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# Power & Energy Automation


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# Power & Energy Automation Overview

## Introduction

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.

## Smart Substation Automation

### Station and Bay Level Application

- **HMI/SCADA Application in Substations**

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 Grids**

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 Sync. Receiver
  - Fiber optic LAN

### Bay and Process Level Application

- **Partial Discharge Detection & Analytic Device**

In electrical engineering, partial discharge is a localized dielectric breakdown if a small portion of a solid or fluid electrical insulation system under high voltage stress, which does not bridge the gap between two conductors. Protracted partial discharge can erode solid insulation and eventually lead to breakdown of insulation. Hence, a detection and analytic device to monitor the partial discharge is essential.

- Application Requirements
  - Reliable IEC 61850-3 platform
  - High-speed analog input for partial discharge detection

- **Vibration Detection & Analytic Device**

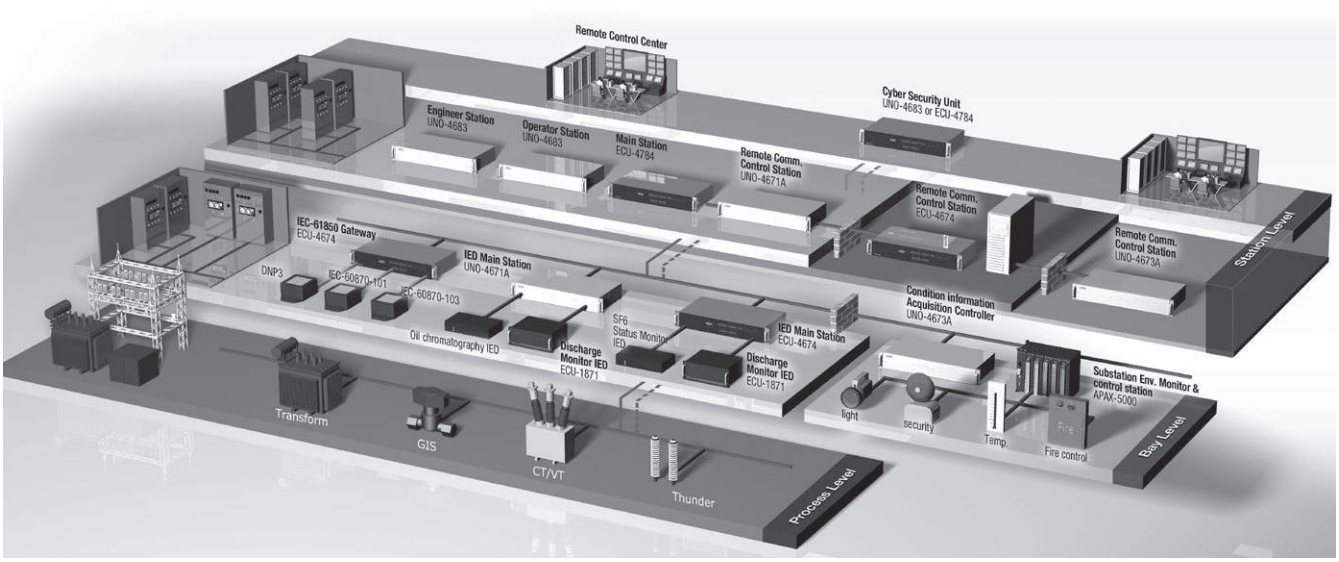
The most common cause of power transformer failures in mechanical defect is excessive vibration, which is formed by the combination of multiples of a frequency of 120 Hz. The vibration generated from machine structures causes abnormal vibration, breakage of machine and noise. The vibration level depends on the transformer construction and design, and it is increased through fault current, phase to ground or phase to phase fault. This electrical fault will change the transformer core or winding construction by mechanical force produced. The effect of the fault can be found by measuring the vibration level before and after several faults on low voltage side. Thus, a vibration analysis of the structure is important to prevent this vibration.

- Application Requirements
  - Reliable IEC 61850-3 platform
  - High-speed analog input for partial discharge detection

- **Distribution Substation RTU Application**

In substation automation systems, the RTU has interfaces towards protection and control equipment, as well as metering devices and other automation products. Local and remote monitoring and control can be easily achieved via the integrated RTU. The IEC 61850 client and server functionality of the RTU opens up an additional application area. It allows the combination of traditional protocols, parallel wiring and the IEC 61850 station bus. The hybrid solution provides the possibility to gradually upgrade the station to an IEC 61850 architecture.

- Application Requirements
  - High isolation for I/O and communication
  - Powerful platform bundled with high density I/O




## Renewable Solar Energy and Wind Power Generation

Renewable solar and wind generation play important roles in high power and low carbon demand. With harsh environment factors, such as drastic day-night temperature differences, dust/sand storms, vibration, heat and electrical noise, Advantech provides rugged, reliable and real-time communication, monitoring, tracking, testing and DAQ control solutions for renewable energy applications.

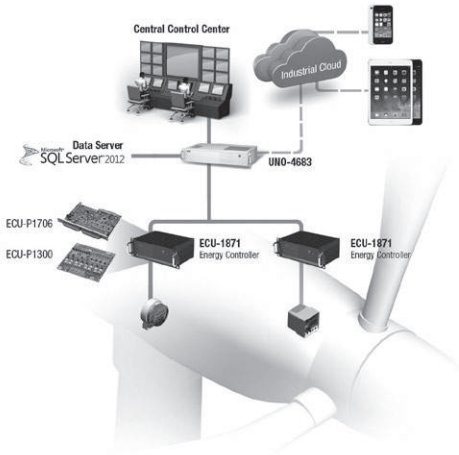
## Wind Power Generation Monitoring Solution

### Wind Power Turbine Gearbox Vibration Monitoring System

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 an Energy Controller, vibration signal modulation card and simultaneous analog input card, Advantech provides an ideal solution for a Wind Power Turbine Gearbox Vibration Monitoring System. With a redundant Ethernet communication port, the analysis of data can be transferred to the remote management center in real time.

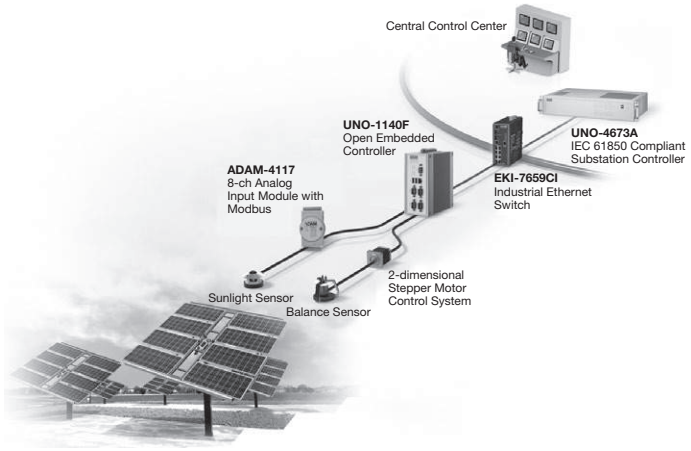
### Wind Power Box-type Transformer Monitoring System

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 monitors the status of the various parts of the transformer i.e. oil temperatures, 3-phase voltage, current, active and in-active power, and transfers the data to the remote control center via Ethernet.




## Solar Power Monitoring System

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'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.



