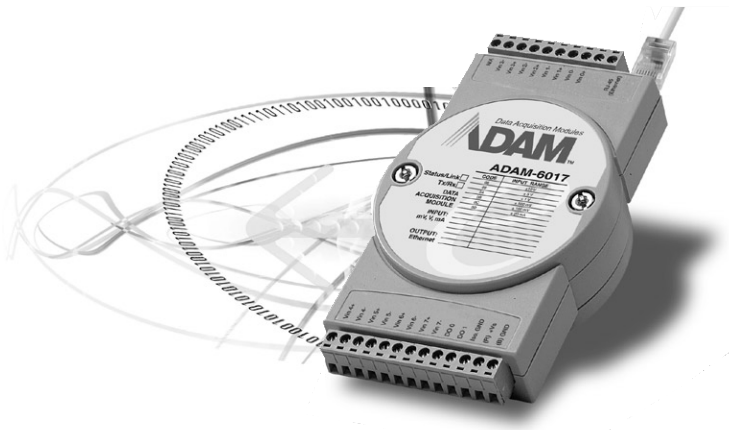


# Ethernet I/O Modules: ADAM-6000

ADAM-6000 Series	Smart Web Ethernet I/O Modules	2
ADAM-6000 Series	I/O System Architecture & Product Category	4
ADAM-6000 Series	System Configuration & Application Development Tool	6
ADAM-6000 Series Selection Guide		8
<b>Communication Controller</b>		
ADAM-6501	Ethernet-based Communication Controller	10
<b>Wireless LAN Input/Output</b>		
ADAM-6050W/6051W/6060W	Wireless LAN-enabled Input/Output Modules	12
<b>Ethernet Networking</b>		
ADAM-6520/6521	5-port Industrial Ethernet Switches with Fiber Optic Switch	14
ADAM-6541	Multi-mode Ethernet to Fiber Optic Converter	14
ADAM-6542	Ethernet to Single Strand WDM Fiber Optic Converter	14
<b>Digital Input/Output, Counter/Relay</b>		
ADAM-6050	12-ch Digital Input/Output Module	15
ADAM-6051	12-ch Digital Input/Output/Counter Mixed Module	15
ADAM-6052	16-ch Source Type Digital Input/Output Module	15
ADAM-6060	6-ch Digital Input/Relay Module	16
ADAM-6066	6-ch Digital Input/Power Relay Module	16
<b>Analog Input/Output</b>		
ADAM-6015	7-ch RTD Input Module	16
ADAM-6017	8-ch Analog Input Module	17
ADAM-6018	8-ch Thermocouple Input Module	17
ADAM-6024	12-ch Universal Input/Output Module	17
ADAM-6022	Dual-loop PID Controller	18
ADAM-6000 Series Dimensions		18



# ADAM-6000 Series



## Features

- Ethernet-based smart I/O
- Mixed I/O in single module
- Pre-built HTTP server and web page in each module for data/alarm monitoring
- User-defined web pages
- Active alarm/event trigger handling
- Industrial Modbus/TCP protocol
- Remote F/W upgrade through the internet
- Pre-built mathematic functions in analog input modules
- ADAM.Net Class Library software support

## The Path to Seamless Integration

The integration of automation and enterprise systems require a change in the architecture of open control systems. From Advantech's point of view, the level of integration between automation and enterprise systems can only be accomplished through Internet technology. The seamless level of integration between plant floor and office floor has not been achieved in all automation systems. However, many enterprises are approaching this goal.

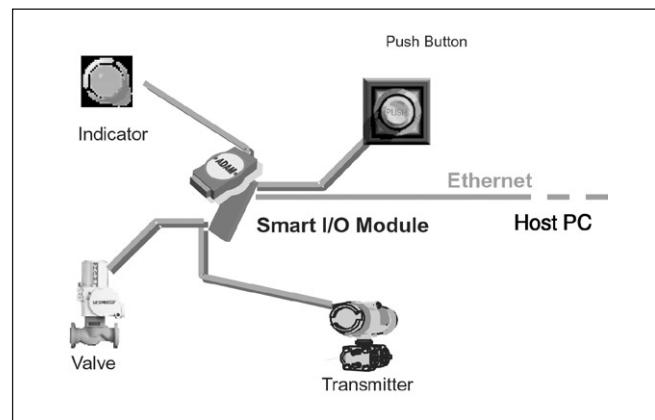
The key element of the seamless integration is a common network architecture, which breaks the traditional layers (enterprise layer, plant information layer, control layer and device level layer, sensor layer) that require a data gateway as an interface to communicate between different layers. Industrial Ethernet is regarded as the most appropriate network to accomplish the task in industrial automation.

It is believed that IP/Ethernet protocols will progress beyond the control layer, into the field layers. Placing remote I/O with IP/Ethernet connections on the shop floor is economical. Advantech believes that over the next five years, Internet protocols over Ethernet will dominate major field connections. The Advantech ADAM-6000 series comprises industrial-grade Ethernet hubs/switches/fiber optics for infrastructure Ethernet solutions in industrial automation environments.

## Control Strategy Moves to Field Devices

It is a trend to move I/O to remote locations to reduce wiring costs. Remote I/O is becoming smarter and equipped with control functions as they move from today's 16 to 64 I/O multi-plexers to the smallest remote I/O units, with perhaps as few as four I/O in the near future.

The ADAM-6000 series is designed to realize the concept of the smart I/O blocks. With control algorithms and mathematical functions built in, the ADAM-6000 series is a revolutionary smart I/O module close to the sensor layer in automation.



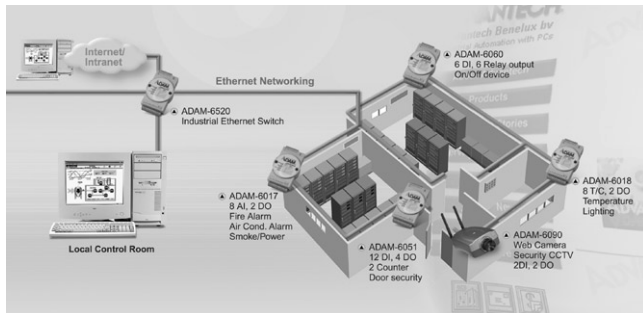
The Future Concept of Smart I/O Blocks

## Web-enabled Technology Becomes Popular on Factory Floors

As Internet technologies and standards have rapidly developed over the past decade, Web-based control methodologies now obviously represent a powerful opportunity for extending efficient network-based management techniques to encompass non-IT real-world assets.

The ADAM-6000 series is equipped with a built-in web server so that its data can be viewed, anytime-anywhere via the Internet. Moreover, ADAM-6000 allows users to configure user-defined web pages to meet the diverse needs in various applications. With this powerful function, the ADAM-6000 series breaks the boundary of traditional multi-layer automation architecture and allows users to access field data directly in real time, which enables seamless integration between the plant floor and the front office.

HMI has provided a friendly operator interface for discrete control and sharply reduced the cost and complexity of automation systems. A web server has been added to most HMI software and a browser allows access to HMI displays from remote locations via the network. The end user is able to see and use an identical HMI from any Internet connected computer anytime, anywhere. ADAM-6000 can be fully integrated with standard HMI software which supports Modbus TCP/IP, including Advantech Studio.



ADAM-6000 Application Architecture

## ADAM-6000 Smart Web Ethernet I/O

The integration of automation and enterprise systems and the adoption of an e-manufacturing strategy requires a shift in the manufacturing system architecture. E-manufacturing demands open access to real-time production data from the field. To achieve a seamless level of integration between plant floors and the enterprise level, some fundamental changes have to occur in I/O systems. E-manufacturing means the power of the Internet and I/O systems are used to take things one step further by leveraging Internet technology. These revolutionary I/O systems are web-enabled, smart and are "just-fit" mixed I/O modules. Improvement of the PLC has been gradually moving from logic and I/O in a single chassis, to I/Os in remote locations. The ADAM-6000 series is based on the concept described above.

## Why Smart I/O ?

To meet the requirements of future automation, smart I/O blocks have become popular in I/O system design. To implement the smart I/O blocks concept, I/O systems should be placed as close to the field sensors as possible. Therefore, intelligent control algorithms or basic mathematical functions are essential in I/O systems. ADAM-6000 provides intelligent functions that accelerate future automation development.

