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Solutions to Extreme Climate

Smart Irrigation and Automatic Water Gate Management

Application Story

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ICP DAS Epoch

Application Story

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ICP DAS 泓格科技
ICP DAS CO., LTD.

Leading the Smart Factory Revolution, Accelerating the Achievement of ESG Goals

By Editorial Office (Translated by Lynn Tang)

Instant messaging reshapes industrial automation, moving towards a sustainable future

EtherCAT (Ethernet for Control Automation Technology) is revolutionizing industrial automation with its outstanding performance and speed. Designed for high-performance needs, its sub-millisecond latency ensures precise synchronized control, making it indispensable in modern manufacturing. In battery electrolyte injection lines, EtherCAT stabilizes production and enhances safety with emergency stop functions, showcasing the infinite potential of industrial automation.

Achieving smart upgrades in multiple application scenarios, promoting the realization of ESG

EtherCAT technology is crucial for ESG. In power battery cell production lines, the ECAT-2610 slave station converts EtherCAT to Modbus RTU, precisely controlling EPSON robotic arms for safe and efficient production. In IC test sorting machines, the ECAT-2094S four-axis stepper motor controller achieves 20-axis control, boosting production efficiency and reducing equipment footprint. Eric Chen, deputy manager of ICP DAS, highlighted that their 'industrial-grade lightweight IoT accelerator,' with various communication ports and built-in EtherCAT master station, supports protocols like Modbus, OPC UA, and MQTT, making it essential in smart manufacturing. Its rapid control cycles and robust cybersecurity features enhance system stability and security.

▲ Eric Chen, Deputy Manager of ICP DAS, analyzes the application of EtherCAT in the field of smart manufacturing.

Revolutionizing Transparency in ESG with Cloud Visualization Management

ICP DAS's IoTstar, IoT cloud management software, is crucial for ESG goals, offering remote device maintenance, sensor databases, dashboards, reports, and robot services. IoTstar provides comprehensive data integration, clear ESG indicator displays, and enhanced transparency. Its real-time monitoring and energy management functions help identify waste, improve energy efficiency, and reduce carbon emissions. Companies can use data analysis for precise energy management, supporting sustainable development.

Smart Modules and PMC Concentrators, Upgrading Energy Management

ICP DAS's WISE intelligent I/O modules simplify system setup without coding. Using IF-THEN-ELSE logic operations, devices can adjust their working logic based on scenario requirements, enhancing automation management capabilities. At the same time, the PMC meter concentrator series is designed for large-scale power monitoring, connecting with various meters to provide real-time power data analysis and management, helping enterprises in planning energy strategies effectively.

Deputy Director Lai's message for the future: Prospects for sustainable development in smart manufacturing

In his speech, Deputy Director Michael Lai emphasized ICP DAS's flexible, scalable, and security-focused products. They offer comprehensive encryption to meet high data security standards across various industries. In sensor monitoring, power management, and smart factory applications, ICP DAS's solutions provide stable and cost-effective

tools, helping companies achieve their ESG goals in the smart factory revolution.

▲ Deputy Director Michael Lai of ICP DAS introduces the application of the cloud management system IoTstar combined with PMC series products for power monitoring.

ESG Smart Factory Path: Strategy and Practice Seminar

ESG has become one of the key indicators for corporate and industry transformation and upgrading. In the energy and manufacturing sectors, how to integrate ESG concepts and adopt smart technologies to improve efficiency and reduce emissions has become a focus for many companies. ICP DAS invites experts from different fields, including ITRI and Digiwin, to provide attendees with insights and ideas, exploring new opportunities and challenges for ESG in intelligent energy and smart manufacturing.

2024 Kaohsiung Seminar: ESG Smart Factory Path - Strategy and Practice
Time: 2024/12/5 (Thu) 08:30-17:00　　**Location:** Golden-Swallow Hall, 5th Floor, Grand Hi-Lai Arena, Kaohsiung

U-7500 Series Enables Efficient Integration of Devices in Commercial Buildings

U-7500 series is equipped with OPC UA standardized protocols, highly scalable features, and excellent remote monitoring and management capabilities, which enable efficient integration and management of various devices in the building and real-time monitoring.

By Carol Hsu (Translated by Carol Hsu)

The rise of smart buildings has increased the need for automation, energy management, and operational efficiency in commercial spaces. Managing diverse systems like lighting, HVAC, and security effectively is a major challenge. Traditional systems lack flexibility and integration, leading to higher maintenance costs and reduced efficiency.

ICP DAS introduced the OPC UA I/O module U-7500 series, an industrial automation solution for modern buildings. It supports seamless integration with devices, enabling centralized management and intelligent control to improve efficiency and reduce energy use.

Management Difficulty of Commercial Buildings

Difficulty in Integrating Multiple Devices

Commercial buildings often feature devices from various manufacturers—lighting, air conditioning, security systems, etc.—using different communication protocols, complicating integration into a unified management platform.

Insufficient System Scalability

Traditional automation systems often lack flexibility and scalability, making it difficult to expand or add devices without upgrading hardware and software.

Data Security and Privacy Risks

As automation systems become more data-driven, poor security design can lead to data leaks or intrusions, disrupting building operations.

U-7500 Series for Commercial Building Automation

Five key reasons make ICP DAS U-7500 Series ideal for commercial building automation:

OPC UA Standardized Protocol Enables Seamless Communication

U-7500 Series supports the OPC UA protocol, ensuring compatibility with various automation devices. ICP DAS modules integrate seamlessly, overcoming communication barriers and enabling cross-platform collaboration in commercial buildings.

High Expansion and Flexibility

U-7500 Series are flexible and support a variety of I/O contacts, which can be applied to a variety of devices, such as lighting, air conditioning, security systems, and so on. No need to rebuild the system, which reduces the cost of subsequent expansion.

Remote Monitoring and Management Capabilities

Managers can remotely monitor and manage building devices via U-7500 Series, controlling operations and making adjustments as needed, enhancing flexibility and operational efficiency.
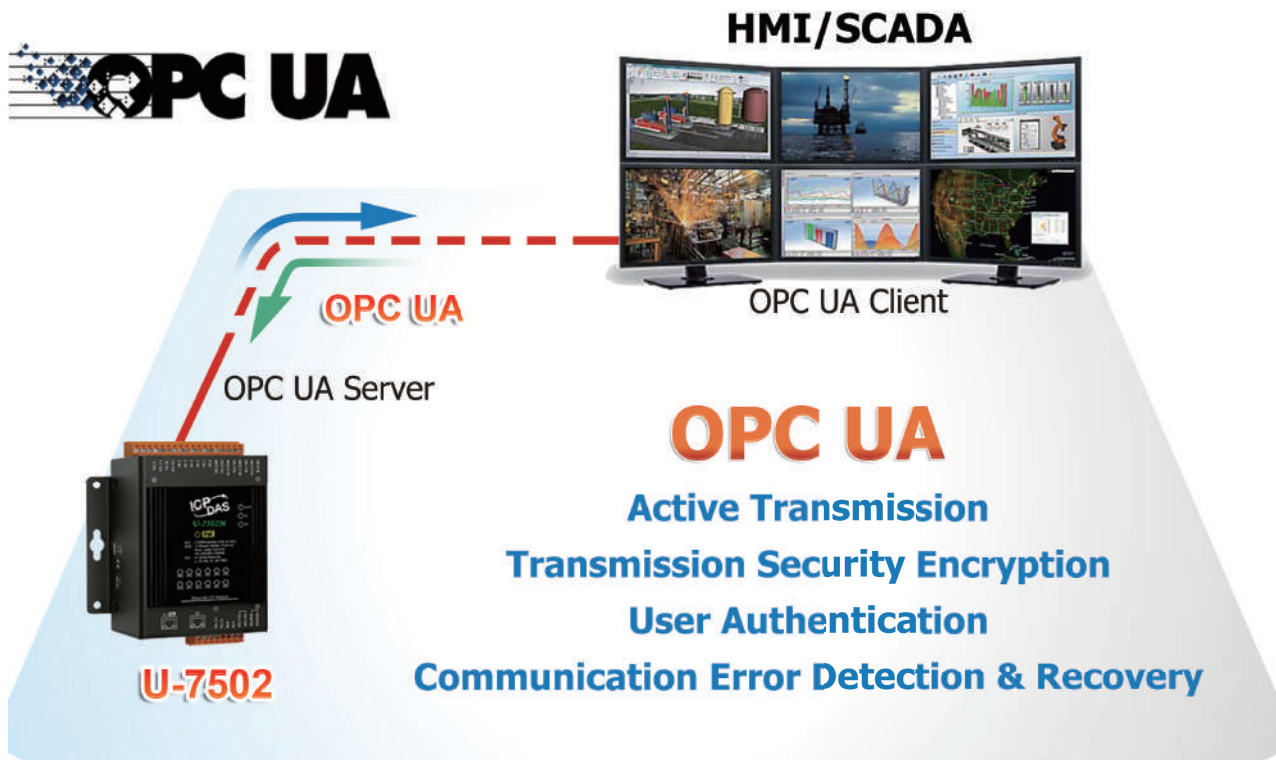
▲ U-7500 Series Built-in OPC UA Server Service

Enhanced Energy Saving

The U-7500 Series supports automated control, intelligently adjusting device operations based on environmental conditions (e.g., light, temperature, pedestrian flow). For instance, they can dim lights based on natural light or turn off air conditioning when no one is present, ensuring energy savings.

