

User Manual



ADAM-6100EI Series

EtherNet/IP I/O Modules

ADVANTECH

eAutomation

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4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

FCC Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (OS, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.

Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. **DO NOT COVER THE OPENINGS.**
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
 15. The power cord or plug is damaged.
 16. Liquid has penetrated into the equipment.
 17. The equipment has been exposed to moisture.
 18. The equipment does not work well, or you cannot get it to work according to the user's manual.
 19. The equipment has been dropped and damaged.
 20. The equipment has obvious signs of breakage.
21. **DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.**
22. **CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.**
23. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

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Chapter 1

Overview

1.1 Introduction

ADAM-6100EI is a series of EtherNet/IP remote I/O modules. EtherNet/IP protocol is very popular in industrial automation applications and all ADAM-6100EI series modules can comply with it. You can easily connect ADAM-6100EI modules to EtherNet/IP masters, like Allen-Bradley PLC, through EtherNet/IP protocol. ADAM-6100EI series module supports **Initial mode** and **Normal mode (EtherNet/IP mode)**, that you can set by the DIP switch on the side of ADAM module. Refer to Section 1.3.3 for how to configure it. When you configure the mode as **Initial mode**, you can configure ADAM-6100EI module's IP address and related setting by Advantech APAX/ADAM.Net utility. When you configure the mode as **Normal mode**, ADAM-6100EI modules are ready to communicate with EtherNet/IP master by EtherNet/IP protocol.

1.2 System Architecture

ADAM-6100EI series modules can be daisy-chained in an Ethernet network, making it easier to deploy, and helping improve scalability. You can refer to the figure below to see how a daisy-chain connection works in the network.

