NEXCOM International Co., Ltd.

# IoT Automation Solutions Business Group

# NIO 50

# Wi-Fi Device Adaptor

User Manual

**NEXCOM International Co., Ltd.**
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# Contents

# PREFACE

## Copyright



## Disclaimer

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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.

## Installation Recommendations

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.

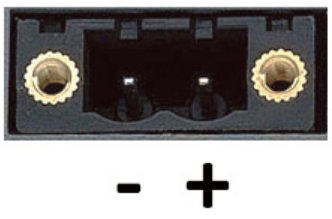
**Main Features:**

- ✓ 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
- ✓ Secure data access with WPA & WPA2
- ✓ 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

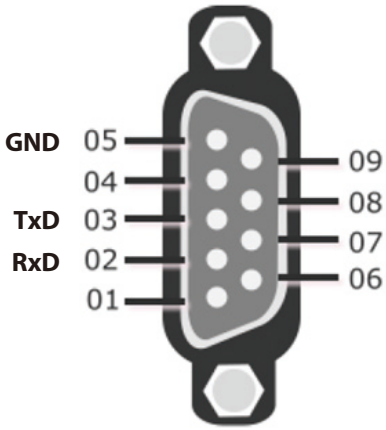

### 1.2.2 Power Pin Assignment



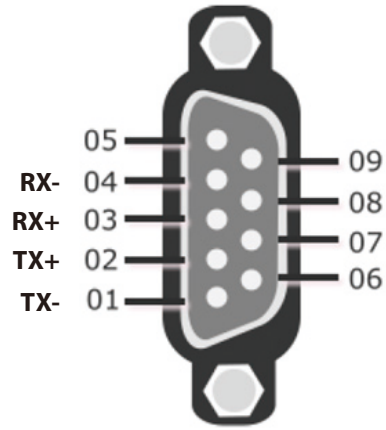

Power pin: DC input range of 9~36 V

### 1.2.3 Serial Interface Pin Assignment

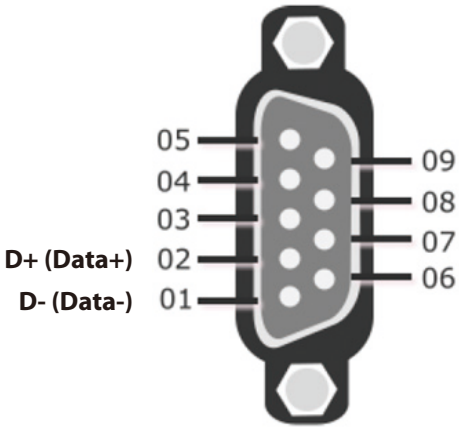
#### RS-232 Pin Assignment




#### RS-422




#### RS-485

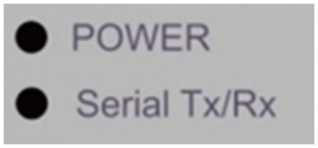


### 1.2.4 LED Display

#### Wi-Fi Signal Indication

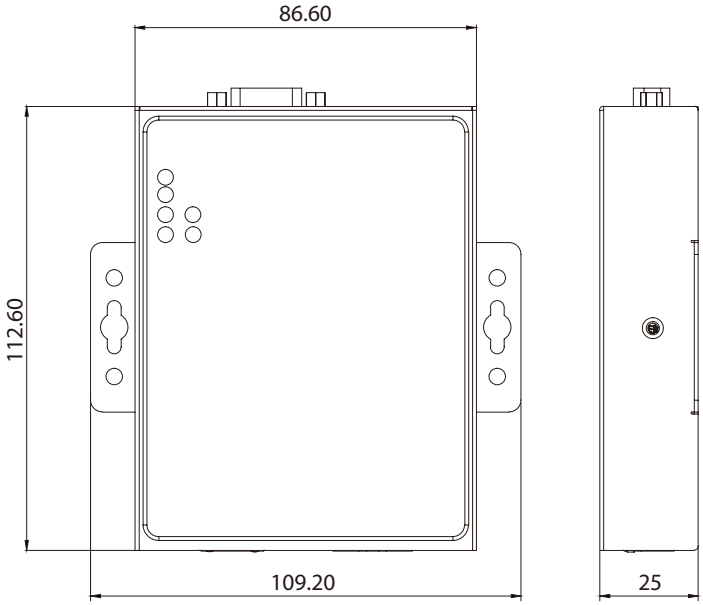
4x LED: Highest signal strength (very good quality)
3x LED: Good signal strength
2x LED: Fair signal strength
1x LED: Poor signal strength (need to improve Wi-Fi connection)
No LED: Cannot connect Wi-Fi (need to review Wi-Fi connection setup)

#### 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:

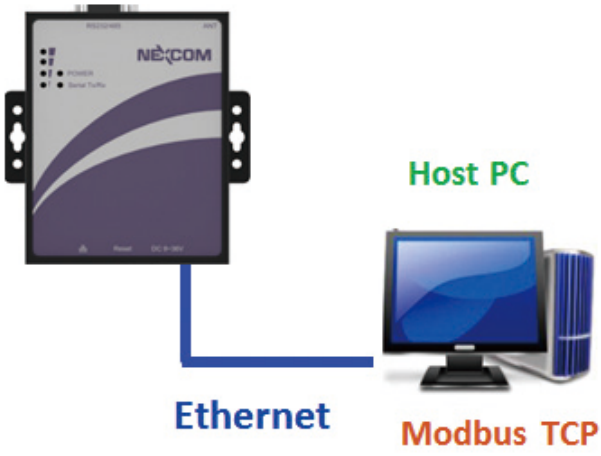
### 2.1.1 Connection of Power


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.

### 2.1.3 Connection of Ethernet



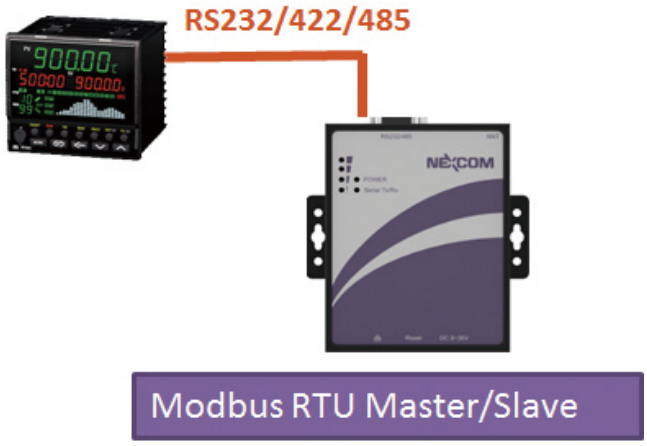

1. Make sure the network settings on the Host PC are correctly configured so that NIO 50 and PC are on the same subnet.
2. Use Windows DOS "ping" command to probe NIO 50 Ethernet IP address. If successful, there should be a ping response as below. (In this case, the IP address of NIO 50 is 10.211.55.1)

```
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 = 0ms，最大值 = 0ms，平均 = 0ms
```

### 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

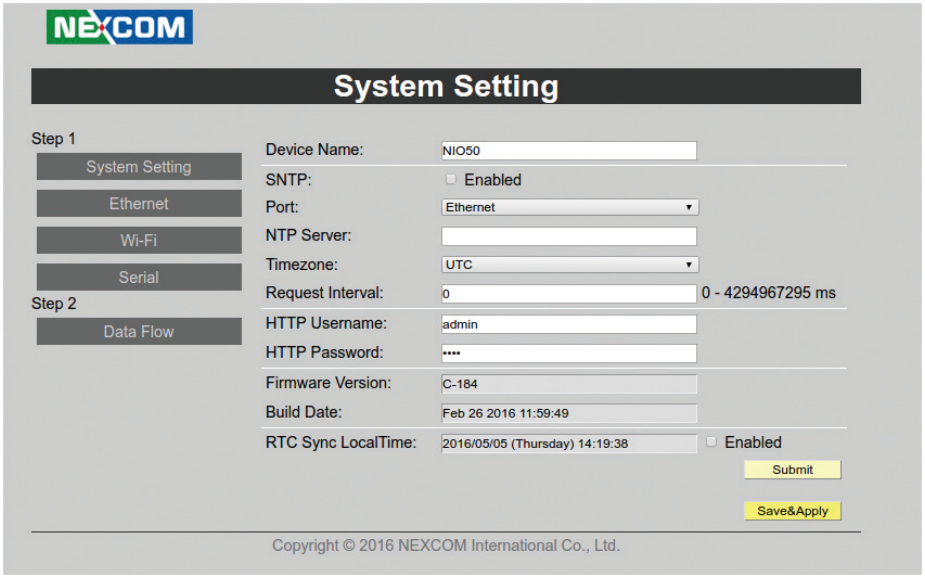
Login is the first step in configuration.


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.




- **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".

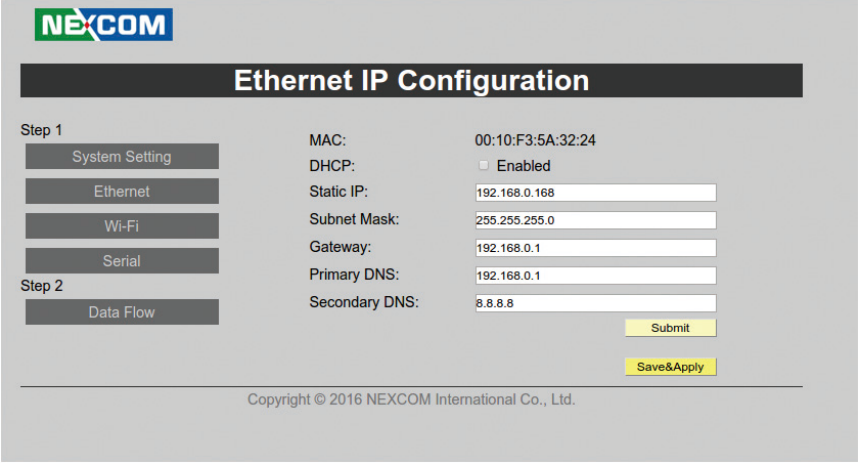
- **HTTP Password**

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




- **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.

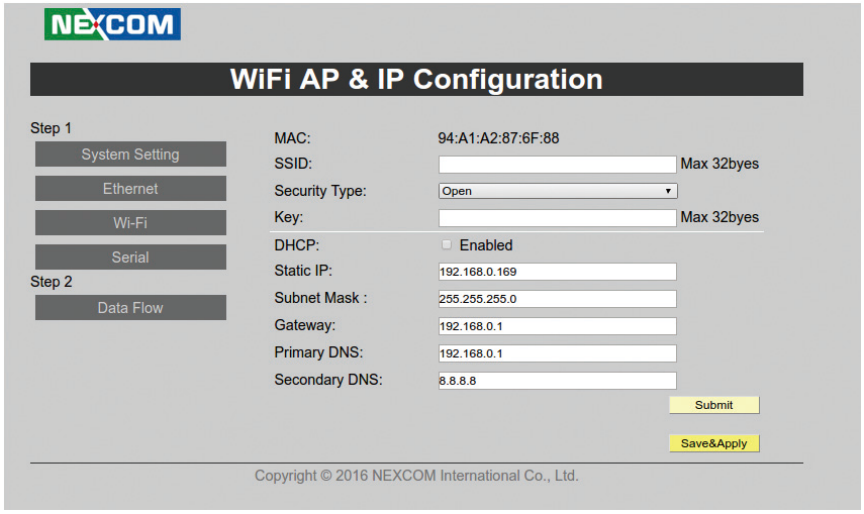
- **Subnet Mask**
  Usually given "255.255.255.0" to specify a class C subnet in network planning.

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

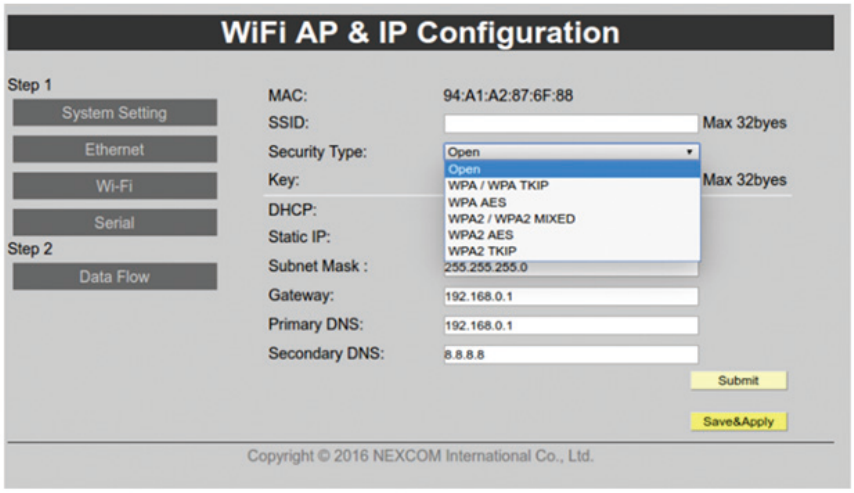
- **Primary DNS**
  Input the primary DNS (Domain Name Server) in the network setup.
- **Secondary DNS**
  Input the primary DNS (Domain Name Server) in the network setup.

