

OPC UA I/O User Manual V7.0, 2022/11

U-7500 Series IIoT OPC UA I/O Module



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Revision History

This chapter provides revision history information to this document.

Revision	Date	Description
V7.0	10/2022	 7th Version: Provide New Models & New Functions: Add news models (*18): U-7502M, 7515M, 7517M, 7518ZM/S, 7518ZM/S2, 7524M, 7528M, 7542M, 7544M, 7545M, 7550AM, 7551M, 7552M, 7553M, 7558M, 7559M, 7561M, 7567M Add new function: Support IoTstar Cloud management software (3.5 and 4.5.6) Add new models to each section of CH1. 2.2.2 Utility upgrade Add counter function to the I/O setting (4.2.1) Add Test function to the MQTT Setting. (3.2.1 and 4.4.1)
V6.0	04/2022	 6th Version: Provide New Models & New Functions: 1. Add news models: U-7517M-10 \ U-7519ZM(/S, /S2) 2. Add more descriptions for 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 CH4.5.4: "Advanced Setting" add "Schedule" new sub-function. 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. CH3.4 Add RESTful API HTTPS section. Add new function to CH1
V4.0	09/2021	 4th Version: Provide New Functions Add CH3.3 Rule Setting (Main new function: Logic) CH4.5 Advanced Setting: add 4.5.3 Rule Setting Setting the logic condition of I/O & Virtual points: IF, THEN, ELSE Add CH3.4 Support RESTful API (Main new function) Read/write the I/O & Virtual points via HTTP Add CH4.5.2 Event Log CH4.5 Advance Setting: add Event Log (provide log file download) Add CH4.1.3 NTP time calibration Strengthen information security protection functions (CH4.1.4) Increase the password length (>6), including at least one uppercase, one lowercase letter and one number Add CH4.1.5 HTTPS Web Server Can upload certificate and private key

The table below shows the revision history.

OPC UA I/O Series User Manual V7.0 - ICP DAS

Revision	Date	Description					
		* Allow/restrict remote device connection					
		8. CH4.1.7 Modify firmware update time: 60 seconds => 2 minutes					
		3 rd Version: Provide New Functions					
		1. Change the Model/Series name: all UA-75xxM change to U-75xxM					
		2. Support to execute OPC UA and MQTT communication simultaneously					
		(Emphasized in the file)					
		3. Add data security protection functions:					
		* The user must change the default username/password after the first					
		login to use other functions					
		* Delete the general user's right to modify the OS account password					
		* General communication uses AES 256 encryption algorithm and set to					
V3.0	03/2021	data encrypt for web pages					
		* For security reasons, only the service ports required by the I/O modules					
		are available, and the rest are not open.					
		* It is forbidden to use ping: turn off this function so that others cannot					
		scan the device to reduce the possibility of cyberattacks.					
		* Add the software system maintenance function for the developer					
		4. The [Module Setting] independently becomes the main menu:					
		* Move [I/O Setting] and [I/O Status] to under here (previously under the					
		[System Setting])					
		* Add [Project File] function to download and upload the project					
		2 nd version:					
V2.0	09/2020	1. Release new AIO models: UA-7504M/UA-7526M					
		2. Provide new function: Scaling					
		Initial issue					
V1.0	06/2020	1. Release new DIO models: UA-7555M/UA-7560M					
		2. Provide OPC UA and MQTT communication functions					

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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, 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, 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:



OPC UA Client

OPC UA Server

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 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.

1.3Selection Guide

U-7500 Series UA I/O Selection Guide:

U-7500 Series OPC UA I/O Module Selection Guide								
Madula	AI		AO		DI		DO	
iviodule	Ch.	Туре	Ch.	Туре	Ch.	Туре	Ch.	Туре
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	Open Collector (Sink)
U-7517M-10	10 / 20	±150mV, ±500mV, ±1V, ±5V, ±10V, ±20mA, 0~20mA, 4~20mA	-	-	-	-	-	-
U-7518ZM/S	-	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V						
U-7518ZM/S2	10	±20 mA, 0 ~ 20 mA, 4 ~ 20 mA Thermocouple: J, K, T, E, R, S, B, N, C, L, M, LDIN43710	-	-	-	-	3	Open Collector (Sink)
U-7519ZM/S	10	±150mV, ±500mV, ±1V, ±5V, ±10V, ±20mA, 0~20mA, 4~20mA	_	_	-	_	3	Open Collector
U-7519ZM/S2		Thermocouple: J, K, T, E, R, S, B, N, C, L, M, LDIN43710						(Sink)
U-7524M	-	-	4	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	5	Dry (Source), Wet (Sink Source)	5	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 Source)	2	Open Collector (Sink)
U-7528M	-	-	8	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	-	-	-	-
U-7542M	-	-	-	-	-	-	16	Open Collector (Sink)
U-7544M	-	-	-	-	8	Wet (Sink/Source)	8	Open Collector (Sink)

U-7500 Series OPC UA I/O Module Selection Guide								
Madula	AI		AO		DI		DO	
iviodule	Ch.	Туре	Ch.	Туре	Ch.	Туре	Ch.	Туре
U-7545M	-	-	-	-	-	-	16	Open Collector (Source)
U-7550AM	-	-	-	-	12	Dry (Source) Wet (Sink)	6	Open Collector (Sink)
U-7551M	-	-	-	-	16	Wet (Sink/Source)	-	-
U-7552M	-	-	-	-	8	Wet (Sink/Source)	8	Open Collector (Source)
U-7553M	-	-	-	-	16	Dry (Source)	-	-
U-7555M	-	-	-	-	8	Dry (Source), Wet (Sink,Source)	8	Open Collector (Sink)
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.)

1.4Specifications

1.4.1 Software Specifications (Series Common)

UA I/O Software Specifications (Series Common)					
Protocol					
OPC UA Server	 OPC Unified Architecture: 1.02 Core Server Facet Data Access Server Facet Method Server Facet UA-TCP UA-SC UA Binary User Authentication: Anonymous Username/Password X.509 Certificate Security Policy: None Basic128Rsa15 (Sign, Sign & Encrypt) Basic256 (Sign, Sign & Encrypt) Max. Session Connections: 3 Can Execute with MQTT and RESTful API Communication Simultaneously 				
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) 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)
Туре	Voltage, Current
	±150 mV, ±500 mV, ±1 V, ±5 V,
Range	±10 V 0 to 20 mA, ±20 mA, 4 to 20
Perclution	16 bit
Resolution	10-Dic
Accuracy	Normal Mode: ±0.1%
	Fast Mode: ±0.5% or better
	Normal Mode: 10 samples/second
Sampling Pate	(Total)
Sampling Rate	Fast Mode: 50 samples/second
	(Total)
Input Impodance	Voltage: 2 MΩ
Input Impedance	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	Yes
Configuration	165
Open Wire Detection	Yes
Zero Drift	±20 μV/°C
Span Drift	±25 ppm/°C
Isolation	±400 VDC, Virtual Channel to
100101011	Channel Isolation

Digital Input/Counter	
Channels	6
Туре	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
Туре	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

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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	

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

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	

Analog Input	
Channels	7 (Differential)
Туре	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	

Analog Input		
Channels	8 (Differential)	
Туре	Voltage, Current	
	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V	
Range	±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	(Total)	
Sumpling Nate	Fast Mode: 50 samples/second (Total)	
	Voltage: 2 MΩ	
Input Impedance	Current: 125 Ω	
Common Mode Rejection	86 dB (min.)	
Normal Mode Rejection	100 dB	
Common Voltage	±200 VDC	
Protection		
Overvoltage Protection	240 Vrms	
Overcurrent Protection	50 mA at 110 VDC (max.)	
Individual Channel	Yes	
Configuration		
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	
Туре	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	

