OPC UA I/O User Manual

V9.1, 2024/02

U-7500 Series

IIoT OPC UA I/O Module

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Revision History

This chapter provides revision history information to this document.

The table below shows the revision history.

Revision	Date	Description
V9.1	02/2024	9.1th Version: Provide New Functions: 1. Increase software specification -Basic256Sha256 (Sign, Sign and Encrypt) - Aes128Sha256RsaOaep (Sign, Sign & Encrypt) - Aes256Sha256RsaPss (Sign, Sign & Encrypt) 2. Modify the contents of project file 4.2.5 3. 4.3.1 Add security settings 4. 4.3.3 Modify the security policy content
V9.0	12/2023	9th Version: Provide New Functions: 1. (4.3.1) (4.3.3) Replace the web interface picture. 2. 2.1.3 Refill notes 3. Delete the 3.5 rule setting. 4. 4.3.1 Add the option to automatically trust all client certificates in the connection settings. 5. Rewrite the content of the "Add new rule" function.
V8.0	09/2023	8th Version: Provide New Functions: 1. Modify the UA I/O manual introduction, features, and specifications. 2. Add Client Setting function 3. Add Client certificate function 4. Add EZ-UAQ Utility
V7.1	05/2023	7.1th Version: Provide New Functions: 1. 1. 4.5.1 New Line function and step-by-step procedure in the event log. The setting is changed to 4.5.1.1 Main settings 2. Add new function 4.5.1.2 Sending messages to Line 3. 4.5.2 rule setting add 4.5.2.1 main settings, optimize the setting process 4. 4. (4.2.3) (4.2.4) (4.4.2) The Nickname name in the function of [Module Setting] ➔ [I/O Setting] 5. 2.2.2 Original Utility changed to EZ-UAQ Utility content update
V7.0	02/2023	7th Version: Provide New Models & New Functions: 1. Add new models (*18): U-7502M, 7515M, 7517M, 7518ZM/S, 7518ZM/S2, 7524M, 7528M, 7542M, 7544M, 7545M, 7550AM, 7551M, 7552M, 7553M, 7558M, 7559M, 7561M, 7567M 2. Add new function: Support IoTstar Cloud management software (3.5 and 4.5.6) 3. Add new models to each section of CH1. 4. 2.2.2 Utility upgrade 5. Add counter function to the I/O setting (4.2.1)

Revision	Date	Description
		6. Add the Test function to the MQTT Setting. (3.2.1 and 4.4.1) 7. InduSoft changed to AVEVA Edge 8. Iotstar added new features 9. Add 3.4 Common settings table for easy integration 10. Add 4.2.1 Overview 11. Alias changed to Nickname 12. chapter order changed Scaling 4.5.1→4.2.3
V6.0	04/2022	6th Version: Provide New Models & New Functions: 1. Add new models: U-7517M-10、U-7519ZM(/S, /S2) 2. Add more descriptions for the 3.3, 4.1, 4.4, and 4.5 sections. 3. Add new models to each section of CH1.
V5.0	01/2022	5th Version: Provide New Functions 1. CH4.5.4: “Advanced Setting” add “Schedule” new sub-function. 2. CH4.5.3: “Rule Setting” add “Details item” that with “Unfold” and “Fold” button for full screen or un-full screen setting. In the “New Action” setting, add “Delay” item. 3. CH3.4 Add RESTful API HTTPS section. 4. Add new function to CH1

Content of Table

Revision History **3**

Content of Table **5**

1. UA I/O Introduction: **9**

1.1 Introduction 9

1.2 Features 11

1.3 Selection Guide 13

1.4 Specifications 15

1.4.1 Software Specifications (Series Common) 15

1.4.2 U-7502M Specifications 17

1.4.3 U-7504M Specifications 18

1.4.4 U-7515M Specifications 19

1.4.5 U-7517M Specifications 20

1.4.6 U-7517M-10 Specifications 21

1.4.7 U-7518ZM/S, U-7518ZM/S2 Specifications 22

1.4.8 U-7519ZM/S, U-7519ZM/S2 Specifications 23

1.4.9 U-7524M Specifications 24

1.4.10 U-7526M Specifications 25

1.4.11 U-7528M Specifications 26

1.4.12 U-7542M Specifications 27

1.4.13 U-7544M Specifications 28

1.4.14 U-7545M Specifications 29

1.4.15 U-7550AM Specifications 30

1.4.16 U-7551M Specifications 31

1.4.17 U-7552M Specifications 32

1.4.18 U-7553M Specifications 33

1.4.19 U-7555M Specifications 34

1.4.20 U-7558M Specifications 35

1.4.21 U-7559M Specifications 36

1.4.22 U-7560M Specifications 37

1.4.23 U-7561M Specifications 38

1.4.24 U-7567M Specifications 39

1.5 Wire Connections / Pin Assignments 40

1.5.1 U-7502M Wire Connections / Pin Assignments/Jumper Pic 40

1.5.2 U-7504M Wire Connections / Pin Assignments/Jumper Pic 41

1.5.3 U-7515M Wire Connections / Pin Assignments 42
1.5.4 U-7517M Wire Connections/Pin Assignments/Jumper Pic 43
1.5.5 U-7517M-10 Wire Connections/Pin Assignments/Jumper Pic 44
1.5.6 U-7518ZM Wire Connections/Pin Assignments 45
1.5.7 U-7519ZM Wire Connections/Pin Assignments/Jumper Pic 46
1.5.8 U-7524M Wire Connections/Pin Assignments/Jumper Pic 47
1.5.9 U-7526M Wire Connections/Pin Assignments/Jumper Pic 48
1.5.10 U-7528M Wire Connections/Pin Assignments/Jumper Pic 49
1.5.11 U-7542M Wire Connections/Pin Assignments 50
1.5.12 U-7544M Wire Connections/Pin Assignments 51
1.5.13 U-7545M Wire Connections/Pin Assignments 52
1.5.14 U-7550AM Wire Connections/Pin Assignments 53
1.5.15 U-7551M Wire Connections/Pin Assignments 54
1.5.16 U-7552M Wire Connections/Pin Assignments 55
1.5.17 U-7553M Wire Connections/Pin Assignments 56
1.5.18 U-7555M Wire Connections / Pin Assignments 57
1.5.19 U-7558M Wire Connections/Pin Assignments 58
1.5.20 U-7559M Wire Connections/Pin Assignments 59
1.5.21 U-7560M Wire Connections / Pin Assignments 60
1.5.22 U-7561M Wire Connections/Pin Assignments 61
1.5.23 U-7567M Wire Connections/Pin Assignments 62
1.6 Dimensions 63
U-7502M/U-7504M/U-7515M/U-7517M/U-7517M-10/U-7524M /U-7526M/U-7528M/U-7542M/U-7544M/U-7545M/U-7550AM /U-7551M/U-7552M/U-7553M/U-7555M/U-7558M/U-7559M /U-7560M/U-7561M/U-7567M Dimensions 63
U-7518ZM/U-7519ZM Dimensions 64
2. Quick Start: Hardware/Network Connection 65
2.1. Hardware Connection 65
2.1.1. Preparations for Devices 65
2.1.2. AI/AO Jumper Setting 65
2.1.3. Hardware Wiring 67
2.2. Network Connection 68
2.2.1. Connection by Factory Default Settings (For New UA) 69
2.2.2. Connection by Utility Searching 72
3. Main Function Settings 75
3.1 Settings for Using OPC UA Connection 76
3.1.1 OPC UA Server Connection Settings (UA I/O) 77
3.1.2 OPC UA Client Side: AVEVA Edge Simple Application 78

3.1.3 Secure Encrypted Connection: OPC UA Certificate 79
3.2 Settings for Using MQTT Connection 80
3.2.1 Connecting to MQTT Broker 81
3.2.2 MQTT Client Setting of the UA I/O 82
3.2.3 Secure Encrypted Connection: MQTT Certificate 87
3.3 RESTful API: Read and Write I/O and Virtual Point 88
What is Restful API? 88
Use RESTful with UA I/O 88
RESTful Description 90
Use RESTful API HTTPS with UA I/O 93
3.4 Common settings table for easy integration 94
Setting Steps: 94
3.5 IoTstar Connection Example 96
4. Main Menu: Parameter Descriptions 98
4.1 Main Menu - System Setting 98
4.1.1 Overview 98
4.1.2 Network Setting 99
Network Setting (LAN) 99
Hostname Setting 100
4.1.3 Time Setting 101
Date and Time Display 101
NTP time calibration 102
Set the time manually 102
4.1.4 Account Setting 103
Administrator Setting 103
User Setting 106
4.1.5 Web Server Setting 107
Web Server Setting 107
Https Web Server Setting 108
RESTful API 109
4.1.6 Firewall Setting 111
4.1.7 Firmware Setting 112
Restore Factory Setting 112
Update Firmware 114
Maintenance 116
4.2 Main Menu - Module Setting 117
4.2.1 I Overview 117
Function Overview 117
Download the file from device 118
4.2.2 I/O Setting 119
Digital Input 119
Digital Output 120
Analog Input 121

Analog Output 122
4.2.3 Scaling 123
4.2.4 I/O Status 124
Digital Input (& Counter) 124
Digital Output 125
Analog Input 126
Analog Output 127
4.2.5 Project File 128
Download the file from device 128
Upload the file to the device 129
4.3 Main Menu - OPC UA Setting 131
4.3.1 Server Setting 132
4.3.2 Server Certificate 134
4.3.3 Client Setting 135
4.3.4 Client Certificate 137
4.4 Main Menu – MQTT Setting 138
4.4.1 Connection Setting 138
4.4.2 Client Setting 139
4.4.3 Certificate 142
4.5 Main Menu – Advanced Setting 144
4.5.1 Event Log 144
4.5.1.1 Main Setting 144
4.5.1.2 Send Messages To Line 147
 Test Token 147
 Line Setting 147
4.5.2 Rule Setting 149
4.5.2.1 Main Setting 149
4.5.2.2. I/O Control 151
4.5.2.3 Schedule 153
4.5.3 IoTstar Setting 155
4.5.4 EZ-UAQ Utility 157
5. Recovering Firmware Setting (Reset) 158
Appendix A. Menu Path Diagram Description 160
Appendix B. MQTT JSON Format of the UA I/O Series 162
Appendix C. Dead Band Description 163

1. UA I/O Introduction:

UA I/O series is a series of **IIoT I/O modules** known as **U-7500 or U-7000**. This series built-in provides the communication protocol functions of the Industrial Internet of Things (IIoT), including OPC UA Server / Client, MQTT Client and Restful API functions. It allows users to choose the network communication method according to their needs and directly transfer the value of the I/O channel to the Cloud system or the field-side control system for displaying, analysis or strategy.

1.1 Introduction

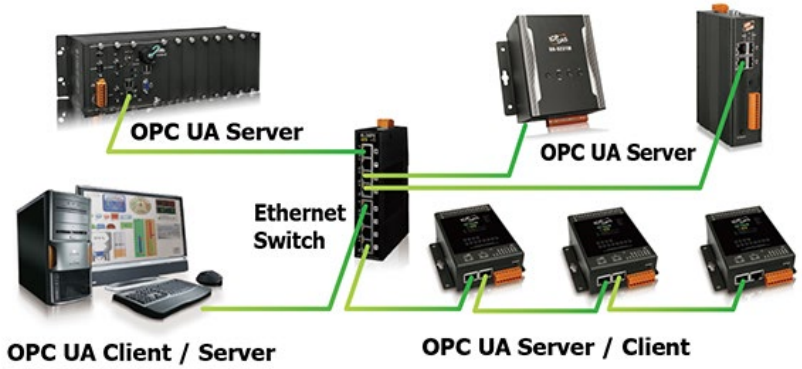
UA I/O modules is a series of Ethernet I/O modules that supports the **OPC UA Server / Client, MQTT Client** and **RESTful API** services (and can be used simultaneously). Users can choose the networking mode according to their needs and environment, to transmit the values of built-in I/O channels to the Cloud system or field control system for displaying, analysis or strategy. Support Scaling. Let the analog signal be converted into a more readable value. Support logic function rule setting IF, THEN, ELSE, can set up logical condition/action for I/O and virtual point; Provide schedule function to execute the set rules at a specific time; and support RESTful API function, can read/write I/O and virtual point through HTTP or HTTPS (identity verification and communication encryption).

In the information security and data security of the platform connection method, the following functions are provided respectively to enhance the security of I/O networking:

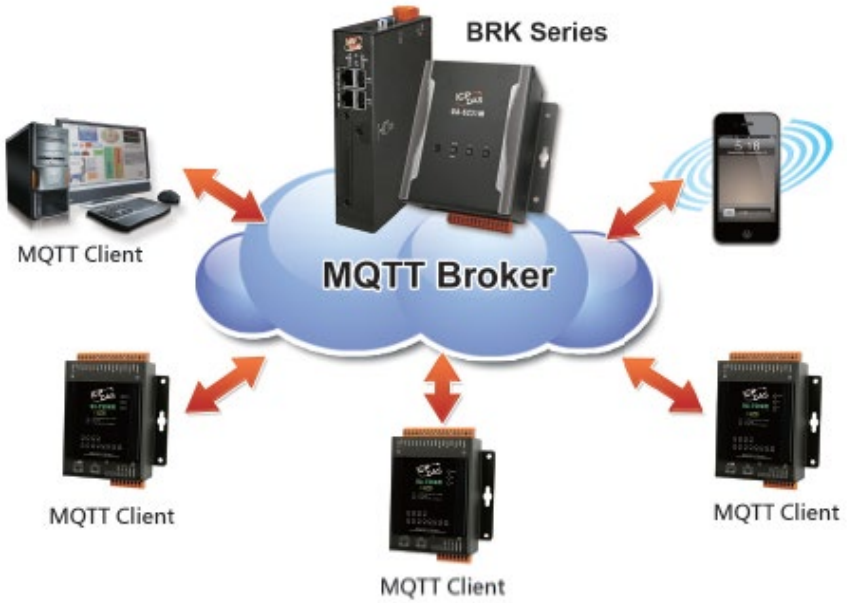
Connectivity for various platforms	OPC UA, MQTT, RESTful API can be used simultaneously
Connect to Cloud	MQTT
Connect to SCADA	OPC UA, MQTT
Connect to MES	OPC UA
Connect to IT	MQTT, RESTful API (HTTP, HTTPS)
Information Security	HTTPS, Port Binding, Allowlist, ICMP drop
Data Security	Certificate(X.509), Communication Encryption(SSL/TLS)

UA I/O Series provides a Web-based User Interface (Web UI) to configure the module, control the output channels, monitor the connection, and I/O status via a normal web browser. It is easy, fast, and no extra APP needed.

OPC UA Architecture:



MQTT Architecture:



1.2 Features

- Built-in OPC UA Server Service
  Compliance 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. Recommend to keep the maximum number of sessions within 3 connections.

- Built-in OPC UA Client Service
  Compliance with IEC 62541 Standard. Provides Transmission Security Encryption (SSL / TLS), User Authentication (X.509 Certificates / Account password), and OPC UA Server Connectivity.

- Built-in MQTT Client Service
  Build-in MQTT Client Service (Compliance with MQTT V.3.1.1 protocol). Provides functions of IoT Active M2M Transmission, QoS (Quality of Service), Retains Mechanism, Identity Authentication, Encryption, Last Will, etc.

- Support RESTful API function
  Support to read/write I/O and Virtual points via HTTP.
  Provide high-security HTTPS (identity verification and communication encryption) to read/write I/O and Virtual points.

- Support to Execute OPC UA, MQTT, and RESTful API Communication at the Same Time.

- Support IoTstar Cloud Management Software
  UA I/O factory version 9.7 and later supports this function.

- Support Scaling
  AI/AO modules support Scaling. Let the analog signal be converted into a more readable value.

- Support logic function Rule Setting: IF, THEN, ELSE
  Users can set up logical condition/action for I/O and virtual point.

- Support Schedule
  Provide schedule function to execute the set rules at a specific time.

- Support **Event Log**
  When the I/O value changes, record the current I/O value for easy device tracking in the future.

- Built-in Web Server to Provide the Web User Interface
  UA I/O Series provides a Web-based User Interface (Web UI) to configure the module, control the output channels, monitor the connection, and I/O status via a normal web browser. It is easy, fast,

and no extra APP needed.

- **Diversified Choices**
  Different models provide different AI, AO, DI, or DO channels, and users can choose the desired model according to the needs of the case.

- Dual-port Ethernet Switch for Daisy-Chain Topology
  Provide dual-port Ethernet switch for Daisy-Chain Topology. The cabling of Daisy-Chain Topology is much easier, and the total costs of cables and switches are significantly reduced.

- IEEE 802.3af-compliant Power over Ethernet (PoE)
  UA I/O follows IEEE 802.3af (classification, Class 2) compliant Power over Ethernet (PoE) specification. It allows receiving power from PoE enabled network by Ethernet pairs. This feature provides greater flexibility and efficiency to simplify system design, save space, and reduce wirings and power sockets.

1.3 Selection Guide

U-7500 Series UA I/O Selection Guide:

U-7500 Series OPC UA I/O Module Selection Guide								
Module	AI		AO		DI		DO	
	Ch.	Type	Ch.	Type	Ch.	Type	Ch.	Type
U-7502M	3	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V +0 mA ~ +20 mA, ±20 mA, 4 ~ 20 mA	-	-	6	Wet (Sink/Source)	3	Power Relay, Form A (SPST N.O.)
U-7504M	4	±500mV, ±1V, ±5V, ±10V, 0~20mA, ±20mA, 4~20mA	4	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	4	Dry (Source), Wet (Sink)	-	-
U-7515M	7	Pt100, Pt1000, Ni120, Cu100, Cu1000	-	-	-	-	-	-
U-7517M	8	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	-	-	-	-	4	Isolated Open Collector (Sink)
U-7517M-10	10 / 20	±150mV, ±500mV, ±1V, ±5V, ±10V, ±20mA, 0~20mA, 4~20mA	-	-	-	-	-	-
U-7518ZM/S	10	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA Thermocouple: J, K, T, E, R, S, B, N, C, L, M, LDIN43710	-	-	-	-	3	Isolated Open Collector (Sink)
U-7518ZM/S2								
U-7519ZM/S	10	±15mV, ±50mV, ±100mV, ±150mV, ±500mV, ±1V, ±2.5V, ±5V, ±10V, ±20mA, 0~20mA, 4~20mA Thermocouple: J, K, T, E, R, S, B, N, C, L, M, LDIN43710	-	-	-	-	3	Isolated Open Collector (Sink)
U-7519ZM/S2								
U-7524M	-	-	4	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	5	Dry (Source) Wet (Sink)	5	Isolated Open Collector (Sink)
U-7526M	6	±500 mV, ±1V, ±5V, ±10V, 0~20mA, ±20mA, 4~20mA	2	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	2	Dry (Source) Wet (Sink)	2	Isolated Open Collector (Sink)
U-7528M	-	-	8	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	-	-	-	-
U-7542M	-	-	-	-	-	-	16	Isolated Open Collector (Sink)

U-7500 Series OPC UA I/O Module Selection Guide								
Module	AI		AO		DI		DO	
	Ch.	Type	Ch.	Type	Ch.	Type	Ch.	Type
U-7544M	-	-	-	-	8	Wet (Sink/Source)	8	Isolated Open Collector (Sink)
U-7545M	-	-	-	-	-	-	16	Isolated Open Collector (Source)
U-7550AM	-	-	-	-	12	Dry (Source) Wet (Sink)	6	Isolated Open Collector (Sink)
U-7551M	-	-	-	-	16	Wet (Sink/Source)	-	-
U-7552M	-	-	-	-	8	Wet (Sink/Source)	8	Isolated Open Collector (Source)
U-7553M	-	-	-	-	16	Dry (Source)	-	-
U-7555M	-	-	-	-	8	Dry (Source), Wet (Sink,Source)	8	Isolated Open Collector (Source)
U-7558M	-	-	-	-	8	Wet (Sink/Source)	-	-
U-7559M	-	-	-	-	8	Wet (Sink/Source)	-	-
U-7560M	-	-	-	-	6	Wet (Sink/Source)	6	Power Relay Form A (SPST N.O.)
U-7561M	-	-	-	-	-	-	11	Power Relay, Form A (SPST N.O.)
U-7567M	-	-	-	-	-	-	8	Power Relay, Form A (SPST N.O.)

1.4 Specifications

1.4.1 Software Specifications (Series Common)

UA I/O Software Specifications (Series Common)	
Protocol	
OPC UA Server / Client	● OPC Unified Architecture: 1.02 ● Core Server Facet ● Data Access Server Facet ● Method Server Facet ● UA-TCP UA-SC UA Binary ● User Authentication: - Anonymous - Username/Password - X.509 Certificate ● Security Policy: - None - Basic128Rsa15 (Sign, Sign & Encrypt) - Basic256 (Sign, Sign & Encrypt) - Basic256Sha256 (Sign, Sign and Encrypt) - Aes128Sha256RsaOaep (Sign, Sign & Encrypt) - Aes256Sha256RsaPss (Sign, Sign & Encrypt) ● Can Execute with MQTT and RESTful API Communication Simultaneously ● Max. Session Connections: 3 (Server only)
MQTT Client	● Connect to the MQTT Broker to read or control the I/O channel value by the publish/subscribe messaging mechanism. (MQTT Ver. 3.1.1; TLS Ver. 1.2)
RESTful API	● User can read/write the I/O & Virtual points through HTTP or HTTPS.
Function	
Web Interface for Configuration	● The system operation can be performed through the browser without installing software tools. ● Use AES 256 encryption algorithm to encrypt web page setting data for general communication. ● HTTPS upgrades the security of web communication.
Scaling	● Convert the analog signal to a more readable value. ● Function is only available for modules with AI/AO.
Security	● Information Security: Provide HTTPS, Port Binding, Allowlist, ICMP drop functions. ● Data security: Provide Certificate (X.509), Communication Encryption (SSL/TLS) functions.
Rule Setting	● Provide simple logic condition rule setting, let UA I/O do automatic condition judgment and action control, to achieve simple intelligentization.

UA I/O Software Specifications (Series Common)	
Schedule	● Provide schedule function to execute the set rules at a specific time.
Event Log	● When the I/O value changes, record the current I/O value for easy device tracking in the future.
IoTstar Setting	● Support IoTstar cloud management software developed by ICP DAS.

1.4.2 U-7502M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±2 kV for Power Line
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter

Power	
Reverse Polarity Protection	Yes
Consumption	4.1 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 to +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Analog Input	
Channels	3 (Differential)
Type	Voltage, Current
Range	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V 0 to 20 mA, ±20 mA, 4 to 20 mA(Jumper Selectable)
Resolution	16-bit
Accuracy	Normal Mode: ±0.1% Fast Mode: ±0.5% or better
Sampling Rate	Normal Mode: 10 samples/second (Total) Fast Mode: 50 samples/second (Total)
Input Impedance	Voltage: 2 MΩ Current: 125 Ω
Common Mode Rejection	86 dB (min.)
Normal Mode Rejection	100 dB
Overvoltage Protection	240 Vrms
Overcurrent Protection	50 mA at 110 VDC (max.)
Individual Channel Configuration	Yes
Open Wire Detection	Yes
Zero Drift	±20 μV/°C
Span Drift	±25 ppm/°C
Isolation	±400 VDC, Virtual Channel to Channel Isolation

Digital Input/Counter	
Channels	6
Type	Wet Contact
Sink/Source (NPN/PNP)	Sink/Source
ON Voltage Level	+10 ~ +50 VDC
OFF Voltage Level	+4 VDC (max.)
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Input Impedance	10 kΩ, 0.5W
Overvoltage Protection	+70 VDC

Relay Output	
Channels	3
Type	Power Relay, Form A (SPST N.O.)
Contact Rating	5 A @ 250 VAC/24 VDC (Resistive Load)
Operate Time	6 ms (Typical)
Release Time	3 ms (Typical)
Electrical Endurance	10^5 ops.
Mechanical Endurance	2 × 10^7 ops.
Power on Value	Programmable
Safe Value	Programmable

1.4.3 U-7504M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication (Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
EFT (IEC 61000-4-4)	±2 kV for Power Line
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter

Power	
Reverse Polarity Protection	Yes
Consumption	5.5 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Analog Input	
Channels	4 (Differential)
Type	Voltage, Current
Range	±500 mV, ±1 V, ±5 V, ±10 V 0 to 20 mA, ±20 mA, 4 to 20 mA (Jumper Selectable)
Resolution	16-bit
Accuracy	Normal Mode: ±0.1% Fast Mode: ±0.5% or better
Sampling Rate	Normal Mode: 10 samples/second (Total) Fast Mode: 50 samples/second (Total)
Input Impedance	Voltage: 2 MΩ Current: 125 Ω
Common Mode Rejection	86 dB (min.)
Normal Mode Rejection	100 dB
Common Voltage Protection	±200 VDC
Overvoltage Protection	240 Vrms
Overcurrent Protection	50 mA at 110 VDC (max.)
Individual Channel Configuration	Yes
Open Wire Detection	Yes
Zero Drift	±20 μV/°C
Span Drift	±25 ppm/°C
Isolation	±400 VDC, Virtual Channel to Channel Isolation

Analog Output	
Channels	4
Type	Voltage, Current
Range	+0 to +5 VDC, ±5 VDC, +0 to +10 VDC, ±10 VDC, 0 to 20 mA, 4 to 20 mA (Jumper Selectable)
Resolution	12-bit
Accuracy	±0.1% of FSR
Open Wire Detection	For 4 ~ 20 mA only
Voltage Output Capability	10 V @ 20 mA
Current Load Resistance	400 Ω
Individual Channel Configuration	Yes
Power-on Value	Programmable
Safe Value	Programmable

Digital Input/Counter	
Channels	4
Type	Dry Contact Wet Contact
ON Voltage Level	Dry: Open Wet: +1 VDC (max.)
OFF Voltage Level	Dry: Close to GND Wet: +3.5 to +30 VDC
Max. Count	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Effective Distance	500m (max.)
Overvoltage Protection	+30 VDC

1.4.4 U-7515M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 3000 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±2 kV for Power Line
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	3.2 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Analog Input	
Channels	7 (Differential)
Type	RTD (2-wire, 3-wire)
Sensor Type	Pt100, Pt1000, Ni120, Cu100, Cu1000
Resistance Measurement	3.2 kΩ (max.)
Resolution	16-bit
Accuracy	±0.05%
Sampling Rate	12 samples/second (Total)
Input Impedance	> 1 MΩ
Common Mode Rejection	150 dB
Normal Mode Rejection	100 dB
Overvoltage Protection	+120 VDC
Individual Channel Configuration	Yes
Open Wire Detection	Yes
3-wire RTD Lead Resistance Elimination	Yes
Zero Drift	±0.5 μV/°C
Span Drift	±20 μV/°C

1.4.5 U-7517M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±2 kV for Power Line
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	4.4 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Analog Input	
Channels	8 (Differential)
Type	Voltage, Current
Range	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V ±20 mA, 0 to 20 mA, 4 to 20 mA (Jumper Selectable)
Resolution	16-bit
Accuracy	Normal Mode: ±0.1% Fast Mode: ±0.5% or better
Sampling Rate	Normal Mode: 10 samples/second (Total) Fast Mode: 50 samples/second (Total)
Input Impedance	Voltage: 2 MΩ Current: 125 Ω
Common Mode Rejection	86 dB (min.)
Normal Mode Rejection	100 dB
Common Voltage Protection	±200 VDC
Overvoltage Protection	240 Vrms
Overcurrent Protection	50 mA at 110 VDC (max.)
Individual Channel Configuration	Yes
Open Wire Detection	For 4 ~ 20 mA only
Zero Drift	±20 μV/°C
Span Drift	±25 ppm/°C
Isolation	±400 VDC, Virtual Channel to Channel Isolation

Digital Output	
Channels	4
Type	Isolated Open Collector
Sink/Source (NPN/PNP)	Sink
Load Voltage	+5 ~ +50 VDC
Load Current	700 mA/channel
Overvoltage Protection	+60 VDC
Overload Protection	1.4 A
Short-circuit Protection	Yes
Power on Value	Programmable
Safe Value	Programmable

1.4.6 U-7517M-10 Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication (Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±2 kV for Power Line
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	3.8 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Analog Input	
Channels	10 differential or 20 single-ended (Note1), software selectable
Type	Voltage, Current
Range	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA, 0 to 20 mA, 4 to 20 mA (Jumper Selectable)
Resolution	16-bit
Accuracy	Normal Mode: ±0.1% Fast Mode: ±0.5% or better
Sampling Rate	Normal Mode: 10 samples/second (Total) Fast Mode: 50 samples/second (Total)
Input Impedance	Voltage: 2 MΩ (Differential), 1 MΩ (Single-ended) Current: 125 Ω
Common Mode Rejection	86 dB (min.)
Normal Mode Rejection	100 dB
Common Voltage Protection	±200 VDC
Overvoltage Protection	Differential: 240 Vrms Single-ended: 150 Vrms
Overcurrent Protection	50 mA at 110 VDC (max.)
Individual Channel Configuration	Yes
Open Wire Detection	For 4 ~ 20 mA only
Zero Drift	±20 μV/°C
Span Drift	±25 ppm/°C
Isolation	±400 VDC, Virtual Channel to Channel Isolation

1.4.7 U-7518ZM/S, U-7518ZM/S2 Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication (Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	RJ-45 x 2, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	3.3 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 114 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Analog Input	
Channels	10 (Differential)
Type	Voltage, Current, Thermocouple
Temperature Output Consistency	Yes
Stable Temperature Output in the Field	Yes
Range	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V ±20 mA, 0 to 20 mA, 4 to 20 mA (Requires Optional External 125 Ω Resistor) Thermocouple (J, K, T, E, R, S, B, N, C, L, M, and LDIN43710)
Resolution	16-bit
Accuracy	±0.1% of FSR or better
Sampling Rate	10 Samples/Second (Total)
Input Impedance	> 300 kΩ
Common Mode Rejection	150 dB (min.)
Normal Mode Rejection	100 dB
Overvoltage Protection	240 Vrms
Individual Channel Configuration	Yes
Open Wire Detection	Yes
Zero Drift	±0.5 μV/°C
Span Drift	±25 ppm/°C
Isolation	±400 VDC, Virtual Channel to Channel Isolation

Digital Output	
Channels	3
Type	Isolated Open Collector
Sink/Source (NPN/PNP)	Sink
Load Voltage	+5 ~ +50 VDC
Load Current	700 mA/channel
Overvoltage Protection	+60 VDC
Overload Protection	1.4 A
Short-circuit Protection	Yes
Power on Value	Programmable
Safe Value	Programmable

1.4.8 U-7519ZM/S, U-7519ZM/S2 Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication (Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	3.6 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 114 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Analog Input	
Channels	10 (Differential)
Type	Voltage, Current, Thermocouple
Temperature Output Consistency	Yes
Stable Temperature Output in the Field	Yes
Range	±15 mV, ±50 mV, ±100 mV, ±150 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V ±20 mA, 0 to 20 mA, 4 to 20 mA (Requires Optional External 125 Ω Resistor) Thermocouple (J, K, T, E, R, S, B, N, C, L, M, and LDIN43710)
Resolution	16-bit
Accuracy	±0.1% of FSR or better
Sampling Rate	10 Samples/Second (Total)
Input Impedance	> 300 kΩ
Common Mode Rejection	86 dB (min.)
Normal Mode Rejection	100 dB
Overvoltage Protection	240 Vrms
Individual Channel Configuration	Yes
Open Wire Detection	Yes
Zero Drift	±0.5 μV/°C
Span Drift	±25 ppm/°C
Isolation	±400 VDC, Virtual Channel to Channel Isolation

Digital Output	
Channels	3
Type	Isolated Open Collector
Sink/Source (NPN/PNP)	Sink
Load Voltage	+5 ~ +50 VDC
Load Current	700 mA/channel
Overvoltage Protection	+60 VDC
Overload Protection	1.4 A
Short-circuit Protection	Yes
Power on Value	Programmable
Safe Value	Programmable

1.4.9 U-7524M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter

Power	
Reverse Polarity Protection	Yes
Consumption	5.5 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Analog Output	
Channels	4
Type	Voltage, Current
Range	+0 to +5 VDC, ±5 VDC, +0 to +10 VDC, ±10 VDC, 0 to 20 mA, 4 to 20 mA (Jumper Selectable)
Resolution	12-bit
Accuracy	±0.1% of FSR
Open Wire Detection	For 4 ~ 20 mA only
Voltage Output Capability	10 V @ 20 mA
Current Load Resistance	500 Ω
Individual Channel Configuration	Yes
Power-on Value	Programmable
Safe Value	Programmable

Digital Input/Counter	
Channels	5
Type	Dry Contact, Wet Contact
ON Voltage Level	Dry: Close to GND Wet: +1 VDC (max.)
OFF Voltage Level	Dry: Open Wet: +3.5 ~ +30 VDC
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Effective Distance	500m (max.)
Overvoltage Protection	+30 VDC
Digital Output	
Channels	5
Type	Isolated Open Collector
Sink/Source (NPN/PNP)	Sink
Load Voltage	+5 ~ +50 VDC
Load Current	600 mA/channel
Overvoltage Protection	+60 VDC
Overload Protection	1.4 A
Short-circuit Protection	Yes
Power on Value	Programmable
Safe Value	Programmable

1.4.10 U-7526M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication (Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
EFT (IEC 61000-4-4)	±2 kV for Power Line
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter

Power	
Reverse Polarity Protection	Yes
Consumption	5.2 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Analog Input	
Channels	6 (Differential)
Type	Voltage, Current
Range	±500 mV, ±1V, ±5 V, ±10 V 0 to 20 mA, ±20 mA, 4 to 20 mA (Jumper Selectable)
Resolution	16-bit
Accuracy	Normal Mode: ±0.1% Fast Mode: ±0.5% or better
Sampling Rate	Normal Mode: 10 samples/second (Total) Fast Mode: 50 samples/second (Total)
Input Impedance	Voltage: 2 MΩ Current: 125 Ω
Common Mode Rejection	86 dB (min.)
Normal Mode Rejection	100 dB
Common Voltage Protection	±200 VDC
Overvoltage Protection	240 Vrms
Overcurrent Protection	50 mA at 110 VDC (max.)
Individual Channel Configuration	Yes
Open Wire Detection	For 4 ~ 20 mA only
Zero Drift	±20 μV/°C
Span Drift	±25 ppm/°C
Isolation	±400 VDC, Virtual Channel to Channel Isolation
Analog Output	
Channels	2
Type	Voltage, Current
Range	+0 to +5 VDC, ±5 VDC, +0 to +10 VDC, ±10 VDC, 0 to 20 mA, 4 to 20 mA (Jumper Selectable)
Resolution	12-bit
Accuracy	±0.1% of FSR

Open Wire Detection	For 4 ~ 20 mA only
Voltage Output Capability	10 V @ 20 mA
Current Load Resistance	500 Ω
Individual Channel Configuration	Yes
Power-on Value	Programmable
Safe Value	Programmable

Digital Input/Counter	
Channels	2
Type	Dry Contact Wet Contact
ON Voltage Level	Dry: Close to GND Wet: +1 VDC (max.)
OFF Voltage Level	Dry: Open Wet: +3.5 to +30 VDC
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Effective Distance	500m (max.)
Overvoltage Protection	+30 VDC
Digital Output	
Channels	2
Type	Isolated Open Collector
Sink/Source (NPN/PNP)	Sink
Load Voltage	+5 ~ +50 VDC
Load Current	700 mA/channel
Overvoltage Protection	+60 VDC
Overload Protection	1.4 A
Short-circuit Protection	Yes
Power-on Value	Programmable
Safe Value	Programmable

1.4.11 U-7528M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	6.0 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Analog Output	
Channels	8
Type	Voltage, Current
Range	+0 to +5 VDC, ±5 VDC, +0 to +10 VDC, ±10 VDC, 0 to 20 mA, 4 to 20 mA (Jumper Selectable)
Resolution	12-bit
Accuracy	±0.1% of FSR
Open Wire Detection	For 4 ~ 20 mA only
Voltage Output Capability	10 V @ 10 mA
Current Load Resistance	500 Ω
Individual Channel Configuration	Yes
Power-on Value	Programmable
Safe Value	Programmable

1.4.12 U-7542M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 3750 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	3.4 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Digital Output	
Channels	16
Type	Isolated Open Collector
Sink/Source (NPN/PNP)	Sink
Load Voltage	+ 3.5 ~ + 50 VDC
Load Current	650 mA/channel at 25°C Direct Drive Power Relay Module
Overvoltage Protection	+60 VDC
Overload Protection	1.3 A
Short-circuit Protection	Yes
Power-on Value	Programmable
Safe Value	Programmable

1.4.13 U-7544M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	3.5 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Digital Input/Counter	
Channels	8
Type	Wet Contact
Sink/Source (NPN/PNP)	Sink/Source
ON Voltage Level	+10 ~ +50 VDC
OFF Voltage Level	+4 VDC (max.)
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Input Impedance	10 kΩ
Overvoltage Protection	+70 VDC
Digital Output	
Channels	8
Type	Isolated Open Collector
Sink/Source (NPN/PNP)	Sink
Load Voltage	+ 3.5 ~ + 50 VDC
Load Current	650 mA/channel at 25°C Direct Drive Power Relay Module
Overvoltage Protection	+60 VDC
Overload Protection	1.4 A
Short-circuit Protection	Yes
Power on Value	Programmable
Safe Value	Programmable

1.4.14 U-7545M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 3750 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	3.1 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Digital Output	
Channels	16
Type	Isolated Open Source
Sink/Source (NPN/PNP)	Source
Load Voltage	+10 ~ +40 VDC
Load Current	600 mA/channel
Overvoltage Protection	+47 VDC
Overload Protection	1.4 A (with short-circuit protection)
Short-circuit Protection	Yes
Power on Value	Programmable
Safe Value	Programmable

1.4.15 U-7550AM Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	2.9 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Digital Input/Counter	
Channels	12
Type	Dry Contact, Wet Contact
Sink/Source (NPN/PNP)	Dry: Source Wet: Sink
ON Voltage Level	Dry: Close to GND Wet: 1 VDC (max.)
OFF Voltage Level	Dry: Open Wet: +3.5 ~ +50 VDC (max.)
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Input Impedance	10 kΩ
Overvoltage Protection	+60 VDC
Digital Output	
Channels	6
Type	Isolated Open Collector
Sink/Source (NPN/PNP)	Sink
Load Voltage	+5 ~ +50 VDC
Load Current	500 mA/channel
Overvoltage Protection	+60 VDC
Overload Protection	1.3 A
Short-circuit Protection	Yes
Power on Value	Programmable
Safe Value	Programmable

1.4.16 U-7551M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	3.1 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Digital Input/Counter	
Channels	16
Type	Wet Contact
Sink/Source (NPN/PNP)	Sink/Source
ON Voltage Level	+10 ~ +50 VDC
OFF Voltage Level	+4 VDC (max.)
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Input Impedance	10 kΩ
Overvoltage Protection	+70 VDC

1.4.17 U-7552M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±2 kV for Power Line
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	3.5 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Digital Input/Counter	
Channels	8
Type	Wet Contact
Sink/Source (NPN/PNP)	Sink/Source
ON Voltage Level	+10 ~ +50 VDC
OFF Voltage Level	+4 VDC (max.)
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Input Impedance	10 kΩ
Overvoltage Protection	+70 VDC
Digital Output	
Channels	8
Type	Isolated Open Collector
Sink/Source (NPN/PNP)	Source
Load Voltage	+10 ~ +40 VDC
Load Current	650 mA/channel at 25°C
Overvoltage Protection	+47 VDC
Short-circuit Protection	Yes
Power on Value	Programmable
Safe Value	Programmable

1.4.18 U-7553M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	4.1 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Digital Input/Counter	
Channels	16
Type	Dry Contact
Sink/Source (NPN/PNP)	Source
ON Voltage Level	Close to GND
OFF Voltage Level	Open
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Effective Distance	500m (max.)

1.4.19 U-7555M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication (Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
EFT (IEC 61000-4-4)	±2 kV for Power Line
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	4.0 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Digital Input/Counter	
Channels	8
Type	Dry Contact Wet Contact
Sink/Source (NPN/PNP)	Dry: Source Wet: Sink/Source
On Voltage Level	Dry: Close to GND Wet: +10 ~ +50 VDC
OFF Voltage Level	Dry: Open Wet: +4 VDC (max.)
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Effective Distance	500m (max.)
Input Impedance	10 kΩ
Overvoltage Protection	+70 VDC
Digital Output	
Channels	8
Type	Isolated Open Collector
Sink/Source (NPN/PNP)	Source
Load Voltage	+10 ~ +40 VDC
Load Current	650 mA/Channel at 25°C
Overvoltage Protection	+47 VDC
Short-circuit Protection	Yes
Power on Value	Programmable
Safe Value	Programmable

1.4.20 U-7558M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	2.7 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Digital Input/Counter	
Channels	8
Type	Wet Contact
Sink/Source (NPN/PNP)	Sink/Source
ON Voltage Level	80 ~ 250 VAC ±90 ~ ±250 VDC
OFF Voltage Level	30 VAC (max.) ±30 VDC (max.)
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Input Impedance	150 kΩ
Overvoltage Protection	300 VAC

1.4.21 U-7559M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	2.7 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Digital Input/Counter	
Channels	8
Type	Wet Contact
Sink/Source (NPN/PNP)	Sink/Source
ON Voltage Level	10 ~ 80 VAC ±15 ~ ±80 VDC
OFF Voltage Level	3 VAC (max.) ±3 VDC (max.)
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Input Impedance	30 kΩ
Overvoltage Protection	120 VAC

1.4.22 U-7560M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication (Programmable)
Isolation	
2-way Isolation	I/O: 3000 VDC
EMS Protection	
EFT (IEC 61000-4-4)	±4 kV for Power Line
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	3.8 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, non-condensing

I/O Specifications

Digital Input/Counter	
Channels	6
Type	Wet Contact
Sink/Source (NPN/PNP)	Sink/Source
ON Voltage Level	+10 ~ +50 VDC
OFF Voltage Level	+4 VDC (max.)
Max. Counts	4,294,967,295 (32-bit)
Frequency	100 Hz
Min. Pulse Width	5 ms
Input Impedance	10 kΩ
Overvoltage Protection	+70 VDC

Relay Output	
Channels	6
Type	Power Relay, Form A (SPST N.O.)
Contact Rating	5 A @ 250 VAC/24 VDC (Resistive Load)
Operate Time	10 ms (max.)
Release Time	5 ms (max.)
Electrical Endurance	10^5 ops.
Mechanical Endurance	2 × 10^7 ops.
Power on Value	Programmable
Safe Value	Programmable

1.4.23 U-7561M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 3000 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	4.6 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

I/O Specifications

Relay Output	
Channels	11
Type	Power Relay, Form A (SPST N.O.)
Contact Rating	5 A @ 250 VAC/24 VDC (Resistive Load)
Operate Time	10 ms (max.)
Release Time	5 ms (max.)
Electrical Endurance	10^5 ops.
Mechanical Endurance	2 × 10^7 ops.
Power on Value	Programmable
Safe Value	Programmable

1.4.24 U-7567M Specifications

System Specifications

CPU Module	
CPU	32-bit CPU (400 MHz)
Watchdog Timer	Module, Communication(Programmable)
Isolation	
2-way Isolation	I/O: 3000 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for each terminal ±8 kV Air for random point
EFT (IEC 61000-4-4)	±4 kV for Power Line
Surge (IEC 61000-4-5)	±2 kV for Power Line
LED Indicators	
Status	Run, Ethernet, I/O
Ethernet	
Ports	2 x RJ-45, 10/100 Base-TX, Swtich Ports
PoE	Yes
LAN bypass	Yes
Security	ID, Password and IP Filter
Power	
Reverse Polarity Protection	Yes
Consumption	4.1 W
Powered from PoE	IEEE 802.3af, Class2
Powered from Terminal Block	+12 ~ +48 VDC
Mechanical	
Dimensions (mm)	97 x 120 x 47 (W x L x H)
Installation	DIN-Rail mounting
Environment	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-30 °C ~ +80 °C
Humidity	10 ~ 90% RH, Non-condensing

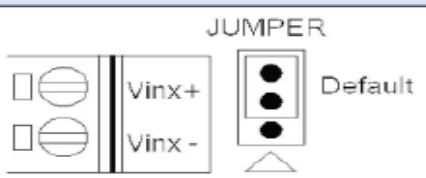
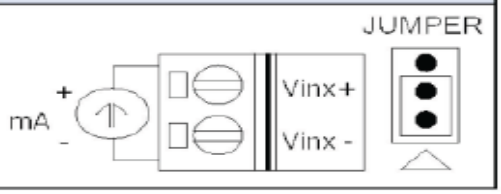
I/O Specifications

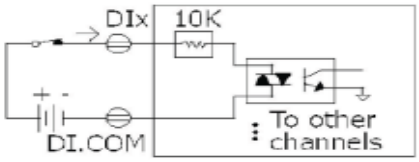
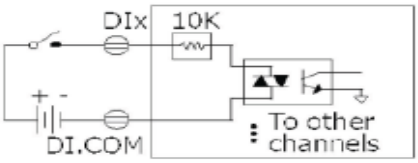
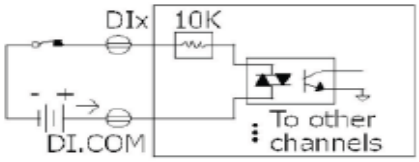
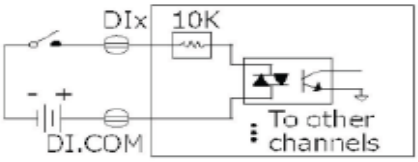
Relay Output	
Channels	8
Type	Power Relay, Form A (SPST N.O.)
Contact Rating	5 A @ 250 VAC/24 VDC (Resistive Load)
Operate Time	10 ms (max.)
Release Time	5 ms (max.)
Electrical Endurance	10^5 ops.
Mechanical Endurance	2 × 10^7 ops.
Power on Value	Programmable
Safe Value	Programmable

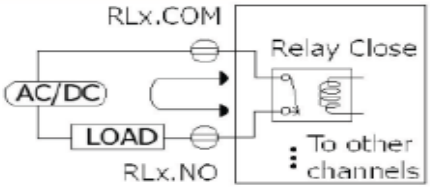
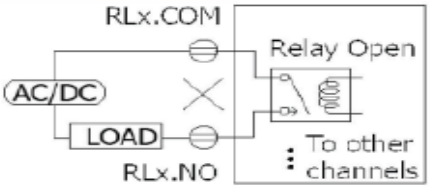
1.5 Wire Connections / Pin Assignments

1.5.1 U-7502M Wire Connections / Pin Assignments/Jumper Pic

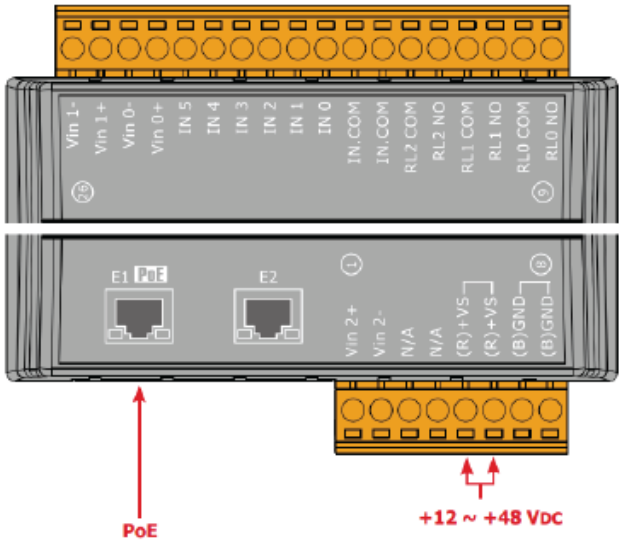
Wire Connections

Voltage Input	Current Input
	

Digital Input/ Counter	Readback as 1	Readback as 0
	+10 ~ +50 VDC	OPEN or <4 VDC
Sink		
	+10 ~ +50 VDC	OPEN or <4 VDC
Source		

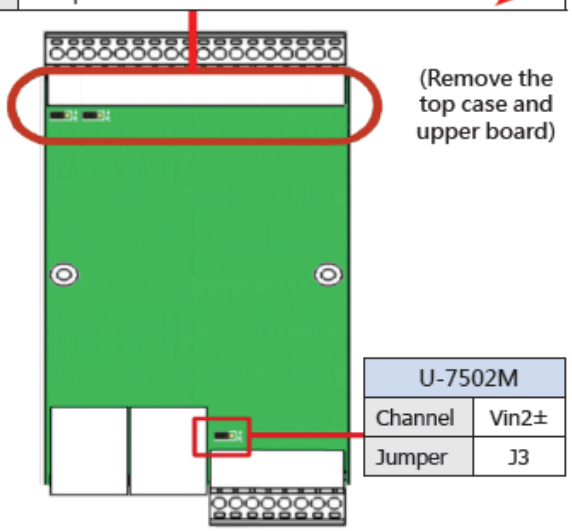
Power Relay	ON State Readback as 1	OFF State Readback as 0
Relay Output		

Pin Assignments



Jumper Location

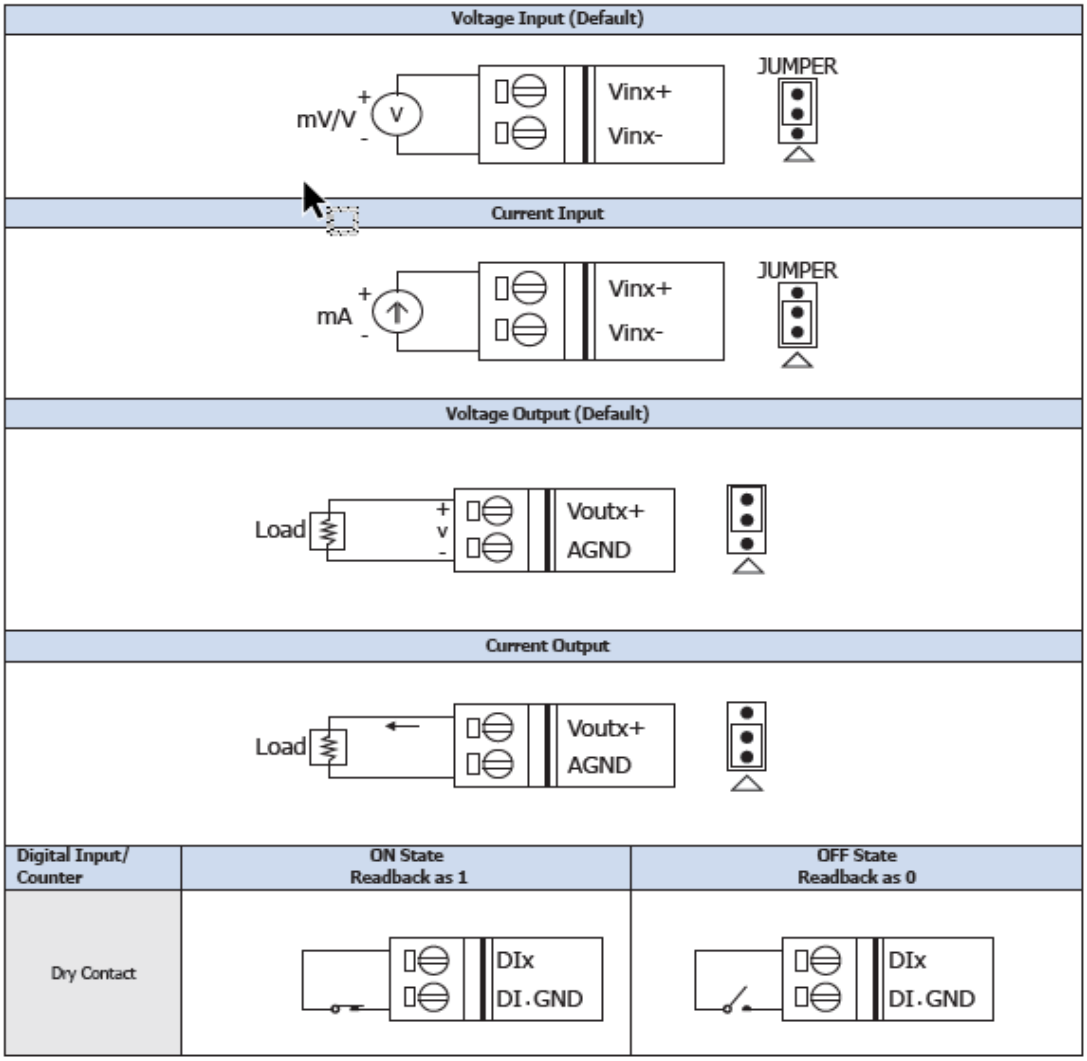
U-7502M		
Channel	Vin1±	Vin0±
Jumper	J2	J1
Location	Jumper	



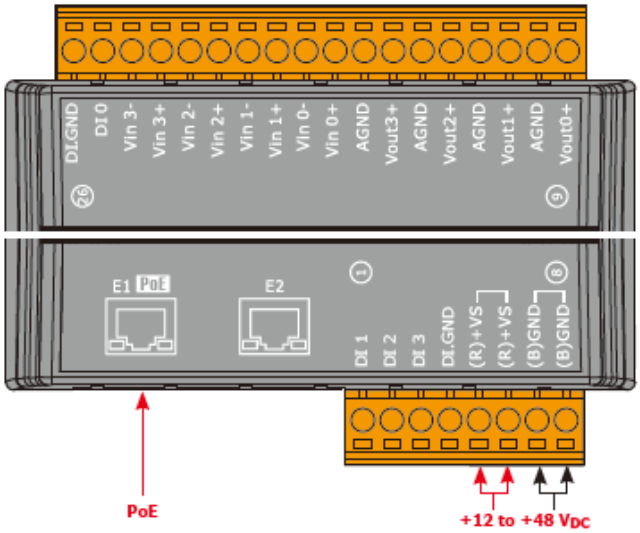
U-7502M	
Channel	Vin2±
Jumper	J3

1.5.2 U-7504M Wire Connections / Pin Assignments/Jumper Pic

Wire Connections

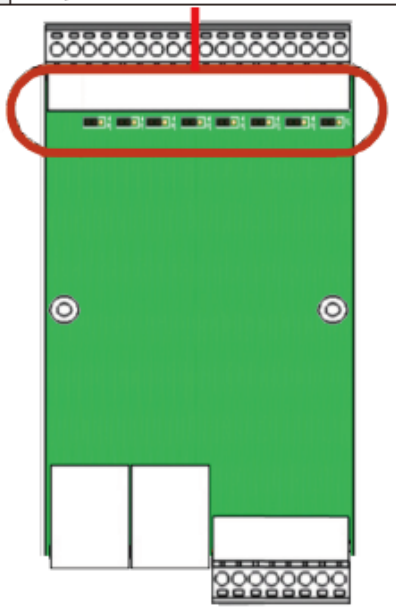


Pin Assignments



Jumper Location

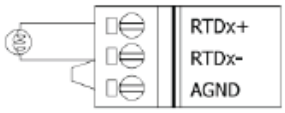
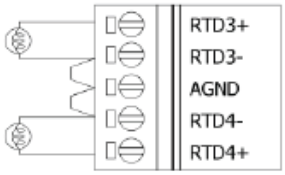
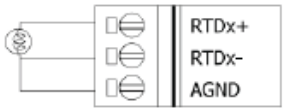
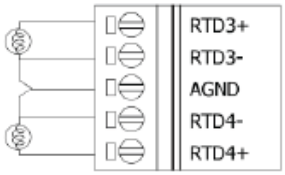
U-7504M								
Channel	Vin3	Vin2	Vin1	Vin0	Vout3	Vout2	Vout1	Vout0
Jumper	J4	J3	J2	J1	J8	J7	J6	J5
Location	Jumper →							



