UA-2800 User Manual

V1.4 (For FW V1.5.6.5)

IIoT Communication Server



UA-2841M

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Document Version Modify List:

Version	Description
V1.4	Date: 2026/10 1. Update HW spec. “Storage” to “32 GB microSD” (1.3, Appendix G)
V1.32	Date: 2026/09 1. Removed support for XV-board (Ch1, 5.2, 5.2.6, 5.4, 5.4.5, Appendix D)
V1.3	Date: 2026/07 (For FW v1.5.6.5) 1. Update software/hardware specifications in conjunction with DS (1.3) Date: 2026/05 (For FW v1.5.6.5) 2. Add *OpenVPN Client* function (1.2 Features, 1.3 SW Specifications) 3. Add two hardware specifications for COM Port (1.3 HD Specifications) 4. Fix Internal Module max. tags limits (1.3 SW Spec., 5.2.7) 5. Add Ping function was default unable (2.2.1) 6. Add *Project Restart Setting* function (Section 5.1.1) 7. Add new settings to IoT platform settings (5.3.1, 5.3.5) 8. Interface: Add “Data Logger” to all original database classes (5.5, 5.6) 9. Settings: Provide a Database Connection “Copy” option (5.5.6, 5.5.7) 10. [MySQL/MariaDB Data Logger] Add 3 setting options — Format Layout, Scaling Points, and Offline Data Recovery (5.5.7) 11. Add *5.5.8 PostgreSQL Data Logger* (interface includes the Connection Copy option) (+3 pages) 12. Add *5.6.4 PostgreSQL Data Logger:* RTU/TCP/MQTT (+3 pages) 13. Modify firmware update instructions via USB (6.3) 14. Appendix D: Additional Notes on Installing the XV511i 15. "Offline Data Recovery" moved to Appendix G.
V1.2	Date: 2026/03 2. Modify the mechanical design (Ch1, 2, 3.3, Appendix C)
V1.1	Date: 2025/12 1. Features & Specifications: Added dynamic blocklist and whitelist (1.2) 2. System Information: Added battery status (ch3, 5.1) 3. New function: System Log (5.1, 5.1.1, 5.1.5, 5.8.4) 4. New function: Network VPN Setting (5.1.3) 5. New function: Enhanced Account Password rules (5.1.4)

Version	Description
	6. New function: Firewall supports enabling ping response and whitelist (5.1.7) 7. Add section: EZ-UAQ Utility (5.1.8) 8. New function: Modbus RTU Module add [Write Timeout Retry] (5.2.1) 9. Update 5.3.1~5.3.4 System Architecture diagram 10. OPC UA add new Security Policy and certificate host IP (soft spec. 5.3.5) 11. Adjust MS SQL Data Log item order (5.5.6) 12. Advanced Setting > MS SQL add [Layout] [Use Scaling Value] items (5.5.6) 13. Modify SNMP (4.1, 5.4, 5.5, 5.4.13/5.4.14 add demo video, 5.5.3, 5.8.5) 14. Add Status description for I/O Status (5.7) 15. Add app. E. Import Modbus Module Profile and CSV File Field (E.1, E.2) 16. Add app. F. VPN Settings OpenVPN Client Profile Example (Appendix F)
V1.0	Date: 2024/11 1. Appendix C: change RUN LED to “ON” and waiting for “30 seconds”.
	Date: 2024/01. 1. Update software security function * OPC UA Server: add 3 items * MQTT Broker: support TLS version 1.3 * MQTT Client: support TLS version 1.3
	Date: 2023/07 First Version. UA-2800 has the following new functions comparing with the UA-2200/2500 series: 1. Serial port name: UA-2800 uses “**COM#**” (UA-2200/5200 uses “ttyO#”). 2. Storage: UA-2800 adds **SSD**, in addition to the Micro SD. 3. New function: **SNMP** communication protocol Add new Wizard **SNMP** example (CH4.1) Add new function **SNMP [Convert Setting]** (CH5.4.13~5.4.14) Add new function **SNMP Agent [Advanced Setting]** (CH5.5.4) Add new function **SNMP MIB File [File Setting]** (CH5.8.5) 4. New function: **RESTful [Advanced Setting]** Web communication service for easy access to device data. (CH5.5.3)

1. Introduction: UA-2800 IIoT Communication Server

This chapter introduces UA-2800 series and its functions, software/hardware specifications.

1.1 Introduction

UA-2800 Series is a series of **IIoT** (Industrial IoT) **Communication Server** for integrating the system and devices of IT and OT. UA features the IIoT Gateway function that allows users to access the remote I/O modules and controllers via Modbus TCP/RTU/ASCII, MQTT, and EtherNet/IP communication protocols. IIoT gateway function can also convert these I/O data to OPC UA or MQTT protocols for the needs of connecting with the MES, ERP, SCADA and Cloud services. Besides, UA features the Data Logger function that allows users to write the I/O data directly into the remote database, and save to the local file as the historical records. UA supports Cloud platform that can connect to Amazon AWS, Microsoft Azure or other Cloud platforms to send over the I/O data; and support Cloud logic service platform “IFTTT” which can connect many web APPs that allows users to receive first-hand notification messages through the most commonly used mobile APPs when an event triggered. UA Series enhances the networking and interoperability between IT and OT. Through UA series, users can easily deploy for Industrial IoT.

- **UA Series:**

	UA-2841M
UA-2800 Series	

1.2 Features

UA-2800 Series Features
• Simultaneous Writing for Remote Database and Local Data Logger • Offline Data Recovery Mechanism for Remote Database • Support to Enable OPC UA, MQTT, SNMP and RESTful at the Same Time • MQTT Broker (Including WebSocket) • Support a Complete Information Protection Mechanism - HTTPS, OpenVPN Client, SNMP v3, Communication Encryption, Dynamic Blocklist, Whitelist • IoT Cloud Platform Connection - Microsoft Azure, Amazon Web Services, IBM Cloud, Alibaba Cloud • IFTTT Logic Control Triggers the APP Notification Function • PID Logic Operation Function

● Function Features

■ Built-in OPC UA Server Service

Compliable with IEC 62541 Standard. Provides functions of Active Transmission, Transmission Security Encryption (SSL/TLS), User Authentication (X.509 Certificates / Account password), Communication Error Detection and Recovery, etc. to connect SCADA or OPC UA Clients. Allowed up to 8000 OPC UA tags and up to 20 sessions for the OPC UA Client connection.

■ Built-in MQTT Broker Service

MQTT Broker (non-SSL & SSL/WebSocket) inside and compliable with MQTT V.3.1.1 protocol. Provides functions of IoT Active M2M Transmission, QoS (Quality of Service), Retain Mechanism, Identity Verification, Encryption, Last Will, MQTT Client Drivers, etc. The MQTT Broker supports 200 MQTT Client or device connections, not to over 400.

■ Provide SNMP Agent function

UA-2841M series products allow IT practitioners to manage various workplaces through ICP DAS NMC-9181 or third-party SNMP software.

■ Provide RESTful API service interface (For UA-2800)

Provide the device data in JSON format, letting the user access it from the outside through the HTTP protocol. And UA support to execute OPC UA, MQTT and RESTful API communication at the same time.

■ Support to Enable OPC UA, MQTT, SNMP and RESTful at the Same Time

■ Support Ethernet and Serial Communication Modules

► Ethernet : UA supports Modbus TCP, MQTT , and ICP DAS EtherNet/IP modules
► Serial : UA supports Modbus RTU/ASCII modules (Max. 3 Serial ports)
► UA Web UI : users can quickly set up the modules and display the real-time I/O status.
► Max. modules supported by each connection:

Communication / UA Series	Ethernet			Serial
	MQTT	Modbus TCP	EtherNet/IP	Modbus RTU/ASCII
UA-2800	500	250	125	32 x 3(ports)
UA-2200/5200	200	100	50	32 x 3(ports)
UA-7200	200	100	50	32 x 1(port)

Sensor Data Upload with Information Security

In the era of cloud IoT, data transfer between sensors and cloud or graphical control platforms is a prerequisite for the operation of the IoT system, And enabling "sensor data upload" to be protected by security mechanisms is the priority of IoT systems. The HTTPS of the UA series protects web data from leakage while the "MQTT with SSL/TLS" and OPC UA Server features that the sensor's real-time data upload is transmitted through encryption to prevent theft and use by anyone. In addition, the UA-2841M supports SNMP (V3) agent (Enhanced security for SNMP protocol) information security protocol. Through the Firewall protection and Protocol data encryption mechanism provided by UA, it can meet the user's needs when building the IoT system.

Save I/O Data Directly into Remote Database & Local Side LOG File

UA series can collect devices I/O status and then directly save into remote side SQL Database. UA series can also save I/O data into a CSV log file on the local side. Furthermore, users can set the time interval of which CSV file to generate and divide on the local side.

Offline Data Recovery Mechanism

For general data collection, the sensor data will be sent to the control center and imported into the Database at cloud. But when the network experience a disconnection, the data transmitted during the offline period will be lost. UA Series supports the Offline Data Recovery mechanism. When experiences network disconnection, all data will be stored in the SD cards in UA Series. And when the network return to normal status, the data stored in SD card will be re-sent to UA, and imported into Database to ensure the integrity of historical data.

Support Cloud Platforms Connection

UA can actively connect to Amazon AWS, Microsoft Azure or other IoT Cloud platforms to send over the I/O data.

Support Logic Control IFTTT to Send Event Messages to LINE... APPs

UA can combine the IFTTT cloud platform functions and send messages over 460 Web APPs (such as Line, Twitter, etc.) when the special events occur. The device I/O change can be set to trigger the event of the IFTTT cloud service, and the IFTTT logic control (If This, Then That) will immediately let the pre-set Web Service (Such as LINE) send a message to one user or group to handle the event immediately.

Provide Function Wizard Web UI for easily step-by-step setup

The Web UI of UA provides a wizard-like “Step Box” in the Function Wizard area to guide user step-by-step to complete the project or function. It provides many items for setting the Communication Conversion, Azure Connecting, Function Configuration, PID Operation, Condition Trigger the APP Message Notification, and will be more. It will help users to set projects easily and quickly.

Provide Internal Module that can create virtual variables as an intermediary for reading, writing, or data exchange

Provides UA server settings for the Internal variables of the Internal virtual module, allowing two OPC UA Clients that cannot directly exchange data to communicate with each other and convert data messages through the Internal variables of the Internal module.

* Create internal variables: 8 Internal virtual modules can be set, each module has 100 Internal variables (points).

* Communication protocol conversion: Provides Internal to OPC UA Server communication conversion.

1.3 Specifications

Hardware Specifications: UA-2800 Series

Model	UA-2841M
Main Unit	
CPU	ARM Quad-Core 1.6 GHz
System Memory	2 GB DDR4 SDRAM
Storage	8 GB eMMC microSD socket with one 32 GB microSD card (supports up to 32 GB microSDHC card or 2 TB microSDXC card)
Non-Volatile Memory	64 KB FRAM 128 KB MRAM
Real Time Clock	Provide second, minute, hour, date, day of week, month, year
Display	
Signal	VGA (Analog RGB), reserved
LED Indicators	
Status	1 x PWR (Power), 1 x RUN (Running), 3 x User Defined LEDs
COM Ports	
Console Port	RS-232 (RxD, TxD and GND); Non-isolated
COM 2	RS-232 (RxD, TxD and GND); Non-isolated
COM 3	RS-485 (Data+, Data-); 2500 VDC isolated
COM 4	RS-485 (Data+, Data-); 2500 VDC isolated
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Data Format	7N1, 7E1, 7O1, 7N2, 7E2, 7O2, 8N1, 8E1, 8O1, 8N2, 8E2, 8O2 (Among which, Modbus RTU is available in: 8N1, 8E1, 8O1, 8N2)
HMI	
Rotary Switch	1 x 10 Position (0 ~ 9)
Ethernet	
Ports	2 x RJ-45, 10/100/1000 Base-TX (Auto-negotiating, Auto MDI/MDI-X, LED indicators)
USB	
Connector	2 x 2.0 host
Power	

Input Range	+12 ~ +48 VDC
Consumption	10 W
Mechanical	
Casing	Metal
Dimensions (mm)	46 x 164 x 129 (W x L x H)
Installation	DIN-Rail Mounting
Environment	
Operating Temperature	-25 ~ +70°C
Storage Temperature	-40 ~ +80°C
Humidity	10 ~ 90% RH (non-condensing)

Software Specifications: UA-2800 Series

Model	UA-2841M
OS	
Linux	Linux Kernel 5.10.72
Protocol (Note 1, Note 2)	
OPC UA Server	● OPC Unified Architecture: 1.02 ● Core Server Facet ● Data Access Server Facet ● Method Server Facet ● UA-TCP UA-SC UA Binary ● User Authentication: Username/Password, X.509 Certificate ● Security Policy: > None > Basic128Rsa15 (Sign / Sign & Encrypt) > Basic256 (Sign / Sign & Encrypt) > Basic256Sha256 (Sign / Sign & Encrypt) > Aes128_Sha256_RsaOaep (Sign / Sign & Encrypt) > Aes256_Sha256_RsaPss (Sign / Sign & Encrypt) ● Recommend Max. 50 Client Sessions, and Max. 8000 Tags (Note 1). (Without using encrypted communication)
MQTT Broker	Supports the MQTT v3.1.1 protocol, with message transmission and distribution management. Provides standard MQTT and WebSocket communication, using TLS v1.2 encryption for security. Recommend client/device connections to 500, with a max of 2100. (Note 1)
MQTT Client	Connects to an MQTT Broker to read or control devices supporting the MQTT communication protocol. Enables external systems to read or control devices connected to the UA via MQTT communication. Supports MQTT v3.1.1 and TLS v1.2 encryption for security. Recommended max. 500 connections. (Note 1)
Modbus TCP Master	To read or control the devices that support standard Modbus TCP Slave protocol. Max. 250 modules. (Note 1)
Modbus RTU/ASCII Master	A max. of 3 ports: COM2, COM3, COM4 to connect other Modbus RTU Slave devices (e.g. M-7000). Recommend no more than 32 devices per port (32*3 port=96) for better communication quality. (Note 1)
EtherNet/IP Scanner	Support connect EIP-2000 series modules of ICP DAS. Recommend no more than 125 devices per UA.(Note 1)

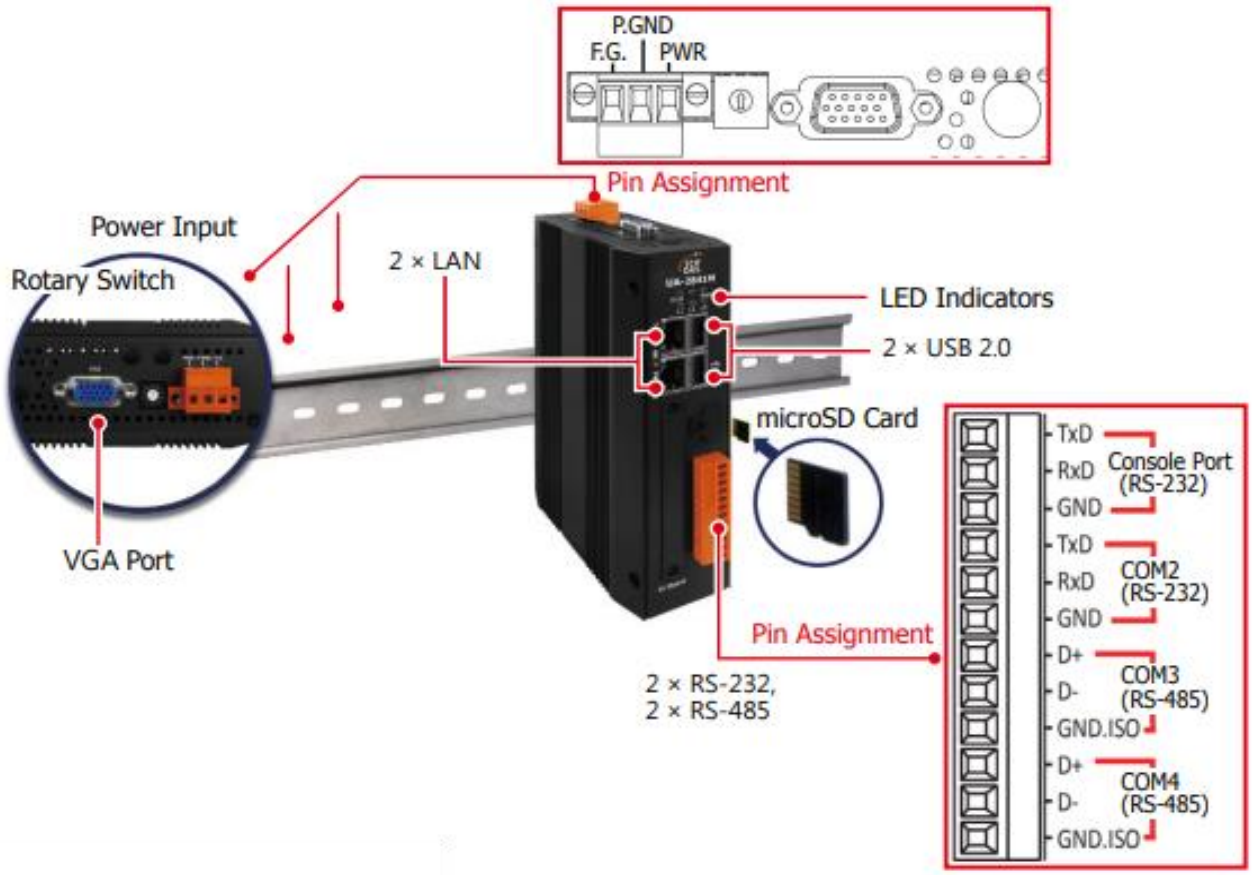
SNMP Agent	Provide SNMP Agent service, for users to external access the devices connected with the UA through the SNMP communication. Supports V1, V2c, and V3 communication. Max. 10 read commands and 10 write commands at the same time.
VPN	Support OpenVPN Client
RESTful	Provide RESTful API service, for users to external access the devices connected with the UA through the HTTP communication. Max. 20 read commands and 1 write command at the same time.
Firewall	
Whitelist	List IP addresses and ranges allowed through the firewall to prevent unauthorized access and system attacks.
Dynamic Blocklist	Set conditions to monitor the connection status of the service port. When the external IP connections exceed the condition setting value, the dynamic blocklist will automatically block the subsequent connection of the IP to avoid a large number of abnormal connections from blocking network services and protect system stability.
Data Logger (Note 2)	
Local Data Logger	Record I/O data, and save to the local MicroSD card in CSV format. Support Modbus RTU module (Master), Modbus TCP module (Master)
Remote Database	Record I/O data, and send to the remote database of MS SQL / MySQL / MariaDB / PostgreSQL. Support max. 3 database connections, with a max. 1000 Tags. Support Modbus RTU module (Master), Modbus TCP module (Master), and MQTT module. The same I/O tag can only be assigned to one database connection of the same type.
Function (Note 2)	
PID Function	Combine the remote I/O devices for the PID logic control system.
Internal Module	Can create virtual variables as an intermediary for reading, writing, or data exchange. Max. 3000 internal variables (Tags)
IoT Service Integration (Note 2)	
Cloud Connection Supported	MQTT Service can connect to Microsoft Azure, Amazon Web Services, IBM Cloud, ThingSpeak
IFTTT	Support Logic event sending to IFTTT Web platform. IFTTT Logic Trigger APP (Line, Twitter, Gmail ...)

Note 1: The specifications in the table are the maximum number of connections or usage when using a single Protocol.

Note 2: When using multiple Protocol functions, the user needs to control the device number to **under 80%** of the CPU usage. Please refer to the CPU Usage of the UA Web UI.

1.4 Appearance / Pin Assignment

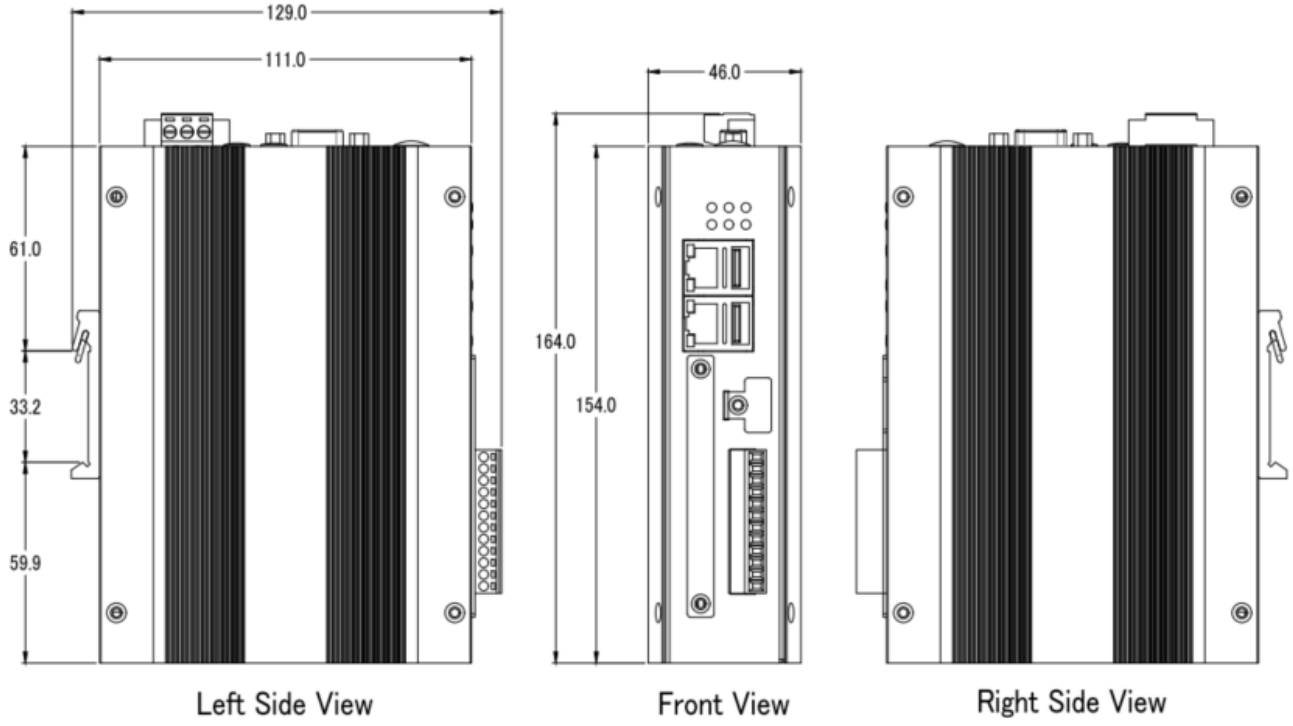
UA-2841M



1.5 Dimensions

UA-2841M

Unit: mm



2. Quick Start 1: Hardware/Network Connection

This chapter describes the devices hardware connection, network connection and quick setting for the UA Controller, and how to connect to the UA controller web-based UI via a browser. Nest chapter will set up web functions, and complete an example project.

2.1 Hardware Connection

This section describes the hardware wiring and connection for the UA Controller.

2.1.1 Preparations for Devices

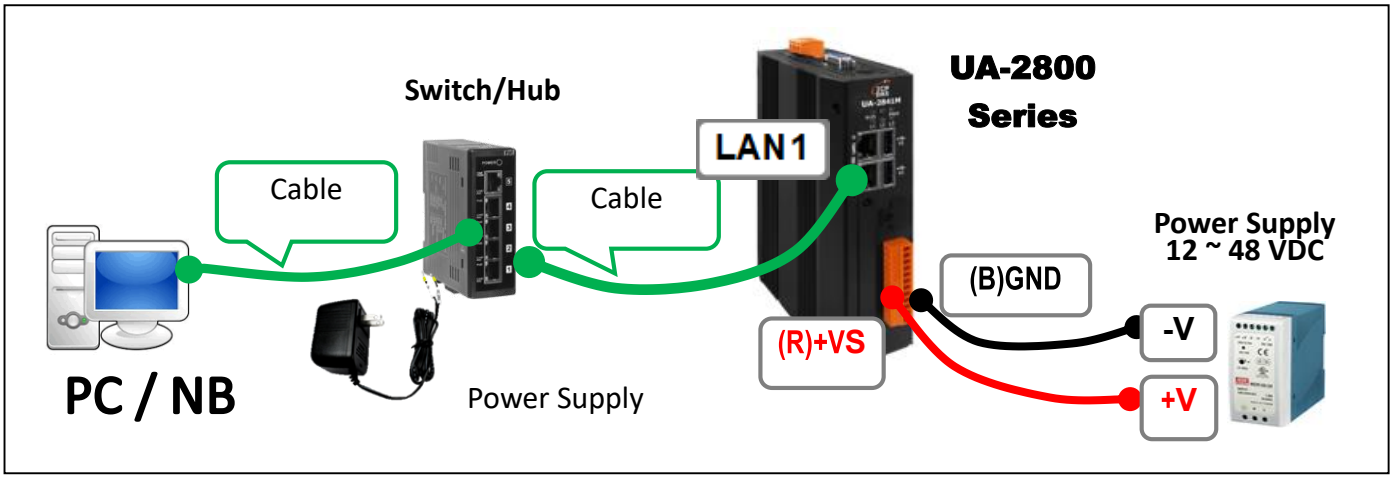
In addition to the UA series controllers (Ex: UA-2841M), please prepare the following:

1. **PC/NB**: Can connect to the network and set the network
2. **Ethernet Hub or Switch:** Ex: NS-205A, (or PoE Switch NSM-208PSE)
3. **Power Supply: +12 ~ +48 VDC** (Ex: MDR-60-24)

2.1.2 Hardware Wiring

Connect the UA-2800 with the **LAN1** RJ-45 Ethernet port to an Ethernet hub/switch and PC. You can also link directly the UA to PC with an Ethernet cable.

After power is connected, please [**wait 1 minute**] for UA start-up procedure. When the "RUN/PWR" light ("RUN" "PWR" lights for UA-2800) starts flashing, it represents the boot is complete.



2.2 Network Connection

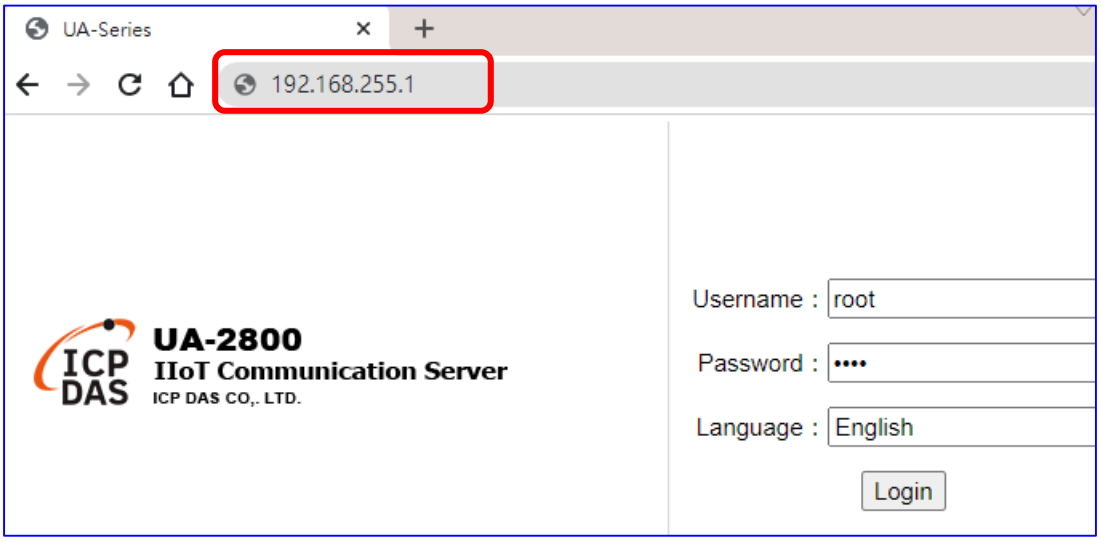
This section introduces how to connect to the UA Web User Interface (UA Web UI).
Setting new UA or the new user please uses the method A in the Chapter 2.2.1 (The same method as the “UA Series Quick Start” manual).
Other users please see the following introductions to choose **method B(Sec.2.2.2)** or **C**.

The methods to login the UA series Web UI:

A. Using Factory Default Setting: **Suitable for setting a new UA controller and the PC network IP is not in the same domain with UA.** This method changes the PC network IP to be the same domain with the UA factory default network IP to login the Web UI. (Refer Section 2.2.1)

B. Using Software Utility: **Suitable for quick setting when many UA servers are in the network but the IP are unknown.** UA Series provides a free software utility for auto searching UA controllers in the network and can quick jump to the login web page of UA. (Refer Section 2.2.2)

C. Using IP Address: **Suitable for the UA has a fixed IP and in the same domain with the PC.** If the UA has a fixed IP and in the same domain with the PC, users can directly enter the IP in the address bar of a web browser and log in to the Web UI of the UA.



2.2.1 Connection by Factory Default Settings (For New UA)

The factory default settings of the UA series are as the following table:

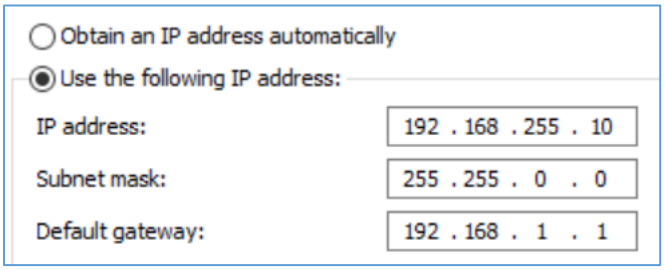
Factory Default Settings of UA Series			
Network	**IP**	**LAN1: 192.168.255.1 LAN2: 10.0.0.1**	Assign UA a new IP setting according to your case. **UA-2800** series uses **LAN1** to connect PC.
	Mask	**255.255.0.0**	
	Gateway	**LAN1: 192.168.1.1 LAN2: 10.168.1.1**	
Web UI Account	**Username**	**root**	**After login, change the default username/password to use other functions.**
	Password	**root**	

The Ping function is disabled by default.
To use Ping, log in to the UI and enable it.

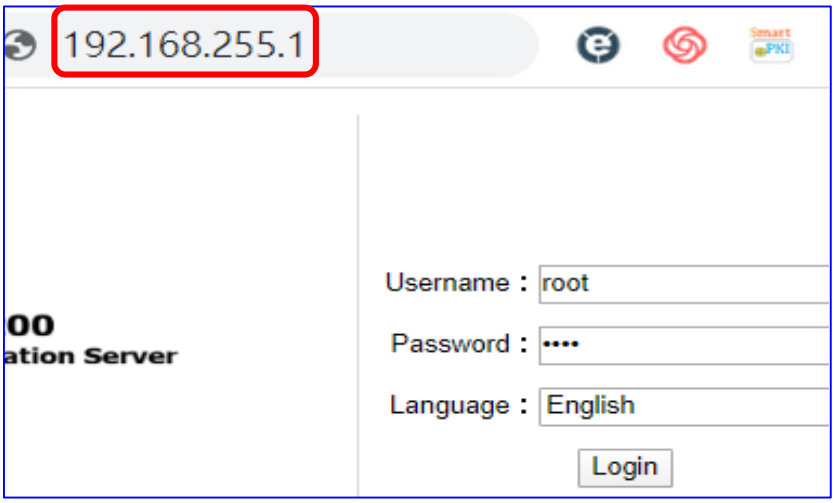
[Steps]

1. Change **PC's Network and Internet IP setting** to be **in the same network with UA**.
   Note. Write down the PC's original IP settings before modifying. And change PC settings back after setting UA.
   EX:

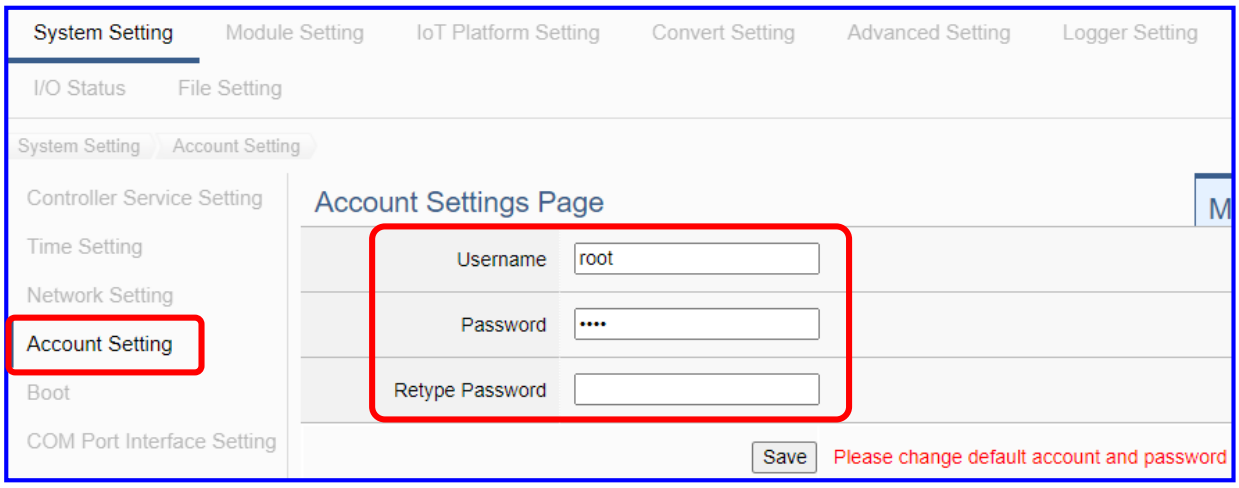
Example: PC's IP Setting Example	
IP address	**192.168.255.10**
Subnet mask	**255.255.0.0**
Default gateway	**192.168.1.1**



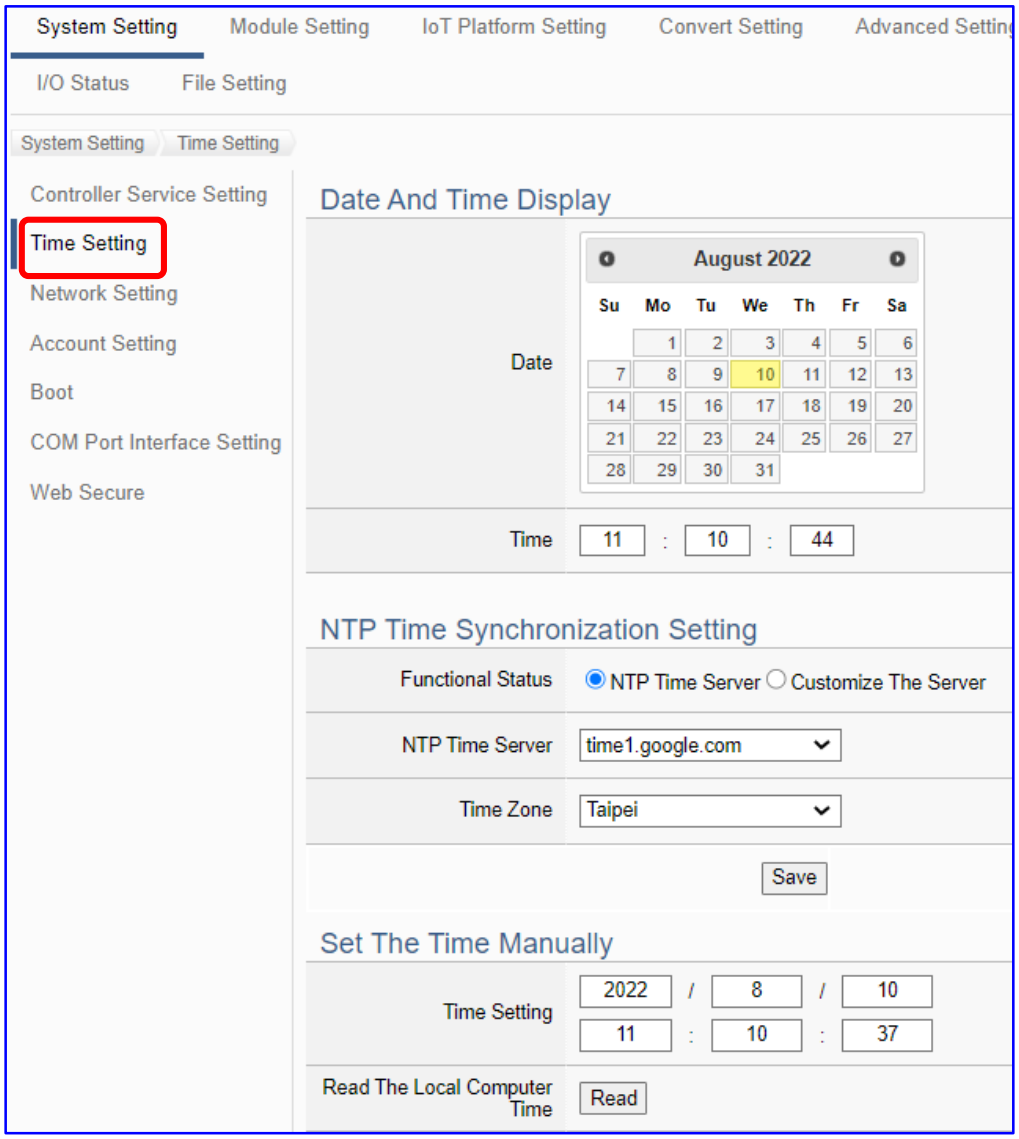
2. Make sure the UA and PC is connecting through Ethernet. And then open a PC side browser (Ex: Chrome, IE…). Type **UA's** IP **http://192.168.255.1** in the URL address. Use default Web UI username/password **root/root** to login the system.



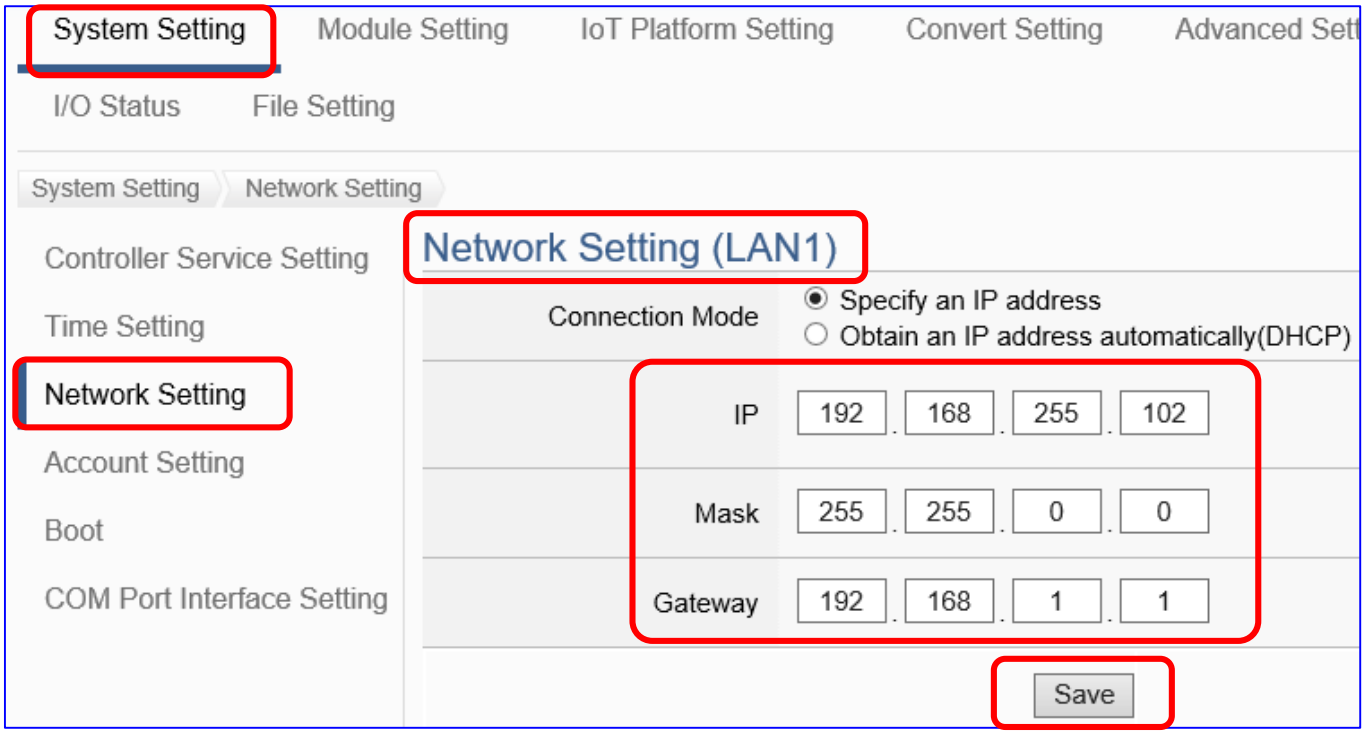
3. Click 【System Setting】➔【**Account Setting**】to change the **default Username / Password** to use other functions (Functions will be gray before changed).



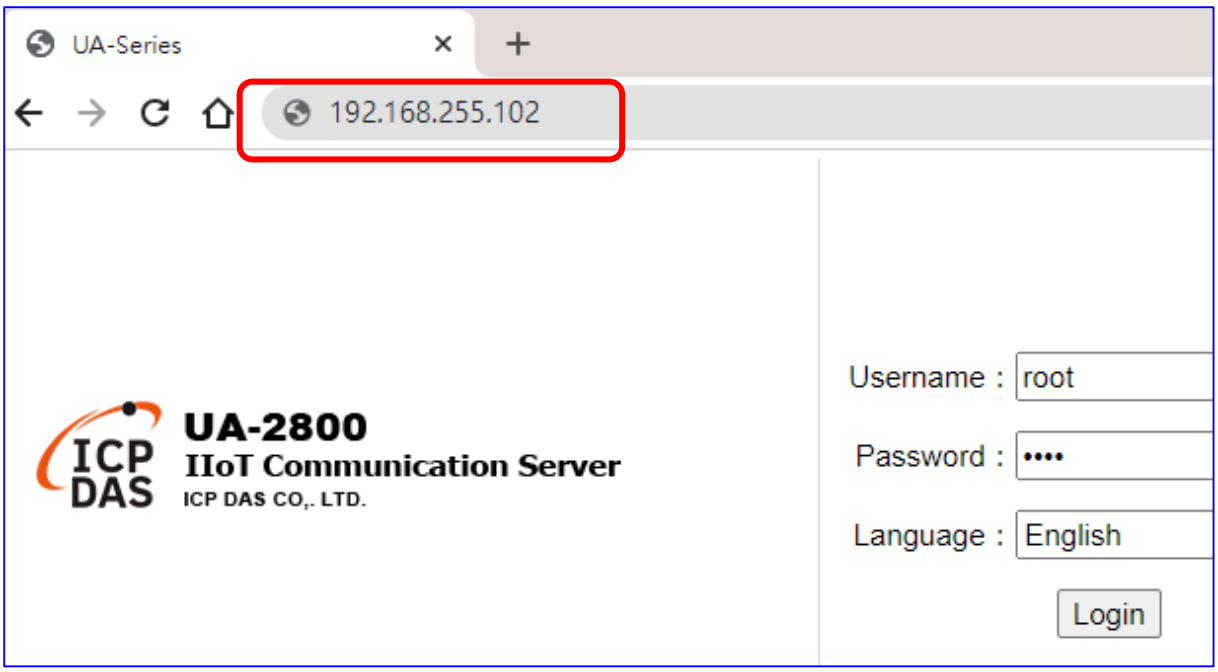
4. Click 【System Setting】➔【**Time Setting**】, check if the UA **time** is correct. If not, **modify** or set **Time Synchronization**.



5. Click【System Setting】➔【**Network Setting**】>【Network Setting(LAN1)】to change the IP setting by user network.



6. Save the IP setting, restore the PC original IP settings, and type the **new IP** in the browser to login the Web UI of UA series. Then configure user's UA project.



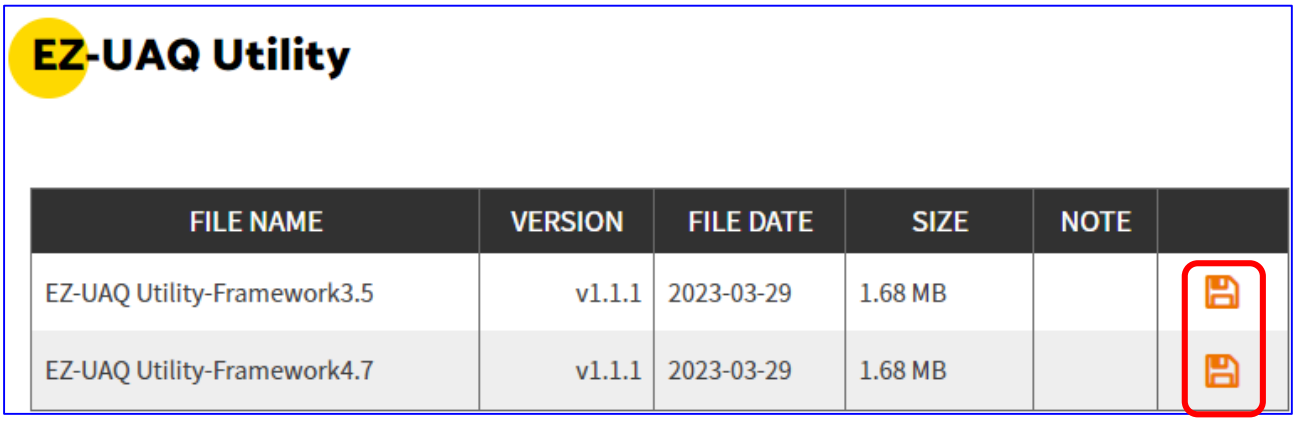
2.2.2 Connection by Utility Searching

Setting new UA or the new user please uses the method in the Chapter 2.2.1. (A)
If the UA has a fixed IP and in the same domain as the PC, users can directly enter the IP in the address bar of a web browser and log in to the Web UI of the UA. (C)

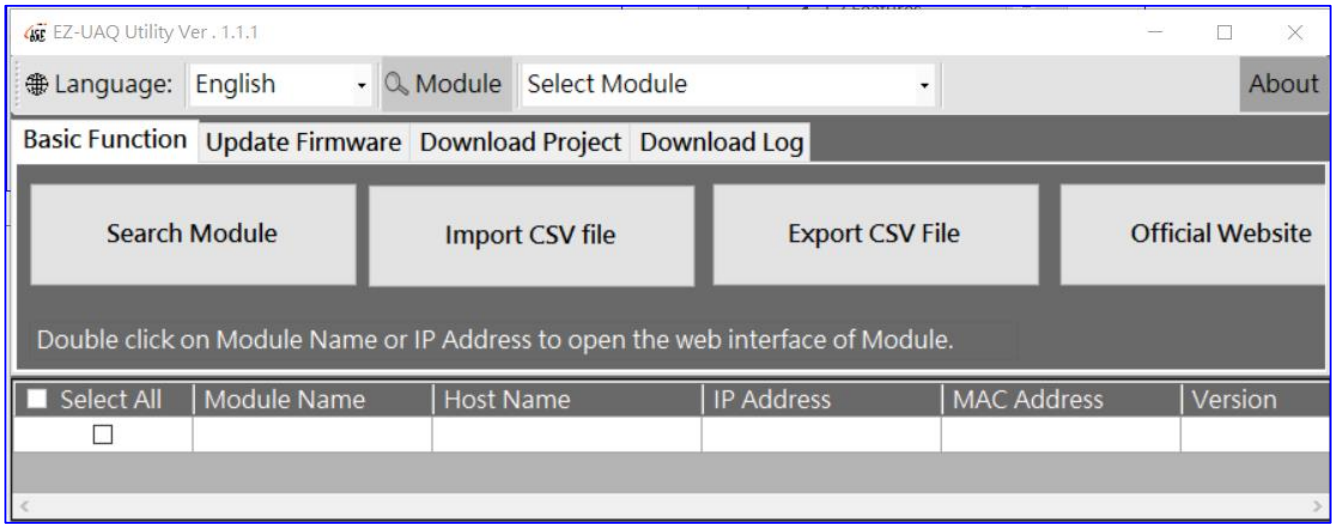
This section introduces the 2nd method(B) that users use the UA Utility to search the Network IP. This method is suitable for connecting multiple UA series controllers to the Internet, but the IP addresses of UA are unknown or need to modify the UA quickly.

The Utility is a free tool software to quickly search each UA/BRK/UA-IO series on the network and connect to its Web UI for setting UA/BRK/UA-IO series products and project.

In the PC, download and install the **Utility (EZ-UAQ Utility)** suitable for your PC, and then run it to connect the device. Please download the utility program from the website:
https://www.icpdas.com/en/download/show.php?num=8560&model=UA

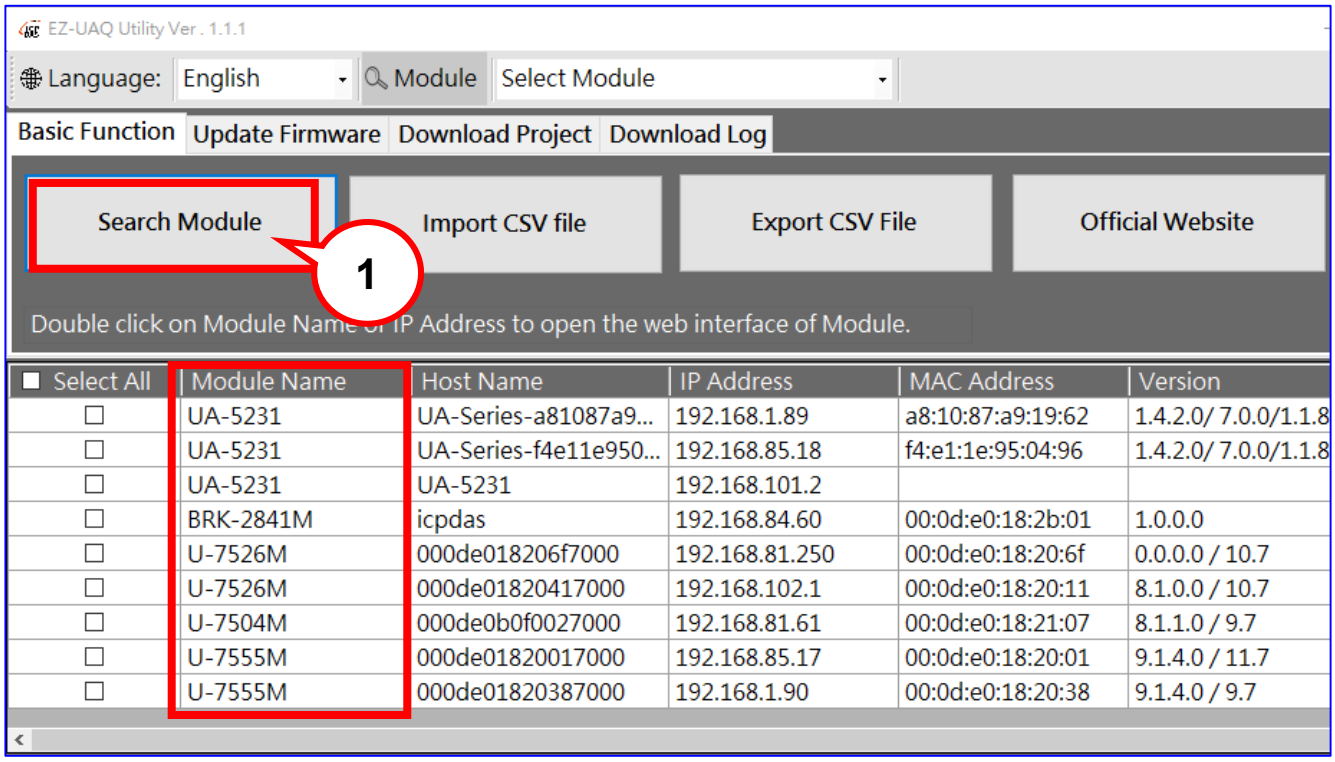


1. **Install and execute the Utility**
   Download and unzip the Utility, double-click the executable file (**EZ-UAQ Utility.msi**) to install and execute the Utility software.
   (If there is an old version of Utility on the PC, please uninstall it first.)



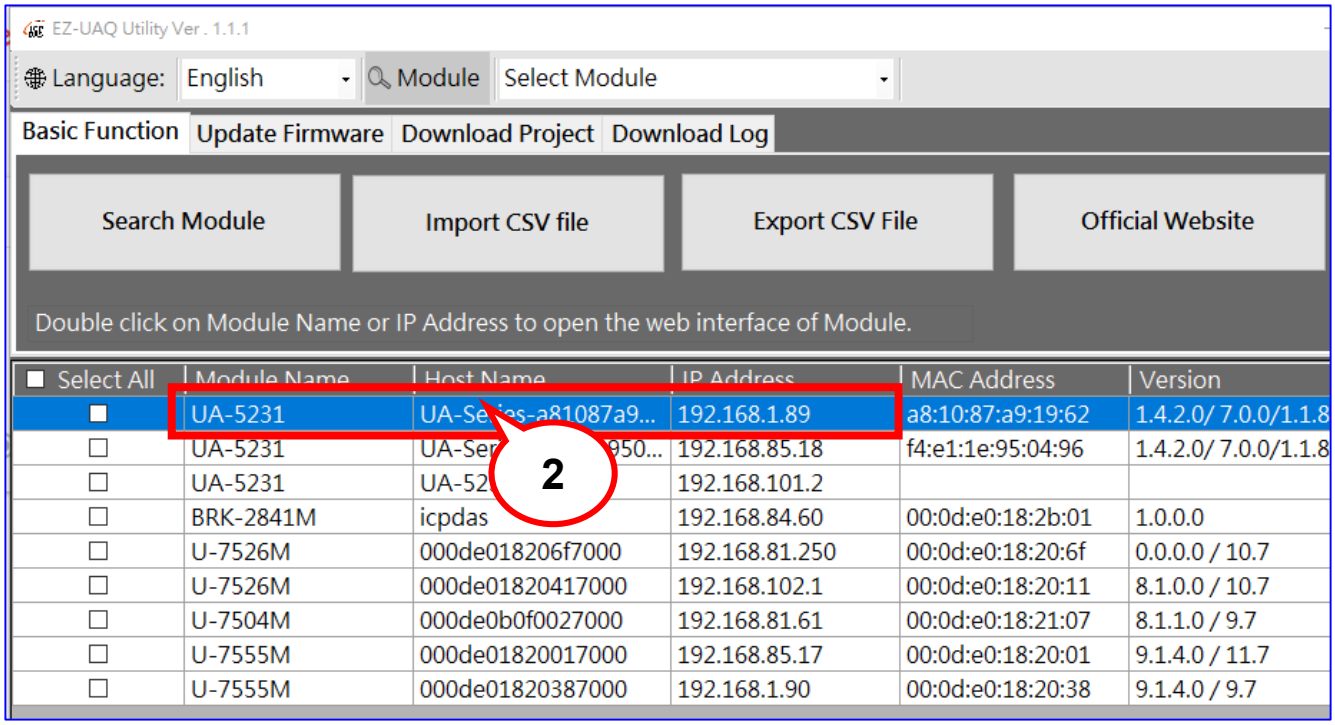
2. Search the UA/BRK/UA-IO series modules

Click the "**Search Module**" button, the utility will search and list all UA/BRK/UA-IO modules in the network.



3. Connect to the UA Series

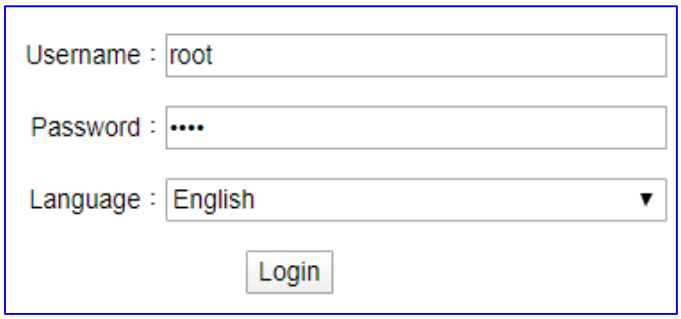
Double click the module list (from the Module Name to the IP address) you want to connect to, and it will directly link to the UA/BRK/UA-IO webpage via the default Web browser (Chrome, Edge, IE…).



4. Connection to the UA Web UI

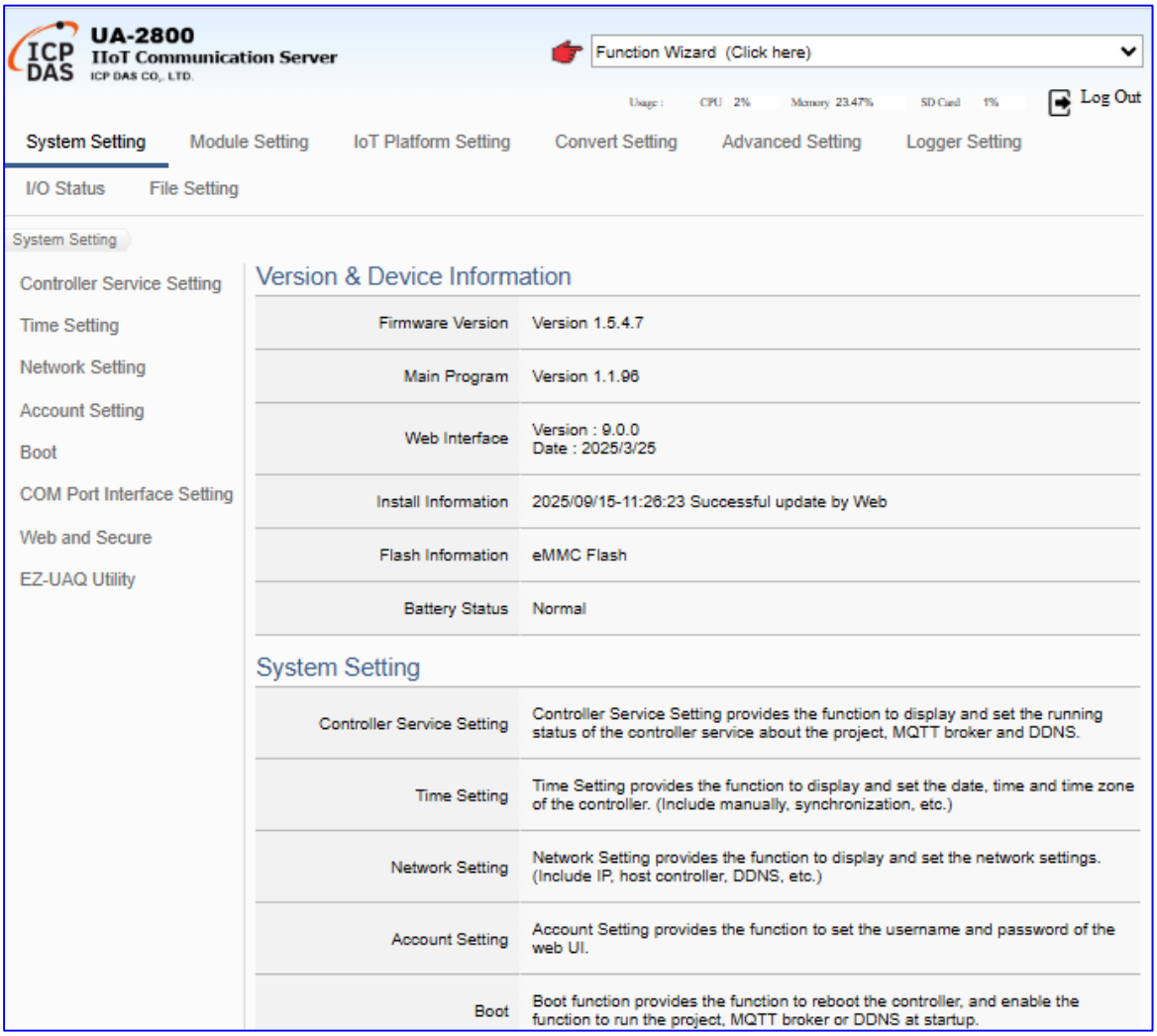
The default web browser will be run and direct go to the UA login web site.
Please enter the username and password to login the UA series Web UI.

The factory default username: **root**. The factory default password: **root**. After login in, change the default Username/password first, or user cannot use any other function (New design for data security).



5. Login the Web UI of the UA Series

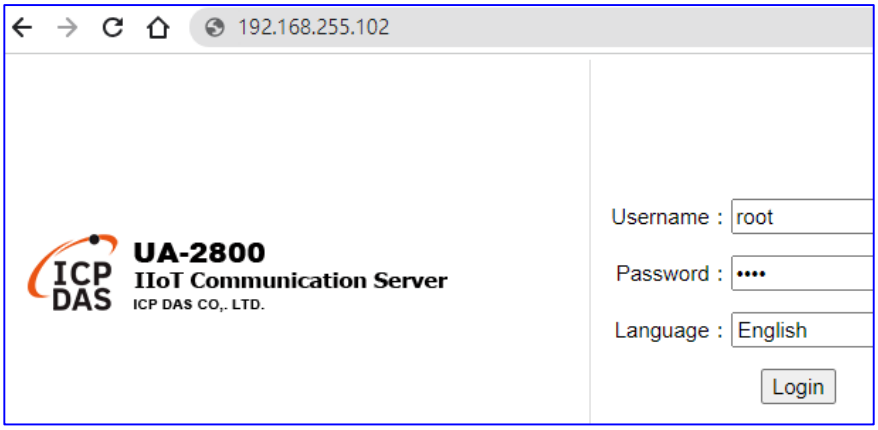
When login into the web interface, the UA default home page (the main configuration screen) will as below, and will automatically read setting of that UA to the webpage.



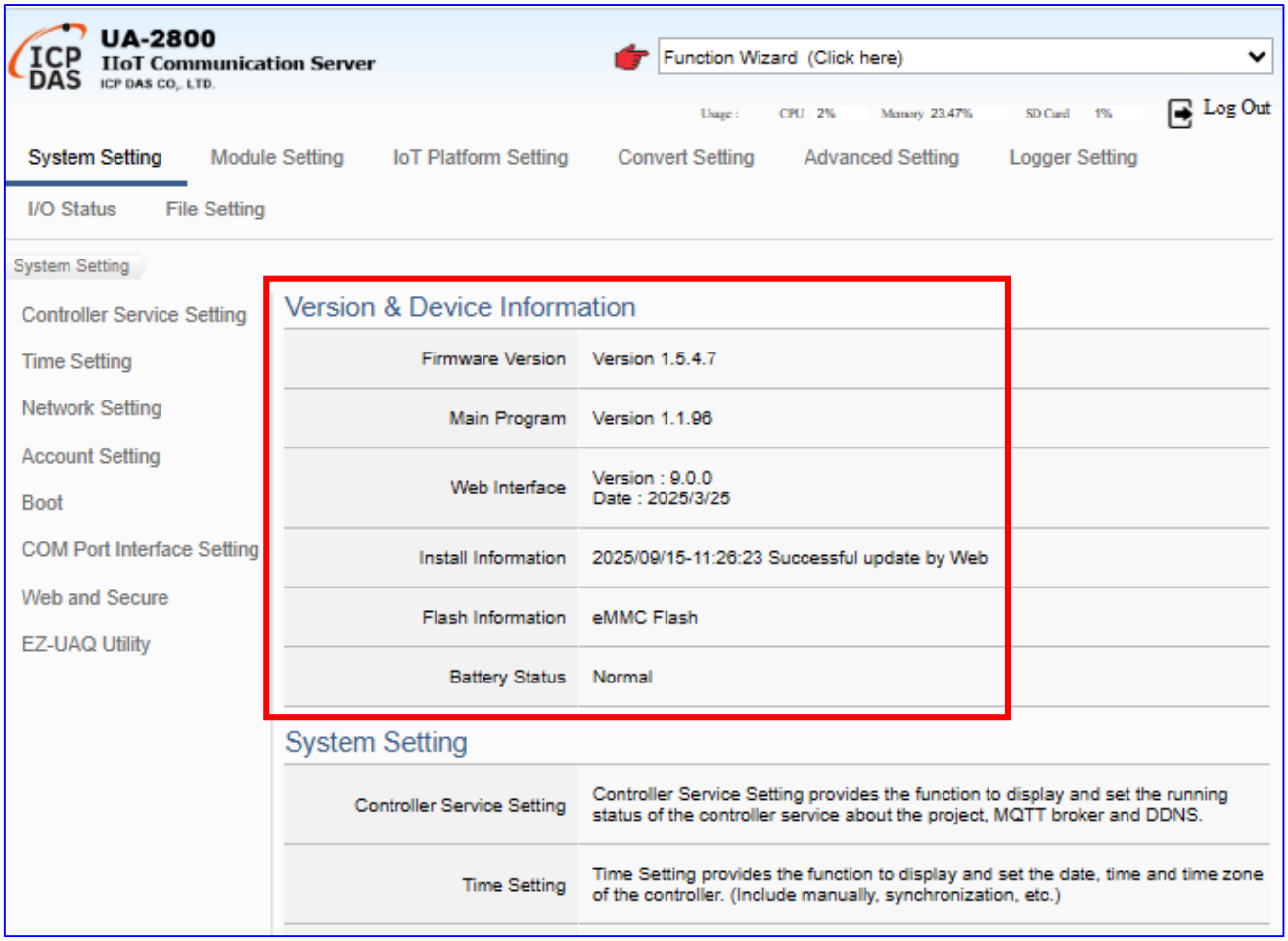
3. Quick Start 2: Web UI / Setting Steps

This chapter introduces the UA Web User Interface (UI), the steps for project / function / list settings, and a project example. For more project examples please see Chapter 4. The detail parameters of the menus, functions, etc. will introduce in the next chapters Chapter 5.

First, login the UA Web UI as below. (**Default username/password: root/root**)
If your UA controller is not connect to the network yet, please refer to Chapter 2.



After log in the Web UI, users can see the version information, including the version of the install Firmware, Main program, Web Interface, install, Flash, Battery… information.



3.1 Web UI Environment Overview

The function areas of the Web UI:

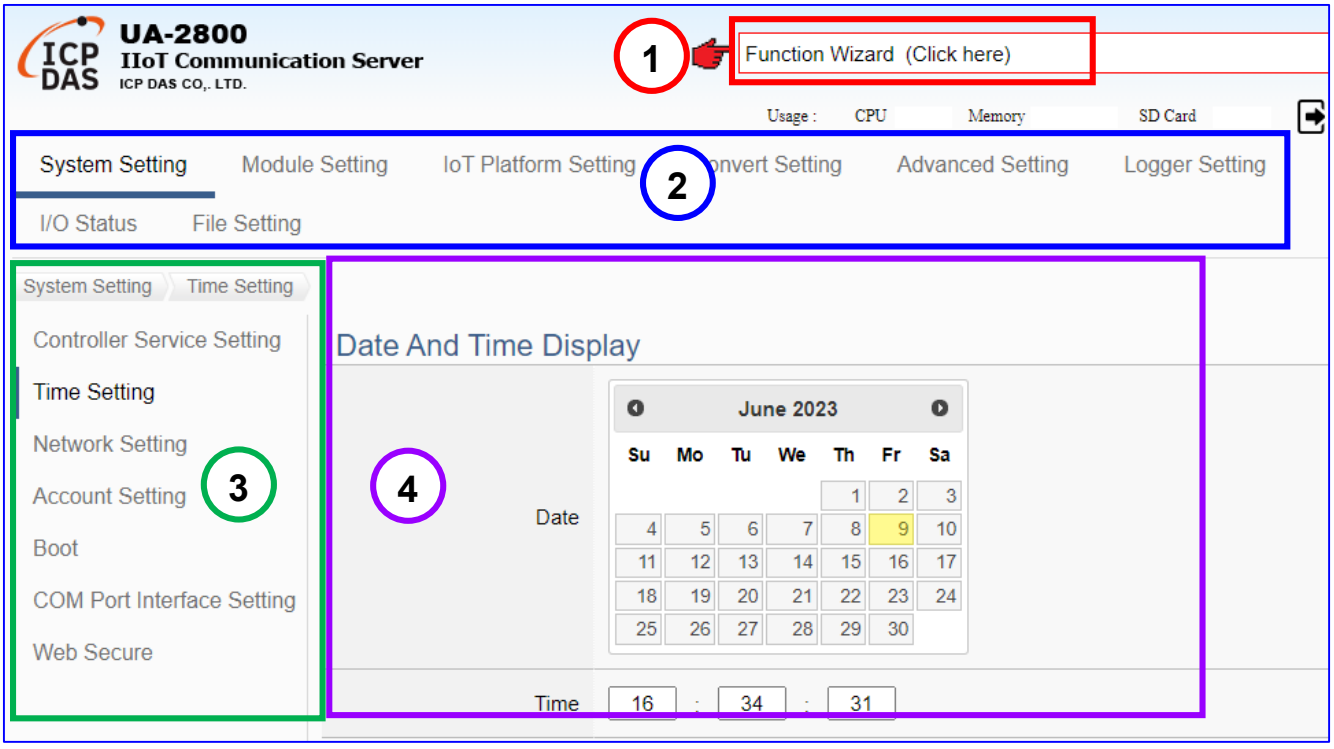
This chapter will overview these areas. The following chapters will introduce the settings of the functions and parameters.

1. **Function Wizard**: A quick setup area for commonly used projects or functions. The Web UI will enable a Wizard mode and show a “Step Box”. The user just follows the “Step Box” step-by-step and then can complete the project quickly and rightly. (Refer to Chapter 4)

2. **Main Menu Area**: The main menu contains all the setting functions that classified into several categories. Click the main menu item, the sub-menu will appear on the left of the page, and the function descriptions will appear under the main menu area. (Refer to Chapter 5)

3. **Sub-Menu Area**: The sub-menu will display detailed functions under the selected main menu. The user could setup or review detailed function options in the setting area. (Refer to Chapter 5)

4. **Setting Area**: The setting area is for displaying and setting the functions and parameters of UA series controller. The content of this area will be vary according to the selected main menu and sub-menu.



3.2 Setting Steps for Project / List

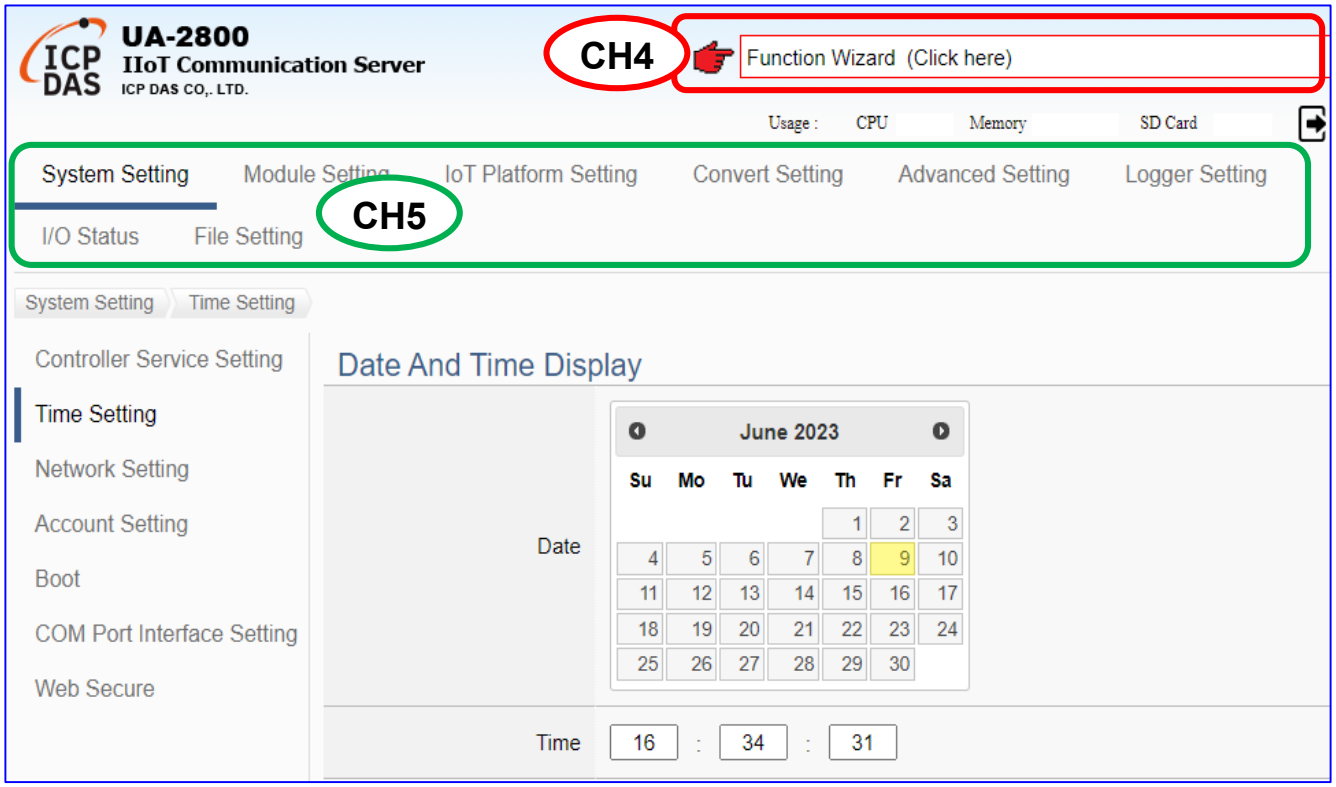
- **【Project Setting Steps】:**

The setting for UA series controller is to set up from the left to the right of the main menu functions. The "**Function Wizard**" even provides the "**Step Box**" for users to follow the steps and prevent from selecting the wrong function.

The Web UI screen of UA Series is as following; User can set up own UA project.
If user has not login your UA Web UI, refer to CH2 Quick Start 1.

CH4 [Function Wizard]: In the upper right corner of the web UI, to guide users quickly set up a project. It provides many quick setting option items. With the step-by-step guide of the function wizard, the project can be completed quickly. Please see Chapter 4.

CH5 [Main Menu]: The user can also select the function of the main menu to set projects by himself. For the detailed function and parameter descriptions, please refer to Chapter 5.



For Example: the setting steps of the Modbus communication conversion with the OPC UA protocol are as below:

Steps for setting the Project:

Controller Setting > Module Setting > Connecting OPC UA (in IoT Platform) > Conversion > File Setting > Execution

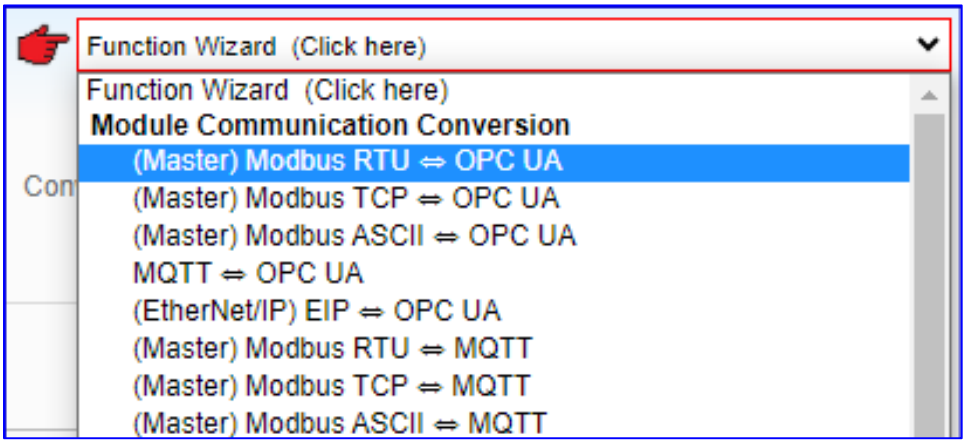
Main Menu:



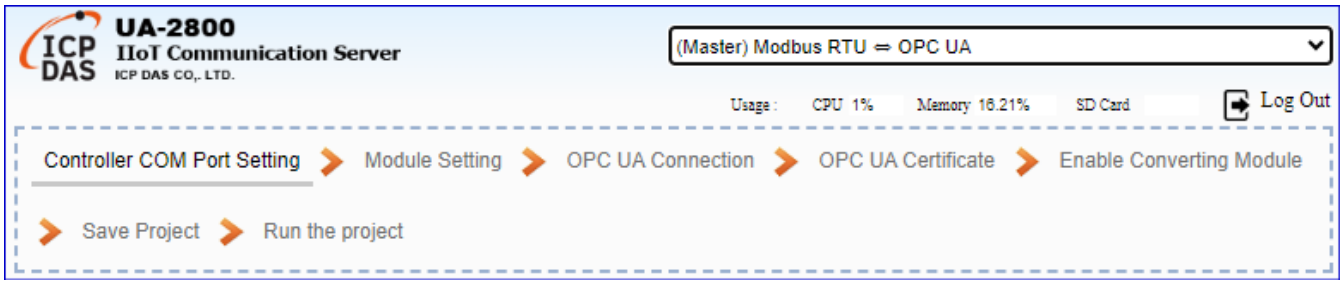
Function Wizard Step Box: (EX. Modbus RTU <=> OPC UA)



Click the **Function Wizard** and select the "**(Master) Modbus RTU <=> OPC UA"** item.



The Web UI will enable a Wizard guide and show a "**Step Box**" (as below picture). The user just needs to follow the "Step Box" step-by-step and then can complete the project quickly and correctly.



- **【List Setting Steps】:**

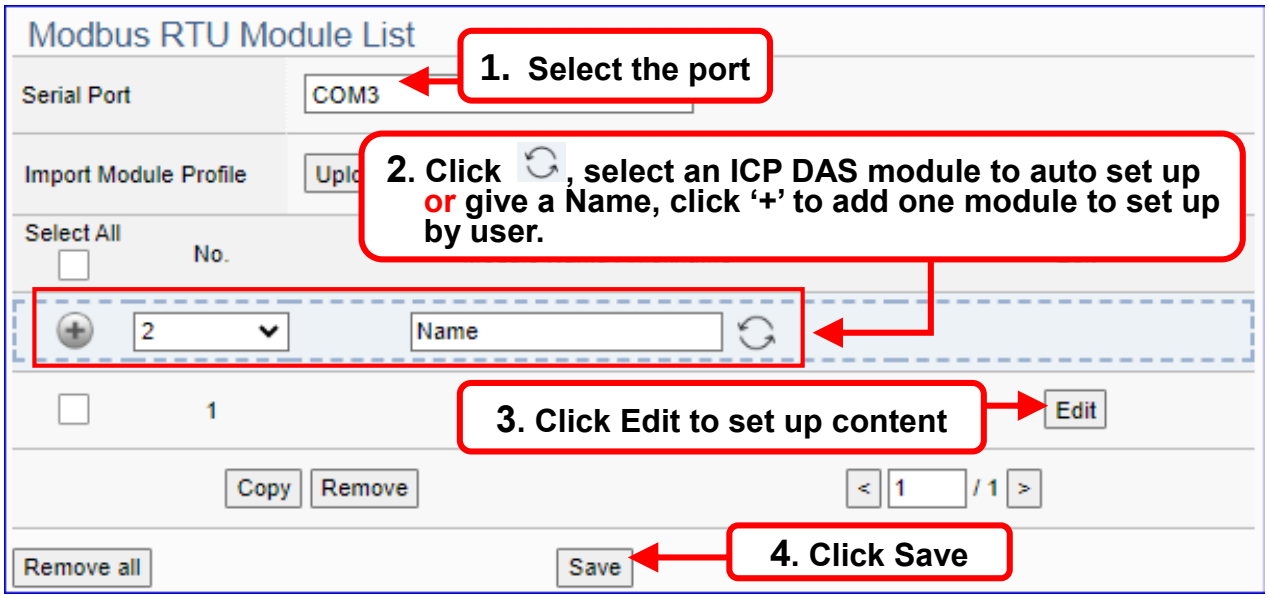
In the steps of setting up the project, various lists need to be set up, including: modules, connections, I/O channels, variables, communication connections, database... etc. About the List setting of module, connection…, they have the similar steps as below.

List Setting Steps:

1. Select the connection **port** for the module (or connection…)
2. Click the icon to switch the mode(Name/Select The Module) to add a new module:

   Name: give a name, then click the button [ ] to add a list of module, connect…
   or Select The Module: Select an ICP DAS module/list (For Modbus RTU/TCP)
3. Click the button [**Edit**] to enter the Content Setting page. Set up the list content.
4. Click [**Save**] to back, and then [Save] the list page.

Diagram for List Setting Steps: e.g. Modbus RTU Module List.



The next chapter 4.Function Wizard: Project Quick Setup will provide various **examples** about setting the commonly projects and functions.

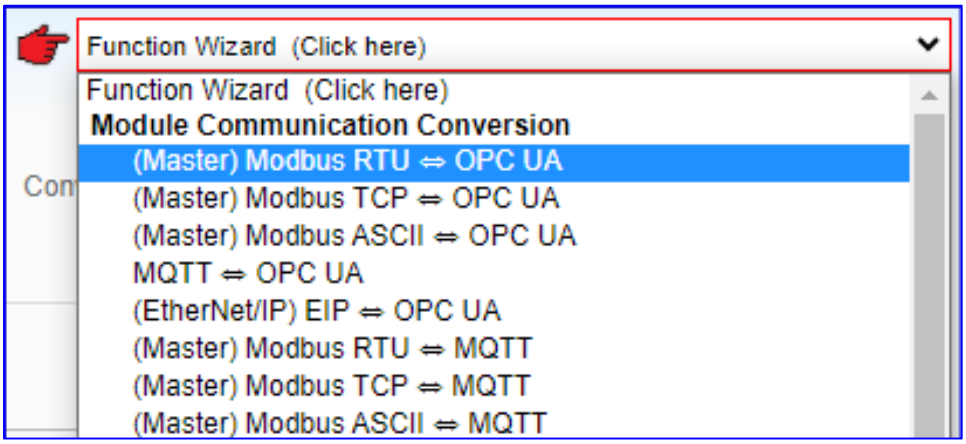
3.3 Project Setting – A Quick Setup Example

This example will setup a project for conversion of OPC UA and Modbus RTU (Master) communication protocol using the Function Wizard. The devices include a UA-2841M controller and an M-7055D module that wired with RS-485 interface to read/write the Modbus RTU I/O data and need the convert setting. The wiring is show as the picture below.

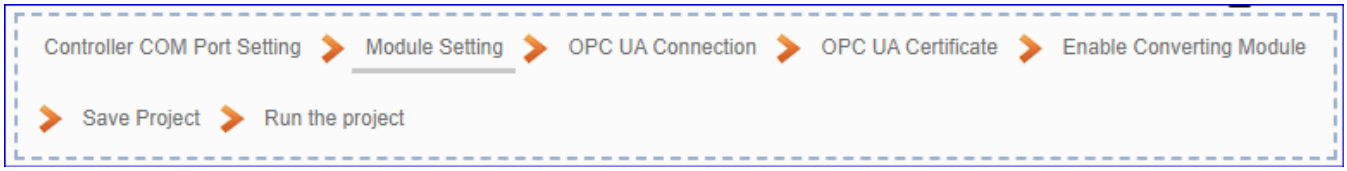


Note:【Function Wizard】at the up-right corner of the Web UI is a quick setup area. The hardware/network connection methods please see the CH. 2 .

This sample uses the conversion function of the Function Wizard to convert the Modbus RTU / OPC UA. First, click the "**(Master) Modbus RTU / OPC UA"** item of the Function Wizard.



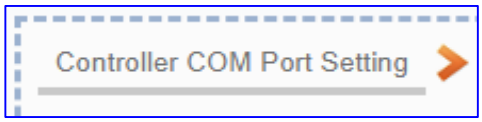
The Web UI will enable a Wizard guide mode and show a "Step Box" (as below picture). The user just needs to follow the "Step Box" step-by-step and then can complete the project quickly and correctly.



After click the【**(Master) Modbus RTU <=> OPC UA**】, follow the "**Step Box**" to complete the 7 steps: (The step with a **bold underline** means it is the current step.)



● Step 1. Controller COM Port Setting

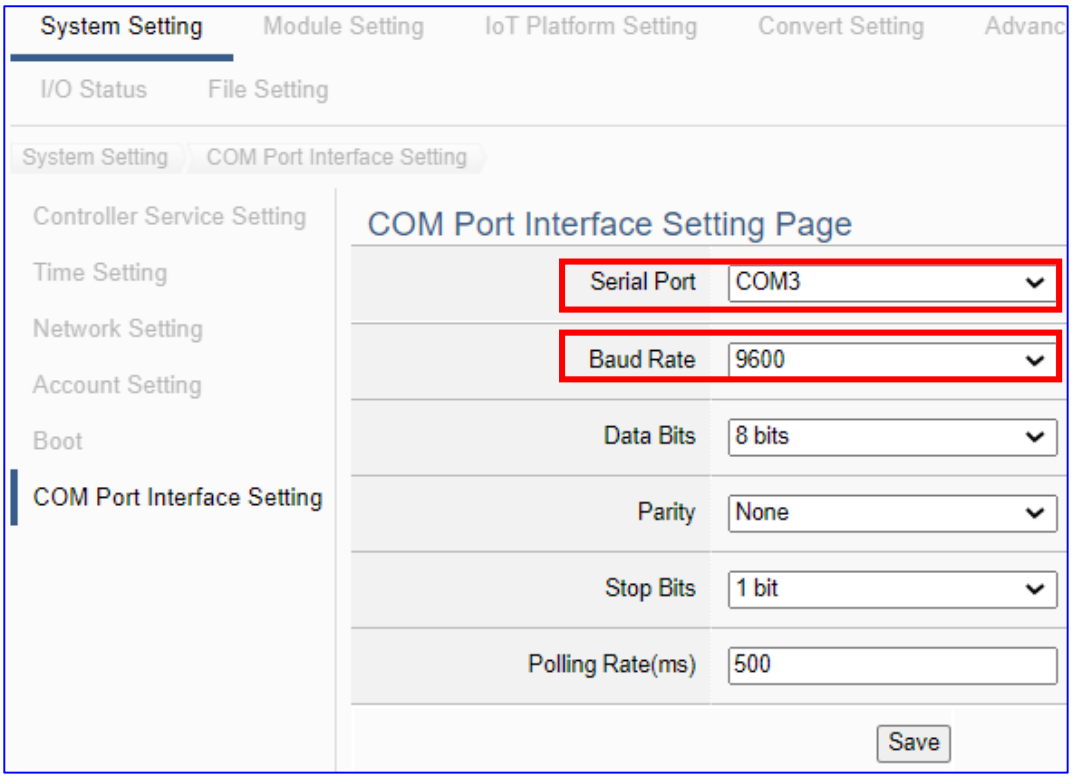


This step sets up the COM port interface of the UA controller to connect with the module and the communication setting.

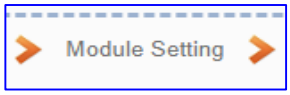
<This Example>

The UA uses the COM3 port to connect with the M-7055D, so set the **Serial Port: COM3**. The M-7055D module default setting is "9600, 8, N, 1", so set **Baud Rate: 9600**, **others need not to change**. After setting, click [Save] button to store this page setting. (The user also can save the whole project until the step of "Save Project".)

Note: If user uses other port to link other module, or the module is not in the default state, please set this step according to your case. The user can find the M-7055D default state in the Module CD or its Product Web Site .



Step 2. Module Setting

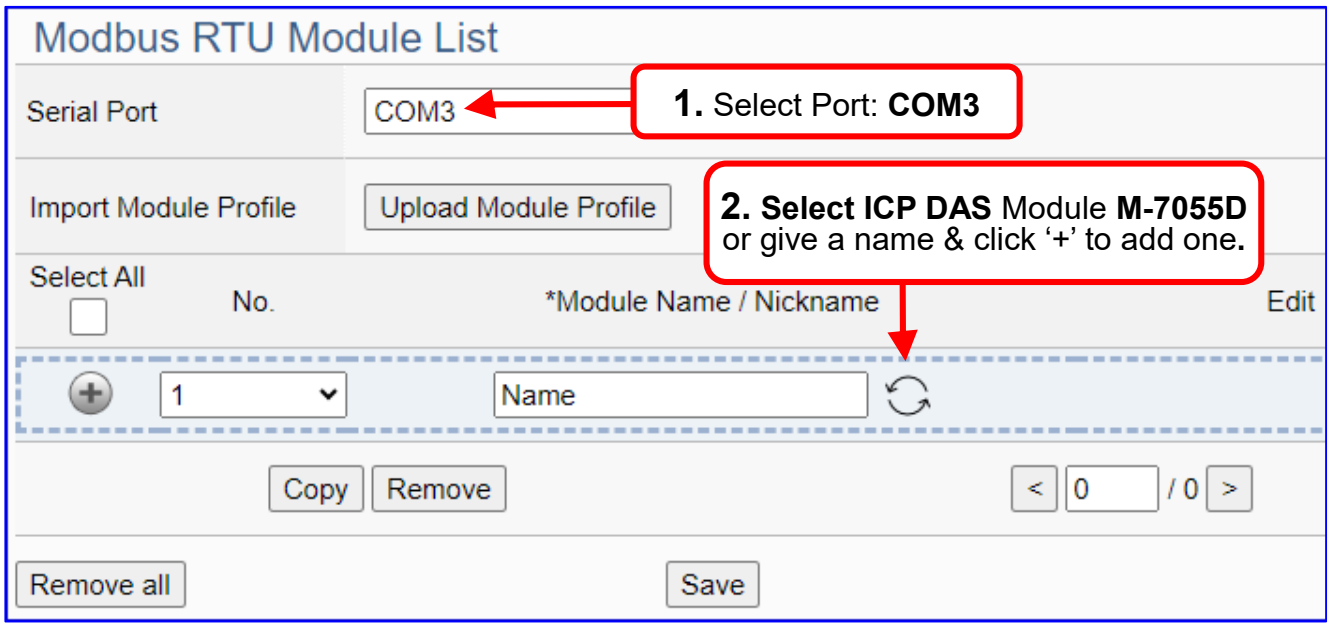


Click the next step, and enter the **Step 2 [Module Setting]** of the UI setting.

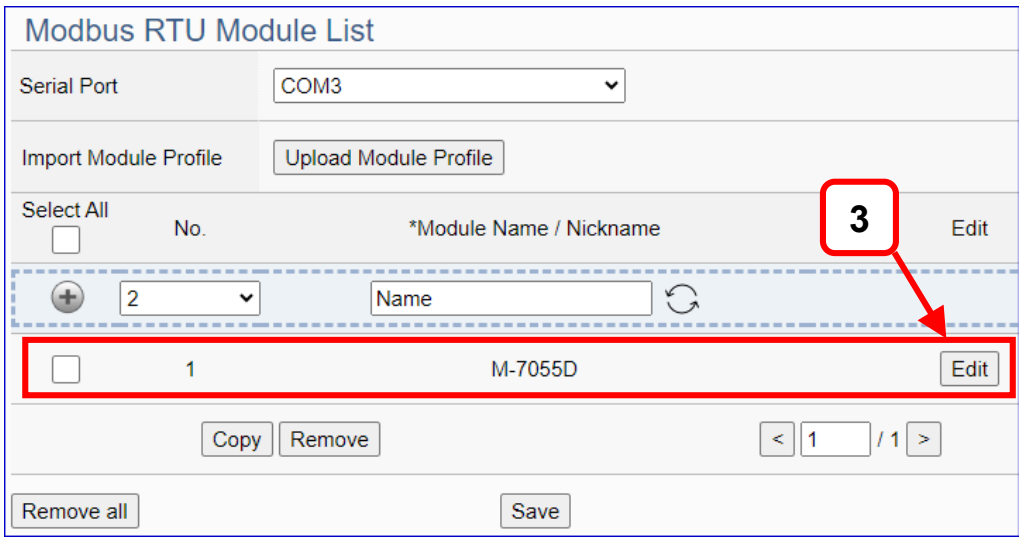
This step is for setting the connected modules. The user can set each module a name (Default name: Name), click [ ] button to create a new module, and click [Edit] button to configure the module content and Modbus mapping table.

<This Example>

In “Module Setting”, select the **Serial Port: COM3**, and select **ICP DAS Module: M-7055D**, the system will auto setup the ICP DAS module. If not use ICP DAS module, please give a name and click the button [ ] to add a Module List.

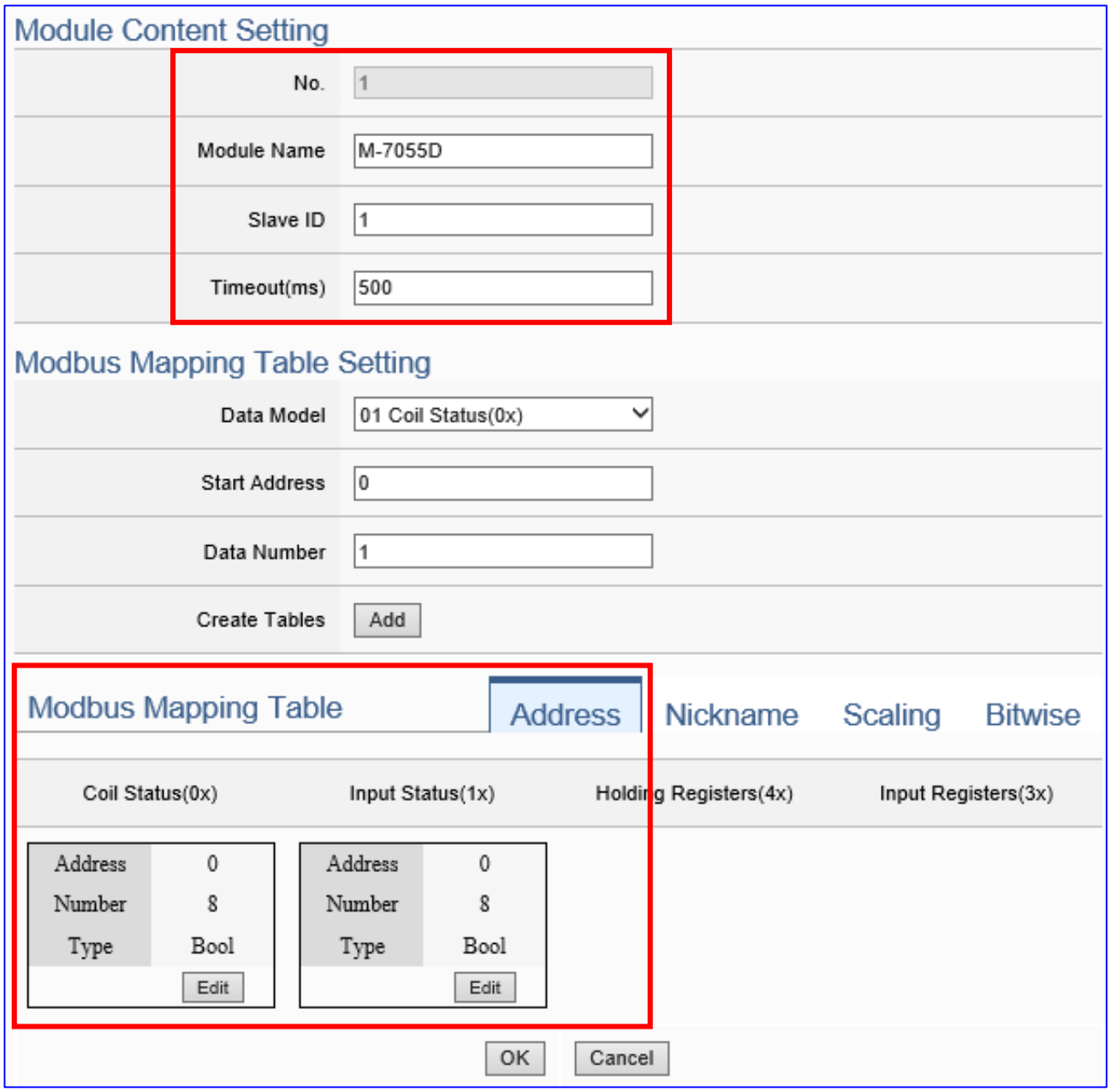


Add a module M-7055D as below, and then click [Edit] button to enter the “Module Content Setting” page.



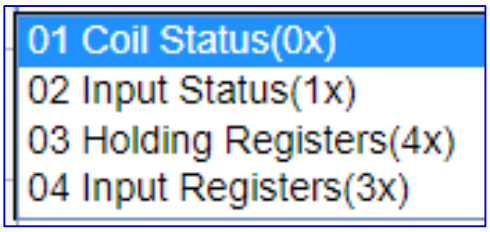
[**Module Content Setting**] page can set the module and its Modbus mapping table.

If use ICP DAS module, system will auto-setup the module and its Modbus Mapping Table. Such as this example, we select the module from “Load ICP DAS Module”, it auto-shows the M-7055D (DO x 8, DI x 8) module content and Modbus Mapping Table as below.



If not use ICP DAS Module, please check the module's user manual to find out the module Modbus Address, and refer to the chapter "Module Setting" of the UA manual as below.

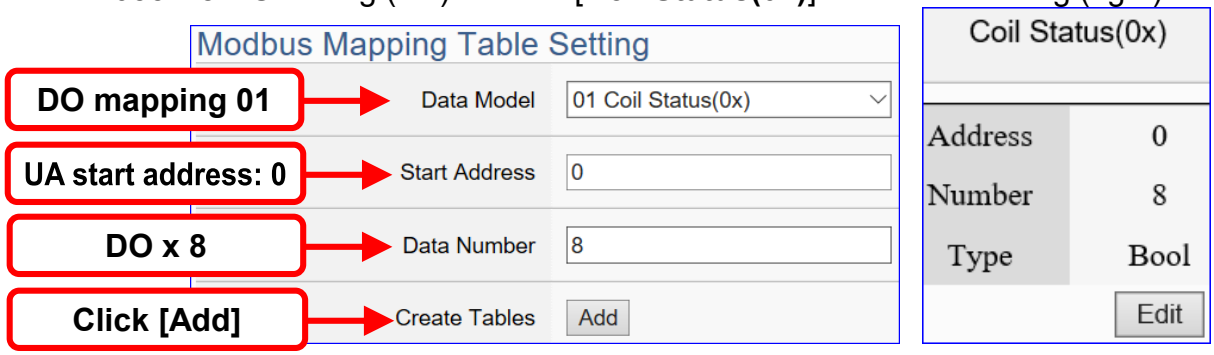
Please set up the addresses mapping with the module I/O channels in the [**Modbus Mapping Table Setting**]. The system provides 4 Modbus data models (as below) **"01" to "04"** for mapping to the **DO, DI, AO and AI** channels.



