RS-485 I/O Modules: ADAM-4000

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| ADAM-4510/S | RS-422/485 Repeater |
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| ADAM-4541 | Multi-mode Fiber Optic to RS-232/422/485 Converter |
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| ADAM-4015T | 6-ch Thermistor Module with Modbus |
| ADAM-4016 | 1-ch Analog Input/Output Module |
| ADAM-4017+ | 8-ch Analog Input Module with Modbus |
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| ADAM-4080 | 2-ch Counter/Frequency Module |
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Introduction

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

General Features

RS-485

The ADAM-4000 series of modules use the EIA RS-485 communication protocol, the industry’s most widely used bi-directional, balanced transmission line standard. The EIA RS-485 was specifically developed for industrial applications. It lets ADAM-4000 modules transmit and receive data at high rates over long distances. All modules use optical isolators to prevent ground loop problems and reduce damages caused by power surges.

Modbus Communication Protocol

Since Modbus is one of the most popular communication standards in the world, Advantech has applied it as the major communication protocol for eAutomation product development. The new-generation ADAM-4000 modules now also support the Modbus/RTU protocol as the remote data transmission mechanism. Featuring the Modbus-support capacity, the new ADAM-4000 series becomes universal remote I/O modules, which work with any Modbus systems. The HMI server or controller can read/write data via standard Modbus command 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 provides great reliability to the system.

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

Flexible Networking

ADAM-4000 series modules need just two wires to communicate with their controlling host computer over a multidrop RS-485 network. Their ASCII-based command/response protocol ensures compatibility with virtually any computer system.

Modular Industrial Design

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

Controller Features

Alternative Standalone Control Solution

A standalone control solution is made possible when the ADAM-4000 series modules are controlled by the ADAM-4501 or ADAM-4502 PC-based communication controller. The ADAM-4501 and ADAM-4502 allow users to download an application (written in a high-level programming language) into its Flash ROM. This allows customization for your applications.
Remote Data Acquisition and Control Modules Overview

I/O Module Features

Remotely Programmable Input Ranges
The ADAM-4000 series modules stand out because of their ability to accommodate multiple types and ranges of analog input. The type and range can be remotely selected by issuing commands from a host computer. One type of module satisfies many different tasks, which greatly simplifies design and maintenance. A single kind of module can handle the measurement needs of a whole plant. Since all modules are remotely configured by the host computer, physical adjustments are unnecessary.

Easy Plug-in System Integration
With 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

Ethernet
ADAM-4570 and ADAM-4571 are designed for the connection between serial devices (RS-232/422/485) and Ethernet. With ADAM-4570 or ADAM-4571, you can use graphical control software to monitor and control I/O modules. With existing devices, you can connect to an Ethernet network with the benefits of enhanced host performance and convenience.

Fiber Optics
If users need to transmit over long distances without noise interference, ADAM-4541 and ADAM-4542 are designed for this task. The ADAM-4541 is a multi-mode converter, which carries signals from fiber optics to RS-232/422/485. It offers a transmission distance of up to 2,500 m with a total immunity to electromagnetic noise. The ADAM-4542 is a single-mode converter, which carries signals from fiber to optics to RS-232/422/485. It offers a transmission distance of up to 15 km with total immunity to electromagnetic noise.

USB Communications
ADAM-4561/4562 is an one-port isolated USB to RS-232/422/485 converter. ADAM-4561 can convert USB to RS-232/422/485 with plug-in terminal. The major features of ADAM-4562 are the capability to use 9-wire RS-232 and to get power from the USB port. With 9-wire RS-232 capability, this converter meets the requirements of PLCs, modems, and controller equipment. As a USB-to-serial converter, ADAM-4562 supports Plug & Play, and hot-swapping, which simplifies the configuration process, and it also acts as a power supply for the module. It is no longer necessary to have an external power supply.

ADAM-4000 Remote Data Acquisition and Control System
Module Function Chart

Controllers

- ADAM-4501 Ethernet-enabled Communication Controller with 8-ch DI/O
- ADAM-4501D Ethernet-enabled Communication Controller with 8-ch DI/O and 7-segment LED
- ADAM-4502 Ethernet-enabled Communication Controller with 2-ch AI/O and 4-ch DO
- ADAM-4522T 2-ch Serial Dual Loop PID Controller with Modbus

- ADAM-4510/4510S RS-422/485 Repeater
- ADAM-4520/4522S RS-232 to RS-422/485 Converter
- ADAM-4521 Addressable RS-422/485 to RS-232 Converter

Communication Modules

- ADAM-4541 Multi-mode Fiber Optic to RS-232/422/485 Converter
- ADAM-4542+ Single-mode Fiber Optic to RS-232/422/485 Converter

- ADAM-4561 1-Port Isolated USB to RS-232/422/485 Converter
- ADAM-4562 1-Port Isolated USB to RS-232 Converter

- ADAM-4011 1-ch Thermocouple Input Module
- ADAM-4012 1-ch Analog Input Module
- ADAM-4013 1-ch RTD Input Module
- ADAM-4015 6-ch RTD Module with Modbus
- ADAM-4015T 6-ch Thermistor Input Module with Modbus
- ADAM-4017+ 8-ch Analog Input Module with Modbus
- ADAM-4018+ 8-ch Thermocouple Input Module with Modbus
- ADAM-4019+ 8-ch Universal Analog Input Module with Modbus

I/O Modules

- ADAM-4021 1-ch Analog Output Module
- ADAM-4024 4-ch Analog Output Module with Modbus
- ADAM-4025 16-ch Isolated Digital Input Module with Modbus
- ADAM-4051 16-ch Isolated Digital Input Module with Modbus
- ADAM-4052 8-ch Isolated Digital Input Module
- ADAM-4053 16-ch Digital Input Module
- ADAM-4060 4-ch Relay Output Module
- ADAM-4068 8-ch Relay Output Module with Modbus
- ADAM-4069 8-ch Power Relay Output Module with Modbus
- ADAM-4080 2-ch Counter/Frequency Module

- ADAM-4106 1-ch Analog Input/Output Module
- ADAM-4150 16-ch Digital I/O Module
- ADAM-4055 16-ch Isolated Digital I/O Module with Modbus

Robust Communication Modules

- ADAM-4510 Robust RS-422/485 Repeater
- ADAM-4520 Robust RS-232 to RS-422/485 Converter

Robust I/O Modules

- ADAM-4117 Robust 8-ch Analog Input Module with Modbus
- ADAM-4118 Robust 8-ch Thermocouple Input Module with Modbus
- ADAM-4150 Robust 15-ch Digital I/O Module with Modbus
- ADAM-4168 Robust 8-ch Relay Output Module with Modbus
## Communication and Controller Module Selection Guide