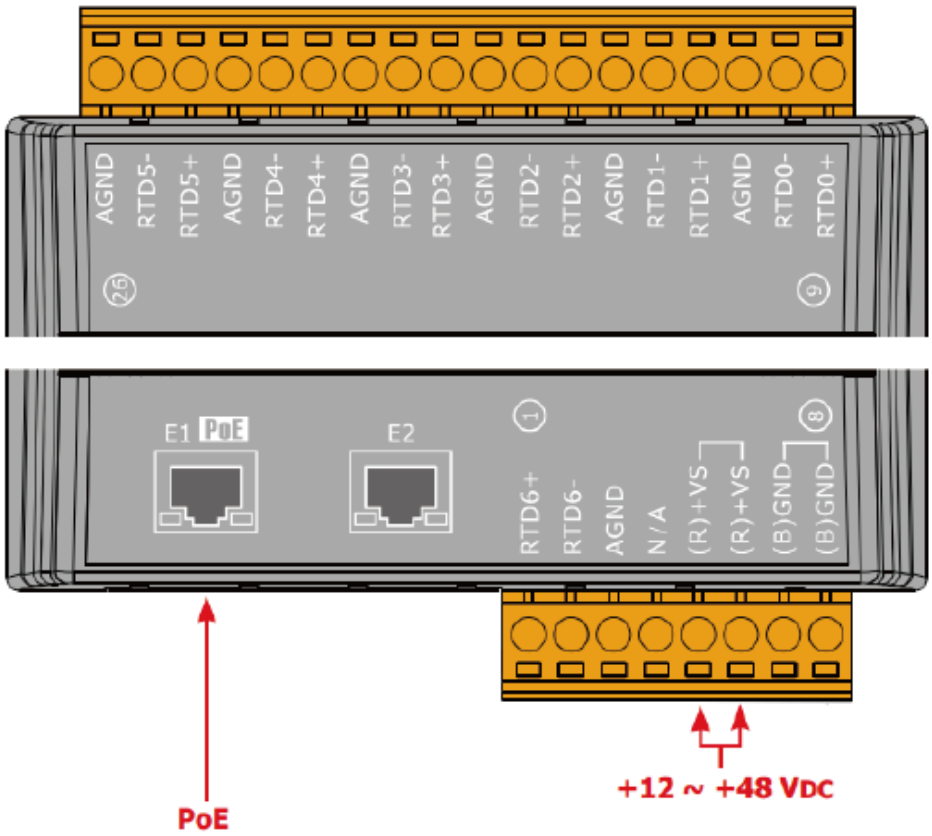
(Remove the top case and upper board)

1.5.3 U-7515M Wire Connections / Pin Assignments

Wire Connections

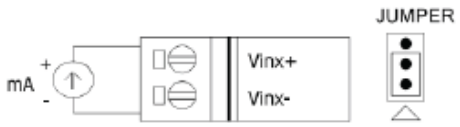
Open Collector (Sink)	CH0, 1, 2, 5 and 6	CH3 and CH4
2-wire of RTD		
3-wire of RTD		

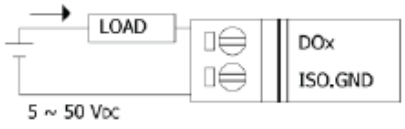
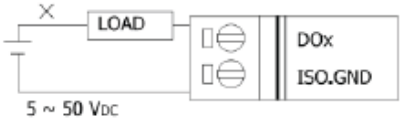
Pin Assignments



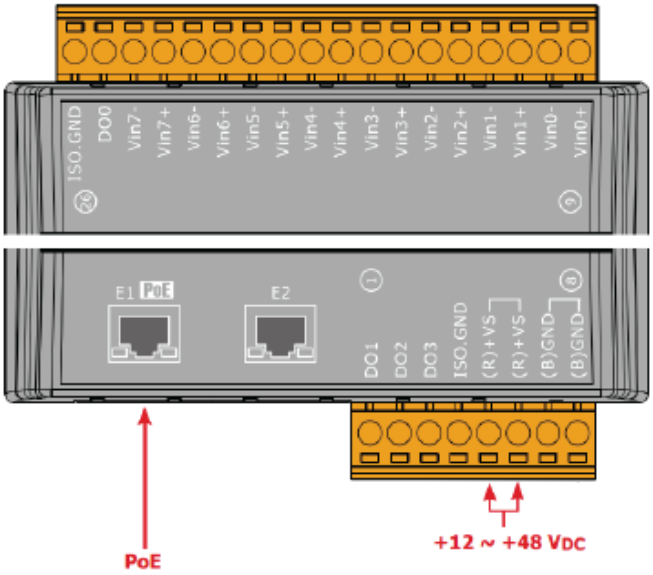
1.5.4 U-7517M Wire Connections/Pin Assignments/Jumper Pic

Wire Connections

Voltage Input	Current Input
	

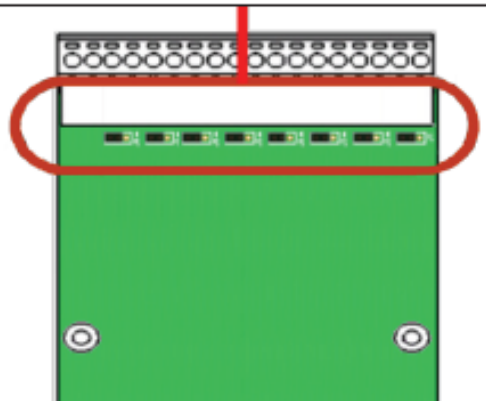
Digital Output	ON State Readback as 1	OFF State Readback as 0
Open Collector (Sink)		

Pin Assignments



Jumper Location

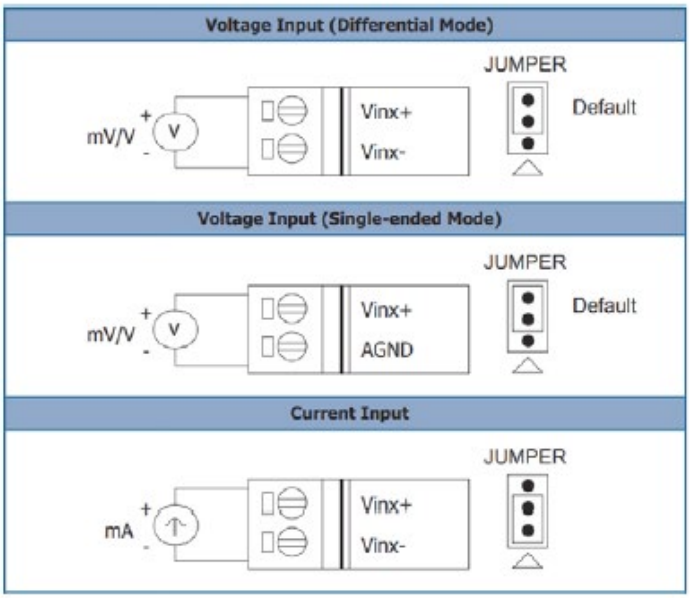
U-7517M							
Channel	Vin7±	Vin6±	Vin5±	Vin4±	Vin3±	Vin2±	Vin1±	Vin0±
Jumper	J8	J7	J6	J5	J4	J3	J2	J1
Location	Jumper →							



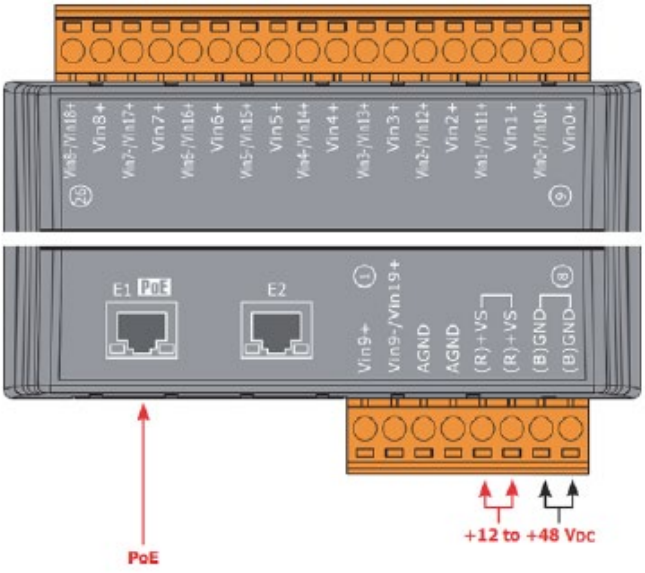
(Remove the top case and upper board)

1.5.5 U-7517M-10 Wire Connections/Pin Assignments/Jumper Pic

Wire Connections

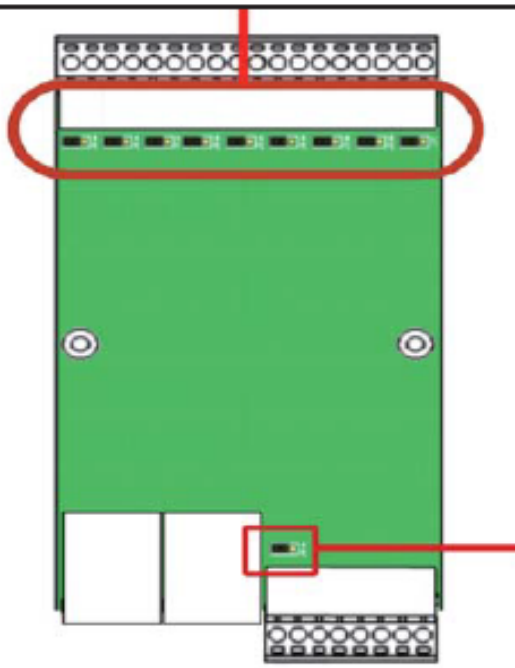


Pin Assignments



Jumper Location

U-7517M-10									
Channel	Vin8±	Vin7±	Vin6±	Vin5±	Vin4±	Vin3±	Vin2±	Vin1±	Vin0±
Jumper	J9	J8	J7	J6	J5	J4	J3	J2	J1
Location	Jumper →								



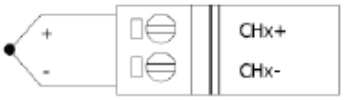
U-7517M-10	
Channel	Vin9±
Jumper	J10

1.5.6 U-7518ZM Wire Connections/Pin Assignments

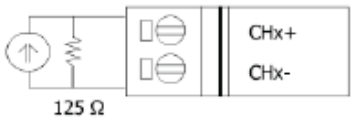
Wire Connections

Voltage Input (Default)

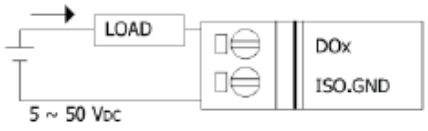
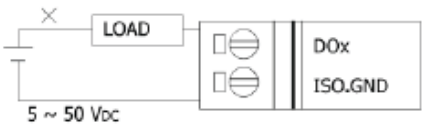
Thermocouple Input (Default)



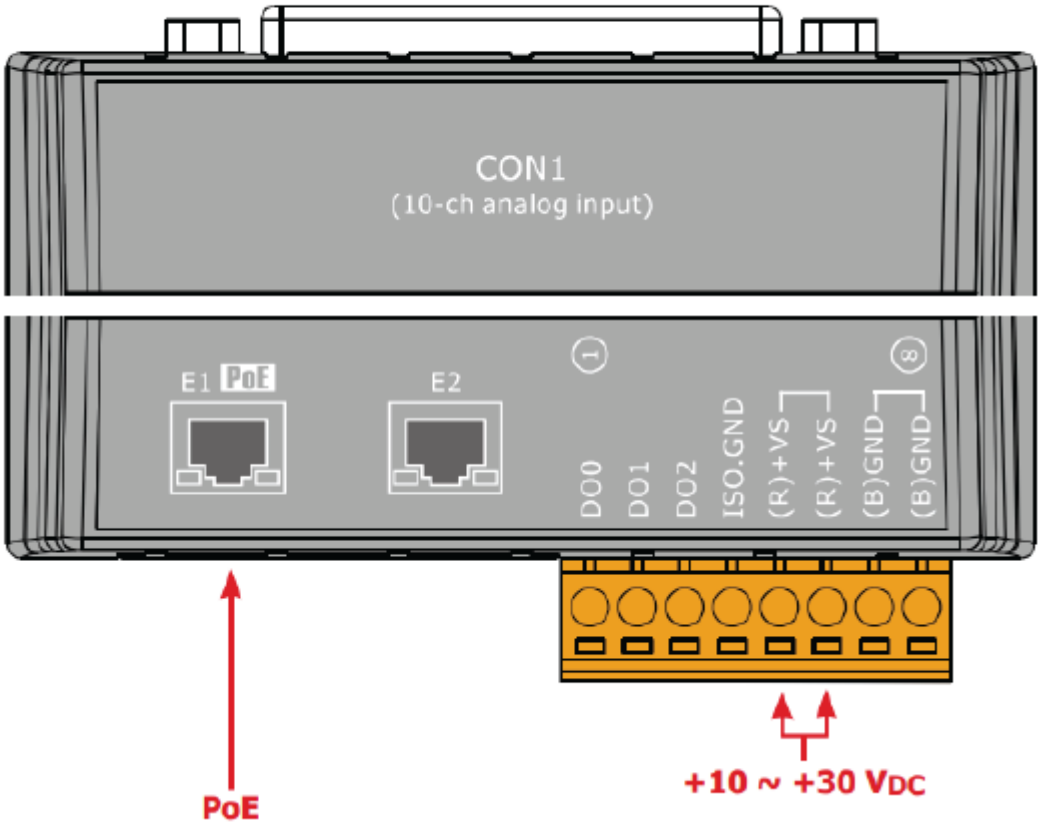
Current Input



Note: When connecting to a current source, an optional external 125 Ω resistor is required.

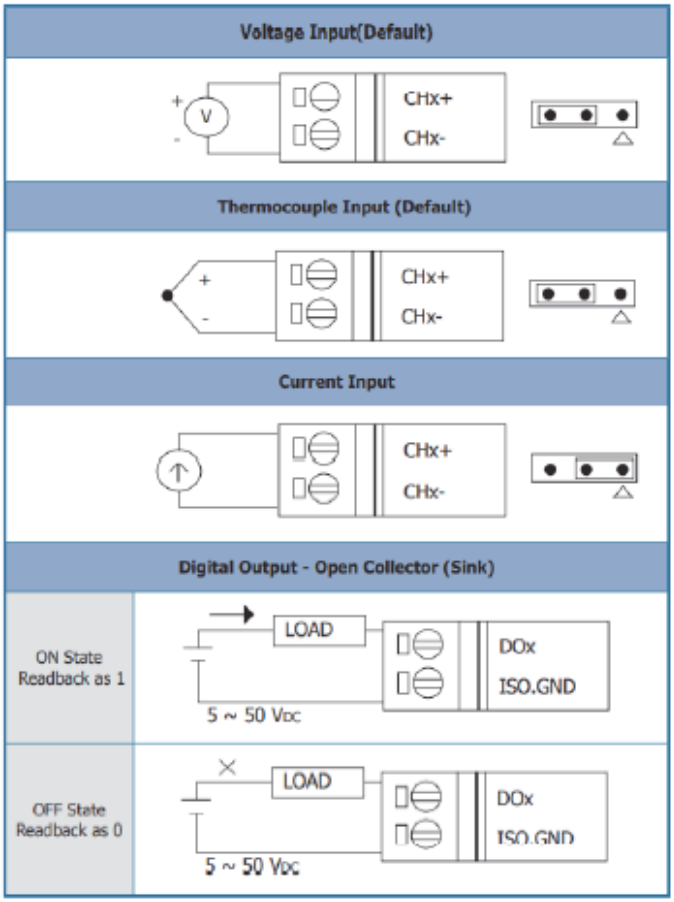
Digital Output	ON State Readback as 1	OFF State Readback as 0
Open Collector (Sink)		

Pin Assignments

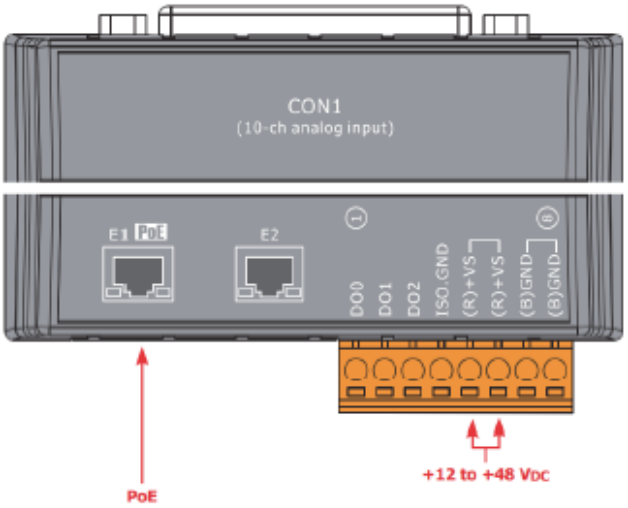


1.5.7 U-7519ZM Wire Connections/Pin Assignments/Jumper Pic

Wire Connections

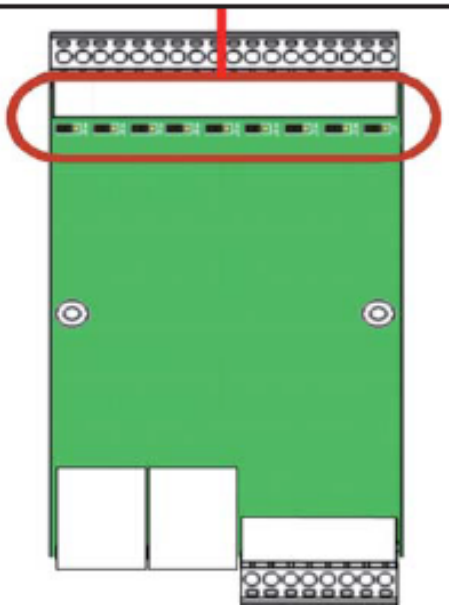


Pin Assignments



Jumper Location

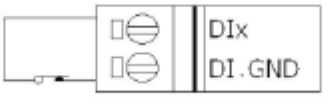
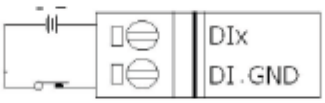
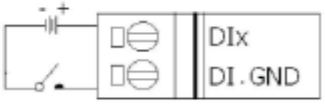
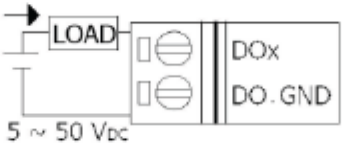
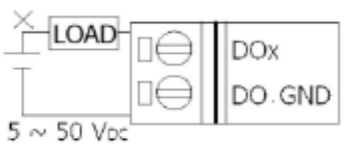
U-7519ZM										
Channel	CH0±	CH1±	CH2±	CH3±	CH4±	CH5±	CH6±	CH7±	CH8±	CH9±
Jumper	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10
Location	Jumper →									

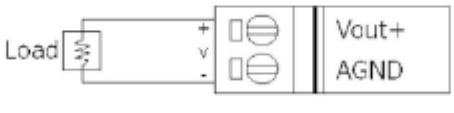
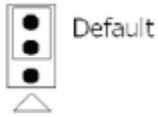
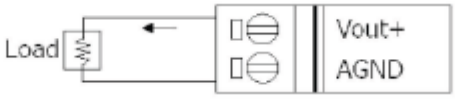


(Remove the top case and upper board)

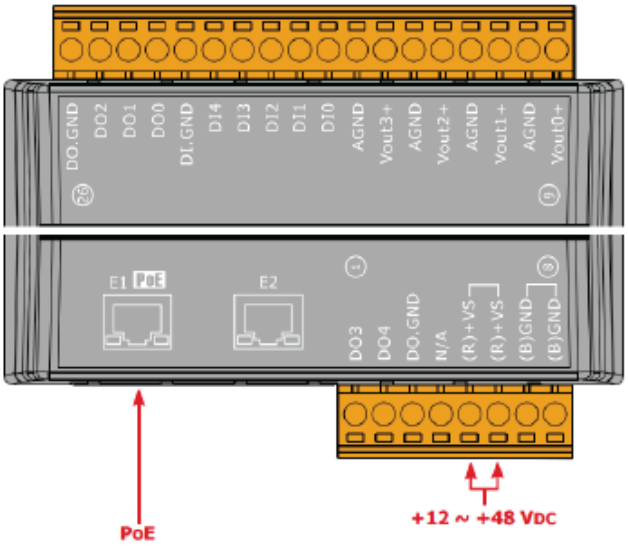
1.5.8 U-7524M Wire Connections/Pin Assignments/Jumper Pic

Wire Connections

Digital Input/ Counter	ON State Readback as 1	OFF State Readback as 0
Dry Contact		
Digital Input/ Counter	**ON State Readback as 1**	**OFF State Readback as 0**
Wet Contact		
Digital Output	**ON State Readback as 1**	**OFF State Readback as 0**
Open Collector (Sink)		

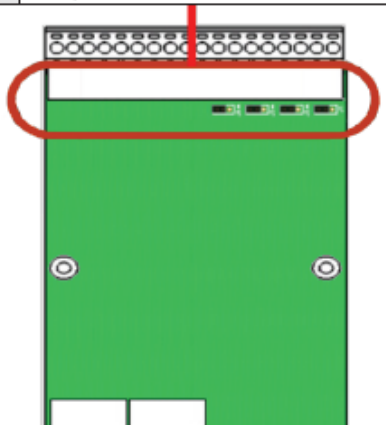
Voltage Output	
	
Current Output	
	

Pin Assignments



Jumper Location

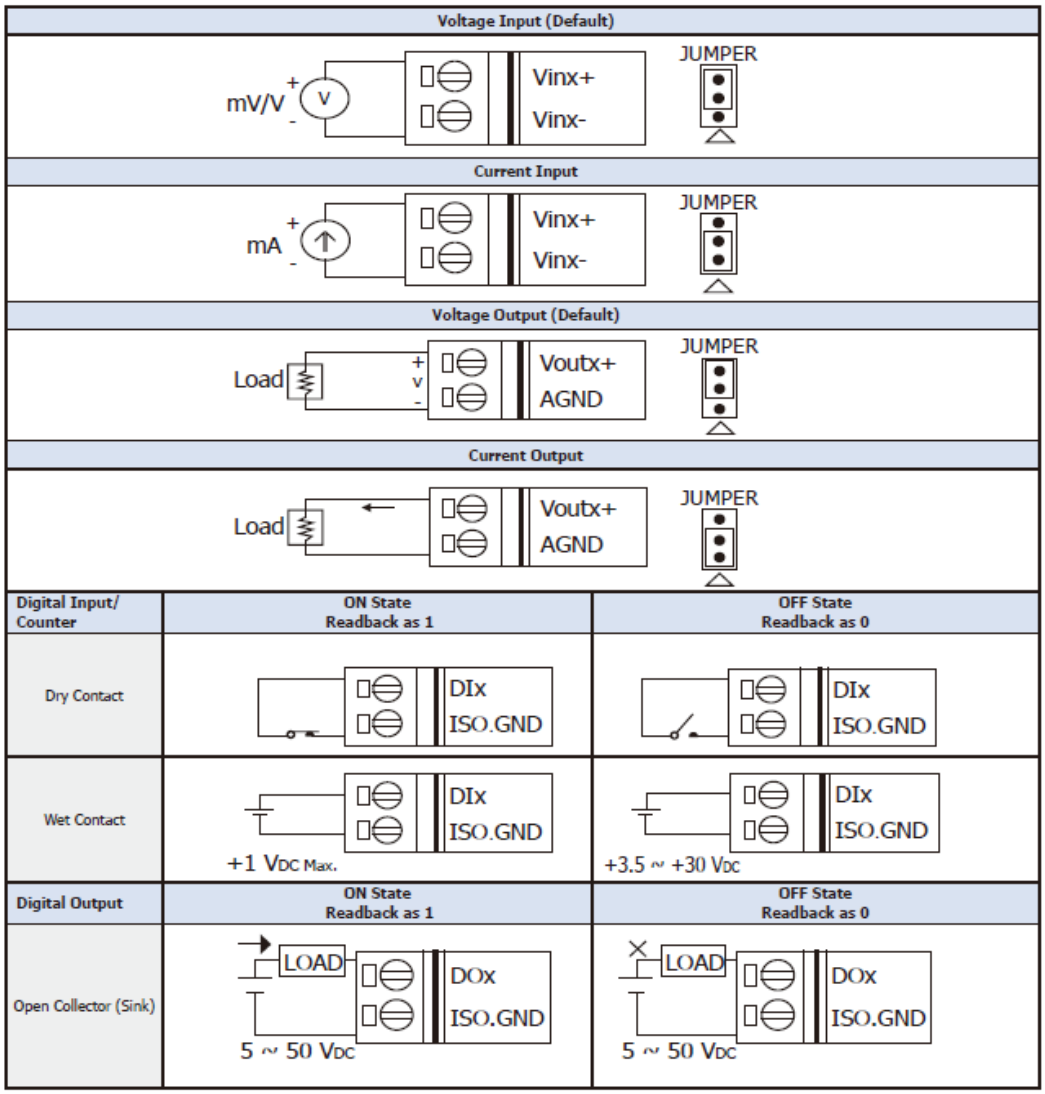
U-7524M				
Channel	Vout3+	Vout2+	Vout1+	Vout0+
Jumper	J4	J3	J2	J1
Location	Jumper →			



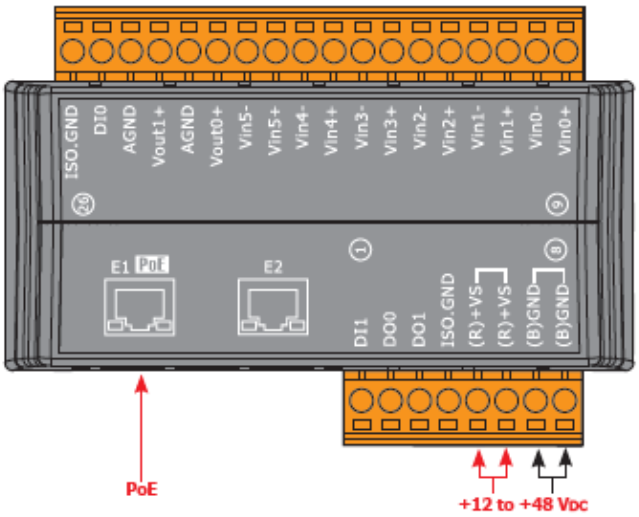
(Remove the top case and upper board)

1.5.9 U-7526M Wire Connections/Pin Assignments/Jumper Pic

Wire Connections

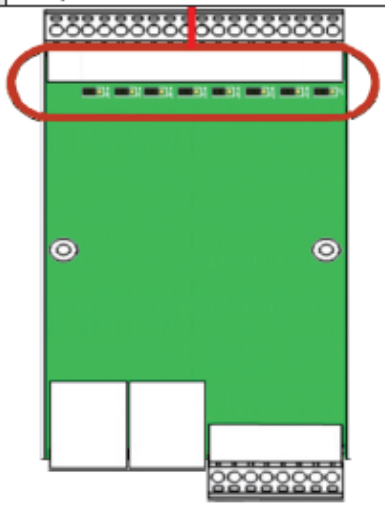


Pin Assignments



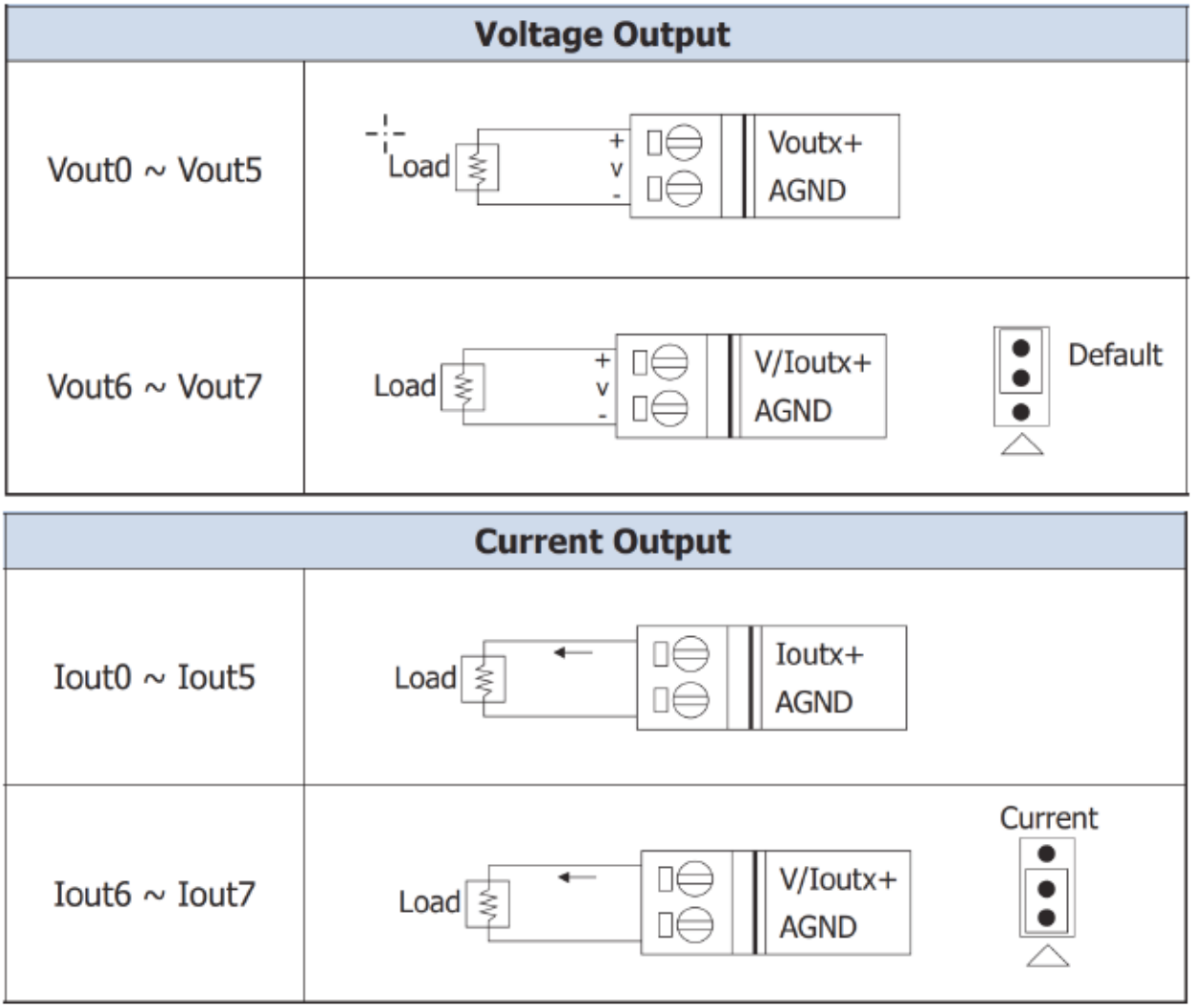
Jumper Location

U-7526M								
Channel	Vout1	Vout0	Vin5	Vin4	Vin3	Vin2	Vin1	Vin0
Jumper	J8	J7	J6	J5	J4	J3	J2	J1
Location	Jumper →							

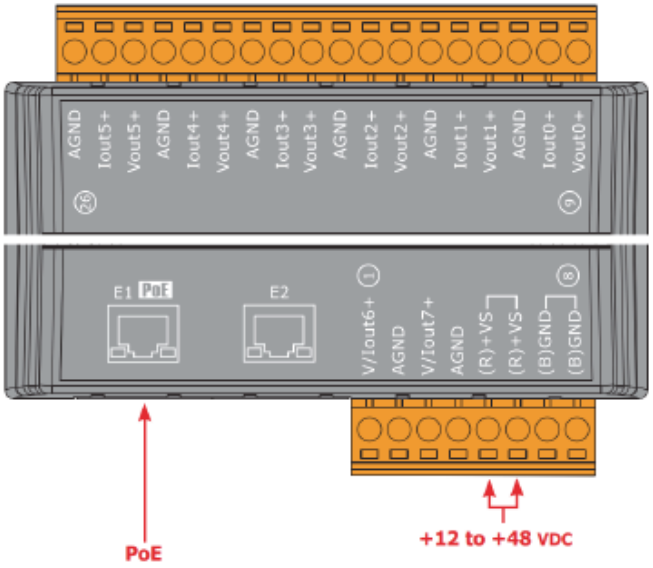


1.5.10 U-7528M Wire Connections/Pin Assignments/Jumper Pic

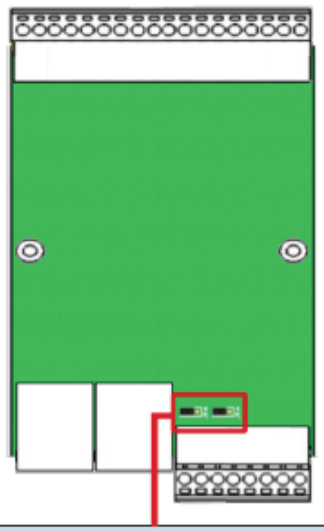
Wire Connections



Pin Assignments



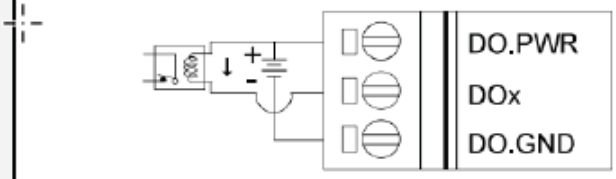
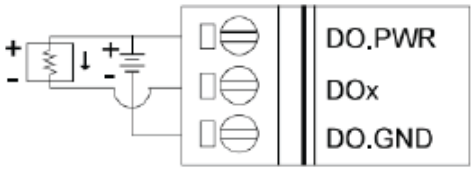
Jumper Location

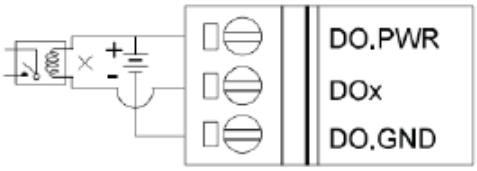
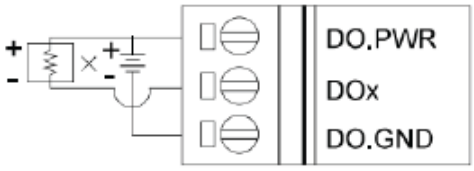


U-7528M		
Channel	V/Iout6+	V/Iout7+
Jumper	J1	J2
Location	Jumper	

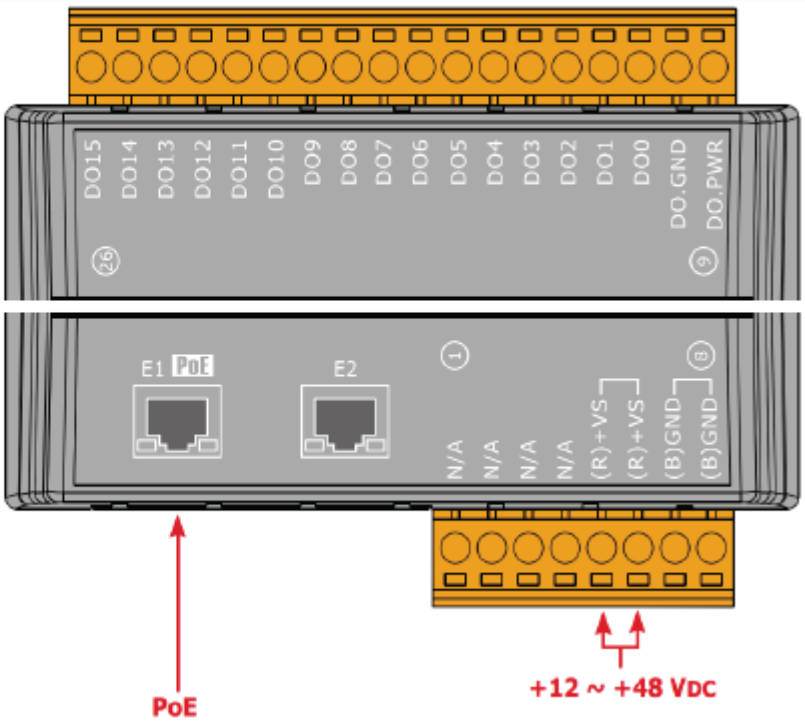
1.5.11 U-7542M Wire Connections/Pin Assignments

Wire Connections

Output Type	ON State Readback as 1
Drive Relay	
Resistance Load	

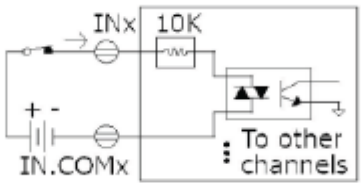
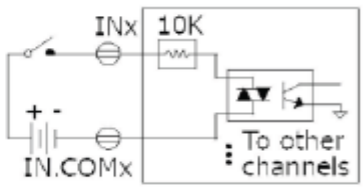
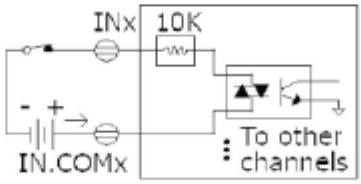
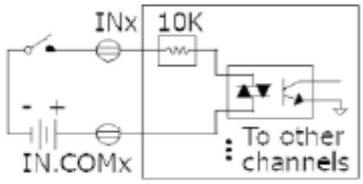
Output Type	OFF State Readback as 0
Drive Relay	
Resistance Load	

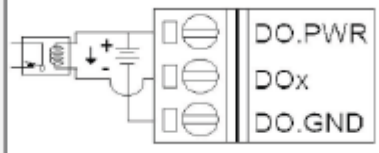
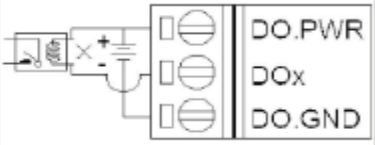
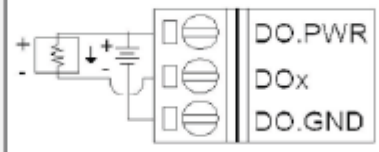
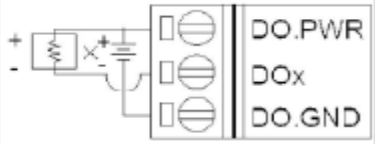
Pin Assignments



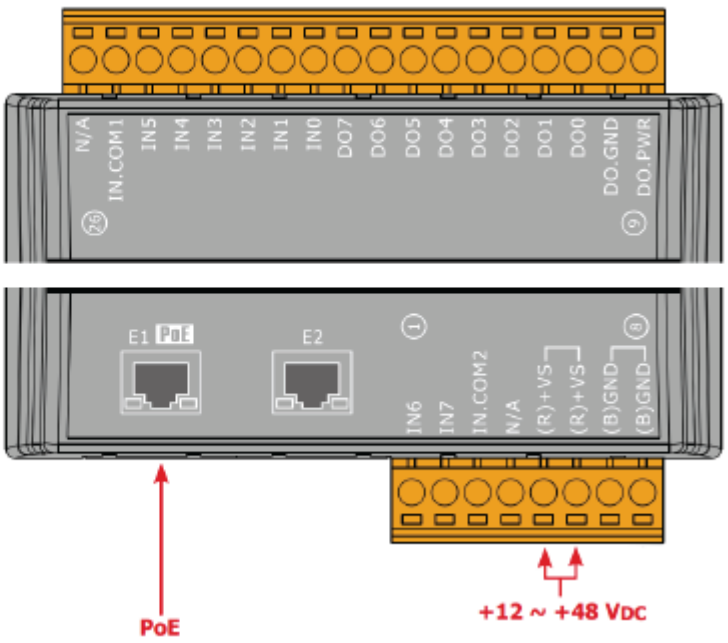
1.5.12 U-7544M Wire Connections/Pin Assignments

Wire Connections

Digital Input/ Counter	Readback as 1	Readback as 0
Sink	+10 ~ +50 VDC	OPEN or <4 VDC
		
Source	+10 ~ +50 VDC	OPEN or <4 VDC
		

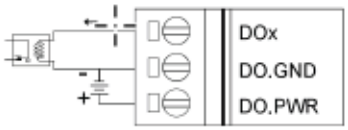
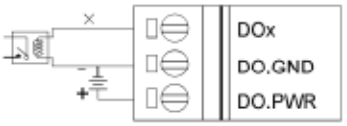
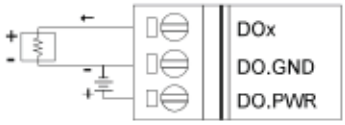
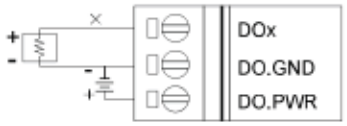
Output Type	ON State Readback as 1	OFF State Readback as 0
Drive Relay		
Resistance Load		

Pin Assignments

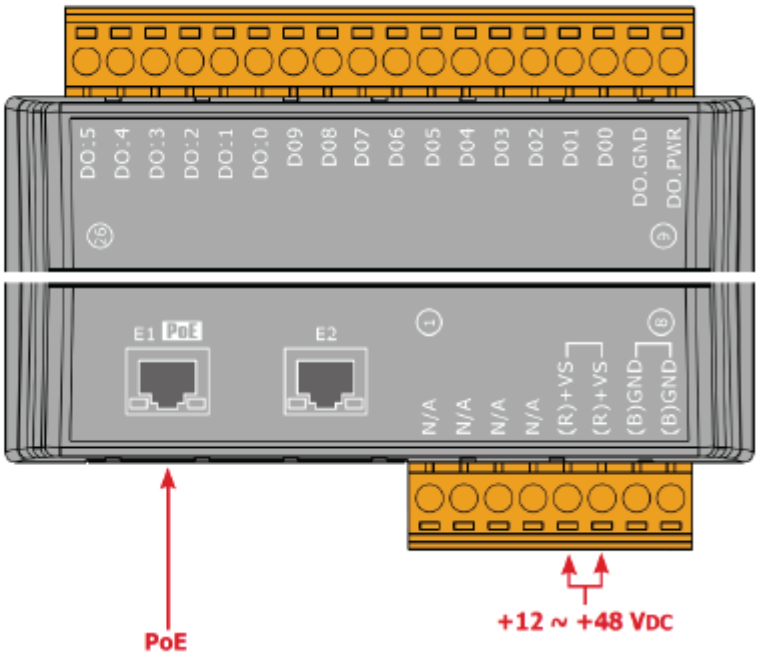


1.5.13 U-7545M Wire Connections/Pin Assignments

Wire Connections

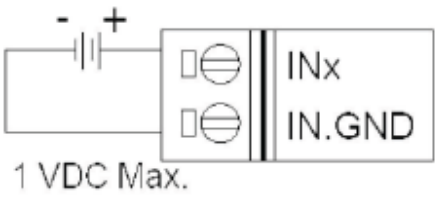
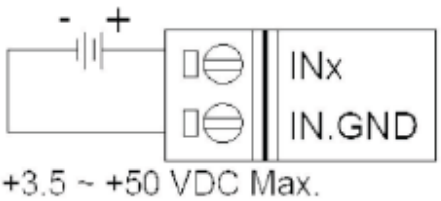
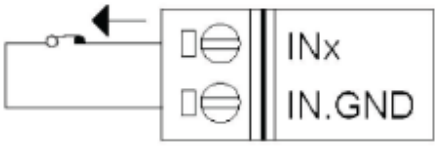
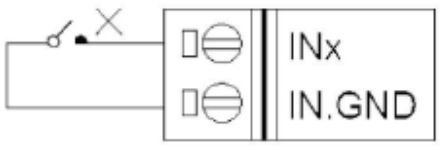
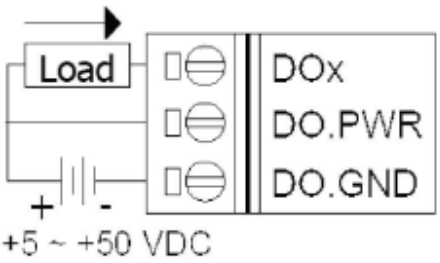
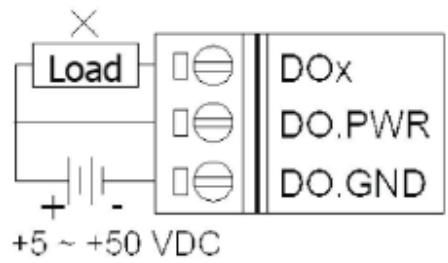
Output Type	ON State Readback as 1	Output Type	OFF State Readback as 0
Drive Relay		Drive Relay	
Resistance Load		Resistance Load	

Pin Assignments

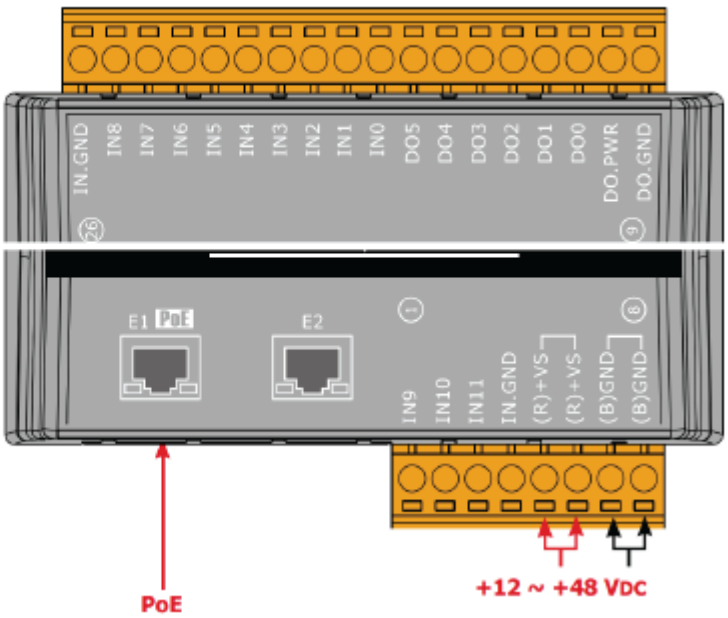


1.5.14 U-7550AM Wire Connections/Pin Assignments

Wire Connections

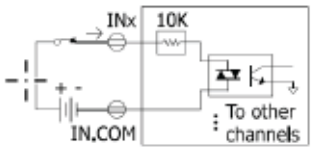
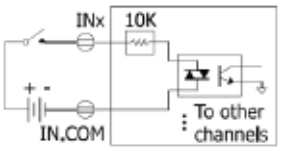
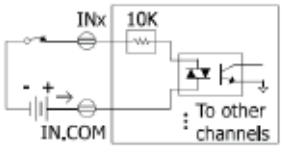
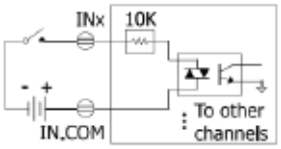
Digital Input/ Counter	ON State Readback as 1	OFF State Readback as 0
Wet Contact (Sink)	1 VDC Max. 	+3.5 VDC ~ +50 VDC Max. 
Dry Contact (Source)	Close to GND 	Open 
Digital Output	**ON State Readback as 1**	**OFF State Readback as 0**
Open Collector (Sink)		

Pin Assignments

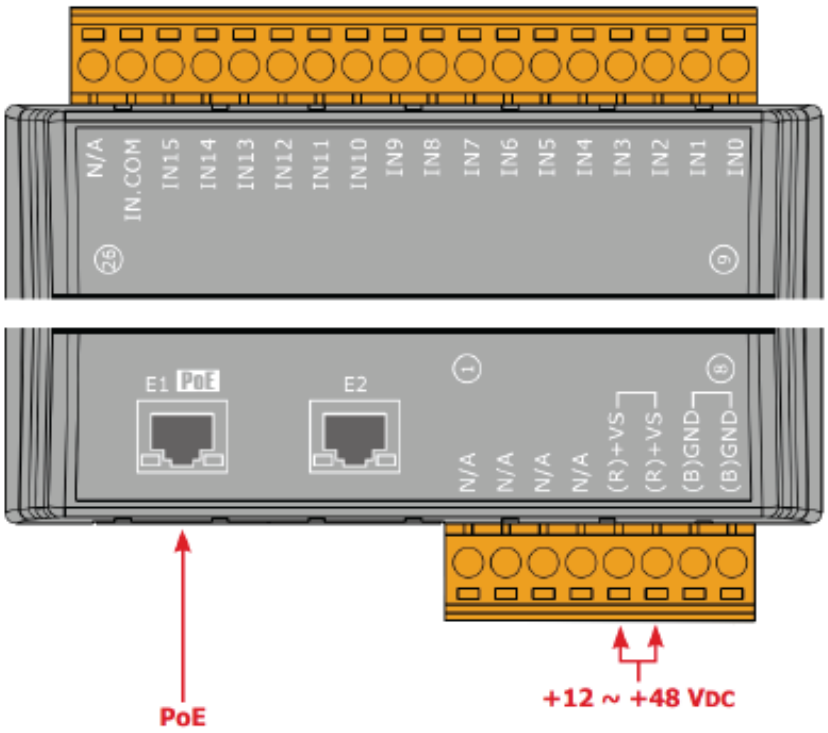


1.5.15 U-7551M Wire Connections/Pin Assignments

Wire Connections

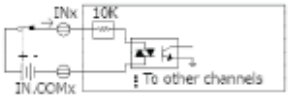
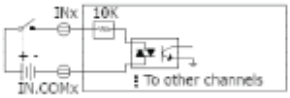
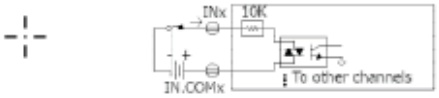
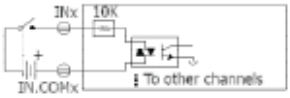
Digital Input/Counter	Readback as 1	Readback as 0
Sink	+10 ~ +50 VDC	OPEN or <4 VDC
		
Source	+10 ~ +50 VDC	OPEN or <4 VDC
		

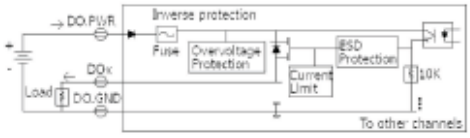
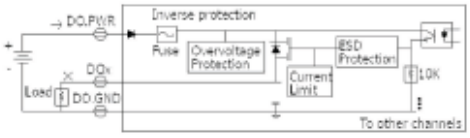
Pin Assignments



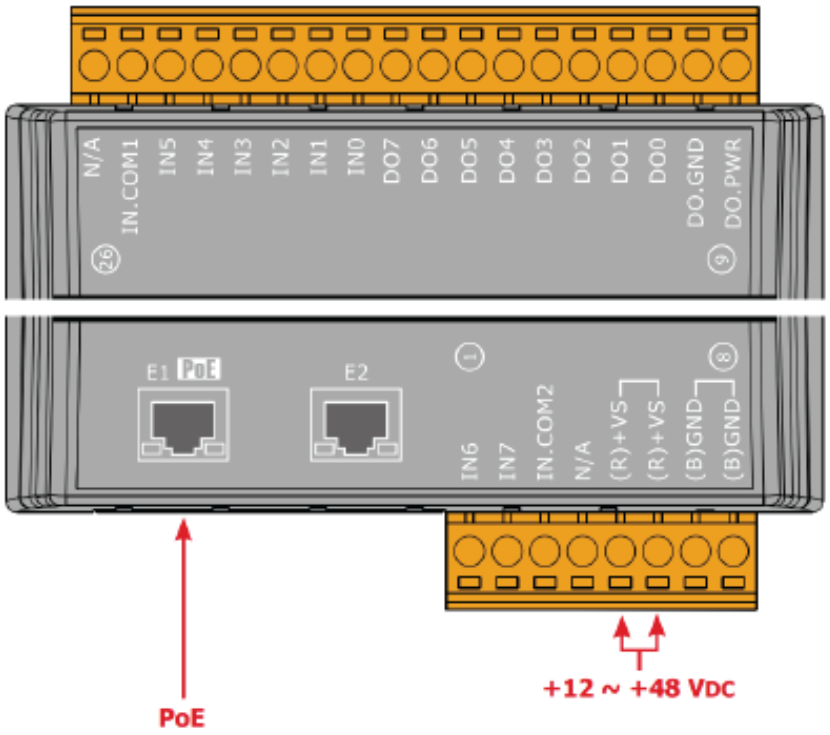
1.5.16 U-7552M Wire Connections/Pin Assignments

Wire Connections

Digital Input/Counter	Readback as 1	Readback as 0
Sink	+10 ~ +50 VDC	OPEN or <4 VDC
		
Source	+10 ~ +50 VDC	OPEN or <4 VDC
		

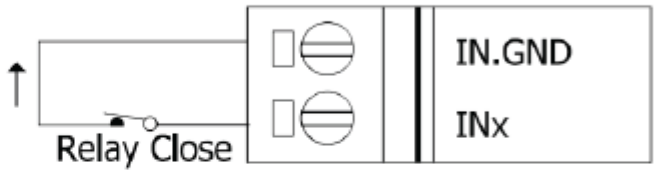
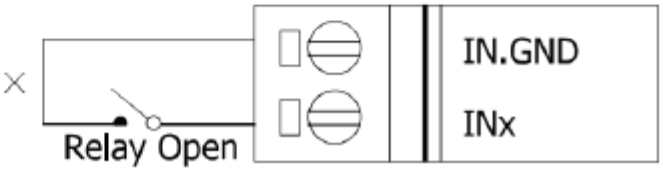
Digital Output	ON State Readback as 1	OFF State Readback as 0
Source		

Pin Assignments

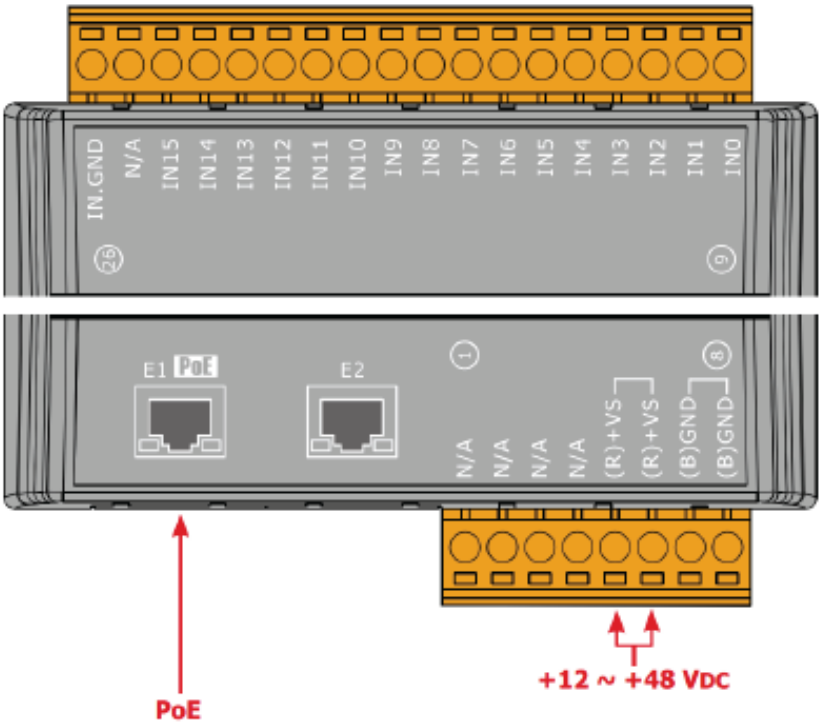


1.5.17 U-7553M Wire Connections/Pin Assignments

Wire Connections

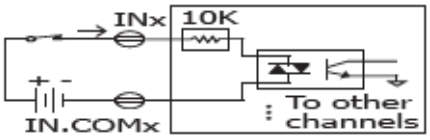
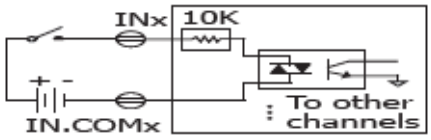
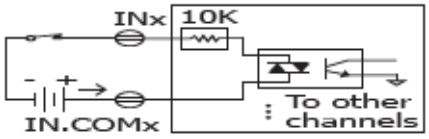
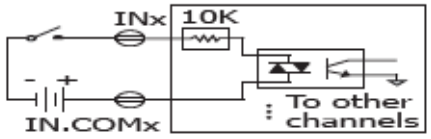
<table>
<tr><th>Digital Input/Counter</th><th>ON State
Readback as 1</th></tr>
<tr><td rowspan="3">Dry Contact</td><td> 
</td></tr>
<tr><td>OFF State
Readback as 0</td></tr>
<tr><td> 
</td></tr>
</table>

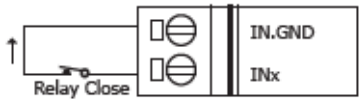
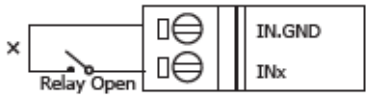
Pin Assignments

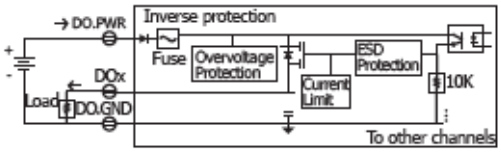
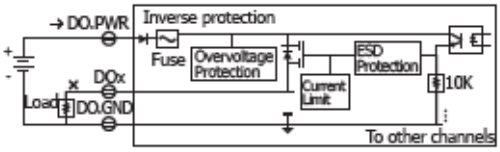


1.5.18 U-7555M Wire Connections / Pin Assignments

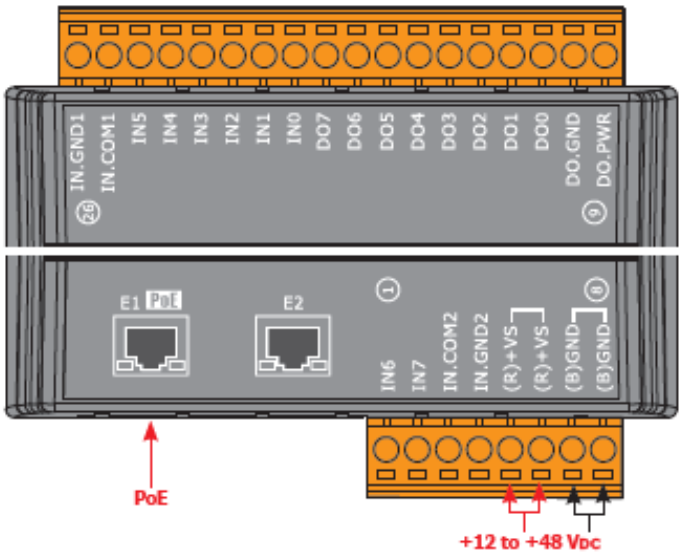
Wire Connections

Digital Input/Counter	Readback as 1	Readback as 0
Wet Contact (Sink)	+10 ~ +50 Vdc	OPEN or <4 Vdc
		
Wet Contact (Source)	+10 ~ +50 Vdc	OPEN or <4 Vdc
		

Digital Input/Counter	ON State Readback as 1	OFF State Readback as 0
Dry Contact		

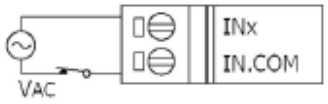
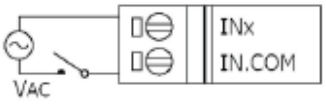
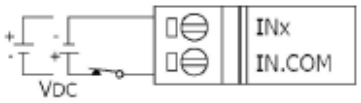
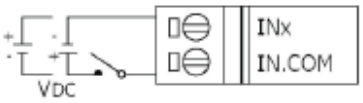
Digital Output	ON State Readback as 1	OFF State Readback as 0
Source		

Pin Assignments

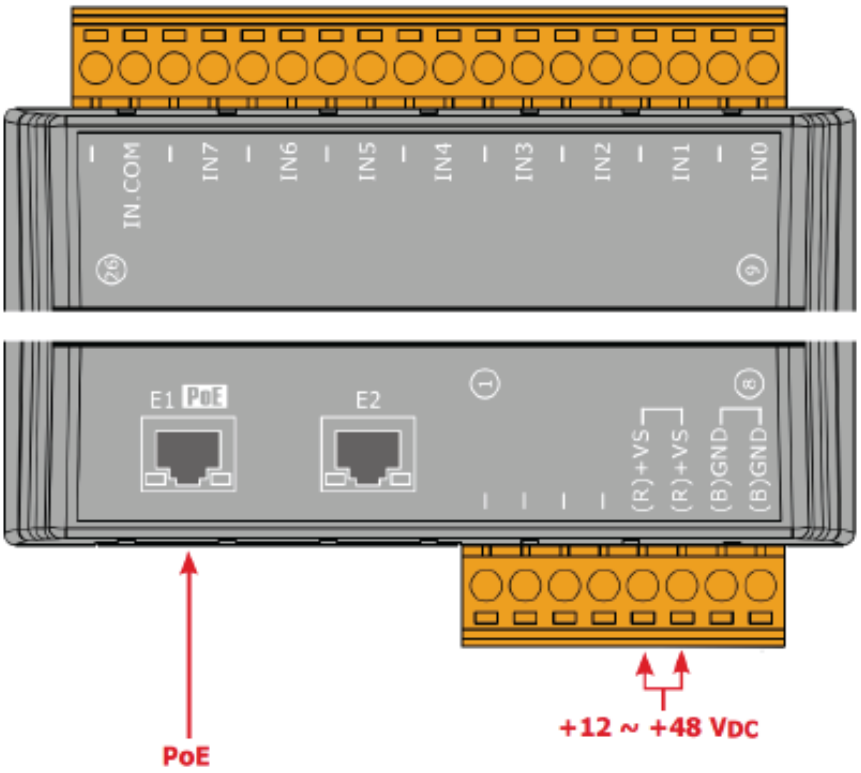


1.5.19 U-7558M Wire Connections/Pin Assignments

Wire Connections

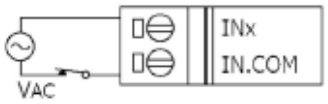
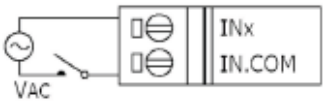
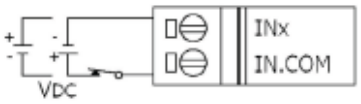
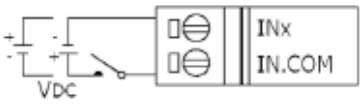
Digital Input/Counter	ON State Readback as 1	OFF State Readback as 0
AC Digital Input	80 ~ 250 VAC	OPEN or < 30 VAC Max.
		
