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# IIoT Cloud Solution

# UA SERIES

## IIoT Communication Server

UA Brochure Vol 1.07.05

Microsoft Azure Certified

OPC UA

MQTT.ORG

# IIoT Cloud Solution

## UA Series: IIoT Communication Server

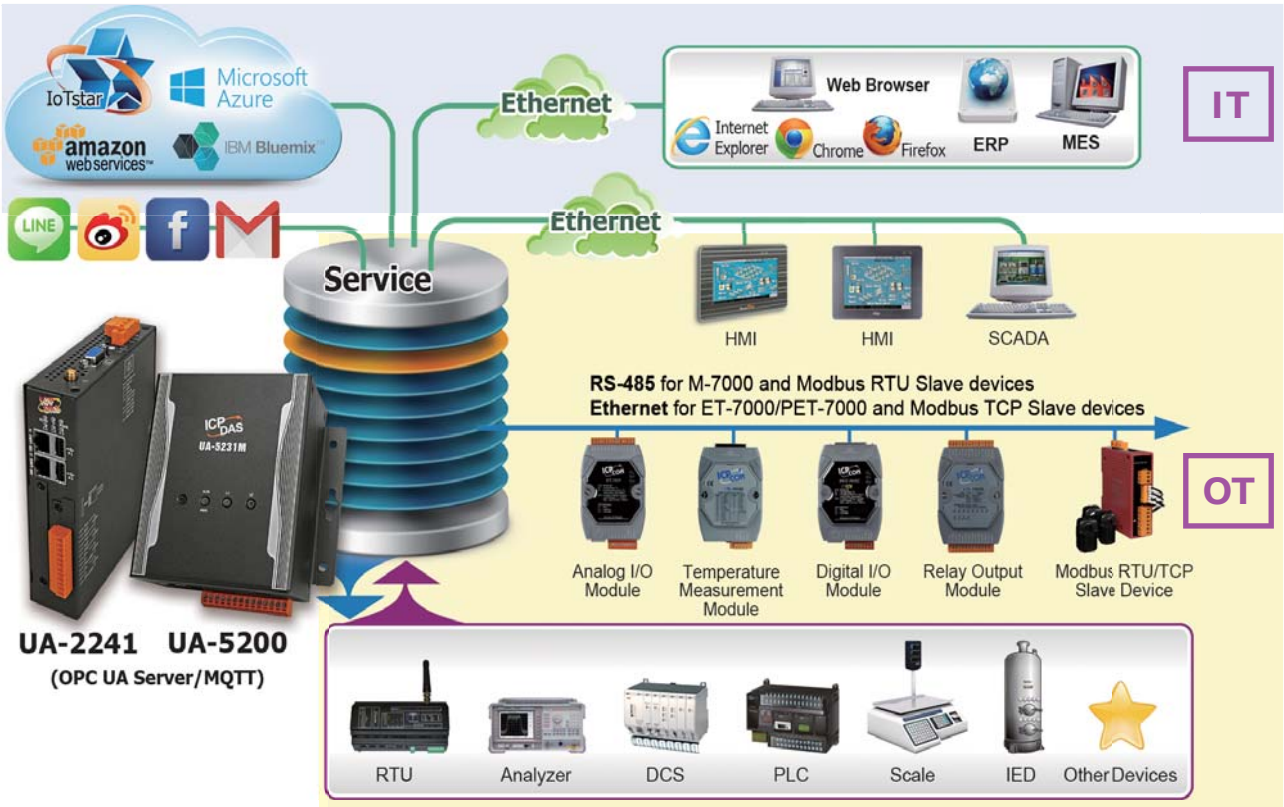
### Connect IT with OT – IoT Devices
### Build IoT Global Competitiveness
### IIoT Cloud Solution – Launch Industry 4.0