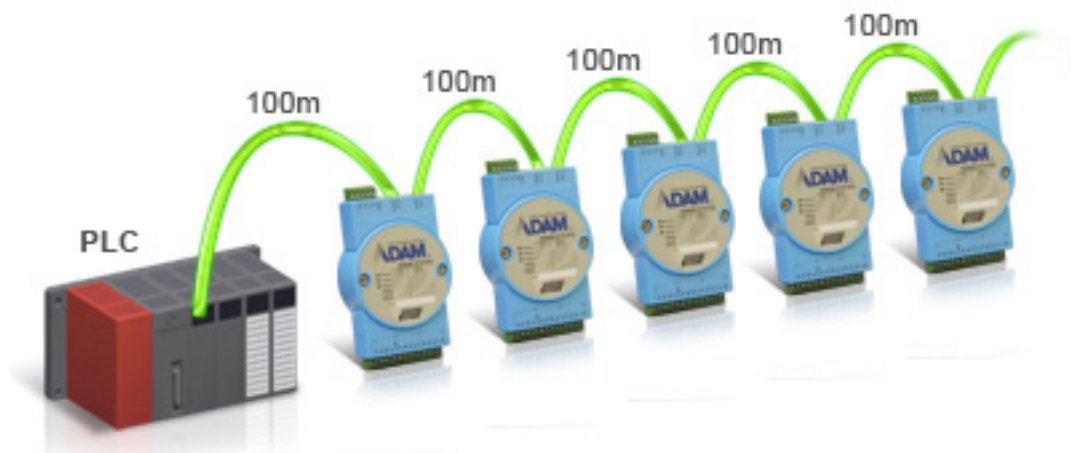


Figure 1.1 ADAM-6100EI Daisy Chain Connections

1.3 Features

1.3.1 Daisy Chain Connection

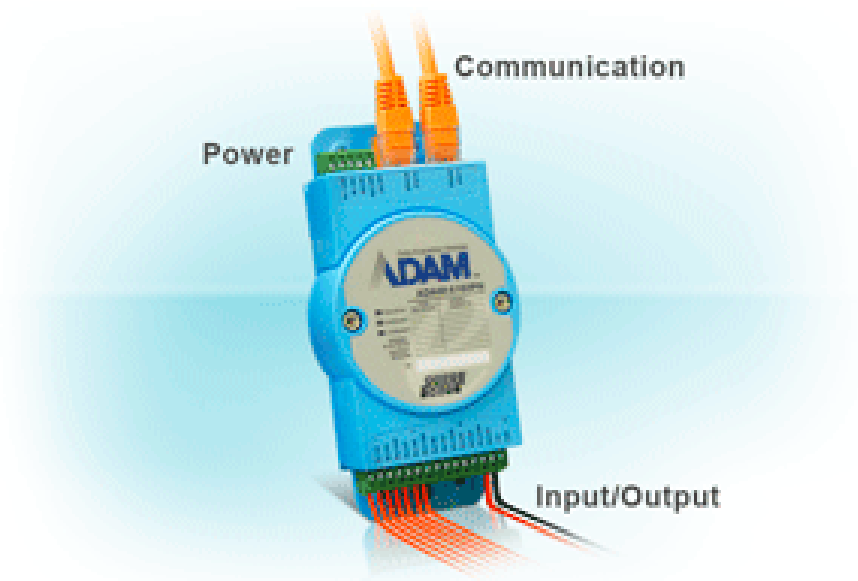
ADAM-6100EI module has built in Ethernet switches to allow daisy chain connections in an Ethernet network, making it easier to deploy, and helping improve scalability. The two Ethernet ports are fully compliant with IEEE 802.3u 10/100Mbps through standard RJ-45 connectors.



Pin	Assignment	Description
1	TD +	Transmit +
2	TD -	Transmit -
3	RD +	Receive +
4	N/C	not used
5	N/C	not used
6	RD -	Receive -
7	N/C	not used
8	N/C	not used

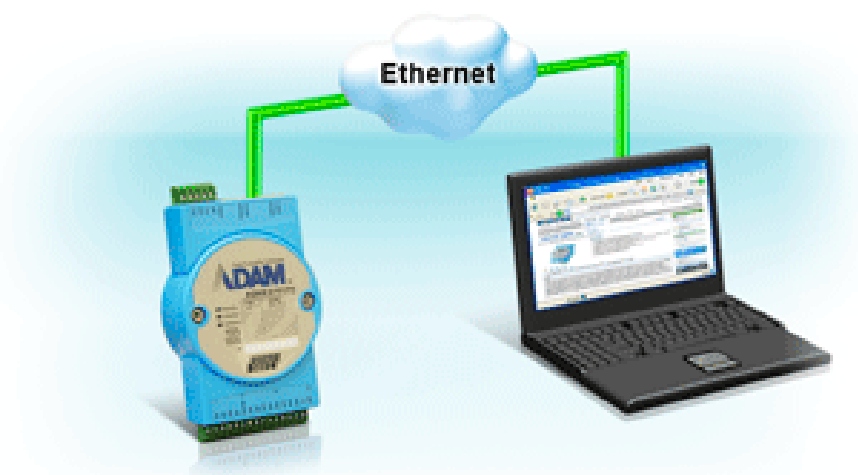
1.3.2 2,500V Isolation Protection

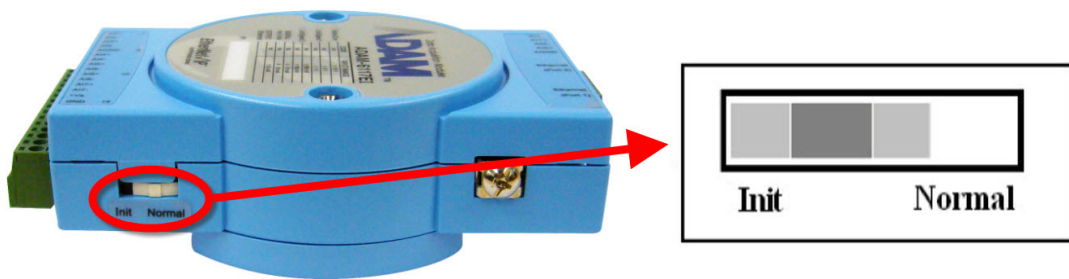
With triple isolation, including power supply, input/output, and Ethernet communication, ADAM-6100EI series ensures I/O data to be controlled correctly, and prevents devices from breaking down.