Stability and Security

ICP DAS U-7500 series modules offer industrial-grade stability for 24/7 operation in commercial buildings. They also support encryption and authentication to ensure security and prevent unauthorized access.

Automation Management for U-7500 Series

ICP DAS U-7500 Series is used in a wide range of applications in commercial buildings and can effectively integrate various facilities for automation management:

Lighting Scheduler

Commercial buildings have significant lighting needs. The U-7500 Series controls and monitors lighting, using motion sensors to save energy by turning off lights in unoccupied areas. A preset scheduler automates lighting based on time or location, reducing staff workload and enhancing efficiency.

Ventilation Monitoring

U-7500 Series manages ventilation in commercial buildings by connecting to CO_2 or air quality sensors. It adjusts fan operations to maintain air quality, increasing air changes in crowded areas and reducing ventilation in unoccupied spaces to ensure comfort and lower costs.

Send Messages to Line

U-7500 Series monitors building equipment in real-time, including lighting,

21-storey Building

Central Control (First Floor)

15~21

U-7500 Series

8~14

U-7500 Series

1~7

U-7500 Series
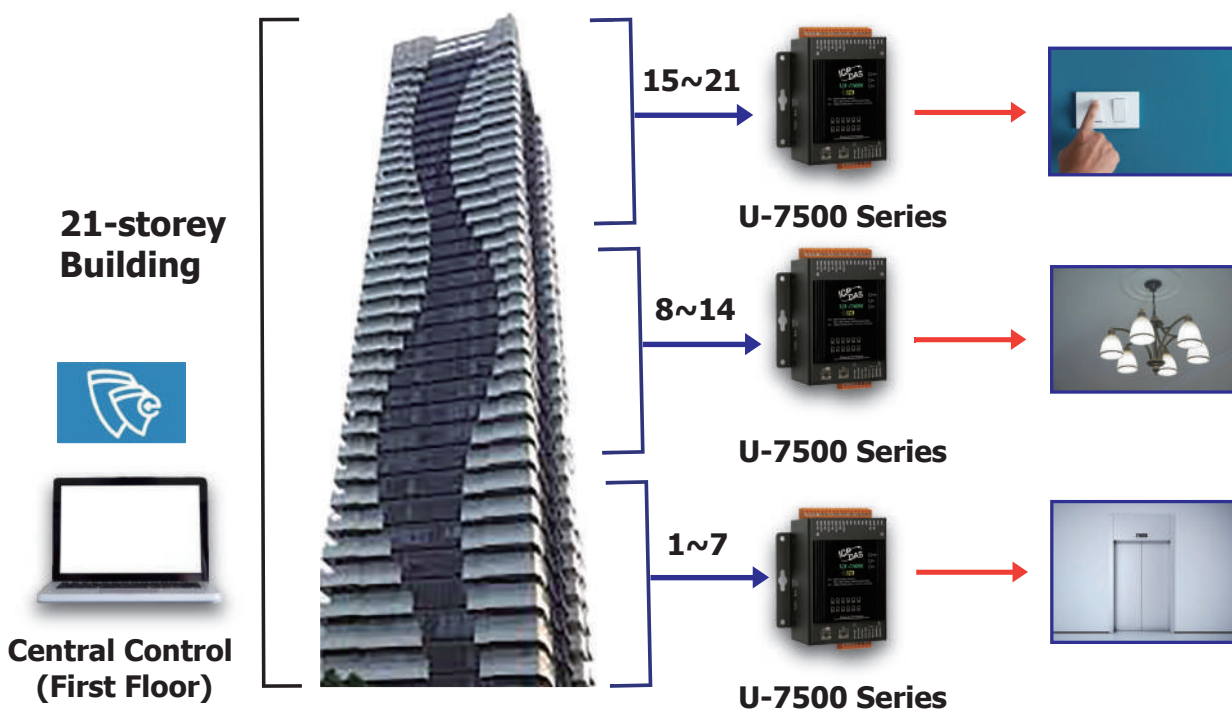
Specified Range

Delete	NO.	Start Time				End Time		
☐	Add	Year	Month	Day		Year	Month	Day
		Hour	Minute	Second		Hour	Minute	Second

Exclude

Delete	NO.	Exclude Date		
☐	Add	Year	Month	Day

Cycle

| Week	Start Time			End Time			Display
Sunday	hr	min	sec	hr	min	sec	Disable
Monday	hr	min	sec	hr	min	sec	Disable
Tuesday	hr	min	sec	hr	min	sec	Disable
Wednesday	11	45	0	11	50	0	11:45:0~11:50:0 Enable
Thursday	hr	min	sec	hr	min	sec	Disable
Friday	hr	min	sec	hr	min	sec	Disable
Saturday	hr	min	sec	hr	min	sec	Disable

U-7502M

Range Scheduler
- Start Date : 2024/10
- Duration : three month
- Work Date : Monday~Friday
- Time Range : 07:00 – 12:00
  13:00 – 17:00

Cycle Scheduler
- Work Date : Monday~Friday
- Time Range : 07:00 – 12:00
  13:00 – 17:00
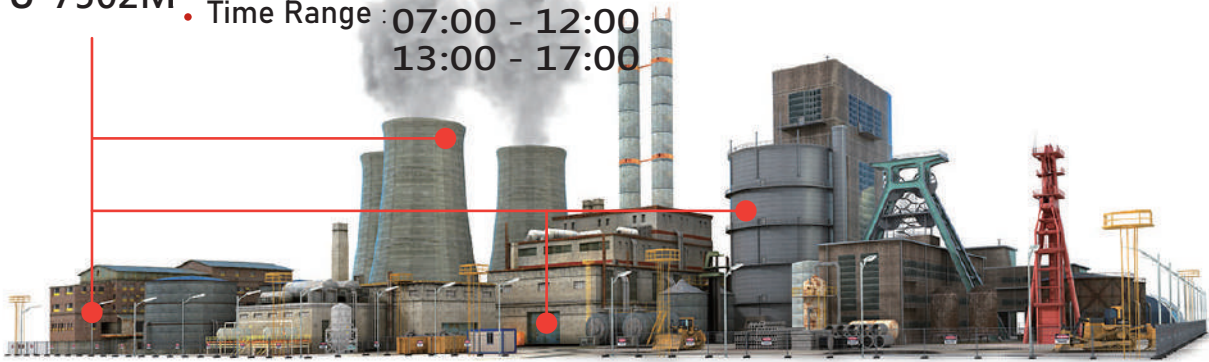
▲ U-7500 series can add the set rules to the schedule

ventilation, and sensors. If a fault or abnormal data is detected, it triggers an alarm and notifies staff via Line.

Conclusion

ICP DAS U-7500 series enhances facility automation in commercial buildings while reducing costs through intelligent control. With flexibility and high performance, it optimizes energy efficiency, supports remote monitoring, and provides building managers with a stable, expandable, and eco-friendly smart building solution.

More Information on ICP DAS U-7500 Series

ICP DAS U-7500 website provides complete and detailed information about U-7500 series products, such as product features, selection guides, catalogs, user manuals, applications, etc. Please refer to the following QR code.■

Guardians of the Marine Environment: 4G Communication Marine Hydrology Remote Monitoring System

ICP DAS introduces a 4G communication-based marine hydrology remote monitoring solution using the GRP-540M-4GE gateway and tM series modules. The system efficiently monitors seawater quality, provides real-time anomaly alerts, and ensures stable remote transmission. With SCADA remote monitoring, it enhances data accuracy, supporting marine environmental protection and sustainable resource development.

By Adam Tsai (Translated by Lynn Tang)

Polluted or significantly altered seawater quality impacts marine life, fishery resources, and ecological balance. Monitoring water quality is vital for maintaining healthy marine ecosystems. ICP DAS offers a 4G communication-based remote monitoring solution using the GRP-540M-4GE gateway and tM series modules, integrating water quality sensors for remote monitoring, reducing wiring costs, and providing real-time anomaly alerts.

Detecting Changes in the Marine Environment: Starting with Key Data

Seawater quality parameters, like temperature, salinity, pH, dissolved oxygen, and pollutant levels, are vital for marine ecosystem health. Abnormal changes can cause coral bleaching, fish die-offs, and red tides, threatening coastal economies and ecologies. The 2020 National Ocean Policy White Paper stresses the importance of accurate water quality monitoring and timely responses for sustainable management. Climate change and extreme weather events heighten the need for effective monitoring systems, which can detect anomalies early and enable rapid responses, reducing impacts on marine ecosystems.