# P&E Automation Computers & Controllers Selection Guide

## P&E Automation Computers

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| Model Name | UNO-4671A | ECU-4674 | ECU-4574 | UNO-4673A/4683 | ECU-4784 |
|---|---|---|---|---|---|
| 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 | IEC 61850-3/ IEEE 1613/ UL Certificate |
| CPU | Intel Atom D510 1.66GHz Intel Atom D525 1.8GHz | Intel Atom N2600 1.66GHz | Intel Atom N2600 1.66GHz | Intel Atom D510, 1.6 GHz Intel Core i7, 2.0 GHz | Intel Haswell Core i7-4650U 1.7 GHz |
| RAM | 2GB DDR2 SDRAM 4GB DDR3 SDRAM | 2G DDR3 SDRAM | 2G DDR3 SDRAM | 2GB DDR2 SDRAM 4GB DDR3 SDRAM | 8G DDR3L SDRAM 16G DDR3L SDRAM |
| Battery-Backup RAM | - | 1 MB | 1 MB | 1 MB | - |
| Display | VGA | VGA | VGA | VGA/DVI-I | VGA/DVI |
| Serial Ports | 2 x Isolated RS-232, 4 x Isolated RS-422/485, 4 x Isolated RS-485 | 2 x Isolated RS-232, 16 x Isolated RS-232/485 | 2 x isolated RS-232 8 x isolated RS-232/485 | 2 x Isolated RS-232/422/485 | 2 x Isolated RS-232 (Standard), 8 x RS-232/422/485 |
| Ethernet Ports | 6 x 10/100Base-T RJ-45/ 2 x 10/100/1000Base-T and 4 x 10/100 Base-T RJ-45 | 2 x 10/100/1000Base-T 6 x 10/100Base-T | 2 x 10/100/1000Base-T 6 x 10/100Base-T | 2 x 10/100/1000, 4 x 10/100 Base-T RJ-45 | 1 x 10/100/1000 Base T RJ45 (Support AMT) 7 x 10/100/1000 Base T RJ45 |
| Smart LAN | - | - | - | - | - |
| USB Ports | Four (One internal) | Five (One internal) | Four | Six (One internal) | Six (One internal) |
| PC/104 Expansion | PCI-104 | PCI-104 | - | - | - |
| Onboard I/O | - | 8 x isolated DI, 8 x isolated DO | - | - | - |
| Watchdog Timer | Yes | Yes | Yes | Yes | Yes |
| CompactFlash Slots | One Internal | One Internal | One Internal | One Internal | One Internal |
| 2.5" HDD Expansion | 1 x SATA | 2 x SATA | 1 x SATA | 1 x SATA | 2 x SATA |
| Operating Systems | WES2009, WES7, Windows CE 6.0 and Linux | WES7, Windows7, Linux | WES 7, WES 2009, Windows XP, Windows CE 6.0, Linux | WES, Windows XP Embedded, Windows CE 6.0, Windows 2000/XP, Linux, QNX, Window server 2008 R2 (64bits) | WES7, Windows7,Linux Window server 2008 R2 (64bits) |
| Mounting | 2U Rackmount | 2U Rackmount | 1U Rackmount | 2U Rackmount | 2U Rackmount |
| 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 | 2 Gw/CF, 1 Gw/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 | 30 G w/CF, 20 G w/HDD |
| Operating Temperature | -20 ~ 60°C (-4 ~ 140°F) | -20 ~ 70°C (-4 ~ 158°F) | -20 ~ 70°C (-4 ~ 158°F) | -20 ~ 70°C (-4 ~ 158°F) | -20 ~ 70°C (-4 ~ 158°F) |
| Power Consumption Typical | 30 W | - | 45 W | 45 W | - |
| Power Requirements | Supports Redundant 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 $V_{DC}$) | Supports Redundant power input Power 1: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ Power 2: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ | Supports Redundant power input Power 1: 100 ~240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ Power 2: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ | Supports Redundant power input Power 1: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ Power 2: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ | Supports Redundant power input Power 1: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ Power 2: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ |
| Dimensions (W x D x H) | 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 272 x 44 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 44 mm (17.3" x 8.6" x 1.7") |
| Weight | ~5.5 kg | ~6.0 kg | 4.6 Kg | ~6.0 kg | ~6.0 kg |
| Page | 3-6 | 3-7 | 3-8 | 3-9 | 3-10 |

# Energy Automation Controller

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| Model Name | ECU-1710A | ECU-1871 | ECU-1911 |
|---|---|---|---|
| Certification | - | IEC 61850-3 / IEEE 1613 Compliant China Electricity Certificate IV level | - |
| CPU | Intel Atom D510, 1.66 GHz | Intel Atom D510, 1.66 GHz | Xscale @ PXA-270 520MHz |
| RAM | 1GB DDR2 667MHZ | 2GB DDR2 SDRAM | 64MB SDRAM 32 MB Flash |
| Battery-Backup RAM | 1MB | - | - |
| Display | VGA | VGA | - |
| Serial Ports | 2 x RS-232 | 1 x RS-232 2 x Isolated RS-485 | 1 x RS-232 3 x isolated RS-485 |
| Ethernet Ports | 2 x 10/100Base-T RJ-45 | 2 x 10/100/1000 Base-T RJ-45 | 2 x 10/100Base-T RJ-45 |
| Smart LAN | - | - | - |
| USB Ports | Two | Two | One |
| PC/104 Expansion | - | PCI-104 | - |
| Onboard I/O | 8-ch AI 4-ch AO 16-ch Isolated DI/DO 1-ch Isolated Counter | Support Expansion IO: (1) ECU-P1702: 10Ms/S, 12-bit Simultaneous 4-ch PCI-104 card (2) ECU-P1706: 250Ks/S, 16-bit Simultaneous 8-ch PCI-104 card (3) ECU-P1300: Vibration Signal Modulate card | 8-ch AI 32-ch isolated DI 32-ch isolated DO |
| Watchdog Timer | Yes | Yes | Yes |
| CompactFlash Slots | One Internal | One Internal | One Internal |
| 2.5" HDD Expansion | 1 x SATA | 1 x SATA | - |
| Operating Systems | WES2009, WinCE 5.0, Linux | WES 7, WES 2009, Windows CE 5.0 & 6.0, Linux | Windows CE 5.0 |
| Mounting | Wall & Rack Mount | Wall & Rack Mount | DIN-rail |
| Anti-Vibration | - | 2 G w/CF, 1 G w/HDD | - |
| Anti-Shock | - | 30 G w/CF, 20 G w/HDD | - |
| Operating Temperature | -20 ~ 70°C (-4 ~ 158°F) | -20 ~ 70°C (-4 ~ 158°F) | -20 ~ 70°C (-4 ~ 158°F) |
| Power Consumption Typical | 28 W | 24 W | < 10 W |
| Power Requirements | 18 ~ 30 $V_{DC}$ (e.g 24 V @ 2 A) (Min. 48 W), AT | 18 ~ 30 $V_{DC}$ (e.g 24 V @ 2 A) (Min. 48 W), AT | DC: 10 ~ 30 $V_{DC}$ |
| Dimensions (W x D x H) | 255 x 152 x 59 mm (10" x 6.0" x 2.3") | 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 | ~2.4 kg | ~2.4 kg | ~1.5 kg |
| Page | 3-12 | 3-13 | 3-14 |

# Extension IO Cards

| Module Name | | ECU-P1706 | ECU-P1702 |
|---|---|---|---|
| BUS | | PCI-104 | PCI-104 |
| Analog Input | Resolution | 16-bit | 12-bit |
| | Channels | 8 | 4 |
| | Onboard FIFO | 8K samples/total | 32K samples/per channel |
| | Sampling Rate | 250KS/s | 10MS/s |
| | Input Range/ Bipolar Inputs | ±10, 5, 2.5, 1.25 | ±5, 2.5, 1, 0.5 |
| Timer/ Counter | Channels | 2 channels (Isolation) | - |
| | Resolution | 32-bit | - |
| | Max. Input Frequency | 1 M Hz | - |
| | Isolation Voltage | 2500 $V_{DC}$ | - |
| Page | | 3-15 | 3-15 |

| Module Name | | ECU-P1300 |
|---|---|---|
| Inputs | Voltage Input Range | ±5 V Maximum* |
| | Channels | 8 |
| | Amplifier Input Impedance | 20k (min) |
| | Input Coupling | AC |
| Outputs | Maximum Output Voltage | ±10V |
| | Accelerometer Input | 4 mA ±1% , 24 V compliant |
| Page | | 3-15 |

# UNO-4671A

## Intel® Atom™ D510/D525 Power & Energy Automation Computers with 6 x LAN, 10 x COM, and 1 x PCI-104

## Features

- IEC 61850-3 and IEEE 1613 compliant for Power & Energy automation applications
- China Electricity Certificate IV level
- Onboard Intel Atom D510 1.66GHz/D525 1.8 GHz processor
- Supports wide range and dual power input
- 2 x RS-232 isolated ports, 4 x RS-422/485 isolated ports and 4 x RS-485 isolated ports
- 6 x 10/100Base-T RJ-45 connector/2 x 10/100/1000Base-T and 4 x 10/100 Base-T RJ-45 connector
- Supports 1 x internal CF card and 1 x 2.5" SATA HDD
- Fanless design
- WES 2009, Windows XP, Windows CE 6.0, WES7 and Linux ready solution

## Introduction

The UNO-4671A is compliant with Electricity Certificate level IV (especially for China) and IEC 61850-3 certification, which defines the international standards of network and system communications in power substations. Featuring a fanless design with low power consumption and high performance Intel Atom D510/D525 processor, the UNO-4671A comes with 10 isolated serial ports, 6 x LAN, 4 x USB (Internal) and 1 x PCI-104 extension. With rich OS and driver support, such as WES 2009, Windows XP, Windows CE 6.0, WES7 and Linux, users can integrate applications easily with a platform that can provide versatile functions to fulfill diverse requirements.

