

Ethernet I/O Modules: ADAM-6000

Real-time Ethernet I/O Modules

EtherNet/IP & PROFINET I/O Module Introduction	17-2
ADAM-6100 Series Selection Guide	17-3
ADAM-6117 (New)	8-ch Isolated Analog Input Real-time Ethernet Module
ADAM-6118 (New)	7-ch Thermocouple Input Real-time Ethernet Module
ADAM-6124 (New)	4-ch Analog Output Real-time Ethernet Module
ADAM-6150	15-ch Isolated Digital I/O Real-time Ethernet Module
ADAM-6151/6156	16-ch Isolated Digital Input/ Digital Output Real-time Ethernet Module
ADAM-6160	6-ch Relay Real-time Ethernet Module

Ethernet I/O Modules

ADAM-6000 Series	Ethernet I/O System Introduction	17-6
ADAM-6000 Features: Graphic Condition Logic (GCL) Technology		17-7
ADAM-6000 Features: Peer-to-Peer Technology		17-8
ADAM-6000 Series Selection Guide		17-9

Analog Input/Output Modules

ADAM-6015	7-ch Isolated RTD Input Modbus TCP Module	
ADAM-6017	8-ch Isolated Analog Input Modbus TCP Module with 2-ch DO	17-10
ADAM-6018	8-ch Isolated Thermocouple Input Modbus TCP Module with 8-ch DO	

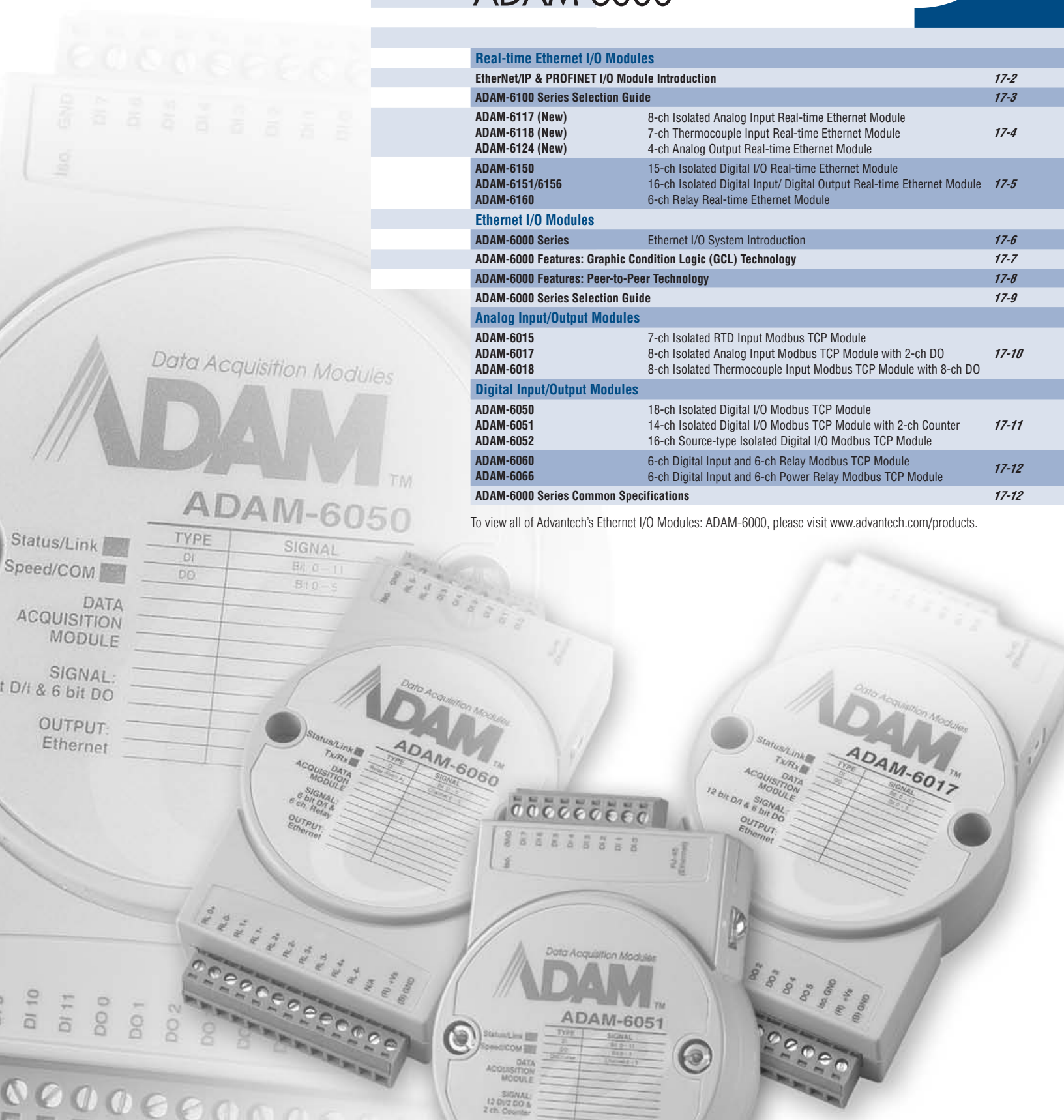
Digital Input/Output Modules

ADAM-6050	18-ch Isolated Digital I/O Modbus TCP Module	
ADAM-6051	14-ch Isolated Digital I/O Modbus TCP Module with 2-ch Counter	17-11
ADAM-6052	16-ch Source-type Isolated Digital I/O Modbus TCP Module	
ADAM-6060	6-ch Digital Input and 6-ch Relay Modbus TCP Module	17-12
ADAM-6066	6-ch Digital Input and 6-ch Power Relay Modbus TCP Module	

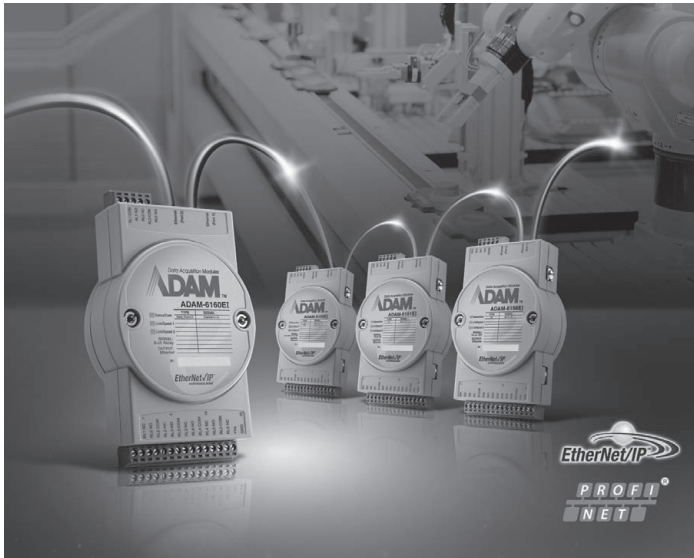
ADAM-6000 Series Common Specifications

17-12

To view all of Advantech's Ethernet I/O Modules: ADAM-6000, please visit www.advantech.com/products.