## Why Web I/O ?

The Internet is the major technology that allows all levels of an organization to be able to communicate and make the sensor-to-boardroom model a reality. Access can be realized from any device that utilizes a standard web browser, so connections between remote manufacturing plants, production planners, plant managers, and the CEO can be made without having to create a dedicated proprietary network. Since a web page can be installed in the I/O system as a Web I/O, then not only a sensor-to-boardroom model can be practiced, but sensor-to-home, and a sensor-to-mobile display can also be realized. ADAM-6000 Smart Web Ethernet I/O modules provide built-in standard and customizable web pages, which truly demonstrate the power of Web I/O.

## Why Mixed I/O ?

The impact of a tailor-made business model is spreading in automation, and I/O design is no exception. Over the past few years, the average size of PLCs have been reduced by the use of many small and micro PLCs to replace larger PLCs. A compact-sized and application-oriented mixed I/O is the trend. A just-fit mixed I/O module reduces the engineering effort, as well as installation and maintenance cost. It simplifies system architecture and increases system reliability. Obviously the ADAM-6000 series is the perfect choice to meet the specific requirements of many vertical markets.

## Common Key Features

### 1. Industrial Ethernet Networking

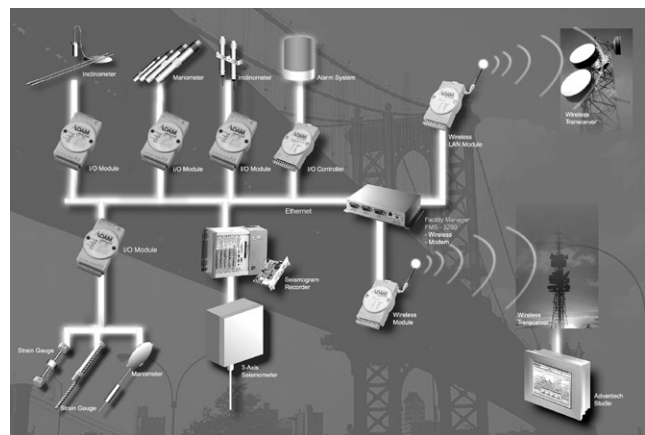
The ADAM-6000 series provides various communication modules such as Ethernet hubs, Ethernet switches and Ethernet switches with fiber ports. ADAM-6000 supports both Modbus/TCP and UDP. Embedded with a 10/100 Mbps Ethernet chip, ADAM-6000 supports industrial Modbus/TCP over TCP/IP networks which are commonly used in most business environments. ADAM-6000 also supports UDP, which allows users to develop their applications and handle events.

### 2. Smart and Mixed I/O Modules

ADAM-6000 provides built-in mathematical functions, including MAX, MIN, AVG, and others in analog input/output modules. ADAM-6000's mixed I/O modular design optimizes the performance and usage of I/O and minimizes the engineering efforts and maintenance cost.

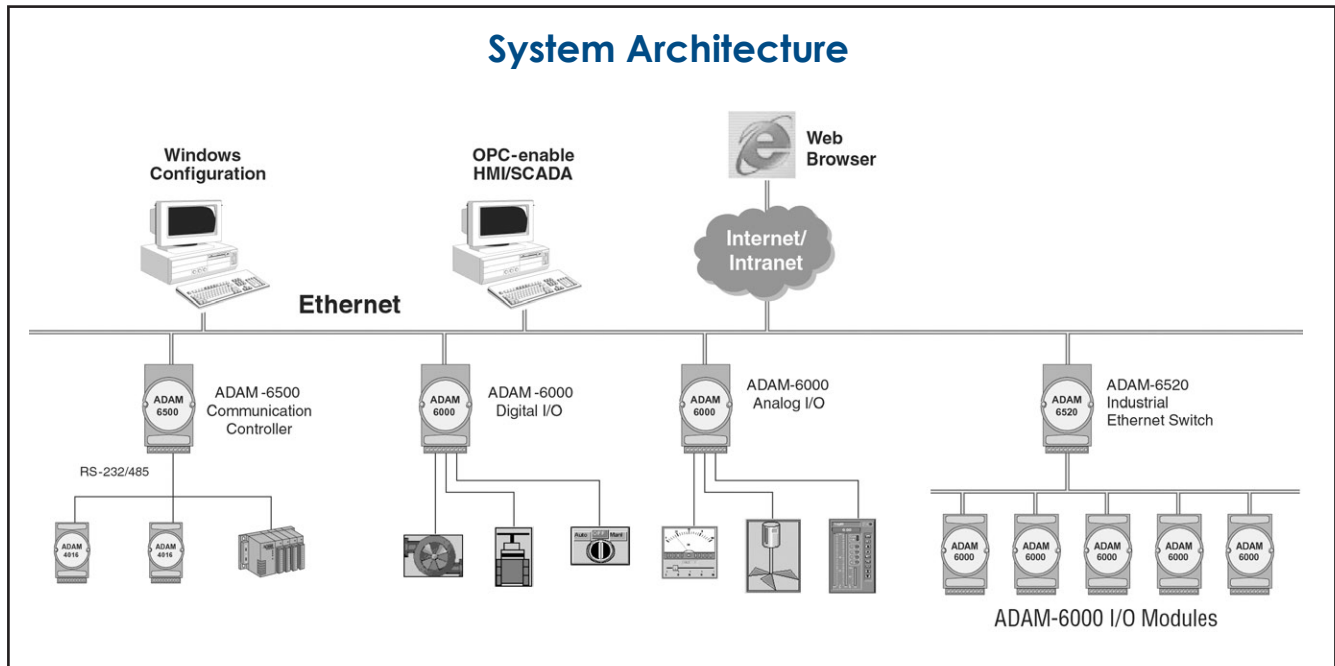
### 3. Built-in Standard and User-defined Web Pages

ADAM-6000 adopts web technology to enable remote monitoring via Internet. In addition to standard web pages, ADAM-6000 allows users to use the Java programming language to develop pages to meet their own requirements. ADAM-6000 supports standard HMI software with Modbus/TCP OPC drivers and ActiveX drivers.



ADAM-6000 Application Diagram

## I/O System Architecture



The ADAM-6000 is a controller independent, distributed I/O solution with modular design for maximum flexibility. Its powerful onboard intelligence makes it well suited to SCADA and stand-alone control applications.

### Ethernet-enabled Networking

The ADAM-6000 series Ethernet-enabled data acquisition and control module works as an Ethernet I/O data processing center. This new product is not only a standard I/O, but also an intelligent system designed with local control functions and a Modbus/TCP standard for users to easily develop various applications over Ethernet.

### Analog Input Modules

The ADAM-6000 analog input modules use microprocessor-controlled, high-resolution, 16-bit, sigma-delta A/D converters to acquire sensor signals such as voltage, current, thermocouple or RTD. They translate analog data into two's complement. After the modules receive a request from the host, they send the data in the desired format over the Ethernet network. ADAM-6000 analog input modules protect your equipment from ground loops by providing 3000 V<sub>DC</sub> isolation. The ADAM-6017 and ADAM-6018 modules feature digital outputs which may also be used for alarms and event counting. The analog input module's two digital output channels are open-collector transistor switches that you can control from the host computer. By switching solid state relays, the output channels can control heaters, pumps and other power equipment. The module can use its digital input channel to sense the state of a remote digital signal.

### Programmable Alarm Output

Analog input modules include high and low alarm signals with remotely configurable boundary values. After each A/D conversion, the digital value is compared with the high and low limit. The module can change the state of a digital output depending on the result of this comparison. This function allows it to perform on/off control of a device independently of the host PC.

### Independent Channel Input Type Configuration

The ADAM-6015 6-channel RTD module, provides independent channel input type configuration. You can configure PT-100, Pt-1000 or Balco mA for each channel. This independent channel input type configuration gives the ADAM-6015 more flexibility for versatile applications. This functionality saves customers the cost of buying multiple modules and reduces inventory as well.

### Loop Controller Module

The ADAM-6022 offers two analog inputs, two analog outputs, two digital inputs and four digital outputs in one module. The ADAM-6022 is a two loop PID controller. Each loop may be configured as single loop, dual loop ratio, dual loop cascade or single loop with override. An auto tune function is provided to maximize the effectiveness of the control.

### Analog Input Modules

The ADAM-6017/6018 are 16-bit, 8-channel analog input modules that provide programmable input ranges on all channels. These modules are an extremely cost-effective solution for industrial measurement and monitoring applications. 3000 V<sub>DC</sub> optical isolation between the analog input and the modules protects the modules and peripherals from damage due to high input-line voltages.