### Controllers

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<thead>
<tr>
<th>Model</th>
<th>ADAM-4501</th>
<th>ADAM-4501D</th>
<th>ADAM-4502</th>
<th>ADAM-4022T</th>
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<tr>
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<td>Modbus/RTU, Modbus/TCP, TCP/IP, UDP, ICMP, ARP, DHCP</td>
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<td>ASCII Command/ Modbus</td>
<td>ASCII Command/ Modbus</td>
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<td>Serial: From 1,200 to 115.2 kbps</td>
<td>Serial: From 1,200 to 115.2 kbps</td>
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<td>Serial: 1.2 km</td>
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<td>Power</td>
<td>Power</td>
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<td>Watchdog Timer</td>
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<td>3,000 Vdc</td>
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<td>3,000 Vdc</td>
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<td>-10 – 50° C</td>
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### Repeaters

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<tr>
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<th>ADAM-4510</th>
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<tbody>
<tr>
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<td>RS-485</td>
<td>RS-485</td>
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<tr>
<td>Comm. Protocol</td>
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<td>Serial: 1.2 km</td>
</tr>
<tr>
<td>Comm. Distance</td>
<td>Serial: 1.2 km</td>
<td>RS-422/485: plug-in screw terminal</td>
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<tr>
<td>Interface Connectors</td>
<td>RS-485: plug-in screw terminal</td>
<td>Communication &amp; Power</td>
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<td>Data Flow Control</td>
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<tr>
<td>Watchdog Timer</td>
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<tr>
<td>Isolation Voltage</td>
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<td>ADAM-4510: 3,000 Vdc ADAM-4510S: 3,000 Vdc</td>
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<tr>
<td>Special Features</td>
<td>Email function Built-in HTTP and FTP Server PID Control</td>
<td>-</td>
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<tr>
<td>Built-in I/O</td>
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<td>-</td>
</tr>
<tr>
<td>Power Requirement</td>
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<td>10 – 30 Vdc</td>
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<tr>
<td>Operating Temperature</td>
<td>-10 – 70° C</td>
<td>-10 – 70° C</td>
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<tr>
<td>Humidity</td>
<td>5 – 95% RH</td>
<td>5 – 95% RH</td>
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<td>Power Consumption</td>
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<td>1.4 W @ 24 Vdc</td>
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## Converters

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<tr>
<th>Model</th>
<th>ADAM-4520</th>
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<th>ADAM-4521</th>
<th>ADAM-4541</th>
<th>ADAM-4542+</th>
<th>ADAM-4561</th>
<th>ADAM-4562</th>
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<tr>
<td>Network</td>
<td>RS-232 to RS-422/485</td>
<td>Fiber Optic to RS-232/422/485</td>
<td>USB to RS-232/485/422</td>
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<td>Comm. Protocol</td>
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<td>ADAM-4542+: 15 km</td>
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<td>Serial: 1.2 km</td>
<td>ADAM-4541: 2.5 km</td>
<td>ADAM-4542+: 15 km</td>
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<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
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<td>1,000 V&lt;sub&gt;ac&lt;/sub&gt;</td>
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<td>ADAM-4561: 3,000 V&lt;sub&gt;ac&lt;/sub&gt; ADAM-4562: 2,500 V&lt;sub&gt;ac&lt;/sub&gt;</td>
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<td>1 W @ 24 V&lt;sub&gt;dc&lt;/sub&gt;</td>
<td>ADAM-4541: 1.5 W @ 24 V&lt;sub&gt;dc&lt;/sub&gt; ADAM-4542+: 3 W @ 24 V&lt;sub&gt;dc&lt;/sub&gt;</td>
<td>ADAM-4561: 1.5 W @ 5 V&lt;sub&gt;dc&lt;/sub&gt; ADAM-4562: 1.1 W @ 5 V&lt;sub&gt;dc&lt;/sub&gt;</td>
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<tr>
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## Analog Input

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<td>±15 mV</td>
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<td>-</td>
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<tr>
<td>Isolation</td>
<td>3,000 VDC</td>
<td></td>
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<tr>
<td>Digital LED Indicator</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>Watchdog Timer</td>
<td>Yes (System)</td>
<td>Yes (System)</td>
<td>Yes (System)</td>
<td>Yes (System &amp; Comm.)</td>
<td>Yes (System)</td>
<td>Yes (System &amp; Comm.)</td>
</tr>
<tr>
<td>Safety Setting</td>
<td>-</td>
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<tr>
<td>Modbus Support</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
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* All ADAM-4000 I/O Modules support ASCII Commands
### Analog Input

<table>
<thead>
<tr>
<th>Model</th>
<th>ADAM-4018+</th>
<th>ADAM-4019+</th>
<th>ADAM-4021</th>
<th>ADAM-4024</th>
<th>ADAM-4050</th>
<th>ADAM-4051</th>
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</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>16 bit</td>
<td>12 bit</td>
<td>12 bit</td>
<td>12 bit</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Channels</strong></td>
<td>8 differential</td>
<td>8 differential</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<tr>
<td><strong>Sampling Rate</strong></td>
<td>10 Hz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>Voltage Input</strong></td>
<td>-</td>
<td>± 100 mV</td>
<td>± 500 mV</td>
<td>± 1 V</td>
<td>± 2.5 V</td>
<td>± 5 V</td>
</tr>
<tr>
<td><strong>Current Input</strong></td>
<td>4 ~ 20 mA</td>
<td>0 ~ 20 mA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Direct Sensor Input</strong></td>
<td>J, K, T, E, R, S, B Thermocouple</td>
<td>J, K, T, E, R, S, B Thermocouple</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Burn-out Detection</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>Channel Independent Configuration</strong></td>
<td>Yes</td>
<td>Yes</td>
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### Analog Output

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<th>ADAM-4050</th>
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<tr>
<td><strong>Channels</strong></td>
<td>-</td>
<td>1</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td><strong>Voltage Output</strong></td>
<td>-</td>
<td>0 ~ 10 V</td>
<td>± 10 V</td>
<td>-</td>
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<tr>
<td><strong>Current Output</strong></td>
<td>-</td>
<td>0 ~ 20 mA</td>
<td>0 ~ 20 mA</td>
<td>-</td>
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<tr>
<td><strong>Output Channels</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>Alarm Settings</strong></td>
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<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td><strong>Input Frequency</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Isolation</strong></td>
<td>3,000 VDC</td>
<td>3,000 VDC</td>
<td>3,000 VDC</td>
<td>2,500 VDC</td>
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<tr>
<td><strong>Digital LED Indicator</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Watchdog Timer</strong></td>
<td>Yes (System &amp; Comm.)</td>
<td>Yes (System &amp; Comm.)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Safety Setting</strong></td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>**Modbus Support *</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Page</strong></td>
<td>23-20</td>
<td>23-20</td>
<td>23-21</td>
<td>23-21</td>
</tr>
</tbody>
</table>