1.3.3 Ethernet-based Configuration Tool

You can configure ADAM-6100EI module as Initial mode or Normal mode by the DIP switch in the side of each module. Refer to figure below for how to configure it. When ADAM-6100EI module is set as Initial mode, you can use ADAM.Net utility to configure and test the module via Ethernet connection between PC and the module. This can ensure the ADAM-6100EI module is set properly and is working correctly before connecting it to an EtherNet/IP network. When ADAM-6100EI module is set as Normal mode, it can directly communicate with EtherNet/IP master device such as Allen-Bradley PLC by EtherNet/IP protocol.





Note! The default mode is the utility mode.



Chapter 2

Product Specifications

2.1 Digital I/O Modules

2.1.1 Overview

The ADAM-6150EI, ADAM-6151EI and ADAM-6156EI are a series of isolated digital I/O modules which support the EtherNet/IP protocol. According to the channel number difference, you can choose the best digital I/O modules for your application.

- ADAM-6150EI: 8-ch isolated digital input and 7-ch isolated digital output module
- ADAM-6151EI: 16-ch isolated digital input module
- ADAM-6156EI: 16-ch isolated digital output module



Figure 2.1 ADAM-6150EI



Figure 2.2 ADAM-6151EI



Figure 2.3 ADAM-6156EI

2.1.2 Specifications

Digital Input

- Channels:
 - ADAM-6150EI: 8
 - ADAM-6151EI: 16
- Dry Contact:
 - Logic level 0: Open
 - Logic level 1: Close to Ground
- Wet Contact:
 - Logic level 0: $0 \sim 3 V_{DC}$
 - Logic level 1: $10 \sim 30 V_{DC}$
- Input Impedance: 10 kohm
- Transition Time: 0.2 ms

Digital Output

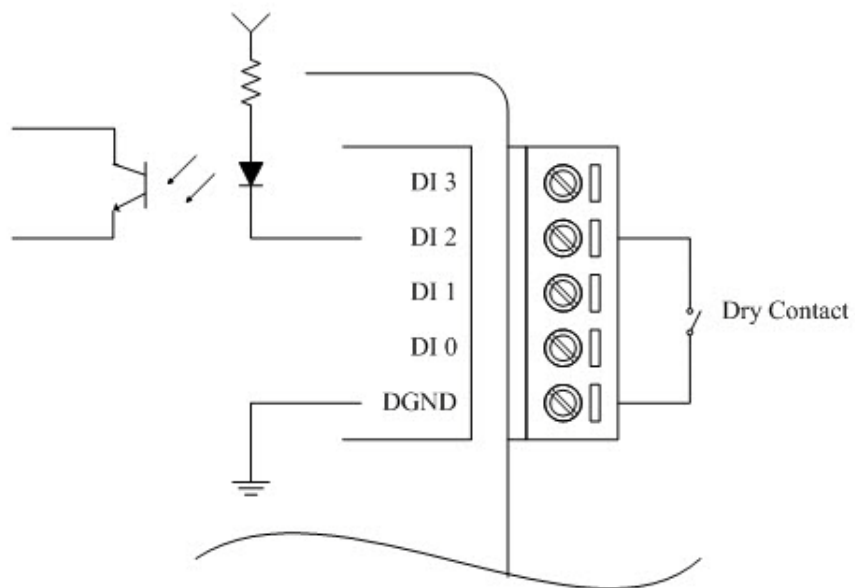
- Channels:
 - ADAM-6150EI: 7
 - ADAM-6156EI: 16
- Output Voltage Range: $8 \sim 35 V_{DC}$
- Normal Output Current: 100 mA (per channel)

