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ICP DAS CO., LTD.

Energy Management Best Practices

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From Air Conditioning to Power Meters, The National Taichung Theater's Energy Management Cuts 125 Tons of Carbon Annually

The Smart Power Monitoring System uses IoT-enabled smart meters and a centralized platform for precise energy management. It enhances efficiency, security, and scalability, helping public facilities optimize energy use, cut emissions, and ensure stability, which is ideal for smart buildings and green cities.

IoT technology accomplishes 2.5% annual electricity saving

The National Taichung Theater, a major cultural landmark in Taiwan, emphasizes green and smart management. Since 2016, it has used 100% eco-friendly materials and integrated advanced IoT energy management systems with ICP DAS, saving 2.5% of electricity and cutting 125 tons of carbon emissions annually. This sets a strong example for sustainability and future green building innovations.

The core of smart management, ICP DAS 3-phase Smart Power Meter

The National Taichung Theater uses 204 ICP DAS M-3133 series 3-phase smart power meters for precise power monitoring. These meters, with <0.5% accuracy (PF=1), support 3P4W, 3P3W, 1P3W, and 1P2W systems. They also offer reliable data transmission with protocols like Modbus RTU and Modbus TCP.

The ICP DAS 3-phase smart power meter’ s open CT simplifies installation and speeds up data return. It delivers real-time, accurate energy data to the central control system. Backend officers can monitor power usage and adjust configurations anytime, ensuring precise energy management..

Smart Energy Management System for National Taichung Theater

Besides smart meters, the National Taichung Theater's "Central Smart Management System" auto-adjusts air conditioning based on audience density, improving energy efficiency and enhancing the audience experience by controlling temperature, humidity, and airflow.

In addition, the theater adopted a "Visualized Energy Management System" to

review energy data, help management address waste, and ensure efficiency, making its energy management a more precise and smart energy-saving model.

Application Scenarios and Solution Advantages

The Smart Power Monitoring System has significantly improved the theater's energy management:

1. Accurate energy management: Smart meters provide real-time data to optimize energy use.
2. Enhance energy efficiency: Data analysis saves 2.5% annually, offering economic benefits.
3. Reduce carbon emissions: Cut 125 tons annually, supporting green, sustainable development.

Green Vision for Sustainable Development

In 2022, the National Taichung Theater adopted ISO 50001 and trained sustainability managers to enhance energy management. ICP DAS upgraded IoT systems, integrating energy management and data, exemplifying smart energy-saving and environmental protection.

Key Products

PM-3133-100

3-phase Smart Power Meter

- True RMS Power Measurements
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- IEC 61010-1 and EN 61010-1 Standard

PM-3133-RCT1000P

3-phase Smart Power Meter

- Bi-directional Energy
- Current Measurements Up to 1000 A
- Voltage Measurements Up to 500 V
- Rogowski Coil Soft CT for Easy Installation
- 2 Power Relay Output (Form A)

Marine Museum Smart Meter Upgrade Pioneering Energy Conservation with Sub-Meter Billing Management

The Marine Museum upgraded its smart meters, centralizing electricity management for dormitories and administrative areas to boost energy efficiency. Using smart power meters PM-3133 and PM-3114, data is transmitted via the PMC-5231 controller to enable sub-meter billing. The substation integrates high-voltage devices for accurate power distribution. Remote cloud monitoring enhances energy savings, reduces carbon emissions, and supports sustainability.

With advancing technology, public facilities like the Marine Museum are adopting smarter energy management. The museum is pioneering energy conservation and carbon reduction efforts by upgrading smart meters and implementing sub-meter billing.

Challenges of Traditional Energy Management

In the past, the Marine Museum's dormitories and administrative areas used traditional digital meters. Monthly manual meter readings required significant manpower and had the potential for errors. Without real-time electricity data, managers lacked detailed energy usage, resulting in frequent waste.

As electricity demands grew, accurately monitoring dorms, offices, and research areas became challenging. Traditional energy management couldn't meet rising needs, prompting the museum to seek advanced solutions.

Implementation of Smart Meters and Sub-Meter Billing Management

The Marine Museum upgrades its smart meters to improve energy management, starting with dormitories and expanding to research and administrative areas. Smart meters like PM-3133 and PM-3114 record power usage, with data sent to the central system via the PMC-5231 concentrator.

Sub-meter billing allows individual monitoring and billing for each dormitory or area, raising energy awareness. Managers can access consumption data anytime via mobile, tablet, or computer on the cloud platform.

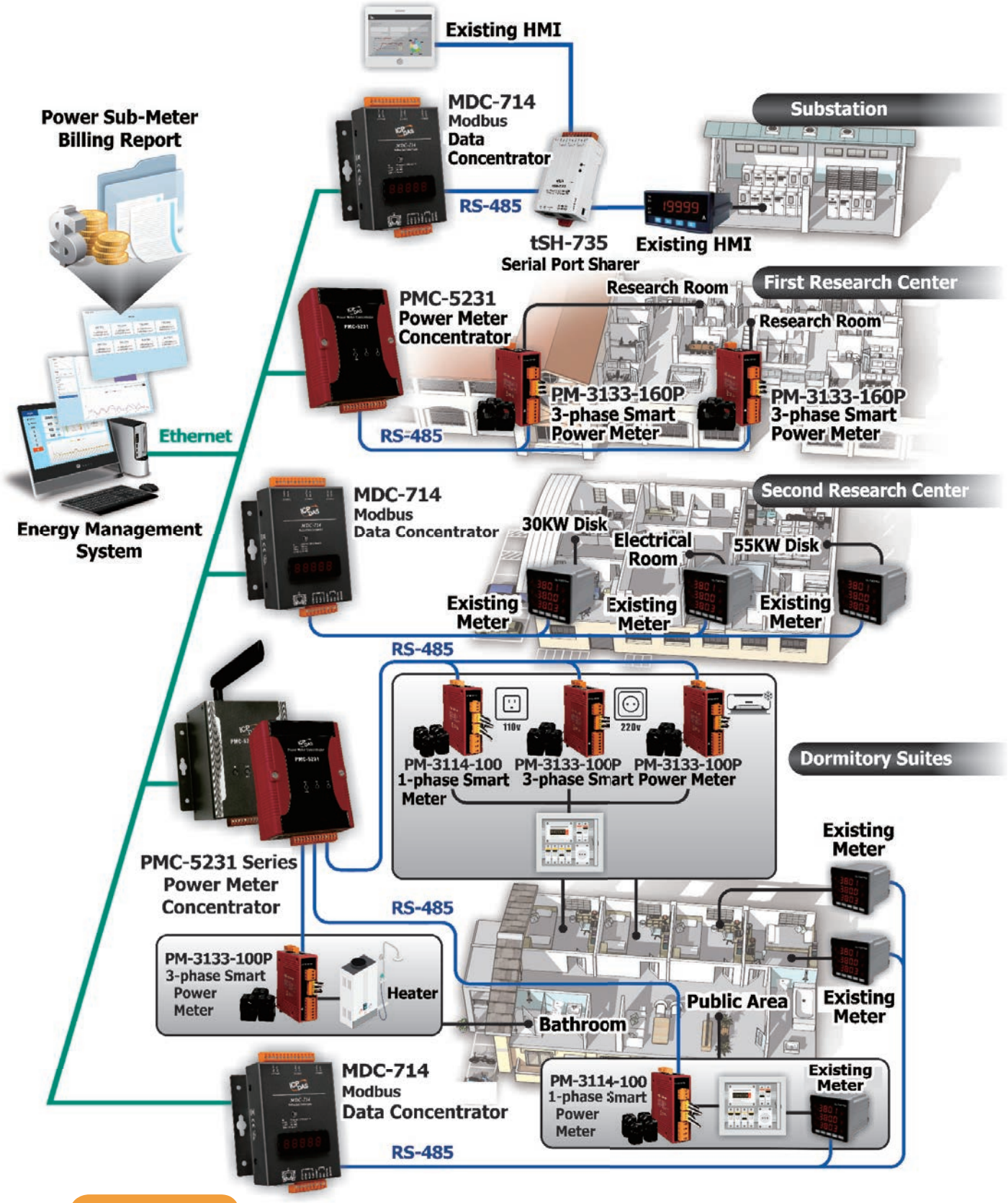
Substation Upgrade and Integration

High-voltage feeders link to the substation, where transformers step down the voltage to 380/220V for dormitories, air conditioning, and server rooms. The MDC-714 concentrator collects meter data via RS-485 for stable, accurate transmission.

The system integration enhances facility-wide energy management by enabling precise power usage monitoring and real-time adjustments, preventing unnecessary waste.

Energy Saving Achievements and Future Prospects

Since the 2021 smart meter upgrade, manual reading costs and energy waste have decreased. Zone billing clarifies power use by dormitories and areas, enabling precise control, cutting costs, and promoting sustainability.



Key Products

tSH-735

Tiny Serial Port Sharer

- Baud Rate and Data Format Conversion
- Two Masters Share One Slave

MDC-714

Modbus Data Concentrator

- Supports up to 8 simultaneous Modbus TCP connections at one time
- Data pool for up to 9600 registers

Smart Public Toilet Friendly System: Energy Saving and Intelligent Future Trend

As demand for smart cities and energy efficiency rises, smart public toilet systems offer innovative solutions. This article will explore the architecture of smart toilet-friendly systems and their contributions to environmental, energy, and social benefits, highlighting how smart technologies enhance comfort, convenience, and sustainability.

In building smart cities, public facility management is moving towards intelligent systems. Traditional toilet management struggles with real-time adjustments, rising energy, and maintenance costs. Key issues during evaluation include:

1. Technical Stability: System stability and compatibility are vital, especially with multi-brand integration.
2. Data Security and Privacy: Smart toilets collect significant data, requiring strong protection against misuse and privacy breaches.
3. User Acceptance: Public education is needed as some users are unfamiliar with smart technologies.
4. Infrastructure Support: Reliable power and internet are essential for smooth system operation.

Collaboration among governments, tech providers, and operators, combined with innovation and education, is key to promoting smart toilet development.

The Perfect Combination of Technology and Environmental Protection

The architecture of smart toilets includes:

1. Smart Lighting System

   Using LC-103H and LC-223H sensors to detect user presence, lighting brightness is dynamically adjusted to prevent energy waste. LED lights reduce energy, while LC-305 monitors each light's current load, ensuring proper operation and energy efficiency.

2. Water-Saving Devices

   The system conserves water with sensor faucets and water-saving toilets, while the iSN-101/S/DIN detects leaks in real-time, minimizing waste.

3. Air Conditioning and Ventilation System

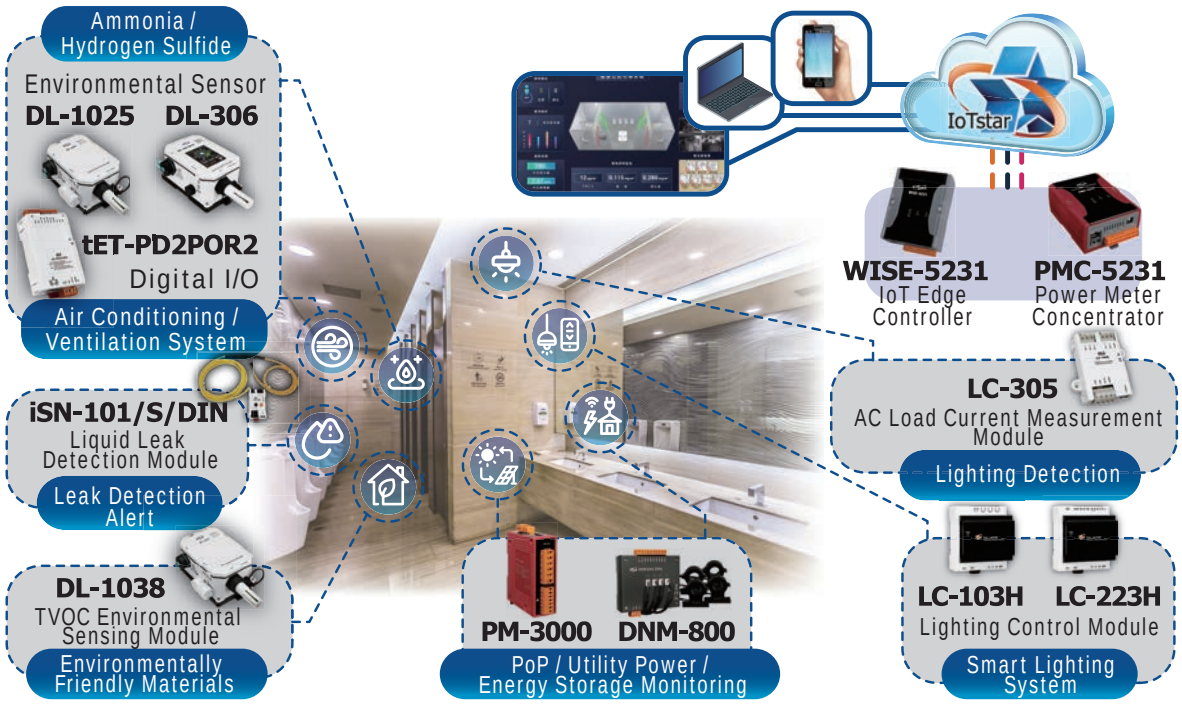
   Upgrade the smart temperature control system with the WISE controller, air box, and digital I/O. Optimize air conditioning and ventilation based on NH3/H2S odor levels to

Key Products

iSN-101

1-channel Liquid Leak Detection Module

- Relay Output for Liquid Leakage Alarm
- Liquid Leak Detection Cable and Leader Cable can be up to 500 meters
- Sensitivity adjustable



prevent overuse.

4. Energy Monitoring System

   The IoTstar/AVEVA Edge energy system monitors energy usage in real time, preventing illegal use and ensuring efficient public resource management.

5. Renewable Energy Utilization

   Use solar power for electricity or solar heaters for hot water in public toilets, integrating IoTstar/AVEVA Edge via PM-3000/ DNM-800 for smart energy management.