* All ADAM-4000 I/O Modules support ASCII Commands

---

### I/O Module Selection Guide

<table>
<thead>
<tr>
<th>Analog Input</th>
<th>Analog Output</th>
<th>Digital Input/Output</th>
</tr>
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<tr>
<td><strong>Model</strong></td>
<td><strong>Resolution</strong></td>
<td><strong>Channels</strong></td>
</tr>
<tr>
<td>ADAM-4018+</td>
<td>16 bit</td>
<td>8 differential</td>
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<tr>
<td>ADAM-4019+</td>
<td>12 bit</td>
<td>8 differential</td>
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---

**ADANTECH**

RS-485 I/O Modules

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23-8
### Relay Output

<table>
<thead>
<tr>
<th>Model</th>
<th>ADAM-4052</th>
<th>ADAM-4053</th>
<th>ADAM-4055</th>
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<tbody>
<tr>
<td>Relay Configuration</td>
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<td></td>
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</tr>
<tr>
<td>8ично relay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-ч relay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-ch power relay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5,000 Vrms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,500 Vdc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (System)</td>
<td>Yes (System)</td>
<td>Yes (System &amp; Comm.)</td>
<td></td>
</tr>
<tr>
<td>23-22</td>
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### Counter

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<th>ADAM-4069</th>
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<tr>
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</tr>
<tr>
<td>4-ч relay</td>
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<td></td>
</tr>
<tr>
<td>8-ч relay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-ch power relay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,500 Vrms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (System)</td>
<td>Yes (System &amp; Comm.)</td>
<td>Yes (System &amp; Comm.)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>23-24</td>
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</tr>
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<td>23-23</td>
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**Selection Guide**

19. Embedded Controllers
20. PC-based Controllers
21. PAC
22. Motion Control
23. RS-485/IO
24. Ethernet IO
25. Building Automation
26. Self-service Terminals
27. eHome Platforms

---

Online Download  www.advantech.com/products
Introduction

The ADAM-4000 robust family includes the ADAM-4100 series modules, ADAM-4510I and ADAM-4520I modules. The ADAM-4100 series modules are compact, versatile sensor-to-computer interface units designed for reliable operation in harsh environments. Their built-in microprocessors, encased in rugged industrial-grade ABS-PC plastic, independently provide intelligent signal conditioning, analog I/O, digital I/O, LED data display, and an address mode with an user-friendly design for convenient address reading. The ADAM-4510I and ADAM-4520I modules are robust industrial-grade communication modules. The ADAM-4000 robust family is designed to endure more severe and adverse environments. The operating temperature is -40 – 85° C which makes them suitable for more widespread applications.

Broader Operating Temperature Range

The ADAM-4000 robust family supports a broad operating temperature range of -40 to 85° C.

Higher Noise Immunity

In order to prevent noise from affecting your system, the ADAM-4000 robust family has been designed with more protection to counteract these effects. New standard features include: 1 kV surge protection on power inputs, 3 kV EFT, and 8 kV ESD protection.

Broader Power Input Range

The ADAM-4000 robust family accepts any unregulated power source between 10 and 48 VDC. In addition, they are also protected against accidental power reversals, and can be safely connected or disconnected without disturbing a running network.

New Features for I/O Modules

- **ADAM-4117/4118**
  1. Supports 200 VDC High Common Mode voltage
  2. Software Filter
  3. Supports Auto Optimized Working Frequency
  4. Auto noise rejection at 50/60 Hz
  5. Higher over voltage protection ±60 VDC
  6. Optional Sampling Rate 10 or 100 samples/sec
  7. Supports unipolar and bipolar input (ADAM-4117 only)
  8. Supports ±15V input range (ADAM-4117 only)

- **ADAM-4150**
  1. Over current and temperature protection circuit
  2. DI channels support counter (32-bit, overflow flag) and frequency type signal input
  3. DO channels support pulse (1 KHz) and delay (high-to-low and low-to-high) type signal output
  4. Support invert DI status

- **ADAM-4168**
  1. Supports 1 kHz pulse output

**ADAM-4100 Module with LED Display**

The ADAM-4100 series modules have a LED display that lets you monitor the channel status. Using ADAM-4117/4118, the LED will be lit when related channel is active. Using ADAM-4150/4168, the LED will be lit when related channel value is high. The ADAM-4100 series modules have two operating modes (initial and normal), unlike the old module using extra wiring, ADAM-4100 modules can use the switch on the case to set “initial” mode or “normal” mode. It is very convenient for the user to configure. When you set to “initial” mode, the LED display can represent the node address of that module. Besides, when you use multiple ADAM-4100 series modules, you can locate the module through ADAM utility and LED display. All of these functions are very helpful to diagnose the ADAM-4100 series system.

Online Firmware Updates

The ADAM-4100 series modules have a friendly and convenient design where firmware can be updated through a local network or the Internet. You can easily update latest firmware using utility on host PC. This saves time and ensures that the module always runs with the latest functional enhancements.

Legacy Communication Protocol Support

To satisfy both the current ADAM users, and Modbus users, The ADAM-4100 series modules support both the ADAM (ASCII) protocol and the Modbus/RTU protocol. You can select the communication mode you want through the Windows Utility Software. The Modbus protocol not only supports the original data format (N, 8, 1) for (parity check, data bit, stop check) but also accepts (N,8,1) (N, 8, 2) (E, 8, 1) (O, 8, 1).
## Robust RS-485 I/O Module Selection Guide