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

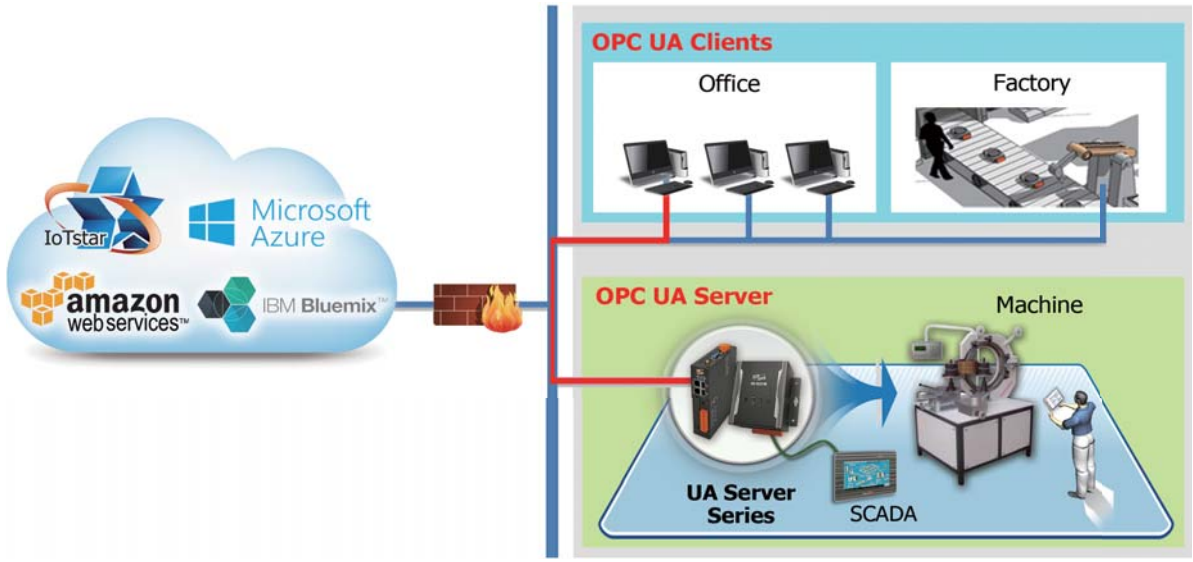
The IIoT Cloud Solution of ICP DAS provides UA series of IIoT Communication Server for linking the front-end devices to the Cloud, connecting the IT, OT, Cloud and Web APP, and integrating the cloud-based Internet of Things (IoT). This solution can improve the system performance and enhance your global IIoT competitiveness.

- Built-in **OPC UA**, the new industrial communication standard: connect IT with OT for linking devices to the Cloud.
- Built-in **MQTT**, the active M2M transmission mechanism: ensure Cloud messages secure, reliable and rapid.
- Support **IoTstar**, the IoT cloud management software: integrate public & private Cloud, manage the Big Data.
- Support **IFTTT**, for Cloud logic control: send device message to APP. Ex. FB, LINE, Mail, etc. about 500 APPs.
- Support **I/O Data Log**: save local data log to CSV file, and record I/O statuses at the scheduled time.
- Support **Remote DB** Writing: change the OT data to IT, and provide IT analysis to the OT big data.

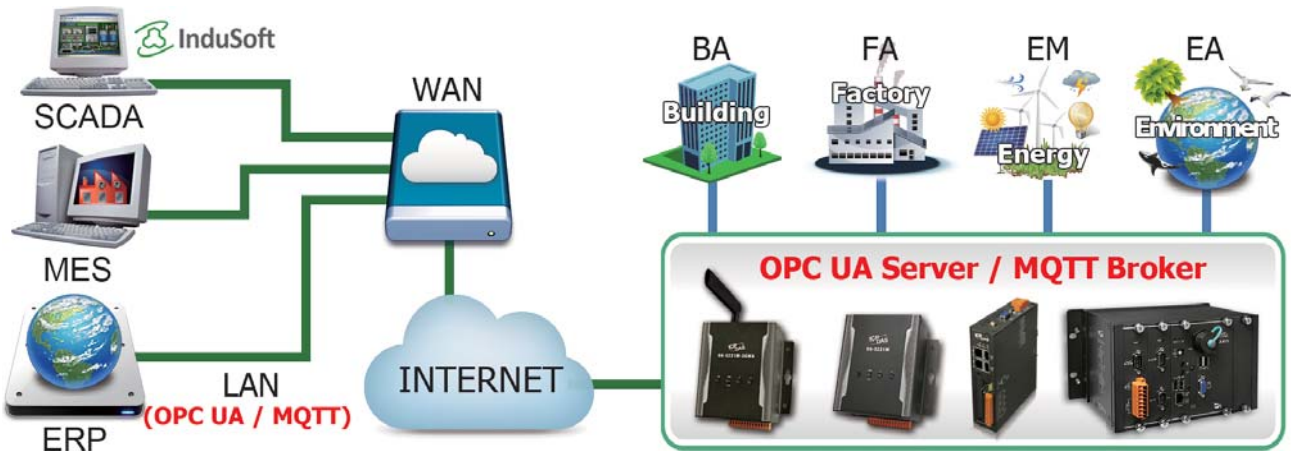
## System Architecture



## Cloud Integration Architecture (IT)




## System Integration Main Architecture (OT)




## IIoT Cloud Technology Integration

**OPC UA** : The New Generation Industrial Communication Standard

**MQTT** : The IoT Active M2M Transmission Mechanism

**IoTstar** : The IIoT Cloud Management Software

**IFTTT** : The Web Platform for Cloud Logic Control

## UA Introduction

# UA-5231

IIoT Communication Server, with 1 Ethernet port (RoHS)

# UA-5231M
# UA-5231M-3GWA
# UA-5231M-4GE/4GC
# UA-2241

IIoT Communication Server (Metal) (RoHS)

