

# Cloud-Enabled Edge Gateways for Industrial IoT

## Powering Edge Intelligence with Advantech WISE-PaaS/EdgeLink

- / Utilizing Edge Computing Applications
- / Advantech WISE-PaaS/EdgeLink Introduction
- / Case Study
- / WISE-PaaS/EdgeLink Core Edge Devices Selection Guide

Vertrieb durch



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### WISE-PaaS/ EdgeLink



**ADVANTECH**

*Enabling an Intelligent Planet*



ADVANTECH iAutomation  
Premier Partner

# Machine-to-Intelligence (M2I) Ensures Future Business Success

In the Industrial IoT era, companies are seeking solutions that can help them to utilize data analytics to raise service levels, create better products, and reduce operational costs. Ideally, the first step is the digitalization of assets. This means that increasingly more data need to be analyzed, and both the volume and diversity of such data from different equipment are also increasing. Equipment manufacturers, owners, and maintainers require an easy and reliable way to collect equipment data from field sites. Advantech WISE-PaaS/EdgeLink provides a solution for M2I. Without frequent on-site maintenance and service trips incurring time and financial costs, users will be able to monitor critical assets, track equipment performance, receive alarm notifications in the event of a problem, and perform system management and configuration using handheld devices. Thus, costs can be substantially reduced and field equipment and facilities can be better monitored and controlled.



## Optimizing Efficiency with Connected Equipment

For industrial boilers, air compressors, chillers, power distribution cabinets, and other equipment, Advantech WISE-PaaS/EdgeLink serves as a hub for data acquisition, data storage, alarm notification, data reporting, and other functions, maximizing equipment efficiency with reliable data.



## “Click-and-Go” Cloud Access Deployment

Advantech WISE-PaaS/EdgeLink Studio offers a “click-and-go” function for sending data to the cloud. Acquired data can be easily and effortlessly uploaded for analysis and visualization to serve as a more useful reference for management.



ECU-1152



### Machine-to-Intelligence

- Leasing equipment management
- Overall equipment efficiency
- Pump status monitoring
- Flow pressure monitoring
- HVAC system operating status analysis



### Agriculture

- Granary monitoring
- Greenhouse regulation



### Renewable Energy

- Power generation efficiency monitoring
- Weather station monitoring
- Equipment status monitoring



IEC-60870-5-104

DNP3.0

Modbus

BACNet

MQTT

RESTful

ODBC

HTTP

LoRaWAN

LTE

Zigbee

GPRS

RS-485

3G

Ethernet

Wi-Fi

NB-IOT



## Integrating Equipment Data into Cloud Middleware with Secure Data Conversion

In the industrial IoT era, the requirements for connecting equipment are becoming increasingly more diverse and complex. Advantech WISE-PaaS/EdgeLink Studio supports data conversion, which enables equipment used in mass production, such as programmable logic controllers (PLCs), sensors, inverters, and so on, to be directly integrated with SCADA, manufacturing execution systems (MESs), and ERP systems, thus facilitating equipment operation and maintenance.



### Urban

- Air quality monitoring
- Flood control systems
- Levee monitoring
- Wastewater systems
- Hazardous materials control



### Factory Environment

- Energy management
- Wastewater discharge
- Continuous emission monitoring systems
- Volatile organic compounds

