# IIoT Products

## For Industrial Internet of Things


Vol. IIoT_2.20.09_EN

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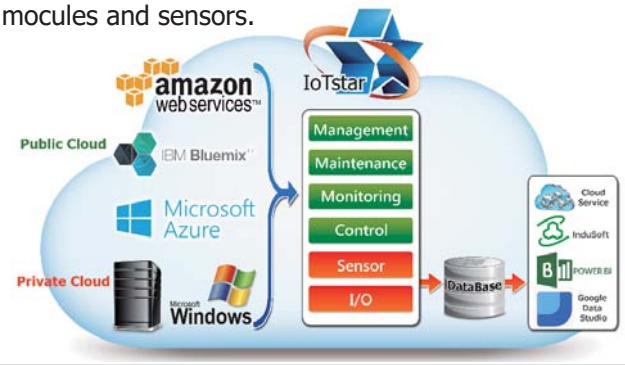
# IIoT Overview

Industrial Internet of Things (IIoT) is the new cloud trend, and the IoT technology which makes all the devices communicated with each other is the first jigsaw puzzle of the entire cloud vision. To meet the demand for industry, ICP DAS offers software, controllers, I/O modules and sensors. Our goal is to take the data to the cloud and make the whole system very easy to monitor, manage and maintain.

## 1 IoTstar

The IoT cloud management software to monitor, manage and maintain the controllers, I/O mocules and sensors.




## IoTstar Bot Service

**Mobile Phone Solution -** Monitor WISE / PMC / PMD controllers anytime and anywhere by LINE App.


## 2 UA Series

The communication severs which support OPC UA, Modbus and MQTT protocol.

## 3 WISE Series

Controllers and I/O modules for IIoT.

## 4 iCAM Series

The network cameras co-work with WISE to implement new surveillance solution.

## 5 MQ Series

The I/O modules which support MQTT protocol.

## 6 Sensors

Various sensors with communication interface to measure temperature, humidity, dew point, CH4 methane, CO, CO2, PM2.5, etc.

# Chapter 1. IIoT Software and Hardware

## 1-1 SCADA System Software: InduSoft

### InduSoft Web Studio®

**InduSoft Web Studio** is a powerful, integrated collection of automation tools that includes all the building blocks needed to develop modern Human Machine Interfaces (HMI), S**upervisory Control and Data Acquisition (SCADA)** systems, and embedded instrumentation and control applications. InduSoft Web Studio supports all Windows runtime platforms, ranging from Windows CE, Windows 7 (32/64 bit), Windows 8 (32/64 bit), Windows 10, and Windows Server Editions, along with built-in support for local or remote (web) based visualization. InduSoft also conforms to industry standards such as Microsoft .NET, OPC, DDE, ODBC, XML, and ActiveX.

ICP DAS provides the InduSoft bundled driver to integrate InduSoft software and ICP DAS products (I-7000, I-8000, I-87K and CAN Series) for SCADA system. Besides, the VxComm software of ICP DAS can be performed to link to Internet/Intranet modules in an easy way. And DCON Utility of ICP DAS can be used to configure network module for easy use and maintenance.

### InduSoft Features

#### Streamlined Licensing

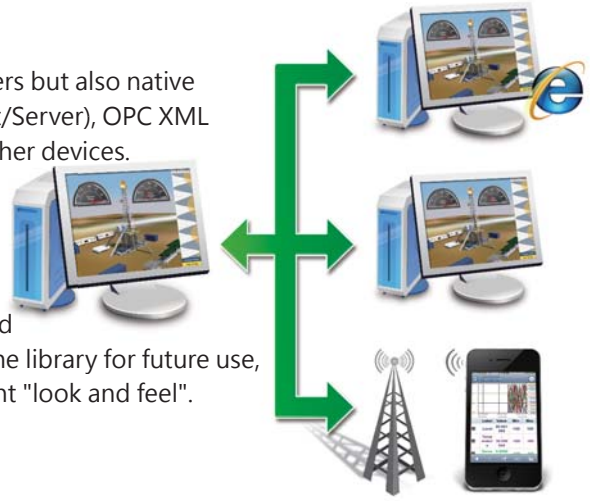
Now all license levels support an unlimited number of concurrent communication drivers (limited only by hardware constraints). Native communication drivers for the electrical protocols (DNP3/IEC) available for Full Runtime and EmbeddedView, are no longer an add-on. License no longer restricts the type of Thin Clients, nor pre-defined packages of Thin Clients. The user can define the exact maximum number of Thin Clients that should be concurrently supported by the license.

#### OPC UA Server

Support is now included for the OPC UA Server for full runtime, EmbeddedView, and IoTView.

#### Drivers and OPC

IWS 8.1 not only Provides over 250 native communication drivers but also native OPC interfaces, such as OPC UA (Client/Server), OPC DA (Client/Server), OPC XML (Client), OPC .NET (Client), and OPC HDA (Server), and many other devices.



#### Graphics and Design Tools

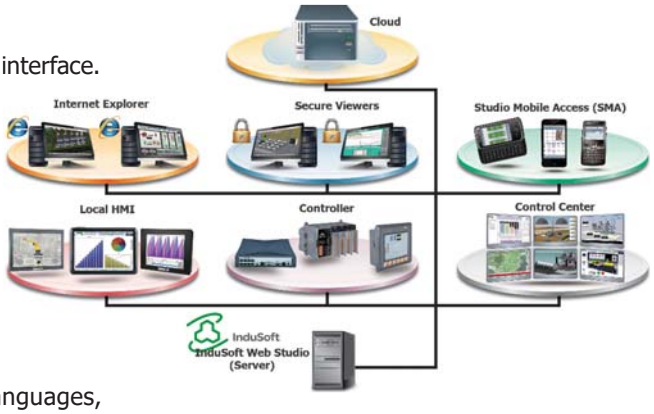
Create screens to meet any application requirement using the tools in our graphic interface. Combine over 1,000 animated objects to create any functionality required. Store graphics in the library for future use, and easily make projects across a product line share a consistent "look and feel".

#### Alarms

Send online alarms or reports using multi-media formats like PDF. Alarms are real-time and historical; log data in binary format or to any database. Use remote notification to send alarms right to your inbox, printer, or smartphone. Custom Alarm fields allow you to customize up to 10 additional fields to the alarm history.

## Animation

Take command over graphics in a user friendly and intuitive interface. Paste images, and even rotate dynamically using custom rotation points. Fill bar graphs with color, or adjust the scale of objects with easy-to-use configuration. Other animations include'command'(for touch, keyboard and mouse interaction), hyperlink, text data link, color, resize, transparency, and position.




## Multi-Language

Develop your application in one of many development languages, including English, Portuguese, German, French, Russian, Chinese Traditional and Simplified, and Spanish, or use translation tools to switch the runtime to any language. InduSoft Web Studio offers automatic font replacement based on the language selected.

## Database

Connect to SQL database (Microsoft SQL, MySQL, Sybase, Oracle), or Microsoft Access or Excel, and ERP/MES systems (including SAP), even from Windows Embedded Compact Edition. The flexible built in interface doesn't require knowledge of SQL. A patented solution allows for communication with SQL and relational databases running on any supported platform.


## Recipes and Reports

Save time and maintain consistency by automating part parameters or production quantities with flexible recipe management tools. Create clear, concise reports in plain text, RTF, XML, PDF, HTML, and CSV or integrate with Microsoft Office programs such as Excel. Get the data you need, in the format you need it, to make informed decisions, fast.


## Trends

Real-time and Historical trends, and SPC functionality are supported. Log data in binary format, or to any local or remote SQL database. Color or fill trends with graphic elements to enhance clarity of data. Date/Time based or numeric (X/Y plot) trends give you the flexibility to display information that best suits your application. InduSoft Web Studio supports vertical and horizontal trending.

## Scheduler

Schedule application behavior triggered by tag changes, date/time, frequency, or any trigger. Use this for simulation, to trigger reports or other functionality at a particular time of day, or even to trigger driver worksheets to read/write at a scan rate you choose.

## Scripting

Two powerful scripting languages are supported; built-in InduSoft functions and standard VBScript. Take advantage of widely available resources for VBScript. Both the native InduSoft scripting language and VBScript can be used simultaneously to give you the functionality you need, even from thin clients. Script debugging tools for the native VBScript editor include break-points, and a variable watch list to improve scripting productivity.

# InduSoft Software Ordering Information

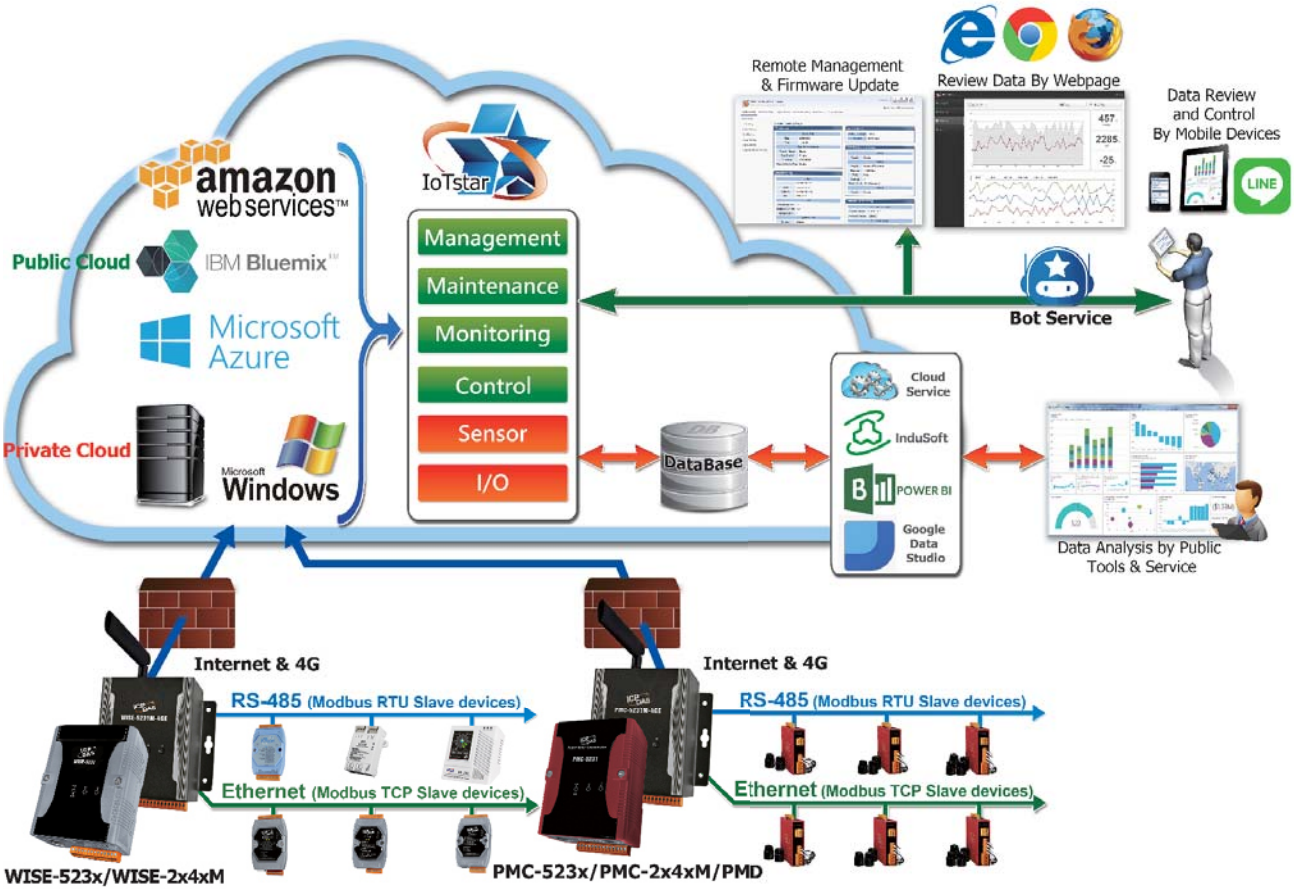
| | |
|---|---|
| IWS Development Package for Windows | InduSoft development package can generate applications for Windows, Windows Embedded and Windows Embedded CE |
| IWS Runtime Package for Windows | InduSoft runtime package for Windows, Windows Embedded |
| IWS Runtime Package for Windows Embedded CE | InduSoft runtime package for Windows Embedded CE |
| Additional Package for Development or Runtime License | The additional package number of Thin Clients |

# 1-2 IIoT Cloud Management Software : IoTstar + Mobile Phone Solution : Bot Service


IoTstar is a software developed by ICP DAS for use in remote management of the IIoT Edge controllers on a private or public cloud platform such as: Microsoft Azure, IBM Bluemix or Amazon AWS, etc.. With the help of the IoTstar and the IIoT Edge controllers, data of I/O modules or sensors can be quickly and easily collected and imported to the database on the cloud platform; and users can analysis and generate report by using the tools provide by the cloud platforms.

## Features:

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



## Based on Public Cloud

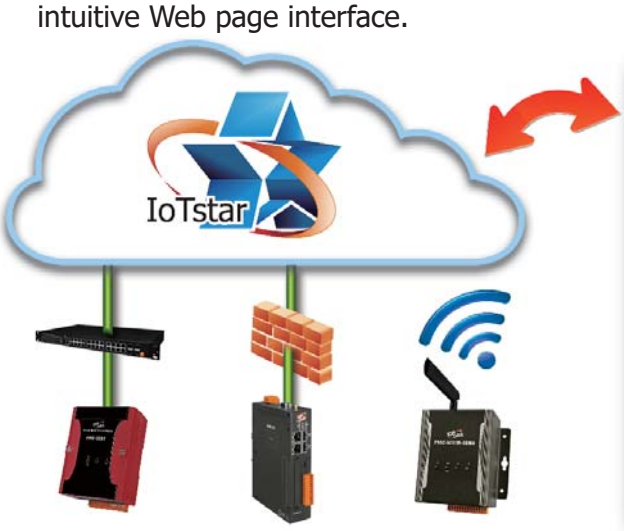
Can be installed on Microsoft Azure, IBM Bluemix or Amazon AWS to implement the public IoT cloud Solution.


## Based on Private Cloud

Support Windows system (Windows 7/8/10, Windows Server) to implement the private IoT cloud solution.


## Remote Management and Maintenance

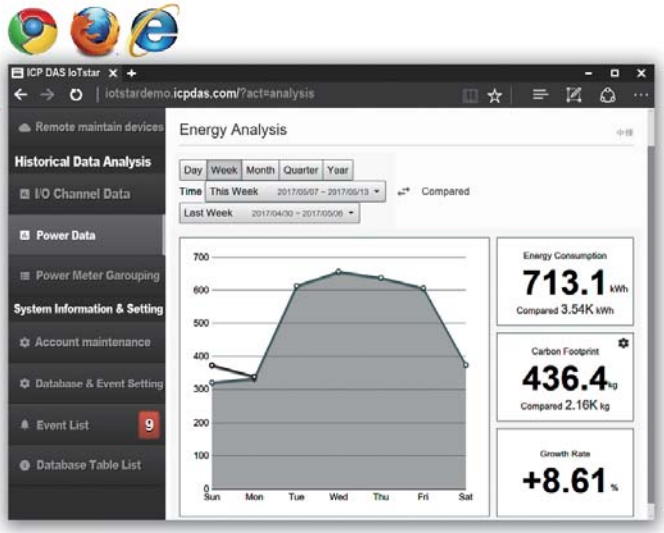
Enables the remote management and firmware update on the controllers via user-friendly and intuitive Web page interface.





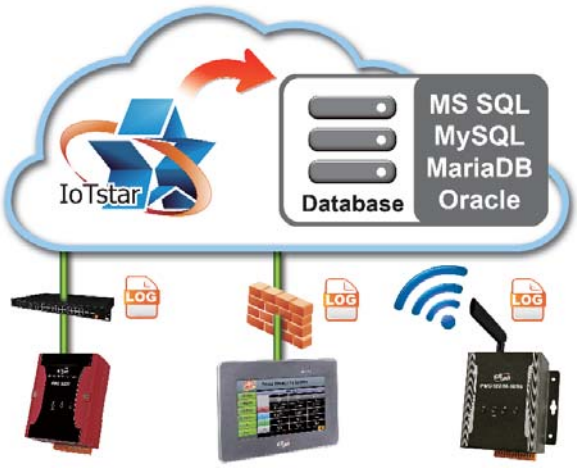
## Remote Monitoring and Control

User can retrieve and review the data of the sensors directly by the built-in Web page interface.

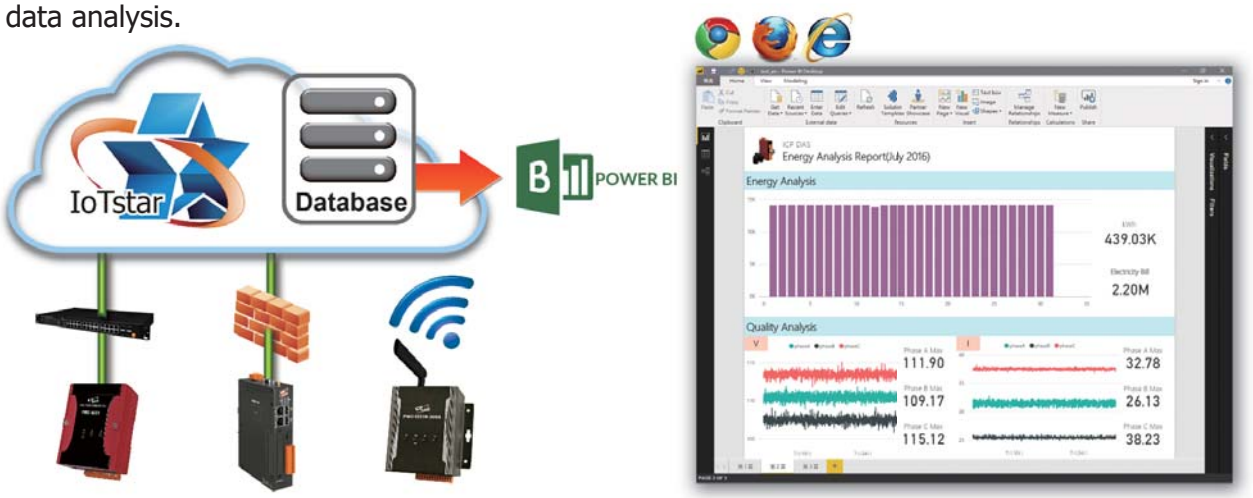
## Sensor Data Collection and Database Import

Receive the data log file of the sensors from the remote IIoT Edge controllers and import the content of the data log file into the Database.




## Analysis and Report by Public Tools

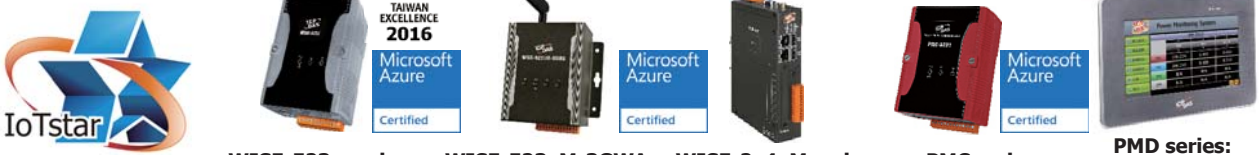
By Database interface, it is easy to integrate with SCADA, Microsoft Power BI, Google Data Studio or Cloud Service to retrieve the data of the Sensors directly from the Database for future data analysis.




▲ Analysis and Report by Microsoft Power BI


▲ Analysis and Report by Google Data Studio

Products support IoTstar:




**WISE-523x series:** IIoT Edge Controller

**WISE-523xM-3GWA** **WISE-523xM-4GE** 3G/4G IIoT Edge Controller

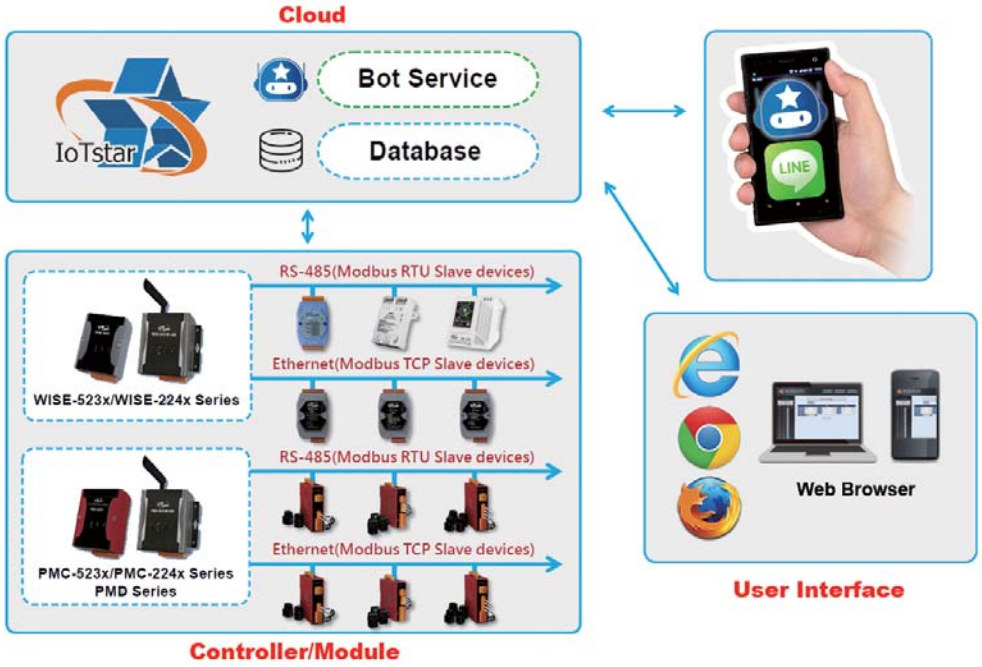
**WISE-2x4xM series:** IIoT Edge Controller

**PMC series:** IIoT power meter Concentrator

**PMD series:** IIoT power meter Concentrator with touch panel

## IoTstar Bot Service (Supported LINE App)

IoTstar Bot Service is an optional software package for IoTstar that provides users two-way message interactions between the WISE/PMC/PMD controller managed by IoTstar and LINE chat rooms. IoTstar Bot Service provides an easier and more convenient mechanism for user to manage his/her remote controllers with LINE App. It does not like the traditional Chatbot which get the information or service by entering the text message; it provides a friendly user interface that includes buttons and dialogue menu to perform the monitoring of remote controllers in an easy way.



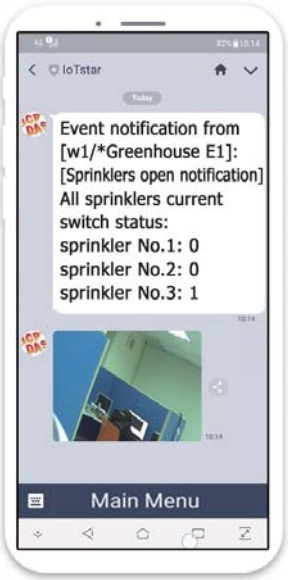

## Features

- Monitor WISE/PMC/PMD controllers anytime and anywhere by LINE App.
- Query real-time sensor or power data and change the value of DO/AO output channels.
- Quickly browse the real-time sensor data efficiently by Grouping data.
- Receive real-time event messages with text, pictures or videos (WISE can work with the iCAM IP camera to send the picture or video files).
- Review and query the historical event messages.
- Secure and reliable communication mechanism between LINE and controllers.
- Easy to Maintain; only need the upgrade of LINE App.


Operation
User Interface


Query Sensor
(or power) data


DO/AO channel
setting




Event notification
and query

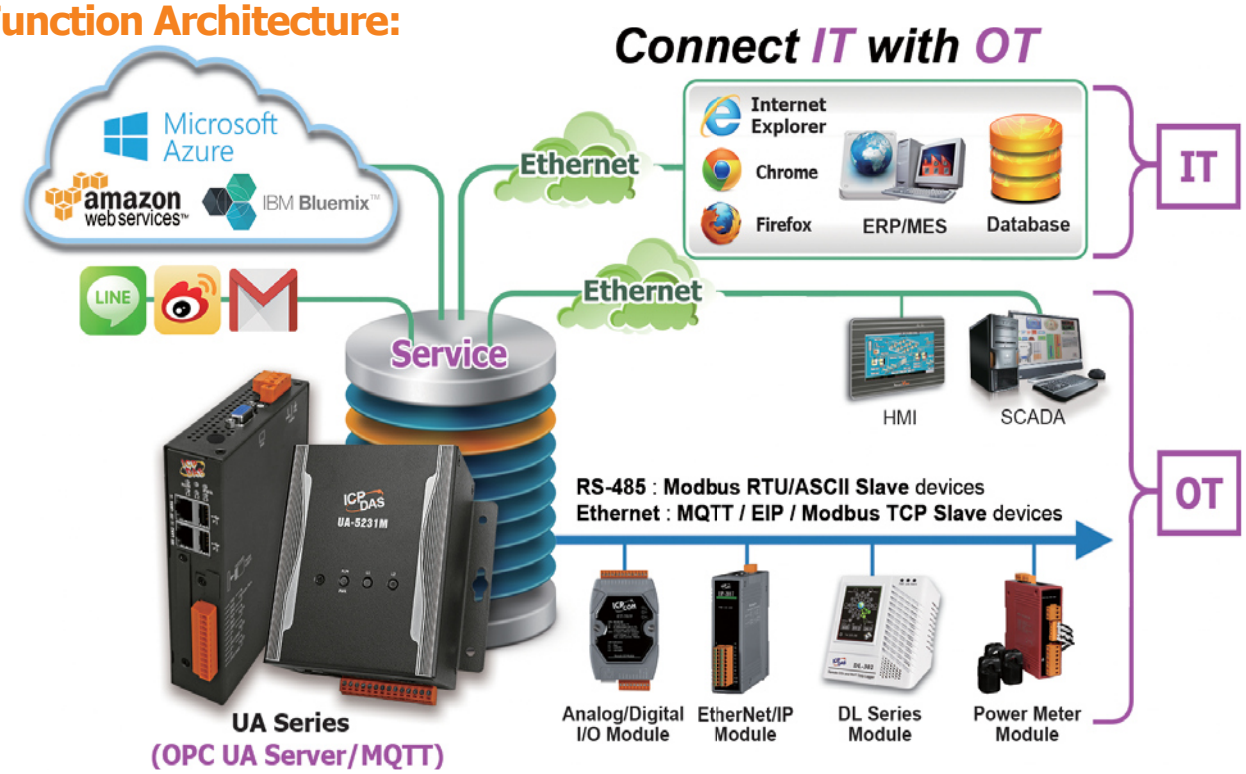
# 1-3 IIoT Communication Server: UA Series


## 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, 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.

## Function Architecture:



# Selection Guide:

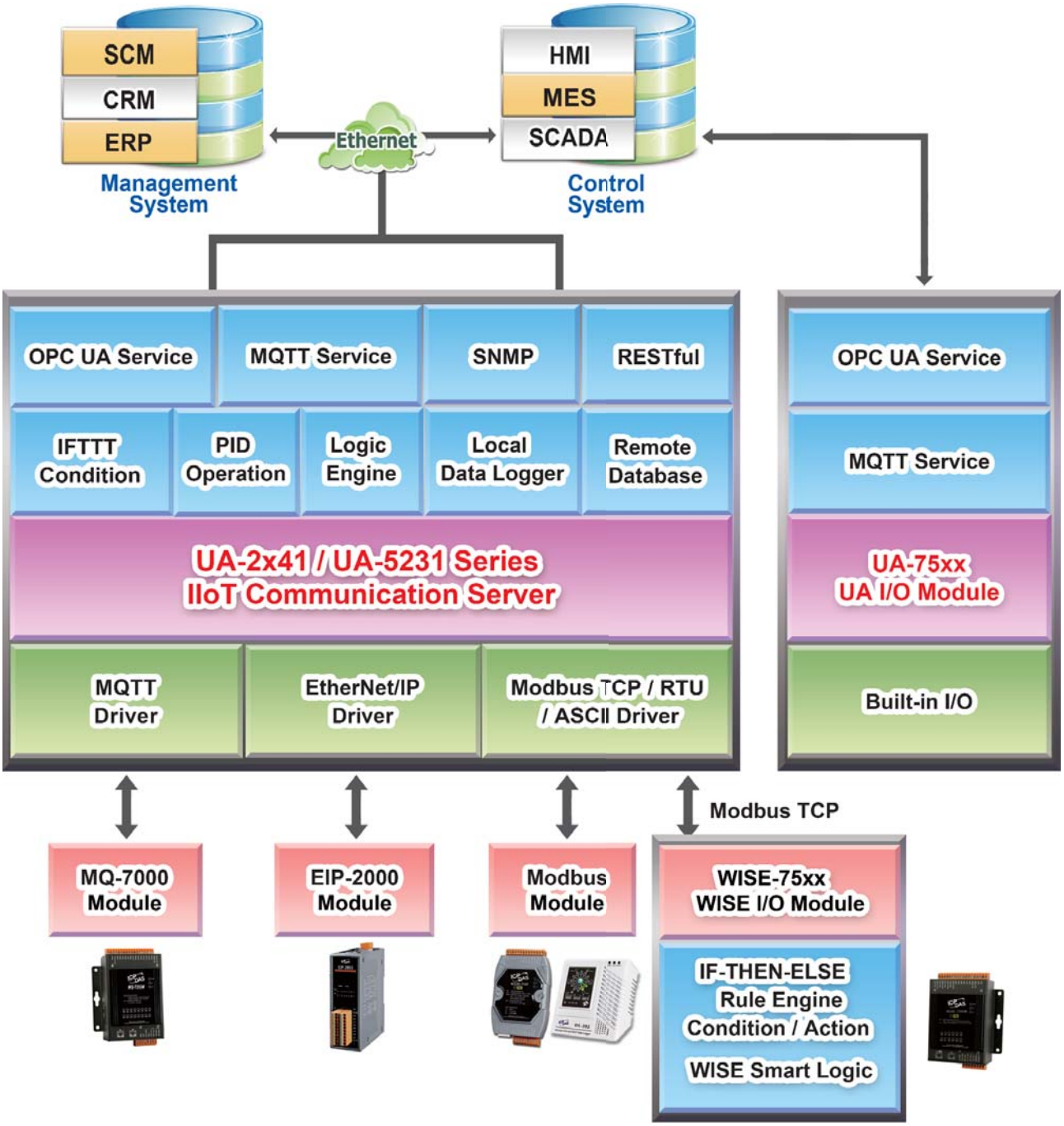

## ■ Hardware

| Model | | UA-2841M<br>UA-2841M-4GE/4GC | UA-2241M<br>UA-2241M-4GE/4GC | UA-5231/UA-5231M<br>UA-5231M-4GE/4GC/3GWA |
|---|---|---|---|---|
| System / Module | | | | |
| OS | | Linux Kernel 4.1.15 | Linux Kernel 3.2.14 | |
| CPU | | Quad Core ARM, 1.6 GHz | ARM, 1.0 GHz | |
| SDRAM / Flash | | DDR3 1 GB / 8 GB | DDR3 512 MB / 512 MB | |
| Expansion Memory | | microSD socket with one 4 GB microSD card<br>(support up to 32 GB microSDHC card. UA-2841M can up to 2 TB microSDXC card) | | |
| Communication Ports / 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 / 2 x RS-485 (2 x isolated) | | 2 x RS-232 / 2 x RS-485 (1x isolated) |
| Port Expansion | | Optional XV-board | | - |
| Environmental / Power | | | | |
| Temperature | | Operating T.: -25 ~ +75°C / Storage T.: -40 ~ +80°C / Humidity: 10 ~ 90% RH (non-condensing) | | |
| Input Range | | +12 ~ +48 VDC | | |
| Consumption | | Ethernet: 10 W<br>-4GE/4GC: 11.7 W | Ethernet: 4.8 W<br>-4GE/4GC/3GWA: 6.5 W | |
| Wireless Communication (Only For UA-2x41M-4GE/4GC, UA-5231M-4GE/4GC/3GWA) | | | | |
| 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 bands (Asia Only; Frequency Band: Except China) | | |
| | -4GC | FDD LTE: B1/B3/B8 bands (Asia Only; Frequency Band: for China)<br>TDD LTE: B38/B39/B40/B41 bands (Asia Only; Frequency Band: for China) | | |

## ■ Software

| Model | UA-2841M Series | UA-2241M Series | UA-5231 Series |
|---|---|---|---|
| Protocol Connection Support | | | |
| OPC UA Server | Max. 8000 Tags<br>Max. 40 Client Sessions | Max. 8000 Tags<br>Max. 20 Client Sessions | |
| MQTT Broker | Max. 1800 Client Devices | Max. 400 Client Devices | |
| MQTT Client | Max. 400 Connections | Max. 200 Connections | |
| Modbus TCP Master | Max. 200 Modules | Max. 100 Modules | |
| Modbus RTU/ASCII Master | Max. 32 Modules x 3 ports (UA-2x41 can expand by 1 optional XV511i board) | | |
| EtherNet/IP Scanner | Max. 100 Modules | Max. 50 Modules | |
| SNMP | Max. 10 read commands and 10 write commands at the same time. | - | |
| RESTful | Max. 20 read commands and 1 write command at the same time. | - | |
| Database Connection (MS SQL, MySQL, MariaDB) | | | |
| Remote Database | Max. 2 Databases per Time, Max. 1000 Tags | 1 Database per Time, Max. 1000 Tags | |
| Cloud Support | | | |
| IoT Cloud Platform | Microsoft Azure, Amazon Web Services, IBM Blumix | | |
| Web APP | IFTTT Logic Trigger APP (Line, Twitter, Gmail ...) | | |

## Function Architecture:




## UA provides Function Wizard for setting functions easy and quick

UA products afford many valuable functions as showing in the Function Architecture picture. The functions are multiple, but the setting is easy and quick. Because the UA provides a Function Wizard "Step Box" in the Web UI to guide users step by step to complete the project or function. It provides many items for setting the Communication Conversion (OPC UA, MQTT, Modbus, EtherNet/IP, SNMP...), Certificate Setting, Cloud Platform Connecting (Azure), Local Data Logger, Remote Database (MS SQL, MySQL, MariaDB), Function Configuration, PID Operation, Condition Trigger the APP Message Notification (Line, Twitter...), I/O Module connection and setting, and will be more. It will help users to set projects easily and quickly.

# Features:

## Built-in OPC UA Server

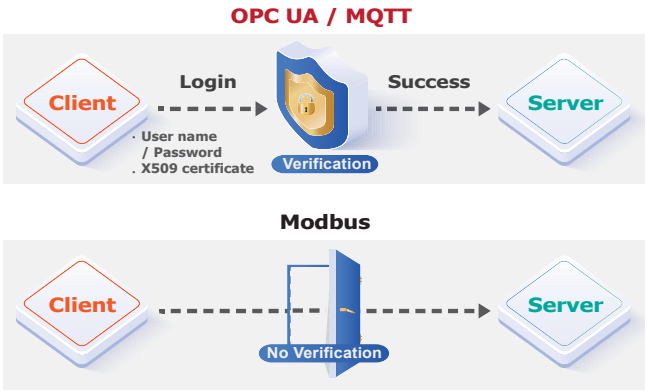
Compliance with IEC 62541 Standard. Provides functions of Active Transmission, Transmission Security Encryption(SSL/TLS), User Authentication (X.509 Certificates/Account password), Communication Error Detection and Recovery, etc. to connect SCADA or OPC UA Clients.

## Support MQTT Broker/Client

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

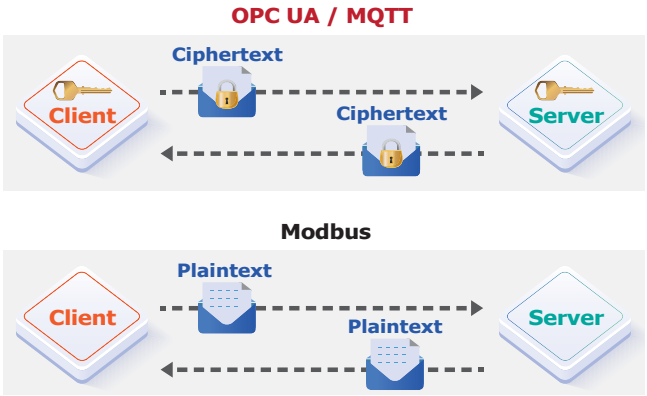
## Support Identity Authentication

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



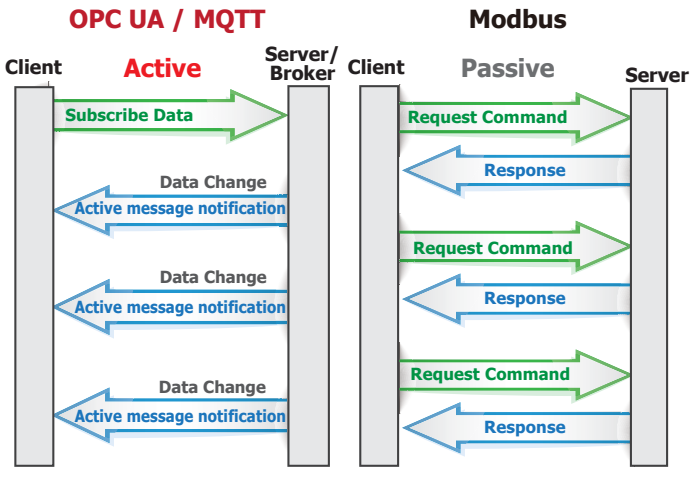

## Support Data Encryption

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



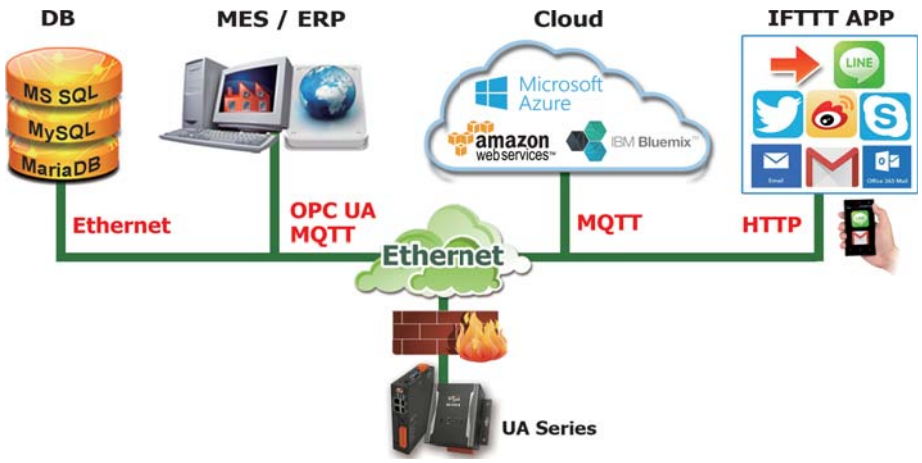

## Active Data Transmission

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



## Support Logic Control IFTTT To Send Event Messages To LINE ... APPs

UA can combine the **IFTTT** cloud platform functions and send messages to more than 500 **Web APPs** (such as LINE, 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 notify message to the specific user or group to handle the event immediately.



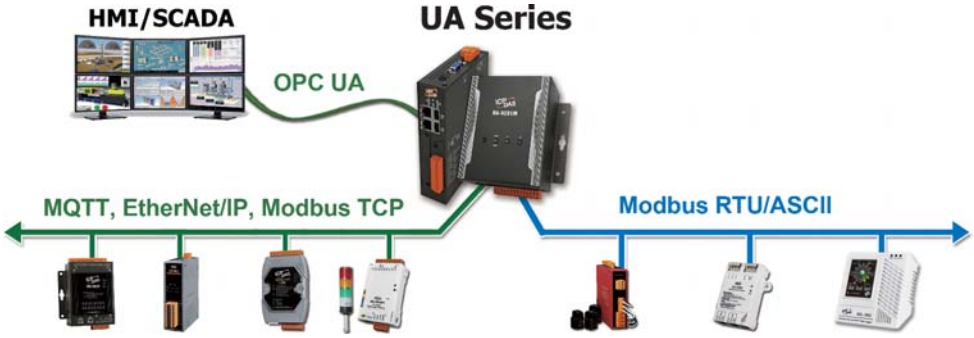

## Save I/O Data Directly into Remote Database & Local Side LOG File

UA series can collect devices I/O status and then directly save into remote side **SQL Database (MS SQL, MySQL and MariaDB)**. 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.

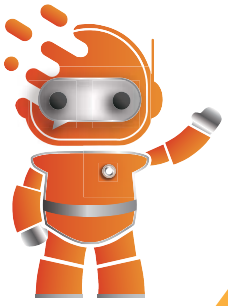

## Support Ethernet and Serial Communication Modules

- **Ethernet** : UA supports **Modbus TCP**, **MQTT** and **ICP DAS EtherNet/IP** modules
- **Serial** : UA supports **Modbus RTU/ASCII** modules (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 |
|---|---|---|---|---|
| | Modbus TCP | MQTT | EtherNet/IP | Modbus RTU/ASCII |
| UA-2800 | 200 | 400 | 100 | 32 x 3 ports |
| UA-2200/5200 | 100 | 200 | 50 | 32 x 3 ports |



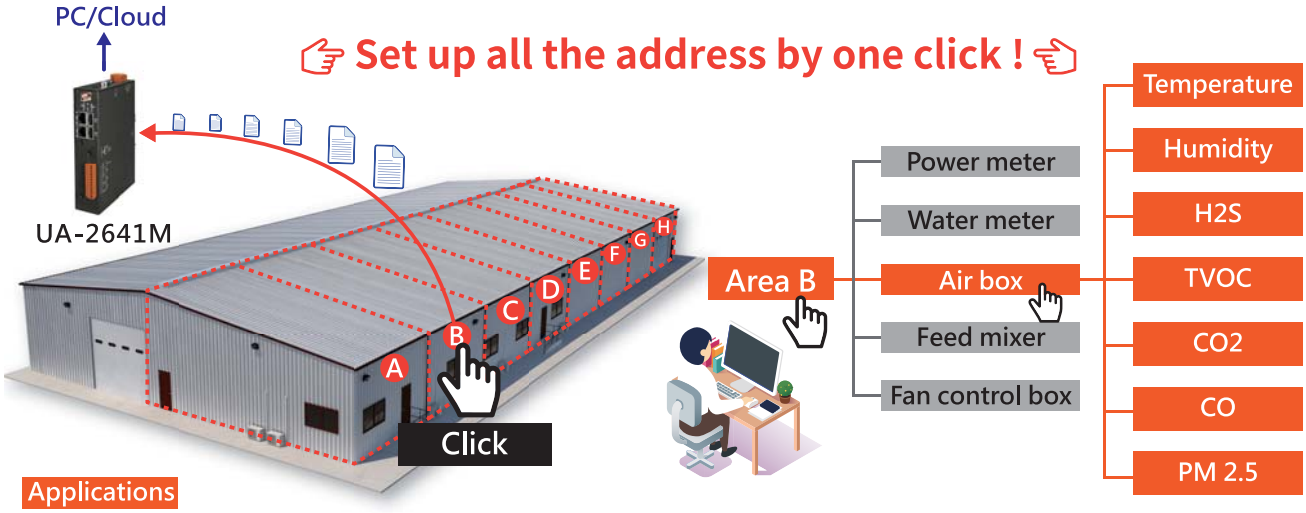
## Easy Project Building



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 : Choose and click | STEP1 : Routing table<br>STEP2 : Hand-shaking test<br>STEP3 : Choose IP address |
| STEP2 : Automatically extend tree view | STEP4 : Set up IP address range<br>STEP5 : Set up tag name<br>STEP6 : Do tag scaling |




### Applications

**Modern pig farms**

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

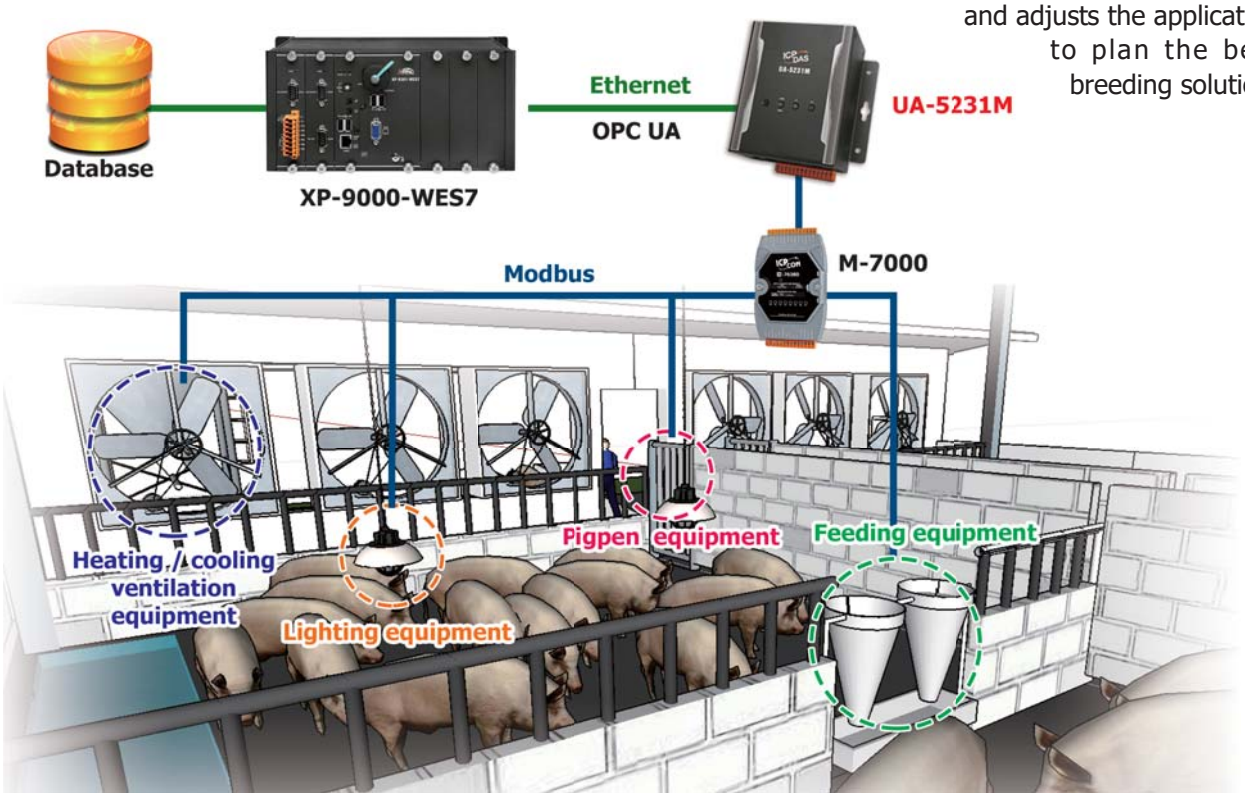
**Chemical plant**

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

# 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.

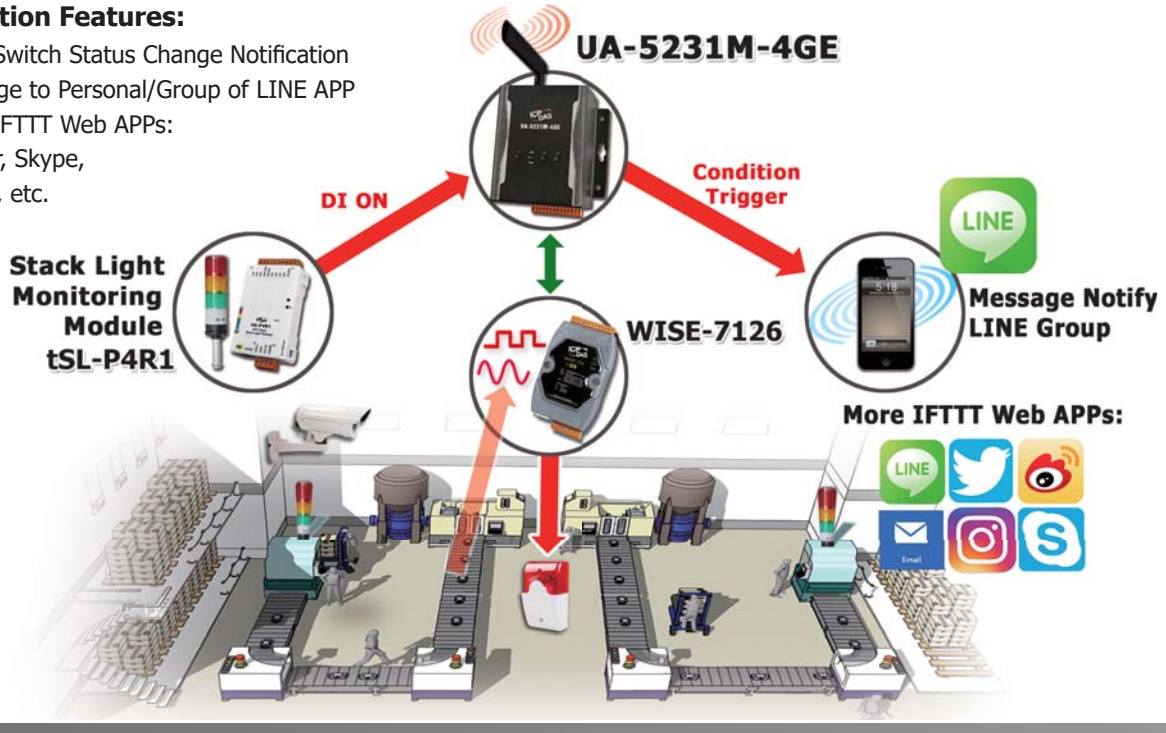



## Alert Message Notify LINE Group Application

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.

