# Advantech Energy Automation Solutions

## Robust Products for a Variety of Energy Applications

- Smart Substation Solutions
- Solar Energy Solutions
- Wind Power Solutions
- Advantech Energy Automation Products

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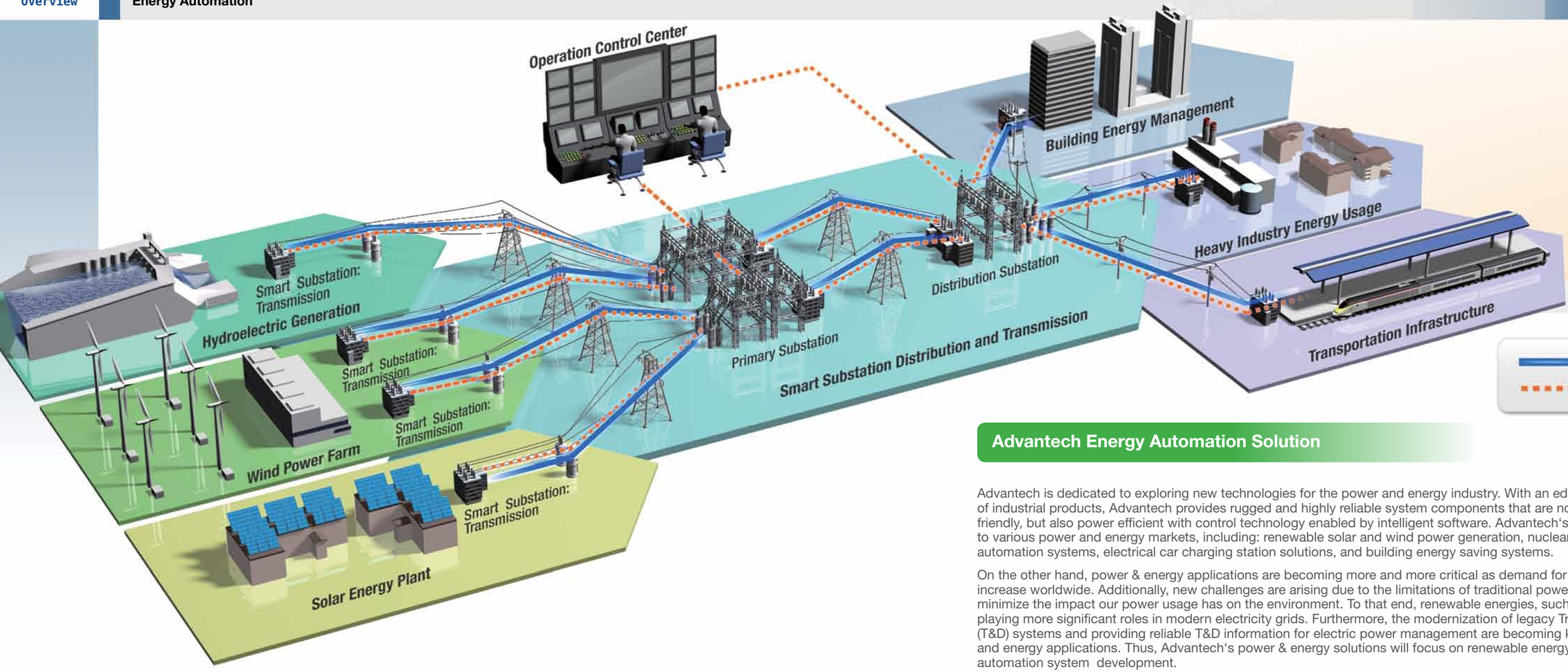


## Advantech Energy Automation Solution

Advantech is dedicated to exploring new technologies for the power and energy industry. With an edge in the research and design of industrial products, Advantech provides rugged and highly reliable system components that are not only environmentally friendly, but also power efficient with control technology enabled by intelligent software. Advantech's products can be applied to various power and energy markets, including: renewable solar and wind power generation, nuclear simulation, substation automation systems, electrical car charging station solutions, and building energy saving systems.

On the other hand, power & energy applications are becoming more and more critical as demand for electricity continues to increase worldwide. Additionally, new challenges are arising due to the limitations of traditional power resources as we try to minimize the impact our power usage has on the environment. To that end, renewable energies, such as wind and solar power are playing more significant roles in modern electricity grids. Furthermore, the modernization of legacy Transmission & Distribution (T&D) systems and providing reliable T&D information for electric power management are becoming key goals for today's power and energy applications. Thus, Advantech's power & energy solutions will focus on renewable energy generation and substation automation system development.

## Introduction

Founded in 1983, Advantech is a leader in providing trusted innovative embedded & automation products and solutions. Advantech offers comprehensive system integration, hardware, software, customer-centric design services, and global logistics support; all backed by industry-leading front and back office e-business solutions. We cooperate closely with our partners to help provide complete solutions for a wide array of applications across a diverse range of industries. Advantech has always been an innovator in the development and manufacturing of high-quality, high-performance computing platforms, and our mission is to empower these innovations by offering trustworthy automation products and services. With Advantech, there is no limit to the applications and innovations our products make possible.