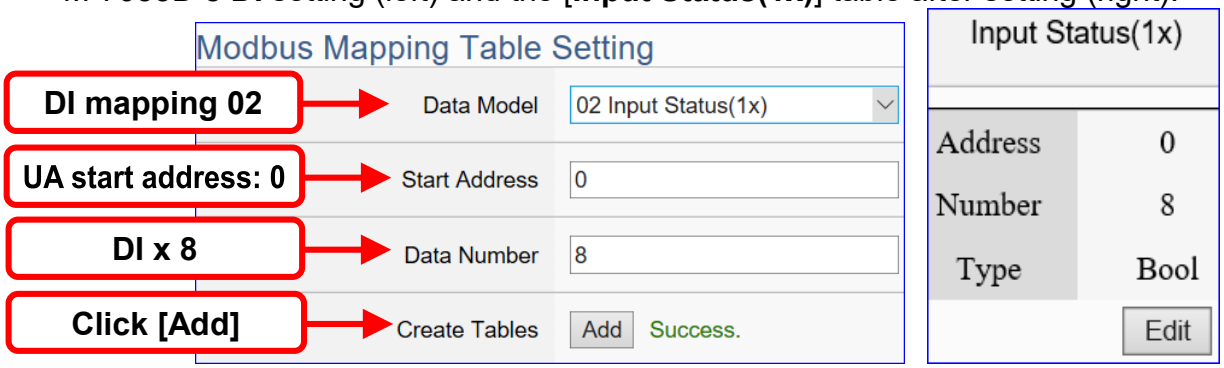
Note: the start address of UA series is bass on **"0"**. Some modules start address are bass on "1", but please note UA is follow the rule of start address "**0**", and set enough Data Number for mapping to the I/O channels of the linking module.

In this example, M-7055D has 8 DO and 8 DI channels, please create the table as following pictures of the [**Modbus Mapping Table Setting**]. After complete the setting, the DO and DI Modbus address settings will show in the [**Modbus Mapping Table**].

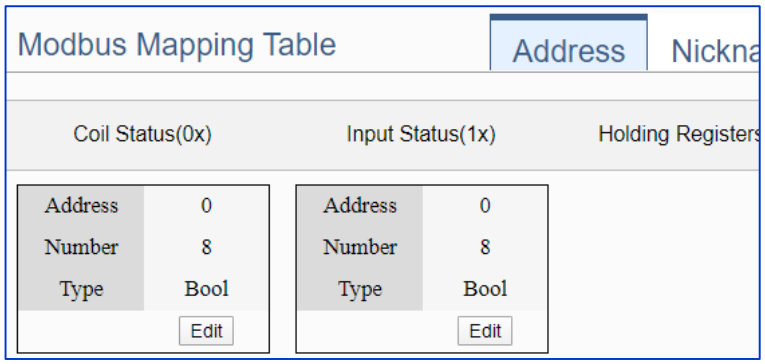
M-7055D **8 DO** setting (left) and the [**Coil Status(0x)**] table after setting (right):



M-7055D **8 DI** setting (left) and the [**Input Status(1x)**] table after setting (right):

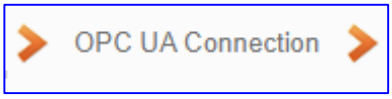


The Modbus Mapping table is showing as below. Click [OK] to save and exit.



For more setting item descriptions, please refer to chapter Chapter 5.2. Module Setting.

Step 3. OPC UA Connection



Click the next step, and enter the **Step 3 [OPC UA Connection]** of the UI setting

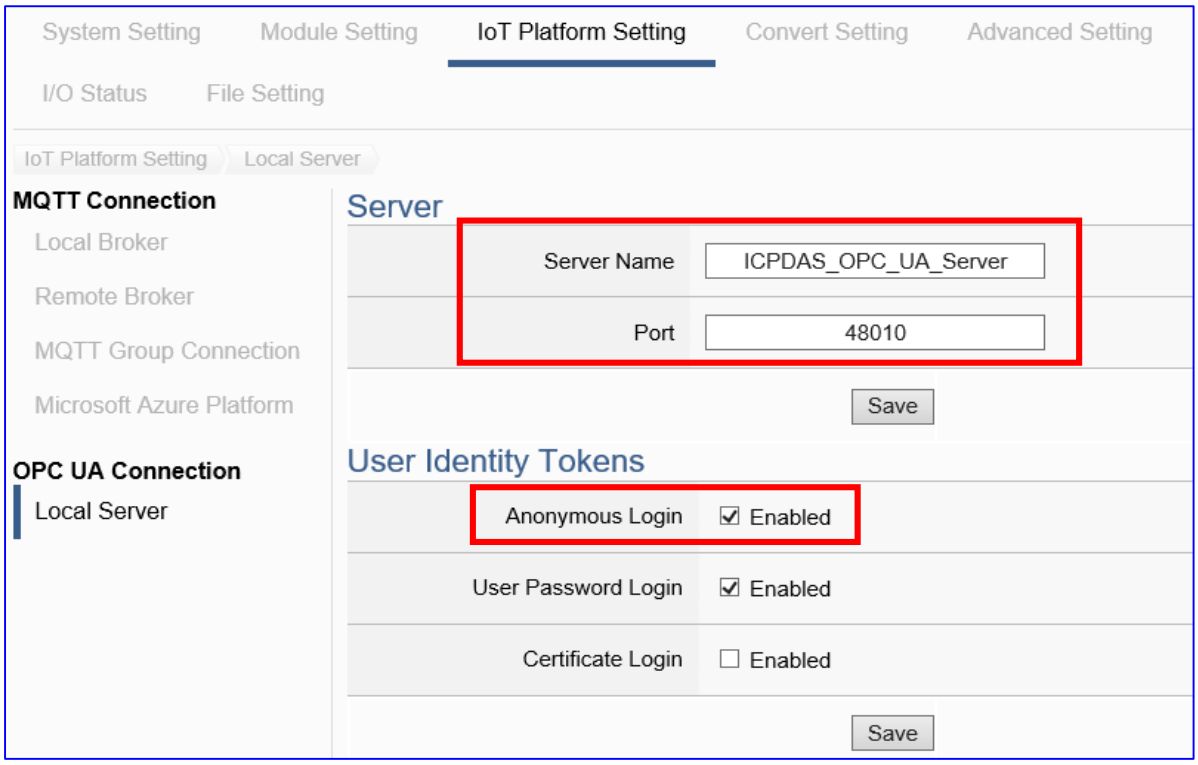
This step is for setting the IoT platform and the OPC UA connection, e.g. the server name, port, login identity information, etc.

We select the “Modbus RTU / OPC UA” conversion at the beginning, so this step will auto enter the [**OPC UA Connection > Local Server**] page of IoT Platform Setting. The “Step Box” will prevent the user from selecting the wrong platform.

<This Example>

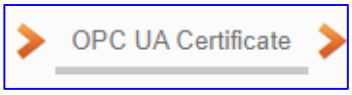
The server name and port of [**OPC UA Connection**] will auto show up, user needs not to change in this example, but can change the port if needs.

The Anonymous Login default enables, you need not to change in this example. At last, click [Save] button.



For enabling other logins, please see the [OPC UA Connection] in the Chapter 5.3 IoT Platform Setting .

Step 4. OPC UA Certificate

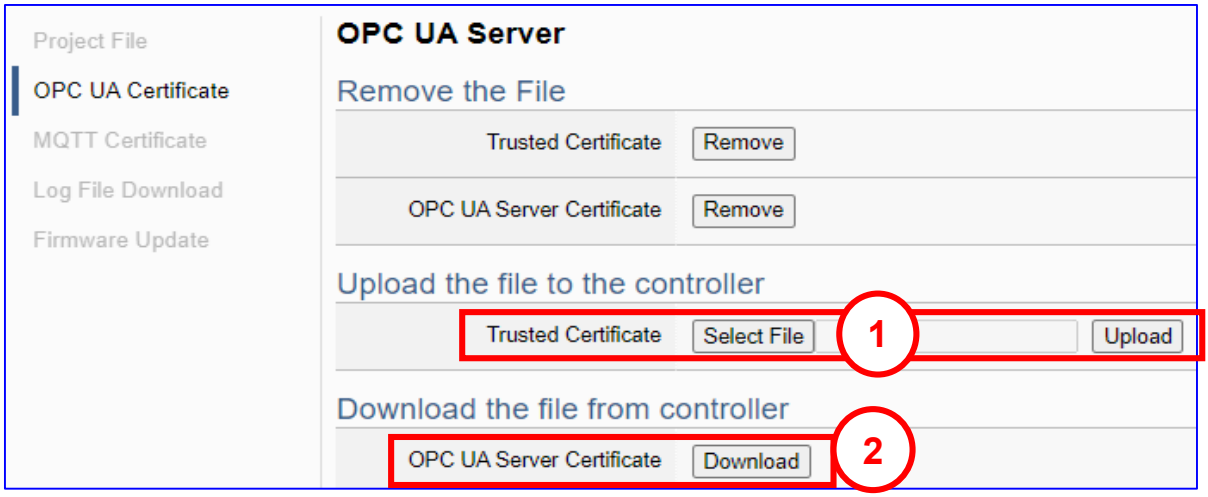


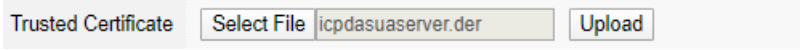
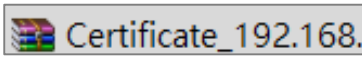
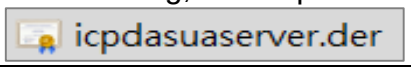
Click the next step, and enter the **Step 3 [OPC UA Certificate]** of the UI setting.
This step is about setting the OPC UA Certificate for the security and encryption, e.g. upload, download, remove certificate. **If user's project does not need to use the secure encryption connection, please skip this step and click the next step directly.**

The connected **Server/Client** adds the certificate to each other for secure encryption:

① Get the Trusted Certificate file from the connecting **OPC UA Client** and save it in the PC. In this step, select the file and upload it to the UA controller.

② Provide the **OPC UA Server** certificate of this UA controller to the Client device. In this step, **download** the certificate file (**Certicate_IPAddress_.tar**), decompress it (**icpdasuaserver.der**) and upload it to the client device.



File Setting > OPC UA Certificate > Upload the file to the controller	
Trusted Certificate	**Select File**: select the OPC UA Trusted Certificate file in PC to upload to the UA controller. **Upload**: upload the Trusted Certificate file to the UA controller. • File format must be **DER**. Extension name must be "**der / cer / crt**".  • If select a wrong file, the system will show an error message. 
File Setting > OPC UA Certificate > Download the file from controller	
OPC UA Server Certificate	**Download**: Download the OPC UA Server Certificate file to the current using computer. • File format: **DER**. File name: **Certicate_IP-address_.tar** e.g.  Before using, decompress to **icpdasuaserver.der**, as below. 

For more settings, refer to the [5.8.3 OPC UA Certificate] in the Chapter 5.8 File Setting .

Step 5. Enable Converting Module



Click the next step, and enter the **Step 5 [Enable Converting Module]** UI setting

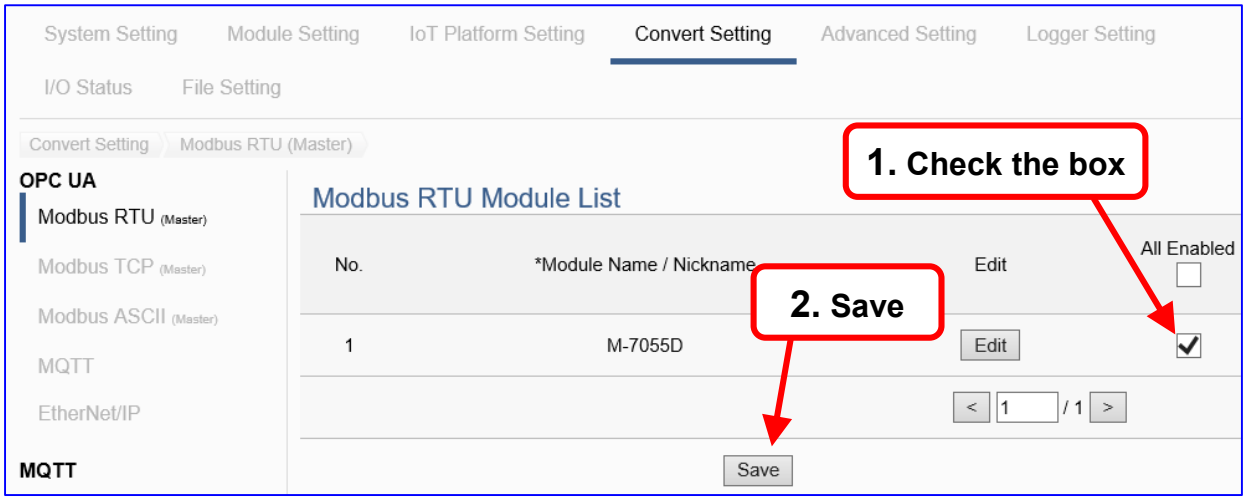
This step is for enabling the Modbus RTU / OPC UA conversion.

This step will auto enter the [**OPC UA > Modbus RTU (Master)**] page of Conversion setting because we select the “Modbus RTU / OPC UA” conversion at the beginning. The “Step Box” will prevent the user from selecting the wrong platform.

<This Example>

In this setting page, please **check** the enable box of the module **M-7055D** we set up in the previous steps. Then click [Save] button.

The above action will enable all I/O channels of the M-7055D for communication conversion. If users need to enable some channels only, please click [Edit] to enable individual channels. (Refer to Chapter 5.4)



Step 6. Save Project

The setting of this example is finished now. Click the next step **[Save Project],** the Step Box will show an animation as below picture, that means the project is saving. When the animation disappears, the project is saved completely.



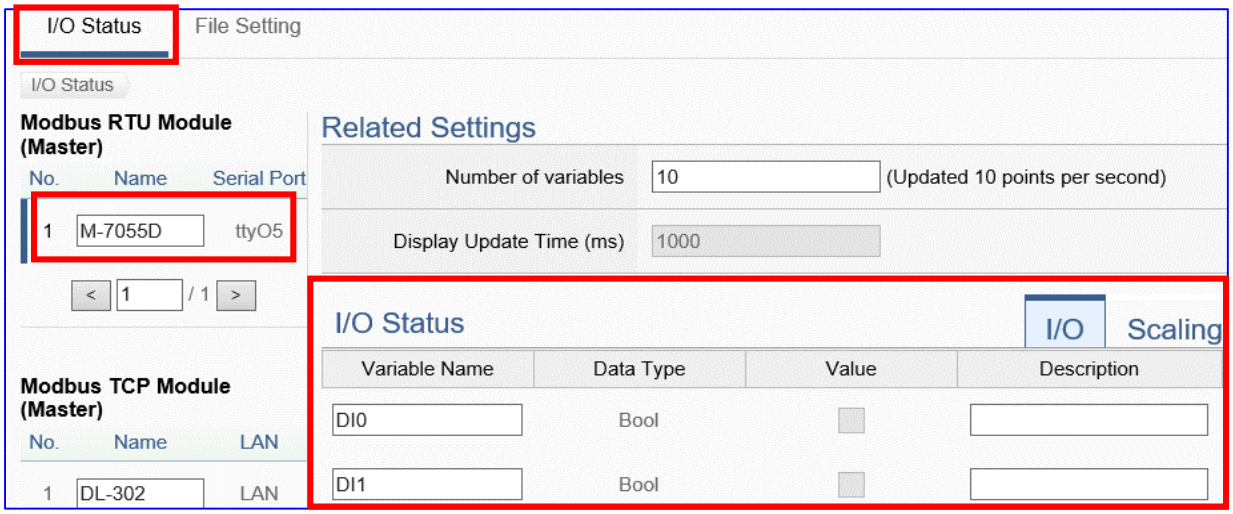
Step 7. Run the Project

The project, after saving, needs to be executed. Click the next step **[Run the Project]**. This step can also via the [**System Setting** > **Controller Service Setting** > **Run Project**] to Stop and Run the project.



When the words "**Please wait**" disappears, the new words "**Success**" appears, that means the UA controller is running new project successfully. Then the Step Box will disappear automatically now, and back to the first screen view of the Web UI.

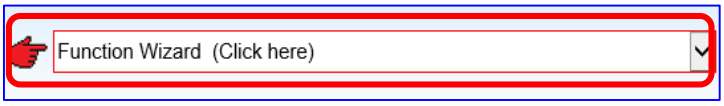
The new project now completes the setting, uploading and running in the UA controller and can process the conversion communication. Users can see the I/O status from the menu [**I/O Status**]. For more about the Web UI settings, please refer to CH4 and CH5.

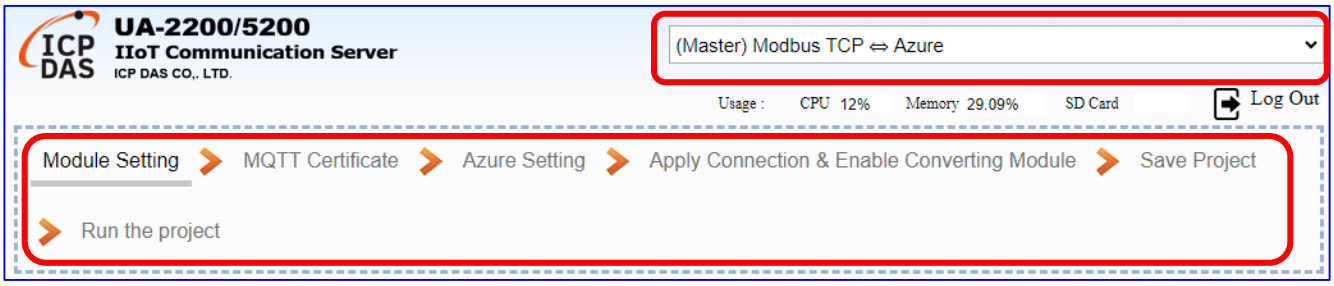


4. Function Wizard: Project Quick Setup

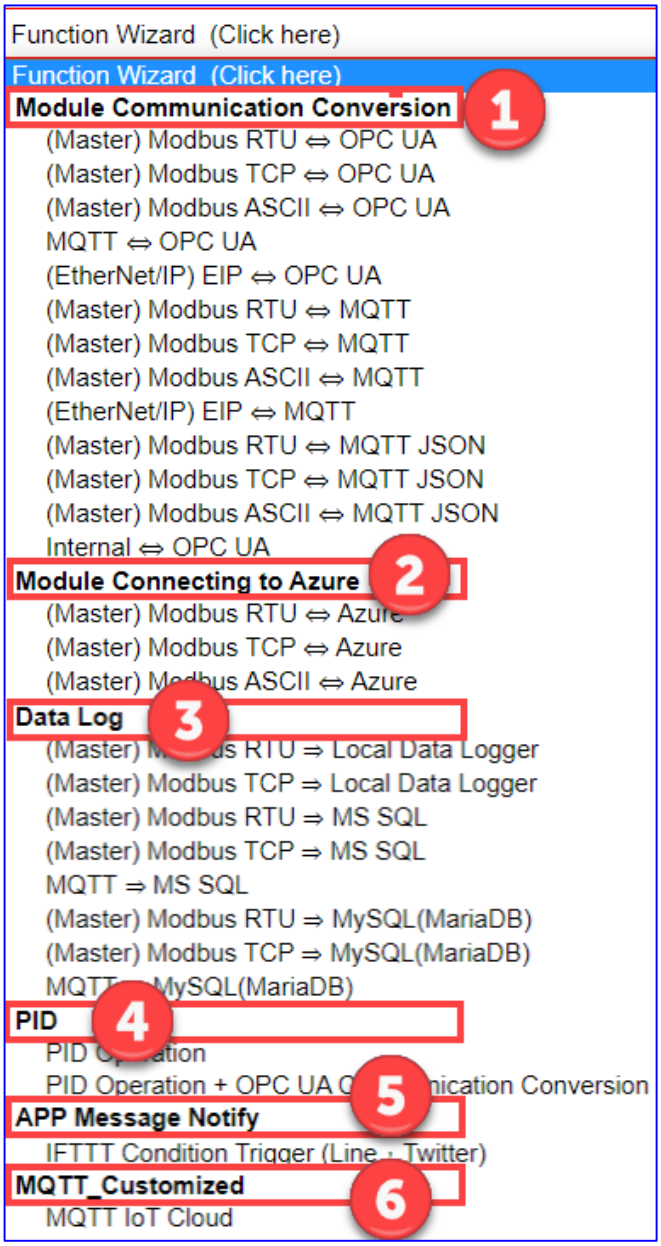
Chapter 4 is about the UA project setup. [**Function Wizard**] in the up-right corner of the Web UI provides an **easy and quick** setting "**Step Box**" that **very suitable for the new users**.

[**Function Wizard Step Box**]
(abbreviation [**Step Box**])





Step Box is a step guide of the Function Wizard. When users select an item, the Web UI will enable a Wizard and show a "Step Box" for user to follow the "Step Box" step-by-step and then can complete the project easily & quickly.



This chapter introduce the Function Wizard category and items, the examples for setting steps of the projects/functions are on the FAQ Webpage. The are several **categories (in red box, they also are the FAQ Category**) and items in each section. We will develop more items in the future.

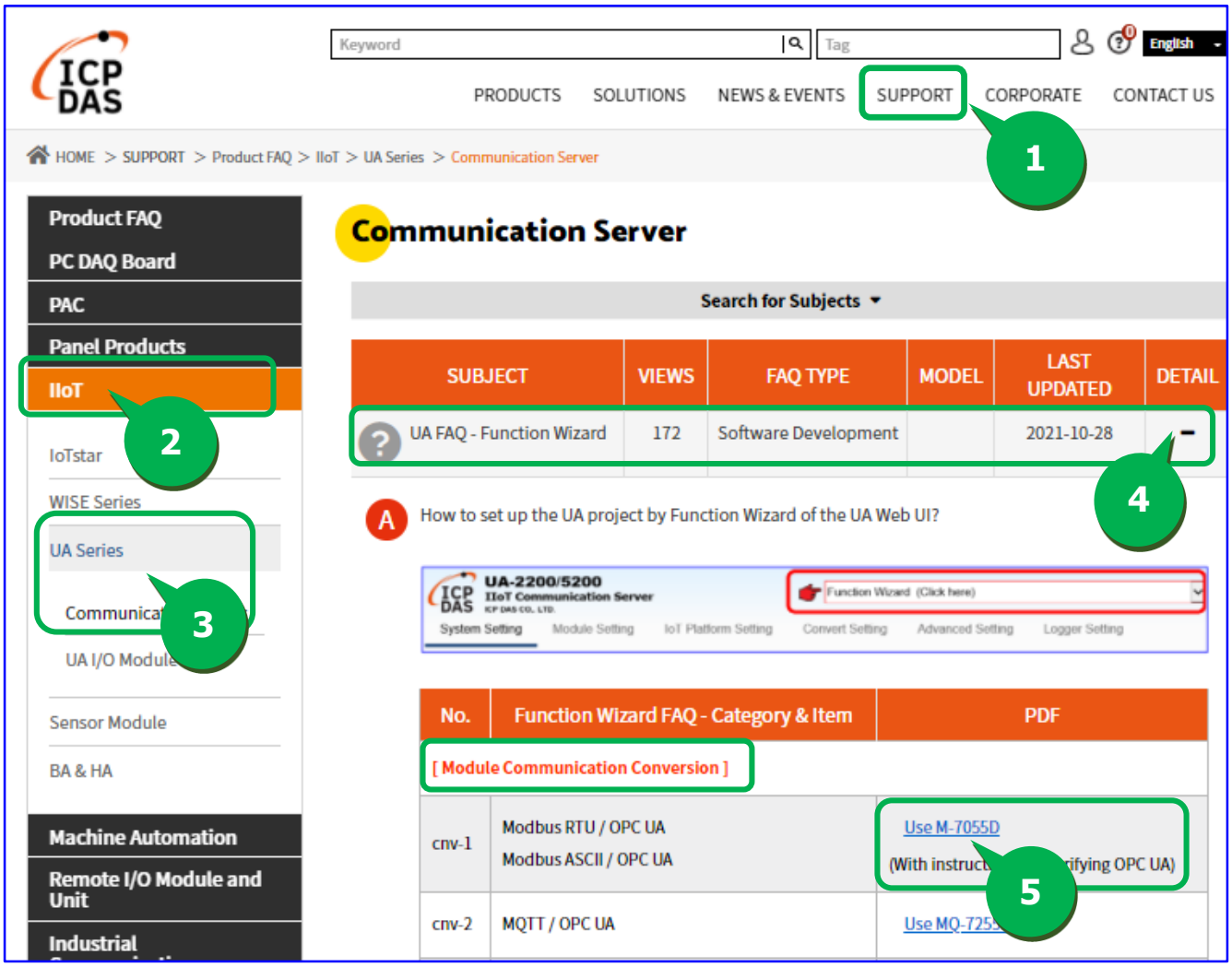
When set up the project, please choose an item from a category and follow the steps. Please at least refer one example in this chapter to know the setting steps and tips.

All **setting examples** of most used Function Wizard items are put on the UA series FAQ website. Please refer to **ICP DAS homepage > Support > Product FAQ > IIoT > UA series >Communication Server > UA FAQ – Function Wizard.**

Example FAQ of Function Wizard as following:

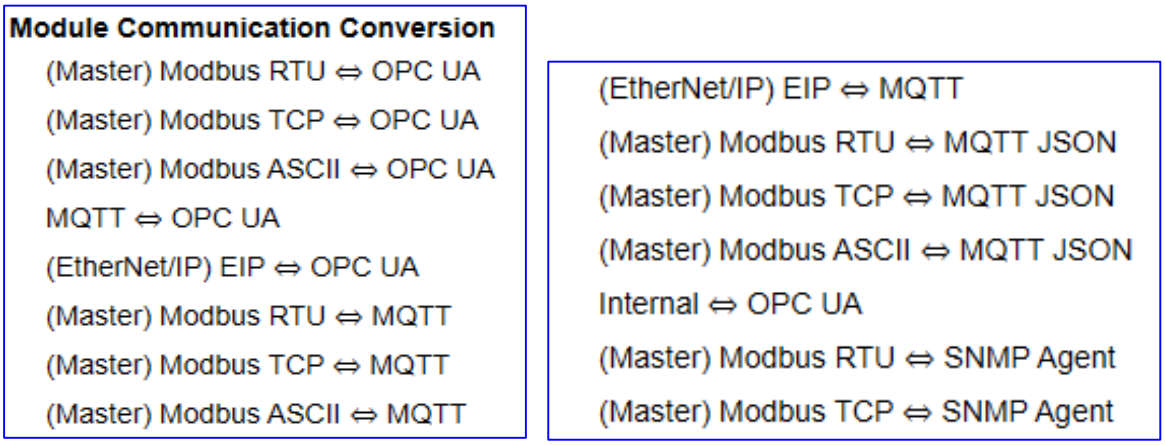
1. **Enter ICP DAS Homepage > SUPPORT > Production FAQ web page**
2. **On the left side menu, click the IIoT of the Product FAQ**
3. **Select UA Series > Communication Server**
4. **Select the "+" icon on the right side of the UA FAQ-Function Wizard, find the Category and Item you want.**
5. **Click the "Use Module Name" of the FAQ you need to see the example.**

UA FAQ Web Page: https://www.icpdas.com/en/faq/index.php?kind=326#950



4.1 [Module Communication Conversion] Category

“Module Communication Conversion” of UA series, a very commonly used function, can effectively communicate the IoT devices or systems (e.g. cloud, database…) with I/O data of the module (e.g. Modbus module). This section will introduce the setting steps and the function parameters of the “Module Communication Conversion”. In the category, there are several items that can be divided into the following protocol types and will introduce them in the FAQ: OPC UA, MQTT, MQTT JSON, SNMP and Internal for virtual.



Item	Description
Modbus RTU <=> OPC UA **Modbus TCP <=> OPC UA** **Modbus ASCII <=> OPC UA**	Using the **OPC UA** Service to convert with **Modbus** RTU/TCP/ ASCII protocols.
MQTT <=> OPC UA	Using the **OPC UA** Service to convert with **EtherNet/IP** protocols.
EIP <=> OPC UA	Using the **OPC UA** Service to convert with **EtherNet/IP** protocols.
Modbus RTU <=> MQTT **Modbus TCP <=> MQTT** **Modbus ASCII <=> MQTT**	Using the **MQTT** Service to convert with **Modbus** RTU/TCP/ ASCII protocols.
EIP <=> MQTT	Using the **MQTT** Service function to convert with **EtherNet/IP** protocols.
Modbus RTU <=> MQTT JSON **Modbus TCP <=> MQTT JSON** **Modbus ASCII <=> MQTT JSON**	Using the **MQTT** Service function in-group of **JSON** format to convert with **Modbus** RTU/TCP/ ASCII protocols.
Internal <=> OPC UA	Using the **SNMP (Agent)** Service to convert with **Modbus** RTU/TCP protocols.
Internal <=> OPC UA	Using the **OPC UA** Service function to convert **Internal** to OPC UA (Server) protocol, or as an intermediary to provide **data exchange** for **OPC UA Client to Client**.
Modbus RTU <=> SNMP Agent **Modbus TCP <=> SNMP Agent**	Provides **SNMP Agent** and **Modbus RTU/TCP** (Master) communication protocol conversion

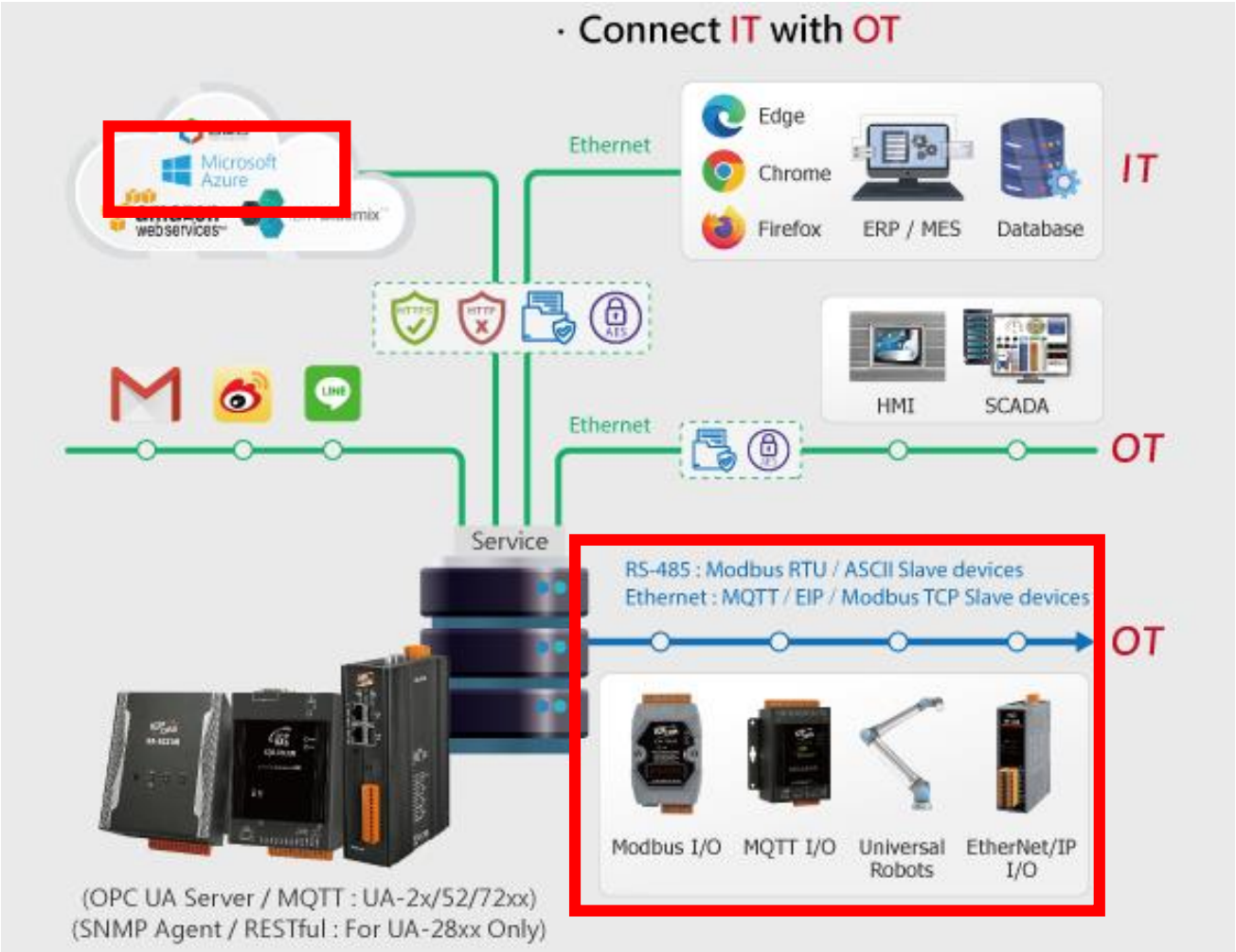
UA FAQ Web Page: https://www.icpdas.com/en/faq/index.php?kind=326#950

No.	Function Wizard FAQ	PDF / Attachment
[Module Communication Conversion]		
Cnv-01	Modbus RTU / OPC UA Modbus ASCII / OPC UA	Use M-7055D (With verifying OPC UA)
Cnv-02	MQTT / OPC UA	Use MQ-7255M
Cnv-03	(EtherNet/IP) EIP / OPC UA	Use EIP-2060
Cnv-04	Modbus TCP / MQTT	Use DL-302
Cnv-05	(EtherNet/IP) EIP / MQTT	Use EIP-2060
Cnv-06	Modbus RTU / MQTT JSON Modbus ASCII / MQTT JSON	Use M-7055D
Cnv-07	Internal / OPC UA	Data Exchange for OPC UA Client to Client
Cnv-08	** / MQTT (JSON) -> AWS	Use MQTT to upload data to AWS
Cnv-09	Modbus RTU <=> SNMP	Use UA-7231M [**Video**]

4.2 [Module Connecting to Azure] Category

"Module Connecting to Azure" is a common way to integrate IoT devices into the cloud. Many of the applications use MQTT connection to the cloud for the setting is fast and easy. The UA series also provides the MQTT function for module to connect to the Azure platform and allows users to publish messages to Microsoft Azure and receive messages from Microsoft Azure.

Before setting the Azure connection, user needs to apply user **SAS Token** and **Root CA** from Microsoft Azure. This FAQ will introduce the setting steps and the function parameters. There are 3 items about Azure function in the “Function Wizard”. All connections use the MQTT Service. Here will introduce the Modbus TCP / Azure.



Module Connecting to Azure

(Master) Modbus RTU ⇔ Azure

(Master) Modbus TCP ⇔ Azure

(Master) Modbus ASCII ⇔ Azure

Item	Description
Modbus RTU <=> Azure	Allow the Modbus RTU connecting to the Microsoft Azure platform and can publish messages to Microsoft Azure and receive messages from Microsoft Azure.
Modbus TCP <=> Azure	Allow the Modbus RTU connecting to the Microsoft Azure platform and can publish messages to Microsoft Azure and receive messages from Microsoft Azure.
Modbus ASCII <=> Azure	Allow the Modbus RTU connecting to the Microsoft Azure platform and can publish messages to Microsoft Azure and receive messages from Microsoft Azure.

UA FAQ Web Page: https://www.icpdas.com/en/faq/index.php?kind=326#950

No.	Function Wizard FAQ - Item	PDF
[Module Connecting to Azure]		
azr-1	Modbus TCP / Azure	Use DL-302 [Attachment]

4.3 [Data Log] Category

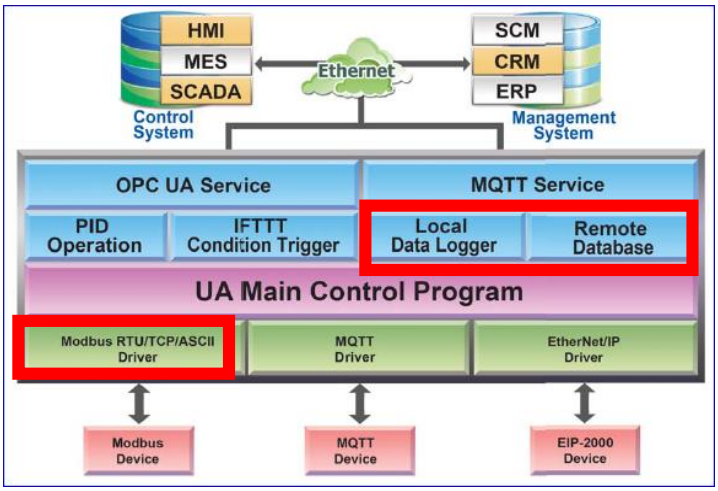
UA series supports Data Logger function. Its Local Data Logger can save I/O data log to local CSV file, and record I/O status at the scheduled time. Furthermore, users can set the time interval of which CSV file to generate and divide on the local side. Its Remote Database can import I/O data collection directly into the remote SQL database, e.g. MS SQL, MySQL, MariaDB …, for the Big Data analysis.



This section will introduce the setting steps and the function parameters of the “Data Log”. In the category, there are 6 items about Modbus RTU/TCP module for Local Data Logger or MS SQL, MySQL/MariaDB… Remote Database. This section will introduce the function items in 3 sub-sections.

Data Log

- (Master) Modbus RTU ⇒ Local Data Logger
- (Master) Modbus TCP ⇒ Local Data Logger
- (Master) Modbus RTU ⇒ MS SQL
- (Master) Modbus TCP ⇒ MS SQL
- MQTT ⇒ MS SQL
- (Master) Modbus RTU ⇒ MySQL(MariaDB)
- (Master) Modbus TCP ⇒ MySQL(MariaDB)
- MQTT ⇒ MySQL(MariaDB)



Item	Description
Modbus RTU => Local Data Logger **Modbus TCP => Local Data Logger**	Provide users to record I/O data of Modbus RTU/TCP module to internal register.
Modbus RTU => MS SQL **Modbus TCP => MS SQL** **MQTT => MS SQL**	Provide users to record I/O data of Modbus RTU/TCP module into remote database MS SQL.

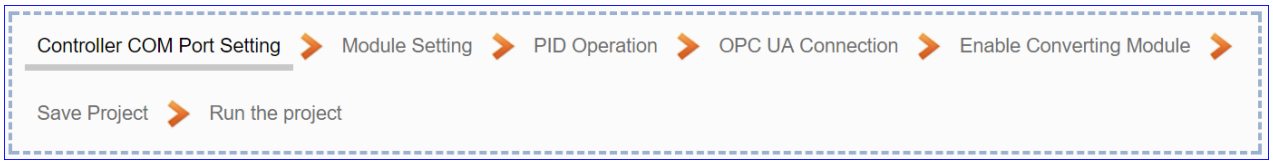
Item	Description
Modbus RTU => MySQL(MariaDB) **Modbus TCP => MySQL(MariaDB)** **MQTT => MySQL(MariaDB)**	Provide users to record I/O data of Modbus RTU/TCP module into MySQL/MariaDB remote database.

UA FAQ Web Page: https://www.icpdas.com/en/faq/index.php?kind=326#950

No.	Function Wizard FAQ - Item	PDF
[Data Log]		
dbl-1	Modbus RTU / Local Data Logger	Use tM-AD4P2C2 and DL-302
dbl-2	Modbus TCP / Local Data Logger	Use DL-302
dbl-3	Modbus RTU / MS SQL	Use tM-AD4P2C2 and DL-302
dbl-4	Modbus TCP / MS SQL	Use DL-302
dbl-5	Modbus RTU / MySQL(MariaDB)	Use M-7026
dbl-6	Modbus TCP / MySQL(MariaDB)	Use TPD-703 and DL-302
Dbl-07	MQTT / MS SQL	Use MQ-7255M
Dbl-08	MQTT / MySQL(MariaDB)	Use MQ-7255M

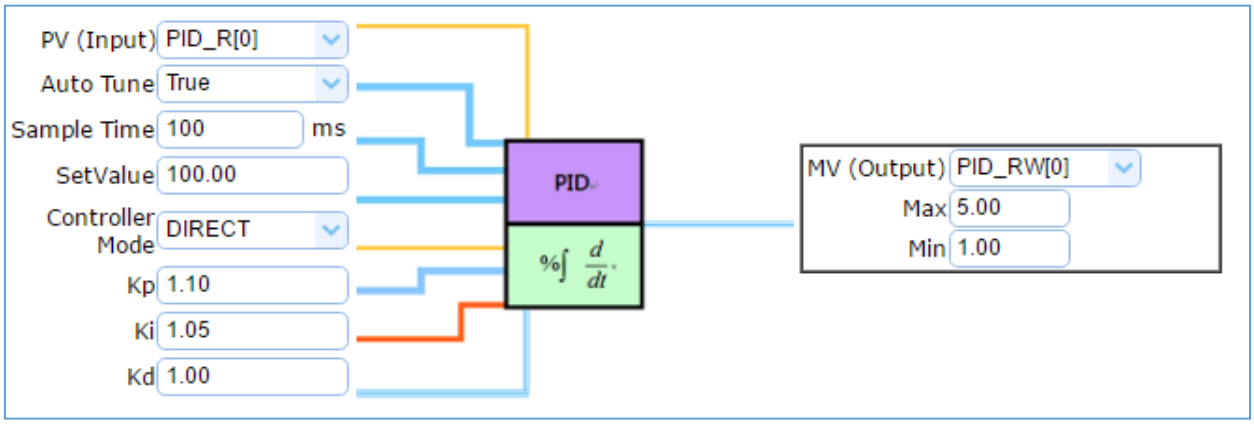
4.4 [PID] Category

PID (Proportional-Integral-Derivative) control is the most widely used in industrial control systems. A regulator that controlled in accordance with Proportional, Integral and Derivative is called PID

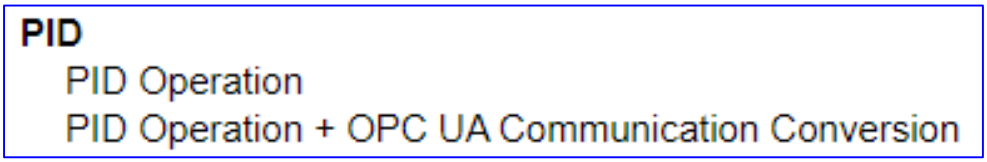


control for short, also called PID regulator. When the user cannot fully grasp or measure parameters of the control system, the PID regulator is the best solution.

The PID controller is a common feedback loop component in industrial control applications. The controller compares the collected data with a reference value and then uses this difference to calculate a new input value whose purpose is to allow the system data to reach or remain at the reference value.



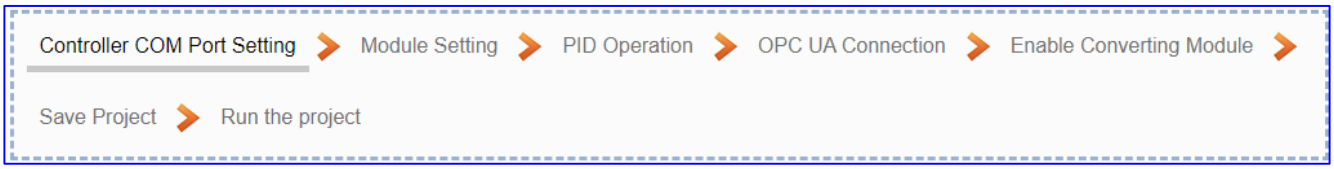
This section introduces the setting steps and the function parameters of the PID. There are 2 items about “PID” function in the “Function Wizard”. The 2nd item [PID Operation + OPC UA Communication Conversion] is combining the 1st item [PID Operation] and the FAQ. **The PID operation is for AI/AO data only, please select the AIO module when use the PID related Function Wizard.**



[Step Box] of [PID Operation] :



[Step Box] of [PID Operation + OPC UA Conversion] :

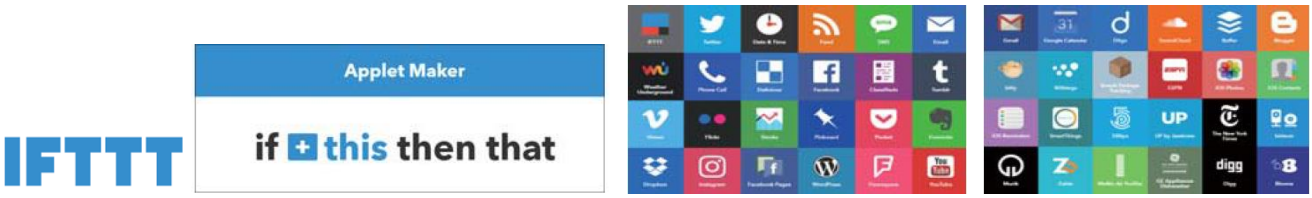


UA FAQ Web Page: https://www.icpdas.com/en/faq/index.php?kind=326#950

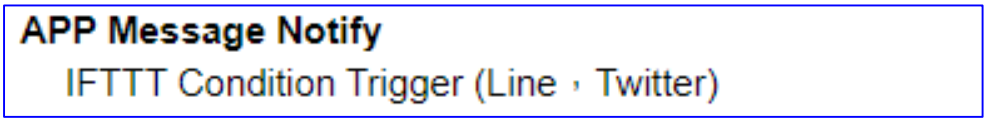
No.	Function Wizard FAQ - Item	PDF
[PID]		
pid-1	PID Operation	Use M-7026

4.5 [APP Message Notify] Category

The "APP Message Notify" in the UA Function Wizard provides a condition trigger of IFTTT. IFTTT (if this then that) is a cloud service platform that easy to get your apps and devices working together via creating chains of simple conditional statements (applets). An applet is triggered by changes that occur within other web services such as Line, Twitter, Gmail, Instagram, etc. For example, “if” Line (Service A) has a new message, “then” send an email to Gmail (Service B). With the IFTTT cloud platform and UA functions, the users can send messages to IFTTT-related cloud services such as Line, Twitter, etc. when the special events occur.



This section introduces the setting steps and the function parameters of the “APP Message Notify” and its item of “IFTTT Condition Trigger (Line, Face, Twitter)” function in the “Function Wizard”.



[Step Box] of [IFTTT Condition Trigger (Line, Twitter)] :



UA FAQ Web Page: https://www.icpdas.com/en/faq/index.php?kind=326#950

No.	Function Wizard FAQ - Item	PDF
[APP Message Notify]		
app-01	IFTTT Condition Trigger (Line, Twitter)	Use M-7055D
app-02	IFTTT Condition Trigger (Line, Twitter)	Set up LINE Message Notify on IFTTT

4.6 [MQTT_Customized] Category

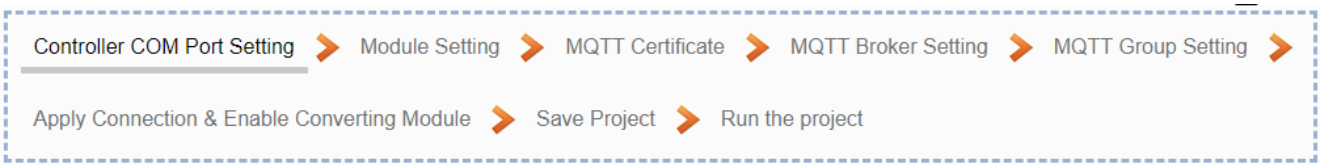
The " MQTT_Customized " in the UA Function Wizard provides a custom MQTT format setting function. Users can customize the MQTT format layout and add the module value to the publishing message. With customized MQTT message content, this function can support multiple IoT platforms.

For example, to connect to the Azure platform, the user can use the standard MQTT JSON format; to connect to the AWS platform, the user can use the general standard MQTT format; to connect to the ThingSpeak platform, the user needs to customize the MQTT format according to the user needs. Then, the user can use this [MQTT customization] function to define and set up the needed MQTT format.

This section introduces the setting steps and the function parameters of the “MQTT _Customized” and its item of “MQTT IoT Cloud” function in the “Function Wizard”.



[Step Box] of [MQTT IoT Cloud] :



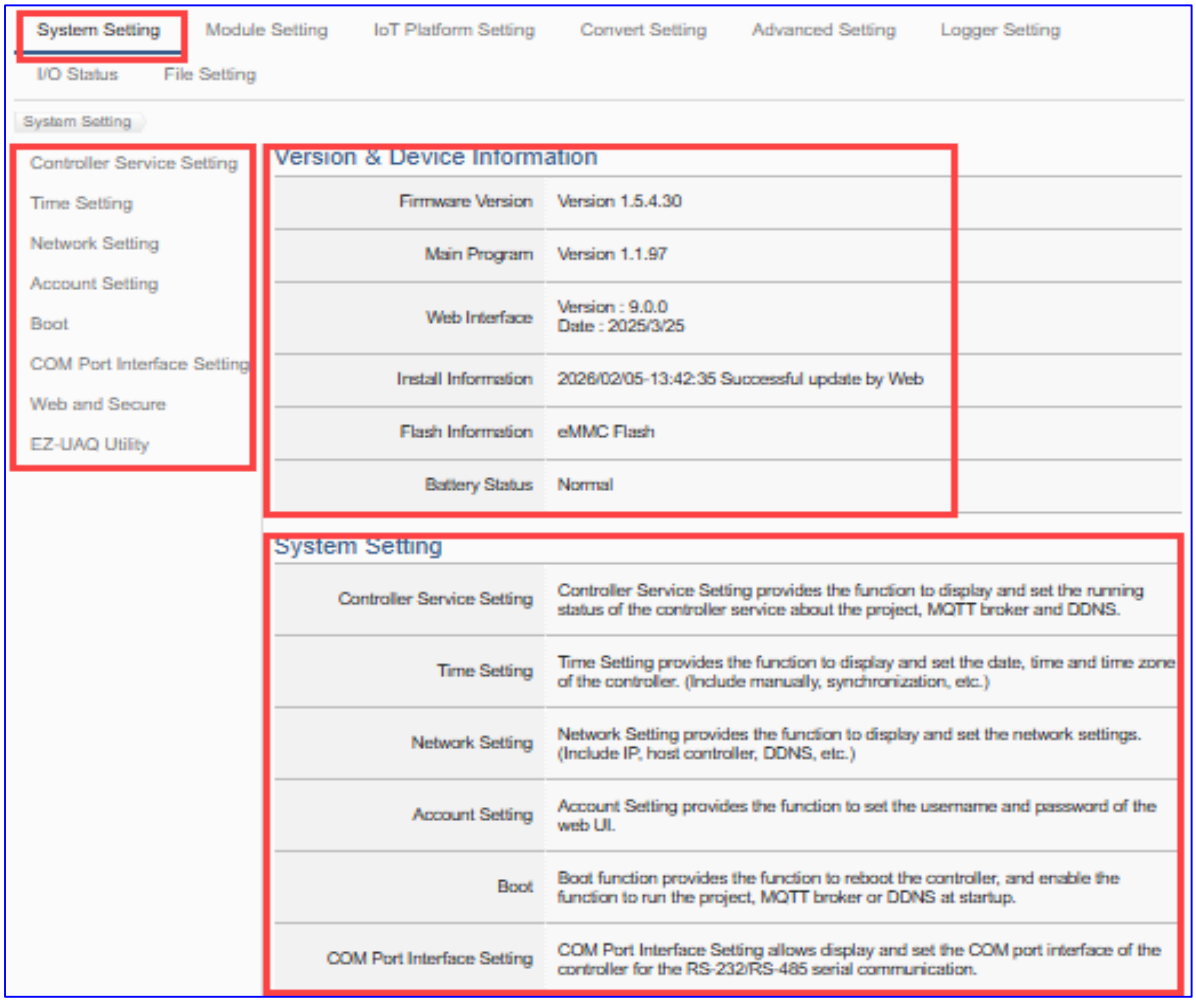
UA FAQ Web Page: https://www.icpdas.com/en/faq/index.php?kind=326#950

5 Main Menu: Parameter Settings

5.1 Main Menu: System Setting

System Setting is the first item of the Main Menu and the first screen view when login the UA Web UI. The System Setting provides the functions for system management of UA series controller and displays the version information of the system (Higher-left picture).

[System Setting] includes several sub-menu functions (Left picture) and the function descriptions are listed on the page of the Main Menu, such as the controller service, time, network, account, boot and COM port interface settings. This chapter will introduce these function items and setting parameters.

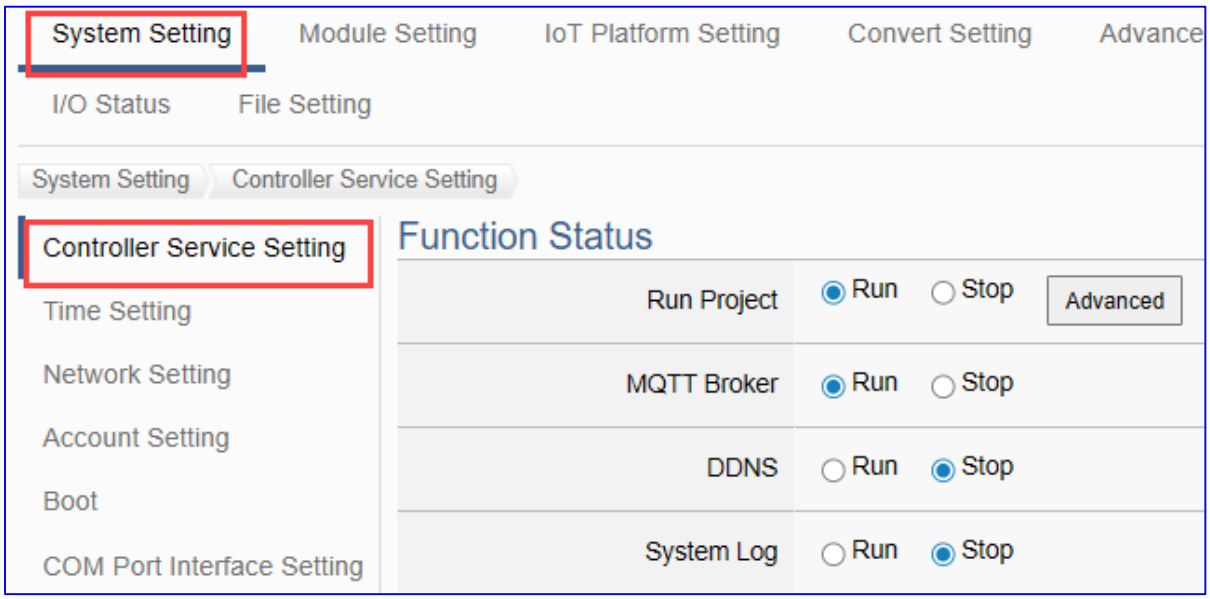


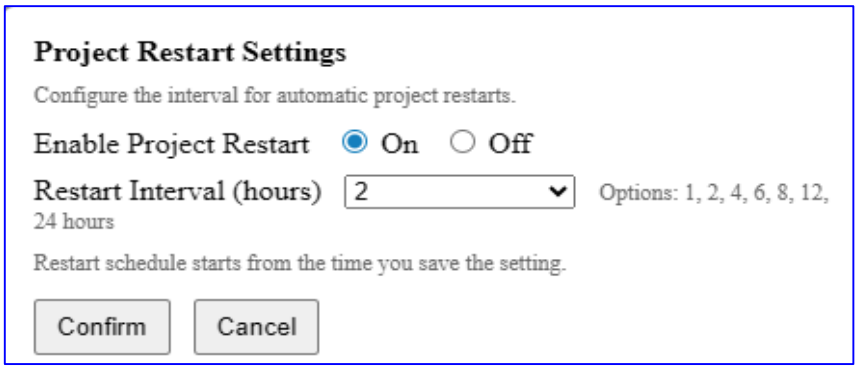
The setting for UA series controllers is to set up from the left to the right of the main menu functions. User can find the setting step and Web UI information in the following chapters.

CH2 Quick Start 1: Hardware/Network Connection
CH3 Quick Start 2: Web UI / Setting Steps
CH4 Function Wizard: Project Quick Setup

5.1.1 Controller Service Setting

Controller Service Setting provides the function to display and set the running status of the controller service about the project, MQTT Broker and DDNS.



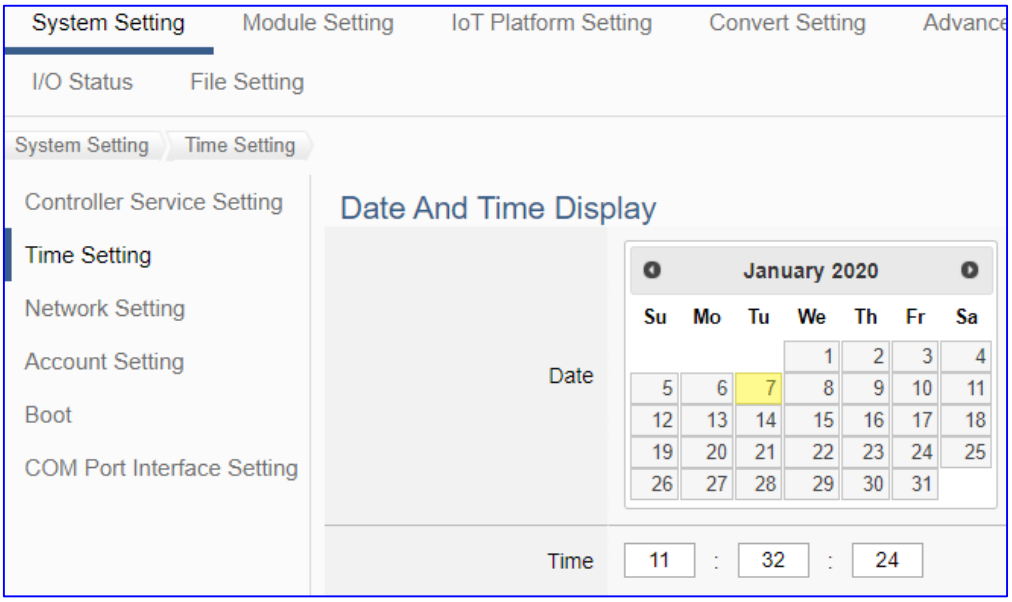
System Setting > Controller Service Setting > Functional status	
Run Project	Display the current status of project running in the UA series controller and provide “**Run**” and “**Stop**” button to switch the status. Default: Run.
Run Project > [Advanced]	Users can set the project's scheduled restart. This automatically restarts UA projects after a set number of hours.  * Enable Project Restart: Select to turn the restart setting on or off. * Restart Interval (hours): Select the interval for the restart (in hours).
MQTT Broker	Display the current status of MQTT Broker of the UA series controller and provide “Run” and “Stop” button to switch the status. Default: Run.
DDNS	Display the current status of DDNS Client of the UA series controller and provide “Run” and “Stop” button to switch the status. Default: Stop.

System Setting > Controller Service Setting > Functional status	
System Log	After being enabled, UA will record the following UA status data every 30 minutes: 1. Record IP information 2. TCP connection status 3. Web service status 4. CPU usage 5. MQTT Broker test connection status The recorded log data will be stored in MicroSD Card, and the file can be downloaded through the web interface [File Setting] > [Log File Download] > [DataLog] > [syslog]

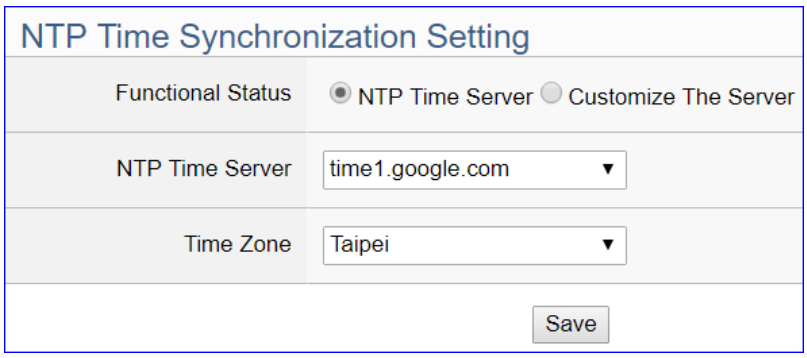
5.1.2 Time Setting

Time Setting provides the function to display and set the date, time and time zone of the controller, including manually, synchronization, etc.

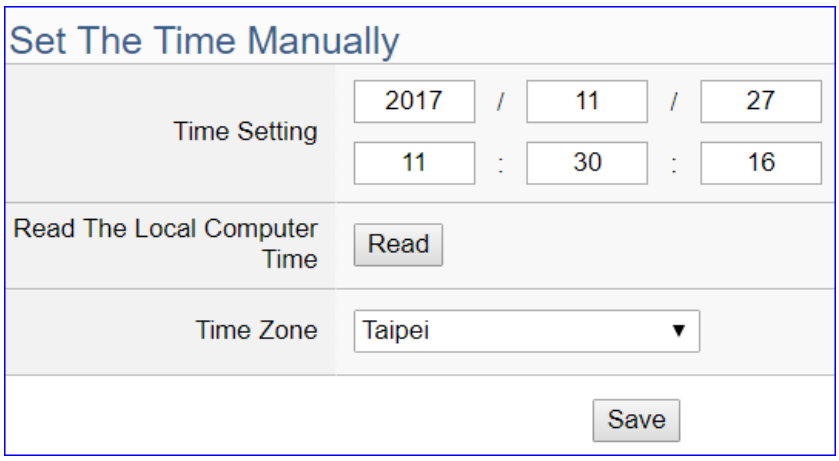
Time Setting provides 3 functions: Data and Time Display, NTP Time Synchronization Setting and Set the Time Manually.



System Setting > Time Setting > Date And Time Display	
Date	Display the date of the UA series controller. The yellow block means current day. User can switch to show the date in other month.
Time	Display the current time of the UA series controller, including hour, minute and second.



System Setting > Time Setting > NTP Time Synchronization Setting	
Functional Status / NTP Time Server	Set up one NTP Time Server from the google (4), windows and nist (4) servers for synchronization. Click “Customize The Server” and enter the IP address or the domain name can set up user own time server.
Time Zone	Set up the time zone.
Save	Click to save the settings of this item.



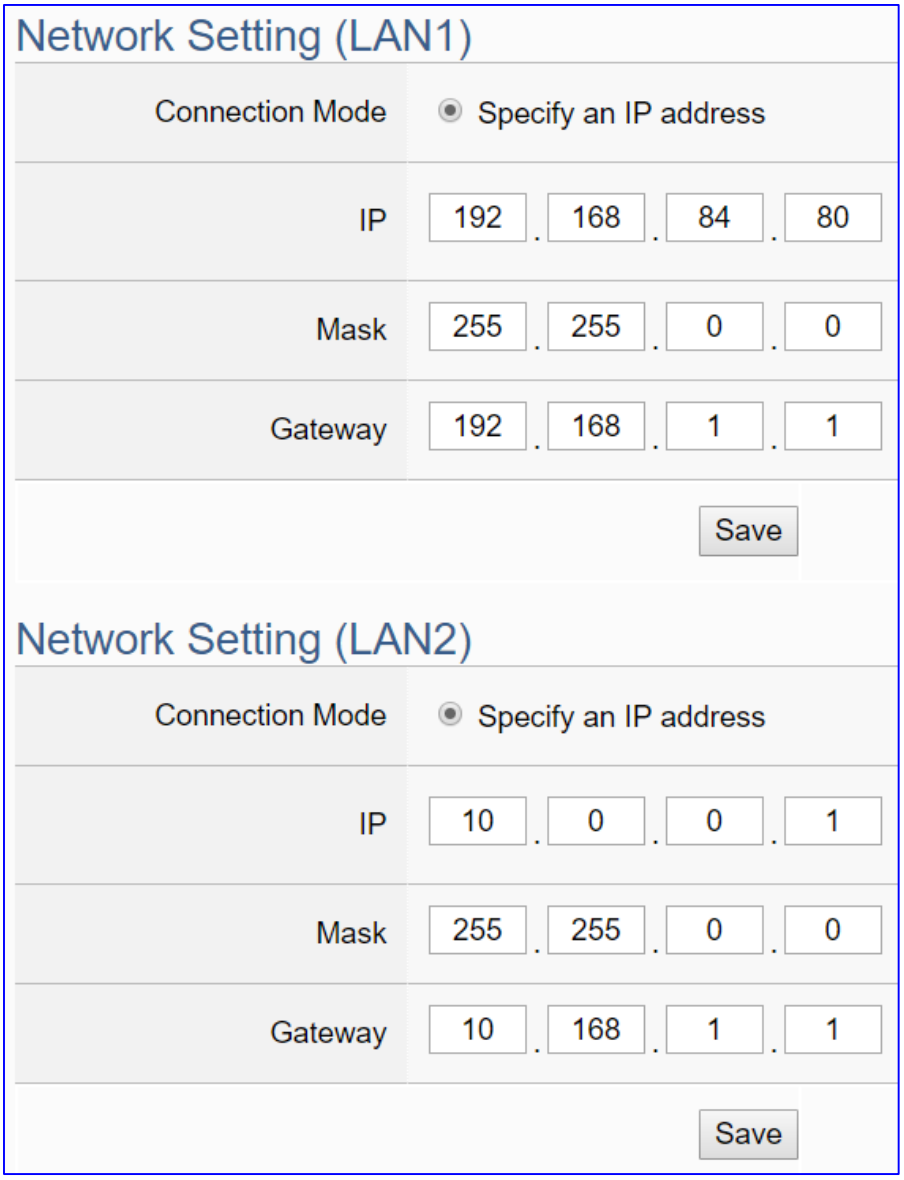
System Setting > Time Setting > Set The Time Manually	
Time Setting	Set the system time of the UA controller by manually. Directly enter the new year/month/date and hour:minute:second.
Read The Local Computer Time	Click [Read] can copy the current time of the using computer to the “Time Setting” of this item.
Time Zone	Set up the time zone.
Save	Click to save the settings of this item and update the data of “Time Setting” to the “Date And Time Display” on the top of this page.

5.1.3 Network Setting

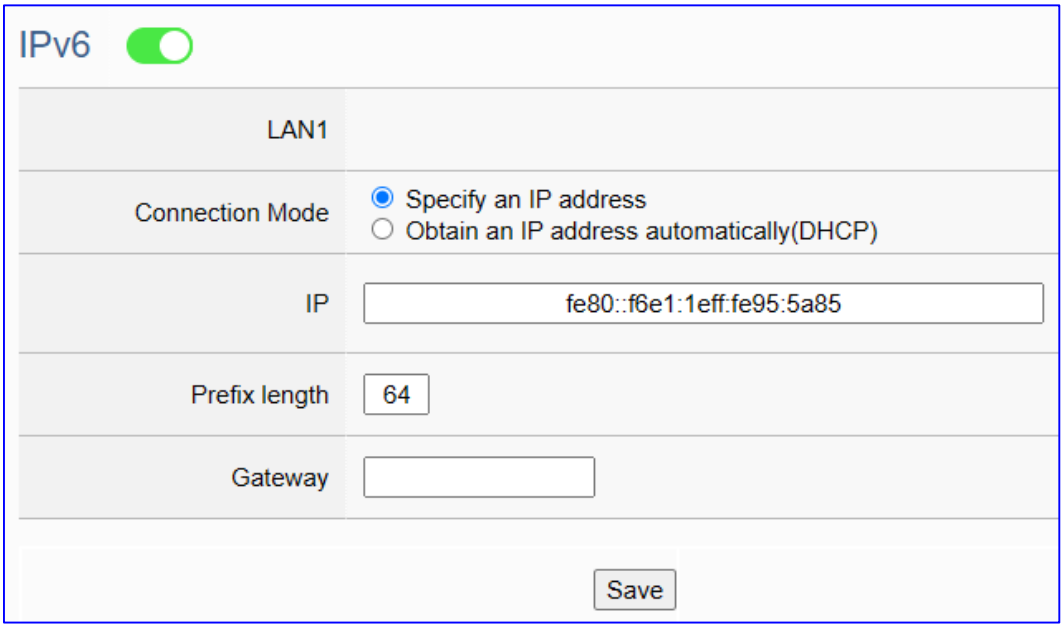
Network Setting provides the function to display and set the network settings, including IP address, host controller, DDNS, etc.

NOTE:

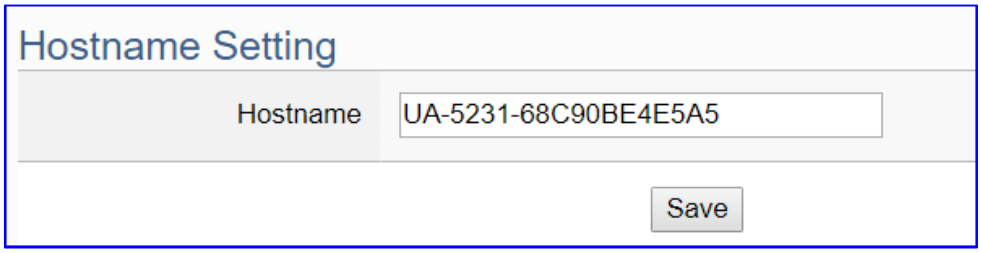
1. **UA-2800 series has 2 LANs (LAN1 / LAN2).**
2. **UA-2800 series supports static IP only, so it needs to specify an IP address for each LAN1 and LAN2.**
3. **The IPs of LAN1 and LAN2 of UA-2800 series must be set in different subnets. Ex: Set one IP to 192.168.84.80, and set the other IP to other subnets, e.g. 10.1.1.2.**



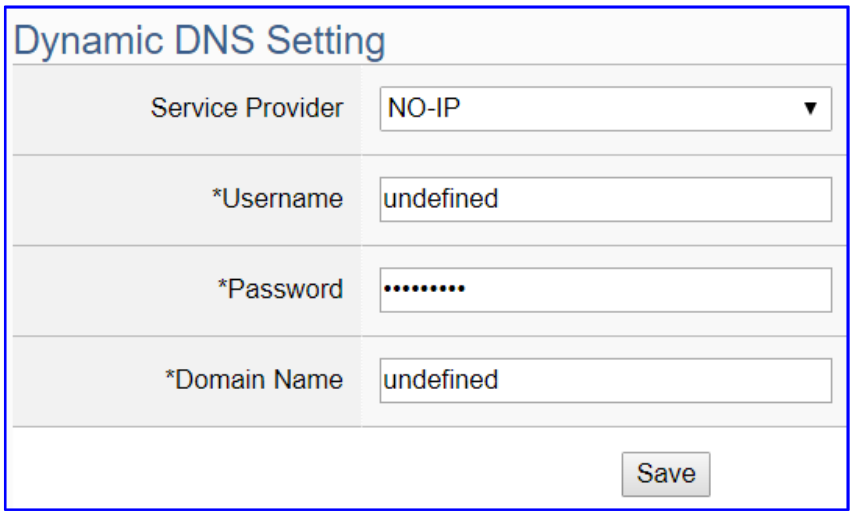
System Setting > Network Setting > Network Setting (LAN1)	
Connection Mode	**Specify an IP address**: Users input the values in the fields of IP, Mask and Gateway according to customer's network. Detail information for the factory default value of UA controller network refers to the Section 2.2.1.
IP	The LAN1 IP address of this UA. Factory Default: 192.168.255.1
Mask	The LAN1 mask address of this UA. Factory Default: 255.255.0.0
Gateway	The LAN1 gateway address of this UA. Factory Default: 192.168.1.1
Save	Click to save the settings of LAN1 item.
System Setting > Network Setting > Network Setting (LAN2)	
Connection Mode	**Specify an IP address**: Users input the values in the fields of IP, Mask and Gateway according to customer's network. Detail information for the factory default value of UA controller network refers to the Section 2.2.1.
IP	The LAN2 IP address of this UA. Factory Default: 10.0.0.1
Mask	The LAN2 mask address of this UA. Factory Default: 255.255.0.0
Gateway	The LAN2 gateway address of this UA. Factory Default: 10.168.1.1
Save	Click to save the settings of LAN2 item.



System Setting > Network Setting > IPv6	
LAN1 LAN2	IPV6 address of this controller LAN1 or LAN2.
Connection Mode	Set the IPV6 address and specify the IP, prefix length, and gateway fields below to manually input. or automatically generated by DHCP
IP	IPV6 address of this controller LAN1 or LAN2
Prefix length	IPV6 subnet prefix length of the controller LAN1 or LAN2
Gateway	IPV6 gateway address of the controller LAN1 or LAN2
Save	Click to save the settings of this item.



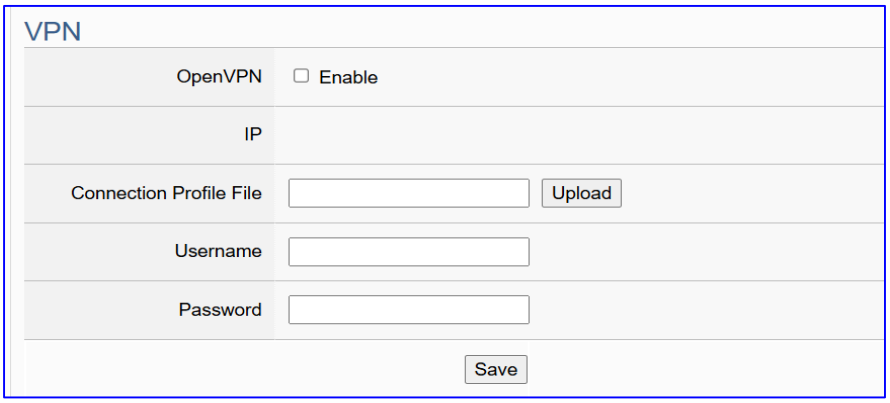
System Setting > Network Setting > Hostname Setting	
Hostname	The host name of this UA. Default: system value. User can give a new name, but cannot be null.
Save	Click to save the settings of this item.



System Setting > Network Setting > Dynamic DNS Setting	
Service Provider	Select the company of the DDNS service. Default: NO-IP. Supports: NO-IP, ChangeIP.com, DynDNS, FreeDNS.
*Username	Set up the login user name. The star * means the field cannot be null. Default: undefined.
*Password	Set up the login password. The star * means the field cannot be null.
*Domain Name	Define the parked domain name of the DDNS. The star * means the field cannot be null. Default: undefined.
Save	Click to save the settings of this item.

* The star " * " means the field cannot be null.

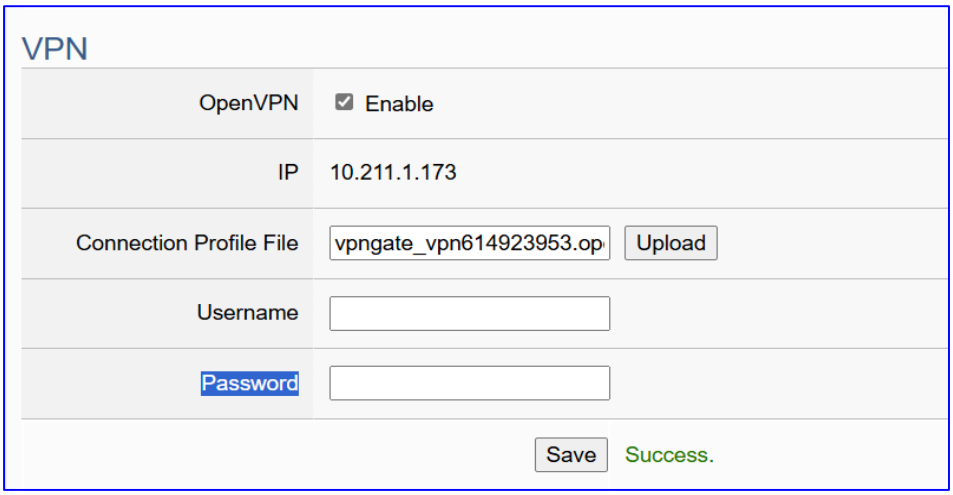
- **** VPN Setting:**



System Setting > Network Setting > VPN	
OpenVPN	Enable: Set whether the OpenVPN connection is enabled or not.
IP	OpenVPN Server configured IP, if offline or not enabled the field is blank.
Connection Profile File	Upload the OpenVPN Client profile file (sub-filename .conf).
Username	Configure the OpenVPN connection Username if the OpenVPN Server authentication mechanism is using the Username/Password method.
Password	Configure the OpenVPN connection Password if the OpenVPN Server authentication mechanism is using the Username/Password method.
Save	Click to save the settings of this item.

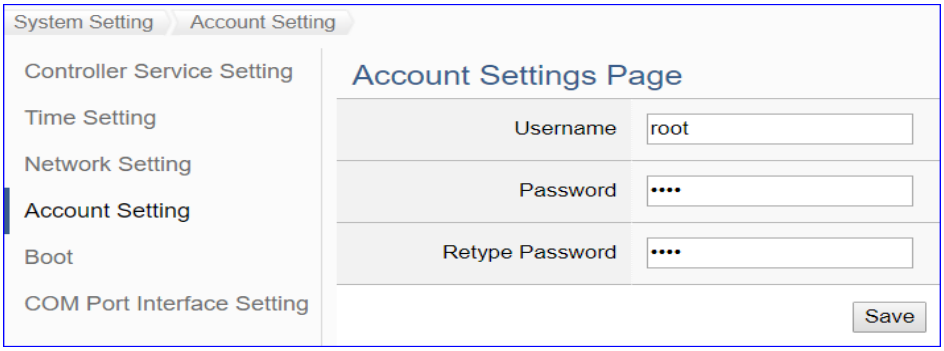
VPN Connection Setup Steps:

1. Upload Connection Profile File: When connecting to OpenVPN Server, you need to set up the OpenVPN Client Profile (refer to Appendix F for .conf example), click [Upload] to select the profile.
2. Set the Username and Password: If the OpenVPN Server authentication mechanism uses the Username/Password method, then the [Username] and [Password] should be set.
3. Click [Save] to save the settings.
4. Check the [Enable] and the IP field will be displayed when the connection is successful.



5.1.4 Account Setting

Account Setting provides the function to set the login username and password of the UA web UI.



System Setting > Account Setting > Account Settings Page	
Username	The login username for the UA Web UI. Factory default: root
Password	The login password for the UA Web UI. Factory default: root A strong password checking mechanism is added to the password setting. The new password must meet the following conditions: • Be at least 8 characters' long • Contains at least one lowercase letter • Contains at least one uppercase letter • contains at least one number Contains at least one symbol (**! @ # $ % ^ & * ( ) , . ? " : { } | < > \\ / ; = - [ ] ~ +**)
Retype Password	Retype the password for the operation conform when setting the new account information.
Save	Click to save the settings of this page.

After first login, change your password as soon as possible for your system safety.

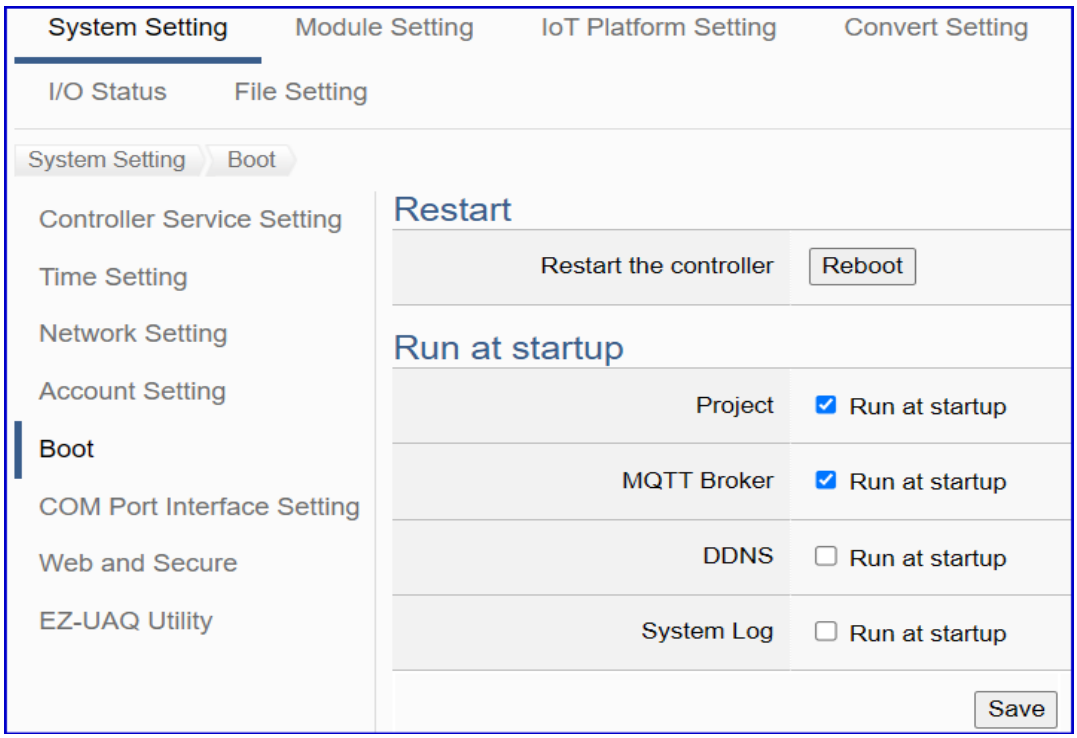
Steps to change the username and password:

1. Type the new username in the "Username" item.
2. Type the new password in the "Password" item.
3. Retype the new password in the "Retype Password" item.
4. Click the "Save". Then re-login the UA Web UI with the new username and password.

Factory Default Settings of UA Series			
Network	**IP (LAN1)** **IP (LAN2)**	**192.168.255.1** **10.0.0.1**	Assign UA a new IP address according to your case. Set the **LAN1** for the PC connection.
	Mask	**255.255.0.0**	
	Gateway	**LAN1: 192.168.1.1** **LAN2: 10.168.1.1**	
Web UI Account	**Username**	**root**	**After login, change your password as soon as possible.** (Section 5.1.4 for Web UI)
	Password	**root**	

5.1.5 Boot

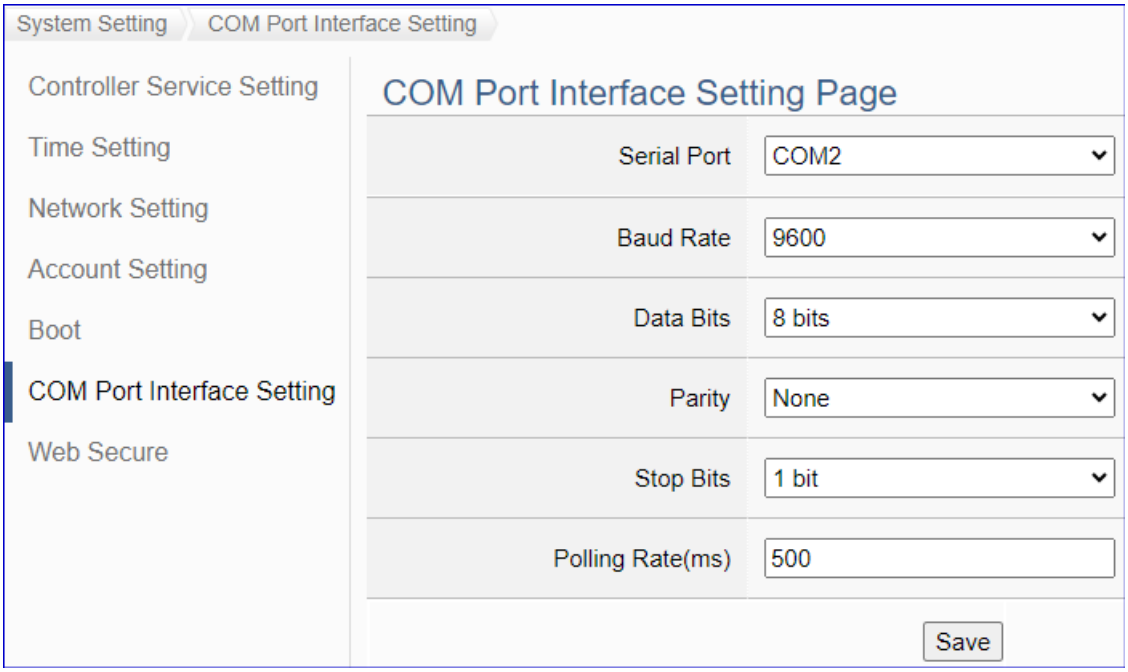
Boot function provides the function to reboot the UA series controller, and enable the function to run the project, MQTT broker or DDNS at startup.



System Setting > Boot > Restart	
Restart the controller	Click “Reboot” can restart the UA controller at once.
System Setting > Boot > Run at startup	
Project	Check the “Run at startup” box can set the project to run at the UA controller startup. Default: check.
MQTT Broker	Check the “Run at startup” box can set the MQTT Broker to run at the UA controller startup. Default: check.
DDNS	Check the “Run at startup” box can set the DDNS to run at the UA controller startup. Default: uncheck.
System Log	After being enabled, UA will record the following UA status data every 30 minutes: 1. Record IP information 2. TCP connection status 3. Web service status 4. CPU usage 5. MQTT Broker test connection status The recorded log data will be stored in MicroSD, and the file can be downloaded through the web interface [File Settings] > [Log File Download] > [DataLog] > [syslog]
Save	Click to save the settings of this page.

5.1.6 COM Port Interface Setting

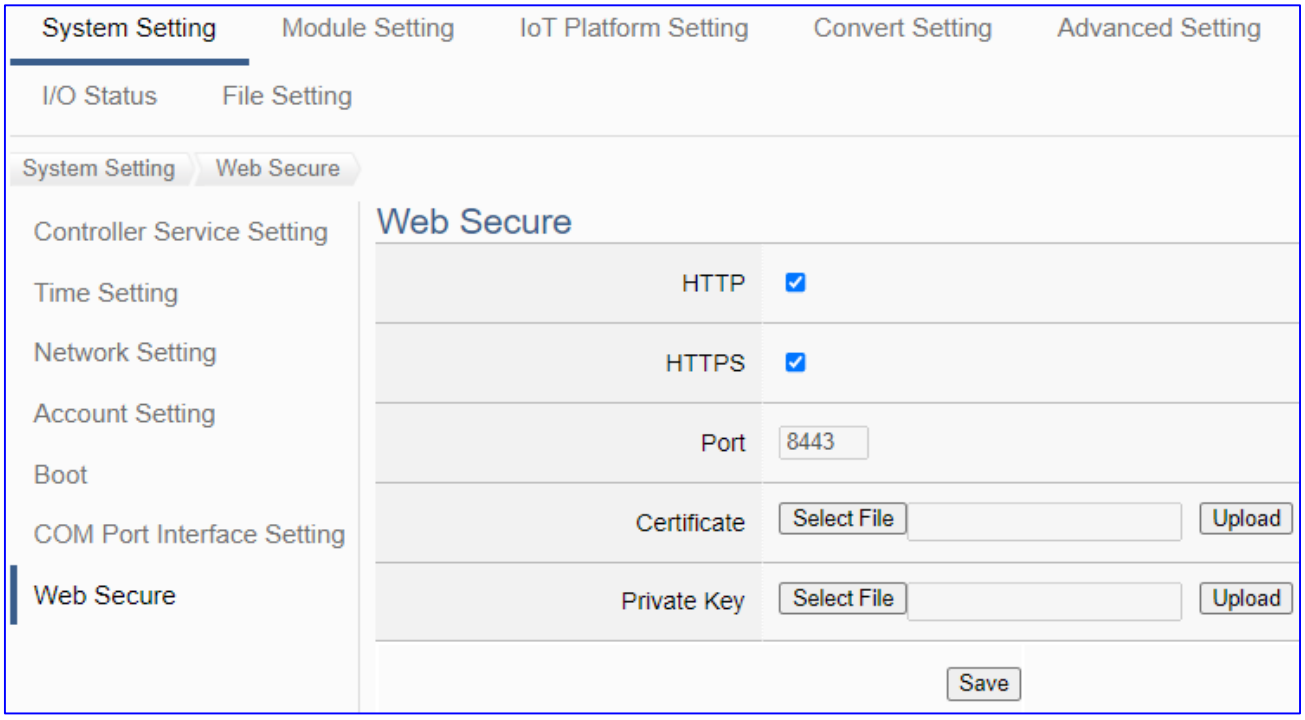
COM Port Interface Setting allows display and set the COM port interface of the UA series controller for the RS-232/RS-485 serial communication.



System Setting > COM Port Interface Setting > COM Port Interface Setting Page	
Serial Port	Choose the serial port of UA controller that links with the I/O module. UA-2800: COM2 (RS-232); COM3 (RS-485); COM4 (RS-485) Select the port that the module is actually connected to.
Baud Rate	Choose a baud rate to communicate with the module: 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200. The UA controller and the I/O module need have the same baud rate. Default: 115200.
Data Bits	The number of bits used to represent one byte of data: 7 bits or 8 bits. Default: 8 Bits.
Parity	Choose one way for the parity checking. Options: None, Even, and Odd. Default: None.
Stop Bits	Choose the number of stop bit: 1 bit or 2 bits. Default: 1.
Polling Rate (ms)	Set a time interval for the command. Minimum: 20 ms. Default: 500 ms
Save	Click to save the settings of this page.

5.1.7 Web Secure

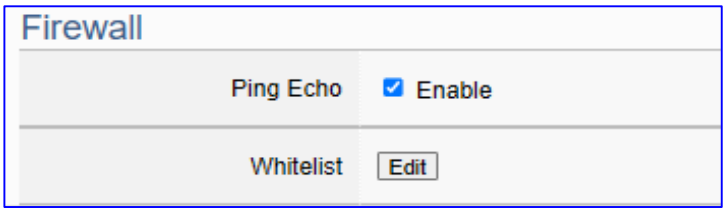
This function is mainly to set the security options and related parameter descriptions of the web page.



System Setting > Web Secure –Web Secure	
HTTP	Check box to enable web HTTP communication (Default: Enable)
HTTPS	Check box to enable web HTTPS communication Port Number: 8443
Certificate	Certificate required for HTTPS communication. The user can select the certificate file on the browser side by clicking the “Select File” button. Then upload by clicking the “Upload” button.
Private Key	Private key required for HTTPS communication. The user can select the Private Key file on the browser side by clicking the “Select File” button. Then upload by clicking the “Upload” button.

After uploading the certificate and private key, when using HTTPS to securely encrypt the webpage, please enter “**https://**” in the address bar of the browser, add the **IP**, add the UA HTTPS port number "**:8443**" **after the IP**, and then press Enter to enter the webpage, the example is as follows:

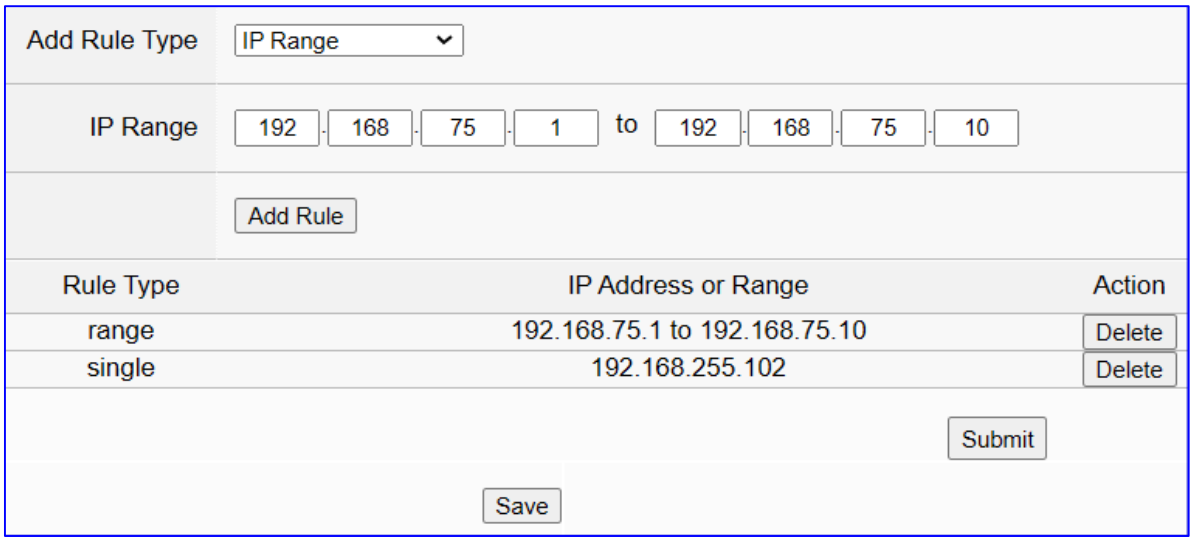




The firewall includes “Ping Echo” (default: disabled) and whitelist settings.
Click [Edit] to expand the [Whitelist] settings:



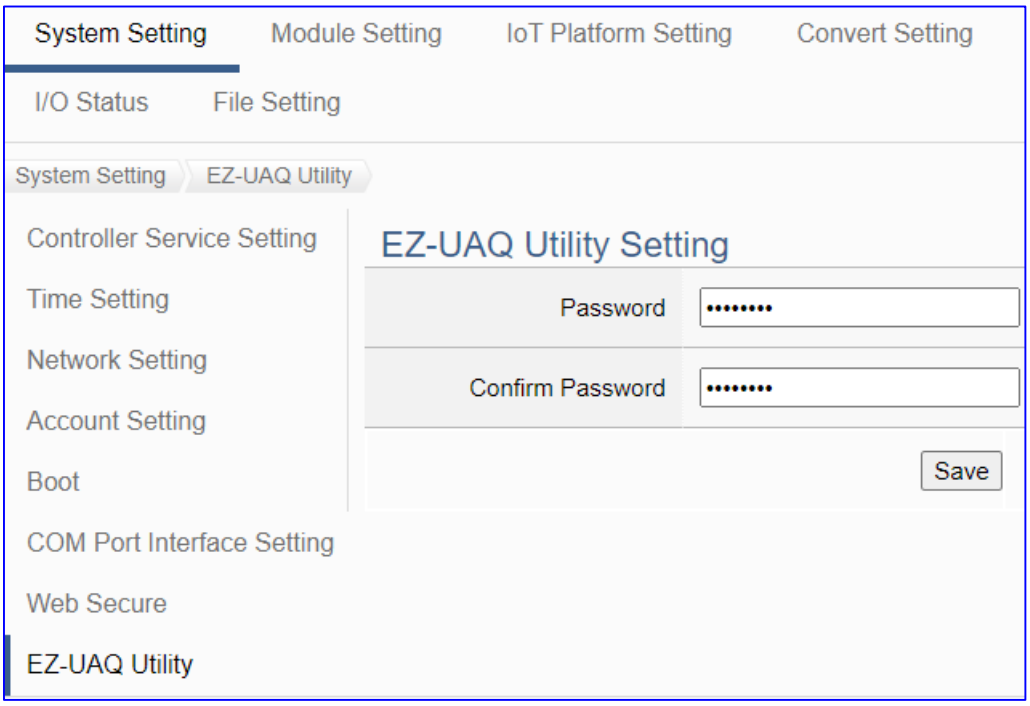
Or



System Setting > Web and Secure – Firewall	
Ping Echo	If checked, enables the UA to respond to ping command. (Default: disabled)
Whitelist	Click [Edit] to expand the settings page to allow connected device IP or IP range devices
Add Rule Type	There are two types of whitelist rules: single IP address, IP range
Single IP Address	Allows one single device with a specified IP to connect
IP Range	Allow devices within an IP range to connect
Add Rule	After setting a rule, click the [Add Rule] button once and the rules will be listed below.
Action	To delete a rule, click the [Delete] button of the rule list
Submit	After setting all the rules, click [Submit] to complete the whitelist setting.
Save	Save all settings on this web page.

5.1.8 EZ-UAQ Utility

This function is mainly to set up the password for operating the functions from the EZ-UAQ Utility.



System Setting > EZ-UAQ Utility	
Password	set up the password for operating functions from EZ-UAQ Utility. Password rules: Allow English and numbers, no special symbols, at least 4 characters
Confirm Password	Type the password to confirm the setting password

UA supports the new version of EZ-UAQ Utility functions starting from V1.4.2.0, as follows (for details, please refer to the Utility manual)

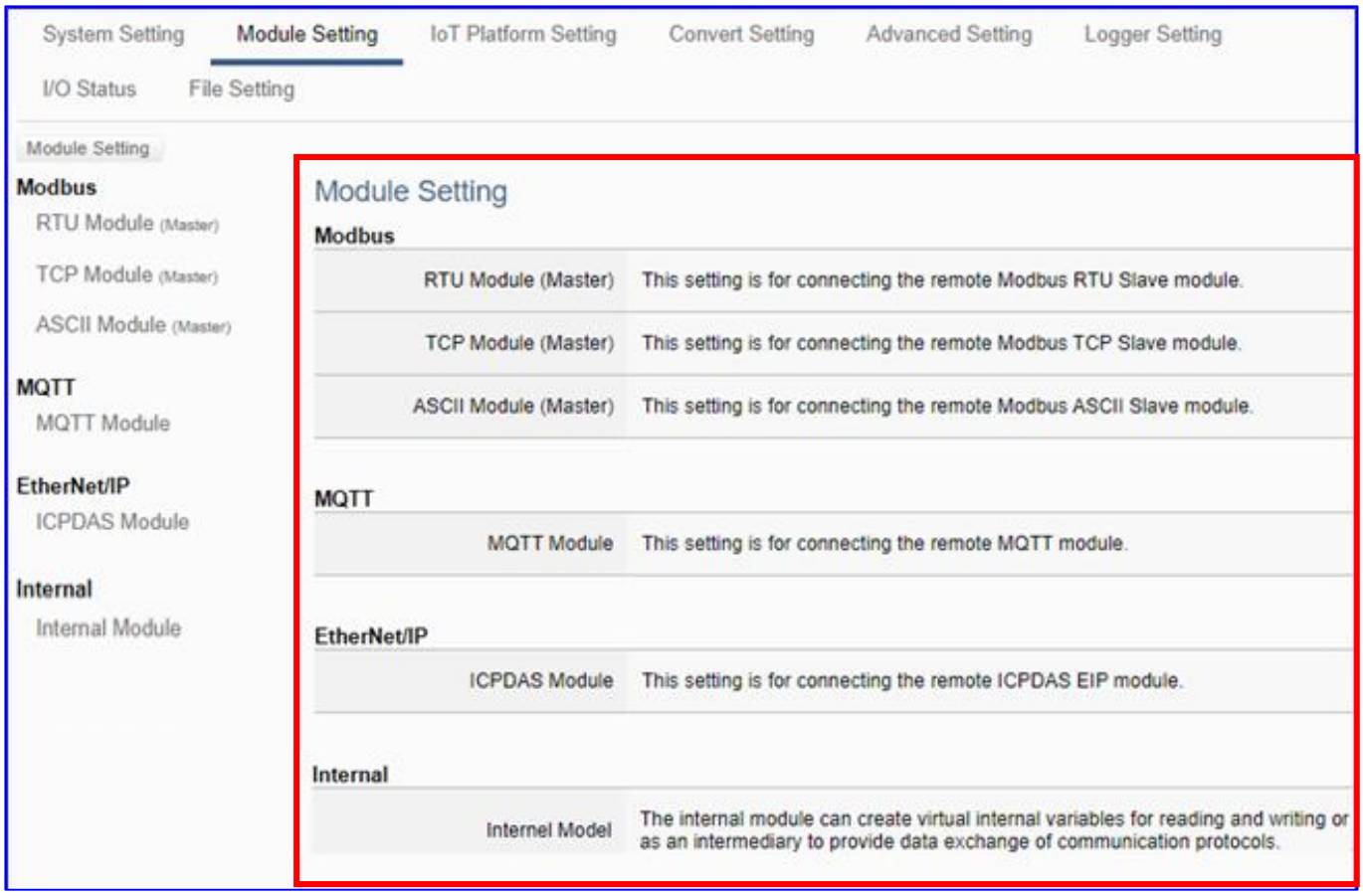
- Module Details (TCP、UDP、Protocol、Port)
- Reduce CPU Usage
- Update Firmware, Update Project
- Download Modbus and OPC UA Configuration
- Download Log
- Download Project

When EZ-UAQ Utility uses the above functions and connects to UA, UA will require password verification, and the operation will only be processed if the verification is passed. The user sets the EZ-UAQ Utility password here to verify the password sent by the Utility.

