Remote I/O & Wireless Sensing Modules

7-2  Wireless IoT Sensing Devices: WISE-4000, WISE-2000
7-30 Ethernet I/O Modules: ADAM-6000
7-45 RS-485 I/O Modules: ADAM-4000
# Wireless IoT Sensing Devices

## Overview

Coinciding with the development of wireless and cloud technologies, remote management is now distributed across wider areas due to the availability of cloud services. To shorten the gap between the edge and the cloud, Advantech has launched wireless sensing devices that can directly pass data from the edge to different cloud platforms via MQTT and RESTful APIs.

For wide area communication, WISE-4000 I/O modules and sensor nodes have been designed with LPWAN, LoRa, NB-IoT/eMTC, 3G/LTE, and IP65-rated features, making them highly suitable for outdoor applications. WISE-2000 sensor devices are all-in-one devices designed for specific applications, whereas WISE-6000 devices are ready-to-use M2I edge devices for machine status monitoring in the field of remote management.

To realize a complete IoT sensing solution, the WISE-4000 series goes beyond merely providing a wireless communication interface for sensors—it also provides cloud connectivity for additional user applications. With support for IoT protocols such as MQTT and RESTful API, the WISE-4000 series can communicate with cloud services or other web services via secure web sockets. The WISE-4000 series comes with pre-integrated APIs for major cloud service providers (e.g., Dropbox) and IoT cloud services (e.g., Azure IoT Hub) and provides support for both private cloud platforms (e.g., private file servers or databases) and ERP/MES systems.

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### Wireless Sensor and Sensing Devices

![Diagram showing WISE-2210, WISE-4000, WISE-4200, WISE-4400, and WISE-4600 devices with features like Power Consumption Measuring, Direct Mobile Connectivity, Battery-Powered, Built-In Antenna, GPS Location Tracking, Self-Powered by Sensor or Panel, Date Logger, 2-km Wireless Communication, IP65-Rated Protection, and Solar Panel Rechargeable Battery.](image-url)
Wireless Communication

Wireless Technology

Advancements in IoT have led to the development of many wireless technologies that can be implemented in a range of hardware products. The WISE-4000 series utilizes Wi-Fi, 3G, and LPWAN to meet specific wireless communication requirements of virtually any project.

Low-Power Wide-Area Network (LPWAN, Sub-1 GHz)

LPWAN technology, including LoRa, SigFox, and NB-IoT, is suitable for applications requiring low-volume, long-range data transmission while maintaining a long battery life, minimal cost, and low levels of interference. The WISE-4000 series provides both standard LPWAN, eMTC/NB-IoT, and LoRa devices to meet different long-range sensing requirements. For the WISE-4210 and WISE-4610 end nodes, Advantech also provides LPWAN access points or LoRa gateways, enabling users to easily build up an LPWAN or LoRa network.

Wireless RFID Gateway and Edge Device

- Supports more than 100 PLC drivers by WISE-PaaS/EdgeLink
- Built-in digital I/O, analog I/O, and RS-485 for machine status monitoring
- Wi-Fi, 3G, NB-IoT with mini PCIe communication
- Intelligent logic control with Node-RED
- ePaper for local visualization and web service support for remote management

4-port UHF RFID read/write function
- Node-RED programmable for data read, write, filter, and transfer
- Application-ready function block
- Ethernet/Wi-Fi interface for uplink
# IoT Wireless I/O Modules

<table>
<thead>
<tr>
<th>Model</th>
<th>WISE-4012E</th>
<th>WISE-4012</th>
<th>WISE-4050</th>
<th>WISE-4060</th>
<th>WISE-4051</th>
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<tr>
<td><strong>Description</strong></td>
<td>6-ch IoT wireless I/O module for IoT developers</td>
<td>4-ch universal input + 4-ch digital output IoT wireless I/O module</td>
<td>4-ch digital input + 4-ch digital output IoT wireless I/O module</td>
<td>4-ch digital input + 4-ch relay output IoT wireless I/O module</td>
<td>8-ch digital input IoT wireless I/O module with 1 x RS-485 port</td>
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<td>IEEE 802.11b/g/n</td>
<td>IEEE 802.11b/g/n</td>
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<td>110 m (L.O.S.)</td>
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<td>0 – 10 V</td>
<td>±150 mV, ±500 mV</td>
<td>±1 V, ±5 V, ±10 V</td>
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<td>0 – 20, 4 – 20, ±20 mA</td>
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<td>Channel</td>
<td>2-ch dry contact</td>
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<td>4-ch dry contact or wet contact</td>
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<td>3,000 Vrms</td>
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<td>3,000 Vrms</td>
<td>3,000 Vrms</td>
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<td>7, 8</td>
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<td>Stop Bits</td>
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<td>Parity</td>
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<td><strong>General</strong></td>
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<td>LED Indicators</td>
<td>Status, communication, network mode, quality</td>
<td>Status, communication, network mode, quality</td>
<td>Status, communication, network mode, quality</td>
<td>Status, communication, network mode, quality</td>
<td>Status, communication, network mode, quality, serial Tx, Rx</td>
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<td>Real-Time Clock</td>
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<td>✓ (with battery backup)</td>
<td>✓ (with battery backup)</td>
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<td>Plug-in screw terminal block (I/O and power)</td>
<td>Plug-in screw terminal block (I/O and power)</td>
<td>Plug-in screw terminal block (I/O and power)</td>
<td>Plug-in screw terminal block (I/O and power)</td>
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<td>-</td>
<td>-</td>
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<tr>
<td><strong>Environment</strong></td>
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<tr>
<td>Operating Temperature</td>
<td>-25 ~ 70°C (-13 ~ 158°F)</td>
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<td>Storage Temperature</td>
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<td>Operating Humidity</td>
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<td>Input Range</td>
<td>Micro USB 5 Vcc</td>
<td>10 ~ 30 Vcc</td>
<td>10 ~ 30 Vcc</td>
<td>10 ~ 30 Vcc</td>
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<tr>
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<td>1.5 W @ 5 Vcc</td>
<td>2.5 W @ 24 Vcc</td>
<td>2.2 W @ 24 Vcc</td>
<td>2.5 W @ 24 Vcc</td>
<td>2.2 W @ 24 Vcc</td>
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</tbody>
</table>
Introduction

The Advantech WISE IoT Developer Kit is a complete hardware & software solution to help users develop IoT applications and simulate their projects in the simplest way. The WISE IoT Developer Kit provides everything you need to get going: a WISE-4012E 6-ch universal input or output wireless Ethernet I/O module, and developer kit including: WebAccess 8.0 with open interfaces for intelligent application developer, extension board for simulating sensor status, a micro USB cable for power input, and a screwdriver for wiring. The WISE-4012E has an integrated Wi-Fi interface with AP mode and web configuration which can be accessed by mobile device directly. Data can be logged in the I/O module and then automatically pushed to the file-based cloud.

Product Concept: Data A-P-P

Data Acquisition

Data Processing

Data Publishing

Application Scenario 1

Connect to end devices

Application Scenario 2

Connect to an extension board

Features

- 2.4 GHz IEEE 802.11b/g/n WLAN
- 2-ch 0 – 10V Input, 2-ch DI, and 2-ch Relay Output
- Includes WebAccess with demo project for developer
- Includes extension board for simulating sensor status
- Includes micro USB cable for power input
- Supports Modbus/TCP with RESTful web service
- Supports wireless client and server mode that can be accessed directly without AP or router
- Supports mobile device web configuration with HTML5 without the platform limitation
- Supports file-based cloud storage and local logging with time stamp
### Specifications

**Voltage Input**
- **Channel**: 2
- **Resolution**: 12-bit
- **Sampling Rate**: 10 Hz (Total)
- **Accuracy**: ±0.1 Vdc
- **Input Type and Range**: 0 – 10 V
- **Input Impedance**: 100 kΩ

**Digital Input**
- **Channels**: 2
- **Logic level**: Dry Contact 0; Open
- **Supports 3 kHz Counter Input**: 32-bit + 1-bit overflow
- **Keep/Discard Counter Value when Power-off**: Yes
- **Supports 3 kHz Frequency Input**: Yes
- **Supports Inverted DI Status**: Yes

**Relay Output**
- **Channels**: 2 (Form A)
- **Contact Rating**: 120 Vdc @ 0.5 A
  - (Resistive Load) 30 Vdc @ 1 A
- **Isolation**: 1,500 Vrms
- **Relay On Time**: 10 ms
- **Relay Off Time**: 7 ms
- **Insulation Resistance**: 1 GΩ min. @ 500 Vdc
- **Maximum Switching**: 60 operations/minute
- **Supports Pulse Output**: Yes
- **Supports High-to-Low and Low-to-High Delay Output**: Yes

**Environment**
- **Operating Temperature**: -25 – 70°C (-13 – 158°F)
- **Storage Temperature**: -40 – 85°C (-40 – 185°F)
- **Operating Humidity**: 20 – 95% RH (non-condensing)
- **Storage Humidity**: 20 – 95% RH (non-condensing)

**General**
- **WLAN**: IEEE 802.11b/g/n 2.4GHz
- **Connectors**: Plug-in screw terminal block (I/O)
- **Watchdog Timer**: System (1.6 second) and Communication (programmable)
- **Certification**: CE, FCC, R&TTE, NCC, SRRC, RoHS, ANATEL
- **Dimensions (W x H x D)**: 80 x 139 x 25 mm
- **Enclosure**: PC
- **Power Input**: Micro-B USB 5 Vdc
- **Power Consumption**: 1.5 W @ 5 Vdc
- **Supports User Defined Modbus Address**: Yes
- **Supports Data Log Function**: Up to 10,000 samples with time stamp
- **Supported Protocols**: Modbus/TCP, TCP/IP, UDP, DHCP, and HTTP
- **Supports RESTful Web API in JSON format**: Yes
- **Supports Web Server in HTML5 with JavaScript & CSS3**: Yes
- **Supports System Configuration Backup and User Access Control**: Yes

### Ordering Information
- **WISE-4012E-AE-WA**: WISE-4012E IoT Developer Kit with WebAccess

### Advantech WebAccess 8.0

**WebAccess Cloud Architecture**
WebAccess is a 100% web based HMI and SCADA software with private cloud software architecture. WebAccess can provide large equipment vendors, SIs, and Enterprises access to and manipulation of centralized data to configure, change/update, or monitor their equipment, projects, and systems all over the world using a standard web browser. Also, all the engineering works, such as: database configuration, graphics drawing and system management and the troubleshooting can be operated remotely. This can significantly increase the efficiency of maintenance operations and reduce maintenance costs.

**Business Intelligence Dashboard**
WebAccess 8.0 provides an HTML5 based Dashboard as the next generation of WebAccess HMI. System integrators can use Dashboard Editor to create the customized information page by using analysis charts and diagrams which are called widgets. Ample widgets have been included in the built-in widget library, such as trends, bars, alarm summary, maps… etc. After the dashboard screens have been created, end user can view the data by Dashboard Viewer in different platforms, like Explorer, Safari, Chrome, and Firefox for a seamless viewing experience across PCs, Macs, tablets and smartphones.

**Open Interfaces**
WebAccess has three interfaces for different uses. First, WebAccess provides a Web Service interface for partners to integrate WebAccess data into APPs or application system. Second, a pluggable widget interface has been opened for programmer to develop their own widget and run on WebAccess Dashboard. Last, WebAccess API, a DLL interface for programmer to access WebAccess platform and develop Windows applications. With these interfaces, WebAccess can act as an IoT platform for partners to develop IoT applications in various vertical markets.

**Google Maps and GPS Tracking Integration**
WebAccess integrates real-time data on each geographical site with Google Maps and GPS location tracking. For remote monitoring, users can intuitively view the current energy consumption on each building, production rate on each field or traffic flow on the highway together with alarm status. By right-clicking on Google Maps or entering the coordinate of the target, users can create a marker for the target and associate the real-time data of three sites with a display label. Furthermore, this function also integrates with GPS modules to track the location of the marker in Google Maps and allows it to be used in vehicle systems.

**Ample Driver Support**
WebAccess supports hundreds of devices. In addition to Advantech I/Os and controllers, WebAccess also supports all major PLCs, controllers and I/Os, like Allen Bradley, Siemens, LonWorks, Mitsubishi, Beckhoff, Yokogawa etc. WebAccess can easily integrate all devices in one SCADA. All of these device drivers are integrated into WebAccess and free of charge. For a complete list of WebAccess drivers, refer to webaccess.advantech.com.

**Distributed SCADA Architecture with Central Database Server**
SCADA nodes run independent of any other node. Each SCADA node communicates to and manipulation of centralized data to configure, change/update, or monitor their equipment, projects, and systems all over the world using a standard web browser. Also, all the engineering works, such as: database configuration, graphics drawing and system management and the troubleshooting can be operated remotely. This can significantly increase the efficiency of maintenance operations and reduce maintenance costs.

**Open Data Connectivity**
Advantech WebAccess exchanges online data with 3rd party software in real-time by supporting OPC UA/DA, DDE, Modbus and BACnet Server/Client. It supports SQL, Oracle, MySQL, and MS Access for offline data sharing.

**Software Requirements**
- **Operating System**: Windows XP (SCADA Node Only), Windows 7 SP1, Windows 8 Professional, Windows Server 2008 R2 or later
- **Hardware**: Intel Atom or Celeron. Dual Core processors or higher recommended
  - 2GB RAM minimum, more recommended
  - 30GB or more free disk space
**WISE-4012**

**4-ch Universal Input and 2-ch Digital Output IoT Wireless I/O Module**

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**Features**

- 4-ch universal input and 2-ch digital output
- 2.4GHz Wi-Fi reducing the wiring cost during big data acquisition
- Easily extend the existing network by adding APs, and share existing Ethernet software
- Configured by mobile devices directly without installing any software or Apps
- Zero data loss using the log function with RTC time stamp
- Data can be automatically pushed to Dropbox or computer
- Supports RESTful web API in JSON format for IoT integration

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**Introduction**

The WISE-4000 series is an Ethernet-based wireless IoT device, integrated with IoT data acquisition, processing, and publishing functions. As well as various I/O types, the WISE-4000 series provides data pre-scaling, data logic, and data logger functions. These data can be accessed via mobile devices and be securely published to the cloud anytime from anywhere.

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**Features**

**IEEE 802.11 b/g/n 2.4GHz Wi-Fi with AP Mode**

The Wi-Fi interface is easily integrated with wired or wireless Ethernet devices, users only need to add a wireless router or AP to extend existing Ethernet network to wireless. The limited AP mode enables the WISE-4000 to be accessed via other Wi-Fi devices directly as an AP.

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**HTML5 Web Configuration Interface**

All the configuration interfaces are applied in web service, and the web pages are based on HTML5, so users can configure the WISE-4000 without the limitation of OS/devices. You can use your mobile phone or tablet to directly configure the WISE-4000.

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**RESTful Web Service with Security Socket**

As well as supporting Modbus/TCP, the WISE-4000 series also supports IoT communication protocol, RESTful web service. Data can be polled or even be pushed automatically from the WISE-4000 when the I/O status is changed. The I/O status can be retrieved over the web using JSON. The WISE-4000 also supports HTTPS which has security that can be used in a Wide Area Network (WAN).

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**Data Storage**

The WISE-4000 can log up to 10,000 samples of data with a time stamp. The I/O data can be logged periodically, and also when the I/O status changes. Once the memory is full, users can choose to overwrite the old data to ring log or just stop the log function.

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**Cloud Storage**

Data logger can push the data to file-based cloud services like Dropbox using pre-configured criteria. With RESTful API, the data can also be pushed to a private cloud server in the format of JSON. Users can setup their private cloud server using the provided RESTful API and their own platform.
### Specifications

#### Universal Input
- **Channels**: 4
- **Resolution**: 16-bit
- **Sampling Rate**
  - Analog Input: 10Hz (Total)
  - Digital Input: 2Hz (Per Channel)
- **Accuracy**
  - ±0.1% of FSR (Voltage)
  - ±0.2% of FSR (Current)
- **Input Type and Range**
  - Analog Input: ±150mV, ±500mV, ±1V, ±5V, ±10V, 0~150mV, 0~500mV, 0~1V, 0~5V, 0~10V, 0~20mA, 4~20mA, ±20mA
  - Digital Input (Dry Contact): 0: Open, 1: Close
- **Input Impedance**
  - Voltage: > 10MΩ
  - Current: 120Ω (External resistor for current)
- **Over Voltage Protection**: ±35VDC
- **Burn-out Detection**: Yes (4~20mA only)
- **Supports Data Scaling and Averaging**

#### Digital Output
- **Channels**: 2
- **Isolation**: 3,000Vrms
- **Supports 5 kHz Pulse Output**
- **Supports High-to-Low and Low-to-High Delay Output**

#### General
- **WLAN**: IEEE 802.11b/g/n 2.4GHz
- **Outdoor Range**: 110 m with line of sight
- **Connectors**: Plug-in screw terminal block (I/O and power)
- **Watchdog Timer**: System (1.6 second) and Communication (programmable)
- **Certification**: CE, FCC, RAITTE, NCC, SRRC, RoHS, KC
- **Dimensions (W x H x D)**: 80 x 148 x 25 mm
- **Enclosure**: PC
- **Mounting**: DIN 35 rail, wall, and stack
- **Power Input**: 10 ~ 30Vdc
- **Power Consumption**: 2.5 W @ 24Vdc
- **Power Reversal Protection**: Supports
- **Supports User Defined Modbus Address**: Yes
- **Supports Data Log Function**: Up to 10000 samples with RTC time stamp
- **Supported Protocols**: Modbus/TCP, TCP/IP, UDP, DHCP, and HTTP

#### Environment
- **Operating Temperature**: -25 ~ 70°C (-13~158°F)
- **Storage Temperature**: -40 ~ 85°C (-40~185°F)
- **Operating Humidity**: 20 ~ 95% RH (non-condensing)
- **Storage Humidity**: 0 ~ 95% RH (non-condensing)

#### Pin Assignment

#### Ordering Information
- **WISE-4012-AE**: 4-ch Universal Input and 2-ch Digital Output IoT Wireless I/O Module

#### Selection Table

<table>
<thead>
<tr>
<th>Model</th>
<th>Universal Input</th>
<th>Digital Input</th>
<th>Digital Output</th>
<th>Relay Output</th>
<th>RS-485</th>
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<td>4</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
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<td>WISE-4059</td>
<td>4</td>
<td></td>
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<td>WISE-4051</td>
<td>8</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>WISE-4060</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

#### Accessories
- **PWR-242-AE**: DIN-rail Power Supply (2.1A Output Current)
- **PWR-243-AE**: Panel Mount Power Supply (3A Output Current)
- **PWR-244-AE**: Panel Mount Power Supply (4.2A Output Current)

#### Dimensions

<table>
<thead>
<tr>
<th>Unit: mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front View</td>
</tr>
<tr>
<td>80 x 148 x 25 mm</td>
</tr>
</tbody>
</table>

Wireless IoT Sensing Devices
WISE-4050

4-ch Digital Input and 4-ch Digital Output IoT Wireless I/O Module

Features

- 4-ch digital input and 4-ch digital output
- 2.4GHz Wi-Fi reducing the wiring cost during big data acquisition
- Easily extend the existing network by adding APs, and share existing Ethernet software
- Configured by mobile devices directly without installing any software or Apps
- Zero data loss using the log function with RTC time stamp
- Data can be automatically pushed to Dropbox or computer
- Supports RESTful web API in JSON format for IoT integration

Introduction

The WISE-4000 series is an Ethernet-based wireless IoT device, integrated with IoT data acquisition, processing, and publishing functions. As well as various I/O types, the WISE-4000 series provides data pre-scaling, data logic, and data logger functions. Data can be accessed via mobile devices and be securely published to the cloud anytime from anywhere.