DC Digital Input	90 ~ 250 VDC	OPEN or < 30 VDC Max.
		

Pin Assignments

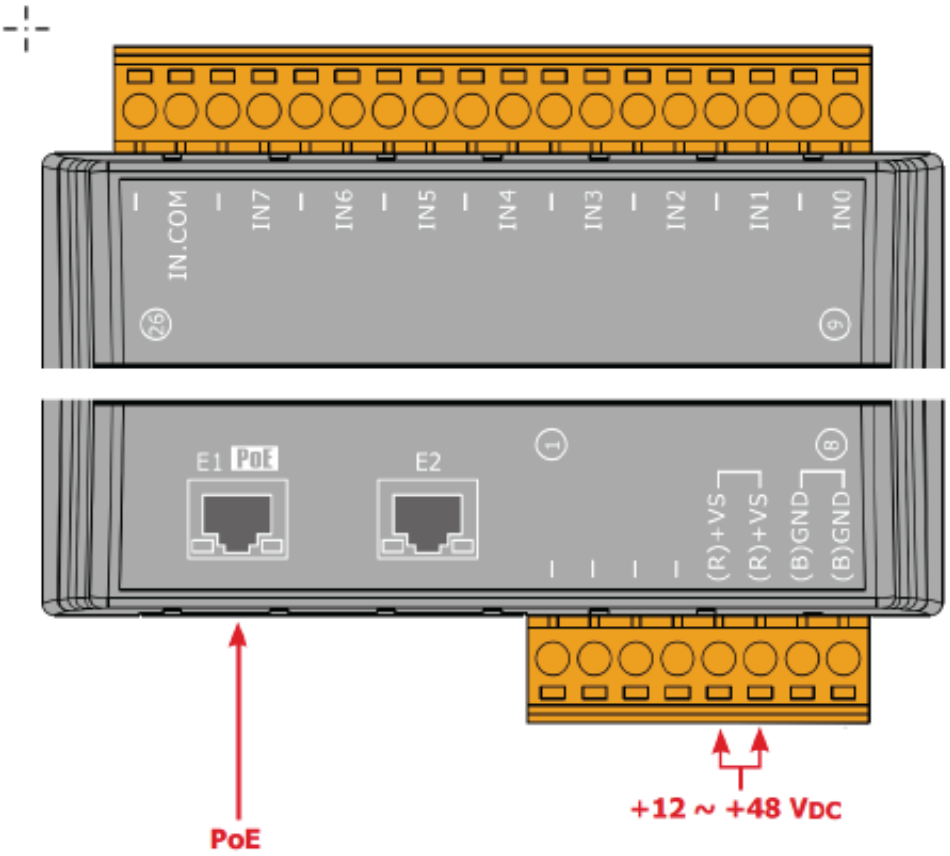


1.5.20 U-7559M Wire Connections/Pin Assignments

Wire Connections

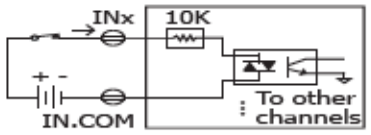
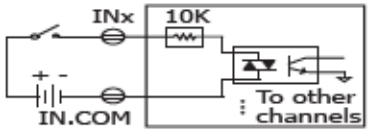
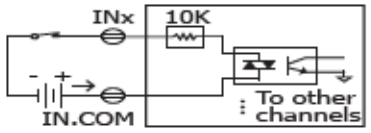
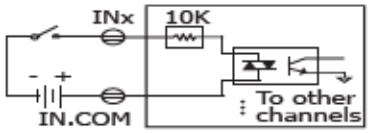
Digital Input/Counter	ON State Readback as 1	OFF State Readback as 0
AC Digital Input	10 ~ 80 VAC	OPEN or < 3 VAC Max.
		
DC Digital Input	15 ~ 80 VDC	OPEN or < 3 VDC Max.
		

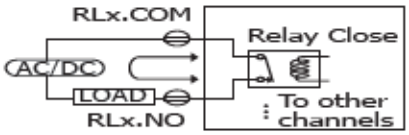
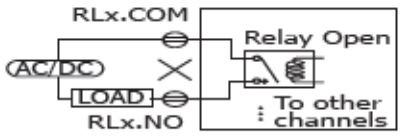
Pin Assignments



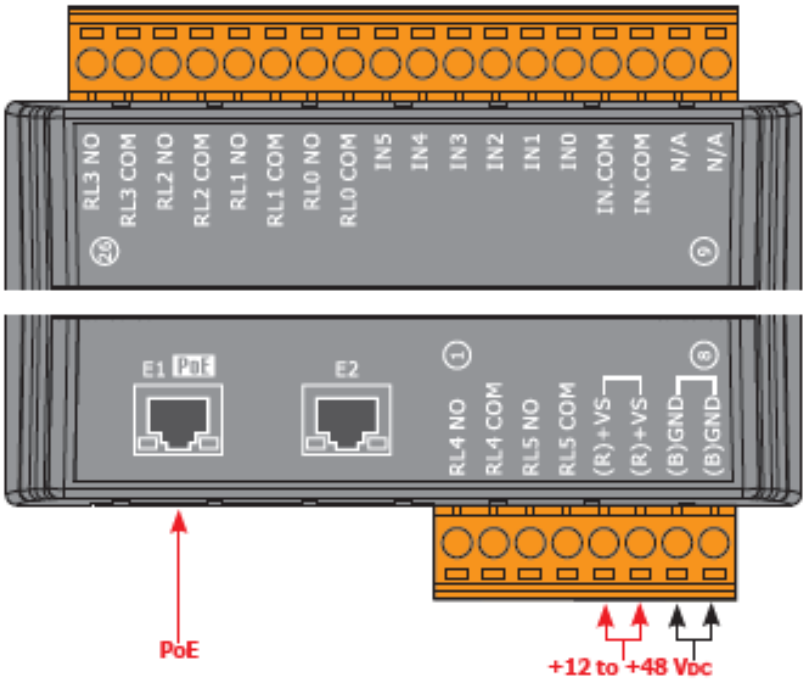
1.5.21 U-7560M Wire Connections / Pin Assignments

Wire Connections

Digital Input/Counter	Readback as 1	Readback as 0
Sink	+10 ~ +50 VDC	OPEN or <4 VDC
		
Source	+10 ~ +50 VDC	OPEN or <4 VDC
		

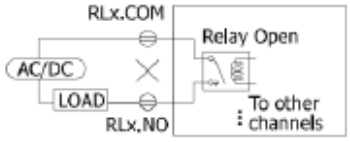
Power Relay	ON State: Readback as 1
Relay Output	
	OFF State: Readback as 0
	

Pin Assignments

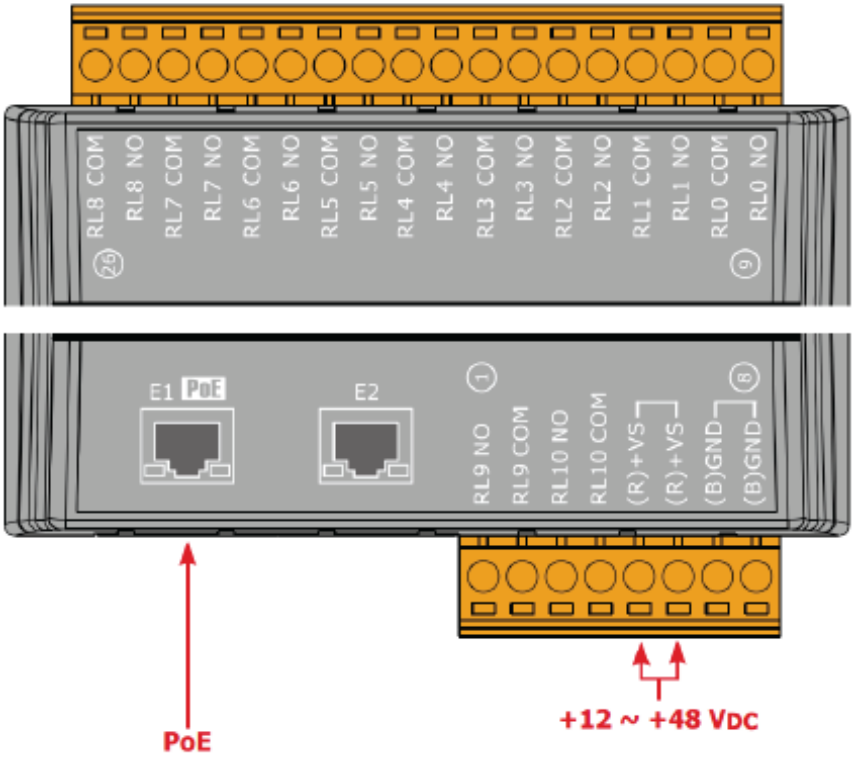


1.5.22 U-7561M Wire Connections/Pin Assignments

Wire Connections

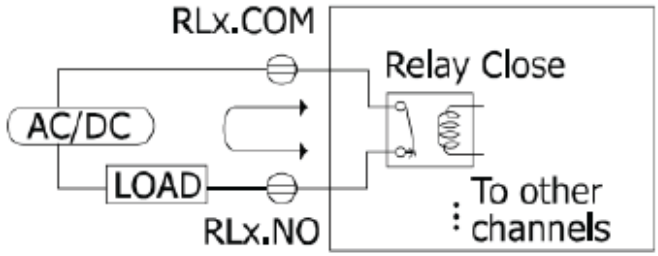
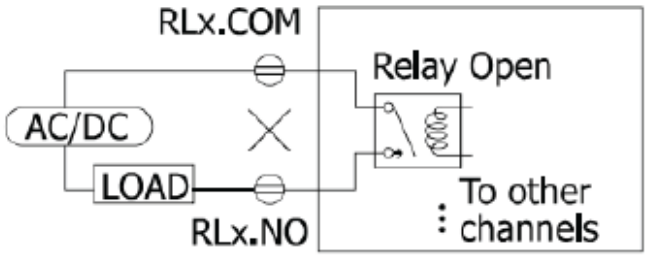
Power Relay	ON State Readback as 1
Relay Output	
	OFF State **Readback as 0**
	

Pin Assignments

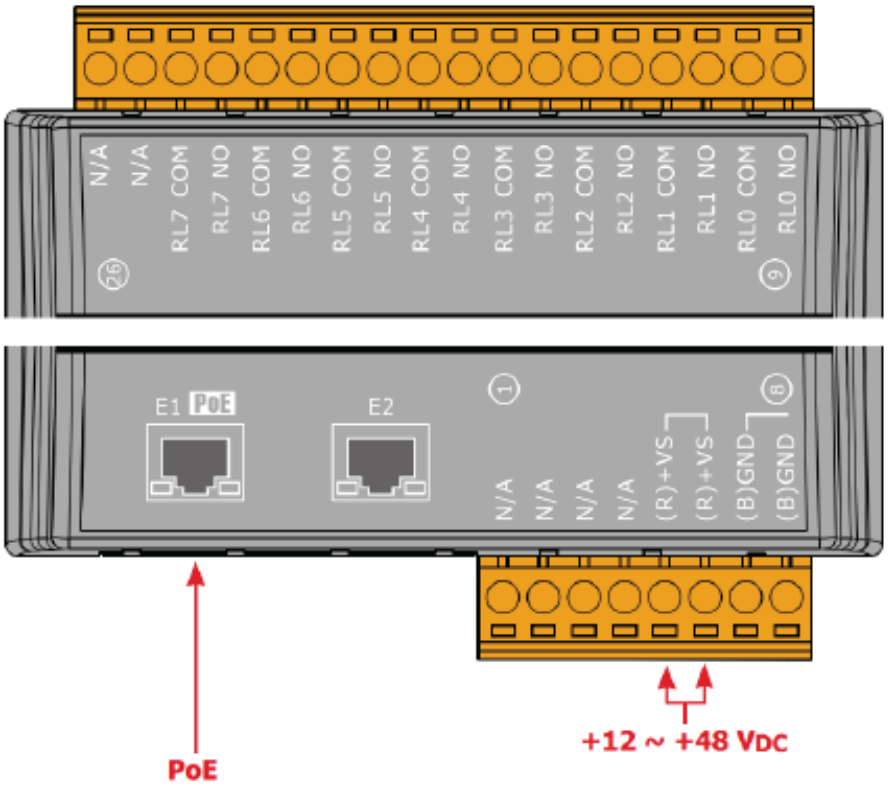


1.5.23 U-7567M Wire Connections/Pin Assignments

Wire Connections

Power Relay	ON State Readback as 1
Relay Output	
	OFF State Readback as 0
	

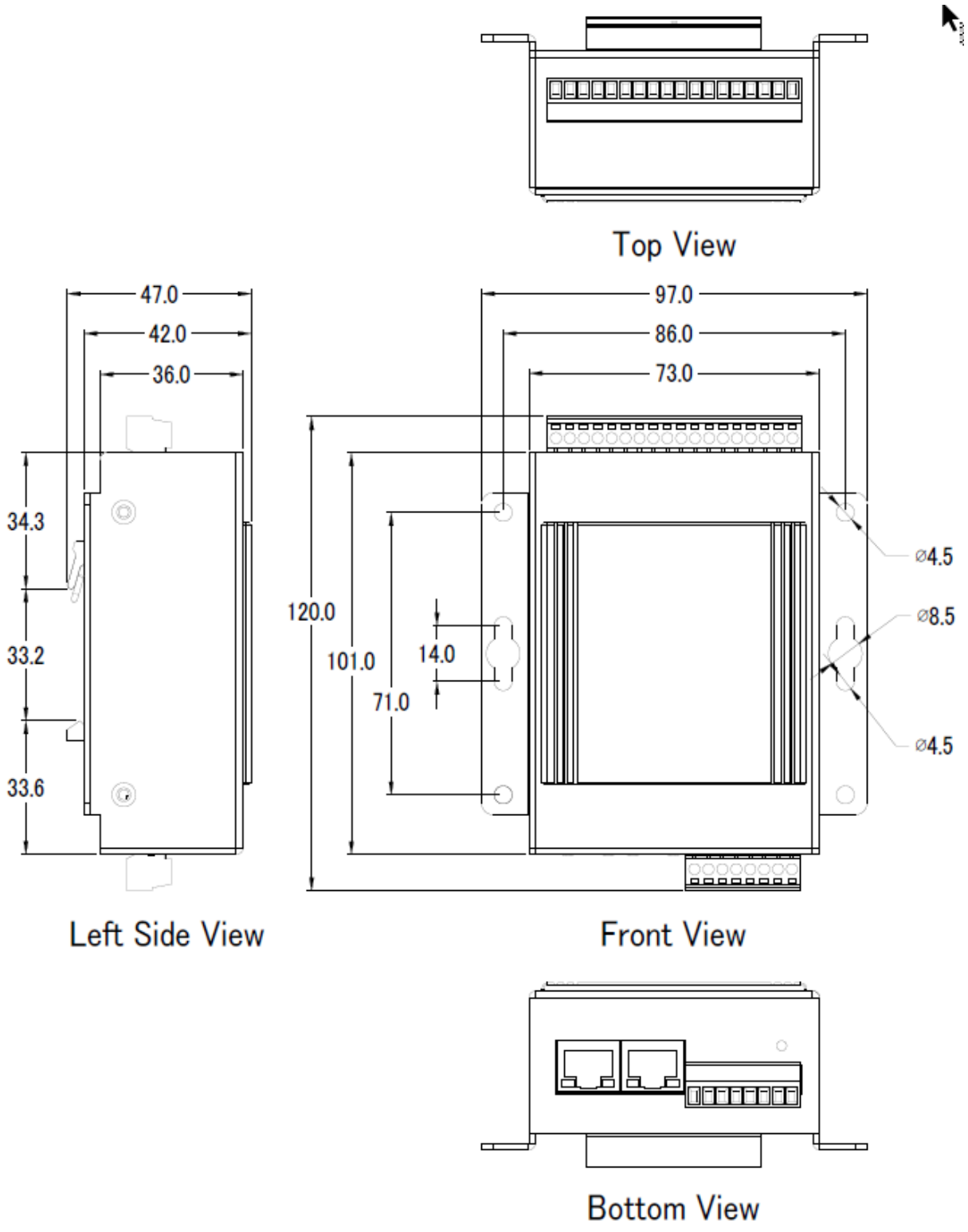
Pin Assignments



1.6 Dimensions

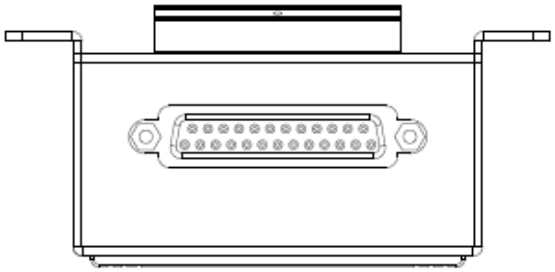
U-7502M/U-7504M/U-7515M/U-7517M/U-7517M-10/U-7524M /U-7526M/U-7528M/U-7542M/U-7544M/U-7545M/U-7550AM /U-7551M/U-7552M/U-7553M/U-7555M/U-7558M/U-7559M /U-7560M/U-7561M/U-7567M Dimensions

(Unit: mm)

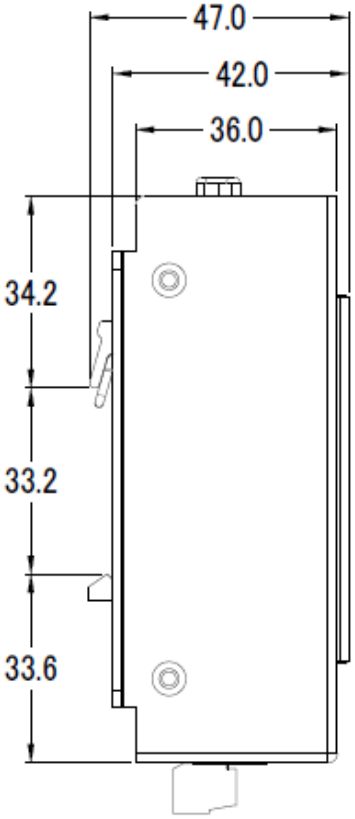


U-7518ZM/U-7519ZM Dimensions

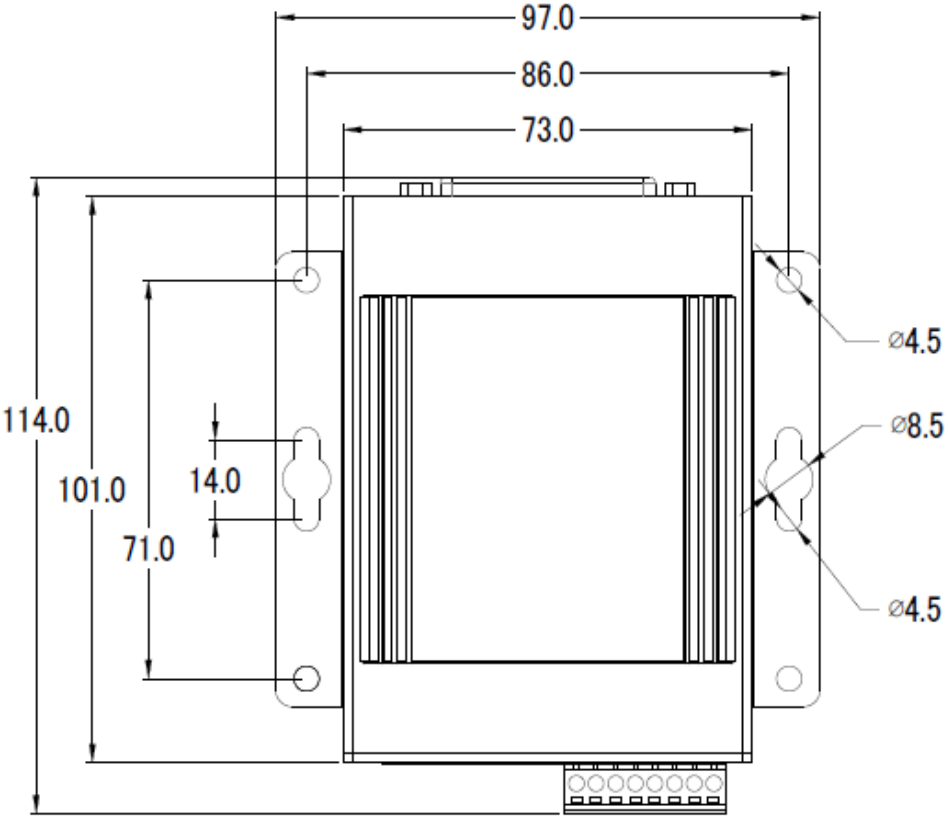
(Unit: mm)



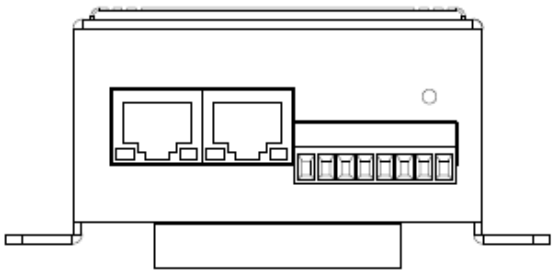
Top View



Left Side View



Front View



Bottom View

2. Quick Start: Hardware/Network Connection

This chapter describes the UA I/O module's hardware connection, network connection and quick setting. For how to set up a project via the Web UI on the browser, please refer to Chapter 3.

2.1. Hardware Connection

This section describes the hardware wiring and connection for the UA I/O module.

2.1.1. Preparations for Devices

In addition to the UA I/O modules (Ex: U-7555M), please prepare the following:

1. **PC/NB**: Can connect to the network and set the network
2. **Ethernet Switch/Hub**: e.g. NS-205 or **PoE Switch** NSM-208SE
3. **Power Supply: +12 ~ +48 VDC**, e.g. MDR-60-24 (If using PoE Switch, user can save a power supply.)

2.1.2. AI/AO Jumper Setting

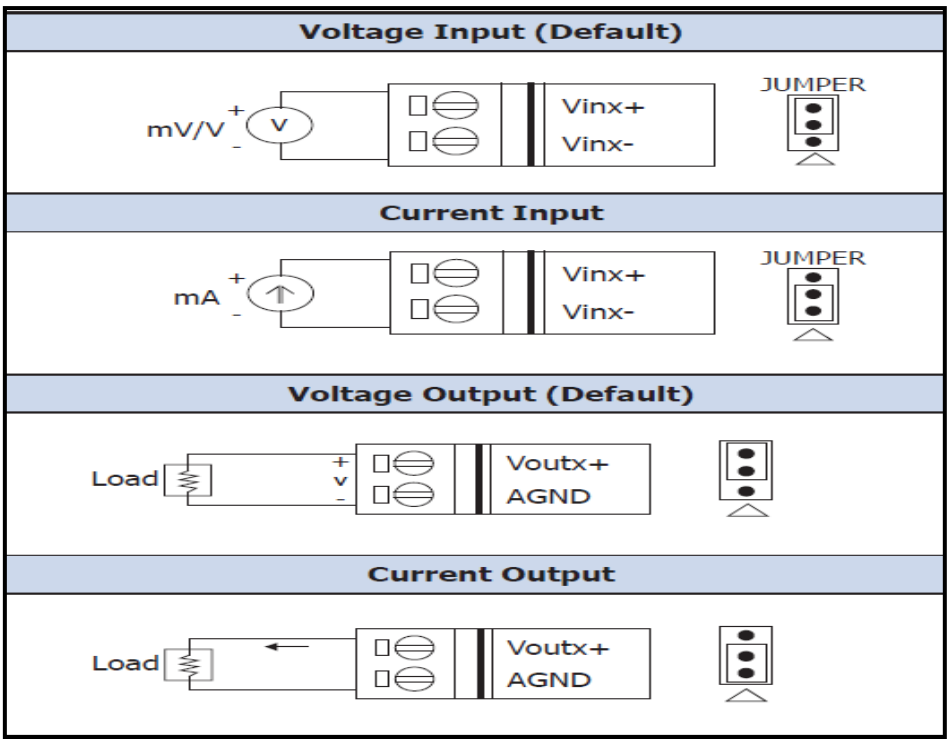
This section is for setting the AI/AO jumpers, take U-7504M, U-7526M for example, if use DI/O module, please go to the next section.

Setting the Selection Jumpers for Analog channels:

1. **Disconnect the power, remove the top case and upper board** of the module if need to change the selection jumper, the selection jumpers are next to the connector.

2. Set up the **Jumper** corresponding to the type of **voltage/current and input/output** for each analog channel.

Voltage/Current Input/output Selection Jumper: (Default as AI/AO: Voltage/Voltage)

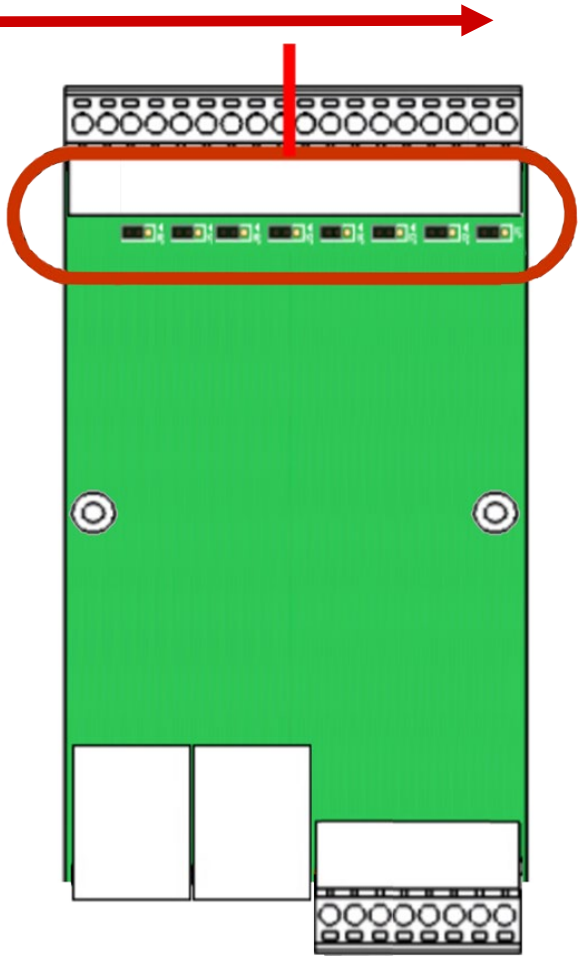


Jumper Location:

U-7504M								
Channel	Vin3	Vin2	Vin1	Vin0	Vout3	Vout2	Vout1	Vout0
Jumper	J4	J3	J2	J1	J8	J7	J6	J5

U-7526M								
Channel	Vout1	Vout0	Vin5	Vin4	Vin3	Vin2	Vin1	Vin0
Jumper	J8	J7	J6	J5	J4	J3	J2	J1

Jumper Direction



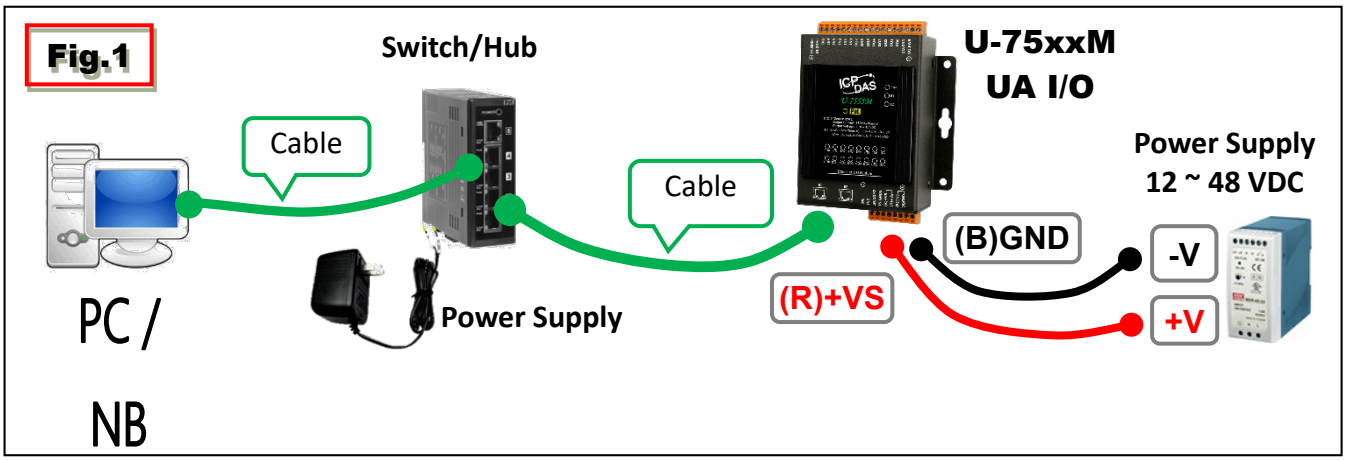
(**Jumpers default** as:
Input: Voltage
Output: Voltage.

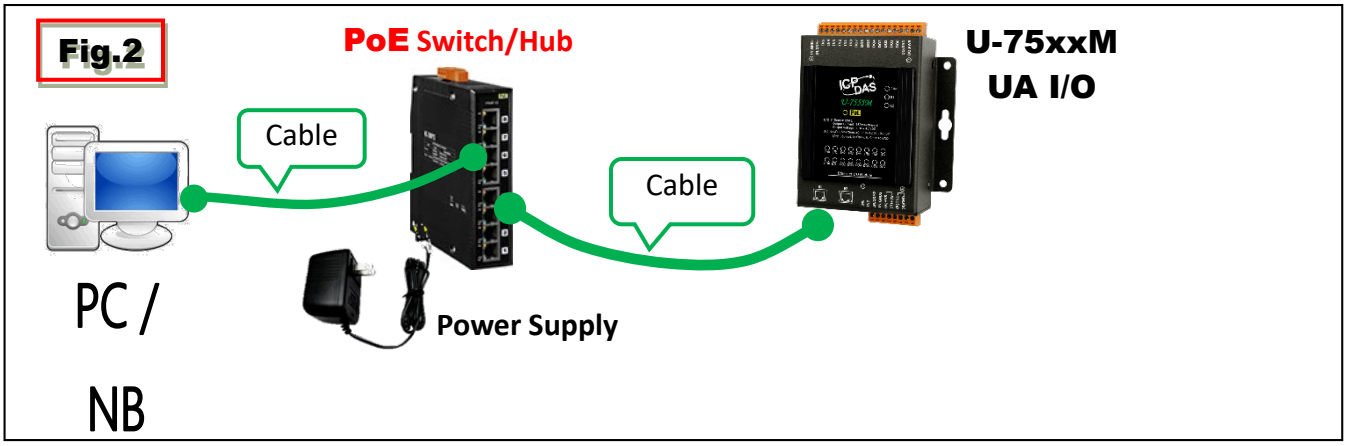
If you need to change the jumpers, remove the top case and upper board first.)

2.1.3. Hardware Wiring

Connect the U-7500 I/O Module with the RJ-45 Ethernet port to an Ethernet switch/hub and PC (**Fig.1**). Beside, U-7500 support PoE (Power over Ethernet). If using the PoE switch, do not need one more power supply (**Fig.2** for PoE Switch). You can also directly link the U-7500 to the PC with an Ethernet cable.

After power is connected, please【**wait 1 minute**】for U-7500 start-up procedure. When the "**RUN**" light starts operating, it represents the boot is complete. **(**After a minute, the "**RUN**" light flashes at one-second intervals, showing that the contact of the SD card in the module is abnormal.)





2.2. Network Connection

This section introduces 3 methods to connect to the **UA I/O Web UI** (User Interface).

Setting new UA I/O module or the new user please uses method A in Chapter 2.2.1 (The same method as the "UA I/O Quick Start" document.). Other users, please see the following introductions to choose method B or C.

The methods to login the UA I/O Web UI:

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

B. Using Software Utility:
Suitable for quick setting when many UA I/O are in the network but the IP are unknown. UA products provide a free software utility for auto searching UA products in the network and can quick jump to the login web page of UA. (Refer **Chapter 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. After login the UA I/O Web UI, then can set up the UA project.

2.2.1. Connection by Factory Default Settings (For New UA)

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

Factory Default Settings of UA I/O Modules			
Network	**IP**	**192.168.255.1**	Assign U-7500 a new IP setting according to your case.
	Mask	**255.255.0.0**	
	Gateway	**192.168.1.1**	
Web UI Account	**Username**	**root**	**After the first login, change the default username/password to use other functions.**
	Password	**root**	

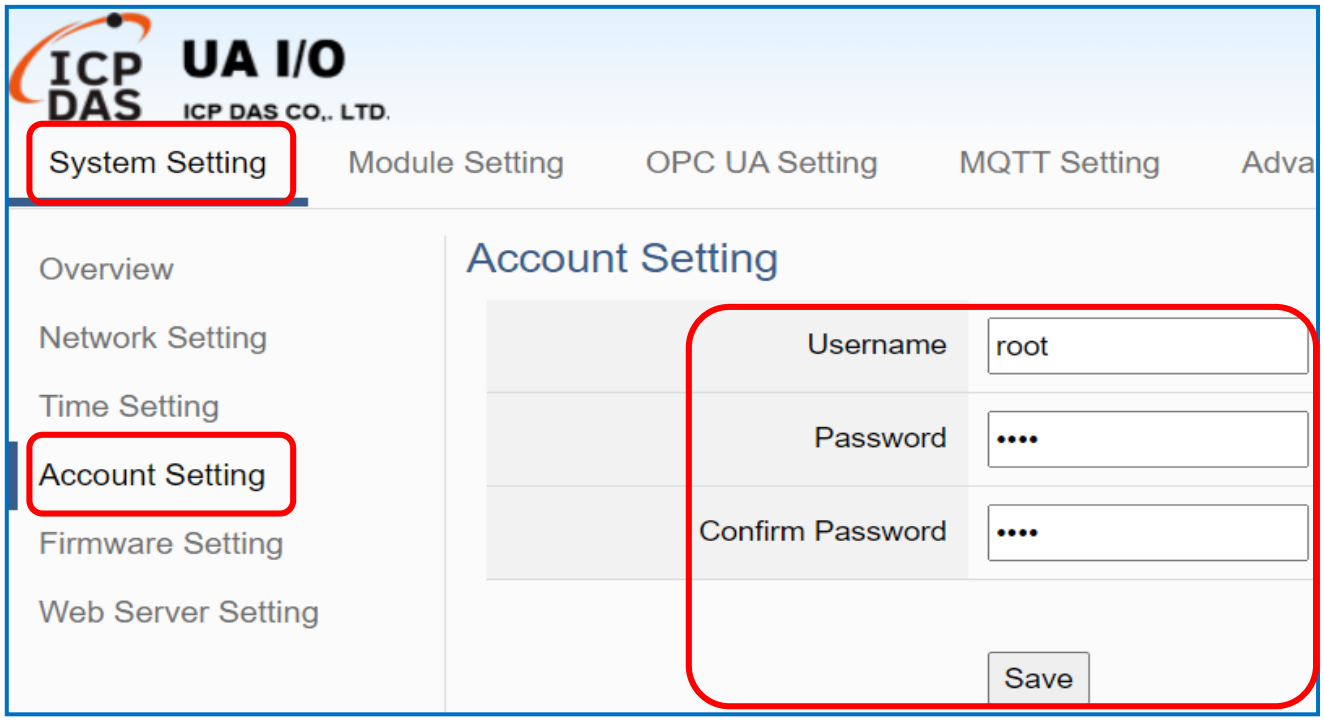
1. Change the PC's IP setting as following. (Write down the PC original network settings before modify.)

IP	**192.168.255.10**
Subnet mask	**255.255.0.0**
Default gateway	**192.168.1.1**

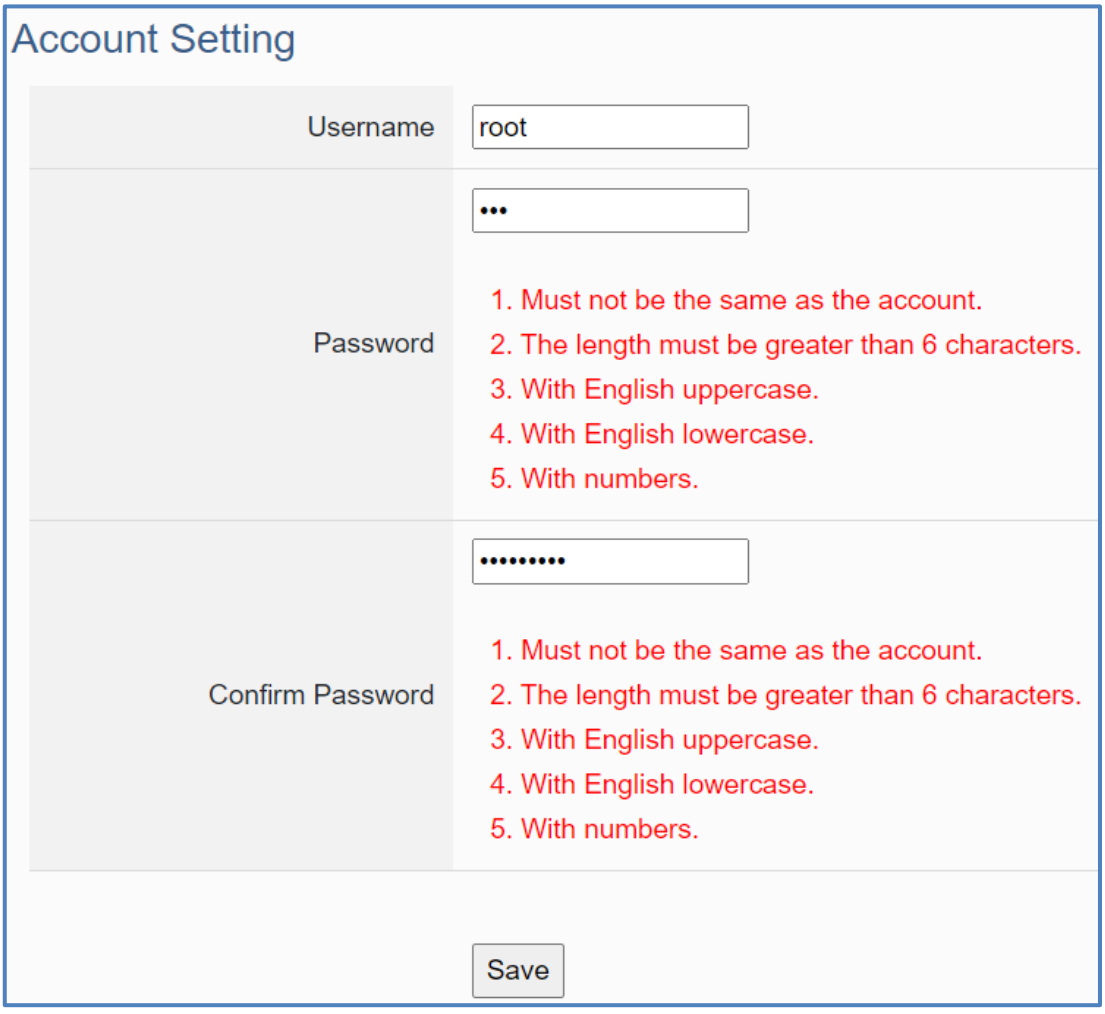
2. Make sure the PC and UA I/O is connecting through Ethernet. Then open a PC side browser (Ex: Chrome, IE…).

   Type http://192.168.255.1 in the URL address. Use Web UI default username / password "root" / "root" to login the system.

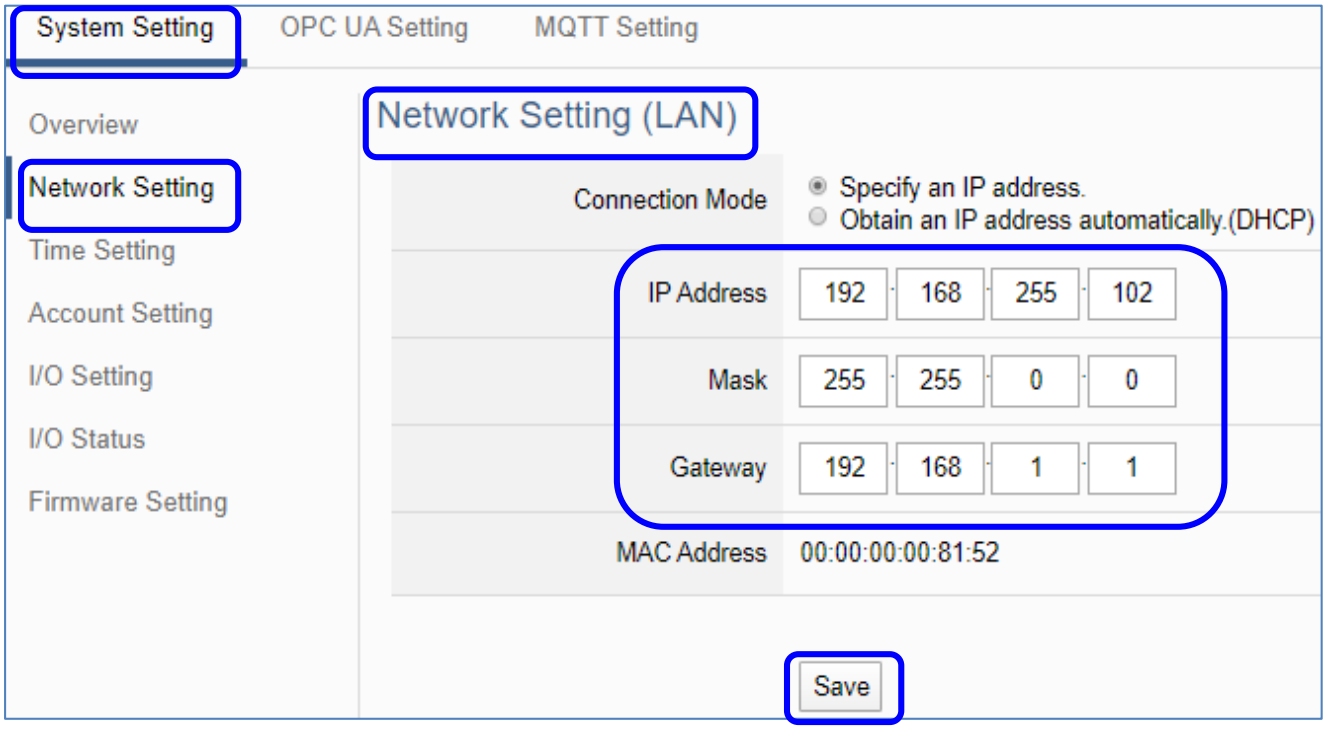
3. Click 【System Setting】➔【Account Setting】, change the Username/password first, or user cannot use any other function (New design for data security).



Password Setting rules:



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



5. Save the IP setting, restore the PC original IP settings, and type the new IP in the browser as step-2 to login the Web UI of UA I/O. Then configure user's UA project.

After setting, you can enter the IP address of the UA in the browser's URL bar and connect to the network interface to set up the UA.

2.2.2. Connection by Utility Searching

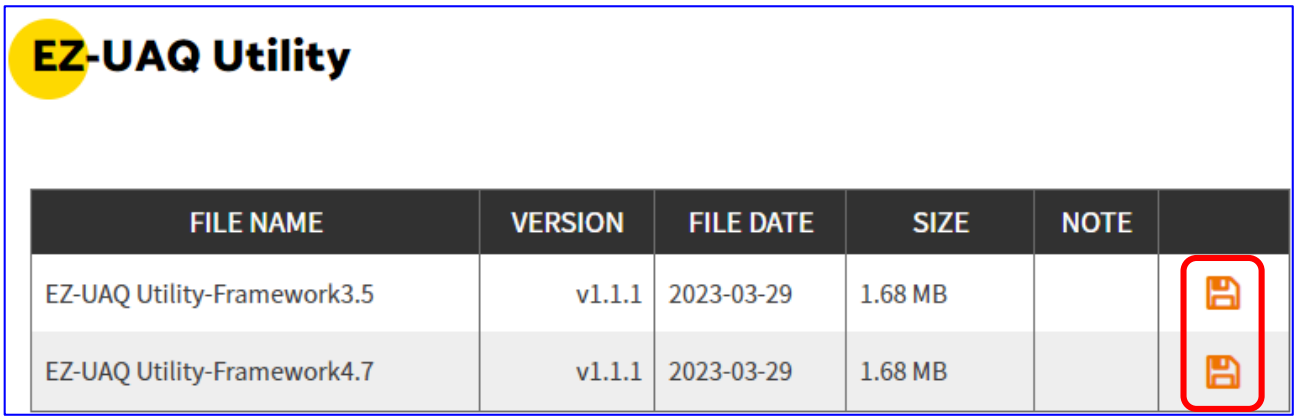
Setting new UA I/O or the new user please uses the method in the Chapter 2.2.1. (A)

If the UA I/O 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.I/O (C)

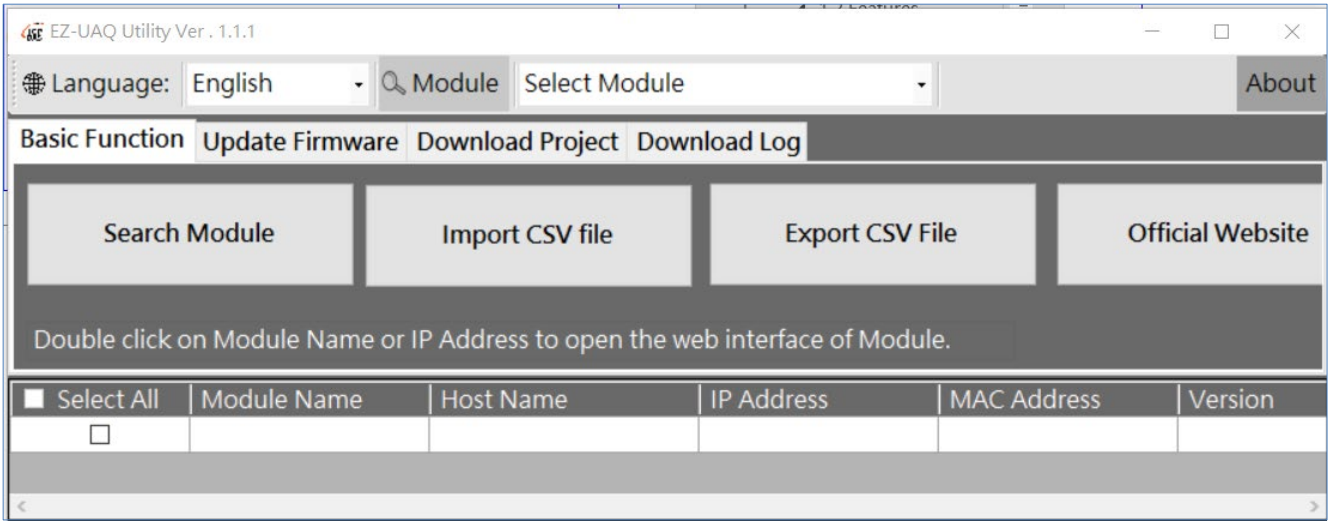
This section introduces the 2nd method(B) that users use the UA I/O Utility to search the Network IP. This method is suitable for connecting multiple UA I/O series modules to the Internet, but the IP addresses of UA I/O are unknown or need to modify the UA I/O quickly.

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 projects.

