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IIoT Cloud Solution

UA SERIES

IIoT Communication Server

Vol. UA_2.19.09_EN



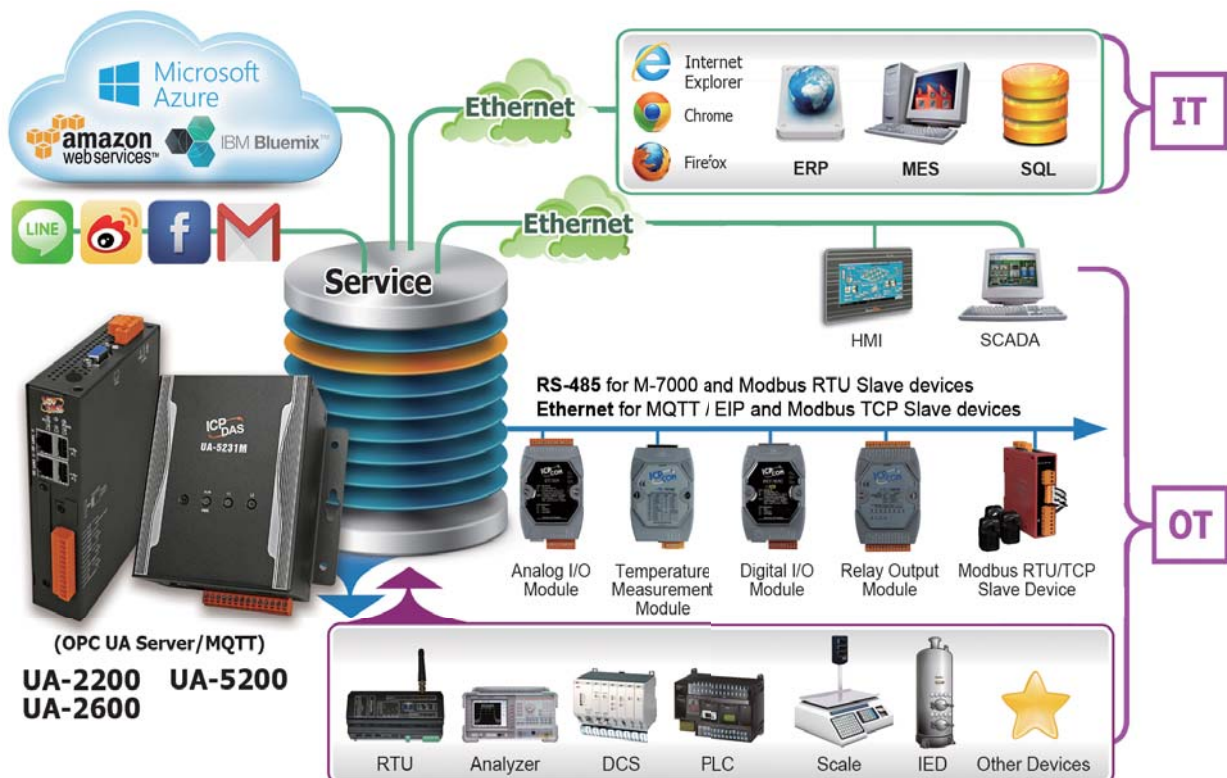


UA Series IIoT Communication Server: Connect IT with OT, Integrate Cloud and Web APPs

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 cloud-based Internet of Things (IoT). This solution can improve system performance and enhance global IIoT competitiveness of the system.

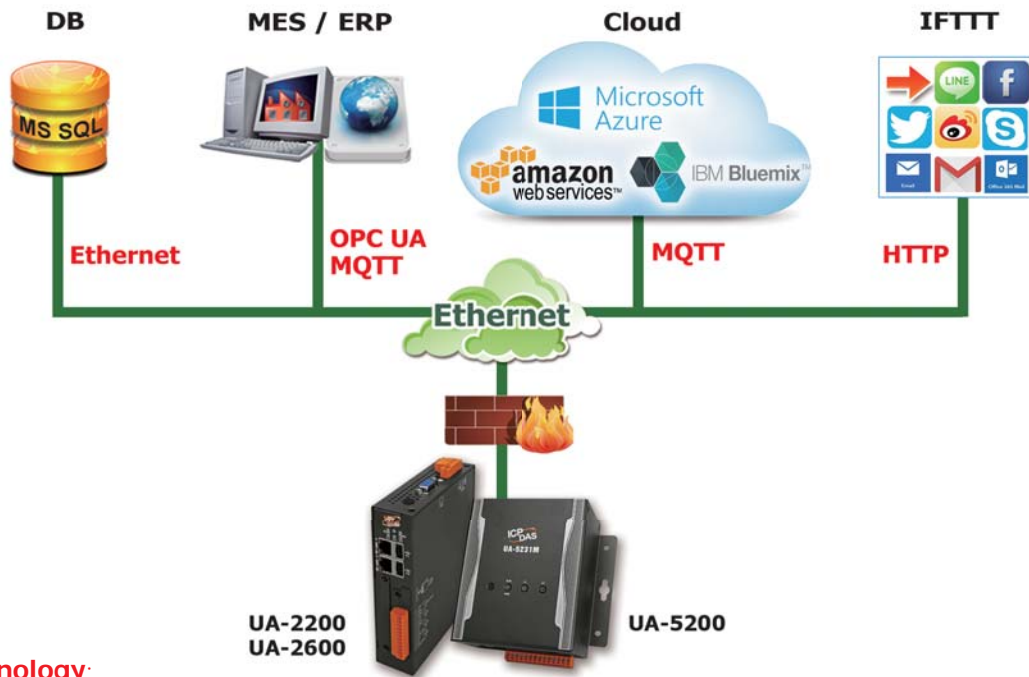
- Built-in **OPC UA**, the industrial communication standard: connect OT to IT for integrating devices to the Cloud.
- Built-in **MQTT**, the active IoT transmission technology: accelerate data exchange and optimize the network resources.
- Support **Data Logger**: save I/O data directly to Local CSV log file or remote database.
- Support **IFTTT** for Cloud logic control: send device event notifications to LINE, FB, Twitter, Mail, etc. over 500 APPs.
- Support **Modbus Protocol**: Connect Modbus TCP/RTU/ASCII Remote I/O Modules.
- Support **EtherNet/IP Protocol**: Connect EIP-2000 Series EtherNet/IP Remote I/O Modules of ICP DAS.
- Support **Cloud Platforms**: Connect to Amazon AWS, Microsoft Azure or other IoT Cloud platforms to send over the I/O data.