6. Smart Cleaning System

   Smart public toilets use cleaning robots and sensors to analyze passenger flow and odor concentration, reducing human resources and ensuring cleanliness.

Intelligent Technology for a Sustainable Future

Implementing smart public toilets enhances urban infrastructure by integrating technology with environmental protection. Their management system collects real-time data to optimize operations and support decision-making. This approach showcases the role of science and technology in promoting sustainability throughout the city.

LC-103H

Relay Output Lighting Control Module with High Power Relay Output

- 3-channel Relay Output Lighting Control
- Support Lighting Module:
  - Incandescent Lamp 8 Sets (40 W/ 220 VAC)
  - LED(Electronic ballast) 10 Sets (40 W/ 220 VAC)

LC-305

5-channel AC Load Current Measurement Module

- AC Current Input Ranges from 0 to 5 A
- Load Current Measurement Accuracy 3%
- Support DCON and Modbus RTU Protocol

High Growth in Energy Storage Technology!
Seizing Green Opportunities in the Energy Transition

An “Energy Storage CUBE” by a Taiwanese automobile manufacturer addresses global energy challenges. The core devices GW-2235i, ET-7250A, and DL-10 enable precise power, security, and environmental monitoring for efficient energy management and market potential.

As the global energy transition accelerates, energy storage technology is essential for addressing the intermittency of renewable sources like solar and wind. This enhances efficiency, drives market growth, and presents significant business opportunities in the energy sector.

Market Opportunities - The Core Driver of Green Economy

The global demand for energy storage is growing due to new technology and government policies. Many countries are offering subsidies for energy storage and new energy management policies are being introduced to encourage its use. Energy technology providers are bringing new products to the market.

The Taiwanese automobile manufacturer has launched "Energy Storage CUBE," a customized solution for the energy storage market. Energy Storage CUBE adapts to diverse energy management needs and provides more efficient power distribution. This technology demonstrates energy storage's role in meeting the energy transition challenges.

Core Technical Challenges for Energy Storage Systems

Energy storage technology faces technical challenges. These include improving battery efficiency, reducing costs, and simplifying installation and maintenance. SMEs have a harder time adopting new technologies because they have longer payback periods.

As technology improves, energy storage is becoming more affordable and easier to use. The Taiwanese automobile manufacturer's "Energy Storage CUBE" combines equipment to provide efficient and flexible energy storage management, helping companies monitor energy flows and use energy more efficiently.

Analysis of the Core Framework

GW-2235i: Mainstay Precision Power Monitoring

The GW-2235i has a gateway function that

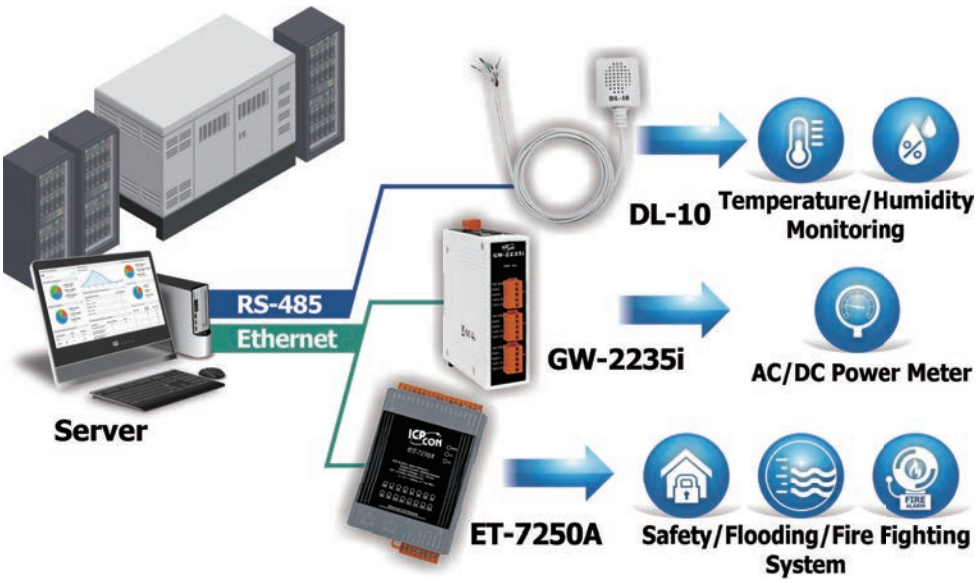
Key Products

GW-2235i

Modbus TCP to RTU/ASCII Gateway

- 2-port Ethernet Switch and 3-port Isolated RS-422/485
- Read-cache ensures faster Modbus TCP/UDP response

enables Modbus/TCP hosts to communicate with serial Modbus RTU/ASCII devices over the network. As the CUBE core monitor, it tracks AC and DC currents in real-time to ensure optimal energy storage system performance in any operating mode. The GW-2235i provides real-time power flow data support for effective energy management.



ET-7250A: Total Security Monitoring

The ET-7250A is a 2-port Ethernet switch with Daisy-Chain topology. As an Ethernet I/O monitoring module, it has built-in 12 digital inputs/counters and 6 digital outputs. This safety device monitors the Energy Storage CUBE's access, fire, and flood protection in real time, ensuring the system reacts to unexpected situations.

DL-10: Environmental Monitoring and System Protection

The DL-10 monitors ambient conditions inside the storage cabinet in real time, adjusting parameters to prevent performance degradation and equipment failure.

Green Opportunities, Unlimited Energy Transformations

Energy storage will be key to the green economy, backed by policy, innovation, and market demand. Early adopters can gain an edge and shape the future energy landscape.

In the global shift towards sustainability, the innovation and application of energy storage technologies will be key forces driving businesses and society towards a greener future. For companies that seize this opportunity, the future holds limitless possibilities.

ET-7250A

Ethernet I/O Module

- 2-port Ethernet Switch for Daisy-Chain Topology
- Built-in 12 Channels DI/Counter & 6 Channels DO

DL-10

Temperature/Humidity/Dew Point Sensing Module

- Measurement Ranges: -25 ~ +75°C and 0 ~ 95% RH
- Accuracy: ±0.4°C; ±3.0% RH

New Energy Storage Cabinets Save Businesses 15% on Energy Costs

As power systems face extreme weather, energy storage cabinets have become key for the industry. It stabilizes power and secures the grid. Energy storage lets businesses save 15% a year on energy costs. Taoyuan City subsidizes energy storage, showing how energy storage technology is poised for growth.

As extreme global weather intensifies, energy systems face unprecedented challenges. Wildfires in California and heatwaves in Europe threaten lives and strain energy supplies. Energy storage cabinets have emerged as a key solution in the industry.

These cabinets offer stable power support and monitor environmental changes in real-time, ensuring the safe operation of energy systems. Through smart management, they help the grid withstand climate-related impacts and secure future energy needs.

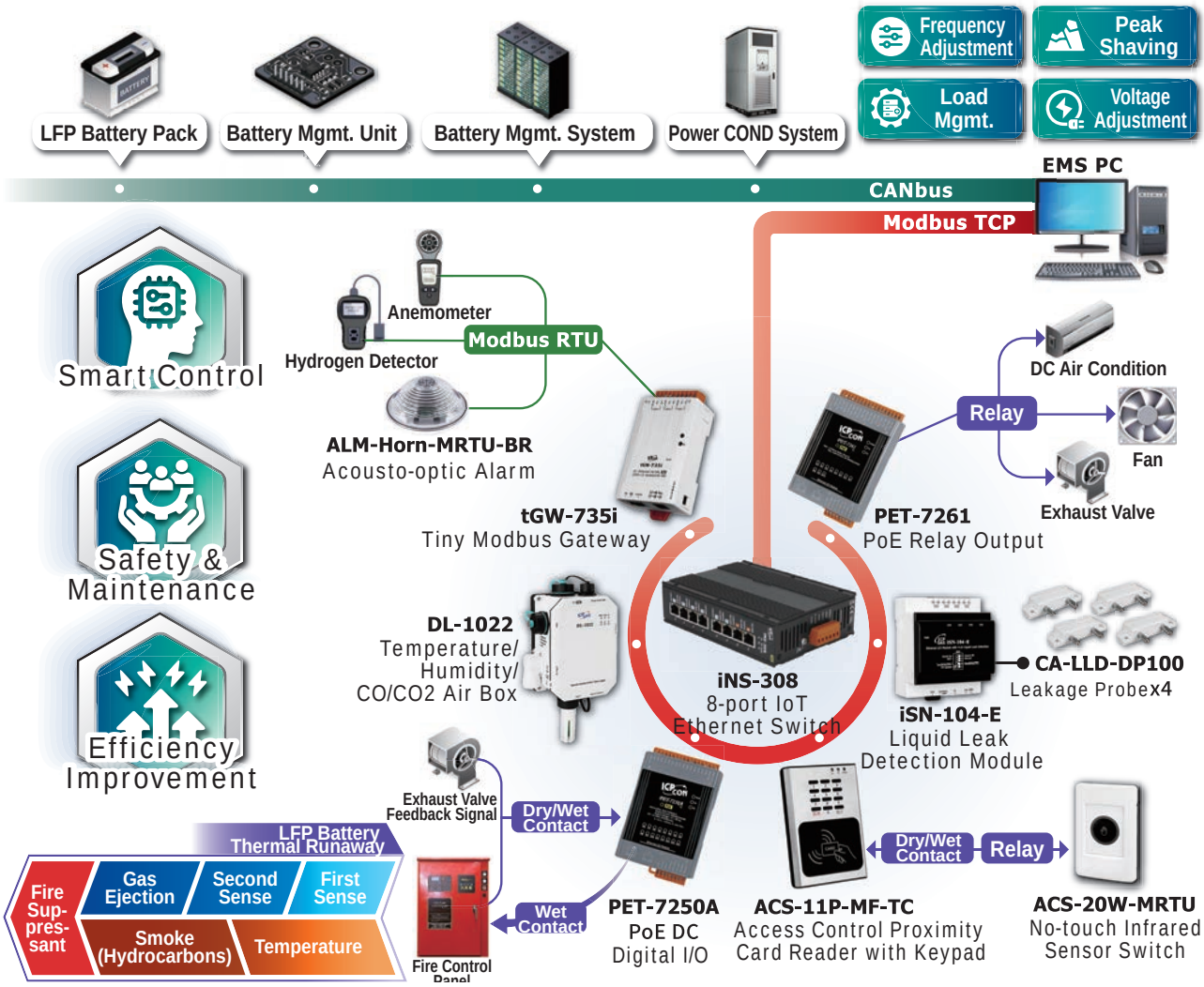
Tech Revolution - Full Protection for Energy Storage Systems

Modern energy storage cabinets optimize power use, reduce costs, and ease grid stress. With Automatic Frequency Control, they track grid frequency in real time to prevent outages and ensure stability.

The "Intelligent Brain" in the Energy Storage Cabinet

Energy storage cabinets use advanced modules and communication tech for precise monitoring and coordination, featuring key components like:

- Communication Protocol Integration: Multiple protocols like Modbus TCP, Modbus RTU, and CANbus allow devices to interconnect and share critical data quickly. This ensures millisecond-level adjustments to handle grid stress or sudden fluctuations.
- Data Exchange and Network Connectivity: The NS-208A Ethernet switch maintains efficient data flow, linking the EMS PC to monitoring modules. This setup ensures rapid data processing, keeping the system stable under heavy loads.
- Monitoring and Sensing Modules: Collect real-time data.
  1. DL-1022 Air Data Logger Module: Monitors gas concentration (e.g. CO, CO2) and records temperature and humidity to ensure optimal battery pack operation and prevent damage.
  2. ET-7261 Network I/O Module: Controls fans and exhaust devices. Activates fan to dissipate excess heat when temperature or gas concentration reaches dangerous range.
  3. iSN-104-E Liquid Leak Detection Module: Monitors lithium battery leakage and sends timely alarms to prevent fire or explosion.
- Battery Management and Power Control: The energy storage cabinet's key modules, like the BMU, BMS, and PCS, monitor the lithium-



ion battery, regulate charging/discharging, ensure safe battery limits, and adapt to grid frequency shifts to prevent instability.

- Alarms and Security Devices: In the event of an anomaly, the system's alarm devices ALM-Horn-MRTU-BR, combined with the ACS-11-MF-TC sensor-based access control and automatic fire protection, prevent external disturbances.

Energy Arbitrage – Enterprise Magic Tool for Energy Saving

With the rise of energy storage, companies save up to 15% on electricity bills by storing and releasing electricity at different times. They are also reducing carbon emissions.

The Taoyuan City Government has launched a $5 million grant program to encourage companies to install energy storage equipment. This will help businesses manage their energy more effectively.

Deep Recognition for ICP DAS Technology

ICP DAS only supplies over 60% of energy storage cabinet products. This high coverage saves customers effort and proves the company's product price/performance ratio advantage.

The ICP DAS CO+CO2+H2 3-in-1 gas detector detects thermal runaway in battery storage, improving safety. Energy storage is still simple, so standardized products suffice, proving the advantages of ICP DAS products in terms of stability and adaptability.