Analog Input	
Channels	10 differential or 20 single-ended
Channels	(Note1), software selectable
Туре	Voltage, Current
	±150 mV, ±500 mV, ±1 V, ±5 V,
Range	±10 V, ±20 mA, 0 to 20 mA, 4 to 20
	mA (Jumper Selectable)
Resolution	16-bit
Accuracy	Normal Mode: ±0.1%
Accuracy	Fast Mode: ±0.5% or better
	Normal Mode: 10 samples/second
Sampling Rate	(Total)
	Fast Mode: 50 samples/second
	(Total)
Toronte Torona da marca	Voltage: 2 MS2 (Differential), 1 MS2
Input Impedance	(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
overvolage Protection	Single-ended: 150 Vrms
Overcurrent Protection	50 mA at 110 VDC (max.)
Individual Channel	Voc
Configuration	100
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	

Analog Input	
Channels	10 (Differential)
Туре	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
Туре	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	

Analog Input		
Channels	10 (Differential)	
Туре	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	
Туре	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	

Analog Output	
Channels	4
Туре	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	
Туре	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	
Туре	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 \sim 90% RH, Non-condensing	

Analog Input	
Channels	6 (Differential)
Туре	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
Туре	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	
Туре	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	
Туре	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	

Analog Output	
Channels	8
Туре	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	

Digital Output	
Channels	16
Туре	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

Digital Input/Counter	
Channels	8
Туре	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
Туре	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	

Digital Output	
Channels	16
Туре	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

Digital Input/Counter		
Channels	12	
Туре	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	
Туре	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	

Digital Input/Counter	
Channels	16
Туре	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	

Digital Input/Counter	
Channels	8
Туре	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
Туре	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	

Digital Input/Counter	
Channels	16
Туре	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	

Digital Input/Counter	
Channels	8
Туре	Dry Contact
	Wet Contact
Sink/Source (NDN/DND)	Dry: Source
Sing Source (nengenae)	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
Туре	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	

Digital Input/Counter	
Channels	8
Туре	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	

Digital Input/Counter	
Channels	8
Туре	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				
Туре	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	б
Туре	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
Туре	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
Туре	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

1.5Wire Connections / Pin Assignments

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

Wire Connections



🗎 Pin Assignments





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

Wire Connections



🖮 Pin Assignments





1.5.3 U-7515M Wire Connections / Pin Assignments

Wire Connections

	N	
Open Collector (Sink)	CH0, 1, 2, 5 and 6	CH3 and CH4
2-wire of RTD	© □⊖ RTDx+ □⊖ RTDx- RTDx- AGND	© □ ← RTD3+ RTD3- AGND RTD4- RTD4+
3-wire of RTD	Interpretation	□ RTD3+ □ RTD3- □ AGND □ RTD4- □ RTD4+



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

Wire Connections



🗎 Pin Assignments



U-7517M								
Channel	Vin7±	Vin6±	Vin5±	Vin4±	Vin3±	Vin2±	Vin1±	Vin0±
Jumper	J8	J7	J6	35	J4	33	J2	J1
Location	Jumper							
		<pre></pre>					e the and bard)	

4

4

+12 to +48 Vpc

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

Wire Connections



Jumper Location

U-7517M-10									
Channel	Vin8±	Vin7±	Vin6±	Vin5±	Vin4±	Vin3±	Vin2±	Vin1±	Vin0±
Jumper	39	J8	37	J6	35	34	J3	J2	J1
Location	Jumper								-



E1 POE

POE

.

1.5.6 U-7518ZM Wire Connections/Pin Assignments

Wire Connections

Voltage Input (Default)	
+ - -	CHx+
Thermocouple Input (Default)	
	□ CHx+ CHx- CHx-
Current Input	
(1) \$ 125 Ω	$\begin{array}{c} \mbox{CHx+} \\ \mbox{CHx-} \end{array} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $

Digital Output	ON State Readback as 1	OFF State Readback as 0	
Open Collector (Sink)	LOAD LOAD DOX ISO.GND 5 ~ 50 Voc	× LOAD DOX □⊖ DOX ISO.GND 5 ~ 50 Voc	



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

Wire Connections

🛢 Pin Assignments





	U-7519ZM									
Channel	CH0±	CH1±	CH2±	CH3±	CH4±	CH5±	CH6±	CH7±	CH8±	CH9±
Jumper	J1	J2	J3	J4	J5	J6	J7	J 8	J9	J10
Location	Jumper								*	



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

Wire Connections



🗎 Pin Assignments





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



🖿 Pin Assignments





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

Wire Connections

Voltage Output				
Vout0 ~ Vout5	Load + AGND			
Vout6 ~ Vout7	Load + U OFfault - OFFault			



🖮 Pin Assignments





1.5.11 U-7542M Wire Connections/Pin Assignments

Wire Connections

Output Type	ON State Readback as 1
- Drive Relay	
Resistance Load	+ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓





1.5.12 U-7544M Wire Connections/Pin Assignments

Wire Connections

Digital Input/ Counter	Readback as 1	Readback as 0		
	$+10 \sim +50 \text{ VDC}$	OPEN or <4 VDC		
! Słnk	INX 10K +- III + - IN.COMx To other Channels	INX 10K		
	$+10 \sim +50 \text{ VDC}$	OPEN or <4 VDC		
Source	INX 10K	INX 10K		





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	+ ↓ □ → DOx - ↓ ↓ □ → DO.GND DO.PWR



1.5.14 U-7550AM Wire Connections/Pin Assignments

Wire Connections

Digital Input/ Counter	ON State Readback as 1	OFF State Readback as 0		
	! 1 VDC Max.	+3.5 VDC \sim +50 VDC Max.		
Wet Contact (Sink)	- + □⊖ INx □⊖ IN.GND 1 VDC Max.	- + INx IN.GND +3.5 ~ +50 VDC Max.		
	Close to GND	Open		
Dry Contact (Source)				
Digital Output	ON State Readback as 1	OFF State Readback as 0		
Open Collector (Sink)	Load DOx DO.PWR DO.GND +5 ~ +50 VDC	× Load □⊖ DOx □⊖ DO.PWR □⊖ DO.GND +5 ~ +50 VDC		



1.5.15 U-7551M Wire Connections/Pin Assignments

Wire Connections

Digital Input/Counter	Readback as 1	Readback as 0		
	+10 ~ +50 Vpc	OPEN or <4 VDC		
Sink	- - - - - - - - - -	INx 10K		
	+10 ~ +50 VDC	OPEN or <4 VDC		
Source	INX 10K INX INK	INx 10K		



1.5.16 U-7552M Wire Connections/Pin Assignments

Wire Connections





1.5.17 U-7553M Wire Connections/Pin Assignments

Wire Connections





1.5.18 U-7555M Wire Connections / Pin Assignments

Wire Connections









1.5.19 U-7558M Wire Connections/Pin Assignments

WIRE CONNECTIONS

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



1.5.20 U-7559M Wire Connections/Pin Assignments

Wire Connections

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



1.5.21 U-7560M Wire Connections / Pin Assignments

Wire Connections

Digital Input/Counter	Readback as 1	Readback as 0		
	+10 ~ +50 Vpc	OPEN or <4 Vbc		
Sink	INX 10K + - IN.COM	INx 10K +- INx To other IN.COM		
	+10 ~ +50 Vpc	OPEN or <4 Vbc		
Source	IN× 10K → → → ↓ IN.COM ↓ To other i channels	INx 10K - + IN.COM		





1.5.22 U-7561M Wire Connections/Pin Assignments

Wire Connections





1.5.23 U-7567M Wire Connections/Pin Assignments

Wire Connections





1.6Dimensions

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



Bottom View

U-7518ZM/U-7519ZM Dimensions



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)

Voltage Input (Default)				
mV/V + V IIII Vinx+ Vinx- JUMPER				
Current Input				
mA ⁺ 1 □ Uinx+ Uinx+ Vinx- Uinx- Uinx-				
Voltage Output (Default)				
Load + U Houtx+ - AGND				
Current Output				
Load The Loa				

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



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 (<u>Fig.1</u>). Beside, U-7500 support PoE (Power over Ethernet). If using the PoE switch, do not need one more power supply (<u>Fig.2 for PoE Switch</u>). You can also directly link the U-7500 to PC with an Ethernet cable.