Water quality monitoring provides essential data for scientists to study climate change's impact on marine environments and supports environmental protection policy-making. Establishing a stable and
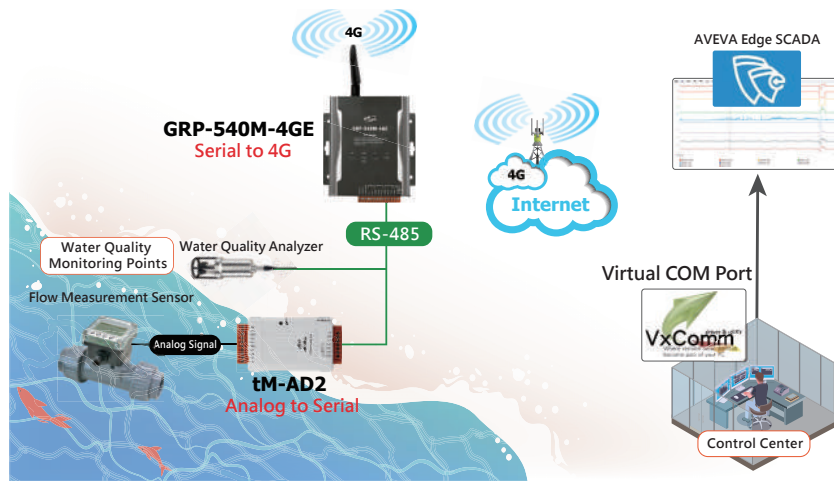
efficient remote hydrological monitoring system is crucial for marine ecological protection and sustainable use of marine resources.

Failing on Land Routes, Take to the Skies: Remote Hydrological Monitoring Solutions

Water quality sensors in remote areas are often kilometers apart, making traditional wiring costly and impractical. The GRP-540M-4GE gateway uses 4G communication technology to ensure stable data transmission in remote areas, reducing wiring costs and enabling remote communication and control of sensors from the monitoring center.
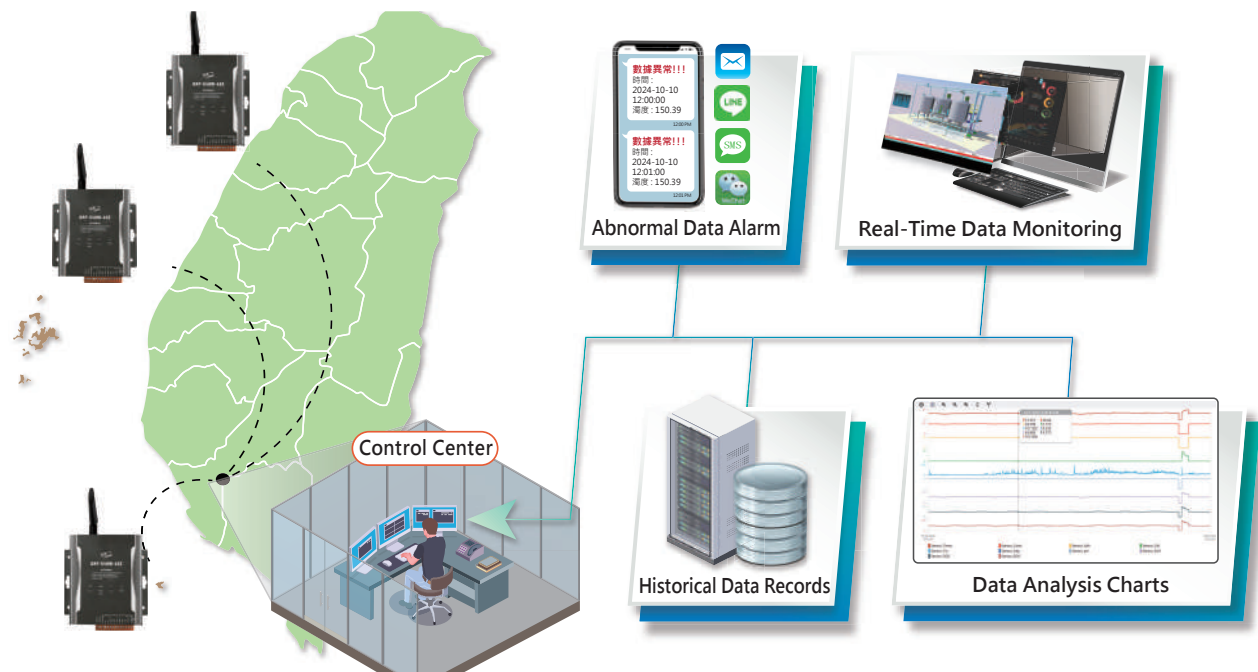
In this system, the GRP-540M-4GE serves as a communication control device, integrating DO (Digital Output) or AO (Analog Output) signals through tM series modules. Using VxServer and VxComm for data relay, the AVEVA Edge SCADA system can remotely read and monitor sensor data in real-time.

System Operations and Real-time Alerts

The system, using GRP-540M-4GE, communicates with water quality instruments, measuring parameters like temperature, salinity, and pH. It sends real-time alerts via API if data exceed preset ranges or

Abnormal Data Alarm

Real-Time Data Monitoring

Control Center

Historical Data Records

Data Analysis Charts

abnormalities occur for immediate action. Historical data and analysis charts help researchers observe long-term ocean water quality trends and assess impacts from activities such as fishing, industrial discharge, and marine transport.

tM Series RS-485 Remote I/O Modules, Flexible Integration with Various Sensors

The tM series modules have diverse I/O communication interfaces for integrating sensors with analog and digital outputs. For instance, using the tM-AD2 module to integrate the 4-20mA flow meter's output into the monitoring system. Read values using DCON commands to calculate the instantaneous flow rate making tM modules ideal for various sensor integrations.

4G Gateway GRP-540M-4GE: From Wired to Wireless Interface Conversion

GRP-540M-4GE supports 4G communication for wireless data transmission, reducing wiring costs. With port mapping functions, VxServer, and VxComm, SCADA systems can remotely read RS-485 sensor data, ensuring seamless data transfer.

Advantages and Future Applications of Remote Hydrological Monitoring

The advantages of this 4G remote

hydrological monitoring are as follows:

1. Enhanced real-time monitoring and response capabilities: 4G communication ensures real-time data updates, enabling quick monitoring of seawater changes and enhancing response capabilities.

2. Improved data accuracy: Multi-point monitoring improves water quality data accuracy, aiding scientific research and environmental management.

3. Remote management and cost savings: Remote monitoring reduces manual checks and physical wiring costs, which is crucial for remote areas.

This 4G-based remote seawater hydrological monitoring system enhances marine environment monitoring's efficiency and accuracy, promoting sustainable development and ecological protection. Future advancements will expand its application in environmental management, achieving a healthier, more sustainable marine environment.

More information is available for ICP DAS tM Series and GRP-540M-4GE

ICP DAS website offers comprehensive and detailed information about the tM series and GRP-540M-4GE products, including specifications, catalogs, and user manuals.

tM Series   GRP-540M-4GE

Distributed
Remote I/O Module

✵ Up to 300 types I/O communication and motion control modules

✵ Analog Input: Voltage, Current, Thermocouple, Strain gauge, RTD, DS18B20 sensor, Transmitter, Thermistor

✵ Analog Output: Current, Voltage

✵ Digital Input / Output : DC, AC, Counter, Encoder, Relay, Solid State Relay, PhotoMos, PWM

✵ Dual Watchdog

✵ Electrostatic and Electrical Surge Protection
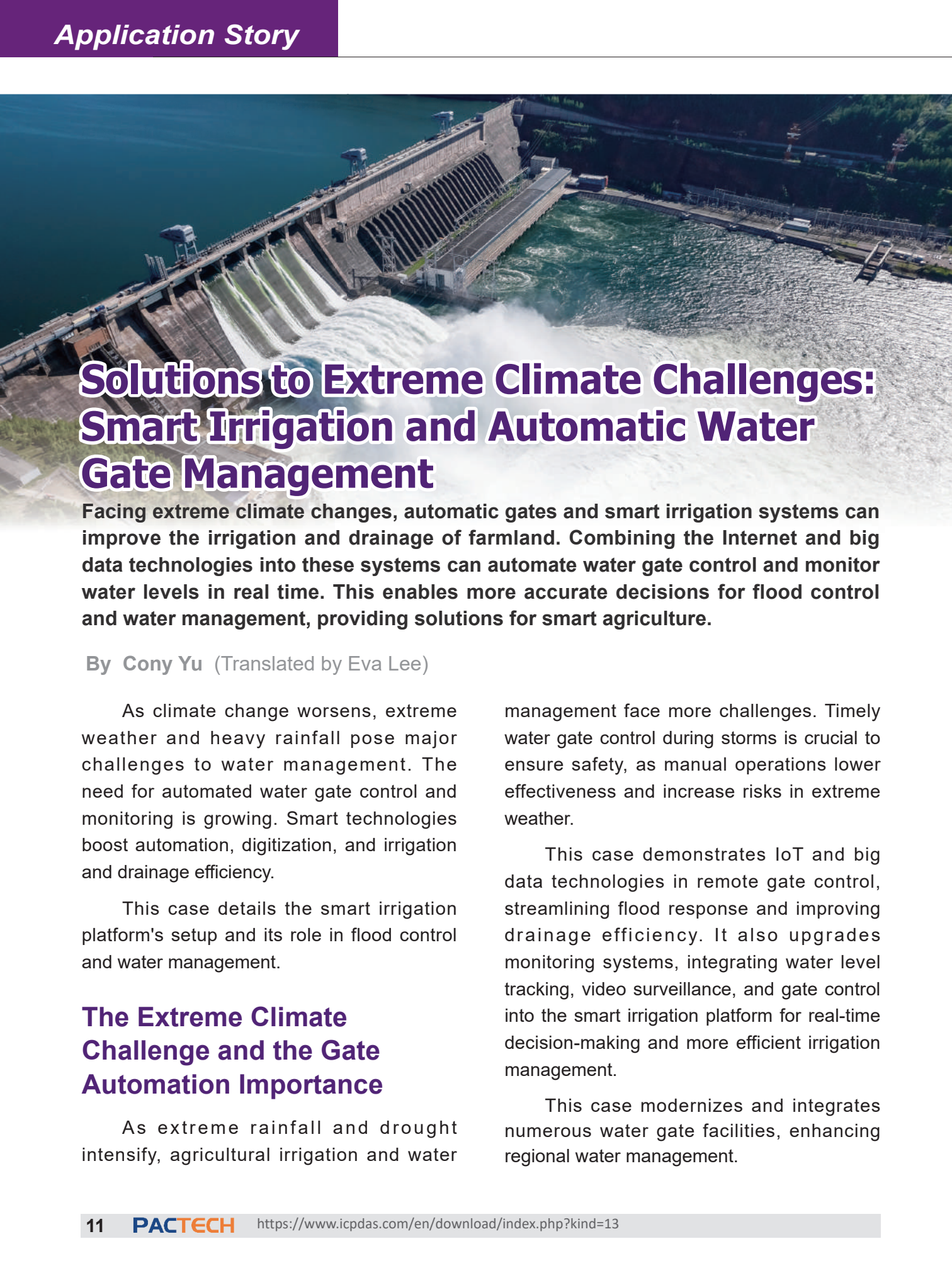
✵ 3000V Surge protective function