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&nation=US&kind1=&model=&kw=u-7

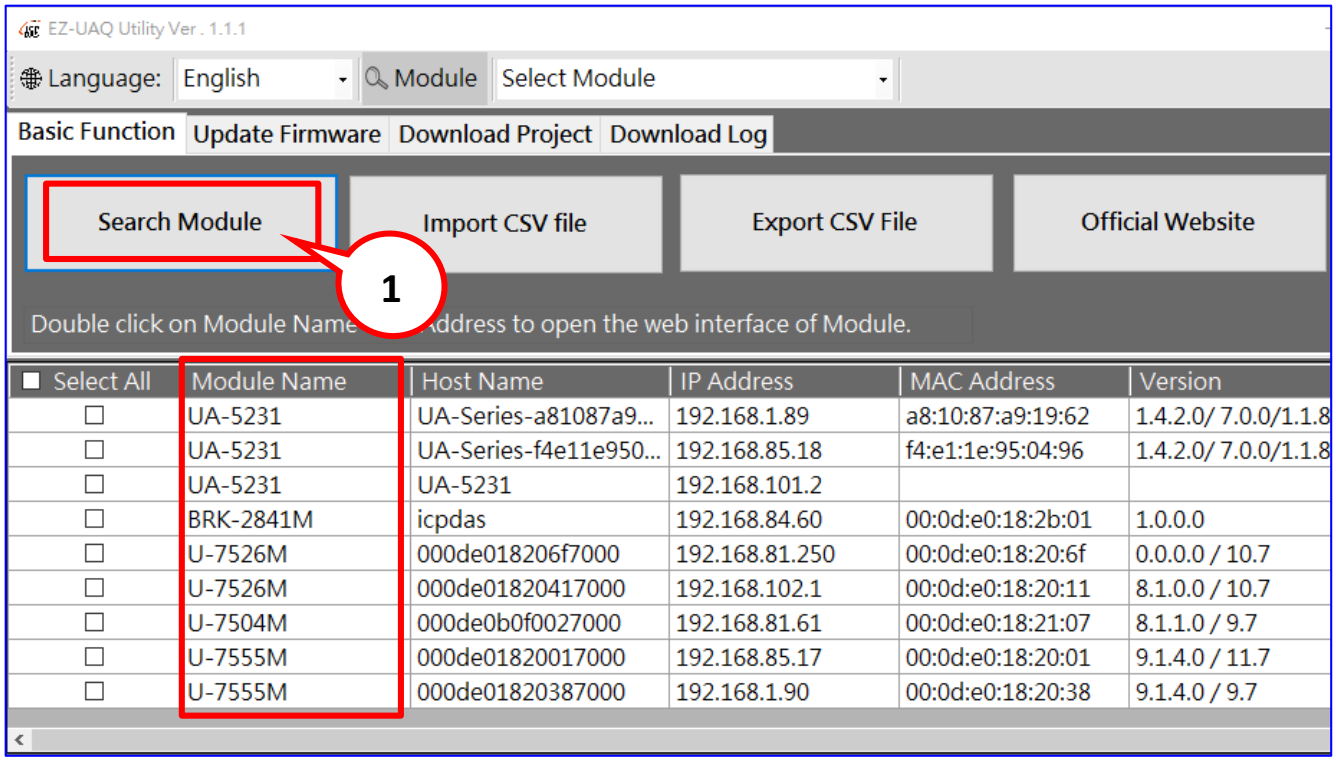


1. Install and execute the Utility
   Download and unzip the Utility, double-click the executable file (EZ-UAQ Utility.msi) to install and execute the Utility software.
   (If there is an old version of Utility on the PC, please uninstall it first.)



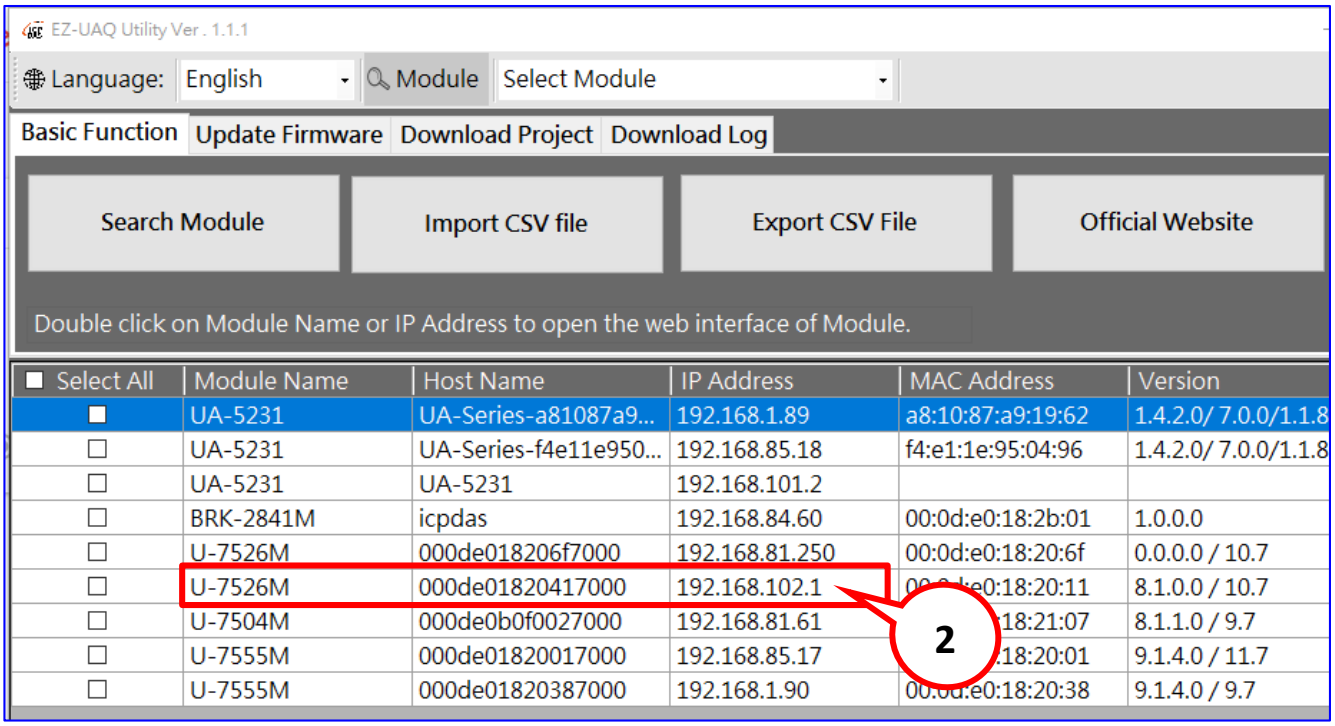
2. Search the UA/BRK/UA_IO series modules

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



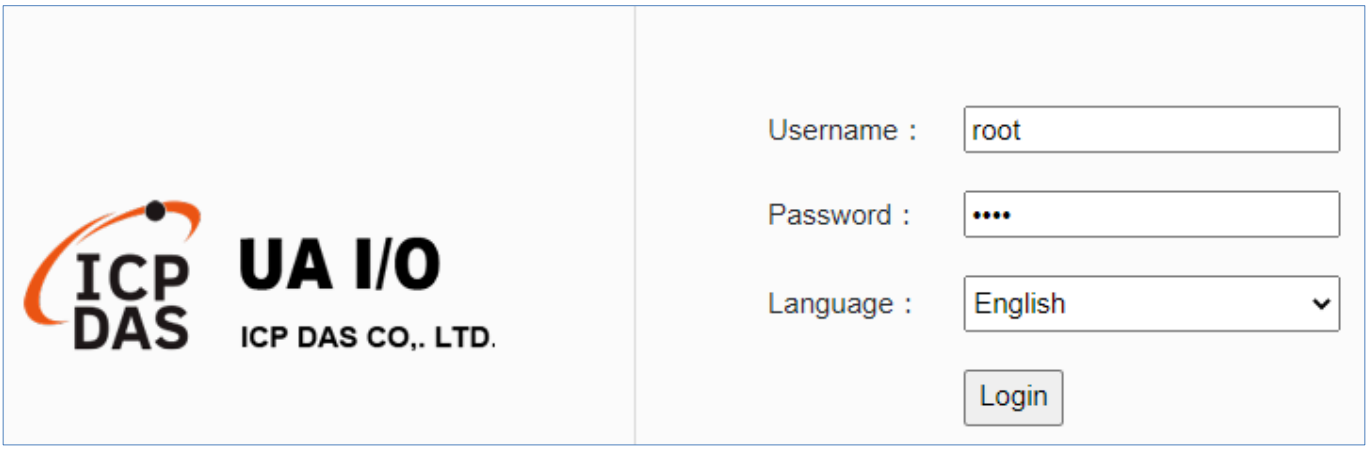
3. Connect to the UA I/O Series

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…).

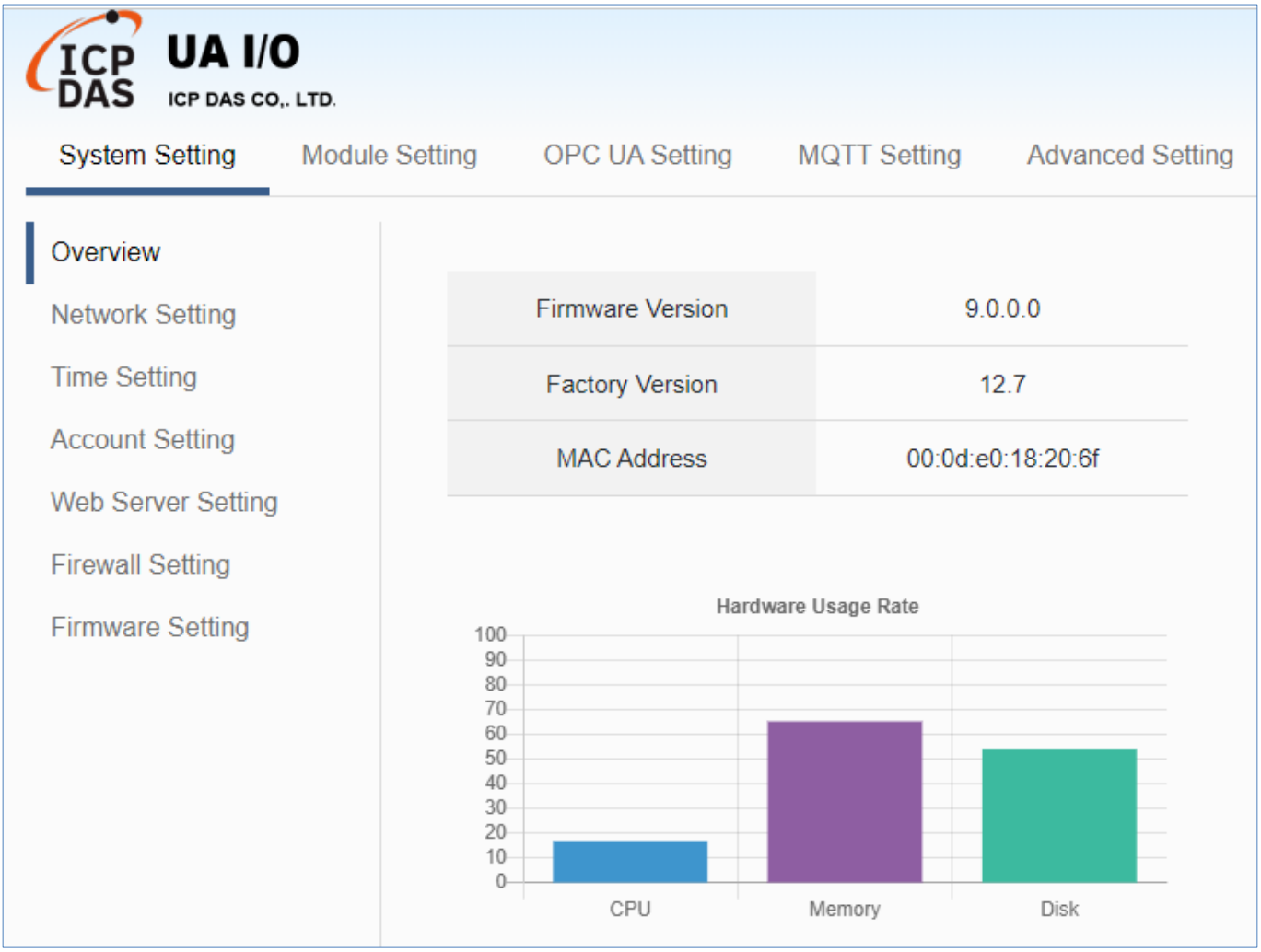


4. Connection to the UA I/O Web UI
The default web browser will be run and direct go to the UA login web site.
Please enter the username and password to login the UA I/O series Web UI.

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



3. Main Function Settings

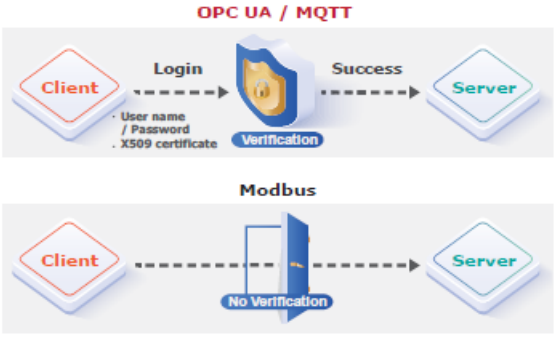
This chapter introduces some of the most important and commonly used functions of UA I/O and their setting steps.

OPC UA I/O modules is a series of Ethernet I/O modules that built-in with the **OPC UA Server / Client, MQTT Client and RESTful API services**. The OPC UA I/O module, also called UA I/O or U-7500, supports the OPC UA Server, MQTT Client and RESTful API function in industrial networking communication. Users can choose the networking mode according to their needs and environment, to transmit the values of built-in I/O channels to the cloud IT system or field control system for reading and writing. So, the main functions are the OPC UA connection and the MQTT connection. This chapter will introduce them first. Each function can be divided into the settings for the Server/Broker and Client, and how to enable secure encrypted communication, and how to download/upload the secure certificates. In addition, the AI/AO, DI/DO function applications are also very important for the UA I/O, which will be added to this chapter soon.

OPC UA / MQTT Communication Advantages: (V.S. traditional Modbus Communication)

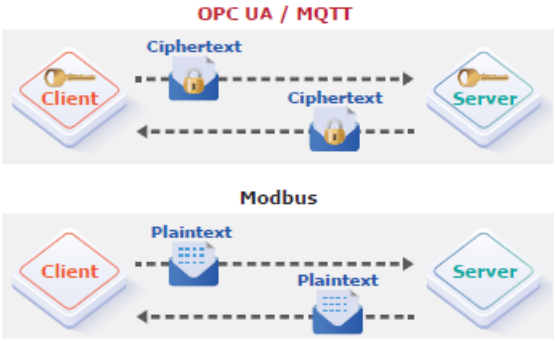
Support Identity Authentication

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



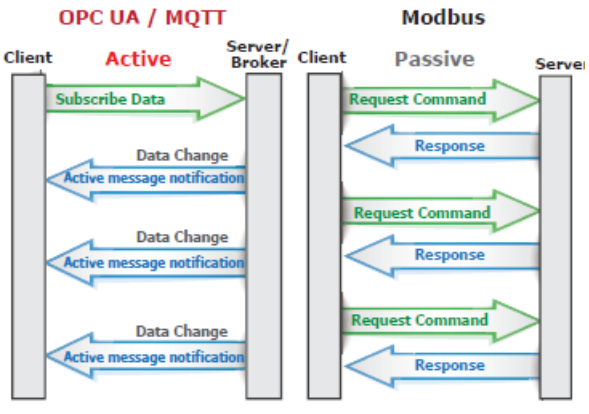
Support Data Encryption

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



Active Data Transmission

Data Transmission			
ICP DAS UA Solution	OPC UA	**Active** (Server sends Data to the Client)	Active ✓
	MQTT	**Active** (Client publishes Data to Broker, and the Broker sends Data to other Clients)	
Traditional	Modbus	**Passive** Request/Response (Wait for Master to poll the Data)	



3.1 Settings for Using OPC UA Connection

This section introduces how to set up the OPC UA communication service of UA I/O, and recommends compatible ICP DAS products.

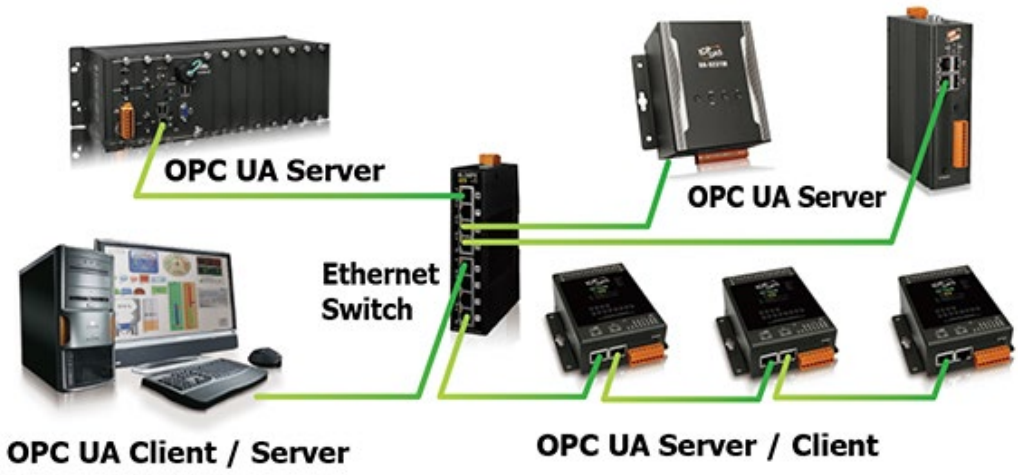
UA I/O module built-in OPC UA Server Service that compliance with IEC 62541 Standard. Provides functions of Active Transmission, Transmission Security Encryption (SSL/TLS), User Authentication (X.509 Certificates / Account password), Communication Error Detection and Recovery, etc. to connect SCADA or OPC UA Clients. Recommend to keep the maximum number of sessions within 3 connections.

OPC UA connection includes the following settings that will be introduced in 3 sub-sections.

1. OPC UA Server Connection Settings (UA I/O)
2. OPC UA Client I/O Settings (Recommend to use the AVEVA Edge/ InduSoft product of ICP DAS.)
3. How to enable secure encrypted function, and download/upload the encrypted certificates

OPC UA Architecture and Advantages of the UA I/O:

OPC UA Architecture



Comparison: ICP DAS UA I/O Module v.s. Traditional I/O Module

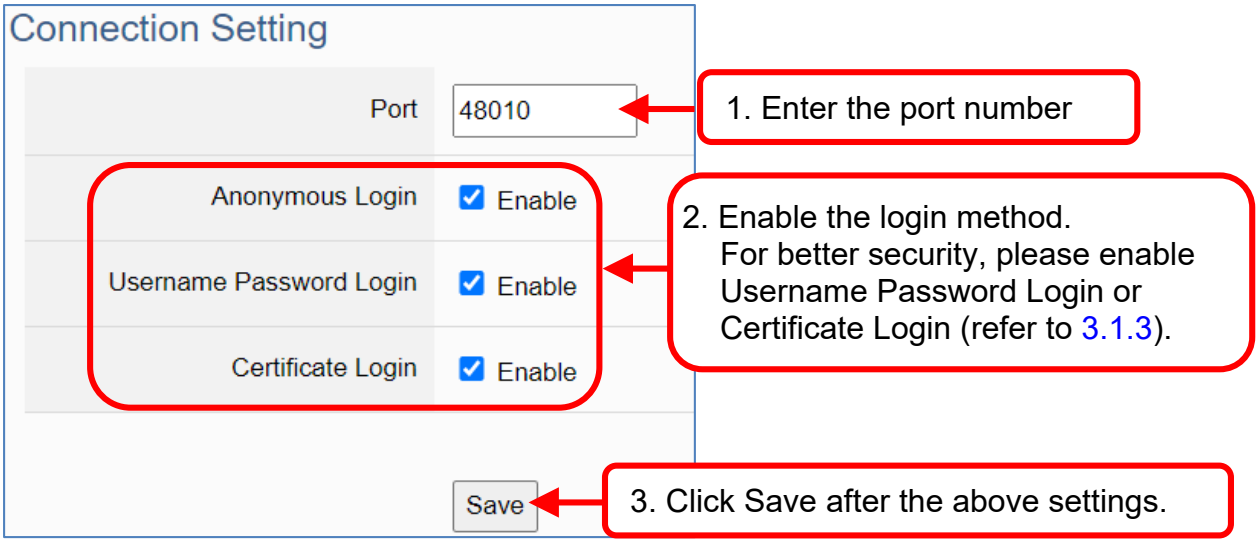
Item	ICP DAS UA I/O Module		Traditional I/O Module
Protocol	**OPC UA Server / Client**	**MQTT Client**	**Modbus TCP Slave**
Identity Authentication	Account ID/Password, Anonymous, Certificate Verification	Account ID/Password, Anonymous, Certificate Verification	None
Encryption	SSL/TLS, Anonymous	SSL/TLS, Anonymous	None
Data Transmission	Active (Actively sends Data to the Client)	Active (Actively publishes Data to Broker, and the Broker sends Data to other Clients)	Passive (Wait for Master to poll the Data: Query/Response)
Project Building	Via browse the Server Content	Via subscribe Topic from Broker	Manually assign an ID and define the Data address and type.

3.1.1 OPC UA Server Connection Settings (UA I/O)

UA I/O module built-in OPC UA Server function and itself is the Server side of the connection. So, when setting up the Server, you only need to set the connection port number and choose the login method (via anonymous, username, or certificate). Usually, the user will enable the username login method, so the user can set the username/password of the account besides.

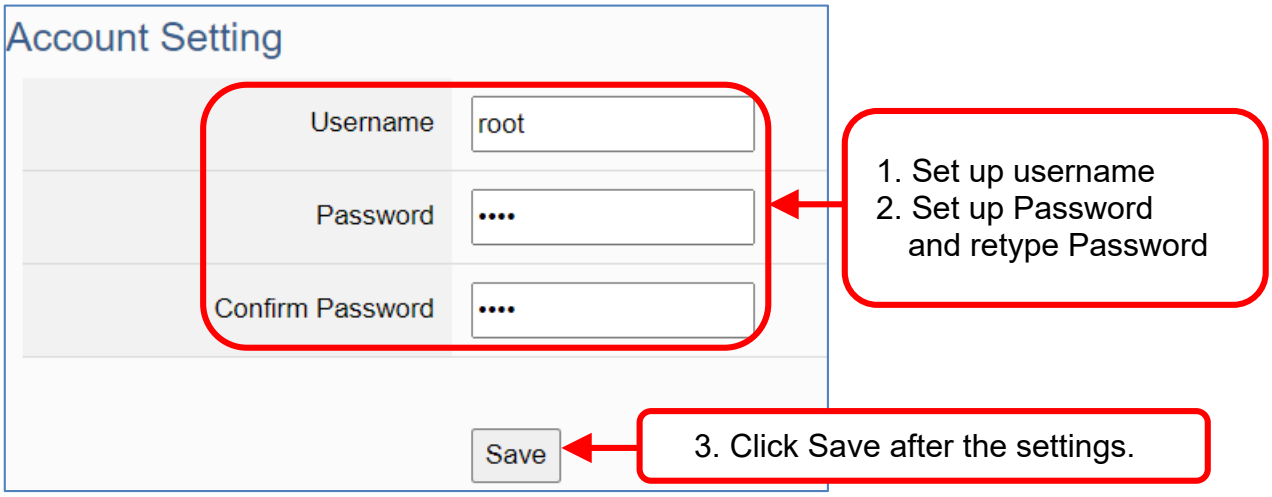
1. Connection Setting

Click Main Menu【OPC UA Setting】➔【Server Setting】➔【Connection Setting】.



2. When enabling username password login, please set the account in the following menu path.

Menu Path:【System Setting】➔【Account Setting】 System Setting ➔ Account Setting (Appendix A).



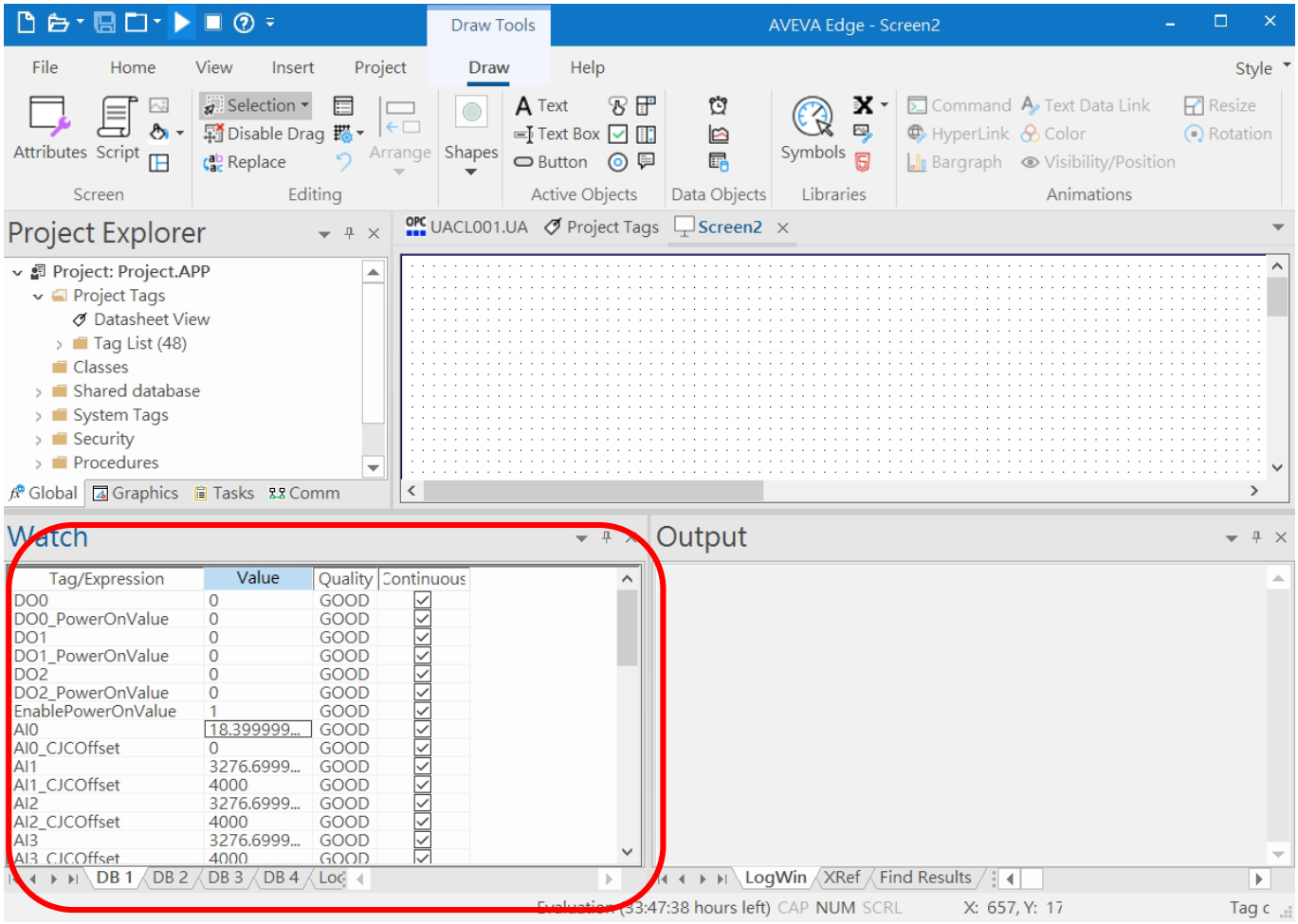
If users enable the secure and encrypted OPC UA **Certificate Login** and need to upload/download certificates, please refer to Sec.3.1.3 .

After completing the Server connection settings, then set the **Client connection** (refer to Sec.3.1.2), and then can communicate with each other.

3.1.2 OPC UA Client Side: AVEVA Edge Simple Application

After setting the OPC UA Server-side (UA I/O), you only need to configure the OPC UA Client for connection. Now, go to the Client device that connects with UA I/O, and set the corresponding data point. We recommend using ICP DAS InduSoft products as the Client device. It is easier to set up relatively and can connect to UA I/O faster. For detailed settings, please refer to UA I/O FAQ-Dev-001.

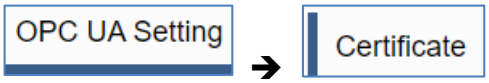
The setting screen is as follows:



3.1.3 Secure Encrypted Connection: OPC UA Certificate

When using the OPC UA connection, in addition to the account login for security, users can also enable the certificate login to double the protection by the secure encryption. This section describes how to download/upload the certificates. If you do not want to enable the certificate login, please skip.

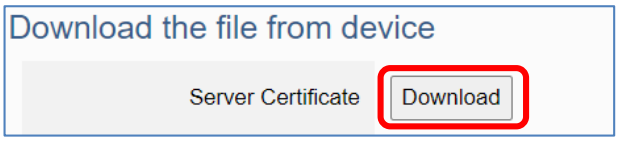
When enabling the OPC UA certificate login, the Server/Client both sides of the connection need to add certificates to each other's trust zones. This section will show how to do the steps.

Menu Path:【OPC UA Setting】➔【Certificate】。 

(Appendix A).

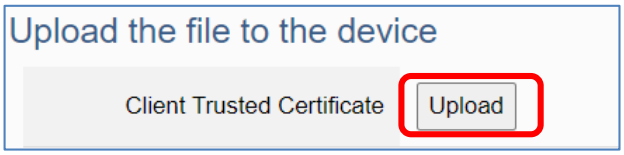
A. **Provide the OPC UA Server Certificate of the UA I/O** to the Client device. That is, download the Server certificate file of the UA I/O, and then upload and import it into the software (or APP) of the OPC UA Client device.

Click the "Download" button to get the Certificate file generated by the Server.
File Name: icpdasuaserver.der

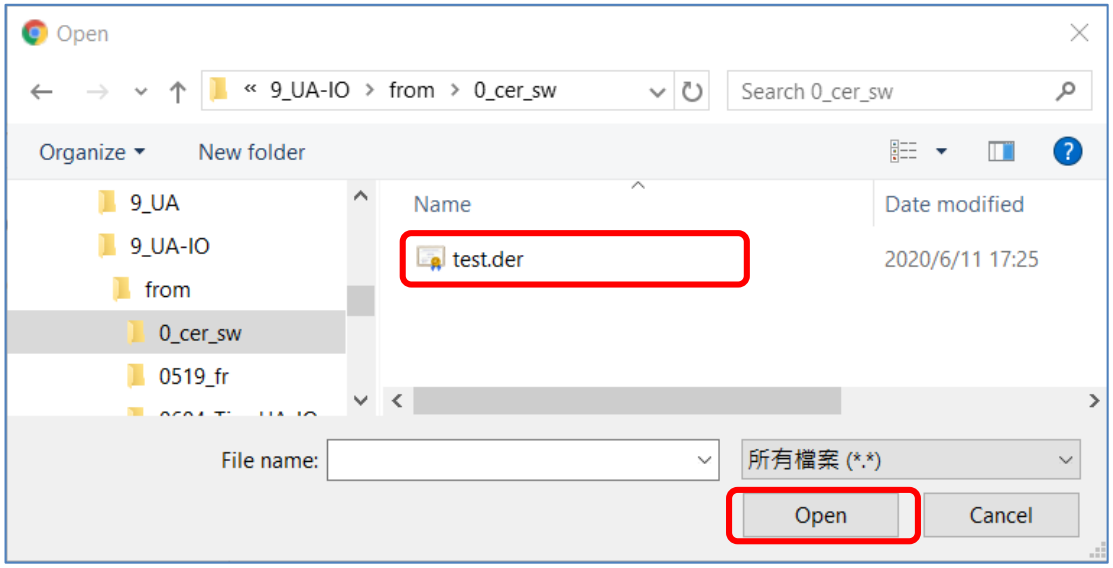


B. **Get the Trusted Certificate file of the connected OPC UA Client**, save it in the PC, and upload it into the UA I/O module.

1) Click the “Upload” button to open the “open” window.



2) Select the Trusted Certificate file.



3.2 Settings for Using MQTT Connection

This section introduces how to set up the MQTT Client communication of UA I/O, and recommends the compatible ICP DAS products.

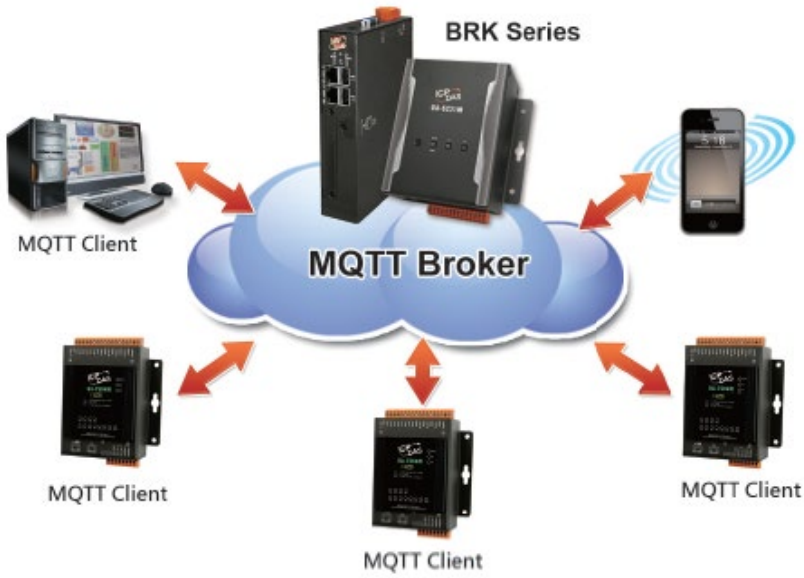
UA I/O module built-in MQTT Client Service (Compliance with MQTT V.3.1.1 protocol). Provides functions of IoT Active M2M Transmission, QoS (Quality of Service), Retains Mechanism, Identity Authentication, Encryption, Last Will, etc.

MQTT connection includes the following settings that will be introduced in 3 sub-sections.

1. MQTT Broker Connection Settings (Recommend the UA-2xxx/52xx & BRK series of ICP DAS)
2. MQTT Client side I/O Settings (UA I/O)
3. How to enable secure encrypted function, and download/upload the encrypted certificates

MQTT Architecture and Advantages of the UA I/O:

MQTT Architecture



Comparison: ICP DAS UA I/O Module v.s. Traditional I/O Module

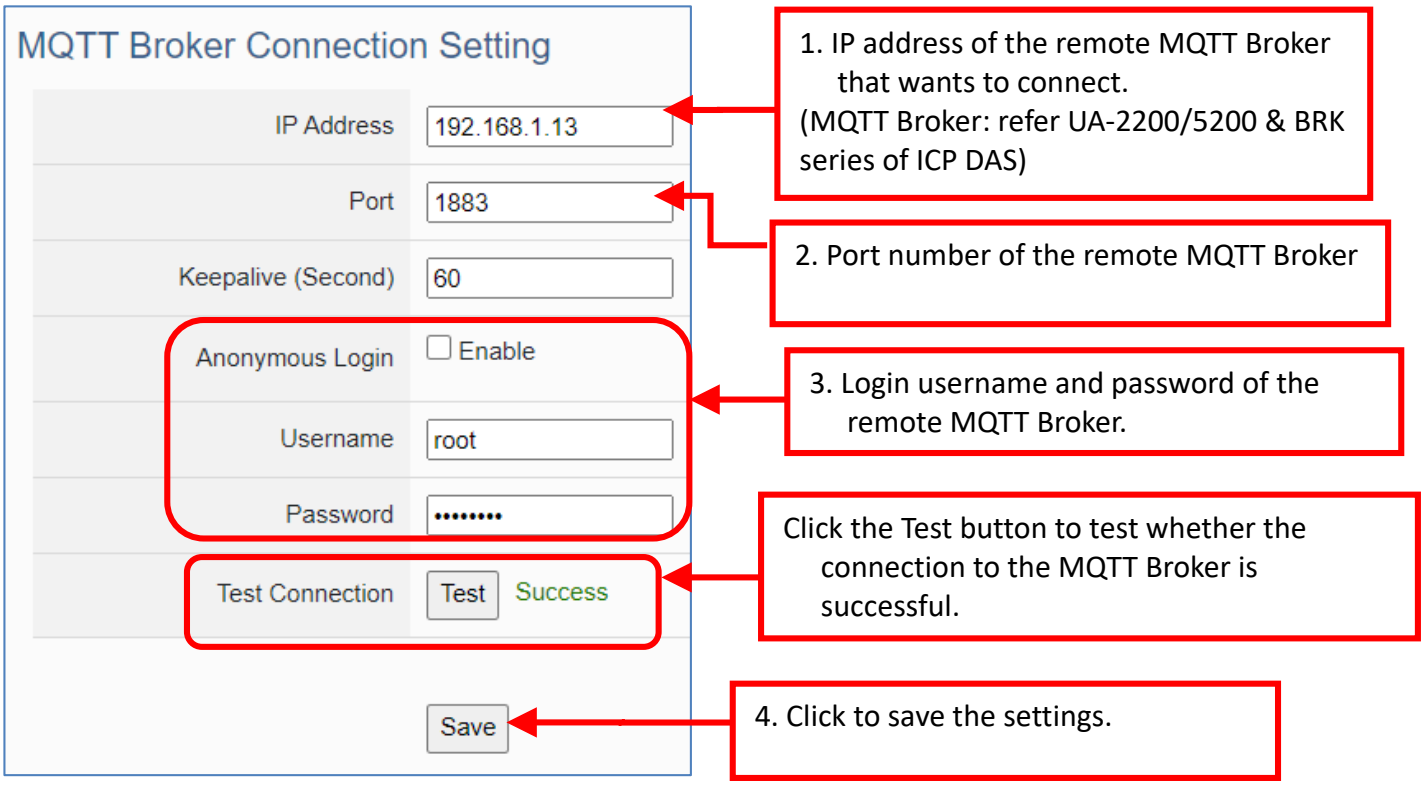
Item	ICP DAS UA I/O Module		Traditional I/O Module
Protocol	**OPC UA Server / Client**	**MQTT Client**	**Modbus TCP Slave**
Identity Authentication	Account ID/Password, Anonymous, Certificate Verification	Account ID/Password, Anonymous, Certificate Verification	None
Encryption	SSL/TLS, Anonymous	SSL/TLS, Anonymous	None
Data Transmission	Active (Actively sends Data to the Client)	Active (Actively publishes Data to Broker, and the Broker sends Data to other Clients)	Passive (Wait for Master to poll the Data: Query/Response)
Project Building	Via browse the Server Content	Via subscribe Topic from Broker	Manually assign an ID and define the Data address and type.

3.2.1 Connecting to MQTT Broker

UA I/O module built-in MQTT Client function and itself is the Client side of the connection. So, when setting up the MQTT Broker, it is to set the data of the remote device (Broker) that the UA I/O module wants to connect. The data includes Broker's IP address, port number, anonymous login, account password login, etc.

MQTT Broker Device: recommend to use ICP DAS IIoT communication server **UA-2200/5200/2600 series** or MQTT Broker **BRK-2600M/5200M series**.

Main Menu:【MQTT Setting】➔【Connection Setting】 MQTT Setting ➔ Connection Setting (Appendix A).



If users enable the secure and encrypted MQTT **Certificate Login**, need to upload/download certificates, please refer to Sec.3.2.3.

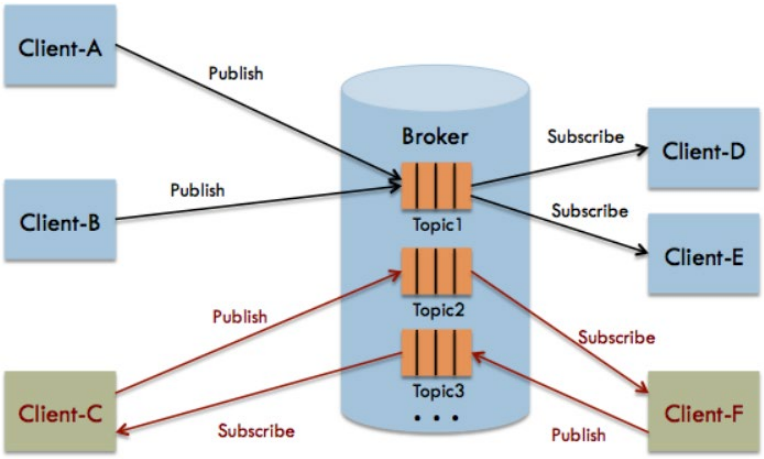
After completing the MQTT Broker connection settings, then set the **Client connection** (refer to Sec.3.2.2), and then can communicate with each other.

3.2.2 MQTT Client Setting of the UA I/O

UA I/O built-in MQTT Client function and itself is the MQTT Client side of the connect. When setting, please set the connecting remote MQTT Broker device first, and then set the UA I/O module of the MQTT client.

Reference for MQTT related basic knowledge:

MQTT (MQ Telemetry Transport) is a lightweight **publish/subscribe** messaging protocol. An MQTT-based application will include two or **more *clients***, which are applications exchanging messages, and **a *broker***, which is a server that accepts incoming messages and routes them to the appropriate destination client. As with most *publish-subscribe* systems, message sends involve ***publishing*** on a specified ***topic***. The **broker** then forwards the message to all ***subscribers*** of that topic. These primitives can be used to build different interaction patterns. (as the picture below)



MQTT gives you flexibility by specifying a *Quality of Service* (QoS) with each message. QoS is a parameter available on each publish call. It is one of three levels:

- QoS 0: At most once
- QoS 1: At least once
- Q0S 2: Exactly once

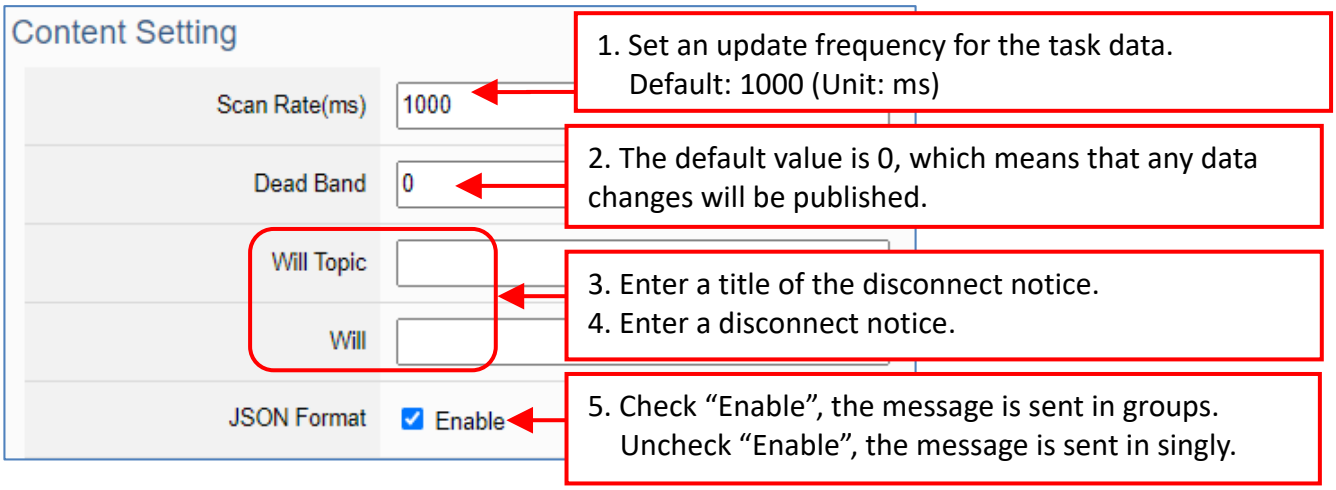
Provides a Quality-of-Service data delivery: QoS can be selected based on the needs of the application.

MQTT Retained messages: The last published message (with retained flag set to true) is stored at the broker so that new subscribers can immediately obtain last known good value rather than wait for the next update from publisher.

REFERENCES: (The above information is from the following websites.)
https://micropython-iot-hackathon.readthedocs.io/en/latest/mqtt.html
https://devopedia.org/mqtt

MQTT Client Setting of the UA I/O:

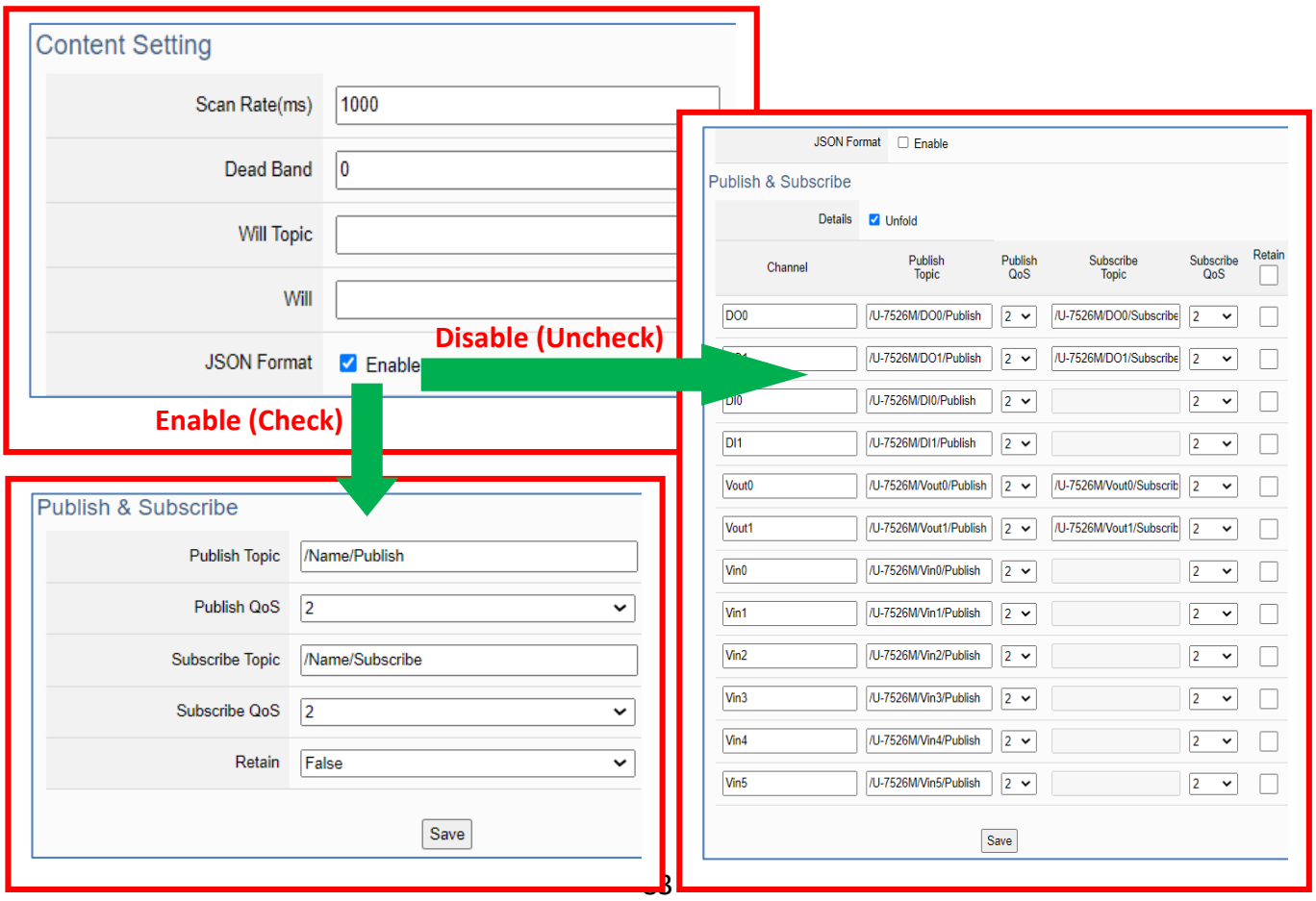
Manu Path:【MQTT Setting】➔【Client Setting】 MQTT Setting ➔ Client Setting (Appendix A).



Enable of JSON Format: Descriptions for the **Enable (check “Enable”)** / **Disable (uncheck “Enable”)**

- Enable: Enter the Group setting screen, the Publish & Subscribe message is sent in a group.
  Group setting (**JSON Format**) the Publish & Subscribe: Suitable for obtaining all I/O values at one time, it can reduce network resources. It will pack all I/O point values into a JSON string, and then send the JSON string as a message or subscribe JSON string to get all I/O values back at one time. (Refer to Appendix B for the detailed JSON format)

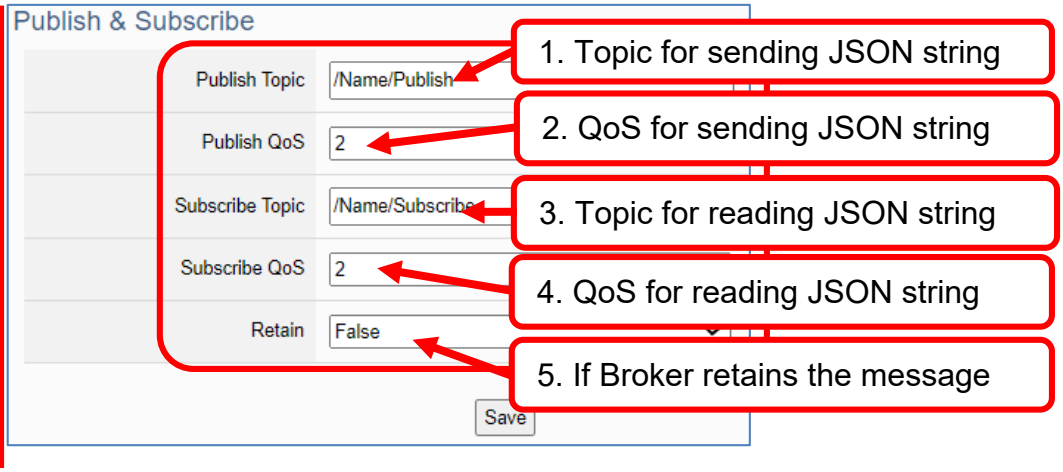
- Disable: Enter the Singly setting screen, the Publish & Subscribe message is sent in singly (P to P).
  Singly setting (Point-to-point) the Publish & Subscribe: Suitable for I/O points that require high real-time performance, or devices that do not support generating or parsing JSON format.



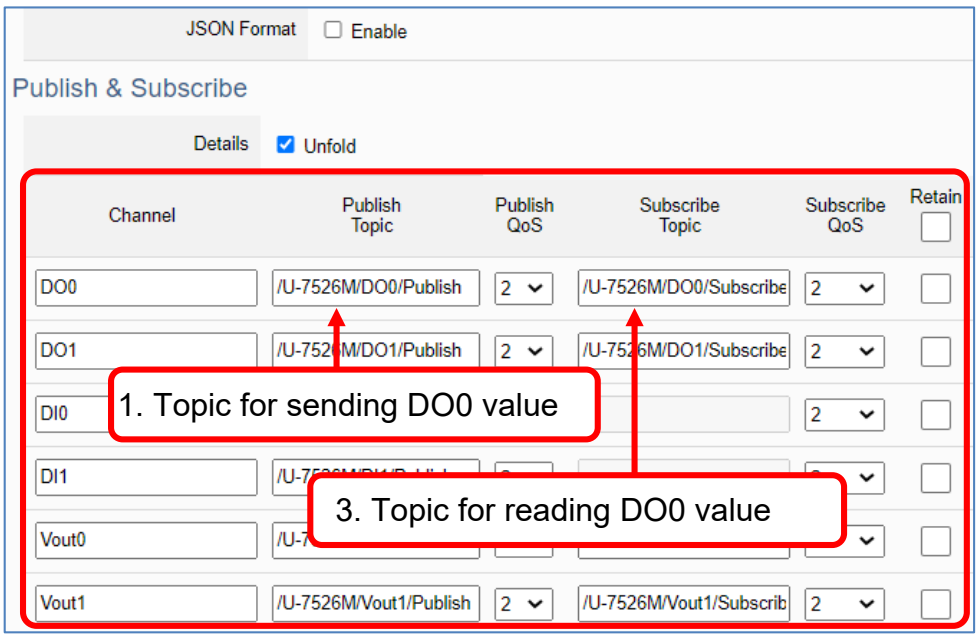
The setting parameters for Both enable or disable the JSON Format:

MQTT Setting > Client Setting - Publish & Subscribe	
Publish Topic	The topic of sending data / publishing 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 data / subscribing message. It can copy the Publish Topic of linked device.
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	Set up if the Broker retains the message.
Save	Click to save the setting of this page.

When **Enable JSON format**, it will pack all I/O point values into a JSON string, and then send the JSON string as a message or subscribe JSON string to get all I/O values back at one time. (Refer to Appendix B)

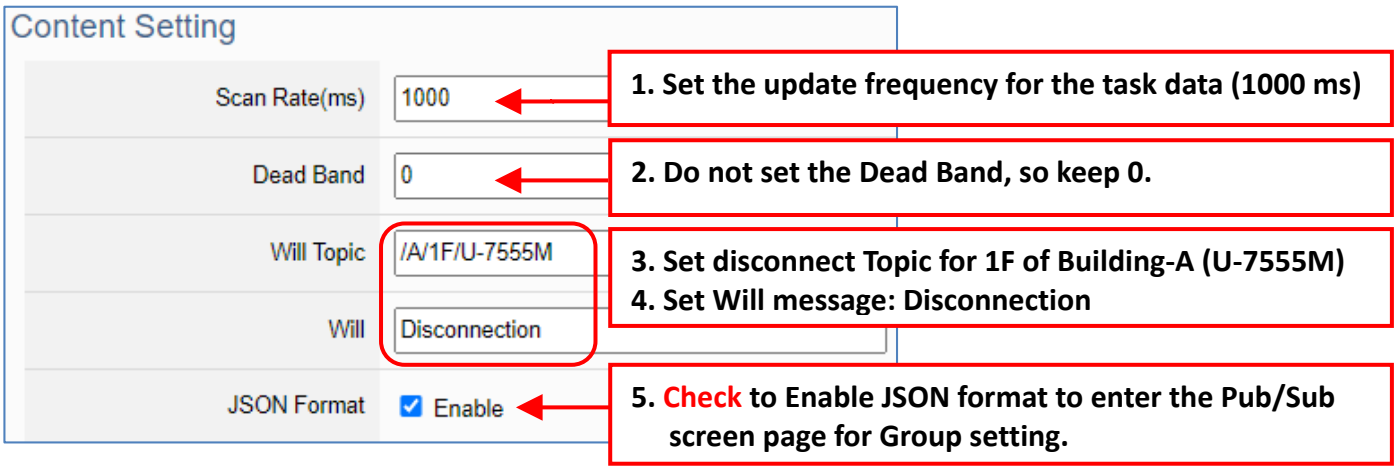


When **Disable JSON format**, it will publish or subscribe the message in singly (Point-to-point). User needs to set each I/O point.

