ADAM-4000 Series

1 Software and Industry Solutions

2 Industrial Server

3 Intelligent System

4 Intelligent HMI and Monitors

5 Automation Computers and Controllers

6 Industrial Communication

7 Remote I/O & Wireless Sensing Modules

8 Industrial I/O and Video Solutions

Introduction

ADAM-4000 series modules are compact, versatile sensor-to-computer interface units designed specifically for reliable operation in harsh environments. Their built-in microprocessors are encased in rugged industrial grade plastic and independently provide intelligent signal conditioning, analog I/O, digital I/O, data display, and RS-485 communication. The ADAM-4000 series can be categorized into three groups: controllers, communication modules, and I/O modules.

Applications

- Remote data acquisition
- Process monitoring
- Industrial process control
- Energy management
- Supervisory control
- Security systems
- Laboratory automation
- Building automation
- Product testing
- Direct digital control
- Relay control

General Features

Modbus Communication Protocol

Since Modbus is one of the most widely used communication standards in the world, Advantech has applied it as the major communication protocol for eAutomation product development. The new generation of ADAM-4000 modules now also supports Modbus/RTU as the remote data transmission protocol. Featuring Modbus-support capacity, the new ADAM-4000 series have become universal remote I/O modules that can operate with any Modbus system. HMI servers or controllers can read/write data via standard Modbus commands instead of complex ASCII code.

Watchdog Timer

A watchdog timer supervisory function will automatically reset the ADAM-4000 series modules if required, which reduces the need for maintenance. It also contributes a high level of reliability to the system.

Modular Industrial Design

You can easily mount modules on a DIN rail, panel, or piggyback them on top of each other. Signal connections can be formed through plug-in screw-terminal blocks, ensuring simple installation, modification, and maintenance.

I/O Module Features

Easy Plug-In System Integration

With the ADAM-4000's Modbus I/O and built-in Modbus/RTU protocol, any controller using the Modbus/RTU standard can be integrated as part of an ADAM-4000 control system. Any Modbus Ethernet data gateway can upgrade these I/O modules up to the Modbus/TCP Ethernet layer. Most HMI software is bundled with a Modbus driver and can access the ADAM-4000 I/O directly. Moreover, Advantech provides Modbus OPC Server and Modbus/TCP OPC Server as data exchange interfaces between the ADAM-4000 Modbus I/O and any Windows applications.

Communication Module Features

Fiber Converter

The ADAM-4541 and ADAM-4542+ have been designed specifically for transmitting data over long distances without noise interference. The ADAM-4541 is a multi-mode converter that carries signals from fiber optics to RS-232/422/485. It offers a transmission distance of up to 2,500 m with total immunity against electromagnetic noise. The ADAM-4542+ is a single-mode converter that carries signals from fiber optics to RS-232/422/485. It offers an incredible transmission distance of up to 15 km, also with total immunity against electromagnetic noise.

USB Converter

The ADAM-4561 and ADAM-4562 are one-port isolated USB to RS-232/422/485 converters. The ADAM-4561 can convert USB to RS-232/422/485 with a plug-in terminal, and its major features are the capability to use 9-wire RS-232 and to draw power from a USB port. With 9-wire RS-232 capability, this converter meets the requirements of PLCs, modems, and controller equipment. The ADAM-4562 is a USB-to-serial converter that supports Plug & Play and hot-swapping, which simplifies the configuration process while allowing the module to draw power via USB, thus making it no longer necessary to have an external power supply.

ADAM-4100 Series

Robust Remote Data Acquisition and Control Modules Overview

Applications

- Wide operating temperature: -40 ~ 85°C
- Higher Noise Immunity
  ESD (IEC 61000-4-2) 8KV
  EFT (IEC 61000-4-4) 4KV
  Surge (IEC 61000-4-5) 4KV
- Wide power input: 10 ~ 48 V_{DC}
- Support modbus/RTU
- Multiple interface :RS-485, Micro USB

Introduction

The robust ADAM-4000 family includes ADAM-4100 series modules, the ADAM-4510I, and the ADAM-4520I modules. The ADAM-4100 series comprises compact, versatile sensor-to-computer interface units designed for reliable operation in harsh environments. Their built-in microprocessors, encased in rugged industrial-grade PC plastic, independently provide intelligent signal conditioning, analog I/O, digital I/O, LED data display, and an address mode with a user-friendly design for convenient address reading. The ADAM-4510I and ADAM-4520I modules are robust industrial-grade communication modules.

