User Manual

WISE-4000 Series

IoT Ethernet I/O Module

ADVANTECH

Enabling an Intelligent Planet

Copyright

Acknowledgments

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Product Warranty (2 years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product to be defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandize authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Part No. 2003D40005 Edition 6

Printed in Taiwan September 2025

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This type of cable is available from Advantech. Please contact your local supplier for ordering information.

CE

This product has passed the CE test for environmental specifications. Test conditions for passing include the equipment being operated within an industrial enclosure. In order to protect the product from damage caused by electrostatic discharge (ESD) or EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference. In this event, users are required to correct the interference at their own expense.

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Trade name or Applicant name: Advantech

Equipment name: IoT Wireless I/O Module

Basic model name:

- WISE-4012
- WISE-4050

Certificate number:

- WISE-4012: MSIP-CRM-AK0-WISE-4012
- WISE-4050: MSIP-CRM-AK0-WISE-4050

Manufacture/Country of Origin: Advantech Taiwan

The date for certificate issue: 2016

Type of identification: Wi-Fi I/O

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
12. Never pour liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If any of the following occurs, have the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated the equipment.
    - The equipment has been exposed to moisture.
    - The equipment is malfunctioning, or does not operate according to the user manual.
    - The equipment has been dropped and damaged.
    - The equipment shows obvious signs of breakage.
15. Do not leave the equipment in an environment with a storage temperature of below -20 °C (-4 °F) or above 60 °C (140 °F) as this may damage the components. The equipment should be kept in a controlled environment.

16. CAUTION: Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
17. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).

DISCLAIMER: These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Contents

Chapter 1

Product Overview

1.1 Introduction

WISE-4000 series is an Ethernet-based wired or wireless IoT device, which integrated with IoT data acquisition, processing, and publishing functions. Except various I/O type offering, WISE-4000 series provides data pre-scaling, data logic, and data logger functions. These data can be access via mobile devices and be published to cloud with security in anytime and anywhere.

1.2 Feature Highlights

1.2.1 RESTful Web Service

Representational State Transfer (REST) is a software architecture style widely used for creating scalable web services. With the advantage of scalability, simplicity and performance, it's already adopted in IoT applications. It is based on Hypertext Transfer Protocol (HTTP) and uses verbs, like GET, POST, PUT, DELETE, etc., for web browsers to get web pages or retrieve data with remote servers. The data can be retrieved by internet media like HTML, XML, or JSON. REST s a uniform resource identifier (URI) to identify the data. Like using “http://10.0.0.1/analog input/ch0” to identify the analog input value of channel 0. Then the web server may retrieve a JSON file analog input value of channel 0.

1.2.2 Data Storage Function

The internal flash of the WISE module can log up to 10,000 data samples with a time stamp. The I/O data can be logged periodically, and 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. When the module is powered-off, data can be kept in the module. When restarting, users can decide whether to clear all data or continue logging.

The definition of data in the IoT is not only the status of everything, but also includes time or location information. With a built-in Real Time Clock (RTC), WISE modules log data with a time stamp and the MAC address of the WISE module. The internal RTC can be calibrated by SNTP with time server. Once the module has been powered-off, the internal time can also be saved using the time backup battery. When users poll the data from the data logger, the time stamp will always be attached to the data.

1.2.3 IoT Cloud Function

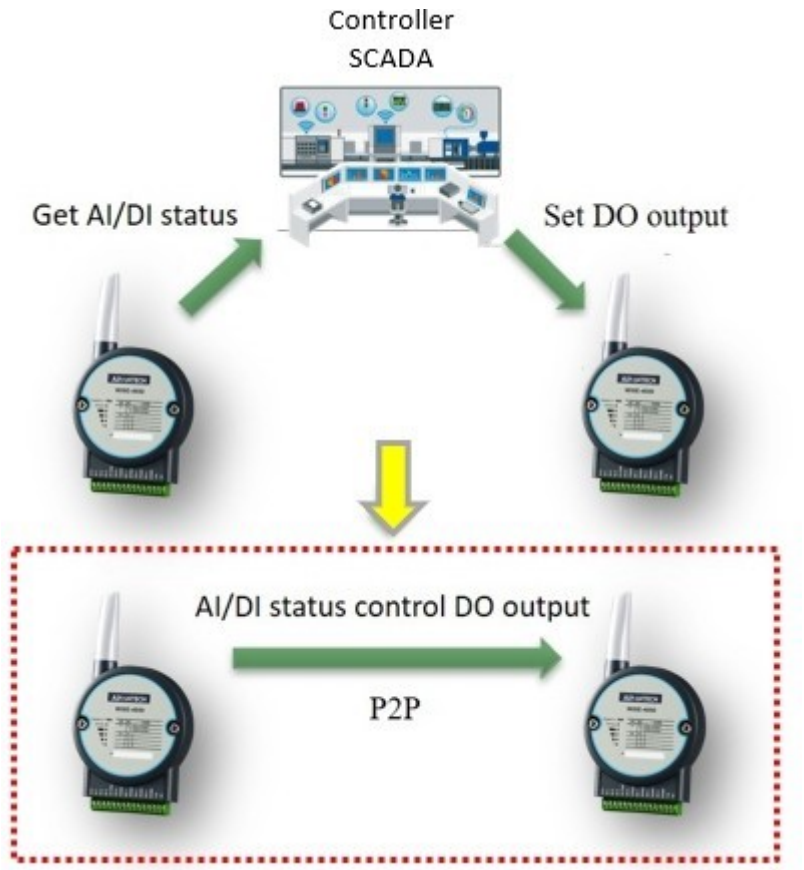
Local storage data not only can be polled by the user, it can also be pushed to the cloud automatically. Once the logger reaches the upload criteria, Data Logger will push the data to public cloud services like Dropbox or Baidu. This data will be saved on the cloud using a *.csv file extension. Users can synchronize the data on the cloud using the application program provided by the cloud provider where it can be accessed from anywhere. With the provided RESTful API, users can configure their private cloud and push the data onto it. Cloud Logger provides a very flexible solution for cloud data storage. A WISE module is the only one stop from data acquisition to

1.2.4 Peer to Peer (P2P)

This function allows modules to send signals to each other remotely (up to 16 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: a basic mode for a single target module/channel and an advanced mode for multiple target modules/channels.

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



1.3 Series Family and Specifications

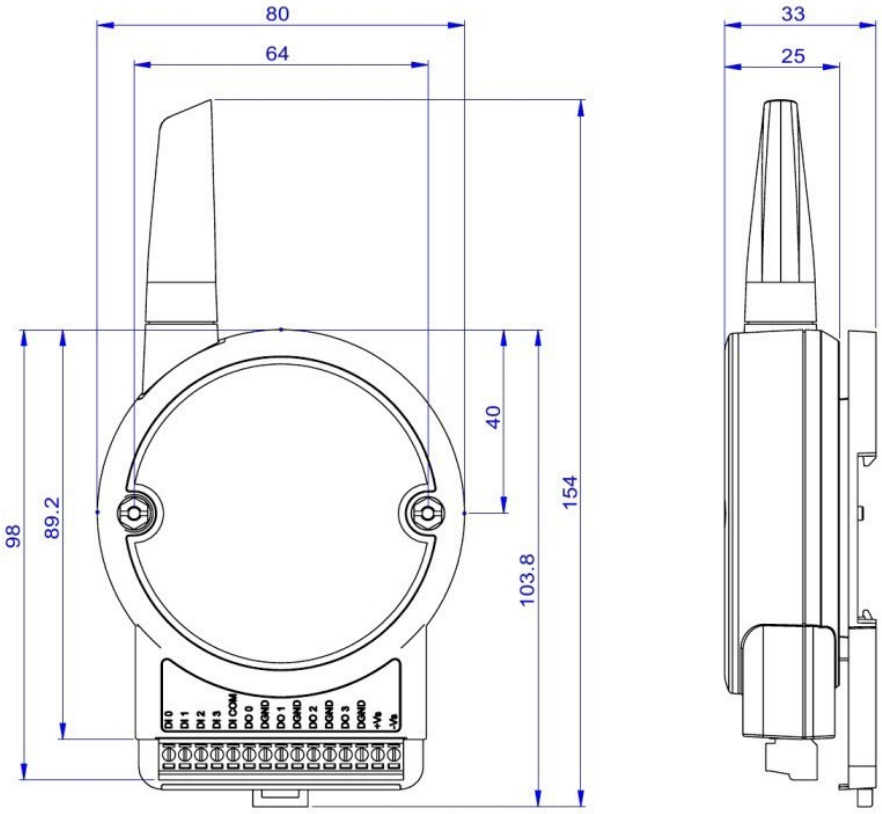
1.3.1 Series Family

Table 1.1: Series Family

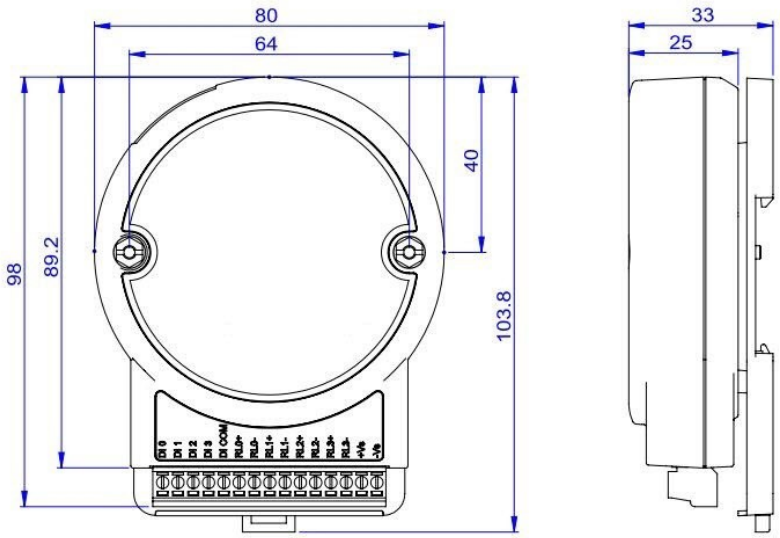
Interface	Model	Description
WLAN	WISE-4012E	6-ch Input/Output IoT Wireless I/O Module for IoT Developers
	WISE-4012	4-ch Universal Input and 2-ch Digital Output IoT Wireless I/O Module
	WISE-4050	4-ch Digital Input and 4-ch Digital Output IoT Wireless I/O Module
	WISE-4051	8-ch Digital Input IoT Wireless I/O Module with 1-port RS-485
	WISE-4060	4-ch Digital Input and 4-ch Relay Output IoT Wireless I/O Module
LAN	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

1.4 Mechanical Design and Dimensions

1.4.1 WISE-4000 Wireless Series Dimensions



1.4.2 WISE-4000/LAN Dimensions



1.5 Switch

Table 1.2: Switch

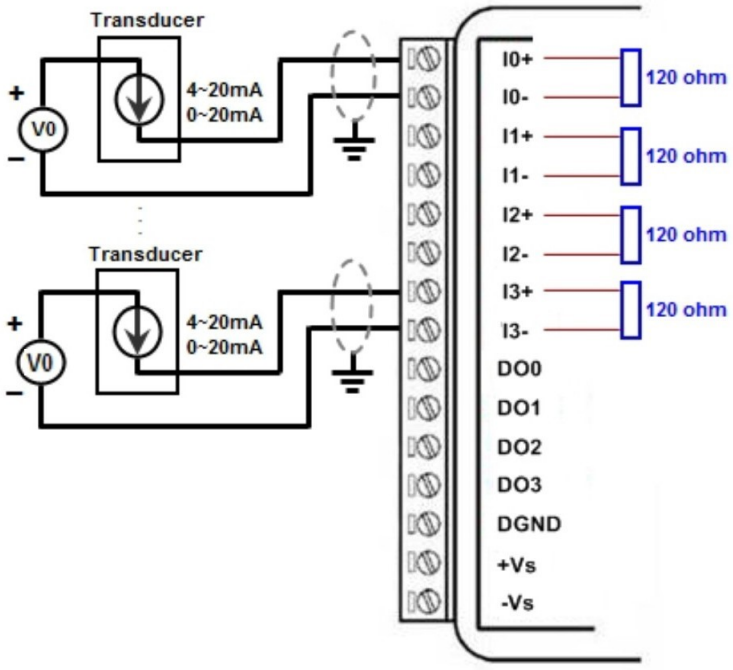
Switch	Description	Position	ON (Default)	OFF
SW1	Operation Mode	P1	Normal Mode	Initial Mode
		P2	N/A	N/A
SW2	DI Type (Ch0~3)	P1	Dry Contact	Wet Contact
		P2	Dry Contact	Wet Contact
SW3	DI Type (Ch4~7)	P1	Dry Contact	Wet Contact
		P2	Dry Contact	Wet Contact

Note 1: After the position 1 of SW1 been changed, user need to power on the module again to apply the operation mode.

Note 2: SW2 is for WISE-4051, WISE-4050(/LAN), and WISE-4060(/LAN), all 4 channels have to be configured to dry contact or wet contact in the same time, and both P1 and P2 have to be changed together.

Note 3: SW3 is for WISE-4051 only, all 4 channels have to be configured to dry contact or wet contact in the same time, and both P1 and P2 have to be changed together.

*While the module is powered off, switch it to Initial mode by setting switch 1 on the back to OFF, then power on the module.



1.6 LED Definition

Table 1.3: WISE-4000 Wireless Series

LED	Color	Indication	Behavior
Status	Green	Blink	2Hz: Wait for connection 0.5Hz: Network Connected
		ON 30 Sec	When enable LOCATE function.
Com	Yellow	Blink	When TX/RX data in transmission
AP/Infra	Green	ON	Limited AP Mode
		OFF	Station Mode
Signal Strength	Green	ON *4	Full Signal
		ON *3	Good Signal
		ON *2	Okay Signal
		ON *1	Poor Signal
		All OFF	No Signal/ Limited AP Mode

Table 1.4: WISE-4051 Only

LED	Color	Indication	Behavior
Tx	Yellow	Blink	RS-485 port is transmitting data
Rx	Green	Blink	RS-485 port is receiving data

Table 1.5: WISE-4051 Only

LED	Color	Indication	Behavior
Status	Green	Blink	Module is normally at work. (1Hz)
		ON 30 Sec	When enable LOCATE function.
Com	Yellow	Blink	When TX/RX data in transmission
Link	Green	ON	Both ends of devices are connected
Speed	Yellow	ON/OFF	ON: 100 Mbps OFF: Less than 10 Mbps

1.7 Certification and Safety Standard

WISE-4000/LAN Series

- FCC
  - FCC Part 15 Class A
  - IC ICES-003
- CE
  - EN 55011 (Group 1, CLASS A)
  - EN 55022
  - EN 61000-6-4
  - EN 61000-6-2
  - IEC 61000-4-2
  - IEC 61000-4-3
  - IEC 61000-4-4
  - IEC 61000-4-5
  - IEC 61000-4-6
  - IEC 61000-4-8
  - IEC 61000-4-11
  - RoHS
- China RoHS

WISE-4000 Wireless Series

- FCC
  - FCC Part 15 Class A
  - IC ICES-003
- CE
  - EN 55011 (Group 1, CLASS A)
  - EN 55022
  - EN 61000-6-4
  - EN 61000-6-2
  - IEC 61000-4-2
  - IEC 61000-4-3
  - IEC 61000-4-4
  - IEC 61000-4-5
  - IEC 61000-4-6
  - IEC 61000-4-8
  - IEC 61000-4-11
  - RoHS
- NCC
- SRRC
- China RoHS

1.8 Package Information

WISE-4000 Wireless Series

- WISE-4000 Module with bundle antenna and terminal connector x1
- Mounting bracket x1
- Quick startup manual with China RoHS declare

WISE-4000/LAN Series

- WISE-4000/LAN Module
- Mounting bracket x1
- Quick startup manual with China RoHS declare

WISE-4012

- WISE-4000 Module with bundle antenna and terminal connector x1
- Mounting bracket x1
- Quick startup manual with China RoHS declare
- 120Ohm precise resistors

WISE-4012E

- WISE-4012E Module with bundle antenna and terminal connector x1
- Quick startup manual with China RoHS declare
- USB drive with WebAccess (WISE-4012E-AE-WA only)
- USB power cable
- Extension board

Chapter 2

Product Specifications

2.1 General Specifications

WLAN Interface

- Standard Conformance
  - 802.11b
  - 802.11g
  - 802.11n (2.4GHz only)
- Network Modes
  - Limited AP (Wireless Server)
  - Station/Infrastructure (Wireless Client)
- Transmission Distance: 110 meters (In open areas with bundled external antenna)
- Wireless Security: WPA2 Personal & Enterprise
- Transmit Power
  - 802.11b: 15.00 dBm
  - 802.11g: 16.45 dBm
  - 802.11n: 16.39 dBm
- Antenna
  - Connector: RP-SMA
  - Gain (Peak): 3.26 dBi

LAN Interface (WISE-4000/LAN Series)

- Ethernet: IEEE 802.3u 10/100Base-T(X)
- Connector: 1-port RJ-45

General

- I/O Connector: 3.5mm spacing, 15-pole, plug-in screw terminal block
- Power Connector: Micro-B USB for WISE-4012E, other modules use same connector as I/O
- Watchdog Timer
  - System: 1.6 second
  - Communication
  - Programmable (FSV)
- RTC Accuracy: 3 min/month (WISE-4012E does not provide RTC)
- Enclosure: PC
- Mounting: DIN 35 rail, wall, and stack
- Dimensions (W x H x D)
  - With bundle antenna: 80 x 148 x 25 mm
  - Without bundled antenna: 80 x 89 x 25 mm
- Operation Temperature
  - WISE-4000 Wireless Series: -25~70 °C (-13~158 °F)
  - WISE-4000/LAN Series: -40~70 °C (-40~158 °F)
- Cold Start Temperature
  - WISE-4000 Wireless Series: -20~70 °C (-4~158 °F)
  - WISE-4000/LAN Series: -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)

Note! *Equipment will operate below 30% humidity. However, static electricity problems occur much more frequently at lower humidity levels. Make sure you take adequate precautions when you touch the equipment.*

Consider using ground straps, anti-static floor coverings, etc. if you use the equipment in low humidity environments.

Power

- Power Input Voltage
  - WISE-4012E: USB $5V_{DC}$
  - WISE-4012: 10~30 V_{DC} (24 V_{DC} Standard)
  - WISE-4050: 10~30 V_{DC} (24 V_{DC} Standard)
  - WISE-4051: 10~30 V_{DC} (24 V_{DC} Standard)
  - WISE-4060: 10~30 V_{DC} (24 V_{DC} Standard)
  - WISE-4010/LAN: 10~30 V_{DC} (24 V_{DC} Standard)
  - WISE-4050/LAN: 10~30 V_{DC} (24 V_{DC} Standard)
  - WISE-4060/LAN: 10~30 V_{DC} (24 V_{DC} Standard)
- Power Consumption
  - WISE-4012E: 2.2 W @ 5 V_{DC}
  - WISE-4012: 2.5 W @ 24 V_{DC}
  - WISE-4050: 2.2 W @ 24 V_{DC}
  - WISE-4051: 2.2 W @ 24 V_{DC}
  - WISE-4060: 2.5 W @ 24 V_{DC}
  - WISE-4010/LAN: 1.2 W @ 24 V_{DC}
  - WISE-4050/LAN: 2.2 W @ 24 V_{DC}
  - WISE-4060/LAN: 2.5 W @ 24 V_{DC}
- Reverse Power Protection (not for WISE-4012E)

Software

- Configuration Interface: Web Interface, Windows Utility
- Utility: WISE-4000/Apax .NET Utility
- Driver: WISE-4000 .NET Class Library
- Industrial Protocol: Modbus/TCP
- Supported Protocols: TCP/IP, UDP, HTTP, HTTPS, DHCP, ARP, SNTP
- Supports RESTful Web API in JSON format
- Supports Web Server in HTML5 with JavaScript & CSS3

Note! *RTC Accuracy: 3 min/month (WISE-4012E does not provide RTC).*

2.2 WISE-4010/LAN

2.2.1 I/O Specification

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

- **Digital Output**
  - Channels: 4
    Open collector to 30 V, 400 mA max. for resistance load
    Inductive loads require an external diode to eliminate back-EMF when the DO is turned off
  - On Resistance (R DS(ON)): 0.7 Ω (max.) @ 400mA, 25°C, 10V
  - Supports 5 kHz Pulse Output
  - Supports High-to-Low and Low-to-High Delay Output

2.2.2 Application Wiring

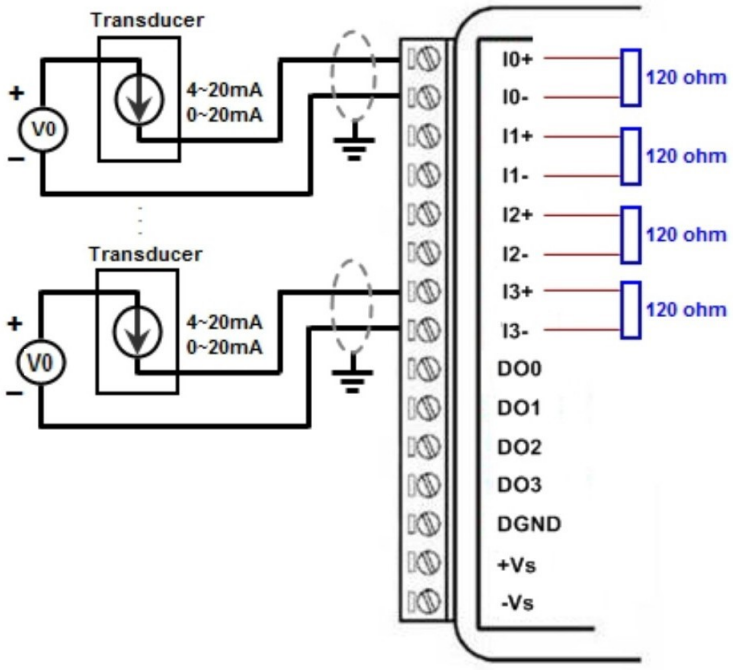


Figure 2.1 WISE-4010/LAN Current Input Wiring Diagram

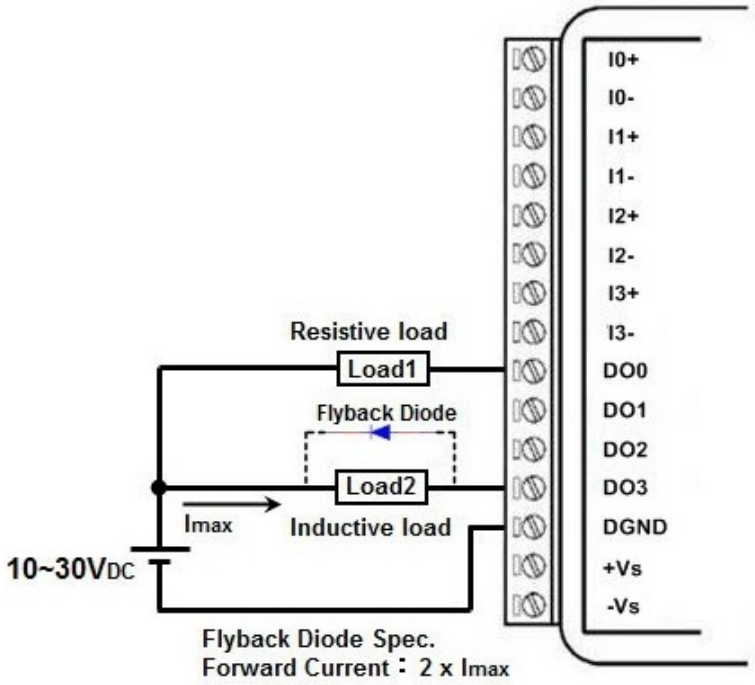


Figure 2.2 WISE-4010/LAN Digital Output Wiring Diagram

2.2.3 Pin Assignment

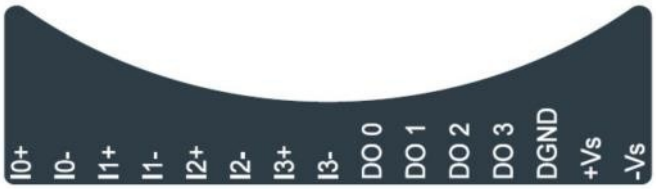


Figure 2.3 WISE-4010/LAN Pin Assignment

2.2.4 Block Diagram

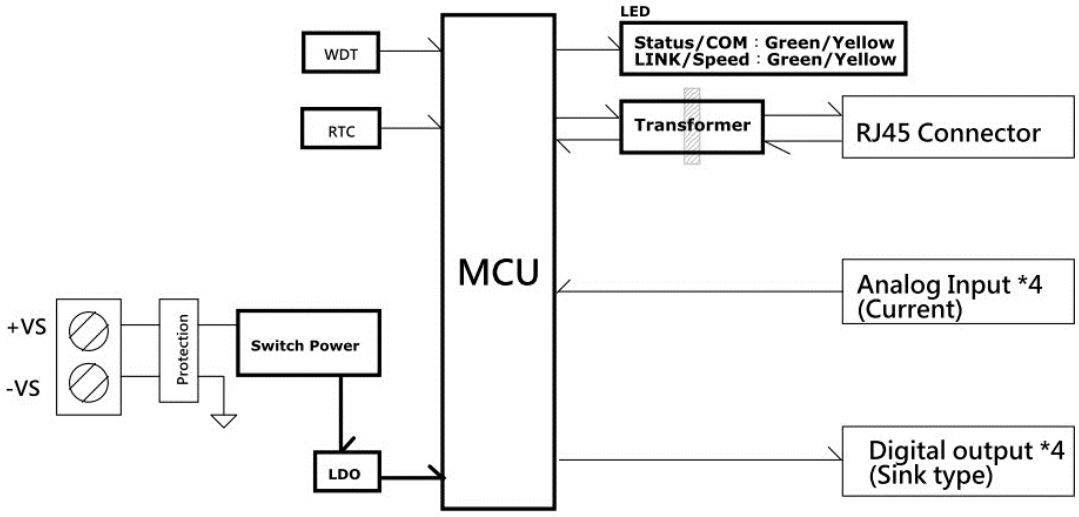


Figure 2.4 WISE-4010/LAN Block Diagram

2.3 WISE-4050/LAN

2.3.1 I/O Specification

- **Digital Input**
  - Channel: 4
  - Logic level
  - Dry Contact
    - 0: Open
    - 1: Close to DI COM
  - Wet Contact
    - 0: 0~3 V_{DC} or -3~0 V_{DC}
    - 1: 10~30 V_{DC} or -30~-10 V_{DC} (3 mA min.)
  - All 4 channels should be configured to dry contact or wet contact in the same time
  - Isolation: 3,000 V rms
  - Supports 32-bit Counter Input Function (Maximum signal frequency 3 kHz)
  - Keep/Discard Counter Value when Power-off
  - Supports Frequency Input Function (Maximum frequency 3 kHz)
  - Supports Inverted DI Status

- **Digital Output**
  - Channels: 4
    - Open collector to 30 V, 400 mA max. for resistance load
    - Inductive loads require an external diode to eliminate back-EMF when the DO is turned off
  - Isolation: 3,000 V rms
  - On Resistance (R DS(ON)): 0.7 Ω (max.) @ 400mA, 25 °C, 10V
  - Supports 5 kHz Pulse Output
  - Supports High-to-Low and Low-to-High Delay Output

2.3.2 Application Wiring

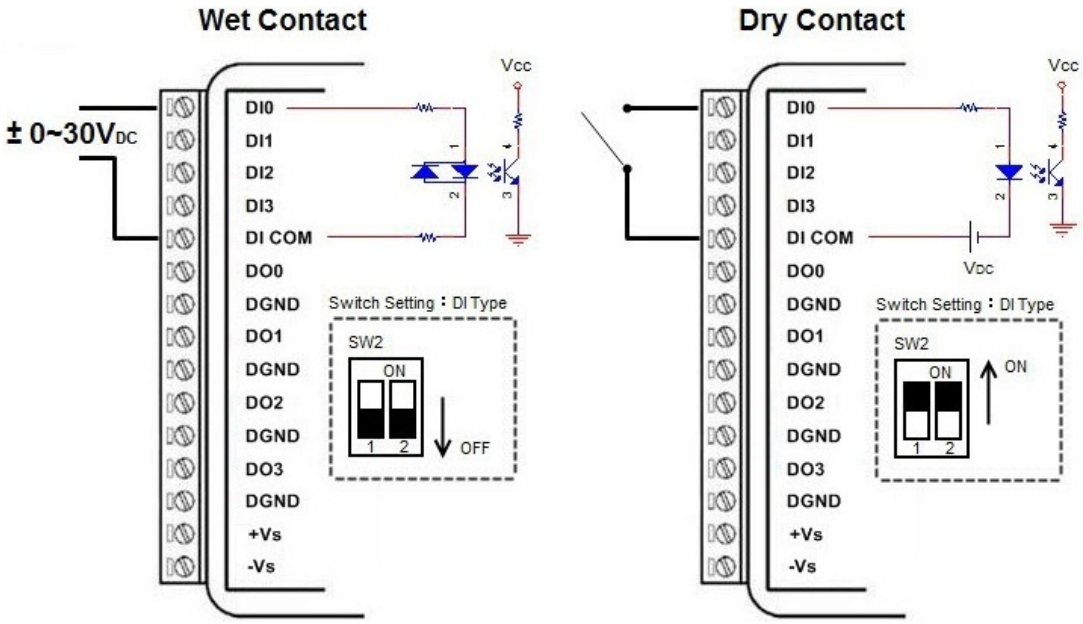


Figure 2.5 WISE-4050/LAN Digital Input Wiring Diagram

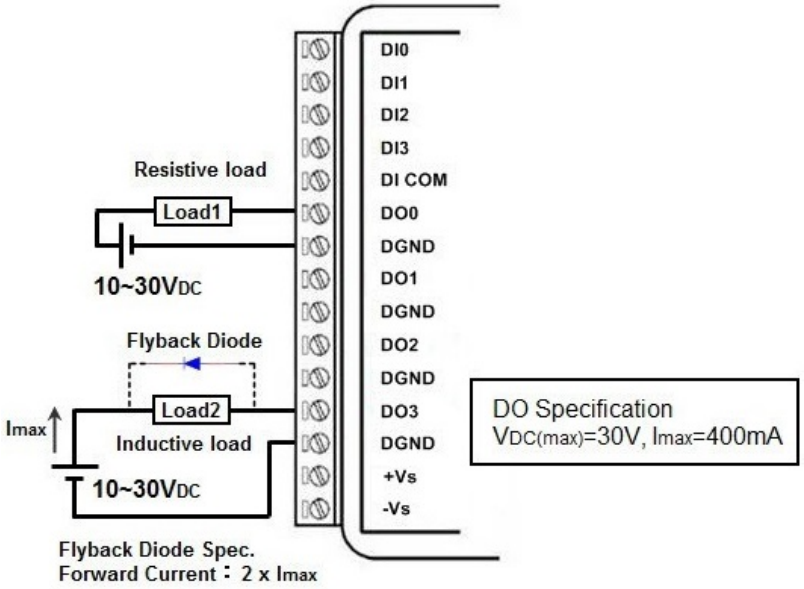


Figure 2.6 WISE-4050/LAN Digital Output Wiring Diagram

2.3.3 Pin Assignment

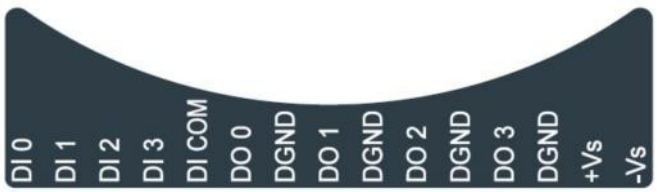


Figure 2.7 WISE-4050/LAN Pin Assignment

2.3.4 Block Diagram

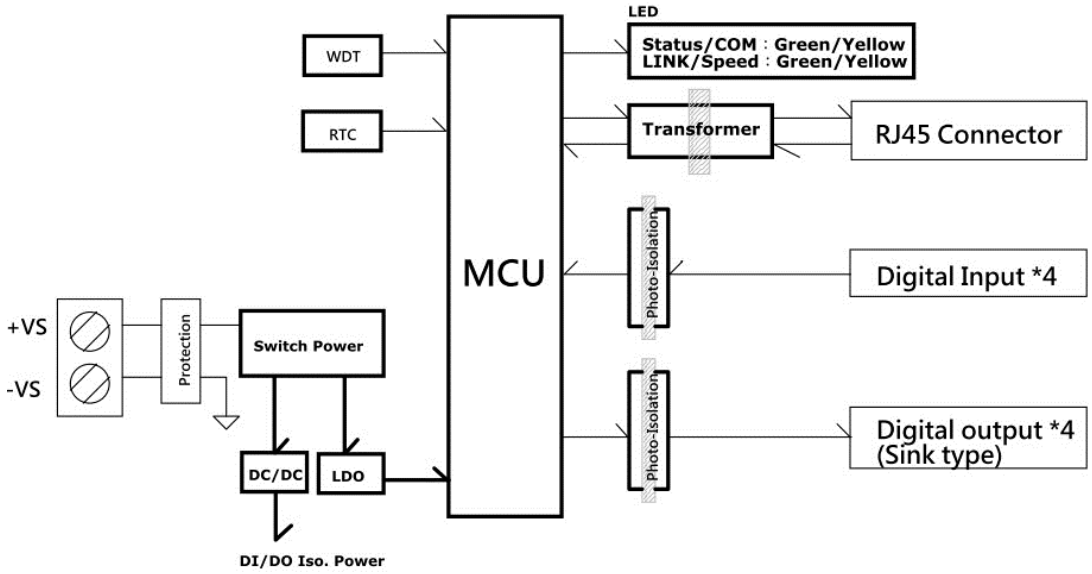


Figure 2.8 WISE-4050/LAN Block Diagram

2.4 WISE-4060/LAN

2.4.1 I/O Specification

- **Digital Input**
  - Channel: 4
  - Logic level
  - Dry Contact
    - 0: Open
    - 1: Close to DI COM
  - Wet Contact
    - 0: 0~3 V_{DC} or -3~0 V_{DC}
    - 1: 10~30 V_{DC} or -30~-10 V_{DC} (3 mA min.)
  - Isolation: 3,000 V rms
  - Supports 32-bit Counter Input Function (Maximum signal frequency 3 kHz)
  - Keep/Discard Counter Value when Power-off
  - Supports Frequency Input Function (Maximum frequency 3 kHz)
  - Supports Inverted DI Status

- **Relay Output**
  - Channels: 4 (Form A)
  - Contact Rating (Resistive Load)
    - 250 VAC @ 5 A
    - 30 V_{DC} @ 3 A
  - Relay On Time: 10 ms
  - Relay Off Time: 5 ms
  - Insulation Resistance: 1 GΩ min. @ 500 V_{DC}
  - Dielectric Strength
    - Between Contacts: 1000 V_{AC} (1min)
    - Between Coil to Contact: 3000 V_{AC} (1min)

- Maximum Switching: 60 operations/minute
- Supports Pulse Output
- Supports High-to-Low and Low-to-High Delay Output

2.4.2 Application Wiring

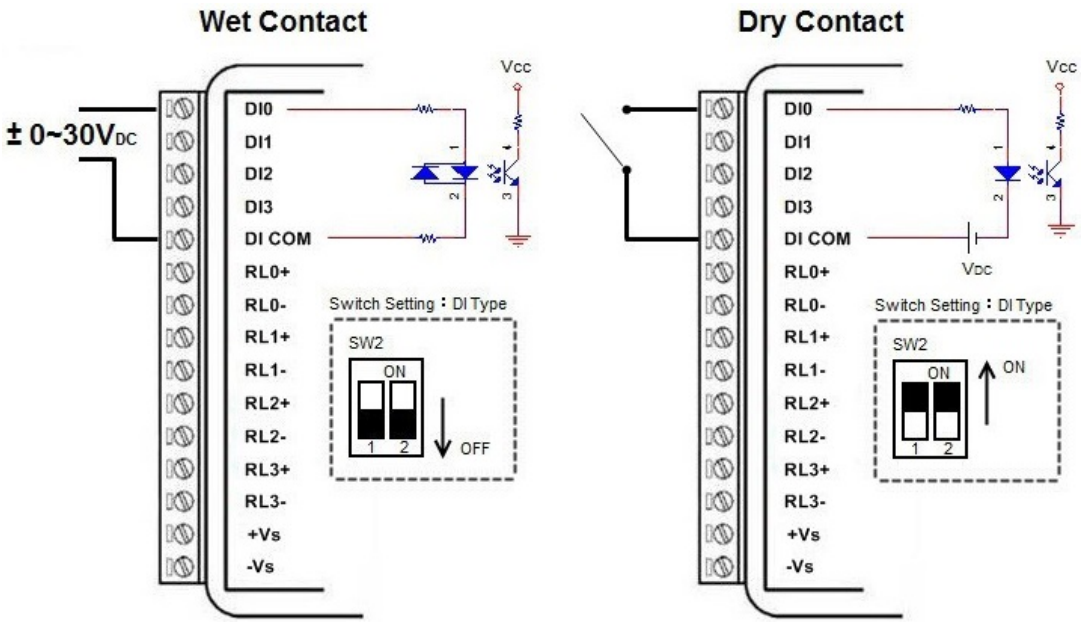


Figure 2.9 WISE-4060/LAN Digital Input Wiring Diagram

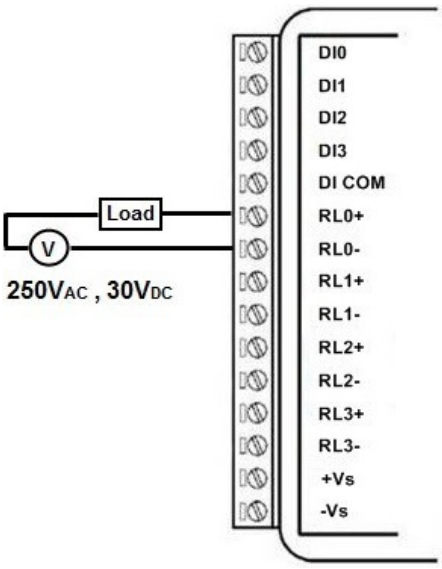


Figure 2.10 WISE-4060/LAN Relay Output Wiring Diagram

2.4.3 Pin Assignment

Figure 2.11 WISE-4060/LAN Pin Assignment

2.4.4 Block Diagram

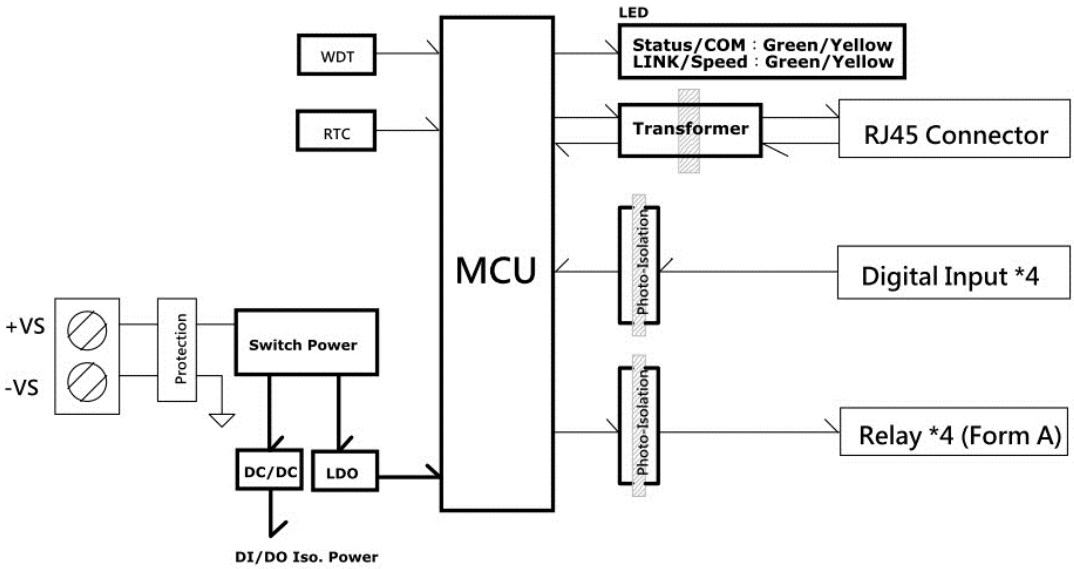


Figure 2.12 WISE-4060/LAN Block Diagram

2.5 WISE-4012E

2.5.1 I/O Specification

- **Voltage Input**
  - Channel: 2
  - Resolution: 12-bit
  - Sampling Rate: 10 Hz (Total)
  - Accuracy: ±0.1 V DC
  - Input Range: 0~10 V DC
  - Input Impedance: 100 kΩ
  - Supports Data Scaling and Averaging

- **Digital Input**
  - Channel: 2
  - Logic level
  - Dry Contact
    - ♦ 0: Open
    - ♦ 1: Close to GND
  - Supports 32-bit Counter Input Function (Maximum signal frequency 3 kHz)

- Keep/Discard Counter Value when Power-off
- Supports Frequency Input Function (Maximum frequency 3 kHz)
- Supports Inverted DI Status

■ **Relay Output**
- Channels: 2 (Form A)
- Contact Rating
  - ♦ 120 V_{AC} @ 0.5 A
  - ♦ 30 V_{DC} @ 1A
- Relay On Time: 5 ms
- Relay Off Time: 6 ms
- Insulation Resistance: 1 GΩ min. @ 500 V_{DC}
- Dielectric Strength
  - ♦ Between Contacts: 1000 V_{AC} (1min)
  - ♦ Between Coil to Contact: 1500 V_{AC} (1min)
  - ♦ Maximum Switching: 60 operations/minute
- Supports Pulse Output
- Supports High-to-Low and Low-to-High Delay Output

Note! *The analog input channels of the WISE-4012E do not support 50/60 Hz noise rejection. The following methods can help to reduce noise:*
- *Power up WISE-4012E by power bank*
- *Supply sensor power by battery*
- *Wiring V0- and V1- pin to GND pin*

Note! *The analog input channel of the WISE-4012E does not support inverted voltage protection, note that the input voltage should within 0~10V_{DC}.*

2.5.2 Application Wiring

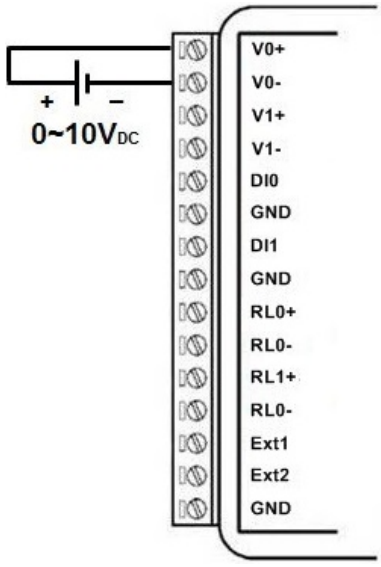


Figure 2.13 WISE-4012E Voltage Input Wiring Diagram

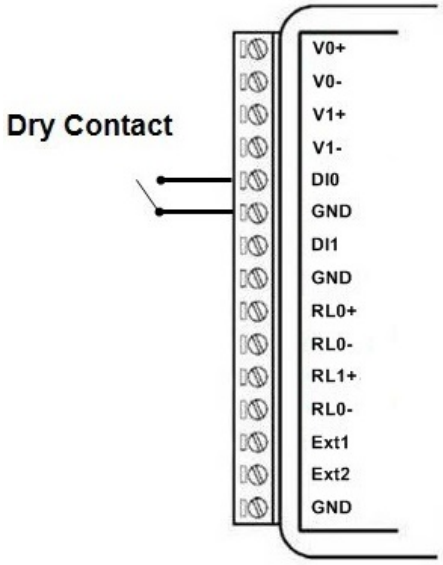


Figure 2.14 WISE-4012E Digital Input Wiring Diagram

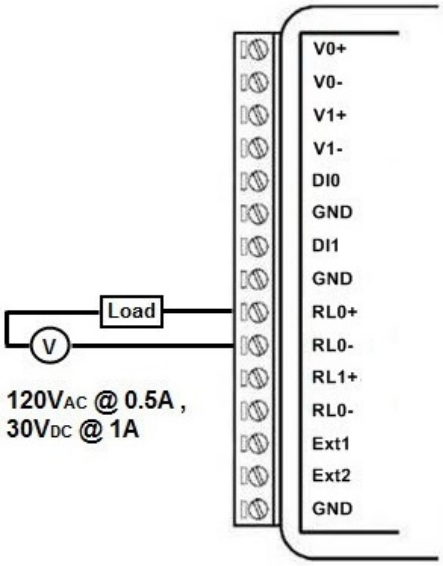


Figure 2.15 WISE-4012E Relay Output Wiring Diagram

2.5.3 Pin Assignment

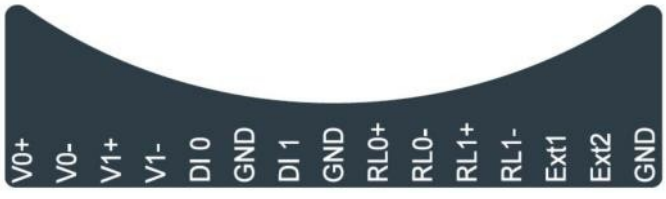


Figure 2.16 WISE-4012E Pin Assignment

2.5.4 Block Diagram

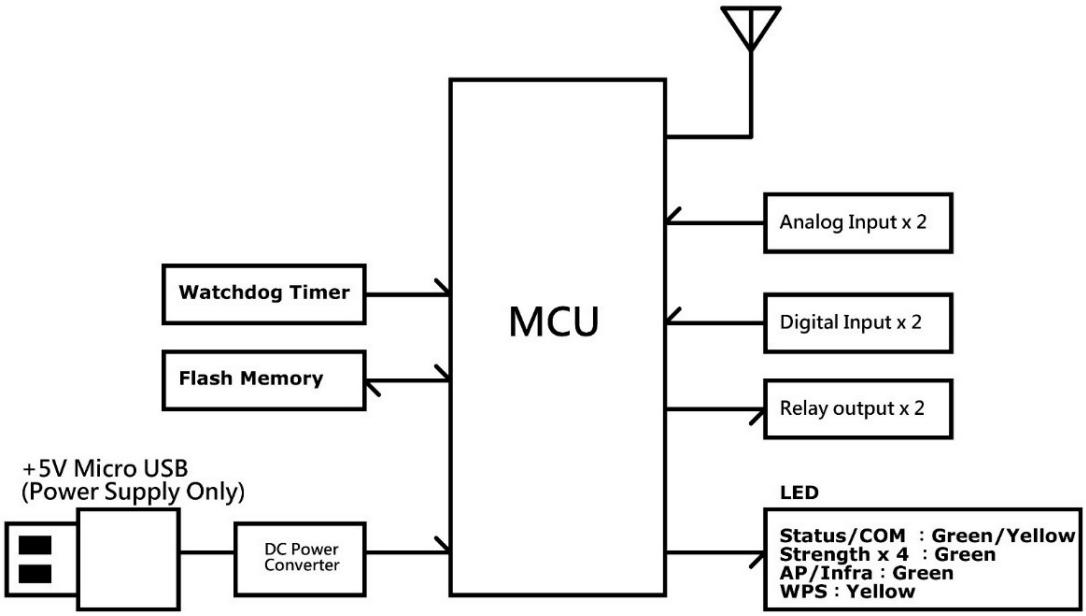


Figure 2.17 WISE-4012E Block Diagram

2.6 WISE-4012

2.6.1 I/O Specification

- **Universal Input**
  - Channel: 4
  - Resolution: 16-bit
  - Sampling Rate*
    - ♦ Universal Input: 10Hz (Total)
    - ♦ Digital Input: 2Hz (Per Channel)
  - Accuracy
    - ♦ Voltage: ±0.1% of FSR
    - ♦ Current: ±0.2% of FSR**
  - Input Type and Range
  - Voltage Input
    - ♦ ±150mV, ±500mV, ±1V, ±5V, ±10V
    - ♦ 0~150mV, 0~500mV, 0~1V, 0~5V, 0~10V
  - Current Input: 0~20mA, 4~20mA, ±20mA
  - Digital Input (Dry Contact)
    - ♦ 0: Open (Resistance > 1.5kΩ)
    - ♦ 1: Close to GND (Resistance < 300 Ω)
  - Input Impedance
    - ♦ Voltage: >10M Ω
    - ♦ Current: 120 Ω (Need external resistor**)
  - Burn-out Detection: for 4~20 mA input range
  - Supports Data Scaling and Averaging
  - Channel Mode: DI (Logic status, Counter, Low to High Latch, High to Low Latch, Frequency)

* When the universal channel been configured as digital input, it will also share the sampling rate of analog input. And please be noted that the maximum sampling rate of digital input is 2Hz.