## Specifications

### General

| | |
|---|---|
| **Certification** | CE, FCC class A, CCC, Electricity IV level for China (Compatible IEC 61850-3, IEEE 1613) |
| **Dimensions (W x D x H)** | 2U (440 x 220 x 88 mm/17.3" x 8.6" x 3.4") fits into standard 19 inch rack |
| **Enclosure** | SECC & Aluminum |
| **Mounting** | 2U Rackmount |
| **Power Consumption** | 30 W @ 24 V (Typical) |
| **Power Requirements** | Supports Redundant power input<br>Power 1: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$<br>Power 2: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ |
| **Weight** | < 5.5 kg |
| **System Design** | Fanless design |
| **OS Support** | WES 2009, Windows XP, Windows CE 6.0, WES7 and Linux |
| **Remote Management** | Built-in Advantech DiagAnywhere agent on Windows CE/XPe/7 |

### System Hardware

| | |
|---|---|
| **CPU** | Intel Atom D510 1.66 GHz/D525 1.8 GHz |
| **Memory** | 2GB DDR2/4GB DDR3 SDRAM |
| **Indicators** | LEDs for Power1&2, IDE, LAN (Active,Link) and Serial (Tx, Rx) |
| **Storage** | 1 x Internal typeI/II CompactFlash® slot,<br>1 x Built-in 2.5" SATA HDD bracket |
| **Display** | VGA , 1920 x 1080 |
| **Reset Button** | Yes |
| **WatchDog Timer** | Programmable 256 levels time interval, from 1 to 255 seconds for each tier |

### I/O Interface

| | |
|---|---|
| **Serial Ports** | 10 ports, 2 x RS-232, 4 x RS-422/485, 4 x RS-485 (Automatic RS-485 data flow control) |
| **Communication Speed** | RS-232: 50 ~ 115.2 kps,<br>RS-422/485: 50 ~ 921600 bps |
| **LAN** | 6 x 10/100 Base-T RJ-45 ports (For UNO-4671A-A33E)<br>2x 10/100/1000 Base-T RJ-45 ports and<br>4 x 10/100 Base-T RJ-45 ports (For UNO-4671A-A44BE) |
| **USB Ports** | 4 x USB (include 1 x internal USB), UHCI, Rev. 2.0 compliant |
| **Expansion** | 1 x PCI-104 |

### Environment

| | |
|---|---|
| **Storage Humidity** | 95% @ 40°C (non-condensing) |
| **Operating Temperature** | IEC 60068-2-2 with 100% CPU/ I/O loading, 48 hrs -20 ~ 60°C (-4 ~ 140°F) |
| **Operating Humidity** | 20 ~ 95% (non-condensing) |
| **Shock Protection** | IEC 68 2-27 CompactFlash®: 30 G half sine, 11 ms<br>HDD: 20 G half sine, 11 ms |
| **Vibration Protection** | IEC 68 2-64 (Random 1 Oct./min, 1hr/axis.)<br>CompactFlash: 2 Grms @ 5 ~ 500 Hz |

## Ordering Information

| | |
|---|---|
| **UNO-4671A-A33E** | Intel Atom D510 1.66 GHz, 2 GB RAM Power & Energy Automation Computer |
| **UNO-4671A-A44BE** | Intel Atom D525 1.8 GHz, 4GB RAM Power & Energy Automation Computer |
| **1757004251-01(*)** | SPS AC 100-240V 120W W/PFC EOFP-120MA (For UNO-4671A Dual Power, by CTOS configuration center) |

# ECU-4674

## Intel® Atom™ N2600 Power & Energy Computers with 8xLAN, 18xCOM, 8DI, 8DO, 1x IRIG-B and 1 x PCI-104

## Features

- China Electricity Certificate IV level
- IEC 61850-3 and IEEE 1613 compliant for substation automation applications
- Intel Atom N2600 1.6GHz processor
- 2 x RS-232 isolated serial ports, 16 x RS-232/485 isolated serial ports
- 2 x 10/100/1000 Base-T RJ-45 connector (Support teaming function and IEEE-1588 hardware capability) and 6 x 10/100 Base-T RJ-45 connector
- Support 1 x internal CF, 2x 2.5" SATA HDD
- 5x USB2.0 (1 x internal)
- Front or Rear wiring, programmable LED indicator
- Isolated 8-ch Digital Input and 8-ch Digital Output
- 1 x Time Synchronize IRIG-B
- Fanless design
- Supports Redundant isolated power with wide AC/DC input range
- iCDManager: intelligent Connectivity Diagnosis and Management

## Introduction

The ECU-4674 series of products is compliant with Electricity Certificate level IV (especially for China) and IEC 61850-3 and IEEE 1613 certification , which provide higher reliability and stability, suitable for any Global P&E automation market and harsh environment. With versatile communication interface to use for Smart substation Communication server and IED Analyzer to fulfill the Data Gateway & Protocol Conversion requirement easily. Featuring a fanless design with high performance Intel Atom N2600 processor, the ECU-4674 comes with 18 isolated serial ports, 8 x LAN and 1 x PCI-104 extension. With iCDMananger support , users can easy diagnose System & Communication and enhance maintenance efficiency, with Structured and functional module Internal design for easy customization and Fast assembly to fulfill the different kind of application.

## Specifications

### General

- **Certification** CE, FCC class A, CCC, Electricity IV level for China (Compatible IEC 61850-3, IEEE 1613)
- **Dimensions (W x D x H)** 440 x 220 x 88 mm
- **Enclosure** SECC & Aluminum
- **Mounting** 2U Rack mount
- **Power Requirements** Supports Redundant power input
  Power 1: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$
  Power 2: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$
  Supports Power Monitoring during power loss
- **Weight** < 5.5 kg
- **OS Support** WES7, Windows7,Linux
- **System Design** Fanless

### System Hardware

- **CPU** Intel Atom N2600, 1.6GHz
- **Memory** 2G DDR3 SDRAM built-in
- **Indicators** LEDs for Power, HDD, Programmable LED,IRIG-B, LAN (Active, Status) and Serial (Tx, Rx)
- **Storage** 1 x internal CF, 2 x 2.5" SATA HDD
- **Display** DB15 VGA connector
- **PC/104 slot** 1 x PCI-104
- **Watchdog Timer** Programmable 256 levels time interval, from 1 to 255 seconds for each tier

### I/O Interface

- **Serial Ports** 18 Ports, 2 x RS-232, 16 x RS-232/485
  2000 $V_{DC}$ isolation
  (Automatic RS-485 data flow control)
- **Serial Port Speed** RS-232: 50 ~ 115.2 kbps,
  RS-485: 50 ~ 921.6 kbps
- **LAN** 2 x 10/100/1000Base-T RJ-45 ports, teaming function supported,IEEE-1588 hardware capability,
  6 x 10/100Base-T RJ-45 ports
- **USB Ports** 5 x USB (1x internal), UHCI, Rev. 2.0 compliant
- **Digital Input** 8-ch isolated digital input
  Wet contact: Logic 0:0~3 $V_{DC}$; Logic 1: 10~30 $V_{DC}$
  Isolation protect: 2000 $V_{DC}$, 30-50 $V_{DC}$ over voltage protection (Only for ECU-4674-A53SAE)
  Opto-Isolator Response:25us-interrupt capable
- **Digital Output** 8-ch isolated digital output
  2000 $V_{DC}$ isolation, 200mA max/channel sink current
  Keeps output status after system hot reset
  Open collector to 40V (200mA maximum sink current load) 3 kHz speed (Only for ECU-4674-A53SAE)
- **Programmable LED** 8-ch programmable LED indicator
  Only for ECU-4674-A53SAE)

### Time Synchronization Interface (Only for ECU-4674-A53SAE)

- **Type** IRIG-B (RS-485)
- **Channel** 1
- **Support Format** IRIG-B00X according to IRIG STANDARD 04, 200-98
- **Message Syntax** QQQHHMMSS (year, day, hour, minute & second)
- **Resolution of Time** 1s

### Environment

- **Storage Humidity** 95% @ 40°C (non-condensing)
- **Operating Temperature** IEC 60068-2-2 with 100% CPU/ I/O loading, 48 hrs
  -20~ 70°C (-4 ~ 140°F)
- **Operating Humidity** 20 ~ 95% (non-condensing)
- **Shock Protection** IEC 68 2-27 CompactFlash®: 30 G half sine, 11 ms
  HDD: 20 G half sine, 11 ms
- **Vibration Protection** IEC 68 2-64 (Random 1 Oct./min, 1hr/axis.)
  CompactFlash: 2 Grms @ 5 ~ 500 Hz
  HDD: 1 Grms @ 5 ~ 500 Hz