System Architecture



UA Series

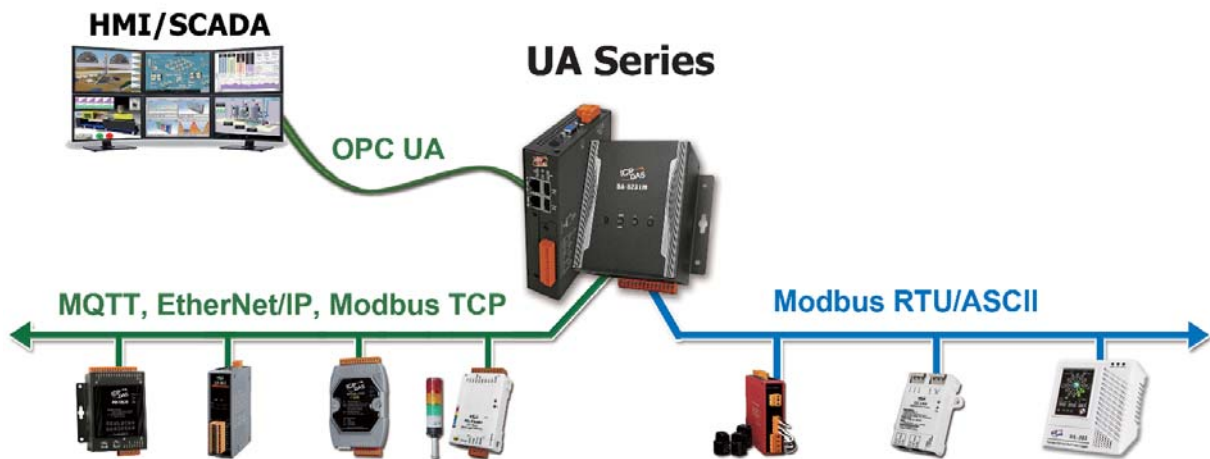
IT Integration Technology



Technology:

- **OPC UA** : **OPC UA** The Industrial Communication Standard
- **MQTT** : **MQTT** The IoT Active Transmission Technology
- **Data Logger** : **LOG DB** I/O data save directly to **Local LOG file** or **Remote Database**
- **IFTTT** : **IFTTT** The Cloud Logic Control (**IF** This **T**hen **T**hat)
- **Cloud** : The IIoT **Cloud Platform** Connection Technology

OT Integration Technology



Technology:

- **OPC UA** : **OPC UA** The Industrial Communication Standard
- **MQTT** : **MQTT** The IoT Active Transmission Technology
- **Modbus** : **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**

UA Series



▶ UA Introduction



UA-2641M
UA-2241M



UA-5231



UA-5231M



UA-5231M-4GE
UA-5231M-4GC
UA-5231M-3GWA



Features:

- OPC UA Server
- MQTT Broker/Client
- ARM CPU, 1.0/1.2 GHz
- Linux kernel OS
- Support Data Logger, IFTTT and PID
- 10/100/1000 Mbit/s Ethernet Port
- 4 Serial Ports (RS-232/RS-485)
- Operating Temperature: -25 ~ +75°C

Introduction:

UA Series (UA-5200/UA-2200/UA-2600) is a series of **IIoT (Industrial IoT) Communication Server** for integrating the system and devices of IT and OT. UA features the IIoT Gateway function that allows users to access the remote I/O modules and controllers via Modbus TCP/RTU/ASCII, MQTT, and EtherNet/IP communication protocols. IIoT gateway function can also convert these I/O data to OPC UA or MQTT protocols for the needs of connecting with the MES, ERP, SCADA and Cloud services. Besides, UA features the Data Logger function that allows users to write the I/O data directly into the remote database (MS SQL / MySQL / MariaDB), and save to the local file (.csv) as the historical records. UA supports Cloud platform that can connect to Amazon AWS, Microsoft Azure or other Cloud platforms to send over the I/O data; and support Cloud logic service platform "IFTTT" which can connect many web APPs that allows users to receive first-hand notification messages through the most commonly used mobile APPs when an event triggered. UA Series enhances the networking and interoperability between IT and OT. Through UA series, users can easily deploy for Industrial IoT.