The ADAM-6018 also supports thermocouple input in combination with the ADAM-6015 7 channels RTD input module. These two modules can offer a complete solution for temperature measurement applications.

### Digital Input and Output Modules

The ADAM-6050 features twelve isolated digital input channels and six isolated digital output channels. The outputs are open-collector transistor switches that you can control from the host computer. You can also use the switches to control solid-state relays, which in turn can control heaters, pumps or other power equipment. The host computer can use the module's digital inputs to determine the state of limit switches, safety switches or remote digital signals. The ADAM-6051 provides twelve isolated digital input channels, two isolated digital output channels and two counter channels. All have 5000 V<sub>RMS</sub> isolation to prevent ground loop effects and prevent damage from power surges on the input lines.

### Digital Input

The ADAM-6050 & ADAM-6051 digital input channels provide four operational modes:

- Normal digital input with inverter setting
- 3 kHz frequency
- 3 kHz counter with digital filter
- Hi-to-Lo, Lo-to-Hi latch

Each digital input channel can set its operational mode independently.

### Digital Output

The ADAM-6050 & ADAM-6051 digital output channels also provide four operational modes: normal digital output, pulse output with continuous or burst count mode, Hi-to-Lo, Lo-to-Hi delay. Each digital output channel can set its operational mode independently as well.

### Counter/Frequency

The ADAM-6051 offers two 32-bit counter channels and a built-in programmable timer for frequency measurement.

### Programmable Alarm Output

The ADAM-6051 modules include two digital output channels for alarm functions. You can set alarm values (32-bit) into the module from your host computer.

### Relay Output Module

The ADAM-6060 offers six isolated digital input channels and six isolated relay channels. The digital input channel accepts 10 ~ 30 V<sub>DC</sub> input. Just like other ADAM modules, the ADAM-6060 relay module is controlled remotely and stores its configuration data in EEPROM. It provides six Form A relay channels with 24 V<sub>AC</sub> output. This module is excellent for on/off control or low-power switching applications.

### 12-ch Universal Input/Output Module

The ADAM-6024 offers six analog inputs, two analog outputs, two digital inputs and two digital outputs. This module is especially cost-effective for applications that require various signal type I/O points. The ADAM-6000 series also offers analog output functions.



# System Configuration & Application Development Tools

## Software Support

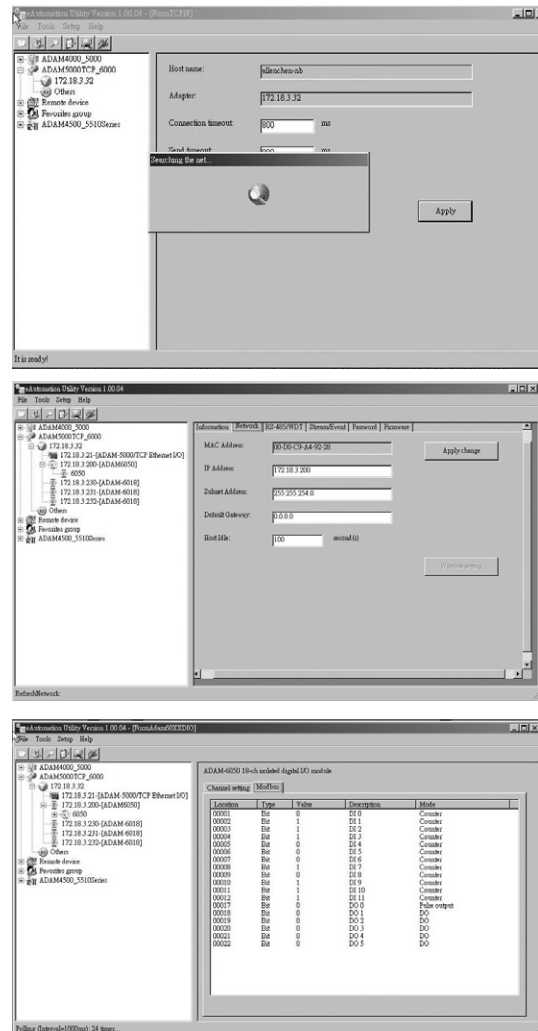
Based on the Modbus/TCP standard, the ADAM-6000 firmware has a built-in Modbus/TCP server. Advantech provides the necessary DLL drivers, OPC Server, and ADAM.Net Utility for the ADAM-6000. You can configure this DA&C system via ADAM.Net Utility and integrate it with a HMI software package via Modbus/TCP driver or Modbus/TCP OPC Server. Furthermore, you can use the DLL driver to develop your own applications.

## ADAM.Net Utility

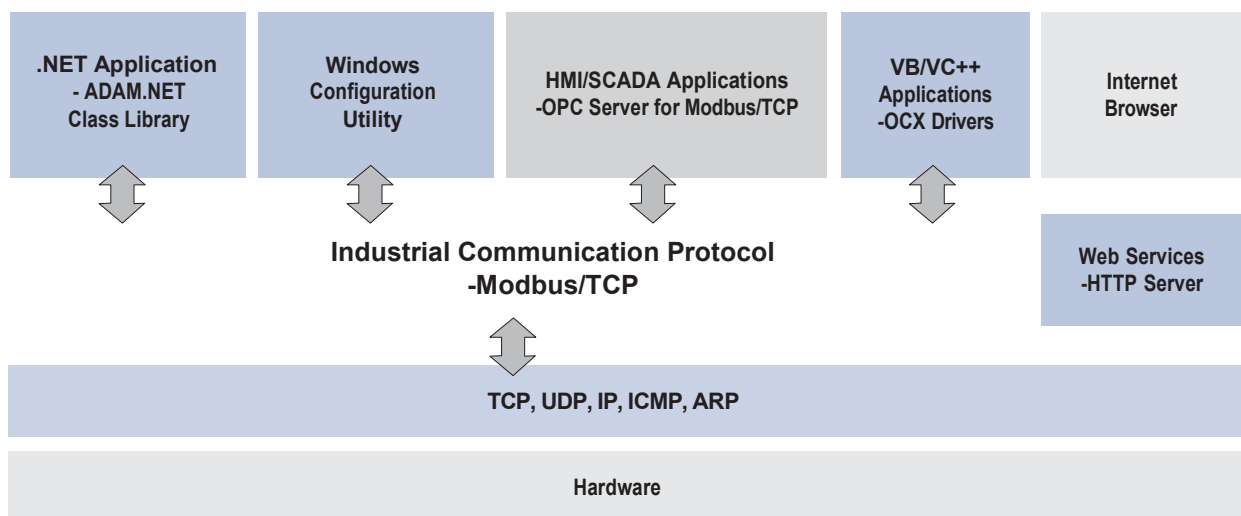
For system configuration, ADAM.Net Utility offers a friendly operating environment to calibrate I/O modules, monitor current data, set IP addresses etc. As you execute this program, it will automatically search each ADAM-6000 device on the network. There are also some advanced functions, such as the scaling function, which helps users convert various field signals to engineering units, and a latch output function, which forces data or status to create system simulations.

## Browser-based Online Monitoring

Each ADAM-6000 module features an embedded HTTP server for remote monitoring and diagnostics. The ADAM-6000 also pre-builds a default html page in each module for online support for monitoring analog input/output, digital input/output, alarm/event, counter, or real-time values, all done remotely via the Intranet/Internet. Just enter the IP address of the ADAM-6000 module in any standard browser, and you can get dynamic, real-time values of ADAM-6000 I/O modules immediately, without any required programming.



## How to Develop Applications



## System Configuration & Application Development Tools

### ActiveX Controls

Advantech offers an easy-to-use integration tool, Modbus/TCP ActiveX Controls for ADAM-6000 I/O data access. This can be used for users to develop applications with VB, VC, and other Windows development kits. (Note: The UDP function isn't fully supported in the existing version.)

### DLL Driver

Advantech also offers another easy-to-use integration tool, the ADAM-6000 DLL driver, for users to develop their own applications with VB, VC, BCB, Delphi, and other Windows development kits.