Low Carbon Energy Saving - Application of Air Compressor and Energy Management

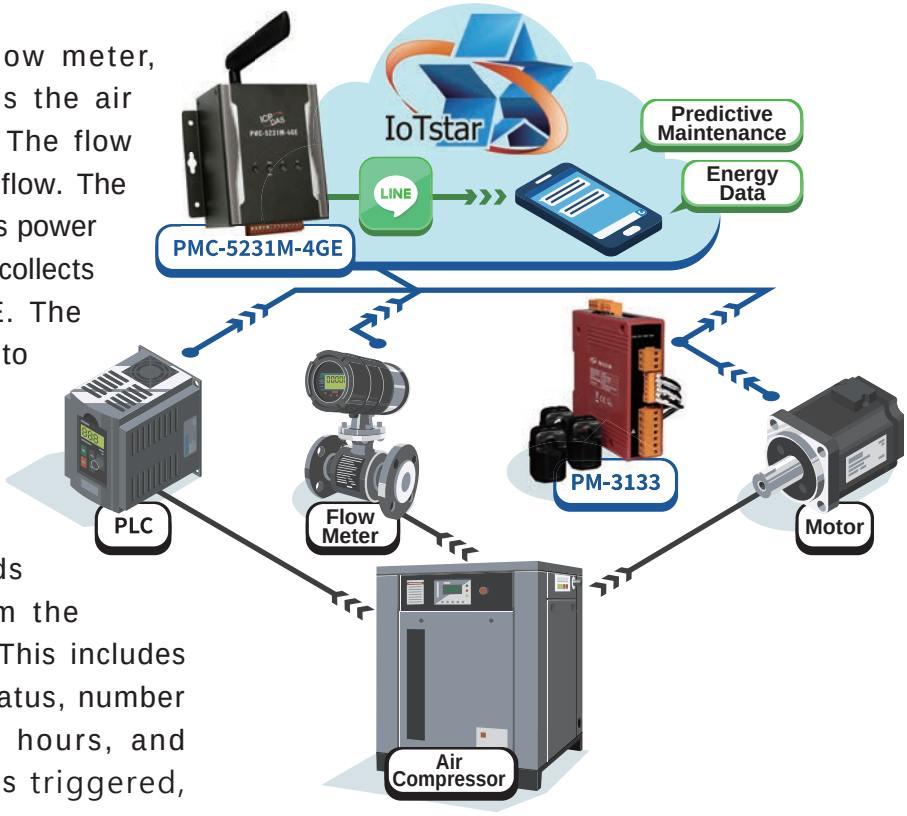
Monitoring and managing energy usage is key to improving efficiency and reducing costs. This paper discusses the ICP DAS solution for monitoring and controlling air compressor energy consumption and optimizing energy management.

The government mandates companies using over 800kW of electricity to save energy, monitor systems, and upload power data. Air compressors are essential for factory production, and a solution that monitors power use and sends maintenance alerts, like ICP DAS PMMS, can help ensure smooth operation.

PMMS: Power Monitoring and Management Solution

System Architecture

The system has a PLC, flow meter, and PM-3133. The PLC controls the air compressor and sensor values. The flow meter detects and totals the gas flow. The PM-3133 monitors the compressor's power performance. The PMC-5231-4GE collects data and sends it through LINE. The system is paired with the IoTstar to present a dashboard.

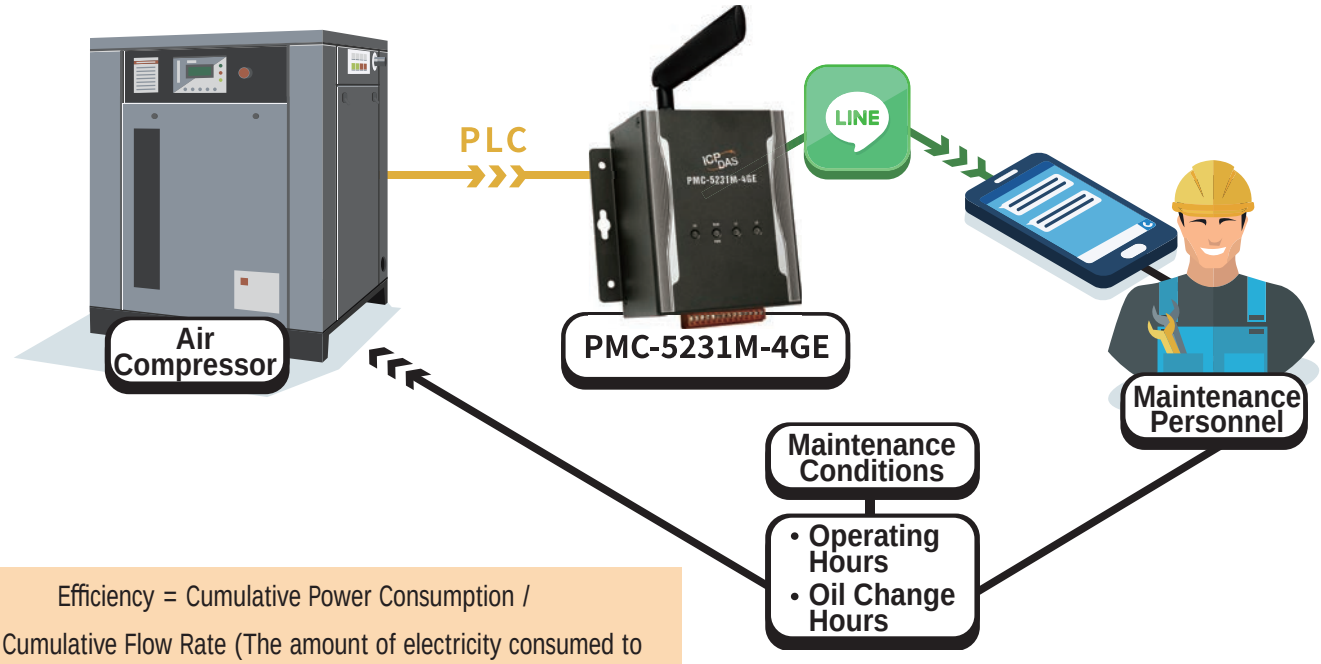


Preventive Maintenance

The PMC-5231M-4GE reads the air compressor status from the PLC and sets the alarm value. This includes the air compressor start/stop status, number of running hours, oil change hours, and alarm status. Once an alarm is triggered, a maintenance message is sent to the maintenance personnel via LINE, who then come to the site to carry out maintenance.

Energy Management

This section uses the PMC-5231M-4GE to collect data from the flow and power meters and calculate the efficiency. The conversion formula is:



Efficiency = Cumulative Power Consumption / Cumulative Flow Rate (The amount of electricity consumed to produce 1 cubic meter of compressed air)

The efficiency value shows the air compressor's performance. At the start of each month, the PMC-5231M-4GE calculates the previous month's efficiency and sends it to the customer via LINE. Users consuming over 800 kW must report this efficiency to the government energy department for record-keeping.

Monitoring Information

Beyond preventive maintenance and energy management, air compressor key data is displayed via IoTstar. Customers can monitor the compressor status via the IoTstar Dashboard and analyze it using IoTstar recording and trend features.

Conclusion

In this case, the ICP DAS PMMS solution helped the customer establish a machine network quickly. This solution solved the need to send personnel to the site for regular inspections, upload real-time equipment data to the cloud, and save labor and other costs.

Key Products

IoT Cloud Management Software

IoTstar

Quickly integrates with many cloud platforms and data analysis tools (e.g., Power BI, Google DataStudio, SCADA systems) to help users build cloud “IoT+Big Data” applications.

PMC-5231-4GE

IIoT Power Meter Concentrator

- Display real-time or historical power data and power data statistics report
- Provide power data log file auto send-back, and file recovery when the disconnected network is resumed

Optimizing Production Efficiency with Intelligent Power Monitoring Systems

Energy management and carbon emission control are essential in modern industry. ESG (Environmental, Social and Governance) policies drive companies to seek net-zero emissions solutions. Intelligent power monitoring systems efficiently monitor energy consumption and optimize production equipment performance, effectively reducing operating costs while ensuring sustainability and compliance with environmental regulations.

As environmental awareness grows, Taiwan's industrial sector aligns with ESG and energy-saving policies. Companies are pursuing innovative energy management for net-zero emissions. A grinder manufacturer introduced an intelligent power monitoring system, setting a new benchmark for smart upgrades in Industry 4.0.

Multi-Level Architecture Design for Accurate Management of Energy Consumption

ICP DAS Power Monitoring System provides modular, scalable solutions for real-time energy monitoring and analysis, optimizing energy management by controlling equipment consumption with advanced technology.

PM-3133 Series Smart Meters

PMC-5231 collects data from PM-3133 series smart meters to accurately monitor equipment energy consumption. PM-3133-100P handles low power devices, while PM-3133-360P and PM-3133-RCT1000P monitor high power devices like laminators and air compressors. Key devices and technology modules optimize overall energy management.

PMC-5231 Power Meter Concentrator

PMC-5231 centralizes data from monitoring points and transmits equipment status via RS-485 and Ethernet, enabling real-time energy consumption monitoring for management.

IoTstar Cloud Management System

The IoTstar cloud system enables real-time data analysis and remote management, improving energy transparency and optimizing production through big data insights.

1. Real-time data transmission and monitoring

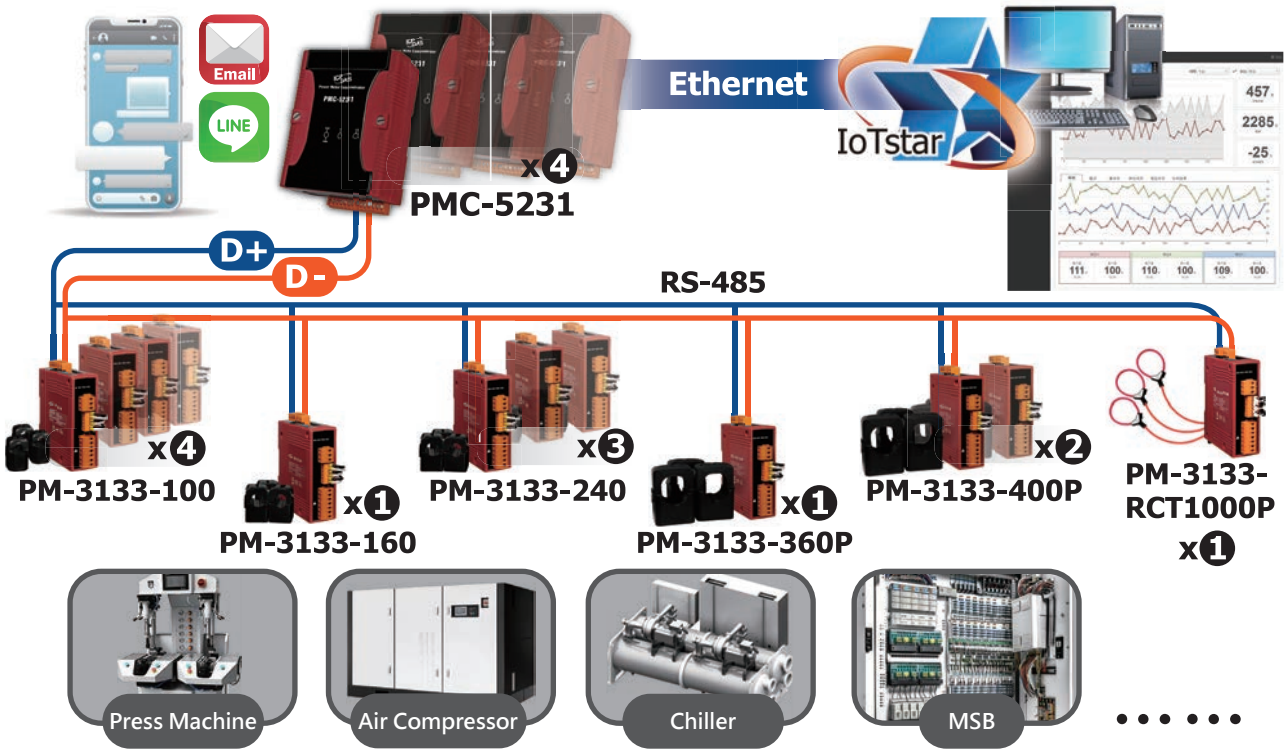
   PM-3133 Series sends energy data to the PMC-5231 controller and IoTstar cloud via RS-485 and Ethernet, enabling real-time insights for quick adjustments to reduce energy waste.

2. Remote management and control

   IoTstar's remote management lets managers monitor and control equipment via phone or computer anytime, enhancing efficiency and enabling data-driven adjustments to reduce energy use.

Intelligent Uupgrades, the Results Are On the Way

This intelligent power monitoring system



enables a Taiwanese grinder manufacturer to track power and carbon data for each machine, supporting energy policies and expanding production line monitoring. Real-time carbon data helps meet government targets, analyze trends, and advance toward net-zero emissions.

The Future of Smart Industry

With advancing technology, intelligent power monitoring systems will expand across industries. The success of this Taiwanese grinder maker shows that adopting innovation meets environmental goals and boosts competitiveness, essential for thriving in a fast-changing market.

Taiwanese manufacturer of specialized grinder have long been known for their high-quality products and robust production lines. In the face of increasingly stringent environmental regulations and market demand for energy-saving products, the company is promoting the implementation of energy-saving policies through active digital transformation and the deployment of IoT-enabled power monitoring and energy management systems.

Key Products

RFU-433

433MHz RF Wireless Modem

- 16 RF Channels
- Wireless line of sight (LOS) transmission range of up to 500 meters at an RF Baud Rate of 9600 bps

PM-3114-100

Single-phase Smart Power Meter

- True RMS Power Measurements
- 1Energy Analysis for 1P2W, 1P4W
- Current Measurements Up to 60 A
- Voltage Measurements Up to 300 V

How Air Conditioning Systems for Aluminum Rolling Mills Are Getting a New Look

The main challenge for the aluminum rolling mill was to improve system efficiency using advanced control technology without replacing the entire air conditioning system. The goal was to control machine room temperature within a constant range and monitor power consumption for energy-saving measures. ICP DAS solution was created to meet this need.

Temperature Control Challenges in the Digital Era

The digital era's rapid growth has driven enterprises to demand stricter server room conditions, especially for high-performance computing equipment. In an aluminum rolling mill, old floor-standing air conditioners struggled to maintain stable temperatures, reducing performance. The customer aimed to improve air conditioning efficiency using modern logic control technology while optimizing energy consumption.

Core Strategy for Innovative Solutions

The ICP DAS solution is based on the following aspects:

1. System Control Upgrading

Upgrading the old air conditioning in the server room through logical control was more cost-effective than replacing the equipment. The new automatic temperature control system ensures stability.

2. Power Meter Measurement and Data Logging

To meet the customer's demand for real-time energy information, we installed advanced meters on the power supply side to monitor and record air conditioner data, enabling the customer to adjust operations for energy savings.