PLCs

I/O Modules

Water Leakage Detection

Humidity

AC

Voltage

Temperature

Liquid Level

Pulse Counting

Current

Pressure

Resistance

Illuminance

Modbus
tM series

I-7000

M-6000

DeviceNet
CAN-2000D

EtherNet/IP
EIP-2000

USB
USB-2000

MQTT
MQ-7200M

FRnet
FR-2000

EtherCAT
ECAT-2000

CANopen
CAN-2000C

BACnet
BNET-5304
BNET-5310

PROFI BUS
PROFI-5000

PROFINET
PFN-2000

OPC UA
U-7500M

WiFi
WF-2000

ZigBee
ZT-2000

Modbus
ET-2200
ET-7000/ET-7200
I/O Expansion Unit

Solutions to Extreme Climate Challenges: Smart Irrigation and Automatic Water Gate Management

Facing extreme climate changes, automatic gates and smart irrigation systems can improve the irrigation and drainage of farmland. Combining the Internet and big data technologies into these systems can automate water gate control and monitor water levels in real time. This enables more accurate decisions for flood control and water management, providing solutions for smart agriculture.

By **Cony Yu** (Translated by Eva Lee)

As climate change worsens, extreme weather and heavy rainfall pose major challenges to water management. The need for automated water gate control and monitoring is growing. Smart technologies boost automation, digitization, and irrigation and drainage efficiency.

This case details the smart irrigation platform's setup and its role in flood control and water management.
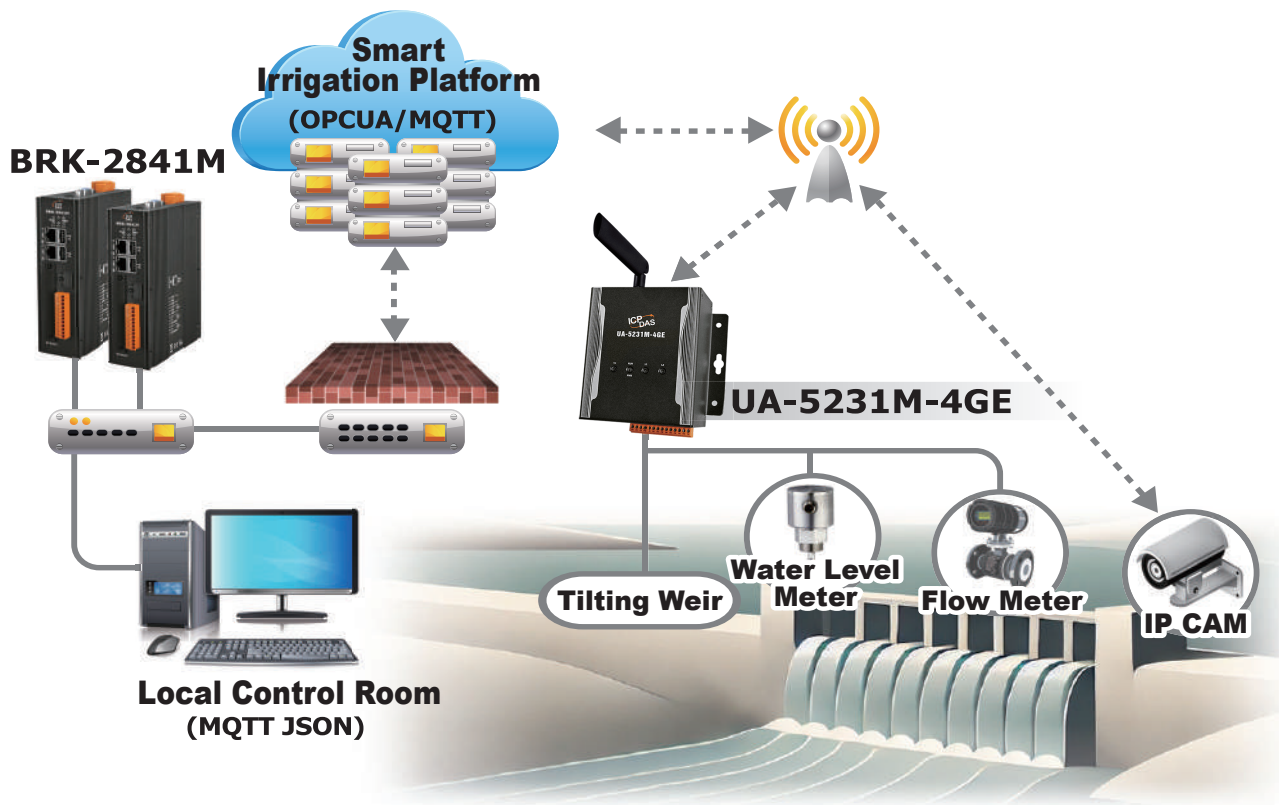
The Extreme Climate Challenge and the Gate Automation Importance

As extreme rainfall and drought intensify, agricultural irrigation and water management face more challenges. Timely water gate control during storms is crucial to ensure safety, as manual operations lower effectiveness and increase risks in extreme weather.

This case demonstrates IoT and big data technologies in remote gate control, streamlining flood response and improving drainage efficiency. It also upgrades monitoring systems, integrating water level tracking, video surveillance, and gate control into the smart irrigation platform for real-time decision-making and more efficient irrigation management.

This case modernizes and integrates numerous water gate facilities, enhancing regional water management.

Smart Irrigation Platform (OPCUA/MQTT)

BRK-2841M

UA-5231M-4GE

Tilting Weir

Water Level Meter

Flow Meter

IP CAM

Local Control Room
(MQTT JSON)

Application of Smart Irrigation and Drainage Management System

Key to Building a Smart Irrigation and Drainage System

In the smart irrigation system, UA-5231M-4GE and BRK-2841M are keys. The UA-5231M-4GE handles data collecting, computing, transmitting, and control, with features like scheduling, logic control, event alerts, and secure data encryption. The BRK-2841M provides redundancy, data storage, logic control, event/image alerts, dashboards, and secure data transmission.

Remote Operation Features of Gate Control Stations

The remote gate control system is central to this case. It allows staff to control water gates in real time via the smart irrigation platform, removing the need for on-site operation. Each gate has controllers, control panels, PoE switches, and network cameras for monitoring. This setup digitizes and automates gate operations, reducing the risk for staff during extreme weather.

Hydrological Monitoring and Real-Time Video Surveillance

Besides remote control, monitoring of the water level is a spotlight. Sensors at each gate send real-time data to the smart irrigation platform, allowing managers to track water levels and adjust gate operations efficiently.

With network IP cameras, real-time video monitoring lets staff remotely observe gates

and surroundings, improving decision-making. This feature is especially valuable during flood control, boosting the speed and accuracy of responses.

Data Integration and Smart Irrigation Platform

The smart irrigation platform integrates water level and video data, enabling centralized management of gate locations, water levels, and flow rates for region-specific control. It also stores historical data for analysis and irrigation optimization.

The platform is scalable, supports remote gate control, and connects with other IoT devices like soil sensors and weather systems, enhancing irrigation automation and intelligence.

Application Effectiveness of Remote Gate Control System

Flood Control Response Efficiency

The remote gate control system greatly improves flood response. Previously, manual on-site operations during heavy rain were risky and inefficient. Now, managers can adjust gates remotely, reducing risks and ensuring timely drainage, protecting residents from floods.

Improving Agricultural Irrigation

The smart irrigation platform integrates data like water levels and flow rates, allowing flexible irrigation based on seasons, water supply, and soil conditions. It enhances

irrigation efficiency, reduces water waste, and promotes environmentally friendly agricultural practices.