5.2 Main Menu: Module Setting

Module Setting is the second item of the Main Menu. The Module Setting provides the functions for UA series controller to connect the remote Modbus (RTU/TCP/ASCII module), remote MQTT and remote EtherNet/IP module.

[Module Setting] includes three sub-menu functions (see the picture below) and the function descriptions are listed on the page of the Main Menu, such as the Modbus RTU Module (Master), TCP Module (Master), ASCII Module (Master), MQTT and ICP DAS EIP Module. The Module Setting will support more modules in the future. This chapter will introduce the current function items and setting parameters.



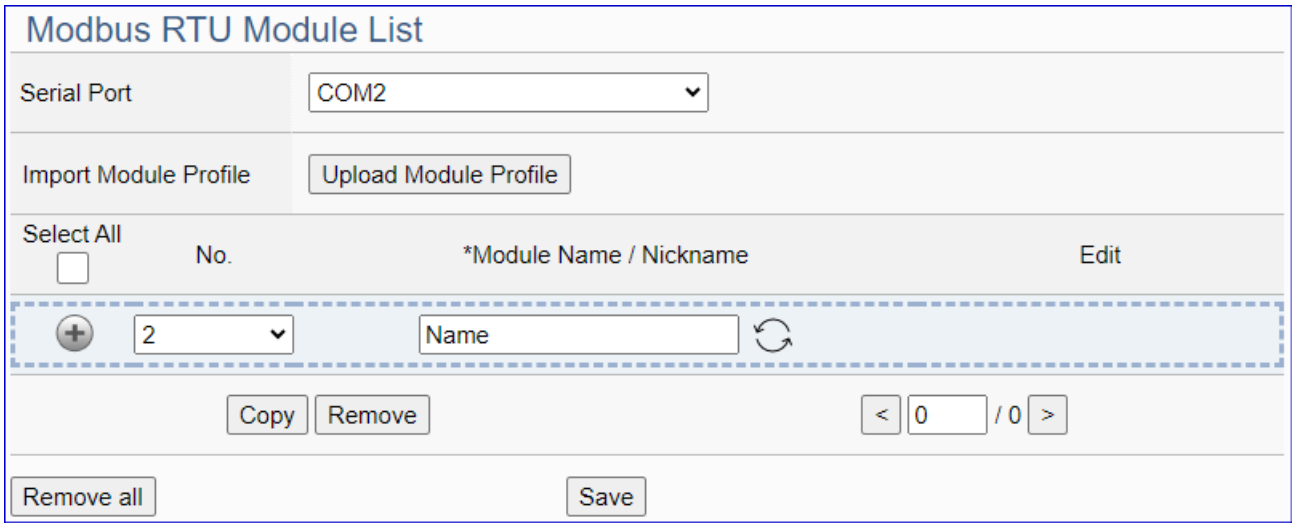
The setting for UA series controllers is to set up from the left to the right of the main menu functions. User can find the setting step and Web UI information in the following chapters.

CH2 Quick Start 1: Hardware/Network Connection
CH3 Quick Start 2: Web UI / Setting Steps
CH4 Function Wizard: Project Quick Setup

Recommend to use ICP DAS module, system will auto set up the Modbus Mapping Table. The user can check the module Modbus address or I/O number from the user manual.
Website: https://www.icpdas.com/en/product/p02.php?root=537

5.2.1 Modbus RTU (Master)

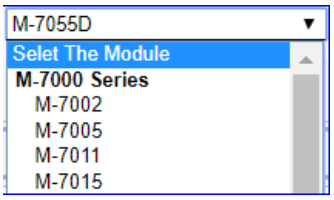
This setting is for UA Controller connecting the remote Modbus RTU Slave module.



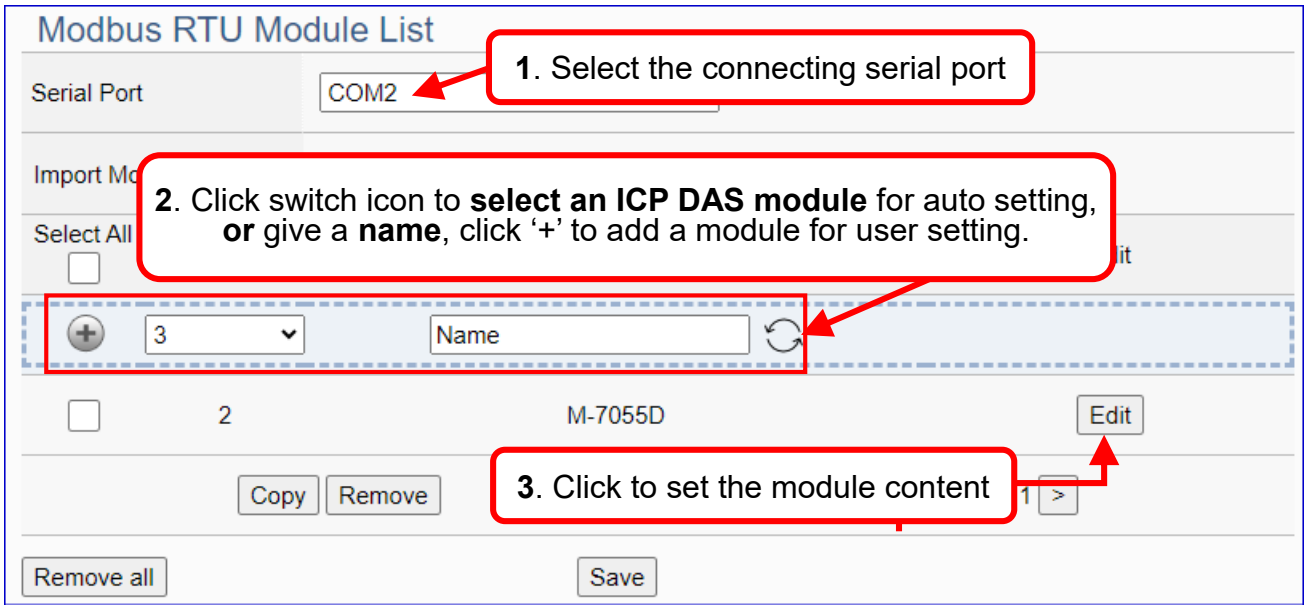
This page is for setting the communication values with the connected modules. First choose the serial port that connected with the module, and each module can give a name (Default: Name). Click [⊕] button could add a new module. If using ICP DAS module, user just need to select the model number, system will auto add and setup the module. Click [Edit] button can configure the module content and the Modbus mapping table.

Setting Steps:

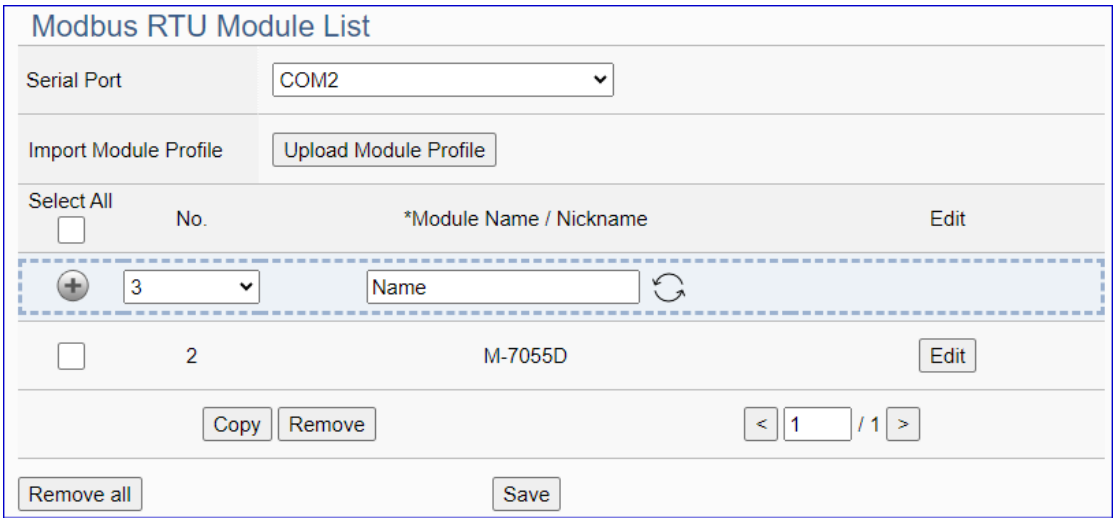
1. Select the module Serial port
2. Click the switch icon ⟳ to select the adding mode:

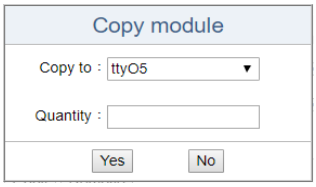
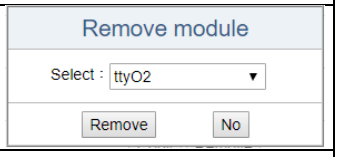
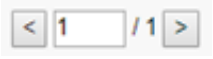


   a) **Select The Module**: Select an ICP DAS model (as the pic), system will auto setup.
   b) **Name**: Give a name, e.g. M-7055D. Click [⊕] to add a module for user setting.
3. Click the button [Edit] to enter the Module Content Setting page
   View or set the Modbus Mapping Table for the UA series and module I/O channels



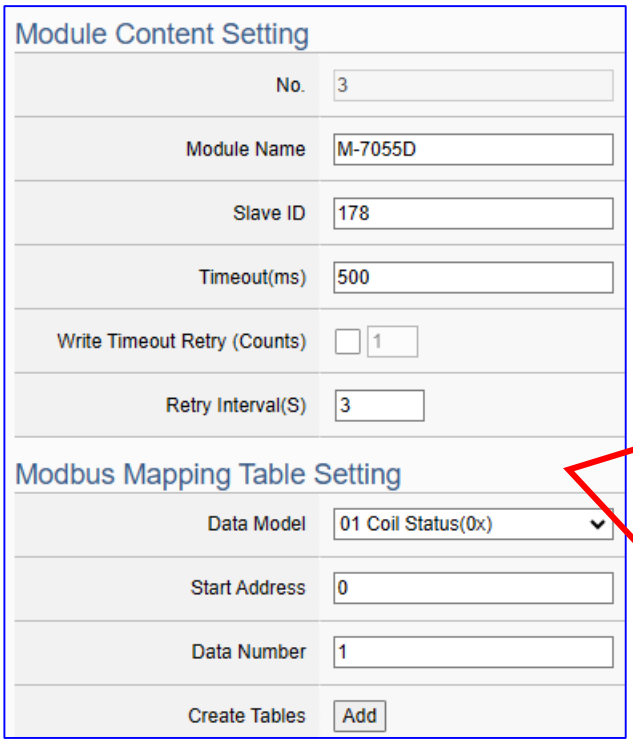
The function items and setting parameters of the [Modbus RTU Module List]:



Module Setting > Modbus - RTU Module (Master) > Modbus RTU Module List	
Serial Port	Choose the serial port of UA controller that links with the I/O module. UA-2800: COM2 (RS-232); COM3 (RS-485); COM4 (RS-485) Select the port that the module is actually connected to.
Import Module Profile: Upload Module Profile	1.Click to import the pre-edited **.csv** module profile (see UA-FAQ) 2.Click to import the **.json** ICP DAS module list. Go to UA Download Center > Firmware to download the new .json Module List.
Select All 	Check the box “Select All” will select all modules in the list. Check the box in the left of the module is to select that module list, can delete or copy the module.
	Click to add a list of module.
No.	The number of the module list (System arrange, not editable)
*Module Name / Nickname 	Module name (*: cannot be null). Click  can switch setting mode. **Name**: User set up the module. **Select The Module**: Select a ICP DAS model, system auto-setup the module.
Edit	Click to set the module in the Module Content Setting page.
Copy	Select the module wants to copy by check the box and click [Copy] can copy module by assigning port and Number. Yes: copy the module and exit. No: exit without copy. 
Remove	Click to delete the checked module(s)
Remove all	Click to delete all modules linked with the selected port. Remove: delete the modules and exit. No: exit without delete module. 
	The page number / total pages of the module list. Click < or > to go to the previous or the next page.
Save	Click to save the settings of this page.

Click [Edit] button to enter the “Module Content Setting” page.

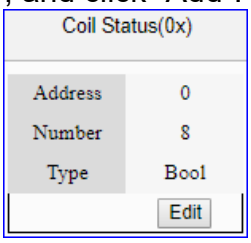
Enter the **Module Content Setting** page.



If select ICP DAS module, system will auto set up the Modbus Mapping Table, or user needs to check the module Modbus address or I/O number from the module user manual.

> **Modbus Mapping Table Setting:**
Set module in the order of Data Model, Start Address and Data Number, then click “Add”.

Ex: M-7055D has 8 Data Models of “01 Coil Status (0x)” (Mapping: DO), so select Model “01”, Start Add. “0”, Number “8”, and click “Add”.



Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	Give a name, e.g. model number or name. Default: Name.
Slave ID	Set the module Slave ID of the UA. (Range: 1 ~ 247)
Timeout	Set the timeout value for the module. Default: 500 ms
Write Timeout Retry	Retry to write again when there is no response after the timeout is up, and it can be set to Write Timeout Retry up to 3 times. (Counts)
Write Retry	Check to retry writing again when there is no response after the set time is up, and it can be set up to retry 3 times
Modbus Mapping Table Setting	
Data Model	System provides 4 Modbus data models for mapping to the Modbus address of the Ch.: Coil Status, Input Status, Holding Registers, Input Registers.
Data Model	System provides 4 Modbus data models for mapping to the Modbus address of the channels.
Start Address	The start address of the Modbus command. **Note:** the Start Address of UA is base 0, even if some modules are base 1, here it needs to follow UA to set base 0.
Data Number	Set the number of module channel (DO, DI, AO, AI) data according to "Data Model". Default: 1.
Type	This item only appears when the data model is 03 or 04. Set it according to the module data: 16-bit Short, 16-bit Unsigned Short, 32-bit Long, 32-bit Unsigned Long, 64-bit Int64, 32-bit Float, 64-bit Double.

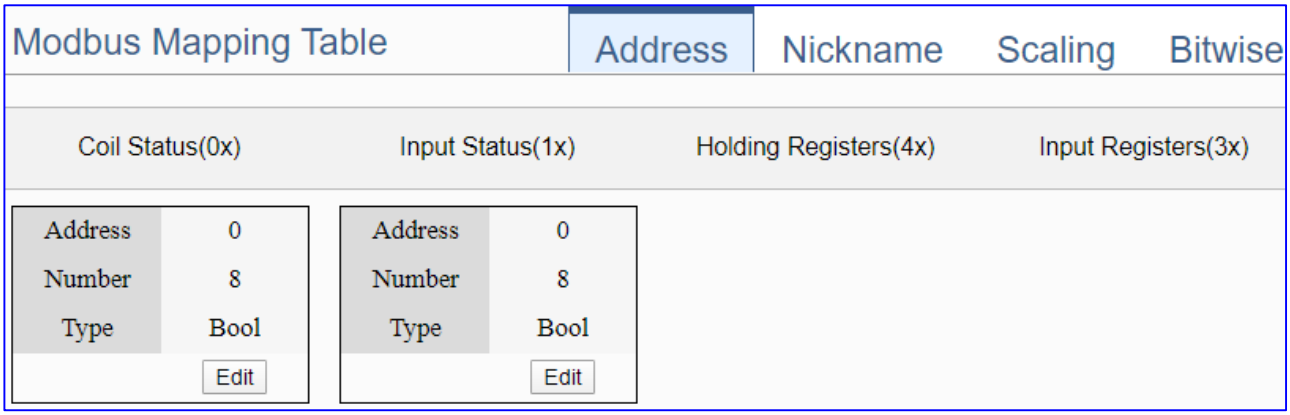
Data Model	Modbus Addr.	Ch. Type
Coil Status	0xxxxx	DO
Input Status	1xxxxx	DI
Holding Registers	2xxxxx	AO
Input Registers	3xxxxx	AI

	Note: 32-bit and 64-bit data occupy 2 and 4 Modbus Register addresses.
Create Tables	Click [Add] button, it will add a table in the Modbus mapping table.

The finished Modbus Mapping Table as below.

Address Setting:

Display and edit the Modbus Mapping Table.

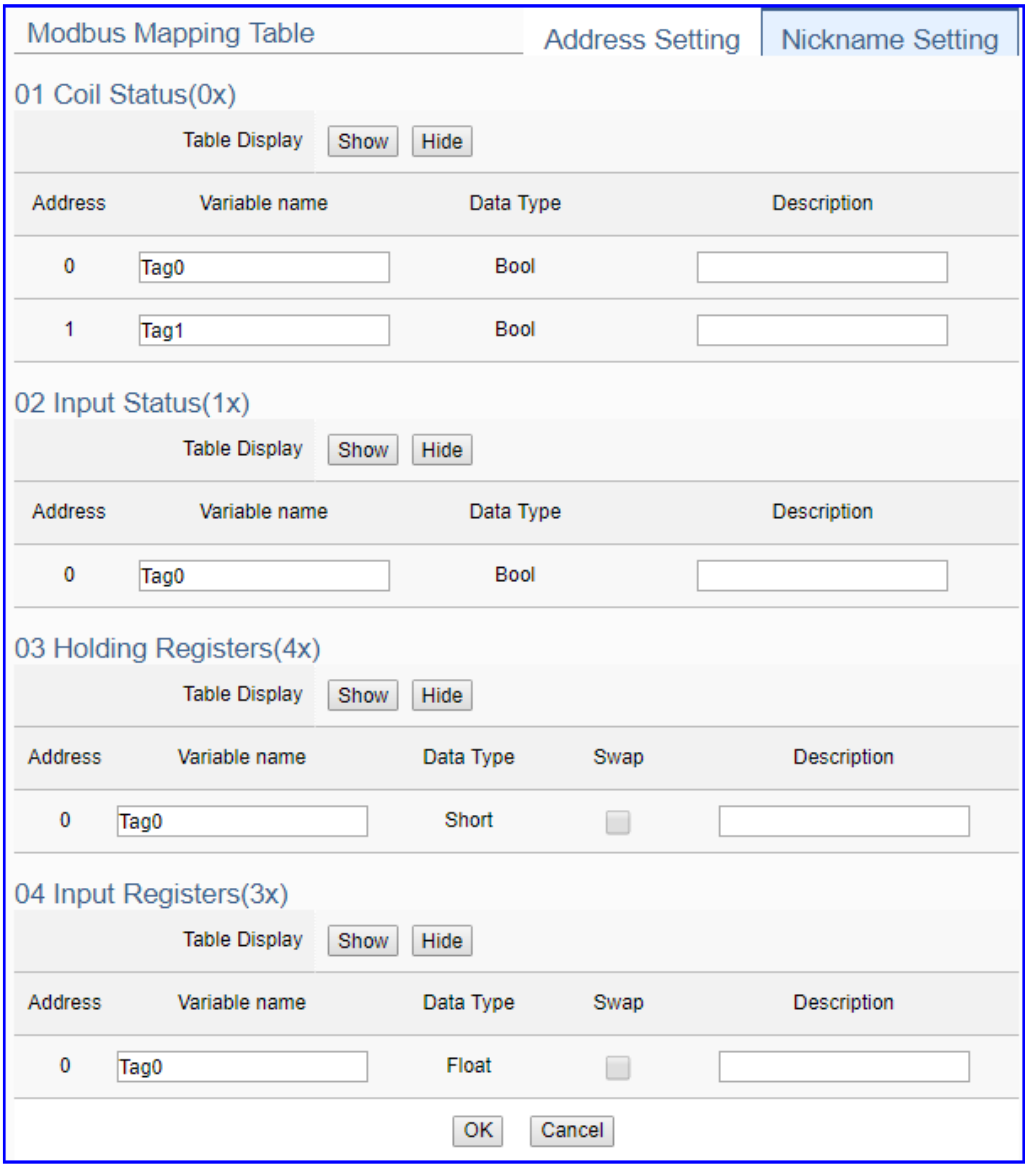


If user selects ICP DAS module, the system will auto set up the Modbus Mapping Table. If not, user needs to check the module Modbus address or I/O number from the module user manual.

Modbus Mapping Table – Address Setting	
Address Setting	The “Address Setting” page of the Modbus Mapping Table
Nickname Setting	Click can switch to the The “Nickname Setting” page of the Modbus Mapping Table. (Next page)
Modbus Mapping Table	Coil Status(0x): Mapping to DO Modbus address Input Status(1x): Mapping to DI Modbus address Holding Registers(4x): Mapping to AO Modbus address Input Registers(3x): Mapping to AI Modbus address
Address	The start address of the Modbus command. Default: 0. **Note:** the Start Address of UA is base 0, even if some modules are base 1, here it needs to follow UA to set base 0.
Number	The number of the Modbus address. Need to give enough number for the DO, DI, AO, AI channels of the module. At least 1.
Type	DO/DI type: Bool (Boolean) AO/AI type: depend on setting of [Modbus Mapping Table Setting]
Edit	Click to change the address and Number.
Delete	Click to delete this address table.
Save	Click to save and exit this table editing.
Cancel	Click to exit without saving and back to the module list page.
OK	Click to save this page settings and back to the module list page.

Nickname Setting:

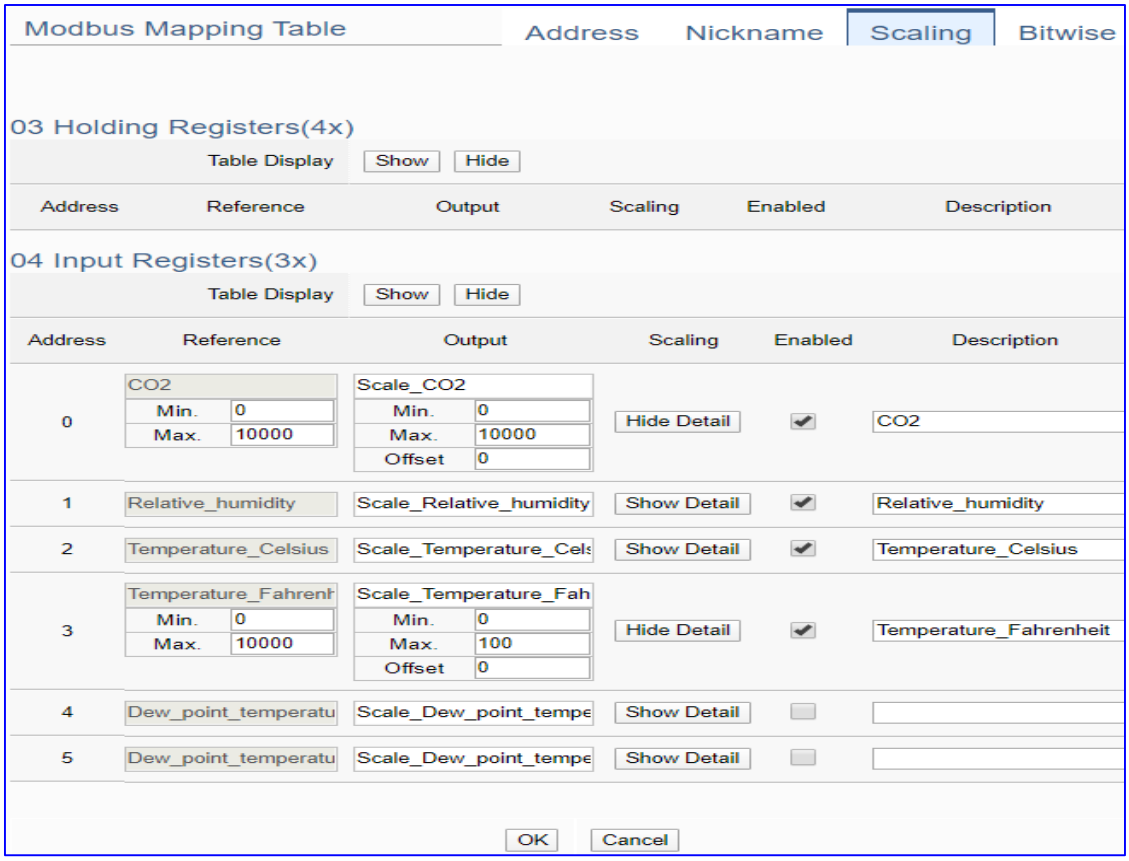
Setting the variable nickname and description.



Modbus Mapping Table – Nickname Setting	
Modbus Mapping Table	Coil Status(0x): Mapping to DO Modbus address Input Status(1x): Mapping to DI Modbus address Holding Registers(4x): Mapping to AO Modbus address Input Registers(3x): Mapping to AI Modbus address
Table Display	Click [Show] to display all fields, click [Hide] to hide some fields.
Address	Modbus address. System auto arrange.
Variable name	The variable name of the mapping address. Default: Tag0 and auto arrange the number. User can define the name.
Data Type	Display data type of the variable. (Not editable)
Swap	Check to swap the byte order (Lo-Hi/Hi-Lo) for 4-byte or 8-byte.
Description	Write a note for this variable.
OK	Click to save this page settings and back to the module list page.

● ** Scaling

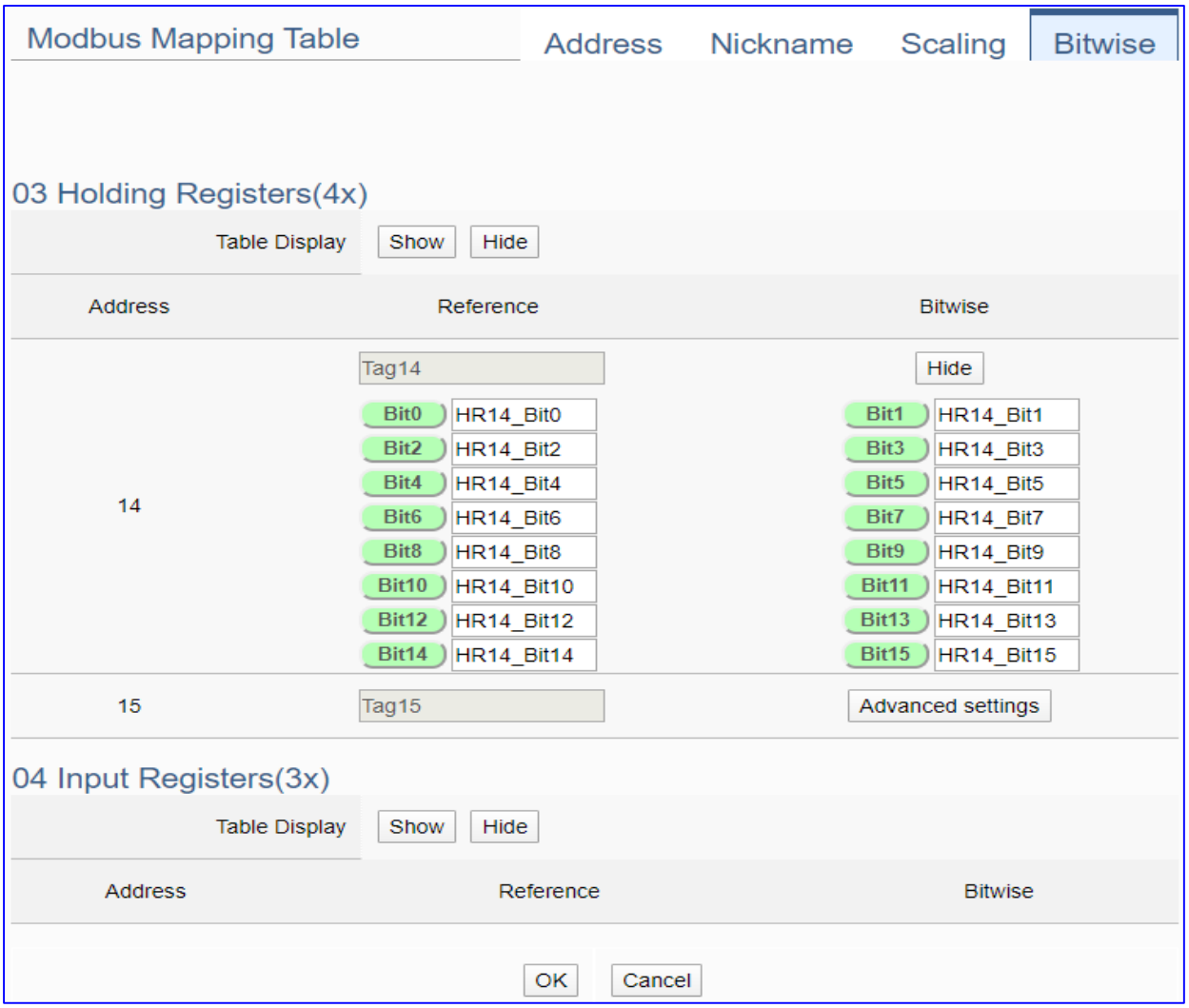
Scaling is only available in the AI/AO settings of Modbus RTU/TCP. When the variable value needs to be scaled or converted before output, click the "**Advanced Setting**" button of the variable on the **Scaling** page, input the **Min**./**Max**./**Offset** of the Reference/Output items, add a description, and check "**Enable**" box, The Scaling conversion function will be activated.



Modbus Mapping Table – Scaling	
Modbus Mapping Table	Holding Registers(4x): Mapping to AO Modbus address Input Registers(3x): Mapping to AI Modbus address **Scaling do not support 01 Coil Status(0x):DO & 02 Input Status(1x):DI**
Table Display	Click [Show] to display all fields, click [Hide] to hide some fields.
Address	Modbus address. System auto arrange.
Reference	The I/O variable of the Modbus address.
Output	The scaling variable for scaling output. User can define the variable name.
Scaling	Click [Show Detail] to set up the Scaling parameters, and click [Hide Detail] to hide the parameters. Fill in the Min/Max range values of the source in the Reference column. Fill in the Min/Max range values after scaling in the Output column. If needs offset, fill the offset value in the Offset item. Remember check “Enable” box.
Enable	Check the box of the variable can enable just that variable for scaling.
Description	Write a note for this variable.
OK	Click to save this page settings and back to the module list page.

- **** Bitwise**

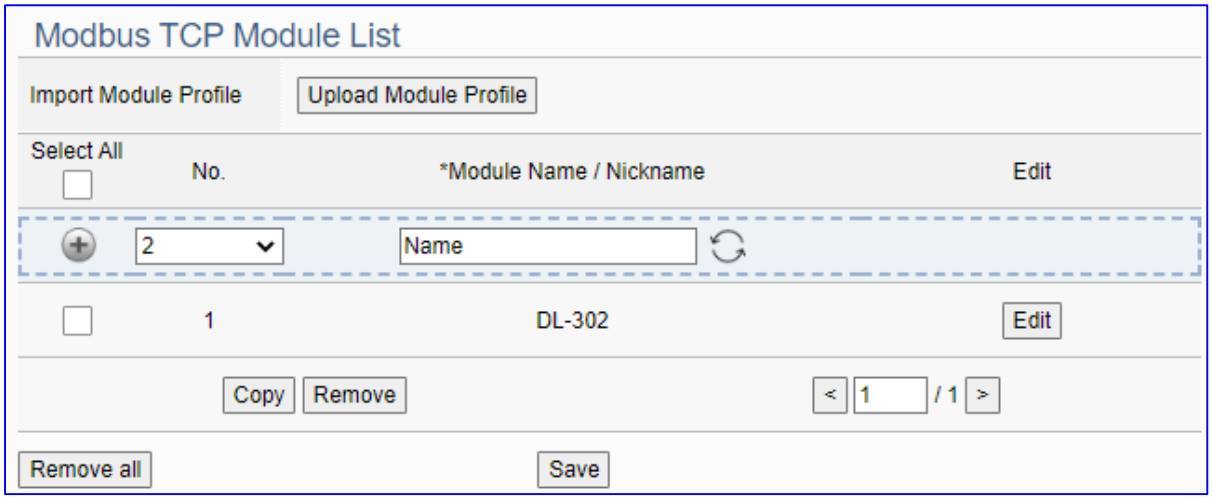
Bitwise is only available in the AI/AO settings of Modbus RTU/TCP. When the data needed to take out the value of the specified bit, fill in the variable name in the specified Bit# of the required address, and the value of the bit can be output to the filled variable.



Modbus Mapping Table – Bitwise	
Modbus Mapping Table	Holding Registers(4x): Mapping to AO Modbus address Input Registers(3x): Mapping to AI Modbus address **Bitwise do not support 01 Coil Status(0x):DO & 02 Input Status(1x):DI** **Bitwise do not supports 32-bit Float & 64-bit Double data types.**
Table Display	Click [Show] to display all fields, click [Hide] to hide some fields.
Address	Modbus address. System auto arrange.
Reference	The Bit# variables of the Modbus address.
Bitwise	Set up the variables for Bitwise. Click [Advanced Settings] to set up the Bitwise parameters, and click [Hide] to hide the parameters. Fill in the variable names to the Bit# that wanted to do the Bitwise. The value in the fixed bit number will be assigned into the variable.
OK	Click to save this page settings and back to the module list page.

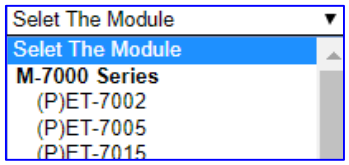
5.2.2 Modbus TCP (Master)

This setting is for UA Controller connecting the remote Modbus TCP Slave module.

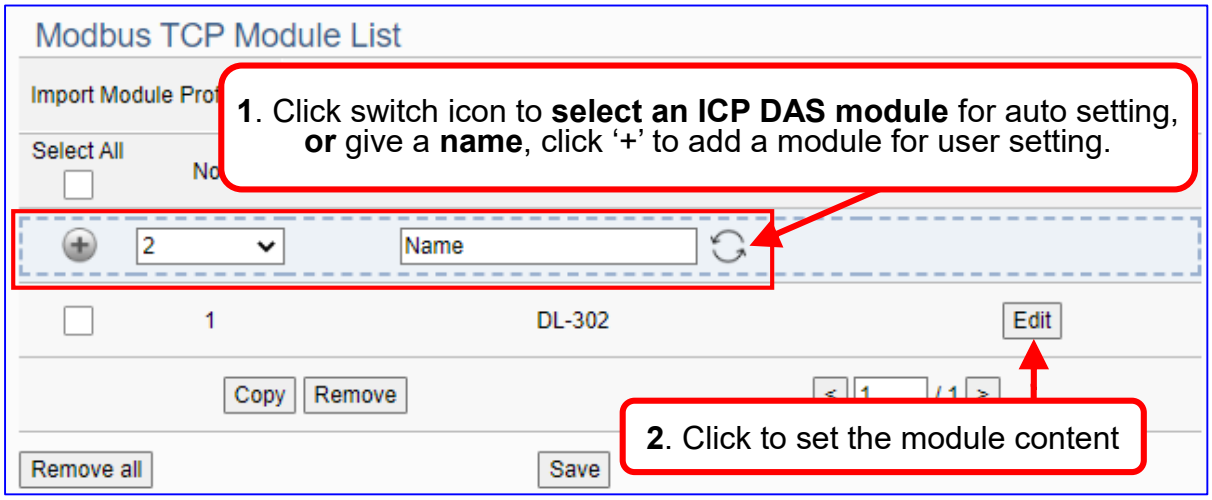


This section shows the settings for the Modbus TCP module on Ethernet LAN. User can give module a name (Default: Name), click [⊕] button to add a new module, and then setup the module. If using ICP DAS module, user can just select the model, system will auto add and setup the module. Click [Edit] button to set the module content and the Modbus mapping table.

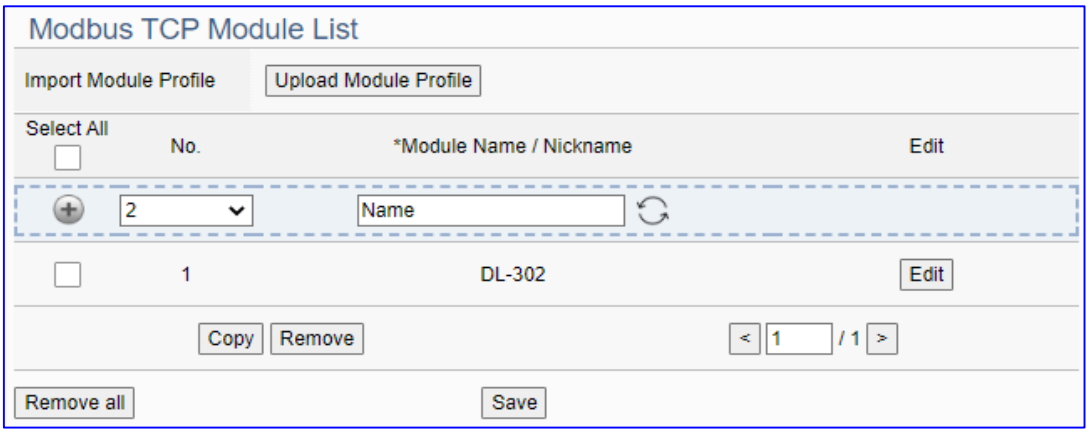
Setting Steps:

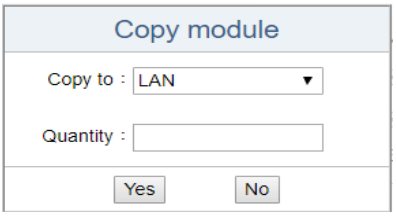
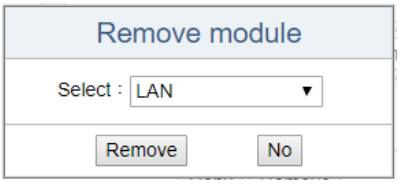


1. Click the switch icon ⟳ to select the adding mode:
   a) **Select The Module**: Select an ICP DAS model (as the pic), system will auto setup.
   b) **Name**: Give a name, e.g. DL-302. Click [⊕] to add a module for user setting.
2. Click the button [Edit] to enter the Module Content Setting page
   View or set the Modbus Mapping Table for the UA Series and module I/O channels

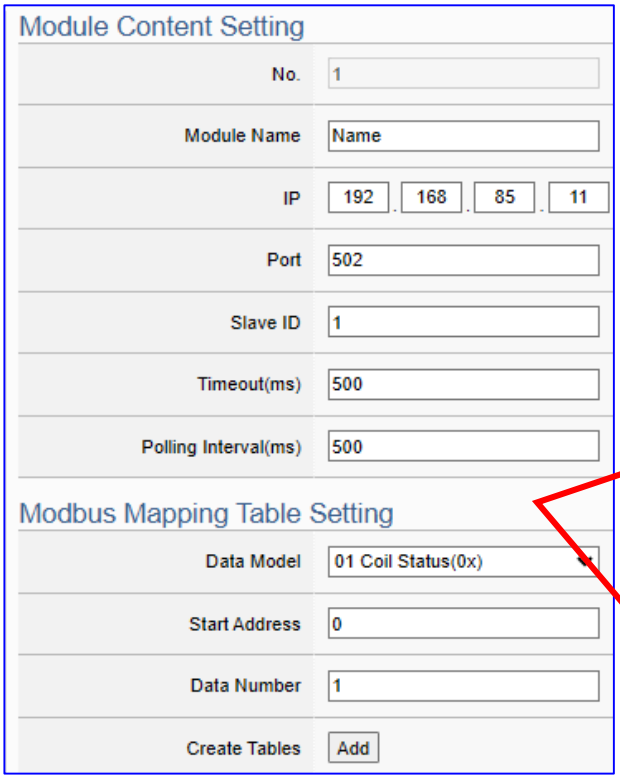


The function items and setting parameters of the [Modbus TCP Module List]:



Module Setting > Modbus - RTU Module (Master) > Modbus RTU Module List	
Import Module Profile: Upload Module Profile	1.Click to import the pre-edited **.csv** module profile (see UA-FAQ) 2.Click to import the **.json** ICP DAS module list. Go to UA Download Center > Firmware to download the new .json Module List.
Select All	Check the box “Select All” will select all modules in the list. Check the box in the left of the module is to select that module list, can delete or copy the module.
	Click to add a list of module.
No.	The module number in the module list (System arrange, not editable)
*Module Name / Nickname	Module name (*: cannot be null). Click can switch setting mode. **Name**: User give a name to set up the module. **Select The Module**: Select a ICP DAS model, system auto-setup the module.
Edit	Click to set the module in the Module Content Setting page.
Copy	Select the module wants to copy by check the box and click [Copy] can copy module by assigning port and quantity. Yes: copy the module and exit. No: exit without copy. 
Remove	Click to delete the checked module(s)
Remove all	Click to delete all modules linked with the selected port. Remove: delete the modules and exit. No: exit without delete module. 
< 1 / 1 >	The page number / total pages of the module list. Click < or > to go to the previous or the next page.
Save	Click to save the settings of this page.

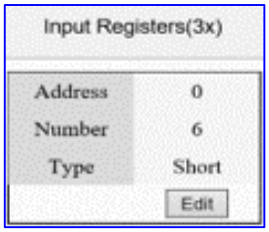
Click [Edit] can enter the [**Module Content Setting**] page to set up the module and the Modbus address mapping table.



If select ICP DAS module, system will auto set up the Modbus Mapping Table, or user needs to check the module Modbus address or I/O number from the module user manual.

> **Modbus Mapping Table Setting:**
Set module in the order of Data Model, Start Address and Data Number, then click "Add".

Ex: DL-302 has 6 Data Models of "04 Input Registers (3x)" (Mapping: AI), so select Model "04", start 0, number 6, type Short, and click "Add".



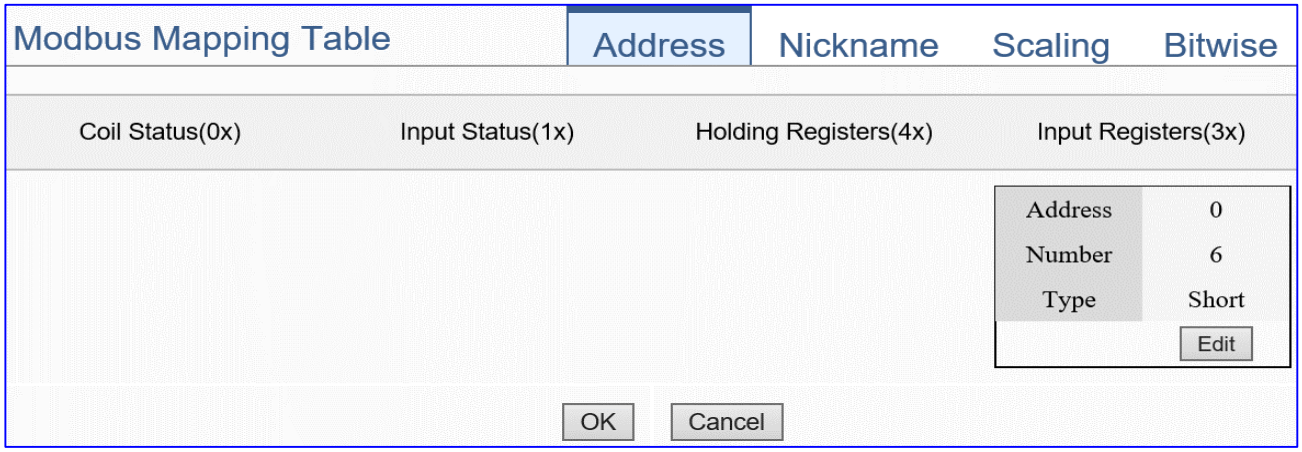
Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	Give a name, e.g. model number or name. Default: Name.
IP	The IP address of the connected module. Default: 0.0.0.0
Port	The port number for Modbus TCP. Default: 502
Slave ID	Set the Slave ID of the UA. (Range: 1 ~ 247)
Timeout	Set the timeout value for the module. Default: 500 ms
Polling Interval	Set a time interval for the command. Default: 500 ms
Modbus Mapping Table Setting	
Data Model	System provides 4 Modbus data models for mapping to the Modbus address of the Ch.: Coil Status, Input Status, Holding Registers, Input Registers.
Start Address	The start address of the Modbus command. **Note:** the Start Address of UA is base 0, even if some modules are base 1, here it needs to follow UA to set base 0.
Data Number	Set the number of module channel (DO, DI, AO, AI) data according to "Data Model". Default: 1.
Type	This item only appears when the data model is 03 or 04. Set it according to the module data: 16-bit Short, 16-bit Unsigned Short, 32-bit Long, 32-bit Unsigned Long, 64-bit Int64, 32-bit Float, 64-bit Double. **Note:** 32-bit and 64-bit data occupy 2 and 4 Modbus Register addresses.
Create Tables	Click [Add] button, it will add a table in the Modbus mapping table.

Data Model	Modbus Addr.	Ch. Type
Coil Status	0xxxxx	DO
Input Status	1xxxxx	DI
Holding Registers	2xxxxx	AO
Input Registers	3xxxxx	AI

The finished Modbus Mapping Table as below is in order of DO, DI, AO and AI.

Address Setting:

Display and edit the Modbus Mapping Table.

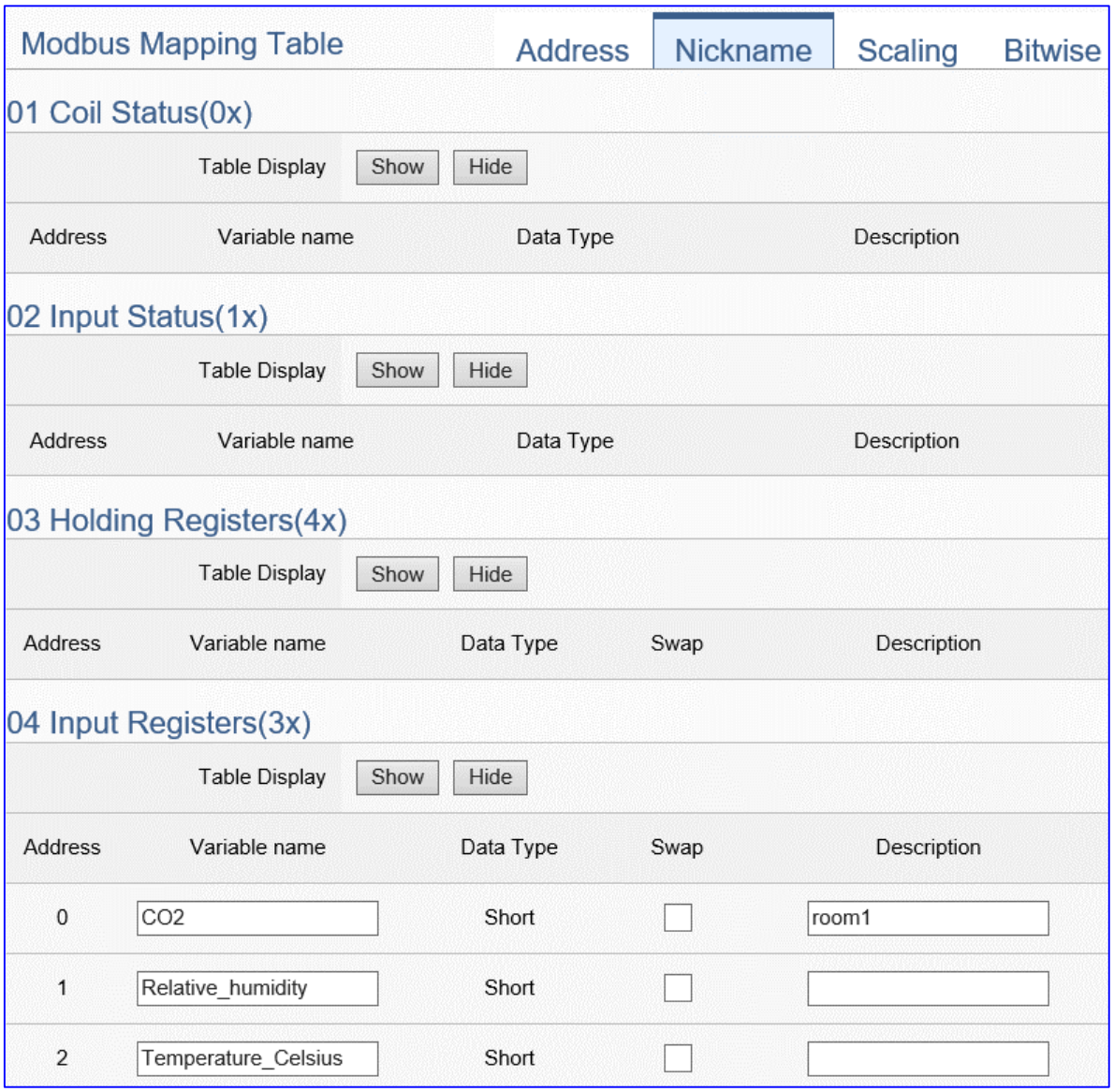


If user selects ICP DAS module, the system will auto set up the Modbus Mapping Table. If not, user needs to check the module Modbus address or I/O number from the module user manual.

Modbus Mapping Table – Address Setting	
Address Setting	The “Address Setting” page of the Modbus Mapping Table
Nickname Setting	Click can switch to the The “Nickname Setting” page of the Modbus Mapping Table. (Next page)
Modbus Mapping Table	Coil Status(0x): Mapping to DO Modbus address Input Status(1x): Mapping to DI Modbus address Holding Registers(4x): Mapping to AO Modbus address Input Registers(3x): Mapping to AI Modbus address
Address	The start address of the Modbus command. Default: 0. **Note:** the Start Address of UA is base 0, even if some modules are base 1, here it needs to follow UA to set base 0.
Number	The number of the Modbus address. Need to give enough number for the DO, DI, AO, AI channels of the module. At least 1.
Type	DO/DI type: Bool (Boolean) AO/AI type: depend on setting of [Modbus Mapping Table Setting]
Edit	Click to change the address and Number.
Delete	Click to delete this address table.
Save	Click to save and exit this table editing.
Cancel	Click to exit without saving and back to the module list page.
OK	Click to save this page settings and back to the module list page.

Nickname Setting:

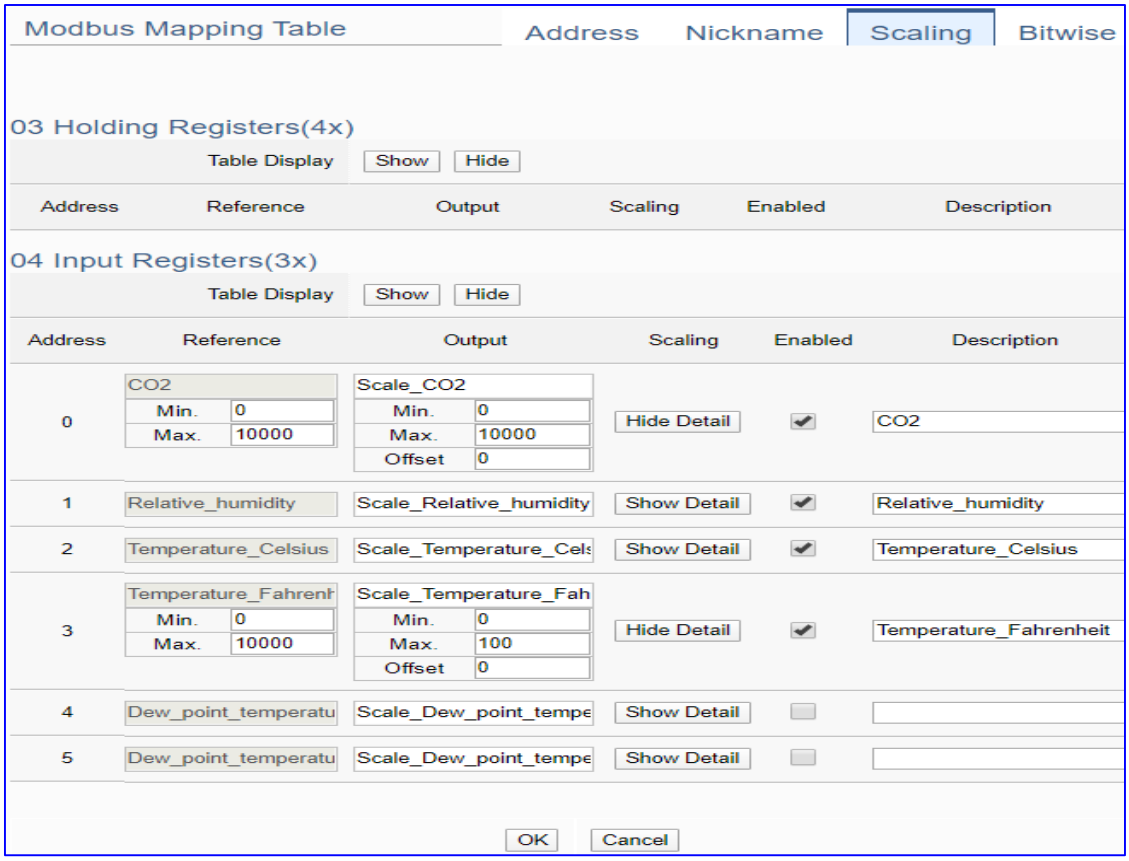
Setting the variable nickname and description.



Modbus Mapping Table – Nickname Setting	
Modbus Mapping Table	Coil Status(0x): Mapping to DO Modbus address Input Status(1x): Mapping to DI Modbus address Holding Registers(4x): Mapping to AO Modbus address Input Registers(3x): Mapping to AI Modbus address
Table Display	Click [Show] to display all fields, click [Hide] to hide some fields.
Address	Modbus address. System auto arrange.
Variable name	The variable name of the mapping address. Default: Tag0 and auto arrange the number. User can define the name.
Data Type	Display data type of the variable. (Not editable)
Swap	Check to swap the byte order (Lo-Hi/Hi-Lo) for 4-byte or 8-byte.
Description	Write a note for this variable.
OK	Click to save this page settings and back to the module list page.

● ** Scaling

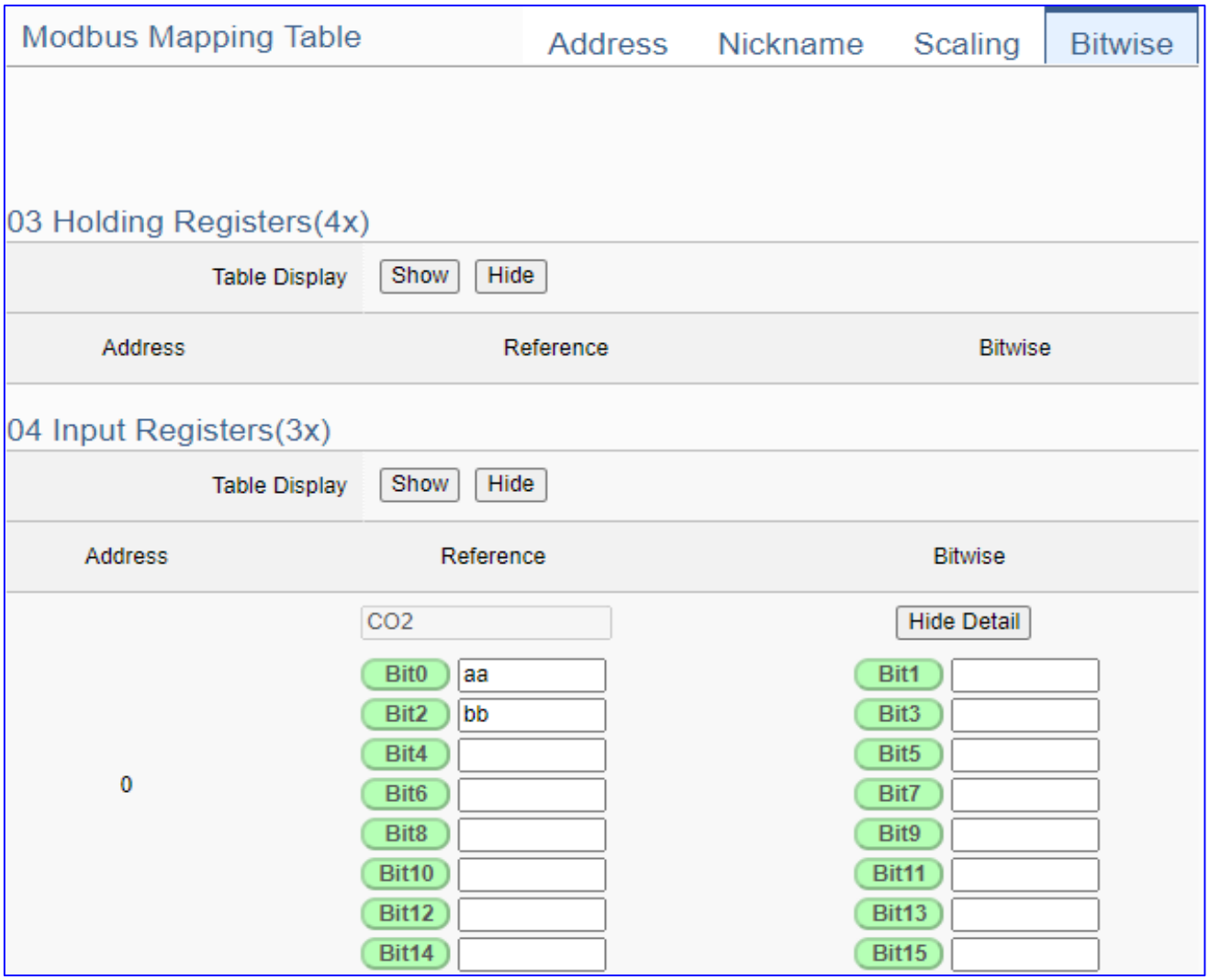
Scaling is only available in the AI/AO settings of Modbus RTU/TCP. When the variable value needs to be scaled or converted before output, click the "**Advanced Setting**" button of the variable on the **Scaling** page, input the **Min**./**Max**./**Offset** of the Reference/Output items, add a description, and check "**Enable**" box, The Scaling conversion function will be activated.



Modbus Mapping Table – Scaling	
Modbus Mapping Table	Holding Registers(4x): Mapping to AO Modbus address Input Registers(3x): Mapping to AI Modbus address **Scaling do not support 01 Coil Status(0x):DO & 02 Input Status(1x):DI**
Table Display	Click [Show] to display all fields, click [Hide] to hide some fields.
Address	Modbus address. System auto arrange.
Reference	The I/O variable of the Modbus address.
Output	The scaling variable for scaling output. User can define the variable name.
Scaling	Click [Show Detail] to set up the Scaling parameters, and click [Hide Detail] to hide the parameters. Fill in the Min/Max range values of the source in the Reference column. Fill in the Min/Max range values after scaling in the Output column. If needs offset, fill the offset value in the Offset item. Remember check “Enable” box.
Enable	Check the box of the variable can enable just that variable for scaling.
Description	Write a note for this variable.
OK	Click to save this page settings and back to the module list page.

- **** Bitwise**

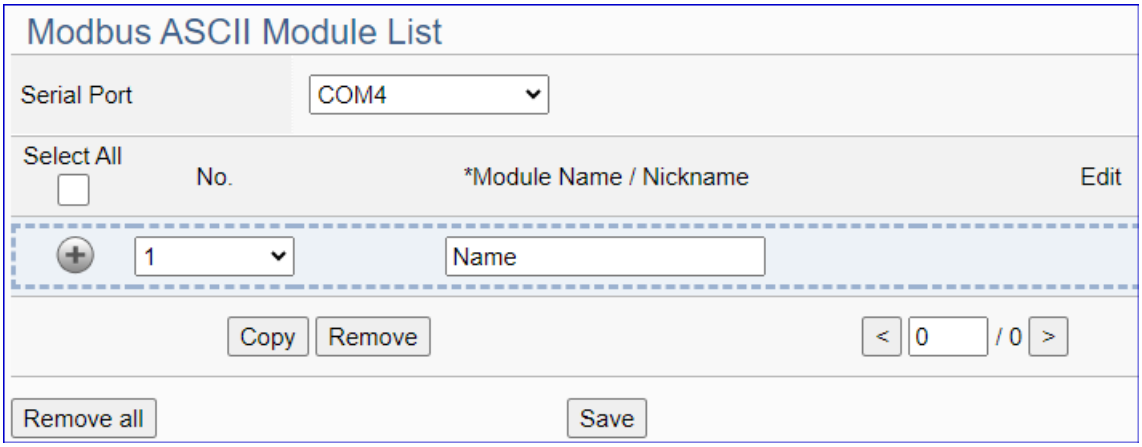
Bitwise is only available in the AI/AO settings of Modbus RTU/TCP. When the data needed to take out the value of the specified bit, fill in the variable name in the specified Bit# of the required address, and the value of the bit can be output to the filled variable.



Modbus Mapping Table – Bitwise	
Modbus Mapping Table	Holding Registers(4x): Mapping to AO Modbus address Input Registers(3x): Mapping to AI Modbus address **Bitwise do not support 01 Coil Status(0x):DO** & **02 Input Status(1x):DI** **Bitwise do not supports 32-bit Float** & **64-bit Double data types.**
Table Display	Click [Show] to display all fields, click [Hide] to hide some fields.
Address	Modbus address. System auto arrange.
Reference	The Bit# variables of the Modbus address.
Bitwise	Set up the variables for Bitwise. Click [Advanced Settings] to set up the Bitwise parameters, and click [Hide] to hide the parameters. Fill in the variable names to the Bit# that wanted to do the Bitwise. The value in the fixed bit number will be assigned into the variable.
OK	Click to save this page settings and back to the module list page.

5.2.3 Modbus ASCII (Master)

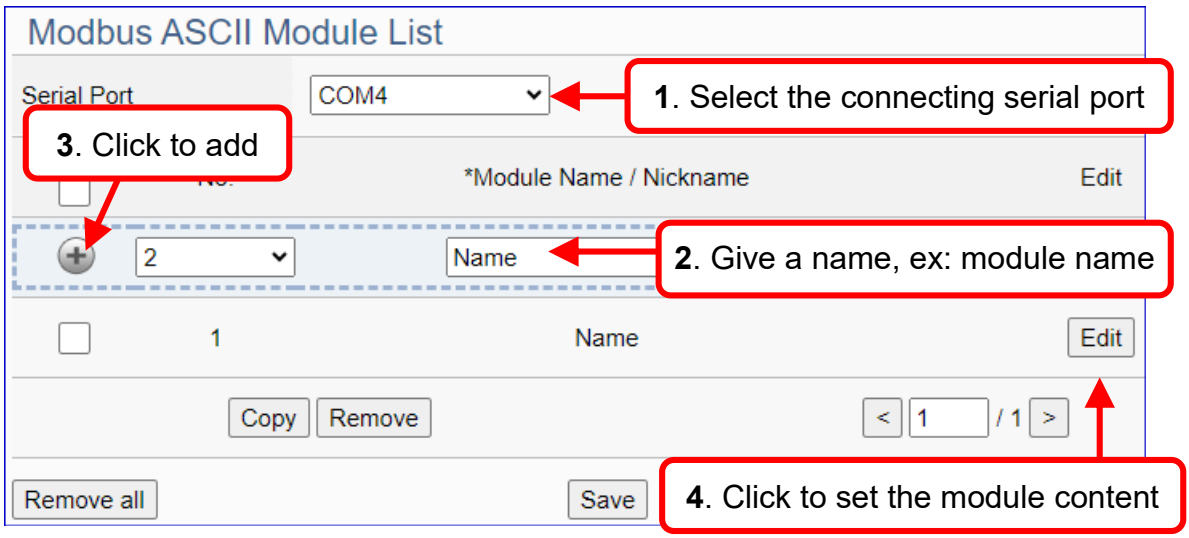
This setting is for UA Controller connecting the remote Modbus ASCII Slave module.



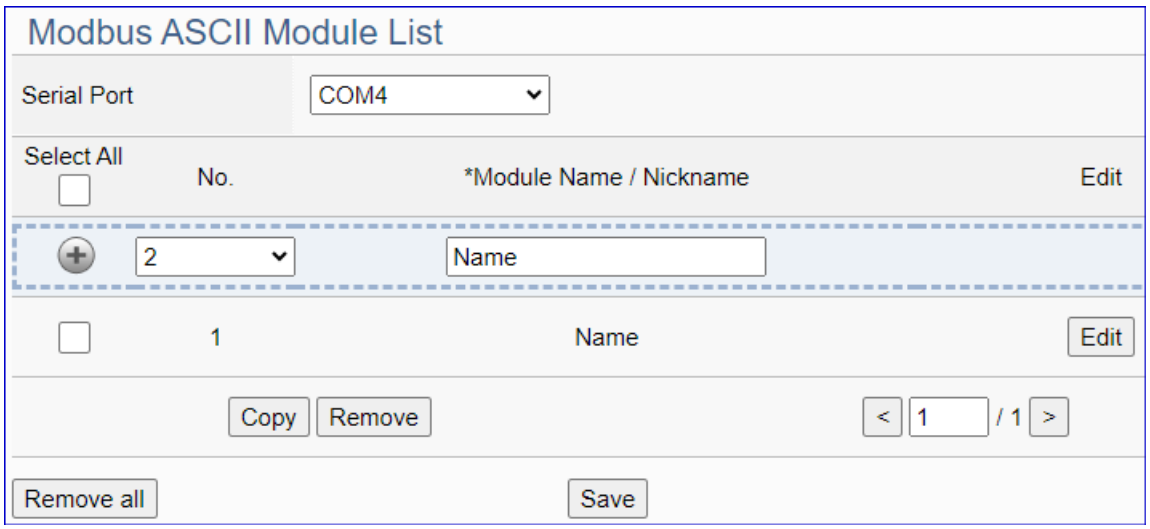
This page is for setting the communication values with the connected modules. First choose the serial port that connected with the module, and each module can give a name (Default name: Name). Click [⊕] button could add a new module, and then click [Edit] button to configure the module content and the Modbus mapping table.

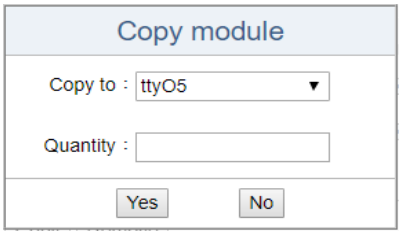
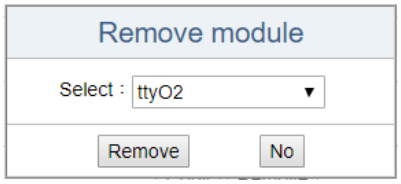
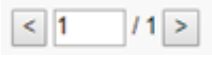
Setting Steps:

1. Select the module connecting Serial port
2. Give the module name or nickname, e.g. module number. Default: Name
3. Click the button [⊕] to add a new module
4. Click the button [Edit] to enter the Module Content Setting page
   Set up the Modbus Mapping Table for the UA controller and module I/O channels

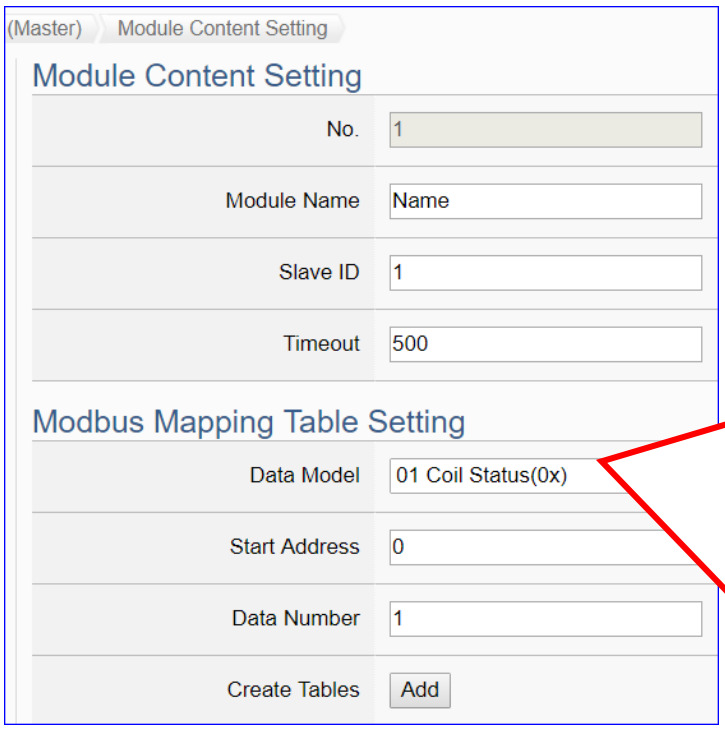


The function items and setting parameters of the [Modbus ASCII Module List]:



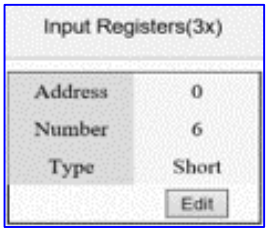
Module Setting > Modbus - ASCII Module (Master) > Modbus ASCII Module List	
Serial Port	Choose the serial port of UA controller that links with the I/O module. UA-2800: COM2 (RS-232); COM3 (RS-485); COM4 (RS-485) Select the port that the module is actually connected to.
	Click to add a list of module.
	Check the box in the left of the module is to select that module list, can delete or copy the module. Check the box “Select All” will select all modules in the list.
No.	The module number in the module list (System arrange, not editable)
*Module Name / Nickname	Module name or nick name. User can give a new name. (The star * means this field cannot be null.)
Edit	Click to set the module in the Module Content Setting page.
Copy	Select the module wants to copy by check the box and click [Copy] can copy module by assigning port and Quantity. Yes: copy the module and exit. No: exit without copy. 
Remove	Click to delete the checked module(s)
Remove all	Click to delete all modules linked with the selected port. Remove: delete the modules and exit. No: exit without delete module. 
	The page number / total pages of the module list. Click < or > to go to the previous or the next page.
Save	Click to save the settings of this page.

Click [Edit] button to enter the “**Module Content Setting**” page.



> **Modbus Mapping Table Setting:** Set module in the order of Data Model, Start Address and Data Number, then click “Add”.

Ex: Module has 6 Data Models of “04 Input Registers (3x)” (Mapping: AI), so select Model “04”, start 0, number 6, type Short, and click “Add”.

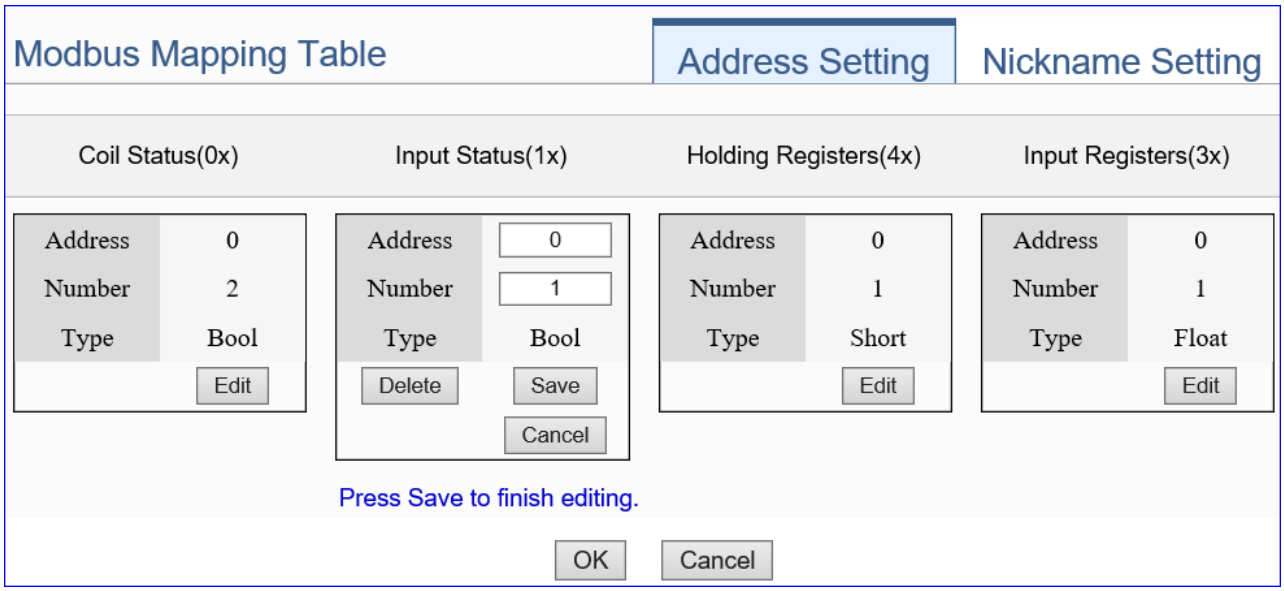


Module Content Setting				
No.	The module number in the module list (Not editable here)			
Module Name	Give a name, e.g. model number or name. Default: Name.			
Slave ID	Set the module Slave ID of the UA. (Range: 1 ~ 247)			
Timeout	Set the timeout value for the module. Default: 500 ms			
Modbus Mapping Table Setting				
Data Model	System provides 4 Modbus data models for mapping to the Modbus address of the Ch.: Coil Status, Input Status, Holding Registers, Input Registers.	Data Model	Modbus Addr.	Ch. Type
		Coil Status	0xxxxx	DO
		Input Status	1xxxxx	DI
		Holding Registers	2xxxxx	AO
		Input Registers	3xxxxx	AI
Start Address	The start address of the Modbus command. **Note:** the Start Address of UA is base 0, even if some modules are base 1, here it needs to follow UA to set base 0.			
Data Number	Set the number of module channel (DO, DI, AO, AI) data according to "Data Model". Default: 1.			
Type	This item only appears when the data model is 03 or 04. Set it according to the module data: 16-bit Short, 16-bit Unsigned Short, 32-bit Long, 32-bit Unsigned Long, 64-bit Int64, 32-bit Float, 64-bit Double. **Note:** 32-bit and 64-bit data occupy 2 and 4 Modbus Register addresses.			
Create Tables	Click [Add] button, it will add a table in the Modbus mapping table.			

The finished Modbus Mapping Table as below is in order of DO, DI, AO and AI.

Address Setting:

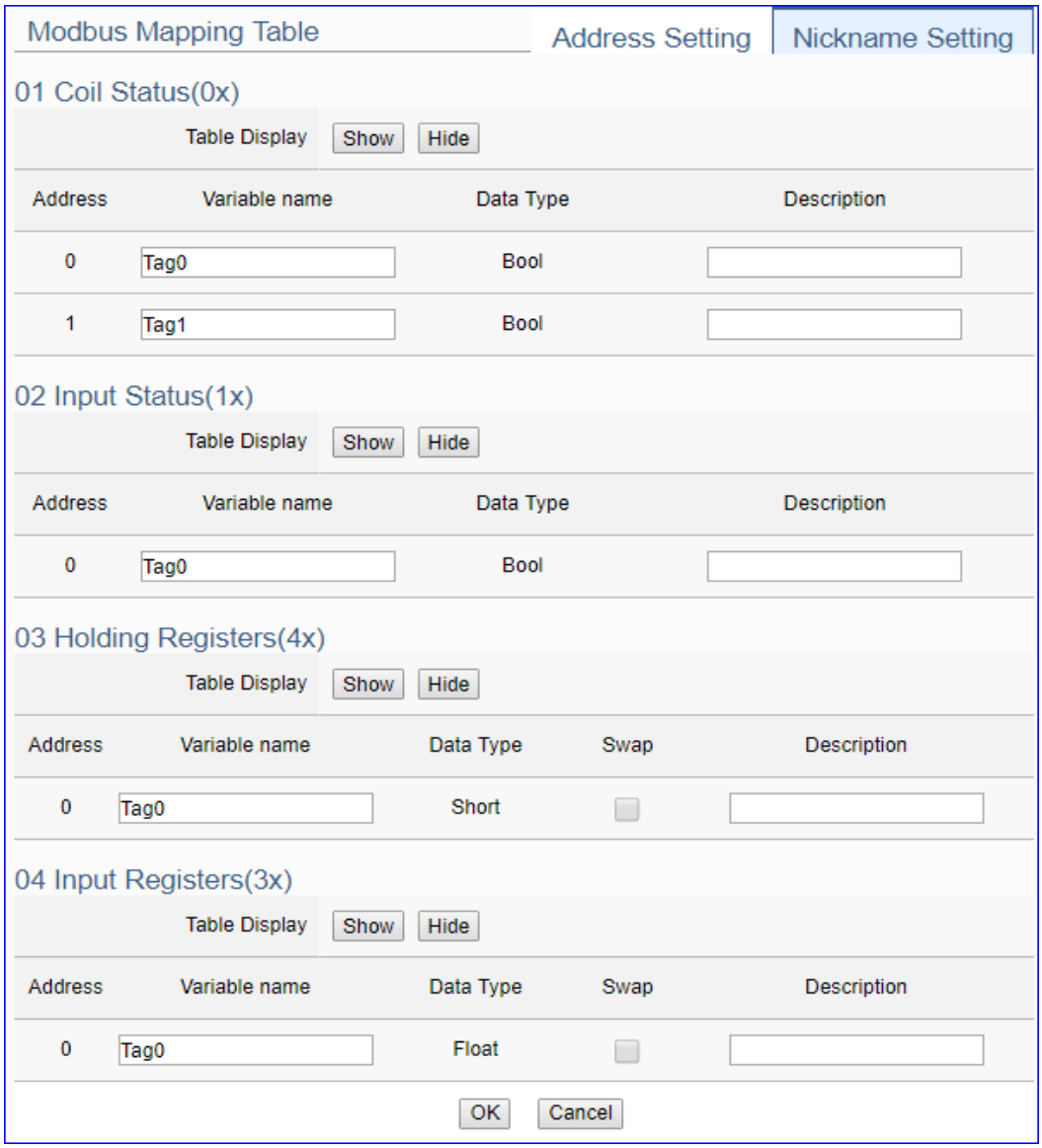
Display and edit the Modbus Mapping Table.



Modbus Mapping Table – Address Setting	
Address Setting	The “Address Setting” page of the Modbus Mapping Table
Nickname Setting	Click can switch to the The “Nickname Setting” page of the Modbus Mapping Table. (Next page)
Modbus Mapping Table	Coil Status(0x): Mapping to DO Modbus address Input Status(1x): Mapping to DI Modbus address Holding Registers(4x): Mapping to AO Modbus address Input Registers(3x): Mapping to AI Modbus address
Address	The start address of the Modbus command. Default: 0. **Note:** the Start Address of UA is base 0, even if some modules are base 1, here it needs to follow UA to set base 0.
Number	The number of the Modbus address. Need to give enough number for the DO, DI, AO, AI channels of the module. At least 1.
Type	DO/DI type: Bool (Boolean) AO/AI type: depend on setting of [Modbus Mapping Table Setting]
Edit	Click to change the address and Number.
Delete	Click to delete this address table.
Save	Click to save and exit this table editing.
Cancel	Click to exit without saving and back to the module list page.
OK	Click to save this page settings and back to the module list page.

Nickname Setting:

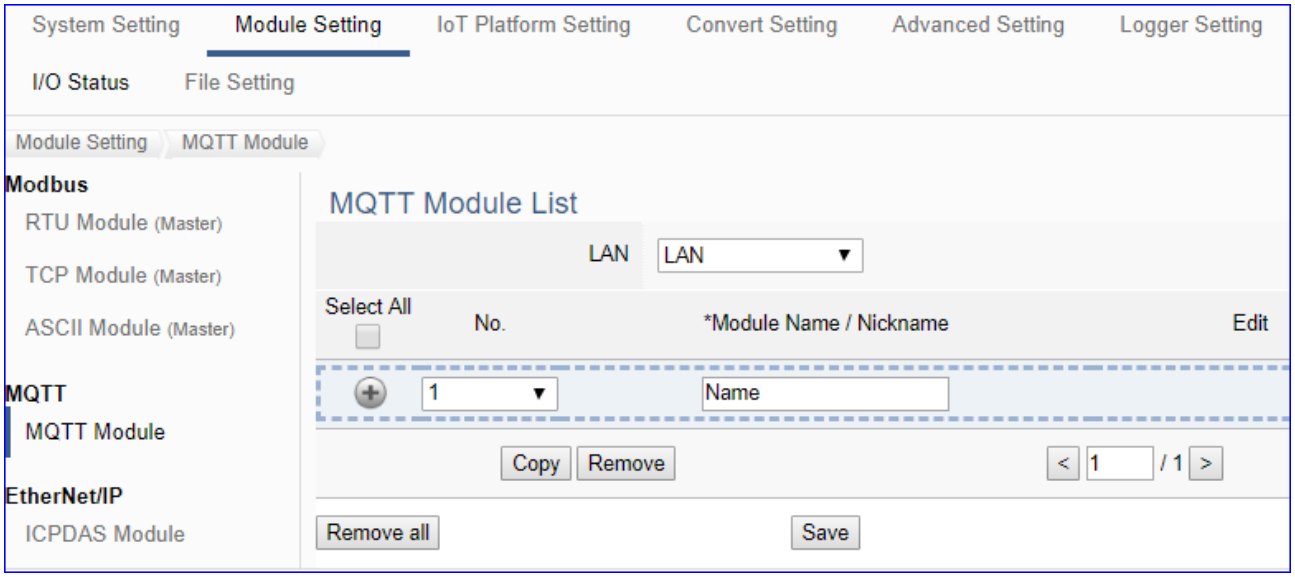
Setting the variable nickname and description.



Modbus Mapping Table – Nickname Setting	
Modbus Mapping Table	Coil Status(0x): Mapping to DO Modbus address Input Status(1x): Mapping to DI Modbus address Holding Registers(4x): Mapping to AO Modbus address Input Registers(3x): Mapping to AI Modbus address
Table Display	Click [Show] to display all fields, click [Hide] to hide some fields.
Address	Modbus address. System auto arrange.
Variable name	The variable name of the mapping address. Default: Tag0 and auto arrange the number. User can define the name.
Data Type	Display data type of the variable. (Not editable)
Swap	Check to swap the byte order (Lo-Hi/Hi-Lo) for 4-byte or 8-byte.
Description	Write a note for this variable.
OK	Click to save this page settings and back to the module list page.

5.2.4 MQTT Module

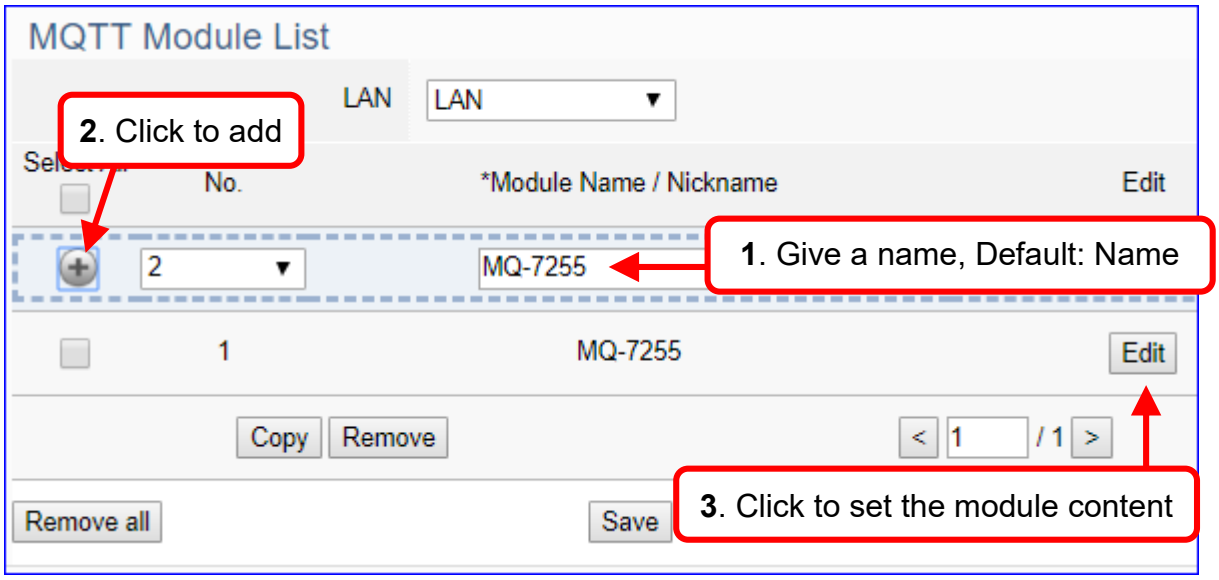
This setting is for UA Controller connecting the remote MQTT module.



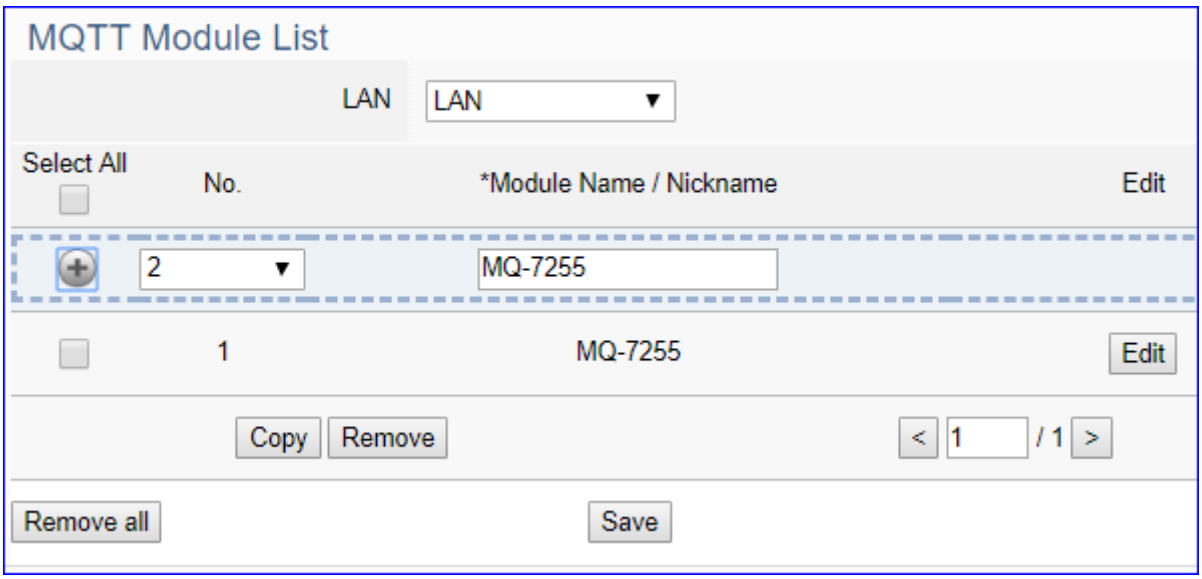
This page is for setting the communication values with the connected modules. First choose the Ethernet LAN port that connected with the module, and each module can give a name (Default name: Name). Click [⊕] button could add a new module, and then click [Edit] button to configure the module content and the MQTT variable table.

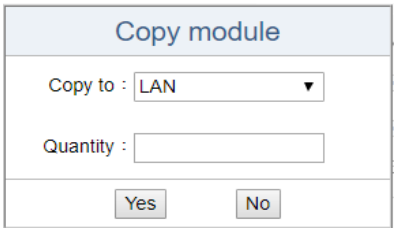
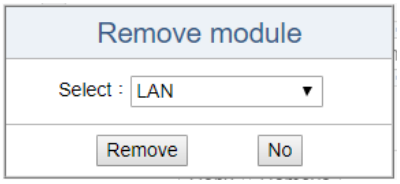
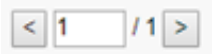
Setting Steps:

1. Give the module name or nickname, e.g. MQ-7255, DL-302. Default: Name
2. Click the button [⊕] to add a new module
3. Click the button [Edit] to enter the Module Content Setting page
   Set up the Modbus Mapping Table for the UA controller and module I/O channels



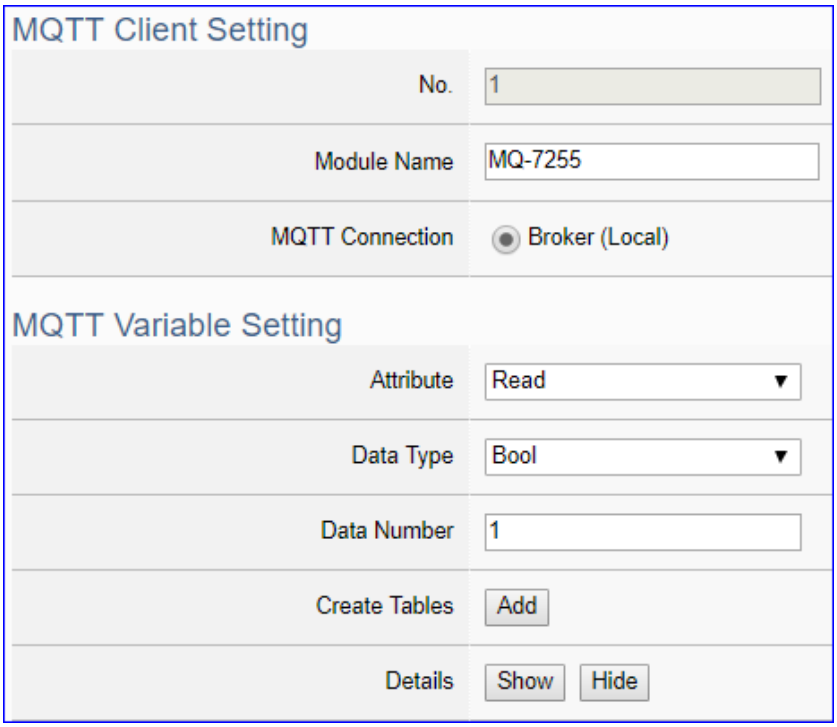
The function items and setting parameters of the [MQTT Module List]:



Module Setting > MQTT - MQTT Module > MQTT Module List	
	Click to add a list of module.
	Check the box in the left of the module is to select that module list, can delete or copy the module. Check the box “Select All” will select all modules in the list.
No.	The module number in the module list (System arrange, not editable)
*Module Name / Nickname	Module name or nick name. User can give a new name. (The star * means this field cannot be null.)
Edit	Click to set the module in the Module Content Setting page.
Copy	Select the module wants to copy by check the box and click [Copy] can copy module by assigning port and quantity. Yes: copy the module and exit. No: exit without copy. 
Remove	Click to delete the checked module(s)
Remove all	Click to delete all modules linked with the selected port. Remove: delete the modules and exit. No: exit without delete module. 
	The page number / total pages of the module list. Click < or > to go to the previous or the next page.
Save	Click to save the settings of this page.

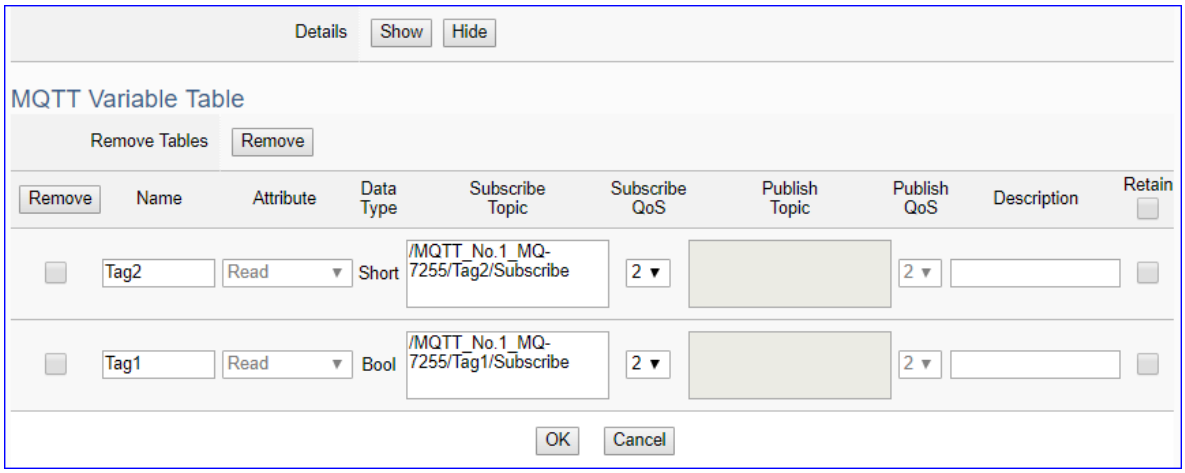
Click [**Edit**] can enter the [**MQTT Client Setting**] page.

[**MQTT Client Setting**] page: to set up the module and the variable table



MQTT Client Setting	
No.	The module number in the module list (Not editable here)
Module Name	Give a name, e.g. model number or name. Default: Name.
MQTT Connection	Broker (Local): The using Local Broker. Broker Name (Remote) will be another option if there is another Remote Broker setting.
MQTT Variable Setting	
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the MQTT variable. Include: Bool, Short, Unsigned Short, Long, Unsigned Long, Int64, Float, Double, String.
Data Number	The number for the I/O variables of the module. Default: 1.
Create Tables	Click [Add] button, it will add a variable list in the MQTT Variable Table.
Details Show / Hide	Click [Show] to display all fields, click [Hide] to hide some fields. The hide fields: Subscribe QoS, Publish QoS, Retain.

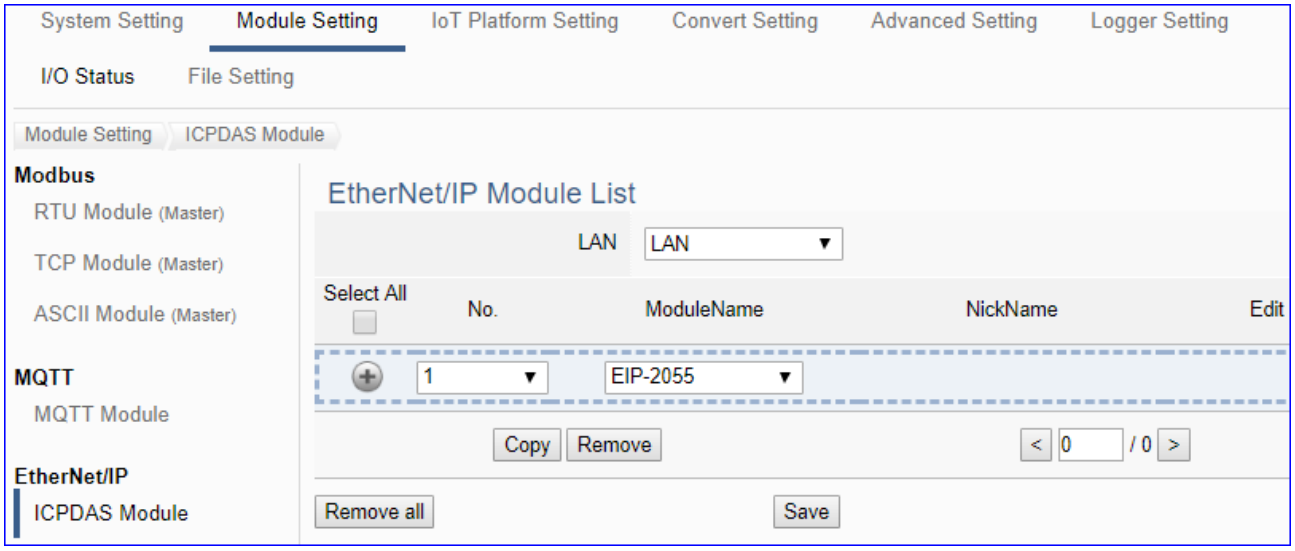
[**MQTT Variable Table**] :



MQTT Variable Table	
Details Show / Hide	Click [Show] to display all fields, click [Hide] to hide some fields. The hide fields: Subscribe QoS, Publish QoS and Retain.
Remove Table / Remove	Check the box in the left of the variable is to select that variable list, and click the “remove” on the box can delete that variable list. Click the “Remove” of the “Remove Table” will delete all lists.
Name	The name of the MQTT variable. Default: Tag#
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable. Include: Bool, Short, Unsigned Short, Long, Unsigned Long, Int64, Float, Double, String
Subscribe Topic	The topic of receiving/subscribing data message.
Subscribe QoS	The subscribe QoS (Quality of Service) levels. Default: 2 0: Delivering a message at most once. 1: Delivering a message at least once. 2: Delivering a message at exactly once.
Publish Topic	The topic of sending/publishing data message.
Publish QoS	The publish QoS (Quality of Service) levels. Default: 2 0: Delivering a message at most once. 1: Delivering a message at least once. 2: Delivering a message at exactly once.
Description	For users set up the description for the variables.
Retain	Check [Retain] box of the top row can store the broker message for all variables in list. Check the box of each variable can store the broker message just that variable. Default: Uncheck.
OK / Cancer	Click [OK] to save and exit the page settings. Click [Cancer] to exit without saving.

5.2.5 EtherNet/IP ICP DAS Module

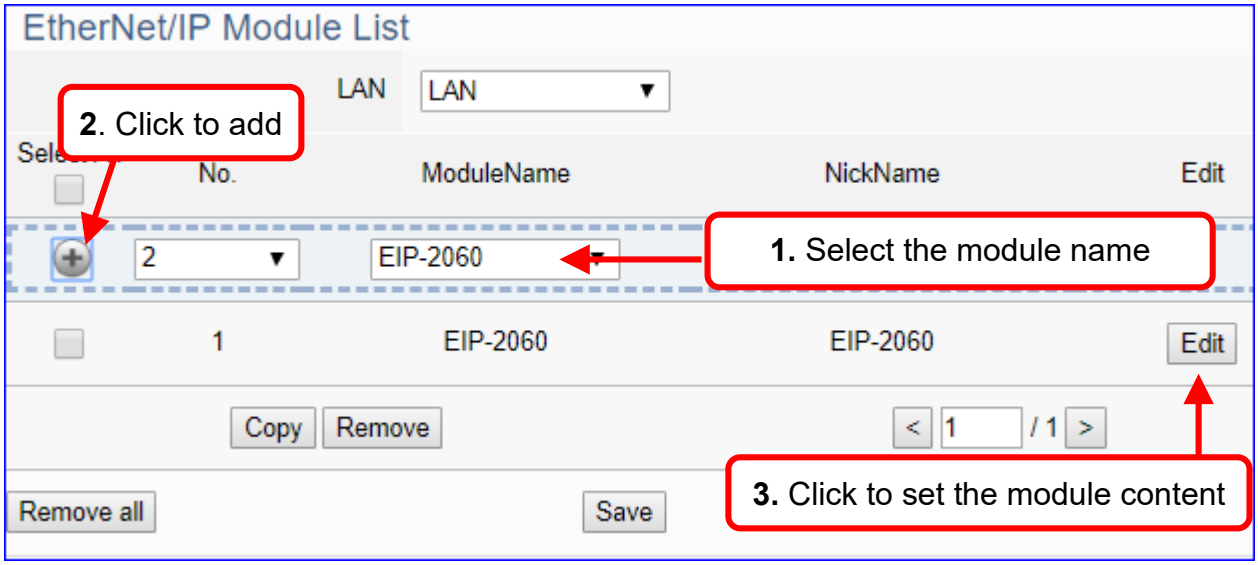
This setting is for UA Controller connecting the remote ICP DAS EIP module.