EtherNet/IP & PROFINET I/O Module Introduction



Real-time distributed control systems are an important technology for reliable industrial Ethernet and automation applications. A number of techniques are used to adapt the Ethernet protocol for industrial processes, which must provide reliable service to ensure stable operation. Through modern protocols, automation systems from different manufacturers can be interconnected throughout a plant. Industrial Ethernet takes advantage of the relatively larger marketplace for computer interconnections to reduce cost and improve performance of communications between industrial controllers.

Real-time Systems

A real-time system is one in which the correctness of a result not only depends on correct calculations, but also upon correct timing.

In computing, real-time refers to a time frame that is very brief, appearing to be immediate. When a computer processes data in real time, it reads and handles data as it is received, producing results without delay. A non real-time computer process does not have a deadline. Such a process can be considered non-real-time, even if fast results are preferred. A real-time system, on the other hand, is expected to respond not just quickly, but also within a predictable period of time. In an automation control system, real time technology provides multiple advantages, such as improved safety, quality, and efficiency.

To build a real-time distributed control system, it is critical to establish reliable and real-time communication among the controllers and targets. Distributed processors must be able to intercommunicate via real-time protocols. There is now increasing interest in the use of Ethernet as the link-layer protocol, such as EtherNet/IP, PROFINET, EtherCAT, Ethernet PowerLink, SERCOS III.

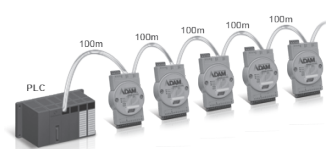
EtherNet/IP

EtherNet/IP was developed in the late 1990's by Rockwell Automation for use in process control and other industrial automation applications, ensuring multi-vendor system interoperability. EtherNet/IP is a lot like standard office Ethernet, using the same TCP/IP messaging but with a new application layer added where data is arranged. This is known as Object-Orientated Organization, and allows ordinary office Ethernet to become a more versatile system. Today, EtherNet/IP is commonly used in industrial automation applications, such as water processing, manufacturing, and utilities.

PROFINET

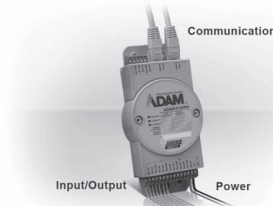
PROFINET is the open industrial Ethernet standard of PROFIBUS & PROFINET International (PI) for automation. Like EtherNet/IP, it uses TCP/IP standards as protocols for communication in the network. It includes two modes - PROFINET IO and PROFINET CBA - and allows to combine distributed automation and distributed I/O. With its flexible capabilities, PROFINET is suitable for most automation technology requirements.

Feature Highlights



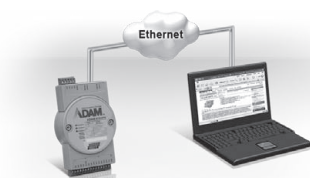
Daisy Chain Connections

Each ADAM-6100 module has two built in Ethernet switches to allow daisy chain connections in an Ethernet network, making it easier to deploy, helping improve scalability and improving resistance against interference common in factory settings.



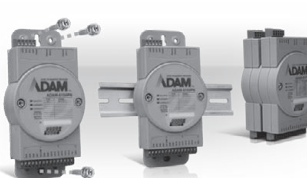
2,500 V_{DC} Isolation Protection

With triple isolation, including power supply, input/output, and Ethernet communication, ADAM-6100 series ensures I/O data to be controlled correctly, and prevents devices from breaking down.



Ethernet-based Configuration Tool

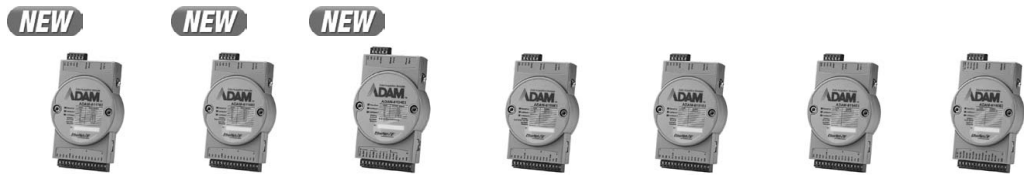
ADAM.NET Utility comes bundled with each ADAM-6100 module. With ADAM.NET Utility, users can configure, set and test ADAM-6100 modules through Ethernet.



Multiple Mounting Mechanisms

Advantech provides versatile mounting methods to fit various demands in the field. ADAM-6100 series supports DIN-rail mounting, wall mounting and piggybacking.

ADAM-6100 Series Selection Guide



Model		ADAM-6117	ADAM-6118	ADAM-6124	ADAM-6150	ADAM-6151	ADAM-6156	ADAM-6160
Interface		10/100 Mbps Ethernet						
Support Protocol		ADAM-6100EI: EtherNet/IP; ADAM-6100PN: PROFINET						
Analog Input	Resolution	16 bits	16 bits	-	-	-	-	-
	Channels	8	7	-	-	-	-	-
	Sampling Rate	10 S/s	10 S/s	-	-	-	-	-
	Voltage Input	±150 mV ±500 mV ±1 V ±5 V ±10 V	±50 mV ±100 mV ±500 mV ±1 V ±2.5 V	-	-	-	-	-
	Current Input	0 ~ 20 mA 4 ~ 20 mA ±20 mA	0 ~ 20 mA 4 ~ 20 mA ±20 mA	-	-	-	-	-
	Direct Sensor Input	-	J, K, T, E, R, S, B Thermocouple	-	-	-	-	-
Analog Output	Resolution	-	-	12 bits	-	-	-	-
	Channels	-	-	4	-	-	-	-
	Current Output	-	-	0~20 mA, 4~20 mA	-	-	-	-
	Voltage Output	-	-	0 ~ 5 V, 0 ~ 10 V, ±5 V, ±10 V	-	-	-	-
Digital Input/Output	Input Channels	-	-	4 (Dry Contact Only)	8	16	-	-
	Output Channels	-	-	-	7	-	16	6-ch power relay
Isolation Protection		2,500 V _{DC}	2,500 V _{DC}	2,500 V _{DC}	2,500 V _{DC}	2,500 V _{DC}	2,500 V _{DC}	2,500 V _{DC}
Connectors		2 x RJ-45 LAN (Daisy Chain) Plug-in screw terminal block (I/O and power)						
Page		17-4	17-4	17-4	17-5	17-5	17-5	17-5