UA-5231 UA-5231M UA-5231M-3GWA UA-5231M-4GE UA-5231M-4GC UA-2241

### Features:

- OPC UA Server
- MQTT Broker Inside
- ARM CPU, 1.0 GHz
- Linux kernel 3.2.14 OS
- Support Redundancy (OPC UA) and PID
- 10/100/1000 Mbit/s Ethernet Port
- 4 Serial Ports (RS-232/RS-485)
- Operating Temperature: -25 ~ +75°C

### Introduction:

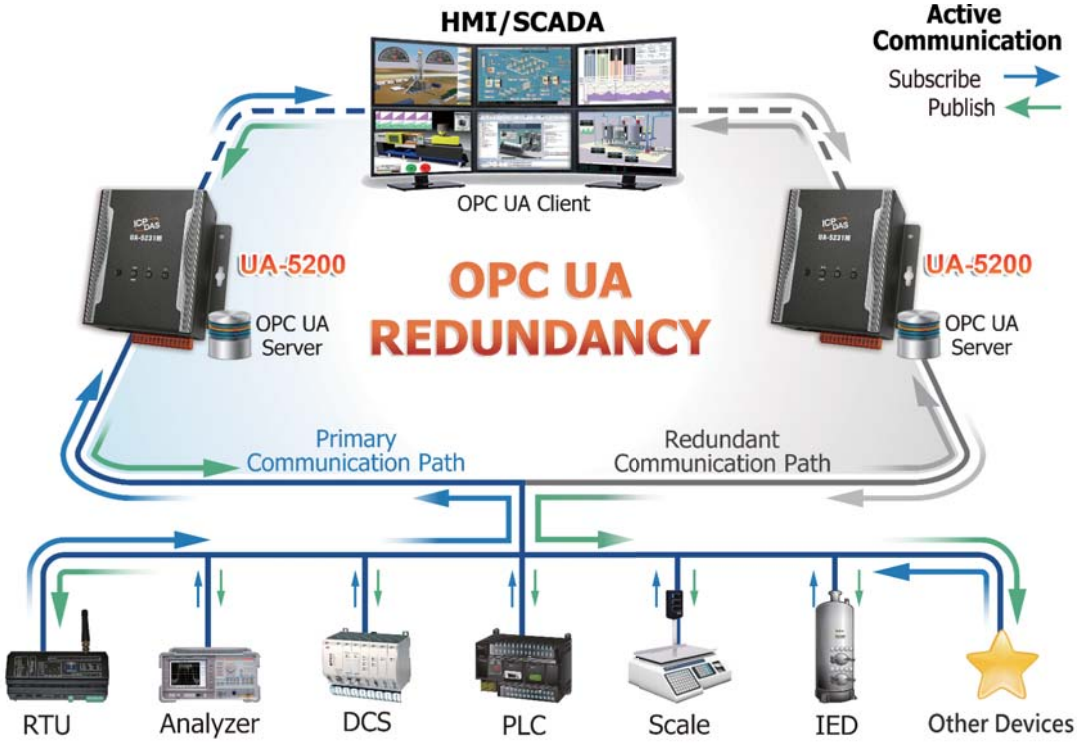
The UA-5200/2241 series is an IIoT communication server. It has built-in OPC UA server, MQTT broker and client driver to meet the need to connect to the MES, ERP, SCADA and cloud service. And with the Ethernet, RS-232, RS-485 interfaces and Modbus TCP/RTU/ASCII protocol, the UA-5200/2241 series can access regular remote I/O modules or controllers that already widely used in the factory. With the UA-5200/2241 series, it becomes very easy to make things used in the factory to connect to MES, ERP, SCADA and cloud.

| Model | UA-2241 | UA-5231 | UA-5231M | UA-5231M-3GWA | UA-5231M-4GE/4GC |
|---|---|---|---|---|---|
| CPU Module | | | | | |
| CPU | Cortex-A8 (1.0 GHz) | | | | |
| Memory | microSD socket with one 4 GB microSD card (support up to 32 GB microSDHC card) | | | | |
| VGA & Communication Ports | | | | | |
| VGA | 1 (Resolution: 640 × 480, 800 × 600, 1024 × 768, 1280 x 720) | | | | |
| Ethernet (RJ-45) | 2 | 1 | | | |
| USB 2.0 | 2 | 1 | | | |
| Serial Port | 2 x RS-485, 1 x RS-232, 1 x Console port | | | | |
| Mechanical | | | | | |
| DIM. (W x L x H, mm) | 33 x 160 x 129 | 91 x 132 x 52 | 117 x 126 x 58 | | |
| Installation | DIN-Rail Mounting | | | | |
| Environmental and Power | | | | | |
| Temperature | Operating: -25 ~ +75°C / Storage: -40 ~ +80°C | | | | |
| Humidity | Ambient Relative Humidity: 10 ~ 90% RH (non-condensing) | | | | |
| Input Range | +12 ~ +48 VDC / Consumption: 4.8 W | | | +12 ~ +48 VDC / Consumption: 6.5 W | |
| Wireless Communication (Only For UA-5231M-3GWA / UA-5231M-4GE / UA-5231M-4GC ) | | | | | |
| GSM System | GSM: 850/900/1800/1900 MHz; GPRS class 12/10; GPRS station class B | | | | |
| 3G System | 3GWA : WCDMA 850/900/1800/1900 MHz<br>4GE : WCDMA 850/900/2100 MHz<br>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<br>4GC : FDD LTE: B1/B3/B8 MHz; TDD LTE: B38/B39/B40/B41 MHz | | | | |

