

NEXCOM International Co., Ltd.

# IoT Automation Solutions Business Group NIO 50 Wi-Fi Device Adaptor

User Manual

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## PREFACE

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## Acknowledgements

NIO 50 is a trademark of NEXCOM International Co., Ltd. All other product names mentioned herein are registered trademarks of their respective owners.

## **Regulatory Compliance Statements**

This section provides the FCC compliance statement for Class B devices and describes how to keep the system CE compliant.



### **Declaration of Conformity**

#### **Federal Communication Commission Interference Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

#### IMPORTANT NOTE: Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/CANADA.

Operation of this device is restricted to indoor use only.

# This device is intended only for OEM integrators under the following conditions:

The antenna must be installed such that 20 cm is maintained between the antenna and users.

The transmitter module may not be co-located with any other transmitter or antenna.

For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 3 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

#### **IMPORTANT NOTE**

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

#### **End Product Labeling**

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: YHI-EWF3210K".

#### Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as shown in this manual.

#### CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.



## **RoHS Compliance**



**NEXCOM RoHS Environmental Policy and Status Update** NEXCOM is a global citizen for building the digital infrastructure. We are committed to providing green products and services, which are compliant with European

Union RoHS (Restriction on Use of Hazardous Substance in Electronic Equipment) directive 2011/65/EU, to be your trusted green partner and to protect our environment. RoHS restricts the use of Lead (Pb) < 0.1% or 1,000ppm, Mercury (Hg) < 0.1% or 1,000ppm, Cadmium (Cd) < 0.01% or 100ppm, Hexavalent Chromium (Cr6+) < 0.1% or 1,000ppm, Polybrominated biphenyls (PBB) < 0.1% or 1,000ppm, and Polybrominateddiphenyl Ethers (PBDE) < 0.1% or 1,000ppm. In order to meet the RoHS compliant directives, NEXCOM has established an engineering and manufacturing task force to implement the introduction of green products. The task force will ensure that we follow the standard NEXCOM development procedure and that all the new RoHS components and new manufacturing processes maintain the highest industry quality levels for which NEXCOM are renowned.

The model selection criteria will be based on market demand. Vendors and suppliers will ensure that all designed components will be RoHS compliant.

#### How to recognize NEXCOM RoHS Products?

For existing products where there are non-RoHS and RoHS versions, the suffix "(LF)" will be added to the compliant product name. All new product models launched after January 2013 will be RoHS compliant. They will use the usual NEXCOM naming convention.

## **Safety Information**

Before installing and using the device, note the following precautions:

- Read all instructions carefully.
- Do not place the unit on an unstable surface, cart, or stand.
- Follow all warnings and cautions in this manual.
- When replacing parts, ensure that your service technician uses parts specified by the manufacturer.
- Avoid using the system near water, in direct sunlight, or near a heating device.

Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.

Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:

- A Philips screwdriver
- A flat-tipped screwdriver
- A grounding strap
- An anti-static pad

Using your fingers can disconnect most of the connections. It is recommended that you do not use needle-nose pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.

## **Safety Precautions**

- 1. Read these safety instructions carefully.
- 2. Keep this User Manual for later reference.
- 3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- 4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
- 5. Keep this equipment away from humidity.
- 6. Put this equipment on a stable surface during installation. Dropping it or letting it fall may cause damage.
- 7. The openings on the enclosure are for air convection to protect the equipment from overheating. DO NOT COVER THE OPENINGS.
- 8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- 9. Place the power cord in a way so that people will not step on it. Do not place anything on top of the power cord. Use a power cord that has been approved for use with the product and that it matches the voltage and current marked on the product's electrical range label. The voltage and current rating of the cord must be greater than the voltage and current rating marked on the product.



- 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 by transient overvoltage.
- 12. Never pour any 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 one of the following situations arises, get the equipment checked by service personnel:
  - a. The power cord or plug is damaged.
  - b. Liquid has penetrated into the equipment.
  - c. The equipment has been exposed to moisture.
  - d. The equipment does not work well, or you cannot get it to work according to the user's manual.
  - e. The equipment has been dropped and damaged.
  - f. The equipment has obvious signs of breakage.
- 15. Do not place heavy objects on the equipment.
- 16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

## **Technical Support and Assistance**

- 1. For the most updated information of NEXCOM products, visit NEXCOM's website at www.nexcom.com.
- 2. For technical issues that require contacting our technical support team or sales representative, please have the following information ready before calling:
  - Product name and serial number
  - Detailed information of the peripheral devices
  - Detailed information of the installed software (operating system, version, application software, etc.)
  - A complete description of the problem
  - The exact wordings of the error messages



#### Warnings

Read and adhere to all warnings, cautions, and notices in this guide and the documentation supplied with the chassis, power supply, and accessory modules. If the instructions for the chassis and power supply are inconsistent with these instructions or the instructions for accessory modules, contact the supplier to find out how you can ensure that your computer meets safety and regulatory requirements.

- 1. Handling the unit: carry the unit with both hands and handle it with care.
- 2. Opening the enclosure: disconnect power before working on the unit to prevent electrical shocks.
- 3. Maintenance: to keep the unit clean, use only approved cleaning products or clean with a dry cloth.

#### Cautions

Electrostatic discharge (ESD) can damage system components. Do the described procedures only at an ESD workstation.

If no such station is available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

## **Conventions Used in this Manual**



Warning:

Information about certain situations, which if not observed, can cause personal injury. This will prevent injury to yourself when performing a task.



Caution:

Information to avoid damaging components or losing data.



Note:

Provides additional information to complete a task easily.

## CHAPTER 1: PRODUCT OVERVIEW

## **1.1 Introduction**

Modbus has been widely applied in factory communication protocol, and is now the most popular protocol in industrial devices. Modbus is also used to connect a supervisory computer with a remote terminal unit (RTU) in supervisory control and data acquisition (SCADA) systems.

NIO 50 is a Modbus TCP to RTU/ASCII gateway that enables a Modbus/TCP host to communicate with serial Modbus RTU/ASCII devices through Wi-Fi or Ethernet network, thus eliminates the cable length limitation of legacy serial communication devices. By breathing new life to fieldbus-based controllers, legacy manufacturing machines, and serial-based devices, the NIO 50 fills the communication gap between edge nodes to the cloud, enabling field data to be harnessed for manufacturing process optimization, remote management, and preventive maintenance.

