

M2M RTU Center

User Manual

Warranty

All products manufactured by ICP DAS are warranted against defective materials for one year from the date of delivery to the original purchaser.

Warning

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Chapter 1 Introduction

The M2M RTU Center provided by ICP DAS is an M2M (Machine to Machine) management software that has strong core technology for handling data and lets the user save the trouble of dealing with large IO data. The RTU Center supports the G-4514 RTU, GTP-541M, and other RTU products in ICP DAS that allow users to manage these RTU devices remotely. It can monitor the local IO data, local GPS data, and IO data of Modbus RTU modules. With M2M RTU Center software, users can establish the remote system by the OPC Client of the user's SCADA software with our NAOPC DA Server or EZ Data logger software of ICP DAS. That provides an easy way to complete a user's project.

NAOPC.M2M OPC Server is a free OPC DA Server (The "OPC" stands for "OLE for Process Control" and the "DA" stands for "Data Access") provided by ICP DAS. EZ Data Logger is small data logger software. It can be applied to a small remote I/O system. With its user-friendly interface, users can quickly and easily build a data logger software without any programming skills.

The M2M RTU Center with G-4514 RTU or GTP-541M applications can be divided into 2 parts: One part is the fixed intelligent remote management equipment such as water monitor system, vending machine system, remote machine monitor, home security, POS system, power measurement system, etc. Another kind of application is movement management equipment such as vehicle management system, maritime system, taxi dispatch system, etc. Anyway, the M2M RTU Center can save the cost and development time for users.

Features:

- RTU series Management tool
- Up to 10 M2M RTU devices can be managed in one RTU Center software in the free version.
- Up to 1024 M2M RTU devices can be managed in one RTU Center software in the official version.
- Help users to connect to any Modbus device to GPRS/Ethernet by M2M RTU devices
- Easy and quick to build a Remote monitor system
- Windows-based software
- Support NAOPC.M2M server, EzDatalog, and M2M API tool of ICP DAS

RUN-TIME LICENSE

Free Version	Up to 10 M2M RTU devices can be managed in one RTU Center software.
Official version	Up to 1024 M2M RTU devices can be managed in one RTU Center software.

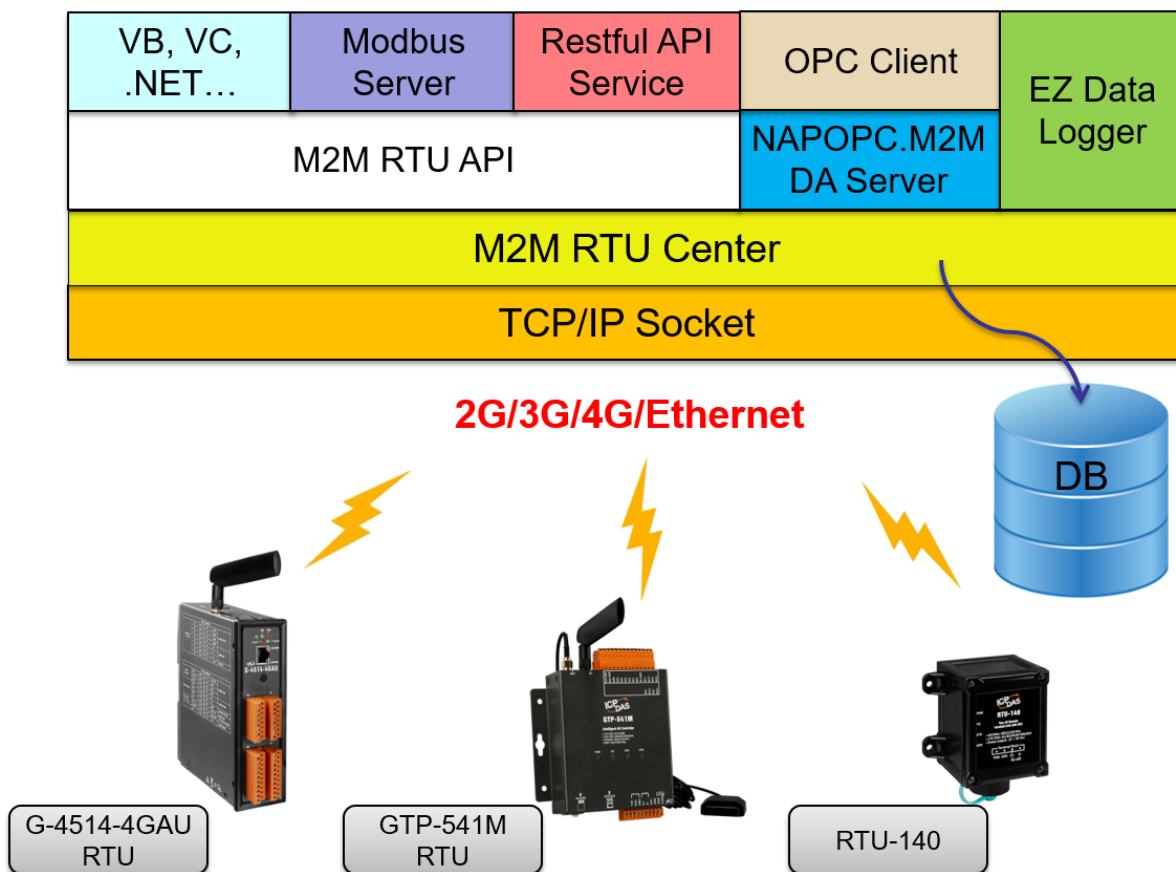
To order an M2M RTU Center license, please contact your distributor.

Chapter 2 Hardware Requirement

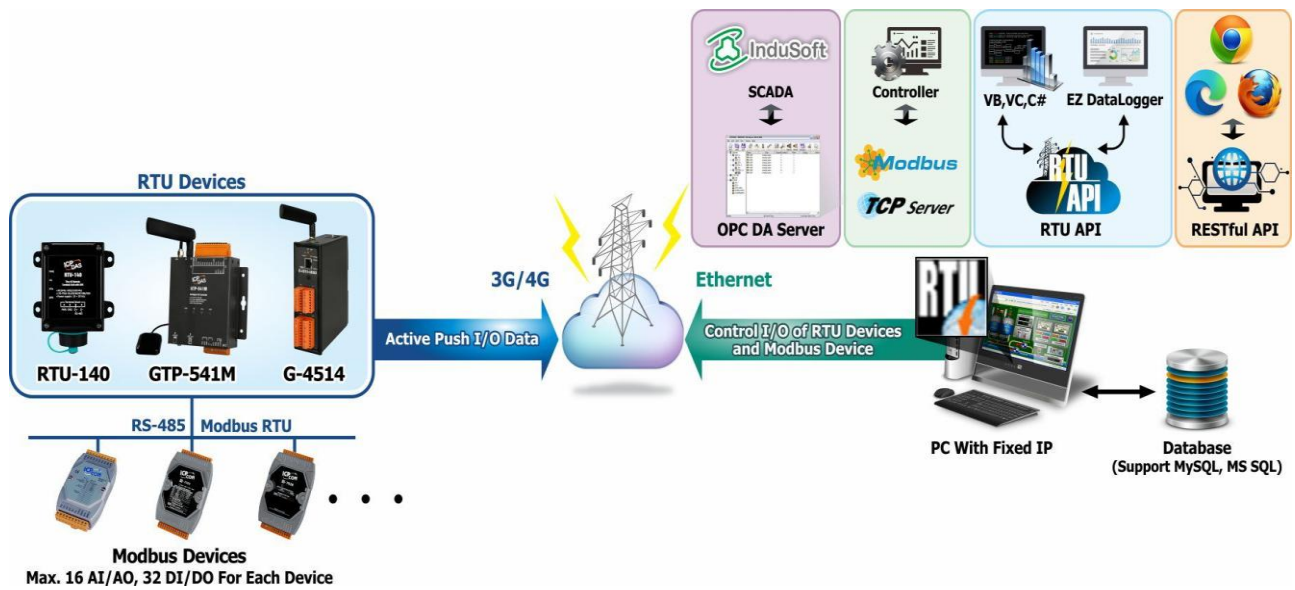
2.1 Software architecture

When users want to use the following software or others to their system with RTU products of ICP DAS, M2M RTU Center must be executed at the same time.

Device	Description
NAPOPC.M2M	OPC server
EZ Data Logger software	Version 4.24 or higher
.NET Framework software	Version 4.8 or higher



2.2 Application architecture



2.3 System requirement

● Software requirement:

Operating system Version	Support
Windows 7	✓
Windows 10	✓
Windows 11	✓

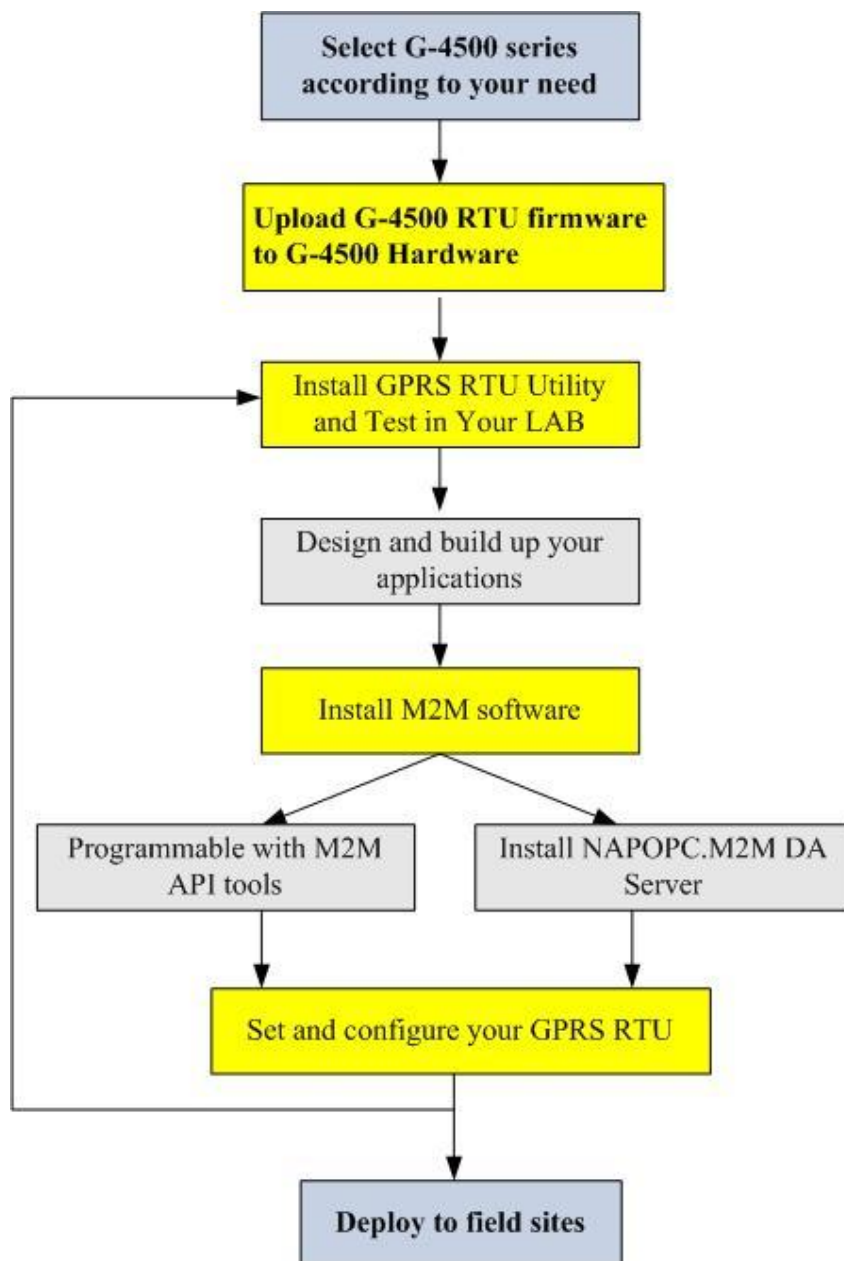
● Hardware requirement:

Hardware Items	Requirement
CPU	1.0 GHz or higher
Memory	512 MB or higher
Hardware space	100 MB or higher
Other	CD-ROM or DVD-ROM

Support Hardware

Product Type	Description
G-4514 Series RTU	Intelligent GPRS Remote Terminal Unit
GT-540	Smart GPRS Remote Terminal Unit
GRP-540	Ethernet/Serial/CAN to 4G Gateway
GTP-541M	4G Multi Function Controller with GPS
RTU-140	4G Remote Terminal Unit with GPS

Flowchart for using RTU devices



Chapter 3 Installing Required Components

To execute M2M RTU Center, the following runtime components must be installed:

- .Net Framework 4.8 or above
- Microsoft Visual C++ 2015-2022 Redistributable

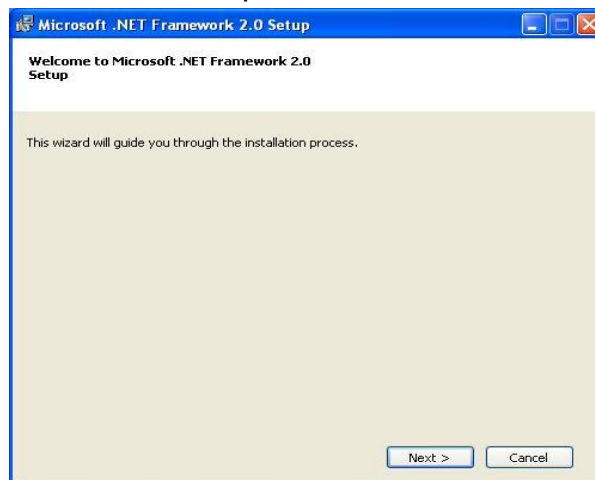
If both components are already present on the PC, you may skip Chapter 3

◆ Microsoft .Net Framework Version 4.8:

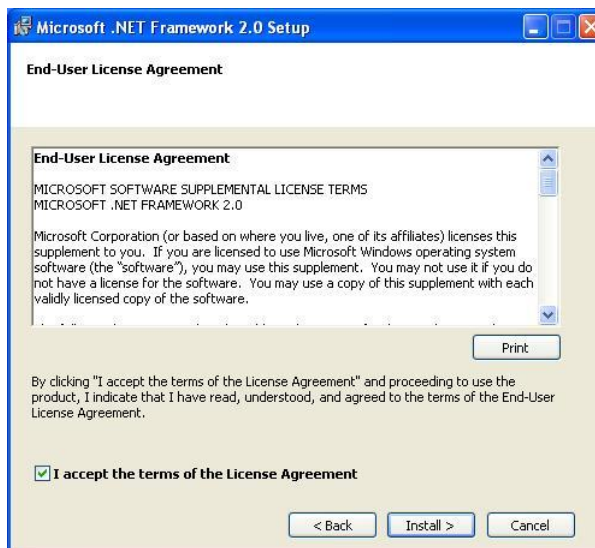
<https://dotnet.microsoft.com/en-us/download/dotnet-framework/net48>

The install figure is as follows:

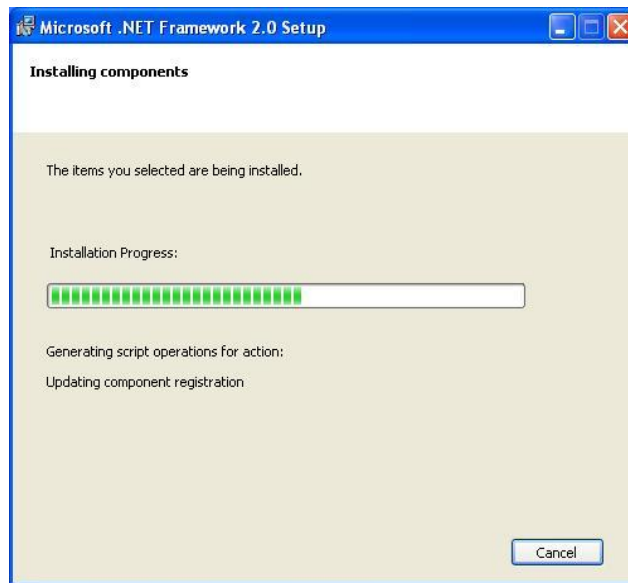
- ◆ Press “Next” to the next step.



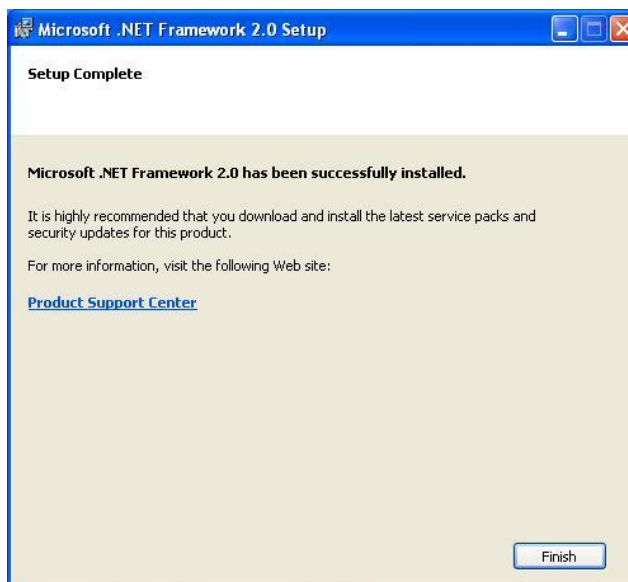
- ◆ Select the “I accept the terms of the License Agreement” and “Install” to the next step.



- ◆ The installation process would be going



- ◆ After finishing the installation, press "Finish" to exit the program.