Data-driven decision support

The large amount of water data collected by the monitoring equipment enables automated gate control and data-driven decision support. This helps managers optimize gate operation schedules, analyze water demand, and predict future trends.

Future Prospects of Water Resources Management

This case has achieved remarkable results. It still faces challenges like network coverage and stability in remote areas. These may affect the remote operation of gates and real-time data return.

Another direction to consider is how to share and utilize data securely. The future of smart irrigation lies in interconnected, intelligent platforms that integrate with various devices to achieve efficient, comprehensive management.

Conclusion

Using remote gate control technology, IoT, and big data has increased automation in irrigation and drainage management and effectively responded to extreme weather challenges.

This platform makes irrigation more precise, efficient, and environmentally friendly, setting a successful example for future agricultural development. As technology

advances, smart irrigation and automated water gate control will be applied to more areas, contributing to sustainable agriculture.

More Information about UA-5231M-4GE and BRK-2841M

ICP DAS website provides complete and detailed information about UA-5231M-4GE and BRK-2841M products, e.g. product Data Sheets, Brochures, manuals, etc. Please refer to the QR code.■

UA-5231M-4GE   BRK-2841M

IT-OT Connection
UA-5231
IIoT Gateway

Features
❋ Built-in OPC UA Server Service
❋ Built-in MQTT Broker Service
❋ Supports IFTTT Logic Control and Notification
❋ Supports Cloud IoT Platform Connectivity
❋ Wizard Project Guiding Function
❋ Supports Ethernet and Serial Comm. Modules
❋ Save I/O Data Directly into Remote Database

CRM
SCM
PLM
APS
ERP
MES

Publish
Subscribe

InduSoft

TP-6150

MQTT Pub

IIoT Communication Service
MQTT Broker

SQL

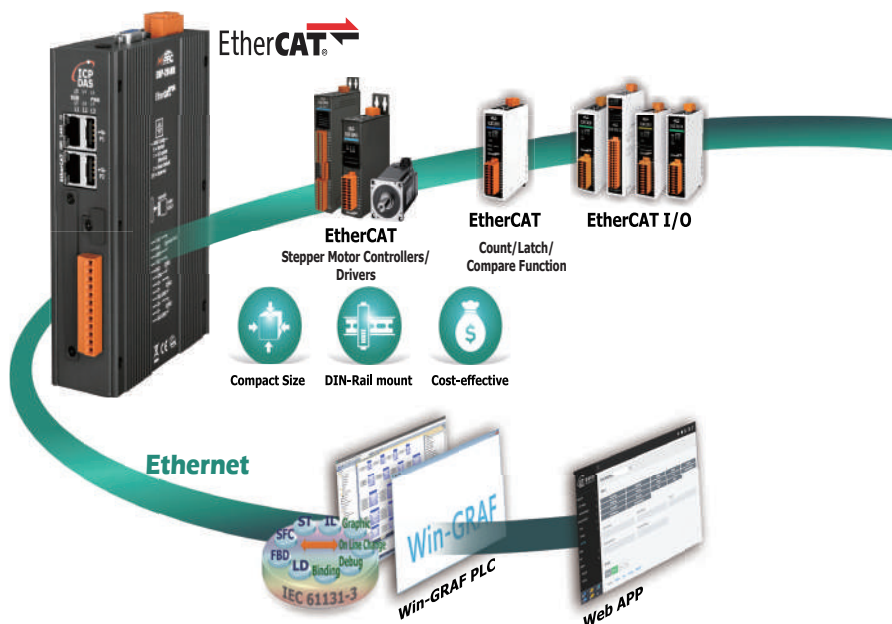Modbus RTU Devices | MQTT Devices | RS-485 Device | EtherNet/IP Device

EMP-2848M Ideal for Compact Motion Controller

The EMP-2848M Compact Motion Controller features multi-axis control, powerful performance, and compact design. It supports various programming languages and industrial protocols for efficient automation and data transfer for industrial applications.

By Bryan Huang (Translated by Carol Hsu)

Modern industrial automation demands stable, high-performing, compact, and versatile controllers. A reliable, multifunctional controller is essential in space-limited or harsh environments.

The EMP-2848M is a high-performance compact motion controller designed to meet such needs. As a Soft PLC-based solution, it combines powerful motion control, metal casing design, and compact size to handle complex environments. It ensures efficient industrial control and

EtherCAT

EtherCAT
Stepper Motor Controllers/ Drivers

EtherCAT
Count/Latch/ Compare Function

EtherCAT I/O

Compact Size   DIN-Rail mount   Cost-effective

Ethernet

Win-GRAF

Win-GRAF PLC

Web APP

ST IL Graphic
SFC   On Line Change
FBD   Debug
LD Binding
IEC 61131-3

supports various programming languages and communication protocols.

Win-GRAF Workbench

The EMP-2848M is equipped with Win-GRAF Workbench development software, which provides a powerful and flexible PLC programming environment to help users complete various industrial control applications effectively. The workbench has a wide range of functions.

- Support Multiple Programming Languages: Conforms to the international standard IEC61131-3 PLC programming languages, including Sequential Function Chart, Structured Text, Function Block Diagram, Ladder Diagram, and Instruction List.

- Language Conversion Function:
  Allows users to convert programs between languages, which is ideal for teamwork or projects requiring different languages at various stages. Developers can also use ST syntax in LD and FBD programs, combining graphical design and logic for more flexible development.

- Extensive Library:
  Covering a wide range of common industrial automation functions, it provides developers with a wide variety of ready-to-use modules and functional libraries, helping to reduce programming effort. Libraries for motion control, I/O, math, and data processing are predefined, speeding up development,

reducing repetitive programming, and enhancing efficiency and accuracy.

- Support Customized Library:
  In addition to the built-in libraries, the PLC supports customized libraries, allowing developers to create solutions based on project requirements and increasing the system's flexibility and adaptability.

- Spy List:
  Users can monitor selected variables on one screen and observe real-time changes for intuitive and efficient testing. This helps them quickly detect system problems and make adjustments and optimizations in real-time.

Support Multiple Industrial Automation Protocols

The EMP-2848M supports a wide range of common industrial automation protocols and can be flexibly integrated into various industrial control systems to provide seamless data exchange.

EtherCAT Protocol

- Multi-axis motion control: EtherCAT's high-speed synchronization supports servo motion control of up to 16 axes for complex multi-axis applications.

SPY LIST · PROGRAMMING · EXTENSIVE LIBRARY · DEBUG · **Win-GRAF Workbench** · DATA BINDING
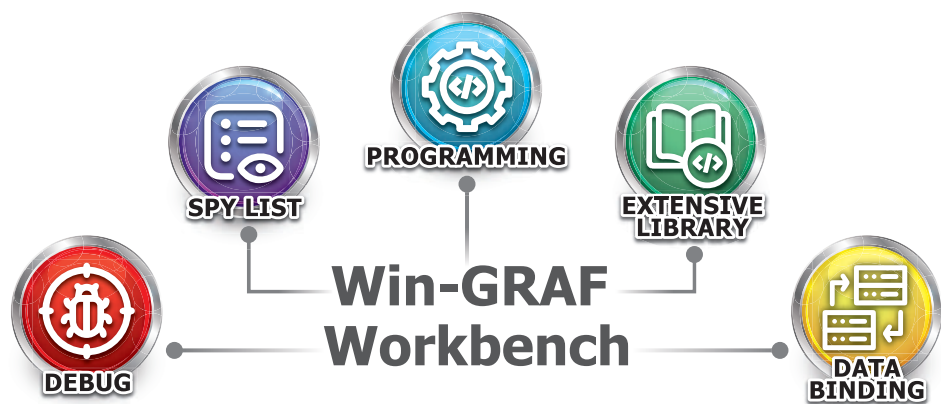
- High-performance I/O modules: Updates up to 128 slave modules in 500μs for real-time response.
- Distributed control systems: EtherCAT's flexible topology and efficient data transfer suit large factory applications.

Modbus Protocol

- Simple and easy: Modbus's intuitive design ensures easy implementation in industrial automation.
- Open standard: Modbus is an open protocol enabling device interoperability, and enhancing system integration flexibility and compatibility.
- Support Modbus variants: Support Modbus TCP (Master/Slave) and Modbus RTU/ASCII (Master/Slave).

OPC UA Protocol

- Real-time Monitoring: Upper-level systems (e.g., SCADA) can access PLC data in real-time for monitoring and analysis, improving operational efficiency.

- Standardized Protocol: OPC UA ensures seamless communication between devices from different manufacturers, reducing integration complexity.
- High data security: OPC UA has a strong security protection mechanism that prevents unauthorized access to critical system data.

User-friendly Web Management Interface

The EMP-2848M's intuitive web interface enables easy system configuration, management, and maintenance via any browser, with no extra software needed.

- EtherCAT Network Topology Configuration: Supports network topology configuration using slave ESI files. Users can import the ESI file via the web interface, allowing the system to automatically recognize and configure each slave device, simplifying setup and enhancing EtherCAT network efficiency.

SCADA/HMI DCS

OPC UA

Modbus

Stepper Motor Controllers

Digital/Analog IO

Servo Drivers

Digital/Analog IO

EtherCAT.

- Slave Module Parameter Configuration:
  You can set parameters for each slave module, including data update frequency, input/output signal types, and ranges.