Features

IEEE 802.11 b/g/n 2.4GHz Wi-Fi with AP Mode

The Wi-Fi interface is easily integrated with wired or wireless Ethernet devices, users only need to add a wireless router or AP to extend existing Ethernet network to wireless. The limited AP mode enables the WISE-4000 to be accessed via other Wi-Fi devices directly as an AP.

HTML5 Web Configuration Interface

All the configuration interfaces are applied in web service, and the web pages are based on HTML5, so users can configure the WISE-4000 without the limitation of OS/devices. You can use your mobile phone or tablet to directly configure the WISE-4000.

RESTful Web Service with Security Socket

As well as supporting Modbus/TCP, the WISE-4000 series also supports IoT communication protocol, RESTful web service. Data can be polled or even be pushed automatically from the WISE-4000 when the I/O status is changed. The I/O status can be retrieved over the web using JSON. The WISE-4000 also supports HTTPS which has security that can be used in a Wide Area Network (WAN).

Data Storage

The WISE-4000 can log up to 10,000 samples of data with a time stamp. The I/O data can be logged periodically, and also when the I/O status changes. Once the memory is full, users can choose to overwrite the old data to ring log or just stop the log function.

Cloud Storage

Data logger can push the data to file-based cloud services like Dropbox using pre-configured criteria. With RESTful API, the data can also be pushed to a private cloud server in the format of JSON. Users can setup their private cloud server using the provided RESTful API and their own platform.
Specifications

Digital Input
- Channels: 4
- Logic Level:
  - Dry Contact: 0: Open
  - 1: Close to DI COM
  - Wet Contact: 0: 0 ~ 3 VDC
  - 1: 10 ~ 30 VDC (3 mA min.)
- Isolation: 3,000 Vrms
- Supports 3 kHz Counter Input (32-bit + 1-bit overflow)
- Keep/Discard Counter Value when Power-off
- Supports 3 kHz Frequency Input
- Supports Inverted DI Status

Digital Output
- Channels: 4
  - (Open collector to 30 V, 400 mA max. for resistance load)
- Isolation: 3,000 Vrms
- Supports 5 kHz Pulse Output
- Supports High-to-Low and Low-to-High Delay Output

General
- WLAN: IEEE 802.11b/g/n 2.4GHz
- Outdoor Range: 110 m with line of sight
- Connectors: Plug-in screw terminal block (I/O and power)
- Watchdog Timer: System (1.6 second) and Communication (programmable)
- Certification: CE, FCC, R&TTE, NCC, SRRC, RoHS, KC, ANATEL
- Dimensions (W x H x D): 80 x 148 x 25 mm
- Enclosure: PC
- Mounting: DIN 35 rail, wall, and stack
- Power Input: 10 ~ 30 VDC
- Power Consumption: 2.2 W @ 24 VDC
- Power Reversal Protection: Supports
- Supports User Defined Modbus Address
- Supports Data Log Function: Up to 10000 samples with RTC time stamp
- Supported Protocols: Modbus/TCP, TCP/IP, UDP, DHCP, and HTTP
- Supports RESTful Web API in JSON format
- Supports Web Server in HTML5 with JavaScript & CSS3
- Supports System Configuration Backup and User Access Control

Environment
- Operating Temperature: -25 ~ 70°C (-13~158°F)
- Storage Temperature: -40 ~ 85°C (-40~185°F)
- Operating Humidity: 20 ~ 95% RH (non-condensing)
- Storage Humidity: 0 ~ 95% RH (non-condensing)

Pin Assignment

Ordering Information
- WISE-4050-AE: 4-ch Digital Input and 4-ch Digital Output IoT Wireless I/O Module

Selection Table

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Universal Input</th>
<th>Digital Input</th>
<th>Digital Output</th>
<th>Relay Output</th>
<th>RS-485</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISE-4012</td>
<td>4</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WISE-4050</td>
<td>4</td>
<td>4</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>WISE-4051</td>
<td>8</td>
<td>4</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>WISE-4060</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accessories
- PWR-242-AE: DIN-rail Power Supply (2.1A Output Current)
- PWR-244-AE: Panel Mount Power Supply (4.2A Output Current)

Dimensions

Unit: mm
**Features**

- 4-ch digital input and 4-ch relay output
- 2.4GHz Wi-Fi reducing the wiring cost during big data acquisition
- Easily extend the existing network by adding APs, and share existing Ethernet software
- Configured by mobile devices directly without installing any software or Apps
- Zero data loss using the log function with RTC time stamp
- Data can be automatically pushed to Dropbox or computer
- Supports RESTful web API in JSON format for IoT integration

**RESTful Web Service with Security Socket**

As well as supporting Modbus/TCP, the WISE-4060 series also supports IoT communication protocol, RESTful web service. Data can be polled or even be pushed automatically from the WISE-4060 when the I/O status is changed. The I/O status can be retrieved over the web using JSON. The WISE-4060 also supports HTTPS which has security that can be used in a Wide Area Network (WAN).

**Data Storage**

The WISE-4000 can log up to 10,000 samples of data with a time stamp. The I/O data can be logged periodically, and also when the I/O status changes. Once the memory is full, users can choose to overwrite the old data to ring log or just stop the log function.

**Cloud Storage**

Data logger can push the data to file-based cloud services like Dropbox using pre-configured criteria. With RESTful API, the data can also be pushed to a private cloud server in the format of JSON. Users can setup their private cloud server using the provided RESTful API and their own platform.
Specifications

Digital Input
- Channels: 4
- Logic Level:
  - Dry Contact: 0: Open, 1: Close to DI COM
  - Wet Contact: 0: 0~3 VDC, 1: 10~30 VDC (3 mA min.)
- Isolation: 3,000 Vrms
- Supports 3 kHz Counter Input (32-bit + 1-bit overflow)
- Keep/Discard Counter Value when Power-off
- Supports 3 kHz Frequency Input
- Supports Inverted DI Status

Relay Output
- Channels: 4 (Form A)
- Contact Rating:
  - Resistive Load: 250 VAC @ 5 A, 30 VDC @ 3 A
- Isolation (b/w coil & contacts): 3,000 VAC
- Relay On Time: 10 ms
- Relay Off Time: 5 ms
- Insulation Resistance: 1 GΩ min. @ 500 VDC
- Maximum Switching: 60 operations/minute
- Supports Pulse Output
- Supports High-to-Low and Low-to-High Delay Output

General
- WLAN: IEEE 802.11b/g/n 2.4GHz
- Outdoor Range: 110 m with line of sight
- Connectors: Plug-in screw terminal block (I/O and power)
- Watchdog Timer: System (1.6 second) and Communication (programmable)
- Certification: CE, FCC, R&TTE, NCC, SRRC, RoHS, ANATEL
- Dimensions (W x H x D): 80 x 148 x 25 mm
- Enclosure: PC
- Mounting: DIN 35 rail, wall, and stack
- Power Input: 10 ~ 30 VDC
- Power Consumption: 2.5 W @ 24 VDC
- Power Reversal Protection
- Supports User Defined Modbus Address
- Supports Data Log Function: Up to 10000 samples with RTC time stamp
- Supported Protocols: Modbus/TCP, TCP/IP, UDP, DHCP, and HTTP
- Supports RESTful Web API in JSON format
- Supports Web Server in HTML5 with JavaScript & CSS3
- Supports System Configuration Backup and User Access Control

Environment
- Operating Temperature: -25 ~ 70°C (-13~158°F)
- Storage Temperature: -40 ~ 85°C (-40~185°F)
- Operating Humidity: 20 ~ 95% RH (non-condensing)
- Storage Humidity: 0 ~ 95% RH (non-condensing)

Pin Assignment

Ordering Information
- WISE-4060-AE: 4-ch Digital Input and 4-ch Relay Output IoT Wireless I/O Module

Selection Table

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Universal</th>
<th>Digital Input</th>
<th>Digital Output</th>
<th>Relay Output</th>
<th>RS-485</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISE-4012</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>WISE-4050</td>
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<td>WISE-4051</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>WISE-4060</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Accessories
- PWR-242-AE: DIN-rail Power Supply (2.1A Output Current)
- PWR-244-AE: Panel Mount Power Supply (4.2A Output Current)

Dimensions

Unit: mm

WISE-4060
**Introduction**

The WISE-4051 is an Ethernet-based wireless IoT device, integrated with IoT data acquisition, processing, and publishing functions. As well as various I/O types, the WISE-4051 provides data pre-scaling, data logic, and data logger functions. Data can be accessed via mobile devices and be securely published to the cloud anytime from anywhere.

**Features**

**IEEE 802.11 b/g/n 2.4GHz Wi-Fi with AP Mode**

The Wi-Fi interface is easily integrated with wired or wireless Ethernet devices, users only need to add a wireless router or AP to extend existing Ethernet network to wireless. The limited AP mode enables the WISE-4000 to be accessed via other Wi-Fi devices directly as an AP.

**Modbus/RTU to Web Service or Modbus/TCP**

The RS-485 port of the WISE-4051 supports Modbus, which can be used to poll the data from Modbus/RTU devices, like ADAM-4000, or ADAM-5000/485. Then you can access the data by Modbus or REST from the WISE-4051. The data can also be logged.

**RESTful Web Service with Security Socket**

As well as supporting Modbus/TCP, the WISE-4051 series also supports IoT communication protocol, RESTful web service. Data can be polled or even be pushed automatically from the WISE-4051 when the I/O status is changed. The I/O status can be retrieved over the web using JSON. The WISE-4051 also supports HTTPS which has security that can be used in a Wide Area Network (WAN).

**Data Storage**

The WISE-4000 can log up to 10,000 samples of data with a time stamp. The I/O data can be logged periodically, and also when the I/O status changes. Once the memory is full, users can choose to overwrite the old data to ring log or just stop the log function.

**Cloud Storage**

Data logger can push the data to file-based cloud services like Dropbox using pre-configured criteria. With RESTful API, the data can also be pushed to a private cloud server in the format of JSON. Users can setup their private cloud server using the provided RESTful API and their own platform.

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All product specifications are subject to change without notice. Last updated: 31-Aug-2018
Specifications

**Digital Input**
- **Channels**: 8
- **Logic Level**
  - Dry Contact: 0: Open, 1: Close to DCOM
  - Wet Contact: 0: 0 ~ 3 VDC, 1: 10 ~ 30 VDC (3 mA min.)
- **Isolation**: 3,000 Vrms
- **Supports 3 kHz Counter Input (32-bit + 1-bit overflow)**
- **Keep/Discard Counter Value when Power-off**
- **Supports 3 kHz Frequency Input**
- **Supports Inverted DI Status**

**Serial Port**
- **Port Number**: 1
- **Type**: RS-485
- **Serial Signal**: DATA+, DATA-
- **Data Bits**: 7, 8
- **Stop Bits**: 1, 2
- **Parity**: None, Odd, Even
- **Baud Rate**: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- **Protection**: 15 kV ESD
- **Protocol**: Modbus/RTU (Total 32 address by max. 8 instructions)

**General**
- **WLAN**: IEEE 802.11b/g/n 2.4GHz
- **Outdoor Range**: 110 m with line of sight
- **Connectors**: Plug-in screw terminal block (I/O and power)
- **Watchdog Timer**: System (1.6 second) and Communication (programmable)
- **Certification**: CE, FCC, R&TTE, NCC, SRRC, RoHS
- **Dimensions (W x H x D)**: 80 x 148 x 25 mm
- **Enclosure**: PC
- **Mounting**: DIN 35 rail, wall, and stack
- **Power Input**: 10 ~ 30 VDC
- **Power Consumption**: 2.2 W @ 24 VDC
- **Power Reversal Protection**: supports user-defined modbus address
- **Supports Data Log Function**: up to 10000 samples with RTU time stamp
- **Supported Protocols**: Modbus/TCP, TCP/IP, UDP, DHCP, and HTTP
- **Supports RESTful Web API in JSON format**
- **Supports Web Server in HTML5 with JavaScript & CSS3**
- **Supports System Configuration Backup and User Access Control**

**Environment**
- **Operating Temperature**: -25 ~ 70°C (-13~158°F)
- **Storage Temperature**: -40 ~ 85°C (-40~185°F)
- **Operating Humidity**: 20 ~ 95% RH (non-condensing)
- **Storage Humidity**: 0 ~ 95% RH (non-condensing)

**Pin Assignment**

**Ordering Information**
- **WISE-4051-AE**: 8-ch Digital Input IoT Wireless I/O Module with RS-485 Port

**Selection Table**

<table>
<thead>
<tr>
<th>Model</th>
<th>Universal Input</th>
<th>Digital Input</th>
<th>Digital Output</th>
<th>Relay Output</th>
<th>RS-485</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISE-4012</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WISE-4050</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WISE-4051</td>
<td>8</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>WISE-4060</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Accessories**
- **PWR-242-AE**: DIN-rail Power Supply (2.1A Output Current)
- **PWR-243-AE**: Panel Mount Power Supply (3A Output Current)
- **PWR-244-AE**: Panel Mount Power Supply (4.2A Output Current)

**Dimensions**

Unit: mm
# IoT Ethernet I/O Modules

<table>
<thead>
<tr>
<th>Model Name</th>
<th>WISE-4010/LAN</th>
<th>WISE-4050/LAN</th>
<th>WISE-4060/LAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>4-ch current input + 4-ch digital output IoT Ethernet I/O module</td>
<td>4-ch digital input + 4-ch digital output IoT Ethernet I/O module</td>
<td>4-ch digital input + 4-ch relay output IoT Ethernet I/O module</td>
</tr>
<tr>
<td><strong>Analog I/O</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channels</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Resolution</td>
<td>12-bit</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.2% of FSR</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sampling Rate</td>
<td>10/100 Hz per channel</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Current Input</td>
<td>0 – 20, 4 – 20 mA</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Digital I/O</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Channels</td>
<td>-</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Output Channels</td>
<td>4</td>
<td>4</td>
<td>4 (from a power relay)</td>
</tr>
<tr>
<td>Counter Input</td>
<td>-</td>
<td>3 kHz</td>
<td>3 kHz</td>
</tr>
<tr>
<td>Frequency Input</td>
<td>-</td>
<td>3 kHz</td>
<td>3 kHz</td>
</tr>
<tr>
<td>Pulse Output</td>
<td>1 kHz</td>
<td>1 kHz</td>
<td>1 kHz</td>
</tr>
<tr>
<td>Isolation Protection</td>
<td>-</td>
<td>3,000 Vrms</td>
<td>3,000 Vrms</td>
</tr>
<tr>
<td>LED Indicators</td>
<td>Status, Comm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Requirement</td>
<td>10 – 30 Vdc (24 Vdc Standard)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>1.2 W @ 24 Vcc</td>
<td>2.2 W @ 24 Vcc</td>
<td>2.5 W @ 24 Vcc</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40 – 70°C (-40–158°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 – 85°C (-40–185°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>20 – 95% RH (non-condensing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Humidity</td>
<td>0 – 95% RH (non-condensing)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
WISE-4000/LAN Series

IoT Ethernet I/O Module

Features
- IEEE 802.3u 10/100Base-T(X)
- Industrial grade operating temperature -40~70°C
- Supported Protocols: Modbus/TCP, TCP/IP, UDP, DHCP, HTTP
- Supports RESTful web API in JSON format
- Supports local logging with RTC time stamp
- Supports mobile device web configuration in HTML5
- Supports 10~30VDC power with reverse protection

Introduction
The WISE-4000/LAN series is a newly designed IoT Ethernet I/O module which supports new RESTful web API for IoT applications. A HTML5 web configured interface enables users to configure WISE modules without the limitation of a platform or operating system. The built-in data logger function logs data with time information. Wide operating temperatures enable the WISE series to be implemented in more IoT data acquisition applications. As well as these functions, the new mechanical design allows users to install the module and perform diagnostics easier than before.