NIO 50 enables flexible direction selection between Ethernet, Serial or Wi-Fi. Users can use the same device to cover the connectivity among different communication interfaces. It has built-in Web server for easy configuration from Ethernet network. It can also be managed via NEXCOM nCare I4.0 node & network manager.

For use on factory floors the NIO 50 is specially engineered to deliver industrial-grade durability. For instance, the metal-cased NIO 50 offers an extended operating temperature range from -20 to 70 degree Celsius, a 9 to 36 voltage input range, and surge protection on serial and LAN connectors to work in proximity with field devices.





#### Main Features:

- ✓ Modbus support including Modbus TCP/RTU/ASCII
- ✓ Support MQTT
- ✓ Network connectivity 1x 10/100 Fast Ethernet port
- ✓ Web-based configuration
- ✓ 9600~115200 bps baudrate for RS-232/422/485 transmissions
- $\checkmark\,$  Secure data access with WPA & WPA2  $\,$
- $\checkmark$  Enhanced surge protection for serial, LAN, and power
- ✓ Support 9~36V DC input
- ✓ Support -20~70°C extended operating temperature

## **1.2 Interface Introduction**

#### 1.2.1 NIO 50 Front View



1.2.2 Power Pin Assignment



Power pin: DC input range of 9~36 V



### 1.2.3 Serial Interface Pin Assignment RS-232 Pin Assignment













#### 1.2.4 LED Display Wi-Fi Signal Indication



- 4x LED: Highest signal strength (very good quality)
- 3x LED: Good signal strength
- 2x LED: Fair signal strength
- 1x LED: Poor signal strength (need to improve Wi-Fi connection)
- No LED: Cannot connect Wi-Fi (need to review Wi-Fi connection setup)

#### **Power & Serial Status**



- Power LED: Power is normal→ON No power→OFF Serial Tx/Rx: Serial port runs in Tx or Rx direction
  - Tx: Orange
  - Rx: Green

## 1.3 NIO 50 Dimension



## **1.4 Package Contents**

NIO 50	
Wi-Fi Antenna	
Phoenix Contact Terminal Block Connector	

## CHAPTER 2: HARDWARE INSTALLATION

## 2.1 Hardware Installation Guide

Hardware connection of NIO 50 is very simple. Please follow the steps below:



#### 2.1.1 Connection of Power

- 1. Prepare DC power source (9~36 VDC) or NEXCOM optional power adaptor accessory.
- 2. If using a NEXCOM power adaptor, plug the adaptor terminal block directly into the NIO 50 bottom power connector.
- 3. If using an external DC power source, please carefully check if the polarity of power cord fits the polarity drawing in this diagram.
- 4. If the power connects correctly, then the "Power LED" will light up accordingly.

#### 2.1.2 Connection of Wi-Fi



- 1. Connect the Wi-Fi antenna accessory to the NIO 50 Wi-Fi connector.
- 2. Setup Wi-Fi configuration in NIO 50 so that SSID, Security type and pre-shared key are the same as the Wi-Fi access point which NIO 50 connects to.
- 3. Check the Wi-Fi signal LED on the front panel if the Wi-Fi signal strength is good enough. Please make sure the Wi-Fi signal strength has at least 2x LEDs.





- 1. Make sure the network settings on the Host PC are correctly configured so that NIO 50 and PC are on the same subnet.
- 2. Use Windows DOS "ping" command to probe NIO 50 Ethernet IP address. If successful, there should be a ping response as below. (In this case, the IP address of NIO 50 is 10.211.55.1)

C:\Users\stevechen>ping 10.211.55.1
Ping 10.211.55.1 (使用 32 位元組的資料): 回覆自 10.211.55.1: 位元組=32 time<1ms TTL=128 回覆自 10.211.55.1: 位元組=32 time<1ms TTL=128 回覆自 10.211.55.1: 位元組=32 time<1ms TTL=128 回覆自 10.211.55.1: 位元組=32 time<1ms TTL=128
10.211.55.1 的 Ping 統計資料: 封包: 已傳送 = 4,已收到 = 4, 已遺失 = 0 (0% 遺失), 大約的來回時間 (毫秒): 最小值 = Oms,最大值 = Oms,平均 = Oms



#### 2.1.4 Connection of Serial Port

- 1. Connect the serial port to RS232/422/485 devices.
- 2. Make sure the pin arrangement of the DB-9 port matches the pin definitions listed in section 1.2.3.
- 3. The configuration of NIO 50 serial communication (such as baudrate, data format, etc.) should be identical to the connected serial devices.

# CHAPTER 3: SYSTEM CONFIGURATION GUIDE

After NIO 50 have been setup correctly in hardware connection, user can follow the system configuration guide for further software configuration.

## 3.1 Login

Login is the first step in configuration.

indows 安全性	
The server 19 The server rep	2.168.0.168 is asking for your user name and password. orts that it is from 'Secure Area'.
Warning: Your authentication	user name and password will be sent using basic on a connection that isn't secure.
	🗌 記住我的認識
	確定 政道

Please check the following steps and confirm the setting is correct:

- 1. Confirm the Ethernet configuration of host PC is on the same subnet as 192.168.0.168 so that it can access NIO 50 default IP address.
- 2. Connect Ethernet port of Host PC to NIO 50 Ethernet port.
- 3. Open a web-browser and type the IP address 192.168.0.168 to access the Web server of NIO 50.
- 4. Type username and password as the following:
  - Username: admin
  - Password: 0000

## 3.2 System Setting

In system setting page, user can setup the Device Name, enable SNTP setup, Time Zone, etc.

	Syster	n Setting	
Step 1	Device Name:	NI050	
	SNTP:	Enabled	
Ethernet	Port:	Ethernet	•
Wi-Fi	NTP Server:		
Serial	Timezone:	UTC	<b>*</b>
tep 2	Request Interval:	0	0 - 4294967295 ms
Data Flow	HTTP Username:	admin	
	HTTP Password:		
	Firmware Version:	C-184	
	Build Date:	Feb 26 2016 11:59:49	
	RTC Sync LocalTime:	2016/05/05 (Thursday) 14:19:38	Enabled
			Submit
			Cause Analy

#### • Device Name

Input the Device Name which you want to display. Default setting is "NIO 50".

#### • SNTP Enable

Let user select if the time synchronization is done via SNTP or not.

• Port

Let user define if the time synchronization is via Wi-Fi or Ethernet port.

#### • NTP Server

Input the URL or IP address of NTP server for time synchronization.