** For accuracy assurance in current mode, please use the 120 Ω precise resistors in the package list.

- **Digital Output**
  - Channel: 2
    Open collector to 30 V, 400 mA max. for resistance load
  - Inductive loads require an external diode to eliminate back-EMF when the DO is turned off
  - Isolation: 3,000 Vrms
  - On Resistance (R DS(ON)): 0.7 Ω (max.) @ 200mA, 25 °C, 5V
  - Supports 5 kHz Pulse Output
  - Supports High-to-Low and Low-to-High Delay Output

2.6.2 Application Wiring

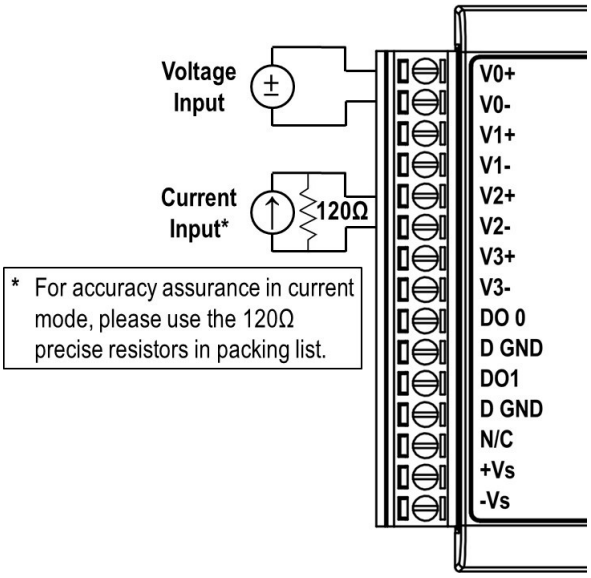


Figure 2.18 WISE-4012 Analog Input Wiring Diagram

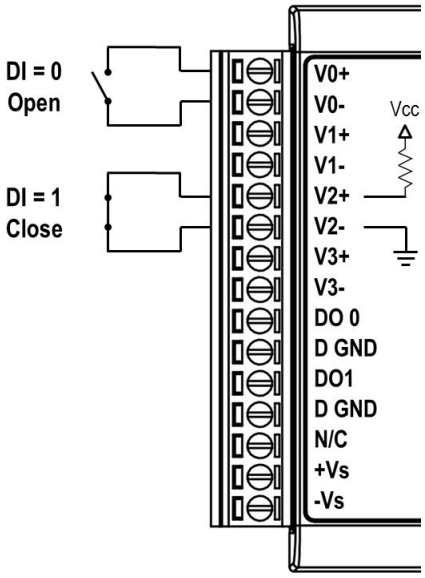


Figure 2.19 WISE-4012 Digital Input Wiring Diagram

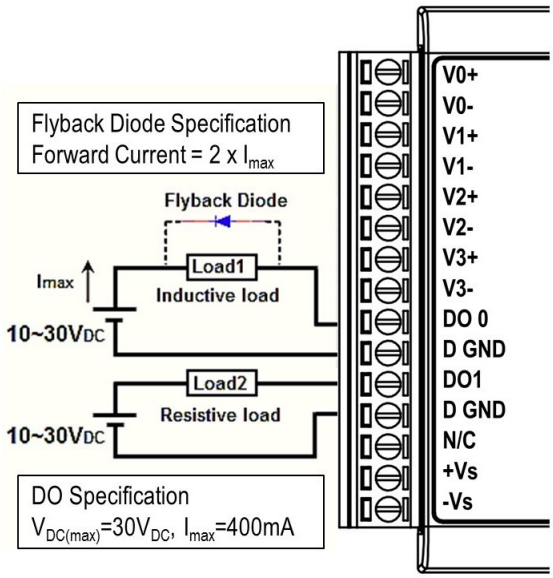


Figure 2.20 WISE-4012 Digital Output Wiring Diagram

2.6.3 Pin Assignment

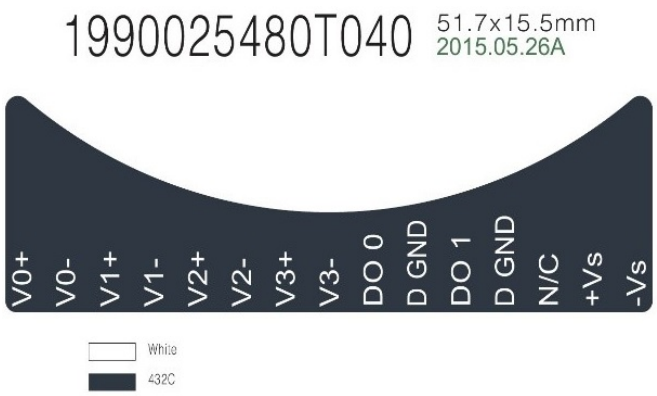


Figure 2.21 WISE-4012 Pin Assignment

2.6.4 Block Diagram

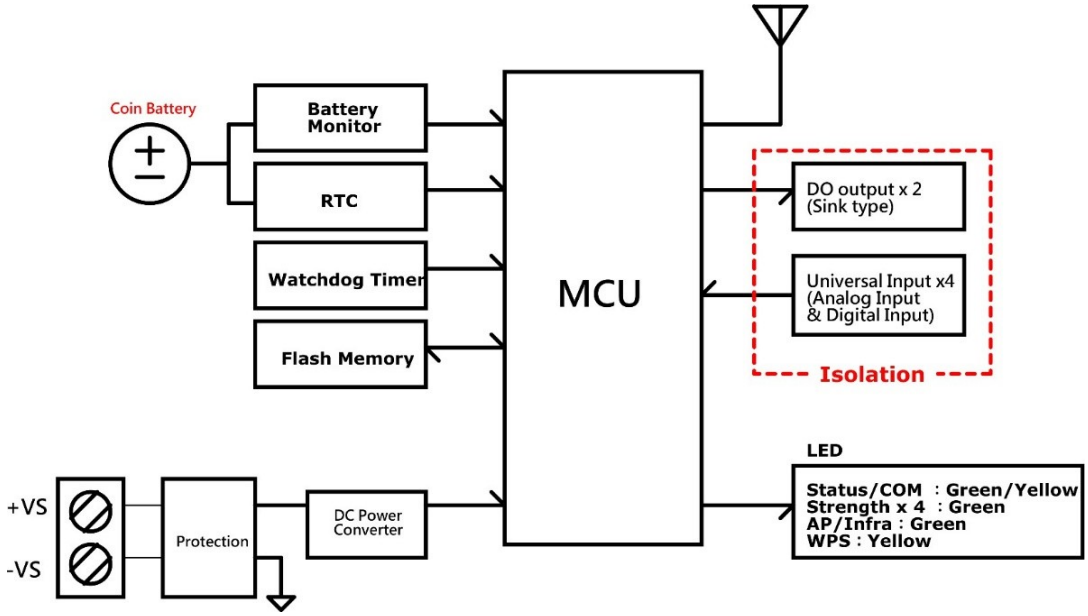


Figure 2.22 WISE-4012 Block Diagram

2.7 WISE-4050

2.7.1 I/O Specification

- **Digital Input**
  - Channel: 4
  - Logic level
  - Dry Contact
    - 0: Open
    - 1: Close to DI COM
  - Wet Contact
    - 0: 0~3 V_{DC} or -3~0 V_{DC}
    - 1: 10~30 V_{DC} or -30~-10 V_{DC} (3 mA min.)
    - All 4 channels should be configured to dry contact or wet contact in the same time

- Isolation: 3,000 V rms
- Supports 32-bit Counter Input Function (Maximum signal frequency 3 kHz)
- Keep/Discard Counter Value when Power-off
- Supports Frequency Input Function (Maximum frequency 3 kHz)
- Supports Inverted DI Status

■ **Digital Output**

- Channels: 4
  - ♦ Open collector to 30 V, 500 mA max. for resistance load
  - ♦ Inductive loads require an external diode to eliminate back-EMF when the DO is turned off
- Isolation: 3,000 V rms
- On Resistance (R DS(ON)): 0.7 Ω (max.) @ 500mA, 25°C
- Supports 5 kHz Pulse Output
- Supports High-to-Low and Low-to-High Delay Output

2.7.2 Application Wiring

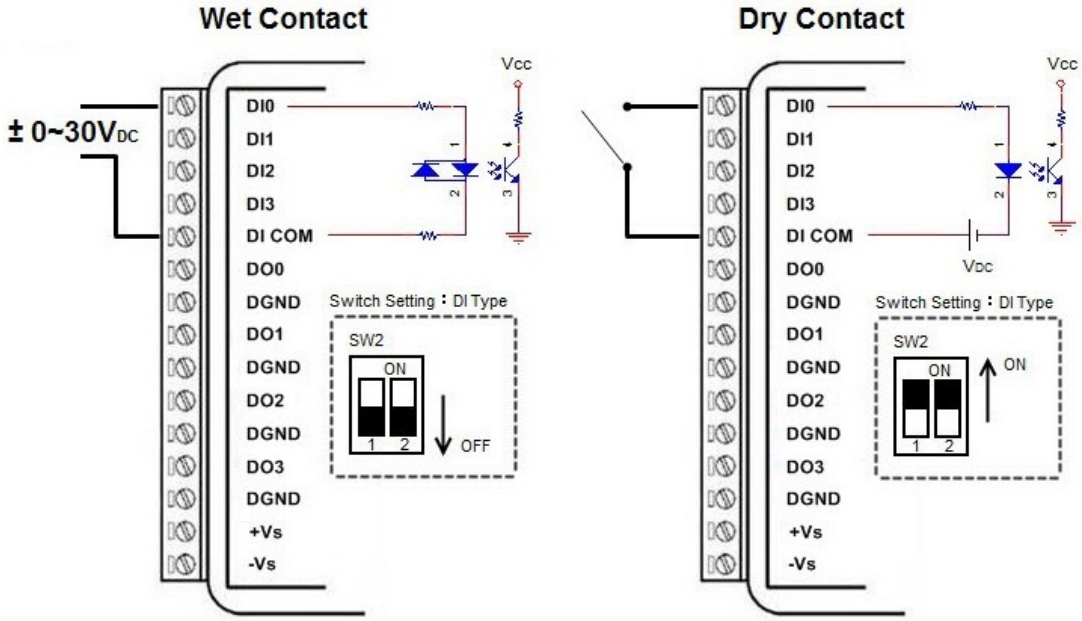


Figure 2.23 WISE-4050 Digital Input Wiring Diagram

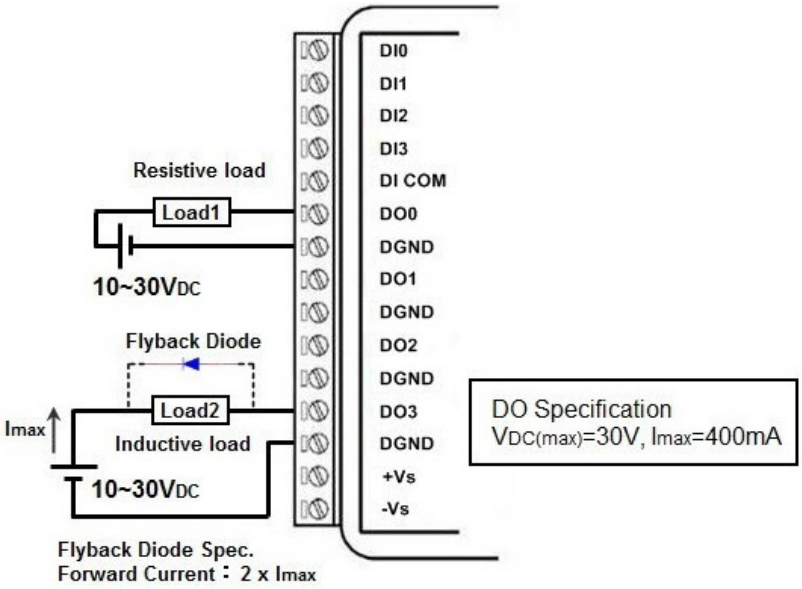


Figure 2.24 WISE-4050 Digital Output Wiring Diagram

2.7.3 Pin Assignment

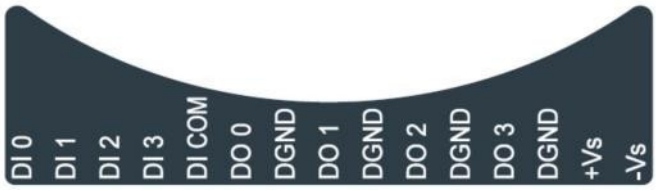


Figure 2.25 WISE-4050 Pin Assignment

2.7.4 Block Diagram

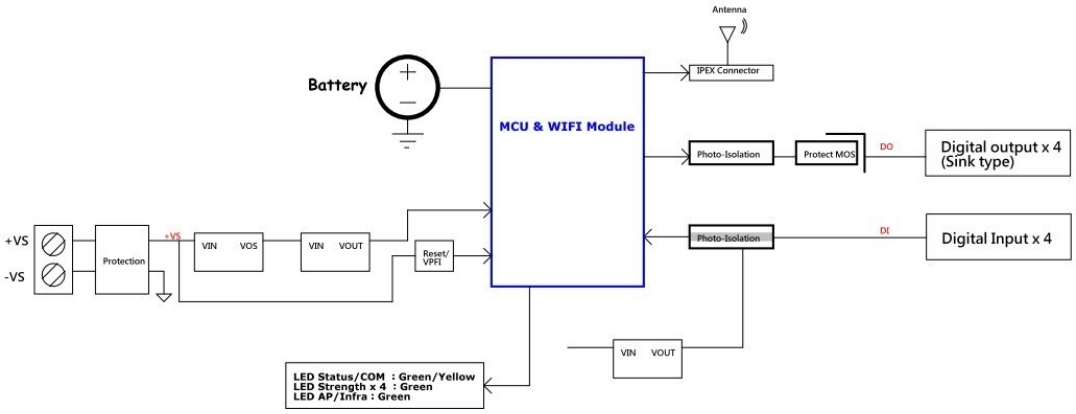


Figure 2.26 WISE-4050 Block Diagram

2.8 WISE-4051

2.8.1 I/O Specification

- **Digital Input**
  - Channel: 8
  - Logic level
  - Dry Contact
    - 0: Open
    - 1: Close to DI COM
  - Wet Contact
    - 0: 0~3 VDC or -3~0 VDC
    - 1: 10~30 VDC or -30~-10 VDC (3 mA min.)
    - Channel 0~3 should be configured to dry contact or wet contact in the same time
    - Channel 4~7 should be configured to dry contact or wet contact in the same time
  - Isolation: 3,000 V rms
  - Supports 32-bit Counter Input Function (Maximum signal frequency 3 kHz)
  - Keep/Discard Counter Value when Power-off
  - Supports Frequency Input Function (Maximum frequency 3 kHz)
  - Supports Inverted DI Status

- **RS-485 Port**
  - Number of Ports: 1
  - Port Connector: 3.5mm spacing plug-in screw terminal block (shared with I/O and power)
  - Baud Rate (bps): 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
  - Data Bits:7, 8
  - Stop Bits: 1, 2
  - Parity: None, Odd, Even
  - Flow Control: Auto flow control
  - Signals: DATA+ and DATA-
  - Protection: 15 kV ESD
  - Supported Protocol: Modbus/RTU (Total 64 address by max. 20 instructions)

2.8.2 Application Wiring

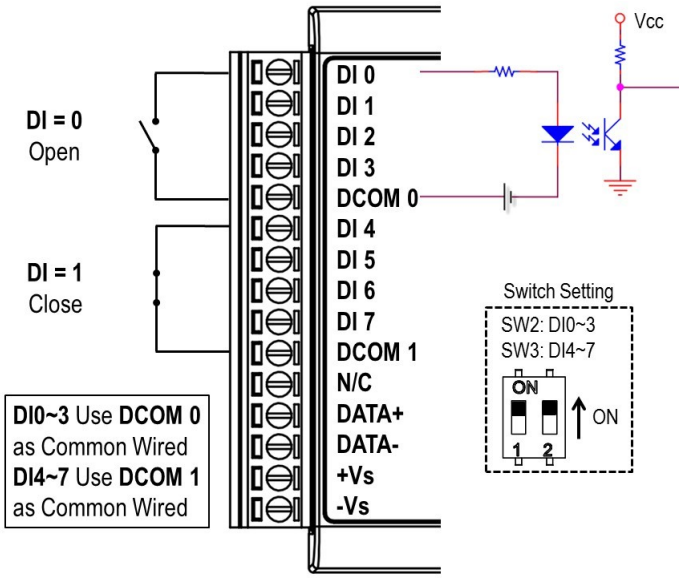


Figure 2.27 WISE-4051 Digital Input Dry Contact Wiring Diagram

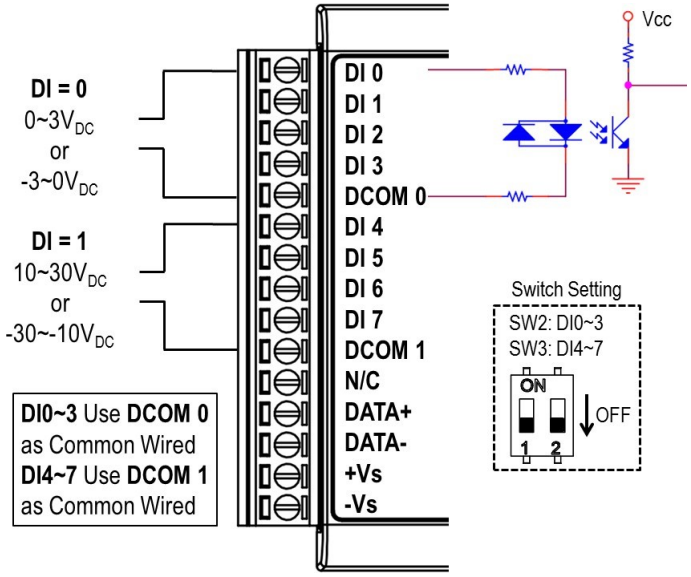


Figure 2.28 WISE-4051 Digital Input Wet Contact Wiring Diagram

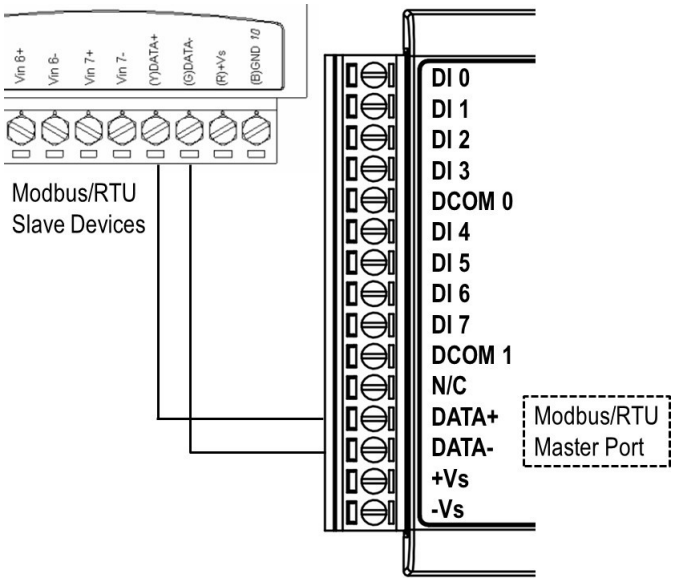


Figure 2.29 RS-485 Port Wiring Diagram

2.8.3 Pin Assignment

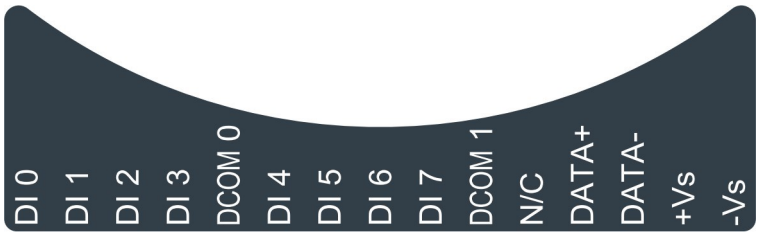


Figure 2.30 WISE-4051 Pin Assignment

2.8.4 Block Diagram

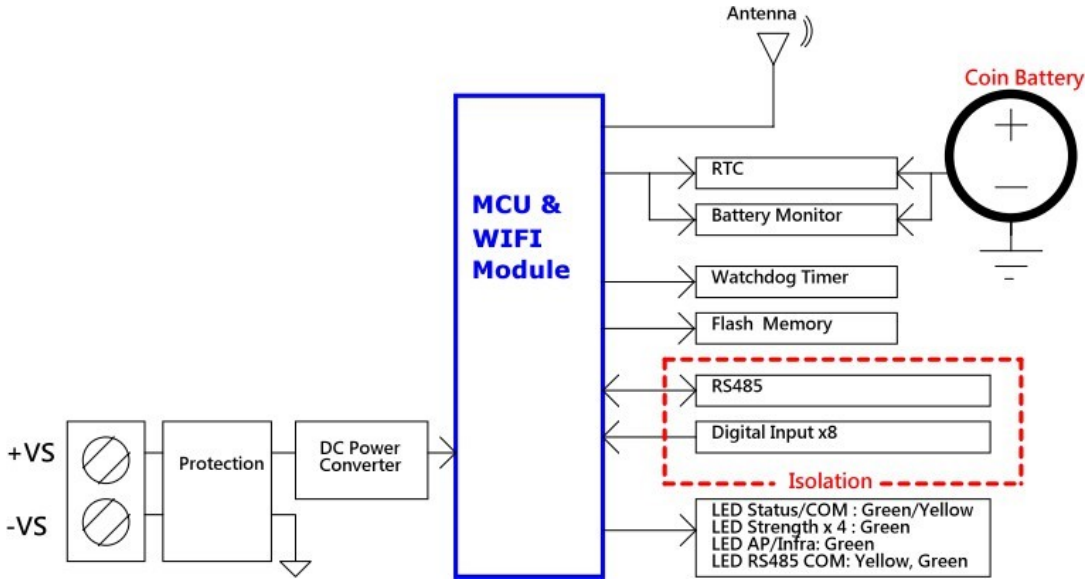


Figure 2.31 WISE-4051 Block Diagram

2.9 WISE-4060

2.9.1 I/O Specification

- **Digital Input**
  - Channel: 4
  - Logic level
  - Dry Contact
    - 0: Open
    - 1: Close to DI COM
  - Wet Contact
    - 0: 0~3 V_{DC} or -3~0 V_{DC}
    - 1: 10~30 V_{DC} or -30~-10 V_{DC} (3 mA min.)
  - Isolation: 3,000 V rms
  - Supports 32-bit Counter Input Function (Maximum signal frequency 3 kHz)
  - Keep/Discard Counter Value when Power-off
  - Supports Frequency Input Function (Maximum frequency 3 kHz)
  - Supports Inverted DI Status

- **Relay Output**
  - Channels: 4 (Form A)
  - Contact Rating (Resistive Load)
    - 250 V_{AC} @ 5 A
    - 30 V_{DC} @ 3 A
  - Relay On Time: 10 ms
  - Relay Off Time: 5 ms
  - Insulation Resistance: 1 GΩ min. @ 500 V_{DC}
  - Dielectric Strength
    - Between Contacts: 1000 V_{AC} (1min)
    - Between Coil to Contact: 3000 V_{AC} (1min)
  - Maximum Switching: 60 operations/minute
  - Supports Pulse Output
  - Supports High-to-Low and Low-to-High Delay Output

2.9.2 Application Wiring

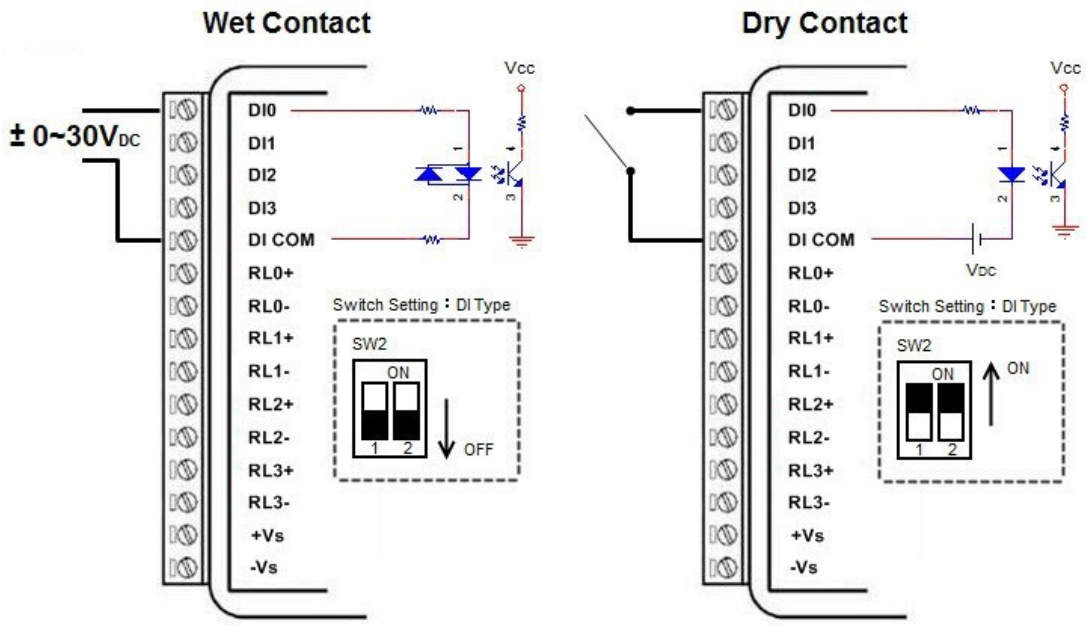


Figure 2.32 WISE-4060 Digital Input Wiring Diagram

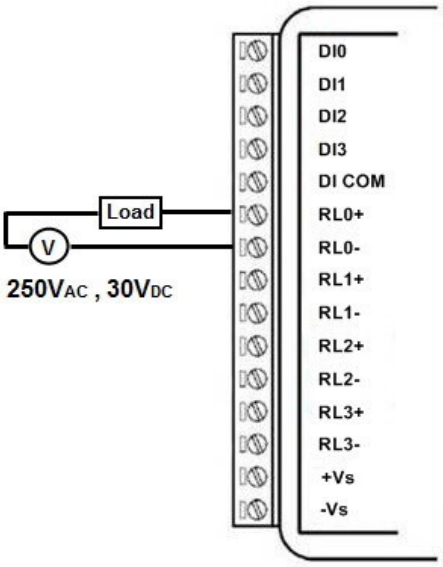


Figure 2.33 WISE-4060 Relay Output Wiring Diagram

2.9.3 Pin Assignment

Figure 2.34 WISE-4060 Pin Assignment

2.9.4 Block Diagram

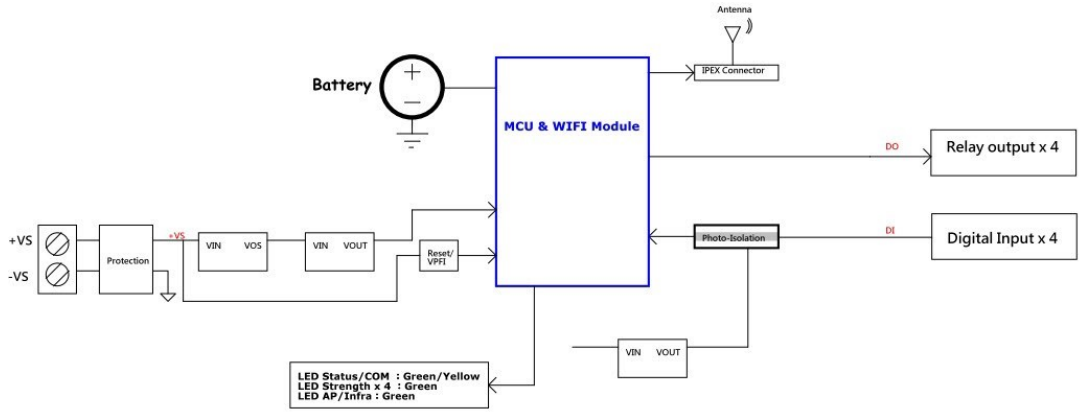


Figure 2.35 WISE-4060 Bloc

Chapter 3

Hardware Installation

3.1 Interface Introduction

3.1.1 Mounting

WISE-4000 modules are designed as compact units and are allowed to be installed in the field site under the following methods.

3.1.2 DIN-Rail Mounting

The WISE-4000 module can also be fixed to the cabinet by using mounting rails. You need to assemble the DIN rail adapter to WISE-4000 module with flathead screw driver as below. When the module is mounted on a rail, you may also consider using end brackets at each end of the rail to keep the module from sliding horizontally along the rail.

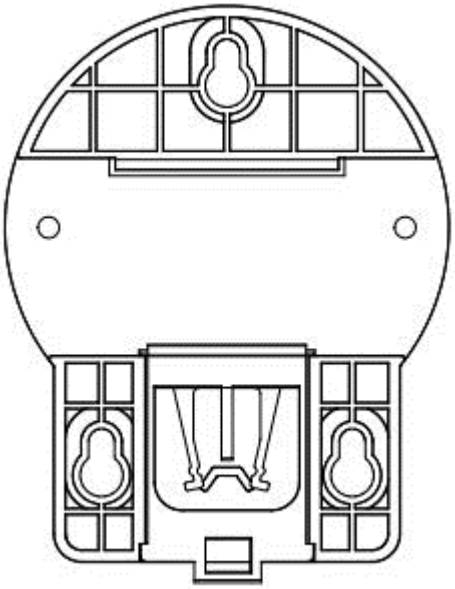


Figure 3.1 Mounting Kit Back View

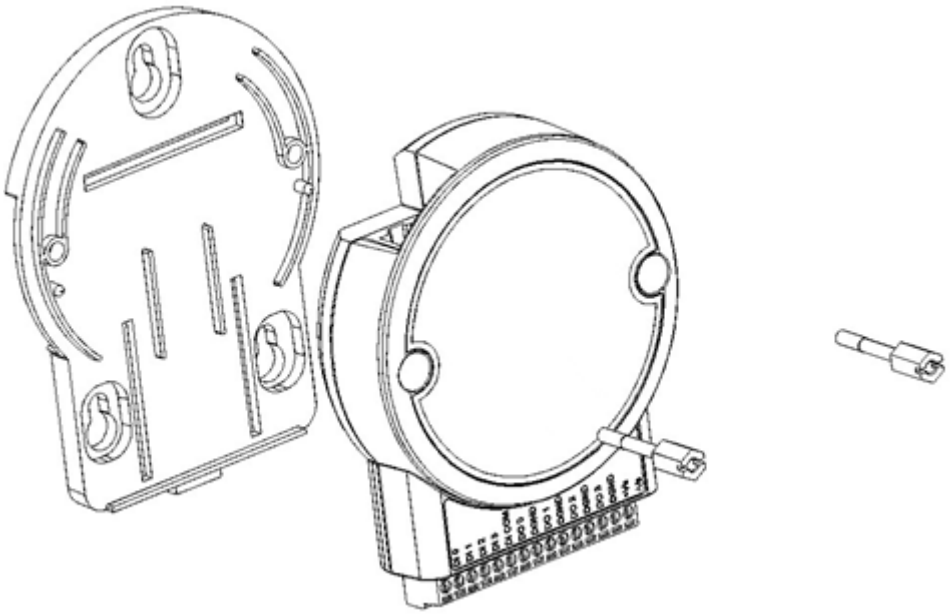


Figure 3.2 Installing the Mounting Kit for a DIN-Rail

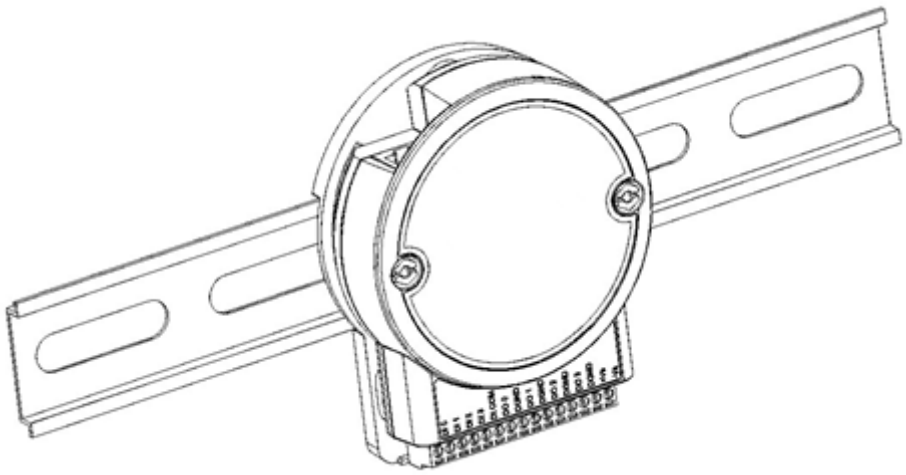


Figure 3.3 Mounting on the DIN-Rail

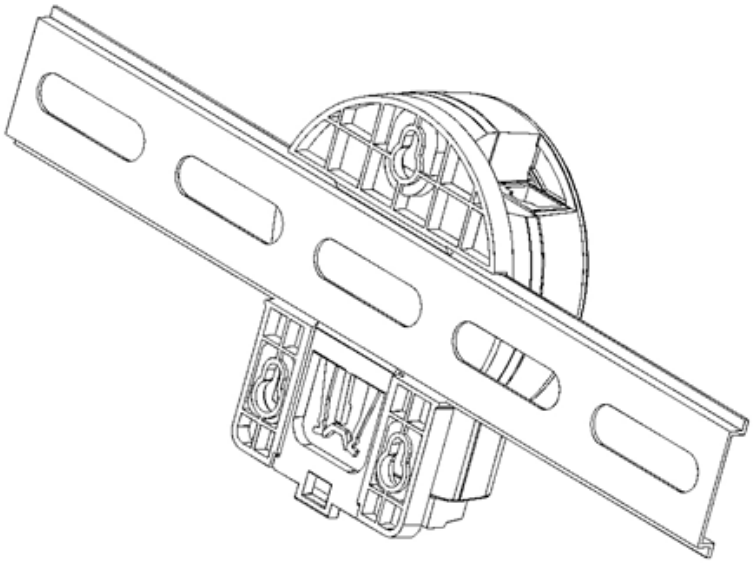


Figure 3.4 Rear View of DIN-Rail Mounting

3.1.3 Wall Mounting

Each WISE-4000 module is packed with a plastic wall mounting bracket. User can refer the bracket dimension and assembling figure to configure an optimal placement in a wall, panel, or cabinet.

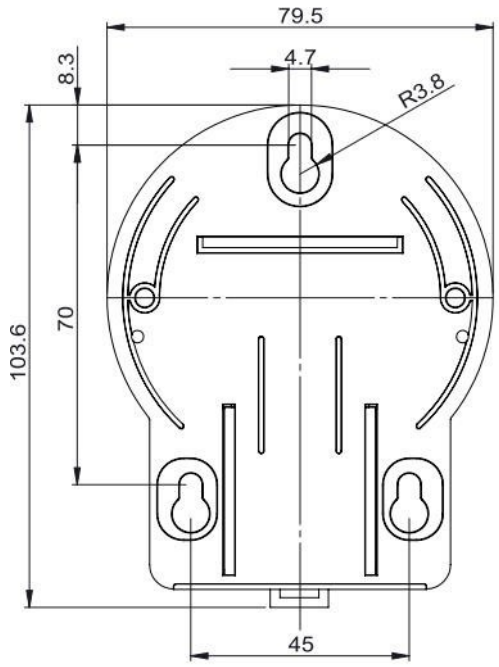
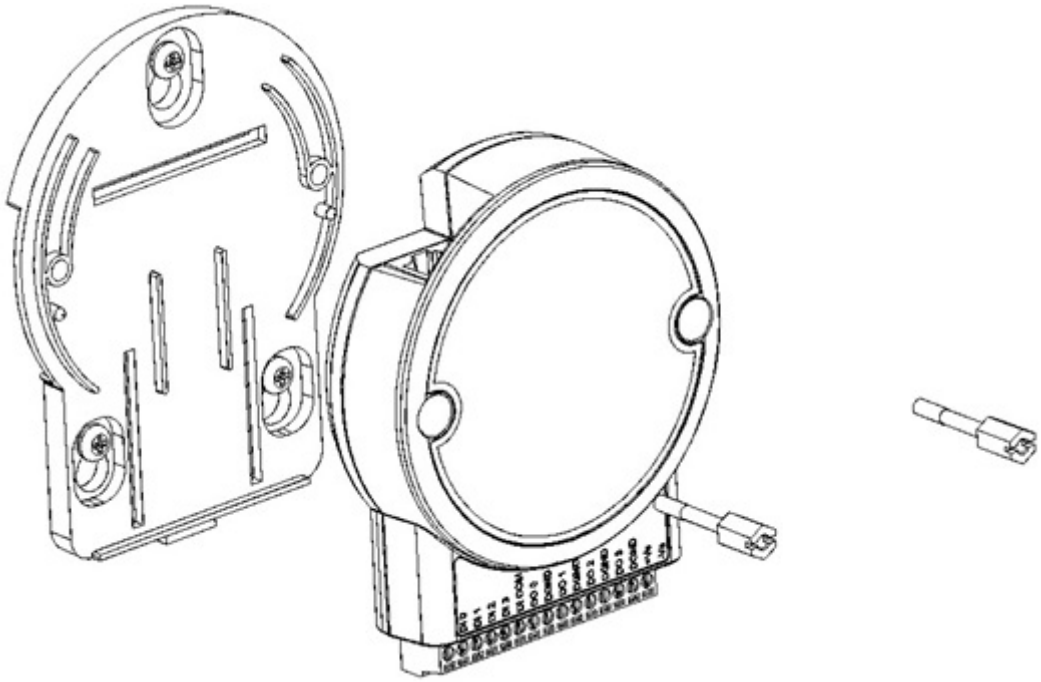


Figure 3.5 Mounting Kit Dimensions



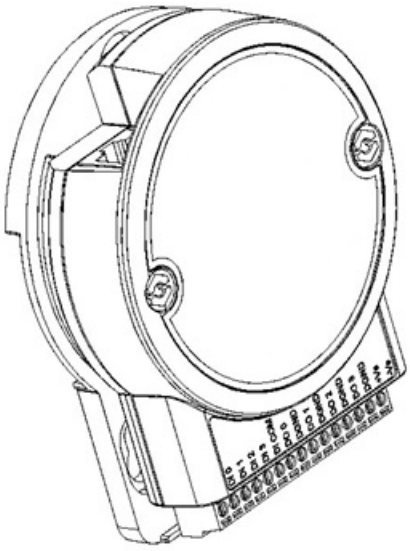


Figure 3.6 Wall Mounting Finished

3.1.4 Stack Mounting

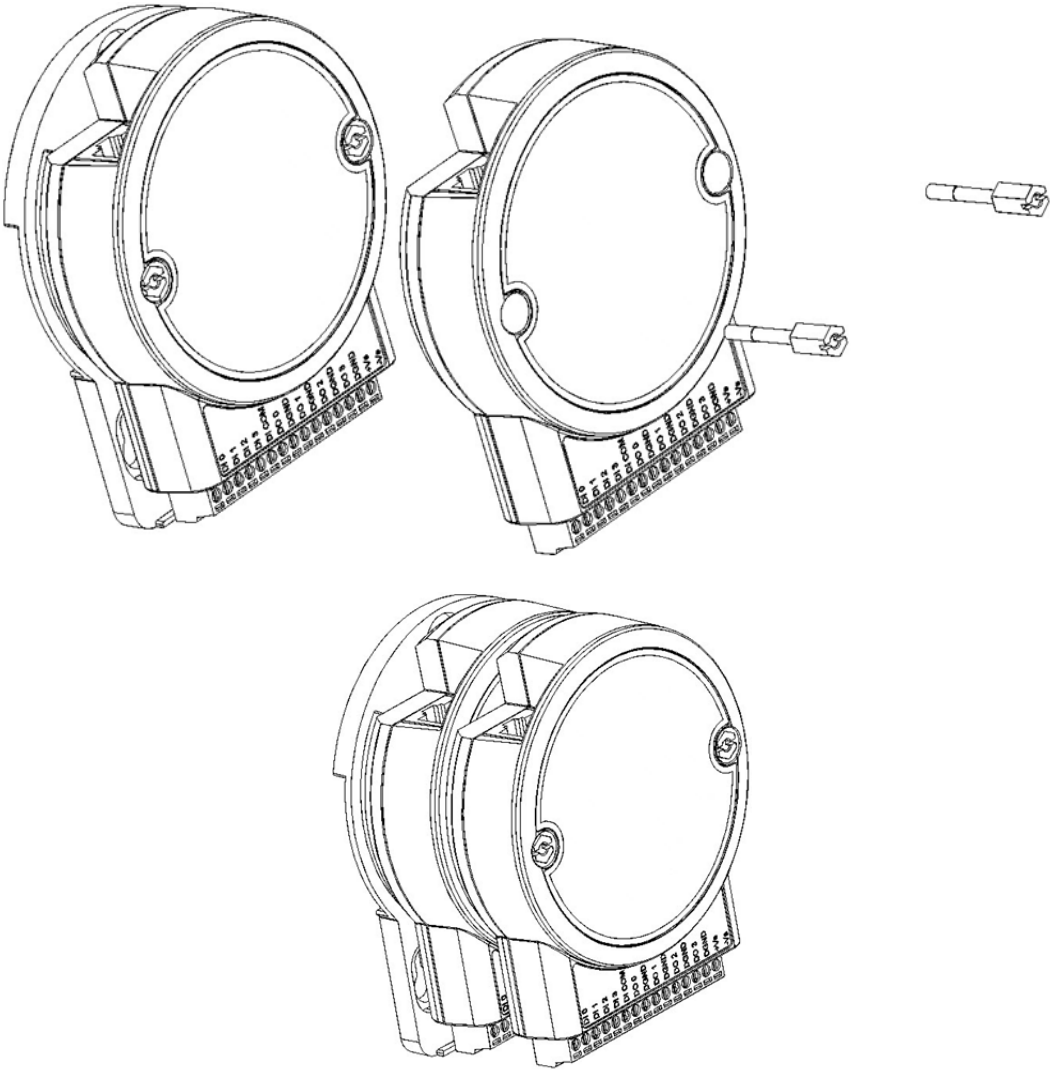


Figure 3.7 Finished Stack Mounting

3.2 Wiring & Connections

This section introduces basic information on wiring the power supply, I/O units, and Ethernet connection.

3.2.1 Power Supply Wiring (Not for WISE-4012E)

The system of WISE-4000 is designed for a standard industrial unregulated 24 V_{DC} power supply. For further application, it can also accept +10 to +30 V_{DC} of power input, 200mV peak to peak of power ripple, and the immediate ripple voltage should be maintained between +10 and +30 V_{DC}.

Screw terminals +Vs and -Vs are for power supply wiring

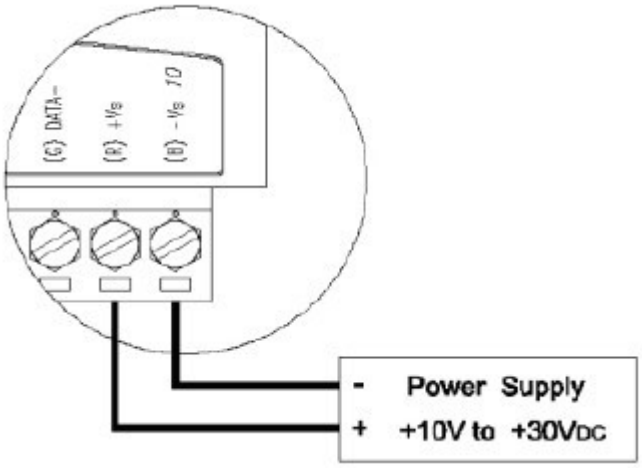


Figure 3.8 Power Supply Wiring

Note! *The wires used should be at least 2 mm.*

3.2.2 USB Power (WISE-4012E Only)

The system of WISE-4012E IoT Developer Kit is designed for a standard Micro-B USB 5VDC power supply. Use the provided USB power cable to power up the module. Insert the Micro-B USB end to the USB port on the side of the module, and insert another end to Type-A 5VDC USB port such as a PC, notebook, USB power adapter, USB power bank.

Note! *The wider or flared part of the USB Micro-B connector is at the front side of the module, please make sure the direction of the cable before inserting it into the module to prevent the damage to the USB port.*

Some USB power banks will automatically switch off, in this case, use a standard USB power instead.

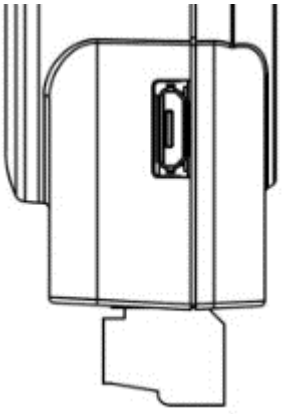


Figure 3.9 USB Power Supply Wiring

3.2.3 I/O Units

The system uses a plug-in screw terminal block for the interface between I/O modules and field devices. The following information must be considered when connecting electrical devices to I/O modules.

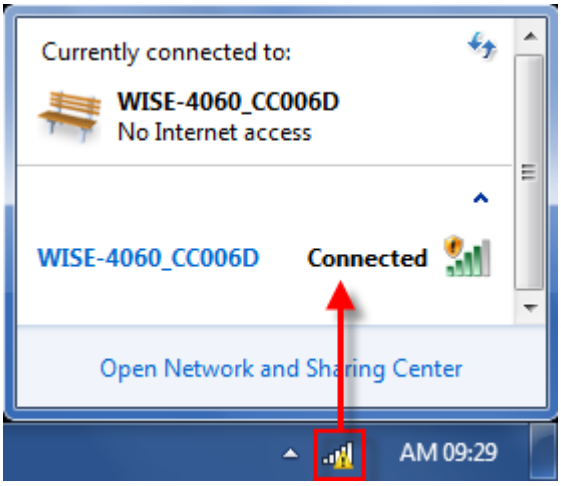
1. The terminal block accepts wires from 0.5 mm to 2.5 mm.
2. Always use a continuous length of wire. Do not combine wires.
3. Use the shortest possible wire length.
4. Use wire trays for routing where possible.
5. Avoid running wires near high-energy wiring.
6. Avoid running input wiring in close proximity to output wiring.
7. Avoid creating sharp bends in the wires.

Chapter 4

System Configuration

4.1 Connection

1. Plug a DC power source into the +Vs, -Vs pin of WISE module to turn the power on, or plug in the USB power cable for the WISE-4012E.
2. For WISE-4000/LAN Series, connect your computer to Ethernet port of WISE module with RJ-45 cross-over Ethernet cable, and configure the IP address of your computer as same IP domain as default IP address of module: 10.0.0.1. Or the wireless router can be used for configure the WISE-4000/LAN Series by mobile devices or computer with wireless adapter.
3. For WISE-4000 Wireless Series, the default operation mode in normal mode is AP Mode, or you can change position 1 of SW1 to OFF as in Section 1.5, to setting the module as Initial Mode, then module must be AP Mode. Now the module can be searched by mobile devices or wireless adapter of computer with SSID: WISE-4xxx_MACAddress. Click the SSID to connect the module in AP Mode, WISE module will auto assign the IP address for mobile devices or computer.



4.2 Configure WISE Using the Web Interface

4.2.1 System Requirements

WISE-4000 module is developed by public HTML 5 base, but for detailed indication and data transmission mode may be different on Web page of the operating system. For mobile devices, the minimum requirement of web browsers as below:

- Safari 6 in Apple iOS
- Web Browser in Google Android 4.0 (Ice Cream Sandwich)
- Chrome in Google Android 4.0 (Ice Cream Sandwich)

Table 4.1:

Mobile Browse	Chrome	Android	Safari
Configuration	Y	Y	Y
File Upload	N	N	N
Data Log Chart	Y	Y	Y
Data Log Export	N	N	N

For PC platforms, the minimum requirement of web browsers as below:

- Internet Explorer (version 11)
- Google Chrome (version 30)
- Mozilla Firefox (version 25)

Table 4.2:						
Mobile Browse	Chrome	Firefox	Safari	IE11	IE10	IE9
Configuration	Y	Y	Y	Y	Y	Y
File Upload	Y	Y	N	Y	N	N
Data Log Chart	Y	Y	Y	Y	Y	N
Data Log Export	Y	Y	N	N	N	N

4.2.2 List of WISE-4000 Default Ethernet Ports

Table 4.3: List of WISE-4000 Default Ethernet Ports			
Application	**Protocol**	**Port**	**Note**
WebServer	TCP	80	Configurable
Modbus Server	TCP	502	-
Search Engine	UDP	5048	-
SNTP Client	UDP	-	Randomly
DNS Server	UDP	53	

4.2.3 Factory Default Settings

WISE-4000/LAN Series

- Operation Mode: Normal Mode
- IP Mode: Static IP Address
- Default IP: 10.0.0.1
- Subnet Mask: 255.0.0.0
- Default Gateway: 0.0.0.0
- Default Connection Timeout: 720 second
- HTTP Port: 80

WISE-4000 Wireless Series

- Operation Mode: Normal Mode
- Wireless Mode: AP Mode
- IP Mode: Static IP Address
- Default IP: 192.168.1.1
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1
- DHCP Server: Enabled
- Default Connection Timeout: 720 second
- HTTP Port: 80
- Default DNS Server IP: 1.1.1.1
- Security Mode: Disabled (Strongly recommend switching to “Enabled” after completing the configuration)
- Modbus: Enabled

4.3 First Login

4.3.1 Operation Mode

The operation mode can be configured by switch SW1 on the back of module. Please refer to previous chapter for the detail of configuring SW1.

