PACTECH

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Smart Safety: Using Intelligent Monitoring to Guard Against Heat Hazards

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New Products

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2026 ICP DAS Nationwide Seminar Tour Launches — One-Stop Solution Covering ESG, AIoT, Cybersecurity & Industrial Energy Saving

By Editorial Team (Translated by Lynn Tang)

As net-zero goals advance and ESG standards tighten, manufacturing and high-tech industries face major transformation challenges. The integration of OT and IT systems heightens cybersecurity risks, making it critical for organizations to improve energy efficiency, digital management, and system security—while minimizing changes to existing equipment.

ICP DAS, dedicated to industrial control and AIoT, will launch the 2026 Technical Seminar Tour in Taichung, Hsinchu, and Kaohsiung.

Featuring case studies, system analysis, and demonstrations, the seminars help enterprises turn energy efficiency, AIoT, and cybersecurity concepts into practical solutions. Guided by affordability, connectivity, scalability, and protection, tailored courses support industries in choosing the best upgrade options.

Smart Efficiency, Instant Results

With rising energy costs, enterprises must quantify efficiency gains. ICP DAS offers dual solutions for airflow and water management, using sensing and control logic to optimize air conditioning and chilled water systems. Real-world cases show electricity use can drop 3–5%,

cutting costs and supporting ESG goals.

Seamless ESG & Data Integration—No Equipment Swap Needed

To overcome outdated equipment, fragmented protocols, and isolated data, ICP DAS enables rapid collection of production and environmental information via gateways and modules. This builds a strong digital foundation for ESG, EHS, and safety management, ensuring legacy plant upgrades remain low-risk and cost-effective.

Industry-Focused Topics for Each Venue

The Taichung session focuses on seamless upgrades for existing lines and aged equipment, using DIO/AIO modules and gateways to unify protocols, enable rapid digitization, and enhance safety with tri-color monitoring and gas sensing.

The Hsinchu session targets semiconductor and advanced tech facilities, highlighting cleanroom and Sub-fab management with wireless sensing, power monitoring, infrared detection, and intelligent control to ensure process stability and protect yield.

From Reactive Repairs to Predictive Maintenance & AI

Unexpected shutdowns carry heavy hidden costs. This seminar explores phased adoption of predictive maintenance (PdM)—from vibration monitoring and diagnostics to AI analytics—allowing organizations to deploy solutions by priority and budget. The result: reduced downtime and longer equipment life.

Cybersecurity Upgrade: Real-Time Protection

With OT and IT deeply integrated, industrial sites face rising cybersecurity risks. ICP DAS offers edge protection, encrypted communications, remote security maintenance, and real-time alerts—building an OT defense network with immediate response capability.

The ICP DAS Roadshow helps enterprises evaluate today, plan tomorrow, and implement solutions step by step. By combining energy efficiency, digital transformation, and cybersecurity into a predictable investment, organizations can cut costs, reduce risks, strengthen ESG, and advance intelligent manufacturing.

For details and registration, visit the ICP DAS website: https://www.icpdas.com

2026 ICP DAS Seminar Tour Schedule and Venue Information

Session	Date	Event Time	Venue
Taichung	4/23 (Thr.)	13:00–17:00	The Lin Hotel 6F Ocean Ballroom
Hsinchu	7/23 (Thr.)	13:00–17:00	Sheraton Hsinchu Hotel 3F FongYi Ballroom I
Kaohsiung	12/3 (Thr.)	08:30–17:00	Light Wedding Kaohsiung 11F Morning Star

Targeting Heavy Industry Transformation in Southern Taiwan: ICP DAS Joins Industry and Research Partners to Land AIoT in Factories

▲ President Frank Cheng says AIoT's core value is making better decisions, which forms a concrete path to ESG.

▲ Deputy Manager Hugo Cheng shows EtherCAT cutting latency and securing precise sync on fast lines.

▲ Project Manager Eugene Chen stresses that redundancy eliminates single-point failures and enables millisecond switchover.

By Editorial Team (Translated by Eva Lee)

With supply chains reshaped and net-zero pressure rising, Southern Taiwan's manufacturers face a critical upgrade crossroads. ICP DAS gathered experts from ITRI, Digiwin, LEDVONTEC and SGD companies to focus on data value and system stability. Instead of slogans, the seminar addressed latency, safety gaps, unplanned downtime and carbon-audit stress with concrete solutions.

Rebuilding Communication & Breaking Silos

In the opening session, ICP DAS President Frank Cheng spoke on "AIoT Empowering Smart Manufacturing for Productivity and ESG". He noted that today, AIoT aims squarely at better decisions and ESG. Plants must integrate data, add edge-to-cloud analytics, and let equipment sense and self-tune to make ESG actionable.

Real-time data needs a strong communication backbone. In his talk on "Seamless EtherCAT Integration in Smart Manufacturing", Hugo Cheng, Deputy Manager of ICP DAS Greater China Marketing, noted that legacy fieldbuses often lack bandwidth and sync accuracy for high-speed lines. EtherCAT uses distributed clocks and efficient frames to cut delay and keep controllers, sensors, and drives tightly synchronized.

For heavy industry, reliability is as critical as speed. Project Manager Eugene Chen outlined high-reliability redundancy for petrochemical and steel processes. He warned that even one-second

stops can cost millions, so any single point of failure is unacceptable. Dual controllers, power, and networks let backup systems take over within milliseconds. The message is clear: manufacturers now value resilience as much as performance.

Predictive Diagnostics for Preventive Safety

Safety is now about both compliance and long-term viability. LEDVONTEC President Tsai outlined new safety trends through explosion-proof equipment. With TS standards aligned globally, design shifts to intrinsic safety, limiting energy so no spark can ignite gas or dust. This evolution lifts safety from protection to true prevention.

On active monitoring, ICP DAS Senior Engineer Adam Tsai demonstrated infrared temperature sensing applications. Motor overheating and loose contacts once relied on inefficient manual checks. Thermal imaging turns heat into data, flags early anomalies, and shifts safety from repair to prevention.

Equipment health likewise depends on solid data. Dr. Wang from ITRI's mechanical division shared "Intelligent Predictive Diagnostics and Inspection", showing how vibration and current signals can be used to estimate remaining life. He promoted condition-based maintenance over rigid time-based schedules. AI on key features lets engineers act before failure and sharply cut unplanned downtime.

Electro-Hydrostatic Actuators for Maritime Control

Control technology is evolving for energy

▲ LEDVONTEC President Tsai notes that modern explosion-proof design centers on intrinsic safety at the source.

▲ ICP DAS Senior Engineer Adam Tsai shows infrared sensing turning invisible heat into actionable data.

▲ ITRI's Dr. Wang explains how AI-based vibration analysis enables accurate condition-based maintenance.

▲ SGD PM Chui notes that ICP DAS controllers and EtherCAT let the EHA system compensate waves in under 1 ms cycles.

▲ Digiwin Consultant Wu says that only by linking IT and OT can plants calculate accurate product carbon footprints.

▲ ICP DAS Manager Louis Yen adds that MDC concentrators upgrade RS-485 polling to near real-time for solid carbon accounting.

savings and advanced marine and defense uses. SGD Project Manager Chui presented an “intelligent stabilizer fin” using EHA and ICP DAS controllers for fast attitude control on ships and military platforms.

Stabilizer fins must correct roll quickly under changing seas. Using EHA power-by-wire, SGD embeds the servo in the actuator, cutting size by about 50% and energy use by 30%. An ICP DAS high-performance controller synchronizes multi-axis motion via EtherCAT in sub-millisecond cycles. Wide-temperature, anti-vibration design secures mission performance at sea.

IT-OT Data for Energy Management

With carbon tariffs and rising power prices, energy management took center stage. Digiwin Senior Consultant Wu shared “Towards IT+OT Integration for Precise Energy Management”. He noted that many factories see total power use but lack per-product carbon data because OT and IT are split. Only by tying energy data to production schedules can plants spot hotspots and tune strategies.

ICP DAS Project Manager Louis Yen likened the approach to moving from “single dishes to a full set menu”, showing how the IoTstar cloud platform plus integrated hardware helps electronics, stone, and semiconductor customers overcome digital-transformation barriers. The core is visualization, upgrading from single-machine views to plant-wide dashboards. One electronics plant used analytics to find hidden waste and save over 100,000 TWD in a month. In stone plants, shared monitoring helps offset limited IT staff. MDC concentrators also lift RS-485 from second-level polling to near real-time, strengthening carbon inventory for ESG.

On-site Highlights: Seven Zones Present a Full Ecosystem

Beyond dense sessions, the show floor was equally active. Seven demo zones were set up around key themes: EtherCAT high-speed automation, energy management, vibration diagnostics, infrared thermography, high-reliability redundancy, 5G communication, and air-quality monitoring.