  <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



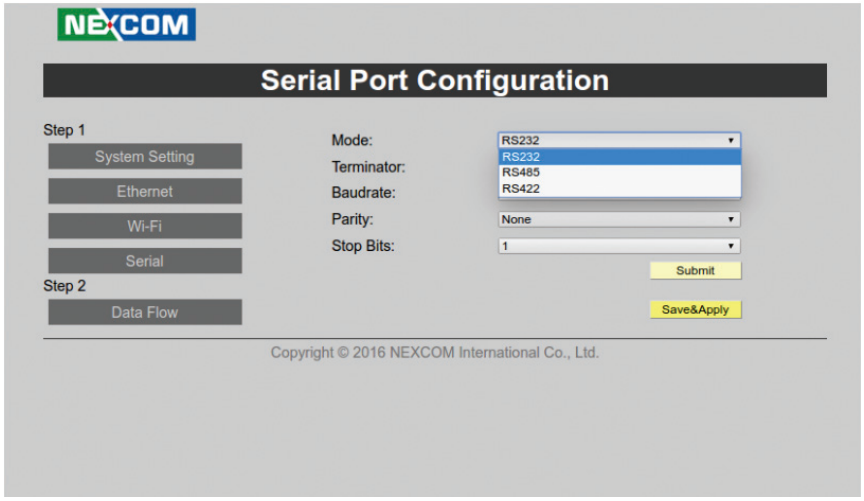

- **SSID**
  Input the SSID of the AP to connect.
- **DHCP**
  When user wants to let NIO 50 retrieve IP remotely from DHCP server, this function should be enabled.
- **Subnet Mask**
  Usually given "255.255.255.0" to specify a class C subnet in network planning.
- **Static IP**
  If user wants to setup IP manually, this IP address is the pre-assigned address and will not be changed under such setting.




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

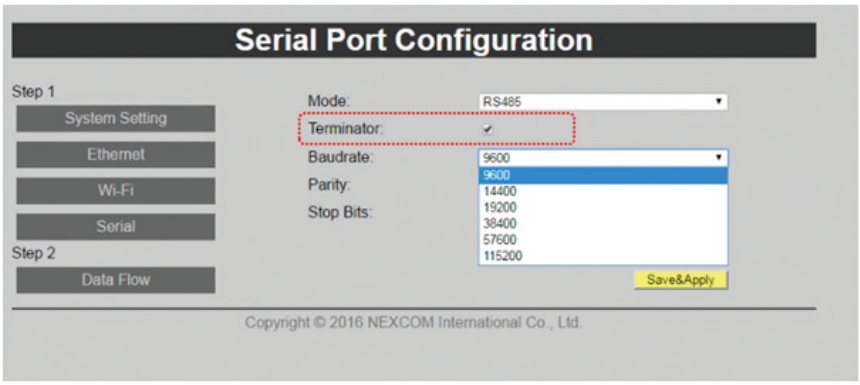
### 3.3.3 Serial Interface Setting

**Mode selection.**



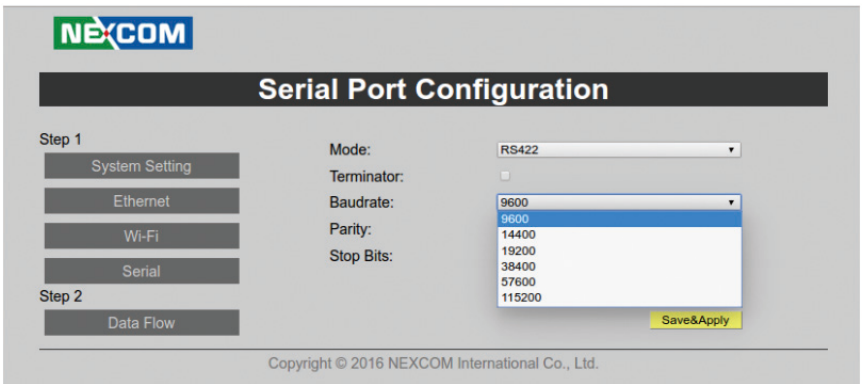

- Select the Serial interface mode to connect.

### Terminator



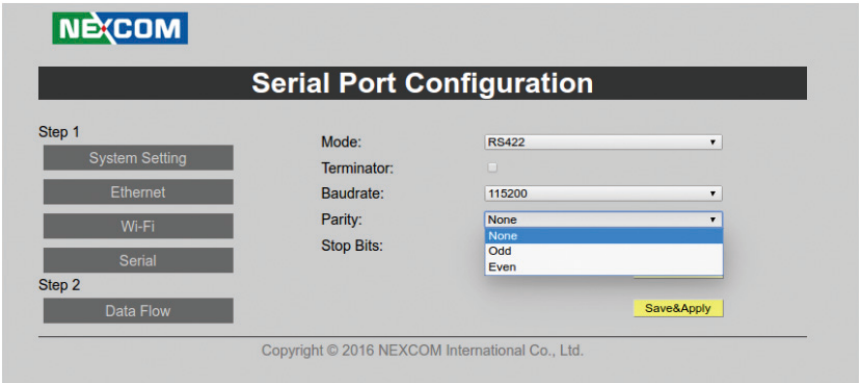

- Selected when serial cable needs terminator for impedance matching.

### Baudrate



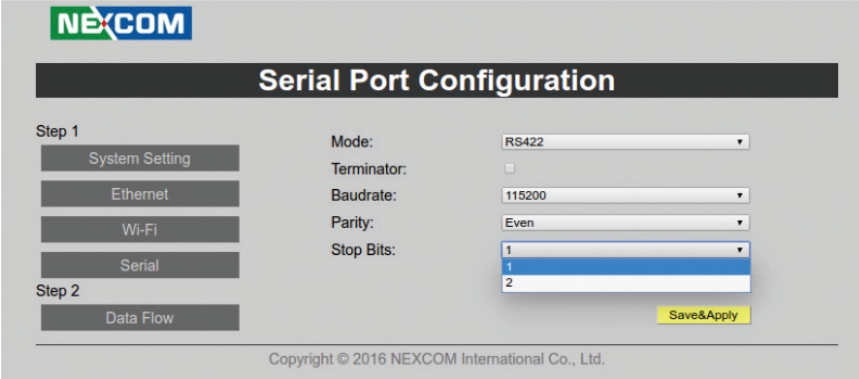

- Select the proper Baudrate to connect serial device.

### Parity




- Select the proper Parity setting to connect serial device.

## Stop Bits



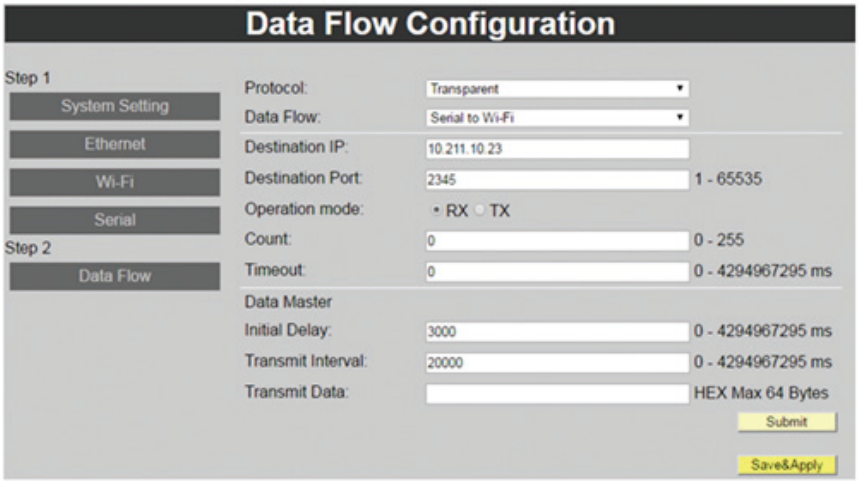

- Select the proper Stop Bits setting to connect serial device.

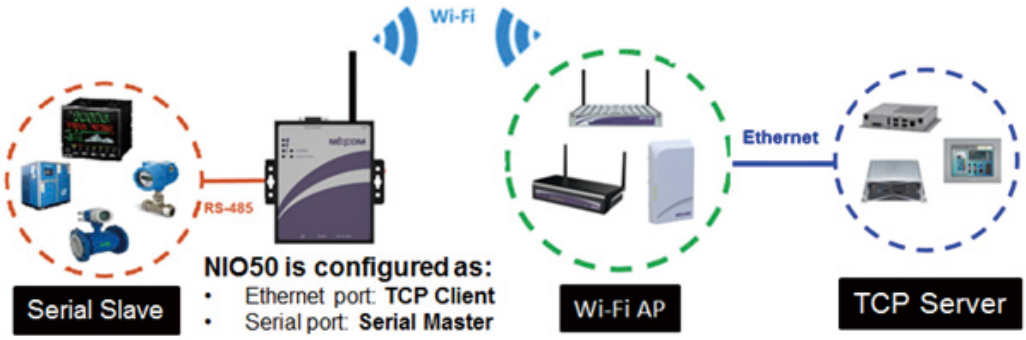
# 3.4 Protocol Configuration

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.

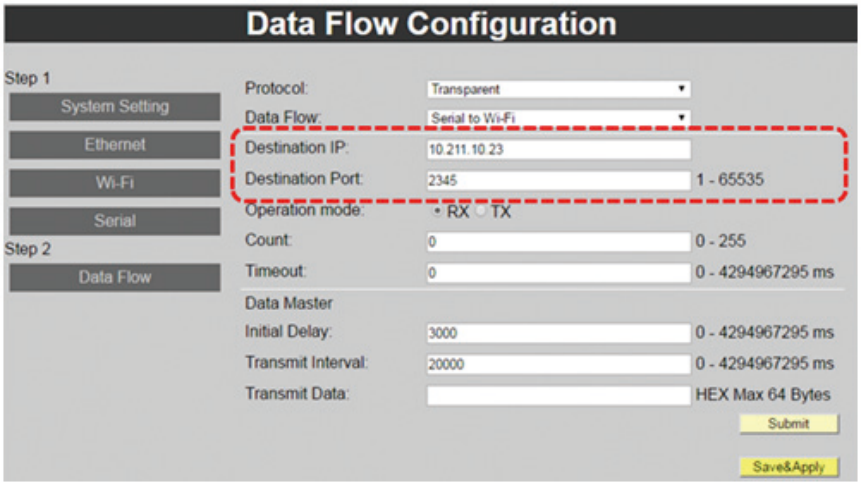
## 3.4.1 Transparent Configuration

### 3.4.1.1 Serial to Wi-Fi



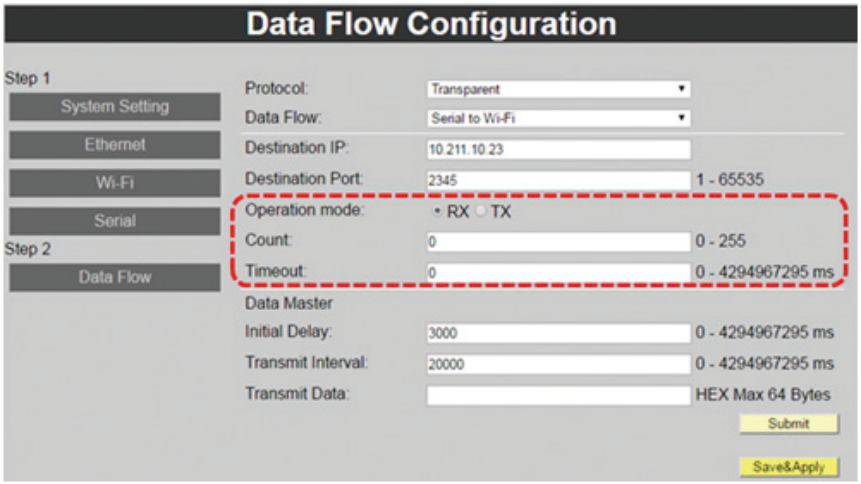



Wi-Fi Setting




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

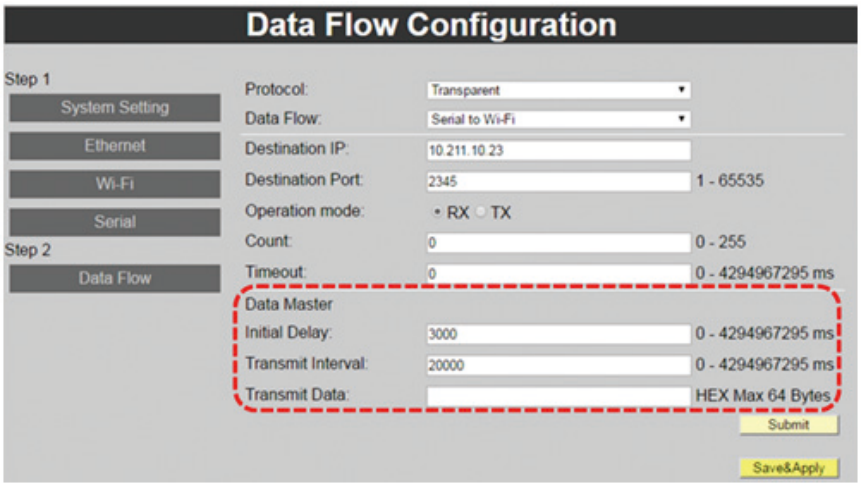
### TCP Timeout Setting




- **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.