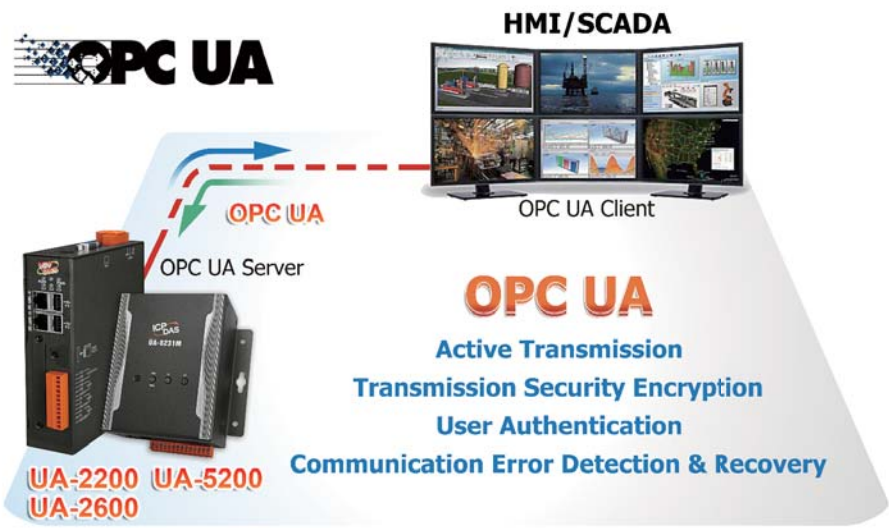
Model	UA-2641M	UA-2241M	UA-5231	UA-5231M	UA-5231M-3GWA UA-5231M-4GE/4GC
System / Module					
OS	Linux Kernel 4.1.15		Linux Kernel 3.2.14		
CPU	ARM Quad Core 1.2 GHz		ARM CPU, 1.0 GHz		
SDRAM / Flash	DDR3 1 GB / 4 GB		DDR3 512 MB / 512 MB		
Expansion Memory	microSD socket with one 4 GB microSD card (support up to 32 GB microSDHC card. UA-2641M can up to 2 TB microSDXC card)				
Communication Ports / IO Expansion					
Ethernet	2 x RJ-45		1 x RJ-45		
USB	2 x 2.0 host		1 x 2.0 host		
Serial Port	2 x RS-232 (1 x Console), 2 x RS-485 (UA-2600/2200: 2 x isolated; UA-5200: 1 x isolated)				
I/O Expansion	-	Optional XV-board	-		
Mechanical / Environmental / Power					
DIM. (mm)	33 x 160 x 129		91 x 132 x 52	117 x 126 x 58	
Temperature	Operating T.: -25 ~ +75°C / Storage T.: -40 ~ +80°C / Humidity: 10 ~ 90% RH (non-condensing)				
Input Range	+12 ~ +48 VDC				
Consumption	10 W	4.8 W		6.5 W	
Wireless Communication (Only For UA-5231M-3GWA / UA-5231M-4GE / UA-5231M-4GC)					
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				
4G System	4GE : FDD LTE: B1/B3/B5/B7/B8/B20 MHz 4GC : FDD LTE: B1/B3/B8 MHz; TDD LTE: B38/B39/B40/B41 MHz				

4G System Note: **UA-5231M-4GE:** Frequency Band for EMEA, Korea, Thailand, India and Taiwan
UA-5231M-4GC: Frequency Band for China