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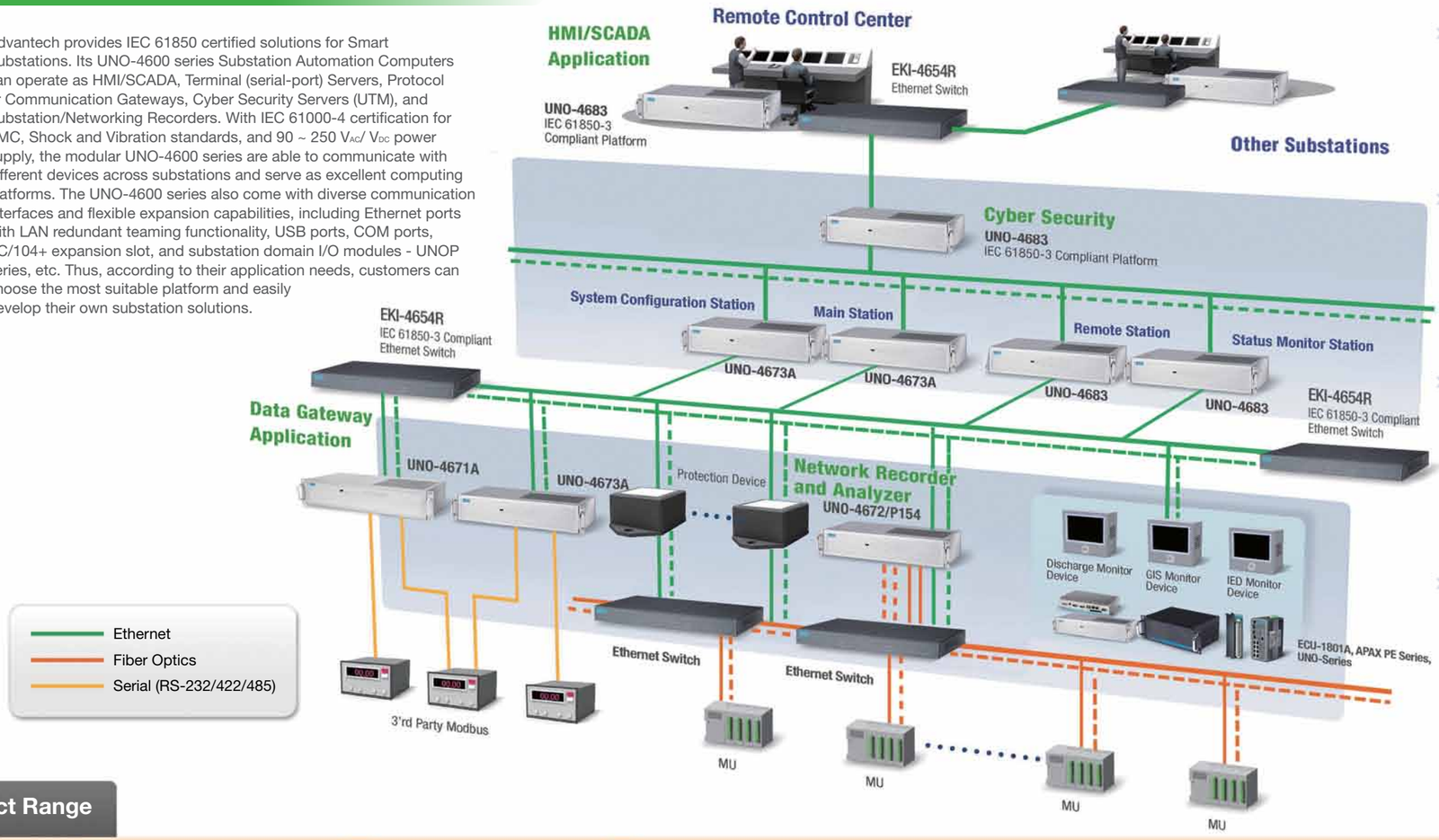
## Smart Substation Automation

Advantech provides IEC 61850 certified solutions for Smart Substations. Its UNO-4600 series Substation Automation Computers can operate as HMI/SCADA, Terminal (serial-port) Servers, Protocol or Communication Gateways, Cyber Security Servers (UTM), and Substation/Networking Recorders. With IEC 61000-4 certification for EMC, Shock and Vibration standards, and 90 ~ 250 $V_{AC}$/ $V_{DC}$ power supply, the modular UNO-4600 series are able to communicate with different devices across substations and serve as excellent computing platforms. The UNO-4600 series also come with diverse communication interfaces and flexible expansion capabilities, including Ethernet ports with LAN redundant teaming functionality, USB ports, COM ports, PC/104+ expansion slot, and substation domain I/O modules - UNOP series, etc. Thus, according to their application needs, customers can choose the most suitable platform and easily develop their own substation solutions.




## System Description & Requirements

### HMI/SCADA Application in Substation

Working status of devices within cabinet is controlled and monitored via HMI/SCADA, besides information and event trigger collection, time synchronization, such as IRIG-B function is also implemented in the automation controller.

**Application Requirements**

- Reliable IEC 61850-3 platform
- Redundancy

### Cyber Security for Smart Grid

Communication within smart substations is based on network connection, and so is connection between smart substations. Hence, the cyber security to ensure smart substation maintenance becomes more critical than before. The UTM (Unified Threat Management) is the key to preventing hacker attacks.

**Application Requirements**

- Reliable IEC 61850-3 platform
- Fiber optic LAN

### Network Recorder and Analyzer

A network recorder at substation operates in the same way as an aircraft flight recorder and is critical for recording and analyzing network flow information. It is possible to record and analyze data to discover the reason behind IED damage.

**Application Requirements**

- Reliable IEC 61850-3 platform
- High-speed computing & packet acquisition
- Synchronized time stamp
- RAID for storage

### Data Gateway for IEC 61850

Within a substation, there are lots of devices using a wide variety of protocols. Status and information of devices need to be monitored and controlled reliably; hence, a reliable automation controller plays such an important data protocol gateway, communication server and IED analyzer at a substation.

**Application Requirements**

- Reliable IEC 61850-3 platform
- Isolated COM port
- IRIG-B Time Synchronization receiver
- Fiber optic LAN

## Product Range

### UNO-4671A

**IEC 61850-3/ IEEE 1613 Compliant Intel® Atom™ D510 Substation Computer with 6 x LAN, 10 x COM, and 1 x PCI-104**

- Supports 2 x RS-232, 4 x RS-422/485, and 4 x RS-485 isolated ports
- Supports 6 x 10/100Base-T RJ-45 connector
- Supports 1 x internal CF card and 1 x 2.5" SATA HDD

**Ordering Information**

UNO-4671A-A33E

### UNO-4672I (UNO-4672/P154)

**Intel® Core™ Duo LV Substation Network Recorder/ Analyzer with Smart LAN**

- Supports 2 x isolated RS-232 and 8 x isolated RS-232/422/485
- Supports 2 x 10/100/1000Base-T RJ-45 ports, 4 x 10/100Base-T RJ-45 ports, 2 x 10/100 SC Multi-Mode, and 4 x 10/100 SC Multi-Mode Smart LAN for data acquisition