- Motion Control Function Configuration:
  It allows users to flexibly configure motion control functions. Users can set parameters such as multi-axis servo control, speed, and position control according to different application requirements.

- Testing of Motion Control Axes:
  Perform a real-time axis motion test to verify motion parameters and directly view key data like status, speed, and position on the interface.

- Visual Module Data Interface:
  Intuitive visual data acquisition and control allow users to monitor DAQ module data, perform real-time control, and easily understand system status for simpler operation.

- Easy Troubleshooting:
  The built-in EtherCAT diagnosis and log functions quickly locate and resolve issues. The diagnosis function displays node statuses for problem detection, at the same time, the log records the operating history and error information, providing a detailed basis for troubleshooting.

- Firmware Updates:
  Quick firmware updates: View the current version, upload the latest firmware, and update directly to ensure the system is always in the best state and has the latest functions.

Conclusion

The compact and rugged EMP-2848M adapts to harsh industrial environments, integrating control components with various programming languages and protocols. It offers efficient, stable, and flexible solutions for motion control and automation in space-limited areas.

More ICP DAS EMP-2848M information

ICP DAS EMP-2848M web page provides complete and detailed information about EMP-2848M series products, such as product specifications, catalogs, user manuals, applications, etc. Please refer to the following QR code.■

PMC-2241M-iWSN IIoT Power Meter Concentrator: A New Option for Wireless Power Monitoring

The PMC-2241M-iWSN provides real-time electricity information collection, power management, data recording, and remote alarm notifications. It integrates with iWSN wireless meters for IoT monitoring, solving wiring difficulties. Supporting multiple communication protocols, it connects with SCADA, IT, and IoT systems, aiding enterprises in smart electricity management.

By Tomy Lai (Translated by Lynn Tang)

PMC-2241M-iWSN, developed by ICP DAS, offers electricity information collection, power demand management, data recording, and remote alarm notification. This intelligent power meter management concentrator exclusively supports iWSN wireless meters..

Functions of PMC-2241M-iWSN

Real-time Collection and Display of Electricity Usage Information

PMC-2241M-iWSN integrates with ICP DAS iWSN wireless power meters via iWSN-200 data concentrator, collecting power usage data. The built-in Web Server allows browser-based review of real-time or historical power data.

Power Demand Management and Alarm Notifications

PMC-2241M-iWSN enhances thought-out power demand management and alarm notification through its IF-THEN-ELSE logic rule capabilities and LINE/Email alarm message sending functions.

Support for Multiple Protocols and Cloud Platform Connections

Function	Description
Operation Interface	Web Page
Power Data Collection	● Dedicated Support for ICP DAS iWSN-9603 Wireless Power Meter. ● Power data collection; Real-time and Historical power data displayed. ● Power data logging and historical power data statistics report provided ● PUE information provided and displayed
Power Demand Management	● Built-in IF-THEN-ELSE logic engine for thought-out power demand management ● Supports ICP DAS iWSN signal sensing modules (iWSN-110X, iWSN-121A, iWSN-1310) to collect sensor data in real time ● Provide message notification function via Email, LINE
Integrate with SCADA/ IT/ IoT System	● Support Modbus TCP/RTU, MQTT, SNMP(v1, v2c), CGI protocols to transmit real-time power data ● Power data logging and power data file auto send-back (by FTP protocol) & recovery when network is resumed after disconnection ● Support DDNS (Dynamic DNS) system ● Support Microsoft Azure, IBM Bluemix IoT Cloud platforms ● Support ICP DAS IoTstar Cloud software

▲ Product Features of PMC-2241M-iWSN

PMC-2241M-iWSN supports multiple IT/IoT protocols and seamlessly connects with SCADA, IT, and IoT systems for electricity data analysis. It also connects with cloud services like IoTstar software from ICP DAS, Microsoft Azure, and IBM Bluemix.

Advantages of Pairing with iWSN Wireless Meters and Sensor Modules

Excellent Signal Penetration and Anti-interference Performance

iWSN modules use 433MHz low-frequency wireless communication for excellent signal penetration, noise resistance, and anti-interference. It's ideal for IoT monitoring with high wireless data transmission requirements, solving on-site wiring issues.

Multiple Power Supply Options

iWSN wireless products offer sensor modules for AC voltage, current, power, temperature, and 4-20mA, meeting various monitoring needs with stable wireless transmission.

Quick and Easy Setup

The iWSN series modules offer various power and charging options, easily set up with DIP switches. This simplifies and speeds up system setup, reducing time and maintenance costs, making it an ideal solution for wireless communication and monitoring applications.
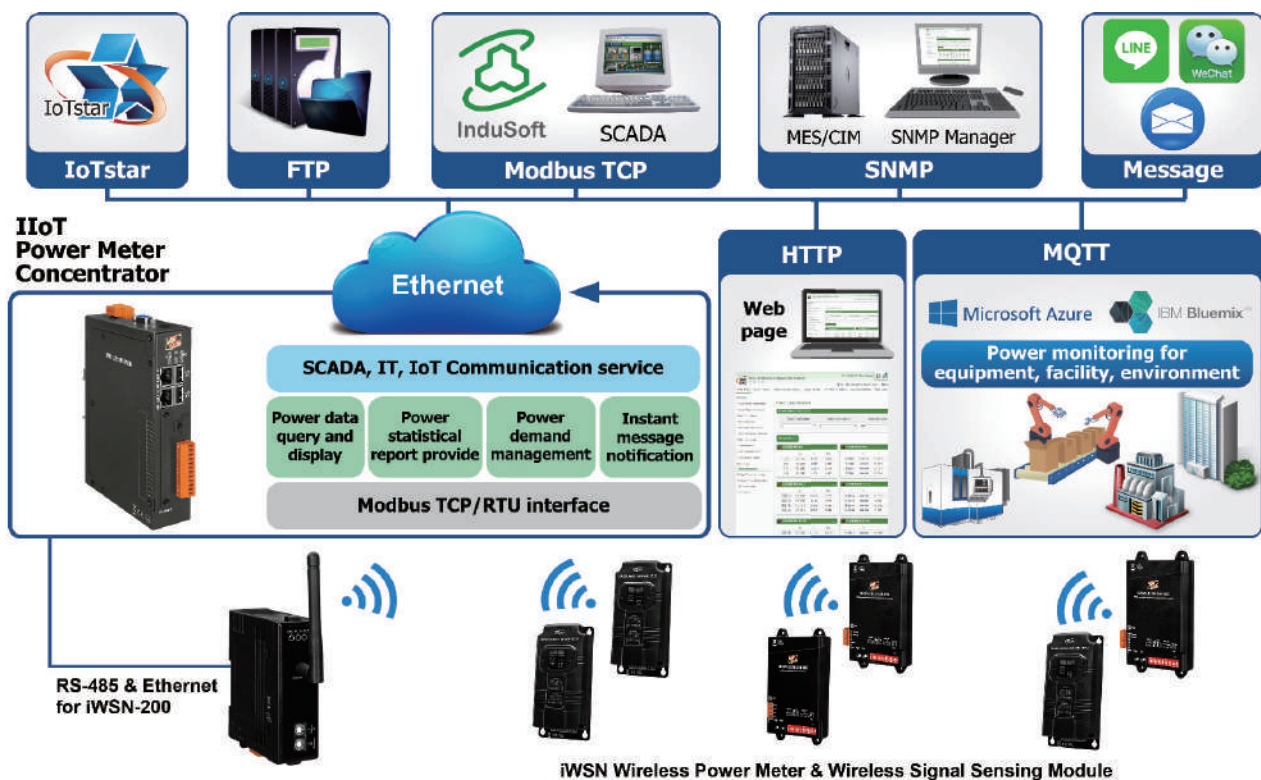
▲ PMC-224xM-iWSNseries can connect to iWSN wireless meters, becoming an efficient solution for wireless power monitoring.
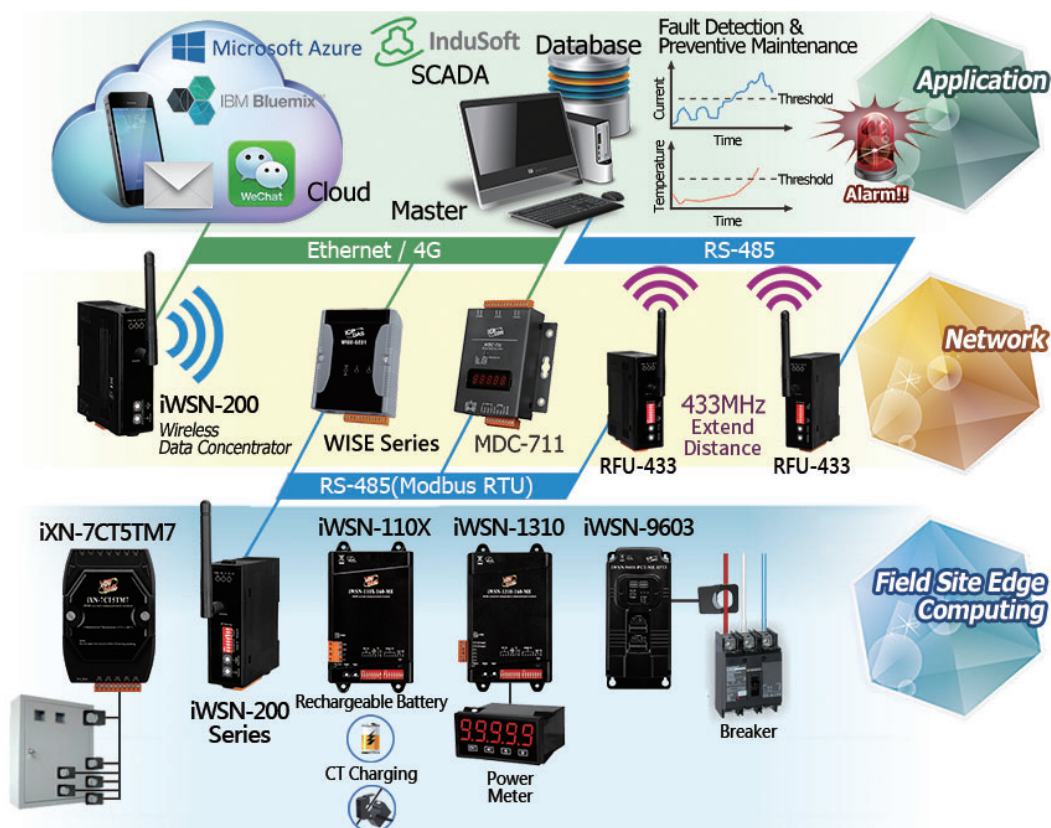
Comparisons of PMC Series Products