After power is connected, please **(wait 1 minute)** for U-7500 start-up procedure. When the "**RUN**" light starts flashing, it represents the boot is complete.



Power Supply

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 the method A in the 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.

\leftrightarrow \rightarrow G	▲ ③ 192.168.2	51.1	🤪 ં બ 🗓 :
		Username :	root
ICP	UA I/O	Password :	•••
DAS	ICP DAS CO,. LTD.	Language :	English v

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

		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 t	
		Password	root	use other functions.	

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

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).

	0 ,, LTD.					
System Setting	Module	Setting	OPC UA S	etting	MQTT Setting	Adva
Overview		Accour	nt Setting			
Network Setting			\bigcap	Username	root	
Time Setting Account Setting				Password	••••	
Firmware Setting			Confirm	Password	••••	
Web Server Setting						
					Save	

Password Setting rules:

Account Setting	
Username	root
Password	 Must not be the same as the account. The length must be greater than 6 characters. With English uppercase. With English lowercase. With numbers.
Confirm 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.
	Save

4. Click **[System** Setting **]** → **[Network** Setting **]** → **[**Network Setting(LAN1) **]** to change the IP setting by user network.

System Setting	OPC UA Setting MQTT Setting	
Overview	Network Setting (LAN)	
Network Setting	Connection Mode	 Specify an IP address. Obtain an IP address automatically.(DHCP)
Account Setting	IP Address	192 · 168 · 255 · 102
I/O Setting	Mask	255 255 0 0
I/O Status Firmware Setting	Gateway	192 · 168 · 1 · 1
. Intrato county	MAC Address	00:00:00:81:52
		Save

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.

← → C ☆ ③ 192.168.255.102	😝 🌀 🚟 🐑 🚺 🛛
	Username : root
	Password :
DAS ICP DAS CO,. LTD.	Language: English •
	Login

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. (Method 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. (Method C)

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

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

In the PC, install the **UA/BRK/UA series Utility**, and then run it to connect the device. Please download the utility program from the website:

https://www.icpdas.com/en/download/index.php?nation=US&kind1=&model=&kw=u-7

<mark>Ut</mark> ilit	Utility & Tools					
	FILE NAME	DESCRIPTION	MODEL	LAST UPDATE		
	All UA-BRK-UAIO Series	All UA-BRK-Server & UA-I/O U- 7000 module Search Utility		2022-06-29		

1. Install and execute the Utility

Run the execution file (UAandBRK_Search_Utility.exe) to install the Utility program.



🙀 UA&BRK Search Utility Ver. :	1.0.0.0 🕒 🗖 🗙			
Search Device	About			
Double click the Device Name or IP Address to open the device Web.				
Device Name	IP Address			
2. Search the UA I/O device and connect the device

Click the "Search Device", the utility will search and list all devices in the network. Double click the Device Name (left) or the IP Address (right) to connect the device.

Contraction Contractico Contra	10.00 - • ×			
Double click the Devic open the device Web.	e Name or IP Address to			
Device Name	IP Address			
U-7526M / U7526M0.	. 192.168.102.1			
U-7504M / aabbc0a	192.168.85.122			
U-7526M / 000de01	192.168.81.251			
UA-5231	192.168.2.148			
UA-5231	192.168.101.2			
2				

3. Login the device Web UI

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

		Username :	root
ICP	UA I/O	Password :	••••
DAS	ICP DAS CO,. LTD.	Language :	English •
			Login

4. The Web UI of the UA I/O Series

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



3. 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, 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		ID/Password, Anonymous, Certificate	Yes
Solution	ΜQTT	ID/Password, Anonymous	•
Traditional	Modbus	None	

Support Data Encryption

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

Active Data Transmission

Data Transmission				
	OPC UA	Active (Server sends Data to the Client)	Active	
ICP DAS UA Solution	мүтт	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)		



OPC UA / MQTT

Modbus

OPC UA / MQTT

Modbus

Ciphertext

Plaintext

Ciphertext

Plaintext

Success

Se

Se

Login

/ Pass

Client

Client

Client

Client

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 U	Traditional I/O Module	
Protocol	OPC UA Server	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 】.

Connection Setting		
Port	48010	1. Enter the port number
Anonymous Login	Enable	2. Enable the login method.
Username Password Login	Enable	Username Password Login or Certificate Login (refer to 3.1.3).
Certificate Login	Enable	
	Save 3. C	lick Save after the above settings.

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

Menu Path:【System Setting】→【Ac	count Setting] Sys	tem Setting	→ Account Setting (Appendix A)
Account Setting			
Username	root		
Password	••••		1. Set up username 2. Set up Password and retype Password
Confirm Password	••••		
	_		
	Save	8. Click Sa	ave after the settings.

If users enable the secure and encrypted OPC UA **Certificate Login**, 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: InduSoft 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】。	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		Download the file from device		
		Server Certificate		
icpdasuaserver.der	Import this file into OPC UA Client APP.			

- 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.
 - Click the "Upload" button to open the "open" window.

Jpload the file to the device			
Client Trusted Certificate	Upload		

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 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**.



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
- QOS 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).

Content Setting		1. Set an update frequency for the task data.	
Scan Rate(ms)	1000	Default: 1000 (Unit: ms)	
Dead Band	0	2. The default value is 0, which means that any data changes will be published.	
Will Topic			
The topic		3. Enter a title of the disconnect notice.	
Will		4. Enter a disconnect notice.	
JSON Format	Enable	5. Check "Enable", the message is sent in groups. Uncheck "Enable", the message is sent in singly.	

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.

Content Setting								
Scan Rate(m	is) 1000							
Dead Ba	nd 0	Publisl	JSON Fo	ormat Enable				
Will Top	ic		Details	Unfold				Retain
W	/ill	DO0	Channel	Topic /U-7526M/DO0/Publish	QoS	Topic	QoS	
JSON Form	Disable (Uncheck)			/U-7526M/DO1/Publish	2 🗸	/U-7526M/DO1/Subscribe	2 🗸	
Enable (Che	eck)	DIU		/U-7526M/DI0/Publish /U-7526M/DI1/Publish	2 🗸		2 ×	
Publish & Subscribe		Vout0		/U-7526M/Vout0/Publish	2 🗸	/U-7526M/Vout0/Subscrib	2 🗸	
Publish Topic	/Name/Publish	Vout1 Vin0		/U-7526M/Vout1/Publish /U-7526M/Vin0/Publish	2 •	/U-7526M/Vout1/Subscrib	2 × 2 ×	
Publish QoS	2 ~	Vin1		/U-7526M/Vin1/Publish	2 🗸		2 🗸	
Subscribe Topic	/Name/Subscribe	Vin2		/U-7526M/Vin2/Publish	2 🗸		2 🗸	
Subscribe QoS	2 ~	Vin3		/U-7526M/Vin3/Publish	2 ~		2 🗸	
Retain	False 🗸	Vin4		/U-7526M/Vin5/Publish	2 •		2 ~	
	Save				Save			

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

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

JSON Fo	rmat 🗌 Enable				
Publish & Subscribe					
Details	Unfold				
Channel	Publish Topic	Publish QoS	Subscribe Topic	Subscribe QoS	Retain
DO0	/U-7526M/DO0/Publish	2 🗸	/U-7526M/DO0/Subscribe	2 🗸	
D01	/U-752 M/DO1/Publish	2 🗸	/U-7526M/DO1/Subscribe	2 🗸	
DIO 1. Topic f	or sending DO	0 valu	e	2 🗸	
DI1	/U-7			~ ~	
Vout0	3. Topic f	or read	ding DO0 value		
Vout1	/U-7526M/Vout1/Publish	2 🗸	/U-7526M/Vout1/Subscrib	2 🗸	

• 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]**.