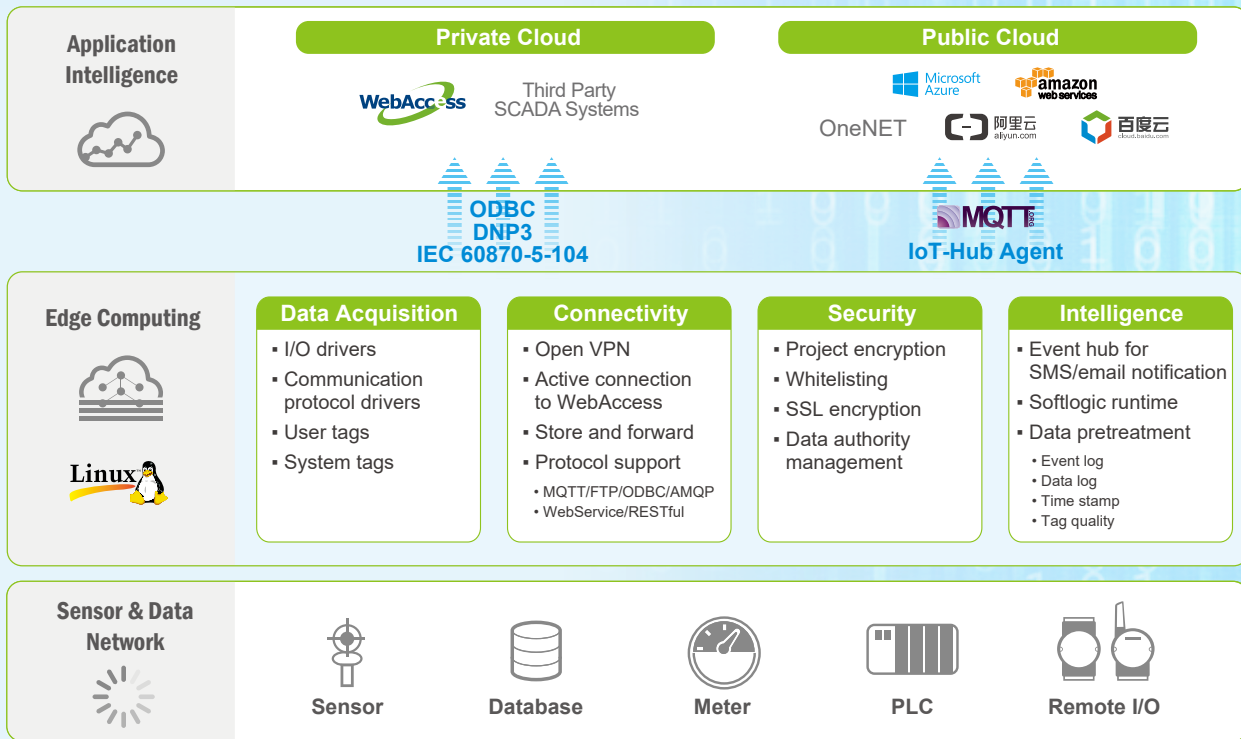


# Industrial IoT Data: From the Field to the Cloud

Before the data are ready for analysis, they must undergo several stages of processing. Without complicated and time-consuming programming, Advantech WISE-PaaS/EdgeLink organizes the acquired data for the cloud. The data need to be pretreated and sent to server/cloud securely and using specific protocols. Advantech WISE-PaaS/EdgeLink studio provides an efficient interface that allows you to perform this complex task with just several clicks.

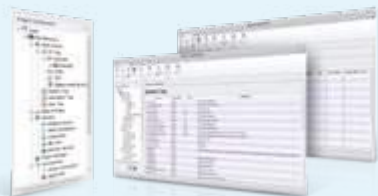
## Advantech WISE-PaaS/EdgeLink Runtime Kernel Architecture

Advantech WISE-PaaS/EdgeLink is equipped key functionalities for edge applications. With the integrated abilities of downlink for data acquisition and uplink with connectivity, security, and intelligent functionalities, sending field data to the cloud becomes an easy task.



## Advantech WISE-PaaS/EdgeLink Studio

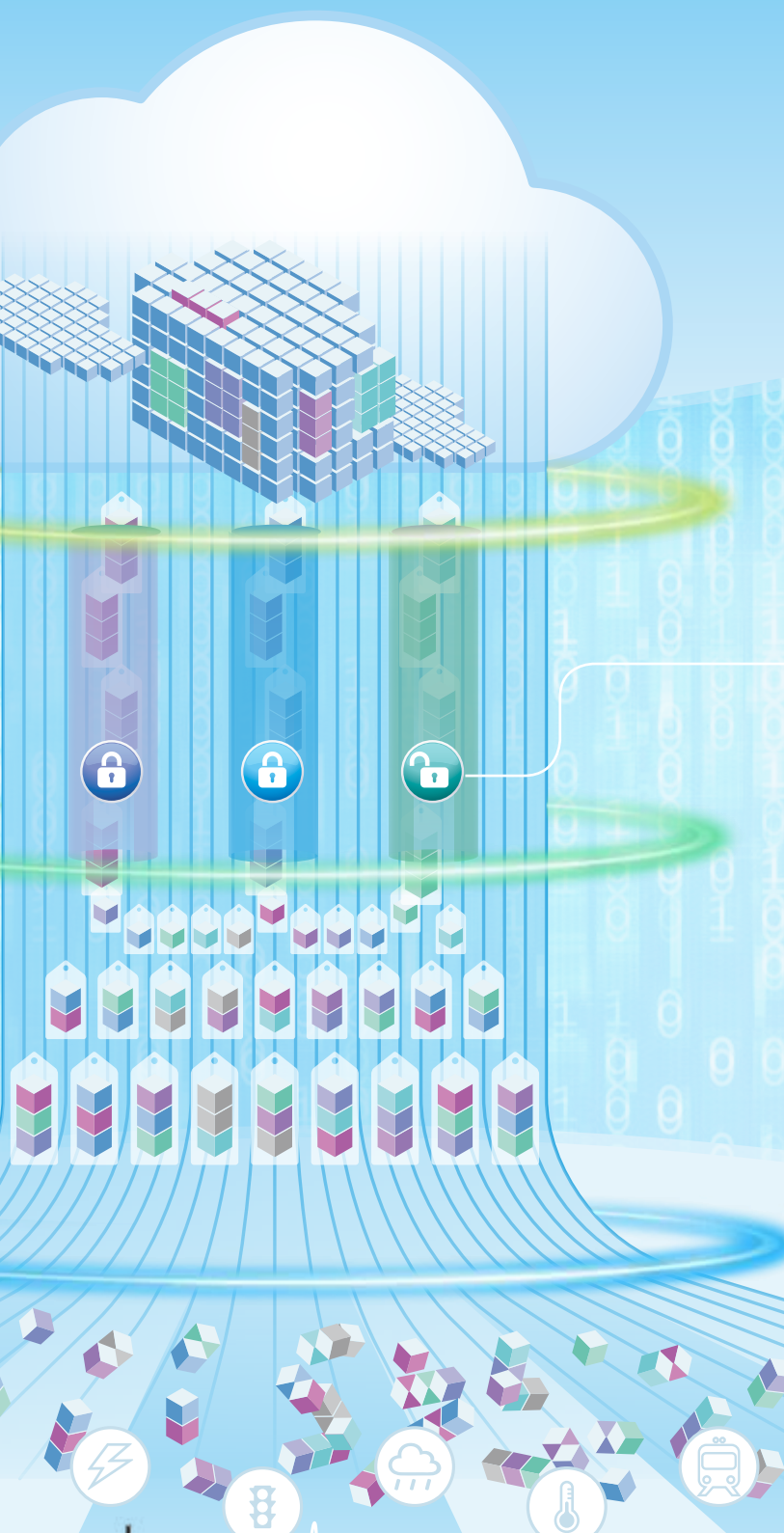
- Administer all gateways that support Advantech WISE-PaaS/EdgeLink
- Gateway status monitoring
- Event alert configuration
- Cloud access rights administration
- Custom integration
- Supports both 32- and 64-bit Windows
- No license required