## UA Features

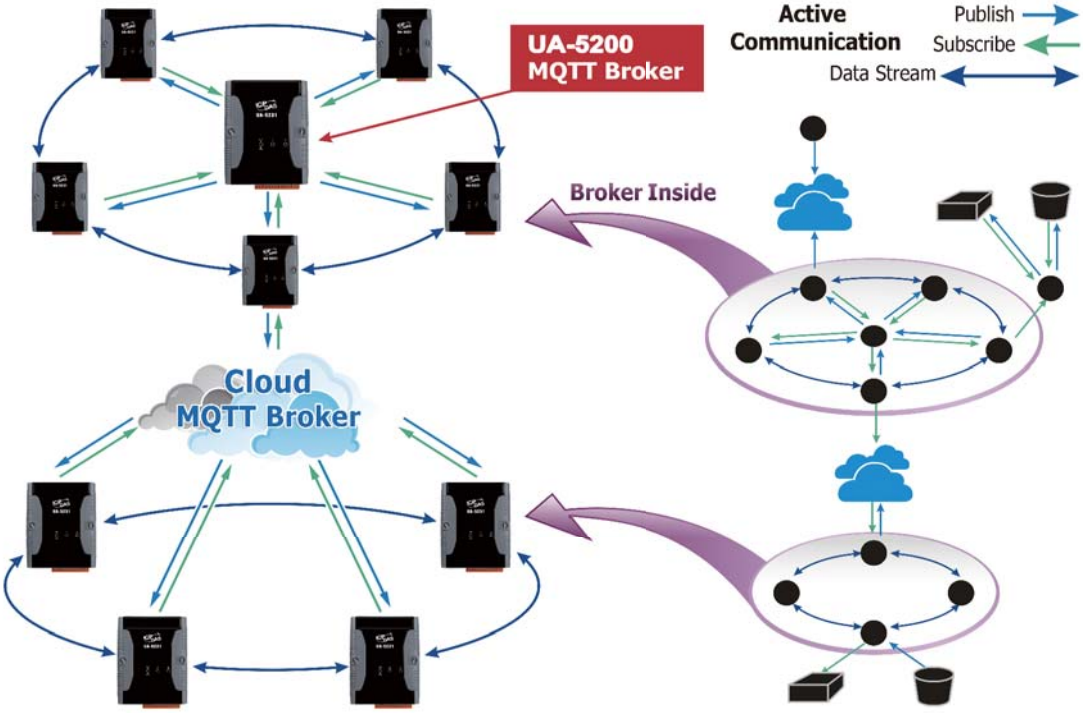
### Built-in OPC UA Server Service

Compliable with IEC 62541 Standard. Provides functions of **Redundancy**, **Transmission Security Encryption**, Active Transmission, Error Detection, Communication Failure 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 compliable with MQTT V.3.1.1 protocol. Provides functions of IoT **Active M2M** Transmission, QoS Quality Service, Retain Mechanism, Identity Verification, Encryption, Will, MQTT Client Drivers, etc. The Broker can connect up to 400 MQTT Clients.



