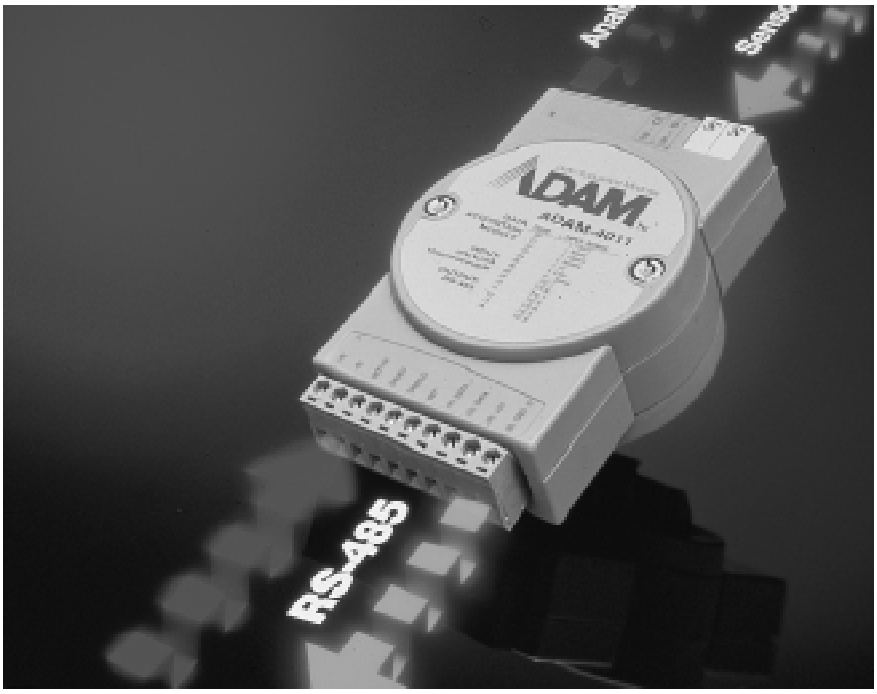



## Applications

- 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

## Introduction

ADAM 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 packages, let them independently provide intelligent signal conditioning, analog I/O, digital I/O, data display and RS-485 communication.

### *Remotely Programmable Input Ranges*

ADAM modules stand out because of their ability to accommodate multiple types and ranges of analog input. You select the type and range remotely by issuing commands from the host computer. You may use just one type of unit for many different tasks, greatly simplifying design and maintenance. You can handle the measurement needs of a whole plant using a single kind of module. Physical adjustments are unnecessary, since all modules are 100% remotely configured by the host computer.

### *Watchdog Timer Inside*

A watchdog timer supervisory function will automatically reset the ADAM modules, reducing the need for maintenance.

### *Flexible Networking*

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

### *Alternative Standalone Control Solution*

A standalone control solution is possible when ADAM modules are controlled by the ADAM-4500 PC-based communication controller. The ADAM-4500 allows users to download an application (written in a high-level programming language) into its flash ROM. This permits customization for your applications.

### *Modular Industrial Design*

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

### *Ready for the Industrial Environment*

ADAM modules accept any unregulated power source between +10 and +30 $V_{DC}$. They are protected against accidental power supply reversals and can be safely connected or disconnected without disturbing a running network.

## RS-485 Multi-Drop Networking

ADAM modules use the EIA RS-485 communication protocol, the industry's most widely used bidirectional, balanced transmission line standard. EIA RS-485 was specifically developed for industrial applications. It lets ADAM modules transmit and receive data at high rates over long distances. All modules use optical isolators to prevent ground-loop problems and limit the chance of damage due to power surges.

### Two-wire Communication

ADAM modules use a single twisted pair of wires to transmit and receive data. Special circuitry suppresses noise picked up from communication lines, ensuring clean and reliable communication. ADAM's two-wire RS-485 technology keeps the number of cables, connectors and communication conditioners (such as repeaters and filters) to a minimum, simplifying installation and reducing overall network costs.

### Surge Protection

ADAM modules offer internal surge protection on their data lines. Internal high speed transient suppressors on each data line protect the modules from damaging voltages or spikes.

### Network Expansion

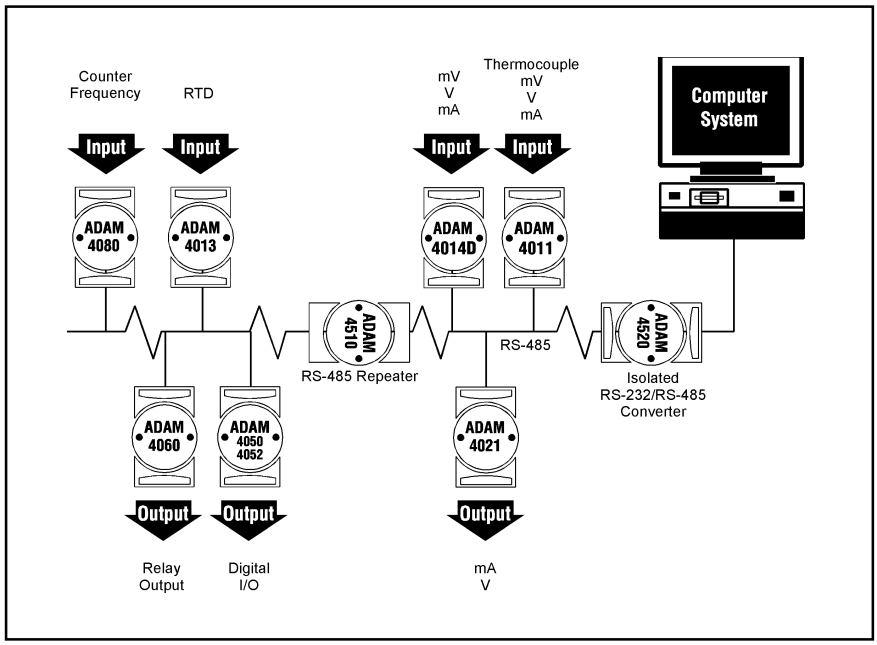
Each ADAM-4510 repeater lets you add 32 ADAM modules to the network or extend the network by another 4000 feet (1.2 km). You can connect up to 256 ADAM modules to a single RS-485 network.

### RS-232/RS-485 Conversion

If no RS-485 interface is available on the host computer, you can use the ADAM-4520 RS-232/RS-485 converter to change standard RS-232 port signals into fully isolated RS-485 signals. The ADAM converter and repeater modules automatically control the RS-485 bus direction without external handshaking signals from the host. Host software written for half-duplex RS-232 may be used without modification. RS-485 bus control is completely transparent to the user. The ADAM converter also protects the host computer from potentially destructive voltages which may develop on the RS-485 data lines.

### Universal Protocol

All ADAM commands are issued in printable ASCII-based form. This allows you to write ADAM applications in any high-level language that supports ASCII string functions, such as C, Pascal or BASIC. RS-232 and ASCII support means that you can use virtually any computer to manage your ADAM network.




*Up to 256 ADAM-4000 modules with repeaters can be connected to a single RS-485 network*

## Single Module, Multiple Input Types and Ranges

The ADAM-4011/4011D Analog Input Modules can be remotely configured for 14 different combinations of input types and ranges (T/C, mA, V, mV). You save on spare parts since you only have to stock one model.

## Analog Input Modules

Analog input modules use microprocessor-controlled high-resolution 16-bit sigma-delta A/D converters to acquire sensor signals such as voltage, current, thermocouple or RTD. They translate analog data into one of the following formats: engineering units, % of FSR, two's complement or ohms. After the modules receive a request from the host, they send the data in the desired format over the RS-485 network.

ADAM analog input modules protect your equipment from ground loops by providing 3000 $V_{DC}$ isolation.

All analog input modules, except for the ADAM-4013, feature digital inputs and outputs which may also be used for alarm and event counting.

### Digital Input/Output

The analog input module's two digital output channels are open-collector transistor switches that you can control from the host computer. By switching solid state relays, the output channels can control heaters, pumps and other power equipment. The module can use its digital input channel to sense the state of a remote digital signal.