Live demos from vibration to reliable links let visitors experience data visualization firsthand. Steel and petrochemical engineers crowded the redundancy booth, reflecting strong concern for robustness.

Ecosystems Driving Routine Transformation

Looking across this seminar, it is clear that the era of 'going it alone' has come to an end. Smart manufacturing is no longer a battlefield for individual equipment vendors, but rather a domain that emphasizes interoperability and ecosystem integration.

By linking ICP DAS communication and redundancy with LEDVONTEC's explosion-proof know-how, ITRI's algorithms, Digiwin's management, and SGD's mechatronics, the event drew a clear path. Southern Taiwan must build smart systems that sense, warn, and count costs precisely. The seminar is over, but its directions will be required lessons for the coming upgrades.

▲ ICP DAS joins hands with cross-disciplinary experts, building Southern Taiwan's smart manufacturing ecosystem through technical dialogue and practical sharing.

Smart Safety: Using Intelligent Monitoring to Guard Against Heat Hazards

Air temperature alone underestimates heat risk, but with the DL-10 sensor and TPD-703 HMI, the system calculates and visualizes the heat index in real time. Integrated with the M-7066PD-G relay, it enables automated alarms and supports Modbus RTU/TCP for seamless central monitoring. This smart solution mitigates high-temperature risks while enhancing safety and worker protection.

Written by Jim Hou (Translated by Carol Hsu)

Rising global temperatures pose severe heat risks in construction and foundries, where prolonged exposure causes heatstroke and dehydration. Extreme heat also diminishes worker concentration, significantly increasing machinery accidents. Smart monitoring is essential to mitigate heat hazards and ensure operational safety. Employers must follow the Occupational Safety and Health Facilities Rules and the Heat Hazard Prevention Guide for Outdoor Workers to implement necessary safety measures.

Traditional monitoring relies on subjective judgment, often leading to accidents due to delayed data. Adopting smart systems with real-time alerts is essential for regulatory compliance and corporate social responsibility. This automated approach effectively safeguards worker safety while transforming on-site management.

Why is “temperature” insufficient for risk assessment?

Some companies rely solely on air temperature data, yet underestimate risks by neglecting humidity, airflow, and work intensity. These factors significantly impact human heat dissipation. In poorly ventilated or humid environments, ignoring the “wet-bulb temperature” effect may mask physiological heat accumulation, leading to inaccurate management decisions.

Understanding the Heat Index

heat index combines temperature and humidity to quantify the actual heat load on the body. Since human heat dissipation relies on sweat, environmental humidity directly determines the rate of evaporation:

- Dry environment: Sweat evaporates rapidly, effectively dissipating heat.
- In high humidity, inhibited evaporation causes apparent temperatures and heat accumulation to far exceed thermometer readings, doubling heatstroke risks.

Therefore, even when thermometers show moderate readings, apparent temperature may exceed safe limits. Monitoring air temperature alone causes misjudgment; humidity must be integrated into a heat index to reflect the true heat load.

Risk Levels & Management

In occupational safety, the heat index is the core metric for assessing heat hazards. Environments are categorized into four heat index levels:

1. Low Risk: Normal operations; no special protection required.
2. Caution: Ensure regular hydration and rest breaks.
3. High Risk: Shorten work shifts; increase cooling and rest.
4. Extreme Risk: Prohibit long shifts; suspend work if necessary, and provide professional protection.

In addition to standard classification guidelines, employers can assess risks based on duration of work, age, fitness, and protective gear. Through precise monitoring and management mechanisms, health risks associated with high-temperature work can be effectively mitigated, ensuring worker safety.

Heat Safety Alert System: Real-time heat index monitoring and alerts

ICP DAS integrates the DL-10 sensor module, TPD-703 HMI, and the M-7066PD-G relay module to build a highly flexible heat hazard monitoring system.

System Operation Logic: A DL-10 sensor monitors temperature and humidity. The TPD-703 automatically calculates the "heat index" and "risk level," instantly displaying them on the operator interface for on-site assessment. An M-7066PD-G then drives on-site warning devices to achieve automated protection.

DL-10 Temp/Humidity/Dew Point Module

The front end uses the DL-10 industrial RS-485 sensor module for high-precision environmental data acquisition.

- Wide Temperature Range with High Accuracy: Supports operation from -25°C to +75°C and 0 to 95% RH. Built-in logic directly provides the dew point temperature, eliminating extra backend conversion.
- Space-Efficient Design: This module features magnetic attachment and wall-mounting. It is easily installed within cramped machinery or complex piping, optimizing operational space.
- Standard Communication Integration: Supports Modbus RTU protocol, seamlessly compatible with the TPD-703 via RS-485 for stable data transmission.

TPD-703 Touch HMI Device

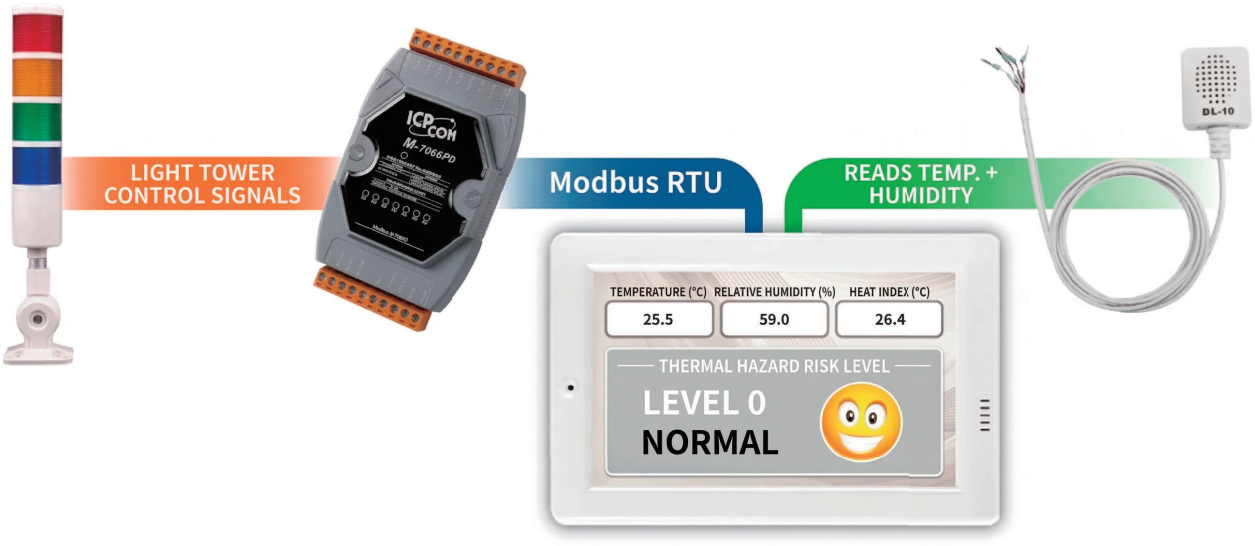
Data is computed and displayed by the TPD-703. Its 7-inch TFT color touchscreen possesses computational power, reading data from the DL-10 and instantly converting it into "Heat Index" and "Risk Level."

Visual Decision-Making: Graphical design and color-coded displays provide immediate environmental assessments. For instance, if the heat index becomes high risk, the screen displays a red warning with detailed data, aiding rapid decisions.

M-7066PD-G PhotoMOS Relay Module

To enhance warning effects, the system output can pair with the M-7066PD-G to drive on-site devices.

- High-Reliability Drive: PhotoMOS technology provides faster response, longer life, and better vibration resistance than traditional electromechanical relays.
- Protocols & Linked Alerts: Supports Modbus RTU / DCON to seamlessly integrate with TPD-703 for remote control of 5-color stack lights based on the predefined heat index, ensuring clear safety alerts in industrial fields.



▲ Heat Hazard System Diagram: Integrating DL-10 Monitoring, TPD-703 Display, and M-7066PD-G Stack Light Control.

Combined visual monitoring and on-site alerts protection mechanism

Considering that actual work sites may be noisy or busy, operators may not always be able to monitor changes on the TPD-703 display. The system employs a multi-layered protection architecture combining "**screen display + stack light + audible alarm**":

- Real-Time Display: The TPD-703 screen displays the heat index value and risk color instantly.
- Stack Light: M-7066PD-G drives a 5-color stack light, mapping heat index to specific colors.
- Audible Alarm: Buzzer alerts personnel instantly, overcoming visual obstructions.

Additionally, data is acquired via Modbus RTU/TCP and integrated into the central control system for real-time linkage control and historical data tracking.