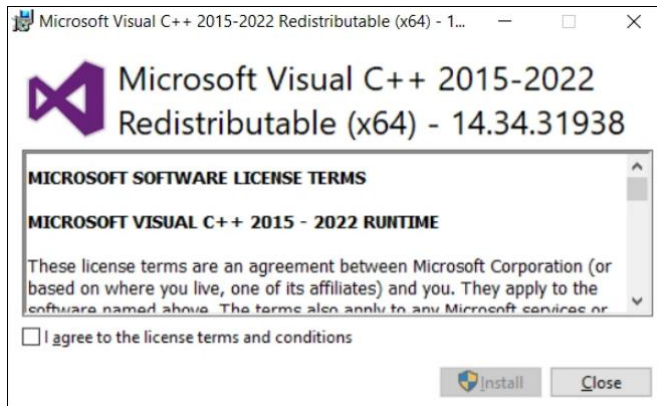
◆ **Microsoft C++ 2015-2022 Redistributable:**

The installation file can be found in the following path:

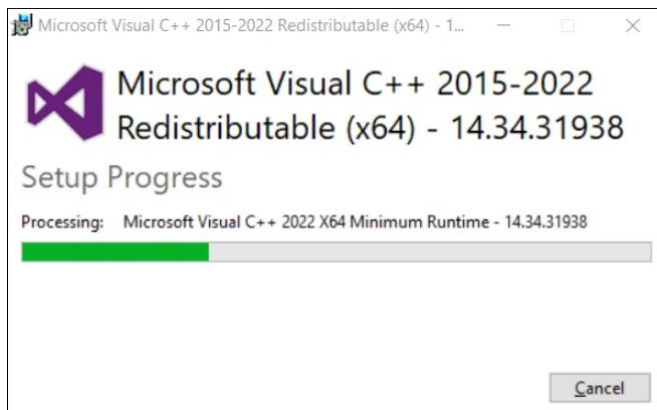
RTU_Center_v1.xx/driver/VC_redist.x64.exe

The install figure is as follows:

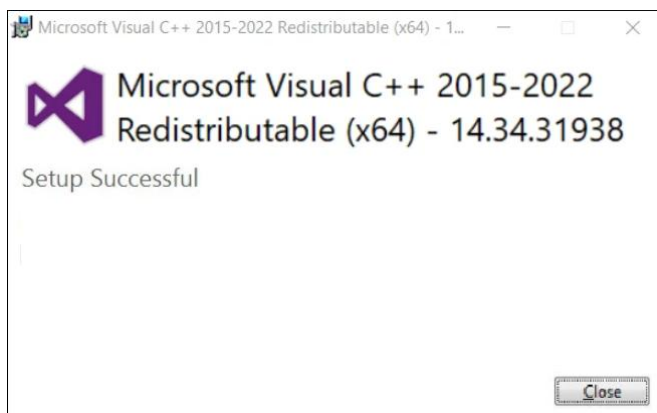
- ◆ During installation ,check “I agree” to accept the licens terms, then click ”Install” to proceed to the next step.



- ◆ The installation process would be going.



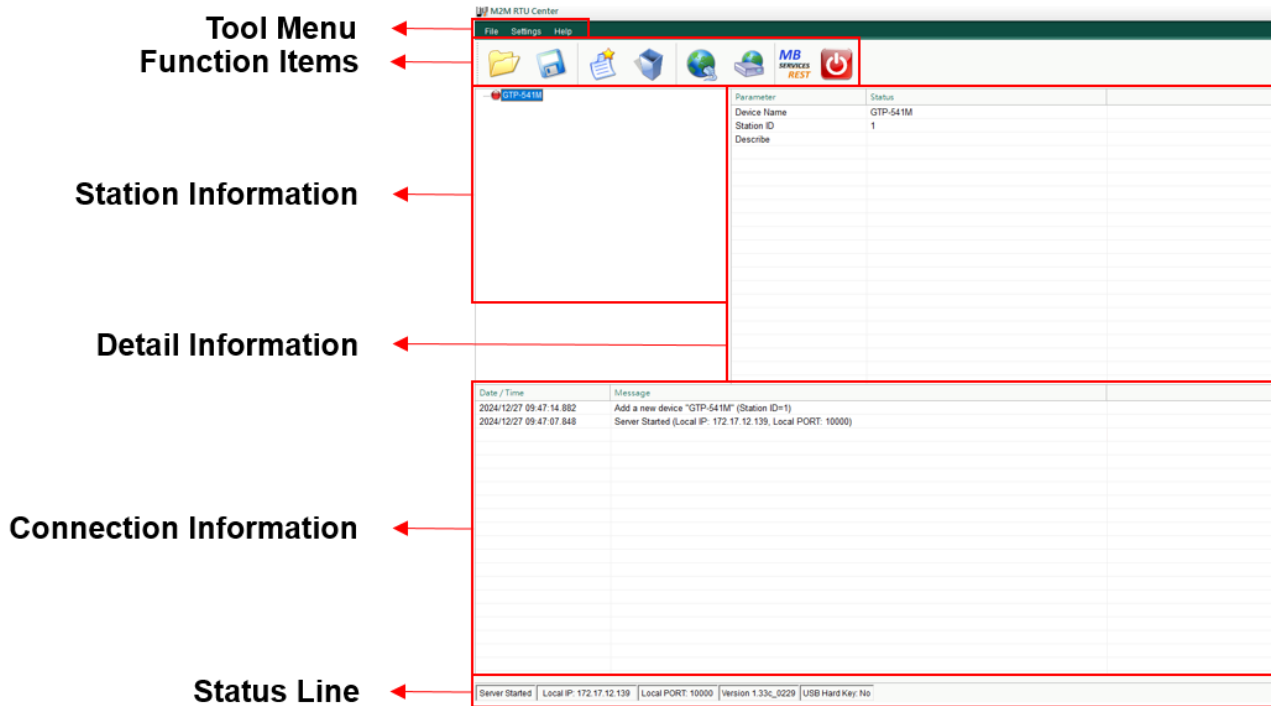
- ◆ After finishing the installation, press “Close” to exit the program.



Chapter 4 RTU Center Operation

OPC Server: Launch M2M RTU Center from the Start menu "Start→All Programs→ICPDAS→ ICP DAS OPC Suite→ NAPOPC.M2M→ M2M_RTU_Center".

4.1 Main menu



➤ The main menu of RTU Center includes the following sections:

◆ Tool menu:

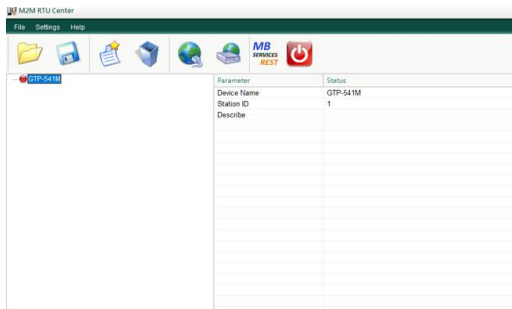
- File: Save or open station information of the user.
- Settings: Modify the local IP or local port.
- Help: Describe the version of RTU Center and other information.

◆ Function items:

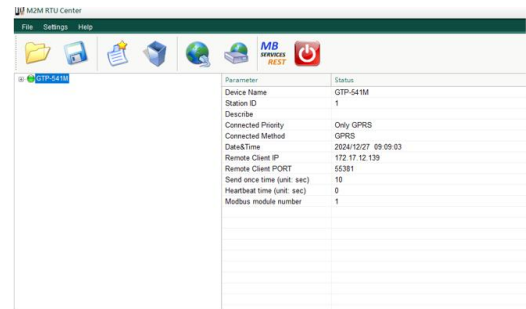
- Open file: Open the station information of the user.
- Save file: Save the station information of the user.
- New Device: Add a new device.
- Delete Device: Delete the assigned device.
- Modify IP: Modify the local IP
- Modify port: Modify the local port
- About: The version of RTU Center and other information.
- Exit: Exit the RTU Center.

➤ Station Information:

- ◆ Manage total stations interface. It will turn green light from a red light when the station connects to RTU Center successfully.



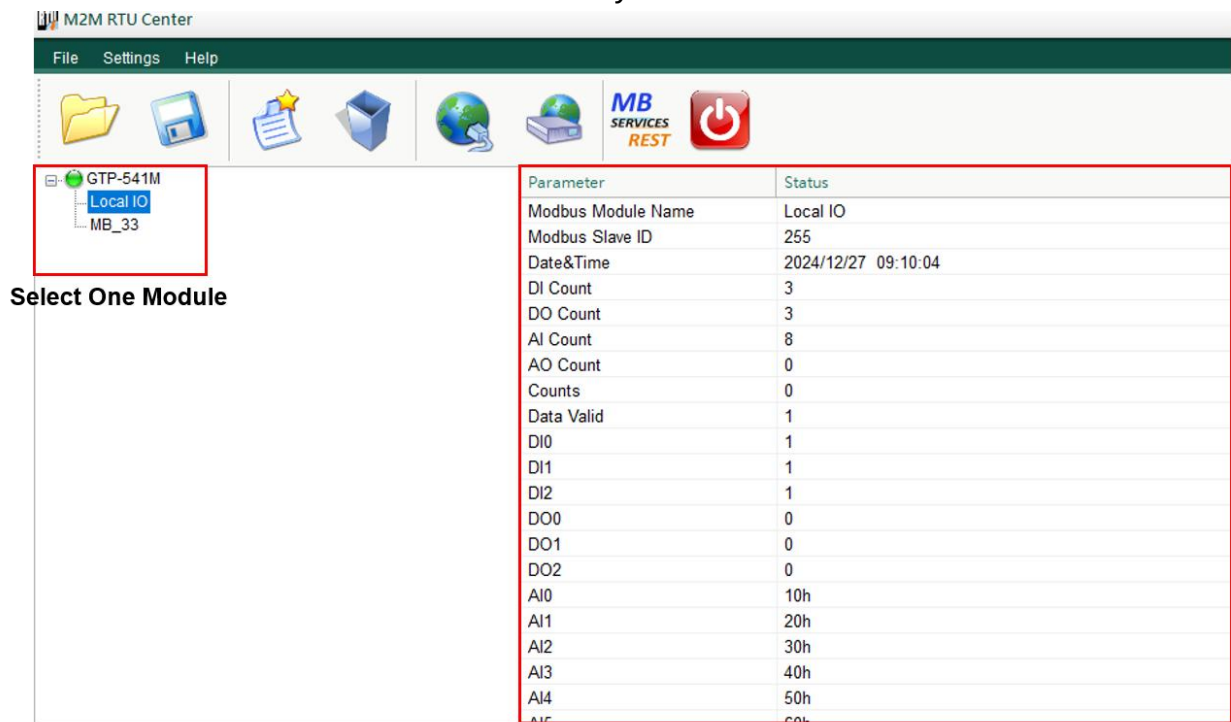
Before Connection



After Connection, It Shows Information Of The Station

➤ Detailed Information:

- ◆ It shows detailed information when you select one module



Detailed Information

➤ Connection Information:

- ◆ Total stations connect to RTU Center information.

➤ Status Line:

- ◆ Show the related information during the operation procedure including:
 - The status of the Server of the PC
 - The local IP of the PC
 - The local port of the PC

4.2 NEW Device

➤ It adds a new device. The description is below:

- ◆ Choose Function Item > New Device.

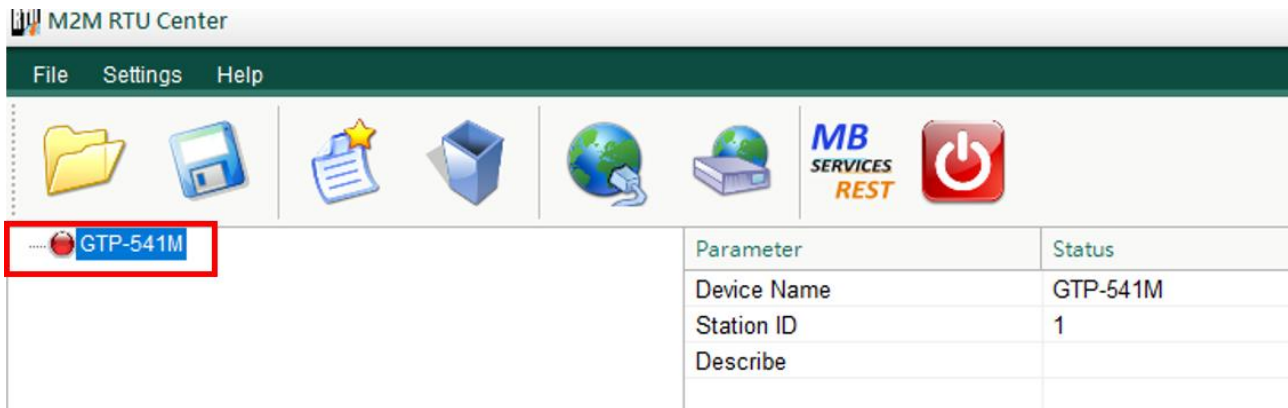


- ◆ Device Properties

- Device Name: Input your Device name
- Module: Select your connection module like G-4514 or GTP-541M...etc.
- Station ID: Input the station ID. It can't repeat the same station ID in the RTU Center. The station ID must match your connection module.
(Range: 1 ~ 65535)
- Describe: It shows in the field of "Detailed Information"
- Operation:
 - OK: Exit the window and add a new device
 - Cancel: Exit the window and don't add
 - It will add to "Station Information" after press the "OK" button

4.3 Delete Device

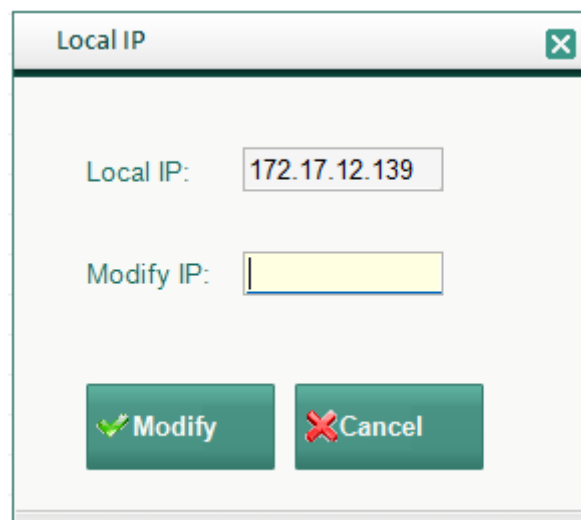
- It deletes a device. The description is below:
 - ◆ Select the device that you want to delete.



- ◆ Choose Function Item > Delete Device.

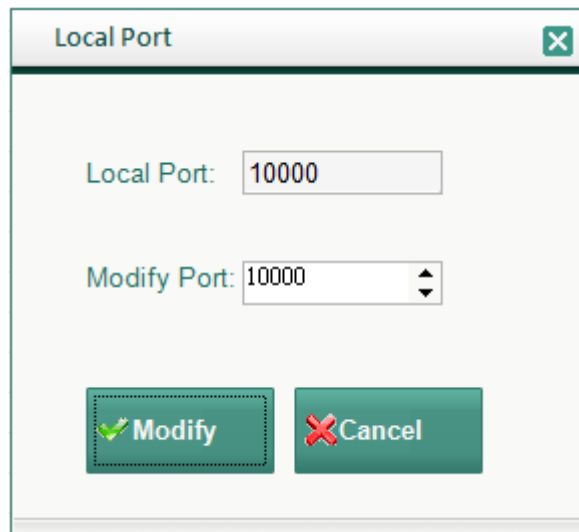


4.4 Modify IP



- Local IP: Show your old IP address
- Modify IP: Show your new IP address
- Operation:
 - ◆ Modify: Exit the Modify IP window and modify the IP address
 - ◆ Cancel: Exit the Modify IP window and don't save

4.5 Modify Port

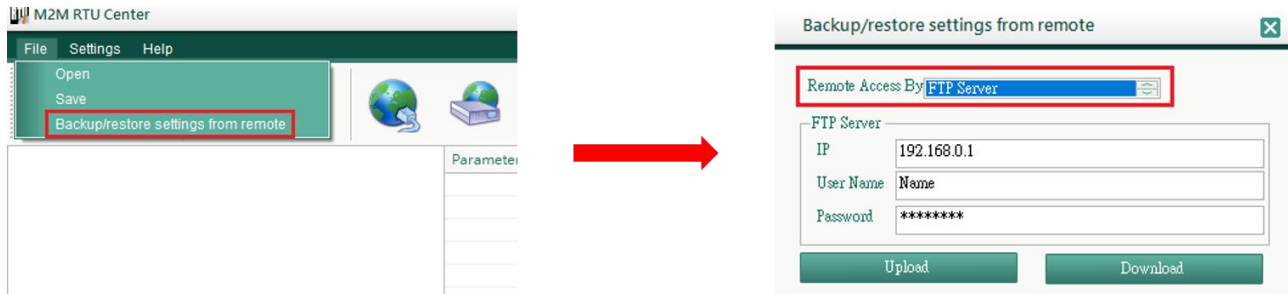


The screenshot shows a dialog box titled "Local Port". It contains two input fields: "Local Port:" with a text box containing "10000", and "Modify Port:" with a spinner box containing "10000". At the bottom are two buttons: "Modify" (with a green checkmark icon) and "Cancel" (with a red X icon).

- Local port: Show your old port address.
- Modify port: Show your new port address.
- Operation:
 - Modify: Exit the Modify port window and modify the port address.
 - Cancel: Exit the Modify port window and don't save.

4.6 Configuration file backup

Provide a configuration file backup mechanism for users, which can prevent users from having to reconfigure the related settings.



➤ Remote Access: There are three backup options available to choose from.

■ FTP Server:

The user must set up their own FTP server and enter the IP, username, and password.