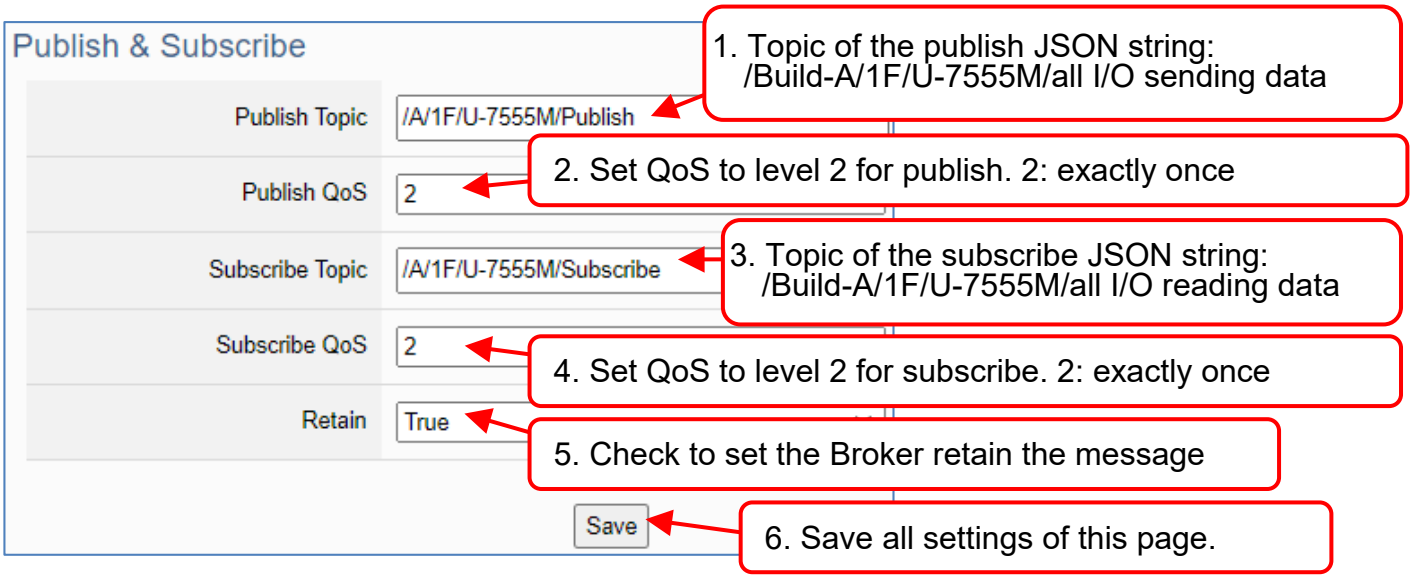


- Group Setting example: Check “Enable” of “JSON Format”

Here is an example of the lighting control in a factory. Use the I/O points of the U-7555M module to connect the light switches of Room 1 to 7 in the factory Building-A to monitor/control the on/off of the room lights. We want to use the **Group Setting**, so **check** **"Enable"** of the "**JSON Format**". The following is a parameter example for the settings of **[MQTT Setting] > [Client Setting]**.



The Pub & Sub setting page when enable the JSON Format: Sending/Reading the JSON string

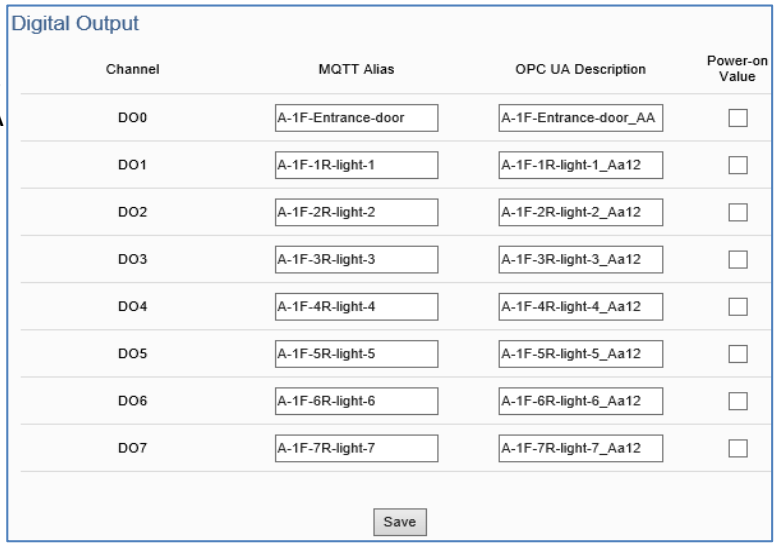


Note:

When setting the Pub/Sub of MQTT Client, please also set the Nickname of I/O channel, which includes MQTT Nickname and OPC UA Description.

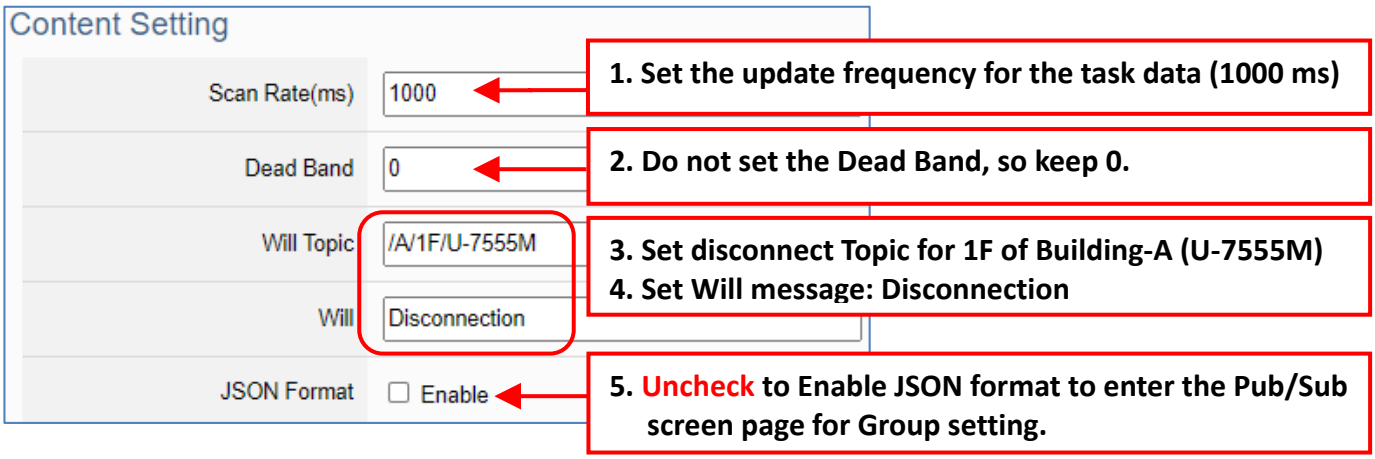
MQTT Client setting should cooperate with MQTT Nickname of the I/O channels for the accuracy/readability of MQTT communication settings.

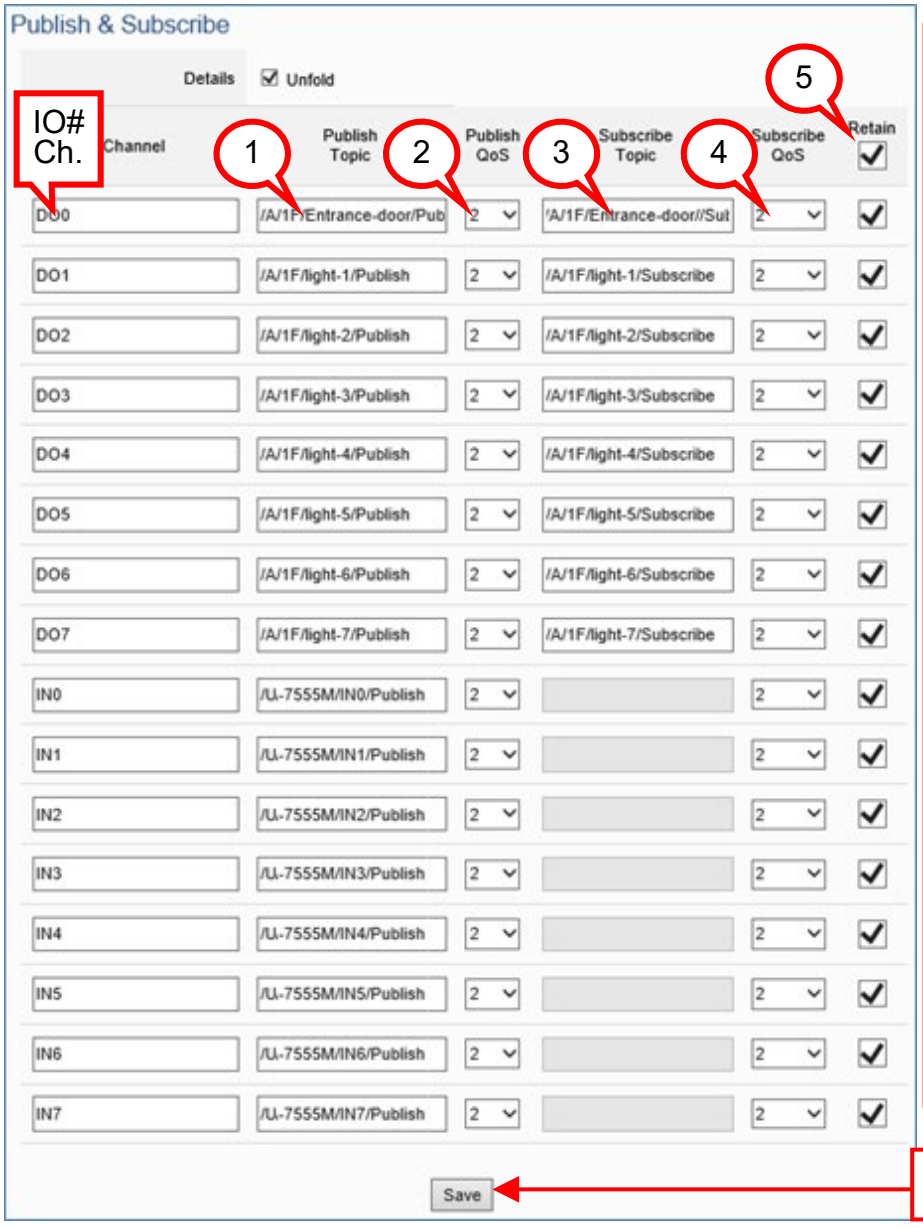
Menu: 【Module Setting】>【I/O Setting】 As shown on the right.



- Singly Setting example: Uncheck “Enable” of “JSON Format”

Here is an example of the lighting control in a factory. Use the I/O points of the U-7555M module to connect the light switches of Room 1 to 7 in the factory Building-A to monitor/control the on/off of the room lights. We want to use the **Point-to-Point Setting**, so **uncheck** **"Enable"** of the "**JSON Format**". The following is a parameter example for the settings of **[MQTT Setting] > [Client Setting]**.





Uncheck the JSON Format to do the Point-to-Point singly setting (as the left figure): User needs to set up each Topic/QoS of Publish/ Subscribe for each I/O channel.

1. Set the Publish Topic of DO0 and set each IO#.
   Topic means: /Building-A/1F/light# of U-7555M/Topic
2. The level of sending Topic for each IO#.
   level 2: Exactly once
3. Set the Subscribe Topic of DO0 and set each IO#.
   Topic means: /Building-A/1F/light# of U-7555M/Topic
4. The level of reading Topic for each IO#.
   level 2: Exactly once
5. Check to set the Broker retain the message

6. Save all settings.

3.2.3 Secure Encrypted Connection: MQTT Certificate

When using the MQTT connection, in addition to the account login for security, users can also enable the SSL/TLS login to use the MQTT Certificate protection of the secure encryption. This section describes how to download/upload the certificates. If you do not want to enable the certificate login, please skip.

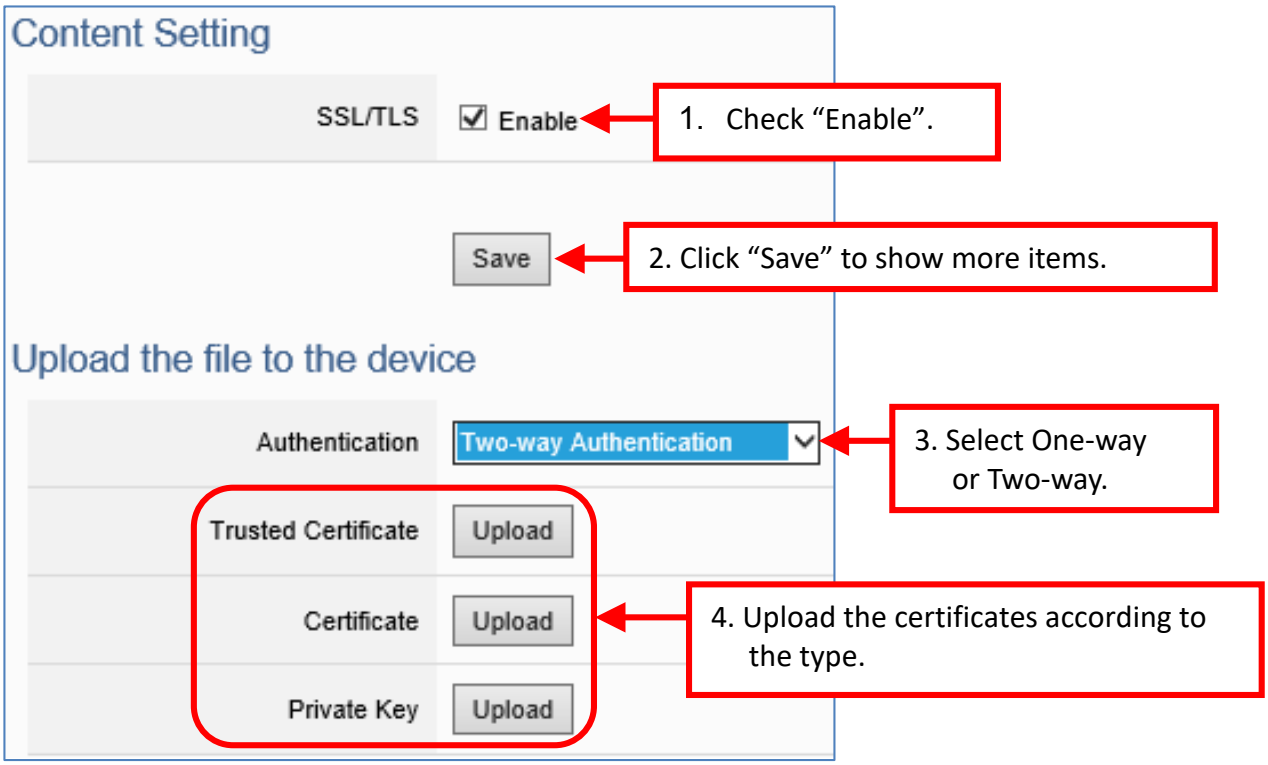
The settings of MQTT certificate connection need to enable the SSL/TLS secure encryption. And the UA I/O needs to get the certificate of the connecting device first. And then upload the certificates to UA I/O. There are three types of certificates: Trusted Certificate, Certificate, and Private Key.

Please upload the files to the UA I/O module according to the type of certificates:
To perform the One-way authentication, you need to upload the Trusted Certificate.
To perform the Two-way authentication, you need to upload the Trusted Certificate first, and then upload the Certificate and Private Key.

Note:

1. One-way authentication: The Client verifies the validity of Broker credentials; need to upload the Trusted Certificate.
2. Two-way authentication: The Client and Broker verify the validity of the certificate with each other; need to upload the Trusted Certificate first, and then upload the Certificate and Private Key.
3. Trusted Certificate: File format must be PEM. Extension name must be “pem”, “cer”, or “crt”.
4. Certificate: File format must be PEM. Extension name must be “pem”, “cer”, or “crt”.
5. Private Key: File format must be PEM. Extension name must be “key”.

Manu Path:【MQTT Setting】➔【Client Setting】 MQTT Setting ➔ Client Setting (Appendix A).



3.3 RESTful API: Read and Write I/O and Virtual Point

This section describes RESTful API functions and usage. UA I/O supports RESTful API functions. Users can remotely read and write the I/O points (include the virtual point) of UA I/O modules through HTTP.

What is Restful API?

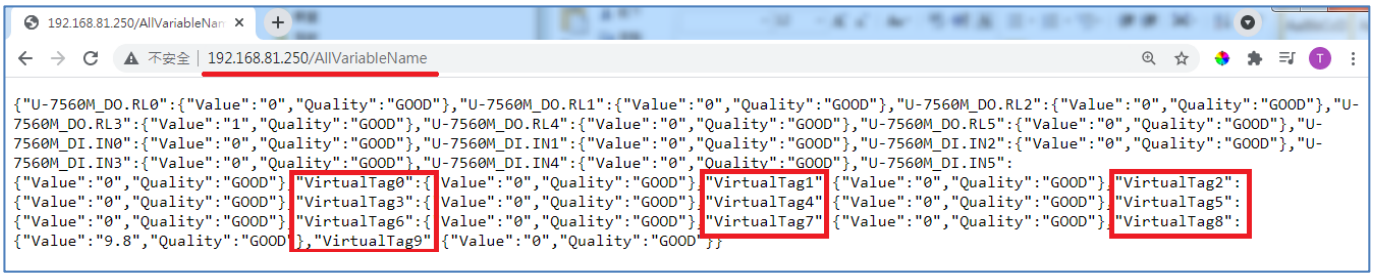
REST (Representational state transfer) is a software architectural style that was created to guide the design and development of the architecture for the World Wide Web. REST is a widely accepted set of guidelines for creating stateless, reliable web APIs. A web API that obeys the REST constraints is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

Use RESTful with UA I/O

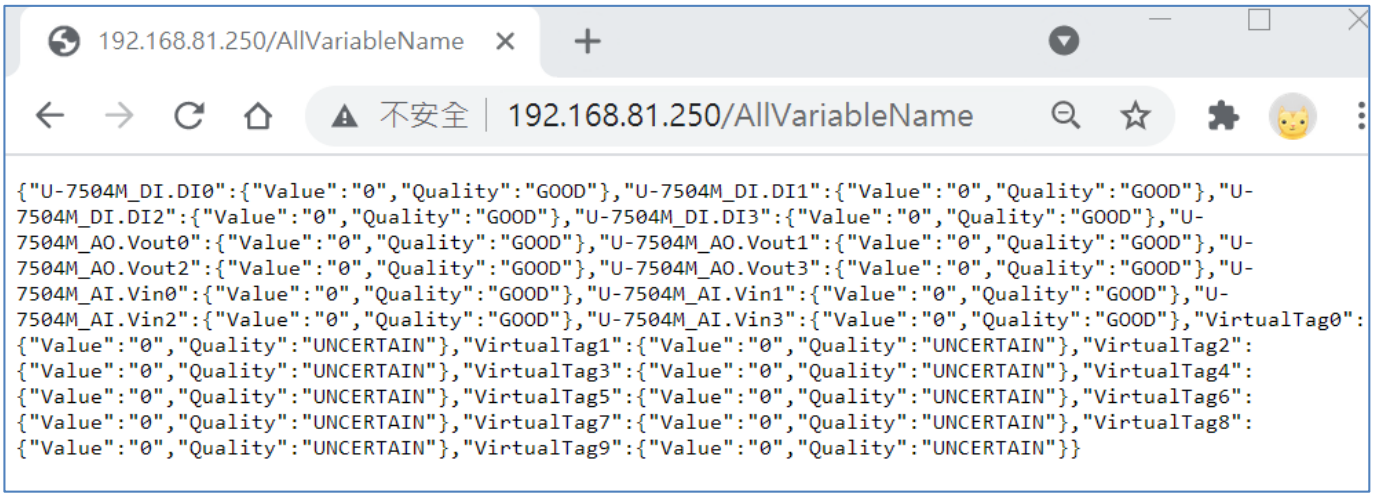
Reading and writing the virtual points are the same as that of physical I/O points. Examples:

[Example 1.]

IP/AllVariableName : Define 10 virtual points (all types are AO), and the names all start with VirtualTag (red box in the figure below).

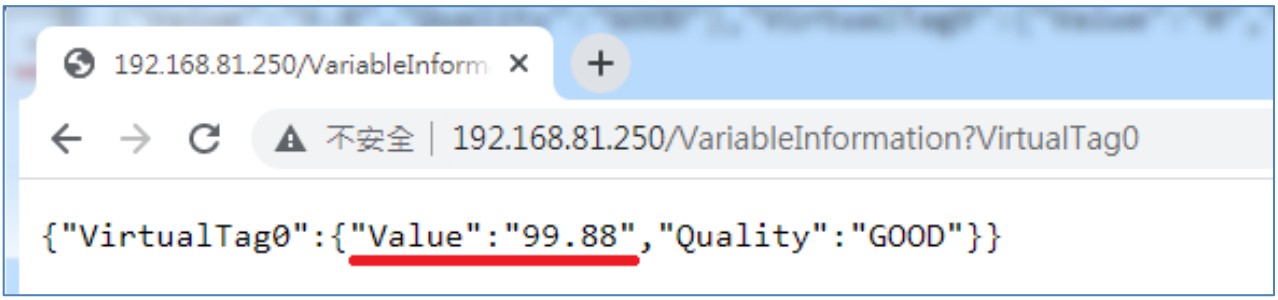


Or as following:



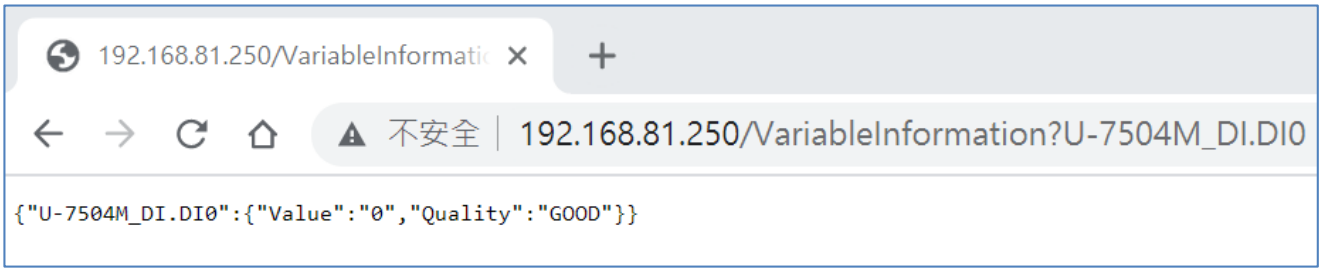
[Example 2.]

IP/VariableInformation?VirtualTag0 : RESTful **Read** the value of VirtualTag0



Or as following:

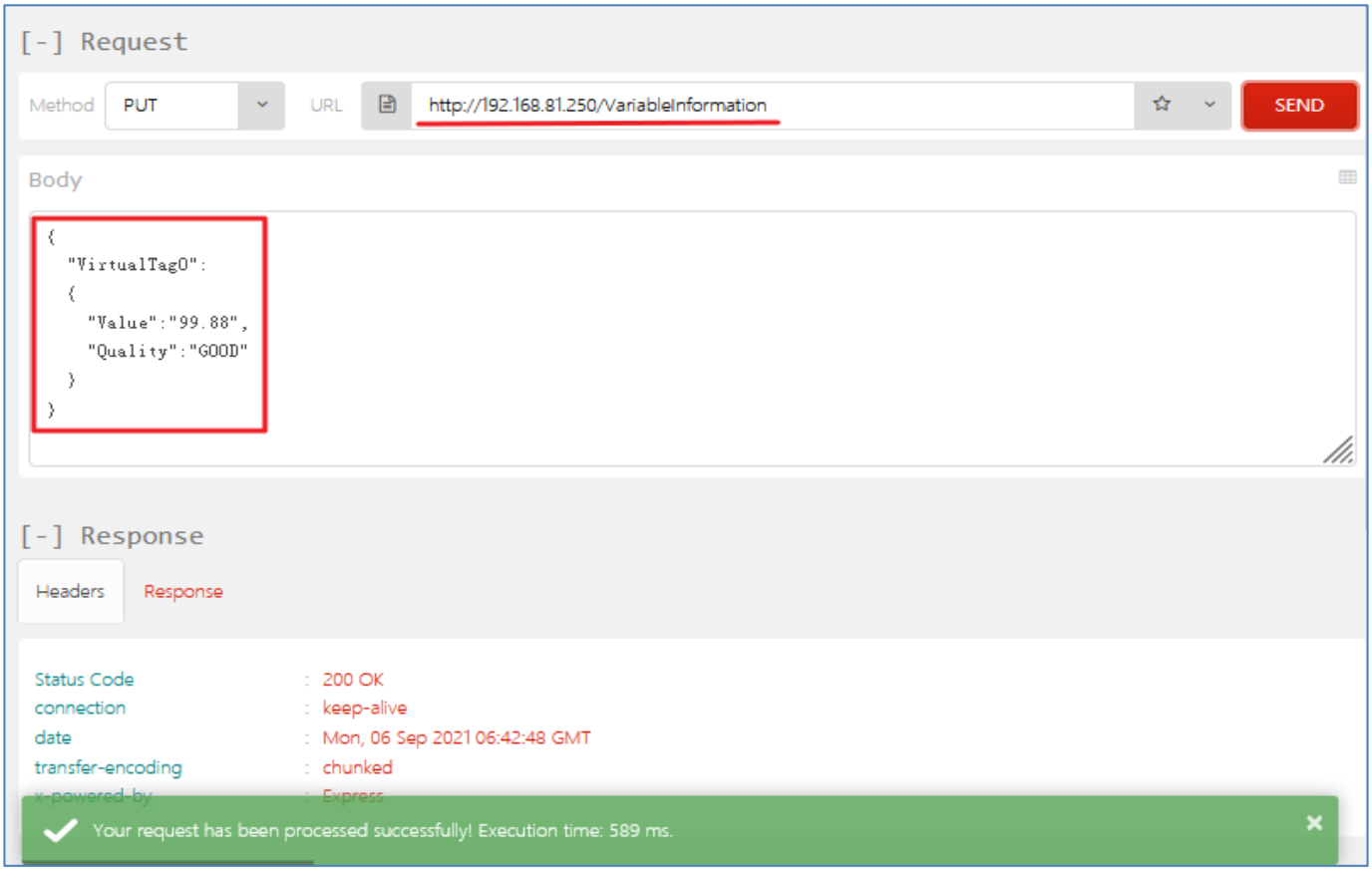
IP/VariableInformation?U-7504M_DI.DI0 : RESTful **Read** the DI.DI0 value of U-7504M.



[Example 3.]

IP/VariableInformation : RESTful **write** the value of VirtualTag0

This example uses the Firefox as the RESTful client.



RESTful Description

[Resource Definition]

HTTP Method	Path	Description	Remarks
GET	/AllVariableName	Read all variable data.	Link to Example G1.1
	/VariableInformation?var0,var1, var2…	Read the data of var0, var1, var2… in all variables, data are separated by commas.	Link to Example G1.2
PUT	/VariableInformation	writes the variable data being used.	Link to Example P1.1

[JSON 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.

[GET Examples]

Resource Definition	Actual Application Corresponding to the Resource Definition
GET /AllVariableName	GET /AllVariableName
Description	Back to G1.1
GET：Read /AllVariableName：All variables For Example： GET /AllVariableName：Read all variable data, and the return value is in JSON format.	

Resource Definition	Actual Application Corresponding to the Resource Definition
GET /VariableInformation?var0, var1, var2…	GET /VariableInformation?U-7560M_DO.RL0,U-7560M_DO.RL1
Description	Back to G1.2
GET：Read /VariableInformation：Variable Information. ?：Used to separate the API and the parameters. U-7560M_DO.RL0：The variable name of the module. U-7560M_DO.RL1：The variable name of the module. Use "commas" to separate variables. For Example： GET /VariableInformation?U-7560M_DO.RL0, U-7560M_DO.RL1 The data of variables such as U-7560M_DO.RL0, U-7560M_DO.RL1. The return value is in JSON format.	

[PUT Example]

Resource Definition	Actual Application Corresponding to the Resource Definition

PUT /VariableInformation	PUT /var/use
	
	[RAW Body]
	{
	"Var1": {
	"Quality": "Good",
	"Value": "24.5"
	},
	"Var2": {
	"Quality": "Good",
	"Value": "24.5"
	}
	}

Description	Back to P1.1
PUT：Write /VariableInformation：Variable Information. [RAW Body]：The JSON format to be written. PUT /VariableInformation：Compare from [RAW Body], check whether the variable name exists on the server side, modify it if it exists, and skip it if it doesn't. The return value is a string.	

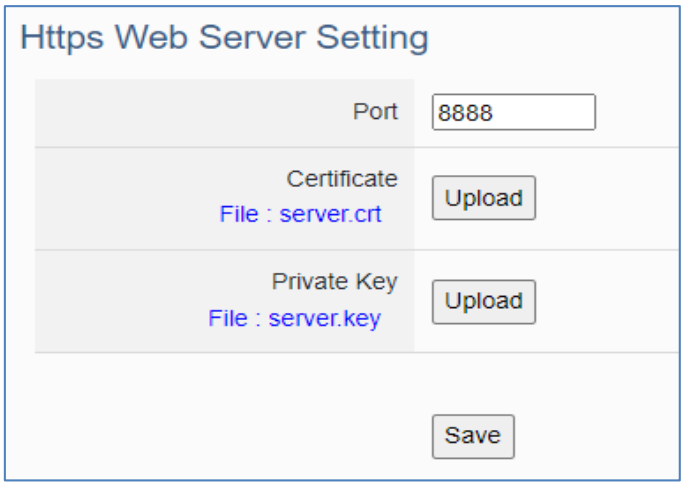
Use RESTful API HTTPS with UA I/O

Before using RESTful API HTTPS, users need to check whether "Https Web Server" has imported the certificate.

If the certificate has not been imported, please open the web interface and switch to the following menu location to upload the certificate.

Manu Path:

【System Setting】➔【Web Server Setting】 System Setting ➔ Web Server Setting (Appendix A).



After uploading the certificate, users can read and write I/O according to the RESTful API example in the previous section.

Apply on the Website Address Bar:

https://IP:Port/Resource Definition

IP：Device IP.

Port：Https Web Server Port; Default is 8888 for UA I/O.

[Example]：https://192.168.81.250:8888/AllVariableName

3.4 Common settings table for easy integration

This section explains how UA I/O can obtain the necessary settings for software integration, allowing users to integrate the site more quickly. UA-I/O provides a common settings table that includes the settings of OPC UA, MQTT, and HTTP (HTTPS) protocols. These settings are compiled into a file so that users can find the required settings quickly and easily.
The following is the UA-I/O with ICP DAS product AVEVA Edge as an example of how to use the common setup table.

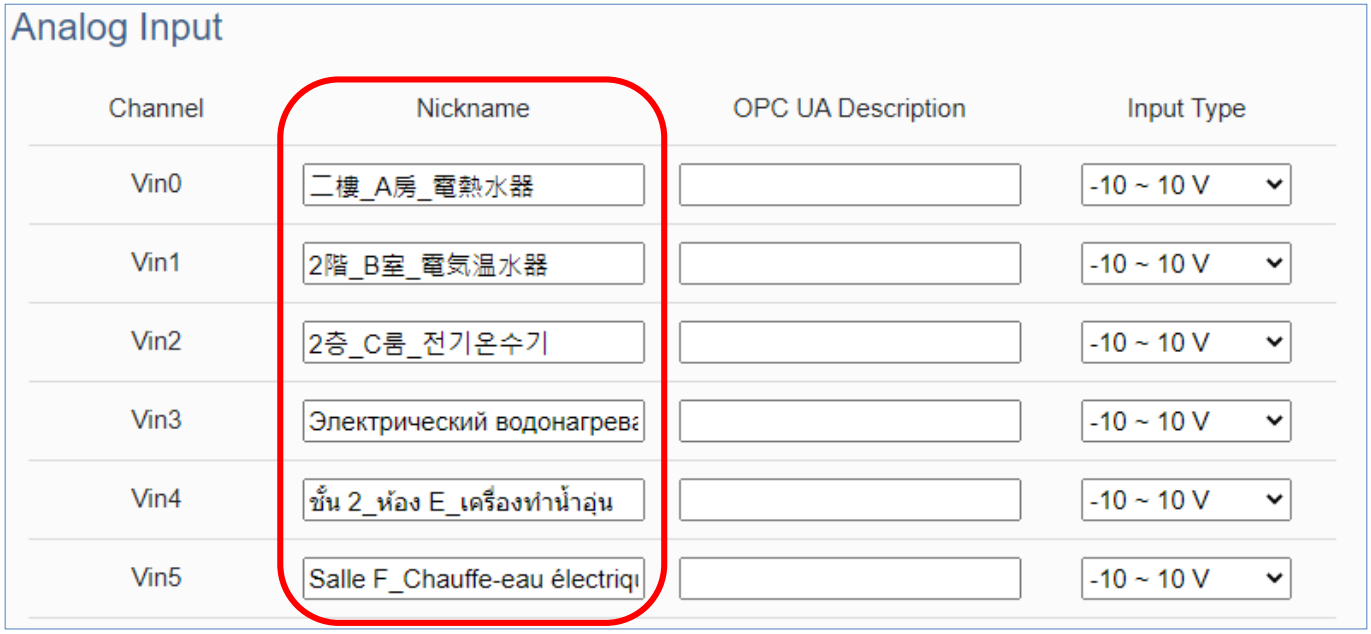
Setting Steps:

[Step 1]

Menu Path:

【Module Setting】➔【Overview】 Module Setting ➔ I/O Setting (Appendix A).

Set the Nickname: Enter a name that is easily identifiable.

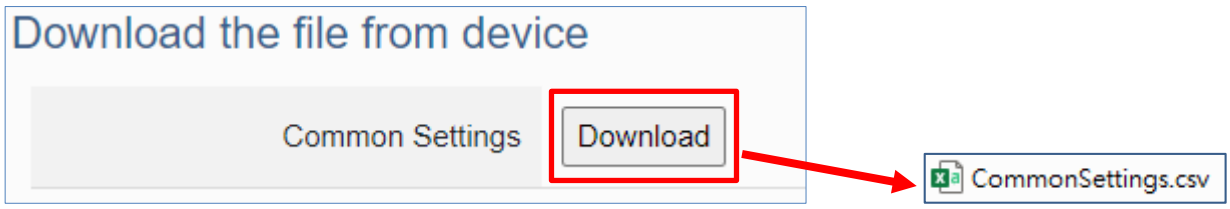


[Step 2]

Menu Path:

【Module Setting】➔【Overview】 Module Setting ➔ Overview (Appendix A).

Click the Download button and get CommonSettings.csv

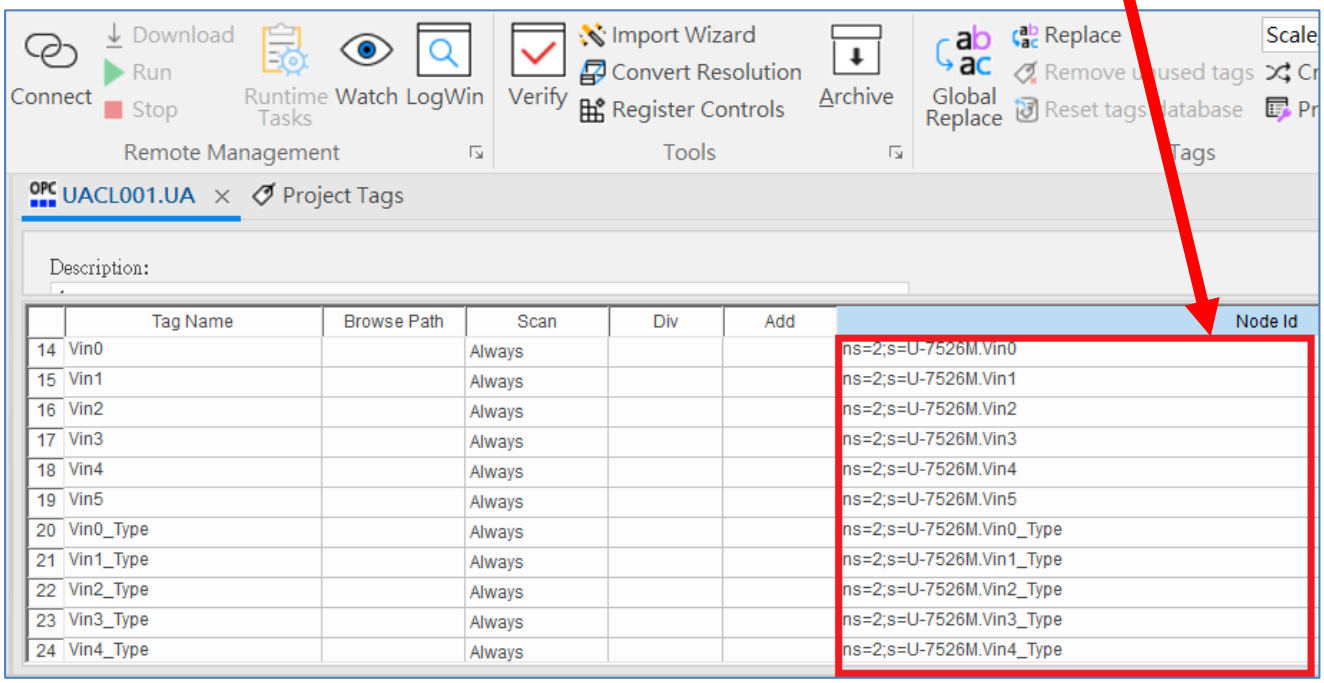


[Step 3]

Find the settings for the software by "Nickname" and copy and paste them into the software settings to complete the communication integration.

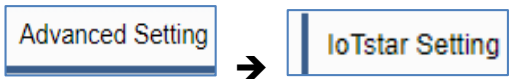
Below is an example of AVEVA Edge.

20	EnablePowerOnValue		ns=2;s=U-7526M.EnablePowerOnValue
21	Vin0	二樓_A房_電熱水器	ns=2;s=U-7526M.Vin0
22	Vin1	2階_B室_電気温水器	ns=2;s=U-7526M.Vin1
23	Vin2	2층_C룸_전기온수기	ns=2;s=U-7526M.Vin2
24	Vin3	Электрический водонагреватель	ns=2;s=U-7526M.Vin3
25	Vin4	ชั้น 2_ห้อง E_เครื่องทำน้ำอุ่น	ns=2;s=U-7526M.Vin4
26	Vin5	Salle F_Chauffe-eau électrique	ns=2;s=U-7526M.Vin5
27	Vin0_Type		ns=2;s=U-7526M.Vin0_Type
28	Vin1_Type		ns=2;s=U-7526M.Vin1_Type
29	Vin2_Type		ns=2;s=U-7526M.Vin2_Type
30	Vin3_Type		ns=2;s=U-7526M.Vin3_Type



3.5 IoTstar Connection Example

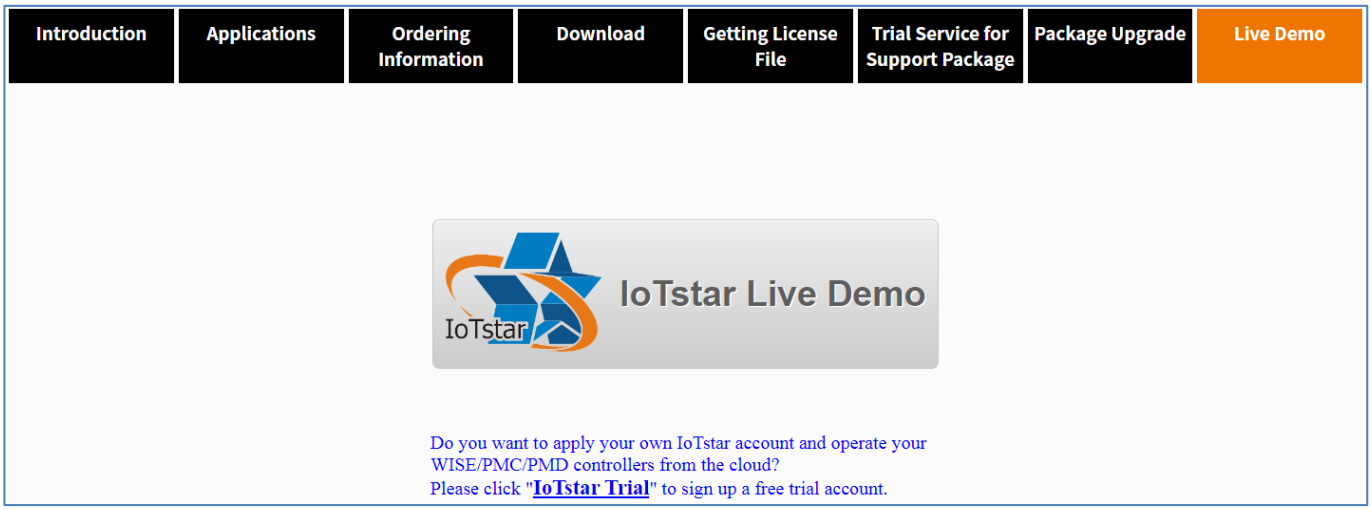
This section introduces the IoTstar connection settings. Please go to the IoTstar setting menu.

Manu Path:【Advanced Setting】➔【IoTstar Setting】 

(Appendix A)

Please go to the following link to apply for a free trial account

https://www.icpdas.com/en/product/guide+IIoT+Software+IoTstar#1080



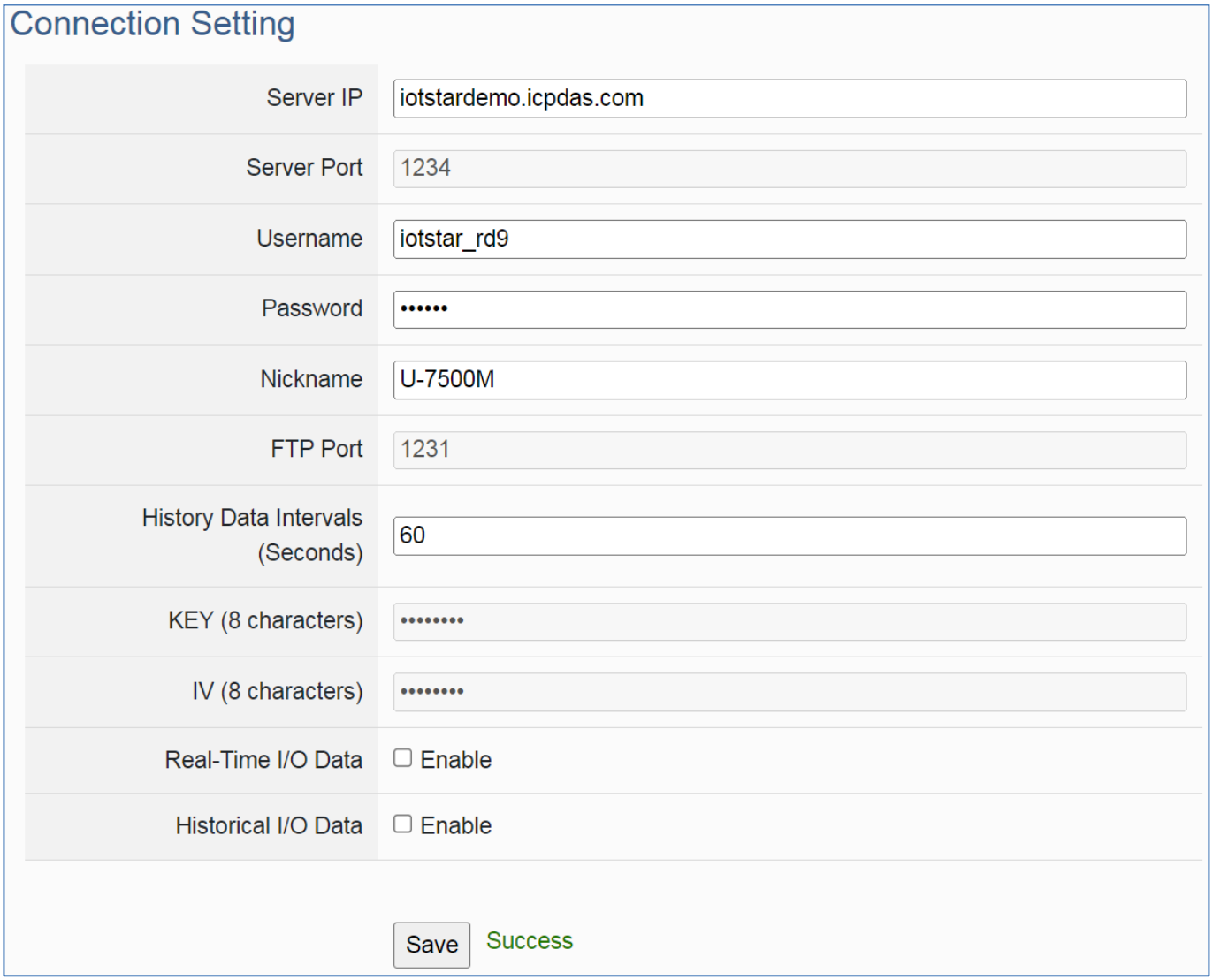
Enter the following information:

Server IP: iotstardemo.icpdas.com

Username: The account name of the free trial account

Password: Password for a free trial account

The other items are default values and click Save. The screen is as follows.



After saving successfully, the connection will be completed.

4. Main Menu: Parameter Descriptions

This chapter introduces the menu functions of the UA I/O web UI and is more focused on the function parameters of the menu. Each section introduces one main menu and its sub-menu functions. The function location is shown in a brief text and diagram of【Menu Path】, for Menu Path introductions please refer to Appendix A.

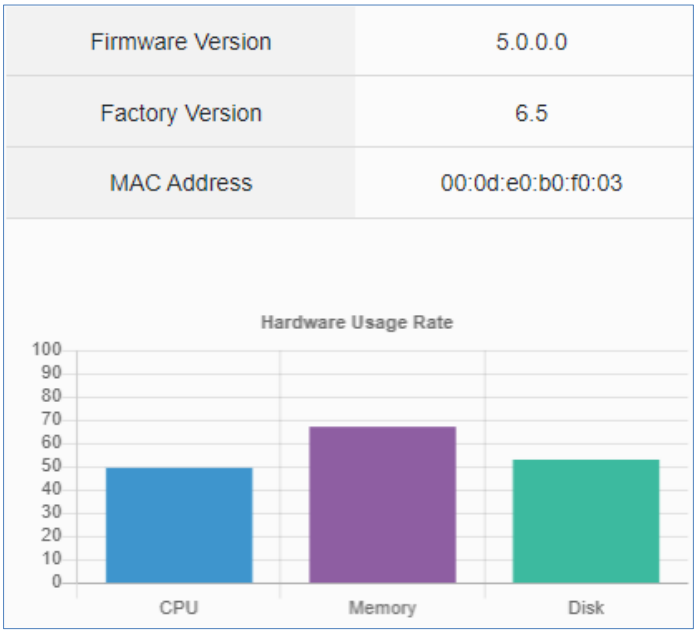
4.1 Main Menu - System Setting

System Setting is the first item of the Main Menu. This item is about the settings related to the hardware and operating system.

4.1.1 Overview

Function: Display the current information on the hardware and operating system.
Support Module: All UA I/O modules support this function.

Manu Path:【System Setting】➔【Overview】 System Setting ➔ Overview (Refer to Appendix A).



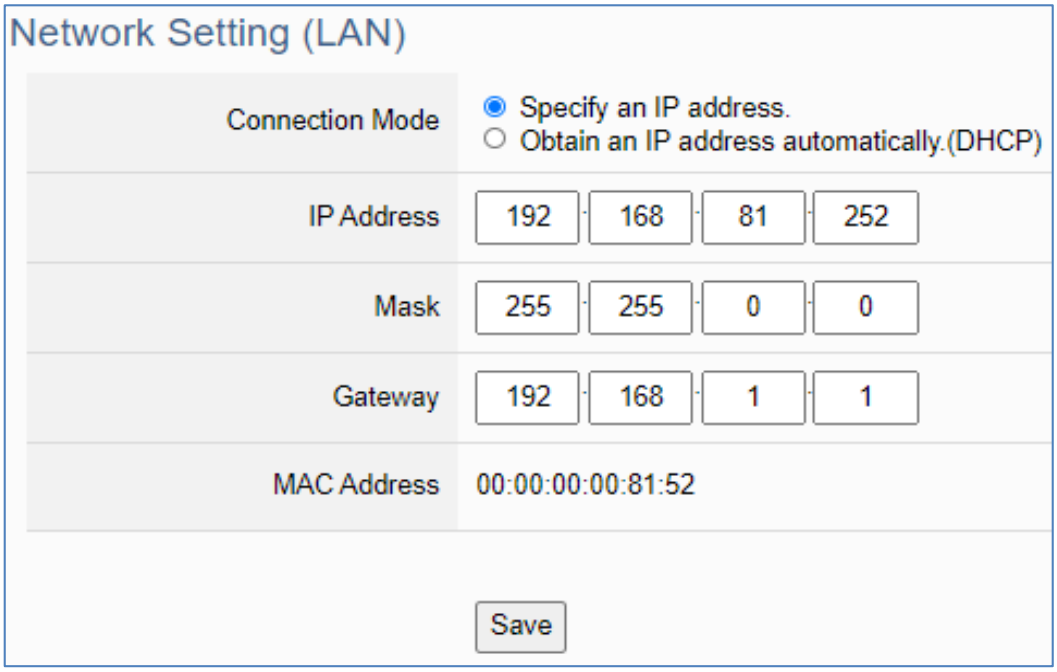
System Setting > Overview	
Firmware Version	Display the firmware version of the UA I/O module.
Factory Version	Display the factory version (OS & UI) of the UA I/O module.
MAC Address	The LAN MAC address of this UA I/O.
CPU	Display the current CPU usage of the module. Do not use to achieve 95% or more.
Memory	Display the current memory usage of the module. Do not use to achieve 95% or more.
Disk	Display the current disk usage of the module. Do not use to achieve 95% or more.

4.1.2 Network Setting

Function: Display and set up the network settings of the UA I/O.
Support Module: All UA I/O modules support this function.

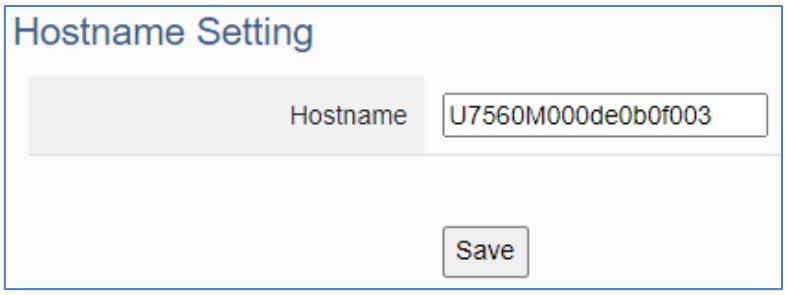
Manu Path:【System Setting】➔【Network Setting】 System Setting ➔ Network Setting (Appendix A).

Network Setting (LAN)



System Setting > Network Setting - Network Setting (LAN)	
Connection Mode	**Specify an IP address**: Users input the values in the fields of IP, Mask, and Gateway according to the customer's network. Detail information for the factory default value of the UA controller network refers to the. Sec. 4.1.7 **Obtain an IP address automatically (DHCP)**: It's the Dynamic Host Configuration Protocol mode. The system assigns the IP, Mask, and Gateway automatically.
IP Address	The LAN IP address of this UA I/O. Factory Default: 192.168.255.1
Mask	The LAN mask address of this UA I/O. Factory Default: 255.255.0.0
Gateway	The LAN gateway address of this UA I/O. Factory Default: 192.168.1.1
MAC Address	The LAN MAC address of this UA I/O.
Save	Click to save the settings of the LAN item.

Hostname Setting

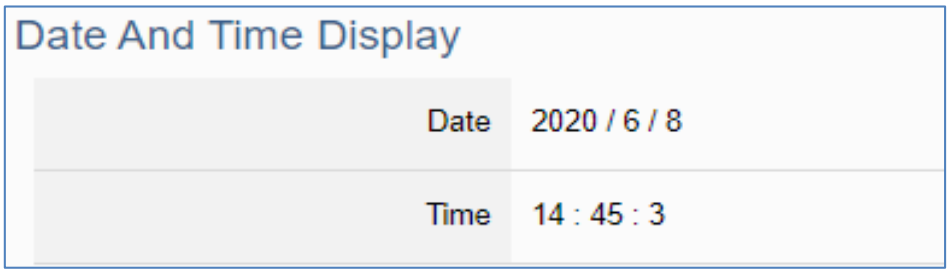


System Setting > Network Setting - Hostname Setting	
Hostname	The host name of this UA I/O. Default: system value. Users can give a new name, but cannot be null, Chinese characters, or special symbols.
Save	Click to save the settings of this item.

4.1.3 Time Setting

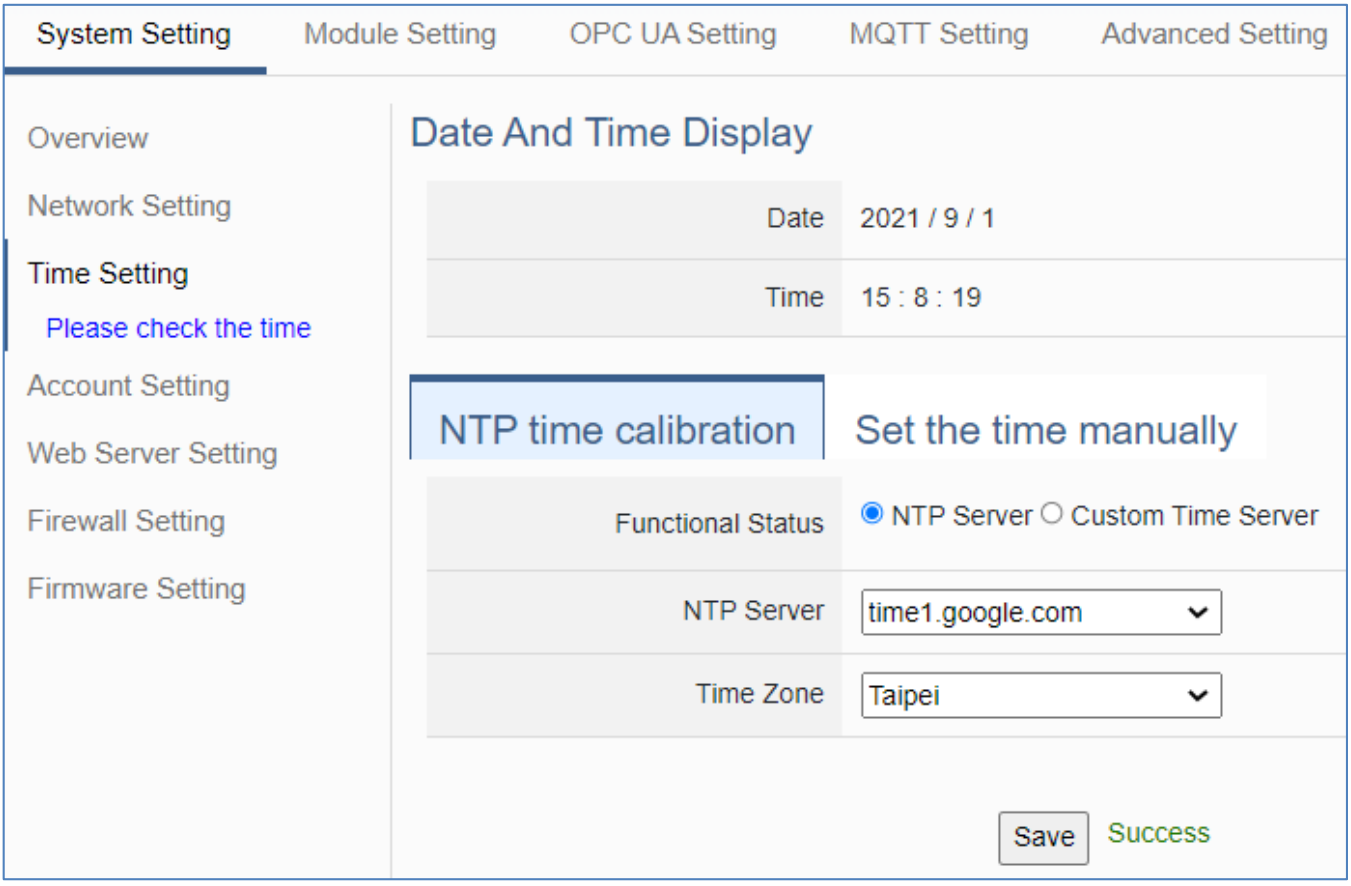
Function: Display and set up the date and time of the UA I/O.
Support Module: All UA I/O modules support this function.
Manu Path:【System Setting】➔【Time Setting】 System Setting ➔ Time Setting (Appendix A).