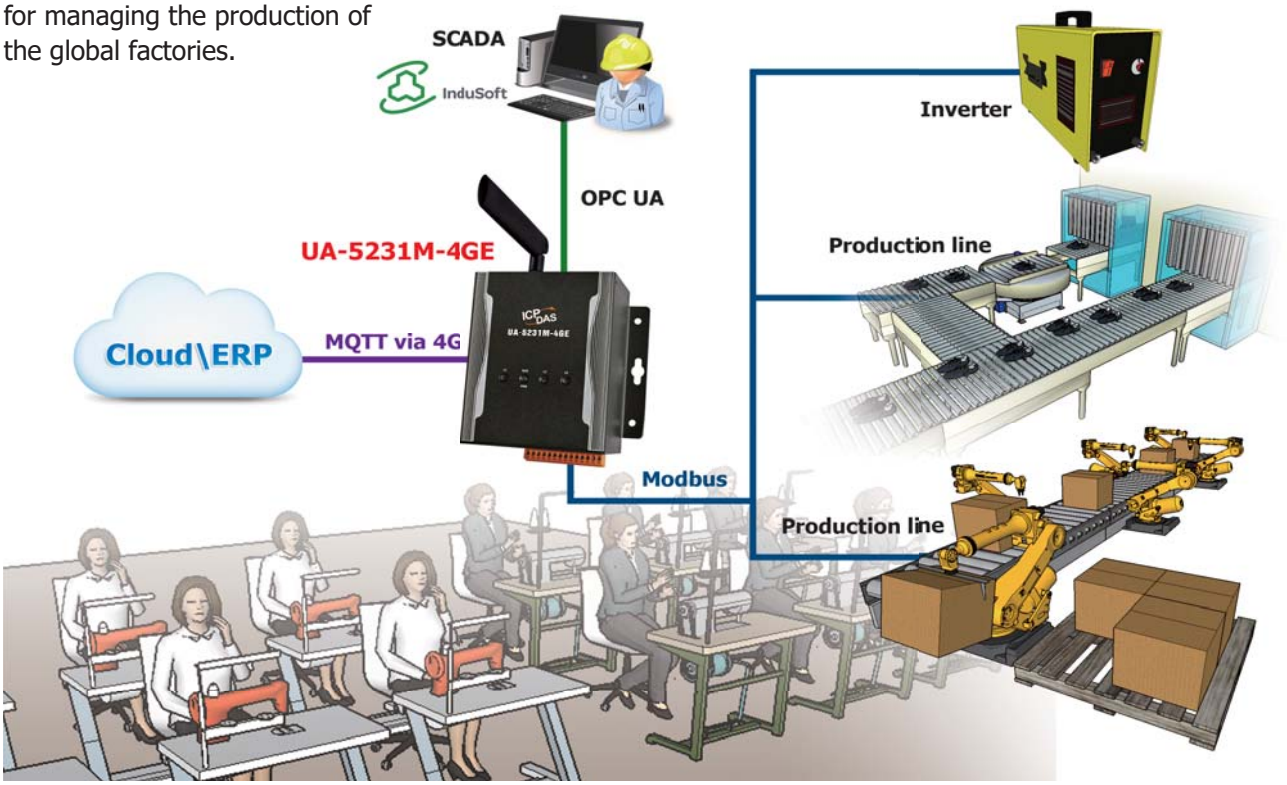
**Application Features:**

- DI or Switch Status Change Notification
- Message to Personal/Group of LINE APP
- More IFTTT Web APPs: Twitter, Skype, Weibo, etc.



## 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.




## 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 .....

# UA I/O Module: UA-7000 Series

UA-7000

## Features:

- Built-in Web Server to Provide the Web User Interface
- Built-in OPC UA Server
- Support MQTT Client Communication Protocol
- Built-in I/O Channels (AI, AO, DI and/or DO)
- 2-port Ethernet Switch for Daisy-Chain Topology
- IEEE 802.3af-compliant Power over Ethernet (PoE).

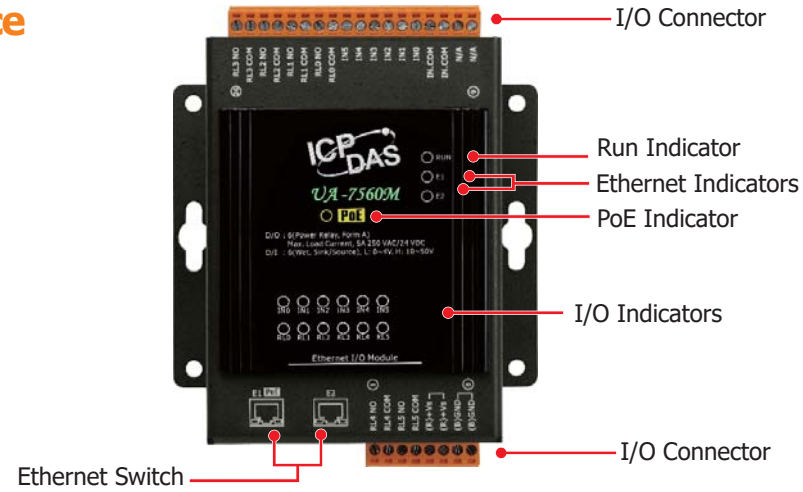
## Intrudoction

**UA-7000** is a series of **OPC UA I/O modules** with built-in OPC UA Server and MQTT Client. It provides a web interface for configuring the module, controlling the output channels, monitoring the connection and I/O status. UA I/O supports OPC UA server and MQTT client function in industrial networking communication. Users can choose the networking mode according to their needs and environment, to transmit the values of built-in I/O channels to the cloud IT system or field control system for reading and writing.

## Comparison Table of ICP DAS UA I/O Module & Traditional I/O Module

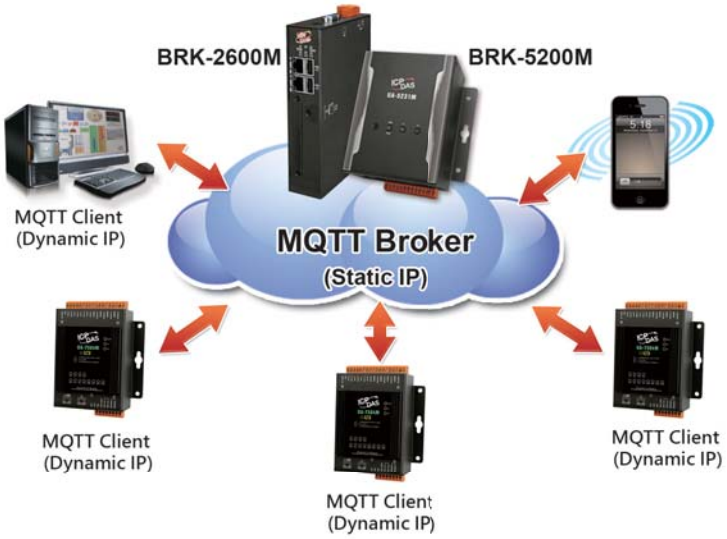
| | ICP DAS UA I/O Module | | Traditional I/O Module |
|---|---|---|---|
| **Protocol** | **OPC UA Server** | **MQTT Client** | **Modbus TCP Slave** |
| IP Setting | Static IP | Static or Dynamic(DHCP) IP | Static IP |
| Identity Authentication | Account ID/Password, Anonymous, Certificate Verification | Account ID/Password, Anonymous | None |
| Encryption | SSL/TLS | SSL/TLS | None |
| Data Transmission | Active<br>(Actively sends Data to the Client) | Active<br>(Actively publishes Data to Broker, and the Broker sends Data to other Clients) | Passive<br>(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. |

## Appearance



## OPC UA Architecture:


## MQTT Architecture:




## Selection Guide:

| Module Name | AI | | AO | | DI | | DO | |
|---|---|---|---|---|---|---|---|---|
| | Ch. | Type | Ch. | Type | Ch. | Type | Ch. | Type |
| **UA-7555M** | - | - | - | - | 8 | Dry (Source), Wet (Sink,Source) | 8 | Open Collector (Sink) |
| **UA-7560M** | - | - | - | - | 6 | Wet (Sink/Source) | 6 | Power Relay Form A (SPST N.O.) |
| **UA-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) | - | - |
| **UA-7526M** | 6 | ±500 mV, ±1V, ±5V, ±10V, 0~20mA, ±20mA, 4~20mA | 2 | 0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA | 2 | Dry (Source), Wet (Sink,Source) | 2 | Open Collector |
| **UA-7517M-10** | 10 / 20 | ±150mV, ±500mV, ±1V, ±5V, ±10V, ±20mA, 0~20mA, 4~20mA | - | - | - | - | - | - |
| **UA-7519ZM** | 8 | ±150mV, ±500mV, ±1V, ±5V, ±10V, ±20mA, 0~20mA, 4~20mA Thermocouple: J, K, T, E, R, S, B, N, C, L, M, LDIN43710 | - | - | - | - | 3 | Open Collector (Sink) |

# 1-4 IIoT MQTT Broker: BRK Series

**BRK-2841M**

## Features:

- MQTT Broker Inside:
  - Bridge Architecture
  - Cluster Architecture
  - QoS message quality mechanism
  - Retains mechanism
  - Identity/Password authentication
  - Communication encryption
  - Last message (Last Will)
- Support Load Balancer Function
- Support High Availability Architecture

## Intrudoction:

**BRK Series** is an embedded controller that specially provides Broker function of MQTT protocol for MQTT message distribution and agent 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 MQTT functions such as QoS message quality mechanism & Retains mechanism, identity authentication & communication encryption, last message (Last Will), bridge, etc. And support Web UI setting method to quickly set up BRK functions to reduce the burden of setting up the server by user oneself and reduce the maintenance cost. Besides, **BRK** Series provides Cluster, Bridge, Load balancer, and high availability functions. Composing multiple BRK Series can form a High Availability system that prevents field systems from stopping services due to hardware or network failures.

### Support MQTT Broker Redundancy Architecture

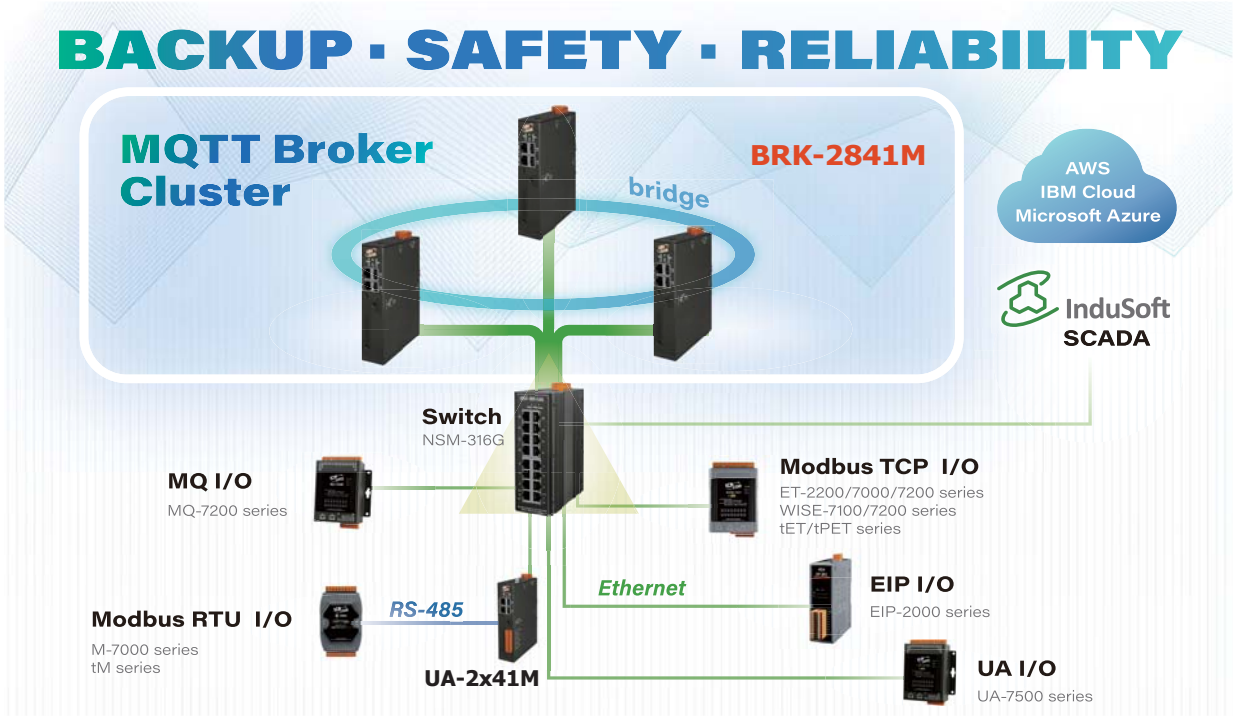
Use Two **BRK Series** as the **MQTT Brokers** to **bridge** and communicate with each other. Use one **BRK Series** as the **Load Balancer** to handle MQTT devices and software as well as the **redundancy** connections with Broker. When there is any disconnect or Broker out of work, another Broker will take over and continued working.

## Selection Guide:

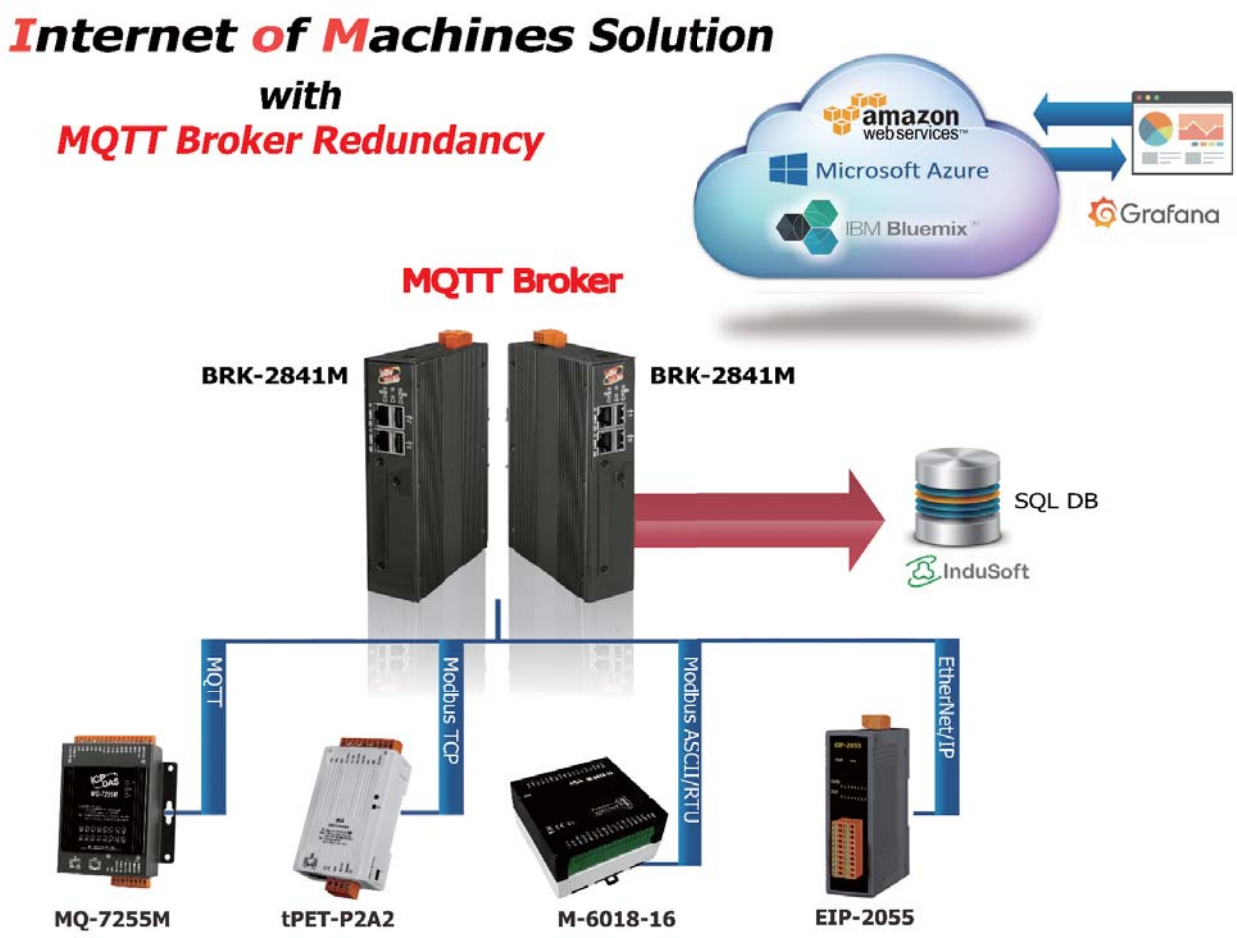
| **Module Name** | | **BRK-2841M** |
|---|---|---|
| **Hardware** | | |
| CPU | | ARM Quad Core CPU 1.6 G Hz |
| RAM | | 1 GB |
| **Software** | | |
| **MQTT Broker** | Client (Connecting Numbers) | 3000 |
| | Bridge | Y |
| | Cluster | Y |
| | WebSockets | Y |
| **Load Balancer** | | Y |
| **High Availability** | | Y |

## Applications:

### BRK Series MQTT Broker Cluster Application




### IoM Solution with MQTT Broker Redundancy

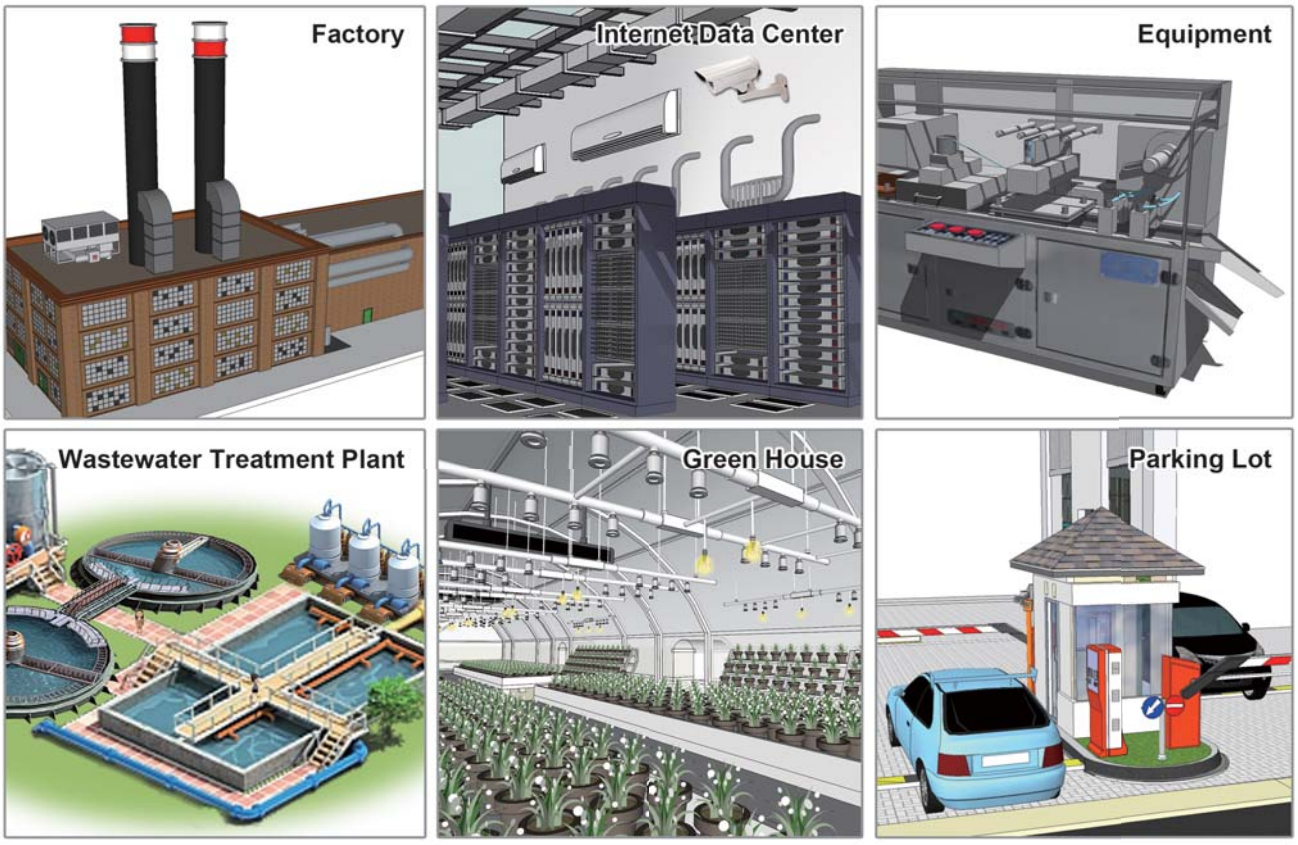


# 1-5 IIoT Edge Controller : WISE Series

## *Smart Front End for IIoT*

The trend of "Industry 4.0" has brought numerous upgrade requirements in industries. For a smart factory, each process or equipment is required to operate independently and is able to communicate with each other. ICP DAS has developed a series of WISE controllers and I/O modules, which allows to getting down to the smart front-end. With the built-in intelligent logic engine and a wide range of I/O modules, it can perform monitoring of the onsite sensors and devices in real time; and then it can connect with the network system seamlessly via the MQTT communication protocol. By using WISE series of controllers and I/O modules, the users can design a variety of combinations to meet the requirements from all applications; and achieve the Internet of things vision with ease.

| Comparison Table of ICP DAS WISE series & Traditional Ethernet I/O Module | |
|---|---|
| **ICP DAS WISE Series** | **Traditional Ethernet I/O** |
| Built-in logic engine, can proceed complex operations | Just simple input, output operations |
| Supports MQTT for IoT system | Does not support MQTT |
| Provides management software on the cloud | N/A |
| Microsoft Azure certified (WISE-5231 series) | N/A |



# Selection Guide:




## ■ Hardware

| Model | WISE-264xM Series | WISE-224xM Series | WISE-523x | WISE-523xM Series |
|---|---|---|---|---|
| System / Module | | | | |
| OS | WinCE 7.0 | | | |
| CPU | Quad-core ARM CPU, 1.0 GHz/Core | ARM CPU, 1.0 GHz | | |
| SDRAM / Flash | DDR3 1 GB / 8 GB | DDR3 512 MB / 256 MB | | |
| Expansion Memory | microSD socket with one 4 GB microSD card (support up to 32 GB microSDHC card) | | | |
| Communication Ports / IO Expansion | | | | |
| Ethernet | 2 x RJ-45 | | 1 x RJ-45 | |
| Serial Port | 2 x RS-232 / 2 x RS-485 (2 x isolated) | | 2 x RS-232 / 2 x RS-485 (1 x isolated) | |
| IO Expansion | XV-board, RS-485, Ethernet | | | |
| Mechanical / Environmental / Power | | | | |
| DIM. (mm) | 35 x 167 x 119 | | 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 | Ethernet: 4.8 W; -4GE/4GC/3GWA: 6.5 W | | | |
| Wireless Communication (Only For **WISE-264xM-4GE/4GC, WISE-224xM-4GE/4GC, WISE-523xM-4GE/4GC/3GWA**) | | | | |
| 3G System (-3GWA) | WCDMA: 850/900/1900/2100 MHz | | | |
| 3G/4G System (-4GE) | FDD LTE: B1/B3/B5/B7/B8/B20 bands (Frequency Band for EMEA, Korea, Thailand, India and Taiwan)<br>WCDMA: 850/900/2100 MHz | | | |
| 3G/4G System (-4GC) | FDD LTE: B1/B3/B8 bands (Frequency Band for China)<br>TDD LTE: B38/B39/B40/B41 bands (Frequency Band for China)<br>WCDMA: 900/2100 MHz, TD-SCDMA 1900/2100 MHz, CDMA2000 (BC0) 800 MHz | | | |

## ■ Software

| Model | WISE-264xM Series | WISE-224xM Series | WISE-523x(M) Series |
|---|---|---|---|
| Web page Interface | Yes | | |
| IF-THEN-ELSE Logic Rule | Yes | | |
| I/O channel monitoring and control | Yes | | |
| Schedule | Yes (Calendar and Week Repeat mode) | | |
| Data Logger | Yes (Multiple sets) | | |
| Connect with IoT/IT/SCADA | Modbus TCP/RTU, FTP Client/ Server, CGI sending/receiving, **MQTT, SNMP** | | |
| Message Notification | **LINE Notify**, **WeChat**, SSL/TLS Email, SMS (3G/4G series WISE-264xM/224xM/523x) | | |
| Connect to IoTstar | Yes | | |
| Connect to public Cloud platform | Yes (Microsoft Azure & IBM Bluemix) | | |

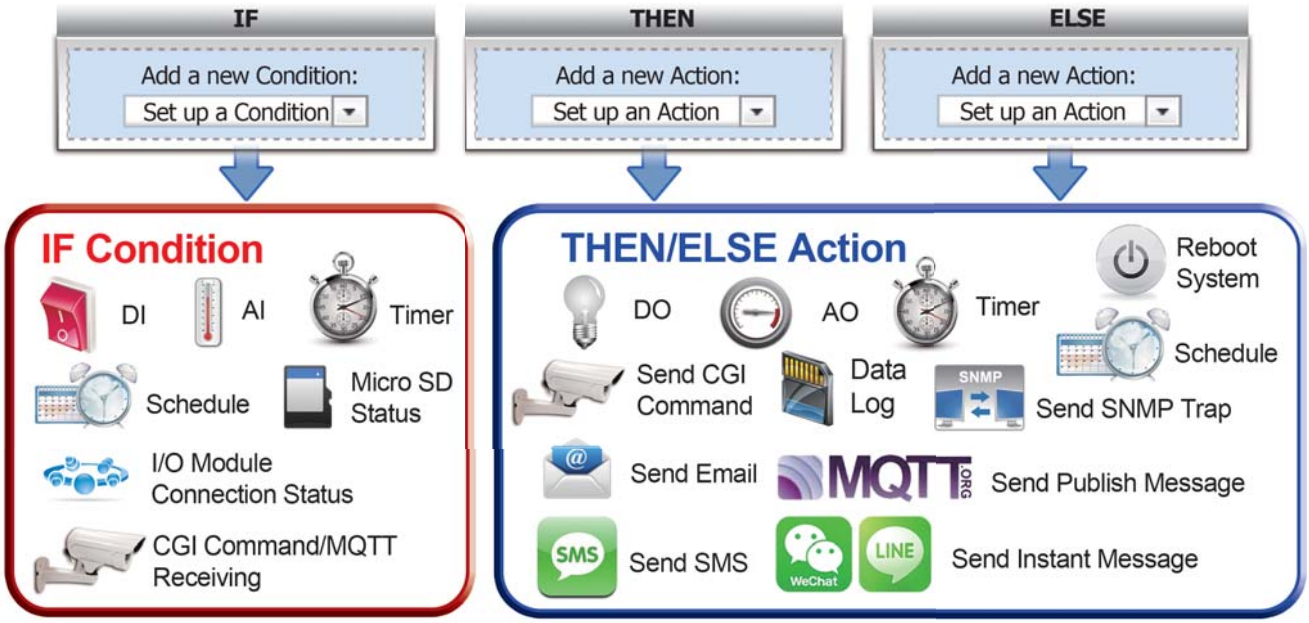
# WISE Introduction

**WISE** (**W**eb **I**nside, **S**mart **E**ngine) is a product series developed by ICP DAS that functions as control units for use in remote logic control and monitoring in various industrial applications. WISE offers a user-friendly and intuitive web site interface that allows users to implement IF-THEN-ELSE control logic on controllers just a few clicks away; no programming is required. With its powerful and easy-to-use features, it will minimize the learning curve, shorten time to market and dramatically reduce the labor and cost spent on system development.

## WISE Architecture


## IF-THEN-ELSE logic rules execution ability

After completing rule edition and downloading rules to the WISE, the rule engine will loop execute the rules in accordance with the execution order under specific conditions.

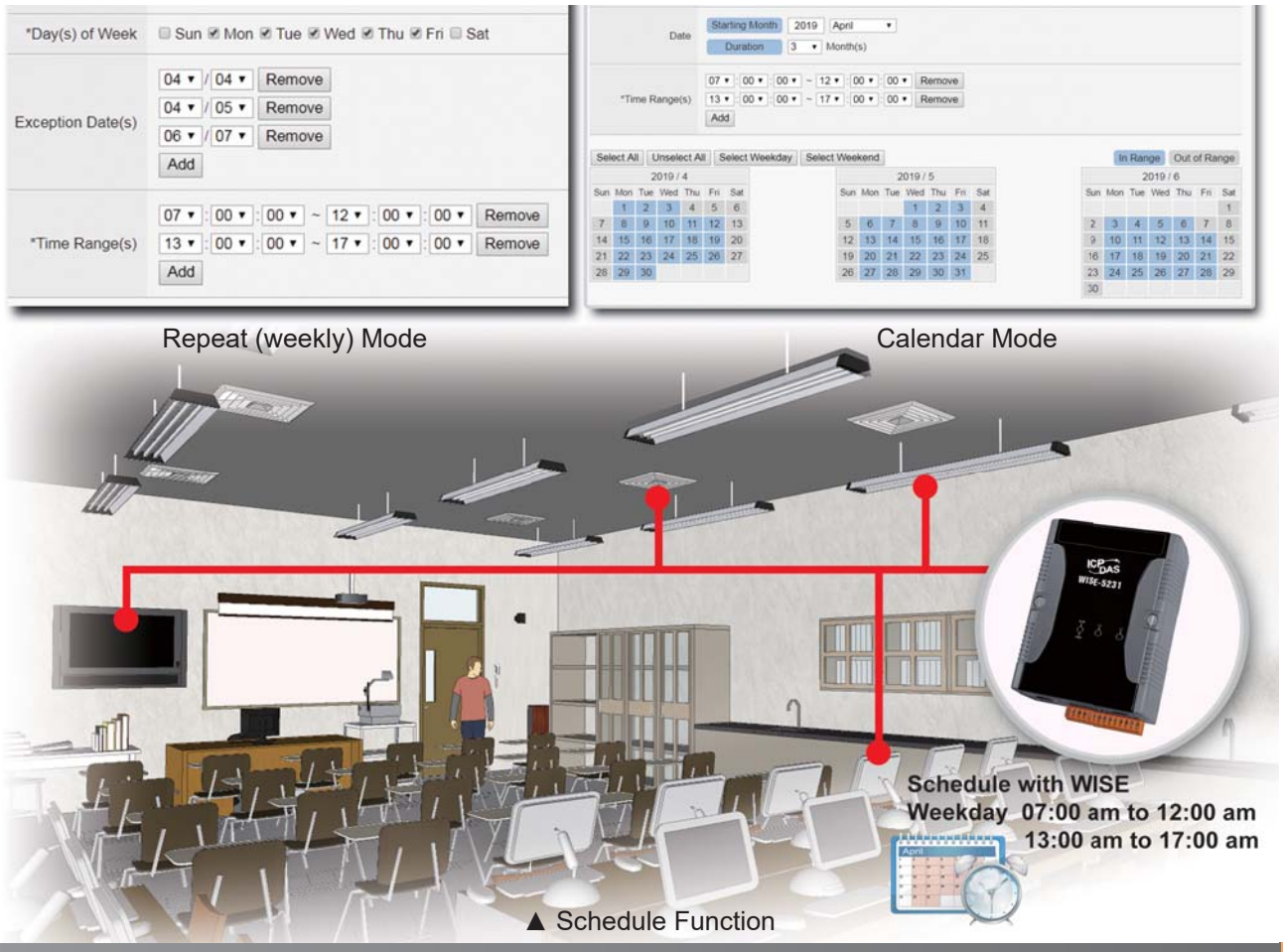


## Connection ability to a variety of sensors and devices

WISE Controller allows to connect with sensors and devices that support Modbus TCP/RTU protocol for I/O monitoring. The ability to connect with Modbus TCP/RTU slave devices enables the flexibility and scalability for system implementation and allows to meet various requirements of the applications from the clients.


## Provide Timer and Schedule operation

WISE features Timer function. It allows to perform the timing delay of the working logic rule. In addition, WISE also provides Schedule function to perform the prescheduled routine tasks. Through the two setting interfaces of the Calendar and Repeat (weekly) provided by the Schedule function, the administrator can quickly assign the weekly schedule operation, or flexibly arrange the annual schedule operation for the on-site equipment. The Schedule function will be helpful to user to handle the applications such as factories or schools that require specific equipment scheduling management mechanism.



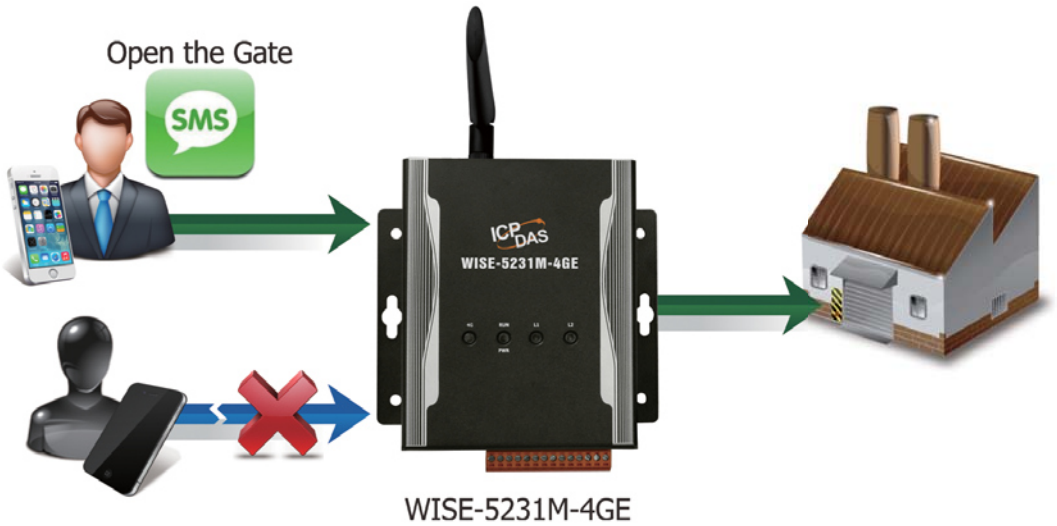

▲ Schedule Function

## Well-thought-out CGI command operation with IP Camera

WISE allows connections to ICP DAS iCAM IP Camera series. Users can trigger the connected IP camera to perform snapshot or video recording with IF-THEN-ELSE logic rules. WISE-523x/WISE-224xM provides the IP Camera Status webpage to display the event list ordered by time, and you can just click and play the images or videos on the browser. In additional, WISE-523x/WISE-224xM provides remote backup mechanism to upload images and videos to the remote FTP server automatically.

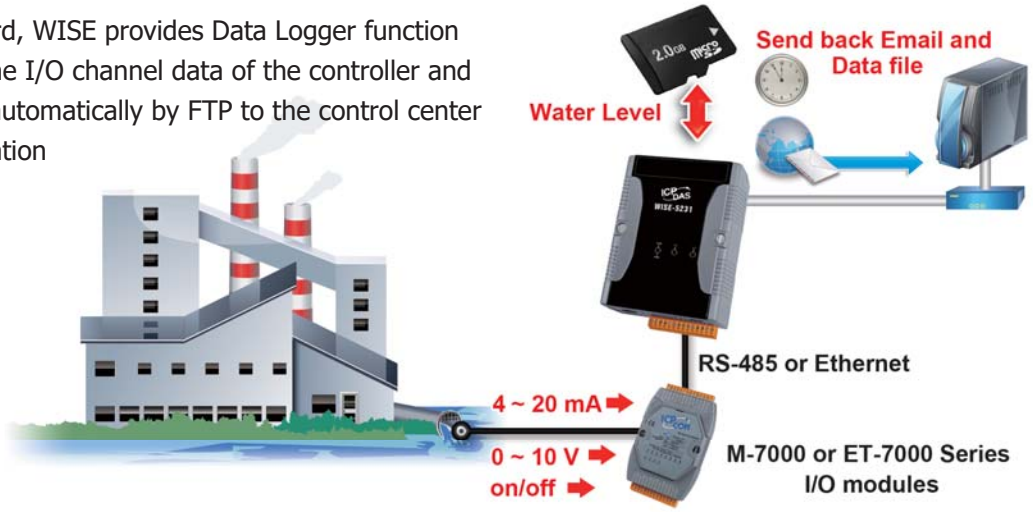

## Support SMS command receiving function

WISE-5231M-3GWA and WISE-523xM-4GE/4GC is equipped with SMS alarm message notification function. It allows to include SMS alarm sending action into logic rules to send a pre-set SMS message to related personnel when an event occurs. In addition, WISE-5231M-3GWA and WISE-523xM-4GE/4GC also allows to receive the SMS commands sending by specific phones numbers to perform tasks such as real-time I/O channel status monitoring, DO/AO channel value modification and logic rules execution (triggered by SMS), etc.



## Data Logger operation

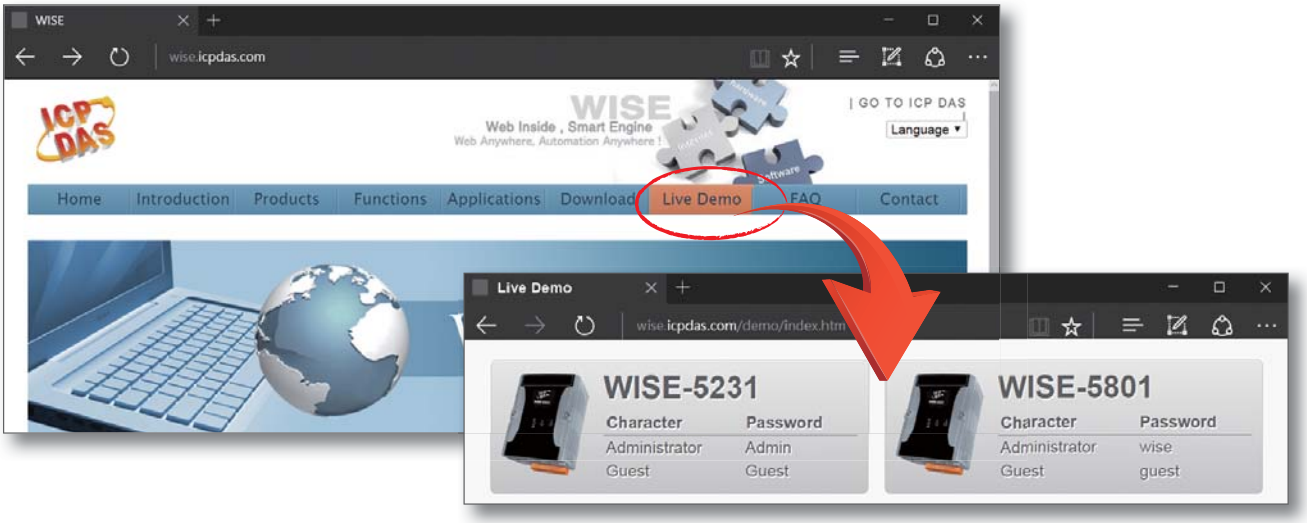
With the microSD card, WISE provides Data Logger function to real-time record the I/O channel data of the controller and sends the data files automatically by FTP to the control center for further administration management or data analysis.




## Support LINE, WeChat, SMS and Email sending functions

WISE supports LINE, WeChat, SMS, and Email sending function for real-time message notification. The message sending action can be added to the logic edition as part of logic control to provide real-time message notification to the related personnel when an event occurs. In addition, when WISE connects with ICP DAS iCAM series IP cameras, WISE can send the pictures and videos to the related personnel by LINE and WeChat. (WISE-523x/WISE-2x4xM only)


## WISE Live Demo *http://wise.icpdas.com*



## Selection Guide:

ICP DAS provides various WISE controllers for users to choose from to meet their demands for use in various industrial applications:

The WISE-71xx series is a WISE I/O module with basic functions;

The WISE-75xxM series is an advanced WISE I/O module with more powerful features in both hardware and software.

| Series | WISE-71xx | WISE-75xxM |
|---|---|---|
| **Hardware** | | |
| Housing Material | Plastic | Metal |
| LED Indicator for DIO | - | Yes |
| Ethernet | 1 x 10/100 Base-TX | 2 x 10/100 Base-TX (daisy-chain switch) |
| **Software** | | |
| If-Then-Else Logic Rules | 36 | 72 |
| Timers | 12 | 24 |
| Schedules | - | 24 |
| Internal Registers | 48 | 48 |
| Modbus TCP Slave | Support | Support |
| MQTT Client | - | Support (Non-SSL) |

### *WISE-71xx/WISE-75xxM Intelligent I/O Modules*

| Model Name | | WISE-7102 | WISE-7105 | WISE-7115 | WISE-7117 | WISE-7118Z | WISE-7126 | |
|---|---|---|---|---|---|---|---|---|
| Pictures | |  |  |  |  |  |  | |
| **Model Name** | | **WISE-7502M** | **WISE-7504M** | **WISE-7515M** | **WISE-7517M** | **WISE-7518ZM** | **WISE-7526M** | **WISE-7519ZM** |
| Pictures | |  |  |  |  |  |  |  |
| Ethernet Port | | 10/100 Base-TX with PoE (Power over Ethernet) | | | | | | |
| Local I/O Function | DI | 6 | - | - | - | - | 2 | - |
| | DO | 3 | 4 | - | 4 | 6 | 2 | 4 |
| | AI | 3 | 8 | 7 | 8 | 10 | 6 | 8 |
| | AO | - | - | - | - | - | 2 | - |
| Over Voltage Protection | | 240 Vrms | 110 VDC/VAC | - | 240 Vrms | 240 Vrms | 240 Vrms | 240 Vrms |
| Note | | - | Support Thermistor | Support RTD | - | Support Thermocouple Input | - | Support Thermocouple Input |

| Model Name | | WISE-7142 | WISE-7144 | WISE-7151 | WISE-7152 | WISE-7153 | WISE-7160 | WISE-7167 |
|---|---|---|---|---|---|---|---|---|
| Pictures | |  |  |  |  |  |  |  |
| **Model Name** | | **WISE-7542M** | **WISE-7544M** | **WISE-7551M** | **WISE-7552M** | **WISE-7553M** | **WISE-7560M** | **WISE-7567M** |
| Pictures | |  |  |  |  |  |  |  |
| Ethernet Port | | 10/100 Base-TX with PoE (Power over Ethernet) | | | | | | |
| Local I/O Function | DI | - | 8 | 16 | 8 | 16 | 6 | - |
| | DO | 16 (Sink Type) | 8 (Sink Type) | - | 8 (Source Type) | - | 6 (Power Relay) | 8 (Power Relay) |
| Note | | - | WISE-7153's DI channel is for Dry Contact (Source). Other's DI channel is for Wet Contact (Sink, Source). | | | | | - |

# I/O Expansion for WISE Series

## ☑ I/O Expansion Boards (XV-board) for WISE-523x/WISE-2x4xM

**DIO Board**

| Model Name | Series | DI | | | DO | | |
|---|---|---|---|---|---|---|---|
| | | Channels | Sink/Source | Contact | Channels | Type | Sink/Source |
| **XV107** | XV | 8 | Source | Wet | 8 | Open Collector | Sink |
| **XV107A** | | 8 | Sink | | 8 | Open Emitter | Source |
| **XV110** | | 16 | Sink/Source | Wet + Dry | - | - | - |
| **XV111** | | 0 | - | - | 16 | Open Collector | Sink |
| **XV111A** | | 0 | - | - | 16 | Open Emitter | Source |
| **XV116** | | 5 | Sink/Source | Wet | 6 | Power Relay, Form A | - |

**Multifunctional Board**

| Model Name | Series | AI | | AO | | DI | | DO | |
|---|---|---|---|---|---|---|---|---|---|
| | | Channels | Type | Channels | Type | Channels | Type | Channels | Type |
| **XV306** | XV | 4 | Voltage/Current | - | - | 4 | Wet | 4 | Relay, FormA, 6A |
| **XV307** | | - | - | 2 | Voltage/Current | 4 | Wet | 4 | Relay, FormA, 6A |
| **XV308** | | 8 | Voltage/Current | - | - | DI+DO=8 | Dry/Wet | DI+DO=8 | Sink |
| **XV310** | | 4 | Voltage/Current | 2 | Voltage/Current | 4 | Dry, Source | 4 | Source |

## ☑ I/O Expansion Boards (XW-board) for WISE-580x(-MTCP)

**DI, DO Expansion**

| Model Name | DI | DO | Isolation |
|---|---|---|---|
| **XW107** | 8 | 8 | - |
| **XW107i** | | | 3750 Vrms |
| **XW110i** | 16 | - | 3750 Vrms |

**AI, AO, DI, DO Expansion**

| Model Name | AI (12-bit) | | AO (12-bit) | | DI | DO | Isolation |
|---|---|---|---|---|---|---|---|
| | Channels | Range | Channels | Range | | | |
| **XW304** | 6 | ±5 V | 1 | ±5 V | 4 | 4 | - |
| **XW310** | 4 | ±10 V | 2 | ±10 V | 3 | 3 | |
| **XW310C** | 4 | 0 ~ 20 mA | 2 | 0 ~ 20 mA | 3 | 3 | |

## ☑ I-7000 Remote I/O Module

**AI/AO Module**

| Model Name | | AI | AO | DI | DO |
|---|---|---|---|---|---|
| Voltage/Current | **I-7012** | 1 | - | 1 | 2 |
| | **I-7017** | 8 | - | - | - |
| Thermocouple | **I-7011** | 1 | - | 1 | 2 |
| | **I-7018** | 8 | - | - | - |
| | **I-7019** | 8 | - | - | - |
| RTD | **I-7013** | 1 | - | - | - |
| | **I-7015** | 6 | - | - | - |
| | **I-7033** | 3 | - | - | - |
| Thermistor | **I-7005** | 8 | - | - | 6 |
| Transmitter | **I-7014** | 1 | - | 1 | 2 |
| Analog Output | **I-7021** | - | 1 | - | - |
| | **I-7022** | - | 2 | - | - |
| | **I-7024** | - | 4 | - | - |
| | **I-7024R** | - | 4 | 5 | - |

**Others**

| Model Name | | DI Counter | DO |
|---|---|---|---|
| Counter/Frequency | **I-7080** | 2 | 2 |
| **Model Name** | | **DI** | **PWM Output** |
| PWM | **I-7088** | 8 | 8 |

**DI/DO Module**

| Model Name | | DI | DO |
|---|---|---|---|
| Digital Input | **I-7041** | 14 | - |
| | **I-7051** | 16 | - |
| | **I-7052** | 8 | - |
| | **I-7053** | 16 | - |
| | **I-7058** | 8 | - |
| | **I-7059** | 8 | - |
| Digital Output | **I-7042** | - | 13 |
| | **I-7043** | - | 16 |
| | **I-7045** | - | 16 |
| Digital Input & Output | **I-7044** | 4 | 8 |
| | **I-7050** | 7 | 8 |
| | **I-7055** | 8 | 8 |
| Relay Output | **I-7060** | 4 | 4 |
| | **I-7061** | - | 12 |
| | **I-7063** | 8 | 3 |
| | **I-7065** | 4 | 5 |
| | **I-7066** | - | 7 |
| | **I-7067** | - | 7 |

# 1-6 Condition Monitoring Solution : ExoSense

## Introduction:

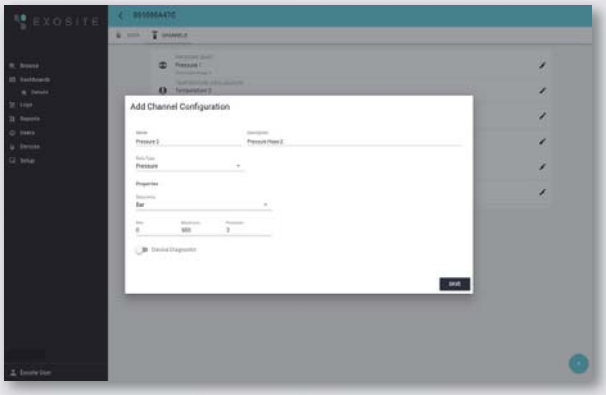
ExoSense™
Condition Monitoring Solution

A ready-to-deploy condition-monitoring application that provides operational insight into high-value assets, systems, and equipment.

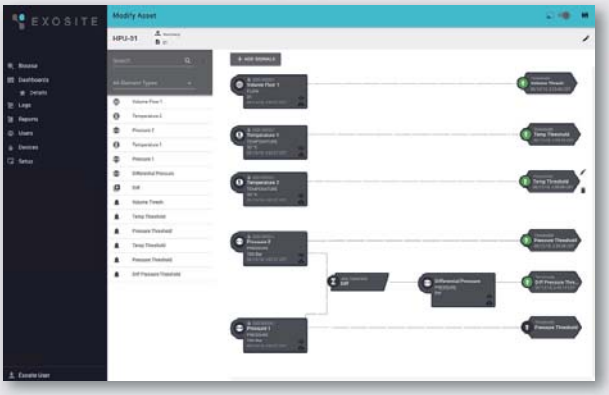
Customized and deployed without the need for a software developer, ExoSense enables you to monitor equipment status and performance, customize alerts and notifications, build tailored insights, manage user and asset groups, and build dashboard views specific to your needs.