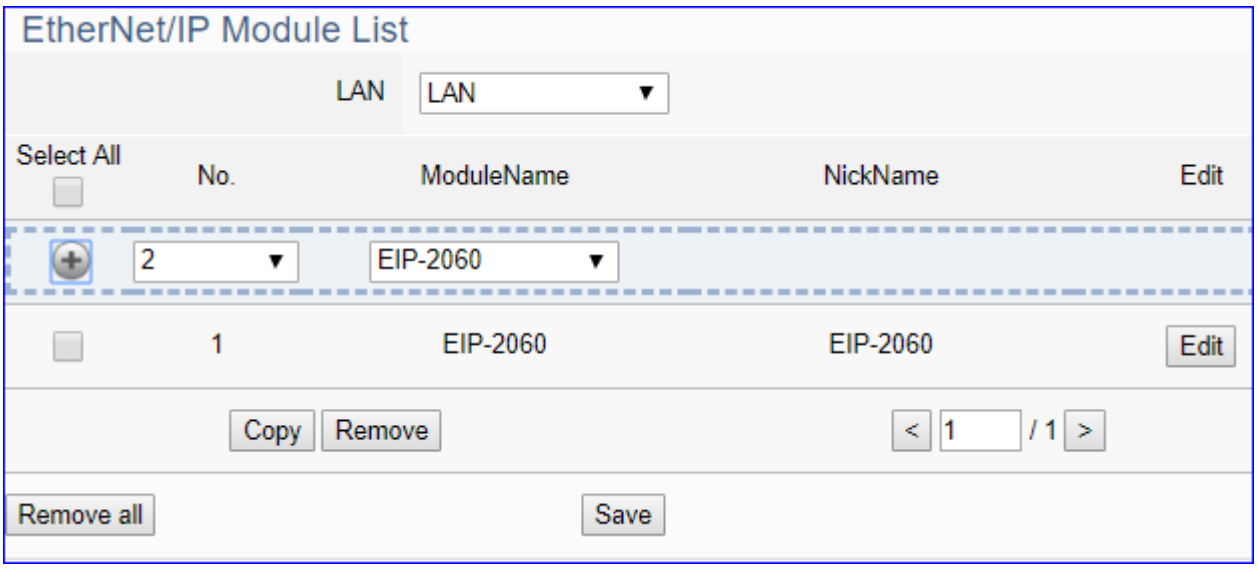
This page is for setting the communication values with the connected EIP modules. First, choose the Ethernet LAN port that connected with the module, and select the name of EIP module. Click [⊕] button could add a new module, and then click [Edit] button to configure the module content and the MQTT variable table.

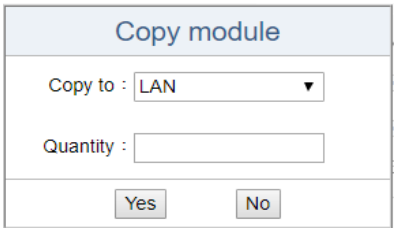
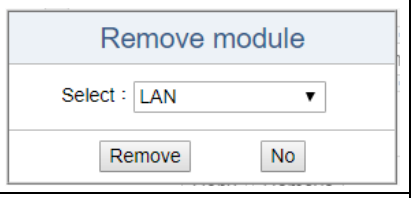
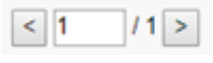
Setting Steps:

1. Select the module name of EIP-2000
2. Click the button [⊕] to add a new module
3. Click the button [Edit] to enter the Module Content Setting page
   Set up the module IP and module I/O channels



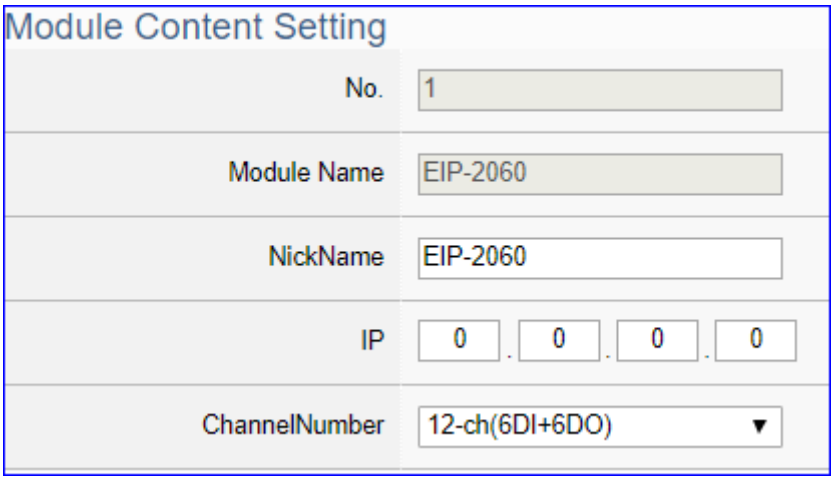
The function items and setting parameters of the [EtherNet/IP Module List]:



Module Setting > EtherNet/IP – ICPDAS Module > EtherNet/IP Module List	
Select All 	Check the box in the left of the module is to select that module list, can delete or copy the module. Check the box “Select All” will select all modules in the list.
	Click to add a list of module.
No.	The module number in the module list (System arrange, not editable)
ModuleName	Select the connecting EIP-2000 module name.
NickName	User can define a nickname for the EIP-2000 module.
Edit	Click to set the module in the Module Content Setting page.
Copy	Select the module wants to copy by check the box and click [Copy] can copy module by assigning port and quantity. Yes: copy the module and exit. No: exit without copy. 
Remove	Click to delete the checked module(s)
Remove all	Click to delete all modules linked with the selected port. Remove: delete the modules and exit. No: exit without delete module. 
	The page number / total pages of the module list. Click < or > to go to the previous or the next page.
Save	Click to save the settings of this page.

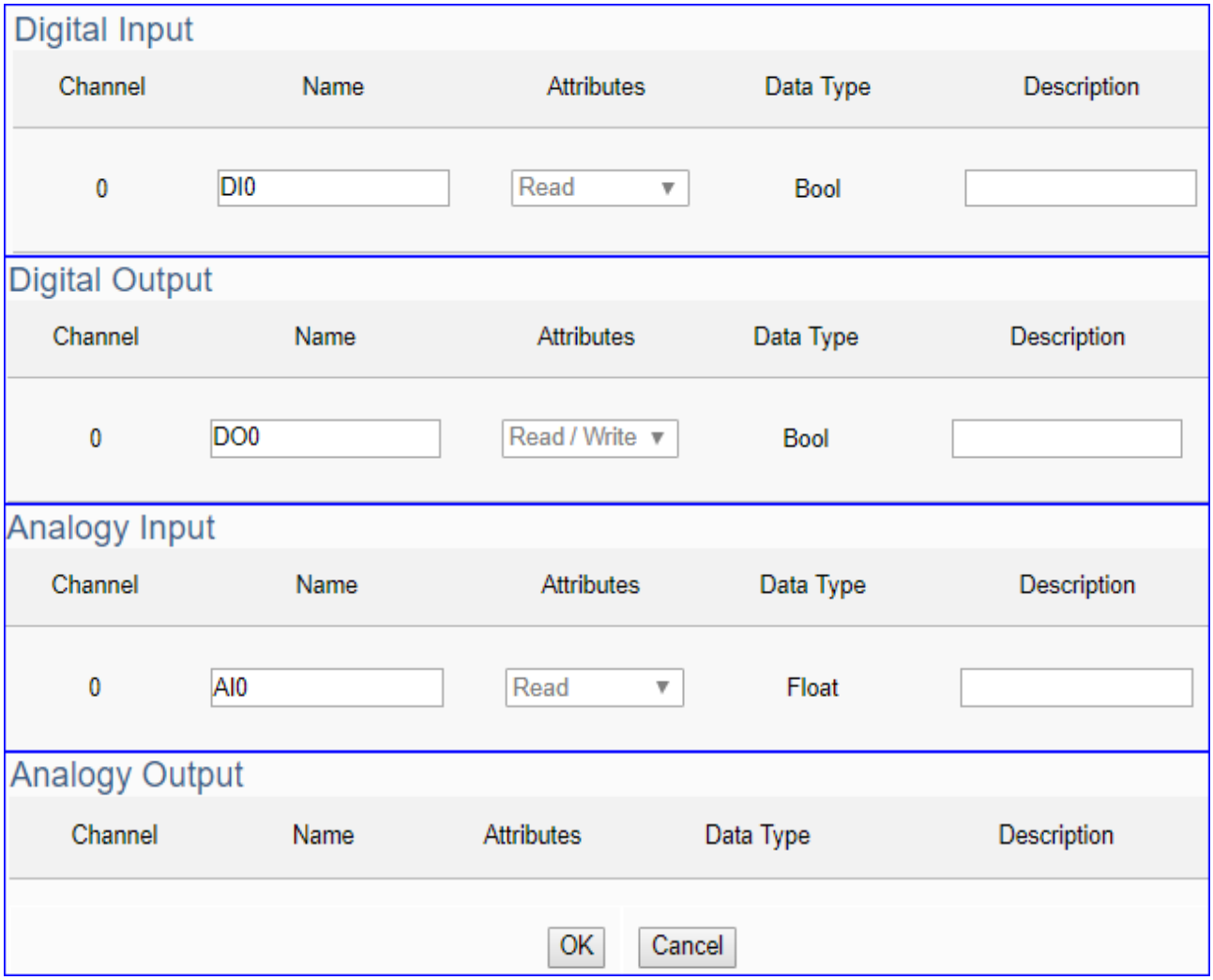
Click [**Edit**] can enter the [**Module Content Setting**] page to set up the module.

[**Module Content Setting**] page:



Module Setting > EtherNet/IP – ICPDAS Module > Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The selected EIP module number.
NickName	User can define a nickname for the module. Default: Module name.
IP	Enter the IP address of the module. Default: 0.0.0.0
ChannelNumber	System auto setup the I/O channel numbers and the I/O table. Some module provides 2 or more channel mode needed user to select one.

DI/DO/AI/AO Channel Table: System auto setup the table according to the module name.



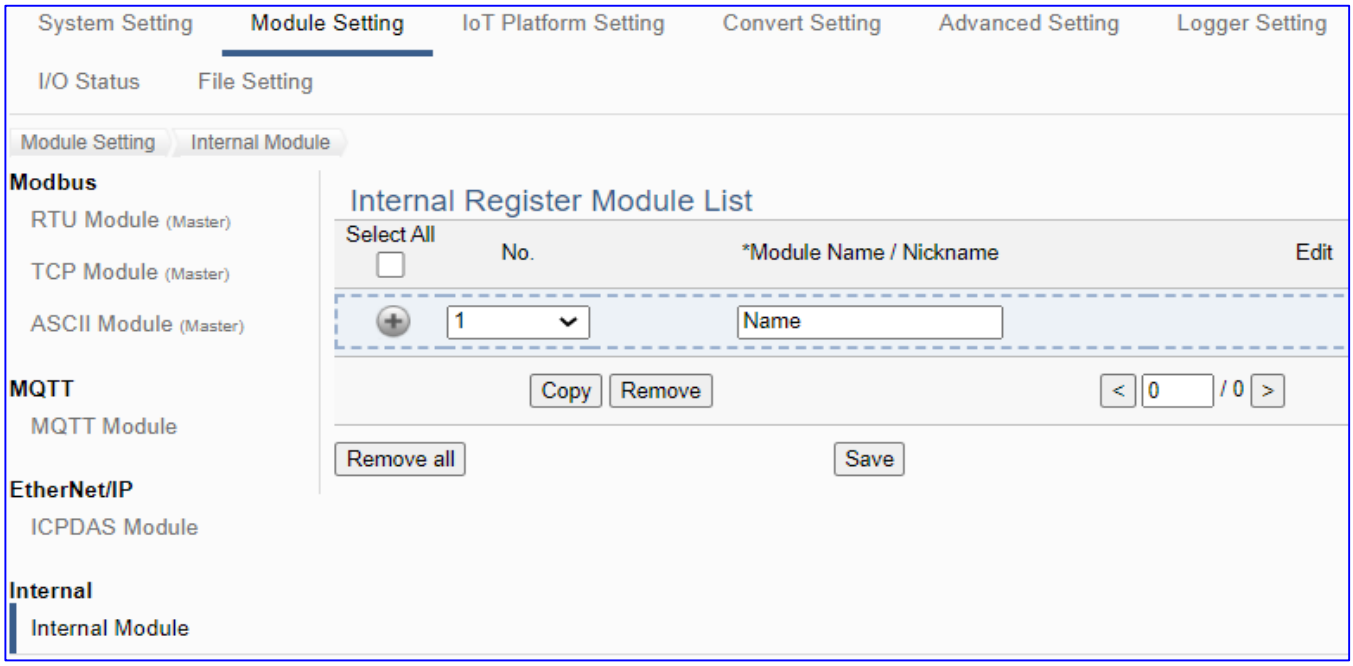
Module Setting > EtherNet/IP – ICPDAS Module > Di/Do/AI/AO Channel Table	
Channel	Channel number set by system. (Not editable)
Name	Channel name. User can define a new channel name.
Attribute	Display data attribute of the channel. (Not editable) Include: Read, Read / Write…
Data Type	Display data type of the channel. Include: Bool, Short, Float, … according to the module.
Description	User can set up the description for the channel.
OK / Cancer	Click [OK] to save and exit the page settings. Click [Cancer] to exit without saving.

5.2.6 Internal Module

The function can create internal modules and variables for virtual reading and writing, or as an intermediary to provide data exchange of communication protocols.

1. Internal Variable: Max. 1000 Internal variables (Tags).

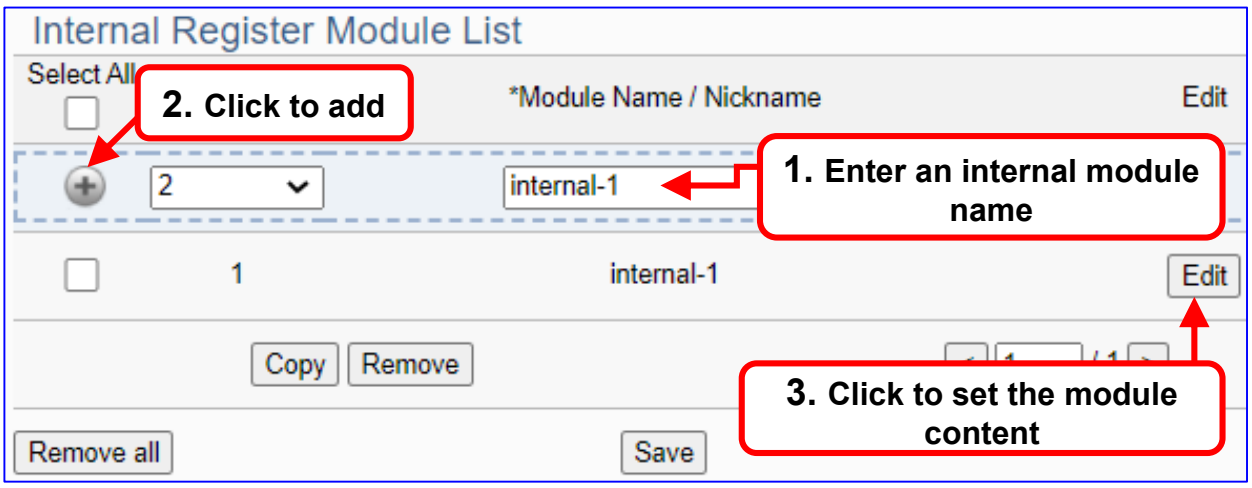
2. Protocol Communication Conversion: provide Internal to OPC UA (Server)



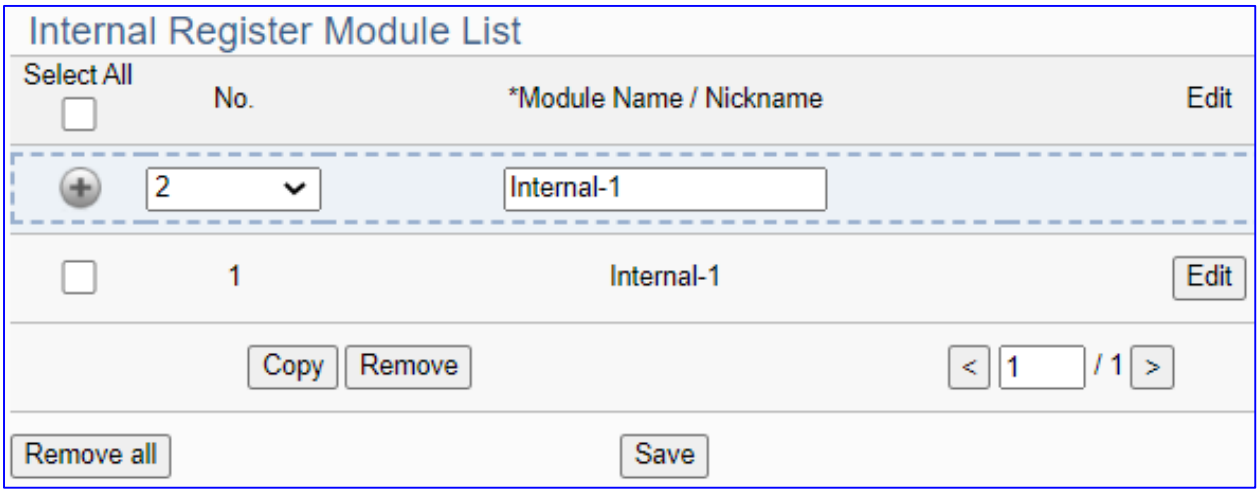
This page is for setting the internal module list. First, enter the name for the module. Click [⊕] button to add a new module, and then click [Edit] button to configure the module variables.

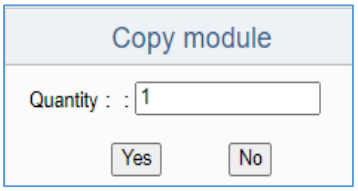
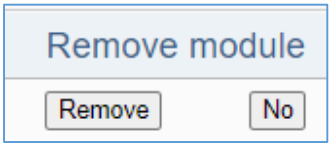
Setting Steps:

1. Enter a name for the internal module
2. Click the button [⊕] to add the module
3. Click the button [Edit] to enter the Module Content Setting page.
   Set up the module variables



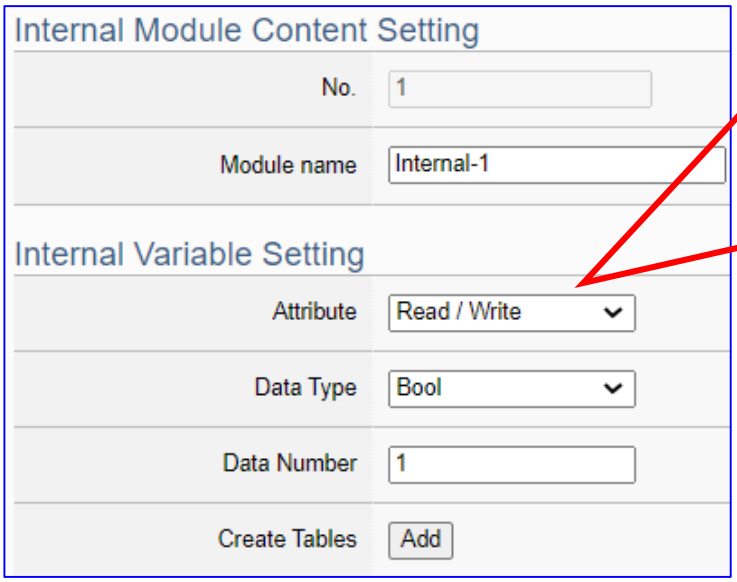
The function items and setting parameters of the [Internal Register Module List]:



Module Setting > Internal – Internal Module > Internal Register Module List	
Select All	Check the box “Select All” will select all modules in the list. Check the box in the left of the module is to select that module list, can delete or copy the module.
	Click to add a list of module.
No.	The module number in the module list (System arrange, not editable)
*Module Name / Nickname	Module name or nickname. User can give a new name. (The star * means this field cannot be null.)
Edit	Click to set the module in the Module Content Setting page.
Copy	Select the module wants to copy by check the box and click [Copy] can copy module by assigning port and quantity. Yes: copy the module and exit. No: exit without copy. 
Remove	Click to delete the checked module(s)
Remove all	Click to delete all modules linked with the selected port. Remove: delete the modules and exit. No: exit without delete module. 
< 1 / 1 >	The page number / total pages of the module list. Click < or > to go to the previous or the next page.
Save	Click to save the settings of this page.

Click [**Edit**] can enter the [**Internal Module Content Setting**] page.

[**Internal Module Content Setting**] page: to set up the module and the variable table



> Internal Variable Table:
Sequentially select the Attribute, Data Type, and Data Number of the variable, and then click [Add].

EX: Internal-1 has 2 “Bool” type variables, then select Type “Bool”, Number “2”, then click [Add]. If user needs other variables, please add more variables by your case.

Internal Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	Give a name, e.g. model number or name.
Internal Variable Setting	
Attribute	Display data attribute of the variable. (Not editable) Include: Read/Write…
Data Type	Display data type of the MQTT variable. Include: Bool, Short, Unsigned Short, Long, Unsigned Long, Float, Double, String.
Data Number	The number for the I/O variables of the module. Default: 1.
Create Tables	Click [Add] button, it will add a variable list in the Variable Table.

The Internal Variable Table is as below.



[**Internal Variable Table**] :

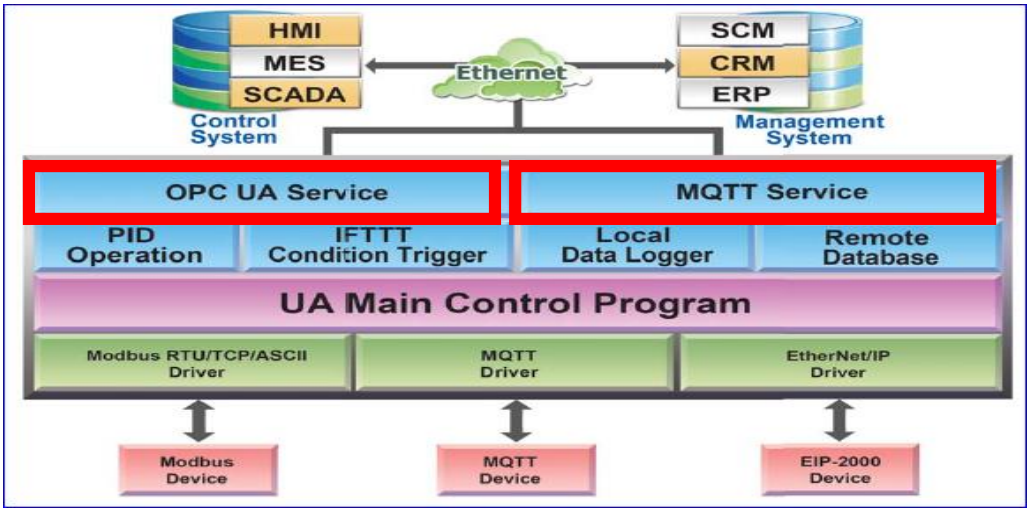


Internal Variable Table	
Remove Table / Remove	Check the box in the left of the variable is to select that variable list, and click the “remove” on the box can delete that variable list. Click the “Remove” of the “Remove Table” will delete all lists.
No.	The module number in the module list (Not editable here)
Name	The name of the variable. Default: Tag#
Attribute	Display data attribute of the variable. (Not editable) Include: Read/Write…
Data Type	Display data type of the variable. Include: Bool, Short, Unsigned Short, Long, Unsigned Long, Int64, Float, Double, String (Not editable)
Description	For users set up the description for the variables.
OK / Cancer	Click [OK] to save and exit the page settings. Click [Cancer] to exit without saving.

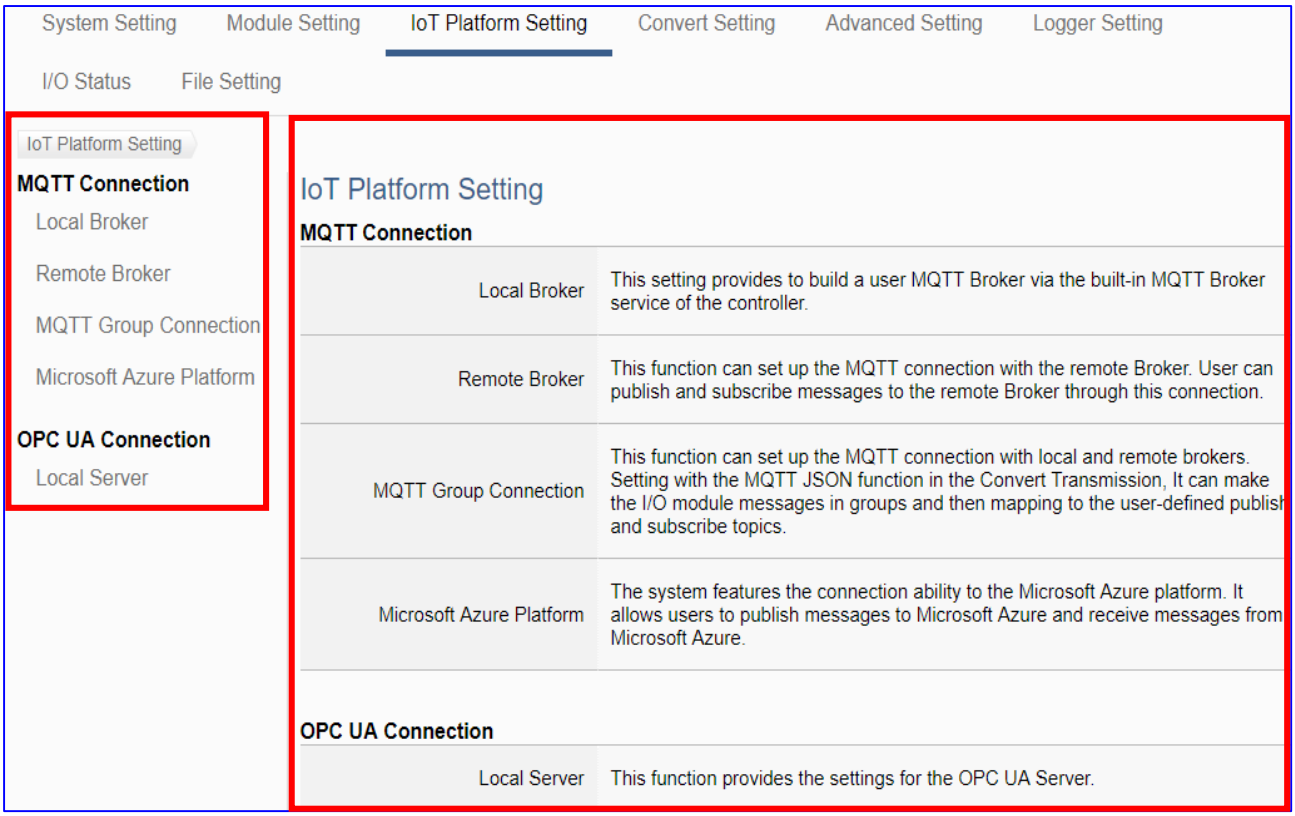
5.3 Main Menu: IoT Platform Setting

UA series can connect to Amazon AWS, IBM Cloud, Microsoft Azure or other IoT Cloud platforms. The Azure connection is more complicated and will set up in another setting item.

IoT Platform Setting is the third item of the Main Menu. It manages the interaction of the UA series connecting with the host computer in the Internet of Things. It provides OPC UA and MQTT protocols connection services via the Ethernet interface for data transmission.

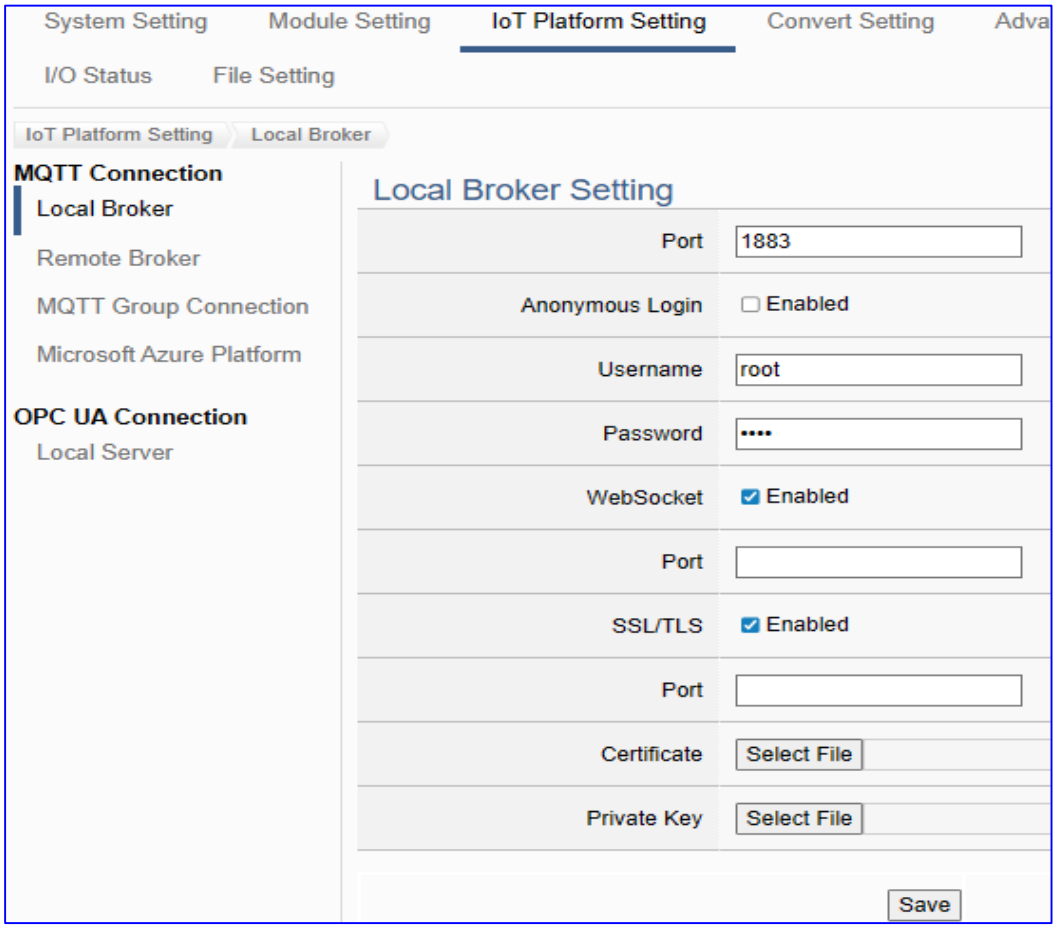


[IoT Platform Setting] includes five sub-menu functions in MQTT and OPC UA two connections and the function descriptions are listed on the page of the Main Menu, such as the Local Broker, Remote Broker, MQTT Group Connection and Microsoft Azure Platform in the MQTT Connection category, and the Local Server in the OPC UA Connection category. This chapter will introduce these function items and setting parameters.



5.3.1 MQTT Local Broker

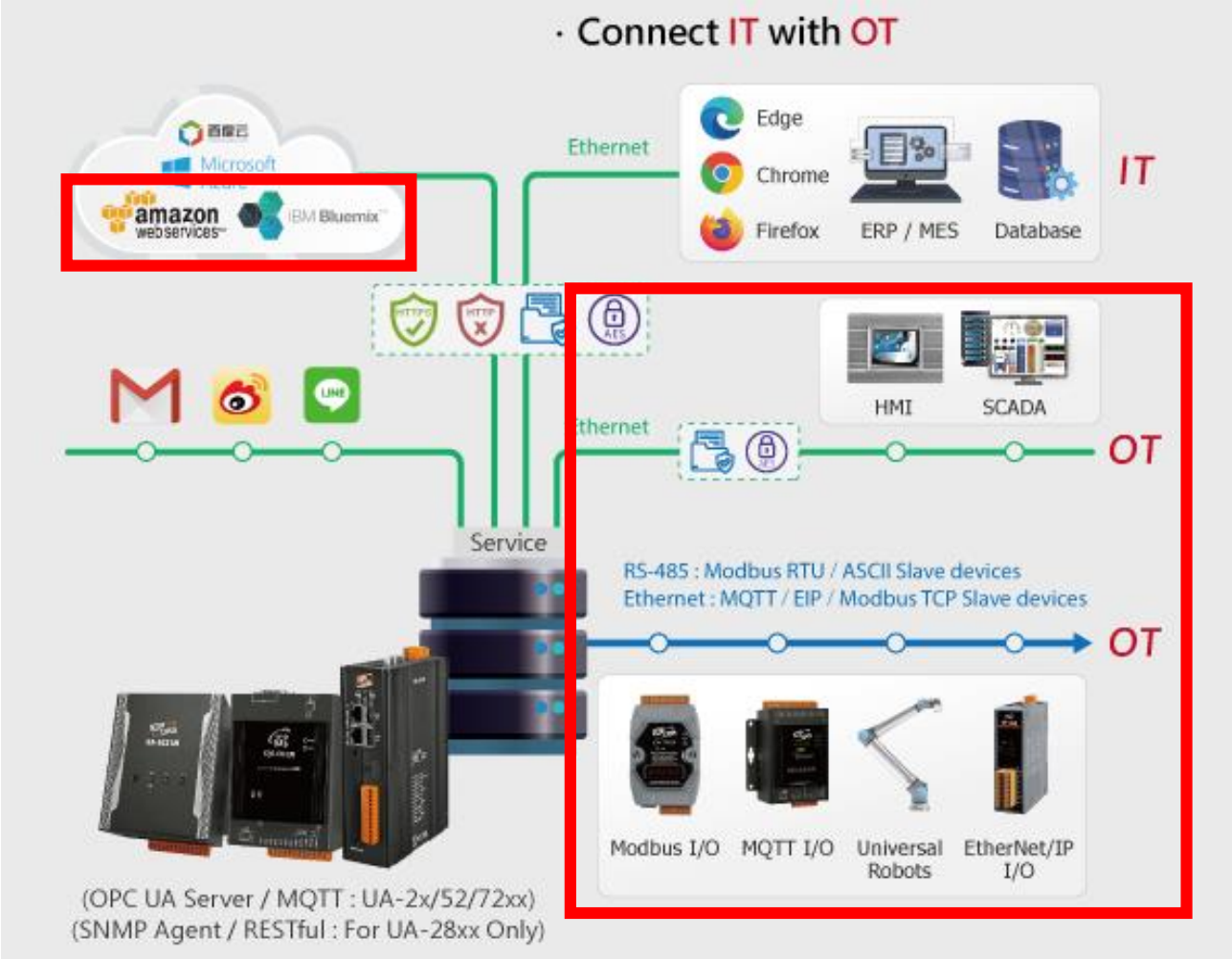
UA series controller built-in MQTT Broker that compliance with MQTT v3.1.1 protocol and supporting MQTT message distribution management. When using MQTT communication, there is no need to build a new Broker system.



MQTT Connection > Local Broker Setting	
Port	MQTT Local Broker's COM port. System default: 1883
Anonymous Login	Check to allow anonymous login. Default: Not Enabled. The default Username/Password: root/root.
WebSocket	Check to enable MQTT Broker WebSocket communication
Port	Set WebSocket port
SSL/TLS	Check to enable MQTT Broker SSL/TLS communication
Port	Set SSL/TLS port
Certificate	The Certificate required for MQTT Broker SSL/TLS communication. The user clicks Select File to select the certificate file to be uploaded on the browser side. Then click Upload to upload the file.
Private Key	The Private Key required for MQTT Broker SSL/TLS communication. The user clicks Select File to select the certificate file to be uploaded on the browser side. Then click Upload to upload the file.
Save	Click to save the settings of this page.

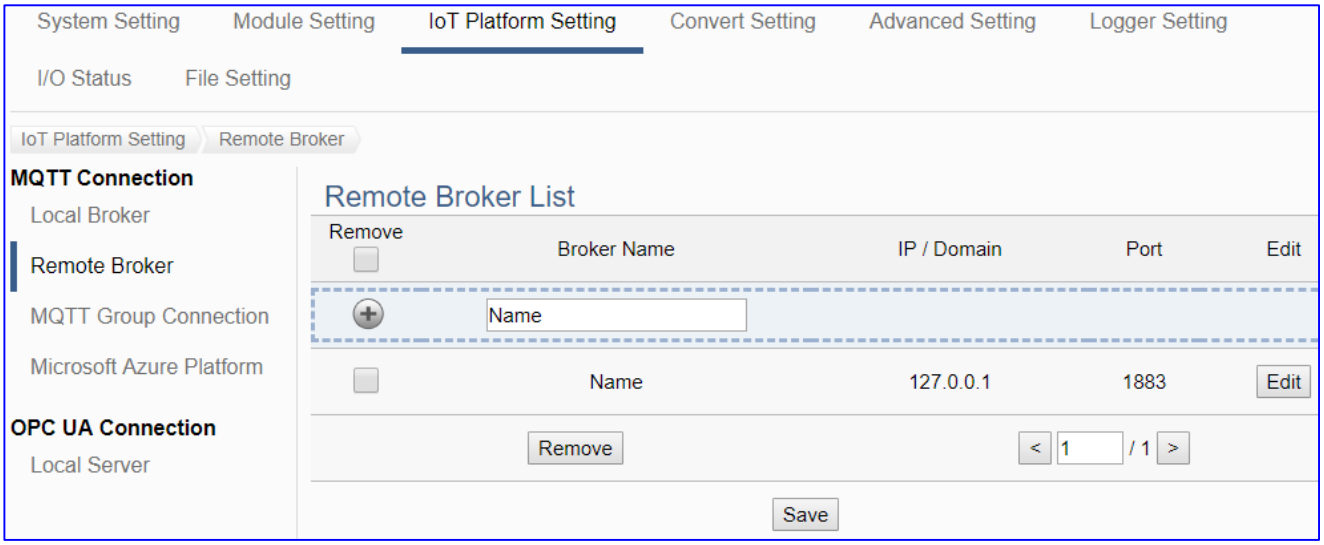
5.3.2 MQTT Remote Broker

UA series can connect to Amazon AWS, IBM Cloud, Microsoft Azure or other IoT Cloud platforms. The Azure connection is more complicated and will set up in another setting item.



UA series controller built-in MQTT Broker, but when users want to use the external MQTT Broker, UA system also provides the settings to connect and publish/subscript messages with the MQTT Remote Broker.

This page can set up the MQTT connection with the remote Broker. User can publish and subscribe messages to the remote Broker through this connection.



Setting Sequence for the MQTT Connection:

1. Add and set up a connection Broker name in the Remote Broker List.

2. Set up the contents of the Topic messages published/subscribed by other external MQTT devices for mapping to the Variables Table of the UA controller.

3. Convert the data contents of the MQTT device to communicate with other protocols.

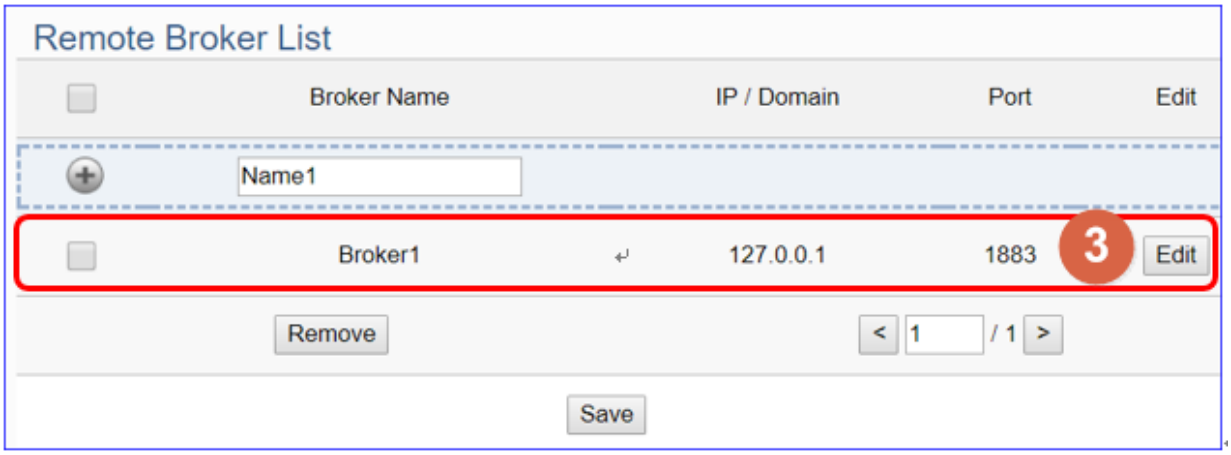
For the certificate about the communication security, please refer to Chapter 7.

This section will introduce the function items and setting parameters.



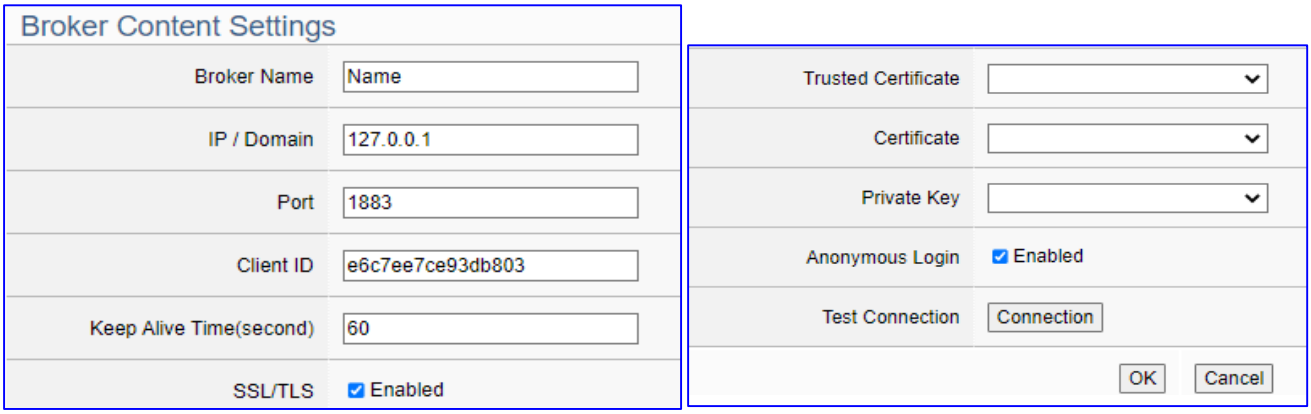
MQTT Connection > Remote Broker > Remote Broker List	
Broker Name	MQTT Remote Broker name. User can give a new name, e.g. Broker1. Default: Name.
	Click to add a list of remote Broker.
Save	Click to save the settings of this page.

After adding a list of the Remote Broker:



MQTT Connection > Remote Broker > Remote Broker List	
Broker Name	The MQTT remote Broker name.
IP / Domain	The IP address or domain name of the remote Broker.
Port	The communication port of the remote Broker.
	Check the box in the left of the Broker is to select that Broker, can delete or copy the Broker. Check the box on the top of the list will select all Brokers in the list.
Edit	Click to set up the remote Broker in the Broker Content Setting page.
Remove	Click to delete the checked Broker(s)
	The page number / total pages of the Broker list. Click < or > to go to the previous or the next page.
Save	Click to save the settings of this page.

Click [Edit] to set up the group in the Broker Content Setting page.

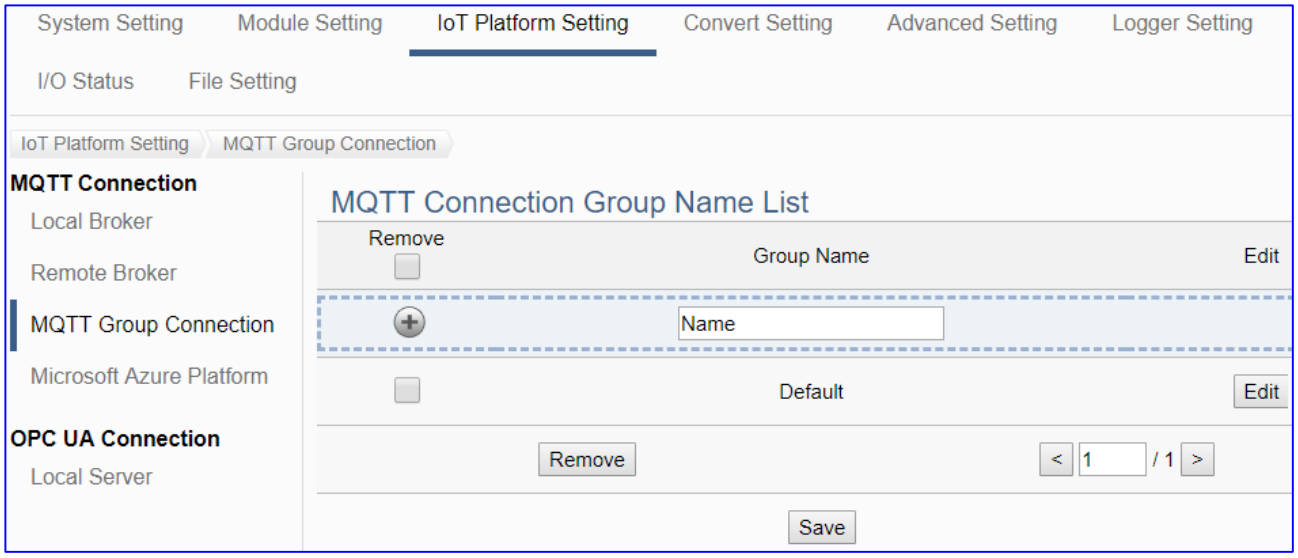


MQTT Connection > Remote Broker List > Broker Content Settings	
Broker Name	The name of the remote MQTT Broker. User can define a new name.
IP / Domain	Set the IP address or domain name of the Remote MQTT Broker. Default: 127.0.0.1
Port	The remote Broker port. Default: 1883.
Client ID	Set the MQTT Client ID value. Default: The system automatically generates a random value. **Recommendation**: If multiple MQTT Clients use this same configuration file, leave this field blank to avoid using the same fixed Client ID, which may cause the Broker to detect duplicate connections and result in disconnection or connection conflicts. ⚠ When using the "Test Connection" function, the Client ID field must be filled in and cannot be left blank.
Keep Alive Time (second)	Set the time in second that pass away without communication between the UA controller and Cloud platform. Default: 60 second.
SSL/TLS	Check to enable SSL/TLS security communication. Default: Uncheck. Sub-item: Trusted Certificate/Certificate/Private Key. Before enabling, upload the needed file from [File Setting] function menu.
Trusted Certificate	Select the trusted root CA file name uploaded to the controller via the File Setting function to verify the broker side certificate.
Certificate	Select the name of the certificate file uploaded to the controller via the File Setting function as the client side certification. When the "Certificate" field is not empty, the "Private Key" field cannot be empty.
Private Key	Select the name of the Private Key file uploaded to the controller via the File Setting function as the client side Private Key. When the "Private Key" field is not empty, the "Certificate" field cannot be empty.
Anonymous Login	Check to allow anonymous login. Default: Check Enabled.
Test Connection	Test whether the current parameters can successfully connect to the Broker. ⚠ The Client ID field is required when using Test Connection function.
OK / Cancel	Click: save the setting and exit this page. Cancel: exit without saving.

5.3.3 MQTT Group Connection

This function is mainly the MQTT group list of UA series controllers, including adding, removing, setting, and function parameter description.

MQTT groups can combine with the MQTT JSON function of conversion settings to encapsulate device I/O data into JSON format content in groups and then publish or subscribe to a single topic.

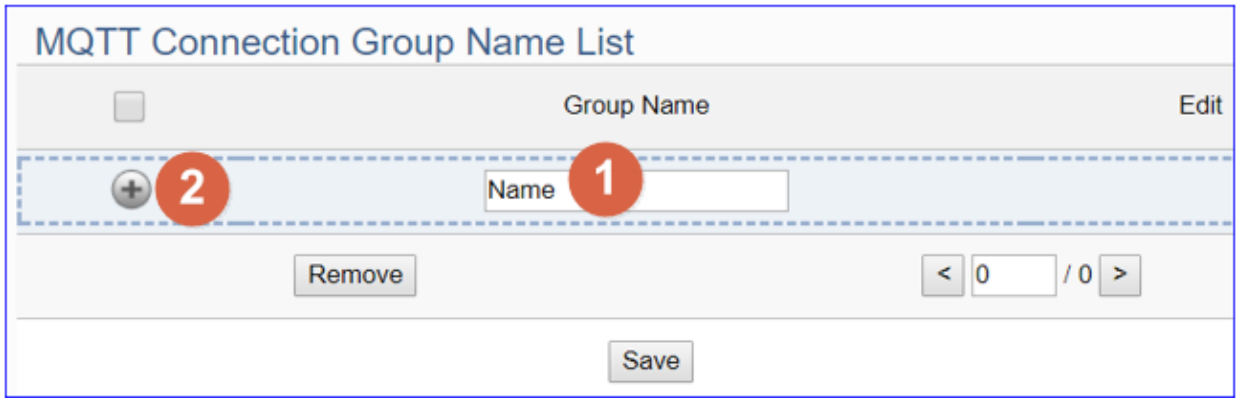


Setting Sequence for the MQTT Group Connection:

1. Set up a connection MQTT Broker of Local or Remote Broker.
2. Add and set up a MQTT connection group name in the List.
   Set up the contents of the Topic messages published/subscribed by other external MQTT devices that supporting JSON format for mapping to the Variables Table of the UA controller.
3. Convert the data contents of the MQTT device into JSON format of groups to communicate with other protocols.

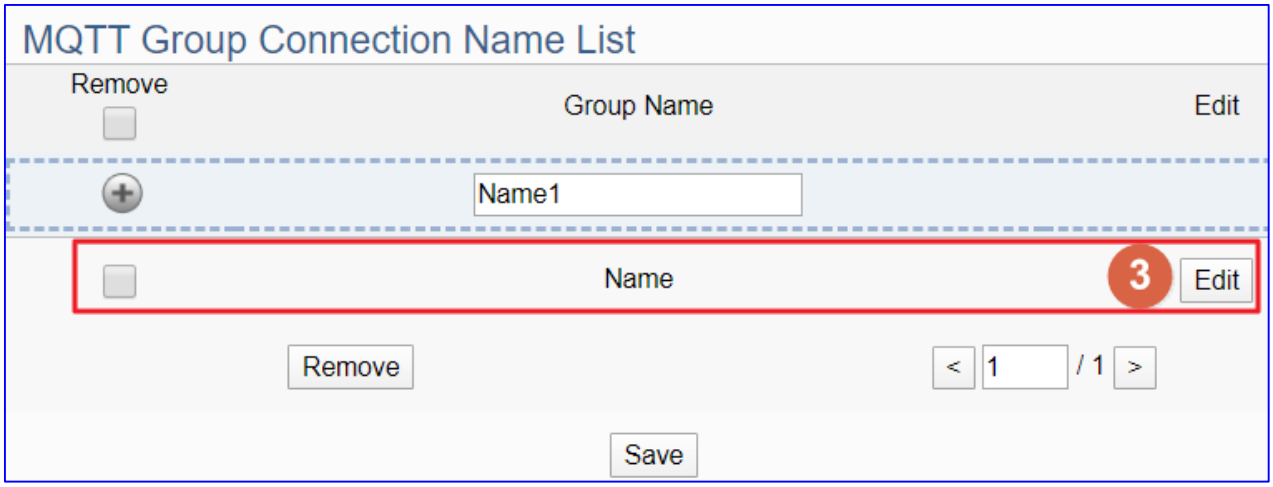
For the certificate about the communication security, please refer to Chapter 7.

This section will introduce the function items and setting parameters.



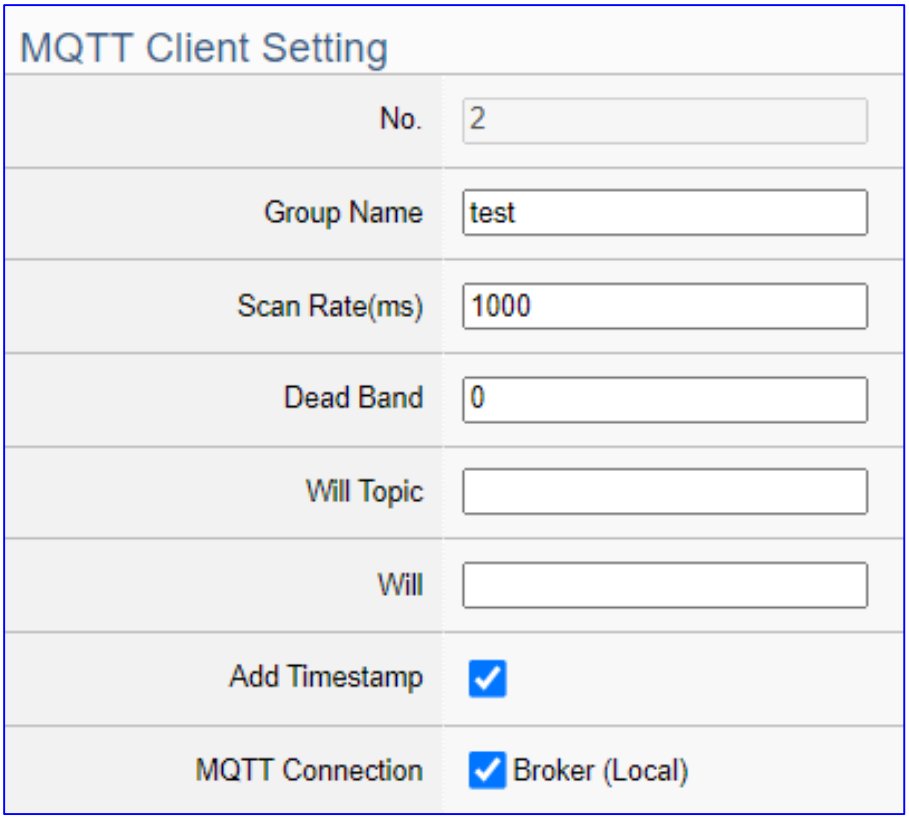
IoT Platform Setting > MQTT Connection > MQTT Connection Group Name List	
Group Name	MQTT connection group name. User can give a new name, e.g. Group1. Default: Name.
⊕	Click to add a list of MQTT connection group.
Save	Click to save the settings of this page.

After adding a list of the MQTT connection group:

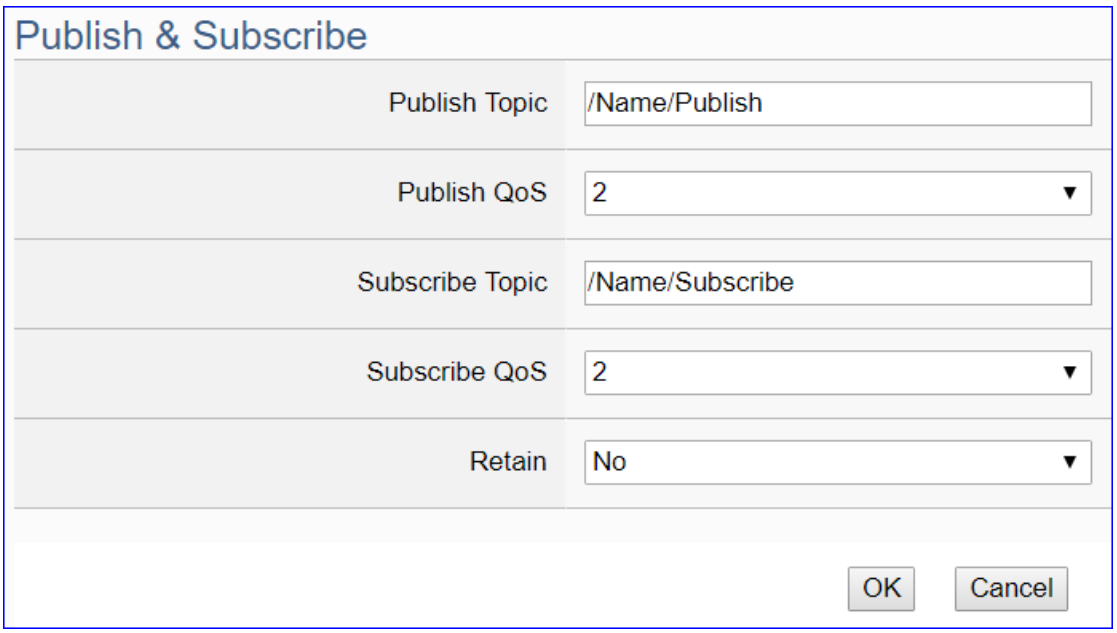


IoT Platform Setting > MQTT Connection > MQTT Connection Group Name List	
Group Name	The MQTT connection group name.
☐	Check the box in the left of the Group name is to select that group, can delete or copy the group. Check the box on the top of the list will select all groups in the list.
Edit	Click to set up the group in the MQTT Client Setting page.
Remove	Click to delete the checked group(s)
< 1 / 1 >	The page number / total pages of the group list. Click < or > to go to the previous or the next page.
Save	Click to save the settings of this page.

Click [Edit] to set up the group in the MQTT Client Setting page.



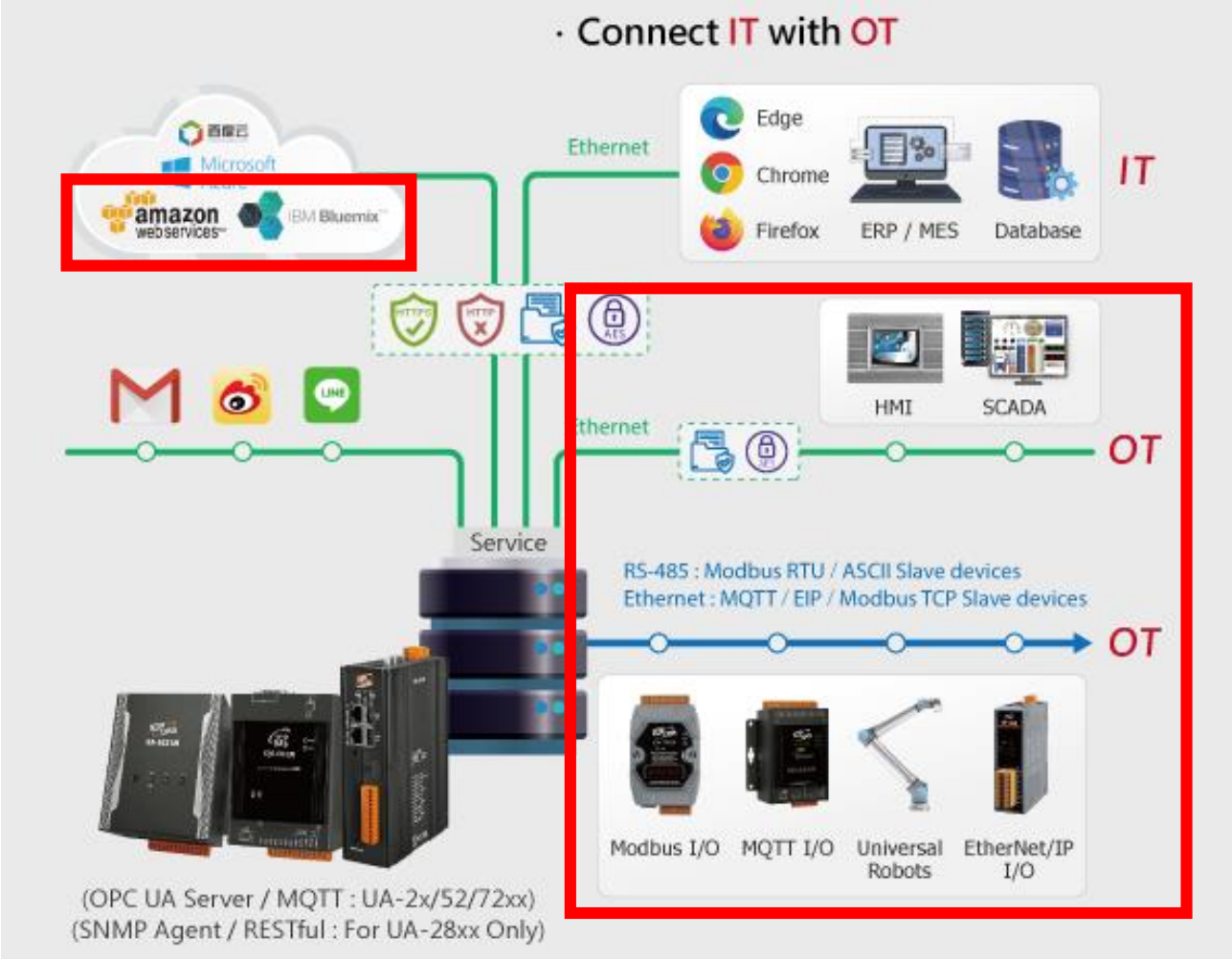
IoT Platform Setting > MQTT Connection > MQTT Client Setting	
No.	The MQTT Client Number. (Un-editable)
Group Name	The name of the Group. User can define a new name.
Scan Rate(ms)	Set an update frequency for the data. Unit: ms. Default: 1000 ms.
Dead Band	Give a dead bend value for updating a **float** signal. Default: 0 Dead Band: The minimum amount by which the tag value must change in order for the new tag value to be saved.
Will Topic	The title of a disconnect notice. Default: Null.
Will	The disconnect notice. Default: Null.
Add Timestamp	Add the timestamp in MQTT JSON format message
MQTT Connection	Check the Broker for this MQTT connection, Local Broker or Remote Broker. Remote Broker option will appear only when set in advance.



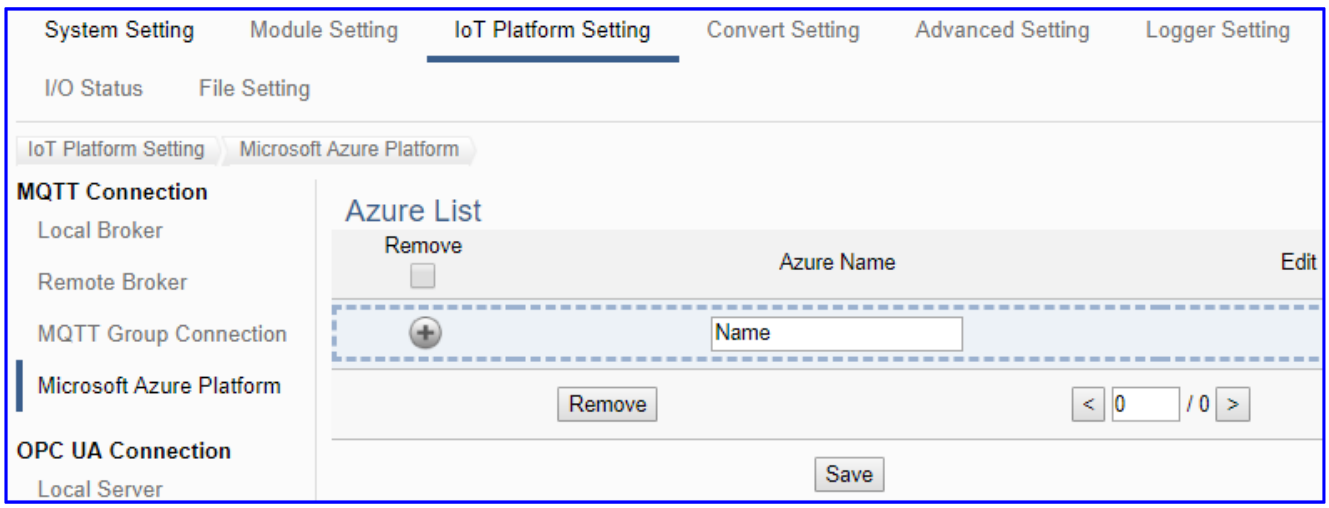
IoT Platform Setting > MQTT Connection > MQTT Client Setting – Publish & Subscribe	
Publish Topic	The topic of sending/publishing data message.
Publish QoS	The publish QoS (Quality of Service) levels. Default: 2. 0: Delivering a message at most once. 1: Delivering a message at least once. 2: Delivering a message at exactly once.
Subscribe Topic	The topic of receiving/subscribing data message.
Subscribe QoS	The subscribe QoS (Quality of Service) levels. Default: 2. 0: Delivering a message at most once. 1: Delivering a message at least once. 2: Delivering a message at exactly once.
Retain	Whether the Broker to store the message. Default: No.
OK	Click to save the setting and exit this page. Click [Cancel] to exit this page without saving.

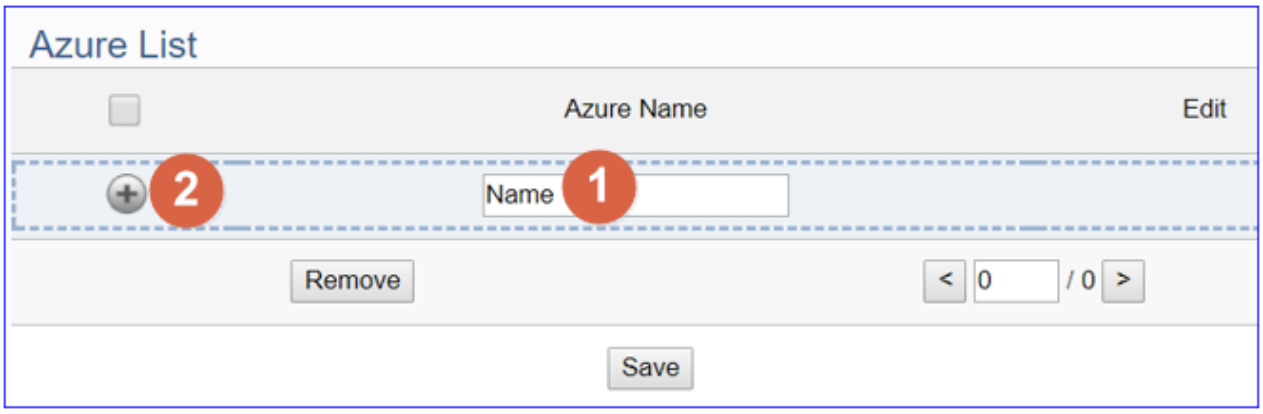
5.3.4 MQTT Connection - Microsoft Azure Platform

Microsoft Azure Platform is a common platform to integrate IoT devices into the cloud. Many of the applications use MQTT connection to the cloud for the setting is fast and easy. The UA series also provides the MQTT function for module to connect to the Azure platform and allows users to publish messages to Microsoft Azure and receive messages from Microsoft Azure.



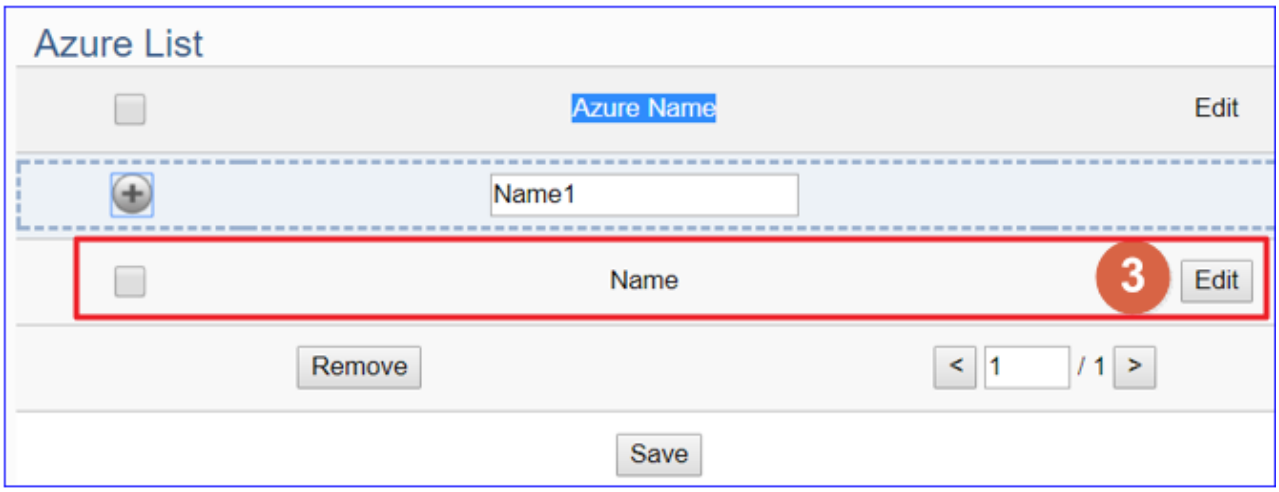
This page will introduce the settings for UA series controller using MQTT service to connect to the Microsoft Azure Platform. It includes new, remove and set up the Azure list and the function parameters





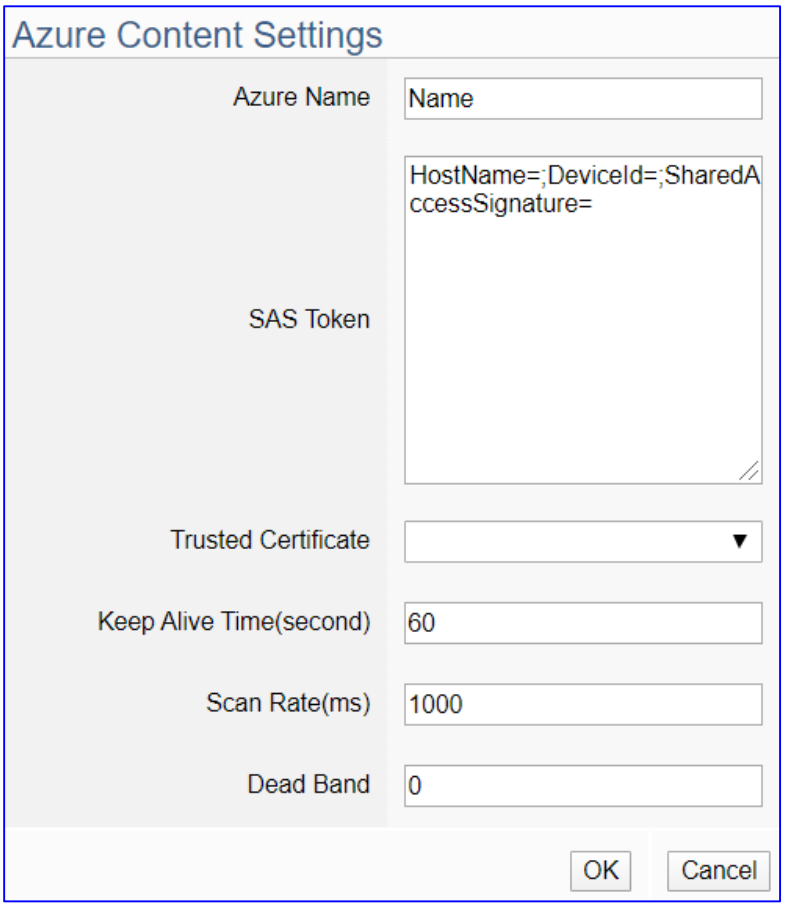
IoT Platform Setting > MQTT Connection > Microsoft Azure Platform > Azure List	
Azure Name	Azure name. User can give a new name1. Default: Name.
	Click to add a list of Azure.

After adding a list of the Azure:



IoT Platform Setting > MQTT Connection > Microsoft Azure Platform > Azure List	
Azure Name	Azure name. User can define the name. Default: Name.
	Click to add a new Azure list.
	Check the box in the left of a Azure name is to select that Azure, can delete or copy the Azure. Check the box on the top of the list will select all Azures in the list.
Edit	Click to set up the Azure in the Azure Content Setting page.
Remove	Click to delete the checked Azure(s).
< 1 / 1 >	The page number / total pages of the Azure list. Click < or > to go to the previous or the next page.
Save	Click to save the settings of this page.

Click [Edit] to set up the Azure in the Azure Content Setting page.



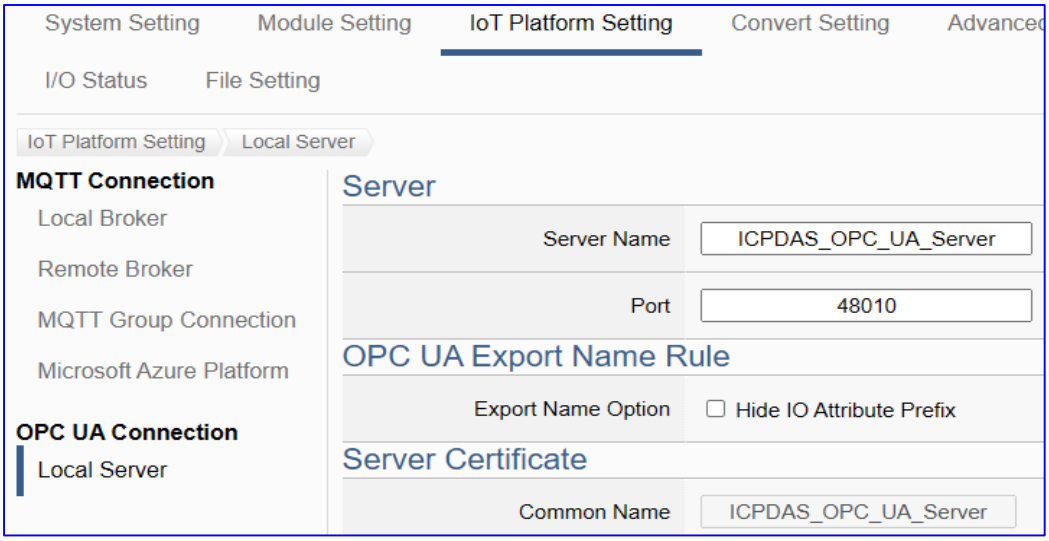
IoT Platform Setting > MQTT Connection > Microsoft Azure Platform > Azure Content Settings	
Azure Name	Azure name. User can define the name. Default: Name.
SAS Token	Input the SAS Token which you previously registered for the UA controller from Microsoft Azure. For the procedure to generate a SAS Token, please refer to the “Documentation > Azure IoT Hub > IoT Hub MQTT support” section on the Microsoft Azure Web Site for detailed information.
Trusted Certificate	Select the Trusted Certificate file that you previously got for the UA controller from Microsoft Azure, and uploaded in the menu [MQTT Certificate] of [File Setting] function. Sub-filename: **.crt**
Keep Alive Time (second)	Set the time in second that pass away without communication between the UA controller and Microsoft Azure. Default: 60 second.
Scan Rate(ms)	Set an update frequency for the task data. Default: 1000 (Unit: ms)
Dead Band	Give a dead bend value for updating a **float** signal. Default: 0 Dead Band: The minimum amount by which the tag value must change in order for the new tag value to be saved.
OK / Cancel	OK: save and exit this page. Cancel: exit without saving.

5.3.5 OPC UA Connection - Local Server

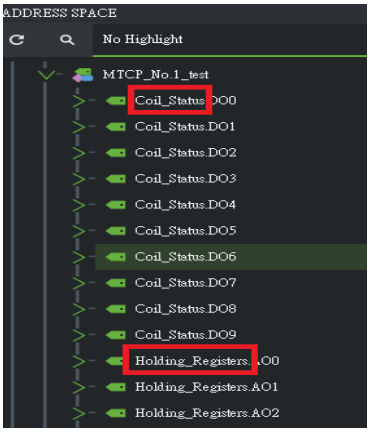
UA series controller built-in OPC UA Server service can integrate the I/O products and the third-party devices, import their data to the back-end SCADA management system or the big-data analysis/decision system, to satisfy the reliability, interoperability and security needs of the Industrial 4.0 automation system.

This setting is for the related service function of OPC UA Server built in UA series controller. The Security policy is **default to enable** the function of **None, Basic128Rsa15 (Sign), Basic128Rsa15 (Sign and Encrypt), Basic256 (Sign), and Basic256 (Sign and Encrypt)**.

This page provides the settings for the UA series built-in OPC UA Server.

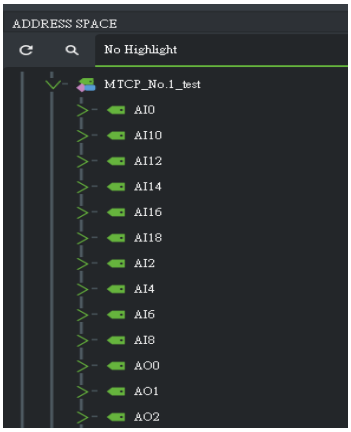


OPC UA Connection > Local Server – Server	
Server Name	Display the active OPC UA Server name, which can be edited and adjusted. The [Common Name] of [Server Certificate] will change according to this [Server Name]. System default: ICPDAS_OPC_UA_Server
Port	The communication port number of the OPC UA Server. System: 48010.
OPC UA Connection > Local Server – OPC UA Export Name Rule	
Export Name Option	Checking "Hide IO Attribute Prefix" will prevent the Modbus address attribute prefix from being displayed in the Display Name of the OPC UA Server Tag when using OPC UA Export.



Left Image: (Unchecked)
When using OPC UA Export, the screen will display the Modbus address attribute prefix by default, as shown in the red box.

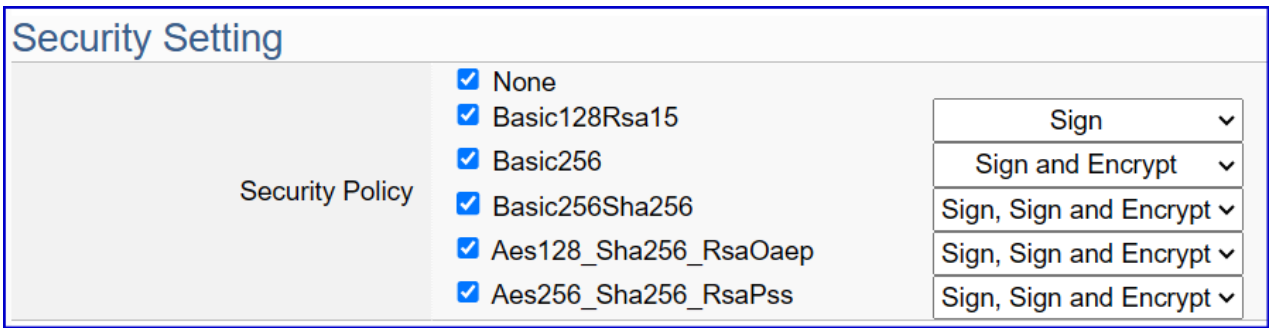
Right Image: (Checked)
If "Hide IO Attribute Prefix" is checked, the screen will look like the right image when using OPC UA Export, without the attribute prefix string.



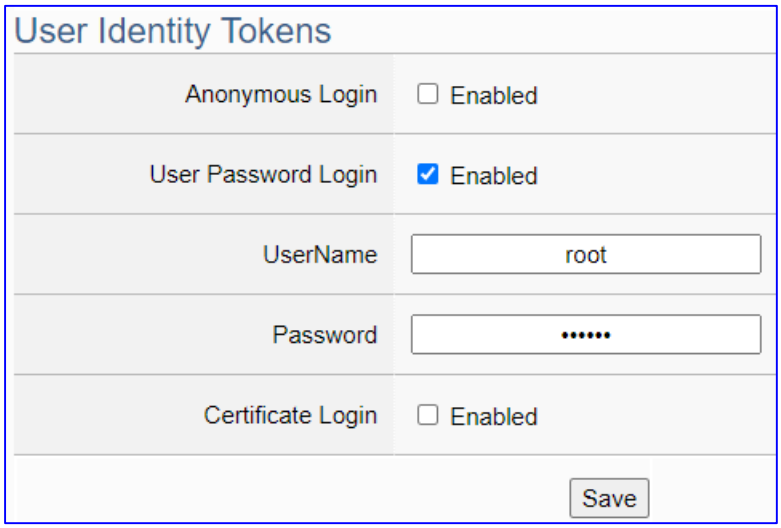


OPC UA Connection > Local Server – Server Certificate	
Common Name	Set the content of the self-signed certificate automatically generated by the OPC UA Server
Organization	
Organization Unit	
Locality	
State	
Country	
Certificate Validity (Years)	Set the validity period of the certificate (unit year)
Key Length	Set the length of Key (2048)
IP	Set the IP address of the OPC UA Server service

Note: The format of the generated certificate is SHA256.



OPC UA Connection > Local Server – Security Setting	
Security Policy	Set the message security mode that the OPC UA Server opens to the Client. 6 Policy: None, Basic128Rsa15, Basic256, Basic256Sha256, Aes128_Sha256_RsaOaep, Aes256_Sha256_RsaPss. All default enabled.
None	This policy do not use any security policy.
Basic128Rsa15	Each policy has 3 selections: **Sign**: Message Signing **Sign and Encrypt**: Message Signing and Encryption **Sign; Sign and Encrypt**: Message Signing; Message Signing and Encryption
Basic256	
Basic256Sha256	
Aes128_Sha256_RsaOaep	
Aes256_Sha256_RsaPss	

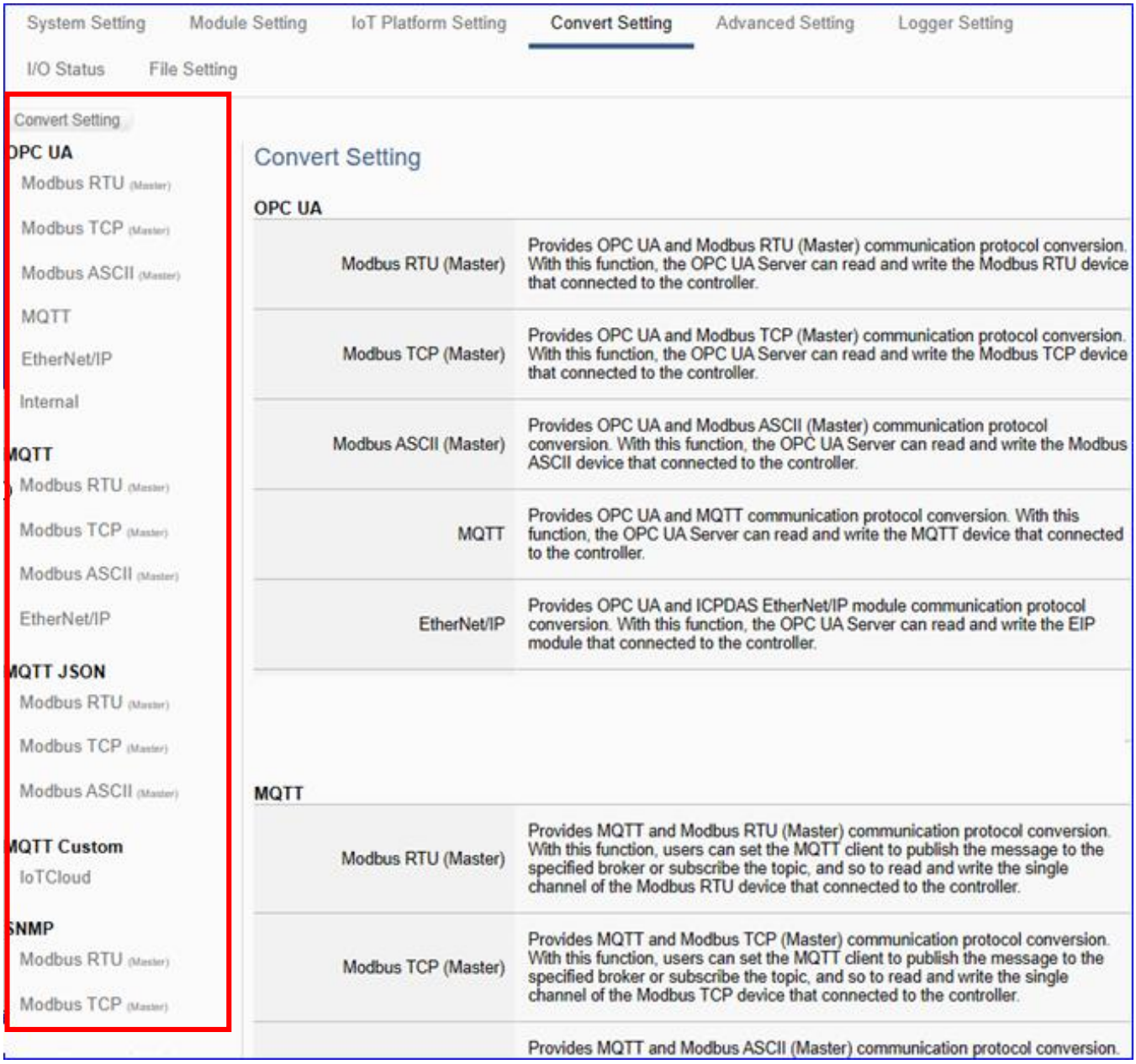


OPC UA Connection > Local Server – User Identity Tokens	
Anonymous Login	Check to enable the anonymous login of clients. Default: check.
User Password Login	Check to enable the user password login of clients. Default: uncheck. User Name: If check the “Enabled”, show the User name for setting. Password: If check the “Enabled”, show the Password for setting.
Certificate Login	Check to enable the certificate login of clients. Default: uncheck.
Save	Click to save the settings of this item.

5.4 Main Menu: Convert Setting

Convert Setting is the 4th item of the Main Menu for the communication conversion.

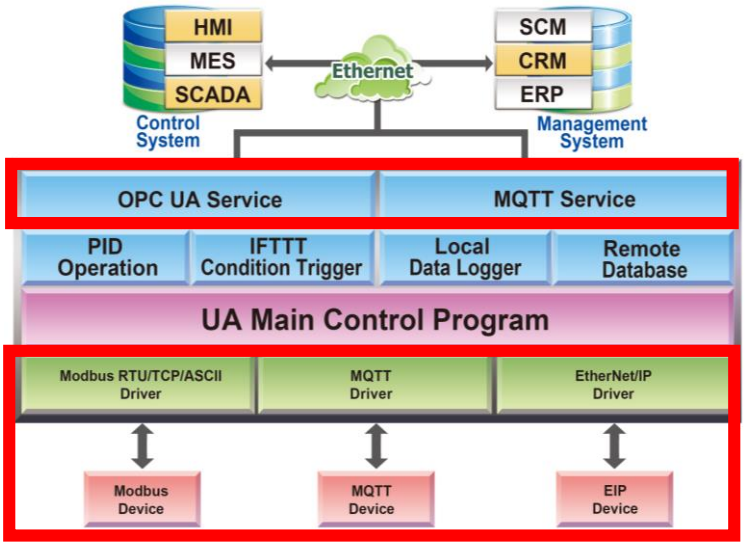
There are 4 converting types: **OPC UA, MQTT, MQTT JSON, MQTT Custom & SNMP**. Each type has some convert settings items for conversion with the Modbus RTU/TCP/ASCII (Master), MQTT, EtherNet/IP protocols or Internal virtual converting for the data communication, and user custom converting. The function descriptions are on the home page of the Main Menu. This chapter will introduce these function items and setting parameters.



The settings of Modbus RTU/ASCII are the same. Here will introduce them together.

OPC UA	Use **OPC UA** Service to convert with **Modbus RTU/ASCII** protocol. **(5.4.1)** Use **OPC UA** Service to convert with **Modbus TCP** protocol. **(5.4.2)** Use **OPC UA** Service to convert with **MQTT** protocol. **(5.4.3)** Use **OPC UA** Service to convert with **EtherNet/IP** protocol. **(5.4.4)** Use **OPC UA** Service to convert with **Internal** communication. **(5.4.5)**
MQTT	Use **MQTT** Service to convert with **Modbus RTU/ASCII** protocol. **(5.4.6)** Use **MQTT** Service to convert with **Modbus TCP** protocol. **(5.4.7)** Use **MQTT** Service to convert with **EtherNet/IP** protocol. **(5.4.8)**
MQTT JSON	Use **MQTT** Service in group of JSON format to convert with **Modbus RTU/ASCII** protocol. **(5.4.9)** Use **MQTT** Service in group of JSON format to convert with **Modbus TCP** protocol. **(5.4.10)**
MQTT Custom	**IoTCloud**: Users can customize the MQTT format layout and add the module value to the publishing message. With **customized MQTT message content**, this function can support multiple IoT platforms. **(5.4.11)**
SNMP	Use **SNMP Agent** Service to convert with **Modbus RTU** protocol. **(5.4.12)** Use **SNMP Agent** Service to convert with **Modbus TCP** protocol. **(5.4.13)**

UA Series Function Diagram:

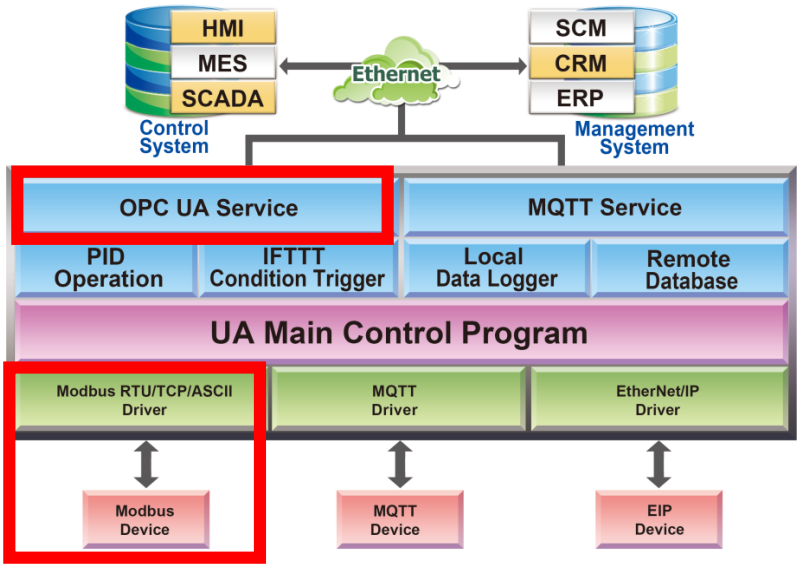


5.4.1 OPC UA and Modbus RTU/ASCII Conversion

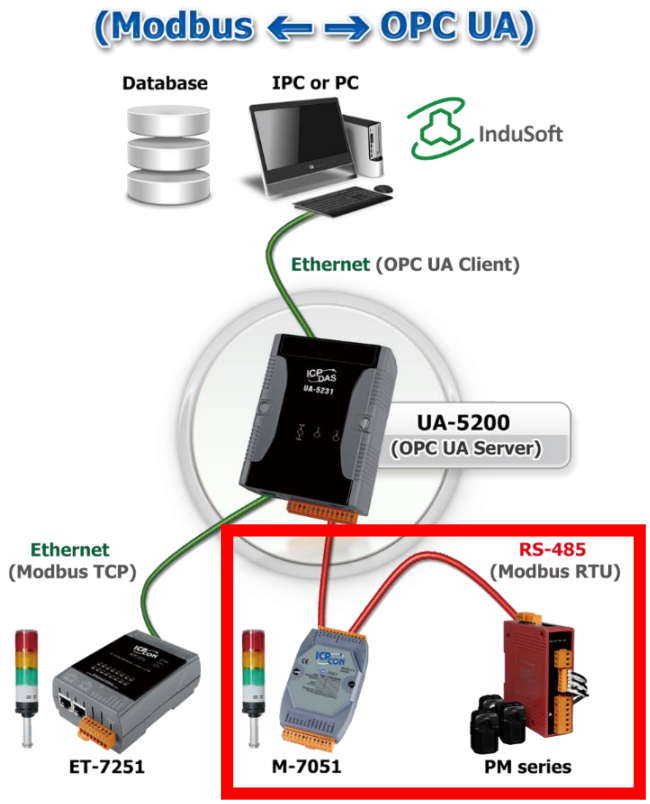
This page provides OPC UA and Modbus RTU/ASCII (Master) communication protocol conversion. With this function, the OPC UA Server can read and write the Modbus RTU / ASCII device that connected to the controller.

The settings of Modbus RTU/ASCII are the same. Here will introduce them together.

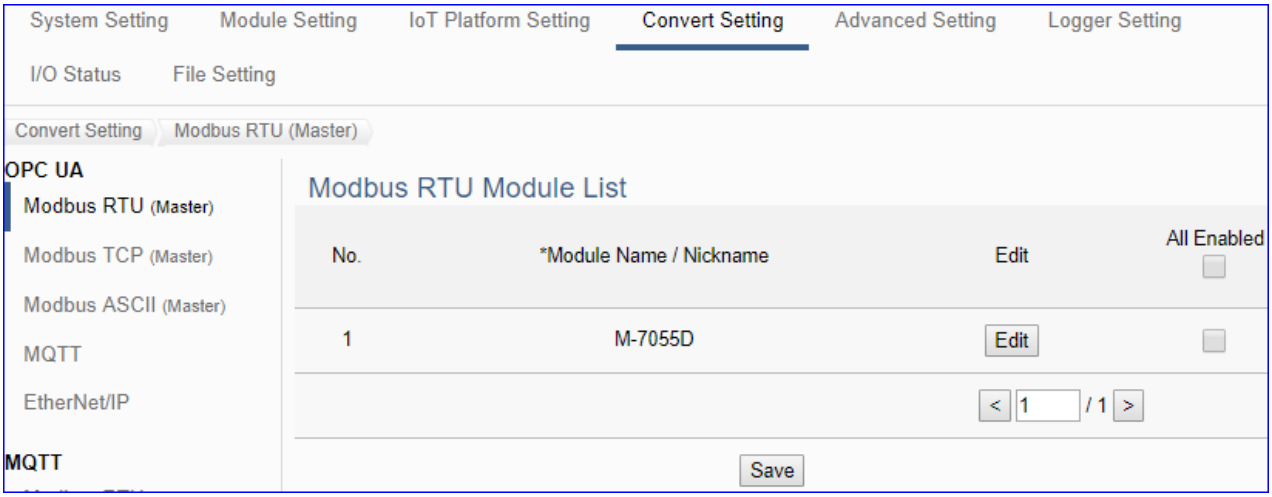
Function Diagram:



Application Solution:



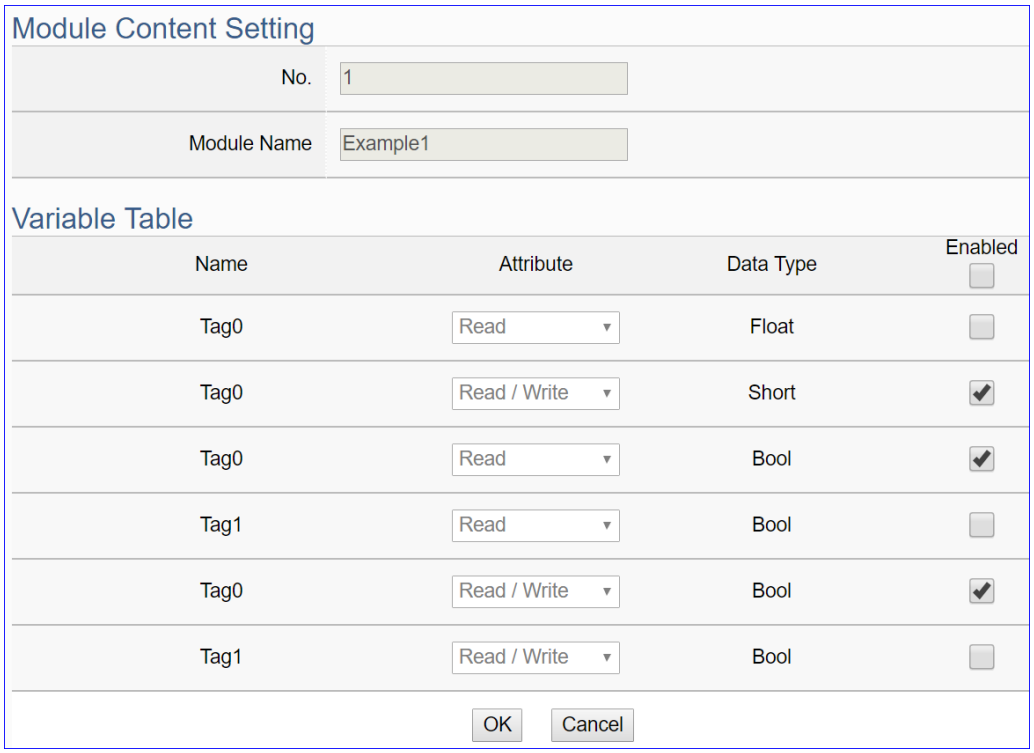
When entering the menu [**Convert Setting**] and the sub-menu [OPC UA] > Modbus RTU (Master) or Modbus ASCII (Master), the Modbus RTU/ASCII modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



Convert Setting > OPC UA > Modbus RTU (Master) Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
Edit	If user wants to enable some I/O channels for conversion, click [Edit] of that module to enter the “Variable Tale” setting. It is normal to set all channels as enabled, and the conversion will not affect the unconnected channels.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, please check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.

The “Module Content Setting” page after clicking the [Edit] button:



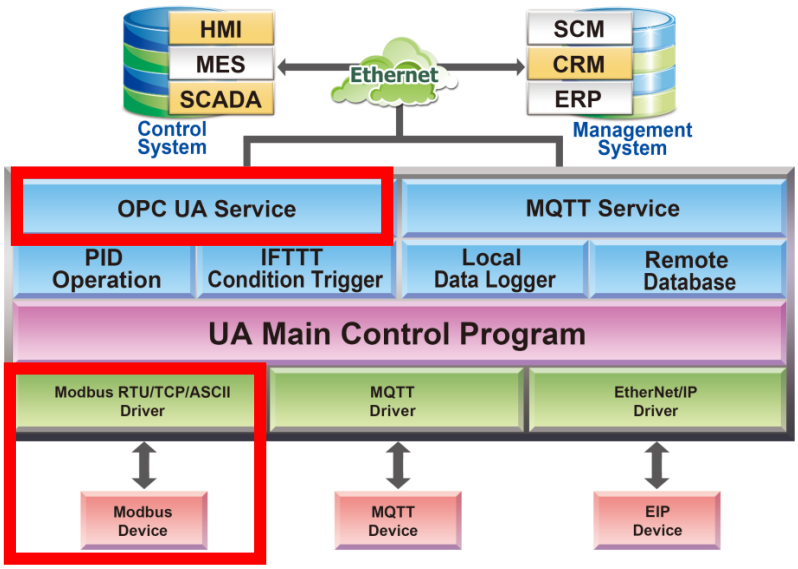
Convert Setting > OPC UA > Modbus RTU (Master) – Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Convert Setting > OPC UA > Modbus RTU (Master) – Variable Table	
Name	Display the variable name that set in the Modbus Address Mapping Table page (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

When complete the setting, click [OK] to save this page settings and back to the module list page. Remember to click [Save] to save the Convert Setting.