1
Motion Control

2
Hazardous Location

3
Energy Automation

4
Building Automation Systems

5
Automation Software

6
Operator Panels

7
Automation Panel PCs

8
Industrial Monitors

9
Industrial Ethernet

10
Device Servers & Gateways

11
Serial Communication Cards

12
Embedded Auto. Computers

13
PACs

14
M2M I/O

15
Distributed Nano Controllers

16
RS-485 I/O

17
Ethernet I/O

18
DAQ Boards

ADAM-6117

ADAM-6118

ADAM-6124

8-ch Isolated Analog Input Real-time Ethernet Module

7-ch Thermocouple Input Real-time Ethernet Module

4-ch Analog Output Real-time Ethernet Module



ADAM-6117

CE FCC RoHS



ADAM-6118

CE FCC RoHS



ADAM-6124

CE FCC RoHS

Specifications

Analog Input

- Channels 8 (differential)
- Input Impedance > 10 M Ω (voltage)
120 Ω (current)
- Input Type mV, V, mA
- Input Range ± 150 mV, ± 500 mV, ± 1 V
 ± 5 V, ± 10 V, 0~20 mA,
4~20 mA, ± 20 mA
- Span Drift ± 30 ppm/ $^{\circ}$ C
- Zero Drift ± 6 μ V/ $^{\circ}$ C
- Resolution 16-bit with accuracy $\pm 0.1\%$
of FSR (voltage)
 $\pm 0.2\%$ of FSR (current)
- Sampling Rate 12 sample/second (total)
- CMR @ 50/60 Hz 92 dB
- NMR @ 50/60 Hz 60 dB
- High Common Mode 200 V_{DC}

Ordering Information

- ADAM-6117EI 8-ch Isolated AI EtherNet/IP Module
- ADAM-6117PN 8-ch Isolated AI PROFINET Module

Specifications

Analog Input

- Channels 7 (differential)
- Input Impedance > 1 M Ω (voltage)
120 Ω (current)
- Input Type mV, V, mA, Thermocouple
- Temperature Range Type J (-210 ~ 1,200 $^{\circ}$ C),
Type K (-270 ~ 1,372 $^{\circ}$ C),
Type T (-270 ~ 400 $^{\circ}$ C),
Type E (-270 ~ 1,000 $^{\circ}$ C),
Type R (0 ~ 1,768 $^{\circ}$ C),
Type S (0 ~ 1,768 $^{\circ}$ C),
Type B (200 ~ 1,820 $^{\circ}$ C)
- Voltage/Current Range ± 50 mV, ± 100 mV,
 ± 500 mV, ± 1 V, ± 2.5 V,
 ± 20 mA, 0~20 mA,
4~20 mA
- Span Drift ± 30 ppm/ $^{\circ}$ C
- Zero Drift ± 6 μ V/ $^{\circ}$ C
- Resolution 16-bit with accuracy $\pm 0.1\%$
(voltage or T/C)
 $\pm 0.2\%$ (current)
- Sampling Rate 12 sample/second (total)
- CMR @ 50/60 Hz 92 dB
- NMR @ 50/60 Hz 60 dB
- High Common Mode 200 V_{DC}

Ordering Information

- ADAM-6118EI 7-ch Thermocouple Input EtherNet/IP Module
- ADAM-6118PN 7-ch Thermocouple Input PROFINET Module

Specifications

Analog Output

- Channels 4
- Output Impedance 2.1 Ω
- Output Settling Time 20 μ s
- Output Slew Rate 1.0 V/sec
- Output Type V, mA
- Voltage Range 0 ~ 5 V, 0 ~ 10 V, ± 5 V,
 ± 10 V
- Current Range 0~20 mA, 4~20 mA
- Accuracy $\pm 0.1\%$ (Voltage) at 25 $^{\circ}$ C
 $\pm 0.1\%$ (Current) at 25 $^{\circ}$ C
- Resolution 12-bit

Digital Input

- Channels 4
- Input type Dry Contact
(Close to Iso. GND)

Ordering Information

- ADAM-6124EI 4-ch Isolated Analog Output EtherNet/IP Module
- ADAM-6124PN 4-ch Isolated Analog Output PROFINET Module

Common Specifications

General

- LAN 10/100Base-T(X)
- Power Consumption 3 W @ 24 V_{DC}
- Connectors 2 x RJ-45 LAN, (Daisy Chain
Plug-in screw terminal block (I/O and power))
- Watchdog System (1.6 second) and Communication
(programmable)
- Power Input 10 ~ 30 V_{DC}

Protection

- Isolation Protection 2,500 V_{DC}
- Built in TVS/ESD Protection
- Power Reversal Protection

Environment

- Operating Temperature -10 ~ 70 $^{\circ}$ C (14 ~ 158 $^{\circ}$ F)
- Storage Temperature -20 ~ 80 $^{\circ}$ C (-4 ~ 176 $^{\circ}$ F)
- Operating Humidity 20 ~ 95% RH (non-condensing)
- Storage Humidity 0 ~ 95% RH (non-condensing)

ADAM-6150

ADAM-6151/6156

ADAM-6160

15-ch Isolated Digital I/O Real-time Ethernet Module

16-ch Isolated Digital Input/ Digital Output Real-time Ethernet Module

6-ch Relay Real-time Ethernet Module



ADAM-6150/6151/6156



Specifications

Digital Input

- **Channels** ADAM-6150: 8
ADAM-6151: 16
- **Dry Contact** Logic level 0: open
Logic level 1: close to DGND
- **Wet Contact** Logic level 0: 0 ~ 3 V_{DC} or 0 ~ -3 V_{DC}
Logic level 1: 10 ~ 30 V_{DC} or -10 ~ -30 V_{DC}
(Dry/Wet Contact decided by switch)
- **Input Impedance** 10 kΩ
- **Transition Time** From logic level 0 to 1: 0.2 ms
From logic level 1 to 0: 0.2 ms

Digital Output

- **Channels** ADAM-6150: 7
ADAM-6156: 16
- **Output Voltage Range** 8 ~ 35 V_{DC}
- **Normal Output Current** 100 mA (per channel)

Ordering Information

- **ADAM-6150EI** 15-ch Isolated DI/O EtherNet/IP Module
- **ADAM-6151EI** 16-ch Isolated DI EtherNet/IP Module
- **ADAM-6156EI** 16-ch Isolated DO EtherNet/IP Module
- **ADAM-6150PN** 15-ch Isolated DI/O PROFINET Module
- **ADAM-6151PN** 16-ch Isolated DI PROFINET Module
- **ADAM-6156PN** 16-ch Isolated DO PROFINET Module

Common Specifications

General

- **LAN** 10/100Base-T(X)
- **Power Consumption** ADAM-6150: 2.4 W @ 24 V_{DC}
ADAM-6151: 2.4 W @ 24 V_{DC}
ADAM-6156: 2.7 W @ 24 V_{DC}
ADAM-6160: 3.5 W @ 24 V_{DC}
- **Connectors** 2 x RJ-45 LAN, (Daisy Chain)
Plug-in screw terminal block (I/O and power)
- **Watchdog** System (1.6 second) and Communication (programmable)
- **Power Input** 10 ~ 30 V_{DC}