### Programmable Alarm Output

Analog input modules include high and low alarm signalling with remotely configurable limit values. After every A/D conversion, the digital value is compared with the high and low limit. The module can change the state of a digital output depending on the result of this comparison. This lets it perform On/Off control of a device independent of the host PC.

### Event Counter

The on-board event counter can count up to 65,535 transitions occurring on the digital input. The counter can be read and cleared by the host computer. The counter can be used in production line applications to keep a record of repetitive operations.

## Eight-channel Analog Input Modules

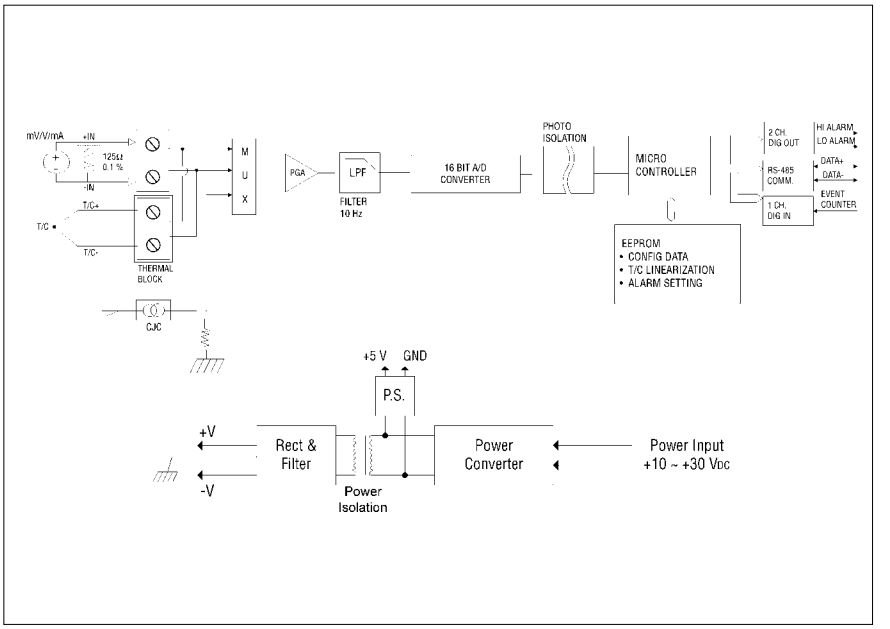
The ADAM-4017/4018 are 16-bit, 8-channel analog input modules that provide programmable input ranges on all channels. These modules are an extremely cost-effective solution for industrial measurement and monitoring applications. 3000 $V_{DC}$ optical isolation between the analog input and the modules protects the modules and peripherals from damage due to high input-line voltages.

## Analog Input Modules with LED Display

The 4½ -digit LED display on the back of the ADAM-4011D/4014D lets you monitor process readings right at their source. The modules display readings in a wide variety of data formats as well as high-low alarm messages. The ADAM-4011D/4014D offers flexibility, ease of installation and direct availability of process data. These modules are the ideal choice for critical process monitoring.

## Eight-channel Analog Input Data Logger

The ADAM-4018M features six differential and two single-ended channels. Its 128 KB of Flash memory can accommodate up to about 38,000 data samples and will write until the memory is exhausted. Featuring a remotely configurable sampling interval of 2 seconds to 18 hours, the ADAM-4018M is the perfect link between industrial processes and your PC, enabling remote process monitoring from virtually any kind of computer.




***Block Diagram of the ADAM-4011 Analog Input Module***

## Strain Gauge Input Modules

The ADAM-4016 is a strain gauge input module with 3000 $V_{DC}$ isolation for load cell and stress measurement. It accepts voltage and current input signals. The module includes 2 digital outputs for programmable alarm output and another 2 digital outputs for individual use. This enables the ADAM-4016 to control a device's On/Off control independent of a host PC.

## Analog Output Modules

The ADAM-4021 Analog Output Module supplies single-channel analog output in a range of voltages and currents. It uses optical isolators to prevent ground loop effects and limit the chance of damage from power surges. You can specify slew rates and start-up currents.

### Analog Readback

The analog output module's ADC (Analog to Digital Converter) is independent of the DAC, so it provides true readback of the analog output signal to the microprocessor. While the ADC is not intended to provide highly accurate measurement of the output data, it indicates that analog output is being produced as intended. It also lets you easily detect output fault conditions due to improper wiring or unexpected loads.

## Digital Input and Output Modules

The ADAM-4050 features seven digital input channels and eight digital output channels. The outputs are open-collector transistor switches that you can control from the host computer. You can also use the switches to control solid-state relays, which in turn can control heaters, pumps or other power equipment. The host computer can use the module's digital inputs to determine the state of limit switches, safety switches or remote digital signals.

The ADAM-4052 provides eight digital input channels: six fully independent isolated channels and two isolated channels with a common ground. All have 5000 $V_{RMS}$ isolation to prevent ground loop effects and prevent damage from power surges on the input lines.

The ADAM-4053 provides 16 digital input channels for dry contact or wet contact signals. For dry contact, the effective distance from DI to contact point is up to 500 m.

## Counter / Frequency Input Module

The ADAM-4080/4080D Isolated Counter/Frequency Input Modules have two 32-bit counter channels and a built-in programmable timer for frequency measurement.

### Programmable Alarm Output

The ADAM-4080/4080D modules include digital alarm functions. You can download alarm values (32-bit) into the module from your host computer.

### Programmable Digital Filter and Threshold

The ADAM-4080/4080D modules include a unique programmable digital filter to reject noise on the input signal. You can specify separate time constants to provide stable output readings.

### Programmable Preset Value

The ADAM-4080 module includes a programmable preset mode. You can download the preset value of a counter into the module from your host computer.

### Front Panel Display

The ADAM-4080D module's 5-digit LED displays the data being sent over a RS-485 line to the host computer. The module can be programmed to show either channel 0 or channel 1. The ADAM-4080D enables users to monitor counter, frequency and RPM data as it is being transmitted.

## Relay Output Modules

As with other ADAM modules, the ADAM-4060 Relay Module is controlled remotely and stores its configuration data in EEPROM. It provides four relay channels, two of Form A and two of Form C. This module is excellent for On/Off control or low-power switching applications.

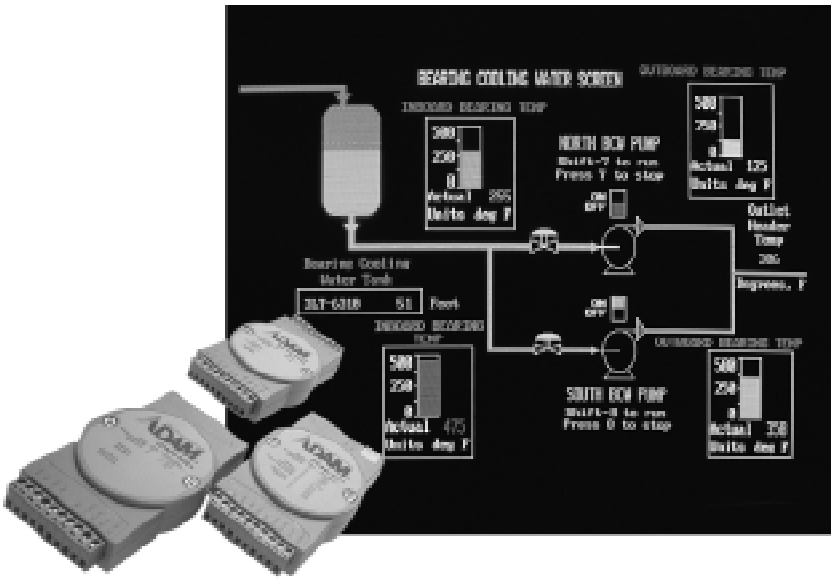
**DIN-Rail Mounting**
*Streamline your system with industry standard DIN-rails*

**Panel/Wallmounts**
*Use this special bracket to mount modules on any flat surface*

**Piggybacking**
*Save space by stacking the modules, one on top of the other*

**Plug-in Terminal Block**
*Save time by leaving wiring intact while connecting or disconnecting modules*

- *Simple Configuration*
- *Easy Programming*
- *Supported by Major DA&C Software Packages*




You can use any high-level language with ASCII-based string functions (such as C, Pascal or BASIC) to communicate with ADAM modules or process their data. For example, the command and response for an analog input module would be:

**Command**: `#05 <CR>`
**Response**: `>+4.834 <CR>`

This command requests the data stored by the module with address 05 (Hex). The module responds with the value +4.834 V.