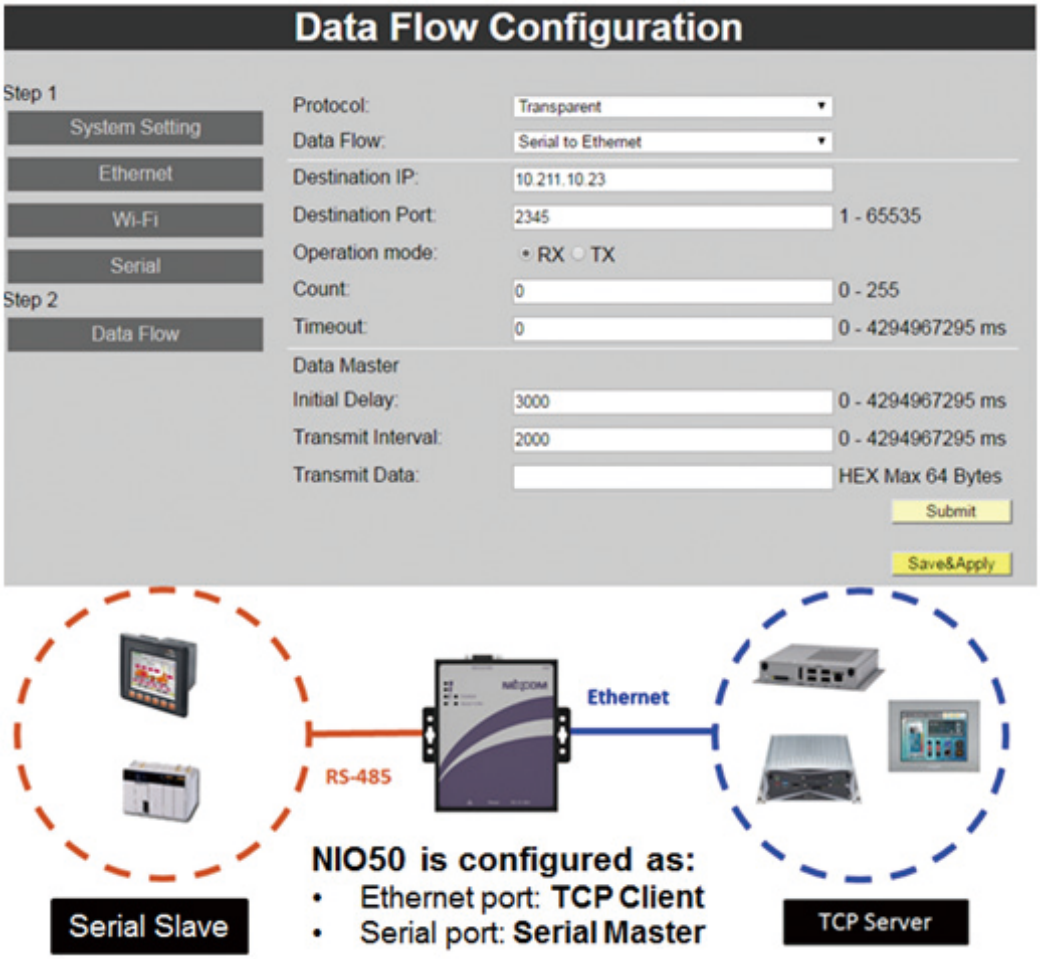
- **Timeout**
  - Input the specified timer setting allowed for the TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.

### Serial Setting

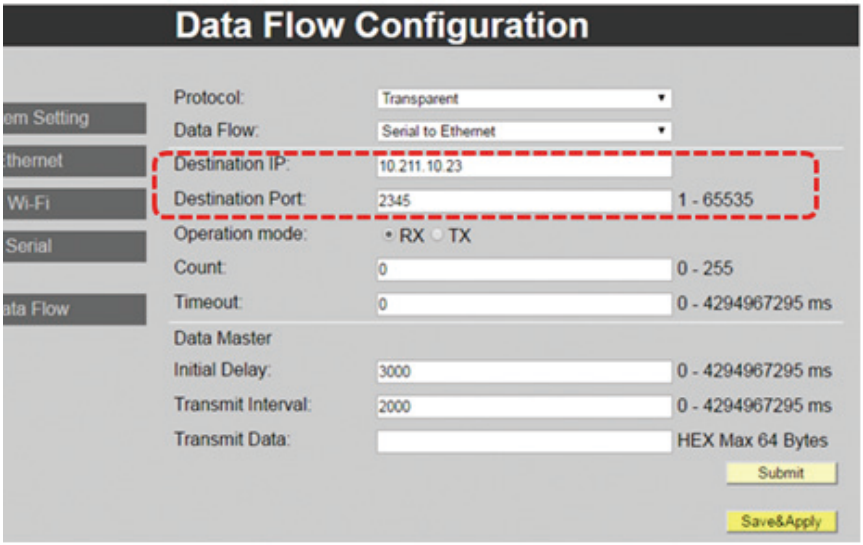



- **Data Master Setting (For serial device communication, not Wi-Fi)**
  - Initial Delay:
    - This setting takes effect right after NIO 50 boots up.
    - This is used to delay the communication to serial device to avoid garbage data sent during NIO 50 boot up stage.
  - Transmit Interval:
    - Input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

### 3.4.1.2 Serial to Ethernet

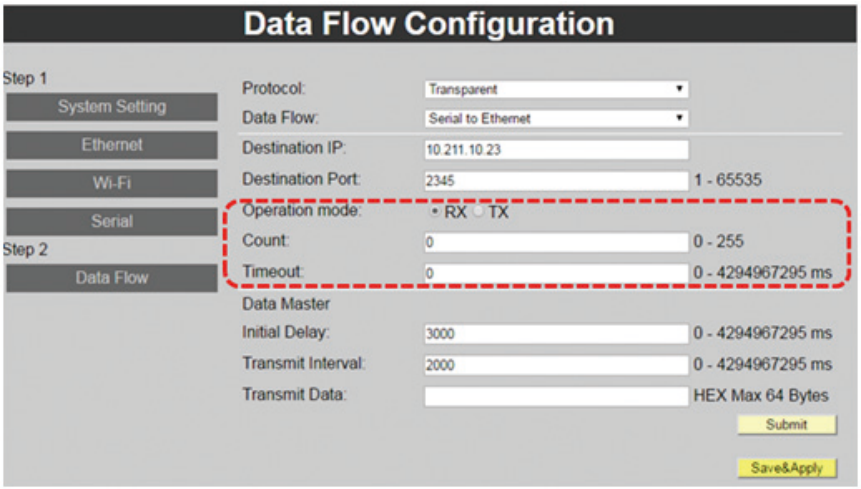


### Ethernet Setting




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

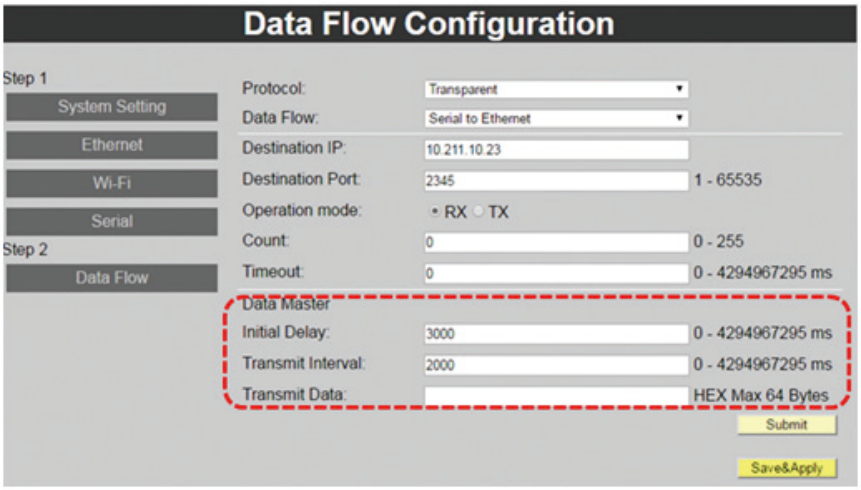
### TCP Timeout Setting




- **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.

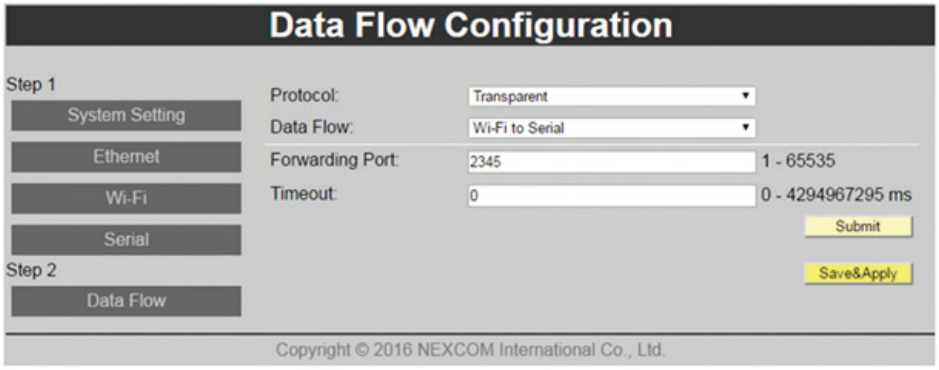
- **Timeout**
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.

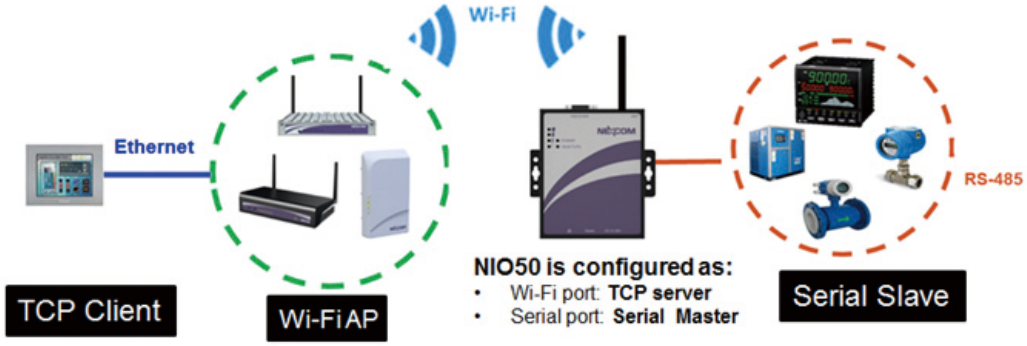
### Serial Setting



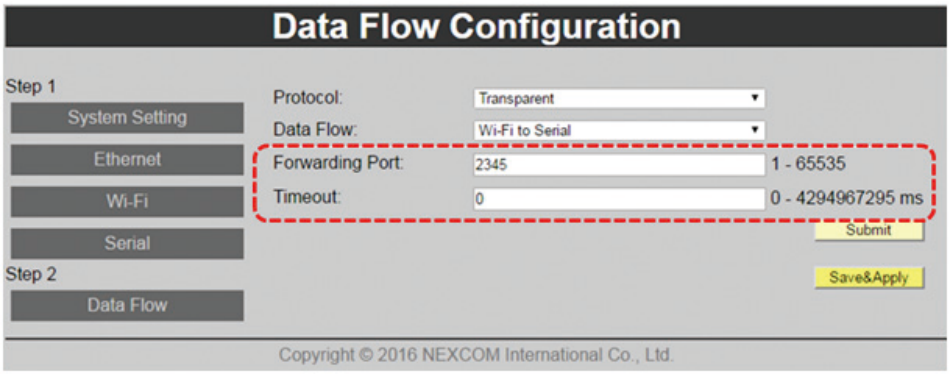

- **Data Master Setting (For serial device communication, not Ethernet)**
  - Initial Delay:
    - This setting takes effect right after NIO 50 boots up.
    - This is used to delay the communication to serial device to avoid garbage data sent during NIO 50 boot up stage.
  - Transmit Interval:
    -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