## Ordering Information

- **ECU-4674-A53SAE** Intel Atom N2600 1.6Ghz 8LAN 18COM 8DI/DO, 1IRIG Computer
- **ECU-4674-LBA53SAE** Intel Atom N2600 1.6Ghz 8LAN 10COM+IRIG Computer
- **XECU-FSP150-1H35(*)** FSP AC 100-240V 150W W/PFC (Note: For ECU-4674 Dual Power, by CTOS configuration center)

# ECU-4574

## Intel® Atom™ N2600 Power & Energy Computers with 8 x LAN, 10 x COM Ports

## Features

- China Electricity Certificate level IV
- IEC 61850-3 and IEEE 1613 compliant for substation automation applications
- Intel Atom N2600 1.6GHz processor
- 2GB DDR3 SDRAM and 1MB Battery Backup RAM
- 2 x RS-232 isolated serial ports, 8 x RS-232/485 isolated serial ports
- 2 x 10/100/1000 Base-T RJ-45 connector,6 x 10/100 Base-T RJ-45 connector
- Supports 1 x CF, 2 x SATA 2.5" HDD
- Mounting: 1U Rack-mount
- Fanless design
- Support Redundant isolated power with wide AC/DC input range
- WES7, Windows7, Linux
- Intelligent Connectivity Diagnose Manager (iCDManager)

## Introduction

The ECU-4574 product is compliant with Electricity Certificate level IV, IEC 61850-3 and IEEE 1613 certification, provides higher reliability and stability performance that is suitable for global smart substations. With a flexible communication interface, the ECU-4574 works as an IED Analyzer that fulfills the smart substation bay level requirements. Featuring a fanless design with Intel Atom N2600 processor, 10 isolated serial ports, eight Ethernet ports and iCDMananger software, the ECU-4574 is easy for customization and fast assembly to fulfill different kinds of applications.

## Specifications

### General

| | |
|---|---|
| **Certification** | CE, FCC class A, CCC, Electricity IV level for China (Compatible IEC 61850-3, IEEE 1613) |
| **Dimensions (W x D x H)** | 440 x 220 x 72 mm |
| **Enclosure** | SECC & Aluminum |
| **Mounting** | 1U Rack mount |
| **Power Requirements** | Supports Redundant power input<br>Power 1: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$<br>Power 2: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ |
| **Weight** | < 5.5 kg |
| **OS Support** | WES7, Windows7, Linux |
| **System Design** | Fanless |

### System Hardware

| | |
|---|---|
| **CPU** | Intel Atom N2600, 1.6GHz |
| **Memory** | 2G DDR3 SDRAM built-in |
| **Indicators** | LEDs for Power, IDE, LAN(LINK, ACT) and Serial (Tx, Rx) |
| **Storage** | 1 x internal CF, 2 x 2.5" SATA HDD |
| **Display** | DB15 VGA connector |
| **Watchdog Timer** | Programmable 256 levels time interval, from 1 to 255 seconds for each tier |

### I/O Interface

| | |
|---|---|
| **Serial Ports** | 2 x RS-232, 8 x RS-232/485<br>2000 $V_{DC}$ isolation |
| **Serial Port Speed** | RS-232: 50 ~ 115.2 kbps,<br>RS-485: 50 ~ 921.6 kbps |
| **LAN** | 2 x 10/100/1000Base-T RJ-45 ports, teaming function supported,IEEE-1588 hardware capability,<br>6 x 10/100Base-T RJ-45 ports |
| **USB Ports** | 4 x USB, UHCI, Rev. 2.0 compliant |

### Environment

| | |
|---|---|
| **Storage Humidity** | 95% @ 40°C (non-condensing) |
| **Operating Temperature** | IEC 60068-2-2 with 100% CPU/ I/O loading, 48 hrs<br>-20~ 70°C (-4 ~ 140°F) |
| **Operating Humidity** | 20 ~ 95% (non-condensing) |
| **Shock Protection** | IEC 68 2-27 CompactFlash®: 30 G half sine, 11 ms<br>HDD: 20 G half sine, 11 ms |
| **Vibration Protection** | IEC 68 2-64 (Random 1 Oct./min, 1hr/axis.)<br>CompactFlash: 2 Grms @ 5 ~ 500 Hz<br>HDD: 1 Grms @ 5 ~ 500 Hz |

## Ordering Information

| | |
|---|---|
| **ECU-4574-A53SAE** | 1U Intel® Atom™ N2600 Power & Energy Computers |
| **XECU-FSP150-1H35(*)** | FSP AC 100-240V 150W W/PFC (Note: For ECU-4574 Dual Power, by CTOS configuration center) |

# UNO-4673A
# UNO-4683

## Intel® Atom™ / Core™ i7 Automation Computers with 6 x LAN, 2 x COM and 3 x Expansion Slots

NEW

IEC 61850-3 / IEEE 1613 Compliant

## Features

- IEC 61850-3 and IEEE 1613 compliant for substation automation applications
- Onboard Intel Atom 1.66 GHz / Core i7 2.0 GHz processor
- 2 x RS-232/422/485 isolated serial ports with automatic flow control and 128KB FIFO
- 2 x 10/100/1000 Base-T (supports teaming function) and 4 x 10/100 Base-T
- Supports 1 x internal CF card and 1 x 2.5" SATA HDD
- 6 x USB 2.0 (1 x internal) and 3 x Domain I/O expansions
- Rear wiring, multiple system & I/O LED status indicators
- Windows® CE 6.0, Windows XP Embedded SP2, and Linux ready solution
- Fanless design
- Isolation power design with wide AC / DC input range
- Isolation between chassis and power ground
- One internal USB for dongle and flash drive
- Redundant power supplier for system power backup

## Introduction

The UNO-4673A and UNO-4683 are compliant with the hardware requirements of IEC 61850-3, which defines the international standards of network and system communications in power substations. Featuring fanless designs with built-in isolated PSU and 3 expansion slots for I/O plug-in cards, the UNO-4673A and UNO-4683 are suitable for harsh environment applications. The rear I/O connection and LEDs on front panel for all ports and modes highly simplify monitoring for operation and maintenance.

## Specifications

### General

| | |
|---|---|
| **Certification** | IEC 61850-3, IEEE 1613, CE, FCC Class A, UL, CCC |
| **Dimensions (W x D x H)** | 2U (440 x 280 x 88) mm (17.3" x 11" x 3.4")<br>fits into standard 19 inch rack |
| **Enclosure** | SECC |
| **Mounting** | 2U Rackmount |
| **Power Consumption** | 45W (Typical) |
| **Power Requirements** | AC : 100 ~ 240 $V_{AC}$ (47 ~ 63 Hz)<br>DC : 106 ~ 250 $V_{DC}$<br>With isolation protection, AT |
| **Weight** | 6.0 kg |
| **OS Support** | WES, Windows XP Embedded, Windows /XP, Windows CE 6.0, Linux, QNX |
| **System Design** | Fanless |
| **Remote Management** | Built-in Advantech DiagAnywhere agent on Windows CE/XPe |

### System Hardware

| | |
|---|---|
| **CPU** | Intel Dual Core Atom D510 1.66 GHz / Core i7 2.0 GHz |
| **Memory** | 2G DDR2 SDRAM/4G DDR3 SDRAM built-in |
| **Indicators** | LEDs for Power, IDE, Alarm for battery backup SRAM, Diagnosis (programmable), LAN (Active, Status) and Serial (Tx, Rx) |
| **Keyboard/Mouse** | 2 x PS/2 connector for Keyboard & Mouse |
| **Storage** | |
| CF | 1 x internal type I/II CompactFlash® slot |
| HDD | 1 x build-in 2.5" SATA HDD bracket |
| *RAID capable with 2nd HDD kit | |
| **Display** | DB15 VGA connector, 2048 x 1536 @ 85 Hz (UNO-4673A)<br>1 x DVI-I, 1 x DVI-D (UNO-4683) |
| **Watchdog Timer** | Programmable 7-tier event handler, from 1 to 255 seconds for each tier |
| **Battery Backup SRAM** | 1 MB |
| **Relay:** | |
| Relay output: | Form C |
| Contact: | 5A@250$V_{AC}$\5A@30$V_{DC}$ |

### I/O Interface

| | |
|---|---|
| **Serial Ports** | 2 x DB-9<br>Automatic RS-485 data flow control<br>2000 $V_{DC}$ EFT protection & 2000 $V_{DC}$ isolation |
| **Serial Port Speed** | RS-232: 50 ~ 115.2 kbps<br>RS-422/485: 50 ~ 921.6 kbps (Max.) |
| **LAN** | 2 x 10/100/1000 Base-T RJ-45 ports,teaming function supported<br>4 x 10/100Base-T RJ-45 ports |
| **Audio** | Line-out |
| **USB Ports** | 6 x USB, UHCI, Rev. 2.0 compliant<br>2 x Front, 3 x Rear and 1 x Internal ports |
| **Expansion** | 3 x Domain I/O expansions (Only slot 1 supports PCIe resource) |