Content Setting		
Scan Rate(ms)	1000	1. Set the update frequency for the task data (1000 ms)
Dead Band	0	2. Do not set the Dead Band, so keep 0.
Will Topic	/A/1F/U-7555M	3. Set disconnect Topic for 1F of Building-A (U-7555M) 4. Set Will message: Disconnection
Will	Disconnection	
JSON Format	Enable	5. Check to Enable JSON format to enter the Pub/Sub screen page for Group 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 Alias of I/O channel, which includes MQTT Alias and OPC UA Description.

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

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

Channel	MQTT Alias	OPC UA Description	Power-on Value
DO0	A-1F-Entrance-door	A-1F-Entrance-door_AA	
D01	A-1F-1R-light-1	A-1F-1R-light-1_Aa12	
DO2	A-1F-2R-light-2	A-1F-2R-light-2_Aa12	
DO3	A-1F-3R-light-3	A-1F-3R-light-3_Aa12	
DO4	A-1F-4R-light-4	A-1F-4R-light-4_Aa12	
DO5	A-1F-5R-light-5	A-1F-5R-light-5_Aa12	
DO6	A-1F-6R-light-6	A-1F-6R-light-6_Aa12	
DO7	A-1F-7R-light-7	A-1F-7R-light-7_Aa12	

• 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].

Content Setting						
Scan Rate(ms)	1000	1. Set the u	update	frequ	ency for the task data (1000 ms)	
Dead Band	Dead Band 0					
Will Topic Will	/A/1F/U-7555M Disconnection	3. Set disco 4. Set Will	onnect messag	Topic ge: Dis	for 1F of Building-A (U-7555M) sconnection	
JSON Format	Enable	5. Uncheck screen p	to Ena	ble JS r Grou	ON format to enter the Pub/Sub up setting.	
Publish & Subscribe Details ☑ Unfold IO# Publish Topic D00 ////F/light-file D00 /////F/light-file D01 ////F/light-file D02 ////F/light-file D03 ////F/light-file D04 ////F/light-file D05 ////F/light-file D06 ////F/light-file D07 ////////////////////////////////////	2 Publish QoS 3 loor/Pub 2 /A/1F lish 2 /A/1F libish 2 lblish 2 <th>Subscribe Topic 4 /Entrance-door//Sut /light-1/Subscribe /light-2/Subscribe /light-3/Subscribe /light-6/Subscribe /light-6/Subscribe</th> <th>5 Subscribe 2 2 2 2 2 2 2 2 2 2</th> <th></th> <th> 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 DOO 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 DOO 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 </th>	Subscribe Topic 4 /Entrance-door//Sut /light-1/Subscribe /light-2/Subscribe /light-3/Subscribe /light-6/Subscribe /light-6/Subscribe	5 Subscribe 2 2 2 2 2 2 2 2 2 2		 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 DOO 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 DOO 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 	
L	Save				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**".



3.3 Rule Setting

This section introduces how to set the "Rule Setting" of the logic control function of UA I/O. It provides simple logic condition rule setting, let UA I/O do automatic condition judgment and action control, to achieve simple intelligentization.

Manu Path:



• Setting Steps:

First, click [Advanced Setting] > [Rule Setting], switch to the rule setting screen, to add the condition.

System Setting	Module Setting	OPC UA Sett	ting MQTT Settir	g Advanced Setting	
Scaling	Conten	t Setting			
Rule Setting		Sampling Interv (millise	sal Time (5000 (5000		
I/O Control Link-Lin	Rule S	etting			
Schedule			Details Unfold	Fold	
Schedule	Delete	e Rule Name	IF	THEN	ELSE
		•	Add a new Condition	Add a new Action	Add a new Action
				2	

Select an I/O point, to add a condition rule.

IF	THEN	ELSE
Add a new Condition	Add a new Action	Add a new Action
DI	▼	L
DO	Sava	
AI	Jave	
AO		
Virtual Point		

DO Condition Setting			
Channel(Alias)	DO0		~
Status	ON		~
			Canaal
		OK	Cancel

Select an I/O point, to add a condition rule.

IF		THEN	ELSE
Add a new Co	ondition		
DI	_	Add a new Action	Add a new Action
DO	ä		
AI	Save		
AO			
Virtual			

Virtual Point Condition Setti	ng	
Alias	Operator	Value
VirtualTag0	>= ~	36
	OK Cancel	

Delete	Rule Name	IF	THEN	ELSE		
	٠	Add a new Condition AND DO0 = ON VirtualTag0 >= 36	Add a new Action	Add a new Action		
		Sav	/e			

If set a wrong condition, click the "Delete" icon indicated by the green arrow to delete the rule condition.

Delete	Rule Name	IF	THEN	ELSE
	•	Add a new Condition AND DO0 = ON VirtualTag0 >= 36	Add a new Action	Add a new Action
		Save		

Set up the "IF, THEN, ELSE" conditions/actions to add the rule according to the above steps.

Then, click the "• icon on the left to add the rule to the table.

Delete	Rule Name	IF	THEN	ELSE		
		Add a new Condition	Add a new Action	Add a new Action		
	€J €J	AND ✓ DO0 = ON m VirtualTag0 >= 36 m	DO1 = ON 👘 VirtualTag8 = 11 👘	DO1 = OFF 👘 VirtualTag8 = 98 👘		
		Sav	е			

Red box part: AND or OR means that all judgment conditions are AND or OR.

Example: Condition 1 AND Condition 2 AND Condition 3...

Example: Condition 1 OR Condition 2 OR Condition 3...



Changing the sampling interval time to speed up the rule judgment. Click "Save" to write the settings of this page to the device.

Content Setting								
	Samp	ling Interval Time (milliseconds)	100					
Rule Setting								
		Details	Unfold	Fold				
Delete	Rule Name	IF		THEN		ELSE	Resident Execution	
	٠	Add a new Condition AND	· · · · · · · · · · · · · · · · · · ·	Add a new Action		Add a new Action	✓	
	Nam	AND DO0 = ON VirtualTag0 >=	I = 36	DO1 = ON VirtualTag8 = 11		DO1 = OFF VirtualTag8 = 98	✓	
				Save				

3.4 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:

•	192.16	58.81.2	250/Allv	'ariab	leName	×	+					0		[×
\leftarrow	\rightarrow	C		▲	不安全	19	2.168.81.	.250/All	Variabl	eName	9	Q	☆	*	63	:
{"U-75 7504M_ 7504M_ 7504M_ 7504M_ 7504M_ {"Valu {"Valu {"Valu {"Valu {"Valu {"Valu	04M_DI DI.DI2 AO.Vou AI.Vin AI.Vin e":"0" e":"0" e":"0" e":"0"	.DI0" ":{"Vo t0":{' t2":{' 2":{" ,"Qua ,"Qua ,"Qua ,"Qua ,"Qua	:{"Value alue":"0 "Value": Value": Value":' Value":' lity":"l lity":"l lity":"l lity":"l	≥":"0 3","0 :"0"," "0"," "0"," JNCER JNCER JNCER JNCER JNCER	","Quality": "Quality" "Quality" Quality" (Quality" (TAIN"}," (TAIN"}," (TAIN"}," (TAIN"},"	ty":" "GOOD ":"GOO ":"GOO ':"GOO Virtu Virtu Virtu Virtu Virtu	GOOD"},"U-7 "},"U-7504N OD"},"U-7504 D"},"U-7504 D"},"U-7504 D"},"U-7504 alTag1":{"\ alTag5":{"\ alTag7":{"\ alTag9":{"\	7504M_DI. M_DI.DI3" 24M_AO.Vo 24M_AO.Vo 44M_AI.Vin 4M_AI.Vin /alue":"0 /alue":"0 /alue":"0 /alue":"0	DI1":{"V :{"Value ut1":{"V ut3":{"V 1":{"Val 3":{"Val ","Quali ","Quali ","Quali ","Quali ","Quali	<pre>'alue":"0 'alue":"0 'alue":"0 'alue":"0 'ue":"0", ue":"0", ty":"UNC ty":"UNC ty":"UNC ty":"UNC ty":"UNC ty":"UNC</pre>	9","Qua Quality 9","Qua 9","Quali "Quali "Quali CERTAIN CERTAIN CERTAIN CERTAIN	ality" /":"GC ality" ality":" ty":" ty":" u"},"V u"},"V u"},"V u"},"V	:"GOOD OD"}, :"GOOD :"GOOD"} GOOD"} GOOD"} irtual irtual irtual	"},"U- U- "},"U- ,"U- ,"Virt Tag2": Tag4": Tag6": Tag8":		30":

[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.