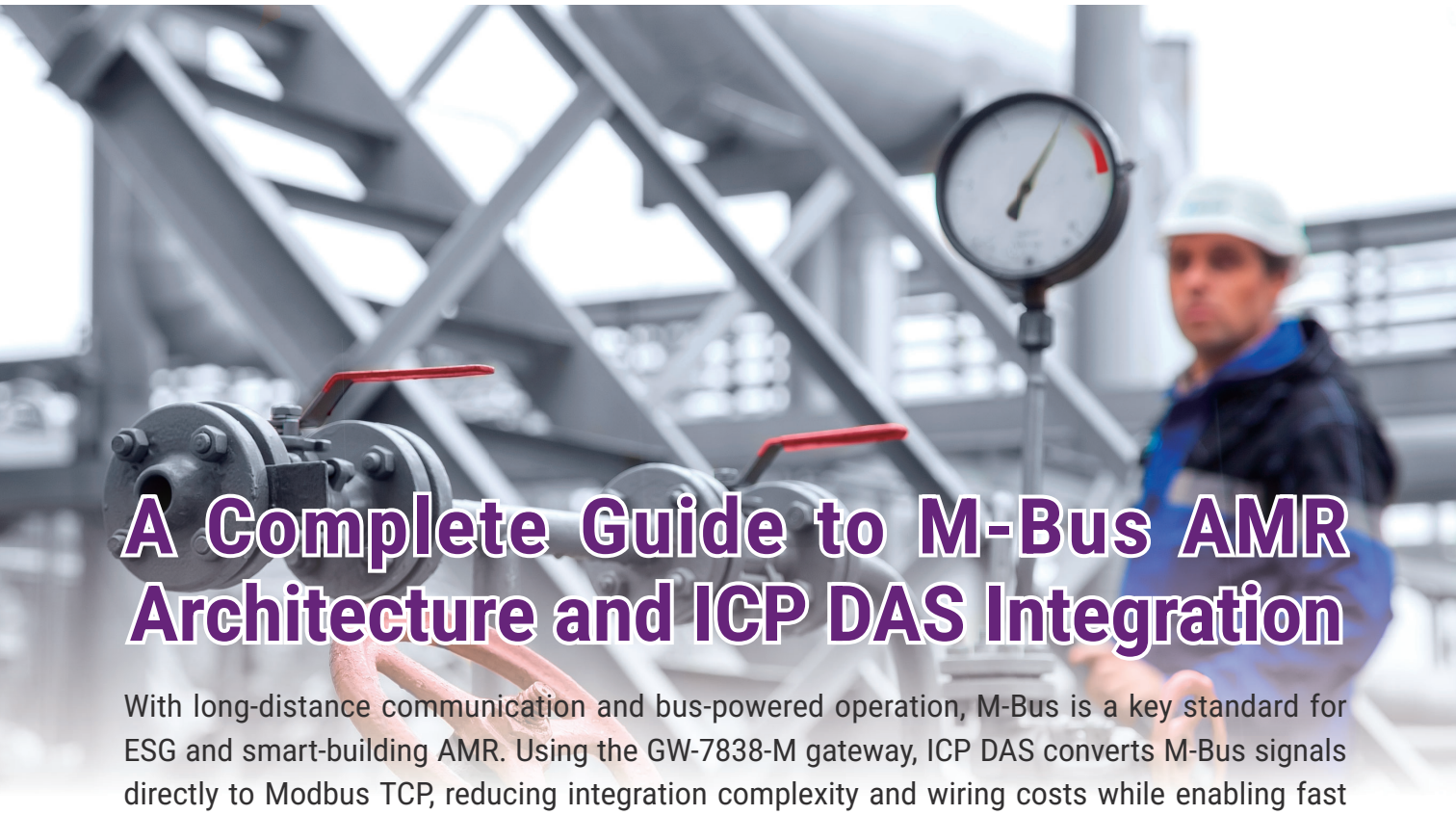
Building a Safe and Productive Workplace

Monitoring the heat indices in high-temperature environments is essential for worker safety and productivity. Centered on the DL-10 Temperature/Humidity Sensor, the TPD-703 HMI, and the M-7066PD-G Relay Module, ICP DAS offers comprehensive, flexible integration solutions.

By detecting real-time heat anomalies, the system uses a multi-layered alarm to accelerate personnel response and enhance proactive safety. This empowers enterprises to build safe, efficient environments that prioritize worker health.

Heat Index vs. Risk Levels

Light Color	Range (HI)	Level	Status / Action
White	HI < 26.7	0	**Normal**. Safe for work.
Blue	26.7 ≤ HI < 32.2	1	**Caution**. Monitor changes; rest & hydrate.
Green	32.2 ≤ HI < 40.6	2	**Alert**. Enhance ventilation; shorten work time.
Orange	40.6 ≤ HI < 54.4	3	**Danger**. Stop or take immediate protection.
Red / Flashing	HI ≥ 54.4	4	**Extreme**. Stop all work & activate alarms.



A Complete Guide to M-Bus AMR Architecture and ICP DAS Integration

With long-distance communication and bus-powered operation, M-Bus is a key standard for ESG and smart-building AMR. Using the GW-7838-M gateway, ICP DAS converts M-Bus signals directly to Modbus TCP, reducing integration complexity and wiring costs while enabling fast deployment of reliable energy management systems for factories and commercial buildings.

Written by Ming Chen (Translated by Lynn Tang)

Automatic Meter Reading (AMR) has become a key foundation of modern energy management systems as intelligent buildings, energy management, and utility digitalization continue to advance. It enables automatic, regular, and accurate collection of water, electricity, gas, and heat meter data, reducing manual reading costs while providing reliable data for analytics and operational decision-making.

Among various communication technologies, M-Bus (Meter-Bus) is widely used in smart metering systems due to its long-distance transmission, low cost, low power consumption, and suitability for centralized multi-device meter reading. This article outlines typical M-Bus AMR architectures and introduces related ICP DAS products, including the I-7590, GW-7828, GW-7838-M, and I-3591, for building stable energy monitoring networks.

Why Choose M-Bus for Metering?

M-Bus (Meter-Bus) is a European standard (EN 13757) developed for remote data transmission in water, electricity, gas, and heat metering. Unlike general industrial protocols such as Modbus, M-Bus is optimized at the physical and data link layers specifically for metering applications:

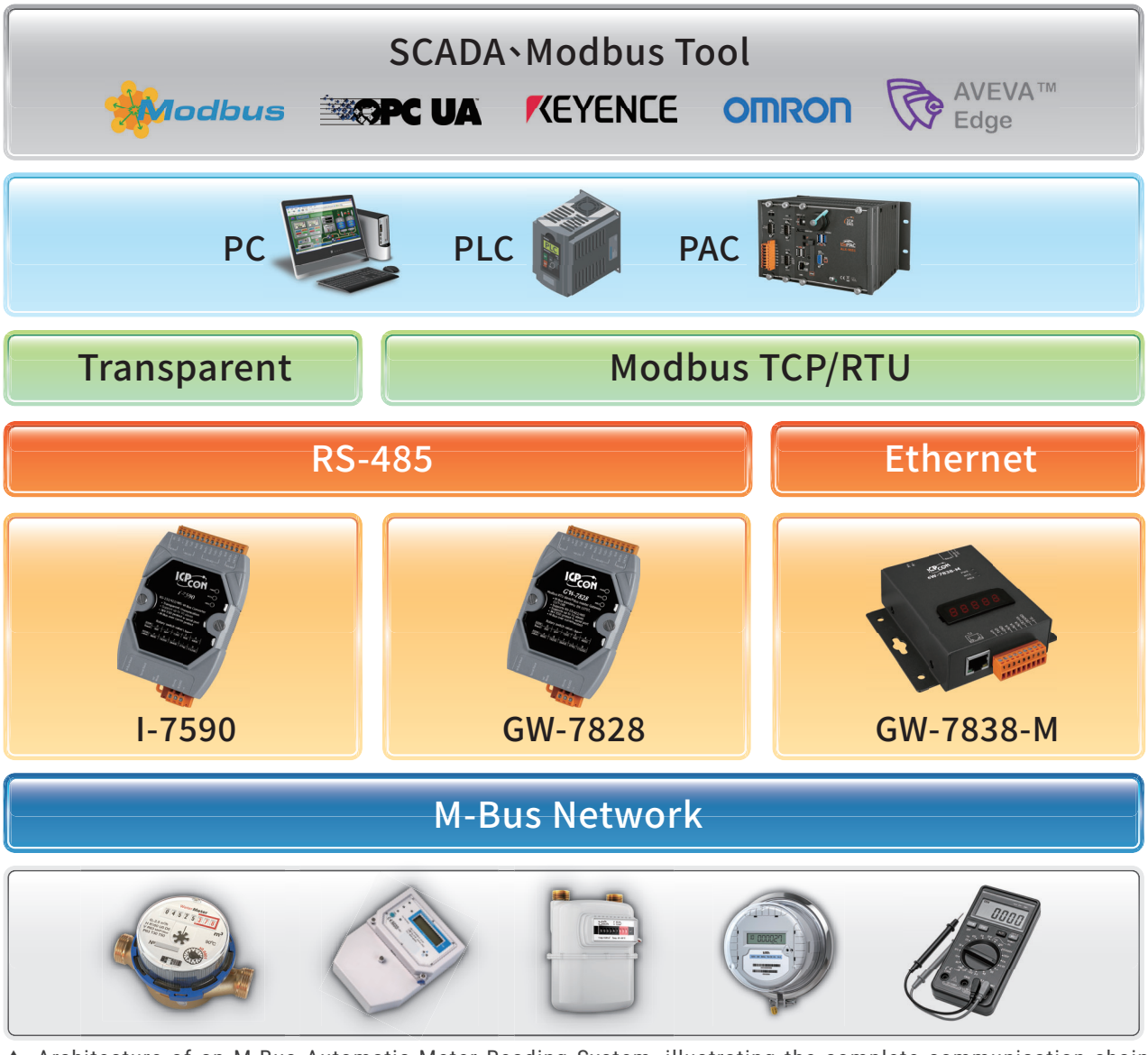
1. **Long-distance transmission:** One bus can cover several hundred meters, reducing the need for repeaters or intermediary devices.
2. **Multi-node architecture:** A single line can connect many slave meters, making it ideal for high-density deployments.