<table>
<thead>
<tr>
<th>Model</th>
<th>ADAM-4117</th>
<th>ADAM-4118</th>
<th>ADAM-4150</th>
<th>ADAM-4168</th>
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<tbody>
<tr>
<td>Resolution</td>
<td>16 bit</td>
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<td>-</td>
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<tr>
<td>Channels</td>
<td>8 differential</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sampling Rate</td>
<td>10/100 Hz (total)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Voltage Input</td>
<td>0 ~ 150 mV, 0 ~ 500 mV, 0 ~ 1 V, 0 ~ 5 V, 0 ~ 10 V, ±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±15 V</td>
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<tr>
<td>Current Input</td>
<td>0 ~ 20 mA, ±20 mA, 4 ~ 20 mA</td>
<td>±20 mA, 4 ~ 20 mA</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Direct Sensor Input</td>
<td>-</td>
<td>J, K, T, E, R, S, B Thermocouple</td>
<td>-</td>
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<tr>
<td>Burn-out Detection</td>
<td>Yes (mA)</td>
<td>Yes (mA and All T/C)</td>
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<td>Channel Independent Configuration</td>
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<td>7</td>
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<td>Output Channels</td>
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<td>8-ch relay</td>
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<td>Digital Input and Output</td>
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<td>-</td>
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<tr>
<td>Channel</td>
<td>-</td>
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<td>7</td>
<td>-</td>
</tr>
<tr>
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<td>3 kHz</td>
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</tr>
<tr>
<td>Counter</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>3,000 Vdc</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>Digital LED Indicator</td>
<td>Communication and Power</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Watchdog Timer</td>
<td>Yes</td>
<td>System &amp; Communication</td>
<td>-</td>
<td>-</td>
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<td>Safety Setting</td>
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<td>Yes</td>
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<td>Communication Protocol</td>
<td>ASCII Command/Modbus</td>
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<tr>
<td>Power Requirement</td>
<td>10 ~ 48 Vdc</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>Operating Temperature</td>
<td>-40 ~ 85°C</td>
<td>-40 ~ 85°C</td>
<td>-40 ~ 85°C</td>
<td>-40 ~ 85°C</td>
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<tr>
<td>Storage Temperature</td>
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<td>-40 ~ 85°C</td>
<td>-40 ~ 85°C</td>
<td>-40 ~ 85°C</td>
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<tr>
<td>Humidity</td>
<td>-</td>
<td>-</td>
<td>-95% RH</td>
<td>-</td>
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<tr>
<td>Power Consumption</td>
<td>1.2 W @ 24 Vdc</td>
<td>0.5 W @ 24 Vdc</td>
<td>0.7 W @ 24 Vdc</td>
<td>1.8 W @ 24 Vdc</td>
</tr>
<tr>
<td>Page</td>
<td>23-12</td>
<td>23-13</td>
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<table>
<thead>
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<th>Model</th>
<th>ADAM-4510i</th>
<th>ADAM-4520i</th>
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<tr>
<td>Network</td>
<td>RS-422/485</td>
<td>RS-232 to RS-422/485</td>
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<td>Communication Speed (bps)</td>
<td>From 1,200 to 115.2k</td>
<td>Serial: 1.2 km</td>
</tr>
<tr>
<td>Communication Distance</td>
<td>200 km</td>
<td>1.2 km</td>
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<td>Digital LED Indicators</td>
<td>Communication and Power</td>
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</tr>
<tr>
<td>Auto Data Flow Control</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>3,000 Vdc</td>
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<td>Power Requirement</td>
<td>10 ~ 48 Vdc</td>
<td>-</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40 ~ 85°C</td>
<td>-40 ~ 85°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 ~ 85°C</td>
<td>-40 ~ 85°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>-</td>
<td>-95%</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>1.4 W @ 24 Vdc</td>
<td>1.2 W @ 24 Vdc</td>
</tr>
<tr>
<td>Page</td>
<td>23-12</td>
<td>23-13</td>
</tr>
</tbody>
</table>
**Specifications**

**General**
- Connectors: 2 x plug-in terminal blocks (#14 – 22 AWG)
- Power Consumption: 1.4 W @ 24 VDC

**Communications**
- Input: RS-485 (2-wire) or RS-422 (4-wire)
- Output: RS-485 (2-wire) or RS-422 (4-wire)
- Speed Modes (bps): 1,200, 2,400, 4,800, 9,600, 19.2 k, 38.4 k, 57.6 k, 115.2 k, RTS control and RS-422 (switchable)
- Supports Auto Baud-Rate
- Provide RS-485 to RS-422 Convert Ability

---

**ADAM-4510I**
- Robust RS-422/485 Repeater
- 8-channel Analog Input Module with Modbus

**ADAM-4520I**
- Robust RS-232 to RS-422/485 Converter

**ADAM-4117**
- Robust 8-ch Analog Input Module with Modbus

---

**Common Specifications**

**General**
- Power Input: Unregulated 10 ~ 48 VDC w/power reversal protection
- Isolation Voltage: 3,000 VDC

**Environment**
- Humidity: 5 ~ 90% RH
- Operating Temperature: -40 ~ 85°C (-40 ~ 185°F)
- Storage Temperature: -40 ~ 85°C (-40 ~ 185°F)
- Supports Noise Rejection

---

**Ordering Information**
- **ADAM-4510I**: Robust RS-422/485 Repeater
- **ADAM-4520I**: Robust RS-232 to RS-422/485 Converter
- **ADAM-4117**: Robust 8-ch Analog Input Module with Modbus
ADAM-4118
ADAM-4150
ADAM-4168

Robust 8-ch Thermocouple Input Module with Modbus
Robust 15-ch Digital I/O Module with Modbus
Robust 8-ch Relay Output Module with Modbus

Specifications

General
- Power Consumption: 0.5 W @ 24 Vdc

Analog Input
- Channels: 8 differential and independent configuration channels
- Input Impedance: Voltage: 20 MΩ, Current: 120 Ω
- Input Type: J, K, T, E, R, S, B
- Input Range: J: 0 ~ 760° C, K: 0 ~ 1370° C, T: -100 ~ 400° C, E: 0 ~ 1,000° C, R: 500 ~ 1,750° C, S: 500 ~ 1,750° C, B: 500 ~ 180° C
- Voltage mode: ±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V
- Current mode: ±20 mA, ±20 mA
- Accuracy: Voltage mode: ±0.1% or better, Current mode: ±0.2% or better
- Resolution: 16-bit
- Sampling Rate: 10/100 samples/sec (selected by Utility)
- CMR: 92 dB
- NMR: 60 dB
- Overvoltage Protection: ±60 Vdc
- High Common Mode: 200 Vdc
- Span Drift: ±25 ppm/V°C
- Zero Drift: ±50 µV/° C
- Burn-out Detection

Common Specifications

General
- Power Input: Unregulated 10 ~ 48 Vdc
- Watchdog Timer: System (1.6 second) & Communication
- Connector: 2 x plug-in terminal blocks (#14 ~ 22 AWG)
- Isolation Voltage: 3,000 Vdc
- Supported Protocols: ASCII Command and Modbus/RTU

Environment
- Humidity: 5 ~ 95% RH
- Operating Temperature: -40 ~ 85°C (-40 ~ 185°F)
- Storage Temperature: -40 ~ 85°C (-40 ~ 185°F)

Ordering Information
- ADAM-4118
- ADAM-4150
- ADAM-4168

Related Controls
- Embedded Controllers
- PC-based Controllers
- PAC Systems
- Motion Control
- RS-485 I/O
- Ethernet I/O
- Building Automation
- Self-service Terminals
- eHome Platforms
- Robust 8-ch Thermocouple Input Module with Modbus
- Robust 15-ch Digital I/O Module with Modbus
- Robust 8-ch Relay Output Module with Modbus

Ordering Information
- ADAM-4118
- ADAM-4150
- ADAM-4168

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Introduction
The ADAM-4501/D consists of compact-sized Ethernet-enabled communication controllers with an x86 CPU architecture. They support not only an Ethernet interface but also 4 serial ports, which makes them very suitable for industrial communication and control applications. The Ethernet-enabled features include built-in HTTP Server, FTP Server and email alarm functions. The modularized I/O design provides high flexibility for versatile application requirements. The ADAM-4501/D also supports rich Modbus function libraries including Modbus/RTU (Master/Slave) and Modbus/TCP (Server/Client) function libraries.