### *Standard Command Set*

The ADAM-4011 utilizes a standard command set for configuration, shown below (AA is the module's address in hex):

%AANNTTCCFF Configuration: Sets the module's address, input range, baud rate, data format and checksum status for analog input modules

#AA: Read analog input data

$AA0: Span calibration

$AA1: Offset calibration

$AA2: Read configuration status

@AADI: Read alarm/digital inputs

@AADO: Set digital inputs

@AAHI: Set high alarm limit

@AALO: Set low alarm limit

@AAEAT: Enable alarms

@AARE: Read event counter

### *Error Checking with Checksum*

ADAM's built-in checksum feature ensures data integrity by detecting communication errors. This feature adds two checksum characters to every command or response string, thus enabling you to verify that the message received is exactly the same as the message sent.

### *Programming Example*

The following BASIC program demonstrates how to communicate with an ADAM-4011 Analog Input Module through an ADAM-4520 RS-232 to RS-485 Converter Module. The program instructs an ADAM-4011 to measure a T-Type thermocouple and then display the result on screen.

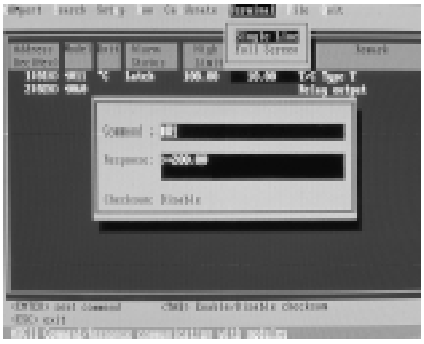
```
10 OPEN "COM1: 9600, N, 8,
   1, RS, CS, CD, DS" AS # 1
20 CMD $="%2324100600"
30 PRINT #1, CMD$ 'ADAM-4011
   is configured to address
   24H,T-type TC input, baud
   rate of 9600, engineering
   unit data format'
40 CMD$="#24"
50 PRINT #1, CMD$ 'Read
   analog input data'
60 RESULT$=INPUT$ (5, #1)
70 PRINT "Temperature=";
   Result$
80 CLOSE: END
```

### *Setup/Utility Software (included)*

Easy-to-use, menu-driven utility software makes configuration and calibration a snap. Its terminal emulation program lets you easily read from and write to ADAM modules. Writing application programs with this software is simple, and you can learn the basics in just a few minutes.

### *Rich Application Software Support*

Most popular industrial process control and SCADA software packages support ADAM, including Labview, InTouch, FIX, Citect, and GENIE. With these ready-to-go application software packages, remote data acquisition, process control, historical trending and data analysis require only a few keystrokes. No programming is necessary.

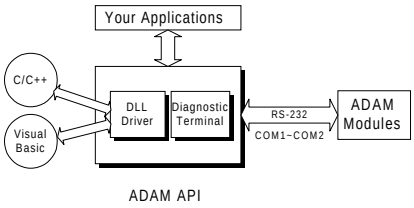


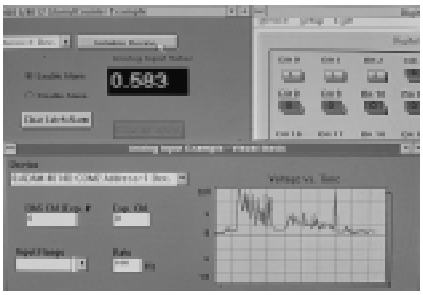
***ADAM Setup/Utility software***

# Windows Application Software

## ADAM DLL Driver

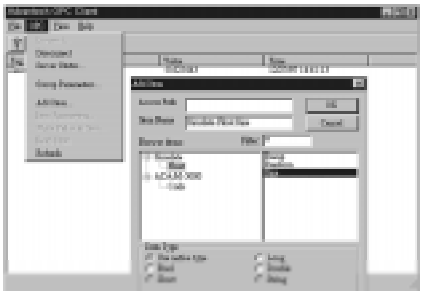
The ADAM API Dynamic Link Library (DLL) driver lets you easily control ADAM modules from your Windows application programs. The DLL driver can use PC-COM ports COM1 or COM2. This library supports C/C++ and Visual BASIC. Drivers support analog I/O and digital I/O as well as counter and temperature measurement. For easy setup and troubleshooting the package also includes Windows programs for data display, module setup and terminal emulation.



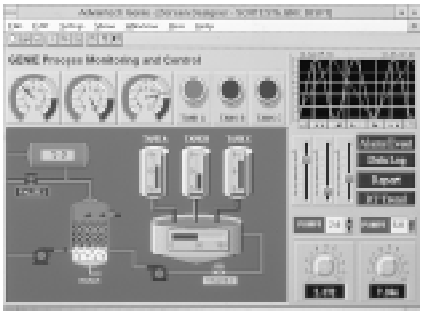
## ADAM OPC Server

OPC is a standardized interface for industrial device servers. An OPC server lets devices, such as PLCs and other I/O devices, communicate with a wide range of MMI/SCADA software packages residing on a server. Advantech OPC server drivers conform to OPC standards, and provide immediate compatibility between Advantech I/O systems and a very wide range of application software systems. Any software system with OPC client capabilities can access Advantech OPC server drivers. Advantech OPC server drivers are available for many Advantech devices, including ADAM-4000, ADAM-5000/485 and ADAM-5000/CAN modules.



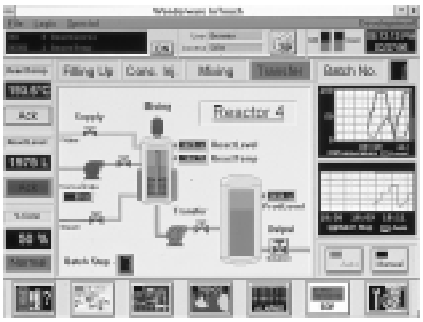
## GENIE

GENIE is an easy-to-use, flexible data acquisition and control software package designed for the Microsoft Windows environment. GENIE provides an intuitive object-oriented graphical user interface (GUI) that simplifies control strategy and display setups. You simply select icon blocks from the toolbox, connect them, and draw your dynamic display without any programming. In addition, GENIE features Script Designer (a BasicScript engine), DataCenter, Task Designer, Screen Designer, Report Designer, and DDE/OLE Automation to deliver a flexible and open industrial monitoring and control development environment.



## Third Party Drivers

In order to provide the best PC-based automation solution for your application needs, Advantech offers InTouch, FIX and Citect drivers for Adam-4000 and Adam-5000 series modules. Wonderware InTouch, Intellution FIX and Citect are consistently rated as the top software products for industrial automation and related applications. These packages enable users to quickly and easily build a powerful control interface for their manufacturing or industrial process. Whether you choose an MMI package or a SCADA system, you will receive the same powerful features, functionality and data integrity that have made these products an industry standard.