ADAM-6160



Specifications

Relay Output

- **Channels** 5 Form C
1 Form A or B (selectable)
- **Contact Rating** AC: 250 V @ 5 A
DC: 30 V @ 5 A
- **Mechanism** 20,000,000 operations
- **Breakdown Voltage** 500 V_{AC} (50/60 Hz)
- **Relay On Time** 7 ms
- **Relay Off Time** 3 ms
- **Contact Resistance** 30 mΩ (maximum)
- **Insulation Resistance** 1 GΩ (minimum) at 500 V_{DC}

Ordering Information

- **ADAM-6160EI** 6-ch Relay EtherNet/IP Module
- **ADAM-6160PN** 6-ch Relay PROFINET Module

Protection

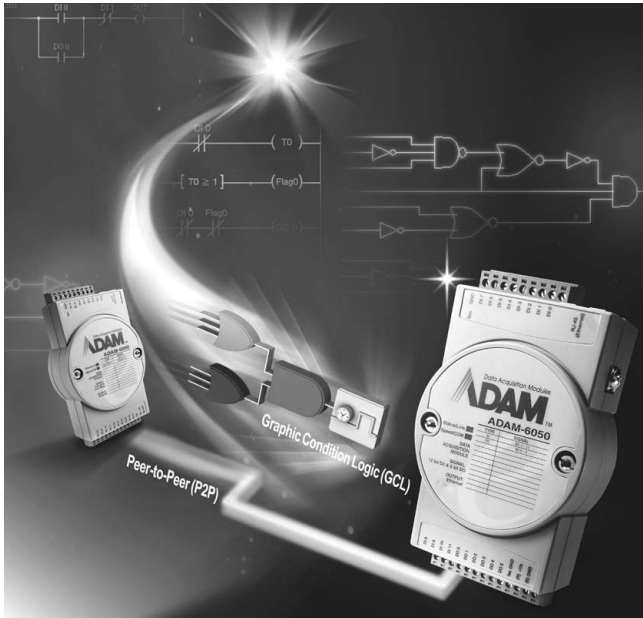
- **Over Voltage Protection** ±35 V_{DC}
- **Isolation Protection** 2,500 V_{DC}
- **Power Reversal Protection**

Environment

- **Operating Temperature** -10 ~ 70°C (14 ~ 158°F)
- **Storage Temperature** -20 ~ 80°C (-4 ~ 176°F)
- **Operating Humidity** 20 ~ 95% RH (non-condensing)
- **Storage Humidity** 0 ~ 95% RH (non-condensing)
0 ~ 95% RH (non-condensing)

- 1 Motion Control
- 2 Hazardous Location
- 3 Energy Automation
- 4 Building Automation Systems
- 5 Automation Software
- 6 Operator Panels
- 7 Automation Panel PCs
- 8 Industrial Monitors
- 9 Industrial Ethernet
- 10 Device Servers & Gateways
- 11 Serial Communication Cards
- 12 Embedded Auto. Computers
- 13 PACs
- 14 M2M I/O
- 15 Distributed Nano Controllers
- 16 RS-485 I/O
- 17 Ethernet I/O
- 18 DAQ Boards

ADAM-6000 Series



Features

- Ethernet-based smart I/O
- Mixed I/O in single module
- Pre-built HTTP server and web pages in each module
- Active I/O message by data stream or event trigger function
- Industrial Modbus/TCP protocol
- Easily update firmware through Ethernet
- ADAM.NET Class Library for .NET application
- Intelligent control ability by Peer-to-Peer and GCL function

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. 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 offers ideal remote I/O solutions with Internet protocols for industrial automation environments.

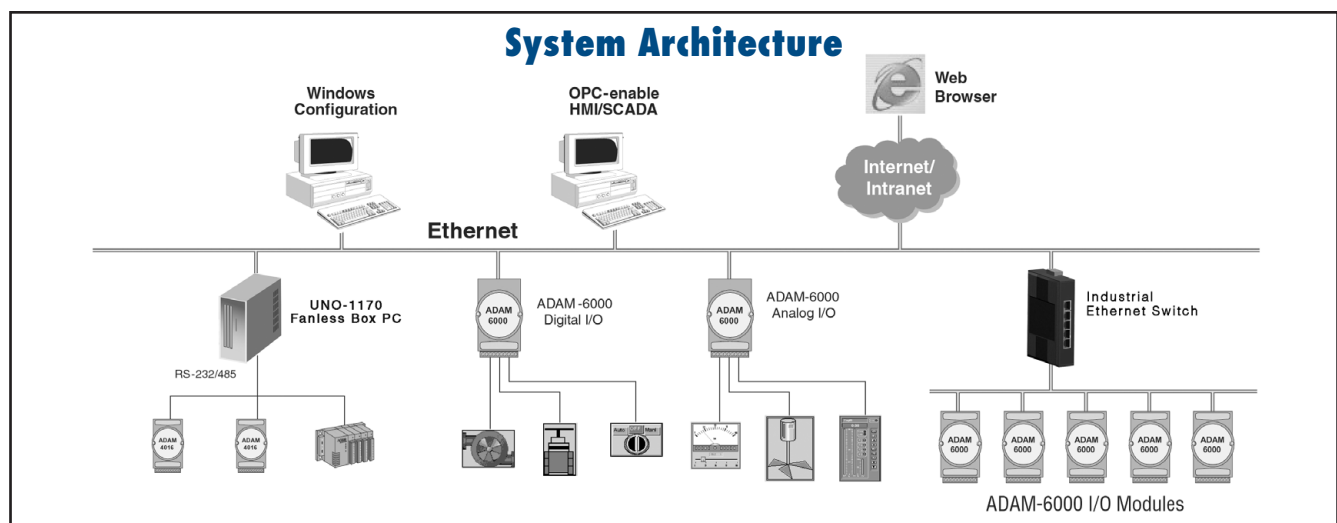
ADAM-6000 firmware features a built-in Modbus/TCP server. Advantech provides the ADAM.NET Utility, ADAM.NET class library and OPC Server for the ADAM-6000 series to support these functions as well. Users can configure DA&C systems via ADAM.NET Utility and integrate it with an HMI software package via Modbus/TCP driver or Modbus/TCP OPC Server. Furthermore, users can easily use the ADAM.NET class library to develop their own applications.

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 series 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 series can be fully integrated with standard HMI software which supports Modbus/TCP.