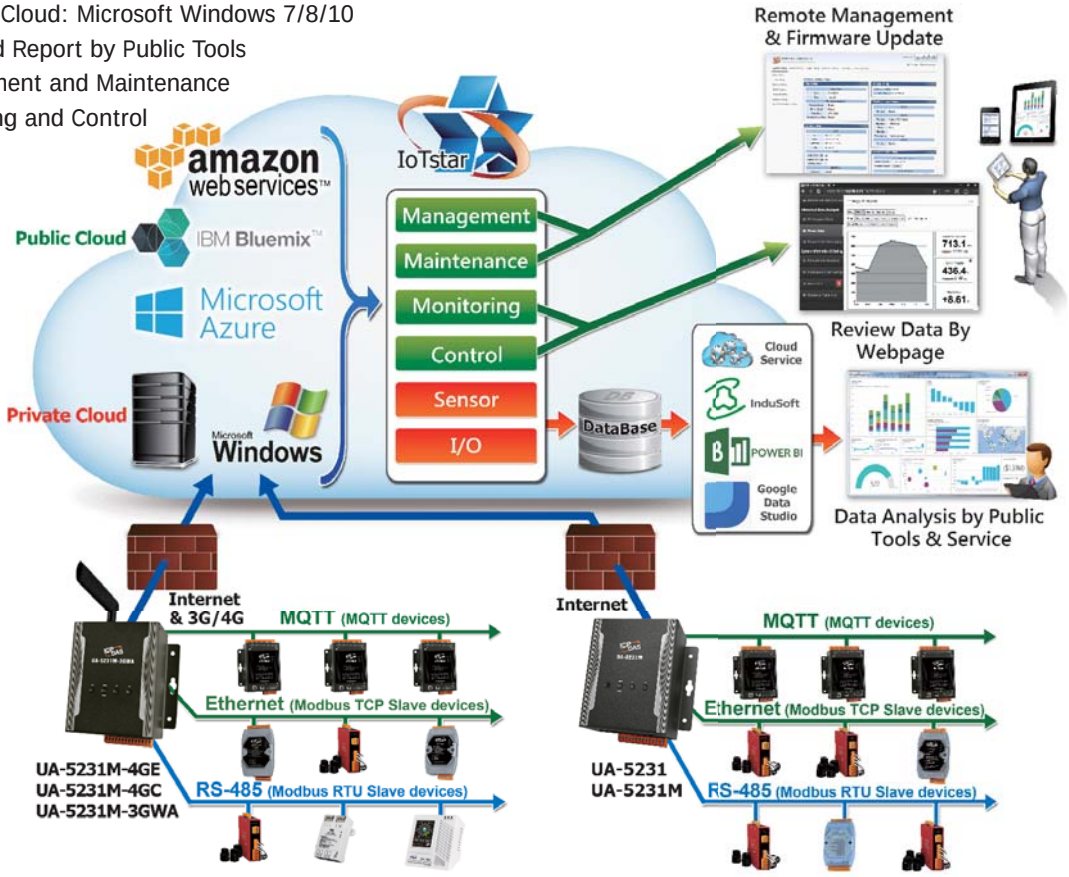
## Support IFTTT Logic Control and APP Message Notification

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

## Support IoTstar and IoT Cloud Platforms Connection

UA can actively connect with the IoTstar platform for users to manage UA series via the IoTstar, or connect to Amazon AWS, Microsoft Azure or other IoT platforms to send over the I/O data. The IoTstar Features:

1. Based on Public Cloud: Microsoft Azure, IBM Bluemix, Amazon AWS
2. Based on Private Cloud: Microsoft Windows 7/8/10
3. Data Analysis and Report by Public Tools
4. Remote Management and Maintenance
5. Remote Monitoring and Control
6. Cloud Big Data



## Provide Step Box of Function Wizard for Easy Setup

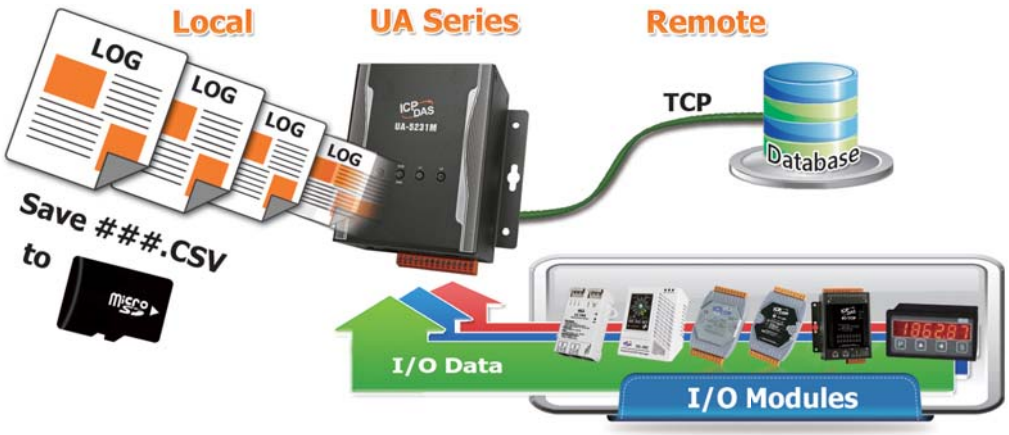
The Web UI of UA provides a wizard-like Step Box in the Function Wizard area to guide user step by step to complete the project or function. It provides many items for setting the Communication Conversion, Azure Connecting, Function Configuration, PID Operation, Condition Trigger the APP Message Notification,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