■ Google Drive:

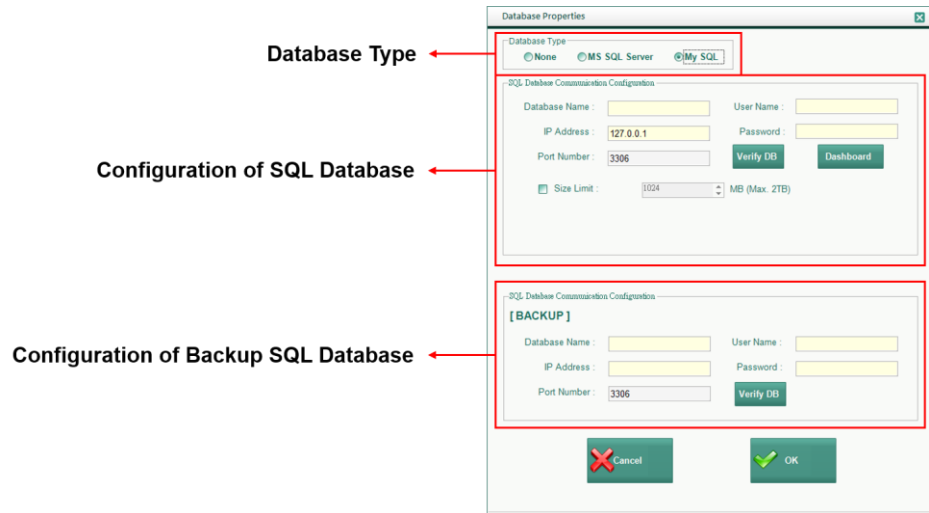
The user need to download Google Drive from the official Google website and follow the specified steps for setup, and it can be used after installation is complete.

■ Dropbox:

The user need to download the application from the Dropbox website , and it can be used after installation is complete.

4.7 Database and backup database settings

Provide a database for users to store data, and implement a backup database mechanism to prevent data loss caused by database corruption, ensuring data security. Additionally, a backup database option is provided for users to use.



➤ The database property settings include the following sections:

- Database Type: Provide MS SQL and MySQL options for users to choose from.

- ✧ For setting up the database server, please refer to the “DB Server Setup Manual”.

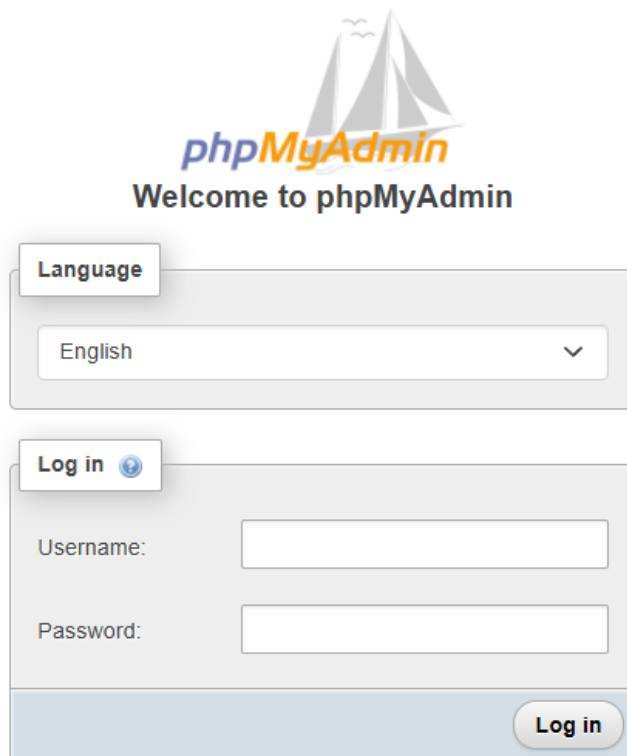
- SQL Database Configuration:

- ◆ Database Name: Database name, the user must manually create the database.
- ◆ IP Address: The default IP address of the database server is **127.0.0.1**.
- ◆ User Name: Username with database access and permissions.
- ◆ Password: The password for connecting to the database, if configured.
- ◆ Size Limit: Database write threshold
- ◆ Verify DB: For testing database connection.
- ◆ Dashboard: Open the phpMyAdmin database management interface.
- ◆ Port Number: MySQL defaults to 3306 and MS SQL defaults to 1433.

- Configuration of the backup SQL Database:

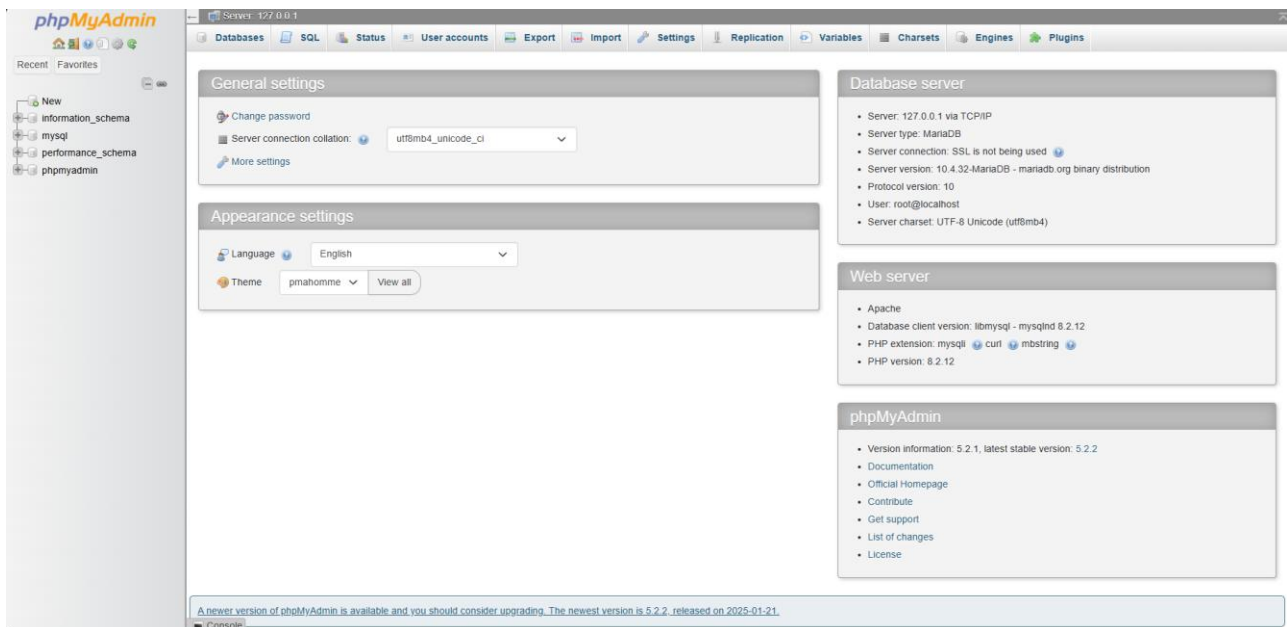
- ◆ Database Name: Database name, the user must manually create the database.
- ◆ IP Address: The IP address of the database server.
- ◆ User Name: Username with database access and permissions.
- ◆ Password: The password for connecting to the database, if configured.
- ◆ Port Number: MySQL defaults to 3306 and MS SQL defaults to 1433.

- PhpMyAdmin login interface, the default **username** and **password** (**root / 0000**)



The image shows the PhpMyAdmin login interface. At the top, there is a logo with a sailboat and the text "phpMyAdmin" and "Welcome to phpMyAdmin". Below the logo, there is a "Language" dropdown menu set to "English". Underneath, there is a "Log in" button with a blue circular icon. Below the "Log in" button, there are two input fields: "Username:" and "Password:". At the bottom right, there is a "Log in" button.

- User interface after a successful login



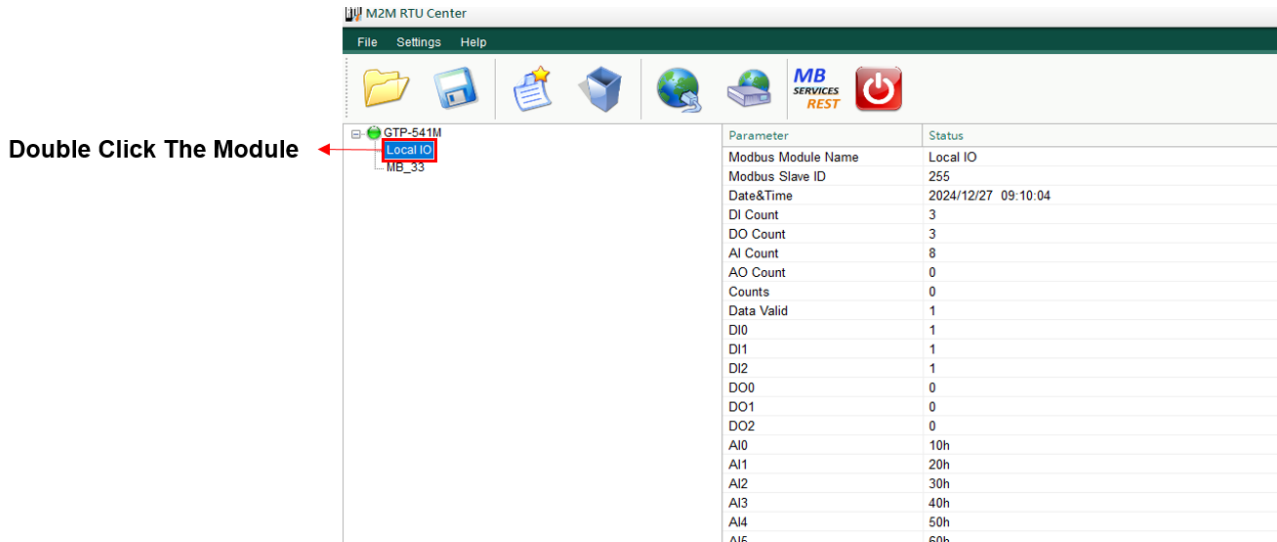
The following are tutorial articles related to phpMyAdmin for your reference.

1. [PhpMyAdmin Official Website](#)
2. [TutorialsPoints](#)

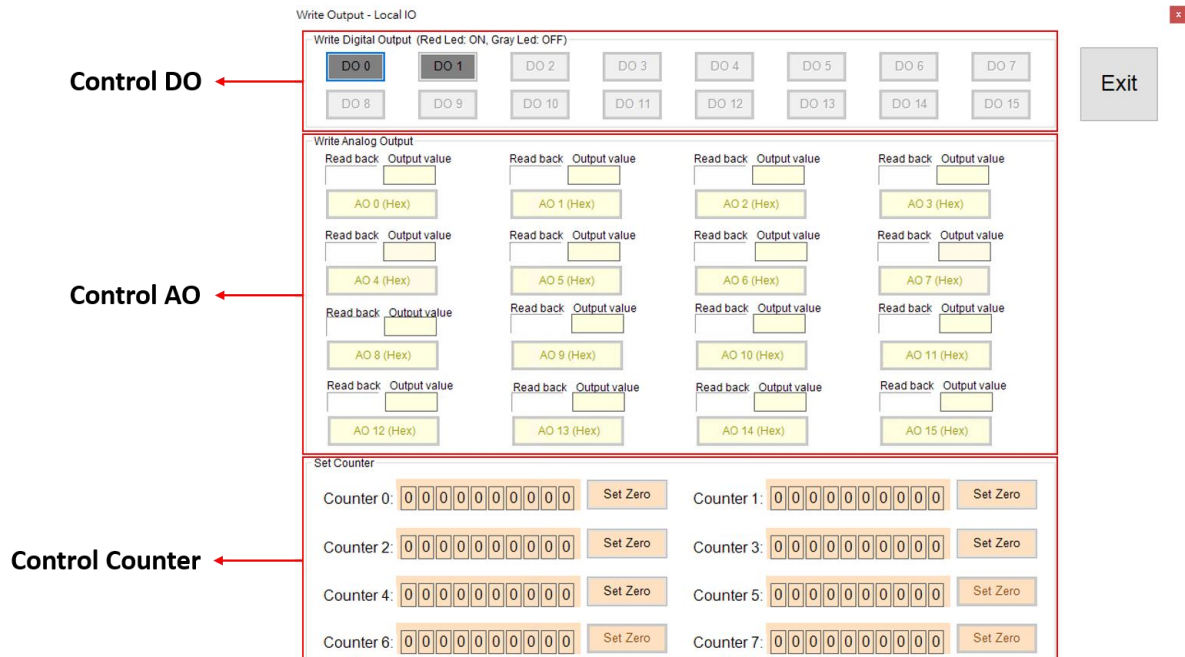
4.8 Control module I/O

- It controls an IO of the module. The description is below:

- ◆ Double-click the module that you want to control, like Local IO or M-7000 module.



- ◆ Operation



- Control DO: If your module had to DO counts, you can control them.

- DO0 ~ DO15 :

- Red: the voltage logic is high
- Gray: the voltage logic is low
- Disable: your module does not have this DO count.

- Operation

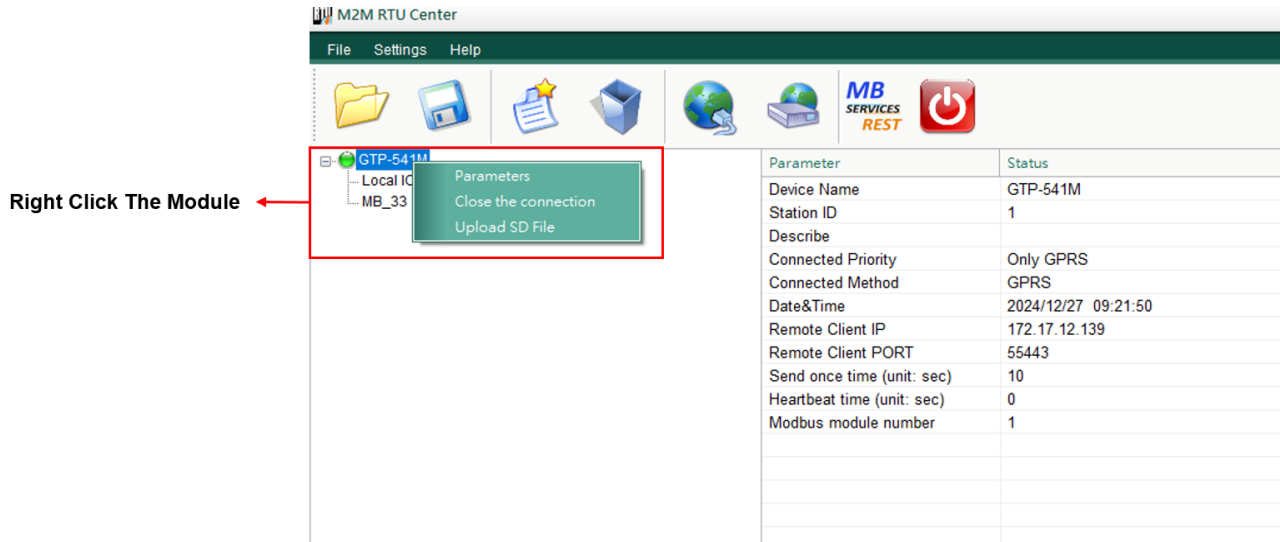
- DO0 ~ DO15 Gray: Set the DO output on

- ☐ DO0 ~ DO15 Red: Set the DO output off
- Control AO: If your module had AO counts, you can control them.
 - AO0 ~ AO15
 - ☐ Read back: Get the AO value.
 - ☐ Output Value: Want to set the AO value.
 - Operation
 - ☐ AO0 ~ AO15 : Set the AO value
- Control Counter: If your module had Counter counts, you can control them.
 - Counter0 ~ Counter7
 - ☐ Get the Counter value.
 - Operation
 - ☐ Set Zero Counter0 ~ Set Zero Counter 7 : Set the counter value to zero

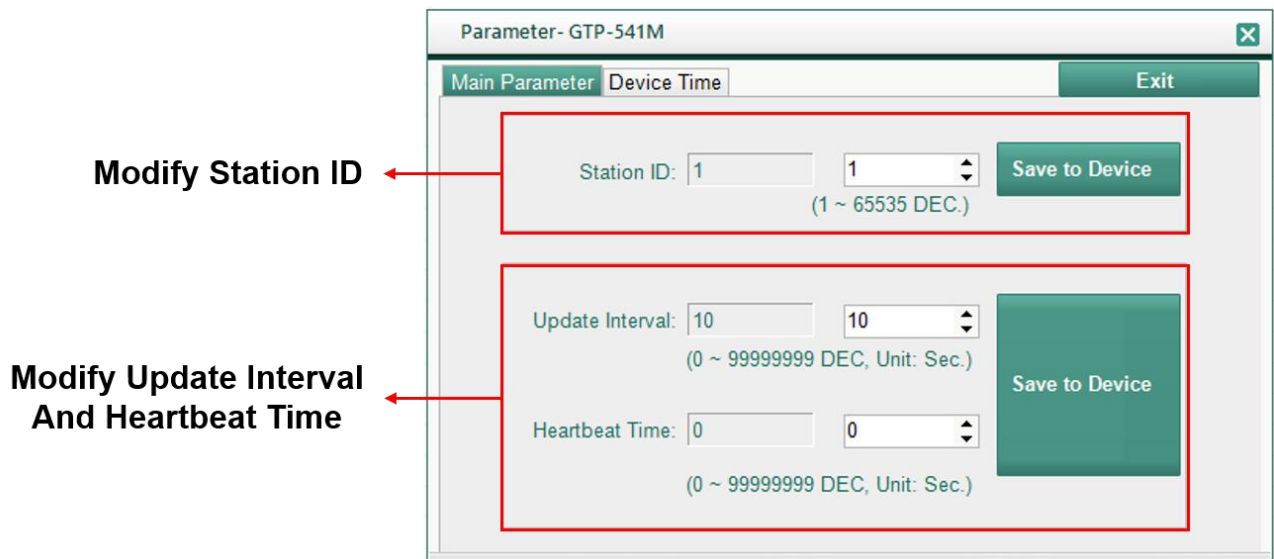
4.9 Modify the module parameters

- It modifies the module parameter. The description is below:

- ◆ Right-click the module that you want to modify and select the “Parameters” item.



- ◆ Main Parameter



- Modify Station ID: Modify the station ID of the module.

- Old Station ID: the old station ID of the module.
- New Station ID: the new station ID of the module.

- Operation

- Save to Device: Set the new Station ID to the assigned module.
- Modify Update Interval: Modify the Update Interval of the module. Set module report time interval. The module calculates time intervals according to report base time. (Unit: sec)
- Old Update Interval: the old Update Interval of the module.