3. Constant Temperature Logic Control

Logic control technology adjusts the air

Key Products

DL-100TM485PS

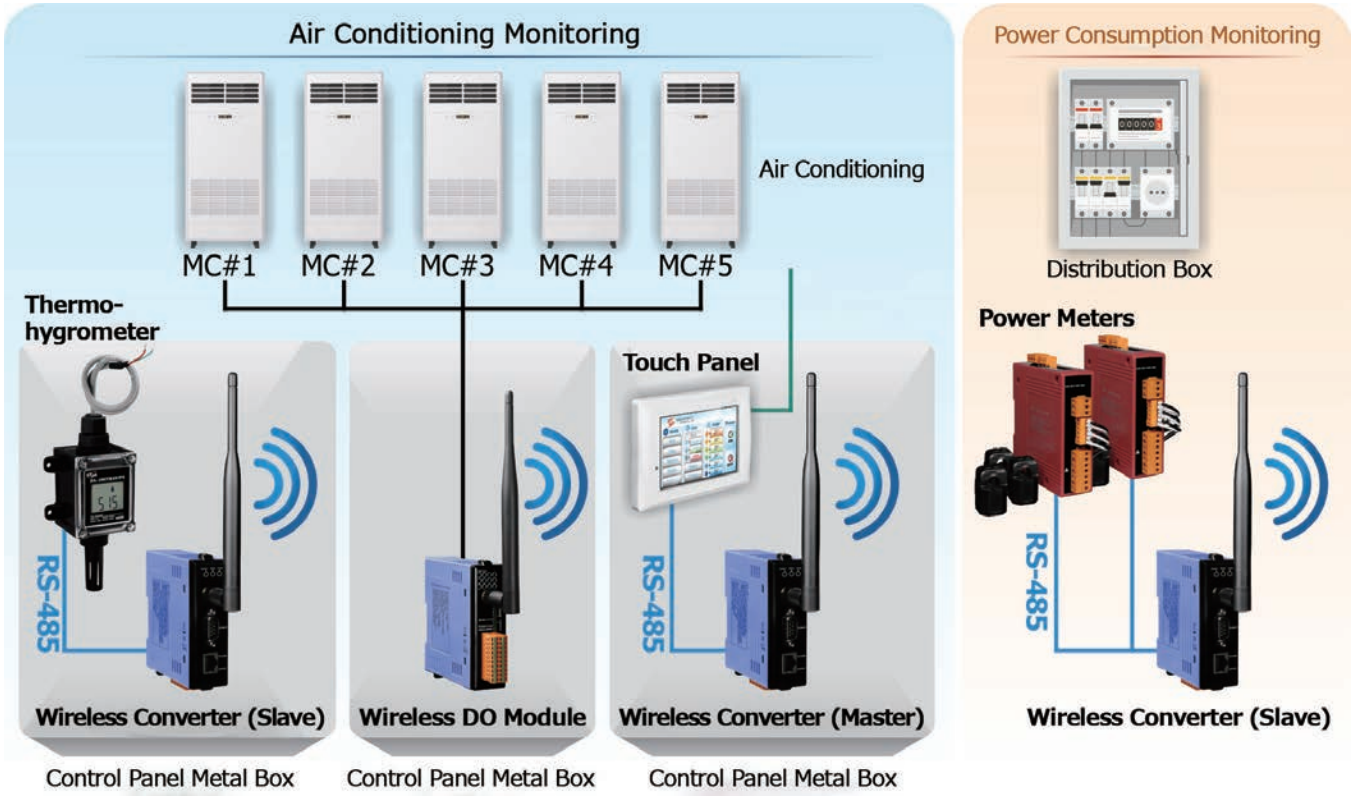
T&H Data Logger with LCD Display

- can store up to 4088 T&H records
- ±0.3 °C; ±1.8% RH for P version
- IP66 Waterproof
- Modbus RTU Protocol

ZT-2043

ZigBee Wireless 14-ch Isolated DO Module

- Adjustable RF Transmission Output Power
- Supports ZigBee Repeater Function
- Surge and ESD Protection
- External DIP and Rotary Switches



conditioner's operation mode to keep the temperature stable. This improves efficiency and reduces energy waste.

4. System Integration and Remote Monitoring

The solution includes function enhancement and remote monitoring and management. Customers can monitor and control all air conditioners through the platform, supporting subsequent optimization.

Successful cases of implementation

The air conditioning system in the machine room of the aluminum rolling mill runs more efficiently now. The constant temperature control technology maintains the temperature in the machine room at set levels to prevent overheating and meter readings help customers monitor and reduce overall energy consumption by about 10%.

ZT-2550 / ZT-2551

RS-232/RS-485 to ZigBee Converter

- Wireless Transmission Range up to 700 m
- Adjustable RF Transmission Output Power
- Supports AES-128 Encryption for the Wireless Communication
- Source Identification for the non-address Device Data Transmission
- Supports Topology Utility for Network Monitoring and Improvement
- Provides ZigBee signal LED indication lights

The Cooling Force in a Heat Storm: Intelligent Control of Single-Phase Immersion Cooling Systems

AI technology's rapid growth makes server cooling a serious problem. Traditional air and liquid cooling cannot meet the requirements of high-performance GPUs. Single-phase immersion cooling is the ideal choice to solve the heat dissipation crisis in data centers due to its precision, efficiency, and environmental safety.

As AI technology advances, data centers are upgrading their servers to meet the challenge of new, high-performance GPU processors. The NVIDIA H100 and similar GPUs are pushing the limits of heat dissipation. Traditional cooling methods are failing, and many data centers are struggling to keep up.

Single-Phase Immersion Cooling Technology, a New Era in Cooling

Air or liquid cooling are the main cooling options for servers. Air cooling is simple and convenient but has limited cooling effect, especially under heavy loads. Liquid cooling is more efficient but requires a complex and costly system and takes up valuable space.

Single-phase submersible cooling changes the way we think about cooling. Instead of relying on an external fan or radiator, we can cool servers in the fluid itself. A non-conductive cooling fluid is used with the server, which absorbs heat more evenly. Circulation then cools the fluid, improving efficiency and preventing overheating.

While traditional air cooling causes accelerated GPU aging due to prolonged operation, single-phase immersion technology maintains a low-temperature environment, reducing maintenance and downtime. The cooling fluid is a single-phase liquid that does not need to evaporate at high temperatures, making it safer and less harmful to the environment and people.

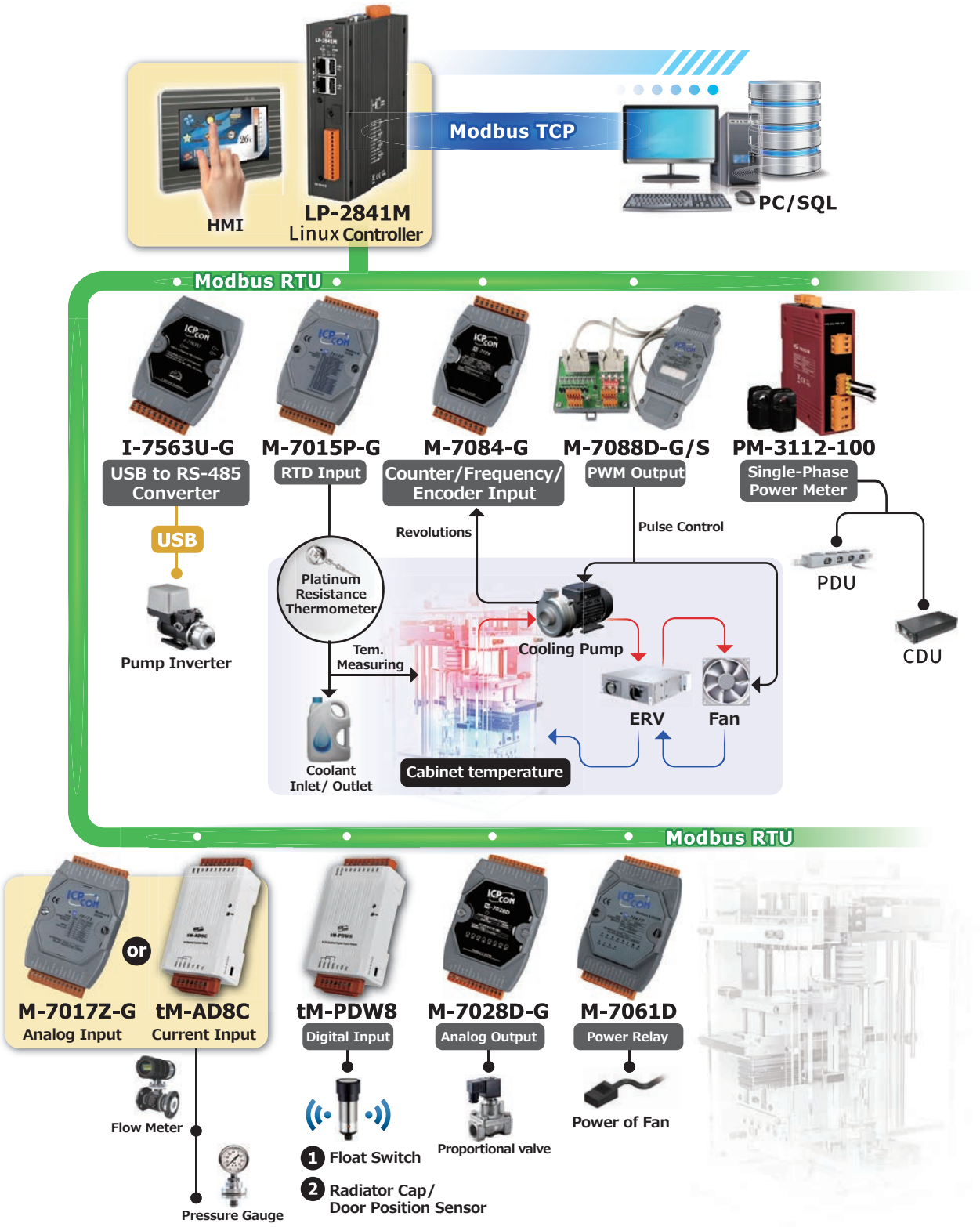
Intelligent Control: Creating High-Efficiency Cooling Solutions

1. Temperature and Flow Monitoring: The cooling system monitors the flow and temperature of the coolant using a flow meter and RTD temperature sensor (M-7015P-G), allowing real-time adjustments to ensure optimal server cooling.
2. Data Transmission and Processing: Collected data is transmitted to the system control unit via a USB-to-RS-485 converter (I-7563U-G). The proportional valve (M-7028D-G) precisely adjusts liquid flow and internal pressure for stable cooling.
3. The system's power meter (M-7061D) monitors server energy use, aligning cooling needs with power consumption to prevent waste.
4. The PWM output controller (M-7088D-G/S) regulates the pump frequency, precisely adjusting coolant flow to efficiently dissipate heat via a full heat exchanger.
5. The LP-2841M Linux controller, with the XV107A module, manages the system and

consolidates data into a PC/SQL database for analysis and optimization.

Conclusion

The server cooling industry trends toward compact configurations, making component size critical for chassis space. Single-phase immersion cooling uses sensors, controllers, and intelligent adjustments for efficient cooling of high-power equipment, offering precise control and energy optimization for servers and data centers.



Smart power monitoring reduces carbon emissions and costs for Taiwanese manufacturers.

In today's industrial sector, energy management and carbon emission control are crucial. With the implementation of ESG (Environmental, Social, and Governance) and energy-saving policies, companies aim to achieve net-zero emissions. Smart power monitoring systems address these challenges by effectively monitoring energy consumption and optimizing production equipment efficiency, reducing operational costs.

With the rise of green energy and smart manufacturing, energy management is key for modern enterprises. A Taiwanese electric bus manufacturer integrates intelligent energy systems to boost efficiency and competitiveness in Industry 4.0.

As a leading electric bus manufacturer in the country, the company deeply recognizes the importance of digital technology in energy management and actively invests in intelligent energy management systems. This ensures precise monitoring and optimization of energy use at every stage of the production process, maintaining competitiveness in the global market.

Challenges

The manufacturing process of electric buses involves energy-intensive equipment, like paint and sanding booths, consuming significant electricity. Precisely monitoring and optimizing energy use in these stages is a primary challenge for Taiwanese vehicle manufacturers.

With new plants, energy costs are a major operational expense. To reduce costs and comply with international standards, enterprises need a real-time energy management system. Traditional models rely on manual operation, lacking real-time data assessment, impacting overall production efficiency.

Implementing an Intelligent Power Monitoring System

A Taiwanese vehicle manufacturer uses smart power meters to monitor energy use, integrate data into a carbon monitoring system, and enable real-time adjustments for efficiency.

The system includes multifunctional smart power meters (PM-3133-XXX-MTCP) installed in key production facilities, transmitting data via Ethernet to the central control unit. This unit collects real-time data from all equipment, analyzes overall plant power usage, and provides detailed power usage reports.

System Architecture and Product Description

The power monitoring system includes servers, Ethernet, and smart meters on production equipment, tracking voltage, current, and power, with real-time data sent to servers.

- The server collects and processes smart meter data, offering visual charts via custom software for managerial analysis and decision-making.
- Smart Power Meters (PM-3133-XXX-MTCP): Each meter measures various power parameters and transmits the data to the central control via Modbus TCP protocol.

The scalable system supports easy integration of additional equipment and monitoring points for future expansions or upgrades.

Implementation Results

The intelligent power system revealed paint and sanding booths as top energy users, leading to process adjustments that reduced consumption.

The system also provides real-time carbon emission data, significantly lowering energy costs and meeting international green standards. As production develops, the system will expand to more areas, continuously monitoring and optimizing energy use for greater efficiency.

Key Products

PM-3133-240P-MTCP

3-phase Smart Power Meter

- Bi-directional Energy
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Total Harmonic Distortion (THD)
- Supports Modbus TCP Protocol
- Supports 2 Power Relay Output (Form A)

PM-3133-RCT4000P-MTCP

3-phase Smart Power Meter

- Bi-directional Energy
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Supports Modbus TCP Protocol
- Supports 2 Power Relay Output (Form A)

A Successful Case Study of a Major Machine Tool Manufacturer and YunTech

A major machine tool maker and YunTech have developed a smart factory integrating equipment networking, energy management, and environmental monitoring to enhance efficiency, cut energy waste, and ensure ecological quality, advancing Industry 4.0 manufacturing.