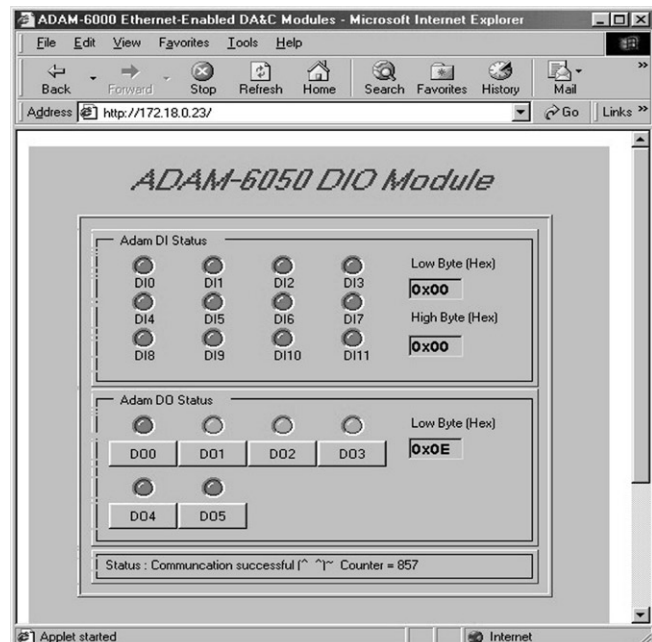
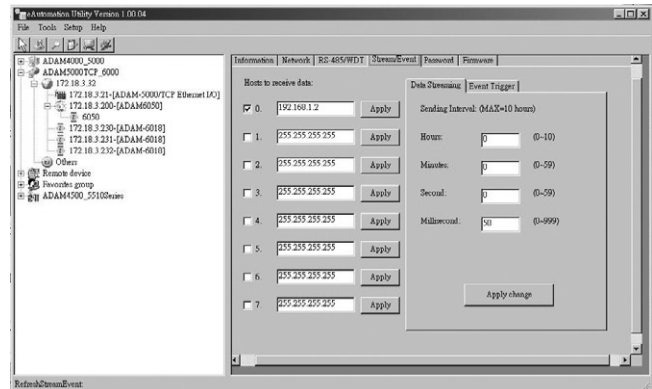
### Customizeable Web Page

Since the ADAM-6000 modules have an embedded web server with one default web page, users can monitor and control the I/O status everywhere. The ADAM-6000 modules data can also be downloaded to one user-defined web page for custom applications. These configurations can be downloaded into ADAM-6000 modules via ADAM.Net Utility.

To create a web page for ADAM-6000 modules is quick and easy. The following steps show a simple method to configure your own web page in short time.

### ADAM.NET Class Library

Advantech has created the VB.Net and C# library for ADAM-4000, 5000/485, 5000/TCP, 6000 series I/O. It offers a powerful tools for Microsoft Virtual Studio.Net 2003/2005 that allows users to easily implement the ADAM series I/O into their applications under Windows Embedded XP and WinCE.Net platform.



#### How to Configure Your Own Web Page

##### Step1

Open the Web Page Configuration Page in ADAM-6000 Utility Software

##### Step2

Key in the "Tag Name", "Descriptions", "Label" Wording

##### Step3

Save the Web Page Configuration File

##### Step4

Download to ADAM-6000 Module through ADAM.Net Utility

# ADAM-6000 Selection Guide

Module Spec.	ADAM-6015	ADAM-6017	ADAM-6018	ADAM-6022	ADAM-6024	ADAM-6050	ADAM-6051	ADAM-6052	ADAM-6060	ADAM-6066	ADAM-6050W	ADAM-6051W	ADAM-6060W
Interface*	10/100 Mbps Ethernet										802.11 b wireless LAN		
Resolution	16 bit	16 bit	16 bit	16 bit for AI 12 bit for AO	16 bit for AI 12 bit for AO	-	-	-	-	-	-	-	-
Analog Input	Input Channels	7 differential	8 differential	8 differential	6 differential	6 diff. AI	-	-	-	-	-	-	-
	Sampling Rate	10 samples/sec					-	-	-	-	-	-	-
	Voltage Input	PT-50 PT-100 PT-200 PT-1000 Balco 500 NI 50	±150 mV ±500 mV ±1 V ±5 V ±10 V	-	±10 V	±10 V	-	-	-	-	-	-	-
	Current Input		0~20 mA 4~20 mA	0~20 mA 4~20 mA	0~20 mA 4~20 mA	0~20 mA 4~20 mA	-	-	-	-	-	-	-
	Direct Sensor Input	Pt, Balco and Ni RTD	-	J.K.T.E.R.S.B. Thermocouple	-	-	-	-	-	-	-	-	-
	Burn-out Detection	Yes	-	Yes	-	-	-	-	-	-	-	-	-
	Channel Independent Configuration	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	-	-
Analog Output	Math. Functions	Max. Min. Avg.	Max. Min. Avg.	Max. Min. Avg.	-	-	-	-	-	-	-	-	-
	Output Channels	-	-	-	2 AO	2 AO	-	-	-	-	-	-	-
	Voltage Output	-	-	-	0~20 mA, 4~20 mA with 15 V <sub>DC</sub>	0~20 mA, 4~20 mA with 15 V <sub>DC</sub>	-	-	-	-	-	-	-
Digital Input and Output	Drive Current	-	-	-	0~10 V <sub>DC</sub> with 30 mA	0~10 V <sub>DC</sub> with 30 mA	-	-	-	-	-	-	-
	Digital Input Channels	-	-	-	2	2	12	12	8	6	6	12	12
	Digital Output Channels	-	2 (Sink)	8 (Sink)	2 (Sink)	2 (Sink)	6 (Sink)	2 (Sink)	8 (Source)	6-channel relay	6-channel power relay	6 (Sink)	2 (Sink)
	Event Counter	-	-	-	-	-	-	2 (4.5 kHz)	-	-	-	-	2 (4.5 kHz)
Digital Input and Output	High/Low Alarm Settings	Yes	Yes	Yes	-	-	-	-	-	-	-	-	-
	Isolation	2,000 V <sub>RMS</sub>											
	Watchdog Timer	Yes											
	Remark	-	-	-	Built-in Dual Loop PID Control Algorithm	-	-	-	-	-	-	-	-
Page	5-16	5-17		5-18	5-17	5-15				5-16		5-12	



## Selection Guide

Name	ADAM-6501	ADAM-6520/6521	ADAM-6541/6542
Interface	10/100Base-T	10/100Base-T, 100Base-FX	10/100Base-TX and 100Base-FX
Ethernet Port	1	5	2
Serial Port	2	-	-
Speed	10/100 Mbps	up to 100 Mbps	up to 100 Mbps
Parity	Even, odd, none, space, mark	-	-
Data Bit	5, 6, 7, 8	-	-
Stop Bit	1, 1.5, 2	-	-
Software	Configuration/ port mapping utility	-	-
Connector	Network: RJ-45 Serial: RJ-48 & Screw Terminator	Network: RJ-45 Fiber: SC type multi/single mode	Network: RJ-45 Fiber: SC type multi-mode ST type single-mode
Mounting	DIN 35 rail, stack, wall		
Power Requirement	10 - 30 V		
Power Consumption	4 W	6520: 2.4 W 6521: 3 W	3 W
Operating Temperature	0 ~ 55° C	-10 ~ 65° C	-10 ~ 65° C
Page	5-10	5-14	

# ADAM-6501

## Web-enabled Universal Communication Controller with Intel® XScale



CE FCC RoHS

### Features

- Powerful Ethernet-enabled communication controller in a tiny package
- Built-in Windows CE .NET to run embedded Ethernet applications
- Embedded web server
- Microsoft embedded VC++ development environment supported
- Built-in CompactFlash® slot
- Built-in Flash disk for Win CE and user applications
- Built-in 32 MB real-time clock and watchdog timer
- Offers RS-232 and RS-485 series communication port
- Automatic data flow control in RS-485 mode
- Communication speed up to 115.2 kbps
- Easy to mount on a DIN-rail or wall
- ADAM.Net Class Library software support

### Introduction

ADAM-6501 is a fully functional Ethernet-enabled controller for industrial automation and control. It provides an ideal environment to develop applications converting RS-232/485 devices/equipment data to the Ethernet/Internet world with minimum effort. Their built-in Windows CE .NET operating system lets users run new programs produced in Microsoft embedded VC++ & VS.Net development Software. The Windows environment also includes a web server to allow the designer to develop web-enabled applications.