3. **Installation-Friendly with Bus Power:** Features a non-polarized two-wire design for error-free wiring and supports direct bus power, eliminating extra power cabling while ensuring low power consumption and quick installation.
4. **High Compatibility:** Standardized data format for seamless integration across different meter brands.

Typical Architecture of an M-Bus Automatic Meter Reading System

M-Bus networks typically use a Master/Slave architecture, where the master station polls devices and meters respond as slaves. This structure is ideal for centralized meter reading in buildings, communities, industrial parks, and smart cities.

A complete M-Bus automatic meter reading system is generally organized into three key layers:



▲ Architecture of an M-Bus Automatic Meter Reading System, illustrating the complete communication chain from field meters to cloud management

1. **On-Site Measurement Layer (Installation and Wiring):** M-Bus meters are installed on each floor or in designated building zones, with centralized wiring through trunk or branch lines.
2. **Communication Conversion Layer (Data Collection):** The M-Bus master station or conversion module periodically polls each endpoint to collect metering data.
3. **Backend Management Layer (Integration and Application):** A gateway converts M-Bus signals into RS-485 or Ethernet protocols, such as Modbus TCP, and sends the data to SCADA, BMS, or EMS for visualization, cost calculation, and alarm analysis.

The key advantage of this architecture is its flexible network connectivity. Through LAN, WAN, or VPN, once standard TCP forwarding and firewall settings are completed, the upper-level system can directly access the gateway's TCP port (such as Port 502) via a static IP address to read data. This makes it a highly flexible solution for distributed buildings and cross-site energy management.

ICP DAS Key Solution: Bridging Communication Gaps

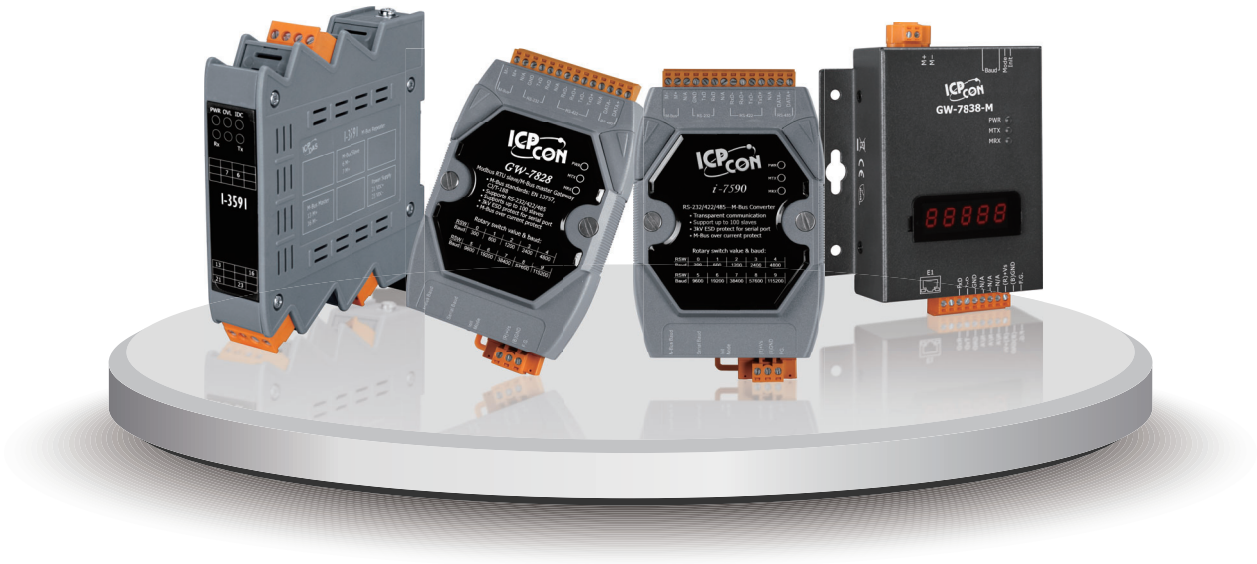
In practice, the main challenge is how to integrate M-Bus data into existing PLC or network systems. ICP DAS provides a range of M-Bus communication products that can be selected based on the number of measurement points, building scale, wiring distance, and upper-level system interface requirements.

M-Bus to Modbus Intelligent Gateway

To simplify protocol conversion in system integration, the GW-7828 and GW-7838-M directly convert M-Bus data into Modbus RTU or Modbus TCP. The GW-7838-M also supports Modbus TCP Server, allowing upper-level systems to access data directly through TCP Port 502.

M-Bus Master Communication Converter

The I-7590 acts as the M-Bus master, polling bus meters and converting the data into standard communication formats for backend controllers.



▲ ICP DAS M-Bus Communication Conversion Solutions: I-3591 Repeater (far left), GW-7828 Gateway (left center), I-7590 Converter (right center), and GW-7838-M Gateway (far right)

Signal Relay and Extension

For long wiring distances or signal loss, the I-3591 acts as a repeater to extend communication range, improve signal quality, and ensure stable data transmission.

Practical Application Insights

Green Factory Energy Management and ESG Reporting

To support ESG initiatives, factories need accurate monitoring of water, electricity, and gas usage across production lines. For widely distributed outdoor water and gas meters where power is difficult to obtain, M-Bus offers bus-powered operation without requiring separate power supplies for slave devices. Combined with I-7590 and I-3591 repeaters, it can cover the entire facility and simplify carbon audit data collection.

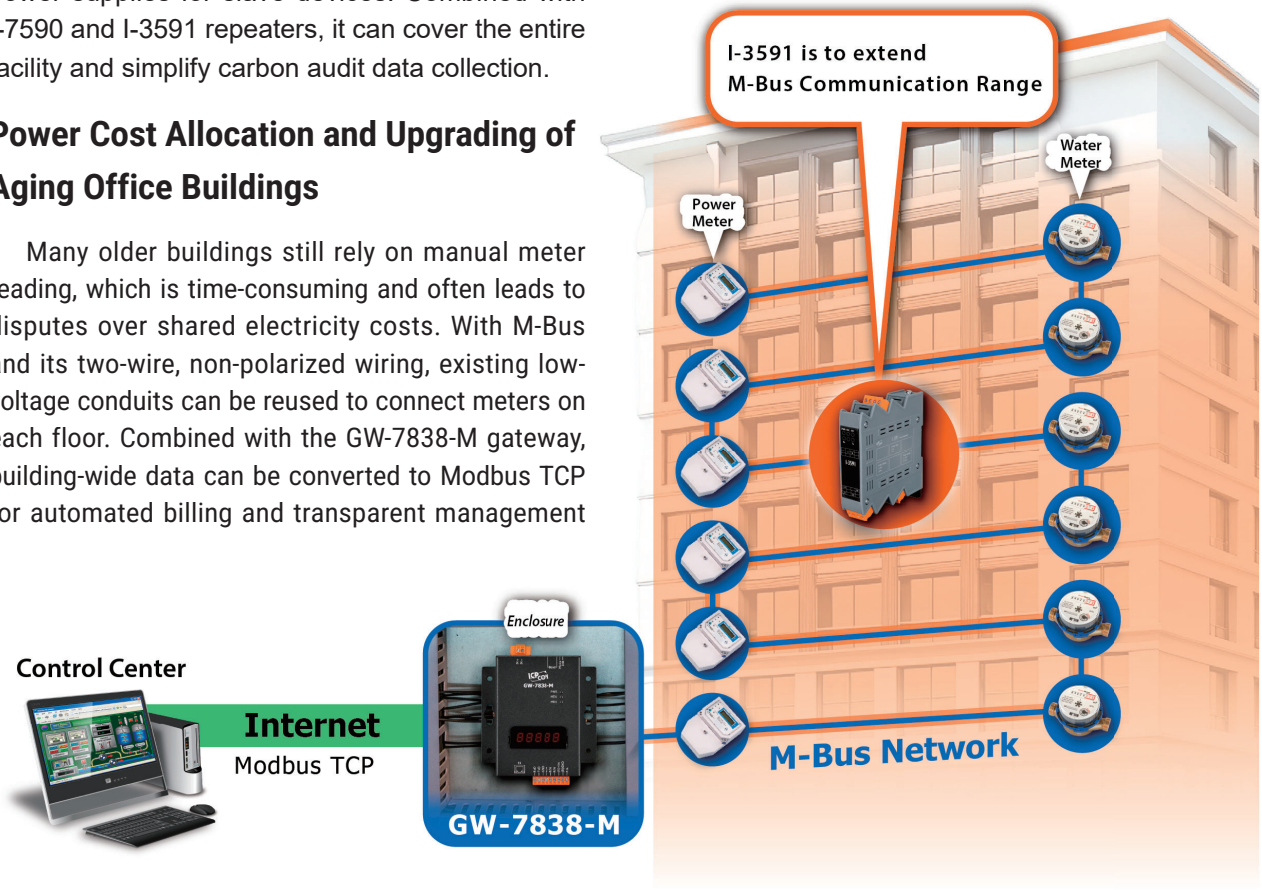
Power Cost Allocation and Upgrading of Aging Office Buildings