Date and Time Display

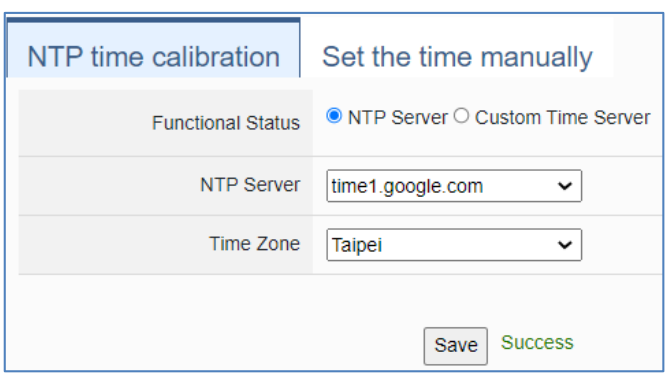


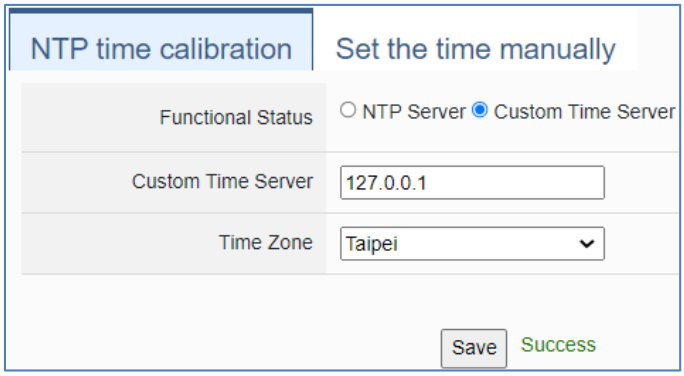
System Setting > Time Setting - Date And Time Display	
Date	Display the date of the UA I/O module, including year, month, and day.
Time	Display the current time of the UA I/O module, including hour, minute, and second.

When the device time is one day different from the local computer time, a warning message "Please check the time" will be displayed, as shown below.



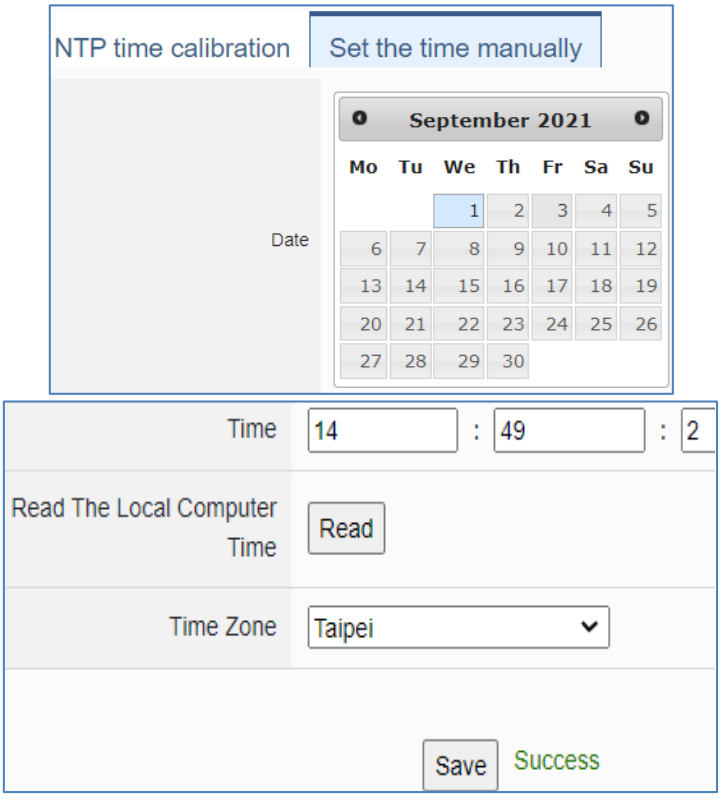
NTP time calibration





System Setting > Time Setting - NTP time calibration	
Functional Status	NTP Server: Click to display the setting columns for NTP Server. Custom Time Server: Click to display the setting columns for Custom Time Server.
NTP Server	Select the common time server provided by the system.
Custom Time Server	Enter the IP address of the time server by custom.
Time Zone	Select the time zone of your location.
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.

Set the time manually



System Setting > Time Setting - Set The Time Manually	
Date	Set the system date of the UA I/O manually. Directly enter the new

	year/month/day, and then click “Save”.
Time	Set the system time of the UA I/O manually. Directly enter the new hour: minute: and second, and then click “Save”.
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	Select the time zone of your location.
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.

4.1.4 Account Setting

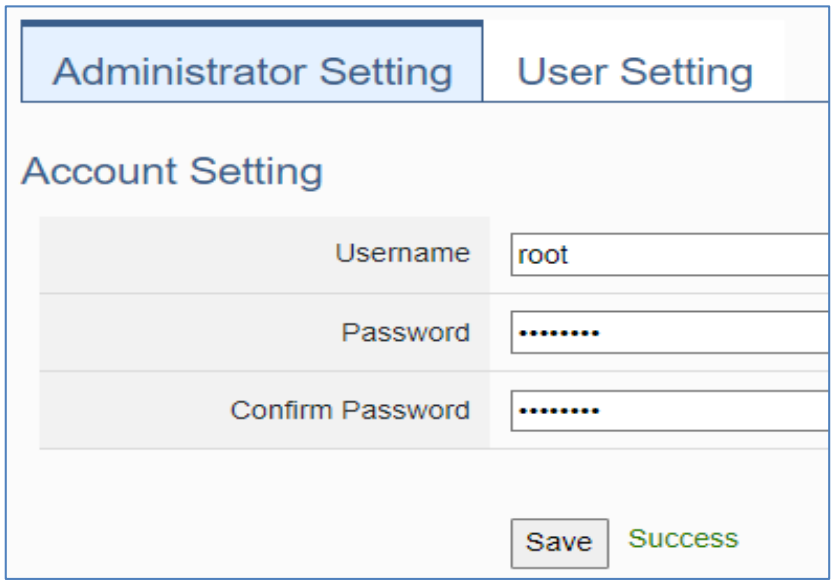
Function: Display and set up the login username and password of the UA I/O Web UI.
Support Module: All UA I/O modules support this function.

Manu Path:【System Setting】➔【Account Setting】 System Setting ➔ Account Setting (Appendix A).

There are two modes of account setting: **Administrator Setting** and **User Setting,** only one administrator or user can log in at any one time. The administrator login provides customers with the most complete device information and setting items.
The user login only allows customers to read device I/O point information and control items.

Administrator Setting

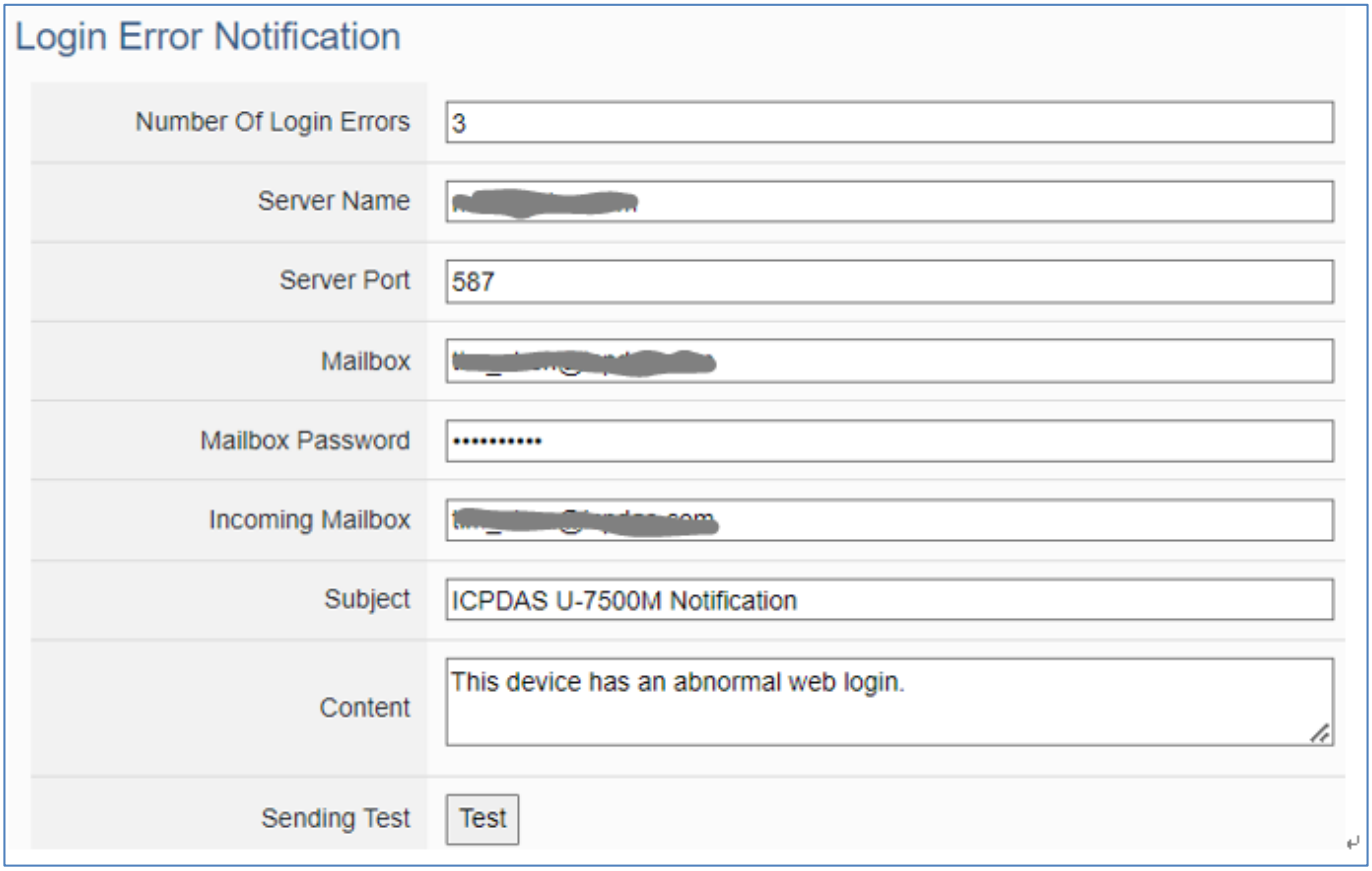
Account Setting:



System Setting > Account Setting	
Username	The login username for the UA Web UI. Factory default: root. Cannot be null. **After the first login in using the factory default settings, change the default username/password first, or the user cannot use any other function (designed for data security) except the [Overview] and [Account Setting] (Mouse showing hand shape).**
Password	The login password for the UA Web UI. Factory default: root. Cannot be null. **After the first login in using the factory default settings, change the default username/password first, or the user cannot use any other function (designed for**

	data security) except the [Overview] and [Account Setting] (Mouse showing hand shape). **Password setting rules:** Password 1. Must not be the same as the account. 2. The length must be greater than 6 characters. 3. With English uppercase. 4. With English lowercase. 5. With numbers.
Confirm Password	Retype the password for the operation conform when setting the new account information.
Save	Click to save the settings of this page.

Login Error Notification:

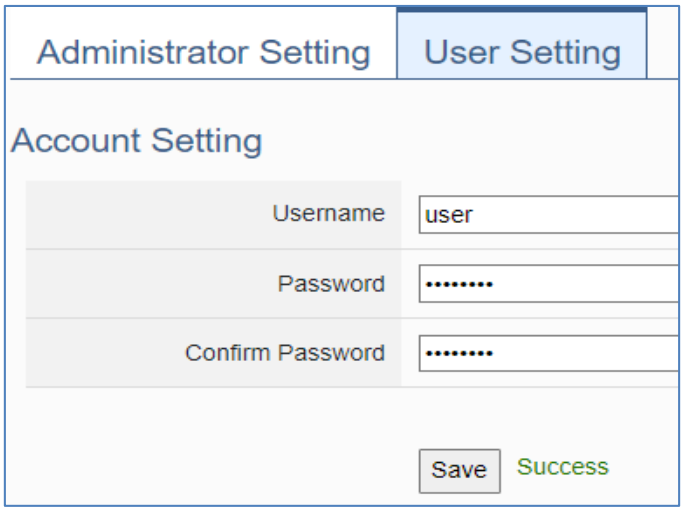


System Setting > Account Setting - Login Error Notification	
Number Of Login Errors	Default: 3 The number of times the wrong account or password is allowed. Example: Set the value 3. If the input is wrong 3 times, the system will send a notification.
Server Name	Mail server URLs provided by MIS, or URLs of major well-known mail servers.
Server Port	Default: 587 The mail server Port is provided by MIS, or the ports of major famous mail servers.
Mailbox	Set up an available mailbox for sending emails to notify customers.
Mailbox Password	Enter the password for the mailbox.

Incoming Mailbox	The mailbox to receive messages.
Subject	Default: ICP DAS U-7500M Notification. The subject of the sanding letter.
Content	Default: This device has an abnormal web login. The content of the sanding letter.
Sending Test	Click the test button. After success, the settings are available. At the same time, the set value is also stored in the device.

User Setting

Account Setting:



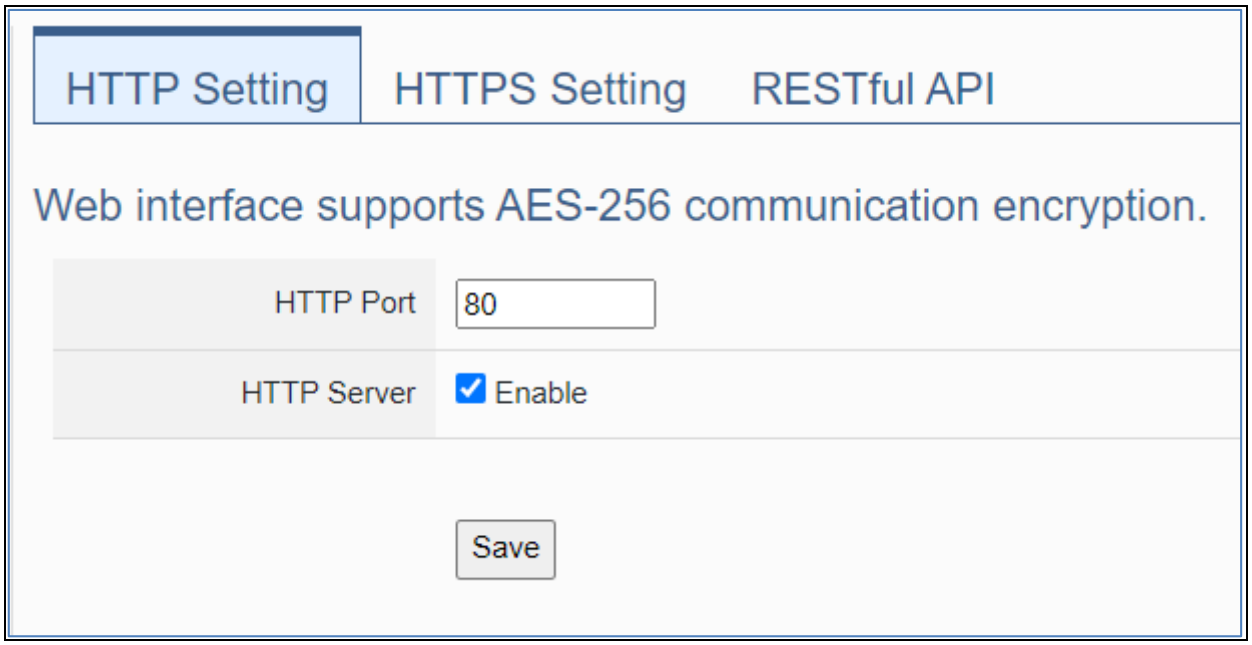
System Setting > Account Setting	
Username	The login username for the UA Web UI. Factory default: root. Cannot be null. **After the first login in using the factory default settings, change the default username/password first, or the user cannot use any other function (designed for data security) except the [Overview] and [Account Setting] (Mouse showing hand shape).**
Password	The login password for the UA Web UI. Factory default: root. Cannot be null. **After the first login in using the factory default settings, change the default username/password first, or the user cannot use any other function (designed for data security) except the [Overview] and [Account Setting] (Mouse showing hand shape).** **Password setting rules:** Password 1. Must not be the same as the account. 2. The length must be greater than 6 characters. 3. With English uppercase. 4. With English lowercase. 5. With numbers.
Confirm Password	Retype the password for the operation conform when setting the new account information.
Save	Click to save the settings of this page.

4.1.5 Web Server Setting

Function: Provide Web Server settings, such as display and set the Web Server port.
Support Module: All UA I/O modules support this function, both Http and Https can be enabled.

Manu Path: 【System Setting】➔【Web Server Setting】 System Setting ➔ Web Server Setting (Appendix A).

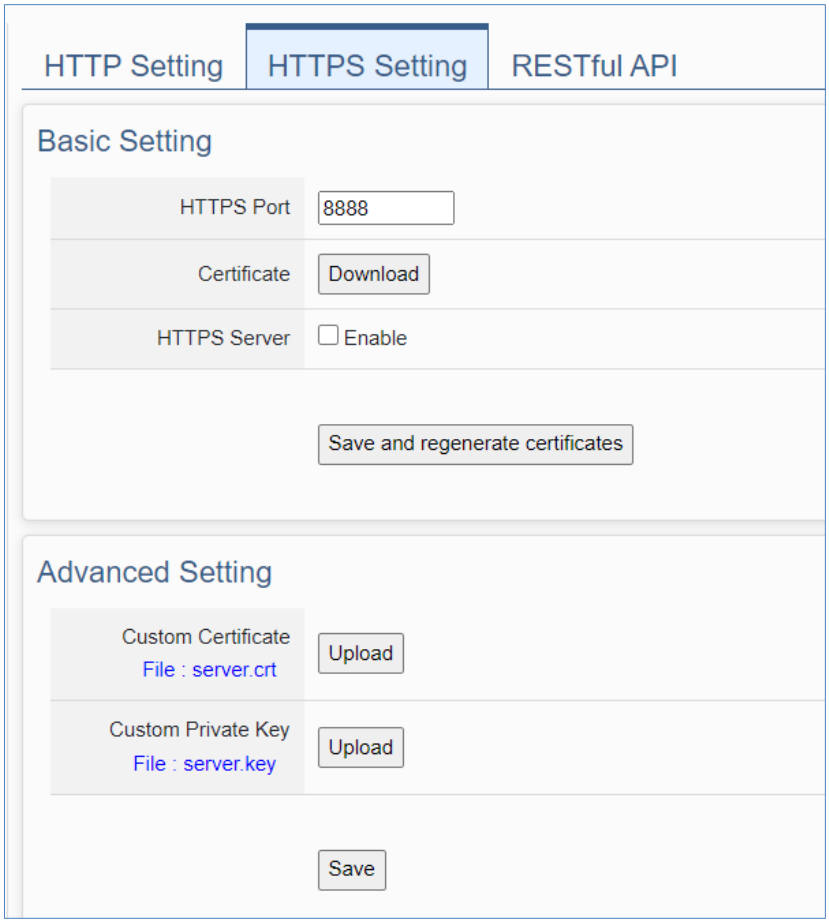
Web Server Setting



System Setting > Web Server Setting	
HTTP Port	Web Server port of the UA I/O device. Factory default port: 80.
HTTP Server	When Enable is checked, HTTP Server is enabled.
Save	Click to save the settings.

NOTE: After clicking the “save” icon, the system will restart the Web Server. It takes time to start, please wait patiently.

Https Web Server Setting

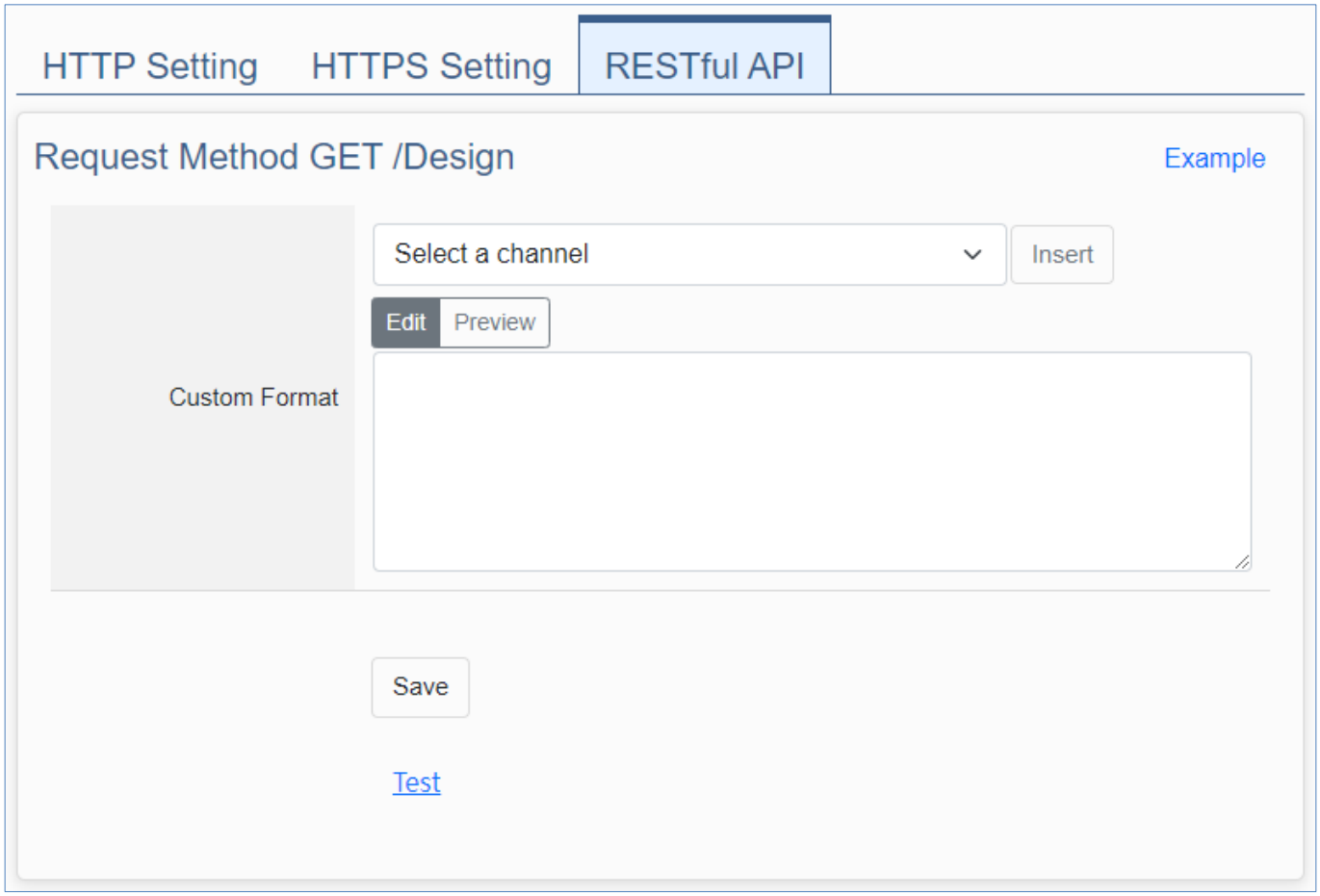


System Setting > Web Server Setting - Basic Setting	
HTTPS Port	HTTPS Web Server port of the UA I/O device. Factory default port: 8888.
Certificate	Click the Download button to download the .crt file from the module to the local computer.
HTTPS Server	When Enable is checked, HTTPS Server is enabled.

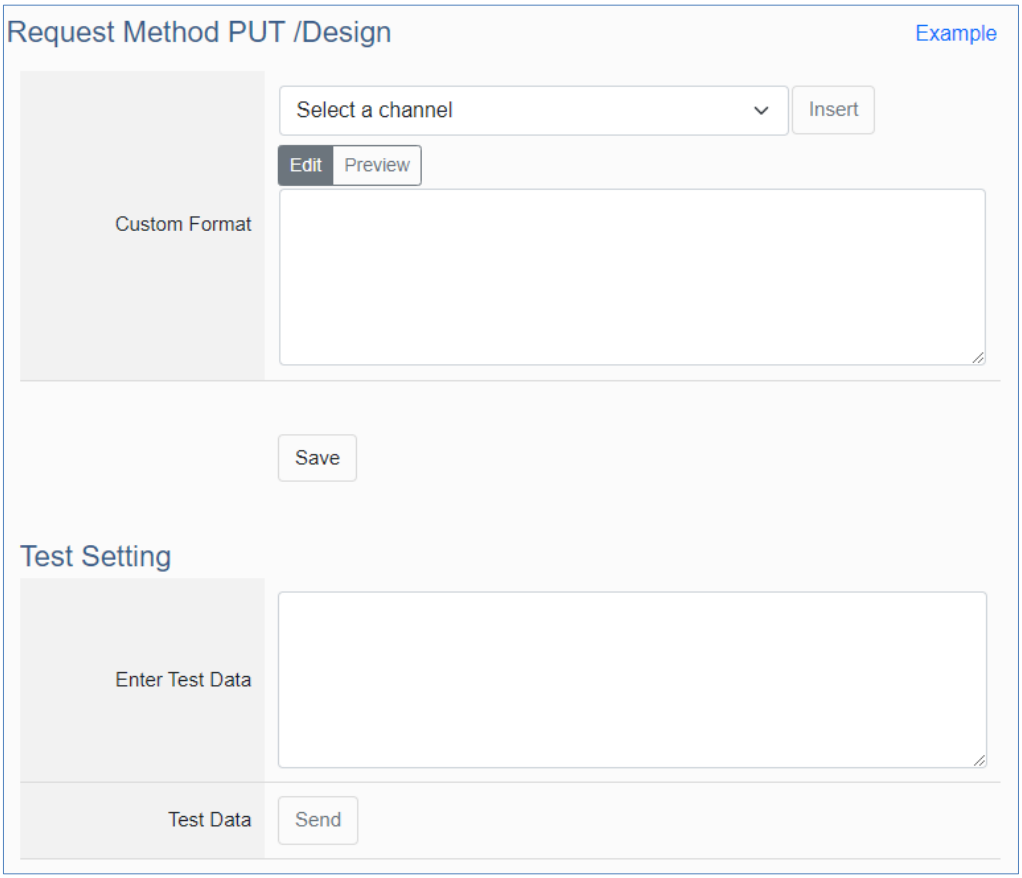
System Setting > Web Server Setting - Advanced Setting	
Custom Certificate	Customize the server certificate. Filename rules: [A-Z, a-z, 0-9].crt, only .crt files consisting of letters and numbers are accepted.
Custom Private Key	Customize the Private Key. Filename rules: [A-Z, a-z, 0-9].key, only .key files consisting of letters and numbers are accepted.

NOTE: After clicking the “save” icon, the system will restart the Web Server. It takes time to start, please wait patiently.

RESTful API



System Setting > Web Server Setting – Request Method Get / Design	
Custom Format	Please click on the "Examples" button on the top right corner of the page for detailed instructions. Step 1: Select the channel and click the Insert button. Insert the identifier into the edit box. Step 2: Click the Edit button to customize the content. Step 3: Click the Preview button to check if the customized content is correct. Step 4: Click the Save button to save the setting. Step 5: Click the Test button to test if the format is correct.



System Setting > Web Server Setting – Request Method PUT / Design	
Custom Format	Please click on the " Examples " button on the top right corner of the page for detailed instructions. Step 1: Select the channel and click the Insert button. Insert the identifier into the edit box. Step 2: Click the Edit button to customize the content. Step 3: Click the Preview button to check if the customized content is correct. Step 4: Click the Save button to save the setting.

System Setting > Web Server Setting - Test Setting	
Enter Test Data	Step 1: Copy the customized content and enter it into the edit box. Step 2: Change the identifier of the customized content to a value.
Test Data	Step 1: Click the Send button Step 2: Check if the I/O channel value has changed.

4.1.6 Firewall Setting

Function: Provide firewall settings, allowing specific IP to have permission to connect to the module.

Support Module: All UA I/O modules support this function.

Manu Path:【System Setting】➔【Firewall Setting】 System Setting ➔ Firewall Setting (Appendix A).

System Setting > Firewall Setting	
Allow all IP	Check the box to allow all IPs to connect to UA-I/O. Factory default value: Enabled.
Allow IP	Enter the IP to allow a specific IP to connect to UA-I/O. Limit the number of IP connections: Up to 3 sets of client computer or device IP.
Allow IP zones	Allow UA-I/O connection for specific IP zones

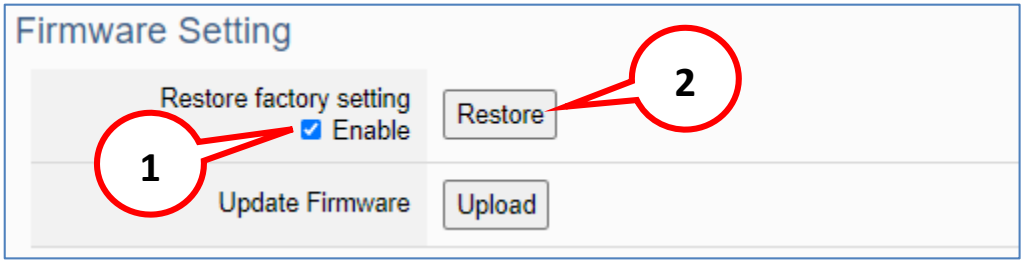
4.1.7 Firmware Setting

Function: Provide firmware settings, such as restore factory setting and update firmware.
Support Module: All UA I/O modules support this function.

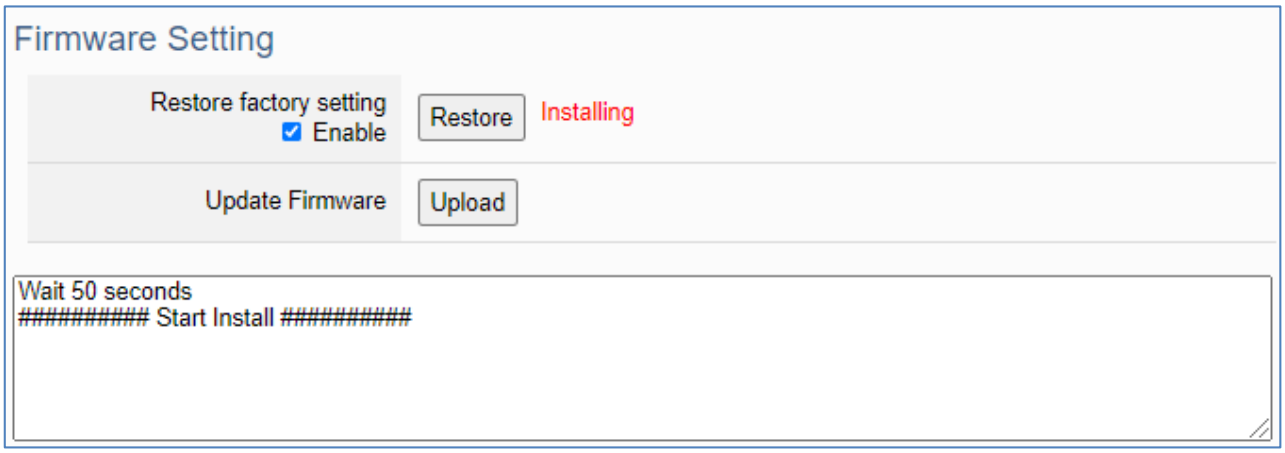
Manu Path:【System Setting】➔【Firmware Setting】 System Setting ➔ Firmware Setting (Appendix A).

Restore Factory Setting

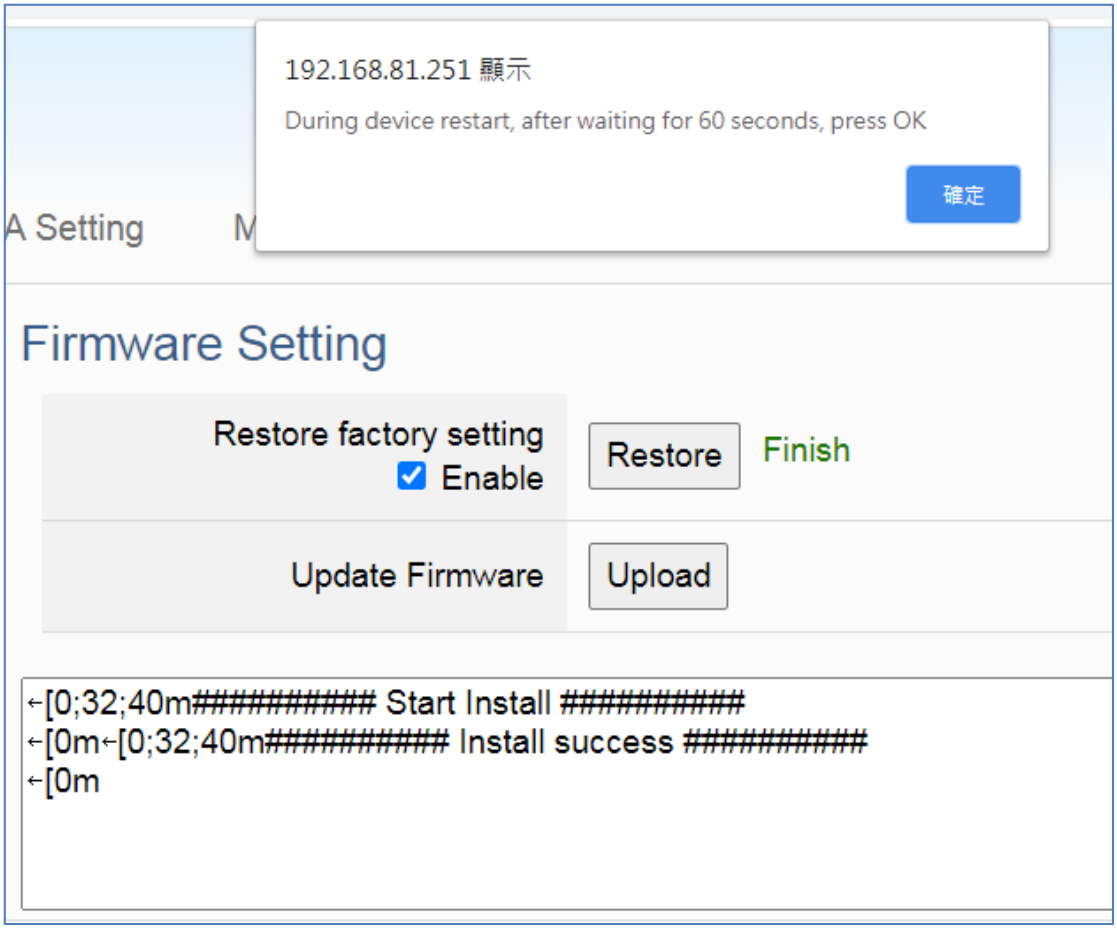
1. Check the “Enable” box to enable the “Restore” button, and then click on the “Restore” button to start the restore operation.



2. A message will prompt appear, showing the installation process of the restore program, please wait approximately 2 minutes.



3. After the process finished, it appears a box message "During device restart, after waiting for 60 seconds, press OK", indicating that **this restoration succeeds**. If the box does not pop up, **this restoration fails**.



4. After restarting, the module will restore the factory default settings as follows: (Web IP address automatically changes to 192.168.255.1)

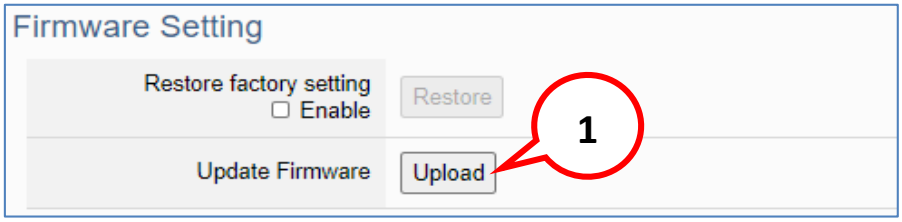
Factory Default Settings of UA I/O Modules			
Network	**IP (LAN)**	**192.168.255.1**	Assign UA I/O a new IP setting according to your case.
	Netmask	**255.255.0.0**	
	Gateway	**192.168.1.1**	
Web UI Account	**Username**	**root**	**After login, change the default username/password to use other functions.**
	Password	**root**	

Update Firmware

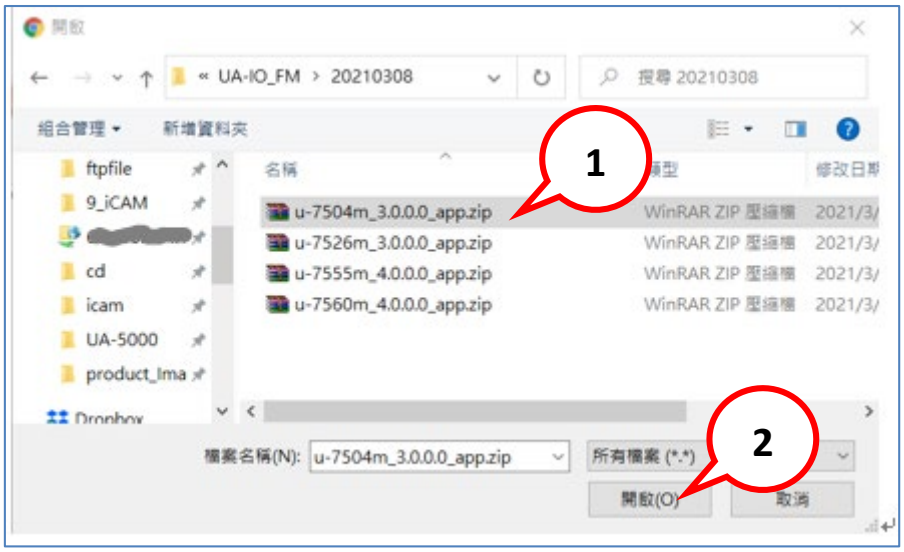
When UA I/O has new functions, users can go to the UA series download center on the ICP DAS website to download the latest version of Firmware software, and then update the firmware of your UA I/O module according to the steps in this section.

UA series download center on the ICP DAS website:
https://www.icpdas.com/en/download/index.php?nation=US&kind1=&model=&kw=ua-

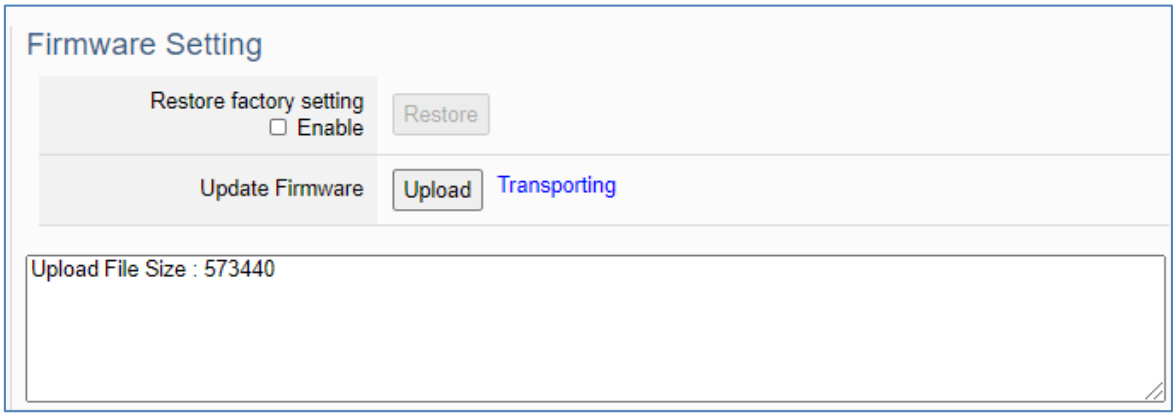
1. Click on the “Upload” button



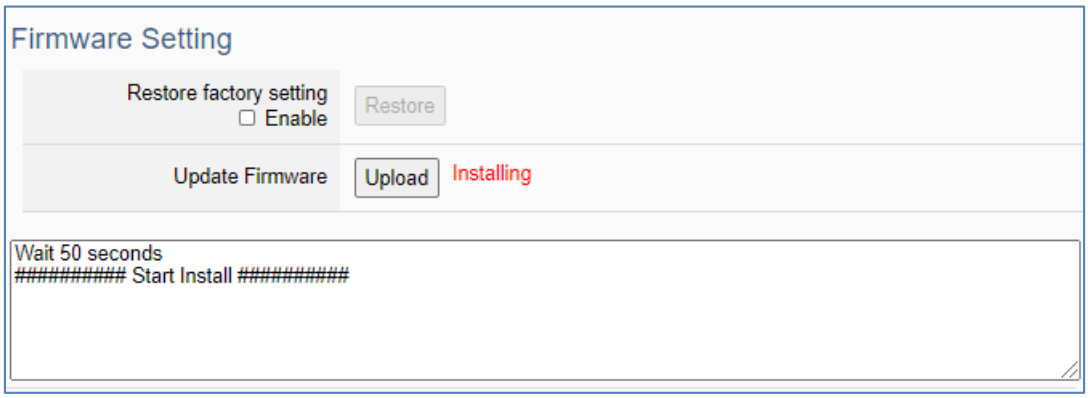
2. Select the firmware file



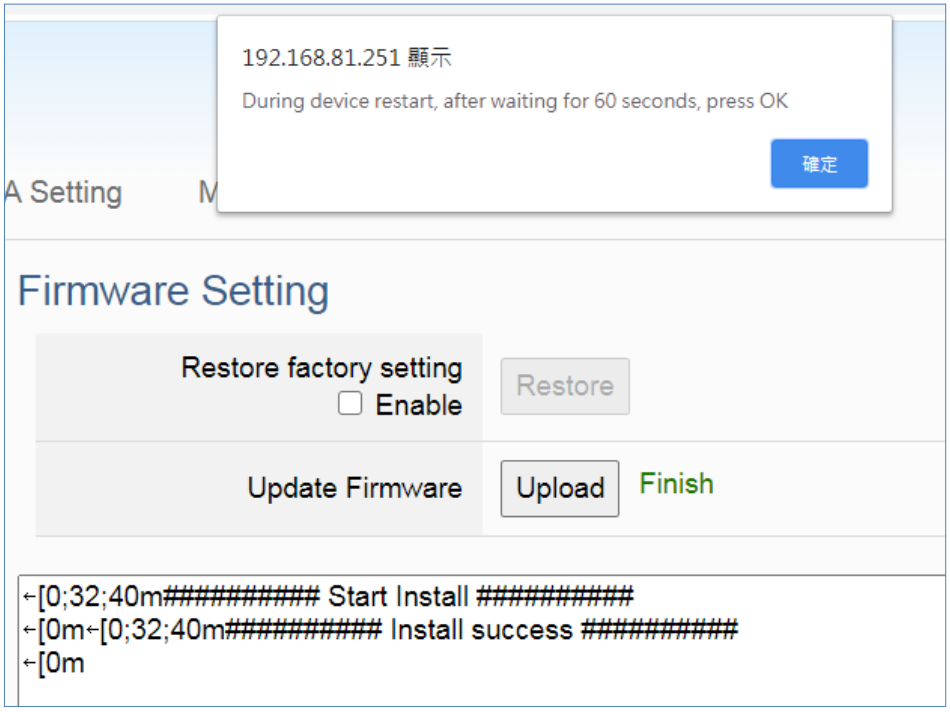
3. Begin to upload the Firmware file, and the lower message box will show the progress.



4. After uploading the file, it begins to install the firmware.



5. After the process is finished, it appears a box message "During device restart, after waiting for 60 seconds, press OK", indicating that **this update succeeds**. If the box does not pop up, **this update fails**.

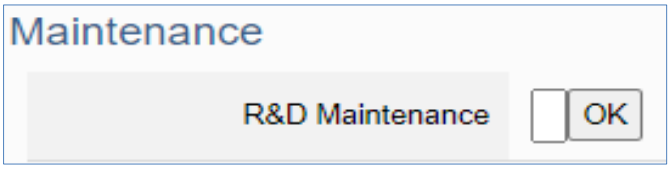


6. After restarting, the module will recover the UA I/O settings as follows:

Update Firmware of UA I/O Modules			
Network	**IP (LAN)**	**Keep the original setting**	Assign UA I/O a new IP setting according to your case.
	Netmask	**Keep the original setting**	
	Gateway	**Keep the original setting**	
Web UI Account	**Username**	**root**	**After login, change the default username/password to use other functions.**
	Password	**root**	

Maintenance

This function is only provided to ICP DAS R&D personnel for maintenance using. It is reserved and not open for use.



4.2 Main Menu - Module Setting

This main menu aggregates all modules and projects in the module-related function settings. This chapter focuses on parameter descriptions. For the detailed steps and notices for using OPC UA connection/certificate, please refer to **3.1 Settings for Using OPC UA Connection** of Chapter 3 Main Function Settings.

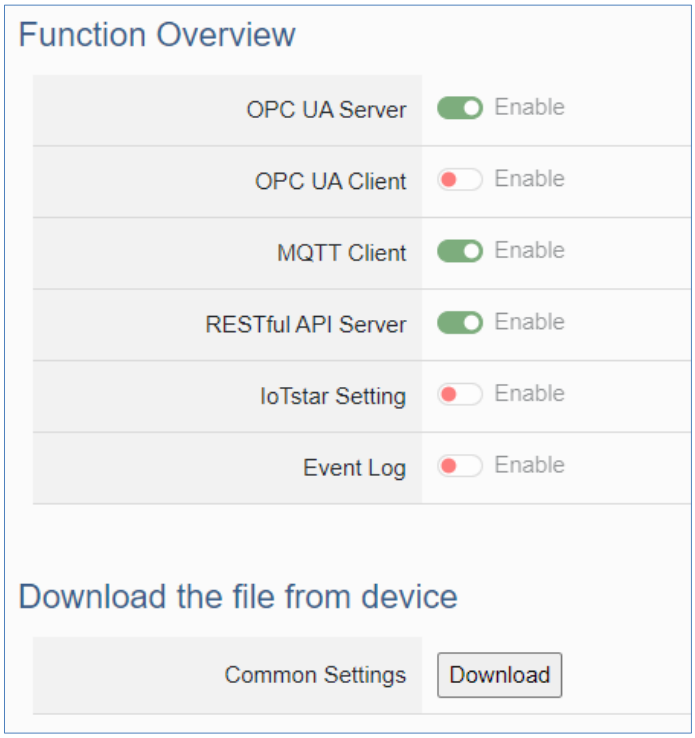
4.2.1 I Overview

Function: Provides the status of the I/O functions, and a common settings table for download.

Support Module: All UA I/O modules support this function.

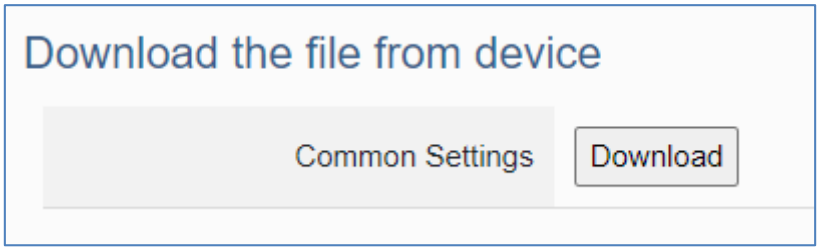
Manu Path:【Module Setting】➔【Overview】 Module Setting ➔ Overview (Refer to Appendix A)

Function Overview



Module Setting > Overview> Function Overview	
OPC UA Server	Display the OPC UA Server enable status.
OPC UA Client	Display the OPC UA Client enable status.
MQTT Client	Display the MQTT Client enable status.
RESTful API Server	Display the RESTful API Server enable status.
IoTstar Setting	Display the IoTstar Client enable status.
Event Log	Display the Event Log enable status.

Download the file from device



Module Setting > Overview> Download the file from device	
Common Settings	Press the Download button to get the common settings table. Example reference: For a simple setup example, please refer to Section 3.4.

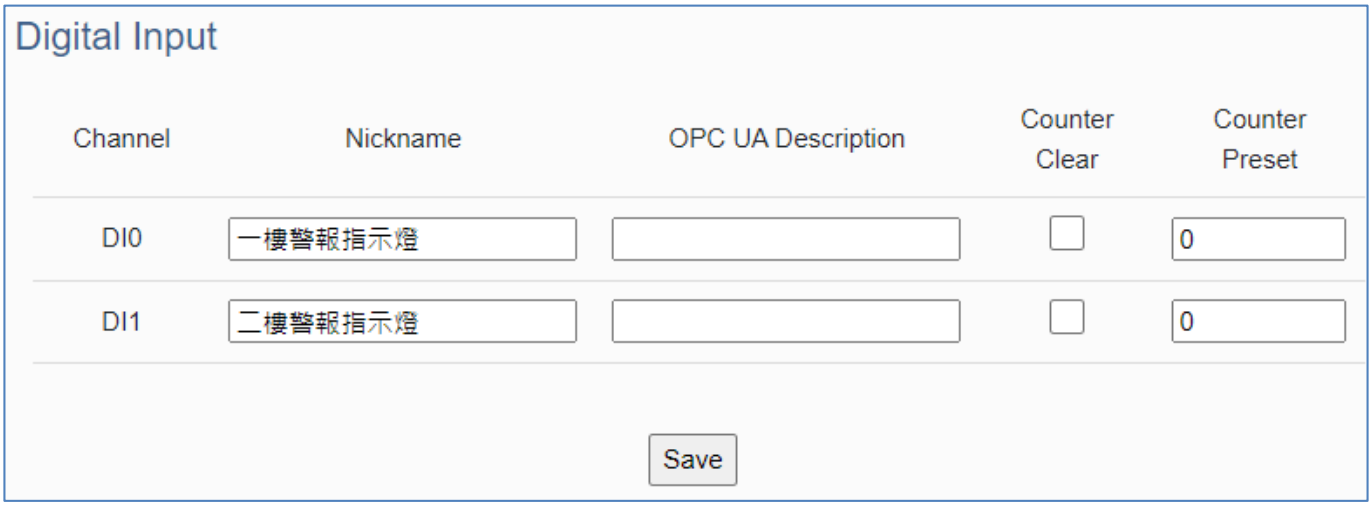
4.2.2 I/O Setting

Function: Display and change the I/O settings of the UA I/O module.

Support Module: All UA I/O modules support this function, Http, and Https, both can be enabled.

Manu Path:【Module Setting】➔【I/O Setting】 Module Setting ➔ I/O Setting (Appendix A).

Digital Input

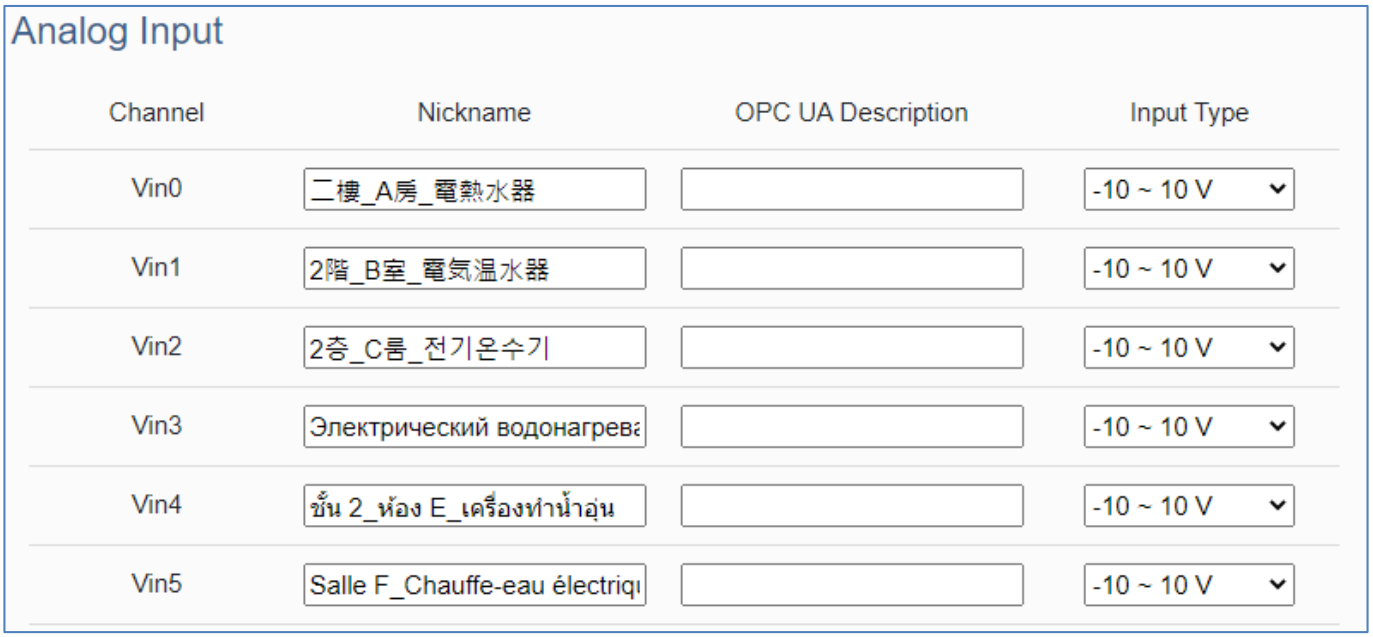


Module Setting > I/O Setting - Digital Input	
Channel	The channel name (number) of the UA I/O hardware.
Nickname	The identification name of the channel for easy identification
OPC UA Description	The messages got from the description column of the OPC Client when using an OPC UA connection.
Counter Clear	Counter reset to zero
Counter Preset	The count starts from this set value after powering on, and the count will return to zero after the module is powered off.

Digital Output

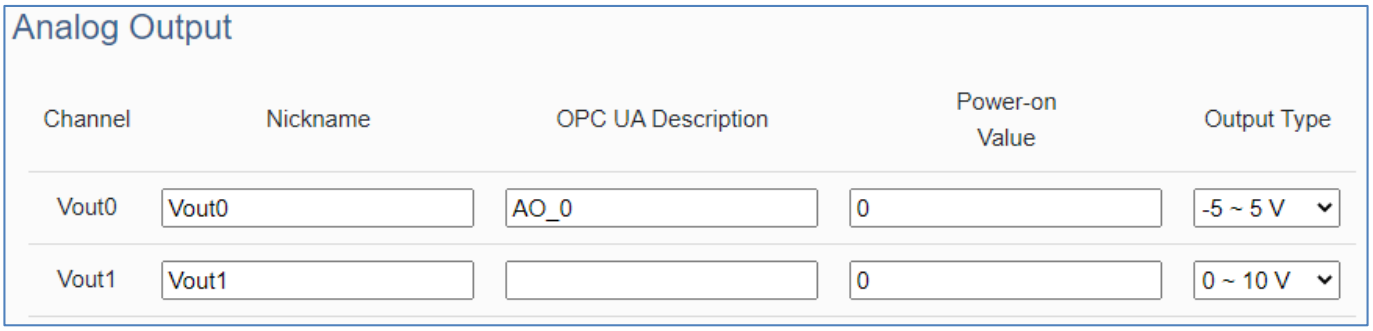
Module Setting > I/O Setting - Digital Output	
Channel	The channel name (number) of the UA I/O hardware.
Nickname	The identification name of the channel for easy identification
OPC UA Description	The messages got from the description column of the OPC Client when using an OPC UA connection.
Power-on Value	After the power is turned off and restarted, the startup value of I/O, if checked, the boot output will output True, otherwise, it will output False.

