UA Series / BRK Series
IIoT Cloud Solution

UA Series

Easy planning

IIoT Communication Server

OPC UA®

MQTT.ORG

Vol. UA_4.24.07_EN

Content

CH1. IIoT Cloud Solution Products

Products introduction and features

The IIoT Cloud Solution of ICP DAS provides UA series of IIoT Communication Server to upgrade the front-end devices to the Cloud, connect IT with OT, link Cloud and Web APPs, and integrate the IIoT Cloud solution.

1 IIoT Communication Server : UA Series

The UA series integrates IT and OT systems and equipment to connect to the cloud, and converts data into OPC UA and MQTT communication data to connect to the cloud Internet, remote database, SCADA graphic control and management system. Support multiple cloud platforms (Amazon AWS, Microsoft Azure, IBM Bluemix, Baidu... etc.).

2 MQTT Communication Server : BRK Series

BRK Series is an Communication Server that specially provides Broker function of MQTT protocol for MQTT message distribution and concentrator in M2M and Industrial IoT. It supports QoS, retains, identity authentication, communication encryption, Last Will, Bridge, Cluster, Load Balancer, and High Availability functions.

3 OPC UA I/O Modules

OPC UA I/O modules are a series of Ethernet I/O modules with OPC UA Server, MQTT Client, and RESTful API services. Built-in logic function Rule Setting IF-THEN-ELSE, Scheduling, Event log... functions. And it can be connected with IoTstar Cloud management software.

IIoT Cloud Solution : OPC UA Surveillance System

OPC UA Benefits

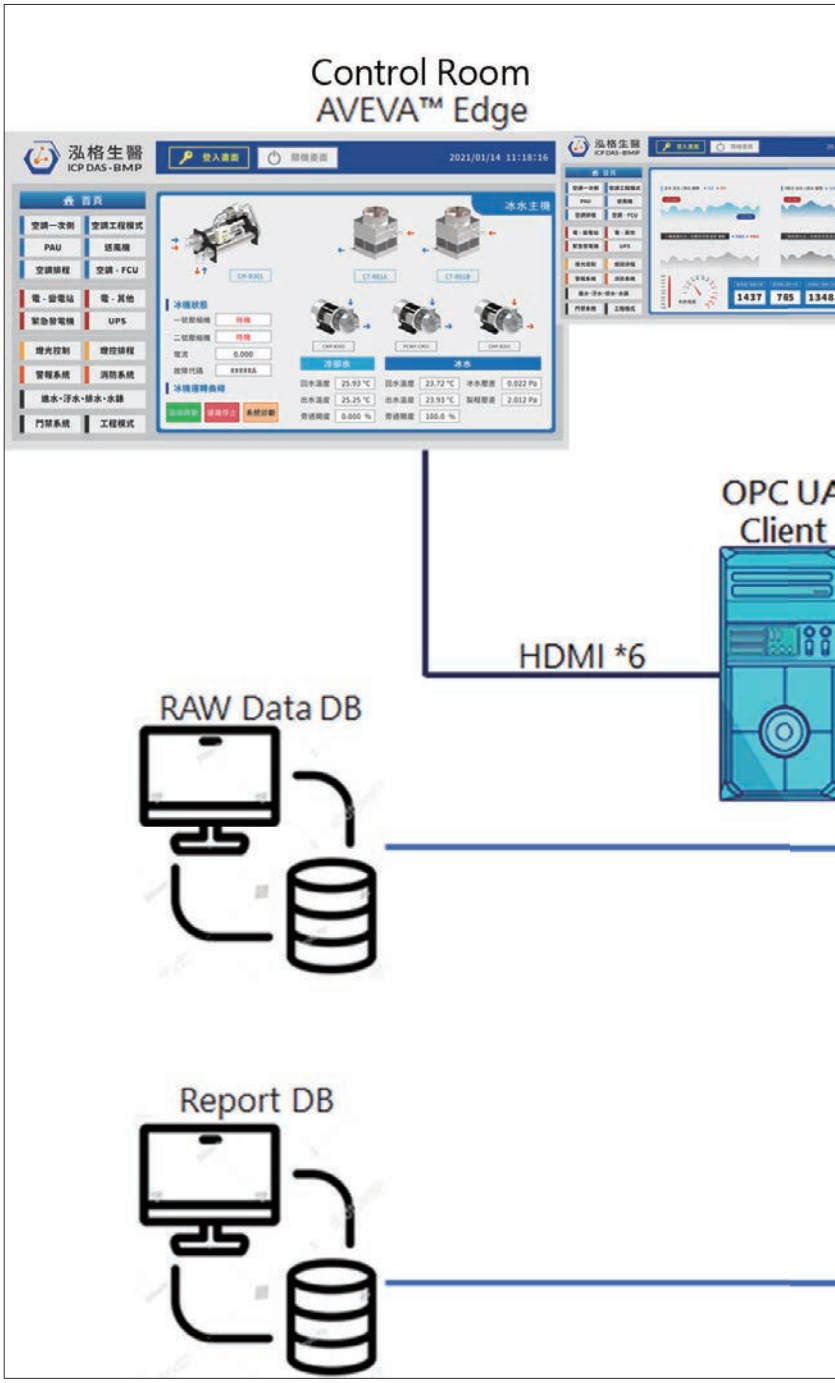
OPC UA compliable with IEC 62541 Industrial Communication Standard. There are two main benefits of switching to the OPC UA protocol, one is to reduce the number of communication packets, and the other is to ensure the security of data transmission at the TCP layer.

How to set up an OPC UA surveillance system?

For example, in the TPU plant shown below, the OPC UA-based monitoring and control system utilizes a three-tier architecture consisting of the AVEVA™ Edge Graphic Control System, which supports OPC UA clients, a UA communications server and I/O modules with OPC UA server functionality, as well as I/O modules or sensors that need to be connected to the communications server.

• AVEVA™ Edge SCADA

The main purpose of the Control Room SCADA is to provide visual information to plant managers to maintain the normal operation of the plant. Designed and deployed with **AVEVA™ Edge**, **the Control Room SCADA** can present real-time information and images of production lines, plant services, IP equipment security topology, and cameras, and display alarm messages when equipment is out of order, allowing managers to quickly troubleshoot abnormalities. In addition, the storage and utilization of real-time information is also an important function of the Control Room SCADA. The source of real-time information in the plant and production of the Control Room SCADA is obtained through the OPC UA protocol of TCP/IP, which is different from the map control architecture that uses Modbus TCP protocol, and the following is a list of the common differences of the protocols.



- OPC UA has two communication modes, Client/Server and Publish-Subscribe, while Modbus uses a One Question One Answer Client/Server architecture for communication.

- OPC UA incorporates security features like encryption, authentication, and access control, whereas Modbus does not.

- Modbus is designed for industrial control systems and is typically used to access data from devices like programmable controllers, drives, and sensors.

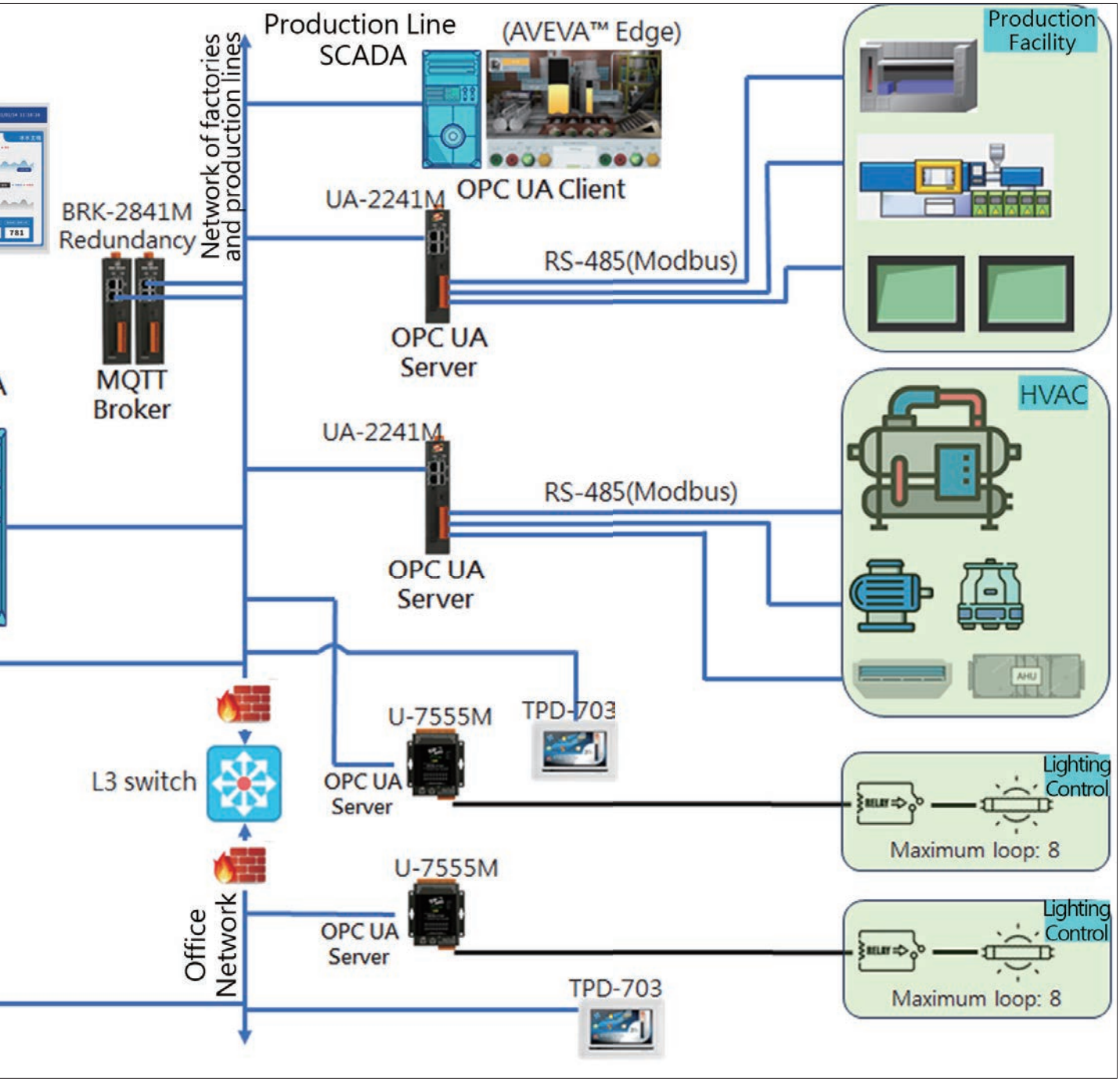
- OPC UA communicates based on the TCP/IP protocol, can be deployed on any hardware and software platform that supports this protocol and can interact with a variety of devices and systems regardless of their manufacturer or location. In comparison, Modbus is designed to work with a limited number of devices and systems that support the Modbus protocol.

• UA Communication Server

The **UA-2241M UA communication server**, in this case, collects the data of the production line and factory equipment and then converts it to OPC UA protocol before providing it to the Control Room. There are two main benefits of switching to the OPC UA protocol, one is to reduce the number of communication packets, and the other is to ensure the security of data transmission at the TCP layer.

• UA I/O Module

The **UA I/O series U-7555M** is used for factory lighting control. In addition to the advantages of the OPC UA protocol mentioned above, it also utilizes the logic control within the UA I/O to determine the actual on and off status of the lights, reducing the need to write development logic for the TPD-703. In addition, the scheduling function of the UA I/O can also schedule the factory lights to be turned off, avoiding the situation where the lights are not turned off during off-duty hours.



Comprehensive Applications:

Plastic Injection Molding Machine Monitoring Applications

Due to labor costs increasing and manpower shortages in the manufacturing industry, how to digitize information is an important issue, companies have trouble integrating IT and OT staff because they have different perceptions, and eventually have to abandon the project. The difficulties, in this case, can be divided into the following items:

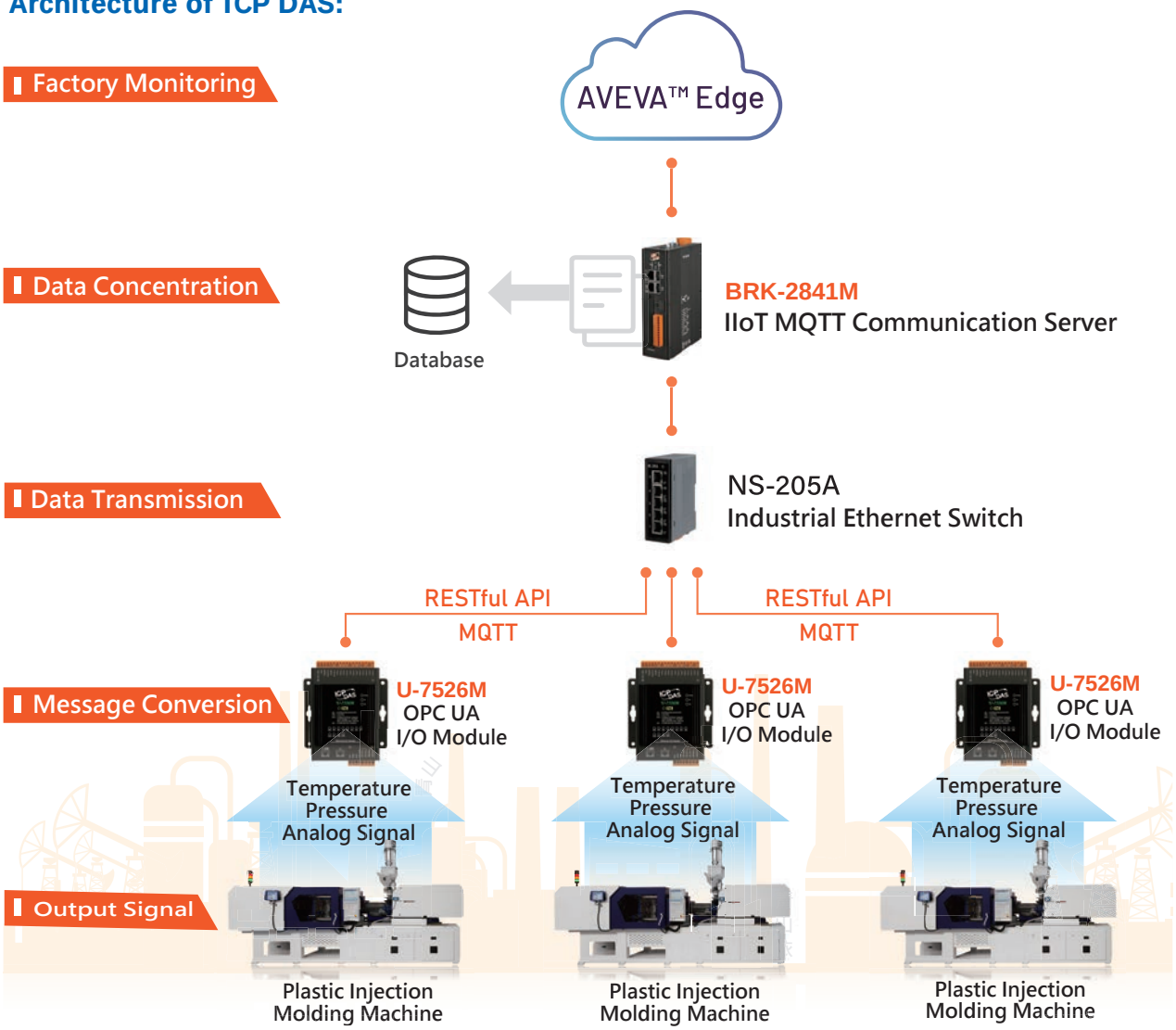
1. Hard to record Sensor value
2. Machine messages scattered
3. No Data Graphing

ICP DAS uses the U-7526M to convert analog signals into RESTful API / MQTT data to achieve the goal of "information digitization". Makes it more flexible for database and graphic software and makes it easier to control and record.

Projects	Before	After
Meter	Manual meter reading	Record in database
Machine Status	Manual inspection	Screen Monitoring
Quality	Manual adjustment	Data analysis
Management	Error-prone	Not error-prone
Communication	Difficult	Easy
KPI managing	According to experience	According to data

- **Advantages of ICP DAS:**
  1. Digitalization for recording
  2. Centralized message
  3. Data graphing

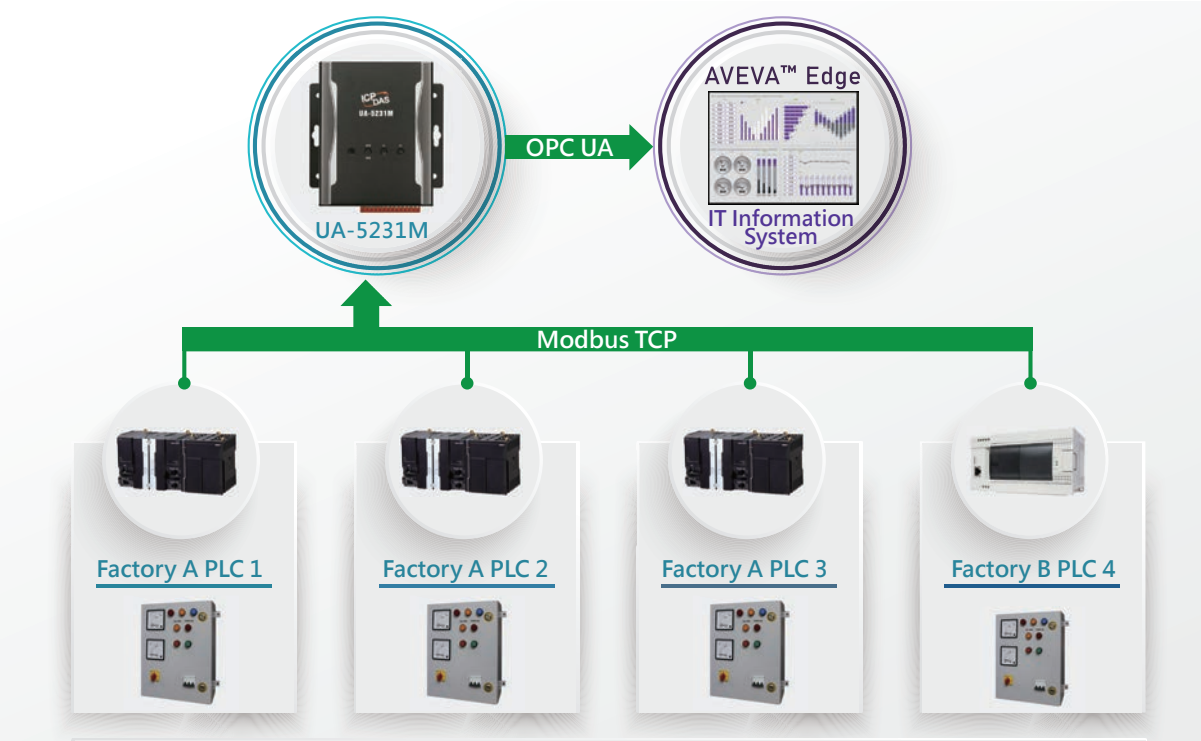
- **Architecture of ICP DAS:**



Chemical Factory Water Filters Applications

- **Reduce the difficulty of obtaining PLC data and save time for IT system setup**

  The IT system has to record the flow, pressure, and water quality data of the water filter. It's difficult to read the contents of the PLC in the filter tray. By deploying UA-5231M, the UA-5231M can convert PLC data into OPC UA service, which can reduce the difficulty of equipment and system integration.



- **Integrate sensing and output modules to simplify difficulties in the field**

  The reverse osmosis equipment encountered the problem that no space to place the sensor module and the controller, the U-7526M provides analog sensor and OPC UA services to collect water quality, flow, and pressure data from equipment to the IT system, reducing field staffing integration burden.

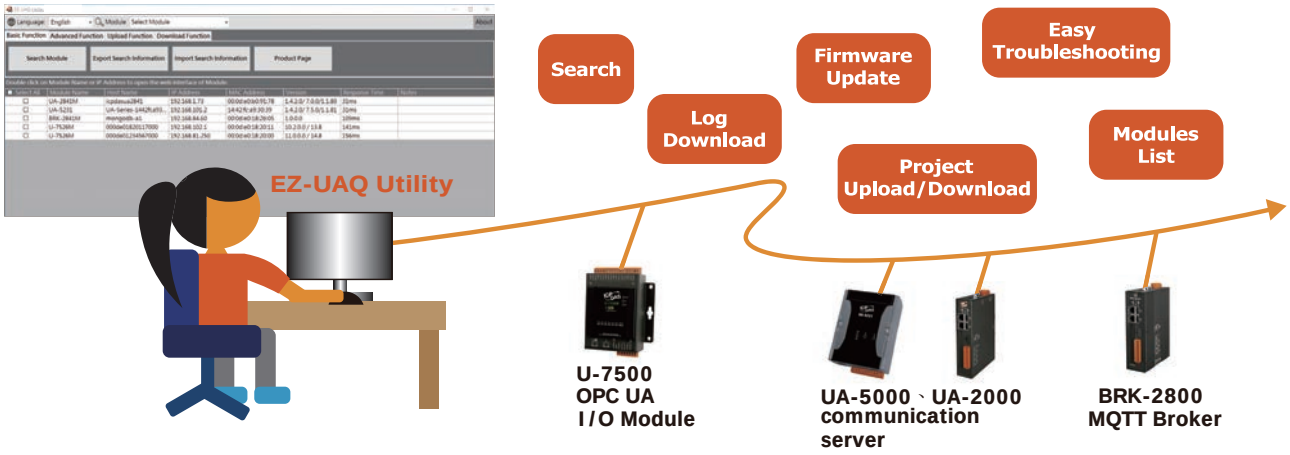
EZ-UAQ Utility : For UA, BRK, UA I/O Series

Introduction

The EZ-UAQ Utility provides network administrators and field managers with the ability to integrate all modules in the field. Besides receiving basic information (such as IP address, MAC address, firmware version, etc.) about the UA Communications Server, UA I/O, and BRK products, Network administrators can also acquire information about the protocols and ports used of the modules to manage the network information of the field and apply it to the security integration system.

Also, updating firmware, and downloading projects, and logs, can be used either as a single module or as multiple modules. Using the above functions reduces the cost of field management. It can be easily maintained to ensure normal operation during module expansion, basic maintenance of modules, and staff changes in the field.

Application Diagram



Features

Speed Management

Provide the ability of people on the spot include person in charge and IT administrator to quickly manage communication servers and I/O modules.

Information Security Integration

Applied to information security integration systems to enhance field security. Quickly integrate UA communication server, UA I/O and BRK information.

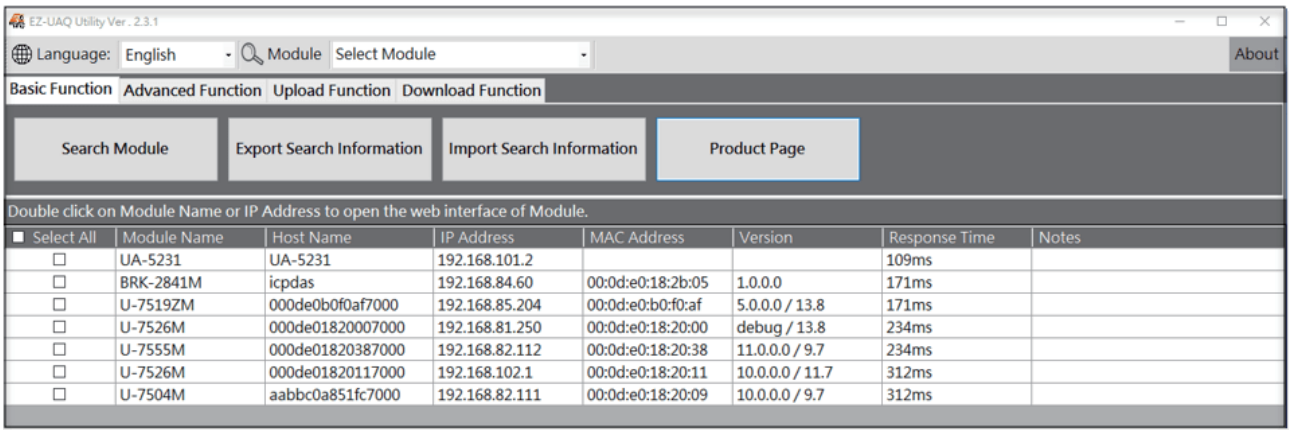
Cost-effectiveness

Reduce field management cost and maintenance time.

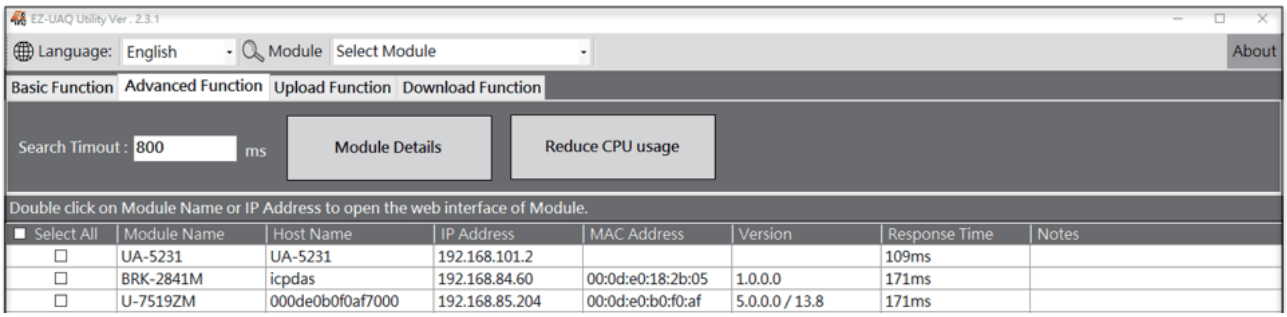
Easy maintenance

It ensures that the field can operate normally during module expansion, basic module maintenance, and field personnel changes, and provides the convenience of easy maintenance.