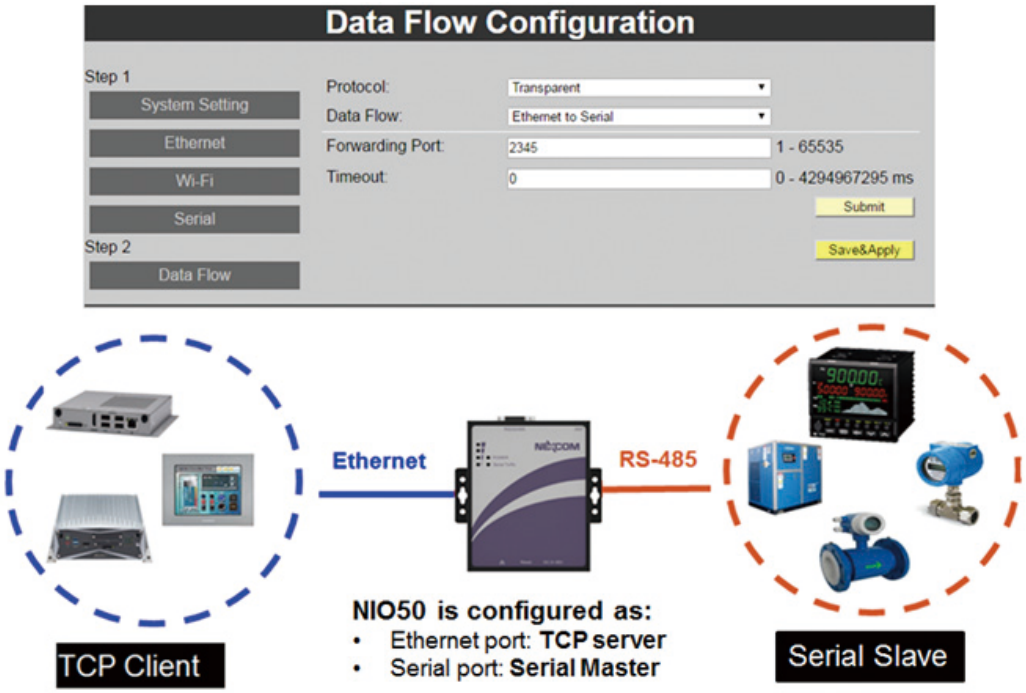




### Wi-Fi Setting

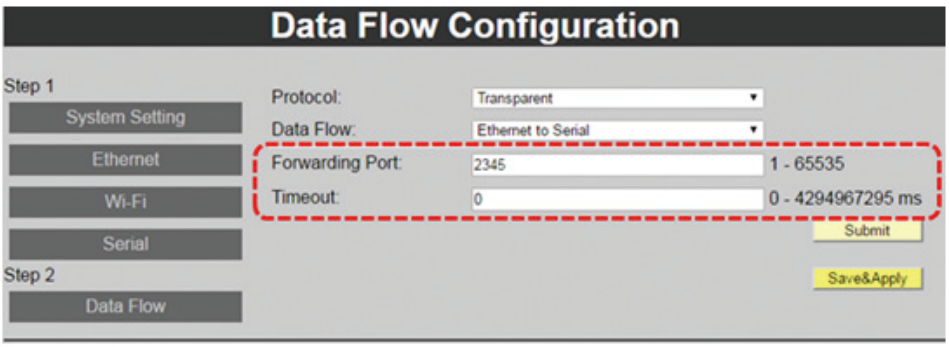



- **Forwarding Port**
  Input the port number of this Wi-Fi interface. It's used for remote TCP clients to connect with.
- **Timeout**
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will be permanently on.

### 3.4.1.4 Ethernet to Serial

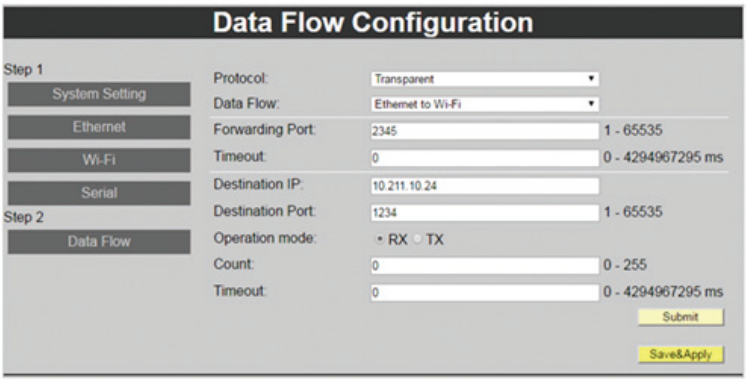


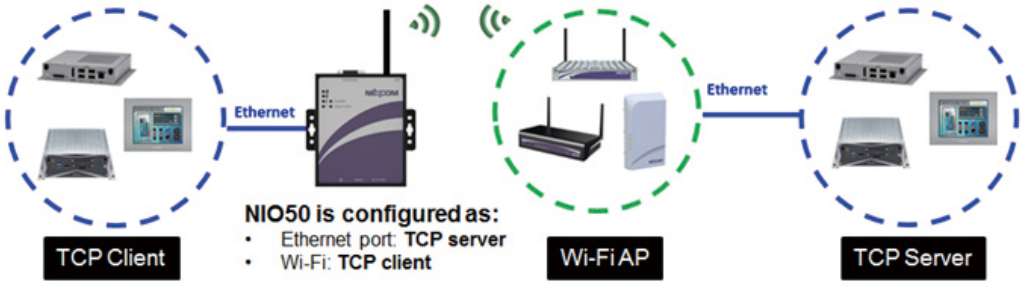

**Ethernet Setting**



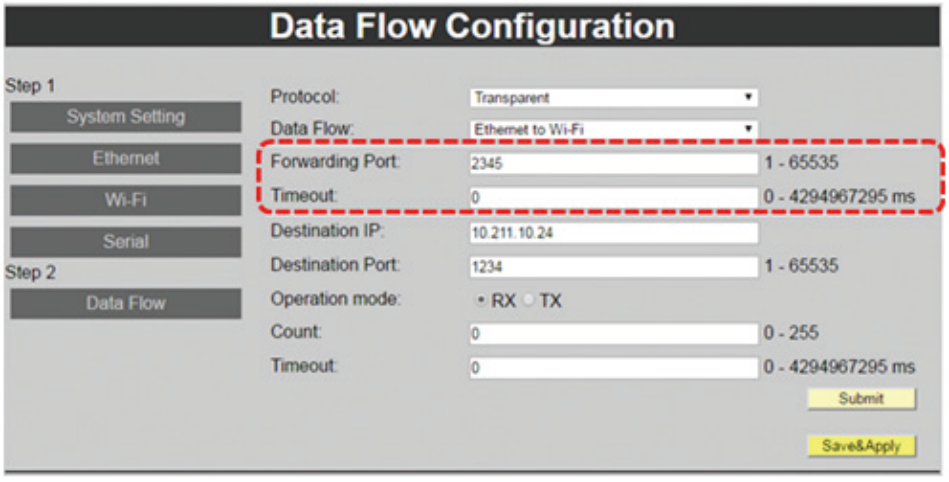

- **Forwarding Port**
  Input the port number of this Ethernet interface. It's used for remote TCP client to connect with.
- **Timeout**
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will be permanently on.

### 3.4.1.5 Ethernet to Wi-Fi



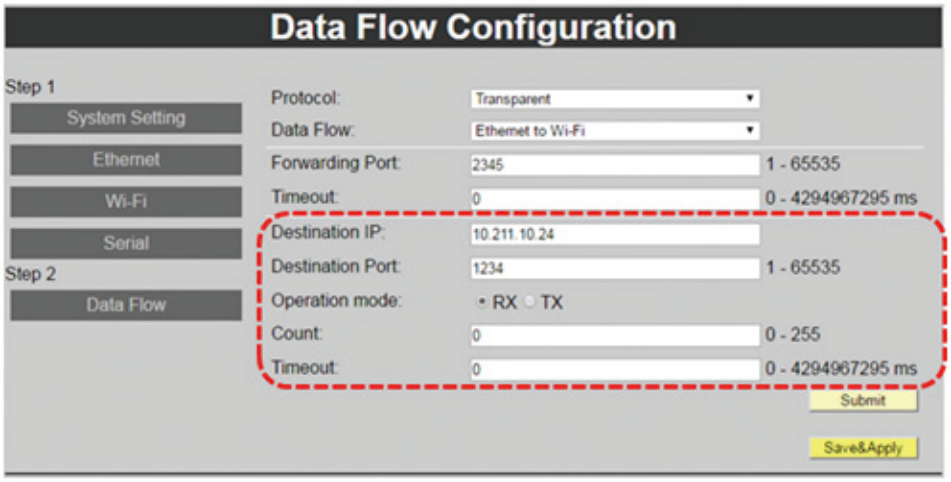




**Ethernet Setting**



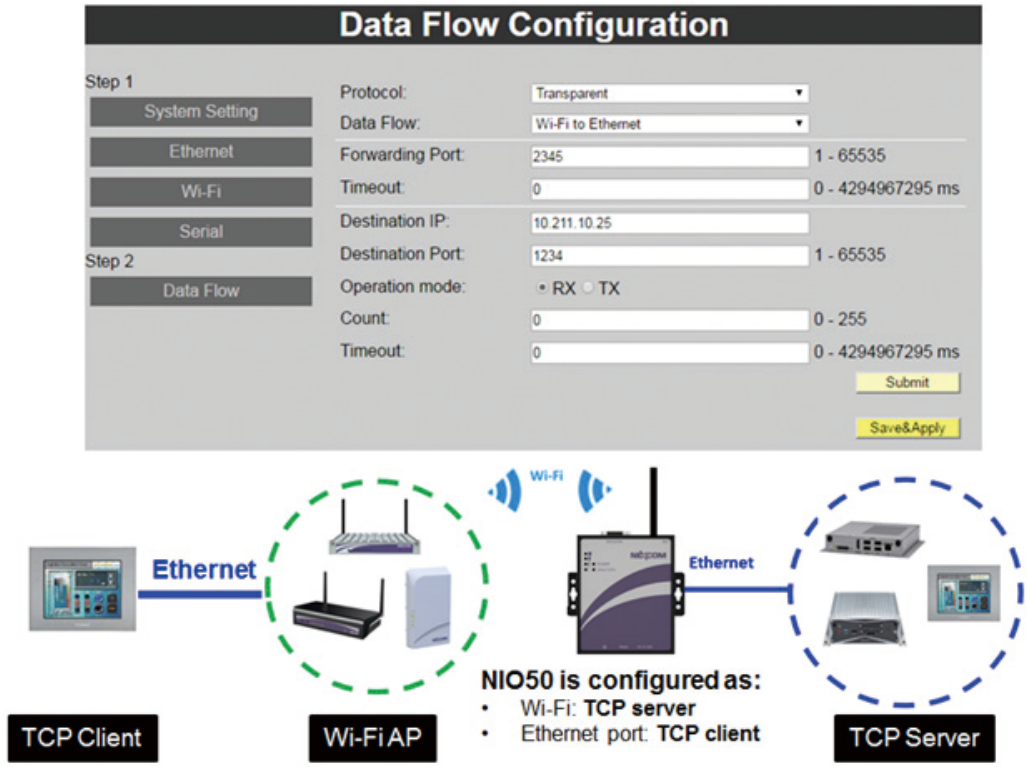

- **Forwarding Port**
  Input the port number of this Ethernet interface. It's used for remote TCP client to connect with.
- **Timeout**
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will be permanently on.