#### • Timezone

Input the Time Zone which this NIO 50 is located.

#### • Request interval

Input the request time interval to synchronize with Time server. Recommendation: at least 5,000 ms.

#### • HTTP Username

Input the username of Login Web page. Default setting is "admin".

#### HTTP Password

Input the password of Login Web page. Default setting is "0000".

## 3.3 Direction Configuration

Direction configuration includes the interface setting of Ethernet, Wi-Fi and Serial ports. NIO 50 can be configured as a converter of Serial-to-Wi-Fi, Serial-to-Ethernet and Ethernet-to-Wi-Fi. The function of connecting those interfaces is preceded in this Web page setting.

#### 3.3.1 Ethernet Interface Setting

	Ethernet IP Cor	nfiguration	
System Setting	MAC: DHCP:	00:10:F3:5A:32:24	
Ethernet	Static IP:	192.168.0.168	
Wi-Fi	Subnet Mask:	255.255.255.0	
Sorial	Gateway:	192.168.0.1	
en 2	Primary DNS:	192.168.0.1	
Data Flow	Secondary DNS:	8.8.8	
			Submit
			Save&Apply

#### • DHCP

When user wants to let NIO 50 retrieve IP remotely from DHCP server, this function should be enabled. <Note: When DHCP is enabled, NIO 50 IP address will be changed by DHCP server. As a result, user may not be able to know the assigned IP address. Please make sure you do not have such problem in network management.>

#### • Static IP

If user wants to setup IP manually, this IP address is the pre-assigned address and will not be changed under such setting.

#### • Subnet Mask

Usually given "255.255.255.0" to specify a class C subnet in network planning.

#### • Gateway IP

Put the IP address of the Internet gateway in the network environment, which NIO 50 can connect to for Internet access.



#### • Primary DNS

Input the primary DNS (Domain Name Server) in the network setup.

#### • Secondary DNS

Input the primary DNS (Domain Name Server) in the network setup.

<Note: User needs to click the "Submit" icon after the changes have been made. The "Save and Apply" icon should also be clicked before leaving setup Web page. Otherwise, the setup data will not be saved and taken into effect. >

#### 3.3.2 Wi-Fi Interface Setting

	WiFi AP & IP	Configuration	
1	MAC:	94:A1:A2:87:6F:88	
System Setting	SSID:		Max 32byes
Ethernet	Security Type:	Open	•
Wi-Fi	Key:		Max 32byes
Serial	DHCP:	Enabled	
2	Static IP:	192.168.0.169	
Data Flow	Subnet Mask :	255.255.255.0	
	Gateway:	192.168.0.1	
	Primary DNS:	192.168.0.1	
	Secondary DNS:	8.8.8	
			Submit
			Save&Apply

• SSID

Input the SSID of the AP to connect.

• DHCP

When user wants to let NIO 50 retrieve IP remotely from DHCP server, this function should be enabled.

• Subnet Mask

Usually given "255.255.255.0" to specify a class C subnet in network planning.

• Static IP

If user wants to setup IP manually, this IP address is the pre-assigned address and will not be changed under such setting.



ep 1	MAC:	94:A1:A2:87:6F:88	
System Setting	SSID:		Max 32byes
Ethernet	Security Type:	Open	•
Wi-Fi	Key:	Open WPA / WPA TKIP	Max 32byes
Serial	DHCP: Static IP: Subnet Mask :	WPA AES WPA2 / WPA2 MIXED WPA2 AES WPA2 TKIP 255.255.255.0	
Data Flow	Gateway:	192.168.0.1	
	Primary DNS:	192.168.0.1	
	Secondary DNS:	8.8.8.8	
			Submit
			Save&Apply

### • Security Type

Choose the proper Wi-Fi security setting of the AP to connect.

### 3.3.3 Serial Interface Setting

#### Mode selection.

ep 1 System Setting	Mode:	RS232 RS232	•
Ethernet	Baudrate:	RS485 RS422	
Wi-Fi	Parity:	None	•
Serial	Stop Bits:	1	•
ep 2			Submit
Data Flow			Save&Apply
	Copyright © 2016 NEXCOM	I International Co., Ltd.	

• Select the Serial interface mode to connect.



#### Terminator

	Mode:	R\$485	
stem Setting	Terminator:	2	
Ethernet	Baudrate:	9600	•
Wi-Fi	Parity: Stop Bits:	9600	
Social		19200	
Seria		57600 115200	
ata Flow			Save&Apply

• Selected when serial cable needs terminator for impedance matching.

#### Baudrate

	Serial Port Co	onfiguration	
ep 1 System Setting	Mode: Terminator:	RS422	•
Ethernet	Baudrate:	9600	•
Wi-Fi	Parity:	9600 14400	-
Serial	Stop Bits:	19200 38400 57600	
Step 2		115200	
Data Flow		Save&A	pply

• Select the proper Baudrate to connect serial device.

#### Parity

	Serial Port Co	onfiguration	
tep 1	Mode:	RS422	•
System Setting	Terminator:		
Ethernet	Baudrate:	115200	*
Wi-Fi	Parity:	None	•
0.11	Stop Bits:	Odd None	
Serial		Even	
ep z			Cauce Apply

• Select the proper Parity setting to connect serial device.



### Stop Bits

Serial Port Configuration		
tep 1	Mode:	RS422
System Setting	Terminator:	
Ethernet	Baudrate:	115200
Wi-Fi	Parity:	Even
Serial	Stop Bits:	1
ep 2		2
Data Flow		Save&Apply

• Select the proper Stop Bits setting to connect serial device.

## **3.4 Protocol Configuration**

NIO 50 can be configured to convert serial data to IP based communication devices. This gives a big hand to data acquisition applications especially for connecting to legacy devices which only have serial ports. Due to this kind of protocol conversion, NIO 50 can be applied to a wide range of shop floor monitoring in factories.

## 3.4.1 Transparent Configuration

#### 3.4.1.1 Serial to Wi-Fi





#### Wi-Fi Setting

tep 1	Protocol:	Transparent	
System Setting	Data Flow:	Serial to Wi-Fi	
Ethernet	Destination IP:	10.211.10.23	
Wi-Fi	Destination Port:	2345	1 - 65535
Serial	Operation mode:	• RX ं TX	
ep 2	Count	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 ms
	Data Master		
	Initial Delay:	3000	0 - 4294967295 ms
	Transmit Interval:	20000	0 - 4294967295 ms
	Transmit Data:		HEX Max 64 Bytes

• Destination IP

Remote TCP server IP address.