### Specifications

#### General

- **Certifications** CE, FCC class A
- **Connectors** 1 x RJ-45 (LAN), 1 x RJ-48 (RS-232), Plug-in screw terminal blocks (RS-485 and power)
- **Enclosure** ABS+PC
- **LED Indicators** Power, diagnostics, communications
- **Mounting** DIN 35 rail, stack, wall
- **Power Consumption** 4 W @ 24 V<sub>DC</sub>
- **Power Input** Unregulated 10 ~ 30 V<sub>DC</sub> (max. 6 W)
- **Real-time Clock** Yes
- **Watchdog Timer** Yes, programmable

#### System Hardware

- **CPU** 32-bit Intel® XScale 400 MHz
- **Flash Memory** 32 MB flash memory
- **RAM** 64 MB SDRAM
- **Battery Backup RAM** 2 MB
- **Storage** 1 x CompactFlash slot (external)

#### Protection

- **Power Reversal Protection**

#### Software

- **Operating System** Windows® CE .NET
- **System Management** Web-based remote configuration via standard browser with Java® support.  
Command line configuration in console mode.

#### Communications

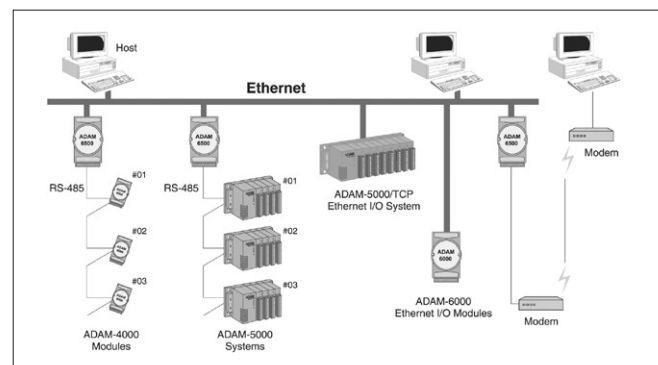
- **Default Setting Recovery** Onboard
- **LAN** 1 x 10/100Base-T (RJ-45)
- **Serial Ports (Isolated)** 1 x RS-232 (RJ-48), 1 x RS-485  
Speed: 115.2 kbps
- **Protocols Supported** TCP/IP, UDP

#### Environment

- **Humidity** 5 ~ 95% RH, non-condensing
- **Operating Temperature** 0 ~ 55° C
- **Storage Temperature** -20 ~ 80° C (-13 ~ 185° F)

### Ordering Information

- **ADAM-6501** Web-enabled Universal Communication Controller



ADAM-6501 Modules Installed as Controllers in a Typical System

## Feature Details

### Built-in Ethernet and RS-232/485 COM Ports

The ADAM-6501 has one Ethernet (10/100BASE-T), one RS-232 and one RS-232/485 ports. These provide easy communication between the controller and devices in your applications, and has been designed for program downloading, debugging and linking serial devices with the Ethernet/Internet. ADAM-6501 is equipped with a COM1 port (RS-232) supporting full RS-232 signals for applications such as modem connections, while the 3-pin RS-232 and RS-485 are designed as the interface for traditional RS-232/485 devices/equipment. This design allows the controller to be used in a variety of applications. For example, the user may download a data logging application into the ADAM-6501's memory while the ADAM-6501 is connected to a RS-485 network, and then collect the data over the network.

### Built-in Real-time Clock and Watchdog Timer

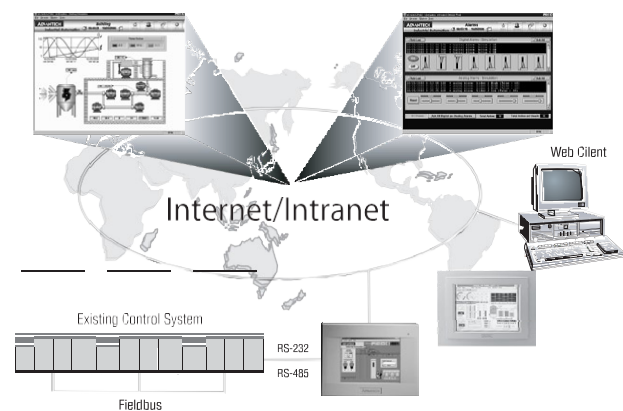
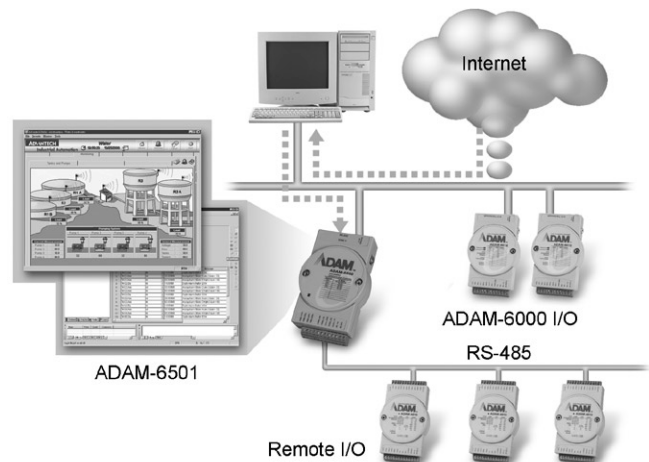
The real-time clock in the controller ensures accurate time recording when the system operates. The watchdog timer is designed to automatically reset the CPU if the system fails.

### ADAM-6501AS PC-Based HMI Station/SCADA

The ADAM-6501AS embeds Advantech Studio into ADAM-6501 hardware. So you can easily develop the required application in a desktop PC, then download it into ADAM-6501AS as a cost effective, compact size SCADA/HMI station. Advantech Studio (AStudio), a powerful, integrated collection of automation tools that includes all the building blocks required to develop modern Human Machine Interfaces (HMI), and Supervisory Control and Data Acquisition System (SCADA) applications. AStudio in ADAM-6501AS can run native on Windows CE.NET or in an Internet and Intranet environment. A simple drag and drop, point and click development environment mimics the most complex behavior of your live processes. AStudio is an eAutomation solution that allows designers to develop web-enabled applications.

## Applications

- Distributed data acquisition and control
- Embedded control application (Advantech AStudio SCADA Software)
- Data logging applications
- Serial to Ethernet conversion
- Web-enabled data acquisition and control



# ADAM-6050W ADAM-6051W ADAM-6060W

18-ch Wireless LAN-enabled DI/O Module  
16-ch Wireless LAN-enabled Isolated I/O w/Counter Module  
6-ch Wireless LAN-enabled Relay Output Module



CE FCC

## Features

- Supports IEEE802.11b wireless LAN
- Embedded web server with built-in web page
- Supports Modbus/TCP & UDP protocols
- Supports event trigger function

## Introduction

ADAM-6050W, ADAM-6051W, and ADAM-6060W bring wireless LAN communication to your network. The hardware design of the modules were based on ADAM-6050, 6051, and 6060, but a wireless LAN interface has replaced the RJ-45 Ethernet port. With support for the common IEEE802.11b, these modules can be accessed on your wireless LAN without any hardwiring. A sensible choice for environments with wiring limitations, or expensive wiring requirements.

## Specifications

### General

- **Certifications** CE, FCC class A
- **Connectors** Plug-in screw terminal block (#14 ~ 28 AWG)
- **Dimensions (WxHxD)** 70 x 112 x 25 mm
- **Enclosure** ABS+PC
- **LAN** IEEE802.11b WLAN
- **LED Indicators** Power, communication, signal, strength
- **Mounting** DIN 35 rail, stack, wall
- **Power Consumption** ADAM-6050W, ADAM-6060W: 2 W @ 24 Vdc  
ADAM-6051W: 2.5 W @ 24 Vdc
- **Power Input** Unregulated 10 ~ 30 V<sub>DC</sub>
- **Watchdog Timer** Yes, programmable

### Communications

- **Channels** ADAM-6050W: 12 DI, 6 DO  
ADAM-6051W: 12 DI/2 DO/2 Counter  
ADAM-6060W: 6 DI, 6 Relay
- **Counter** Maximum Count: 4,294,967,285 (32 bit)  
Input frequency: 0.3 ~ 4500 Hz max. (frequency mode)  
4500 Hz max. (counter mode)  
Modes: Counter, Frequency
- **Digital Input**
  - Dry Contact: Logic level 0: Close to GND  
Logic level 1: Open (Status inversable by utility)
  - Wet Contact: (ADAM-6050W and ADAM-6051W only)  
Logic level 0: +3 V (max.)  
Logic level 1: +10 to 30 V
  - Counter Mode: Up to 3 kHz for ADAM-6050W/6060W  
Up to 4.5 kHz for ADAM-6051W
  - Frequency Mode: Up to 3 kHz for ADAM-6050W/6060W  
Up to 4.5 kHz for ADAM-6051W
- **Digital Output** Open collector to 30 V, 100 mA max. load 300 mW  
Pulse output: up to 5 kHz for ADAM-6050W and ADAM-6051W