## Wi-Fi Setting

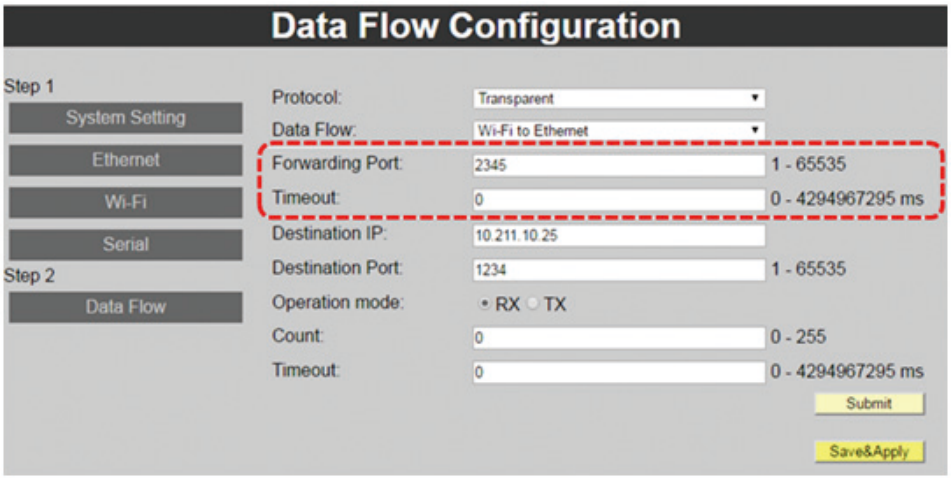



- **Destination IP**
  Remote TCP server IP address.
- **Destination Port**
  Remote TCP server port number.
- **Operation Mode & Count (RX, TX)**
  - Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket 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



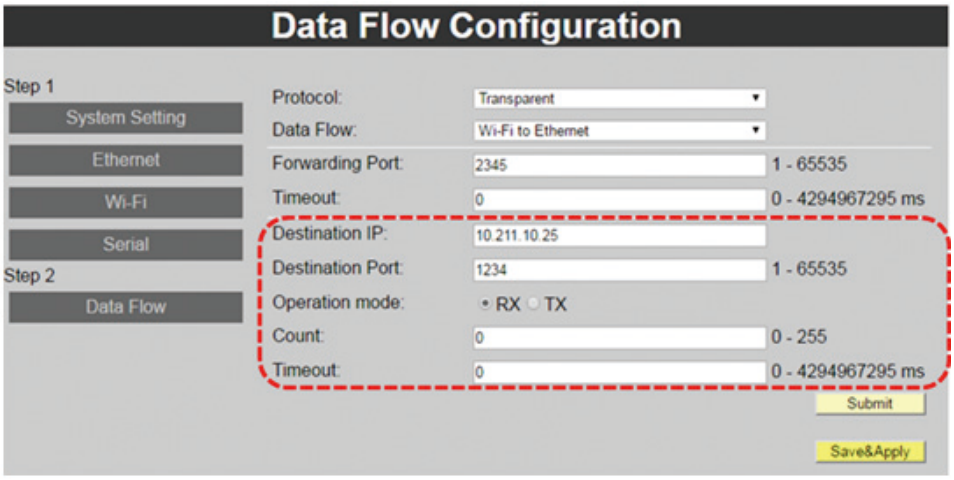

### Wi-Fi Setting




- **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.

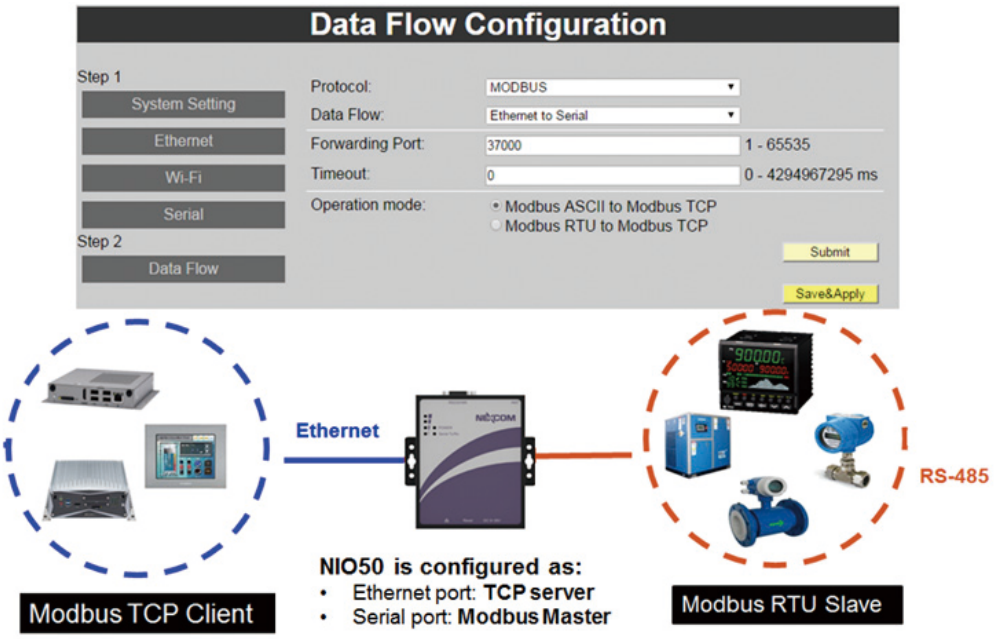
### Ethernet Setting

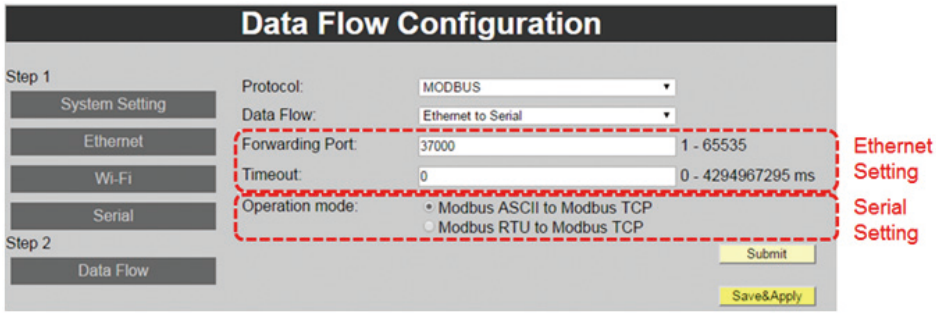



- **Destination IP**
  Remote TCP server IP address.
- **Destination Port**
  Remote TCP server port number.
- **Operation Mode & Count (RX, TX)**
  – Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket 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



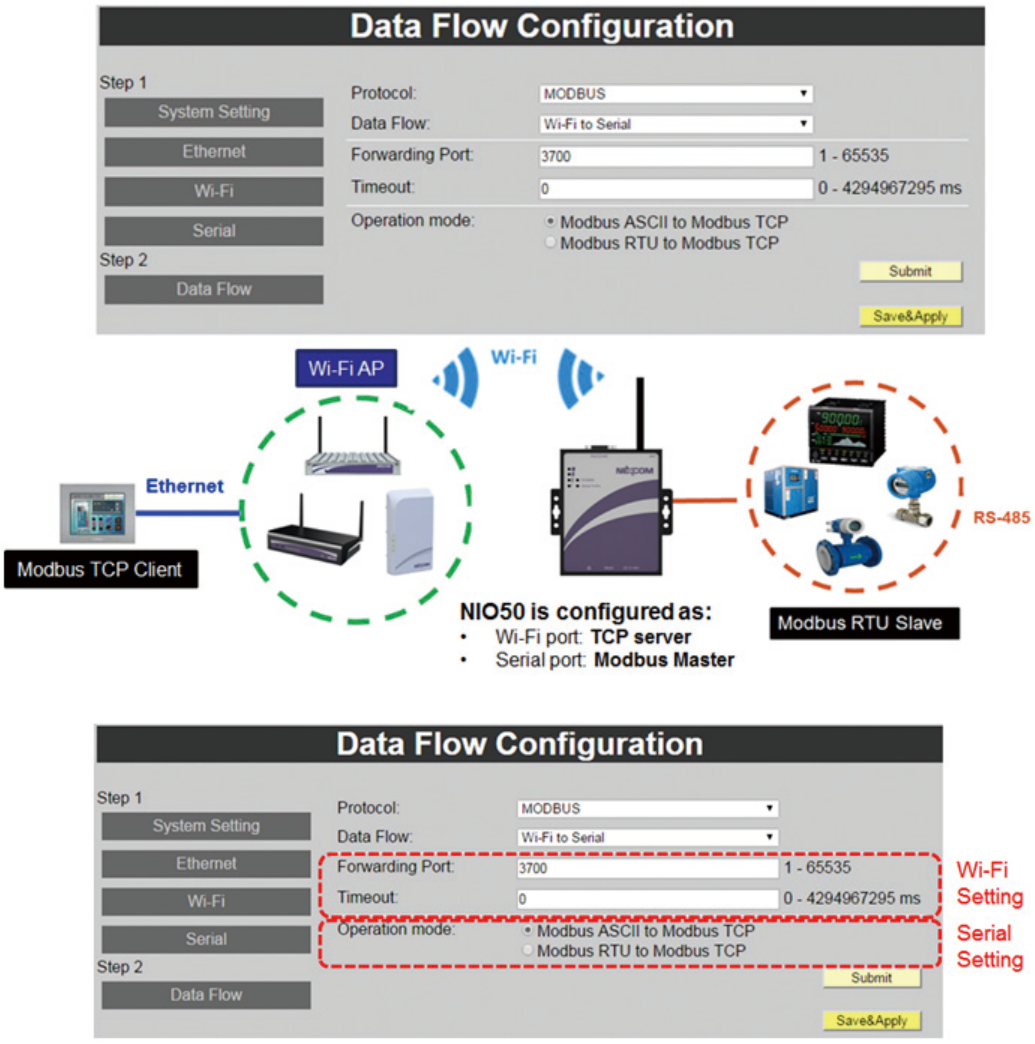

**Ethernet Setting**

- **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







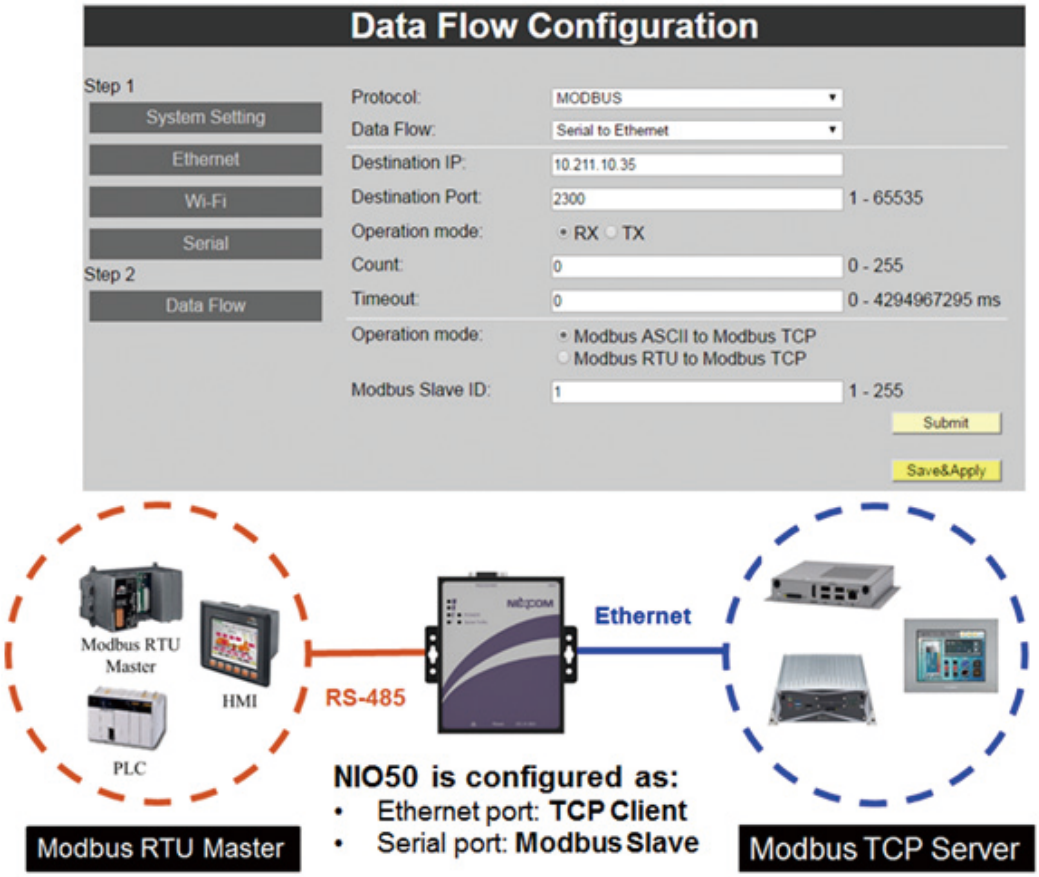
**Wi-Fi Setting**

- **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.