Many older buildings still rely on manual meter reading, which is time-consuming and often leads to disputes over shared electricity costs. With M-Bus and its two-wire, non-polarized wiring, existing low-voltage conduits can be reused to connect meters on each floor. Combined with the GW-7838-M gateway, building-wide data can be converted to Modbus TCP for automated billing and transparent management without major system replacement.

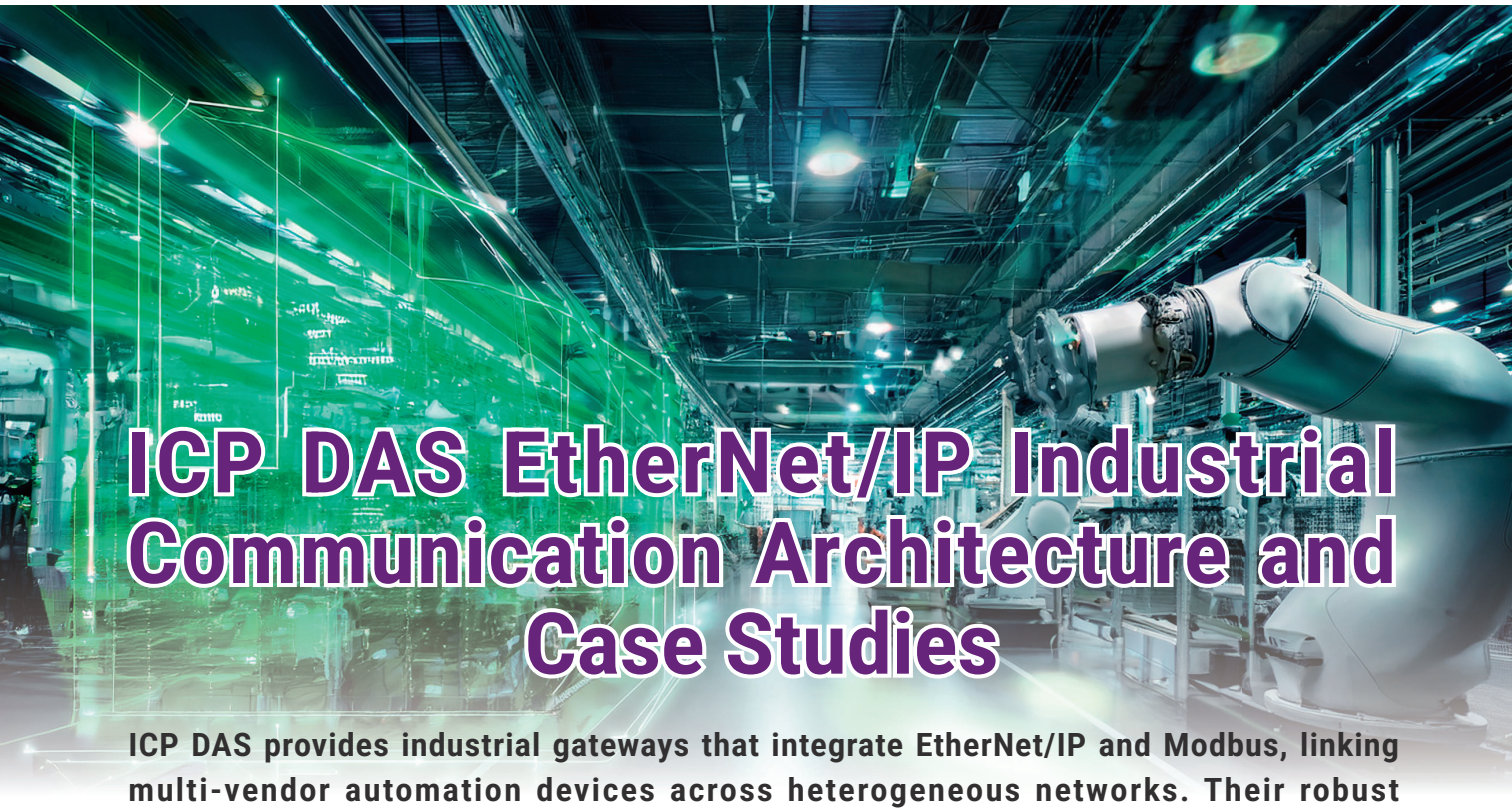
Conclusion

As demand for smart buildings and energy management grows, M-Bus is becoming increasingly important in automated meter reading systems. With mature standards, strong compatibility, and high cost-effectiveness, it is ideal for applications requiring centralized management of large numbers of meters.

ICP DAS provides a complete M-Bus communication and integration product line to help system integrators, building automation providers, and end users quickly build stable and reliable automated meter reading systems. In the future, M-Bus will play an even more important role in smart energy management through integration with IoT and cloud platforms.



▲ In high-rise meter reading applications, M-Bus connects floor-level meters, extends transmission distance with the I-3591 repeater, and sends data in real time to a remote control center via the GW-7838-M.



ICP DAS EtherNet/IP Industrial Communication Architecture and Case Studies

ICP DAS provides industrial gateways that integrate EtherNet/IP and Modbus, linking multi-vendor automation devices across heterogeneous networks. Their robust interoperability and flexible setup cut integration effort and deployment time, while improving communication efficiency and system reliability.

Written by Alex Chen (Translated by Eva Lee)

In real-world plants, equipment from different vendors often uses different protocols such as EtherNet/IP, Modbus RTU, and Modbus TCP. As systems grow, engineers face protocol mismatches, rigid architectures, and legacy devices that are hard to bring into new platforms.

To solve this without replacing installed equipment, ICP DAS introduced the GW-7472 and GW-7473 gateways, each tailored for specific control architectures and field scenarios.

EtherNet/IP Slave to Modbus RTU/TCP Master Gateway

The GW-7472 is designed for EtherNet/IP control systems to communicate with Modbus RTU/TCP devices. It acts as an EtherNet/IP adapter while serving as a Modbus RTU master and Modbus TCP client, so EtherNet/IP controllers can directly access existing Modbus devices.

Modbus Slave to EtherNet/IP Master Gateway

Conversely, the GW-7473 is designed for Modbus-based supervisory systems to integrate EtherNet/IP adapters in the field. Working as an EtherNet/IP scanner and presenting a Modbus TCP interface, it links EtherNet/IP devices into Modbus control platforms without redesigning the network.

With the GW-7472 and GW-7473, users can choose the right role for their architecture, simplifying cross-protocol design and improving

network stability and flexibility.

EtherNet/IP Slave Integration — Screw Factory Case Study

Application Background

At a screw manufacturing plant, the production lines are controlled by Allen-Bradley PLCs, using EtherNet/IP as the main industrial network. To enhance energy management, Modbus RTU power meters were added on each line to capture real-time consumption data.