### Sensor Data

Handles I/O tags for data acquisition:

- Sensor voltage/current signals
- Limit switch ON/OFF status
- Alarms/buzzers
- Flow level
- Pressure
- Frequency
- Valve control



## Protocols

- Modbus
- DNP3
- RESTful
- MQTT
- IEC 61850-5-104
- WASCADA

## Security

- Data encryption by AES-256 and access control
- Whitelist
- Web service encryption by SSL
- User authorization management

## Connectivity

- Active connection
- Store and forward
- OpenVPN

## Pretreatment

- Scaling/calculation
- Time stamp
- Data buffering
- Quality index for data protocols

## Self-Diagnosis Information

System information can be easily accessed as system tags:

- CPU loading
- Memory and storage usage
- Serial/LAN ports quality index
- Location information (GPS)
- Cellular network quality
- Hardware operating status

## Equipment Status

Acquire data using various communication protocols:

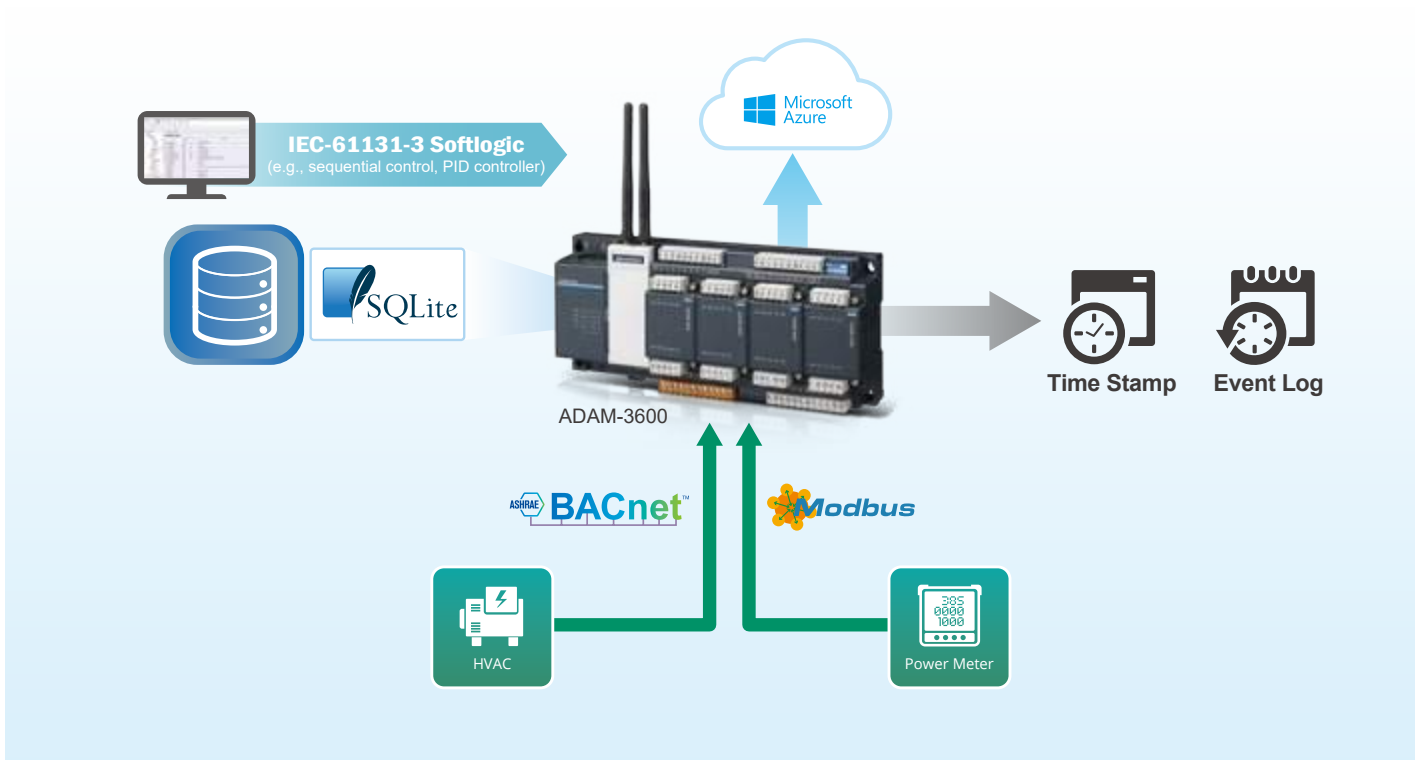
- Modbus RTU/ Modbus TCP
- PLC protocols for SIEMENS, Allen-Bradley, OMRON, etc.
- Open SDK for ASCII command

# Remote Equipment Monitoring for Equipment Builders



## System Requirements

Equipment builders who thrive on improving equipment efficiency understand the importance of quality data in the analysis of component status. Given the high level of energy consumption for heating and cooling, being able to monitor and control heating, ventilation, and air conditioning (HVAC) systems can have a sizable effect on operation costs. Energy controllers can be used to monitor and control HVAC systems via a mobile or cloud system. With customizable software, they also accommodate customers who require customized functionality and input assemblies as well as cloud access.