▶ UA Features

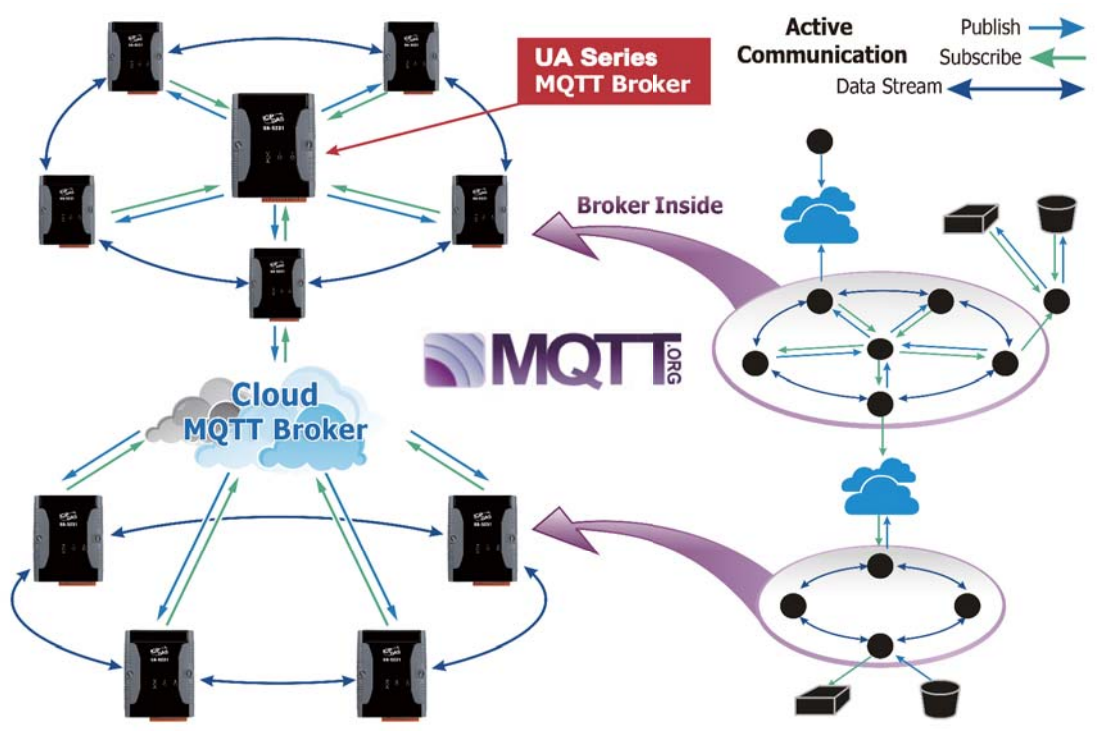
■ Built-in OPC UA Server Service

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

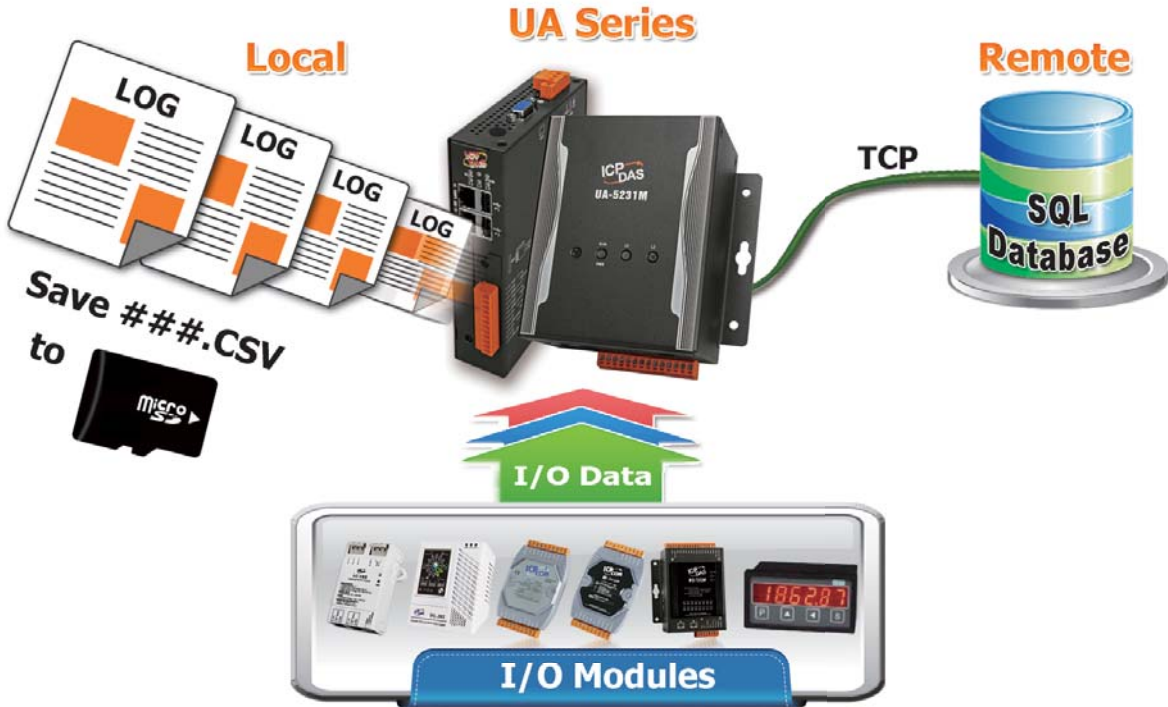
MQTT Broker inside and Compliance with MQTT V.3.1.1 protocol. Provides functions of **IoT Active M2M Transmission**, **QoS Quality Service**, **Retain Mechanism**, **Identity Verification**, **Encryption**, **Last Will**, **MQTT Client Drivers**, etc. The Broker can connect up to 400 MQTT Clients.



UA Series

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

UA series can collect devices I/O status and then directly save into remote side SQL Database (MS SQL is supported. MySQL and MariaDB are available soon). UA series can also save I/O data into a CSV log file on the local side. Furthermore, users can set the time interval of which CSV file to generate and divide on the local side.



Support Logic Control IFTTT To Send Event Messages To LINE, FB... APPS

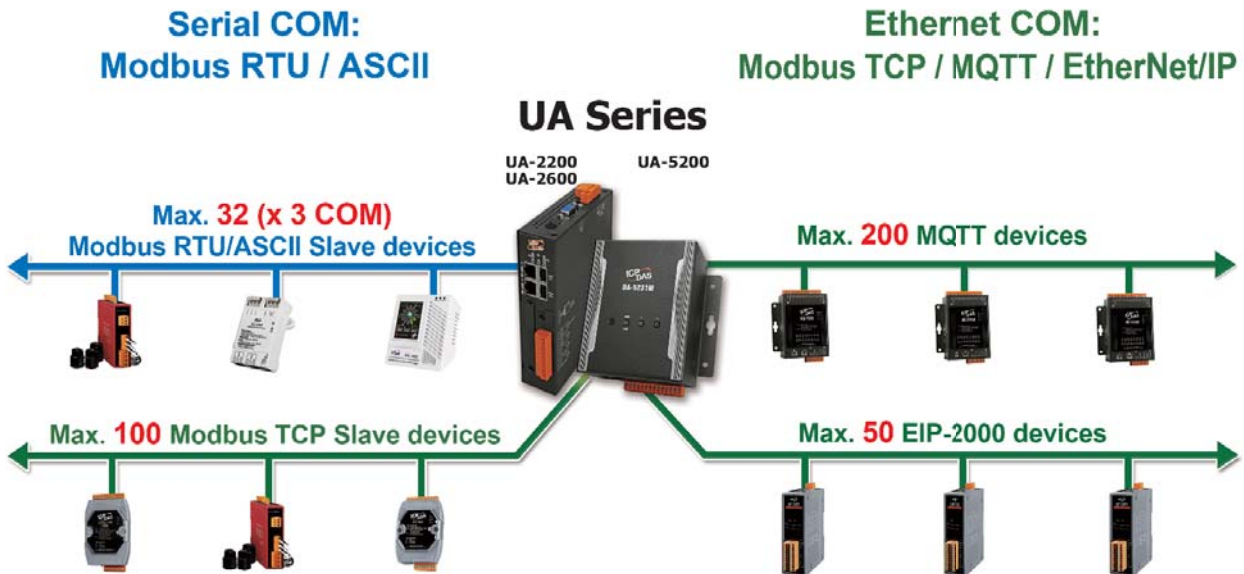
UA can combine the IFTTT cloud platform functions and send messages to more than 500 Web APPS (such as LINE, Facebook, Twitter, Calendar, Mail, Sina Weibo... etc.) when the special events occur. The device I/O change can be set to trigger the event of the IFTTT cloud service, and then the preset "That" Web Service (e.g. LINE) will do the action follow the IFTTT (If This, Then That) logic control, for example, the LINE will send a message to the specific user or group to handle the event immediately.