Specifications

Current Input
- Channel: WISE-4010/LAN: 4 (differential)
- Resolution: 12-bit
- Sampling Rate: 10/100 Hz/channel
- Accuracy: ±0.2% of FSR @ 25°C
- Input Range: 0~20 mA, 4~20 mA
- Input Impedance: 120 Ω
- Burn-out Detection: Yes (4~20 mA only)
- Supports Data Scaling and Averaging

Digital Input
- Channels: WISE-4050/LAN: 4, WISE-4060/LAN: 4
- Logic level:
  - Dry Contact: 0: Open
  - Wet Contact: 0: 0 ~ 3 VDC
  - 1: 10 ~ 30 VDC (3 mA min.)
- Isolation: 3,000 Vrms
- Supports 32-bit Counter Input Function (Maximum frequency 3kHz)
- Supports Frequency Input Function (Maximum frequency 3 kHz)
- Supports Inverted DI Status

Digital Output
- Channels: WISE-4010/LAN: 4, WISE-4050/LAN: 4
- (Open collector to 30 V, 500 mA max. for resistance load)
- Isolation: 3,000 Vrms (WISE-4050/LAN only)
- Supports 1 kHz Pulse Output
- Supports High-to-Low and Low-to-High Delay Output

Relay Output
- Channels: WISE-4060/LAN: 4 (Form A)
- Contact Rating:
  - 250 VAC @ 5 A
  - 30 VDC @ 3 A
- Isolation (b/t coil & contact): 3,000 Vrms
- Relay On Time: 10 ms
- Relay Off Time: 5 ms
- Insulation Resistance: 1 GΩ min. @ 500 VAC
- Maximum Switching: 60 operations/minute
- Supports Pulse Output
- Supports High-to-Low and Low-to-High Delay Output

Environment
- Operating Temperature: -40 ~ 70°C (-40~158°F)
- Storage Temperature: -40 ~ 85°C (-40~185°F)
- Operating Humidity: 20 ~ 95% RH (non-condensing)
- Storage Humidity: 0 ~ 95% RH (non-condensing)

General
- LAN: IEEE 802.3u 10/100Base-T(X)
- Connectors: Plug-in screw terminal block (I/O and power)
- Watchdog Timer: System (1.6 second) and Communication (programmable)
- Certification: CE, FCC, RoHS
- Dimensions (W x H x D): 80 x 98 x 25 mm
- Enclosure: PC
- Mounting: DIN 35 rail, wall, and stack
- Power Input: 10 ~ 30 VDC
- Power Consumption:
  - WISE-4010/LAN: 1.2 W @ 24 VDC
  - WISE-4050/LAN: 2.2 W @ 24 VDC
  - WISE-4060/LAN: 2.5 W @ 24 VDC
- Power Reversal Protection
- Supports Data Log Function: Up to 10000 samples with time stamp
- Supports User Defined Modbus Address
- Supported Protocols: Modbus/TCP, TCP/IP, UDP, DHCP, and HTTP
- Supports RESTful Web API in JSON format
- Supports Web Server in HTML5 with JavaScript & CSS3
- Supports System Configuration Backup and User Access Control

Ordering Information
- WISE-4010/LAN: 4-ch Current Input and 4-ch Digital Output IoT Ethernet I/O Module
- WISE-4050/LAN: 4-ch Digital Input and 4-ch Digital Output IoT Ethernet I/O Module
- WISE-4060/LAN: 4-ch Digital Input and 4-ch Relay Output IoT Ethernet I/O Module

Selection Table

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Current Input</th>
<th>Digital Input</th>
<th>Digital Output</th>
<th>Relay Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISE-4010/LAN</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>WISE-4050/LAN</td>
<td>4</td>
<td>4</td>
<td>4</td>
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</tr>
<tr>
<td>WISE-4060/LAN</td>
<td>4</td>
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<td>4</td>
<td></td>
</tr>
</tbody>
</table>
# IoT Wireless Sensor Nodes

<table>
<thead>
<tr>
<th>Wireless Model</th>
<th>Wi-Fi</th>
<th>Cellular</th>
<th>LoRa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Name</td>
<td>WISE-4220-S231</td>
<td>WISE-4220-S214</td>
<td>WISE-4220-S215</td>
</tr>
<tr>
<td>Description</td>
<td>Wireless IoT WSN with Temperature/Humidity Sensors</td>
<td>Wireless IoT WSN with 4-ch AI and 4-ch DI</td>
<td>Wireless IoT WSN with 4-ch RTD</td>
</tr>
<tr>
<td>IEEE Standard</td>
<td>IEEE 802.11b/g/n</td>
<td>IEEE 802.15.4 LoRa Modulation</td>
<td></td>
</tr>
<tr>
<td>Frequency Band</td>
<td>2.4GHz</td>
<td>NA915, EU868, JP925, CN470</td>
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</tr>
<tr>
<td>Mode / Topology</td>
<td>Infrastructure, Limited AP</td>
<td>Infrastructure, Limited AP</td>
<td></td>
</tr>
<tr>
<td>Outdoor Range</td>
<td>110m (L.O.S.)</td>
<td>5000m (L.O.S.)</td>
<td></td>
</tr>
<tr>
<td>GNSS</td>
<td>GPS/GLONASS/Beidou</td>
<td>GPS/GLONASS/Beidou</td>
<td></td>
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<tr>
<td>Network Interface</td>
<td>WLAN</td>
<td>Micro-B USB</td>
<td></td>
</tr>
<tr>
<td>Protocol</td>
<td>Modbus/TCP, REST, MQTT, Azure</td>
<td>REST, MQTT, Azure</td>
<td></td>
</tr>
<tr>
<td>Channel</td>
<td>Built-in Sensors</td>
<td>4-ch</td>
<td>4-ch</td>
</tr>
<tr>
<td>Input Type</td>
<td>Temperature, Humidity</td>
<td>V, A</td>
<td>2, 3-wire Pt RTD</td>
</tr>
<tr>
<td>Input Range</td>
<td>-25 ~ 70°C, 0 ~ 90% RH</td>
<td>0<del>10V, 0</del>20mA, 4~20mA</td>
<td>Pt-100: -200<del>200°C, Pt-1000: -40</del>160°C</td>
</tr>
<tr>
<td>Digital Input / Output</td>
<td>-</td>
<td>4-ch Dry Contact DI</td>
<td>-</td>
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<tr>
<td>Serial Port</td>
<td>Port Number</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Power Input</td>
<td>Battery Power</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>External Power</td>
<td>10 ~ 50 Vdc</td>
<td>-</td>
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</table>
## IoT Wireless Sensor Nodes

### Wireless LPWAN

<table>
<thead>
<tr>
<th>Model Name</th>
<th>WISE-4210-AP</th>
<th>WISE-4210-S231</th>
<th>WISE-4210-S251</th>
<th>WISE-4210-S214</th>
<th>WISE-4210-S215</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>LPWAN Wireless to Ethernet AP</td>
<td>LPWAN WSN with Temperature/Humidity Sensor</td>
<td>LPWAN WSN with 1-port RS-485 and 6-ch DI</td>
<td>LPWAN WSN with 4-ch AI and 4-ch DI</td>
<td>LPWAN WSN with 4-ch RTD</td>
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<tr>
<td></td>
<td>IEEE Standard</td>
<td>IEEE 802.15.4g FSK/GFSK Modulation</td>
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<td></td>
<td>Frequency Band</td>
<td>433, 868, or 923 MHz</td>
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<tr>
<td></td>
<td>Topology</td>
<td>Star</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Outdoor Range</td>
<td>2000m (L.O.S.)</td>
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<tr>
<td>Network</td>
<td>Configuration</td>
<td>RJ-45</td>
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<td>Protocol</td>
<td>Micro-B USB</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Analog / Sensor Input</td>
<td>Channel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Input Type</td>
<td>Temperature, Humidity</td>
<td>V, A</td>
<td>2, 3-wire Pt RTD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input Range</td>
<td>-25°C ~ 70°C, 0 ~ 90% RH</td>
<td>0<del>10V, 0</del>20mA, 4~20mA</td>
<td>Pr-100: -200<del>200°C, Pr-1000: -40</del>160°C</td>
<td></td>
</tr>
<tr>
<td>Digital Input / Output</td>
<td>Channel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Port Number</td>
<td>1-port RS-485 for Modbus/RTU</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Power Input</td>
<td>Battery Power</td>
<td>3 x AA, 3.6V Vcc Lithium Battery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>External Power</td>
<td>10 ~ 50 Vdc</td>
<td></td>
<td></td>
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</table>

### eMTC / NB-IoT

<table>
<thead>
<tr>
<th>Model Name</th>
<th>WISE-4471-S250</th>
<th>WISE-4471-S214</th>
<th>WISE-4671-S672</th>
<th>WISE-4671-S614</th>
<th>PCM-2481S1</th>
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<tbody>
<tr>
<td>Description</td>
<td>eMTC/NB-IoT WSN with 1-port RS-485 and DIO</td>
<td>eMTC/NB-IoT WSN with 4-ch AI and 4-ch DI</td>
<td>Outdoor eMTC/NB-IoT WSN with 2 Serial Port</td>
<td>Outdoor eMTC/NB-IoT WSN with 4-AI &amp; 4-DI</td>
<td>LPWAN Wireless iDoor AP</td>
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<tr>
<td></td>
<td>IEEE Standard</td>
<td>R13 LTE Cat M1 / NB1</td>
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<td>Frequency Band</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Topology</td>
<td>Star</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outdoor Range</td>
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<td></td>
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<tr>
<td>Network</td>
<td>Interface</td>
<td>Micro-B USB</td>
<td>Micro-B USB</td>
<td>Micro-B USB</td>
<td>Micro-B USB</td>
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<tr>
<td></td>
<td>Protocol</td>
<td>UDP, CoAP, REST, MQTT</td>
<td>UDP, CoAP, REST, MQTT</td>
<td>UDP, CoAP, REST, MQTT</td>
<td>UDP, CoAP, REST, MQTT</td>
</tr>
<tr>
<td>Analog / Sensor Input</td>
<td>Channel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Input Type</td>
<td>V, A</td>
<td>V, A</td>
<td>V, A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input Range</td>
<td>0<del>10V, 0</del>20mA, 4~20mA</td>
<td>0<del>10V, 0</del>20mA, 4~20mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital Input / Output</td>
<td>Channel</td>
<td>6-ch Dry Contact DI, 2-ch Sink-type DO</td>
<td>4-ch Dry Contact DI</td>
<td>6-ch Dry Contact DI</td>
<td>4-ch Dry Contact DI</td>
</tr>
<tr>
<td></td>
<td>Port Number</td>
<td>1-port RS-485 for Modbus/RTU</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Power Input</td>
<td>Battery Power</td>
<td>Solar Rechargeable Battery</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>External Power</td>
<td>10 ~ 50 Vdc</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**WISE-4220-S231**

**Wi-Fi IoT WSN with Temperature and Humidity Sensors**

**Features**
- Built-in temperature and humidity sensors
- 2.4GHz Wi-Fi reducing the wiring cost during big data acquisition
- Easily extend the existing network by adding APs, and share existing Ethernet software
- Configured by mobile devices directly without installing any software or Apps
- Zero data loss using the log function with RTC time stamp
- Data can be automatically pushed to Dropbox or computer
- Supports RESTful web API in JSON format for IoT integration

**Introduction**

The WISE-4220 series is an Ethernet-based wireless IoT device, integrated with IoT data acquisition, processing, and publishing functions. As well as various I/O and sensor types, the WISE-4220 series provides data pre-scaling, data logic, and data logger functions. These data can be accessed via mobile devices and be published to the cloud with security at anytime and anywhere.

**Features**

**IEEE 802.11 b/g/n 2.4GHz Wi-Fi with AP Mode**

The Wi-Fi interface is easily integrated with wired or wireless Ethernet devices, users only need to add a wireless router or AP to extend existing Ethernet network to wireless. The limited AP mode enables the WISE-4220 to be accessed via other Wi-Fi devices directly as an AP.

**HTML5 Web Configuration Interface**

All the configuration interfaces are applied in web service, and the web pages are based on HTML5, so users can configure the WISE-4220 without the limitation of OS/devices. You can use your mobile phone or tablet to directly configure the WISE-4220.

**RESTful Web Service with Security Socket**

As well as supporting Modbus/TCP, the WISE-4220 series also supports IoT communication protocol, RESTful web service. Data can be polled or even be pushed automatically from the WISE-4220 when the I/O status is changed. The I/O status can be retrieved by internet media types like JSON. The WISE-4220 also supports HTTPS which has security that can be used in a Wide Area Network (WAN).

**Data Storage**

The WISE-4220 can log up to 10,000 samples of data with a time stamp. The I/O data can be logged periodically, and also when the I/O status changes. Once the memory is full, users can choose to overwrite the old data to ring log or just stop the log function.

**Cloud Storage**

Data logger can push the data to file-based cloud services like Dropbox using pre-configured criteria. With RESTful API, the data can also be pushed to a private cloud server in the format of JSON. Users can setup their private cloud server using the provided RESTful API and their own platform.
Specifications

Temperature Sensor
- Operating Range: -25°C ~ 70°C (-13°F ~ 157.9°F)
- Resolution: 0.1 °C/°F/K
- Accuracy: ±1.0°C (±1.8°F) (vertical installation)

Humidity Sensor
- Operating Range: 10 ~ 90% RH
- Resolution: 0.1% RH
- Accuracy: ±4% for 0%~50% RH
  ±6% for 50%~60% RH
  ±10% for 60%~90% RH

General
- WLAN: IEEE 802.11b/g/n 2.4GHz
- Outdoor Range: 150m with line of sight
- Connectors: Plug-in screw terminal block (power)
- Watchdog Timer: System (1.6 second) and Communication (programmable)
- Certification: CE, FCC, IC, RED, NCC, SRRC, RCM, VCCI, TELEC (CC3200 listed antenna)
- Dimensions (W x H x D): 70 x 102 x 38 mm
- Enclosure: PC
- Mounting: DIN 35 rail, wall, stack, and pole
- Power Input: 10 ~ 50 Vdc
- Power Consumption: 1.2 W @ 24 Vdc
- Power Reversal Protection
- Supports User Defined Modbus Address
- Supports Data Log Function: Up to 10000 samples with RTC time stamp
- Supported Protocols: Modbus/TCP, TCP/IP, UDP, DHCP, and HTTP
- Supports RESTful Web API in JSON format
- Supports Web Server in HTML5 with JavaScript & CSS3
- Supports System Configuration Backup and User Access Control

Environment
- Operating Temperature: -25 ~ 70°C (-13~158°F)
- Storage Temperature: -40 ~ 85°C (-40~185°F)
- Operating Humidity: 20 ~ 95% RH (non-condensing)
- Storage Humidity: 0 ~ 95% RH (non-condensing)

Pin Assignment

Ordering Information
- WISE-4220-S231 IoT WSN with Temperature and Humidity Sensors

Selection Table

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Analog Input</th>
<th>Digital Input</th>
<th>Digital Output</th>
<th>Relay Output</th>
<th>RS-485</th>
<th>Built-in Sensor</th>
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<td>WISE-4012</td>
<td>4</td>
<td>2</td>
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<td>WISE-4050</td>
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<td>WISE-4060</td>
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<td></td>
<td></td>
<td></td>
<td>4</td>
<td>Temp. &amp; Humidity</td>
</tr>
</tbody>
</table>

Accessories
- PWR-242-AE: DIN-rail Power Supply (2.1A Output Current)
- PWR-244-AE: Panel Mount Power Supply (4.2A Output Current)
**Features**
- Proprietary LPWAN with using sub-1GHz wireless frequency
- Battery power for 5 years with 3 x 3.6V AA batteries
- Up to 5 km communication range in open space
- Longer communication range than 2.4GHz
- Better penetration through concrete and steel than 2.4GHz
- Less interference than 2.4GHz spectrum
- Application-ready I/O combination with modularization design

**WISE-4210-S214**

**Analog Input**
- **Channels**: 4
- **Resolution**: 16-bit
- **Input Range**: ±5V, ±10V, 0~5V, 0~10V, 0~20mA, 4~20mA, ±20mA

**Digital Input**
- **Channels**: 4 (Dry Contact)

**WISE-4210-S251**

**Digital Input**
- **Channels**: 6 (Dry Contact)

**Serial Port**
- **Port Number**: 1
- **Type**: RS-485
- **Data Bits**: 7, 8
- **Stop Bits**: 1, 2
- **Parity**: None, Odd, Even
- **Baud Rate (bps)**: 1200, 2400, 4800, 9600, 19200, 38400, 15000, 115200
- **Protocol**: Modbus/RTU (total number of bytes by max. 8 instructions)

**WISE-4210-S215** (Preliminary)

**RTD Input**
- **Channels**: 4
- **Input Type**: 3, 4-wire Pt RTD or digital input
- **Temperature Range**: Pt-100 -200 ~ 200°C
- **Accuracy**: ±0.1% or better

**Ordering Information**

**Wireless Access Point**
- **WISE-4210-APNA**: LPWAN Wireless to Ethernet AP – AS923/EU868
- **WISE-4210-APNA**: LPWAN Wireless to Ethernet AP – UN433

**Wireless Sensor Node**
- **WISE-4210-S231**: LPWAN WSN with Temp/RH Sensors – AS923/EU868
- **WISE-4210-S231**: LPWAN WSN with Temp/RH Sensors – UN433
- **WISE-4210-S214**: LPWAN WSN with 4AI and 4DI – AS923/EU868
- **WISE-4210-S215**: LPWAN WSN with 4AI and 4DI – UN433

**Accessories**
- **175008836-01**: 863-870MHz Dipole Antenna for WISE-4210
- **175008837-01**: 902-928MHz Dipole Antenna for WISE-4210

