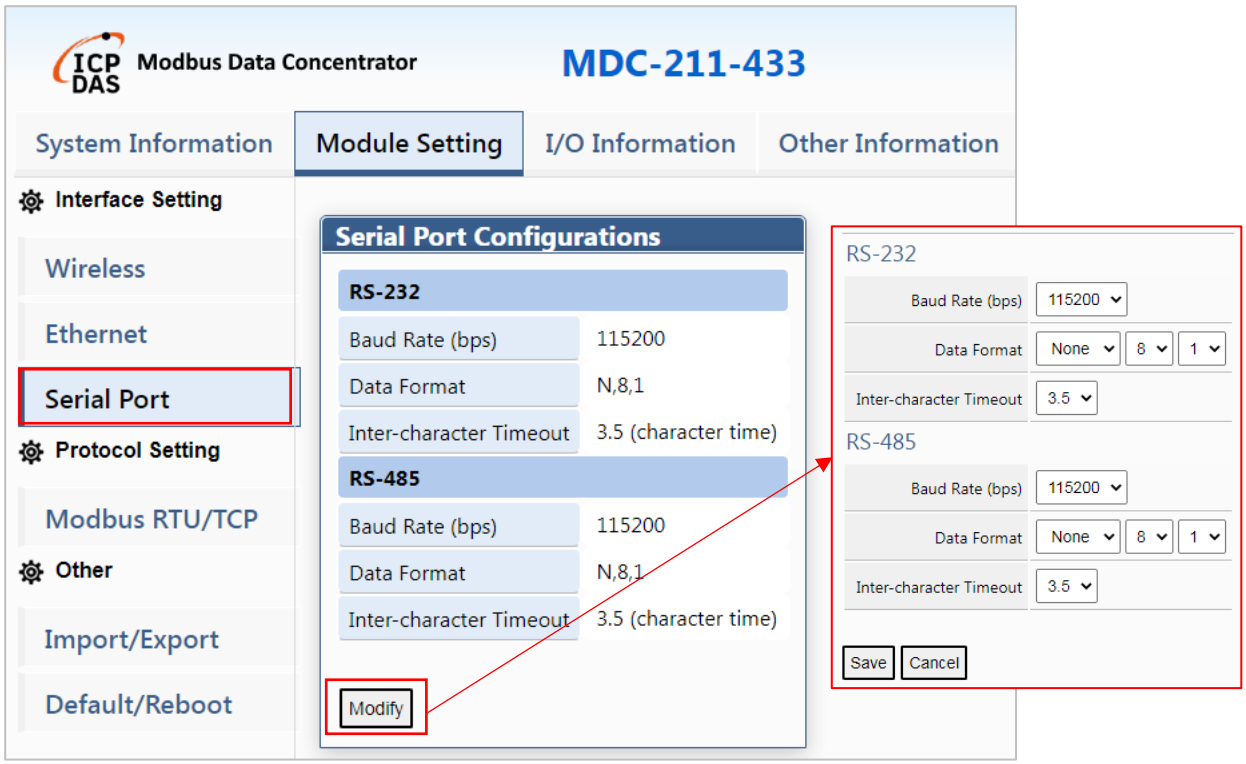
When this item is clicked, the web page will read and display the current Ethernet parameters of the module. When the user clicks the Modify button, it will switch to the parameter modification page. After the modification is completed, the user can click the Save button. To save, the web page will prompt the user to restart the module and reconnect using a new IP address. In addition, if you want to give up the modification, you can click the Cancel button and leave the modification page.



Parameter name	Description
DHCP	Whether the IP address is automatically assigned by the DHCP server. If you select Enabled, the module's IP address is configured by the DHCP server. If you select Disabled, you need to manually assign a fixed IP address to the module. , the default value is disabled.
IP	The IP address of the module, the default value is 192.168.255.1.
Mask	The subnet mask of the module. The default value is 255.255.0.0.
Gateway	The module's communication gateway address, the default value is 192.168.0.1.
Web Server Port	Fixed 80.
Modbus TCP Port	Fixed 502.

- **2.5.1.3. Serial Port**

When this item is clicked, the web page will read and display the current serial port parameters of the module. When the user clicks the Modify button, it will switch to the parameter modification page. After the modification is completed, the user can click the Save button. Save and the parameters will take effect immediately. In addition, if you want to give up the modification, you can click the Cancel button and leave the modification page.



Parameter name	Description
Baud Rate (bps)	The communication baud rate of RS-232 or RS-485, the value range is 1200, 2400, 4800, 9600, 19200, 38400, 57600, and the default value is 115200 bps.
Data Format	The data formats of RS-232 or RS-485 are as follows: ➢ Parity bit: no check (None), odd parity bit (Odd), even parity bit (Even), Mark and Space, the default is not check (None). ➢ Data bits: 7 or 8, the default value is 8. ➢ Stop bit: 1 or 2, the default value is 1.
Inter-character Timeout	The character timeout time of RS-232 or RS-485, the value range is 1.5~10 character time, the module will wait for this time after receiving each character (or byte) of the data. Confirm whether new characters are received. If no new characters are received after this waiting time and it

	times out, the module will determine that the data has been received. The default value is 3.5 characters. . [For example]: If the communication baud rate is 9600bps, it takes about 1 millisecond (ms) to transmit each character. When the character timeout time is set to 3.5 characters, the interval between characters only needs to exceed 3.5 milliseconds, the module will determine that the data has been received and then start parsing the data.

2.6. Communication protocols and modes

MDC-211-433 supports Modbus RTU or Modbus TCP communication protocols according to the communication interface. The communication interfaces that support Modbus RTU are Wireless, RS-232 and RS-485, and the communication interface that supports Modbus TCP is Ethernet.

In addition, these four communication interfaces can be set as Modbus master or Modbus slave respectively, as shown in the table below. Among them, if the communication interface is set as a Modbus master station, you can further plan the external slave devices that are expected to be monitored on the module web page or using a csv file. If the communication interface is set as a Modbus slave station, then the slave station number needs to be set to facilitate the external controller to read the internal register information through this communication interface.

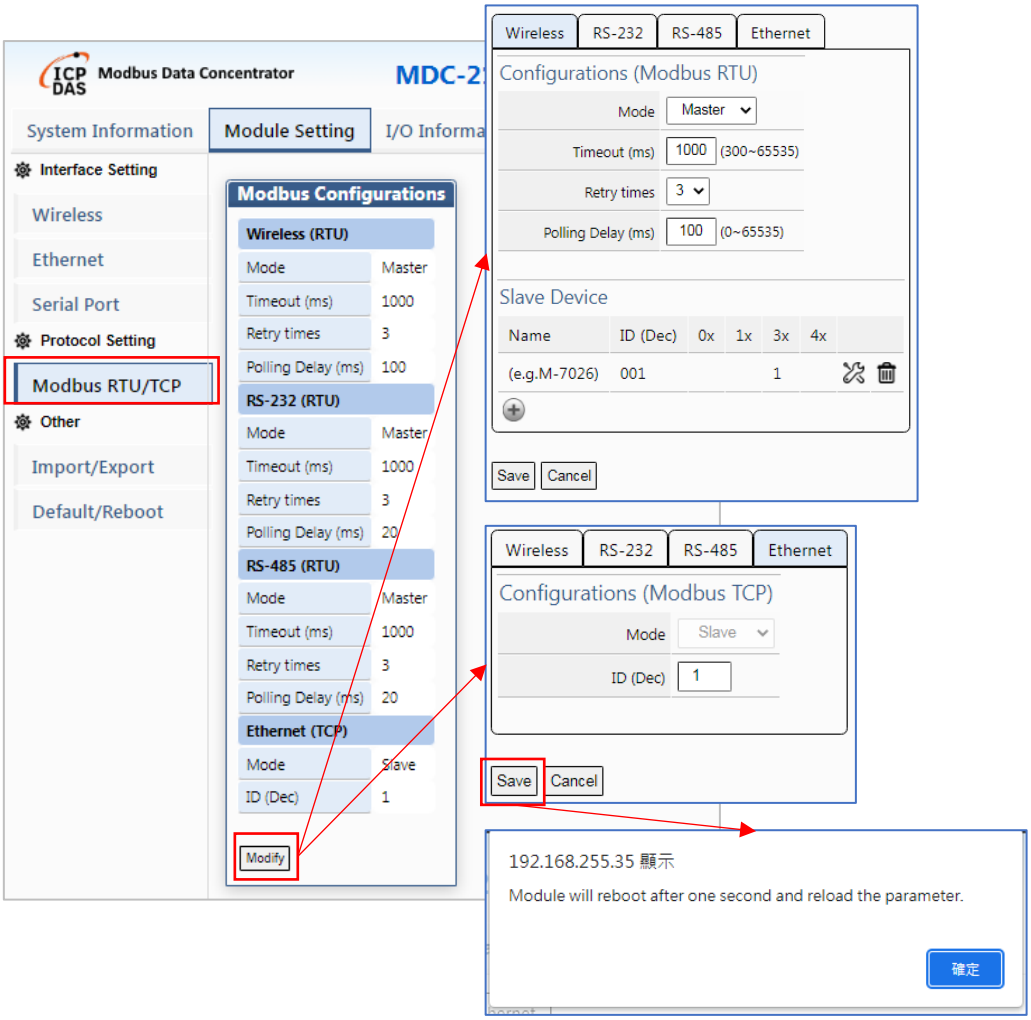
Communication interface	Communication protocol (Modbus)	Set as Modbus master	Set as Modbus slave
Wireless	RTU	Yes	No
RS-232	RTU	Yes	Yes
RS-485	RTU	Yes	Yes
Ethernet	TCP	No	Yes