## Advanced features and functionality.

▶ Connected device configuration

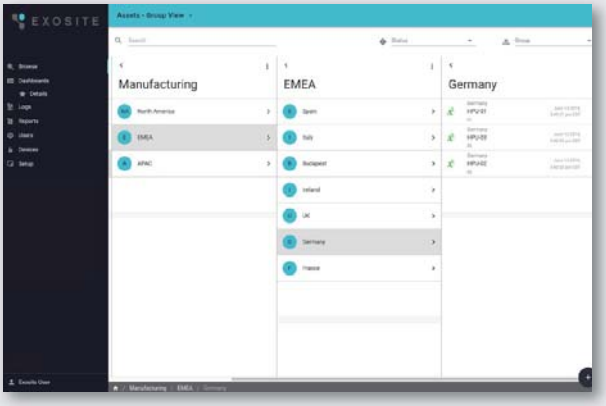



▶ Codeless asset builder



▶ Programmable insights

▶ Flexible hierarchies



## Advantages:

ExoSense™
Condition Monitoring Solution

### Why choose ExoSense?

- **Zero coding to customize.**

A simple configuration environment lets you customize your solution without writing a line of code. Add your branding, change themes, define user hierarchies, assign roles, and more.

- **Deploys in an hour.**

Deploy the application in an hour, connect ready-made devices in a day, and have a solution in customers' hands within a week. Get feedback and get to production—in weeks rather than years.

- **Makes IoT accessible (and affordable).**

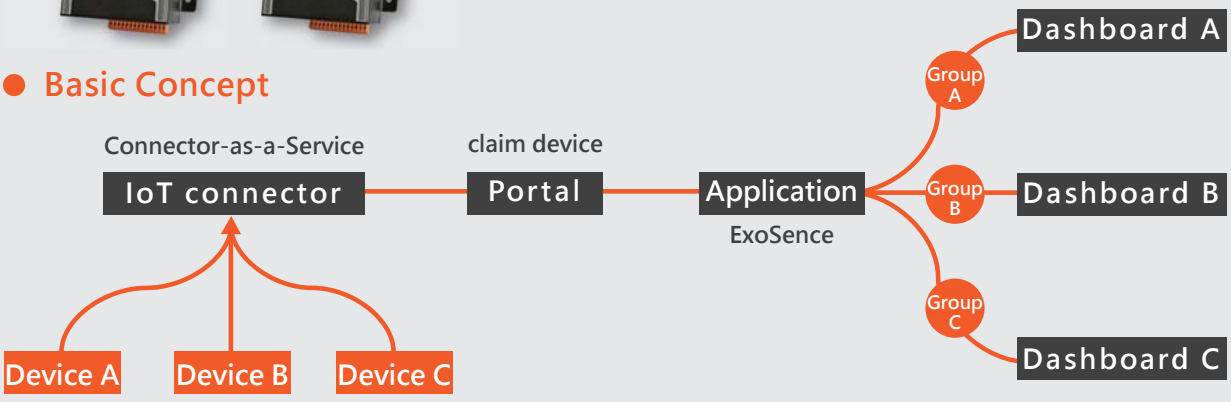
No huge up-front costs, lengthy development times, or in-house DevOps team required. We've already done that work for you, so you'll experience a more feasible and cost-efficient way to engage in IoT.

- **Backed by a powerful platform.**

Built on Murano, an IoT platform that offers the security, scalability, and business-system integrations required for enterprise IoT solutions, ExoSense grows as you grow—guaranteed.

- **Integrate with WISE-5231 Series in few steps.**

- **Basic Concept**



# Chapter 2. Security Identification and Monitoring System

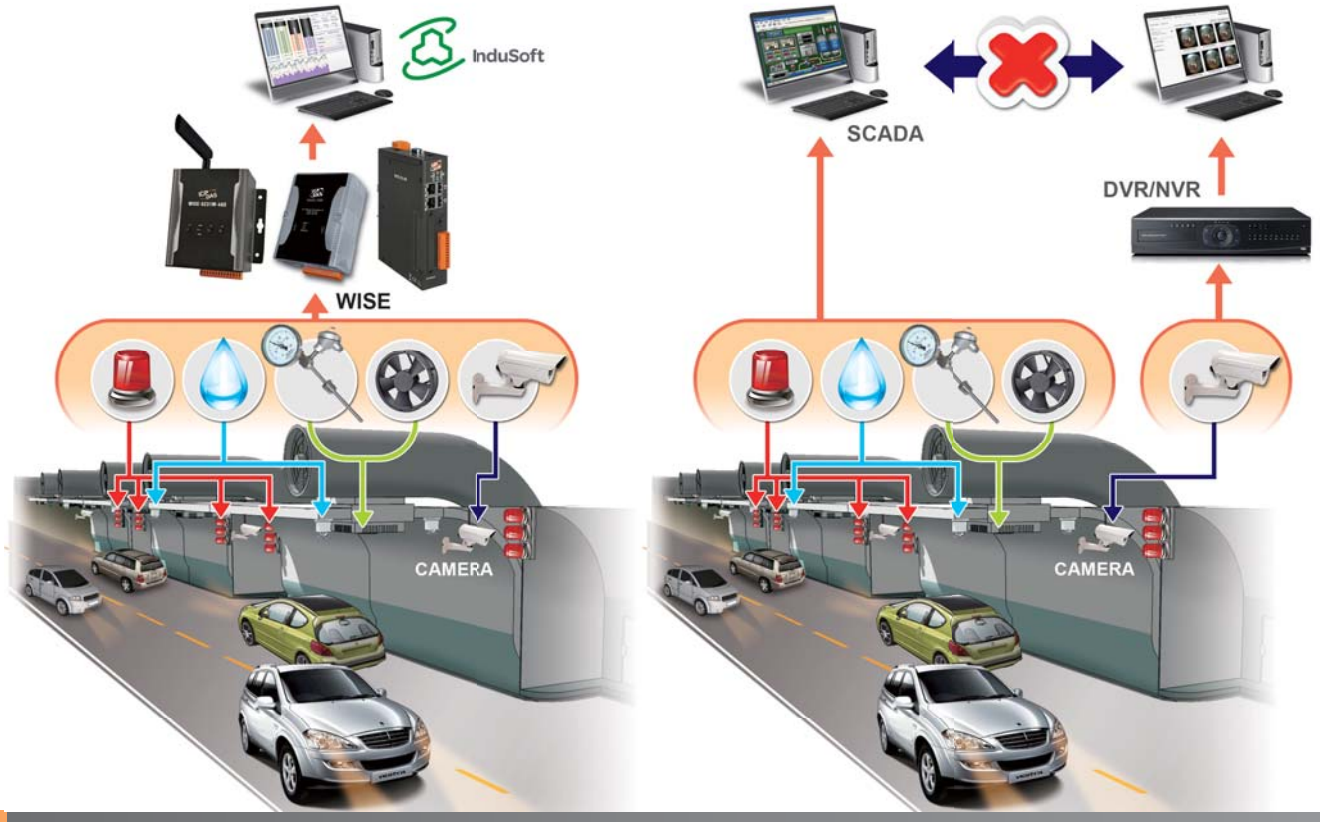
## 2-1 WISE Surveillance Solution

### WISE IIoT Edge Controller + iCAM IP Camera

A general surveillance system on current market usually features separated systems: the camera DVR/NVR as a system, and the I/O monitoring as another system; each system operates independently. For now the DVR/NVR system of the camera usually records video for 24H/7Day without interruption, it requires huge storage space and sufficient network bandwidth; therefore the system implementation fee is usually high. In addition, when playback a certain video, it does not allow to search the suspicious activities of related I/O (temperature, doors and windows switch, water level, etc.) at the same time.

ICP DAS WISE surveillance solution integrates logic control, I/O, camera and data log in one single WISE controller. WISE allows two-way interactions between the I/O and the camera; it enables to record a piece of video or to take images when there is an event triggered by either I/O condition or ROI (Region of Interest) by camera. In this way, the storage size can be reduced significantly and the connection between I/O event and Video/Image can be built for easy query.

| ICP DAS WISE Surveillance Solution | Regular Surveillance Solution |
|---|---|
| 1. One WISE controller to integrate camera and I/O | 1. Two independent systems: SCADA & DVR/NVR |
| 2. Records key video and image, only needs a few storage memory. | 2. Record video 24H/7Days, needs huge storage memory. |
| 3. Two-way interaction between I/O and Video/Image | 3. I/O and Video/Image are independent |
| 4. Can work stand along or be integrated into a SCADA system | 4. Needs a host PC to run the SCADA |
| 5. One stop shopping/service for<br>● Controller: WISE Series<br>● I/O Modules: Various options for RS-485, Ethernet interfaces<br>● Camera: Bullet, Fisheye, Dual Lens<br>● SCADA: InduSoft | 5. Buy from different venders for SCADA, I/O Modules, DVR/NVR |

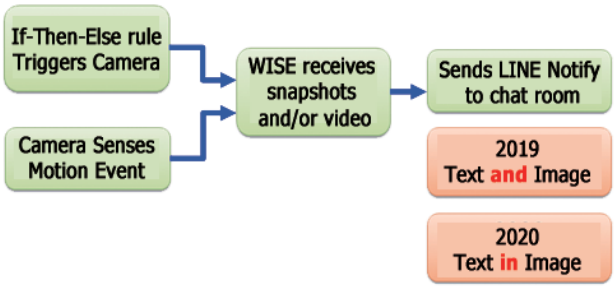


## ● OSD (On Screen Display)

WISE controllers can connect 4 cameras. There are two methods to get images and videos:

(1) If-Then-Else rule sends commands to trigger camera to take snapshots and/or a video.

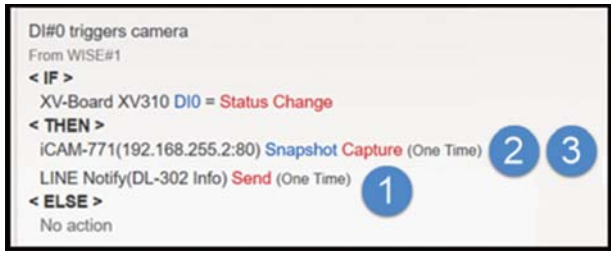
(2) Camera takes snapshots and/or a video when senses motion event. And then sends the snapshots and/or video to the WISE controller.




| Module | iCAM-721F<br>iCAM-771<br>iCAM-760D<br>(2019) | iCAM-ZMR8422X<br>iCAM-MR6422X<br>iCAM-6322<br>(2020) |
|---|---|---|
| Camera Name on OSD | Yes | Yes |
| Time Stamp on OSD | Yes | Yes |
| Text Message on OSD | N/A | Yes, user defined. (Chinese and English fonts) |
| No. of LINE Notify | 3 | 2 |

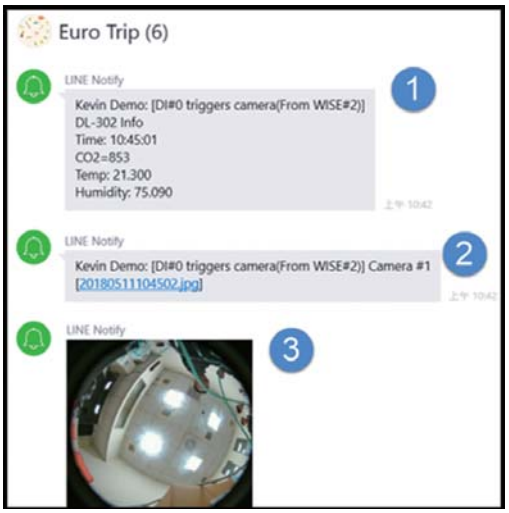
### 2019: OSD with camera name and time stamp.

WISE controller has to sends **3** LINE notifies to delivery completed information.



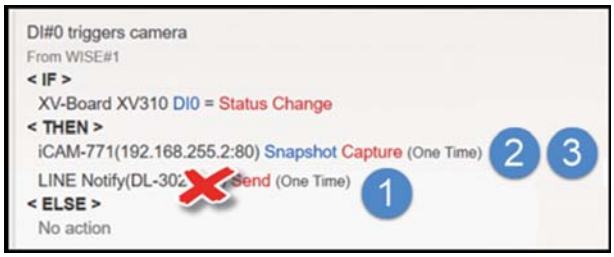

If-Then-Else rule ☐

LINE APP chat room ►



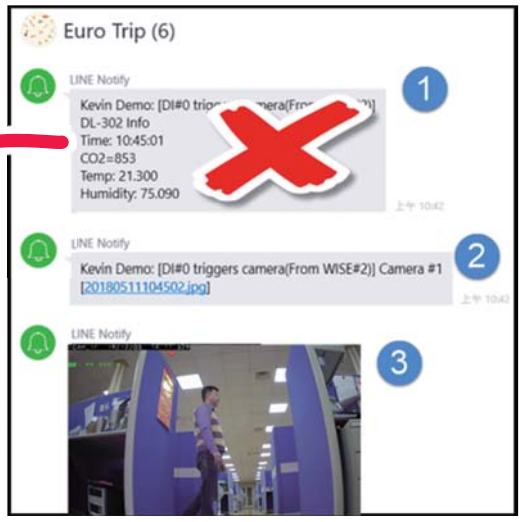

### 2020: OSD with camera name, time stamp and user's defined text message.

WISE controller has to sends **2** LINE notifies to delivery completed information.




◄ If-Then-Else rule

▼ LINE APP chat room

# 2-2 IP Camera : iCAM Series

## Auto Focus IR IP Bullet Camera

### iCAM-ZMR8422X

**Bullet Type / Auto focus with zoom**

2MP | 1080P Full HD | IP67 | ONVIF | PoE 802.3af

### Features

- Full HD 2.0 megapixel CMOS image sensor
- 1080P True H.264 AVC High Profile video compression
- H.264 and Motion JPEG multi-profile video streaming
- Auto focus with zoom / focus motorized lens
- 3D noise reduction (MCTF), 2D WDR function
- HDR function up to 100dB
- Digital PTZ and ROI (Region of Interest) supported
- Day and Night IR-cut removable LED, radiant distance up to 30m
- Built-in 4GB MicroSD Card
- ONVIF Profile S supported
- IP67-rated Housing

**iCAM-ZMR8422X** is a day & night 2MP auto-focused vandal resistant bullet IR IP camera. It features a full HD 2.0 megapixel CMOS image sensor. The camera has built-in IR-cut filter which allows clearer images at day and night operations even in the low lux condition.

The high efficiency IR LED radiant distance can extend up to 30 meters. Its auto-focus feature allows users to automatically focus the camera from a distant location. With motorized lens, all you need to do with zoom/ focus adjustments is simply a click on browsers. Support with privacy mask, 3D noise reduction, 2D WDR function, and HDR function up to 100dB, it's easier implement iCAM-ZMR8422X into a range of environments such as retail, home, office, residential premises and hotel curity.

## Vari-Focal IR IP Dome Camera

### iCAM-MR6422X

**Dome Type / Vari-Focal**

2MP | 1080P Full HD | IP67 | ONVIF | PoE 802.3af

### Features

- Full HD 2 megapixel CMOS image sensor
- 1080P High Profile video compression
- H.264/MJPEG multi-profile video streaming
- HDR function up to 100dB
- IR cut filter for day/night operations, radiant distance up to 30m
- Built-in 4GB MicroSD Memory Card
- ONVIF Profile S supported
- IP67-rated Housing
- Lens: 2.8 – 12mm
- Aperture: F2.0
- IR Angle: 60°/ 90°

**iCAM-MR6422X** is 30M-Range IR Varifocal Dome IP Camera which has built-in Sense up+ technology to deliver stunning video in low-light conditions. It features 1080p at 30 frames per second and intelligent video surveillance (IVS) functions. Utilizing intelligent image signal processing, HDR, AGC control, and 3D Noise Reduction, the combination successfully delivers the ultimate low-light image without motion blur. iCAM-MR6422X support PoE, privacy masking, white balance, as well as the minimum illumination 0.117 Lux at F1.4 can certainly satisfy multiple applications.

# Fixed IR IP Dome Camera

## iCAM-MR6322

**Dome Type / Fixed**

2MP | 1080P Full HD | IP67 | ONVIF | PoE 802.3af

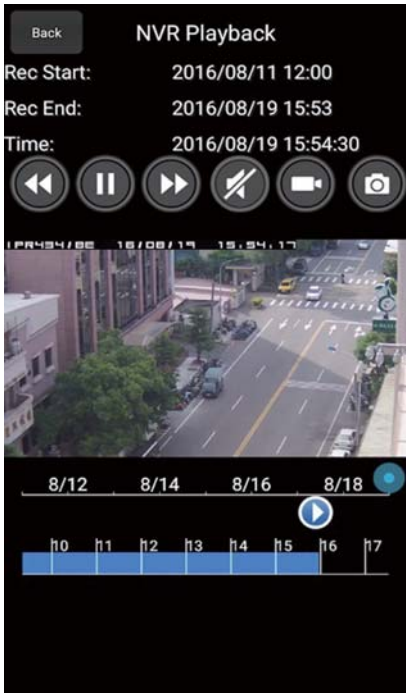
## Features

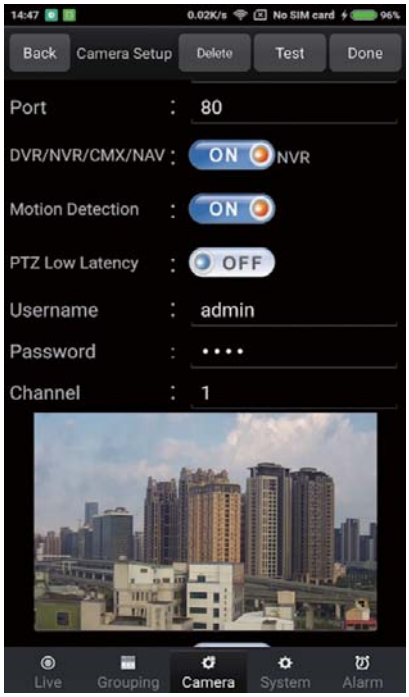
- Full HD 2 megapixel CMOS image sensor
- 1080P True H.264 AVC High Profile video compression
- H.264 and Motion JPEG multi-profile video streaming
- Smart H.264 supported
- 3D noise reduction (MCTF), 2D WDR function
- HDR function up to 100dB
- IR cut filter for day/night operations, radiant distance up to 30m
- Built-in 4GB MicroSD Memory Card
- ONVIF Profile S supported
- IP67-rated Housing

**iCAM-MR6322** is 30M-Range IR Fixed Dome IP Camera built-in Sense up+ technology to deliver stunning video in low-light conditions. It features 1080p at 30 frames per second and intelligent video surveillance (IVS) functions. Utilizing intelligent image signal processing, HDR, AGC control, and 3D Noise Reduction, the combination successfully delivers the ultimate low-light image without motion blur.
iCAM-MR6322 support PoE, privacy masking, white balance, as well as the minimum illumination 0.13 Lux at F2.0 can certainly satisfy multiple applications.

## Support Android & iOS Mobile APP: IPCAMPlus

**iCAM-ZMR8422X/iCAM-MR6422X / iCAM-MR6322** provide smart phone APP for Android and iOS platform. Apps allow you to catch the firsthand notifications and to take over all event situations in real-time. Furthermore, using the App can also allow you to reward the recorded video remotely. While the alarm is triggerred, App will send a notification message to the user immediately.

# IR Bullet Network Camera

## iCAM-721F

**Bullet Type / Fixed**

3MP | 1080P Full HD | IP67 | ONVIF | PoE 802.3af

**iCAM-721F** is a professional bullet camera offering 1080p Full HD resolution with super image quality up to 30 fps. Featuring 3-Megapixel resolution and high-performance H.264/MPEG-4/MJPEG compression technology, iCAM-721F offers extra-smooth video and wide coverage. With other advanced features such as 802.3af compliant PoE, ONVIF Compliant for interoperability, built-in SD/SDHC/SDXC card slot for storage, two-way audio, and digital input / output for alarm, the iCAM-721F is an all-in-one bullet network camera for detailed surveillance in outdoor environment.

# IR Fisheye Network Camera

## iCAM-771

**Fisheye Type / Panoramic View**

5MP | 1080P Full HD | 360° | 180° | IP66 | ONVIF | PoE 802.3af

*360° Panoramic View*

*180° Panoramic View*

**iCAM-771** is a Fish-eye IR Network Camera, featuring a detailed 5-Megapixel resolution sensor with clear image quality. Equipped with a fish-eye lens for 360°/180° panoramic view without blind spots, certified ImmerVision Enables 2.0, the cameras are able to provide coverage of wide, open areas, such as airports, shopping malls, factories, parking lots, retail stores, offices and etc.

# IR Dome Network Camera

## iCAM-760D

**Dual Lens / Dome Type / Panoramic / Fixed**

**iCAM-760D** dual lens camera provides a professional camera solution. Integrated with Dual 5-Megapixel sensors, one equipped with f 1.05mm non-linear fisheye lens offers 180/360 degree de-warped image (single or multiple). Wide Dynamic Range and IR cut removable are available for both sensors.

iCAM-760D with outdoor 6" dome housing

Max. Res. 7.3MP | 1080P Full HD | 360° | 180°

Dual Lens | IP66 | ONVIF | PoE 802.3af

*360° Panoramic View* + *Fixed-focal View*

*180° Panoramic View* + *Fixed-focal View*

*180° Triple View* + *Fixed-focal View*

*Quad View* + *Fixed-focal View*

# 2-3 Smart Access Control

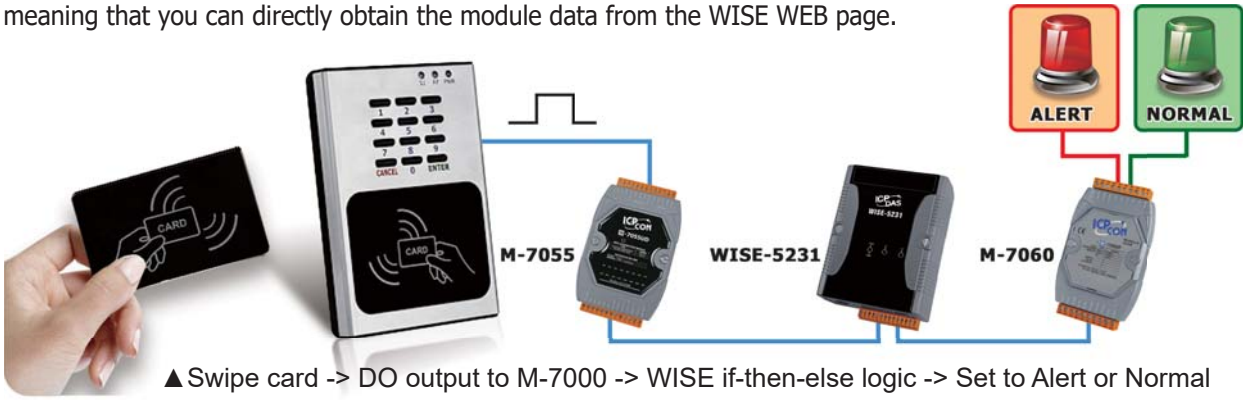
## WISE IIoT Edge Controller
## + Access Control Reader + Camera + Alarm


ICP DAS Smart Access Control System can solve problems of traditional systems. In traditional systems, the controllers need to be developed by professional software engineers, and the control projects need to collect all statuses of the sensors and handle the communication of the I/O modules. When expanding the system in the future, it needs a lot of human power and time to modify the projects, which costs more and gets poor benefits. Moreover, the integration is not easy due to the sensors and image monitoring are mostly separated.

The WISE-523x/WISE-2x4xM IIoT Edge controller in the ICP DAS Access Control System support I-7000/M-7000 I/O modules in default and no programming is required to implement logic content to display the sensor status of the I/O modules on the webpage. The WISE  has built-in IF-THEN-ELSE Logic Rule Engine, which can be easily selected on the webpage to complete the access control system. More importantly, the WISE also supports two-way CGI command communication mechanism, which can easily integrate IP camera images.

## Using ACS series card reader to connect M-7000 I/O to achieve multi-group alarm loops

1. Multi-condition door access: Supports 3 conditions for door opening card only, password only, or card + password. It can be configured using an access control application or attendance application.
2. Provides the PC software for authorization and password management, and supports updating card recorder information to a remote database via an Ethernet connection.
3. Supports electric door lock control and allows you to connect this via an M-7000 I/O module to detect trigger conditions for the WISE if-then-else logic control.
4. WISE supports most M-7000 I/O modules, so you can select a module from the supported list that can be found on the WISE WEB page, and WISE will automatically create the corresponding WEB UI and handle the communication, meaning that you can directly obtain the module data from the WISE WEB page.

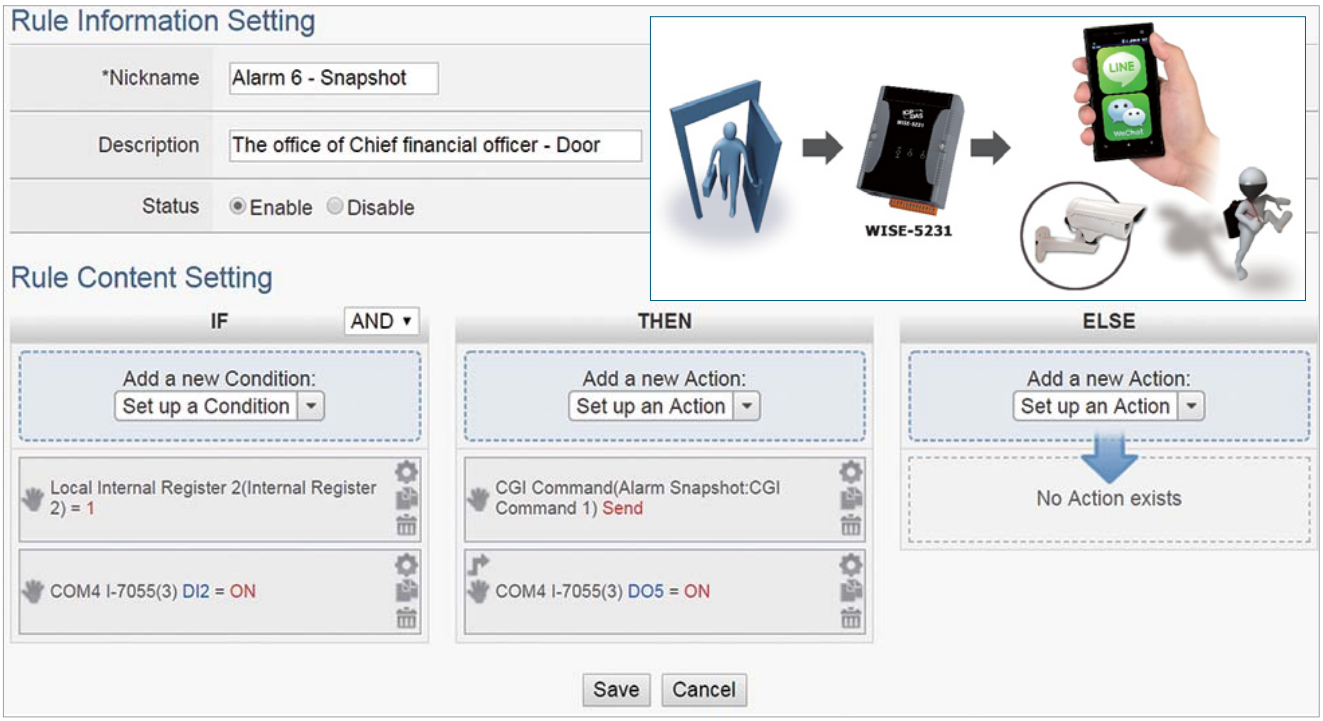



▲Swipe card -> DO output to M-7000 -> WISE if-then-else logic -> Set to Alert or Normal


◄ The M-7041 module transmits the data from door/window sensors and infrared motion detectors to the WISE-523x.

## WISE provides logic control to achieve the access control, camera capture and the alert notify of the mobile phone

1. The WISE logic control function can set the status of I/O module as a logical control condition: Using the WISE logic control function can implement the access control function easily by clicking on the webpage without any additional programming.
2. WISE uses CGI commands to let iCAM capture images with the simple and fast setting.



# 2-4 IIoT and Smart Phone Integration Solution

## WISE IIoT Edge Controller
## + I/O & Sensor + Camera + APP

The **WISE-523x/WISE-2x4xM** series is the **IIoT Edge Controller** designed by ICP DAS for industrial IoT application. In addition to the simple, easy-to-use, flexible and full-featured features of the past, the new features of Instant Messaging (IM) technology with Mobile phone were also released. The I/O data and pictures taken by the WISE/Camera can be instantly pushed to the LINE/WeChat contacts and chat rooms on the smart phone.

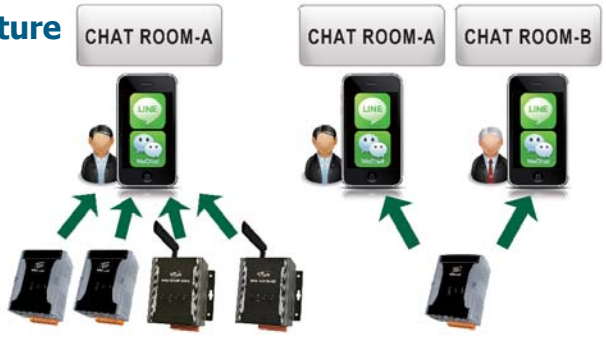


# WISE message notification to smart phone


## SMS : Sends alert messages and receives commands

- The same SMS can be sent to multiple phone numbers
- The same SMS can include multiple variable values (SMS < 160 characters)
- Phone number must be authorized to send SMS commands

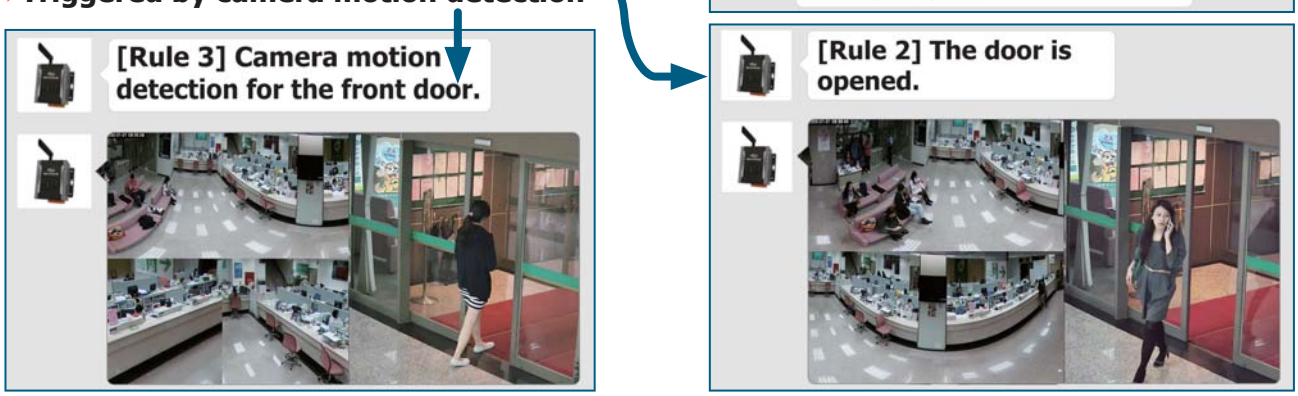
## LINE/WeChat: Sends alert messages and picture




- **Object: Contact, Chat Room**
- **Content:**

| | LINE | WeChat |
|---|---|---|
| **Text** | 1000 / **hour** | 6000 / day, **Expandable** |
| **Picture** | 50 / **hour** | |
| **Film** | N/A | |

- **When:**
  - **Triggered by WISE If-Then-Else rules**
  - **Triggered by camera motion detection**




**WeChat Function Using Note:**

**An Enterprise WeChat account in China is required for WISE to send the messages to the members under the enterprise WeChat account.**

## Ordering Information:

| | |
|---|---|
| **WISE-5231** | **IIoT Edge Controller, Support LINE APP, Ethernet** |
| **WISE-5231M** | **IIoT Edge Controller, Support LINE APP, Ethernet, Metal Casing** |
| **WISE-5231M-3GWA** | **IIoT Edge Controller, Support LINE APP, Ethernet, 3G Wireless (WCDMA)** |
| **WISE-5231M-4GE** | **IIoT Edge Controller, Support LINE APP, Ethernet, 4G Wireless (FDD LTE)** |
| **WISE-5231M-4GC** | **IIoT Edge Controller, Support LINE APP, Ethernet, 4G Wireless (FDD, TDD LTE)** |
| **WISE-2241M** | **IIoT Edge Controller, Support LINE APP, Ethernet** |
| **WISE-2241M-4GE** | **IIoT Edge Controller, Support LINE APP, Ethernet, 4G Wireless (FDD LTE)** |
| **WISE-2241M-4GC** | **IIoT Edge Controller, Support LINE APP, Ethernet, 4G Wireless (FDD, TDD LTE)** |
| **WISE-2641M** | **IIoT Edge Controller, Support LINE APP, Ethernet** |
| **WISE-2641M-4GE** | **IIoT Edge Controller, Support LINE APP, Ethernet, 4G Wireless (FDD LTE)** |
| **WISE-2641M-4GC** | **IIoT Edge Controller, Support LINE APP, Ethernet, 4G Wireless (FDD, TDD LTE)** |
| | |
| **WISE-5236** | **IIoT Edge Controller, Support WeChat APP, Ethernet** |
| **WISE-5236M** | **IIoT Edge Controller, Support WeChat APP, Ethernet, Metal Casing** |
| **WISE-5236M-4GC** | **IIoT Edge Controller, Support WeChat APP, Ethernet, 4G Wireless (FDD, TDD LTE)** |
| **WISE-2246M** | **IIoT Edge Controller, Support WeChat APP, Ethernet** |
| **WISE-2246M-4GC** | **IIoT Edge Controller, Support WeChat APP, Ethernet, 4G Wireless (FDD, TDD LTE)** |
| **WISE-2646M** | **IIoT Edge Controller, Support WeChat APP, Ethernet** |
| **WISE-2646M-4GC** | **IIoT Edge Controller, Support WeChat APP, Ethernet, 4G Wireless (FDD, TDD LTE)** |

- **WISE introduction and live demo: http://wise.icpdas.com**
- **RS-485 remote I/O module: M-7000 series**

# 2-5 MQTT I/O Module: MQ Series

MQ-7200M is an I/O module designed for Internet of Things. It support MQTT V3.1 client. Through the MQTT broker (can be installed on private cloud or public cloud), it can fl exibly exchange data between I/O modules and other MQTT clients.

Compared to request/response type of Ethernet I/O modules, MQTT I/O modules bring two obvious benefits:

**1. Reduce the Ethernet communication packets**

The behavior of most request/response type of Ethernet I/O modules is: the master polls every modules periodically no matter the data is changed or not. MQTT I/O modules can be configured to publish data to the broker periodically or an event happens. Thus the Ethernet communication packets can be obviously reduced.

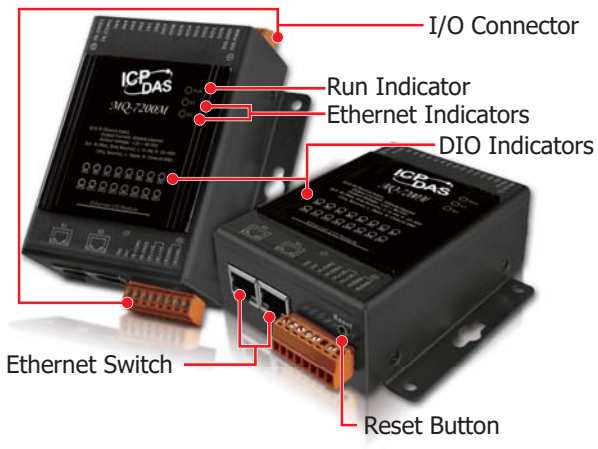
**2. Simplify the network configuration**

MQTT I/O modules can be configured as dynamic IP address. Only the MQTT broker needs a domain name or a static IP address. Thus the networking configuration for each MQTT I/O module can be the same. Thus the configuring work becomes simplified.

## Features:

- Support MQTT V3.1 Client Point
- Built-in Web Server for Configuration
- 2-port Ethernet Switch for Daisy-chain Topology
- Build-in LED indicators
- LAN Bypass Function of Ethernet Switch can Keep Other 2 MQ-7200M Communication Even When One Power Lost

## Appearance:



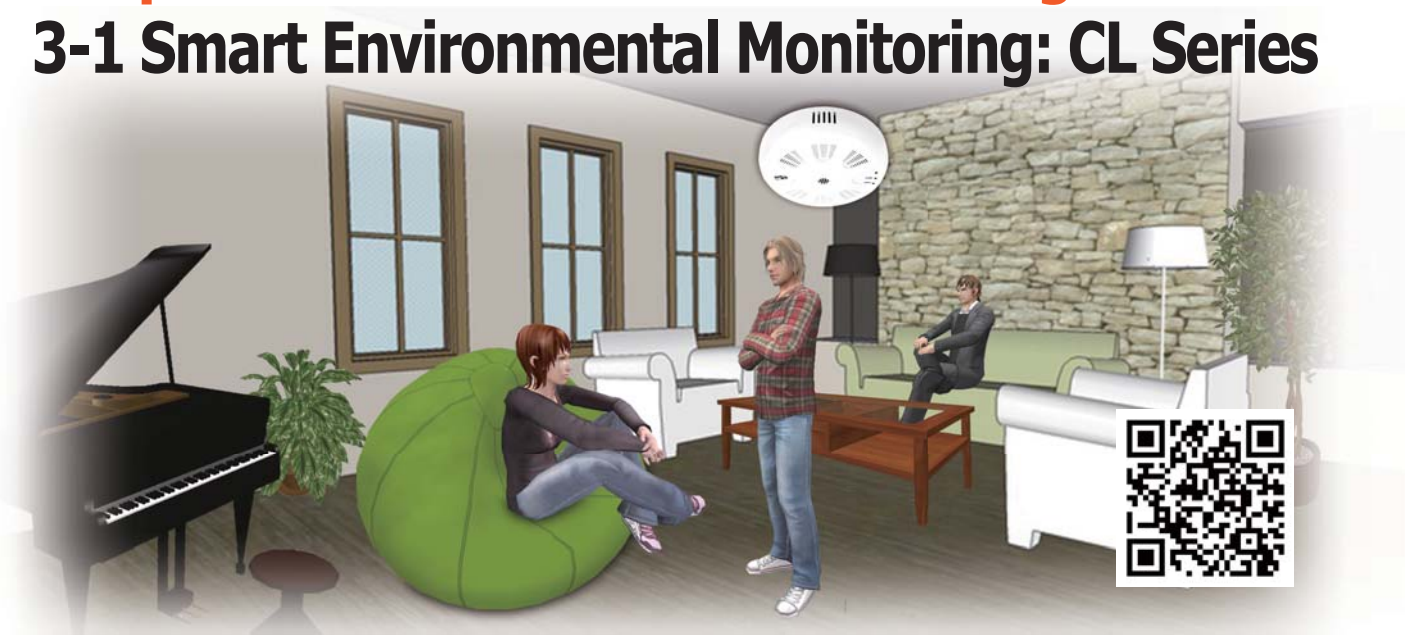

## Applications:


## Selection Guide:

| Module Name | DI | | | DO | | | |
|---|---|---|---|---|---|---|---|
| | Channel | Type | Sink/Source | Channel | Type | Sink/Source | Max. Load |
| **MQ-7244M** | 8 | Wet | Sink/Source | 8 | Open Collector | Sink | 300 mA/Channel |
| **MQ-7251M** | 16 | Wet | Sink/Source | - | - | - | - |
| **MQ-7252M** | 8 | Wet | Sink/Source | 8 | Open Collector | Source | 650 mA/Channel |
| **MQ-7253M** | 16 | Dry | Source | - | - | - | - |
| **MQ-7255M** | 8 | Dry, Wet | Source | 8 | Open Collector | Source | 650 mA/Channel |
| **MQ-7258M** | 16 | AC | Sink/Source | - | - | - | - |

# Chapter 3. Environmental Monitoring

## 3-1 Smart Environmental Monitoring: CL Series





Fine particulate matter (PM2.5), gas (CH4), HCHO, and CO affect health and safety of human. Monitoring the concentration of these fume and gas can prevent people from danger. High concentrations of CO2 is always harmful to health, so data of CO2 monitring is a reference for indoor air quality. **The CL-200** series can detect CH4, HCHO, PM2.5, CO, CO2, Humiture and Dew Point information. The Sensing Solution is suitable for the public area, commercial space, green building, smart buildings. A free Utility is included to configurate and display data in a powerful chart that can be exported to Excel format. CL series can connected with various communication interfaces, so that the device can be easily integrated into existing HMI or SCADA systems.

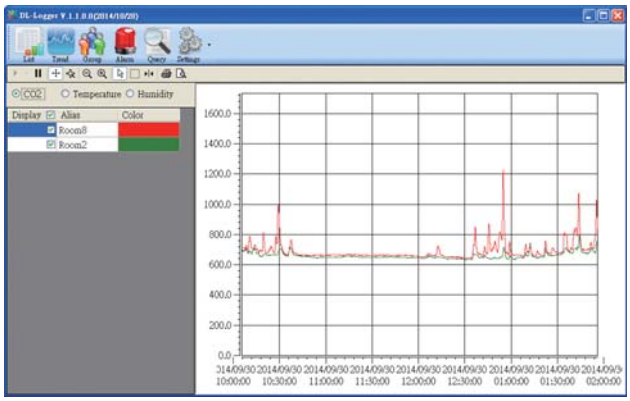
**CL-200** series can be used to record HCHO, CH4, PM2.5, CO, CO2, Temperature, Humidity and Dew Point information, including date and time stamps, and can store up to 450,000 downloadable records. Real-time data can be accessed from the free Utility from anywhere and anytime using the free Windows software.

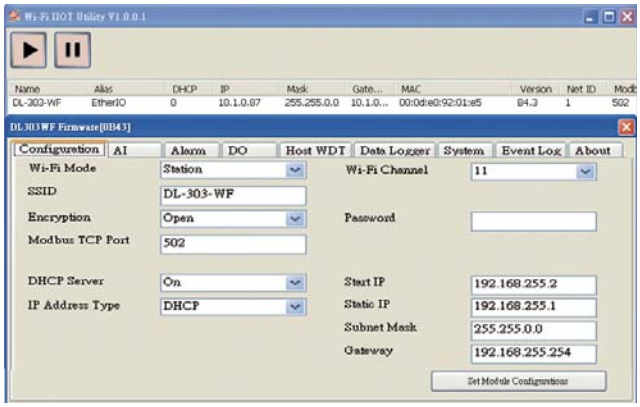
iOS APP QR CODE

- Building and Energy Management
- Warehouse Management
- Museums, Archives and Galleries
- Blood Stations and Pharmacies
- Food and Beverage Industry (HACCP)
- Transportation of Food or Pharmaceuticals

Android APP QR CODE

### Free and Powerful Utility Software





# CL-200 Series: PM2.5 / Fumes / Humiture Monitoring

**CL-2 X X - X**


**CL-200 Series**

**Particle Matter Sensor**
- 1 : PM2.5
- 2 : PM2.5/1/10 +Particle

* PM Sizes: 0.3μm, 0.5μm, 1μm, 2.5μm, 5μm, 10μm

**Types of Fume Sensor**
- 1 : CO
- 2 : CO2
- 3 : CO+CO2
- 4 : HCHO + TVOC
- 5 : NH3
- 6 : H2S
- 7 : HCHO
- 8 : TVOC

**Communication**
- E : Ethernet/PoE
- BLE : Bluetooth
- WF : Wi-Fi

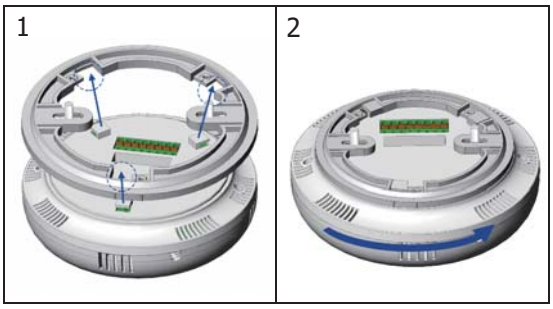
| Sensor | Range and Descriptions |
|---|---|
| CO | 0 ~ 1000 ppm |
| CO2 | 0 ~ 9999 ppm (NDIR) |
| HCHO | 0 ~ 2000 ppb |
| TVOC | 0 ~ 60000 ppb (MEMS) |
| NH3 | 0 ~ 100 ppm |

| Sensor | Range and Descriptions |
|---|---|
| H2S | 0 ~ 100 ppm |
| CH4 | 500 ~ 7000 PPM |
| PM2.5 | 0 ~ 400 μg/m3; Resolution: 1μg/m3; |
| Temperature | -10℃ ~ 50℃ / Accuracy: ±0.6℃ |
| Humidity | 0 ~ 100 % RH / Accuracy: ±5% RH |

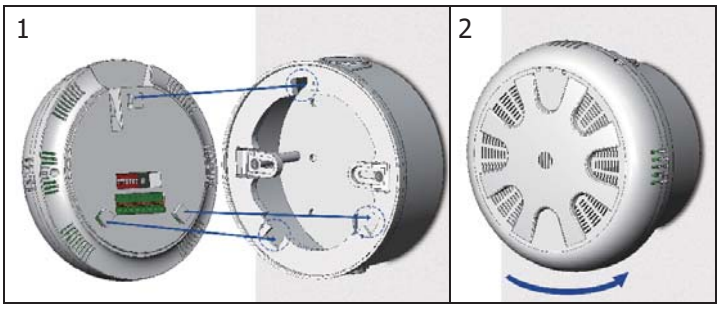
| Models | | | Accessory | Sensor Type | | |
|---|---|---|---|---|---|---|
| Ethernet/PoE | Bluetooth | Wi-Fi | Filter | Particulate Matter | Fumes | Humiture |
| CL-201-E | CL-201-BLE | CL-201-WF | - | - | CO | Temp RH |
| CL-202-E | CL-202-BLE | CL-202-WF | | | CO2 | |
| CL-203-E | CL-203-BLE | CL-203-WF | | | CO + CO2 | |
| CL-204-E | CL-204-BLE | CL-204-WF | | | HCHO + TVOC | |
| CL-205-E | CL-205-BLE | CL-205-WF | | | NH3 | |
| CL-206-E | CL-206-BLE | CL-206-WF | | | H2S | |
| CL-207-E | CL-207-BLE | CL-207-WF | | | HCHO | |
| CL-208-E | CL-208-BLE | CL-208-WF | | | TVOC | |
| CL-210-E | CL-210-BLE | CL-210-WF | Replaceable Filter | PM2.5 | - | Temp RH |
| CL-211-E | CL-211-BLE | CL-211-WF | | | CO | |
| CL-212-E | CL-212-BLE | CL-212-WF | | | CO2 | |
| CL-213-E | CL-213-BLE | CL-213-WF | | | CO + CO2 | |
| CL-220-E | CL-220-BLE | CL-220-WF | Replaceable Filter | PM1 PM2.5 PM10 Particle (PM Sizes: 0.3μm, 0.5μm, 1μm, 2.5μm, 5μm, 10μm) | - | Temp RH |
| CL-221-E | CL-221-BLE | CL-221-WF | | | CO | |
| CL-222-E | CL-222-BLE | CL-222-WF | | | CO2 | |
| CL-223-E | CL-223-BLE | CL-223-WF | | | CO + CO2 | |
| CL-224-E | CL-224-BLE | CL-224-WF | | | HCHO + TVOC | |
| CL-225-E | CL-225-BLE | CL-225-WF | | | NH3 | |
| CL-226-E | CL-226-BLE | CL-226-WF | | | H2S | |
| CL-227-E | CL-227-BLE | CL-227-WF | | | HCHO | |
| CL-228-E | CL-228-BLE | CL-228-WF | | | TVOC | |
| * All modules have RS-485 Interface | | | | | | |

# Installation: CL-200 Series

## Ceiling Mounting

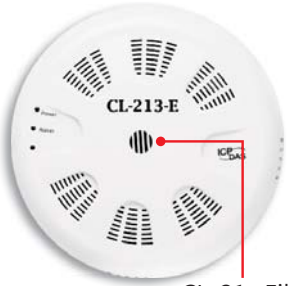



## Wall Mounting (+ External Wall Box EWB-C150)




## Replaceable Filter Patch

CL-2xx offers a replaceable filter patch. This makes users to replace only the filter patch rather than uninstall all devices. CL-21x uses the round filters, CL-22x uses the rectangular filters.




