ADAM-4000 Modbus I/O Solution Profile

Product Coverage

The Modbus protocol has become a de facto standard for data exchange and information communication in industrial network applications targeting facility automation markets. In view of integrating with SCADA/PLC/DCS systems as a complete remote I/O solution, Advantech is introducing the ADAM-4000 Modbus series, consisting of ADAM-4017+ analog input, ADAM-4018+ T/C input, ADAM-4015 RTD input, ADAM-4024 analog output, ADAM-4051/4055 digital input/output, and ADAM-4068 relay output modules.

ADAM-4000 Modbus/RTU Network Highlights

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<th>Device Bus</th>
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<td>Shielded Twisted Pairs in One Shielded Cable</td>
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<td>Network Topology</td>
<td>Star with Drops</td>
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<td>Maximum Devices</td>
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<td>Maximum Distance</td>
<td>350m</td>
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<td>Communication Methods</td>
<td>Master-Slave Query</td>
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<td>Wiring Types (types used varies on application)</td>
<td>Shielded Twisted Pair #18AWG (0.8mm)</td>
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Product Features

1. Modbus I/O Solutions

The total Modbus I/O series supports Modbus/RTU protocol as the remote data transmission mechanism, providing easy-integration to any controller bearing Modbus/RTU standard. In addition to Modbus network support, these ADAM-4000 modules also feature a robust and intelligent design of system diagnostic function and safety setting capability, offering users an easy-to-use, cost-effective remote monitoring and control system.
1.1 Modbus Network Support
Nowadays, 60% of the existing control systems worldwide support Modbus network. The Modbus devices communicate over a serial network in a master/slave (request/response) type relationship using one of two transmission modes: ASCII (American Standard Code for Information Interchange) mode or RTU (Remote Terminal Unit) mode. The ADAM-4000 Modbus I/O modules are designed to operate as slave devices on a Modbus network, communicating via Modbus/RTU transmission mode.

1.2 Easy Plug-in System Integration
With built-in Modbus/RTU protocol, the ADAM-4000 Modbus I/O is endowed with easy plug-in system integration capabilities. Aside from effortless integration with controllers carrying Modbus/RTU standard, ADAM-4572 can upgrade the ADAM-4000 I/O modules to the Modbus/TCP Ethernet layer. Moreover, most HMI software is bundled with Modbus driver and can access the ADAM-4000 I/O directly.

1.3 Robust and Intelligent Design
The ADAM-4015/4017+/4018+/4024 are designed with channel differential, 3000V<sub>DC</sub> system isolation. Moreover, the ADAM-4017+/4018+ offer 4~20 mA input range without additional resistor. The ADAM-4051/4055, built with 3000V<sub>DC</sub> isolation, is a robust & high density DI/O solution. Different from other ADAM AI/O modules, the ADAM-4015/4017+/4018+/4024 can be set in different ranges and in different channels. The ADAM-4015/4018+ are even designed with burned-out diagnostic function to inform users of problems with wire openings.

2. ADAMView-The Operation Interface Software designed for ADAM
Many users apply the ADAM Data Acquisition modules in small based projects. ADAMView, the ADAM Data Acquisition software, is especially designed to target these low-volume ADAM projects. It provides 150 physical point database, ADAM Drivers, and OPC Server for monitoring and control functions. In brief, ADAMView is a cost-effective and simple SCADA software for ADAM I/O series.

2.1 Complete Software Package
ADAMView takes advantage of Microsoft Windows graphical interface, offering fast and intuitive configuration for human-machine interface and data acquisition applications. This application software combines easy-to-use graphical development and the flexibility of BasicScript, a powerful programming tool. With ADAMView, you can easily design both simple and complex applications, ranging from factory process and utility monitoring, to lab testing or environmental monitoring.

2.2 Modularized and Prioritized Task Design
ADAMView development environment allows you to decompose your system into
several smaller modules or tasks. The modular design is very useful to develop, and facilitate large and complicated system maintenance. Each module or task has its own properties, such as scan rate, start/stop method, and priority etc. With 32-bit Windows multi-tasking capability, all tasks run simultaneously. Moreover, ADAMView software allows you to prioritize your tasks to increase overall performance.

2.3 Powerful BasicScript Scripting Language to Customize Your Needs
ADAMView fully integrates BasicScript language in its kernel to meet your specific needs. Over 600 commands are available to perform almost any function you can imagine, including calculations, reading and writing files, DDE, and ODBC. It allows you to access and share data with other applications, such as Microsoft Access and Microsoft Excel. With BasicScript scripting language, it allows you to reuse existing codes and build your applications faster and easier.