UA Series

Support Ethernet and Serial Communication Modules

- Under the **Ethernet** communication, UA supports Modbus TCP, MQTT and ICP DAS EtherNet/IP modules:
 - * Up to 100 **Modbus TCP** Slave module connections
 - * Up to 200 **MQTT** module connections
 - * Up to 50 **EtherNet/IP** EIP-2000 module connections
- Under the **Serial** communication, UA provides 3 RS-232/RS-485 Serial ports to support Modbus RTU/ASCII modules:
 - * Up to 32 **Modbus RTU/ASCII** Slave modules per COM
- Through the UA Web UI, users can quickly set up the modules and display the real-time status.



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, Facebook, Twitter) and will be more. It will help users to set projects easily and quickly.

Function Wizard (Click here)

- Module Communication Conversion**
 - (Master) Modbus RTU / OPC UA
 - (Master) Modbus TCP / OPC UA
 - (Master) Modbus ASCII / OPC UA
 - MQTT / OPC UA
 - (EtherNet/IP) EIP / OPC UA
 - (Master) Modbus RTU / MQTT
 - (Master) Modbus TCP / MQTT
 - (Master) Modbus ASCII / MQTT
 - (EtherNet/IP) EIP / MQTT
 - (Master) Modbus RTU / MQTT JSON
 - (Master) Modbus TCP / MQTT JSON
 - (Master) Modbus ASCII / MQTT JSON
- Module Connecting to Azure**
 - (Master) Modbus RTU / Azure
 - (Master) Modbus TCP / Azure
 - (Master) Modbus ASCII / Azure
- Data Log**
 - (Master) Modbus RTU / Local Data Logger
 - (Master) Modbus TCP / Local Data Logger

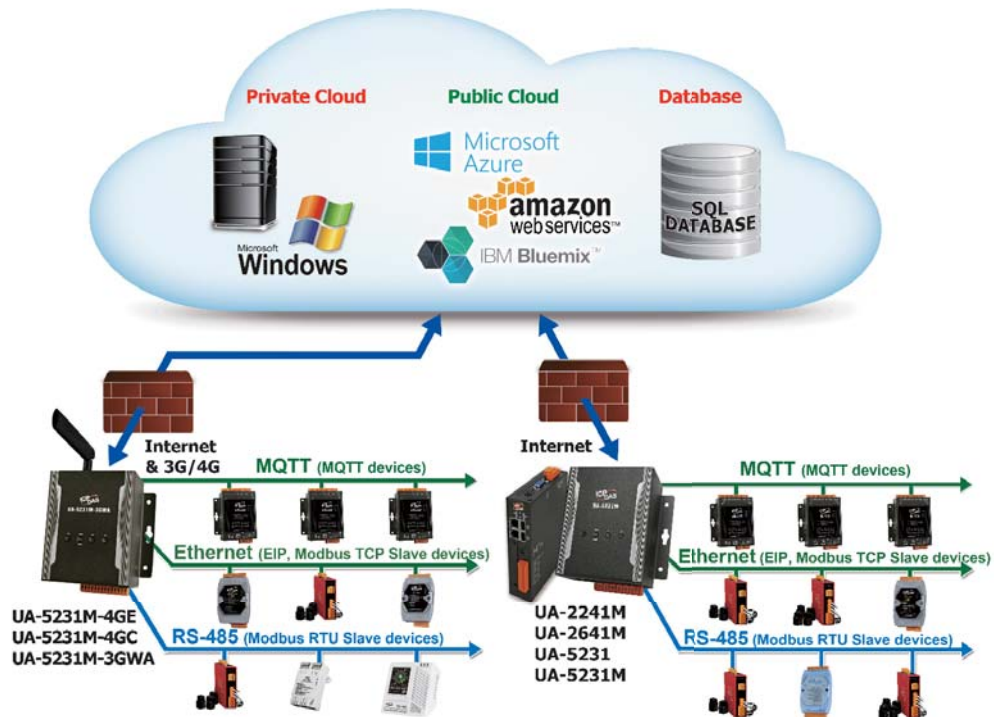
System Setting

Module Setting > Azure Setting > Apply Connection & Enable Converting Module > Save Project > Run the project

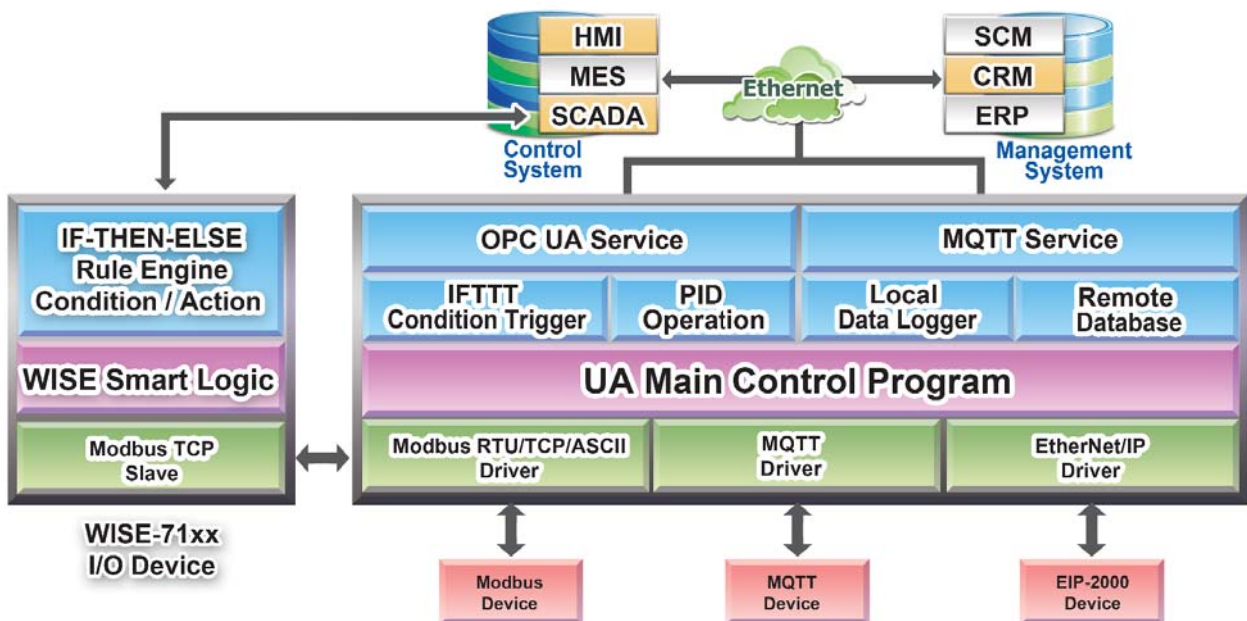
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Support Cloud Platforms Connection