* AS923/EU868 version of WISE-4210 need to order antenna separately

**Common Specification**

**Wireless Communication**
- **IEEE Standard**: 625bps: IEEE 802.15.4g FSK Modulation
- **Frequency Band**: 50kbps: IEEE 802.15.4g GFSK Modulation
- **Data Rate**: 923MHz (920.60~924.60), BW: 400kHz
- **Operating Range**: ±0.1% RH (±1.8°F) (vertical installation)
- **Accuracy**: ±10% for 60%~90% RH

**General**
- **Power Input**: AP: 10 ~ 50 Vdc; Sensor Node: 3 x AA, 3.6V Lithium Battery or 10 ~ 50 VDC
- **Battery Life**: 625bps: 5 years with 10 minute update rate
- **Configuration Interface**: AP: LAN port
- **LED Indicator**: Status, Error, Tx, Rx, Battery/Signal Level
- **Mounting**: DIN 35 rail, wall, and stack
- **Dimension (W x H x D)**: 70 x 102 x 38 mm

**Environment**
- **Operating Temperature**: -25 ~ 70°C
- **Operating Humidity**: 5 ~ 95% RH
- **Storage Temperature**: -40 ~ 85°C
- **Storage Humidity**: 0 ~ 95% RH

**WISE-4210-AP**

**General**
- **Ethernet**: RJ-45 (for configuration and data query)
- **RS-485**: Data, DAO, Data- (for query node data)
- **Messaging Protocol**: Modbus/TCP, Modbus/RTU, REST, MQTT
- **Application Protocol**: HTTP, HTTPS, SMTP, DHCP
- **Transport Protocol**: TCP, UDP
- **Supports RESTful Web API in JSON format**
- **Supports Web Server in HTML5**
WISE-4470

3G IP65 IoT Wireless Sensor Node

**Features**
- Application-ready I/O combination with optional IP65 I/O
- Global coverage of 3G frequency bands from 800 to 2100MHz
- Supports multiple cellular technologies including GSM, GPRS & HSPA
- Fast and easy deployment to reduce operation cost
- Supports RESTful web API in JSON format for IoT integration
- Data buffered function with RTC reducing data lost

**Common Specification**

**Wireless Communication**
- **3GPP Standards**: GSM/GPRS/HSPA
- **Frequency Band**: GSM/GPRS/EDGE: 850, 900, 1800, 1900MHz
  UMTS/HSPA: 900, 2100MHz
- **Antenna Type**: Internal

**General**
- **Power Input**: 10~50VDC external power
- **Configuration Interface**: Micro-B USB
- **Connector**
  - WISE-4470-S2xx: Plug-in screw terminal block (I/O and power)
  - WISE-4470-S4xx: M12 4-pin code-A male x 1 (Power)
  - M12 8-pin code-D female x 1 (I/O)
- **LED Indicator**: Status, Error, Tx, Rx, Signal Level
- **Mounting**: DIN 35 rail, wall, pole, and stack
- **Dimension (W x H x D)**: 69 x 112 x 38 mm

**Environment**
- **Operating Temperature**: -25 ~ 70°C
- **Storage Temperature**: -40 ~ 85°C
- **Operating Humidity**: 20 ~ 95% RH
- **Storage Humidity**: 0 ~ 95% RH

**WISE-4470-S250**

**Digital Input**
- **Channels**: 6 (Dry Contact)
- **Supports 3kHz Frequency Input**

**Digital Output**
- **Channels**: 2

**Serial Port**
- **Port Number**: 1
- **Type**: RS-485
- **Data Bits**: 7, 8
- **Stop Bits**: 1, 2
- **Parity**: None, Odd, Even
- **Baud Rate (bps)**: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- **Protocol**: Modbus/RTU (Total 32 addresses by 8 max. instructions)

**WISE-4470-S214/S414**

**Analog Input**
- **Channels**: S214: 4
  - S414: 4
- **Resolution**: 16-bit
- **Input Range**: ±5V, ±10V, 0~5V, 0~10V, 0~20mA, 4~20mA

**Digital Input**
- **Channels**: S214: 4 (Dry Contact)
- **Supports 3kHz Frequency Input**

**WISE-4470-S215**

**RTD Input**
- **Channels**: 4
- **Input Type**: 2, 3-wire Pt RTD or digital input
- **Temperature Range**: Pt-100: -200~200°C
  Pt-1000: -40~160°C
- **Accuracy**: ±0.1% or better

**WISE-4470-S472**

**Serial Port**
- **Port Number**: 2
- **Type**:
  - Port1: RS-485
  - Port2: RS-485/RS-232
- **Data Bits**: 7, 8
- **Stop Bits**: 1, 2
- **Parity**: None, Odd, Even
- **Baud Rate (bps)**: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- **Protocol**: Modbus/RTU
  (Total 32 addresses by 8 max. instructions)

**Ordering Information**

**Wireless Sensor Node**
- **WISE-4470-S250CA**: 3G IoT WSN with 6DI, 2DO, and RS-485
- **WISE-4470-S214CA**: 3G IoT WSN with 4AI and 4DI
- **WISE-4470-S215CA**: 3G IoT WSN with 4-ch RTD
- **WISE-4470-S414CA**: 3G IP65 IoT WSN with 4-ch Analog Input
- **WISE-4470-S472CA**: 3G IP65 IoT WSN with 2 serial ports
## WISE-4471

**NB-IoT / eMTC IoT Wireless Sensor Node**

### Features
- Global coverage of NB-IoT and eMTC frequency bands
- Application-ready I/O combination with optional IP65 I/O
- Wide voltage power input with 10~50VDC
- Data buffered function with RTC reducing data lost
- Fast and easy deployment to reduce operation cost
- Supports direct cloud service for IoT integration
- Support MQTT and CoAP protocols

### Common Specification

#### Wireless Communication
- **3GPP Standards**: R13 LTE Cat M1 / NB1
- **Frequency Band**: 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28 (and band 39 in M1-only)
- **Antenna Type**: Internal

#### General
- **Power Input**: 10~50VDC external power
- **Configuration Interface**: Micro-B USB
- **Connector**:
  - WISE-4471-S2xx: Plug-in screw terminal block (I/O and power)
  - WISE-4471-S4xx: M12 4-pin code-A male x 1 (Power), M12 8-pin code-D female x 1 (I/O)
- **LED Indicator**: Status, Error, Tx, Rx, Signal Level
- **Mounting**: DIN 35 rail, wall, pole, and stack
- **Dimension (W x H x D)**: 69 x 112 x 38 mm

#### Environment
- **Operating Temperature**: -20 ~ 65°C
- **Storage Temperature**: -40 ~ 85°C
- **Operating Humidity**: 20 ~ 95% RH
- **Storage Humidity**: 0 ~ 95% RH

### WISE-4471-S214/S414

#### Analog Input
- **Channels**: S214: 4, S414: 4
- **Resolution**: 16-bit
- **Input Range**: ±5V, ±10V, 0~5V, 0~10V, 0~20mA, 4~20mA, ±20mA

#### Digital Input
- **Channels**: S214: 4
- **Supports 3kHz Frequency Input**

### WISE-4471-S215

#### RTD Input
- **Channels**: 4
- **Input Type**: 2, 3-wire Pt RTD or digital input
- **Temperature Range**: Pt100: -200 ~ 200°C, Pt1000: -40 ~ 160°C
- **Accuracy**: ±0.1% or better

### WISE-4471-S472

#### Serial Port
- **Port Number**: 2
- **Type**:
  - Port1: RS-485
  - Port2: RS-485/RS-232
- **Data Bits**: 7, 8
- **Stop Bits**: 1, 2
- **Parity**: None, Odd, Even
- **Baud Rate (bps)**: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- **Protocol**: Modbus/RTU (Total 32 addresses by 8 max. instructions)

### Ordering Information

**Wireless Sensor Node**
- **WISE-4471-S250UA**: NB-IoT/eMTC IoT WSN with 6DI, 2DO, and RS-485
- **WISE-4471-S214UA**: NB-IoT/eMTC IoT WSN with 4AI and 4DI
- **WISE-4471-S215UA**: NB-IoT/eMTC IoT WSN with 4-ch RTD
- **WISE-4471-S414UA**: NB-IoT/eMTC IP65 IoT WSN with 4-ch Analog Input
- **WISE-4471-S472UA**: NB-IoT/eMTC IP65 IoT WSN with 2 serial ports

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All product specifications are subject to change without notice. Last updated: 31-Aug-2018

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### WISE-4471-S214/S414

#### Analog Input
- **Channels**: S214: 4, S414: 4
- **Resolution**: 16-bit
- **Input Range**: ±5V, ±10V, 0~5V, 0~10V, 0~20mA, 4~20mA, ±20mA

#### Digital Input
- **Channels**: S214: 4
- **Supports 3kHz Frequency Input**

---

### WISE-4471-S215

#### RTD Input
- **Channels**: 4
- **Input Type**: 2, 3-wire Pt RTD or digital input
- **Temperature Range**: Pt100: -200 ~ 200°C, Pt1000: -40 ~ 160°C
- **Accuracy**: ±0.1% or better

---

### WISE-4471-S472

#### Serial Port
- **Port Number**: 2
- **Type**:
  - Port1: RS-485
  - Port2: RS-485/RS-232
- **Data Bits**: 7, 8
- **Stop Bits**: 1, 2
- **Parity**: None, Odd, Even
- **Baud Rate (bps)**: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- **Protocol**: Modbus/RTU (Total 32 addresses by 8 max. instructions)

---

### Ordering Information

**Wireless Sensor Node**
- **WISE-4471-S250UA**: NB-IoT/eMTC IoT WSN with 6DI, 2DO, and RS-485
- **WISE-4471-S214UA**: NB-IoT/eMTC IoT WSN with 4AI and 4DI
- **WISE-4471-S215UA**: NB-IoT/eMTC IoT WSN with 4-ch RTD
- **WISE-4471-S414UA**: NB-IoT/eMTC IP65 IoT WSN with 4-ch Analog Input
- **WISE-4471-S472UA**: NB-IoT/eMTC IP65 IoT WSN with 2 serial ports

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All product specifications are subject to change without notice. Last updated: 31-Aug-2018
Features
- For North America, Europe, Japan, and China
- Longer communication range than 2.4GHz
- Better penetration through concrete and steel than 2.4GHz
- Less interference than 2.4GHz spectrum
- Application-ready radioS with IPv6 support
- Powered by solar rechargeable battery or 10~50VDC input
- Global Positioning System (GPS) support

Digital Input
- Channels: 6
- Input Type: Dry Contact (Wet Contact by request)
- Logic Level: 0: Open
- Isolation Voltage: 3,000Vrms
- Supports 200kHz Counter Input (16-bit + 1-bit overflow)
- Keep/Discard Counter Value when Power-off
- Supports 200kHz Frequency Input
- Supports Inverted DI Status

WISE-4610-S614

Analog Input
- Channels: 4
- Resolution: 16-bit
- Sampling Rate: 1/s per channel
- Accuracy: ±0.1% of FSR (Voltage)
- ±0.2% of FSR (Current)
- Input Impedance: >2MΩ (Voltage)
- >2MΩ (Current)
- Isolation Voltage: 3,000Vrms
- Ground Protection: ±35V
- Burn-out Detection: Yes (4-20mA only)
- Supports Data Scaling and Averaging

Digital Input
- Channels: 4
- Input Type: Dry Contact (Wet Contact by request)
- Logic Level: 0: Open
- Isolation Voltage: 3,000Vrms
- Supports 200kHz Counter Input (16-bit + 1-bit overflow)
- Keep/Discard Counter Value when Power-off
- Supports 200kHz Frequency Input
- Supports Inverted DI Status

Ordering Information

Wireless Sensor Node
- WISE-4610-S672A: LoRa Outdoor WSN with 6DI & 2COM - NA915
- WISE-4610-S672EA: LoRa Outdoor WSN with 6DI & 2COM - EU868
- WISE-4610-S672JA: LoRa Outdoor WSN with 6DI & 2COM - JP923
- WISE-4610-S614NA: LoRa Outdoor WSN with 4AI & 4DI - NA915
- WISE-4610-S614EA: LoRa Outdoor WSN with 4AI & 4DI - EU868
- WISE-4610-S614JA: LoRa Outdoor WSN with 4AI & 4DI - JP923
- WISE-4610-S614CA: LoRa Outdoor WSN with 4AI & 4DI - CN470

Private LoRa Network Gateway
- WISE-3610SILS-51A1N: Private LoRa Network IoT Gateway - NA915
- WISE-3610SILS-51A1E: Private LoRa Network IoT Gateway - EU868
- WISE-3610SILS-51A1C: Private LoRa Network IoT Gateway - CN470
### Features
- Global coverage of frequency bands from 800 to 2100MHz
- Multiple cellular technologies including UMTS, HSPA, GSM & GPRS
- Application-ready I/O combination with IP65 housing
- Global Positioning System (GPS) support
- Fast and easy deployment to reduce operation cost
- Supports RESTful web API in JSON format for IoT integration
- Data buffered function with RTC reducing data lost

### Wireless Communication
- **3GPP Standards**
  - GSM/GPRS/HSPA
- **Frequency Band**
  - UMTS/HSPA: 850, 900, 1800, 1900MHz
- **Transmit Power**
  - Up to +32dBm
- **Antenna Type**
  - External

### GPS
- **Support System**
  - GPS/QZSS L1/C/A, GLONASS L10F, BeiDou B1I
- **Update Rates**
  - Single GNSS: up to 18 Hz
  - 2 Concurrent GNSS: up to 10 Hz
- **Accuracy**
  - Position: 2.5 m CEP (50% confidence)
  - With SBAS: 2.0 m CEP (50% confidence)
- **Acquisition Time**
  - Cold starts: 26 s

### General
- **Power Input**
  - Built-in 4000mA Lithium rechargeable battery pack
- **Configuration Interface**
  - Micro-B USB
- **Connector**
  - Power: M12 4-pin code-A male x 1
  - I/O: M12 8-pin code-D female x 2
- **LED Indicator**
  - Status, Error, Tx, Rx, Battery/Signal Level
- **Mounting**
  - DIN 35 rail, wall, pole, and stack
- **Dimension (W x H x D)**
  - 82 x 122 x 49 mm

### Environment
- **Operating Temperature**
  - 0 ~ 60°C
- **Operating Humidity**
  - 5~95% RH
  - No Battery Version: -20 ~ 70°C

### Ordering Information
- **WISE-4670-S614**
  - 3G Outdoor IoT WSN with 4AI & 4DI
- **WISE-4670-S672CA**
  - 3G Outdoor IoT WSN with 6DI & 2COM
- **WISE-4670-S614CA**
  - 3G Outdoor IoT WSN with 4AI & 4DI

---

**WISE-4670-S672**
- **Serial Port**
  - **Port Number**
    - 2
  - **Type**
    - RS-485
  - **Serial Signal**
    - RS-485: RX+, TX-, RX-, TX+, GND
  - **Data Bits**
    - 7, 8
  - **Stop Bits**
    - 1, 2
  - **Parity**
    - None, Odd, Even
  - **Baud Rate (bps)**
    - 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
  - **Protection**
    - 15 kV ESD
  - **Protocol**
    - Modbus/RTU (total 8 address)
**Features**
- Global coverage of NB-IoT and eMTC
- Application-ready I/O combination with IP65 housing
- Powered by solar rechargeable battery or 10~50VDC input
- Global Positioning System (GPS) support
- Data buffered function with RTC reducing data lost
- Support MQTT and CoAP protocols

**Common Specification**

**Wireless Communication**
- 3GPP Standard: Rel.13 LTE Cat. NB1/Cat. M1
- Frequency Band: 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28 (and band 39 in M1-only)
- Antenna Type: External

**GPS**
- Support System: GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1L
- Update Rates:
  - Single GNSS: up to 18 Hz
  - 2 Concurrent GNSS: up to 10 Hz
  - WAAS, EGNOS, MSAS, GAGAN
- Accuracy:
  - Position: 2.5 m CEP (50% confidence)
  - With SBAS: 2.0 m CEP (50% confidence)
- Acquisition Time:
  - Cold starts: 26 s

**General**
- Power Input: Built-in 4000mA Lithium rechargeable battery pack or 10~50VDC external power
- Battery Life: 6 months (1 hour data update and 1 day GPS update)
- Configuration Interface: Micro-B USB
- Connector:
  - Power: M12 4-pin code-A male x 1
  - I/O: M12 8-pin code-D female x 2
- LED Indicator: Status, Error, Tx, Rx, Battery/Signal Level
- Mounting: DIN 35 rail, wall, pole, and stack
- Dimension (W x H x D): 82 x 122 x 49 mm

**Environment**
- Operating Temperature: 0~60°C
- Operating Humidity: 5~95% RH

**Ordering Information**
- WISE-4671-S672UA: NB-IoT/eMTC Outdoor Wireless Sensor Node with 6-ch DI & 2-port RS-485
- WISE-4671-S614UA: NB-IoT/eMTC Outdoor Wireless Sensor Node with 4-ch DI & 4-ch AI

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**WISE-4671**

**NB-IoT / eMTC Outdoor IoT Wireless Sensor Node**

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**Preliminary**

**Features**
- Global coverage of NB-IoT and eMTC
- Application-ready I/O combination with IP65 housing
- Powered by solar rechargeable battery or 10~50VDC input
- Global Positioning System (GPS) support
- Data buffered function with RTC reducing data lost
- Support MQTT and CoAP protocols

**Preliminary**

**Features**
- Global coverage of NB-IoT and eMTC
- Application-ready I/O combination with IP65 housing
- Powered by solar rechargeable battery or 10~50VDC input
- Global Positioning System (GPS) support
- Data buffered function with RTC reducing data lost
- Support MQTT and CoAP protocols

**Common Specification**

**Wireless Communication**
- 3GPP Standard: Rel.13 LTE Cat. NB1/Cat. M1
- Frequency Band: 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28 (and band 39 in M1-only)
- Antenna Type: External