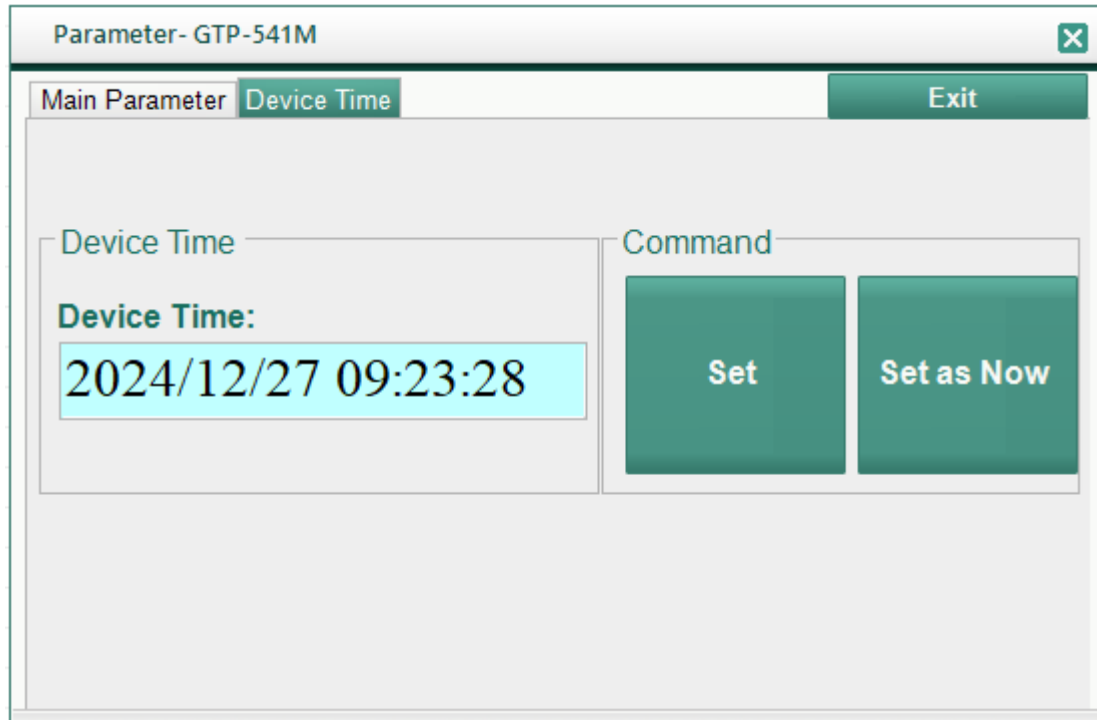
- ❑ New Update Interval: the New Update Interval of the module.

- ❑ Old Heartbeat Time: the old Heartbeat Time of module.

- ❑ New Heartbeat Time: the newHeartbeat Time of the module.

- Save to Device: Set the new Update Interval to the assigned module.

◆ Device Time



- Device time: show the time of the module. Users also can change the time in this field to key in the specific time.

- Operation

- “Set as Now”: Set the PC time to module. After setting the time successfully, the information of module time.

- Set: Set the module time according to the “Device Time” field. After setting the time successfully, the information of module time would be updated.

4.10 Close the connection

- It closes the connection. The description is below:

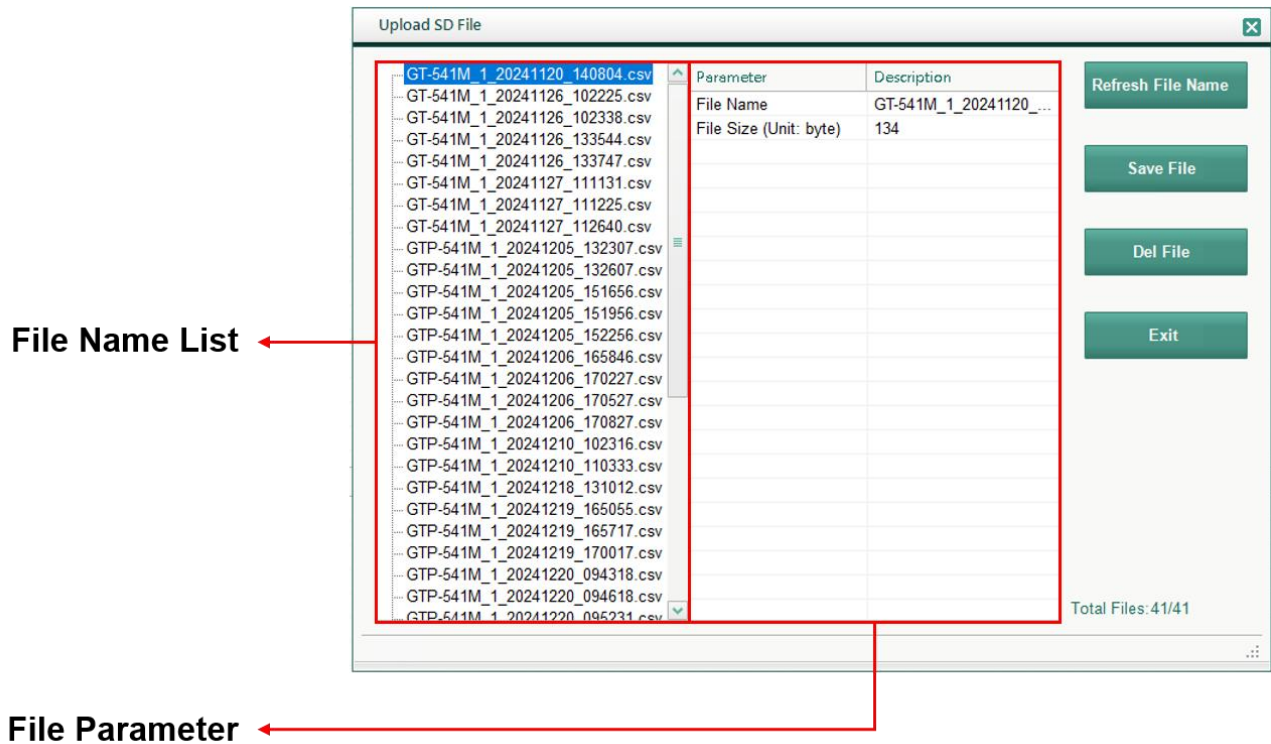
- ◆ Right-click the module that you want to modify and select the “Close the connection” item.

- ◆ Close the assigned connection.

4.11 Upload SD File

● It Uploads SD Files. The description is below:

- ◆ Right-click the module that you want to modify and select the “Upload SD File” item.
- ◆ Upload SD File



■ File name list: List all the file names.

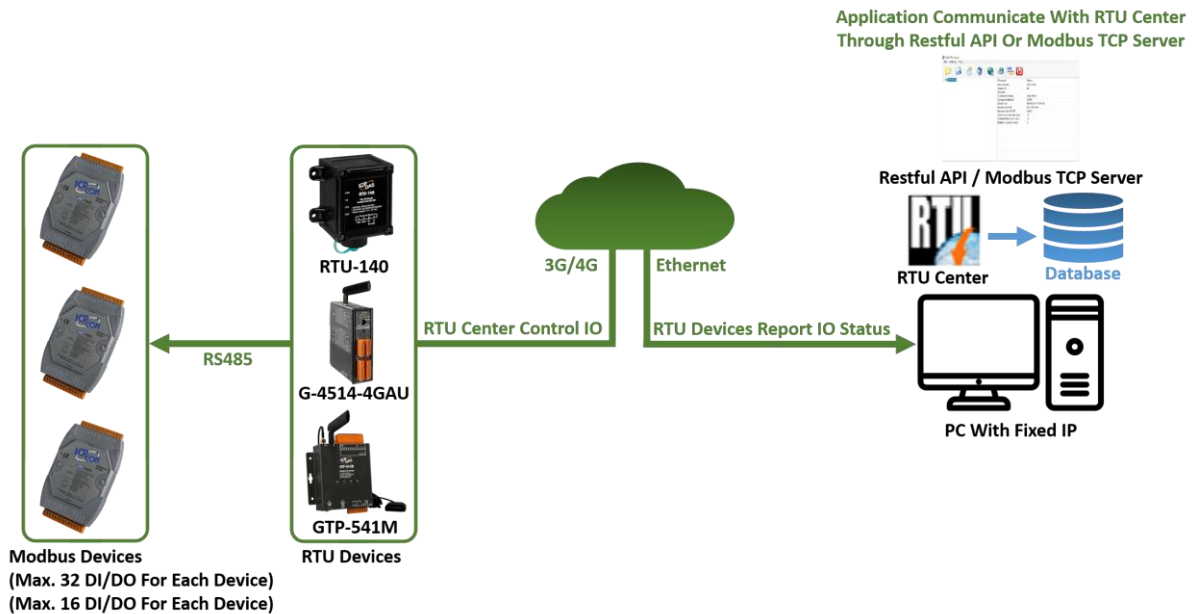
■ File parameter: List this file parameter. Like: Filename and File size.

■ Operation

- Refresh File Name: Refresh the File name list from the remote module.
- Save File: Upload and Save the assigned File from the remote module.
- Del File: Delete the assigned SD File on the remote module.
- Exit: Exit upload SD file program.

Chapter 5 Restful API And Modbus Server

Restful API and Modbus Server architecture



5.1 Set Restful API and Modbus Server

- It set Restful API and Modbus server. The description is below:

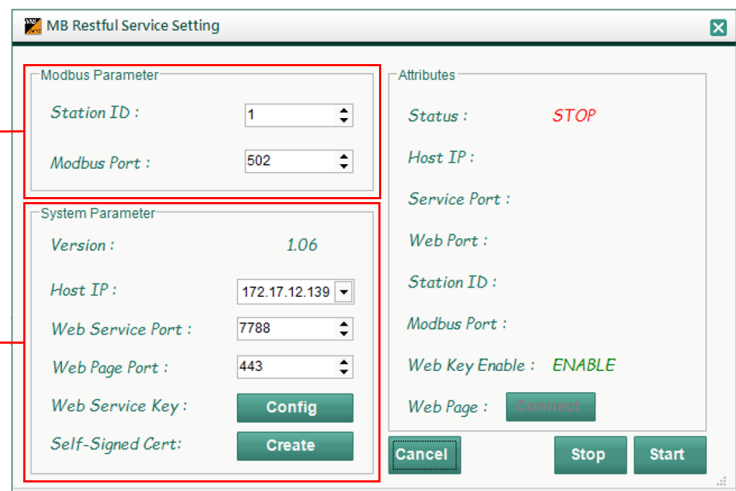
- Choose function item > MB Restful Service Setting



- Modify system parameter: information of server IP and port

Modify Modbus Server Slave ID and Modbus TCP Port

Modify Restful API Server IP Port the Web Service Key and Port
Generate a self-signed network certificate

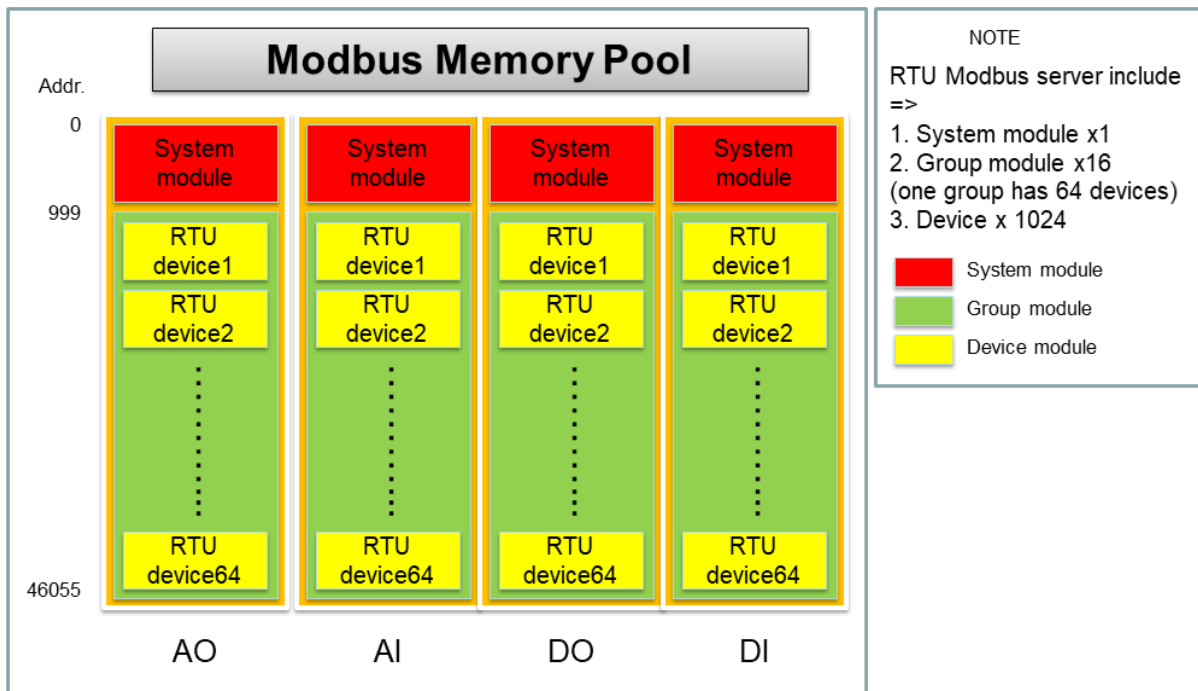


- Host IP
- Web Service Port: from 0 ~ 65535
- Web Page Port: from 0 ~ 65535
- Web Service Key: Secure key of Restful Service
- Self-Signed Cert: Generate a self-signed network certificate

Attention: for security reasons, it is recommended to operate only on the local side, like "Host IP = 127.0.0.1".

- ◆ Modify Modbus Parameter: information of Modbus server
 - Modbus server Slave ID
 - Modbus server port: from 0 ~ 65535
- ◆ Path of log files:
 - Automatically output in the current directory:
"/MB_Restful_Service/yyyy-mm-dd.txt"

5.2 Modbus Server Memory Planning



1. Device Description

- RTU Center has 16 groups (Group 0 ~ 15)
- Each group has 64 RTU devices (RTU device 1 ~ 64)
- Each RTU device has 11 modules (1 * Local device + 10 * Modbus device)

2. IO Number

- Max.32 DI for each device.
- Max.32 DO for each device.
- Max.16 AI for each device.

- Max.16 AO for each device.
- Max.16 Counters for each device.

3. IO Description

Item	Description	
Discrete Input	0 means OFF and 1 means ON.	
Coil		
Input Register	AI (first half)	Counter (second half)
	From 0 to 65535 (Uint16) for unipolar input ranges. Like 0 ~ 5V, 0 ~ 10V.	From 0 to 65535 (Uint16)
	From -32768 to 32767 (Int16) for bipolar input ranges. Like ±5V, ±10V	
Holding Register	From 0 to 65535 (UINT16). From -32768 to 32767 (INT16).	

4. Read RTU device status

Step1. Calculate RTU device in which group: (Station ID - 1) / 64

Step2. Write group which is calculated in the previous step to Modbus address"0"

Note. The default [current control group] is 0. If the Station ID is during 1~64, then the step1 and step2 can be ignored.

Step3. Check online status of local RTU device through Modbus address "000~ 00063"

Step4. Check online status of slave RTU device through Modbus address "100~ 00739"

System Module		
Description	Function	Address
Select current control group	Input Register	00000
Check current control group	Holding Register	
Local device online / offline	Discrete Input	00000 ~ 00063
Reserve	-	00064 ~ 00099
Modbus Device Of RTU device 1 online / offline	Discrete Input	00100 ~ 00109
Modbus Device Of RTU device 2 online / offline		00110 ~ 00119
Modbus Device Of RTU device 3 online / offline		00120 ~ 00129
Modbus Device Of RTU device 4 online / offline		00130 ~ 00139
Modbus Device Of RTU device 5 online / offline		00140 ~ 00149
Modbus Device Of RTU device 6 online / offline		00150 ~ 00159
Modbus Device Of RTU device 7 online / offline		00160 ~ 00169
Modbus Device Of RTU device 8 online / offline		00170 ~ 00179
Modbus Device Of RTU device 9 online / offline		00180 ~ 00189
Modbus Device Of RTU device 10 online / offline		00190 ~ 00199
Modbus Device Of RTU device 11 online / offline		00200 ~ 00209

Modbus Device Of RTU device 12 online / offline	00210 ~ 00219
Modbus Device Of RTU device 13 online / offline	00220 ~ 00229
Modbus Device Of RTU device 14 online / offline	00230 ~ 00239
Modbus Device Of RTU device 15 online / offline	00240 ~ 00249
Modbus Device Of RTU device 16 online / offline	00250 ~ 00259
Modbus Device Of RTU device 17 online / offline	00260 ~ 00269
Modbus Device Of RTU device 18 online / offline	00270 ~ 00279
Modbus Device Of RTU device 19 online / offline	00280 ~ 00289
Modbus Device Of RTU device 20 online / offline	00290 ~ 00299
Modbus Device Of RTU device 21 online / offline	00300 ~ 00309
Modbus Device Of RTU device 22 online / offline	00310 ~ 00319
Modbus Device Of RTU device 23 online / offline	00320 ~ 00329
Modbus Device Of RTU device 24 online / offline	00330 ~ 00339
Modbus Device Of RTU device 25 online / offline	00340 ~ 00349
Modbus Device Of RTU device 26 online / offline	00350 ~ 00359
Modbus Device Of RTU device 27 online / offline	00360 ~ 00369
Modbus Device Of RTU device 28 online / offline	00370 ~ 00379
Modbus Device Of RTU device 29 online / offline	00380 ~ 00389
Modbus Device Of RTU device 30 online / offline	00390 ~ 00399
Modbus Device Of RTU device 31 online / offline	00400 ~ 00409
Modbus Device Of RTU device 32 online / offline	00410 ~ 00419
Modbus Device Of RTU device 33 online / offline	00420 ~ 00429
Modbus Device Of RTU device 34 online / offline	00430 ~ 00439
Modbus Device Of RTU device 35 online / offline	00440 ~ 00449
Modbus Device Of RTU device 36 online / offline	00450 ~ 00459
Modbus Device Of RTU device 37 online / offline	00460 ~ 00469
Modbus Device Of RTU device 38 online / offline	00470 ~ 00479
Modbus Device Of RTU device 39 online / offline	00480 ~ 00489
Modbus Device Of RTU device 40 online / offline	00490 ~ 00499
Modbus Device Of RTU device 41 online / offline	00500 ~ 00509
Modbus Device Of RTU device 42 online / offline	00510 ~ 00519
Modbus Device Of RTU device 43 online / offline	00520 ~ 00529
Modbus Device Of RTU device 44 online / offline	00530 ~ 00539
Modbus Device Of RTU device 45 online / offline	00540 ~ 00549
Modbus Device Of RTU device 46 online / offline	00550 ~ 00559
Modbus Device Of RTU device 47 online / offline	00560 ~ 00569
Modbus Device Of RTU device 48 online / offline	00570 ~ 00579
Modbus Device Of RTU device 49 online / offline	00580 ~ 00589

Modbus Device Of RTU device 50 online / offline		00590 ~ 00599
Modbus Device Of RTU device 51 online / offline		00600 ~ 00609
Modbus Device Of RTU device 52 online / offline		00610 ~ 00619
Modbus Device Of RTU device 53 online / offline		00620 ~ 00629
Modbus Device Of RTU device 54 online / offline		00630 ~ 00639
Modbus Device Of RTU device 55 online / offline		00640 ~ 00649
Modbus Device Of RTU device 56 online / offline		00650 ~ 00659
Modbus Device Of RTU device 57 online / offline		00660 ~ 00669
Modbus Device Of RTU device 58 online / offline		00670 ~ 00679
Modbus Device Of RTU device 59 online / offline		00680 ~ 00689
Modbus Device Of RTU device 60 online / offline		00690 ~ 00699
Modbus Device Of RTU device 61 online / offline		00700 ~ 00709
Modbus Device Of RTU device 62 online / offline		00710 ~ 00719
Modbus Device Of RTU device 63 online / offline		00720 ~ 00729
Modbus Device Of RTU device 64 online / offline		00730 ~ 00739

Note. RTU device 1 means Station ID 1, 65, 129, ... and 960,
RTU device 2 means Station ID 2, 66, 130, ... and 961,
RTU device 3 means Station ID 3, 67, 131, ... and 962,
RTU device 4 means Station ID 4, 68, 132, ... and 963,
and so on.