CL-21x Filter Patch

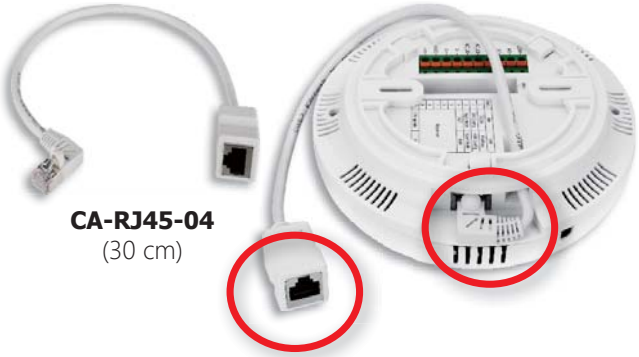
**Filter Patch**

**FLT-C001**

**FLT-C002**

## CL-2xx-E + RJ45 Cable

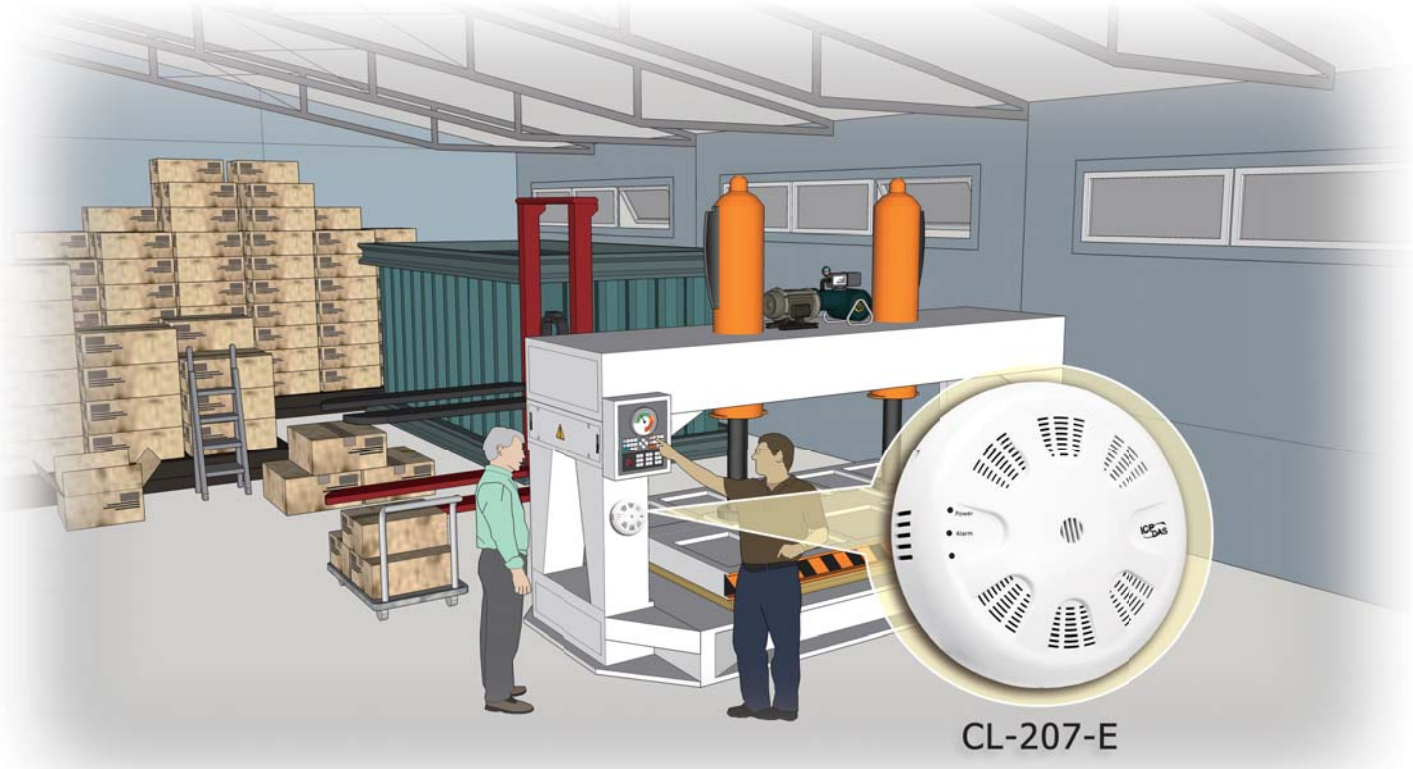
CL-2xx-E (Ethernet Type) are with optional angle-bent RJ45 cable to smoothly install the Ethernet plug in the hole of the ceiling-mounted.



**CA-RJ45-04**
(30 cm)

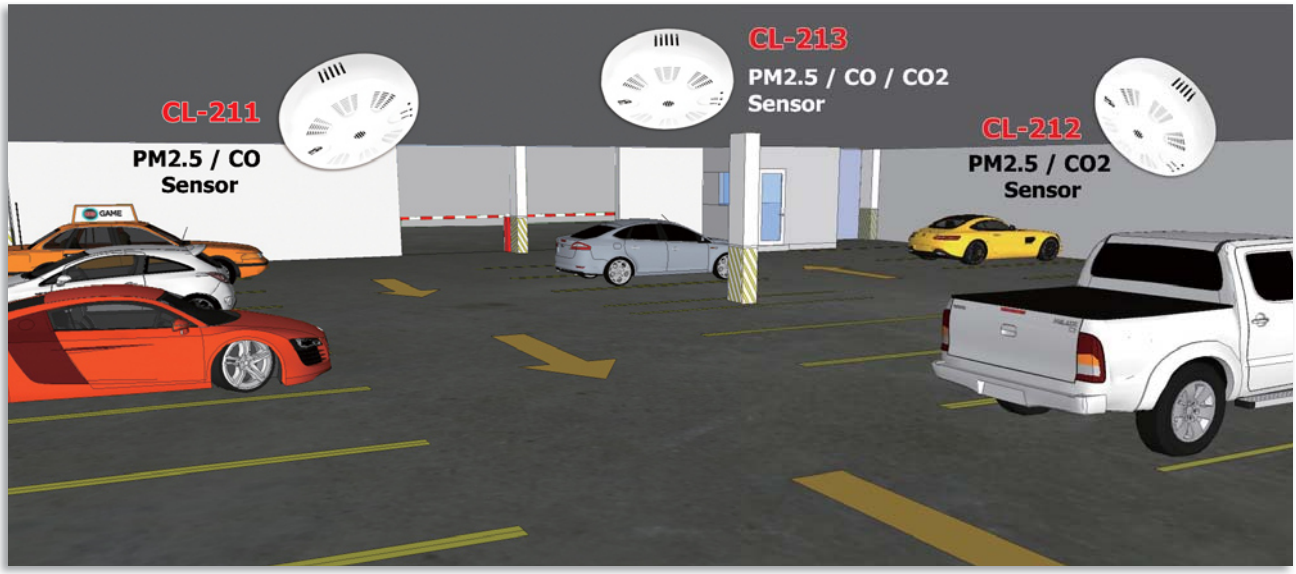
# Applications:

## HCHO (Formaldehyde) Detector Automatic Solution



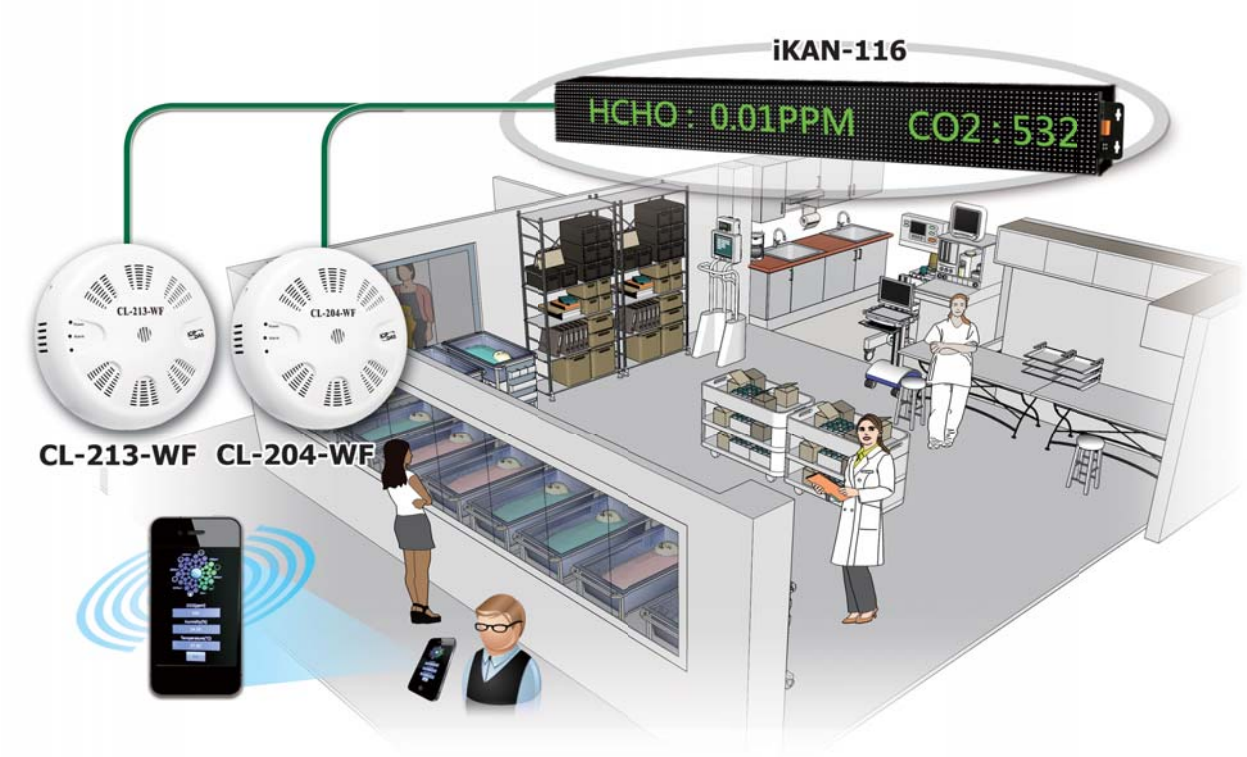
## Indoor or Underground Parking Lot Automatic Monitoring Solution

The air quality automation system for indoor or underground parking lot can use the CL-200 series modules to monitor the health and satify information, such as PM2.5, CO, CO2, temperature, humidity, dew point, and etc...



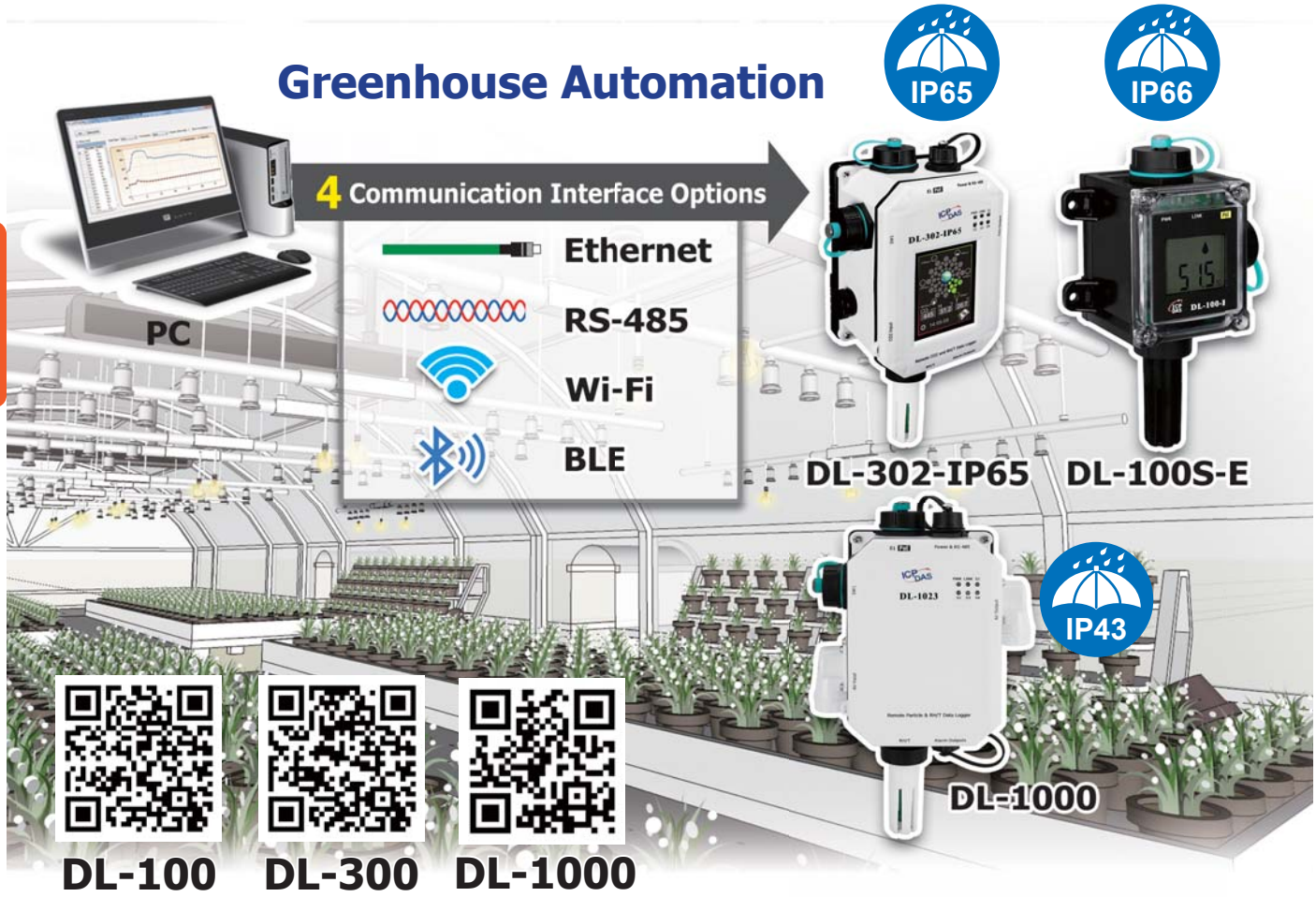

## Preschool Air Quality Monitoring

Indoor air quality is a key matter for children in preschool. ICP DAS provide a solution toward this environment include CL-213-E, CL-204-E modules to monitor the fumes and Particle Matters such as PM1, PM2.5, PM10, CO, CO2, HCHO, TVOC, and etc. Combine with ICP DAS iKAN series LED monitors, teachers in the preschool can easily check the real-time Air Quality Index. Furthermore, diversity of SCADA software is also compatible with these monitoring modules and can upload received data into remote database. Teachers can use their mobile App to remotely check the AQI or other fumes data to make sure that the Air Quality is always in the safety range.



# 3-2 Smart Environmental Monitoring: DL Series

## CO / CO2 / HCHO / NH3 / H2S / TVOC / Temperature / Humidity / Dew Point






DL series Data Logger provides RS-485, Ethernet/PoE, WiFi and Bluetooth communication interfaces for intelligent environment monitoring.

**DL-300 Series** monitors and records data of CO, CO2, HCHO, temperature, relative humidity and dew point. It can record up to 450,000 sets of data with time and date stamps. You can also download the iAir App, both iOS and Android supported, into smart phones and tablets to download the historical records. Furthermore, by using the free software for DL-300 series which can be run in the Windows Operating System, users can easily analyze and get the reports while DL-300 series are connected to the same local network.

**DL-100 Series** is a temperature and humidity data logger module that includes an RS-485, Ethernet/PoE communication interface and LCD display. It can store up to 4088 temperature and humidity records. DL-100 series provide free utility to install, configure, retrieve and display data records, and export the data into Excel format. These modules are suitable in luxury houses, villas, public facilities, business areas, smart buildings, and etc.

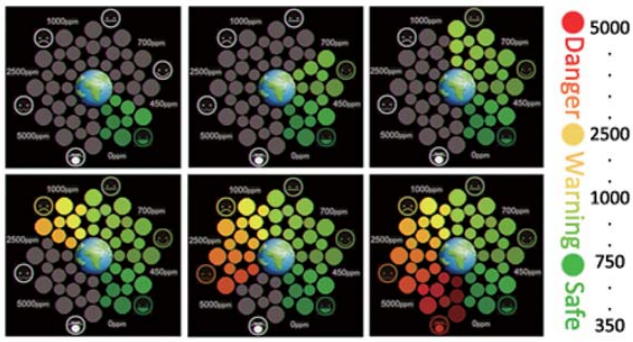
**DL-1000 Series** is a Particle Matter measurement module that gets the concentration of aerosols like PM2.5, PM1, PM10 and the number of particles (0.3μm, 0.5μm, 1μm, 2.5μm, 5μm, 10μm). In addition, this series can measure various fume concentrations related to human health, such as: CO / CO2 / HCHO / NH3 / H2S / TVOC. It can also send alarms and record data. Furthermore, a replaceable hood filter is added in the mechanism. A customized dust filter patch is equipped in the back of the hood filter. Customers can replace the dust filter patch with no fail.

Designed for industrial applications in harsh environments, the **IP65 version of DL series** is IP65 rated for protection against water and dust. Use a rugged RJ-45 to ensure a tight and strong connection, it can improve the reliability of operation even in applications with high vibration and high impact.

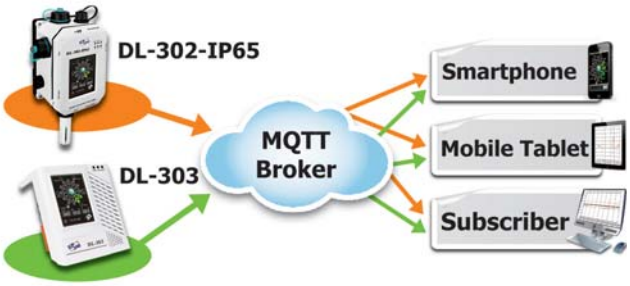
# DL Series: Industrial Data Logger

DL Series supports popular industrial protocols such as DCON, Modbus RTU, and Modbus TCP, as well as the emerging machine-to-machine (M2M) / IoT (Internet of Things) connectivity protocol – MQTT. The DL-300 Data Logger can connect with communication interfaces including RS-485, Ethernet and PoE, so the device can integrate easily into existing HMI or SCADA systems, and its easy to maintain in a distributed control system.

## Large 2.8" LCD Touch Screen, with clear Color Chart to indicate the CO/CO2 Level




## Supports MQTT Protocol for IoT Applications

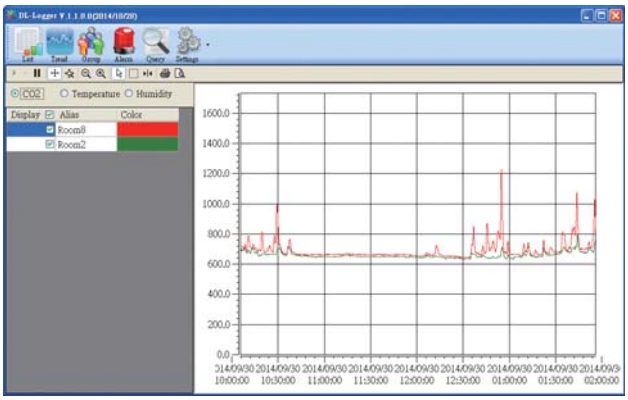



## Display Messages in Multiple Languages

The display-message-on-screen function supports multiple language character sets based on UTF-8 encoding. Users can remotely display either pre-configured messages or dynamic messages to prompt an operator with a daily schedule or IAQ device control instructions.


## Free and Powerful Utility Software

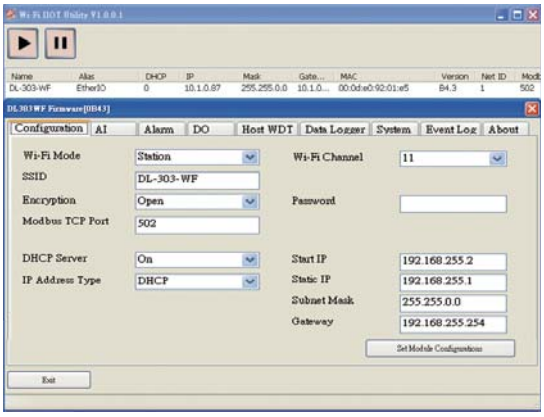
DL-300 Utility can be used to configure the modules, monitor real-time data, group DL-300 modules so that the status of groups can be viewed and managed. The utility can download the log data and exported to a .CSV format that can be imported into any industry-standard software or spread sheet for analysis.



## Multi-platform Remote Access Software

Real-time data from the DL-300 Data Logger can be accessed from anywhere and at any time using the DL-300 Utility, the iOS or Android App, or via a regular web browser, as long as they are connected to the same local network as the Data Logger.

## Real-time data from the DL-300-WF series can be accessed from anywhere and at any time using the WF-IIOT-Utility and iOS App.





▲ iOS APP QR CODE

▲ Android APP QR CODE

## CO / CO2 HCHO / TVOCNH3 / H2 Temperature / Humidity

DL-300


DL-300-IP65


DL-1000

## Temperature / Humidity / illumination


DL-10 DL-10-BK


DL-100S


DL-110S

## DL Series Sensing Function Selection Guide:

| Series No. | DL-10 | DL-100S | DL-110S | DL-300/DL-300-IP65 | DL-1000 |
|---|---|---|---|---|---|
| Types of Sensor | - | - | illumination | CO / CO2 / HCHO / TVOC / NH3 / H2S | |
| | Temperature / RH | | | Temperature / RH | |
| CO | - | - | | 0 ~ 1000 ppm | 0 ~ 1000 ppm |
| CO2 | | | | 0 ~ 9999 ppm (NDIR) | 0 ~ 9999 ppm (NDIR) |
| HCHO | | | | 0 ~ 2000 ppb | 0 ~ 2000 ppb |
| TVOC | | | | 0 ~ 60000 ppb | 0 ~ 60000 ppb |
| NH3 | | | | 0 ~ 100 ppm | 0 ~ 100 ppm |
| H2S | | | | 0 ~ 100 ppm | 0 ~ 100 ppm |
| Particle | - | - | | - | PM1, PM2.5, PM10, Particle (Particle No.: 0.3μm, 0.5μm, 1μm, 2.5μm, 5μm, 10μm) |
| illumination | - | - | 0 ~ 100,000 Lux | - | - |
| Temperature Range / Accuracy | R: -20°C ~ +60°C<br>A: ±0.4°C | R: -20°C ~ +60°C<br>A: max. ±0.3°C | | Range: 0°C ~ 50°C ( IP65 support -20°C ~ 50°C )<br>Accuracy: ±0.6°C / Resolution: 0.1°C | |
| RH Range / Accuracy | R: 10 ~ 95% RH<br>A: ±3% RH | R: 0 ~ 100% RH<br>A: max. ±1.8% RH | | Range: 0 ~ 100% RH<br>Accuracy: ±5% RH / Resolution: 0.1% RH | |
| Dew Point | - | Range: ratio of Temperature to RH / Resolution: 0.1°C | | | |
| Data Logger | - | up to 4088 or 600,000 records | | up to 450,000 records | |
| IP Rate | - | IP66 | IP67 | for module name with IP65 | IP43 |
| Display Screen | - | Monochrome LCD | | 2.8" TFT full-color touch LCD | - |
| Communication | Modbus RTU | RS-485 / ZigBee / Ethernet / PoE<br>DCON or Modbus RTU | | RS-485 / Ethernet / PoE / BLE / WiFi<br>DCON, Modbus RTU, Modbus TCP, MQTT | |
| Advantage | Small-sized | IP66 rated | | Support MQTT, Mobile Apps, Safety Alarm, IP65 rated | |

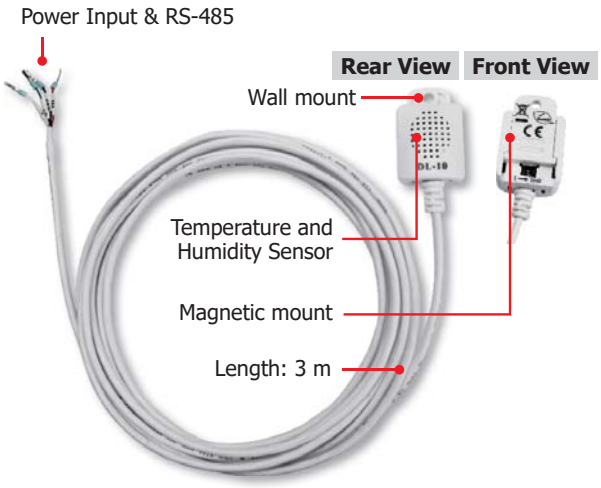
## DL-100 Series:

| DL-10/DL-100 Series: Temperature / Humidity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Series/Model | | Sensor | | DO x 2 | Interface | Protocol | Cover Color | IP Code |
| | | Temp. | RH | | | | | |
| DL-10 | DL-10 | Yes | Accuracy 3%RH | - | RS-485 | Modbus RTU | White | - |
| | DL-10-BK | | | | | | Black | |
| DL-100S | DL-100T485S<br>DL-100T485S-W | Yes | Accuracy 3% RH | - | RS-485 | DCON | Black | IP66 |
| | | | | | | | White | |
| | DL-100TM485S<br>DL-100TM485S-W | | | | | Modbus RTU | Black | |
| | | | | | | | White | |
| | DL-100T485PS<br>DL-100T485PS-W | | Accuracy 1.8% RH | | | DCON | Black | |
| | | | | | | | White | |
| | DL-100TM485PS<br>DL-100TM485PS-W | | | | | Modbus RTU | Black | |
| | | | | | | | White | |
| | DL-100S-E<br>DL-100S-E-W | | Accuracy 3% RH | | Ethernet /PoE | Modbus TCP, MQTT | Black | |
| | | | | | | | White | |
| DL-101S | DL-101S-E<br>DL-101S-E-W | Yes | Accuracy 3% RH | Yes | | | Black | |
| | | | | | | | White | |

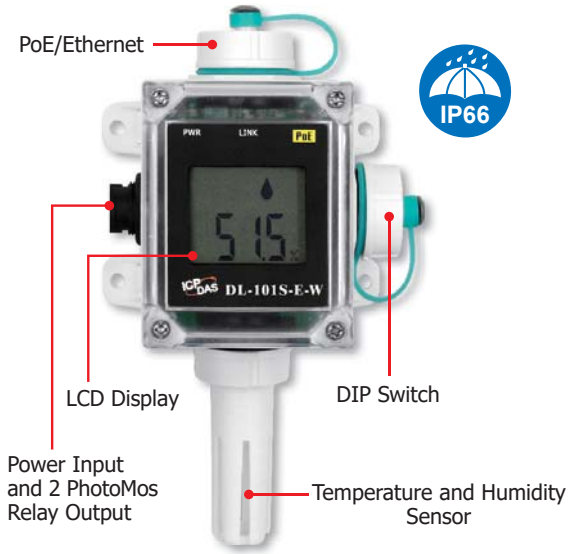
## Appearance:

### DL-100T485PS-W

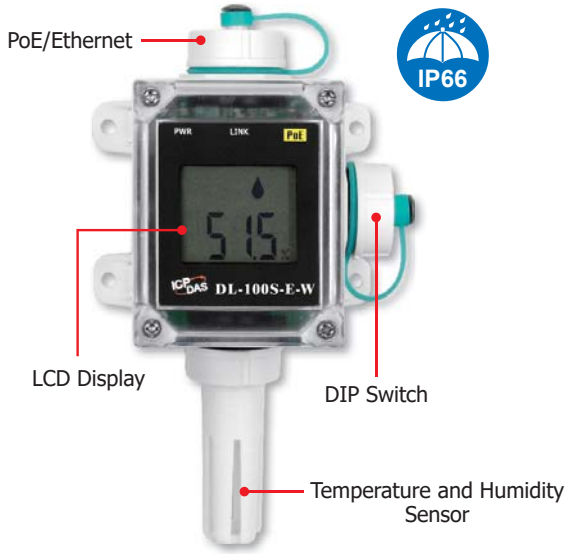

### DL-10




### DL-101S-E-W




### DL-100S-E-W

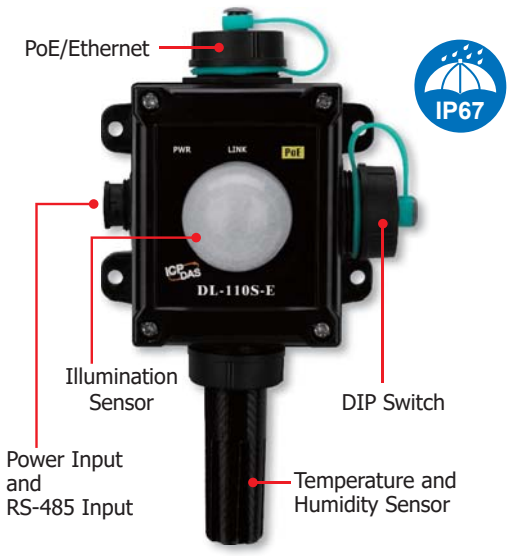


## Illuminance Module Selection Guide:

| DL-110S/DL-120/iSN-201 Series: Illuminance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Series/Model | | | Sensor | | | | Interface | Cover Color | IP Code |
| | | | Temp. | RH | Lux | Range | | | |
| Out-door | DL-110S | DL-110S-E | Yes | Accuracy 3% RH | Yes | 0-100,000 (Lux) | RS-485/ Ethernet/PoE | Black | IP67 |
| | | DL-110S-E-W | | | | | | White | |
| | DL-120 | DL-120-E | - | - | | | | Black | |
| | | DL-120-E-W | | | | | | White | |
| In-door | iSN-201 | iSN-201-E | Yes | Accuracy 3% RH | Yes | 0-20,000 (Lux) | RS-485/ Ethernet/PoE | White | IP20 |
| | | iSN-201-BLE | | | | | RS-485/ Ethernet/PoE/ Bluetooth | | |
| | | iSN-201-WF | | | | | RS-485/ Ethernet/PoE/ Wi-Fi | | |

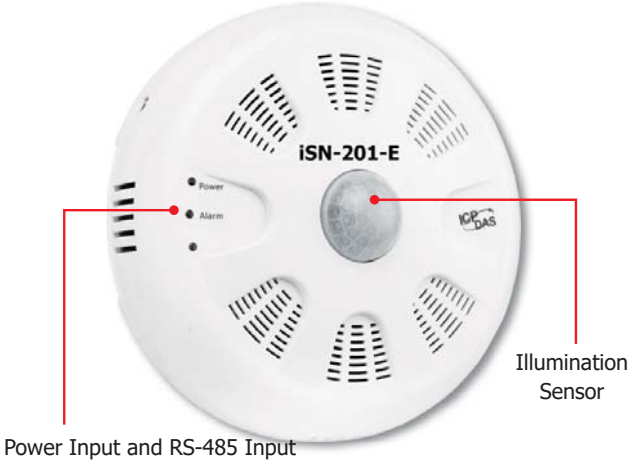
## Appearance:

### DL-110S-E

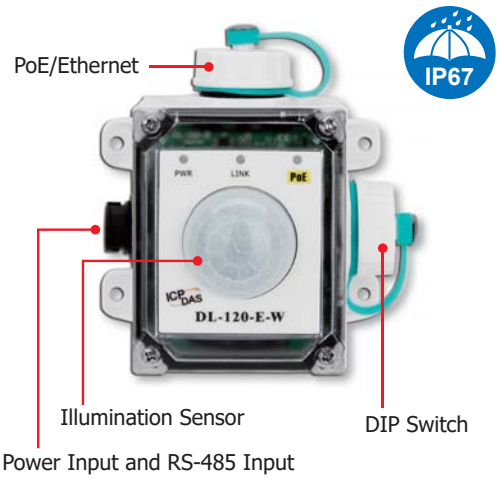



### DL-110S-E-W


### iSN-201-E




### DL-120-E-W



## DL-300 Series:

# DL-30 X - X - X

**Types of Fume Sensor**

**1 : CO**
**2 : CO2**
**3 : CO+CO2**
**4 : HCHO + TVOC**
**5 : NH3**
**6 : H2S**
**7 : HCHO**
**8 : TVOC**

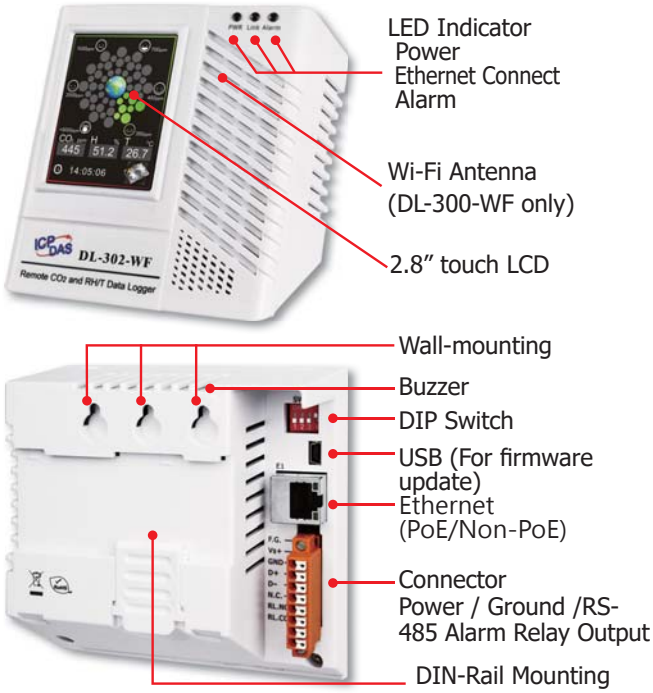
**Communication**

**N/A : Ethernet/PoE + RS-485**
**BLE : N/A + Bluetooth**
**WF : N/A + Wi-Fi**

**IP Protection Class**

**IP65 : with IP65 Waterproof and dustproof**
**N/A : with IP30**

### DL-300 Series




### DL-300 Series with IP65


| DL-300 Series | | | Type of Sensor | | Communication | IP Code |
|---|---|---|---|---|---|---|
| **Ethernet & RS-485** | **Bluetooth** | **Wi-Fi** | **Fume Sensor** | **Humiture** | | |
| **DL-301** | **DL-301-BLE** | **DL-301-WF** | **CO** | Yes | **N/A type:** Ethernet/PoE + RS-485<br>**BLE type :** Bluetooth + Ethernet/PoE + RS-485<br>**WF type:** Wi-Fi + Ethernet/PoE + RS-485 | IP30 |
| **DL-301-IP65** | **DL-301-BLE-IP65** | **DL-301-WF-IP65** | | | | IP65 |
| **DL-302** | **DL-302-BLE** | **DL-302-WF** | **CO2** | | | IP30 |
| **DL-302-IP65** | **DL-302-BLE-IP65** | **DL-302-WF-IP65** | | | | IP65 |
| **DL-303** | **DL-303-BLE** | **DL-303-WF** | **CO + CO2** | | | IP30 |
| **DL-303-IP65** | **DL-303-BLE-IP65** | **DL-303-WF-IP65** | | | | IP65 |
| **DL-304** | **DL-304-BLE** | **DL-304-WF** | **HCHO + TVOC** | | | IP30 |
| **DL-304-IP65** | **DL-304-BLE-IP65** | **DL-304-WF-IP65** | | | | IP65 |
| **DL-305** | **DL-305-BLE** | **DL-305-WF** | **NH3** | | | IP30 |
| **DL-305-IP65** | **DL-305-BLE-IP65** | **DL-305-WF-IP65** | | | | IP65 |
| **DL-306** | **DL-306-BLE** | **DL-306-WF** | **H2S** | | | IP30 |
| **DL-306-IP65** | **DL-306-BLE-IP65** | **DL-306-WF-IP65** | | | | IP65 |
| **DL-307** | **DL-307-BLE** | **DL-307-WF** | **HCHO** | | | IP30 |
| **DL-307-IP65** | **DL-307-BLE-IP65** | **DL-307-WF-IP65** | | | | IP65 |
| **DL-308** | **DL-308-BLE** | **DL-308-WF** | **TVOC** | | | IP30 |
| **DL-308-IP65** | **DL-308-BLE-IP65** | **DL-308-WF-IP65** | | | | IP65 |

## HCHO (Formaldehyde) Detector Automatic Solution

The **DL-307** is a 1-ch **HCHO** detector with **data logger** that provides an instantaneously warning of toxic formaldehyde, which can be found in a plywood factory, furniture factory and new interior remodelling house commonly. Real-time data can be accessed from the DL-307 from anywhere and at any time using the free Windows software, the iOS App or the Android App.


## Pig Farming Solution

Ammonia (**NH3**) and hydrogen sulfide (**H2S**) are among the most significant pollutant gases in Pig Farming relating to animal and worker well-being. Large quantities of **NH3** and **H2S** emissions can have negative impacts on growth and immunity of the animals. Therefore, it requires long term environmental monitoring. However, a general device on market may not function properly under such environment. By using **DL-305-IP65**, it can monitor the concentration of **NH3** & **H2S**, temperature, and humidity information with date and timestamps over a wide range of operating temperature from -20°C to +50°C, and are able to store up to 450,000 downloadable records. The **WISE-5231-4GE** features timer and schedule functions. It allows user to schedule specific date or time for control logic execution, or perform specific tasks such as time delay. With calendar user interface provided, schedule setting can be more efficient and flexible. No programming is required, only a few simple settings will be able to achieve the farm production control and quality control, production resume and so on.

## ● Greenhouse Monitoring Solution

The greenhouse monitoring solution include **WISE-5231M-4GE**, **DL-110-E** and **DL-300/DL-100** series. It provide the environmental monitoring operation for illuminance, temperature and humidity. Based on the built-in intelligent logic engine of WISE, the solution can automatically control the operation of sprinkler, lamp and curtain to help the plants grow well, increase crop yield and improve quality.

Based on the functions provided by **WISE-523xM-4GE** with **iCAM** series network camera, it can perform the personnel access control operation for greenhouse, and send the alarm message by SMS, Email, **LINE/WeChat** to the related personnel for the emergency event notification. WISE can connect with the IoTstar cloud management software to help user to build the IoT cloud solutions in a easy way, and monitor the situation of the greenhouse remotely.


## ● Mushroom Farming Solution

Mushrooms are very fragile in nature, so do not need too much sunlight. A temperature ranging between 18°C to 35°C is considered as the ideal one and favorable for mushroom farming. Also, a good moisture level is more beneficial in enhancing the good development of mushrooms. For this, humidity of 85 to 90 % of air should be maintained. The general equipment cannot work in such environment, but the **DL-302-IP65** can be implement in this mushroom farming to record **CO2**, temperature and humidity information. By the way, **WISE-5231M-4GE** here is a controller with built-in logic control to receive and send SMS messages when there is something wrong.

## DL-1000 Series:

# DL-10 X X - X

**Particle Matter Sensor**

**1 : PM2.5**
**2 : PM2.5/1/10 +Particle**

*** PM Sizes: 0.3μm, 0.5μm, 1μm, 2.5μm, 5μm, 10μm**

**Types of Gas Sensor**

**0 : Particle**
**1 : CO**
**2 : CO2**
**3 : CO+CO2**
**4 : HCHO+TVOC**
**5 : NH3**
**6 : H2S**
**7 : HCHO**
**8 : TVOC**

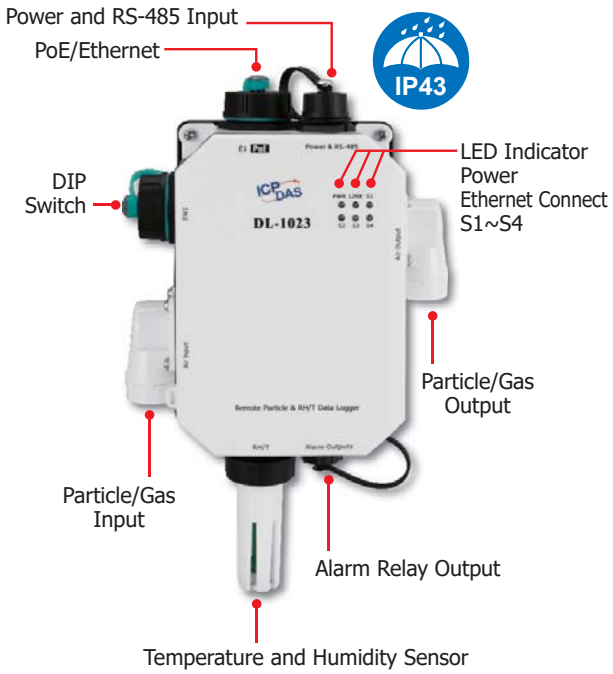
**Communication**

**□ : Ethernet/PoE**
**BLE : Bluetooth**
**WF : Wi-Fi**



## Particle Matter and Fume Detector

DL-1000 is a series of particle and gas measurement module that can measure the concentration of aerosols in the air, such as: PM2.5, PM1, PM10 and the number of particles (0.3μm, 0.5μm, 1μm, 2.5μm, 5μm, 10μm). In addition, various fume concentrations related to human health can also be measured. For example: CO/CO2/ HCHO/NH3/H2S/TVOC. DL-1000 can record data and send alarm when concentration is too high.




## Differences of DL-1000 and DL-300-IP65

Differences between DL-1000 and DL-300-IP65:

1. DL-1000 add the function to measure PM1, PM2.5, PM10, and Particle in the air.
2. DL-1000 has replaceable filter patches, but DL-300-IP65 doesn't.
3. DL-300-IP65 has a 2.8-inch screen, but DL-1000 doesn't.
4. DL-300-IP65 has IP65 waterproof, but DL-1000 has IP43.

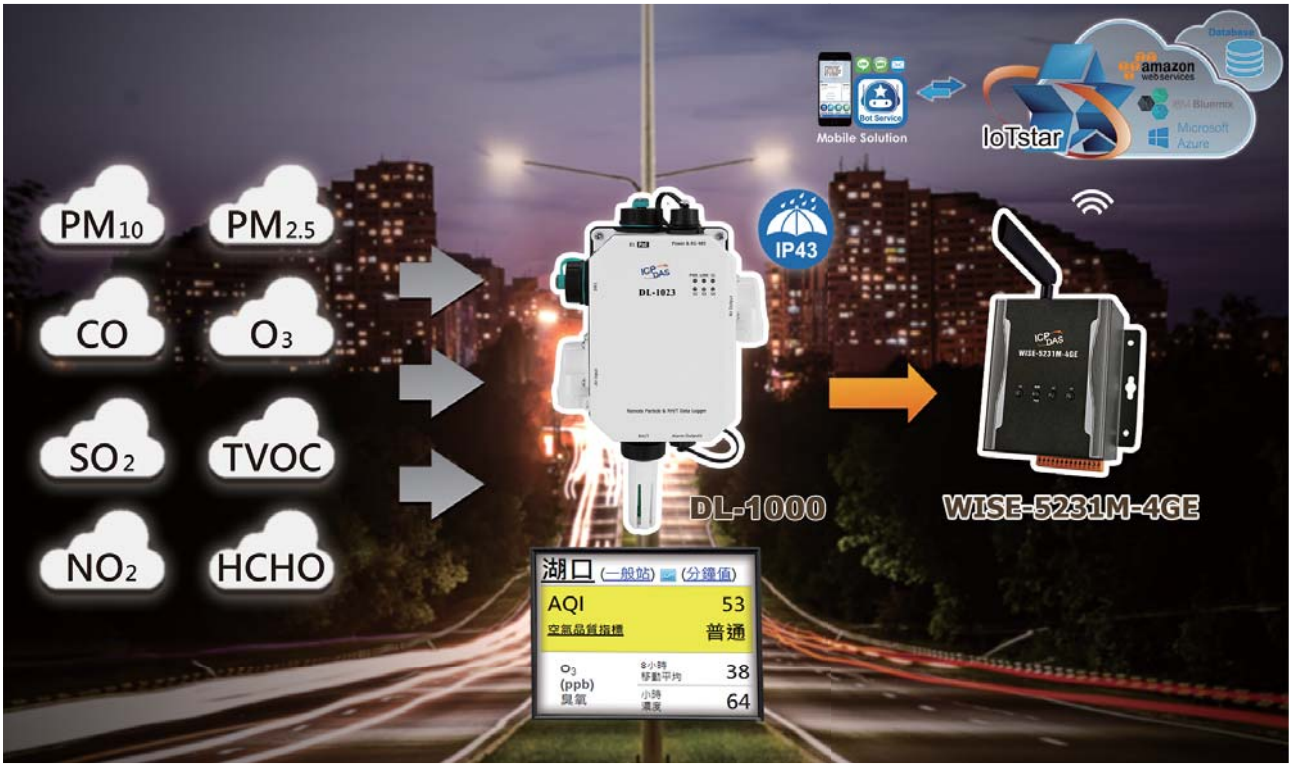
| DL-1000 Series | | | Type of Sensor | | | Communication |
|---|---|---|---|---|---|---|
| Basic Type | Bluetooth | Wi-Fi | Particle | Gas Sensor | T & RH | |
| DL-1020 | DL-1020-BLE | DL-1020-WF | PM1<br>PM2.5<br>PM10<br>Particle<br>(PM Sizes:<br>0.3μm, 0.5μm,<br>1μm, 2.5μm,<br>5μm, 10μm) | - | Yes | **Basic type:**<br>**RS-485 +**<br>**Ethernet/PoE**<br><br>**BLE type :**<br>**Bluetooth**<br>**+ RS-485**<br>**+ Ethernet/PoE**<br><br>**WF type:**<br>**Wi-Fi**<br>**+ RS-485**<br>**+ Ethernet/PoE** |
| DL-1021 | DL-1021-BLE | DL-1021-WF | | CO | | |
| DL-1022 | DL-1022-BLE | DL-1022-WF | | CO2 | | |
| DL-1023 | DL-1023-BLE | DL-1023-WF | | CO + CO2 | | |
| DL-1024 | DL-1024-BLE | DL-1024-WF | | HCHO + TVOC | | |
| DL-1025 | DL-1025-BLE | DL-1025-WF | | NH3 | | |
| DL-1026 | DL-1026-BLE | DL-1026-WF | | H2S | | |
| DL-1027 | DL-1027-BLE | DL-1027-WF | | HCHO | | |
| DL-1028 | DL-1028-BLE | DL-1028-WF | | TVOC | | |

## Replaceable Filter Patch (FLT-C001)

Generally, the PM2.5 measuring sensor on the market is usually installed in outdoor applications. Because the outdoor air is quite dusty, the measuring channel of PM2.5 sensor is easily clogged by aerosol, resulting in continued alarms for the heavy concentration. Due to the error data from the clogged sensor, this module is returned to the factory for repair. Downtime during the repair period often causes significant cost and losses. In order to solve this problem, ICP DAS design the CL-200 series and DL-1000 series with replaceable patch, FLT-C001, which makes it easy for users to replace them without uninstall the devices. Cost of repair and time can be reduced by this innovated mechanical design.


## Intelligent Street Lighting in Smart City

In smart city applications, smart street lights integrate various communication technologies and are no longer illumination only. The high-density construction of streetlights have become one of the most important sources of government collecting road information in recent years. DL-1000 series products, with standard industrial communication protocol Modbus RTU/TCP, can integrate with smart streetlights to achieve outdoor air quality monitoring such as: O3, CO, CO2, SO2, NO2, TVOC, HCHO, and Particle Matter 1/2.5/10. Due to these aerosol could accumulate around the sensor and would cause error record after using for a period, DL-1000 support replaceable dust filter patch to easily change the patches inside the filter hood rather than uninstall the device.



## ● Outdoor Mobile Air Quality Detection Application

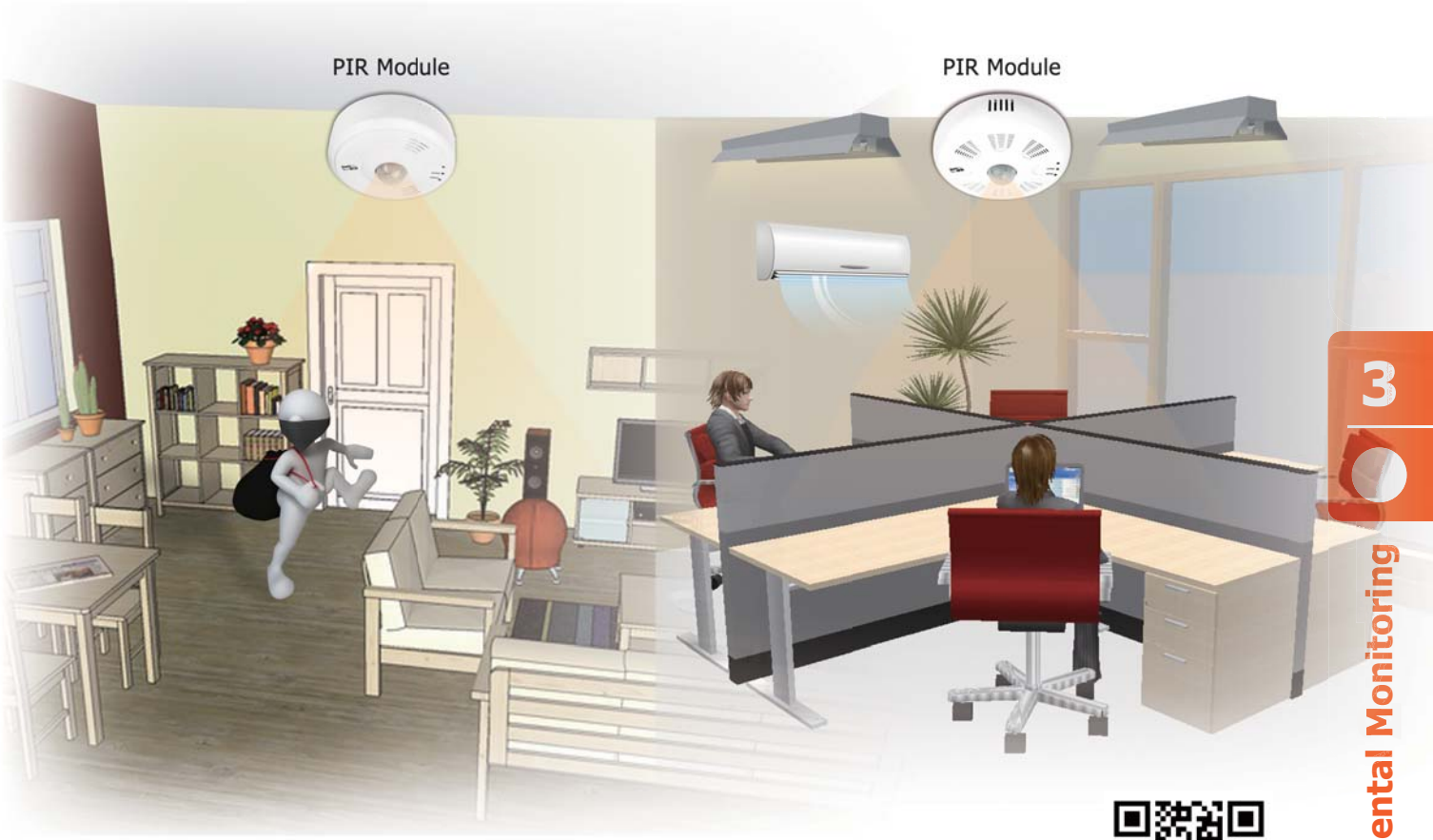
In developed countries, the Air Quality detection, statistics and evaluation is the most for improvement. In a vast area, it can only rely on the vehicle moving to record status of air quality, and to offline extract these and send back sorting out. ICP DAS DL-1000 series can integrate with our 3G/ 4G controllers to transmit data back to control center wirelessly.