- **Relay Output (Form A)** Contact rating: AC: 120 V @ 0.5 A, DC: 30 V @ 1 A  
Breakdown voltage: 500 V<sub>AC</sub> (50/60 Hz)  
Relay on time: 7 msec; Relay off time: 3 ms  
Total switching time: 10 ms  
Insulation resistance: 1 GΩ minimum at 500 V<sub>DC</sub>

### Protection

- **Isolation Voltage** 2,000 V<sub>RMS</sub>
- **Power Reversal Protection**

### Software

- **Support Protocol** Modbus/TCP and UDP
- **Web Server** Embedded, with web page for configuration

### Environment

- **Humidity** 5 ~ 95 % RH, non-condensing
- **Operating Temperature** -10 ~ 60 °C (14 ~ 140 °F)
- **Storage Temperature** -25 ~ 85 °C (-13 ~ 185 °F)

## Ordering Information

- **ADAM-6050W** 18-ch Wireless LAN-enabled DI/O Module
- **ADAM-6051W** 16-ch Wireless LAN-enabled Isolated I/O w/Counter Module
- **ADAM-6060W** 6-ch Wireless LAN-enabled Relay Output Module

## Feature Details

### Communication

ADAM-6050W, ADAM-6051W and ADAM-6060W support IEEE802.11b, so they can connect to most wireless LAN access points.

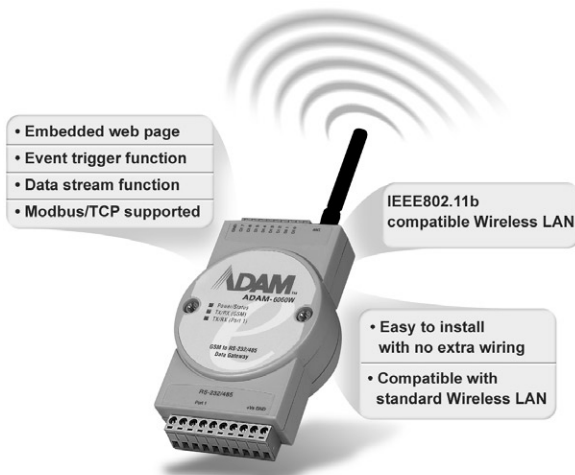
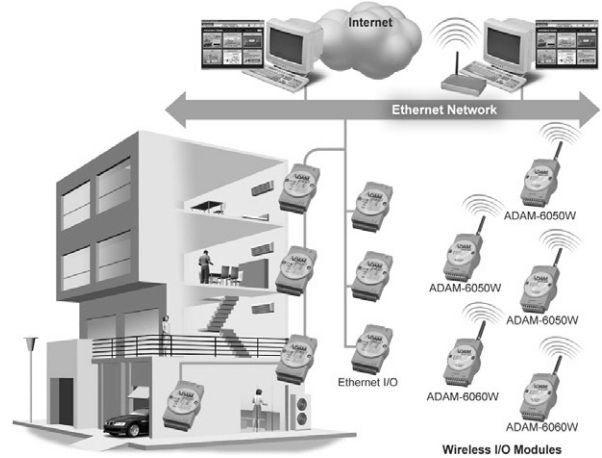
Like other ADAM-6000 modules, ADAM-6050W, ADAM-6051W and ADAM-6060W also support the Modbus/TCP and UDP protocols. You can use HMI/SCADA software to communicate with the modules through Modbus/TCP. The pre-built UDP protocol supports event trigger and data streaming functions for critical and real time responses.

### Embedded Web Server with Built-in Web Page

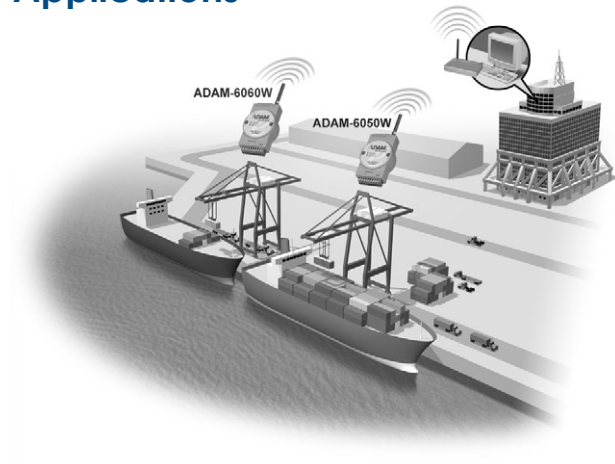
The modules have an embedded web server with a built-in webpage that can be configured by an utility for: Tag Name, Status Label (for example, Start/Stop, Run/Stop, Enable/Disable and Alarm/Normal), and Channel Enable.

Although it is based on Java technology, there is no need to learn how to write Java applets to design a customized web page. By using ADAM-6000 utility software, the webpage can be customized to exact requirements.

## Home/Building Applications



## Port Crane Monitoring & Control Applications





# ADAM-6520 ADAM-6521 ADAM-6541 ADAM-6542

5-port Industrial 10/100 Mbps Ethernet Switch  
5-port Industrial 10/100 Mbps Ethernet Switch with Fiber Optic  
Ethernet to Multi-mode Fiber Optic Converter  
Ethernet to Single Strand WDM Fiber Optic Converter



ADAM-6520

ADAM-6521



ADAM-6542

ADAM-6541



## Specifications

- **Standard** IEEE 802.3, IEEE802.3u
- **LAN** ADAM-6520 : 10/100Base-T standard network  
ADAM-6521 : 10/100Base-T & 10/100 Base-FX standard
- **Transmission Distance** Ethernet: 100 m, Multi-mode Fiber: Up to 2 km (ADAM-6521)
- **Transmission Speed** ADAM-6520 : up to 10/100 Mbps  
ADAM-6521 : 4 x 10/100 Mbps & 1 x 100 Mbps (Fiber)
- **Connectors** ADAM-6520 : RJ-45,  
ADAM-6521 : 4 x RJ-45 & 1 x Fiber (SC type)
- **LED Indicators** Power, 10/100 Mbps
- **Power Inputs** Unregulated 10 ~ 30 V<sub>DC</sub>
- **Power Consumption** 2.4 W @ 24V<sub>DC</sub>
- **Enclosure** ABS with captive mounting hardware
- **Operating Temperature** -10 ~ 65° C (14 ~ 149° F)
- **Storage Temperature** -20 ~ 80° C (14 ~ 176° F)
- **Operating Humidity** 20 ~ 95% (non-condensing)
- **Storage Humidity** 0 ~ 95% (non-condensing)

## Ordering Information

- **ADAM-6520** 5-port Industrial 10/100 Mbps Ethernet Switch
- **ADAM-6521** 5-port Industrial 10/100Mbps Ethernet Switch with Fiber port

## Specifications

- **Standard** IEEE 802.3, 802.3u, 802.3x
- **LAN** 10/100Base-TX, 100Base-FX
- **Transmission Distance** Ethernet : 100 m  
Fiber:  
ADAM-6541: Multi-mode: Up to 2km,  
Single-mode: Up to 20 km  
ADAM-6542: Up to 20 km
- **Transmission Speed** Up to 100 Mbps
- **Connectors** 1 x RJ-45  
1 x SC type fiber optic connector (ADAM-6541, ADAM-6542/W13, ADAM-6542/W15)  
1 x ST type fiber optic connector (ADAM-6541/ST)
- **LED Indicators** Power, Full/Link (100Base-FX), 100/10 M Ethernet (ADAM-6541)  
Power, Link (100Base-FX), 100/10 M Ethernet (ADAM-6542)
- **Power Input** Unregulated 10 ~ 30 V<sub>DC</sub>
- **Power Consumption** 3W @ 24 V<sub>DC</sub>
- **Isolation Protection** 1,500 V<sub>RMS</sub> (Ethernet port)
- **Enclosure** IP30, ABS+PC with solid mounting hardware Mounting  
DIN 35 rail, stack, wall Protection
- **Operating Temperature** -10 ~ 65° C (14 ~ 149° F),  
stack : -10 ~ 60° C (14 ~ 140° F)
- **Storage Temperature** -20 ~ 80° C (-4 ~ 176° F)
- **Operating Humidity** 20 ~ 95% (non-condensing)
- **Storage Humidity** 0 ~ 95% (non-condensing)

