WISE-4250

Wi-Fi 2.4/5 GHz 802.11 a/b/g/n/ac I/O and Sensor Module

NEW

Features

- Wi-Fi Dual band 2.4/5 GHz up to 802.11 a/b/g/n/ac
- Supports interchangeable I/O and Sensor module
- Supports the smart roaming function
- Supports MQTT, Modbus/TCP, SNTP, TCP/IP, HTTPS, RESTful, UDP, and DHCP protocols
- Supports the WPA3 /TLS1.3 encryption protocol
- UDP-based AES-128 encrypted wireless P2P (Peer-to-Peer) function
- Easy configuration via web UI with mobile devices and PC
- 10000+ data logger with SNTP/RTC time synchronization and WDT (Watchdog Timer) auto connection recovery
- Supports Dropbox, WebAccess, iSensing MQTT, IFTTT, Azure, AWS, Azure MQTT, Line messaging API, and other cloud services
- Supports SNMP network monitoring. User can remotely monitor, manage, and control network devices

IC CE FC

Introduction

The WISE-4250 series is a wireless IoT solution designed for industrial applications. This Ethernet-based device is compatible with various I/O and sensors and integrates data acquisition, processing, and publishing functions. It supports real-time P2P communication between devices, enabling edge intelligence without a central controller, making it ideal for applications requiring rapid response and distributed control. Furthermore, a watchdog timer and smart roaming ensure stable device operation in any environment. The WISE-4250 also prioritizes data security, with a data logger, data recovery function, WPA3/TLS1.3 encryption, and IP whitelisting to prevent data loss and unauthorized access. Best of all, it supports MQTT, Modbus, and RESTful APIs, enabling you to easily publish data to various cloud platforms for data-driven decision-making.

Features

IEEE 802.11 a/b/g/n/ac 2.4/5GHz 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-4250 to be accessed via other Wi-Fi devices directly as an AP.

Smart Roaming

This function help WISE-4250 series communicate and connect to surrounding AP much more flexibly and effectively to prevent long disconnection idle time and setup more stable network. 802.11 k/v/r are also supported to help on better signal strength management in advance and faster connection time.
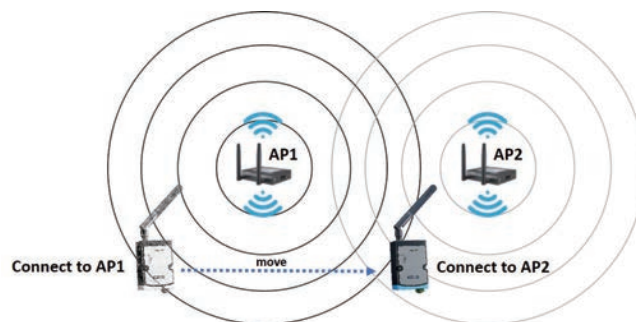

Data Logger and Recovery

The WISE-4250 can periodically log over 10,000 data points with timestamps and system logs at 100ms intervals, both during normal operation and wireless disconnections. Notably, it can record at a faster 50ms interval during signal state changes. Once the memory is full, users can choose to overwrite old data in a ring buffer or stop the logging function. This ensures no data loss and facilitates comprehensive data tracking.

Security Features

- ☐ X.509 Certificate
  Digital Certificate
- ☐ WPA2 & WPA3 Personal/Enterprise
  Protect Wi-Fi networks from attacks
  - WPA3 uses a longer 192-bit key, further enhancing security.
- ☐ TLS1.3 encryption
  Cryptographic Protocol
  - Secures data transmission between clients and the server
  - Supports **EAP-PEAP** and **EAP-TLS** security types
- ☐ AES-128 encrypted
  - UDP based AES-128 (advanced encryption standard) encrypted wireless **P2P** (Peer to Peer) function

Peer to Peer (P2P)