Specifications

General
- Connectors
  - 1 x RJ45 (Ethernet)
  - 1 x RJ48 (COM1)
  - 2 x Plug-in terminal blocks (#14 ~ 28 AWG)
- Indicators
  - LEDs for Power, run, communication and battery
- Power Input
  - Unregulated 10 ~ 30 VDC w/power reversal protection

System
- CPU
  - 40 MHz, 16-bit
- CPU Power Consumption
  - 4 W @ 24 VDC
- Memory
  - 1.5 MB flash memory:
    - 256 kB system flash disk (Drive C: Read Only)
    - 256 kB flash memory (accessed by function LIB)
    - 1024 kB file system, 960 kB for user applications (Drive D: Read/Write)
    - 640 kB SRAM, up to 384 kB with battery backup (accessed by function LIB)
- Real-time Clock (RTC) Yes
- Watchdog Timer Yes

Digital Input
- Channels 4
- Input Level
  - Dry Contact: Logic level 0: Close to GND
  - Logic level 1: Open
  - Wet Contact: Logic level 0: 2 V max.
  - Logic level 1: 4 V ~ 30 V

Digital Output
- Channels 4, open collector to 30 V, 30 mA max. load
- Power Dissipation 200 mW

Communication
- LAN
  - 1 x 10/100Base-T
- RS-485 Speed
  - 1.2 to 115.2 kbps
- Serial Ports
  - COM1: RS-232 (Full Modem Signals)
  - COM2, COM3: RS-485
  - COM4: RS-232 (Programming Port)/RS-485 (Selected by Jumper)

Software
- C Library
  - Borland C++ 3.0 for DOS
- Operating System
  - ROM-DOS

Environment
- Humidity
  - 5 ~ 95% RH
- Operating Temperature
  - -10 ~ 70° C (-14 ~ 158° F)
- Storage Temperature
  - -25 ~ 85° C (-13 ~ 185° F)

Ordering Information
- ADAM-4501 Ethernet-enabled Comm. Controller w/ 8-ch DI/O
- ADAM-4501D Ethernet-enabled Comm Controller, 8-ch DI/O, LED
Introduction
With its modular design, ADAM-4502 has all the same functionality as ADAM-4501, but provides different I/O options. The ADAM-4502 provides one Ethernet interface and 4 serial ports module, but also features 1 analog input, 1 analog output, 2 digital inputs and 2 digital outputs. This versatility allows users to implement rich interfaces for different applications.

Specifications

General
- Connectors
  - 1 x RJ45 (Ethernet)
  - 1 x RJ48 (COM1)
  - 2 x plug-in terminal blocks (#14 – 28 AWG)
- Indicators
  - LEDs for Power, run, communication and battery
- Power Input
  - Unregulated 10 – 30 Vcc, w/power reversal protection
- CPU
  - 40 MHz, 16-bit
- CPU Power Consumption
  - 4 W @ 24 Vcc
- Memory
  - 1.5 MB flash memory:
    - 256 KB system flash disk (Drive C: Read Only)
    - 256 KB flash memory (accessed by function LIB)
    - 1024 KB file system, 960 KB for user applications (Drive D: Read/Write)
    - 640 KB SRAM, up to 384 KB with battery backup (accessed by function LIB)
- Real-time Clock (RTC)
  - Yes
- Watchdog Timer
  - Yes

Analog Input
- Channels
  - 1
- Input Type
  - mV, V, mA
- Input Range
  - ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±2.5 V, ±20 mA
- Resolution
  - 16-bit
- Sampling rate
  - 100 Sample/second
- Isolation Voltage
  - 1,000 Vcc

Analog Output
- Channels
  - 1
- Output Type
  - V, mA
- Output Range
  - 0 – 10 V, 0 – 20 mA
- Slew Rate
  - 1 V/µs
- Isolation Voltage
  - 1,000 Vcc

Digital Input
- Channels
  - 2
- Input Level
  - Dry Contact: Logic level 0 : Close to GND
  - Logic level 1 : Open
  - Wet Contact: Logic level 0 : 2 V max.
  - Logic level 1 : 4 V – 30 V

Digital Output
- Channels
  - 2, open collector to 40 V, 1 A max. load
- Power Dissipation
  - 1 W load maximum

Communication
- LAN
  - 1 x 10/100Base-T
- RS-485 Speed
  - 1.2 to 115.2 kbps
- Serial Ports
  - COM1: RS-232 (Full Modem Signals)
  - COM2, COM3: RS-485
  - COM4: RS-232 (Programming Port)/RS-485 (Selected by jumper)

Software
- C Library
  - Borland C++ 3.0 for DOS
- Operating System
  - ROM-DOS

Environment
- Humidity
  - 5 – 90% RH
- Operating Temperature
  - -10 – 70°C (14 – 158°F)
- Storage Temperature
  - 25 – 85°C (-13 – 185°F)

Ordering Information
- ADAM-4502
  - Ethernet Comm Controller w/2-ch AI/O, 4-ch DI/O
## RS-485 I/O Modules
### Specifications
#### General
- **Connectors**: 2 x plug-in terminal blocks (#14 ~ 22 AWG) (RS-422/485)
- **Isolation Voltage**: 3,000 VDC (ADAM-4510S)
- **Power Consumption**: 1.4 W @ 24 VDC

#### Serial Communications
- **Input**: RS-485 (2-wire) or RS-422 (4-wire)
- **Output**: RS-485 (2-wire) or RS-422 (4-wire)
- **Speed Modes (bps)**: 1,200, 2,400, 4,800, 9,600, 19.2 k, 38.4 k, 57.6 k, 115.2 k, RTS control and RS-422 (switchable)

### Specifications
#### General
- **Connectors**: 1 x plug-in terminal block (#14 ~ 22 AWG) (RS-422/485)
- **Isolation Voltage**: 1,000 VDC
- **Power Consumption**: 1.2 W @ 24 VDC

#### Serial Communications
- **Input**: RS-232 (4-wire)
- **Output**: RS-485 (2-wire) or RS-422 (4-wire)
- **Speed Modes (bps)**: 1,200, 2,400, 4,800, 9,600, 19.2 k, 38.4 k, 57.6 k, 115.2 k, RTS control and RS-422 (switchable)