# ADAM Selection Guide

Analog Input

| Module | | ADAM-4011 | ADAM-4011D | ADAM-4012 | ADAM-4013 | ADAM-4014D | ADAM-4016 | ADAM-4017 | ADAM-4018 | ADAM-4018M |
|---|---|---|---|---|---|---|---|---|---|---|
| Analog input | Resolution | 16 bit | 16 bit | 16 bit | 16 bit | 16 bit | 16 bit | 16 bit | 16 bit | 16 bit |
| | Input channels | 1 differential | 1 differential | 1 differential | 1 differential | 1 differential | 1 differential | 6 differential<br>2 S. E. | 6 differential<br>2 S. E. | 6 differential<br>2 S. E. |
| | Sampling rate | 10 Hz | 10 Hz | 10 Hz | 10 Hz | 10 Hz | 10 Hz | 10 Hz<br>(total) | 10 Hz<br>(total) | 10 Hz<br>(total) |
| | Voltage input | ±15 mV<br>±50 mV<br>±100 mV<br>±500 mV<br>±1 V<br>±2.5 V | ±15 mV<br>±50 mV<br>±100 mV<br>±500 mV<br>±1 V<br>±2.5 V | ±150 mV<br>±500 mV<br>±1 V<br>±5 V<br>±10 V | - | ±150 mV<br>±500 mV<br>±1 V<br>±5 V<br>±10 V | ±15 mV<br>±50 mV<br>±100 mV<br>±500 mV | ±150 mV<br>±500 mV<br>±1 V<br>±5 V<br>±10 V | ±15 mV<br>±50 mV<br>±100 mV<br>±500 mV<br>±1 V<br>±2.5 V | ±15 mV<br>±50 mV<br>±100 mV<br>±500 mV<br>±1 V<br>±2.5 V |
| | Current input | ±20 mA* | ±20 mA* | ±20 mA* | - | ±20 mA | ±20 mA | ±20 mA* | ±20 mA* | ±20 mA* |
| | Direct sensor input | J, K, T, E,<br>R, S, B<br>Thermocouple | J, K, T, E,<br>R, S, B<br>Thermocouple | - | RTD<br>Pt, Ni | - | - | - | J, K, T, E,<br>R, S, B<br>Thermocouple | J, K, T, E,<br>R, S, B<br>Thermocouple |
| | Digital LED display | - | 4½ digit | - | - | 4½ digit | - | - | - | - |
| | Isolated loop power | - | - | - | - | Yes | - | - | - | - |
| | Input linear scaling | - | - | - | - | Yes | - | - | - | - |
| | Isolation | 3000 $V_{DC}$ | 3000 $V_{DC}$ | 3000 $V_{DC}$ | 3000 $V_{DC}$ | 500 $V_{DC}$ | 3000 $V_{DC}$ | 3000 $V_{DC}$ | 3000 $V_{DC}$ | 3000 $V_{DC}$ |
| | Storage capacity | - | - | - | - | - | - | - | - | 128 KB Flash Memory |
| Digital input and output | Digital input channels | 1 | 1 | 1 | - | 1 | - | - | - | - |
| | Digital output channels | 2 | 2 | 2 | - | 2 | 4 | - | - | - |
| | Event counter | Yes | Yes | Yes | - | Yes | - | - | - | - |
| | High/Low alarm settings | Yes | Yes | Yes | - | Yes | - | - | - | - |
| Analog output | Output channels | - | - | - | - | - | 1 | - | - | - |
| | Voltage output | - | - | - | - | - | 0 - 10 V | - | - | - |
| | Drive current | - | - | - | - | - | 30 mA | - | - | - |
| Watchdog timer | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

*: Requires a 125 Ω shunt resistor

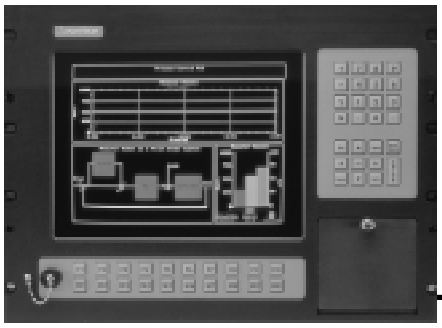
| | | Analog Output | Digital I/O | | | Relay Output | Counter | |
|---|---|---|---|---|---|---|---|---|
| Module | | ADAM-4021 | ADAM-4050 | ADAM-4052 | ADAM-4053 | ADAM-4060 | ADAM-4080 | ADAM-4080D |
| Analog output | Resolution | 12 bit | - | - | - | - | - | - |
| | Output channels | 1 | - | - | - | - | - | - |
| | Voltage output | 0 - 10 V | - | - | - | - | - | - |
| | Current output | 0 - 20 mA<br>4 - 20 mA | - | - | - | - | - | - |
| Digital input and output | Digital input channels | - | 7 | 8 | 16 | - | - | - |
| | Digital output channels | - | 8 | - | - | 4-channel relay | 2 | 2 |
| | Alarm settings | - | - | - | - | - | Yes | Yes |
| Counter (32-bit) | Channels | - | - | - | - | - | 2 | 2 |
| | Input frequency | - | - | - | - | - | 50 kHz | 50 kHz |
| Isolation | | 3000 $V_{DC}$ | - | 5000 $V_{RSM}$ | - | - | 2500 $V_{RSM}$ | 2500 $V_{RSM}$ |
| Digital LED display | | - | - | - | - | - | - | 5 digit |
| Watchdog timer | | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

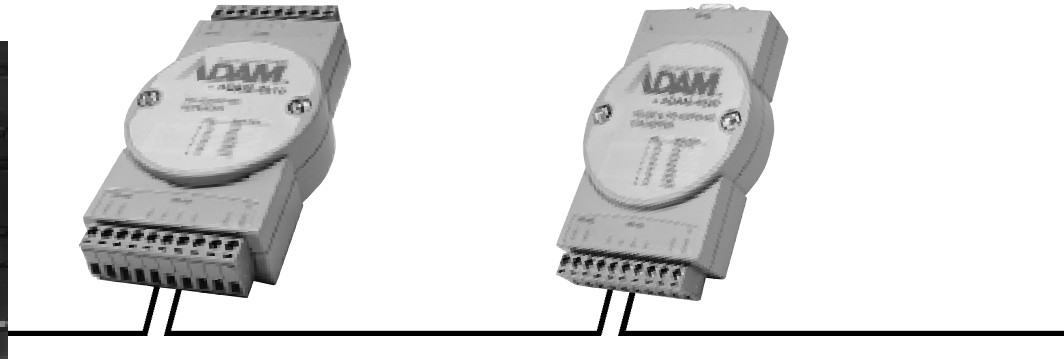




Note: All specifications are subject to change without notice

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





## ADAM-4510/4510S RS-422/485 Repeater

- **Input:**
  RS-485 (2-wire) or RS-422 (4-wire)
- **Output**:
  RS-485 (2-wire) or RS-422 (4-wire).
  Speed (bps): 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 57.6 k, 115.2 k, RTS control and RS-422 mode (switchable)
- **RS-422/485 interface connector**:
  Plug-in screw terminal
- **Isolation voltage**: 3000 $V_{DC}$
  (ADAM-4510S only)
- **Power consumption**: 1.4 W

## ADAM-4520 Isolated RS-232 to RS-422/485 Converter

- **Input:**
  RS-232 (4-wire)
- **RS-232 interface connector**:
  Female DB-9
- **Output**:
  RS-485 (2-wire) or RS-422 (4-wire).
  Speed (bps): 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 57.6 k, 115.2 k, RTS control and RS-422 mode (switchable)
- **RS-422/485 interface connector**:
  Plug-in screw terminal
- **Isolation voltage**: 3000 $V_{DC}$
- **Power consumption**: 1.2 W

## ADAM 4000 Series Common Specifications

### Communication

- RS-485 (2-wire) to host
- Speeds: 1200, 2400, 4800, 9600, 19200, 38400 bps
- Max. communication distance: 4000 feet (1.2 km)
- Power and communication LED indicator
- ASCII command/response protocol
- Communication error checking with checksum
- Asynchronous data format: 1 start bit, 8 data bits, 1 stop bit, no parity
- Up to 256 multidrop modules per serial port
- On-line module insertion and removal
- Transient suppression on RS-485 communication lines

### Power Requirements

- Unregulated +10 ~ +30 $V_{DC}$
- Protected against power reversal

### Mechanical

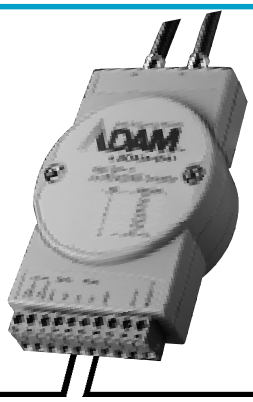
- **Case**: ABS with captive mounting hardware
- **Plug-in screw terminal block**:
  Accepts 0.5 $mm^2$ to 2.5 $mm^2$,
  1 - #12 or 2 - #14 to #22 AWG