5. Read / Write RTU devices:

Step1. Calculate RTU device in which group: $(\text{Station ID} - 1) / 64$

Step2. Write group which is calculated in the previous step to Modbus address"0"

Note. The default [current control group] is 0. If the Station ID is during 1~64, then the step1 and step2 can be ignored.

Step3. Calculate Modbus address

(1) Calculate RTU device in which group → $\text{DID} = (\text{Station ID} - 1) / 64$

(2) Calculate index of RTU device in group → $\text{MID} = 0$ [Local device]

→ $\text{MID} = 1$ [Slave device1]

.....

→ $\text{MID} = 10$ [Slave device10]

(3) Calculate Modbus address → $\text{ADDR} = 1000 + \text{MID} \times 64 + \text{DID} \times 704$

Step4. Read / Write Modbus address which is calculated in previous step

Attention: Station ID must between 1 and 1024.

DI Address	
Group 0 ~ 15	
Description	Address
RTU Device 1 (Station ID 1, 65, 129, ..., 960)	

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Local Device	01000 ~ 01031
Slave Device 1	01064 ~ 01095
Slave Device 2	01128 ~ 01159
Slave Device 3	01192 ~ 01223
Slave Device 4	01256 ~ 01287
Slave Device 5	01320 ~ 01351
Slave Device 6	01384 ~ 01415
Slave Device 7	01448 ~ 01479
Slave Device 8	01512 ~ 01543
Slave Device 9	01576 ~ 01607
Slave Device 10	01640 ~ 01671
RTU Device 2 (Station ID 2, 66, 130, ..., 961)	
Local Device	01704 ~ 01735
Slave Device 1	01768 ~ 01799
Slave Device 2	01832 ~ 01863
Slave Device 3	01896 ~ 01927
Slave Device 4	01960 ~ 01991
Slave Device 5	02024 ~ 02055
Slave Device 6	02088 ~ 02119
Slave Device 7	02152 ~ 02183
Slave Device 8	02216 ~ 02247
Slave Device 9	02280 ~ 02311
Slave Device 10	02344 ~ 02375
RTU Device 3 (Station ID 3, 67, 131, ..., 962)	
Local Device	02408 ~ 02439
Slave Device 1	02472 ~ 02503
Slave Device 2	02536 ~ 02567
Slave Device 3	02600 ~ 02631
Slave Device 4	02664 ~ 02695
Slave Device 5	02728 ~ 02759
Slave Device 6	02792 ~ 02823
Slave Device 7	02856 ~ 02887
Slave Device 8	02920 ~ 02951
Slave Device 9	02984 ~ 03015
Slave Device 10	03048 ~ 03079
RTU Device 4 (Station ID 4, 68, 132, ..., 963)	
Local Device	03112 ~ 03143
Slave Device 1	03176 ~ 03207

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Slave Device 2	03240 ~ 03271
Slave Device 3	03304 ~ 03335
Slave Device 4	03368 ~ 03399
Slave Device 5	03432 ~ 03463
Slave Device 6	03496 ~ 03527
Slave Device 7	03560 ~ 03591
Slave Device 8	03624 ~ 03655
Slave Device 9	03688 ~ 03719
Slave Device 10	03752 ~ 03783
.....	
RTU Device 64 (Station ID 64, 128, 192, ..., 1024)	
Local Device	45352 ~ 45383
Slave Device 1	45416 ~ 45447
Slave Device 2	45480 ~ 45511
Slave Device 3	45544 ~ 45575
Slave Device 4	45608 ~ 45639
Slave Device 5	45672 ~ 45703
Slave Device 6	45736 ~ 45767
Slave Device 7	45800 ~ 45831
Slave Device 8	45864 ~ 45895
Slave Device 9	45928 ~ 45959
Slave Device 10	45992 ~ 46023

DO Address	
Group 0 ~ 15	
Description	Address
RTU Device 1 (Station ID 1, 65, 129, ..., 960)	
Local Device	01000 ~ 01031
Slave Device 1	01064 ~ 01095
Slave Device 2	01128 ~ 01159
Slave Device 3	01192 ~ 01223
Slave Device 4	01256 ~ 01287
Slave Device 5	01320 ~ 01351
Slave Device 6	01384 ~ 01415
Slave Device 7	01448 ~ 01479
Slave Device 8	01512 ~ 01543
Slave Device 9	01576 ~ 01607
Slave Device 10	01640 ~ 01671

RTU Device 2 (Station ID 2, 66, 130, ..., 961)	
Local Device	01704 ~ 01735
Slave Device 1	01768 ~ 01799
Slave Device 2	01832 ~ 01863
Slave Device 3	01896 ~ 01927
Slave Device 4	01960 ~ 01991
Slave Device 5	02024 ~ 02055
Slave Device 6	02088 ~ 02119
Slave Device 7	02152 ~ 02183
Slave Device 8	02216 ~ 02247
Slave Device 9	02280 ~ 02311
Slave Device 10	02344 ~ 02375
RTU Device 3 (Station ID 3, 67, 131, ..., 962)	
Local Device	02408 ~ 02439
Slave Device 1	02472 ~ 02503
Slave Device 2	02536 ~ 02567
Slave Device 3	02600 ~ 02631
Slave Device 4	02664 ~ 02695
Slave Device 5	02728 ~ 02759
Slave Device 6	02792 ~ 02823
Slave Device 7	02856 ~ 02887
Slave Device 8	02920 ~ 02951
Slave Device 9	02984 ~ 03015
Slave Device 10	03048 ~ 03079
RTU Device 4 (Station ID 4, 68, 132, ..., 963)	
Local Device	03112 ~ 03143
Slave Device 1	03176 ~ 03207
Slave Device 2	03240 ~ 03271
Slave Device 3	03304 ~ 03335
Slave Device 4	03368 ~ 03399
Slave Device 5	03432 ~ 03463
Slave Device 6	03496 ~ 03527
Slave Device 7	03560 ~ 03591
Slave Device 8	03624 ~ 03655
Slave Device 9	03688 ~ 03719
Slave Device 10	03752 ~ 03783
.....	
RTU Device 64 (Station ID 64, 128, 192, ..., 1024)	

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Local Device	45352 ~ 45383
Slave Device 1	45416 ~ 45447
Slave Device 2	45480 ~ 45511
Slave Device 3	45544 ~ 45575
Slave Device 4	45608 ~ 45639
Slave Device 5	45672 ~ 45703
Slave Device 6	45736 ~ 45767
Slave Device 7	45800 ~ 45831
Slave Device 8	45864 ~ 45895
Slave Device 9	45928 ~ 45959
Slave Device 10	45992 ~ 46023

AI Address		
Group 0 ~ 15		
Description	Type	Address
RTU Device 1 (Station ID 1, 65, 129, ..., 960)		
Local Device	AI	01000 ~ 01015
	Reserve	01016 ~ 01031
	Counter	01032 ~ 01063
Slave Device 1	AI	01064 ~ 01079
	Reserve	01080 ~ 01095
	Counter	01096 ~ 01127
Slave Device 2	AI	01128 ~ 01143
	Reserve	01144 ~ 01159
	Counter	01160 ~ 01191
Slave Device 3	AI	01192 ~ 01207
	Reserve	01208 ~ 01223
	Counter	01224 ~ 01255
Slave Device 4	AI	01256 ~ 01271
	Reserve	01272 ~ 01287
	Counter	01288 ~ 01319
Slave Device 5	AI	01320 ~ 01335
	Reserve	01336 ~ 01351
	Counter	01352 ~ 01383
Slave Device 6	AI	01384 ~ 01399
	Reserve	01400 ~ 01415
	Counter	01416 ~ 01447
Slave Device 7	AI	01448 ~ 01463

	Reserve	01464 ~ 01479
	Counter	01480 ~ 01511
Slave Device 8	AI	01512 ~ 01527
	Reserve	01528 ~ 01543
	Counter	01544 ~ 01575
Slave Device 9	AI	01576 ~ 01591
	Reserve	01592 ~ 01607
	Counter	01608 ~ 01639
Slave Device 10	AI	01640 ~ 01655
	Reserve	01656 ~ 01671
	Counter	01672 ~ 01703
RTU Device 2 (Station ID 2, 66, 130, ..., 961)		
Local Device	AI	01704 ~ 01719
	Reserve	01720 ~ 01735
	Counter	01736 ~ 01767
Slave Device 1	AI	01768 ~ 01783
	Reserve	01784 ~ 01799
	Counter	01800 ~ 01831
Slave Device 2	AI	01832 ~ 01847
	Reserve	01848 ~ 01863
	Counter	01864 ~ 01895
Slave Device 3	AI	01896 ~ 01911
	Reserve	01912 ~ 01927
	Counter	01928 ~ 01959
Slave Device 4	AI	01960 ~ 01975
	Reserve	01976 ~ 01991
	Counter	01992 ~ 02023
Slave Device 5	AI	02024 ~ 02039
	Reserve	02040 ~ 02055
	Counter	02056 ~ 02087
Slave Device 6	AI	02088 ~ 02103
	Reserve	02104 ~ 02119
	Counter	02120 ~ 02151
Slave Device 7	AI	02152 ~ 02167
	Reserve	02168 ~ 02183
	Counter	02184 ~ 02215
Slave Device 8	AI	02216 ~ 02231
	Reserve	02232 ~ 02247

	Counter	02248 ~ 02279
Slave Device 9	AI	02280 ~ 02295
	Reserve	02296 ~ 02311
	Counter	02312 ~ 02343
Slave Device 10	AI	02344 ~ 02359
	Reserve	02360 ~ 02375
	Counter	02376 ~ 02407
RTU Device 3 (Station ID 3, 67, 131, ..., 962)		
Local Device	AI	02408 ~ 02423
	Reserve	02424 ~ 02439
	Counter	02440 ~ 02471
Slave Device 1	AI	02472 ~ 02487
	Reserve	02488 ~ 02503
	Counter	02504 ~ 02535
Slave Device 2	AI	02536 ~ 02551
	Reserve	02552 ~ 02567
	Counter	02568 ~ 02599
Slave Device 3	AI	02600 ~ 02615
	Reserve	02616 ~ 02631
	Counter	02632 ~ 02663
Slave Device 4	AI	02664 ~ 02679
	Reserve	02680 ~ 02695
	Counter	02696 ~ 02727
Slave Device 5	AI	02728 ~ 02743
	Reserve	02744 ~ 02759
	Counter	02760 ~ 02791
Slave Device 6	AI	02792 ~ 02807
	Reserve	02808 ~ 02823
	Counter	02824 ~ 02855
Slave Device 7	AI	02856 ~ 02871
	Reserve	02872 ~ 02887
	Counter	02888 ~ 02919
Slave Device 8	AI	02920 ~ 02935
	Reserve	02936 ~ 02951
	Counter	02952 ~ 02983
Slave Device 9	AI	02984 ~ 02999
	Reserve	03000 ~ 03015
	Counter	03016 ~ 03047

Slave Device 10	AI	03048 ~ 03063
	Reserve	03064 ~ 03079
	Counter	03080 ~ 03111
RTU Device 4 (Station ID 4, 68, 132, ..., 963)		
Local Device	AI	03112 ~ 03127
	Reserve	03128 ~ 03143
	Counter	03144 ~ 03175
Slave Device 1	AI	03176 ~ 03191
	Reserve	03192 ~ 03207
	Counter	03208 ~ 03239
Slave Device 2	AI	03240 ~ 03255
	Reserve	03256 ~ 03271
	Counter	03272 ~ 03303
Slave Device 3	AI	03304 ~ 03319
	Reserve	03320 ~ 03335
	Counter	03336 ~ 03367
Slave Device 4	AI	03368 ~ 03383
	Reserve	03384 ~ 03399
	Counter	03400 ~ 03431
Slave Device 5	AI	03432 ~ 03447
	Reserve	03448 ~ 03463
	Counter	03464 ~ 03495
Slave Device 6	AI	03496 ~ 03511
	Reserve	03512 ~ 03527
	Counter	03528 ~ 03559
Slave Device 7	AI	03560 ~ 03575
	Reserve	03576 ~ 03591
	Counter	03592 ~ 03623
Slave Device 8	AI	03624 ~ 03639
	Reserve	03640 ~ 03655
	Counter	03656 ~ 03687
Slave Device 9	AI	03688 ~ 03703
	Reserve	03704 ~ 03719
	Counter	03720 ~ 03751
Slave Device 10	AI	03752 ~ 03767
	Reserve	03768 ~ 03783
	Counter	03784 ~ 03815
.....		

RTU Device 64 (Station ID 64, 128, 192, ..., 1024)		
Local Device	AI	45352 ~ 45367
	Reserve	45368 ~ 45383
	Counter	45384 ~ 45415
Slave Device 1	AI	45416 ~ 45431
	Reserve	45432 ~ 45447
	Counter	45448 ~ 45479
Slave Device 2	AI	45480 ~ 45495
	Reserve	45496 ~ 45511
	Counter	45512 ~ 45543
Slave Device 3	AI	45544 ~ 45559
	Reserve	45560 ~ 45575
	Counter	45576 ~ 45607
Slave Device 4	AI	45608 ~ 45623
	Reserve	45624 ~ 45639
	Counter	45640 ~ 45671
Slave Device 5	AI	45672 ~ 45687
	Reserve	45688 ~ 45703
	Counter	45704 ~ 45735
Slave Device 6	AI	45736 ~ 45751
	Reserve	45752 ~ 45767
	Counter	45768 ~ 45799
Slave Device 7	AI	45800 ~ 45815
	Reserve	45816 ~ 45831
	Counter	45832 ~ 45863
Slave Device 8	AI	45864 ~ 45879
	Reserve	45880 ~ 45895
	Counter	45896 ~ 45927
Slave Device 9	AI	45928 ~ 45943
	Reserve	45944 ~ 45959
	Counter	45960 ~ 45991
Slave Device 10	AI	45992 ~ 46007
	Reserve	46008 ~ 46023
	Counter	46024 ~ 46055

AO Address	
Group 0 ~ 15	
Description	Address

RTU Device 1 (Station ID 1, 65, 129, ..., 960)	
Local Device	01000 ~ 01031
Slave Device 1	01064 ~ 01095
Slave Device 2	01128 ~ 01159
Slave Device 3	01192 ~ 01223
Slave Device 4	01256 ~ 01287
Slave Device 5	01320 ~ 01351
Slave Device 6	01384 ~ 01415
Slave Device 7	01448 ~ 01479
Slave Device 8	01512 ~ 01543
Slave Device 9	01576 ~ 01607
Slave Device 10	01640 ~ 01671
Reserve	01672 ~ 01703
RTU Device 2 (Station ID 2, 66, 130, ..., 961)	
Local Device	01704 ~ 01735
Slave Device 1	01768 ~ 01799
Slave Device 2	01832 ~ 01863
Slave Device 3	01896 ~ 01927
Slave Device 4	01960 ~ 01991
Slave Device 5	02024 ~ 02055
Slave Device 6	02088 ~ 02119
Slave Device 7	02152 ~ 02183
Slave Device 8	02216 ~ 02247
Slave Device 9	02280 ~ 02311
Slave Device 10	02344 ~ 02375
Reserve	02376 ~ 02407
RTU Device 3 (Station ID 3, 67, 131, ..., 962)	
Local Device	02408 ~ 02439
Slave Device 1	02472 ~ 02503
Slave Device 2	02536 ~ 02567
Slave Device 3	02600 ~ 02631
Slave Device 4	02664 ~ 02695
Slave Device 5	02728 ~ 02759
Slave Device 6	02792 ~ 02823
Slave Device 7	02856 ~ 02887
Slave Device 8	02920 ~ 02951
Slave Device 9	02984 ~ 03015
Slave Device 10	03048 ~ 03079