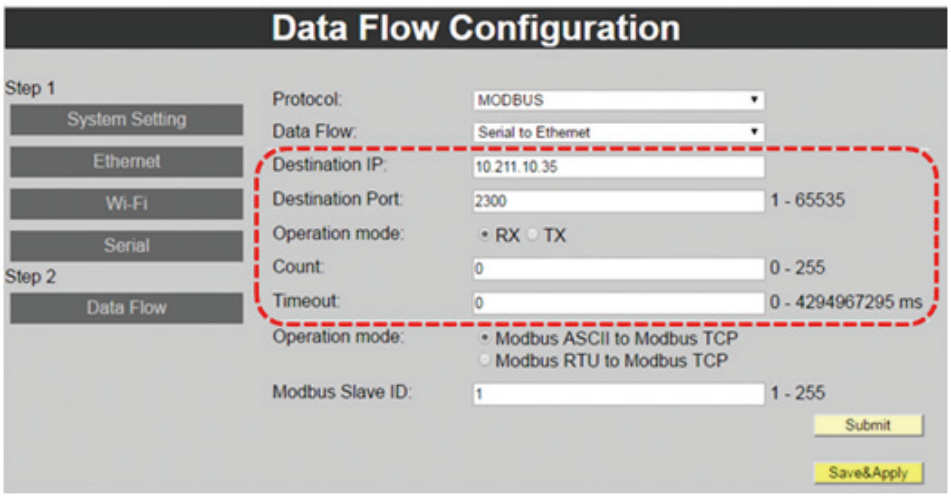
**Serial Setting**

- **Operation Mode**
  Choose the protocol conversion between Modbus ASCII/RTU and TCP.

### 3.4.2.3 Serial to Ethernet



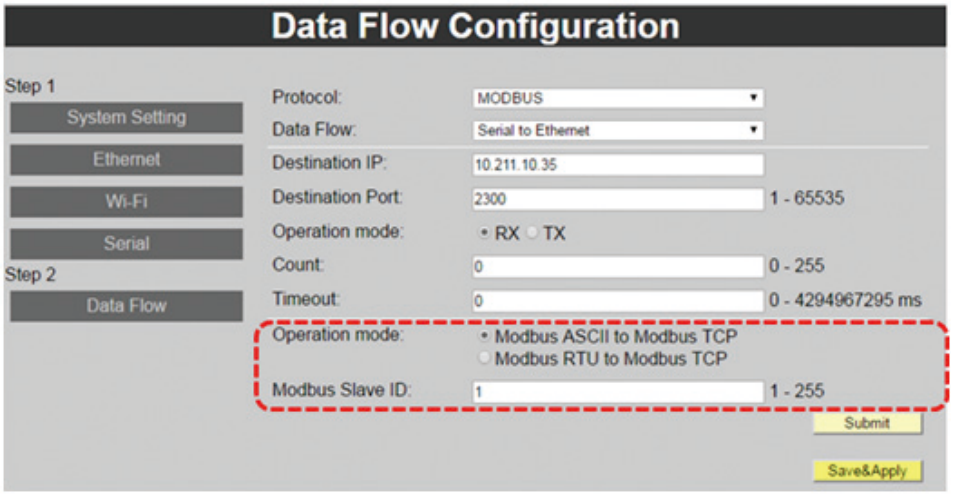

### Ethernet Setting




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

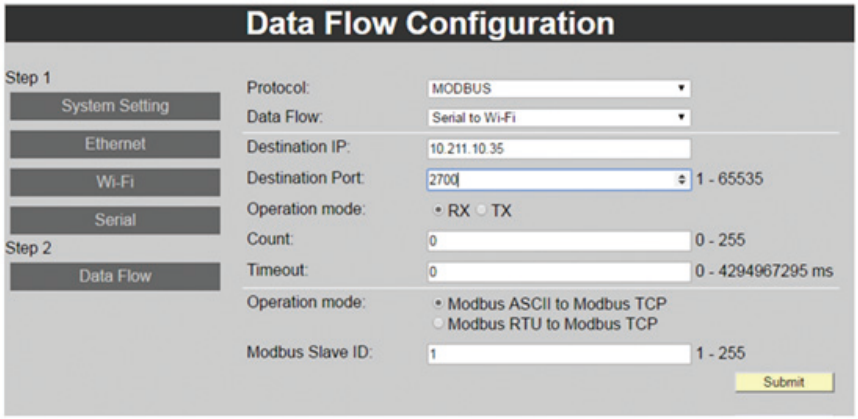
- **Operation Mode & Count (RX, TX)**
  - Input the specified counter setting (for example, '5') allowed for TCP packets at "RX" direction. When the RX count reaches 5 packets, the TCP socket will be disconnected.
  - "0": Means this function is disabled. TCP socket will not be disconnected due to "RX"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

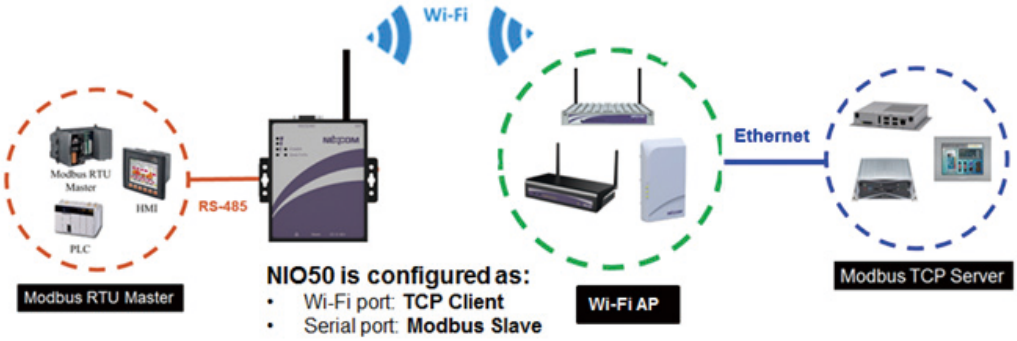
### Serial Setting



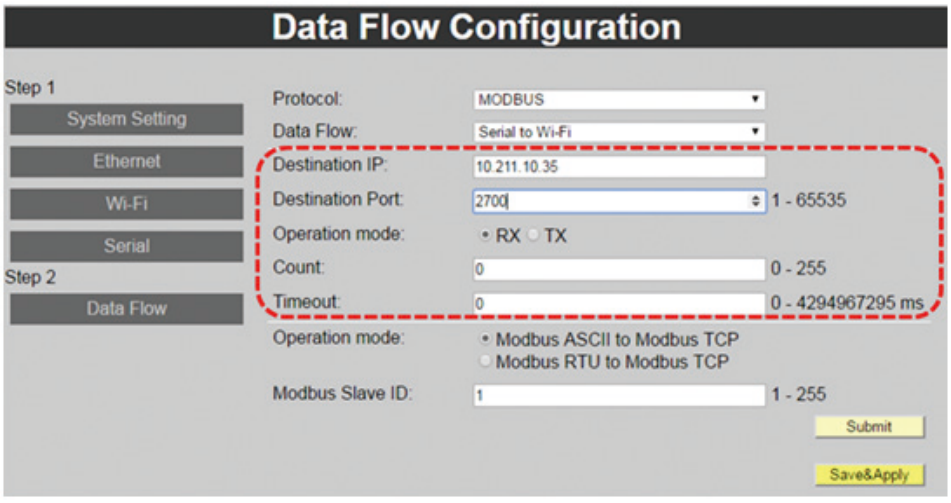

- **Operation mode**
  Choose the protocol conversion between Modbus ASCII/RTU and TCP.
- **Modbus Slave ID**
  Input the Modbus Slave device ID which NIO 50 connects to.

### 3.4.2.4 Serial to Wi-Fi



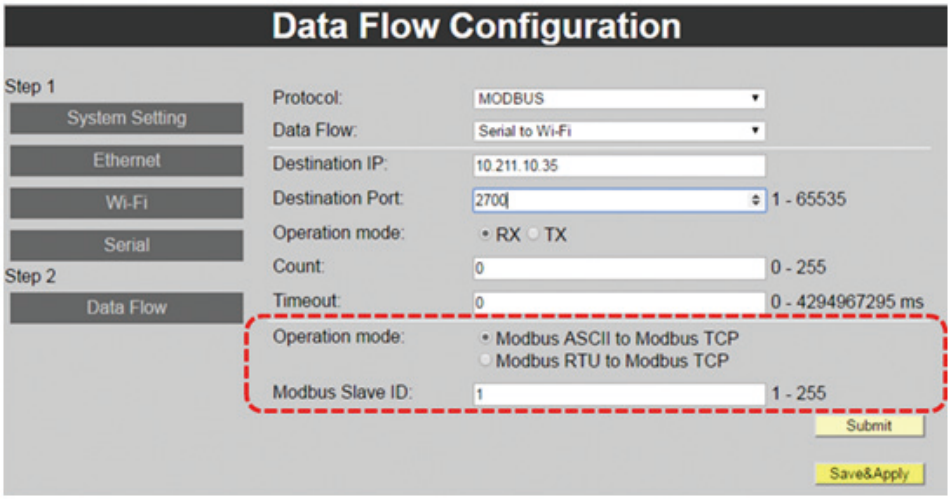

### Wi-Fi Setting




- **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.

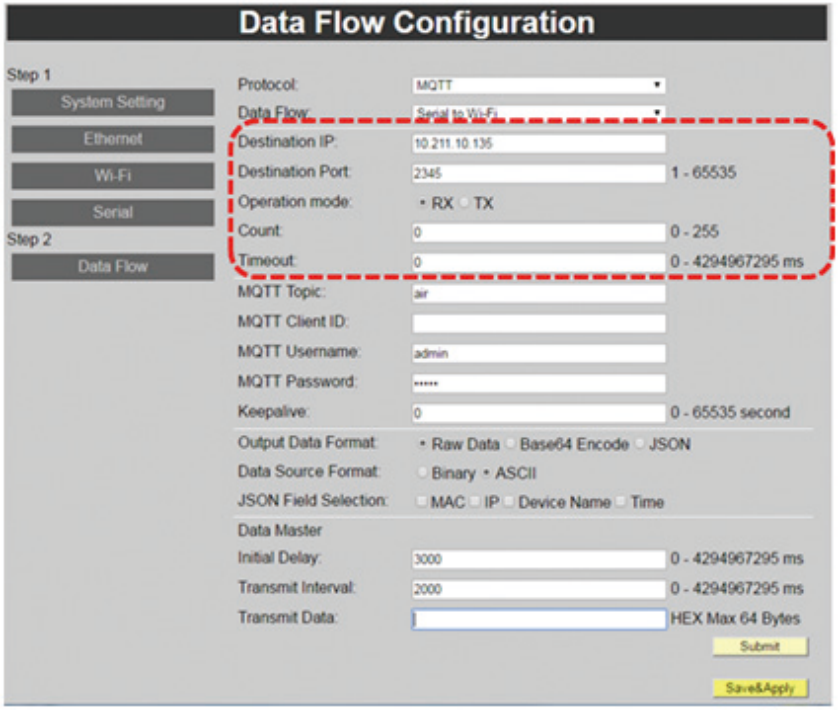
### Serial Setting



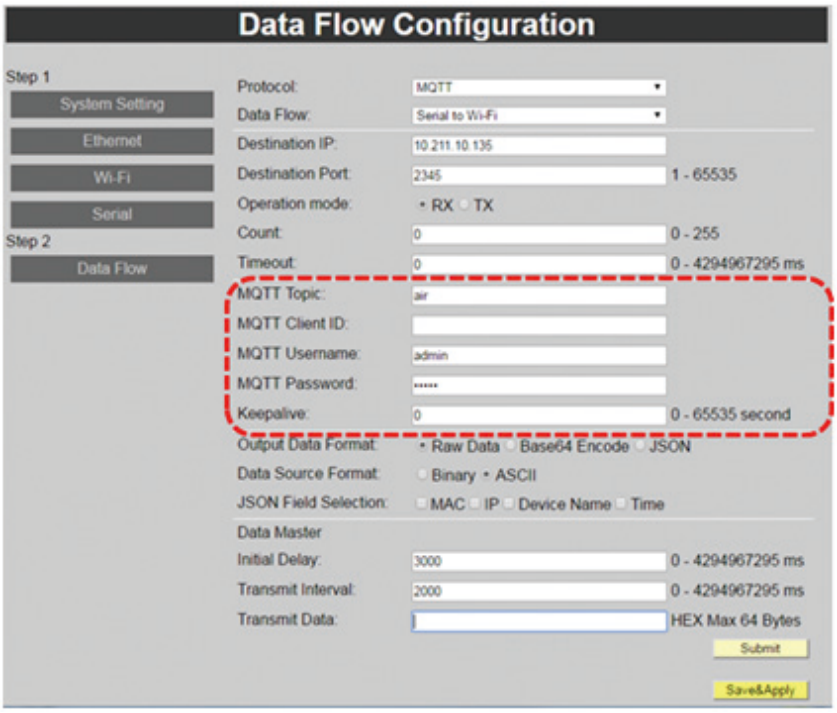

- **Operation Mode**
  Choose the protocol conversion between Modbus ASCII/RTU and TCP.
- **Modbus Slave ID**
  Input the Modbus Slave device ID which NIO 50 connects to.