### Environment

- **Operating temperature**: -10 ~ 70° C (14 ~ 158° F)
- **EMI**: Meets FCC Class A
- **Storage temperature**: -25 ~ 85° C (-13 ~ 185° F)
- **Humidity**: 5 ~ 95%, non-condensing

# ADAM

## ADAM-4500 PC-based Communication Controller
## ADAM-4541 Fiber Optic to RS-232/422/485 Converter
## ADAM-4550 2.4 GHz Radio Modem Module



## ADAM-4500 PC-based Communication Controller

### Board

- **CPU:** 80188, 16-bit microprocessor
- **Flash ROM**: 256 KB (170 KB free memory for the user)
- **Operating system**: Boot ROM-DOS
- **Timer BIOS**: Yes
- **SRAM**: 256 KB (234 KB free memory for the user)
- **Real-time clock**: Yes
- **Watchdog timer**: Yes
- **COM1**: RS-232/RS-485
- **COM2**: RS-485
- **Program download port (RS-232)**: Tx, Rx, GND

### Communication

- **RS-232/485 transmission speed**: Up to 115.2 kbps
- **RS-232 interface connector**: Female DB-9
- **RS-485 interface connector**: Plug-in screw terminal
- **RS-485 auto flow control**

### Power

- **Power requirement**: +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption:** 2.0 W

## ADAM-4541 Fiber Optic to RS-232 / 422 / 485 Converter

### Communication

- **Fiber optic input**
- **RS-232/422/485 output transmission speed (bps)**: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 57.6 k, 115.2 k and RS-232/422 mode (switchable)
- **Communication mode**: asynchronous, full/half duplex
- **RS-232/422/485 interface connector**: Plug-in screw terminal
- **Fiber connector**: ST
- **Transmission distance**: Over 2.5 km
- **Optical power budget (attenuation):** 12.5 db (measured with 62.5/125 μm)
- **Fiber optical type:** multimode
- **Wavelength:** 820 nm

### Power

- **Power requirement**: +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 1 W, typ., (1.5 W, max.)

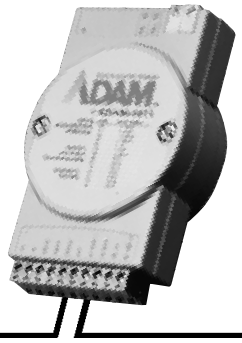
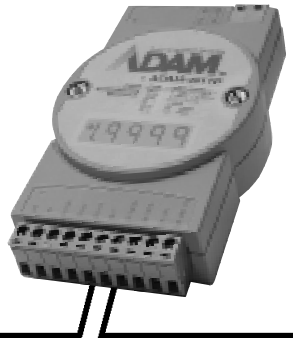
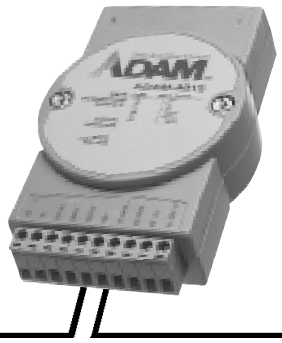
## ADAM-4550 2.4 GHz Radio Modem Module (RS-232 / 485 Interface)

- **RS-232/485 transmission speed (bps)**: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 57.6 k, 115.2 k
- **RS-232 interface connector**: Female DB-9
- **RS-485 interface connector**: Plug-in screw terminal
- **Radio transmission rate**: 1 Mbps
- **Radio transmission frequency**: 2.45 GHz nominal
- **Radio transmission power**: 100 mW nominal
- **Radio modulation**: Direct sequence spread spectrum PSK
- **Radio communication**: Point-to-Point or Point-to-multipoint
- **Antenna**: 2 dBi omni antenna included (Effective communication distance: Up to 550 feet under open site test)
- **Includes diagnostic software for measuring radio links**
- **Automatic RS-485 data flow control**
- **Power consumption**: 4 W



Note: All specifications are subject to change without notice

# ADAM-4011 Analog Input Module
# ADAM-4011D Thermocouple Input Module with LED Display
# ADAM-4012 Analog Input Module

## ADAM-4011 Analog Input Module

***Analog Input***

- **Effective resolution:** 16-bit
- **Input type:** Thermocouple, mV, V or mA
- **Input range:** ±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, ±20 mA
- **T/C type and temperature range**:

| | | | |
|---|---|---|---|
| J | 0 | ~ | 760° C |
| K | 0 | ~ | 1370° C |
| T | -100 | ~ | 400° C |
| E | 0 | ~ | 1000° C |
| R | 500 | ~ | 1750° C |
| S | 500 | ~ | 1750° C |
| B | 500 | ~ | 1800° C |

- **Isolation voltage**: 3000 $V_{DC}$
- **Input surge protection**: yes
- **Sampling rate**: 10 samples/sec.
- **Input impedance:** 2 MΩ
- **Bandwidth**: 2.62 Hz
- **Accuracy**: ±0.05% or better
- **Zero drift**: ±3 μV/°C
- **Span drift**: ±25 ppm/°C
- **CMR @ 50/60 Hz**: 150 dB
- **NMR @ 50/60 Hz**: 100 dB

***Digital Input***

- **Channels**: 1
  (See specifications of ADAM-4012)
- **Event counter:**
  (See specifications of ADAM-4012)

***Digital Output***

- **Channels**: 2
  (See specifications of ADAM-4012)

***Built-in Watchdog Timer***

***Power***

- **Power requirements**:
  +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 1.2 W

## ADAM-4011D Thermocouple Input Module with LED Display

***Analog Input***

- **Effective resolution:** 16-bit
- **Input type:** Thermocouple, mV, V or mA
- **Input range**: same as ADAM-4011
- **T/C type and temperature range**: same as ADAM-4011
- **Isolation voltage**: 3000 $V_{DC}$
- **Input surge protection**: Yes
- **Thermocouple open detection**: Yes
- **Sampling rate**: 10 samples/sec.
- **Input impedance:** 2 MΩ
- **Bandwidth**: 2.62 Hz
- **Accuracy**: ±0.05% or better
- **Zero drift**: ±3 μV/°C
- **Span drift**: ±25 ppm/°C
- **CMR @ 50/60 Hz**: 150 dB
- **NMR @ 50/60 Hz**: 100 dB

***Display***

- **LED indicator**: 4½ - digit readout

***Digital Input***

- **Channels**: 1
  (See specifications of ADAM-4012)
- **Event counter:**
  (See specifications of ADAM-4012)

***Digital Output***

- **Channels**: 2
  (See specifications of ADAM-4012)

***Built-in Watchdog Timer***

***Power***

- **Power requirements**:
  +10 to +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 1.4 W

## ADAM-4012 Analog Input Module

***Analog Input***

- **Effective resolution:** 16-bit
- **Input type**: mV, V or mA
- **Input range:** ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V and ±20 mA
- **Isolation voltage**: 3000 $V_{DC}$
- **Sampling rate**: 10 samples/sec.
- **Input impedance:** 2 MΩ
- **Bandwidth**: 2.62 Hz
- **Accuracy**: ±0.05% or better
- **Zero drift**: ±6 μV/°C
- **Span drift**: ±25 ppm/°C
- **CMR @ 50/60 Hz**: 150 dB
- **NMR @ 50/60 Hz**: 100 dB

***Digital Input***

- **Channels**: 1
  Logic level 0: +1 V max.
  Logic level 1: +3.5 V ~ +30 V
  Pull up current: 0.5 mA,
  10 KΩ resistor to +5 V
- **Event counter:**
  Max. input frequency: 50 Hz
  Min. input pulse width: 1 msec.