### Ordering Information
- **ADAM-4510**: RS-422/485 Repeater
- **ADAM-4510S**: Isolated RS-422/485 Repeater
- **ADAM-4520**: RS-232 to RS-422/485 Converter
- **ADAM-4522**: RS-232 to RS-422/485 Converter
- **ADAM-4521**: Addressable RS-422/485 to RS-232 Converter

#### Common Specifications
- **General**
  - **Power Input**: Unregulated 10 ~ 30 VDC w/ power reversal protection

#### Environment
- **Operating Temperature**: -10 ~ 70°C (14 ~ 158°F)
- **Storage Temperature**: -25 ~ 85°C (-13 ~ 185°F)
- **Humidity**: 5 ~ 95% RH
**ADAM-4541**
**ADAM-4542+**
**ADAM-4561/4562**

**Specifications**

### General
- **Power Input**: Unregulated 10 – 30 Vdc
- **Connectors**: 1 x plug-in terminal block (#14 – 22 AWG) (RS-232/422/485) 2 x ST fiber connector
- **Power Consumption**: 1.5 W @ 24 Vdc

### Serial Communications
- **Communication Mode**: Asynchronous
- **Speed Modes (bps)**: 1,200, 2,400, 4,800, 9,600, 19.2 k, 38.4 k, 57.6 k, 115.2 k and RS-232/422 mode (switchable)
- **Transmission Mode**: Full/half duplex, bidirectional

### Fiber Optic Communications
- **Optical Power Budget**: 12.5 dB (measured with (Attenuation) 62.5/125 μm)
- **Transmission Distance**: 2.5 km
- **Transmission Mode**: Multi mode (Send and Receive)
- **Wavelength**: 820 nm

**Specifications**

### General
- **Power Input**: Unregulated 10 – 30 Vdc
- **Connectors**: 1 x plug-in terminal block (#14 – 22 AWG) (RS-232/422/485) 1 x SC fiber connector
- **Power Consumption**: 3 W @ 24 Vdc

### Serial Communications
- **Communication Mode**: Asynchronous
- **Speed Modes (bps)**: 1,200, 2,400, 4,800, 9,600, 19.2 k, 38.4 k, 57.6 k, 115.2 k and RS-232/422 mode (switchable)
- **Transmission Modes**: Full/half duplex, bidirectional

### Fiber Optic Communications
- **Optical Power Budget**: 15 dB (Attenuation)
- **Transmission Distance**: 15 km
- **Transmission Mode**: Single mode (Send and Receive)
- **Wavelength**: 1310 nm

**Common Specifications**

### Environment
- **Humidity**: 5 – 95% RH
- **Operating Temperature**: ADAM-4541/4542+: -10 – 70°C (14 – 158°F) ADAM-4561/4562: 0 – 70°C (32 – 158°F)
- **Storage Temperature**: -25 – 85°C (-13 – 185°F)

**Ordering Information**

- **ADAM-4541**: Multi-mode Fiber to RS-232/422/485 Converter
- **ADAM-4542+**: Single-mode Fiber to RS-232/422/485 Converter
- **ADAM-4561**: 1-port Isolated USB to RS-232/422/485 Converter
- **ADAM-4562**: 1-port Isolated USB to RS-232 Converter
### Specifications

#### General
- **Power Consumption**: 1.4 W @ 24 Vc
- **Supported Protocols**: ASCII command

#### Analog Input
- **Channels**: 1
- **Input impedance**: Voltage: 2 MΩ
  - Current: 125 Ω
- **Input type**: T/C, mV, V or mA
- **Input range**: ±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V
- **Accuracy**: ±0.5% or better
- **T/C type and temperature range**
  - J: 0 ~ 1,760° C
  - K: 0 ~ 1,370° C
  - R: 500 ~ 1,750° C
  - S: 500 ~ 1,750° C
  - T: -100 ~ 400° C
  - E: 0 ~ 1,000° C
- **Span drift**: ±25 ppm/° C
- **Zero drift**: ±6 µV/° C

#### Digital Input
- **Channels**: 1
- **Event counter**: Max. input freq.: 50 Hz

#### Digital Output
- **Channels**: 2, open collector to 30 V, 30 mA max. load
- **Power Dissipation**: 300 mW

### ADAM-4012

#### Specifications

#### General
- **Power Consumption**: 1.2 W @ 24 Vc
- **Supported Protocols**: ASCII command

#### Analog Input
- **Channels**: 1
- **Input impedance**: Voltage: 2 MΩ
  - Current: 125 Ω
- **Input type**: mV, V or mA
- **Input range**: ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V and ±20 mA
- **Accuracy**: Voltage mode: ±0.1% or better
  - Current mode: ±0.2% or better
- **Span drift**: ±25 ppm/° C
- **Zero drift**: ±6 µV/° C

#### Digital Input
- **Channels**: 1
- **Event counter**: Max. input freq.: 50 Hz

#### Digital Output
- **Channels**: 2, open collector to 30 V, 30 mA max. load
- **Power Dissipation**: 300 mW

### ADAM-4013

#### Specifications

#### General
- **Power Consumption**: 0.7 W @ 24 Vc
- **Supported Protocols**: ASCII command

#### Analog Input
- **Channels**: 1
- **Input connections**: 2, 3, or 4-wire
- **Input Impedance**: Voltage: 2 MΩ
  - Current: 125 Ω
- **Input type**: T/C, mV, V or mA
- **Input range**: ±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±5 V, ±10 V and ±20 mA
- **Accuracy**: ±0.1% or better
- **Span drift**: ±25 ppm/° C
- **Zero drift**: ±3 µV/° C

### Ordering Information

- **ADAM-4011**: 1-ch Thermocouple Input Module
- **ADAM-4012**: 1-ch Analog Input Module
- **ADAM-4013**: 1-ch RTD Input Module

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### Common Specifications

#### General
- **Power Input**: Unregulated 10 ~ 30 Vc
- **Connectors**: 1 x plug-in terminal block (#14 ~ 22 AWG)
- **Watchdog Timer**: System (1.6 second)

#### Analog Input
- **Resolution**: 16-bit
- **Sampling Rate**: 10 sample/second
- **CMR @ 50/60 Hz**: 150 dB
- **NMR @ 50/60 Hz**: 100 dB
- **Isolation Voltage**: 3,000 Vc

#### Environment
- **Humidity**: 5 ~ 95% RH
- **Operating Temperature**: -10 ~ 70° C (14 ~ 158° F)
- **Storage Temperature**: -25 ~ 85° C (-13 ~ 185° F)
ADAM-4015
ADAM-4015T
ADAM-4016

6-ch RTD Module with Modbus
6-ch Thermistor Module with Modbus
1-ch Analog Input/Output Module