## Ordering Information

- **ADAM-6541** 10/100 Base-TX Ethernet to 100 Base-FX Multi-mode SC Type Fiber Optic Converter
- **ADAM-6541/ST** 10/100 Base-TX Ethernet to 100 Base-FX Multi-mode ST Type Fiber Optic Converter
- **ADAM-6542/W15** 10/100Base-TX Ethernet to 100Base-FX WDM Single Strand Fiber Optic Converter (Tx:1550nm, Rx:1310nm)
- **ADAM-6542/W13** 10/100Base-TX Ethernet to 100Base-FX WDM Single Strand Fiber Optic Converter (Tx:1310 nm, Rx:1550nm)

# ADAM-6050

# ADAM-6051

# ADAM-6052

18-ch Isolated Digital I/O Module

16-ch Isolated Digital I/O w/Counter Module

16-ch Source Type Digital I/O Module



ADAM-6050

CE FCC RoHS



ADAM-6051

CE FCC RoHS



ADAM-6052

CE FCC RoHS

## Specifications

### General

- Power Consumption 2 W @ 24 V<sub>DC</sub>
- Watchdog Timer Yes, programmable (comm.)

### Digital Input

- Channels 12
- Dry Contact Logic level 0: close to GND  
Logic level 1: open
- Wet Contact Logic level 0: 3 V max  
Logic level 1: 10 ~ 30 V<sub>DC</sub>

### Digital Output

- Channels 6
- Open Collector to 30 V, 100 mA max. load
- Power Dissipation 300 mW for each module

## Ordering Information

- ADAM-6050 18-ch Isolated Digital I/O Module

## Specifications

### General

- Power Consumption 2 W @ 24 V<sub>DC</sub>
- Watchdog Timer Yes, programmable (comm.)

### Counter

- Channels 2
- Maximum Count 4,294,967,285 (32 bit)
- Input Frequency 0.3 ~ 4500 Hz max. (frequency mode)  
4500 Hz max. (counter mode)
- Modes Counter, Frequency

### Digital Input

- Channels 12
- Dry Contact Logic level 0: close to GND  
Logic level 1: open
- Wet Contact Logic level 0: +3 V max  
Logic level 1: +10 V to 30 V<sub>DC</sub>

### Digital Output

- Channels 2
- Open Collector to 30 V, 100 mA max. load
- Power Dissipation 300 mW for each module

## Ordering Information

- ADAM-6051 16-ch Isolated Digital I/O with Counter Module

## Specifications

### General

- Power Consumption 2 W @ 24 V<sub>DC</sub>
- Watchdog Timer Yes, programmable (comm.)

### Digital Input

- Channels 8
- Dry Contact Logic level 0: close to GND  
Logic level 1: open
- Wet Contact Logic level 0: +3 V max  
Logic level 1: +10 V to 30 V<sub>DC</sub>

### Digital Output

- Channels 8
- V<sub>DC</sub> 35 V (Source Type)
- Current 1 A

## Ordering Information

- ADAM-6052 16-ch Source Type Digital I/O Module

## Common Specifications

### General

- Certifications CE, FCC class A
- Connectors 1 x RJ-45 (LAN)  
Plug-in screw terminal block (I/O, and power)  
10/100Base-T
- LAN
- LED Indicators Power and communication
- Power Input Unregulated 10 ~ 30 V

### Digital Input

- Support 3kHz Counter Input
- Support 3kHz Frequency Input
- Support Invert DI Status

### Digital Output

- Support 1kHz Pulse Output
- Support High-to-Low Delay Output
- Support Low-to-High Delay Output

### Protection

- Power Reversal Protection
- Power Reversal Protection
- Isolation Voltage 2,000 V<sub>DC</sub>

### Environment

- Humidity (Operating) 20 ~ 95% RH (non-condensing)
- Humidity (Storage) 0 ~ 95% RH (non-condensing)
- Operating Temperature -10 ~ 70 °C
- Storage Temperature -20 ~ 80 °C

# ADAM-6060

# ADAM-6066

# ADAM-6015

6-ch Digital Input/Relay Module

6-ch Digital Input/Power Relay Module

7-ch RTD Input Module



ADAM-6060

CE FCC RoHS



ADAM-6066

CE FCC RoHS



ADAM-6015

CE FCC RoHS

## Specifications

### General

- Power Consumption 2 W @ 24 Vdc
- Watchdog Timer Yes, programmable (Comm.)

### Digital Input

- Channels 6 DI
- Dry Contact Logic level 0: close to GND  
Logic level 1: open
- Wet Contact Logic level 0: +3 V max  
Logic level 1: 10 ~ 30 V<sub>DC</sub>

### Relay Output (Form A)

- Channels 6 Relay
- Contact Rating AC: 120 V @ 0.5 A  
DC 30 V @ 1 A
- Breakdown Voltage 500 V<sub>AC</sub> (50/60 Hz)
- Relay On Time 7 ms
- Relay Off Time 3 ms
- Total Switching Time 10 ms
- Insulation Resistance 1 G. min. at 500 V<sub>DC</sub> Protection

## Ordering Information

- ADAM-6060 6-ch Digital Input/Relay Module

## Common Specifications

### General

- Certifications CE, FCC class A
- Connectors 1 x RJ-45 (LAN)  
Plug-in screw terminal block (I/O, and power)  
10/100Base-T
- LAN Power and communication
- LED Indicators Unregulated 10 ~ 30 V<sub>DC</sub>
- Power Input

### Digital Input

- Support 3 kHz Counter Input
- Support 3 kHz Frequency Input
- Support Invert DI Status

## Specifications

### General

- Power Consumption 2.5 W @ 24 Vdc
- Watchdog Timer Yes, programmable (Comm.)

### Digital Input

- Channels 6 DI
- Dry Contact Logic level 0: close to GND  
Logic level 1: open
- Wet Contact Logic level 0: +3 V max  
Logic level 1: 10 ~ 30 V<sub>DC</sub>

### Relay Output (Form A)

- Channels 6 Relay
- Contact Rating AC: 250 V @ 5 A  
DC 30 V @ 5 A
- Breakdown Voltage 500 V<sub>AC</sub> (50/60 Hz)
- Relay On Time 7 ms
- Relay Off Time 3 ms
- Total Switching Time 10 ms
- Insulation Resistance 1G. min. at 500 V<sub>DC</sub> Protection

## Ordering Information

- ADAM-6066 6-ch Digital Input/Power Relay Module

### Digital Output

- Support Pulse Output
- Support High-to-Low Delay Output
- Support Low-to-High Delay Output

### Protection

- Power Reversal Protection
- Isolation Voltage 2,000 V<sub>DC</sub>

### Environment

- Humidity (Operating) 20 ~ 95% RH (non-condensing)
- Humidity (Storage) 0 ~ 95% RH (non-condensing)
- Operating Temperature -10 ~ 70° C
- Storage Temperature -20 ~ 80° C

## Specifications

### General

- Power Consumption 2 W @ 24 Vdc
- Watchdog Timer Yes, programmable (comm.)

### Analog Input

- Accuracy ± 0.05 % or better
- Channels 7 differential
- CMR @ 50/60 Hz 150 dB
- Input Connections 2 or 3 wire
- Input Type Pt, Balco and Ni RTD
- Input Impedance 10 k.
- NMR @ 50/60 Hz 100 dB
- Resolution 16 bits
- RTD Types and Temperature Ranges
  - PT-100 RTD
    - Pt-50° C to 150° C
    - Pt 0° C to 100° C
    - Pt 0° C to 200° C
    - Pt 0° C to 400° C
    - Pt-200° C to 200° C
  - EC RTD 100 ohms. = 0.00385)
  - JIS RTD 100 ohms. = 0.00392)
  - Pt 1000 RTD: Pt -40 ~ 160° C
  - Balco 500 RTD: -30 ~ 120° C
  - Ni 518: -80 ~ 100° C
  - Ni 518: 0 ~ 100° C
- Sampling Rate 10 samples /sec.
- Span Drift ± 25 ppm/° C
- Zero Drift ± 3 μV/° C

### Protection

- Individual Wire Burn-out Detection

## Ordering Information

- ADAM-6015 7-ch RTD InputModule

# ADAM-6017 ADAM-6018 ADAM-6024

8-ch Analog Input w/DO Module

8-ch Thermocouple Input w/DO Module

12-ch Universal Input/Output Module



ADAM-6017

CE FCC



ADAM-6018

CE FCC



ADAM-6024

CE FCC

## Specifications

### General

- Power Consumption 2 W @ 24 Vdc
- Watchdog Timer Yes, programmable (Comm.)