Challenge Encountered

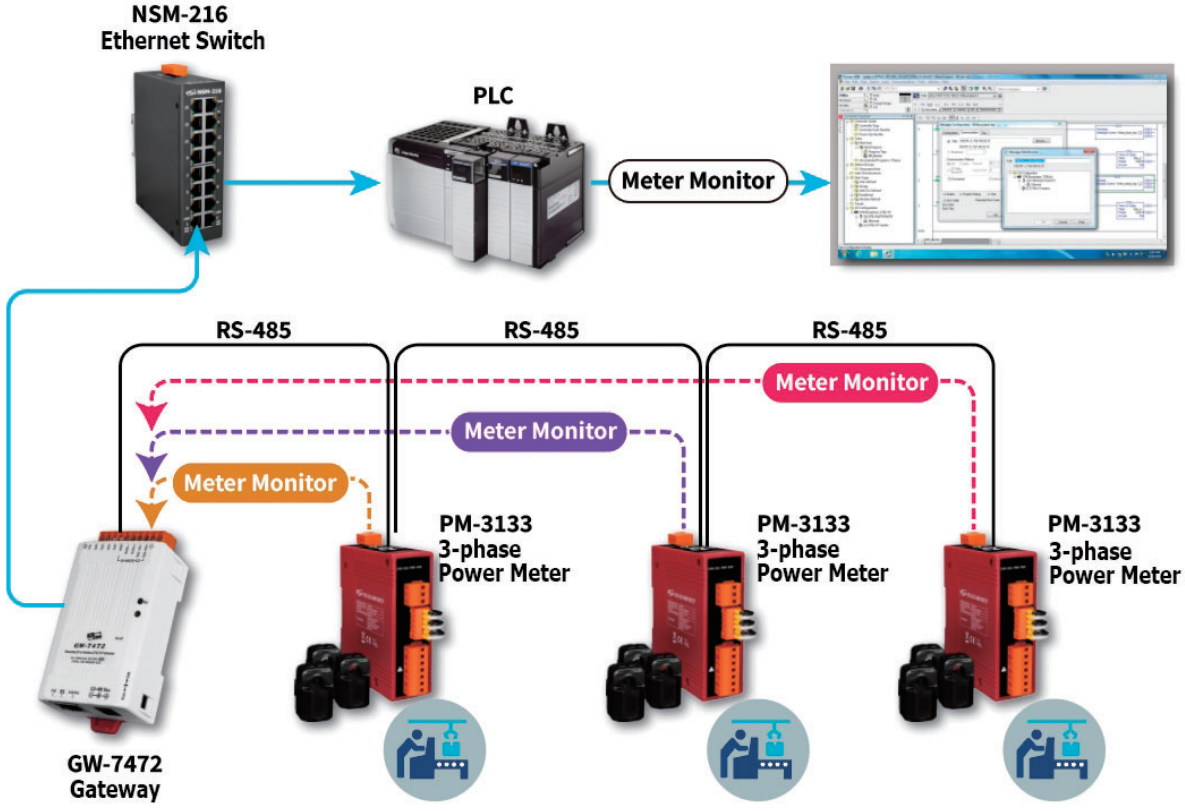
Because the AB PLCs only support EtherNet/IP, they cannot directly poll the Modbus RTU meters, making integration difficult. Replacing meters or adding another SCADA layer would increase both cost and maintenance complexity.

Solution — GW-7472

The customer adopted the GW-7472 as a protocol bridge. It appears as an EtherNet/IP adapter to the AB PLC, and as a Modbus RTU master on the other side, reading power data and mapping it into EtherNet/IP system.

Integration Benefits

With the GW-7472, the plant integrated line-level energy data without changing the AB PLC architecture or replacing Modbus RTU meters. This enhances energy monitoring and preserves system expansion flexibility.



▲ EtherNet/IP PLC integrates Modbus RTU power meters via the GW 7472 gateway to enable centralized line level energy monitoring.

EtherNet/IP Master Integration: Chemical Plant Case Study

Application Background

In a chemical plant, flowmeters continuously measure material flow in pipelines as key inputs for process control and production management. Several EtherNet/IP-based flowmeters have already been deployed and run stably in the field.

Challenge Encountered

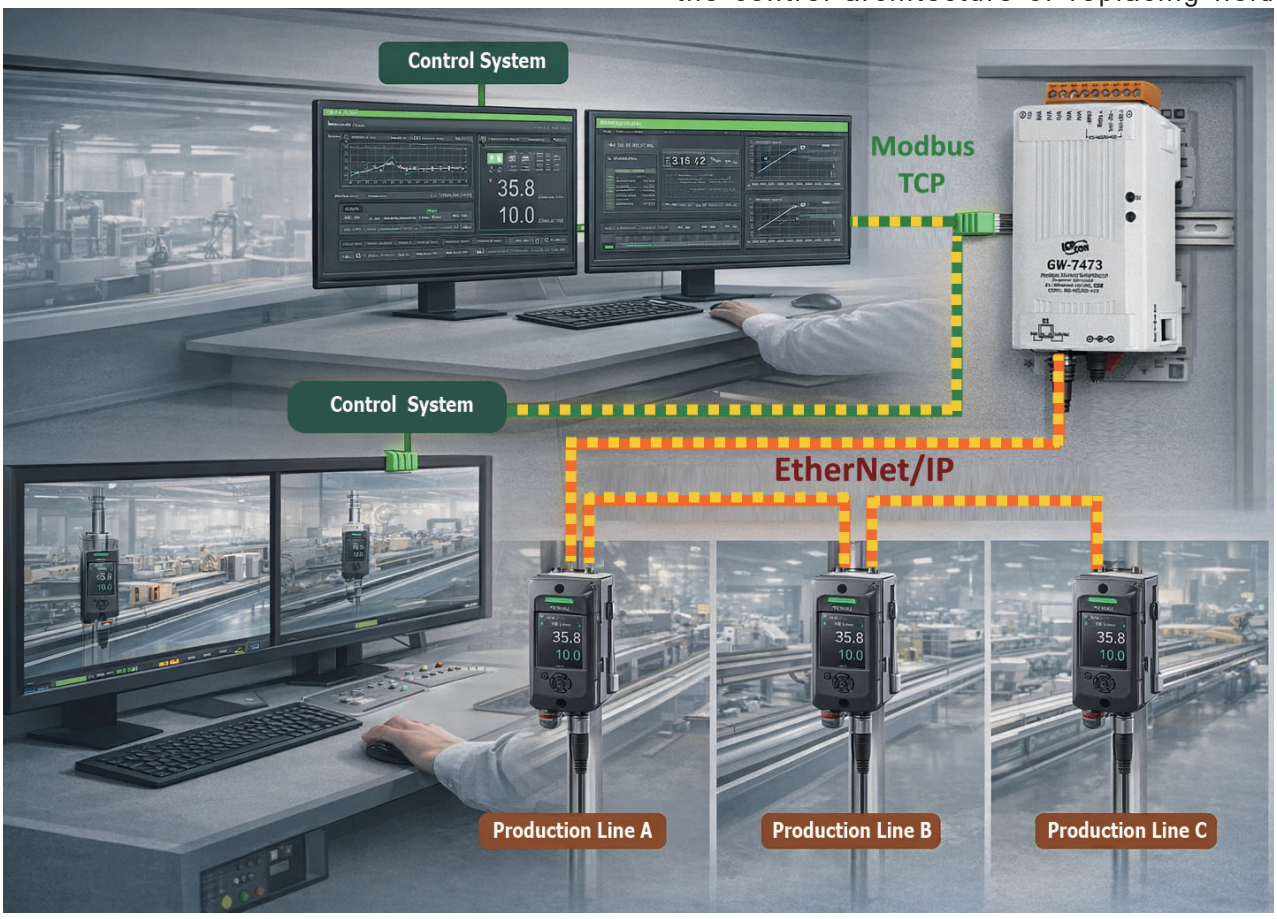
The plant's main controller uses Modbus TCP and cannot directly communicate with EtherNet/IP flowmeters, so flow data cannot be integrated into the monitoring system in real time. Replacing controllers or meters would introduce process changes and shutdown risks that the plant cannot accept.

Solution：GW-7473

To resolve this, the customer installed the GW-7473 as the integration gateway. It works as an EtherNet/IP scanner to read flow data, and offers a Modbus TCP server so the existing controller can access the data through familiar commands.

Integration Benefits

With the GW-7473, cross-protocol flow data integration is achieved without modifying the control architecture or replacing field



▲ GW-7473 Application Architecture — the Modbus TCP control system reads EtherNet/IP flow meter data via the GW-7473, achieving cross-protocol integration.

instruments. Material flow data now returns to the control system in real time, improving process responsiveness and overall reliability.

Conclusion

Without suitable tools, integrating heterogeneous system often hinders plant expansion and new system deployment. Through ICP DAS's communication gateway solution, we successfully bridged previously isolated communication silos.

Previously, customers struggled to share data across different systems, affecting both expansion and upgrades. With appropriate gateway solutions, devices that could not talk before are now seamlessly integrated.

These cases show that as automation and system upgrades accelerate, cross-protocol integration will become standard. Effective gateway solutions can cut deployment cost, shorten commissioning, and raise overall operational efficiency.