[-] Request					
Method PUT ~	URL 🗎	http://192.168.81.250/VariableInformation	☆	~	SEND
Body					
<pre>{ "VirtualTagO": { "Value":"99.88", "Quality":"GOOD" } }</pre>					11.
[-] Response Headers Response					
Status Code connection date transfer-encoding x-powered-by	: 200 OK : keep-alive : Mon, 06 So : chunked : Express	ap 2021 06:42:48 GMT			
✓ Your request has been	processed succ	essfully! Execution time: 589 ms.			×

RESTful Description

HTTP Method	Path	Description	Remarks
	/AllVariableName	Read all variable data.	Link to Example G1.1
GET	/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

[Resource Definition]

[JSON Description]

JSON Content	Item	Description
{ "Var1": { "Quality": "Good", "Value": "24.5" }	Quality	The communication quality of the variable. Return Item: Good, Uncertain, Bad.
,, "Var2": { "Quality": "Good", "Value": "24.5" } }	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	/AllVariableName:All variables						
For Example:							
GET /AllVariableName:Read all variab	le data, and the return value is in JSON format.						
Resource Definition	Actual Application Corresponding to the Resource Definition						
GET /VariableInformation?var0, var1,	GET /VariableInformation?U-7560M_DO.RL0,U-7560M_DO.RL1						
var2…							
Description	Back to G1.2						
GET:Read							
/VariableInformation:Variable Information:	ation.						
?:Used to separate the API and the pa	irameters.						
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" <i>,</i>						
	"Value": "24.5"						
	},						
	"Var2": {						
	"Quality": "Good",						
	"Value": "24.5"						
	}						
	}						
Description	Back to P1.1						
PUT : Write							
/VariableInformation:Variable Informa	ation.						
[RAW Body]:The JSON format to be w	[RAW Body]:The JSON format to be written.						
PUT /VariableInformation:Compare fr	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).
---	----------------	---	--------------------	---------------

ŀ	Https Web Server Setting		
	Port	8888	
	Certificate File : server.crt	Upload	
	Private Key File : server.key	Upload	
		Save	

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

←	\rightarrow	G	仚	Â	https://	192.168.81	.250:888	8/AllVariat	oleName	Q	¢	☆	*
{"U-75 {"Valu {"Valu {"Valu {"Valu {"Valu {"Valu {"Valu {"Valu {"Valu {"Valu {"Valu {"Valu	26M_DO e":"0" e":"0" e":"0" e":"0" e":"0" e":"0" e":"0" e":"0"	.DO0": ,"Qual ,"Qual ,"Qual ,"Qual ,"Qual ,"Qual ,"Qual ,"Qual	{"Value ity":"G ity":"G ity":"G ity":"G ity":"G ity":"G ity":"G ity":"G ity":"G	":"0", 00D"}, 00D"}, 00D"}, 00D"}, 00D"}, 00D"}, 00D"}, 00D"},	"Quality": "U-7526M_A "U-7526M_A "U-7526M_A "U-7526M_A "U-7526M_A "VirtualTa "VirtualTa "VirtualTa "VirtualTa "VirtualTa	"GOOD"}, "U-7)I.DI1":{"Valu (0.Vout1":{"Valu I.Vin1":{"Va (I.Vin5":{"Va (I.Vin5":{"Value") (1.Vin5":{"Value") (25":{"Value") (25":{"Value") (29":{"Value")	526M_DO.DO1 ue":"0","Qu alue":"-2.2' lue":"0","Qu lue":"0","Qu lue":"0","Qu :"0","Quali :"0","Quali :"0","Quali :"0","Quali :"0","Quali	<pre>':{"Value":"@ ality":"GOOD" ","Quality":"GOOD uality":"GOOD uality":"GOOD"," ty":"GOOD"}," ty":"GOOD"}," ty":"GOOD"};</pre>	0","Quality" '},"U-7526M_/ 'GOOD"},"U-75 0"},"U-7526M_ 0"},"U-7526M_ 0"},"Virtual 'VirtualTag2' 'VirtualTag6' 'VirtualTag6'	:"GOOD' AO.Vout 526M_AJ _AI.Vir _AI.Vir Tag0": ': ':	'},"U-7 :0": [.Vin0' 12": 14":	'526M_DI	.DI0":

3.5 IoTstar Connection Example

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

Manu Path: (Advanced Setting) -> (InTstar Setting)	Advanced Setting	→	lo	oTstar Setting	J

Enter the following settings:

Server IP : iotstardemo.icpdas.com

Username: iotstar_rd9

Password: 123456

Set default values for other items and press Save. The screen is as follows:

C	Connection Setting	
	Server IP	iotstardemo.icpdas.com
	Server Port	1234
	Username	iotstar_rd9
	Password	•••••
	Nickname	U-7500M
	KEY (8 characters)	
	IV (8 characters)	
		Save Success

Then, click the web link: https://iotstar.icpdas.com/en/IoTstarLiveDemo.php And click the "IoTstar Live Demo" button.

(ICP DAS IoTstar				🖪 loTstar(iot	star_demo) ⋺ l	
Remote Access Service	Online Device List (4/50)		Dicol	ay the device that i		
 Device Maintenance 			Display the device that just set			
Data Display & Analysis	PMC-5231(新店) PMC-5231	WISE-5236M-4GC(新店) WISE-5236M-4GC	_	U-7519ZM	_	
Dashboard Service			>	CODde01820117000		
🕫 Real-Time I/O Data						
💀 Real-Time Power Data	PMD-2201(新店) PMD-2201 014504d515000043	ML PANEL(湖山總公司) PMC-5231 01c90f061800003d		PMC_03(湖山總公司) PMC-5231 0104e90518000026		
Historical I/O Data	₽ 🌣					
III Historical Power Data	MP2 PANEL(湖口總公司) 🗳					
Report Service	PMC-5231 0128e905180000ed					
■ Video Event Data	P					

Now, the user can configure the web interface through the IoTstar remote module.

4. Main Menu: Parameter Descriptions

This chapter introduces the menu functions of the UA I/O web UI and more focused on the function parameters of the menu. Each section introduces one main menu and its sub-menu functions. The function location is showing 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 of the hardware and operating system. **Support Module:** All UA I/O modules support this function.

System Setting Overview Manu Path: 【System Setting】 → 【Overview】 (Refer to Appendix A). Firmware Version 5.0.0.0 6.5 Factory Version MAC Address 00:0d:e0:b0:f0:03 Hardware Usage Rate 100 90 80 70 60 50 40 30 20 10 0 CPU Memory Disk

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.						

(Appendix A).

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
wanu Path: Loystem Setting 1 7	Network Setting 1			~

• Network Setting (LAN)

Network Setting (LAN)	
Connection Mode	 Specify an IP address. Obtain an IP address automatically.(DHCP)
IP Address	192 · 168 · 81 · 252
Mask	255 · 255 · 0 · 0
Gateway	192 · 168 · 1 · 1
MAC Address	00:00:00:81:52
	Save

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 customer's network. Detail information for the factory default value of 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 LAN item.					

• Hostname Setting

Hostname Setti	ing	
	Hostname	U7560M000de0b0f003
		Save

System Setting > Network Setting - Hostname Setting						
Hostname	The host name of this UA I/O. Default: system value. User 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

Date And Time Display						
Date	2020 / 6 / 8					
Time	14 : 45 : 3					

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 in the below.