Reserve	03080 ~ 03111
RTU Device 4 (Station ID 4, 68, 132, ..., 963)	
Local Device	03112 ~ 03143
Slave Device 1	03176 ~ 03207
Slave Device 2	03240 ~ 03271
Slave Device 3	03304 ~ 03335
Slave Device 4	03368 ~ 03399
Slave Device 5	03432 ~ 03463
Slave Device 6	03496 ~ 03527
Slave Device 7	03560 ~ 03591
Slave Device 8	03624 ~ 03655
Slave Device 9	03688 ~ 03719
Slave Device 10	03752 ~ 03783
Reserve	03784 ~ 03815
.....	
RTU Device 64 (Station ID 64, 128, 192, ..., 1024)	
Local Device	45352 ~ 45383
Slave Device 1	45416 ~ 45447
Slave Device 2	45480 ~ 45511
Slave Device 3	45544 ~ 45575
Slave Device 4	45608 ~ 45639
Slave Device 5	45672 ~ 45703
Slave Device 6	45736 ~ 45767
Slave Device 7	45800 ~ 45831
Slave Device 8	45864 ~ 45895
Slave Device 9	45928 ~ 45959
Slave Device 10	45992 ~ 46023
Reserve	46024 ~ 46055

5.2 How Restful API Get & Post

GET /DeviceInfoQuery/DeviceNum

Responses:

Media type: **application/json**

Example Value:

```
{
  "DeviceNum": "5",
  "ModbusName": [
    "Local IO,MB_33",
    "Local IO,MB_33",
    "Local IO,MB_33",
    "Local IO,MB_33",
    "Local IO,MB_33"
  ],
  "ModbusNum": [2, 2, 2, 2, 2],
  "ModuleName": [
    "aa_0001",
    "aa_0002",
    "aa_0003",
    "aa_0004",
    "aa_0005"
  ],
  "ModuleNameLength": [7, 7, 7, 7, 7],
  "SlaveID": [
    "255,33",
    "255,33",
    "255,33",
    "255,33",
    "255,33"
  ],
  "StationID": [1, 2, 3, 4, 5],
  "Status": [
    "online",
    "online",
    "online",
    "online",
    "offline"
  ]
}
```

Value Parsed:

```
{
  "DeviceNum": "5",
  "ModbusName": [
    "Local IO,MB_33",
    "Local IO,MB_33",
    "Local IO,MB_33",
    "Local IO,MB_33",
    "Local IO,MB_33"
  ],
  "ModbusNum": [
    2,
    2,
    2,
    2,
    2
  ],
  "ModuleName": [
    "aa_0001",
    "aa_0002",
    "aa_0003",
    "aa_0004",
    "aa_0005"
  ],
  "ModuleNameLength": [
    7,
    7,
    7,
    7,
    7
  ]
}
```

```
▼ "SlaveID": [  
    "255,33",  
    "255,33",  
    "255,33",  
    "255,33",  
    "255,33"  
],  
▼ "StationID": [  
    1,  
    2,  
    3,  
    4,  
    5  
],  
▼ "Status": [  
    "online",  
    "online",  
    "online",  
    "online",  
    "offline"  
]  
}
```

GET	/DeviceInfoQuery/{Station ID, Slave ID}
-----	---

Responses:

Media type: **application/json**

Example Value:

```
{ "Status": "online", "DI": "1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0","DO": "0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0","AI": "16,32,48,64,80,96,112,128,16,32,48,64,80,96,112,128","AO": "1,2,3,4,5,6,7,8,1,2,3,4,5,6,7,8","Counter": "1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16","GPS": "null","ModbusName": "MB_33","DateTime": "2022V5V26 16:14:46" }
```

Value Parsed:

```
{
  "Status": "online",
  "DI": "1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0",
  "DO": "0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0",
  "AI": "16,32,48,64,80,96,112,128,16,32,48,64,80,96,112,128",
  "AO": "1,2,3,4,5,6,7,8,1,2,3,4,5,6,7,8",
  "Counter": "1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16",
  "GPS": "null",
  "ModbusName": "MB_33",
  "DateTime": "2022/5/26 16:14:46"
}
```


POST /DeviceInfoQuery/SetInfo

- SID // Integer
- MID // Integer
- Type // String
- Offset // Integer
- Value // String

PHP Example:

```
$dataArr = array("SID"=>(int)$_POST['pSid'], "MID"=>(int)$_POST['pMid'],
"Type"=>$_POST['pType'], "Offset"=>(int)$_POST['pOffset'], "Value"=>$_POST['pVal']);

$returnVal = CallAPI("POST", $_POST['postUrl'], json_encode($dataArr));
```

```
function CallAPI($method, $url, $data = false)
{
    $curl = curl_init();

    switch ($method)
    {
        case "POST":
            curl_setopt($curl, CURLOPT_POST, 1);

            if ($data)
                curl_setopt($curl, CURLOPT_POSTFIELDS, $data);
            break;
        case "PUT":
            curl_setopt($curl, CURLOPT_PUT, 1);
            break;
        default:
            if ($data)
                $url = sprintf("%s?%s", $url, http_build_query($data));
    }

    // Optional Authentication:
    curl_setopt($curl, CURLOPT_HTTPAUTH, CURLAUTH_BASIC);
    curl_setopt($curl, CURLOPT_USERPWD, "username:password");

    curl_setopt($curl, CURLOPT_URL, $url);
    curl_setopt($curl, CURLOPT_HTTPHEADER, array(
        'Content-Type: application/json',
    ));
    curl_setopt($curl, CURLOPT_RETURNTRANSFER, 1);

    $result = curl_exec($curl);

    curl_close($curl);

    return $result;
}
```

Responses:

```
{“Status”:”ok/failed”}
```

HTTP Methods : Post (By curl)

Query=>

```
curl -X POST -H "Content-Type: application/json" -d '{"SID": {Station ID},
"Mid": {Slave ID}, "Type": "{DO/DOCH/AOCH}", "Offset": {Value},
"Value": "{Value}"}' http://{IP}:{Port}/DeviceInfoQuery/SetInfo
```

EX:

```
curl -X POST -H "Content-Type: application/json" -d '{"SID": 1, "Mid":
255, "Type": "DO", "Offset": 0, "Value": "0,0,0,0"}'
http://127.0.0.1:7788/DeviceInfoQuery/SetInfo
curl -X POST -H "Content-Type: application/json" -d '{"SID": 1, "Mid":
255, "Type": "AOCH", "Offset": 0, "Value": "1234"}'
http://127.0.0.1:7788/DeviceInfoQuery/SetInfo
```

Response<=

```
{“Status”: “ok/failed”}
```

```
C:\Windows\system32\cmd.exe
D:\curl-7.65.3-win64-mingw\bin>curl -X POST -H "Content-Type: application/json"
-d '{"SID": 1, "Mid": 255, "Type": "DO", "Offset": 0, "Value": "0,0,0,0"}' http://127.0.0.1:7788/DeviceInfoQuery/SetInfo
{"Status": "ok"}
D:\curl-7.65.3-win64-mingw\bin>
```

Note: curl is used in command lines or scripts to transfer data. Users can down from the following URL: <https://curl.se/>

Parameters

Parameter	Description
Station ID	RTU Device ID (1~65535)
Slave ID	Modbus Device ID (Local: 255, Slave:0~254)
Value	DI: 0 Or 1
	DO: 0 Or 1
	AI: 0 ~ 65535
	AO: 0 ~ 65535

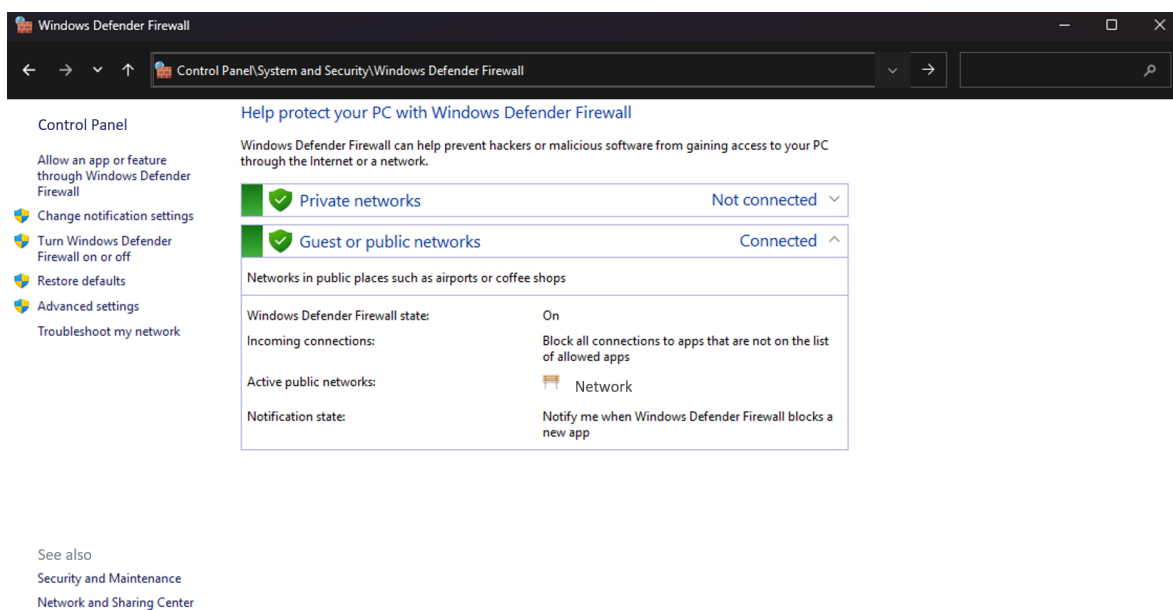
Chapter 6 Windows Defender Firewall Setting

Since the system includes a built-in Apache Web Server, enabling it will by default open port 443 for external connections. To reduce the risk of unauthorized access, it is strongly recommended to implement one of the following security measures:

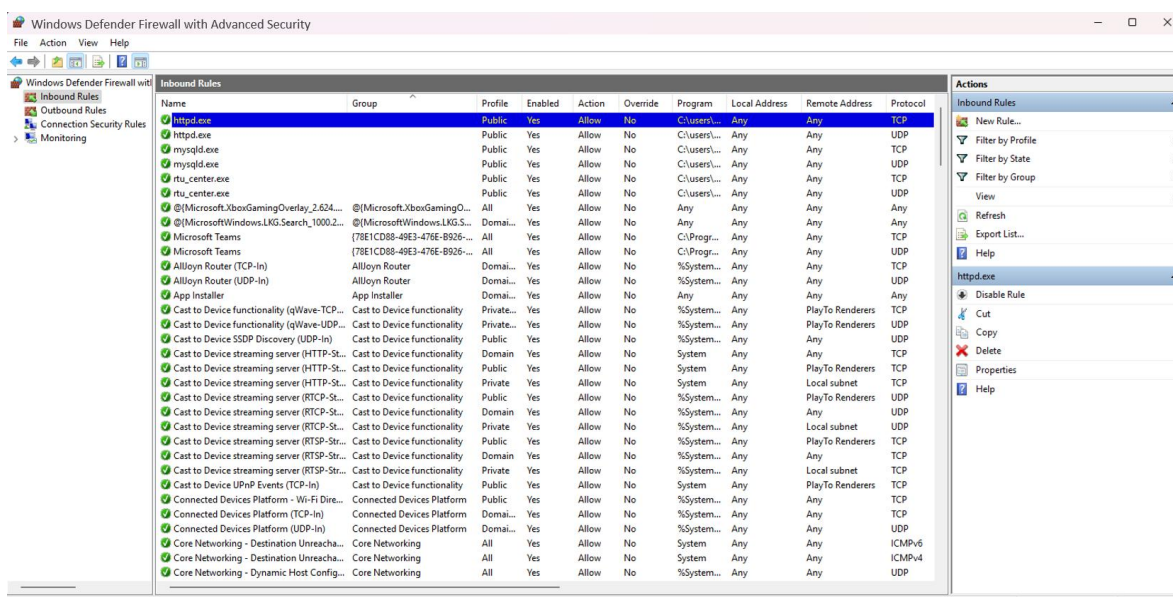
- Install a hardware firewall to control the source of incoming connections or
- Configure a whitelist in the operating system's firewall to allow access only from specified IP addresses

The following section demonstrates how to configure a firewall whitelist using Windows Firewall:

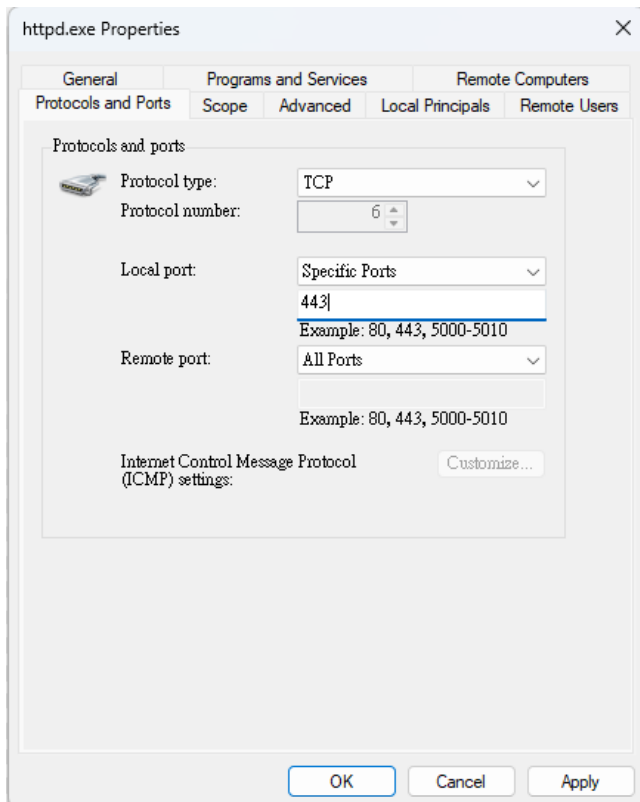
◆ Open Advanced Settings in Windows Defender Firewall



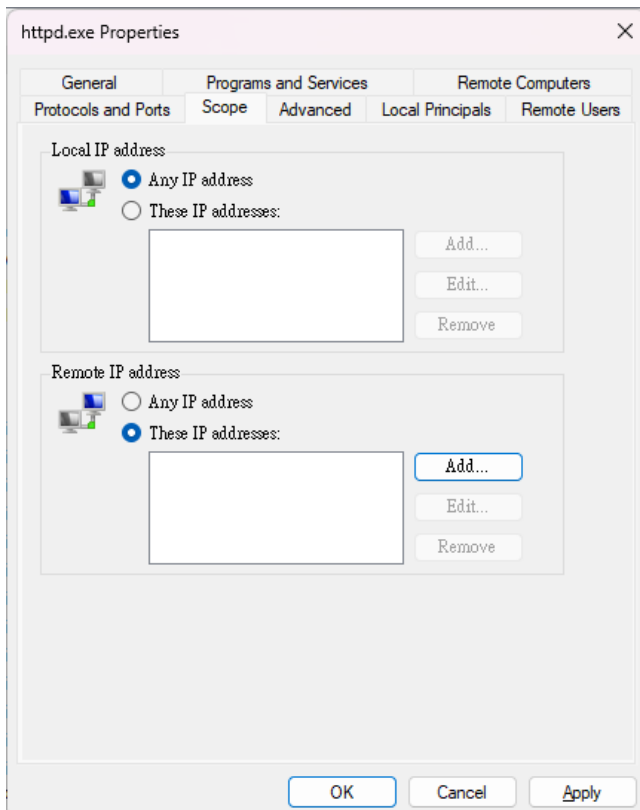
- ◆ In the left pane, select Inbound Rules and locate the rule associated with httpd.exe using TCP protocol. Double-click the rule to open its properties.