For detailed product specifications and operating instructions, please refer to the webpage below:

Model	Hyperlink	QR Code
GW-7472	https://www.icpdas.com/tw/product/GW-7472	
GW-7473	https://www.icpdas.com/tw/product/GW-7473	

Product Selection Guide

Model	Ethernet/IP	Modbus TCP/RTU	COM port	UL	Operation Temperature
GW-7472	Adapter	Master	1 x RS-422/485	-	-25 ~ +75 °C
GW-7472-UL				Yes	-25 ~ +75 °C
GW-7472-UL-UTA				Yes	-40 ~ +75 °C
GW-7473	Scanner	Slave		-	-25 ~ +75 °C
GW-7473-UL				Yes	-25 ~ +75 °C
GW-7473-UL-UTA				Yes	-40 ~ +75

Smart Vessel Safety Integration: Upgrading Real-Time Monitoring

ICP DAS provides comprehensive vessel monitoring solutions that cover critical safety and damage-control areas, including fire and flooding detection. Utilizing CAN bus, diverse protocols, and robust data transmission, these solutions significantly enhance vessel safety and efficiency.

By International Marketing (Translated by Carol Hsu)

Vessel safety depends on Damage Control and Onboard Safety Systems, but legacy vessel safety systems create "information silos. In emergencies, difficulties in data integration lead to monitoring blind spots. Furthermore, cabin electrical noise and mixed protocols (CANopen/Modbus) easily disrupt transmissions, making signal stability a major integration bottleneck.

To overcome these challenges, this solution employs ICP DAS controllers and I/O modules to build a fault-tolerant architecture through communication redundancy and edge local logic. It seamlessly overcomes interference and communication protocol differences while integrating security systems, ensuring the reliability and centralized management of vessel monitoring.

Damage Control System: Dual-Redundant Edge Logic Control Solution

The Damage Control System uses a dual-CAN Bus architecture to ensure critical data transmission during single-channel failures. The acquisition end collects flooding, temperature, and pressure signals, while the host triggers the control end for drainage and fan shutdowns.

Dual-CAN Backbone for Zero Downtime

For high availability, the acquisition and control boxes utilize LP-8821 and LP-8421 Linux PACs, respectively. The LP-8000 series features a Cortex-A8 CPU, Linux 3.x kernel, and built-in VGA, USB, Ethernet, and RS-232/485 interfaces.

For redundancy, the controllers utilize the I-8120W Intelligent Programmable CAN Bus Module, which processes heavy CAN traffic independently without burdening the main CPU. This enables dual-CAN Bus data exchange with the damage control console, instantly switching to a backup path upon main line failure.

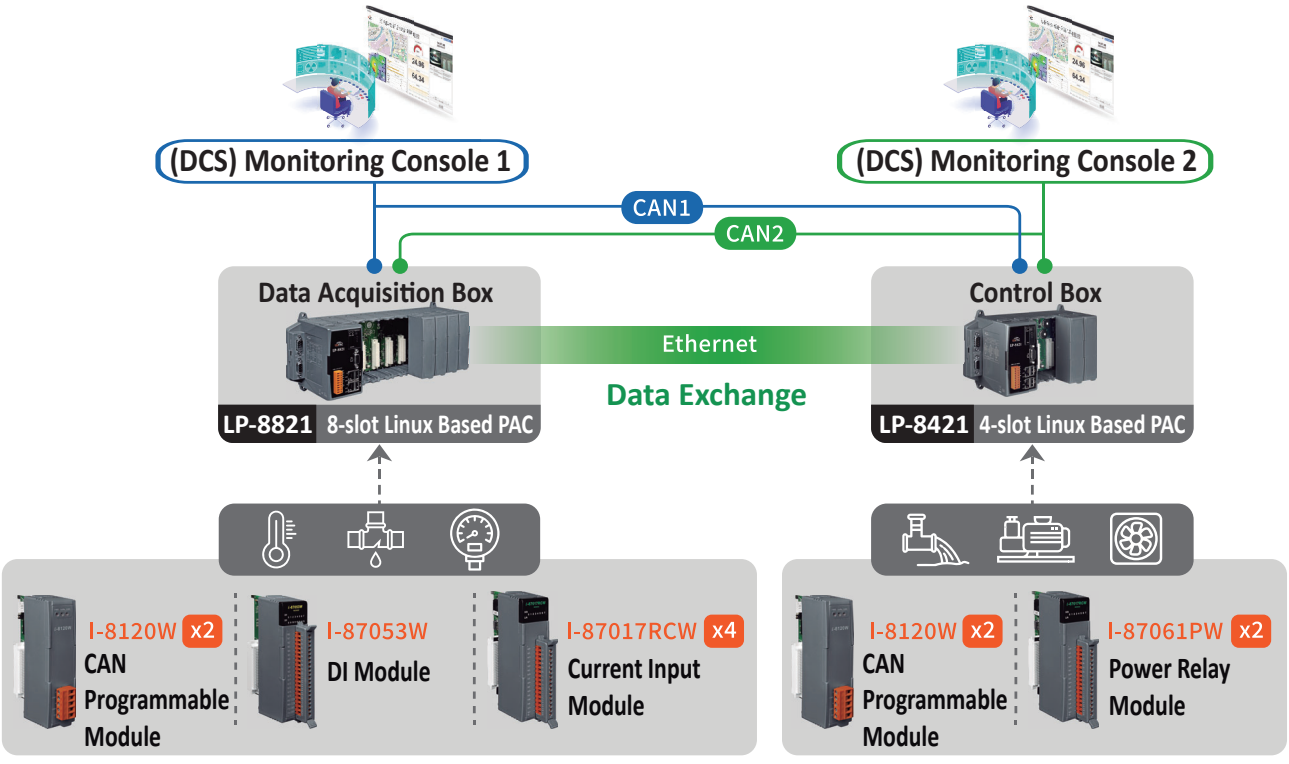
Precision Acquisition & Noise Optimization

For the vessel's electrical environment, the acquisition end pairs the LP-8821 with the I-87053W Isolated Digital Input Module. Featuring a low-pass filter and dual watchdog mechanism, it effectively eliminates high-frequency noise and prevents false alarms. Each channel includes photocoupler isolation, an LED indicator, and independent counter functionality.

The I-87017RCW module uses built-in resistors for direct analog current measurement, simplifying wiring and reducing risks. With independent channel ranges and dual sampling modes, it is ideal for monitoring flooding levels and pipeline pressure.

Edge Computing & Fail-Safe for Autonomous Response

The I-87061PW relay module features independent channels with isolated common terminals to prevent single-point failures. The LP-8421 controller retrieves data via Modbus TCP for direct local logic execution. Supported by Power-On and Safe Value settings, the edge controller can autonomously activate drainage and fire pumps during host communication outages, ensuring continuous damage control.



▲ Figure 1: Architecture of the Damage Control System

Vessel Safety: Multi-Protocol & Topology Optimization

The Vessel Safety System monitors electrical equipment, passageway doors, and generator sets. Powered by the LP-8421 core controller, it integrates these signals and transmits all data to the host console via Modbus TCP.

Optimizing Ethernet Topology for Wide-Area Wiring

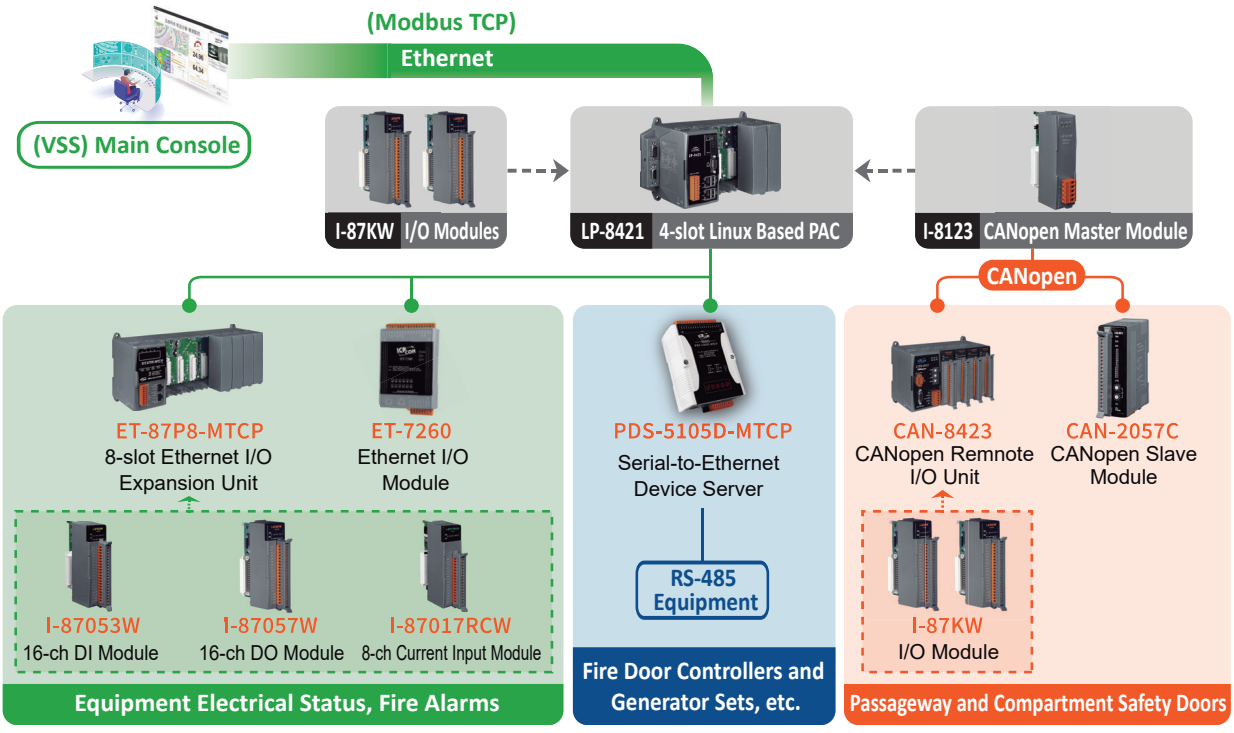
To meet wide-area transmission needs, the system uses the ET-87P8-MTCP Ethernet Expansion Unit with daisy-chain support to minimize cabling costs. The paired I-87057W module provides a 100 mA load current, full circuit protection (over-voltage/overload/short-circuit), 3750 Vrms isolation, and 4 kV ESD protection, guaranteeing reliable long-distance signals.