***Digital Output***

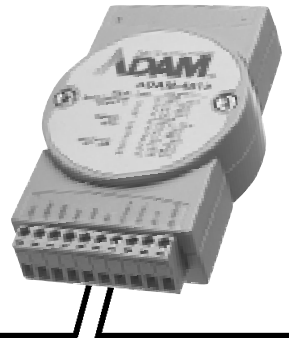
- **Channels**: 2
  Open collector to 30 V,
  30 mA max. load
  Power dissipation: 300 mW

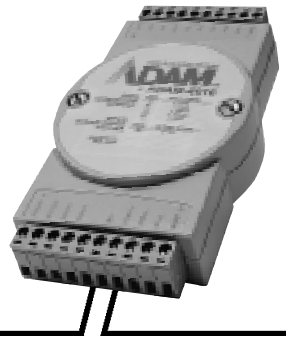
***Built-in Watchdog Timer***

***Power***

- **Power requirements**:
  +10 to +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 1.2 W

# ADAM-4013 RTD Input Module
# ADAM-4016 Strain Gauge Input Module
# ADAM-4017 8-Channel Analog Input Module





## ADAM-4013 RTD Input Module

***Analog Input***

- **Effective resolution:** 16-bit
- **Input type**: Pt or Ni RTD
- **RTD types and temperature ranges:**

  Pt -100° C to +100° C α = 0.00385
  Pt 0° C to +100° C α = 0.00385
  Pt 0° C to +200° C α = 0.00385
  Pt 0° C to +600° C α = 0.00385
  Pt -100° C to +100° C α = 0.003916
  Pt 0° C to +100° C α = 0.003916
  Pt 0° C to +200° C α = 0.003916
  Pt 0° C to +600° C α = 0.003916
  Ni -80° C to +100° C
  Ni 0° C to +100° C
- **Isolation voltage**: 3000 $V_{DC}$
- **Sampling rate**: 10 samples/sec.
- **Input impedance:** 2 MΩ
- **Bandwidth**: 2.62 Hz
- **Input connections**: 2, 3 or 4 wire
- **Accuracy**: ±0.05% or better
- **Zero drift**: ±3 μV/°C
- **Span drift**: ±25 ppm/°C
- **CMR @ 50/60 Hz**: 150 dB
- **NMR @ 50/60 Hz**: 100 dB

***Built-in Watchdog Timer***

***Power***

- **Power requirements**: +10 to +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 0.7 W

## ADAM-4016 Strain Gauge Input Module

***Strain Gauge Input***

- **Effective resolution:** 16-bit
- **Channels**: 1 differential
- **Input type**: mV and mA
- **Input range**: ±15 mV, ±50 mV, ±100 mV, ±500 mV, ±20 mA
- **Isolation voltage**: 3000 $V_{DC}$
- **Sampling rate**: 10 samples/sec.
- **Input impedance:** 2 MΩ
- **Bandwidth**: 2.62 Hz
- **Accuracy**: ±0.05% or better
- **Zero drift**: ±6 μV/°C
- **Span drift**: ±25 ppm/°C
- **CMR @ 50/60 Hz**: 150 dB
- **NMR @ 50/60 Hz**: 100 dB

***Analog Output***

- **Channel**: 1
- **Output type**: V
- **Output range:** 0 ~ 10 V
- **Drive current**: 30 mA
- **Isolation voltage**: 3000 $V_{DC}$
- **Accuracy**: 0.05% of FSR
- **Drift**: ±50 ppm/°C

***Digital Output***

- **Channels**: 4 (see specifications of ADAM-4012)

***Built-in Watchdog Timer***

***Power***

- **Power requirements**: +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 2.2 W

## ADAM-4017 8-Channel Analog Input Module

***Analog Input***

- **Effective resolution:** 16-bit
- **Channels**: Six differential, two single-ended
- **Input type**: mV, V, mA
- **Input range**: ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA
- **Isolation voltage**: 3000 $V_{DC}$
- **Fault and overvoltage protection:** Withstands overvoltage up to ±35 V
- **Sampling rate**: 10 samples/sec. (total)
- **Input impedance:** 20 MΩ
- **Bandwidth**: 13.1 Hz @ 50 Hz, 15.72 Hz @ 60 Hz
- **Accuracy**: ±0.1% or better
- **Zero drift**: ±6 μV/°C
- **Span drift**: ±25 ppm/°C
- **CMR @ 50/60 Hz**: 92 dB min.

***Built-in Watchdog Timer***

***Power***

- **Power requirements**: +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 1.2 W

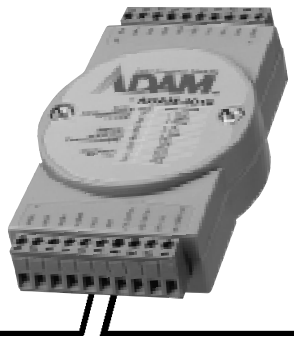


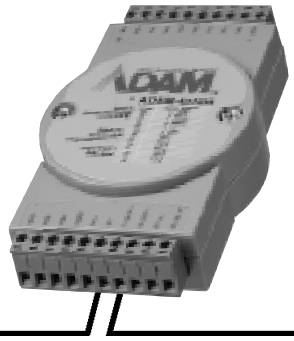


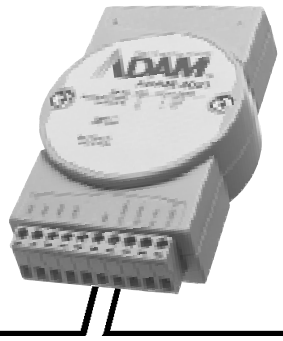
Note: All specifications are subject to change without notice

# ADAM

## ADAM-4018 8-Channel Thermocouple Input Module
## ADAM-4018M 8-Channel Analog Input Data Logger
## ADAM-4021 Analog Output Module







## ADAM-4018 8-Channel Thermocouple Input Module

### *Analog Input*

- **Effective resolution:** 16-bit
- **Channels**:
  Six differential, two single-ended
- **Input type**: Thermocouple, mV, V, mA
- **Input range**: ±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, ±20 mA
- **T/C type and temperature range:**

| | | | |
|---|---|---|---|
| J | 0 | ~ | 760° C |
| K | 0 | ~ | 1370° C |
| T | -100 | ~ | 400° C |
| E | 0 | ~ | 1000° C |
| R | 500 | ~ | 1750° C |
| S | 500 | ~ | 1750° C |
| B | 500 | ~ | 1800° C |

- **Isolation voltage**: 3000 $V_{DC}$
- **Fault and overvoltage protection:** Withstands overvoltage up to ±35 V
- **Sampling rate**: 10 samples/sec. (total)
- **Input impedance:** 20 MΩ
- **Bandwidth**: 13.1 Hz @ 50 Hz, 15.72 Hz @ 60 Hz
- **Accuracy**: ±0.1% or better
- **Zero drift**: ±3 μV/° C
- **Span drift**: ±25 ppm/°C
- **CMR @ 50/60 Hz**: 92 dB min.

### *Built-in Watchdog Timer*

### *Power*

- **Power requirements**:
  +10 ~ +30 $V_{DC}$ (non-isolated)
- **Power consumption**: 0.8 W

## ADAM-4018M 8-Channel Analog Input Data Logger

### *Analog Input*

- **Effective resolution:** 16-bit
- **Channels**:
  Six differential, two single-ended
- **Input type**: Thermocouple, mV, V, mA
- **Input range**: ±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, ±20 mA
- **T/C type and temperature range:**

| | | | |
|---|---|---|---|
| J | 0 | ~ | 760° C |
| K | 0 | ~ | 1370° C |
| T | -100 | ~ | 400° C |
| E | 0 | ~ | 1000° C |
| R | 500 | ~ | 1750° C |
| S | 500 | ~ | 1750° C |
| B | 500 | ~ | 1800° C |

- **Isolation voltage**: 3000 $V_{DC}$
- **Sampling rate**: 10 samples/sec. (total)
- **Input impedance:** 1.8 MΩ
- **Bandwidth**: 13.1 Hz @ 50 Hz, 15.72 Hz @ 60 Hz
- **Accuracy**: ±0.1% or better
- **Zero drift**: ±3 μV/°C
- **Span drift**: ±25 ppm/°C
- **CMR @ 50/60 Hz**: 92 dB min.