## ● Factory Gas Detection Application

In some factories, H2S is one of the harmful gases. Due to the colorless and odorless are two characteristics quite hard to find or feel it, sometimes the workers inside the factory get injured inevitably. Joint liability from the injury brings the company a massive fines.

DL-1026 H2S detector module can put in the spot. It equip with standard industrial protocols and with high flexible to integrate information from devices and transmit back to control center. When the concentration of gas is too high, DL-1026 can also send alarm signals to inform relative person to evacuate people there.

# 3-3 Motion Detector: PIR Series






**PIR-130 series**, the Passive Infrared series, provides human motion detection and temperature measurement; and **PIR-230/231 series** provides motion detection, temperature and humidity and other environmental measurements. These series are very helpful for the indoor body sensing, anti-theft security, green energy and environmental protection and energy efficiency enhancement. A free Utility is included in the package to configurate and display of data in a powerful chart that can be exported to Excel format. The screw-free quick-connect connector, DIP switch and rotary switch, makes it easy to install, repair and maintain the product. The white color and mini-sized exterior design is quite suitable to match with interior decoration.

## Selection Guide:

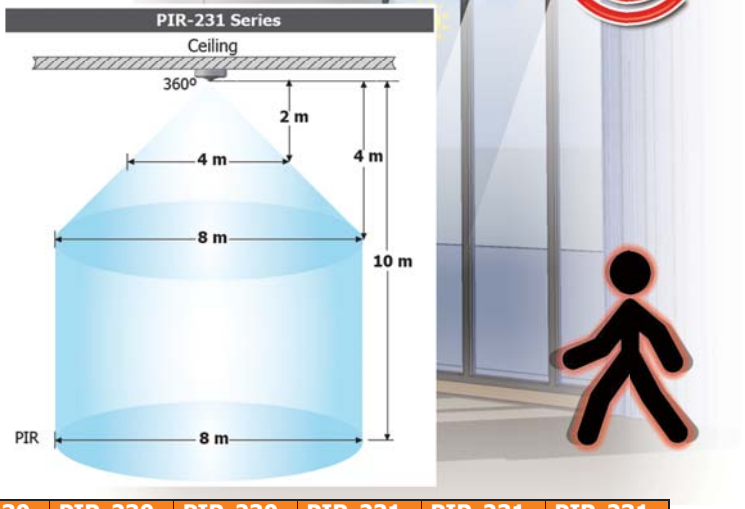
| Model | Motion Sensor | T&R Sensor | Protocol | Interface | Detection Height |
|---|---|---|---|---|---|
| **PIR-130-AC** | PIR | Temperature | DCON/Modbus RTU | RS-485 | 4m (Max.) |
| **PIR-130-DC** | | | | | |
| **PIR-130-ZT** | | | | ZigBee | |
| **PIR-230-E** | | Temperature + Humidity | Modbus TCP, MQTT | Ethernet, PoE | |
| **PIR-230-BLE** | | | Modbus RTU | Bluetooth | |
| **PIR-230-WF** | | | Modbus TCP | Wi-Fi | |
| **PIR-231-E** | | | Modbus TCP, MQTT | Ethernet, PoE | 10m (Max.) |
| **PIR-231-BLE** | | | Modbus RTU | Bluetooth | |
| **PIR-231-WF** | | | Modbus TCP | Wi-Fi | |

# PIR-230 Series

## PIR Motion Sensor Temperature/Humidity Sensor

## Features:

- Adjustable Time-Delay / Lux / Sensitivity
- Internal Photosensor for Smart Switch Control
- LED Indicator for PIR/Temperature Sensor
- Temperature Sensor for Measuring Room Temperature or Fire Alarm
- Relay Output Used to Control the Light Via the PIR/ Temperature Sensor
- Suitable for loads up to 1500 W (Incandescent) and 300 W (Fluorescent)
- Multiple Communication Interfaces and Protocols
- Ceiling Surface Mount Design




The **PIR series** can detect infrared waves generated by human within a range of approximately 8 meters in diameter with a 360° coverage area for indoor motion detection, and can be configured to auto-switch on a light if the motion is detected. It also has a temperature sensor for measuring room temperature or can be set up to activate a fire alarm. The **PIR series** especially is suitable for BA applications. There are RS-485/ZigBee/ Ethernet/Bluetooth/Wi-Fi models can be selected. Different models support DCON, Modbus RTU/TCP or MQTT protocol, and can be integrated to HMI/SCADA/ central control system.

| Models | PIR-130-AC | PIR-130-DC | PIR-130-ZT | PIR-230-E | PIR-230-BLE | PIR-230-WF | PIR-231-E | PIR-231-BLE | PIR-231-WF |
|---|---|---|---|---|---|---|---|---|---|
| **Sensor Type** | **PIR Motion Sensor Temperature** | | | **PIR Motion Sensor Temperature / Humidity** | | | | | |
| **Passive Infrared (PIR) Motion Sensor** | | | | | | | | | |
| Time-delay | Hardware: 8-step Switch-selectable (sec) Software: 16-step (sec) | | | | | | | | |
| LUX Control | Hardware: 2 mode (Dawn and dust) / Software: 5-step | | | | | | - | | |
| Detection Range | 4 meters max. | | | | | | 10 meters max. | | |
| Detection Field of View | PIR: 360º; Diameter 8 meters Max. | | | | | | | | |
| **Temperature Sensor** | | | | | | | | | |
| Range | -25 ~ +100°C | | | -40°C ~ +120°C | | | | | |
| Fire Alarm | 65 °C (Programmable) | | | | | | | | |
| Measurement | Resolution: 0.0625°C / Accuracy: ±2°C | | | esolution: 0.1°C / Accuracy: ±0.6°C | | | | | |
| **Relative Humidity Measurement** | | | | | | | | | |
| Range | - | | | 0 ~ 100 % RH | | | | | |
| Measurement | - | | | Resolution: 0.1% RH / Accuracy: ±5% RH | | | | | |
| **I/O Channel** | | | | | | | | | |
| Relay Output | 1 | | | | | | | | |
| **Communication** | | | | | | | | | |
| Protocol | DCON, Modbus RTU | | | DCON, Modbus RTU, Modbus TCP, MQTT | | | | | |
| Wired Interface | Yes, RS-485 x 1 | | | Yes, RS-485 x 1 and Ethernet/PoE x 1 | | | | | |
| Wireless Interface | - | - | ZigBee | - | Bluetooth | Wi-Fi | - | Bluetooth | Wi-Fi |

# 3-4 Industrial Sensor Network Detection: iSN Series

**iSN Series** is a series products of Industrial Sensor Network Detection includes Leakage Detection, Indoor Illumination and humiture detection.

## Leakage Detection


**iSN-101**

## Illumination/ Humiture Detection


**iSN-201**

| Module | Sensor | | | | Relay Output | | |
|---|---|---|---|---|---|---|---|
| | Ch. | Type | Range | Function | Ch. | Type | Max. Current Load |
| **iSN-101** | 1 | Liquid | Liquid Length: 500 M | 1 alarm indicator/ Adjustable detection sensitivity | 1 | Signal Relay, Form C | 2 A |
| **iSN-201** | 1 | Indoor illumination | Range: 0 ~ 20,000 Lux | Temperature: -40 ~ +120°C Humidity: 0 ~ 100% RH | 1 | Power Relay, Form C | NO: 10 A NC: 6 A |

## iSN Series Selection Guide:

| Industrial Sensor Network Detection | Channel | Sensor Type | Interface |
|---|---|---|---|
| **iSN-101** | 1 | Liquid Leakage Detection | RS-485 |
| **iSN-201-E** | | Indoor Illuminance, Temperature and Humidity | Ethernet, PoE, RS-485 |
| **iSN-201-BLE** | | | Ethernet, PoE, RS-485, Bluetooth |
| **iSN-201-WF** | | | Ethernet, PoE, RS-485, Wi-Fi |

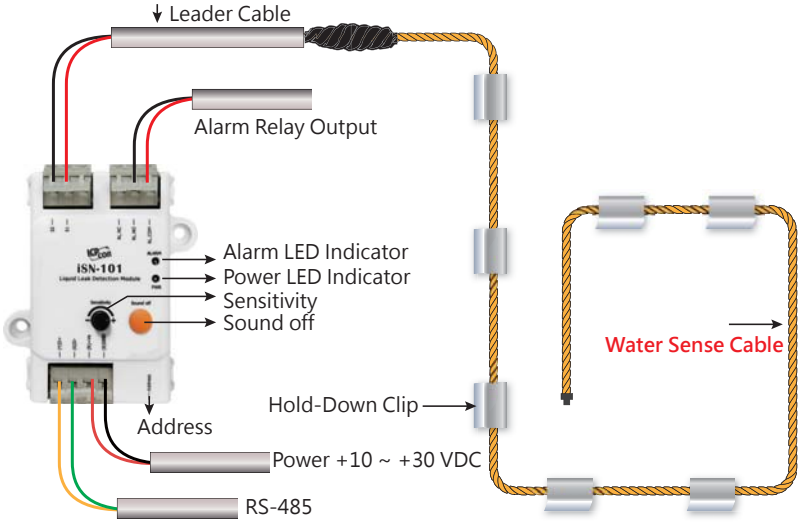
## Illuminance Module Selection Guide:

| iSN-201/DL-110/DL-120 Series: Illuminance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Series/Model | | | Sensor | | | | Interface | Cover Color | IP Code |
| | | | T. | RH | Lux | Range | | | |
| In-door | iSN-201 | iSN-201-E | Yes | Accuracy 3% RH | Yes | 0-20,000 (Lux) | RS-485/ Ethernet/PoE | White | IP20 |
| | | iSN-201-BLE | | | | | RS-485/ Ethernet/PoE/ Bluetooth | | |
| | | iSN-201-WF | | | | | RS-485/ Ethernet/PoE/ Wi-Fi | | |
| Out-door | DL-110 | DL-110-E | Yes | Accuracy 3% RH | Yes | 0-100,000 (Lux) | RS-485/ Ethernet/PoE | Black | IP65 |
| | | DL-110-E-W | | | | | | White | |
| | DL-120 | DL-120-E | - | - | | | | Black | |
| | | DL-120-E-W | | | | | | White | |

# Leakage module detection device description :

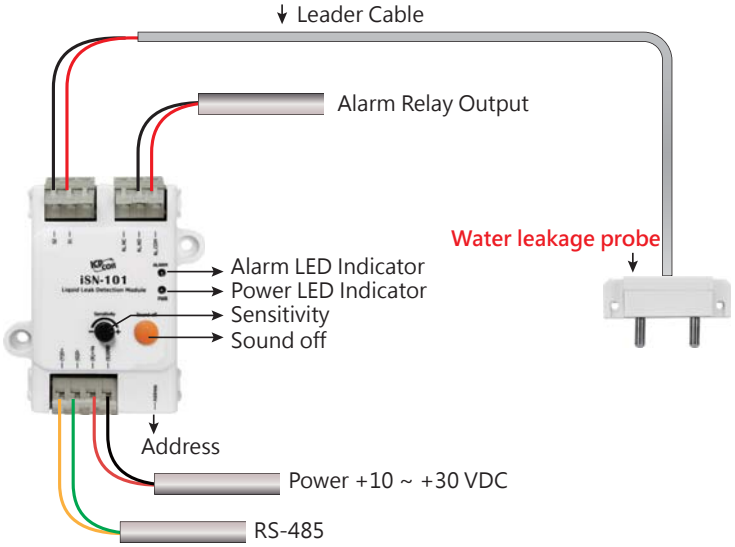
**iSN-101** is a liquid leak detection module used in water pipe leak monitoring in buildings with two working modes.

1. Work with the water sense cable that installed near the possible leaking pipe or area to detect leakage with alarm.
2. Work with the water leakage probe that installed in fixed possible leak locations to detect.




## Features:

- 1-ch Liquid Leak Detection
- Relay Output for Water Leakage Alarm
- A mute button to silence the audible alarm
- Two LED indicators to display the status of the power and the alarm
- Liquid Leak Water Sense Cable and Leader Cable can be up to 500 meters
- Sensitivity adjustable detection
- Supports the DCON and the Modbus RTU Protocols




## Ordering Information:

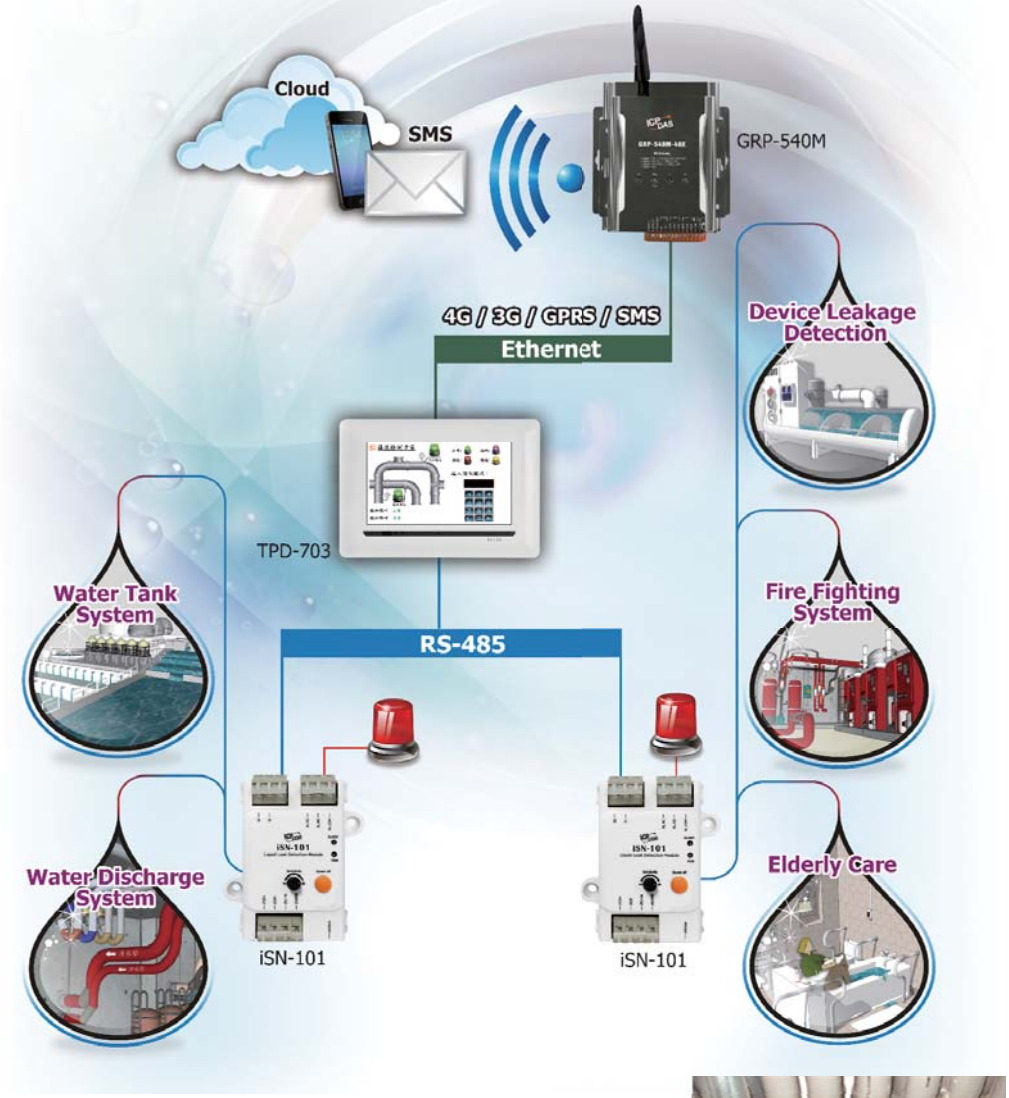
| | |
|---|---|
| **iSN-101 CR** | 1-channel Liquid Leak Detection Module (Wall mount) |
| **iSN-101/DIN CR** | 1-channel Liquid Leak Detection Module (DIN Rail mount) |
| **iSN-101/S CR** | 1-channel Liquid Leak Detection Module<br>Includes a 1m Liquid Leak Water Sense Cable and 3m Leader Cable. |
| **iSN-101/S/DIN CR** | |
| **iSN-101/S2 CR** | 1-channel Liquid Leak Detection Module<br>Includes a 3m Liquid Leak Water Sense Cable and 3m Leader Cable. |
| **iSN-101/S2/DIN CR** | |
| **iSN-101/S3 CR** | 1-channel Liquid Leak Detection Module<br>Includes a Leakage Probe. |
| **iSN-101/S3/DIN CR** | |
| **CA-LLD-DC100-L100** | Water Sense Cable w/o Position, 10 m length |

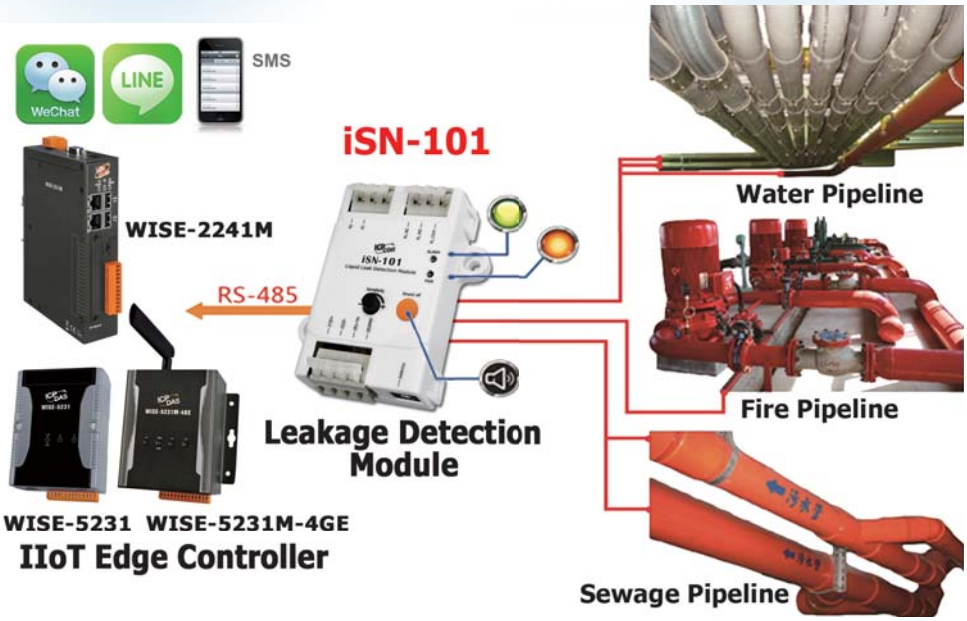
| **iSN-101/S CR** = | **iSN-101/S2 CR** = | **iSN-101/S3 CR** = |
|---|---|---|
| iSN-101 + CA-LLD-DC100-L010 + CA-LLD-EC-L030 | iSN-101 + CA-LLD-DC100-L030 + CA-LLD-EC-L030 | iSN-101 + CA-LLD-DP100 |
|  |  |  |

**Note:** The length of the leader cable can be extended by customer and the total length includes the detection cable can be up to 500 m.

## Leakage Monitoring Application:

The leakage monitoring is applied to the water pipes, fire pipes and sewage pipes of buildings, as well as the detecting of domestic water, drainage and electric equipment, which can eff ectively achieve water saving and ensure the safety of living. The iSN-101 can detect leakages, send out signal and alarms, combine with the WISE IoT Edge Controller or TPD/VPD Touch HMI, and to further integrate with the mobile APP or community system.



# Chapter 4. Factory Automation

## 4-1 Stack Light Monitoring Module: SL/tSL Series

**SL-PA6R1-WF**
**SL-P6R1-WF**

**tSL-P4R1**
**tSL-PA4R1**



### Features:

- Able to detect the status of each color segment: ON, OFF, or Flashing
- 4-channel DC/AC digital input and 1-channel alarm relay output
- Status monitoring for user-defined combinations of multiple color segments
- Reports the duration of the previous status
- Supports Modbus RTU, Modbus TCP and MQTT protocols
- Includes RS-485/Ethernet communication interfaces
- Includes redundant power inputs: PoE (IEEE 802.3af, Class 1) and DC input
- Web-based configuration interface and firmware update via Ethernet
- Relay output for alarm devices
- Provides WiFi telemetry for SL-P6R1-WF and SL-PA6R1-WF
- Wide operating temperature range: -25 to +75°C

### Introduction:

The main purpose of managing machine status is to reduce the amount of downtime and to reduce production costs. The easiest way to achieve this is by installing a tSL-P4R1/tSL-PA4R1 intelligent module from ICPDAS, which monitors the output of the machine's indicators without affecting the operation of the equipment, thereby enabling the current operation stage of the machine to be mastered and ensuring timely command of the logistics system support in order to achieve production goals.

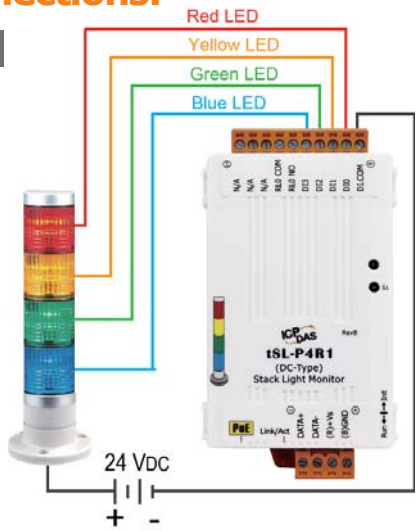
The tSL-P4R1/tSL-PA4R1 is a stack light monitoring module which includes 4-channel DC/AC digital input and 1-channel relay output that can be used to monitor the status of the stack light of the MES (Manufacturing Execution System) machine. The module can be used to detect the status of each color segment of the stack light as being either OFF, ON, or fl ashing. In addition to detecting the status of each individual color segment, the status of the combination of multiple color segments can also be defined, including the ability to report the duration of the previous status. By integrating the tSL-P4R1/tSL-PA4R1 module into your system, it is easy to implement stack light status monitoring on an MES via SCADA software to improve machine utilization and throughput.

### Selection Guide:

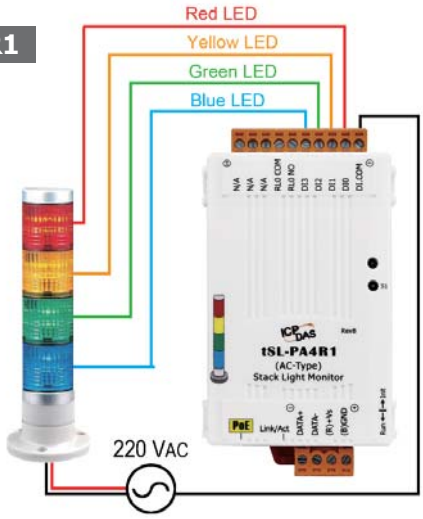
| Stack Light Monitoring Module | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Model** | **Digital Input** | | **Alarm Output** | | **Protocol** | **Interface** | | |
| | Channel | Type | Channel | Type | | RS-485 | Ethernet/PoE | WiFi |
| **tSL-P4R1** | 4 | DC | 1 | Power Relay, Form A (SPST) | Modbus RTU, Modbus TCP, MQTT | 1 | 1 | - |
| **tSL-PA4R1** | | AC | | | | | | |
| **SL-P6R1-WF** | 6 | DC | | | | 1 | 1 | 1 |
| **SL-PA6R1-WF** | | AC | | | | | | |

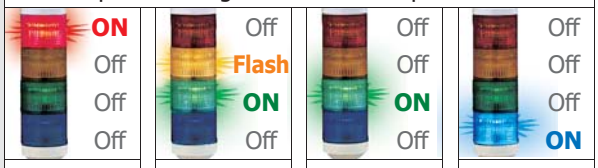
### Wire Connections:

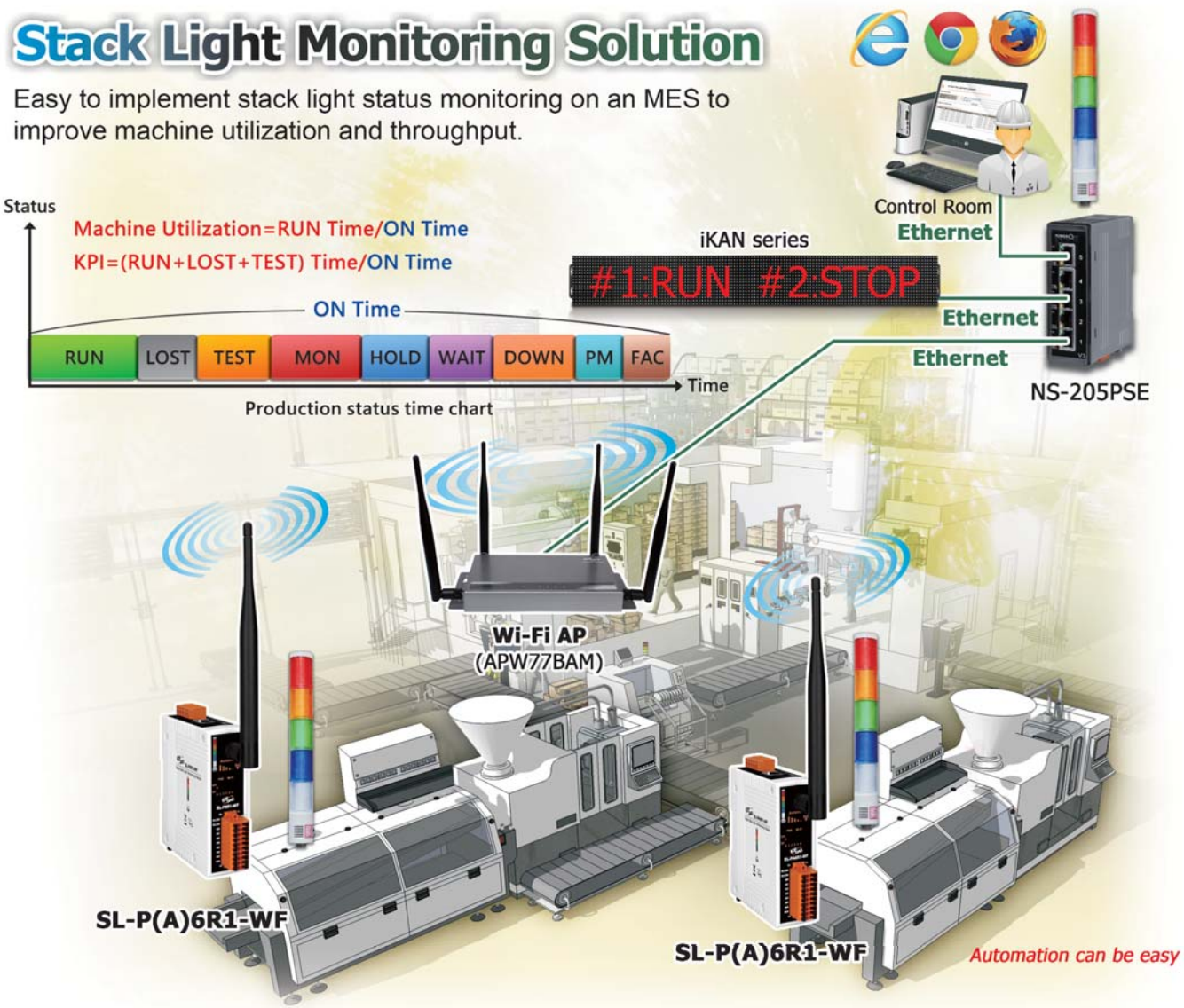
**tSL-P4R1**




**tSL-PA4R1**



| | ICP DAS Solution (SL/tSL series)) | Other company's solution |
|---|---|---|
| Interface | RS-485, Ethernet or Wi-Fi | RS-485, Ethernet |
| SCADA Integration | Modbus/RTU, Modbus/TCP | Modbus/RTU, Modbus/TCP |
| IIoT Integration | MQTT protocol.<br>Push the data when the status changed,<br>light Ethernet bandwidth loading. | RESTful protocol.<br>Polling the status,<br>heavy Ethernet bandwidth loading. |
| Stack Light (DC Type) | Yes | Yes |
| Stack Light (DC Type) | Yes | No<br>(needs Relays to convert AC to DC) |
| On/Off Status Detections | Yes | Yes |
| Flashing Status Detections | Yes | Yes |
| MES, ERP Integration | Yes<br>1. Status for max. of 81 user-defined combinations of multiple color segments. For example:<br>  <br><br>Status#1 (Error) Status#2 (Wait) Status#3 (Run) Status#4.... (Test)<br>2. Previous Status Duration Report: Easy to calculate the machine utilization for MES, ERP. | No<br>....#81 |



# 4-2 Voice Alert Module: ALM Series

## ALM-06-WF/ALM-04-MRTU

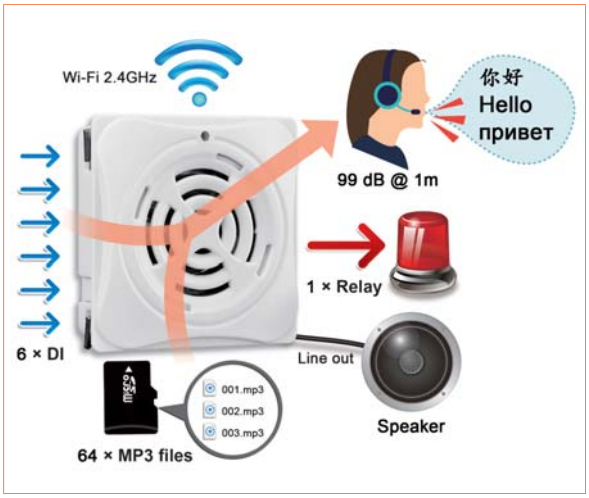
## Features:

- Compatible with IEEE 802.11 b/g/n, 2.4 GHz
- Support WEP/WPA/WPA2 wireless encryption
- Support Wi-Fi AP and Station modes
- Support Modbus TCP slave protocol
- 3W speaker, external Line out
- 99 dB/1kHz at 1m
- microSD card to store max. 64 MP3 voice files
- 6x DI, 1x Relay
- Voice Alert trigged by DI or Modbus TCP command

## Introduction:

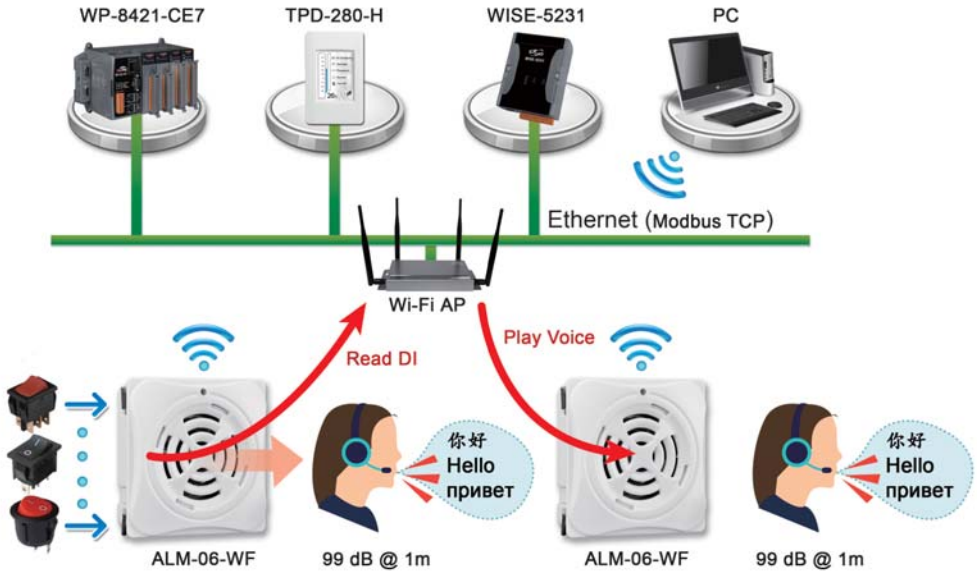
**ALM-06-WF** is equipped with a 4 GB microSD card to store MP3 files. The ALM-06-WF can play the MP3 files when the DI status matches the pre-defined conditions or gets Modbus TCP commands via the Wi-Fi. The built-in speaker power is only 3W. It is about 99 dB, 1 meter away the module. When requires for louder sound, the module also features audio line out to external speaker.

The ALM-06-WF provides 8 modes to define the DI conditions to play MP3 files. The conditions can be simply mapped to each DI channel to have 6 conditions or mapped to 5 DI channels combination status to have 32 conditions. And every condition not only plays the MP3 files but also can be configured to turn on the built-in relay to trigger a warning lamp. That means with WLM-06-WF can have both voice and light warning.




| Model | RS-485 | Wi-Fi (2.4 GHz) | DI (Dry) | Relay | Voice File | Sound | Audio |
|---|---|---|---|---|---|---|---|
| **ALM-06-WF** | - | Yes | 6 | 1 (500mA@50VDC) | MP3, 64x Files | 99 dB @1 meter | 3 W |
| **ALM-04-MRTU** | Yes | - | 4 | | | | |

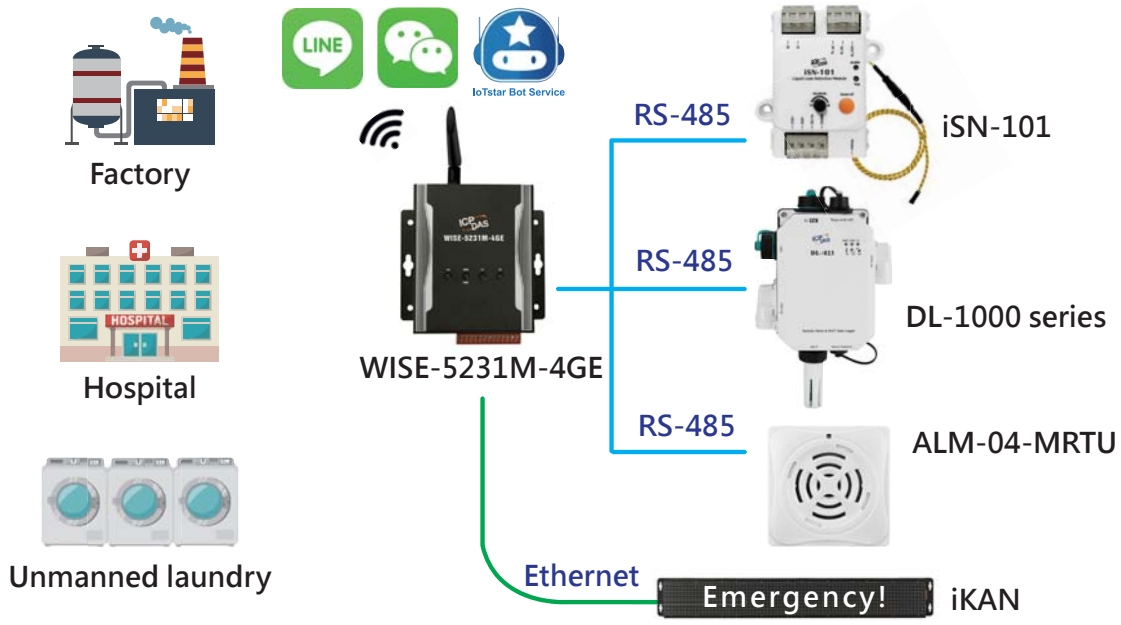
## Applications:

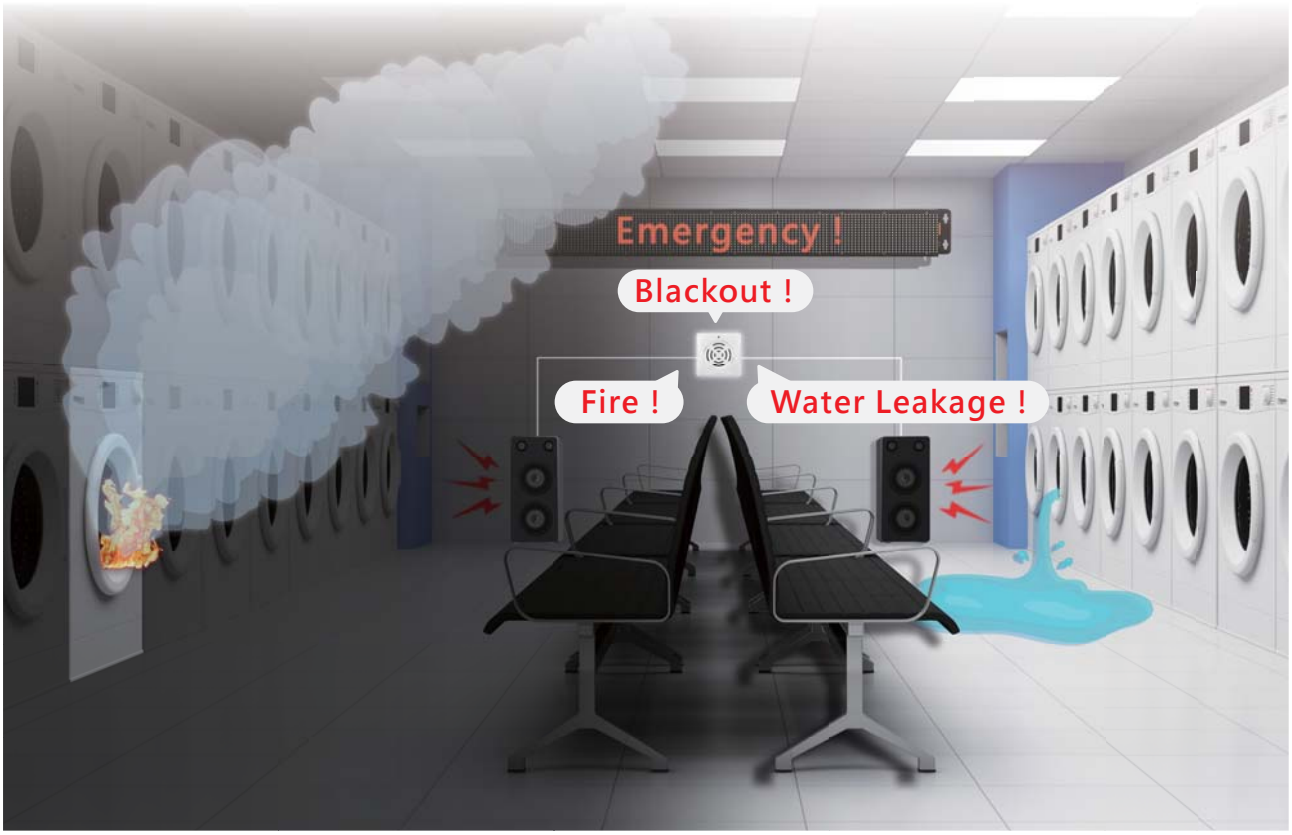


# Application of Environmental iAlarm – Visual and Sound notify

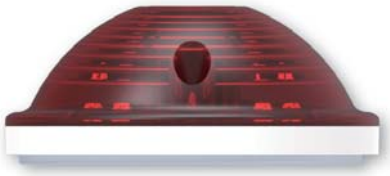
The ICP DAS ALM-06-WF/ALM-04-MRTU Smart Buzzer module can be configured via Wi-Fi, and has a 99db volume alarm and eight-voice alarm modes that can be used to notify personnel of different situations in a complex area.

The ALM-04-MRTU combines our DL-1020 series environment sensor, the iSN-101 leak detection module, and a WISE-5231M-4GE edge controller that can detect multiple air factors, plus fire, water leakage or current failure in an unmanned laundry. Besides, it can also generate a voice alarm to warn personnel nearby and send an instant LINE notification to the manager.



# Emergency Visual Alert Module: ALM-Horn Series



## ALM-Horn
## ALM-Horn-WF
## ALM-Horn-MRTU

## Features:

**ALM-Horn**
- Wide power supply range
- Sound Pressure up to 103dBm
- Ultra-bright flashing LED
- Support Expansion module box

**ALM-Horn-WF**
- Wi-Fi communication monitoring and configuration
- Compatible with IEEE 802.11b/g/n standards
- Support Access Point(AP, 1 Client) & Station(STA) modes for wireless networks
- Support WEP, WPA and WPA2 wireless encryption
- Support Modbus TCP, with Remote alarm command
- Photo couple input, NC/NO option select

**ALM-Horn-MRTU**
- RS-485 Interface
- Modbus RTU protocol, with Remote alarm command
- Photo couple input, Relay output ,NC/NO option select

## Introduction:

The **ALM-Horn** series is an Alarm Horn product, include a high output volume up to 103 dBm and Ultra-bright flashing LED. ALM-Horn-WF and ALM-Horn-MRTU include 1 channel DI input and a remote trigger alarm based on Modbus protocol.

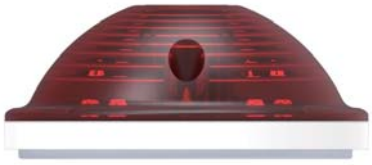
**ALM-Horn-WF** has WLAN connection complies with the IEEE802.11b/g/n standards. It supports Modbus TCP protocol and network encryption configuration.

**ALM-Horn-MRTU** have RS-485 connection and support Modbus RTU protocol. It makes an easy way to incorporate RS-485 connectivity into monitoring and control systems. Besides, both ALM-Horn-WF and ALM-Horn-MRTU makes perfect integration of monitoring in SCADA software and HMI utility.

## Applications:

- Fire Alarm System
- Building Automation
- Security Automation
- Machine Automation
- Factory Automation
- Testing Equipment


## Selection Guide:



ALM-Horn Series

EWB-C150
Expansion module box

| Module | ALM-Horn | ALM-Horn-WF | ALM-Horn-MRTU |
|---|---|---|---|
| **Audio** | | | |
| Sound Pressure Level | 103dB@100cm | | |
| Volume Control | no | | |
| **Digital Input** | | | |
| Channels | 1 | | |
| Input Type | Dry Contact: Sink | | |
| Dry Contact Level | NO: Open, NC: Close to GND | | |
| Photo-Isolation | 3750 VDC | | |
| Input Condition | Pulse Width must > 150mSec or more | | |
| **Wi-Fi Interface** | | | |
| Antenna | - | Chip Antenna | - |
| Output Power | - | 18.0 dBm @ 1 DSSS /<br>14.5 dBm @ 54 OFDM | - |
| Receive Sensitivity | - | –95.7 dBm @ 1 DSSS /<br>–74.0 dBm @ 54 OFDM | - |
| Interface | - | Wi-Fi 2.4G | - |
| Standard Supported | - | IEEE 802.11b/g/n | - |
| Wireless Mode | - | Station & AP (1 Client) | - |
| Encryption | - | WEP, WPA and WPA2 | - |
| Service | - | TCP, Modbus TCP | - |
| **RS-485** | | | |
| Parity /Data bit/ Stop bit | - | - | None/Odd/Even, 8, 1/2 |
| Baud Rate | - | - | 300 ~ 115200 bps |
| Protocol | - | - | Modbus RTU |
| **LED Indicators** | | | |
| Power/Status | 2 colors LED, Blue for System status, Red for Alarm status. | | |
| **Mechanism** | | | |
| Dimensions (Ø x H) | 120 mm x 73 mm | | |
| Installation | Wall Mount | | |
| **Power Requirements** | | | |
| Input Voltage Range | 12 ~ 48 VDC with Reverse Protection (Vin to GND) | | |
| Consumption | 0.4 W Active. | 0.7 W Standby. | 0.48 W Standby. |

# 4-3 Industrial LED Message Display: iKAN Series


**iKAN-116S/iKAN-124S**


**iKAN-116/iKAN-124**

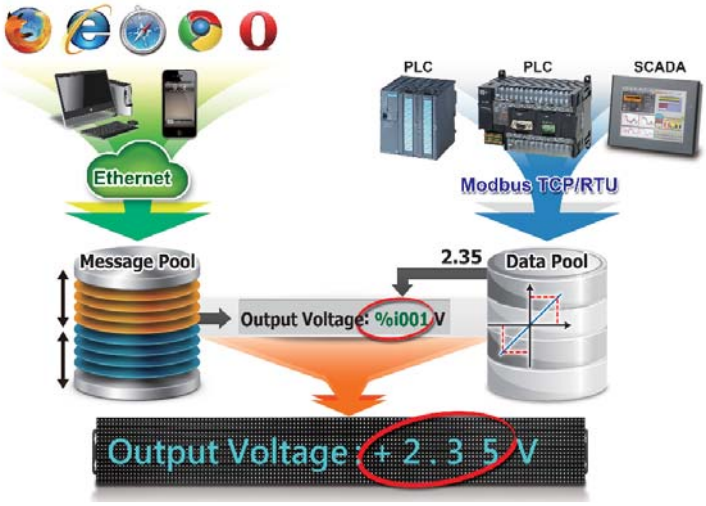

**iKAN-208/iKAN-216/iKAN-224**

## Features:

- Support multiple languages: text height of 16/11.5 cm
- 7 colors, including red, blue, yellow, green, light blue, purple and white
- Able to store up to 128 messages with priority configuration
- Convert 8 Modbus numbers into ASCII messages Instantly
- Integrate both text and variables in a single message
- Support Modbus TCP/RTU/CGI protocols
- Built-in RTC (Real Time Clock )
- Web-based User Interface
- Can be remotely controlled via a PLC, PC, or smart phone

## Introduction:

The iKAN series is a family of industrial Modbus LED message display devices that deliver industrial-grade anti-noise capabilities as well as reliability and stability. ASCII characters and Unicode characters, which can be used to display multiple languages, are supported for presenting formatted messages. Support for the popular Modbus industrial protocol is provided meaning that iKAN display devices can easily integrate into existing PLC and SCADA environments. The iKAN series allows data written from a PC or a PLC to display on a formatted message in real-time. Seven colors are available for the text, which can be used to indicate different degrees of importance of the message, as well as significantly increase the readability of the message in an industrial arena.




### Built-in RTC

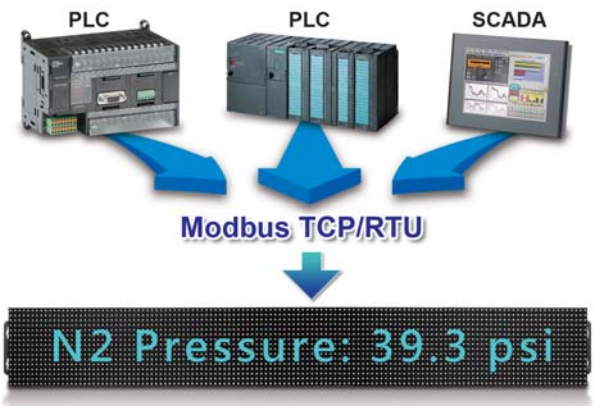
Date and time, 24 hour format including second, minute, hour, date, day of the week, month, year.


### Smart Phone Controllable

Messages can be edited using a standard web browser on a PC, mobile device, or smartphone without any limitations related to specific control tools or programs.

### Support Modbus TCP/RTU protocols

The popular Modbus industrial protocols are provided. iKAN can be easily integrated into PLC/SCADA.




### IP65 Rating

The iKAN IP65 model is totally waterproof and dustproof so it can be installed in dirty, soiled, or semi-outdoor environments, such as eaves, open halls, outdoor canopies, or beneath a sunroof.

## Indoor Air Quality Display

The iKAN device can be used to display indoor air quality monitoring data from ICP DAS DL sensor modules, including details of the CO, CO2, and PM2.5 levels, the temperature, and the humidity, without requiring any programming skills or knowledge.


## Message Editing

- **Edit default messages:**

A maximum of 128 messages with priority can be preconfigured from the first moment that the iKAN display is switched on. When the display is in operation, the focus needs only be on message management rather than the need to frequently update the messages.

- **Convert 8 Modbus data into ASCII character messages Instantly:**

8 Modbus control registers sets can be assigned to 4 messages; each of which contains up to 64 ASCII characters. It allows the Modbus controller to write text message to be displayed on the iKAN device.

## Message Priority

Messages with instant priority have a higher priority than other messages. Once a message with instant priority is enabled, the common message currently being displayed will be suspended until the instant message is disabled. This feature allows the most important information to be displayed in an emergency situation.