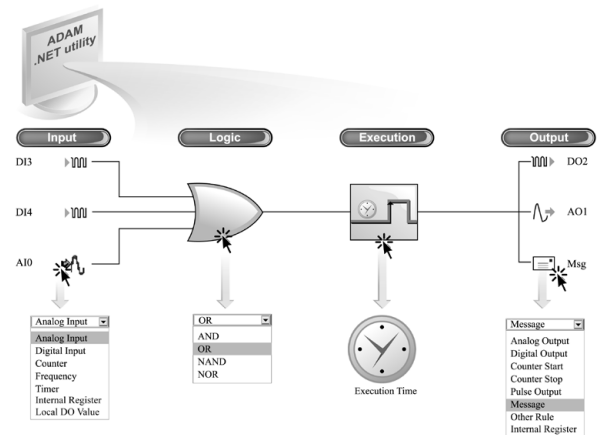
ADAM-6000 Features: GCL

Using Ethernet I/O Modules as Controllers

What is GCL?

GCL (Graphic Condition Logic) gives Ethernet I/O modules control ability. Users can define the control logic rules using graphic configuration environment in ADAM.NET Utility, and download defined logic rules to ADAM-6000 Ethernet I/O modules. Then, that Ethernet I/O module will execute the logic rules automatically just like a standalone controller.

For each Ethernet I/O module, 16 logic rules can be defined. In the configuration environment of ADAM.NET Utility, 4 graphic icons shows the 4 stages of one logic rule: Input, Logic, Execution and Output (Refer to figure below). Users can simply click on each icon and one dialog window will pop-up for users to configure each stage. After completing all configurations, users can click one button to download the defined logic rules to the specific Ethernet I/O module.



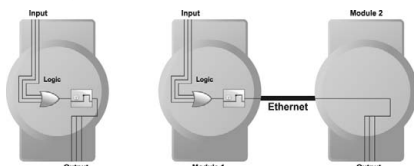
ADAM-6000 GCL is the Simplest Logic Ethernet I/O

Complete Graphic Configuration Environment

Unlike other text-based logic configuration utility, Advantech GCL provides a complete graphic configuration utility, which is very intuitive to use. By simply clicking the icons, all related configurations can be done through the pop-up dialog window. GCL is not only easy-to-use, but is also features very powerful functionality.

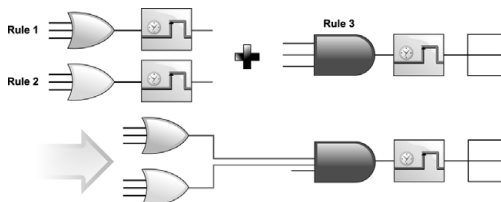
Supports Both Local and Remote Output

When users defines the destination of Output stage (such as digital output, analog output, counter and pulse output), users can choose either local module or other remote module as target.



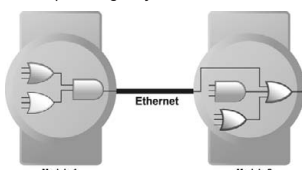
Cascade Logic

The output of one logic rule can be another rule. Therefore, different rules can be combined together. GCL provides this kind of functionality called Cascade Logic. It helps to create more input number of logic rule. For example, if users combine rule 1 and rule 2 with rule 3, the maximum inputs become 7 inputs. (Two inputs of rule 3 will be rule 1 and rule 2. Refer to figure below.) So users can define complex logic architecture to satisfy various application requirements.



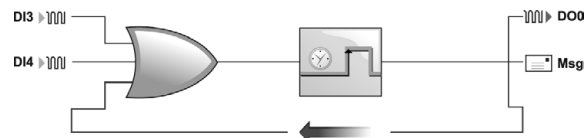
Distributed Cascade Logic

Users can assign other rule as output of one logic rule. In fact, that "Other Rule" can be on the same module, or on another remote module. So, one GCL logic architecture can operate across different modules. Several Ethernet I/O modules can be integrated into one complete logic system.



Feedback

Users can assign input and output of logic rule to the same internal register. This gives GCL feedback ability. No hardware wiring is needed.



Rich I/O Options

Analog Input	Thermocouple, RTD, Voltage, Current
Analog Output	Voltage, Current
Digital Input	Dry Contact, Wet Contact, Counter/Frequency input
Digital Output	Sink, Source, Relay output, Pulse output

Fast Execution Time

Advantech GCL features extremely short logic rule execution time in the market. When users choose local output (input and output channel are on the same module), the processing time (including hardware input delay time, one logic rule execution time and hardware output delay time) is less than 1 millisecond. When users choose remote output (input and output channel are on different modules), the total time needed (including processing and communication time) is less than 3 milliseconds.

Analog Input Scaling

When configuring analog input condition, GCL provides linear scaling function to convert measured voltage/current value to its engineer unit value (such as temperature or pressure unit). Then users can use the engineer unit value to define the logic condition, and it is more intuitive for users.

Online Monitoring

After users complete all GCL configurations in ADAM.NET Utility, they can simply click the "Run Monitoring" button. Then users can see real-time execution workflow of logic rule on ADAM-6000 modules. Beside, current input values will also be displayed. This greatly helps users to maintain the system easily.

Sending Messages

In GCL, you can define your customized message. When conditions are satisfied, message, module's IP and I/O status will be sent to defined PC or device.

Local DO Status Can be Input Condition

In GCL, you can read the local DO channel value and use it in the input condition. So you can define logic rule based on the local DO status.

- 1 Motion Control
- 2 Hazardous Location
- 3 Energy Automation
- 4 Building Automation Systems
- 5 Automation Software
- 6 Operator Panels
- 7 Automation Panel PCs
- 8 Industrial Monitors
- 9 Industrial Ethernet
- 10 Device Servers & Gateways
- 11 Serial Communication Cards
- 12 Embedded Auto. Computers
- 13 PACs
- 14 M2M I/O
- 15 Distributed Nano Controllers
- 16 RS-485 I/O
- 17 Ethernet I/O
- 18 DAQ Boards

ADAM-6000 Features: Peer-to-Peer

Requirements

One of our clients has three branches across multiple countries. For each branch, cameras were installed near the gates. At the headquarters, people in the control room can monitor each gate via Intranet. Now they want to enhance the system to remotely control each gate, so that each gate can be controlled from inside the control room of the headquarters. Since the distance between the headquarters and each branch is thousands of miles away, it may be very difficult to establish extra communication network for this purpose.

Solution

Through 3 pairs of Advantech ADAM-6000 Peer-to-Peer Ethernet I/O modules (without any additional hardware), this application has been easily solved. For each pair of ADAM-6000 modules, one module is inside control room of headquarters, and another is located at each branch. When the module in headquarters is activated, it will notify its paired module at the branch to open or close the gate. The communication is Ethernet-based, so that our clients can leverage their existing Ethernet infrastructure.

What is Peer-to-Peer?

Unlike client / server mode, Peer-to-Peer enabled modules will actively update input channel status to specific output channel. There will be a pair of module: one input module and one output module. Users can define the mapping between input channel and output channel. Then the input value will be transferred to the output channel actively.