## Ethernet and Serial Communication Module Supporting

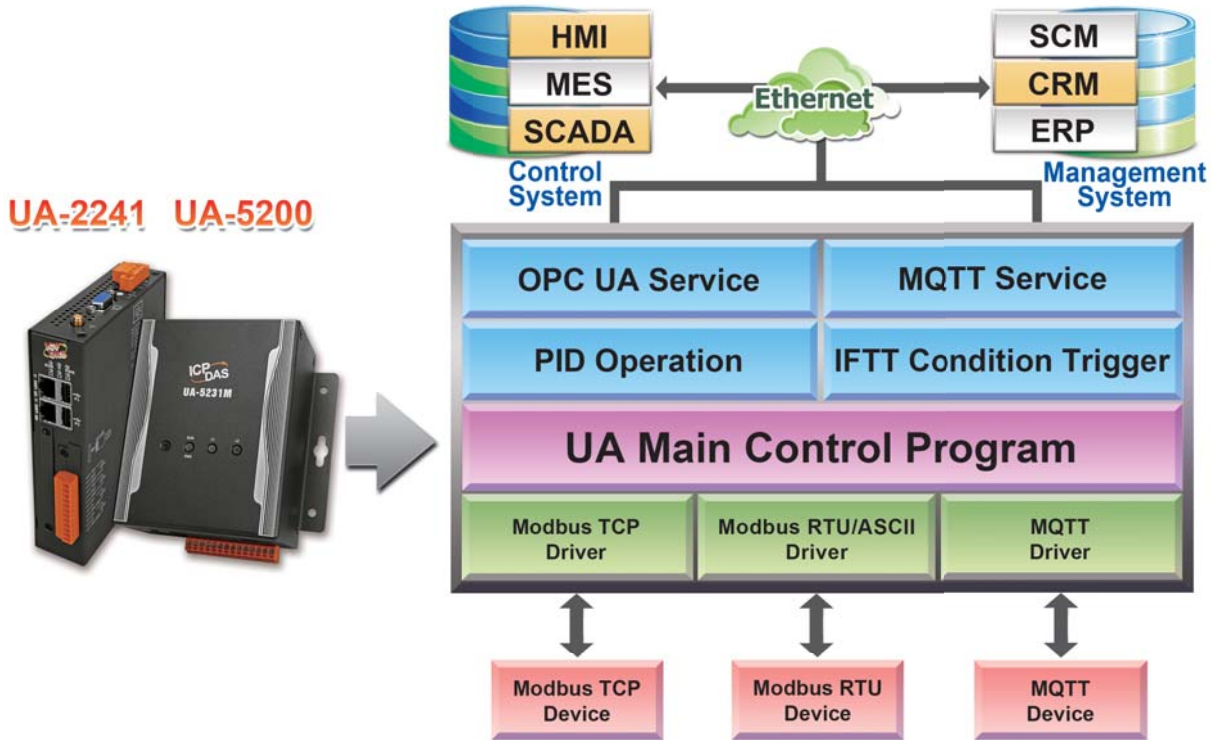
- In the Ethernet communication, the UA supports up to 100 Modbus TCP Slave module connections and up to 200 MQTT module connections.
- In the Serial communication, the UA provides three RS-232/RS-485 Serial ports, each of which can connect up to 32 Modbus RTU/ASCII Slave modules.
- Through the UA Web UI, the user can quickly set up the modules and display the module real-time statuses.

## I/O Data Log Function

The UA can record the I/O change status of the connected devices at the setting time into a CSV data log file on the local side and can store these changes to the connected SQL Database on the remote side. The user can also set the time interval to generate and divide the CSV file on the local side.