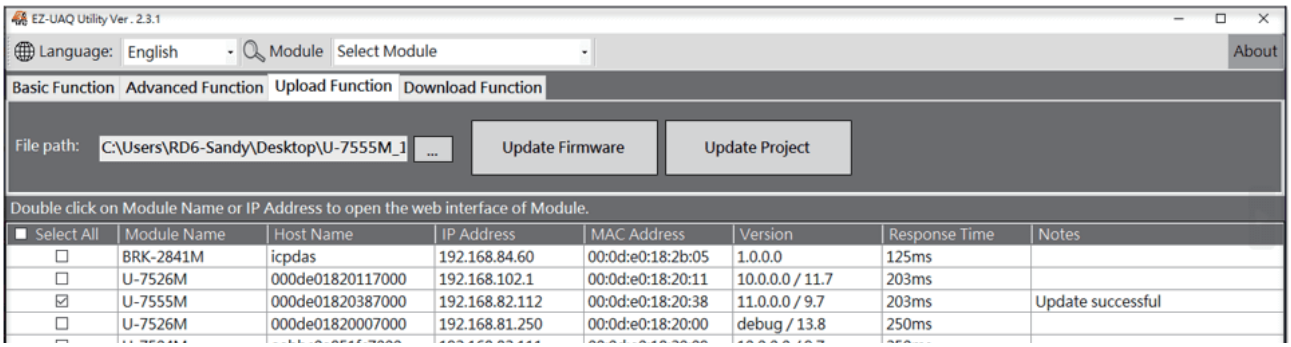
Basic Function - Search Module, Export, Import , Product Page



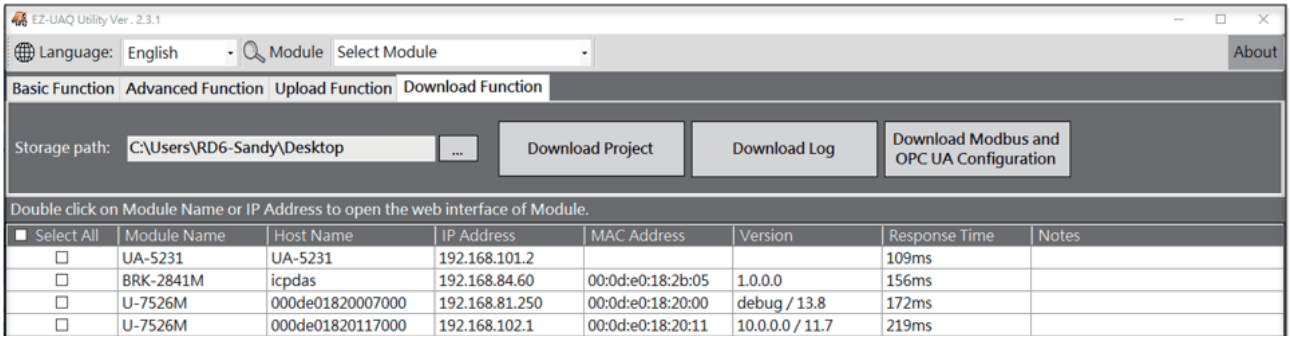
Advanced Function - Module Details, Reduce CPU usage



Upload Function - Update Firmware, Update Project

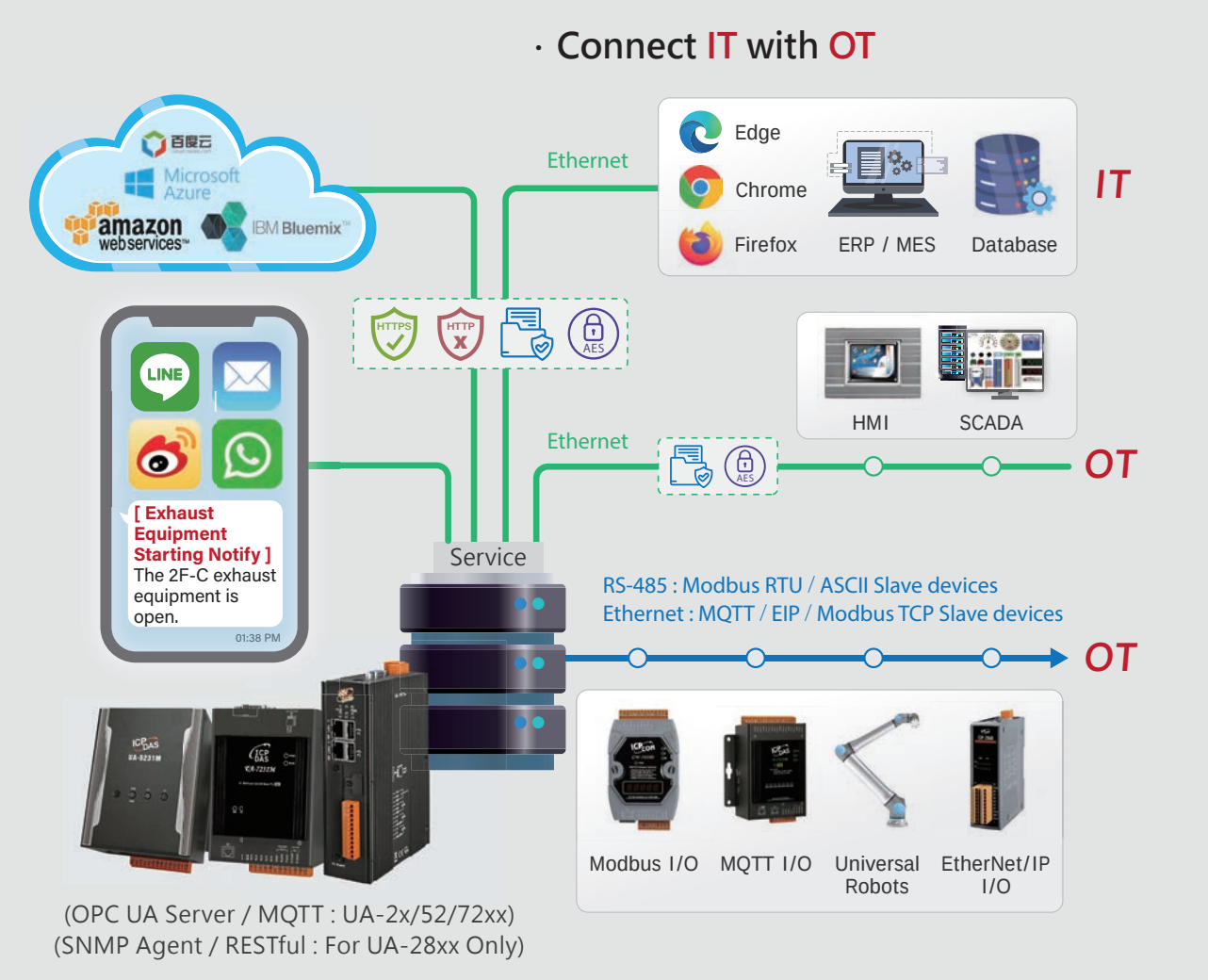


Download Function - Project, Log, Modbus and OPC UA Configuration



CH2. IIoT Communication Server: UA Series
UA-2000/UA-5000/UA-7000

UA System Architecture:



UA Highlights:

- **Simultaneous Writing** for **Remote Database** and **Local Data Logger**
- **Offline Data Recovery** Mechanism for **Remote Database**
- Enable **OPC UA**, **MQTT**, **SNMP**, and **RESTful** at the Same Time
  - **OPC UA**, the Industrial Communication Standard Protocol
  - **MQTT**, the IoT Transmission Protocol, MQTT Broker(Including WebSocket)/Client
  - **SNMP Agent** Protocol Function, Real-time Monitoring Device Data
  - **RESTful API** Web Service, Access from Outside Through the HTTP Protocol
- **Security - HTTPS, SNMP v3, Communication Encryption, Dynamic Blocklist, Whitelist**
- **IoT Cloud Platform** - MS Azure, Amazon Web Services, IBM Bluemix, Alibaba Cloud
- **Mobile Notifications** - Triggers the APP Notification Function

UA Series: Connect IT with OT, Integrate Cloud and Web APPs

The IIoT Cloud Solution of ICP DAS provides UA series of IIoT Communication Server to upgrade the front-end devices to the Cloud, connect IT with OT, link Cloud and Web APPs, and integrate the IIoT Cloud solution.

IT & OT Integration Technology:

Communication Service Technology:

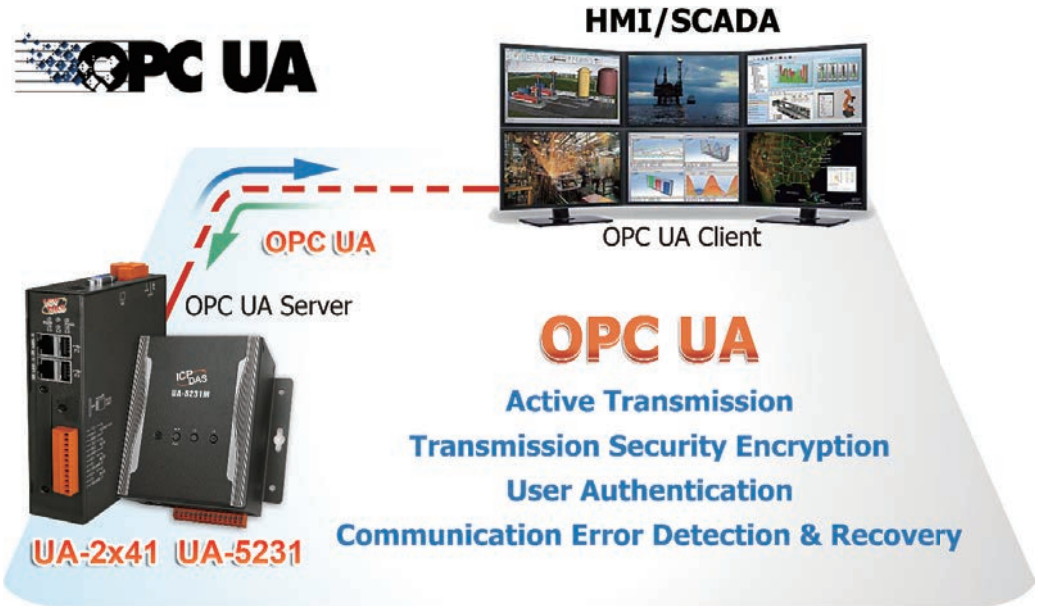
- **OPC UA** : The **Industrial Communication Standard**
- **MQTT** : The **IoT Active Transmission** Technology
- **RESTful API** : **Third-party Integration,** exchange of data securely over the internet
- **SNMP Agent** : **S**imple **N**etwork **M**anagement **P**rotocol Real-time monitoring device data
- **Data Logger** : I/O data save directly to **Local LOG file** or **Remote Database**
- **IFTTT** : The **Cloud Logic Control** (**IF** This **T**hen **T**hat)
- **Cloud** : The IIoT **Cloud Platform** Connection Technology
- **Modbus** : A **protocol** widely used within **Industrial Automation Systems**
- **EtherNet/IP** : **Industrial Ethernet protocol,** based on **TCP/IP** protocol and compatible with **factory and enterprise networks**

Support OPC UA/MQTT/SNMP/RESTful API

Features:

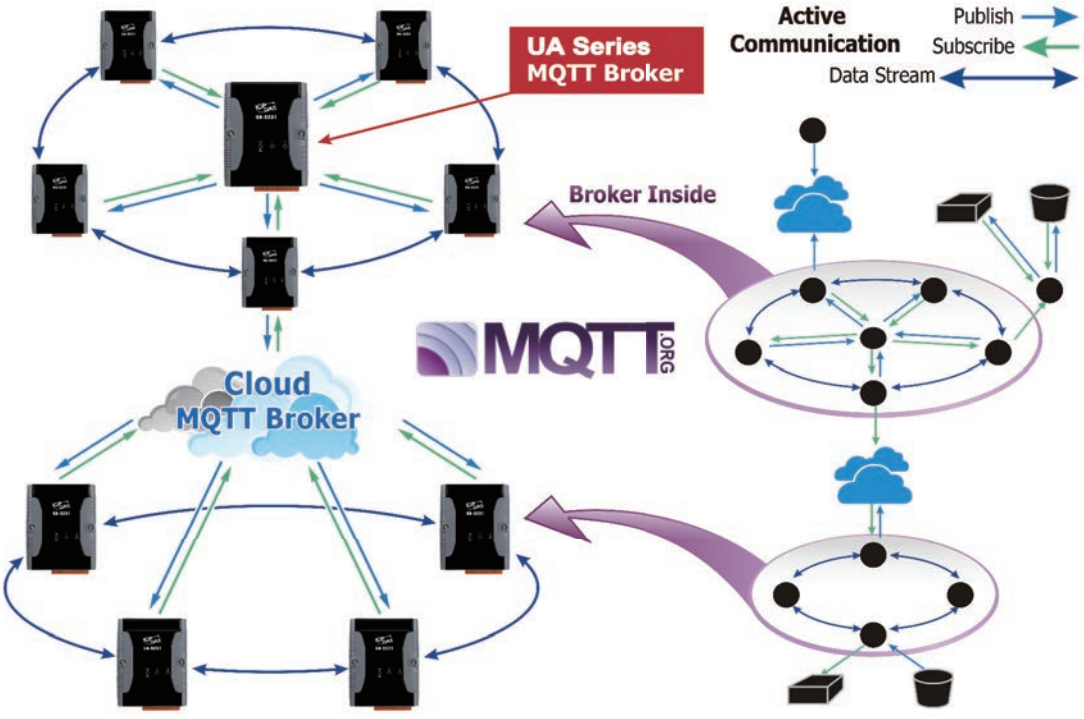
Built-in OPC UA Server Service

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. Allowed up to 8000 OPC UA tags and up to 20 sessions for the OPC UA Client connection.



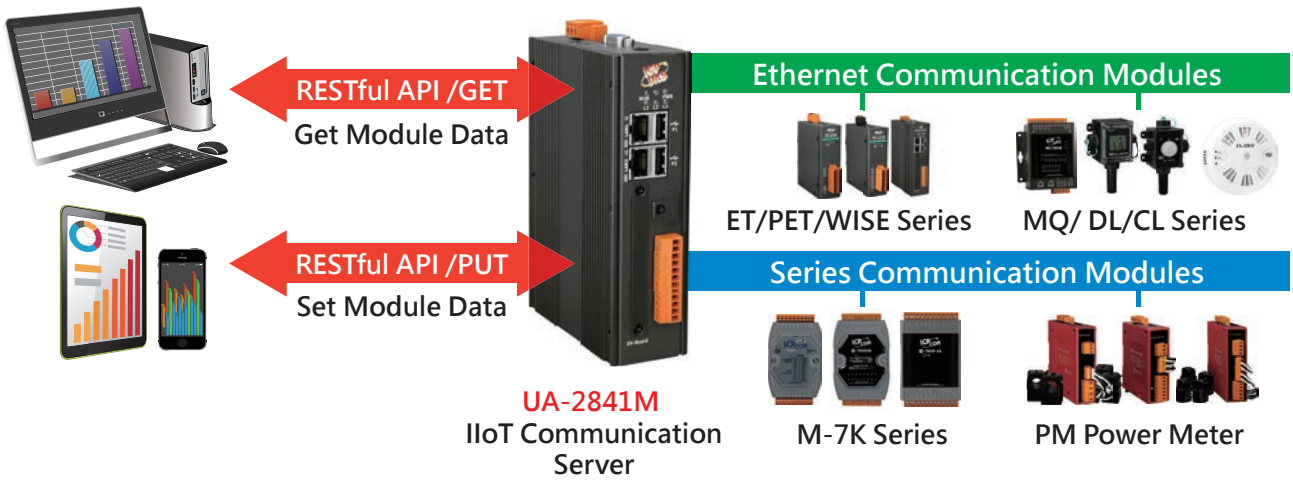
Built-in MQTT Broker Service

MQTT Broker inside and Compliance with MQTT V.3.1.1 protocol. Provides functions of IoT Active M2M Transmission, QoS Quality Service, Retain Mechanism, Identity Verification, Encryption, Last Will, MQTT Client Drivers, etc. The Broker can connect up to 400 MQTT Clients.



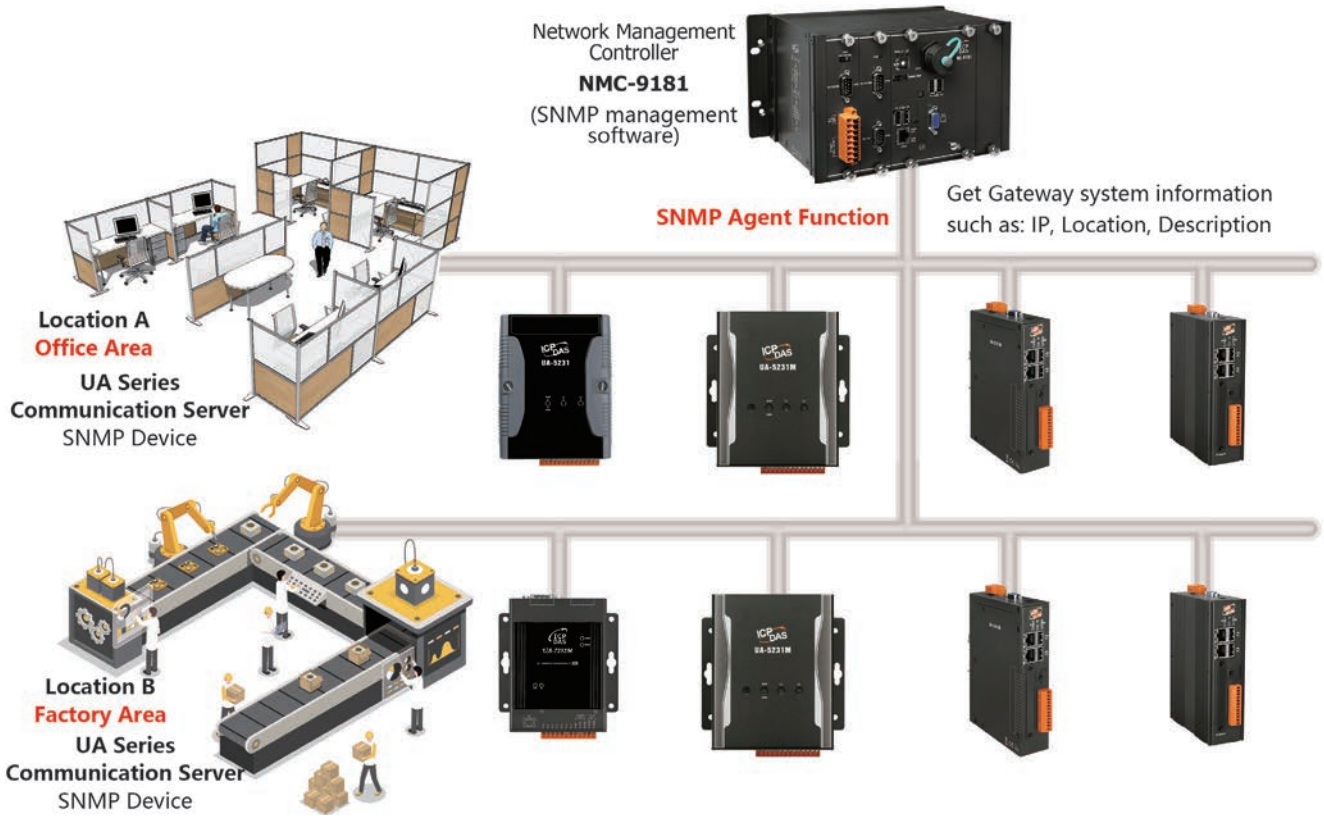
Provide RESTful API service interface (For UA-2800)

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

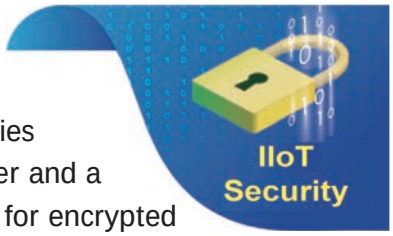


Provide SNMP Agent function (For UA-2800)

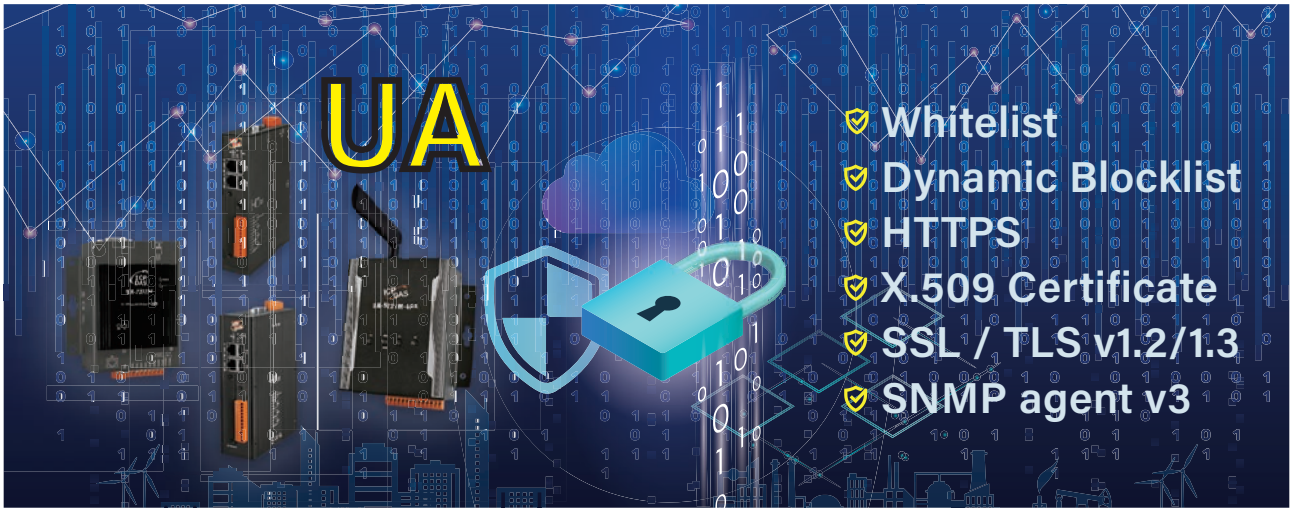
UA-2841M series products allow IT practitioners to manage various workplaces through ICP DAS NMC-9181 or third-party SNMP software.



Secure IT Data Exchange (Certificates/Encryption)



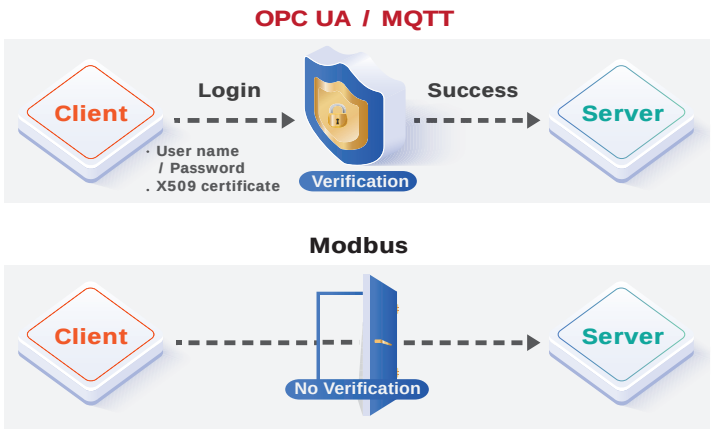
To secure I/O data uploads between UA Series and platforms, UA Series supports HTTPS to safeguard information sent between a web browser and a website, as well as MQTT with SSL/TLS and OPC UA Server functions for encrypted real-time I/O data transfer and confidentiality. With the protection offered by UA — certificates and data encryption, the series achieves cybersecurity while building IoT systems.