What Benefits Do Peer-to-Peer Modules Provide?

No Controller Required

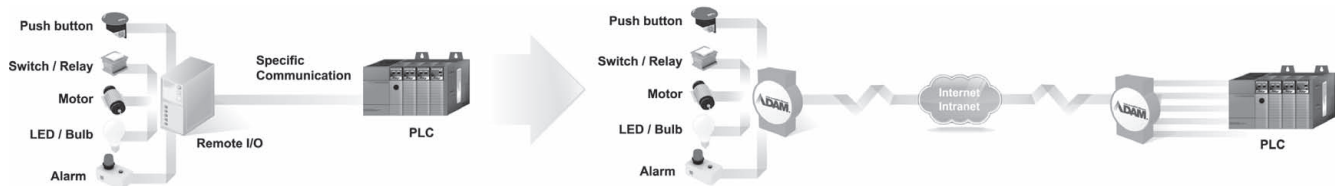
For Ethernet I/O modules without Peer-to-Peer functionality, a controller is needed to read data from the input module and then send data to the output module. With Peer-to-Peer solutions, the controller can be removed since data will automatically transfer. This not only simplifies the process, but also helps save system hardware costs.

No Programming Required

To utilize Peer-to-Peer modules, the only thing required is to configure related setting through ADAM .NET Utility. No additional programming effort is needed, that it helps to save system development time.

Simple and Flexible System Wiring

Long distance wiring can easily become a nightmare. For some automation applications, if the PLC and the sensors are far away, one remote I/O module needs to be located near the sensors, and a proprietary communication network needs to connect the PLC and the remote I/O module, and the communications distance is severely limited. Moreover, networks provided by PLC manufacturers are rarely open. Peer-to-Peer modules can replace limited and closed networks with no limitations since they leverage the most open and flexible Ethernet networks.



Why is Advantech's Peer-to-Peer Technology the Best Choice?

Flexible Channel Mapping

ADAM-6000 Peer-to-Peer modules provide two modes: Basic and Advanced. For Basic mode, channels on one input module are directly mapped to channels on another single output module. For Advanced mode, channels on one input module can be mapped to channels on different output modules. (Refer to figure below)

Fast Response Time

Advantech Peer-to-Peer modules feature excellent execution performance in market. The execution time to transfer data from input to output module is less than 1.2 millisecond.

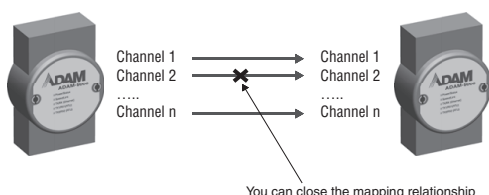
Advanced Security

When engineers use Peer-to-Peer modules, they don't want it to be controlled by non-authorized computers or devices. ADAM-6000 Peer-to-Peer module lets users decide which IP or MAC address has control authority. This can make sure the output module is only controlled by its paired input module.

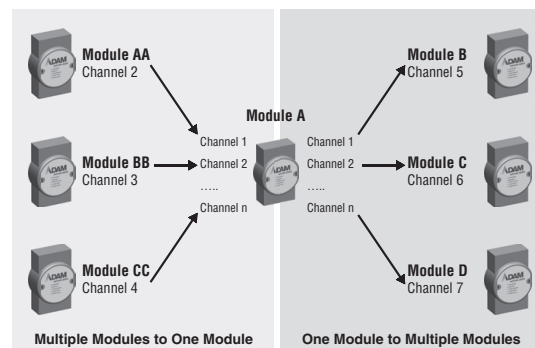
Advanced Reliability

When communication between a pair of ADAM-6000 Peer-to-Peer modules is broken, the digital output module can generate pre-defined value to ensure safety.

ADAM-6000 P2P Mode: Basic Mode



ADAM-6000 P2P Mode: Advanced Mode



ADAM-6000 Series Selection Guide



Spec.		Model	ADAM-6015	ADAM-6017	ADAM-6018	ADAM-6022	ADAM-6024
Interface			10/100 Mbps Ethernet				
Peer-to-Peer ¹			Yes			No	Receiver Only ²
GCL ¹			Yes			No	Receiver Only ²
Resolution			16 bit			16 bit for AI 12 bit for AO	16 bit for AI 12 bit for AO
Analog Input	Channels		7	8	8	6	6
	Sampling Rate		10 S/s				
	Voltage Input		-	±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
	Direct Sensor Input		Pt, Balco and Ni RTD	-	J, K, T, E, R, S, B Thermocouple	-	-
	Burn-out Detection		Yes	-	Yes	-	-
	Math. Functions		Max. Min. Avg.	Max. Min. Avg.	Max. Min. Avg.	-	-
Analog Output	Channels		-	-	-	2	2
	Current Output		-	-	-	0 ~ 20 mA, 4 ~ 20 mA with 15 V _{DC}	0 ~ 20 mA, 4 ~ 20 mA with 15 V _{DC}
	Voltage Output		-	-	-	0 ~ 10 V _{DC} with 30 mA	0 ~ 10 V _{DC} with 30 mA
Digital Input/ Output	Input Channels		-	-	-	2	2
	Output Channels		-	2 (Sink)	8 (Sink)	2 (Sink)	2 (Sink)
	Extra Counter Channels		-	-	-	-	-
	Counter Input		-	-	-	-	-
	Frequency Input		-	-	-	-	-
	Pulse Output		-	-	-	-	-
High/Low Alarm Settings			Yes	Yes	Yes	-	-
Isolation Protection			2,000 V _{DC}			2,000 V _{DC} ³	2,000 V _{DC} ³
Remark			-	-	-	Built-in Dual Loop PID Control Algorithm	-
Page			17-10	17-10	17-10	online	online



Spec.		Model	ADAM-6050	ADAM-6051	ADAM-6052	ADAM-6060	ADAM-6066
Interface			10/100 Mbps Ethernet				
Peer-to-Peer ¹			Yes				
GCL ¹			Yes				
Digital Input/ Output	Input Channels		12	12	8	6	6
	Output Channels		6 (Sink)	2 (Sink)	8 (Source)	6-channel relay	6-channel power relay
	Extra Counter Channels		-	2	-	-	-
	Counter Input		3 kHz	4.5 kHz	3 kHz	3 kHz	3 kHz
	Frequency Input		3 kHz	4.5 kHz	3 kHz	3 kHz	3 kHz
	Pulse Output		-	-	Yes	-	-
	High/Low Alarm Settings		-	-	-	-	-
Isolation Protection			2,000 V _{DC}				
Page			17-11	17-11	17-11	17-12	17-12

Note 1: Peer-to-Peer and GCL cannot run simultaneously, only one feature is enabled at one time.