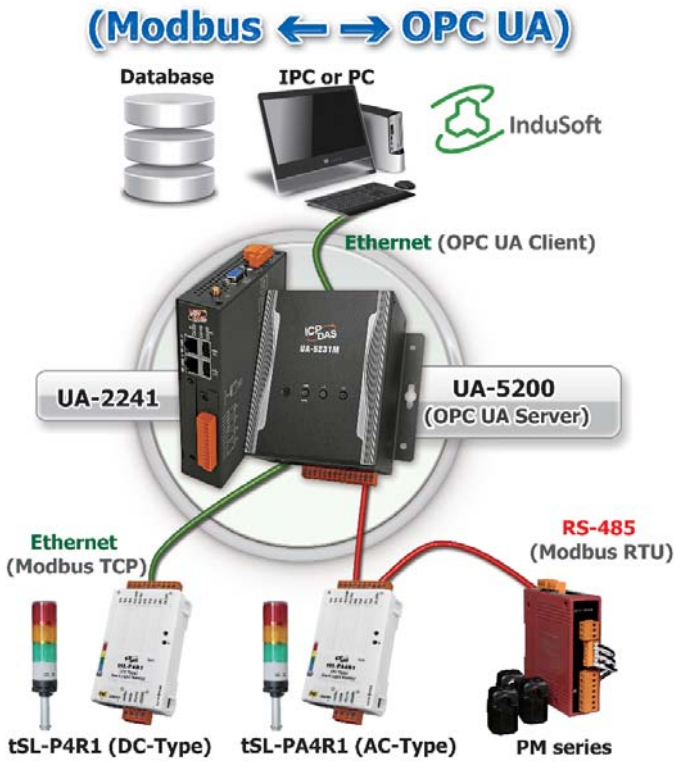


## Functions




## Solutions

1




2

3

## (MQTT ⇐⇒ OPC UA)

4

## (MQTT ⇐⇒ MQTT)

5

## (I/O Event ⇒ Comm. APP)

6

## (I/O Event ⇒ Mail)

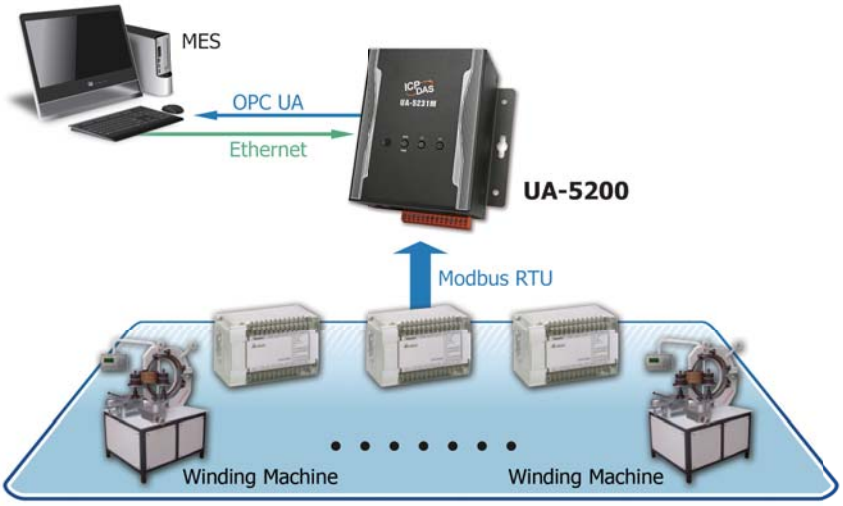
## Applications

### 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 to manage the pumping device data from many stations. It uploads the data of all pumping stations to the control center using the UA-5231 IIoT Communication Server and centrally 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 clicking on the web to complete configuration easily, efficiently, and time-saving.

**Application Features:**

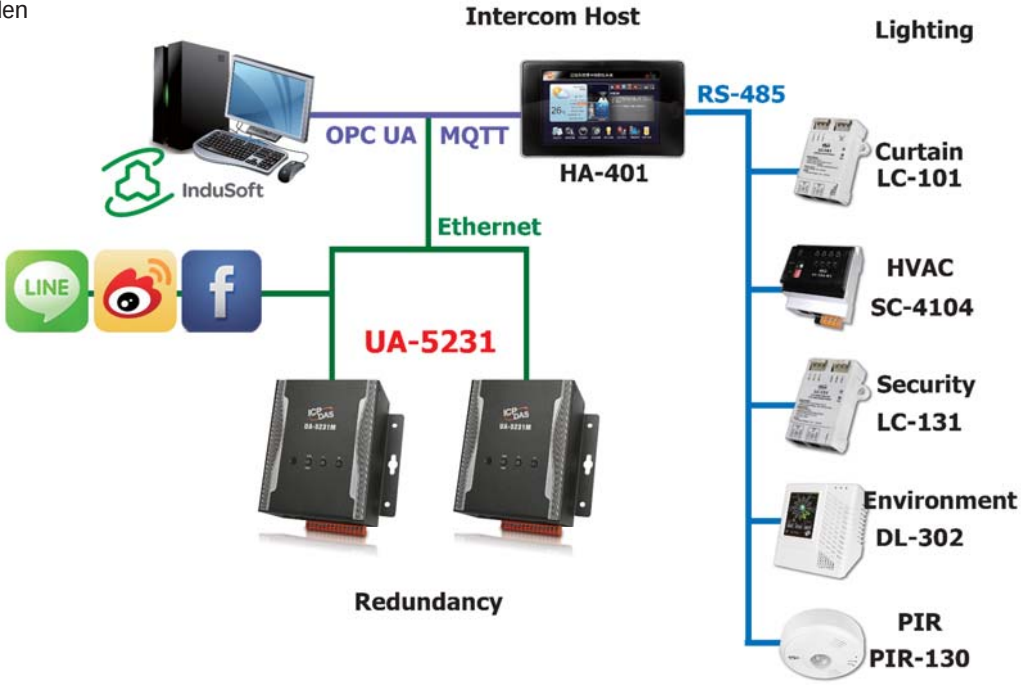
- Cross Web Domain
- Security

## BA Smart Building IoT Redundancy Application

This redundancy 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 sensing devices to create a safe and comfortable environment. If there happens a special situation, UA can quickly trigger the event, send a message to notify the Web APP (ex: LINE, Weibo, Facebook, Twitter, etc.). The architecture is a redundancy system of dual UA that can reduce the system burden, backup the data, and avoid the communication break.