Specifications

General
- Connectors: 2 x plug-in terminal blocks (#14 ~ 28 AWG)
- Power Consumption: 1.2 W @ 24 Vdc
- Watchdog Timer: System (1.6 s) & Communication
- Supported Protocols: ASCII command and Modbus/RTU
- Burn-out Detection: Yes

Analog Input
- Channels: 6 differential
- Input Connections: 2, 3, or 4-wire
- Input Impedance: 10 MΩ
- Input Type: Pt, Balco and Ni RTD
- RTD Types and Temperature Ranges:
  - Pt 100 RTD:
    - Pt 0°C to 150°C
    - Pt 0°C to 200°C
    - Pt 0°C to 400°C
    - Pt -200°C to 200°C
  - IEC RTD 100 ohms (α = 0.00385)
  - JIS RTD 100 ohms (α = 0.00392)
  - Pt 1000 RTD:
    - Pt 0°C to 160°C
  - Balco 500 RTD:
    - -30°C to 120°C
  - Ni 50 RTD:
    - -80°C to 100°C
  - Ni 508 RTD:
    - 0°C to 100°C
  - BA1:
    - -200°C to 600°C
- Accuracy: ±0.1% or better
- CMR @ 50/60 Hz: 120 dB
- Span Drift: ±25 ppm/°C
- Zero Drift: ±3 µV/°C

Analog Output
- Channels: 1
differential
- Input Impedance: Voltage: 2 MΩ Current: 125 mA (Added by users)
- Input Type: mV and mA
- Input Range: ±15 mV, ±50 mV, ±100 mV, ±500 mV, ±20 mA
- Accuracy: ±0.1% or better
- CMR @ 50/60 Hz: 150 dB
- Span Drift: ±25 ppm/°C
- Zero Drift: ±6 µV/°C

Digital Output
- Channels: 4, open collector to 30 V, 30 mA max. load
- Power Dissipation: 300 mW

Common Specifications

General
- Power Input: Unregulated 10 ~ 30 Vdc
- Resolution: 16 bits
- NMR @ 50/60 Hz: 100 dB
- Sampling Rate: 10 sample/second (total)
- Isolation Voltage: 3,000 Vdc

Environment
- Humidity: 5 ~ 95% RH
- Operating Temperature: 0 ~ 70°C (14 ~ 158°F)
- Storage Temperature: -25 ~ 85°C (-13 ~ 185°F)

Ordering Information
- ADAM-4015: 6-ch RTD Input Module with Modbus
- ADAM-4015T: 6-ch Thermistor Input Module with Modbus
- ADAM-4016: 1-ch Analog Input/Output Module
ADAM-4017+ 8-ch Analog Input Module with Modbus
ADAM-4018+ 8-ch Thermocouple Input Module with Modbus
ADAM-4019+ 8-ch Universal Analog Input Module with Modbus

Specifications

General
- Power Consumption: 1.2 W @ 24 VDC
- Watchdog Timer: System (1.6 second) & Communication
- Supported Protocols: ASCII command and Modbus/RTU

Analog Input
- Channels: 8 differential
- Channel Independent: Yes
- Input Impedance: Voltage: 20 MΩ, Current: 120 Ω
- Input Type: ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA, 4 – 20 mA
- Input Range: ±1 V, ±2.5 V, ±5 V, ±10 V, ±100 mV, ±500 mV, ±20 mA, 4 – 20 mA
- Burn-out Detection: All T/C

T/C Types and Temperature Ranges

<table>
<thead>
<tr>
<th>T/C Type</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>0 – 760°C</td>
</tr>
<tr>
<td>K</td>
<td>0 – 1,370°C</td>
</tr>
<tr>
<td>R</td>
<td>500 – 1,750°C</td>
</tr>
<tr>
<td>S</td>
<td>500 – 1,750°C</td>
</tr>
<tr>
<td>T</td>
<td>-100 – 400°C</td>
</tr>
<tr>
<td>B</td>
<td>500 – 1,800°C</td>
</tr>
<tr>
<td>E</td>
<td>0 – 1,000°C</td>
</tr>
</tbody>
</table>

Common Specifications

General
- Power Input: Unregulated 10 – 30 VDC
- Connectors: 2 x plug-in terminal block (#14 – 22 AWG)

Analog Input
- Accuracy: Voltage mode: ±0.1% or better
- Current mode: ±0.2% or better
- Resolution: 16-bit
- Sampling Rate: 10 sample/second (total)
- Isolation Voltage: 3,000 VDC
- Overvoltage Protection: ±35 VDC
- CMR @ 50/60 Hz: 120 dB
- NMR @ 50/60 Hz: 100 dB
- Span Drift: ±25 ppm/°C
- Zero Drift: ±6 µV/°C
- Built-in TVS/ESD Protection

Environment
- Humidity: 5 – 96% RH
- Operating Temperature: -10 – 70°C (-14 – 158°F)
- Storage Temperature: -25 – 85°C (-13 – 185°F)

Ordering Information
- ADAM-4017+: 8-ch Analog Input Module with Modbus
- ADAM-4018+: 8-ch Thermocouple Module w/ Modbus
- ADAM-4019+: 8-ch Universal Analog Module w/ Modbus
Specifications

General
- Connectors: 2 x plug-in terminal blocks (#14 ~ 22 AWG)
- Power Consumption: 1.4 W @ 24 V_{dc}
- Watchdog Timer: System (1.6 second)
- Supported Protocols: ASCII command

Analog Output
- Channels: 2
- Output Impedance: 0.5 Ω
- Output Range: 0 ~ 20 mA, 4 ~ 20 mA
- Output Type: mA, V
- Accuracy: ±0.1 % of FSR for current output, ±0.2 % of FSR for voltage output
- Zero Drift: Voltage output: ±30 μV/°C, current output: ±0.2 μA/°C

Common Specifications

General
- Power Input: Unregulated 10 ~ 30 V_{dc}
- Humidity: 5 ~ 95% RH
- Operating Temperature: -10 ~ 70° C
- Storage Temperature: -25 ~ 85° C (-13 ~ 185° F)

Digital Input
- Channels: 2
- Dry Contact: Logic level 0-close to GND, Logic level 1-open

Digital Output
- Channels: 2
- Output Type: Open Collector to 30 V, 30 mA max. load
- Power Dissipation: 300 mW

Ordering Information
- ADAM-4021: 1-ch Analog Output Module
- ADAM-4022T: 2-ch Serial Dual Based Loop PID Controller w/ Modbus
- ADAM-4024: 4-ch Analog Output Module with Modbus

www.advantech.com/products

ADAM-4021
ADAM-4022T
ADAM-4024
Specifications

**General**
- Connectors: 2 x plug-in terminal blocks (#14 ~ 22 AWG)
- Power Consumption: 0.4 W @ 24 V DC
- Watchdog Timer: System (1.6 second)
- Supported Protocols: ASCII command