• **Destination Port** Remote TCP server port number.

#### **TCP Timeout Setting**

	Data Flow	Configuratio	n
Step 1 System Setting	Protocol: Data Flow:	Transparent Serial to Wi-Fi	•
Ethernet Wi-Fi	Destination IP: Destination Port:	10.211.10.23 2345	1 - 65535
Serial Step 2	Operation mode: Count: Timeout:	• RX = TX 0 0	0 - 255 0 - 4294967295 ms
	Data Master Initial Delay: Transmit Interval: Transmit Data:	3000 20000	0 - 4294967295 ms 0 - 4294967295 ms HEX Max 64 Bytes
			Submit Save&Apply

#### • Operation Mode & Count (RX, TX)

- Input the specified counter setting (for example, '5') for TCP packets allowed at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
- "0": Means this function is disabled. TCP socket will not be disconnected due to "RX" or "TX" packet count.

#### • Timeout

- Input the specified timer setting allowed for the TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
- "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.

#### **Serial Setting**

Step 1	Protocol	Transparent	
System Setting	Data Flow:	Serial to Wi-Fi	
Ethernet	Destination IP:	10.211.10.23	
Wi-Fi	Destination Port:	2345	1 - 65535
Sorial	Operation mode:	• RX O TX	
Step 2	Count	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 ms
	Data Master		
	Initial Delay:	3000	0 - 4294967295 ms
	Transmit Interval:	20000	0 - 4294967295 ms
	Transmit Data:		HEX Max 64 Bytes

- Data Master Setting (For serial device communication, not Wi-Fi)
  - Initial Delay:
    - This setting takes effect right after NIO 50 boots up.
    - This is used to delay the communication to serial device to avoid garbage data sent during NIO 50 boot up stage.
  - Transmit Interval:
    - Input the interval between adjacent serial communications.
  - Transmit Data:
    - Input the data sent to serial device to start communications.

	Data Flow	Configuration	_
Step 1 System Setting	Protocol: Data Flow:	Transparent Serial to Ethernet	•
Ethernet Wi-Fi	Destination IP: Destination Port:	10.211.10.23 2345	1 - 65535
Serial Step 2	Operation mode: Count:	・RX   TX 0	0 - 255
Data Flow	Data Master Initial Delay: Transmit Interval:	3000 2000	0 - 4294967295 ms 0 - 4294967295 ms 0 - 4294967295 ms
	mananin Data.		Save&Apply
Serial Slave	NIO50 is c • Ethernet • Serial po	configured as: port: TCP Client ort: Serial Master	TCP Server

#### 3.4.1.2 Serial to Ethernet





#### **Ethernet Setting**

	Protocol:	Transparent	
m Setting	Data Flow:	Serial to Ethernet	•
hermet	Destination IP:	10.211.10.23	
Vi-Fi	Destination Port:	2345	1 - 65535
erial	Operation mode:	. RX ○ TX	
	Count	0	0 - 255
a Flow	Timeout	0	0 - 4294967295 ms
	Data Master		
	Initial Delay:	3000	0 - 4294967295 ms
	Transmit Interval:	2000	0 - 4294967295 ms
	Transmit Data:		HEX Max 64 Bytes

Destination IP

Remote TCP server IP address.

• **Destination Port** Remote TCP server port number.

#### **TCP** Timeout Setting

System Setting	Data Flaur		
The second se	Data Flow.	Serial to Ethernet	
Ethernet	Destination IP:	10.211.10.23	
Wi-Fi	Destination Port:	2345	1 - 65535
Serial	Operation mode:	• RX ⊖ TX	
Step 2	Count:	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 ms
	Data Master		
	Initial Delay:	3000	0 - 4294967295 ms
	Transmit Interval:	2000	0 - 4294967295 ms
	Transmit Data:		HEX Max 64 Bytes

#### • Operation Mode & Count (RX, TX)

- Input the specified counter setting (for example, '5' allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
- "0": Means this function is disabled. TCP socket will not be disconnected due to "RX" or "TX" packet count.

#### • Timeout

- Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
- "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.

#### **Serial Setting**

	Data Flow	<b>Configuration</b>	n
Step 1 System Setting	Protocol: Data Flow:	Transparent Serial to Ethernet	•
Ethernet	Destination IP:	10.211.10.23	
Wi-Fi	Destination Port:	2345	1 - 65535
Serial	Operation mode:	• RX ○ TX	
itep 2	Count	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 ms
	<ul> <li>Data Master</li> <li>Initial Delay:</li> </ul>	3000	0 - 4294967295 ms
	Transmit Interval:	2000	0 - 4294967295 ms
	Transmit Data:		HEX Max 64 Bytes
			Submit
			Save&Apply

- Data Master Setting (For serial device communication, not Ethernet)
  - Initial Delay:
    - This setting takes effect right after NIO 50 boots up.
    - This is used to delay the communication to serial device to avoid garbage data sent during NIO 50 boot up stage.
  - Transmit Interval:
    - Input the interval between adjacent serial communications.
  - Transmit Data:
    - Input the data sent to serial device to start communications.



#### 3.4.1.3 Wi-Fi to Serial



#### Wi-Fi Setting

Step 1	Protocol:	Transparent	•
System Setting	Data Flow:	Wi-Fi to Serial	Ŧ
Ethernet	Forwarding Port:	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 ms
Serial			Submit
Step 2			Save&Apply
Data Flow			

#### • Forwarding Port

Input the port number of this Wi-Fi interface. It's used for remote TCP clients to connect with.

- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will be permanently on.



#### 3.4.1.4 Ethernet to Serial

	Data Flow	Configuration	
Step 1	Protocol:	Transparent	
System Setting	Data Flow:	Ethernet to Serial	
Ethernet	Forwarding Port:	2345	1 - 65535
Wi-Fi	Timeout	0	0 - 4294967295 ms
Serial			Submit
Step 2			Save&Apply
Data Flow			
			90000
	Ethernet	RS-485	

#### **Ethernet Setting**

itep 1	Protocol:	Transparent	
System Setting	Data Flow:	Ethernet to Serial	*
Ethernet	Forwarding Port:	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 ms
Serial			Submit

• Forwarding Port

Input the port number of this Ethernet interface. It's used for remote TCP client to connect with.

- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will be permanently on.