Table 4.4: Operation Mode

Mode	WISE-4000/LAN Series	WISE-4000 Wireless Series
Initial Mode	Fixed IP address: 10.0.0.1	Fixed IP address: 192.168.1.1 Fixed Wi-Fi Mode: AP Mode
Normal Mode	Default IP address: 10.0.0.1	Default IP address: 192.168.1.1 De fault Wi-Fi Mode: AP Mode

4.3.2 Password Setting (WISE-4000)

Table 4.5: Module Authorization

Account	Default Password	Access Ability
root	00000000	All the privileges
admin	00000000	All the privileges except access control configuration
user	00000000	View module status only, not allow to do configuration

When you power on and log in to the device for the first time, the system will prompt you to mandatorily change the default password and set the device's operating region. This critical setting only appears during the initial setup phase and directly determines the device's default security profile and operational behavior.

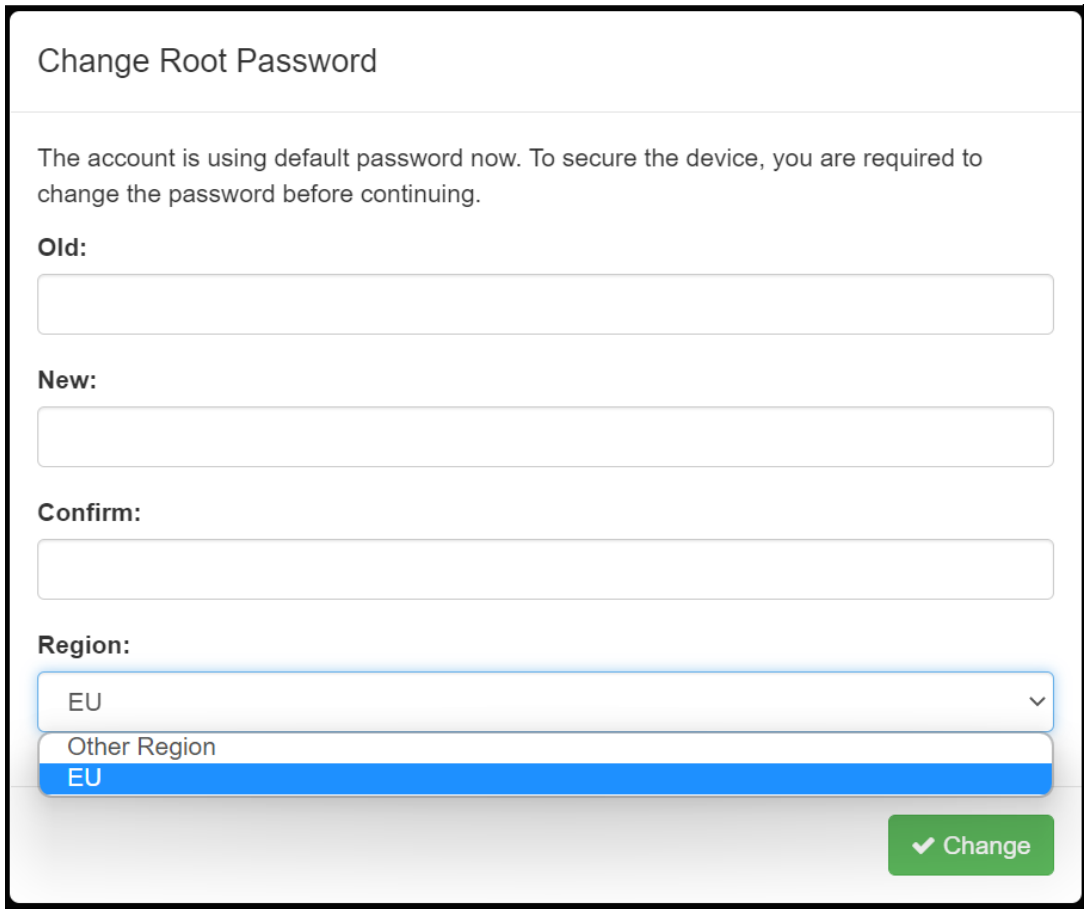
- Open your web browser and enter the device's default IP address (**192.168.1.1 in Initial Mode**).
- You will be directed to the mandatory password change page.
- Please enter your old password (00000000) and update your password (up to 8 characters).

In the **Region** drop-down menu, select based on your geographical location and compliance needs:

- **EU Region:** If this option is selected, "Security Mode" will be enabled by default, and this setting cannot be subsequently changed via the web interface. This is the recommended and default option to ensure the product's compliance with strict EU cybersecurity regulations.
- **Other Region:** If this option is selected, "Security Mode" will be disabled by default. Users in this region can subsequently manually enable or disable "Security Mode" within the system settings as needed.
- After setting your new password, click Change to save the settings.

<Notice>

- New password cannot be the same as default password value (00000000).
- If you enter the wrong password 3 consecutive times, you'll be locked out for 5 minutes.

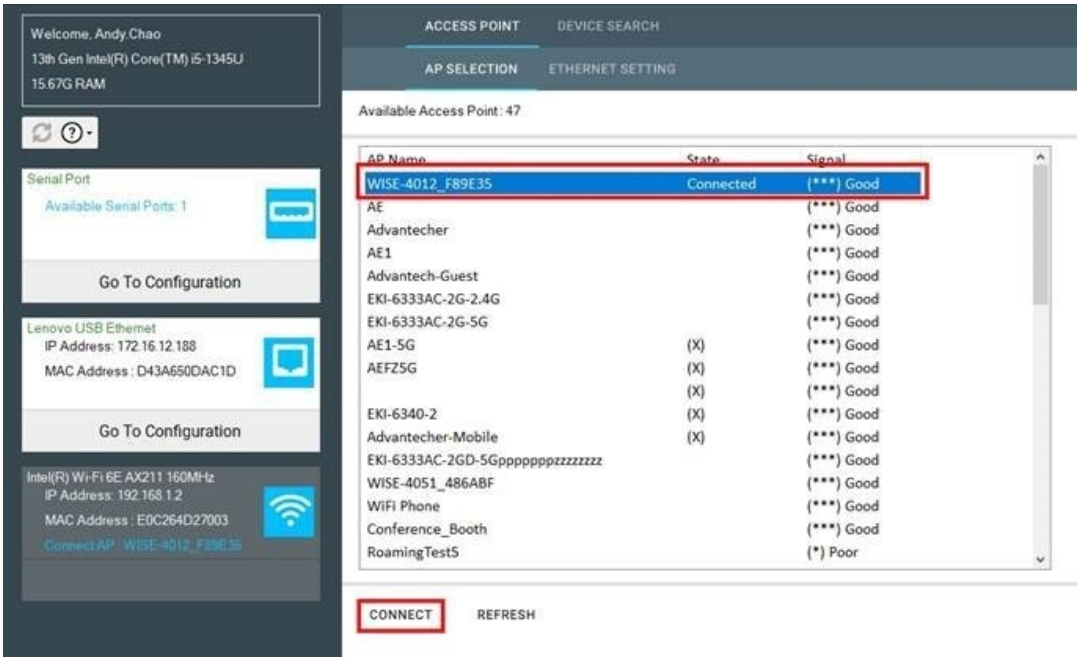


4.3.3 Reset the Default Password

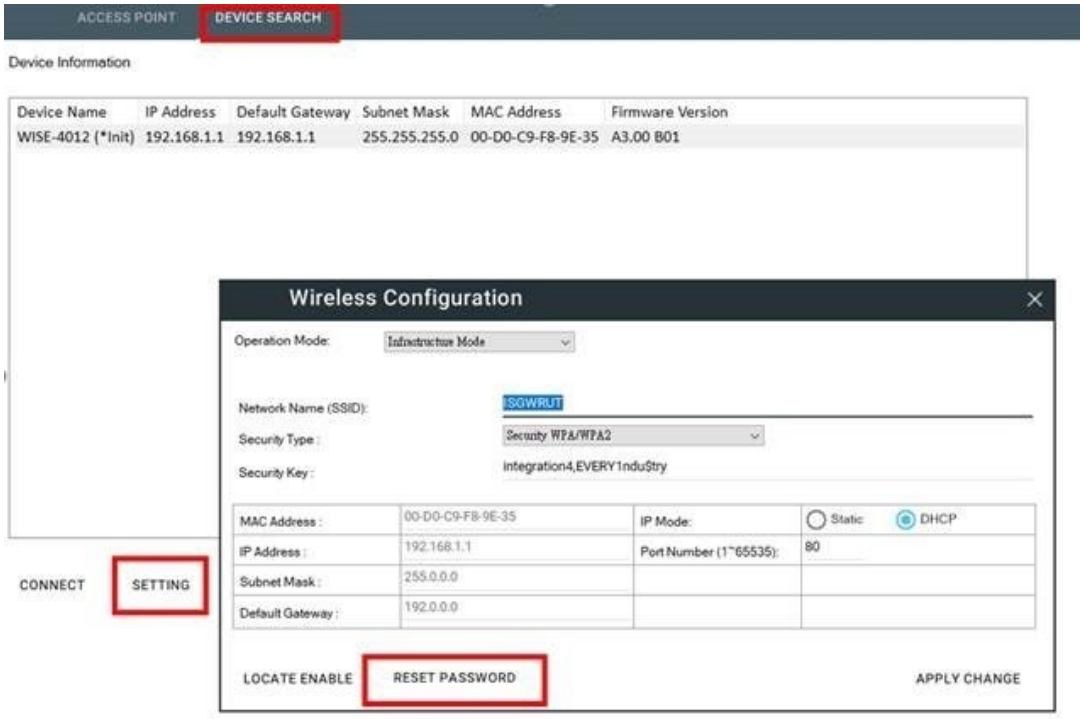
Assuming the user needs to reset the password on the device due to staff changes, poor memory, or unsuccessful password changes, the following steps can be taken:

1. Set the device to “Initial Mode.

2. Open the WISE Studio and choose the AP name.



3. Open the Setting page, then choose Reset Password in the initial mode. Now the user can change the password. After pressing “Reset Password,” please power off the device and then power it back on to return to the initial password setup page.



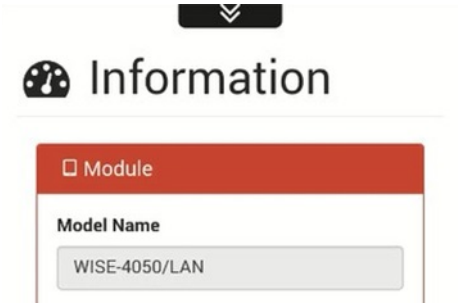
4.3.4 Using a Browser to Configure the Module

- **Configure URL:** http://IP_address/config
- **Default URL:**
  - WISE-4000/LAN Series: http://10.0.0.1/config
  - WISE-4000 Wireless Series: http://192.168.1.1/config

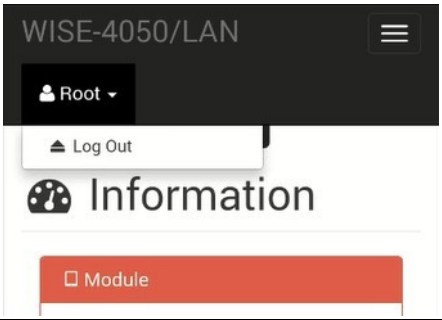
- **Configuration Steps**

Table 4.6: Login Web Configuration Page

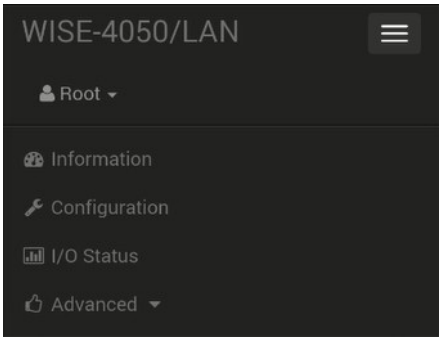
1. Wirelessly connect your smart phone to your local Ethernet network and open the browser of your smart phone.
2. Enter IP address of module with "/con- fig", for example, the default URL: http:// 10.0.0.1/ config or http://192.168.1.1/con- fig
3. Then you will see the login page, please enter the account and password, then click Login button.



4. After login you will see the configuration web page



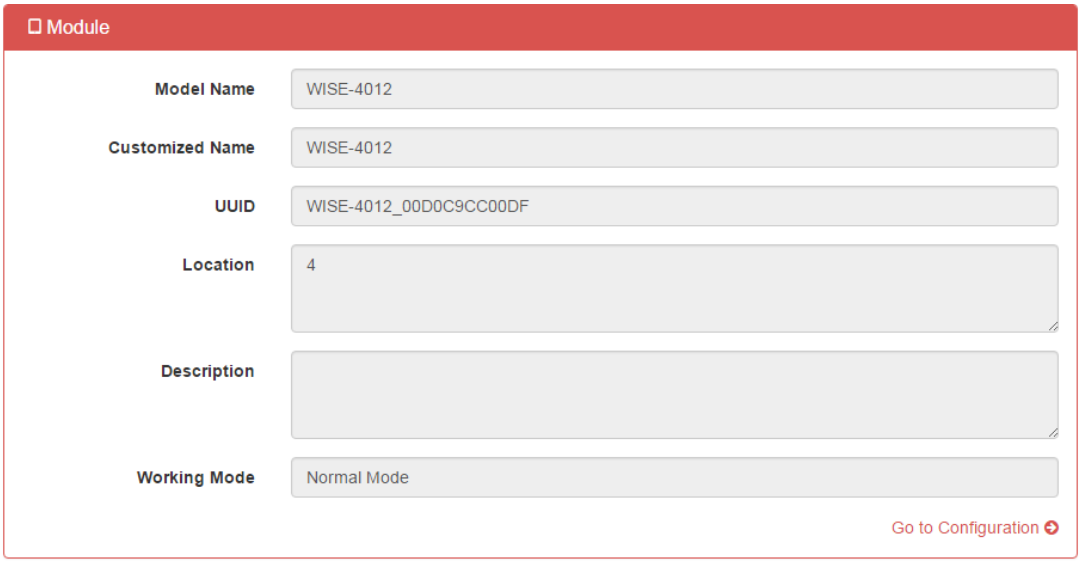
5. Then you will see the login page, please enter the account and password, then click Login button.



6. After login you will see the configuration web page.

System Information

In the information page, you can see the dashboard: module detail, network setting, and module information, including the firmware version.



Module

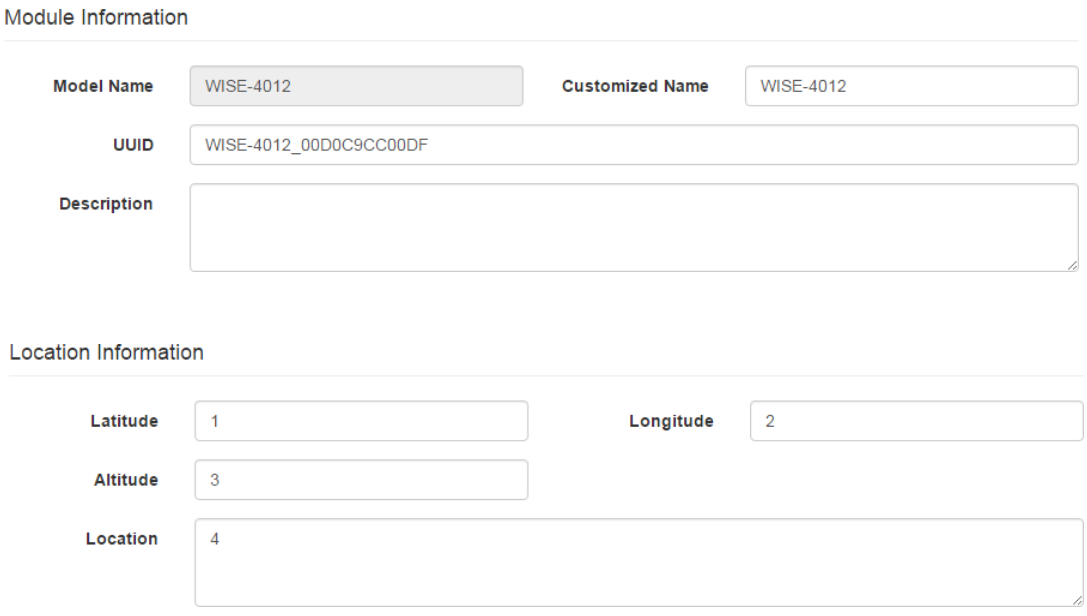
Here you can see the naming of the module and related information. Click “Configuration” to perform the configuration.

Model Name: Indicates the WISE model

Customized Name/UUID: Model name and UUID of the module, the default UUID is the combination of model name and the MAC address. It can be renamed.

Location Information: You can note the location of the module Description: You can add comments on this module for easier recognition.

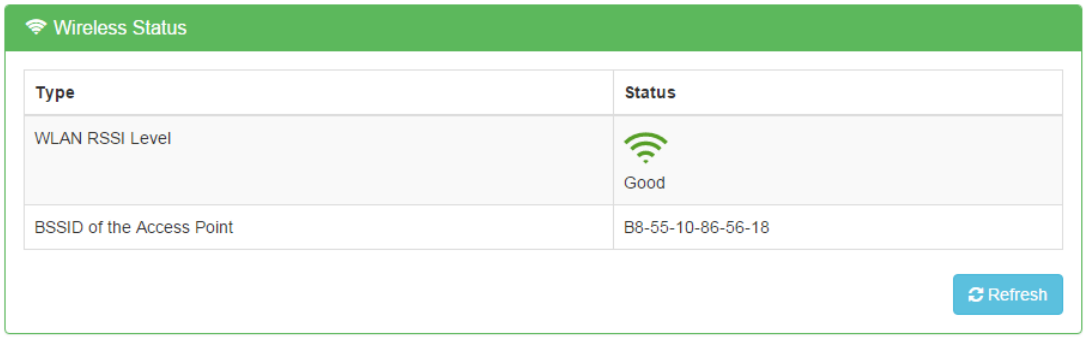
Working Mode: Refer to 4.2.6 for Operation Mode.



Wireless Status

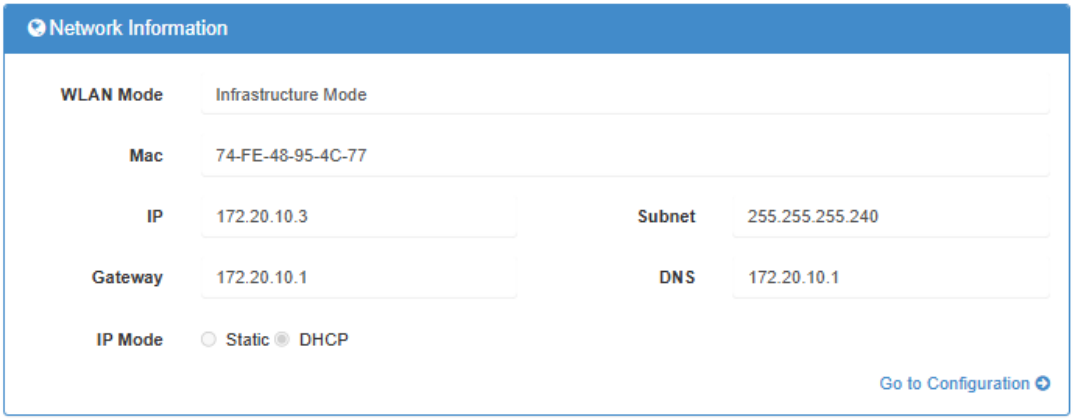
For the WISE-4000 Wireless Series, users can check the WLAN RSSI Level to know the signal quality in Wireless Status field. And it also shows the MAC ID of the client device.

If the module is in AP Mode, the WLAN RSSI Level and Refresh button will not be shown.



Network Information

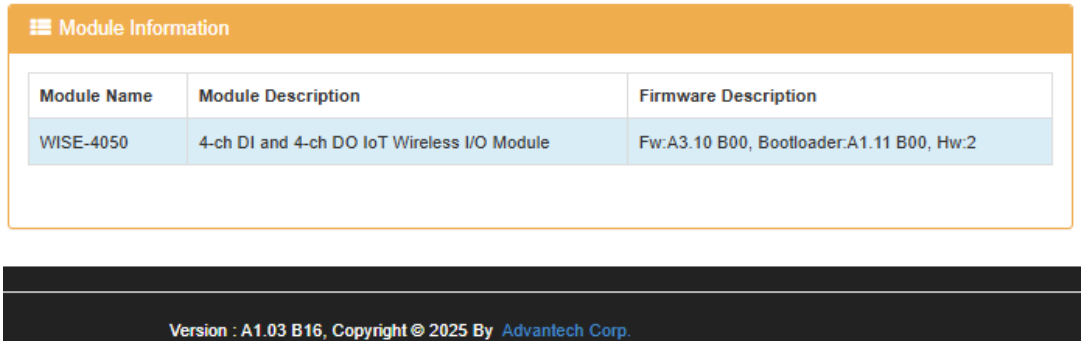
For the WISE-4000 Wireless Series, WLAN Mode (AP Mode / Infrastructure) will be shown in Network Information. Here is an overview of the entire network configuration. To configure the network configuration, click “Go to Configuration”.



Firmware Version

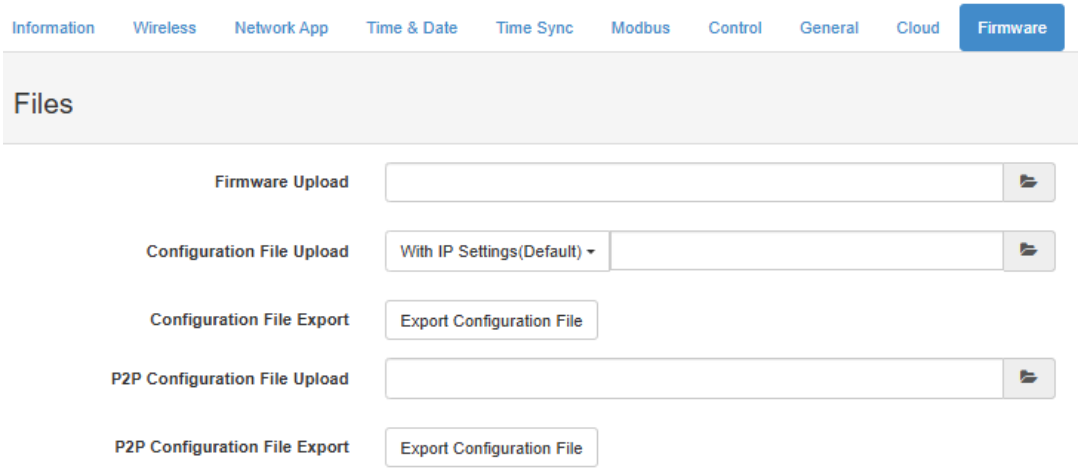
– Check Version

The firmware version is shown in the “System Information” page. At the end of the configuration web page, check the version of configuration web page. For normal release module, the version of configuration web page will increase with the firmware version, as these have to been updated at the same time.



– Update Firmware

Go to the **Firmware** page in system configuration and click the icon to select which firmware file you are going to update. You can find the latest official release firmware file at the Advantech support site (http://support.advantech.com/support/).



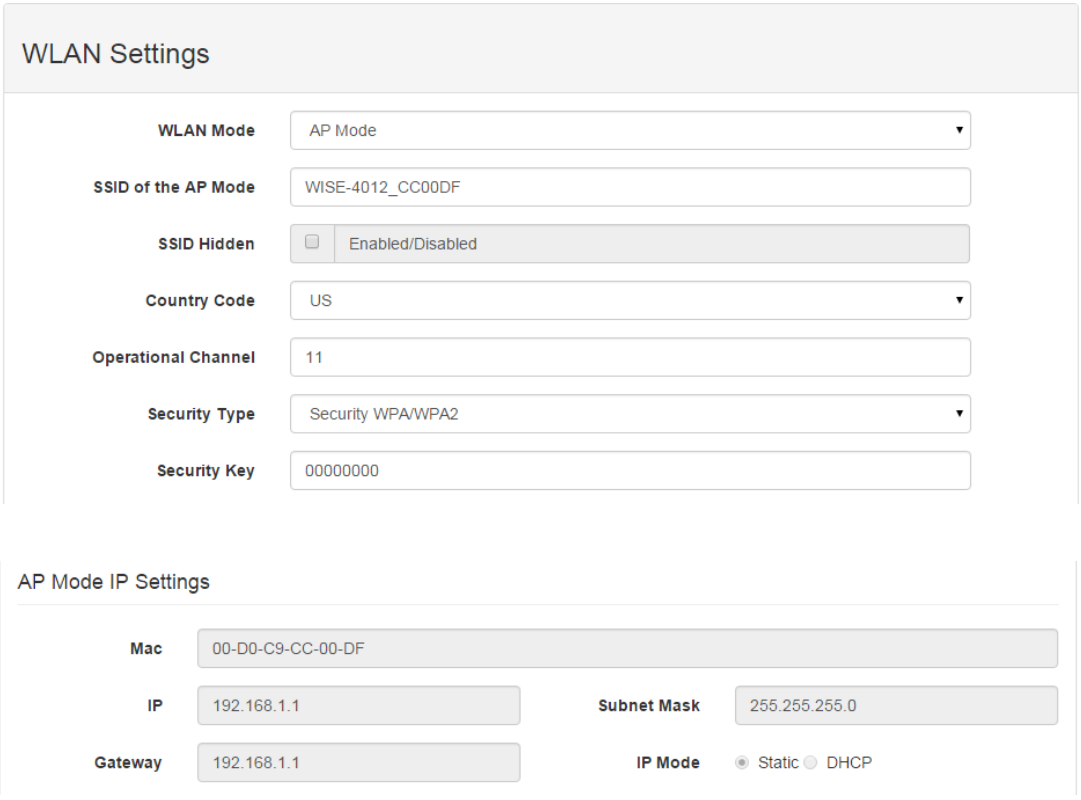
4.4 Network Configuration (WLAN)

4.4.1 WLAN Mode (AP Mode)

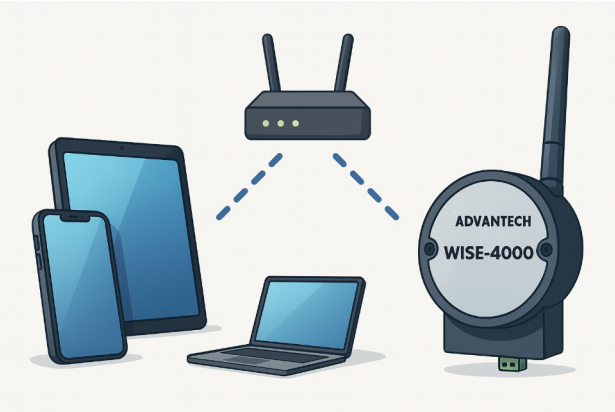
When using the module in AP mode, users can configure the SSID and also decide how the WISE module works as an AP, including the security.

The “AP Mode IP Settings” is fixed and does not allow user to make their own changes.

Note: In the limited AP mode, WISE can only be connected by ONE device at the same time.



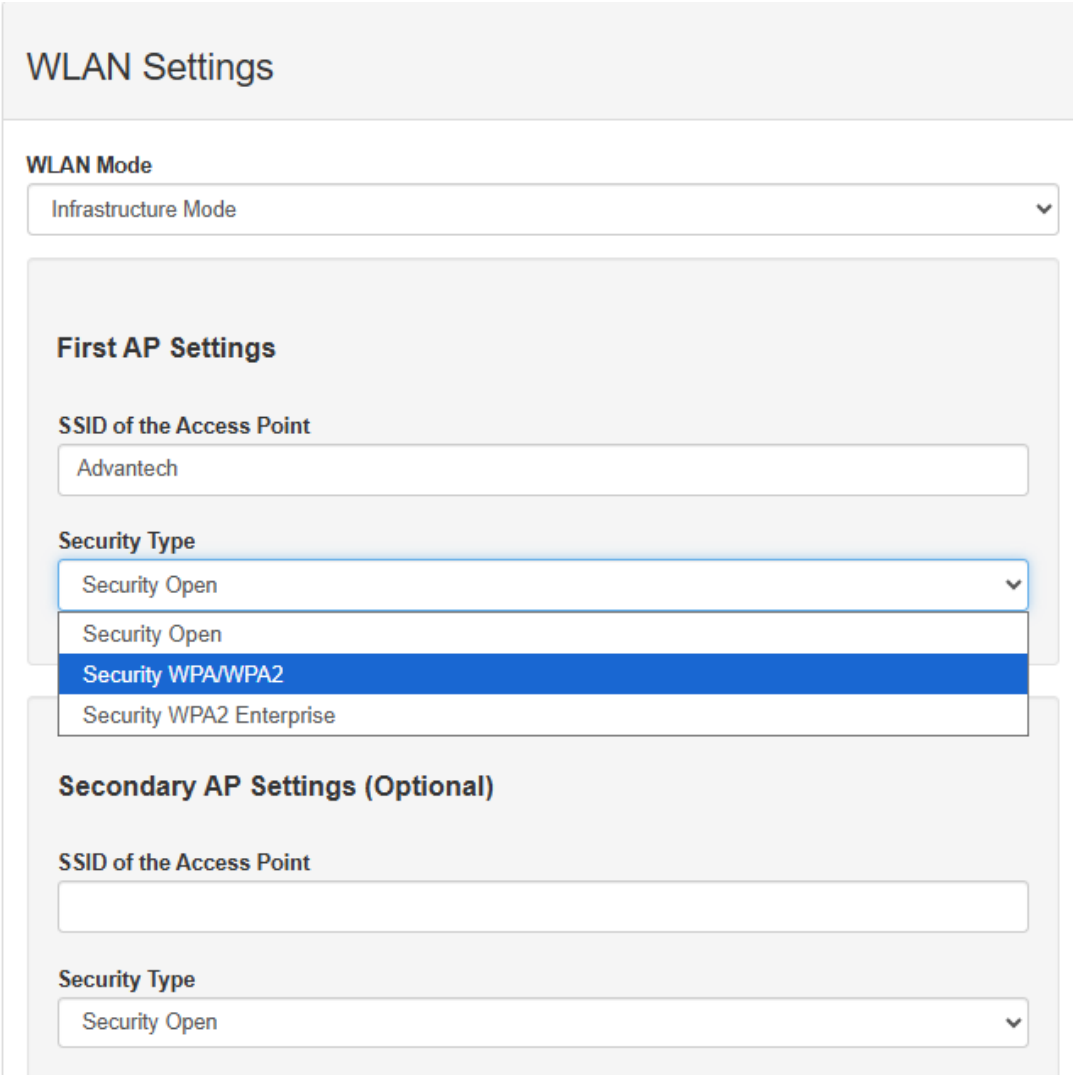
4.4.2 WLAN Mode (Infrastructure Mode)



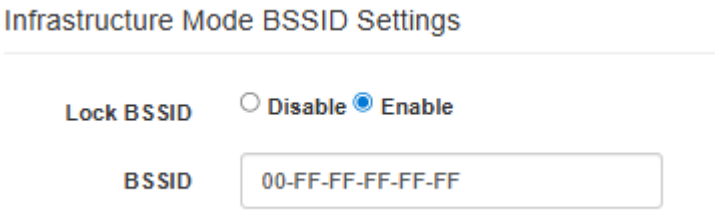
When using the module in “Infrastructure Mode”, users need to enter the SSID of the Access Point (AP) the WISE is going to access, and configure the security from here.

WISE-4000 wireless modules provide a **Second AP Setting**, this is an optional setting for the WISE module to access another AP automatically. If you do not have a Second AP, you can leave the SSID blank.

After configuring the AP that the WISE module going to access, the IP address also needs to be defined in the Infrastructure-Network.


WLAN Settings
WLAN Mode
Infrastructure Mode
First AP Settings
SSID of the Access Point
Advantech
Security Type
Security Open
Security Open
Security WPA/WPA2
Security WPA2 Enterprise
Secondary AP Settings (Optional)
SSID of the Access Point
Security Type
Security Open

4.4.3 BSSID (Basic Service Set Identifier) Setting



The BSSID is the unique identifier for each Wireless Access Point (AP) within a Wi-Fi network, typically represented as the **AP's MAC address**. Its primary function is to enable devices to differentiate and connect to a specific AP, especially in environments where multiple APs broadcast the same SSID, thereby optimizing network connectivity.

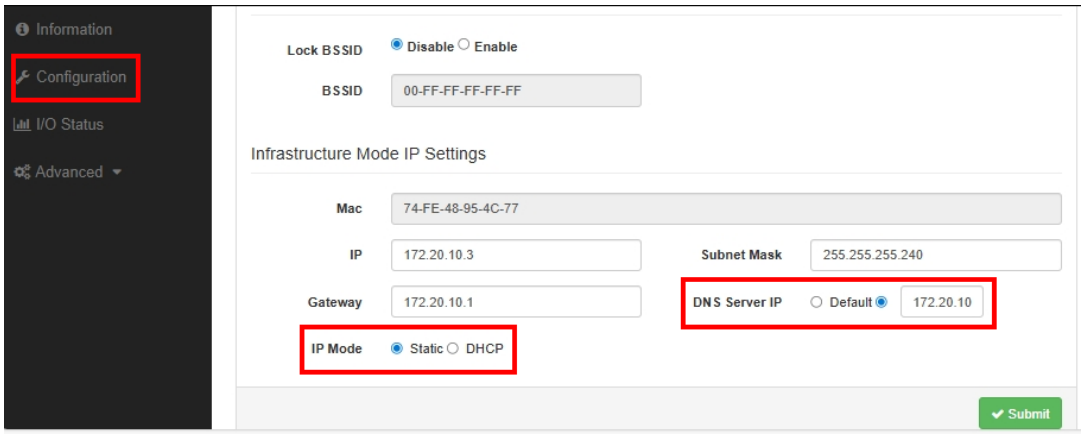
In most cases, end-users do not need to manually configure the BSSID value, as devices automatically select the optimal AP to connect to. However, in certain advanced or specialized application scenarios, manually configuring or specifying the BSSID may be necessary:

- **Forcing Connection to a Specific AP:** In industrial or critical applications requiring high stability, you can manually specify an AP's BSSID to ensure a device connects only to that particular AP (e.g., for specific security configurations or QoS guarantees), preventing it from roaming to other APs.
- **Network Diagnostics and Analysis:** Network administrators or advanced users may utilize BSSID to diagnose connection issues or perform network tests by forcing a device to connect to a specific AP.
- **Implementing MAC Address Filtering:** In some enterprise network environments, if an AP enables MAC address filtering to restrict access, the device's MAC address will be used for connection control, even if the BSSID itself isn't directly configured.

4.4.4 DNS Server IP

(Configuration → Wireless → Infrastructure Mode IP Settings)

When the IP Mode is set to Static, the default value for the DNS Server IP is 1.1.1.1. When the IP Mode is set to DHCP, the IP, Subnet Mask, Gateway and DNS Server IP value can be modified by the user.



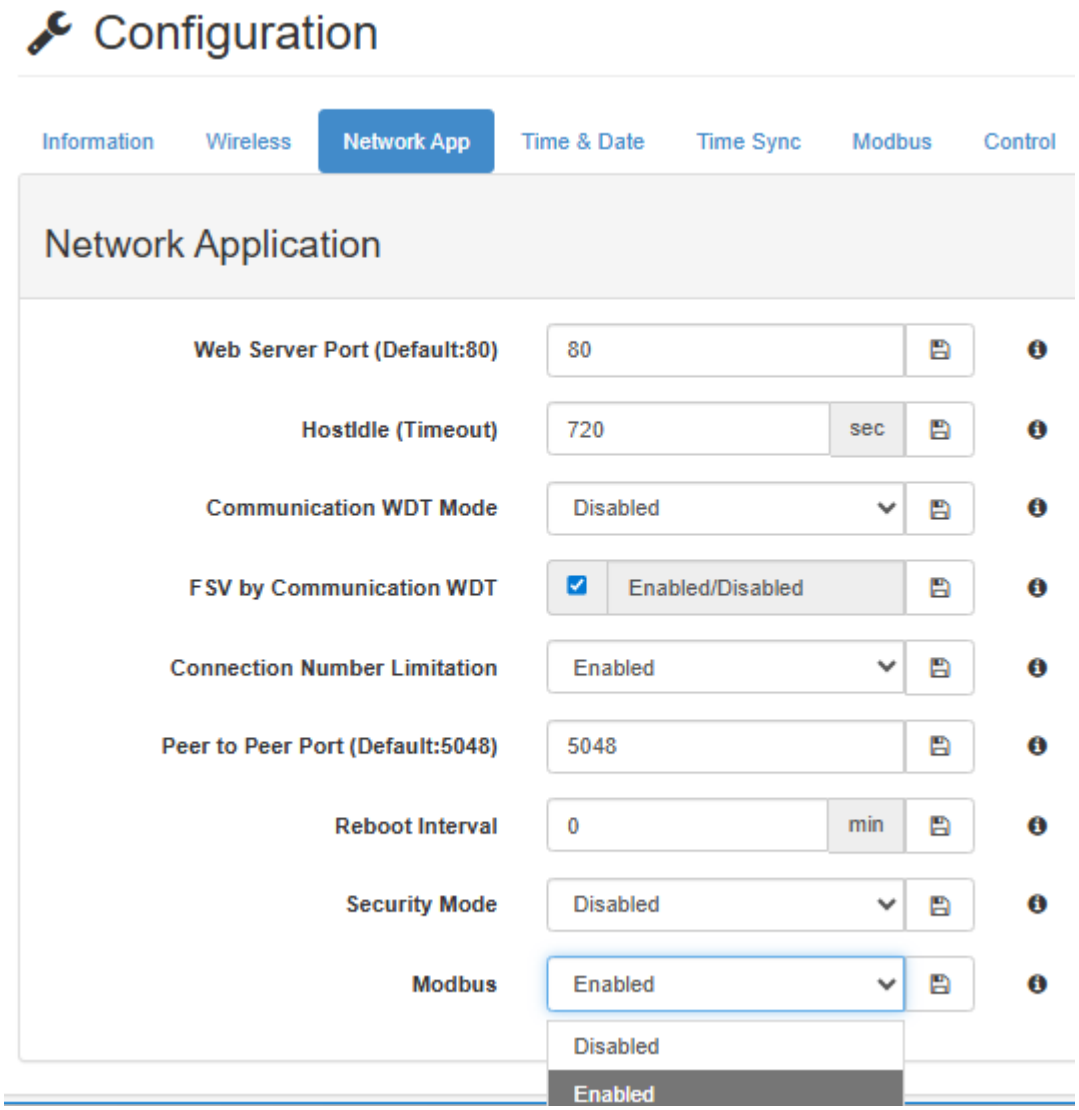
- **LAN**
  For WISE-4000/LAN wired module, you can select the Connection mode as DHCP or Static IP and configure the IP address, Subnet address, and Default gateway.

4.4.5 Network Application Setting

The WISE-4000 series provides a flexible and secure network configuration interface that supports a wide range of deployment scenarios. The following table details the available settings:

Table 4.7: Network Application Setting

Setting	Description
Web Server Port (Default: 80)	Sets the communication port for the device's built-in web server. The default is 80. Change this value to prevent port conflicts on your network.
Host Idle (Timeout)	Sets the timeout duration, in seconds, for the **Communication WDT**. If the device receives no data from the host within this period, the WDT will trigger a predefined recovery action, such as reverting I/O to a fail-safe state. The default is 720 seconds.
Communication WDT Mode	Configures the watchdog timer (WDT) mode for monitoring communication health: ■ **Disabled** – No communication monitoring. ■ **Communication WDT** – Monitors communication from external systems such as SCADA or MQTT broker. ■ **Peer to Peer WDT** – Monitors data exchange from a paired WISE device. If a timeout occurs as defined by 'Host Idle', the WDT will trigger the specified fail-safe mechanism.
FSV by Communication WDT	Enables the Fail-Safe Value (FSV) function. When the Communication Watchdog Timer (WDT) is triggered, Digital Output (DO) channels will revert to their pre-configured fail-safe state.
Connection Number Limitation	Limits the number of simultaneous client connections to prevent system overload. Default is Enabled.
Peer to Peer Port (Default: 5048)	Sets the UDP/TCP port for data exchange when 'Peer to Peer WDT' mode is active. Ensure the same port is configured on both peer devices for successful communication. The default is 5048.
Reboot Interval	Schedules an automatic reboot at a specified interval (in minutes) to ensure long-term operational stability. This is useful for recovering from prolonged inactivity or network disconnection. Set to 0 to disable this feature. (Range: 1 to 1440).
Security Mode	When enabled, disables web interface login to strengthen device security. Ideal for deployments in sensitive or public networks.
Modbus	Enables or disables the built-in Modbus/TCP server. ■ **Enabled (Default):** The device will respond to Modbus/TCP requests from client devices. ■ **Disabled:** Disabling the server is recommended if Modbus functionality is not required, as it reduces the device's network attack surface. **Security Note:** For enhanced security, it is highly recommended to use the Access Control List (ACL) feature to whitelist authorized client IP addresses.



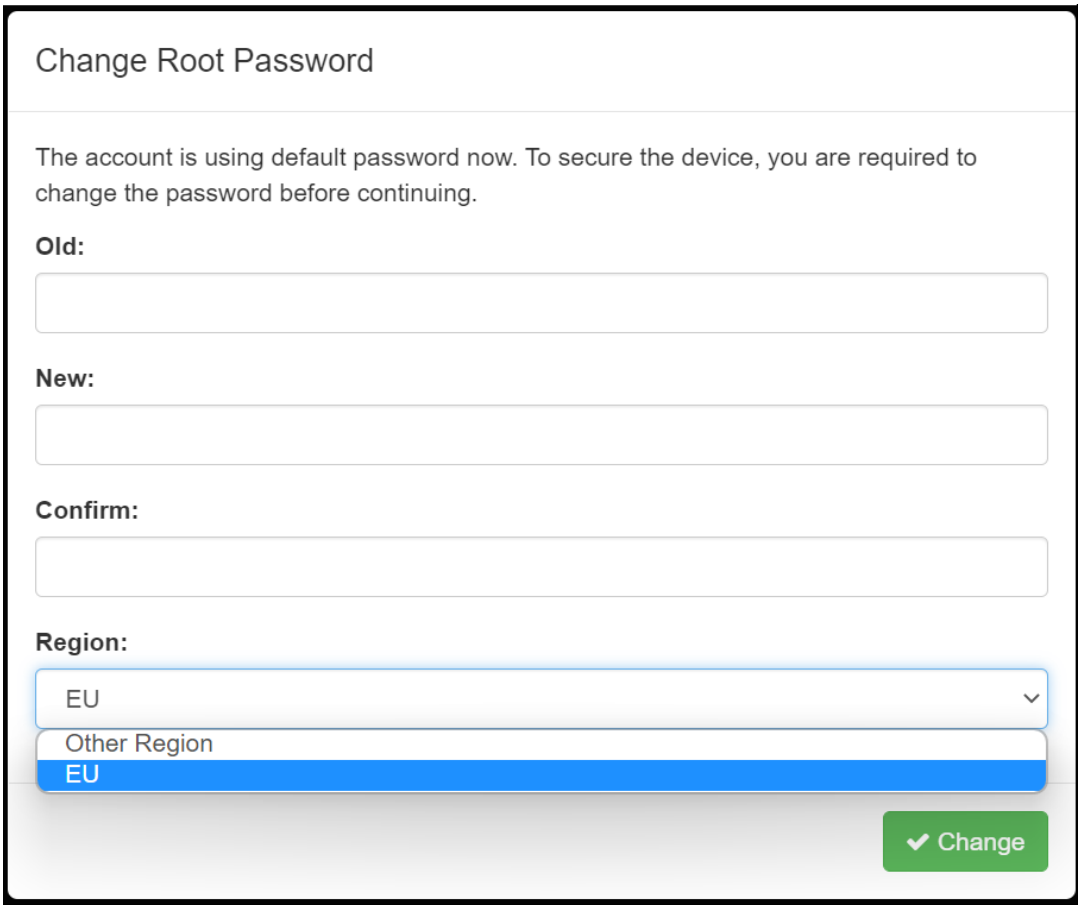
4.4.6 Security Best Practices

To enhance security and prevent unauthorized access to the WISE-4000 device, follow the guidelines below:

1. **Disable unused protocols** (e.g., Modbus/TCP if not needed).
2. **Enable IP Whitelisting (ACL)** (in Advanced >>Access Control page) to restrict device access to specific IP addresses or networks.
3. **Activate Security Mode** to block access to the web configuration interface.
4. **Use Host Idle + Communication WDT** to trigger safe fallback mechanisms when communication is lost.
5. **Set an appropriate Reboot Interval** to automatically recover the device during extended disconnection scenarios.

Example:
If the device is only used for MQTT uploads, disable Modbus and configure ACL to allow access exclusively from the MQTT broker's IP.

4.4.7 Security Mode



Upon the initial boot-up, a prompt will appear to enforce a password change. You must change the default password to secure the device.

To proceed, select whether the device will be deployed in the EU region.

If you select "EU":

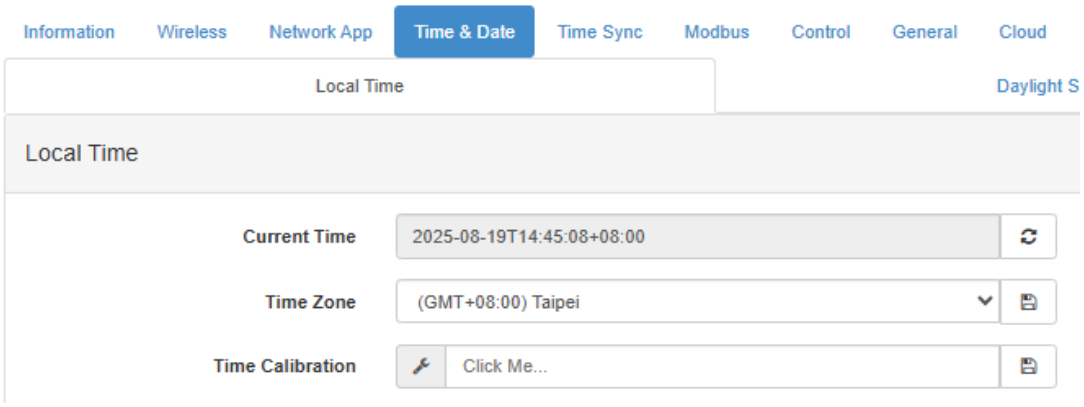
- **Security Mode** is automatically enabled.
- The UI will no longer display the option to toggle this setting.
- This function cannot be disabled.

If you select "Other Region":

- Users can still manually enable **Security Mode**.
- Once enabled, it applies security restrictions regardless of the device's location.
- **Security Mode** is enabled in both normal and Wi-Fi infrastructure modes, locking down insecure functions like the web server, ASCII command, and Site Survey.
- By default, this feature is disabled.

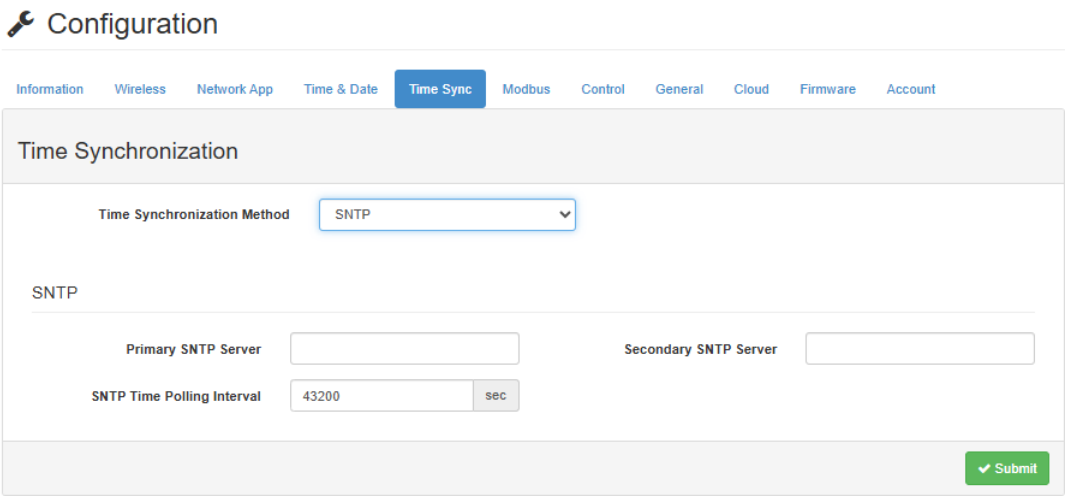
4.4.8 Time & Date Setting

You can see the current time here, decide which time zone you use, and calibrate the time by clicking **Click Me** and reading the time from host devices.