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



Functions

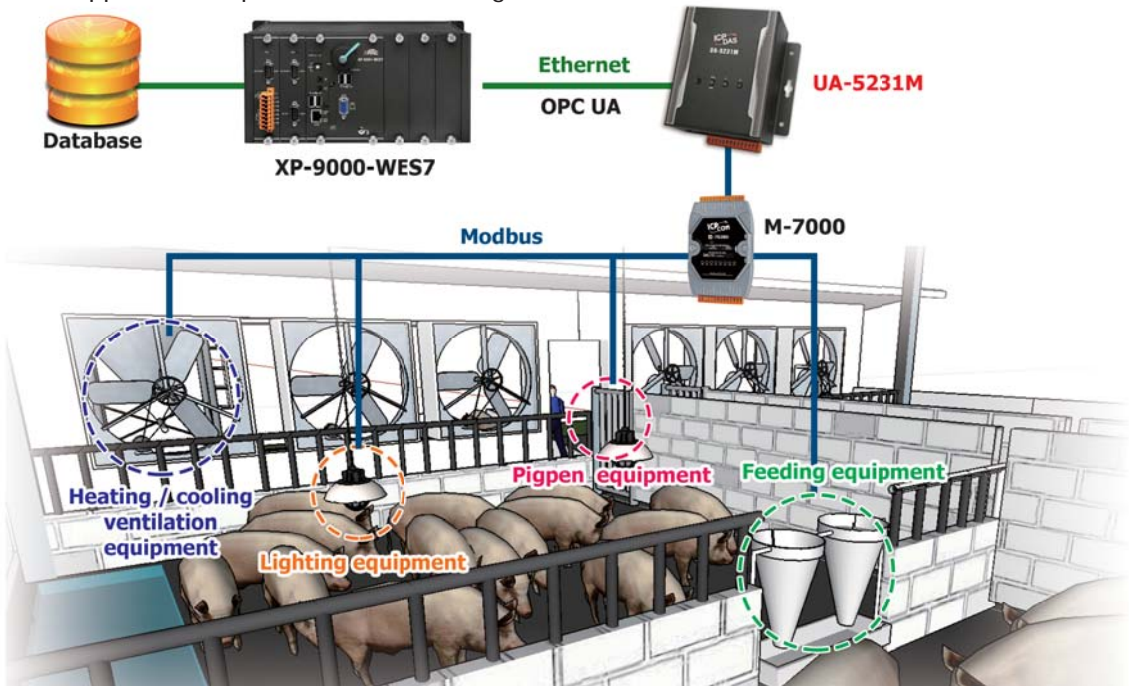


UA Series

► Applications

■ Farm Automation Solution

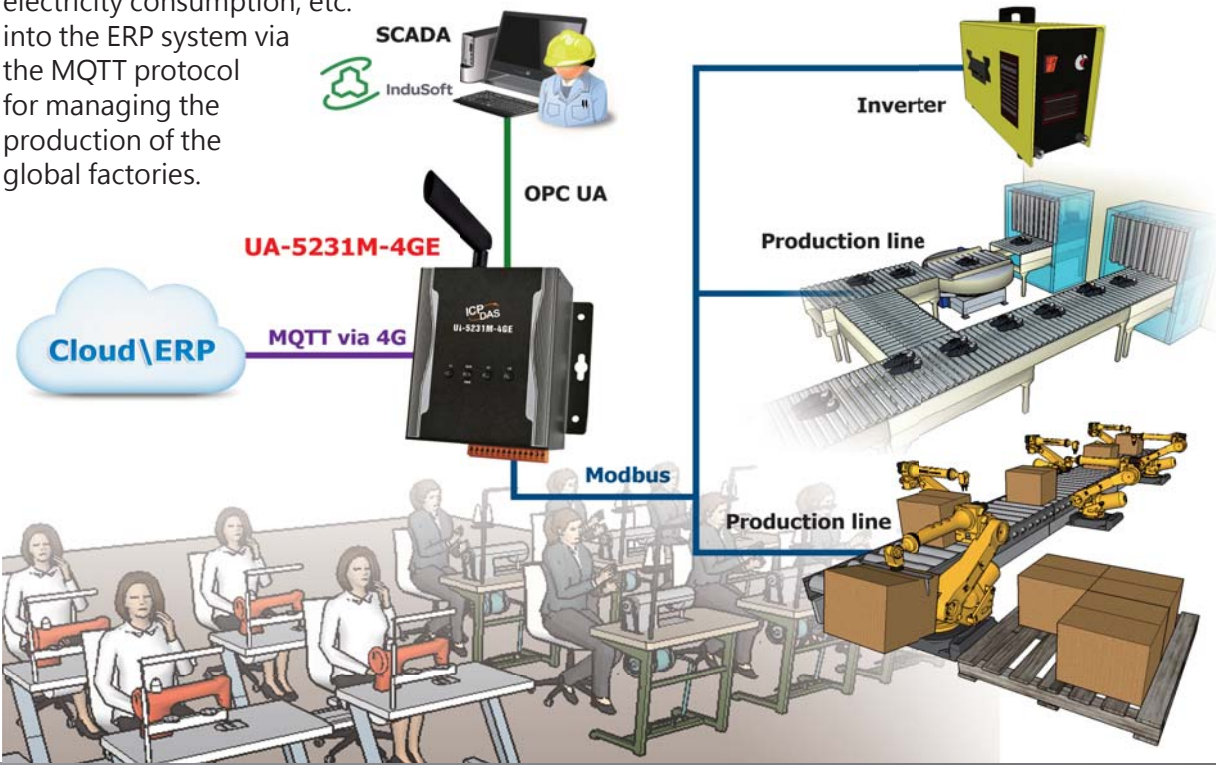
The farm automation solution controls the on-site cooling/heating/ventilation environmental equipment, lighting equipment, feeding equipment, and pigpen equipment through UA-5231M and the connected M-7000 modules. The upper controller XP-9000 manages daily feeding and drinking equipment of every pigpen 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.