P2P function allows modules to send signals to each other remotely (up to 12 devices). These signals can be sent periodically or triggered by a change in status (e.g., an AI/DI input change triggering a DO output). It supports two modes: basic and advanced. The main difference between the two modes lies in channel number mapping:

- *Basic Mode: This mode operates with identical channel number mapping between modules. For example, Digital Input channel 1 of one module will always trigger Digital Output channel 1 on another module. This mode is suitable for straightforward, one-to-multiple signal applications.
- *Advanced Mode: This mode allows for variable channel number mapping between different input and output modules. For example, Digital Input channel 1 of one module could trigger Digital Output channel 3 on another module, or Digital Input channel 2 could trigger Digital Output channel 6 on a different module. This mode provides flexibility for more complex signal routing scenarios.

By utilizing P2P function, modules can communicate directly, effectively reducing latency and improving response time. Furthermore, data transmission uses the UDP protocol and can be encrypted with AES-128 to ensure communication security.
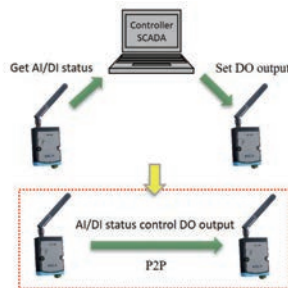

RESTful Web Service with Security Socket

WISE-4250 also supports IoT communication protocol, RESTful web service. Data can be polled or even be pushed automatically from the WISE-4250 when the I/O status is changed. The I/O status can be retrieved over the web using JSON. The WISE-4250 also supports HTTPS which has security that can be used in a Wide Area Network (WAN).

Dimensions

Unit: mm

Front View   Side View   Mounting Kit
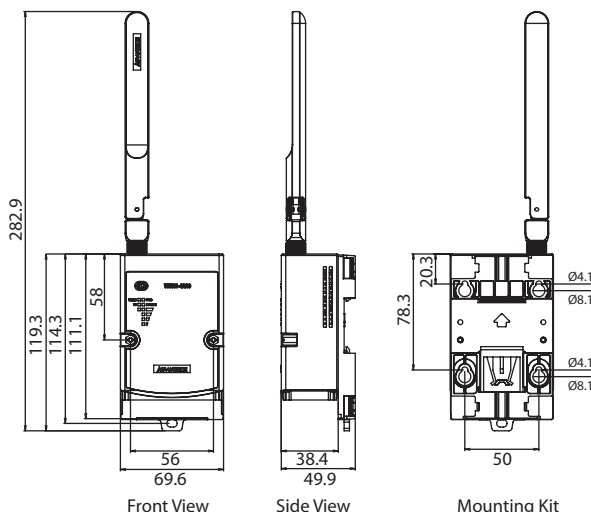
HTML5 Web Configuration Interface

All the configuration interfaces are applied in web service, and the web pages are based on HTML5, so users can configure the WISE-4250 without the limitation of OS/devices. You can use your mobile phone or tablet to directly configure the WISE-4250.

※ It is recommended to use Microsoft Edge browser for a better user experience.

Specifications

General

WLAN Standard	IEEE 802.11a/b/g/n/ac
Modulation	802.11b : CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps) 802.11a/g/n/ac : OFDM
Transmit Power	2.4 GHz 802.11b: 16.0 dBm ±2dBm 802.11g: 14.0 dBm ±2dBm 802.11n: 12.0 dBm ±2dBm 5 GHz 802.11a: 13.0 dBm ±2dBm 802.11n: 10.0 dBm ±2dBm 802.11ac: 8.0 dBm ±2dBm
Wireless Security	X.509 (TLS1.2/1.3), WPA2/WPA3 Personal and Enterprise
Antenna	Connector: RP-SMA Gain (Peak): 2.4G 3.64 dBi / 5G 5.65 dBi
Connectors	Plug-in-and-play I/O and sensor modules
Watchdog Timer	System (1.6 second) and Communication (programmable)
Certification	CE, FCC, IC, TELEC, NBTC
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 V_{DC}
Power Consumption	1.6W @ 24 V_{DC}
RTC Accuracy	±2 second/day
Cloud	Dropbox, WebAccess, iSensing MQTT, IFTTT, Azure, AWS, Azure MQTT, Line messaging API