2.4 Plug-and-Play Connect with ADAM I/O series
Once you install the ADAMView software, you can immediately connect with ADAM-4000/5000 I/O as a complete Data Acquisition System. Current ADAM users can apply direct driver to access all ADAM-4000 modules and ADAM-5000/485 I/O system. Modbus users can link ADAM-5511, ADAM-4000 Modbus I/O, and ADAM-6000 through the Modbus OPC server and Modbus/TCP OPC Server.

3. ADAM-4000 Modbus I/O and ADAMView Target Users
3.1 PC-based System User
To users who are familiar with PC-based Data Acquisition applications, the existing ADAM-4000 series is a good solution for the remote I/O requirements. In general applications with ADAM-4000 series, the system scope usually does not exceed 150 I/O points. Based on these small projects, users would prefer to purchase ADAMView over other SCADA software like Intouch, I-Fix, or Citech. Unlike powerful web-enabled SCADA software, ADAMView is a low entry-level data acquisition software designed for the small ADAM Projects. It provides an easy-to-use and cost-effective graphic operation interface targeted to attract more PC-based users to apply ADAM-4000 I/O at an affordable budget.

3.2 PLC/DCS Users
Different from PC-based users, the PLC/DCS users are the new potential customers for ADAM-4000 I/O series with Modbus protocol support. Adopting the features of Modbus standard, the ADAM-4000 Modbus I/O series is the most suitable remote I/O solution for current PLC/DCS users.
Product Specification

- ADAM-4015  6-channel RTD Module with Modbus
  - 6-channel 2 or 3 wires RTD Input
  - Accept Pt100/1000, Balco500, Ni input signals
  - Channels configurable for different types of input individually
  - Wiring burned-out detectable function
  - 3000 V\textsubscript{DC} isolation
  - Supports Modbus/RTU protocol

- ADAM-4017+  8-channel Analog Input Module with Modbus
  - 16-bit resolution
  - Eight differential inputs
  - Software configurable for mV, V or mA inputs
  - 3000 V\textsubscript{DC} isolation
  - Supports Modbus/RTU Protocol

- ADAM-4018+  8-channel Thermocouple Input Module with Modbus
  - 16-bit resolution
  - Eight differential inputs
  - Software configurable for T/C, low level voltage or mA inputs
  - Wiring burned-out detectable function
  - 3000 V\textsubscript{DC} isolation
  - Supports Modbus/RTU Protocol

- ADAM-4024  4-Channel Analog Output Module with Modbus
  - 12-bit resolution
  - Software configurable for mA or V output in individual channels
  - 4 digital inputs for latch output
  - 2500 V\textsubscript{DC} isolation
  - Programmable output slope:
    \begin{align*}
    0.125 & \sim 128.0 \text{ mA/sec.} \\
    0.0625 & \sim 64 \text{ V/sec.}
    \end{align*}
  - Supports Modbus/RTU protocol

- ADAM-4051  16-channel Iso. Digital Input w/LED Module with Modbus
  - 16 digital input channels
  - Digital input for dry contact or wet contact
  - Input voltage level: 10 \sim 50 \text{ V\textsubscript{DC}}
  - Over voltage protection: 70 V\textsubscript{DC}
  - 2,500 V\textsubscript{DC} optical isolation
  - Supports Modbus/RTU protocol
ADAM-4055  16-channel Iso. Digital I/O w/LED Module with Modbus
- I/O type: 8 DO/8 DI
- Input voltage level: 10 ~ 50 V\(_{DC}\)
- Open collector to 40 V\(_{DC}\)
- Over voltage protection: 70 V\(_{DC}\)
- 2,500 V\(_{DC}\) optical isolation
- Supports Modbus/RTU protocol

ADAM-4068  8-channel Relay Output Module with Modbus
- I/O type: 8 channels form C (NO/NC selectable)
- Contact rating:
  - AC: 125 V @ 0.6 A; 250 V @ 0.3 A
  - DC: 30 V @ 2 A; 110 V @ 0.6 A
- Switch Time:
  - Relay on time (typical): 3 msec.
  - Relay off time (typical): 1 msec.
- LED Indicators
- Supports Modbus/RTU protocol

Modbus System Architecture