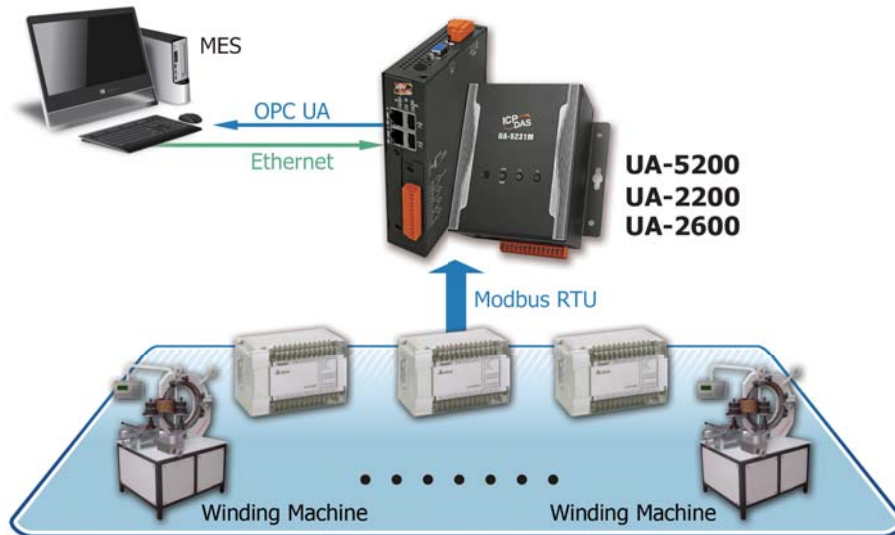
UA Series

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

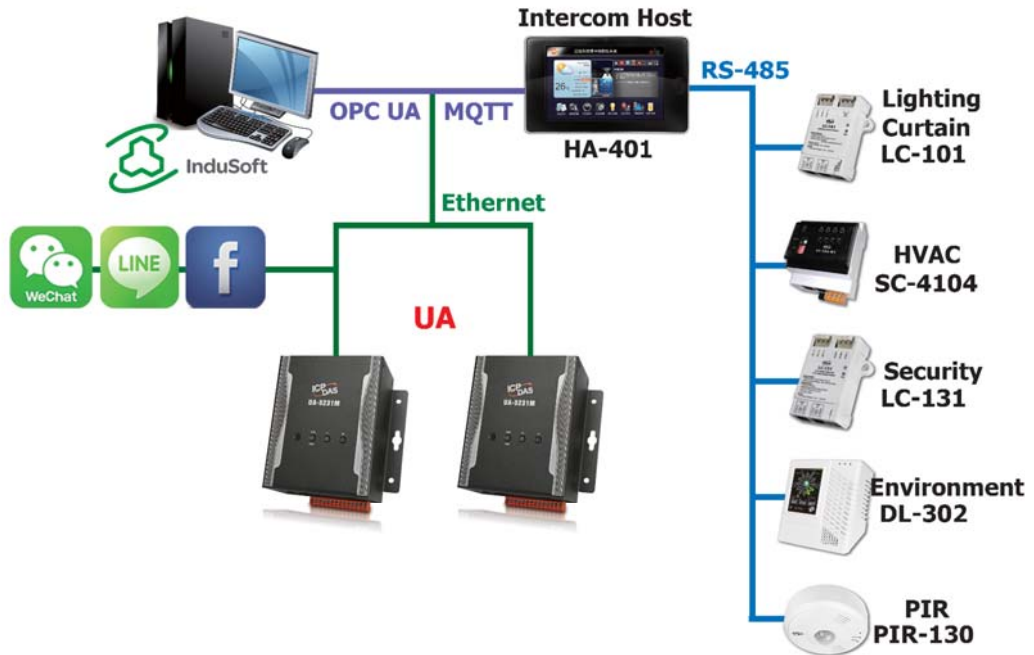


BA Smart Building IoT Application

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, Facebook, Twitter, etc.). The dual UA architecture can reduce the system burden.