- **Support wireless P2P (Peer to Peer) with AES-128 encryption and UDP protocol**
- **Support MQTT data recovery function**
- **Support smart roaming function and 802.11k/v/r**
- **Supports User Defined Modbus Address**
- **Power Reversal Protection**
- **Supports Data Log**   10000+ samples with SNTP/RTC sync time stamp
- **Supported Protocols**   Modbus/TCP, TCP/IP, SNMP V2, SNTP, UDP, DHCP, HTTP, HTTPS, and MQTT
- **Supports RESTful API Client/Server in JSON format**
- **Supports Web Server in HTML5 with JavaScript & CSS3**
- **Supports System Configuration Backup and User Access Control**

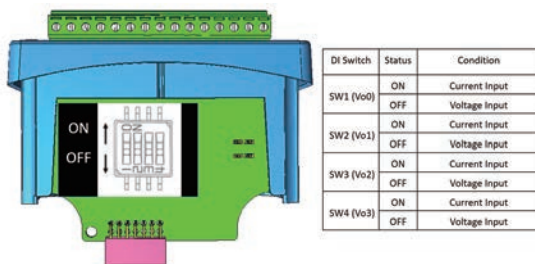## Environment

Operating Temperature	-25 ~ 70°C (-13~158°F)
Storage Temperature	-40 ~ 85°C (-40~185°F)
Operating Humidity	10 ~ 85% RH (non-condensing)
Storage Humidity	0 ~ 60% RH (non-condensing)

Supported I/O module

WISE-S214 (4AI/4DI)

Analog Input

- **Channels**   4
- **Resolution**   16bits Bipolar; 15bits Unipolar
- **Sampling Rate**   10Hz (Total) with 50/60Hz Rejection
- **Accuracy**   ±0.1% for Voltage Input; ±0.2% for Current Input
- **Input Range**   0~150mV, 0~500mV, 0~1V, 0~5V, 0~10V, ±150mV, ±500mV, ±1V, ±5V, ±10V, 0~20mA, ±20mA, 4-20mA
- **Input Impedance**   >1MΩ (Voltage)
  240 Ω (current)
- **Support Data**   Max/min, Scaling and Averaging
- **Supports Burn-out Detection (4~20mA only), prevent failures and downtime**
- **Supports High/Low value Alarm modes**
- **Supports Latch and Momentary Alarm Modes**
- **Switch Label**

DI Switch	Status	Condition
SW1 (Vo0)	ON	Current Input
	OFF	Voltage Input
SW2 (Vo1)	ON	Current Input
	OFF	Voltage Input
SW3 (Vo2)	ON	Current Input
	OFF	Voltage Input
SW4 (Vo3)	ON	Current Input
	OFF	Voltage Input

Digital Input

- **Channels**   4 Dry Contact (Wet Contact by request for customization)
- **Logic Level**   0: Open
  1: Close to DI COM
- **Compatibility**   3.3V/TTL
- **Channel Mode**   DI (Logic status), Counter, Low to High Latch, High to Low Latch, Frequency
- **Supports 200Hz Counter Input (32-bit + 1-bit overflow)**
- **Supports keep/discard counter value on power-off**
- **Support inverted digital input status**
- **Support configuration by each channel**
- **Support digital filter (min 0.1ms)**
- **Support high-to-low and low-to-high latch**

WISE-S250 (6DI, 2DO& 1RS-485)

Digital Input

- **Channels**   6 Dry Contact (Wet Contact by request for customization)
- **Logic Level**   0: Open
  1: Close to DI COM
- **Compatibility**   3.3V/TTL
- **Channel Mode**   DI (Logic status, Counter, Low to High Latch, High to Low Latch, Frequency
- **Supports 3kHz Frequency Input**
- **Supports 3kHz Counter Input (32-bit + 1-bit overflow)**
- **Supports keep/discard counter value on power-off**
- **Support inverted digital input status**
- **Support configuration by each channel**
- **Support digital filter (min 0.1ms)**
- **Support high-to-low and low-to-high latch**