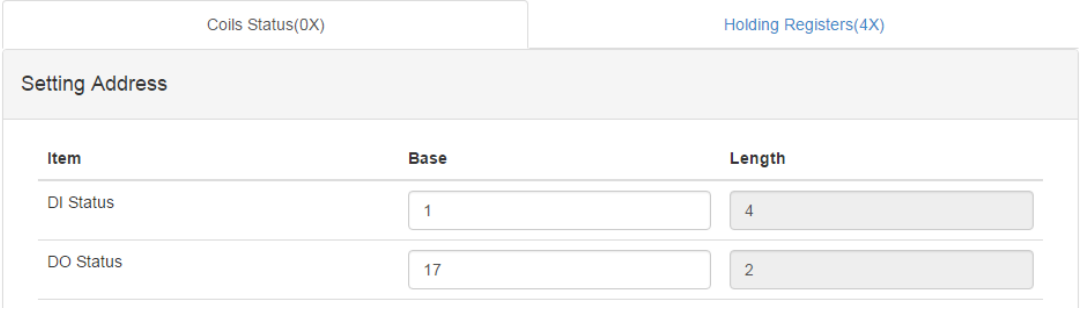
4.4.9 Time Synchronization

You can enable SNTP, so the module can act as an SNTP client to perform time synchronization from an assigned SNTP server.



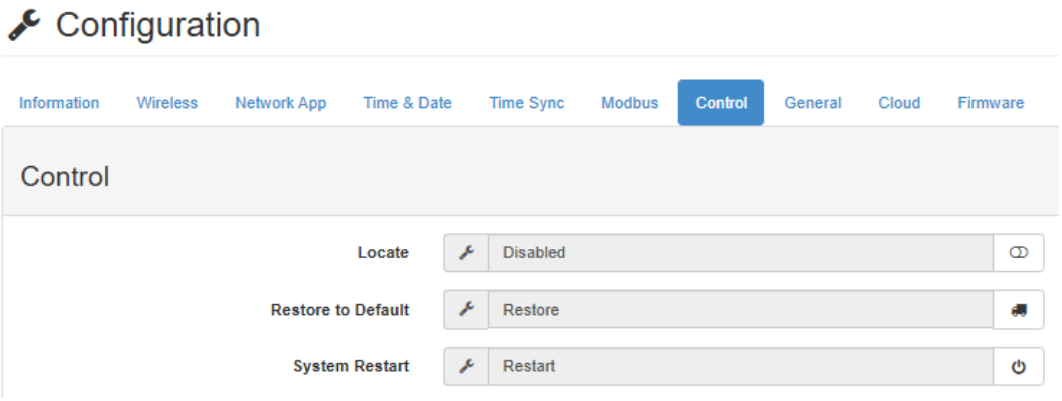
4.4.10 Modbus Address Setting

In order to provide users with more flexibility and scalability in deploying modules. It removes the limitation of the Modbus address setting and make it configurable as user's need. There are two Modbus address sections (0X and 4X) for you to configure each function item.



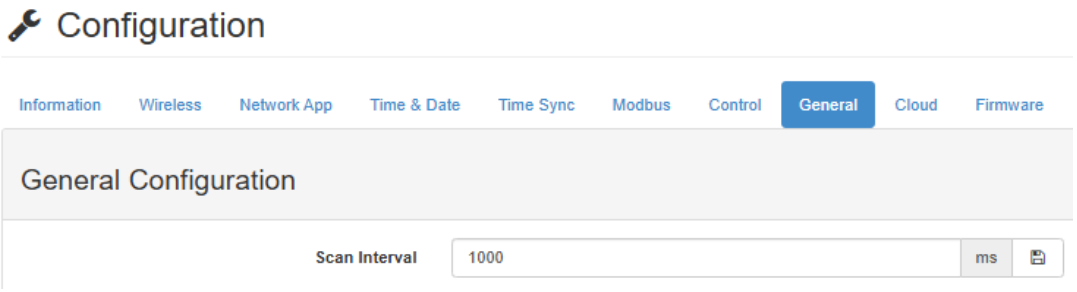
4.4.11 System Control

- **Locate module** - Helps user search for lit modules. (The status LED will be on for 30 seconds when enabled.)
- **Restore to default** -The system configuration will be cleared and restored to factory default settings when enabled.
- **System Restart** -This module's system will reboot when enabled.



4.4.12 General Configuration

The Scan **Interval** decides the I/O polling interval in the next part of the "I/O Status". This value will not be saved into the module, so it is only valid until the power is switched off.

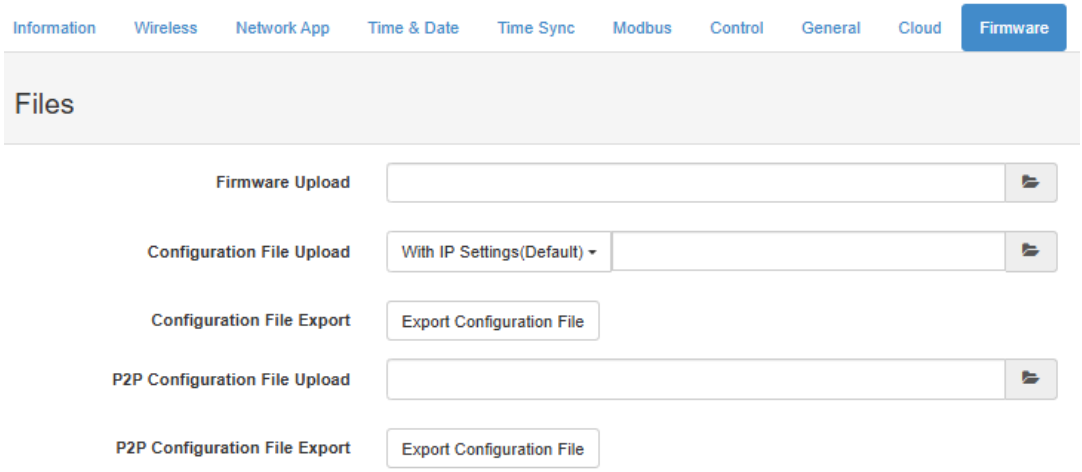


4.4.13 System Configuration File

Update or Download the configuration file from WISE modules. The following items will be saved in the configuration file:

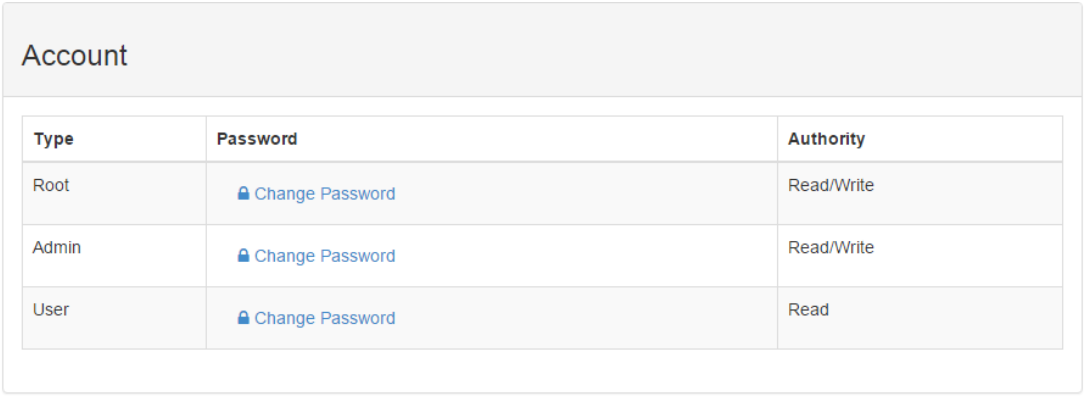
Table 4.8: System Configuration File	
Configuration	Information, Wireless, Network App, Time & Data, SNTP, Modbus, General Cloud, Account
I/O Status	I/O Configuration, RS-485 (WISE-4051 only)
Advanced	Access Control, Data Logger (Data log and Cloud upload)

Go to the Firmware page in system configuration and click the icon to select which configuration file is going to be uploaded from the computer. Before uploading the configuration file to the module, select whether or not to apply the IP settings to the WISE module.



4.4.14 Account Management

Change the passwords of each account here.

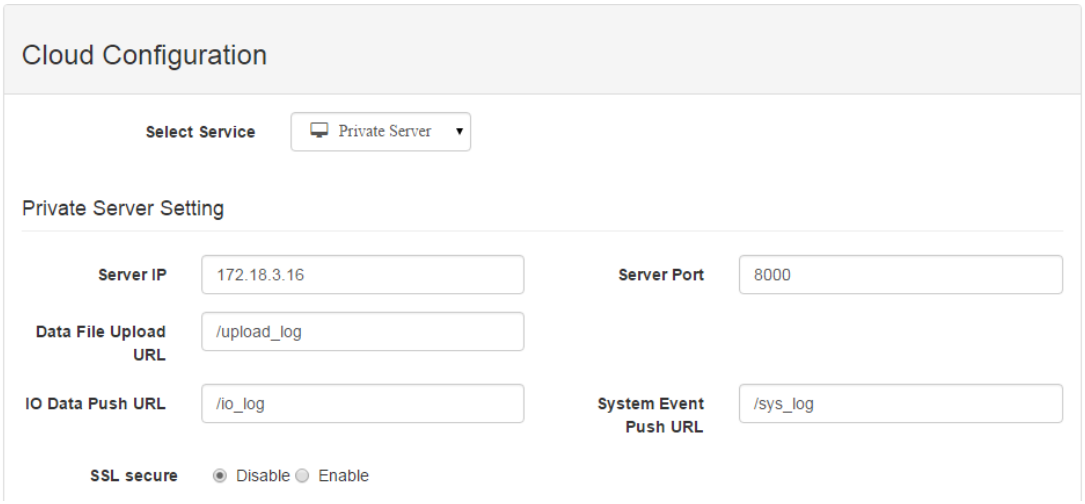


4.4.15 Cloud Logger (WISE-4000 Wireless Series Only) – Dropbox

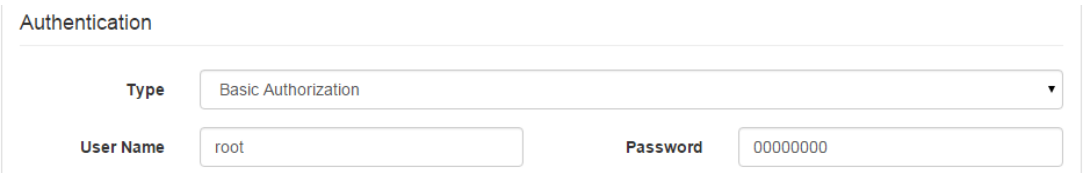
Refer to section **4.2.8 Configuring Cloud Server** for Dropbox cloud logger. – Private Server

If you don't want to push the data to public file-based cloud like Dropbox, WISE also supports the **Private Server** function which pushes data to a private web server setup by yourself. You can setup your own web service to receive the data from WISE module, or use the example agent on your own server to receive the files pushed from the WISE module.

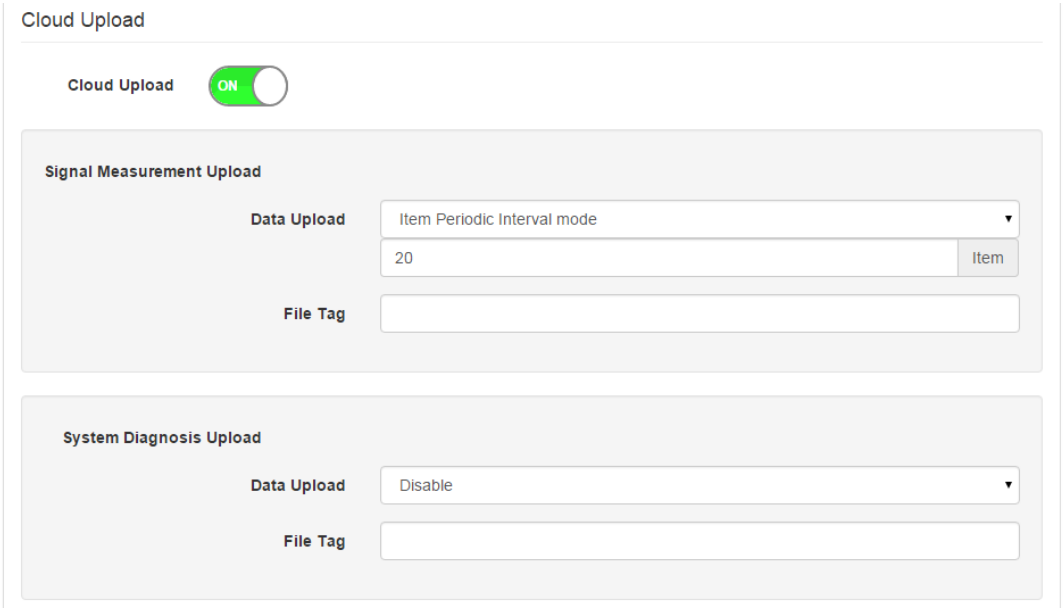
Go to the **Cloud Configuration** page and select the service as **Private Server**. Then configure the **Private Server Setting**. If you would like to use the example agent provided by WISE, you need to confirm the **Server IP** and **Server Port**, and make sure the server port you've configured had not been occupied by another application on your private server. To setup your own application to receive the file from WISE, you may need to configure the URL. SSL security also supports Dropbox to provide you with a safe private cloud solution. Once SSL security had been enabled, you need to setup the SSL service on your private server.



If you are not able to setup the SSL service, there is another option for safety. You can have Authentication for the private server with a User Name and Password which is also provided by our example agent.

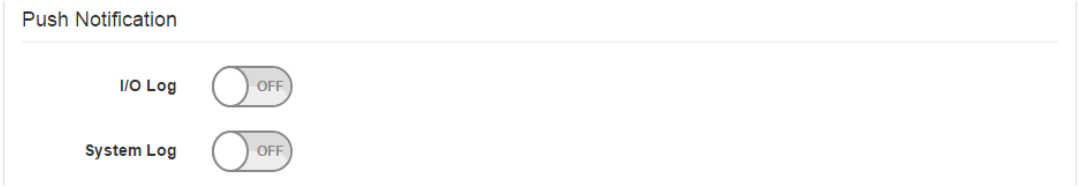


After **Cloud Configuration** had been configured as a private server, you can go back to the **Logger Configuration** page in **Data Logger**. Before switching Cloud Upload to ON, you can configure the data upload criteria, and for I/O signal or system diagnosis individually. The criteria can be **Item Periodic Interval mode** for pushing data by a quantity of data, or **Time Periodic Interval mode** for pushing data by a period of time (Unit: 0.1 sec). If you don't want to upload the I/O or system data, choose **Disable**. After the upload criteria have been configured, you can switch **Cloud Upload** ON and start uploading. Then the data will be pushed to the cloud in *.csv file.



■ Push Notification

For Cloud Logger functions Private Server, the data all comes from the local memory of WISE, so you can see it from the WISE data logger and make a batch of data as a file, then push it to the web server. Then push the latest data when the log condition has been triggered, like the changes of DI status. The WISE module will push a notification in JSON format to the private server as configured above, and then you have the latest WISE module data. You can switch the **I/O Log** or **System Log** ON, then the WISE module will start pushing the latest logged data to the private server.

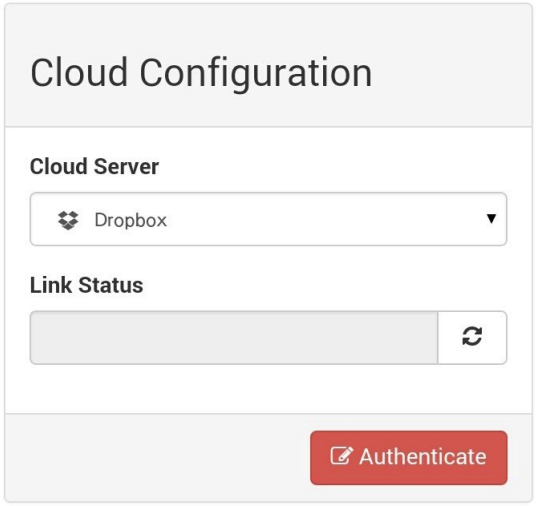


4.5 Configuring Cloud Server (WISE-4000 Wireless Series Only)

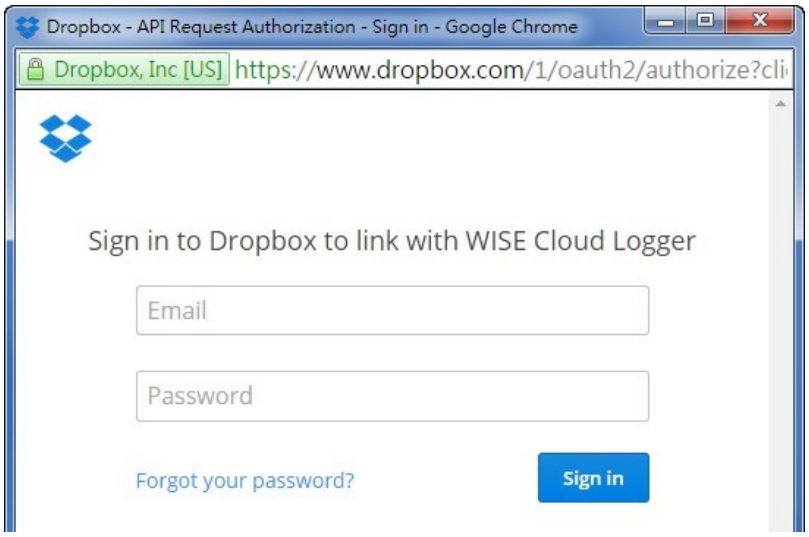
1. Make sure the WISE-4000 module is able to access the Internet, and the device that's going to configure the WISE-4000 module is within the same IP domain as the WISE-4000 module.
2. Go to the Cloud tab of Configuration.

Note! *The following instructions use Dropbox. Make sure Dropbox provide their service in your region or find an alternative public cloud service.*

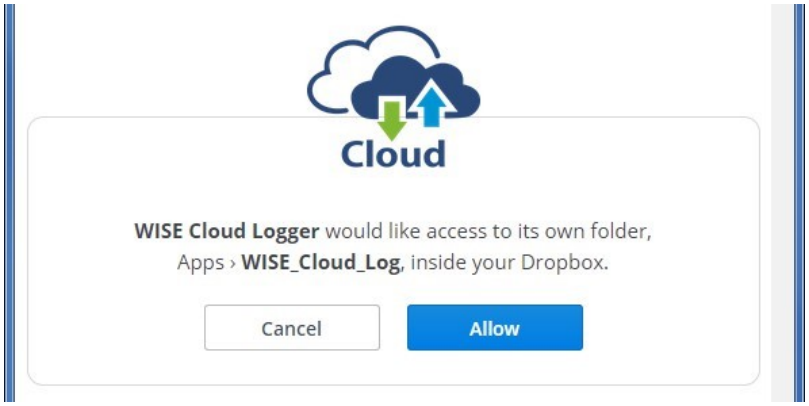
3. Select Dropbox as the cloud server.



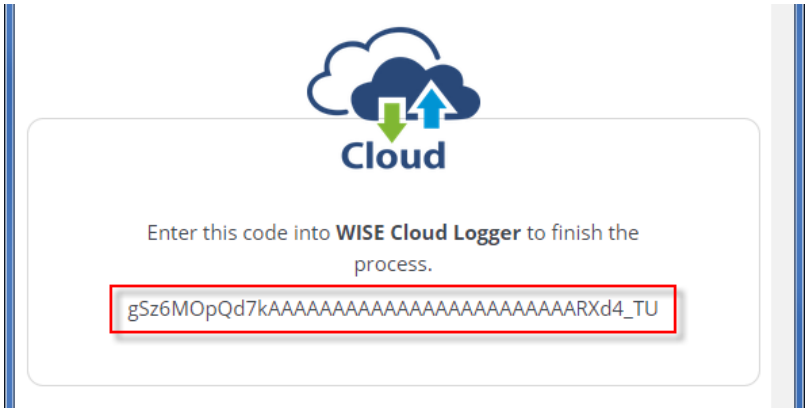
4. The browser will open a new window for Dropbox. Enter your Dropbox account information including E-mail and Password, then click "Sign in".



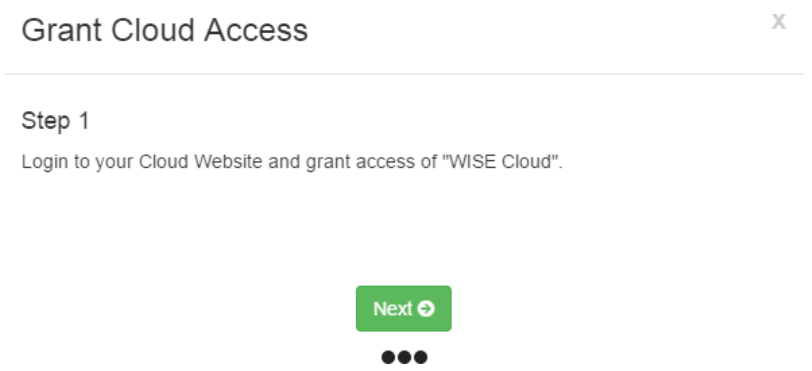
5. After logging in, click "Allow" to allow WISE Cloud Logger Apps to access your Dropbox account to store the data log file.



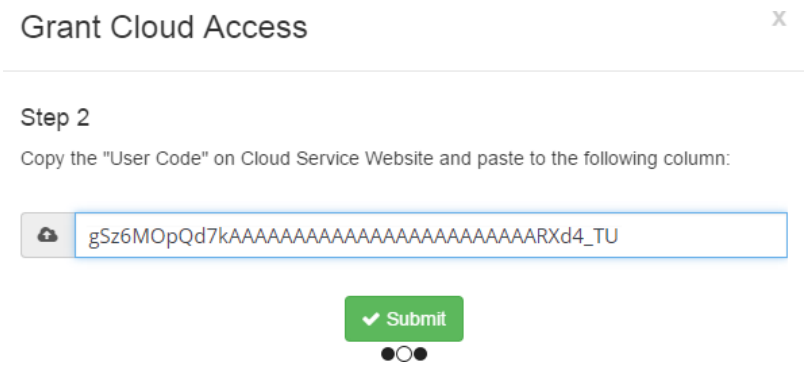
6. Dropbox will then provide a code, copy this code and return to the configuration web page of the WISE module.



7. Click “Next” to enter the code.

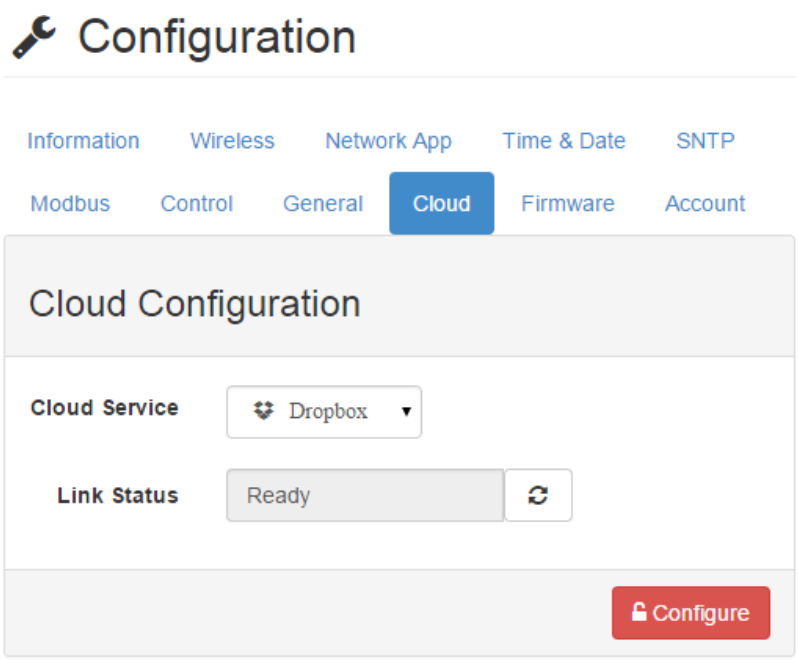


8. Paste the code provided by WISE Cloud Logger, then click “Submit”.



9. If your WISE-4000 module is correctly connected to the Internet, you will be able to set the functions successfully. Click “Close” to return to Configuration.

10. You will then be able to see the “Link Status” shows “Ready”.



4.6 Configure WISE-4000 with ADAM.NET Utility

ADAM.NET Utility, which is designed with graphical operation interface, is aimed to offer users directly configure, control WISE-4000 module, and monitor the real-time status of remote WISE-4000 module via Ethernet or Wireless connection.

To keep you informed with latest update, you also can check it from the following download link on Advantech website. http://support.advantech.com.tw/Support/DownloadSRDetail.aspx?SR_ID=1- 2AKUDB

Note!

- *Before installing ADAM.NET Utility, you need to install .NET Framework 2.0 or higher version.*
- *System requirement*
  - *Microsoft Windows XP/7*
  - *At least 32 MB RAM*
  - *20 MB of hard disk space available*
  - *VGA color or higher resolution monitor*
  - *Mouse or other pointing devices*
  - *10/100 Mbps or higher Ethernet Card*

1. Install ADAM.NET Utility in your computer.
   (After successfully installation, there will be a shortcut generated on the screen)

2. Double click the shortcut icon, and then you will see the main operation window.
3. Click Search Module icon in Toolbar. You will see all online modules in the left Module Tree screen and an unconfigured new module, whose default password is 00000000, will appear on the Others section as below. Now you can define the network mode of the module in the beginning. After that, you will be able to perform other settings.

Note! *The default password is 00000000.*

4.6.1 Operation Framework

The operation window mainly contains 4 areas, including Menu, Toolbar, Module Tree screen and Main Operation screen.

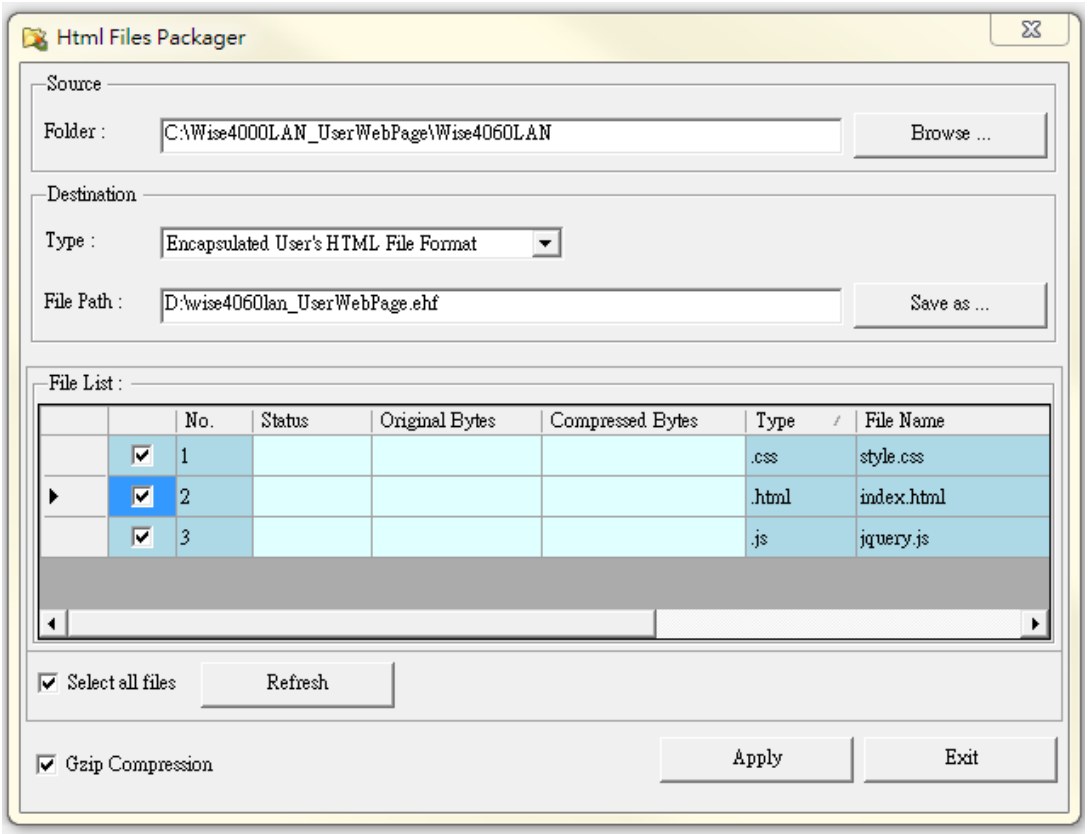
4.6.1.1 Menu

a. File

- **Open Favorite Group**
  You can import the favorite configuration group file (.XML) from your computer.
- **Save Favorite Group**
  You can save the favorite group configuration group as XML file to your computer.
- **Auto-Initial Group**
  If you want to have the same favorite group configuration when you exit ADAM.NET utility and launch it again, you need to check this option.
- **Exit**
  Exit ADAM.NET Utility.

b. Tools

- **Search Device**
  Search all the WISE-4000 modules you connected in local Ethernet.
- **Add Devices to Group**
  It's used to add WISE-4000 modules to your favorite group. After activating search function, all online modules will show on Module Tree Screen area. Now you can enable this function to select the device you want to add in the Module Tree Screen.
- **Group Configuration**
  Group Configuration is on WISE-4000 series module. It can help you efficiently configure or maintain massive WISE-4000 modules with the same configuration file or firmware upgrade at one time in the local network. The following steps will instruct you how to operate it.
- **Terminal for Command Testing**
  WISE-4000 series module Modbus/TCP as communication protocol, so you can launch the terminal to directly communicate with WISE-4000 series module by these two protocols.
- **Print Screen**
  You can save current ADAM.NET Utility screen into an image file by this option.
- **HTML File Packager**
  You can pack your user web page by this tool:
  1. Put all the files that going to pack in same folder, and “Browse…” the folder
  2. Press “Save as…” and give a file name after package
  3. Check all the files had been selected in “File List”
  4. Check “Gzip Compression” to reduce the file size
  5. After press the “Apply” button, your user web page will be compressed as “*.ehf” file, then you can download the file into your WISE module



c. Setup

- **Favorite Group**
  You can configure your favorite group including add one new device, modify or delete one current device, sort current devices and diagnose connection to one device.
- **Refresh Serial and Ethernet**
  ADAM.NET utility will refresh the serial and LAN network connection situation.
- **Add COM Ports**
  This option is used to add serial COM ports in ADAM.NET Utility. You won't need to use this option for WISE-4000 modules.
- **Show TreeView**
  Check this option to display the Module Tree Screen area.
- **Allow Calibration**
  Check this option to allow calibration function enabled on AI/O module.

d. Help

- **Check Up-to-Date on the Web**
  It will automatically connect to support and download page of Advantech web-site when it enabled. You can find and download the latest version of WISE-4000 utility there.
- **About ADAM.NET Utility**
  The current version of ADAM.NET Utility is installed on your computer.

4.6.1.2 Toolbar

There are 8 graphical icons for common used options of Menu on the toolbar.

Definition (from left to right)

1. Open favorite group
2. Save favorite group
3. Search Modules
4. Add Devices to Group
5. Terminal for Command Testing
6. Group Configuration
7. Monitor Data Stream/Event
8. Print Screen

4.6.1.3 Module Tree Screen

The Module Tree Screen locates on the left part of ADAM.NET utility operation window. There are four categories in this area:

Serial

All serial I/O Modules (ADAM-4000 and ADAM-5000 RS-485 serial modules) connected to the host PC will be listed in this category.

Ethernet

All Ethernet I/O Modules (WISE-4000, ADAM-6000, ADAM-6100,and ADAM-5000 TCP modules) connected to the host PC will be listed in this category.

Favorite Group

You can define which devices listed in the three categories above into your personal favorite group. This will make you easier to find your interested modules. Right click on the WISE-4000 device item under the Favorite Group item and you can select Add New Group to create a new group. After you create your own group, right click on your group and Add New Device into your group. You can also select Diagnose connection to check the communication.

ADAM-4500_5510 Series

This is a DOS interface utility for remote controllers such as ADAM-4500 and ADAM-5510 series.

Wireless Sensor Networks

All wireless I/O Modules (ADAM-2000 modules) connected to the host PC, through wireless gateway, will be listed in this category.

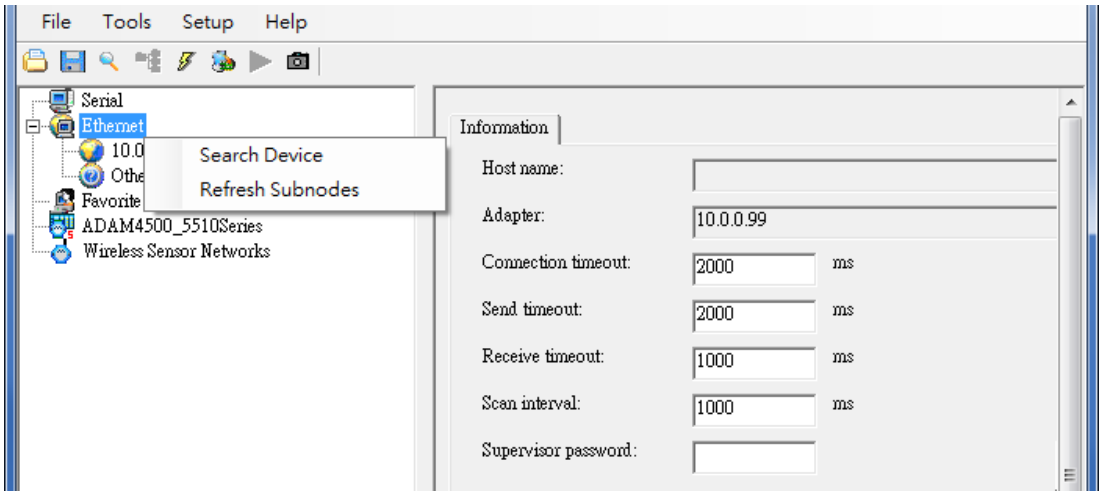
4.6.1.4 Main Operation Screen

Main Operation Screen located on the right side of utility includes I/O status display and function setting. You can select different items in Module Tree Screen, and then Main Operation Screen will change dependently. You can do all configurations and test in this area.

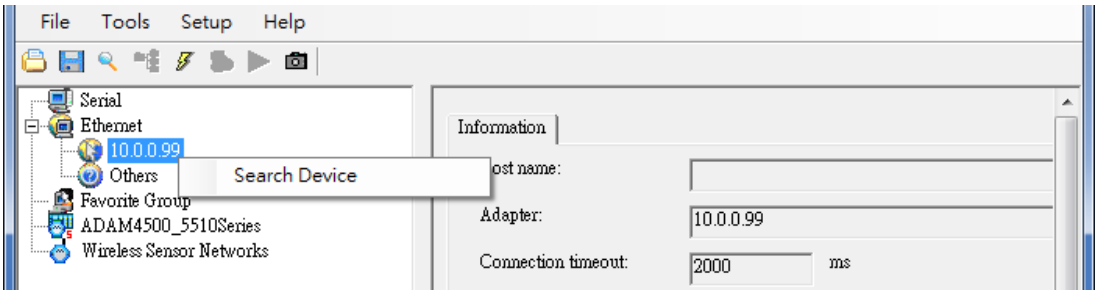
In Information page (after clicking Ethernet), you can configure Connection/Send/Receive/Scan Timeout. The supervisor password is a shortcut to let you enter a password at one time which's applied for certain modules, so you don't need to enter the same password for each module when you check it.

4.6.1.5 Configure WISE-4000

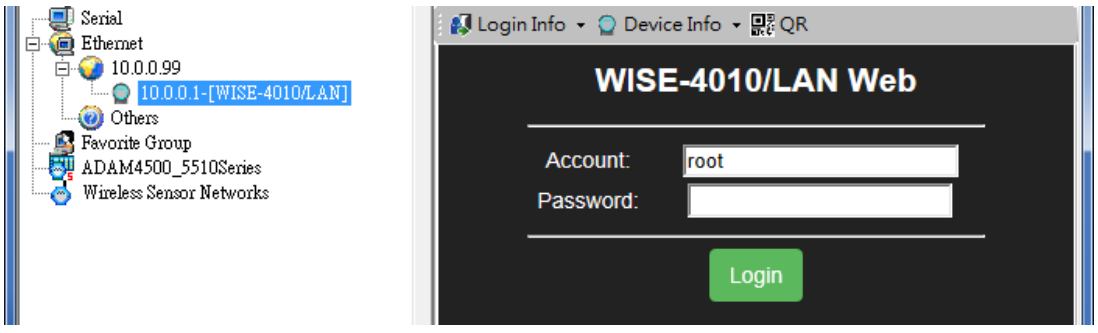
1. Configure the computer's IP address as the same domain as WISE-4000 module. For the new WISE-4000/LAN Series which default IP address is 10.0.0.1, the IP address of computer can be configured as 10.0.0.99 for example as following.
2. Open the Adam/Apax .NET Utility then you can see the IP address of computer been shown under "Ethernet" tree. You can right click to refresh the subnodes of this tree. Or click "Search Device" to find WISE-4000 module.



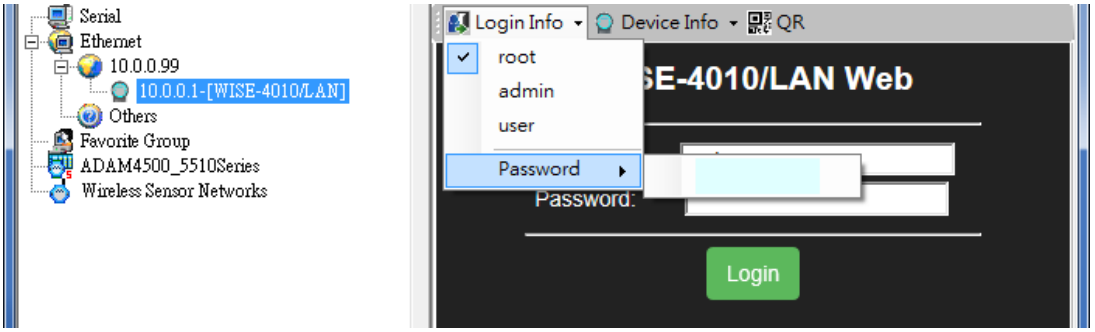
3. Users can also right click the IP address to find WISE-4000 module.



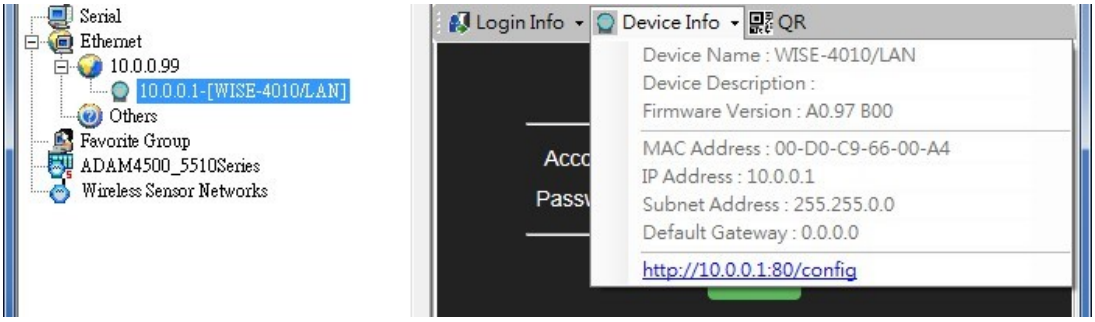
4. After the module been found, it will be listed under IP address in same domain, you can login the embedded web configuration web page for further configuration as introduced in previous section.



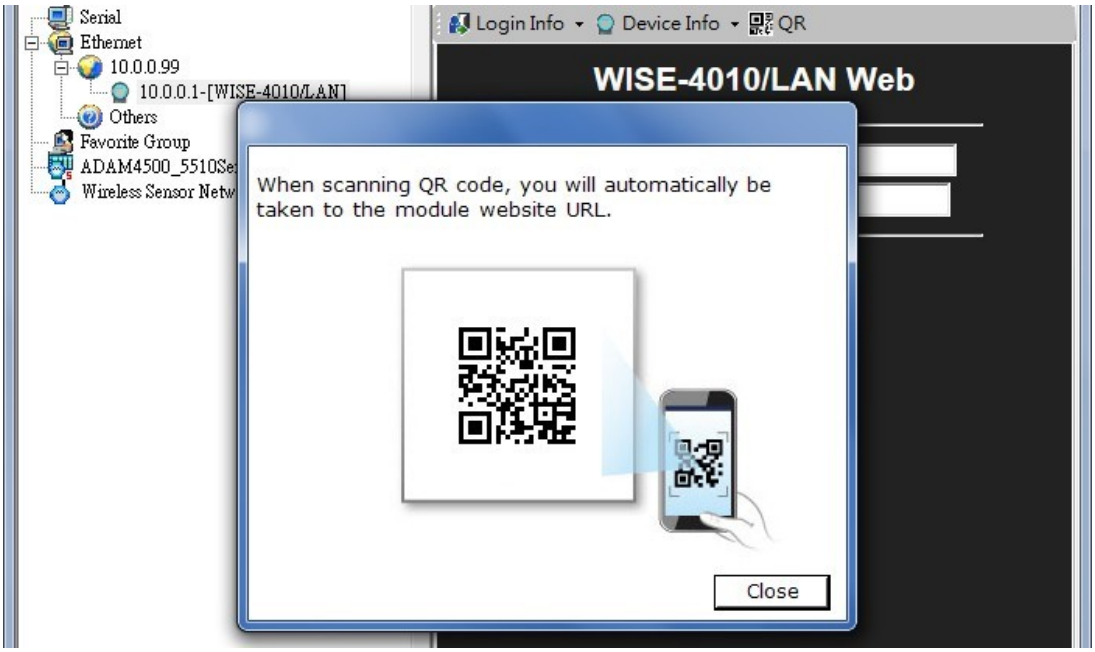
5. There are some function provide in same pages in utility, first you can enter the account and password faster in "Login Info" tab.



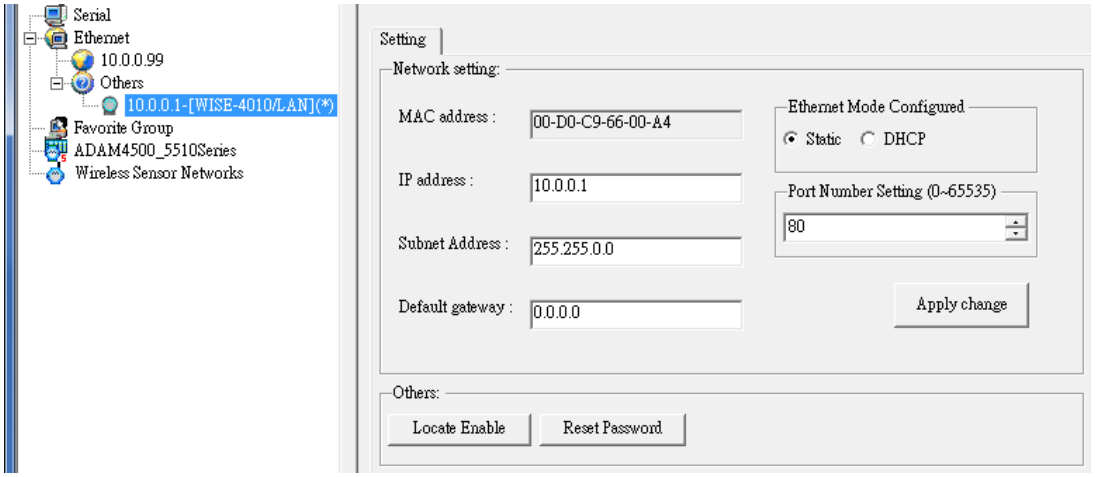
6. In the "Device Info" tab, the detail information of this module will been shown.



7. The "QR" tab will generate the QR code of the web configuration web page for mobile device to access the module. User can also click the QR code to open the browser for further configuration.



Note! *If you are not able to search the module, you can configure the SW1 behind the module to initial mode. After power up and search the module in utility, user can find the module with default IP address, and the device name will been shown in "Others" tree with (*) sign. So user can change the device network setting in this page. Or try to locate the device and also reset the password with same page. After the new network setting been apply, please configure the SW1 back to normal mode and power up again to reboot in new network setting.*

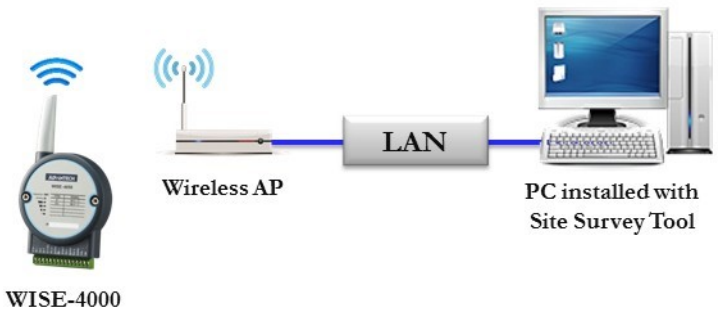


4.7 Site Survey Tool for WISE-4000 Wireless Series

WISE-4000 Wireless Series provides Site Survey Tool for testing the communication quality between WISE-4000 wireless module with wireless access point or wireless router.

4.7.1 Site Survey Architecture

Wiring the wireless AP with the PC installed with Site Survey Tool (Utility), if possible, the network should only have PC, AP, and WISE-4000 only.



4.7.2 Site Survey Mode

WISE module will go to site survey mode operation for testing communication quality. Most of the functions of WISE module will temporally stop to doing site survey operation. And the LED status will work as following:

Table 4.9: Site Survey Mode

LED	Color	Indication	Behavior
Status	Green	OFF	Site Survey mode
Com	Yellow	Blink	Site Survey data packet TX/RX
AP/Infra	Green	OFF	Site Survey mode (Station Mode)
Signal Strength	Green	Blink	Site Survey mode

4.8 General Concept of WISE-4000 Site Survey

How to do the site survey is really important at beginning. In the site survey stage, the **Installation, RSSI, Communication Quality** are three very basic and important elements. Therefore, following will show how to do the good survey.

4.8.1 Installation

The Wi-Fi signal is influenced by the shelter easily, like pillar, wall and partition. To avoid this kind of barrier, WISE should be put at the higher place where it can be Line-of-Sight (Figure 1) to AP. Line-of-Sight means no obstruction in the middle of point A (antenna 1) and point B (antenna 2). It can perform the better communication interface between AP and WISE. Moreover, WISE can't be wrapped by the metal.

The metal around WISE will shield the signal and the signal can't go out.

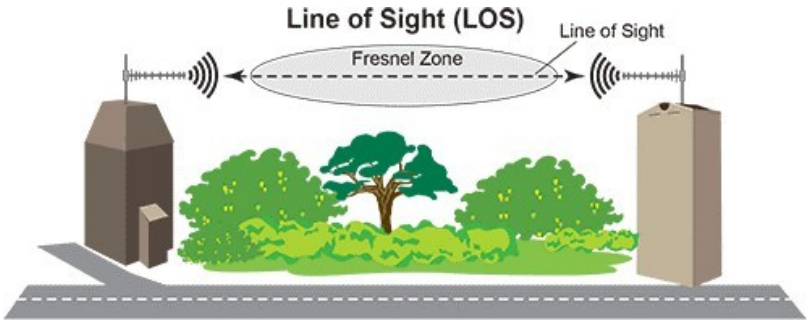


Figure 4.1 Line of Sight (LOS)

4.8.2 RSSI

The relationship between the Wi-Fi signal strength and the number of LED(s) on the panel of WISE-4000 module shows in Figure 2. To achieve good communication quality of Wi-Fi environment, suggest to keep the RSSI above -64dBm, which means the WISE-4000 module should at least shows 3 LEDs. Because the AP plays an important role in Wi-Fi environment, all wireless clients will leverage the AP ability to connect to the outer network.

#LED	RSSI Range
4	RSSI > -48dBm
3	-48dBm > RSSI > -64dBm
2	-64dBm > RSSI > -72dBm
1	-72dBm > RSSI

Figure 4.2 The Relationship between RSSI Level and LED Indicators on WISE-4000 Module

Therefore, when there's a RSSI issue, it is better to determine whether **ALL** or **Just a Few** are facing the poor signal issue. That means:

- If **ALL** of the RSSI of Wi-Fi clients (such as WISE) are poor, it probably means the position of AP is not correct installed and the signal of AP can't reach to wireless client. Therefore, in that case, it is better to adjust the position/attitude/ angle of AP to make the signal cover all of the wireless client.
- If **Just a Few** RSSI of Wi-Fi clients are bad, there might be have several reasons. Here provides step by step to help user to narrow down this problem.

1. Adjust the Tx Power of AP
   Tx power influences the signal coverage. If Tx power is stronger, then the signal coverage can be wider. The industrial AP usually has the function to adjust the Tx power to fit the site environment. Figure 2 shows the Tx power setting section of AP EKI- 6332GN-AE as example.

Figure 2

2. Adjust WISE Installation
   Please try to adjust different position/attitude/antenna angle of WISE. Because antenna of wireless devices (AP) has omni-directional and directional type. Some installation of wireless client (WISE) doesn't fit to the type of antenna. If the type of antenna of AP is omni-directional. The attitude/angle of WISE are the key point to influence the RSSI. If the type of antenna of AP is directional. The position/angle is the key point to influence the RSSI.