#### 3.4.1.5 Ethernet to Wi-Fi

Data Flo	w Configuration	<u>ו</u>	
Protocol:	Transparent		
n Setting Data Flow:	Ethernet to Wi-Fi	•	
ernet Forwarding Port:	2345	1 - 65535	
h-Fi Timeout:	0	0 - 4294967295 ms	
Destination IP:	10.211.10.24		
Destination Port:	1234	1 - 65535	
Flow Operation mode:	• RX ○ TX		
Count:	0	0 - 255	
Timeout:	0	0 - 4294967295 ms	
		Submit	
		Savelándy	
Ethernet		Ethernet	
	Setting Protocol: Data Flow: smet Fi Fi Data Flow: Destination IP: Destination Port Operation mode: Count: Timeout: Ethernet	Sotting     Protocol:     Transparent       Data Flow:     Ethernet to Wi-Fi       smet     Forwarding Port:     2345       i.Fi     Timeout:     0       Destination IP:     10.211.10.24       Destination Port:     1234       Operation mode:     RX TX       Count:     0       Timeout:     0	Sotting       Protocol:       Transparent         Intel       Data Flow:       Ethemet to Wi-Fi         Intel       Forwarding Port:       2345         Intel       Destination IP:       10 211 10 24         Destination Port:       1234       1 - 65535         IFlow       Operation mode:       • RX TX         Count:       0       0 - 255         Timeout:       0       0 - 4294967295 ms         Submit       Submit       Submit         Save&Appy       State

#### **Ethernet Setting**

Step 1 System Setting	Protocol:	Transparent	•
Ethernet	Forwarding Port:	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 ms
Serial	Destination IP:	10.211.10.24	
tep 2	Destination Port:	1234	1 - 65535
Data Flow	Operation mode:	• RX O TX	
	Count:	0	0 - 255
	Timeout:	0	0 - 4294967295 ms
			Submit

#### • Forwarding Port

Input the port number of this Ethernet interface. It's used for remote TCP client to connect with.

- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will be permanently on.



#### Wi-Fi Setting

tep 1 System Setting	Protocol:	Transparent	•
	Data Flow:	Ethernet to Wi-Fi	•
Ethernet	Forwarding Port:	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 ms
Serial	Destination IP:	10.211.10.24	
tep 2	Destination Port:	1234	1 - 65535
Data Flow	Operation mode:	• RX O TX	
	Count:	0	0 - 255
	Timeout:	0	0 - 4294967295 ms

• Destination IP

Remote TCP server IP address.

Destination Port

Remote TCP server port number.

- Operation Mode & Count (RX, TX)
  - Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
  - "0": Means this function is disabled. TCP socket will not be disconnected due to "RX" or "TX" packet count.
- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will be permanently on.



#### 3.4.1.6 Wi-Fi to Ethernet



#### Wi-Fi Setting

	Data Flow	<b>Configuration</b>	n
Step 1 System Setting	Protocol: Data Flow:	Transparent Wi-Fi to Ethernet	•
Ethernet	Forwarding Port:	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 ms
Serial	Destination IP:	10.211.10.25	
itep 2	Destination Port:	1234	1 - 65535
Data Flow	Operation mode:	• RX ○ TX	
	Count:	0	0 - 255
	Timeout:	0	0 - 4294967295 ms
			Submit Save&Apply

#### • Forwarding Port

Input the port number of this Wi-Fi interface. It's used for remote TCP client to connect with.

- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.

"0": Means timeout is disabled. TCP connection will be permanently on.

#### **Ethernet Setting**

tep 1 System Setting	Protocol:	Transparent	•
Ethernet	Forwarding Port:	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 ms
Serial	Destination IP:	10.211.10.25	
tep 2	Destination Port:	1234	1 - 65535
Data Flow	Operation mode:	• RX ○ TX	
	Count:	0	0 - 255
	Timeout:	0	0 - 4294967295 ms

Destination IP

Remote TCP server IP address.

• Destination Port

Remote TCP server port number.

- Operation Mode & Count (RX, TX)
  - Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
  - "0": Means this function is disabled. TCP socket will not be disconnected due to "RX" or "TX" packet count.
- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will be permanently on.



## **3.4.2 Modbus Configuration**

#### 3.4.2.1 Ethernet to Serial



#### **Ethernet Setting**

#### • Forwarding Port

Input the port number of this Ethernet interface. It's used for remote Modbus client to connect with.

- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will be permanently on.

#### Serial Setting

• Operation Mode

Choose the protocol conversion between Modbus ASCII/RTU and TCP.



#### 3.4.2.2 Wi-Fi to Serial



#### Wi-Fi Setting

#### • Forwarding Port

Input the port number of this Wi-Fi interface. It's used for remote Modbus client to connect with.

#### • Timeout

- Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
- "0": Means timeout is disabled. TCP connection will be permanently on.

#### Serial Setting

Operation Mode

Choose the protocol conversion between Modbus ASCII/RTU and TCP.

.

#### **Data Flow Configuration** Step 1 Protocol: MODBUS ٠ System Setting Data Flow: Serial to Ethernet Ethernet Destination IP: 10.211.10.35 **Destination Port:** 2300 1 - 65535 Operation mode: • RX O TX Serial Count 0 - 255 Step 2 0 - 4294967295 ms Timeout . Modbus ASCII to Modbus TCP Operation mode: Modbus RTU to Modbus TCP Modbus Slave ID: 1 1 - 255 Submit Save&Apply Ethernet dbus RTI Master **RS-485** HMI NIO50 is configured as: Ethernet port: TCP Client Serial port: Modbus Slave Modbus TCP Server Modbus RTU Master

#### 3.4.2.3 Serial to Ethernet

#### **Ethernet Setting**

Step 1	Protocol:	MODBUS	•
System Setting	Data Flow:	Serial to Ethernet	•
Ethernet	Destination IP:	10.211.10.35	
Wi-Fi	Destination Port:	2300	1 - 65535
Serial	Operation mode:	• RX ○ TX	
Step 2	Count	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 ms
	Operation mode:	Modbus ASCII to Modbus TCP     Modbus RTU to Modbus TCP	
	Modbus Slave ID:	1	1 - 255
			Submit

- **Destination IP** Remote TCP server IP address.
- **Destination Port** Remote TCP server port number.

#### • Operation Mode & Count (RX, TX)

- Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
- "0": Means this function is disabled. TCP socket will not be disconnected due to "RX" or "TX" packet count.

#### • Timeout

- Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
- "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.