Security	UA-2841	UA-2241	UA-5231	UA-7231
Whitelist	Prevent unknown IP connections and protect system security.			
Dynamic Blocklist	Set conditions to put abnormal IPs into the dynamic blocklist			
HTTPS	Enable https and provide X.509 certificate and key upload for verification use			
OPC UA Server	Authentication: Username/Password, X.509 Certificate Security Policy: > Basic128Rsa15 (Sign / Sign & Encrypt) > Basic256 (Sign / Sign & Encrypt) > Basic256Sha256 (Sign / Sign & Encrypt) > Aes128_Sha256_RsaOaep (Sign / Sign & Encrypt) > Aes256_Sha256_RsaPss (Sign / Sign & Encrypt)			
MQTT Broker	Provides SSL and TLS encryption and security authentication			
	Support TLS 1.3 and below	Support TLS 1.2 and below		
MQTT Client	Provides SSL and TLS encryption and security authentication can be checked through Microsoft Azure, Amazon Web Services, etc.			
	Support TLS 1.3 and below	Support TLS 1.2 and below		
SNMP(V3) Agent	TLS authentication	-		

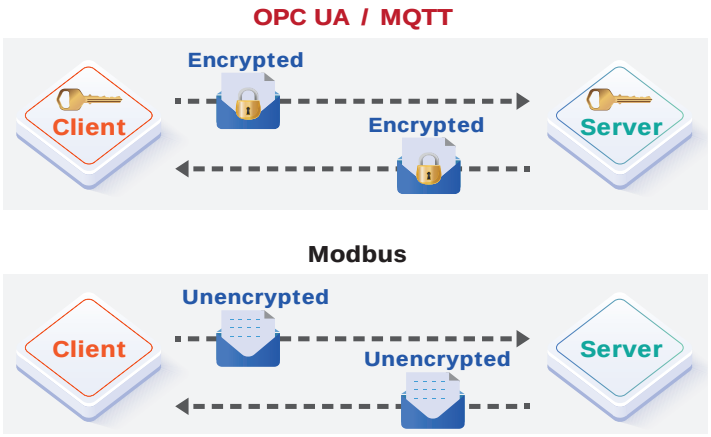
Support Identity Authentication

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



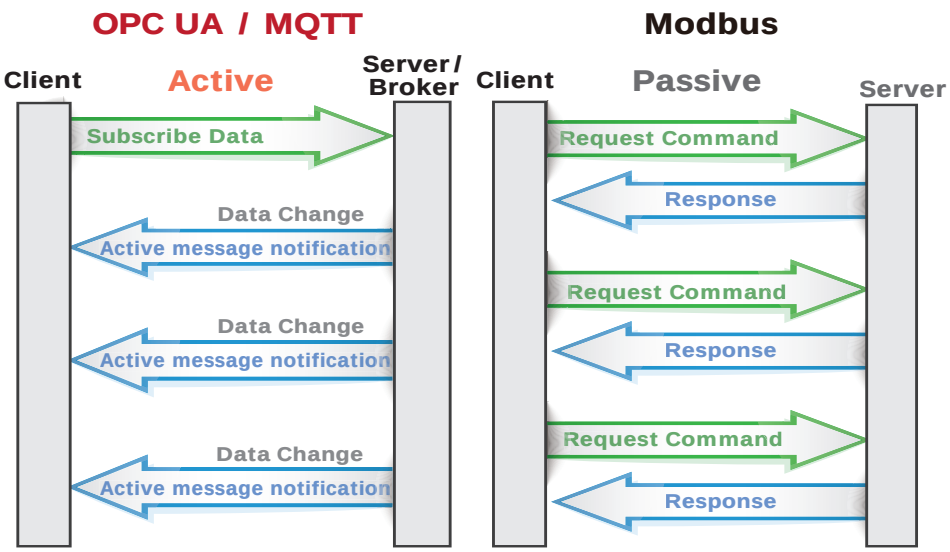
Support Data Encryption

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



Active Data Transmission

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



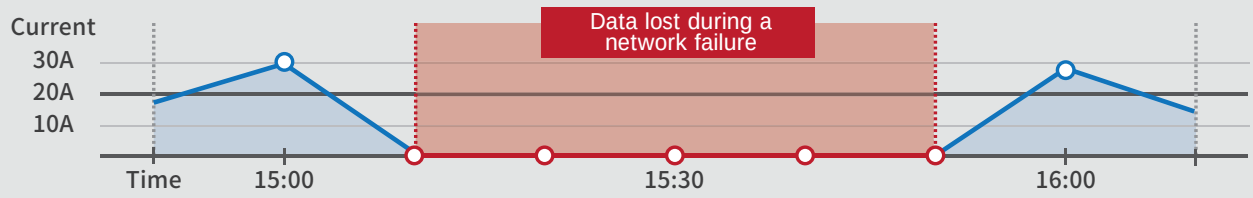
Save I/O Data Directly into Remote Database & Local Side LOG File

UA Series Communication Servers can read data from I/O modules at scheduled intervals, and then log collected data to CSV locally or to SQL DB remotely.

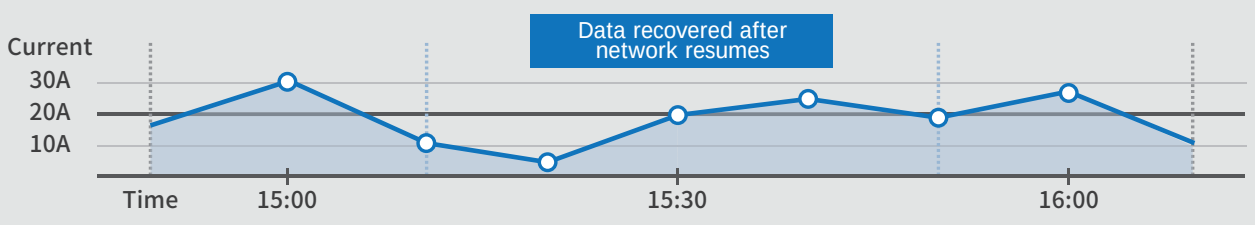
Data Recovery Function

Commonly, data logging involves the process of collecting data regularly and storing it in the database. In the event of a network failure, the obtained data is not stored and irretrievable. To address this issue, UA Series products support a data recovery function by storing all data in the SD card during n etwork loss. When the network is restored, the UA Series products retrieve the data from the SD card and log them to the database. This function avoids historical data loss.

Common Data Logging



Data Logging with a Data Recovery Function

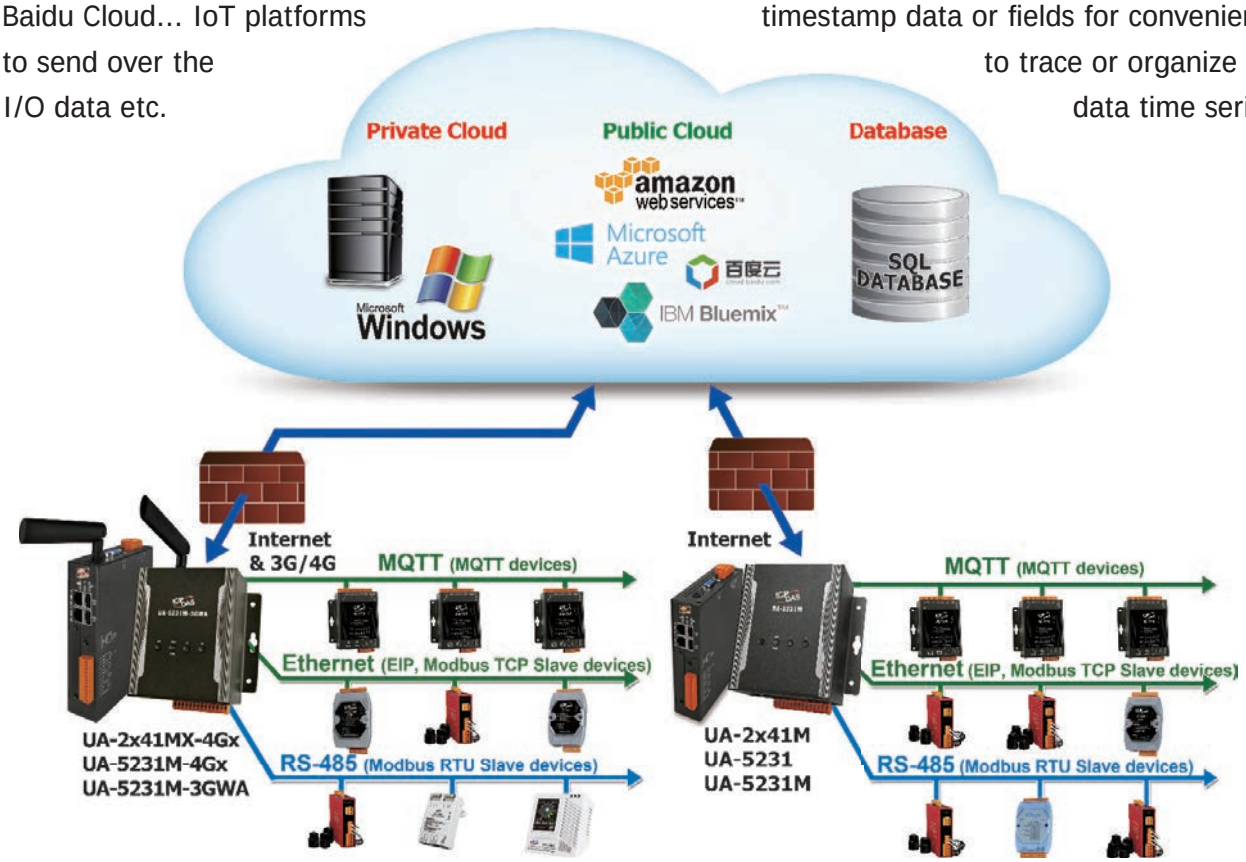


Support Cloud Platforms Connection

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

Provide Timestamp Function

All UA communications, such as MQTT Client, OPC UA, and database connection, include timestamp data or fields for convenience to trace or organize the data time series.



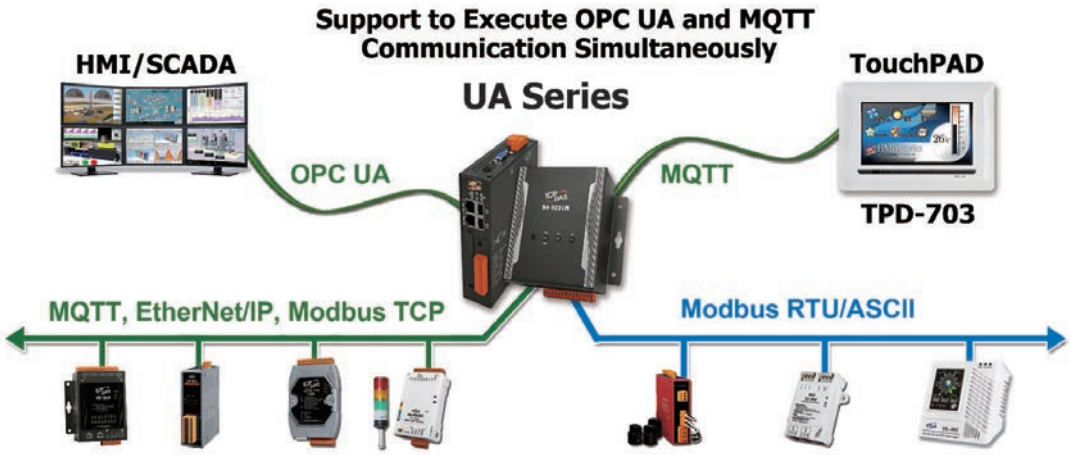
Support Mobile APP Notifications

When detecting anomalies in I/O values, IFTTT (If this, then that) performs logic control and sends real-time notifications to the management staff via over 100 Apps, such as LINE, Twitter, Gmail, Weibo, etc.

Support Ethernet and Serial Communication Modules

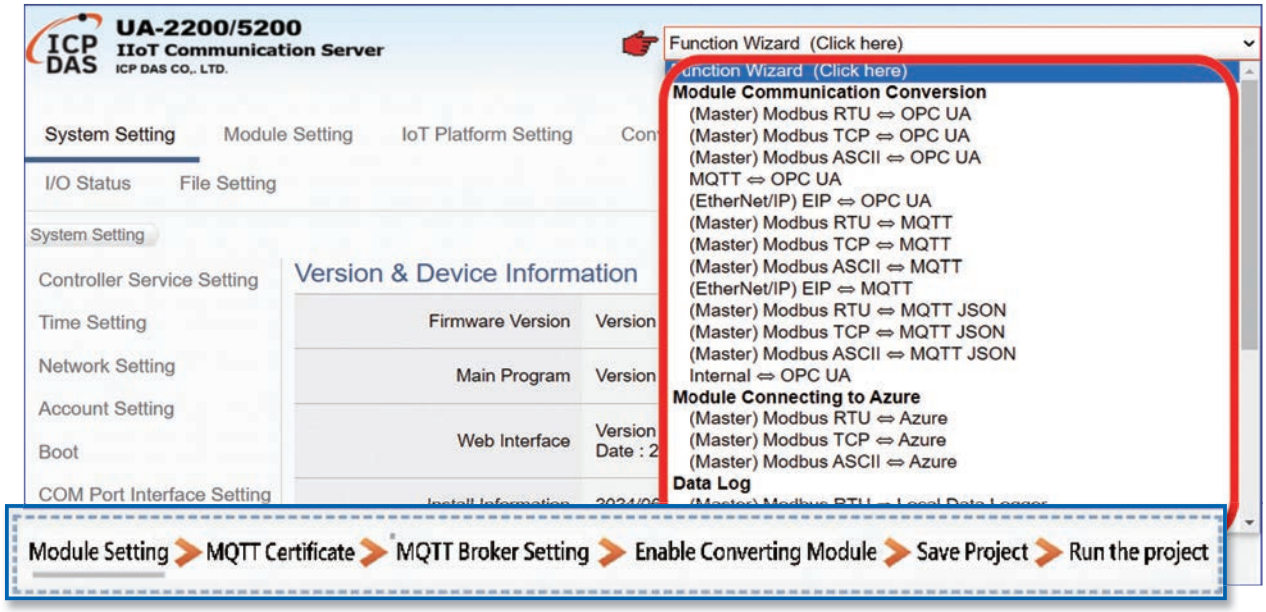
- **Ethernet** : UA supports **MQTT, Modbus TCP**, and **ICP DAS EtherNet/IP** modules
- **Serial** : UA supports **Modbus RTU/ASCII** modules (Max. 3 Serial ports)
- **UA Web UI**: users can quickly set up the modules and display the **real-time I/O status**.
- **Max. modules** supported by each connection:

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

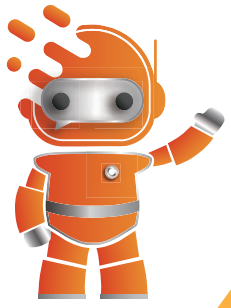


Provide Function Wizard Web UI for easily step-by-step setup

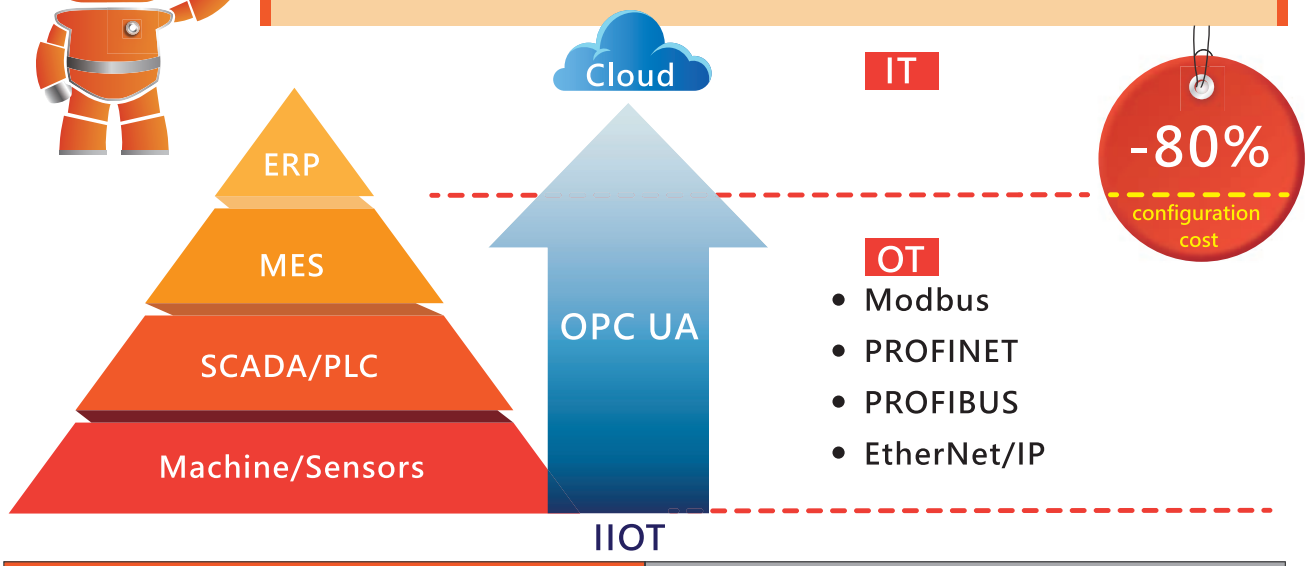
The Web UI of UA provides a wizard-like “Step Box” in the Function Wizard area to guide user step by step to complete the project or function. It provides many items for setting the Communication Conversion, Azure Connecting, Local Data Logger, Remote Database, Function Configuration, PID Operation,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



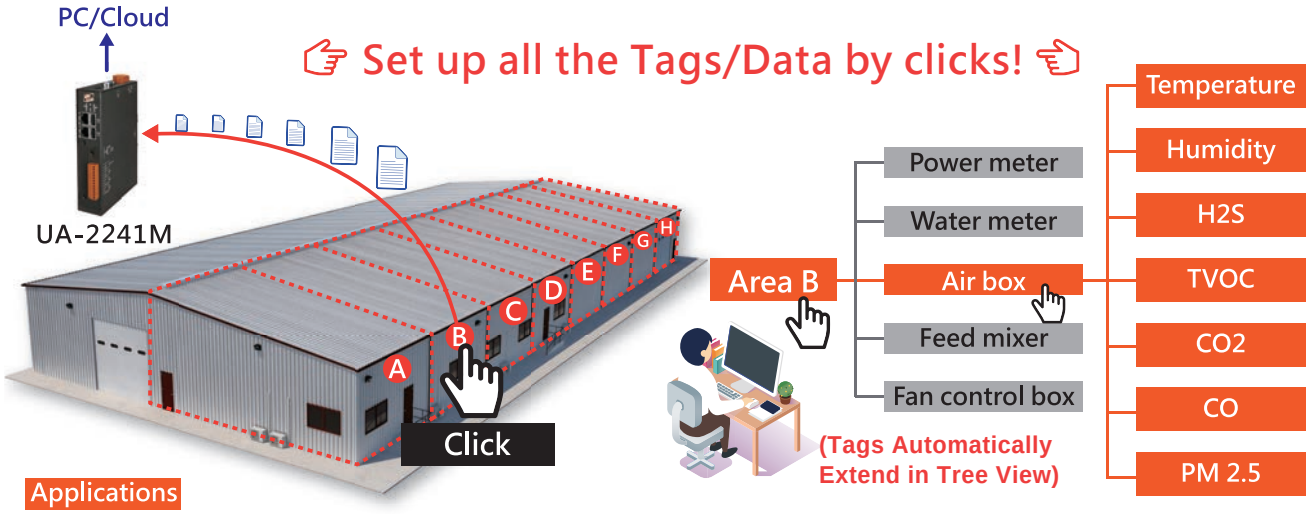
Easy Project Building



Using OPC UA protocol can help MES engineers & software development engineers save 80% configuration cost which is far in advance of competitors.



OPC UA (Easy)	Modbus (Hard)
STEP1 : Get the OPC UA Server URL Address	STEP1: Query the device IP table and get the linked device IP
	STEP2: Set Modbus Master SW and make an IP connection
STEP2 : Connect to the Server via the Client	STEP3: Search Tag Table and get the type and address range
	STEP4: Set Modbus Master SW and get device data
STEP3 : Browse/Subscribe Tags/Data in Server	STEP5: Set SW Tags table and assign recognizable names
	STEP6: Convert the device data to the actual value for the tag



Applications

Modern pig farms

- Temperature
- Humidity
- H2S/TVOC
- CO2/CO
- Water supply
- Food supply
- Fan control

Chemical plant

- Temperature
- Humidity
- Air quality sensor
- Power management
- Access control
- Liquidity monitoring
- Related I/O

Selection Guide:

Advanced

Standard

Compact

■ Hardware

Model	UA-2841M	UA-2241M UA-2241MX-4GE UA-2241MX-4GC	UA-5231/UA-5231M UA-5231M-3GWA UA-5231M-4GE/4GC	UA-7231M
System / Module				
OS	Linux Kernel 5.10.72	Linux Kernel 3.2.14		
CPU	ARM Quad Core, 1.6 GHz	ARM, 1.0 GHz		
SDRAM	DDR4 2 GB	DDR3 512 MB		
Flash	8 GB	512 MB	8 GB	
Expansion Memory	4 GB microSD Card, Max. 32 GB microSDHC or 2 TB microSDXC Card	4 GB microSD Card, Max. 32 GB microSDHC		
Communication Ports / Expansion				
Ethernet	2		1	1 PoE
USB	2 x 2.0 host		1 x 2.0 host	-
Serial Port	4 (2 x RS-232, and 2 x RS-485 isolated 2500 VDC)			1 (isolated RS-232/485)
XV-board Expansion	1 optional XV511i, expands 4 RS-485 ports or 1 optional XV107/107A/110/111/111A/116/119/303/306/307/310, expands I/O p.s. UA-52xx series supports XV-board starting from Version B.			-
Mechanical / Environmental / Power				
Temperature	Operating: -25 ~ +75°C / Storage: -40 ~ +80°C			
Humidity	10 ~ 90% RH			5 ~ 90% RH
	Non-condensing			
Input Range	+12 ~ +48 VDC			
Consumption	10 W	Ethernet: 4.8 W -4GE/4GC/3GWA: 6.5 W		3.5 W
Dimensions	42 x 164 x 130 (mm)		117 x 126 x 58	97x 114 x 38

[Advantages of each series]

- **UA-2841M** : **Advanced**, high specifications, fast speed, and multiple support functions.
- **UA-7231M** : **Compact** size, high cost performance, and provides PoE power supply, it is more suitable for installation in a small environment or where it is difficult to configure a power supply.

■ Wireless Communication

Model		UA-2241MX-4GE UA-2241MX-4GC	UA-5231M-3GWA UA-5231M-4GE UA-5231M-4GC
Wireless Communication (Only For UA-2x41MX-4GE/4GC, UA-5231M-4GE/4GC/3GWA)			
4G System	-4GE	FDD LTE: B1/B3/B5/B7/B8/B20 bands (Asia Only, Except China)	
	-4GC	FDD LTE: B1/B3/B8 bands (For China only) TDD LTE: B38/B39/B40/B41 bands (For China only)	
3G System	-3GWA	WCDMA: 850/900/1900/2100 MHz	
	-4GE	WCDMA: 850/900/2100 MHz	
	-4GC	WCDMA: 900/2100 MHz, TD-SCDMA 1900/2100 MHz, CDMA2000 (BC0) 800 MHz	

■ Software

Series	UA-2841M Series	UA-2241M Series	UA-5231 Series	UA-7231 Series
Security Functions				
Whitelist	List IP addresses and ranges allowed through the firewall to prevent system attacks.			
Dynamic Blocklist	Set conditions to put abnormal IPs into the dynamic blocklist			
HTTPS	Enable https and provide X.509 certificate and key upload for verification use			
OPC UA Server	Authentication: Username/Password, X.509 Certificate Security Policy: > Basic128Rsa15 (Sign / Sign & Encrypt) > Basic256 (Sign / Sign & Encrypt) > Basic256Sha256 (Sign / Sign & Encrypt) > Aes128_Sha256_RsaOaep (Sign / Sign & Encrypt) > Aes256_Sha256_RsaPss (Sign / Sign & Encrypt)			
MQTT Broker	Provides SSL and TLS encryption and security authentication			
	Supports TLS **1.3** and below	Supports TLS 1.2 and below		
MQTT Client	Provides SSL and TLS encryption verification can be checked through Microsoft Azure, Amazon Web Services,etc.			
	Supports TLS **1.3** and below	Supports TLS 1.2 and below		
SNMP(V3) Agent	TLS authentication	-		
Protocol (Note1, Note2)				
OPC UA Server	Max. Numbers of Client Sessions and Max. Tags			
	Max. **50** Sessions Max. 8000 Tags	Max. 20 Sessions Max. 8000 Tags		
MQTT Broker	Connections of non-SSL & SSL / WebSocket			
	Max. **2100**	Max. 400		
MQTT Client	Connections of non-SSL & SSL			
	Max. **500**	Max. 200		
Modbus RTU/ASCII Master	32 * 3 Ports = **96** Devices			32 * 1 Ports = 32 Devices
Modbus TCP Master	Max. **250** Devices	Max. 100 Devices		
EtherNet/IP	Max. **125** Devices	Max. 50 Devices		
SNMP v3 Agent	Max. **10** Read / **10** Write	-		
RESTful	Max. **20** Read / **1** Write	-		
Data Storage (Note2)				
MS SQL / My SQL Data log	**3** Databases per Time, Max. 1000 Tags per link	Max. **1** Databases per Time, Max. 1000 Tags		
Local Data log	Stored in the local MicroSD card or SSD (CSV format)	Stored in the local MicroSD card (CSV format)		
Function (Note2)				
Internal	Can create virtual variables as an intermediary for reading, writing, or data exchange for OPC UA Client to Client.			
PID	Combine the remote I/O devices for the PID logic control system.			
IoT Cloud Platforms and Function (Note2)				
MQTT JSON Function	Microsoft Azure, Amazon Web Services, IBM Bluemix			
MQTT Custom Function	ThingSpeak			
IFTTT Condition Trigger Function	IFTTT Logic Trigger APP (Line, Twitter, Gmail ...)			