**Ordering Information**

UNO-4672-D03E
UNO-4672I-D03E

### UNO-4673A/4683

**IEC 61850-3/ IEEE 1613 Certified Substation Computers with 6 x LAN, 2 x COM, and 3 x Expansion Slots**

- UNO-4673A: Intel® Atom™ D510 1.66 GHz CPU
  UNO-4683: Intel® Core™ i7 2.0 GHz CPU
- Supports fiber optic, IRIG-B, LAN, and COM
- Supports PCI, Mini PCI, Mini PCIe, and PCI-104 expansions

**Ordering Information**

UNO-4673A-A33E
UNO-4683-D34E

### UNO-P154

**4-ch Fiber Smart LAN Network DAQ Card for UNO-4672/4672I**

- Supports 2 x LAN 100 Base-FX and 4 x Smart LAN 100 Base-FX (SC type Multi-mode)
- Supports 1-ch Fiber IRIG-B interface (ST Multi-Mode 850 nm)
- Supports 1-ch RS-485 IRIG-B interface

**Ordering Information**

UNO-P154-AE

### UNOP-1000I

**Expansion Card for Standard PCI and Mini PCI**

- PCI slot (PCI 2.2)
- Mini PCI card slot

### UNOP-1000J

**Expansion Card for Standard PCI-104 and Mini PCIe**

- PCI-104
- Mini PCIe card slot

**Ordering Information**

UNOP-1000I-AE
UNOP-1000J-AE

### UNOP-1514C

**4-port Fiber Optic LAN Card for UNO-4673A/4683**

- LAN 100 Base-FX
- Distance : Up to 2 km
- IEEE 802.3, 802.3u, 802.3x
- Wavelength : 1310 nm
- 4 x SC type Multi-mode Fiber

**Ordering Information**

UNOP-1514C-AE

### UNOP-1624D

**4-port Isolated RS-232/422/485 with IRIG-B for UNO-4673A/4683**

- 4 x COM (DB9)
- Selectable RS-232/422/485
- Isolation 2500$V_{DC}$
- Automatic RS-485 data flow control
- IRIG-B via RS-485, TTL Fiber, BNC

**Ordering Information**

UNOP-1624D-AE

### UNOP-1618D/1628D

**8-port Isolated RS-232/422/485 with/without Port-to-port Isolation for UNO-4673A/4683**

- 8 x COM (DB9)
- Selectable RS-232/422/485
- Isolation 2500$V_{DC}$ (UNOP-1628D)
- Automatic RS-485 data flow control

**Ordering Information**

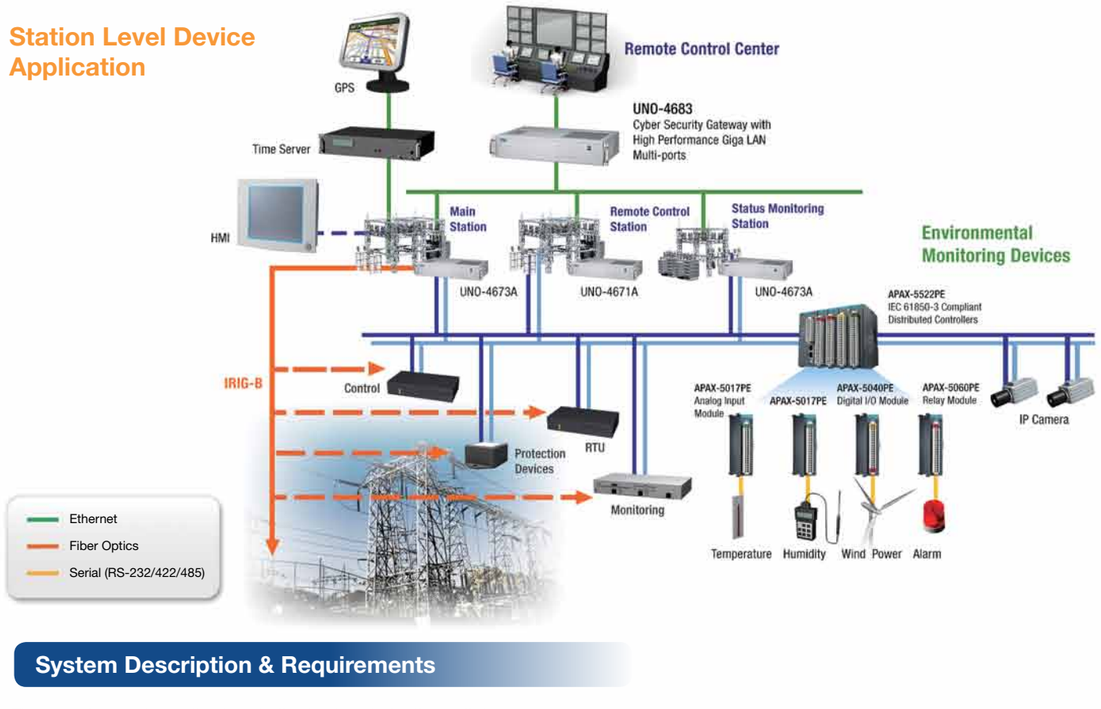
UNOP-1618D-AE
UNOP-1628D-AE

* To view more product information, please refer to P. 9 & 10 selection guides.

# Smart Substation Automation Sub-systems

There are three different levels in Smart Substation architecture: Station Level, Bay Level and Process Level. For the functionality in smart substations, there are control, protection, monitoring and communication levels. A variety of devices are used in smart substations, including controllers, RTUs, protection devices and communication gateways etc.

## Station Level Device Application




## System Description & Requirements

There are four main applications in Station Level of a Smart Substation:

### HMI/SCADA Applications

All communication information needs to be dealt with and displayed. With a computing and display interface, UNO-4600 series can play as such role. Both UNO-4673A and UNO-4683 are ideal IEC 61850-3 computing platforms with a time synchronization function module. Combined with UNOP-1624D module with TTL, Fiber, Serial interface, and HMI, it becomes a complete solution for HMI/SCADA applications.