### Analog Input

- Channels 8 differential
- Input Impedance 20 M $\Omega$
- Input Type mV, V, mA
- Input Range  $\pm 150$  mV,  $\pm 500$  mV,  $\pm 1$  V  
 $\pm 5$  V,  $\pm 10$  V, 0-20 mA, 4-20 mA
- Sampling Rate 10 samples/sec.

### Digital Output

- Channels 2
- Open Collector to 30 V, 100 mA max. load
- Power Dissipation 300 mW for each module

## Ordering Information

- ADAM-6017 8-ch Analog Input with DO Module

## Specifications

### General

- Power Consumption 2 W @ 24 Vdc
- Watchdog Timer Yes, programmable (Comm.)

### Analog Input

- Channels 8 differential
- Input Impedance 20 k $\Omega$
- Input Type Thermocouple
- Thermocouple Type and Thermocouple Range:
 

J	0	~	760° C
K	0	~	1370° C
T	-100	~	400° C
E	0	~	1000° C
R	500	~	1750° C
S	500	~	1750° C
B	500	~	1800° C
- Sampling Rate 10 samples/sec.

### Digital Output

- Channels 8
- Open Collector to 30 V, 100 mA max. load
- Power Dissipation 300 mW for each module

## Ordering Information

- ADAM-6018 8-ch Thermocouple Input with DO Module

## Specifications

### General

- Power Consumption 4 W @ 24 Vdc
- Watchdog Timer Yes, programmable (Comm.)

### Analog Input

- Channels 6 differential
- Input Impedance 20 M $\Omega$
- Input Type mA, V
- Input Range  $\pm 10$  V<sub>DC</sub>, 0~20 mA, 4~20 mA
- Sampling Rate 10 samples/sec.

### Analog Output

- Accuracy 0.05% of FSR
- Channels 2
- Drift  $\pm 50$  ppm/° C
- Drive Voltage 15 V<sub>DC</sub> (current output)
- Output Type V, mA
- Output Range 0~10 V<sub>DC</sub>, 4~20 mA, 0~20 mA
- Resolution 12 bits

### Digital Inputs

- Channels 2
- Dry Contact: Logic level 0: close to GND  
Logic level 1: open
- Wet Contact: Logic level 0: +3 V<sub>max</sub>  
Logic level 1: 10~30 V<sub>DC</sub>

### Digital Outputs

- Channels 2
- Open Collector to 30 V 100 mA max. load
- Power Dissipation 300 mW for each module

## Ordering Information

- ADAM-6024 12-ch Universal Input/Output Module

## Common Specifications

### General

- Certifications CE, FCC class A
- Connectors 1 x RJ-45 (LAN)  
Plug-in screw terminal block (I/O, and power)
- LAN 10/100Base-T
- LED Indicators Power and communication
- Power Input Unregulated 10 ~ 30 V

### Analog Input

- Accuracy  $\pm 0.1\%$  or better
- Bandwidth 13.1 Hz @ 50 Hz, 15.72 Hz @ 60 Hz

- CMR @ 50/60 Hz 92 dB min.
- Resolution 16 bits
- Span Drift  $\pm 25$  ppm/° C
- Zero Drift  $\pm 6$   $\mu$ V/° C

### Protection

- Fault and Overvoltage withstands overvoltage
- Isolation Voltage 2,000 V<sub>DC</sub>
- Protection up to  $\pm 35$  Vdc

### Digital Input

- Supports 3 kHz Counter Input
- Supports 3 kHz Frequency Input
- Supports Invert DI Status

### Digital Output

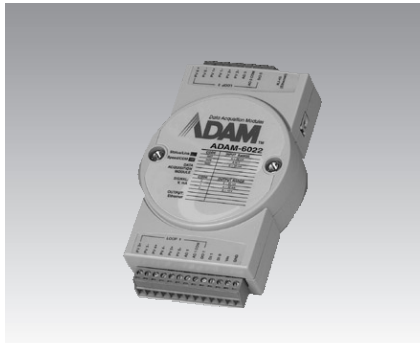
- Supports 1 kHz Pulse Output
- Supports High-to-Low Delay Output
- Supports Low-to-High Delay Output

### Environment

- Humidity (Operating) 20 ~ 95% RH (non-condensing)
- Humidity (Storage) 0 ~ 95% RH (non-condensing)
- Operating Temperature ADAM-6017/6018: -10 ~ 70° C  
ADAM-6024: -10 ~ 50° C
- Storage Temperature -20 ~ 80° C

# ADAM-6022

## Ethernet-based Dual-loop PID Controller



ADAM-6022

CE FCC

### Specifications

#### General

- **Power Consumption** 4 W @ 24 Vdc
- **Loop Number** 2 (3AI, 1AO, 1DI, 1DO for each control loop)
- **LAN** 10/100Base-T

#### Analog Input

- **Accuracy**  $\pm 0.1\%$  or better
- **Bandwidth** 13.1 Hz @ 50 Hz  
15.72 Hz @ 60 Hz
- **Channels** 6 differential
- **CMR @ 50/60 Hz** 92 dB min.
- **Resolution** 16 bits
- **Input Impedance** 20 M
- **Input Range** 0 ~ 10 V<sub>DC</sub>, 0 ~ 20 mA,  
4 ~ 20 mA
- **Isolation Voltage** 2,000 V<sub>DC</sub>
- **Sampling Rate** 10 samples/sec.
- **Span Drift**  $\pm 25$  ppm/°C
- **Zero Drift**  $\pm 6$   $\mu$ V/°C

#### Analog Output

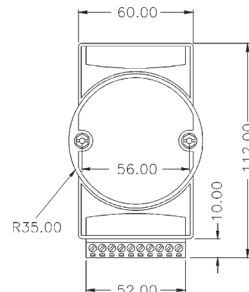
- **Channels** 1
- **Accuracy** 0.05% of FSR
- **Channels** 2
- **Drift**  $\pm 50$  ppm/°C
- **Drive Voltage** 15 V<sub>DC</sub> (current output)
- **Output Range** 0 ~ 10 V<sub>DC</sub>, 4 ~ 20 mA,  
0 ~ 20 mA
- **Resolution** 12 bits

#### Digital Inputs

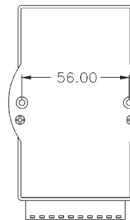
- **Channels** 2
- **Open Collector to 30 V 100 mA max. load** 300 mW
- **Isolation Voltage** 2,000 V<sub>DC</sub>
- **Fault and Overvoltage** Withstands overvoltage  
overvoltage
- **Power Reversal** Protection
- **Protection** up to  $\pm 35$  V<sub>DC</sub>

### ADAM-6000 Series Dimensions

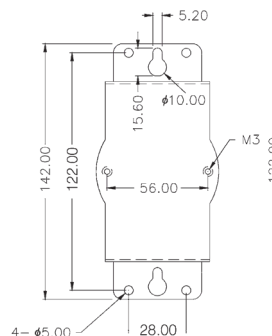
Unit: mm



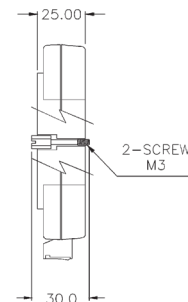
FRONT VIEW



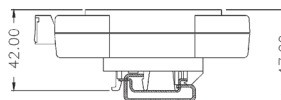
REAR VIEW



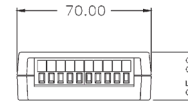
PANEL MOUNTING  
BRACKET



SIDE VIEW



DIN - RAIL MOUNTING  
ADAPTER



TOP VIEW

#### Digital Outputs

- **Channels** 2
- **Open Collector to 30 V 100 mA max. load**
- **Fault and Overvoltage** Withstands overvoltage  
**Protection** up to  $\pm 35$  V<sub>DC</sub>

#### Environment

- **Humidity (Operating)** 20 ~ 95% RH,  
(non-cond)
- **Humidity (Storage)** 0 ~ 95% RH,  
(non-cond.)
- **Operating Temperature** -10 ~ 50°C
- **Storage Temperature** -20 ~ 80°C

### Ordering Information

- **ADAM-6022** Dual-loop PID  
Controller