General

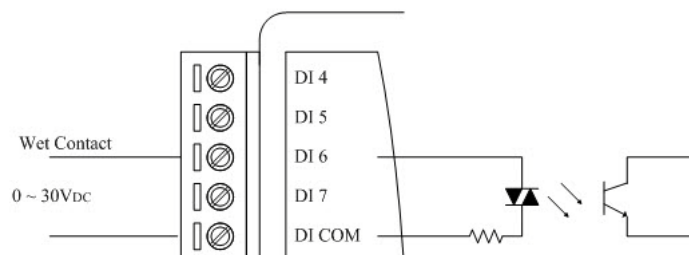
- Communication: 10/100 Base-T Ethernet
- Supports Protocol: EtherNet/IP
- Power Input: Unregulated 10 ~ 30 V_{DC}
- Power Consumption: 2.4 W @ 24 V_{DC}
- Power Reversal Protection
- Operating Humidity: 20 ~ 95% RH (non-condensing)
- Storage Humidity: 0 ~ 95% RH (non-condensing)
- Operating Temperature: -10 ~ 70° C
- Storage Temperature: -20 ~ 80° C

2.1.3 Application Wiring

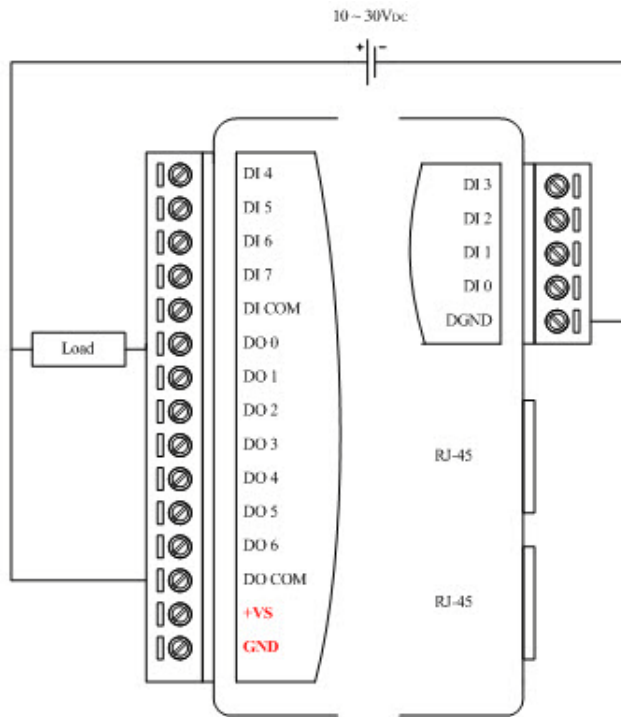
Isolated Digital Input - Dry Contact



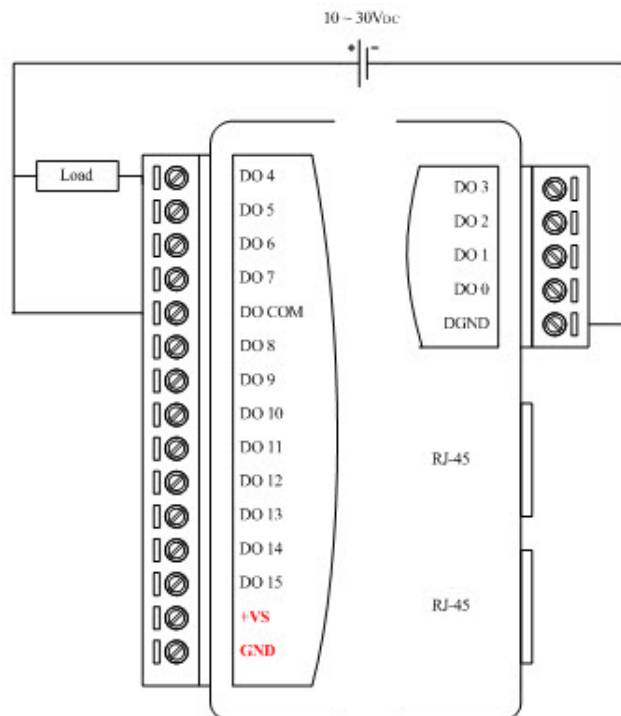
Isolated Digital Input - Wet Contact



Isolated Digital Output (ADAM-6150EI)



Isolated Digital Output (ADAM-6156EI)



2.2 Relay Modules

2.2.1 Overview

The ADAM-6160EI is a relay module which supports EtherNet/IP protocol. It provides six Form C relay channels and is excellent for ON/OFF control or low-power switching applications in an EtherNet/IP system.