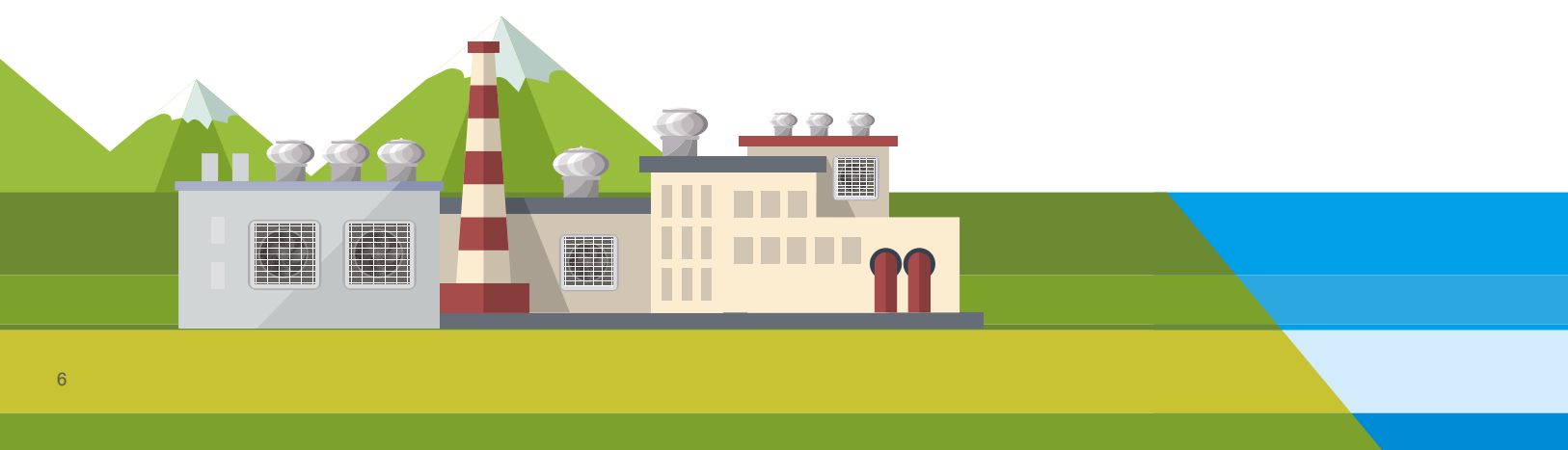


## System Features

- Communication protocols: BACNet & Modbus
- Data time stamping and event logging
- Cloud solution with Microsoft Azure & MQTT
- Various I/O options

## Benefits

- Compact design and customized service
- Operational technology engineers can easily establish cloud access
- Scalable I/O & Comm. interface to different projects