Multi-Protocol Gateways for Seamless Integration

For specific communication needs, the I-8123W master and CAN-2057C slave modules use 16-channel sink outputs to precisely control safety door relays. Generator sets integrate the PDS-5105D-MTCP device server, offering Modbus-to-Ethernet conversion and a 1-second boot time. Additionally, a LAN Bypass function maintains network connectivity during power failures, ensuring uninterrupted monitoring.

Conclusion

ICP DAS solutions resolve vessel communication challenges through a vertically integrated architecture. Integrating signal acquisition, redundancy, and edge control ensures real-time monitoring, boosts fault tolerance, and comprehensively safeguards navigation.



▲ Figure 2: Architecture of the Vessel Safety System

Appendix: Bill of Materials

1. Programmable Automation Controllers (PAC)

Model	Product Name	Application
LP-8821	Linux-based PAC	Data acquisition core (Cortex-A8 CPU)
LP-8421	Linux-based PAC	Damage control box & vessel safety main core

2. Communication Interfaces & Gateways

Model	Product Name	Application
I-8120W	1-port Smart CAN Module	Dual-CAN redundancy; reduces CPU load
I-8123W	CANopen Master Module	Manages the safety door CANopen network
PDS-5105D-MTCP	Serial Device Server	Integrates RS-485 generators; LAN Bypass

3. Data Acquisition & Control I/O

Model	Product Name	Application
I-87053W	16-ch Isolated DI Module	Monitors flooding/pressure; noise filtering
I-87017RCW	8-ch Current Input Module	Analog input; built-in resistor for easy wiring
I-87061PW	16-ch Power Relay Output	Controls drainage pumps and ventilation fans
I-87057W	16-ch Isolated DO Module	Outputs status and alarm signals
CAN-2057C	CANopen Slave DO Module	Controls safety doors

4. Remote I/O Expansion Units

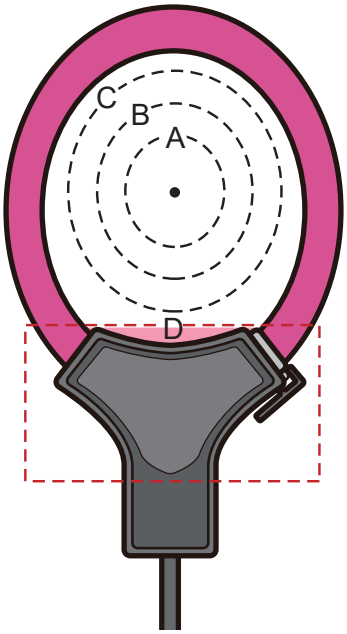
Model	Product Name	Application
ET-87P8-MTCP	8-slot Ethernet I/O Expansion Unit	Daisy-chain support for wide-area signals
ET-7260	Ethernet I/O Module	For distributed small-scale monitoring
CAN-8423	CANopen Slave Expansion Unit	Expands CANopen I/O flexibility

Impact of Rogowski Coil Installation on Measurement Accuracy: Installation steps Precautions

Written by Jason Hsieh/ Translated by Lynn Tang

Calibration Standards and Ideal Positioning

ICP DAS Rogowski Coil is calibrated with the conductor placed at the center (as indicated in Area A of the illustration), which is the ideal location to ensure measurement accuracy.

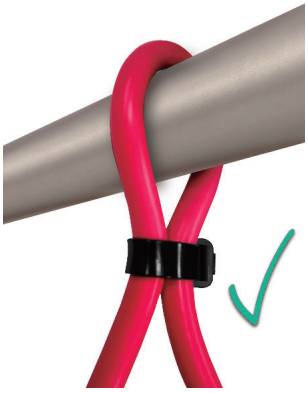


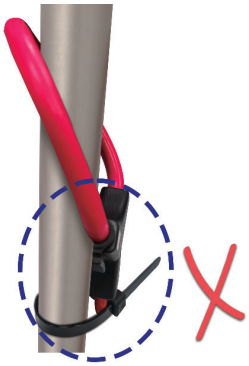
Factors Influencing Accuracy

In practical applications, the following factors may reduce measurement accuracy:

- Off-center conductor
- Tilted coil installation
- Improper conductor-to-coil diameter ratio

Slight conductor tilt or offset may still allow acceptable accuracy, but the error increases as the deviation grows.





Proper Installation

1. Cable tie close to conductor
2. Minimal tilt angle
3. Away from position D

Improper Installation

1. Excessive tilt angle
2. Near connection point D

PCC-1416

4.3" Touch HMI Device, Electronic CAM Controller

High-Precision Angle Control and Intuitive User Interface

The PCC-1416 is an electronic cam controller integrating a 4.3-inch touch HMI, purpose-built for high-precision industrial automation applications. By replacing traditional mechanical cam systems with digital control, it eliminates mechanical wear and tedious adjustments while significantly improving control accuracy and system stability. Its flexible software configuration capability effectively shortens equipment development cycles and reduces subsequent maintenance costs.

The user interface uses a modular, zoned design that shows only necessary parameters, enabling engineers to complete setup and mode switching quickly. A built-in virtual numeric keypad allows direct entry of angle or position values and supports parameter copying to greatly shorten repetitive configuration time. Teaching Mode can write the current encoder angle or position directly into control parameters, simplifying the configuration process.

The controller can connect to absolute encoders, supporting binary and Gray code inputs with up to 12-bit resolution (4096 counts, ~0.08°) for fine positioning. It supports 8 banks (working modes), 16 digital output channels, and up to 32 zone settings; each zone can independently define ON/OFF angle or position conditions mapped to a single output, enabling flexible and precise timing control.

To ensure operational safety, the PCC-1416 includes a Start Input mechanism that locks outputs until start conditions are met, reducing the risk of unintended actions. The front panel is rated IP65 for dust and moisture resistance, suitable for most industrial environments. Built-in password protection prevents unauthorized parameter changes and ensures system security.

The PCC-1416 is suitable for automation equipment requiring high-precision synchronized control, including turret testers, lathes, textile machines, printing machines, automated test equipment, assembly lines, and packaging lines, helping improve process synchronization and product quality stability.

For more information about the PCC-1416, please refer to: https://www.icpdas.com/en/product/PCC-1416

CAN Total Solution

Feature Information

- Complete support for media converter, switch and router, providing various interfaces (USB, Ethernet, RS-485/RS-422/RS-232, WiFi, Fiber)
- Provides various I/O and power relay support
- Supports ICPDAS PAC (I-8120W)
- Support for PC/IPC via expansion cards
- Built-in CPU supporting both master and slave communication control
- Provides various communication protocols (CAN Bus, CANopen, DeviceNet, J1939)

Controller

I-8120W Series

µPAC-7186EXD-CAN
µPAC-5000D-CAN

PCI Series

PCI-104

Communication

I-2534
Switch

I-2532 / I-2533
Bridge

I-7532
Bridge

I-7531
Repeater

I-7565 Series
Converter

I-7540D
Converter

I-7530 Series
Converter

I-7540D-WF
Converter

I/O

CAN-2000 Series
Remote I/O modules with CANopen, DeviceNet (Support AI/ AO/ DI/ DO/ PWM/ Thermocouple modules)

CAN-8000 Series
Remote I/O Expansion Unit with CANopen,DeviceNet (Support I-8K, I-87K I/O modules)

Power meter
(PM-3133-CPS,PM-311x-CPS)

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