2.6.1. Module Setting – Protocol Setting

This Module Setting tab contains three sections: Interface Setting, Protocol Setting and Other. This section mainly focuses on Protocol Setting. Please refer to the Modbus RTU/TCP item in the Protocol Setting block for description.

- **2.6.1.1. Modbus RTU/TCP**

When this item is clicked, the web page will read and display the current communication protocol parameters of each communication interface of the module. When the user clicks the Modify button, it will switch to the parameter modification page. After the modification is completed, the user can click (Save) button to save, the web page will prompt the user that the module will automatically restart and reload parameters after 1 second. In addition, if you want to give up the modification, you can click the Cancel button and leave the modification page.



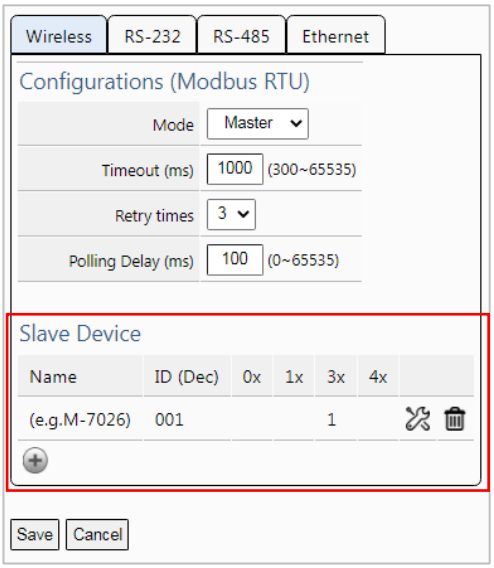
Parameter name	Description
Mode	The modes of the communication protocol are Disabled, Master and Slave. The default value of communication interfaces such as wireless, RS-232 and RS-485 is Master, and Ethernet is fixed as slave. ➢ Disabled: After disabled, this communication interface will not send commands or receive data. ➢ Master: Set this communication interface as the Modbus master station, and then set the external slave station to poll for data. ➢ Slave: Set this communication interface as a Modbus slave station, and after specifying the station number (ID), the external controller can read the internal register information from this communication interface.
Timeout (ms) (Note 1)	The timeout time for the master station to poll data, the value range is 300~65535 milliseconds, and the default value is 1000 milliseconds. When the master station sends a command to an external slave station, it will wait for the slave station to respond with data. If the slave station does not respond after this time, it will be judged as a timeout. The master station will skip this command and use the next command for polling.
Retry times	The number of polling retries of the master station, the value range is 0~9 times, and the default value is 3 times. When a timeout occurs when the master station polls the slave station, the master station will repeatedly use the current command to poll again. If the number of polls reaches the number of retries, the master station will skip this command and use the next command for polling.
Polling Delay (ms)	The waiting time after master station polling, the value range is 0~65535 milliseconds, the default value for wireless is 100 milliseconds, and the default value for RS-232 and RS-485 is 20 milliseconds. This parameter is mainly used to prevent the master station from polling the external slave station too quickly. When the external slave station responds to the data and goes to deal with other matters, it immediately receives a new command and drops the packet. Therefore, this parameter can be used to adjust the polling command time interval.
ID (Dec)	Slave station number, the value range is 1~255, and the default value is 1.

(Note 1) The wireless timeout time is related to the wireless communication baud rate (RF Rate) and data length. Please refer to the table below for recommended values.

RF Rate (bps)	128 bytes timeout (ms)	2 bytes timeout (ms)
57600	300	5
38400	375	6
19200	750	12
9600	1500	24
4800	3000	47
2400	6000	94
1200	12000	188
650	23000	360

2.6.2. Set the external slave device to be polled by the master station

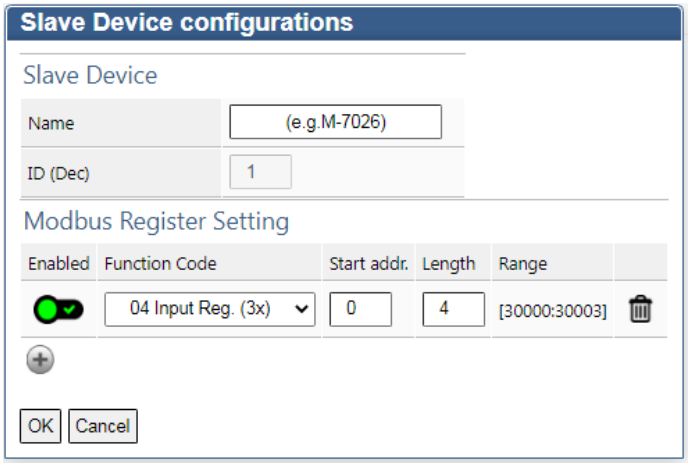
The module's wireless, RS-232 or RS-485 communication interfaces can be set as the Modbus master, but Ethernet cannot be set as the master because it only supports slave station function. When the communication interface is set as the master station, you need to set the Modbus RTU Slave Device to be polled and the command content. After the settings are completed, the module will automatically poll the slave station and will the data responded by the station is rearranged into consecutive addresses and temporarily stored in the internal register. The parameter settings of the slave station are as shown in the figure below.



Parameter name	Description
Name	Alias of the slave station, ASCII numbers, English or symbols with a maximum length of 12 characters.
ID (Dec)	The station number of the slave station, the value range is 1~255.
0x / 1x / 3x / 4x	The total number of each function code, and the corresponding function codes are FC1 / FC2 / FC4 / FC3 respectively.
	Modify the icon of the polling command. After clicking, the web page will pop up the Slave Device Configurations window.
	Delete all polling command icons for this slave station.

	Add icons for adding slave stations and command content. Up to 255 stations can be added. After clicking, the web page will pop up the Slave Device Configurations window.

In addition, when the user clicks the  or  icon, the web page will pop up the Slave Device Configurations window. The relevant parameter settings are as shown in the figure below.

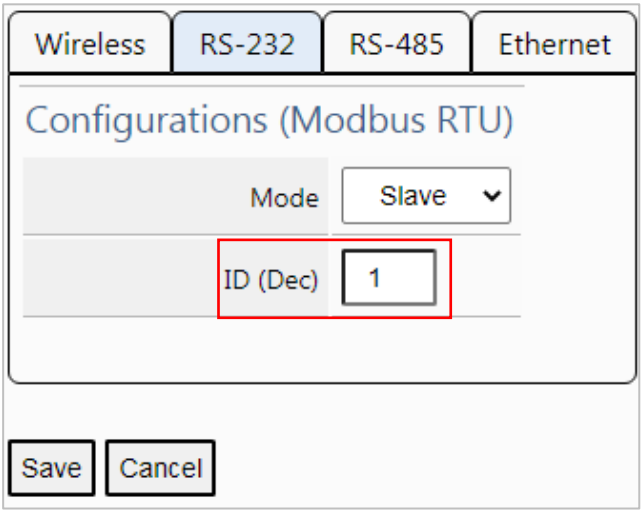


Parameter name	Description
Name	Alias of the slave device, ASCII numbers, English or symbols with a maximum length of 12 characters.
ID (Dec)	The station number of the slave device, the value range is 1~255.
Enabled	Enable or disable the polling function of this command. The default is enabled. If enabled, this command will be added to the polling list of the master station; if disabled, this command will be skipped when polling by the master station.
Function Code	The function code to be read by Modbus can be selected from the following 4 functions. The default is "01 Coils Output (0x)". ➢ 01 Coils Output (0x): Function code 01, used to read DO information. ➢ 02 Discrete Input (1x): Function code 02, used to read DI information. ➢ 03 Holding Reg. (4x): Function code 03, used to read AO information. ➢ 04 Input Reg. (3x): Function code 04, used to read AI information.
Start addr.	The starting address to be read by Modbus, Base 0 is used here, the value range is 0~65535, and the default value is 0.