System Setting Module	e Setting	OPC UA Setting	MQTT Setting Advanced Setting
Overview	Date Ar	nd Time Display	
Network Setting		Date	2021 / 9 / 1
Time Setting Please check the time		Time	15 : 8 : 19
Account Setting			
Web Server Setting	NTP t	ime calibration	Set the time manually
Firewall Setting		Functional Status	● NTP Server ○ Custom Time Server
Firmware Setting		NTP Server	time1.google.com
		Time Zone	Taipei 🗸
			Save Success

• NTP time calibration

NTP time calibration	Set the time manually	NTP time calibration	Set the time manually
Functional Status	● NTP Server ○ Custom Time Server	Functional Status	O NTP Server Custom Time Server
NTP Server	time1.google.com	Custom Time Server	127.0.0.1
Time Zone	Taipei 🗸	Time Zone	Taipei 🗸
	Save Success		Save Success

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

NTP time calibration Set the time manually						y		Time	14 : 49 : 2
	O Mo	Se Tu	epten We	ıber Th	202 Fr	21 Sa	0 Su	Read The Local Computer Time	Read
Date	6	-7	1	2 9	3 10	4	5 12	Time Zone	Taipei 🗸
	13	14	15	16	17	18	19		
	20	21	22	30	24	25	20		Save Success

System Setting > Time Setting - Set The Time Manually					
Date	Set the system date of the UA I/O by manually. Directly enter the new year/month/day, and then click "Save".				
Time	Set the system time of the UA I/O by manually. Directly enter the new hour : minute : 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: <u>Administrator Setting</u> and <u>User Setting</u>, 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 provides customers to read device I/O point information and control items.

• Administrator Setting

Account Setting:

Administrator Setting	User Setting
Account Setting	
Username	root
Password	•••••
Confirm Password	•••••
	Save Success

System Settir	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 user cannot use any other function (design 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 user cannot use any other function (design for data security) except the [Overview] and [Account Setting] (Mouse showing hand shape). Password setting rules:					
	 Password Password 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:

Login Error Notification		
Number Of Login Errors	3	
Server Name		
Server Port	587	
Mailbox		
Mailbox Password	•••••	
Incoming Mailbox	time in the descent	
Subject	ICPDAS U-7500M Notification	
Content	This device has an abnormal web login.	11
Sending Test	Test	ني

System Setting > Account Setting - Login Error Notification					
Number Of Login	Default: 3				
Errors	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 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:

Administrator Setting	User Setting
Account Setting	
Username	user
Password	•••••
Confirm Password	•••••
	Save Success

System Settir	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 user cannot use any other function (design 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 user cannot use any other function (design for data security) except the [Overview] and [Account Setting] (Mouse showing hand shape). Password setting rules:					
	Password	 Must not be the same as the account. The length must be greater than 6 characters. With English uppercase. With English lowercase. 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 】	etting]	System Setting	→	Web Server Setting	(Appendix
A).					

• Http Web Server Setting

Http Web Server Setting	
Port	80
	Save

System Setting > Http Web Server Setting		
Port	Web Server port of the UA I/O device. Factory default port: 80.	
Save	Click to save the settings.	
• Https Web Server Setting

Https Web Server Setting	g
Port	8888
Certificate File : server.crt	Upload
Private Key File : server.key	Upload
	Save

System Settir	System Setting > Https Web Server Setting			
Port	Https Web Server port of the UA I/O device. Factory default port: 8888.			
Certificate	The server certificate required for HTTPS communication. File name rule: [A-Z, a-z, 0-9].crt, only .crt files composed of English uppercase and lowercase and numbers are accepted.			
Private Key	Server private key required for HTTPS communication. File name rule: [A-Z, a-z, 0-9].key, only .key files composed of English uppercase and lowercase and numbers are accepted.			
Save	Click to save the settings.			

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

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.

Ivianu Path: L'System Setting 1 - L'Firewall Setting 1

Allow Remote Device Co	onnection
Allow All IP	Enable
Allow IP	
Allow IP	
Allow IP	
	Save

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

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.

Firmware Setting	
Restore factory setting ☑ Enable	Restore 2
Update Firmware	Upload

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

Firmware Setting	
Restore factory setting Z Enable	Restore Installing
Update Firmware	Upload
Wait 50 seconds ####################################	¥

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**.

A Setting	N	192.168.81.251 顯示 During device restart, after	r waiting for 60 seconds, press OK 確定			
Firmwar	e S	Setting				
	Restore factory setting Enable Finish					
		Update Firmware	Upload			
←[0;32;40m / ←[0m←[0;32; ←[0m	40m	######## Start Install # h############## Install s	######################################			

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				
	IP (LAN)	192.168.255.1		
Network	Netmask	255.255.0.0	Assign UA I/O a new IP setting according to your case.	
	Gateway	192.168.1.1		
Web UI Account	Username	root	After login, change the default	
	Password	root	functions.	

• 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

Firmware Setting	
Restore factory setting	Restore
Update Firmware	Upload

2. Select the firmware file

+ †	📕 « UA	-IO_FM > 20210308 ~	Ö	.○ 按尋 20210308		
组合管理 • 制	所增資料共	t.	1	⊫ •		0
ftpfile	* ^	名稱 ^		1 原型	10	改日
9_iCAM	1	Total applied and applied appl	5	WinRAR ZIP 型弱	10 20	21/3
	D /	au-7526m_3.0.0.0_app.zip		WinRAR ZIP 图组	18 20	21/3
cd 📕	1	🗃 u-7555m_4.0.0.0_app.zip		WinRAR ZIP 壓縮	調 20	21/3
📕 icam	*	🗃 u-7560m_4.0.0.0_app.zip		WinRAR ZIP 壓縮	國 20	121/3
JUA-5000	*					
product_in	na 🖈					
11 Dronboy	~	< []				3
	檀案:	名稱(N): u-7504m 3.0.0.0 app.zi	p ~	所有檔案 (*.*) 2		Ŷ
	個務	619(N): u-7504m_3.0.0.0_app.zi	p ~]	所有備委(*,*)	/	~
				開飯(O)	取消	

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

Firmware Setting	
Restore factory setting	Restore
Update Firmware	Upload Transporting
Upload File Size : 573440	

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

Firmware Setting	
Restore factory setting	Restore
Update Firmware	Upload Installing
Wait 50 seconds ####################################	¥

5. After the process 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**.

A Setting	192.168.81.251 顯示 During device restart, after	r waiting for 60 seconds, press OK 確定
Firmware	Setting	
R	estore factory setting Enable	Restore
	Update Firmware	Upload Finish
- [0;32;40m### - [0m-[0;32;40 - [0m	######################################	######################################

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

Update Firmware of UA I/O Modules				
	IP (LAN)	Keep the original setting		
Network	Netmask	Keep the original setting	Assign UA I/O a new IP setting according to your case.	
	Gateway	Keep the original setting	5 ,	
Web UI Account	Username	root	After login, change the default	
	Password	root	other functions.	

• Maintenance

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

Maintenance	
R&D Maintenance	ОК

4.2 Main Menu - Module Setting

This main menu aggregates all module and project in the module related function 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.

4.2.1 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.

Manu Path: 【Module Setting】 → 【I/O Setting】	Module Setting	>	I/O Setting	(Appendix A).
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• Digital Input

Digi	tal Inpu	t						
с	hannel	Alias	OPC UA Des	scription	Counter Clear		Counter Preset	
	DIO	DIO				5		
	DI1	DI1				0		
				Save				

Module Setting > I/O Setting - Digital Input			
Channel	The channel name (number) of the UA I/O hardware.		
MQTT Alias	The variable alias of the sending message (MQTT JSON format), when using MQTT connection.		
OPC UA Description	The messages got from the description column of OPC Client, when using OPC UA connection.		
Counter Clear	Counter reset to zero		
Counter Preset	The count starts from this set value after power on, and the count will return to zero after the module is powered off.		