Note 1: The specifications are the maximum number of connections or usage when using a single Protocol.
Note 2: When using multiple protocols or functions, the user must adjust the actual usage to control the CPU Usage below 80%. Please refer to the CPU data on the UA web interface.

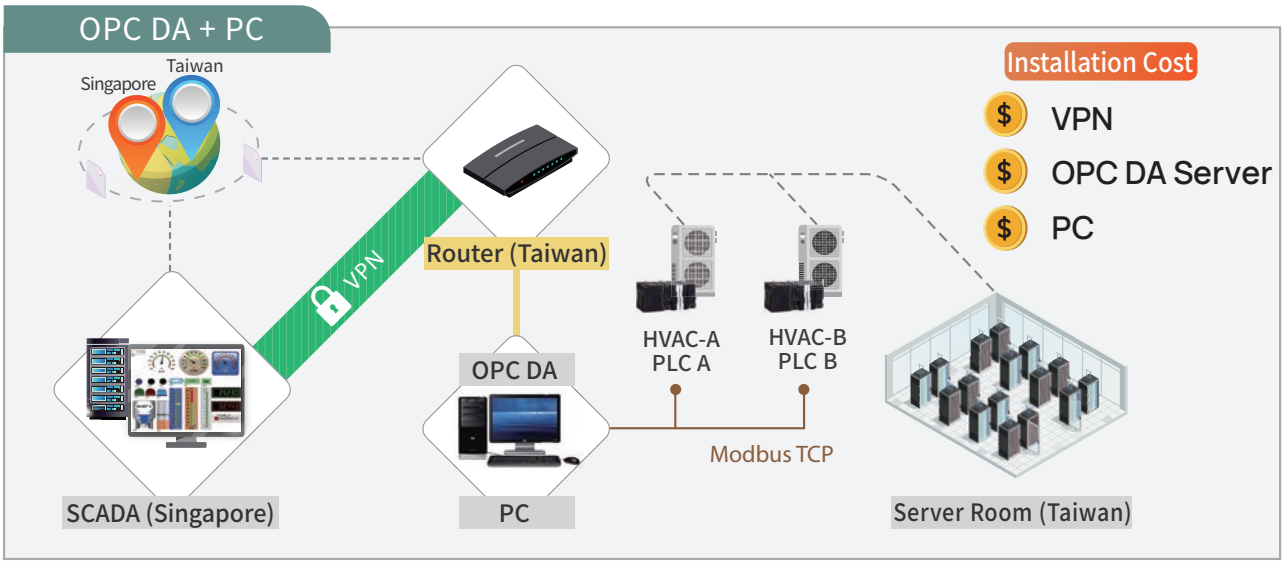
Applications:

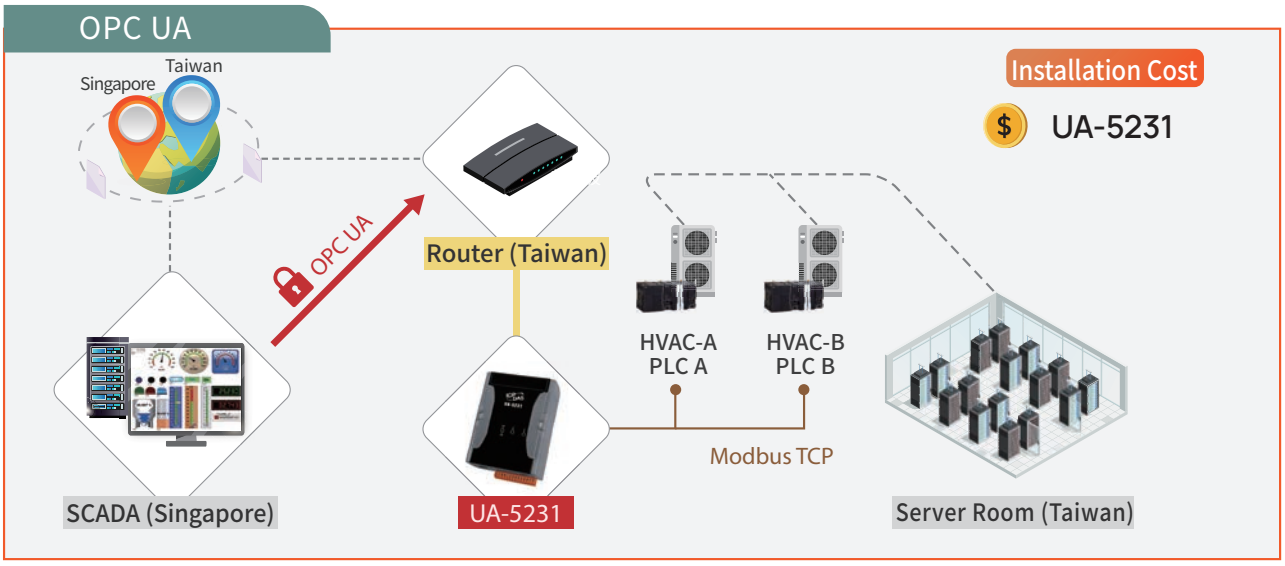
Cross-border Server Room Monitoring Applications

A transnational tech firm employed a PC+OPC DA server architecture to monitor PLCs used for HVAC Controls in the Taiwan server room. The headquarters in Singapore could access the data via VPN while incurring higher overall system costs.The new architecture, with UA-5231 OPC UA Server, replaces the PC+OPC DA.

- **Benefits are as follows.**

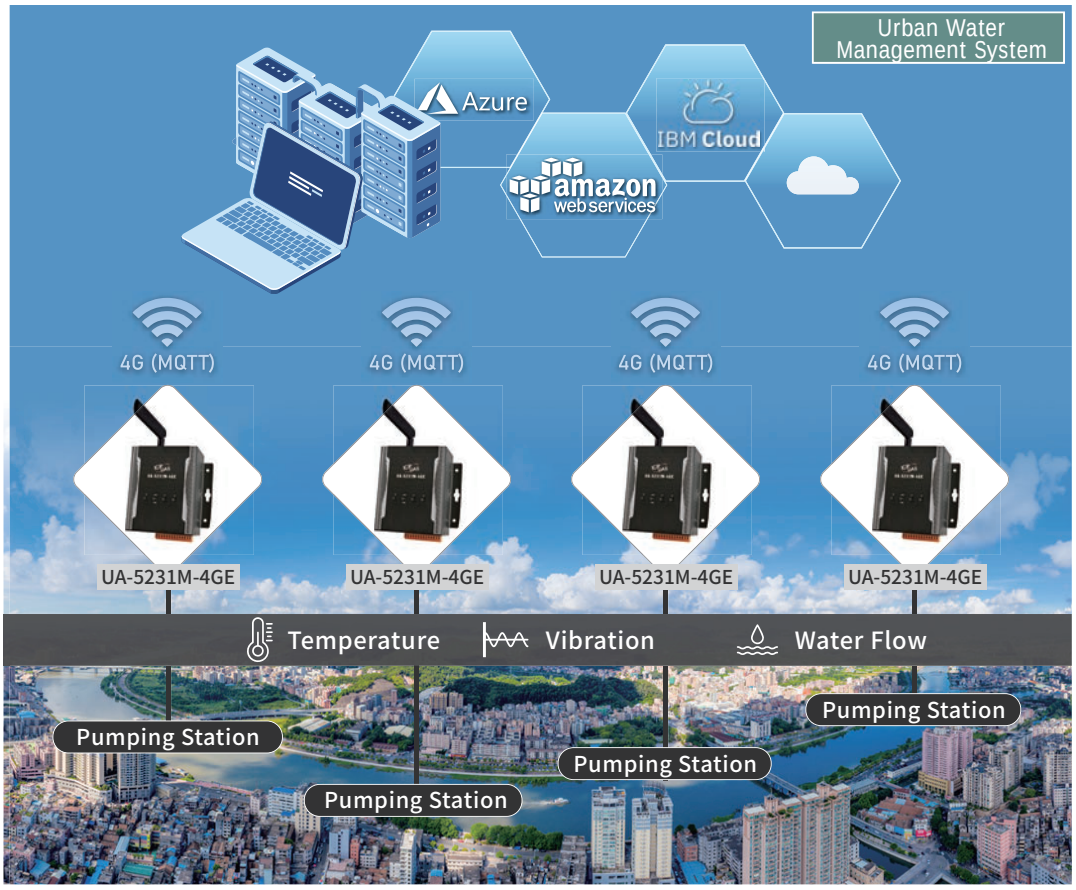
1. Low power consumption, long-term stability, less manual inspections for maintenance.
2. OPC UA offers secure connections, eliminating the need for a VPN previously used to enhance OPC DA security.
3. Staff at he adquarters can quickly convert OPC DA to OPC UA with easy and quick setup using SCADA.





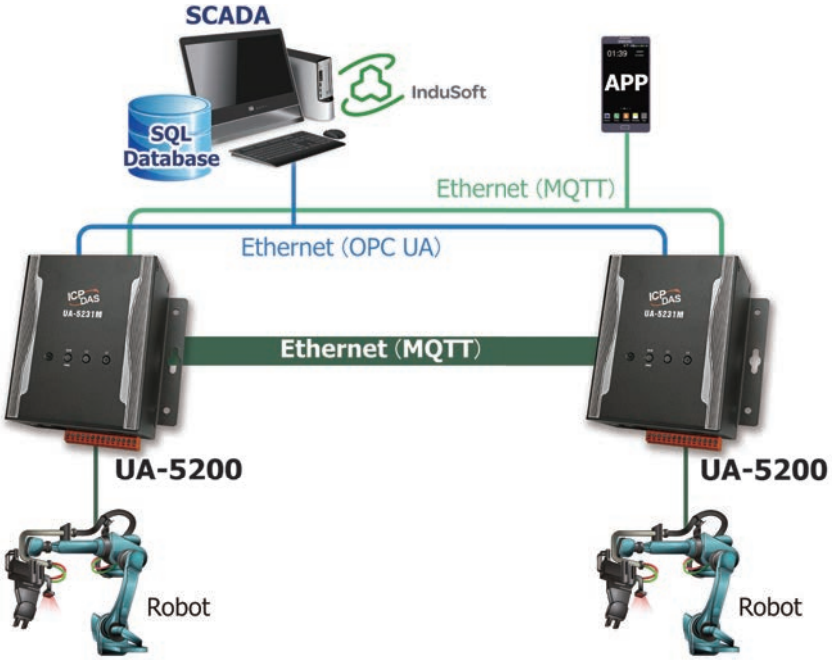
Urban Drainage System Monitoring & Control

Downpours often cause urban flooding, posing risks to life and property. Hence, governments increasingly prioritize integrating and monitoring urban drainage systems. The customer installs UA-5231M-4GE Communication Servers at pumping stations where internet deployment is difficult. The servers collect data on temperature, vibration, and flow of the drainage system via a 4G wireless network. The data is securely sent to the cloud using the MQTT protocol. This ensures secure and real-time data monitoring while reducing manual inspection costs.



Robotic Arm Co-operation Application

This application allows two robotic arms interactive communication and coordinated operation through the MQTT, and do the data analysis and system monitor/control with the database of SQL, Big Data or SCADA through the OPC UA.



Application Features:

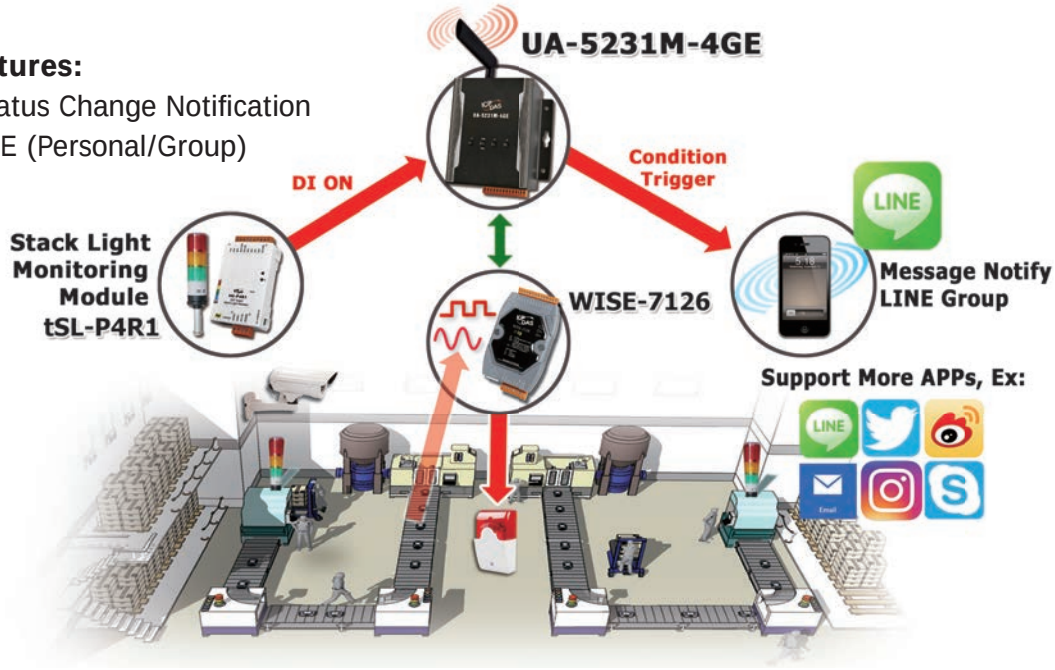
- Asynchronous Transmission
- Mobile Monitoring

Alert Message Notify LINE Group Application

This security application provides active and non-active signal triggers for buildings, factories, etc. Through the IFTTT platform, it can send the message notification to the user-favorite APPs and instantly master the device information.

Application Features:

- DI or Switch Status Change Notification
- Message to LINE (Personal/Group)
- More APPs:
  Twitter,
  Skype,
  Weibo,
  etc.



CO2 Concentration Monitoring & Notification Application

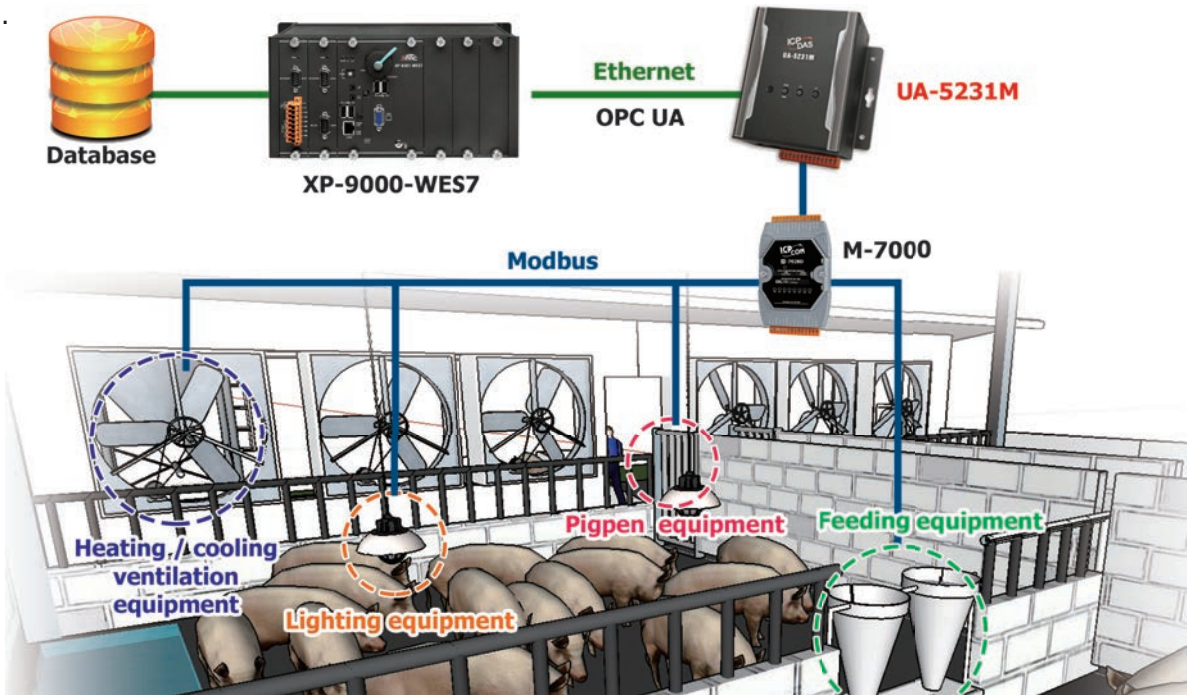
This application for indoor air quality management combines with LED displays, fresh air equipment, etc. When the CO2 concentration exceeds the limit, the system will display information on the LED display, force to ventilation, and sends notifications via IFTTT platform to pre-assigned web software, such as Gmail, e-mail, Office 365 Mail, etc.

Application Features:

- Dead Band Boundary Trigger
  - High:
    Danger Alert
  - Low:
    Safety Notification
- Mail Notification
  (PC/Mobile)
  - Gmail
  - Office 365 Mail
  - e-mail
  - Dropbox ...

Farm Automation Solution

The farm automation solution controls the on-site cooling/heating/ventilation environmental equipment, lighting equipment, feeding equipment, and pigpen equipment through UA-5231M and the connected M-7000 modules. The upper controller XP-9000 manages daily feeding and drinking equipment of every pigpen and integrates the data of the water supply, feed volume and diet to the database, and then analyzes the data and adjusts the application to plan the best breeding solution.

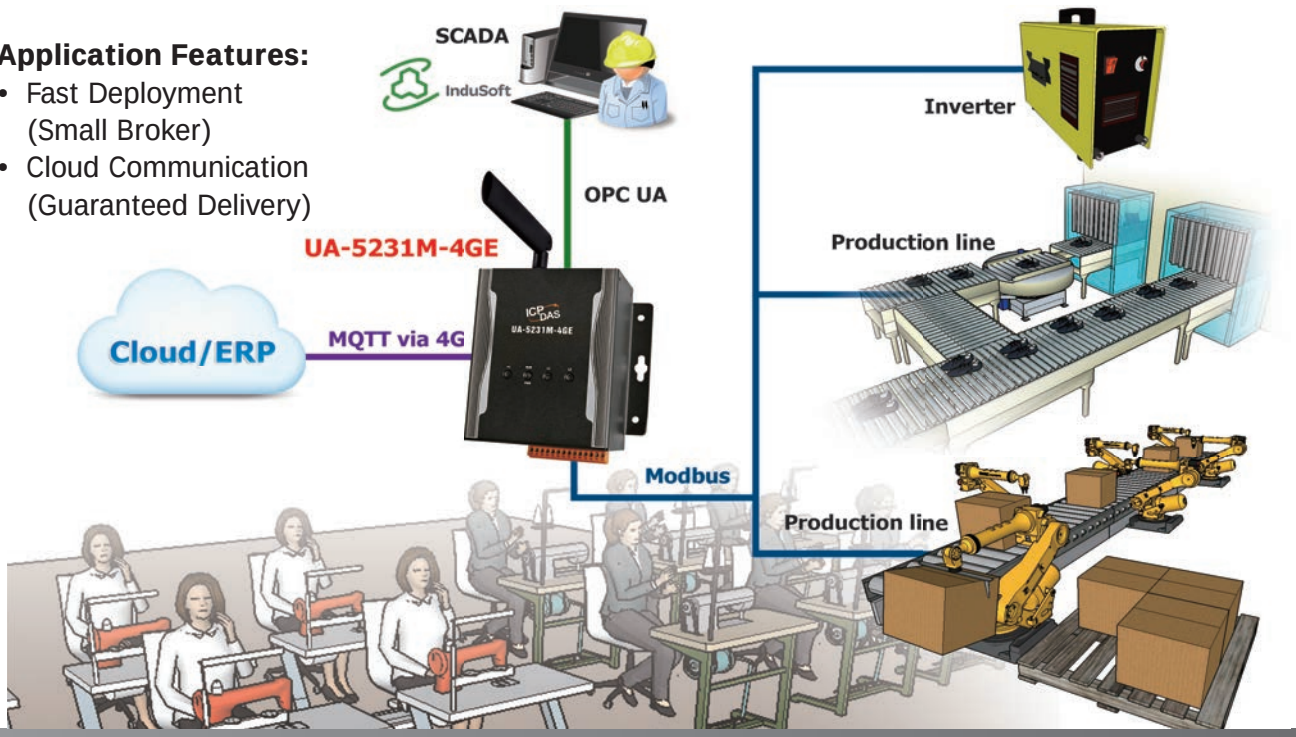


Factory Automatic Solution

The factory automatic solution uses the UA controller to obtain the information such as the safety status of the production line and the temperature, voltage and current status of the inverter, then transmits them to the SCADA control system for real-time factory management. Besides, the 4G wireless can help to integrate the machine status, temperature, product yield, production parameters, electricity consumption, etc. into the ERP system via the MQTT protocol for managing the production of the global factories.

Application Features:

- Fast Deployment (Small Broker)
- Cloud Communication (Guaranteed Delivery)

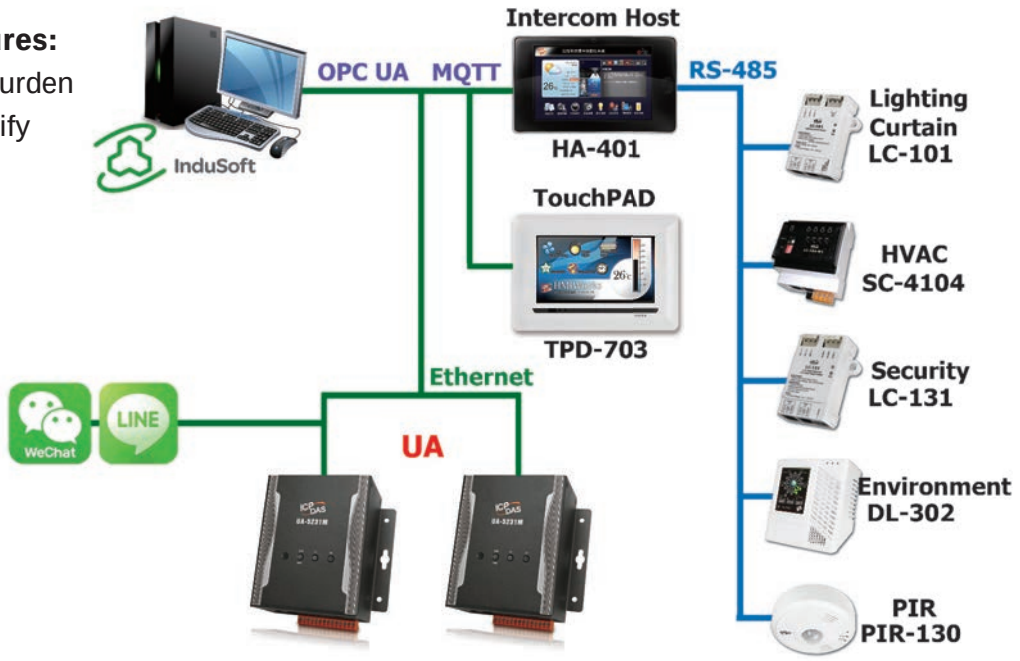


BA Smart Building IoT Application

This IoT application mainly combines the video intercom indoor host HA-401 with the lighting control, air conditioning, security, temperature, humidity, PM2.5, CH4, HCHO, and other harmful substance sense devices to create a safe and comfortable environment. When there is a special situation happens, UA can quickly trigger the event, send a notify to the Web App (ex: LINE, Weibo, Twitter, etc.). The dual UA architecture can reduce the system burden.

Application Features:

- Reduce System Burden
- APP Message Notify

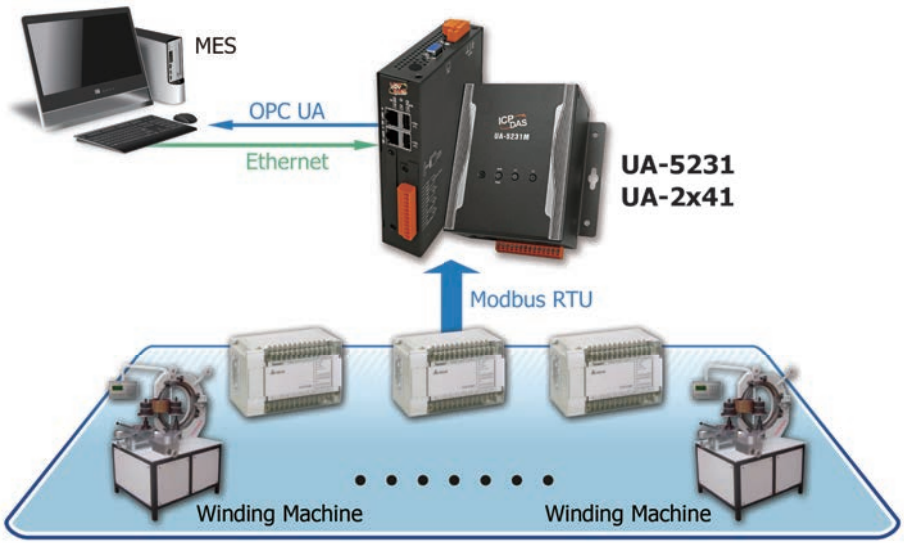


IIoT Factory Application of MES

The Manufacturing Execution System (MES) communicates the factory equipment via OPC UA Client, and the OPC UA Service of the UA-5200 series can seamlessly integrate the system and equipment. The MES is the main solution for today's factory system, and the UA-5200 series IIoT Communication Server is the best choice for the IIoT factory solution.