Length	The length of data to be read by Modbus, the value range is 1~64, and the default value is 1.
Range	This command reads the Modbus address range of the remote slave station.
	Delete all polling command icons for this slave station.
	Add icons for command content, and up to 250 commands can be added.

2.6.3. Set the module slave station number

The module's RS-232, RS-485 and Ethernet communication interfaces can be set as Modbus slaves, but wireless cannot be set as slaves because they only support disabled and master station function. When the communication interface is set as a slave station, the slave station number needs to be set again so that the external controller can read the Modbus data stored in the internal register through this communication interface. The slave station's parameter settings are shown in the figure below, and the Modbus address corresponding to the internal register please refer to the next chapter.



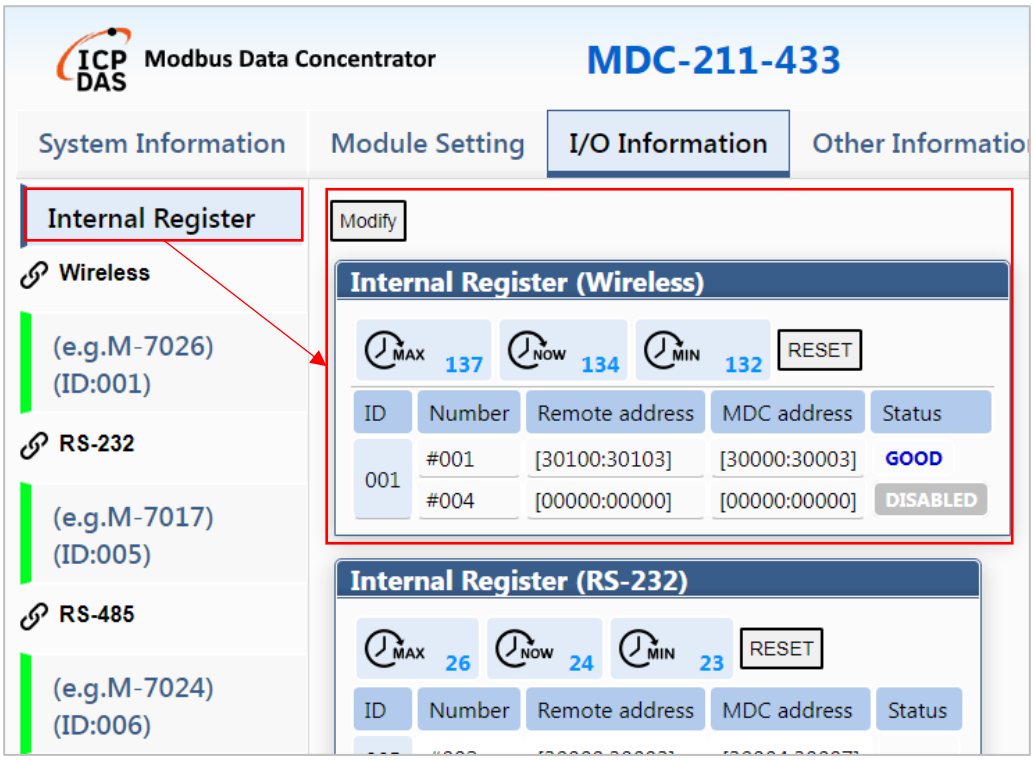
Parameter name	Description
ID (Dec)	Slave station number, the value range is 1~255, and the default value is 1.

2.7. The data corresponding address and polling status of the slave device

For every command that the module polls the external Modbus RTU slave device, its corresponding data address and polling status will be displayed on the module web page to facilitate user browsing and monitoring. This section will introduce how to confirm the data address of the external slave device and the corresponding address of the module's internal register, the polling status of the command, and how to monitor the I/O channel status of the external slave device. The relevant parameters of these functions in the I/O Information tab will be introduced later.

2.7.1. I/O Information - Internal Register

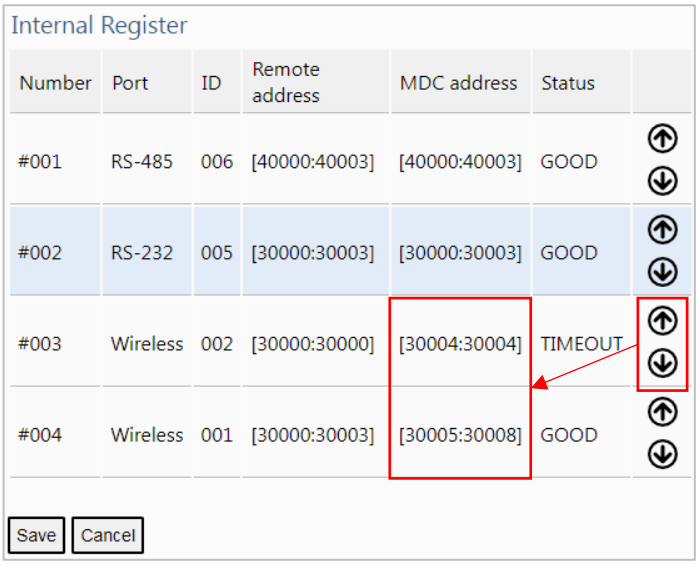
The I/O Information tab contains two types of blocks: Internal Register and the IO channel status of each communication interface in each external slave station. This section is mainly for Internal Register block is explained.



Parameter name	Description
Modify	Modify the command sequence icon. After clicking, the web page will switch to the page for modifying the command sequence.
MAX	The maximum time for one round of polling, in milliseconds (ms), and the value range is 0~4294967295. (Note) Modbus commands can be used to read the polling time. Please refer to the Modbus Table in Section 2.10.
NOW	The time for one round of polling, in milliseconds (ms), and the value range is 0~4294967295. (Note) Modbus commands can be used to read the polling time. Please refer to the Modbus Table in Section 2.10.

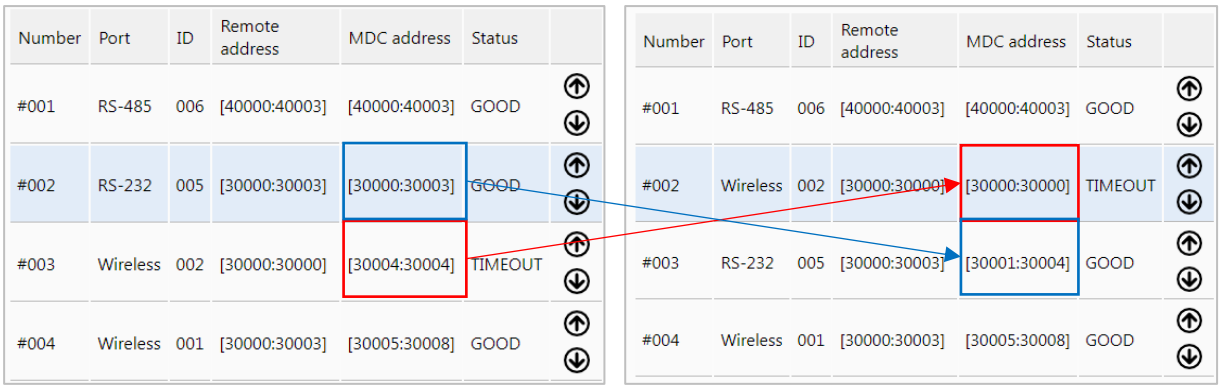
	The minimum time for one round of polling, in milliseconds (ms), and the value range is 0~4294967295. (Note) Modbus commands can be used to read the polling time. Please refer to the Modbus Table in Section 2.10.	
	Icon to reset the polling time.	
ID	The station number of the external slave station, the value range is 1~255.	
Number	The number of the command, the value range is 1~250.	
Remote address	Modbus address of the external slave.	
MDC address	According to the Modbus address of the external slave station, the external controller can read the corresponding Modbus address after rearranging the internal register.	
Status	The module polls the status of the external Modbus slave station. There are 8 statuses as follows. (Note) Modbus commands can be used to read the polling status, please refer to the Modbus Table in Section 2.10.	
		This command can connect and read data normally.
		This command is disabled by the user.
		This command communication timed out and there was no response. Please confirm whether the module wiring or communication parameter settings are correct, such as: baud rate, data format, Modbus station number or Modbus address.
		Modbus Exception Code 01 means that the slave station responds with a Function Code that does not support this command.
		Modbus Exception Code 02 means that the slave response does not support reading the Register Address of this section. Please confirm the Start Address to be read plus the Length. Whether all covered address ranges are legal.
		Modbus Exception Code 03 means that the slave station responds to this command and the quantity of access registers is illegal.
		The CRC 16 check code of the slave station responding to this command is incorrect, indicating that the communication process may be subject to abnormal interference.