### Environment

| | |
|---|---|
| **Humidity** | 95% @ 40°C (non-condensing) |
| **Operating Temperature** | IEC 60068-2-2 with 100% CPU/ I/O loading, 48 hrs<br>-20 ~ 70°C |
| **Operating Humidity** | 20 ~ 95% (non-condensing) |
| **Shock Protection** | IEC 60068-2-27 CompactFlash®: 50 G half sine, 11 ms<br>HDD: 20 G half sine, 11 ms |
| **Vibration Protection** | IEC 60068-2-64 (Random 1 Oct./min, 1hr/axis.)<br>CompactFlash®: 2 Grms @ 5 ~ 500 Hz,<br>HDD: 1 Grms @ 5 ~ 500 Hz |

## Ordering Information

| | |
|---|---|
| **UNO-4673A-A33E** | Intel Atom 1.66 GHz, 2 GB RAM Automation Computer |
| **UNO-4683-D34E** | Core i7 2.0 GHz, 4 GB RAM Automation Computer |
| **UNO-4673ADP-A33E** | Intel Atom 1.66 GHz, 2 GB RAM, dual PSU Automation Computer |
| **UNO-4683DP-D34E** | Core i7 2.0 GHz, 4 GB RAM, dual PSU Automation Computer |

# ECU-4784

## Intel® Haswell Core i7 Power & Energy Automation Computer with 8 x LAN, 10 x COM and 2 x Expansion Slots

## Features

- TUV IEC 61850-3 and IEEE 1613 compliant for substation automation applications
- Intel Haswell Core i7 4650U 1.7GHz processor
- Supports Intel Virtualization Technology for Direct IO ( VT-D)
- Supports Intel Active Management Technology(AMT)
- 2 x 2.5" SATA HDD , RAID (RAID 0 & RAID 1), Hot swap installation
- 1 x 10/100/1000 Base T RJ45 (Support AMT, Teaming Function, PXE)
  7 x 10/100/1000 Base T RJ45 (Support Teaming Function, PXE)
- Security Protection: Trusted Platform Module
- Front or Rear wiring, programmable LED indicator
- Support Redundant Display (DVI& VGA)
- Support Redundant isolated power with wide AC/DC input range

## Introduction

ECU-4784 series products are compliant with TUV IEC 61850-3 and IEEE 1613 certification, which can provide higher reliability and stability, suitable for any global P&E automation market and harsh environment. With high computing and high integration performance , ECU-4784 is target to Smart Substation station level 's Server application, Featuring a fanless design with high performance processor (Intel Haswell Core i7 4650U), the ECU-4784 comes with 10 isolated serial ports, 8 x LAN and 2 x Expansion Slots. ECU-4784 are easy to expand more kinds domain I/O by functional module to extend data collection variety and highly simplify monitoring for operation and maintenance.

## Specifications

### General

| | |
|---|---|
| **Certification** | CE, FCC class A, CCC, Electricity IV level for China (Compatible IEC 61850-3, IEEE 1613), UL |
| **Dimensions (W x D x H)** | 440 x 280 x 88 mm |
| **Enclosure** | SECC & Aluminum |
| **Mounting** | 2U Rack mount |
| **Power Requirements** | Supports Redundant power input<br>Power 1: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$;<br>Power 2: 100 ~ 240 $V_{AC}$ or 100 ~ 240 $V_{DC}$ |
| **Weight** | 6.0 kg |
| **OS Support** | WES7, Windows7, Linux<br>Windows server 2008 R2 (64bits),<br>Windows Embedded 8.1(32/64bits) |
| **System Design** | Fanless |

### System Hardware

| | |
|---|---|
| **CPU** | Intel Haswell Core i7 4650U 1.7GHz |
| **Memory** | DDR3L 1.35V non-ECC 8G (Up to 16G by 2 Piece 8G) |
| **Indicators** | LEDs for Power, HDD, Programmable LED,<br>LAN (Active, Status) and Serial ( Tx , Rx) |
| **Storage** | 2 x 2.5" SATA HDD( RAID 0,1);<br>1 x CFast socket |
| **Display** | DB15 VGA connector, 1 x DVI |
| **Watchdog Timer** | Programmable 256 levels time interval, from 1 to 255 seconds for each tier |

### Relay

| | |
|---|---|
| **Relay Output** | Form C |
| **Contact** | 5 A @ 250 $V_{AC}$/5 A @ 30 $V_{DC}$ |
| **Channel** | 1 |

### I/O Interface

| | |
|---|---|
| **Serial Ports** | 2 x RS-232 (DB-9 connectors) (Standard ),<br>8 x RS-232/422/485 (Terminal Block)<br>2000 $V_{DC}$ isolation |
| **Serial Port Speed** | RS-232: 50 ~ 115.2 kbps,<br>RS-422/ RS-485: 50 ~ 921.6 kbps (Max.) |
| **LAN** | 1 x 10/100/1000 Base T RJ45 ports<br>(Supports AMT, Teaming Function, PXE)<br>7 x 10/100/1000 Base T RJ45 ports<br>(Support Teaming Function, PXE) |
| **USB Ports** | 6 x USB, UHCI, Rev.2.0 Compliant<br>2 x Front, 3 x Rear and 1 x Internal |
| **Expansion** | 2 Domain I/O Expansions<br>(Each Expansion Slot supports 1 x PCIe and 2 x PCI Interface) |

### Environment

| | |
|---|---|
| **Storage Humidity** | 95% @ 40°C (non-condensing) |
| **Operating Temperature** | IEC 60068-2-2 with 100% CPU/ I/O loading, 48 hrs<br>-20~ 70°C (-4 ~ 158°F) |
| **Operating Humidity** | 20 ~ 95% (non-condensing) |
| **Shock Protection** | IEC 68 2-27 CFast®: 50 G half sine, 11 ms<br>HDD: 20 G half sine, 11 ms |
| **Vibration Protection** | IEC 60068-2-64 (Random 1 Oct./min, 1hr/axis.)<br>CFast®: 2 Grms @ 5 ~ 500 Hz,<br>HDD: 1 Grms @ 5 ~ 500 Hz |

## Ordering Information

| | |
|---|---|
| **ECU-4784-D55SAE** | Intel Core i7 1.7GHz, 8GB RAM, 8 x LAN,10 x COM, 2 x Slot Computer |
| **ECU-4784-D56SAE** | Intel Core i7 1.7GHz, 16GB RAM, 8 x LAN, 10 x COM, 2 x Slot Computer |
| **XECU-FSP150-1H35(*)** | FSP AC 100-240V 150W W/PFC (Note: For ECU-4784 Dual Power, by CTOS configuration center) |

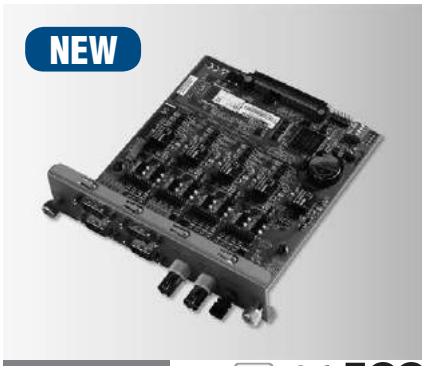
# UNOP-1628D/1618D
# UNOP-1624D
# UNOP-1514RE/PE

8-port Isolated/Non Isolated RS-232/422/485

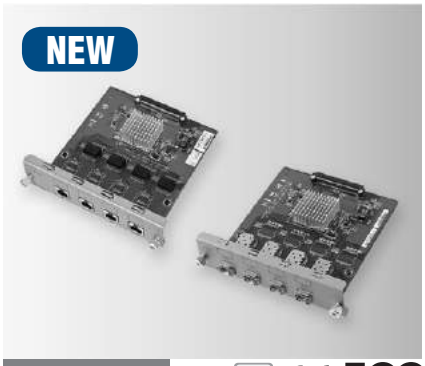
4-port Isolated RS-232/422/485 with IRIG B

4-Port Gigabit Base Ethernet Card

UNOP-1628D/1618D




UNOP-1624D




UNOP-1514RE/PE

## Specifications

### General

- **Connector** 120-pin connector for UNO-4673A/PCI, UNO-4683/PCI
- **Dimensions** 5.3" x 6.0" (136 x 150 mm)
- **Power Consumption** 5V ± 5% @ 620mA typical 3.3V ± 5% @ 75mA typical
- **Certification** CE/FCC