## Selection Guide

**iKAN - X XX S - IP65**

**Lines**
1: Single Line
2: Two Lines

**Characters (1 Line)**
08: 8 Characters
16: 16 Characters
24: 24 Characters

**LED Size**
S: Small Size
Null: Normal Size

**IP Rating**
Null: None
IP65: IP65

| Model | iKAN-116 | iKAN-116S | iKAN-124 | iKAN-124S | iKAN-208 | iKAN-216 | iKAN-224 |
|---|---|---|---|---|---|---|---|
| Display | | | | | | | |
| Text Color | Blue, Red, Yellow, Green, Light Blue, Purple or White | | | | | | |
| Character Sets | 16-bit Unicode or 7-bit ASCII | | | | | | |
| Message Pool | 128 common messages with user-defined priority levels<br>Up to 20 Unicode characters or 50 ASCII characters each | | | | | | |
| Data Pool | 40 Coil values, 64 Float values, and 64 Integer values | | | | | | |
| Communication Interface | | | | | | | |
| Ethernet | 2 × RJ-45, 10/100 Base-TX | | | | | | |
| | Modbus TCP Master/Slave, Max. 8/8 connections, Web-based User Interface | | | | | | |
| COM Port | 2 × RS-485 (Modbus RTU) | | | | | | |
| Mechanical | | | | | | | |
| Dimensions (W x H x D) (mm) | 1346 × 160 × 49 | 834 × 115 × 37.5 | 1986 × 160 × 49 | 1218 × 115 × 37.5 | 707 x 320 x 50 | 1346 × 320 × 49 | 1986 × 320 × 49 |
| Weight | 4 Kg | 2 Kg | 4.6 Kg | 2.5 Kg | 4 Kg | 8 Kg | 12 Kg |
| Housing Material | Aluminum | | | | | | |
| Power Input Range | 100 VAC ~ 240 VAC | | | | | | |

# 4-4 Bluetooth LE Gauge Master for Mitutoyo Gauges: GAM Series


**GAM-100**

## Features:

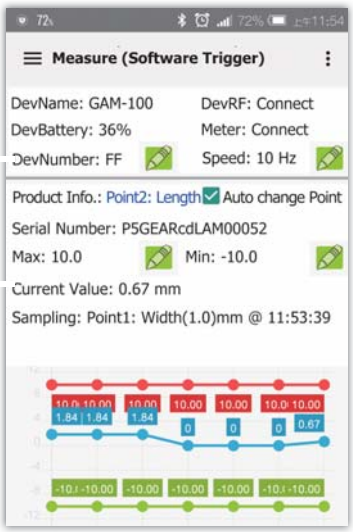
- Frequency: ISM 2.4 GHz
- Standard: Bluetooth 4.0
- Wireless transmission range up to 20 meters (Line of Sight)
- Fully compliant with the Mitutoyo ID-S1012MX/NTD-10-6" PMX
- LED indicators for Battery / RF link / Charge LEDs
- Support different transmission rate: 1/2/5/10 Hz
- Support Trigger button and 3.5 mm foot switch connector to log data
- Powered by micro USB chargeable Li-ion battery
- Battery Usage Life: 100HR / 10Hz

## Introduction:

The **GAM-100** is a Bluetooth Low Energy (Bluetooth LE/Bluetooth 4.0) gauge master for Mitutoyo gauges, with SPC output. A smart phone or tablet can use Bluetooth to get Mitutoyo gauge date through the gauge master. With the built-in micro USB chargeable Li-ion battery, the gauge master can work for 100 hours. To get and log the data, an Android APP is designed for a mobile device. The data can be kept in the local memory storage or uploaded to the remote MySQL server.

## Android APP:

- Provide device search function
- Real time data display
- Support trigger mode configuration
- Support device number configuration
- Support work order generator
- Upload data to remote MySQL server
- Battery remaining capacity display
- Provide recording file (*.csv)





## Applications:

# 4-5 Temperature Data Logger: TCD Series

**TCD-104**
4-ch K-type Thermocouple

**TCD-108**
8-ch K-type Thermocouple

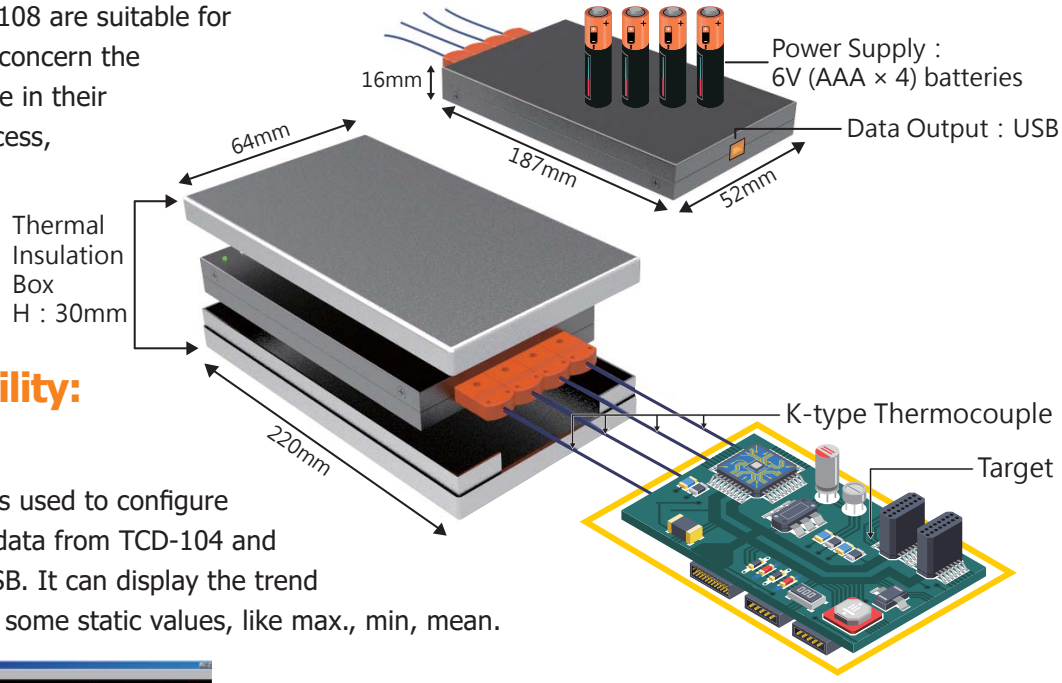
## Features:

- 4/8-channel K-type thermocouple (± 0.5℃ Accuracy)
- Sampling Rate: 50 ms to 1 hour
- Max. recording for each channel: 450,000/300,000
- Powered by 4x AAA batteries (60 hours @ 50 ms sampling rate)
- 400 ℃ Operating Temperature with Optional Thermal Insulation Box

## Introduction:

**TCD-104 and TCD-108** are temperature data loggers with 4/8-channel K-type thermocouple sensors. They are powered by 4x AAA batteries for working more than 60 hours. With an optional thermal insulation box, they can operate in 400℃ environment.

TCD-104 and TCD-108 are suitable for the industries that concern the temperature change in their manufacturing process, especially heating curve in ovens.




## Software Utility: iTCLogger

**iTCLogger** Utility is used to configure and download the data from TCD-104 and TCD-108 via the USB. It can display the trend chart and calculate some static values, like max., min, mean.

## Application Industries:

SMD assembly manufacturing, PC board manufacturing, footware manufacturing, food industry, pharmaceutical industry and any temperature measurement required industries.

# 4-6 Ethernet high-speed Data Acquisition Module: AR-200-AI


## Features:

- 2 simultaneous, 16-bit resolution ADC
- Voltage range: +/- 30V
- Support sample rate: 200kHz, 100kHz, 50kHz
- Max. recording time: 120 seconds
- Flexible trigger modes: push button trigger, schedule trigger, analog threshold trigger, digital input trigger and utility remote trigger
- Supports 4 to 32 GB micro SDHC flash card
- Support 1 digital input and 1 relay

AR-200-AI is a high-speed data acquisition module equipped with 2 analog input channels providing simultaneous-sampling at up to 200 kHz per channel. The module built-in 16 bit resolution ADC, and save data in SDHC type flash. We also provide flexible trigger modes, sample rate, and recording time for efficient data acquisition, making it ideal for signal measurement in various applications.



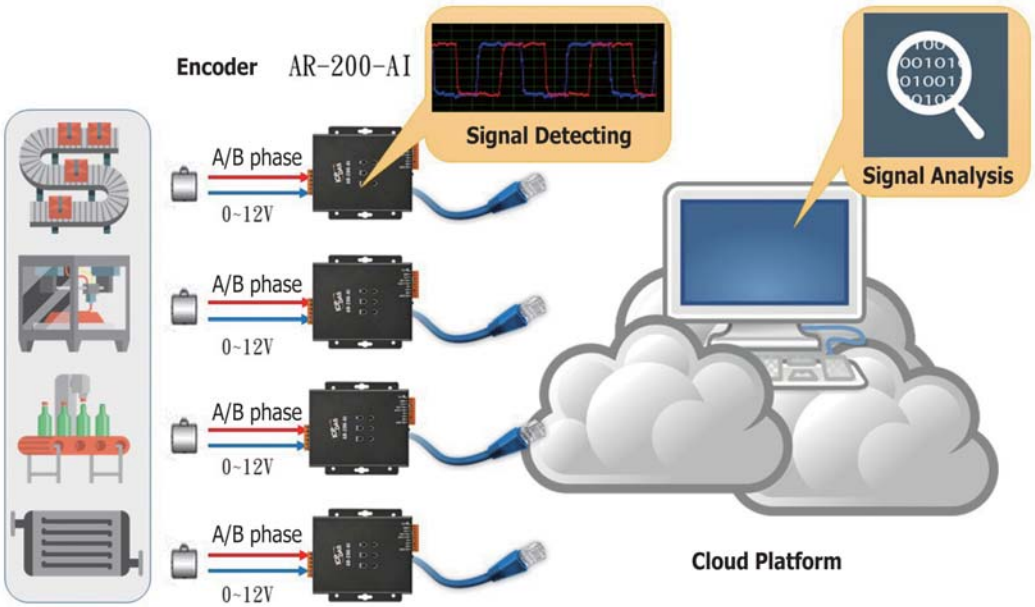
## Application:

### ● Predictive maintenance of VFD control system

The process of the chemical plant is continuous production, and the rotating equipment in the production process plays an important role. If any motor on the production line fails or is damaged during the production process, the entire production line will be shut down and the semi-finished products that have not been completed must also be discarded. Production capacity declines and costs increase. In order to detect and repair the equipment early, the operator uses the measurement method of the recording encoder signal to judge the health of the motor. The AI and big data determine that the current state of the motor is different from the previous record, such as the speed of the encoder. The inverter is set differently, the voltage signal of the encoder is abnormal, and the health status of the equipment is mastered before the damage condition of the equipment has been expanded. Maintenance personnel can prepare materials for immediate maintenance and replacement. In this predictive maintenance system, the front end use the AR-200-AI measure voltage signal of encoder A/B phase, and the back-end user-developed big data analysis software periodically captures the encoder signal in order to avoid abnormality. The AR-200-AI also adds an abnormal signal detection function. When the system is idle, it still detects whether the signal is different from the parameter set by the operator, and saves the signal to the AR-200-AI when an abnormality is detected. The utility software provided by ICP DAS can control multiple AR-200-AI modules, and the analysis software can integrate all AR-200-AI modules on the network by simply communicating with the utility software.

The abnormal signal detection function provides the following functions:

- Voltage level judgment
- Phase difference judgment
- Frequency judgment

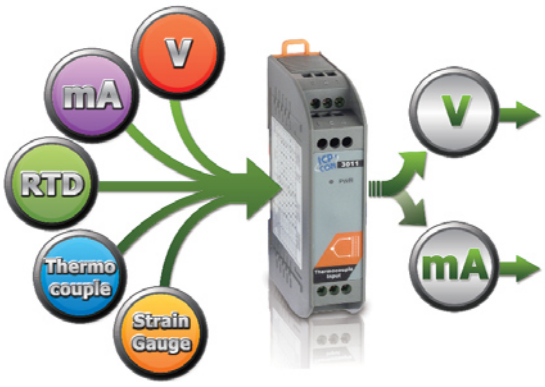


# 4-7 Signal Conditioning Modules: SG-3000

**SG-3000 series** signal conditioning modules are used to accept wide range of input signals, such as voltage, current, temperature (thermocouple and RTD) and provide 0 ~ 10 VDC, 0 ~ 20 mA, 4 ~ 20 mA output signals.

It gives following good features for industrial applications:

- 3-way (power/input/output) isolation (1000 VDC)
- Wide operating temperature (-25 ~ +75°C)
- DIN-Rail mounting
- Input and output connectors on the opposite side
- Signal range configurable by switch




## Selection Guide:

**Analog Conditioning Modules**

| Models | SG-3011H | SG-3013 | SG-3016 | SG-3016-80 | SG-3071 | SG-3081 | New SG-3037 | New SG-3227 |
|---|---|---|---|---|---|---|---|---|
| Pictures |  |  |  |  |  |  |  |  |
| Analog Input | | | | | | | | |
| Channel | 1 | 1 | 1 | | 1 | 1 | 3 | 2 |
| Wiring | Differential | 2/3/4 wires | Differential | | Differential | Differential | 5 wires | Differential |
| Signal | Thermocouple | RTD | Strain Gauge | | Voltage | Current | Voltage | IEPE |
| Type | Type J, K, T, E, R, S, B, N, C, L, M, L2 | Pt100 α=0.00385, Pt100 α=0.003916, Ni 120, Pt1000 α=0.00385 | ±10 mV, ±20 mV, ±30 mV,±50 mV, ±100 mV | | ±5 V, ±10 V | 0 ~ 20 mA, 4 ~ 20 mA | 0 ~ 24 V | 0 ~ 28 V |
| Bandwidth | - | - | 600 Hz | 80 Hz | 1 KHz | 1 KHz | 50 KHz | 50 KHz |
| Response Time | 0.5 ms or 100 ms by switch selectable | 100 ms | - | | - | - | - | - |
| Accuracy | ±0.1% of FSR | ±0.1% of FSR | ±0.1% of FSR | | ±0.1% of FSR | | ±5% of FSR | |
| Input Impedance | 1.6 MΩ | - | - | | 1.6 MΩ | 250 Ω | - | - |
| Excitation Voltage | - | - | 0 ~ 10 V | | - | - | 24V | - |
| Excitation Current | - | - | - | | - | - | - | 2 mA, 4 mA, 6 mA, 10 mA |
| Analog Output | | | | | | | | |
| Channel | 1 | 1 | 1 | | 1 | 1 | 3 | 2 |
| Current Output | 0 ~ 20 mA | 0 ~ 20 mA, 4 ~ 2 0 mA | 0 ~ 20 mA | | 0 ~ 20 mA, 4 ~ 20 mA | 0 ~ 20 mA, 4 ~ 20 mA | - | - |
| Voltage output | 0~10 V | 0~5 V, 0~10 V | ±5V, ±10V, 0~5V, 0~10V | | ±5V, ±10V | 0~5 V, 0~10 V | ±10 V | |
| System | | | | | | | | |
| 3-way Isolation | 1000 VDC | | | | | | | |
| Power Input | 10 ~ 30 VDC | | | | | | | 18 V ~ 24 V |
| Power Consumption | 1.44 W | 1.2 W | 1.44 W | 1.44 W | 1.8 W | 1.61 W | 0.3 W | 1.8 W |
| Operating Temperature | -25 ~ +75°C | | | | | | -25 ~ +70°C | |
| Dimensions (W×H×D) | 25 mm × 114 mm × 71 mm | | | | | | | 25×116×120 |

**Power Conditioning Modules**

| Models | PW-3090-24S | PW-3090-12S | PW-3090-5S | PW-3090-4824S-10 |
|---|---|---|---|---|
| Pictures |  |  |  |  |
| | | | | |
| Input | 18 ~ 36 V (non-regulated) | 18 ~ 36 V (non-regulated) | 18 ~ 36 V (non-regulated) | 36 ~ 72 V (non-regulated) |
| Output | 24 V @ 0.4 A (Max.) | 12 V @ 0.8 A (Max.) | 5 V @ 2 A (Max.) | 24 V @ 0.4 A (Max.) |
| Isolation | 1000 VDC | | | |
| Efficiency | 83% Typical | | | |
| Operating Temperature | -25 ~ +75°C | | | |
| Dimensions (W × H × D) | 25 mm × 114 mm × 71 mm | | | |

# 4-8 No-touch Infrared Sensor Switch

ACS-20W-MRTU

ACS-20B-MRTU

## Features:

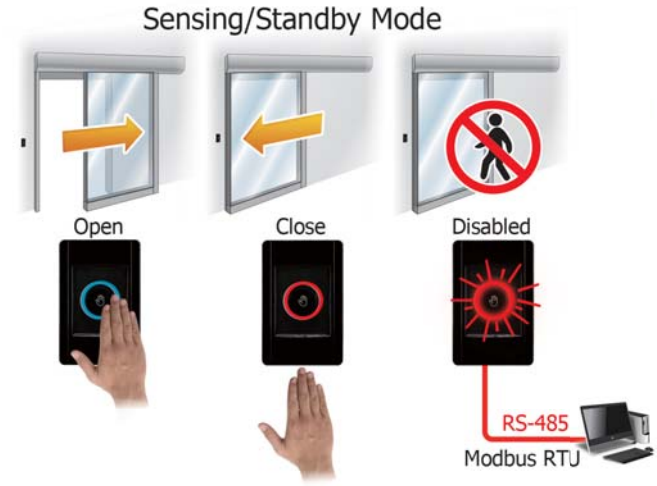
- Special infrared code to against interference
- Multiple operating modes: Sensing/Standby, Lock, Toggle Switch
- Provides 8 lockup periods each day
- Double-color status indicator
- Induction distance: 1 ~ 15 cm
- Inductive action delay time: 0.5 ~ 20 sec
- With Relay (N.C. and N.O. output)
- The switches time recording: 1,000 records
- Communication interface and protocol: RS-485/Modbus RTU

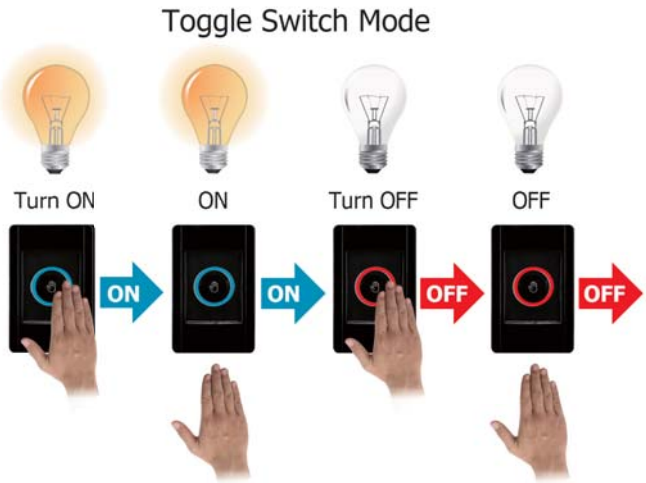
The No-touch Infrared Sensor Switch from ICP DAS can be used to open a door using palm induction, which makes it more convenient when entering or exiting a room or building. The inductive distance and the delay time for door opening are adjustable, and has red and blue indicator lights to show the status of the switch. As people enter and exit the door using the No-touch Infrared Sensor Switches, a time stamp recording the action can be simultaneously logged.

The No-touch Infrared Sensor Switch includes an RS-485 interface and provides Modbus RTU communication, which can remotely enable/disable the switch and get the induction time records by the access control system.

Additionally, the No-touch Infrared Sensor Switch is not only used for access control system but also help you control other electronic devices. While it is triggered in toggle mode at the first time, the switch outputs ON signal, and next time outputs OFF signal.

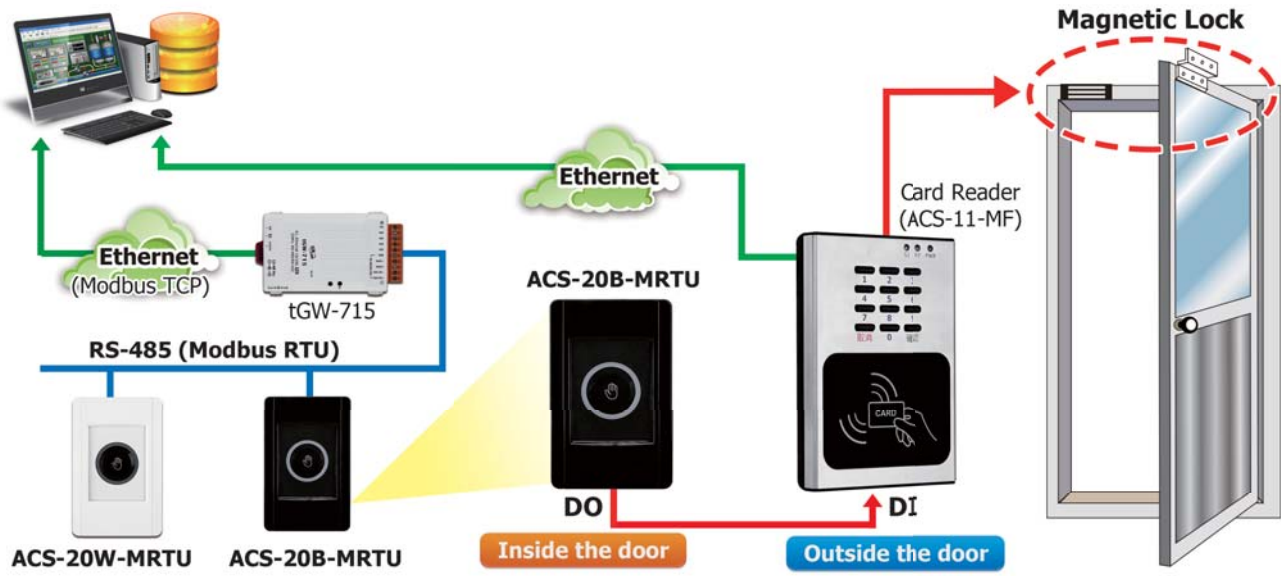
The No-touch Infrared Sensor Switch can be used with electric doors to prevent issues related to the spread of infectious bacteria via touch. The switches can be used in medical institutions, retail stores, the food industry, industrial plants, and offices, etc. to provide an excellent sanitary environment.

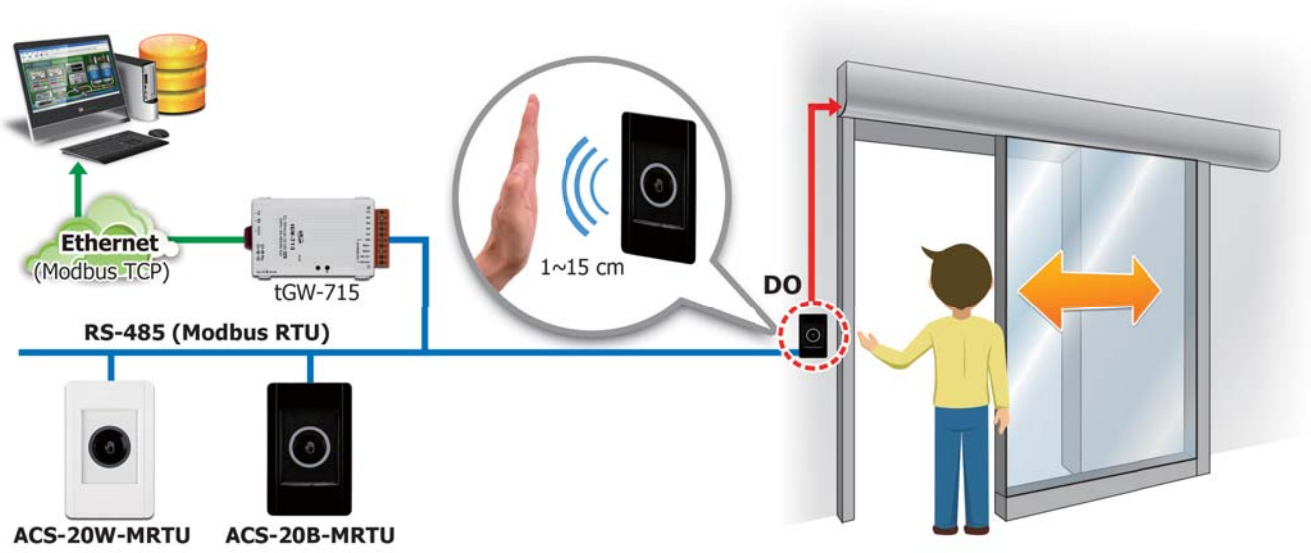



| Specification | | Description |
|---|---|---|
| Induction distance | | 1 ~ 15 cm (adjustable) |
| Inductive action delay time | | 0.5 ~ 20 sec (adjustable) |
| Indicator LED light | | Red (Standby); Blue (Sensing) |
| Relay | Type | Form C |
| | Rated Current | 0.5 A @ 120 VAC, 2 A @ 30 VDC |
| The switches recording times | | 1,000 records |
| Communication interface and Protocol | | RS-485 / Modbus RTU |
| Power Input | | +10 ~ +30 VDC |
| Dimensions (W × L × H) | | 75 mm × 119 mm × 24 mm |

## Applications:



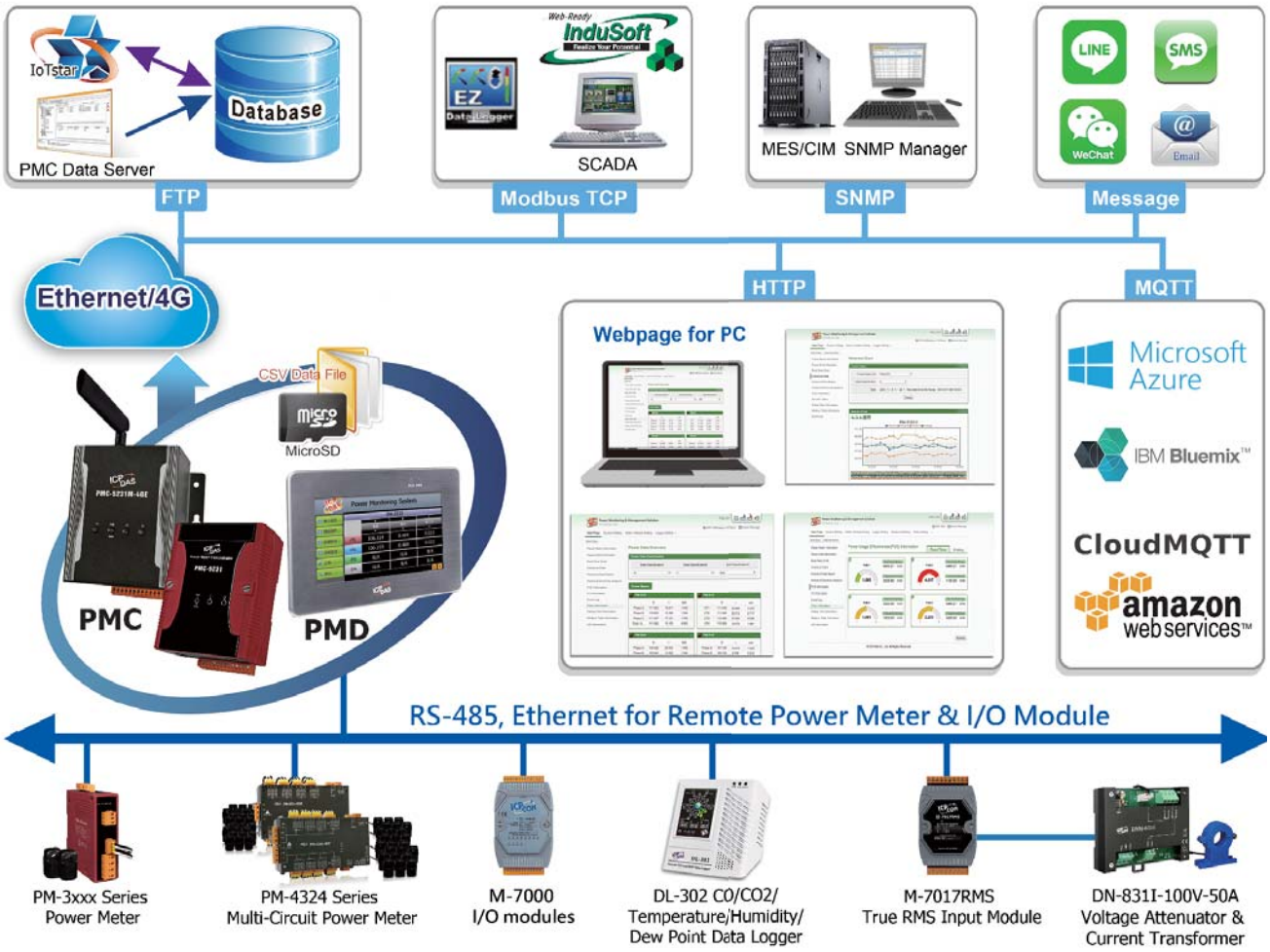




## External Wall Box and Outlet Box:

| External Wall Box | | Outlet Box | |
|---|---|---|---|
|  EWB-T28-BK |  |  OB120 |  |
|  EWB-T28 | | | |

# Chapter 5. Energy Management Solution

## 5-1 Energy Management Solutions: Overview




▲ System Architecture

This innovative total solution for energy management includes: front-end Power Meter, Power Meter Concentrator, backend software tool for database import operation (PMC Data Server), InduSoft SCADA software and IoTstar Cloud Management software. In addition to hardware devices, ICP DAS also provides total solution so that the user could easily view power data by their mobile phones or PC, the administrator could set up the system quickly and the data can be recorded in real time for energy consumption inquiry to achieve effective energy management. During the early stage, if the scale of the application is small, the user could simply use Power Meter and PMC/PMD to set up a simple power monitoring system, once the scale of the application is expanded, the user could get the back-end software tool involved and build an easy-to-expand power monitoring system via blocks stacked structure. By this way, the system will be highly flexible and could be implemented in phases to meet various requirements.

# Energy Management

## PMC Series

## PMD Series With Touch Panel

PMC-523x

PMC-5231M-4GE

PMC-2241M

PMD-2201 (7")
PMD-4201 (10.4")

### PMC/PMD Features:

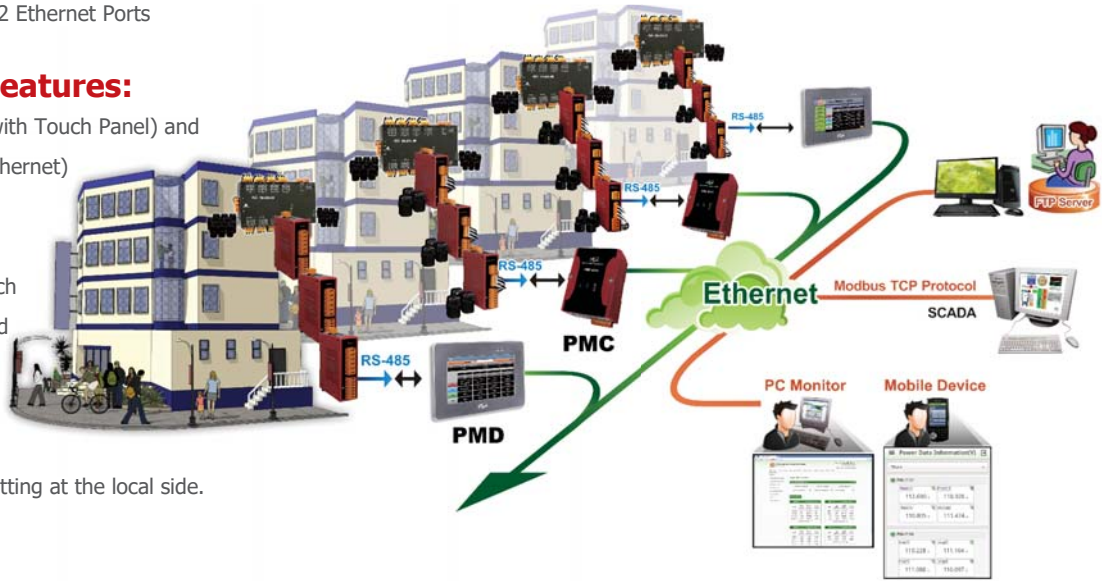
- No extra software tool is required, using browsers to perform system operations
- Support max. **24** ICP DAS Modbus Power Meters (with max. 16 Modbus TCP Power Meters) and **8** Modbus I/O modules.
  * COM3 and COM4 interface can connect to Max. 16 power meters individually.
  * Support at most **4** ICP DAS PM-4324 series Power Meters.
- Display real-time or historical power data; Provide power data statistics report
- Data file auto send-back and recovery when network is resumed after disconnection
- Built-in IF-THEN-ELSE logic engine for thought-out power demand management
- Provide alarm message notification function via LINE, Email or SMS.
- Adjust device operations by its power status via Modbus I/O modules
- Provide Schedule function for operations of I/O modules (devices)
- Support Modbus TCP/RTU Slave protocol for seamless integration with SCADA
- Support SNMP and MQTT protocols
- Support Connection to IoT Cloud Platform (Microsoft Azure and IBM Bluemix); Support ICP DAS IoTstar Cloud software


### PMC Special Features:

- PMC-5231M-4GE/PMC-5231M-3GWA: Support 4G/3G Wireless data communication
- PMC-2241: Support 2 Ethernet Ports

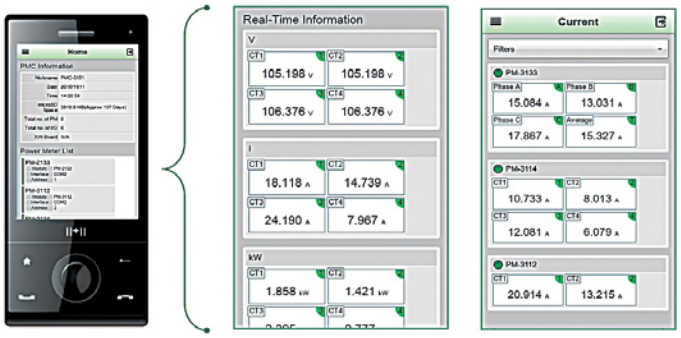
### PMD Special Features:

- 7"/10.4" TFT LCD (with Touch Panel) and PoE (Power over Ethernet) supported
- Equipped with the TFT LCD (with Touch Panel) and designed for panel mount installation. Easily review the power data and system setting at the local side.



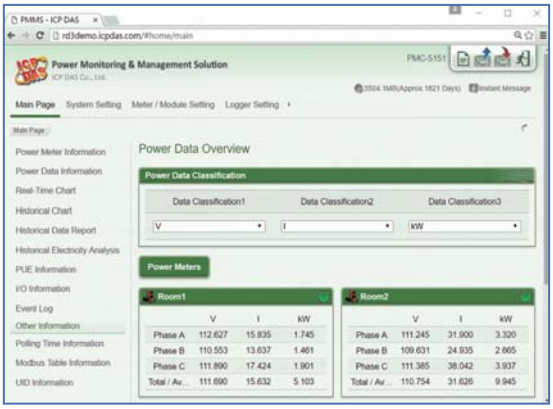
# 5-2 Power Meter Concentrator: PMC/PMD Series


PMC PMD




## No extra software tool, using browsers to perform system operations

Featuring web-based HMI for easy operations, the user could connect to PMC/PMD webpage via browsers to view the power data, set up system parameters, manage power demand and perform logic editing function for alarm notification.

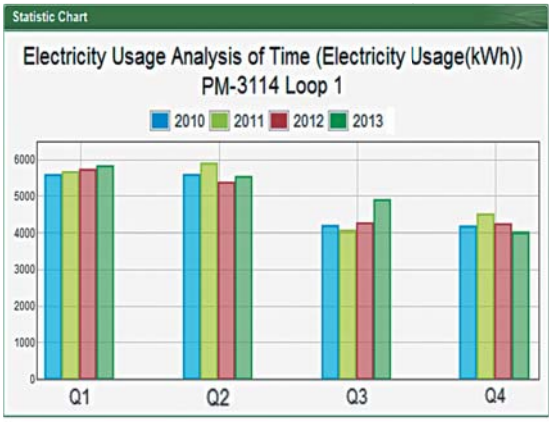


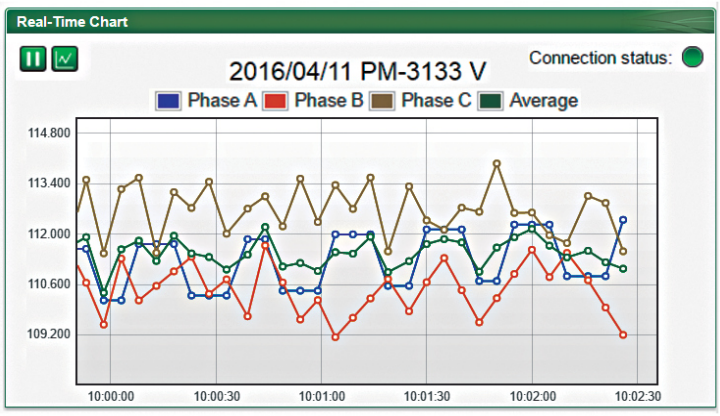

## Built-in Micro SD card for power data logging

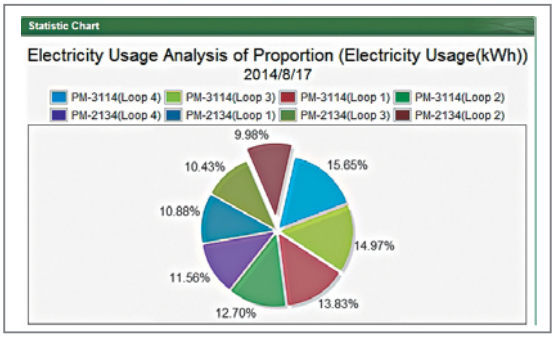
The PMC/PMD features a built-in Micro SD card. After the PMC/PMD retrieving the power data from the power meter, the system will save the power data in CSV format in the Micro SD card and regularly send back the data files to the backend management center for data analysis and statistics.

## Display real-time or historical power data trend

In addition to display power data of the power meter in text format, the power data can also be displayed in real-time and historical trend chart for user to easily identify the variation of the electricity usage of the devices.



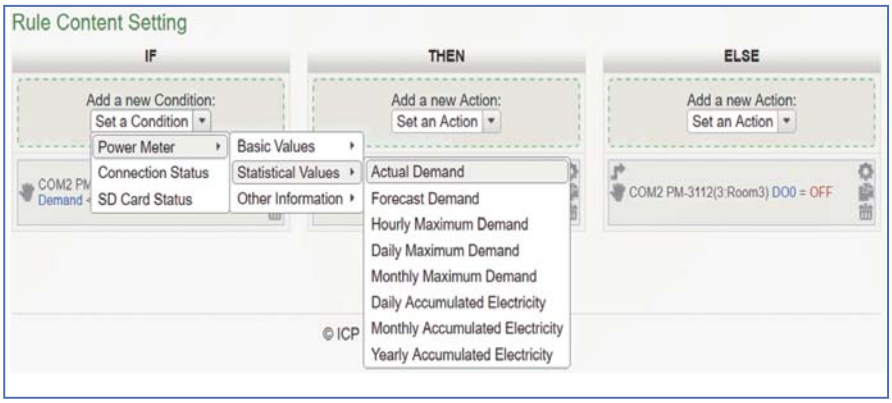




## FTP Server/Client for data file management and file recovery mechanism supported

The built-in FTP Client function of PMC/PMD allows regular transmission of the power data log files saved in the Micro SD card of PMC/PMD to the backend management center for data analysis and statistics. The PMC/PMD offers a complete data file recovery mechanism so that when experiencing network disconnection, the data log files will be recovered after the network is resumed to ensure the system operates properly. With the FTP Server of PMC/PMD, the user could also use FTP Client utility to retrieve the power data files saved in PMC/PMD from the PC side easily.

## Built-in IF-THEN-ELSE logic engine for thought-out power demand management

PMC/PMD is equipped with IF-THEN-ELSE logic engine. The user could complete the control logic via web page and download the logic rules to the PMC/PMD. The logic engine will loop execute the rules in order. By editing the IF-THEN-ELSE logic rules, the user could include the following information in the IF condition, such as: "fail to connect to power meter", "FTP upload failed", "insufficient disk space", "power demand management", "abnormal power data", etc. In addition, the Schedule setting and channel values of I/O modules that are connected to the PMC/PMD can be also included in the IF condition. When the evaluation of the IF condition is matched, the corresponding Action will be executed (such as: Email/ SMS/LINE alarm message sending or AO/DO channel value of the I/O modules setting). By this way, the user could quickly implement applications for power demand management, electricity control of the devices and alarm notification sending.

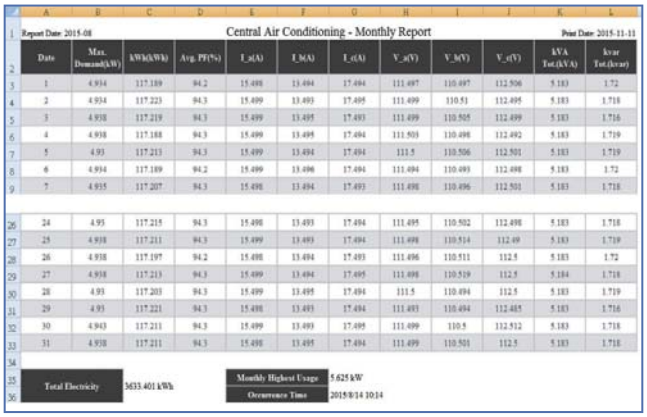




## Provide Schedule function

PMC/PMD provides Schedule function that allows to edit logic for applications that requires Schedule function. The Calendar interface allows to easily set up the schedule for weekdays or weekends so that the user could schedule the operations for the devices as required for efficient electricity usage of the devices.


## Provide historical power data statistics report

PMC/PMD provides historical data report inquiry and display function, the easy-to-read daily and monthly report of the historical power data would help to understand current electricity usage of the devices.




## Modbus TCP/RTU for seamless integration with SCADA

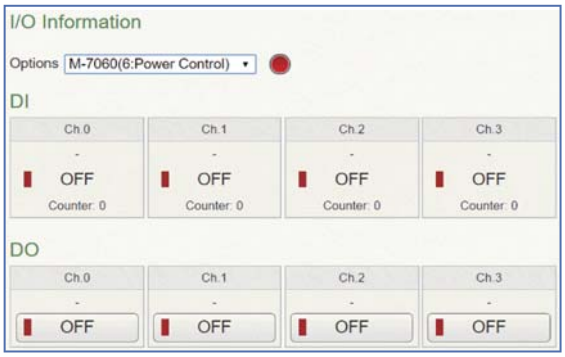
The PMC/PMD supports Modbus TCP/RTU Slave protocol to connect to SCADA software or HMI devices in control center so that it could perform real-time monitoring and control of the electricity usage for the devices. Therefore, the regulation of the system will be more flexible.

## Provide Timer Function

Timer function provides Timeout/Not Timeout status for condition evaluations. With the timer function, the users are able to edit logic that requires timing approach. In addition, the timer function can be reset/started in real time that increases flexibility when performing logic control.

## Support a variety of wide-range I/O modules to achieve power control and load shedding of the devices

According to the requirements of the application and based on the devices connected, the PMC/PMD is able to connect to M-7000 I/O modules, standard Modbus TCP/RTU Slave modules or DO Relay channel of the ICP DAS power meter for real time I/O control operation of the devices, the abundant selections enable maximum flexibility for system set up and power management.



## On-Site Power data viewing and Power Meter setting

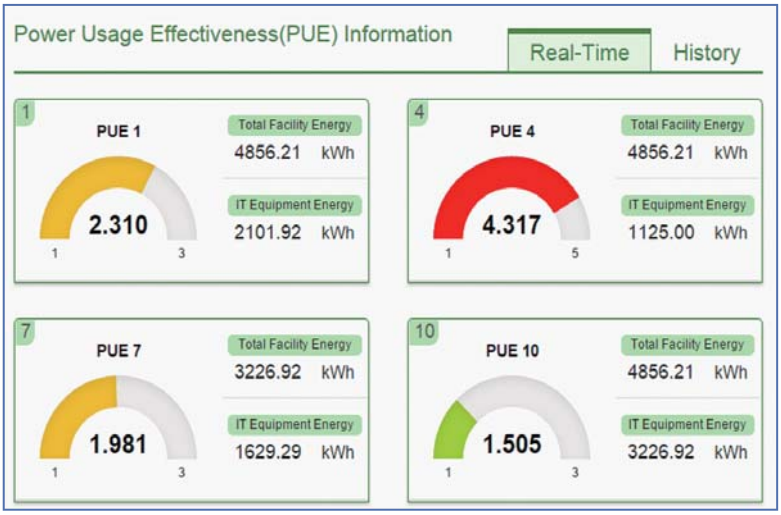
PMD (Power Meter Concentrator with Display) series is equipped with TFT LCD (with Touch Panel). It provides an easy way for viewing the power data and set up the Power Meter parameters on sites.


## Support SNMP Function

In addition to Modbus protocol, PMC/PMD also supports SNMP function that allows seamless integration with IT Management software. The users could integrate PMC/PMD with the existing management system and collect the power data of each device by SNMP function easily.

## Provide "Power Usage Effectiveness (PUE)" calculation operation

Power usage effectiveness (PUE) is a measure of how efficiently a computer data center uses energy; specifically, how much energy is used by the computing equipment (in contrast to cooling and other overhead). PUE is the ratio of total amount of energy used by a computer data center facility to the energy delivered to computing equipment. The PUE will be greater than 1. The larger the PUE number the less efficient your utilization is. PMC/PMD provides the PUE calculation operation and also display the PUE data in two modes (Real-Time and History) through Web page.

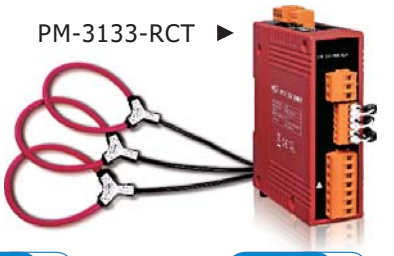


# 5-3 Smart Power Meter: PM Series

## PM Series Features and Selection Guide

Rogowski Coil
Three 1

PM-3133-RCT ►



Three 1

▲ PM-3033

Three 1

▲ PM-3133

Isolated
Three 1

▲ PM-3133i

Single 2

▲ PM-3112

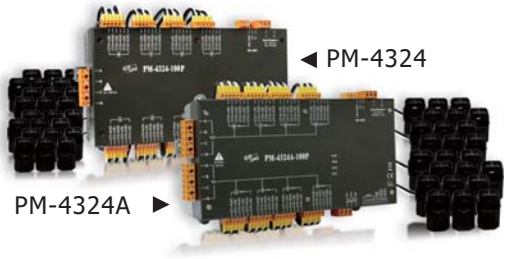
Single 4

▲ PM-3114

LCD Display
Three 8 Single 24

▲ PM-4324D

Three 8 Single 24



◄ PM-4324

PM-4324A ►

LED Display
Three 1

▼ PM-2133D

- Support multiple communication interface
  - RS-485 ( Modbus RTU )
  - Ethernet ( Modbus TCP )
  - CAN bus ( CANopen )
- Bi-directional kWh metering function for accurate measurement of power consumption and generation data
- Compact in size and easy to install, suitable for various industrial sites
- Available with CT for accurate metering, accuracy better than 0.5% (PF=1)
- Clip-on CT for easy installation

## Selection Guide

| Module No. | Phase | Loop | Bi-dir. Energy (Note 4) | CT Included | Max. Voltage | Max. Current | Max. CT ID | Cable Length |
|---|---|---|---|---|---|---|---|---|
| PM-3112-xxx | Single | 2 | N/A | Yes | 300 V | 200 A | 24 mm | 1.8 m |
| PM-3114-xxx | | 4 | | | | | | |
| PM-2133D-xxxP | Three | 1 | Yes | Yes | 500 V | 400 A | 36 mm | 4 m |
| PM-3033 | Three | 1 | Yes | N/A | 500 V | 5 A | N/A | N/A |
| PM-3133-xxx | Three | 1 | Yes | Yes | 500 V | 400 A | 36 mm | 1.8 m |
| PM-3133-xxxP | | | | | 500 V | | | 4 m |
| PM-3133i-xxxP | | | | | 600 V | | | 4 m |
| PM-3133-RCTxxxxP | Three | 1 | N/A | Yes | 500 V | 4000 A | 185 mm | 4 m |
| PM-4324-xxxP | Single/ Three | 24 / 8 | Yes | Yes | 500 V | 400 A | 36 mm | 4 m |
| PM-4324A-xxxP | | | | | | | | |
| PM-4324D-xxxP | | | | | | | | |

Note 1: Maximum CT cable length can be extend to 8m (except for Rogowski Coil CT), and the accuracy does not decrease. [We suggest to use twisted pair cable AWG18-14, sectional area from 0.75 ~ 2.0mm2.]

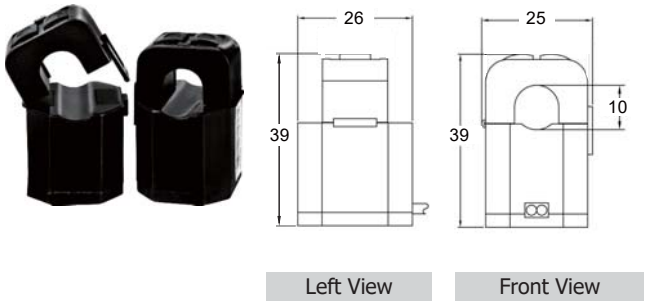
Note 2: The end of power meters with -xxx or -xxxP means the specification of the CT. Users can choose the suitable one based on difference of current range and cable section area.

Note 3: The end of power meters with -xxx**P**, the **P** means CT has built-in circuit protection to prevent CT from secondary open-circuit danger to human.

Note 4: [Bi-dir. Engergy] stands for [Bi-directional Energy].

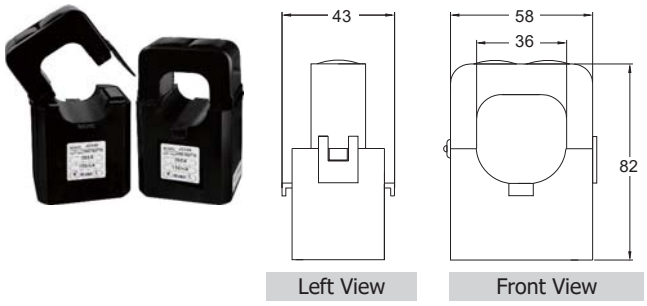
## CT Dimensions (Units: mm)

100: CTΦ10mm (60 A Max.)