In addition, when the user clicks the Modify icon, the webpage will switch to the page for modifying the command sequence. The user can click the ↑ or ↓ icon to adjust the command sequence, so as to adjust the MDC addresses of the same communication interface into consecutive addresses.



However, one thing to note here is that if there are the same function codes in different communication interfaces, the process of adjusting the command sequence may change the originally assigned MDC address and affect the Modbus TCP read address.

For example: In the picture on the left below, the second command was originally to poll the slave through the RS-232 interface, and the MDC address assigned to it was 30000~30003, while the third command was originally to poll the slave through the wireless interface, and the MDC address assigned to it is 30004. However, when the second and third commands in the picture on the right are swapped, it can be found that the MDC address has been reassigned and is different from the original one.



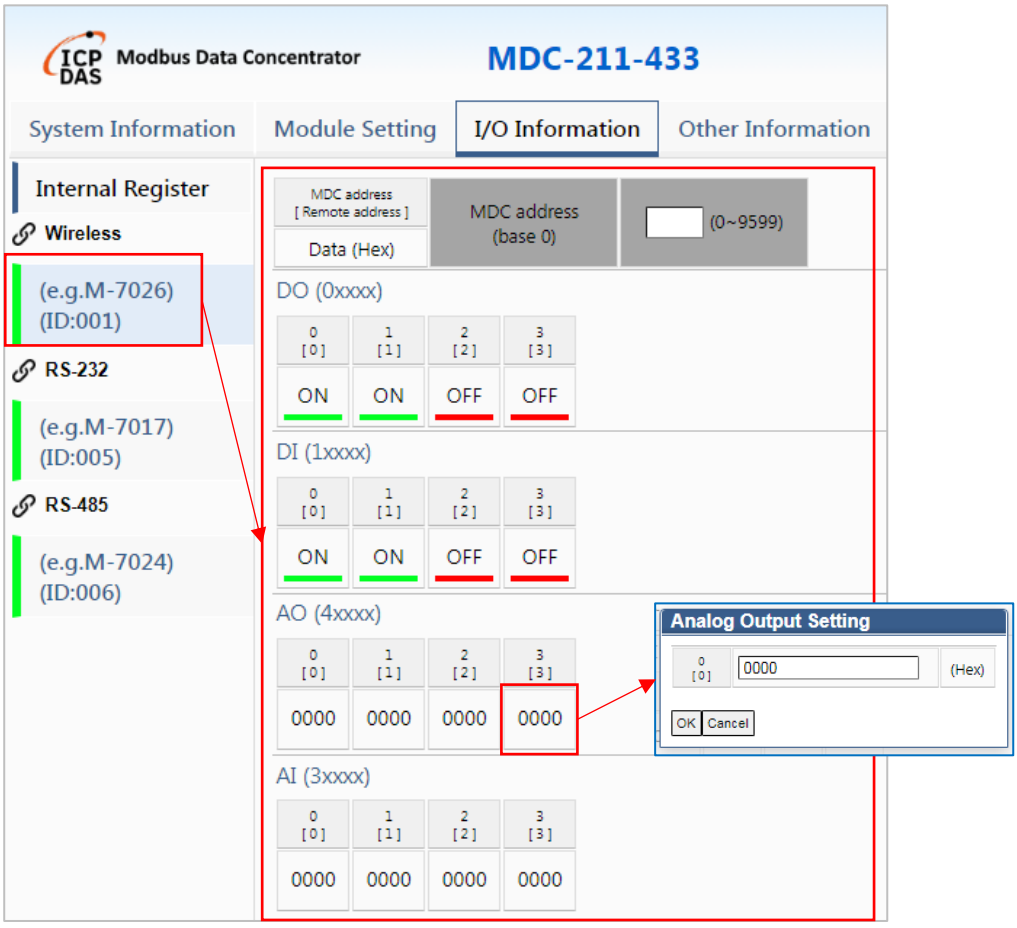
Number	Port	ID	Remote address	MDC address	Status
#001	RS-485	006	[40000:40003]	[40000:40003]	GOOD
#002	RS-232	005	[30000:30003]	[30000:30003]	GOOD
#003	Wireless	002	[30000:30000]	[30004:30004]	TIMEOUT
#004	Wireless	001	[30000:30003]	[30005:30008]	GOOD

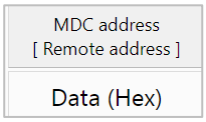
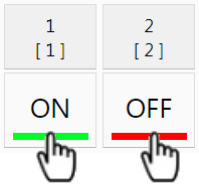
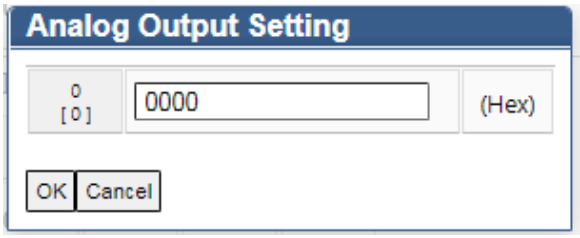
Number	Port	ID	Remote address	MDC address	Status
#001	RS-485	006	[40000:40003]	[40000:40003]	GOOD
#002	Wireless	002	[30000:30000]	[30000:30000]	TIMEOUT
#003	RS-232	005	[30000:30003]	[30001:30004]	GOOD
#004	Wireless	001	[30000:30003]	[30005:30008]	GOOD

2.7.2. I/O Information – I/O channel status

The I/O Information tab contains two types of blocks: Internal Register and the IO channel status of each communication interface in each external slave station. This section is mainly for external slave station is explained in the block of IO channel status.

As shown in the figure below, the module allows users to monitor the I/O channel status of the Modbus slave station on the web page. When the user clicks on the external slave station in the communication interface on the left, the corresponding IO status information will be displayed on the right. Each parameter is explained in the table below.