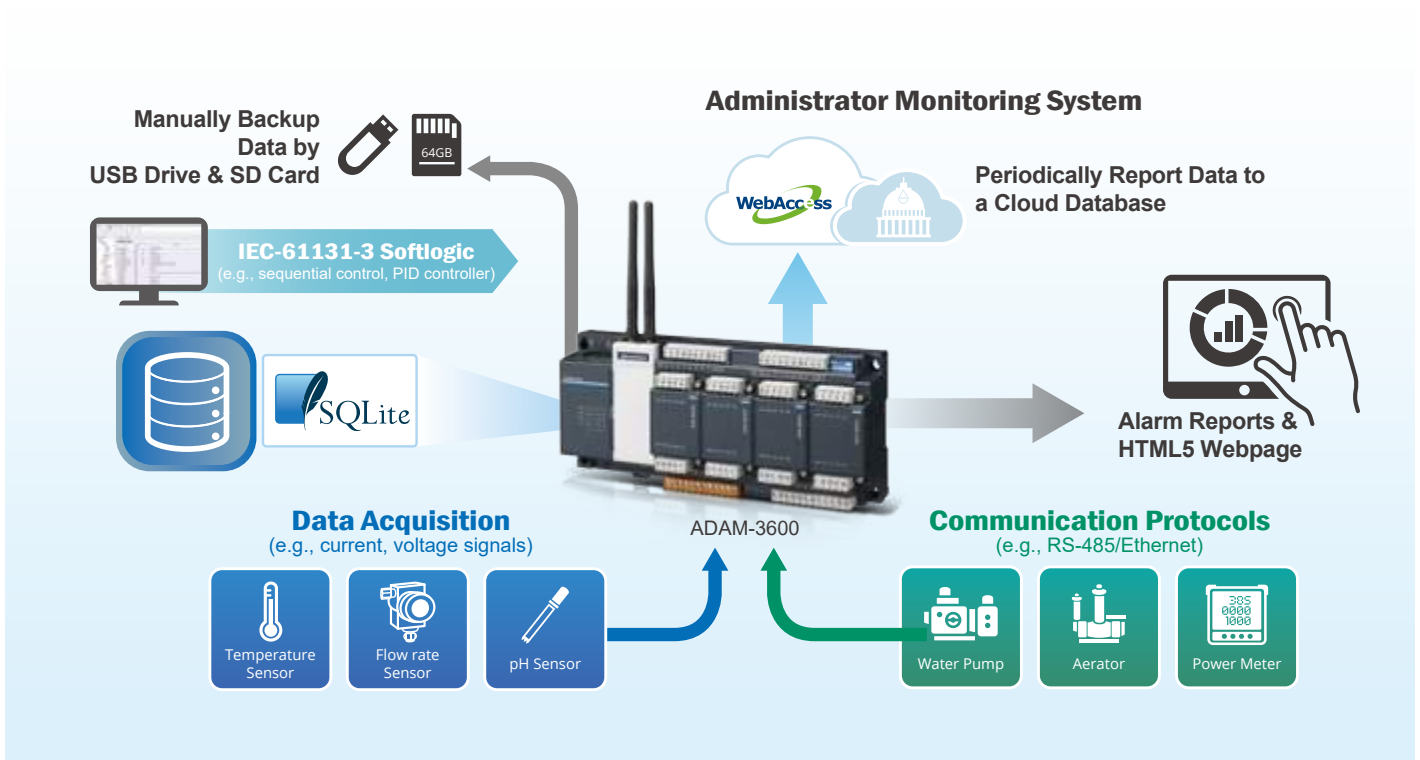


# Monitoring System for Waste Water Treatment and Reclamation Infrastructure



## System Requirements

The monitoring of a water pump station requires fully wireless connectivity with reliable data transmission to a surveillance center. Using PLCs to control and monitor pump stations can incur a high lifetime cost, and complex system integration procedures can be frustrating; hence, many customers prefer to use all-in-one devices for data collection and transmission as well as system monitoring and alarm reporting.

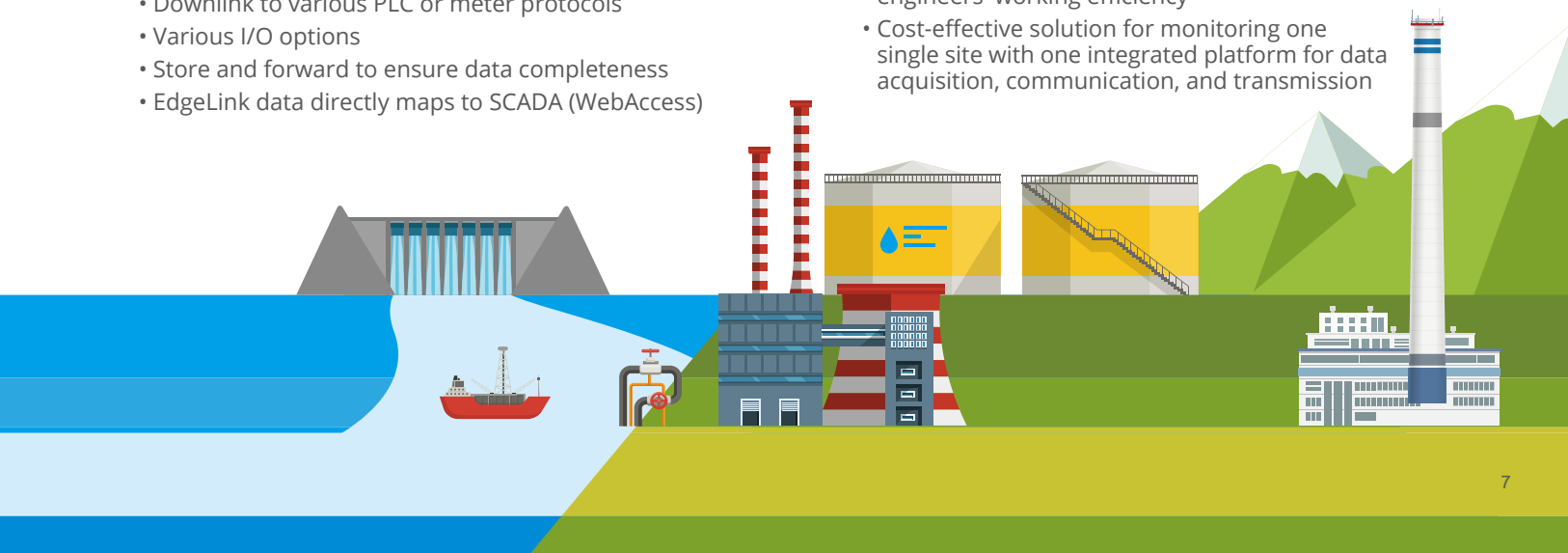


## System Features

- Uplink with DNP3 & Modbus protocols
- Downlink to various PLC or meter protocols
- Various I/O options
- Store and forward to ensure data completeness
- EdgeLink data directly maps to SCADA (WebAccess)

## Benefits

- Requires no programming, thus improving engineers' working efficiency
- Cost-effective solution for monitoring one single site with one integrated platform for data acquisition, communication, and transmission