### *Storage*

- **Capacity (128KB Flash memory):** 38,000 samples (total)
- **Storage mode:** Write to end of memory & cyclic
- **Logging mode:** Internal log or event log (high/low)
- **Sampling interval:** 2 secs. ~ 18 hours

### *Built-in Watchdog Timer*

### *Power*

- **Power requirements**:
  +10 ~ +30 $V_{DC}$ (non-isolated)
- **Power consumption**: 1.8 W

## ADAM-4021 Analog Output Module

### *Analog Output*

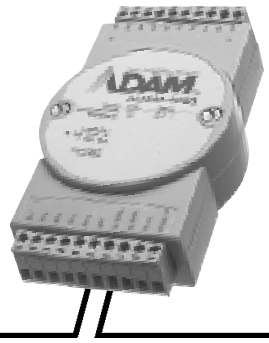
- **Effective resolution:** 12-bit
- **Output type**: mA, V
- **Output range**: 0 to 20 mA, 4 to 20 mA, and 0 to 10 V
- **Isolation voltage**: 3000 $V_{DC}$
- **Output Impedance:** 0.5 Ω
- **Accuracy**:
  ±0.1% of FSR for current output
  ±0.2% of FSR for voltage output
- **Readback accuracy**: ±1% of FSR
- **Resolution**: ±0.015% of FSR
- **Zero drift**:
  Voltage output: ±30 μV/°C
  Current output: ±0.2 μA/°C
- **Span temperature coefficient**: ±25 ppm/°C
- **Programmable output slope**:
  0.125 ~ 128 mA/sec.
  0.0625 ~ 64.0 V/sec.
- **Current load resistor**:
  0 to 500 Ω (source)

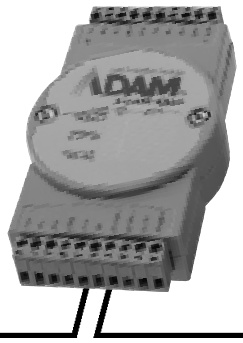
### *Built-in Watchdog Timer*

### *Power*

- **Power requirements**:
  +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 1.4 W

# ADAM-4050 Digital I/O Module
# ADAM-4052 Isolated Digital Input Module
# ADAM-4053 16-Channel Digital Input Module





## ADAM-4050 Digital I/O Module

***Digital Input***

- **Channels**: 7
  Logic level 0: +1 V max.
  Logic level 1: +3.5 V ~ +30 V
  Pull up current: 0.5 mA,
  10 K resistor to +5 V

***Digital Output***

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

***Built-in Watchdog Timer***

***Power***

- **Power requirements**:
  +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 0.4 W

## ADAM-4052 Isolated Digital Input Module

***Digital Input***

- **Channels**: 8
  Six fully independent isolated channels.
  Two isolated channels with common ground
- **Digital input level**:
  Logic level 0: +1 V max.
  Logic level 1: +3 V ~ +30 V
- **Isolation voltage**: 5000 $V_{RMS}$
- **Input resistance**: 3 KΩ/0.5 W

***Built-in Watchdog Timer***

***Power***

- **Power requirements**:
  +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 0.4 W

## ADAM-4053 16-Channel Digital Input Module

***Digital Input***

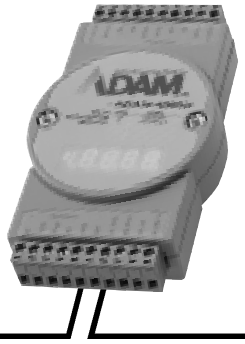
- **Channels**: 16
- **Digital input level**
  **Dry contact:**
  Logic level 0: Close to GND
  Logic level 1: Open
  **Wet contact:**
  Logic level 0: +2 V max.
  Logic level 1: +4 V ~ +30 V
- **Effective distance (dry contact only)**: 500 m max.

***Built-in Watchdog Timer***

***Power***

- **Power requirements**:
  +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 1.0 W

# ADAM-4060 Relay Output Module
# ADAM-4080 Counter/Frequency Input Module
# ADAM-4080D Counter/Frequency Input Module with LED Display



## ADAM-4060 Relay Output Module

***Relay Output***

- **Channels**: 4-channels relay, two Form A and two Form C
- **Contact rating**:
  AC: 125 V @ 0.6 A; 250 V @ 0.3 A
  DC: 30 V @ 2 A; 110 V @ 0.6 A
- **Breakdown voltage**:
  500 $V_{AC}$ (50/60 Hz)
- **Relay on time (typical):** 3 msec.
- **Relay off time (typical)**: 1 msec.
- **Total switching time**: 10 msec.
- **Insulation resistance**:
  1000 MΩ minimum at 500 $V_{DC}$

***Built-in Watchdog Timer***

***Power***

- **Power requirements**:
  +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 0.8 W

## ADAM-4080 Counter/Frequency Input Module

***Counter Input***

- **Channels**:
  Two independent 32-bit counters
- **Input frequency**: 50 kHz max.
- **Input mode**: Isolated or non-isolated
- **Isolation input level**:
  Logic level 0: +1 V max.
  Logic level 1: +3.5 V ~ +30 V
- **Isolation voltage**: 2500 $V_{RMS}$
- **Non-isolated input level**:
  Programmable threshold:
  Logic level 0: 0 to +5 V (default = 0.8 V)
  Logic level 1: 0 to +5 V (default = 2.4 V)
- **Input pulse width**: >10 µsec.
- **Maximum count**:
  4,294,967,295 (32 bits)
- **Programmable digital noise filter**:
  2 µsec. ~ 65 msec.
- **Alarm**: Alarm comparator on each counter
- **Preset type**: Absolute or relative

***Frequency Measurement***

- **Range**: 5 Hz ~ 50 kHz
- **Programmable built-in gate time**:
  1.0/0.1 sec.

***Digital Output***

- **Channels**: 2
  Open collector to 30 V, 30 mA max. load
  Power dissipation: 300 mW

***Built-in Watchdog Timer***

***Power***

- **Power requirements**:
  +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 2.0 W

## ADAM-4080D Counter/Frequency Input Module with LED Display

***Counter Input***

- **Channels**:
  Two independent 32-bit counters
- **Input frequency**: 50 kHz max.
- **Input mode**: Isolated or non-isolated
- **Isolation input level**:
  Logic level 0: +1 V max.
  Logic level 1: +3.5 V ~ +30 V
- **Isolation voltage**: 2500 $V_{RMS}$
- **Non-isolated input level**:
  Programmable threshold:
  Logic level 0: 0 ~ +5 V (default = 0.8 V)
  Logic level 1: 0 ~ +5 V (default = 2.4 V)
- **Input pulse width**: >10 µsec.
- **Maximum count**:
  4,294,967,295 (32 bits)
- **Programmable digital noise filter**:
  2 µsec. ~ 65 msec.
- **Alarm**: High and low alarm comparators on counter 1

***Frequency Measurement***

(See specifications of ADAM-4080)

***Display***

- **LED indicator**: 5-digit readout, CH 0 or CH 1 (programmable)

***Digital Output***

(See specifications of ADAM-4080)

***Built-in Watchdog timer***

***Power***

- **Power requirements**:
  +10 ~ +30 $V_{DC}$ (non-regulated)
- **Power consumption**: 2.0 W

# ADAM-4950-ENC

## IP66 Industrial Enclosure

## ADAM-4950-ENC IP66 Industrial Enclosure

## Introduction

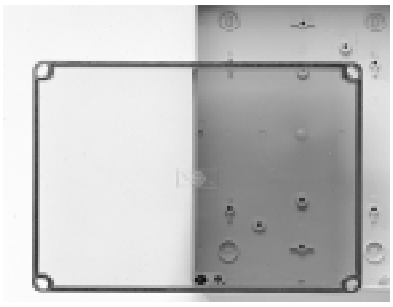
The ADAM-4950-ENC IP66 Industrial Enclosure is designed for use in harsh environments. It offers space for 1 to 3 ADAM modules. Its rugged protective housing guards modules from UV radiation, corrosive materials, moisture and extreme temperatures.