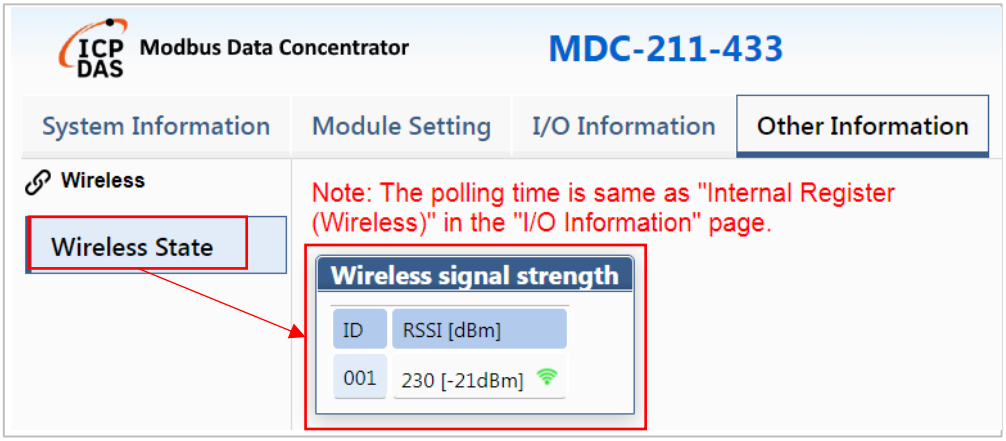
Parameter name	Description
	Example of displaying addresses and data of DI/DO/AI/AO. Among them, the addresses without scratch numbers [ ] in the gray bottom area of the upper row are MDC addresses rearranged by the internal register, while those with scratch numbers [ ] the address is the Modbus address of the external slave station. In addition, if it is DI/DO, the lower data area will display the ON/OFF button; if it is AI/AO, the lower data area will display hexadecimal Word data (2 bytes).
	Search the I/O status of the MDC address. When the MDC address to be searched is entered in the space, the web page will first search for the polling command containing this MDC address and display all the I/O status in this command. If the space is blank, the default search includes polling commands with MDC address 0.
	The status of DI/DO, if it is 1, it displays ON, if it is 0, it displays OFF. If it is DO, it will switch to another state after clicking ON or OFF, and the module will convert the switched state into a command and write it to the external slave.
	AI/AO numerical data, this is hexadecimal Word data (2 bytes). If it is AO, after clicking on the data in the Data area, the Analog Output Setting window will pop up. After entering the value and clicking the OK button, the module will write the AO value to the external slave. 

2.8. Wireless signal strength

The module webpage provides the wireless signal strength between the external wireless slave module and the MDC module, which can help the user further judge and adjust the distance and installation position between the wireless modules. This section will introduce the display method and recommended values of wireless signal strength.

2.8.1. Other Information – Wireless State

The Other Information tab contains the Wireless block, so this section explains the Wireless State item in this block.



Parameter name	Description
ID	The station number of the external slave station, the value range is 1~255.
RSSI [dBm]	Wireless signal strength, the RSSI value range is 0~255. The larger the value, the better the signal. It is recommended to be at least 120. The conversion formula between RSSI and dBm is dBm = -126 + (RSSI x 0.457). (Note) Modbus commands can be used to read the wireless signal strength. Please refer to the Modbus Table in Section 2.10.

RSSI	dBm	Show icon
0 ~ 89	-126 ~ -85	
90 ~ 119	-84 ~ -72	
120 ~ 159	-71 ~ -53	
160 ~ 199	-52 ~ -35	
200 ~ 255	-34 ~ -9	

2.9. Import, export and restore default values of parameters

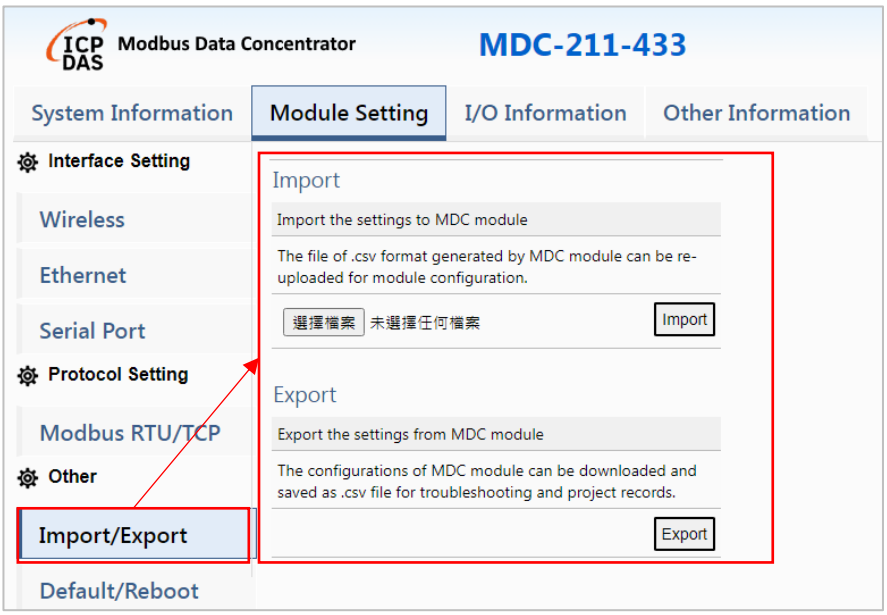
In addition to setting parameters directly on the module web page, users can also export these parameters to a CSV file for storage on the module web page, or import the edited CSV file into the module. This section will introduce how to import/export CSV files on the module web page, explain the meaning of each parameter in the file, and how to restore the module's parameter default values.

2.9.1. Module Setting – Other

This Module Setting tab contains three sections: Interface Setting, Protocol Setting and Other. This section mainly focuses on Other block and explain the Import/Export and Default/Reboot items.

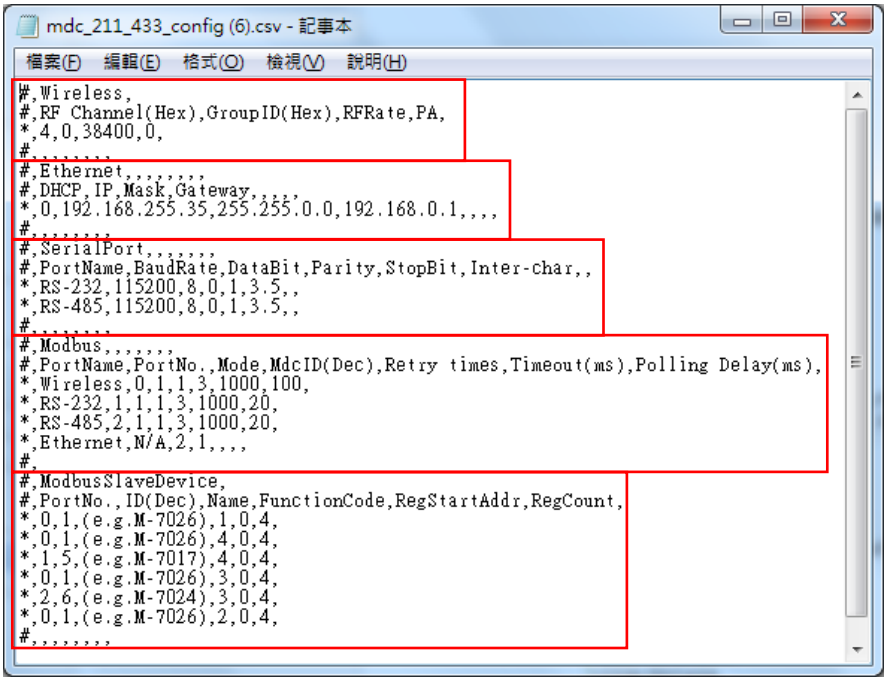
- **2.9.1.1. Import/Export CSV file and file format**

When this item is clicked, the webpage will display the page for importing and exporting parameter settings. Users can import or export CSV files from this page. If the user does not have this CSV file when using the module for the first time, who can export this file from the module first.



Parameter name	Description
選擇檔案	Click to select the CSV file to import.
Import	The icon for importing CSV files can be clicked to import CSV files.
Export	The icon for exporting CSV files can be clicked to export CSV files.

Among them, the content of the CSV file can be divided into 5 sections, namely Wireless, Ethernet, SerialPort, Modbus and ModbusSlaveDevice. The separation and field names between the sections are marked with "#", and please do not modify "#". The order and content of this column are to prevent the module from not being able to find the corresponding field name. In addition, each parameter is separated by ",", and the mark "*" indicates that this parameter is enabled, and the mark "-" indicates that this parameter is not enabled.



➢ 2.9.1.1.1 Wireless section

The main purpose is to set wireless parameters, which are RF Channel (Hex), GroupID (Hex), RFRate, and PA in order, and correspond to the Wireless parameters in Section 2.5.1.1.