### Communication

- **IRQ** All COM ports use the same IRQ assigned by PCI Bus
- **COM Ports** 8 x RS-232/422/485 ports
- **Data Bits** 5, 6, 7, 8
- **Stop Bits** 1, 1.5, 2
- **Parity** None, Even, Odd
- **Baud-rate (bps)** RS-232: 50 ~ 115.2 kbps RS-422/485: 50 ~ 921.6 kbps (max.)
- **Data Signals** TxD, RxD, RTS, CTS, RI,DSR,DTR,DCD,GND for RS-232 Data+, Data-, GND for RS-485 Tx+, Tx-, Rx+,Rx-, GND for RS-422

### Protection

- **Isolation Protection** 2500 $V_{DC}$ (UNOP-1628D)

### Environment

- **Operating Temp.** -20 ~ 70°C (-4 ~158°F)
- **Operating Humidity** 10 ~ 90% RH non-condensing (refer to IEC 60068-2-3)
- **Storage Humidity** 5 ~ 95% RH non-condensing (refer to IEC 60068-2-3)

## Ordering Information

- **UNOP-1618D-AE** 8-port RS-232/422/485 for UNO-4673A & UNO-4683
- **UNOP-1628D-AE** 8-port Iso. RS-232/422/485 for UNO-4673A & UNO-4683

## Specifications

### General

- **Connector** 120-pin connector for UNO-4673A/PCI, UNO-4683/PCI
- **Dimensions** 5.3" x 6.0" (136 x 150 mm)
- **Power Consumption** 5V ± 5% @ 500mA typical. 3.3V ± 5% @ 180mA typical.
- **Certification** CE/FCC

### Communication

- **IRQ** All COM ports use the same IRQ assigned by PCI Bus
- **COM Ports** 4 x RS-232/422/485 ports
- **Baud rate (bps)** RS-232: 50 ~ 115.2 kbps RS-422/485: 50 ~ 921.6 kbps (Max.)
- **Data Signals** TxD, RxD, RTS, CTS, RI, DSR, DTR, DCD, GND for RS-232Data+, Data-, GND for RS-485Tx+, Tx-, Rx+,Rx-, GND for RS-422

### IRIG Time Code Input

- **IRIG Interface** Male 9-pole D-Sub connector (COM4 or IRIG-B) Female BNC
- **ST Multi-Mode** Fiber connector Female BNC
- **Input Signal** RS-422 input signal isolated by optocoupler Optical signal @ 820nm; TTL
- **Supported Formats** IRIG-B according to IRIG STANDARD 200-04, 200-98

### IRIG Time Code Output

- **IRIG Interface** Male 9-pole D-Sub connector (COM4 or IRIG-B) Female BNC
- **Output Signal** RS-422 output signal; TTL

### IRIG Time Code Decoding

- **Message syntax** YYYYQQQHHMMSS (yr, d, h, min, sec)
- **Resolution of the time** 1s
- **Status info** 1 status LED for indication

### Protection

- **Isolation Protection** 2500 $V_{DC}$ for COM/IRIG

### Environment

- **Operating Temp.** -20 ~ 70°C (-4 ~158°F)
- **Operating Humidity** 10 ~ 90% RH non-condensing (refer to IEC 60068-2-3)
- **Storage Humidity** 5 ~ 95% RH non-condensing (refer to IEC 60068-2-3)

## Ordering Information

- **UNOP-1624D-AE** 4-port Iso. RS-232/422/485 and IRIG B for UNO-4673A & UNO-4683

## Specifications

### General

- **Connector** 120-pin connector for UNO-4673A/4683 series PCIe
- **Bus Interface** PCI Express® x 1 compliant
- **Dimensions** 5.3" x 6.0" (136 x 150 mm)
- **Power Consumption** 5V ±5% @ 400mA typical
- **Certification** CE/FCC

### UNOP-1514PE

- **Connector** SFP
- **Ports** 4
- **Compatibility** IEEE 802.3 Ethernet interface
- **Speed** 1000M bps

### UNOP-1514RE

- **Connector** RJ45
- **Ports 4**
- **Compatibility** IEEE 802.3 Ethernet interface
- **Speed** 10/100/1000M bps

### Environment

- **Operating Temp.** -20 ~ 70°C (-4 ~158°F)
- **Operating Humidity** 10 ~ 90% RH n on-condensing (refer to IEC 60068-2-3)
- **Storage Humidity** 5 ~ 95% RH non-condensing (refer to IEC 60068-2-3)

## Ordering Information

- **UNOP-1514RE-AE** 4-port RJ45 Gigabit Base Ethernet Card
- **UNOP-1514PE-AE** 4-port SFP Gigabit Base Ethernet Card

## Accessories

- **SFP-GTX/RJ45** 1000Base RJ45 SFP module
- **SFP-GSX/LC** 1000Base-SX Multi-mode SFP module
- **SFP-GLX/LC-10** 1000Base-LX Single-mode SFP module (10 km)
- **SFP-GLX/LC-20** 1000Base-LX Single-mode SFP module (20 km)
- **SFP-GLX/LC-40** 1000Base-LX Single-mode SFP module (40 km)

# ECU-1710A

## Intel® Atom™ D510 Controller with 16-ch AI, 4-ch AO and 32-ch Isolated DI/O

NEW

## Features

- Onboard Intel Atom D510 1.66 GHz processor
- 2 x RS-232 ports
- 2 x 10/100Base-T RJ-45 ports
- 2 x USB ports
- Integrated PCI-1710UL & PCI-1720U modules
- 16-ch single-ended or 8-ch differential or a combination of Analog Input
- 12-bit A/D converter, with up to 100kS/s sampling rate
- 4-ch 12-bit Analog Output
- 16-ch Isolated Digital Input/Digital Output
- 1-ch Isolated Counter

## Introduction

The ECU-1710A is a standalone automation controller with integrated PCI-1710UL and PCI-1720U to provide 16-ch Analog Input, 4-ch Analog Output, 16-ch Isolated Digital Input and 16-ch Isolated Digital Output. This controller also supports serial communication ports and several other networking interfaces. You can seamlessly integrate your applications into the ECU-1710A and speed up your system development with these application ready controllers.

## Specifications

### General

- **Dimensions (W x D x H)** 255 x 152 x 59 mm (10" x 6.0" x 2.3")
- **Power Consumption** 28 W (Typical)
- **Power Requirements** 18 ~ 30 $V_{DC}$ (e.g 24 V @ 2 A) (Min. 48 W), AT
- **Weight** 2.4 kg (Typical)
- **OS Support** WES 2009

### System Hardware

- **CPU** Intel Atom D510 1.66 GHz/ 512 KB L2 Cache
- **Memory** 1GB DDRII 667MHZ
- **Indicators** LEDs for Power, IDE and LAN (Active, Status)
- **Keyboard/Mouse** 1 x PS/2
- **Storage** 1 x internal typeI/II CompactFlash® slot, 1 x Built-in 2.5" SATA HDD bracket

### I/O Interface

- **Serial Ports** 2 x RS-232
- **LAN** 2 x 10/100Base-T RJ-45 ports
- **USB Ports** 2 x USB, EHCI, Rev. 2.0 compliant

### Analog Input

- **Channels** 16 single-ended/ 8 differential
- **Resolution** 12 bits
- **Max. Sampling Rate** 100 kS/s
- **FIFO Size** 4,096 samples
- **Overvoltage Protection** 30 Vp-p
- **Input Impedance** >18M ohm
- **Sampling Mode** Delay to Start, Delay to Stop,None
- **Input Range** (V)

| | | | | | |
|---|---|---|---|---|---|
| **Unipolar** | N/A | 0 ~ 10 | 0 ~ 5 | 0 ~ 2.5 | 0 ~ 1.25 |
| **Bipolar** | ±10 | ±5 | ±2.5 | ±1.25 | ±0.625 |
| **Accuracy (% of FSR ±1LSB)** | 0.1 | 0.1 | 0.2 | 0.2 | 0.4 |

### Analog Output

- **Channels** 4
- **Resolution** 12 bits
- **Output Range** (Software programmable)
  Unipolar (V) 0 ~ 5, 0 ~ 10
  Bipolar (V) ±5, ±10
  Current Loop (mA) 0 ~ 20, 4 ~ 20
- **Driving Capability** 5 mA
- **Accuracy** Relative: ±1 LSB; Differential Non-Linearity: ±1 LSB (monotonic)
- **Excitation Voltage** 48 V (max.)