### Remote Control Station

UNO-4600 series could be used in Remote Distribution Substation control center or Regional Smart Substation as well. With rich and flexible communication ports and IRIG-B, UNO-4600 series serve as time servers and main controllers for the remote IEDs.

### Cyber Security in Smart Substation

Cyber Security and Unified Threat Management (UTM) are important to ensure connection reliability among substations and prevent attacks from hackers. Advantech's IEC 61850-3 certified platform, the UNO-4683, with the UNOP-1514C fiber LAN module offer a total solution for cyber security applications at smart substations.

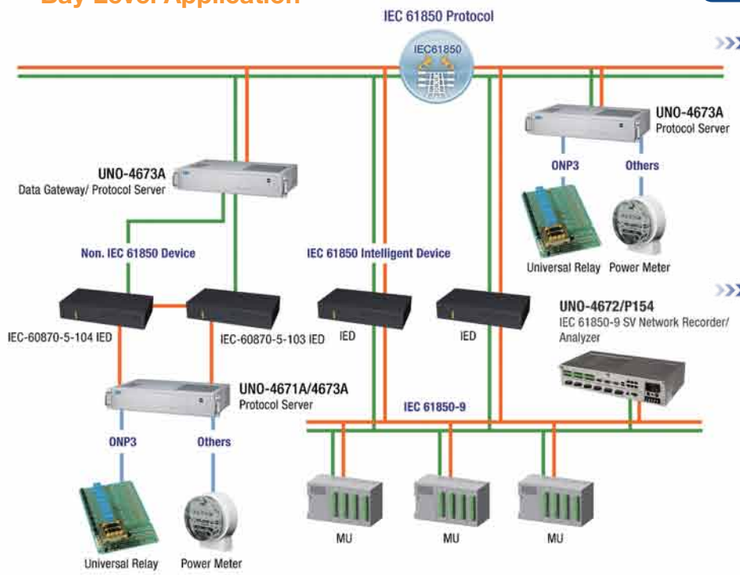
### Environment Status Monitoring

For environmental monitoring devices in station level, Advantech offers IEC 61850-3 certified distributed controller and I/O modules, APAX-5000PE series, which include APAX-5522PE controller, APAX-5017PE analog module, APAX-5040PE digital I/O module, and APAX-5060PE relay output module. APAX-5000PE series are used to monitor temperature, humidity, current and other status of devices. They can also integrate IP cameras and UPS systems for the security management.

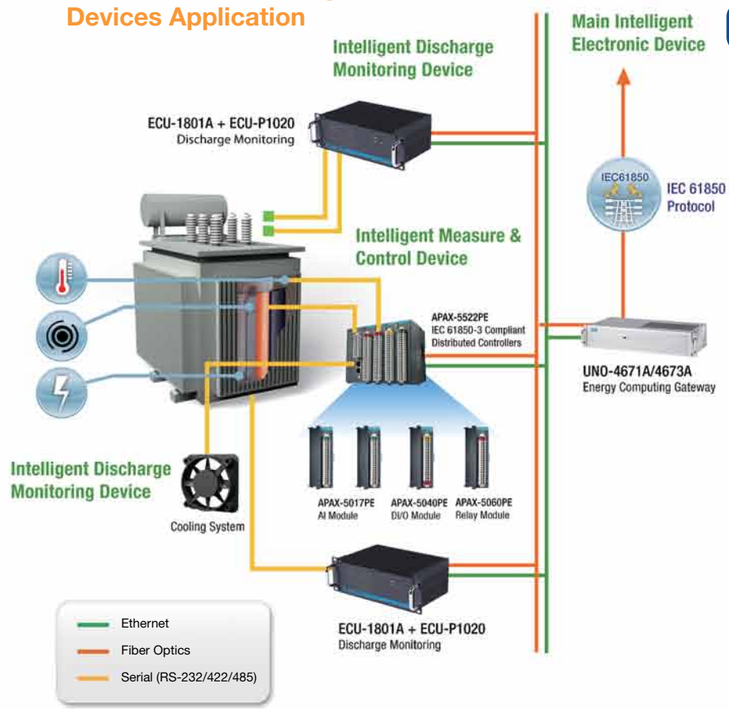
| Product Ordering Information | | | |
|---|---|---|---|
| APAX-5522PELX/PECE | IEC 61850-3 Certified PAC with Marvel Xscale® CPU | ECU-1801A-A32E | Intel® Atom® D510 Energy Controller with 2 x LAN, 3 x COM, IRIG-B, and I/O Extension |
| APAX-5017PE | IEC 61850-3 Certified 12-ch Analog Input Module | ECU-P1020-AE | 30 MS/s, 12 bit, Simultaneous 4-ch PCIe-104 |
| APAX-5040PE | IEC 61850-3 Certified 24-ch Digital Input Module | ECU-P1060-AE | 250 KS/s, 16 bit, Simultaneous 8-ch PCI-104 |
| APAX-5060PE | IEC 61850-3 Certified 12-ch Relay Output Module | ECU-P1300-AE | Vibration Signal Modulate Card |

* To view more product information, please refer to P. 9 & 10 selection guides.

## Bay Level Application




## Process Level : Intelligent Electronic Devices Application




## System Description & Requirements

### Main Intelligent Electronic Devices

Primary devices in substation including transformers, circuit-breakers and switch gears need to be monitored and controlled by IEDs, Intelligent Electronic Device. Main IED is the communication and management hub controlling and communicating with other IEDs and devices in process level. Advantech UNO-4600 series with IEC 61850-3 certification and the low power-consumption CPU are the ideal hardware for main IED applications.

### Partial Discharging / Transformer Vibration IED

Advantech also provides reliable IEC 61850-3 complaint Energy controllers, ECU-1800 series, which can serve as the Partial Discharging IED or transformer vibration monitoring IED. With built-in IRIG-B interface, communication ports and flexible extension cards for various application, the ECU-1800 series are the most suitable for IEC 61850 IED applications.