A central Taiwan machine tool maker, focused on innovation, tackles challenges in efficiency, energy use, and sustainability. Partnering with YunTech, they aim to build a smart factory as a model for campuses and industries.

Data-Driven Intelligence: The Technical Magic Behind It

In YunTech's smart factory case, the overall system primarily comprises three core components: equipment networking, energy management, and environmental monitoring.

Equipment Networking

Equipment networking is crucial for smart factories. By connecting various machines (like lathes, milling machines, grinders, lasers, 3D printers, robotic arms, and CNC machines) to the network, factories can monitor production data in real-time. Data is transmitted to the backend for centralized monitoring.

In YunTech's smart factory, machines connect to a controller via Ethernet, which sends data to the central system. This system monitors and adjusts machine status in real-time, ensuring efficient production.

Energy Management

Energy management is vital in smart factories amid global energy shortages. YunTech's smart factory uses smart power meters and an energy management system to monitor production power usage.

In the North and South areas, PM-3133-MTCP modules send data to the backend, enabling managers to optimize energy use, reduce waste, and lower costs.

Environmental Monitoring

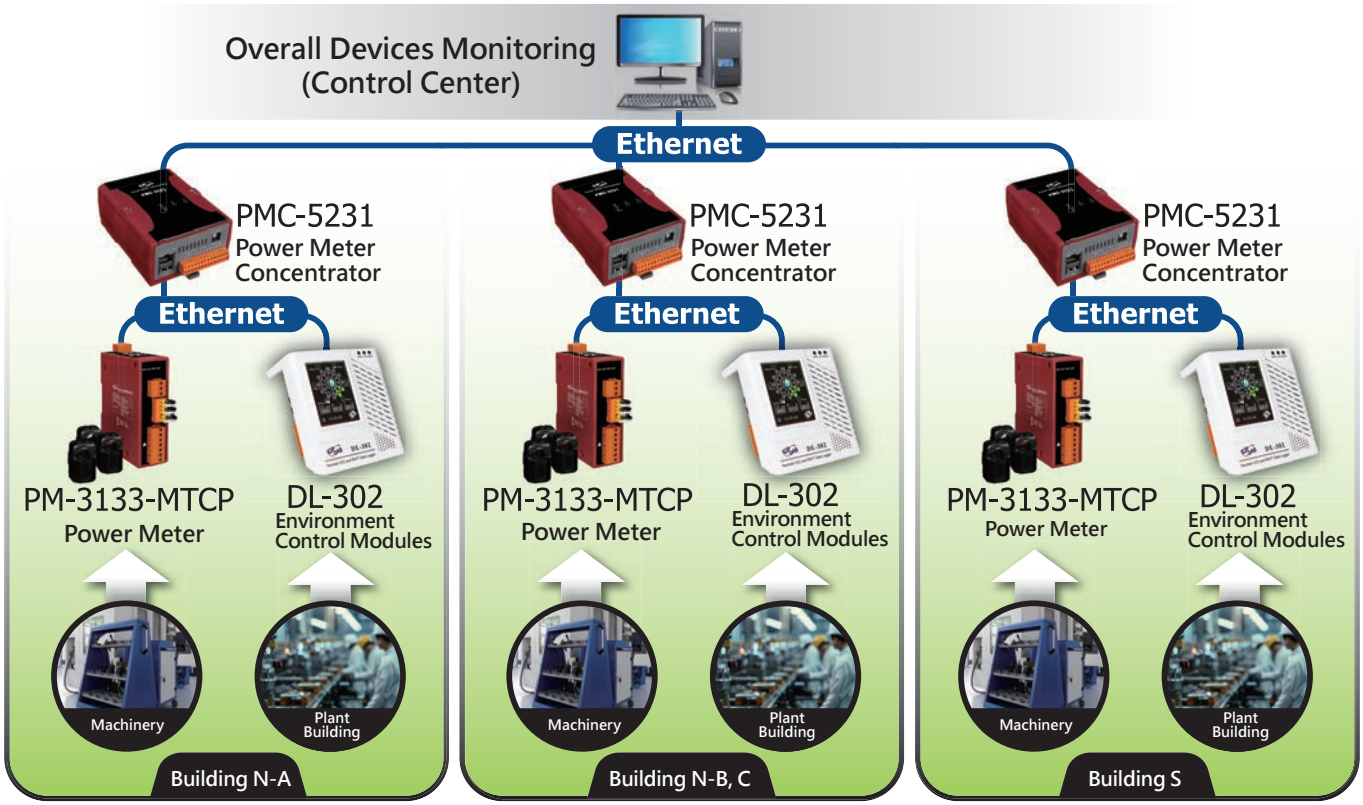
Environmental factors like temperature and humidity impact product quality and equipment. YunTech's smart factory uses DL-302 modules for comprehensive monitoring.

Key Products

PMC-5231

IIoT Power Meter Concentrator

- Display real-time or historical power data by browser.
- Data log file auto send-back & recovery when disconnected network is resumed.
- Support at most "24 ICP DAS Modbus Power Meter modules + 8 Modbus I/O modules"



These modules monitor air quality, temperature, and humidity in real-time, sending data to the control system. Managers can adjust equipment settings to maintain a stable production environment and improve product quality.

Technology and Humanity Intertwined: The Future Blueprint of Smart Factories

Smart factories boost efficiency while optimizing energy use and environmental management. A major machine tool maker and YunTech aim to expand this model to enterprises and schools, driving industry-wide digital transformation.

With Industry 4.0, smart factories will drive future manufacturing. Companies should invest in technologies like equipment networking, energy management, and environmental monitoring to boost automation and maintain a competitive edge.

PM-3133-160-MTCP

3-phase Smart Power Meter

- Bi-directional Energy
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Total Harmonic Distortion (THD)
- Current Measurements Up to 100 A
- Voltage Measurements Up to 500 V

DL-302

Remote CO2/Temperature/ Humidity/Dew Point Data Logger

- Able to store up to 450,000 records with date and time stamps
- Relay Output for Alarm Device or IAQ Device Control

Breaking Free: ZigBee Wireless Technology Simplifies Energy Management

ZigBee wireless technology eliminates wiring issues, enabling precise power monitoring and efficient data analysis to identify energy-saving opportunities. It reduces costs, enhances energy management, and supports carbon verification, offering value and environmental benefits for smart factories.

Energy management has become essential in modern factories and buildings to reduce operational costs and meet stringent environmental regulations. Traditional power monitoring systems require extensive, labor-intensive cabling, especially in large, complex factory layouts.

ZigBee wireless technology changes this by eliminating the need for extensive cabling. It offers a more flexible and convenient solution, making energy management more efficient and less cumbersome for factory managers.

Features of ZigBee technology

ZigBee, based on the IEEE 802.15.4 standard, is a low-speed, short-range wireless protocol covering media access and physical layers. It offers low power use, cost, complexity, high reliability, security, support for many nodes, and various network topologies, ideal for automation.

ZigBee is ideal for smart factories, homes, and buildings, with a wide range of devices and a complete protocol, perfect for low power, stable operations, and automation.

Advantages of ZigBee over other wireless technologies

Compared to Wi-Fi and Bluetooth, ZigBee excels in automation and large-scale device connections. Designed for one-to-many communication, it uses multi-hop technology for stable, flexible data transmission, making it ideal for large, distributed factories or buildings.

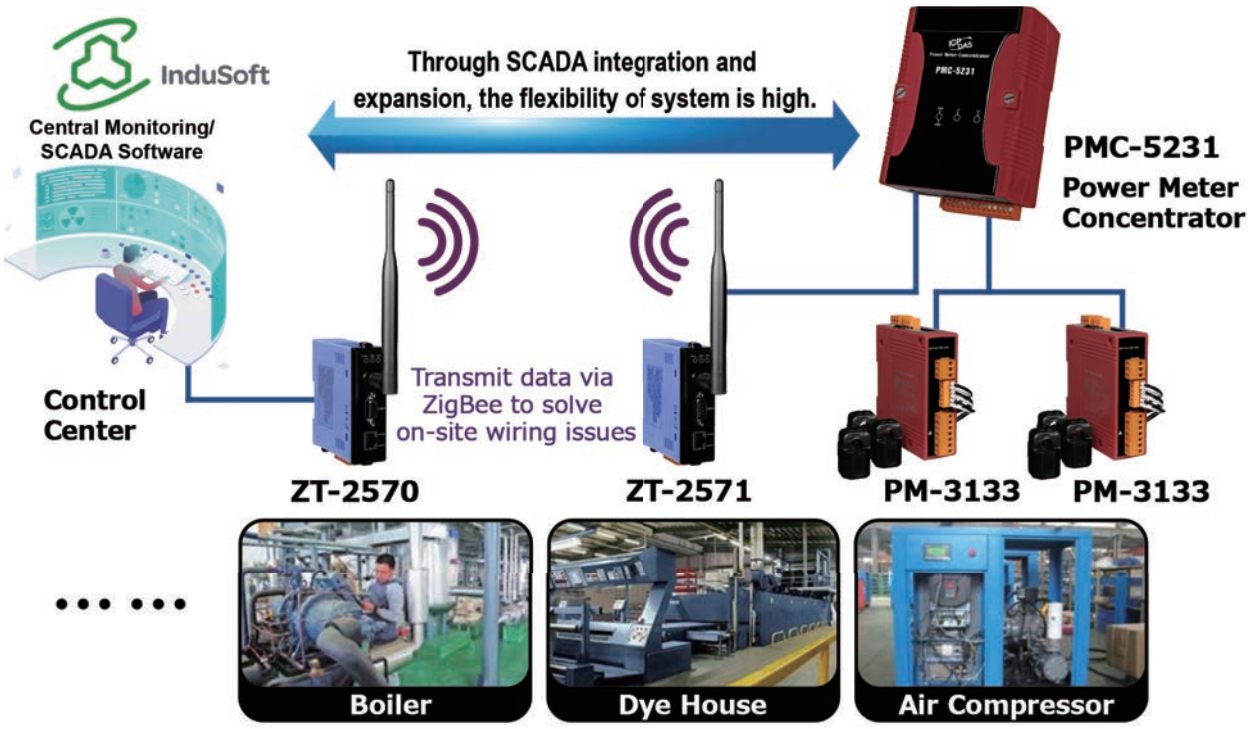
Additionally, ZigBee's low power consumption is ideal for devices in hard-to-maintain locations, reducing maintenance costs and ensuring long-term stability.

Applications of ZigBee in Smart Factory

A renowned sports brand's smart factory in Vietnam overcame labor-intensive and costly wiring issues using ZigBee technology, replacing traditional cabling with efficient wireless solutions.

In the factory, each power-consuming device, like air compressors and boilers, has a PM-3133 smart meter. Using ZigBee wireless modules (ZT-2570 and ZT-2571), real-time power data is sent to the central control center. The data is relayed through the ZigBee network, ensuring stable transmission across the factory, even between floors.

This system requires no rewiring or major modifications—ZigBee modules enable wireless transmission, making energy management more flexible and scalable.



Dual Benefits of Energy Savings and Efficiency Improvements

ZigBee's low power use and cost advantages cut factory operating costs, saving on wiring and reducing maintenance needs. Its flexible multi-path transmission ensures stable networks by rerouting data if a node fails.

Real-time power data from ZigBee networks allows companies to identify and adjust abnormal energy-consuming devices for energy savings. Additionally, this data helps calculate carbon emissions, meeting international markets' stringent environmental and carbon footprint requirements.

Conclusion

ZigBee wireless technology eliminates cumbersome cabling for energy management. With low power use, cost-efficiency, and reliability, it suits smart factories, enabling precise power control, boosting efficiency, and supporting energy-saving and carbon-reduction goals.

ZigBee removes cabling constraints, cutting wiring and maintenance costs, and enabling a smarter, sustainable future for businesses.

Key Products

ZT-2570

ZigBee Coordinator

- Wireless Transmission Range up to 700 m (Default)
- Adjustable RF Transmission Output Power
- Source Identification for the non-address Device Data Transmission

ZT-2571

ZigBee Router

- Supports Broadcast Transmission for the Redundancy Transmission Path
- Supports Unicast Transmission to Reduce Network Loading
- Supports Topology Utility for Network Monitoring and Improvement

Environmental Control and Power Supply: Boosting Efficiency in Contact Lens Production

We explore a cleanroom monitoring system that integrates power, temperature, humidity, and dust data to stabilize contact lens production and ensure quality. The system supports energy-saving subsidies, promoting economic efficiency and environmental protection, highlighting its value in precision manufacturing.

In precision manufacturing, integrating power and environmental monitoring is key to stable, error-free production. A leading Taiwanese contact lens manufacturer that requires strict dust, temperature, and humidity control found its previous system lacked integration for managing power and environmental data. To address this and support energy-saving subsidies, the company adopted the ICP DAS Power & Environment Monitoring System.

Architecture

The Clean Room Power & Environment Monitoring System uses Ethernet and Modbus protocols to collect and manage factory data via distributed sensors and concentrators. Key products and their functions are described below:

1. PMC-5231 IIoT Power Meter Concentrator PMC-5231

The PMC-5231 integrates data sources and transmits collected data to a back-end server. It enables real-time monitoring of power, temperature, humidity, and dust. When an abnormality is detected, the PMC-5231 triggers an alarm to alert the manager.

The PMC-5231 supports various communication protocols such as Modbus RTU/TCP protocols to ensure seamless integration with other industrial equipment.

2. PM-3133i-160P Power Information Monitoring for Factory and DeviceP

The PM-3133i-160P monitors equipment power, providing accurate data to help managers analyze and optimize energy consumption for energy savings.