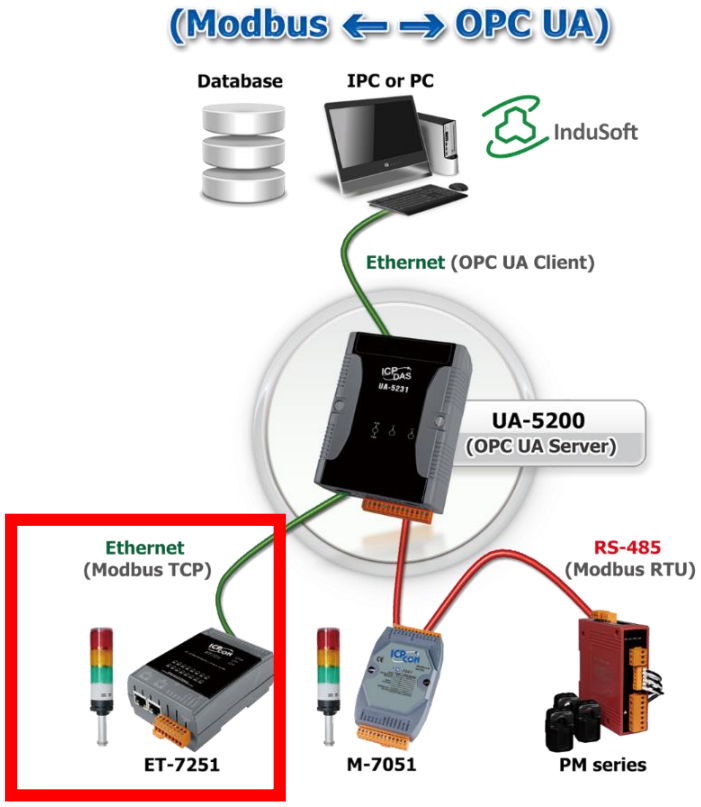
5.4.2 OPC UA and Modbus TCP Conversion

This page provides OPC UA and Modbus TCP (Master) communication protocol conversion. With this function, the OPC UA Server can read and write the Modbus TCP device that connected to the controller.

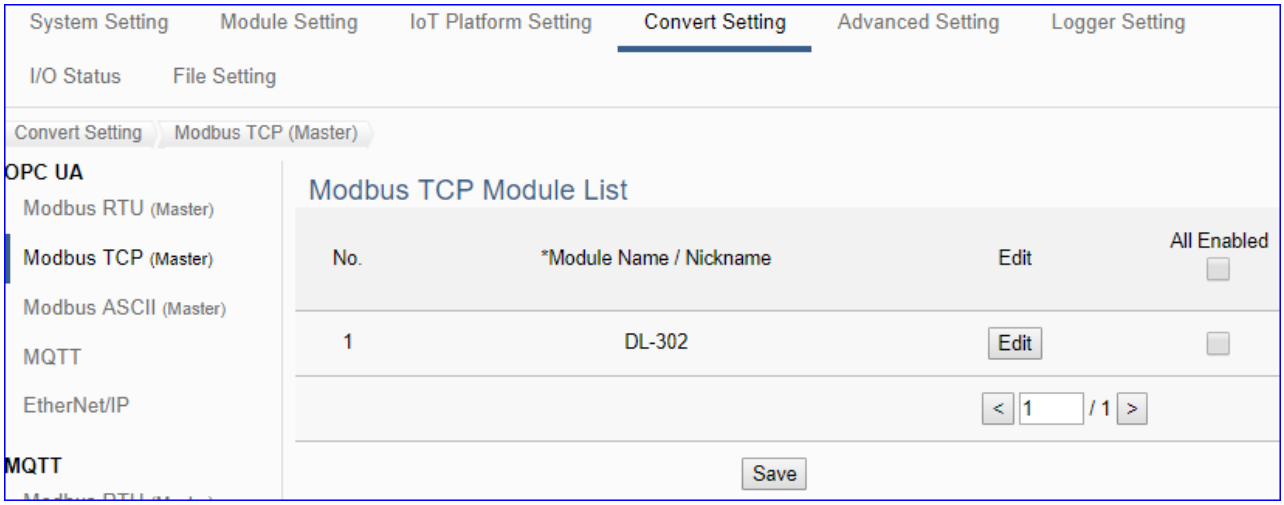
Function Diagram:



Application Solution:



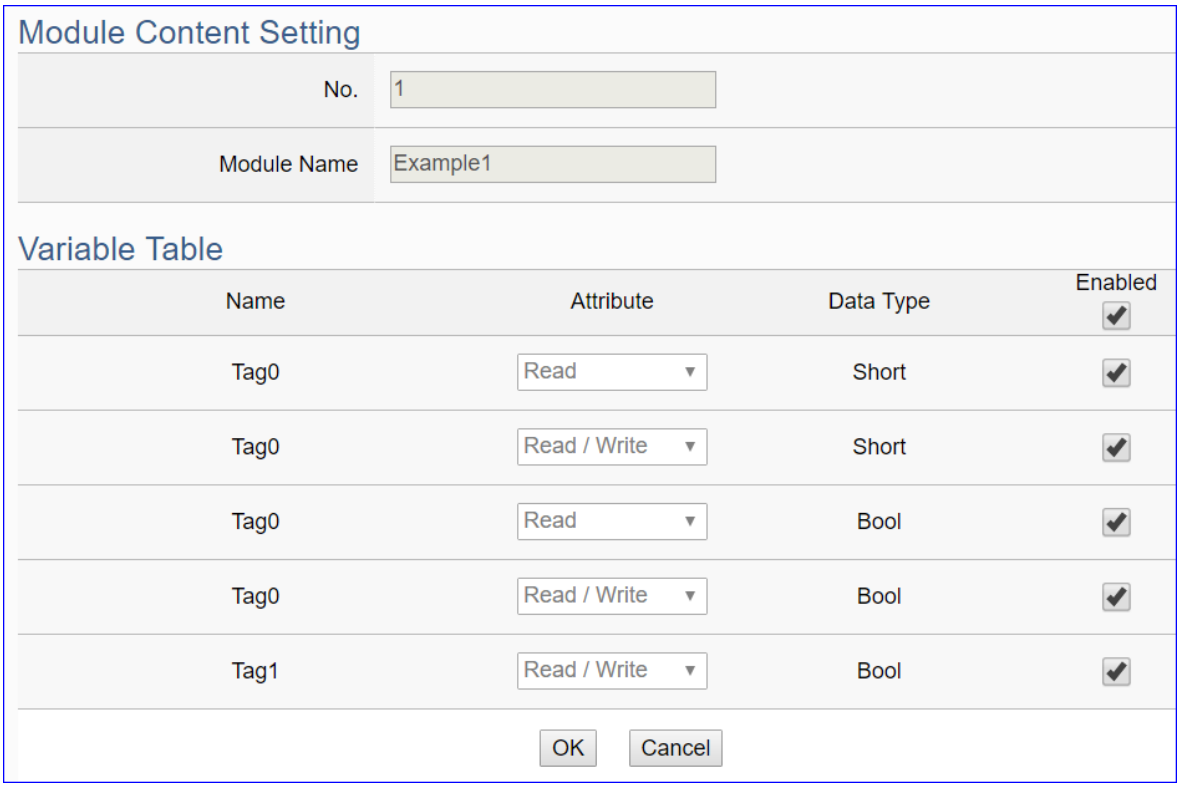
When entering the menu [Convert Setting] and the sub-menu [OPC UA] > Modbus TCP (Master), the Modbus TCP modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



Convert Setting > OPC UA > Modbus TCP (Master) Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
Edit	Click to enter the “Module Content Setting” page to set up and enable the I/O.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, please check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.

The “Module Content Setting” page after clicking the [Edit] button:



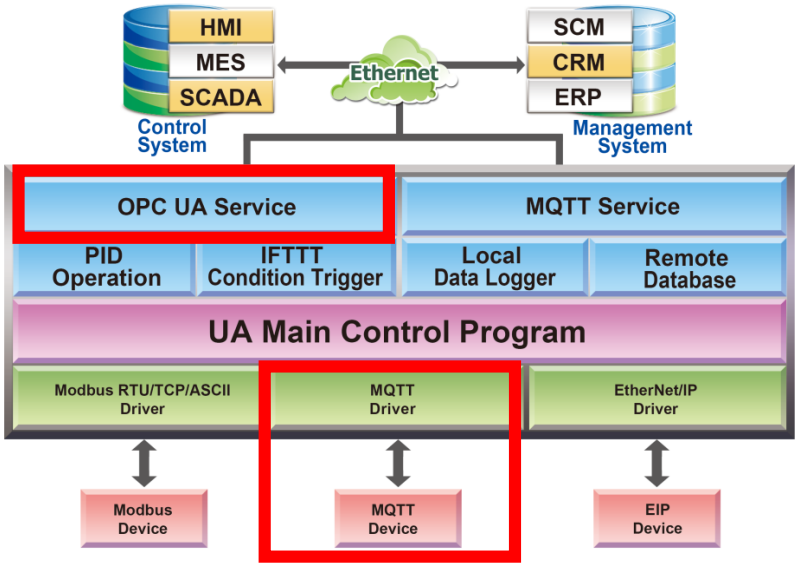
Convert Setting > OPC UA > Modbus TCP (Master) – Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Convert Setting > OPC UA > Modbus TCP (Master) – Variable Table	
Name	Display the variable name that set in the Modbus Address Mapping Table page (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

When complete the setting, click [OK] to save this page settings and back to the module list page. And remember to click [Save] to save the Convert Setting.

5.4.3 OPC UA and MQTT Conversion

This page provides OPC UA and MQTT communication protocol conversion. With this function, the OPC UA Server can read and write the MQTT device that connected to the controller.

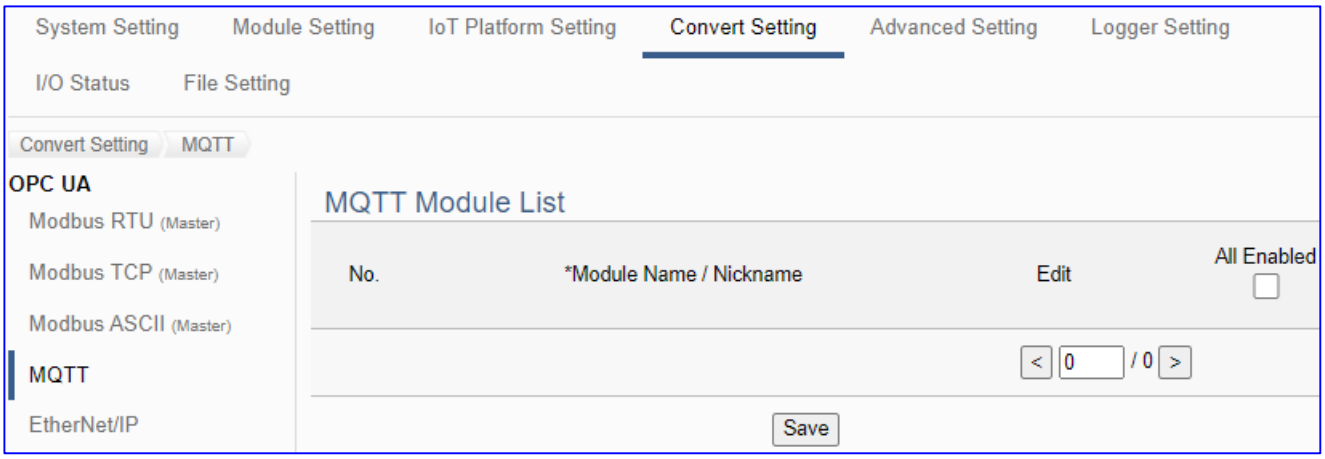
Function Diagram:



Application Solution:



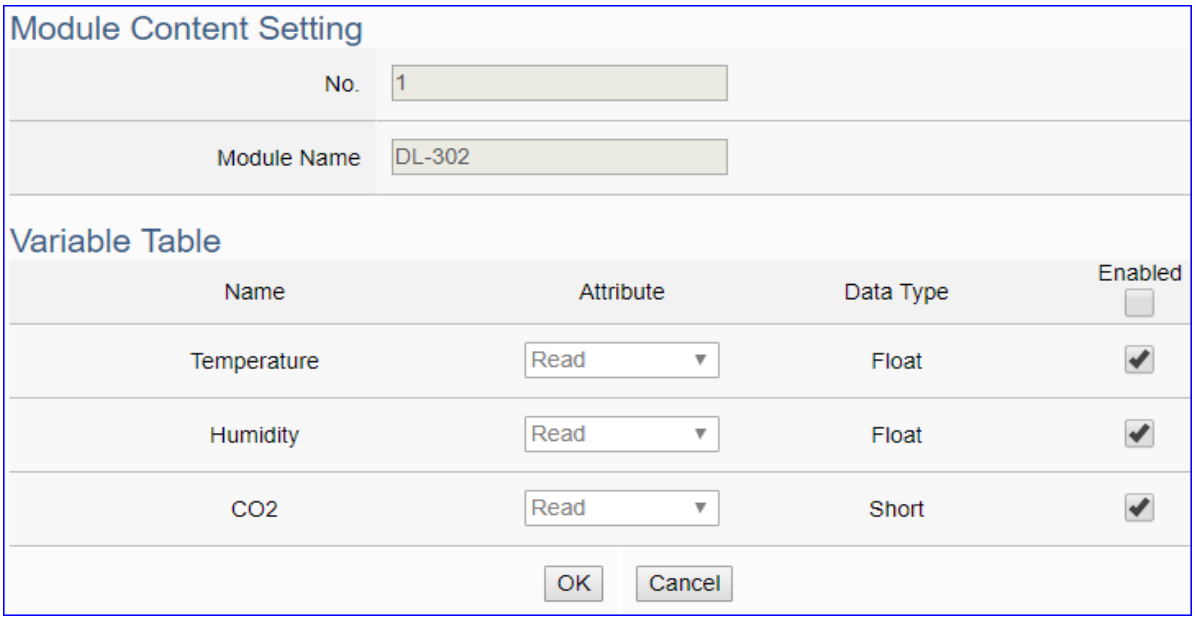
When entering the menu [Convert Setting] and the sub-menu [OPC UA] > MQTT, the MQTT modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



Convert Setting > OPC UA > MQTT - MQTT Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
Edit	Click to enter the “MQTT Client Setting” page to enable the I/O.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, please check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.

[**Module Content Setting**] page:

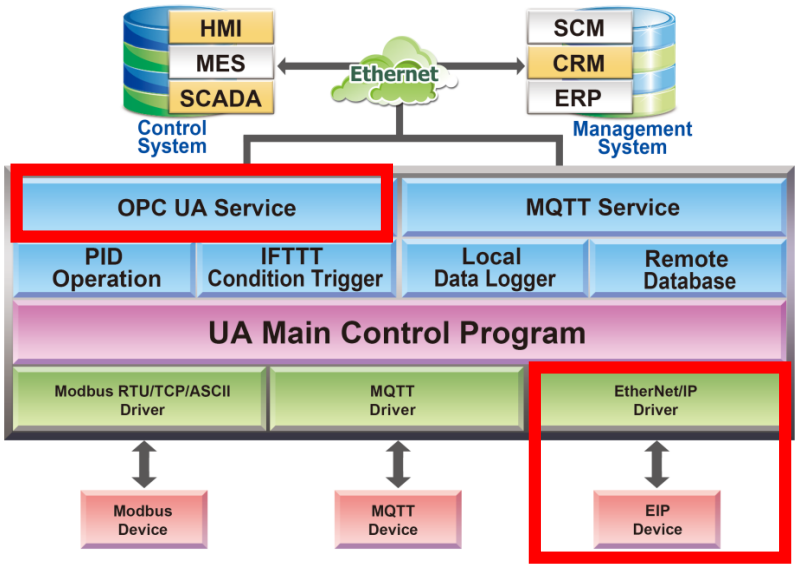


Convert Setting > OPC UA > MQTT - MQTT Module List > Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	Give a name, e.g. model number or name. Default: Name.
Convert Setting > OPC UA > MQTT - MQTT Module List > Variable Table	
No.	The module name in the module list (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the MQTT variable. Include: Bool, Short, Unsigned Short, Long, Unsigned Long, Float, Double, String.
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK / Cancer	Click [OK] to save and exit the page settings. Click [Cancer] to exit without saving.

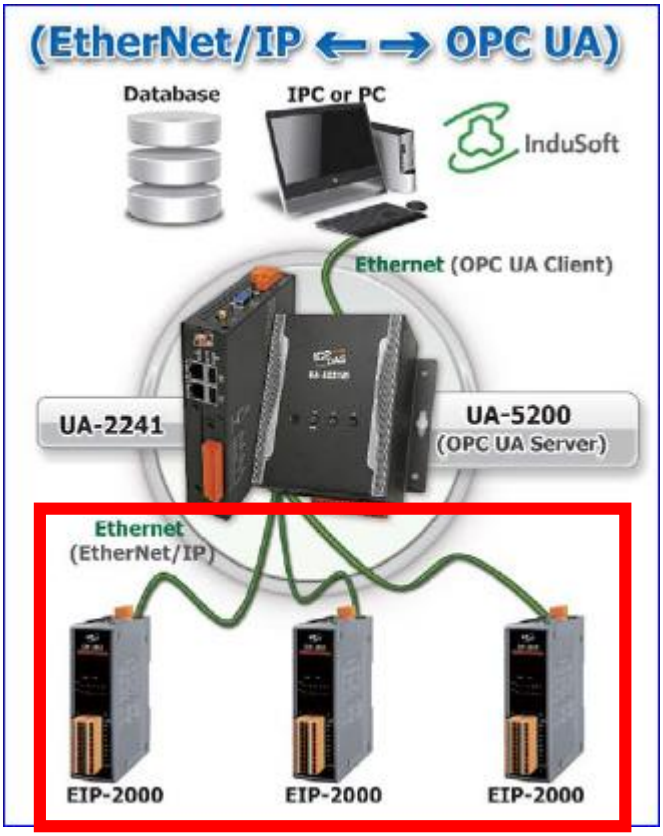
5.4.4 OPC UA and EtherNet/IP Conversion

This page provides OPC UA and EtherNet/IP communication protocol conversion. With this function, the OPC UA Server can read and write the EtherNet/IP EIP-2000 device that connected to the controller.

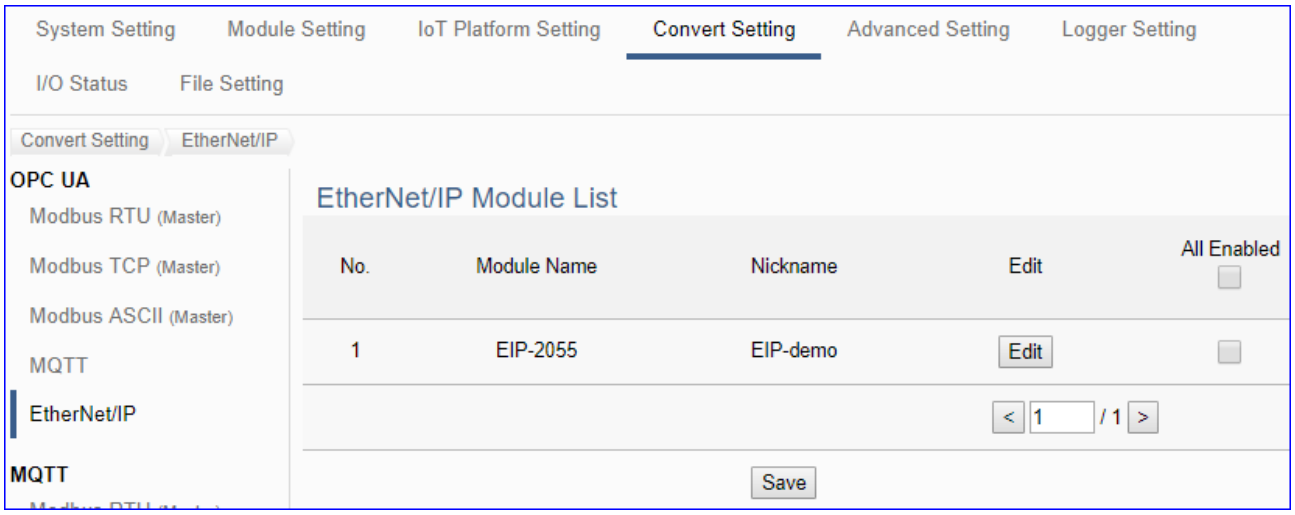
Function Diagram:



Application Solution:



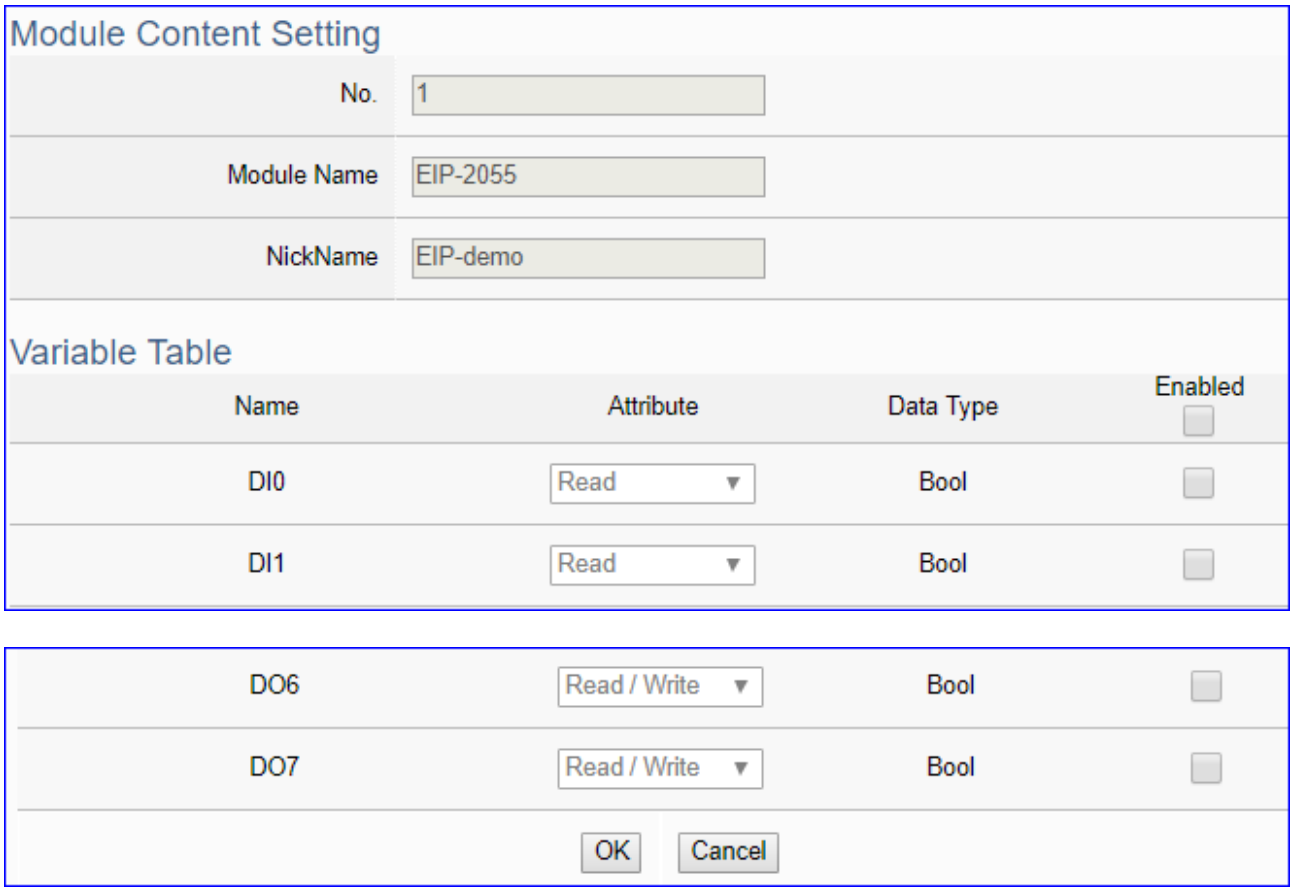
When entering the menu [Convert Setting] and the sub-menu [OPC UA] > EtherNet/IP, the EIP-2000 modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



Convert Setting > OPC UA > EtherNet/IP Module List	
No.	The module number in the module list (Not editable here)
Module Name	The module name selected in the module list (Not editable here)
Nickname	The user defined name for the module (Not editable here)
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
Edit	Click to enter the “Module Content Setting” page to set up and enable the I/O.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, please check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.

The “Module Content Setting” page after clicking the [Edit] button:



Convert Setting > OPC UA > EtherNet/IP – Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Convert Setting > OPC UA > EtherNet/IP – Variable Table	
Name	Display the variable name that set in the Modbus Address Mapping Table page (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

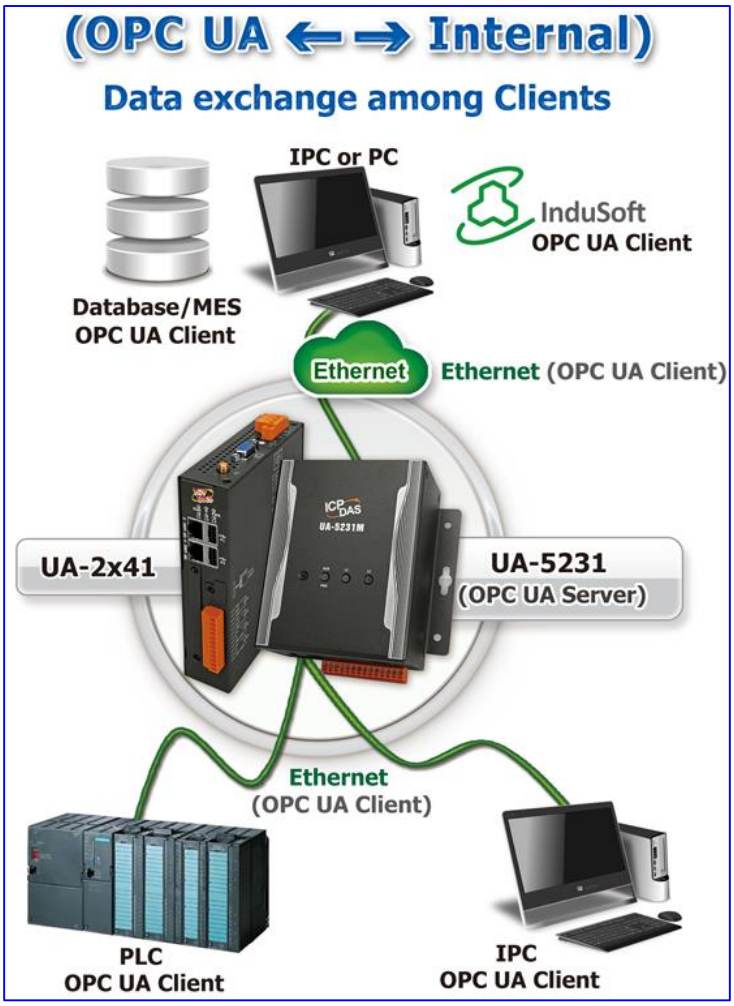
When complete the setting, click [OK] to save this page settings and back to the module list page. Remember to click [Save] to save the Convert Setting.

5.4.5 OPC UA and Internal Conversion

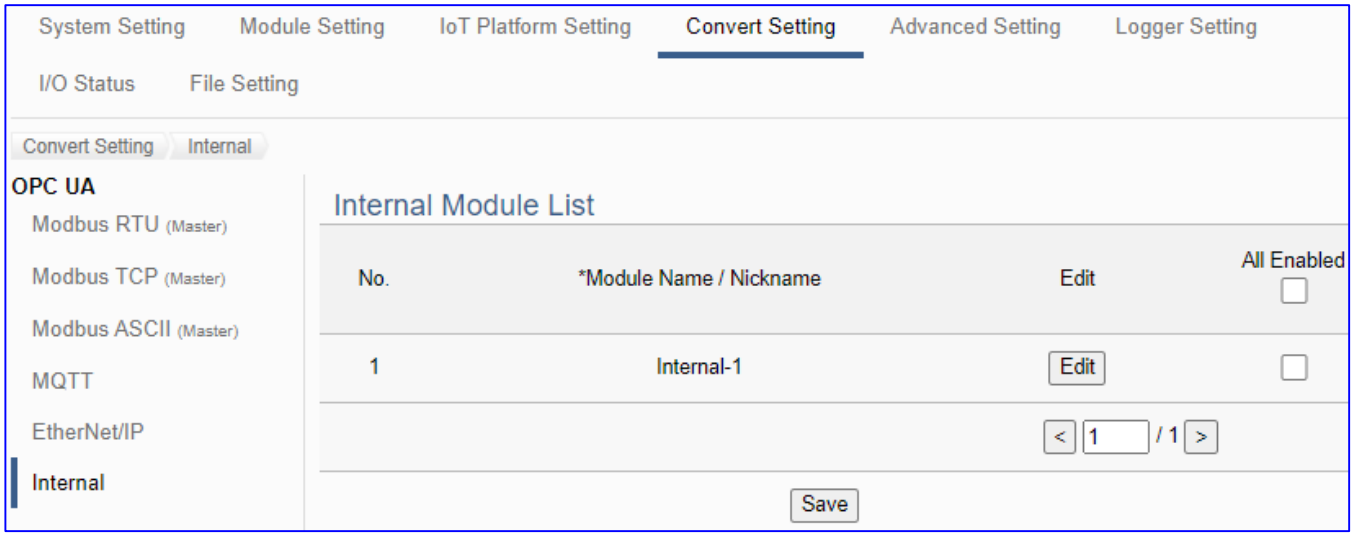
The Internal function can create internal modules and variables for virtual reading and writing, or as an intermediary to provide data exchange for the communication of OPC UA Clients.

* Internal Variable: max. 8 internal modules; max. 100 internal variables (tags) per module.
* Protocol Communication Conversion: provide Internal to OPC UA Server conversion.

Application Solution:



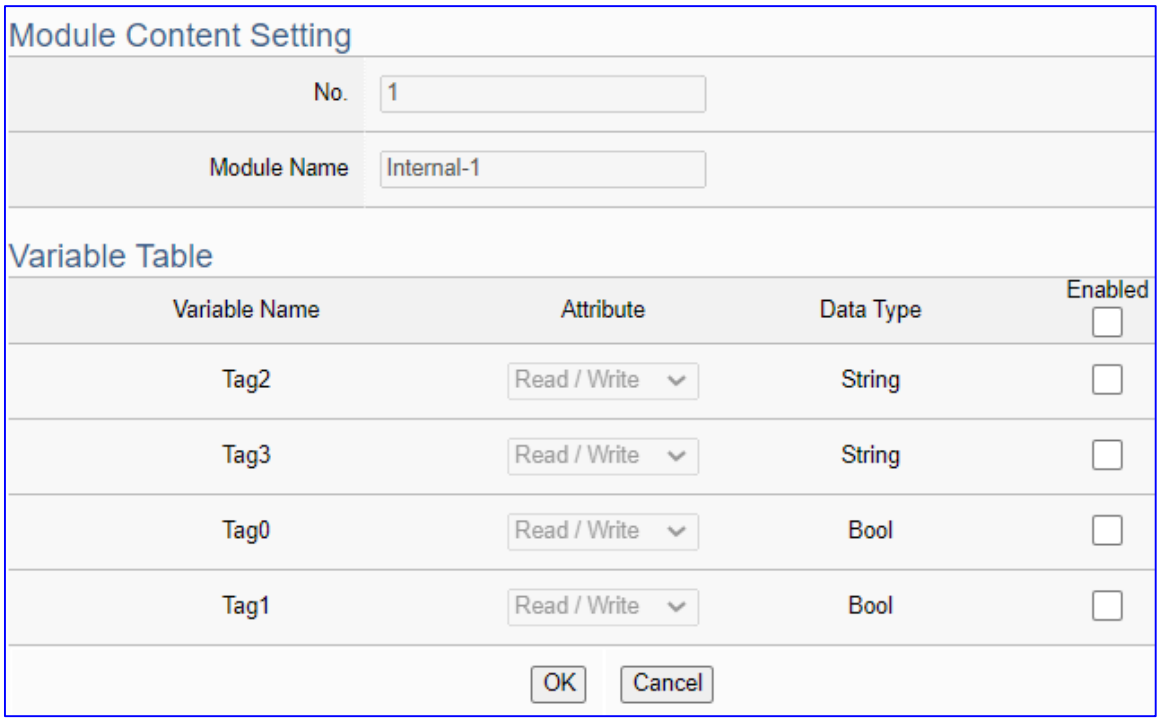
When entering the menu [Convert Setting] and the sub-menu [OPC UA] > Internal, the internal modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



Convert Setting > OPC UA > Internal - Internal Module List	
No.	The module number in the module list (Not editable here)
Module Name / Nickname	The module name set in the module list (Not editable here)
Edit	Click to enter the “Internal Client Setting” page to enable the I/O.
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, please check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.

[**Module Content Setting**] page:



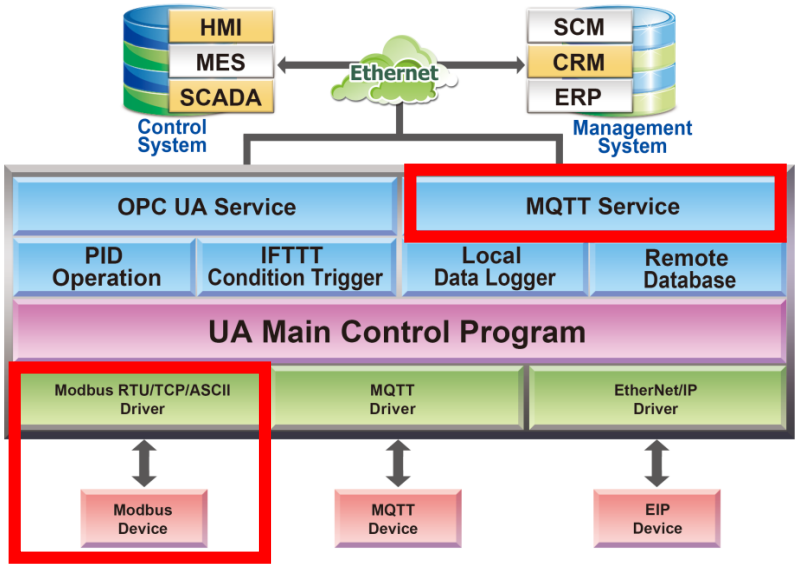
Convert Setting > OPC UA > Internal - Internal Module List > Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	Give a name, e.g. model number or name. Default: Name.
Convert Setting > OPC UA > Internal - Internal Module List > Variable Table	
Variable Name	The Variable name in the module list (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the Internal variable. Include: Bool, Short, Unsigned Short, Long, Unsigned Long, Float, Double, String. (Not editable here)
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK / Cancer	Click [OK] to save and exit the page settings. Click [Cancer] to exit without saving.

5.4.6 MQTT and Modbus RTU/ASCII Conversion

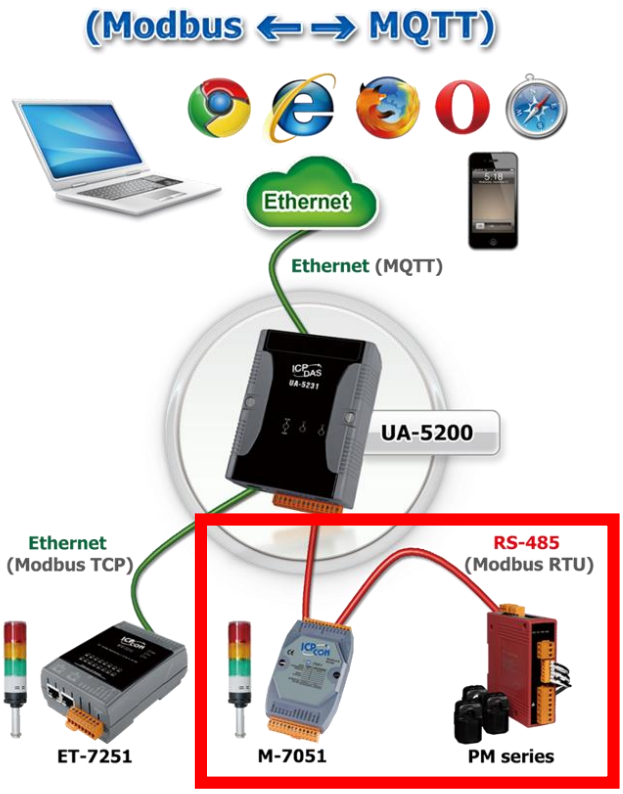
This page provides MQTT and Modbus RTU/ASCII (Master) communication protocol conversion. With the MQTT Service function, users can set the MQTT client to publish the message to the specified broker or subscribe the topic, and so to read and write the single channel of the Modbus device that connected to the controller.

The settings of Modbus RTU/ASCII are the same. Here will introduce them together.
For the certificate about the communication security, please refer to Chapter 7.

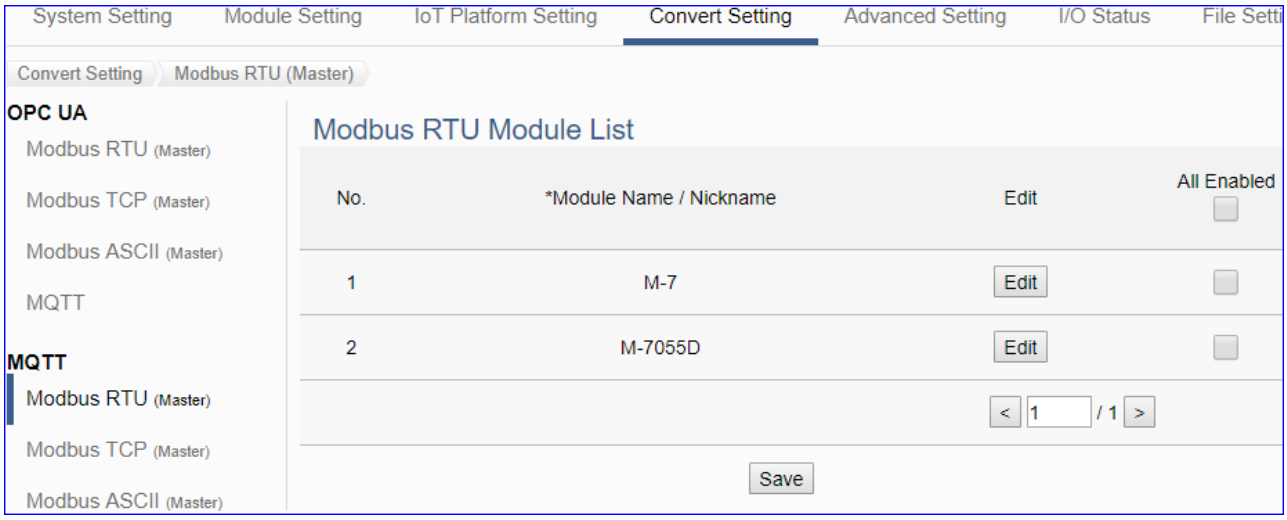
Function Diagram:



Application Solution:



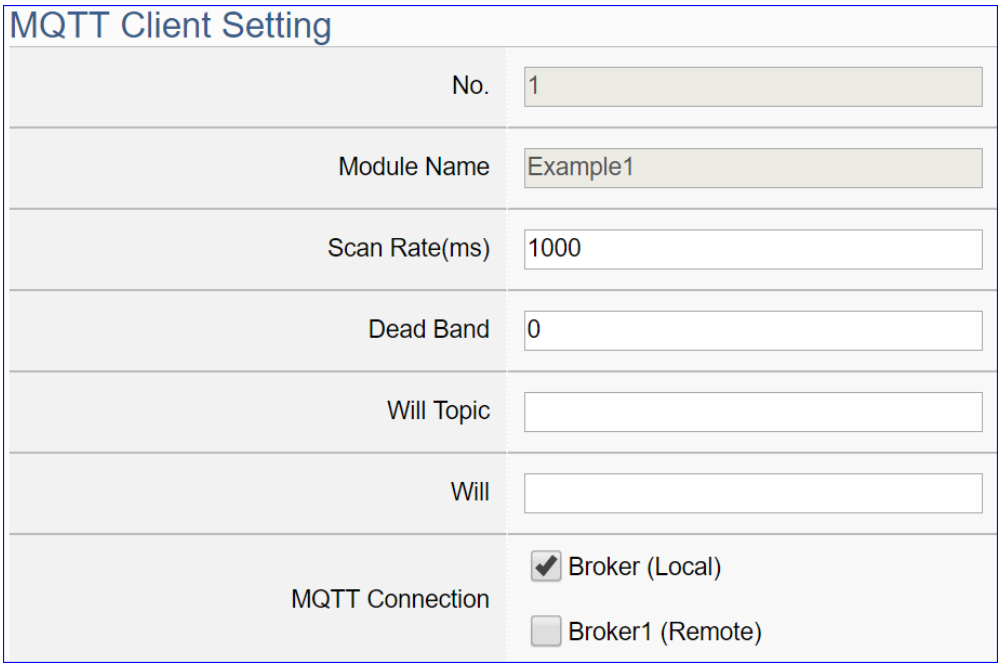
When entering the menu [Convert Setting] and the sub-menu [MQTT] > Modbus RTU (Master) or Modbus ASCII (Master), the Modbus RTU/ASCII modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



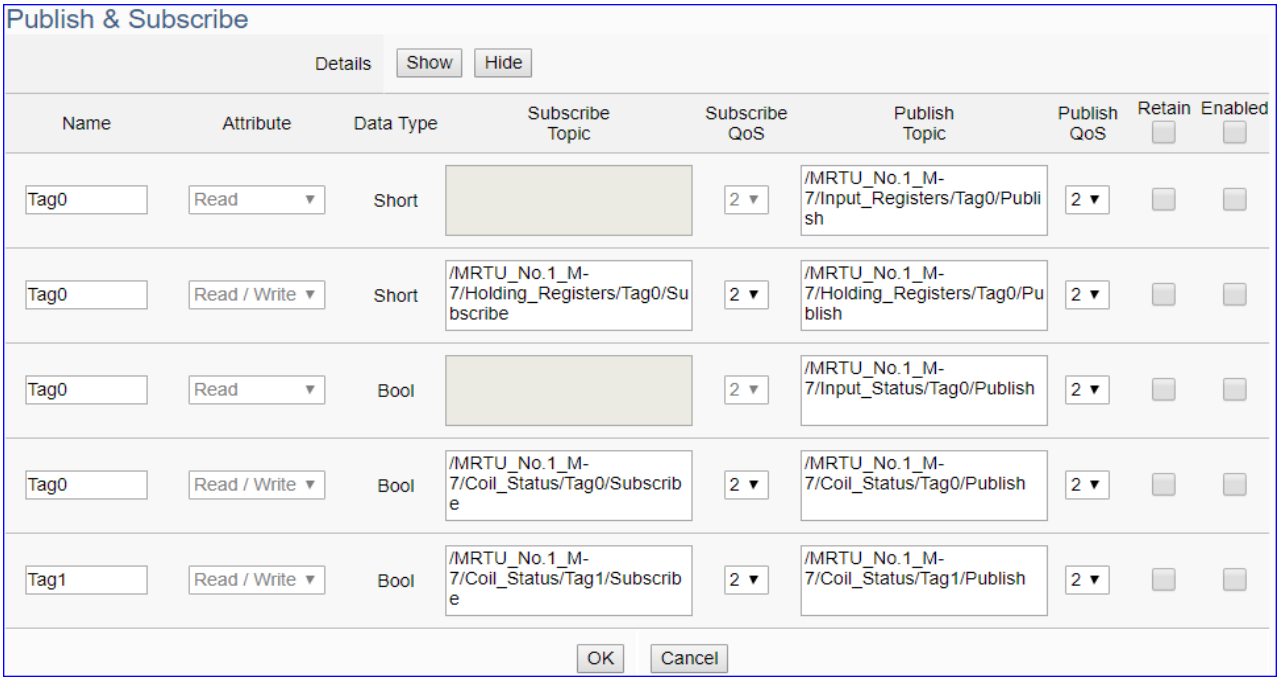
Convert Setting > MQTT > Modbus RTU (Master) Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
Edit	Click to enter the “MQTT Client Setting” page to enable I/O or set up the Topic, QoS, Publish, Subscribe …
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, please check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “MQTT Client Setting” page.

The “MQTT Client Setting” page after clicking the [Edit] button:



Convert Setting > MQTT > Modbus RTU (Master) – MQTT Client Setting	
No.	The module number in the module list (Un-editable)
Module Name	The module name set in the module list (Not editable here)
Scan Rate(ms)	Set an update frequency for the task data. Default: 1000 (Unit: ms)
Dead Bend	Give a dead bend value for updating a **float** signal. Default: 0 Dead Band: The minimum amount by which the tag value must change in order for the new tag value to be saved.
Will Topic	Enter the title of a disconnect notice. Default: Null.
Will	Enter a disconnect notice. Default: Null.
MQTT Connection	Check the Broker for this MQTT connection, Local Broker or Remote Broker. Remote Broker option will appear only when set in advance.



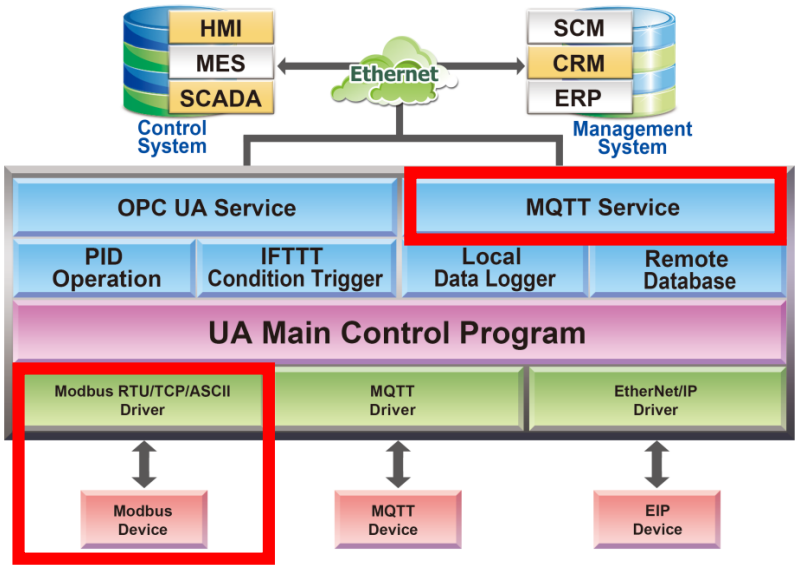
Convert Setting > MQTT > Modbus RTU (Master) – Publish & Subscribe	
Details	Click [Show] to display all fields, click [Hide] to hide some fields.
Name	The variable name of the mapping address. (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Subscribe Topic	The topic of receiving/subscribing data message.
Subscribe QoS	The subscribe QoS (Quality of Service) levels. Default: 2 0: Delivering a message at most once. 1: Delivering a message at least once. 2: Delivering a message at exactly once.
Publish Topic	The topic of sending/publishing data message.
Publish QoS	The publish QoS (Quality of Service) levels. Default: 2 0: Delivering a message at most once. 1: Delivering a message at least once. 2: Delivering a message at exactly once.
Retain	Check [Retain] box of the top row can store the broker message for all variables in list. Check the box of each variable can store the broker message just that variable. Default: Uncheck.
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

5.4.7 MQTT and Modbus TCP Conversion

This page provides MQTT and Modbus TCP (Master) communication protocol conversion. With the MQTT Service function, users can set the MQTT client to publish the message to the specified broker or subscribe the topic, and so to read and write the single channel of the Modbus device that connected to the controller.

For the certificate about the communication security, please refer to Chapter 7.

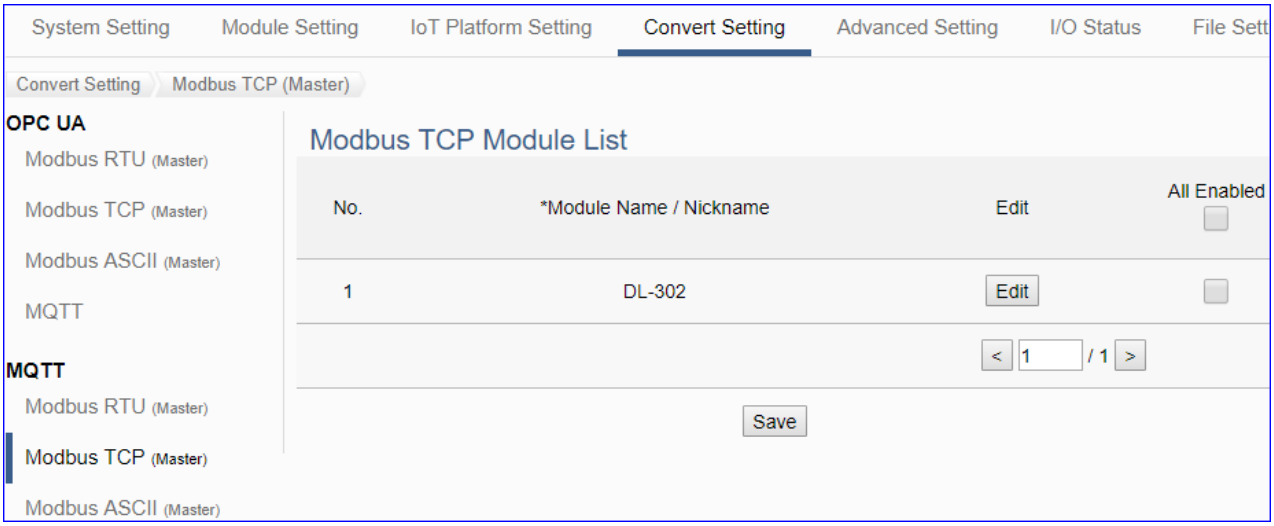
Function Diagram:



Application Solution:



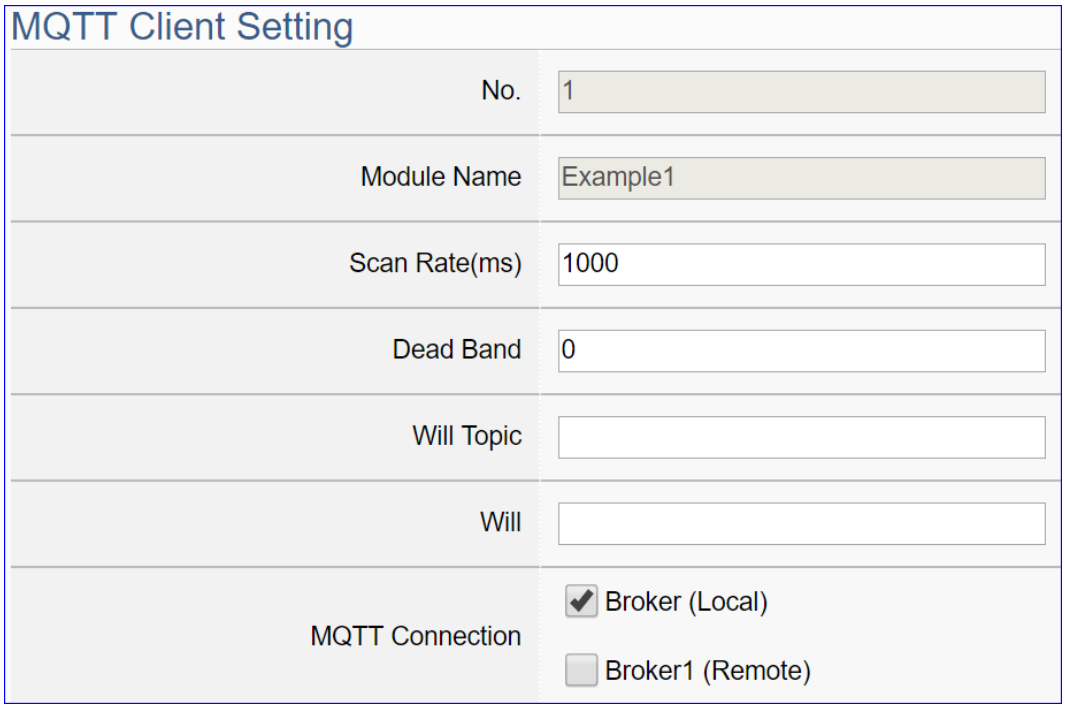
When entering the menu [Convert Setting] and the sub-menu [MQTT] > Modbus TCP (Master), the Modbus TCP modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



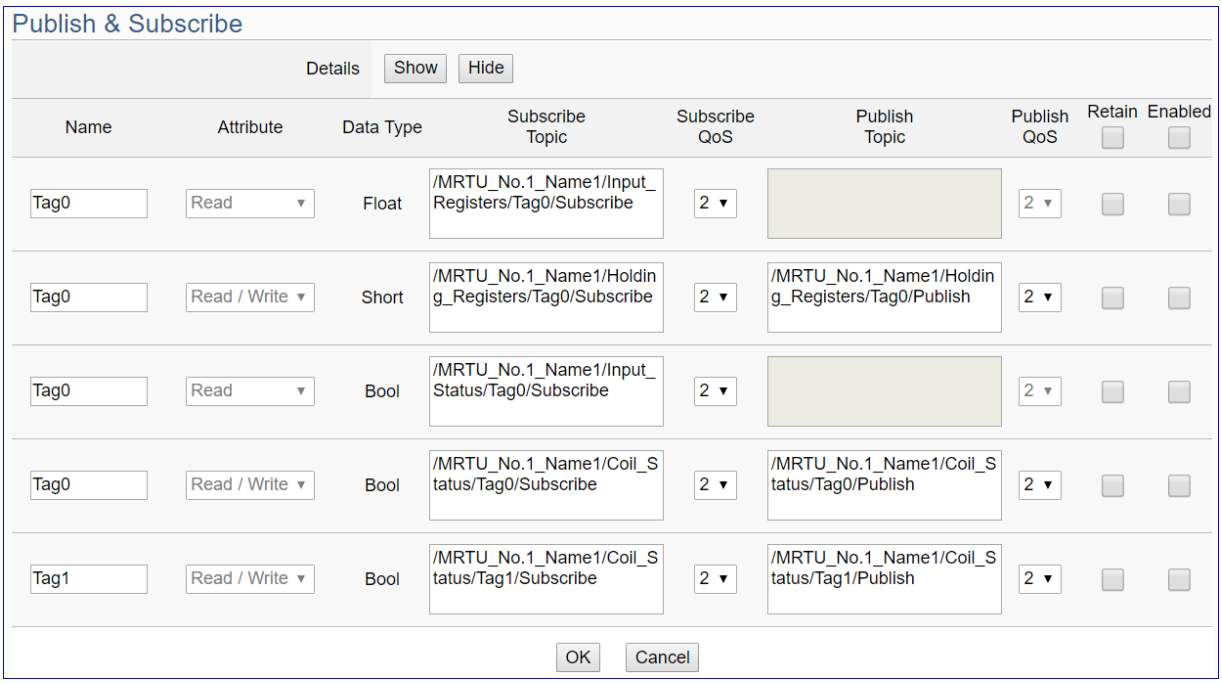
Convert Setting > MQTT > Modbus RTU (Master) Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
Edit	Click to enter the “MQTT Client Setting” page to enable I/O or set up the Topic, QoS, Publish, Subscribe …
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, please check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “MQTT Client Setting” page.

The “MQTT Client Setting” page after clicking the [Edit] button:



Convert Setting > MQTT > Modbus TCP (Master) – MQTT Client Setting	
No.	The module number in the module list (Un-editable)
Module Name	The module name set in the module list (Not editable here)
Scan Rate(ms)	Set an update frequency for the task data. Default: 1000 (Unit: ms)
Dead Bend	Give a dead bend value for updating a **float** signal. Default: 0 Dead Band: The minimum amount by which the tag value must change in order for the new tag value to be saved.
Will Topic	Enter the title of a disconnect notice. Default: Null.
Will	Enter a disconnect notice. Default: Null.
MQTT Connection	Check the Broker for this MQTT connection, Local Broker or Remote Broker. Remote Broker option will appear only when set in advance.



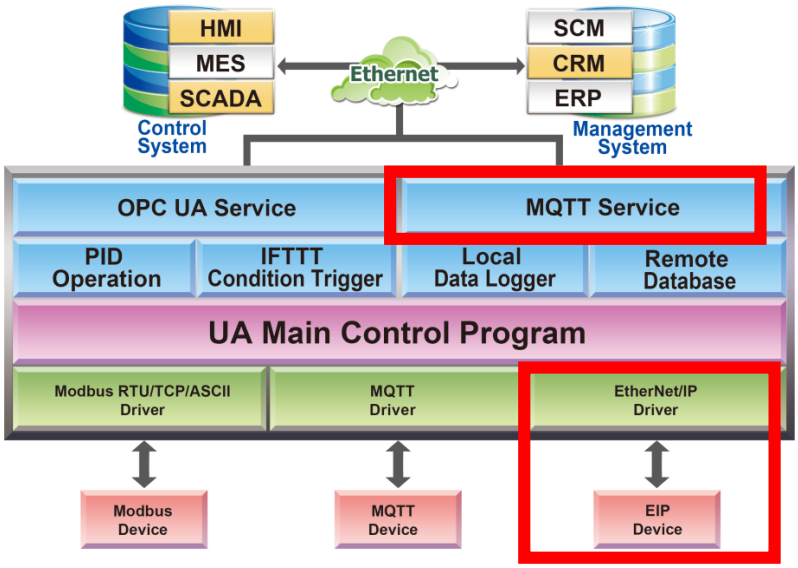
Convert Setting > MQTT > Modbus TCP (Master) – Publish & Subscribe	
Details	Click [Show] to display all fields, click [Hide] to hide some fields.
Name	The variable name of the mapping address. (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Subscribe Topic	The topic of receiving/subscribing data message.
Subscribe QoS	The subscribe QoS (Quality of Service) levels. Default: 2 0: Delivering a message at most once. 1: Delivering a message at least once. 2: Delivering a message at exactly once.
Publish Topic	The topic of sending/publishing data message.
Publish QoS	The publish QoS (Quality of Service) levels. Default: 2 0: Delivering a message at most once. 1: Delivering a message at least once. 2: Delivering a message at exactly once.
Retain	Check [Retain] box of the top row can store the broker message for all variables in list. Check the box of each variable can store the broker message just that variable. Default: Uncheck.
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

5.4.8 MQTT and EtherNet/IP Conversion

This page provides MQTT and EtherNet/IP communication protocol conversion. With this MQTT Service function, users can set the MQTT client to publish the message to the specified broker or subscribe the topic, and so to read and write the single channel of the ICP DAS EIP-2000 device that connected to the controller.

For the certificate about the communication security, please refer to Chapter 7.

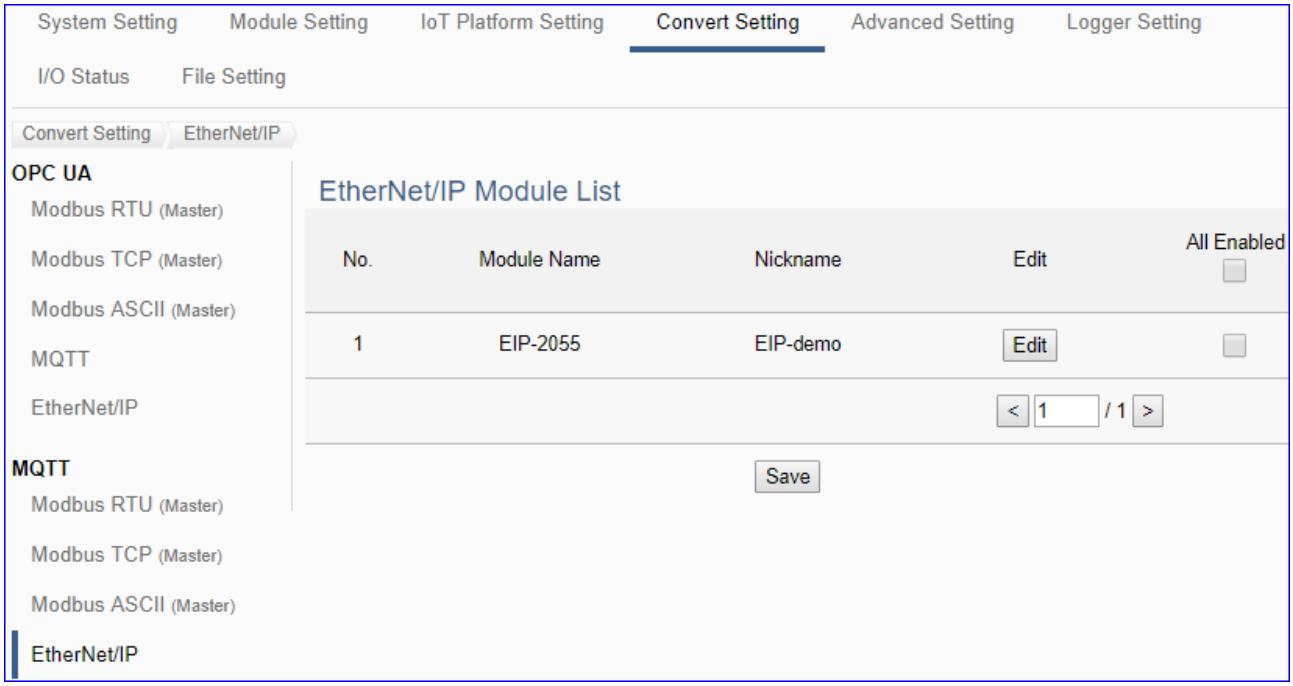
Function Diagram:



Application Solution:



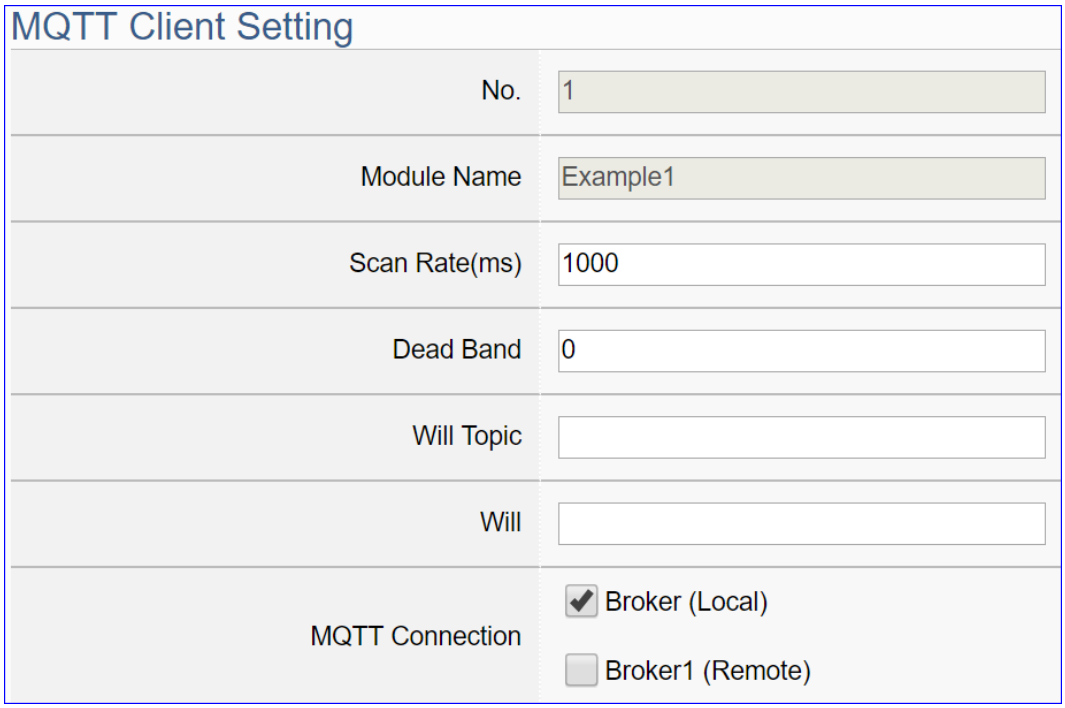
When entering the menu [Convert Setting] and the sub-menu [MQTT] > EtherNet/IP, the ICP DAS EtherNet/IP modules EIP Series preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



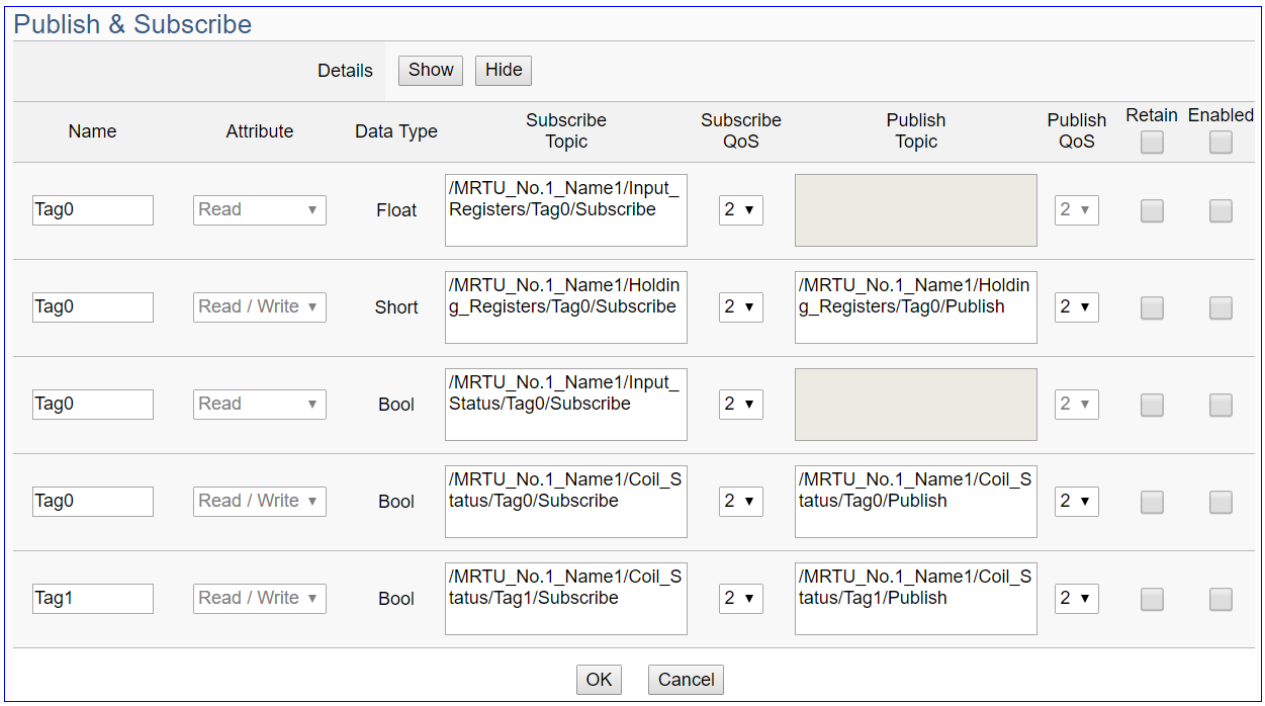
Convert Setting > MQTT > EtherNet/IP Module List	
No.	The module number in the module list (Not editable here)
Module Name	The EIP series model selected in the module list (Not editable here)
Nickname	The user defined name for the module (Not editable here)
All Enabled ☐ ☐ Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
Edit	Click to enter the “MQTT Client Setting” page to enable I/O or set up the Topic, QoS, Publish, Subscribe …
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, please ☑ check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “MQTT Client Setting” page.

The “MQTT Client Setting” page after clicking the [Edit] button:



Convert Setting > MQTT > EtherNet/IP – MQTT Client Setting	
No.	The module number in the module list (Un-editable)
Module Name	The module name set in the module list (Not editable here)
Scan Rate(ms)	Set an update frequency for the task data. Default: 1000 (Unit: ms)
Dead Bend	Give a dead bend value for updating a **float** signal. Default: 0 Dead Band: The minimum amount by which the tag value must change in order for the new tag value to be saved.
Will Topic	Enter the title of a disconnect notice. Default: Null.
Will	Enter a disconnect notice. Default: Null.
MQTT Connection	Check the Broker for this MQTT connection, Local Broker or Remote Broker. Remote Broker option will appear only when set in advance.



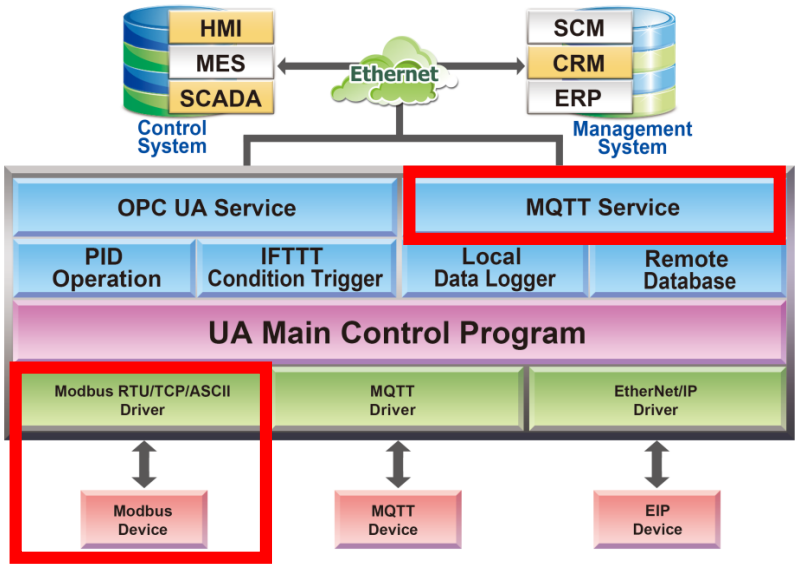
Convert Setting > MQTT > EtherNet/IP – Publish & Subscribe	
Details	Click [Show] to display all fields, click [Hide] to hide some fields.
Name	The variable name of the mapping address. (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Subscribe Topic	The topic of receiving/subscribing data message.
Subscribe QoS	The subscribe QoS (Quality of Service) levels. Default: 2 0: Delivering a message at most once. 1: Delivering a message at least once. 2: Delivering a message at exactly once.
Publish Topic	The topic of sending/publishing data message.
Publish QoS	The publish QoS (Quality of Service) levels. Default: 2 0: Delivering a message at most once. 1: Delivering a message at least once. 2: Delivering a message at exactly once.
Retain	Check [Retain] box of the top row can store the broker message for all variables in list. Check the box of each variable can store the broker message just that variable. Default: Uncheck.
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

5.4.9 MQTT JSON and Modbus RTU/ASCII Conversion

This page provides MQTT JSON and Modbus RTU/ASCII (Master) communication protocol conversion. With the MQTT Service function, users can set the MQTT client to publish the message to the specified broker or subscribe the topic, and combine several messages that converted in JSON format into a group to read and write the multiple channels of the Modbus RTU/ASCII devices that connected to the controller.

The settings of Modbus RTU/ASCII are the same. Here will introduce them together.
For the certificate about the communication security, please refer to Chapter 7.

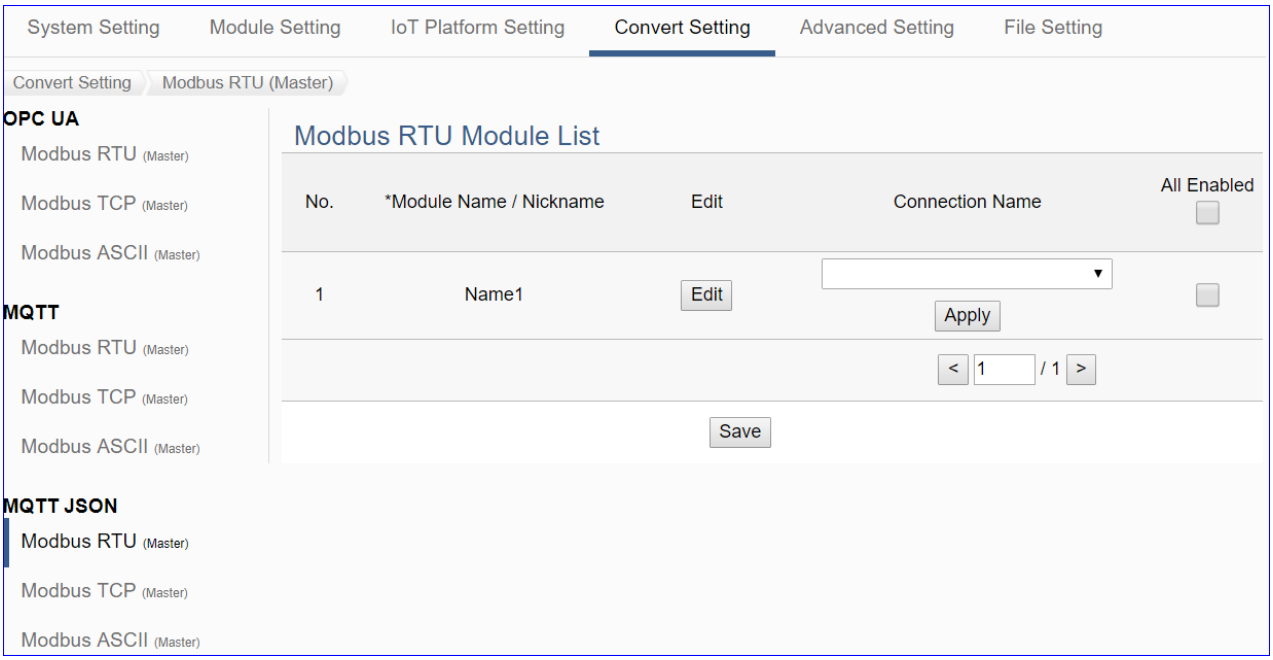
Function Diagram:



Application Solution:

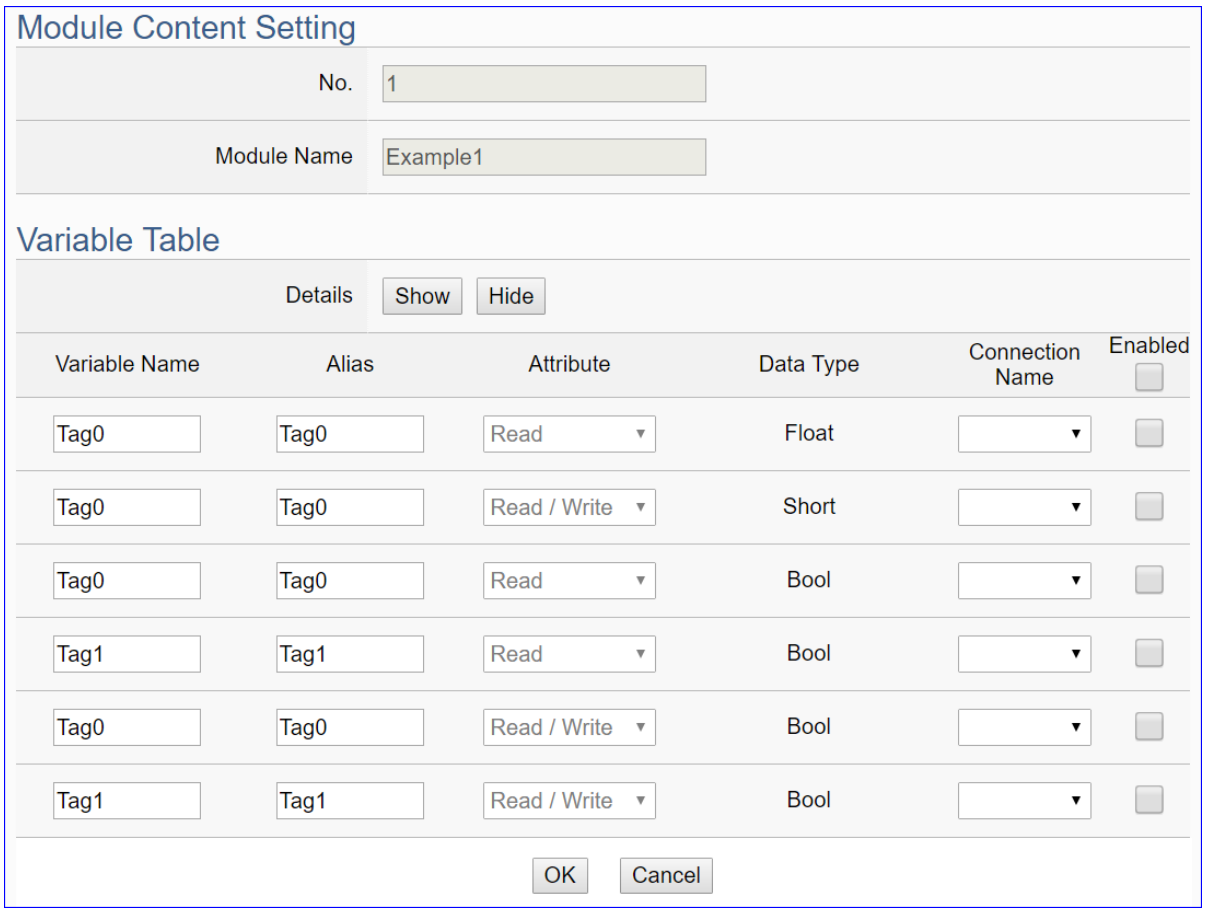


When entering the menu [Convert Setting] and the sub-menu [MQTT JSON] > Modbus RTU or Modbus ASCII (Master), the Modbus RTU/ASCII modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



Convert Setting > MQTT JSON > Modbus RTU (Master) Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
Connection Name	Select a group connection name, and then click [Apply].
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
Edit	If user wants to enable some I/O channels for conversion, click [Edit] of that module to enable I/O or check the “Module Content Setting” and “Variable Tale” page.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, first select the [Connection Name] and click [Apply] button, and then check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.



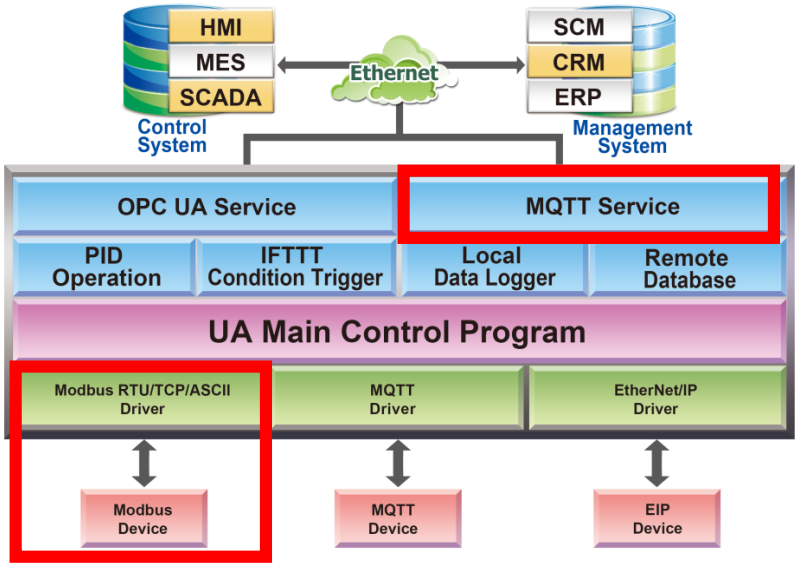
Convert Setting > MQTT JSON > Modbus RTU (Master) – Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Convert Setting > MQTT JSON > Modbus RTU (Master) – Variable Table	
Details	Click [Show] to display all fields, click [Hide] to hide some fields.
Variable Name	The variable name of the mapping address. (Not editable here)
Alias	The user cannot change the variable name but can set an alias for data separation and identification. It is used in the "Name" element parameter of the MQTT JSON format. Refer to Appendix A.
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Connection Name	Select the group name that set in the group list page.
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

5.4.10 MQTT JSON and Modbus TCP Conversion

This page provides MQTT JSON and Modbus TCP (Master) communication protocol conversion. With the MQTT Service function, users can set the MQTT client to publish the message to the specified broker or subscribe the topic, and combine several messages that converted in JSON format into a group to read and write the multiple channels of the Modbus TCP devices that connected to the controller.

For the certificate about the communication security, please refer to Chapter 7.

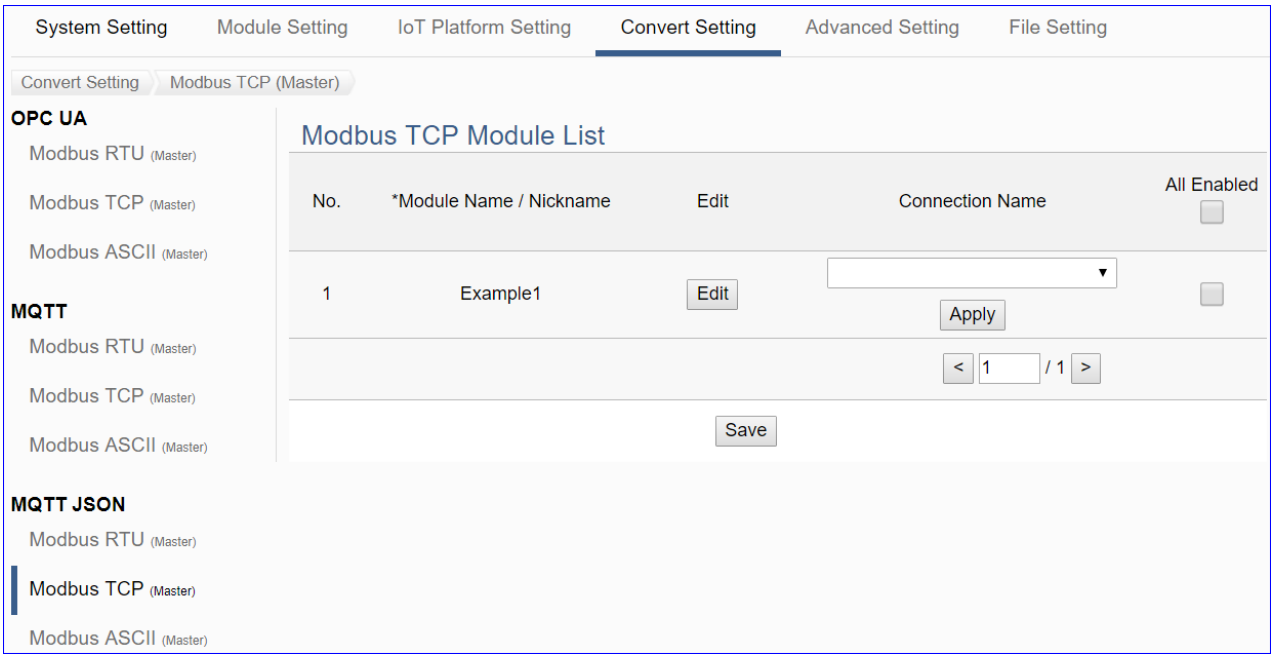
Function Diagram:



Application Solution:

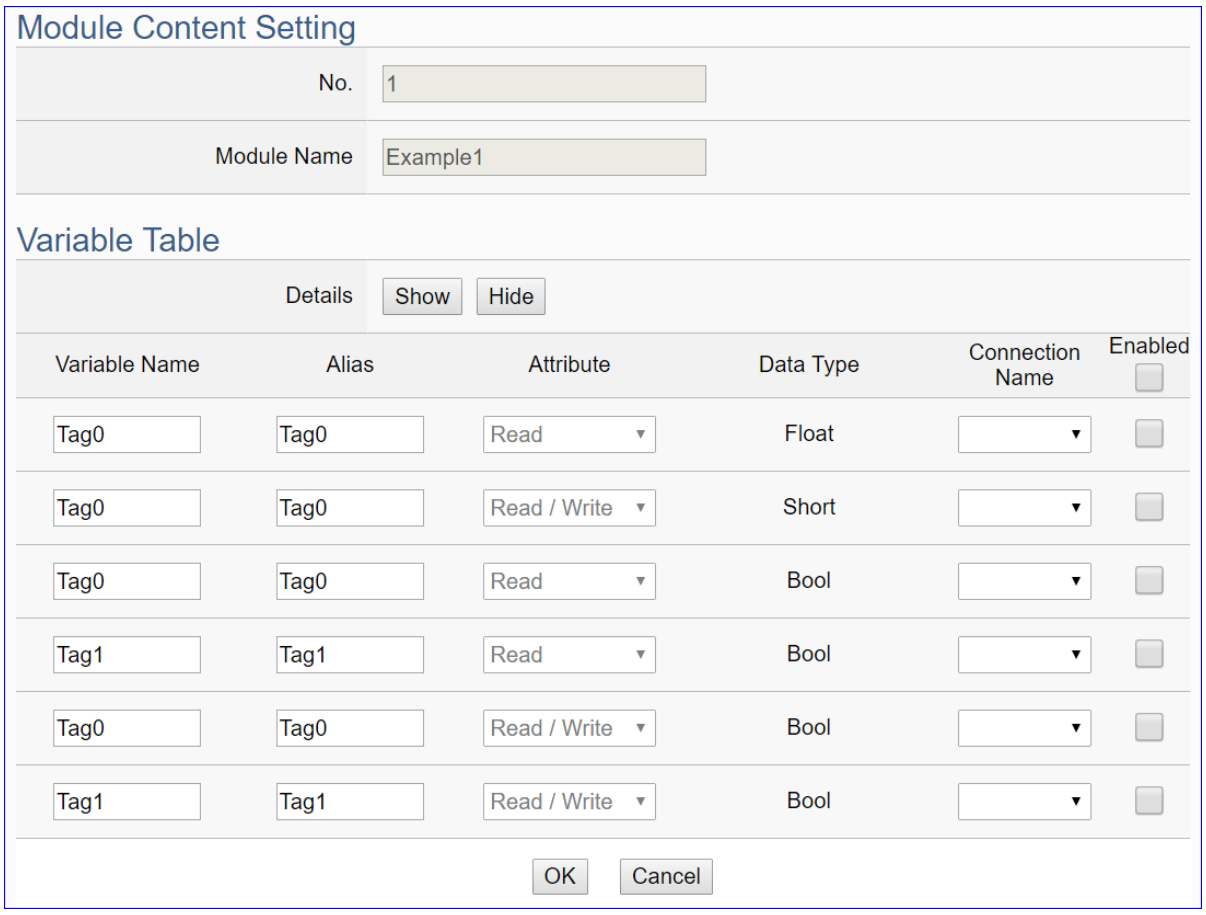


When entering the menu [Convert Setting] and the sub-menu [MQTT JSON] > Modbus TCP (Master), the Modbus TCP modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



Convert Setting > MQTT JSON > Modbus TCP (Master) Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
Connection Name	Select a group connection name, and then click [Apply].
Edit	If user wants to enable some I/O channels for conversion, click [Edit] of that module to enter the “Module Content Setting” and “Variable Tale” page.
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, first select the [Connection Name] and click [Apply] button, and then check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.



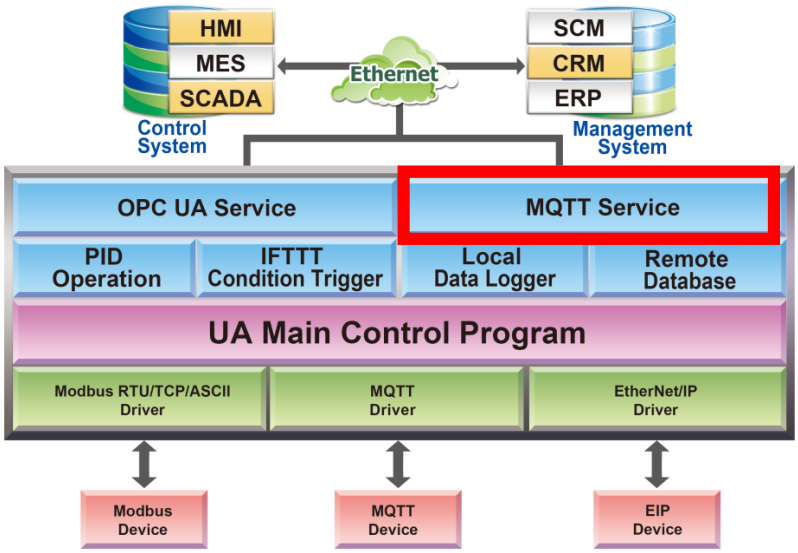
Convert Setting > MQTT JSON > Modbus TCP (Master) – Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Convert Setting > MQTT JSON > Modbus TCP (Master) – Variable Table	
Details	Click [Show] to display all fields, click [Hide] to hide some fields.
Variable Name	The variable name of the mapping address. (Not editable here)
Alias	The user cannot change the variable name but can set an alias for data separation and identification. It is used in the "Name" element parameter of the MQTT JSON format. Refer to Appendix A.
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Connection Name	Select the group name that set in the group list page.
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

5.4.11 MQTT Custom and IoT Cloud Conversion

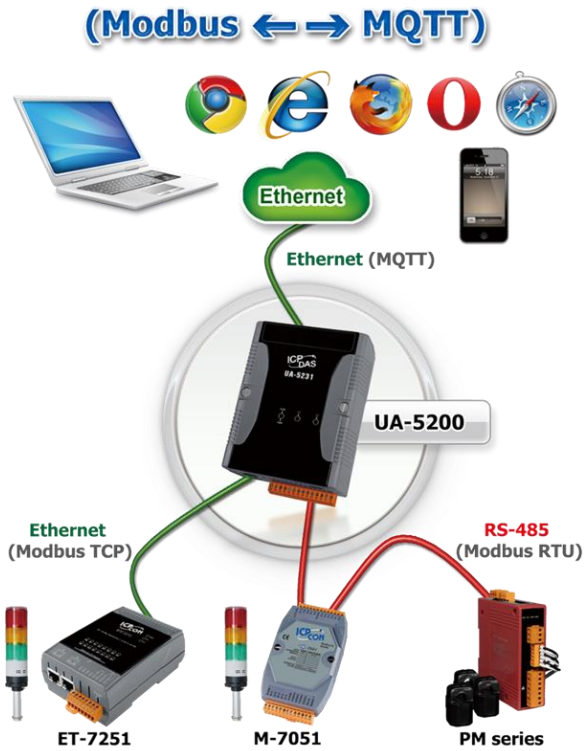
This page provides customized MQTT communication conversion for the IoT Cloud Platform. Users can customize the MQTT format layout and add the module value to the publishing message. With customized MQTT message content, this function can support multiple IoT platforms.

For the certificate about the communication security, please refer to Chapter 7.

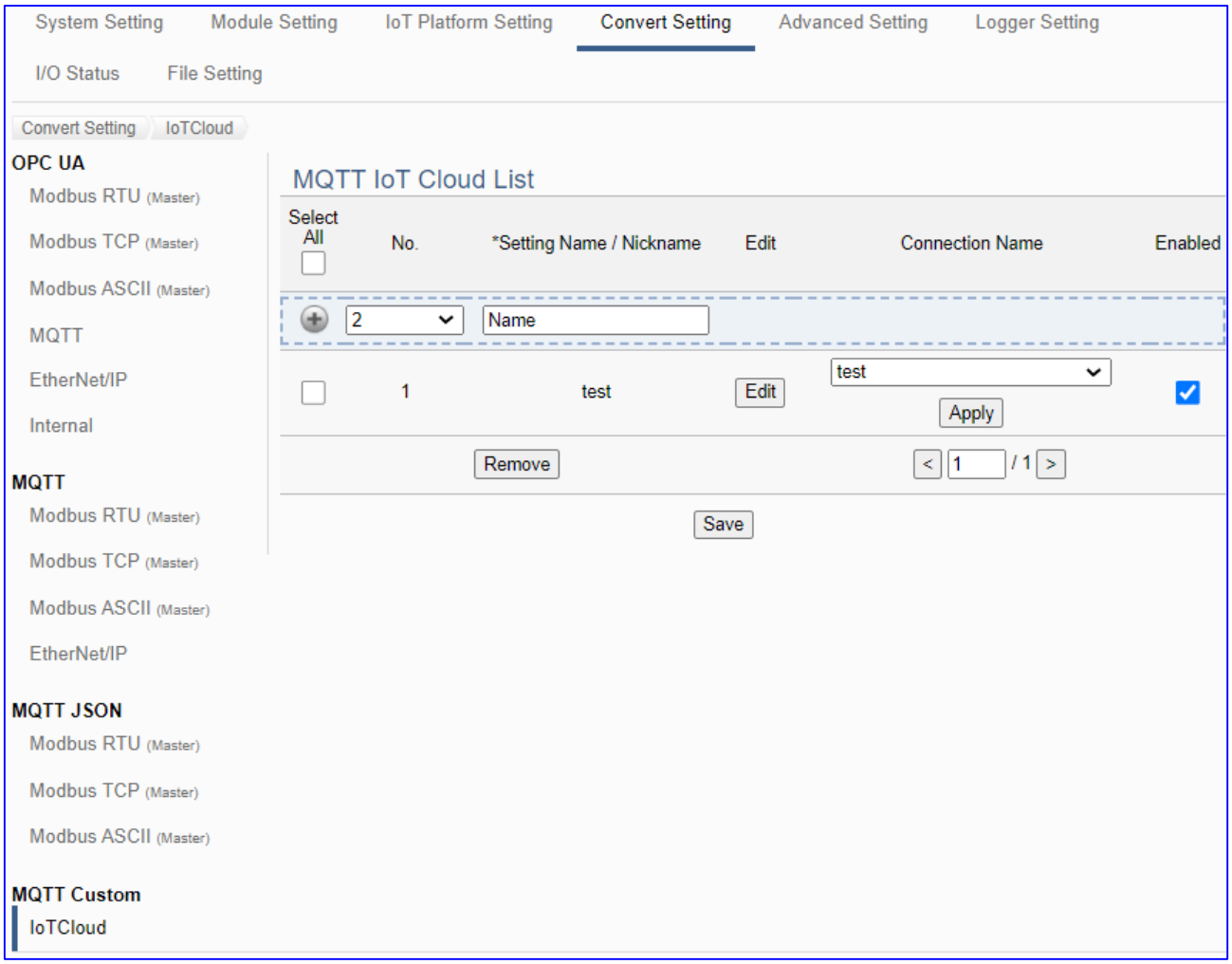
Function Diagram:



Application Solution:

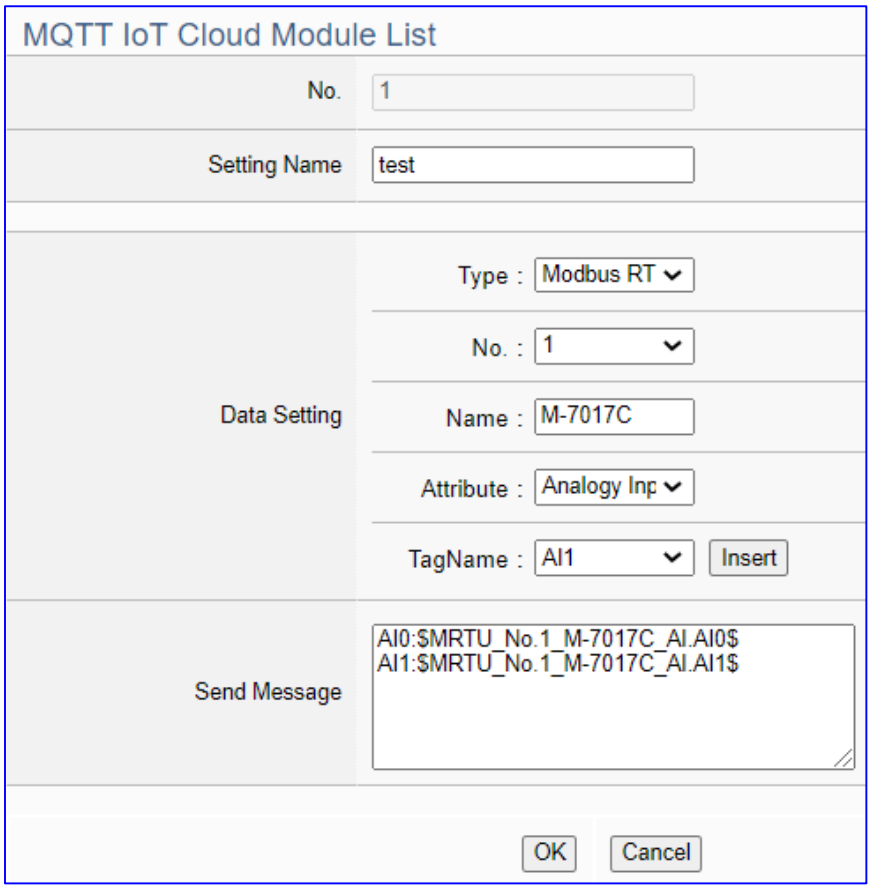


Enter the menu [Convert Setting] and the sub-menu [MQTT Custom] > [IoT Cloud], then can set up the customized MQTT IoT Cloud settings.



Convert Setting > MQTT Custom > IoTCloud – MQTT IoT Cloud List	
No.	The number in the IoT Cloud list (Not editable here)
*Setting Name / Nickname	The Setting name or Nickname set in the IoT Cloud list (editable)
Edit	Click the [Edit] button to enter the Module List, select the module and set up the message to be published.
Connection Name	Select a connection name set in the step of the “IoT Platform”, and then click [Apply].
Enabled	Check the box of list to enable that conversion. Default: Enable
< 1 / 1 >	The page number of the list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

Click [Edit] button to enter the Module List page, the modules preset in the [Module Setting] will show up in the selected items. (Refer to Chapter 5.2 for the Module Setting.)