Note 2: ADAM-6024 can only act as a receiver and generate analog output when using Peer-to-Peer or GCL.

Note 3: Only for analog input and analog output channels.

- 1 Motion Control
- 2 Hazardous Location
- 3 Energy Automation
- 4 Building Automation Systems
- 5 Automation Software
- 6 Operator Panels
- 7 Automation Panel PCs
- 8 Industrial Monitors
- 9 Industrial Ethernet
- 10 Device Servers & Gateways
- 11 Serial Communication Cards
- 12 Embedded Auto. Computers
- 13 PACs
- 14 M2M I/O
- 15 Distributed Nano Controllers
- 16 RS-485 I/O
- 17 Ethernet I/O
- 18 DAQ Boards

ADAM-6015 ADAM-6017 ADAM-6018

7-ch Isolated RTD Input Modbus TCP Module
8-ch Isolated Analog Input Modbus TCP Module with 2-ch DO
8-ch Isolated Thermocouple Input Modbus TCP Module with 8-ch DO



ADAM-6015



ADAM-6017



ADAM-6018



Specifications

Analog Input

- Channels 7 (differential)
- Input Impedance > 10 M Ω
- Input Connections 2 or 3 wire
- Input Type Pt, Balco and Ni RTD
- RTD Types and Temperature Ranges

Pt 100	-50°C ~ 150°C
	0°C ~ 100°C
	0°C ~ 200°C
	0°C ~ 400°C
	-200°C ~ 200°C
Pt 1000	-40°C ~ 160°C

 Supports both IEC 60751 ITS90 (0.03851 W/W/°C) and JIS C 1604 (0.03916 W/W/°C)
- Balco 500 -30°C ~ 120°C
- Ni 518 -80°C ~ 100°C
- 0°C ~ 100°C
- Accuracy $\pm 0.1\%$
- Span Drift ± 25 ppm/°C
- Zero Drift ± 6 μ V/°C
- Wire Burn-out Detection

Ordering Information

- ADAM-6015 7-ch Isolated RTD Input Modbus TCP Module

Specifications

Analog Input

- Channels 8 (differential)
- Input Impedance > 10 M Ω (voltage)
120 Ω (current)
- Input Type mV, V, mA
- Input Range ± 150 mV, ± 500 mV, ± 1 V
 ± 5 V, ± 10 V, 0-20 mA, 4-20 mA
- Accuracy $\pm 0.1\%$ (voltage)
 $\pm 0.2\%$ (current)
- Span Drift ± 25 ppm/°C
- Zero Drift ± 6 μ V/°C

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 Isolated AI with 2-ch DO Modbus TCP Module

Specifications

Analog Input

- Channels 8 (differential)
- Input Impedance > 10 M Ω
- Input Type Thermocouple
- Thermocouple Type and Range:

J	0 ~ 760°C
K	0 ~ 1,370°C
T	-100 ~ 400°C
E	0 ~ 1,000°C
R	500 ~ 1,750°C
S	500 ~ 1,750°C
B	500 ~ 1,800°C
- Accuracy $\pm 0.1\%$
- Span Drift ± 25 ppm/°C
- Zero Drift ± 6 μ V/°C
- Wire Burn-out Detection

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 Isolated Thermocouple Input Modbus TCP Module w/ 8-ch DO

Common Specifications

General

- LAN 10/100Base-T(X)
- Power Consumption 2 W @ 24 V_{DC}
- Connectors 1 x RJ-45 (LAN), Plug-in screw terminal block (I/O and power)
- Watchdog System (1.6 second) and Communication (programmable)
- Power Input 10 ~ 30 V_{DC}
- Supports Peer-to-Peer

- Supports GCL
- Supports Modbus/TCP, TCP/IP, UDP and HTTP Protocols

Analog Input

- Resolution 16-bit
- Sampling Rate 10 sample/second (total)
- CMR @ 50/60 Hz 90 dB
- NMR @ 50/60 Hz 60 dB

Protection

- Over Voltage Protection ± 35 V_{DC}
- Isolation Protection 2,000 V_{DC}

- Built-in TVS/ESD Protection
- Power Reversal Protection

Environment

- Operating Temperature -10 ~ 70°C (14 ~ 158°F)
- Storage Temperature -20 ~ 80°C (-4 ~ 176°F)
- Operating Humidity 20 ~ 95% RH (non-condensing)
- Storage Humidity 0 ~ 95% RH (non-condensing)

ADAM-6050 ADAM-6051 ADAM-6052

18-ch Isolated Digital I/O Modbus TCP Module
14-ch Isolated Digital I/O Modbus TCP Module with 2-ch Counter
16-ch Source-type Isolated Digital I/O Modbus TCP Module



ADAM-6050



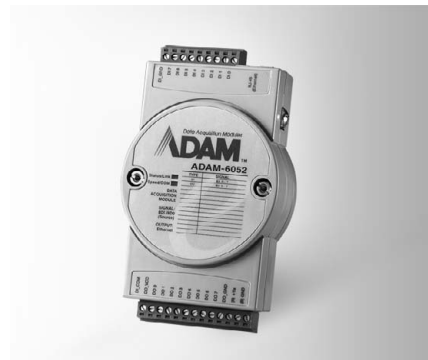
CE FCC



ADAM-6051



CE FCC



ADAM-6052



CE FCC



Specifications

Digital Input

- **Channels** 12
- **Dry Contact** Logic level 0: close to GND
Logic level 1: open
- **Wet Contact** Logic level 0: 0 ~ 3 V_{DC}
Logic level 1: 10 ~ 30 V_{DC}
- **Supports 3 kHz Counter Input (32-bit + 1-bit overflow)**
- **Keep/Discard Counter Value when Power-off**
- **Supports 3 kHz Frequency Input**
- **Supports Inverted DI Status**

Digital Output

- **Channels** 6 (sink type), open collector to 30 V, 100 mA maximum load
- **Supports 5 kHz Pulse Output**
- **Supports High-to-Low and Low-to-High Delay Output**

Ordering Information

- **ADAM-6050** 18-ch Isolated DI/O Modbus TCP Module

Specifications

Digital Input

- **Channels** 12
- **Dry Contact** Logic level 0: close to GND
Logic level 1: open
- **Wet Contact** Logic level 0: 0 ~ 3 V_{DC}
Logic level 1: 10 ~ 30 V_{DC}
- **Supports 3 kHz Counter Input (32-bit + 1-bit overflow)**
- **Keep/Discard Counter Value when Power-off**
- **Supports 3 kHz Frequency Input**
- **Supports Inverted DI Status**

Counter Input

- **Channels** 2
- **Mode** Counter, Frequency
- **Keep/Discard Counter Value when Power-off** 4,294,967,295 (32-bit + 1-bit overflow)
- **Maximum Count**
- **Input Frequency** Frequency Mode: 0.2 ~ 4500 Hz
Counter Mode: 0 ~ 4.5 kHz