**GPS**
- Support System: GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1L
- Update Rates:
  - Single GNSS: up to 18 Hz
  - 2 Concurrent GNSS: up to 10 Hz
  - WAAS, EGNOS, MSAS, GAGAN
- Accuracy:
  - Position: 2.5 m CEP (50% confidence)
  - With SBAS: 2.0 m CEP (50% confidence)
- Acquisition Time:
  - Cold starts: 26 s

**General**
- Power Input: Built-in 4000mA Lithium rechargeable battery pack or 10~50VDC external power
- Battery Life: 6 months (1 hour data update and 1 day GPS update)
- Configuration Interface: Micro-B USB
- Connector:
  - Power: M12 4-pin code-A male x 1
  - I/O: M12 8-pin code-D female x 2
- LED Indicator: Status, Error, Tx, Rx, Battery/Signal Level
- Mounting: DIN 35 rail, wall, pole, and stack
- Dimension (W x H x D): 82 x 122 x 49 mm

**Environment**
- Operating Temperature: 0~60°C
- Operating Humidity: 5~95% RH

**Ordering Information**
- WISE-4671-S672UA: NB-IoT/eMTC Outdoor Wireless Sensor Node with 6-ch DI & 2-port RS-485
- WISE-4671-S614UA: NB-IoT/eMTC Outdoor Wireless Sensor Node with 4-ch DI & 4-ch AI

---

**WISE-4671-S672**

**Serial Port**
- Port Number: 2
- Type:
  - Port 1: RS-485
  - Port 2: RS-485/232
- Serial Signal:
  - RS-485: DATA+, DATA-
  - RS-232: Tx, Rx, GND
- Data Bits: 7, 8
- Stop Bits: 1, 2
- Parity: None, Odd, Even
- Baud Rate (bps):
  - 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- Protection: 15 kV ESD
- Protocol: Modbus/RTU (Total 8 address)
# IoT Wireless Sensor Devices

<table>
<thead>
<tr>
<th>Model Name</th>
<th>WISE-2210</th>
<th>WISE-2834</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>3-ch CT input self-powered wireless sensor node</td>
<td>4-ch digital I/O Ethernet/Wi-Fi intelligent RFID gateway</td>
</tr>
</tbody>
</table>

## Wireless Interface

<table>
<thead>
<tr>
<th>Function</th>
<th>Wireless sensor device</th>
<th>RFID sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication Standard</strong></td>
<td>IEEE 802.15.4g</td>
<td>IEEE 802.15.4g and EPC Global Class 1 Gen 2</td>
</tr>
<tr>
<td><strong>Frequency Band</strong></td>
<td>868, 923 MHz</td>
<td>860 – 928 MHz</td>
</tr>
<tr>
<td><strong>Outdoor Range</strong></td>
<td>1000m (L.O.S.)</td>
<td>10m (L.O.S.)</td>
</tr>
<tr>
<td><strong>Topology</strong></td>
<td>Star</td>
<td>-</td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td>WPA2 Personal and Enterprise of AP</td>
<td>WPA2 Personal and Enterprise</td>
</tr>
<tr>
<td><strong>Antenna Connector</strong></td>
<td>Reverse SMA</td>
<td>RFID: Reverse TNC WiFi: Reverse SMA</td>
</tr>
</tbody>
</table>

## CT Input

<table>
<thead>
<tr>
<th>Channel</th>
<th>3-ch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Type</strong></td>
<td>V</td>
</tr>
<tr>
<td><strong>Voltage Range</strong></td>
<td>1 – 5 V</td>
</tr>
<tr>
<td><strong>Current Range</strong></td>
<td>200 mA (max.)</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>12-bit</td>
</tr>
<tr>
<td><strong>Sampling Rate</strong></td>
<td>10 Hz (total)</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>Voltage: ±1% of FSR</td>
</tr>
</tbody>
</table>

## Digital Input

<table>
<thead>
<tr>
<th>Channel</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Counter Input</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Frequency Input</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Isolation</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Channel</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Output Rating (Resistive Load)</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Pulse Output</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Isolation</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Serial Port</strong></td>
<td>Port Number: 1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>RS-485</td>
</tr>
</tbody>
</table>

## Digital Output

<table>
<thead>
<tr>
<th>Channel</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Rating (Resistive Load)</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Pulse Output</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Isolation</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Serial Port</strong></td>
<td>Port Number: 1</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>RS-485</td>
</tr>
</tbody>
</table>

## Serial Port

<table>
<thead>
<tr>
<th><strong>LED Indicators</strong></th>
<th>COM, USB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Real-Time Clock</strong></td>
<td>Status, communication, network mode, signal quality</td>
</tr>
<tr>
<td><strong>Connectors</strong></td>
<td>I/O: Plug-in screw terminal block Power: Micro USB</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>71 x 72.7 x 29.8 mm (W x H x D)</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td>190 x 120 x 30.2 mm (W x H x D)</td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>-25 – 70°C (-13 – 158°F)</td>
</tr>
<tr>
<td><strong>Storage Temperature</strong></td>
<td>-40 – 85°C (-40 – 185°F)</td>
</tr>
<tr>
<td><strong>Operating Humidity</strong></td>
<td>20 – 95% RH (non-condensing)</td>
</tr>
<tr>
<td><strong>Storage Humidity</strong></td>
<td>0 – 95% RH (non-condensing)</td>
</tr>
<tr>
<td><strong>Input Range</strong></td>
<td>Micro USB: 5 Vdc CT: 1 – 5 Vdc</td>
</tr>
<tr>
<td><strong>Protection</strong></td>
<td>Power reversal protection</td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>0.1 mW @ 3.3 Vdc</td>
</tr>
</tbody>
</table>
Wireless IoT Sensing Devices

Features
- Wireless and self-powered design reduce installation cost
- Energy harvesting from sensors or photovoltaic panel
- Proprietary LPWAN with using sub-1GHz wireless frequency
- Longer communication range than 2.4GHz
- Better penetration through concrete and steel than 2.4GHz
- Less interference than 2.4GHz spectrum
- RESTful Web API supported by access point (AP)

Common Specification

Wireless Communication
- IEEE Standard: IEEE 802.15.4g
- Frequency Band: 923MHz (920.60~924.60), BW: 400kHz
- 868MHz (865.00~869.00), BW: 400kHz
- Data Rate: 2.5kbps
- Outdoor Range: 2000m with line of sight (with external antenna)
- 100m with line of sight (with internal antenna)
- Configuration Interface: AP: LAN Port
- Sensor Node: Micro-B USB
- Topology: Star
- Network Capacity: 1 AP for 64 Nodes

Environment
- Operating Temperature: -25°C ~ 70°C
- Operating Humidity: 5~95% RH
- Storage Temperature: -40°C~ 85°C
- Storage Humidity: 0~95% RH

CT Sensor Node

General
- Power Input: USB: 5VDC
- 1V: 10mins @ 1k ohm
- 5V: 5s @ 1k ohm
- LED Indicator: Comm, USB
- Mounting DIN: 35 rail, wall, pole and stack
- Connector: 3 Channel CT Input
- Dimension (W x H x D): 71 x 72 x 30 mm
- 77 x 72 x 41 mm (with photovoltaic panel)

Temperature and Humidity Sensors

Temperature Sensor
- Operating Range: -25°C – 70°C (-4°F – 157.9°F)
- Resolution: 0.1 °C/°F/K
- Accuracy: ±1.0°C ±1.8°F (vertical installation)

Humidity Sensor
- Operating Range: 10 ~ 90% RH
- Resolution: 0.1% RH
- Accuracy: ±4% RH @ 0~50% RH
±6% RH @ 50~60% RH
±10% RH @ 60~90% RH

Photovoltaic Panel Specification

- Peak Power: 378uW
- Peak Voltage: 0.925V
- Peak Current: 408uA
- Panel Daily Provide Power:

<table>
<thead>
<tr>
<th>Lux</th>
<th>mW</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>0.23</td>
</tr>
<tr>
<td>500</td>
<td>0.40</td>
</tr>
<tr>
<td>1,000</td>
<td>0.81</td>
</tr>
<tr>
<td>1,500</td>
<td>1.49</td>
</tr>
<tr>
<td>3,000</td>
<td>2.13</td>
</tr>
<tr>
<td>6,000</td>
<td>2.94</td>
</tr>
<tr>
<td>10,000</td>
<td>3.75</td>
</tr>
</tbody>
</table>

Wireless Access Point

- Power Input: 10 ~ 50 VDC
- Ethernet: RJ-45 (for configuration and data query)
- RS-485: Data+, Data- (for query node data)
- Mounting: DIN 35 rail, wall, and pole
- Messaging Protocol: Modbus/RTU, Modbus/TCP, REST
- Dimension (W x H x D): 70 x 102 x 38 mm

Ordering Information

Wireless Access Point
- WISE-4210-APNA*: LPWAN IoT Wireless to Ethernet AP - AS923/EU868

Wireless Sensor Node
- WISE-2210A-CNA*: LPWAN Self-Powered Sensor Node for CT - AS923/ EU868
- WISE-2210-CNA: LPWAN Self-Powered Sensor Node for CT with internal antenna - AS923
- WISE-2210-THPA: LPWAN Self-Powered Sensor Node with Temperature & Humidity sensor, Photovoltaic Panel and internal antenna - AS923

Accessories
- 1750008836-01: 863-870MHz Dipole Antenna for EU868
- 1750008837-01: 902-928MHz Dipole Antenna for AS923

* External antenna need to order separately
WISE-2834

Intelligent RFID Gateway

Features
- Intelligent RFID Gateway
- Support Ethernet and WiFi data communication
- Intelligent NodeRed function reducing coding effort
- Data read, filter, transfer could be configured automatically
- Linux operation system and provide web dashboard for RFID setting
- Data log function and cloud connectivity
- Flexible mounting methods suitable for different environment

Common Specification

General
- *RFID Standard* EPC Global Class 1 Gen. 2 (ISO18000-6C)
- *Frequency Band* FCC 902-928 MHz (American), ETSI 865.6-867.6 MHz (EU), NCC 922-928 MHz (Taiwan)
- *RFID Power Output* Available to adjust from +10 ~ +31.5dBm
- *Max Receive Sensitivity* -82dBm
- *Antenna Number* 4 port antennas
- *Antenna Connector* 4 RP-TNC

System Hardware
- *Power Input* 10~30VDC
- *Dimension* 190x120x30.2 mm
- *CPU* ARM Cotex-A8, 400MHz
- *Storage* NAND Flash 512MB for system
- *Memory* DDR3L 512MB
- *SD Slot* 1 x Micro SD card
- *Mounting* DIN 35 rail, Wall, and Pole
- *Watch Dog Timer* System & Power Monitor
- *Real Time Clock* Time Accuracy to Second
- *Programming* Node-RED, Linux OS

Environment
- *Operating Temperature* -25°C~70°C
- *Operating Humidity* 20~95% RH
- *Storage Temperature* -40°C~ 85°C
- *Storage Humidity* 0~95% RH

I/O Interface
- *Ethernet* 1 x 10/100 Based-T RJ-45
- *Serial Port* 1 x RS-232/RS485: 50 ~ 115.2 kbps
- *USB Port* 1 x USB2.0 High Speed (Up to 480Mbps)
- *Digital Input* 4 Dry/Wet Contact
- *Digital Output* 4 Sink Type

Wireless Communication
- *Interface* 1 x Mini-PCIe (Half-Size)
- *Type* WiFi

TOP I/O View

Bottom I/O View

Side I/O View

Ordering Information

**Wireless Access Point**
- **WISE-2834-A** Ethernet intelligent RFID gateway

**Optional Accessories**
- **96PD-RUYU131** Half-size mini card, supports 802.11bgn
- **96PSA-A60W12W6** ADP A/D 100-240V 60W 12V C14 LOCKABLE DC PLUG
- **1700000596-11** Power Cable China Plug 1.8M
- **1702002600** Power Cable US Plug 1.8M
- **1702002605** Power Cable EU Plug 1.8M
- **1702031802** Power Cable UK Plug 1.8M

All product specifications are subject to change without notice. Last updated: 31-Aug-2018
ADAM-6000 and ADAM-6200 Series
Intelligent Ethernet I/O Modules

Transition and Vision for Remote DAQ Devices

IT and network infrastructure have become established technologies. In the future, there will be many potentially key elements such as artificial intelligence, energy-efficiency, cloud computing, cyber-security, and mobile communication technologies being progressively leveraged in automation markets. We believe that these will also contribute to ideal remote data acquisition devices in IoT world.

To fulfill the transition requirements and future applications, Advantech has developed the ADAM-6000/6200 series of Ethernet I/O modules, comprising analog I/O, digital I/O, and relay modules. ADAM-6000/6200 series modules possess a multitude of advanced features that can cope with changes in hardware design and user expectations regarding useful software functions for applications in the field. With a new design and strong capabilities, ADAM-6000/6200 series modules can provide a well-integrated I/O solution for Ethernet control systems.

Major Functionality Comparison

<table>
<thead>
<tr>
<th>Feature</th>
<th>ADAM-6000</th>
<th>ADAM-6200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daisy-chain with auto-bypass</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>GCL</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Peer-to-peer</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Web server (HTML5)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Configuration backup</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Access control</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Protocol Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modbus/TCP</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MQTT</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>SNMP</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>RESTful</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Flexible Deployment with Daisy Chain Networking and Auto-Bypass Protection

ADAM-6200 modules have built-in Ethernet switches to allow daisy chain connections in an Ethernet network, making it easier to deploy, saving on wiring costs, and helping to improve scalability. The two Ethernet ports are fully compliant with IEEE 802.3u 10/100 Mbps via standard RJ-45 connectors.

Although the daisy chain topology brings cost-saving benefits for users, it still comes with the risk that once any device in the chain suffers a power outage, it will cause the disconnection of all devices data stream.

Auto-Bypass Protection

To prevent this critical issue from happening, Advantech has refined the hardware design of ADAM-6200 modules so that they can rapidly recover the network connection within approximately 2.5 s, thereby greatly minimizing any potential damage.

Remote Monitoring and Control with Smart Portable Devices

At the early stage of automation, it was difficult to access or obtain online equipment data when conducting on-site inspections. Mostly, the only possible way to do this was by communicating with engineers on the factory floor or in a central control room where the SCADA program was running. With these factors considered, on-site inspections and debugging were invariably arduous tasks that took considerable effort to complete.

Overcoming this, the ADAM-6200 series of modules integrates HTML5, allowing users to remotely monitor the status of all online modules without bridging a SCADA system. These modules also allow users to perform basic I/O configuration on any built-in HMI device such as a smartphone or digital pad via the Internet. Moreover, users can further develop extended applications based on the default HTML5 file embedded in the module.

With its enhanced syntax structure and integration of rich web technologies such as CSS and JavaScript, the now widely used markup language HTML5 has enhanced the design of web content. This is particularly beneficial for ADAM module users because it allows them to implement more web services and APIs and to develop more interactive applications for configuring and monitoring their hardware.
ADAM-6000 GCL is the Simplest Logic Ethernet I/O

- **What is GCL?**
  Graphic Condition Logic (GCL) gives controllability to Ethernet I/O modules. Users can define control logic rules using the graphic configuration environment in ADAM series modules and download defined logic rules to ADAM-6000/6200 Ethernet I/O modules. The modules will then execute the logic rules automatically, just like a standalone controller. For each Ethernet I/O module, 16 logic rules can be defined. In the configuration environment of Adasm/Apax .NET Utility, four graphic icons show the four stages of one logic rule, referring to the input, logic, execution, and output stages (refer to the image below). Users can simply click on each icon and a dialog window will appear to configure each stage. After completing all configurations, users can simply click a button to download the defined logic rules to their module.

- **Supports Both Local and Remote Output**
  When users define the destination of the output stage (e.g., digital output, analog output, counter, and pulse output), the target module can be set as either the local module or another remote module, thus giving the ability to develop complex logic rules.

- **Fast Execution Time**
  Advantech GCL features the shortest logic rule execution time on the market. When a local output is selected (i.e., the input and output channels are on the same module), the processing time (including an hardware input delay time, logic rule, execution time, and hardware output delay time) is <1 ms. When a remote output is selected (i.e., the input and output channels are on different modules), the total processing time (including processing and communication time) is <3 ms.

- **Sending Messages**
  In GCL, you can define customized message. When the specified conditions are met, the message, module IP, and I/O status will be sent to the PC or device you define.

What Benefits Do Peer-to-Peer Modules Provide?

- **What is Peer-to-Peer?**
  Unlike client/server mode, peer-to-peer mode enabled modules to actively update their input channel status to a specific output channel. For this, a pair of modules is used: one input module and one output module. Users can define the mapping between them and the input value of one module will be transferred to the output channel of the other module.

- **No Controller Required**
  For Ethernet I/O modules without peer-to-peer functionality, a controller is needed to read data from the input module and then send the data to the output module. With peer-to-peer solutions, the controller can be removed since data will be automatically transferred. This not only simplifies the process but also helps save on system hardware costs.

- **No Programming Required**
  To utilize peer-to-peer modules, the only thing required is to configure the settings using Adam/Apax .NET Utility. Because no additional programming effort is needed, this greatly reduces system development time.

- **Fast Response Time**
  Advantech peer-to-peer modules offer the best execution times on the market; specifically, the execution time to transfer data from input to output is <1.2 ms.

- **Advanced Security**
  When peer-to-peer modules are employed, it is critical that they not be controlled by unauthorized computers or devices. ADAM-6000 series peer-to-peer modules allow users to decide which IP or MAC address has control authority. This can make ensure that output modules are controlled only by their paired input modules.