### 3.4.3 MQTT Configuration

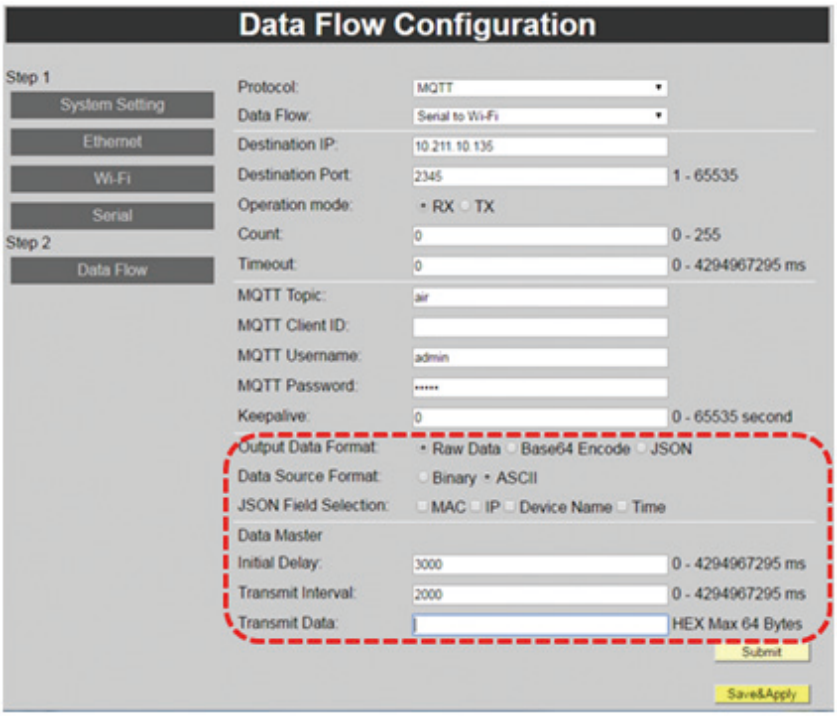
#### 3.4.3.1 Serial to Wi-Fi




- **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.

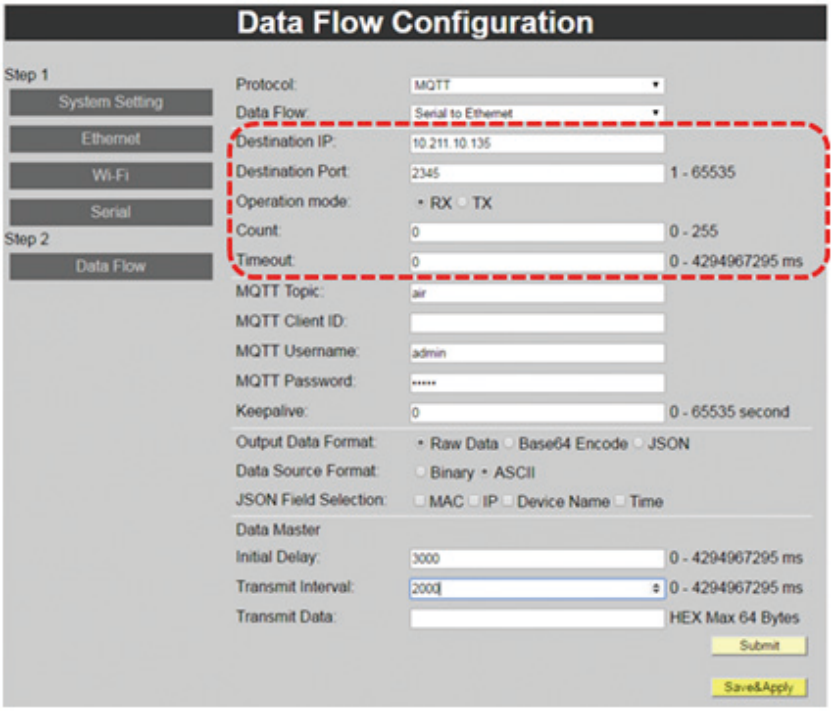



- **MQTT Topic**
  Input MQTT topic. Note: The following characters ("#", "+", "$") are reserved and are not allowed for input.
- **MQTT Client ID**
  Input the MQTT client ID. If no client ID is available, then this field can be blank.
- **MQTT Username**
  Input the Username for MQTT broker.
- **MQTT Password**
  Input the Password for MQTT broker.
- **Keepalive**
  Input the keep alive timer for MQTT connection.

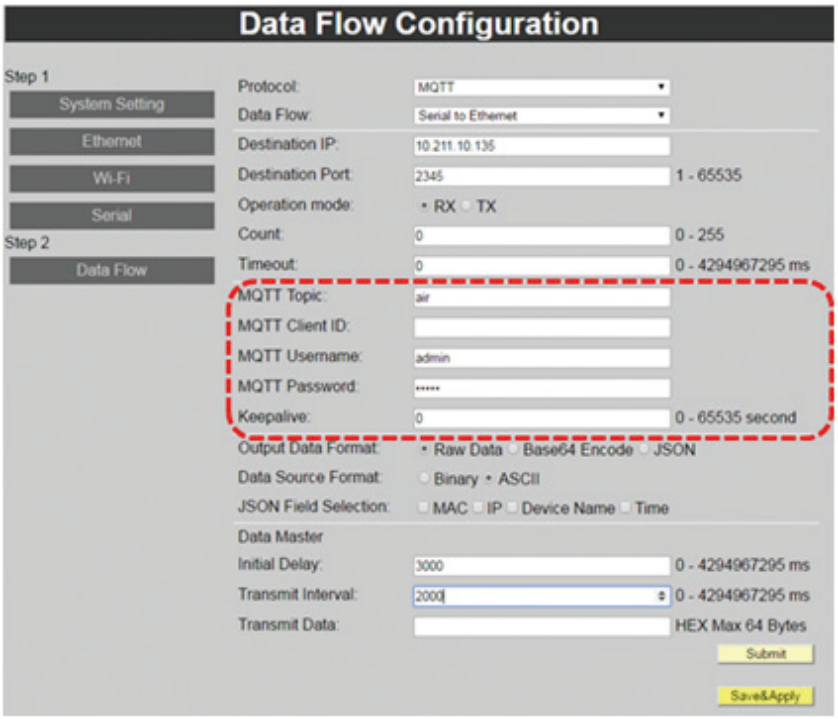



- **Output Data Format**
  Select the MQTT data format. There are "Raw Data", "Base64 Encode" and "JSON" formats to select from. Note: The allowed max. length is 512 bytes for JSON data format.
- **Data Source Format**
  Select the Data Source Format. The format has "Binary" and "ASCII" options.
- **Data 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.

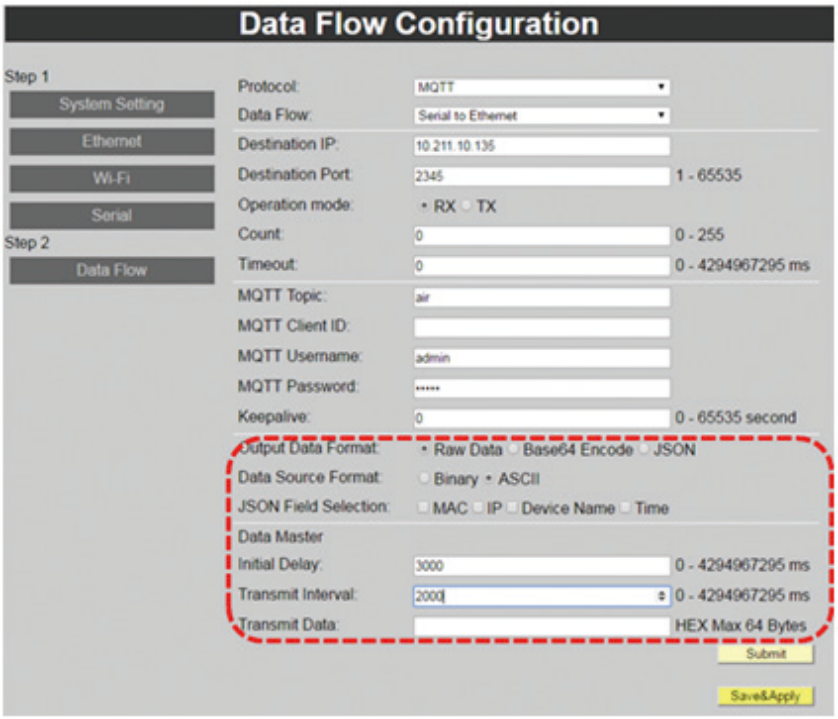
### 3.4.3.2 Serial to Ethernet




- **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.

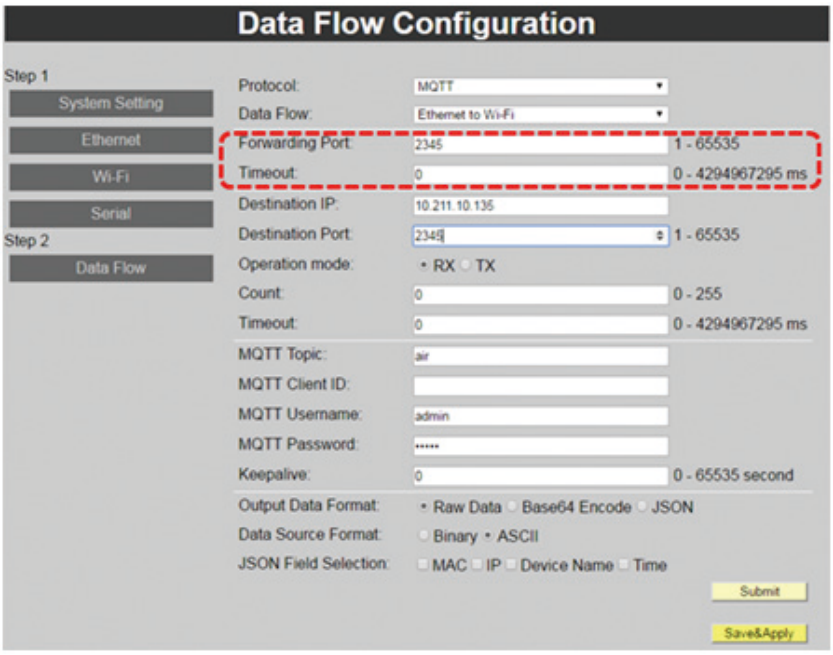



- **MQTT Topic**
  Input MQTT topic. Note: The following characters ("#", "+", "$") are reserved and are not allowed for input.
- **MQTT Client ID**
  Input the MQTT client ID. If no client ID is available, then this field can be blank.
- **MQTT Username**
  Input the Username for MQTT broker.
- **MQTT Password**
  Input the Password for MQTT broker.
- **Keepalive**
  Input the keep alive timer for MQTT connection.