Digital Output

- **Channels** 2 (sink type), open collector to 30 V, 100 mA maximum load
- **Supports 5 kHz Pulse Output**
- **Supports High-to-Low and Low-to-High Delay Output**

Ordering Information

- **ADAM-6051** 16-ch Isolated DI/O with Counter Modbus TCP Module

Specifications

Digital Input

- **Channels** 8
- **Dry Contact** Logic level 0: close to GND
Logic level 1: open
- **Wet Contact** Logic level 0: 0 ~ 3 V_{DC}
Logic level 1: 10 ~ 30 V_{DC}
- **Supports 3 kHz Counter Input (32-bit + 1-bit overflow)**
- **Keep/Discard Counter Value when Power-off**
- **Supports 3 kHz Frequency Input**
- **Supports Inverted DI Status**

Digital Output

- **Channels** 8 (Source Type)
- **Voltage Range** 10 ~ 35 V_{DC}
- **Current** 1 A (per channel)
- **Supports 5 kHz Pulse Output**
- **Supports High-to-Low and Low-to-High Delay Output**
- **Supports Over Current Protection**

Ordering Information

- **ADAM-6052** 16-ch Source-type Isolated DI/O Modbus TCP Module

Common Specifications

General

- **LAN** 10/100Base-T(X)
- **Power Consumption** 2 W @ 24 V_{DC}
- **Connectors** 1 x RJ-45 (LAN), Plug-in screw terminal block (I/O and power)
- **Watchdog** System (1.6 second) and Communication (programmable)

- **Power Input** 10 ~ 30 V_{DC}
- **Supports Peer-to-Peer**
- **Supports GCL**
- **Supports Modbus/TCP, TCP/IP, UDP and HTTP Protocol**

Protection

- **Power Reversal Protection**
- **Isolation Protection** 2,000 V_{DC}

Environment

- **Operating Temperature** -10 ~ 70°C (14 ~ 158°F)
- **Storage Temperature** -20 ~ 80°C (-4 ~ 176°F)
- **Operating Humidity** 20 ~ 95% RH (non-condensing)
- **Storage Humidity** 0 ~ 95% RH (non-condensing)

- 1 Motion Control
- 2 Hazardous Location
- 3 Energy Automation
- 4 Building Automation Systems
- 5 Automation Software
- 6 Operator Panels
- 7 Automation Panel PCs
- 8 Industrial Monitors
- 9 Industrial Ethernet
- 10 Device Servers & Gateways
- 11 Serial Communication Cards
- 12 Embedded Auto. Computers
- 13 PACs
- 14 M2M I/O
- 15 Distributed Nano Controllers
- 16 RS-485 I/O
- 17 Ethernet I/O
- 18 DAQ Boards

ADAM-6060

ADAM-6066

**6-ch Digital Input and 6-ch Relay
Modbus TCP Module**

**6-ch Digital Input and 6-ch Power Relay
Modbus TCP Module**



ADAM-6060

ADAM-6066



Specifications

General

- LAN 10/100Base-T(X)
- Power Consumption 2 W @ 24 V_{DC} (ADAM-6060)
2.5 W @ 24 V_{DC} (ADAM-6066)
- Connectors 1 x RJ-45 (LAN), Plug-in screw terminal block (I/O and power)
- Watchdog Timer System (1.6 second) and Communication (programmable)
- Power Input 10 ~ 30 V_{DC}
- Supports Peer-to-Peer
- Supports GCL
- Supports Modbus/TCP, TCP/IP, UDP and HTTP Protocols

Digital Input

- Channels 6
- Dry Contact Logic level 0: close to GND
Logic level 1: open
- Wet Contact Logic level 0: 0 ~ 3 V_{DC}
Logic level 1: 10 ~ 30 V_{DC}
- Supports 3 kHz Counter Input (32-bit + 1-bit overflow)
- Keep/Discard Counter Value when Power-off
- Supports 3 kHz Frequency Input
- Supports Inverted DI Status

Relay Output (Form A)

- Channels 6
- Contact Rating (Resistive) ADAM-6060: 120 V_{AC} @ 0.5 A
30 V_{DC} @ 1 A
ADAM-6066: 250 V_{AC} @ 5 A
30 V_{DC} @ 3 A
- Breakdown Voltage 500 V_{AC} (50/60 Hz)
- Relay On Time 7 ms
- Relay Off Time 3 ms
- Total Switching Time 10 ms
- Insulation Resistance 1 GΩ min. at 500 V_{DC}
- Maximum Switching Rate (at rated load) 20 operations/minute
- Supports Pulse Output

Protection

- Isolation Voltage 2,000 V_{DC}
- Power Reversal Protection

Environment

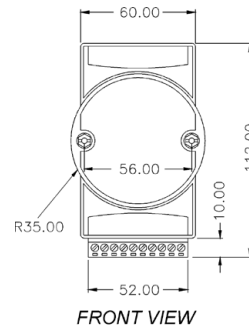
- Operating Temperature -10 ~ 70°C (14 ~ 158°F)
- Storage Temperature -20 ~ 80°C (-4 ~ 176°F)
- Operating Humidity 20 ~ 95% RH (non-condensing)
- Storage Humidity 0 ~ 95% RH (non-condensing)

Ordering Information

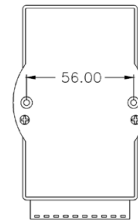
- ADAM-6060 6-ch DI and 6-ch Relay Modbus TCP Module
- ADAM-6066 6-ch DI and 6-ch Power Relay Modbus TCP Module

ADAM-6000 Series Dimensions

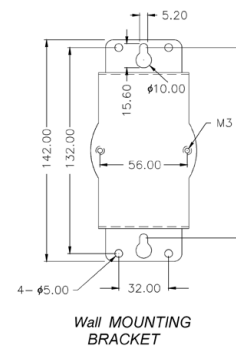
Unit: mm



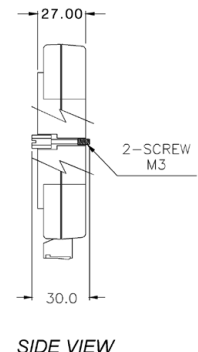
FRONT VIEW



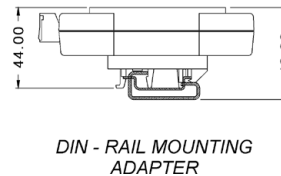
REAR VIEW



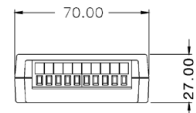
Wall MOUNTING BRACKET



SIDE VIEW



DIN - RAIL MOUNTING ADAPTER



TOP VIEW

ADAM-6000 Series Common Specifications

General

- Dimension (W x H x D) 70 x 120 x 30 mm
- Enclosure ABS+PC
- Mounting DIN 35 rail, stack, wall