3. Adjust the Distance between WISE and AP
   Move WISE close to AP and observe whether the signal strength of WISE's LED improved or NOT. If it does improve, the distance (i.e. or interference where WISE being installed) are the possible reasons to cause this. It means that the signal of AP/WISE can't reach to each other.
4. Enhance the Signal Strength
   Based on the step (3), if WISE cannot be moved due to environmental limitation, then change antenna of AP or add extra AP is another way to enhance the signal strength between the AP and wireless client device (WISE).

4.8.3 Communication Quality

After checking the Installation and RSSI value, there is a site survey tool to verify the communication quality between WISE and AP. This tool can keep sending packet to the WISE and receive ACK to diagnosis whether losing data. As well as Average Response Time, Good Packets Percentage, Average Signal Strength (dBm) etc. Relevant details will introduce in Section 2.

4.9 How to Execute the Site Survey Tool of WISE in WISE Studio?

Site Survey is very important to make sure that the stability connection between AP and WISE. WISE has a site survey tool to let customer to do this test. Because this tool is to test the connection stability between AP and WISE, the connection between AP and the test equipment need to be stable. Therefore, the PC with WISE Studio software and the AP must connect to each other by **LAN port**. The topology shows in Figure 4.

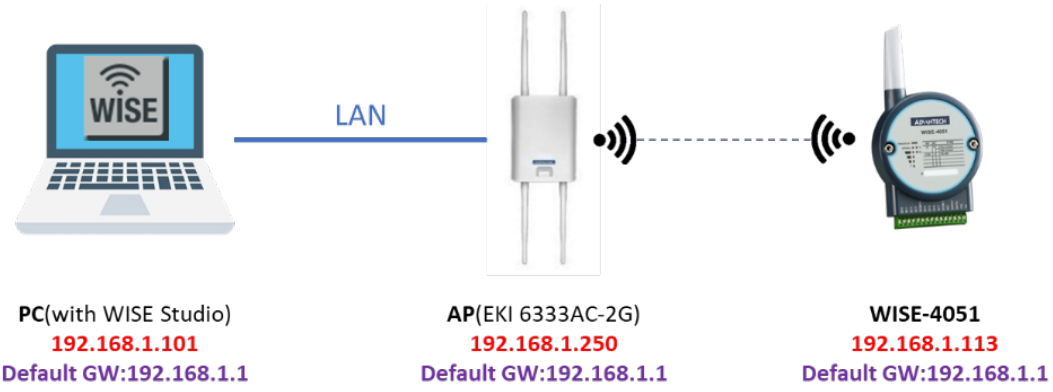


Figure 4.3 Topology of WISE Site Survey

Next, follow the steps below to execute the Site Survey Tool of WISE in WISE Studio.

1. Open the WISE Studio software from personal computer.

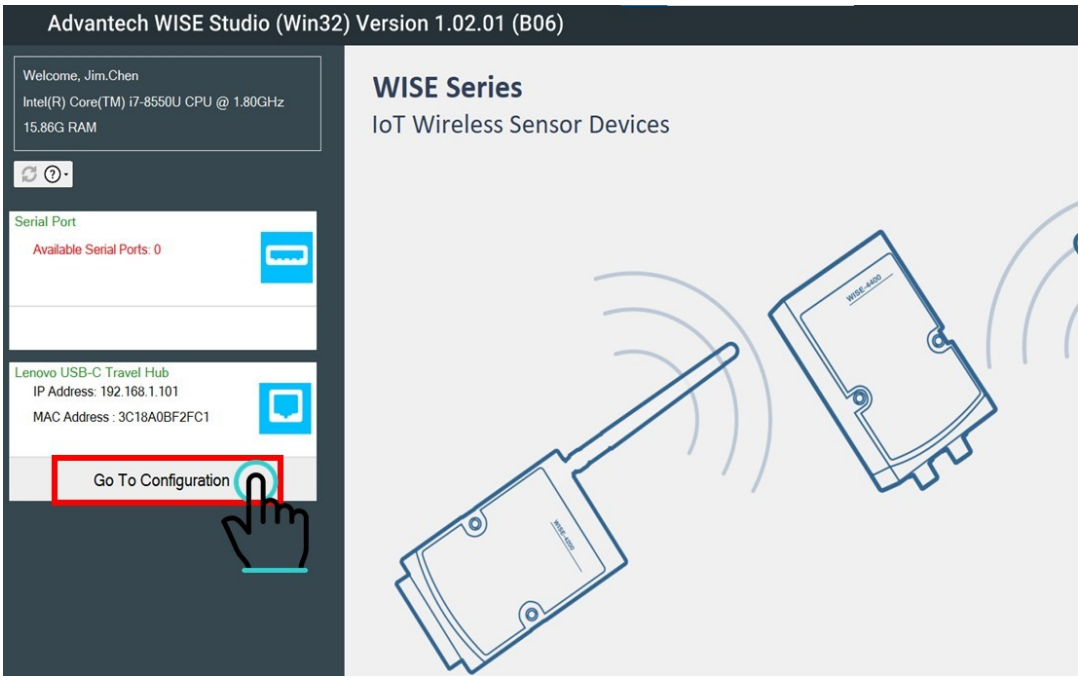


Figure 4.4 WISE Studio Entry Page

Download WISE Studio Software
https://www.advantech.com/zh-tw/support/details/utility?id=1-1MJSJKX

2. Find the Device from WISE Studio Software.
   a. Click “Go To Configuration” button in Figure 5.
   b. Wait for software scanning the device. The device will display as Figure 6.

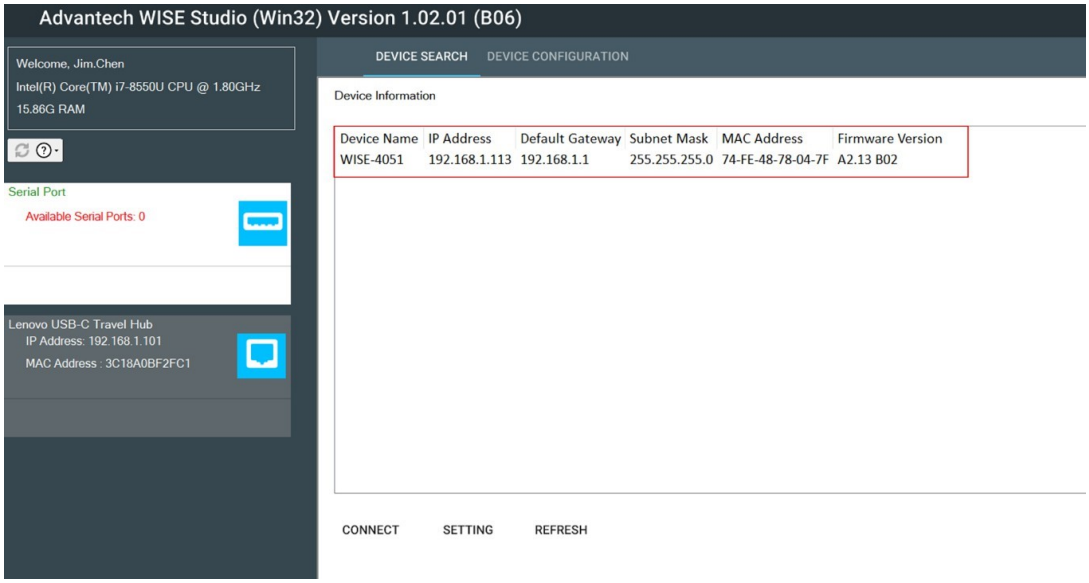


Figure 4.5 Scan the device

3. Use WISE Studio Connect the WISE Device.
   a. Select your WISE device and Click “Go To CONNECT” button in Figure 7.
   b. The entry page of WISE device will come out as Figure 8.

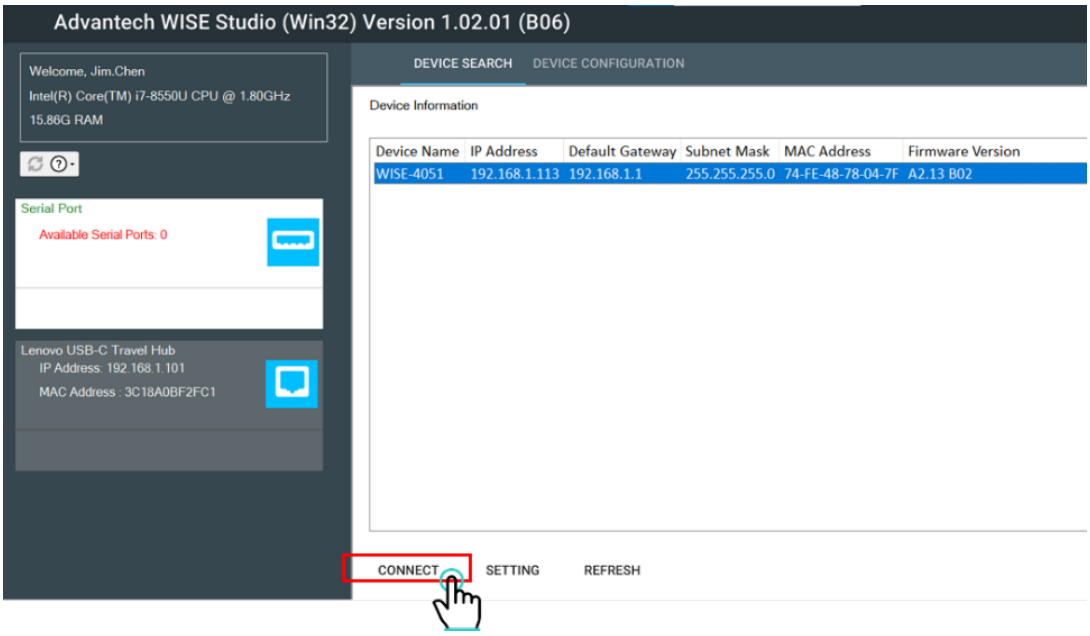


Figure 4.6 Connect to the WISE Device

Figure 4.7 Entry Page of WISE Device

4. Execute the Site Survey Tool.
a. Click “**Site Survey**” button in Entry Page of WISE device, shows in Figure 9.
b. Enter to Site Survey Page and click “**START**” button to start the site survey, shows in Figure 10.
c. When start to execute site survey, the LED indicators on WISE-4000 will start to blink and user will not be allowed to enter to the WISE-4000 module.

Figure 4.8 Site Survey Button

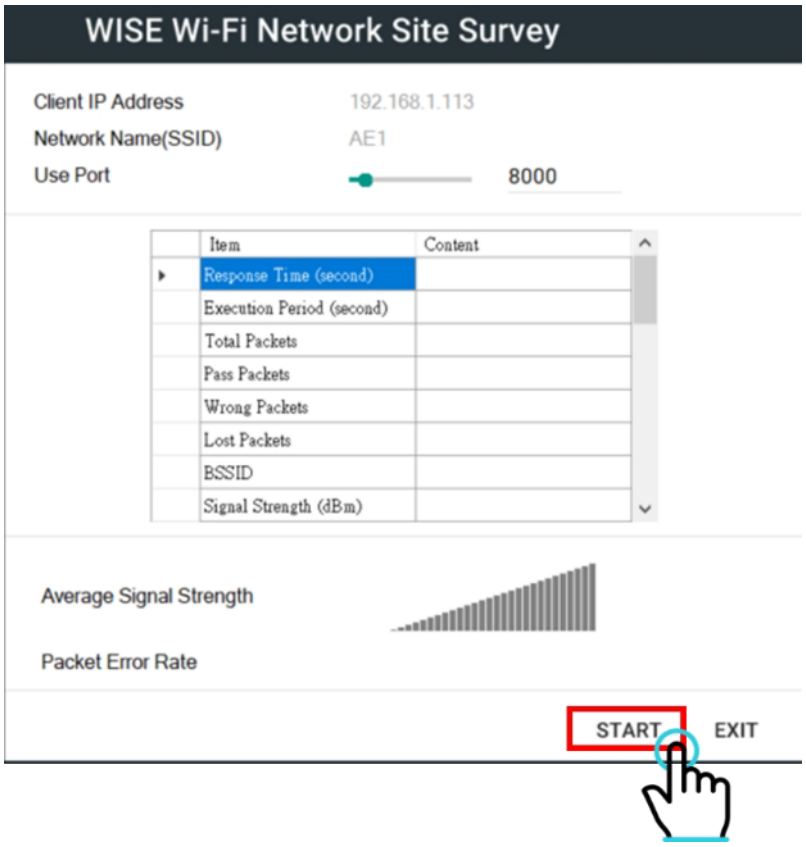


Figure 4.9 Site Survey Page

5. Troubleshooting
   If there is no data shown in WISE studio site survey page, user need to enable “Advantech Public” firewall setting of laptop. User can enter this page by this path: **Control Panel\System and Security\Windows Defender Firewall\Allowed apps**.

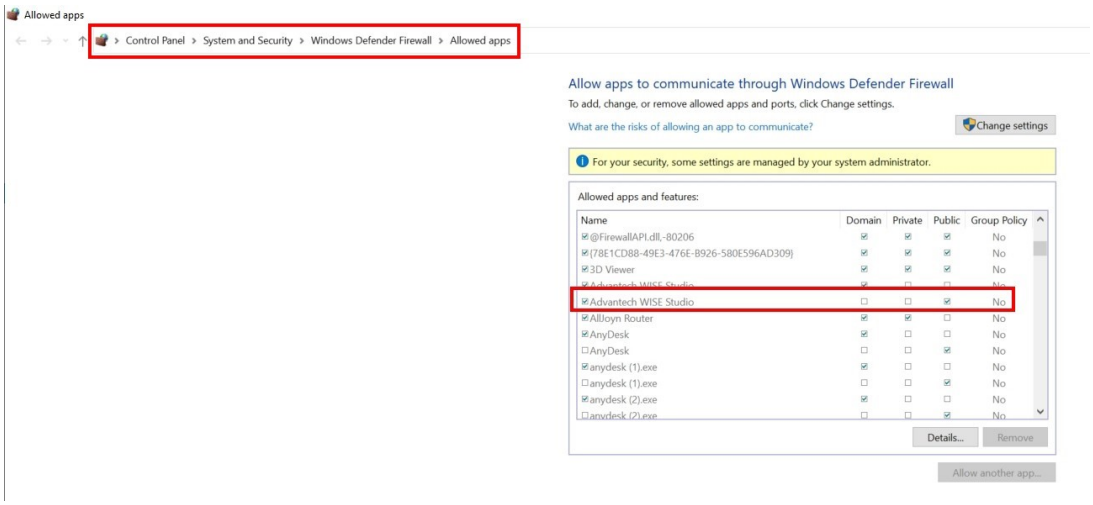


Figure 4.10 Enable Firewall Setting

6. Result of Site Survey
After clicking “START” button to start sending test packets and test for 10 mins to get more reliable average data. The result will show as Figure 11. Please noticed that the Average Signal Strength (RSSI) and Packet Error Rate these two indicators. RSSI value can refer to Figure 2 and make this indicator number above -64dBm as possible as you can. The Packet Lost Rate indicates the rate of lost packets over total packets. The smaller the Packet Lost Rate is, the better transmission status is.

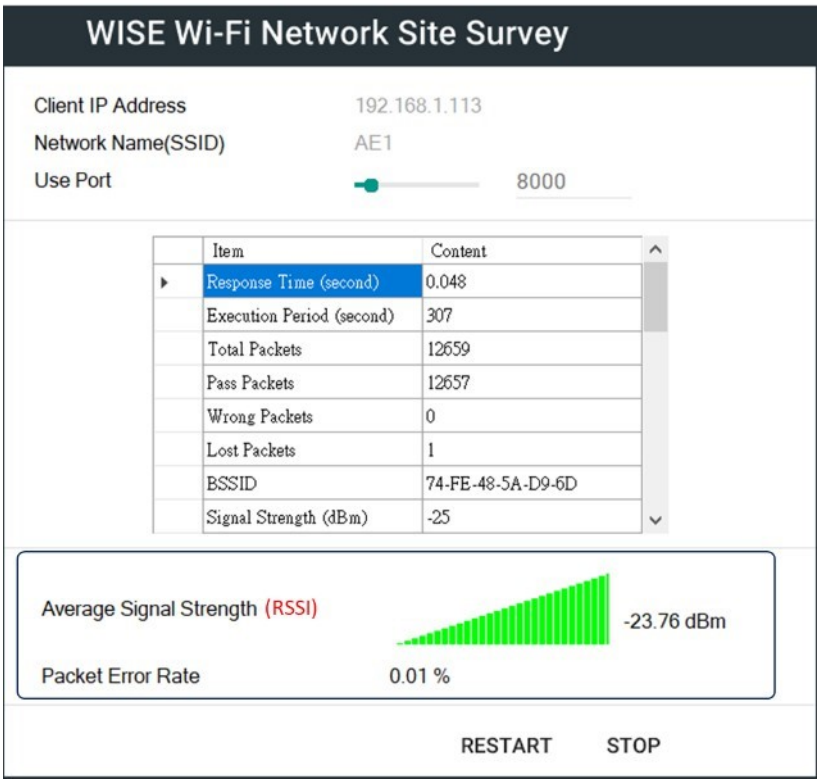


Figure 4.11 Result of Site Survey

Connection

Network Name (SSID): Show which wireless AP is connected.

Client IP Address: Show the IP address of the wireless adapter of PC.

Signal Quality

Show the signal strength by bar chart.

Testing Results

Signal Strength: The average result of the signal strength during testing Good Package: The percentage of passed packets during testing **Current Activity.**

Detail information of each testing packets.

Port

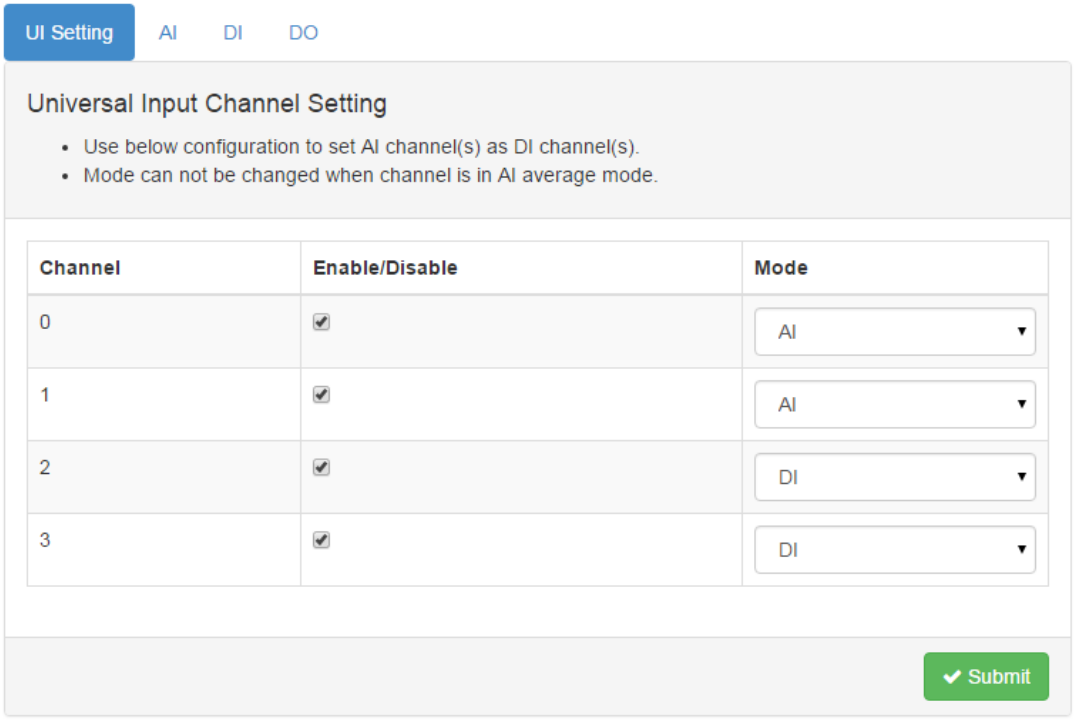
User can configure which UDP port of PC is assigned for site survey testing.

Chapter 5

I/O Configuration

5.1 Universal Input Channel Setting

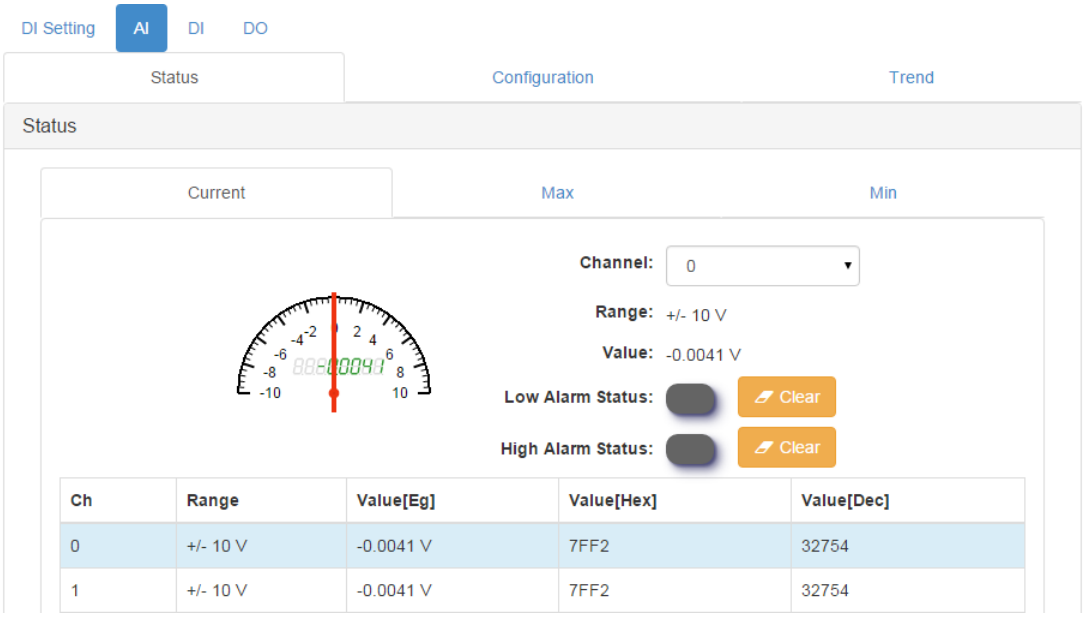
For the **WISE-4012**, there are four universal input channels which can be configured as **Analog Input** (AI) or **Digital Input** (DI). Before using the universal input channels, you need to configure the universal input channels to be AI or DI here.

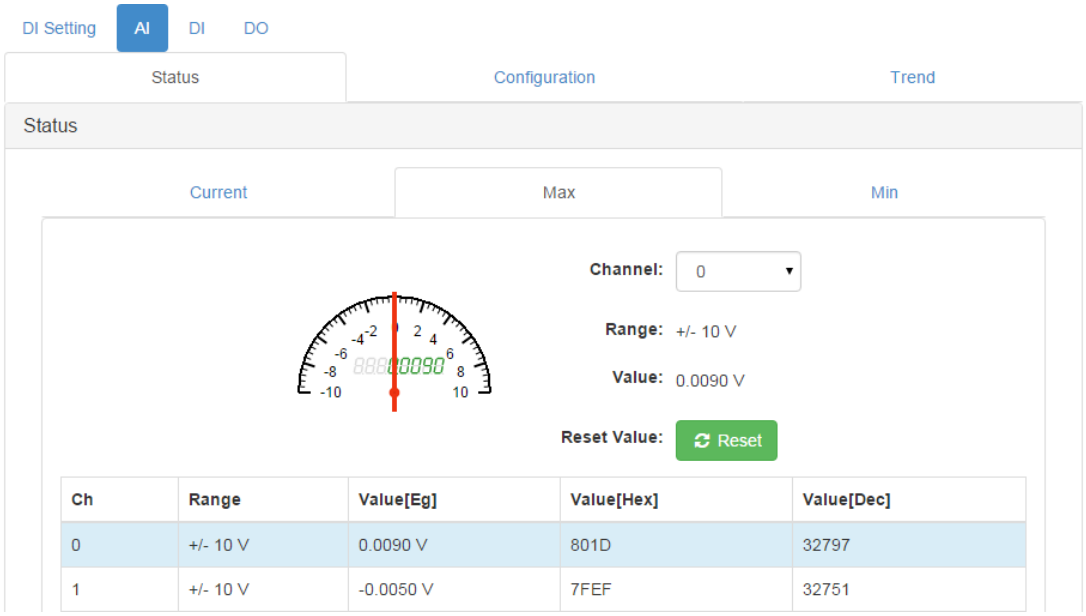


5.2 AI

For the AI channel, the Current/Max/Min status will be shown in the status page, which includes the input range. The current status shows the latest AI value, and also the input range. The average value, which will be introduced in following pages, show the average value of selected channels.

The Max/Min status shows historical maximum or minimum value, you can reset the value by pressing “Reset”.



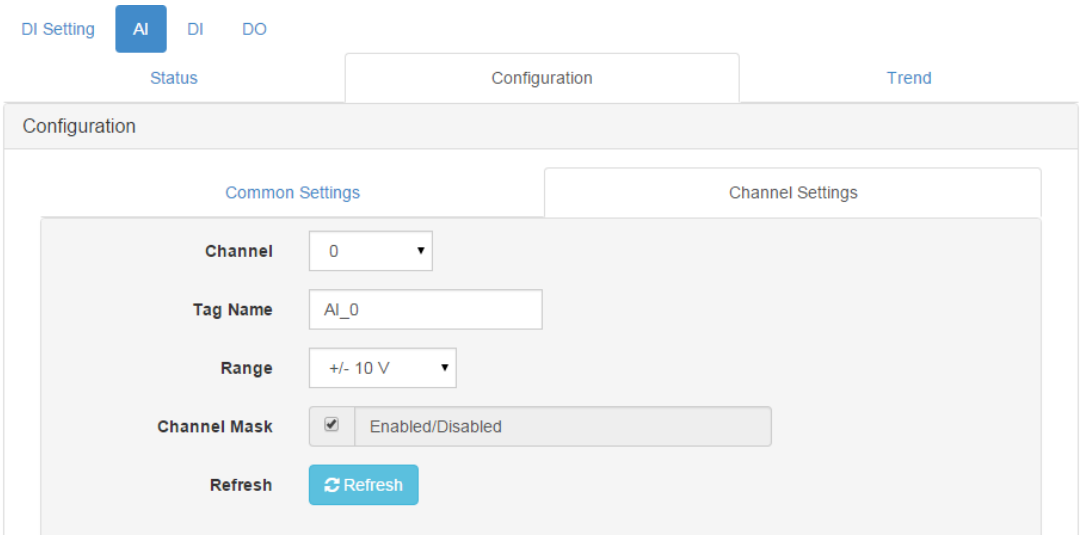


5.2.1 Input Range

For the AI channel which supports more than input range, you can configure the channel setting in “AI/Configuration/Channel Settings”.

5.2.2 Channel Mask

You can disable the AI channel to increase the sampling rate of other enabled channels in “Channel Mask”.



5.2.3 Scaling Function

There are two types of scaling function for AI channels:

1. Input Signal Scaling - Scaling the Input Range

This is for scaling the analog input range within the configured input range, so that the Modbus value can fit the entire range. For example, Ch0 of WISE-4012 had been configured with an input range of 0~5V, but the full range of signal from sensors is 1~5V. If users do not use the Input Signal Scaling function, the 1V will be presented as 13107 in Modbus, 5V will be presented as 65535. But after Input Signal Scaling, 1V will be presented as 0 in Modbus, and 5V will still be presented as 65535.

If you would like to apply the function in the previous example, enter 1 in “Low Scaling Value”, and enter 5 in “High Scaling Value”.

Note! *The function only increases the resolution of Modbus data, but the accuracy still depends on the original input range before scaling. Furthermore, in the previous example, if the 0~10V input range been used for scaling to 1~5V, it may have a lower accuracy compared to using 0~5V.*

For values which are going to be configured for scaling the input range, note that the “Low Scaling Value” should be lower than “High Scaling Value”.

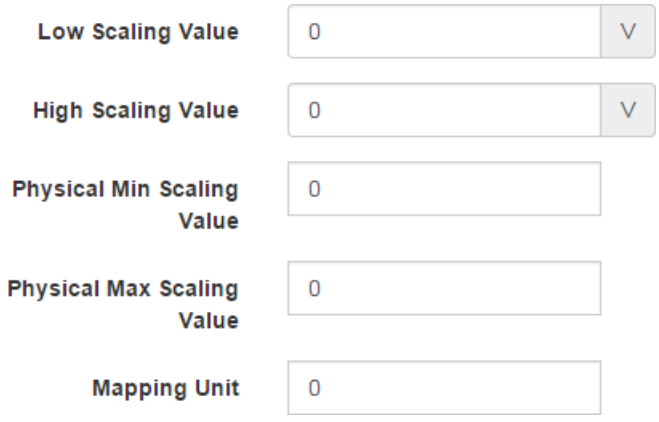
2. Physical Value Scaling - Scaling the Output Data

Further to scaling the input range of the analog input channel, the output data can also be scaled. After the function has been applied, it would be easier to read the Modbus value in the engineering unit. For example, a temperature sensor output 0~10 V which shows 0~100 °C. It would be better to read 0~100 in Modbus with floating data format.

In the previous case, you can configure the “Physical Min Scaling Value” and “Low Scaling Value” as 0, which shows the input voltage 0 V as physical value 0°C; and configure the “Physical Max Scaling Value” as 100 and “High Scaling Value” as 10, which shows the input voltage 10V as physical value 100 °C.

Note! *The function is helping the data be more readable, but the accuracy still depends on the original input range before scaling and also depends on the sensor’s accuracy.*

For the values which are going to be configured for scaling the output data. For users using RESTful Web API Mapping Unit, can be configured here for further use.



5.2.4 High/Low Alarm

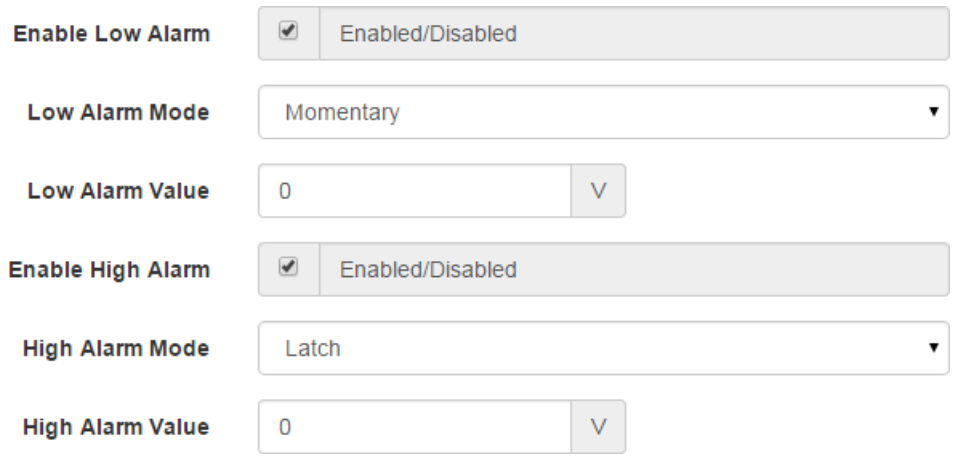
For an AI module with digital or relay output functions featuring a built-in alarm function. When the analog input value is higher than the high alarm value, or lower than the low alarm value, an alarm condition occurs. Then the alarm status will be activated to logic high. The alarm status is shown in the status page of AI as alarm status LED display, when the alarm condition occurs, the Alarm status LED display will be lit.

The specified digital output channel will generate a logic high value if you build the mapping relationship between alarms and DO channel in the DO mapping area. You can map the DO channel referring to AI Alarm section of DO configuration. The High/Low Alarm status LED in AI status page can be cleared by clicking “Clear”.

This page is for enabling and configuring the alarm. There are two alarm modes:

1. **Latch:** Once the alarm occurs, the alarm status will be activated to logic high level and will keep the value until the alarm is manually cleared. Before the value is cleared, the Alarm status LED will be continuously lit. For an AI module with digital or relay output functions, the specific output channel (chosen in the DO AI Alarm configuration page) will continuously generate logic high value. You can clear the alarm by clicking the “Clear” button in the AI status page.
2. **Momentary:** The alarm status will dynamically change depending on the alarm condition. If the alarm occurs, the alarm status will be logic high. If the alarm condition disappears, the alarm status will be logic low. So not only will the Alarm status LED be lit, in the web page the specific digital output channel value will change depending on the alarm condition.

After you choose the alarm mode for high alarm or low alarm, you can define the high alarm value or low alarm value by entering the value in Alarm limit text box.



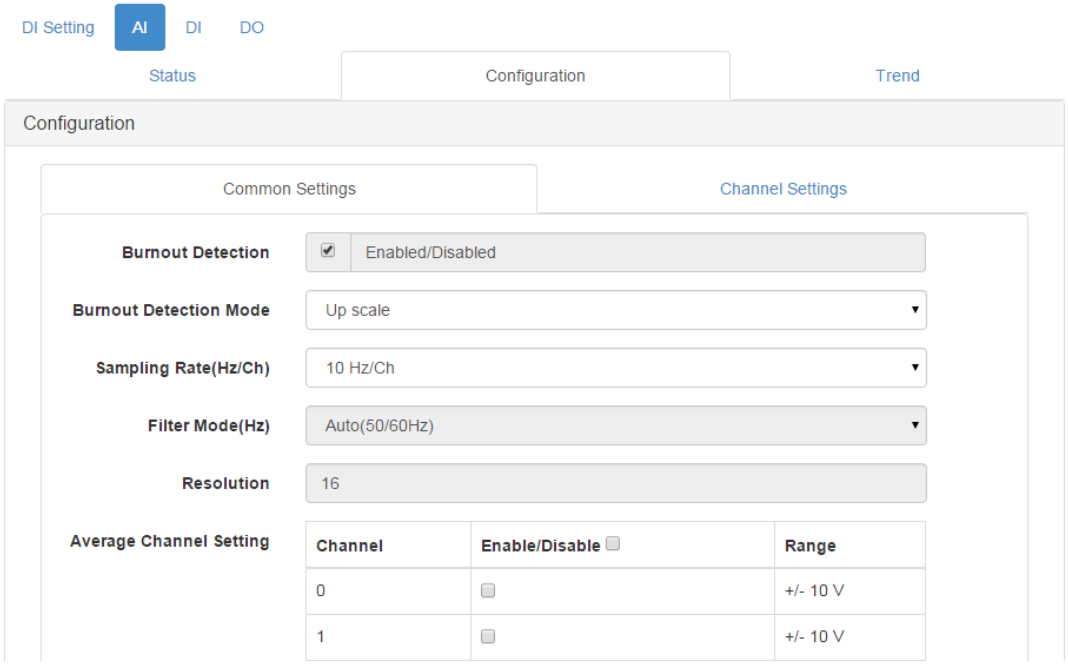
5.2.5 Burnout Detection

The Burnout Detection function, or open-wired function, is designed for 4~20mA input range or temperature input range. For the WISE-4012, the burnout signal is activated when the current is less than 3mA. The Modbus flag indicates that the wire of the sensor connected to the channel has burned out. You can also check the Modbus address of AI Channel Status for detail.

When a burnout situation had been detected, the AI value can be shown in “Up scale” which is FFFF(HEX), or “Down scale” which is 0. You can configure this in “Burnout Detection Mode”.

5.2.6 Sampling Rate

For models which support more than one sampling rate, you can configure the sampling rate here. For low sampling rate mode, the AI channel would have better noise rejection ability. For the high sampling rate mode, the noise will allow easier coupling to the signal.



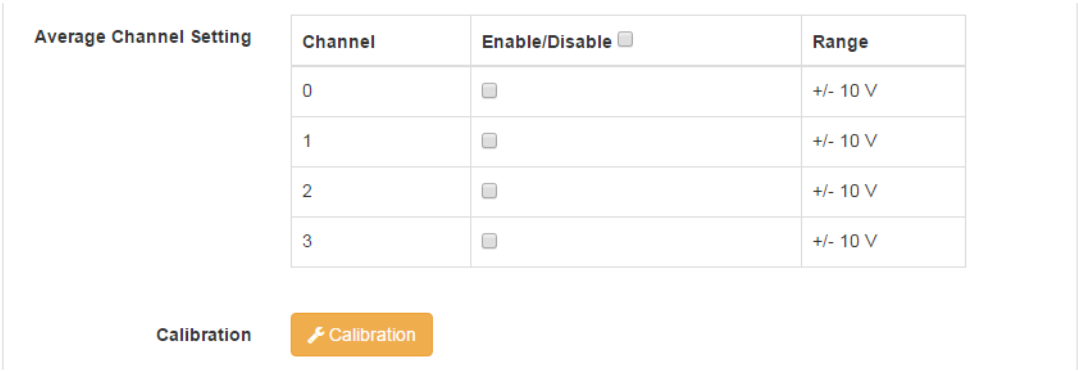
5.2.7 Average Channel Setting

To reduce the data amount, some users don't need the detailed value of each channel but the average value of the selected channel. When the channel is enabled, the values will be averaged in 16-bit integer data, and can be shown or read as another channel.

5.2.8 Calibration

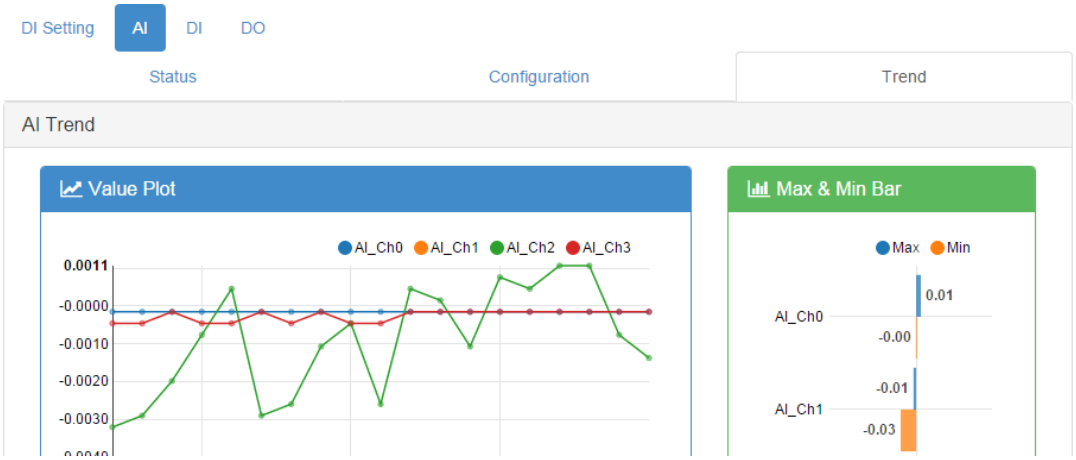
WISE analog input modules support internal reference calibration function, before using the calibration function, you can also try to reset the module to the default factory settings for troubleshooting, or if the calibration process had not succeeded, you can reset the module to the default factory calibration parameters.

Click “Calibration” and follow the instructions to calibrate the AI channels.



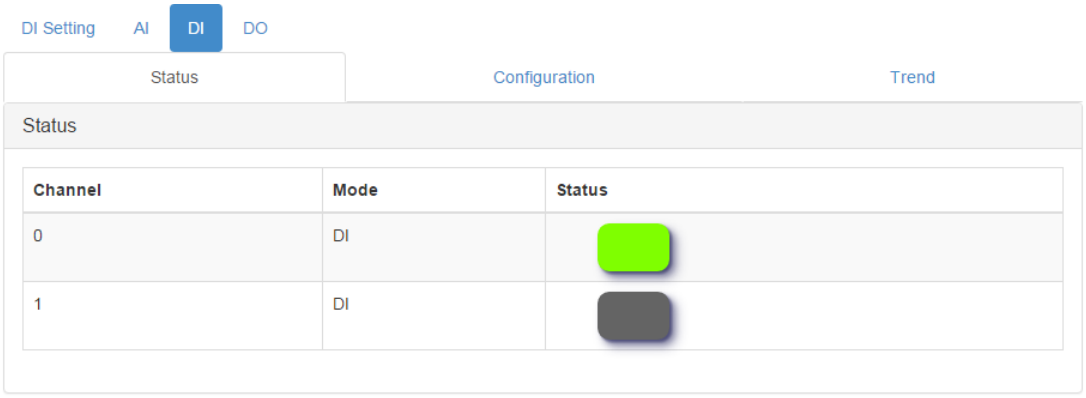
5.2.9 AI Trend

Here you can instantly check the analog input trend of each channel. The function is useful when testing the connection and variety between WISE and sensors.



5.3 DI

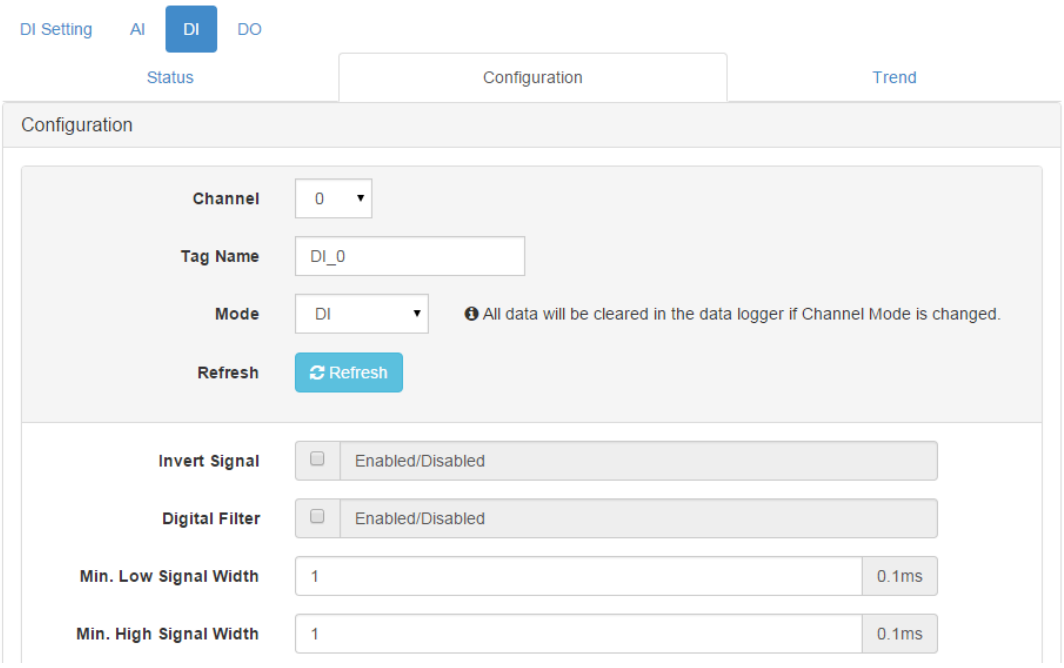
You can see the value of all digital input channels by the related LED display in this page. When DI status is a logical high, the LED will be green. If the status is a logical low, the LED will be grey.



5.3.1 Invert Signal

WISE digital input channels support Invert DI Status function, there will be an **Invert Signal** check box in the configuration page. Click the check box to enable/disable the function.

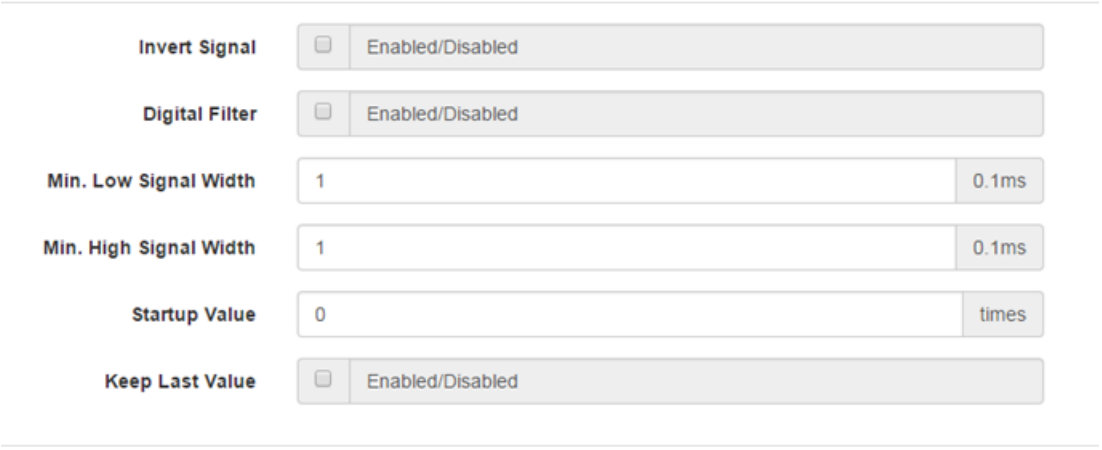
- **Digital Filter**
  Digital input channels support digital filters, these can be enabled or disabled by clicking the **Digital Filter** check box. If you enable the filter, you can define the mini- mum acceptable signal width by the **Min. Low Signal Width** and **Min. High Signal Width** text box. (Unit: 0.1ms) The high frequency noise will be removed by this filter.

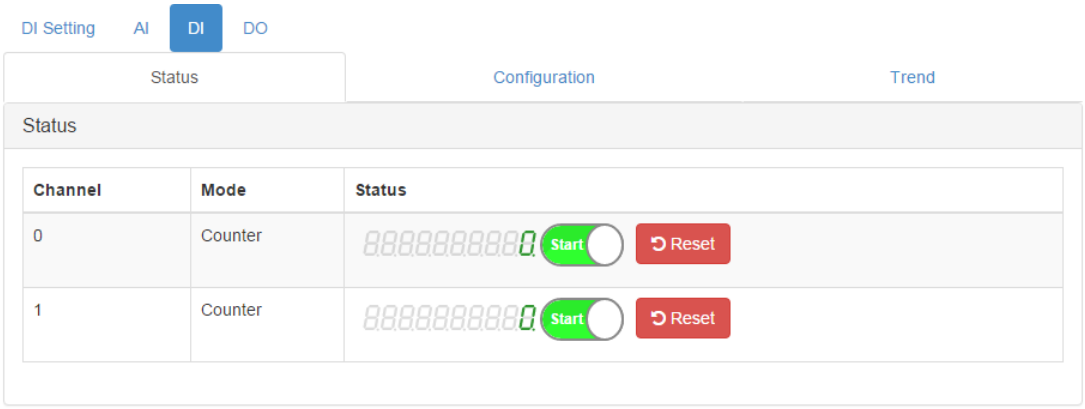


5.3.2 Counter Mode

When you choose Counter mode, one counter will count the pulse number of the digital signal from the selected channel, and then record the count number in the register. In the DI Status page, the current count value of the selected channel is displayed by the Counter value text box. Start or stop the counter by switching the **Start/Stop** switch next to the Counter value. Reset the counter (the value in the register will be initialized to the startup value, default to be zero) by clicking the **Reset** button. Preset the **Startup Value** in the text box. When you reset the counter value, either by the reset button in the status page or by a command, the value will be reset to the Startup Value. The default value of the **Startup Value** is zero.

Like the DI mode, you can enable/disable the **Invert Signal** function and **Digital Filter** in the configuration page. The operation is the same. If you enable **Keep Last Value**, when the digital module been powered off, the last counter value will be kept in the register. When the module powers on, the counter will continuously count from that value. Without this function, when the module powers off, the counter will reset and the count value in the register will be zero.



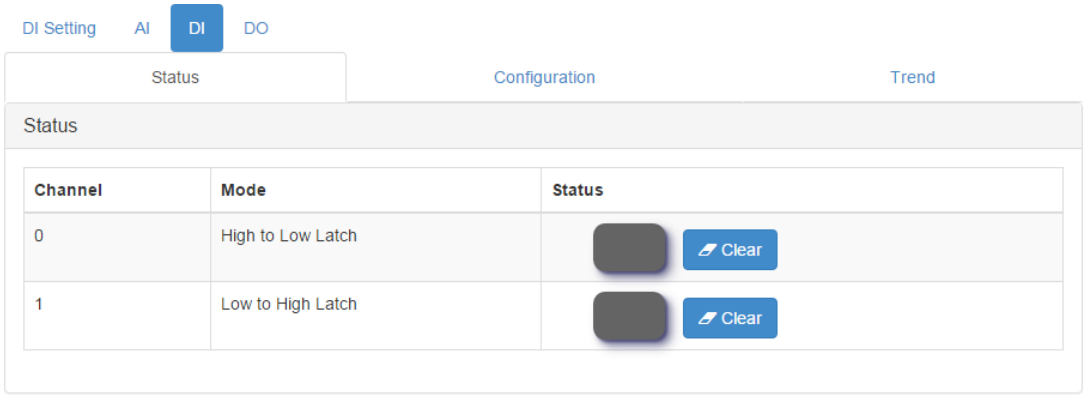


5.3.3 Low to High Latch

When you choose **Low to High Latch** mode, once the digital input channel detects logic level changes from low to high, the logic status will be kept as logic high. The logic status will remain the logic high, until you clear the latch manually. The logic status will return to logic low. The logic status can be seen by the Latch status LED display in the DI Status page. Clear the latch by clicking the **Clear** button. Enable/disable the Invert Status function in the configuration page.