Designed for Harsh Industrial Environments

### ADAM-4100 Module with LED Display

ADAM-4100 series modules have an LED display that lets you monitor the channel status. For the ADAM-4117 and ADAM-4118, the LED will be lit when the related channel is active; for the ADAM-4150 and ADAM-4168, the LED will be lit when the related channel value is high. ADAM-4100 series modules have two operating modes: initial and normal. In contrast to old modules that require additional wiring to set the mode, this can be done using a switch with ADAM-4100 modules, making it very convenient to configure. When set to initial mode, the LED display represents the node address of the module. Additionally, in systems where multiple ADAM-4100 series modules are used, you can locate individual modules using Adam/Apax .NET Utility and the LED display on the module. All of these functions are very helpful for diagnosing ADAM-4100 series systems.

Online Firmware Updates

ADAM-4100 series modules have a user-friendly and convenient design that allows for firmware updates via a local network or the Internet. You can easily update to the latest firmware using Adam/Apax .NET Utility on the host PC. This saves time and ensures that the module always runs with the latest functional enhancements.

Micro USB interface

USB has become common interface in IoT devices, and it is easy to be accessed via PC. To expand the accessibility of ADAM-4100 series modules, in addition to an RS-485 serial port, the B version of these modules also has a micro USB interface that supplies power and a communication interface. Users have the option to use the RS-485 and USB ports concurrently or independently, depending on their application. The ADAM-4100 micro USB interface can be adapted to standard micro USB cable. Advantech also offers a 90° cable (optional) with a locking screw mechanism to further enhance the connection stability.

Customized 90 degrees designed cable (optional accessory)

USB

Micro USB
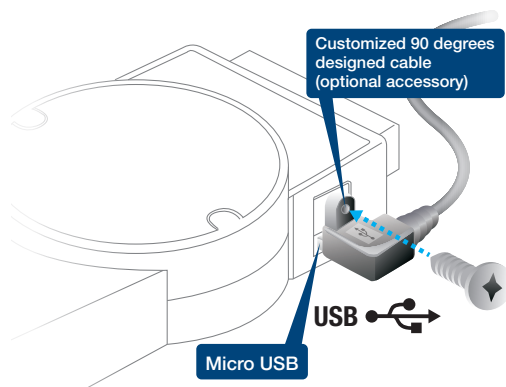
Access ADAM by Passive RFID

There is a trend in current IoT applications where increasingly more data are needed. Consequently, the demand for I/O modules is increasing. Users are pursuing efficient ways to set up and manage the modules. Thus, how to deploy I/O modules quickly and trace related usage information to avoid downtime have become key requirements in IoT applications. To fulfill these needs, ADAM-4100 series modules (B version) implement a passive internal RFID tag. This remarkable feature means that module information such as the model name, device ID, I/O value, firmware version, alarm events, and serial number are stored in the RFID tag. In contrast to typical RFID tags that contain fixed data, the RFID tag information in ADAM modules can be dynamically updated, which means that the RFID tag will reflect the latest ADAM module information. This innovative design makes ADAM modules more flexible for IoT applications.

One-to-Many
Wireless
Configuration

Always-On
Wireless
Inspection

I/O Module Selection Guide

Analog Input

Model	ADAM-4015	ADAM-4017+	ADAM-4018+	ADAM-4019+
Resolution			16 bit	
Analog Input — Channels	6 differential	8 differential	8 differential	8 differential
Analog Input — Sampling Rate	10 Hz		10 Hz	10 Hz
Analog Input — Voltage Input	-	±150 mV ±500 mV ±1 V ±5 V ±10 V	-	± 100 mV ± 500 mV ± 1 V ± 2.5 V ± 5 V ± 10 V
Analog Input — Current Input	-	4 ~ 20, ±20 mA	4 ~ 20, ±20 mA	4 ~ 20, ±20 mA
Analog Input — Direct Sensor Input	RTD	-	J, K, T, E, R, S, B thermocouple	J, K, T, E, R, S, B thermocouple
Analog Input — Burnout Detection	✓	-	✓	✓ (4 ~ 20 mA and all T/C)
Analog Input — Channel Independent Configuration	✓	✓	✓	✓
Isolation Voltage	3,000 V_{DC}		3,000 V_{DC}	3,000 V_{DC}
Watchdog Timer	✓ (system and comm.)	✓ (system and comm.)	✓ (system and comm.)	✓ (system and comm.)
Modbus Support *	✓	✓	✓	✓