<table>
<tr><th>Parameter name</th><th colspan="8">Description</th></tr>
<tr><td rowspan="5">RF Channel (Hex)</td><td colspan="8">Wireless channel, the value range is 0~F (decimal 0~15), corresponding to the following frequencies (MHz), the default value is 4.</td></tr>
<tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>433.1</td><td>433.2</td><td>433.3</td><td>433.4</td><td>433.5</td><td>433.6</td><td>433.7</td><td>433.8</td></tr>
<tr><td>8</td><td>9</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr>
<tr><td>433.9</td><td>434.0</td><td>434.1</td><td>434.2</td><td>434.3</td><td>434.4</td><td>434.5</td><td>434.6</td></tr>
<tr><td>Group ID (Hex)</td><td colspan="8">Group number, the value range is 0~FFFF (decimal 0~65535), mainly subdivided into different small groups in the wireless channel, the default value is 0.</td></tr>
<tr><td>RF Rate (bps)</td><td colspan="8">Wireless communication baud rate, the value range is 650, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and the default value is 38400.</td></tr>
<tr><td>PA</td><td colspan="8">Wireless output power, 0 means about 9±1 dBm, 1 means about 18±1 dBm, the default value is 0.</td></tr>
</table>

➢ 2.9.1.1.2 Ethernet section

The main thing is to set the Ethernet, which are DHCP, IP, Mask, Gateway and other four parameters in order, and correspond to the Ethernet parameters in Section 2.5.1.2.

Parameter name	Description
DHCP	Whether the IP address is automatically assigned by the DHCP server. The value range is 0~1, and the default value is 0. ➢ A value of 0 indicates Disabled, and you need to manually assign a fixed IP address to the module. ➢ A value of 1 indicates Enabled, and the module's IP address is configured by the DHCP server.
IP	The IP address of the module, the default value is 192.168.255.1.
Mask	The subnet mask of the module. The default value is 255.255.0.0.
Gateway	The module’s communication gateway address, the default value is 192.168.0.1.

- 2.9.1.1.3 SerialPort section

It is mainly used to set the communication parameters of the two interfaces, RS-232 and RS-485. In order, there are 6 parameters such as PortName, BaudRate, DataBit, Parity, StopBit, and Inter-char, which correspond to the serial port in Section 2.5.1.3 (Serial Port) parameter.

Parameter name	Description
PortName	There are two types of interface names: RS-232 and RS-485. Please do not modify the name.
Baud Rate	The communication baud rate of RS-232 or RS-485, the value range is 1200, 2400, 4800, 9600, 19200, 38400, 57600, and the default value is 115200 bps.
DataBit	Data bits: 7 or 8, the default value is 8.
Parity	Parity bit, the value range is 0~4, the default is None. ➢ Value 0: None. ➢ Value 1: Odd. ➢ Value 2: Even parity (Even). ➢ Value 3: Mark. ➢ Value 4: Space.
StopBit	Stop bit: 1 or 2, the default value is 1.
Inter-char	Character timeout time, the value range is 1.5, 2, 2.5, 3, 3.5, 4, 5, 6, 7, 8, 9 and 10 character times. The module will wait for each character (or byte) of the received data, it will wait for this time and then confirm whether new characters are received. If no new characters are received after this waiting time and it times out, the module will determine that the data has been reception completed, default value is 3.5 characters. [For example]: If the communication baud rate is 9600bps, it takes about 1 millisecond (ms) to transmit each character. When the character timeout time is set to 3.5 characters, the interval between characters only needs to exceed 3.5 milliseconds, the module will determine that the data has been received, and then start parsing the data.

- 2.9.1.1.4 Modbus section

The main purpose is to set the communication parameters of each interface in Modbus, in order, there are 7 parameters such as PortName, PortNo., Mode, MdcID (Dec), Retry times, Timeout (ms), Polling Delay (ms), etc., and correspond to Modbus RTU/TCP parameters in Section 2.6.1.1.

Parameter name	Description
PortName	There are four interface names: Wireless, RS-232, RS-485, and Ethernet. Please do not modify the name.
PortNo.	The representative number of the interface, the value range is 0~2, respectively represented as follows. ➢ Value 0: Wireless. ➢ Value 1: RS-232. ➢ Value 2: RS-485. In addition, the Ethernet interface does not need to be configured, just maintain N/A.
Mode	Modbus mode, the value range is 0~2, respectively expressed as follows. ➢ Value 0: Disabled. There is no need to set MdcID when selecting this mode. MdcID can be maintained at 1. ➢ Value 1: Master station. There is no need to set MdcID when selecting this mode. MdcID can be maintained at 1. ➢ Value 2: Slave station. Selecting this mode requires setting MdcID.
MdcID(Dec)	The station number of the Modbus slave station, the value range is 1~255.
Retry times	The number of polling retries of the master station, the value range is 0~9 times, and the default value is 3 times. When a timeout occurs while the master station is polling the slave station, the master station will repeatedly use the current command to poll again. If the number of polls reaches the number of retries, the master station will skip this command and use the next command for polling.
Timeout (ms) (Note 1)	The timeout time for the master station to poll data, the value range is 300~65535 milliseconds, and the default value is 1000 milliseconds. When the master station sends a command to an external slave station, it will wait for the slave station to respond with data. If the slave station does not respond after this time, it will be judged as a timeout. The

	master station will skip this command and use the next command for polling.
Polling Delay (ms)	The waiting time after master station polling, the value range is 0~65535 milliseconds, the default value for wireless is 100 milliseconds, and the default value for RS-232 and RS-485 is 20 milliseconds. This parameter is mainly used to prevent the master station from polling the external slave station too quickly. When the external slave station responds to the data and goes to deal with other matters, it immediately receives a new command and drops the packet. Therefore, this parameter can be used to adjust the polling command time interval.

(Note 1) The wireless timeout time is related to the wireless communication baud rate (RF Rate) and data length. Please refer to the table below for recommended values.

RF Rate (bps)	128 bytes timeout (ms)	2 bytes timeout (ms)
57600	300	5
38400	375	6
19200	750	12
9600	1500	24
4800	3000	47
2400	6000	94
1200	12000	188
650	23000	360

- 2.9.1.1.5 ModbusSlaveDevice section

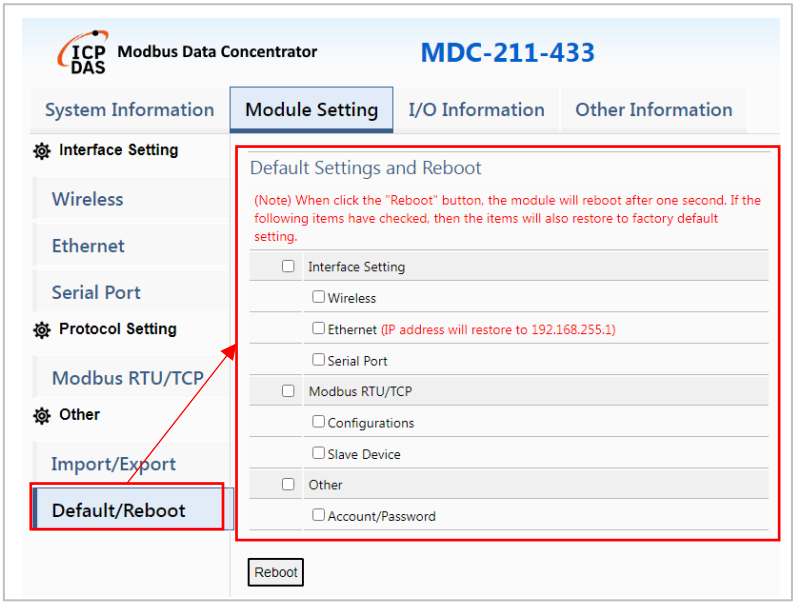
The main purpose is to set the Modbus commands of each interface, which are six parameters in order: PortNo., ID (Dec), Name, FunctionCode, RegStartAddr and RegCount, and correspond to the external slave device settings to be polled in Section 2.6.2.

In addition, it should be noted that although the Modbus commands marked with "-" in this section will be skipped directly when the module is polling, the internal temporary register space will still be configured to avoid affecting the old ones when new commands are added later.

Parameter name	Description
PortNo.	The representative number of the interface, the value range is 0~2, respectively represented as follows. ➢ Value 0: Wireless. ➢ Value 1: RS-232. ➢ Value 2: RS-485.
ID (Dec)	The station number of the external remote slave device, the value range is 1~255.
Name	The alias of the external remote slave device, with a maximum length of 12 characters in ASCII numbers, English or symbols.
FunctionCode	The function code to be read by Modbus can be selected from the following 4 functions. The default is "01 Coils Output (0x)". ➢ 01 Coils Output (0x): Function code 01, used to read DO information. ➢ 02 Discrete Input (1x): Function code 02, used to read DI information. ➢ 03 Holding Reg. (4x): Function code 03, used to read AO ➢ 04 Input Reg. (3x): Function code 04, used to read AI information.
RegStartAddr	The starting address to be read by Modbus, Base 0 is used here, the value range is 0~65535, and the default value is 0.
RegCount	The number of data to be read by Modbus, the value range is 1~64, and the default value is 4.