5.3.4 High to Low Latch

When you choose **High to Low Latch** mode, once the digital input channel detects logic level changes from high to low, the logic status will be kept as high. The logic status will remain high, until you clear latch manually. Then the logic status will return to low. The logic status can be seen by the Latch status LED display in the DI Status page. Clear the latch by clicking the **Clear** button. Enable/disable the **Invert Status** function in the configuration page.

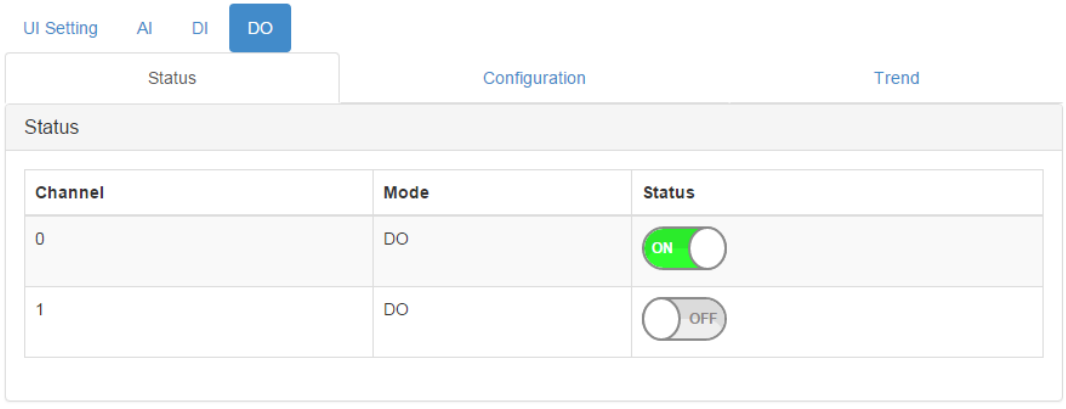


5.3.5 Frequency

For pure DI channels, not including the DI function of the WISE-4012, WISE modules support frequency mode. WISE module will calculate the frequency value of the digital input signal from the selected channel. The frequency value will be displayed in the Frequency value text box in the DI Status page.

5.4 DO

You also can control the values of all digital output channels by the status switch. The color of the switches will display current value of that digital output channel.

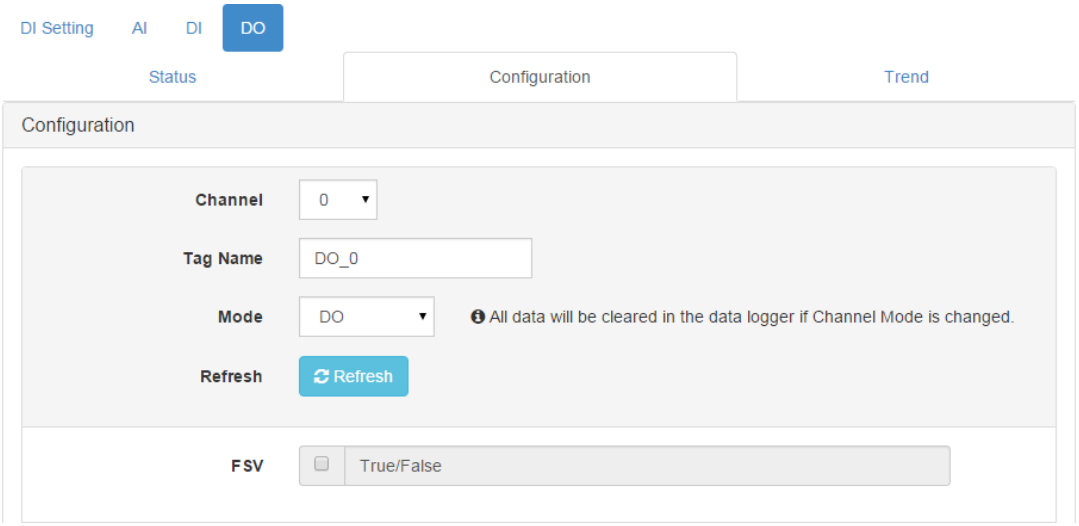


5.4.1 Fail Safe Value (FSV)

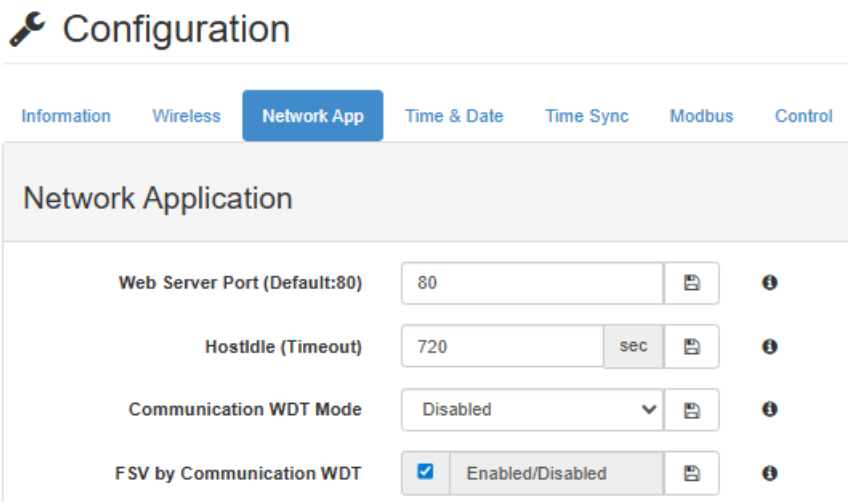
When the communication between the host controller and WISE digital modules is broken, the digital output channel can generate a predefined value (this value is called the fail safe value). If the FSV checkbox is True, the module will set the output channel to logic high when WDT times-out. If the FSV checkbox is False, the module will set the output channel to logic low when WDT times-out.

For this setting, the states are defined as:

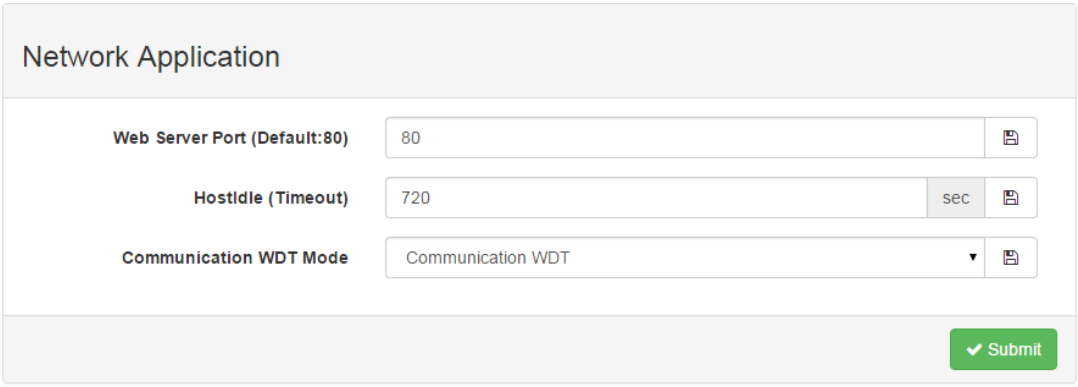
- True = Logic High (FSV=1)
- False = Logic Low (FSV=0)



To decide whether to enable the FSV function triggered by communication with the WDT, go to **Network Application** and enable the FSV function for all the module's output channels.



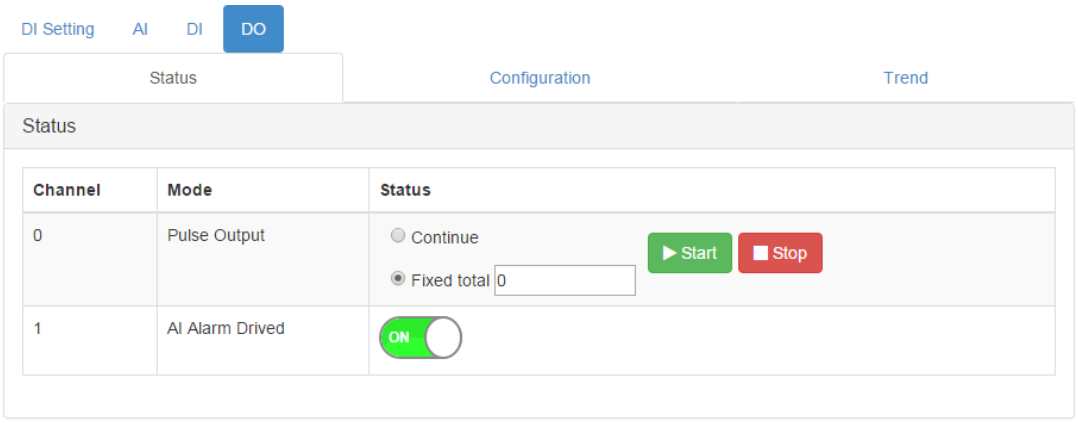
To decide the time period to trigger the communication WDT, go to **Network Application** to enable the **Communication WDT Mode** as **Communication WDT** first, and then configure the **Host Idle (Timeout)**. (Unit: second) The default host idle time is 720 seconds.



5.4.2 Pulse Output

After you choose the **Pulse Output** mode, the selected digital output channel can generate continuous pulse train or finite pulses. You can define the pulse width by entering into the **Low Signal Width** and **High Signal Width** text box in the configuration page. (Unit: 0.1 ms) The frequency and duty cycle of the pulse output signal will be calculated automatically and displayed by the **Output frequency** and **Duty cycle** text box.

Then choose whether to generate a continuous pulse train or finite pulses by selecting the **Continuous** (for pulse train) or the **Fixed total** (for finite pulses). The text box on the right of the **Fixed total** button is used to define how many pulses you want to generate. After selecting pulse output mode, click the **Start** or **Stop** button to generate or to stop the pulse output.

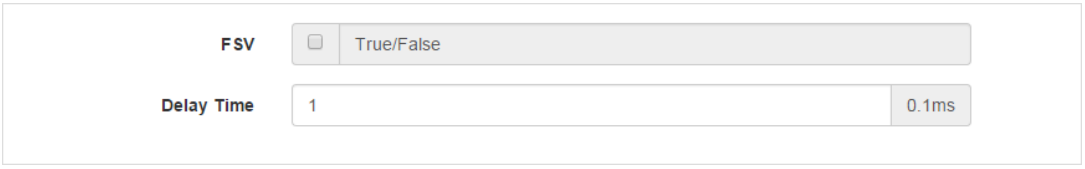


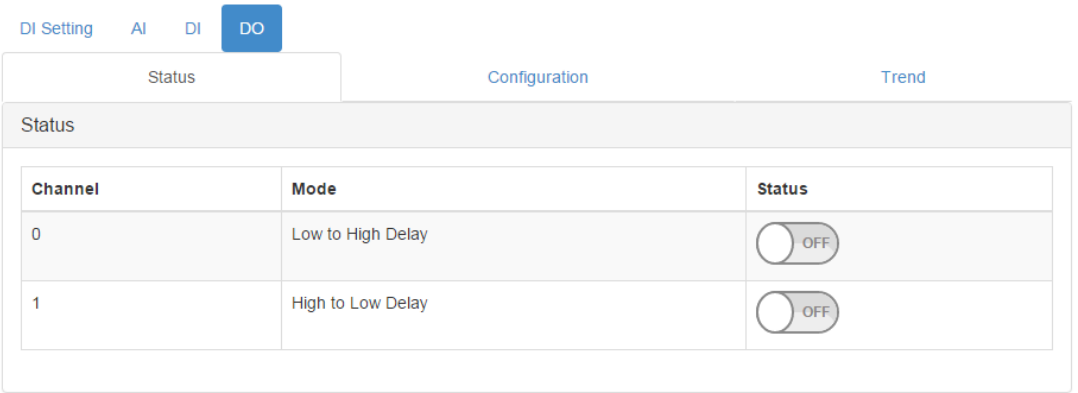
5.4.3 Low to High Delay

Choosing **Low to High Delay** mode, is almost the same as choosing DO mode. The only difference is that there will be certain time delays when the output value changes from logic low to logic high. Define the delay time by entering its value into the **Delay Time** text box in the configuration page. Control the digital output value using the DO button and seeing its current value by the DO status LED display in the DO Status page.

5.4.4 High to Low Delay

Choosing **High to Low Delay** mode, is almost the same as choosing DO mode. The only difference is that there will be certain time delay when the output value changes from logic high to logic low. Define the delay time by entering its value into the **Delay Time** text box in the configuration page. Control the digital output value using the DO button and seeing its current value by the DO status LED display in the DO Status page.





5.4.5 AI Alarm Driven

After the **High/Low Alarm** been configured in AI channel configuration, the alarm status can be mapped in to DO channel. Choose the **High Alarm** or **Low Alarm** in **Trigger Mode** to active the configured DO channel.

5.5 RS-485 (WISE-4051)

WISE-4051 has one RS-485 port for Modbus gateway function, thus you can use this port to polling the data from RS-485 Modbus/RTU slave devices, like ADAM-4000, ADAM-5000/485, or sensors.

5.5.1 External Coils or Registers Status of RS-485 Port

Go the “COM1” tab to check the status or configure the Modbus Master function of RS-485 port. There can be total 64 addresses of all Modbus slave to be mapped as the I/O of WISE-4051. These 64 addresses can be coils or registers. The coils will be mapped as extension bits of WISE-4051, and the registers will be mapped as extension words of WISE-4051. So in the “Status” tab, you can see the bits or words are shown in individual pages.

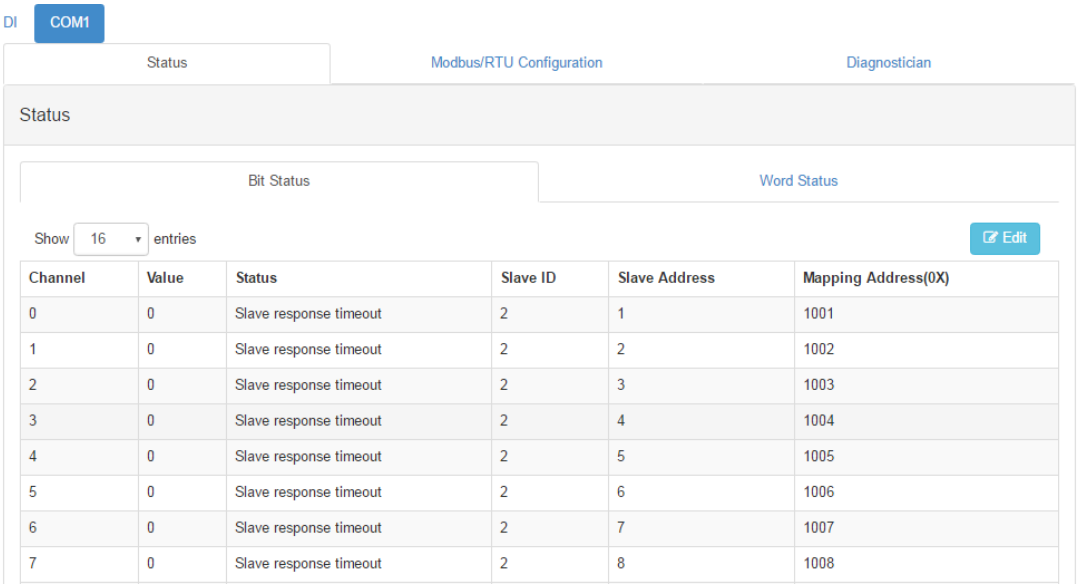
Column "Channel" indicate the number of bits, there are maximum 64 bits can be shown here, but you may only mapping less than 64 coils as bits, so the empty bits are invalid. Same as words may also have empty channels.

Column "Value" shows the value polling from mapped address.

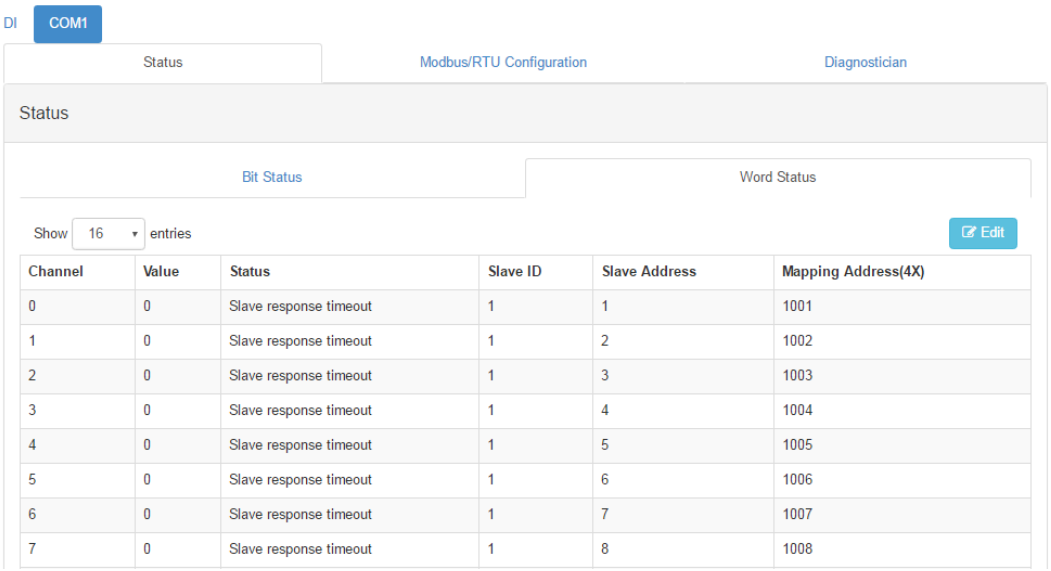
Column "Status" shows the status of each bits or words, if the channel is empty which did not be mapped to Modbus slave address, the status will shows "Unavailable".

Column “Slave ID” and “Slave Address” show where the bit or word from RS-485 Modbus slave device.

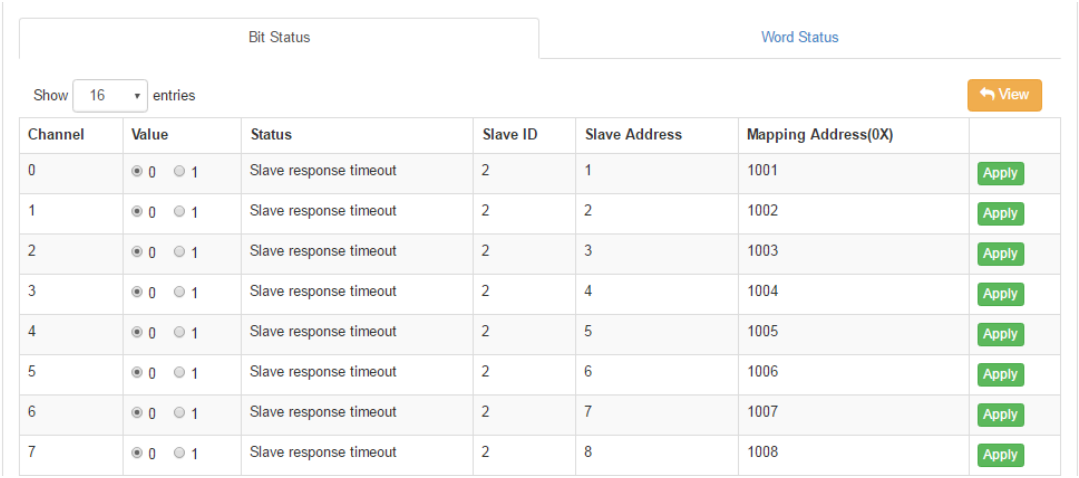
Column "Mapping Address" shows the Modbus address of bits or words when WISE-4051 be polled by Modbus/TCP. The default setting of extension bits is from Modbus address 01001 of WISE-4051, and extension words is from Modbus address 41001 of WISE-4051. There are 64 address reserved for extension bits or words for WISE-4051.



Channel	Value	Status	Slave ID	Slave Address	Mapping Address(0X)
0	0	Slave response timeout	2	1	1001
1	0	Slave response timeout	2	2	1002
2	0	Slave response timeout	2	3	1003
3	0	Slave response timeout	2	4	1004
4	0	Slave response timeout	2	5	1005
5	0	Slave response timeout	2	6	1006
6	0	Slave response timeout	2	7	1007
7	0	Slave response timeout	2	8	1008



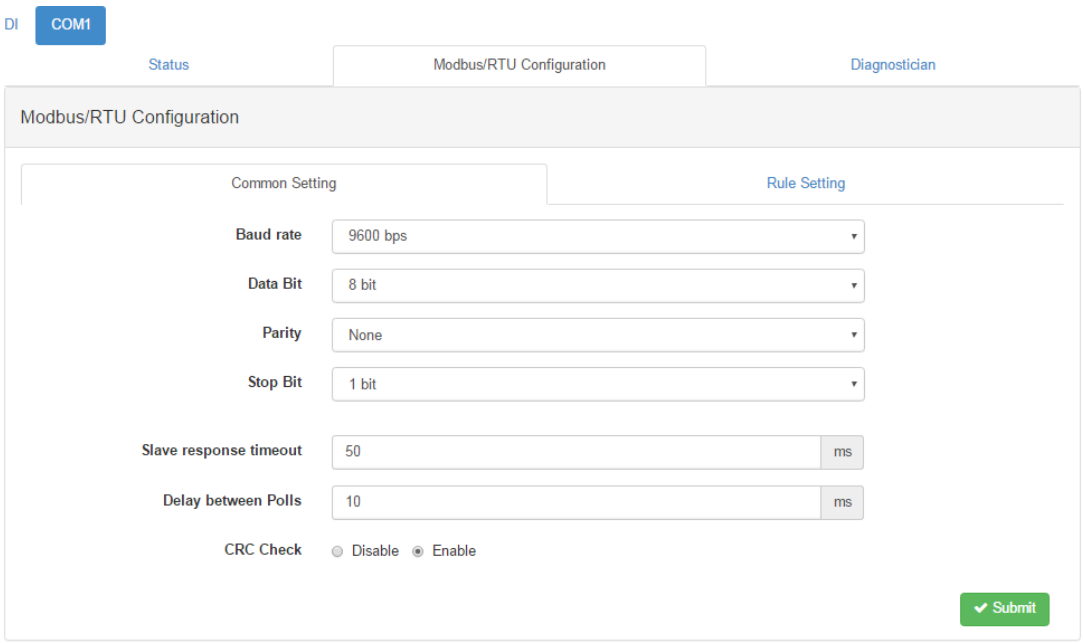
For the writable bit or word, you can click "Edit" button to switch to edit mode, change value and click "Apply" to write the Modbus address individually.



5.5.2 Modbus/RTU Configuration of RS-485 Port

In the “Common Setting” Tab, you can configure the parameters of WISE-4051 RS-485 port

- **Baud Rate:** 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
- **Data Bit:** 7, 8
- **Stop Bit:** 1, 2
- **Parity:** None, Odd, Even
- **Slave Respond Timeout:** Here you can configure the time for waiting Modbus slave reply
- **Delay between Polls:** Here you can configure the delay time between each Modbus instructions
- **CRC Check:** Here you can enable/disable the CRC check/ignore the CRC error of Modbus



In the "**Rule Setting**" tab, you can configure this Modbus address of end devices you would like to polling.

- **Rule:** There are maximum 20 rules that WISE-4051 support. Each rules can be different slave devices, in the other word, it can be maximum 20 devices connected to WISE-4051. Or you can use all rules for polling different address of same slave device.
- **Slave ID:** Different slave devices in same RS-485 has different slave ID, enter the slave address of Modbus devices which connected to WISE-4051 here
- **Type:** We support 4 kinds of Modbus data type, 01 Coil Status (0x), 02 Input Status (1x), 03 Holding Registers (4x), and 04 Input Registers (3x). After you con- figure one of the types in the rule, then this rule will be enabled, and WISE-4051 will start to polling after the configuration been submitted successfully.
- **Start Address:** Enter the first address number that you are going to polling. The address base is 1, if you are going to polling the first address of Holding Registers, 40001, please enter number 1 here. Don't need to enter the whole address 40001.
- **Length:** Enter the length of the address that you are going to polling in this rule. For example, if you are going to polling 40001~40020, enter the length as 20 here. Please be noted that since WISE-4051 can polling maximum 64 address,

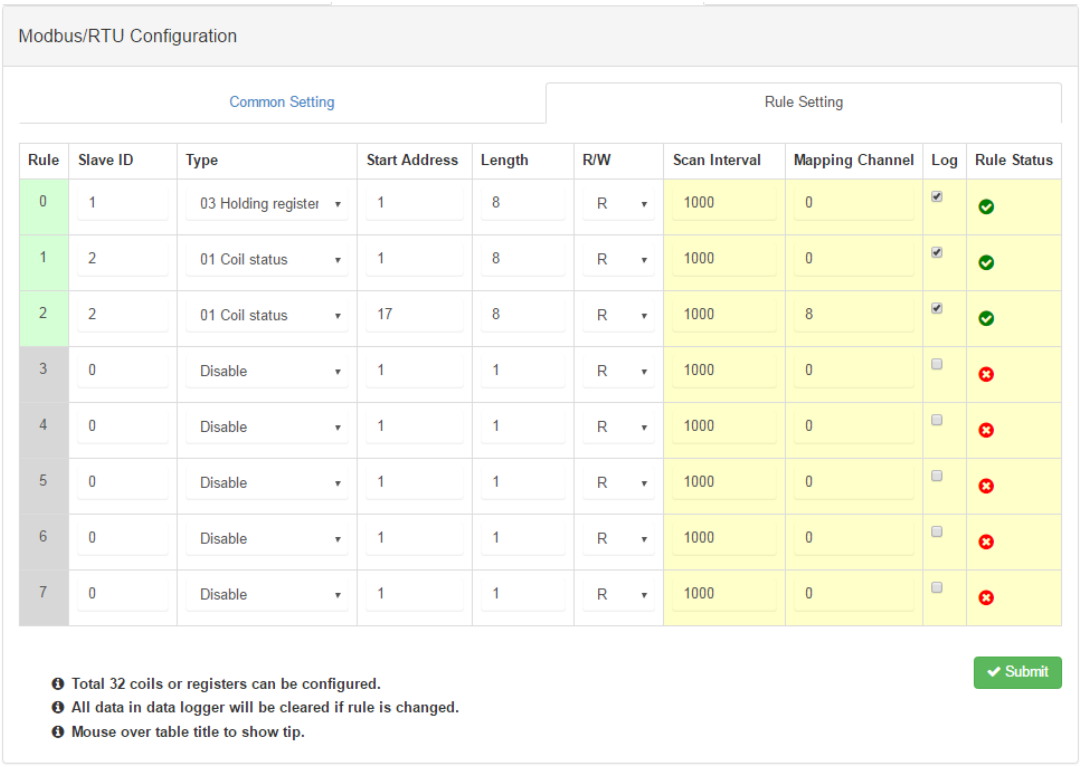
the maximum length is 64 addresses, and the total amount of all rules should also less or equal to 64.

- **R/W:** Here you can decide if the address in this rule will be Read or Written or not. For Coil Status and Holding Registers, you can make these addresses read only, or write only to reduce the polling effort.
- **Scan Interval (in milliseconds):** Here decide the scan interval for WISE-4051 to polling Modbus slave devices. WISE-4051 will optimize the scan interval according you setting. However, the read scan interval may also depend on real case like: Baud rate, slave devices respond time, delay time between polls, etc. Go to the Diagnostician page to check the real respond time for referring the value of scan interval.
- **Mapping Channel:** When the Modbus address of slave devices been configured in each rule, these addresses will also be mapped into WISE-4051. Coils of Modbus slave devices will be mapped as bits for RESTful web service and also be mapped as coils for Modbus address of WISE-4051. Registers of Modbus slave devices will be mapped as words for RESTful web service and also be mapped as registers for Modbus address of WISE-4051. There are 64 continuous channels of bit and another 64 continuous channels of word can be mapped. Please make sure the channels for each rules are not overlapped.
- **Log:** Here you can decide the data been polled from this rule will be logged in data logger or not.
- **Rule Status:** The web configuration interface will check if rule settings have any overlapping or conflicting. The enabled rules (enable the rule by configuring “Type”) should have green icon so that the “Submit” will been shown for submitting the rules.

Note! *After configuring the rules, click “Submit” to apply the rules.*

Note! *After changing the rule configurations, the logged data in data logger will be cleared for organizing new data structure of data logger for new configurations.*

Note! *Place your mouse over the table title to show the tips.*



In previous figure we demonstrate how to configure an ADAM-4017+ (or ADAM-4117) which slave ID is 1 and an ADAM-4055 which slave ID is 2 as the Modbus slave devices connected to WISE-4051.

ADAM-4017+ (or ADAM-4117) is an 8-ch analog input Modbus I/O modules, the Modbus address of AI0~AI7 are 40001~40008. In the **Rule Setting** page, we configure the **Slave ID** = 1; **Type** = 03 Holding Registers, since the Modbus address 40001 is start from 4; **Start Address** = 1 and **Length** = 8 for the address 40001~40008; **R/W** = R, since this address is for analog input which is read only; **Scan Interval** = 1000ms for polling every second; **Mapping Channel** = 0, to mapping the data from AI0~7 of ADAM-4017+ to channel 0~7 of Word Status; and check the **Log** to log the data from ADAM-4017+.

ADAM-4055 is an 8-ch digital input and 8-ch digital output Modbus I/O modules, the Modbus address of DI0~DI7 are 00001~00008; the Modbus address of DO0~DO7 are 00017~00024. Since the address is not continuously, so we are going to configure digital input as one rule, and digital output as another rule.

For digital input channels: In the **Rule Setting** page, we configure the **Slave ID** = 2; **Type** = 01 Coil Status, since the Modbus address 00001 is start from 0; **Start Address** = 1 and **Length** = 8 for the address 00001~00008; **R/W** = R, since this address is for digital input which is read only; **Scan Interval** = 1000ms for polling every second; **Mapping Channel** = 0, to mapping the data from DI0~7 of ADAM-4055 to channel 0~7 of Bit Status; and check the **Log** to log the data from ADAM-4055. Please be noted that the Bit Status and Word Status have individual channel number, so the Word Status for ADAM-4017+ and the Bit Status for ADAM-4055 are all start from 0.

For digital output channels: In the **Rule Setting** page, we configure the **Slave ID** = 2; **Type** = 01 Coil Status, since the Modbus address 00017 is start from 0; **Start Address** = 17 and **Length** = 8 for the address 00017~00024; **R/W** = R/W, since this address is for digital output which can be wrote and read, you can also configured as W if you don't want to read back the value; **Scan Interval** = 1000ms for polling every second; **Mapping Channel** = 8, to mapping the data from DO0~7 of ADAM-4055 to

channel 8~15 of Bit Status; and check the **Log** to log the data from ADAM-4055. Please be noted that the channel 0~7 of Bit Status have been occupied by previous rule, so you should assign the channel number from channel 8~31.

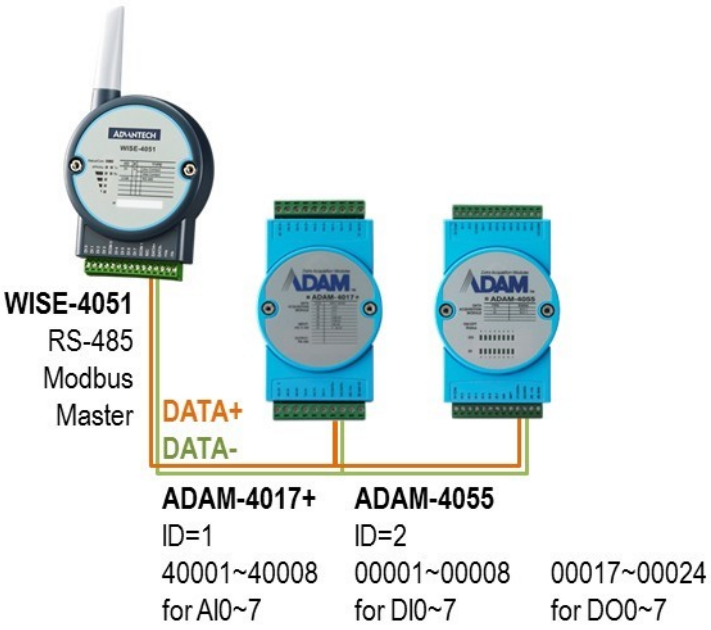
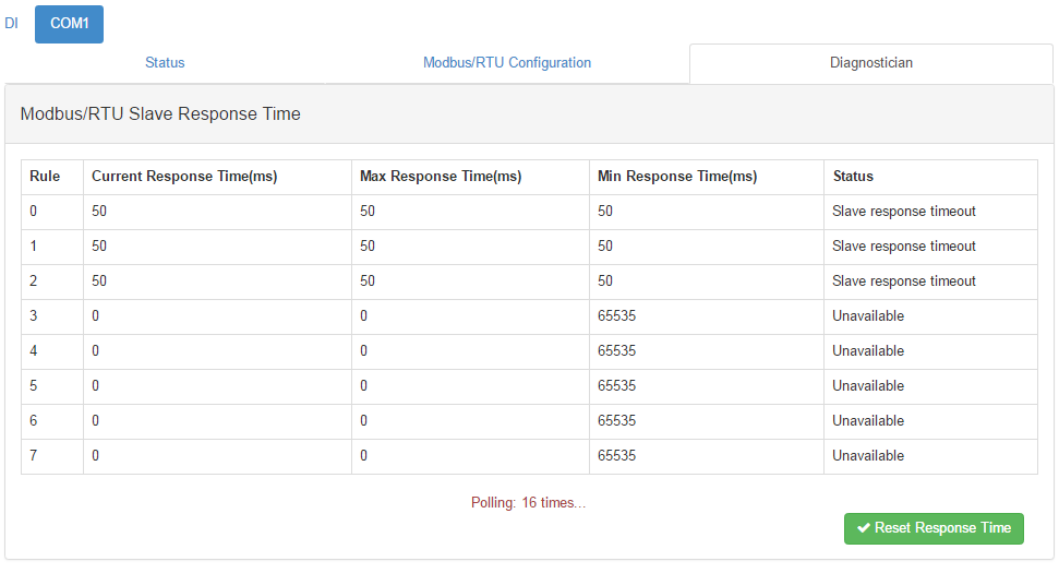


Figure 5.1 Application Scenario of WISE-4051 RS-485 Port with ADAM-4000 Modbus I/O Module

5.5.3 Modbus Slave Devices Diagnostician

Since different devices will have different responds time, to have better configuration of scan interval, here WISE-4051 provides Diagnostician function for testing the respond time of each rule. You can refer to the respond timeout in this page for configuring the "**Scan Interval**" in "**Rule Setting**" page. You can reset the testing result in this page by clicking "**Reset Response Time**".



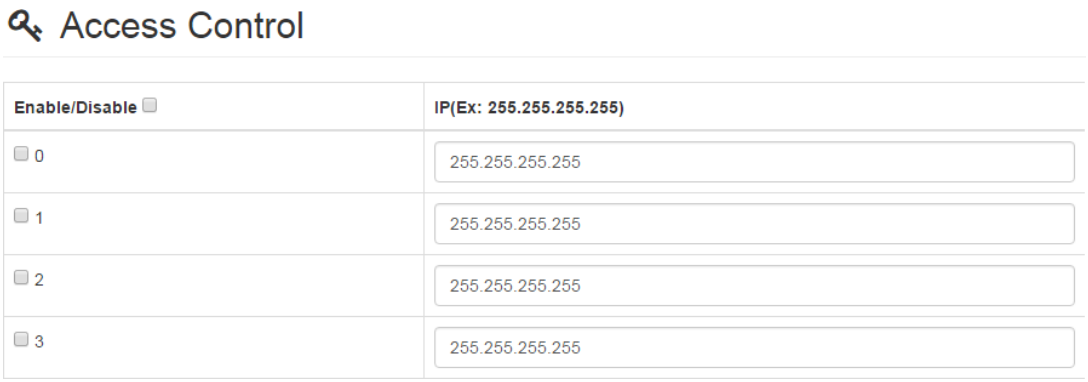
Chapter 6

Advanced Configuration

6.1 Access Control (Whitelist) for Security

To prevent unauthorized connections, WISE-4000 lets you create an **IP whitelist**.

Only the hosts listed in this table can reach the module's web UI, REST API, or Modbus/TCP service; all other traffic is rejected.



6.2 Data Logger

The WISE-4000 series supports data log functions, the I/O status can be logged in the module and also be queried from the module.

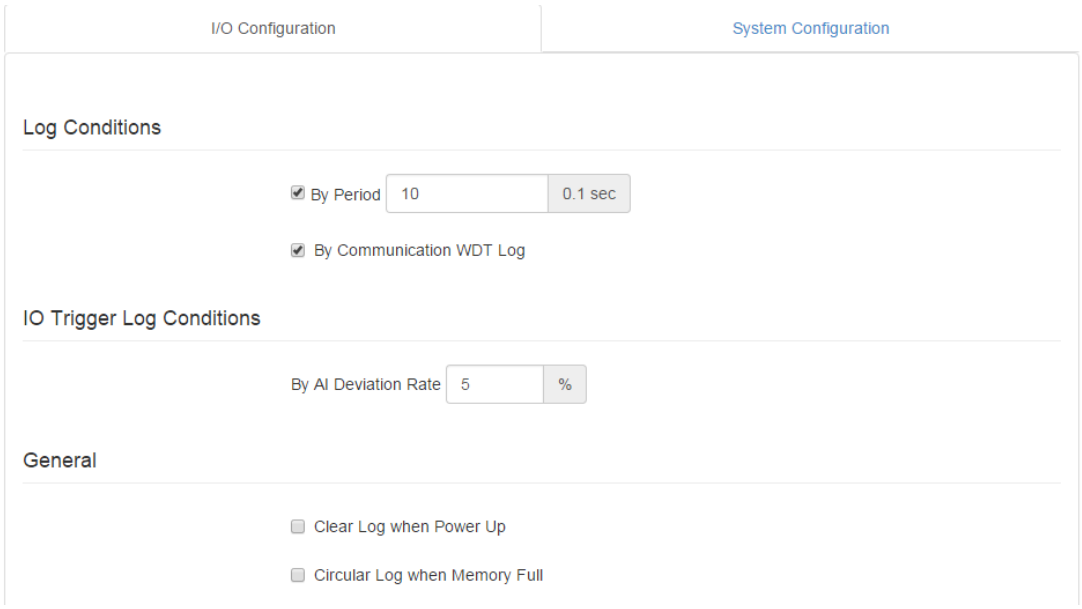
- **Time & Date/SNTP**
  Before you start the log function, confirm the RTC time inside the WISE module is configured to the correct time. Standard WISE modules, not including the WISE- 4012E, come with an RTC battery. Once the RTC time has been configured, you don't need to synchronize the time with SNTP server. The time will be kept in the RTC with the battery. For the WISE-4012E, which doesn't have an RTC battery, you need to synchronize the time with the SNTP server.
- **Data Configuration**

6.2.1 I/O Data

You can configure the **Log Conditions** to be logged by time period or by communication with WDT. If you check the **By Period** box, it enables periodic logging, and the log period can be decided in following box. Note that the period is increased by 0.1 seconds, meaning that if the user configures "600" here, the status of the I/O will be logged each minute. If you check the box **By Communication WDT**, it will been enabled, once the condition of the WDT has been met, the status of the I/O will be logged.

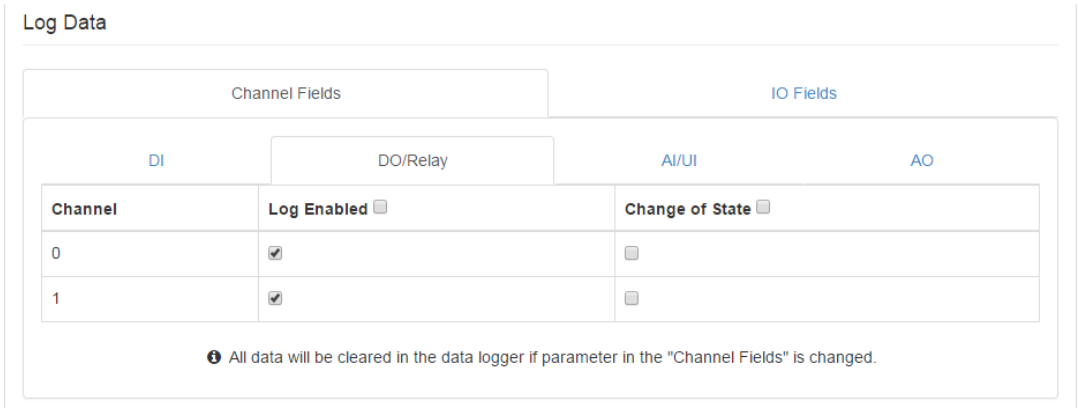
For the analog input channel, data can be logged by the AI Deviation Rate (Dividing difference between present sample value and previous sample value by the total range value). Here you can enter the percentage of deviation rate to be the criteria for triggering logger.

All the data can be kept even if the module is powered off, however, you can clear all data in the logger when powering up WISE module. Just check **the Clear Log when Power Up** box. When the data is logged to maximum memory capacity, logger will stop logging by default. You can check the box of the **Circular Log when Memory Full** to overwrite the earliest data.

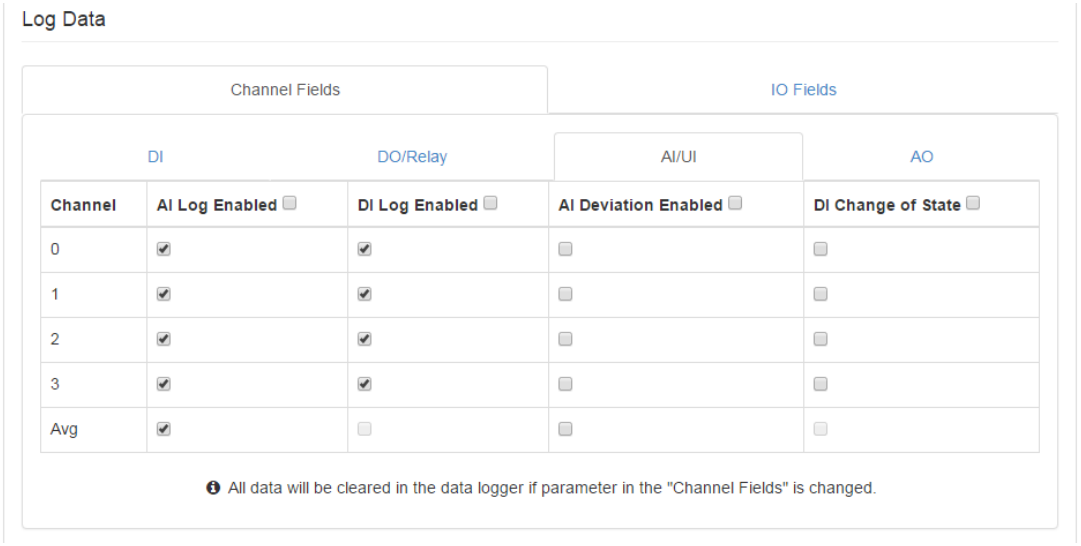


The **Channel Fields** tab is to decide which I/O channel's status will be logged, and if the change of the status also need to be logged or not. Note that the log memory will be cleared once any parameter is changed in the **Channel Fields**, and also in **IO Fields**.

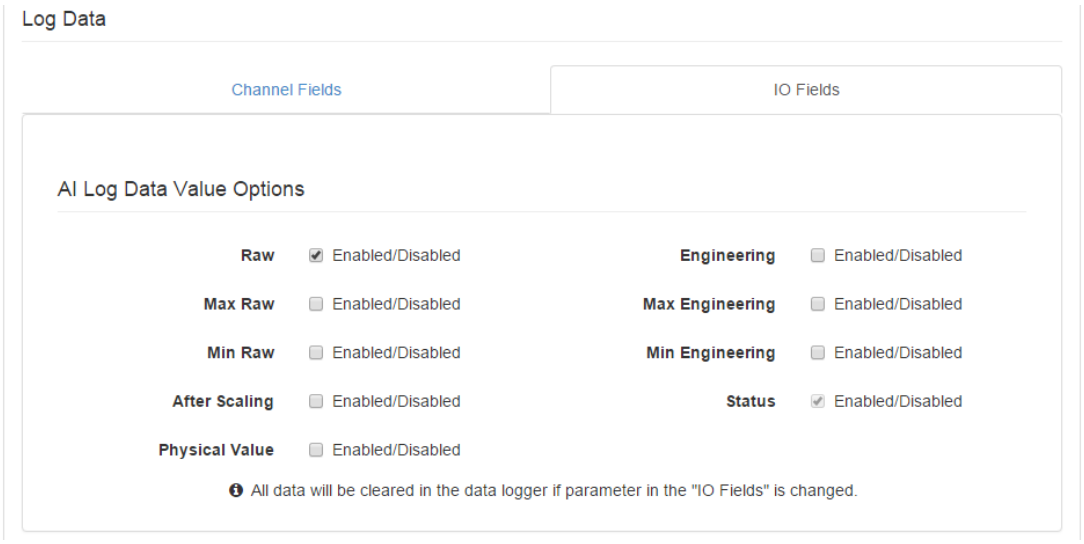
For a digital channel, check the **Log Enabled** box to log the status of checked channel periodically. Or check the **Change of State** to trigger data logged by status change. For the universal input channel, the DI channel should be configured in **AI/UI** page.



For AI channels, check the **AI Log Enabled box** to log the status of checked channel periodically. Or check **AI Deviation Enabled** to trigger data logged when the AI value changed over the deviation rate which been configured in the page above.



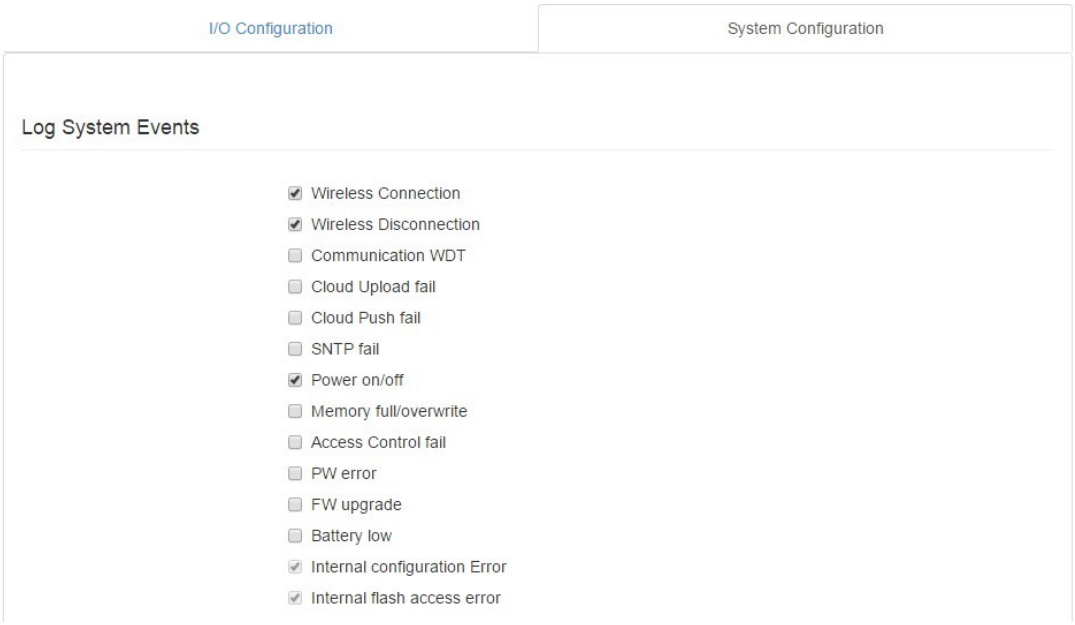
The **IO Fields** tab is to decide which AI data will be logged. Note that the log memory will be cleared once any parameter changed in the **Channel Fields** and **IO Fields** tabs.



6.2.2 System Data

The WISE data logger function not only logs the I/O status, but also logs system events for module diagnostics or troubleshooting. You can decide what kind of system events you would like to log here.

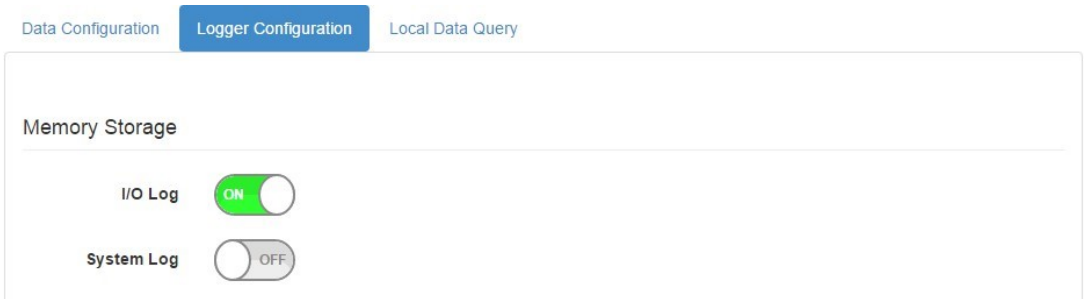
1. Enter to the System Configuration setting of Data Logger page.
   (Advanced → Data Logger → Data Configuration → System Configuration)
2. Check to select the system events to log.