### Digital Input /Output / Counter

- **DI Channels** 16
- **DI Input Voltage** Logic 0: 2 V max. Logic 1: 5 V min. (30 V max.)
- **DO Channels** 16
- **DO Output Type** Sink Type (NPN)
- **DO Output Voltage** 5 ~ 40 $V_{DC}$
- **DO Sink Current** 300 mA max. per channel
- **Counter Channels** 1
- **Counter Resolution** 16 bits
- **Counter Input Voltage** Logic 0: 2 V max. Logic 1: 5 V min. (30 V max.)
- **Counter Max. Input Frequency** 1 MHz
- **Isolation Protection** 1,000 $V_{DC}$

### Environment

- **Storage Humidity** 5 ~ 95% RH, non-condensing (IEC-60068-2-3)
- **Operating Temperature** -10 ~ 60°C (14 ~140°F) @ 5 ~ 85% RH
- **Storage Temperature** -20 ~ 80°C (-4 ~176°F)

## Ordering Information

- **ECU-1710A-A32E** Intel Atom D510 1.66 GHz controller with AI/O and DI/O

### Accessories

- **ADAM-3925-AE** DB25 DIN-rail Wiring Board
- **ADAM-3937-BE** DB37 DIN-rail Wiring Board

# ECU-1871

## Intel® Atom™ D510 Energy Controller with 2 x LAN, 3 x COM, IRIG-B, and I/O Extension

## Features

- Onboard Intel Atom D510 1.66 GHz CPU
- IEC 61850-3 and IEEE-1613 compliant for substation application
- China Electricity Certificate IV level
- Built-in Time Synchronize IRIG-B
- Supports more Smart-Substation application I/O extension
- 1 x RS-232 port/ 2 x RS-485 isolation ports
- 2 x 10/100/1000Base-T RJ-45 ports
- Windows® CE 6.0, WES 2009, WES 7, and Linux ready solution
- Supports PCIe-104 & PCI-104 extension

## Introduction

The ECU-1871 is compliant with Electricity Certificate IV Level (especially for China) and IEC 61850-3 certification. Featuring a fanless design with low power consumption and high performance Intel Atom D510 processor, the ECU-1871 comes with 2 x Ethernet, 1 x RS-232, and 2 x isolation RS-485 ports. The ECU-1871 supports two extension interfaces, PCI-104 & PCIe-104, and users can easily order other Energy I/O boards to integrate into the ECU-1871 and speed up your system development with an energy controller.

## Specifications

### General

- **Dimensions (W x D x H)** 220 x 150 x 89 mm (8.7"x 5.9"x 3.5")
- **Power Consumption** 24 W (Typical)
- **Power Requirements** 18 ~ 30 $V_{DC}$ (e.g 24 V @ 2 A) (Min. 48 W), AT
- **Weight** 2.4 kg (Typical)
- **Mounting** 2U Rack-mount & Wall-mount
- **OS Support** WES 2009, WES 7, WinCE 6.0, Linux
- **System Design** Fanless

### System Hardware

- **CPU** Intel Atom D510 1.66 GHz/ 512 KB L2 Cache
- **Memory** 2G DDRII 667 MHz
- **Indicators** LEDs for Power, HDD,IRIG,COM(Tx Rx) and LAN (Active Statue)
- **Storage** SSD: 1 x type I/II CompactFlash® slot
  HDD: 1 x integrated 2.5" SATA HDD bracket
- **Display** VGA, 1600 x 1200 @ 85 Hz
- **Watchdog Timer** Programmable 256 levels time interval, from 1 to 255 seconds for each tier
- **PCI-104/PCIe-104** Supports +3.3/ +5 V power

### Communication Interface

- **Serial Ports** 3 Ports, 1 x RS-232, 2 x RS-485
- **Serial Ports Speed** RS-232 50 ~ 115.2 kbps
  RS-485 50 ~921.6 kbps
- **LAN** 2 x 10/100/1000Base-T RJ-45 ports
- **USB Ports** 4 x USB (include 1×internal USB), EHCI, Rev. 2.0 compliant

### Time Synchronization Interface

- **Type** IRIG-B
- **Channel** 1
- **Support Format** IRIG-B00X according to IRIG STANDARD 04, 200-98
- **Input Signal** ST Multi-mode, 1 Isolation RS-485 (Optional)
- **Message Syntax** QQQHHMMSS(year, day, hour, minute & second)
- **Resolution of Time** 1s

### Environment

- **Storage Humidity** 5 ~ 95% RH, non-condensing (IEC 60068-2-3)
- **Operating Temperature** -20 ~ 70°C (-4 ~158°F) @ 5 ~ 85% RH
- **Storage Temperature** -40 ~ 80°C (-40 ~176°F)

## Ordering Information

- **ECU-1871 -A33CAE** Intel Atom Energy Controller with 2 x LAN, 3 x COM, IRIG-B and I/O Extension

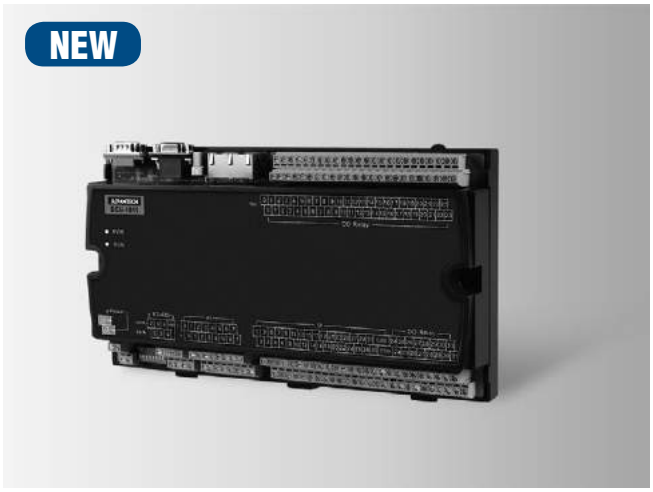
### Accessories

- **ECU-P1706-AE** 250 KS/s, 16 bit, Simultaneous 8-ch Analog input PCI-104 Card
- **ECU-P1300-AE** Vibration Signal Modulate, Vibration Sensor Driver, 8-order Low-pass Filter
- **ECU-P1702-LAE** 10 MS/s, 14bit, Simultaneous 4-ch Analog input PCI-104 Card

# ECU-1911

## Xscale @ PXA-270 520 MHz RTU with 8-ch 16-bit AI,32-ch DI,32-ch DO

NEW



CE FCC

## Features

- Onboard Xscale @ PXA-270 520 MHz CPU
- 1 x RS-232 port
- 3 x RS-485 isolated ports
- 2 x 10/100Base-T RJ-45 ports
- 8-ch 16-bit differential Analog Input
- 32-ch isolated Digital Input
- 32-ch isolated Digital Output
- Built-in Window CE 5.0

## Introduction

The ECU-1911 focuses on RTU monitor application. The ECU-1911 is also a standalone RTU that provides a 16-bit 8-ch A/D converter, 32-ch Relay and 32-ch Digital Input. This controller also supports four serial communication ports and two networking interfaces. You can seamlessly integrate your applications into the ECU-1911 and speed up your system development with this application ready RTU.

## Specifications

### General

- **Power Consumption** <10 W (Typical)
- **Power Requirements** 24 $V_{DC}$ (Typical) (10 $V_{DC}$ Min ~ 30 $V_{DC}$ Max)
- **OS Support** Windows CE 5.0

### System Hardware

- **CPU** Xscale @ PXA-270 520MHz
- **Memory** Onboard 64 MB SDRAM/ 32 MB Flash
- **Storage** 1 x type I/II Compact Flash slot
- **Display** VGA 640 x480 @ 60Hz

### Digital Input

- **Channels** 32
- **I/O Type** Sink
- **Wet Contact** Logic 0: 0 ~ 10 V<br>Logic 1: 19 ~ 30 V
- **Isolation** 3000 $V_{DC}$
- **Connector** Terminal Block (#14 ~ 22 AWG)

### Digital Output

- **Channels** 32
- **I/O Type** Power Relay Form A
- **Contact Rating** AC: 5A @ 250 V; DC: 30 V @ 5 A (Resistive Load)
- **Isolation** 500 $V_{DC}$
- **Connector** Terminal Block (#14 ~ 22 AWG)

### Analog Input

- **Channels** 8 differential
- **Resolution** 16 bits
- **Sampling rate** 10 Hz/sec (total)
- **Input Impedance** 700 kΩ
- **Input Range** 0 ~ 150 mV, 0 ~ 500 mV, 0 ~ 1 V, 0 ~ 5 V, 0 ~ 10 V, 0 ~ 15 V, ±150 mV, ±500mV, ±1 V, ±5 V, ±10 V, ±15 V, ±20 mA, 4 ~ 20 mA
- **Accuray** Voltage : ± 0.1 %<br>Current : ± 0.2 %
- **Span Drift** ±25 ppm/°C
- **Zero Drift** ±6 μV/°C