**Application Features:**

- Reduce System Burden
- Redundancy
- APP Message Notify

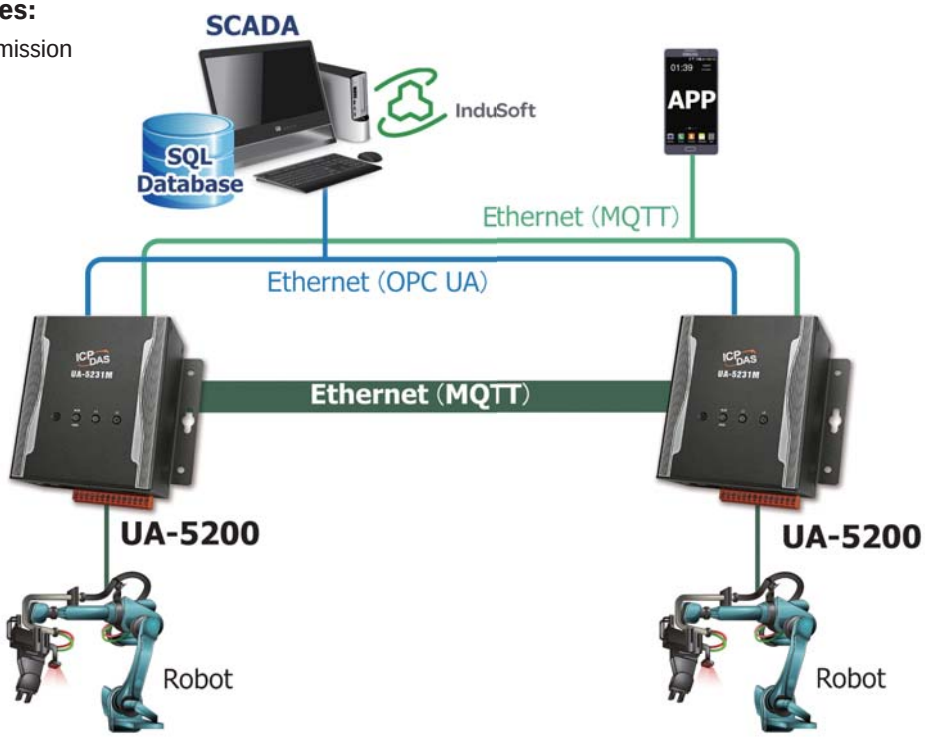



## Robotic Arm Co-operation Application

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

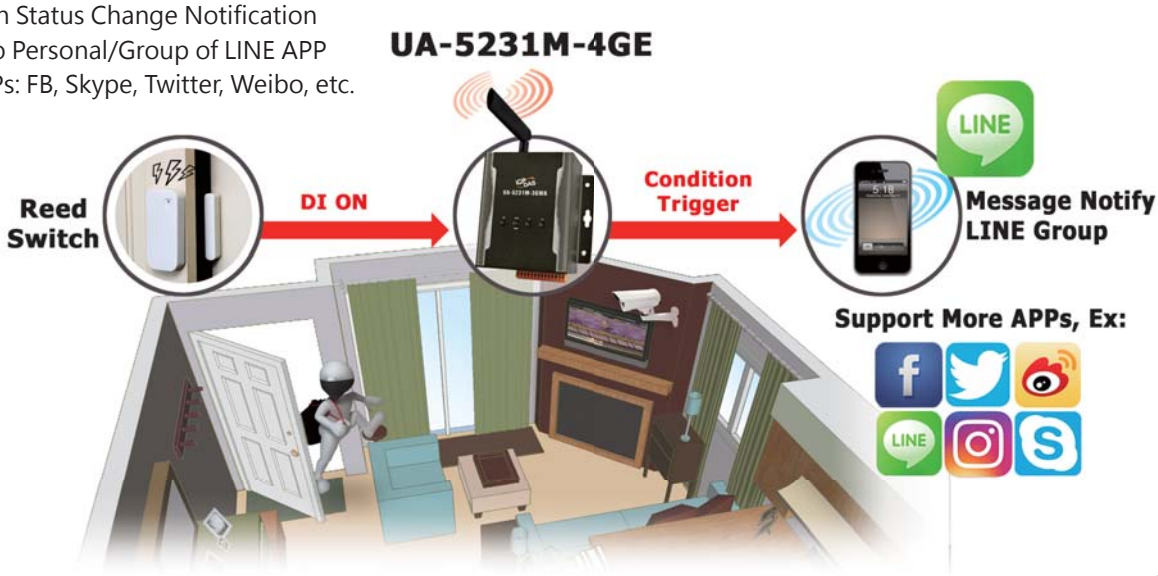


## Alert Message Notify LINE Group Application

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-favored APPs and instantly master the device information.

**Application Features:**

- DI or Switch Status Change Notification
- Message to Personal/Group of LINE APP
  - More APPs: FB, Skype, Twitter, 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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