Analog Input



Module Setting > I/O Setting – Analog Input	
Channel	The channel name (number) of the UA I/O hardware.
Nickname	The identification name of the channel for easy identification
OPC UA Description	The messages got from the description column of the OPC Client when using an OPC UA connection.
Input Type	Select the Input type by user's need.

Analog Output



Module Setting > I/O Setting – Analog Output	
Channel	The channel name (number) of the UA I/O hardware.
Nickname	The identification name of the channel for easy identification
OPC UA Description	The messages got from the description column of the OPC Client when using an OPC UA connection.
Power-on Value	The initial value of the I/O channel after the power off and restart to on.
Output Type	Select the Output type by user's need.

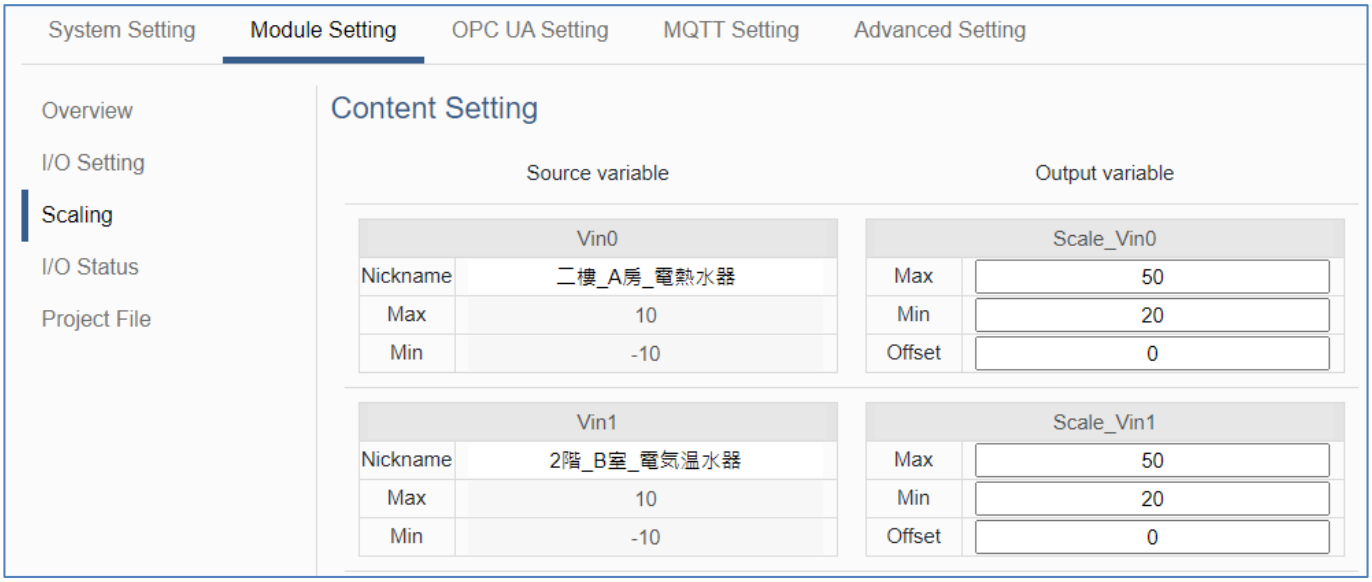
4.2.3 Scaling

Function: The Setting of scaling converts the analog signal to a more readable value. This function is only available for modules with AI/AO.

Support Module: All UA AI/AO modules support this function.

Manu Path:【Module Setting】➔【Scaling】 Module Setting ➔ Scaling (Appendix A).

When the variable value needs to be scaled or converted before output. Fill in the Min/Max items of the Source/Output Variable, and add a description, the Scaling conversion function will be activated.



Module Setting > Scaling – Content Setting	
Nickname(Source variable)	The Nickname name in the function of [Module Setting] ➔ [I/O Setting]
Min (Source variable)	The source variable that is to be converted; Fill in its minimum value.
Max (Source variable)	The source variable that is to be converted; Fill in its maximum value.
Min (Output variable)	The output variable that is to be converted; Fill in its minimum value.
Max (Output variable)	The output variable that is to be converted; Fill in its maximum value.
Offset (output variable)	Output variable + Offset = Actual Value

4.2.4 I/O Status

Function: Display and change the I/O status of the UA I/O module.

Support Module: All UA I/O modules support this function.

Manu Path:【Module Setting】➔【I/O Status】 Module Setting ➔ I/O Status (Appendix A).

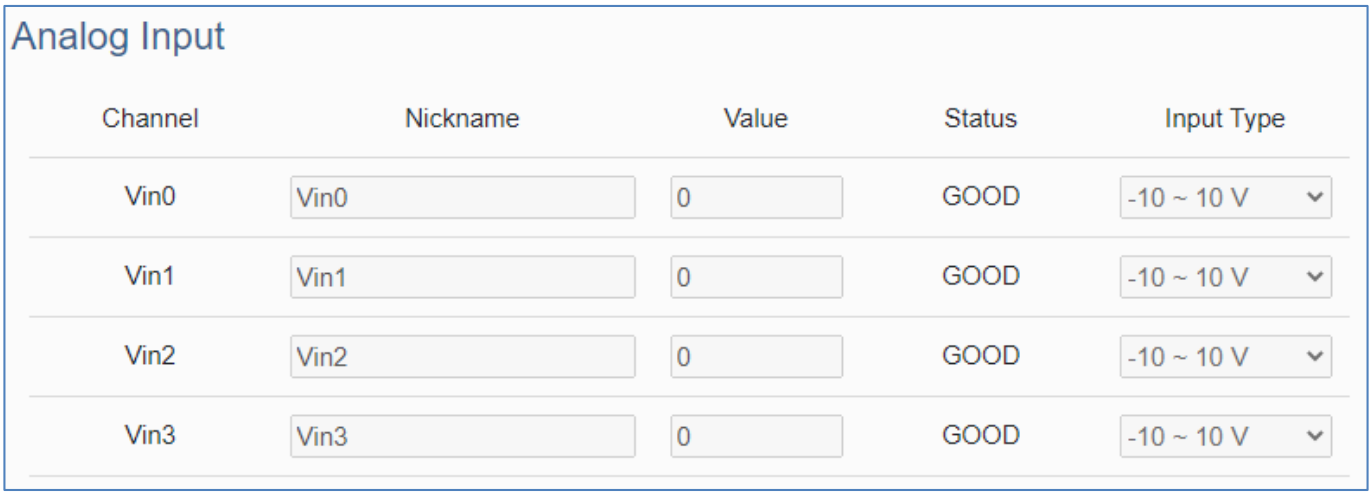
Digital Input (& Counter)

Module Setting > I/O Status - Digital Input	
Channel	The channel name (number) of the UA I/O hardware.
Nickname	The Nickname name in the function of [Module Setting] ➔ [I/O Setting]
Value	Current channel status value. When the value changes, the signal LED will change.
Status	GOOD, BAD, or UNCERTAIN.

Digital Output

Module Setting > I/O Status - Digital Output	
Channel	The channel name (number) of the UA I/O hardware.
Nickname	The Nickname name in the function of [Module Setting] ➔ [I/O Setting]
Value	Current channel status value. When the value changes, the signal LED will change.
Status	GOOD, BAD, or UNCERTAIN.

Analog Input



Module Setting > I/O Status – Analog Input	
Channel	The channel name (number) of the UA I/O hardware.
Nickname	The Nickname name in the function of [Module Setting] ➔ [I/O Setting]
Value	Current channel status value. When the input type is 4-20mA, if an abnormal state occurs, the value will display as -32.768.
Status	GOOD, BAD, or UNCERTAIN.

Input type	Display Value	Anomalous narrative
4~20mA	-32.768	Signal source disconnected

Analog Output

Module Setting > I/O Status - Analog Output	
Channel	The channel name (number) of the UA I/O hardware.
Nickname	The Nickname name in the function of [Module Setting] ➔ [I/O Setting]
Value	Current channel status value.
Status	GOOD, BAD, or UNCERTAIN.

4.2.5 Project File

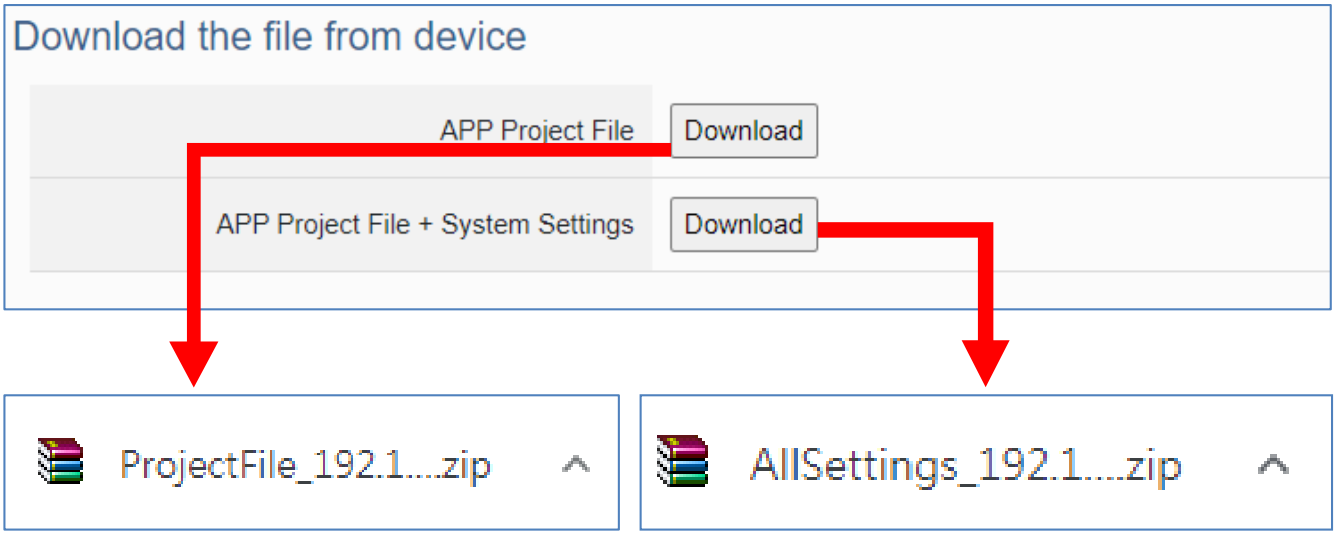
Function: download and upload the project file of the UA I/O module.
Support Module: All UA I/O modules support this function.

Manu Path:【Module Setting】➔【Project File】 Module Setting ➔ Project File (Appendix A).

Download the file from device

APP Project File: Easy to copy the APP settings of this UA-I/O to other UA-I/Os.
APP Project File + System Settings: When this UA-I/O fails, the same UA-I/O can be copied immediately by uploading the AllSetting file.

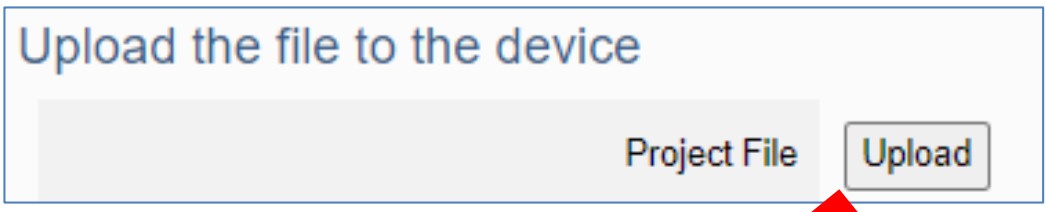
Click the [Download] button to download the file to your computer.

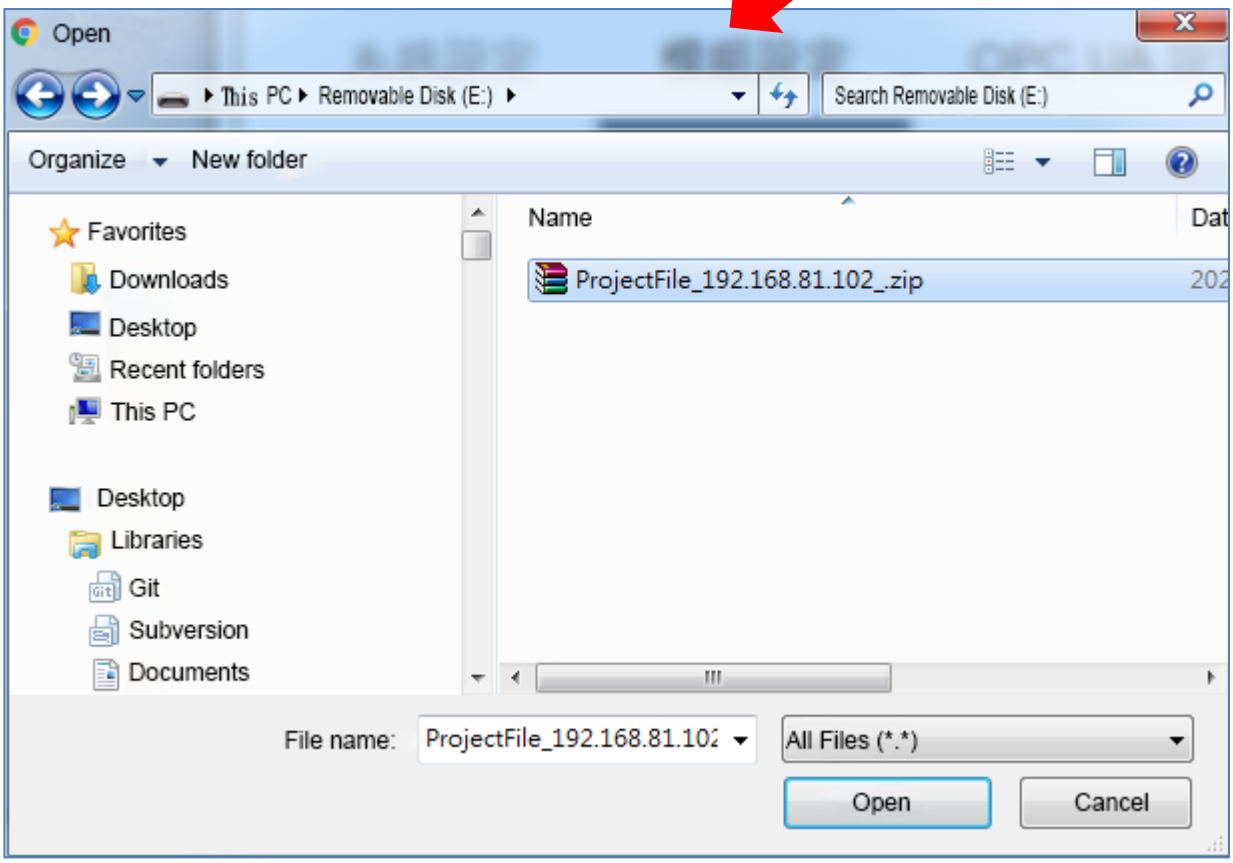


Upload the file to the device

Upload the "ProjectFile_xxx_.zip" file to replace the backed-up project file, then you can restore the project parameters.

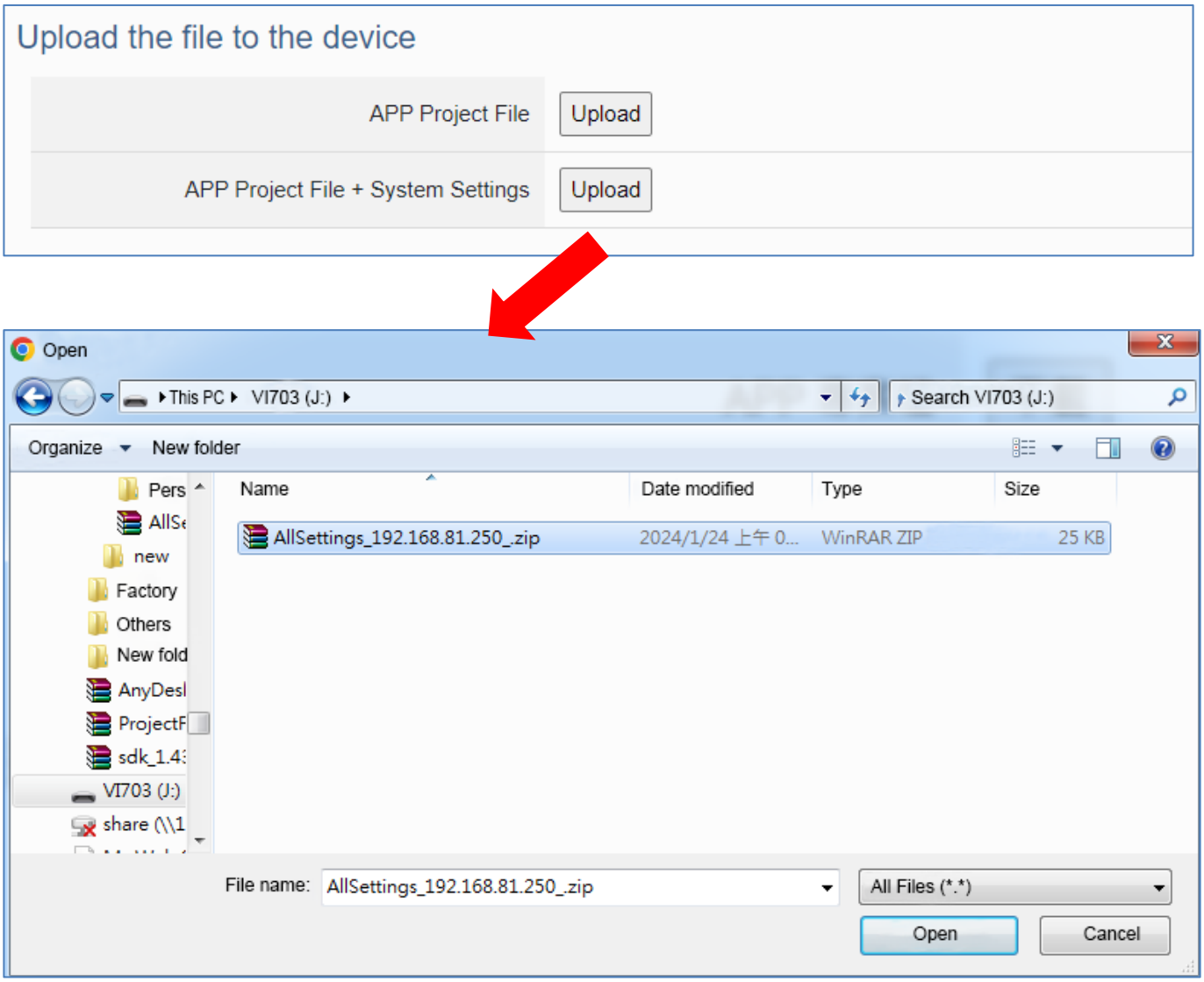
Click [Upload] button, select the project file in the PC.





Upload the "AllSettings_xxx_.zip" file to restore all previous UA-I/O settings.

Click the [Upload] button, and select the project file to be uploaded.



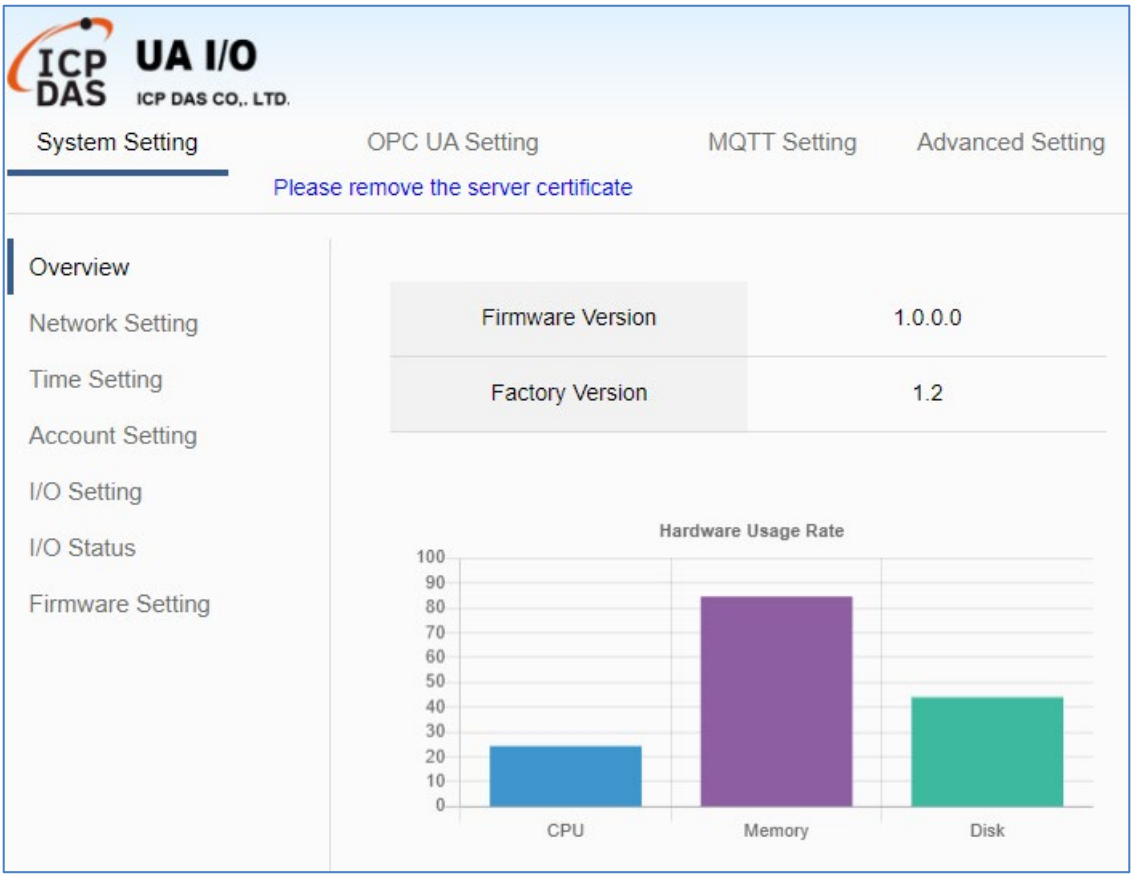
4.3 Main Menu - OPC UA Setting

This main menu aggregates all OPC UA related settings. This chapter focuses on parameter descriptions. About the detailed steps and notices for using OPC UA connection/certificate, please refer to **3.1 Settings for Using OPC UA Connection** of Chapter 3 Main Function Settings.

NOTE:
When the main menu "**OPC UA Setting**" has a message of "Please remove the server certificate" (as the picture below), that means there is something error about the server certificate file.

Please click the menu【OPC UA Setting】➔【Certificate】 OPC UA Setting ➔ Certificate (Appendix A) to remove the Server Certificate, the function of OPC UA menu will be normal again.

The operation to remove the Server Certificate, please refer to the next two section "4.3.2 Certificate".

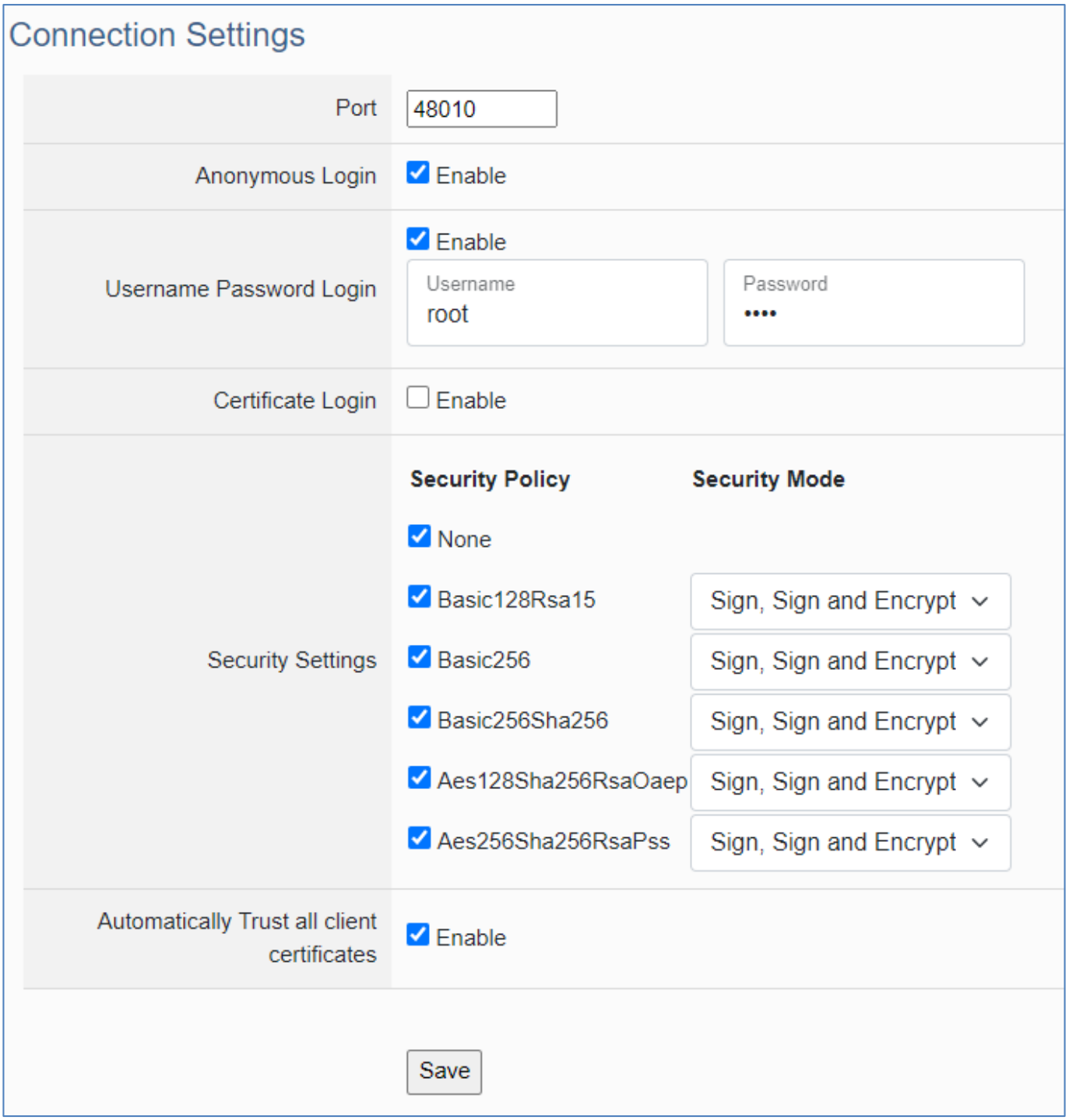


4.3.1 Server Setting

Function: Provide the Server settings for using the OPC UA connection.
Support Module: All UA I/O modules support this function.

Manu Path:【OPC UA Setting】➔【Server Setting】 OPC UA Setting ➔ Server Setting (Appendix A).

Sample: For a simple setting example, please refer to Section 3.1 .



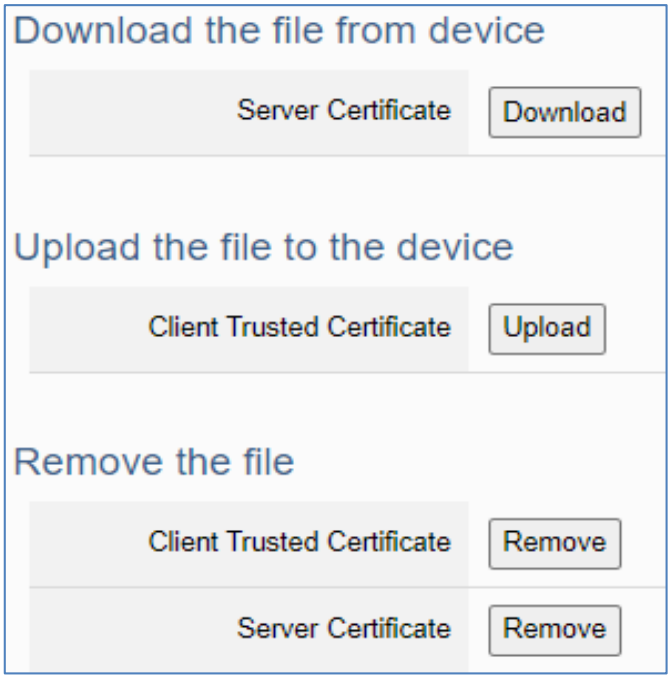
OPC UA Setting > Server Setting - Connection Setting		
Port	The communication port number of the OPC UA Server. System Default: 48010.	
Anonymous Login	Check to enable the anonymous login from OPC UA clients.	
Username Password Login	Check to enable the user password login from OPC UA clients. The following are the defaults for username and password: Username: root Password: root	
Certificate Login	Check to enable the certificate login from OPC UA clients. (refer to next section, Server Certificate)	
Security Setting	Security Policy	Security Mode
	None	
	Basic128Rsa15	Sign, Sign and Encrypt
	Basic256	Sign, Sign and Encrypt
	Basic256Sha256	Sign, Sign and Encrypt
	Aes128Sha256RsaOaep	Sign, Sign and Encrypt
	Aes256Sha256RsaPss	Sign, Sign and Encrypt
Automatically Trust all client certificates	Set this item to true if the OPC UA Client requires only the security policy but doesn't need to exchange certificates when connecting. Set this item to false if you need to exchange certificates. Default: true	
Save	Click to save the connection settings of the OPC UA Server.	

4.3.2 Server Certificate

Function: When selecting the OPC UA certificate connection, the UA I/O (Server side) needs to exchange the certificate with the connecting client side. This page is about setting the OPC UA Certificate for security and encryption, e.g. upload, download, delete the certificate.

Support Module: All UA I/O modules support this function.

Manu Path:【OPC UA Setting】➔【Server Certificate】 OPC UA Setting ➔ Server Certificate (Appendix A).

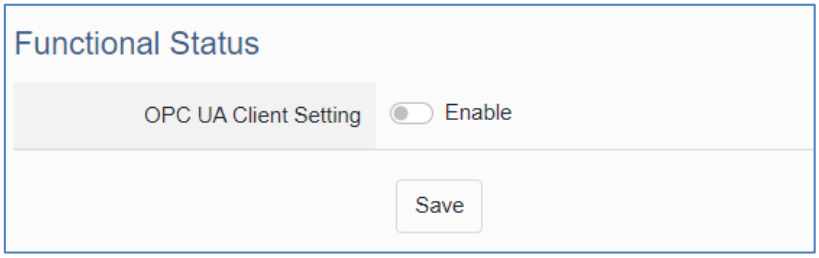


OPC UA Setting > Server Certificate – Download the file from device	
Server Certificate	Click “Download” to download the OPC UA Server Certificate file to the PC for the use of the client-side device. File Name: icpdasuaserver.der
OPC UA Setting > Server Certificate –Upload the file to the device	
Client Trusted Certificate	Click “Upload” to select the OPC UA Client Trusted Certificate file on your PC, and upload the Trusted Certificate file to the UA I/O module.
OPC UA Setting > Server Certificate – Remote the file	
Client Trusted Certificate	Click “Remove” to delete all Client Trusted Certificate files.
Server Certificate	Click “Remove” to delete all Server Certificate files.

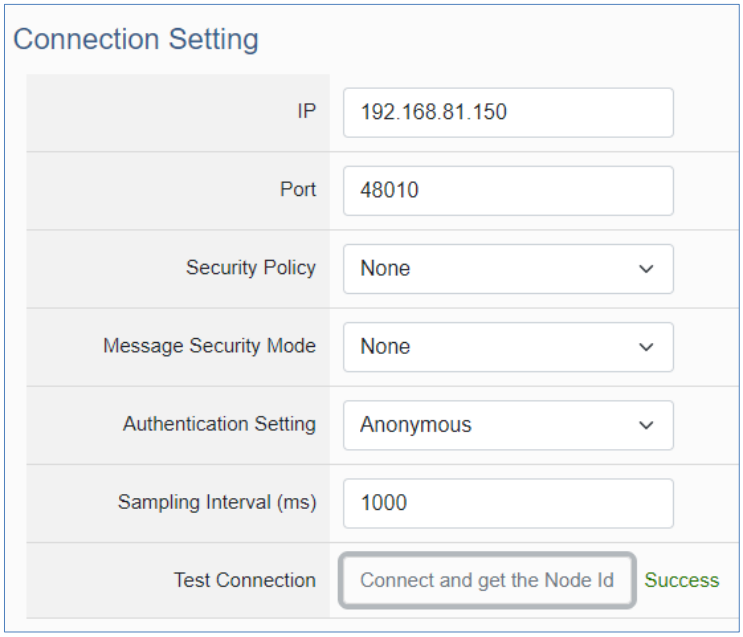
4.3.3 Client Setting

Function: The OPC UA Client connection settings.
Support Module: All UA I/O modules support this function.

Manu Path:【OPC UA Setting】➔【Client Setting】 OPC UA Setting ➔ Client Setting (Appendix A).

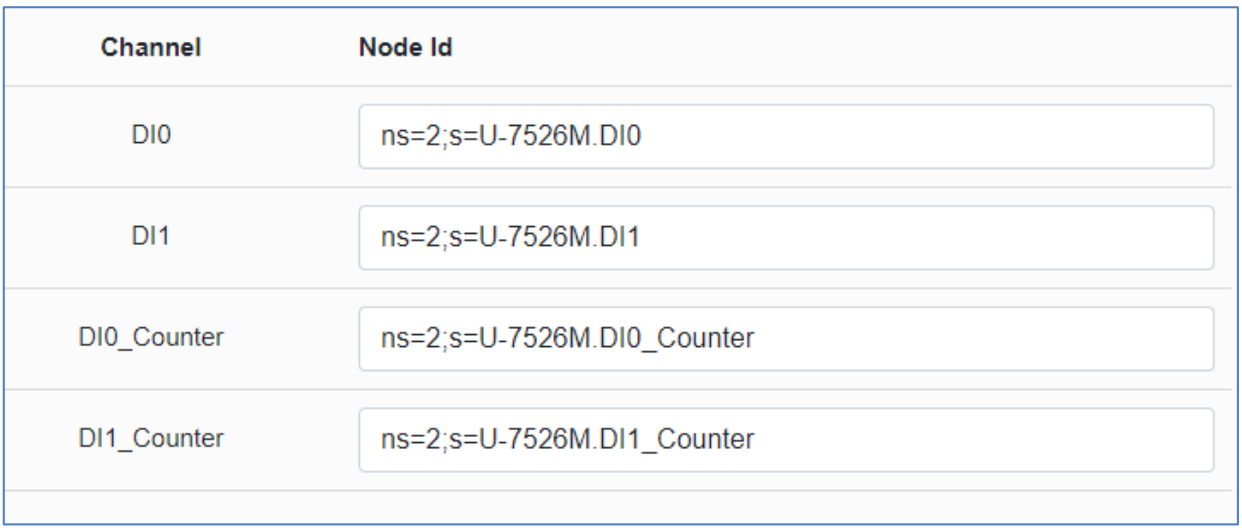


OPC UA Setting > Client Setting - Functional Status	
OPC UA Client	To use this function, select Enable and click the Save button.



OPC UA Setting > Client Setting - Connection Setting	
IP	The IP address of the OPC UA Server.
Port	The port used by the OPC UA Server.
Security Policy	The security policy to use so that you can secure messages that are read from the OPC-UA source. Choose one of the following: None, Basic128Rsa15, Basic256, Basic256Sha256, Aes128Sha256RsaOaep, Aes256Sha256RsaPss.
Message Security Mode	The message security mode to use to secure connections to the OPC-UA source. Choose one of the following: None, Sign, Sign & Encrypt.
Authentication Setting	The client makes the settings for user authentication. Choose one of the following: Anonymous, Username, Password, Certificate, Private Key.
Sampling Interval (ms)	Synchronize the time interval of I/O data so the data of the module

	and OPC UA Server are synchronized.
Test Connection	Click "Connect and get node Id" to connect to OPC UA Server. Success: You can connect and get the node ID of the Server side.

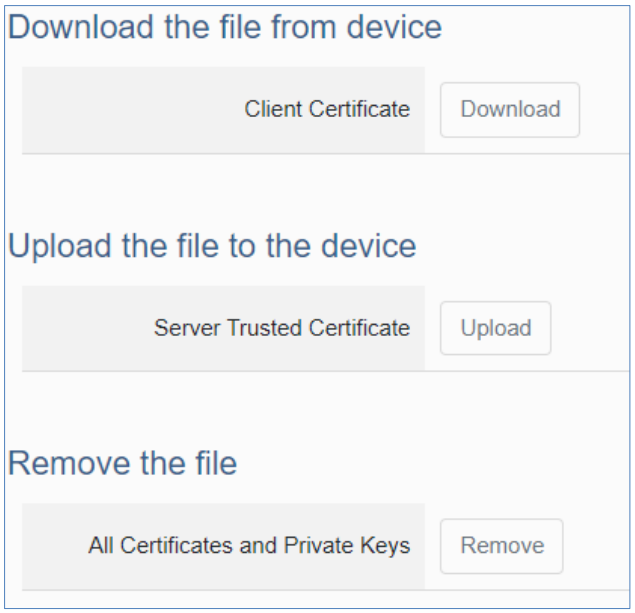


OPC UA Setting > Client Setting – Connection Setting	
Channel	The Nickname name in the function of [Module Setting] ➔ [I/O Setting]
Node Id	Select the node Id on the OPC UA Server and synchronize the channel I/O data to the Server.

4.3.4 Client Certificate

Function: When OPC UA Certificates are connected, they need to exchange certificates with each other. The interface provides Certificate Upload, Download, and Remove functions.
Support Module: All UA I/O modules support this function.

Manu Path:【OPC UA Setting】➔【Client Certificate】 OPC UA Setting ➔ Client Certificate (Appendix A).



OPC UA Setting >Client Certificate – Download the file from device	
Client Certificate	Click “download” to get the Client Certificate. File Name: icpdasuasclient.der.
OPC UA Setting > Server Certificate –Upload the file to the device	
Server Trusted Certificate	Click “Upload” to select the OPC UA Server Trusted Certificate file on your PC.
OPC UA Setting > Client Certificate – Remote the file	
All Certificates and Private Keys	Click "Remove" to delete Client Certificates, Server trusted Certificates and. the certificate and private key in the OPC UA setting.

4.4 Main Menu – MQTT Setting

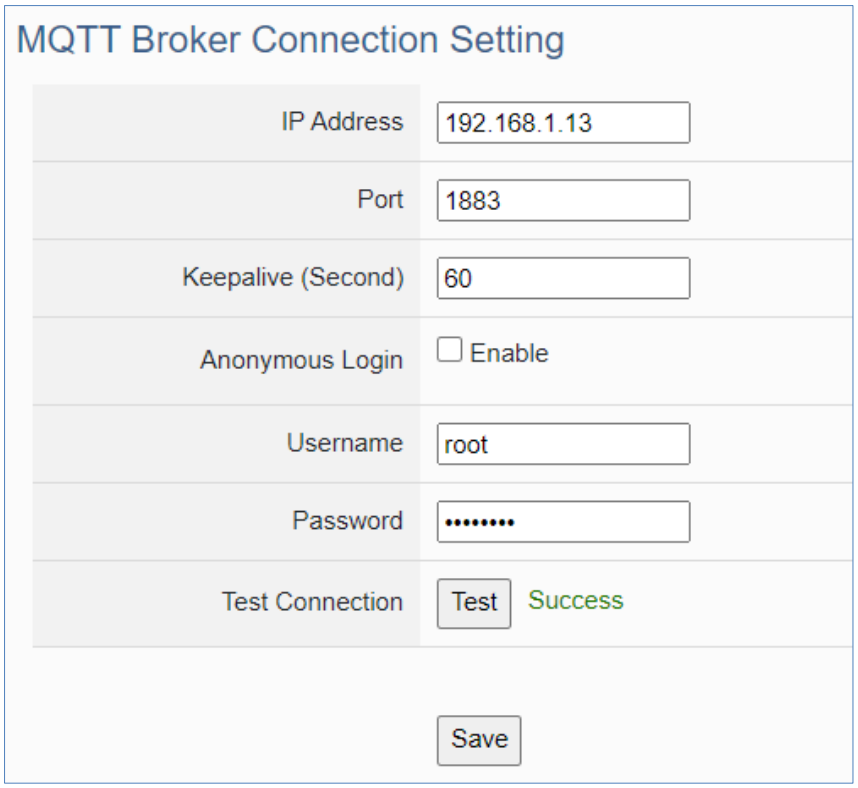
This main menu aggregates all MQTT-related settings. This chapter focuses on parameter descriptions. For the detailed steps and notices for using MQTT connection/certificate, please refer to **3.2 Settings for Using MQTT Connection** of Chapter 3 Main Function Settings.

4.4.1 Connection Setting

Function: Provide the remote MQTT Broker settings for using the MQTT connection.
Support Module: All UA I/O modules support this function.

Manu Path:【MQTT Setting】➔【Connection Setting】 MQTT Setting ➔ Connection Setting (Appendix A).

Sample: For a simple setting example, please refer to Section 3.2 .



MQTT Setting > Connection Setting	
IP Address	The IP address of the remote MQTT Broker
Port	The communication port number of the remote MQTT Broker.
Keepalive (Second)	Keep alive detection time. Default: 60
Anonymous Login	When checking the item box, it can connect without a username and password. If not checked, it needs to set a username and password.
Username	The username to login the remote MQTT Broker
Password	The password to login the remote MQTT Broker
Test Connection	Click the Test button to test whether the connection to the MQTT Broker is successful.
Save	Click to save the setting of this page.

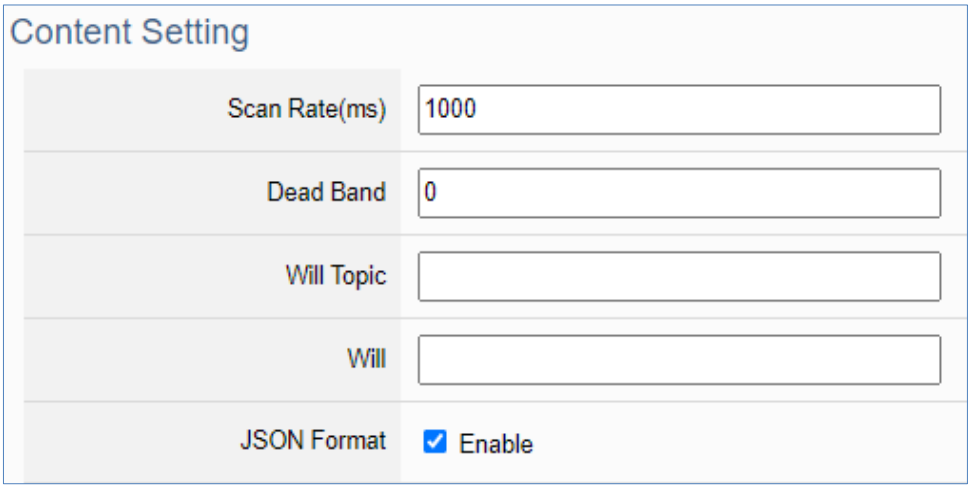
4.4.2 Client Setting

Function: Provide the MQTT Client settings for using MQTT connection.

Support Module: All UA I/O modules support this function.

Manu Path:【MQTT Setting】➔【Client Setting】 MQTT Setting ➔ Client Setting (Appendix A).

Sample: For a simple setting example, please refer to Section 3.2 .

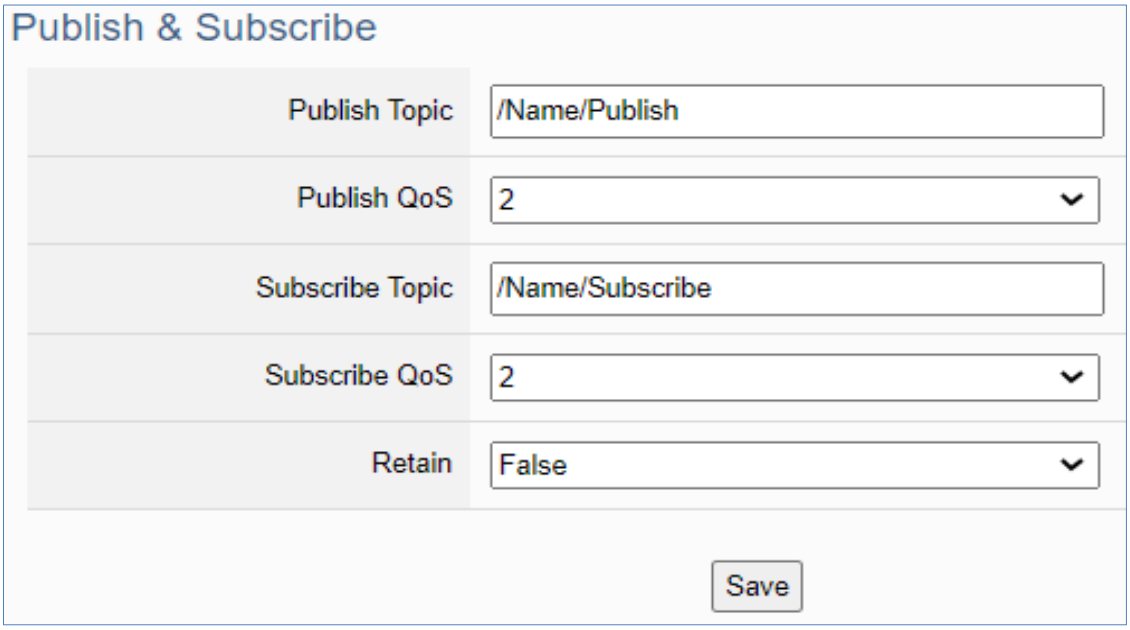


MQTT Setting > Client Setting – Content Setting	
Update Rate(ms)	Set an update frequency for the task data. Default: 1000 (Unit: ms)
Dead Band	Give a dead bend value for updating a float signal. Default: 0 Dead Band description please refer to Appendix C.
Will Topic	Topic with abnormal disconnection. Default: Null. When the Broker detects that the client is disconnected abnormally, it will publish the Will message to Specified Will Topic. (Topic cannot contain “#”, “+”, and “$”
Will	Enter a disconnect notice. Default: Null.
JSON Format	Switch the format for sending MQTT messages. If "Enable" is checked, the message will send in groups. For the message format, please refer to Appendix B. If "Enable" is not checked, the message will send in singly.

If the JSON format is checked as "Enable", the message is sent as a group. For its setting items and parameter descriptions, please see the next page.

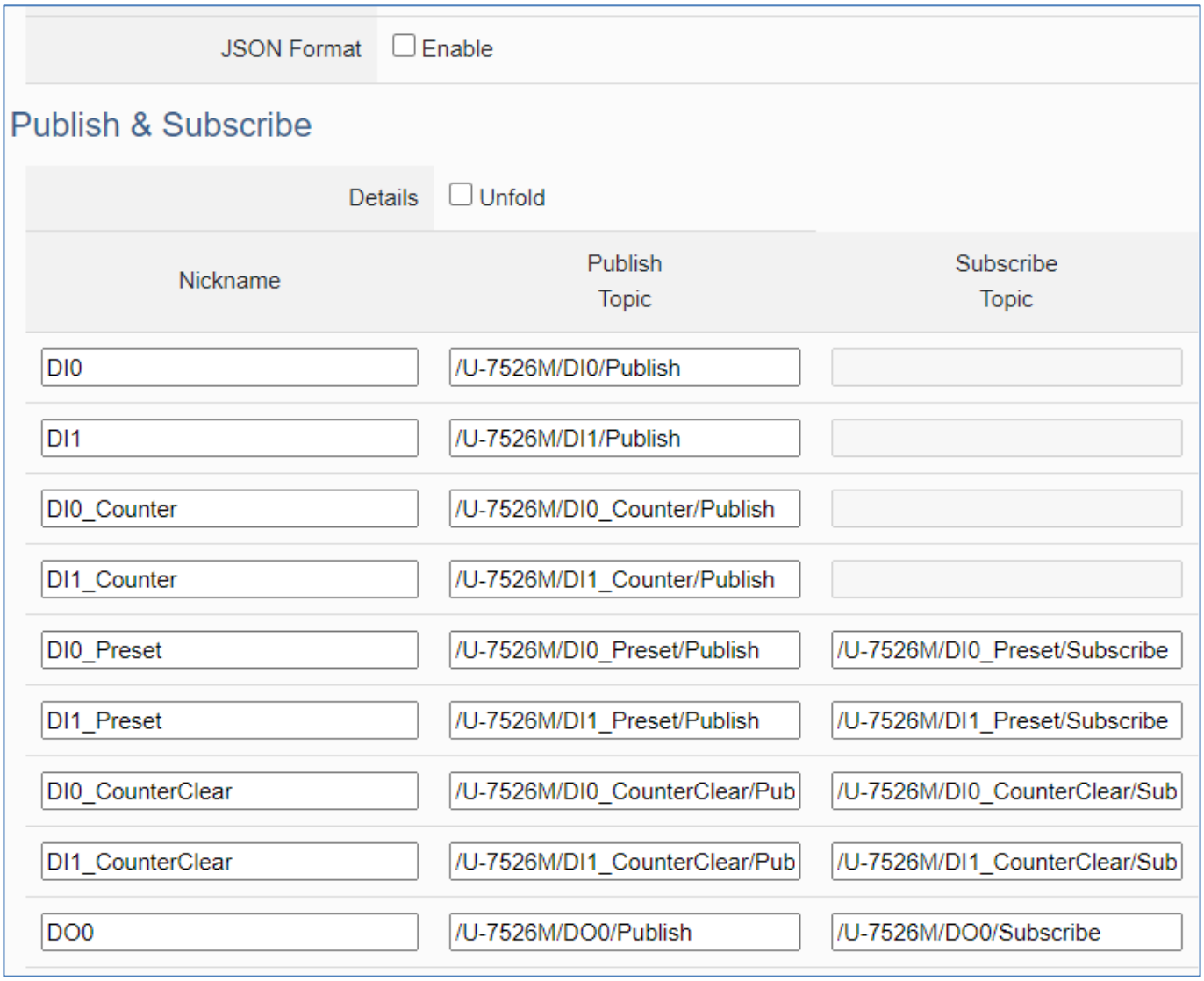
If the JSON format is not checked, the message is sent in singly. For its setting items and parameter descriptions, please see the page after the next page.

- JSON Format: Enable (message is sent as a group):



MQTT Setting > Client Setting - Publish & Subscribe (JSON Format: ☑ Enable)	
Publish Topic	The topic of sending data/publishing messages.
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 data / subscribing messages. It can copy the Publish Topic of the linked device.
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	Set up if the Broker retains the message.
Save	Click to save the setting of this page.

- JSON Format: Not Enable (message is sent in singly):



MQTT Setting > Client Setting - Publish & Subscribe (JSON Format: ☑ Enable)	
Details	Check “Unfold” to display all fields.
Nickname	The Nickname name in the function of [Module Setting] ➔ [I/O Setting]
Publish Topic	The topic of sending data / publishing 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 data / subscribing message. It can copy the Publish Topic of linked device.
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.
Save	Click to save the setting of this page.

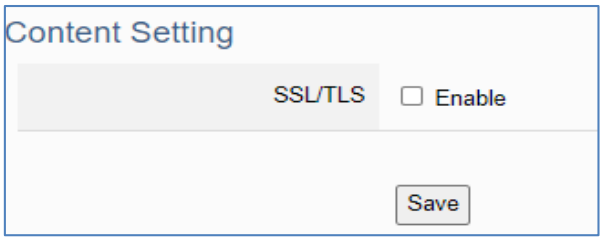
4.4.3 Certificate

Function: When selecting MQTT certificate connection, the UA I/O needs to exchange the certificate with the connecting device. This page is about setting the MQTT Certificate for the security and encryption.

Support Module: All UA I/O modules support this function.

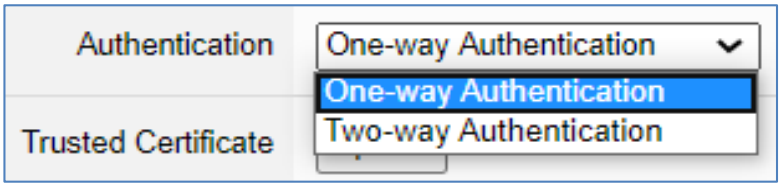
Manu Path:【MQTT Setting】➔【Client Setting】 MQTT Setting ➔ Client Setting (Appendix A).

1. "SSL/TLS" is not "enable" by default. When not enabled, other setting items will be hidden.



MQTT Setting > Certificate – Content Setting	
SSL/TLS	Check the box and click "Save" to enable the settings for SSL/TLS secure communication. Default: uncheck. The setting items will not appear until clicking the "Save" button.

2. Authentication setting item will show up after enable "SSL/TLS". Select one way or two way authentication.



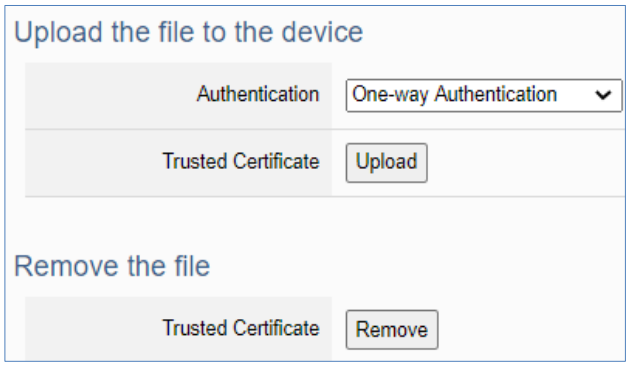
One-way authentication: The **Client verifies** the validity of **Broker** credentials.
Two-way authentication: The **Client and Broker verify** the validity of the certificate with **each other**.

This setting page is setting for the MQTT secure encrypted communication (SSL/TLS: Secure Socket Layer / Transport Layer Security). Before setting this function, you need to download or upload the relevant certificates. There are three types of certificates: Trusted Certificate, Certificate, and Private Key. Please upload the files to the UA I/O module according to the type of certificates.

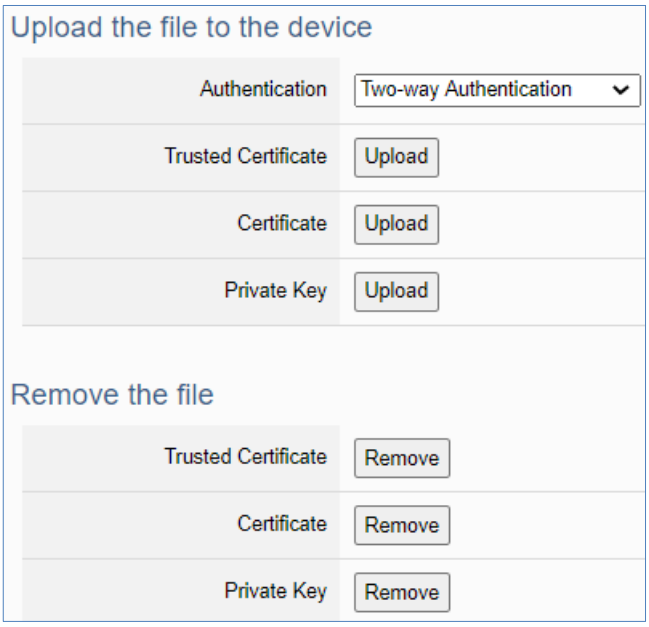
To perform the One-way authentication, you need to upload the Trusted Certificate.
To perform the Two-way authentication, you need to upload the Trusted Certificate first, and then upload the Certificate and Private Key.