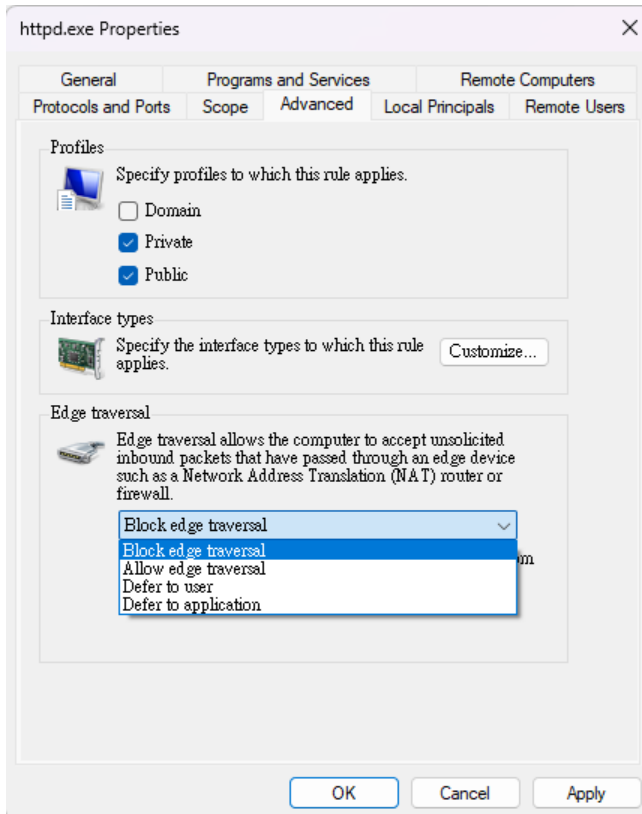
- ◆ In Protocols and Ports tab, change Local port to Specific Ports, then enter the port number what you setting in Web Page Port



- ◆ In Scope tab. Under the Remote IP address section, click Add and enter the IP address you want to allow



- ◆ In the Advanced tab, under the Profiles section, check both Private and Public, Then set Edge traversal to Block edge traversal, and click Apply to save the settings

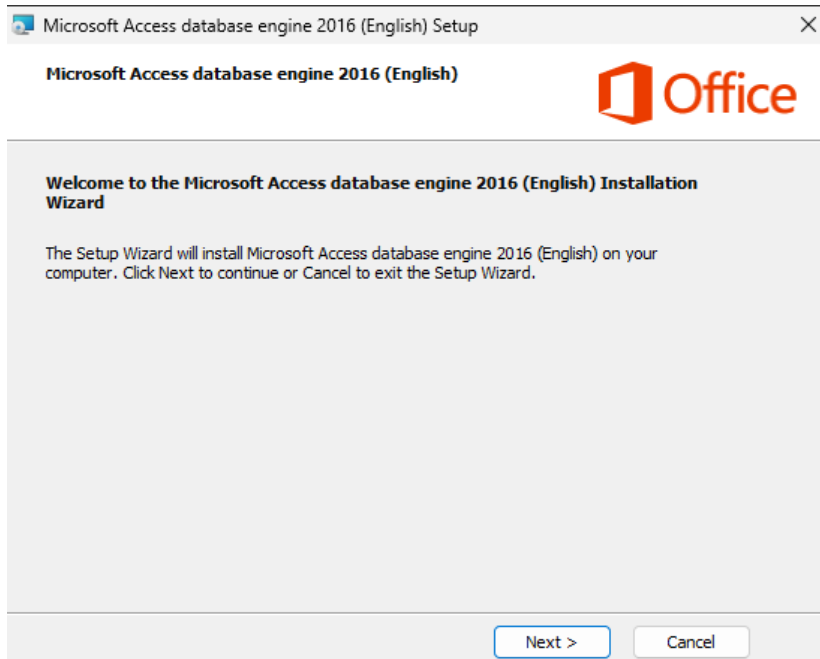


Chapter 7 RTU Web Operation

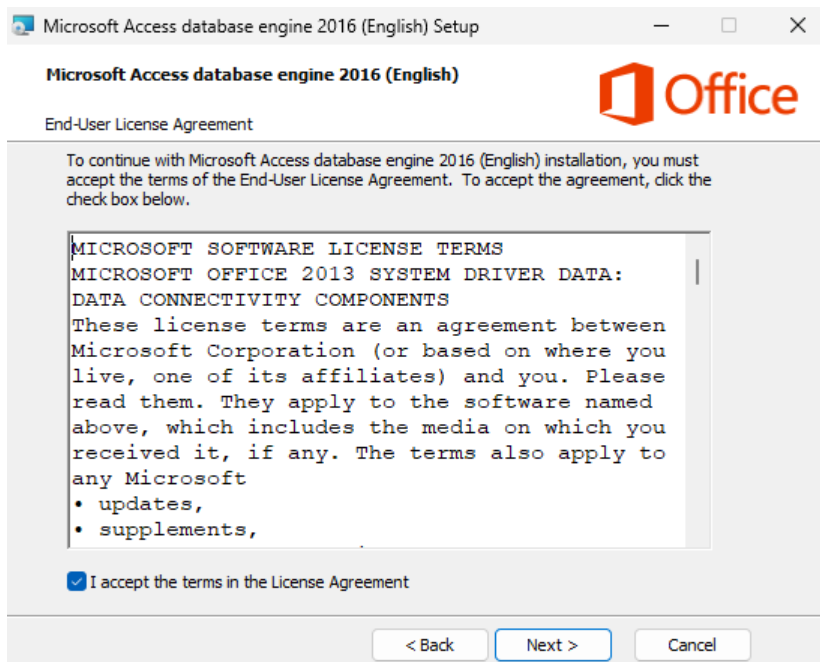
7.1 Preparation

Before using RTU Web, you must first install the ODBC Driver. The installation file can be found in the following path:RTU_Center_v1.xx/driver/accessdatabaseengine_X64.exe

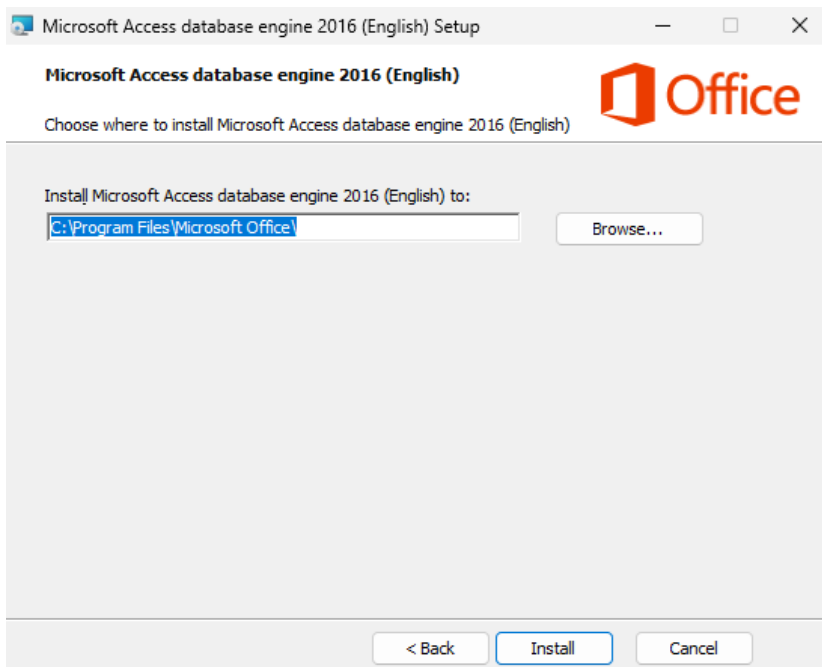
◆Click “Next” to the next step



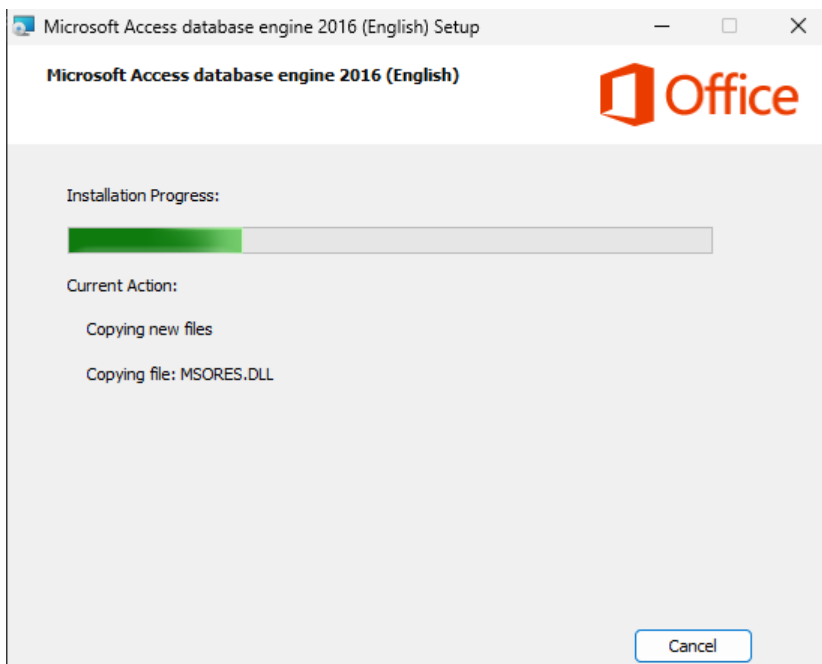
◆ Check “I agree” to accept the license terms. Then click “Install” to the next step.



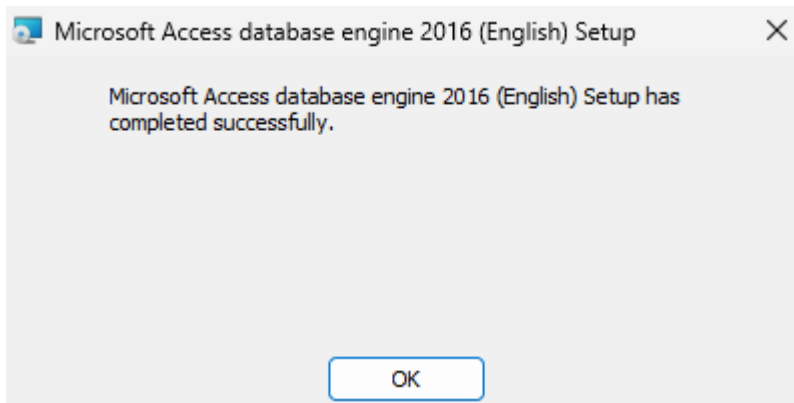
- ◆ Select the installation path. It is recommended to use the default installation path.



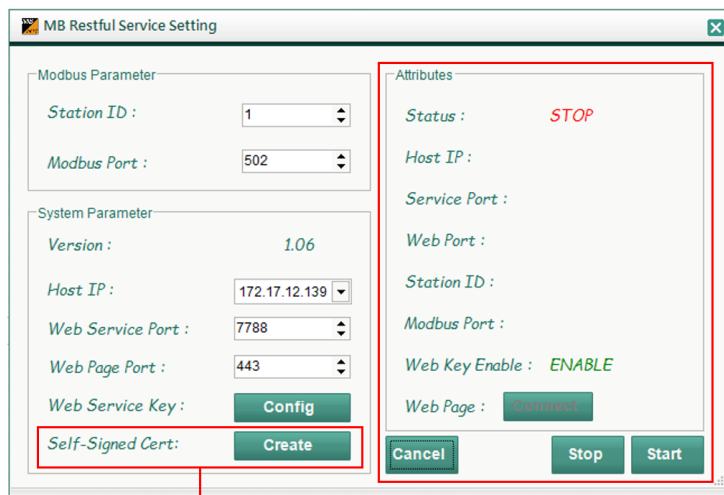
- ◆ Wait for the installation process to complete.



- ◆ Once the installation is finished, click “OK” to close the installation window.



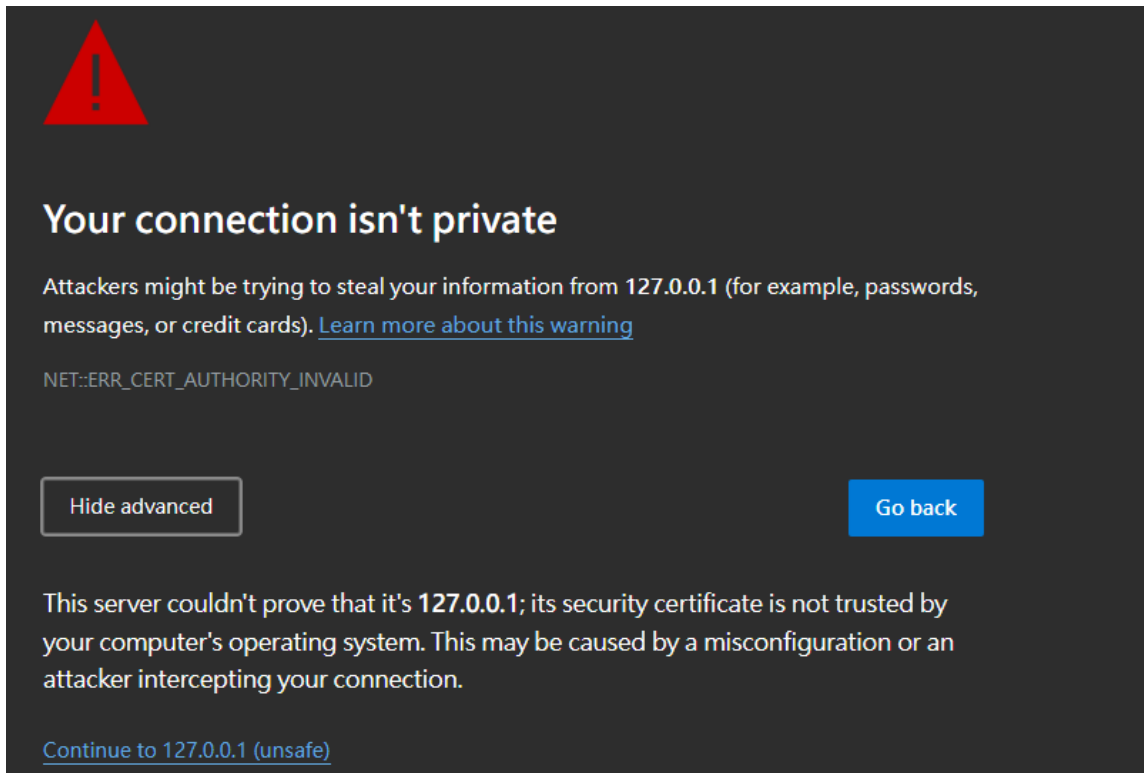
7.2 Access the Web Interface



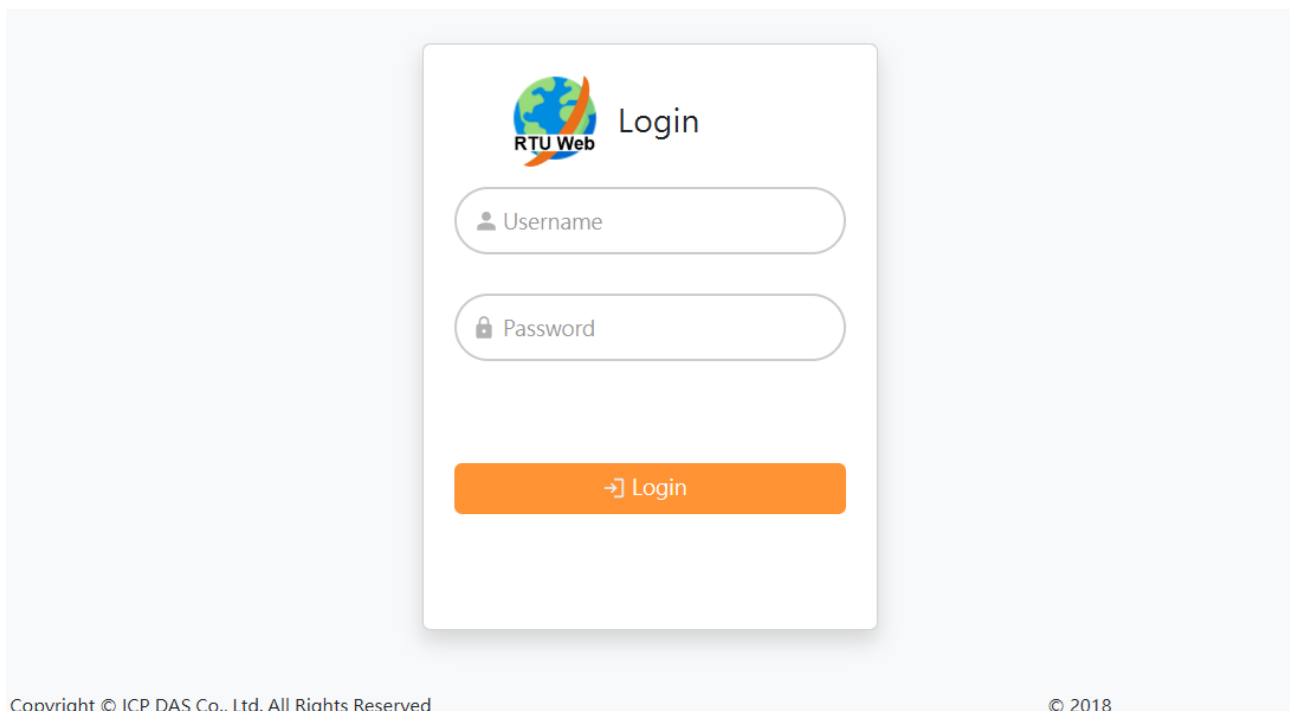
Control panel that includes Apache Server and MySQL Server

Generate a self-signed network certificate

- **Create:** a certificate will be generated and automatically registered to the **Trusted Root Certification Authorities** on the local machine. On remote computers, the certificate must be manually added to the **Trusted Root Certification Authorities**.
- **Connect:** When the server is started, this button will be enabled and you can connect to RTU Web
- **Start:** launch the server, that can access the web login interface via Host https://IP/rtu_web/.
- Upon first access, a message such as "**Your connection isn't private**" may appear due to the certificate. You will be able to download the certificate after logging in



- Click "Continue to IP Address (unsafe)" to proceed to the login page. The default **username** and **password** (**admin / 0000**)



- After successful login, a **Get Cert** button will appear at the bottom left. Click it to download the ssl.cer certificate file