Digital Output (Sink Type)

- **Channel**   2
- **Output Current**   100 mA
  At 0 -> 1: 100 us
  At 1 -> 0: 100 us
  (for Resistive Load)
- **Supports Pules Output**   5 kHz
- **Max. Load Voltage**   30V
- **Support pulse high/low width and duty cycle adjustment**
- **Support high to low and low to high delay time setup**
- **Supports Fail Safe Value (FSV) function, ensures system safety by automatically setting outputs to a predefined state upon communication failure, maximizing safety and preventing unexpected behavior**

Serial Port

- **Port Number**   1
- **Type**   RS-485
- **Data Bits**   8
- **Stop Bits**   1, 2
- **Parity**   None, Odd, Even
- **Baud Rate (bps)**   1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- **Protocol**   Modbus/RTU Supports up to 64 addresses with a maximum of 30 Rules (instructions)
- **Support Server response timeout and Delay between Polls setting**
- **Supports quick setting with Advantech's sensor, reduce the complexity of setting.**

WISE-S251 (6DI/1RS-485)

Digital Input

- **Channels**   6 Dry Contact (Wet Contact by request for customization)
- **Logic Level**   0: Open
  1: Close to DI COM
- **Compatibility**   3.3V/TTL
- **Channel Mode**   DI (Logic status), Counter, Low to High Latch, High to Low Latch, Frequency
- **Supports 200Hz Counter Input (32-bit + 1-bit overflow)**
- **Supports keep/discard counter value on power-off**
- **Support inverted digital input status**
- **Support configuration by each channel**
- **Support digital filter (min 0.1ms)**
- **Support high-to-low and low-to-high latch**

Serial Port

- **Port Number**   1
- **Type**   RS-485
- **Data Bits**   8
- **Stop Bits**   1, 2
- **Parity**   None, Odd, Even
- **Baud Rate (bps)**   1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- **Protocol**   Modbus/RTU Supports up to 64 addresses with a maximum of 30 Rules (instructions)
- **Support Server response timeout and Delay between Polls setting**
- **Supports quick setting with Advantech's sensor, reduce the complexity of setting.**

WISE-S252 (12DI/12DO)

Digital Input

- **Channels**   12
- **Logic Level**   – Dry Contact   0: Open
                 1: Close to DCOM
  – Wet Contact   0: -5~5 V_{DC}
                 1: -17~-30 V_{DC} or 17~30 V_{DC} (2 mA min.)
- **Input Voltage**   30 V_{DC} max

- **Isolation** — 3,000 Vrms
- **Channel Mode** — DI (Logic status), Counter, Low to High Latch, High to Low Latch, Frequency
- **Supports 1kHz Counter Input (32-bit + 1-bit overflow)**
- **Supports keep/discard counter value on power-off**
- **Support inverted digital input status**
- **Support digital filter (min 0.1ms)**
- **Support high-to-low and low-to-high latch**
- **Contact Type Label (Dry/Wet)**
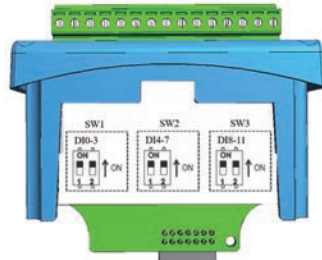
DI Switch	Status	Condition
SW1-1	ON	DI 0-3 Dry Contact
SW1-2	OFF	DI 0-3 Wet Contact
SW2-1	ON	DI 4-7 Dry Contact
SW2-2	OFF	DI 4-7 Wet Contact
SW3-1	ON	DI 8-11 Dry Contact
SW3-2	OFF	DI 8-11 Wet Contact