- **Simple and Flexible System Wiring**
  Long-distance wiring can introduce difficulties into any project. For some automation applications, if the PLC and the sensors are far away, a remote I/O module needs to be located near the sensors and a proprietary communication network needs to connect the PLC and the remote I/O module. However, with this setup, communication will be severely limited. Moreover, networks provided by PLC manufacturers are rarely open networks. Peer-to-peer modules can replace limited and closed networks with no limitations since they leverage the most open and flexible Ethernet networks.
Real-time distributed control systems are an important technology for reliable industrial Ethernet and automation applications. A number of techniques are employed to adopt the Ethernet protocol for industrial processes, which must provide reliable service to ensure stable operation. With modern protocols, automation systems from different manufacturers can be interconnected throughout a plant. Industrial Ethernet exploits the relatively larger marketplace for computer interconnections to reduce the cost and improve the performance of communications between industrial controllers.

Real-Time Systems

A real-time system is one in which the correctness of a result depends not only on precise calculations but also on accurate timing. In computing, “real time” refers to a time frame that is very brief, to the point that it is virtually instantaneous. When a computer processes data in real time, it reads and handles data as it is received, producing results without any delay. A non-real-time computer process does not have a deadline. Such processes can be considered non-real-time—even if fast results are the preferred outcome. A real-time system, on the other hand, is expected to respond not just quickly, but also within a predictable period of time. In automation control systems, real-time technology provides multiple advantages, such as improved safety, quality, and efficiency. To build a real-time distributed control system, it is critical to establish reliable real-time communication among the controllers; accordingly, there is now increasing interest in the use of Ethernet protocols as the link-layer protocol, such as EtherNet/IP, PROFINET, EtherCAT, Ethernet PowerLink, SERCOS III.

EtherNet/IP

EtherNet/IP was developed in the late 1990s by Rockwell Automation for use in process control and other industrial automation applications, ensuring multi-vendor system interoperability. EtherNet/IP is a lot like standard office Ethernet, using the same TCP/IP messaging but with a new application layer added where data are arranged. This is known as object-oriented organization, which allows ordinary office Ethernet to become a markedly more versatile system. Today, EtherNet/IP is commonly used in industrial automation applications such as water processing, manufacturing, and utilities.

Profinet

PROFINET, the standard for industrial networking in automation, connects devices, systems, and cells to facilitate manufacturing that is faster, safer, less costly, and of higher quality. As it is fully compatible with office Ethernet, it can be easily integrated with existing systems and equipment while bringing enhanced features such as real-time performance and control as well as monitoring functions. Additionally, PROFINET features highly scalable architectures, remote access and maintenance of field devices over the network, and lower production/quality data monitoring costs.

Feature Highlights

Daisy Chain Connections
ADAM-6100 modules have two built-in Ethernet switches to allow daisy chain connections in an Ethernet network, making it easier to deploy while improving scalability and resistance against interference commonly found in factory settings.

Ethernet-Based Configuration Tool
Adam/Apax .NET Utility comes bundled with each ADAM-6100 module. With this utility, users can configure, set, and test ADAM-6100 modules via Ethernet.

2,500 Vdc Isolation Protection
With triple isolation, including power supply, I/O, and Ethernet communication, ADAM-6100 series modules ensure that I/O data are controlled correctly while preventing devices from breaking down.

Multiple Mounting Options
Advantech provides various mounting methods to fit the varying needs of different projects in the field. ADAM-6100 series modules support DIN rail mounting, wall mounting, and piggybacking.
## ADAM-6000 Series Selection Guide

### Table: ADAM-6000 Series Specifications

<table>
<thead>
<tr>
<th>Spec.</th>
<th>Model</th>
<th>ADAM-6015</th>
<th>ADAM-6017</th>
<th>ADAM-6018</th>
<th>ADAM-6022</th>
<th>ADAM-6024</th>
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<tr>
<td></td>
<td>ADAM-6050</td>
<td>ADAM-6051</td>
<td>ADAM-6052</td>
<td>ADAM-6060</td>
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<td>±10 V</td>
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<td>2 (sink)</td>
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### Table: ADAM-6050 Specifications

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<td>8 (source)</td>
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# ADAM-6200 Series Selection Guide

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<thead>
<tr>
<th>Model</th>
<th>ADAM-6217</th>
<th>ADAM-6224</th>
<th>ADAM-6250</th>
<th>ADAM-6251</th>
<th>ADAM-6256</th>
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<th>ADAM-6266</th>
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<td>0 ~ 20, 4 ~ 20 mA</td>
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Note 1: Peer-to-peer and GCL cannot be run simultaneously; only one feature can be enabled at a time.

Note 2: The ADAM-6224 can only act as a receiver and generate analog output when peer-to-peer or GCL mode is used.
# ADAM-6100 Series Selection Guide

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<tr>
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<th>ADAM-6150</th>
<th>ADAM-6151</th>
<th>ADAM-6156</th>
<th>ADAM-6160</th>
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<td>10/100 Mbps Ethernet</td>
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<td>Channels</td>
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<td>±500 mV</td>
<td>±1 V</td>
<td>±5 V</td>
<td>±10 V</td>
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<td>Output Channels</td>
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<tr>
<td>Connectors</td>
<td>2 x RJ-45 LAN (daisy chain)</td>
<td>Plug-in screw terminal block (I/O and power)</td>
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</table>
Ethernet I/O Modules: ADAM-6000

ADAM-6015 7-ch Isolated RTD Input Modbus TCP Module
ADAM-6017 8-ch Isolated Analog Input Modbus TCP Module with 2-ch DO
ADAM-6018 8-ch Isolated Thermocouple Input Modbus TCP Module with 8-ch DO

Specifications

Analog Input
- Channels: 7 (differential)
- Input Impedance: > 10 MΩ
- Input Connections: 2 or 3 wire
- Input Type: Pt, Balco and Ni RTD
- RTD Types and Temperature Ranges:
  - Pt 100: -50°C ~ 150°C
  - 0°C ~ 200°C
  - -200°C ~ 200°C
  - Supports both IEC 60751 TS90 (0.0385 W/W°C) and JIS C 1604 (0.0392 W/W°C)
  - Balco 500: -80°C ~ 120°C
  - 0°C ~ 100°C
  - Supports CMR @ 50/60 HZ 90dB
  - Supports NMR @ 50/60 HZ 60dB
- Sampling Rate: 10 or 100 sample/second (total)
- Resolution: 16-bit
- Zero Drift: ±6 μV/°C
- Span Drift: ±25 ppm/°C
- Accuracy: ±0.1% (voltage)
- Output Delay: 10 or 100 sample/second/second (total)
- Common-Mode Voltage: CMR @ 50/60 Hz 90dB
  - NMR @ 50/60 Hz 67dB
  - 350 mW for each module

Digital Output
- Channels: 8, open collector to 30 V, 100 mA max. load
- Power Dissipation: 300 mW for each module

Ordering Information
- ADAM-6015: 7-ch Isolated RTD Input Modbus TCP Module
- ADAM-6017: 8-ch Isolated AI with 2-ch DO Modbus TCP Module
- ADAM-6018: 8-ch Isolated AI with 2-ch DO Modbus TCP Module

Common Specifications

General
- LAN: 10/100Base-T(X)
- Power Consumption:
  - ADAM-6015: 2.5 W @ 24 Vdc (ADAM-6015)
  - ADAM-6017: 2.7 W @ 24 Vdc (ADAM-6017)
  - ADAM-6018: 2 W @ 24 Vdc (ADAM-6018)
- Connectors:
  - 1 x RJ-45 (LAN), Plug-in screw terminal block (I/O and power)
  - System (1.6 second) and Communication (programmable)
- Watchdog: System (1.6 second) and Communication (programmable)

Protection
- Over Voltage Protection: ±35 Vdc
- Isolation Protection: 2,000 Vdc
- Built-in TVS/ESD Protection
- Power Reversal Protection

Environment
- Operating Temperature:
  - -10 ~ 70°C (14 ~ 158°F) (ADAM-6017-D)
- Storage Temperature:
  - -20 ~ 80°C (-4 ~ 176°F)
- Operating Humidity:
  - 20 ~ 95% RH (non-condensing)
- Storage Humidity:
  - 0 ~ 95% RH (non-condensing)

All product specifications are subject to change without notice.
# Specifications

## General
- **Loop Number**: 2 (3 AI, 1 AO, 1 DI, 1 DO for each control loop)

## Analog Input
- **Channels**: 6 (differential)
- **Input Range**: ±10 VDC, 0 ~ 20 mA, 4 ~ 20 mA

## Analog Output
- **Channels**: 2
- **Output Type**: V, mA
- **Output Range**: 0 ~ 10 VDC, 4 ~ 20 mA, 0 ~ 20 mA

## Digital Input
- **Channels**: 2
- **Dry Contact**: Logic level 0: close to GND
  Logic level 1: open
- **Wet Contact**: Logic level 0: 0 ~ 3 VDC
  Logic level 1: 10 ~ 30 VDC

## Digital Output
- **Channels**: 2
- **Power Dissipation**: 200 mW for each module
- **Channels**: 2, open collector to 30 V, 100 mA max. load
- **Power Dissipation**: 300 mW for each module

## Ordering Information
- **ADAM-6022**
  - Ethernet-based Dual-loop PID Controller
- **ADAM-6024**
  - 12-ch Isolated Universal Input/Output Modbus TCP Module

## Common Specifications

### General
- **LAN**: 10/100Base-T(X)
- **Power Consumption**: 4 W @ 24 VDC
- **Connectors**: 1 x RJ-45 (LAN), Plug-in screw terminal block (I/O and power)
- **Watchdog**: System (1.6 second) and Communication (programmable)
- **Power Input**: 10 ~ 30 VDC
- **Supports**: Modbus/TCP, TCP/IP, UDP and HTTP Protocols

### Analog Input
- **Input Impedance**: 20 MΩ
- **Accuracy**: ±0.1% of FSR
- **Resolution**: 16-bit
- **Sampling Rate**: 10 sample/second
- **CMR @ 50/60 Hz**: 60 dB
- **NMR @ 50/60 Hz**: ±25 ppm/°C
- **Span Drift**: ±6 ppm/°C

### Analog Output
- **Accuracy**: ±0.1% of FSR
- **Resolution**: 12-bit
- **Drift**: ±50 ppm/°C
- **Current Load Resistor**: Max. 500Ω
- **Voltage Load Resistor**: Min. 1KΩ

### Protection
- **Isolation Protection**: 2,000 VDC
- **Built-in TVS/ESD Protection**: ±35 VDC
- **Over Voltage Protection**: ±35 VDC
- **Power Reversal Protection**: ±15 VDC

### Environment
- **Operating Temperature**: -10 ~ 50°C
  (14 ~ 122°F)
- **Storage Temperature**: -20 ~ 80°C
  (-4 ~ 176°F)
- **Operating Humidity**: 20 ~ 95% RH
  (non-condensing)
- **Storage Humidity**: 0 ~ 95% RH
  (non-condensing)
Specifications

Digital Input
- Channels: 12
- Dry Contact: Logic level 0: close to GND, Logic level 1: open
- Wet Contact: Logic level 0: 0 ~ 3 VDC, Logic level 1: 10 ~ 30 VDC
- Supports 3 kHz Counter Input (32-bit + 1-bit overflow)
- Keep/Discard Counter Value when Power-off
- Supports 3 kHz Frequency Input
- Supports Inverted DI Status

Digital Output
- Channels: 6 (sink type), open collector to 30 V, 100 mA maximum load
- Supports 5 kHz Pulse Output
- Supports High-to-Low and Low-to-High Delay Output

Ordering Information
- ADAM-6050 18-ch Isolated DI/O Modbus TCP Module

Specifications

Common Specifications

General
- LAN: 10/100Base-T(X)
- Power Consumption: 2 W @ 24 VDC
- Connectors: 1 x RJ-45 (LAN), Plug-in screw terminal block (I/O and power)
- Watchdog: System (1.5 second) and Communication (programmable)

Power Input: 10 ~ 30 VDC
- Supports Peer-to-Peer, GCL
- Supports User Defined Modbus Address
- Supports Modbus/TCP, TCP/IP, UDP, DHCP, SNMP, HTTP and MQTT Protocol

Protection
- Power Reversal Protection
- Isolation Protection: 2,000 VDC

Environment
- Operating Temperature: -20 ~ 70°C (-4 ~ 158°F)
- Storage Temperature: -30 ~ 80°C (-22 ~ 176°F)
- Operating Humidity: 20 ~ 95% RH (non-condensing)
- Storage Humidity: 0 ~ 95% RH (non-condensing)
ADAM-6060  
ADAM-6066  

Specifications

General
- LAN 10/100Base-T(X)
- Power Consumption 2 W @ 24 VDC (ADAM-6060)  
2.5 W @ 24 VDC (ADAM-6066)
- Connectors 1 x RJ-45 (LAN), Plug-in screw terminal block (I/O and power)
- Power Input 10 ~ 30 VDC
- Supports Peer-to-Peer
- Supports GCL
- Supports Modbus/TCP, TCP/IP, UDP, DHCP, SNMP, HTTP and MQTT Protocol

Digital Input
- Channels 6
- Dry Contact Logic level 0: close to GND  
Logic level 1: open
- Wet Contact Logic level 0: 3 VDC  
Logic level 1: 10 ~ 30 VDC
- Supports 3 kHz Counter Input (32-bit + 1-bit overflow)
- Keep/Discard Counter Value when Power-off
- Supports 3 kHz Frequency Input
- Supports Inverted DI Status

Relay Output (Form A)
- Channels 6
- Contact Rating (Resistive) ADAM-6666: 120 VAC @ 0.5 A  
30 VDC @ 1 A
ADAM-6066: 250 VAC @ 5 A  
30 VDC @ 3 A
- Breakdown Voltage 500 VAC (50/60 Hz)
- Relay On Time 7 ms
- Relay Off Time 3 ms
- Total Switching Time 10 ms
- Insulation Resistance 1 GΩ min. at 500 VAC
- Maximum Switching Rate (at rated load) 20 operations/minute
- Supports Pulse Output

Protection
- Isolation Voltage 2,000 VAC
- Power Reversal Protection

Environment
- Operating Temperature -10 ~ 70°C (14 ~ 158°F)
- Storage Temperature -40 ~ 70°C (-40~158°F) for D version
- -20 ~ 80°C (-4 ~ 176°F) for D version
- Operating Humidity 20 ~ 95% RH (non-condensing)
- Storage Humidity 0 ~ 95% RH (non-condensing)

Ordering Information
- ADAM-6060 6-ch DI and 6-ch Relay Modbus TCP Module
- ADAM-6066 6-ch DI and 6-ch Power Relay Modbus TCP Module

ADAM-6000 Series Dimensions

ADAM-6000 Series Common Specifications

General
- Dimensions (W x H x D) 70 x 120 x 30 mm
- Enclosure ABS+PC
- Mounting DIN 35 rail, stack, wall

All product specifications are subject to change without notice.
### ADAM-6217
**ADAM-6224**

## Specifications

### Analog Input
- **Channels**: 8 (differential)
- **Input Impedance**: > 10 MW (voltage) 120 W (current)
- **Input Type**: mV, V, mA
- **Input Range**: ±150 mV, ±500 mV, ±1 V, ±5 V, 0 – 20 mA, 4 – 20 mA, ±20 mA
- **Span Drift**: ± 30 ppm/°C
- **Zero Drift**: ± 6 μV/°C
- **Resolution**: 16-bit
- **Accuracy**: ± 0.1% of FSR (Voltage) at 25°C ± 0.2% of FSR (Current) at 25°C
- **Sampling Rate**: 10 sample/second (total)
- **CMR @ 50/60 Hz**: 92 dB
- **NMR @ 50/60 Hz**: 67 dB
- **Common Mode**: 200 VDC

### Ordering Information
- **ADAM-6217**: 8-ch Isolated Analog Input Modbus TCP Module

## Common Specifications

### General
- **Ethernet**: 2-port 10/100 Base-TX (for Daisy Chain)
- **Protocol**: Modbus/TCP, TCP/IP, UDP, HTTP, DHCP
- **Connector**: Plug-in 5P/15P screw terminal blocks
- **Power Input**: 10 - 30 VDC (24 VDC standard) 1.5 seconds
- **Watchdog Timer**: Communication (Programmable) Communication (Programmable)
- **Dimensions**: 70 x 122 x 27 mm
- **Protection**: Built-in TVS/ESD protection Power Reversal protection Over Voltage protection: ±/ 35VDC Isolation protection: 2500 VDC
- **Power Consumption**: ADAM-6217: 3.5W @ 24 VDC ADAM-6224: 6W @ 24 VDC

### Features
- Daisy chain connection with auto-bypass protection
- Remote monitoring and control with smart phone/pad
- Group configuration capability for multiple module setup
- Flexible user-defined Modbus address
- Intelligent control ability by Peer-to-Peer and GCL function
- Multiple protocol support: Modbus TCP, TCP/IP, UDP, HTTP, DHCP, SNMP (ADAM-6217-B), MQTT (ADAM-6217-B)
- Web language support: XML, HTML 5, JavaScript
- System configuration backup
- User Access Control

### Environment
- **Operating Temperature**: -10 – 70°C (-14 – 158°F) ADAM-6224 -40 – 70°C (-40 – 158°F) ADAM-6217-B
- **Storage Temperature**: -20 – 80°C (-4 – 176°F) -40 – 80°C (-40 – 176°F) for ADAM-6217-B
- **Operating Humidity**: 20 – 95% RH (non-condensing)
- **Storage Humidity**: 0 – 95% RH (non-condensing)

### Ordering Information
- **ADAM-6224**: 4-ch Isolated Analog Output Modbus TCP Module

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All product specifications are subject to change without notice. Last updated: 31-Aug-2018

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ADAM-6250
ADAM-6251
ADAM-6256

15-ch Isolated Digital I/O Modbus TCP Module
16-ch Isolated Digital Input Modbus TCP Module
16-ch Isolated Digital Output Modbus TCP Module