#### Serial Setting

Step 1 System Setting	Protocol:	MODBUS	•
Ethernet	Destination IP:	Senal to Ethernet 10.211.10.35	•
Wi-Fi	Destination Port:	2300	1 - 65535
Sorial	Operation mode:	● RX ○ TX	
tep 2	Count	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 ms
	Operation mode:	Modbus ASCII to Modbus TCP     Modbus RTU to Modbus TCP	
	Modbus Slave ID:	1	1 - 255

#### • Operation mode

Choose the protocol conversion between Modbus ASCII/RTU and TCP.

#### Modbus Slave ID

Input the Modbus Slave device ID which NIO 50 connects to.



#### 3.4.2.4 Serial to Wi-Fi



#### Wi-Fi Setting

	Data Flow	Configuration	
Step 1 System Setting	Protocol: Data Flow:	MODBUS Serial to Wi-Fi	•
Ethernet	Destination IP:	10.211.10.35	
Wi-Fi	Destination Port:	2700	• 1 - 65535
Serial	Operation mode:	• RX ○ TX	
Step 2	Count:	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 ms
	Operation mode:	<ul> <li>Modbus ASCII to Modbus TCP</li> <li>Modbus RTU to Modbus TCP</li> </ul>	
	Modbus Slave ID:	1	1 - 255
			Submit
			Save&Apply

Destination IP

Remote TCP server IP address.

• **Destination Port** Remote TCP server port number.

#### • Operation Mode & Count (RX, TX)

- Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
- "0": Means this function is disabled. TCP socket will not be disconnected due to "RX" or "TX" packet count.

#### • Timeout

- Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
- "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.

#### Serial Setting

	Data Flow	Configuration	
Step 1 System Setting	Protocol: Data Flow:	MODBUS Serial to Wi-Fi	*
Ethernet	Destination IP:	10.211.10.35	
Wi-Fi	Destination Port:	2700	• 1 - 65535
Serial	Operation mode:	• RX O TX	
Step 2	Count:	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 ms
	Operation mode:	Modbus ASCII to Modbus TCP     Modbus RTU to Modbus TCP	
	Modbus Slave ID:	1	1 - 255
			Submit
			Save&Apply

#### Operation Mode

Choose the protocol conversion between Modbus ASCII/RTU and TCP.

#### • Modbus Slave ID

Input the Modbus Slave device ID which NIO 50 connects to.



## 3.4.3 MQTT Configuration

#### 3.4.3.1 Serial to Wi-Fi

	Data Flow	Configuration	
itep 1 System Setting	Protocol: Data Flow	MOTT Secial to Wi-Fi	•
Ethornot	Destination IP:	10.211.10.135	
Wi-Fi	Destination Port:	2345	1 - 65535
Serial	Operation mode: Count:	• RX TX	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 ms
	MQTT Topic: MQTT Client ID: MQTT Username: MQTT Password: Keepalive:	air admin ****	0 - 65535 second
	Output Data Format: Data Source Format: JSON Field Selection:	Raw Data Base64 Encode  Binary * ASCII MAC IP Device Name Tim	JSON Ie
	Data Master Initial Delay:	3000	0 - 4294967295 ms
	Transmit Interval:	2000	0 - 4294967295 ms
	Transmit Data:		HEX Max 64 Bytes Submit

• Destination IP

Input MQTT Broker IP address.

• Destination Port

MQTT Broker port number.

- Operation Mode & Count (RX, TX)
  - Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
  - "0": Means this function is disabled. TCP socket will not be disconnected due to "RX" or "TX" packet count.
- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.



ep 1	Protocol:	MQTT	•
System Setting	Data Flow:	Serial to Wi-Fi	•
Ethernet	Destination IP:	10.211.10.135	
Wi-Fi	Destination Port	2345	1 - 65535
Serial	Operation mode:	• RX O TX	
p 2	Count:	0	0 - 255
Data Flow	Timeout	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format	• Raw Data Base64 E	ncode JSON
	Data Source Format:	Binary * ASCII	
	JSON Field Selection:	MAC IP Device N	ame 🗆 Time
	Data Master		
	Initial Delay:	3000	0 - 4294967295 m
	Transmit Interval:	2000	0 - 4294967295 m
	Transmit Data:		HEX Max 64 Bytes

#### • MQTT Topic

Input MQTT topic. Note: The following characters ("#", "+", "\$") are reserved and are not allowed for input.

MQTT Client ID

Input the MQTT client ID. If no client ID is available, then this field can be blank.

- **MQTT Username** Input the Username for MQTT broker.
- **MQTT Password** Input the Password for MQTT broker.
- **Keepalive** Input the keep alive timer for MQTT connection.



ip 1	Protocol:	MQTT	•
System Setting	Data Flow:	Serial to Wi-Fi	•
Ethernet	Destination IP:	10.211.10.135	
Wi-Fi	Destination Port	2345	1 - 65535
Sorial	Operation mode:	• RX O TX	
p 2	Count:	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format	* Raw Data Base64 8	incode JSON
	Data Source Format:	Binary • ASCII	
	JSON Field Selection:	MAC IP Device N	ame 🗆 Time
	Data Master		
	Initial Delay:	3000	0 - 4294967295 m
	Transmit Interval:	2000	0 - 4294967295 m
	Transmit Data:		HEX Max 64 Bytes

#### • Output Data Format

Select the MQTT data format. There are "Raw Data", "Base64 Encode" and "JSON" formats to select from. Note: The allowed max. length is 512 bytes for JSON data format.

Data Source Format

Select the Data Source Format. The format has "Binary" and "ASCII" options.

- Data Master Setting (For serial device communication, not MQTT)
  - Initial Delay:
    - This setting takes effect right after NIO 50 boots up.
    - This is used to delay the communication to serial device to avoid garbage data sent during NIO 50 boot up stage.
  - Transmit Interval:
    - Input the interval between adjacent serial communications.
  - Transmit Data:
    - Input the data sent to serial device to start communications.

\_



#### 3.4.3.2 Serial to Ethernet

p 1 System Setting	Protocol: Data Flow	MOTT Serial to Ethernet	•
Ethernet	Destination IP:	10 211 10 135	
Wi-Fi	Destination Port:	2345	1 - 65535
Sorial	Operation mode:	• RX = TX	
02	Count	0	0 - 255
Data Flow	Timeout	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format:	* Raw Data O Base64 Encode O	ISON
	Data Source Format:	Binary * ASCII	
	JSON Field Selection:	MAC IP Device Name Tin	10
	Data Master		
	Initial Delay:	3000	0 - 4294967295 m
	Transmit Interval:	2000	• 0 - 4294967295 m
	Transmit Data:		HEX Max 64 Bytes

• Destination IP

Input MQTT Broker IP address.