### Primary Device Status Monitoring Application

Operation status for primary devices in smart substation must be monitored and controlled in real-time. Advantech IEC 61850 compliant distributed controller and I/O modules, the APAX-5000PE series, provide the rich and flexible I/O modules. They are the ideal monitoring IED for transformers, circuit-breakers and switch gears.

## System Description & Requirements

### Data Gateway & Protocol Server Applications: Traditional Device to Smart Substation

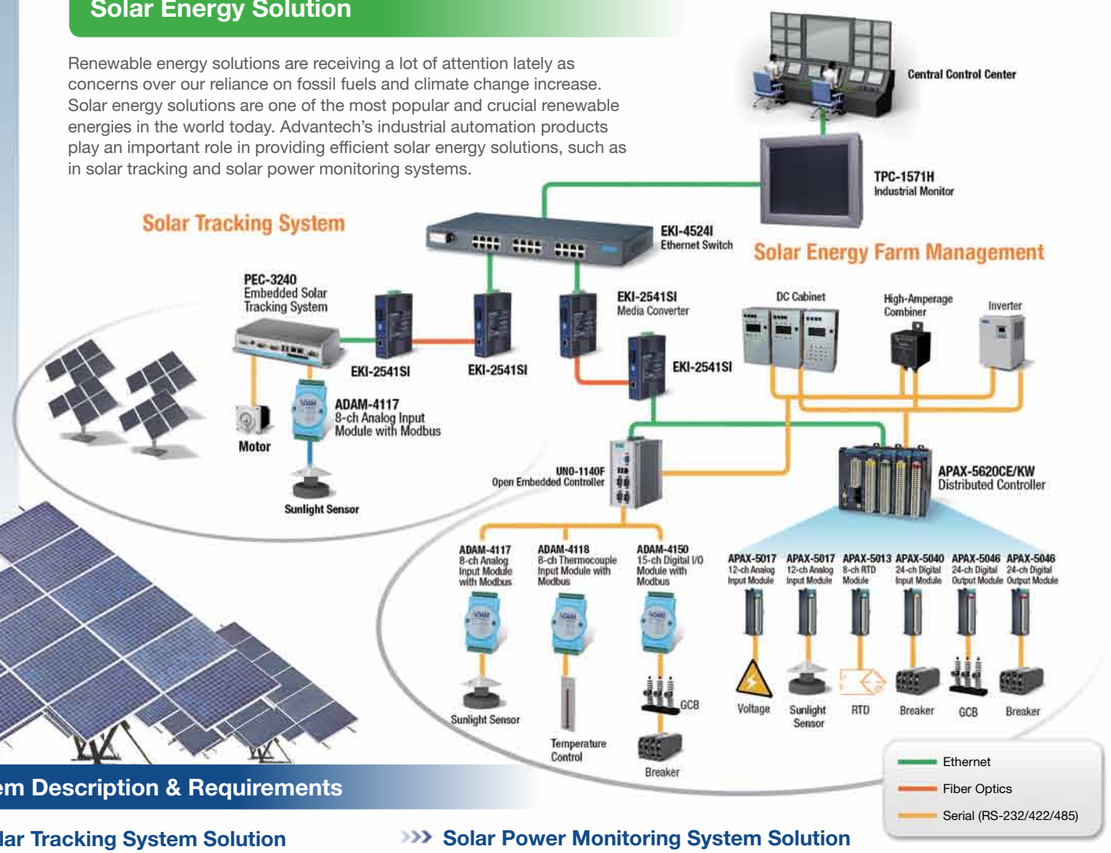
Within a substation, there are lots of legacy devices using a variety of protocols such as IEC-60870-101/103/104, DNP3.0, etc. The status and information of devices need to be monitored and controlled reliably; hence, a reliable communication gateway plays an important role in process level. The communication gateway is in charge of protocol converting, transparent communication and data buffering to transmit data from bay level to station level reliably.

### IEC 61850-9 SV & Goose Network Recorder / Analyzer

When an Ethernet backbone is compulsory and all devices are connected via such a structure, event trace and analysis within the structure become important. Network flow information is recorded for records and analysis. According to IEC 61850-8 and -9 standards, many Ethernet packets must be received and handled. However, a normal LAN is unable to deal them quickly. Hence, the UNO-P154 module with smart LAN has been designed to apply real-time operations at smart substations. It provides four smart LAN ports to collect high-density network packets that come with 32K byte FIFO to keep data integrity, and two standard 10/100 Mbps fiber optic interfaces, which are used to respond to real-time data. IRIG time decode could more accurately record time information to facilitate data analysis.

## Solar Energy Solution

Renewable energy solutions are receiving a lot of attention lately as concerns over our reliance on fossil fuels and climate change increase. Solar energy solutions are one of the most popular and crucial renewable energies in the world today. Advantech's industrial automation products play an important role in providing efficient solar energy solutions, such as in solar tracking and solar power monitoring systems.




## System Description & Requirements

### Solar Tracking System Solution

In Advantech's solar tracking solution, the ADAM-4117 measures the input voltage signals from the sunlight transmitters to detect the direction of the strongest sunlight. The sunlight information is then sent to the PEC-3240, an Intel® Celeron® M Embedded Motion Controller, which can control the stepper motors of the sun tracking system and easily adjust the solar plates to the correct direction of the strongest sunlight. If two transmitters detect different sunlight strengths, the PEC-3240 will calculate the sunlight strength difference to adjust the stepper motors and find the optimal position of the solar cells. Combined with the ADAM-4117, the PEC-3240 with 4-axis motion control and 32-channel isolated digital I/O enables the solar tracking systems to continuously track the relative data and optimize the efficiency of solar cell modules.

### Solar Power Monitoring System Solution

Solar Power Plant management requires fast sampling, recording and analysis of data such as sunlight strength and overall direct current power. Average energy conversion efficiency of solar cell modules and power converters are also important. Advantech provides two solutions to fulfill solar power monitoring applications:

**Solution 1: APAX series**

Advantech's Distributed Computers, APAX series, serve as efficient power controllers due to their outstanding performance in metering, recording, control, storage, and remote maintenance functionality. The APAX-5620 is a low-power consumption controller, which serves as a communication and master controller. The APAX-5000 I/O series with a variety of I/O modules, are used to collect weather, sunlight information, temperature sensors, thermal overshoot, etc.