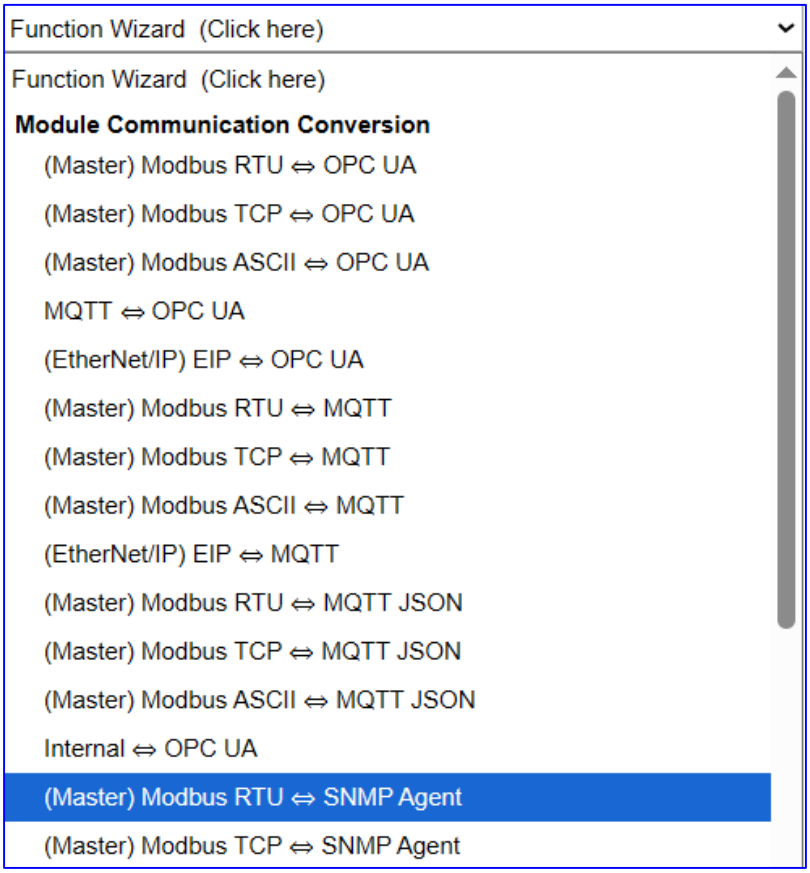


Convert Setting > MQTT Custom > IoT Cloud – MQTT IoT Cloud Module List	
No.	The number in the IoT Cloud setting list (Cannot be changed here)
Setting Name	The setting name set in the IoT Cloud list, can change it here.
Type No. Name Attribute Tag Name	The user can find out the variable name of the current module tags through the following steps: 1. Select the type of module. 2. Select the number of the set module you want to use. 3. Select the module name you want to use. 4. Select the tag attribute of the module. 5. Select the tag name of the module.
Insert	Click "Insert" to add the variable name of the module tag to the "Send Message" field.
Send Message	Message format editing interface, user can click the insert button to add I/O tags and then edit the messages.
OK / Cancel	Click [OK] to save the settings of this page, and exit. Click [Cancel] to exit this page but do not save the settings.

5.4.12 SNMP and Modbus RTU Conversion

This page provides SNMP and Modbus RTU (Master) communication protocol conversion. With this function, the **SNMP Agent** can read and write the **Modbus RTU** device that connected to the controller.

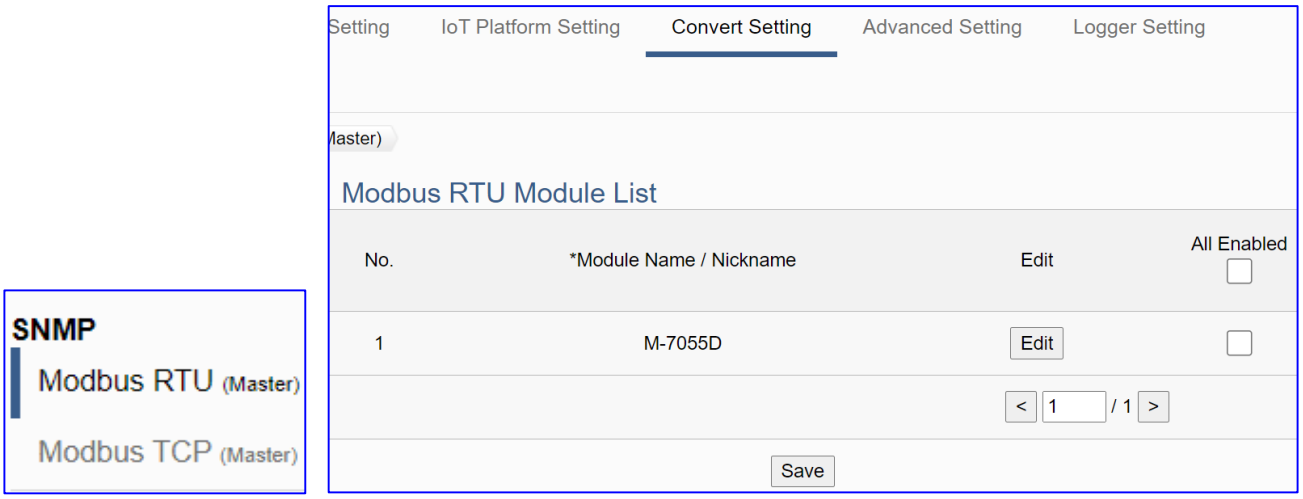
The SNMP is a new feature added to the UA-5200/2200/7200 series, supported starting from Firmware version V1.5.0.0 and above. Users can configure settings via the [Function Wizard] > [Module Communication Conversion - **Modbus RTU ⇔ SNMP Agent**] in the upper-right corner of the UI.



SNMP Setting Demo Video:
UA series provides a demo video of the Modbus RTU to SNMP communication. The video can be viewed on the UA FAQ Cnv-09, the UA-7231M product webpage, and the ICP DAS YouTube official channel.
UA-7231M Product Page: https://www.icpdas.com/tw/product/UA-7231M

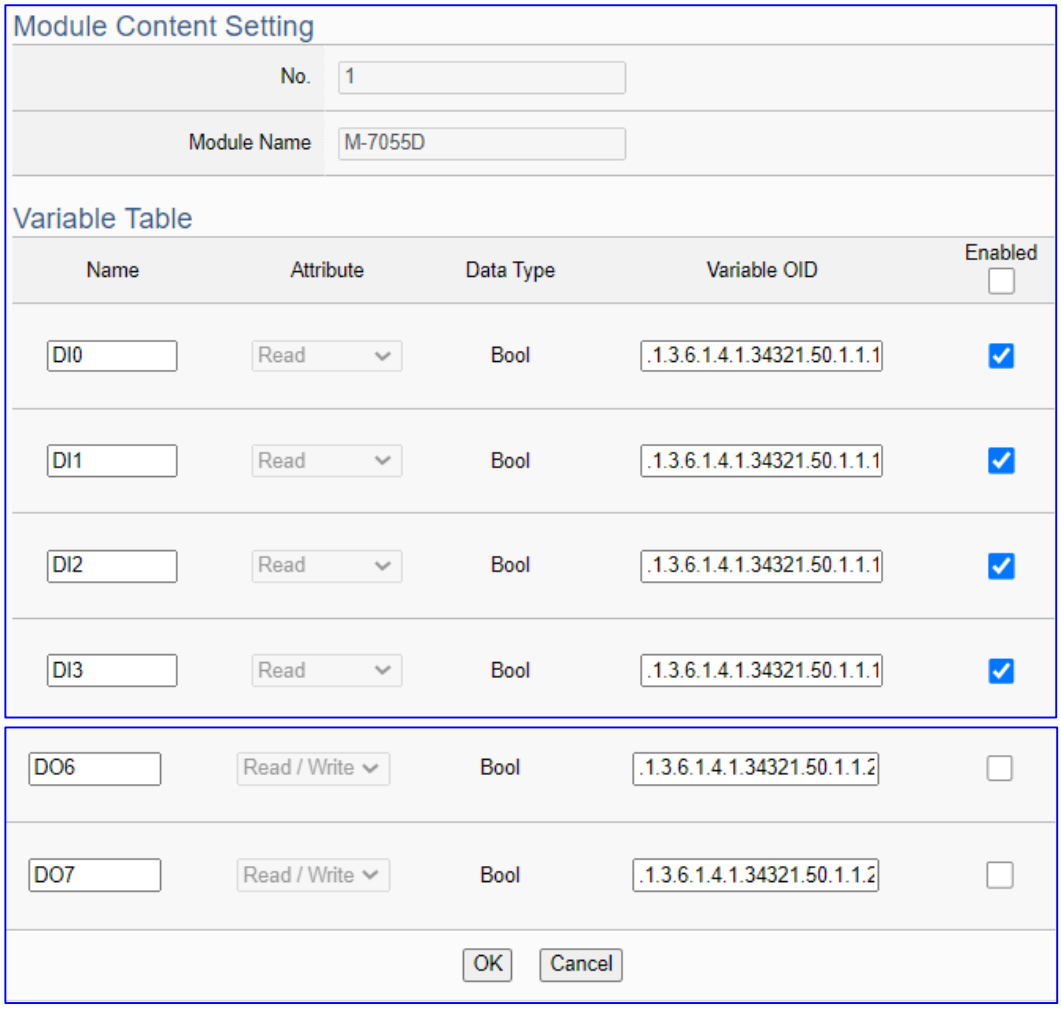


When entering the menu [Convert Setting] and the sub-menu [SNMP] > Modbus RTU (Master), the Modbus RTU modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



Convert Setting > SNMP > Modbus RTU Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
Edit	If user wants to enable some I/O channels for conversion, click [Edit] of that module to enable I/O or check the “Module Content Setting” and “Variable Tale” page.
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, please check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.

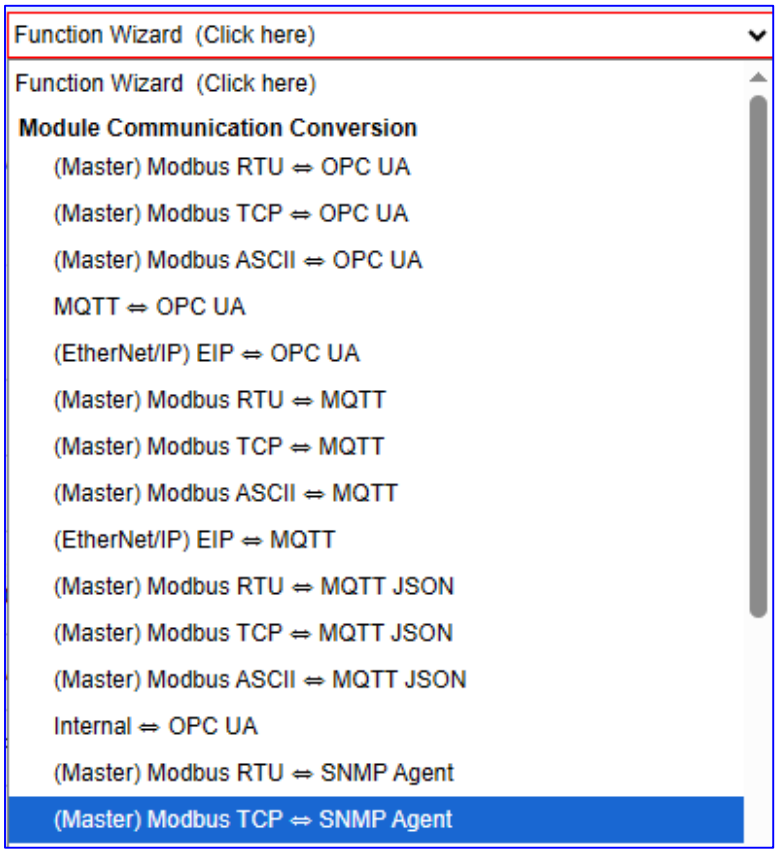


Convert Setting > SNMP > Modbus RTU (Master) – Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Convert Setting > SNMP > Modbus RTU (Master) – Variable Table	
Name	Display the variable name that set in the Modbus Address Mapping Table page (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Variable OID	The variable OID code of each module I/O channel (automatically assigned by the system)
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

5.4.13 SNMP and Modbus TCP Conversion

This page provides SNMP and Modbus TCP (Master) communication protocol conversion. With this function, the **SNMP Agent** can read and write the **Modbus TCP** device that connected to the controller.

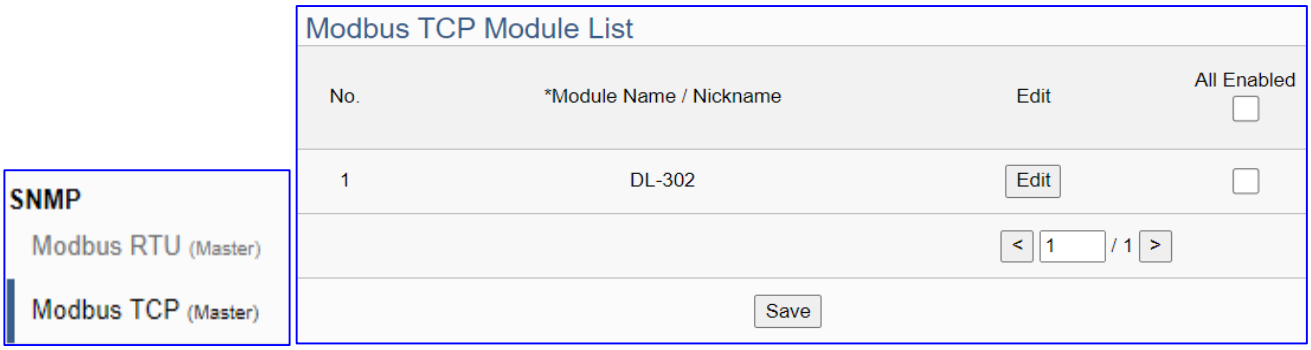
The SNMP is a new feature added to the UA-5200/2200/7200 series, supported starting from Firmware version V1.5.0.0 and above. Users can configure settings via the [Function Wizard] > [Module Communication Conversion - **Modbus TCP ⇔ SNMP Agent**] in the upper-right corner of the UI.



SNMP Setting Demo Video:
UA series provides a demo video of the Modbus RTU to SNMP communication. The video can be viewed on the UA FAQ Cnv-09, the UA-7231M product webpage, and the ICP DAS YouTube official channel.
UA-7231M Product Page: https://www.icpdas.com/tw/product/UA-7231M

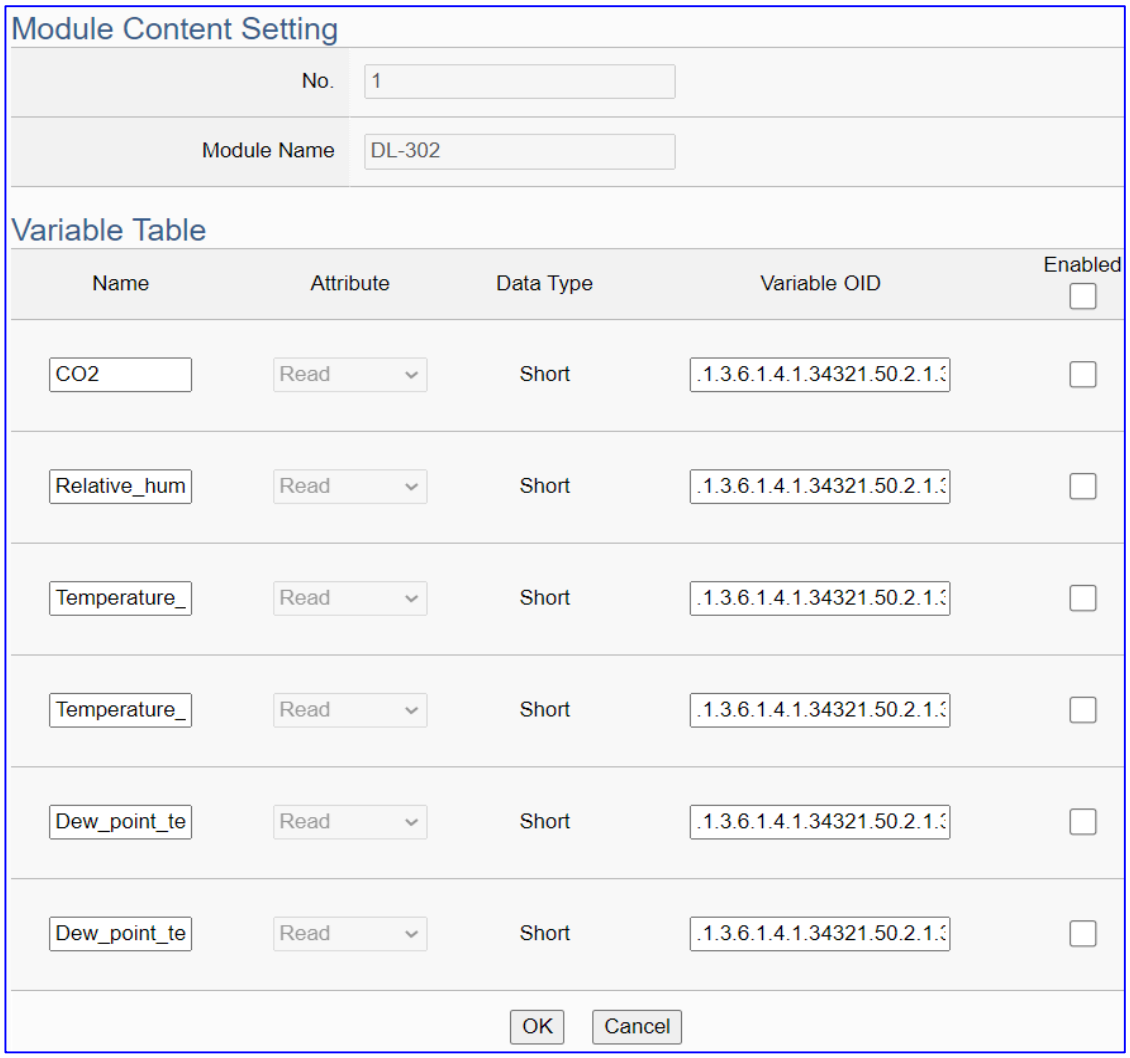


When entering the menu [Convert Setting] and the sub-menu [SNMP] > Modbus RTU (Master), the Modbus RTU modules preset in the [Module Setting] will show up in the Module List. (Refer to Chapter 5.2 for the Module Setting.)



Convert Setting > SNMP > Modbus TCP Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
Edit	If user wants to enable some I/O channels for conversion, click [Edit] of that module to enable I/O or check the “Module Content Setting” and “Variable Tale” page.
All Enabled Enable	Check [All Enabled] box to enable all modules in list for conversion. Default: Uncheck. Check the box of each module can enable just that module for conversion.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the communication conversion module, please check the box of the converting module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.

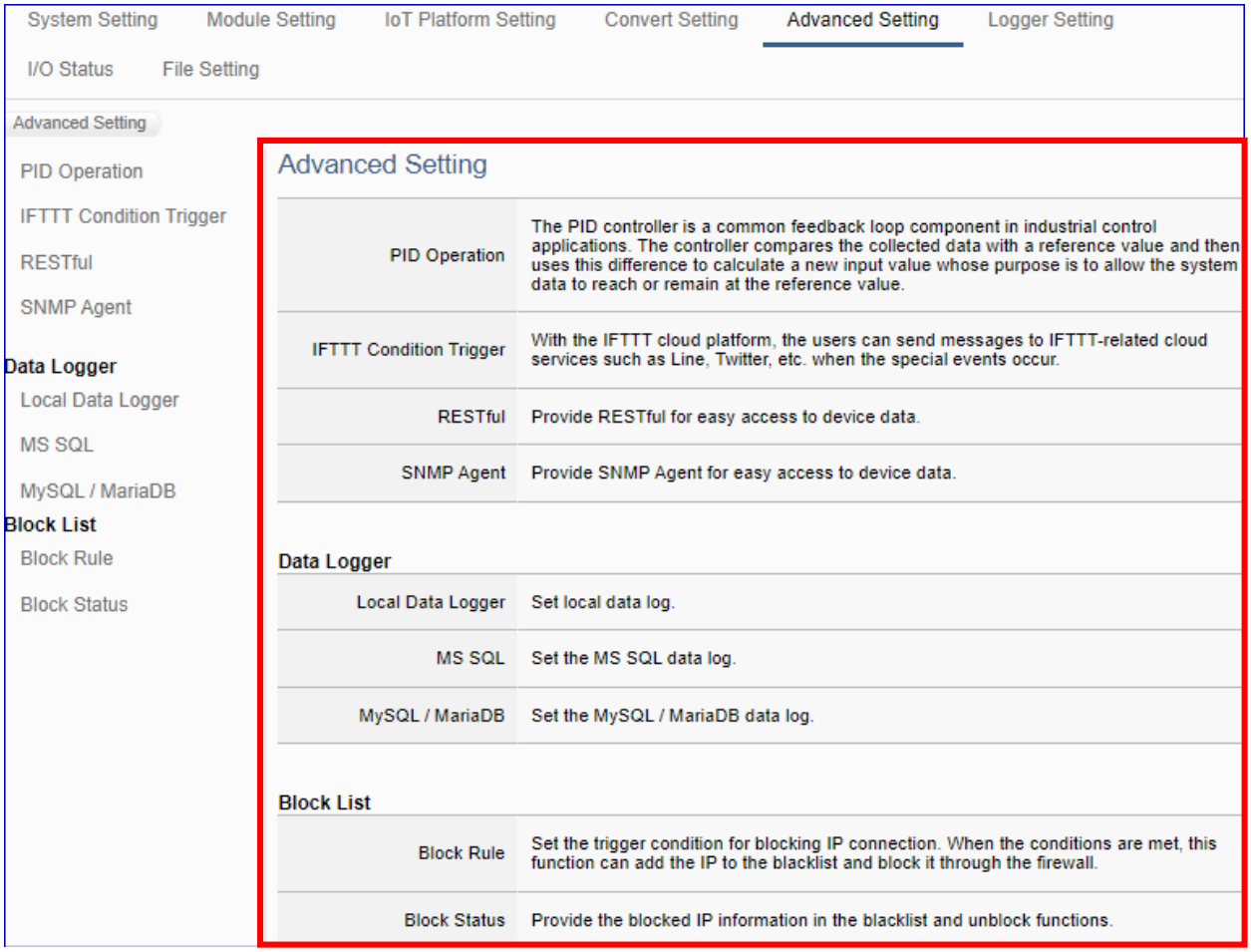


Convert Setting > SNMP > Modbus TCP (Master) – Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Convert Setting > SNMP > Modbus TCP (Master) – Variable Table	
Name	Display the variable name that set in the Modbus Address Mapping Table page (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Variable OID	The variable OID code of each module I/O channel (automatically assigned by the system)
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

5.5 Main Menu: Advanced Setting

Advanced Setting is the fifth (5th) item of the Main Menu, mainly to provide advanced monitoring and control related settings.

Advanced Setting provides virtual device function or cloud service function. The description is on the page of the Main Menu. It will support more functions in the future.
The items in the advanced setting functions are “PID Operation” and “IFTTT Condition Trigger”, “RESTful”, “SNMP Agent” and “Data Logger” that includes “Local Data Logger”, “MS SQL” and “MySQL / MariaDB”. This chapter will introduce the function items and setting parameters.

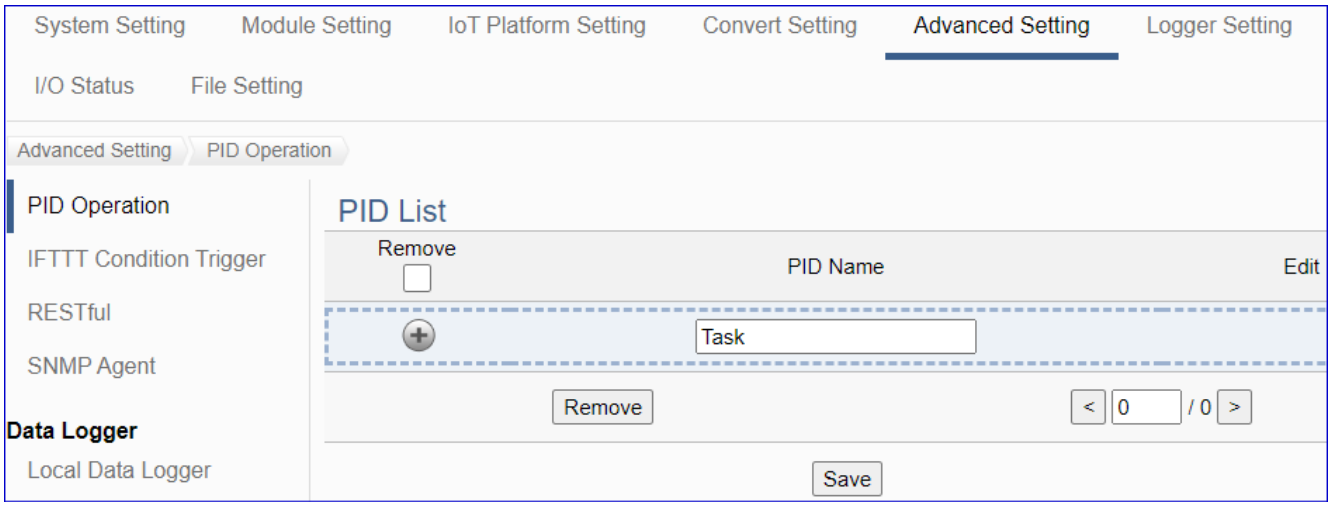


The setting for UA series controllers is to set up from the left to the right of the main menu functions. User can find the setting step and Web UI information in the following chapters.

CH2 Quick Start 1: Hardware/Network Connection
CH3 Quick Start 2: Web UI / Setting Steps
CH4 Function Wizard: Project Quick Setup

5.5.1 PID Operation

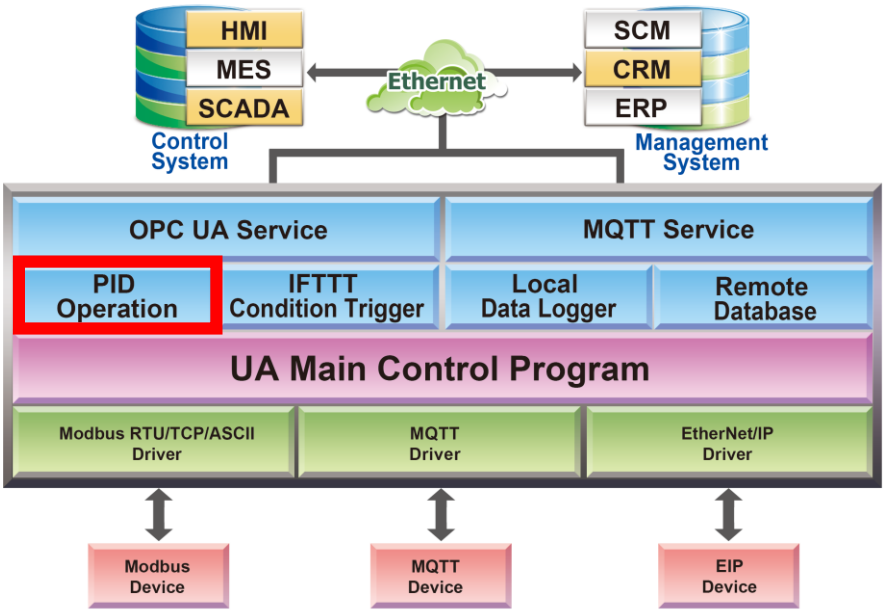
This page is about the virtual device function to allow users to simulate various devices with the real I/O by using the tuning function of PID operation.



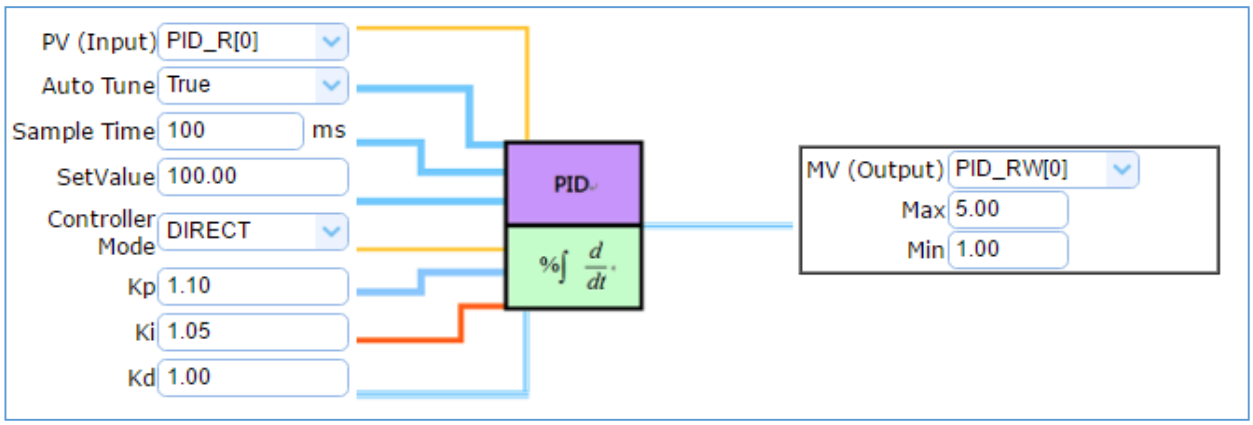
PID (Proportional-Integral-Derivative) control is the most widely used in industrial control systems. A regulator which is controlled in accordance with Proportional, Integral and Derivative is called PID control for short, also called PID regulator. When the user cannot fully grasp or measure parameters of the control system, the PID regulator is the best solution.

The PID controller is a common feedback loop component in industrial control applications. The controller compares the collected data with a reference value and then uses this difference to calculate a new input value whose purpose is to allow the system data to reach or remain at the reference value.

Function Diagram:



PID Operation Solution Example:



In the PID Operation function, UA controller collects the module's data to operate via the feedback loop component of PID control. The controller compares the collected data with a reference value and then uses this difference to calculate a new input value whose purpose is to allow the system data to reach or remain at the reference value.

The setting steps of the PID Operation are as below. The descriptions for the steps setting please refer to Section 4.4 "PID" items in the Function Wizard.

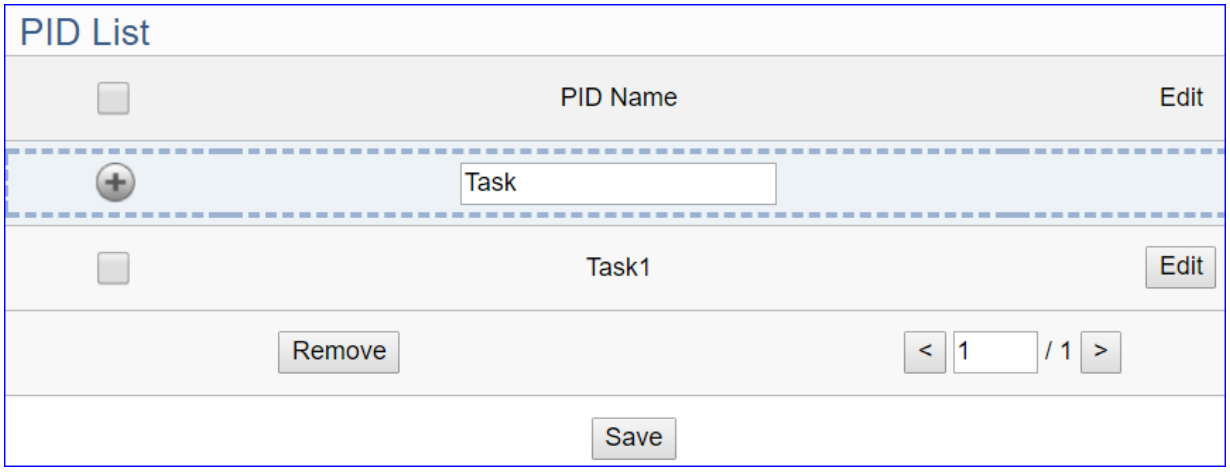
[Step Box] of [PID Operation] :

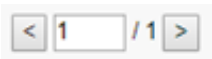


[Step Box] of [PID Operation + OPC UA Conversion] :

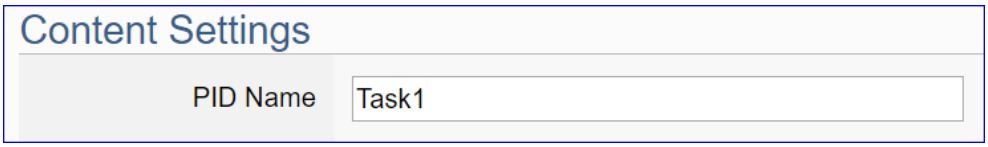


This section will introduce the function items and setting parameters of the PID Operation.

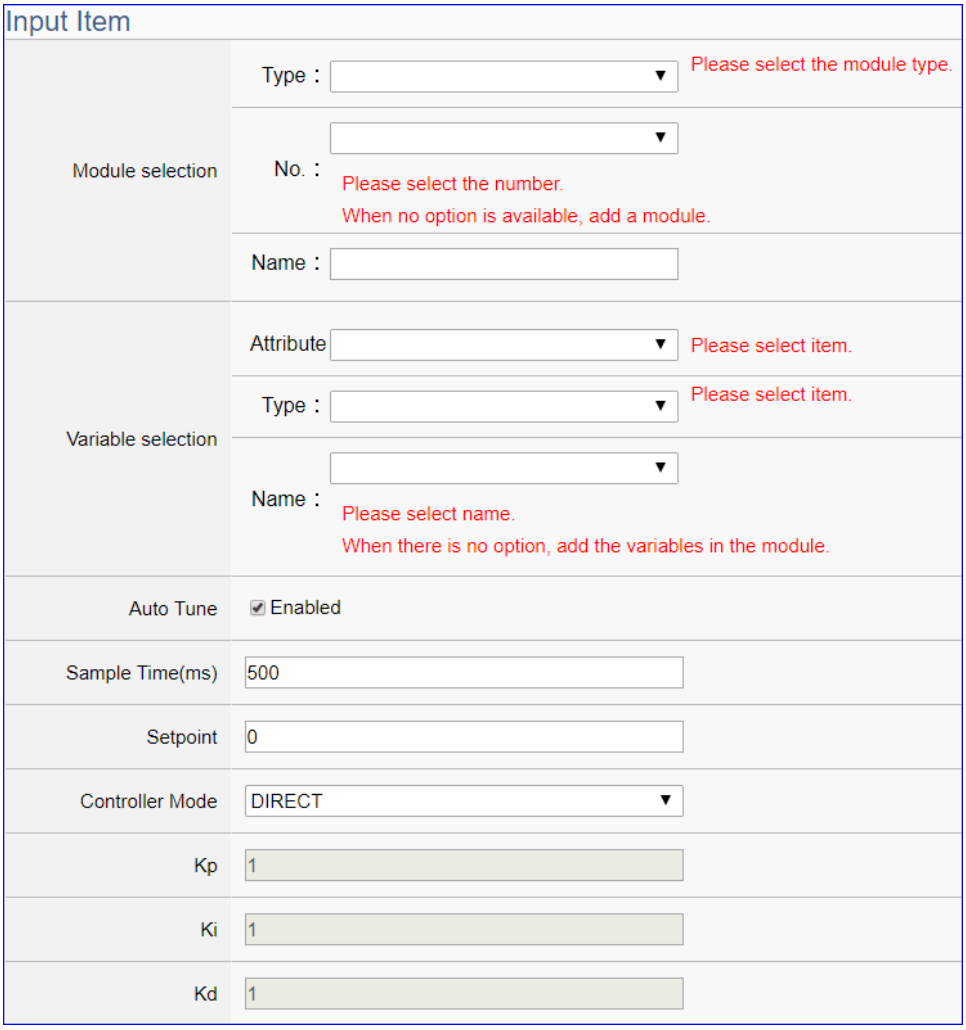


Advanced Setting > PID Operation > PID List	
PID Name	PID name, user can define, e.g. Task1. Default: Task.
	Click to add a new PID Task.
Edit / Remove	Click [Edit] can set the PID content. Click the left box and [remove] can delete the PID list.
	The page number of the PID list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the setting of this page.

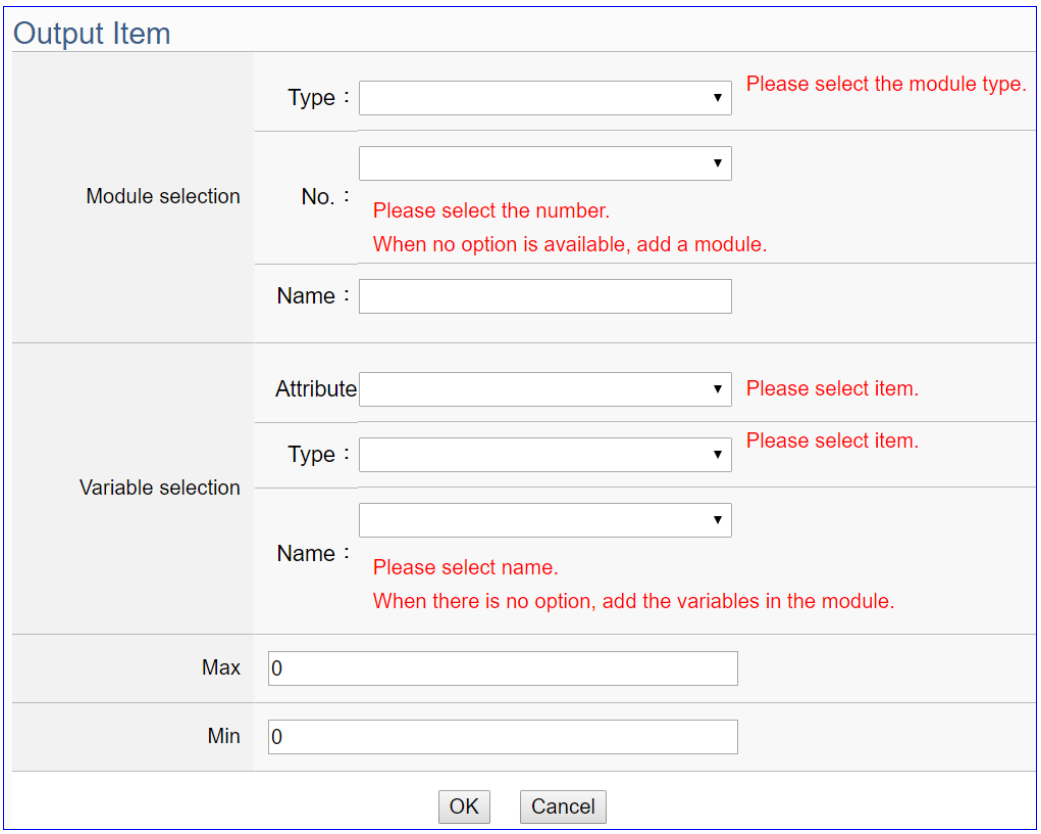
Click [Edit] botton to enter the [Content Settings] page:



Advanced Setting > PID Operation > Content Settings	
PID Name	PID name, user can define, e.g. Task1. Default: Task.

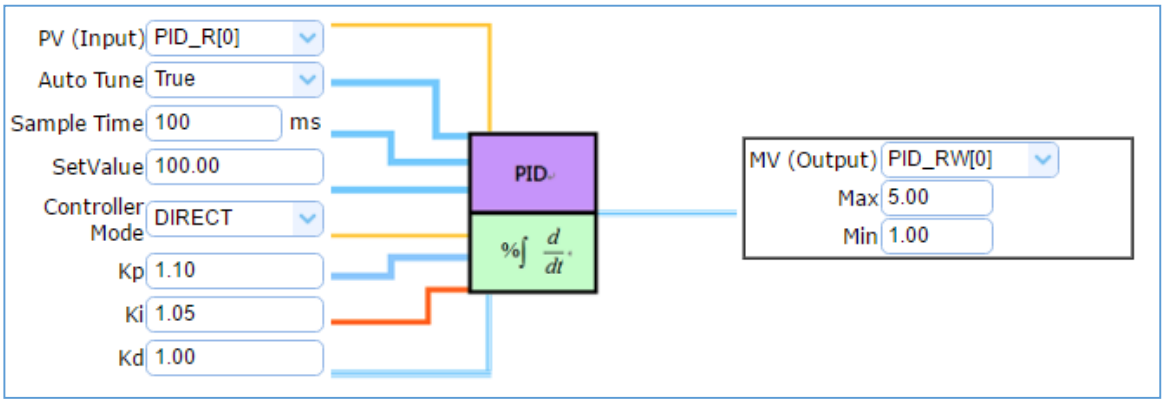


Advanced Setting > PID Operation > Input Item	
Module selection	Choose a predefined module for input data of the PID. Select the type, number and name of the input module. If no option is available, add a new module.
Variable selection	Choose a predefined float variable as the input parameter for PID operation. Select the attribute, type and name of the float variable.
Auto Tune	Enable: Auto-tuning PID parameters for your system. Default: check. Un-Enable: Tuning PID parameters manually, e.g. Kp, Ki, Kd.
Sample Time (ms)	Set the sampling time. (Unit: ms) Default: 500 ms.
Setpoint	The target value for PID control. Default: 0.
Controller Mode	DIRECT: Set it as positive output value. Default: DIRECT. REVERSE: Set it as reverse output value.
Kp	Set the Proportional gain. Default: 1.
Ki	Set the Integral gain. Default: 1.
Kd	Set the Derivative gain. Default: 1.



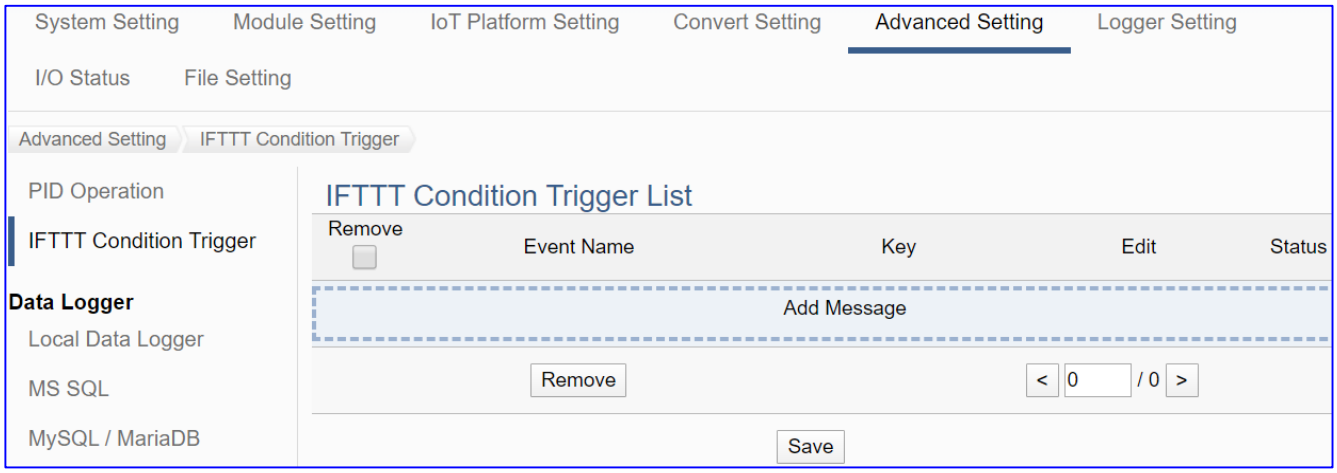
Advanced Setting > PID Operation > Output Item	
Module selection	Choose a predefined module for output data of the PID. Select the type, number and name of the input module. If no option is available, add a new module.
Variable selection	Choose a predefined float variable as the output parameter for PID operation. Select the attribute, type and name of the float variable.
Max	Set the upper-limit value for the variable. Default: 0.
Min	Set the lower-limit value for the variable. Default: 0.
OK	Click to save the settings of the page and back to the PID list page.

PID Operation Solution Example:



5.5.2 IFTTT Condition Trigger

This page is about use the IFTTT cloud platform function. Combine with the IFTTT Condition Trigger function, when the special events occur, the users can send messages to IFTTT-related cloud services (such as Line, Twitter, etc.).



IFTTT (if this then that) is a cloud service platform that easy to get your apps and devices working together via creating chains of simple conditional statements (applets). An applet is triggered by changes that occur within other web services such as Line, Twitter, Gmail, Instagram, etc. For example, “if” Line (Service A) has a new message, “then” send an email to Gmail (Service B).

UA using the IFTTT cloud platform functions, the users can send messages to cloud services such as Line, Twitter, etc. when the special events occur.



The settings for sending the message to the APP with the "IFTTT Condition Trigger (Line, Twitter)" function includes two parts:

1. **IFTTT Cloud Platform Setting:** (Refer to FAQ-app-1.)
   In the IFTTT website, set up the "**if**" side service and event (**this**: use **webhooks** for the UA), the "**then**" side service and action (**that**: user can select the service, such as the Line, twitter, etc.). And then fill the "**Event Name**" and "**Key**" getting from the IFTTT website setting into the "**Content Setting**" of the UA We HMI. (Detail in the FAQ-app-1 & FAQ List.)

2. **UA Web Interface Setting:** (**Sec.5.5.2 Advanced Setting > IFTTT Condition Trigger**)
   In the UA Web HMI, set up the UA controller, modules, IFTTT trigger conditions, the condition variable table, and the IFTTT event connection. (Fill the **Event Name and Key** from IFTTT website into the "**Content Setting**" of the UA Web UI.)

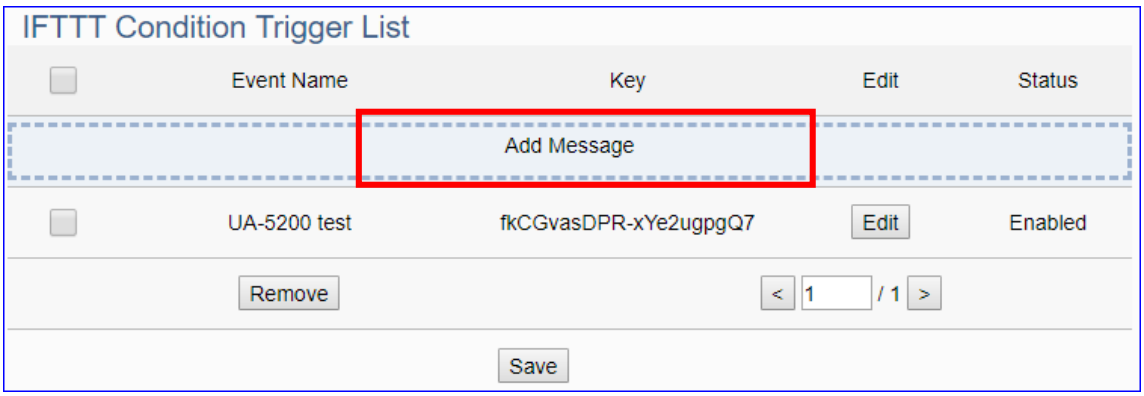
This section introduces the setting part on the UA Web Interface, including the IFTTT trigger condition, variable table and the event message. About the setting on the IFTTT Cloud Platform, user can set up on the IFTTT website and get the "**Event Name**" and "**Key**" for the configuration here. If you are not familiar about the IFTTT, please refer to the FAQ-app-1 & FAQ List.

For the whole steps to send the message to an APP from setting the UA controller, module, I/O variables to the IFTTT Condition Trigger, the users can refer to the Section 4.5 and the step box below.

[Step Box : IFTTT Condition Trigger (Line, Twitter)]:

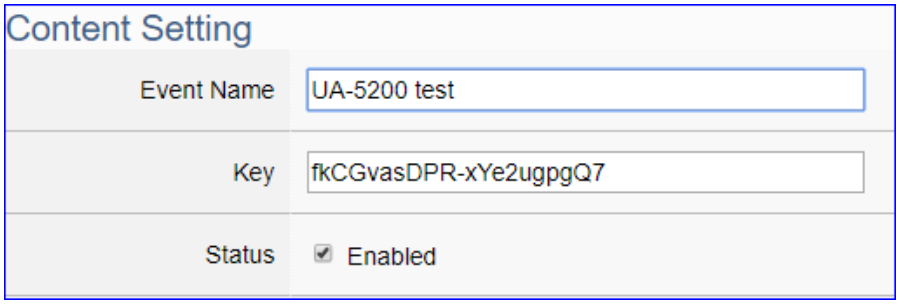


This section will introduce the setting of the IFTTT condition trigger list, variable table and the event message.



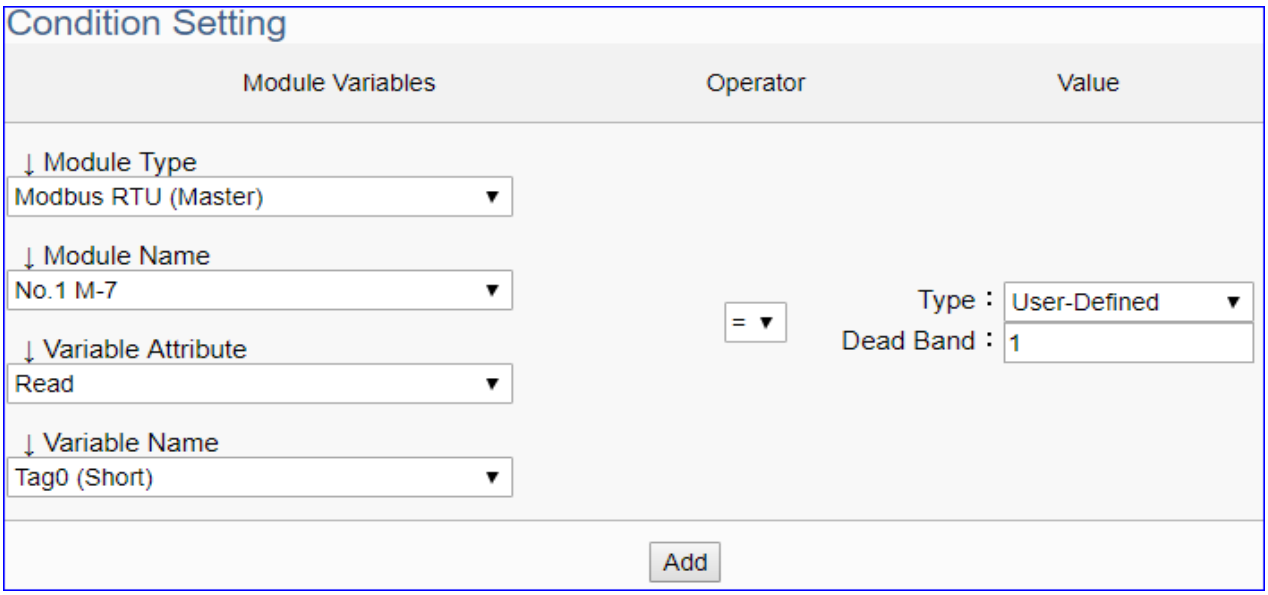
Advanced Setting > IFTTT Condition Trigger > FTTT Condition Trigger List	
Add Message	Click to add a new IFTTT message. After setting, an IFTTT condition trigger list will show on the bottom, includes left box, event name, key and status.
☐	Check the box in the left of the list is to select and to delete the list. Check the box on the top will select all lists.
Event Name	Display the “Event Name” setting in the IFTTT website. (FAQ-app-1)
Key	Display the “Key” getting from the IFTTT website. (FAQ-app-1)
Edit	Click [Edit] can set the IFTTT condition trigger content.
Status	Display the enable status of the IFTTT condition trigger list.
Remove	Click the left box and [remove] can delete the IFTTT list.
< 1 / 1 >	The page number of the IFTTT list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the setting of this page.

Click [**Add Message**] botton to enter the IFTTT [Content Settings] page:

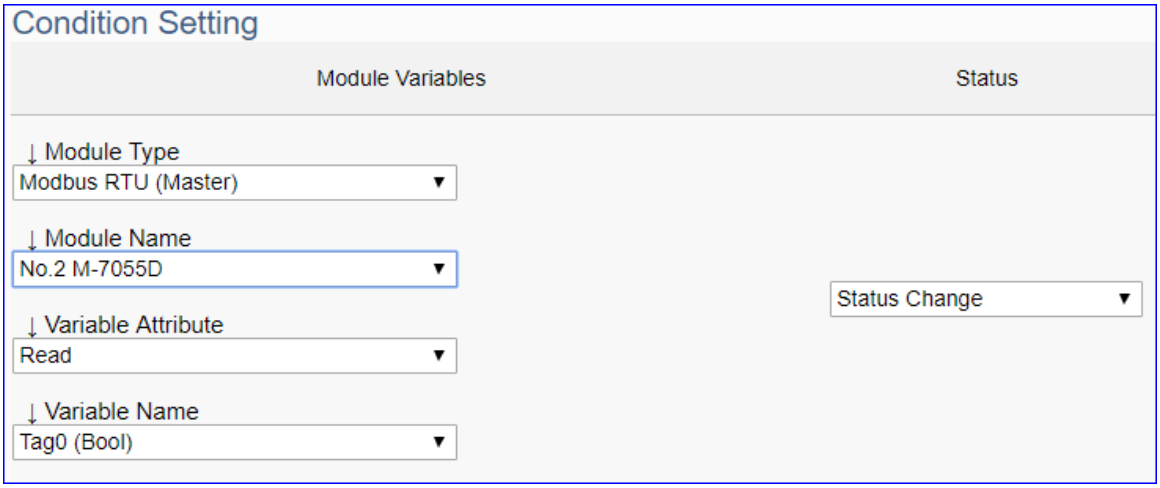


Note: The “Event Name” and “Key” are set in the IFTTT website. If you are not familiar with IFTTT, please see the FAQ-005 for the setting introductions.

Advanced Setting > IFTTT Condition Trigger > Content Setting	
Event Name	Input the “Event Name” setting in the IFTTT website. (FAQ-app-1)
Key	Input the “Key” getting from the IFTTT website. (FAQ-app-1)
Status	Check to enable the IFTTT condition trigger event.



The condition setting field may different depending on the selected variable attribute.

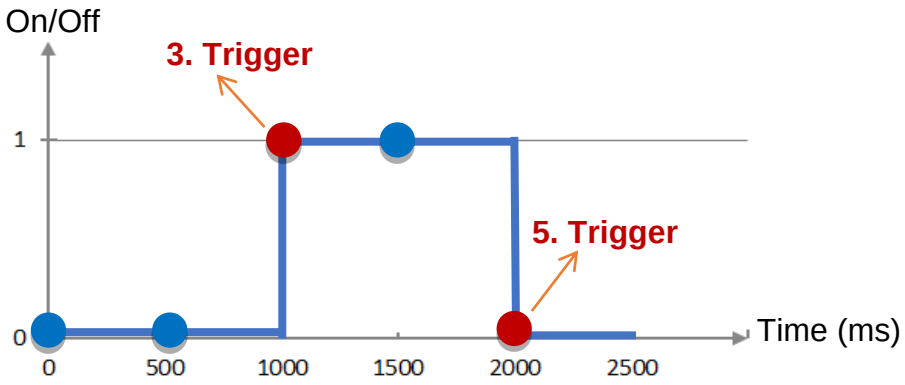


Advanced Setting > IFTTT Condition Trigger > Condition Setting	
Module Variables	Select the module and variable for the condition trigger. Module Type: select the module type, Modbus RTU/TCP/ASCII… Module Name: select the module that set for condition trigger. Variable Attribute: select the variable attribute for condition trigger. Variable Name: select the variable name for condition trigger.
The following condition fields may different depending on the selected variable attribute. The condition trigger method will be descripted after this table.	
Operator	Select the operator for the trigger condition.
Value	Set up the value for the condition, include Type and Dead Band.
Status	Set up the status for the condition. Default: 0.
Add	Click to add a condition trigger list in the Condition Table..

Condition Trigger Descriptions:

The condition trigger method will different depending on the attribute of the selected variable and the trigger will be different. There are two operation styles: **DIO** and **AIO**.

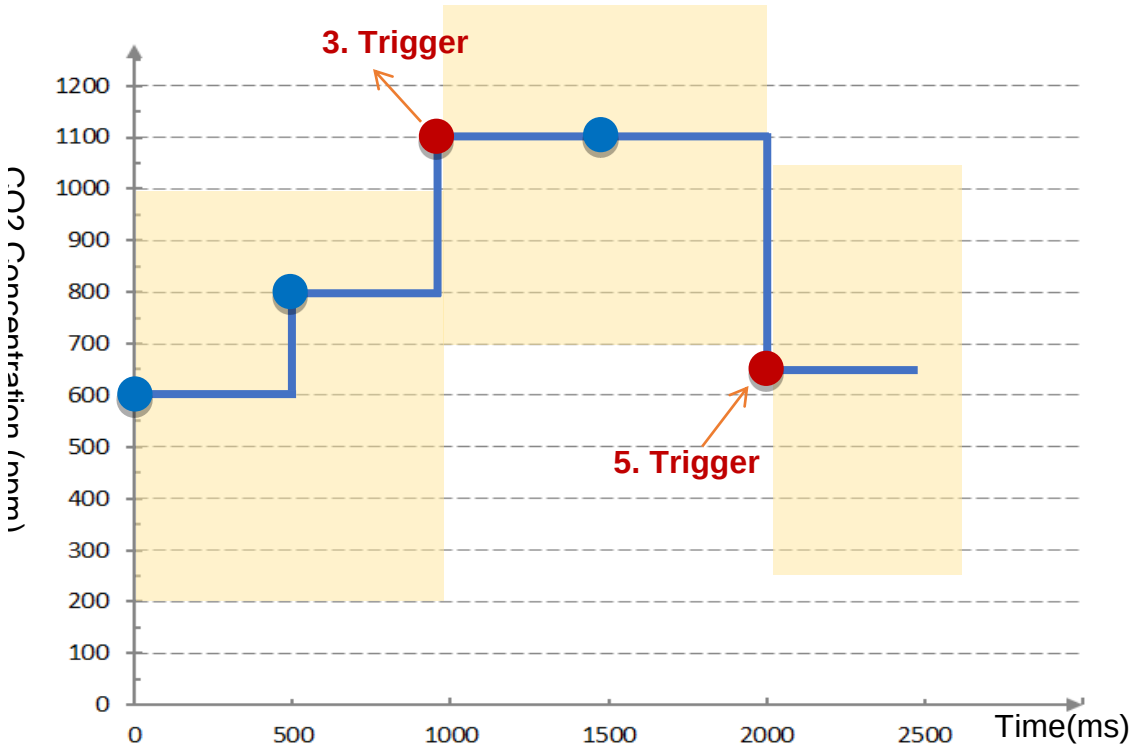
(A) If select **DIO variable**, then Condition is “Status Change”. When detecting the status is changed, it will trigger the event and send the assigned message. (Below is a switch detecting example.)



DIO Trigger: (Detect per 500 ms)

1. Detect initial switch status "Off" (status = 0)
2. Detect "Off" (status = 0, status no change), no trigger
3. Detect "On" (status = 1, status changed), trigger a message notification
4. Detect "On" (status = 1, status no change), no trigger
5. Detect "Off" (status = 0, status changed), trigger a message notification

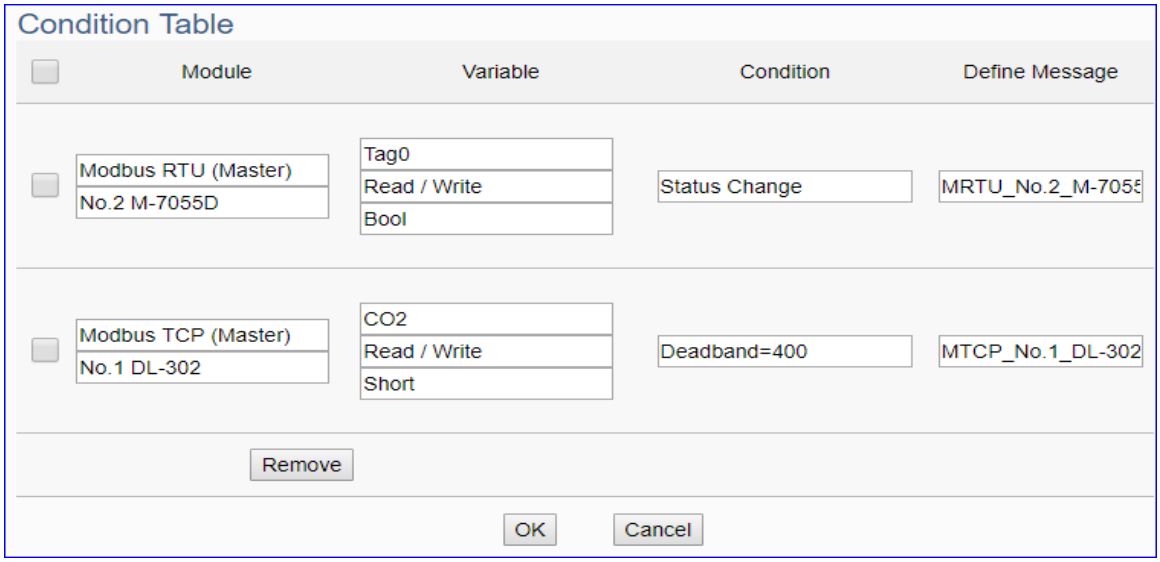
(B) If select **AIO variable**, then Condition is “Value” and can set the “Dead Band”. The condition will be triggered and send the message when the detected value exceeds the upper or lower Dead Band. (Below is a CO2 example. Detect per 500 ms)



AIO Trigger: (Detect per 500 ms. The yellow block means the Dead Band.)

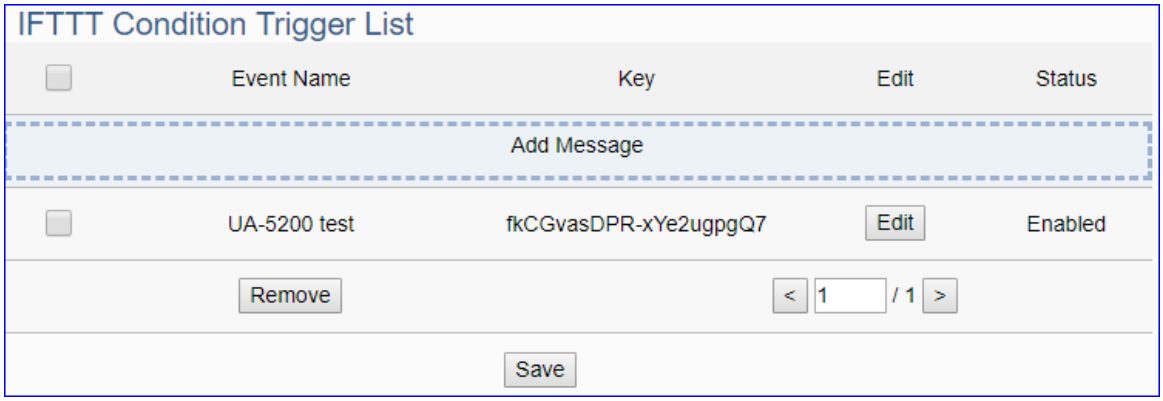
1. Detect initial CO2 concentration 600 (ppm).
   Set Dead Band=400 (Initial Trigger Condition: **>=** 1000 **or <=** 200)
2. Detect CO2 concentration 800. It is in the range of Dead Band.
3. Detect CO2 concentration 1100. It exceeds the upper value (>= 1000) of Dead Band, so trigger a message for danger notification.
4. Detect CO2 concentration 1100. It is in the new range of Dead Band.
   Dead Band=400 (New Trigger Condition: **>=** 1500 **or <=** 700)
5. Detect CO2 concentration 650. It is below the lower value (<= 700) of Dead Band, so trigger a message for safety notification.

Please refer to the previous Condition Trigger Descriptions to set up your Condition. When complete, click the “Add” button. The setting will show in the Condition Table. Below Table is setting 2 conditions.



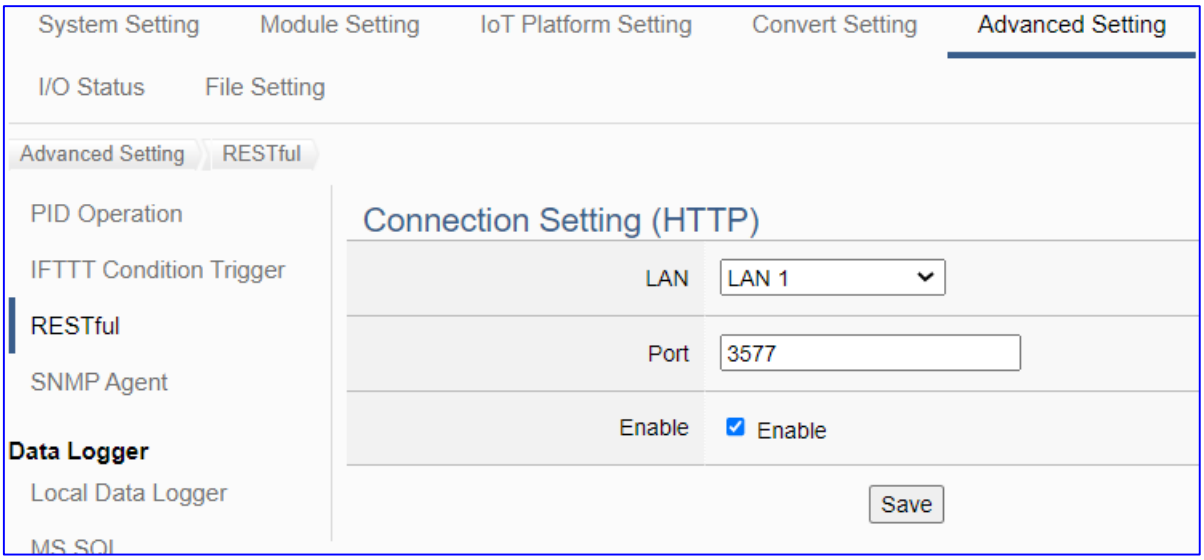
Advanced Setting > IFTTT Condition Trigger > Condition Table	
Module	Display the module type and name of the condition. (Not editable here)
Variable	Display the variable attribute and name of the condition. (Not editable here)
Condition	Display the trigger condition. (Not editable here)
Define Message	Default Message: module code variable code. The user can define own message in the format of English character, number, general symbol…
Remove	Click the left box and [remove] can delete the IFTTT list.
OK	Click to save this page settings and back to the module list page.
Cancel	Click to exit without saving and back to the module list page.

When back to the IFTTT Condition Trigger List, the condition trigger message will show as below picture. If need more trigger conditions, click the “Add Message” again to combine the IFTTT APP message sending and the UA system. At last, click the Save button.



5.5.3 RESTful

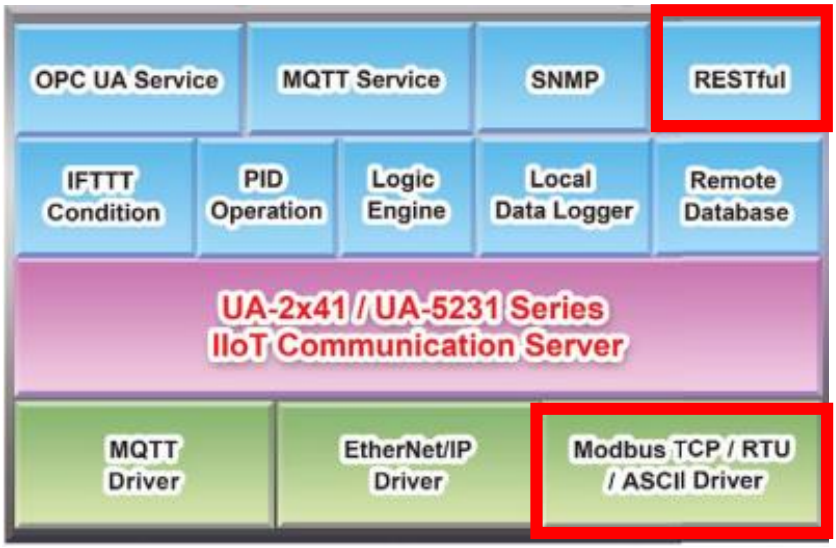
This function is mainly to enable the RESTful API web service function in the REST design format. Via a web browser, users can obtain device information.

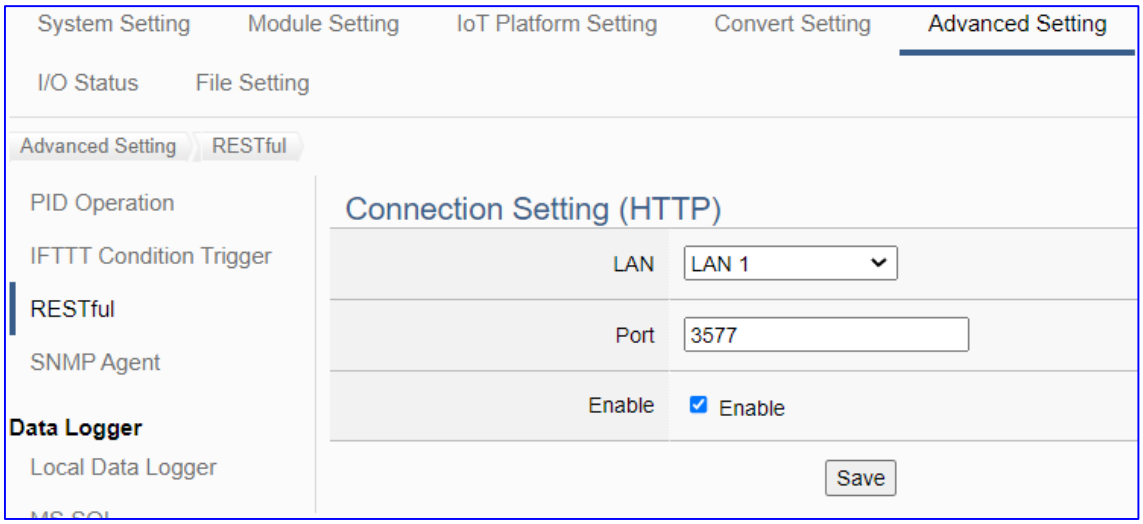


REST (Representational state transfer) is a software architectural style that was created to guide the design and development of the architecture for the World Wide Web. REST is a widely accepted set of guidelines for creating stateless, reliable web APIs. A web API that obeys the REST constraints is informally described as **RESTful**. **RESTful** web APIs are typically loosely based on HTTP methods to access resources via URL-encoded parameters and transmit data.

UA series of ICP DAS provides RESTful web services to read and write I/O variables of the connection module.

Function Diagram:





Advanced Setting > RESTful > Connection Setting (HTTP)	
LAN	Choose LAN1 or LAN2, mainly choose to use the IP address of LAN1 or LAN2.
Port	RESTful connection port, Default: 3577 (the RESTful default port)
Enable	Enable: Check the box and click Save to enable the RESTful function.
Save	Click the Save button to save the settings on this page.

[RESTful usage table] Enter "IP address: port/request method" in the address bar of the web browser.

HTTP Method	Path Command	Description
GET	/AllVariableName	Read all variable data.
	/VariableInformation? var0,var1, var2…	Read the data of var0, var1, var2… in all variables, data are separated by commas.
PUT	/VariableInformation	writes the variable data being used.

[JSON Content Description]

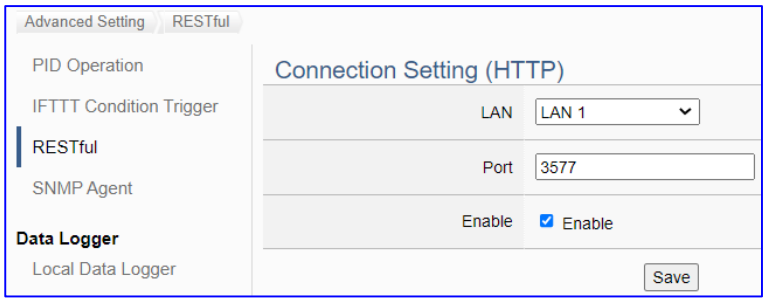
JSON Content	Item	Description
{ "Var1": { "Quality": "Good", "Value": "24.5" }, "Var2": { "Quality": "Good", "Value": "24.5" } }	Quality	The communication quality of the variable. Return Item: Good, Uncertain, Bad.
	Value	Return the value of the variable.

[RESTful Example]:

- Requirements: The user needs to obtain the I/O variable data of all modules connected to the UA-2800 in a web browser.

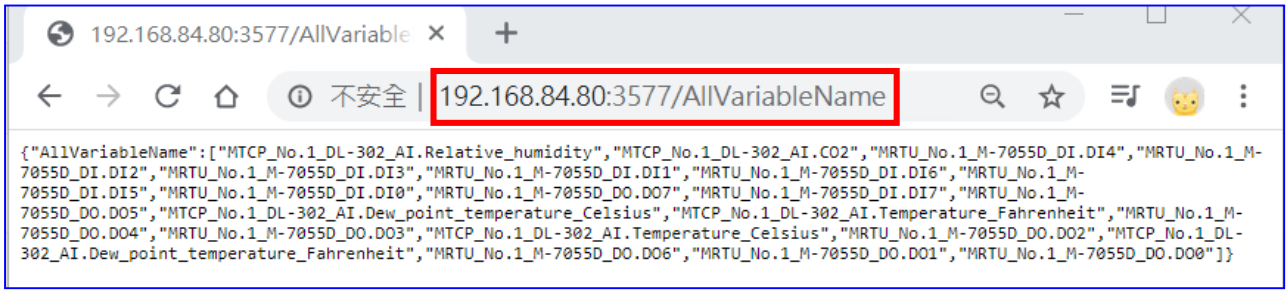
1. Setting Steps:

Click on the UA web interface [**Advanced Settings**] > [**RESTful**] Settings:
Select LAN1 (in this example, the IP of LAN1 is **192.168.84.80**), check the **Enable** box, and click **Save**.

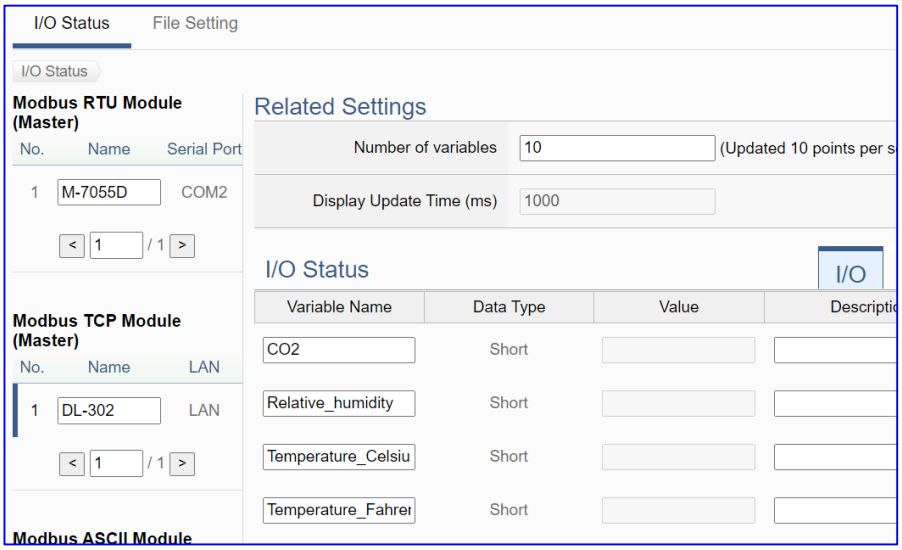


2. Using Steps:

Open a web browser, e.g. Chrome, and then enter "IP:Port" and the requested command in the address bar.
[**This Example**] The user wants to "get" variable data, so use the "**GET**" command "/AllVariableName". Please enter "**192.168.84.80:3577/AllVariableName**" to get the data for all I/O variables of the connected module.

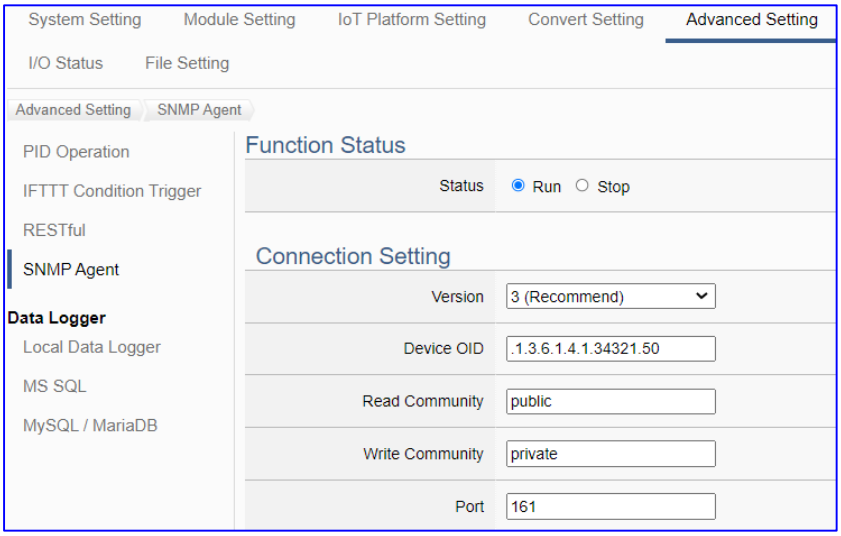


From the upper web browser and the lower UA web interface, the user can find that UA supports directly request all the I/O variable data of the connected modules DL-302 and M-7055D via the web browser.



5.5.4 SNMP Agent

This function is mainly to set up SNMP connection encryption and device management. It provides SNMP Agent to facilitate the acquisition of device information.

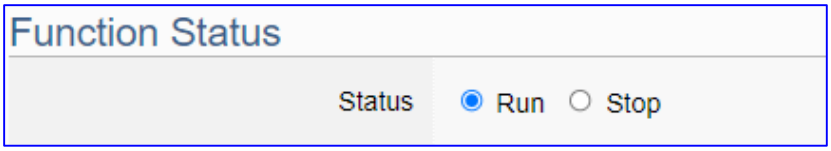


SNMP (Simple Network Management Protocol) is a communication protocol for managing network devices. It is one of the widely accepted communication protocols for managing and monitoring network elements. The user can use it in wireless networks to detect malicious wireless base stations. Network managers can isolate and dispose of them in real-time based on the detection results to avoid leakage of internal information or deliberate external attacks to maintain information security.

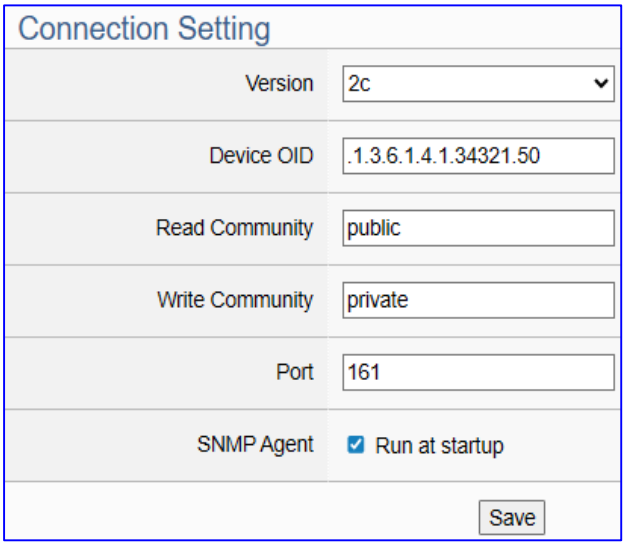
SNMP Agent presents the relevant information of the managed device in the form of variables. Each variable has its unique Object Identifier (OID), and the OID hierarchically describes in the Management Information Base (MIB). For example, the OID of the UA device is ".1.3.6.1.4.1.34321.50".

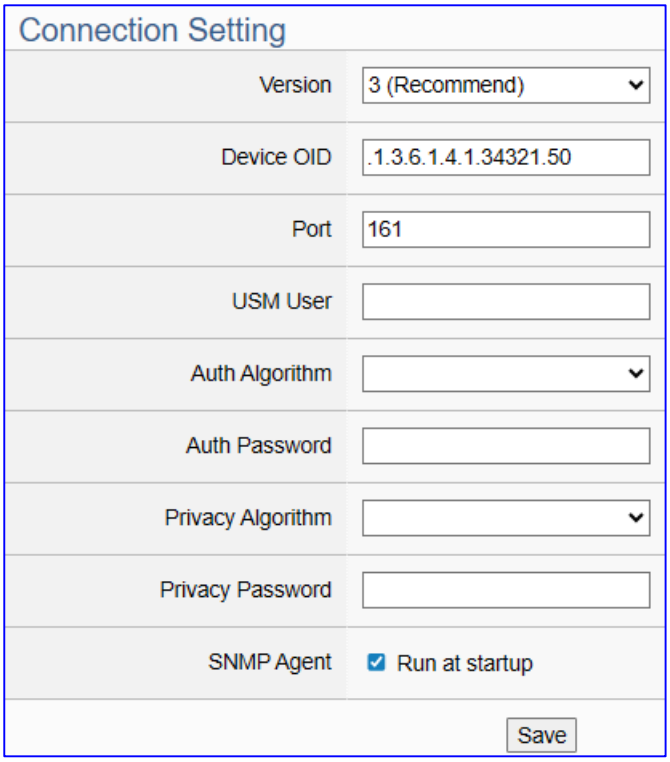
[Advanced Setting] > [SNMP Agent] function:

[Function Status] Setting item ad below.



Advanced Setting > SNMP Agent > Function Status	
Status	Click to start or stop the SNMP Agent connection service immediately.





Advanced Setting > SNMP Agent > Connection Setting	
Version	SNMP currently has versions: v1, v2, v3 **v1** and **v2** provide basic read/write MIB functions. **v3** provides encrypted data transmission and user authentication technology.
Device OID	Object identifier of the device, automatically generated by the system
Read Community	Set the community string for read-only access
Write Community	Set the community string for read and write access permissions
Port	SNMP connection port. Default: 161
USM User	Set the user name of the User-based Security Model, which can be alphanumeric (case-sensitive), with no space, and within 32 characters.
Auth Algorithm	Set the user authorization algorithm to encrypt and protect the password
Auth Password	Set user authentication password, at least 8 and within 32 characters.
Privacy Algorithm	Set encryption type, encrypt and protect privacy password
Privacy Password	Set user privacy password, at least 8 and within 32 characters.
SNMP Agent	Run at startup: Check box to run the SNMP Agent at startup.
Save	Click the Save button to save the settings on this page.

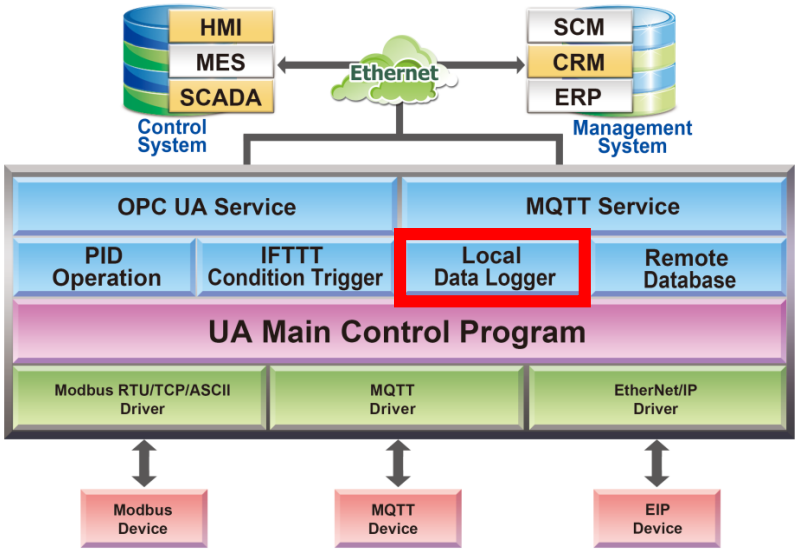
5.5.5 Data Logger: Local Data Logger

UA's Local Data Logger function can automatically record the I/O status at setting intervals and save them in a CSV file on the local microSD card.

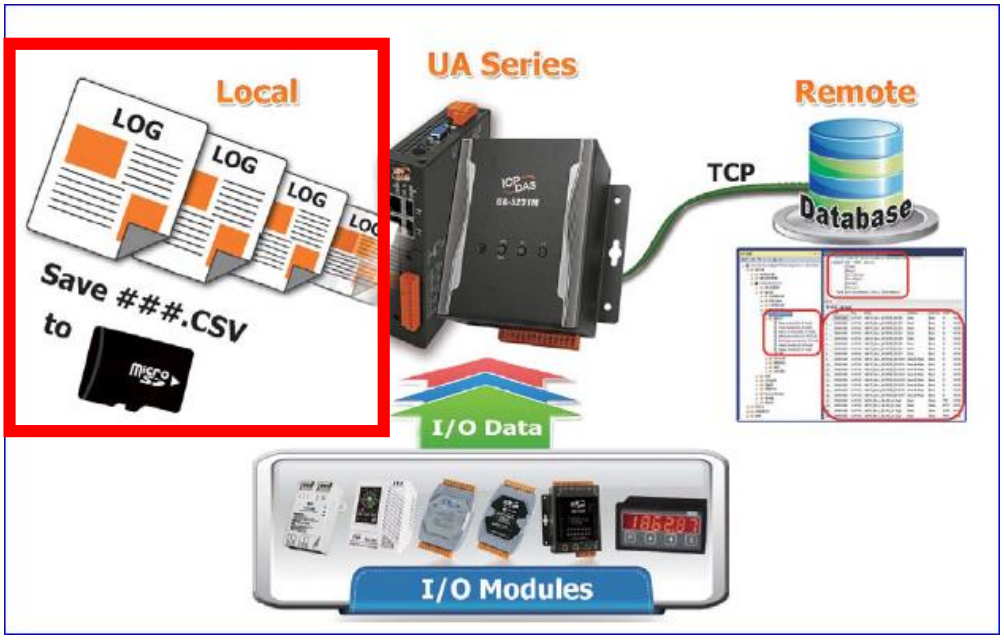
This function is for setting the local data logger and the microSD card. For the setting about the logger and module, please refer to Chapter 5.6.

When the local data logger function is running, the system will allocate memory as a read/write file cache temporarily. When the function runs for a long time, it will increase the memory resource utilization. This situation is normal and does not affect the long-term stability of UA operation.

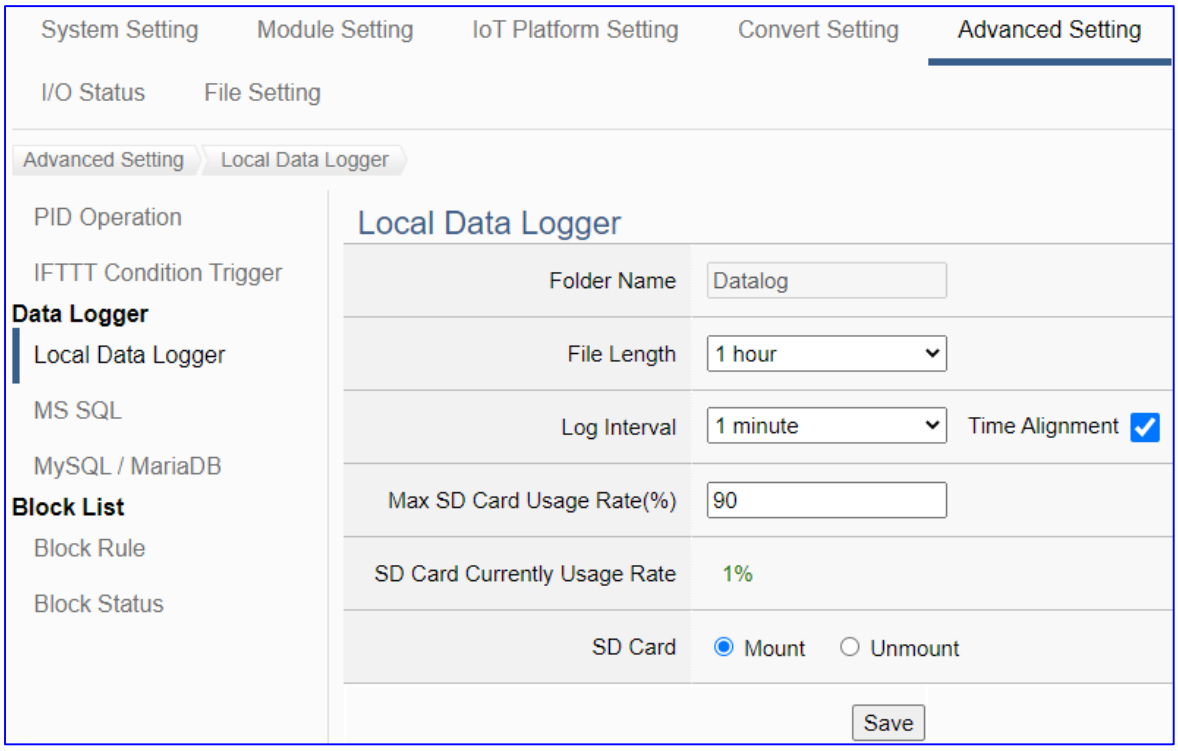
Function Diagram:



Application:



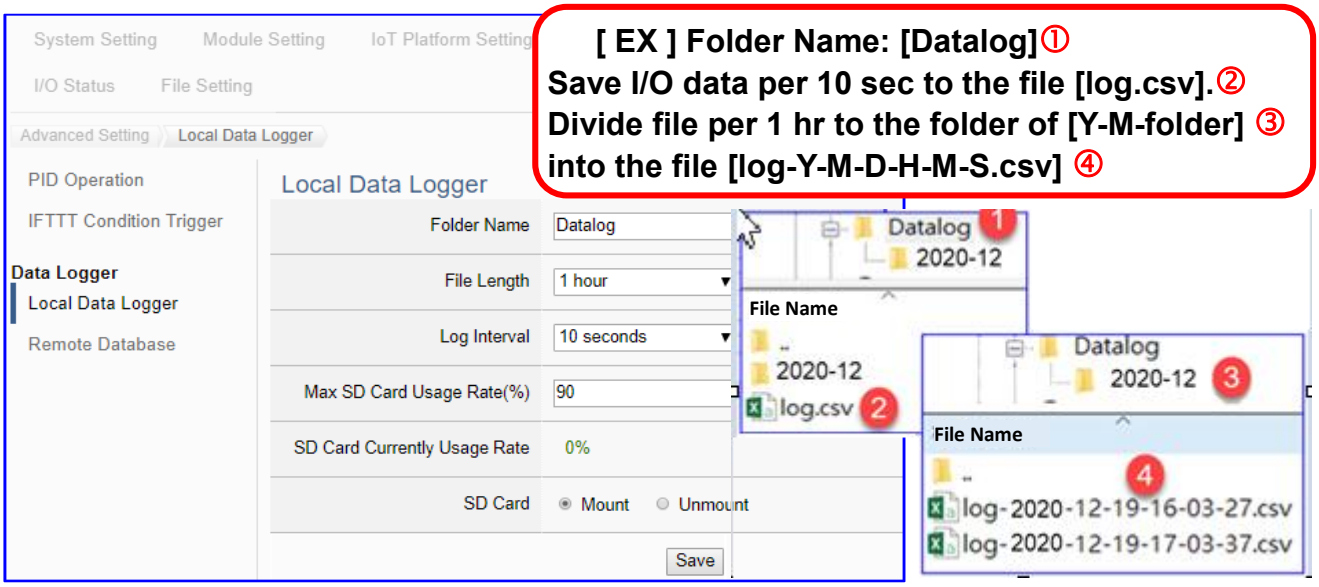
Enter the main menu [Advanced Setting] > [Data Logger] > [Local Data Logger]:



Advanced Setting > Data Logger > Local Data Logger	
Folder Name	The folder name in microSD card of UA, user definable. The I/O data will save into the file “log.csv” under this folder.
File Length	Unit: hour. User can select per 1, 2, 3, … 8, 12, or 24 hours to divide the log.csv into the file “log-Y-M-D-H-M-S.csv” under the folder “Y-M”. (e.g. 2018-12)
Log Interval	The interval to save I/O data per seconds, minutes or hours.
Time Alignment	Align records time at selected log intervals (default: unchecked). When enabling the Time Alignment, it will record the first log at the beginning time. And will align other log times with multiples of the log interval (seconds, minutes, hours). For example, if the log interval is 5 seconds, the first log time is 13:01:04, and the following log records will be 13:01:05, 13:01:10, etc., the seconds being multiples of 5 seconds.
Max SD Card Usage Rate (%)	Set up the maximum usage rate (Unit: %) of UA microSD card. If the data current rate meet the max rate, the oldest data will be removed first.
SD Card Currently Usage Rate	Display the current usage rate of UA microSD card (show %).
SD Card	Mount: Click to mount microSD card and begin to record data. Unmount: Click to unmount microSD card and stop record data.
Save	Click to save the settings of this item.

● CVS local data log file: fields and example

1. The Log record will be stored to the microSD card in the UA PAC, and the default name is the **folder** "**Datalog**" which can be customized by the user.
2. I/O data records will be stored in the **file** "**log.csv"** under this folder.
3. The log data file is divided every 1, 2, 3… 8, 12 or 24 hours according to user settings, and saved under the **folder** "**YYYY-MM**".
4. Save to the **file** "**log-YYYY-MM-DD-HH-MM-SS.csv**". Each tag data and status are recorded in each separate row, **the row is added down for each interval**, and the tag data is recorded in time sequence.



	A	B	C	D
1	# Log file created/rotated Thursday	29 Oct 20 05:50:10 GMT		
2	Timestamp	Name	Value	Status
3	2020-10-29-13-50-10	MRTU_No.1_tM-AD4P2C2_AO.Vin0	11979	Good
4	2020-10-29-13-50-10	MRTU_No.1_tM-AD4P2C2_AO.Vin1	5495	Good
5	2020-10-29-13-50-10	MRTU_No.2_DL-302_AO.CO2	736	Good
6	2020-10-29-13-50-10	MRTU_No.2_DL-302_AO.RH	6371	Good
7	2020-10-29-13-50-10	MRTU_No.2_DL-302_AO.TC	2694	Good
8	2020-10-29-13-50-10	MRTU_No.2_DL-302_AO.TF	8049	Good
9	2020-10-29-13-50-10	MRTU_No.2_DL-302_AO.DC	1947	Good
10	2020-10-29-13-50-10	MRTU_No.2_DL-302_AO.DF	6704	Good
11	2020-10-29-13-50-20	MRTU_No.1_tM-AD4P2C2_AO.Vin0	11979	Good
12	2020-10-29-13-50-20	MRTU_No.1_tM-AD4P2C2_AO.Vin1	5771	Good
13	2020-10-29-13-50-20	MRTU_No.2_DL-302_AO.CO2	734	Good
14	2020-10-29-13-50-20	MRTU_No.2_DL-302_AO.RH	6370	Good
15	2020-10-29-13-50-20	MRTU_No.2_DL-302_AO.TC	2694	Good
16	2020-10-29-13-50-20	MRTU_No.2_DL-302_AO.TF	8049	Good
17	2020-10-29-13-50-20	MRTU_No.2_DL-302_AO.DC	1947	Good
18	2020-10-29-13-50-20	MRTU_No.2_DL-302_AO.DF	6704	Good
19	2020-10-29-13-50-30	MRTU_No.1_tM-AD4P2C2_AO.Vin0	11979	Good

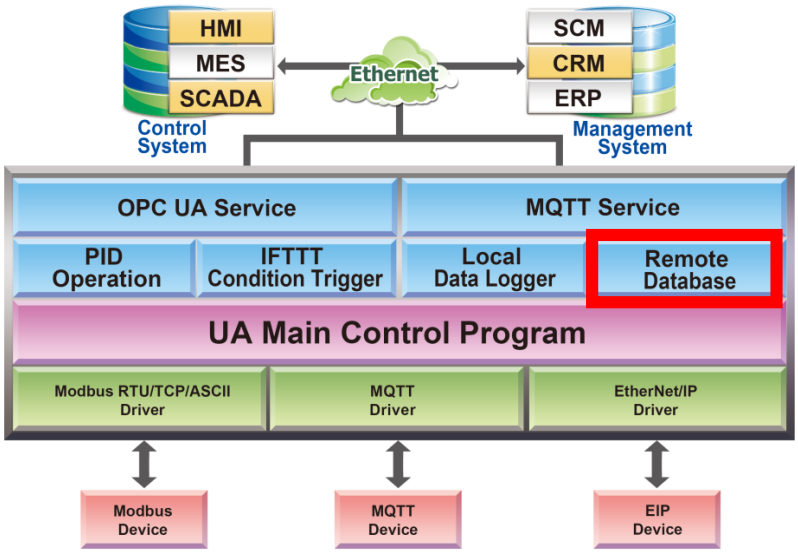
log-2020-10-29-13-51-20

5.5.6 Data Logger: MS SQL

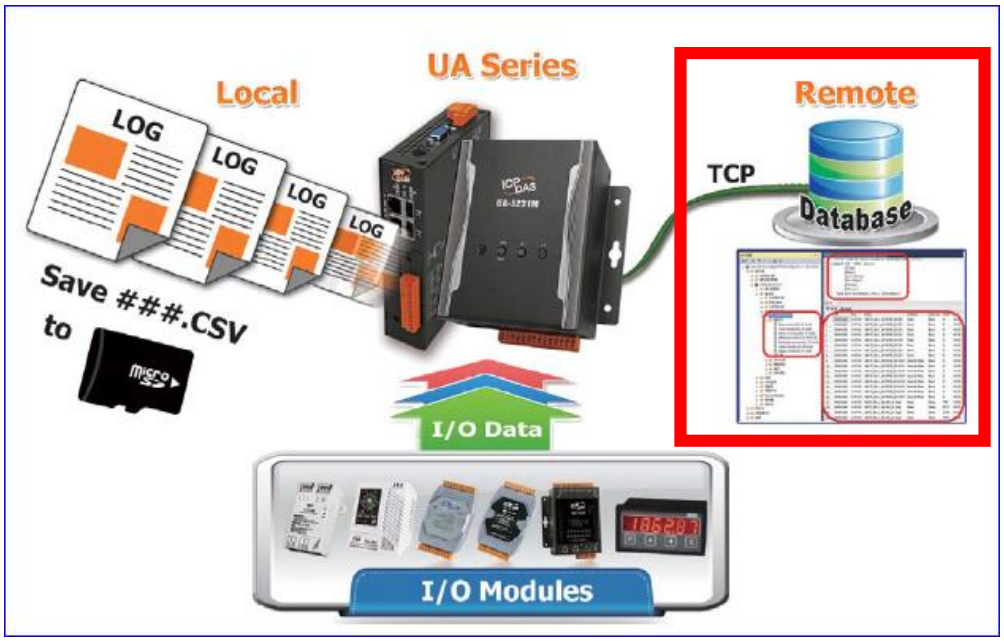
UA's: MS SQL data logger function can automatically record I/O status at setting intervals, and write the data directly to remote MS SQL databases.

This function is for setting the remote database connection. For the setting about the logger and module, please refer to Chapter 5.6.