### Environment

- **Storage Humidity** 5 ~ 95% @ 40°C (non-condensing)
- **Operating Temperature** -20 ~ 70°C (-4 ~158°F) @ 5 ~ 85% RH
- **Storage Temperature** -40 ~ 80°C (-40 ~176°F)

### I/O Interface

- **Serial Ports** 1 x RS-232, 3 x RS-485 (Automatic RS-485 data flow)
- **LAN** 2 x 10/100Base-T RJ-45 ports
- **USB Port** 1 x USB, OpenHCI, Rev. 1.1 compliant

## Ordering Information

- **ECU-1911-R0CAE** Xscale @ PXA-270 520 MHz RTU with 8-ch 16-bit Analog Input, 32-ch Digital Input, and 32-ch Digital Output

# ECU-P1706
# ECU-P1702
# ECU-P1300

## 250 KS/s, 16bit, Simultaneous 8-ch Analog input PCI-104
## 10 MS/s, 12bit, Simultaneous 4-ch Analog input PCI-104

## Vibration Signal Modulate Card

NEW

## Features

- Designed for Smart-Grid Applications
- ECU-P1706 focuses on the Vibration/ Substation Signal Analytics (Wind-Power / Smart Substations)
- ECU-P1702 focuses on the Partial Discharge Detection and Analytical Devices (Smart Substations)
- ECU-P1300 focuses on Vibration Applications (Wind-power / Smart Substations)
- Easy to install to ECU-1871 Energy Controller

ECU-P1706

## Specifications

### General

- **Power Consumption** Typical: 5V @ 850mA
- **Bus Type** PCI-104
- **I/O Connector** Plug-in Terminal Block
- **Operating Temperature** -20 ~ 70°C (-4 ~158°F) @ 5 ~ 85% RH
- **Storage Temperature** -40 ~ 80°C (-40 ~176°F)
- **Storage Humidity** 5 ~ 95% RH, non-condensing (IEC 60068-2-3)

### Analog Input

- **Channels** 8 differential
- **Resolution** 16 bits
- **Max. Sampling Rate** 250 KS/s
- **FIFO Size** 8K samples
- **Overvoltage Protection** ±30V
- **Input Impedance** 18MΩ
- **Sampling Mode** Software, onboard programmable pacer and external (TTL Level)
- **Trigger mode** Delay To Start Trigger, Delay To Stop Trigger
- **Trigger Source** Analog Trigger, External Trigger
- **Input Range** (V. Software Programmable)

| Bipolar | ±10V | ±5V | ±2.5V | ±1.25V |
|---|---|---|---|---|
| Accuracy % of FSR±1LSB | 0.04 | 0.04 | 0.06 | 0.08 |

### Timer Counter

- **Channels** 2
- **Resolution** 32 bits
- **Mode** In: Event counting, Frequency In, PWM In
- **Compatibility** Isolated 24$V_{DC}$
- **Max. Input Frequency** 1 MHz
- **Max. Output Frequency** 1 MHz

## Ordering Information

- **ECU-P1706-AE** 250 KS/s, 16bit, Simultaneous 8-ch PCI-104

ECU-P1702

## Specifications

### General

- **Power Consumption** 5V @ 700mA (Max.) 3.3V @ 850mA (Max.)
- **Bus Type** PCI-104
- **I/O Connector** BNC
- **Operating Temperature** -20 ~ 70°C (-4 ~158°F) @ 5 ~ 85% RH
- **Storage Temperature** -40 ~ 80°C (-40 ~176°F)
- **Storage Humidity** 5 ~ 95% RH, non-condensing (IEC 60068-2-3)

### Analog Input

- **Channels** 4 Single-ended
- **Resolution** 12 bits
- **Max. Sampling Rate** 10 MS/s
- **FIFO Size** 32K samples
- **Overvoltage Protection** ±15V
- **Input Impedance** 50 ohm/1M ohm/Hi Z switch selectable
- **Sampling Mode** Software, onboard programmable pacer and external (TTL Level)
- **Trigger mode** Delay To Start Trigger, Delay To Stop Trigger
- **Trigger Source** Analog Trigger, External Trigger
- **Input Range** ±5V, ±2.5V, ±1V, ±0.5V

## Ordering Information

- **ECU-P1702-LAE** 10 MS/s, 12bit, Simultaneous 4-ch PCI-104

ECU-P1300

## Specifications

### General

- **Power Consumption** Typical: 5V @ 700mA; 12V @ 100mA
- **Operating Temperature** -20 ~ 70°C (-4 ~158°F) @ 5 ~ 85% RH
- **Storage Temperature** -40 ~ 80°C (-40 ~176°F)
- **Storage Humidity** 5 ~ 95% RH, non-condensing (IEC 60068-2-3)

### Vibration Modulate

- **Channels** 8
- **Input Range** ±5V (Max.)
- **Output Range** ±10V
- **Input Coupling** AC
- **Sensor Current Supply** 4mA ±1%, 24V compliant
- **Precision** 0.1%
- **Drive Ability** 0 ~ 5K
- **Sensor Signal Gain** 1
- **Signal Gain** 1
- **Analog Filter** 8th order Lowpass Bessel Filters
- **Filter Adjustable** 0.1 Hz ~ 25KHz Adjustable by Software Program

## Ordering Information

- **ECU-P1300-AE** Vibration Signal Modulate Card

# DMU-3010

## 8-ch AI, 8-ch DI, 4-ch DO Ethernet I/O Module

## Features

- Industrial Modbus/TCP protocol
- Mixed I/O in the Module
- Advantech Domain Focused Configuration Tool
- Remote maintenance through Ethernet
- Supports online device auto-scan or manual configure function
- Auto push data to specification target function
- Supports High/Low Alarm function
- Supports cable burn-out check
- Supports pulse/ accumulator input

## Introduction

The DMU-3010 is an Ethernet I/O module that supports the Modbus TCP protocol, and delivers various onboard I/Os including analog input, digital input, and digital output, providing flexible options to satisfy versatile application requirements. It also features the powerful Advantech Domain Focused Configuration Tool for engineers to quickly develop their applications.

## Specifications

### General

- **Dimensions (W x H x D)** 120 x 120 x 44 mm (4.72" x 4.72" x 1.73")
- **LAN** 10/100Base-T
- **Connector** 1 x RJ-45 (LAN)
  4 x Plug-in screw terminal block (I/O & Power)
- **Watchdog** System (1.6 sec)
- **Supported Protocols** Modbus/TCP
- **Power Input** 10 ~ 30 $V_{DC}$
- **Power Consumption** 3 W @ 24 $V_{DC}$

### Analog Input

- **Channels** 8
- **Input Type** V, mA*1, RTD*2
- **Voltage Range** 0 ~ 10 V
- **Current Range** 0 ~ 20 mA, 4 ~ 20 mA
- **RTD Type** Pt 100 (3-wire): -50 ~ 150°C
  0 ~ 100°C
  0 ~ 200°C
  0 ~ 400°C
  -50 ~ 200°C
  Pt 1000 (3-wire): -40 ~ 160°C
  IEC RTD 100 ohms (=0.0385)
  JIS RTD 100 ohms (=0.0392)
- **Input Impedance** 2 MΩ (voltage)
- **Accuracy** ±0.1%, (voltage); ±0.2% (current); ±0.5°C (RTD); or Better
- **Span Drift** ±25 ppm/°C
- **Zero Drift** ±6 μV/°C
- **Resolution** 16-bit
- **Sampling Rate** 10 samples/second
- **CMR @ 50/60 Hz** 90 dB
- **NMR @ 50/60 Hz** 60 dB
- **Over Voltage Protection** ±35 $V_{DC}$
- **Built-in TVS/ESD Protection**
- **Isolation Protection** 2500 $V_{DC}$
  Channels 0~7 support V, mA
  Channel 4~7 also support RTD input

### Digital Input

- **Channels** 8
- **Dry Contact** Logic level 0: Open
  Logic level 1: Close to Ground
- **Supports 200 Hz pulse/accumulator input**
- **Isolation Protection** 2500 $V_{DC}$

### Digital Output

- **Channels** 4
  Open Collector to 30V
  30mA max load.
- **Power Dissipation** 300 mW for each channel
- **PWM Period** 20 ms ~ 3600 sec
- **PWM Minimum Duty On** 2 ms
- **Isolation Protection** 2500 $V_{DC}$

### Environment

- **Humidity** 5 ~ 95% RH
- **Operation Temperature** -40 ~ 70°C (-40 ~ 158°F)
- **Storage Temperature** -40 ~ 70°C (-40 ~ 158°F)

## Ordering Information

- **DMU-3010-AE** 8-ch AI,8-ch DI,4-ch DO Ethernet IO Module