Application Features:

- Convenient for System Integration
- Unified Access Interface



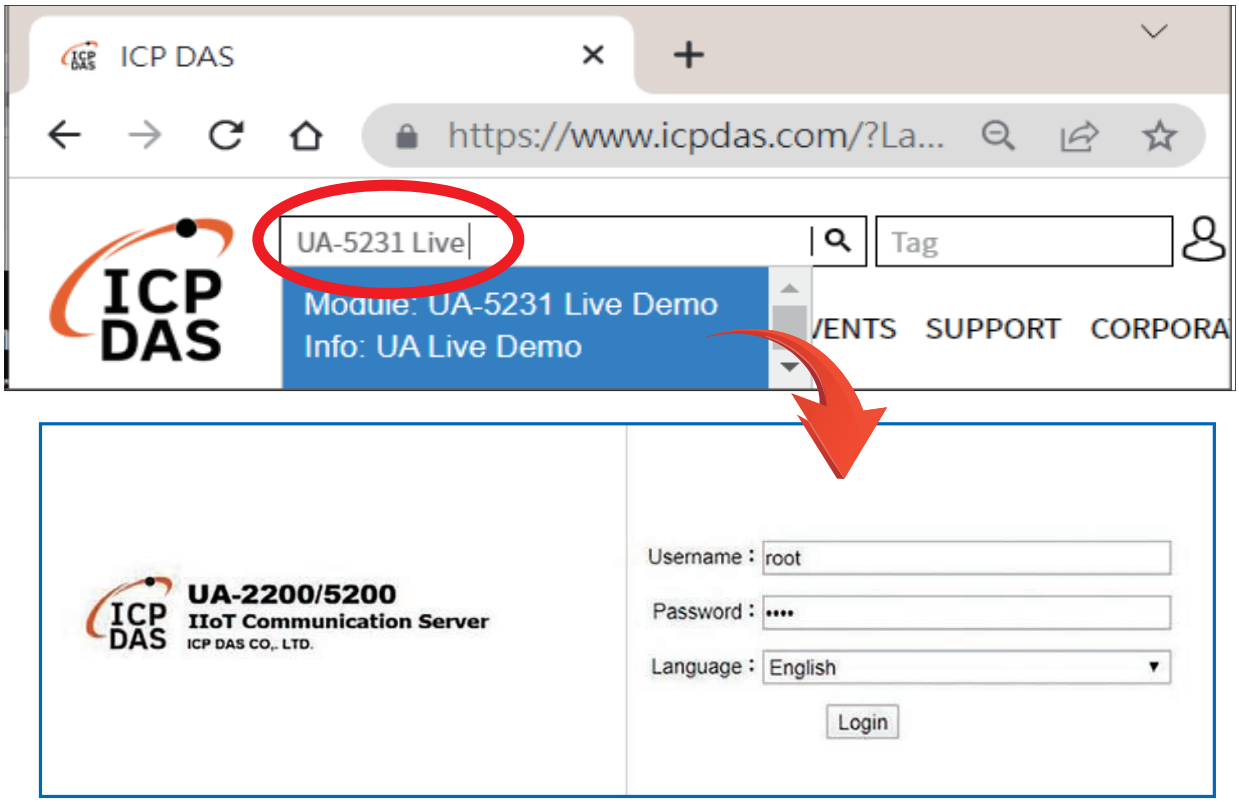
Pumping Station IoT Application

This application is mainly about how to manage the pumping device data from stations. UA-5231 series uploads the data of all pumping stations to the control center and manages/configures with the IWS software. In this case, the UA-5231 shortens the configuring and adjusting time. Without the complicated PC configuration, the UA-5231 directly connect the Modbus and OPC UA Server by completing all configuration easily and efficiently on the web.

Application Features:

- Cross Web Domain
- Security

UA-5231 Live Demo:



CH3.MQTT Communication Server: BRK Series

BRK-2000 Series

BRK Series IIoT MQTT Communication Server

Quad-core ARM CPU and 2 Ethernet Ports

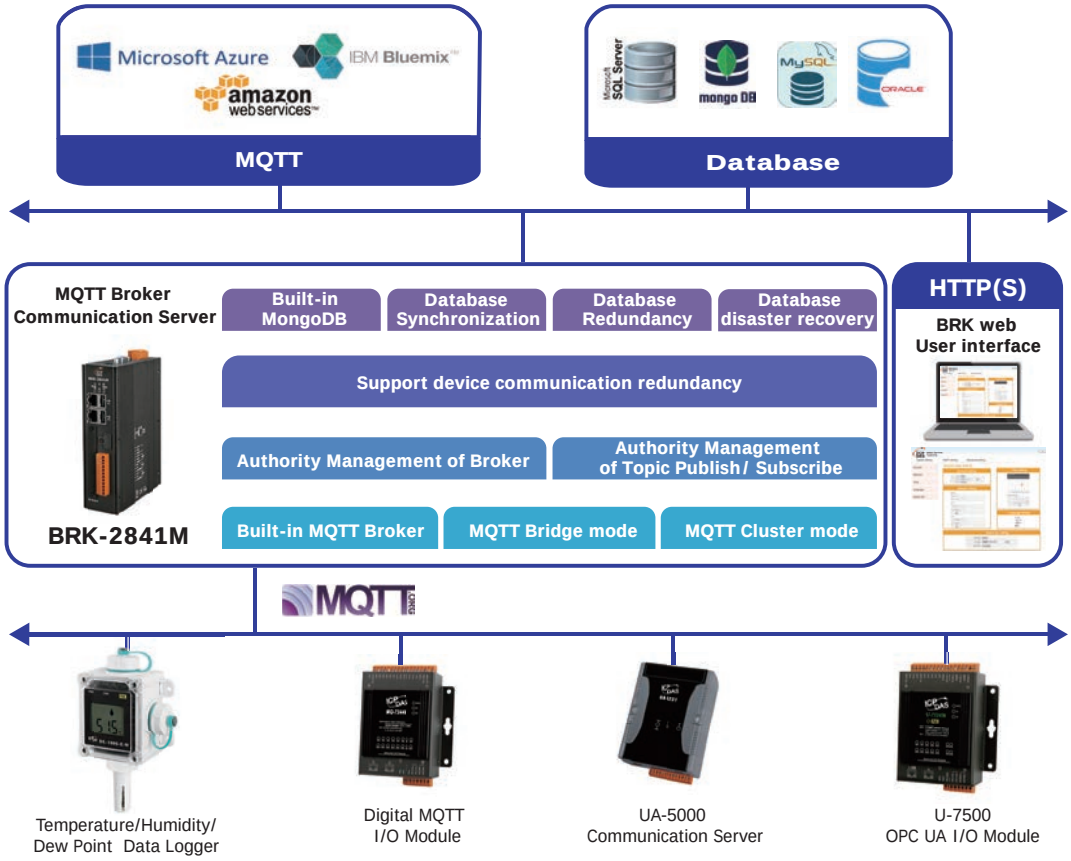
Features

- Built-in database (MongoDB)
- Communication Redundancy Architecture – rapid setup
- Information Security Protection – Multiple Mechanism
  - HTTPS
  - Management of Broker permissions
  - Management of Topic Publish/Subscribe
- MQTT Broker – Bridge and Cluster
  - Bridge Function
  - Cluster Function
  - QoS Message Quality Mechanism
  - Retains Mechanism
  - Last Message (Last Will)

Introduction :

BRK Series is an Communication Server that specially provides Broker function of MQTT protocol for MQTT message distribution and concentrator in M2M and Industrial Internet of Things environments. The BRK Series is compatible with the MQTT version V.3.1, V.3.1.1 and V.5.0 protocol. It supports many functions such as QoS message quality mechanism, retains mechanism, identity authentication, communication encryption, last message (Last Will), and bridge. The method of Web UI settings can quickly set up BRK functions. This reduce the burden of setting up the broker by user oneself and the maintenance cost. Besides, BRK Series provides Bridge, Cluster, Load Balancer, and High Availability functions. By forming multiple BRK Series a group to a better Redundancy system can prevent field systems from stopping services due to hardware or network failures.

System Architecture:



Advantages/Features:

Built-in database

■ Support MongoDB

BRK-2841M can record the collected data into the built-in MongoDB without the added extra database.

■ Data Redundancy

Two or more BRK-2841M consist of a redundancy group in which all databases are synchronized to achieve data redundancy.

■ Database Failover

BRK-2841M in the same redundancy group will monitor each other to see if they are functioning properly, and in case of failure, the rest of the devices will take over to ensure that the database recording is not interrupted.

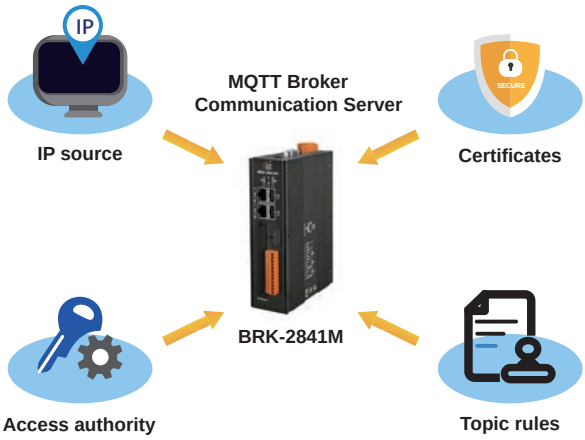
Communication Redundancy Architecture – rapid setup

■ Redundancy System

Information Security Protection – Multiple Mechanism

■ HTTPS

The built-in web server support HTTPS protocol which is authentication of accessed website to protects against man-in-the-middle attacks and ensure the privacy and integrity of exchanged data while it is in transit.



■ Management of Topic Publish/Subscribe

Allow/prohibit publish/subscribe to Topics, to normalize the publish/subscribe privileges of Topics by Clients who have passed the first stage of filtering, and to prevent important Topics from being modified with or read by others.

■ Management of Broker permissions

Allow/prohibit connection requests to the Broker from specific IP addresses, Client IDs, or Broker users, and perform the first stage of filtering from the connection to improve the stability and security of the Broker.

MQTT Broker – Bridge and Cluster

■ Support MQTT Bridge

Under Bridge Mode allows multiple Brokers to communicate and transfer data.
Following introduce the features of Bridge Mode:

- Transfer data to specific Brokers according to predefined rules.
- Subscribe to specific Topics on the Bridge node and transfer or forward them to local or remote Brokers after receiving the data.

■ Support MQTT Cluster

In Cluster Mode, two or more BRK-2841M work together to ensure the consistency and availability of MQTT services, which is very important for enterprises that cannot afford downtime.

Selection Guide:

Hardware Specifications

Model	BRK-2841M
Main Unit	
CPU	Quad-core ARM CPU, 1.6 GHz/Core
System Memory	DDR3 SDRAM 2 GB
Storage	eMMC 8 GB
Non-Volatile Memory	FRAM 64 KB, MRAM 128 KB
Ethernet	
Ports	RJ-45 x 2, 10/100/1000 Base-TX (Auto-negotiating, Auto MDI/MDI-X)

Model	BRK-2841M
Power	
Input Range	+12 ~ +48 VDC
Consumption	4.8 W
Environmental	
Operating Temperature	-25 ~ +75 ° C
Storage Temperature	-40 ~ +80 ° C
Humidity	10 ~ 90% RH,Non-condensing

Software Specifications

Model		BRK-2841M
Function		
Built-in database	Support MongoDB	Data can be recorded directly into the built-in database, additional database setup is not required.
	Data Redundancy	Two or more BRK-2841Ms consist of a redundancy group in which all databases are synchronized to achieve data redundancy.
	Database Failover	BRK-2841Ms in the same redundancy group will monitor each other to see if they are functioning properly, and in case of failure, the rest of the devices will take over to ensure that the database recording is not interrupted.
	Writing Speed	20 times/second
Communication Redundancy Architecture – rapid setup	Redundancy System	Two or more BRK-2841M consist of a redundant group, all the devices in the group monitor each other, and when the host that mainly provides MQTT service fails, the redundant device will take over and continue to provide MQTT service to achieve Broker redundancy.
Information Security Protection – Multiple Mechanism	HTTPS	The built-in web server supports HTTPS to ensure secure communication between the server and the browser.
	Authority Management of Broker	Allow/prohibit connection requests to the Broker from specific IP addresses, Client IDs, or Broker users, and perform the first stage of filtering from the connection to improve the stability and security of the Broker.
	Management of Topic Publish/Subscribe	Allow/prohibit publish/subscribe to Topics, to normalize the publish/subscribe privileges of Topics by Clients who have passed the first stage of filtering, and to prevent important Topics from being modified with or read by others.
MQTT Broker – Bridge and Cluster	Max. Number of Clients	100000 connections
	Max. Number of Topics	100000 records
	Support MQTT Bridge	In Bridge mode, you can transfer data between multiple Brokers. ·Transfer data to specific Brokers according to predefined rules. ·Subscribe to specific Topics on the Bridge node and transfer or forward them to local or remote Brokers after receiving the data.
	Support MQTT Cluster	In Cluster Mode, two or more BRK-2841Ms work together to ensure the consistency and availability of MQTT services, which is very important for enterprises that cannot afford downtime.

Applications:

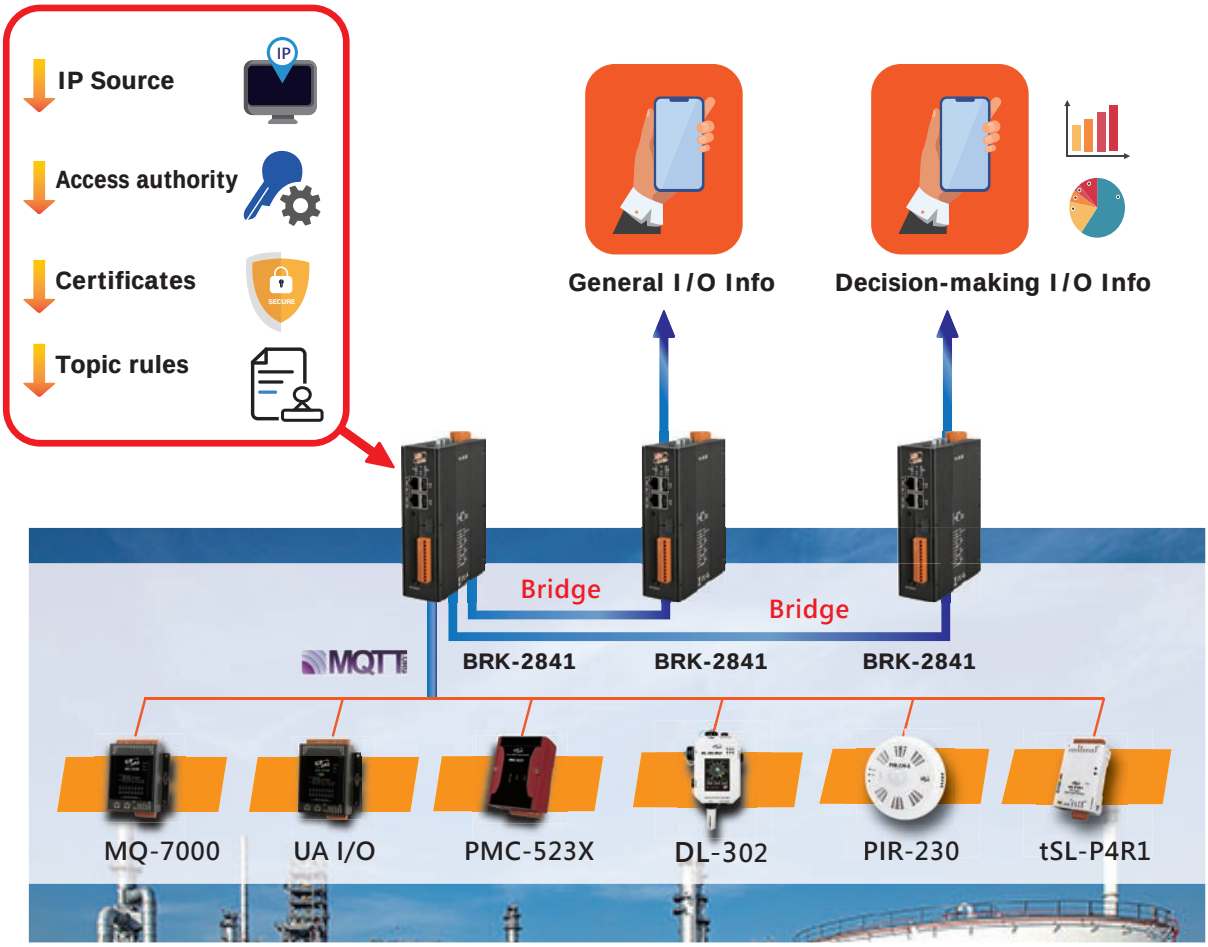
BRK Data Security Management Applications

Many corporations have large factories, ex: manufacturing, and some areas (ex: confidential data areas or clean rooms) require access control, which causes inconvenience in entering and exiting that takes longer when need troubleshoot. The corporations often take remote control systems to solve the problem. However, the remote control will expose the devices to the external network environment. As long as any device in the system has a data security vulnerability, the entire system may be attacked or even paralyzed.

ICP DAS provides BRK-2000 Series MQTT Bridge Architecture. Through the MQTT Bridge mechanism, only the Topics and permissions that are authorized to be transmitted will send to the Remote Broker in the Bridge Architecture. And the built-in MQTT connection authentication methods such as Account/Password, Client ID, Certificates, etc., to increase the security of the communication to protect data. When doing the remote control, the operations are only to the Remote Broker. The equipment network in the factory can separate from the external network. If the external network communication is abnormal, the internal factory system can still operate without external influence.

Why Choose MQTT Bridge?

- **Safety:**
  Separate Monitor/Control
  ➡ Improve Data Security
- **Management:**
  Separate Areas
  ➡ Classify Infomation Security Management



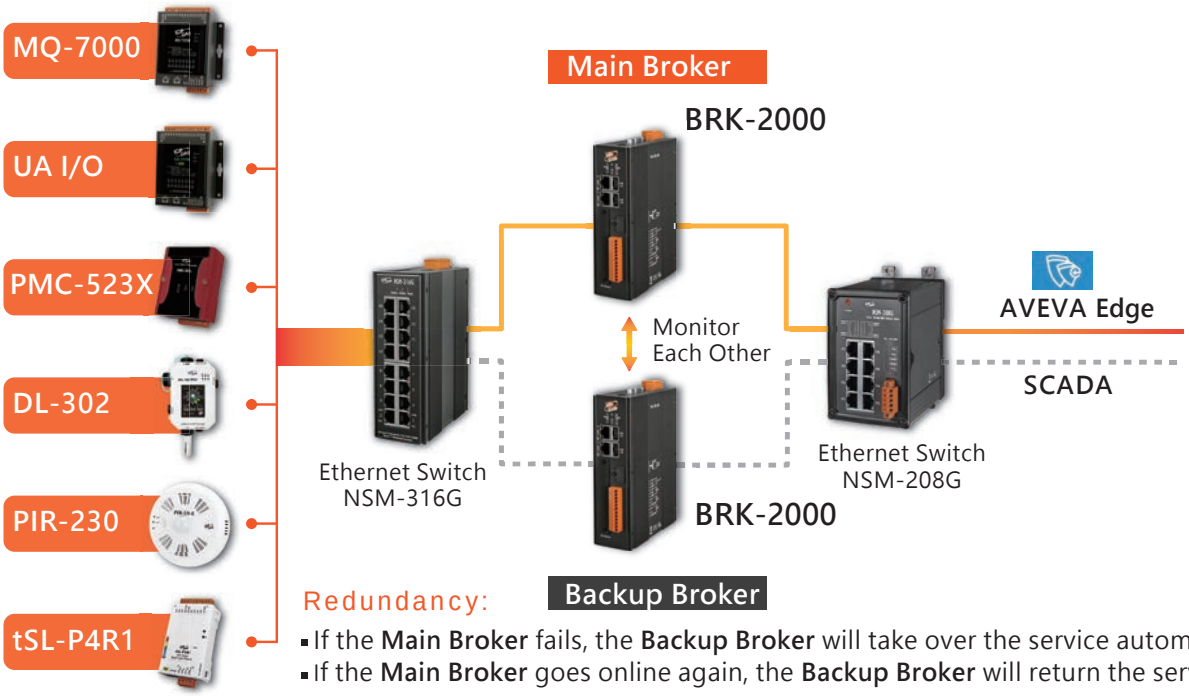
BRK Redundancy Architecture Application

With the development of the Internet of Things, more companies widely use Machine-to-Machine communication to track on-site producing processes, machine operating conditions, report errors, and issue service alerts in real-time. Under the needs, how to protect data from natural disasters and man disasters that damage the system or data has always been the main topic.

ICP DAS provides the BRK Redundancy Architecture for a solution that uses two BRK-2000 Series, one BRK-2000 (Main Broker) provides the MQTT services, and the other is used as a standby backup (Backup Broker) monitor the Main Broker at any time. Once the Main Broker is abnormal (such as shutdown without warning), the standby Backup Broker will take over in time. The MQTT service will not be interrupted, the system manager will have more time to deal with the problem, and the entire system will continue work.

Why Choose MQTT Redundancy?

- **Non-Stop Service:**
  About 5 sec. to switch, no time stamp.
- **Load Balancer Function:**
  Effectively allocate CONN. and COMM.



Redundancy:

- If the **Main Broker** fails, the **Backup Broker** will take over the service automatically.
- If the **Main Broker** goes online again, the **Backup Broker** will return the service.

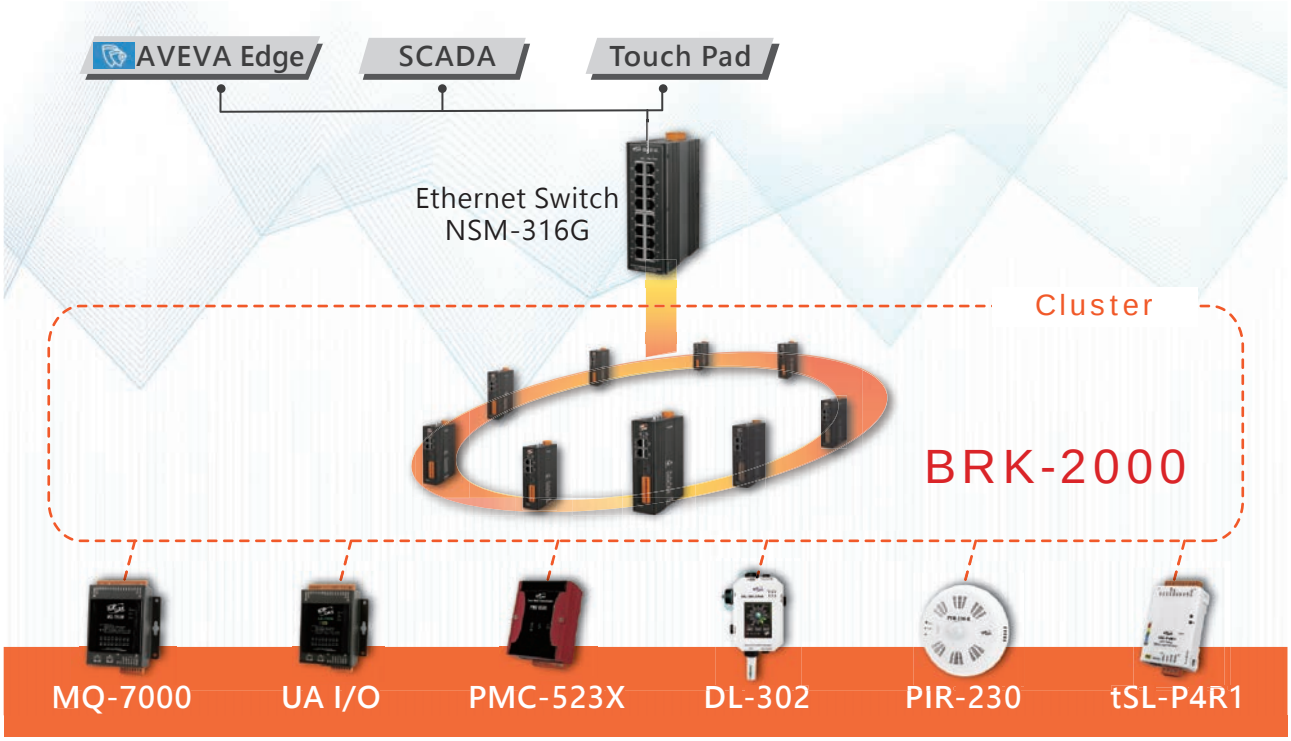
BRK Cluster Architecture Application

The manufacturing industry often deploys sensors to collect the machine status of the production process, parameters, etc. to improve production efficiency, control quality, and reduce the production line shut down due to equipment failure. The sensors send these data to the control center to perform calculations and visualization so that the on-site person can instantly get the status of the production process. However, during the data collection process, the control center may not get the field devices data due to the failure of the network traffic.