Below is a comparison of the features and interfaces of the current ICP DAS PMC series products for reference:

Model	PMC-2241M-iWSN(New) PMC-2241M		PMC-5231 PMC-5231M
CPU	Single-core 32-bit ARM CPU 1GHz		
Ethernet	10/100/1000 Base-TX × 2		10/100/1000Base-TX × 1
microSD	Yes, Up to 32GB		
Supported PM Types	Support ICP DAS iWSN Wireless Module[1]	Support ICP DAS Modbus Power Meter[2]	
Power Data Collection	Yes		
Data Recording and file transmission	Yes (Support Data Recovery Mechanism)		
Power Consumption Report	Yes		
Power Demand Management	Yes		
Real-time Notify	Email, LINE		
Comm. Protocol	Modbus TCP/RTU, MQTT, SNMP(v1, v2c), CGI, FTP		
Support Cloud Platform	Microsoft Azure, IBM Bluemix		
Support IoTstar	Yes		

*1 Up to 3 iWSN-200 iWSN data concentrators be connected, supporting up to 93 ICP DAS iWSN wireless modules. (Power meter: iWSN-9603; I/O module: iWSN-110X, iWSN-121A, iWSN-1310.)

*2 Support at most "24 ICP DAS Modbus Power Meter modules + 8 Modbus I/O modules". (Support at most 4 ICP DAS PM-4324 series Power Meters.)

Conclusion

When using 'PMC-2241M-iWSN + iWSN Wireless Power Meter' to build a wireless power management and monitoring system, during the whole process of system development, no programming is required; it takes a few clicks on web page to complete all settings; it is easy for the user to quickly view the power data of the devices and furthermore process the data for statistics and analysis. For more details about the PMC-2241M-iWSN, please refer to the following QR code.■
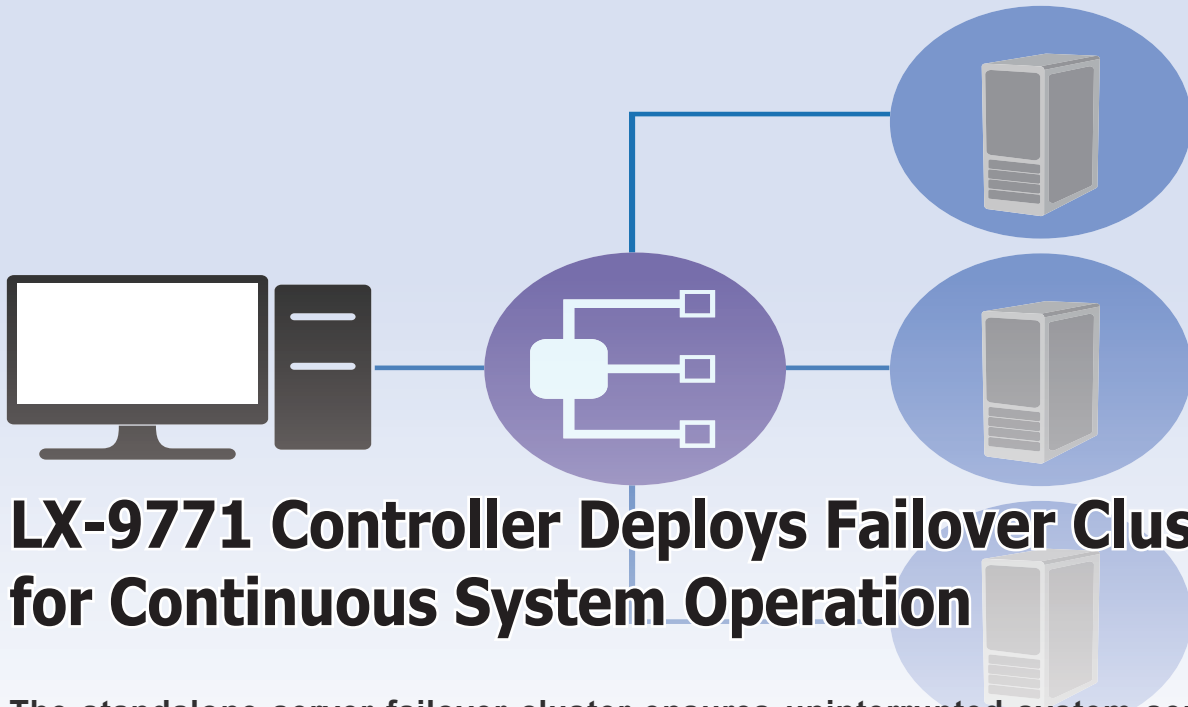
LX-9771 Controller Deploys Failover Cluster for Continuous System Operation

The standalone server failover cluster ensures uninterrupted system services through multi-node redundancy, making it a key solution for the stability of enterprise IT systems. The process, from LX-9771 controller installation to failover testing, is simple and cost-effective, helping businesses achieve high availability and disaster recovery.

By Winson Chen

(Translated by Eva Lee)

Failover Cluster through multi-node redundancy ensures that the IT system transitions seamlessly during failures, providing high availability for business environments like finance, cloud, and production.

As IT systems become essential to operations, minimizing downtime is critical. Failover Cluster offers redundancy and automatic failover between nodes, allowing services to swiftly shift when a node fails, ensuring continuous system operation.

How Failover Clusters Work

A Failover Cluster typically consists of two or more server nodes that run the same application or service. These nodes monitor each other via network connections using a heartbeat mechanism to check their status. If one node fails, the remaining nodes auto-take over the workload, ensuring a seamless service transition. The key mechanisms include:

Quorum

This mechanism prevents "split-brain" by ensuring there are more than half of the nodes in the cluster. A quorum can be achieved by most nodes, disc witnesses, or file witnesses.

Resource Management

Failover Clusters can manage and distribute multiple resources across nodes for load balancing. Applications, databases, or virtual machines can be assigned to different nodes.

Automatic Failover

When a node detects the failure of another, it will auto-take over the services on the failed node, and notify the administrator of the issue, to ensure service continuity and availability.

Business Applications and Benefits of Failover Cluster

The Failover Cluster is critical to the IT infrastructure, especially in the following scenarios:

Financial System

Financial institutions must operate 24/7. Any downtime can result in transaction failure or funds loss. The Failover Cluster can ensure the availability of the financial systems.

Cloud Services

Large data centers and cloud computing rely on failover clusters to provide multi-node redundancy and ensure that any failure does not interrupt services.

Production Environment

Failover Cluster prevents downtime of automated control systems or ERP systems in manufacturing, which can lead to delays or significant losses.

Simple Steps for Failover Cluster (Using two LX-9771 as an example)

Following is a simple step-by-step guide to building a Failover Cluster, including installing, configuring, and testing the VIP.

1. **Install the relevant packages**

    Install the required packages, Pacemaker and Corosync, on both servers:

    apt-get install pacemaker corosync

2. **Set the hostname and update /etc/hosts**

    Set the hostname of the two servers to node1 and node2, and record their IPs and hostnames in the /etc/hosts file.