- **I/O Label**
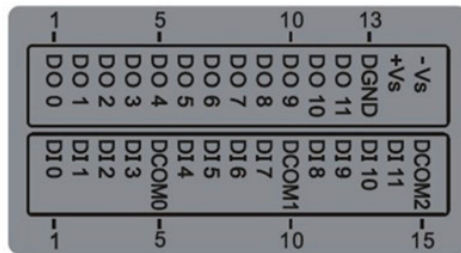
Digital Output (Sink Type)

- **Channel** — 12
- **Output Current** — 100 mA
  At 0 -> 1: 100 us
  At 1 -> 0: 100 us
  (for Resistive Load)
- **Supports Pules Output** — 5 kHz
- **Max. Load Voltage** — 30V
- **Support pulse high/low width and duty cycle adjustment**
- **Support high to low and low to high delay time setup**
- **Supports Fail Safe Value (FSV) function, ensures system safety by automatically setting outputs to a predefined state upon communication failure, maximizing safety and preventing unexpected behavior**

Dimensions

WISE-4250-S232   WISE-S232

WISE-S232 (Temperature & Humidity Sensor)

Temperature

- **Operating Range** — -25°C ~ 70°C (77°F ~ 158°F)
- **Update Rate** — Min. 1 second, Max. 24 hours (with WISE-4250)
- **Resolution** — 0.01 (°C)
- **Accuracy** — ±1°C (at 25°C)
- **Response time ($\tau_{63\%}$)** — 2 seconds
- **Long Term Drift** — <0.04°C/year

Humidity

- **Operating Range** — 0 ~ 100% RH (Recommended 20~80% RH)
- **Update Rate** — Min. 1 second, Max. 24 hours (with WISE-4250)
- **Resolution** — 0.01% RH
- **Accuracy** — ±4% RH (at 25°C) @ 0%~90% RH
  ±5% RH (at 25°C) @ 90%~100% RH
- **Response time ($\tau_{63\%}$)** — 6 seconds
- **Long Term Drift** — <0.5%RH/year

* Default value of measurement interval is 15 seconds, user can set in the configuration page.
* Filter membrane included in the packaging. For applications in environments with high oil mist or dust levels, please install the filter membrane yourself if needed
* $\tau_{63\%}$: Time for achieving 63% of a temperature or humidity step function, measured at 25 °C and 1 m/s airflow.

Ordering Information

Wi-Fi 2.4/5GHz Wireless I/O Module

- **WISE-4250-A** — Wi-Fi 5 (2.4/5 GHz) Wireless I/O Module
- **WISE-4250-S232A** — Wi-Fi 5 (2.4/5 GHz) Wireless I/O Module with Temperature & Humidity Sensor

WISE I/O Board Selection

I/O board	Analog Input	Digital Input	Digital Output	RS-485	Temperature & Humidity sensor
WISE-S214	4 (Current/Voltage)	4 (Dry Contact)			✕
WISE-S250		6 (Dry Contact)	2 (Sink Type)	1	✕
WISE-S251		6 (Dry Contact)		1	✕
WISE-S252 (2025 Q2 MP)		12 (Dry/Wet Contact)	12 (Sink Type)		✕
WISE-S232					✔

Accessories

- **96PSD-A30W24-DS** — DIN Rail Power Supply (1.25A Output Current)
- **BB-RPS-V2-WR2-US** — Power Supply, 12V/1A, US plug
- **BB-RPS-V2-WR2-EU** — Power Supply, 12V/1A, EU plug
- **1750008767-01** — Magnetic Antenna Extend Cable Base 150cm
- **1760000897-11** — RTC Battery 3V/200 mAh with Cable Connector
- **EKI-6333AC-2G** — IEEE 802.11 a/b/g/n/ac Concurrent Dual-Band Wi-Fi AP/Client
- **1990041902N000** — ePTFE protective membrane for WISE-S232 cap

* WISE-4250 doesn't needs to order antenna separately