■ **Logger Configuration**

In the previous page, you configured which data is logged. In this page you can enable the local memory storage function. There are separate switches for enabling logging I/O data or system data. You can turn ON the switches to enable logging.

1. Enter to the Logger Configuration page.
   (Advanced → Data Logger → Logger Configuration)
2. Enable the System Log switch to record the system log to the memory storage of WISE modules.



- **Local Data Query**
  The logged data can be queried from the WISE module. Due to the limitation of MCU- based WISE modules, the file will be saved in a *.json file. You can visit https://json- csv.com/ to convert the data from *.json to *.csv.
  Before querying the logged data, you can configure the format of the file. You can decide whether the data comes with a UUID or MAC ID, and decide the type of time stamp. For the latest version WISE module version, which supports **Local Date and Time (GMT)** the time stamp will look like: "2015-08-27T15:20:29+08:00", or if it sup- ports **Coordinated Universal Time (UTC)** that the time stamp will looks like: “1440660089”.
  After deciding the data format you can query the data by the **Amount of Latest Data** for a quantity of data, or by **Time Filter** for a period of data. However, if the amount of data is not too large, you can also choose **No Filter Enabled** to query all the data.
  Now you can click **Query** to query the data from local memory. Then the data will be shown in a chart and table. Click **Save** to download the data from the WISE module in a *.json file. Or you can click **Clear** to clear all the data in local memory.

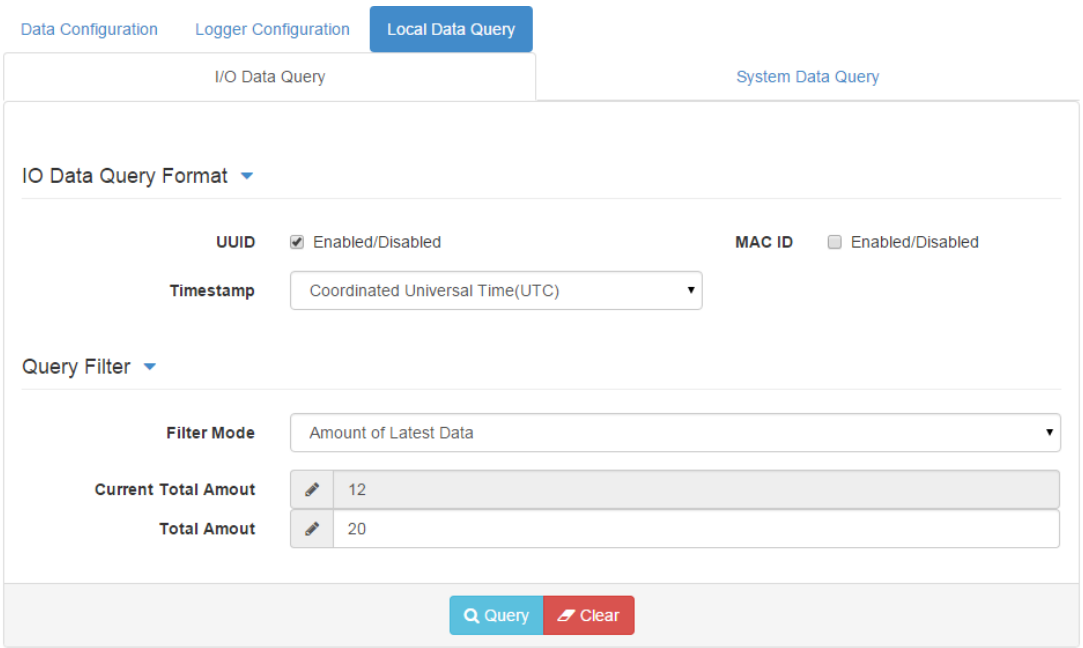
1. Enter to the **System Data Query** setting of Data Logger page.
   (Advanced → Data Logger → Local Data Query → System Data Query)
2. Select the **System Data Query Format** you want to display in system log.

UUID: The default UUID is the combination of model name and the MAC address.

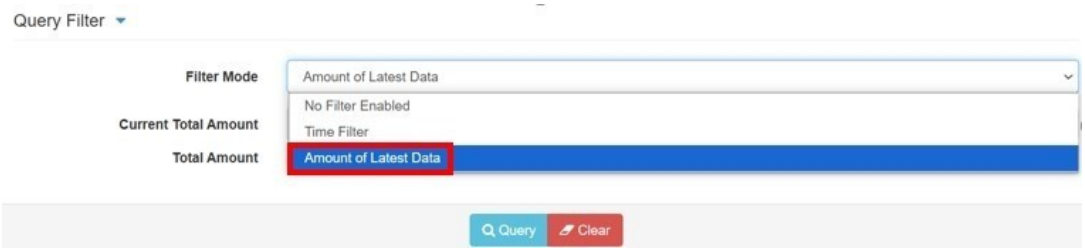
MAC ID: The MAC ID of WISE module.

Timestamp: There are two types of timestamp to choose, **GMT** and **UTC**.

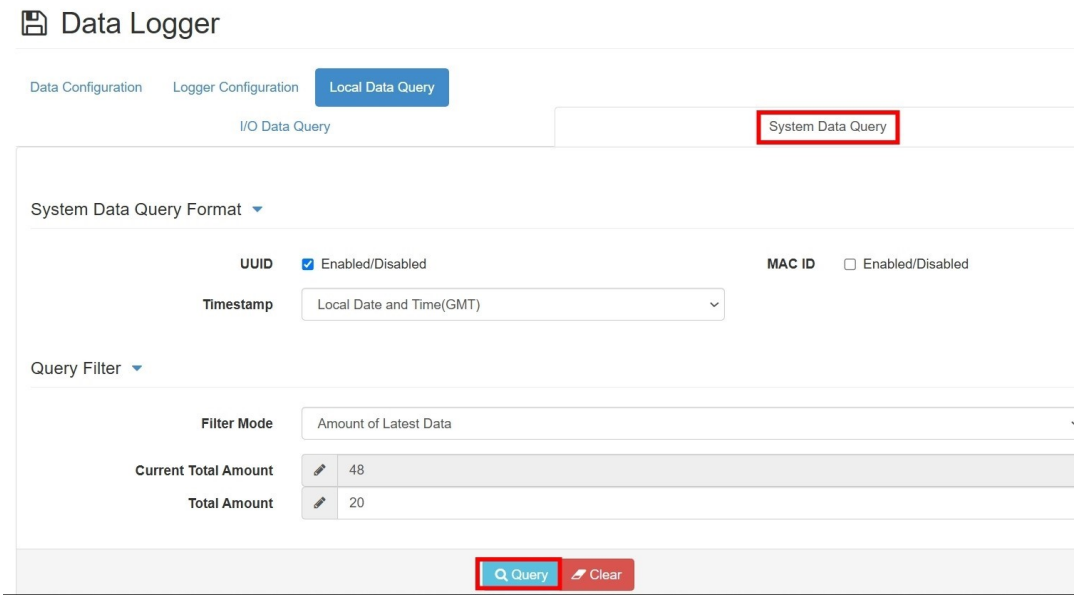
In this case, we enable the UUID and select the GMT Timestamp as our system data query format.

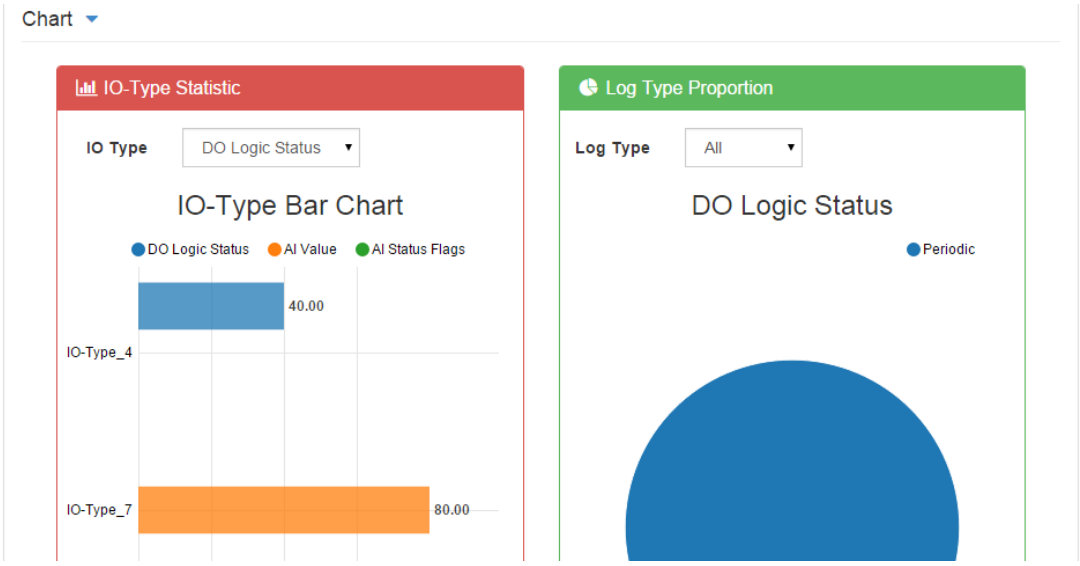


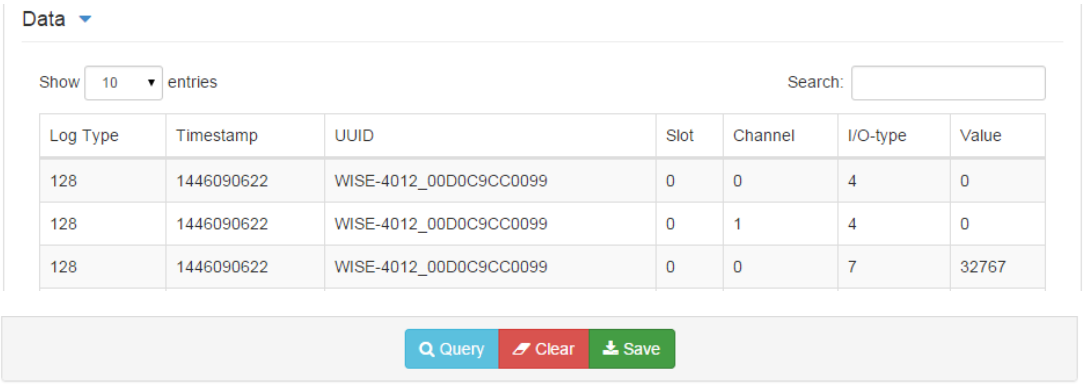
No Filter Enabled: It will query all the data.
Time Filter: It will query a period of time of data.
Amount of Latest Data: It will query a quantity of data that you can set by yourself.



Click the **Query button** to query the data.

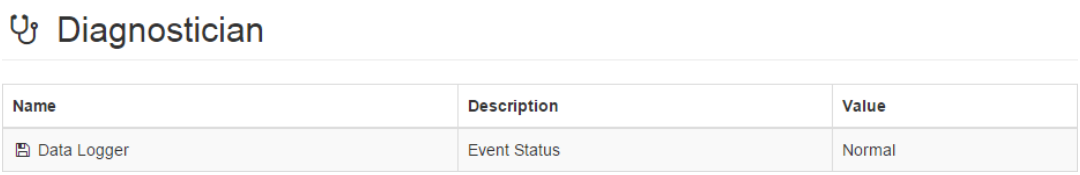






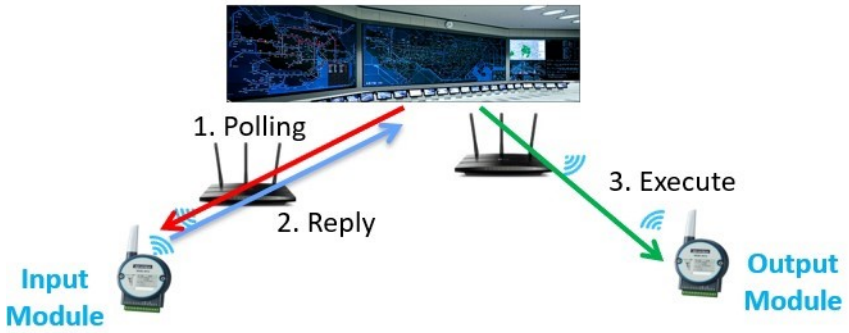
6.3 Diagnostician

WISE modules provide a Diagnostician page for indicating the operating status of the WISE module. The status of each function is shown for easy troubleshooting.



6.4 Peer to Peer (P2P)

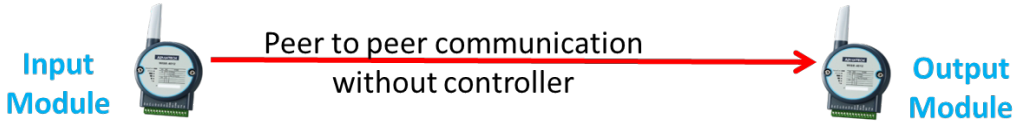
Typical Application: Signal Synchronization via Controller



6.4.1 What is P2P?

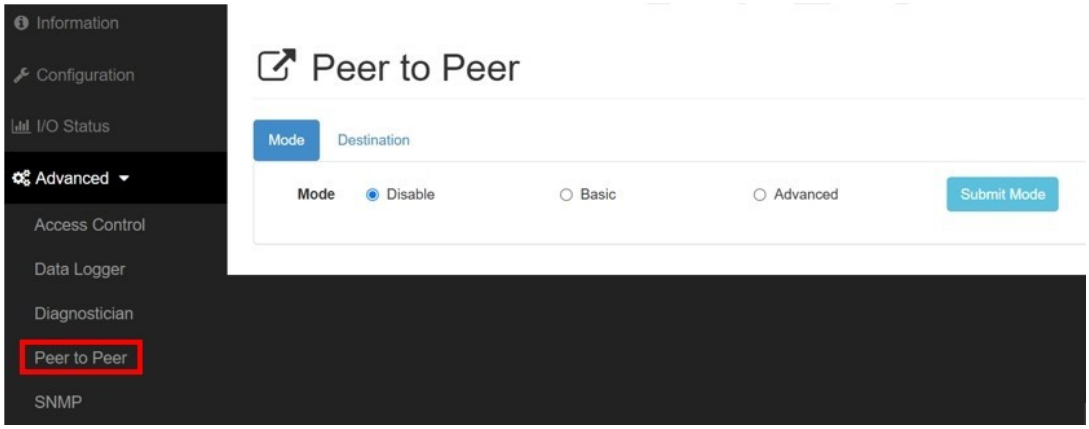
The concept of peer to peer is the input of device A will trigger output of device B by sending control command.

When an input module (Analog Input or Digital Input) sense a signal, it can pass this signal to output module (Analog output or Digital Output) by period or by change of state (C.O.S) which can instantly control your device.



It supports two modes: a basic mode for a single target module/channel and an advanced mode for multiple target modules/channels.

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



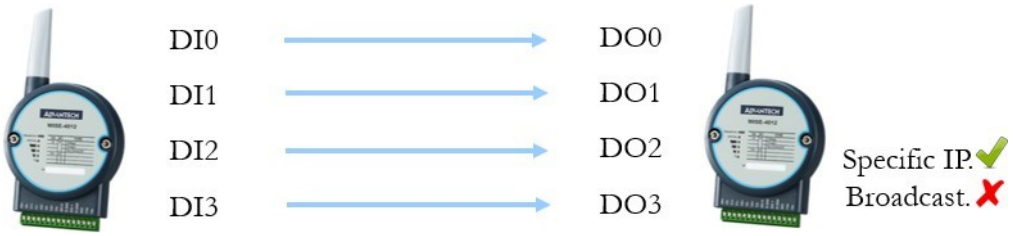
6.4.2 Basic mode

It is worked with **identical channel number mapping**.

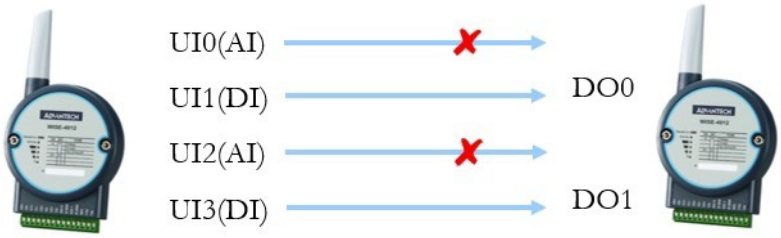
For example: Digital Input channel 1 to Digital Output channel 1 of multiple modules.

Only DI can control DO/relay; AI cannot control DO/relay.

Digital input module map to remote module: In basic mode, user need to be aware of WISE module's Digital Output or relay only can be triggered by Digital Input.



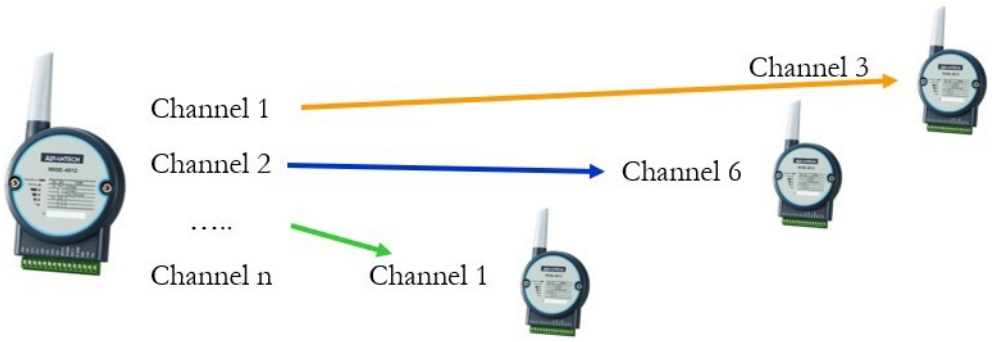
Universal input module can't map to remote module



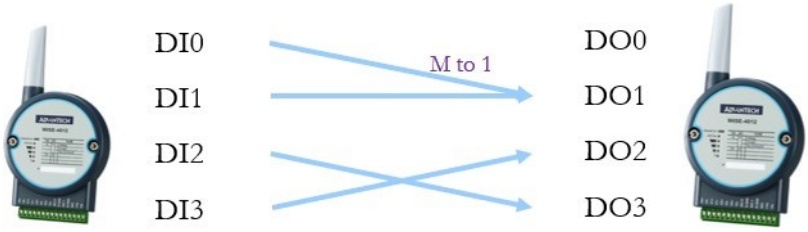
6.4.3 Advanced Mode

You can use different channel number mapping between different input and output module.

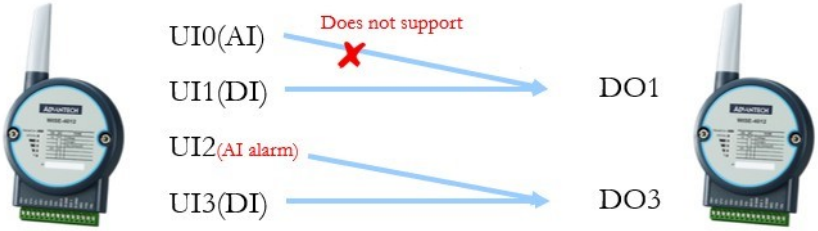
For example: Digital Input channel 1 mapping to Digital Output channel 3 or Digital Input channel 2 mapping to Digital Output channel 6 of another output module as the picture shows.



DI can control DO/relay; AI can also control DO/relay **only in AI alarm mode**. Digital input module map to DO module.



Universal input module map to remote module: The main difference between basic mode and advanced mode is channel number didn't need to be fixed in advanced mode. Because of this difference, user can trigger the Digital Output or relay from multiple inputs.



6.5 P2P Configuration in Web Utility

6.5.1 Basic mode

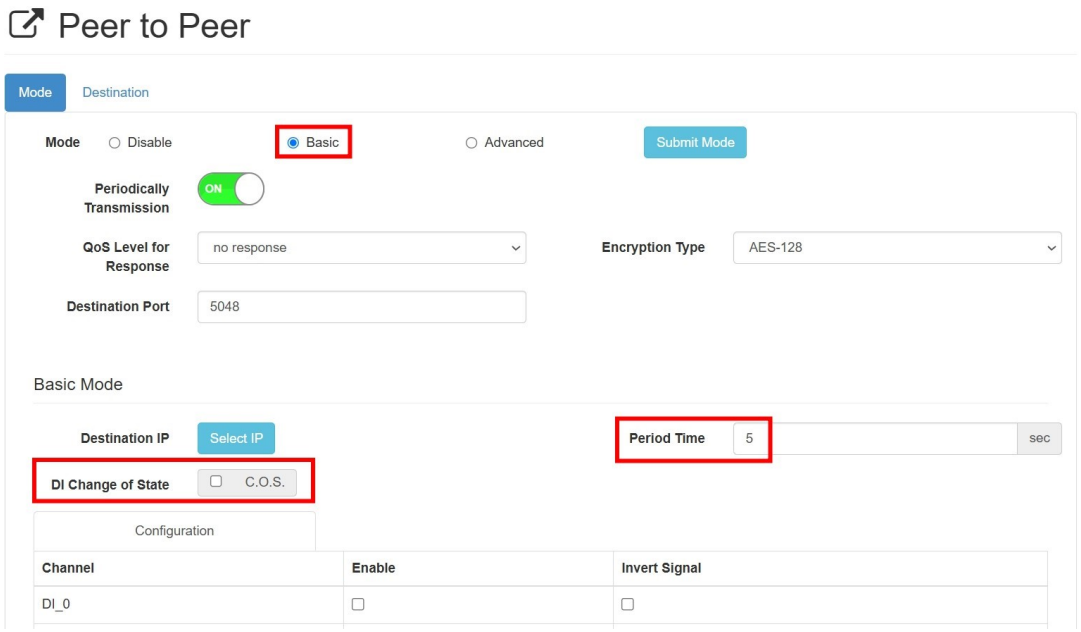
Device can send the data periodically, default of period time is 5 seconds.

User can send data base on Change of State (C.O.S.), which is sending data when DI logic status is changed.

User can setup the customized setting such as QoS level, encryption type, and destination port.

Setting steps:

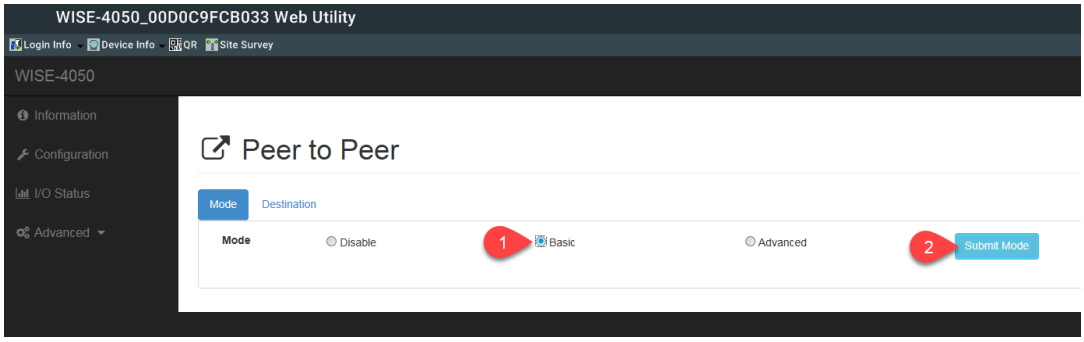
- Choose mode
- Set QOS level
- Set encryption type
- Set destination port
- Setting period
- Assign IP
- Setting individual Channel
- Apply list



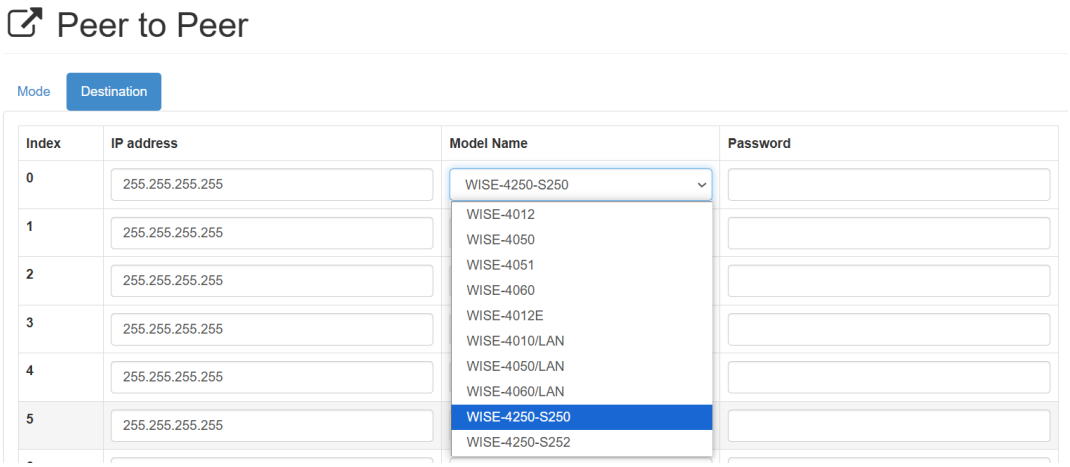
6.5.2 P2P Example (Basic Mode)

We use DI of WISE-4050 to trigger DO of WISE-4012. WISE-4050 is set as dry contact, the DI channel 0 status will trigger the status of the WISE-4012 DO channel 0.

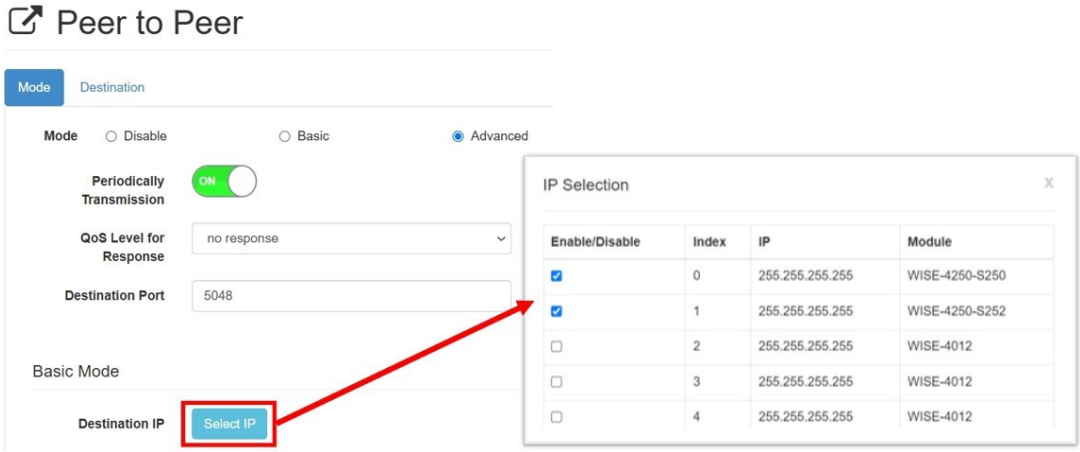
1. Set P2P in Basic mode on input module. (WISE-4050, 192.168.0.100)
2. Click “Submit Mode” to choose basic operating mode.



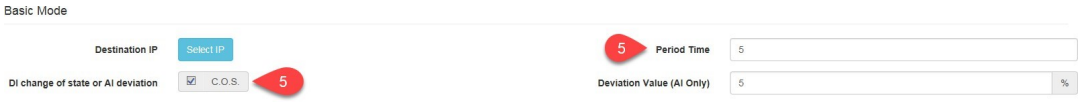
3. Change to “Destination” tab and type-in the destination module IP, model name and password. (WISE-4012, 192.168.0.102).



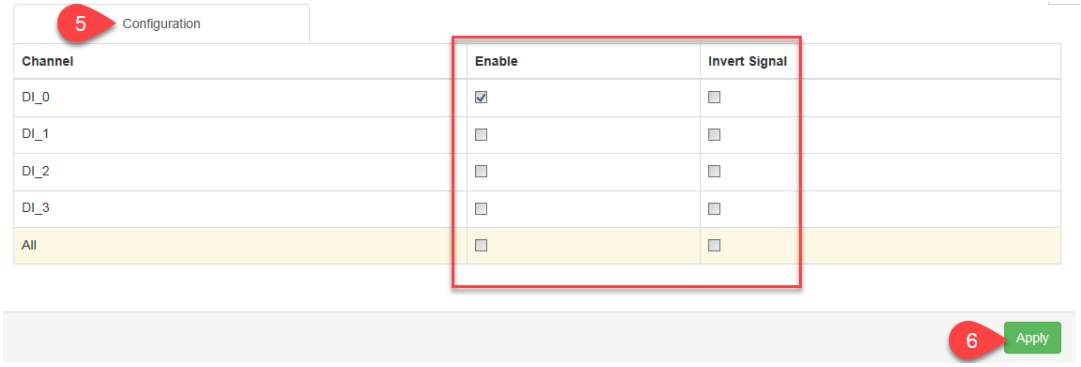
4. Select output module IP address.



5. Set period time or C.O.S. or user can use both.

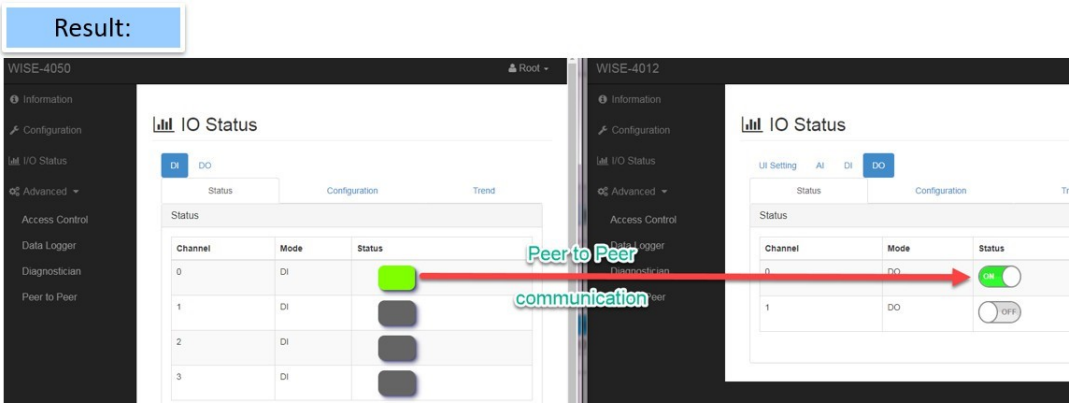


6. Select the channel to use P2P function.
7. Click "**Apply**" to finish P2P setting.



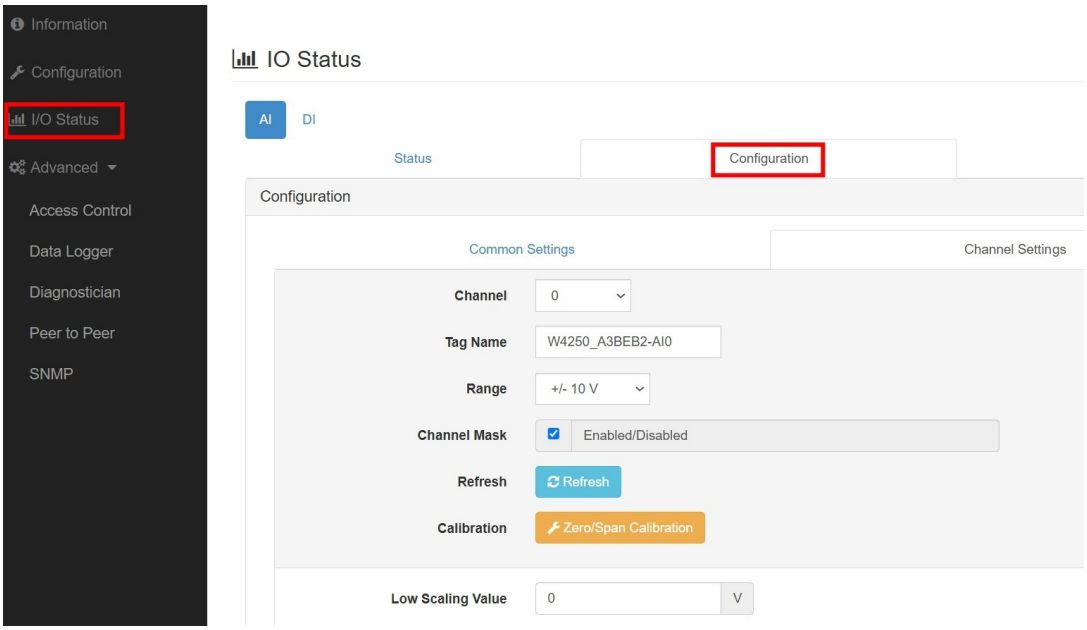
Result:

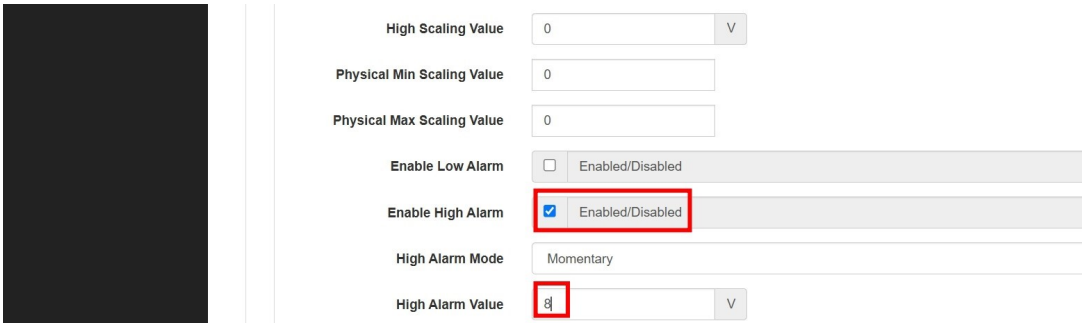
WISE-4050 is set as dry contact, the DI channel 0 status will trigger the status of the WISE-4012 DO channel 0.



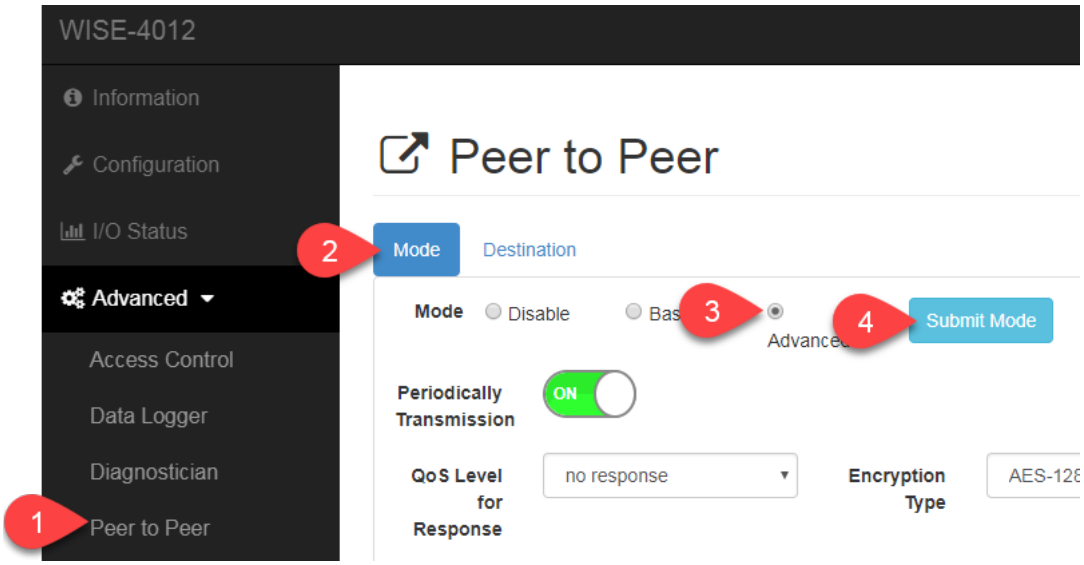
6.5.3 P2P Example (Advanced Mode)

1. Set AI high alarm threshold: We set this AI with high alarm and set the threshold as 8 volts which means when AI value is higher than 8 volts, it will trigger DO of other WISE modules.

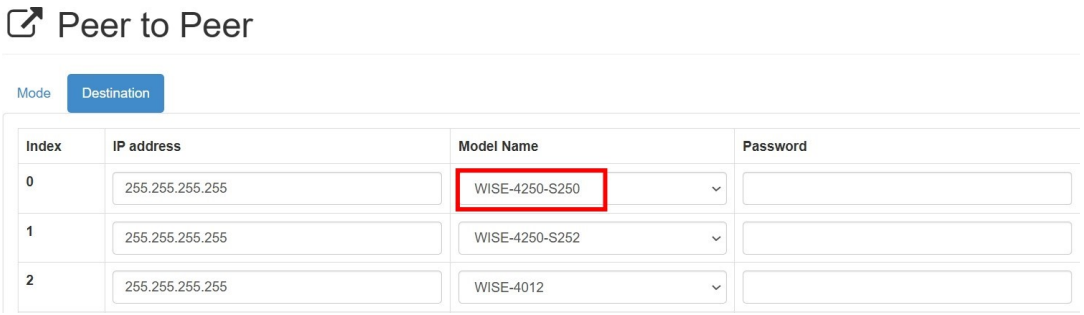




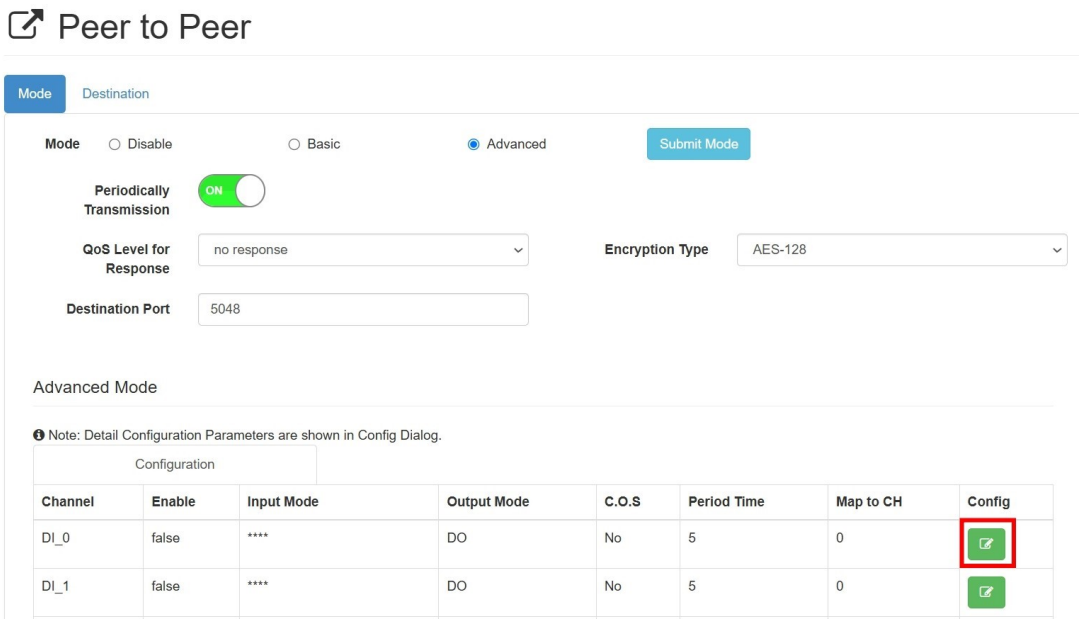
2. Set P2P as Advanced mode on input module. (WISE-4012, 192.168.0.107)
3. Click “Submit Mode” to choose advanced mode.

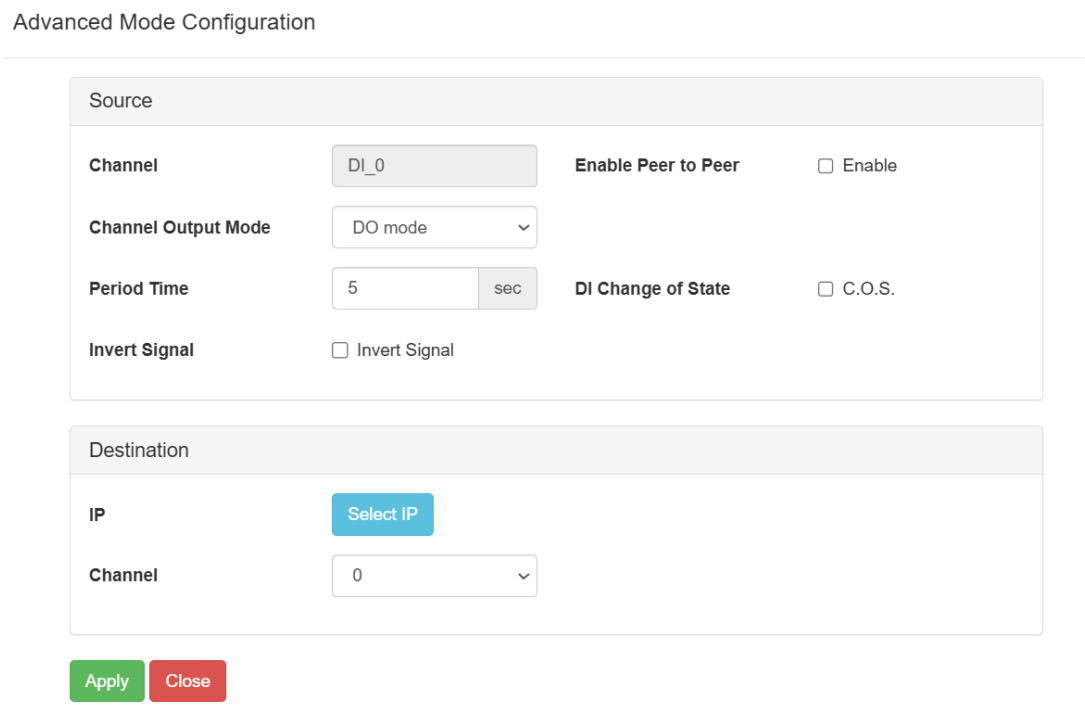


4. Change to “Destination” tab and type-in the destination module IP, model name and password. Then click on “Apply”. (WISE-4050, 192.168.0.100)



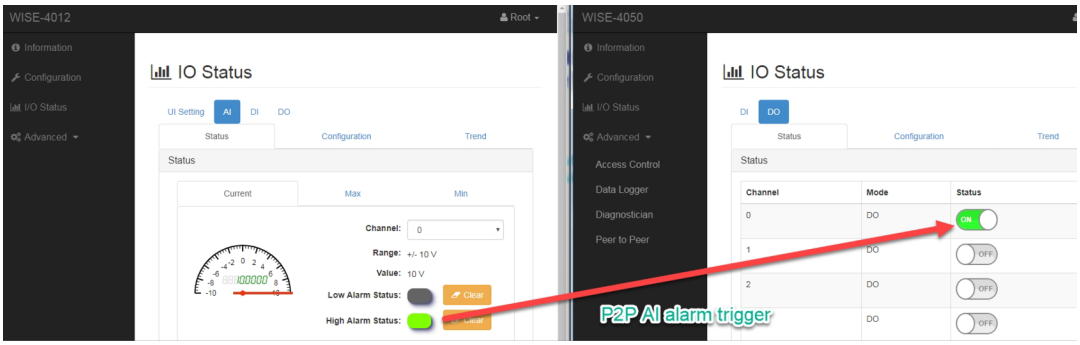
5. Set up the source and the destination, then click on “apply”. In this case, AI “high alarm” is used.
   Will trigger DO of WISE-4050 (according to the destination IP).
6. Click “Apply” to finish P2P setting.





Result:

WISE-4012 AI channel which is alarm mode is going to control the DO of WISE-4050.



Appendix A

I/O Modbus Mapping Table

A.1 Modbus Function Code Introduction

To full-fill the programming requirement, there is a series of function code standard for user's reference.