- ADAM-6160EI: 6-ch Relay Module



Figure 2.4 ADAM-6160EI

2.2.2 Specifications

Relay

- Channels: 6 Form C
- Contact Rating:
 - AC: 250 V @ 5 A
 - DC: 30 V @ 5 A
- Breakdown Voltage:
 - 500 VAC (50/60 Hz)
- Mechanism: 20,000,000 operations
- Relay on time: 7 ms
- Relay off time: 3 ms
- Contact Resistance: 30 mΩ (max.)
- Insulation Resistance: 1 GΩ at 500 V_{DC}

General

- Communication: 10/100 Base-T Ethernet
- Supports Protocol: Ethernet/IP
- Power Input: Unregulated 10 ~ 30 V_{DC}
- Power Consumption: 3.5 W @ 24 V_{DC}
- Power Reversal Protection
- Operating Humidity: 20 ~ 95% RH (non-condensing)
- Storage Humidity: 0 ~ 95% RH (non-condensing)
- Operating Temperature: -10 ~ 70°C
- Storage Temperature: -20 ~ 80°C

2.3 Analog I/O Modules

2.3.1 ADAM-6117EI: 8-ch Isolated Analog Input Module

2.3.1.1 Overview

The ADAM-6117EI is a 16-bit, 8-channel isolated analog input module. It accepts millivoltage inputs (± 150 mV, ± 500 mV), voltage inputs (± 1 V, ± 5 V and ± 10 V) and current input (± 20 mA, 4~20 mA). Each analog channel can be configured to an individual range for a variety of applications.

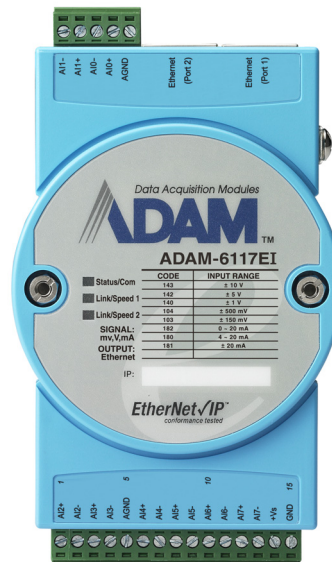


Figure 2.5 ADAM-6117EI

2.3.1.2 Specifications

Analog Input:

- Channels: 8 (Differential)
- Input Impedance:
 - >10 M Ω (Voltage)
 - 120 Ω (Current)
- Input Type: V, mV, mA
- Input Range: ± 150 mV, ± 500 mV, ± 1 V, ± 5 V, ± 10 V
- Accuracy:
 - $\pm 0.1\%$ or better (Voltage) at 25°C
 - $\pm 0.2\%$ or better (Current) at 25°C
- Resolution:

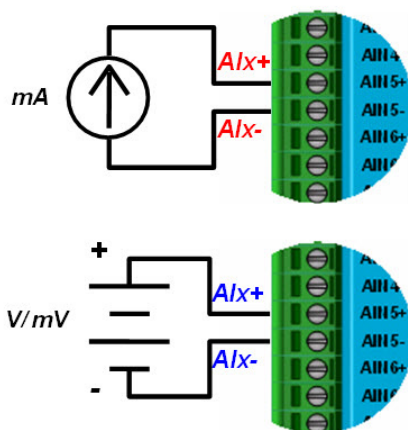
Voltage		Current	
Range	Resolution	Range	Resolution
± 150 mV	16bit	± 20 mA	15 bit
± 500 mV	16 bit	0~20 mA	14 bit
± 1 V	16 bit	4~20 mA	14 bit
± 5 V	16 bit		
± 10 V	16 bit		