• Destination Port

MQTT Broker port number.

- Operation Mode & Count
  - Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
  - "0": Means this function is disabled. TCP socket will not be disconnected due to "RX" or "TX" packet count.
- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.



System Settion	Protocol	MQTT	•
System Setting	Data Flow:	Serial to Ethernet	
Ethernet	Destination IP:	10.211.10.135	
Wi-Fi	Destination Port	2345	1 - 65535
Serial	Operation mode:	* RX © TX	
p2	Count:	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format:	• Raw Data O Base64 E	ncode JSON
	Data Source Format:	Binary * ASCII	
	JSON Field Selection:	MAC IP Device Na	ime 🗆 Time
	Data Master		
	Initial Delay:	3000	0 - 4294967295 m
	Transmit Interval:	2000	<ul> <li>0 - 4294967295 m</li> </ul>
	Transmit Data:		HEX Max 64 Byter

#### • MQTT Topic

Input MQTT topic. Note: The following characters ("#", "+", "\$") are reserved and are not allowed for input.

- **MQTT Client ID** Input the MQTT client ID. If no client ID is available, then this field can be blank.
- **MQTT Username** Input the Username for MQTT broker.
- **MQTT Password** Input the Password for MQTT broker.
- **Keepalive** Input the keep alive timer for MQTT connection.



p 1 System Setting	Protocol:	MQTT	•
Of section of the sec	Data Flow:	Serial to Ethernet	
Ethernet	Destination IP:	10.211.10.135	
Wi-Fi	Destination Port	2345	1 - 65535
Serial	Operation mode:	* RX O TX	
02	Count:	0	0 - 255
Data Flow	Timeout:	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format	• Raw Data Base64 En	code JSON
	Data Source Format:	Binary * ASCII	
	JSON Field Selection:	MAC IP Device Nam	ne 🗆 Time
	Data Master		
	Initial Delay:	3000	0 - 4294967295 m
	Transmit Interval:	2000	0 - 4294967295 m
	Transmit Data:		HEX Max 64 Byte

#### • Output Data Format

Select the MQTT data format. There are "Raw Data", "Base64 Encode" and "JSON" formats to select from. Note: The allowed max. length is 512 bytes for JSON data format.

• Data Source Format

Select the Data Source Format. The format has "Binary" and "ASCII" options.

- Data Master Setting (For serial device communication, not MQTT)
  - Initial Delay:
    - This setting takes effect right after NIO 50 boots up.
    - This is used to delay the communication to serial device to avoid garbage data sent during NIO 50 boot up stage.
  - Transmit Interval:
    - Input the interval between adjacent serial communications.
  - Transmit Data:
    - Input the data sent to serial device to start communications.



#### 3.4.3.3 Ethernet to Wi-Fi

p 1	Protocol:	MQTT	
System Setting	Data Flow:	Ethernet to Wi-Fi	
Ethernet	Forwarding Port	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 m
Sorial	Destination IP:	10.211.10.135	
02	Destination Port	2345	¢ 1 - 65535
Data Flow	Operation mode:	• RX O TX	
	Count	0	0 - 255
	Timeout:	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format:	• Raw Data O Base64 Er	ncode JSON
	Data Source Format:	Binary • ASCII	
	JSON Field Selection:	MAC IP Device Na	me 🗉 Time

This setting is used to setup the Ethernet TCP configuration. In this mode, Ethernet is a TCP server, while Wi-Fi is a TCP client.

#### • Forwarding Port

Input the TCP server port number of this Ethernet interface. It's used for remote TCP client device to connect with.

- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.



p1 Sustem Cattion	Protocol:	MQTT	
System Setung	Data Flow:	Ethernet to Wi-Fi	•
Ethernet	Forwarding Port	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 m
Sorial	Destination IP:	10.211.10.135	
p2	Destination Port	2345	1 - 65535
Data Flow	Operation mode:	• RX O TX	
	Count:	0	0 - 255
	Timeout:	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format:	• Raw Data O Base64 Er	ncode JSON
	Data Source Format:	Binary • ASCII	
	JSON Field Selection:	MAC IP Device Na	me 🗆 Time

- Destination IP Input MQTT Broker IP address.
- **Destination Port** MQTT Broker port number.
- Operation Mode & Count
  - Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
  - "0": Means this function is disabled. TCP socket will not be disconnected due to "RX" or "TX" packet count.
- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.



p1	Protocol:	MQTT	•
System Setting	Data Flow:	Ethernet to Wi-Fi	•
Ethernet	Forwarding Port	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 m
Serial	Destination IP:	10.211.10.135	
p 2	Destination Port	2345	1 - 65535
Data Flow	Operation mode:	• RX O TX	
	Count	0	0 - 255
	Timeout:	0	0 - 4294967295 m
	/ MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Usemame:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format:	• Raw Data Base64 Enco	de JSON
	Data Source Format:	Binary • ASCII	
	JSON Field Selection:	MAC IP Device Name	Time

#### • MQTT Topic

Input MQTT topic. Note: The following characters ("#", "+", "\$") are reserved and are not allowed for input.

#### • MQTT Client ID

Input the MQTT client ID. If no client ID is available, then this field can be blank.

#### MQTT Username

Input the Username for MQTT broker.

- MQTT Password Input the Password for MQTT broker.
- Keepalive

Input the keep alive timer for MQTT connection.



p1	Protocol:	MQTT	•
System Setting	Data Flow:	Ethernet to Wi-Fi	•
Ethernet	Forwarding Port	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 m
Sorial	Destination IP:	10.211.10.135	
p 2	Destination Port	2345	• 1 - 65535
Data Flow	Operation mode:	• RX O TX	
	Count	0	0 - 255
	Timeout:	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format:	• Raw Data Base64 Encode	JSON
	Data Source Format:	Binary • ASCII	
	JSON Field Selection:	MAC IP Device Name 1	Time

#### • Output Data Format

Select the MQTT data format. There are "Raw Data", "Base64 Encode" and "JSON" formats to select from. Note: The allowed max. length is 512 bytes for JSON data format.

• Data Source Format

Select the Data Source Format. The format has "Binary" and "ASCII" options.