- **2.9.1.2. Default/Reboot**

When this item is clicked, the webpage will display an option to restore the default values. If the user checks the option and clicks the Reboot button, the module will automatically restore the parameters in this option to the default values after restarting. If the user does not check the option and only clicks the Reboot button, the module will only automatically reboot.



Parameter name	Description
Wireless	It means all parameters of Wireless on the left.
Ethernet	It means all the parameters of the Ethernet on the left. (Note) Checking this option will restore the IP address to 192.168.255.1.
Serial Port	It means all the parameters of the Serial Port on the left.
Configurations	It means all the communication parameters of Modbus RTU/TCP in Configurations on the left.
Slave Device	It means all the communication commands of Modbus RTU/TCP on the Slave Device on the left.
Account/Password	It means the account/password to log in to the module web page. (Note) Checking this option will restore the account/password to admin.

2.10. Modbus Table

Part of the register inside the module provides information that users can read or modify in the module, as shown in the table below.

Address (Base 0)	Function Code	Attribute	Type	Function	Default Value	Description
39600~39849 (0x2580~0x2679)	4	R	Uint16	The polling status of the external remote Modbus Slave. One address corresponds to one command and can correspond to a maximum of 250 commands.	0xFFFF	[Status value] 0x0000: Display "GOOD". 0xFFFF: Display "TIMEOUT". 0xFF00: Display "DISABLED". [Error code value] 0x8#01: Display "ILLEGAL FUNCTION". 0x8#02: Display "ILLEGAL DATA ADDRESS". 0x8#03: Display "ILLEGAL DATA VALUE". 0x8#0F: Display "CRC ERROR". Among them, # is the function code of the polling command.
310000~310249 (0x2710~0x2809)	4	R	Uint16	Wireless signal strength, one address corresponds to one wireless command, and can correspond to a maximum of 250 commands.	0	[High byte] The station number of the external remote Modbus Slave, the value range is 0~255, where the value 0 means that this address is not used.
						[Low byte]

						Wireless signal strength, the RSSI value range is 0~255. The larger the value, the better the signal. It is recommended to be at least 120 (0x78). The conversion formula between RSSI and dBm is dBm = -126 + (RSSI x 0.457). (Note) This is the signal strength when the MDC module receives wireless data, which means that the wireless data has been required and responded.
49860 (0x2684)	3, 6, 16	R, W	Uint32	Wireless polling time Max。 (High word, 0xHiLo)	0	Value range: 0~4294967295, unit: millisecond. (Note) Writing 0 clears the Wireless polling time Max, Now and Min.
49861 (0x2685)				Wireless polling time Max。 (Low word, 0xHiLo)		
49862 (0x2686)	3, 6, 16	R, W	Uint32	Wireless polling time Now。 (High word, 0xHiLo)	0	Value range: 0~4294967295, unit: millisecond. (Note) Writing 0 clears the Wireless polling time Max, Now and Min.
49863 (0x2687)				Wireless polling time Now。 (Low word, 0xHiLo)		
49864 (0x2688)	3, 6, 16	R, W	Uint32	Wireless polling time Min。 (High word, 0xHiLo)	0xFFFFFFF	Value range: 0~4294967295, unit: millisecond. Value 0xFFFFFFFF: Not used or to be updated.
49865 (0x2689)				Wireless polling time Min。 (Low word, 0xHiLo)		

						(Note) Writing 0 clears the Wireless polling time Max, Now and Min.
49866 (0x268A)	3, 6, 16	R, W	Uint32	RS-232 polling time Max。(High word, 0xHiLo)	0	Value range: 0~4294967295, unit: millisecond. (Note) Writing 0 clears the Wireless polling time Max, Now and Min.
49867 (0x268B)				RS-232 polling time Max。(Low word, 0xHiLo)		
49868 (0x268C)	3, 6, 16	R, W	Uint32	RS-232 polling time Now。(High word, 0xHiLo)	0	Value range: 0~4294967295, unit: millisecond. (Note) Writing 0 clears the Wireless polling time Max, Now and Min.
49869 (0x268D)				RS-232 polling time Now。(Low word, 0xHiLo)		
49870 (0x268E)	3, 6, 16	R, W	Uint32	RS-232 polling time Min。(High word, 0xHiLo)	0xFFFFFFF	Value range: 0~4294967295, unit: millisecond. Value 0xFFFFFFFF: Not used or to be updated. (Note) Writing 0 clears the Wireless polling time Max, Now and Min.
49871 (0x268F)				RS-232 polling time Min。(Low word, 0xHiLo)		
49872 (0x2690)	3, 6, 16	R, W	Uint32	RS-485 polling time Max。(High word, 0xHiLo)	0	Value range: 0~4294967295, unit: millisecond. (Note) Writing 0 clears the Wireless polling time Max, Now and Min.
49873 (0x2691)				RS-485 polling time Max。(Low word, 0xHiLo)		
49874 (0x2692)	3, 6, 16	R, W	Uint32	RS-485 polling time Now。(High word, 0xHiLo)	0	Value range: 0~4294967295, unit: millisecond. (Note) Writing 0 clears the Wireless polling time Max, Now and Min.
49875 (0x2693)				RS-485 polling time Now。(Low word, 0xHiLo)		

49876 (0x2694)	3, 6, 16	R, W	Uint32	RS-485 polling time Min。 (High word, 0xHiLo)	0xFFFFFFF	Value range: 0~4294967295, unit: millisecond. Value 0xFFFFFFFF: Not used or to be updated. (Note) Writing 0 clears the Wireless polling time Max, Now and Min.
49877 (0x2695)				RS-485 polling time Min。 (Low word, 0xHiLo)		
49900 (0xC2EC)	3, 6	R, W	Uint16	Modbus TCP connection timeout time.	180	Value range: 0~65535, unit: second. Value 0: Restore default value.
-	-	-	-	-	-	-

3. FAQ (Questions and Answers)

Q1 - How many Modbus commands and register data can be defined at most in MDC-211-433?

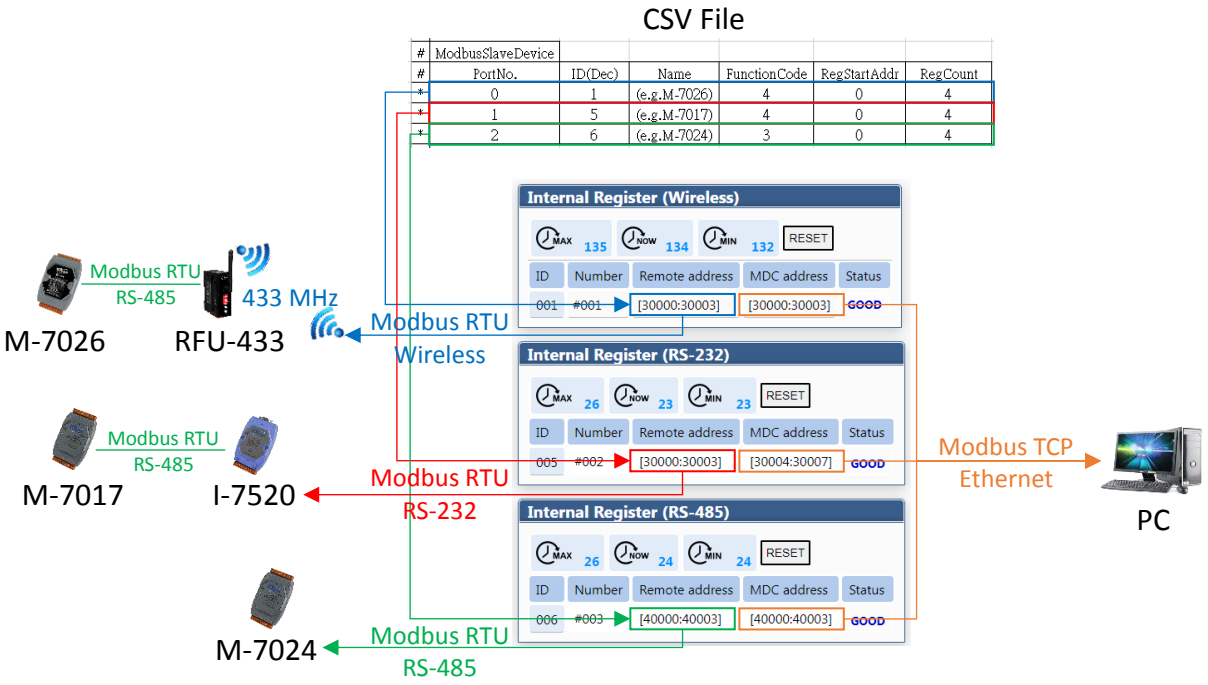
A1: Up to 250 Modbus commands can be defined, and each command can set up to 64 register addresses. MDC-211-433 has four data tables of DI/DO/AI/AO. Each data table can store up to 9600 temporary register data.