Parameter Function Descriptions:

One-way Authentication Screen



Two-way Authentication Screen



MQTT Setting > Certificate – Upload the file to the device	
Authentication	**One-way authentication**: The Client verifies the validity of Broker credentials; need to upload the Trusted Certificate. **Two-way authentication**: The Client and Broker verify the validity of the certificate with each other; need to upload the Trusted Certificate first, and then upload the Certificate and Private Key.
Trusted Certificate	**Upload**: Click to select the MQTT Trusted Certificate file of the device, and upload the MQTT Trusted Certificate file to the UA I/O module. • File format must be PEM. Extension name must be “pem”, “cer”, or “crt”.
Certificate	**Upload**: Click to select the MQTT Certificate file of the device, and upload the MQTT Certificate file to the UA I/O module. • File format must be PEM. Extension name must be “pem”, “cer”, or “crt”.
Private Key	**Upload**: Click to select the MQTT Private Key of the device, and upload the MQTT Private Key file to the UA I/O module. • File format must be PEM. Extension name must be “key”.
MQTT Setting > Certificate – Remove the file	
Trusted Certificate	Click “Remove” to delete all Trusted Certificate files in the UA I/O module.
Certificate	Click “Remove” to delete all Certificate files in the UA I/O module.
Private Key	Click “Remove” to delete all Private Key files in the UA I/O module.

4.5 Main Menu – Advanced Setting

This main menu aggregates the advanced settings, such as the Scaling setting that function can convert the analog signal to a more readable value. The scaling function is only available for AI/AO channels. ICP DAS will develop more advanced functions in the future.

4.5.1 Event Log

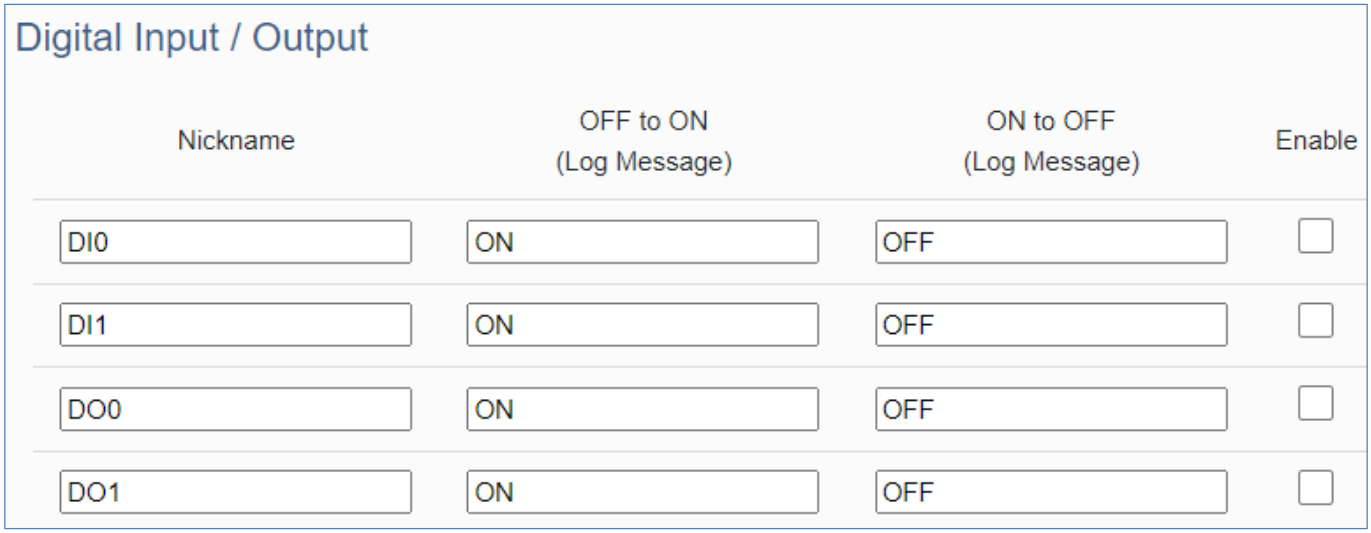
4.5.1.1 Main Setting

Function: When the I/O value changes, record the current I/O value for easy device tracking in the future.

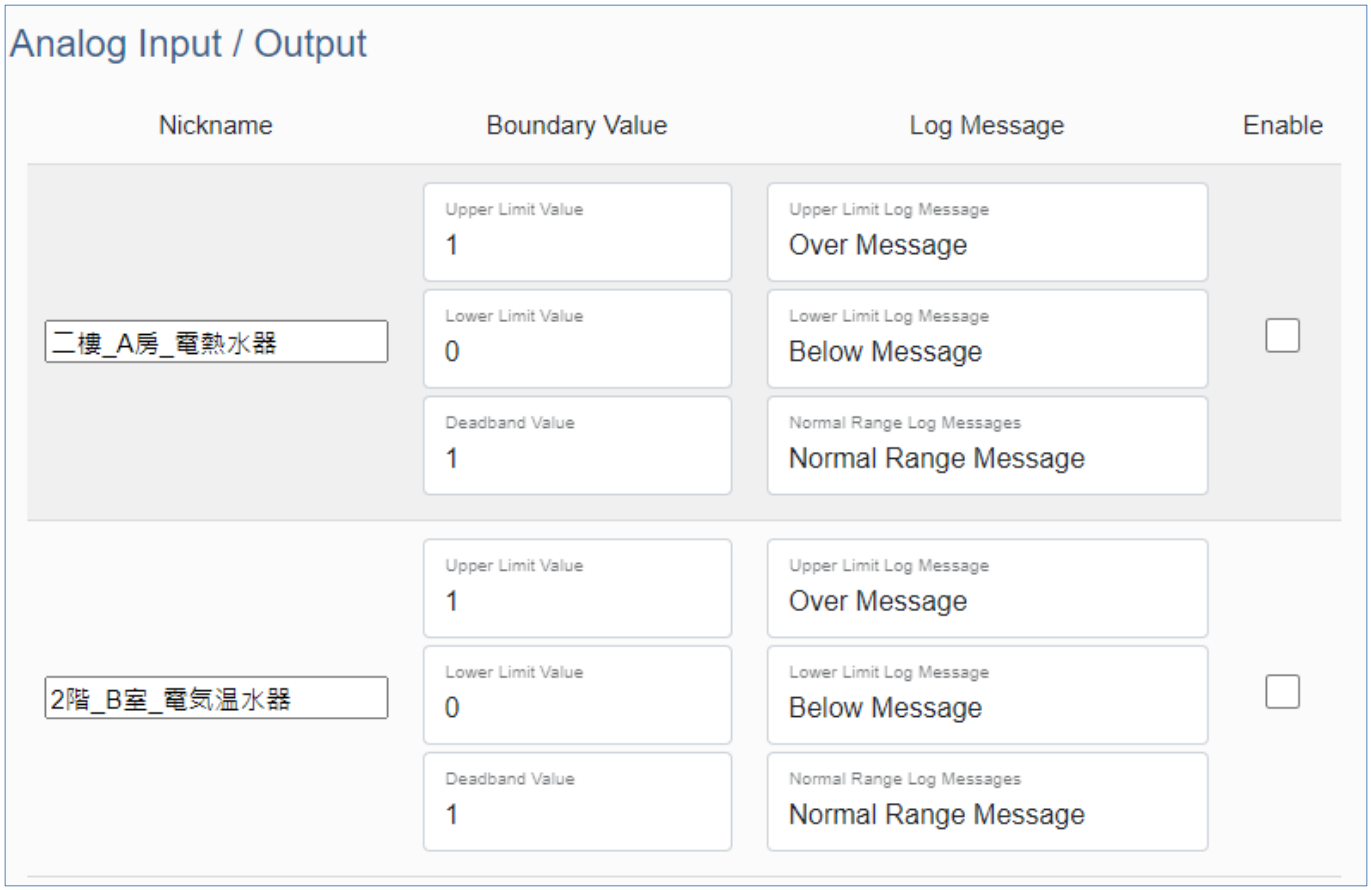
Support Module: All UA I/O modules support this function.

Manu Path:【Advanced Setting】➔【Event Log】➔【Main Setting】

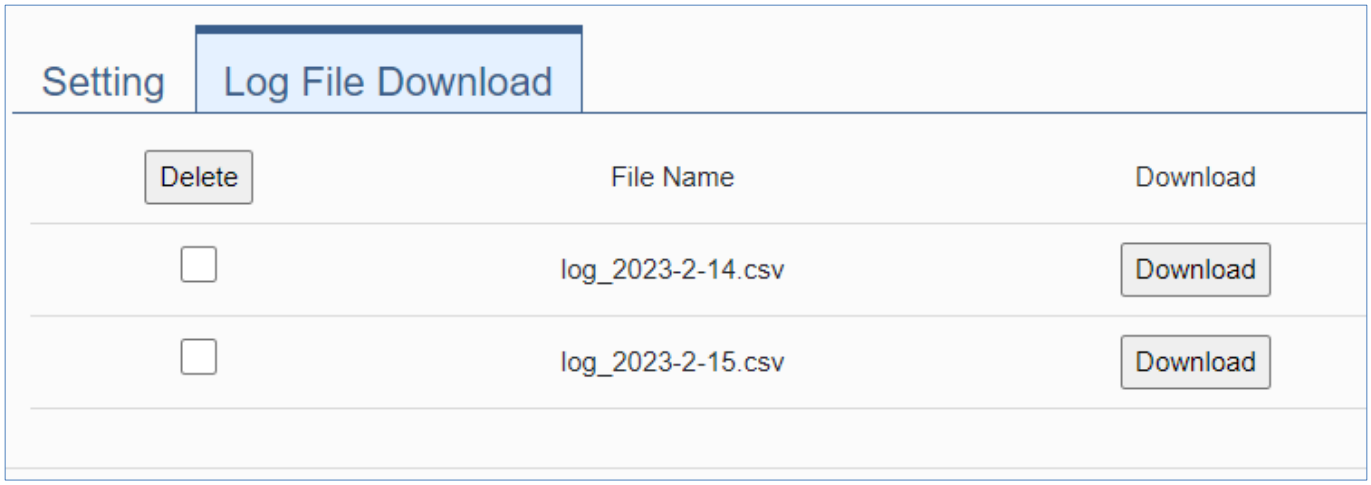
Advanced Setting ➔ Event Log ➔ Main Setting (Appendix A).



Advanced Setting > Event Log> Main Setting > Interface Setting > Digital Input / Output	
Nickname	The nickname in the function of [Module Setting] ➔ I/O Setting]
Off to On (log message)	When I/O is ON, the log file will store this log message. Easy for customers to read.
On to Off (log message)	When I/O is OFF, the log file will store this log message. Easy for customers to read.
Enable	Check this item to enable the event log function for this I/O. Default: not enabled



Advanced Setting > Event Log > Main Setting > Interface Setting > Analog Input / Output	
Nickname	The Nickname name in the function of [Module Setting] ➔ [I/O Setting]
Boundary value	Upper limit: Above the upper limit, it is considered abnormal. Preset: 1
	Lower limit: Below the lower limit, it is considered abnormal. Preset: 0
	Deadband: Dead zone, inactive zone. Set the Deadband value for the floating point data update. Default: 1 (Refer to Appendix C)
Log message	Upper log message: Above the upper limit, this log message is recorded.
	Lower log message: Below the upper limit, this log message is recorded.
	Normal range log message: This log message is recorded between the upper limit value and the lower limit value (only recorded once).
Enable	Check this item to enable the event log function for this I/O. Default: not enabled



Advanced Setting > Event Log > Main Setting – Log File Download	
File Name	The file name is composed of year, month, day, hour, minute, and second. This time is the time of the first content.
Download	Click this button to download the log file.

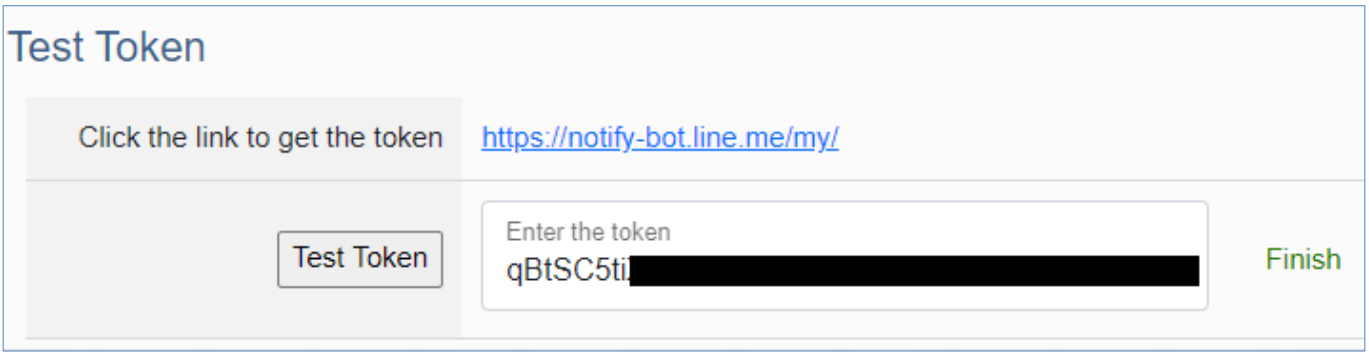
4.5.1.2 Send Messages To Line

Function: When the I/O value changes, the I/O value is sent to Line as an alarm notification.
Module Support: All UA I/O modules support this function.
Manu Path:【Advanced Setting】➔【Event Log】➔【Send Messages TO Line】

(Appendix A).

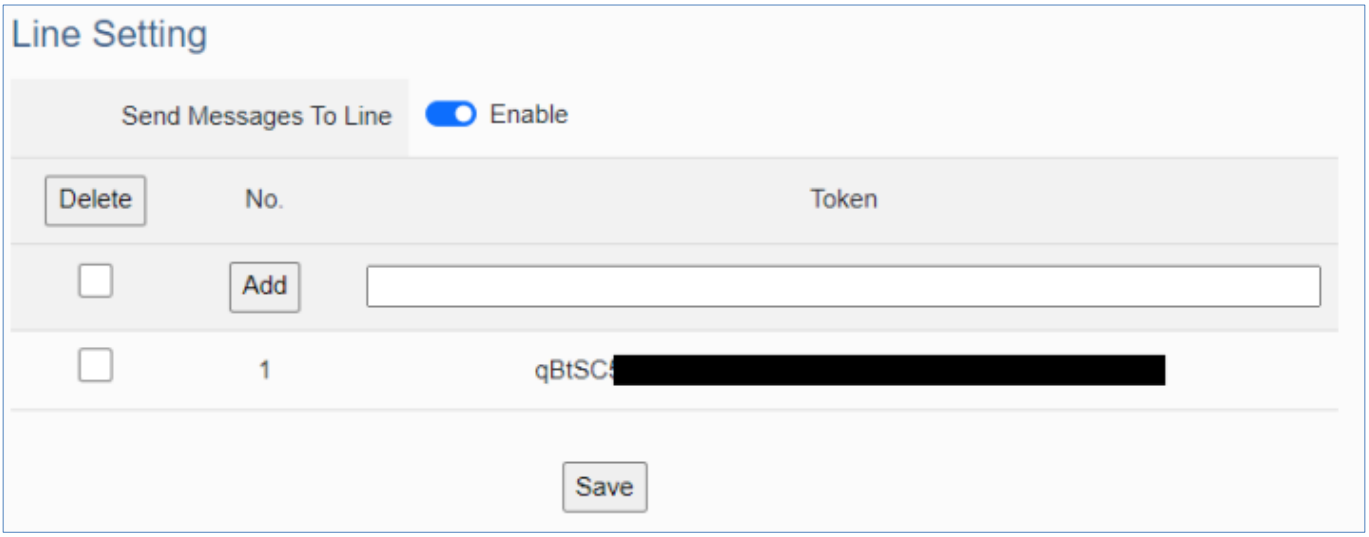
Before using, please make sure that **the main setting** is checked and enabled

- **Test Token**



Advanced Setting > Event Log > Send messages To Line – Test Token	
Click the link to get the token	**1.** Click the link and enter your Line account and password. **2.** Follow the steps to get Line's token.
Test Token	Enter the token in the column and click the Test token button. When the transmission is successful, " Finish " will be displayed.

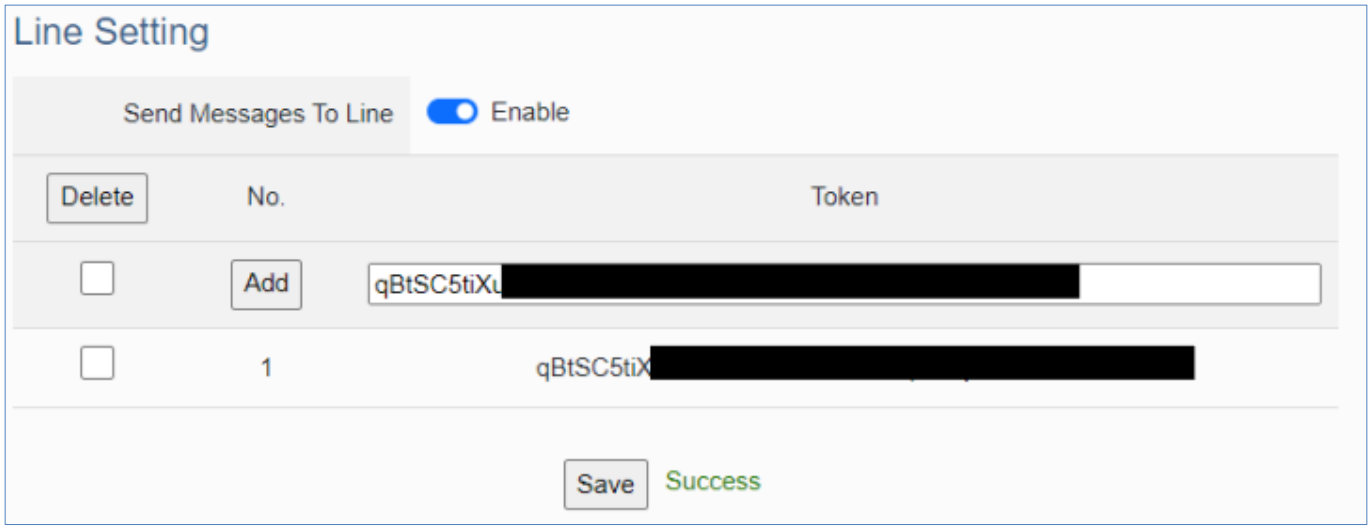
- **Line Setting**



Advanced Setting > Event Log > Send messages To Line – Line Setting	
Send Messages To Line	Enable this item to allow the module to send messages to Line.
Delete	Check this item and click the Delete button to delete the item.
No.	The number is automatically given by the system for identification.
Token	The token obtained by Line is used to connect the module to Line.

How to use Line setting:

1. Enter the token obtained from Line by yourself.
2. Click the "Add" button.
3. Click the "Save" button.



4.5.2 Rule Setting

4.5.2.1 Main Setting

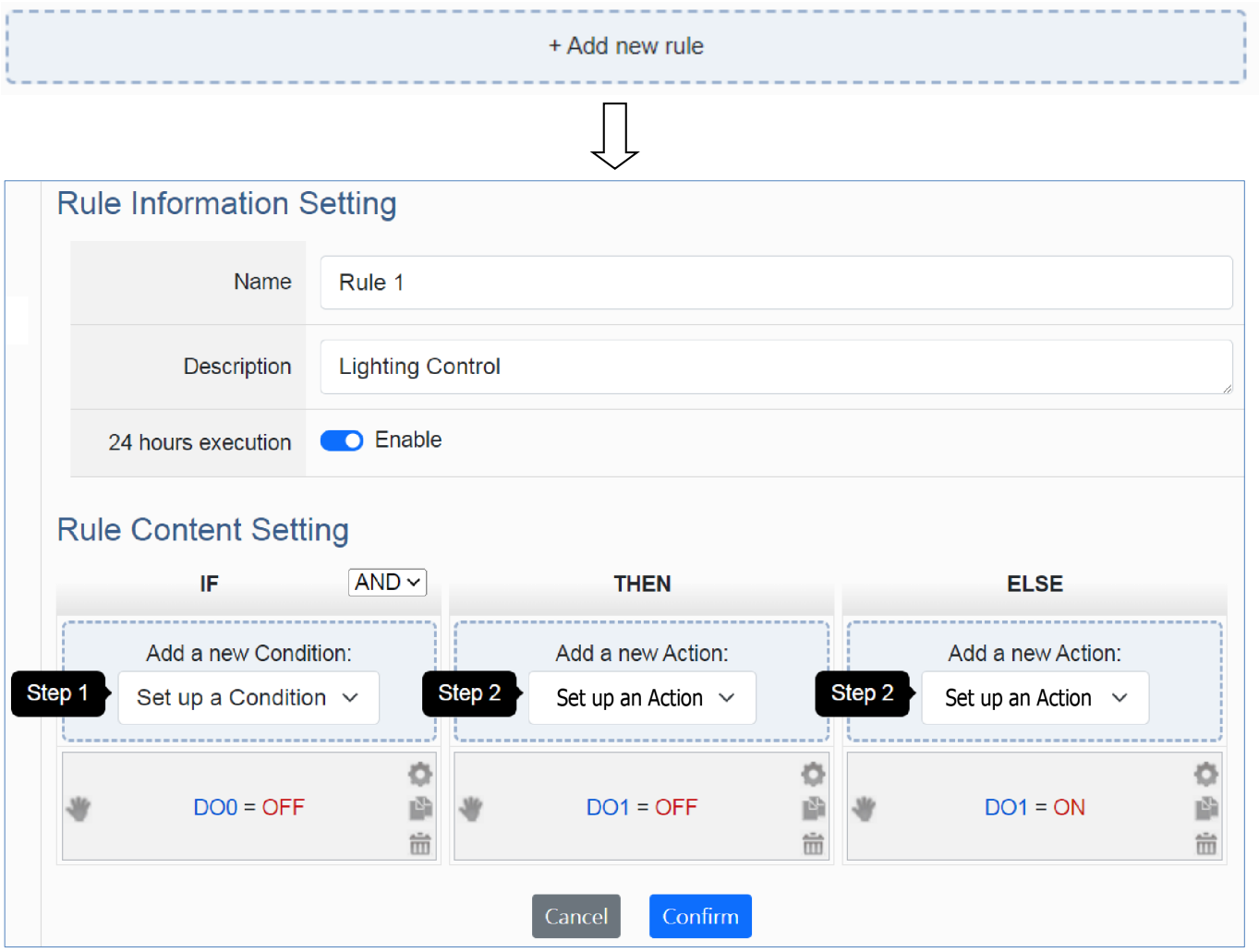
Function: The Rule Setting function provides simple logic condition rule setting, let UA I/O do automatic condition judgment and action control, to achieve simple AI.

Support Module: All UA I/O modules support this function.

Manu Path:【Advanced Setting】➔【Rule Setting】➔【Main Setting】

Advanced Setting ➔ Rule Setting ➔ Main Setting (Appendix A).

Add Rules: Click on "Add new rule" to go to the settings page.



Advanced Setting > Rule Setting > Main Setting - Add new rule> Rule Information Setting	
Name	The rule name auto-given by the system is used for schedule identification. (For the schedule function, refer to【Advanced Setting】>【Schedule】)
Description	A specific description of the rule can be set to improve recognition.
Resident Execution	Check: the rule will be executed 24 hours a day. Default: enabled. Uncheck: the "Schedule" has been set. (For Schedule function, refer to【Advanced Setting】>【Schedule】)
Advanced Setting > Rule Setting > Main Setting - Add new rule> Rule Content Setting	
IF	Set the IF Condition statement of the logic rule. The values or status for evaluation criteria: DI, DO, AI, AO, Virtual Point. Conditions Type: AND, OR.
THEN	When the IF Condition is "Yes", execute the THEN setting. Selectable Action: DO, AO, Delay, Virtual Point, I/O Control, and Link-Up.
ELSE	When the IF Condition is "NO", execute the ELSE setting. Selectable Action: DO, AO, Delay, Virtual Point, I/O Control, and Link-Up.

Advanced Setting:

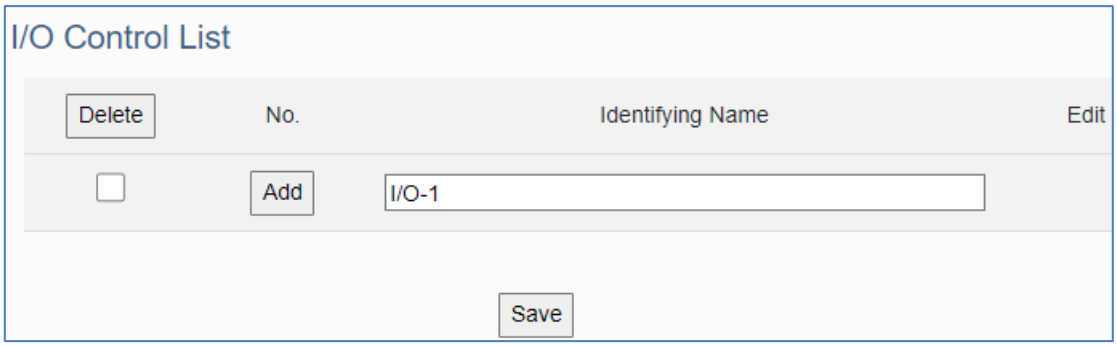
Advanced Setting > Rule Setting > Main Setting – Advanced Setting	
I/O Sampling Interval Time (milliseconds)	Enter the interval time (milliseconds) to obtain the value of UA I/O.

4.5.2.2. I/O Control

Function: Provide UA-I/O series modules to package the I/O points into highly Identifying names. **Must be used with rule setting.**

Support Module: This function is only supported by U-7504M, U-7526M, U-7555M, U-7560M, U-7519ZM, and U-7517M-10.

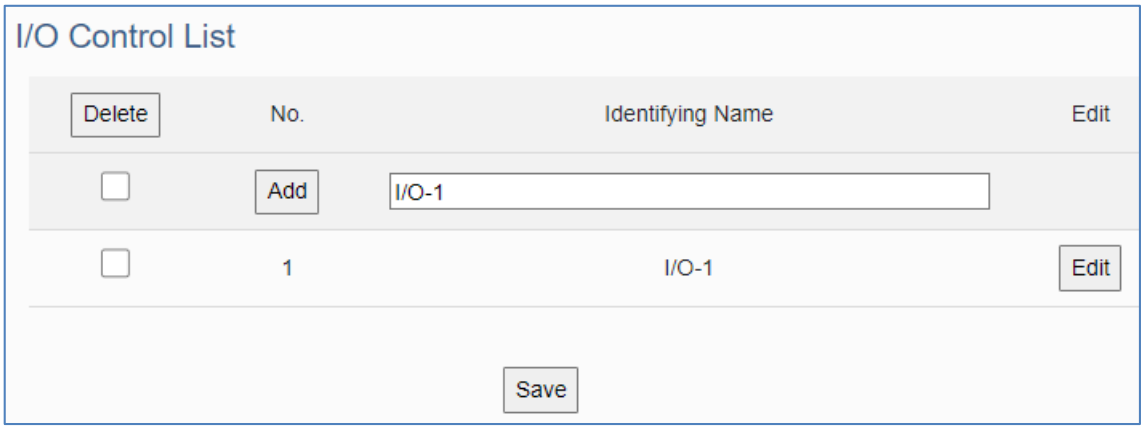
Manu Path:【Advanced Setting】➔【I/O Control】 Advanced Setting ➔ I/O Control (Appendix A).

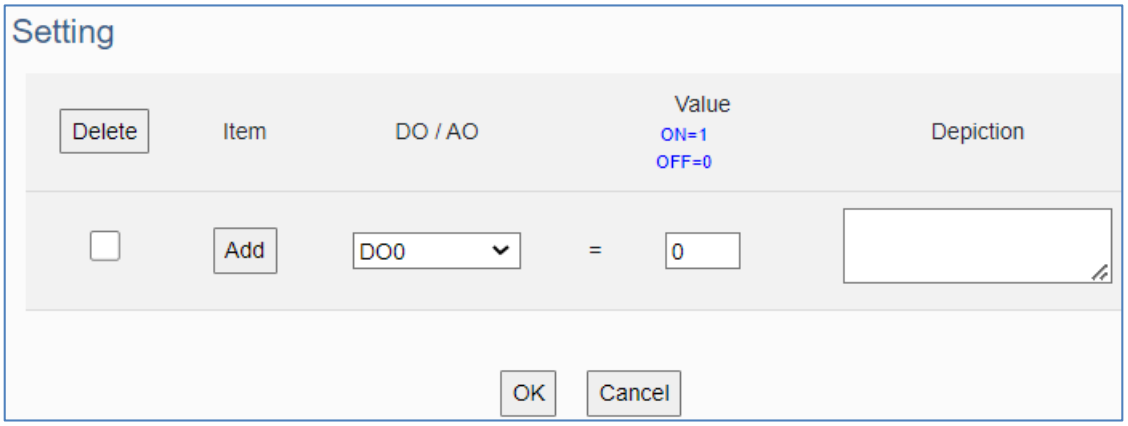


Advanced Setting > Rule Setting > I/O Control	
Delete	Check the box and press the Delete button to delete the item.
No.	The number automatically given by the system for easy identification.
Identifying Name	Can input Multi-language text. For convenient **Rule Setting** and recognition. (For the function of Rule Setting, please refer to [Advanced Settings] > [Rule Setting])
Edit	Enter the Edit Setting screen to provide more detailed settings.

Setting method:

1. Fill in the name in the identifying name, for example: I/O-1.
2. Click the "Add" button.
3. Click the "Edit" button of the item to enter the setting page, and set the I/O action of the device.





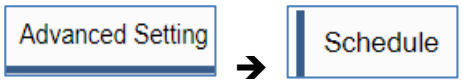
Advanced Setting > Rule Setting > I/O Control > I/O Control(Edit) > Setting	
Delete	Check the box and press the Delete button to delete the item.
Item	The number automatically given by the system for easy identification.
DO / AO	According to the module model, select the corresponding I/O.
Value	Set the I/O value. Default: 0.
Depiction	Used to set a more detailed description of the item to improve recognition.

After setting, remember to click OK to return to the I/O control list, and click Save.

4.5.2.3 Schedule

Function: The Schedule function can achieve the timing control for the rule list in Rule Setting.

Support Module: All UA I/O modules support this function.

Manu Path:【Advanced Setting】➔【Schedule】 

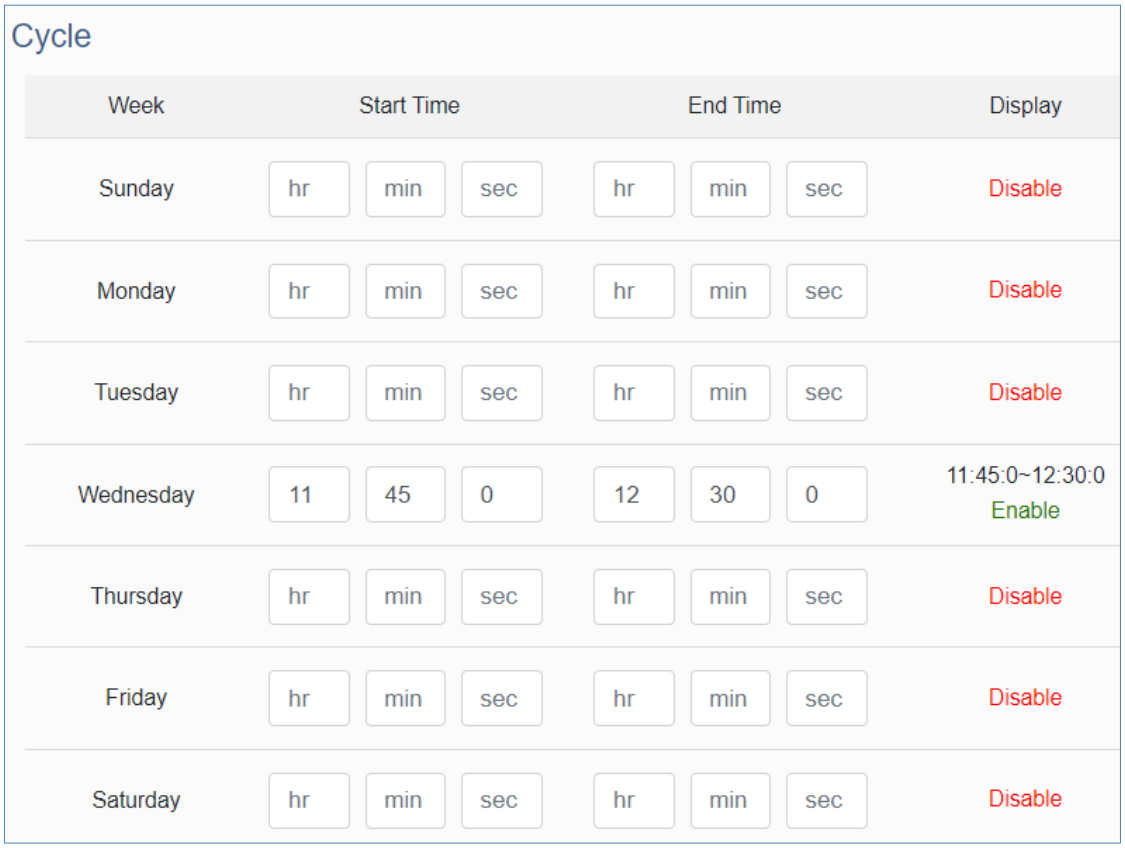
(Appendix A).

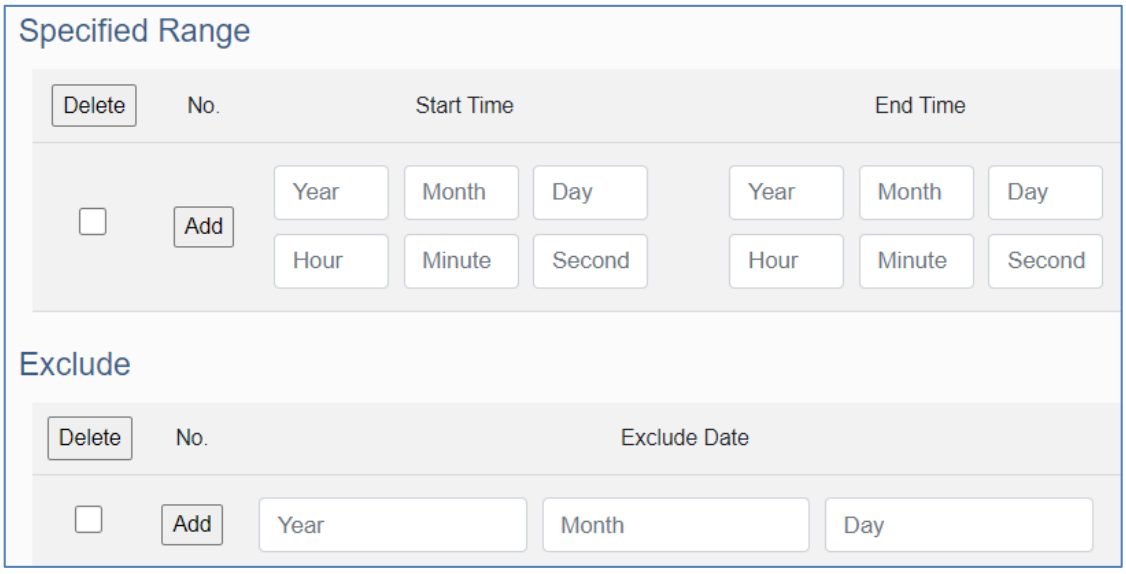
Sample: For a simple setting example, please refer to Section 3.5 .

Note: This webpage will display the rule items (number and name) that have been set in【Rule Setting】; If no rules are set in【Rule Setting】, there will not be any list on this page.

Advanced Setting > Rule Setting > Schedule > Rule Setting List	
No.	The number automatically given by the system corresponds to the number of the【Rule Setting】function, users can find it in the menu: 【Advanced Setting】➔【Rule Setting】.
Rule Name	The names are the corresponding to the Rule Name of the【Rule Setting】function, users can find it in the menu: 【Advanced Setting】➔【Rule Setting】➔【Rule Name】.
Edit	Click “Edit” to enter the editing screen to edit more detailed settings.

Advanced Setting > Rule Setting > Schedule > Rule Setting List (Edit) > Content Setting	
No	The number automatically given by the system. It is the same as the number in the menu: 【Advanced Setting】➔【Rule Setting】
Rule Name	This name can be modified to a more recognizable name here. It is the same as the rule name in the menu: 【Advanced Setting】➔【Rule Setting】➔【Rule Name】.



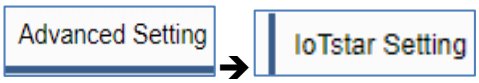


Advanced Setting > Rule Setting > Schedule > Rule Setting List (Edit) >	
Cycle	The rule is enabled and executed every week. Set the start/end time in any day, it will be automatically enabled.
Specified Range	The rule is enabled and executed within a specific time period. Need to set the Start/End time.
Exclude	Specify the exclude date for not execute the rule. If the above two time settings overlap, set the Exclude Date not to execute the rule. Specify the date to exclude the rule.

4.5.3 IoTstar Setting

Function: The IoTstar Setting function can connect to ICP DAS IoTstar cloud IoT management software.

Support Module: All UA I/O modules support this function.

Manu Path:【Advanced Setting】➔【IoTstar Setting】 

(Appendix A).

Sample: For a simple setting example, please refer to Section 3.6 .

Currently supported features:

1. Through ICP DAS IoTstar management software, remote operating the web settings.

2. Through ICP DAS IoTstar management software, remote operating the web I/O status reading.

3. Through ICP DAS IoTstar management software, remote operating the web firmware update.

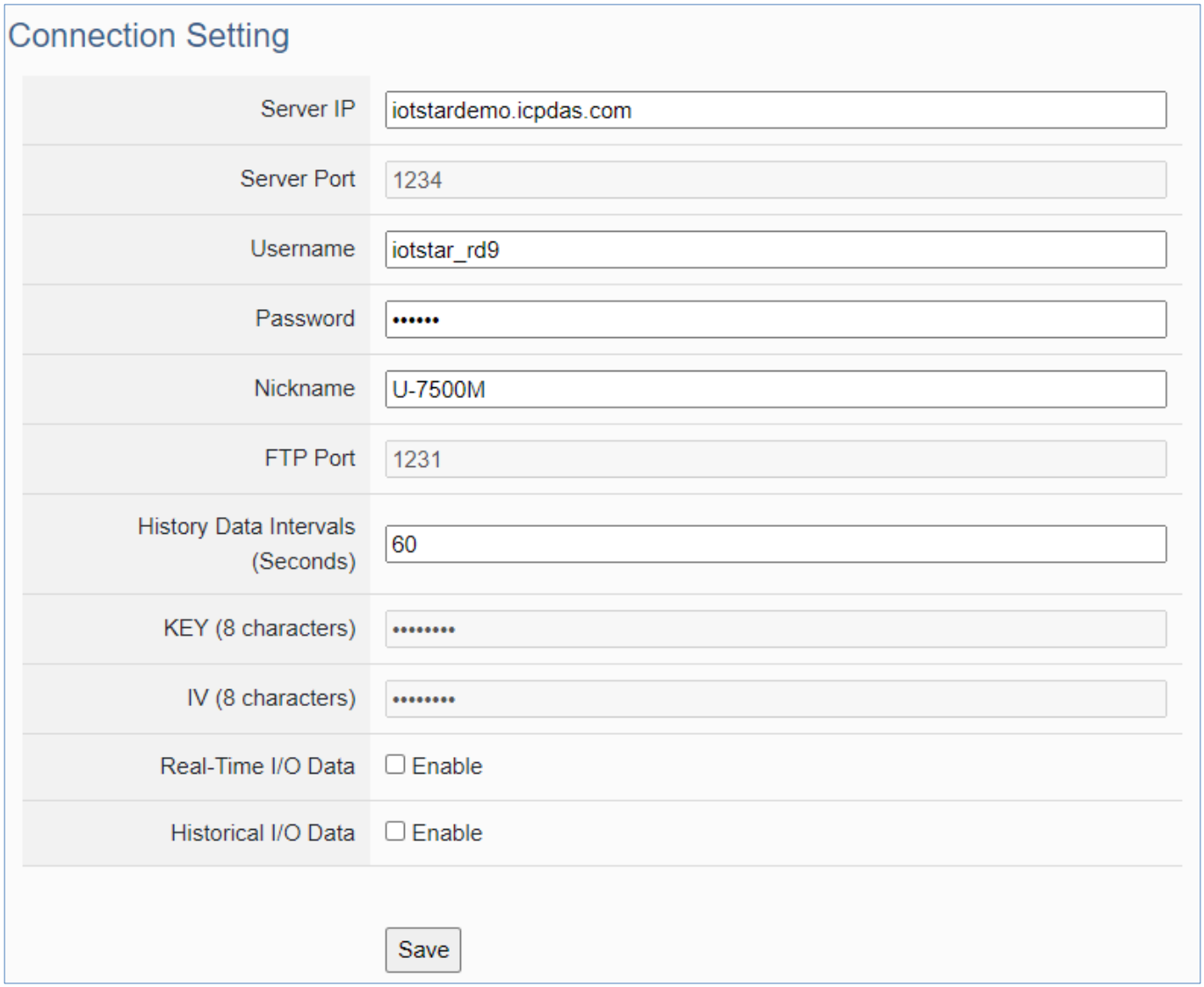
4. Through ICP DAS IoTstar management software, display Real-time I/O data.

5. Through ICP DAS IoTstar management software, display Historical I/O data.

6. Through ICP DAS IoTstar management software, the meter version can control DO, AO value remotely.

7. I/O data of U-7500M → Access to the database via ICP DAS IoTstar management software.

Note: When operating the web interface, please keep only one user in the web interface.

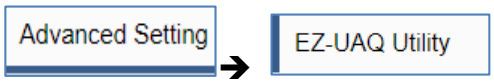


Advanced Setting > IoTstar Setting > Connection Setting	
Server IP	The IP address or domain name of the IoTstar.
Username	Enter the account username registered with the IoTstar.
Password	Enter the password registered with the IoTstar.
Nickname	Default: U-7500M. This item is the title name of the IoTstar Device List.
Historical Data Interval	Default: 60 This item is the interval time for sending I/O historical data to IoTstar.
Real-time I/O information	Allows all UA-I/O data to be sent to IoTstar. Factory default: Not enabled.
Historical I/O information	When enabled, the UA-I/O data is temporarily stored in the module and sent to IoTstar. Factory default: Not enabled.

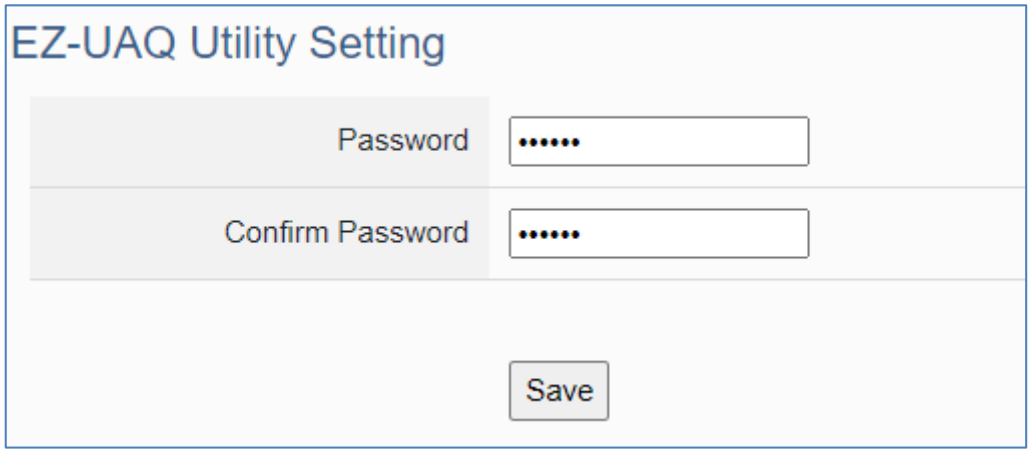
4.5.4 EZ-UAQ Utility

Function: Settings related to the EZ-UAQ Utility network management tool.

Support Module: All UA I/O modules support this function.

Manu Path:【Advanced Setting】➔【EZ-UAQ Utility】 

(Appendix A).



Advanced Setting > EZ-UAQ Utility	
Password	Set a password to restrict the authorization of the EZ-UAQ Utility. When the EZ-UAQ Utility gets the same password, you can control the module.
Confirm Password	Retype the password for the operation conform when setting the new account information.

5. Recovering Firmware Setting (Reset)

This chapter explains how to use the Reset button to recover the firmware settings, **please wait for ten minutes.**

The steps are as follows:

1. Please find the **Reset** button on the UA I/O bottom side, and then press the **Reset** button.

2. When starting the recovering process, all the LEDs on the panel will light up red or green.

3. If all LEDs light on red, it indicates an error. When this happens, please press the Reset button again.

4. If all LEDs light on green, it means the recovering process is successful.

5. After restarting, the module will recover the UA I/O settings as follows:

Recovering Firmware of UA I/O Modules			
Network	**IP (LAN)**	**Keep the original setting**	Assign UA I/O a new IP setting according to your case.
	Mask	**Keep the original setting**	
	Gateway	**Keep the original setting**	
Web UI Account	**Username**	**root**	**After login, change the default username/password to use other functions.**
	Password	**root**	

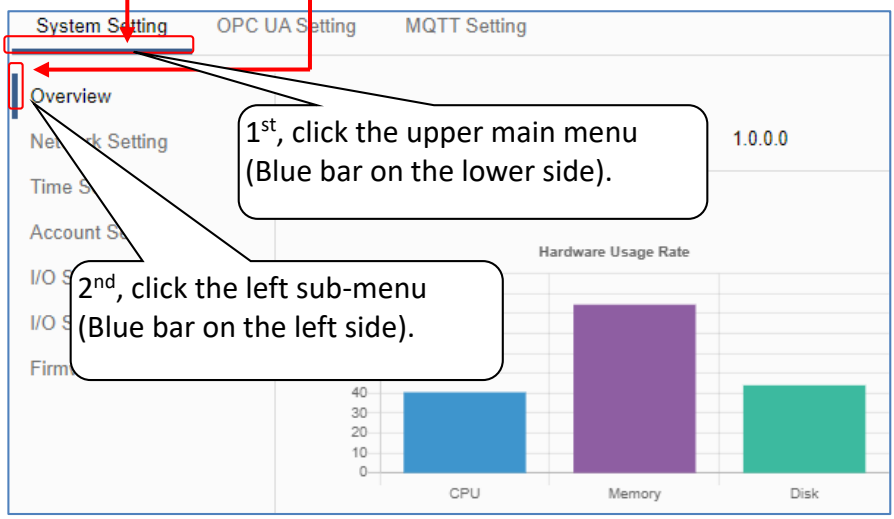
Appendix A. Menu Path Diagram Description

【Menu Path】diagram shows the main menu function section path in a brief way that user can follow the menu path order (text/diagram) to select the main menu and the sub-menu, then can go to the function setting web page. Please see the examples below for detail description.

[Example 1] Description for the menu path of【System Setting】➔【Overview】:

1. Click【System Setting】function of main menu on the upper side, such as System Setting .
2. Click【Overview】function of sub-menu appeared on the left side, such as Overview .
3. Check or set up the information or function items on the setting area of the【Overview】.

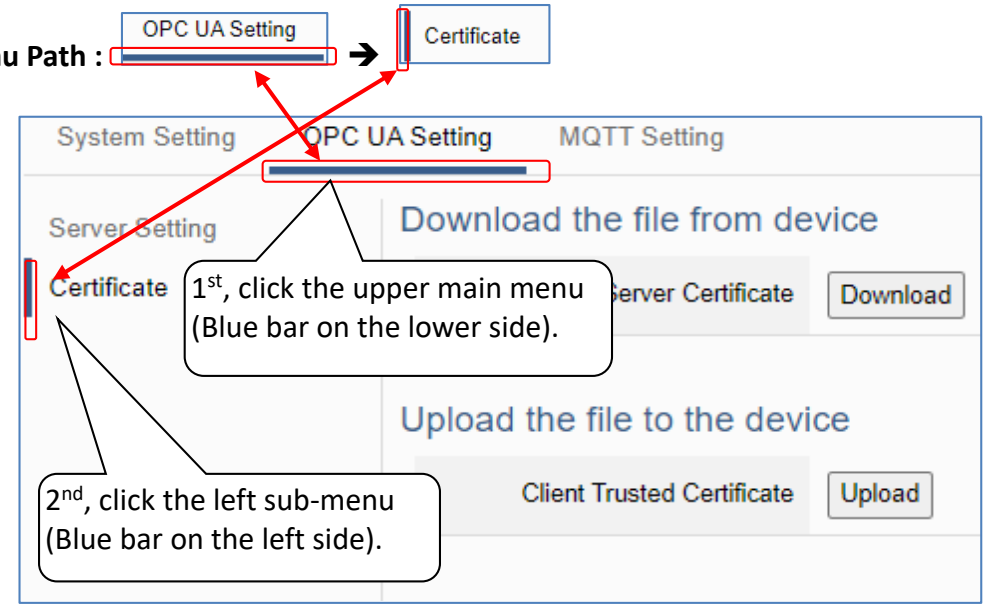
Menu Path : System Setting ➔ Overview



[Example 2] Description for the menu path of【OPC UA Setting】➔【Certificate】:

1. Click【OPC UA Setting】function of main menu on the upper side, as below.
2. Click【Certificate】function of sub-menu appeared on the left side, as below.
3. Set up the function items on the setting area of the【Certificate】.

Menu Path : OPC UA Setting ➔ Certificate



Appendix B. MQTT JSON Format of the UA I/O Series

MQTT JSON Example & Format Descriptions for the U-7526M:


```
{
   "DO0": 0,
   "DO1": 0,
   "DI0": 0,
   "DI1": 0,
   "Vout0": 4.999,
   "Vout1": 4,
   "Vin0": 5.003,
   "Vin1": -32.768,
   "Vin2": -32.768,
   "Vin3": 0,
   "Vin4": 0,
   "Vin5": 0,
   "DI0_Counter": 0,
   "DI1_Counter": 0,
   "DI0_Preset": 0,
   "DI1_Preset": 0,
   "DI0_CounterClear": 0,
   "DI1_CounterClear": 1,
   "Scale_Vout0": 34.997,
   "Scale_Vout1": 32,
   "Scale_Vin0": 35.009,
   "Scale_Vin1": -78.304,
   "Scale_Vin2": -78.304,
   "Scale_Vin3": 20,
   "Scale_Vin4": 20,
   "Scale_Vin5": 20
}
```


Name	Description
Left column (such as DO0, DO1...etc.)	the name of the variable. It will change according to the module.
Right column	The value of the variable.

Method 1 to get the variable name: Login to the web interface

Through【Module Setting】➔【I/O status】 Module Setting ➔ I/O Status

Channel items can be obtained.

Digital Input

Channel	Nickname	Value	Status
DI0	DI0 tim		GOOD
DI1	DI1 tim		GOOD
DI0_Counter	DI0 tim_Counter	0	GOOD
DI1_Counter	DI1 tim_Counter	0	GOOD

Method 2 to get the variable name: Login to the web interface

Through 【 Module Setting】➔【Overview】 Module Setting ➔ Overview

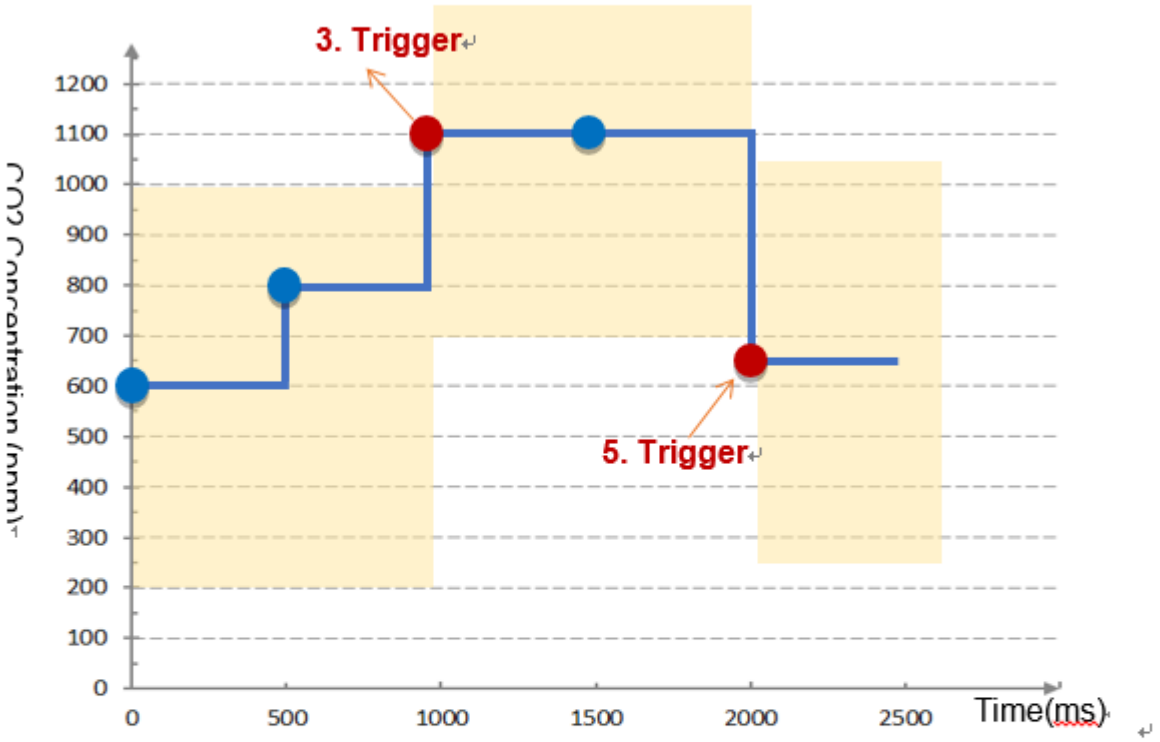
For common settings, click the download button. You can get CommonSettings.csv。

I/O Channel items can be obtained.

##### MQTT	##########	##########	#########	#########	#########	##########	#########
I/O Channel	Nickname	JSON Format Enable	Publish Top	Publish QoS	Subscribe T	Subscribe Q	Retain
DI0	DI0	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
DI0_Counter	DI0_Counter	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
DI0_CounterClear	DI0_CounterClear	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
DI0_Preset	DI0_Preset	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
DI1	DI1	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
DI1_Counter	DI1_Counter	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
DI1_CounterClear	DI1_CounterClear	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
DI1_Preset	DI1_Preset	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
DO0	DO0	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
DO1	DO1	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
Vin0	Vin0	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE
Vin1	Vin1	TRUE	/Name/Publ	2	/Name/Subs	2	TRUE

Appendix C. Dead Band Description

(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.