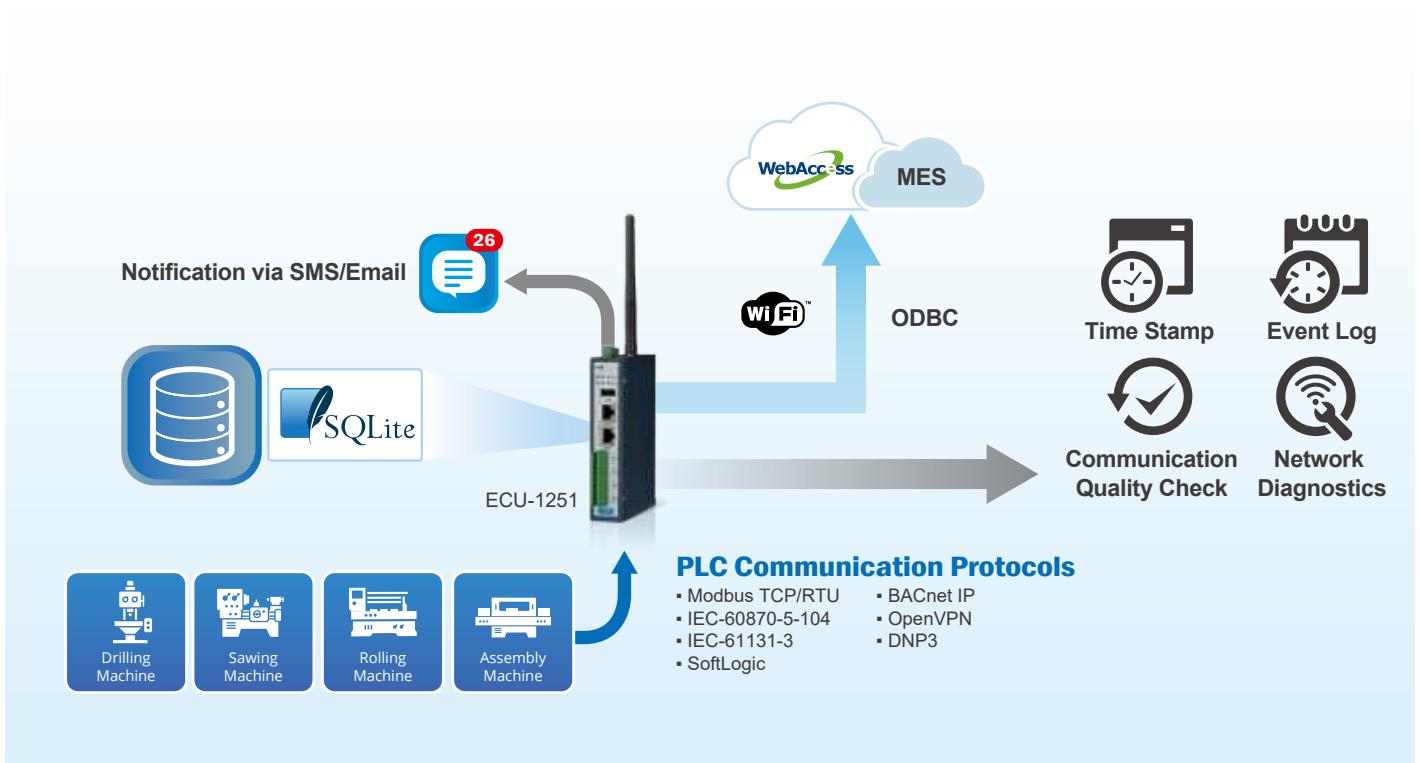


# Connecting Machines & Equipment to the Cloud



## System Requirements

Digitalizing factory equipment is the first step for Industry 4.0. While the transformation covers assembly, machining, and rolling workshops, production lines, and more, the variety of equipment and machines increases the complexity of the project and diversity of protocols and communication ports that are required. In this MES transformation project, the equipment was scattered and there was limited space for installation. The need for distributed, compact, wireless, and multiprotocol gateways solution was clear. The customer needed to connect PLCs to their MES for data transmission to a host computer via Wi-Fi. Due to the space limitations, the customer required a compact wireless device for data acquisition.



## System Features

- Uplink with ODBC
- Data time stamping and event logging
- Downlink to PLCs using various protocols
- Supports Wi-Fi and network diagnostics

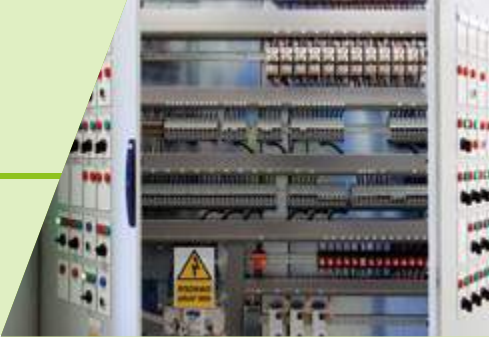
## Benefits

- Easy access to the MES using ODBC
- Data tagged for easy reading and comprehension
- Cost-effective system integration solutions