To solve this problem, ICP DAS provides the BRK-2000 Series Cluster Architecture that uses two and more BRK-2000 to form a High Availability Cluster. The BRK devices in the Cluster share to do the MQTT services. Since the BRK devices in the Cluster can complete the same tasks, if one BRK fails, other BRK devices can continue to work, thus ensuring the nonstop of MQTT services. BRK-2000 has a built-in Load Balancer function, which allows connection services to be equally distributed in the Cluster, making full use of the processing capabilities of each Broker in the Cluster and improving the processing efficiency of tasks.

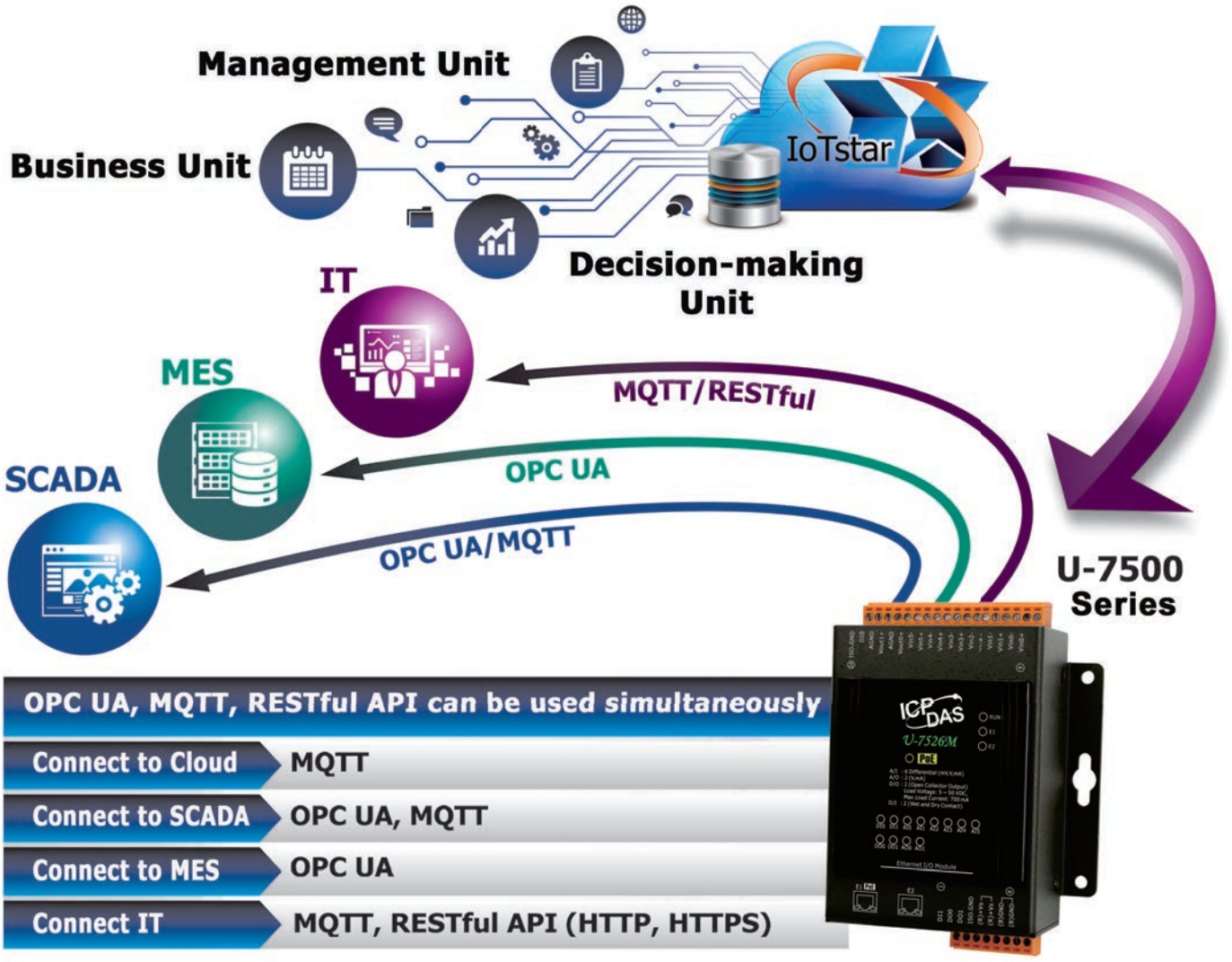
Why Choose MQTT Cluster?

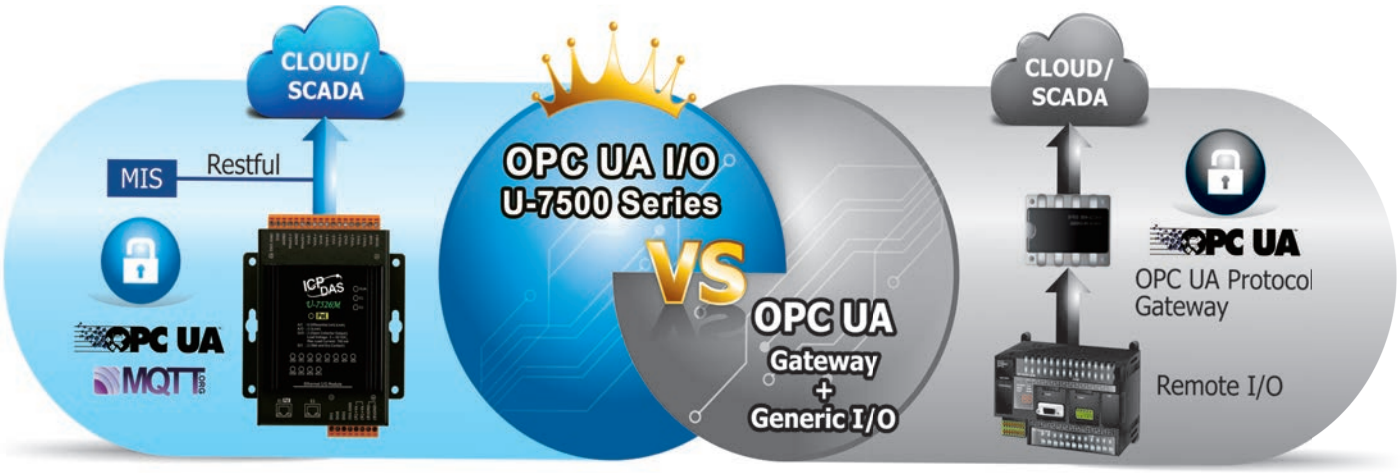
- **Hot-Add:**
  Non-Stop Expansion.
- **High Availability:**
  Non-Interrupted System.



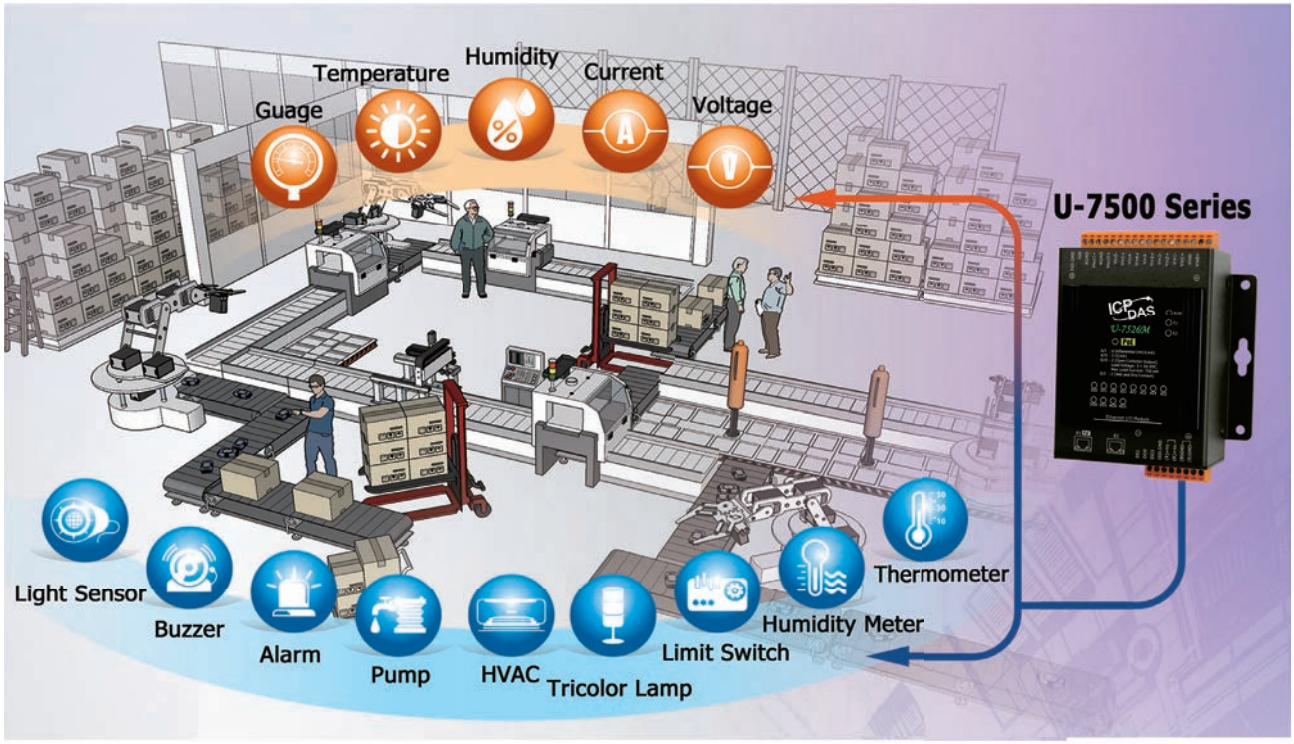
CH4. UA I/O Module: U-7000 Series

IT/OT Connection





Device Connectivity Solutions



Advantages

Information Security	HTTPS, Port Binding, Allowlist, ICMP drop
Data Security	Certificate (X.509), Communication Encryption (SSL/TLS)
Logic Control	IF(AND/OR), THEN, ELSE Menu Setting, Output Groups, Linkage Control
Scheduling	Daily Scheduling Weekly Scheduling Weekly Scheduling Exceptions
Event Log	Record when I/O status or value changes

UA I/O Module: U-7000 Series

U-7500 Series

Features:

- Support OPC UA Server/Client and MQTT Client Protocol
- Support RESTful API via HTTP and HTTPS
- Support to Execute OPC UA, MQTT and RESTful API Simultaneously
- Support Scaling For Analog Signal Converting
- Support Logic Function Rule Setting: IF, THEN, ELSE
- Support Schedule: to Execute the Set Rules at a Specific Time.
- Support Event Log: Record the I/O Change for Device Tracking
- Built-in Web Server to Provide the Web User Interface
- Built-in I/O Channels (DI, DO, AI, AO)
- Dual-port Ethernet Switch for Daisy-Chain Topology
- IEEE 802.3af-compliant Power over Ethernet (PoE)

Intrudoction

UA I/O Module, also called **UA I/O** or **U-7500 Series,** is a series of Ethernet I/O modules with built-in **OPC UA Server/Client** and **MQTT Client**. It has a built-in dual-port Ethernet switch to implement daisy-chain topology. The cabling is much easy and can reduce the total cable and switch cost. It follows IEEE 802.3af (Class 2) compliant Power over Ethernet (PoE) specifi cation. 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.

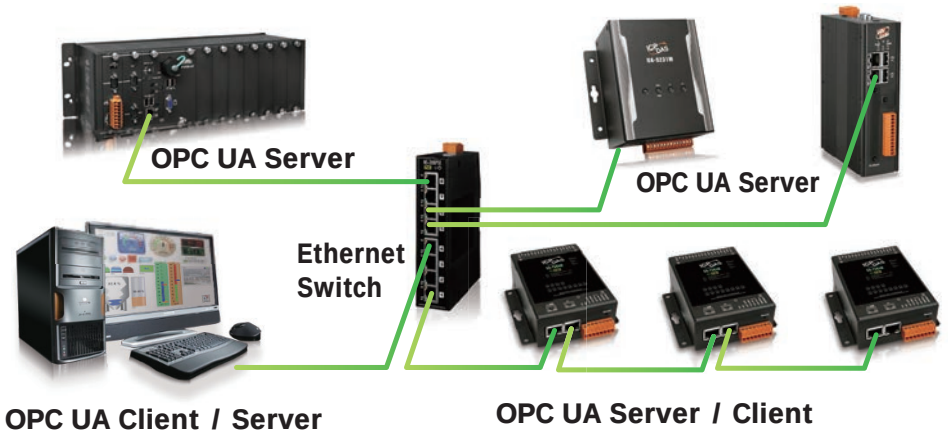
In industrial communication, UA I/O provides OPC UA Server, MQTT Client and RESTful API protocols (can execute all communications at the same time.). Users can choose the networking mode according to their cases. And to transmit the values of the built-in I/O channels to the Cloud IT system or field control system for reading and writing. 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 specifi c time; support RESTful API function, can read/write I/O and virtual point through HTTP or HTTPS.

We provide the following functions to enhance the I/O networking security respectively:

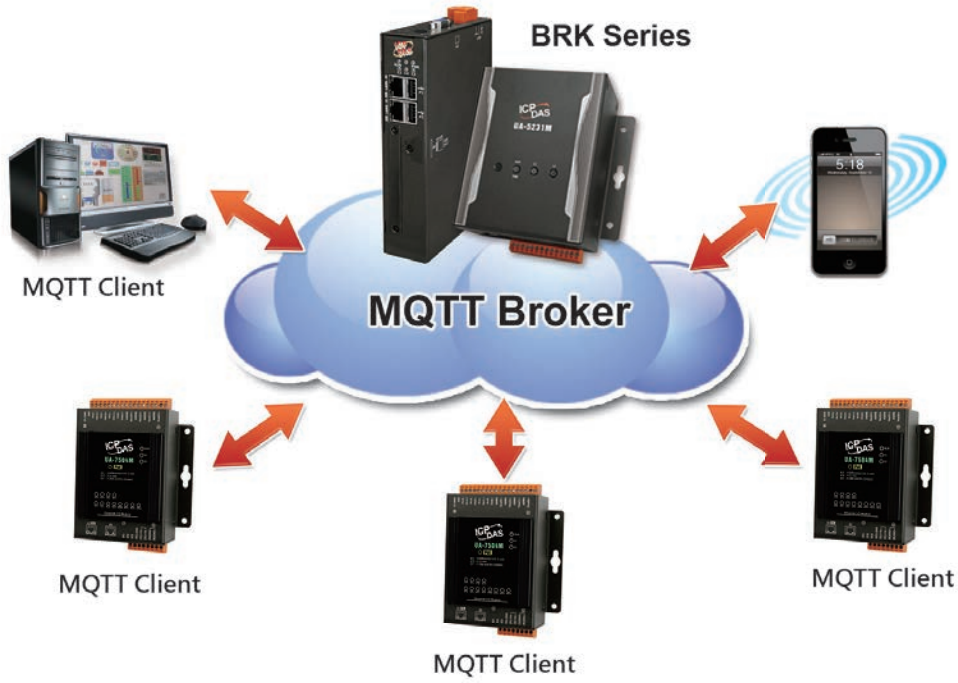
Connectivity for various platforms	OPC UA, MQTT, RESTful API can be used simultaneously
Connect to Cloud	OPC UA, MQTT
Connect to SCADA	OPC UA, MQTT
Connect to MES	OPC UA
Connect to IT	MQTT, RESTful API (HTTP, HTTPS)

Security	I/O Networking Security Functions
Information Security	HTTPS, Port Binding, Allowlist, ICMP drop
Data Security	Certificate (X.509), Communication Encryption (SSL/TLS)

OPC UA Architecture:



MQTT Architecture:



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

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

Software Features:

Protocol	
OPC UA Server/Client	● OPC Unified Architecture: 1.02 ● Core Server Facet ● Data Access Server Facet ● Method Server Facet ● UA-TCP UA-SC UA Binary ● User Authentication: - Anonymous - Username/Password - X.509 Certificate ● Security Policy: - None - Basic128Rsa15 (Sign, Sign & Encrypt) - Basic256 (Sign, Sign & Encrypt) - Basic256Sha256 (Sign, Sign and Encrypt) - Aes128Sha256RsaOaep (Sign, Sign & Encrypt) - Aes256Sha256RsaPss (Sign, Sign & Encrypt) ● Max. Session Connections: 3 ● Can Execute with MQTT and RESTful API Communication Simultaneously
MQTT Client	● Connect to the MQTT Broker to read orcontrol the I/O channel value by thepublish/subscribe messaging mechanism. (MQTT Ver. 3.1.1; TLS Ver. 1.2)
RESTful API	● User can read/write the I/O & Virtual points through HTTP and 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/O.
Security	● Infromation 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 UAI/O do automatic condition judgment and actioncontrol, to achieve simple intelligentization.
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.

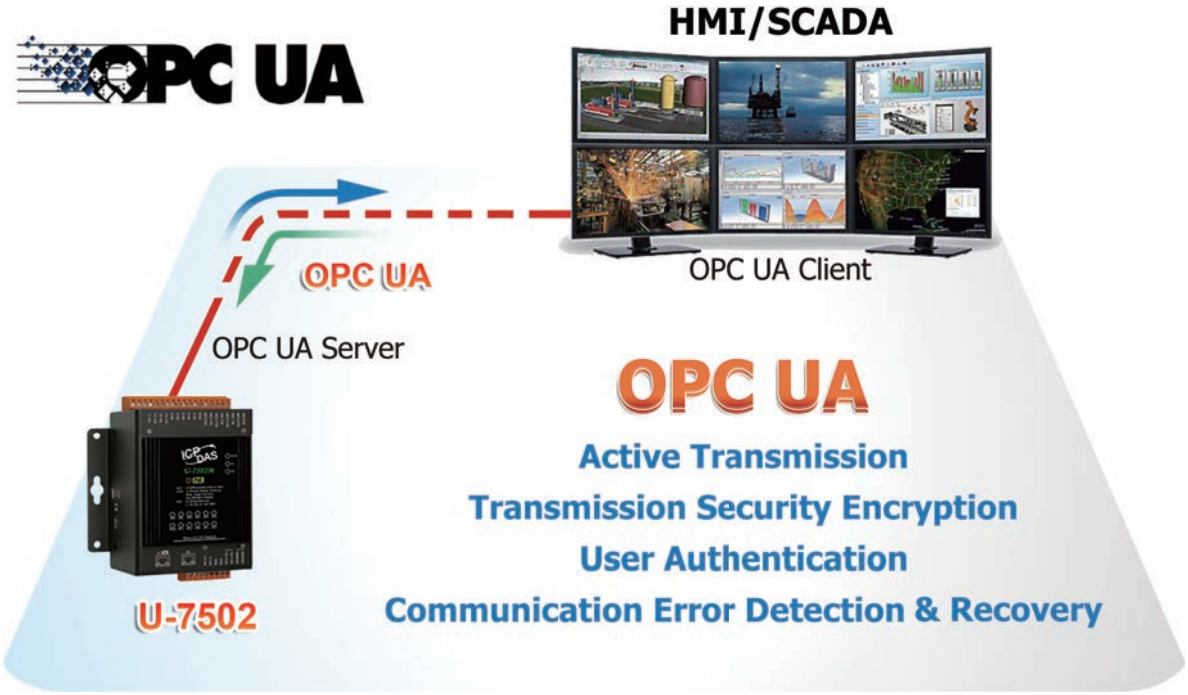
Selection Guide:

Module	AI		AO		DI		DO	
	Ch.	Type	Ch.	Type	Ch.	Type	Ch.	Type
U-7502M	3	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, +0 mA ~ +20 mA, ±20 mA, 4 ~ 20 mA	-	-	6	Wet (Sink/Source)	3	Power Relay Form A (SPST N.O.)
U-7504M	4	±500mV, ±1V, ±5V, ±10V, 0~20mA, ±20mA, 4~20mA	4	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	4	Dry (Source), Wet (Sink)	-	-
U-7515M	7	Pt100, Pt1000, Ni120, Cu100, Cu1000	-	-	-	-	-	-
U-7517M	8	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	-	-	-	-	4	Isolated Open Collector (Sink)
U-7517M-10	10 / 20	±150mV, ±500mV, ±1V, ±5V, ±10V, ±20mA, 0~20mA, 4~20mA	-	-	-	-	-	-
U-7518ZM/S	10	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA Thermocouple: J, K, T, E, R, S, B, N, C, L, M, LDIN43710	-	-	-	-	3	Isolated Open Collector (Sink)
U-7518ZM/S2								
U-7519ZM/S	10	±150mV, ±500mV, ±1V, ±5V, ±10V, ±20mA, 0~20mA, 4~20mA Thermocouple: J, K, T, E, R, S, B, N, C, L, M, LDIN43710	-	-	-	-	3	Isolated Open Collector (Sink)
U-7519ZM/S2								
U-7524M	-	-	4	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	5	Dry (Source), Wet (Sink)	5	Isolated Open Collector (Sink)
U-7526M	6	±500 mV, ±1V, ±5V, ±10V, 0~20mA, ±20mA, 4~20mA	2	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	2	Dry (Source), Wet (Sink)	2	Isolated Open Collector (Sink)
U-7528M	-	-	8	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	-	-	-	-
U-7542M	-	-	-	-	-	-	16	Isolated Open Collector (Sink)
U-7544M	-	-	-	-	8	Wet (Sink,Source)	8	Isolated Open Collector (Sink)
U-7545M	-	-	-	-	-	-	16	Isolated Open Collector (Source)
U-7550AM	-	-	-	-	12	Dry (Source) Wet (Sink)	6	Isolated Open Collector (Sink)
U-7551M	-	-	-	-	16	Wet (Sink,Source)	-	-
U-7552M	-	-	-	-	8	Wet (Sink,Source)	8	Isolated Open Collector (Source)
U-7553M	-	-	-	-	16	Dry (Source)	-	-
U-7555M	-	-	-	-	8	Dry (Source), Wet (Sink,Source)	8	Isolated Open Collector (Source)
U-7558M	-	-	-	-	8	Wet (Sink/Source)	-	-
U-7559M	-	-	-	-	6	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.)