    ```
    root@node1:~# cat /etc/hosts
    192.168.2.216 node1
    192.168.2.204 node2
    root@node1:~#
    ```

    ```
    root@node2:~# cat /etc/hosts
    192.168.2.216 node1
    192.168.2.204 node2
    root@node2:~#
    ```

3. **Adjust the configuration file Corosync**

    Edit the file "/etc/corosync/corosync.conf" as follows:

    - bindnetaddr: Set to the IP address of the network card.
    - expected_votes: Set to the total number of nodes, 2 for this example.
    - nodelist: Add information about each node in the file, such as the following format:

```
   nodelist {
     node {
    name: node1
    nodeid: 1
    ring0_addr: 192.168.2.216
   }
   node {
    name: node2
    nodeid: 2
    ring0_addr: 192.168.2.204
   }
}
```

4. **Start the Corosync and Pacemaker services**

    Run the following commands:

    systemctl start corosync.service

    systemctl start pacemaker.service

5. **Verify the Cluster Startup Status**

    If the startup is successful, the system will display a successful message.

    root@node1:~# crm status

    Last updated: Thu Oct 17 16:20:03 2024 Last change: Tue Oc

    Stack: corosync

    Current DC: node2 (version 1.1.14-70404b0) - partition with quorum

    2 nodes and 1 resource configured

    Online: [node1 node2]

    Full list of resources:

6. **Add VIP resource and turn off STONITH**

    To avoid over-testing, turn off the STONITH function and set up a virtual IP (VIP) for testing:

    crm configure property stonith-enabled=false   #disable STONITH

    Next, set the virtual IP(192.168.2.222):

    crm configure primitive ClusterIP ocf:heartbeat:IPaddr2 params ip="192.168.2.222" cidr_netmask="24"

    op monitor interval="10s"

   This step adds a VIP resource called ClusterIP to the Cluster.

7. **Verifying VIP Resources**

    If everything goes well, the system displays that the VIP resource was successful.

    root@node1:~# crm status

    Last updated: Thu Oct 17 16:20:03 2024   Last change: Tue Oc

    Stack: corosync

    Current DC: node2 (version 1.1.14-70404b0) - partition with quorum

    2 nodes and 1 resource configured

    Online: [nodel node2]

    Full list of resources:

    ClusterIP   (ocf::heartbeat:IPaddr2): Started nodel

8. **Test Failover**

    With the Apache default page to test the VIP resource is auto-transferred to the redundant node in case of failure. It will run on the Apache default page of node1.
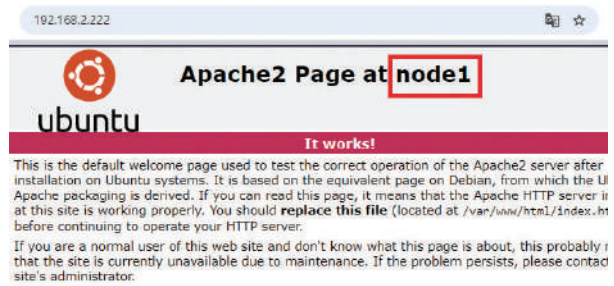
    Simulate Node1 failure, and transfer VIP resources to backup Node2.

    systemctl stop pacemaker.service

```
root@node2:~# crm status
Last updated: Thu Oct 17 16:32:00 2024
Last change: Tue Oc
Stack: corosync
Current DC: node2 (version 1.1.14-70404b0) -
partition with quorum
2 nodes and 1 resource configured
Online: [ node2 ]
OFFLINE: [ node1 ]
Full list of resources:
ClusterIP       (ocf::heartbeat:IPaddr2):
Started node2
```
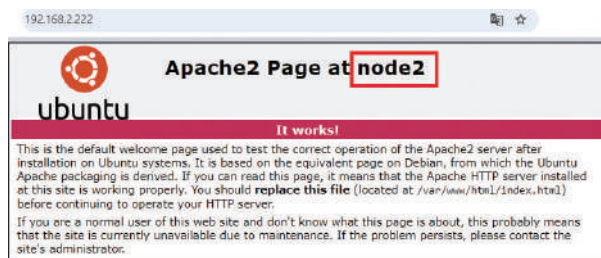
The VIP has been successfully transferred to Node2, shown on Node2's Apache default page.

Conclusion

A failover cluster helps organizations stay operational during service outages. Its use is growing in finance, manufacturing, and cloud services. Technological advancements will make clusters easier to deploy and maintain, reducing costs and improving availability.

More ICP DAS LX-9771 Information

ICP DAS website provides complete and detailed information about LX-9771 products, e.g. product specifications, catalogs, applications manual, etc. Please refer to the QR code.∎

PM-3133-005P

3-phase Smart Power Meter

By Jason Hsieh (Translated by Eva Lee)

The ICP DAS PM-3133-005P series is a new 5A open-type, three-phase meter hat provides a flexible solution for applications that require uninterruptible installation.

Traditional CTs require power off for installation, posing challenges in applications like data centers. Open circuits on the CT's secondary side can be risky even if power can be cut. The PM-3133-005P's clip-on design allows for installation without power off, simply clamping onto the measurement loop for safe, quick installation, ideal for real-time monitoring.

Clip-on CT

PM-3133-005P

Through-type CT
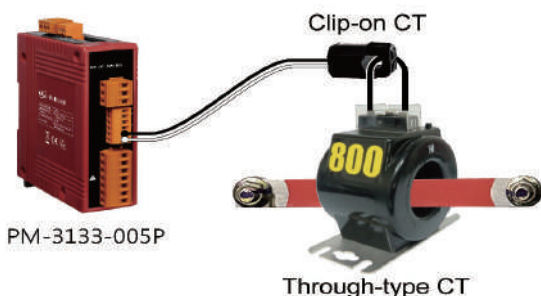
Product Features:

- Bi-directional Energy: To realize precise energy management.
- True RMS Power Measurements: Accurately reflecting actual electricity consumption.
- Supports multiple power system (3P4W, 3P3W, 1P3W, 1P2W): For high applicability.
- Max. 5A current and 500V voltage measurements: To meet various application needs.
- Clip-on CT: For easy and quick installation and no need to power off.
- W Accuracy Better than 0.5% (PF=1; Input Current >0.5A): To ensure data reliability.
- Total Harmonic Distortion (THD): To effectively monitor power quality.
- Supports Modbus RTU, Modbus TCP, or CANopen protocols.
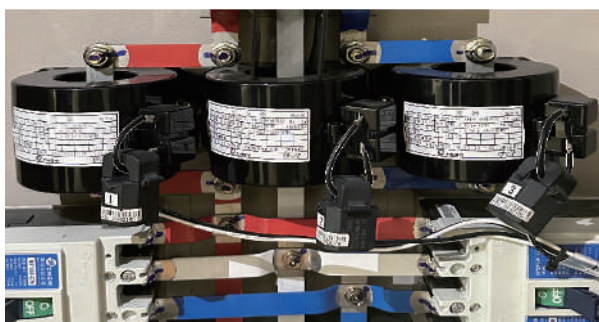
For more information, refer to the QR code. ■

PM-3133-005P   PM-3133-005P-MTCP   PM-3133-005P-CPS

WISE-2841M-4GE
WISE-2841M-4GC

Advanced 4G IIoT Edge Controller

By Michael Lai (Translated by Eva Lee)

The WISE-2841M series is an advanced IIoT Edge Controller by ICP DAS. It provides diverse I/O connections, full data logging, reliable security protection, and powerful IoT communication.

The new products WISE-2841M-4GE and WISE-2841M-4GC support all capabilities of the WISE-2841M and add 4G wireless communication, SMS command reception, and alarm notifications for mobile network applications.

With 4G connectivity, the WISE-2841M-4GE and WISE-2841M-4GC simplify automation where network wiring is challenging, such as roadsides, mountains, or rivers. These devices handle sensor data collection, real-time automation, log uploads, and alarm notifications.

The WISE-2841M-4GE and WISE-2841M-4GC improve security protection with HTTPS for safe web access, SNMP v3 for IT integration, and SFTP/FTPS for secure log downloads.

They also connect to cloud platforms like Amazon Web Services, Microsoft Azure, and IBM Bluemix, and integrate with ICP DAS's IoTstar cloud software for flexible IT/IoT network integration.

Please refer to the QR code for more information about WISE-2841M-4GE /WISE-2841M-4GC.■

WISE-2841M-4GE   WISE-2841M-4GC

Product Information		
Module Name	**Support Frequency Band**	**Support Region**
WISE-2841M-4GE	FDD LTE: B1/B3/B5/B7/B8/B20 MHz	EMEA (Europe, Middle East, Africa), Korea, Thailand, India, Taiwan
WISE-2841M-4GC	FDD LTE: B1/B3/B8 MHz; TDD LTE: B38/B39/B40/B41 MHz	China

Energy Management Solutions

- **Power Data Analysis**
- **Energy Efficiency**
- **Demand Management**
- **Carbon Emissions**

IoTstar Bot Service
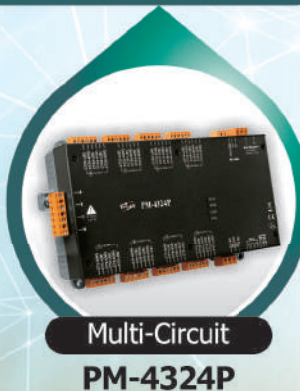
IoTstar

E-Catalog
Energy Management Solutions

PMC-2841M

VPN Client
SNMP agent V3
SFTP
FTPS
HTTPS

PMC-5231
PMC-2241M

PMC-224xM-iWSN
iWSN-200

Concentrators

Modbus RTU | Modbus TCP | EtherNet/IP | CANopen

Transmission Distance 100m

Wired Smart Power Meters

Wireless Smart Power Meters

Single-phase
PM-3114-100

3-phase
PM-2133D-100P
PM-3133i-360P-MTCP
PM-3133-RCT500P

Multi-Circuit
PM-4324P

3-phase 2-loop
iWSN-9603