**Solution 2: UNO series + ADAM-4000 series**

Advantech's Open Embedded Controllers, compact and fanless UNO-1000 series, can serve as communication controllers and protocol converters. Also, Advantech offers Data acquisition I/O modules, ADAM-4000 series, including ADAM-4117 analog input module, ADAM-4118 thermocouple input module, and ADAM-4150 digital I/O module, which support Modbus communication protocol and are used to measure and collect solar plant information.

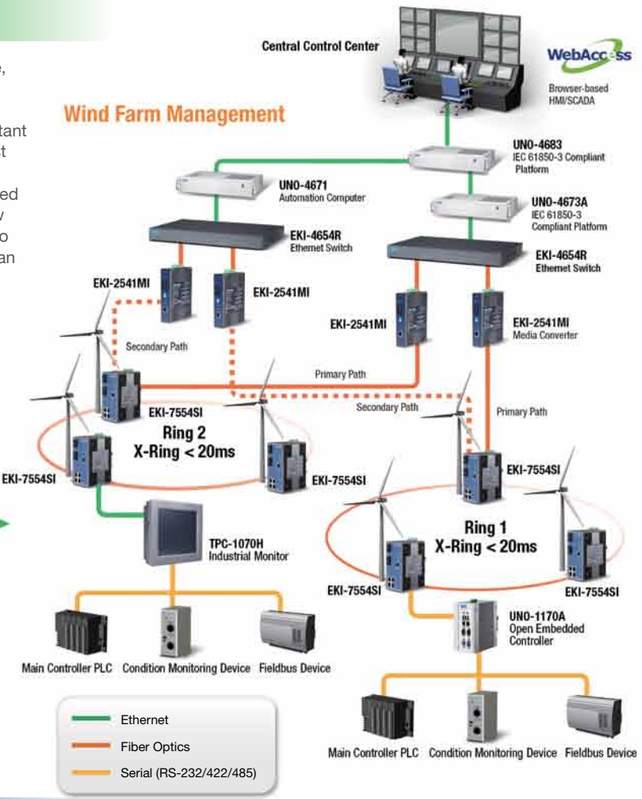
**Product Ordering Information**

| | | | |
|---|---|---|---|
| TPC-1571H-D3AE | 15" XGA TFT LCD Intel® Atom® D525 Touch Panel Computer | PEC-3240-AE | Intel® Celeron® M 4-axis Embedded Motion Controller with 32-ch Digital I/O |
| EKI-2541SI-AE | 10/100T (X) to Single-Mode SC Type Fiber Optic Industrial Medica Converter | APAX-5620CE-AE<br>APAX-5620KW-AE | PAC with Marvel Xscale® CPU and CAN |
| UNO-1140F-V10E | 486SX-grade SoC DIN-rail PC with 1 x LAN and 8 x Isolated COM | APAX-5013-AE | 8-ch RTD Module |
| ADAM-4117-AE | 8-ch Analog Input Module with Modbus | APAX-5017-AE | 12-ch Analog Input Module |
| ADAM-4118-AE | 8-ch Thermocouple Input Module with Modbus | APAX-5040-AE | 24-ch Digital Input Module |
| ADAM-4150-AE | 15-ch Digital I/O Module with Modbus | APAX-5046-AE | 24-ch Digital Output Module |

* To view more product information, please refer to P. 9 & 10 selection guides.

## Wind Energy Solution

As an alternative to fossil fuels, wind power is a plentiful, renewable, widely distributed, and clean energy as well as producing no greenhouse gas emissions during operation. Due to these characteristics, wind energy has, in recent years, become an important player in the world's energy markets. A large wind farm may consist of several hundred individual wind turbines which are connected to the electric power transmission network. Most wind farms are located in sparsely populated areas with harsh environments and only a few maintenance staff. Because of their locations, the problem of how to ensure the wind power plant can be operated safely and reliably is an essential and very important issue.


## System Description & Requirements

### Wind Tower Management

**Wind Power Turbine Gearbox Vibration Monitoring System Solution**

The vibration signals of a wind turbine gearbox contain a wide range of data, which can be used to detect defects within the gearbox. With ECU-1801 Energy Controller, ECU-1300 vibration signal modulation card, and ECU-1060 simultaneous analog input card, Advantech provides an ideal solution for Wind Power Turbine Gearbox Vibration Monitoring Systems. With a redundant Ethernet communication port, the analysis of data can be transferred to the remote management center in real time.

**Wind Power Box-type Transformer Monitoring System Solution**

Box-type substations in a wind power turbine integrate the generated power into a power grid. Like traditional substation monitoring systems, the status of the transformer must be monitored in real time. Advantech Energy remote I/O modules, DMU-3010/5010, monitor the status of the various parts of the transformer i.e. oil temperatures, voltage, current, and transfer the data to the remote control center via Ethernet.

### Wind Farm Management Solution

Wind Farm Management system includes the Message Management, Communication Management, and Power Generation Management. Advantech's wind farm management solution, the Wind Power Management System (WPMS), is based on Advantech WebAccess, the web browser-based HMI/SCADA software. With WPMS, multiple wind farms can be remotely managed and maintained. It can also provide remote fault maintenance and early detection of problems to reduce maintenance costs. WPMS enhances power generation efficiency and enables real-time monitoring. Along with Advantech's EKI series Ethernet Switches, UNO-4600 series Substation Computers, TPC-1070H and UNO-1170A Embedded Controllers, Advantech provides a total solution to fulfill wind farm management application.