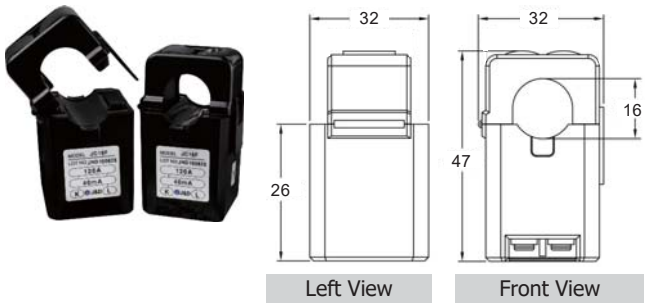

Left View | Front View

360P: CTΦ36mm (300 A Max.)



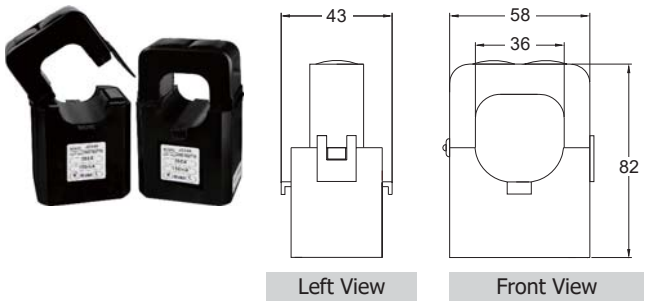

Left View | Front View

160: CTΦ16mm (100 A Max.)



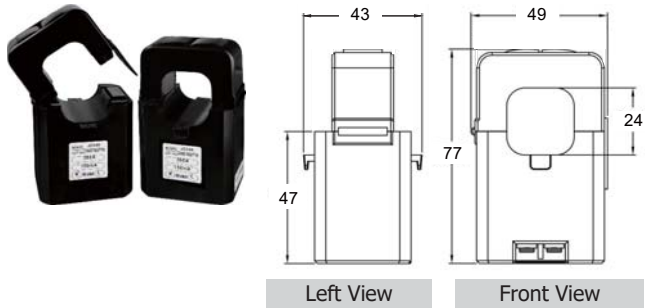

Left View | Front View

400P: CTΦ36mm (400 A Max.)




Left View | Front View

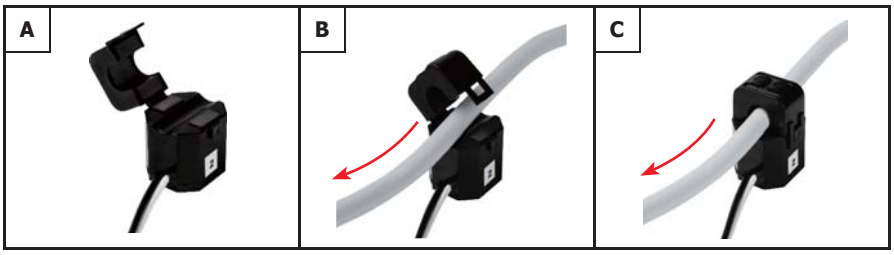
240: CTΦ24mm (200 A Max.)




Left View | Front View

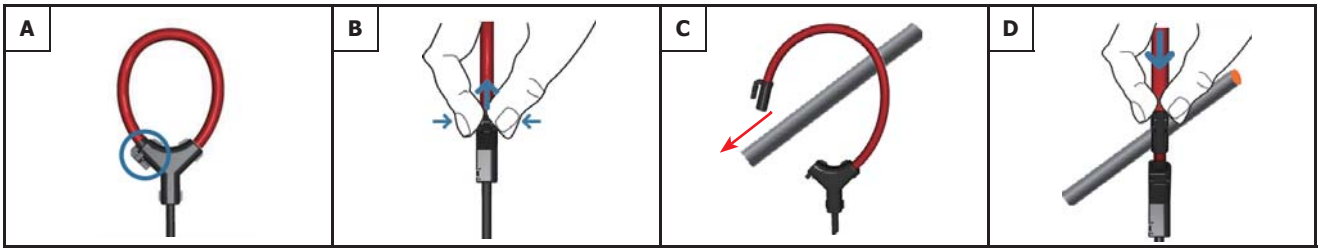
| Models | A (Inside diameter) | B (Outer diameter) |
|---|---|---|
| PM-3133-RCT500P | 55 mm | 68 mm |
| PM-3133-RCT1000P | 80 mm | 93 mm |
| PM-3133-RCT2000P | 105 mm | 118 mm |
| PM-3133-RCT4000P | 185 mm | 199 mm |


## CT Installation Smart Power Meter




Clip-on CT for Easy Installation

DIN-Rail Mounting




Rogowski Coil Soft CT Installation

# 5-4 Portable Power Monitoring Suitcase

## PPMS-133D-RCT2000P

Portable Power Monitoring Suitcase

### Features

- True RMS Power Measurements
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Voltage Measurements up to 500 V
- Current Measurements up to 2000 A
- Harmonic data capture (up to 31th order)
- Provide 7" Touch Panel for On-Site operations
- Support SNMP Protocol
- Temperature and Humidity Data Logger

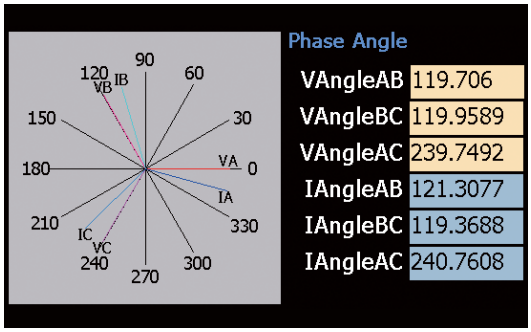
## Introduction

Portable Power Management Suitcase can measuring single to three-phase lines with a high degree of precision and accuracy. The PPMS-133D-RCT2000P Rogowski Coil CT power meters designed to measure demand and harmonics, which are important for energy management, as well as basic electrical parameters such as voltage, current, power, power factor, and integrated power (watthours).

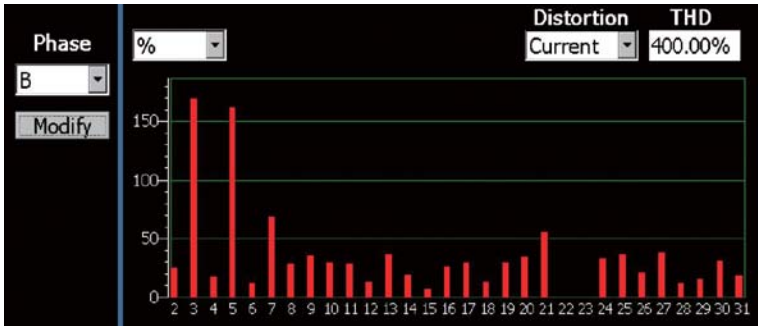
PPMS-133D-RCT2000P is equipped with built-in Web Server that allows direct connections via browsers to the PPMS-133D-RCT2000P for viewing power data and setting up the system parameters.

PPMS-133D-RCT2000P also offers Modbus TCP/RTU Slave function that allows SCADA software to connect to PPMS-133D-RCT2000P to get real-time power data of the devices via Modbus TCP/RTU protocol.

## Applications




▲ Phase angle detector




▲ Harmonic data capture

## Ordering Information

| | |
|---|---|
| PPMS-133D-RCT2000P | Portable Power Monitoring Suitcase, 2000A Rogowski Coil CT (Inside diameter 105 mm; wire lead 4 m) |

# 5-5 Industrial Wireless Sensor Network: iWSN Series

## iWSN Solution(Industrial Wireless Sensor Network)

With the trend toward smart manufacturing and flexible manufacturing, the production process is becoming increasingly complicated, and each production stage is interlocked. The condition of the equipment is evaluated using the concept of predictive maintenance to maintain the operation of the production line. In response to the Internet of Things (IoT), big data analysis, Industry 4.0, energy-saving and carbon-reduction requirements, ICPDAS has developed the "Industrial Wireless Sensor Network" solution. In addition to integrating current, temperature measurement, and wireless transmission functions into a single module, the ultralow power consumption can be matched with a current transformer (CT) for inductive charging, it can meet the supply and demand balance of working power and supply the required continuous uninterrupted measurement equipment parameters with sufficient power. The settings can be completed using a DIP switch, which not only doesn't affect the production process, but also greatly saves system construction time and reduces maintenance costs. To meet the power consumption needs of monitoring equipment, predictive maintenance and power panel temperature monitoring, it's helpful to maintain the production line equipment and prevent accidents caused by the aging of power panel equipment and cables.

## Comparison between Traditional and iWSN methods

| Item | Traditional Meter | iWSN Series |
|---|---|---|
| Main function | Measuring power parameter data | Measuring current, temperature and DI<br>(Continuous development of vibration, gas detection, etc.) |
| Accuracy | <1% | <3% or ±0.3A |
| Cycle | At least once per second | 1/10/30/60 seconds |
| Power | DC power provides an additional transformer<br>AC power provides power lines | CT charging, battery storage<br>(Easy to install and maintain, and easy to build) |
| Power configuration | 100% (7W)<br>(Wireless Module + Meter + Power Supply) | 0.3% (20mW)<br>Power saving design |
| Parameter setting | Software Utility | DIP switch setting |
| Hardware cost | General | Low |
| System defect | Long construction time, system needs to be powered off to be built, complicated to set up, and difficult to maintain | Easy functions, low data update speed |
| Application | Monitoring system, electricity billing, energy efficiency actuarial or power quality analysis | Big data analysis, system monitoring, trend analysis and predictive maintenance |

## AC cable current required for supply and demand balancing

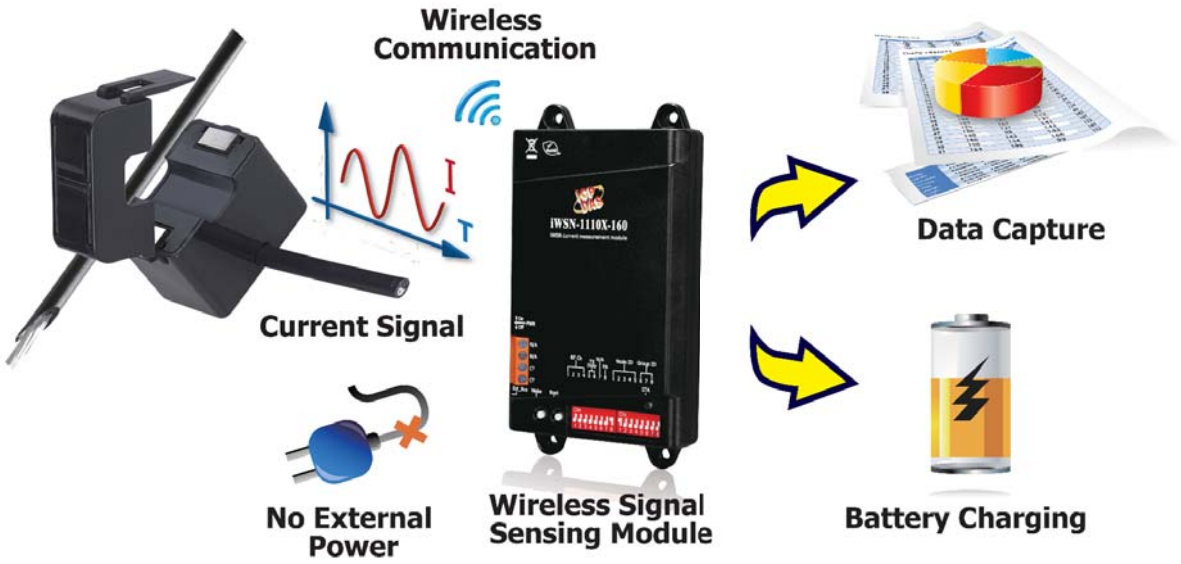
The built-in lithium battery in the iWSN is charged via the tiny current induced by the CT from the power line, and the power consumption of the lithium battery is related to the iWSN's wireless signal transmission period and whether there is an expansion module connected to the iWSN-700 module. Therefore, when building an iWSN data acquisition scheme, the current of the power line to be measured must be greater than the current value of the "balance between supply and demand". The current values for the supply and demand balance under different conditions are as follows:

| Transmission Interval | iWSN-1110X<br>iWSN-1120X | iWSN-1121-DI | iWSN-1131 | iWSN-1110X+iWSN-750P<br>iWSN-1120X+iWSN-750P | iWSN-1110X+iWSN-757P<br>iWSN-1120X+iWSN-757P |
|---|---|---|---|---|---|
| 1s | 11A | 12A | 19A | 20A | 21A |
| 10s | 3A | 5A | 12A | 11A | 13A |
| 30s | 3A | 4A | 5A | 11A | 12A |
| 60s | 3A | 4A | 5A | 11A | 12A |

# Features

## Wireless Sensing

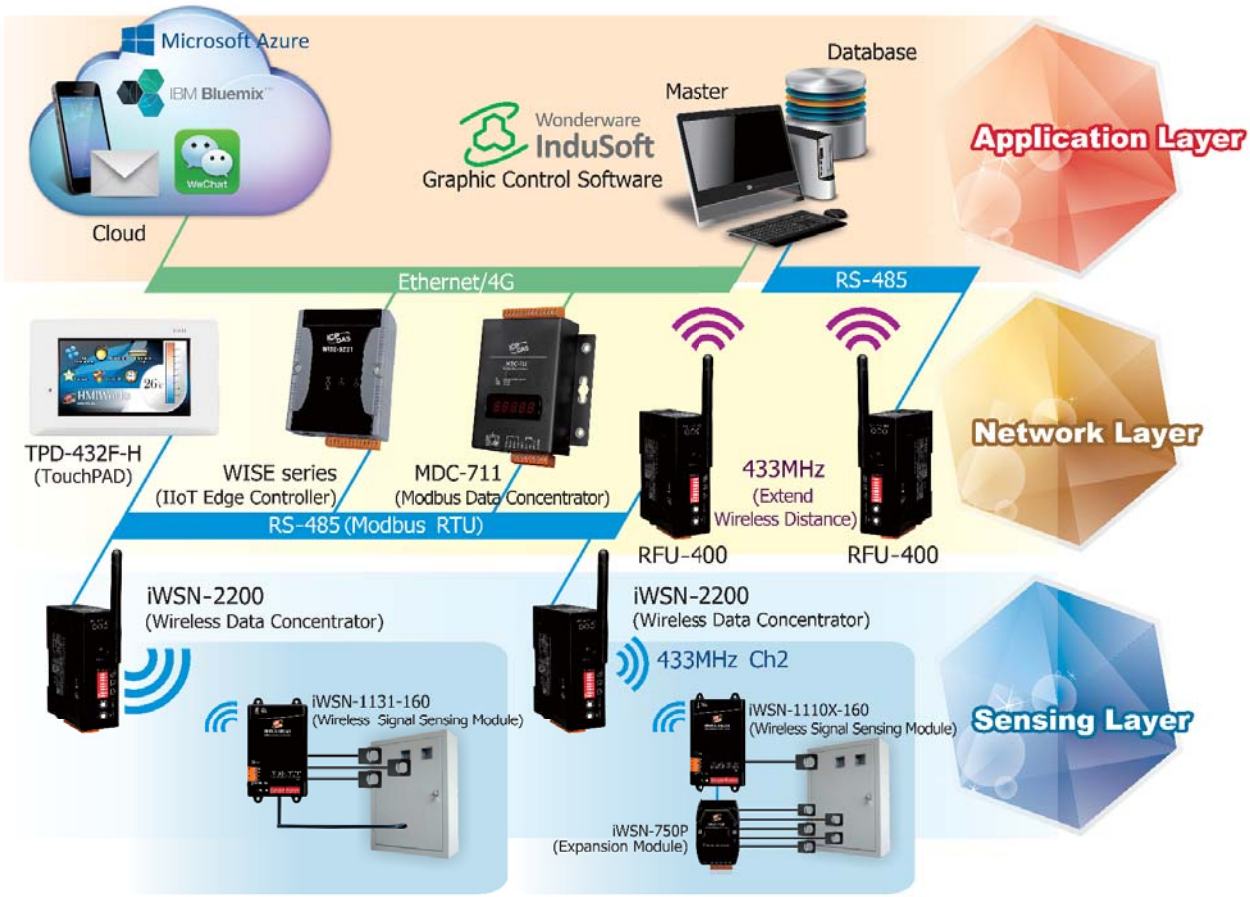
The iWSN wireless signal sensing module is fastened to the circuit being measured wire via the CT. The CT is usually in charging mode and can store the current received from the charging circuit in the battery. When the charging energy is greater than or equal to the power consumption, the wireless sensing module can operate continuously. If it is necessary to measure the current information from the power line, the module will automatically switch to operating mode to introduce the current signal into the circuit being measured. The result and state parameters for the module will be transmitted to the iWSN concentrator via wireless communication, and then the module will switch back to the charging state until the next measurement.




## Rapid Deployment

# System Structure

The iWSN network system includes a wireless data concentrator and a wireless sensing module. If there are more signal points to be collected, the IO interface on the iWSN I/O expansion module can be used to connect to these devices. The information collected by the iWSN data concentrator can be used to provide information to the field personnel through the ICP DAS touch panel controller, or the data can be sent to the cloud via a WISE series IIOT smart controller, or even connecting to instant messaging software. For the connection between the field communication network and the backbone of the network, ICP DAS also provides a series of converters, allowing data to be instantly uploaded to the control center for subsequent big data analysis.




The functions of each device in an iWSN network system are described as follows:

### Wireless Data Concentrator: iWSN-2200 series

The iWSN-2200 series collects and returns data from the sensor, and includes the Modbus RTU or Modbus TCP standard communication protocol that allows you to connect with upper system or graphics control software.

### Wireless Signal Sensing Module: iWSN-1100 series

In addition to the acquisition of energy data via the connected CT, the current value on the cable on the CT is also measured and transmitted back to the data concentrator via wireless communication. Depending on the model, channels or expansion interfaces such as a split-core type CT, a Rogowski coil, temperature, and DI dry contact methods are also available.

### I/O expansion module: iWSN-700 series

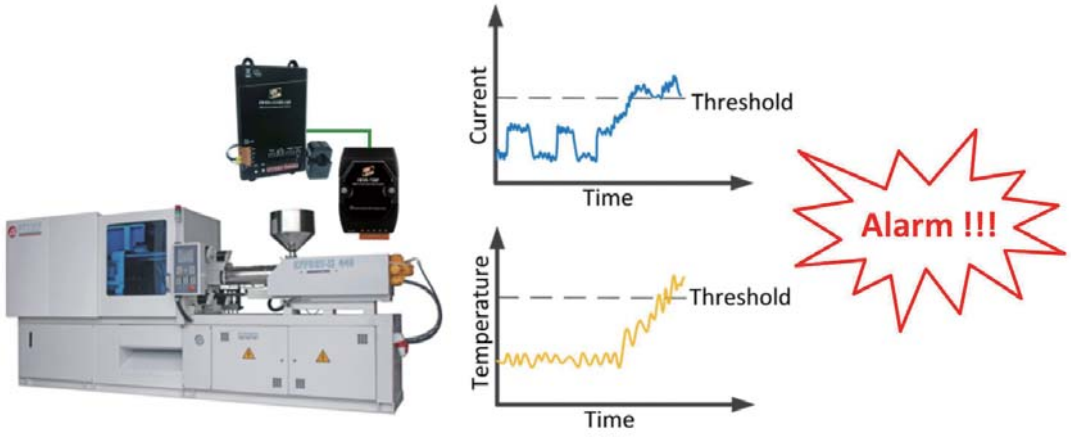
The iWSN-700 series is an expandable CT and temperature measurement interface, which series connects to the sensing module via wireless communication, and transmits the value collected by the expansion module to the sensing module, or, further, to the data concentrator.

## Machine Diagnosis

- Use the iWSN-1110X-160 with the iWSN-757P to monitor current and temperature data.
- If a machine is working abnormally or is overloaded, and based on the relationship between the temperature of the machine and the current power consumption over an extended duration, an alarm will be issued and the fault can be eliminated to prevent more serious damage or loss of the machine caused by forced operations.

If the operation of the machine is not normal, both the current and the temperature follow certain rules. Abnormal data is very likely to indicate that the machine is not operating properly. If the machine is not immediately scheduled for maintenance, more serious damage may be caused to the machine, and may even affect the safety of the operator, resulting in accidents.

If it is discovered that the parts are worn out after the machine is repaired, you can prepare a maintenance plan and order the spare parts in advance so that the production capacity for the production line can be properly planned so as to prevent accidental production line stagnation and loss of raw materials.




## Monitoring the Utilization of a Machine

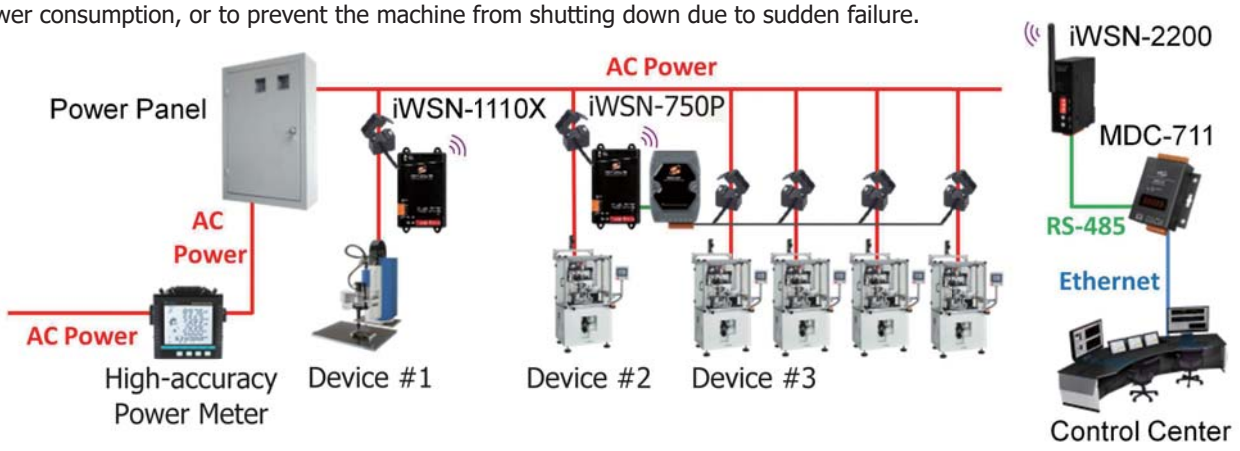
- Use the iWSN-1121-DI-240 module to monitor the current data on the panel.
- The two CT channels on the iWSN-1121-DI-240 module are used to detect the total current consumption of both the device and the main motor so as to determine whether the machine is in either standby or running condition.

The floorspace of some factories is large and contains a lot of equipment. If the owner of the factory can keep track of the production status of each machine, the problem where the waiting time or standby time is too long can be avoided. The traditional method is for the employees to fill in the operating time themselves. Not only does it take time to organize this information, it is also impossible to control the artificial floating time behavior and dynamically understand the productivity of the production line machine. The iWSN network system provides the staff with an instant understanding of the operating status of the field production line, while, in addition, also giving an indication where any necessary raw materials need to be immediately replenished, allowing the machine to continue to operate efficiently and achieve optimal production capacity.

## Energy Monitoring System

- Use the iWSN-1110X series with the iWSN-750P module to monitor the current consumption of each group of devices.
- Based on the difference between the consumptive standby current for the same type machine, the power consumption by each machine can be estimated. When the current consumption for a certain machine is significantly larger than the average value, staff can review the status of the energy consumption and the standby status of the machines.

Ideally, the standby power consumption should not be too great for similar machines. If the power consumption performance for a certain machine is significantly different from the average value, the machine may have some issues related to power management or equipment standby operation. At this time, the hardware device and the software parameter settings for this machine can be checked in detail to prevent any increase in electricity costs due to abnormal power consumption, or to prevent the machine from shutting down due to sudden failure.




## Emergency Alert System

- Use iWSN-SOS-PB / iWSN-SOS-PB-IP65 with iWSN-2200 to make Emergency Alert.

In some on-site spot such as factory, public utilities like parking area and toilets, there would have some emergency events that required rescuing. When an emergency occurs, the one in the event only have to press the button and the iWSN module will send emergency signals back to the control center. The combining with instant messaging software will send notifications to those relevant to achieve the first timing help alerts and to improve the probability of success rescue!

# Wireless Data Concentrator

## iWSN-2200 Series Features

- Supports 433 MHz Radio Frequency
- Provides 16 RF Channels
- Support Modbus RTU Protocol (Slave)
- Temporary storage for 31 sets of iWSN wireless signal sensing modules
- ESD Protection: +/- 4 kV Contact
- Isolation: 3000 VDC for DC-to-DC, 2500 Vrms for photo-couple
- DIN-Rail Mounting
- Operating Temp.: -25 to +75 °C

## Optional Accessories


**Antenna Base :**
**ANT-Base-02**
Antenna Base/1500 mm

**External Cable :**
**3S001-1**
RG58A/U 1-Meter Long RP-SMA Male to RP-SMA Female

| Module Name | iWSN-2200 | iWSN-2200-E |
|---|---|---|
| RF interface | | |
| Radio Frequency | 433 MHz | |
| Channels | 0 to 15 (set by DIP/Rotary Switch) | |
| Transmission Distance (LoS) | 100 m | |
| Connectivity | Supports up to 31 iWSN wireless signal sensing modules | |
| Communication | | |
| Interface | RS-232 or RS-485 x 1 | Ethernet x 1 |
| Protocol | Modbus RTU | Modbus TCP |
| Baud Rate | 1200 to 115200 bps, N81 | 10/100 Mbps |
| Mechanical | | |
| Dimensions (L x W x H) | 108 mm x 84 mm x 33 mm (without antenna) | |
| Antenna Dimensions (L x Ø) | 108 mm x 10 mm | |
| Installation | DIN-Rail Mounting | |
| Other | | |
| Input Voltage Range | 10 ~ 30 VDC | |
| Power Consumption | 0.5W | 1W |
| Operating Temperature | -25 to +75 °C | |
| Certification | CE+RED | CE only |

# Wireless Signal Sensing Module

## iWSN-1100 Series Features

- Built-in rechargeable Li-ion battery power supply
- Li-ion battery can be charged using the CT
- The CT is easy to mount
- Supports up to 1000 amps of cable current
- Supports 433 MHz Radio Frequency
- Provides 16 RF channels
- Provides extended interface for flexibility and scalability
- Wall-mounting and magnetic mechanism for installation


**iWSN-1110X**


**iWSN-1131**

**Split-Core CT**

**Rogowski coil**

| Module | iWSN-1110X-160<br>iWSN-1110X-240<br>iWSN-1110X-360<br>iWSN-1110X | iWSN-1121-DI-160<br>iWSN-1121-DI-240<br>iWSN-1121-DI-360 | iWSN-1131-160<br>iWSN-1131-240<br>iWSN-1131-360<br>iWSN-1131P | iWSN-1120X-240-RCT1000P<br>iWSN-1120X-360-RCT1000P |
|---|---|---|---|---|
| RF Interface | | | | |
| Radio Frequency | 433 MHz | | | |
| Channels | 0 to 15 (set via DIP Switch) | | | |
| Transmission Distance (LoS) | 100 m | | | |
| Split-Core CT specifications | | | | |
| CT Channels | 1 | 2 | 3 | 1 (For charging only) |
| CT Input Voltage | 50Hz / 60Hz, up to 500V | | | |
| CT Type | Φ16mm (100A), Φ24mm (200A) and Φ36mm (400A), 8m (Note 1) | | | Φ24mm (200A) |
| CT Error | <3% or 0.3A | | | - |
| Rogowski Coil Channel | - | | | 1 |
| Rogowski Coil Input Voltage | - | | | 50Hz / 60Hz, up to 500V |
| Rogowski Coil Type | - | | | Φ80mm (1000A), 4m |
| Rogowski Coil Error | - | | | 3% or 2A |
| Thermistor (Optional) | | | | |
| Channels | - | 1 | 1 | - |
| Measurement Range | - | 0 to 80 °C | 0 to 80 °C | - |
| Temperature Error | - | < 2 °C | < 2 °C | - |
| DI specification | | | | |
| Channels | - | 1 | - | - |
| Type | - | Dry contact | - | - |
| Mechanical | | | | |
| Dimensions (L x W x H) | 152 mm x 85 mm x 36 mm | | | |
| Installation | Wall-mounting or magnetic mounting | | | |
| Other | | | | |
| Battery | 3.7V, 800mAh with 1.25mm connector (UV, OV, Short protection) | | | |
| Operating Temperature | 0 to +45 °C | | | |
| Expansion Interface (Supports the iWSN-700 series) | Yes | - | - | Yes |

**Note 1**: The accessories for the iWSN-11□□□-160, iWSN-11□□□-240 and iWSN-11□□□-360 are Φ16 mm (100 A), Φ24 mm (200 A), and Φ36mm (400A).

# I/O Expansion module

## iWSN-700 Series Features

- Supports Multi-channel I/O Expansion
- Supports Split-Core CT using different measurement ranges
- Power is provided by the iWSN-1100X or iWSN-1120X sensing module
- Easy-to-maintain detachable screw terminal block
- Rail-mounting and magnetic mounting


iWSN-750P


iWSN-757P

Magnetic rail

| Module | iWSN-750P | iWSN-757P |
|---|---|---|
| Split-Core CT specifications (Optional) | | |
| Channels | 5 | |
| Input Voltage | 50Hz / 60Hz, up to 500V | |
| Type | Φ16mm (100A), Φ24mm (200A) and Φ36mm (400A), 8m | |
| Error | <3% or 0.3A | |
| Form | Split-Core | |
| Thermistor (Optional) | | |
| Channel | - | 7 |
| Measurement Range | - | 0 to 80 °C |
| Temperature Error | - | < 2 °C |
| Mechanical | | |
| Dimensions (L x W x H) | 115 mm x 72 mm x 35 mm | |
| Installation | Wall-mounting or magnetic mounting | |
| Other | | |
| Operating Temperature | 0 to +45 °C | |
| Certification | CE | |

## Optional accessories

CA-SCT16I-100A-L080
8 m, 100 A, Φ16 mm Split-Core CT

CA-SCT24I-200A-L080
8 m, 200 A, Φ24 mm Split-Core CT

CA-SCT36I-400A-L080
8 m, 400 A, Φ36 mm Split-CoreCT

CA-TM-M200-L050P
5 m Magnetic Plug Thermistor

CA-TM-M100-L050P
5 m Metal Plug Thermistor

CA-TM-P100-L020P
2 m Black Plastic Plug Thermistor

CA-TM-P100-L050P
5 m Black Plastic Plug Thermistor

# Wireless Signal Sensing Module

iWSN wireless environmental sensing series including wireless signal sensing module and expansion module. They are suitable to measure Temperature/ Humidity/ CO2e/ TVOC/ CO/ Vibration. Power supply of iWSN Series include powering by CT or by DC. Different power supply can reduce the cost of wiring and maintenance.

| Module | iWSN-1510X | iWSN-1511X |
|---|---|---|
| **RF Interface** | | |
| Radio Frequency | 433 MHz | |
| RF Channel | 0~15 (Selectable by DIP Switch) | |
| Transmit. Distance | Line of sight up to 100 Meters | |
| Transmit. Cycle | 1 / 10 / 30 / 60 Secs. 3 / 5 / 10 / 30 Mins. (Selectable by DIP Switch) | |
| **Thermistor (Optional)** | | |
| Channels | - | 1 |
| Measurement Range | - | 0 °C ~ +80 °C |
| Temperature Error | - | ± 2 °C |
| **Power Supply** | | |
| Split-Core CT | Φ16mm (100A); Φ24mm (200A); Φ36mm (400A); For charging only | |
| DC Power Supply | 1~3 VDC , 1A | |
| **Mechanism** | | |
| Dimensions (L x W x H) | 152mm x 85mm x 25mm | 152mm x 94mm x 21mm |
| Installation | Wall-mount / Magnetic mount | |
| **Others** | | |
| Battery | 3.7V, 800mAh with 1.25mm connector ( UV, OV, Short circuit protection) | |
| Operation Temp. | 0℃ ~ +45℃ | |
| Expansion Interface | Yes. Support iWSN-010. iWSN-012. iWSN-101. iWSN-201. iWSN-203 | |

# Emergency Button

### *iWSN-SOS Features*

- Powered by built-in disposable lithium batteries
- Support 433MHz Radio Frequency
- Selectable 16 Radio Frequency Channels
- Provide Wall-mounting Installation


**iWSN-SOS-PB**

Indoor Emergency Button


**iWSN-SOS-PB-IP65**

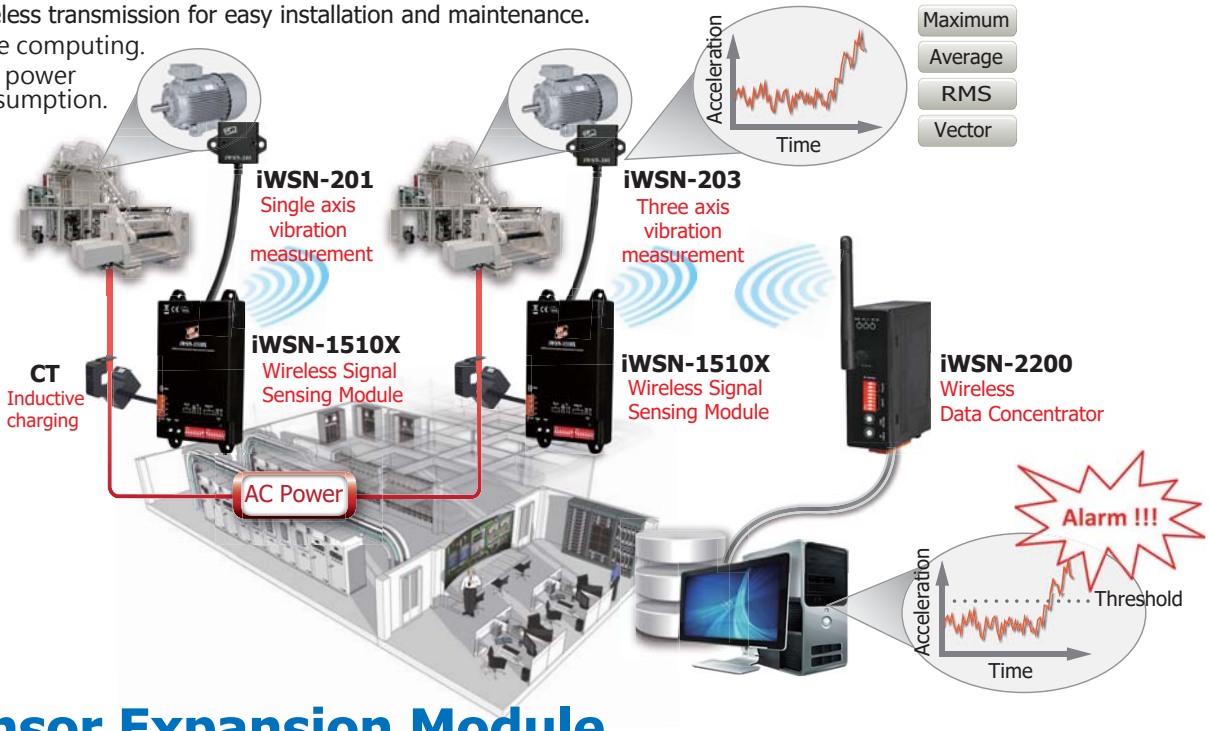
IP65 rated Water-Proof Emergency Button

| Module | iWSN-SOS-PB | iWSN-SOS-PB-IP65 |
|---|---|---|
| **RF Interface** | | |
| Radio Frequency | 433 MHz | |
| RF Channel | 0~15 ( Selectable by DIP Switch) | |
| Transmit. Distance | Line of sight up to 50 Meters | |
| Transmit. Cycle | 1 / 10 / 30 / 60 Secs. 3 / 5 / 10 / 30 Mins. (Selectable by DIP Switch) ; 1 Sec.(Emergency Triggered Only) | |
| **Mechanism** | | |
| Dimensions (L x W x H) | 138mm x 92mm x 52mm | 146mm x 85mm x 95mm |
| IP Rated / Installation | -- /Wall-mount | IP65 /Wall-mount |
| **Others** | | |
| Battery | 1 x CR123A (3.0 VDC); Battery Life: 2 years (Transmit. Cycle: 1 Min.) | |
| Operation Temp. | -25℃ ~ +60℃ | |

## Application-Wireless Vibration Monitoring

Connect iWSN-1510X with iWSN-201 or iWSN-203 to monitor the vibration of Machinery and Motor. With a long-term records, when the analysis software receive data abnormal, iWSN-1510X will send alarms to notify the maintenance of machinery to prevent shutting down.

- This is suitable for sampling low-frequency rotating equipment, and time selectable (1/10/30/60 seconds) cycle measurement to achieve real-time faulty warning.
- Wireless transmission for easy installation and maintenance.
- Edge computing.
- Low power consumption.




# Sensor Expansion Module

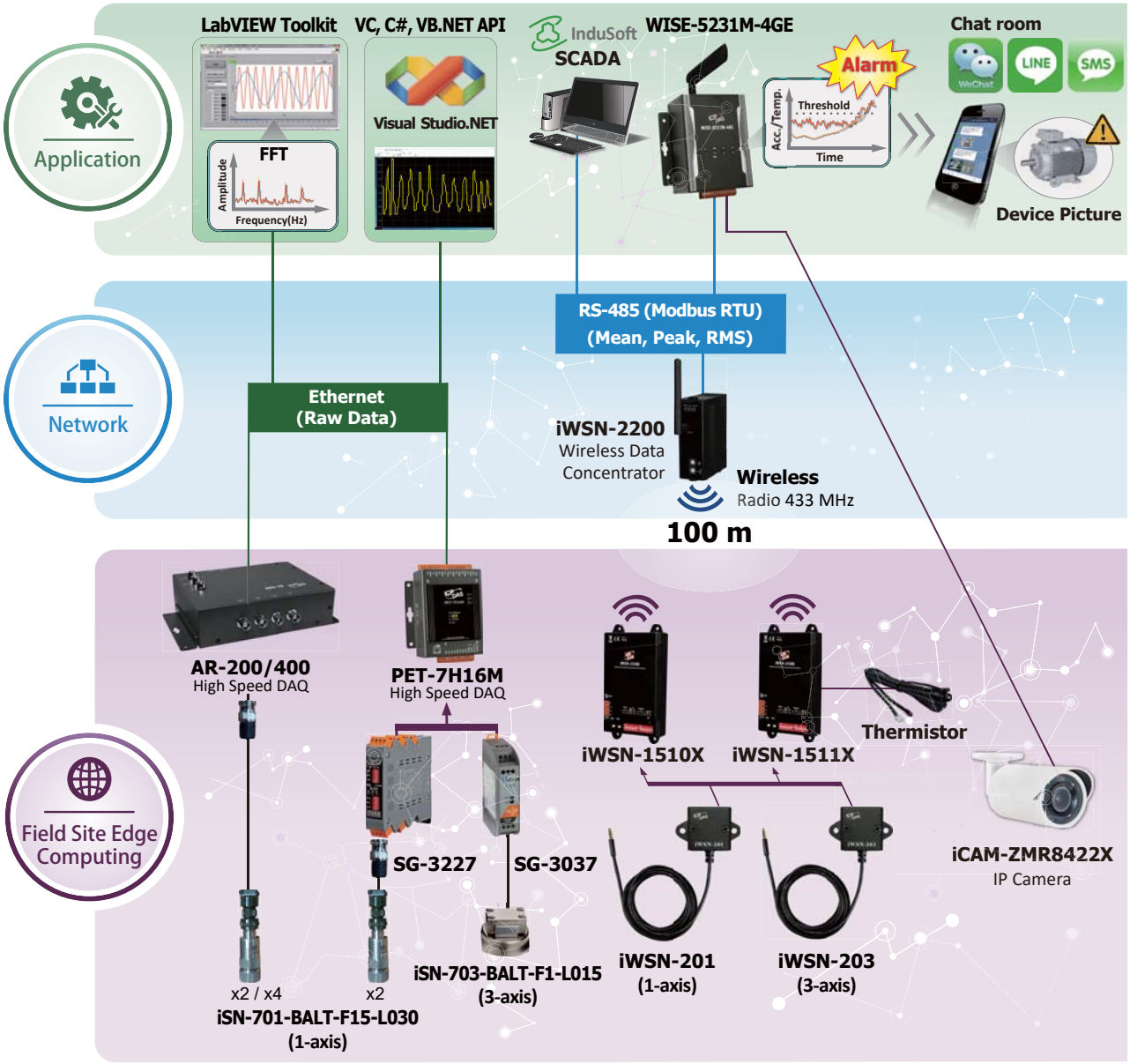
| Module | | iWSN-010 T&H Sensor | iWSN-012 TVOC/CO2e Sensor | iWSN-101 CO Sensor |
|---|---|---|---|---|
| Product Picture | |  |  |  |
| **Sensing Parameter** | | | | |
| T. | Range | -20℃ ~ +60℃ | - | - |
| | Resolution | 0.1℃ | - | - |
| | Accuracy | ±0.3℃ | - | - |
| H. | Range | 10 ~ 95% RH | - | - |
| | Resolution | ±0.1% RH | - | - |
| | Accuracy | ±3%RH @ 20~80%RH | - | - |
| CO2e Sensing Range | | - | 400 ~ 60000 ppm | - |
| TVOC Sensing Range | | - | 0 to 60000 ppb | - |
| CO Sensing Range | | - | - | 0 ~ 1000 ppm |
| **Mechanism** | | | | |
| Dimension (LxWxH) | | 30mm x 25.2mm x 20.2mm | | 131mm x 91mm x 55mm |
| Installation | | Wall mount / Magnetic mount | | Wall mount/DIN-Rail / Magnetic mount |
| **Others** | | | | |
| Operation Temp. | | -20℃ ~ +60℃ | 0℃ ~ +45℃ | |

| Module | iWSN-201 1-Axis Vibration Sensor | iWSN-203 3-Axis Vibration Sensor |
|---|---|---|
| Product Picture |  |  |
| **Sensing Parameter** | | |
| Type | 1-Axis MEMS | 3-Axis MEMS |
| Rate | Up to 10 kHz | Up to 1.5 kHz |
| Range | ±8g | |
| **Output Interface** | | |
| Data Type (g) | Uniaxial RMS, Maximum | X, Y, Z axes of the RMS, the maximum value; triaxial vector value |
| **Mechanism** | | |
| Dimension (LxWxH) | 30mm x 51mm x 15mm | |
| Installation | Wall mount/ Magnetic mount | |
| Cable Length | 1.5 M | |
| **Others** | | |
| Operation Temp. | -25℃ ~ +75℃ | |

# Chapter 6. Vibration Measurement Solution

## 6-1 Vibration Measurement - Overview

In recent years, the concept of predictive maintenance is gaining increased attention in industries. Its purpose is to perform diagnosis and maintenance of the equipment when initial abnormality of the equipment is found; so that the failures will not be accumulated and further causing serious damage. ICP DAS has developed a series of vibration measurement products which can perform measurement to meet different requirements for all kinds of on-site machines in different applications, and then provide result of fault diagnosis and data analysis. "IWSN Vibration Sensor" series is suitable for sampling low-frequency rotating equipment. It features edge computing and self-powered wireless design which make it easy for used in a production line system and can save cost in wiring; while the "Accelerometer Data Logger Module" series and "Signal Conditioning Modules for Vibration Sensors+ PET-7H16M" series support data acquisition of high sampling rate of vibration data.



## Classification:

### A. Ethernet High-speed Data Acquisition Module PET-7H16M/7H24M + SG Series + Accelerometer

- High sampling rate for the on-line data acquisition
- Provide raw data (.csv, .txt, .tdm file formats)
- Can mix-use voltage, current, thermocouple, RTD signals with the help of SG-3000 modules

**PET-7H16M**
**PET-7H24M**

**SG-3227**
**SG-3037**

**iSN-701-BALT-F15-L030**
**iSN-703-BALT-F1-L015**

### B. Accelerometer Data Logger Module AR Series + 1-axis Accelerometer

- High sampling rate for scheduled on-line and off-line data acquisition
- Provide raw data (.csv, .txt, .tdm file formats)
- Built-in IEPE interface

**AR-200**
**AR-400**

**iSN-701-BALT-F15-L030**

### C. iWSN Vibration Sensor Series

- Low sampling rate and time selectable (1/10/30/60 second) for on-line data acquisition
- Provide features (RMS, Mean, Max.)
- Built-in MENS sensor

**iWSN-1510X**
**iWSN-1511X**

**iWSN-201**
**iWSN-203**

## Properties Comparison:

| Classification | A | | B | | C | |
|---|---|---|---|---|---|---|
| Module | PET-7H16M/PET-7H24M | | AR-200 | AR-400 | iWSN-1510X/iWSN-1511X | |
| + Module | SG-3037 | SG-3227 | | | iWSN-201 | iWSN-203 |
| + Accelerometer | iSN-703-BALT-F1-L015 | iSN-701-BALT-F15-L030 | iSN-701-BALT-F15-L030 | | | |
| Measurement Type | Voltage | IEPE signal | IEPE signal, Edge computing | | MEMS sensor, Edge computing | |
| Data Type | Raw data Export to text file (.csv, .txt) or NI TDMS file (.tdm) by SDK API | | | | RMS, Mean, Maximum | RMS, Mean, Maximum, Triaxial vector |
| Channel | 3 | 2 | 2 | 4 | 1 | 3 (XYZ axis) |
| Sampling Rate (Max.) | 200 kHz (PET-7H16M) 128 kHz (PET-7H24M) | | 200 kHz | 125 kHz | 10 kHz | 1.5 kHz |
| Data Storage | -- | -- | 4 GB microSDHC (*) | | -- | -- |
| Abnormal Alarm | -- | -- | Threshold trigger (relay) | | -- | -- |
| Communication | Wired | | Wired | | Wireless | |
| Power Supply | DC | | DC | | CT inductive charging (lithium cell) | |

*** : can support up to 32 GB microSDHC**

# Signal Conditioning Modules for Vibration Sensors

## SG-3037

### Features:

- 3-channal voltage input & output
- Input voltage range: 0-24V
- Provides signal bandwidth: 50 kHz
- Provides 24V power supply for the accelerometer


## SG-3227

### Features:

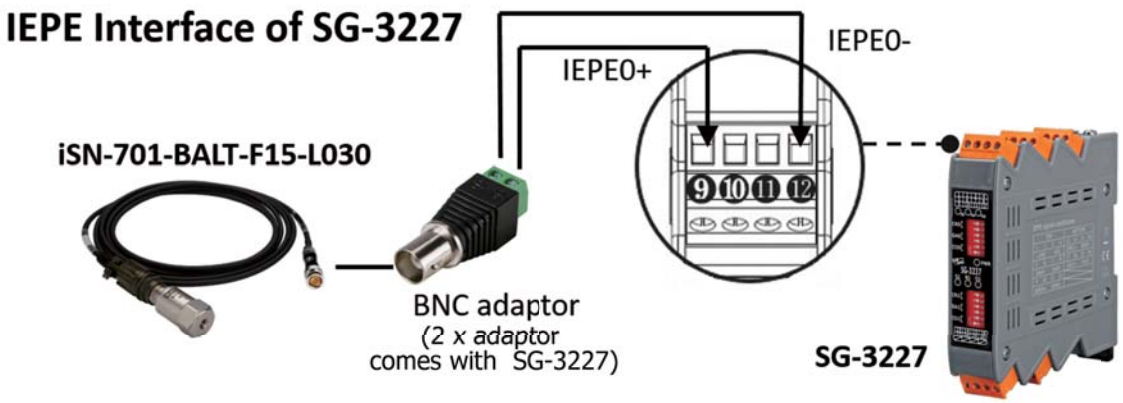
- 2-channel IEPE input
- Individual channel configuration
- Excitation current support: 2 mA / 4 mA / 6 mA / 10 mA
- Signal amplification of x1 , x10 and x100
- LED indicators for sensor open, short and normal

## Introduction:

SG-3037 and SG-3227 are vibration signal conditioning modules for vibration measurement. SG-3037 with 3 channel analog inputs can connect to the voltage output accelerometer (3-axis of iSN-703-BALT-F1-L015). SG-3227 with 2 channel IEPE interface is suitable for the IEPE accelerometer (1-axis of iSN-701-BALT-F15-L030). SG-3037/SG-3227 can convert the signal measured from the accelerometer into the analog voltage output. It collects the vibration data through the PET-7H16M module, and then send them via high-speed Ethernet to the data center for processing and analysis.

## Selection Guide:

| Models | SG-3037 | SG-3227 |
|---|---|---|
| Analog Input for Accelerometer | | |
| Channel | 3 | 2 |
| Wiring | 5 wires | Differential |
| Signal | Voltage | IEPE |
| Type | 0 ~ 24 V | 0 ~ 28 V |
| Gain | - | x1, x10, x100 |
| Bandwidth | 50 KHz | x1, x10 Gain : 80 kHz ; x100 Gain : 50 kHz |
| Accuracy | ±5% of FSR | |
| Excitation Current | - | 2 mA, 4 mA, 6 mA, 10 mA |
| Excitation Voltage | 24 V | - |
| Supported Accelerometer | iSN-703-BALT-F1-L015 (3-Axis) x 1 | iSN-701-BALT-F15-L030 (1-Axis) x 2 |
| Analog Output | | |
| Channel | 3 | 2 |



# Accelerometer:

**iSN-701-BALT-F15-L030**
(1-axis Accelerometer)

**iSN-703-BALT-F1-L015**
(3-axis Accelerometer)

**iSN-701-BALT-Mbase01**
(Magnetic Base)

## Introduction:

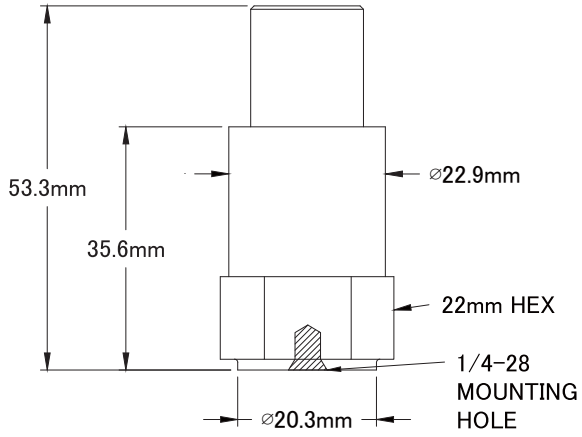
iSN-701-BALT-F15-L030 and iSN-703-BALT-F1-L015 are high sensitivity accelerometer. iSN-701-BALT-F15-L030 is a homotaxial IEPE accelerometer and iSN-703-BALT-F1-L015 is a triaxial accelerometer that simultaneously measures vibration in three orthogonal axes. These sensors are designed primarily for vibration analysis applications.