Specifications

Digital Input
- Channels
  - ADAM-6250: 8
  - ADAM-6251: 16
- Dry Contact
  - Logic 0: Open
  - Logic 1: Closed to DGND
- Wet Contact
  - Logic 0: 0 – 3 VDC or 0 – -3 VDC
  - Logic 1: 10 – 30 VDC or -10 – -30 VDC
  (Dry/Wet Contact decided by Switch)
- Input Impedance
  - 5.2 kΩ (Wet Contact)
- Transition Time
  - 0.2 ms
- Frequency Input Range
  - 0.1 – 3 kHz
- Counter Input
  - 3 kHz (32 bit + 1 bit overflow)
- Keep/Discard Counter Value when power off
- Supports Inverted DI Status

Digital Output
- Channels
  - ADAM-6250: 7 (Sink Type)
  - ADAM-6256: 16 (Sink Type)
- Output Voltage Range
  - 10 – 30 VDC
- Normal Output Current
  - 100 mA (per channel)
- Pulse Output
  - Up to 5 kHz
- Delay Output
  - High-to-Low and Low-to-High

Ordering Information
- ADAM-6250
  - 15-ch Isolated Digital I/O Modbus TCP Module
- ADAM-6251
  - 16-ch Isolated Digital Input Modbus TCP Module
- ADAM-6256
  - 16-ch Isolated Digital Output Modbus TCP Module

Common Specifications

General
- Ethernet
  - 2-port 10/100 Base-TX (for Daisy Chain)
- LED Indication
  - ADAM-6250: 8 DI + 7 DO
  - ADAM-6251: 16 DI
  - ADAM-6256: 16 DO
- Protocol
  - Modbus/TCP, TCP/IP, UDP, HTTP, DHCP, MQTT, SNMP
- Connector
  - Plug-in 5P/15P screw terminal blocks
- Power Input
  - 10 - 30 VDC (24 VDC standard)
- Watchdog Timer
  - System (1.6 seconds)
  - Communication (Programmable)
- Dimensions
  - 70 x 122 x 27 mm
- Protection
  - Built-in TVS/ESD protection
  - Power Reversal protection
  - Over Voltage protection: +/-35 VDC
  - Isolation protection: 2500 VDC
- Power Consumption
  - ADAM-6250: 3 W @ 24 VDC
  - ADAM-6251: 2.7 W @ 24 VDC
  - ADAM-6256: 3.2 W @ 24 VDC

Features
- Daisy chain connection with auto-bypass protection
- Remote monitoring and control with smart phone/pad
- Group configuration capability for multiple module setup
- DI/DI LED indication
- Flexible user-defined Modbus address
- Intelligent control ability by Peer-to-Peer and GCL function
- Multiple protocol support: Modbus/TCP, TCP/IP, UDP, HTTP, DHCP, MQTT, SNMP
- Web language support: XML, HTML 5, Java Script
- System configuration backup
- User Access Control

Environment
- Operating Temperature
  - -10 – 70°C (14 – 158°F) (A version)
  - -40 – 70°C (-40–158°F) (B version)
- Storage Temperature
  - -20 – 80°C (-4 – 176°F)
  - -40 – 80°C (-40–176°F) (B version)
- Operating Humidity
  - 20 – 95% RH (non-condensing)
- Storage Humidity
  - 0 – 95% RH (non-condensing)
### Specifications

#### Relay Output
- **Channels**
  - ADAM-6260: 5 Form C and 1 Form A
  - ADAM-6266: 4 Form C
- **Contact Rating (Resistive)**
  - ADAM-6260: 250 VAC @ 5A
  - ADAM-6266: 30 VDC @ 5A
- **Max. Switching Voltage**
  - ADAM-6260: 400 VAC
  - ADAM-6266: 300 VDC
- **Breakdown Voltage**
  - ADAM-6260: 500 VAC (50/60Hz)
- **Max. Breakdown Capacity**
  - ADAM-6260: 1250 VA
- **Frequency of Operation**
  - ADAM-6260: 360 operations/hour with load
  - ADAM-6260: 72,000 operations/hour without load
- **Set/Reset Time**
  - ADAM-6260: 8 ms/8 ms
- **Mechanical Endurance**
  - ADAM-6260: > 15 x 10^6 operations
- **Isolation between Contact**
  - ADAM-6260: > 10 GΩ @ 500 VDC

#### Digital Input
- **Channels**
  - ADAM-6266: 4
- **Dry Contact**
  - Logic 0: Open
  - Logic 1: Closed to DI COM
- **Wet Contact**
  - Logic 0: 0 ~ 3 VDC or 0 ~ -3 VDC
  - Logic 1: 10 ~ 30 VDC or -10 ~ -30 VDC (Dry/Wet Contact decided by Switch)
- **Input Impedance**
  - ADAM-6266: 5.2 kΩ (Wet Contact)
- **Transition Time**
  - ADAM-6266: 0.2 ms
- **Frequency Input Range**
  - ADAM-6266: 0.1 ~ 3kHz
- **Counter Input**
  - ADAM-6266: 3kHz (32 bit + 1 bit overflow)
- **Keep/Discard Counter Value when power off**
- **Supports Inverted DI Status**

### Ordering Information
- **ADAM-6260**
  - 6-ch Relay Output Modbus TCP Module
- **ADAM-6266**
  - 4-ch Relay Output Modbus TCP Module with 4-ch DI

### Common Specifications

#### General
- **Ethernet**
  - 2-port 10/100 Base-TX (for Daisy Chain)
- **LED Indication**
  - ADAM-6260: 6 RL
  - ADAM-6266: 4 RL + 4 DI
- **Protocol**
  - Modbus/TCP, TCP/IP, UDP, HTTP, DHCP, SNMP, MQTT
- **Connector**
  - Plug-in 5P/15P screw terminal blocks
- **Power Input**
  - 10 ~ 30 VDC (24 VDC standard)
  - System (1.6 seconds) Communication (Programmable)
- **Dimensions**
  - 70 x 122 x 27 mm
- **Protection**
  - Built-in TVS/ESD protection
  - Power Reversal protection
  - Over Voltage protection: +/- 35VDC
  - Isolation protection: 2500 VDC
- **Power Consumption**
  - ADAM-6260: 4.5 W @ 24 VDC
  - ADAM-6266: 4.2 W @ 24 VDC

#### Features
- Daisy chain connection with auto-bypass protection
- Remote monitoring and control with smart phone/pad
- Group configuration capability for multiple module setup
- DI/O LED Indication
- Flexible user-defined Modbus address.
- Intelligent control ability by Peer-to-Peer and GCL function
- Multiple protocol support: Modbus/TCP, TCP/IP, UDP, HTTP, DHCP, SNMP, MQTT
- Web language support: XML, HTML 5, Java Script
- System configuration backup
- User Access Control

#### Environment
- **Operating Temperature**
  - ADAM-6260: -10 ~ 70°C (-14 ~ 158°F)
  - ADAM-6266: -40 ~ 70°C (-40 ~ 158°F) (B version)
- **Storage Temperature**
  - ADAM-6260: -20 ~ 80°C (-4 ~ 176°F)
  - ADAM-6266: -40 ~ 80°C (-40 ~ 176°F) (B version)
- **Operating Humidity**
  - ADAM-6260: 20 ~ 95% RH (non-condensing)
- **Storage Humidity**
  - ADAM-6260: 0 ~ 95% RH (non-condensing)
**ADAM-6117**
**ADAM-6160**

**Specifications**

**Analog Input**
- **Channels**: 8 (differential)
- **Input Impedance**: > 10 MΩ (voltage), 120 Ω (current)
- **Input Range**: ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, 0 – 20 mA, 4 – 20 mA, ±20 mA
- **Span Drift**: ± 30 ppm/°C
- **Zero Drift**: ± 6 μV/°C
- **Resolution**: 16-bit
- **Accuracy**: ± 0.1% of FSR (Current) at 25°C, ± 0.2% of FSR (Current) at 25°C
- **Sampling Rate**: 10 sample/second (total)
- **CMR @ 50/60 Hz**: 92 dB
- **NMR @ 50/60 Hz**: 67 dB
- **High Common Mode**: 200 VDC

**Ordering Information**
- **ADAM-6117EI**: 8-ch Isolated AI EtherNet/IP Module

**Common Specifications**

**General**
- **LAN**: 10/100Base-T(X)
- **Power Consumption**:
  - ADAM-6117: 3.5 W @ 24 VDC
  - ADAM-6160: 4.5 W @ 24 VDC
- **Connectors**: 2 x RJ-45 LAN (Daisy Chain)
- **Watchdog**: System (1.6 second)
- **Power Input**: 10 – 30 VDC

**Protection**
- **Isolation Protection**: 2,500 VDC
- **Built in TVS/ESD Protection**
- **Power Reversal Protection**

**Environment**
- **Operating Temperature**: -10 – 70°C (14 – 158°F)
- **Storage Temperature**: -20 – 80°C (-4 – 176°F)
- **Operating Humidity**: 20 – 95% RH (non-condensing)
- **Storage Humidity**: 0 – 95% RH (non-condensing)

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**Relay Output**
- **Channels**: 5 Form C and 1 Form A
- **Contact Rating (Resistive)**:
  - 250 VAC @ 5A
  - 30 VDC @ 5A
- **Max. Switching Voltage**: 400 VDC, 300 VDC
- **Breakdown Voltage**: 500 VAC (50/60Hz)
- **Max. Breakdown Capacity**: 1250 VA
- **Frequency of Operation**: 360 operations/hour with load, 72,000 operations/hour without load
- **Set/Reset Time**: 8 ms/8 ms
- **Mechanical Endurance**: > 15 x 10⁶ operations
- **Insulation between Contact**: 1000 Vrms
- **Insulation Resistance**: > 10 GΩ @ 500 VDC

**Ordering Information**
- **ADAM-6160EI**: 6-ch Relay EtherNet/IP Module

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All product specifications are subject to change without notice. Last updated: 31-Aug-2018
ADAM-6150
ADAM-6151/6156

15-ch Isolated Digital I/O Real-time Ethernet Module
16-ch Isolated Digital Input/ Digital Output Real-time Ethernet Module

Specifications

Digital Input
- Channels: 8
- Dry Contact:
  - Logic level 0: open
  - Logic level 1: close to DGND
- Wet Contact:
  - Logic level 0: 0 ~ 3 VDC or 0 ~ -3 VDC
  - Logic level 1: 10 ~ 30 VDC or -10 ~ -30 VDC
    (Dry/Wet Contact decided by switch)
- Input Impedance: 5.2 kΩ (Wet Contact)
- Transition Time:
  - From logic level 0 to 1: 0.2 ms
  - From logic level 1 to 0: 0.2 ms

Digital Output
- Channels: 7
- Output Voltage Range: 8 ~ 35 VDC
- Normal Output Current: 100 mA (per channel)

Ordering Information
- ADAM-6150EI: 15-ch Isolated DI/O EtherNet/IP Module

Specifications

Digital Input (ADAM-6151)
- Channels: 16
- Dry Contact:
  - Logic level 0: open
  - Logic level 1: close to DGND
- Wet Contact:
  - Logic level 0: 0 ~ 3 VDC or 0 ~ -3 VDC
  - Logic level 1: 10 ~ 30 VDC or -10 ~ -30 VDC
    (Dry/Wet Contact decided by switch)
- Input Impedance: 5.2 kΩ (Wet Contact)
- Transition Time:
  - From logic level 0 to 1: 0.2 ms
  - From logic level 1 to 0: 0.2 ms

Digital Output (ADAM-6156)
- Channels: 16
- Output Voltage Range: 8 ~ 35 VDC
- Normal Output Current: 100 mA (per channel)

Ordering Information
- ADAM-6151EI: 16-ch Isolated DI EtherNet/IP Module
- ADAM-6156EI: 16-ch Isolated DO EtherNet/IP Module

Common Specifications

General
- LAN: 10/100Base-T(X)
- Power Consumption:
  - ADAM-6150: 3 W @ 24 VDC
  - ADAM-6151: 2.7 W @ 24 VDC
  - ADAM-6156: 3.2 W @ 24 VDC
- Connectors: 2 x RJ-45 LAN, (Daisy Chain), Plug-in screw terminal block (I/O and power)
- Watchdog: System (1.6 second)
- Power Input: 10 ~ 30 VDC

Protection
- Over Voltage Protection: ±35 VDC
- Isolation Protection: 2,500 VDC
- Power Reversal Protection

Environment
- Operating Temperature: -10 ~ 70°C (-14 ~ 158°F)
- Storage Temperature: -20 ~ 80°C (-4 ~ 176°F)
- Operating Humidity: 20 ~ 95% RH (non-condensing)
- Storage Humidity: 0 ~ 95% RH (non-condensing)
ADAM-4000 Series

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

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

General Features

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

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

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

I/O Module Features

Easy Plug-In System Integration
With the ADAM-400’s Modbus I/O and built-in Modbus/RTU protocol, any controller using the Modbus/RTU standard can be integrated as part of an ADAM-4000 control system. Any Modbus Ethernet data gateway can upgrade these I/O modules up to the Modbus/TCP Ethernet layer. Most HMI software is bundled with a Modbus driver and can access the ADAM-4000 I/O directly. Moreover, Advantech provides Modbus OPC Server and Modbus/TCP OPC Server as data exchange interfaces between the ADAM-4000 Modbus I/O and any Windows applications.

Communication Module Features

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

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

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

Designed for Harsh Industrial Environments

ADAM-4100 Module with LED Display

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

Online Firmware Updates

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

Micro USB interface

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

Access ADAM by Passive RFID

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

Applications

- Wide operating temperature: -40 ~ 85°C
- Higher Noise Immunity
  - ESD (IEC 61000-4-2) 8KV
  - EFT (IEC 61000-4-4) 4KV
  - Surge (IEC 61000-4-5) 4KV
- Wide power input: 10 ~ 48 VDC
- Support modbus/RTU
- Multiple interface: RS-485, Micro USB
## I/O Module Selection Guide

### Analog Input

<table>
<thead>
<tr>
<th>Model</th>
<th>ADAM-4015</th>
<th>ADAM-4017+</th>
<th>ADAM-4018+</th>
<th>ADAM-4019+</th>
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<tbody>
<tr>
<td>Resolution</td>
<td>16 bit</td>
<td>16 bit</td>
<td>16 bit</td>
<td>16 bit</td>
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<tr>
<td>Channels</td>
<td>6 differential</td>
<td>8 differential</td>
<td>8 differential</td>
<td>8 differential</td>
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<td>Sampling Rate</td>
<td>10 Hz</td>
<td>10 Hz</td>
<td>10 Hz</td>
<td>10 Hz</td>
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<td>Voltage Input</td>
<td>±150 mV, ±500 mV, ±1 V, ±5 V</td>
<td>±150 mV, ±500 mV, ±1 V, ±5 V</td>
<td>±150 mV, ±500 mV, ±1 V, ±5 V</td>
<td>±150 mV, ±500 mV, ±1 V, ±5 V</td>
</tr>
<tr>
<td>Current Input</td>
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<td>4 ~ 20 mA, ±20 mA</td>
<td>4 ~ 20 mA, ±20 mA</td>
<td>4 ~ 20 mA, ±20 mA</td>
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<tr>
<td>Burnout Detection</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Channel Independent Configuration</td>
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<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>3,000 VDC</td>
<td>3,000 VDC</td>
<td>3,000 VDC</td>
<td>3,000 VDC</td>
</tr>
<tr>
<td>Watchdog Timer</td>
<td>✔ (system and comm.)</td>
<td>✔ (system and comm.)</td>
<td>✔ (system and comm.)</td>
<td>✔ (system and comm.)</td>
</tr>
<tr>
<td>Modbus Support *</td>
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<td>✔</td>
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*All ADAM-4000 I/O modules support ASCII commands

### Analog Output

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<th>ADAM-4024</th>
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<td>4</td>
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<tr>
<td>Voltage Output</td>
<td>0 ~ 10 V</td>
<td>±10 V</td>
</tr>
<tr>
<td>Current Output</td>
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<td>0 ~ 20 mA, 4 ~ 20 mA</td>
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<tr>
<td>Digital I/O</td>
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<tr>
<td>Input Channels</td>
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<td>Output Channels</td>
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<tr>
<td>Alarm Settings</td>
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<tr>
<td>Isolation Voltage</td>
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<td>3,000 VDC</td>
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<tr>
<td>Digital LED Indicator</td>
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<td>-</td>
</tr>
<tr>
<td>Watchdog Timer</td>
<td>✔ (system)</td>
<td>✔ (system and comm.)</td>
</tr>
<tr>
<td>Safety Setting</td>
<td>-</td>
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</tr>
<tr>
<td>Modbus Support *</td>
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<td>✔</td>
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</table>

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

### Digital Input/Output

<table>
<thead>
<tr>
<th>Model</th>
<th>ADAM-4050</th>
<th>ADAM-4051</th>
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<tr>
<td>Voltage Output</td>
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<td>Current Output</td>
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<td>Alarm Settings</td>
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<td>Isolation Voltage</td>
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<td>5,000 VDC</td>
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<td>Digital LED Indicator</td>
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</tr>
<tr>
<td>Watchdog Timer</td>
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<td>✔ (system and comm.)</td>
<td>✔ (system)</td>
</tr>
<tr>
<td>Safety Setting</td>
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<td>Modbus Support *</td>
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*All ADAM-4000 I/O modules support ASCII commands
## I/O Module Selection Guide