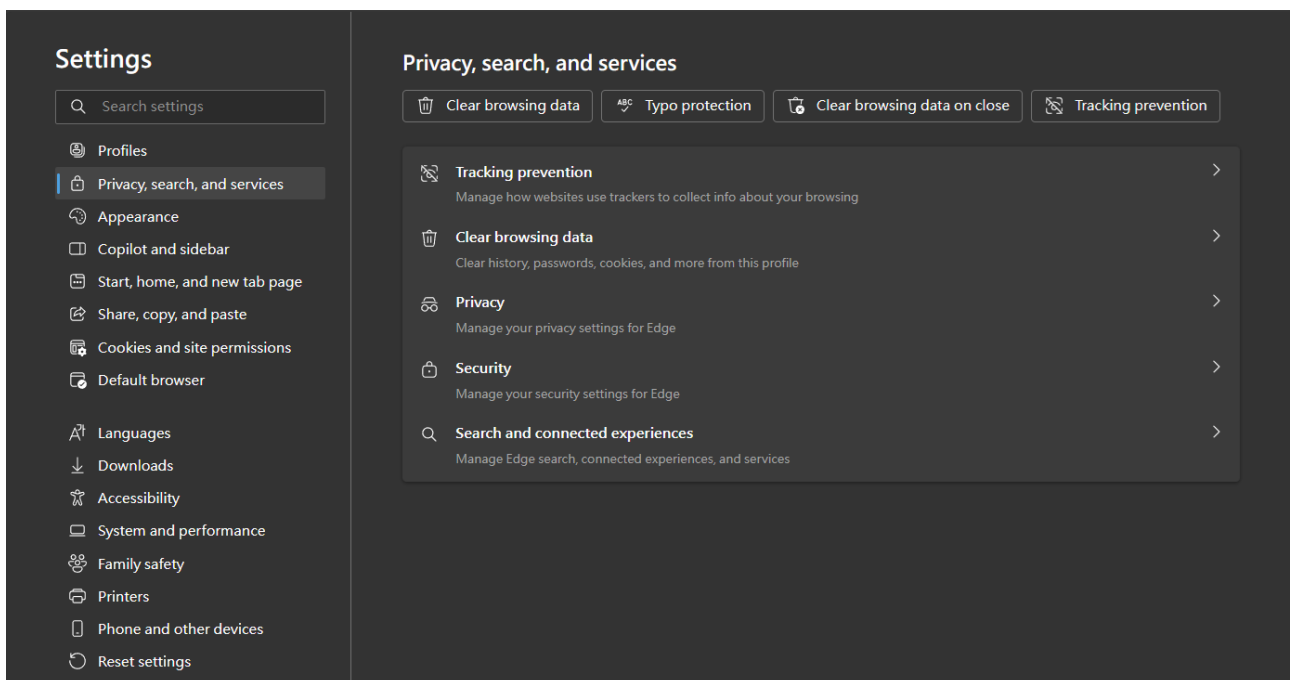


7.3 Importing the ssl.cer Certificate into the Computer

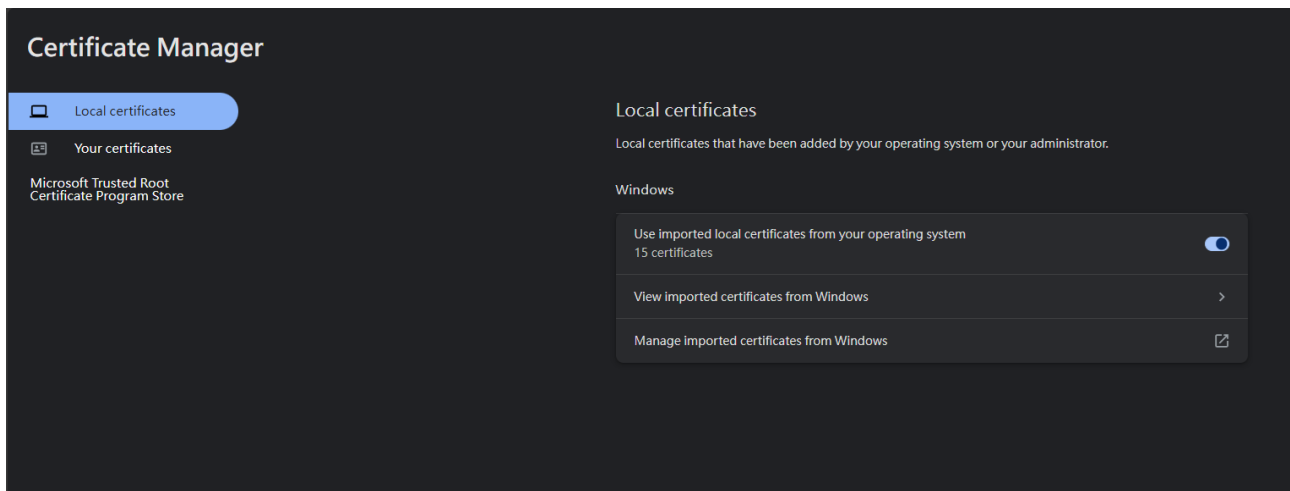
This section demonstrates how to manually add the downloaded ssl.cer file to the **Trusted Root Certification Authorities** using popular web browsers such as Microsoft Edge and Google Chrome.

- Microsoft Edge :

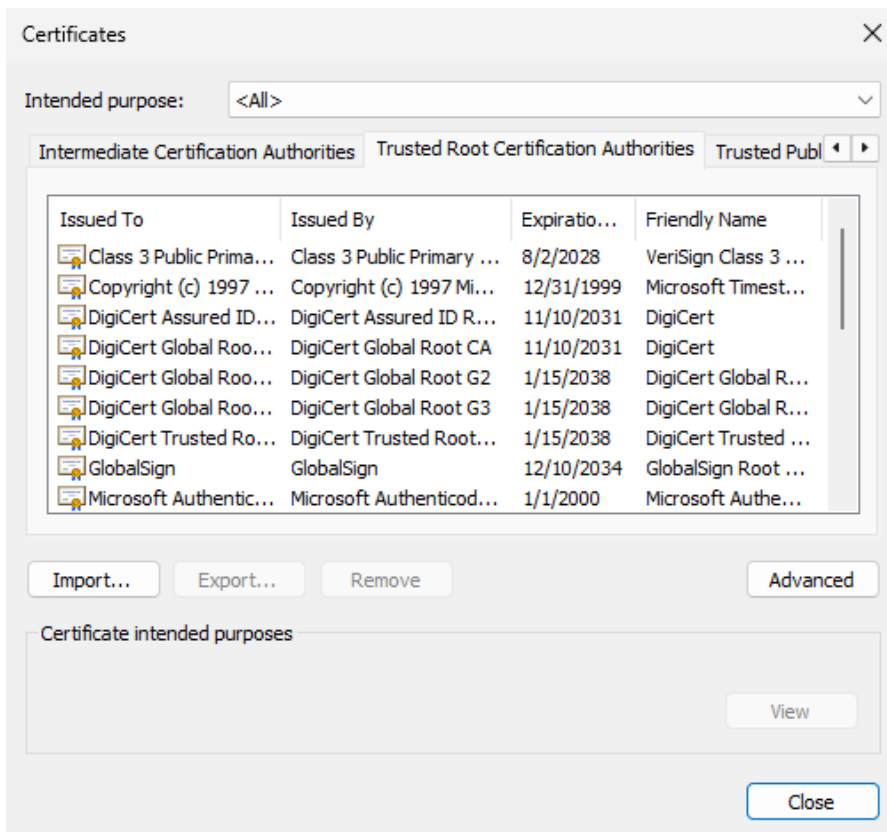
Open the settings and navigate to **Privacy, search, and services**.



Click on **Security**, then select **Manage certificates**.

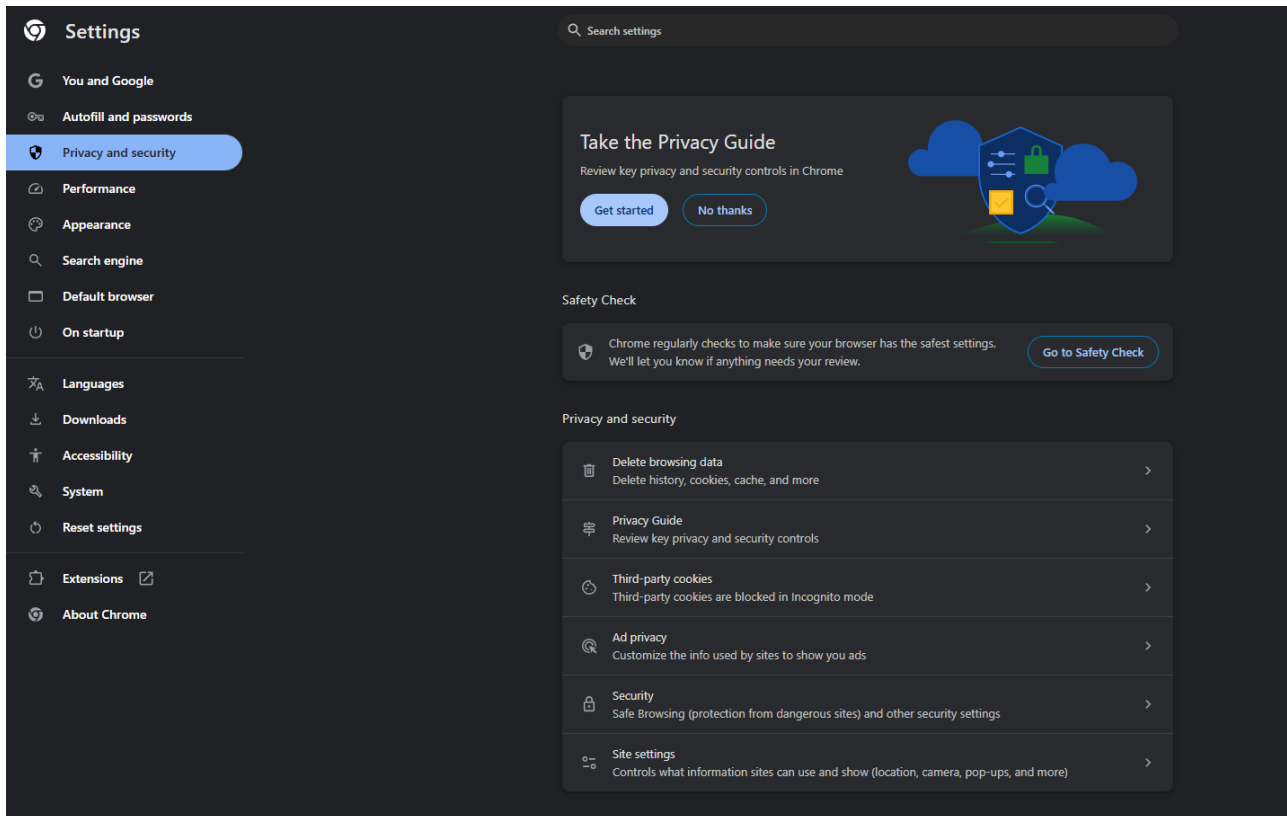


Click **Manage imported certificates from Windows**, choose **Trusted Root Certification Authorities**, then click the **Import** button to import the previously downloaded certificate

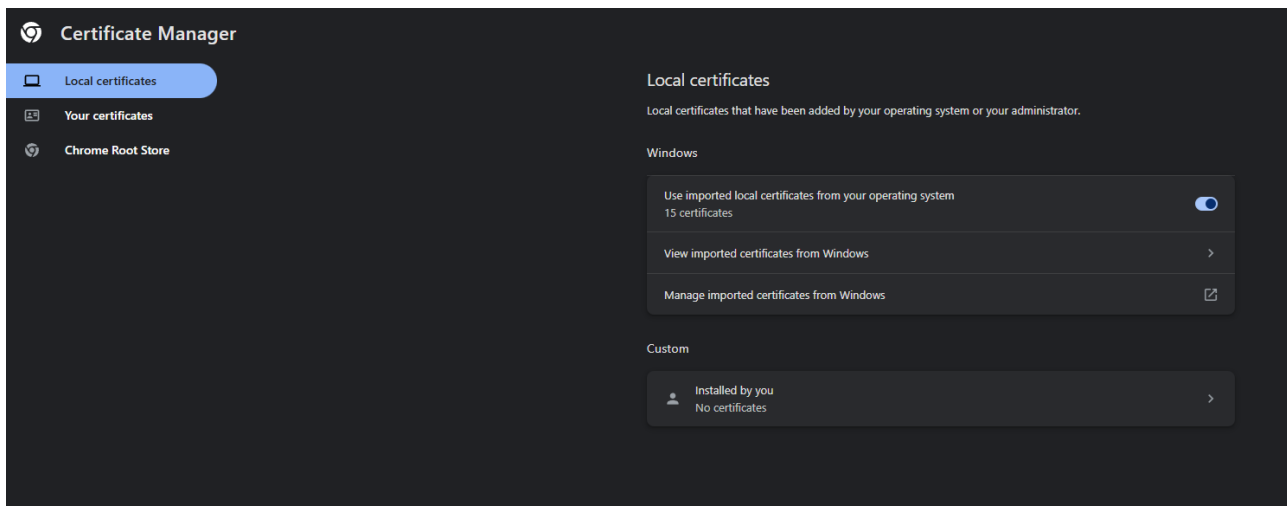


● Google Chrome :

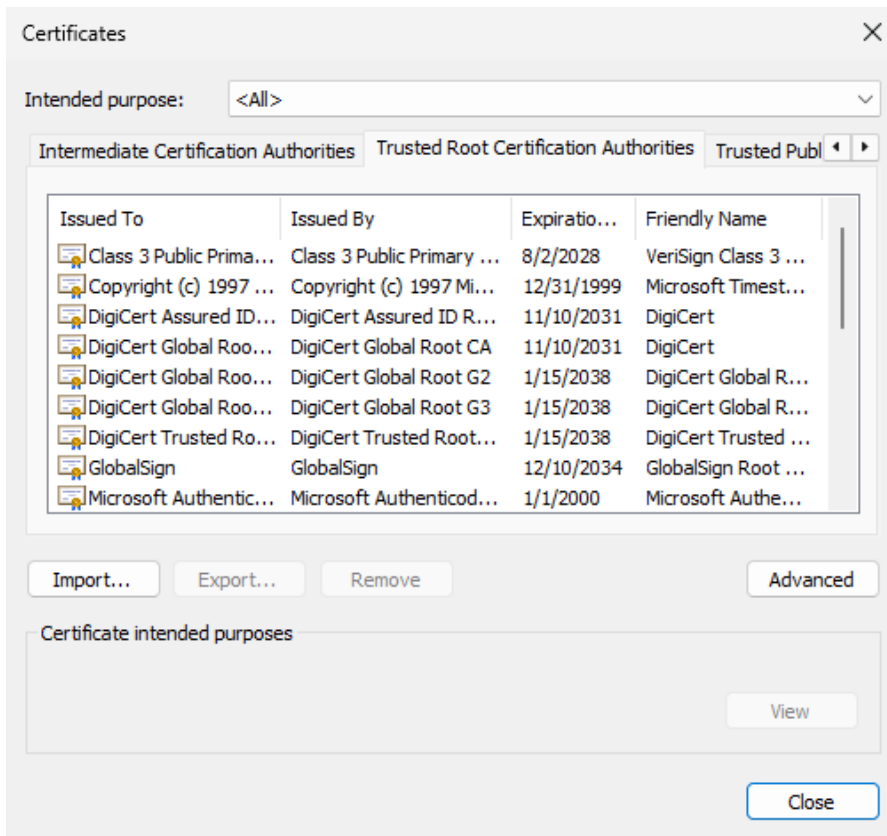
Open the settings and navigate to Privacy and security.



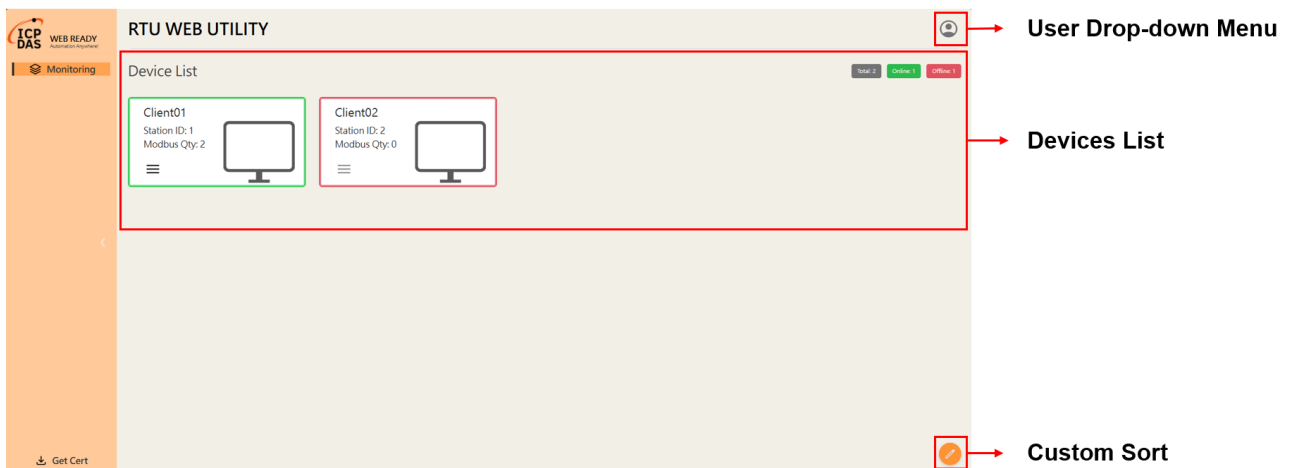
Click on **Security**, then select **Manage certificates**.



Click **Manage imported certificates from Windows**, choose **Trusted Root Certification Authorities**, then click the **Import** button to import the previously downloaded certificate.



7.4 Devices Management Interface



- **User Drop-down Menu:** Functions include changing the password, accessing the admin account interface, switching languages, and logging out.
- **Devices List:** Displays RTU devices that are either online or offline. A green border will appear when a successful connection to an RTU device is established.
- **Custom Sort:** Allows customization of the display order of RTU devices, including an option to restore the default order.

7.5 Station Information

Module Options

Detailed Information

- **Module Options:** Select the module in the station
- **Detailed Information:** It shows detailed information when you select one module

7.6 Accounts Management Interface

RTU WEB UTILITY

Account Management

Search Username: All ▼

ID	UserName	Manager	Write permissions	CreatAt	Actions
1	admin	☒	☒	2025-04-01	Edit

[Add Account](#) [Delete Account](#) [Previous Page](#) 第 1 頁 / 共 1 頁 [Next Page](#)

- **Search Username:** Enter a keyword to search for accounts.
- **Edit:** Edit the management and read/write permissions of a specific account.
- **Add Account:** Add a new user and assign permissions during account creation.
- **Delete Account:** Delete a user.

Version Record

Version	By	Date	Description
1.00	Yide	2010/02/12	
1.01	Yide	2010/03/28	
1.02	Yide	2010/06/02	
1.03	Bird	2011/11/02	
1.11	Selby	2021/04/23	New features: 1.Modbus Server 2.Restful API support
1.12	Ferris	2022/10/31	
1.13	Jackie	2024/12/25	Added “Configuration File Backup” and “Database Settings” instructions
1.21	Jackie	2025/06/03	Added 1.driver installation 2.firewall settings 3.RTU WEB 4.phpMyAdmin