**Digital Input**
- Channels: 7
  - Logic level 0: 1 V max.
  - Logic level 1: 3.5 ~ 30 V
  - Pull up current: 0.5 mA,
    10 kΩ resistor to 5 V
- Input Level
  - Dry contact: Logic level 0: open
    Logic level 1: close to GND
  - Wet contact: Logic level 0: 3 V max
    Logic level 1: 10 ~ 50 V
  (Note: Digital Input levels 0 and 1 can be inverted)

**Digital Output**
- Channels: 8
  - Open collector to 30 V, 30 mA max. load
- Power Dissipation: 300 mW

**Digital Input**
- Channels: 16
- Input Voltage: 50 V max
- Input Level
  - Dry contact: Logic level 0: open
    Logic level 1: close to GND
  - Wet contact: Logic level 0: 3 V max
    Logic level 1: 10 ~ 50 V
  (Note: Digital Input levels 0 and 1 can be inverted)
- Isolation Voltage: 5,000 V RMS
- Input Resistance: 3 kΩ
- Overvoltage Protection: 2,500 VAC

**Common Specifications**

**General**
- Power Input: Unregulated 10 ~ 30 VDC

**Environment**
- Humidity: 5 ~ 95% RH
- Operating Temperature: -10 ~ 70°C (14 ~ 158°F)
- Storage Temperature: -25 ~ 85°C (-13 ~ 185°F)

**Ordering Information**
- ADAM-4050: 15-ch Digital I/O Module
- ADAM-4051: 16-ch Isolated Digital Input Module with Modbus
- ADAM-4052: 8-ch Isolated Digital Input Module
ADAM-4053  16-ch Digital Input Module
ADAM-4055  16-ch Isolated Digital I/O Module with Modbus
ADAM-4080  2-ch Counter/Frequency Module

Specifications

General
- Connectors  2 x plug-in terminal blocks (#14 – 22 AWG)
- Power Consumption  1 W @ 24 Vdc
- Watchdog Timer  System (1.6 second)
- Supported Protocols  ASCII command

Digital Input
- Channels  16
- Input Level
  Dry contact: Logic level 0: close to GND
  Logic level 1: open
  Logic level 1: 4 – 30 V
- Wet contact: Logic level 0: 2 V max.
- Effective Distance  500 m max. (dry contact only)

Specifications

General
- Connectors  2 x plug-in terminal blocks (#14 – 22 AWG)
- Power Consumption  1 W @ 24 Vdc
- Watchdog Timer  System (1.6 second) & Communication
- Supported Protocols  ASCII command and Modbus/RTU
- Isolation Voltage  2,500 Vdc
- LED Indicators  Yes

Digital Input
- Channels  8
- Input Level
  Dry Contact: Logic level 0: open
  Logic level 1: close to GND
  Logic level 1: 3 V max.
- Wet Contact: Logic level 1: 10 – 50 V
- Overvoltage Protection

Digital Output
- Channels  2, open collector to 40 V (200 mA max. load)
- Power Dissipation  Channel: 1 W max.
  Total: 2.2 W (8 Channels)

Common Specifications

General
- Power Input  Unregulated 10 – 30 Vdc
Environment
- Humidity  5 – 95% RH
- Operating Temperature  -10 – 70°C
  (14 – 158° F)
- Storage Temperature  -25 – 85°C
  (-13 – 185° F)

Ordering Information
- ADAM-4053  16-ch Digital Input Module
- ADAM-4055  16-ch Isolated Digital I/O Module with Modbus
- ADAM-4080  2-ch Counter/Frequency Modules

Counter Input
- Channels  2 independent counters
  (32-bit + 1-bit overflow)
- Input Frequency  50 kHz max.
- Input Pulse Width  >10 µs.
- Input Mode  Isolated or non-isolated
  Logic level 0: 1 V max.
  Logic level 1: 3.5 – 30 V
- Isolation Voltage  2,500 Vrms
- Non-isolated Programmable Input Level
  Threshold: Logic level 0: 0.8 Vmax.
  Logic level 1: 2.4 – 5.0 V
  4.294,967,295 (32 bits)
- Maximum Count  4,294,967,295 (32 bits)
- Preset Type  Absolute or relative
- Programmable Digital Noise Filter
- Alarm  Alarm comparators on each counter
- Frequency Measurement Range  5 Hz – 50 kHz
- Programmable Built-in Gate Time  1 or 0.1 second

Ordering Information
- ADAM-4053  16-ch Digital Input Module
- ADAM-4055  16-ch Isolated Digital I/O Module with Modbus
- ADAM-4080  2-ch Counter/Frequency Modules

Digital Output
- Channels  2, open collector to 30 V, 30 mA max. load
- Power Dissipation  360 mW for each channel
ADAM-4060
ADAM-4068
ADAM-4069

4-ch Relay Output Module
8-ch Relay Output Module with Modbus
8-ch Power Relay Output Module with Modbus

Specifications

General
- Connectors 2 x plug-in terminal blocks (#14 - 22 AWG)
- Power Consumption 0.8 W @ 24 V DC
- Watchdog Timer System (1.6 second)
- Supported Protocols ASCII command

Relay Output
- Breakdown Voltage 500 V AC (50/60 Hz)
- Channels 2 x form A
  2 x form C
- Contact Rating (Resistive) 0.6 A @ 125 V AC
  0.3 A @ 250 V AC
  2 A @ 30 V DC
  0.6 A @ 110 V DC
- Initial Insulation Resistance 1 G Ω min. at 500 V DC
- Relay off Time (Typical) 2 ms
- Relay on Time (Typical) 3 ms
- Maximum Operating Speed 20 operations/min (at related load)

Relay Output
- Breakdown Voltage 500 V AC (50/60 Hz)
- Channels 4 x form A
  4 x form C
- Contact Rating (Resistive) 0.5 A @ 120 V AC
  0.25 A @ 240 V AC
  1 A @ 30 V DC
  0.3 A @ 110 V DC
- Initial Insulation Resistance 1 G Ω min. at 500 V DC
- Relay off Time (Typical) 4 ms
- Relay on Time (Typical) 3 ms
- Maximum Operating Speed 50 operations/min (at related load)

Environment
- Humidity 5 - 95% RH
- Operating Temperature -10 - 70° C (14 - 158° F)
- Storage Temperature -25 – 85° C (-13 – 185° F)

Common Specifications

General
- Power Input Unregulated 10 – 30 V DC

Ordering Information
- ADAM-4060 4-ch Relay Output Module
- ADAM-4068 8-ch Relay Output Module with Modbus
- ADAM-4069 8-ch Power Relay Output Module with Modbus

Dimensions

Unit: mm

23-24