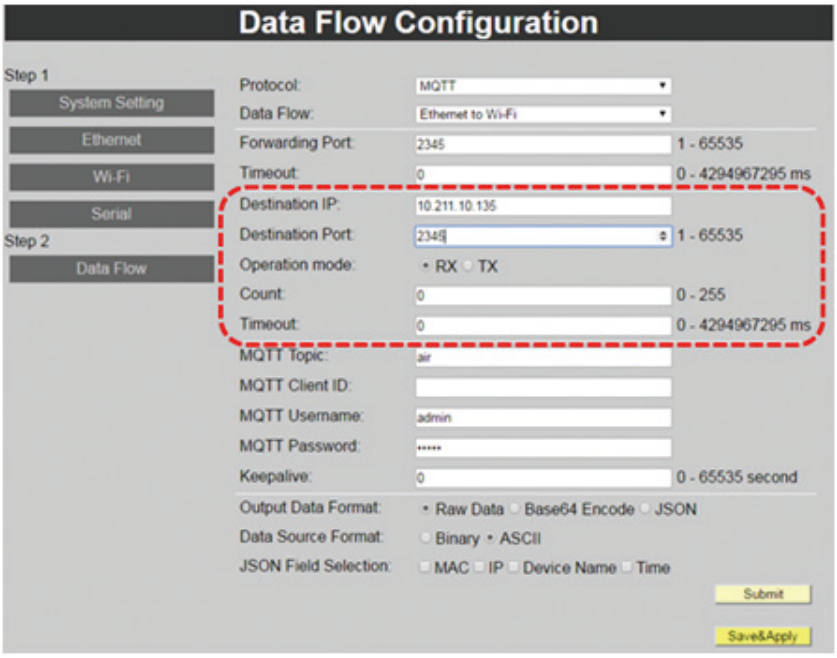

- **Output Data Format**
  Select the MQTT data format. There are "Raw Data", "Base64 Encode" and "JSON" formats to select from. Note: The allowed max. length is 512 bytes for JSON data format.
- **Data Source Format**
  Select the Data Source Format. The format has "Binary" and "ASCII" options.
- **Data 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

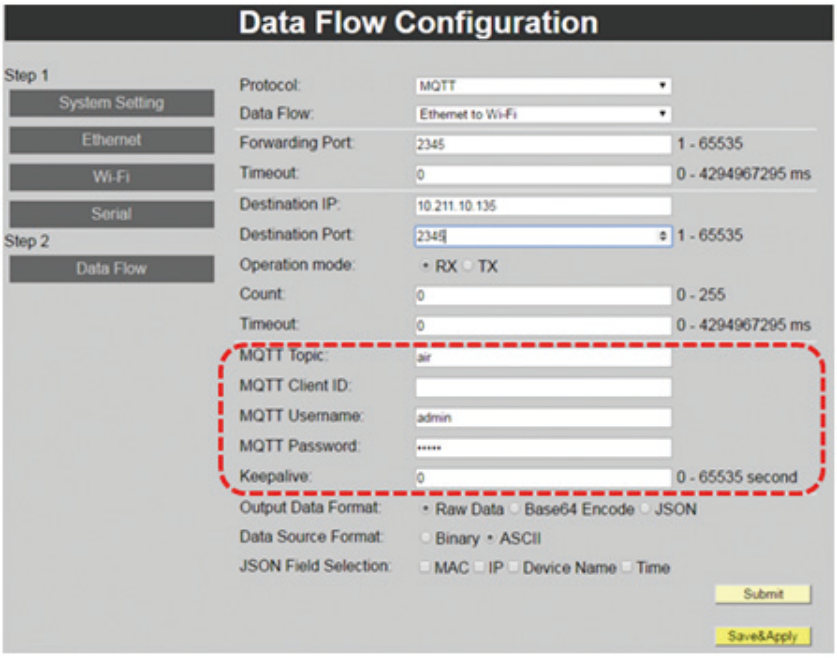



This setting is used to setup the Ethernet TCP configuration. In this mode, Ethernet is a TCP server, while Wi-Fi is a TCP client.

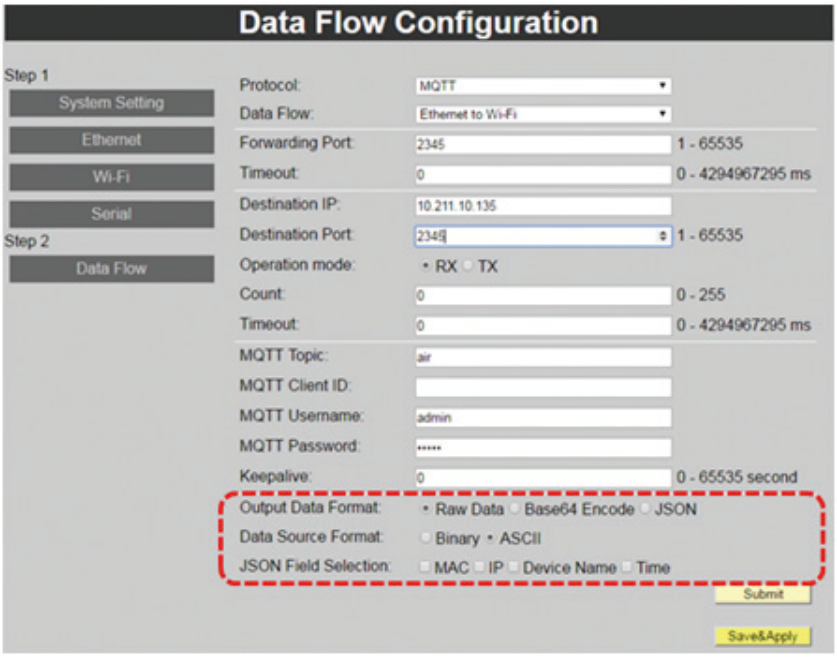
- **Forwarding Port**
  Input the TCP server port number of this Ethernet interface. It's used for remote TCP client device to connect with.
- **Timeout**
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.




- **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.

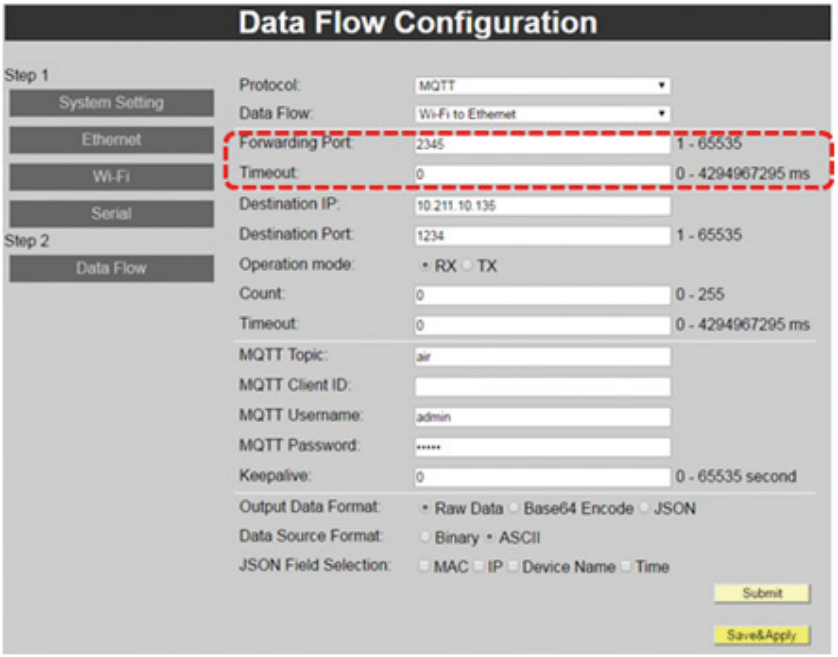



- **MQTT Topic**
  Input MQTT topic. Note: The following characters ("#", "+", "$") are reserved and are not allowed for input.
- **MQTT Client ID**
  Input the MQTT client ID. If no client ID is available, then this field can be blank.
- **MQTT Username**
  Input the Username for MQTT broker.
- **MQTT Password**
  Input the Password for MQTT broker.
- **Keepalive**
  Input the keep alive timer for MQTT connection.



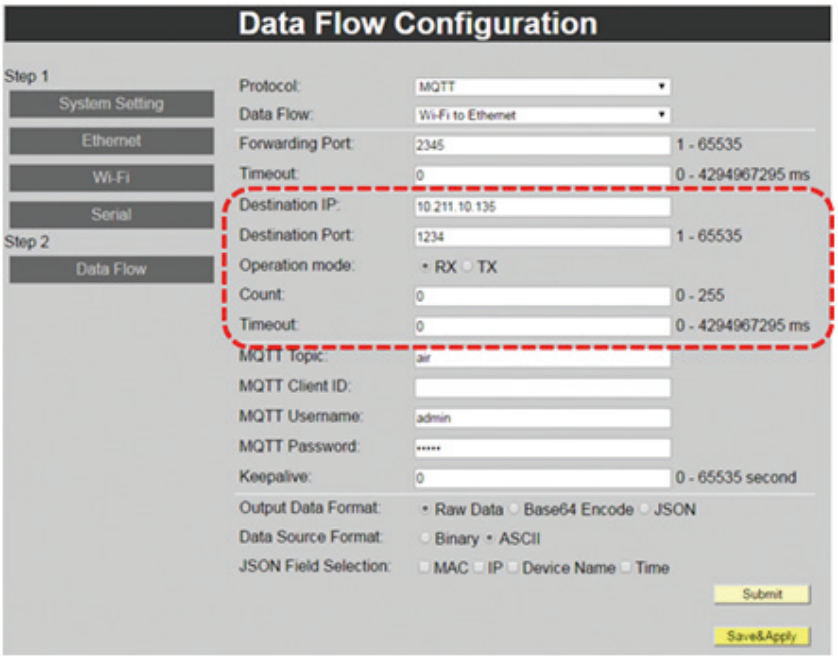

- **Output Data Format**
  Select the MQTT data format. There are "Raw Data", "Base64 Encode" and "JSON" formats to select from.
  Note: The allowed max. length is 512 bytes for JSON data format.
- **Data Source Format**
  Select the Data Source Format. The format has "Binary" and "ASCII" options.
- **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

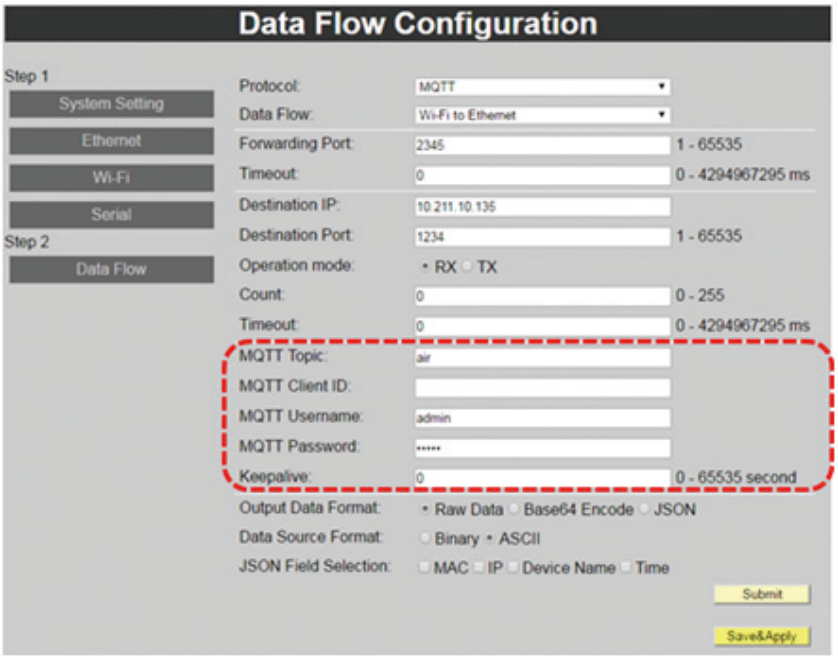



This setting is used to setup the Wi-Fi TCP configuration. In this mode, Wi-Fi is a TCP server, while Ethernet is a TCP client.

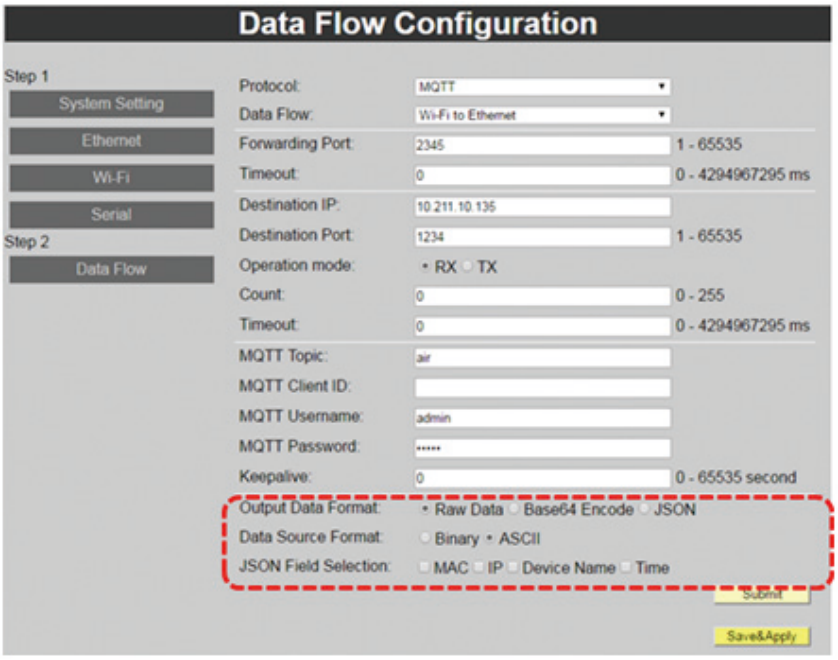
- **Forwarding Port**
  Input the TCP server port number of this Wi-Fi interface. It's used for remote TCP client device to connect with.
- **Timeout**
  - Input the specified timer setting allowed for TCP socket idle time. When idle time reaches timeout setting, the TCP socket will be disconnected.
  - "0": Means timeout is disabled. TCP connection will not be disconnected due to TCP socket idle time.




- **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.




- **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.




- **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