- Sampling Rate: 12 samples/second (total)
- CMR @ 50/60 Hz: 92 dB
- NMR @ 50/60 Hz: 60 dB
- Span Drift: ± 30 ppm/ $^{\circ}$ C
- Zero Drift: ± 6 μ V/ $^{\circ}$ C
- High Common Mode: up to 200 V_{DC}

General:

- Communication: 10/100 Base-T Ethernet
- Supports Protocol: Ethernet/IP
- Power Input: Unregulated 10 ~ 30 V_{DC}
- Power Consumption: 3 W @ 24 V_{DC}
- Power Reversal Protection
- Operating Humidity: 20 ~ 95% RH (non-condensing)
- Storage Humidity: 0 ~ 95% RH (non-condensing)
- Operating Temperature: -10 ~ 70 $^{\circ}$ C
- Storage Temperature: -20 ~ 80 $^{\circ}$ C

2.3.1.3 Application Wiring



2.3.2 ADAM-6118EI: 8-ch Thermocouple Input Module

2.3.2.1 Overview

The ADAM-6118EI is a 16-bit, 8-channel thermocouple input module that provides programmable input ranges on all channels. It accepts various thermocouple inputs (Types J, K, T, E, R, S, B). It is designed for temperature measurement of several industrial control applications.

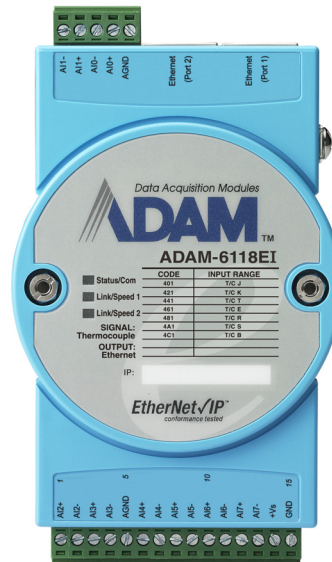


Figure 2.6 ADAM-6118EI

2.3.2.2 Specifications

Analog Input:

- Channels: 8 (Differential)
- Input Impedance:
 - >10 M Ω (Voltage)
 - 120 Ω (Current)
- Input Type: V, mV, mA, thermocouple
- Temperature Range: Type: J (-210 ~ 1,200°C), Type K (-270 ~ 1,372°C), Type T (-270 ~ 400°C), Type E (-270 ~ 1,000°C), Type R (0 ~ 1,768°C), Type S (0 ~ 1,768°C), Type B (300 ~ 1,820°C)
- Voltage/Current Range: ± 150 mV, ± 500 mV, ± 1 V, ± 5 V, ± 10 V
- Accuracy:
 - $\pm 0.1\%$ or better (Voltage, Temp.) at 25°C
 - $\pm 0.2\%$ or better (Current) at 25°C

- Resolution:

Temperature		Voltage		Current	
Range	Resolution	Range	Resolution	Range	Resolution
Type J	14 bit	±150mV	16 bit	±20mA	15 bit
Type K	14 bit	±500mV	16 bit	0~20 mA	14 bit
Type T	14 bit	±1 V	16 bit	4~20 mA	14 bit
Type E	14 bit	±5 V	16 bit		
Type R	14 bit	±10 V	16 bit		
Type S	14 bit		16 bit		
Type B	14 bit		16 bit		

- Sampling Rate: 12 samples/second (total)
- CMR @ 50/60 Hz: 92 dB
- NMR @ 50/60 Hz: 60 dB
- Span Drift: ±25 ppm/°C
- Zero Drift: ±6 $\mu\text{V}/^\circ\text{C}$
- High Common Mode: up to 200 V_{DC}

General:

- Communication: 10/100 Base-T Ethernet
- Supports Protocol: Ethernet/IP
- Power Input: Unregulated 10 ~ 30 V_{DC}
- Power Consumption: 3 W @ 24 V_{DC}
- Power Reversal Protection
- Operating Humidity: 20 ~ 95% RH (non-condensing)
- Storage Humidity: 0 ~ 95% RH (non-condensing)
- Operating Temperature: -10 ~ 70°C
- Storage Temperature: -20 ~ 80°C

2.3.2.3 Application Wiring