Application Features:

- Reduce System Burden
- APP Message Notify

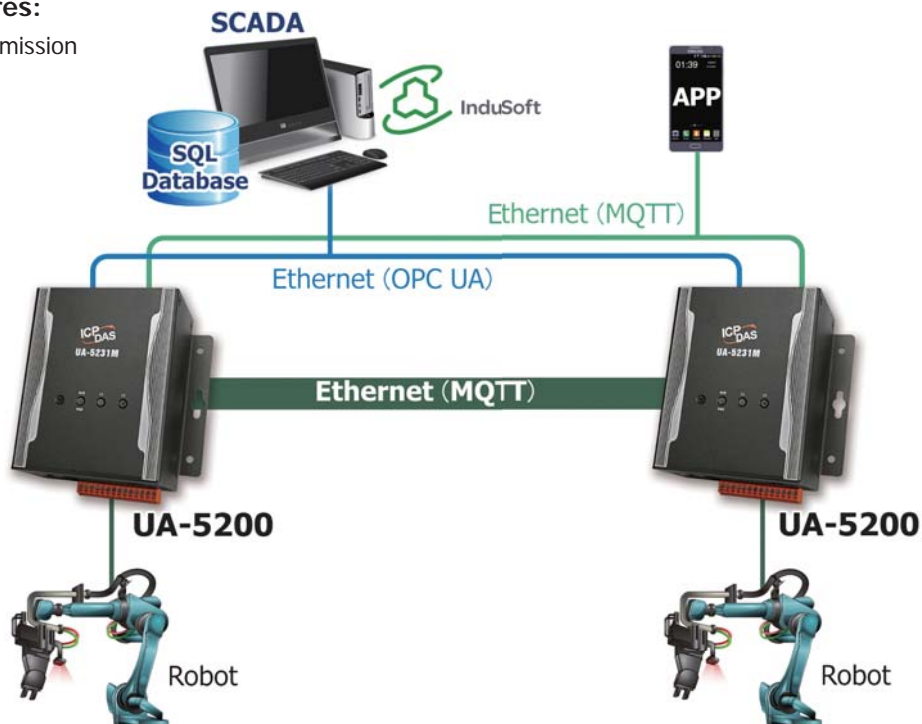


Robotic Arm Co-operation Application

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



► Solutions

1

(Modbus ↔ OPC UA)



2

(Modbus ↔ MQTT)



3

(MQTT ↔ OPC UA)



4

(MQTT ↔ MQTT)



UA Series

5

(I/O Event → 通訊APP)



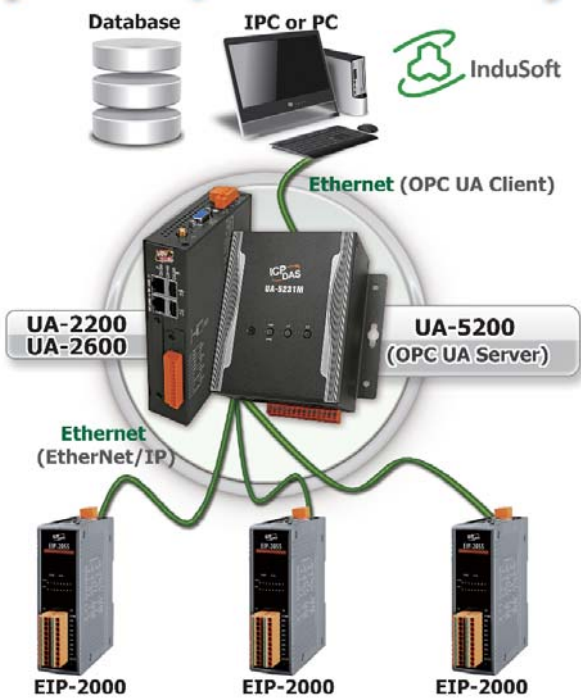
6

(I/O Event → Mail)



7

(EtherNet/IP ↔ OPC UA)



8

(EtherNet/IP ↔ MQTT)



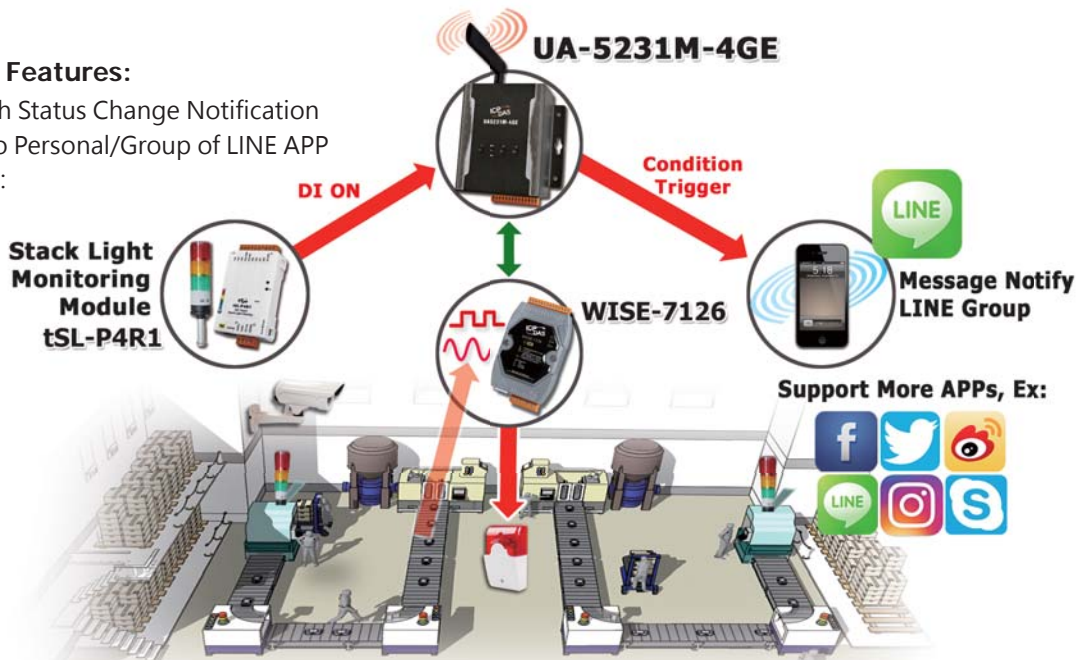
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Alert Message Notify LINE Group Application

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 Personal/Group of LINE APP
- More APPs:
Facebook,
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
- PC/Mobile Mail Notification
 - Gmail
 - e-mail
 - Office 365 Mail
 - Dropbox



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