Features:

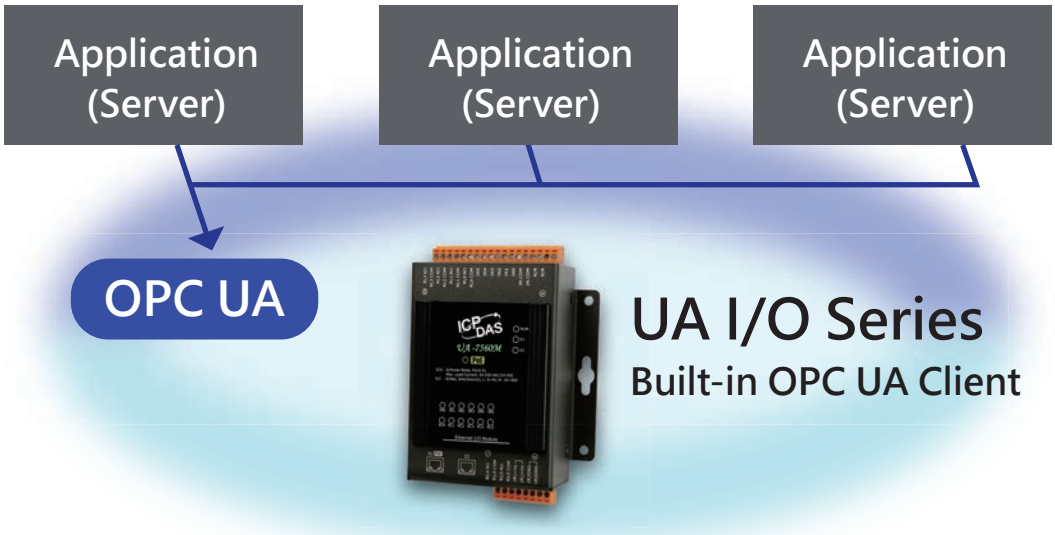
Built-in OPC UA Server Service

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



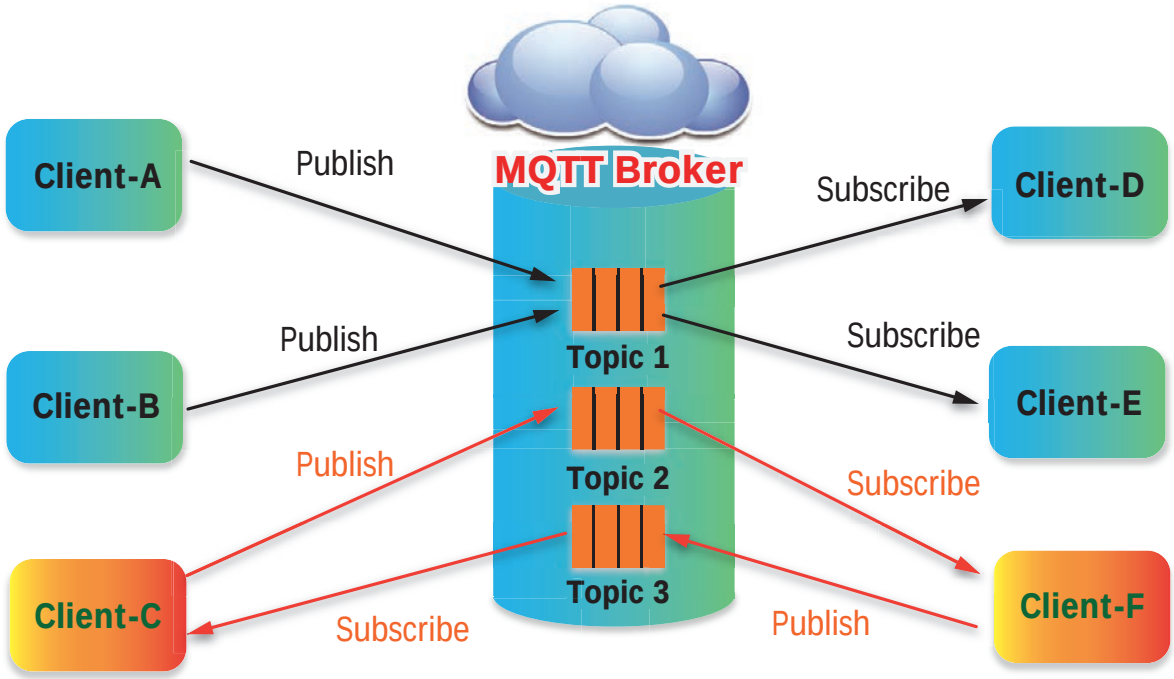
Built-in OPC UA Client Service

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

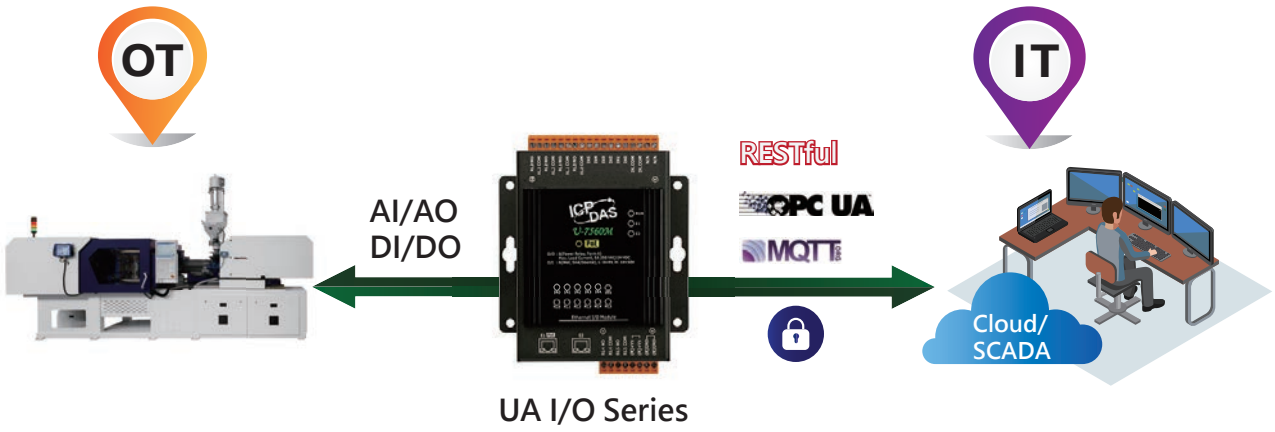


Built-in MQTT Client Service

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

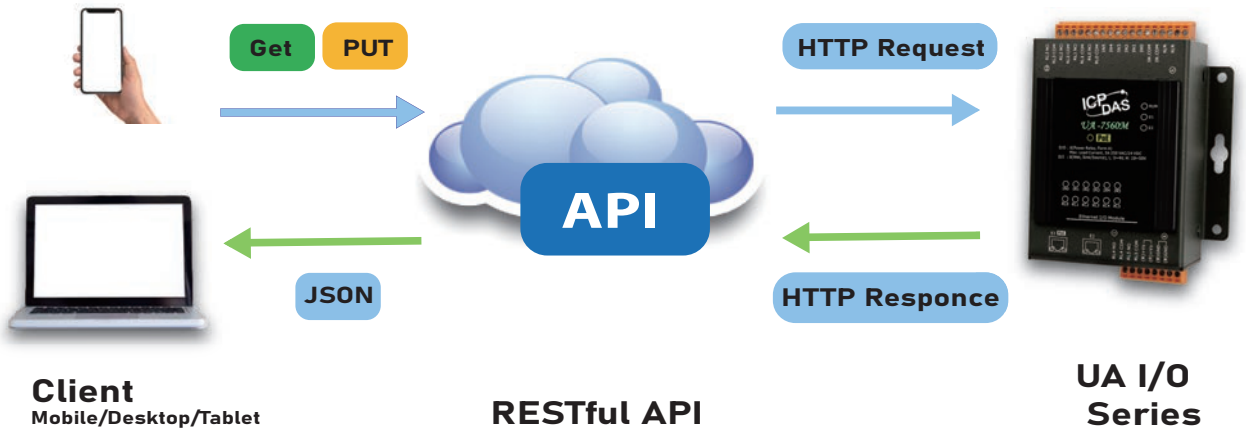


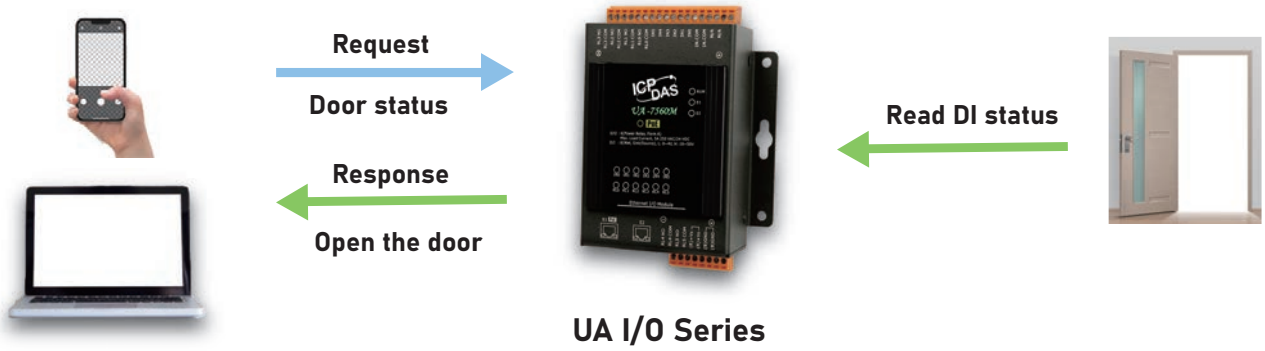
Support to Execute OPC UA , MQTT and RESTful API Communication at the Same Time

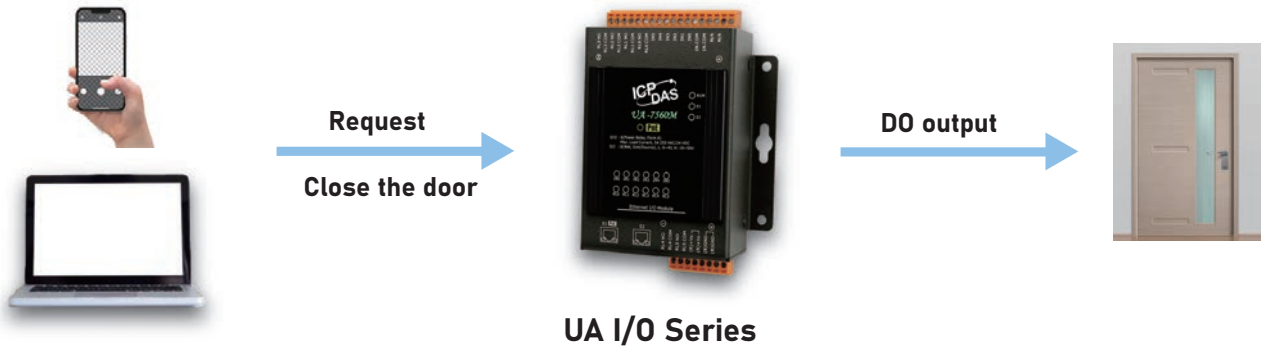


Support RESTful API Function

Can read/write I/O and virtual point through HTTP.
Provide high-security HTTPS (identity verification and communication encryption) to read/write I/O and Virtual points.





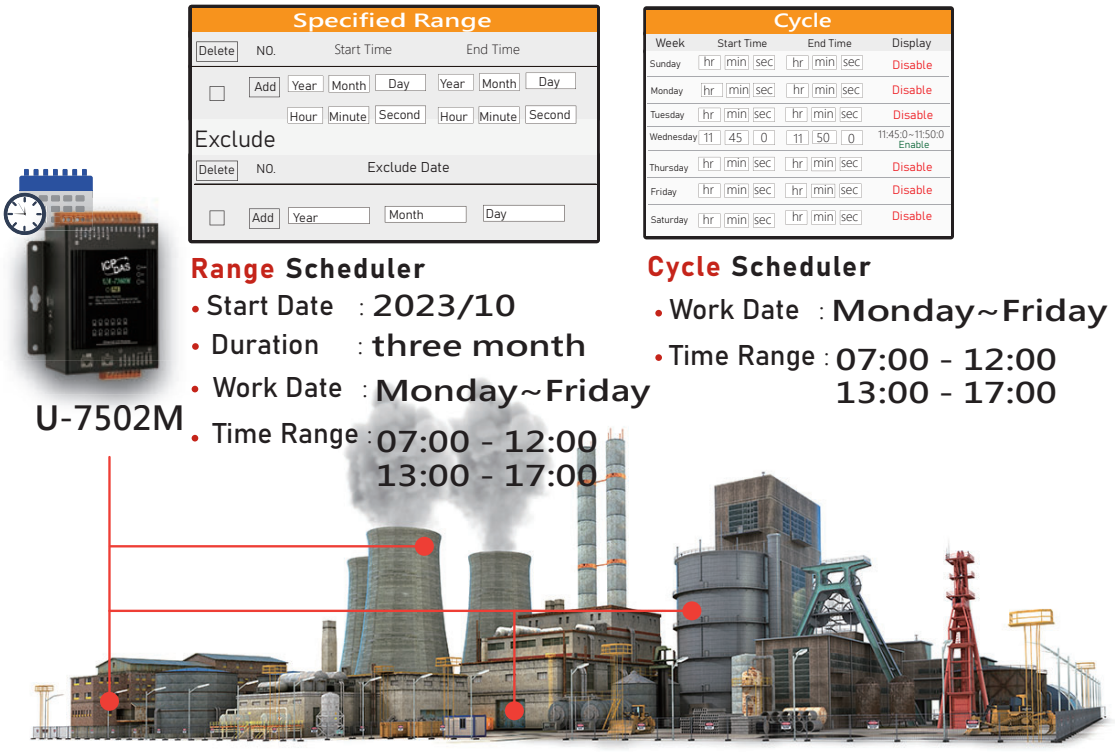


Support IoTstar Cloud Management Software

UA I/O factory version 9.7 and later supports this function.

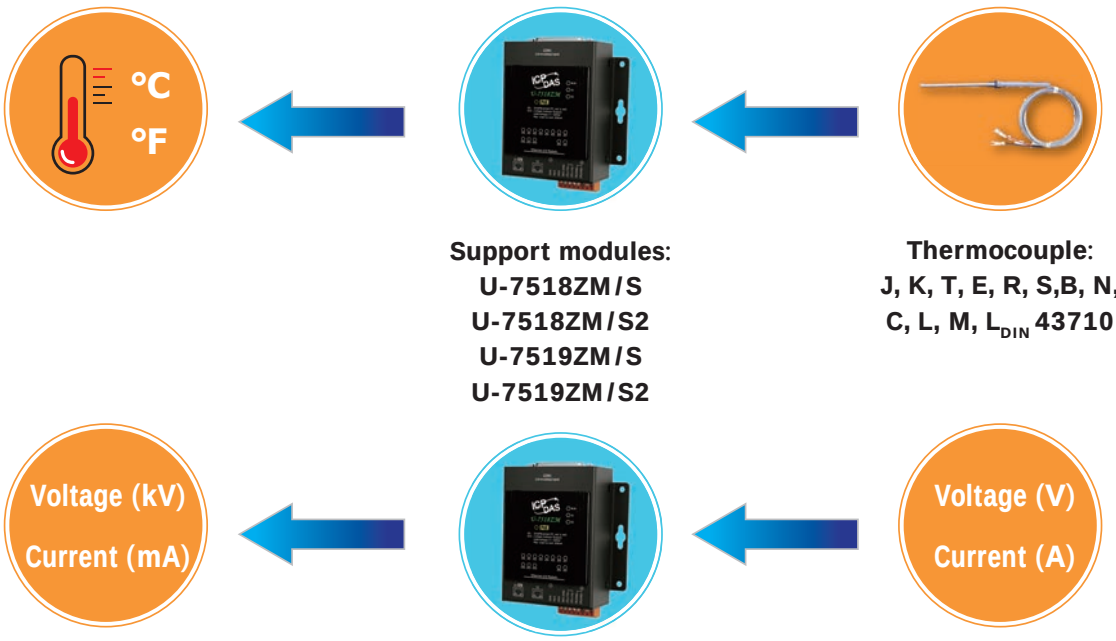
Support Schedule

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



Support Scaling

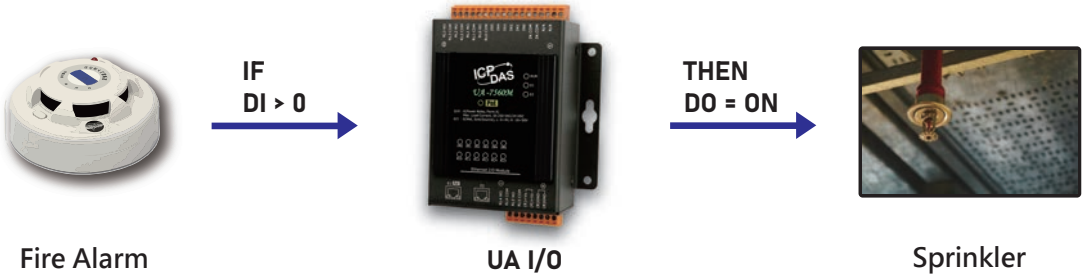
AI/AO modules support Scaling. Let the analog signal be converted into a more readable value.



Support Logic Function Rule Setting: IF, THEN, ELSE

Users can set up logical condition/action for I/O and virtual point.

IF	THEN	ELSE
DI	DO	DO
DO	AO	AO
AI	Software Point	Software Point
AO	Delayed	Delayed
Software Point	IO Control	IO Control
	Gearing	Gearing

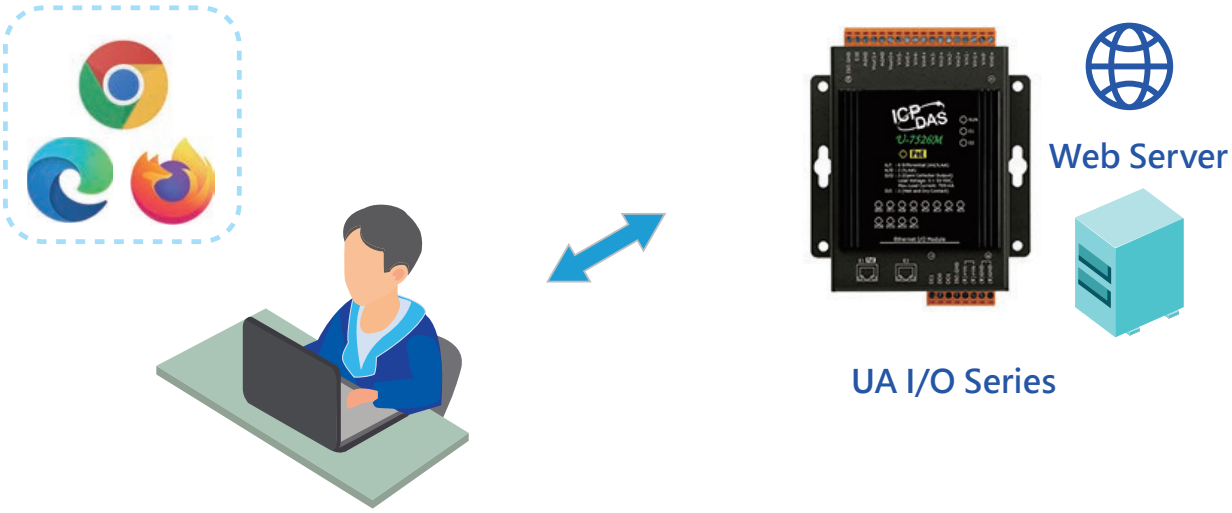


Support Event Log

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

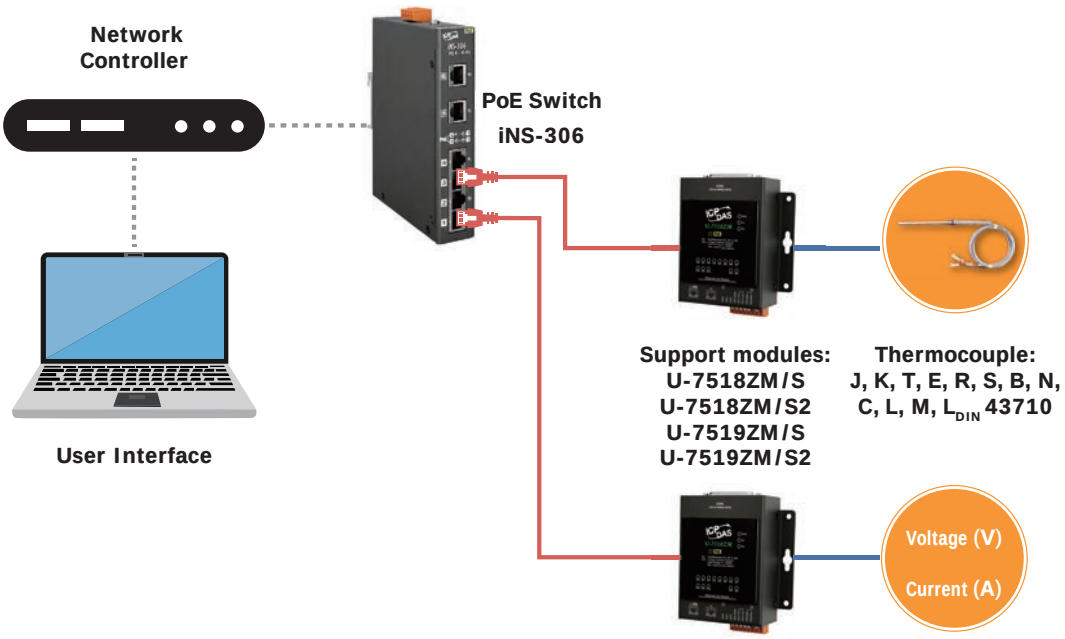
UA I/O Series provides a Web-based User Interface (Web UI) to configure the module, control the output channels, monitor the connection, and I/O status via a normal web browser. It is easy, fast, and no extra APP needed.



The users open a web page with a browser.

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.



Applications:

UA I/O Module Motor Monitoring Applications

[Customer Needs]

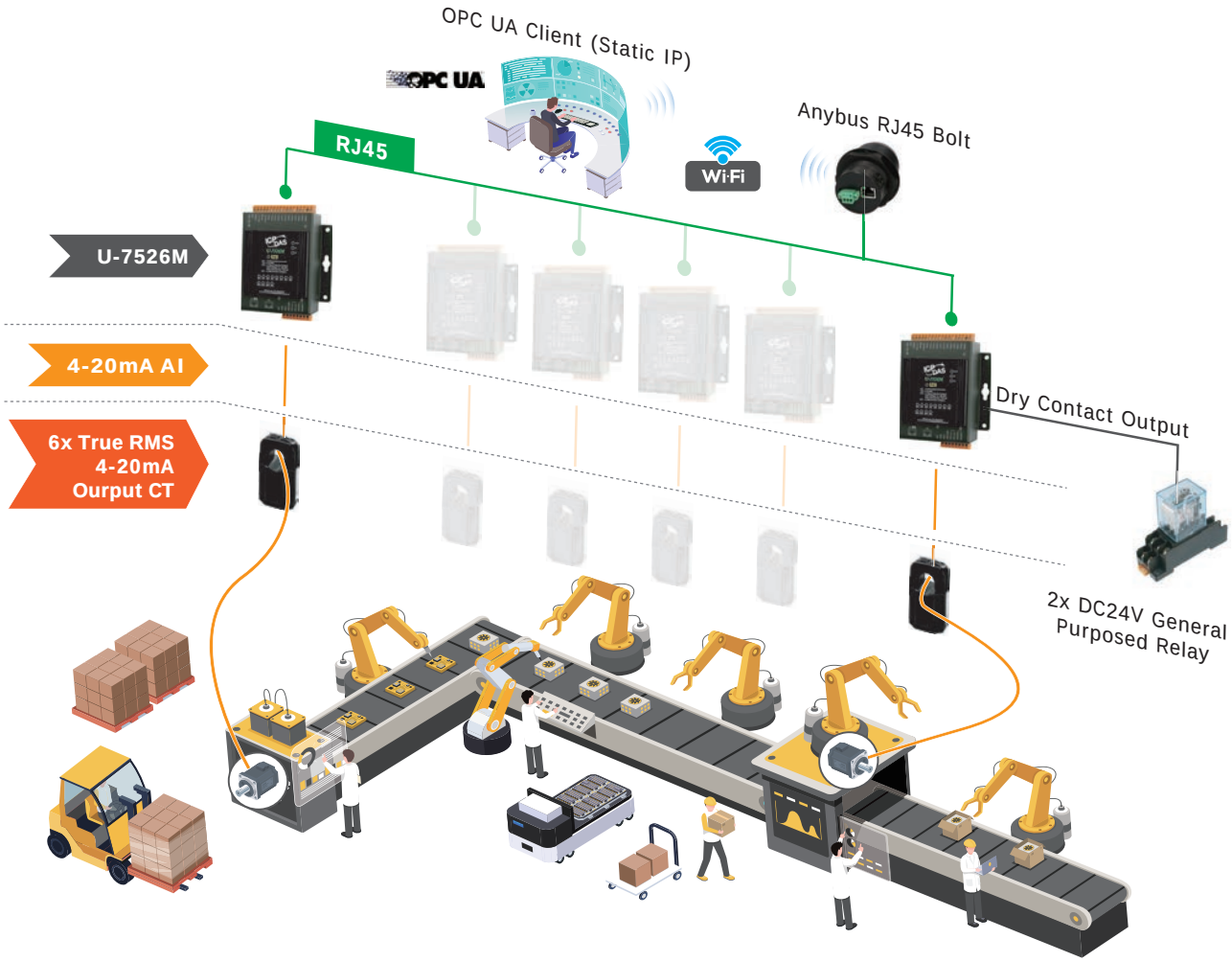
1. Monitoring the motor special-output current in the factory
2. High security data transmission
3. Monitor the factory through wireless according to the client's needs

- **1. Designed to monitor the special-output current motor in the factory**
  The input of the electric meter is 50 / 60 Hz, and the output of the motor in the field is 50 / 6000 Hz, the precision is not enough to use an electric meter for motor monitoring, therefore, a high-frequency CT is used to monitor the motor output current.

- **2. Enhanced data transmission with high security**
  The U-7500 series modules transfer the motor streaming data through OPC UA and MQTT protocols with high security, so the information security of the factory can be improved.

- **3. Monitoring the client's factory via wireless**
  Through the RJ45 to Wi-Fi adapter, the wired signal in the factory is converted to wireless signal transmission, allowing customers to monitor the factory.