Q2 - How many data can the Modbus Master read back from the MDC-211-433 in one command?

A2: The number of data that the Modbus Master can read back with one command is limited by the specifications of the Modbus TCP communication protocol; one command of function code 01/02 can read up to 255 register data, and one command of function code 03/04 can read back up to 126 register data.

Q3 - How does the data address of the Modbus RTU device correspond to the address of the MDC-211-433?

A3: As shown in the figure below, the address of the Modbus RTU device will be displayed in Remote address, and the corresponding Modbus address will be displayed in MDC address after the MDC module is rearranged. The PC software can read back the information of Modbus RTU device through Modbus TCP.



Q4 - How to control the output channel of Modbus RTU device?

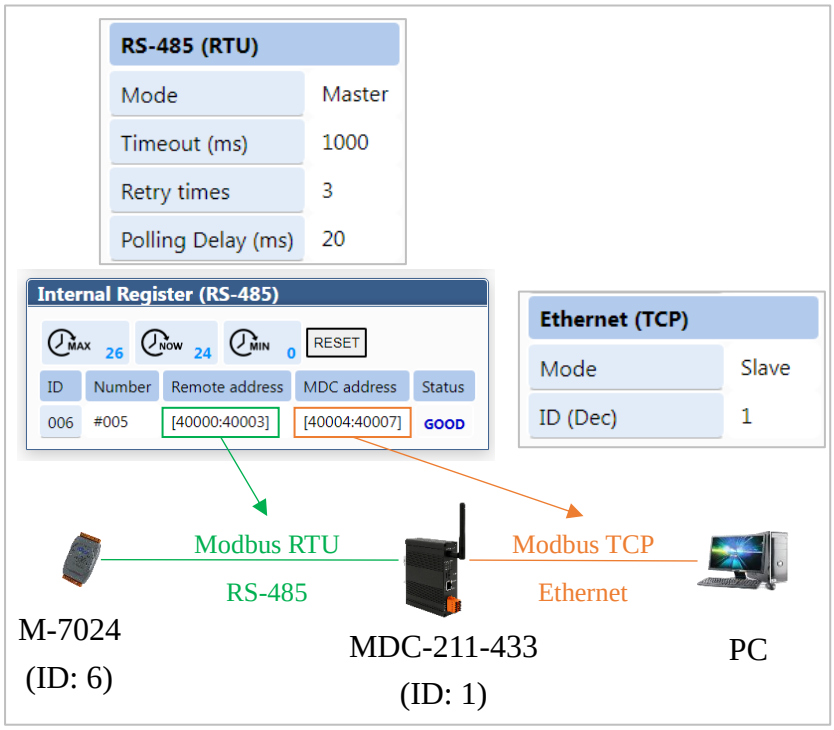
A4: It can be operated on the module web page or controlled using Modbus TCP/RTU commands. The respective instructions are as follows:

- Web page operations

  Please refer to Section 2.7.2 I/O Information - I/O Channel Status for operation instructions.

- Modbus TCP/RTU communication commands

  As shown in the figure below, taking Modbus TCP as an example, the mode of the MDC module on the Ethernet interface is Slave (station number is 1), and the mode of the RS-485 interface is Master. It will use command #005 to poll the external M-7024 (Modbus Slave, station number is 6) has the data of 4 AO channels at addresses 40000~40003(Base 0), and the corresponding addresses of these 4 AO channels in the internal register of the MDC module are 40004~40007(Base 0). Therefore, you can use Modbus command code 06 (0x06) or 16 (0x10) to write to addresses 40004~40007.

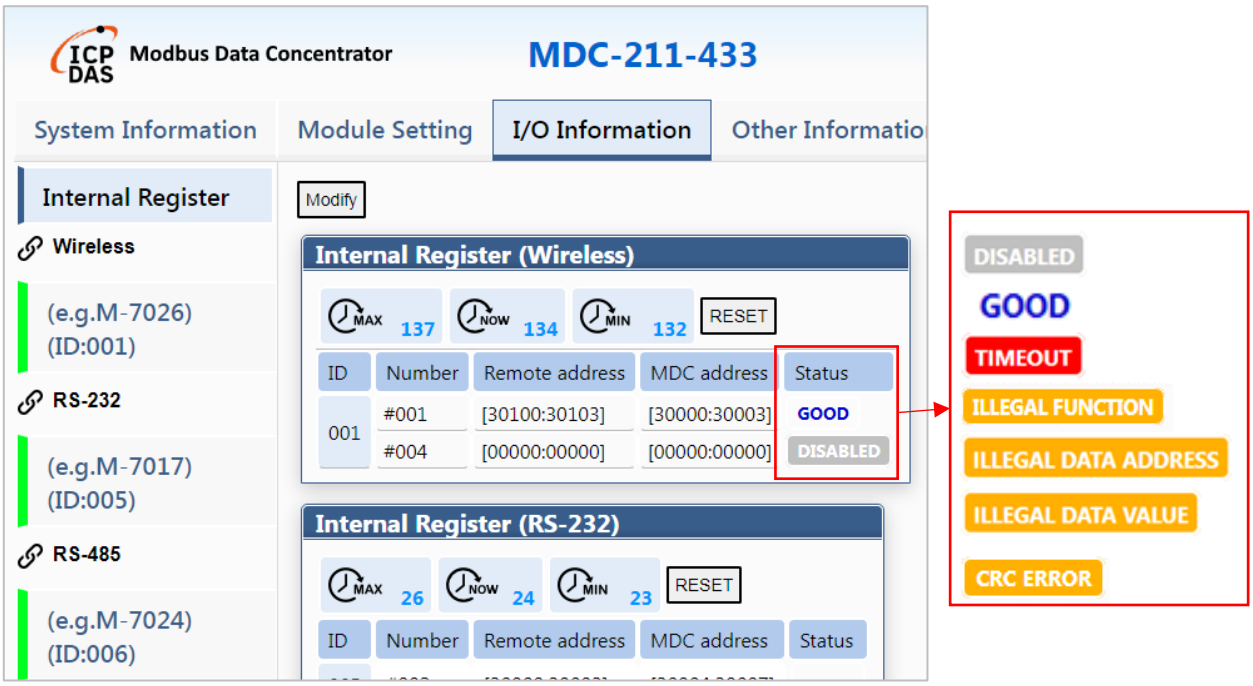


In other words, the PC originally needs to write AO data to the Modbus RTU command of the M-7024 through RS-485. If it writes Modbus TCP commands to the MDC module through Ethernet, the station number needs to be changed from 06 to 01 (red letters in the table below), and the starting address needs to be changed from 0x0000 to 0x0004 (blue letters in the table below).

Command type	content
Modbus RTU	06 10 00 00 00 04 08 00 01 00 02 00 0A 00 0B [4F 70]
Modbus TCP	[B5 FE 00 00 00 0F] 01 10 00 04 00 04 08 00 01 00 02 00 0A 00 0B

Q5 - How to read the connection status of each command through Modbus?

A5: In addition to checking the connection status of each Modbus command on the module web page, users can also read back this status through Modbus commands. Please refer to Section 2.10 for instructions on Modbus table address 39600~39849 (0x2580~0x2679).



Q6 - How to update firmware?

A6: Please refer to the operation and update steps in Section 2.1.3, first let the module into firmware update mode, and then use the software tool (Windows version) to update the firmware through Ethernet.