## Selection Guide:

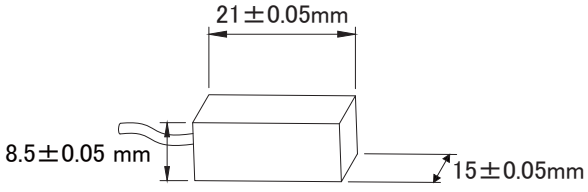
| Models | iSN-701-BALT-F15-L030 | iSN-703-BALT-F1-L015 |
|---|---|---|
| Type | 1-Axis (IEPE) | 3-Axis |
| Sensitivity | 100 mV/g | 400 mV/g per axis |
| Frequency Response | 0.5 Hz ~ 15 kHz | 10 Hz ~ 1 KHz |
| Measuring range | ±80 g | ±18 g |
| Bias Voltage | 10-14 VDC | 10 ± 0.5 VDC |
| Power Requirement | | |
| Voltage | 18-30 VDC | 22 - 26 VDC |
| Current | 2~10 mA | 3 mA |
| Mechanism | | |
| Cable Length | 3 m | 1.5 m |
| Magnetic Base | iSN-701-BALT-Mbase01 (optional) | Included |

## Dimensions:

**iSN-701-BALT-F15-L030**




**iSN-703-BALT-F1-L015**

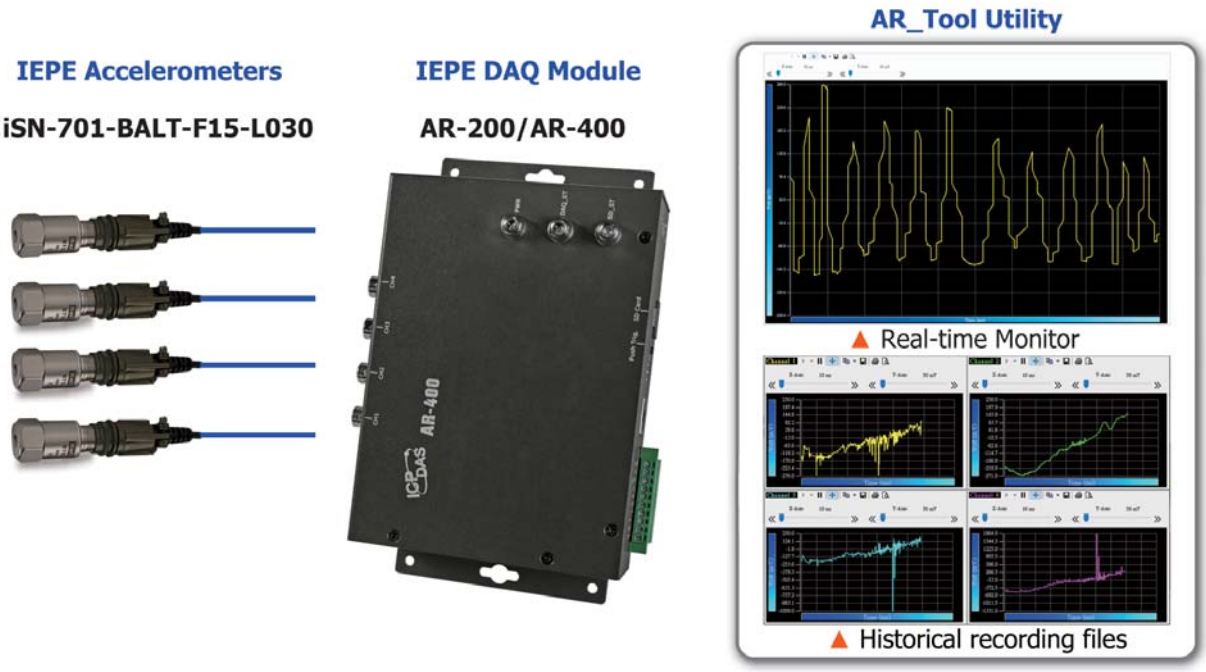


# Applications:

## ● PET-7H16M connect SG-3037 with iSN-703-BALT-F1-L015


## ● PET-7H16M connect SG-3227 with iSN-701-BALT-F15-L030


## ● AR-200/AR-400 with iSN-701-BALT-F15-L030



# 6-2 Ethernet High-speed Data Acquisition Module: PET-7H16M / PET-7H24M

| Module | PET-7H24M | PET-7H16M |
|---|---|---|
| AI | 4<br>Differential<br>Simultaneously | 8<br>Single-ended |
| AO | 2 | - |
| Encoder Input | 32-bit | - |
| DI | 3 | 4 |
| DO | 4 | 4 |
| External Trigger | - | 32 bits Max. Count,<br>30 kHz Max. Input Frequency |

The PET-7H16M/PET-7H24M is a high speed data acquisition devices with a built-in POE Ethernet communication port for data transfer over a network. PET-7H16M includes 8 high-speed 16-bit single-ended Analog input channels (200 kHz sample and hold for all 8 channels) and PET-7H24M includes 4 high-speed 24-bit differential Analog input channels (128 kHz sample and hold for all 4 channels). All high speed data acquisition modules allow A/D signal conversion simultaneously on each channel and provide the programmable input range on all analog input channels. In addition to supporting Analog Input channels, the module also provides Digital Input / Digital Output / Counter / Encoder with different combinations and different numbers of channels. The module provides 4 kV ESD protection as well as 2500 VDC intra-module isolation.

## Features:

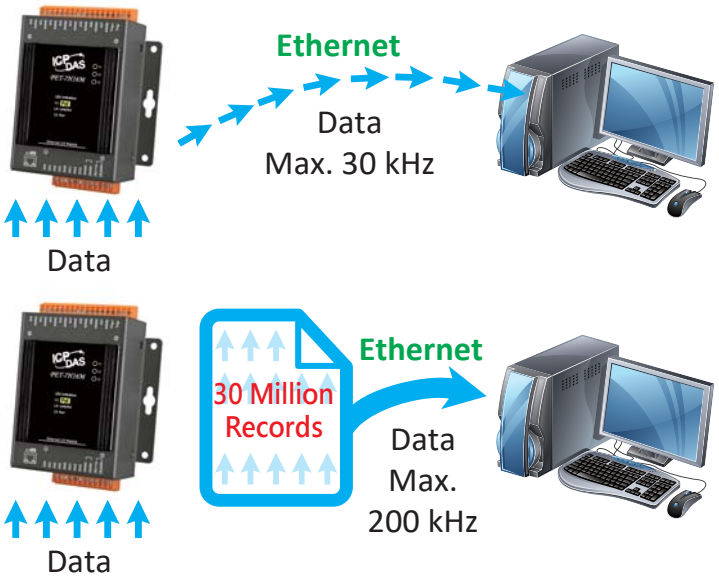
### ❶ Data transmission mode

1. Continuous transmission. After starting A/D acquisition, data is continuously transmitted to the Host PC.

2. After collecting N data samples, the data is transferred to the Host PC.

   a. After starting A/D acquisition, the data will be temporarily stored in the memory on the PET-7H16M/PET-7H24M module, and wait until a command is received from the Host PC, before transferring the collected data to the Host PC.

   b. The memory capacity allows temporary storage of up to 30 million data samples.



## ❷ A/D trigger mode

**1. Software AD Data Acquisition mode**

The A/D acquisition parameters are configured via a command from the Host PC. The continuous A/D acquisition or the acquisition of N data samples begins after the command is triggered.

**2. External Digital Signal Event Trigger mode (*Only for PET-7H16M)**

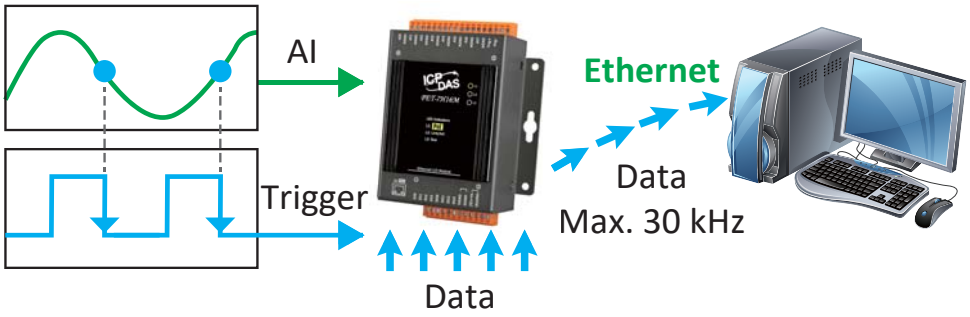
The A/D acquisition parameters are configured via a command from the Host PC, and then triggered via an external electrical signal. The A/D acquisition of the N data samples is then started.

**3. Analog Input Trigger mode**

The A/D acquisition parameters are configured via a command from the Host PC. When the analog input value is higher or lower than the set specific voltage value, the A/D acquisition of the N data is started.

**4. External Clock Signal synchronization A/D Acquisition mode (*Only for PET-7H16M)**

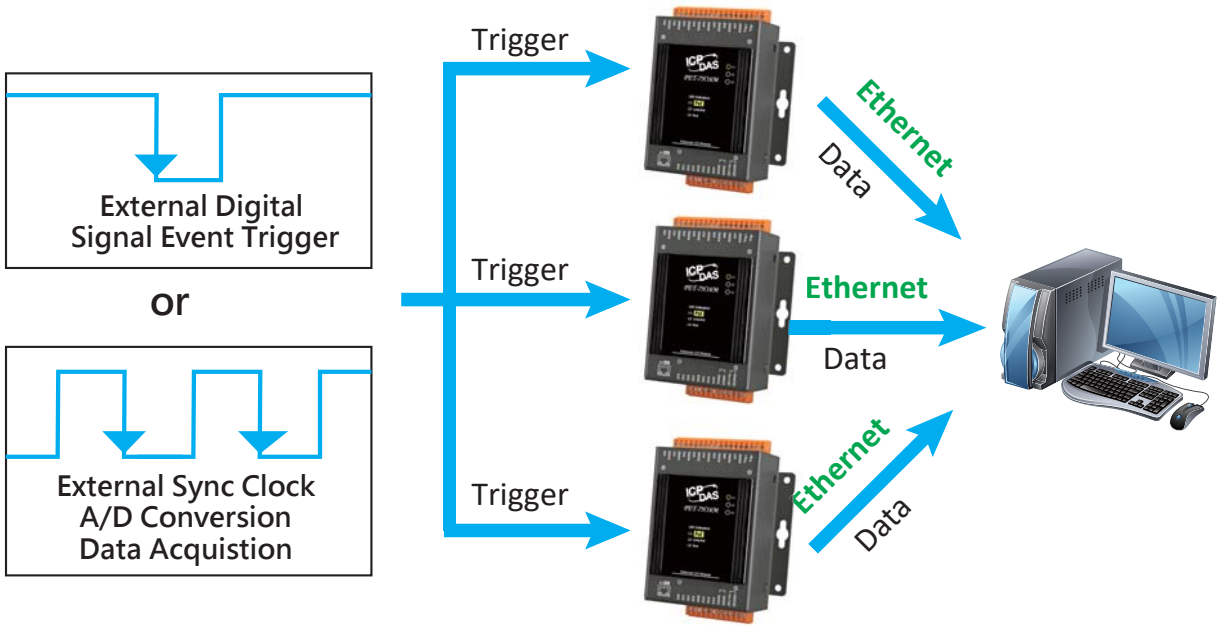
The speed of the A/D acquisition and the amount of data acquired are controlled by external electrical signals. A falling edge for each output waveform triggers an AD conversion.




External Clock Signal synchronization A/D Acquisition mode

## ❸ A/D synchronization trigger between multiple modules

The A/D acquisition parameters are configured via a command from the Host PC, and are triggered by an external digital signal event, the A/D acquisition of N data samples, or A/D acquisition via the synchronization of an external clock signal.



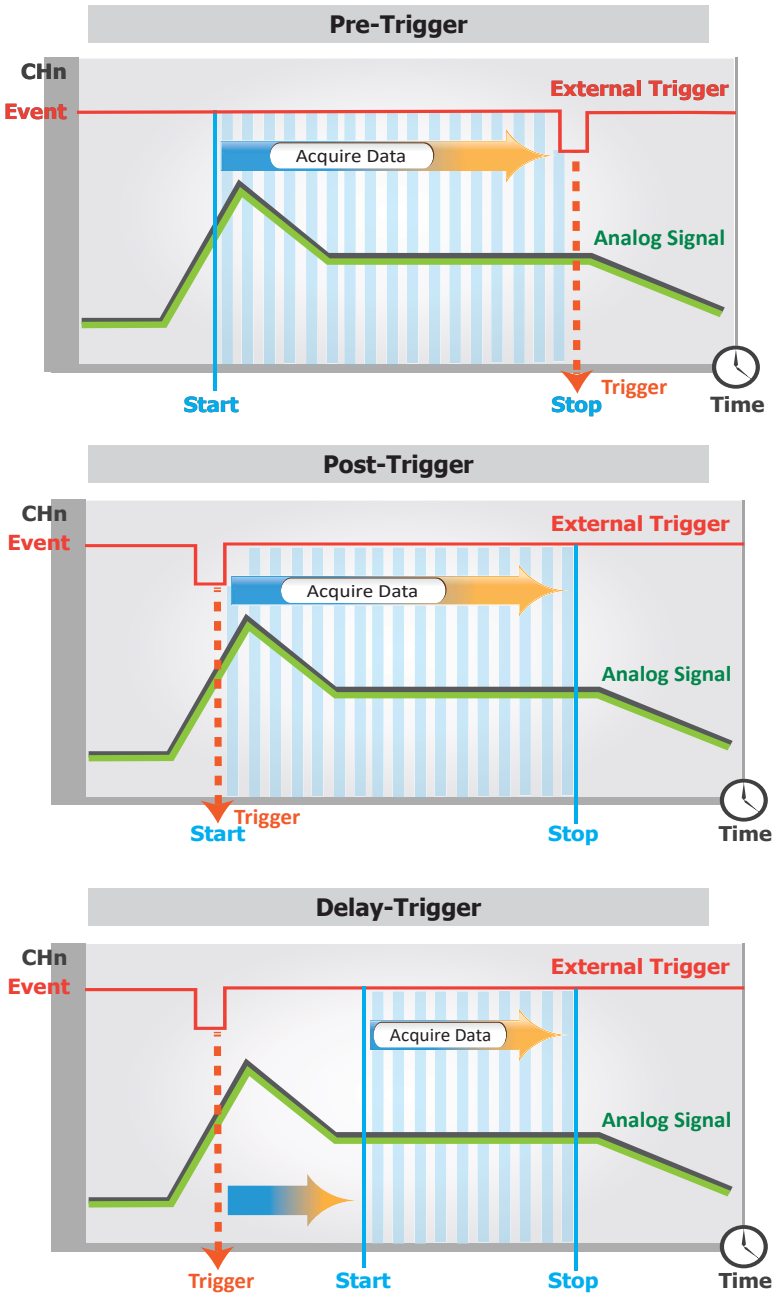
## ❹ External Digital Signal Event Trigger mode

A/D acquisition is performed in external digital event trigger mode (triggering the electrical signal is the falling edge trigger). The maximum sampling rate per channel is 200 kHz, and A/D acquisition of N data samples is performed.

**1. Pre-Trigger**
**(acquisition of N data samples)**
The A/D data is continually collected and is temporarily stored in the memory on the PET-7H16M until the trigger signal is received. Once the trigger signal is received, the collected N data samples are then transferred to the Host PC.

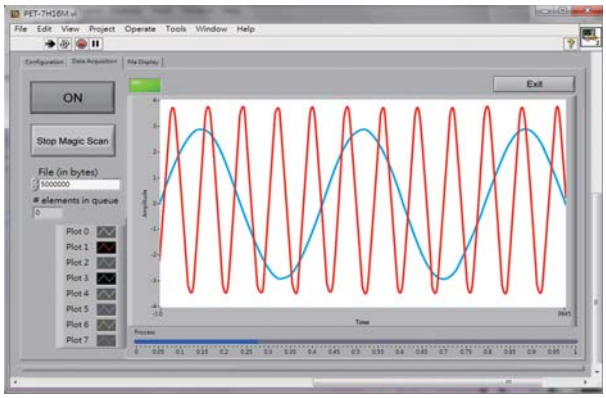
**2. Post-Trigger**
**(acquisition of N data samples)**
In this mode, the A/D acquisition of the N data samples is started once the trigger signal is received.

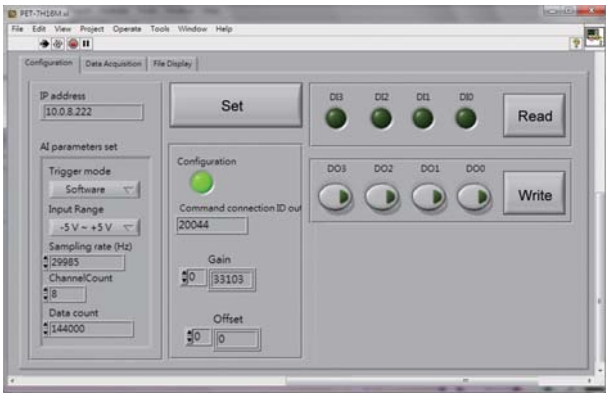
**3. Delay-Trigger**
**(acquisition of N data samples)**
The A/D acquisition of the N data samples is started once the programmed delay period from the trigger has elapsed.




## ❺ Software support

**1. Microsoft VC, C#, VB.NET SDK API and Demo for Windows**
**2. LabVIEW Toolkit and Demo for Windows**
**3. Library and Demo for Linux**



# PET-7H16M / PET-7H24M Selection Guide:

## System Specifications

| Communication | |
|---|---|
| Ethernet Port | 1 x RJ-45, 10/100 Base-TX |
| PoE | Yes |
| Security | ID, Password and IP Filter |
| **LED Indicators** | |
| System Operation | Yes |
| Ethernet Link/Act | Yes |
| PoE Power | Yes |
| **2-way Isolation** | |
| Ethernet | 1500 VDC |
| I/O | 2500 VDC |

| EMS Protection | |
|---|---|
| ESD (IEC 61000-4-2) | 4 kV Contact for each Terminal and 8 kV Air for Random Point |
| EFT (IEC 61000-4-4) | +/-4 kV for Power |
| **Power** | |
| Reverse Polarity Protection | Yes |
| Powered from Terminal Block | +12 ~ +48 VDC |
| Consumption | 2.6 W |

| Mechanical | |
|---|---|
| Dimensions (W × L × H) | 76 mm × 120 mm × 38 mm |
| Installation | DIN-Rail or Wall Mounting |
| Enclosures | Metal |
| **Environment** | |
| Operating Temperature | -25 ~ +75° C |
| Storage Temperature | -30 ~ +80° C |
| Humidity | 10 to 90 % RH, Non-condensing |

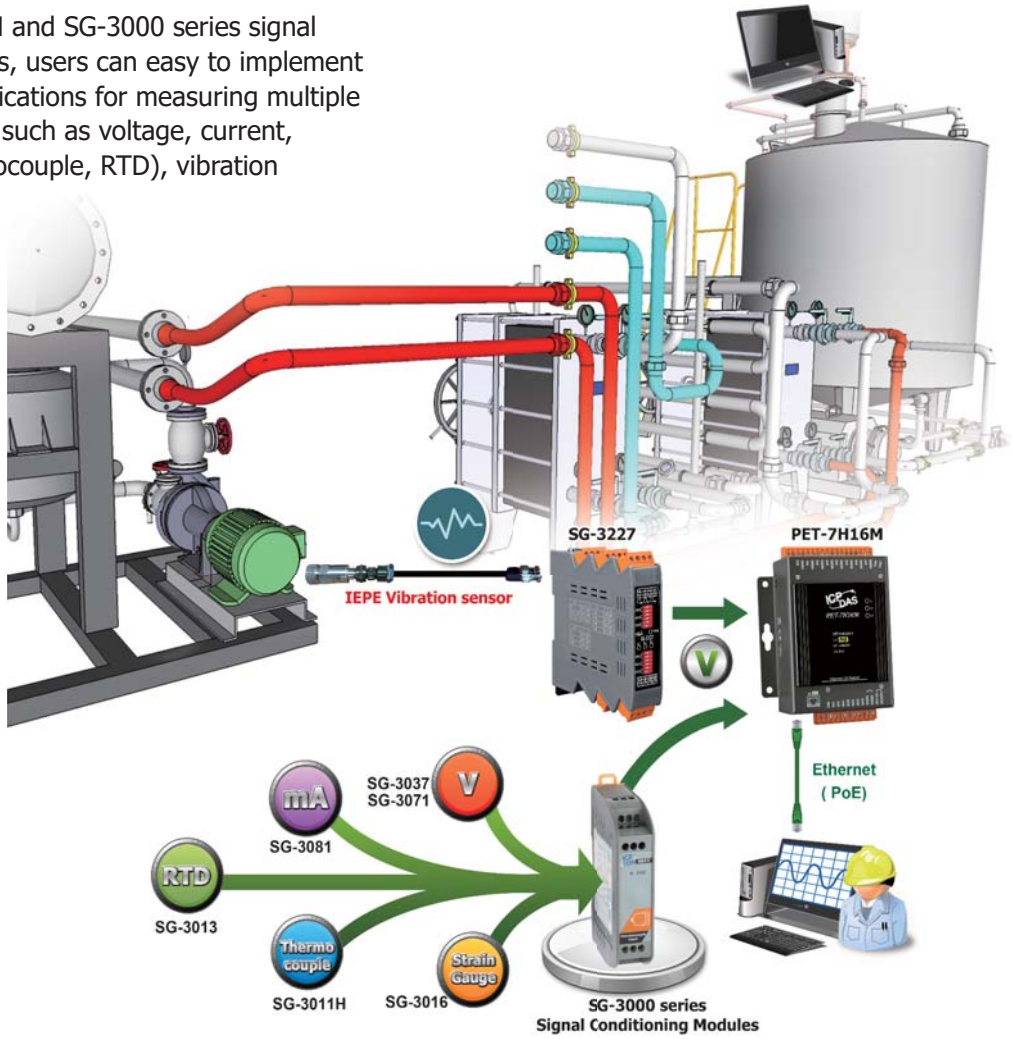
## I/O Specifications

| Module | PET-7H24M | PET-7H16M |
|---|---|---|
| **Analog Input** | | |
| Channels | 4 differential Simultaneously | 8 Single-ended |
| Resolution | 24-bit | 16-bit |
| Sampling Rate | 128kS/s (Each Channel) | 200 kS/s (Each Channel) |
| Bipolar Input (Programmabl) | ±10 V, ±5 V ±2.5 V ±1.25V ±0.625V ±300mV ±150mV ±75mV ±40mV ±20mV | ±10 V, ±5 V |
| FIFO Size | 4 k Samples | 2 K Samples |
| Accuracy | +/- 0.01% of FSR @+/-10 V, +/- 0.02% of FSR @±5 V ±2.5 V, +/- 0.02% of FSR @ ±1.25V ±0.625V +/- 0.1% of FSR @±300mV ±150mV ±75mV ±40mV +/- 0.2% of FSR@±20mV | 0.05 % of FSR, +/- 1 LSB @ 25 °C, +/-10 V |
| AD Trigger Mode (Programmable) | Software/ Analog Input Trigger | Software/ Analog Input/ External Clock Trigger/ Digital Trigger (Post/Pre/Delay trigger) |
| **Analog Output** | | |
| Channels | 2 | N/A |
| Type | ±10 V, ±5 V, 0~5V, 0~10V | |
| Resoluction | 12-bit | |
| Accuracy | +/- 0.1% of FSR | |
| **Encoder Input** | | |
| Counter | 32-bit | N/A |
| Encoder Mode | Quadrant /CW/ CCW and Pulse/Dir | |
| Counting Rate | Quadrant Counting: 2 MHz (Max.) CW/CCW: 6 MHz (Max.); Pulse/Dir: 6 MHz (Max.) | |
| On Voltage Level | +3.5 ~ +5 VDC | |
| Off Voltage Level | +0.8 VDC Max. | |
| Programmable digital filter | 0.55 ~ 33.3 µs | |
| Isolation | 2500 VDC | |
| **Digital Input** | | |
| Channels | 3 | 4 |
| Contact | Wet Contact | Wet Contact |
| Sink/Source (NPN/PNP) | Sink/Source | Sink/Source |
| On Voltage Level | +5 ~ +30 VDC | +5 ~ +30 VDC |
| Off Voltage Level | 2 VDC Max. | 1 VDC Max. |
| Counter | N/A | 32 bits Max. Count, 1 kHz Max. Input Frequency |
| **Digital Output** | | |
| Channels | 4 | 4 |
| Type | Isolated Open Collector | Isolated Open Collector |
| Sink/Source (NPN/PNP) | Sink | Sink |
| Load Voltage | +5 ~ +30 VDC | +5 ~ +30 VDC |
| Short-circuit Protection | Yes | Yes |
| Overload Protection | 1.3 A | 1.3 A |
| **External Clock Trigger / Digital Trigger** | | |
| Trigger Pulse Width | N/A | 1.5 µs Min. |
| Trigger Type | | Falling Edge |
| On Voltage Level | | +5 ~ +5.5 VDC @ 15 mA |
| Off Voltage Level | | < 0.8 VDC |
| Counter | | 32 bits Max. Count, 30 kHz Max. Input Frequency |

# Application:

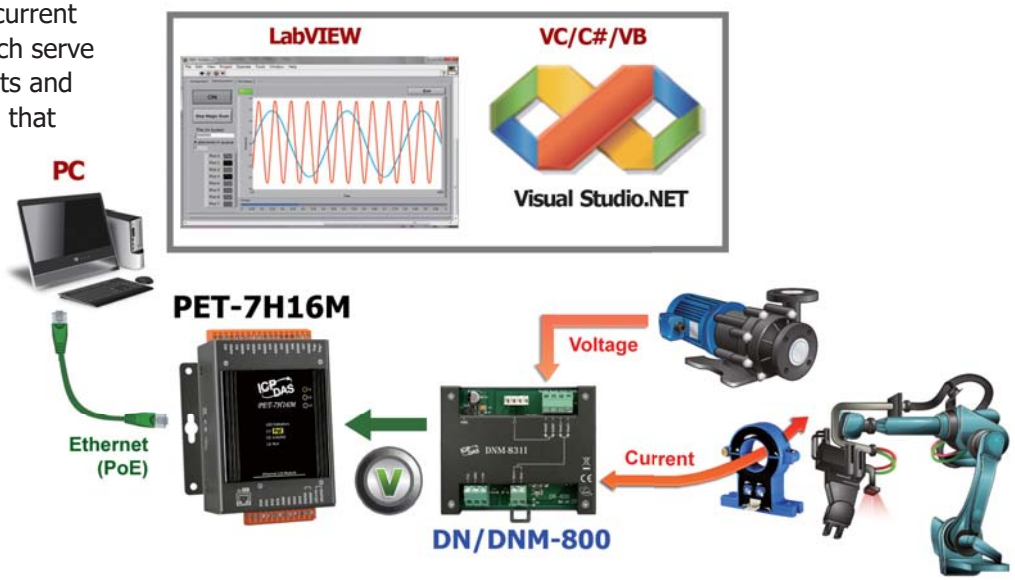
## ● High speed vibration, strain gauge and temperature measurement applications

With the PET-7H16M and SG-3000 series signal conditioning modules, users can easy to implement remote sensing applications for measuring multiple analog input signals such as voltage, current, temperature (thermocouple, RTD), vibration (IEPE sensor) and strain gauge based on an Ethernet network, and collect data from various fields for advanced analysis.




## ● Power monitoring applications for electric motor and robotic arm facilities

By utilizing the high speed data acquisition capability of PET-7H16M combined with DN-800/DNM-800 series modules, the real-time power monitoring applications for a high-voltage/ large-current manufacturing facility built with a motor or a robotic arm can be easy and quick to develop. It also helps to collect data for failure analysis and diagnosis. The DN-800/DNM-800 series modules are voltage attenuators and current transformers which serve to convert currents and voltages to levels that are suitable for measurement.



# 6-3 Accelerometer Data Logger Module : AR Series


AR-200


AR-400

## Features:

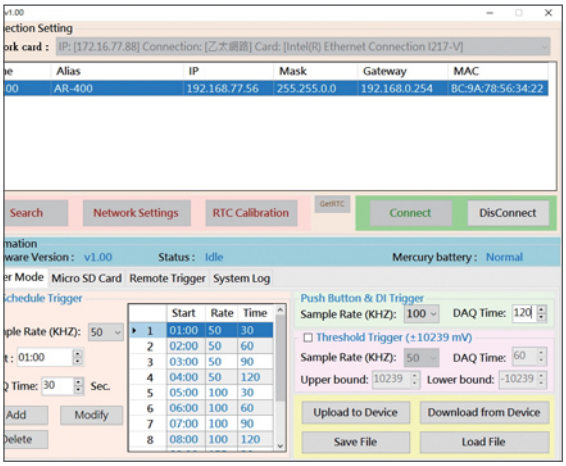
- 2 or 4 simultaneous, 16-bit resolution ADC
- Support 2 or 4 IEPE input and built-in 3 mA excitation current
- Dynamic range: ±10V
- AR-200 support sample rate: 200kHz, 100kHz, 50kHz
- AR-400 support sample rate: 125kHz, 100kHz, 50kHz
- Max. Recording time: 30 m (5kHz) / 20 m (10kHz) / 10 m (20kHz) / 2 m (50kHz or more)
- Flexible trigger modes: Push button trigger, Schedule trigger, analog threshold trigger, digital input trigger and utility remote trigger
- Supports 4 to 32 GB microSD card

## Introduction:

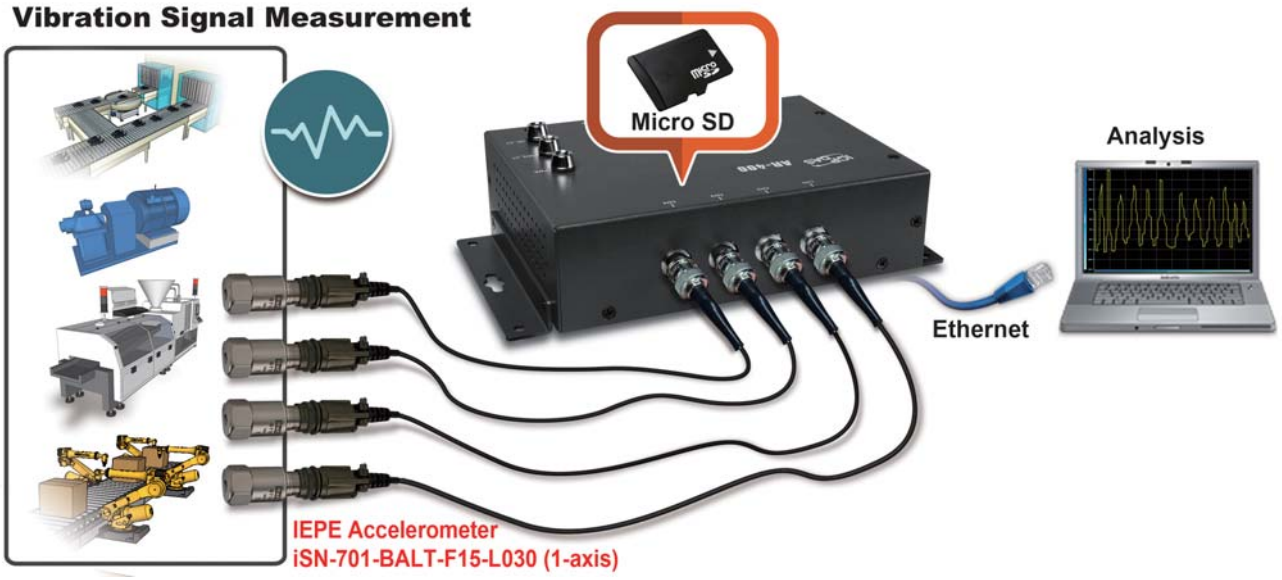
AR-200 / AR-400 is a high-performance dynamic signal acquisition module equipped with 2 / 4 analog input channels providing simultaneous-sampling at up to 200/125 kHz per channel. The module has a built-in 16-bit resolution ADC and 3 mA excitation current to measure IEPE sensors, and a micro SDHC flash card for data logging. It also supports flexible trigger modes, sampling rates, and recording time span, making it ideal for signal measurement in vibration applications.

## Utility:

- Provide device search function.
- Support trigger mode configuration
- Support RTC calibration
- Show system event log
- Support utility remote trigger mode
- Provide recording file (*.ar) convert to various file type (*.xls, *.csv, *.txt, *.tdm)



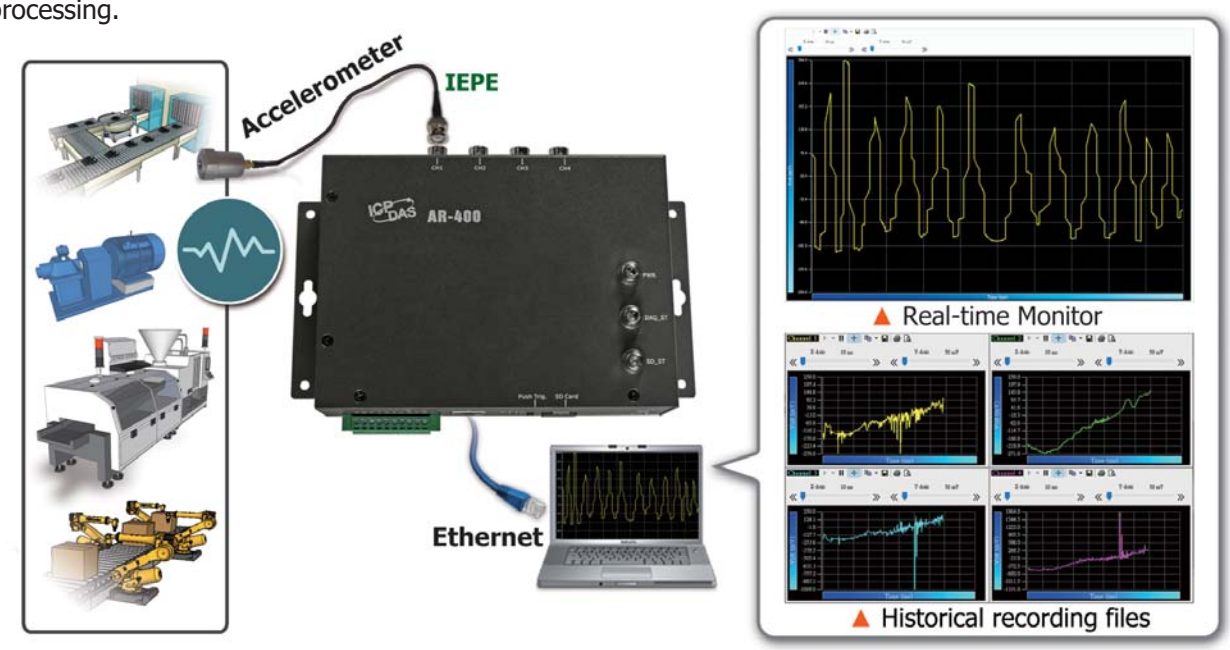

## Application:



# Application:

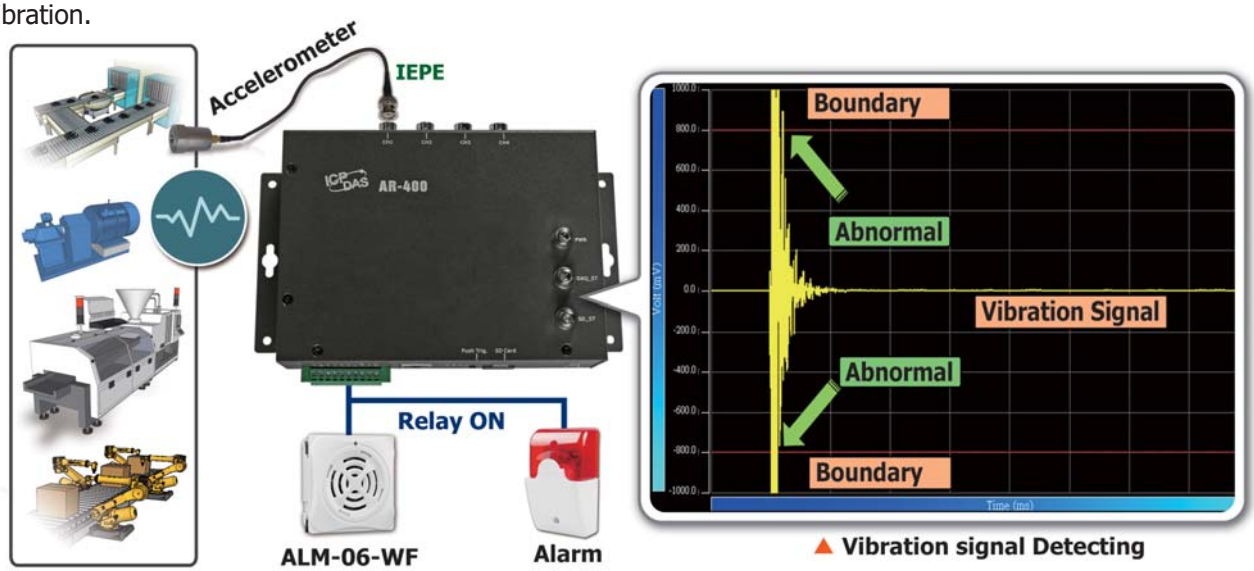
## ● Vibration waveform display function

- Real-time waveform display
  The user can monitor the machine's vibration status through the utility software to monitor the online vibration signal on each channel, which is convenient for the on-site staff to debug and diagnose at the first time.
- Historical waveform recording files playback
  The vibration signal can be recorded and stored in the flash card of the AR-200/AR-400 module. The user can download the recording file back to the computer and play it through the utility software, and convert the vibration signal into a waveform display, which is easy for the user to use. The difference between the signal and the signal between the channels is observed to facilitate further vibration analysis and processing.




## ● Vibration signal abnormal alarm function

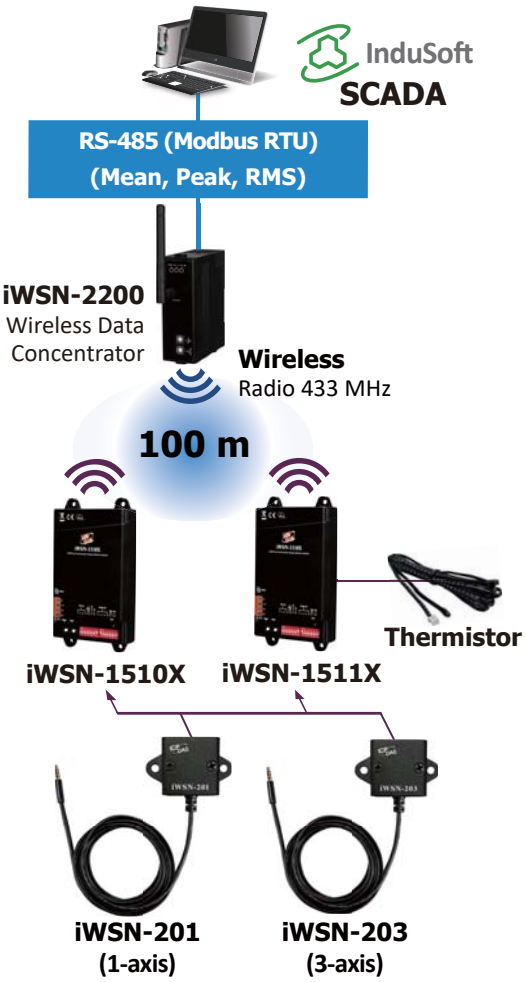
The AR-200/AR-400 module has a threshold trigger function. The user can use the Real-time waveform display function to set the appropriate threshold. When the detected signal exceeds the threshold, an abnormal alarm and the relay on the module will be issued immediately. The ALM-06-WF or the alarm connected to the relay will be activated, so that the field staff can immediately know that the machine has an abnormality for disposal, and then the recording file playback function can be used to check the abnormal vibration.



# 6-4 iWSN Vibration Sensor Series

The iWSN vibration sensor series includes "Wireless Data Concentrator", "Wireless Signal Sensing Module" and "I/O Expansion Module". The data concentrator collects the vibration signal data and provides them to the local officers for reference via the touch PAC of ICP DAS and sends the data to the cloud for management and monitoring via the WISE controller. Also, it can send alarms to the instant messaging APP.

| Module | iWSN-201<br>1-axis Vibration Sensor | iWSN-203<br>3-axis Vibration Sensor |
|---|---|---|
| Product Picture |  |  |
| **Sensing Parameter** | | |
| Type | 1-Axis MEMS | 3-Axis MEMS |
| Rate | Up to 10 kHz | Up to 1.5 kHz |
| Range | ±8g | |
| **Output Interface** | | |
| Data Type (g) | Uniaxial RMS, Maximum | X, Y, Z axes of the RMS, the maximum value; triaxial vector value |
| **Mechanism** | | |
| Dimension (LxWxH) | 51mm x 30mm x 15mm | |
| Installation | Wall mount/ Magnetic mount | |
| Cable Length | 1.5 M | |
| **Others** | | |
| Operation Temp. | -25°C ~ +75°C | |




## Wireless Data Concentrator:

## iWSN-2200 Series

The iWSN-2200 series collects and returns data from the sensor, and includes the Modbus RTU or Modbus TCP standard communication protocol that allows you to connect with upper system or graphics control software.

## Wireless Signal Sensing Module:

## iWSN-1500 Series

Depending on various field applications, not only the vibration sensors are supported, but also the expansion sensing modules of temperature/ humidity, CO2, VOC and CO.

## I/O Expansion Module:

## iWSN-200 Series

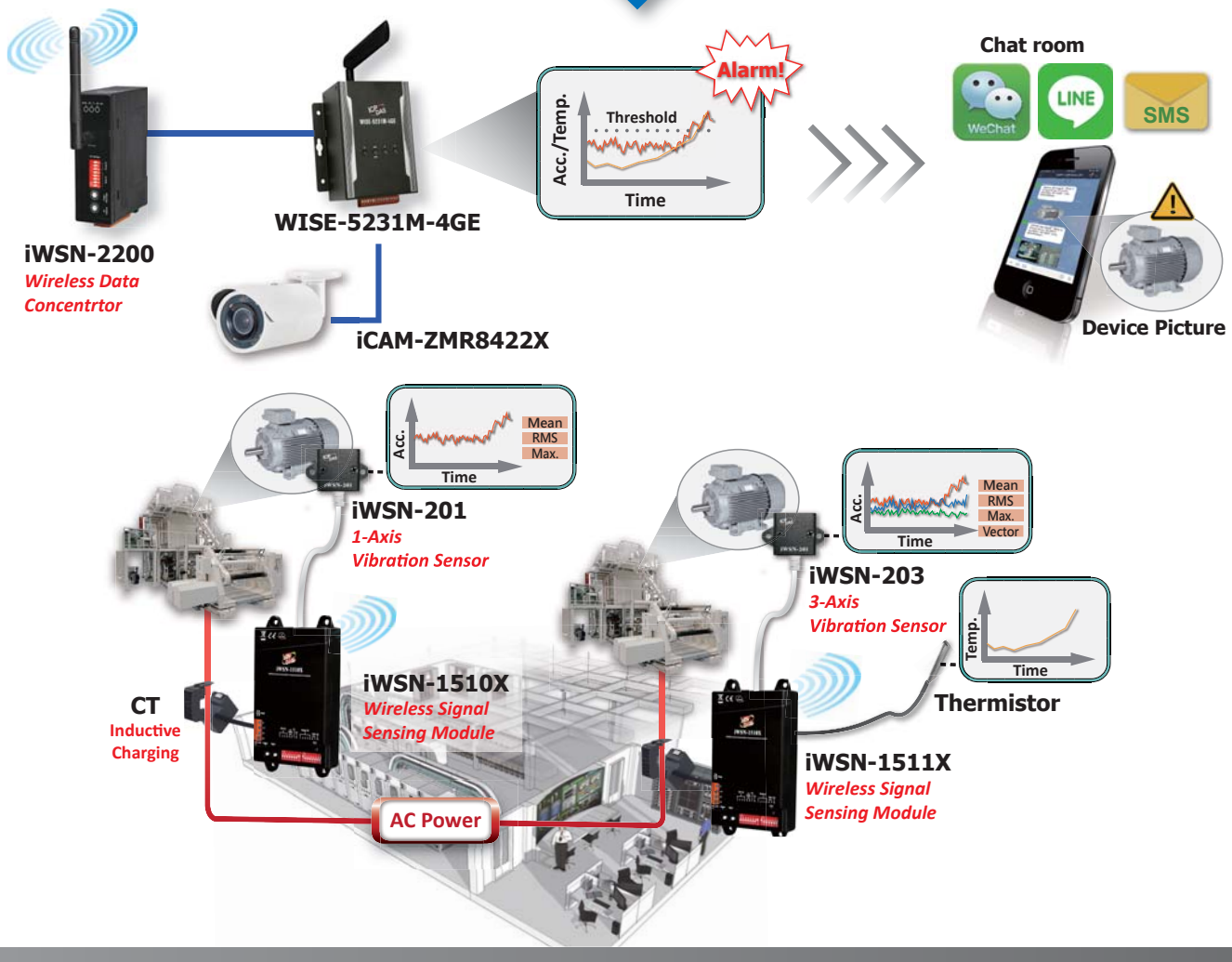
Provide the interface of vibration measurement. Transfer the vibration measurement data back to the wireless data concentrator via the wireless signal sensing module.

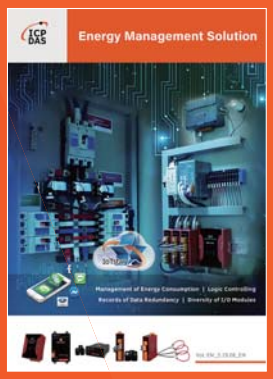
## ● iWSN Vibration Solution: improve the efficiency of traditional On-Site Inspection

In order to maintain normal production operations in factories, regular maintenance must be performed on important equipment. In the past, the vibration data is obtained by on-site inspection; the equipment is regularly checked one by one in a regular route. The data is manually recorded on papers which is labor-intensive, time-consuming and error-prone. The data is not easy to retrieve and analyze, and duplicate measurements or inappropriate inspections may occur. ICP DAS iWSN Vibration Sensor Series uses iWSN-1510X / iWSN-1511X and iWSN-201, or iWSN-203 with thermistor for measuring vibration of the device and temperature detection. The data of vibration/temperature can be long-term recorded and then effectively solve the reliability issue that on-site inspection may involve. Its self-powered wireless design makes it easy to be installed and maintained. The onsite personnel can also set the limit range via WISE series IIoT Edge Controller so that when the collected data exceeds the range of the limit, the alarm message or image of the device can be sent via SMS or LINE/WeChat groups immediately. The control center or related personnel can be notified in real time and estimate or arrange when maintenance should be performed.


▲ Prior Art: Traditional on-site inspection

▼ ICP DAS iWSN Vibration Solution



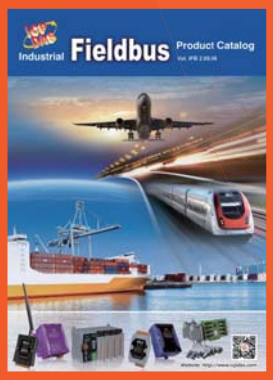



## Energy Management Solution

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


## 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




## Industrial Fieldbus

- RS-485
- Industrial Ethernet
- PROFINET
- CAN bus
- CANopen
- DeviceNet
- J1939
- PROFIBUS
- HART
- Ethernet/IP
- BACnet


## Industrial Communication Product Brochure

- Multiport Serial Cards
- Serial Device Server
- Converter/Repeater/Hub/Splitter
- Termination Resistor/DC Bias Voltage
- Ethernet Switch
- Fieldbus Solution


## Machine Automation

- EtherCAT Motion Control Solutions
- Motionnet Solutions
- Ethernet Motion Control Solutions
- Serial Communication Motion Control Solutions
- CANopen Motion Control Solutions
- PC-based Motion Control Cards
- PAC Solutions - Motion Modules


## Wireless Solution

- WLAN Products
- Radio Modems
- 3G/4G Products
- GPS Products
- Bluetooth LE Converters
- ZigBee Products
- Wireless Modbus Data Concentrators
- Bluetooth LE Gauge Master for
- Mitutoyo Gauges


## TouchPAD HMI Solutions

- Introduction
- TPD/VPD Products Series
- Video Intercom & Access Control Series
- TPD/VPD Application


## PC-based I/O Boards

- PCI Express Bus Data Acquisition Boards
- PCI Bus Data Acquisition Boards
- ISA Bus Data Acquisition Boards

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