## Features

- Temperature range up to 115° C
- Sidewall knockouts provide factory molded openings that are conveniently positioned for wire, cable or conduit feeders.
- Groove- and lip-type seal design provides the highest possible degree of protection
- Built-in DIN-rail for easy mounting of ADAM modules
- Cable glands included

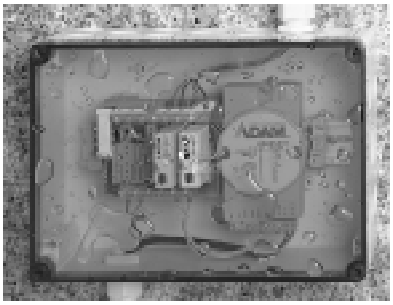
## Enclosure components

- **Case**: Glass filled polycarbonate (PC), transparent cover
- **Accessories (included)**:
  1 x DIN-rail (21.5 cm)
  2 x Polyamide cable glands (seal from 10 - 14 mm)
  4 x Captive lid screws



***Lip-groove seal***
*Non-aging polyurethane seal. Cannot fall out or loosen.*

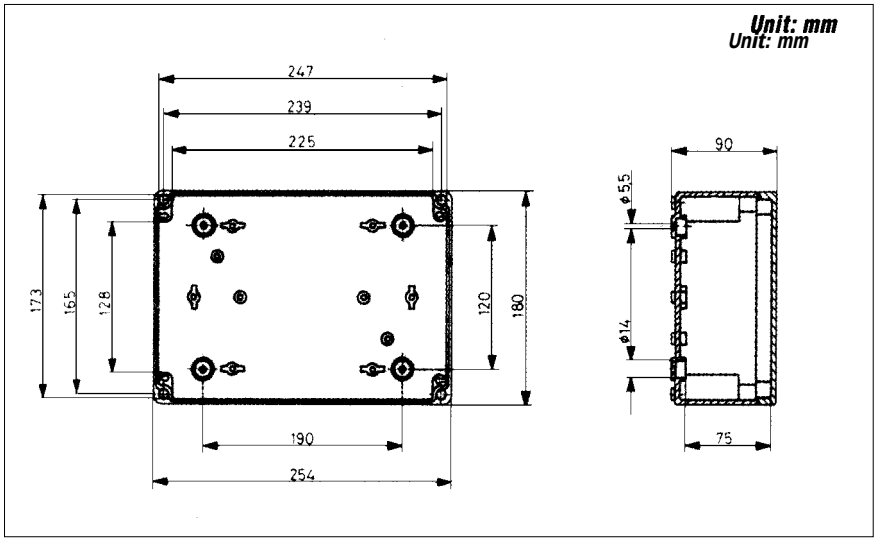
***DIN-rail installation***
*No screws; just snap the module in place. Offers space for three modules.*



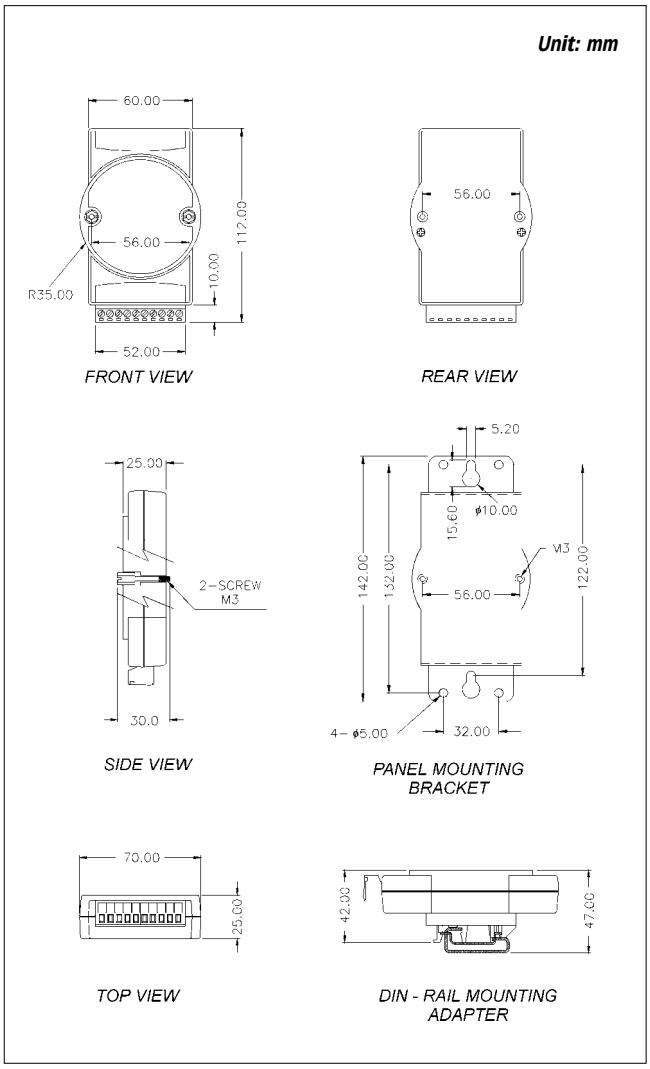
***IP66 protection***
*Resists dust, water jets and even temporary flooding.*

***Mounts in any position***
*Several screw options let you fasten the box in almost any position.*

## Dimensions



## Dimensions




## Ordering Information

- ❑ **ADAM-4011**
  Analog Input Module – mV, V, mA, or thermocouple
- ❑ **ADAM-4011D**
  Thermocouple Input Module with LED display – mV, V, mA or thermocouple
- ❑ **ADAM-4012**
  Analog Input Module – mV, mA, or high voltage
- ❑ **ADAM-4013**
  Analog Input Module – RTD
- ❑ **ADAM-4014D**
  Analog (Transmitter) Input Module with LED Display – mV, mA, or high voltage
- ❑ **ADAM-4016**
  Strain Gauge Input Module – mV or mA
- ❑ **ADAM-4017**
  8-Channel Analog Input Module – mV, V, or mA
- ❑ **ADAM-4018**
  8-Channel Thermocouple Input Module – mV, V, mA, or thermocouple
- ❑ **ADAM-4018M**
  8-Channel Data Logger – mV, V, mA, or thermocouple
- ❑ **ADAM-4021**
  Analog Output Module – V or mA
- ❑ **ADAM-4050**
  Digital I/O Module
- ❑ **ADAM-4052**
  Isolated Digital Input Module
- ❑ **ADAM-4053**
  16-Channel Digital Input Module
- ❑ **ADAM-4060**
  Relay Output Module
- ❑ **ADAM-4080**
  Counter/Frequency Input Module
- ❑ **ADAM-4080D**
  Counter/Frequency Input Module with LED Display
- ❑ **ADAM-4500**
  PC-Based Communication Controller
- ❑ **ADAM-4510**
  RS-422/RS-485 Repeater
- ❑ **ADAM-4510S**
  Isolated RS-422/RS-485 Repeater
- ❑ **ADAM-4520**
  Isolated RS-232 to RS-422/RS-485 Converter
- ❑ **ADAM-4541**
  Fiber Optic to RS-232/422/485 Converter
- ❑ **ADAM-4550**
  2.4 GHz Radio Modem Module (RS-232/485 Interface)

### *Accessories*

- ❑ **ADAM-4950-ENC**
  IP66 Industrial Enclosure

### *Software Drivers*

- ❑ **PCLS-DDE-A**
  Windows DDE Driver for ADAM Series

### *Software Packages*

- ❑ **PCLS-920**
  GENIE
- ❑ **PCLS-FIX**
  FIX Driver for ADAM-4000 Series
- ❑ **PCLS-INT**
  InTouch I/O Driver for ADAM-4000 Series
- ❑ **PCLS-OPC/ADM**
  OPC Server for ADAM-4000/5000 Series (RS-485)
- ❑ **PCLS-NI/ADM32 LabVIEW Driver**
- ❑ **PCLS-OCX/ADM32 ActiveDAQ**

**ESIS Pty Ltd 02 9416 8032**