- Data Master Setting (For serial device communication, not MQTT)
  - Initial Delay:
    - This setting takes effect right after NIO 50 boots up.
    - This is used to delay the communication to serial device to avoid garbage data sent during NIO 50 boot up stage.
  - Transmit Interval:
    - Input the interval between adjacent serial communications.
  - Transmit Data:
    - Input the data sent to serial device to start communications.



#### 3.4.3.4 Wi-Fi to Ethernet

1	Protocol:	MQTT	•
System Setting	Data Flow:	Wi-Fi to Ethernet	•
Ethornot	Forwarding Port	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 m
Sorial	Destination IP:	10.211.10.135	
2	Destination Port	1234	1 - 65535
Data Flow	Operation mode:	• RX TX	
	Count:	0	0 - 255
	Timeout:	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format:	* Raw Data O Base64 Er	ncode JSON
	Data Source Format:	Binary • ASCII	
	JSON Field Selection:	MAC IP Device Na	me 🗉 Time

This setting is used to setup the Wi-Fi TCP configuration. In this mode, Wi-Fi is a TCP server, while Ethernet is a TCP client.

#### • Forwarding Port

Input the TCP server port number of this Wi-Fi interface. It's used for remote TCP client device to connect with.

- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.



ip 1	Protocol:	MOTT	
System Setting	Data Flow:	Wi-Fi to Ethernet	
Ethernet	Forwarding Port	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 m
Sorial	Destination IP:	10.211.10.135	
p 2	Destination Port	1234	1 - 65535
Data Flow	Operation mode:	• RX O TX	
	Count:	0	0 - 255
	Timeout:	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format:	• Raw Data O Base64 En	code JSON
	Data Source Format:	Binary • ASCII	
	JSON Field Selection:	MAC IP Device Nar	me 🗆 Time

- Destination IP Input MQTT Broker IP address.
- **Destination Port** MQTT Broker port number.
- Operation Mode & Count
  - Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
  - "0": Means this function is disabled. TCP socket will not be disconnected due to "RX" or "TX" packet count.
- Timeout
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.



p1	Protocol:	MQTT	•
System Setting	Data Flow:	Wi-Fi to Ethernet	
Ethernet	Forwarding Port	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 m
Sorial	Destination IP:	10.211.10.135	
p2	Destination Port	1234	1 - 65535
Data Flow	Operation mode:	• RX O TX	
	Count:	0	0 - 255
	Timeout:	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format:	• Raw Data Base64 Enc	ode JSON
	Data Source Format:	Binary * ASCII	
	JSON Field Selection:	MAC IP Device Nam	e 🗆 Time

#### • MQTT Topic

Input MQTT topic. Note: The following characters ("#", "+", "\$") are reserved and are not allowed for input.

#### • MQTT Client ID

Input the MQTT client ID. If no client ID is available, then this field can be blank.

#### • MQTT Username

Input the Username for MQTT broker.

- MQTT Password Input the Password for MQTT broker.
- Keepalive

Input the keep alive timer for MQTT connection.



p1	Protocol:	MOTT	•
System Setting	Data Flow:	Wi-Fi to Ethernet	
Ethornot	Forwarding Port	2345	1 - 65535
Wi-Fi	Timeout:	0	0 - 4294967295 m
Sorial	Destination IP:	10.211.10.135	
0.2	Destination Port	1234	1 - 65535
Data Flow	Operation mode:	• RX O TX	
	Count:	0	0 - 255
	Timeout:	0	0 - 4294967295 m
	MQTT Topic:	air	
	MQTT Client ID:		
	MQTT Username:	admin	
	MQTT Password:		
	Keepalive:	0	0 - 65535 second
	Output Data Format:	• Raw Data Base64 Er	ncode JSON
	Data Source Format:	Binary • ASCII	
	JSON Field Selection:	MAC IP Device Na	me 🗆 Time

#### • Output Data Format

Select the MQTT data format. There are "Raw Data", "Base64 Encode" and "JSON" formats to select from. Note: The allowed max. length is 512 bytes for JSON data format.

Data Source Format

Select the Data Source Format. The format has "Binary" and "ASCII" options.

- Data Master Setting (For serial device communication, not MQTT)
  - Initial Delay:
    - This setting takes effect right after NIO 50 boots up.
    - This is used to delay the communication to serial device to avoid garbage data sent during NIO 50 boot up stage.
  - Transmit Interval:
    - Input the interval between adjacent serial communications.
  - Transmit Data:
    - Input the data sent to serial device to start communications.



## CHAPTER 4: PRODUCT SPECIFICATION

### **NIO 50**



### **Main Features**

- Support transparent Modbus TCP/RTU, Modbus ASCII & MQTT
- Web-based configuration
- 9600~115200 bps baudrate for RS-232/422/485 transmissions
- Secure data access with WPA, WPA2
- 1x 10/100 Fast Ethernet port
- Support 9~36V wide range DC input with 2-pin Phoenix Contact terminal block
- Support -20~70°C extended operating temperature
- LED indicators to display: Power, Serial Status and Wi-Fi RSSI signal strength

## **Specifications**

#### **CPU Support**

Onboard STM32F407ZE processor

#### **Main Memory**

• 512KB (embedded Flash in STM32)

#### **Serial Port**

• 1x RS232/422/485 (software selectable)

#### Wireless

• Wi-Fi: 802.11 b/g/n 1x1



#### Ethernet

- 1x 10/100 Base-TX
- MDI/MDIX Auto cross

#### Reset

• 1x Reset/restore to default push button

#### **Physical and Power**

- DC 9~36V with 2-pin Phoenix contact terminal block
- Din-Rail (optional)/Wall mountable
- Dimension: 110 mm X 87 mm X 25 mm
- Weight: 600 g

#### **SW** Features

- OS: FreeRTOS
- Management
- Web GUI for configuration
- Ethernet Firmware upgrade
- SNTP client (real IP, static)
- Factory default/reset (press reset button 3 seconds interval for factory default)

#### **Environment Protection**

- Operating temperature: -20°C~70°C
- Storage temperature: -40°C~85°C

#### **Relative Humidity**

• Operating: 5%~95%, non-condensing

#### Certification

- EMI: FCC, CE Class A
- RF:
  - FCC: PART15C
  - CE: EN 300328
- EN60950-1
- EMC: EN 301 489-1/17, FCC Part 15 Subpart B, EN 55022/55024