- **[UA I/O Module Motor Monitoring Framework] :**



Environmental Monitoring and Maintenance Applications

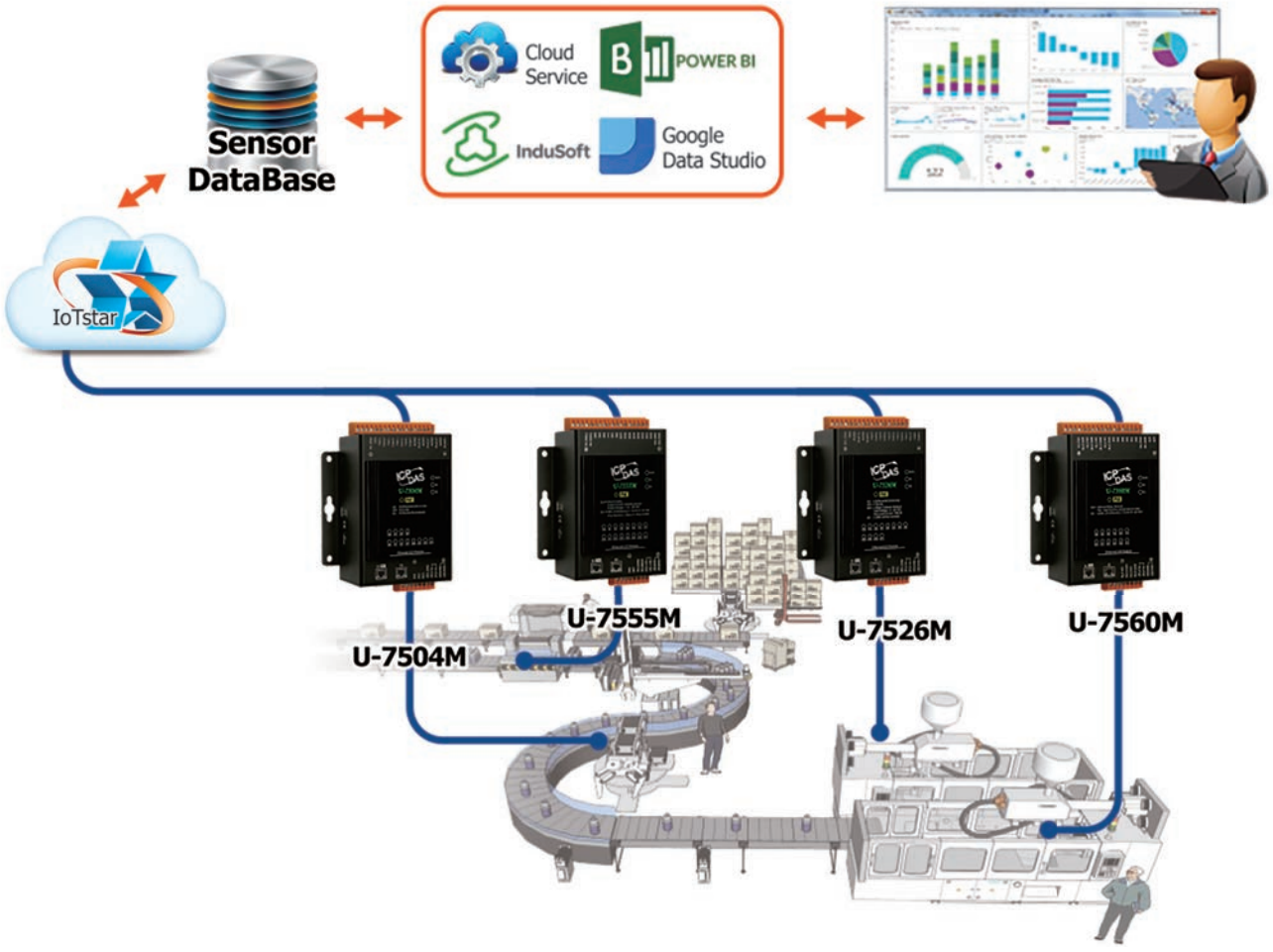
Using ICP DAS IoTstar with UA I/O solution can bring many benefits. In this case, the customer uses IoTstar cloud management software combined with UA I/O module series to set up a cloud IoT monitoring system, and the manager can get the following benefits.
** Support IoTstar cloud management software

- 1. **No programming is required**
  Collect environmental parameters and store them in the cloud database, the system can be set up through the web interface without writing programs.

- 2. **Collection and monitoring of production line information**
  Check environment parameters of the site in real-time via IoTstar Dashboard Service, information on the production line can be collected and monitored completely.

- 3. **Reduce the cost of equipment maintenance**
  Through IoTstar Remote Access Service, cloud monitoring, setting adjustment, and firmware updates can be performed, reducing the time and cost of personnel movement due to equipment maintenance.

- **[IoTstar with UA I/O Module Environmental Monitoring Framework] :**

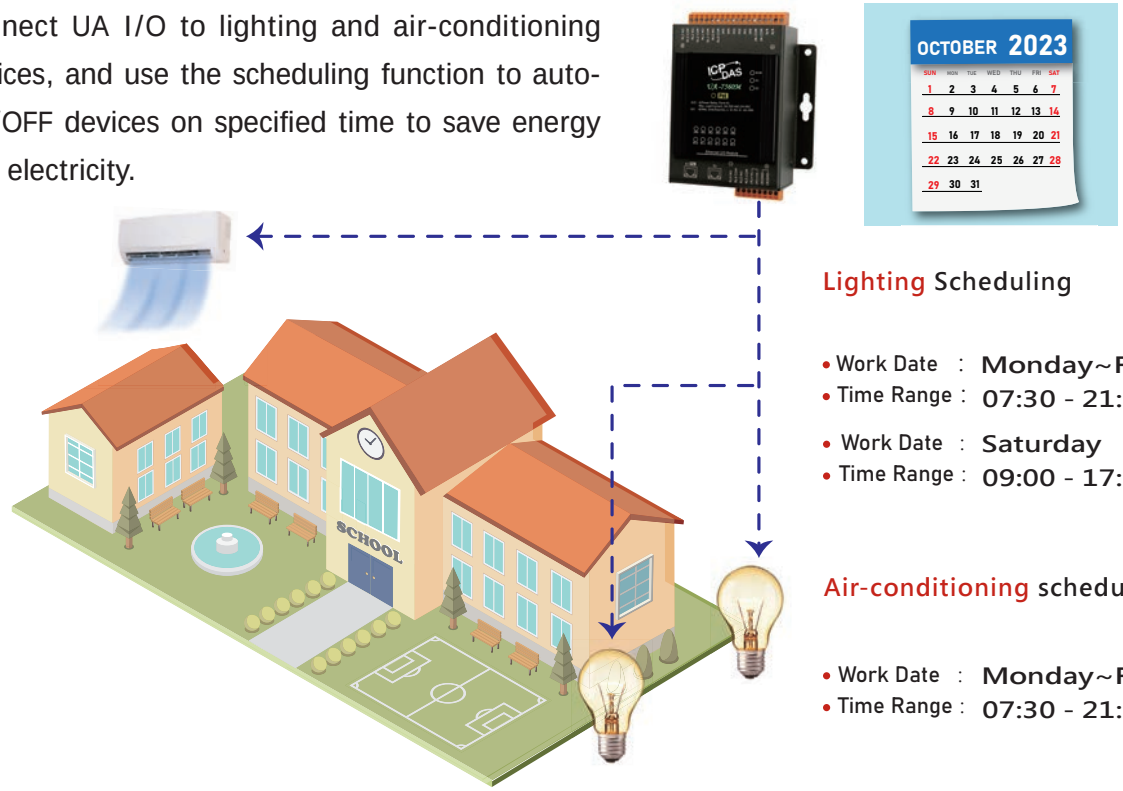


Campus Auto-Control Applications - Fire Fighting and Energy Saving

Users can use the UA I/O modules for fire control, lighting, and air conditioning controls. It is very suitable for campuses and communities.

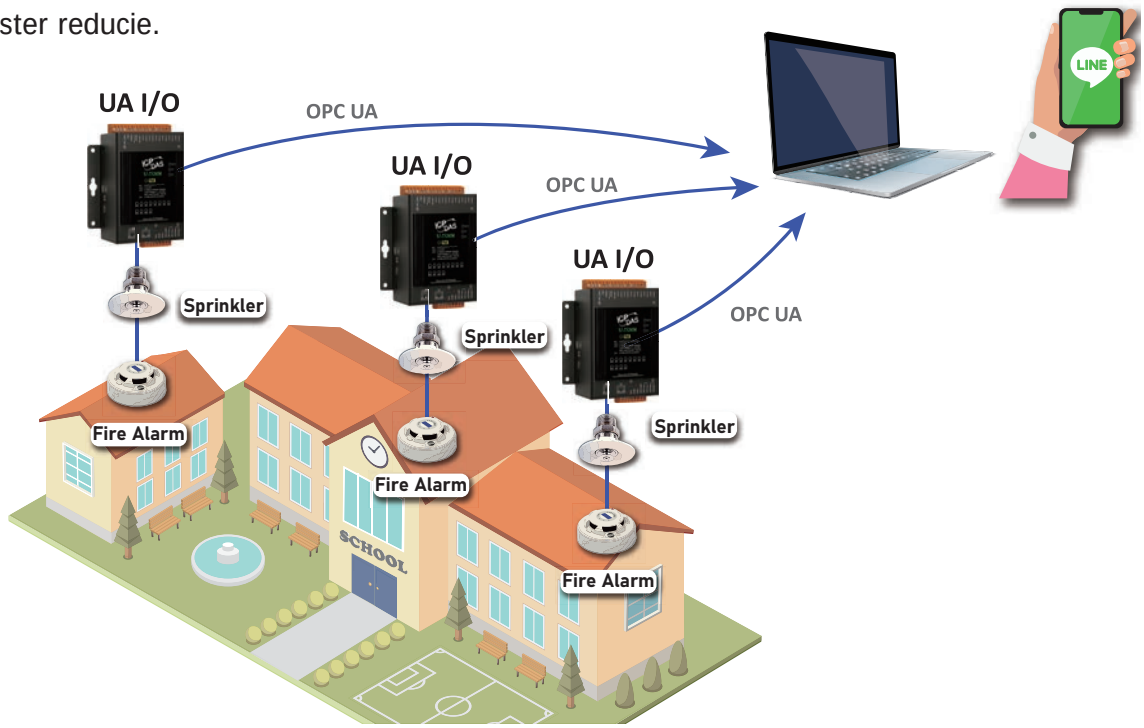
• Campus Energy Saving Application

Connect UA I/O to lighting and air-conditioning devices, and use the scheduling function to auto-ON/OFF devices on specified time to save energy and electricity.



• Campus Fire Fighting Application

Connect the UA I/O to the sprinkler and fire alarm. When detecting a fire, it can automatically start sprinkling water, send alarm messages, and notify the control center and specified persons for disaster reducie.



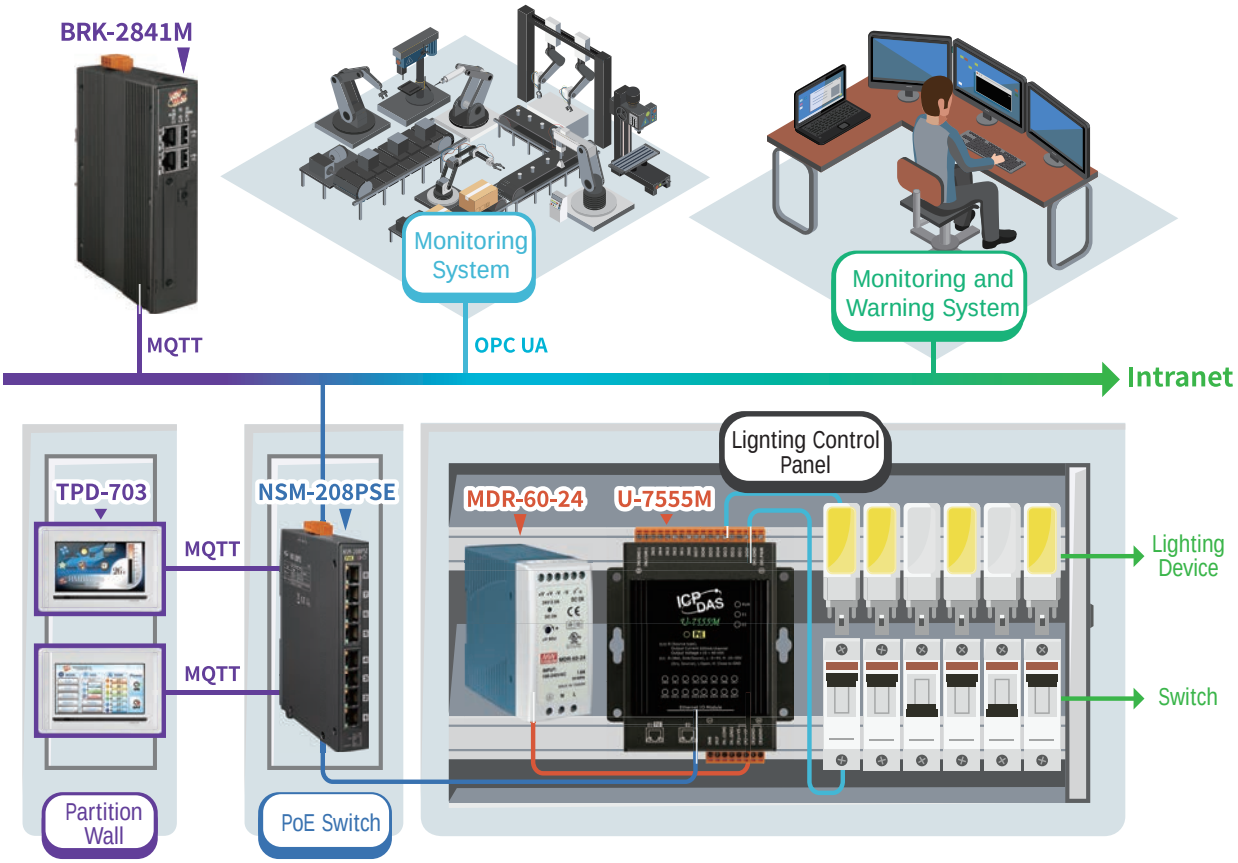
Smart Lighting Control System for Biomedical Factory

Various smart devices have been added to daily life. Smart lighting control can achieve energy savings, data analysis, and remind maintenance of lighting equipment. However, it also faces the threat of security attacks. ICP DAS has installed an intelligent lighting control system to provide stable lighting and arrange maintenance to reduce management costs.

The new function reduces the distance between the new technology and people by retaining the traditional light control panel switch. It provides the service when the lighting control module needs to be repaired. The security of data transmission using the network interface for lighting control also needs to be considered.

- **System Architecture**

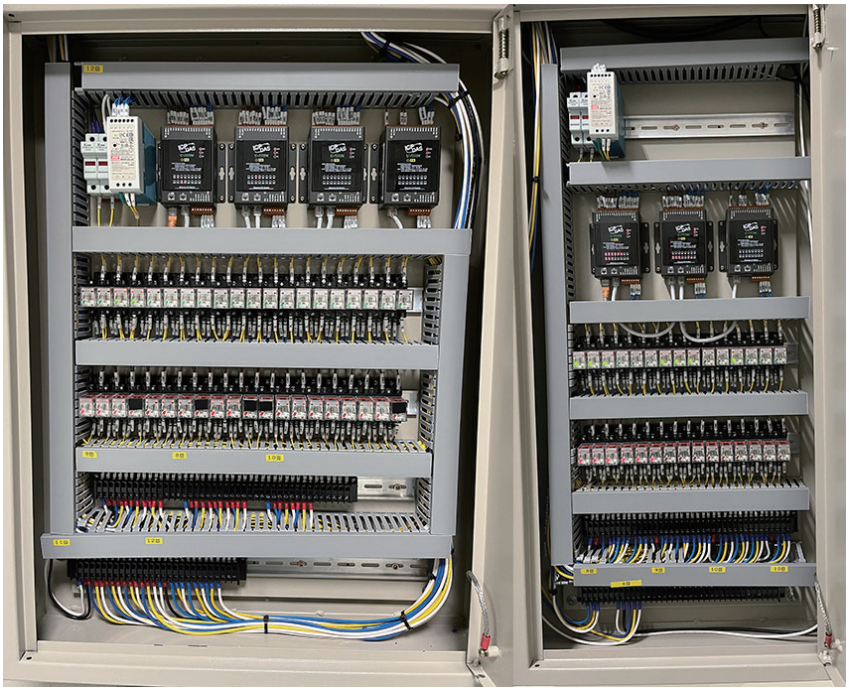
  ICP DAS on the lighting control system for medical factorys, in addition to the traditional lighting and physical switches, **six additional units** have been added, a lighting control panel, network switch, touch screen, communication server, factory monitoring system, and monitoring and early warning system.



The lighting control can also be integrated with various sensors to realize context-based dimming functions to achieve energy-saving effects, and data analysis can be added to remind equipment maintenance to reduce management costs.

• 1. Lighting Control Panel

The control core is the U-7555M module. The digital outputs and inputs on the module are wired to the relays of the lighting circuits and the lighting panel switch, respectively. This module also provides logic and scheduling control. It's a stand-alone lighting control module. Provides three highly secure data exchange protocols, OPC UA, MQTT, and Restful API (https) to reduce information security risks.



• 2. Network Switch

The network switch is daisy-chained to the U-7555M in the lighting control panel, the user expects to install the touch screen on the cubicle wall and integrated it into the main network. The communication protocols are not polling mechanisms, the bandwidth requirements for the factory are extremely low.

• 3. Touch Screen

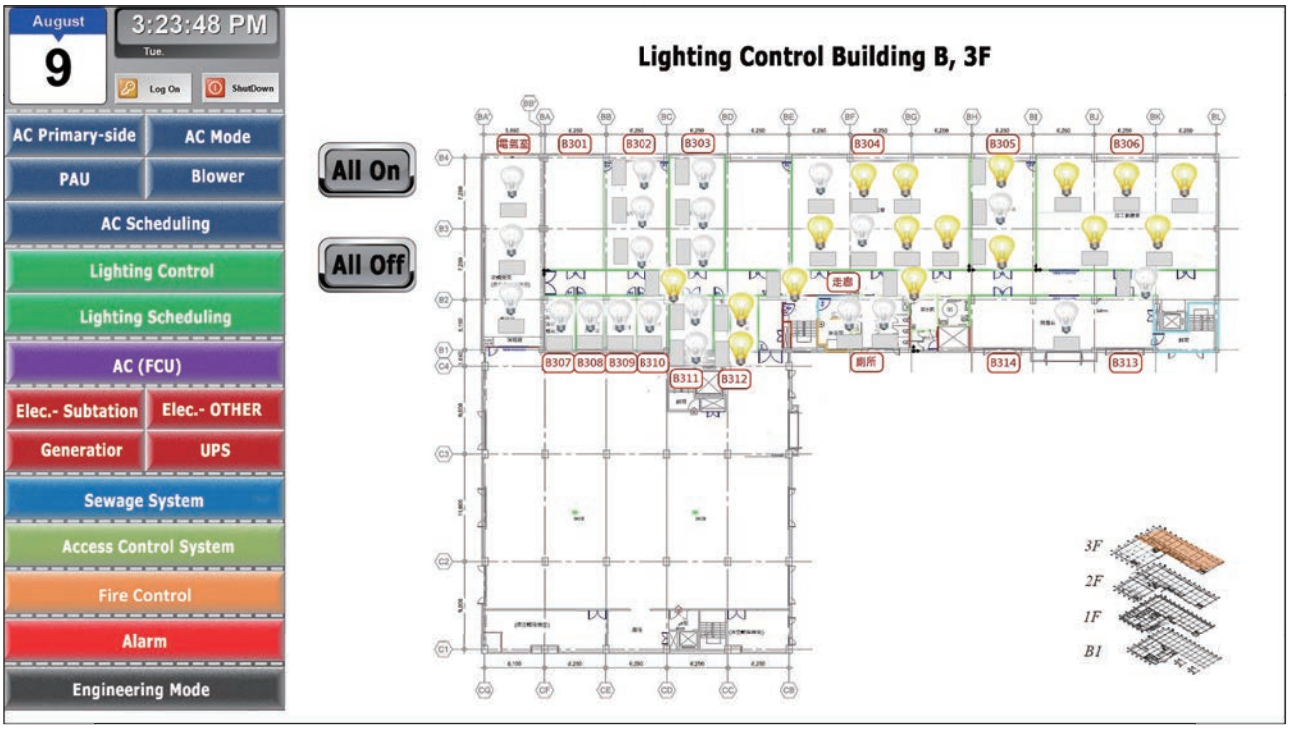
The touch screen is available in 2.8", 4.3", or 7". Small size fits only light switches, large size with other settings that can be integrated, such as air conditioning, access control, power information, environmental sensor information, etc. It can also use a control interface for lighting and air conditioning.

• 4. Communication Server

BRK-2841M provides the Broker function of MQTT protocol for MQTT message dispatching and proxy. It is compliant with MQTT V.3.1, 3.1.1, and 5.0 protocols, and supports the QoS message quality mechanism, retention mechanism, identity verification, communication encryption, Last Will, and bridging function. Supports Web UI setting to quickly set up the BRK function, which can reduce the burden of setting up the Broker by individuals and reduce management costs. It provides clustering, bridging, load balancing, and high availability functions to prevent service downtime due to system failure in the field.

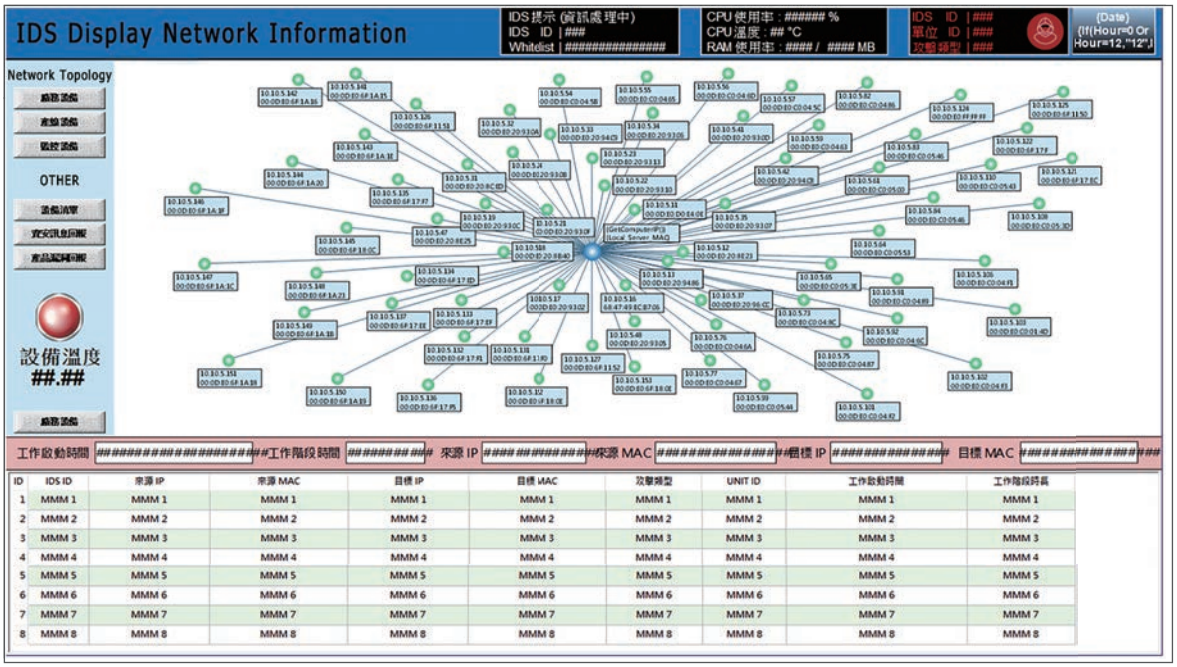
• 5. Factory Monitoring System

Using AVEVA Edge to integrate water, electricity, gas, lighting, access control, etc. within the factory. Provides the information in real-time on factory computers, handheld devices, and databases where information is not immediately available but needs to be stored. The former provides a stable production environment, while the latter is used for data analysis and supplied maintenance notification, etc.



• 6. Monitoring and Early Warning System

The network planning is based on the Purdue model of IoT, but most of the equipment purchased in the factory cannot provide high-security communication protocols. Therefore, a monitoring and early warning system is built to monitor IP and devices without encrypted communication protocol (Modbus TCP) in the factory in real-time, and notify MIS, factory management and record notification in case of abnormalities.



IIoT 1
Software . Controller / Server

- Cloud Management Software: IoTstar
- SCADA System Software: AVEVA Edge
- Condition Monitoring Solution: ExoWISE
- Edge Controller WISE Series:
- Communication Server: UA Series
- MQTT Communication Server: BRK Series

IIoT 2
Access Control Security / Factory Automation

- WISE Surveillance Solution
- IP Camera iCAM Series
- Smart Access Control
- IIoT and Smart Phone Integration
- MQTT I/O Module MQ Series
- Stack Light Monitoring Module
- Emergency Voice/Visual Alert Module
- Industrial LED Message Display
- Bluetooth LE Gauge Master
- Temperature Data Logger
- Signal Conditioning Modules
- No-touch Infrared Sensor Switch

Energy Management Solution

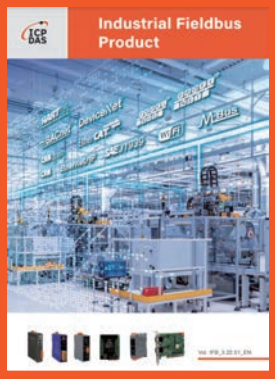
- InduSoft SCADA Software
- Smart Power Meter Concentrator
- Smart Power Meter
- True RMS Input Module
- TouchPAD Devices - VPD Series

IIoT 3
Environmental Monitoring / Mini Weather Station

- Smart Environmental Monitoring: CL Series
- Air Box: DL Series
- Mini Weather StationMotion: DLW Series
- Detector: PIR Series
- Industrial Sensor Network Detection: iSN Series
- Wireless Environmental Solution: iWSN/iXN/iSOS Series

ZigBee Wireless Product Solutions

- ZigBee Wireless Network
- Applications
- ZigBee Converters
- ZigBee Repeater
- ZigBee Bridge
- ZigBee I/O Group Module
- ZigBee I/O Module
- ZigBee Modbus Data Concentrator
- Accessories



Industrial Fieldbus

- RS-485
- Industrial Ethernet
- Profinet
- CAN bus
- CANopen
- Devicenet
- J1939
- PROFIBUS
- HART
- Ethernet/IP
- BACnet

WISE - Intelligent IIoT Edge Controller & I/O Module

- WISE IIoT Edge Controller & I/O Module
- Cloud Management
- Applications
- Product Specification
- Solution Integration

Smart Building, Smart Home Automation

- Video Intercom & Access Control
- Touch HMI - TouchPAD Series
- Smart Lighting Control
- Energy Saving - PM/PMC Series
- Environmental - DL/CL Series
- Motion Detector - PIR Series
- Wi-Fi Wireless - WF Series
- Infrared Wireless - IR Series
- ZigBee Wireless - ZT Series
- IIoT Server & Concentrator
- LED Display - iKAN Series

ICP DAS
www.icpdas.com

ICP DAS CO., LTD.
Taiwan (Headquarters)
+886-3-597-3366

Local Distributor