*All ADAM-4000 I/O modules support ASCII commands

Analog Output

Digital Input/Output

Model	ADAM-4021	ADAM-4024	ADAM-4050	ADAM-4051	ADAM-4052
Resolution	12 bit	12 bit	-	-	-
Analog Output — Channels	1	4	-	-	-
Analog Output — Voltage Output	0 ~ 10 V	±10 V	-	-	-
Analog Output — Current Output	0 ~ 20, 4 ~ 20 mA	0 ~ 20, 4 ~ 20 mA	-	-	-
Digital I/O — Input Channels	-	4	7	16	8
Digital I/O — Output Channels	-	-	8	-	-
Digital I/O — Alarm Settings	-	✓	-	-	-
Isolation Voltage	3,000 V_{DC}	3,000 V_{DC}	-	2,500 V_{DC}	5,000 V_{RMS}
Digital LED Indicator	-	-	-	Yes	-
Watchdog Timer	✓ (system)	✓ (system and comm.)	✓ (system)	✓ (system and comm.)	✓ (system)
Safety Setting	-	✓	-	-	-
Modbus Support *	-	✓	-	✓	-

*All ADAM-4000 I/O modules support ASCII commands

I/O Module Selection Guide

Digital Input/Output   **Relay Output**   **Counter**

		ADAM-4053	ADAM-4055	ADAM-4056S/4056SO	ADAM-4060	ADAM-4068	ADAM-4069	ADAM-4080
Model		ADAM-4053	ADAM-4055	ADAM-4056S/4056SO	ADAM-4060	ADAM-4068	ADAM-4069	ADAM-4080
Resolution		-	-	-	-	-	-	-
Analog Input	Channels	-	-	-	-	-	-	-
	Sampling Rate	-	-	-	-	-	-	-
	Voltage Input	-	-	-	-	-	-	-
	Current Input	-	-	-	-	-	-	-
	Direct Sensor Input	-	-	-	-	-	-	-
	Burnout Detection	-	-	-	-	-	-	-
	Channel Independent Configuration	-	-	-	-	-	-	-
Analog Output	Channels	-	-	-	-	-	-	-
	Voltage Output	-	-	-	-	-	-	-
	Current Output	-	-	-	-	-	-	-
Digital I/O	Input Channels	16	8	-	-	-	-	-
	Output Channels	-	8	12	4-ch relay	8-ch relay	8-ch power relay	2
	Alarm Settings	-	-	-	-	-	-	Yes
Counter (32-bit)	Channels	-	-	-	-	-	-	2
	Input Frequency	-	-	-	-	-	-	50 kHz
Isolation Voltage		-	2,500 V_{DC}	5,000 V_{DC}	-	-	-	2,500 V_{RMS}
Digital LED Indicator		-	✓	✓	-	✓	-	-
Watchdog Timer		✓ (system)	✓ (system and comm.)	✓ (system and comm.)	✓ (system)	✓ (system and comm.)	✓ (system and comm.)	✓ (system)
Safety Setting		-	✓	-	✓	✓	✓	-
Modbus Support *		-	✓	✓	-	✓	✓	supported in E version

*All ADAM-4000 I/O modules support ASCII commands

Communication and Controller Module Selection Guide

Repeaters

Model	ADAM-4510 ADAM-4510S
Network	RS-422 RS-485
Comm. Protocol	-
Comm. Speed (bps)	Serial: From 1,200 to 115.2K
Comm. Distance	Serial: 1.2 km
Interface Connectors	RS-422/485: plug-in screw terminal
LED Indicators	Communication and power
Data Flow Control	-
Watchdog Timer	-
Isolation Voltage	ADAM-4510: - ADAM-4510S: 3,000 V_{DC}
Special Features	-
Built-In I/O	-
Power Requirements	10 ~ 30 V_{DC}
Operating Temperature	-10 ~ 70°C (14 ~ 158°F)
Operating Humidity	5 ~ 95% RH
Power Consumption	1.4 W @ 24 V_{DC}