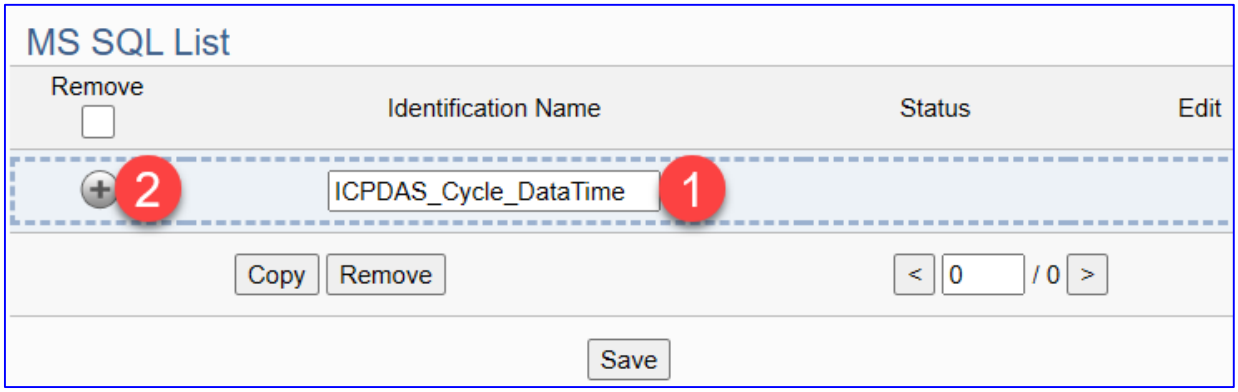
Function Diagram:

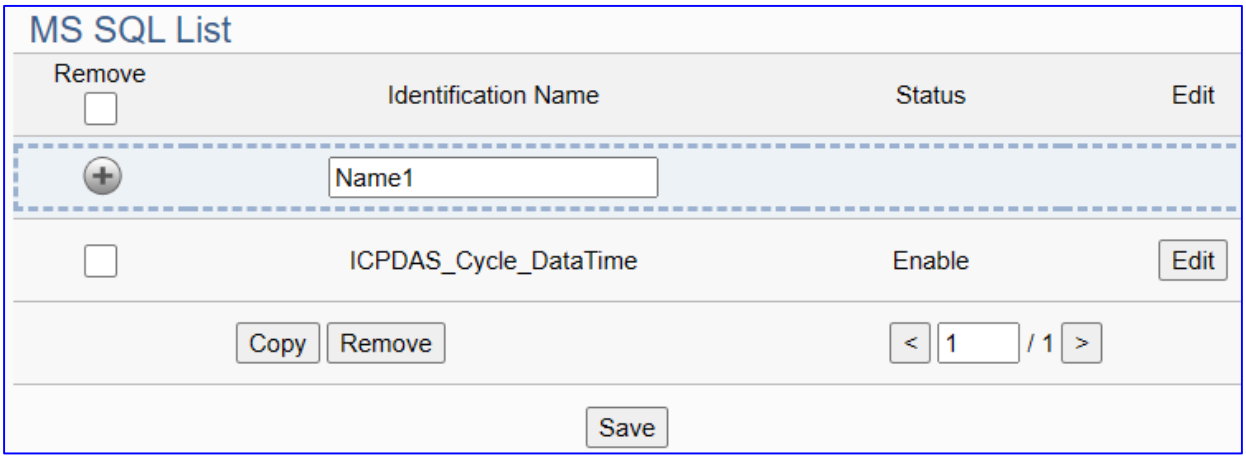


Application:



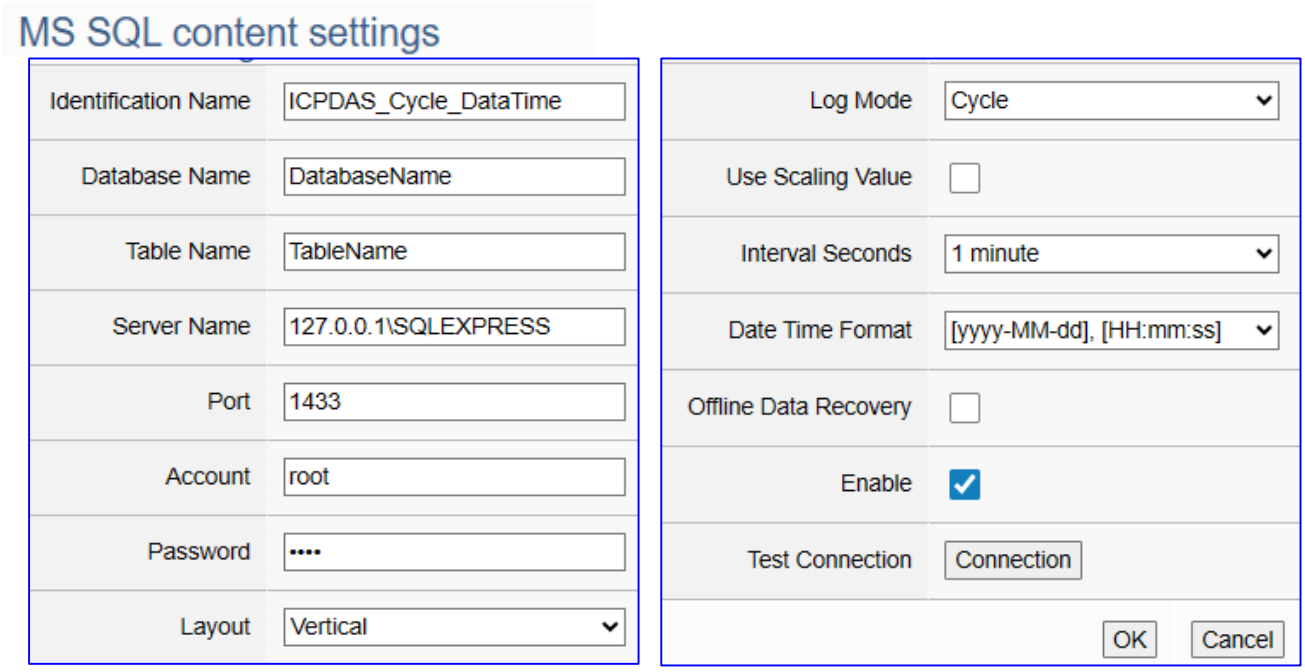
Enter the main menu **[Advanced Setting] > [Data Logger] > [MS SQL]** screen, enter a Name (e.g. "**ICPDAS_Cycle_DateTime**"), and click the plus sign to add a MS SQL remote database list as below.





Advanced Setting > Data Logger > MS SQL List	
Remove	Check Remove box to remove all database connection in list. Check the box of each database and click the "Remove" button can remove just that database connection.
Identification Name	User defined name to identify the remote database. Default: Name.
Status	Display the status (Enable/Disable) of the database connection. Default: Enable.
⊕	Click to add a new remote database connection.
Edit	Click to enter the "Content Setting" page of the remote database.
Copy	Click the box of the list, then click 'Copy' to duplicate the DB settings. * Copy Quantity: 1 ~ 10. * Name suffix: Default add a suffix "_copy".
Remove	Click the box of the list, then click 'Remove' to delete the DB list.
< 1 / 1 >	The page number of the database list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

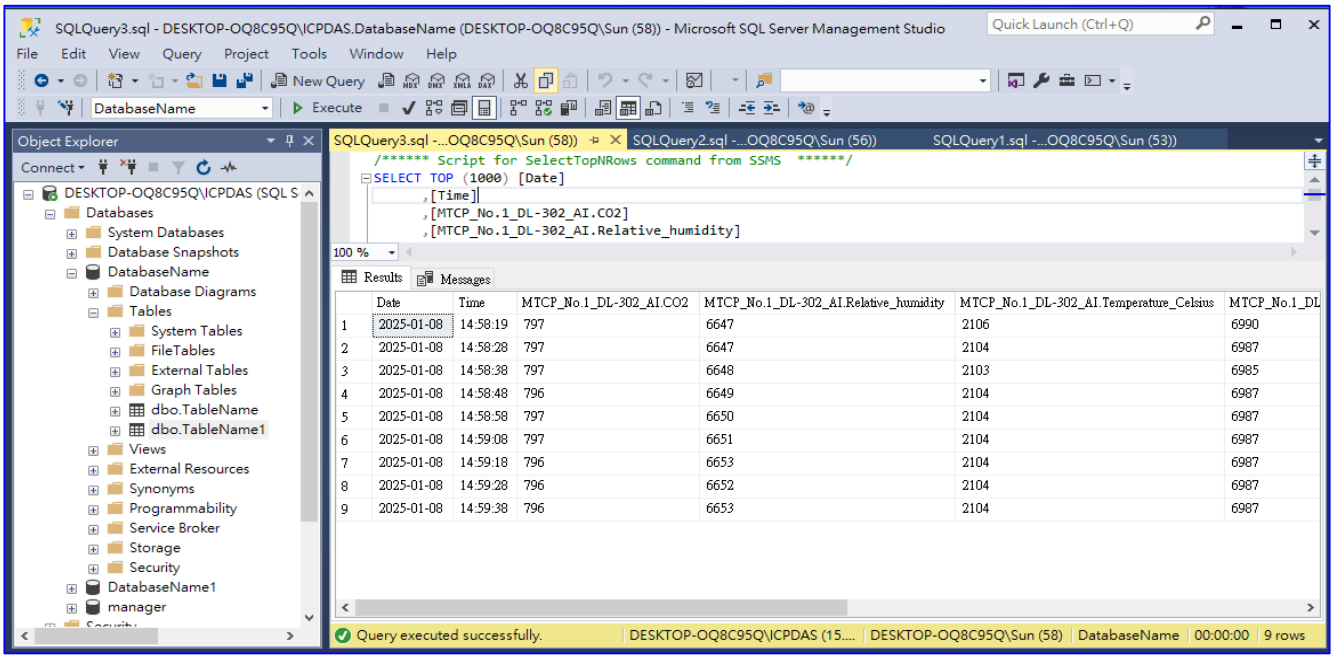
Click "Edit" to enter the "MS SQL connect settings" page.



Advanced Setting > Data Logger > MS SQL – Content Setting	
Identification Name	User defined name to identify the database.
Database Name	The name of the remote database. If not exist, It will create one.
Table Name	The table name of the remote DB. If not exist, It will create one.
Server Name	The Server IP and name of the remote database.
Port	The port to link with database. Default: 1433 (for MS SQL)
Account	The login name of the remote database.
Password	The login password of the remote database.
Layout	Select Vertical or Horizontal (**Note 1**)
Log Mode	**Cycle**: Record one log data at the interval time (set below). **Cycle-Time Alignment**: Cycle mode with **Time Alignment**. Time Alignment is to align records time at the selected interval. It will record the first log at the beginning time. And will align other log times with multiples of the log interval (seconds, minutes, hours). For example, if the log interval is 5 seconds, the first log time is 13:01:04, and the following log records will be 13:01:05, 13:01:10, etc., the seconds being multiples of 5 seconds. **Data Change**: Only record when the data has changed.
Use Scaling Value	When checked, it will prefer to write the scaling value to the database (need to enable Scaling in the [Module Setting] first).
Interval Seconds	Set up the interval time to save the I/O data to the remote database. Unit: Second.
Date Time Format	Select to separate the date and time into two [Columns] or combine the date and time in one [Column]. (**Note 2**)

Advanced Setting > Data Logger > MS SQL – Content Setting	
Offline Data Recovery **(Appendix G)**	Check to enable the Offline Data Recovery. If the database is offline, UA will temporarily store the data in the SD card. When the connection is online, UA will retrieve the data from the SD card and re-sent it to the database. (Default: unchecked)
Enable	Enable the data logger to the remote database. Default: check.
Test Connection	Click to test the connection to the remote database. Result: Success or Failure.
OK / Cancel	Click “OK” to save the settings of this page. Click “Cancel” to exit the setting page without saving.

- **Note 1: MS SQL Record Layout Format Horizontal Schematics**



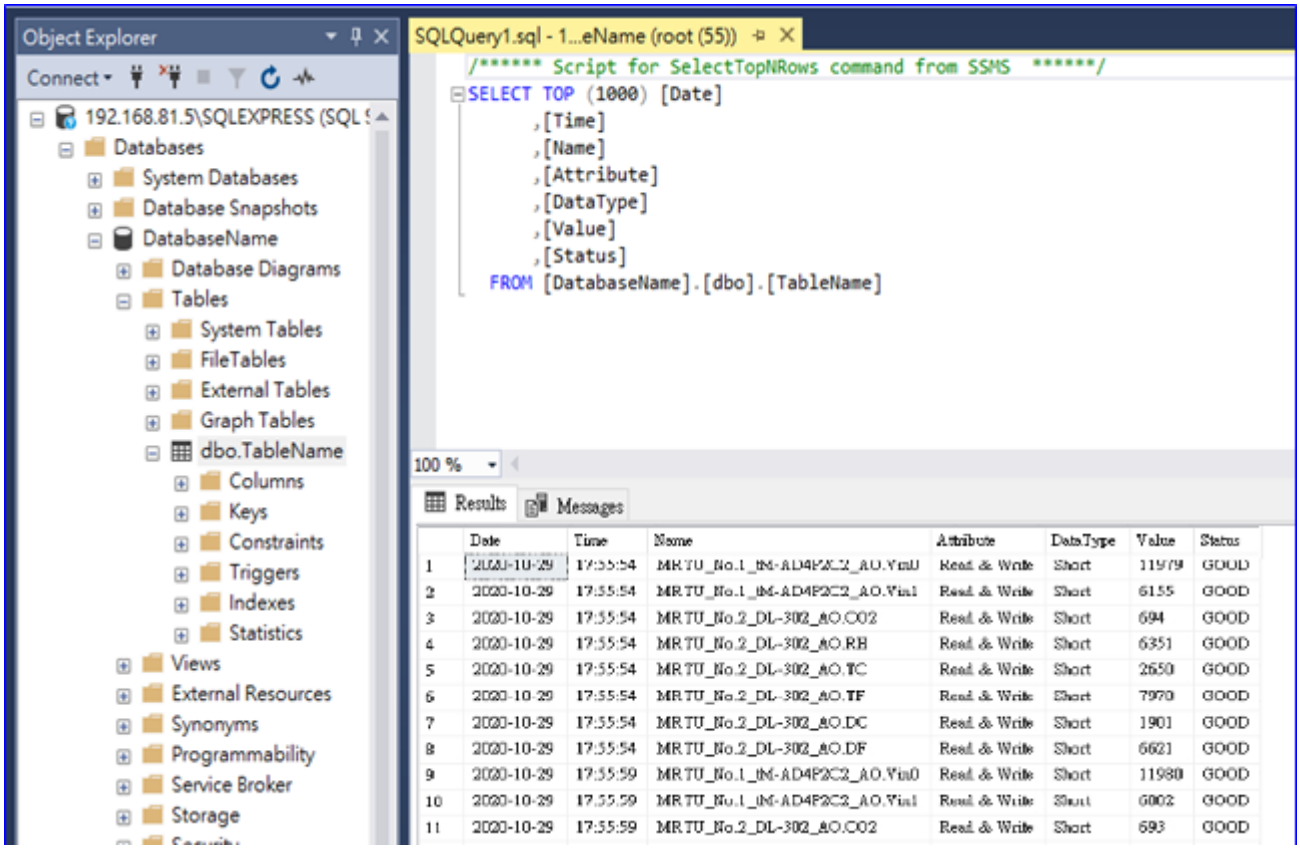
- **Note 2: MS SQL Remote Database Example Descriptions:**

Each tag data and status are recorded in each separate row, the row is added down for each interval, and the tag data is recorded in time sequence.

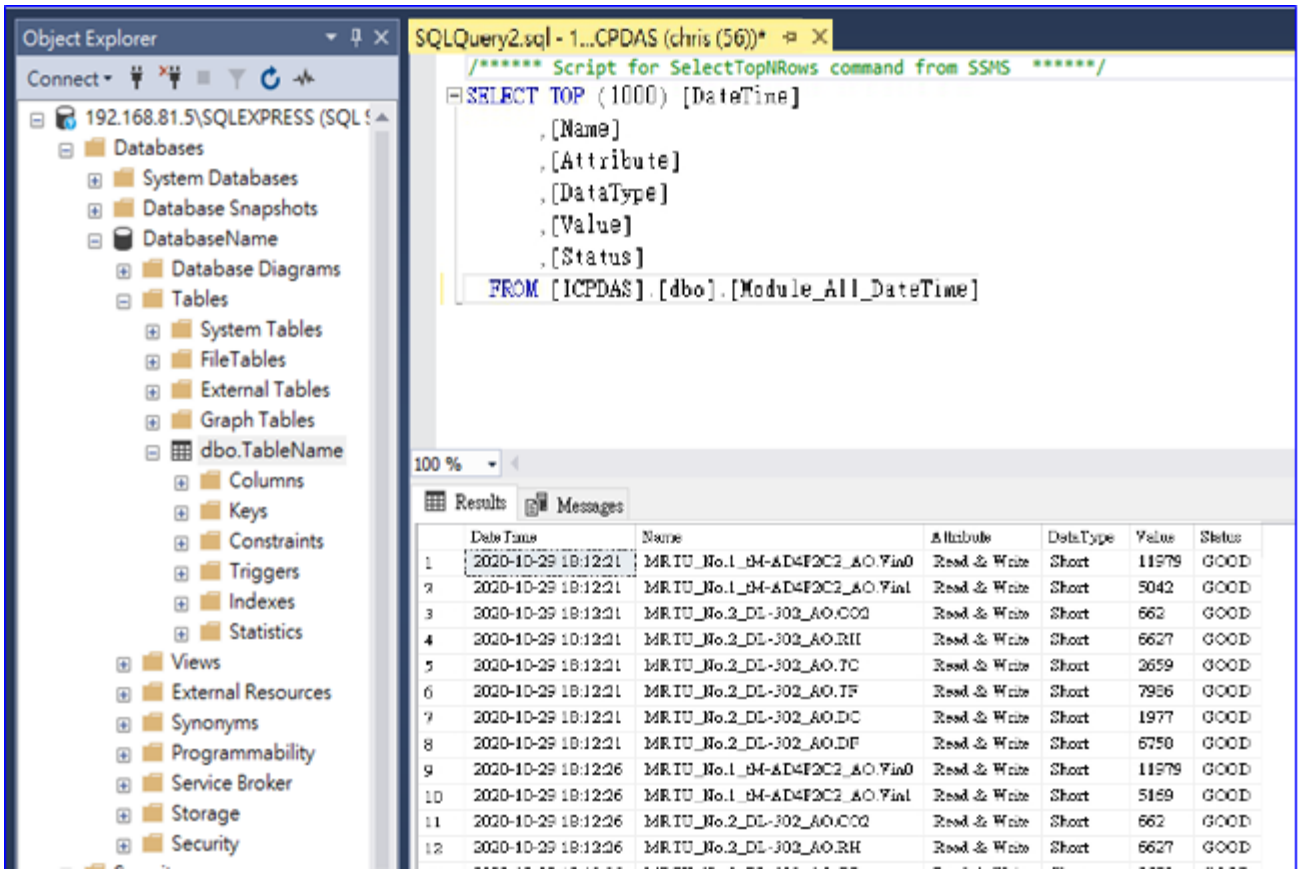
For database operation, please refer to **FAQ-Dev-001** of the **UA series FAQ list**:
FAQ-Dev-001 How to save the UA collected data into SQL and then show trend chart in InduSoft? (Take MS SQL 2017 Express as an example)

The connection screen view of the MS SQL Remote Database.

1. MS SQL database screen view: Date/Time column separated



2. MS SQL database screen view: Date/Time column combined

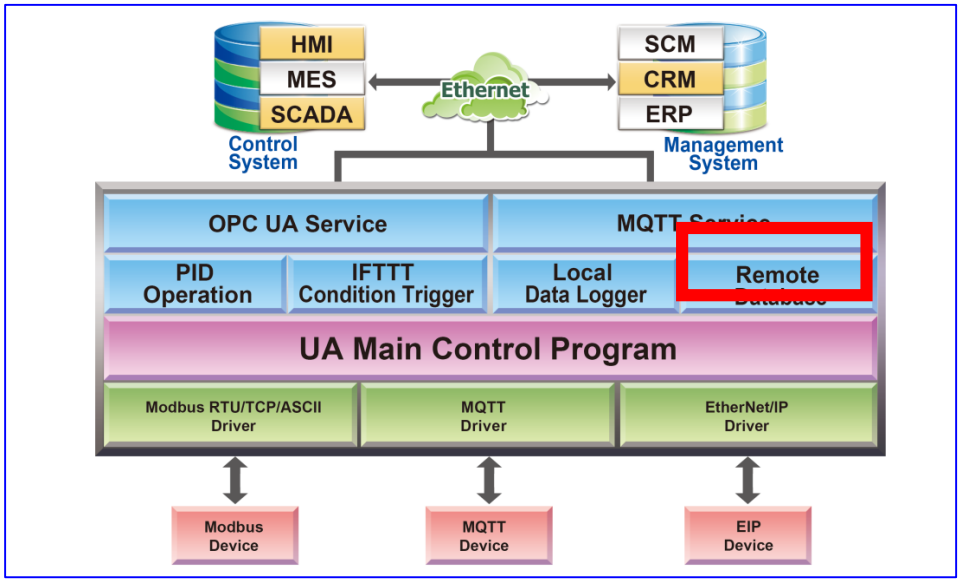


5.5.7 Data Logger: MySQL / MariaDB

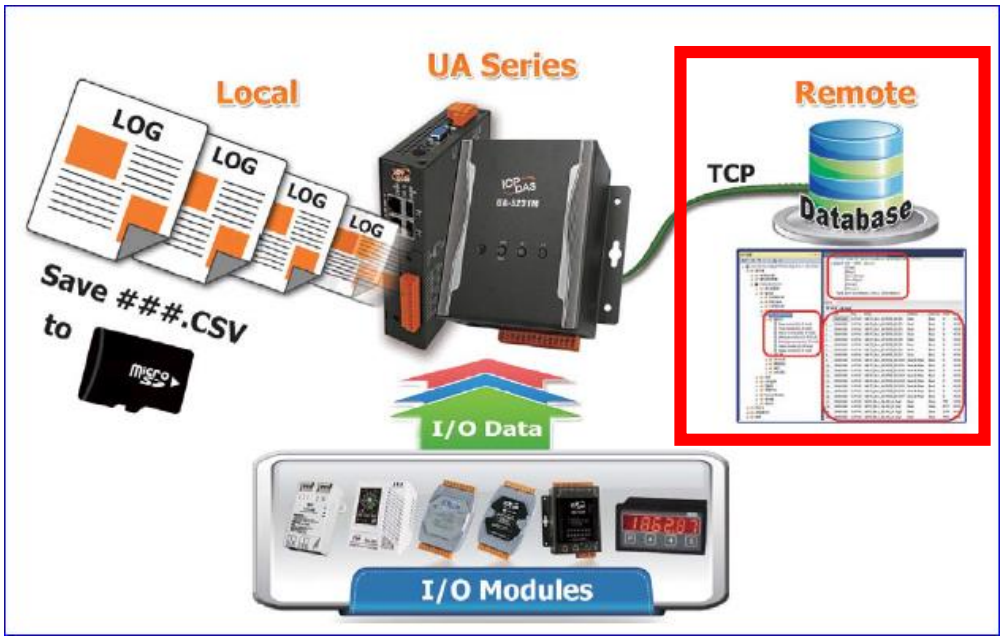
UA's: MySQL / MariaDB data logger function can automatically record I/O status at setting intervals, and write the data directly to remote MySQL and MariaDB databases.

This function is for setting the remote database connection. For the setting about the logger and module, please refer to Chapter 5.6.

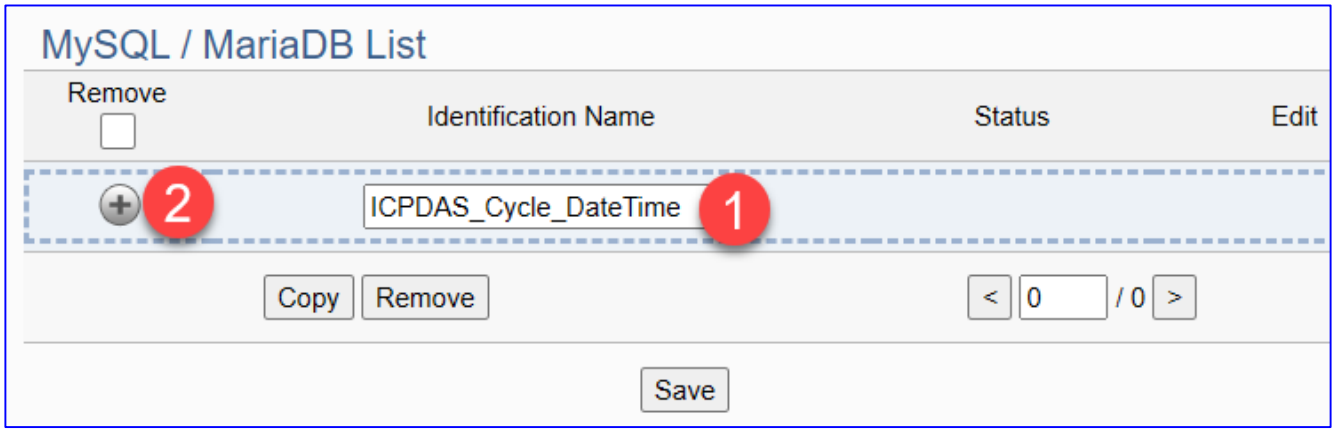
Function Diagram:

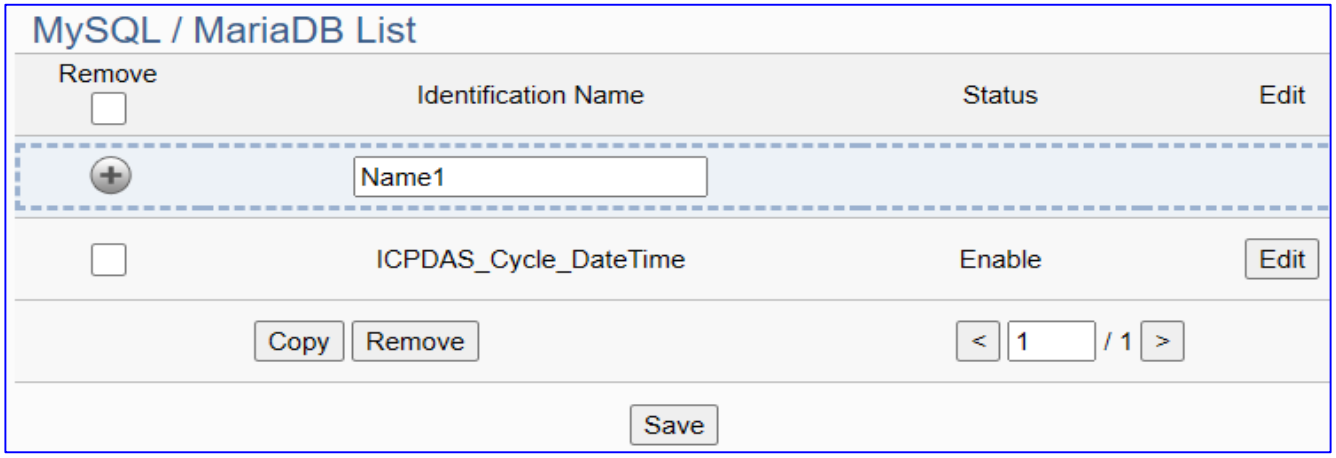


Application:



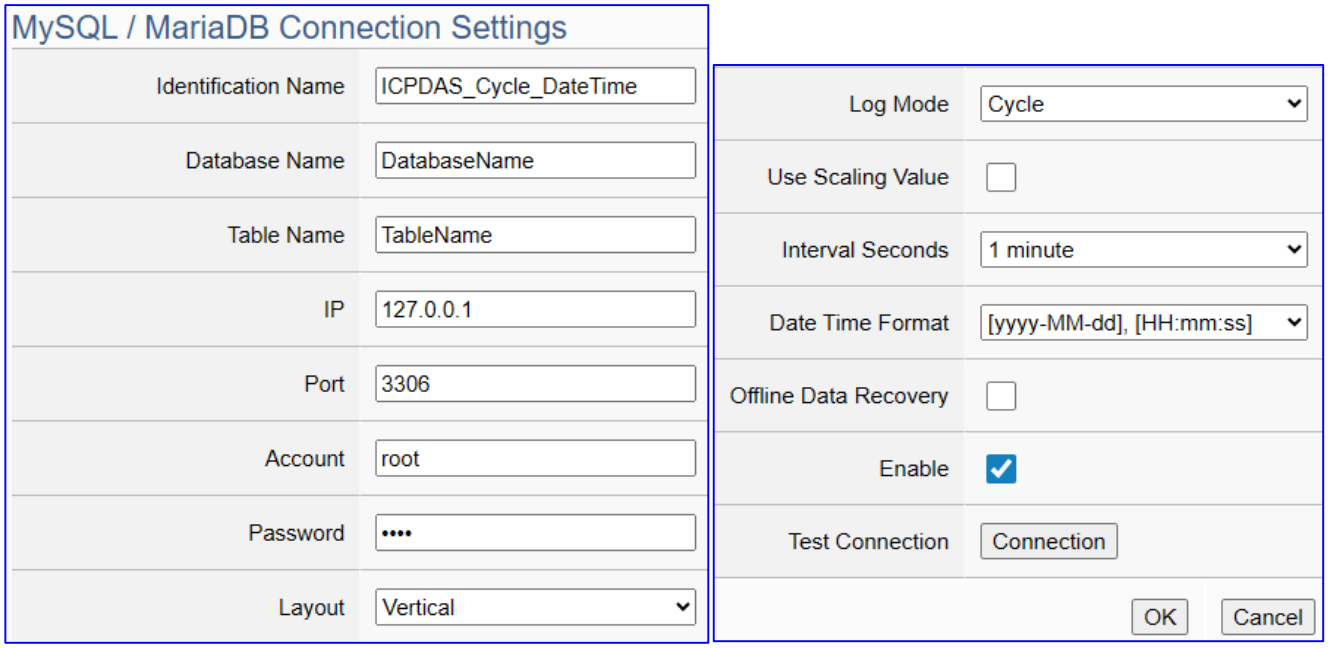
Enter the main menu **[Advanced Setting] > [Data Logger] > [MySQL/MariaDB]**, enter a name (e.g. "**ICPDAS_Cycle_DateTime**"), and click the plus sign to add a MySQL or DariaDB remote database list.





Advanced Setting > Data Logger > MySQL/MariaDB – MySQL/MariaDB List	
Remove	Check Remove box to remove all database connection in list. Check the box of each database and click the "Remove" button can remove just that database connection.
Identification Name	User defined name to identify the remote database. Default: Name.
Status	Display the status (Enable/Disable) of the database connection. Default: Enable.
⊕	Click to add a new remote database connection.
Edit	Click to enter the "Content Setting" page of the remote database.
Copy	Click the box of the list, then click 'Copy' to duplicate the DB settings. * Copy Quantity: 1 ~ 10. * Name suffix: Default add a suffix "_copy".
Remove	Click the box of the list, then click 'Remove' to delete the DB list.
< 1 / 1 >	The page number of the database list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

Click "Edit" to enter the "Remote database connect settings" page.



Advanced Setting > Data Logger > MySQL/MariaDB – Content Settings	
Identification Name	User defined name to identify the database.
Database Name	The name of the remote database. If it does not exist, it will add a new database with this name.
Table Name	The table name of the remote database. If it does not exist, it will add a new table with this name.
IP	The Server IP and name of the remote database.
Port	The port to connect with database. Default: 3306 (for MySQL/MariaDB)
Account	The login name of the remote database.
Password	The login password of the remote database.
Layout	Select Vertical or Horizontal layout formatting
Log Mode	**Cycle**: Record one log data at the interval time set below. **Cycle-Time Alignment**: Cycle mode with Time Alignment. Time Alignment is to align records time at the selected interval. It will record the first log at the beginning time. And will align other log times with multiples of the log interval (seconds, minutes, hours). For example, if the log interval is 5 seconds, the first log time is 13:01:04, and the following log records will be 13:01:05, 13:01:10, etc., the seconds being multiples of 5 seconds. **Data Change**: Only record when the data has changed.
Use Scaling Value	When checked, it will prefer to write the scaling value to the database (need to enable Scaling in the [Module Setting] first).
Interval Seconds	Set up the interval time to save the I/O data to the remote database. Unit: Second.
Date Time Format	Select to separate the date and time into two [Columns] or combine the date and time in one [Column].

Advanced Setting > Data Logger > MySQL/MariaDB – Content Settings	
Offline Data Recovery **(Appendix G)**	Check to enable the Offline Data Recovery. If the database is offline, UA will temporarily store the data in the SD card. When the connection is online, UA will retrieve the data from the SD card and re-sent it to the database. (Default: unchecked)
Enable	Check to enable the data logger to the remote database. Default: check.
Test Connection	Click to test the connection to the remote database. Result: Success or Failure.
OK / Cancel	Click “OK” to save the settings of this page. Click “Cancel” to exit the setting page without saving.

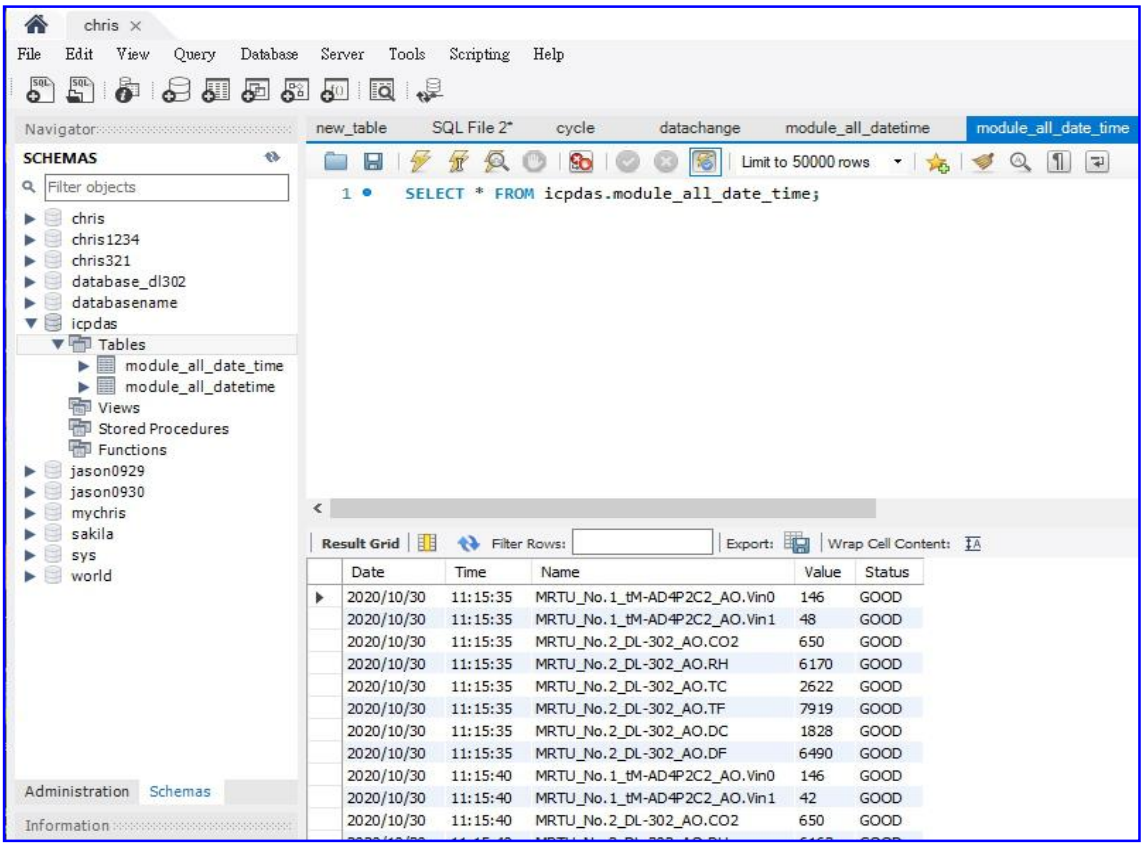
- **MySQL/MariaDB Remote Database Example Descriptions:**

Each tag data and status are recorded in each separate row, the row is added down for each interval, and the tag data is recorded in time sequence.

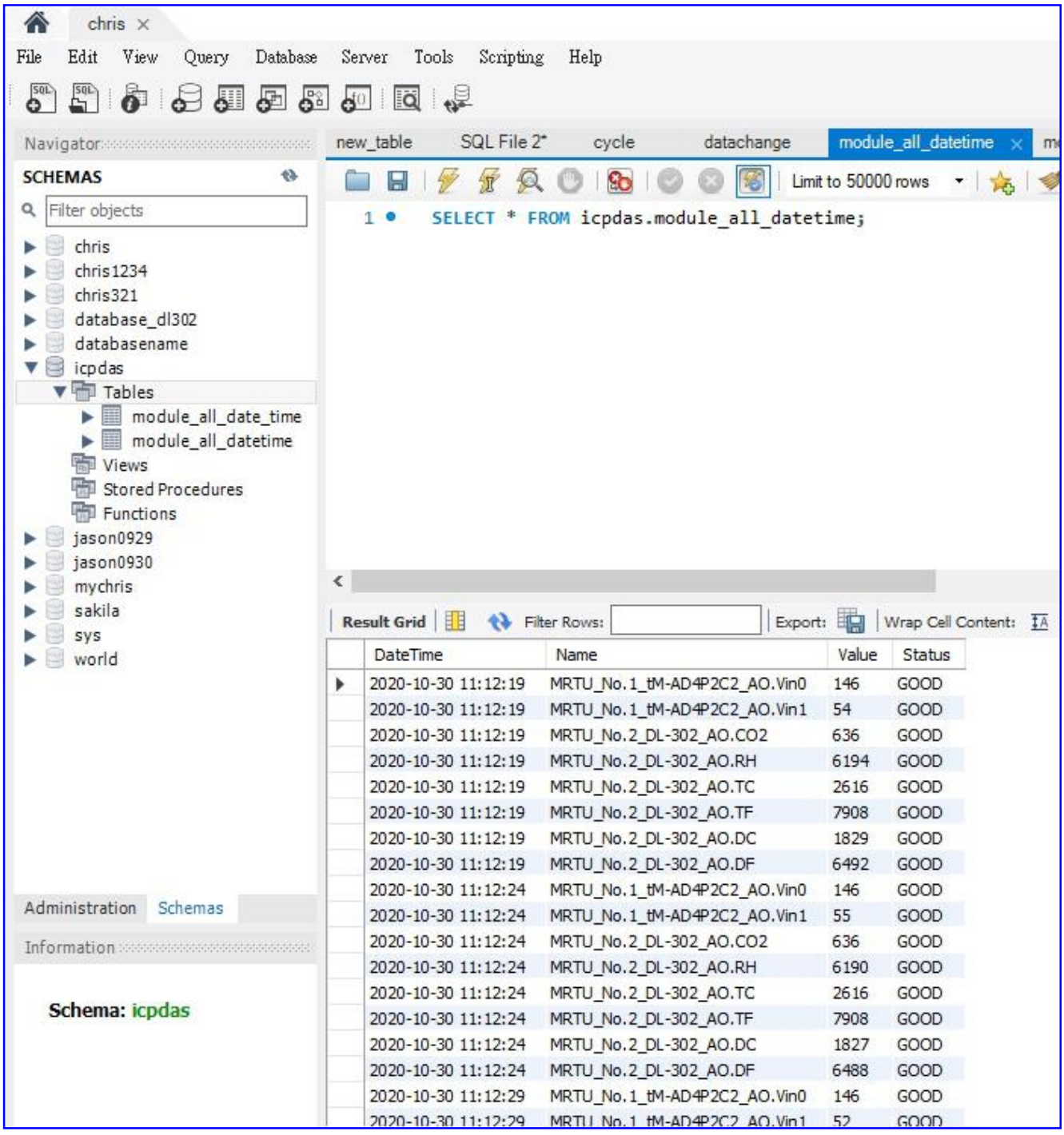
For database operation, please refer to **FAQ-Dev-002 (MySQL)** of the **UA series FAQ list**:
FAQ-Dev-002_How to save the UA collected data into SQL and then show trend chart in InduSoft? (Take MySQL Installer 5.7.31 as an example)

The connection screen view of the **MySQL Remote Database**.

1. MySQL database screen view: Date/Time column separated (reference)



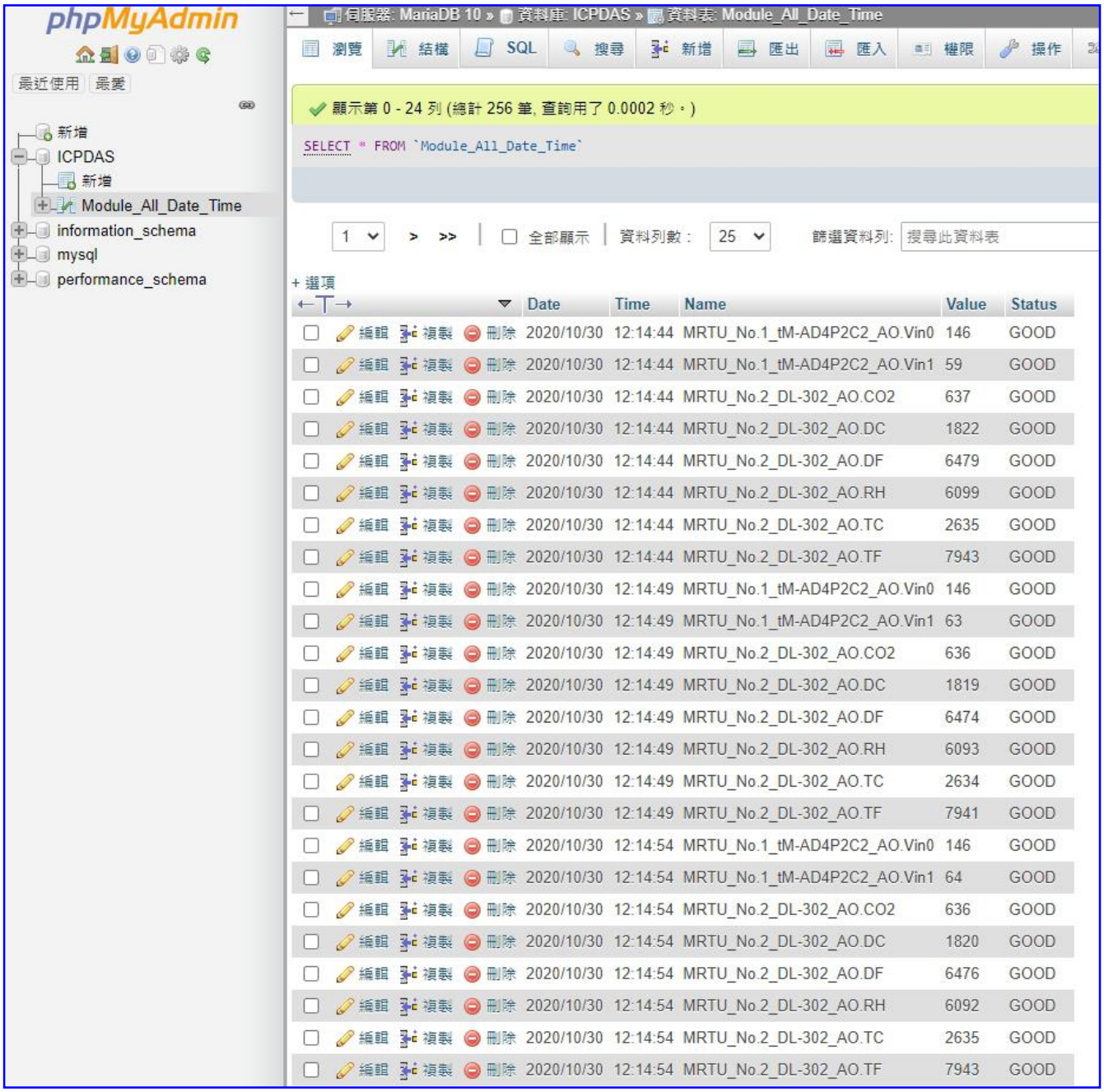
2. MySQL database screen view: Date/Time column combined (reference)



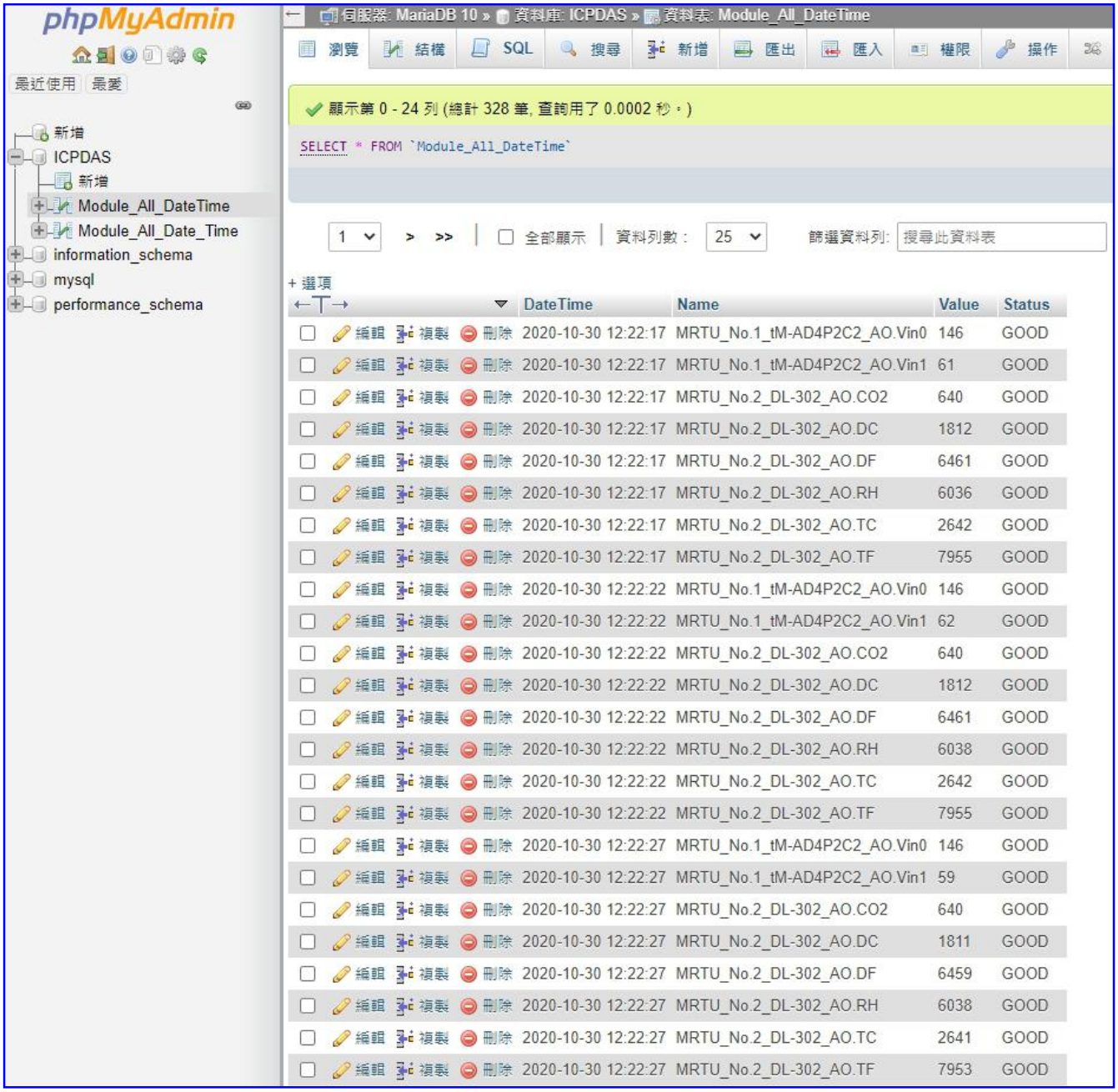
DateTime	Name	Value	Status
2020-10-30 11:12:19	MRTU_No.1_tM-AD4P2C2_AO.Vin0	146	GOOD
2020-10-30 11:12:19	MRTU_No.1_tM-AD4P2C2_AO.Vin1	54	GOOD
2020-10-30 11:12:19	MRTU_No.2_DL-302_AO.CO2	636	GOOD
2020-10-30 11:12:19	MRTU_No.2_DL-302_AO.RH	6194	GOOD
2020-10-30 11:12:19	MRTU_No.2_DL-302_AO.TC	2616	GOOD
2020-10-30 11:12:19	MRTU_No.2_DL-302_AO.TF	7908	GOOD
2020-10-30 11:12:19	MRTU_No.2_DL-302_AO.DC	1829	GOOD
2020-10-30 11:12:19	MRTU_No.2_DL-302_AO.DF	6492	GOOD
2020-10-30 11:12:24	MRTU_No.1_tM-AD4P2C2_AO.Vin0	146	GOOD
2020-10-30 11:12:24	MRTU_No.1_tM-AD4P2C2_AO.Vin1	55	GOOD
2020-10-30 11:12:24	MRTU_No.2_DL-302_AO.CO2	636	GOOD
2020-10-30 11:12:24	MRTU_No.2_DL-302_AO.RH	6190	GOOD
2020-10-30 11:12:24	MRTU_No.2_DL-302_AO.TC	2616	GOOD
2020-10-30 11:12:24	MRTU_No.2_DL-302_AO.TF	7908	GOOD
2020-10-30 11:12:24	MRTU_No.2_DL-302_AO.DC	1827	GOOD
2020-10-30 11:12:24	MRTU_No.2_DL-302_AO.DF	6488	GOOD
2020-10-30 11:12:29	MRTU_No.1_tM-AD4P2C2_AO.Vin0	146	GOOD
2020-10-30 11:12:29	MRTU_No.1_tM-AD4P2C2_AO.Vin1	52	GOOD

The connection screen view of the **MariaDB Remote Database**.

1. MariaDB database screen view: Date/Time column separated (reference)



2. MariaDB database screen view: Date/Time column combined (reference)

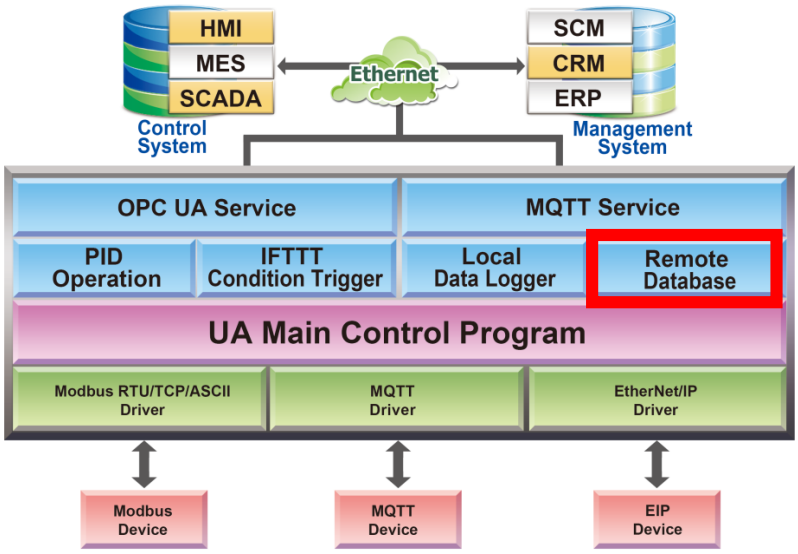


5.5.8 Data Logger: PostgreSQL

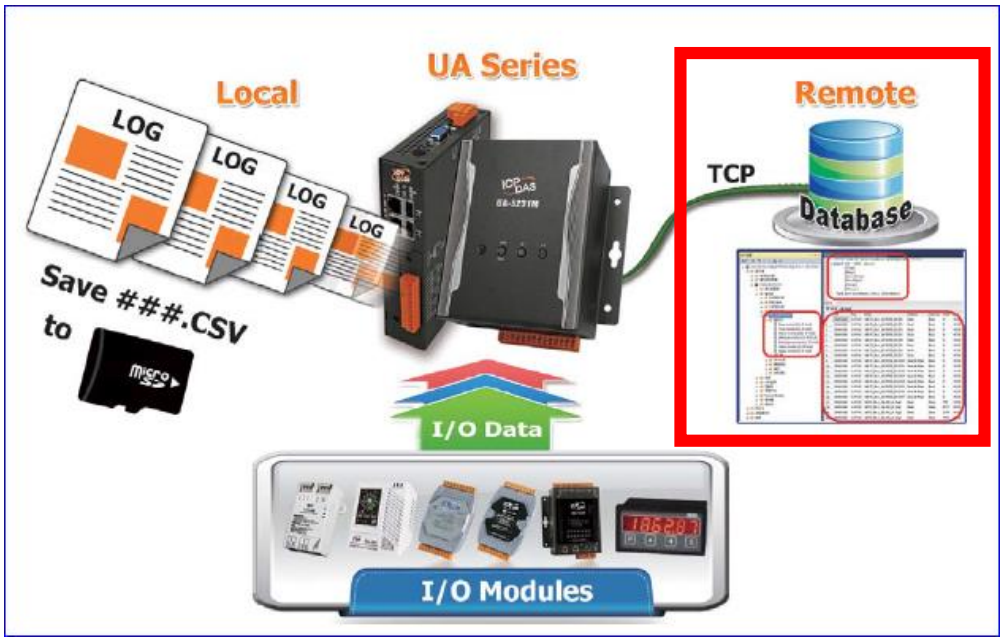
UA's PostgreSQL data logger function can automatically record I/O status at setting intervals, and write the data directly to remote PostgreSQL databases.

This function is for setting the remote database connection. For the setting about the logger and module, please refer to Chapter 5.6.

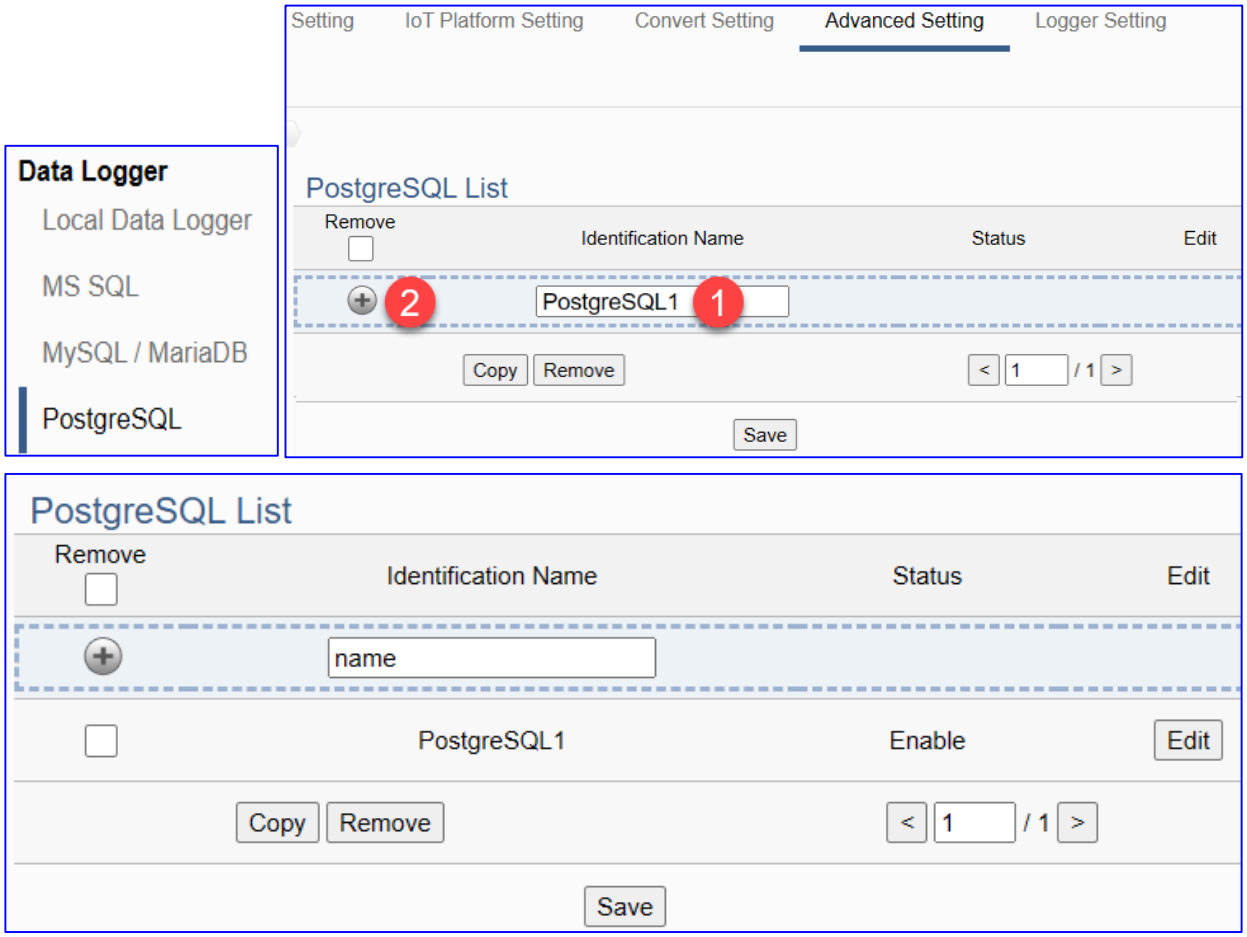
Function Diagram:



Application:

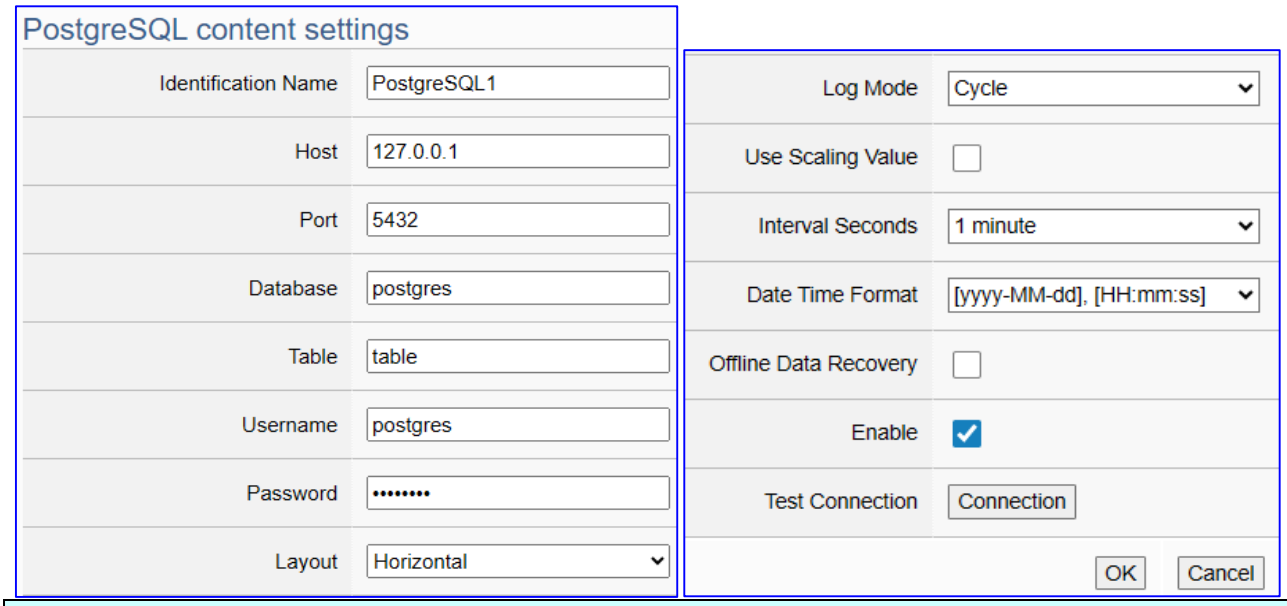


Enter the main menu **[Advanced Setting] > [Data Logger] > [PostgreSQL]** screen, enter a Name (e.g. "**PostgreSQL1**"), and click the plus sign to add a MS SQL remote database list as below.



Advanced Setting > Data Logger > PostgreSQL List	
Remove	Check Remove box to remove all database connection in list. Check the box of each database and click the "Remove" button can remove just that database connection.
Identification Name	User defined name to identify the remote database. Default: Name.
Status	Display the status (Enable/Disable) of the database connection. Default: Enable.
	Click to add a new remote database connection.
Edit	Click to enter the "Content Setting" page of the remote database.
Copy	Click the box of the list, then click 'Copy' to duplicate the DB settings. * Copy Quantity: 1 ~ 10. * Name suffix: Default add a suffix "_copy".
Remove	Click the box of the list, then click 'Remove' to delete the DB list.
< 1 / 1 >	The page number of the database list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

Click "Edit" to enter the "PostgreSQL content settings" page.



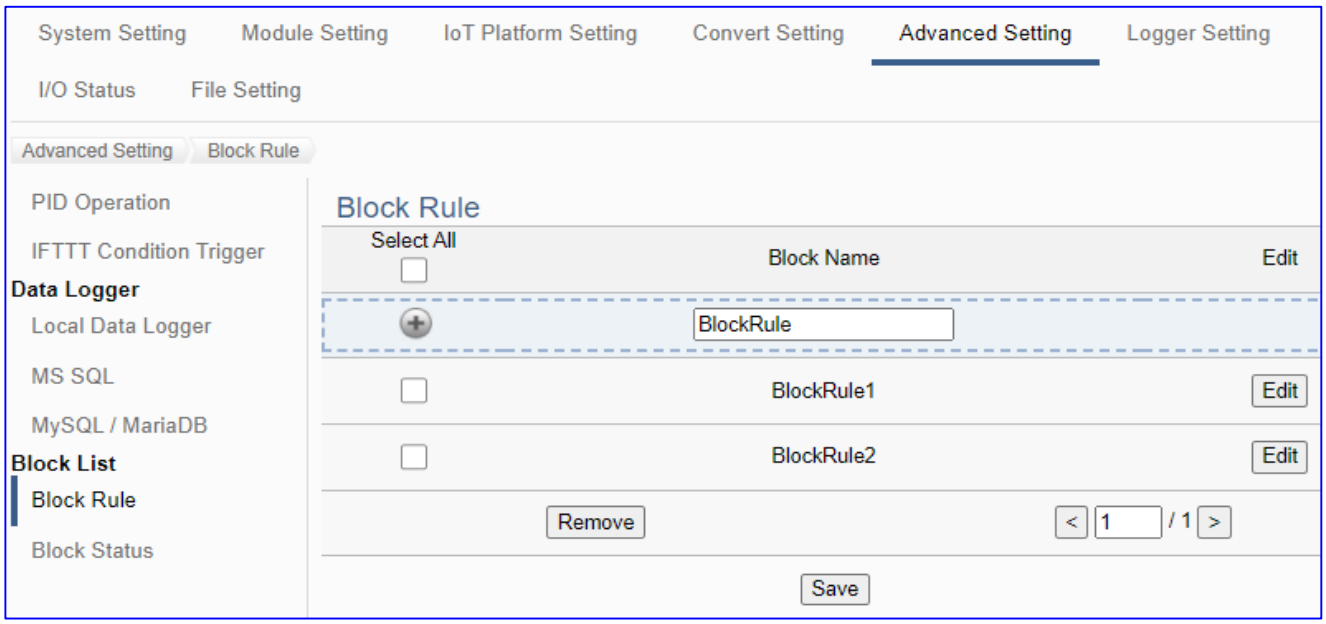
Advanced Setting > Data Logger > PostgreSQL – Content Setting	
Identification Name	User defined name to identify the database.
Host	The IP of the remote database.
Port	The port to link with database. Default: 5432 (for PostgreSQL)
Database	The name of the remote database. If not exist, It will create one.
Table	The table name of the remote DB. If not exist, It will create one.
Username/Password	The login name and password of the remote database.
Layout	Horizontal
Log Mode	**Cycle**: Record one log data at the interval time. **Cycle-Time Alignment**: Cycle mode with **Time Alignment**. To align records time at the selected interval. It will record the first log at the beginning time. And will align other log times with multiples of the log interval (seconds, minutes, hours).
Use Scaling Value	When checked, it will prefer to write the scaling value to the database (need to enable Scaling in the [Module Setting] first).
Interval Seconds	Set up the interval time to save the I/O data to the remote database. Unit: Second.
Date Time Format	Select to separate the date and time into two [Columns] or combine the date and time in one [Column].
Offline Data Recovery **(Appendix G)**	Check to enable the Offline Data Recovery. If the database is offline, UA will temporarily store the data in the SD card. When the connection is online, UA will retrieve the data from the SD card and re-sent it to the database. (Default: unchecked)
Enable	Enable the data logger to the remote database. Default: check.
Test Connection	Click to test the connection to the remote database. Result: Success or Failure.
OK / Cancel	Click “OK” to save the settings of this page. Click “Cancel” to exit the setting page without saving.

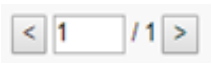
5.5.9 Block List: Block Rule

UA supports a dynamic block list function for information security. This function can set up the rules to block IP connections. When the conditions have met the rules, the system can add the IP to the block list and block it through the firewall. It also provides the IP situation of the block list and the function to unblock the current blocked IP.

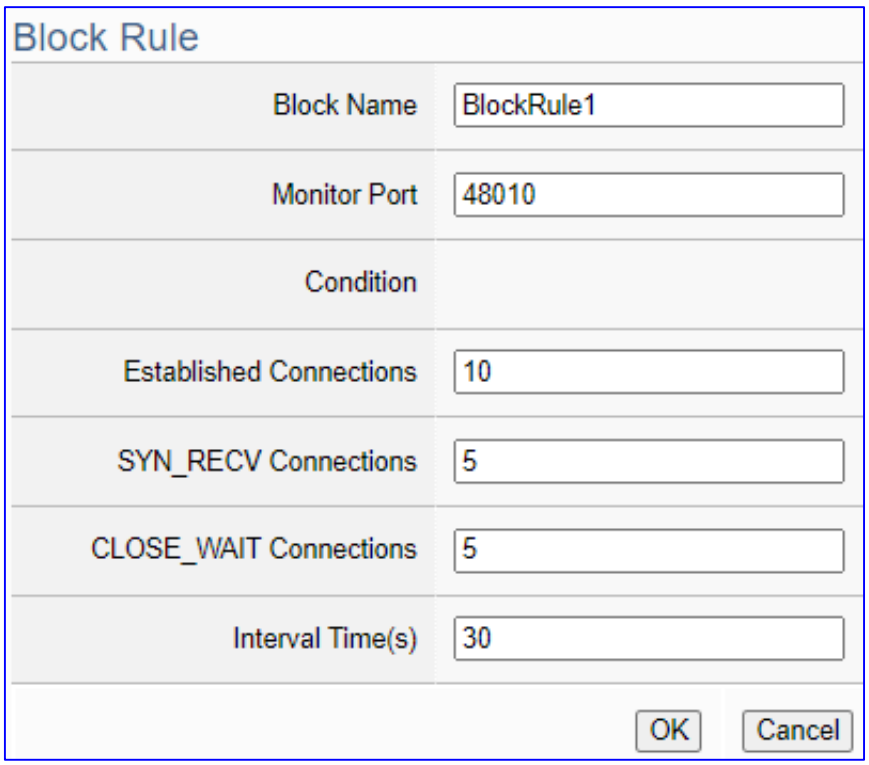
The Block List function includes: Block Rule (this section) and Block Status (next section).

Enter the menu [Advanced Setting] > [Block List] - [Block Rule], the screen is as follows.



Advanced Setting > Block List > Block Rule – Block Rule	
Select All 	Check “Select All” box can select all block rules in the list. Check the box of each list can select one list, and click the “Remove” button can remove just that rule.
Block Name	User defined name to identify the block rules. Default: BlockRule.
	Click  can add a new Block Name, and then click the [Edit] to set up the Block Rule
Edit	Click the [Edit] button to edit the block rules.
Remove	Check the box of the list and click the “Remove” button can remove that rule.
	The page number of the list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

Click the [Edit] button of the Block List to edit the block rules.



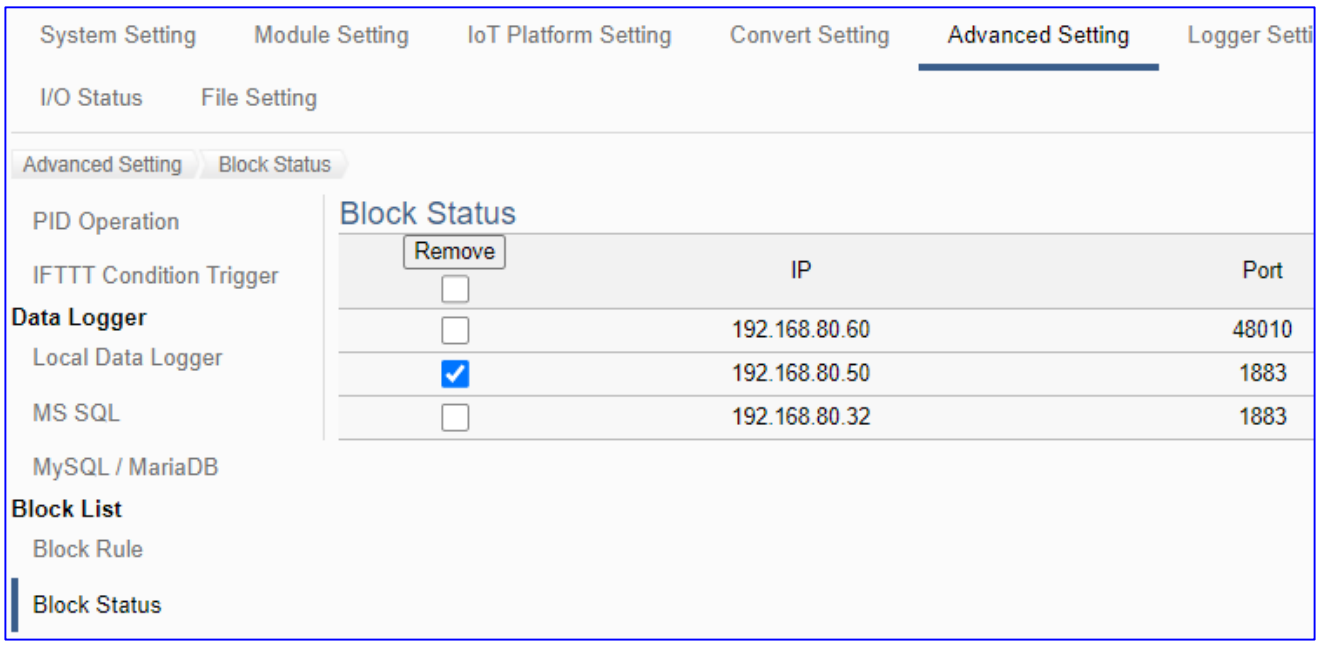
Advanced Setting > Block List > Block Rule – Block Rule (Edit)	
Block Name	Set the Block Rule Name
Monitor Port	Set the number of the monitor port
Condition	Set and check the connection status threshold and the interval for the IP block list of the monitoring port.
Established Connections	The threshold for established connections
SYN_RECV Connections	The threshold for SYN_RECV connections
CLOSE_WAIT Connections	The threshold for CLOSE_WAIT connections
Interval Time(s)	Set the interval time to check (in seconds)
OK / Cancel	Click [OK] to save the settings of this page, and exit. Click [Cancel] to exit this page but do not save the settings.

5.5.10 Block List: Block Status

UA supports a dynamic block list function for information security. This function can set up the rules to block IP connections. When the conditions have met the rules, the system can add the IP to the block list and block it through the firewall. It also provides the IP situation of the block list and the function to unblock the current blocked IP.

The Block List function includes: Block Rule (previous section) and Block Status (this section).

Enter the menu [Advanced Setting] > [Block List] - [Block Status], the screen is as follows.

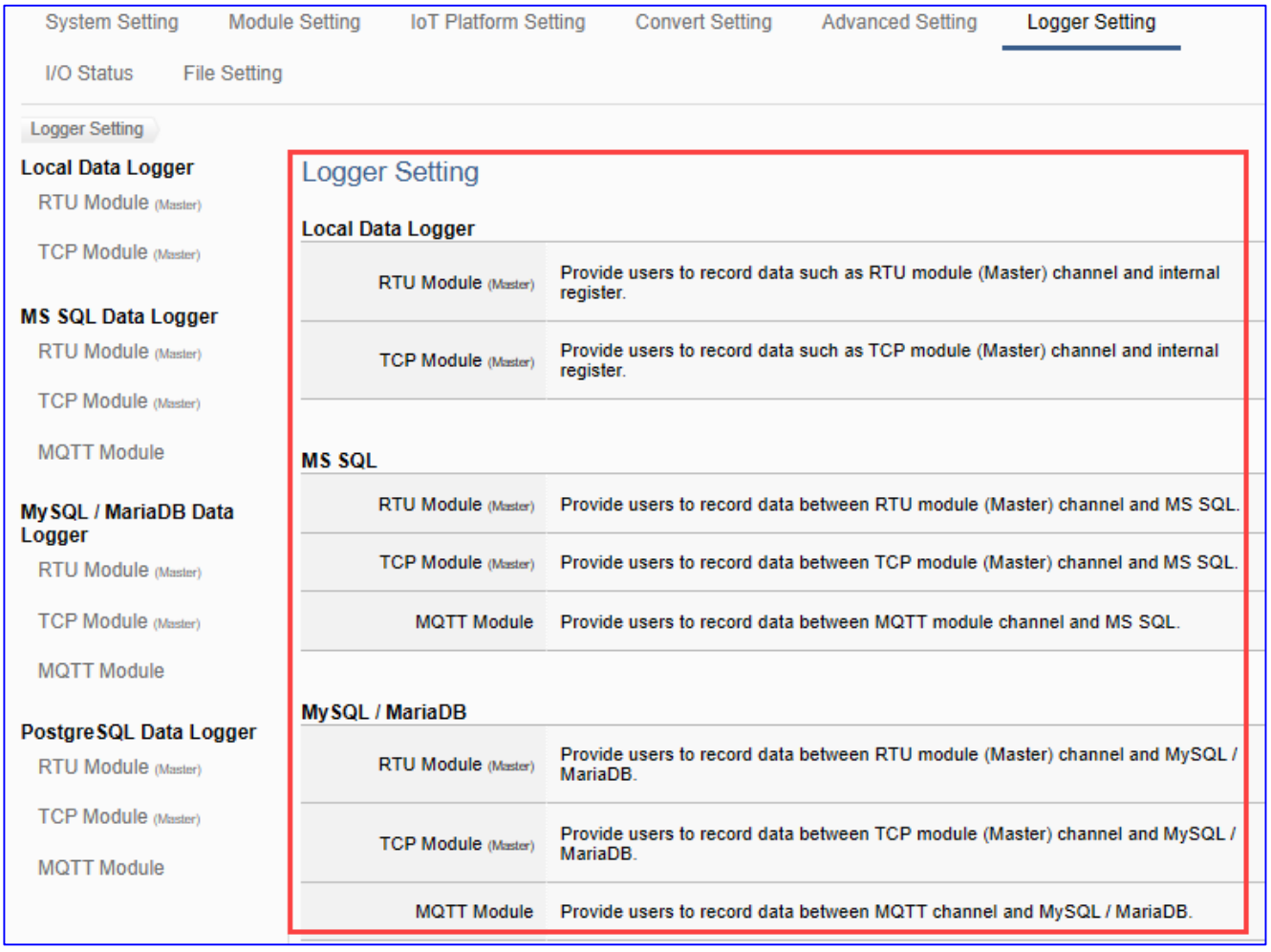


Advanced Setting > Block List > Block Status – Block Status	
IP	Display the blocked IP and port number of the block list. Can remove the blocked IP from the block list via the "Remove" button.
Port	
Remove	Check the box of the list and click the “Remove” button can remove the IP from the Block List.

5.6 Main Menu: Logger Setting

Logger Setting is the 6th item of the Main Menu, mainly to provide the data logger and the connecting modules related settings.

"Logger Setting" provides "Local Data Logger", "MS SQL", "MySQL/MariaDB", and "PostgreSQL", and all have RTU/TCP or MQTT module setting items. The Local Data Logger allows users to record data such as RTU/TCP module (Master) channel data into Local CSV log files of the microSD card in UA. Other Remote Databases provides users with the ability to record data between RTU/TCP module (Master) or MQTT channel data directly into a remote database, such as SQL DB.



The setting for UA series controllers is to set up from the left to the right of the main menu functions. User can find the setting step and Web UI information in the following chapters.

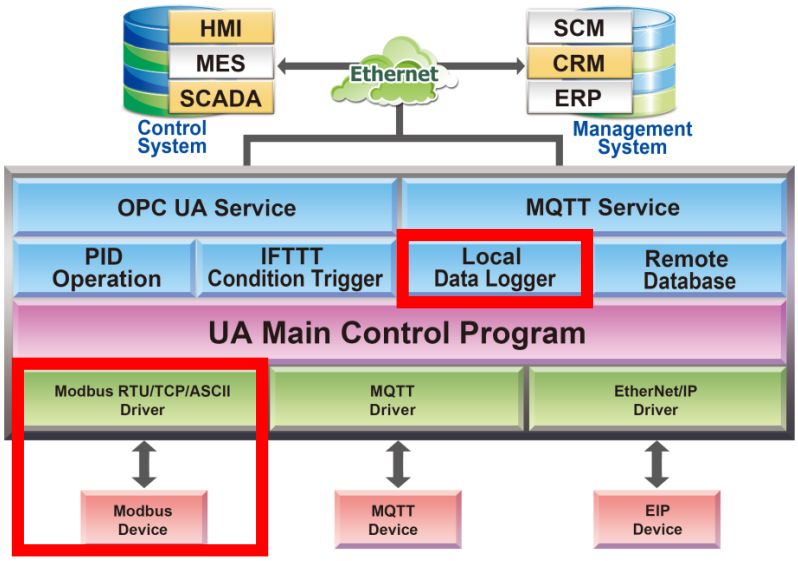
CH2 Quick Start 1: Hardware/Network Connection
CH3 Quick Start 2: Web UI / Setting Steps
CH4 Function Wizard: Project Quick Setup

5.6.1 Local Data Logger: RTU / TCP Module (Master)

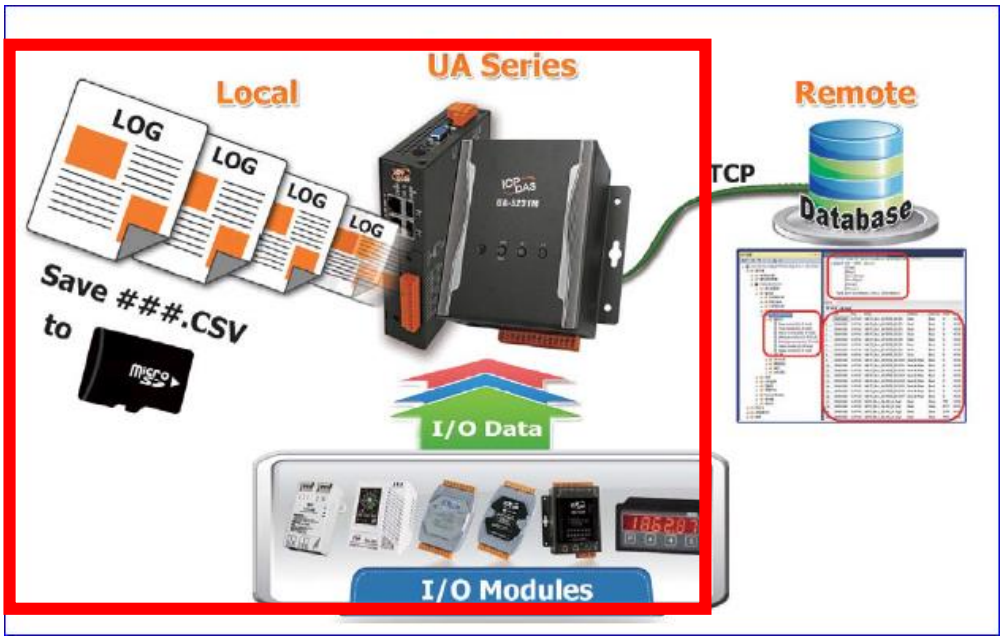
"Local Data Logger" of "Logger Setting" provides users to record I/O log data of the connecting RTU/TCP module (Master) into the local microSD card.

This function is for setting the local data logger and the RTU/TCP modules, using "RTU" module setting as an example. For the setting about the logger and microSD card, please refer to Chapter 5.5.5.

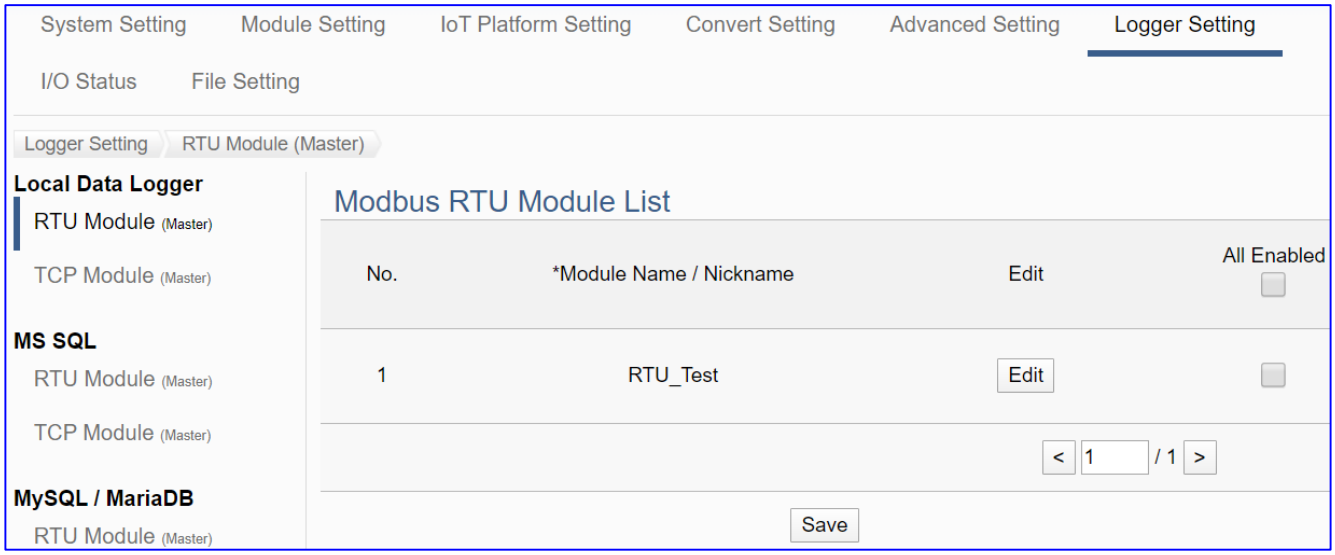
Function Diagram:



Application:



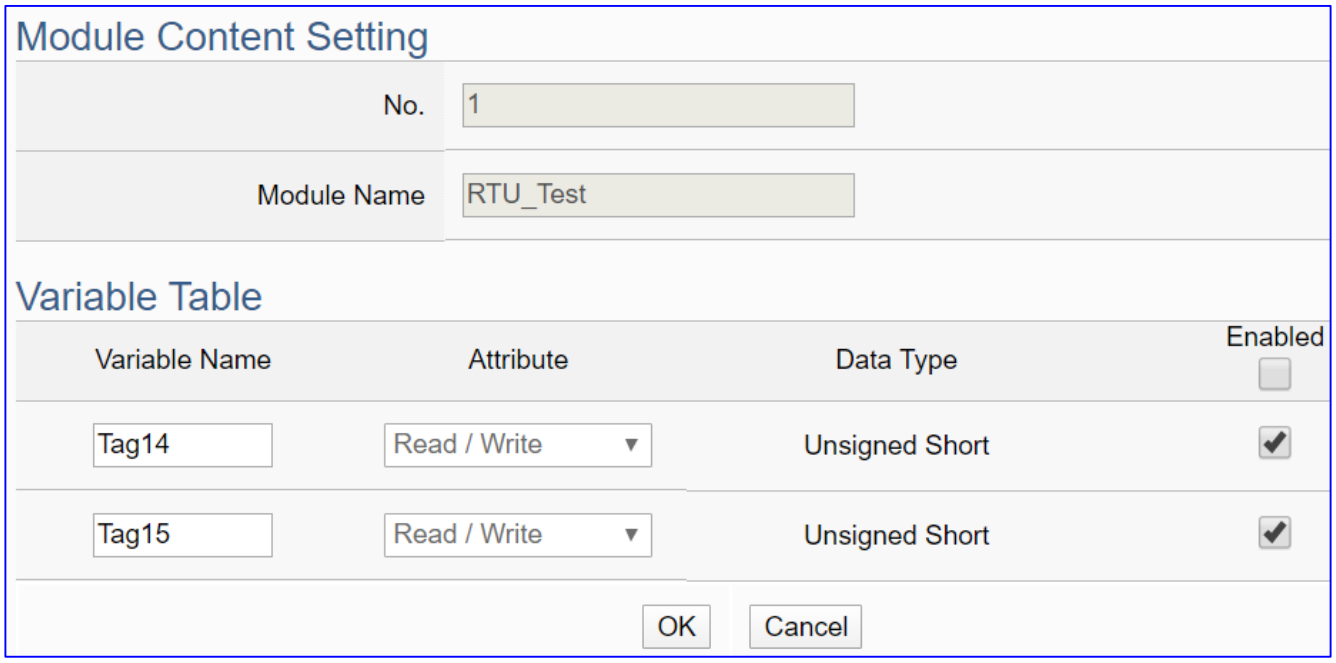
Enter the main menu [Logger Setting] > [Local Data Logger] > [RTU Module (Master)].
This setting page is to enable the module(s) or I/O channels for data logger.



Logger Setting > Local Data Logger - RTU Module (Master) – Modbus Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
Edit	If user wants to enable some I/O channels for data logger, click [Edit] of that module to enter the “Variable Tale” setting. It is normal to set all channels as enabled, and the conversion will not affect the unconnected channels.
All Enabled Enable	Check [All Enabled] box to enable all modules in list for data logger. Default: Uncheck. Check the box of each module can enable just that module for data logger.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

This function is to enable the module for data logger, please check the box of the module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.

The “Module Content Setting” page after clicking the [Edit] button:



Logger Setting > Local Data Logger > RTU Module (Master) – Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Logger Setting > OPC UA > Modbus RTU (Master) – Variable Table	
Variable Name	Display the variable name that set in the Modbus Address Mapping Table page (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for data logger. Default: Uncheck.
OK	Click to save this page settings and back to the module list page.

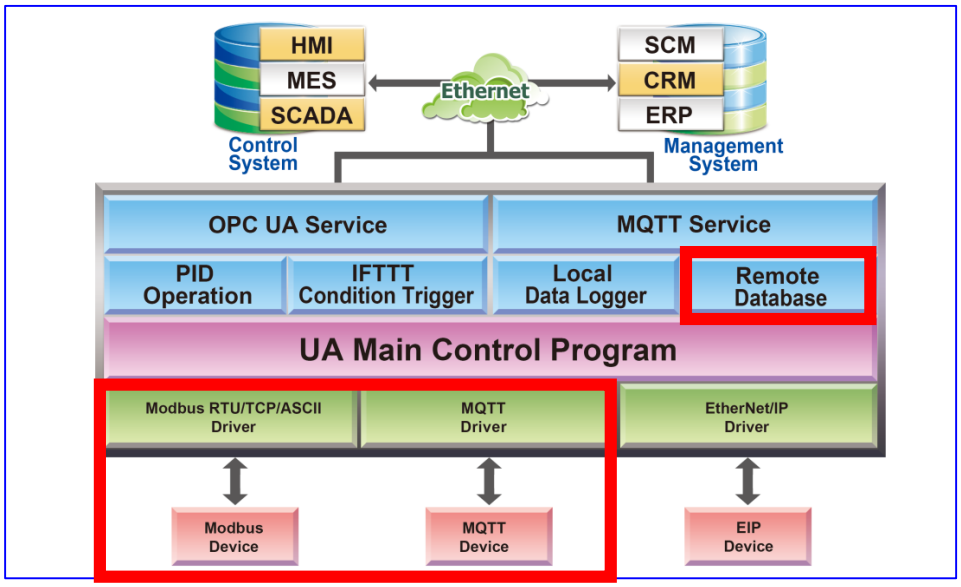
When complete the setting, click [OK] to save this page settings and back to the module list page. Remember to click [Save] to save the Convert Setting.

5.6.2 MS SQL Data Logger: RTU / TCP / MQTT Module

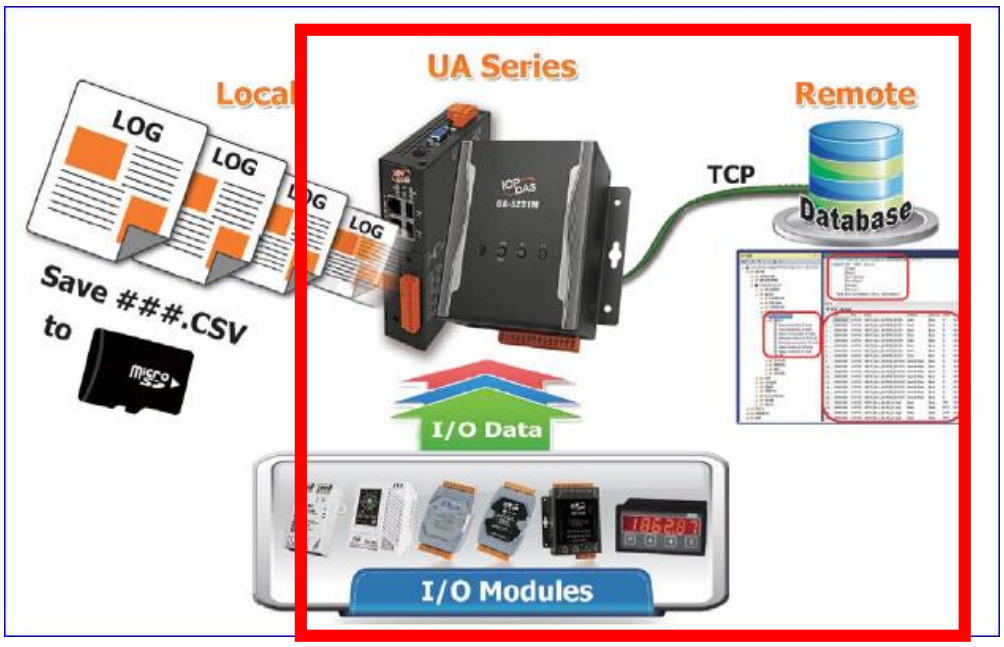
"MS SQL Data Logger" of "Logger Setting" provides users to record I/O log data of the connecting RTU/TCP/MQTT module (Master) into the MS SQL remote database.

This function is for setting the remote data logger and the RTU/TCP modules, using "**TCP module**" setting as an example. For the setting about the MS SQL data logger, please refer to Chapter 5.5.6.

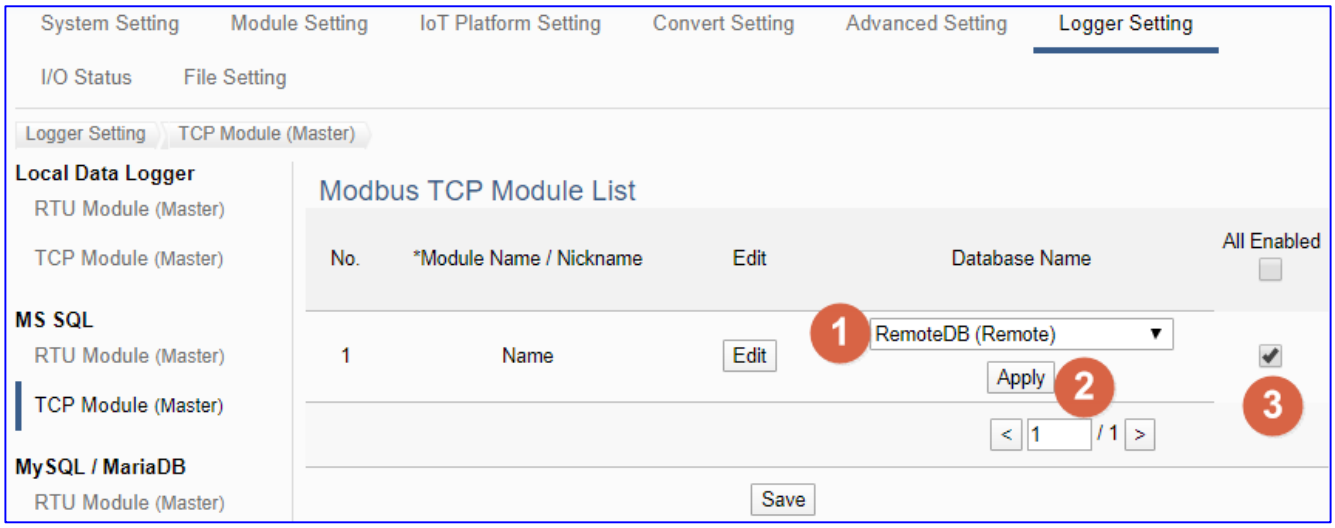
Function Diagram:



Application:

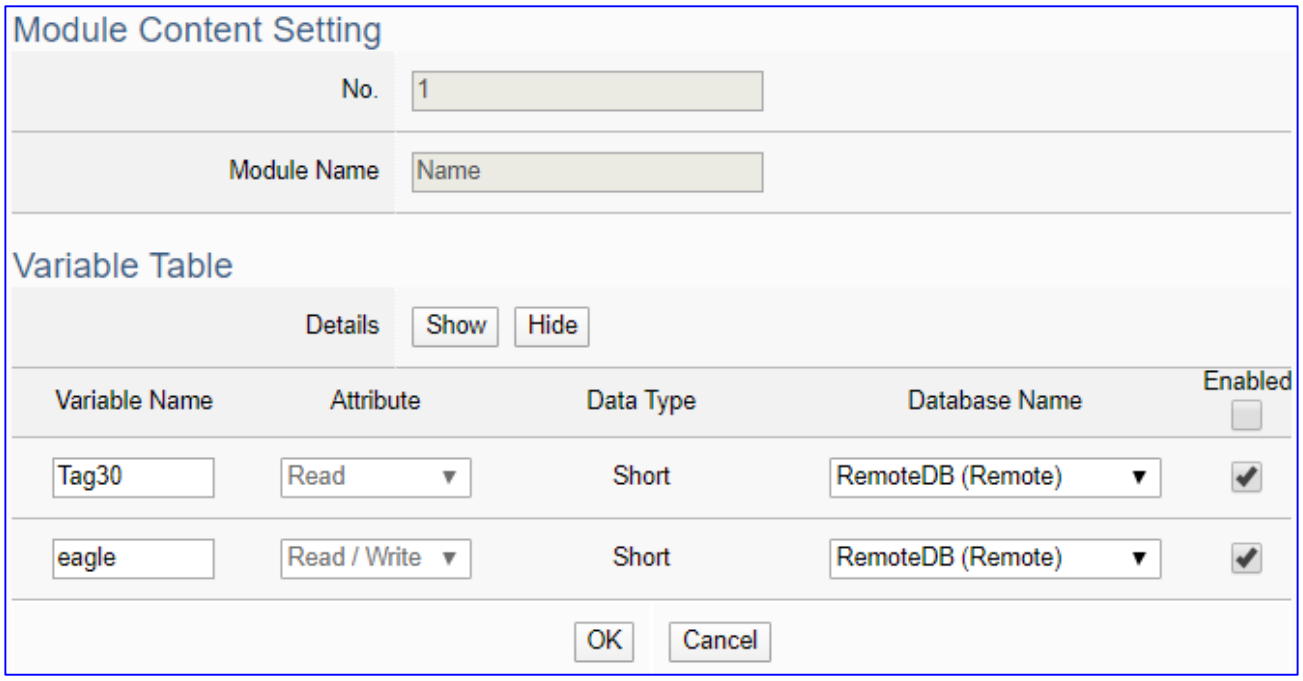


Enter the main menu [Logger Setting] > [MS SQL] > [TCP Module (Master)], e.g. the remote database Name as below.



Logger Setting > MS SQL - TCP Module (Master) > Modbus TCP Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
Edit	If user wants to enable some I/O channels for data logger, click [Edit] of that module to enter the “Variable Tale” setting. It is normal to set all channels as enabled, and the conversion will not affect the unconnected channels.
Database Name Apply	Select the database name set in the “MS SQL” of the “Advanced Setting”. Click “Apply” (Text color will change from black to gray).
All Enabled Enabled	Check [All Enabled] box to enable all modules in list for data logger. Default: Uncheck. Check the box of each module can enable just that module for data logger.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

First select [Database name] and click [Apply] button, and check the enable box of the module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.



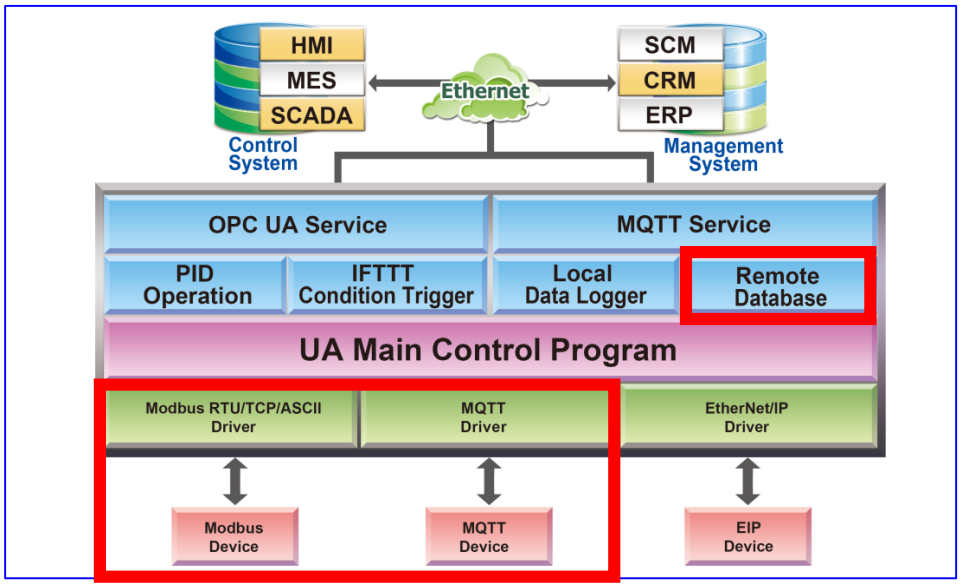
Logger Setting > MS SQL > TCP Module (Master) – Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Logger Setting > MS SQL > TCP Module (Master) – Variable Table	
Variable Name	Display the variable name that set in the Modbus Address Mapping Table page (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Database Name	Display the database name select in previous setting page. (Not editable here)
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK / Cancel	Click “OK” to save this page settings and back to the module list page. Click “Cancel” to leave this page without save.