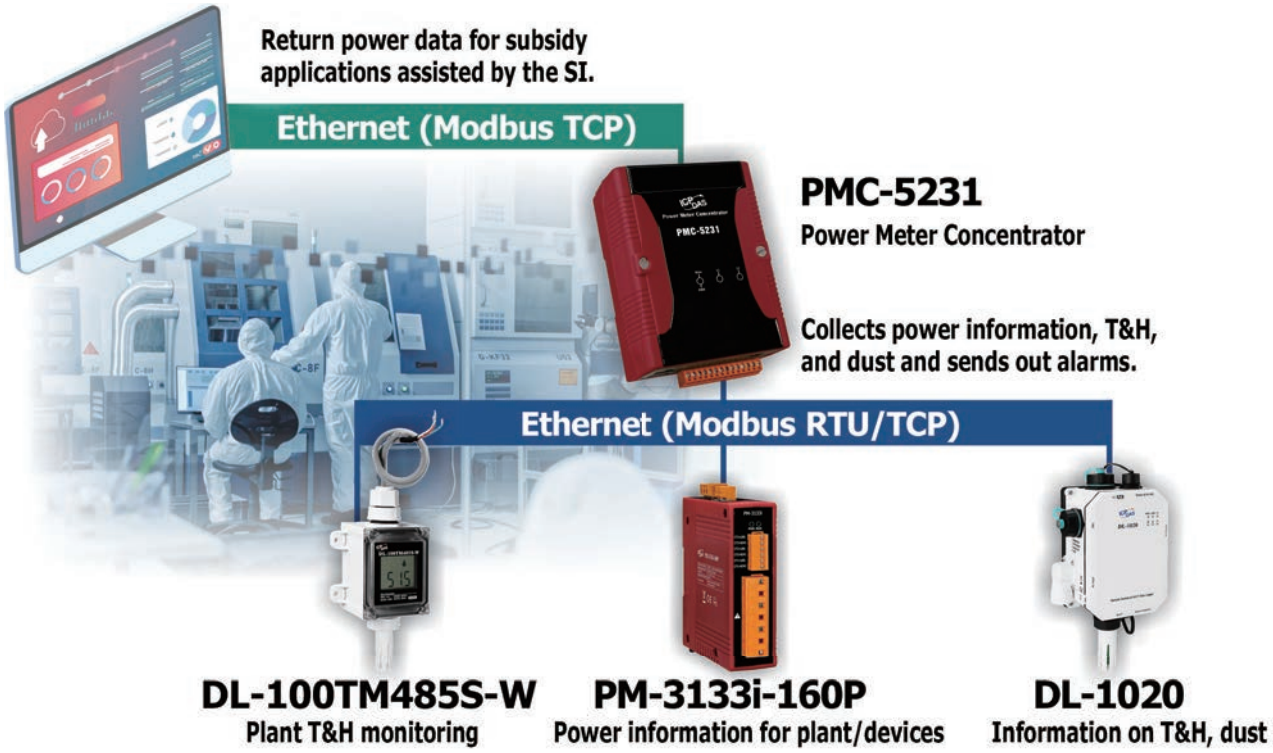
The PM-3133i-160P, integrated with the PMC-5231, transmits and analyzes real-time data from environmental monitoring to optimize the production process.

3. DL-1020 Production Line Environmental Monitoring

The DL-1020 monitors environmental data in the production line, including temperature, humidity, and particulate matter, sending real-time data to the concentrator. For a leading Taiwanese contact lens manufacturer, it ensures environmental stability during production, minimizing defects caused by fluctuations.

4. DL-100T485W Factory T&H Monitoring

The DL-100T485W monitors temperature and humidity throughout the factory, ensuring even



distribution to meet production requirements. With the PMC-5231, managers can easily monitor each area and respond quickly.

System Integration and Applications

The PMC-5231 integrates data from multiple sources via Modbus RTU/TCP, enabling unified monitoring and analysis of power, temperature, humidity, and air quality for comprehensive environmental oversight.

The system alerts staff to data exceeding limits, preventing disruptions and quality issues. It optimizes power management and supports energy-saving subsidies, cutting costs.

Conclusion

A leading Taiwanese contact lens manufacturer enhanced production stability and quality with a cleanroom monitoring system, also securing energy-saving subsidies to meet environmental goals.

Cleanroom monitoring systems are essential for precision manufacturing, tracking power, temperature, humidity, and dust to ensure stable operations.

Key Products

DL-1020

PM1/2.5/10/T&H/Dew Point Data Logger

- Up to 180,000 records with date and time stamps
- Offers relay output for alarm lights or HVAC device connections.

DL-100TM485S-W

T & H Data Logger with LCD Display

- Store Up to 4088 T & H Records
- Accuracy :±0.4 °C; ±3.0% RH
- Waterproof: IP66
- Support Modbus RTU protocol

Beyond Traditional Inspection
Power Monitoring System Reform Factory

A sanitary products manufacturer implemented a smart power monitoring system, setting an industry example in efficiency and environmental protection. The system's smart controller and precision monitoring module track real-time power usage and issue fault alarms, minimizing production losses.

Silent Heroes of the Industrial Revolution: Smart Power Monitoring

In the sanitary products manufacturer's factory, each piece of machinery and equipment is like a precise and coordinated symphony orchestra, running orderly. Supporting all this is an invisible lifeline - power. The ICP DAS energy management system is the silent hero of this industrial revolution.

When an abnormality occurs somewhere in the factory the system promptly alerts managers, who can quickly pinpoint and resolve them via the Visual Interface. The system keeps the sanitary product manufacturer's production running smoothly, even during challenges.

Smart Power Monitoring for Industrial Challenges

ICP DAS's energy management system adopts a multi-integrated solution. The PMC-5231 controller and PM-3133-240 module are used for real-time monitoring, flexible control, and seamless expansion.

PMC-5231/PMD-2201 Power Meter Concentrator

The PMC-5231/PMD-2201 offers no programming control, enabling quick configuration and reducing setup time. It easily supports basic power monitoring and complex automation.

PM-3133-240 Smart Power Meter

The PM-3133-240 measures key power parameters like RMS voltage (Vrms), RMS current (Irms), active power (kW), active energy (kWh), apparent power (kVA), apparent energy (kVAh), reactive power (kVAR), reactive energy (kVARh), power factor (PF), and frequency (Frequency), offering comprehensive data to aid energy optimization.

IoTstar Management Software

IoTstar supports the rapid setup of private cloud systems on PCs or public cloud platforms. With an intuitive web interface, no programming is needed. It integrates with major cloud platforms and analytics tools, helping enterprises build IoT + Big Data applications efficiently and cost-effectively.

In Crisis, Data is the Best Defence

Previously, power outages or communication failures risked data loss, affecting production. The ICP DAS PMC/PMD Power Meter Concentrator

includes an 'Offline Data Recovery System' to store power data during failures, ensuring no loss of critical information.

The IoTstar cloud system offers an offline data recovery feature, ensuring sensor data is automatically uploaded to the cloud after an outage, providing stable data protection for factories. With its open SQL interface, IoTstar connects sensor data to third-party cloud platforms, enabling seamless OT (Operational Technology) and IT (InformationTechnology) integration. Managers can monitor device status in real-time via mobile devices, ensuring stable supply capacity even during global disruptions or unforeseen events.

The Seamless Integration of IoT and Big Data.

With rising global demand for smart manufacturing, this sanitary products manufacturer is leading the way through advanced IoT and big data use. This production revolution will transform the sanitary products industry and drive global manufacturing toward full automation and intelligence.

Key Products

IoTstar IoT Cloud Management Software

IoTstar

It can be quickly integrated with many cloud management platforms and data analytics tools (e.g. Power BI, Google DataStudio, SCADA systems) to help users quickly build cloud-based 'IoT + Big Data' applications.

PMD-2201-TC

Power Meter Concentrator with 7" Touch Panel

- 7" TFT LCD (with Touch Panel) & PoE (Power over Ethernet) supported
- Data log file auto send-back & recovery when disconnected network is resumed.

Innovative Industrial Energy Management - Smart Power Monitoring System for Die Casting Machine Manufacturing

As the manufacturing industry embraces Industry 4.0, energy management has become a critical focus. To address energy challenges and meet ESG goals, factories must adopt efficient power monitoring systems for energy savings and emission reductions.

Industrial Digitisation and Energy Challenges

With Industry 4.0 driving smart manufacturing, IoT, and automation, energy management systems have become essential. Die-casting machine manufacturers prioritize power monitoring to optimize energy, cut costs, and meet ESG-driven sustainability goals.

A comprehensive power monitoring system solves the problem of energy wastage and supports organizations in achieving their ESG growth targets.

System Architecture Design, Zone Power Monitoring

Considering the factory's scale and diverse devices, the power monitoring system uses a zoned structure with three main zones for precise control.

1. Total Power Management

Monitoring a factory's power consumption gives managers an overview of energy use, aids in resource optimization, and helps predict demand to avoid costs from consumption surges.

2. Storage Area Power Monitoring

Though the storage area's power consumption is low, long lighting hours and device standby can waste energy. The system monitors real-time usage to reduce standby energy waste and improve efficiency.

3. Device Power Management

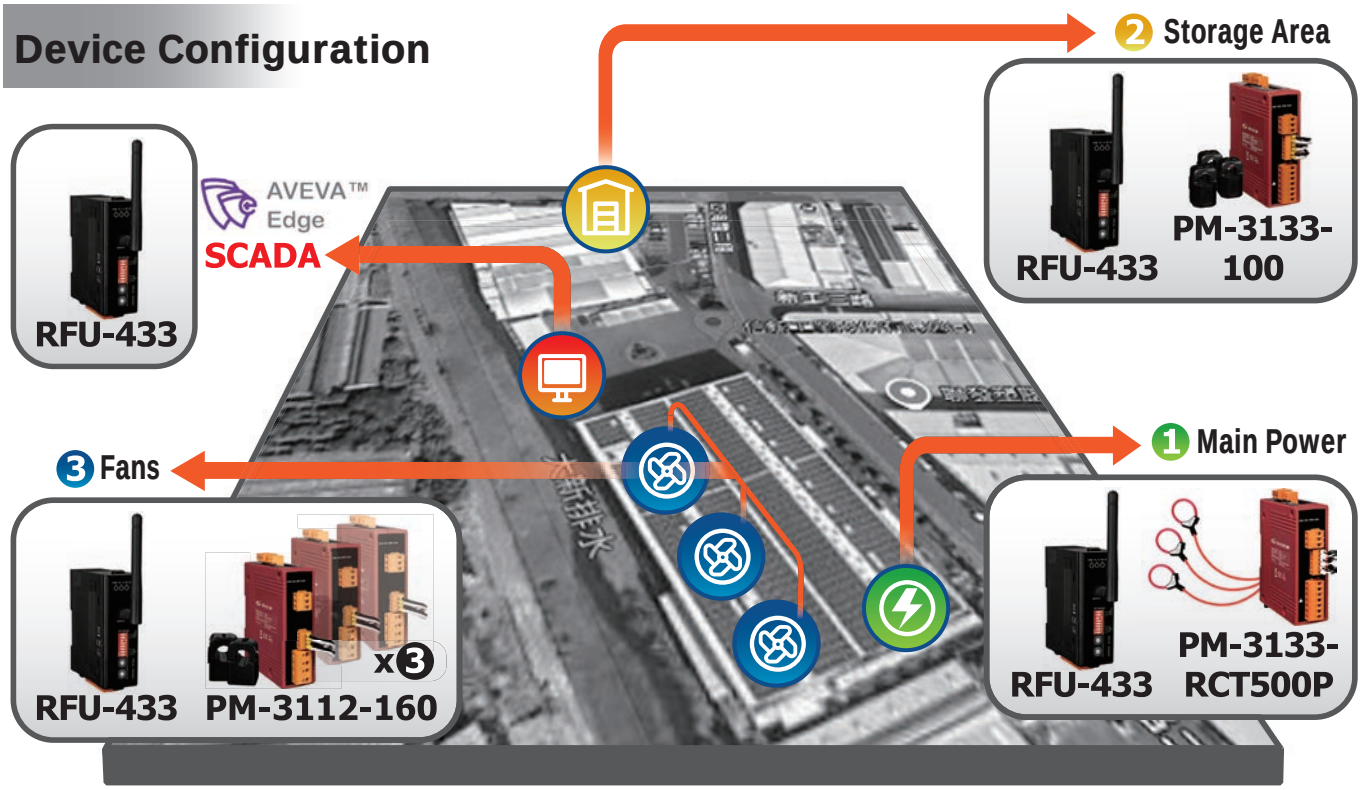
Die-casting machines, cooling systems, and auxiliary facilities are the main power consumers in the factory. Real-time monitoring enables dynamic power adjustments based on production needs, reducing waste and optimizing energy use.

RFU-433 Wireless technology solves data transmission challenges

The company uses 433 MHz RF wireless technology to handle data transmission across its large, dispersed factory. RFU-433 modems convert RS-232/485 data into RF signals, enabling stable transmission over distances up to 500 meters.

To solve interference in harsh industrial environments, the RFU-433 allows a configurable RF transmission baud rate as low as 650 bps, improving noise resistance. Its setup parameters can be adjusted via rotary and DIP switches, enhancing flexibility and usability.

Device Configuration



AVEVA Edge: Powerful Tool for Data Visualization and Management

All the power monitoring data collected by the system is ultimately aggregated and visualized on the AVEVA Edge graphical control platform, which transforms complex data into intuitive charts and reports. Managers can analyze trends, adjust schedules to reduce peak-hour energy costs and receive alerts for abnormal power usage, ensuring that devices are always running optimally to prolong their lifespan.

Conclusion

The expandable design of power monitoring systems enables companies to extend monitoring and control with minimal changes, ensuring flexibility for future upgrades.

A die casting machine manufacturer developed a wireless power monitoring system, providing a stable foundation for growth. As Industry 4.0 progresses, energy management is key to competitiveness.

Key Products

RFU-433

433 MHz RF Wireless Modem

- 16 RF Channels
- Wireless line of sight (LOS) transmission range of up to 500 meters at an RF Baud Rate of 9600 bps

PM-3112-160

Single-phase Smart Power Meter

- True RMS Power Measurements
- Energy Analysis for 1P2W, 1P4W
- Current Measurements Up to 100 A
- Voltage Measurements Up to 300 V

Energy Saving and Efficiency - Intelligent Power Management in Screw Factory

A screw processing factory in Gangshan has implemented WISE and PMC intelligent systems to optimize energy use. The factory monitors power consumption in real-time using smart meters, temperature controllers, and the IoTstar platform and adjusts for efficiency. This reduces energy use, boosts production, and serves as a model for green manufacturing in the Industry 4.0 era.