Table A.1: Modbus Function Code Introduction

Code (Hex)	Name	Usage
01	Read Coil Status	Read Discrete Output Bit
02	Read Input Status	Read Discrete Input Bit
03	Read Holding Registers	Read 16-bit register. Used to read integer or floating point process data.
04	Read Input Registers	
05	Force Single Coil	Write data to force coil ON/OFF
06	Preset Single Register	Write data in 16-bit integer format
08	Loopback Diagnosis	Diagnostic testing of the communication port
0F	Force Multiple Coils	Write multiple data to force coil ON/OFF
10	Preset Multiple Registers	Write multiple data in 16-bit integer format

A.2 WISE-4010/LAN Modbus Mapping Table

Table A.2: WISE-4010/LAN Modbus Mapping Table

Address (0X)	Channel	Description	Attribute
00017	0	DO Value	Read/Write
00018	1		Read/Write
00019	2		Read/Write
00020	3		Read/Write
00101	0	Reset Historical Maximum AI Value	Write
00102	1		Write
00103	2		Write
00104	3		Write
00105	Average Ch 0~3		Write
00111	0	Reset Historical Min. AI Value	Write
00112	1		Write
00113	2		Write
00114	3		Write
00115	Average Ch 0~3		Write
00121	0	Open-Circuit Flag (Burnout)	Read
00122	1		Read
00123	2		Read
00124	3		Read

00131	0	High Alarm Flag	Read
00132	1		Read
00133	2		Read
00134	3		Read
00135	Average Ch 0~3		Read

00141	0	Low Alarm Flag	Read
00142	1		Read
00143	2		Read
00144	3		Read
00145	Average Ch 0~3		Read

Address (4X)	**Channel**	**Description**	**Attribute**
40211		Module Name 1	Read
40212		Module Name 2	Read
40221	All AI	AI Channel Enabled	Read/Write
40303	All DO	DO Value	Read/Write
40001	0	AI Value	Read
40002	1		Read
40003	2		Read
40004	3		Read
40005	Average Ch 0~3		Read
40009-40010	0	Pulse Output Low Level Width	Read/Write
40011~40012	1		Read/Write
40013~40014	2		Read/Write
40015~40016	3		Read/Write
40017-40018	0	Pulse Output High Level Width	Read/Write
40019~40020	1		Read/Write
40021~40022	2		Read/Write
40023~40024	3		Read/Write
40025-40026	0	Pulse Output Number (0 for continuous output)	Read/Write
40027~40028	1		Read/Write
40029~40030	2		Read/Write
40031~40032	3		Read/Write
40033~40034	0	Set Incremental Pulse Output Number	Read/Write
40035~40035	1		Read/Write
40037~40038	2		Read/Write
40037~40040	3		Read/Write

40101~40102	0	AI Status*	Read
40103~40104	1		Read
40105~40106	2		Read
40107~40108	3		Read

40111	0	Historical Maximum AI Value	Read
40112	1		Read
40113	2		Read
40114	3		Read
40115	Average Ch 0~3		Read

40121	0	Historical Minimum AI Value	Read
40122	1		Read
40123	2		Read
40124	3		Read
40125	Average Ch 0~3		Read

40131~40132	0	AI Floating Value (IEEE754)	Read
40133~40134	1		Read
40135~40136	2		Read
40137~40138	3		Read
40139~40140	Average Ch 0~3		Read

40151~40152	0	Historical Maximum AI Floating Value (IEEE754)	Read
40153~40154	1		Read
40155~40156	2		Read
40157~40158	3		Read
40159~40160	Average Ch 0~3		Read

40171~40172	0	Historical Minimum AI Floating Value (IEEE754)	Read
40173~40174	1		Read
40175~40176	2		Read
40177~40178	3		Read
40179~40180	Average Ch 0~3		Read

40191	0	AI Value After Scaling	Read
40192	1		Read
40193	2		Read
40194	3		Read
40195	Average Ch 0~3		Read

40201	0	AI Type Code** (The type codes of channels for average value can't be changed.)	Read/Write
40202	1		Read/Write
40203	2		Read/Write
40204	3		Read/Write
40205	Average Ch 0~3		Read

Table A.3: * AI Status (2 Registers)			
Lower Register		**Higher Register**	
Bit	Description	Bit	Description
0	Fail to Provide AI Value	0	DI triggered to Safety Value
1	Over Range	1	DI triggered to Startup Value
2	Under Range	2	Reserved
3	Open Circuit / Burnout	3	Reserved
4	Reserved	4	Reserved
5	Reserved	5	Reserved
6	Reserved	6	Reserved
7	ADC Initializing/Error	7	Reserved
8	Reserved	8	Reserved
9	Zero/Span Calibration Error	9	Reserved
10	Reserved	10	Reserved
11	Reserved	11	Reserved
12	Reserved	12	Reserved
13	Reserved	13	Reserved
14	Reserved	14	Reserved
15	Reserved	15	Reserved

Table A.4: ** AI Type Code (2 Registers)	
Type Code	**Input Range**
0x1080	4~20 mA
0x1082	0~20 mA

A.3 WISE-4050/LAN Modbus Mapping Table

Table A.5: WISE-4050/LAN Modbus Mapping Table

Address 0X	Channel	Description	Attribute
00001	0	DI Value	Read
00002	1		Read
00003	2		Read
00004	3		Read
00017	0	DO Value	Read/Write
00018	1		Read/Write
00019	2		Read/Write
00020	3		Read/Write
00033	0	Counter Status (0: stop 1: start)	Read/Write
00034	1		Read/Write
00035	2		Read/Write
00036	3		Read/Write
00037	0	Clear Counter (1: write to clear value)	Write
00038	1		Write
00039	2		Write
00040	3		Write
00041	0	Clear Overflow (1: counter overflow, auto set to 0 after read)	Read/Write
00042	1		Read/Write
00043	2		Read/Write
00044	3		Read/Write
00045	0	DI Latch Status (1: DI latched, 0: write to clear latch)	Read/Write
00046	1		Read/Write
00047	2		Read/Write
00048	3		Read/Write

Address 4X	Channel	Description	Attribute
40211	-	Module Name 1	Read
40212	-	Module Name 2	Read
40301	All DI	DI Value	Read
40303	All DO	DO Value	Read/Write
40001~40002	0	Counter/Frequency Value	Read
40003~40004	1		Read
40005~40006	2		Read
40007~40008	3		Read

40009~40010	0	Pulse Output Low Level Width	Read/Write
40011~40012	1		Read/Write
40013~40014	2		Read/Write
40015~40016	3		Read/Write
40017~40018	0	Pulse Output High Level Width	Read/Write
40019~40020	1		Read/Write
40021~40022	2		Read/Write
40023~40024	3		Read/Write
40025~40026	0	Set Absolute Pulse Output Number (0 for continuous output)	Read/Write
40027~40028	1		Read/Write
40029~40030	2		Read/Write
40031~40032	3		Read/Write
40033~40034	0	Set Incremental Pulse Output Number	Read/Write
40035~40036	1		Read/Write
40037~40038	2		Read/Write
40039~40040	3		Read/Write

A.4 WISE-4060/LAN Modbus Mapping Table

Table A.6: WISE-4060/LAN Modbus Mapping Table

Address 0X	Channel	Description	Attribute
00001	0	DI Value	Read
00002	1		Read
00003	2		Read
00004	3		Read
00017	0	DO Value	Read/Write
00018	1		Read/Write
00019	2		Read/Write
00020	3		Read/Write
00033	0	Counter Status (0: stop 1: start)	Read/Write
00034	1		Read/Write
00035	2		Read/Write
00036	3		Read/Write
00037	0	Clear Counter (1: write to clear value)	Write
00038	1		Write
00039	2		Write
00040	3		Write

00041	0	Clear Overflow (1: counter overflow, auto set to 0 after read)	Read/Write
00042	1		Read/Write
00043	2		Read/Write
00044	3		Read/Write

00045	0	DI Latch Status (1: DI latched, 0: write to clear latch)	Read/Write
00046	1		Read/Write
00047	2		Read/Write
00048	3		Read/Write

Address 4X	**Channel**	**Description**	**Attribute**
40211	-	Module Name 1	Read
40212	-	Module Name 2	Read

40301	All DI	DI Value	Read
40303	All DO	DO Value	Read/Write

40001~40002	0	Counter/Frequency Value	Read
40003~40004	1		Read
40005~40006	2		Read
40007~40008	3		Read

40009~40010	0	Pulse Output Low Level Width	Read/Write
40011~40012	1		Read/Write
40013~40014	2		Read/Write
40015~40016	3		Read/Write

40017~40018	0	Pulse Output High Level Width	Read/Write
40019~40020	1		Read/Write
40021~40022	2		Read/Write
40023~40024	3		Read/Write

40025~40026	0	Set Absolute Pulse Output Number (0 for continuous output)	Read/Write
40027~40028	1		Read/Write
40029~40030	2		Read/Write
40031~40032	3		Read/Write

40033~40034	0	Set Incremental Pulse Output Number	Read/Write
40035~40036	1		Read/Write
40037~40038	2		Read/Write
40039~40040	3		Read/Write

A.5 WISE-4012E Wireless Modbus Mapping Table

Table A.7: WISE-4012E Wireless Modbus Mapping Table

Address 0X	Channel	Description	Attribute
00001	0	DI Value	Read
00002	1		Read
00017	0	DO Value	R/W
00018	1		R/W
00033	0	Counter Status (0: stop 1: start)	R/W
00034	1		R/W
00035	0	Clear Counter (1: write to clear value)	Write
00036	1		Write
00037	0	Clear Overflow (1: counter overflow, auto set to 0 after read)	R/W
00038	1		R/W
00039	0	DI Latch Status (1: DI latched, 0: write to clear latch)	R/W
00040	1		R/W
00101	0	Reset Historical Maximum AI Value	Write
00102	1		Write
00103	Average Channel 0~1		Write
00111	0	Reset Historical Minimum AI Value	Write
00112	1		Write
00113	Average Channel 0~1		Write
00131	0	High Alarm Flag	Read
00132	1		Read
00133	Average Channel 0~1		Read
00141	0	Low Alarm Flag	Read
00142	1		Read
00143	Average Channel 0~1		Read

Address 4X	Channel	Description	Attribute
40211		Module Name 1	Read
40212		Module Name 2	Read

40221	All AI	AI Channel Enable	R/W
40301	All DI	DI Value	Read
40303	All DO	DO Value	R/W
40001	0	AI Value (Value Range: 0~10000, Value Unit: mV)	Read
40002	1		Read
40003	Average Channel 0~1		Read
40017~40018	0	Counter/Frequency Value	R/W
40019~40020	1		R/W
40021~40022	0	Pulse Output Low Level Width	R/W
40023~40024	1		R/W
40025~40026	0	Pulse Output High Level Width	R/W
40027~40028	1		R/W
40029~40030	0	Set Absolute Pulse Output Number (0 for continuous output)	R/W
40031~40032	1		R/W
40033~40034	0	Set Incremental Pulse Output Number	R/W
40035~40036	1		R/W
40101~40102	0	AI Status*	Read
40103~40104	1		Read
40111	0	Historical Maximum AI Value	Read
40112	1		Read
40113	Average Channel 0~1		Read
40121	0	Historical Minimum AI Value	Read
40122	1		Read
40123	Average Channel 0~1		Read
40131~40132	0	AI Floating Value (IEEE754)	Read
40133~40134	1		Read
40135~40136	Average Channel 0~1		Read
40151~40152	0	Historical Maximum AI Floating Value (IEEE754)	Read
40153~40154	1		Read
40155~40156	Average Channel 0~1		Read

40171~40172	0	Historical Minimum AI Floating Value (IEEE754)	Read
40173~40174	1		Read
40175~40176	Average Channel 0~1		Read

40191	0	AI Value After Scaling	Read
40192	1		Read
40193	Average Channel 0~1		Read

40201	0	AI Type Code** (The type codes of channels for average value can't be changed.)	R/W
40202	1		R/W
40203	Average Channel 0~1		R

Table A.8: * AI Status (2 Registers)

Lower Register		Higher Register	
Bit	**Description**	**Bit**	**Description**
0	Fail to Provide AI Value	0	DI triggered to Safety Value
1	Over Range	1	DI triggered to Startup Value
2	Under Range	2	Reserved
3	Open Circuit / Burnout	3	Reserved
4	Reserved	4	Reserved
5	Reserved	5	Reserved
6	Reserved	6	Reserved
7	ADC Initializing/Error	7	Reserved
8	Reserved	8	Reserved
9	Zero/Span Calibration Error	9	Reserved
10	Reserved	10	Reserved
11	Reserved	11	Reserved
12	Reserved	12	Reserved
13	Reserved	13	Reserved
14	Reserved	14	Reserved
15	Reserved	15	Reserved

Table A.9: ** AI Type Code (2 Registers)

Type Code	Input Range
0x0148	0~10 V

A.6 WISE-4012 Wireless Modbus Mapping Table

Table A.10: WISE-4012 Wireless Modbus Mapping Table			
Address 0X	**Channel**	**Description**	**Attribute**
00001	0	DI Value	Read
00002	1		Read
00003	2		Read
00004	3		Read
00017	0	DO Value	R/W
00018	1		R/W
00033	0	Counter Status (0: stop 1: start)	R/W
00034	1		R/W
00035	2		R/W
00036	3		R/W
00037	0	Clear Counter (1: write to clear value)	Write
00038	1		Write
00039	2		Write
00040	3		Write
00041	0	Clear Overflow (1: counter overflow, auto set to 0 after read)	R/W
00042	1		R/W
00043	2		R/W
00044	3		R/W
00045	0	DI Latch Status (1: DI latched, 0: write to clear latch)	R/W
00046	1		R/W
00047	2		R/W
00048	3		R/W
00101	0	Reset Historical Maximum AI Value	Write
00102	1		Write
00103	2		Write
00104	3		Write
00105	Average Channel 0~3		Write
00111	0	Reset Historical Minimum AI Value	Write
00112	1		Write
00113	2		Write
00114	3		Write
00115	Average Channel 0~3		Write

00131	0	High Alarm Flag	Read
00132	1		Read
00133	2		Read
00134	3		Read
00135	Average Channel 0~3		Read

00141	0	Low Alarm Flag	Read
00142	1		Read
00143	2		Read
00144	3		Read
00145	Average Channel 0~3		Read

Address 4X	**Channel**	**Description**	**Attribute**
40211		Module Name 1	Read
40212		Module Name 2	Read
40221	All AI	AI Channel Enable	R/W
40301	All DI	DI Value	Read
40303	All DO	DO Value	R/W
40001	0	AI Value	Read
40002	1		Read
40003	2		Read
40004	3		Read
40005	Average Channel 0~1		Read
40017~40018	0	Counter/Frequency Value	R/W
40019~40020	1		R/W
40021~40022	2		R/W
40023~40024	3		R/W
40025~40026	0	Pulse Output Low Level Width	R/W
40027~40028	1		R/W
40029~40030	0	Pulse Output High Level Width	R/W
40031~40032	1		R/W
40033~40034	0	Set Absolute Pulse Output Number (0 for continuous output)	R/W
40035~40036	1		R/W
40037~40038	0	Set Incremental Pulse Output Number	R/W
40039~40040	1		R/W

40101~40102	0	AI Status*	Read
40103~40104	1		Read
40105~40106	2		Read
40107~40108	3		Read

40111	0	Historical Maximum AI Value	Read
40112	1		Read
40113	2		Read
40114	3		Read
40115	Average Channel 0~3		Read

40121	0	Historical Minimum AI Value	Read
40122	1		Read
40123	2		Read
40124	3		Read
40125	Average Channel 0~3		Read

40131~40132	0	AI Floating Value (IEEE754)	Read
40133~40134	1		Read
40135~40136	2		Read
40137~40138	3		Read
40139~40140	Average Channel 0~3		Read

40151~40152	0	Historical Maximum AI Floating Value (IEEE754)	Read
40153~40154	1		Read
40155~40156	2		Read
40157~40158	3		Read
40159~40160	Average Channel 0~3		Read

40171~40172	0	Historical Minimum AI Floating Value (IEEE754)	Read
40173~40174	1		Read
40175~40176	2		Read
40177~40178	3		Read
40179~40180	Average Channel 0~3		Read

40191	0	AI Value After Scaling	Read
40192	1		Read
40193	2		Read
40194	3		Read
40195	Average Channel 0~3		Read

40231~40232	0	Physical AI Floating Value (IEEE754)	Read
40233~40234	1		Read
40235~40236	2		Read
40237~40238	3		Read
40239~40240	Average Channel 0~3		Read

40201	0	AI Type Code** (The type codes of channels for average value can't be changed.)	R/W
40202	1		R/W
40203	2		R/W
40204	3		R/W
40205	Average Channel 0~3		R

Table A.11: * AI Status (2 Registers)

Lower Register		**Higher Register**	
Bit	Description	Bit	Description
0	Fail to Provide AI Value	0	DI triggered to Safety Value
1	Over Range	1	DI triggered to Startup Value
2	Under Range	2	Reserved
3	Open Circuit / Burnout	3	Reserved
4	Reserved	4	Reserved
5	Unavailable Channel Configuration	5	Reserved
6	Reserved	6	Reserved
7	ADC Initializing/Error	7	Reserved
8	Reserved	8	Reserved
9	Zero/Span Calibration Error	9	Reserved
10	Reserved	10	Reserved
11	Reserved	11	Reserved
12	Reserved	12	Reserved
13	Reserved	13	Reserved
14	Reserved	14	Reserved
15	Reserved	15	Reserved

Table A.12: ** AI Type Code (2 Registers)		
Input Type	**Input Range**	**Type Code**
Unipolar Voltage	0~10 V	0x0148
	0~5 V	0x0147
	0~1 V	0x0145
	0~500m V	0x0106
	0~150m V	0x0105
Bipolar Voltage	+/-10V	0x0143
	+/-5V	0x0142
	+/-1V	0x0140
	+/-500mV	0x0104
	+/-150mV	0x0103
Current	0~20mA	0x0182
	4~20mA	0x0180
	+/-20mA	0x0181
DI Mode	DI	0x01E0

A.7 WISE-4050 Wireless Modbus Mapping Table

Table A.13: WISE-4050 Wireless Modbus Mapping Table			
Address 0X	**Channel**	**Description**	**Attribute**
00001	0	DI Value	Read
00002	1		Read
00003	2		Read
00004	3		Read
00017	0	DO Value	R/W
00018	1		R/W
00019	2		R/W
00020	3		R/W
00033	0	Counter Status (0: stop 1: start)	R/W
00034	1		R/W
00035	2		R/W
00036	3		R/W
00037	0	Clear Counter (1: write to clear value)	Write
00038	1		Write
00039	2		Write
00040	3		Write
00041	0	Clear Overflow (1: counter overflow, auto set to 0 after read)	R/W
00042	1		R/W
00043	2		R/W
00044	3		R/W

00045	0	DI Latch Status (1: DI latched, 0: write to clear latch)	R/W
00046	1		R/W
00047	2		R/W
00048	3		R/W

Address 4X	**Channel**	**Description**	**Attribute**
40211	-	Module Name 1	Read
40212	-	Module Name 2	Read
40301	All DI	DI Value	Read
40303	All DO	DO Value	R/W
40001~40002	0	Counter/Frequency Value	Read
40003~40004	1		Read
40005~40006	2		Read
40007~40008	3		Read
40009~40010	0	Pulse Output Low Level Width	R/W
40011~40012	1		R/W
40013~40014	2		R/W
40015~40016	3		R/W
40017~40018	0	Pulse Output High Level Width	R/W
40019~40020	1		R/W
40021~40022	2		R/W
40023~40024	3		R/W
40025~40026	0	Set Absolute Pulse Output Number (0 for continuous output)	R/W
40027~40028	1		R/W
40029~40030	2		R/W
40031~40032	3		R/W
40033~40034	0	Set Incremental Pulse Output Number	R/W
40035~40036	1		R/W
40037~40038	2		R/W
40039~40040	3		R/W

A.8 WISE-4051 Wireless Modbus Mapping Table

Table A.14: WISE-4051 Wireless Modbus Mapping Table

Address 0X	Channel	Description	Attribute
00001	0	DI Value	Read
00002	1		Read
00003	2		Read
00004	3		Read
00005	4		Read
00006	5		Read
00007	6		Read
00008	7		Read
00033	0	Counter Status (0: stop 1: start)	R/W
00034	1		R/W
00035	2		R/W
00036	3		R/W
00037	4		R/W
00038	5		R/W
00039	6		R/W
00040	7		R/W
00041	0	Clear Counter (1: write to clear value)	Write
00042	1		Write
00043	2		Write
00044	3		Write
00045	4		Write
00046	5		Write
00047	6		Write
00048	7		Write
00049	0	Clear Overflow (1: counter overflow, auto set to 0 after read)	R/W
00050	1		R/W
00051	2		R/W
00052	3		R/W
00053	4		R/W
00054	5		R/W
00055	6		R/W
00056	7		R/W
	0		

00057	0	DI Latch Status (1: DI latched, 0: write to clear latch)	R/W
00058	1		R/W
00059	2		R/W
00060	3		R/W
00061	4		R/W
00062	5		R/W
00063	6		R/W
00064	7		R/W
01001~01064		Expansion Bit	R/W
05001		Low Battery Status	Read

Address 4X	**Channel**	**Description**	**Attribute**
40211	-	Module Name 1	Read
40212	-	Module Name 2	Read
40301	All DI	DI Value	Read
40001~40002	0	Counter/Frequency Value	R/W
40003~40004	1		R/W
40005~40006	2		R/W
40007~40008	3		R/W
40009~40010	4		R/W
40011~40012	5		R/W
40013~40014	6		R/W
40015~40016	7		R/W
41001~41064		Expansion Word	R/W
41101~41164		Expansion Bit Error Code	Read
41201~41264		Exapsnion Word Error Code	Read
45101		Data Log Status	Read

A.9 WISE-4060 Wireless Modbus Mapping Table

Table A.15: WISE-4060 Wireless Modbus Mapping Table			
Address 0X	**Channel**	**Description**	**Attribute**
00001	0	DI Value	Read
00002	1		Read
00003	2		Read
00004	3		Read
00017	0	DO Value	R/W
00018	1		R/W
00019	2		R/W
00020	3		R/W
00033	0	Counter Status (0: stop 1: start)	R/W
00034	1		R/W
00035	2		R/W
00036	3		R/W
00037	0	Clear Counter (1: write to clear value)	Write
00038	1		Write
00039	2		Write
00040	3		Write
00041	0	Clear Overflow (1: counter overflow, auto set to 0 after read)	R/W
00042	1		R/W
00043	2		R/W
00044	3		R/W
00045	0	DI Latch Status (1: DI latched, 0: write to clear latch)	R/W
00046	1		R/W
00047	2		R/W
00048	3		R/W

Address 4X	**Channel**	**Description**	**Attribute**
40211	-	Module Name 1	Read
40212	-	Module Name 2	Read
40301	All DI	DI Value	Read
40303	All DO	DO Value	R/W
40001~40002	0	Counter/Frequency Value	Read
40003~40004	1		Read
40005~40006	2		Read
40007~40008	3		Read

40009~40010	0	Pulse Output Low Level Width	R/W
40011~40012	1		R/W
40013~40014	2		R/W
40015~40016	3		R/W

40017~40018	0	Pulse Output High Level Width	R/W
40019~40020	1		R/W
40021~40022	2		R/W
40023~40024	3		R/W

40025~40026	0	Set Absolute Pulse Output Number (0 for continuous output)	R/W
40027~40028	1		R/W
40029~40030	2		R/W
40031~40032	3		R/W

40033~40034	0	Set Incremental Pulse Output Number	R/W
40035~40036	1		R/W
40037~40038	2		R/W
40039~40040	3		R/W

Appendix B

REST for WISE-4000 Series

B.1 Introduction

REST is the short for Representational State Transfer. It's a software architecture style widely used for creating scalable web services. It is web standards based architecture and uses HTTP Web service. APIs that adhere to the REST architectural constraints are called RESTful APIs. HTTP-based RESTful APIs are defined with these aspects:

- Base URI, such as http://example.com/resources/
- An Internet media type for the data. This is often JSON but can be any other valid Internet media type (e.g., XML, Atom, microformats, images, etc.)
- Standard HTTP methods (e.g., GET, PUT, POST, or DELETE)

User could find the REST resources for WISE-4000 series in the appendix b of user manual.

Take the web-service that related to DI as an example, you could find it meets the definition of RESTful.

- **URL structure:**
  http://10.0.0.1/di_value/slot_index (Collection URI)
  http://10.0.0.1/di_value/slot_index/ch_num (Element URI)

- **Internet media type:**

application/json

```
{
 "Ch":2,
 "Md":1,
 "Stat":0,
 "Val":3378,
 "Cnting":0,
 "ClrCnt":1,
 "OvLch": 0
}
```

(Please note that ADAM-6000-CE and ADAM-6200 series use XML as the Internet media type)

- **HTTP methods**:

GET:Returns the representation of all of digital input value resource.

PUT:Replace all of digital input value resource

PATCH:Apply partial modifications to digital input value resource.

B.2 REST Resources for WISE-4000 Series

B.2.1 Digital Input

B.2.1.1 /di_value/slot_index/ch_num

Table B.1: Address 4XChannelDescriptionAttribute	
Description	Retrieves information about the digital input value resource on specific slot.
URL Structure	http://10.0.0.1/di_value/slot_index http://10.0.0.1/di_value/slot_index/ch_num
HTTP Method	GET:Returns the representation of all of digital input value resource. PUT:Replace all of digital input value resource PATCH:Apply partial modifications to digital input value resource.
GET	Multiple Channel Request: **GET /di_value/slot_index** Single Channel Request: GET /di_value/slot_index/ch_num [Example] Request: **GET /di_value/slot_0** Content-type: application/json Response: 200 OK { "DIVal": [{ "Ch":0, "Md":0, "Stat":1, "Val":1, "Cnting":0, "ClrCnt":0, "OvLch": 0 }, { "Ch":1, "Md":0, "Stat":0, "Val":0, "Cnting":0, "ClrCnt":0, "OvLch": 0 }, { "Ch":2, "Md":1, "Stat":0, "Val":3378, "Cnting":1, "ClrCnt":0, "OvLch": 0 },

	{
	"Ch":3,
	"Md":3,
	"Stat":0,
	"Val":1,
	"Cnting":0,
	"ClrCnt":0,
	"OvLch": 0
	}
	]
	}

GET (Cont.)	Request : **GET /di_value/slot_0/ch_2**
	
	Content-type: application/json
	Response: 200 OK
	{
	"Ch":2,
	"Md":0,
	"Stat":1,
	"Val":1,
	"Cnting":0,
	"ClrCnt":0,
	"OvLch": 0
	}

PUT	Single/Multiple Channel Request: **PUT /di_value/slot_index** Single Channel Request: PUT /di_value/slot_index/ch_num [Example] Request: **PUT /di_value/slot_0** Content-type: application/json { "DIVal": [{ "Ch":0, "Md":0, "Stat":0, "Val":0, "Cnting":0, "ClrCnt":0, "OvLch": 0 }, { "Ch":1, "Md":0, "Stat":0, "Val":0, "Cnting":0, "ClrCnt":0, "OvLch": 0 },

PUT (Cont.)	{
	"Ch":2,
	"Md":1,
	"Stat":0,
	"Val":3378,
	"Cnting":0,
	"ClrCnt":1,
	"OvLch": 0
	},
	{
	"Ch":3,
	"Md":3,
	"Stat":0,
	"Val":0,
	"Cnting":0,
	"ClrCnt":0,
	"OvLch": 0
	}
	]
	}
	
	Response: 200 OK
	
	Request: **PUT /di_value/slot_0/ch_2**
	
	Content-type: application/json
	{
	"Ch":2,
	"Md":1,
	"Stat":0,
	"Val":3378,
	"Cnting":0,
	"ClrCnt":1,
	"OvLch": 0
	}
	
	Response: 200 OK

PATCH	Single/Multiple Channel Request:
	PATCH /di_value/slot_index
	Single Channel Request:
	PATCH /di_value/slot_index/ch_num
	
	[Example]
	
	Request: **PATCH /di_value/slot_0**
	
	Content-type: application/json
	{
	"DIVal": [
	{
	"Ch":2,
	"Cnting": 1
	},
	{
	"Ch":3,
	"OvLch":0
	}
	]
	}
	
	Response: 200 OK
	
	Request: **PATCH /di_value/slot_0/ch_3**
	Content-type: application/json
	{
	"Ch":3,
	"ClrCnt":1
	}
	
	Response: 200 OK

Table B.2: JSON array name definition:

Field	Abbreviation	Data Type
Array of Digital input configurations	DIVal	Array

:

Table B.3: Resource value definitions					
Field	**Abbreviation**	**Data Type**	**Property**	**Description**	
Channel Number	Ch	Number	R	0, 1, …: Digital input channel number.	
Mode	Md	Number	R	**Digital input mode**	
				0	DI
				1	Counter
				2	LowToHighLatch
				3	HighToLowLatch
				4	Frequency
Signal Logic Status	Stat	Number	R	1, 0: Input signal is Logic High or Low.	
Channel Value	Val	Number	R	**DI measurement data**	
				Input Mode	Value Description
				DI	Logic Status of DI
				Counter	Counter Value
				LowToHigh-Latch	Logic status of DI
				HighToLow-Latch	Logic status of DI
				Frequency	Frequency(unity 0.1 Hz)
Start Counter	Cnting	Number	RW	Start/Stop counter counting Read 1: counter is counting 0: not counting Write 1: start counting 0: stop counting	
Clear Counter	ClrCnt	Number	W	1: Clear the counter value	
Get/Clear Counter Overflow or Latch Status	OvLch	Number	RW	counter overflow or latch status Read 1: overflow/latch occurred. 0: no overflow or latch Write 0: clear the overflow or latch status	

B.2.2 Digital Output

B.2.2.1 /do_value/slot_index/ch_num

Table B.4: /do_value/slot_index/ch_num	
Description	Retrieves information about the digital output value resource on specific slot.
URL Structure	http://10.0.0.1/do_value/slot_index http://10.0.0.1/do_value/slot_index/ch_num
HTTP Method	GET:Returns the representation of all of digital output value resource. PUT:Replace all of digital output value resource PATCH:Apply partial modifications to digital output value resource.
GET	Multiple Channel Request: **GET /do_value/slot_index** Single Channel Request: GET /do_value/slot_index/ch_num [Example] Request: **GET /do_value/slot_0** Content-type: application/json Response: 200 OK { "DOVal": [{ "Ch":0, "Md":0, "Stat":1, "Val":1, "PsCtn":0, "PsStop":0, "PsIV": 0 }, { "Ch":1, "Md":0, "Stat":0, "Val":0, "PsCtn":0, "PsStop":0, "PsIV": 0 }, { "Ch":2, "Md":1, "Stat":1, "Val":3378, "PsCtn":0, "PsStop":0, "PsIV": 0 },

GET (Cont.)	{
	"Ch":3,
	"Md":3,
	"Stat":1,
	"Val":1,
	"PsCtn":0,
	"PsStop":0,
	"PsIV": 0
	}
	]
	}
	
	Request : **GET /do_value/slot_0/ch_2**
	
	Content-type: application/json
	Response: 200 OK
	{
	"Ch":2,
	"Md":0,
	"Stat":1,
	"Val":1,
	"PsCtn":0,
	"PsStop":0,
	"PsIV": 0
	}

PUT	Single/Multiple Channel Request: **PUT /do_value/slot_index** Single Channel Request: PUT /do_value/slot_index/ch_num [Example] Request: **PUT /do_value/slot_0** Content-type: application/json { "DOVal": [{ "Ch":0, "Md":0, "Stat":1, "Val":1, "PsCtn":0, "PsStop":0, "PsIV": 0 }, { "Ch":1, "Md":0, "Stat":0, "Val":0, "PsCtn":0, "PsStop":0, "PsIV": 0 },

PUT (Cont.)	{
	"Ch":2,
	"Md":1,
	"Stat":1,
	"Val":3378,
	"PsCtn":0,
	"PsStop":0,
	"PsIV": 0
	},
	{
	"Ch":3,
	"Md":3,
	"Stat":1,
	"Val":1,
	"PsCtn":0,
	"PsStop":0,
	"PsIV": 0
	}
	]
	}
	
	Response: 200 OK
	
	Request: **PUT /do_value/slot_0/ch_2**
	
	Content-type: application/json
	{
	"Ch":2,
	"Md":2,
	"Stat":0,
	"Val":0,
	"PsCtn":0,
	"PsStop":0,
	"PsIV": 0
	}
	
	Response: 200 OK

PATCH	Single/Multiple Channel Request:
	PATCH /do_value/slot_index
	Single Channel Request:
	PATCH /do_value/slot_index/ch_num
	
	[Example]
	
	Request: **PATCH /do_value/slot_0**
	
	Content-type: application/json
	{
	"DOVal": [
	{
	"Ch":2,
	"Md": 2
	},
	{
	"Ch":3,
	"PsStop":1
	}
	]
	}
	
	Response: 200 OK
	
	Request: **PATCH /do_value/slot_0/ch_3**
	
	Content-type: application/json
	{
	"Ch":3,
	"PsCtn":1
	}
	
	Response: 200 OK

Table B.5: JSON array name definition:

Field	Abbreviation	Data Type
Array of Digital input configurations	DOVal	Array

:

Table B.6: Resource value definitions				
Field	**Abbreviation**	**Data Type**	**Property**	**Description**
Channel Number	Ch	Number	R	0, 1, …: Digital output channel number.
Mode	Mode	Mode	R	**Digital output mode** 0 DO 1 Pulse Output 2 LowToHighDelay 3 HighToLowDelay
Signal Logic Status	Stat	Number	R	1, 0: Output signal is Logic High or Low.
Channel Value	Val	Number	RW	DO measurement data Output Mode Value Description DO Get the current signal status or set its status Pulse Output Get or set the absolute pulse count value LowToHighDelay Get the current signal status or set its status HighToLowDelay Get the current signal status or set its status
Pulse Output Continue State	PsCtn	Number	RW	1 / 0: Pulse outputting is continuous or not.
Stop Pulse Output	PsStop	Number	W	1: Stop the pulse outputting. (Continue is disabled, Absolute and incremental values are reset to zero. DO signal status is set to logic low.)
Incremental Pulse Output Value	PsIV	Number	RW	Incremental Pulse Output Value

B.2.3 Analog Input

B.2.3.1 /ai_value/slot_index/ch_num

Table B.7: /ai_value/slot_index/ch_num	
Description	Retrieves information about the analog input value resource on specific slot.
URL Structure	http://10.0.0.1/ai_value/slot_index http://10.0.0.1/ai_value/slot_index/ch_num
HTTP Method	GET:Returns the representation of all of analog input value resource. PUT:None PATCH:Apply partial modifications to analog input value resource.
GET	Multiple Channel Request: **GET /ai_value/slot_index** Single Channel Request: GET /ai_value/slot_index/ch_num [Example] Request : **GET /ai_value/slot_0** Content-type: application/json Response: 200 OK { "AIVal": [{ "Ch":0, "En":1, "Rng":328, "Val":148, "Eg":650, "Evt":0, "LoA": 0, "HiA": 0, "HVal":190, "HEg":1250, "LVal":15, "LEg":500, "SVal":148, "ClrH": 0, "ClrL": 0 },

GET (Cont.)	{ "Ch":1, "En":1, "Rng":328, "Val":0, "Eg":0, "Evt":0, "LoA":0, "HiA":0, "HVal":0, "HEg":0, "LVal":0, "LEg":0, "SVal":0, "ClrH": 0, "ClrL": 0 }, { "Ch":2, "En":1, "Rng":328, "Val":0, "Eg":0, "Evt":8, "LoA":0, "HiA":0, "HVal":0, "HEg":0, "LVal":0, "LEg":0, "SVal":0, "ClrH": 0, "ClrL": 0 }, { "Ch":3, "En":1, "Rng":328, "Val":0, "Eg":0, "Evt":0, "LoA":0, "HiA":0, "HVal":0, "HEg":0, "LVal":0, "LEg":0, "SVal":0, "ClrH": 0, "ClrL": 0 },

	{
	"Ch":4,
	"En":1,
	"Rng":328,
	"Val":0,
	"Eg":0,
	"Evt":0,
	"LoA":0,
	"HiA":0,
	"HVal":0,
	"HEg":0,
	"LVal":0,
	"LEg":0,
	"SVal":0,
	"ClrH": 0,
	"ClrL": 0
	}
	]
	}

GET (Cont.)	Request : **GET /ai_value/slot_0/ch_2**
	
	Content-type: application/json
	Response: 200 OK
	{
	"Ch":2,
	"En":1,
	"Rng":328,
	"Val":0,
	"Eg":0,
	"Evt":8,
	"LoA":0,
	"HiA":0,
	"HVal":0,
	"HEg":0,
	"LVal":0,
	"LEg":0,
	"SVal":0,
	"ClrH": 0,
	"ClrL": 0
	}

PUT	None

PATCH	Single/Multi Channel Request:
	PATCH /ai_value/slot_index
	Single Channel Request:
	PATCH /ai_value/slot_index/ch_num
	
	[Example]
	
	Request: **PATCH /ai_value/slot_0**
	
	Content-type: application/json
	{
	"AIVal": [
	{
	"Ch":2,
	"LoA": 0
	},
	{
	"Ch":3,
	"HiA":0
	}
	]
	}
	
	Response: 200 OK
	
	Request: **PATCH /ai_value/slot_0/ch_3**
	
	Content-type: application/json
	{
	"LoA":0
	}
	
	Response: 200 OK

Table B.8: JSON array name definition

Field	Abbreviation	Data Type
Array of Analog input configurations	AIVal	Array

:

Table B.9: Resource value definitions (Total channels = AI channel number + 1 average channel)					
Field	**Abbreviation**	**Data Type**	**Property**	**Description**	
Channel Number	Ch	Number	R	0, 1, …: Analog input channel number. Note for the average channel: The average channel number for a 4-ch AI module is 4.	
Input Range	Rng	Number	R	Analog input range.	
				Range code	
				328	(0x0148) 0 – 10 V
				259	(0x0103) +/- 150 mV
				260	(0x0104) +/- 500 mV
				320	(0x0140) +/- 1 V
				321	(0x0141) +/- 2.5 V
				322	(0x0142) +/- 5 V
				323	(0x0143) +/- 10 V
				327	(0x0147) 0 ~ 5 V
				384	(0x0180) 4 ~ 20 mA
				385	(0x0181) +/- 20 mA
				386	(0x0182) 0 ~ 20 mA
				65535	Invalid range, if average channel is disable
Channel Enable	En	Number	R	1 / 0: Enable / Disable AI conversion Notice: Average channel is read only. When channel mask of average is not 0, the value is 1.	
Channel Raw Value	Val	Number	R	0 ~ 65535:AI measurement data (Raw data)	
Channel Engineering data	Eg	Number	R	AI engineering data, the value is 1/1000 scale. For example, 1630 à 1.63	
Channel Event Status	Evt	Number	R	AI statuses	
Low Alarm Status	LoA	Number	RW	Low alarm status Read 1: low alarm occurred. 0: not occurred Write 0: clear the low alarm status	

High Alarm Status	HiA	Number	RW	High alarm status Read 1: high alarm occurred. 0: not occurred Write 0: clear the high alarm status
Maximum AI Raw Value	HVal	Number	R	AI max. measurement data (Raw data)
Maximum AI Engineering data	HEg	Number	R	AI max. engineering data, the value is 1/1000 scale For example, 10200→10.2
Minimum AI Raw Value	LVal	Number	R	AI min. measurement data (Raw data)
Minimum AI Engineering data	LEg	Number	R	AI min. engineering data, the value is 1/1000 scale For example, 250 → 0.25
Channel Raw Value After Scaling	SVal	Number	R	0 ~ 65535 : AI measurement data (Raw data) after scaling
Clear Maximum AI Value	ClrH	Number	W	1 : Clear the Maximum AI value
Clear Minimum AI Value	ClrL	Number	W	1 : Clear the Minimum AI value
Physical value after scaling	PEg	Number	R	AI physical value after scaling, the value is 1/1000 scale For example: 150350'150.35
Mapping unit	Uni	String	R	Unit for mapping value Max. 32 characters

Table B.10: * AI Status (2 Registers)			
Lower Register		**Higher Register**	
Bit	**Description**	**Bit**	**Description**
0	Fail to Provide AI Value	0	DI triggered to Safety Value
1	Over Range	1	DI triggered to Startup Value
2	Under Range	2	Reserved
3	Open Circuit/Burnout	3	Reserved
4	Reserved	4	Reserved
5	Unavailable Channel Configuration	5	Reserved
6	Reserved	6	Reserved
7	ADC Initializing/Error	7	Reserved
8	Reserved	8	Reserved
9	Zero/Span Calibration Error	9	Reserved
10	Reserved	10	Reserved
11	Reserved	11	Reserved
12	Reserved	12	Reserved
13	Reserved	13	Reserved
14	Reserved	14	Reserved
15	Reserved	15	Reserved

B.2.4 RS-485 Port Expansion Data

B.2.4.1 Expansion Bit Data

Table B.11: /expansion_bit/com_x/ch_num	
Description	Retrieves information about the expansion tag bit data resource, the data information is defined by user configuration
URL Structure	**http://10.0.0.1/expansion_bit/com_x (Get only)** **http://10.0.0.1/expansion_bit/com_x /idx_y (Get only)** **http://10.0.0.1/expansion_bit/com_x /ch_num** **where x = 1 ~ : the identifier of COM number** **where y = 0 ~ : the index of data resource requisition, 8 channel in each index** **where num = 0 ~ : the channel number**
HTTP Method	GET: Returns the representation of all of expansion bit data resource. PUT: None PATCH: Apply partial modifications to expansion bit data resource.
GET	Multi-Channel Request? **GET /expansion_bit/com_x** Single Channel Request? **GET /expansion_bit/com_x/ch_num** [Example]: ■ Request : **GET /expansion_bit/com_1/** Content-type: application/json Response: 200 OK { "ExpBit": [{ "Ch":0, "Val":1, "Evt":0, "SID":1, "Addr":1, "MAddr":1001, "WEvt":0 }, { "Ch":1, "Val":0, "Evt":0, "SID":1, "Addr":2, "MAddr":1002, "WEvt":0 }, { "Ch":2, "Val":1, "Evt":0, "SID":1, "Addr":3, "MAddr":1003, "WEvt":0 },

GET (Cont.)	{
	"Ch":3,
	"Val":1,
	"Evt":0,
	"SID":1,
	"Addr":4,
	"MAddr":1004,
	"WEvt":0
	},
	{
	"Ch":4,
	"Val":1,
	"Evt":0,
	"SID":2,
	"Addr":1,
	"MAddr":1005,
	"WEvt":0
	},
	……
	{
	"Ch":31,
	"Val":0,
	"Evt":0,
	"SID":3,
	"Addr":17,
	"MAddr":1032,
	"WEvt":0
	}
	]
	}
	
	■ Request : **GET /expansion_bit/com_1/ch_2**
	
	Content-type: application/json
	Response: 200 OK
	{
	"Ch":2,
	"Val":1,
	"Evt":0,
	"SID":1,
	"Addr":3,
	"MAddr":1003,
	"WEvt":0
	
	}

Table B.12: JSON array name definition

Field	Abbreviation	Data Type
Array of Analog input configurations	ExpBit	Array

Table B.13: Resource value definitions

Field	Abbreviations	Data type	Property	Description
Channel Number	Ch	Number	R	0, 1, …: expansion tag data channel number
Channel Value	Val	Number	R/W	The channel value of expansion tag data Value: 0/1 *After writing action, user must poll the "expansion bit writing status" to get process result
Channel Error Code	Evt	Number	R	The channel error code of expansion tag data (TBD) Modbus exception code Bit 7: Write only mask

Event Value (Bit: 6~0)	Description
0 (0x00)	No error
1 (0x01)	Illegal function
2 (0x02)	Illegal data address
3 (0x03)	Illegal data value
4 (0x04)	Slave device failure
5 (0x05)	Acknowledge
6 (0x06)	Slave device busy
7 (0x07)	Negative acknowledge
8 (0x08)	Memory parity error
9 (0x09)	Reserved
10 (0x0A)	Gateway path unavailable
11 (0x0B)	Gateway target device failed to respond
12 ~15	Reserved
16 (0x10)	Unavailable
17 (0x11)	Slave response timeout
18 (0x12)	Checksum error
19 (0x13)	Reserved data error
20 (0x14)	Send request fail
21 (0x15)	Unprocessed
22 (0x16)	Read only
23 (0x17)	22 (0x16)

Slave ID	SID	Number	R	Modbus RTU slave ID 0~255
Slave Modbus Address	Addr	Number	R	Modbus RTU Slave device polling address: 1-9999
Modbus TCP Mapping Address	MAddr	Number	R	Modbus TCP mapping address of expansion value:1-9999

Table B.14:

Field	Abbreviations	Data type	Property	
Expansion bit writing status	WEvt	Number	**The status for preview writing action.**	
			Event Value (Bit: 6~0)	**Description**
			0 (0x00)	No error
			1 (0x01)	Illegal function
			2 (0x02)	Illegal data address
			3 (0x03)	Illegal data value
			4 (0x04)	Slave device failure
			5 (0x05)	Acknowledge
			6 (0x06)	Slave device busy
			7 (0x07)	Negative acknowledge
			8(0x08)	Memory parity error
			9 (0x09)	Reserved
			10 (0x0A)	Gateway path unavailable
			11 (0x0B)	Gateway target device failed to respond
			12 ~15	Reserved
			16 (0x10)	Unavailable
			17 (0x11)	Slave response timeout
			18 (0x12)	Checksum error
			19 (0x13)	Reserved data error
			20 (0x14)	Send request fail
			21 (0x15)	Unprocessed
			22 (0x16)	Read only
			23 (0x17)	**In processing**
			*Event value 0x17: the writing process is not finish, user should poll the status later.	
Remarks				

B.2.4.2 Expansion Word Data

Table B.15: /expansion_word/com_x/ch_num	
Description	Retrieves information about the expansion tag bit data resource, the data information is defined by user configuration
URL Structure	**http://10.0.0.1/expansion_word/com_x** **http://10.0.0.1/expansion_word/com_x/ch_num** **where x = 1 ~ : the identifier of COM number** **where num = 0 ~ : the channel number**
HTTP Method	GET: Returns the representation of all of expansion bit data resource. PUT: None PATCH: Apply partial modifications to expansion bit data resource.
GET	Multi-Channel Request? **GET /expansion_word/com_x** Single Channel Request? **GET /expansion_word/com_x/ch_num** [Example]: ■ Request : GET /expansion_word/com_1 Content-type: application/json Response: 200 OK { "ExpWord": [{ "Ch":0, "Val":32768, "Evt":0, "SID":1, "Addr":1, "MAddr":1001, "WEvt":0 }, { "Ch":1, "Val":1235, "Evt":0, "SID":1, "Addr":2, "MAddr":1002, "WEvt":0 }, { "Ch":2, "Val":65535, "Evt":0, "SID":1, "Addr":3, "MAddr":1003, "WEvt":0 },

GET (Cont.)


```
  {
   "Ch":3,
   "Val":33358,
   "Evt":0,
   "SID":1,
   "Addr":4,
   "MAddr":1004,
   "WEvt":0
  },
  {
   "Ch":4,
   "Val":4095,
   "Evt":0,
   "SID":2,
   "Addr":211,
   "MAddr":1005,
   "WEvt":0
  },
  ……
{
    "Ch":31,
    "Val":0,
    "Evt":0,
    "SID":3,
    "Addr":1,
    "MAddr":1032,
    "WEvt":0
  }
 ]
}
```


■ Request : **GET /expansion_word/com_1/ch_2**


```
Content-type: application/json
Response: 200 OK
{
    "Ch":2,
    "Val":65535,
    "Evt":0,
    "SID":1,
   "Addr":3,
   "MAddr":1003,
   "WEvt":0
}
```


Table B.16: JSON array name definition

Field	Abbreviation	Data Type
Array of Analog input configurations	ExpWord	Array

Table B.17: Resource value definitions

Field	Abbreviations	Data type	Property	Description	
Channel Number	Ch	Number	R	0, 1, …: expansion tag data channel number	
Channel Value	Val	Number	R/W	The channel value of expansion tag data Value: 0/1 *After writing action, user must poll the "expansion bit writing status" to get process result	
Channel Error Code	Evt	Number	R	The channel error code of expansion tag data (TBD) Modbus exception code Bit 7: Write only mask	
				Event Value (Bit: 6~0)	**Description**
				0 (0x00)	No error
				1 (0x01)	Illegal function
				2 (0x02)	Illegal data address
				3 (0x03)	Illegal data value
				4 (0x04)	Slave device failure
				5 (0x05)	Acknowledge
				6 (0x06)	Slave device busy
				7 (0x07)	Negative acknowledge
				8(0x08)	Memory parity error
				9 (0x09)	Reserved
				10 (0x0A)	Gateway path unavailable
				11 (0x0B)	Gateway target device failed to respond
				12 ~15	Reserved
				16 (0x10)	Unavailable
				17 (0x11)	Slave response timeout
				18 (0x12)	Checksum error
				19 (0x13)	Reserved data error
				20 (0x14)	Send request fail
				21 (0x15)	Unprocessed
				22 (0x16)	Read only
				23 (0x17)	In processing
Slave ID	SID	Number	R	Modbus RTU slave ID 0~255	
Slave Modbus Address	Addr	Number	R	Modbus RTU Slave device polling address: 1-9999	
Modbus TCP Mapping Address	MAddr	Number	R	Modbus TCP mapping address of expansion value:1-9999	

Table B.18:

Field	Abbreviations	Data type	Property	
Expan-sion bit writing status	WEvt	Number	The status for preview writing action.	
			Event Value (Bit: 6~0)	**Description**
			0 (0x00)	No error
			1 (0x01)	Illegal function
			2 (0x02)	Illegal data address
			3 (0x03)	Illegal data value
			4 (0x04)	Slave device failure
			5 (0x05)	Acknowledge
			6 (0x06)	Slave device busy
			7 (0x07)	Negative acknowledge
			8(0x08)	Memory parity error
			9 (0x09)	Reserved
			10 (0x0A)	Gateway path unavailable
			11 (0x0B)	Gateway target device failed to respond
			12 ~15	Reserved
			16 (0x10)	Unavailable
			17 (0x11)	Slave response timeout
			18 (0x12)	Checksum error
			19 (0x13)	Reserved data error
			20 (0x14)	Send request fail
			21 (0x15)	Unprocessed
			22 (0x16)	Read only
			23 (0x17)	**In processing**
			*Event value 0x17: the writing process is not finish, user should poll the status later.	
Remarks				

B.2.5 Data Logger

B.2.5.1 /log_message

Table B.19: /log_message	
Description	Retrieves the log data in system memory.
URL Structure	http://10.0.0.1/log_message
HTTP Method	GET: According to the setting of filtering, server returns the all/partial of logged data.

GET	Request:
	GET /log_message
	
	[Example]:
	Request: **GET /log_message** for WISE-4060/LAN module
	
	Content-type: application/json
	Response: 200 OK
	{
	"LogMsg": [
	{
	"PE":128,
	"TIM":"2014-11-11T15:48:32+08:00",
	"UID":"ADAM-4060/LAN_00D0C9FE1601",
	"MAC":"00-D0-C9-FE-16-01",
	"Record" :
	[
	[0,3,3,1],
	[0,2,4,150],
	[0,5,5,250]
	]
	},
	{
	"PE":128,
	"TIM":"2014-11-11T15:49:44+08:00",
	"UID":"ADAM-4060/LAN_00D0C9FE1601",
	"MAC":"00-D0-C9-FE-16-01",
	"Record" :
	[
	[0,3,3,0],
	[0,2,4,140],
	[0,5,5,240]
	]
	},
	{
	"PE":128,
	"TIM":"2014-11-11T15:51:02+08:00",
	"UID":"ADAM-4060/LAN_00D0C9FE1601",
	"MAC":"00-D0-C9-FE-16-01",
	"Record" :
	[
	[0,3,3,0],
	[0,2,4,130],
	[0,5,5,230]
	]
	}
	]
	}

Table B.20: JSON array name definition		
Field	**Abbreviation**	**Data Type**
Array of log messages	LogMsg	Array
Array of I/O records	Record	Array

Table B.21: Resource value definitions:

Field	Abbreviations	Data type	Property	Description		
Periodic/ Event	128	Number	R	**Recording mode of storage**		
				1	Event from	DI
				2		DO
				4		AI
				8		AO
				16		WDT
				128	Periodic	
Time-stamp	TIM	String	R	Timestamp of the storage “Coordinated Universal Time (UTC) Ex. “1415757750” corresponds to November 12, 2014, 2:02:30 am, Standard Time. (meanwhile, 2014, 10:02:30 am, Taipei Time.) “Local Date/Time according GMT time zone (ISO 8601) Ex. “1994-11-05T08:15:30-05:00” corresponds to November 5, 1994, 8:15:30 am, US Eastern Standard Time.		
UUID	UID	String	R	Universally Unique Identifier (UUID) Max. 32 characters		
MAC ID	MAC	String	R	MAC address. (12+5) characters, ex, “00-D0-C9-F0-63-F7		
Record-ing mes-sage	Record	Array	R	* The information in array is as follows. [Slot-index, Channel-index, I/O-type-index, I/O-value] * The data type in array is as follows. [Number, Number, Number, Number] Notice: When the I/O-type-index is engineering type (12, 13, 14, 18), the I/O value is 1/1000 scale.		
				Index	**Recording I/O-type of the storage**	
				0	Invalid	
				1	DI Logic Status	
				2	DI Counter value	
				3	DI Frequency value	
				4	DO Logic Status	
				5	DO Absolute Pulse Output value	
				6	DO Incremental Pulse Output Value	

Recording message	Record	Record	Record	7	AI value
				8	Historical Maximum AI value
				9	Historical Minimum AI value
				10	AI value after scaling
				11	AI status flags
				12	AI engineering value
				13	Historical Maximum AI engineering value
				14	Historical Minimum AI engineering value
				15	AO value
				16	AO value after scaling
				17	AO status flags
				18	AO engineering value
				19	AI physical value
				20	AI engineering value (floating type)
				21	Historical Maximum AI engineering value (floating type)
				22	Historical Minimum AI engineering value (floating type)
				23	AI physical value (floating type)
				30	Expansion bit data
				31	Expansion bit error code
				32	Expansion word data
				33	Expansion word error code
Remarks					

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