5.6.3 MySQL / MariaDB Data Logger: RTU / TCP / MQTT Module

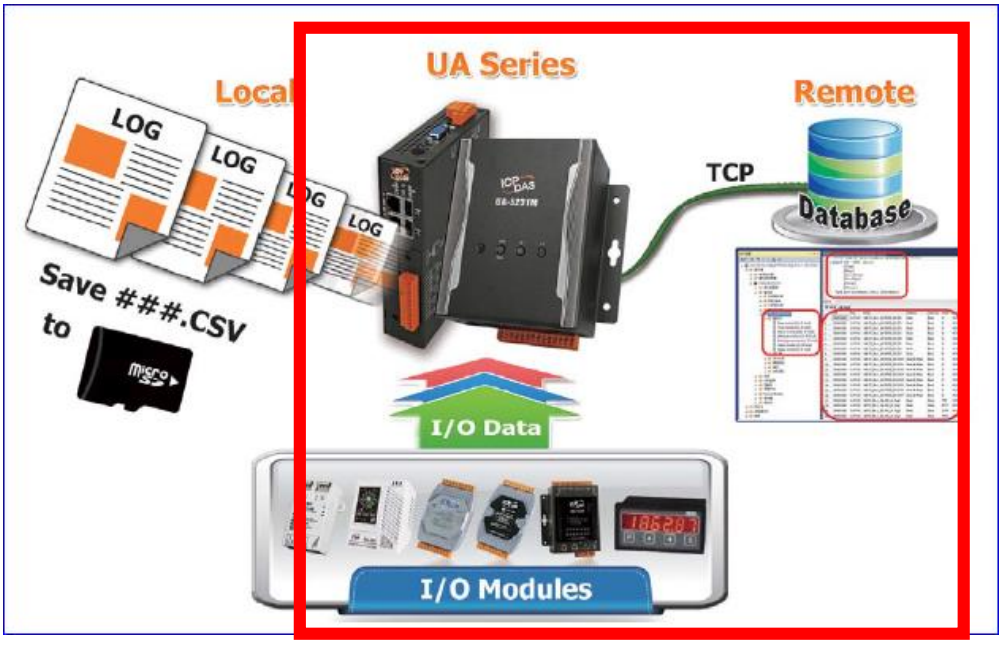
"MySQL / MariaDB Data Logger" of "Logger Setting" provides users to record I/O log data of the connecting RTU/TCP/MQTT module (Master) into the MySQL / MariaDB remote database.

This function is for setting the remote data logger and the RTU/TCP modules, using "**RTU module**" setting as an example. For the setting about the MySQL / MariaDB data logger, please refer to Chapter 5.5.7.

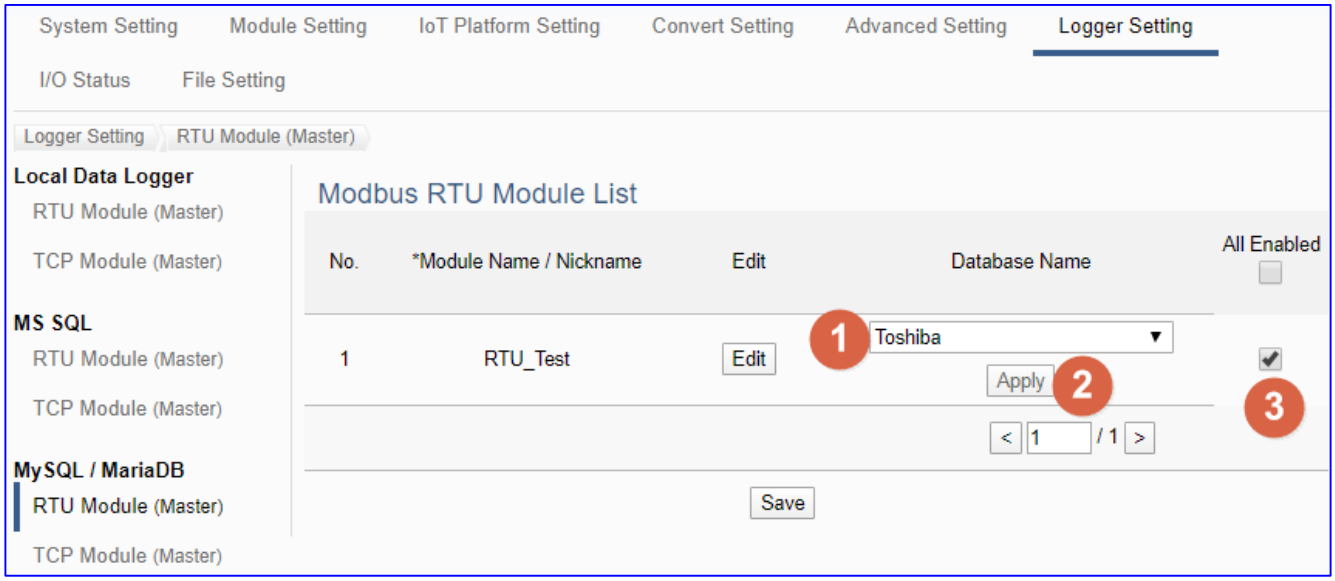
Function Diagram:



Application:

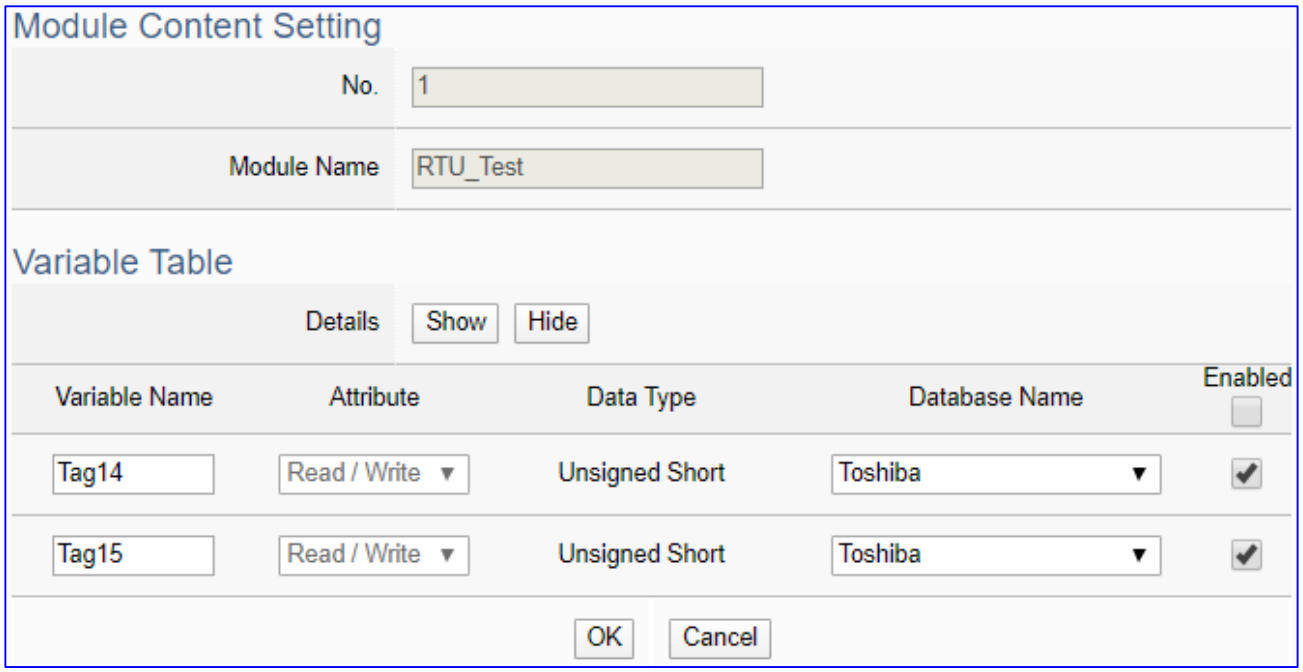


Enter the main menu [Logger Setting] > [MySQL / MariaDB] > [RTU Module (Master)], e.g. the remote database Name “Toshiba”, as below.



Logger Setting > MySQL/MariaDB - RTU Module (Master) - Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
Edit	If user wants to enable some I/O channels for data logger, click [Edit] of that module to enter the “Variable Tale” setting. It is normal to set all channels as enabled, and the conversion will not affect the unconnected channels.
Database Name Apply	Select the database name set in the “MS SQL” of the “Advanced Setting”. Click “Apply” (Text color will change from black to gray).
All Enabled Enabled	Check [All Enabled] box to enable all modules in list for data logger. Default: Uncheck. Check the box of each module can enable just that module for data logger.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

First select [Database name] and click [Apply] button, and check the enable box of the module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.



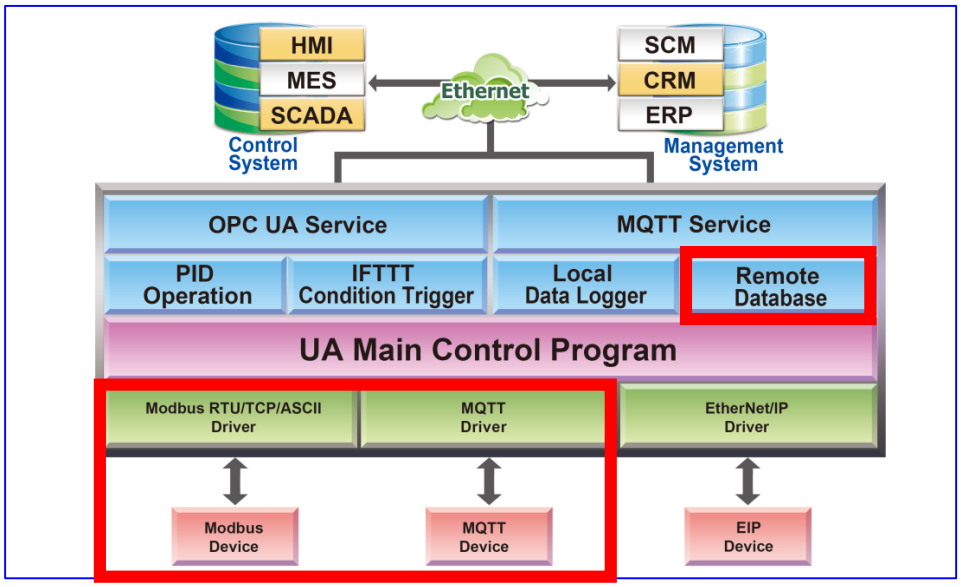
Logger Setting > MySQL/MariaDB - RTU Module (Master) – Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Logger Setting > MySQL/MariaDB - RTU Module (Master) – Variable Table	
Variable Name	Display the variable name that set in the Modbus Address Mapping Table page (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Database Name	Display the database name select in previous setting page. (Not editable here)
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK / Cancel	Click “OK” to save this page settings and back to the module list page. Click “Cancel” to leave this page without save.

5.6.4 PostgreSQL Data Logger: RTU / TCP / MQTT Module

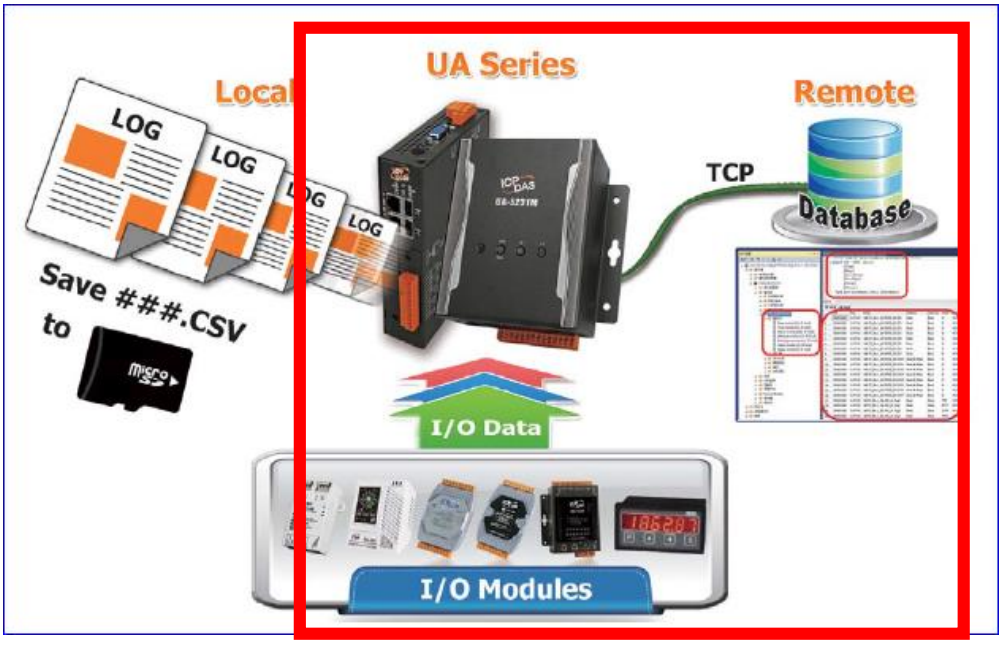
"PostgreSQL Data Logger" of "Logger Setting" provides users to record I/O log data of the connecting RTU/TCP/MQTT module (Master) into the PostgreSQL remote database.

This function is for setting the remote data logger and the RTU/TCP/MQTT modules, using "**MQTT module**" setting as an example. For the setting about the PostgreSQL data logger, please refer to Chapter 5.5 about the PostgreSQL section.

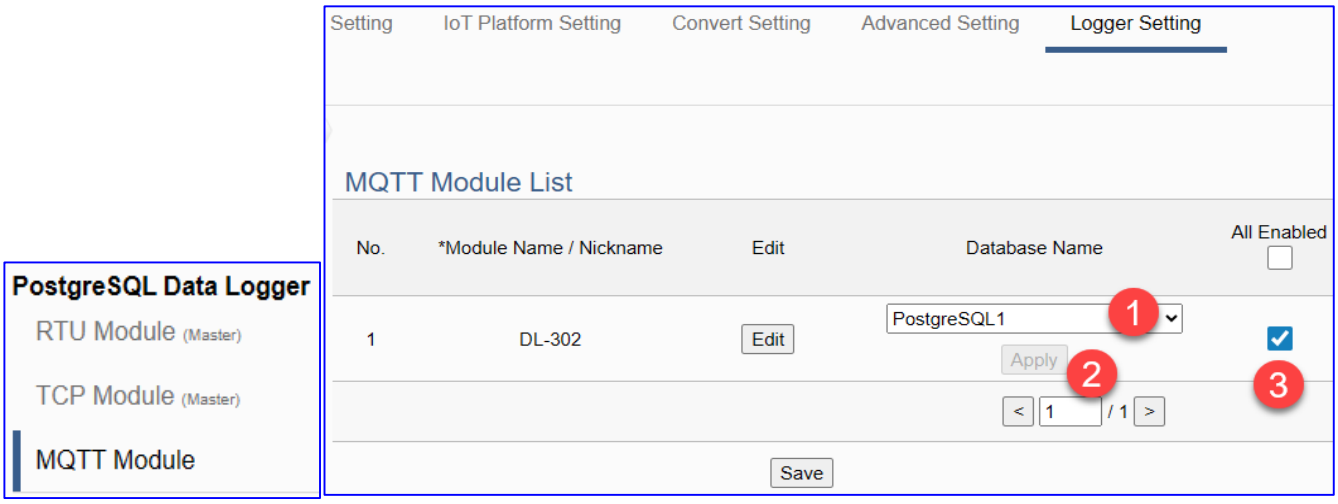
Function Diagram:



Application:

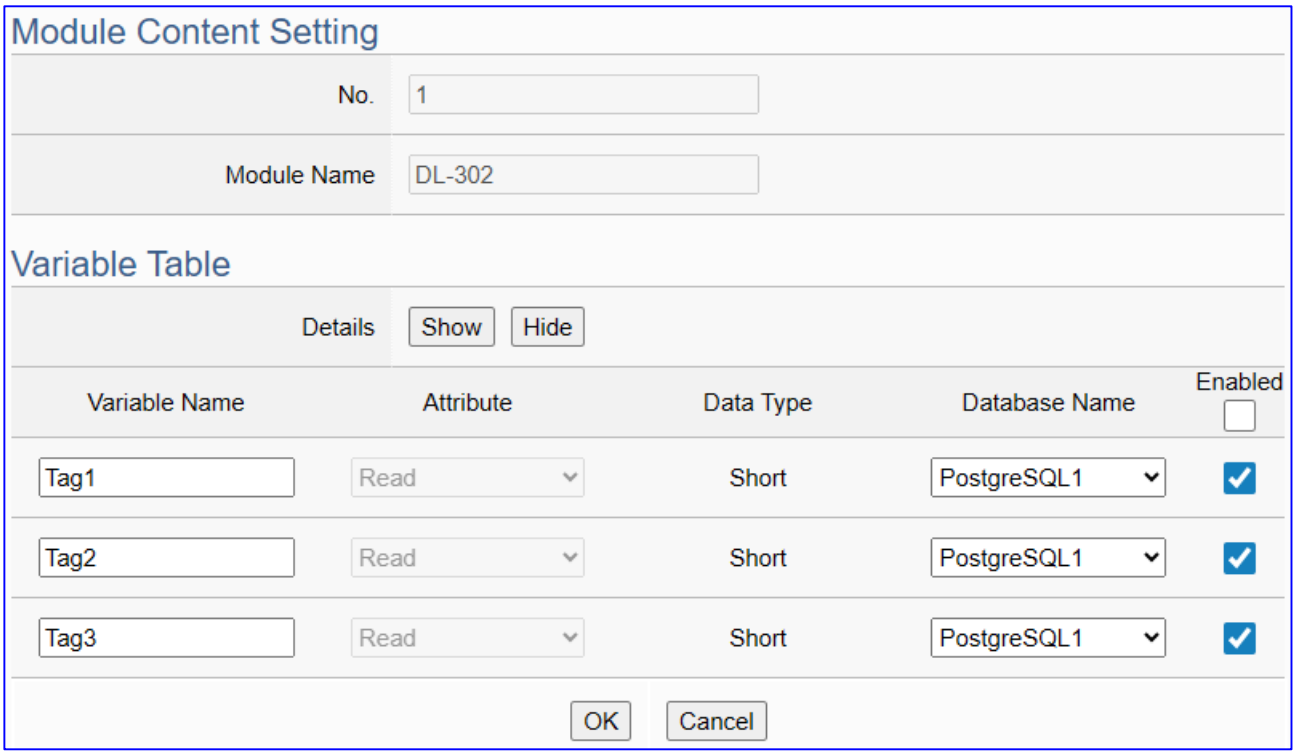


Enter the main menu [Logger Setting] > [PostgreSQL] > [MQTT Module], e.g. the remote database Name as below.



Logger Setting > PostgreSQL - MQTT Module > MQTT Module List	
No.	The module number in the module list (Not editable here)
*Module Name / Nickname	The module name set in the module list (Not editable here)
Edit	If user wants to enable some I/O channels for data logger, click [Edit] of that module to enter the “Variable Tale” setting. It is normal to set all channels as enabled, and the conversion will not affect the unconnected channels.
Database Name Apply	Select the database name set in the “PostgreSQL” of the “Advanced Setting”. Click “Apply” (Text color will change from black to gray).
All Enabled Enabled	Check [All Enabled] box to enable all modules in list for data logger. Default: Uncheck. Check the box of each module can enable just that module for data logger.
< 1 / 1 >	The page number of the module list: Current page / Total pages. Click < or > to go to the previous or next page.
Save	Click to save the settings of this page.

First select [Database name] and click [Apply] button, and check the Enable box of the module. If user wants to enable some I/O of the module, please click [Edit] button to enter the “Module Content Setting” page.



Logger Setting > PostgreSQL - MQTT Module – Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	The module name set in the module list (Not editable here)
Logger Setting > PostgreSQL - MQTT Module – Variable Table	
Variable Name	Display the variable name that set in the Modbus Address Mapping Table page (Not editable here)
Attribute	Display data attribute of the variable. (Not editable) Include: Read, Read/Write…
Data Type	Display data type of the variable that set in the Modbus Address Mapping Table page. (Not editable) Include: Bool, Short, Float…
Database Name	Display the database name select in previous setting page. (Not editable here)
Enabled	Check [Enabled] box of the top row can enable all variables in list. Check the box of each variable can enable just that variable for conversion. Default: Uncheck.
OK / Cancel	Click “OK” to save this page settings and back to the module list page. Click “Cancel” to leave this page without save.

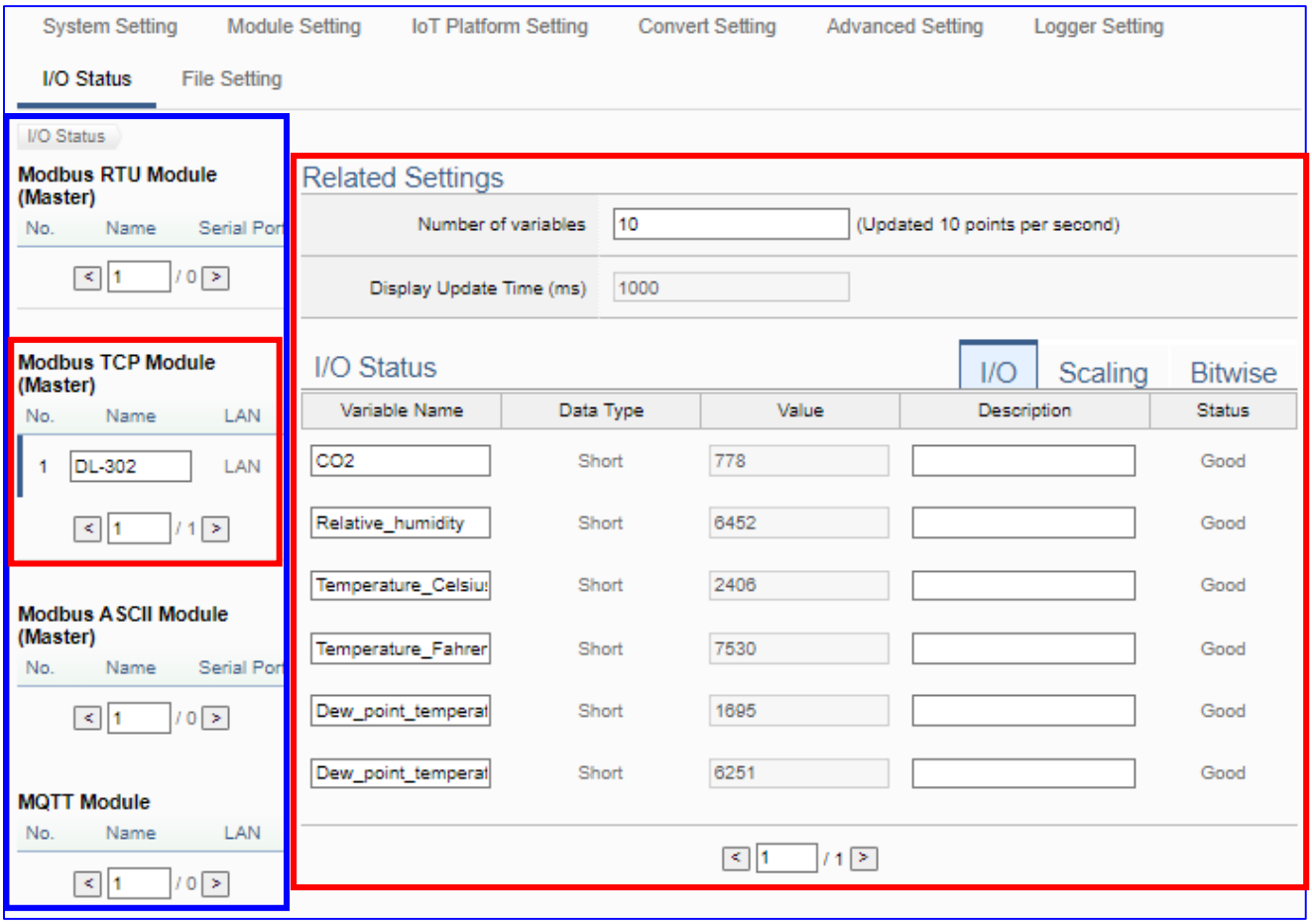
5.7 Main Menu: I/O Status

I/O Status is the 6th item of the Main Menu, mainly to display the retime I/O status of all the modules.

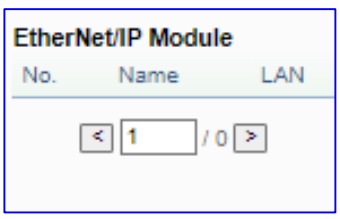
I/O Status page offers an easy way to view monitoring page that allows you to view important controller information in real time. The I/O Status page includes the following information.

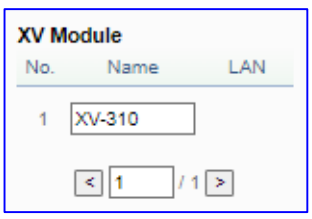
i. System default I/O Status page: It displays the all I/O channel information based on the sorting of all I/O Modules.
ii. Related settings and the user-defined I/O Status page: It displays the I/O channel status based on the user-defined arrangement.

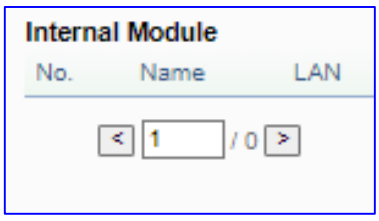
The user can click the module name on the left site, and the right will show all the real time I/O status of the selected module.

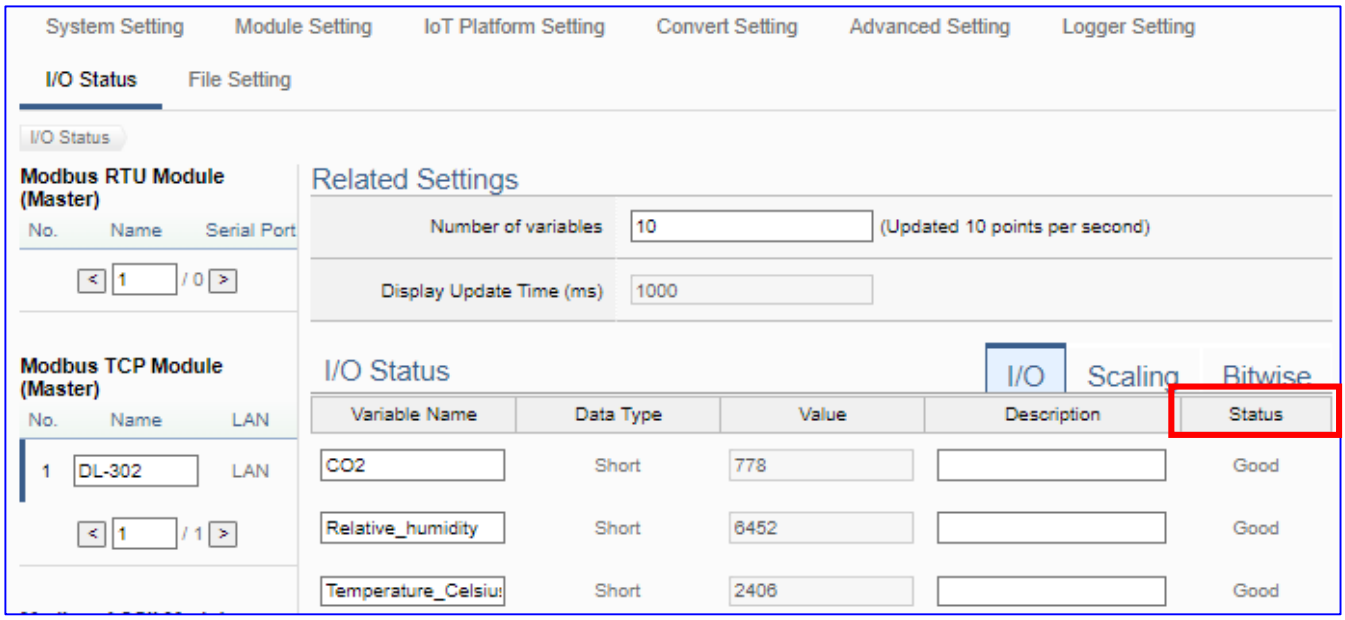


And the I/O status for the following:









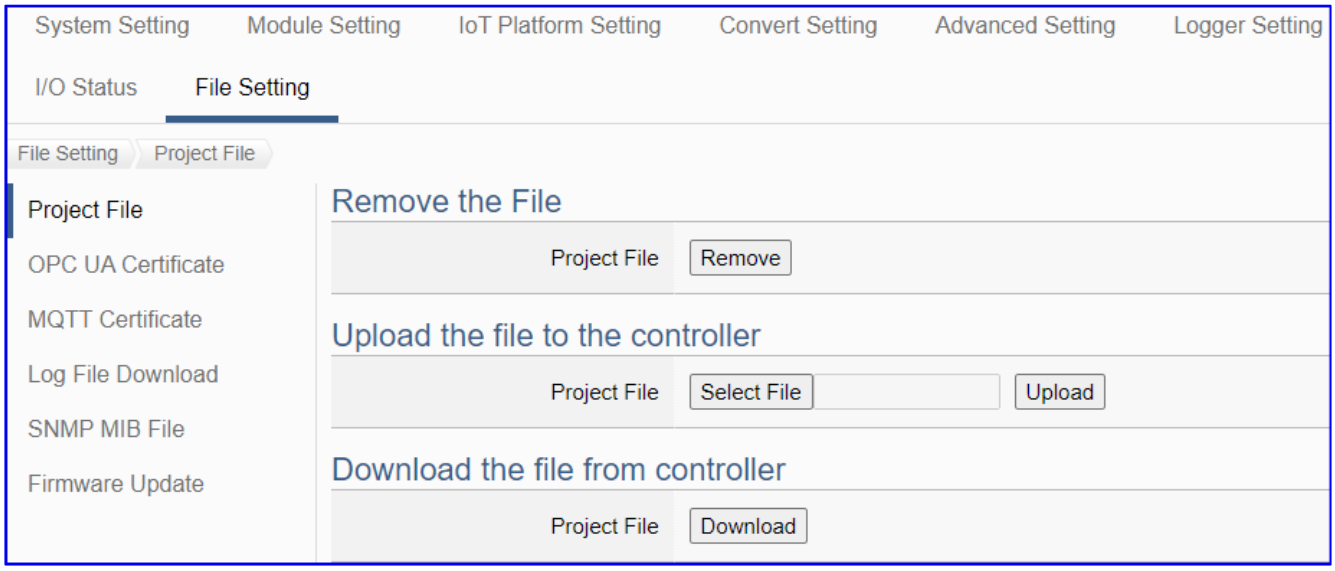
Descriptions for Point Status of the [I/O Status]:

I/O Status > I/O Status > Status	
Good	This indicates that the UA has successfully communicated with the I/O point, data reception is normal and reliable, and no errors or anomalies are detected.
Bad	This indicates that the UA has communicated with the I/O point, but an error has occurred, preventing data from being retrieved. Possible causes include: • The communication link is interrupted, preventing the UA from establishing a connection with the device. • A data retrieval error occurs, such as a command not supported by the device or an abnormal response data format.
Uncertain	This indicates that the UA has not yet communicated with the I/O point, and the point's value status is uncertain.
Not exist	This indicates that the module point has been established but has not yet been updated to the currently running project. You need to close the current project and restart it. Ensure that the new module settings are added to the project.

5.8 Main Menu: File Setting

File Setting is the last item of the Main Menu, mainly to provide the settings about the files, such as remove, update, upload and download the files of the project and certificate.

File Setting provides 4 sub-menu functions. This chapter will introduce the function items and setting parameters.

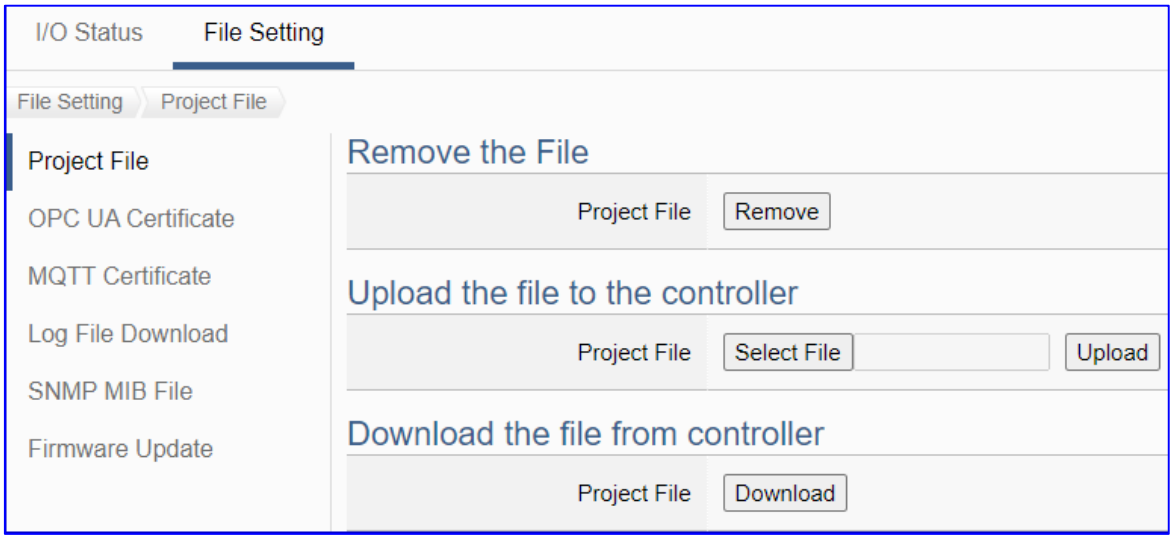


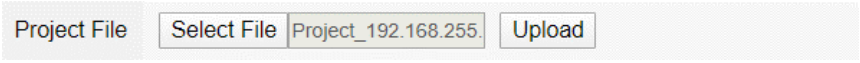
The setting for UA series controllers is to set up from the left to the right of the main menu functions. User can find the setting step and Web UI information in the following chapters.

CH2 Quick Start 1: Hardware/Network Connection
CH3 Quick Start 2: Web UI / Setting Steps
CH4 Function Wizard: Project Quick Setup

5.8.1 Project File

This page provides 3 setting items: Remove the file, Upload the file to the controller, and Download the file to the local computer.



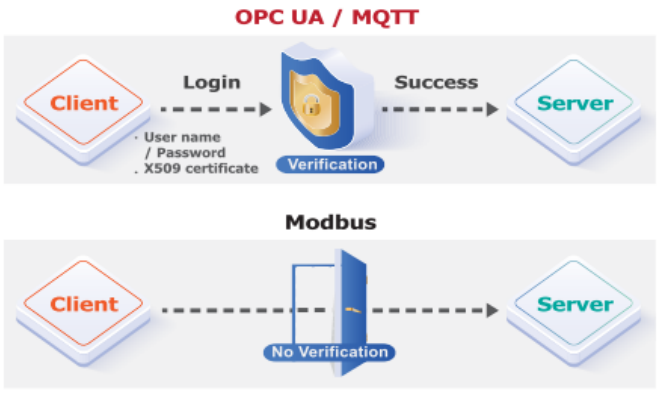
File Setting > Project File > Remove the File	
Project File	Click [Remove] to delete all project settings current in the UA series controller.
File Setting > Project File > Upload the file to the controller	
Project File	**Select File**: click to select the project that want to upload to the UA controller. (Extension name of the project file: "**.tar**") **Upload**: upload the project file into the UA controller. If select a wrong file (extension name is not ".tar"), the system will show an error message.  Select a right format file with extension name of ".tar", as below. 
File Setting > Project File > Download the file to the local computer	
Project File	**Download**: Download the project with all Web UI settings to the current computer. (Extension name of the project file: "**.tar**")

5.8.2 OPC UA Certificate

UA controller supports OPC UA Server security connection, including identity authentication, data encryption, data signature. Server and Client authenticate each other through x.509 certificate. Compared with the traditional method, it has the following functional advantages.

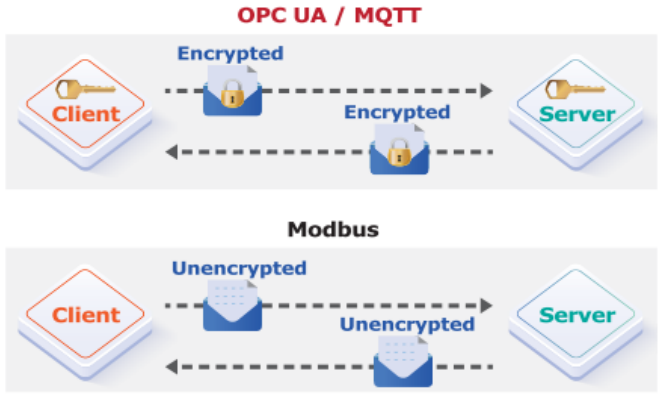
Support Identity Authentication

Identity Authentication			
ICP DAS UA Solution	OPC UA	ID/Password, Anonymous, Certificate	Yes ✓
	MQTT	ID/Password, Anonymous, Certificate	
Traditional	Modbus	None	



Support Data Encryption

Data Encryption			
ICP DAS UA Solution	OPC UA	SSL/TLS Encryption	Yes ✓
	MQTT	SSL/TLS Encryption	
Traditional	Modbus	None	



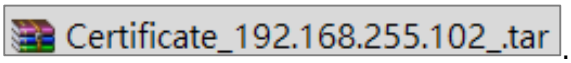
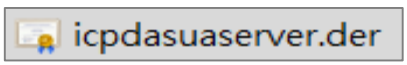
This function is the **certificate** file management function of **OPC UA Server**. There are 3 setting items about OPC UA Certificate: Remove, Upload the file to the controller, download the file from the controller. If your project need not the certificate, you can skip this step.

In the [**OPC UA Certificate**] step, users can add mutual credentials on both side's devices to strengthen security encryption.

① First, obtain the **OPC UA Client** trust certificate file of the device from the connected party, save it to the PC. In this step, select this file and upload it to the UA controller. (If there was an old certificate file in UA, remove it first.)

② The device of the other side needs the UA certificate also. In this step, download the **OPC UA Server** certificate file (**Certicate_IPAddress_.tar**) to the other party, so that they can decompress the file (**icpdasuaserver.der**) and upload to their device.



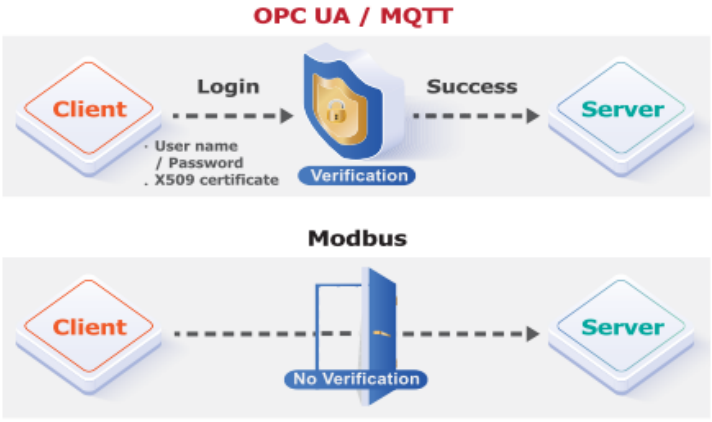
File Setting > OPC UA Certificate > Remove the File	
Trusted Certificate	**Remove**: Click to delete the OPC UA client Trusted Certificate current in the UA controller.
OPC UA Server Certificate	**Remove**: Click to delete the OPC UA Server Certificate current in the UA controller.
File Setting > OPC UA Certificate > Upload the file to the controller	
Trusted Certificate	**Select File**: select the OPC UA Trusted Certificate file in PC to upload to the UA controller. **Upload**: upload the Trusted Certificate file to the UA controller. • File format must be **DER**. Extension name must be "**der / cer / crt**".  • If select a wrong file, the system will show an error message. 
File Setting > OPC UA Certificate > Download the file from controller	
OPC UA Server Certificate	**Download**: Download the OPC UA Server Certificate file to the current using computer. • File format: **DER**. File name: **Certicate_IP-address_.tar** e.g.  Before using, decompress to **icpdasuaserver.der**, as below. 

5.8.3 MQTT Certificate

UA controller supports MQTT Client secure encrypted certificate file management. There are three types of files: Trusted Certificate, Certificate, and Private Key. Compared with the traditional method, it has the following functional advantages.

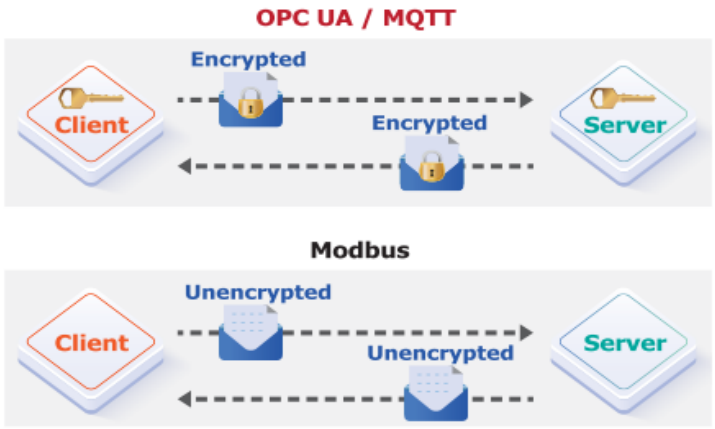
Support Identity Authentication

Identity Authentication			
ICP DAS UA Solution	OPC UA	ID/Password, Anonymous, Certificate	Yes ✓
	MQTT	ID/Password, Anonymous, Certificate	
Traditional	Modbus	None	



Support Data Encryption

Data Encryption			
ICP DAS UA Solution	OPC UA	SSL/TLS Encryption	Yes ✓
	MQTT	SSL/TLS Encryption	
Traditional	Modbus	None	



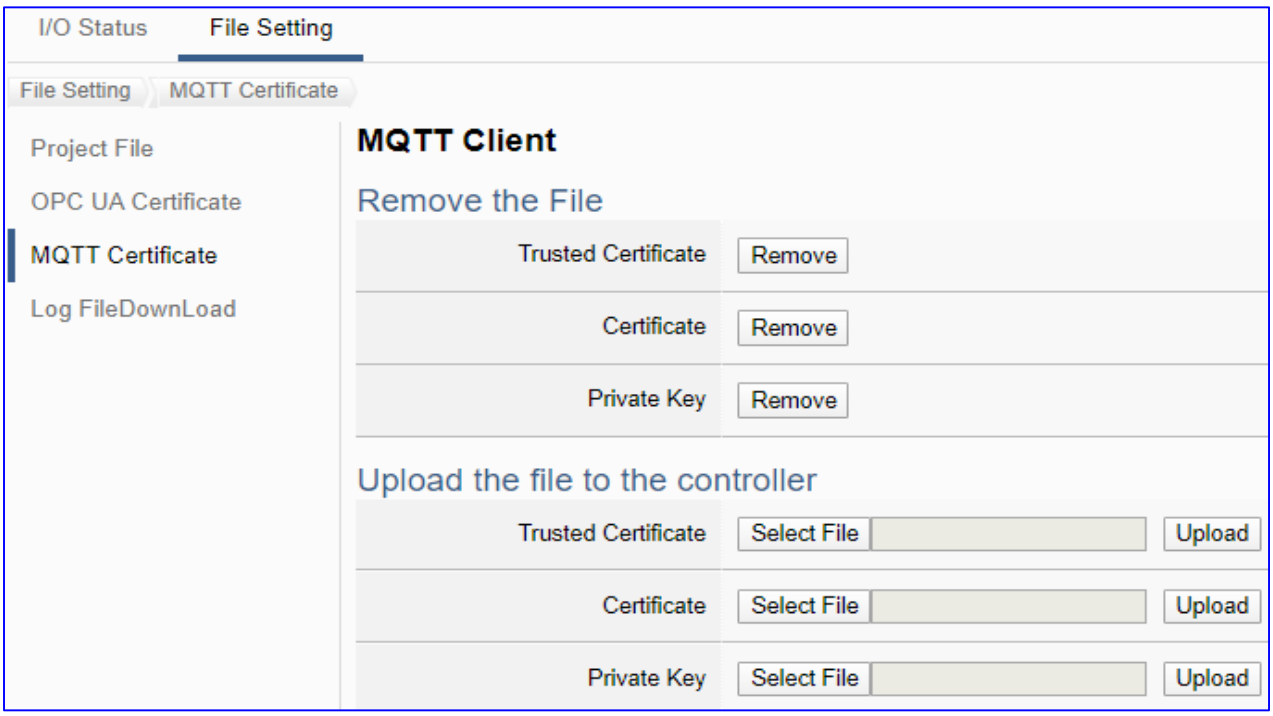
The **[MQTT Certificate]** is for setting up security communications to upload and remove the MQTT Certificate.

The users upload the file to the UA controller according to the type of obtained certificate. There are **3 types of MQTT Certificate**:

- **Trusted Certificate**
- **Certificate**
- **Private Key**

If you want to perform **Broker authentication**, you need to upload the **Trusted Certificate**. If you want to perform the **Broker/Client two-way authentication**, you need to upload the **Credential and Private Key additionally**. The user can skip this step if the user project does not use certificate transmission security.

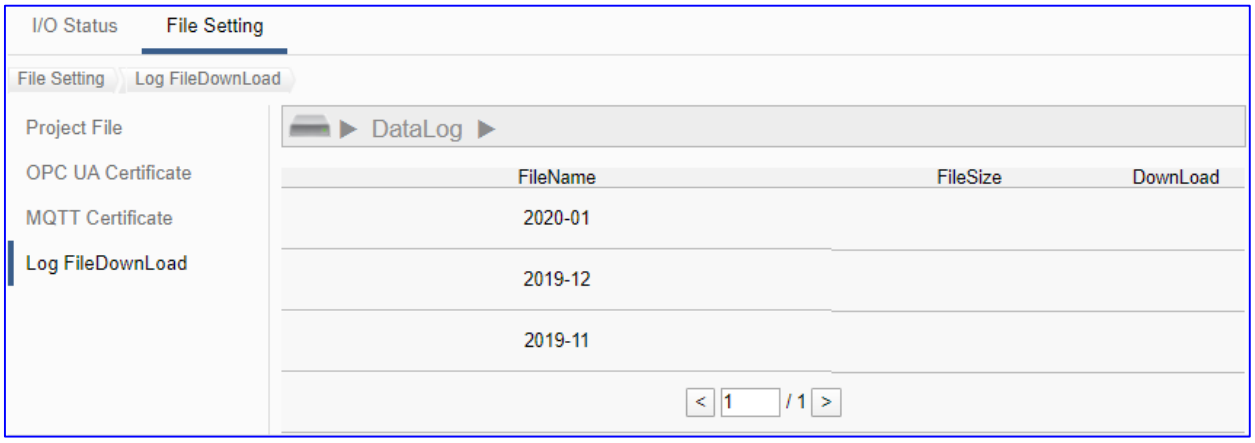
This page provides 2 setting items: Remove the file, and Upload the file to the controller for the MQTT Trusted Certificate, Certificate and Private Key.



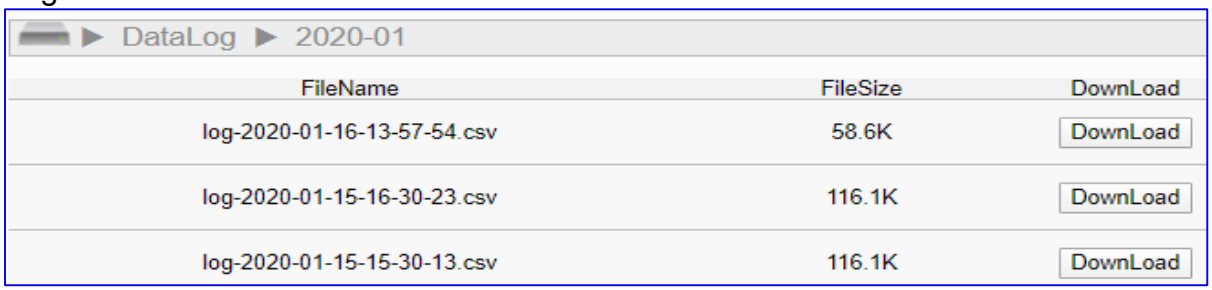
File Setting > MQTT Certificate > Remove the File	
Trusted Certificate	**Remove**: delete the MQTT Trusted Certificate current in the UA series controller.
Certificate	**Remove**: delete the MQTT Certificate current in the UA series controller.
Private Key	**Remove**: delete the MQTT Private Key current in the UA series controller.
File Setting > MQTT Certificate > Upload the file to the controller	
Trusted Certificate	**Select File**: select the MQTT Trusted Certificate file of the device. **Upload**: upload the MQTT Trusted Certificate file to the UA controller. • File format must be **PEM**. Extension name must be "**pem / cer / crt**". • If select a wrong file, the system will show an error message. Trusted Certificate Select File Certificate_192.168.255.10 Certificate type is wrong. Upload
Certificate	**Select File**: select the MQTT Certificate file of the device. **Upload**: upload the MQTT Certificate file to the UA controller. • File format must be **PEM**. Extension name must be "**pem / cer / crt**". • If select a wrong file, the system will show an error message.
Private Key	**Select File**: select the MQTT Private Key of the device. **Upload**: upload the MQTT Private Key file to the UA controller. • File format must be **PEM**. Extension name must be ".**key**". • If select a wrong file, the system will show an error message.

5.8.4 Log File Download

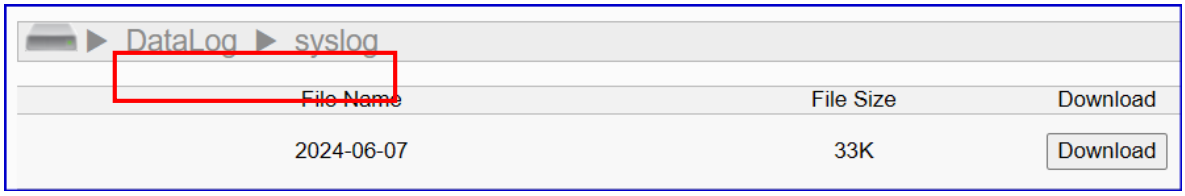
This function page is to view and download the Local Data Logger files of the microSD card in the UA series controller.



When enable the [Local Data Loger] function, the module's Data log files will be regularly generated and stored in the microSD card of the UA. The User can download the generated data log files to a PC in this function.



When enable the [System Log] of [controller service setting] or [boot], you can download the [syslog] file here to view the UA system status.

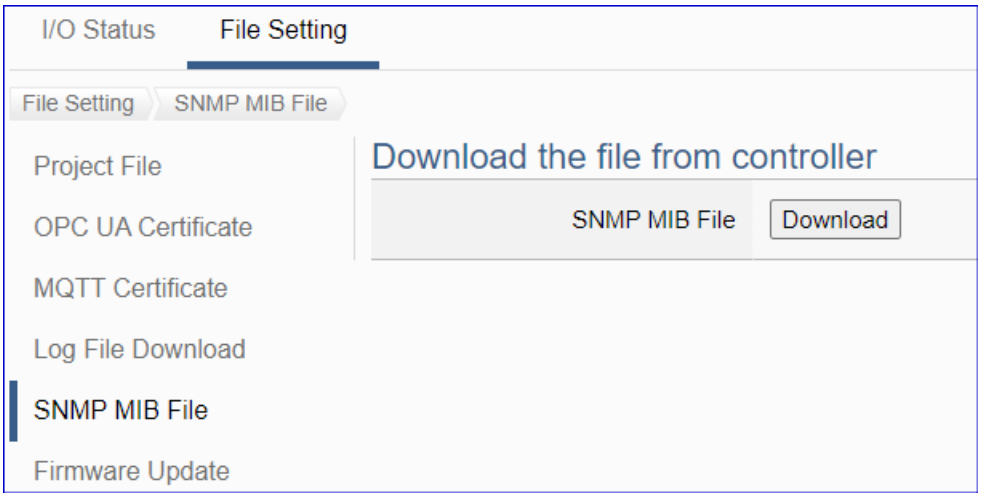


File Setting > Log File Download > DataLog	
File Name	At first, display the year-month folder (e.g. 2020-01), click the year-month folder to list all log files in this month, with the file name "**log-YYYY-MM-DD-HH-mm-ss.csv** ".
File Size	The size of the log file. Unit: KB
Download	Click to download the Log file to the specific folder of the PC.
< 1 / 950 >	The page number of the Log file list: Current page / Total pages. Click < or > to go to the previous or next page.

5.8.5 SNMP MIB File

This function is about downloading SNMP MIB files. Users can download all the settings of [Advanced Settings] > [SNMP Agent Settings] into a file for subsequent use.

SNMP is an advanced function only available on UA-2800 series, UA-5200/2200 series does not support SNMP function.



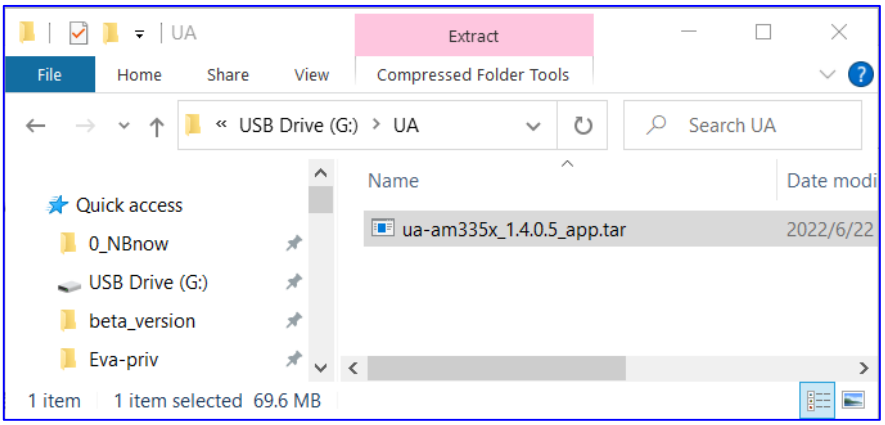
File Setting > SNMP MIB File > Download the file from controller	
SNMP MIB File	Click to download the SNMP MIB file to the specific folder of the PC.

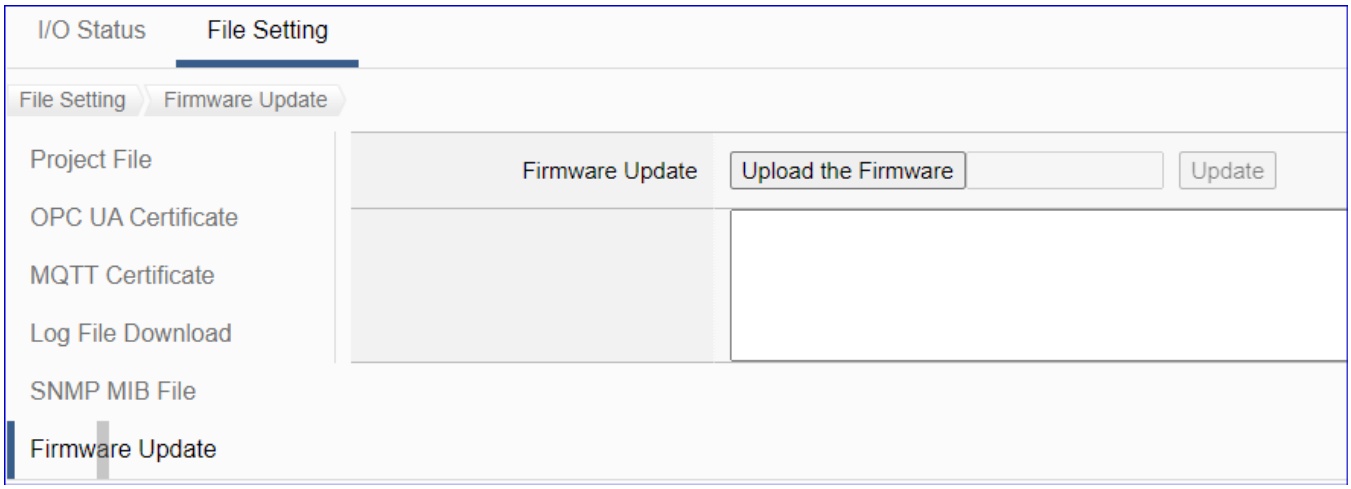
5.8.6 Firmware Update

This function is about the update operation of the firmware file, mainly uploading the firmware file to update the version of the UA controller.

Before updating, please download the latest Firmware software file from ICP DAS UA series download center, save it to your computer, and then can upload the file to the UA controller.

UA series Download Center):
https://www.icpdas.com/en/download/index.php?nation=US&kind1=&model=&kw=ua-
Note: unzip the zip file to ".tar", DO NOT decompress the ".tar" file again.





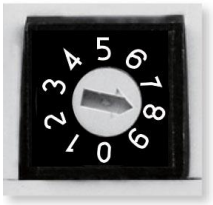
File Setting > Firmware Update	
Upload the Firmware	Go to the UA series download center of the ICP DAS website to download the latest Firmware software file, save it to your computer. **Note: unzip the zip file to ".tar", DO NOT decompress the ".tar" file again.** Click "Upload the Firmware" button and select the firmware file.
Update / Information Box	Select the Firmware file and click the "Update" button, it will update the Firmware version automatically. In the update operation, the information box below will display the updating status, and a final message will show if the updating succeeded or failed.

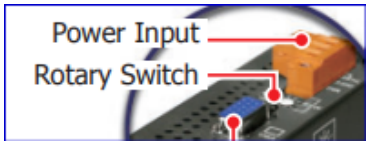
6. Factory Setting Recovering and Firmware Updating

This chapter will introduce the settings by hardware Rotary Switch, including “Factory Setting Recovering” and “Firmware Updating” that supported since Version 1.0.0.3.

6.1 Recovering to Factory Setting (Rotary Switch: 8)

Switch the Rotary Switch of UA-2800 to “8” to “ON” for recover the UA Series to the factory setting. Before that, first to connect the UA controller via a network cable to a PC or a Switch.





The steps:

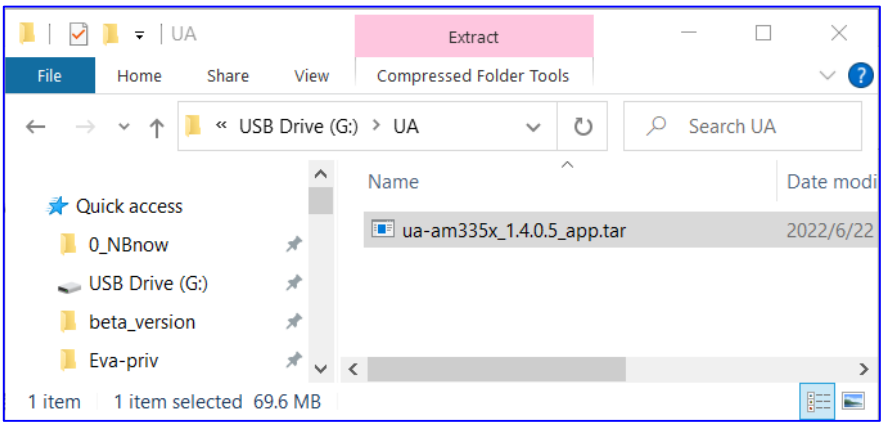
1. After connecting the network, power off the UA hardware. Turn the **Rotary Switch** to “**8**”.
2. Reboot the UA and wait a long buzzer sound that means of doing the recovering.
3. Wait about 3 minutes until **2 long** buzzer sounds, and then turn the Rotary Switch of UA-2800 to “**0**”.
   Note: If the buzzer makes **4 short** beeps, it means the network is not connected properly. Please check the network cable again.
4. Reboot the UA again, and the system will recover to the factory settings.

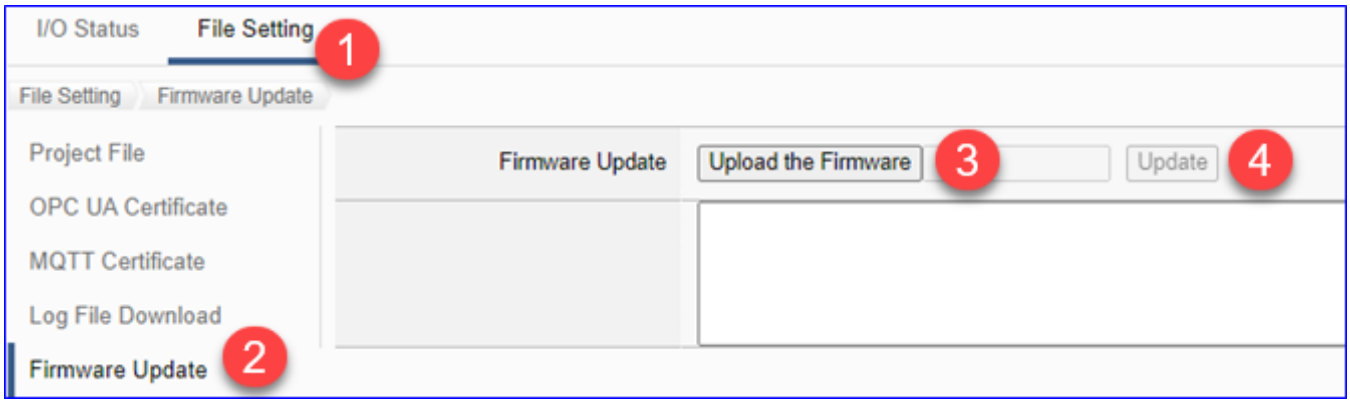
Factory Default Settings of UA Series			
Network	**IP**	**LAN1: 192.168.255.1** **LAN2: 10.0.0.1**	Assign UA a new IP address according to your case. For UA-2800 series, set the LAN1 for the connection to PC.
	Mask	**255.255.0.0**	
	Gateway	**LAN1: 192.168.1.1** **LAN2: 10.168.1.1**	
Web UI Account	**Username**	**root**	**After login, change your password as soon as possible.** (Section 5.1.4 for Web UI)
	Password	**root**	

6.2 Updating Firmware A – via Web UI of UA

The user can update firmware via the Web UI function of the UA controller.
Before updating, please download the latest Firmware software file from ICP DAS UA series download center, save it to your computer, and then can upload the file to the UA controller.

UA series Download Center:
https://www.icpdas.com/en/download/index.php?nation=US&kind1=&model=&kw=ua-
Note: DO NOT decompress the firmware file ".tar".





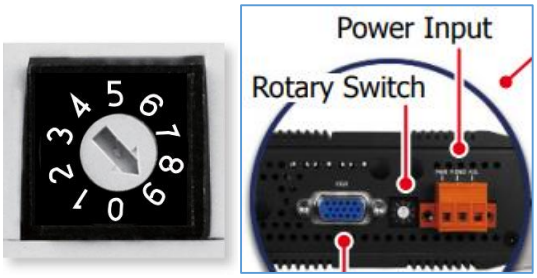
File Setting > Firmware Update	
Upload the Firmware	Go to the UA series download center of the ICP DAS website to download the latest Firmware software file, save it to your computer. **Note: DO NOT decompress the firmware file ".tar".** Click "Upload the Firmware" button and select the firmware file.
Update / Information Box	Select the Firmware file and click the "Update" button, it will update the Firmware version automatically. In the update operation, the information box below will display the updating status, and a final message will show if the updating succeeded or failed.

6.3 Updating Firmware B - via USB (Rotary Switch: 9)

Turn the Rotary Switch of UA series to “9” can update the Firmware version via USB.

The steps:

1. Power off the UA hardware, and turn the Rotary Switch to “9”.



2. Download the Firmware package file of the UA hardware corresponding model.
   UA Download Center:
   https://www.icpdas.com/en/download/index.php?nation=US&kind1=&model=&kw=ua-

3. Save the Firmware package file into an empty FAT32 format USB drive and put to the UA USB port.

4. Reboot the UA and wait a long buzzer sound that means of doing the version updating.

5. Wait about **three** minutes until **two** long buzzer sounds, and then turn the Rotary Switch to “0”.
   Note:
   If the buzzer makes **4 short beeps**, it means the USB may not connected properly. Please check the USB again.

6. Reboot the UA again, and the system will update to the version of the package file.

7 Security Certificate: Download / Upload

UA communication security includes the **username/password protection**, **SSL/TLS secure communication** (Secure Socket Layer / Transport Layer Security), and **OPC UA Server / MQTT Client certificate mechanism** to protect data transmission security.

OPC UA certificate provides the certificate exchange with **Server and Client** side to authenticate each other **through the x.509 certificate** to protect the data transmission security. OPC UA **default enables** encryption and security mechanisms with advanced processing, **including: Authentication, Authorization, Confidentiality and Integrity**.

MQTT certificate provides three certificate types: **Trusted Certificate**, **Certificate**, and **Private Key**. Depending on the type of certificate obtained to perform the **Broker verification** or **Broker/Client mutual verification**. It supports identity verification and data encryption, and provides a secure connection. mechanism.

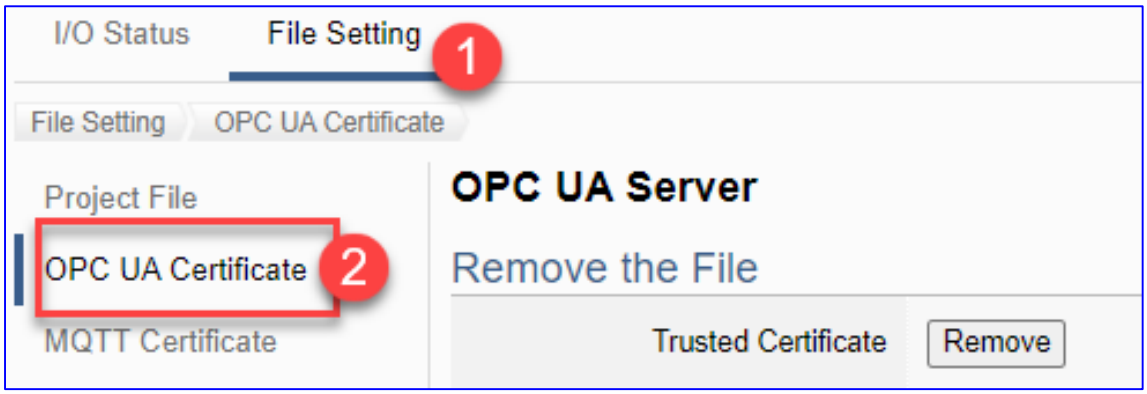
- **OPC UA Server Certificate management**

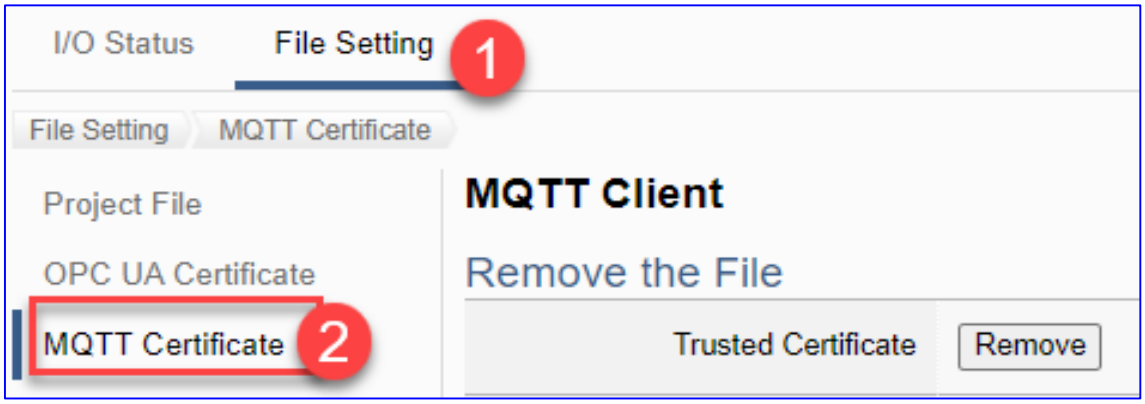
UA controller supports OPC UA Server security connection, including identity authentication, data encryption, data signature. Server and Client authenticate each other through x.509 certificate.
There are 3 items in OPC UA Certificate: Remove, Upload and Download the Certificate file.
Download is for providing the OPC UA Server certificate to the other side.
Upload is to save the other's trust certificate into the UA. So before uploading, please get the certificate file of the other side device first. Please refer to 7.2.1 for details.

- **MQTT Client Certificate management**

UA controller supports MQTT Client secure encrypted certificate file management. There are three types of files: Trusted Certificate, Certificate, and Private Key. The users upload the file to the UA controller according to the type of obtained certificate. If you want to perform **Broker authentication**, you need to upload the **Trusted Certificate**. If you want to perform the **Broker/Client two-way authentication**, you need to upload the **Credential and Private Key additionally**.
Therefore, before uploading, you must confirm the required verification method, obtain the required certificate file, and store it in your computer before you can configure the upload certificate. Please refer to 7.2.2 for details.

The upload and download of OPC UA and MQTT Certificates are in the main menu [**File Setting**]. Before setting this function, you need to download or upload the relevant certificates. This chapter is divided into two sections, download/upload, to explain the setting steps and notices.





7.1 Download the Certificate from UA Controller

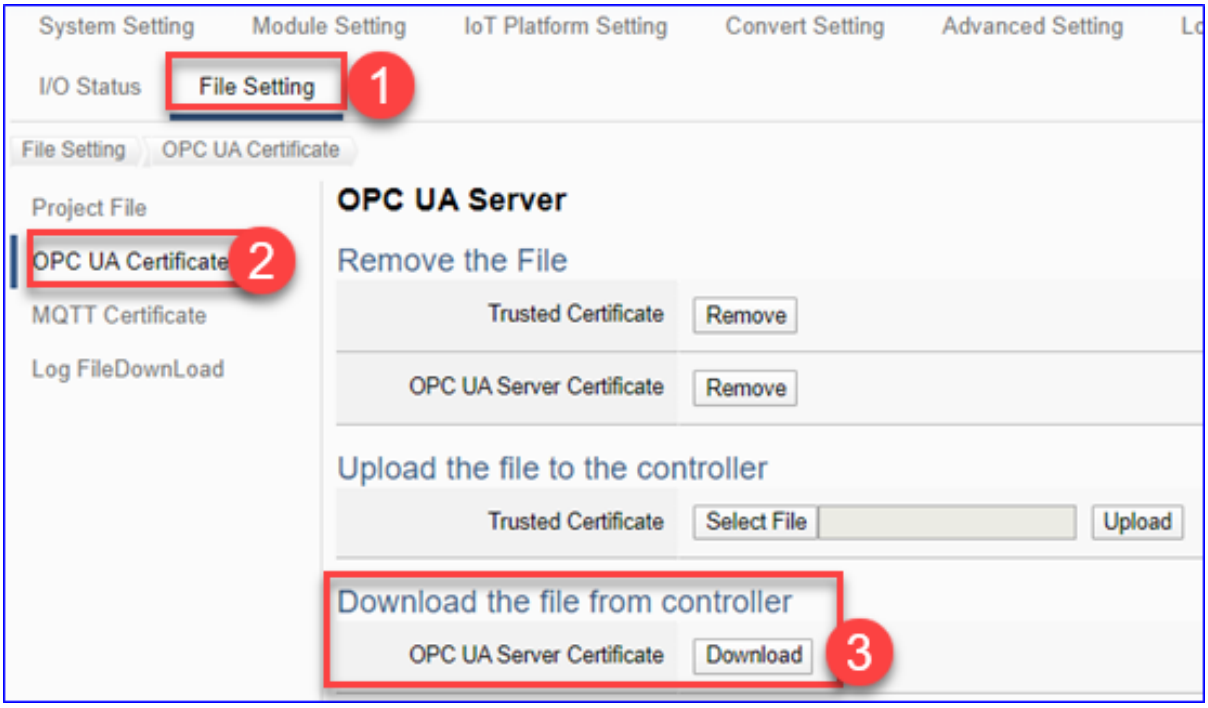
7.2 Upload the Certificate to UA Controller

7.2.1 OPC UA Certificate

7.2.2 MQTT Certificate

7.1 Download the Certificate from UA Controller

Download is for providing the OPC UA Server certificate to the other side.



1. Click the main menu [①**File Setting >** ②**OPC UA Certificate > Download the file from the controller** – OPC UA Server Certificate] and then click on the button ③ [**Download**].

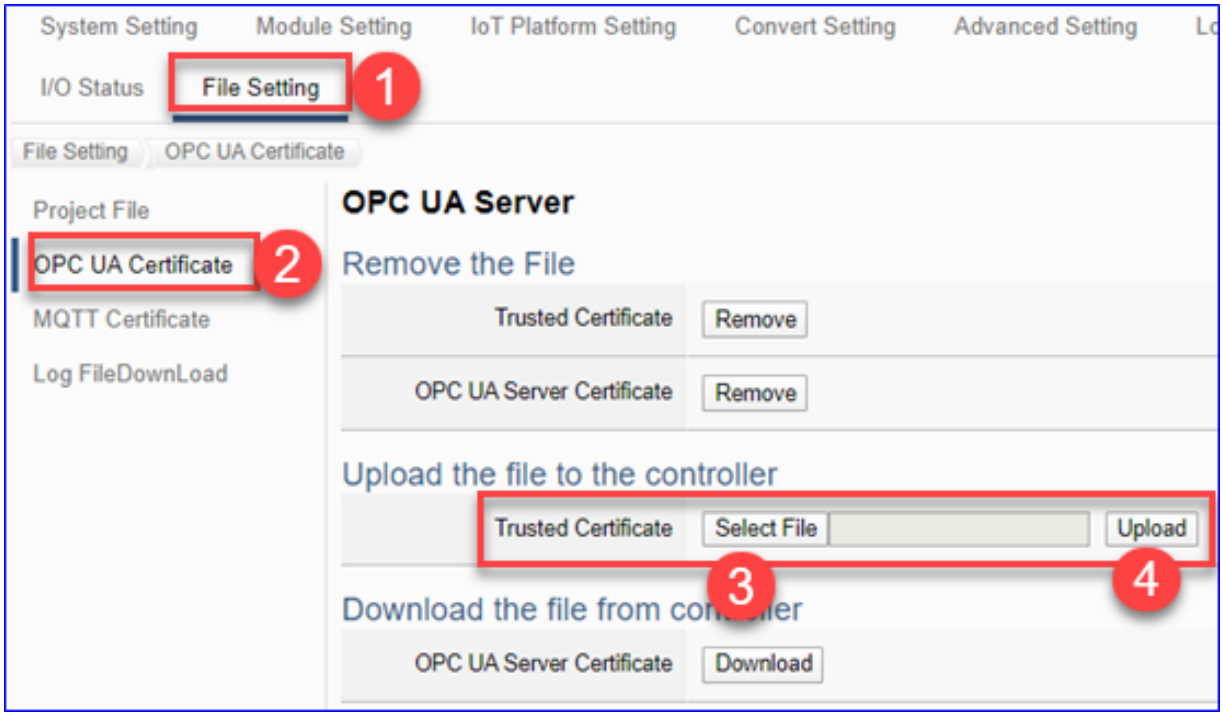
2. Save the OPC UA Server certificate file to your designated folder. The downloaded certificate file (***.tar**) of the UA series controller looks similar to the figure below.



7.2 Upload the Certificate to UA Controller

The user can store trusted certificates of the OPC UA client or the MQTT Broker from other device into the UA project for setting up security communications.

7.2.1 OPC UA Certificate



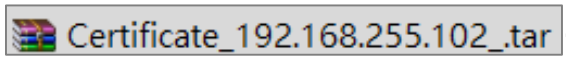
1. Get the trusted certificates from OPC UA Client and save in the PC.

2. Click the main menu [①File Setting > ② OPC UA Certificate > Upload the file to the controller – Trusted Certificate], click on the button ③ [Select File] to select the trusted certificates from OPC UA Client.

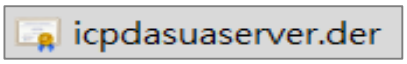
3. Click the button ④ [Upload], then can upload and exchange the certificate authentication.

Notes for OPC UA Certificate:

- The supported code format: "**DER**".
- The supported file extension name: " ***.der / *.cer / *.crt** " .
- The OPC UA Server Certificate downloaded from UA series:

  File name: **Certicate_IP-address_.tar,** e.g. 

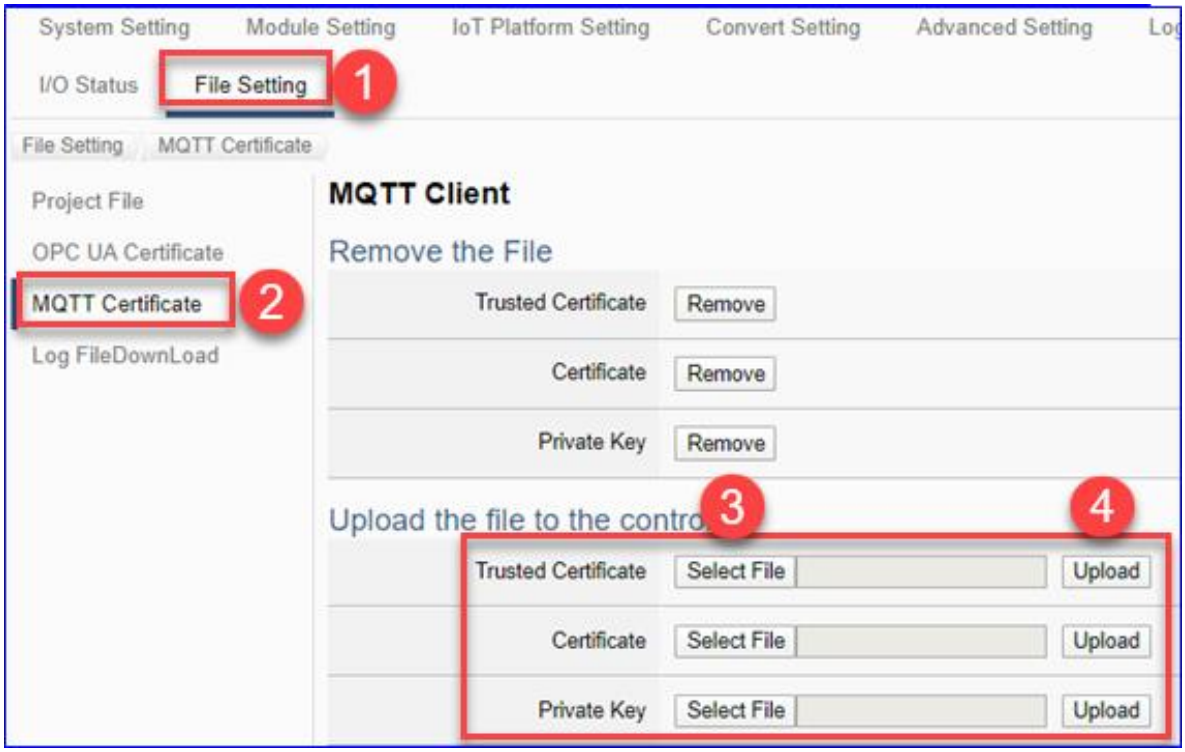
.

  Before using, decompress to **icpdasuaserver.der**, e.g. 

- Refer to 5.8.2 for detail parameter descriptions.

7.2.2 MQTT Certificate

If you want to perform **Broker authentication**, you need to upload the **Trusted Certificate**. If you want to perform the **Broker/Client two-way authentication**, you need to upload the **Credential and Private Key additionally**.



1. Get the trusted certificates from MQTT Client and save in the PC.

2. Click the main menu [① **File Setting** > ② **MQTT Certificate** > **Upload the file to the controller – Trusted Certificate / Certificate / Private Key**], click on the button ③ [**Select File**] to select the Trusted Certificate, Certificate or Private Key from MQTT Client.

3. Click the button ④ [**Upload**], then UA system can exchange the certificate authentication.

Notes for MQTT Client Certificate:

- The supported code format: "**PEM**".
- The supported file extension name for Certificates: " ***.pem / *.cer / *.crt** " .
- The supported file extension name for Private Key: " ***.key** " .
- Refer to 5.8.3 for detail parameter descriptions.

Appendix A. MQTT JSON Format of the UA Series

MQTT JSON Example & Format Descriptions:

```
{
   "Variable" : [ {
      "Name" : "Bool_R[0]",
      "Attribute" : "R",
      "Datatype" : "Bool",
      "Value" : 0,
      "Quality" : "Uncertain"
   }, {
      "Name" : "Short_R[0]",
      "Attribute" : "R",
      "Datatype" : "Int16",
      "Value" : 0,
      "Quality" : "Uncertain"
   }, {
      "Name" : "Short_R[1]",
      "Attribute" : "R",
      "Datatype" : "Int16",
      "Value" : 0,
      "Quality" : "Uncertain"
   }, {
      "Name" : "Short_R[2]",
      "Attribute" : "R",
      "Datatype" : "Int16",
      "Value" : 0,
      "Quality" : "Uncertain"
   }, {
      "Name" : "Short_RW[2]",
      "Attribute" : "RW",
      "Datatype" : "Int16",
      "Value" : 0,
      "Quality" : "Uncertain"
   } ]
}
```

Name	Descriptions
Variable	The array name of JSON. Its structure includes several member data as below.
Name	The member name of the array element
Attribute	The member attribute of the array element: “R” : can read “W” : can write ”RW” : can read and write
Datatype	The member’s data type of the array element: "Bool" "Int8" "UInt8" "UInt16" "Int16" "UInt32" "Int32" "UInt64" "Int64" "Float" "Double" "String"
Value	The member’s current value of the array element
Quality	The member’s current status of the array element: "Uncertain" "Good" "Bad"

Appendix B. Protocol Technical Reference

- **OPC UA**

https://opcfoundation.org/

- **MQTT**

http://mqtt.org/

- **Modbus**

http://modbus.org/

Appendix C. LED Indicators

LED indicators of UA Series provide a very convenient way of status indications for faster, easier diagnostics.





UA-2841M		
LED	LED Status	Module Status
PWR	Green: ON	The module is powered on.
RUN	Red: ON	The system is functioning normally. When power on UA, please wait about 30 seconds to complete the start-up procedure until the "RUN" LED starts ON.
L1 / L3	OFF	Function reserved
L2	Yellow: Blinking, then ON, and then OFF.	When install or update the Firmware, L2 will blinking. When complete the process, L2 will steady ON to notify user and then OFF.

Appendix D. Expansion Board

The UA-2841M no longer supports the XV-board expansion module starting from September 2026. Please do not install it, thank you.

Appendix E. Import Modbus Module Profile and CSV File Field Descriptions

When UA connects many modules, setting multiple modules one by one is very time-consuming. UA allows setting many modules at once by writing the setting data of many modules in a CSV file and importing it to UA. Please write the different types of modules in different CSV files.

The following sections describe the Modbus RTU and TCP module configuration file functions and the field data of the CSV file.

E.1 Modbus RTU Module Profile and Field Descriptions

The Import Modbus RTU module profile function is in the menu [Module Setting] > [Modbus > RTU Module] > [Import Module Profile] – [Upload Module Profile] option. as follows.

Modbus RTU Import Module Profile function:

Click the [Upload Module Profile] button, then select the prepared CSV file, import it, and save the settings. The setting modules will show on the [Module List], and click the [Edit] button to see the module settings.

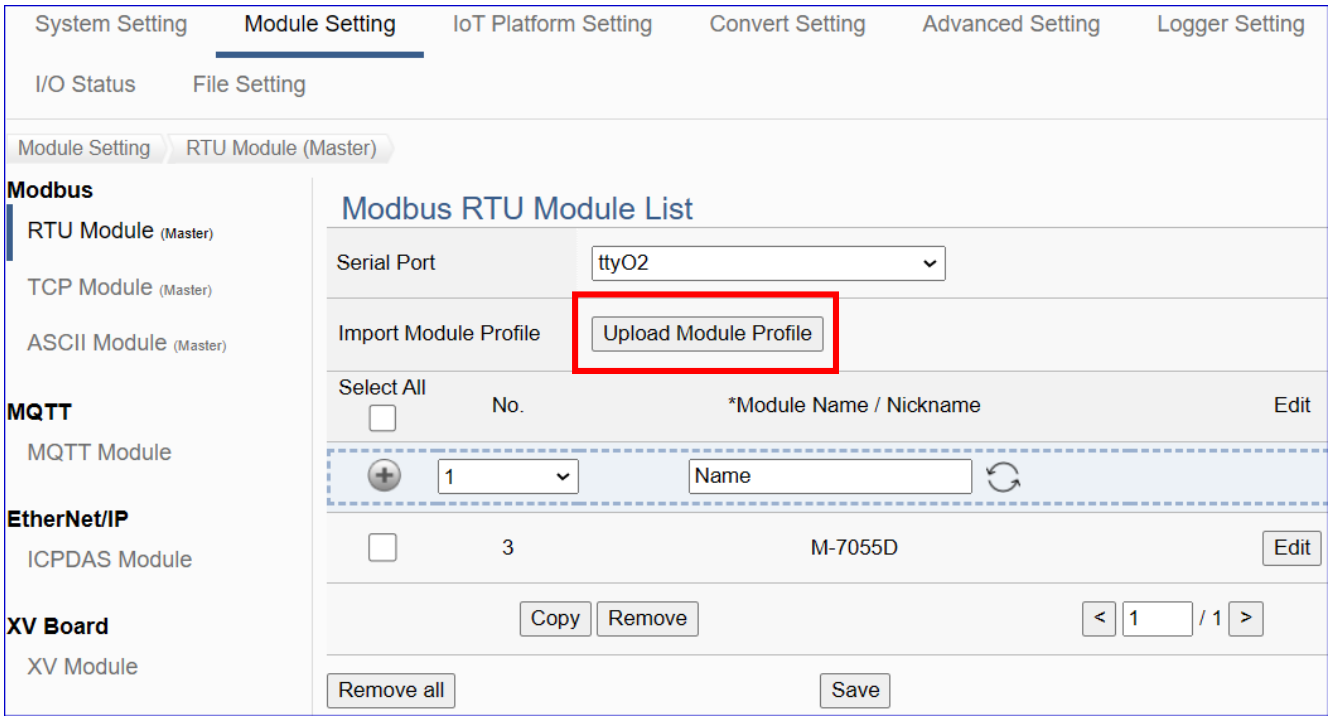


Fig. 1) Appendix E.1 Modbus RTU Import CVS Module Profile function

Field Setting Descriptions of CVS File for Modbus RTU Module:

ModuleName	SlaveID	Timeout										
DL-302	1	500										
VariableName	ModuleName	DataType	Function	Address	FunctionG	IsSwap	Description	Scaling Name	Original	Target	Offset	Scaling Description
CO2	DL-302	Short	3x	0	1	FALSE	CO2	CO2	0~10000	0~10000		
Relative_humidity	DL-302	Short	3x	1	1	FALSE	Hhumidity	Relative_humidity	0~10000	0~1000		
Temperature_Cels	DL-302	Short	3x	2	1	FALSE		Temperature_Celsius	-100~500	-10~50		
Temperature_Fahr	DL-302	Short	3x	3	1	FALSE		Temperature_Fahrenheit	140~1220	14~122		
Dew_point_tempe	DL-302	Short	3x	4	1	FALSE		Dew_point_temperature	-100~500	-10~50		
Dew_point_tempe	DL-302	Short	3x	5	1	FALSE		Dew_point_temperature	140~1220	14~122		

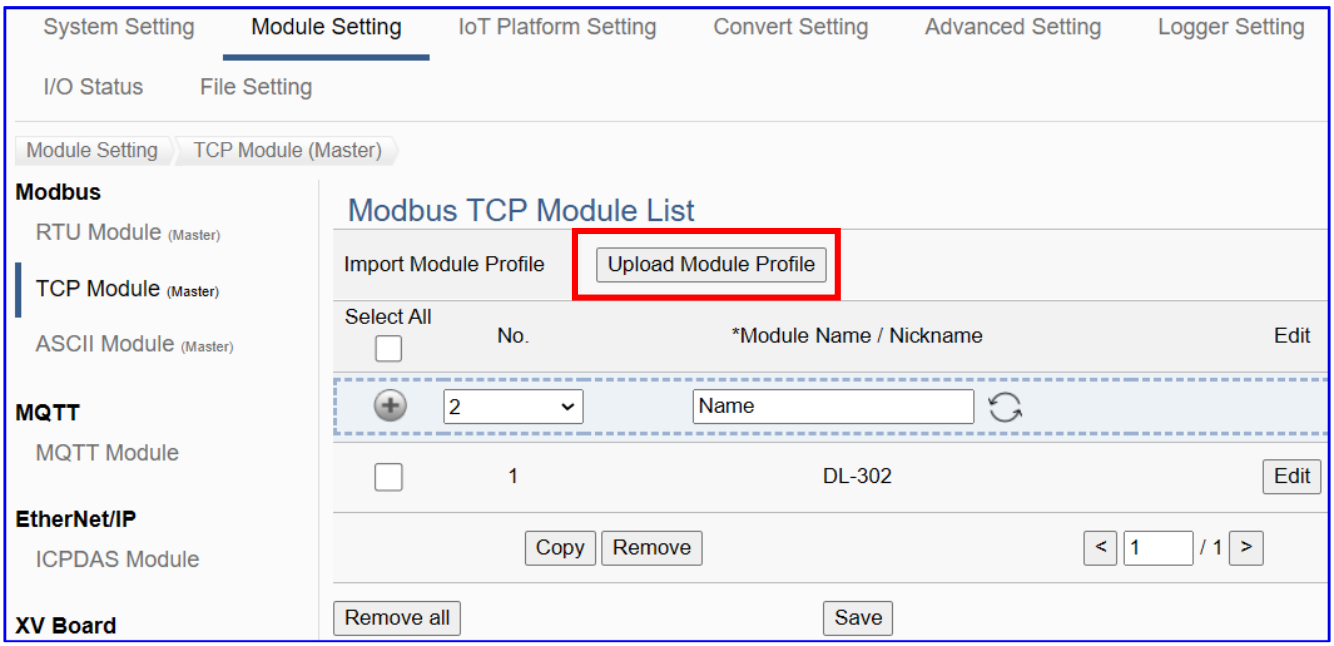
First Table Field Descriptions:	
ModuleName	The module name. e.g. in the example, the module name is "DL-302".
SlaveID	The Slave ID of the module. e.g. In the example, the Slave ID is "1".
Timeout	The time no response, unit: ms. If the module does not respond within this period, the communication is considered failed. In the example, the timeout is "500" ms.
Second Table Field Descriptions:	
VariableName	The variable name, e.g. "CO2", "Relative_humidity", etc.
ModuleName	The module name of the variable, e.g. this example sets "DL-302", indicating that the variable belongs to DL-302.
DataType	The type of data, includes "Bool", "Short", "Unsigned Short", "Long", "Unsigned Long", "Int64", "Float", "Float64" and other types.
Function	The Modbus function codes of the variable, includes "0x", "1x", "3x", and "4x".
Address	The address of the Modbus variable.
FunctionGroup	Functional group of variable. Variables in the same group are represented as being in the same Modbus command.
IsSwap	Set whether the value of the variable swaps the byte positions. "TRUE" means swap, and "FALSE" does not swap.
Description	Description of the variable, such as "CO2", "Hhumidity", etc.
Scaling Name	The name of the Scaling variable, fill in if you want to set Scaling.
Original	The range of the original value is separated by the “~” symbol, such as 0~1000.
Target	The range of the value after scaling is separated by the “~” symbol, such as 0~100.
Offset	The offset of the value after scaling
Scaling Description	Description of Scaling variables

E.2 Modbus TCP Module Profile and Field Descriptions

The Import Modbus TCP module profile function is in the menu [Module Setting] > [Modbus > TCP Module] > [Import Module Profile] – [Upload Module Profile] option. as follows.

Modbus TCP Import Module Profile function:

Click the [Upload Module Profile] button, then select the prepared CSV file, import it, and save the settings. The setting modules will show on the [Module List], and click the [Edit] button to see the module settings.



Field Setting Descrptions of CVS File for Modbus TCP Module:

ModuleName	IP	Port	SlaveID	Timeout	PollingRate							
DL-302	192.168.101.15	502	1	500	300							
VariableName	ModuleName	DataType	Function	Address	FunctionG	IsSwap	Descriptio	Scaling Name	Original	Target	Offset	Scaling Description
CO2	DL-302	Short	3x	0	1	FALSE	CO2	CO2	0~10000	0~10000		
Relative_humidity	DL-302	Short	3x	1	1	FALSE		Relative_humidity	0~10000	0~1000		
Temperature_Celsius	DL-302	Short	3x	2	1	FALSE		Temperature_Celsius	-100~500	-10~50		
Temperature_Fahrenheit	DL-302	Short	3x	3	1	FALSE		Temperature_Fahrenheit	140~1220	14~122		
Dew_point_temperature_	DL-302	Short	3x	4	1	FALSE		Dew_point_temperature_	-100~500	-10~50		
Dew_point_temperature_	DL-302	Short	3x	5	1	FALSE		Dew_point_temperature_	140~1220	14~122		

First Table Field Descriptions:	
ModuleName	The module name. e.g. in the example, the module name is "DL-302".
IP	IP of the connected module
Port	The connected TCP communication port
SlaveID	The Slave ID of the module. e.g. In the example, the Slave ID is "1".
Timeout	The time no response, unit: ms. If the module does not respond within this period, the communication is considered failed. In the example, the timeout is "500" ms.
PollingRate	The interval time between polling commands
Second Table Field Descriptions:	
VariableName	The variable name, e.g. "CO2", "Relative_humidity", etc.
ModuleName	The module name of the variable, e.g. this example sets "DL-302", indicating that the variable belongs to DL-302.
DataType	The type of data, includes "Bool", "Short", "Unsigned Short", "Long", "Unsigned Long", "Int64", "Float", "Float64" and other types.
Function	The Modbus function codes of the variable, includes "0x", "1x", "3x", and "4x".
Address	The address of the Modbus variable.
FunctionGroup	Functional group of variable. Variables in the same group are represented as being in the same Modbus command.
IsSwap	Set whether the value of the variable swaps the byte positions. "TRUE" means swap, and "FALSE" does not swap.
Description	Description of the variable, such as "CO2", "Hhumidity", etc.
Scaling Name	The name of the Scaling variable, fill in if you want to set Scaling.
Original	The range of the original value is separated by the “~” symbol, such as 0~1000.
Target	The range of the value after scaling is separated by the “~” symbol, such as 0~100.
Offset	The offset of the value after scaling
Scaling Description	Description of Scaling variables

Appendix F. VPN Settings OpenVPN Client Profile Example

In 5.1.3 VPN Setting, when connecting to an OpenVPN Server, you need to set up an OpenVPN Client Profile first, and its sub-file name must be **".conf"**. Here is an example and explanation. Users can edit the ".txt" text file first, then change the sub-name to **".conf"** and then upload the file.

Example of a VPN profile:

[Filename]: e.g. vpngate_vpn614923953.opengw.net_udp_1326.conf
Edit the contents in ".txt" format (e.g. [Content] below), and then change the sub-filename to the ".conf" when finished.

[Content]:

```
# OpenVPN set to client mode
client

# Use the TAP virtual network interface
dev tap

# Use UDP protocol to connect to the server.
# Change "proto udp" to "proto tcp" if you want to use TCP protocol.
proto udp

# Hostname or IP address of the server and port number to connect to (example)
remote example-vpn-server.com 1194

# Specify the encryption method
cipher AES-128-CBC

# Specify the authentication algorithm
auth SHA1

# Infinitely retry to resolver the hostname of the server.
resolv-retry infinite

# unbind local port number
nobind

# Keep private key across reboots
persist-key

# persist TAP state across reboots
persist-tun

# ping the server every 10 seconds
# If no response within 60 seconds, it is considered lost and will auto-reboots
keepalive 10 60
```

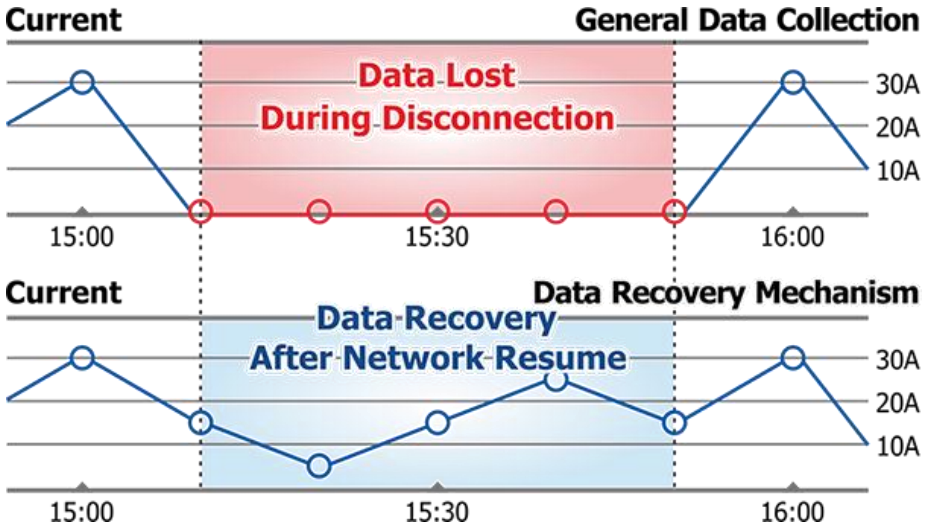
```
# CA certificate file (use comments here)
# <ca>
# -----BEGIN CERTIFICATE-----
# [Your CA certificate content here]
# -----END CERTIFICATE-----
# </ca>

# Client-side certificate file (use comments here)
# <cert>
# -----BEGIN CERTIFICATE-----
# [Your client certificate content here]
# -----END CERTIFICATE-----
# </cert>

# Client private key file (use comments here)
# <key>
# -----BEGIN RSA PRIVATE KEY-----
# [Your client private key content here]
# -----END RSA PRIVATE KEY-----
# </key>
```

Appendix G. Offline Data Recovery Mechanism

For general data collection, the sensor data will be sent to the control center and imported into the Database at cloud. But when the network experience a disconnection, the data transmitted during the offline period will be lost. UA Series supports the Offline Data Recovery mechanism. When experiences network disconnection, all data will be stored in the SD cards in UA Series. And when the network return to normal status, the data stored in SD card will be re-sent to UA, and imported into Database to ensure the integrity of historical data.



When offline occurs, the data storage capacity of e.g. the 4GB SD card and the time to write data back to SQL after online again:

MS SQL Database			
1000 Tags / Log Interval	Data amount for offline 1 hr.	Time to write data to SQL after offline 1 hr.	Time capacity of 4 GB SD card
10 Seconds	22.4 MB	28 Minutes	5.5 Days (132 Hours)
30 Seconds	7.47 MB	9.34 Minutes	16.5 Days (396 Hours)
1 Minute	3.73 MB	4.67 Minutes	33 Days (732 Hours)
5 Minutes	0.47 MB	0.94 Minutes	165 Days (3960 Hours)