Converters

Model	ADAM-4520	ADAM-4521	ADAM-4541 ADAM-4542+	ADAM-4561 ADAM-4562
Network	RS-232 to RS-422/485		Fiber optic to RS-232/422/485	USB to RS-232/485/422
Comm. Protocol	-			
Comm. Speed (bps)	Serial: From 1,200 to 115.2K			
Comm. Distance	Serial: 1.2 km	Serial: 1.2 km	ADAM-4541: 2.5 km ADAM-4542+: 15 km	Serial: 1.2 km
Interface Connectors	RS-232: female DB9 RS-422/485: plug-in screw terminal	RS-232: female DB9 RS-422/485: plug-in screw terminal	RS-232/422/485: plug-in screw terminal Fiber: ADAM-4541: ST connector ADAM-4542+: SC connector	USB: type A client connector Serial: ADAM-4561: plug-in screw terminal (RS-232/422/485) ADAM-4562: DB9 (RS-232)
LED Indicators	Communication and power			
Data Flow Control	-	✓	-	✓
Watchdog Timer	-	✓	-	✓
Isolation Voltage	3,000 V_{DC}	1,000 V_{DC}	-	ADAM-4561: 3,000 V_{DC} ADAM-4562: 2,500 V_{DC}
Power Requirements	10 ~ 30 V_{DC}			
Operating Temperature	-10 ~ 70°C (14 ~ 158°F)			
Operating Humidity	5 ~ 95% RH			
Power Consumption	1.2 W @ 24 V_{DC}	1 W @ 24 V_{DC}	ADAM-4541: 1.5 W @ 24 V_{DC} ADAM-4542+: 3 W @ 24 V_{DC}	ADAM-4561: 1.5 W @ 5 V_{DC} ADAM-4562: 1.1 W @ 5 V_{DC}

Robust RS-485 I/O Module Selection Guide

Model		ADAM-4117	ADAM-4118	ADAM-4150	ADAM-4168
Resolution		16 bit		-	-
Analog Input	Channels	8 differential		-	-
	Sampling Rate	10/100 Hz (total)		-	-
	Voltage Input	0 ~ 150 mV, 0 ~ 500 mV, 0 ~ 1 V, 0 ~ 5 V, 0 ~ 10 V, 0 ~ 15 V, ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±15V	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5V	-	-
	Current Input	0 ~ 20, 4 ~ 20, ±20 mA	4 ~ 20, ±20 mA	-	-
	Direct Sensor Input	-	J, K, T, E, R, S, B Thermocouple	-	-
	Burnout Detection	✓ (mA)	✓ (mA and All T/C)	-	-
	Channel Independent Configuration	✓	✓	-	-
Digital I/O	Input Channels	-	-	7	-
	Output Channels	-	-	8	8-ch relay
Counter	Channels	-	-	7	-
	Input Frequency	-	-	3 kHz	-
Isolation Voltage		3,000 V_{DC}			
Digital LED Indicator		Communication and Power			
Watchdog Timer		Yes (System & Communication)			
Safety Setting		-	-	✓	✓
Communication Protocol		ASCII Command/Modbus			
Power Requirements		10 ~ 48 V_{DC}			
Operating Temperature		-40 ~ 85°C (-40 ~ 185°F)			
Storage Temperature		-40 ~ 85°C (-40 ~ 185°F)			
Operating Humidity		5 ~ 95% RH			
Power Consumption		1.2 W @ 24 V_{DC}	0.5 W @ 24 V_{DC}	0.7 W @ 24 V_{DC}	1.8 W @ 24 V_{DC}
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Model	ADAM-4510I	ADAM-4520I
Network	RS-422/485	RS-232 to RS-422/485
Communication Speed (bps)	From 1,200 to 115.2k	
Communication Distance	Serial: 1.2 km	
Interface Connectors	RS-422/485: plug-in screw terminal	RS-232: female DB9 RS-422/485: plug-in screw terminal
Digital LED Indicators	Communication and Power	
Auto Data Flow Control	✓	
Isolation Voltage	3,000 V_{DC}	
Power Requirements	10 ~ 48 V_{DC}	
Operating Temperature	-40 ~ 85°C (-40 ~ 185°F)	
Storage Temperature	-40 ~ 85°C (-40 ~ 185°F)	
Operating Humidity	5 ~ 95%	
Power Consumption	1.4 W @ 24 V_{DC}	1.2 W @ 24 V_{DC}
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