A screw factory in Gangshan, facing rising energy costs and environmental pressures, revamped its energy management. Consuming 1M kWh monthly with $2.7M bills, it adopted an intelligent system, optimizing energy use from furnaces to lighting, cutting costs, and improving efficiency.

Intelligent management in every corner

Effect of PMC-5231 Controller with Smart Power Meters

In a screw processing factory, electric furnaces are crucial for heat-treating screws to enhance hardness. Traditional power control was inefficient and wasteful. Now, smart meters and temperature systems with IoTstar optimize usage. The factory optimizes power use in real-time, ensuring maximum efficiency.

Stable Temperature Control for Production: Quenching Oil Heat Exchanger System

In the high-temperature environment of a screw factory, stable temperature control is crucial for smooth production. Using a PT100 and CB900 the system monitors quenching furnaces, tempering furnaces, and oil tanks in real-time. The WISE-5231M controller analyzes data, while inverters manage fans and pumps, dynamically adjusting cooling to match production needs, ensuring consistent product quality.

iSN-301H 1-ch Intelligent Rangefinder Module

Continuous lighting in storage areas often wastes energy. Accurate detection of forklifts entering and exiting is needed for efficient light control. Standard infrared sensors struggle with sensitivity in high summer temperatures, leading to inaccuracies. The iSN-301H, using ToF technology, operates reliably from -25°C to +75°C. Mounted on the ceiling, it accurately detects forklift movement, enabling real-time light switching to reduce energy use and improve safety.

Key Products

WISE-5231M

IIoT Edge Controller

- No more programming, Web pages are provided for control logic editing
- Support LINE and Email real-time message sending

IoTstar Cloud Software - Data Visualization & Management

Data from WISE and PMC systems is centralized on the IoTstar platform, converting raw data into real-time charts displayed on control room screens and managers' devices. This enables quick monitoring of plant energy usage and flexible strategy adjustments for efficient energy management.

A Win-Win for Energy Savings and Efficiency

In July, the screw factory implemented an intelligent power management system, earning recognition by ITRI as part of the 'Green Manufacturing Assistance Projects for Heat Treatment of Screw Fasteners.' The system enhances efficiency, reduces energy waste, and supports low-carbon production.

Intelligent energy management spans the factory, from high-temperature furnaces to storage areas. Every device and data point supports green manufacturing. The factory will boost efficiency, save energy, and support sustainability.

I-7015P

6-ch RTD Input Module

- Lead Resistance Elimination for 3-wire Connection
- Open Wire Detection

iSN-301H

1-ch Rangefinder Module

- Non-contact Distance Measurement
- Distance Measurement: 5 cm ~ 4 m
- Typical Full Field-of-View (FoV): 27°
- Programmable Region-of-Interest (ROI)

Precise Monitoring and Intelligent Optimisation - Energy Management Strategies for Nut Manufacturing Factories

In modern manufacturing, energy saving and emission reduction are critical priorities. To solve energy consumption, enterprises seek solutions to cut costs and boost efficiency. Leveraging a government subsidy program, nut manufacturing factory reduced energy use and capital costs, setting a strong example for others.

To tackle rising energy consumption, a nut manufacturing factory in Gangshan upgraded its equipment and integrated an energy management system with government subsidies. Rising power demand for high-strength nut production makes efficient energy management essential to overcome bottlenecks.

Energy Challenges for Nut Factories

Producing screws and nuts involves multiple steps, with the energy-intensive forming and treating stages being the most challenging. Effective energy management is vital for a nut factory's power-intensive production line.

Rising energy prices drive up production costs and harm factory competitiveness. Adopting intelligent energy-saving solutions is key to overcoming energy consumption challenges.

Energy Management System

The factory implemented an intelligent energy management system to solve high energy consumption and installed smart meters (e.g., PM-3133 series) on key equipment. These meters record real-time power usage and transmit data to a centralized management system via a stable Ethernet network.

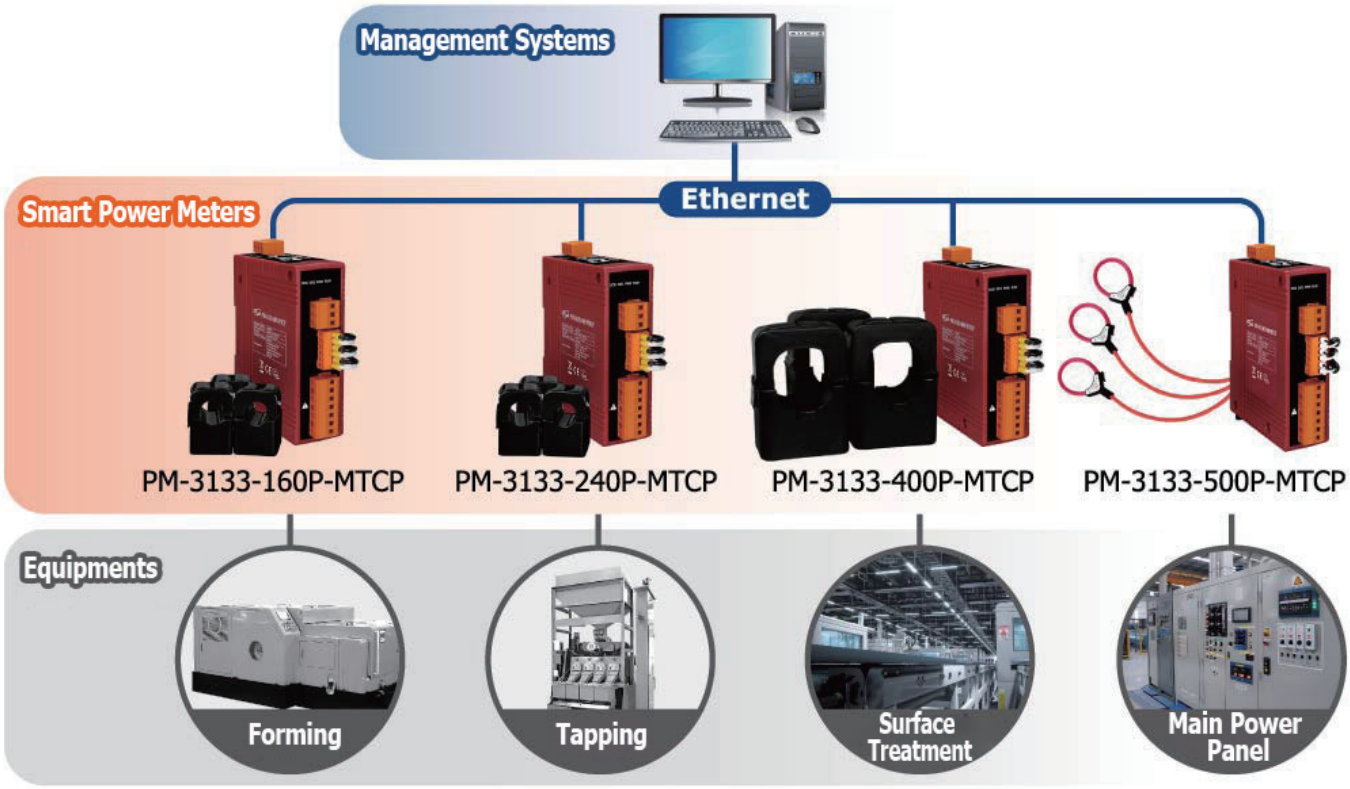
Real-time Data Integration

Smart meters installed throughout the factory record energy consumption at every production stage, from molding to surface treatment. The data is transmitted in real-time to a centralized system, creating a factory energy map. This enables management to monitor equipment usage and adjust based on real-time demand.

Comprehensive Management from Production to Data Analysis

Smart power meters installed on all production equipment monitor and record energy consumption throughout the process. The back-end system provides real-time data and generates energy efficiency reports, enhancing factory operations and supporting future energy-saving upgrades.

With energy consumption data, management can assess equipment performance and implement optimization strategies, such as scheduling energy-intensive processes during off-peak hours or upgrading inefficient equipment, to stay competitive.



Green Policy and Government Subsidy

Amid climate concerns, Taiwan's government promotes carbon reduction, helping the nut factory upgrade systems and cut costs with grants.

Factory management highlights that intelligent energy management reduces costs and unlocks future potential. "The system enhances energy control, boosts efficiency, and improves adaptability to market changes."

Energy Saving and Emission Reduction

The nut manufacturing factory shows how intelligent energy management boosts efficiency, marking a technological and strategic milestone. As more companies embrace energy-saving tech, global manufacturing enters a new era of intelligence.

Key Products

PM-3133-160P-MTCP

3-phase Smart Power Meter

- Bi-directional Energy
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Total Harmonic Distortion (THD)
- Supports Modbus TCP Protocol
- Supports 2 Power Relay Output (Form A)

PM-3133-RCT500P-MTCP

3-phase Smart Power Meter

- Bi-directional Energy
- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Supports Modbus TCP Protocol
- Supports 2 Power Relay Output (Form A)

EU Carbon Tax: How Hydraulic Manufacturers Tackle Carbon Emissions?

Under pressure from global carbon emissions and the upcoming EU carbon tax, a leading hydraulic threaded cartridge valve manufacturer has adopted an intelligent power monitoring system. This innovation enhances efficiency, reduces emissions, and sets a green manufacturing benchmark.

Amid a growing global focus on environmental protection, a leading hydraulic cartridge valve manufacturer, heavily exporting to Europe, is preparing for the EU carbon tax policy. The company adopted ICP DAS's power monitoring system to enhance competitiveness, integrating energy savings and carbon reduction into production while driving green energy transformation.

In 2019, the hydraulic valve manufacturer installed a smart power monitoring system at its Huatan factory, enhancing efficiency, cutting costs, and reducing emissions.

Data-driven, energy-saving strategy upgrades

The hydraulic valve manufacturer uses ICP DAS's PMC-5231 Power Meter Concentrator and PM-3133 Smart Power Meters to monitor factory energy use in real time, enabling precise adjustments and area-specific consumption management.

PM-3133 modules are installed in key factory areas (Zone A, B, and C) to measure voltage, current, and power, with data aggregated by the PMC-5231 to the central control room via Ethernet. This system allows managers to monitor energy usage, predict consumption peaks, and optimize production plans using historical data for maximum energy savings.

The energy management solution allows the hydraulic valve manufacturer to track carbon emissions in real time and quickly adjust energy strategies. This improves operational flexibility and enhances global competitiveness.

Precise monitoring and data management

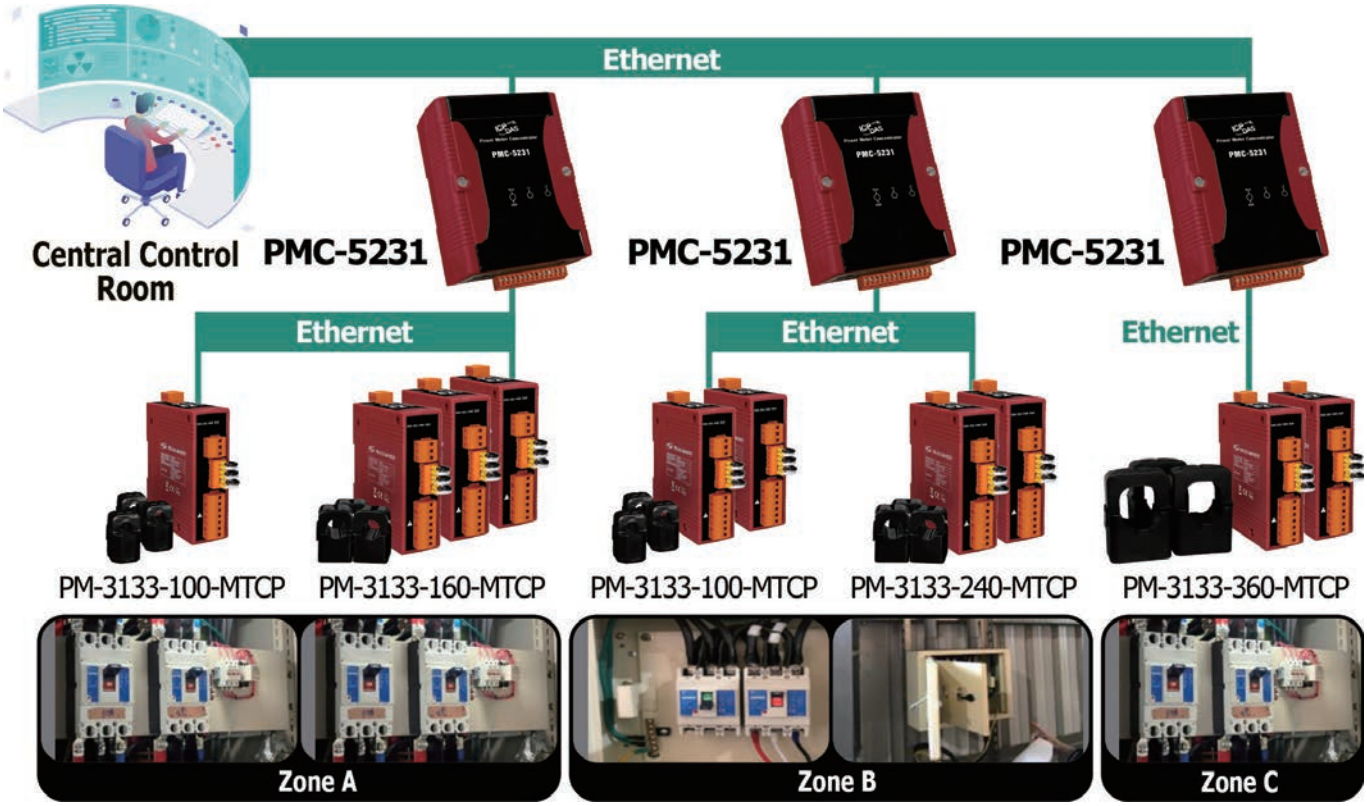
The hydraulic valve manufacturer's intelligent power monitoring system includes PMC-5231 Power Meter Concentrator and PM-3133 smart meters, enabling precise monitoring, real-time data collection, analysis, and reporting across the factory.