• Digital Output

Digital Output			
Channel	MQTT Alias	OPC UA Description	Power-on Value
DO0	DO0		
DO1	D01		
DO2	DO2		
DO3	DO3		
DO4	DO4		
DO5	DO5		
DO6	DO6		
D07	D07		
	Save		

Module Setting > I/O Setting - Digital Output			
Channel	The channel name (number) of the UA I/O hardware.		
MQTT Alias	The variable alias of the sending message (MQTT JSON format), when using MQTT connection.		
OPC UA Description	The messages got from the description column of OPC Client, when using 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

Analog Input			
Channel	MQTT Alias	OPC UA Description	Input Type
Vin0	Vin0		4 ~ 20 mA 🗸
Vin1	Vin1		0 ~ 20 mA 🗸
Vin2	Vin2		-20 ~ 20 mA 🗸
Vin3	Vin3		-20 ~ 20 mA 🗸
Vin4	Vin4		-20 ~ 20 mA 🗸
Vin5	Vin5		-20 ~ 20 mA 🗸
	S	ave	

Module Setting > I/O Setting – Analog Input			
Channel	The channel name (number) of the UA I/O hardware.		
MQTT Alias	The variable alias of the sending message (MQTT JSON format), when using MQTT connection.		
OPC UA Description	The messages got from the description column of OPC Client, when using OPC UA connection.		
Input Type	Select the Input type by user's need.		

• Analog Output

Analog Output				
Channel	MQTT Alias	OPC UA Description	Power-on Value	Output Type
Vout0	Vout0		4	4 ~ 20 mA ✔
Vout1	Vout1		3.202	0 ~ 20 mA 🗸
		Save		

Module Setting > I/O Setting – Analog Output		
Channel	The channel name (number) of the UA I/O hardware.	
MQTT Alias	The variable alias of the sending message (MQTT JSON format), when using MQTT connection.	
OPC UA Description	The messages got from the description column of OPC Client, when using 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.	

4.2.2 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).
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• Digital Input (& Counter)

C	Digital Input		
	Channel	Value	Status
	D10		GOOD
	DI1		GOOD
	DI0_Counter	0	GOOD
	DI1_Counter	0	GOOD

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

• Digital Output

Digital Output		
Channel	Value	Status
DO0		GOOD
DO1		GOOD
DO2		GOOD

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

• Analog Input

Analog Input				
Channel	Value	Status		
Vin0	-32.768	GOOD		
Vin1	0	GOOD		
Vin2	0	GOOD		
Vin3	0	GOOD		
Vin4	-0.001	GOOD		

Module Setting > I/O Status – Analog Input		
Channel	The channel name (number) of the UA I/O hardware.	
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

Analog Output			
Channel	Value	Status	
Vout0	4	GOOD	
Vout1	3.202	GOOD	

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

4.2.3 Projec File

功能:專案檔的下載、上傳功能。 4.2.3 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

Download the project file, for back up the project settings.

Click [Download] button, the project file in the UA I/O can be download to the operating PC.

Download the file from dev	/ice
	Project File Download
ProjectFile_192.1zip	^

• Upload the file to the device

Upload the project file into the UA I/O. This function can quickly replace the previously backed up project file, and then restore the project setting parameters.

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

Upload the file to	o th	ne devic	е					
			Project I	File	Upload]		
💿 Open								×
← → × ↑ 📙 « Nox_sha	are⇒	Download	~	Ū	Search Downl	oad		Q
Organize 🔻 New folder								?
📌 Quick access	^	Name	^			Date mo	dified 1 4:13 Pl	M
This PC 3D Objects Desktop		ProjectFile	_192.168.81.	102zi	p	1/22/202	1 2:59 P	М
Documents Downloads								
File name:	Proje	<pre>ctFile_192.168.8</pre>	1.102zip	~	所 <mark>有檔</mark> 案 (*.	*)		~
					Open		Cancel	

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) \rightarrow (Certificate) \rightarrow (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".

DAS ICP DAS CO., LTI System Setting	D. OPC	UA Setting	MQTT Setting	Advanced Setting
F	Please remove	e the server certificate		
Overview				
Network Setting		Firmware Version		1.0.0.0
Time Setting		Factory Version		1.2
Account Setting				
I/O Setting				
I/O Status	-	Ha	ardware Usage Rate	
Firmware Setting		80 70 60 50 40 30 20 10 0		
		CPU	Memory	Disk

4.3.1 Server Setting

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

Sample: For a simple setting example, please refer t	o <u>Section 3.1</u>			
Manu Path: 【OPC UA Setting 】 → 【Server Setting】	OPC UA Setting	→	Server Setting	(Appendix A)

Connection Setting	
Port	48010
Anonymous Login	Enable
Username Password Login	Enable
Certificate Login	Enable
	Save

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 username and password here is the same as the login username and password of the Web UI.)		
Certificate Login	Check to enable the certificate login from OPC UA clients. (refer to next section 4.2.2)		
Save	Click to save the connection settings of OPC UA Server.		

4.3.2 Certificate

Function: When selecting 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 the security and encryption, e.g. upload, download, delete certificate.

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

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

Download the file from device					
Server Certificate	Download				
Upload the file to the device					
Client Trusted Certificate Upload					
Remove the file					
Client Trusted Certificate	Remove				
Server Certificate	Remove				

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

4.4 Main Menu – MQTT Setting

This main menu aggregates all MQTT related settings. This chapter focuses on parameter descriptions. About 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 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 Broker Connection Setting				
IP Address	192.168.1.13			
Port	1883			
Keepalive (Second)	60			
Anonymous Login	Enable			
Username	root			
Password	•••••			
Test Connection	Test Success			
	Save			

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.

Sample: For a simple setting example, please refer	to Section 3.	<u>2</u> .		
Manu Path: 【MQTT Setting】 → 【Client Setting】	MQTT Setting	→	Client Setting	(Appendix A).

Content Setting	
Scan Rate(ms)	1000
Dead Band	0
Will Topic	
Will	
JSON Format	Enable

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):

Publish & Subscribe	
Publish Topic	/Name/Publish
Publish QoS	2
Subscribe Topic	/Name/Subscribe
Subscribe QoS	2
Retain	False
	Save

MQTT Setting > Client Setting - Publish & Subscribe (JSON Format: 🗹 Enable)		
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.	

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

JSON Format Enable			
Publish & Subscribe			
Details	Unfold		
Channel	Publish Topic	Subscribe Topic	
DO0	/U-7526M/DO0/Publish	/U-7526M/DO0/Subscribe	
D01	/U-7526M/DO1/Publish	/U-7526M/DO1/Subscribe	
DI0	/U-7526M/DI0/Publish		
DI1	/U-7526M/DI1/Publish		
Vout0	/U-7526M/Vout0/Publish	/U-7526M/Vout0/Subscribe	
Vout1	/U-7526M/Vout1/Publish	/U-7526M/Vout1/Subscribe	
Vin0	/U-7526M/Vin0/Publish		
Vin1	/U-7526M/Vin1/Publish		
Vin2	/U-7526M/Vin2/Publish		
Vin3	/U-7526M/Vin3/Publish		
Vin4	/U-7526M/Vin4/Publish		
Vin5	/U-7526M/Vin5/Publish		
Save			

MQTT Setting > Client Setting - Publish & Subscribe (JSON Format: 🗖 Enable)		
Details	Check "Unfold" to display all fields.	
Channel	The I/O channel name of the hardware.	
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. Check "Retain" box of the top row can store the broker message for all variables in list.	
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).
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1. "SSL/TLS" is not "enable" by default. When not enabled, other setting items will be hidden.

SSL/TLS	Enable
	Save
	SSL/TLS

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.

Authentication	One-way Authentication 🗸	
	One-way Authentication	
Trusted Certificate	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		
Upload the file to the device		
Authentication	One-way Authentication 🗸	
Trusted Certificate	Upload	
Remove the file		
Trusted Certificate	Remove	

Two-way Authentication Screen		
Upload the file to the device		
Authentication	Two-way Authentication 🗸	
Trusted Certificate	Upload	
Certificate	Upload	
Private Key	Upload	
Remove the file		
Trusted Certificate	Remove	
Certificate	Remove	
Private Key	Remove	

MQTT Setting > C	ertificate – 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 Scaling

Function: The Scaling function convert the analog signal to a more readable value. This function is only available for modules with AI/AO.



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.