### Digital Input/Output

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<th>ADAM-4053</th>
<th>ADAM-4055</th>
<th>ADAM-4056S/4056SO</th>
<th>ADAM-4060</th>
<th>ADAM-4068</th>
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<td>Voltage Input</td>
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<td>12</td>
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<td>8-ch power relay</td>
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<td>2,500 VDC</td>
<td>5,000 VDC</td>
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<td>2,500 Vrms</td>
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<td>-</td>
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<td>✓</td>
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<tr>
<td>Watchdog Timer</td>
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<td>✓ (system and comm.)</td>
<td>✓ (system and comm.)</td>
<td>✓ (system)</td>
<td>✓ (system and comm.)</td>
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<td>-</td>
<td>✓</td>
<td>✓</td>
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<td>-</td>
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<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>supported in E version</td>
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*All ADAM-4000 I/O modules support ASCII commands*
## Communication and Controller Module Selection Guide

### Repeaters

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

<table>
<thead>
<tr>
<th>Model</th>
<th>ADAM-4520</th>
<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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<tr>
<td>Comm. Protocol</td>
<td>Serial: From 1,200 to 115.2K</td>
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<tr>
<td>Comm. Distance</td>
<td>Serial: 1.2 km</td>
<td>ADAM-4541: 2.5 km ADAM-4542+: 15 km</td>
<td>Serial: 1.2 km</td>
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<td>LED Indicators</td>
<td>Communication and power</td>
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<td></td>
<td></td>
<td></td>
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<td>Data Flow Control</td>
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<td>-</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watchdog Timer</td>
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<td>-</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>1,000 Vdc</td>
<td>-</td>
<td>ADAM-4561: 3,000 Vdc ADAM-4562: 2,500 Vdc</td>
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</tr>
<tr>
<td>Power Requirements</td>
<td>10 ~ 30 Vdc</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-10 ~ 70°C (14 ~ 158°F)</td>
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<td></td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>5 ~ 95% RH</td>
<td></td>
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</tr>
<tr>
<td>Power Consumption</td>
<td>1.2 W @ 24 Vdc</td>
<td>1 W @ 24 Vdc</td>
<td>ADAM-4541: 1.5 W @ 24 Vdc ADAM-4542+: 3 W @ 24 Vdc</td>
<td>ADAM-4561: 1.5 W @ 5 Vdc ADAM-4562: 1.1 W @ 5 Vdc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# 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>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>16 bit</td>
<td>-</td>
<td>-</td>
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</tbody>
</table>

### Analog Input

<table>
<thead>
<tr>
<th>Channels</th>
<th>ADAM-4117</th>
<th>ADAM-4118</th>
<th>ADAM-4150</th>
<th>ADAM-4168</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</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>
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<tr>
<td>Voltage Input</td>
<td>0 – 150 mV, 0 – 500 mV, 0 – 1 V, 0 – 5 V, 0 – 10 V, 0 – 15 V, ±150 mV, ±500 mV, ±1 V, ±15 V, ±10 V, ±15 V</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>Current Input</td>
<td>0 – 20, 4 – 20, ±20 mA</td>
<td>4 – 20, ±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>
<td>-</td>
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<tr>
<td>Burnout Detection</td>
<td>✓ (mA)</td>
<td>✓ (mA and All T/C)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Channel Independent Configuration</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
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### Digital I/O

<table>
<thead>
<tr>
<th>Input Channels</th>
<th>ADAM-4117</th>
<th>ADAM-4118</th>
<th>ADAM-4150</th>
<th>ADAM-4168</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Channels</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>-</td>
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</table>

### Counter

<table>
<thead>
<tr>
<th>Channels</th>
<th>ADAM-4117</th>
<th>ADAM-4118</th>
<th>ADAM-4150</th>
<th>ADAM-4168</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Channels</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>-</td>
</tr>
</tbody>
</table>

### Isolation Voltage

- 3,000 Vcc Communication and Power

### Digital LED Indicators

- Communication and Power

### Watchdog Timer

- Yes (System & Communication)

### Safety Setting

- ✓ ✓ ✓

### Communication Protocol

- ASCII Command/Modbus

### Power Requirements

- 10 – 48 Vcc

### Operating Temperature

- -40 – 85°C (-40 – 185°F)

### Storage Temperature

- -40 – 85°C (-40 – 185°F)

### Operating Humidity

- 0 – 150 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V

### Operating Frequency

- 3 kHz

### Power Consumption

- 1.2 W @ 24 Vcc
- 0.7 W @ 24 Vcc
- 1.8 W @ 24 Vcc

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## Model

<table>
<thead>
<tr>
<th>Model</th>
<th>ADAM-4510I</th>
<th>ADAM-4520I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network</td>
<td>RS-422/485</td>
<td>RS-232 to RS-422/485</td>
</tr>
<tr>
<td>Communication Speed (bps)</td>
<td>From 1,200 to 115.2k</td>
<td></td>
</tr>
<tr>
<td>Communication Distance</td>
<td>Serial: 1.2 km</td>
<td>RS-232: female DB9</td>
</tr>
<tr>
<td>Interface Connectors</td>
<td>RS-422/485: plug-in screw terminal</td>
<td>RS-422/485: plug-in screw terminal</td>
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<tr>
<td>Digital LED Indicators</td>
<td>✓</td>
<td>Communication and Power</td>
</tr>
<tr>
<td>Auto Data Flow Control</td>
<td>✓</td>
<td></td>
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<tr>
<td>Isolation Voltage</td>
<td>3,000 Vcc</td>
<td></td>
</tr>
<tr>
<td>Power Requirements</td>
<td>10 – 48 Vcc</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40 – 85°C (-40 – 185°F)</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 – 85°C (-40 – 185°F)</td>
<td></td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>5 – 95%</td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>1.4 W @ 24 Vcc</td>
<td>1.2 W @ 24 Vcc</td>
</tr>
</tbody>
</table>

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8-ch Analog Input Module with Modbus
8-ch Thermocouple Input Module with Modbus
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**: Thermocouple, mA
- **Input Range**: ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA, 4 ~ 20 mA
- **T/C Types and Temperature Ranges**
  - J: 0 ~ 760°C
  - K: 0 ~ 1,370°C
  - T: -100 ~ 400°C
  - E: 0 ~ 1,000°C
- **Burnout Detection**: All T/C

**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 (Typical)
- **Zero Drift**: ±6 μV/°C
- **Built-in TVS/ESD Protection**
- **Environment**
  - **Operating Humidity**: 5 ~ 95% 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 Input Module with Modbus
- **ADAM-4019+**: 8-ch Universal Analog Input Module with Modbus

All product specifications are subject to change without notice. Last updated: 31-Aug-2018
RS-485 I/O Modules: ADAM-4000

1-ch Analog Output Module
6-ch RTD Module with Modbus
4-ch Analog Output Module with Modbus

Specifications

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

Analog Output
- Channels: 1
- Output Impedance: 0.5 Ω
- Output Range: 0 – 20 mA, 4 – 20 mA, 0 – 10 V
- Output Type: mA, V
- Accuracy: ±0.1% of FSR for current output, ±0.2% of FSR for voltage output
- Current Load: 0 to 500 Ω (source)
- Resolution: 12-bit
- Isolation Voltage: 3,000 Vdc
- Programmable: 0.125 – 128 mA/sec.
- Output Slope: 0.0625 – 64.0 V/sec.
- Readback Accuracy: ±1% of FSR
- Span Temperature Coefficient: ±25 ppm/°C
- Zero Drift:
  - Voltage output: ±30 μV/°C
  - Current output: ±0.2 μA/°C

Common Specifications

General
- Power Input: Unregulated 10 – 30 Vdc

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

Ordering Information
- ADAM-4021: 1-ch Analog Output Module
- ADAM-4015: 6-ch RTD Module with Modbus
- ADAM-4024: 4-ch Analog Output Module with Modbus
### Specifications

#### General
- **Connectors**: 2 x plug-in terminal blocks (#14 – 22 AWG)
- **Power Consumption**: 0.4 W @ 24 VDC
- **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**: Logic level 0: 1 V max.
- **Input Voltage**: 50 V max.
- **Input Resistance**: 5 kΩ
- **Overvoltage Protection**: 70 VDC
- **Isolation Voltage**: 2,500 VDC

#### 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**: Logic level 0: 0, 1 V max.
- **Input Resistance**: 5 kΩ
- **Overvoltage Protection**: 70 VDC

#### LED Indicators
- **Yes**

### Common Specifications

#### General
- **Power Input**: Unregulated 10 – 30 VDC

#### Environment
- **Operating 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-4055
ADAM-4056S/4056SO
ADAM-4080

16-ch Isolated Digital I/O Module with Modbus
12-ch Sink/Source Type Isolated Digital Output Modules with Modbus
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) & Communication
- Supported Protocols: ASCII command and Modbus/RTU
- Isolation Voltage: 5000 VDC
- LED Indicators: Yes

Digital Input
- Channels: 8
- Input Level
  - Dry Contact: Logic level 0: open
  - Wet Contact: Logic level 1: close to GND
  - Logic level 1: 0 ~ 50 V
  - Logic level 1: 10 ~ 50 V
- Overvoltage Protection: 70 VDC

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

ADAM-4056S
- Digital Output Channels: 12
  - Open collector to 40V (200mA max. load)
- Power Dissipation: Channel: 1 W max.
  - Total: 4 W (12 Channels)
- Digital Output Type: Sink

ADAM-4056SO
- Digital Output Channels: 12
  - VCC: 10 ~ 35 VDC
- Power Dissipation: Current: 1A (per channel)
- Digital Output Type: Source

ADAM-4080
- 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
- Isolated Input Level: Logic level 0: 1 V max.
  - Logic level 1: 3.5 ~ 30 V
- Isolation Voltage: 2,500 VDC
- Non-isolated Programmable Input Level:
  - Logic level 0: 0.8 Vmax.
  - Logic level 1: 2.4 ~ 5.0 V
- Maximum Count: 4,294,967,295 (32-bit)
- Preset Type: Absolute or relative
- Programmable Digital Noise Filter: 2 μs ~ 65 ms
- Alarm: Alarm comparators on each counter
- Frequency Measurement Range: 5 Hz ~ 50 kHz
- Programmable Built-in Gate Time: 1 or 0.1 second

Common Specifications

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

Ordering Information

ADAM-4055
- 16-ch Isolated Digital I/O Module with Modbus

ADAM-4056S
- 12-ch Sink Type Isolated Digital Output Module with Modbus
- 2-ch Counter/Frequency Modules

ADAM-4056SO
- 12-ch Source Type Isolated Digital Output Module with Modbus
- 2-ch Counter/Frequency Modules

ADAM-4080
- 2-ch Counter/Frequency Module

All product specifications are subject to change without notice.
# 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

## Specifications

### General
- **Connectors**: 2 x plug-in terminal blocks (#14 – 22 AWG)
- **Power Consumption**: 0.6 W @ 24 VDC
- **Watchdog Timer**: System (1.6 second)
- **Supported Protocols**: ASCII command and Modbus/RTU

### Relay Output
- **Breakdown Voltage**: 500 VAC (50/60 Hz)
- **Channels**: 2 x Form A, 2 x Form C
- **Contact Rating (Resistive)**: 0.6 A @ 125 VAC, 0.3 A @ 250 VAC, 2 A @ 30 VAC, 0.6 A @ 110 VDC
- **Initial Insulation Resistance**: 1 GΩ min. at 500 VDC
- **Relay off Time (Typical)**: 2 ms
- **Relay on Time (Typical)**: 3 ms
- **Maximum Operating Speed**: 20 operations/min (at related load)

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

## Ordering Information
- **ADAM-4060-DE**: 4-ch Relay Output Module
- **ADAM-4068-BE**: 8-ch Relay Output Module with Modbus
- **ADAM-4069-AE**: 8-ch Power Relay Output Module with Modbus

## Dimensions

<table>
<thead>
<tr>
<th>Dimensions (Unit: mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front View</td>
</tr>
<tr>
<td>60.00</td>
</tr>
<tr>
<td>55.00</td>
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<tr>
<td>55.00</td>
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<td>35.00</td>
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<td>Rear View</td>
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<tr>
<td>21.00</td>
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<tr>
<td>2-SCREW M3</td>
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<td>Side View</td>
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<tr>
<td>2-SCREW M3</td>
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<td>Panel Mounting View</td>
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<td>44.00</td>
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<td>44.00</td>
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<tr>
<td>Top View</td>
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<td>44.00</td>
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<tr>
<td>44.00</td>
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<tr>
<td>Din-Rail Mounting View</td>
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<tr>
<td>44.00</td>
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<tr>
<td>44.00</td>
</tr>
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</table>

All product specifications are subject to change without notice.
ADAM-4510/S
ADAM-4520
ADAM-4521

RS-422/485 Repeater
Isolated RS-232 to RS-422/485 Converter
Addressable RS-422/485 to RS-232 Converter

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: 3,000 VDC
- Power Consumption: 1.2 W @ 24 VDC

Serial Communications
- Input: RS-422 (DB9)
- 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: 1.0 W @ 24 VDC
- Built-in microprocessor and watchdog timer

Serial Communications
- Input: RS-485 (2-wire) or RS-422 (4-wire)
- Output: RS-422 (DB9)
- Speed Modes (bps): 300, 600, 1,200, 2,400, 4,800, 9,600, 19.2 k, 38.4 k, 57.6 k, 115.2 k (software configurable)
- RS-232 and 485 can be set to different baudrates
- RS-485 surge protection and automatic RS-485 data flow control
- Software configurable to either addressable or non-addressable mode

Common Specifications

General
- Power Input: Unregulated 10 ~ 30 VDC w/ power reversal protection

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

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

All product specifications are subject to change without notice. Last updated: 31-Aug-2018
ADAM-4541
ADAM-4542+
ADAM-4561/4562

Specifications

General
- Power Input: Unregulated 10 – 30 Vdc
- Connectors:
  - ADAM-4541: 1 x plug-in terminal block (#14 – 22 AWG)
  - ADAM-4542+: 1 x plug-in terminal block (#14 – 22 AWG)
  - ADAM-4561/4562: 1 x plug-in terminal block (#14 – 22 AWG)
- Power Consumption: 1.1 W @ 5 V
- Operation Modes: Support Point-to-Point, Redundant and Ring (half-duplex)

Fiber Optic Communications
- Optical Power Budget: 15 dB (measured with (Attenuation) 62.5/125 μm)
- Transmission Distance: 15 km
- Transmission Mode: Multi mode (Send and Receive)
- Wavelength: 1310 nm

Serial Communications
- Communication Mode: Asynchronous
- Speed Modes (bps):
  - ADAM-4561: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 57.6 k, 115.2 k and RS-232/422/485 mode (switchable)
  - ADAM-4562: 75 bps to 115.2 kbps
- Transmission Mode: Full/half duplex, bidirectional

Common Specifications

Environment
- Operating Humidity: 5 – 95% RH
- Operating Temperature:
  - ADAM-4541/4542+: -10 – 70°C (14 – 158°F)
  - ADAM-4561/4562: -10 – 70°C (14 – 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

* The highest speed for RS-232 mode is 115.2 kbps

All product specifications are subject to change without notice.
RS-485 I/O Modules: ADAM-4000

### Specifications

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

#### Connectors
- **Power Consumption**: 1.2 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**

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### ADAM-4510I

**Robust RS-422/485 Repeater**

**Robust RS-232 to RS-422/485 Converter**

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

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### ADAM-4520I

**Common Specifications**

#### General
- **Power Input**: Unregulated 10 – 48 Vdc w/power reversal protection
- **Isolation Voltage**: 3,000 Vdc

#### Environment
- **Operating Humidity**: 5 – 95% 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

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All product specifications are subject to change without notice. Last updated: 31-Aug-2018

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# 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

## Specifications
### General
- **Power Consumption**: 0.5W @ 24 Vdc

### Analog Input
- **Channels**: 8 differential and independent configuration channels
- **Input Impedance**: Voltage: 20 MΩ, Current: 120 Ω
- **Input Type**: T, C, mV, V, mA
- **Input Range**
  - J: 0 – 760°C
  - K: 0 – 1,370°C
  - T: -100 – 400°C
  - E: 0 – 1,000°C
- **Voltage mode**: ±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V
- **Current mode**: ±20 mA, ±4 – 20 mA
- **Accuracy**: Voltage mode: ±0.1% or better
  - Current mode: ±0.2% or better
- **Resolution**: 16-bit
- **Sampling Rate**: 92 dB
- **CMR @ 50/60 Hz**: ±60 Vdc
- **NMR @ 50/60 Hz**: ±60 Vdc
- **Overvoltage Protection**: ±60 Vdc
- **High Common Mode**: 200 Vdc
- **Span Drift**: ±25 ppm/°C (Typical)
- **Zero Drift**: ±6μV/°C
- **Built-in TVS/ESD Protection**: RS-485, micro USB
- **Burnout Detection**: Supports 3 kHz Counter Input (32-bit + 1-bit overflow)
- **Supports 3 kHz Frequency Input**: Supports 3 kHz Frequency Input
- **Supports Invert DI Status**: OVER Voltage Protection 40 Vdc
- **Digital Output Channels**: 8, open collector to 40 V (0.8A max. load)
- **Power Dissipation**: 1W load max
- **RON Maximum**: 150 mΩ
- **Supports 1 kHz Pulse Output**: Supports 1 kHz Pulse Output
- **Supports High-to-Low Delay Output**: Supports High-to-Low Delay Output
- **Supports Low-to-High Delay Output**: Supports Low-to-High Delay Output
- **Supported Protocols**: ASCII Command and Modbus/RTU
- **Environment**: Operating Humidity: 5 – 95% RH
  - Operating Temperature: 40 – 85°C (-40 – 185°F)
- **Storage Temperature**: 40 – 85°C (-40 – 185°F)

## 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
- **Interface (B version)**: RS-485, micro USB

## Ordering Information
- **ADAM-4118**: Robust 8-ch Thermocouple Input Module w/ Modbus
- **ADAM-4150**: Robust 15-ch Digital I/O Module w/ Modbus
- **ADAM-4168**: Robust 8-ch Relay Output Module w/ Modbus

All product specifications are subject to change without notice. Last updated: 31-Aug-2018