PMC-5231 Power Meter Concentrator

The PMC-5231 offers data integration, report generation, and remote monitoring, providing insights into equipment energy use and efficiency. Its built-in processing delivers timely analysis, real-time and historical data displays, and power usage statistics.

PM-3133 Series Smart Power Meter

The PM-3133 series smart power meters comply with IEC 61010-1 and EN 61010-1 standards, offering high accuracy (<0.5%, PF=1)



for real-time 3-phase power monitoring. They are suitable for low-voltage primary and medium/high-voltage secondary systems and provide reliable energy consumption data and equipment operation insights.

The Hwatan factory uses PM-3133-100-MTCP, PM-3133-160-MTCP, PM-3133-240-MTCP, and PM-3133-360P-MTCP meters across all power control panels for precise energy monitoring throughout the facility.

Improved energy efficiency

ICP DAS Energy Management Solution enables detailed monitoring and adjustment of power consumption to reduce energy use. The system's data helps identify energy wastage, allowing for swift action and optimized energy strategies.

The system helps enterprises track carbon emissions with automated reports, enabling regional adjustments and gradual footprint reduction to boost environmental compliance and competitiveness.

Key Products

PMC-5231

IIoT Power Meter Concentrator

- Provide power data statistics report by browser
- Provide data log file auto send-back & recovery function

PM-3133-160-MTCP

3-phase Smart Power Meter

- Energy Analysis for 3P4W, 3P3W, 1P3W, 1P2W
- Current Measurements Up to 100 A
- Voltage Measurements Up to 500 V

Transmission Component Manufacturer Sets a Benchmark in Manufacturing

A transmission component specialist improves quality using advanced current measurement and data analysis. The system monitors real-time machine currents, predicting risks, enhancing quality and efficiency, and reducing energy use. Future optimizations will expand its application, driving the shift to smart factories.

Quality issues, particularly in grinding linear rails, have challenged engineers despite advanced CNC automation. Traditional inspections lack real-time parameter monitoring, relying on experience-based adjustments. A transmission component manufacturer implemented data-driven solutions with precise current monitoring to address this, ensuring stable quality and boosting efficiency.

Intelligent Monitoring System

This system leverages power measurement and data analysis for real-time grinding data collection and analysis, with a focus on efficient data flow and precise monitoring.

Current Signal Conversion / Acquisition

Current variations in grinding machines often indicate quality issues. The DN-831I voltage-to-current converters transform machine inverter signals into ±10V analog signals, enabling accurate current monitoring and data processing.

Analog Signal Digitisation

Analog current signals are sent to the M-7017RMS module, which uses True RMS technology for precise digital conversion. Data is transmitted via RS-485 using the Modbus RTU protocol. It integrates seamlessly with the central monitoring platform.

Data Transfer and Analysis

Key Products

DN-831I-100V-50A

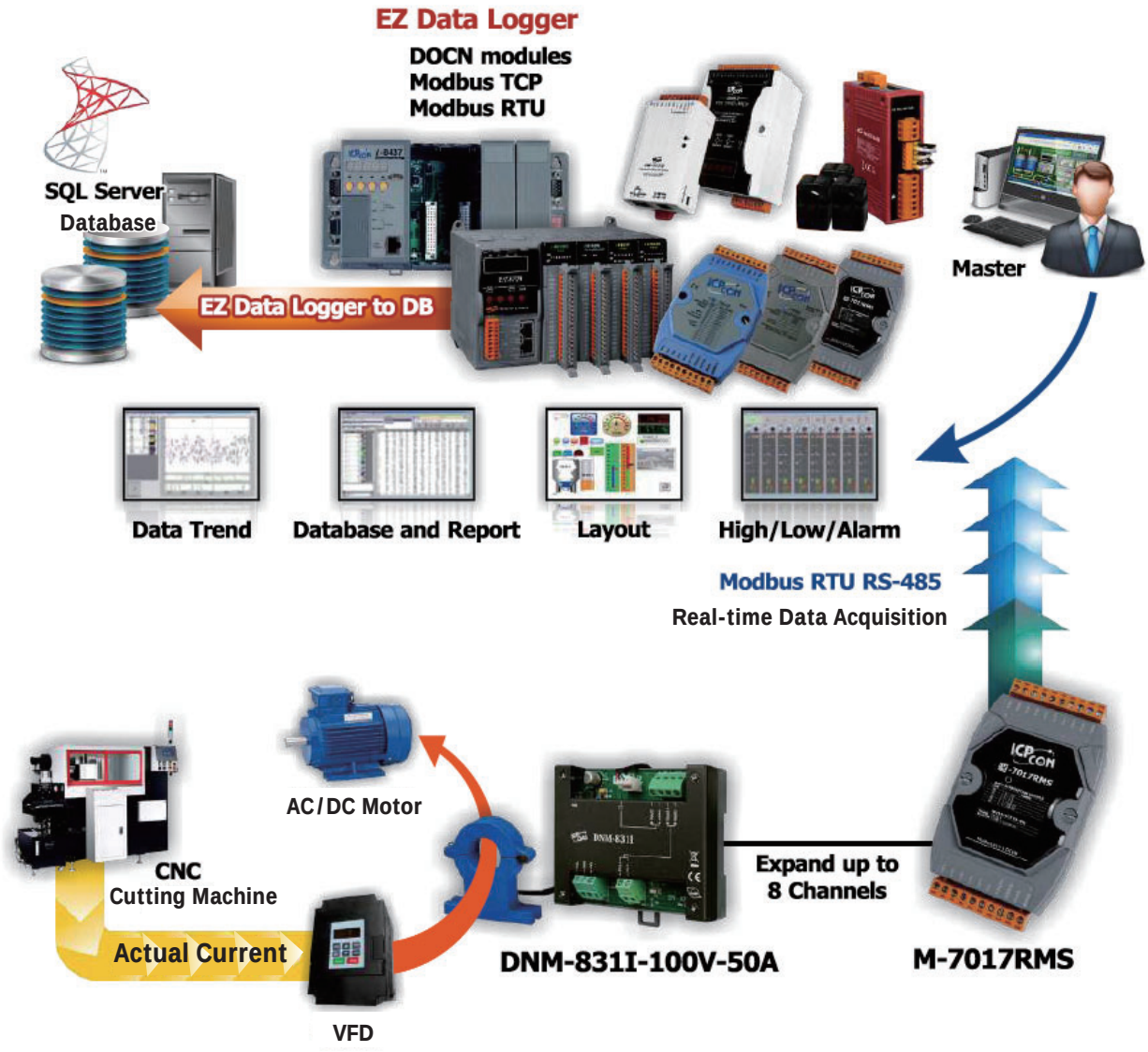
1 Channel Voltage Attenuator and 1 Channel Current Transformer

- High Voltage Input and High Current Input Measurement
- Linear Attenuation Ratio
- High Input Impedance

M-7017RMS-G

8-ch True RMS Input Module

- ±0.15% Factory Calibrated Accuracy
- The RMS Input Range Can be from +150m Vrms to +10 Vrms
- Designed for Standard Operating Frequencies of 45 Hz to 10 KHz
- Individual Channel Configurable



The back-end platform analyzes data in real-time, providing operators with clear machine status and key parameters. Data modeling helps predict quality issues, enhancing transparency. Real-time feedback reduces delays in quality inspection.

Predictive Modeling and Quality Control

Using extensive historical data, the transmission components manufacturer developed intelligent models to detect current anomalies and predict quality issues. These models enable early action to prevent problems from escalating. This ensures final product quality.

Technical Highlights

1. High-precision current sensors provide real-time monitoring of minor machine changes, ensuring production stability.
2. The system converts machine operation data into simple messages, offering real-time feedback for production managers.
3. Supports industrial protocols like Modbus RTU, ensuring seamless integration with factory systems.
4. Utilizes data modeling to predict issues, preventing quality losses from unexpected production problems.

Power Monitoring Systems through Data Decoding Industrial Energy Efficiency

The PMC-5231 and PM-3133 meters enable precise energy monitoring, production optimization, and cross-factory management. They support government subsidies, helping businesses save costs and improve efficiency.

In today's industrial world, energy efficiency is critical to cost control and sustainability. Improving energy efficiency is key to meeting the global sustainability challenge. Tracking power usage helps companies manage energy and meet carbon reduction targets. Power monitoring systems can effectively fulfill this need.

Make good use of data to tackle energy waste

Power data reveals real-time usage and identifies energy wastage points. Enterprises can obtain accurate and detailed electricity data, including multi-dimensional parameters such as voltage, current, power factor, and energy consumption.

This data helps managers monitor equipment efficiency, avoid waste, and identify peak power periods. Long-term data enables better scheduling to reduce energy costs and optimize operations.

Accurate data shows energy savings between old and new equipment

This power monitoring system records and analyzes energy usage of old and new equipment, providing solid data on energy savings. These insights serve as key evidence for government subsidy applications. It helps companies secure subsidies efficiently.

Energy management across plants and borders

As enterprises globalize, managing multiple plants is challenging. This power monitoring system integrates and manages energy data across plants and countries via RS-485 and Ethernet.

The PMC-5231 Power Meter Concentrator centralizes power data for real-time global monitoring. It streamlines cross-district management, reducing costs and enabling a unified global energy strategy.

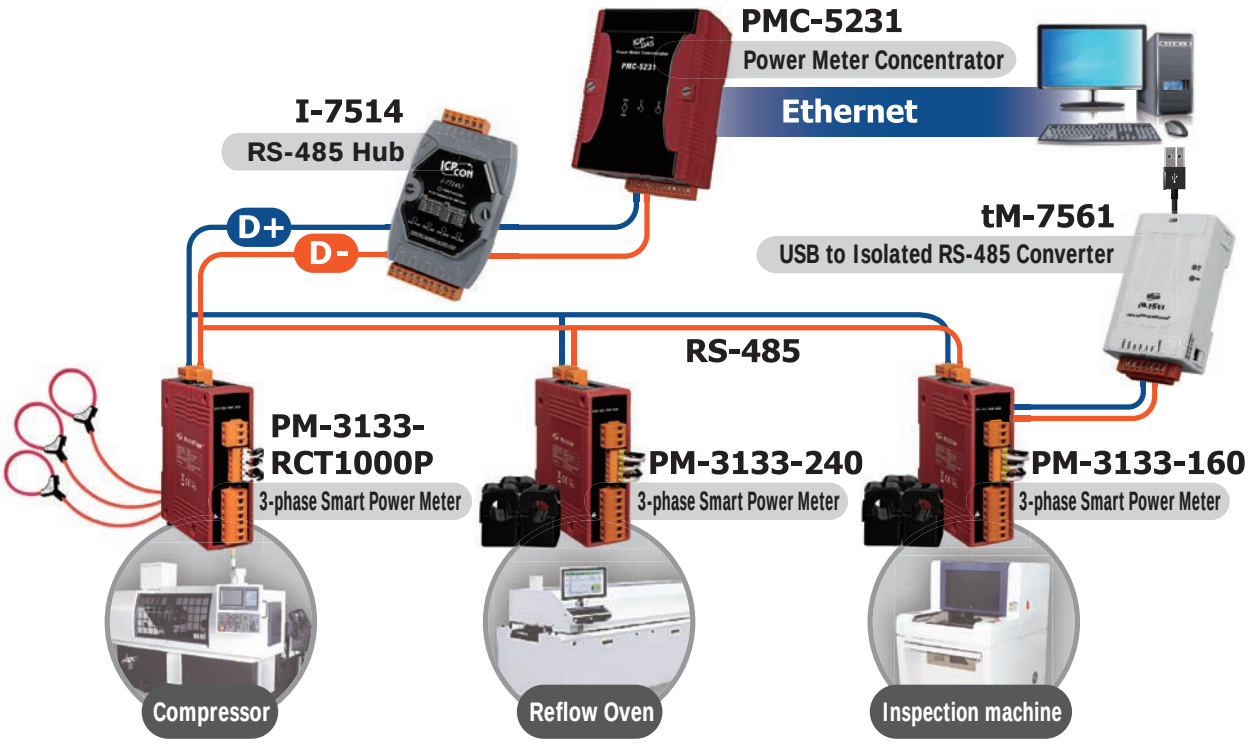
System Architecture

PMC-5231 Power Meter Concentrator

The PMC-5231 aggregates real-time power data via RS-485 and Ethernet. It supports multiple protocols for seamless integration with factory automation systems.

The PMC-5231 collects power data, such as voltage, current, power factor, and energy consumption, reflecting equipment conditions. It also automatically generates reports for decision-making.

PM-3133 Series 3-Phase Smart Power Meters



The PM-3133 series power meters accurately monitor various power parameters and support diverse current input sizes. They suit production environments from large factories to small workplaces, enabling effective power consumption tracking. Enterprises can clearly understand equipment-specific power usage.

Enhanced and extended RS-485 signals

Devices like tM-7561 and I-7514 boost RS-485 signal strength, ensuring reliable data transmission in large factory settings.

Data is the key to unlocking energy savings

Power monitoring systems replace guesswork with data-driven energy management, unlocking industrial energy efficiency. From real-time monitoring to predictive analysis, they offer comprehensive tools for enterprises, helping businesses lead the global energy-saving trend.

As global energy efficiency demand rises, power monitoring systems are key to staying competitive. Data-driven insights make industrial energy saving an achievable reality.

Key Products

I-7514U-G

Isolated 4-channel RS-485 Hub

- Solving RS-485 Star and Tree Wiring Problems
- Independent RS-485 driver for each channel
- Auto Switching baud rate, and fixed baud rate setting via rotary switch

tM-7561

USB to Isolated RS-485 Converter

- 2500 VDC Isolation Protection on the RS-485 side
- Automatic RS-485 Direction Control

Energy Management Solutions

Power Data Analysis | Energy Efficiency | Demand Management | Carbon Emissions

IoTstar

E-Catalog
Energy Management Solutions

PMC-2841M

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