System Setting	OPC UA Setting	MQTT Setting	Advanced Setting	
Scaling	Conten	t Setting Source variable	Output variable	Description
		Vout0 Min 0 Max 10	Scale_Vout0Min20Max50Offset0	
	_	Vout1Min0Max10	Scale_Vout1Min20Max50Offset0	

Advanced Setting > Scaling – Content Setting			
Min (Source variable)	The source variable that to be converted; Fill in its minimum value.		
Max (Source variable)	The source variable that to be converted; Fill in its maximum value.		
Min (Output variable)	The output variable that to be converted; Fill in its minimum value.		
Max (Output variable)	The output variable that to be converted; Fill in its maximum value.		
Description	Write a note for this variable by user needs.		

4.5.2 Event Log

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.

	Advanced Setting		Event Log	
Manu Path: 【 Advanced Setting 】 → 【 Event Log 】		→		(Appendix A).

	Setting	Log File Download		
	Single File Size (MB)		10	
Sampling Interval Time (milliseconds)		ng Interval Time liseconds)	1000	

Advanced Setting > Event Log – Setting			
Single File Size (MB)	The maximum size can be recorded in each single log file.		
Sampling Interval Time (milliseconds)	Enter the interval time (milliseconds) to obtain the current value of UA I/O.		

Digital Input / Output			
Alias	ON (log message)	OFF (log message)	Enable
RL0	ON	OFF	✓
RL1	ON	OFF	
RL2	ON	OFF	
RL3	ON	OFF	

Advanced Setting > Event Log –Digital Input / Output		
Alias	The alias name in function of [Module Setting] > [I/O Setting]	
ON (log message)	When I/O is ON, the log file will store this log message. Easy for customers to read.	
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	

Analog Input / C	Dutput			
Alias	Deadband	Above The Upper Limit (log message)	Below The Lower Limit (log message)	Enable
Vout0	1	Over Deadband	Below Deadband	
Vout1	1	Over Deadband	Below Deadband	
Vin0	1	Over Deadband	Below Deadband	
Vin1	1	Over Deadband	Below Deadband	
Vin2	1	Over Deadband	Below Deadband	
Vin3	1	Over Deadband	Below Deadband	
Vin4	1	Over Deadband	Below Deadband	
Vin5	1	Over Deadband	Below Deadband	

Advanced Setting > Event Log –Analog Input / Output		
Alias	The alias name in function of [Module Setting] > [I/O Setting]	
Deadband	Set the Deadband value for updating floating-point data. Default: 1 Deadband: Dead zone, inactive zone.	
Above The Upper Limit (log message)	When it exceeds the Deadband upper limit, the log file will record this log message. Easy for customers to read.	
Below The Lower Limit (log message)	When it is below the Deadband lower limit , the log file will record 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	

Setting	Log File Download	
	File Name	Download
	log_2021-9-3_17-3-12.csv	Download

Advanced Setting > Event Log – 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.	

4.5.3 Rule 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.

	Advanced Setting		Rule Setting	
Manu Path: 【 Advanced Setting 】 → 【 Rule Setting 】		→	ruie ootang	(Appendix A).

Sample: For a simple setting example, please refer to <u>Section 3.3</u>.

Content Setting	
Sampling Interval Time (milliseconds)	5000

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

Rule Setting				
	Details	Unfold	Fold	

Advanced Setting > Rule Setting – Rule Setting				
Details	Unfold: Display more fields and expand the web page width. Improve the			
	readability of scripts and facilitate editing.			
Fold: Only the necessary fields are displayed.				

Fold View:

Delete	Rule Name	IF	THEN	ELSE
	•	Add a new Condition	Add a new Action	Add a new Action
		Save	2	

Unfold View:

Delete	Rule Name	IF	THEN	ELSE	Resident Execution	Remark
	•	Add a new Condition	Add a new Action	Add a new Action		
			Save			

Advanced Set	ting > Rule Setting > Rule Setting > Unfold /Fold
Delete	Check this item and press the delete button to delete this rule.
Rule Name	The rule name auto-given by the system is used for schedule identification.
	(For the schedule function, refer to 【 Advanced Setting 】 > 【 Schedule 】)
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 Action statement setting.
	Action statement: DO, AO, Virtual Point, Delay.
ELSE	When the IF Condition is "No", execute the ELSE Action statement setting.
	Action statement: DO, AO, Virtual Point, Delay.
Resident	Check: the rule will be executed 24 hours a day. Default: enabled.
Execution	Uncheck: the "Schedule" has been set. (For Schedule function, refer to
	【Advanced Setting】 >【Schedule】)
Remark	Set more detailed description for the rule to improve recognition.
	Items: No. Rule Name, Depiction.
Save	Click the "Save" button to save the rule settings.

****Tip:** For the logic condition setting steps of rule setting, please refer to Section 3.3.

4.5.4 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: All UA I/O modules support this function.

Manu Path:【Advanced Setting】→【I/O Control】	Advanced Setting	→	I/O Control) (Appendix A).
Manu Path: [Advanced Setting] 🔿 [I/O Control]] (Appendix /

I/O Control Li	st		
Delete	No.	Identifying Name	Edit
	Add	1/0-1	
		Save	

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	Can input Multi-language text. For convenient Rule Setting and			
Name	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.

1/0	O Control L	ist		
	Delete	No.	Identifying Name	Edit
		Add	I/O-1	
		1	I/O-1	Edit
			Save	

Setting				
Delete	Item	DO / AO	Value ON=1 OFF=0	Depiction
	Add	D00 ~	= 0	
		ОК	Cancel	

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.		
Itom	The number automatically given by the system for easy		
item	identification.		
DO / AO	According to the module model, select the corresponding I/O.		
Value	Set the I/O value.		
value	Default: 0.		
Deviation	Used to set a more detailed description of the item to improve		
Depiction	recognition.		

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

4.5.5 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]
Schedule (Appendix A).
Sample: For a simple setting example, please refer to Section 3.3.

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.

Rule Setting List		
No.	Rule Name	Edit
1	RuleName	Edit
	Save	

Advanced 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.		

Content Setting	
No.	1
Rule Name	RuleName

Advanced 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】		
規則名稱	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】.		

Cycle			
Week	Start Time	End Time	Display
Sunday	hr min sec	hr min sec	Disable
Monday	hr min sec	hr min sec	Disable
Tuesday	hr min sec	hr min sec	Disable
Wednesday	11 45 0	12 30 0	11:45:0~12:30:0 Enable
Thursday	hr min sec	hr min sec	Disable
Friday	hr min sec	hr min sec	Disable
Saturday	hr min sec	hr min sec	Disable
Specified Range			
Delete No.	Start Time		End Time
Add	Year Month [Day Year	Month Day
	Hour Minute	Second Hour	Minute Second
Exclude			
Delete No.		Exclude Date	
Add	Year	Month	/

Advanced 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.	

4.5.6 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 】	Advanced Setting	→	IoTstar Setting	(Appendix A).
Sample: For a simple setting example, please refer to	Section 3.5.			

Currently supported features:

- 1. Through ICP DAS IoTstar management, remote operating the web settings.
- 2. Through ICP DAS IoTstar management, remote operating the web I/O status reading.
- 3. Through ICP DAS IoTstar management, remote operating the web firmware update.

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

Connection Setting	
Server IP	iotstardemo.icpdas.com
Server Port	1234
Username	iotstar_demo
Password	
Nickname	U-7500M
KEY (8 characters)	•••••
IV (8 characters)	
	Save

Advanced Setting > IoTstar Setting > Connection Setting		
Server IP	The IP address or domain name of the IoTstar.	
Server Port	The port of the IoTstar. Default: 1234	
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.	
KEY (8 characters)	This item is only open for engineer settings.	
IV (8 characters)	This item is only open for engineer settings.	

5. Recovering Firmware Setting (Reset)

This chapter explains how to use the Reset button to recover the firmware settings.

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		
System Setting

Overview

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



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

MQTT JSON Example & Format Descriptions:

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

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

Appendix 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.