**Product Ordering Information**

| | | | |
|---|---|---|---|
| ECU-1801A-A32E | Intel® Atom® D510 Energy Controller with 2 x LAN, 3 x COM, IRIG-B, and I/O Extension | Advantech WebAccess | Browser-based HMI/SCADA Software |
| ECU-P1020-AE | 30 MS/s, 12 bit, Simultaneous 4-ch PCIe-104 Card | EKI-2541MI-AE | 10/100T (X) to Multi-Mode SC Type Fiber Optic Industrial Medica Converter |
| ECU-P1060-AE | 250 KS/s, 16 bit, Simultaneous 8-ch PCI-104 Card | EKI-7554SI-AE | 4+2 SC Type Fiber Optic Managed Industrial Ethernet Switch with Wide Temperature |
| ECU-P1300-AE | Vibration Signal Modulate Card | TPC-1071H-D3AE | 10.4" SVGA TFT LCD Intel® Atom® D525 Touch Panel Computer |
| DMU-3010-AE | 8-ch AI, 8-ch DI, 4-ch DO Ethernet I/O Module | UNO-1170A-A12E | Intel® Atom® N270 DIN-rail PC with 2 x LAN, 3 x COM, 4 x USB, and PC/104+ |

* To view more product information, please refer to P. 9 & 10 selection guides.

## Energy Controllers

| Model Name | UNO-4671A | UNO-4672I (UNO-4672/P154) | UNO-4673A/4683 | ECU-1801A | ECU-1911 |
|---|---|---|---|---|---|
| Certification | IEC 61850-3 / IEEE 1613 Compliant China Electricity Certificate IV level | IEC 61850-3 / IEEE 1613 Compliant China Electricity Certificate IV level | IEC 61850-3/IEEE 1613 China Electricity Certificate IV level | IEC 61850-3 / IEEE 1613 Compliant China Electricity Certificate IV level | - |
| CPU | Intel Atom D510, 1.66 GHz | Intel Core Duo LV L2400, 1.66 GHz | Intel Atom D510, 1.66 GHz Intel Core i7, 2.0 GHz | Intel Atom D510, 1.66 GHz | Xscale @ PXA-270 20MHz |
| Onboard RAM | 2 GB DDR2 SDRAM | 2 GB DDR2 SDRAM | 2G DDR2 SDRAM 4G DDR3 SDRAM | 2 GB DDR2 SDRAM | 64 MB SDRAM/ 32 MB Flash |
| Battery-Backup RAM | - | 512 KB | 1 MB | - | - |
| Display | VGA | VGA | VGA/ Dual DVI | VGA | - |
| Serial Ports | 2 x isolated RS-232 4 x isolated RS-422/485 4 x isolated RS-485 | 2 x isolated RS-232 8 x isolated RS-232/422/485 | 2 x DB-9 | 1 x isolated RS-232 2 x isolated RS-485 | 1 x isolated RS-232 3 x isolated RS-485 |
| Ethernet Ports | 6 x 10/100Base-T | 2 x 10/100/1000Base-T 4 x 10/100Base-T 2 x 10/100 SC Mutil-Mode | 2 x 10/100/1000Base-T 4 x 10/100Base-T | 2 x 10/100/1000Base-T | 2 x 10/100Base-T |
| Smart LAN | - | 4 x 10/100 SC Mutil-Mode | - | - | - |
| USB Ports | Four (One internal) | Four (One internal) | Six (One internal) | Two | One |
| PC/104 Expansion | PCI-104 | PCI-104 | - | PCI-104 & PCIe-104 | - |
| Onboard I/O | - | - | - | Support Expansion IO: ECU-P1060: 250Ks/S, 16bit, Simultaneous 8-ch PCI-104 ECU-P1020: 30Ms/S, 12bit, Simultaneous 4-ch PCIe-104 ECU-P1300: Vibration Signal Modulate Card | 8-ch AI 32-ch isolated DI 32-ch isolated DO |
| Watchdog Timer | Yes | Yes | Yes | Yes | Yes |
| CompactFlash Slots | One Internal | Two Internal | One Internal | One Internal | One Internal |
| 2.5” HDD Expansion | 1 x SATA | 1 x SATA | 1 x SATA | 1 x SATA | - |
| Operating Systems | WES 7, WES 2009, Windows XP, Windows CE 6.0, Linux | WES, Windows XP Embedded, Windows 2000/XP, Windows CE 6.0, Linux, QNX | WES, Windows XP Embedded, Windows CE 6.0, Windows 2000/XP, Linux, QNX | WES 7, WES 2009, Windows CE 5.0 & 6.0, Linux | Windows CE 5.0 |
| Mounting | Rack Mount | Rack Mount | Rack Mount | Wall & Rack Mount | DIN-rail |
| Anti-Vibration | 2 G w/CF, 0.5 G w/HDD | 2 G w/CF, 1 G w/HDD | 2 G w/CF, 1 G w/HDD | 2 G w/CF, 1 G w/HDD | - |
| Anti-Shock | 30 G w/CF, 20 G w/HDD | 30 G w/CF, 20 G w/HDD | 30 G w/CF, 20 G w/HDD | 30 G w/CF, 20 G w/HDD | - |
| Power Input Range | AC: 100 ~ 240 $V_{AC}$ DC: 100 ~ 240 $V_{DC}$ | AC: 90 ~ 250 $V_{AC}$ | AC: 100 ~ 240 $V_{AC}$ DC: 106 ~ 250 $V_{DC}$ | 18 ~ 30 $V_{DC}$ | 10 ~ 30 $V_{DC}$ |
| Operating Temperature | -20 ~ 60°C (-4 ~ 140°F) | -20 ~ 60°C (-4 ~ 140°F) | -20 ~ 70°C (-4 ~ 158°F) | -20 ~ 70°C (-4 ~ 158°F) | -20 ~ 70°C (-4 ~ 158°F) |
| Power Consumption (Typical) | 30 W | 44 W | 45 W | 24 W | < 10 W |
| Power Requirements | Supports dual power input: Power 1:100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ (Optional:18 ~ 30 $V_{DC}$) Power 2:100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ (Optional:18 ~ 30 $V_{DC}$) | AC: 90 ~ 250 $V_{AC}$ (47 ~ 400 Hz), AT | AC: 90 ~ 250 $V_{AC}$ (47-400 Hz) DC: 106 ~ 250 $V_{DC}$ with isolation protection, AT | 18 ~ 30 $V_{DC}$ (e.g 24 V @ 2 A) (Min. 48 W), AT | 10 ~ 30 $V_{DC}$ |
| Dimensions (W x H x D) | 440 x 220 x 88 mm (17.3” x 8.6” x 3.4”) | 440 x 220 x 88 mm (17.3” x 8.6” x 3.4”) | 440 x 220 x 88 mm (17.3” x 8.6” x 3.4”) | 220 x 150 x 89 mm (8.7” x 5.9” x 3.5”) | 266 x 146 x 45 mm (10.5” x 5.7” x 1.8”) |
| Weight | 5.5 kg | 6.0 kg | 6.0 kg | 2.4 kg | 1.5 kg |
| Ordering Information | UNO-4671A-A33E | UNO-4672-D03E UNO-4672I-D03E | UNO-4673A-A33E UNO-4683-D34E | ECU-1801A-A32E | ECU-1911-AE |