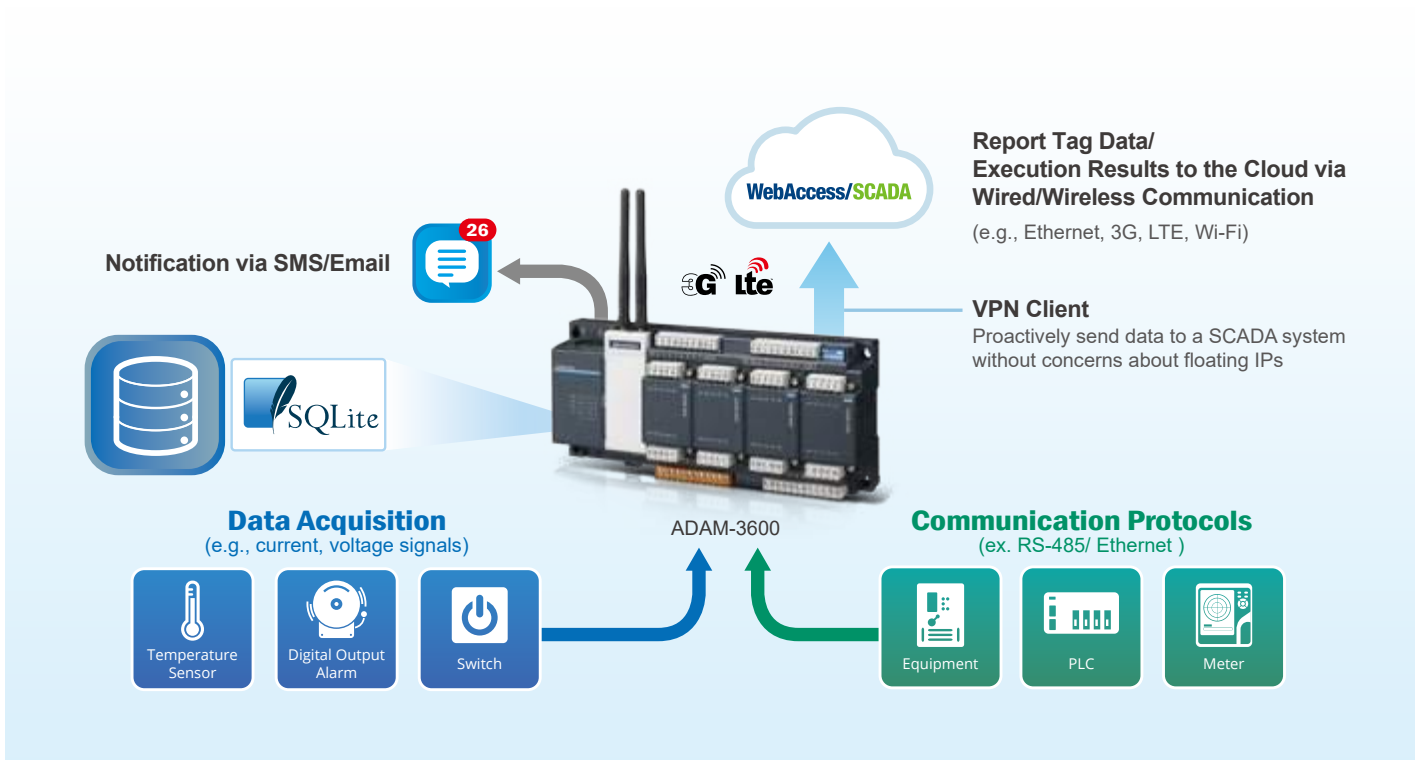


# Remote Facility Management Solution



## System Requirements

The client required a solution that can support various types of protocols as well as event logging. To facilitate managing system problems, the customer also needed a remote terminal unit that can trigger alarm notifications via SMS or email. A system integrator will follow up this lead to provide a fully cost-effective turnkey solution that fulfills the client's requirements.

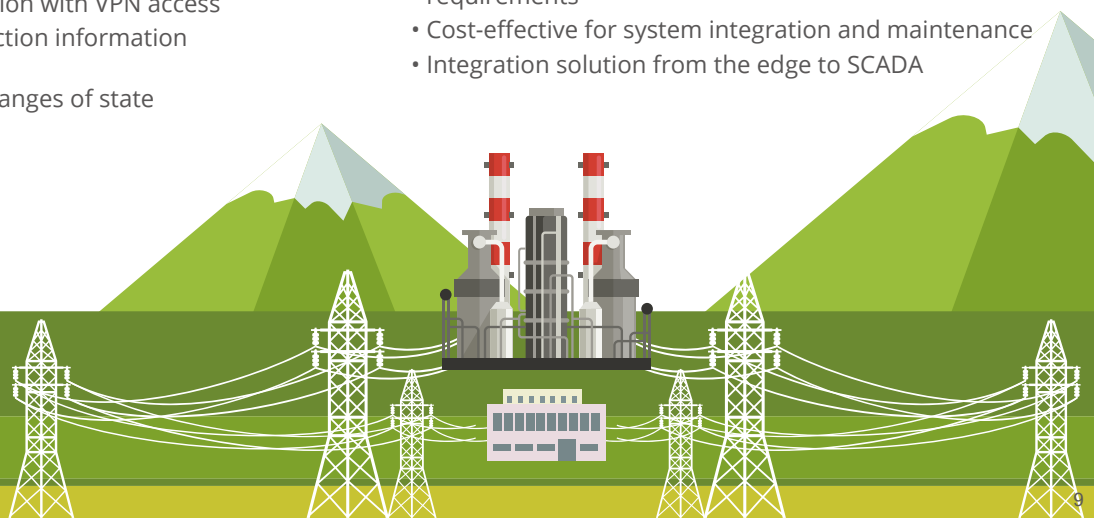


## System Features

- All-in-one device for handling multiple sensors
- 3G/LTE network communication with VPN access
- Event logging for acquiring action information from remote sites
- SMS/email notification for changes of state

## Benefits

- Easy to install and manage according to client requirements
- Cost-effective for system integration and maintenance
- Integration solution from the edge to SCADA