## PAC Controller

| System | | APAX-5522PELX/CE |
|---|---|---|
| Certification | | IEC 61850-3/ IEEE 1613 |
| CPU | | XScale PXA270 520 MHz |
| Memory | | Flash 32 MB, SDRAM 64MB |
| Storage | | 1 x CF slot |
| Cooling System | | Fanless |
| Power Input | | 18 ~ 30 $V_{DC}$ |
| PC/104 Expansion | | PCI-104 |
| Diagnostics LED | | Power, Battery, Run, Error |
| Real-time Clock | | Yes |
| Watchdog Timer | | Yes |
| Control Software | | C/C++ library and .NET class library for C and .NET programming environment KW IEC 61131-3 SoftLogic programming tool |
| Local Real-time I/O Modules | | 32 (max.)* |
| Digital I/O Points | | 768 (max.) |
| Analog I/O points | | 192 (max.) |
| Communication (Ethernet) | LAN Ports | 1 |
| | Speed | 10/100 Mbps |
| Communication (Serial) | COM 1 | RS-232 |
| | COM 2 | RS-232 |
| | COM 3 | - |
| | CAN Bus | - |
| Isolation | Communication | 2500 $V_{DC}$ (RS-485) |
| Environment | Operating Temperature (when mounted vertically) | -20 ~ 70°C (-4 ~ 158°F) |
| | Storage Temperature | -40 ~ 85°C (-40 ~ 185°F) |
| | Relative Humidity | 0 ~ 95 % (non-condensing) |
| | Vibration Protection | IEC 60068-2-64/ 60068-2-6: 1 Grms @ 5 ~ 500 Hz (Random, operating) 2 G @ 5 ~ 500 Hz (Sine, nonoperating) |
| | Shock Protection | IEC 60068-2-27: 20 G @ wall mount |
| Ordering Information | | APAX-5522PELX APAX-5522PECE |

* APAX DI/O modules can use ID numbers 0 ~ 31, while AI/O modules and counter modules can only use ID numbers 0 ~ 15.

## Analog Input Module

| Model Name | | APAX-5017PE |
|---|---|---|
| Certification | | IEC 61850-3/ IEEE 1613 |
| Description | | 12-ch AI Module |
| Analog Input | AI Channels | 12 |
| | Input Type* | V, mV |
| | Sampling Rate (Samples/ second) | 12 (Total**) |
| | Input Resolution | 16-bit (voltage) 14 ~ 15-bit (current) |
| | Input Accuracy | ±0.1 % of FSR (voltage) ±0.2 % of FSR (current) |
| | Voltage Input | ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V |
| | Current Input | - |
| | Direct Sensor Input | - |
| | Wire Burnout Detection | - |
| General | Weight | 170 g |
| | Operating Temperatrure | -20 ~ 70°C (-4 ~ 158°F) (when mounted vertically) |
| | Storage Temperature | -40 ~ 85°C (-40 ~ 185°F) |
| | Relative Humidity (Noncondensing) | 5 ~ 95% |
| | Power Consumption (Typical) | 2 W @ 24 $V_{DC}$ |
| | Isolation between Channels and Backplane | 2500 $V_{DC}$ |
| Ordering Information | | APAX-5017PE |

* Each channel can be configured with different type and range.
** Sampling rate value depends on used channel number.

## Digital Input/ Output Modules

| Model Name | | APAX-5040PE | APAX-5060PE |
|---|---|---|---|
| Certification | | IEC 61850-3/ IEEE 1613 | IEC 61850-3/ IEEE 1613 |
| Description | | 24-ch DI Module | 12-ch Relay Module |
| Digital Input | DI Channels | 24 | - |
| | Input Type* | Sink or Source Load | - |
| | Rated Input Voltage | 24 $V_{DC}$ | - |
| | Input Voltage Range (Signal “0”) | -5 ~ 5 $V_{DC}$ | - |
| | Input Voltage Range (Signal “1”) | 15 ~ 30 $V_{DC}$ -15 ~ -30 $V_{DC}$ | - |
| | Rated Input Current | 4.4 mA (typical) | - |
| | Input Filter | 3 ms | - |
| | Over Voltage Protection | Yes | - |
| Relay Output | DO Channels | - | 12 |
| | Output Type | - | Relay Form A (SPST) |
| | Rated Output Voltage | - | 250 $V_{AC}$ 30 $V_{DC}$ |
| | Rated Output Current (Signal “1”) | - | 5 A |
| General | Weight | 160 g | 195 g |
| | Operating Temperatrure | -20 ~ 70°C (-4 ~ 158°F) (when mounted vertically) | |
| | Storage Temperature | -40 ~ 85°C (-40 ~ 185°F) | |
| | Relative Humidity (Noncondensing) | 5 ~ 95% | |
| | Power Consumption (Typical) | 2 W @ 24 $V_{DC}$ | |
| | Isolation between Channels and Backplane | 2500 $V_{DC}$ | |
| | Channel Status LED | Yes (per channel) | |
| | Fail Safe Value | - | Yes |
| Ordering Information | | APAX-5040PE | APAX-5060PE |

* Each channel can be configured with different type and range.

## Regional Service & Customization Centers

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86-512-5777-5666

**Taiwan**
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886-2-2792-7818

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## Worldwide Offices

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| Rueiguang | 886-2-2792-7818 |
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