# Product Selection Guide



Expansion Module for ADAM-3600

Model Name		ADAM-3600
Description		Open Basis Intelligent RTU
System	CPU	Cortex A8
	Operating system	Linux RT 3.12
	Programming interface	C (Linux) IEC-61131-3
	Communication protocols	Modbus/RTU, Modbus/TCP, DNP3
	Wireless communication protocols	GPRS, 3G, Wi-Fi, Zigbee
	Special functions	Monitoring (iCDManager), data identification, breakpoint transmission, initiative reporting
Serial Port	Number of ports	3
	Type	1 x RS-232/485, 2 x RS-485
Network Port	Number of channels	2
	Number of independent IP addresses	2
	Speed	10/100 Mbps
	IP specifications	IPv4/IPv6
I/O	Onboard I/O	8 analog inputs, 8 digital inputs, 4 digital outputs
	Expansion slots	4
USB	USB2.0	1
Display Interface	VGA	1
	LED	System, serial, Ethernet, digital I/O, programmable
Storage Interface	SD	1 x SD slot
Operating Temperature		-40~70 °C
Certification		CE/FCC
Part Number		ADAM-3600-C2GL1A1E

Model	Category	Channel	Part Number
ADAM-3617	Analog input module	4	ADAM-3617-AE
ADAM-3618	Analog input module	4, thermocouple	ADAM-3618-AE
ADAM-3624	Analog output module	4	ADAM-3624-AE
ADAM-3651	Digital input module	8	ADAM-3651-AE
ADAM-3656	Digital output module	8	ADAM-3656-AE
ADAM-3613	Analog input module	4, RTD	ADAM-3613-AE

Analog Input	
Signal Input	Differential
Sampling Rate	10 Hz
Voltage Input	+/- 10 V, +/- 2.5 V
Input Current	0~20 mA, 4~20 mA
Sensor Input	Thermocouple (type J, K, T, E, R, S, B) RTD (Pt100, Pt1000, Balco 500, Ni 518)
Resolution	16-bit

Analog Output	
Output Voltage	0~10 V
Output Current	0~20 mA, 4~20 mA
Resolution	12-bit

Digital Input	
Input Type	Sink
Rated Voltage	12/24 VDC
Logic "0" Voltage	0~5 VDC
Logic "1" Voltage	11~30 VDC

Digital Output	
Output Type	Open collect
Output Voltage	8~30 VDC @ max 200 mA

## Wireless Expansion Module



### 96PD-RYUW131

Half-sized mini card, supports 802.11bgn

1750006043 SMA(M) cable, 15 cm

1750000318 2-dBi antenna, 11 cm

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Model Name		ECU-1152TL	ECU-1251TL	ECU-1051TL	ECU-1050TL
Description		Industrial Communication Gateway			
System	CPU	Cortex A8	Cortex A8	Cortex A8	Cortex A8
	Operating system	Linux RT 3.12	Linux RT 3.12	Linux RT 3.12	Linux RT 3.12
	Data publish service	OPC-UA, LwM2M, MQTT, Modbus/RTU, Modbus/TCP, IEC-60870-104, BACNet/IP, ODBC, JDBC, FTP	OPC-UA, LwM2M, MQTT, Modbus/RTU, Modbus/TCP, IEC-60870-104, BACNet/IP, ODBC, JDBC, FTP	OPC-UA, LwM2M, MQTT, Modbus/RTU, Modbus/TCP, IEC-60870-104, BACNet/IP, ODBC, JDBC, FTP	OPC-UA, LwM2M, MQTT, Modbus/RTU, Modbus/TCP, IEC-60870-104, BACNet/IP, ODBC, JDBC, FTP
	Wireless communication	GRPS, 3G, LTE, Wi-Fi	GRPS, 3G, LTE, Wi-Fi	GRPS, 3G, LTE, Wi-Fi	GRPS, 3G, LTE, Wi-Fi
	SIM slot	1	1	2(switch by event)	2(switch by event)
Serial Port	Number of ports	6	4	2	-
	Type	RS-232/485	RS-232/485	RS-232/485	-
Network Port	Number of channels	2	2	2	1
	Independent IP number	2	2	2	1
	Speed	10/100 Mbps	10/100 Mbps	10/100 Mbps	10/100 Mbps
	IP specifications	IPv4/IPv6	IPv4/IPv6	IPv4/IPv6	IPv4/IPv6
I/O	Expansion slots	1 x mini-pcie	1 x mini-pcie	1 x mini-pcie	2 x mini-pcie
USB	USB2.0	1	1	-	-
Display Interface	LED	PWR/Serial/Prog/LAN	PWR/Serial/Prog/LAN	PWR/Prog/LAN	PWR/Prog
Storage Interface	SD	1 x micro SD slot	1 x micro SD slot	1 x micro SD slot	1 x micro SD slot
Data collection	Modbus, IEC-60870-104, DNP3, OPC UA, DL-645, IEC-62056-21, ODBC, JDBC				
Data collection from PLC	Siemens/ Allen-Bradley/ Schneider/ Mitsubishi/ Omron/Honeywell/ Yokogawa/ Delta/ Panasonic				
Data logger	Realtime data logger				
Programming Support	Linux C, RESTful				
Operating Temperature	-40~70°C	-40~70°C	-40~70°C	-40~70°C	-40~70°C
Certification	CE/FCC	CE/FCC	CE/FCC	CE/FCC	CE/FCC
Part Number	ECU-1152TL-R11ABE	ECU-1251TL-R10AAE	ECU-1051TL-R10AAE	ECU-1050TL-R10AAE	



**EWM-C117FL Series**

6-band HSPA cellular module with SIM holder

- 1750006264 SMA(F) cable, 15 cm
- 1750008818-01 Dipole Ant. LTE 10x13.35 cm



**EWM-G108H01E**

GPS/GNSS half-sized mini PCIe card

- 1750006264 SMA(F) cable, 15 cm
- 1750006432 4.5-dBi antenna, 5 m