User Manual

EKI-1200 Series

1/2/4-port Modbus Gateways

ADVANTECH

Enabling an Intelligent Planet

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Declaration of Conformity

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

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

Technical Support and Assistance

We offer several channels for assistance with your device:

1. Visit AutomationDirect's tech support web site at support.automationdirect.com.
2. Call our tech support line at 1-800-633-0405 or 1-770-884-4200 from 9:00 a.m. to 6:00 p.m. Eastern Time, Monday through Friday.
3. Connect with other users in the AutomationDirect community at community.automationdirect.com.

When contacting tech support, the following information will be helpful:

- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data. For example:*
There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. The battery is not field replaceable.

Note! *Notes provide optional additional information.*

Document Feedback

To assist us in making improvements to this manual, we would welcome comments and constructive criticism. Please send all using the Contact Tech Support feature at https://community.automationdirect.com/s/contactsupport.

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1 x Industrial Modbus Device
- 1 x DIN Rail Mounting Bracket and Screws
- 1 x Wall-mounting Bracket

Safety Instructions

- Read these safety instructions carefully.
- Keep this User Manual for later reference.
- Disconnect this equipment from any DC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
- Keep this equipment away from humidity.
- Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
- The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Position the power cord so that people cannot step on it. Do not place anything over the power cord.
- All cautions and warnings on the equipment should be noted.
- If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
- Never pour any liquid into an opening. This may cause fire or electrical shock.
- Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
- If one of the following situations arises, get the equipment checked by service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated into the equipment.
  - The equipment has been exposed to moisture.
  - The equipment does not work well, or you cannot get it to work according to the user's manual.
  - The equipment has been dropped and damaged.
  - The equipment has obvious signs of breakage.
- DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO -40°C (-40°F) ~ 85°C (185°F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
- The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).
  DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precaution - Static Electricity

Static electricity can cause bodily harm or damage electronic devices. To avoid damage, keep static-sensitive devices in the static-protective packaging until the installation period. The following guidelines are also recommended:

- Wear a grounded wrist or ankle strap and use gloves to prevent direct contact to the device before servicing the device. Avoid nylon gloves or work clothes, which tend to build up a charge.
- Always disconnect the power from the device before servicing it.
- Before plugging a cable into any port, discharge the voltage stored on the cable by touching the electrical contacts to the ground surface.

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Chapter 1

Introduction

1.1. Overview

Advantech's EKI-1200 Series of Modbus Gateways (the following manual will use EKI-1200 Series instead of complete model name) are a robust, feature-rich, and cost effective way to integrate Ethernet and Serial Modbus devices. The EKI-1200 Series provides serial ports (one, two or four), Ethernet ports (two), a wide range of power inputs, and a compact slim design, making them an ideal solution for connecting multiple Modbus/ RTU and Modbus/ASCII serial devices to Modbus TCP (Ethernet).

Originally developed for PLCs in industrial automation and manufacturing control applications, Modbus is one of the most popular open standard protocols in use today. The communication mode can be Modbus RTU/ASCII (Serial) or Modbus TCP (Ethernet). Many industrial devices use Modbus as their communication standard. However, the Ethernet-based Modbus protocol is different from the original serial-based protocols that a Modbus Gateway is needed to be a bridge for integration.

The two Ethernet ports allow the EKI-122x-CE to establish two separated Ethernet connections to two Ethernet domains or two Ethernet switches in the same domain. Through a dual Ethernet connection, the EKI-122x-CE greatly improves the device connectivity reliability, increase system stability, and simplify the redundant configuration.

The Modbus/RTU and Modbus/ASCII protocols define how a "client" device polls one or more "server" devices and write real-time data over RS-232, RS-422, or RS-485 serial data communication. The EKI-1200 Series provides a feature that can allow users to select client or server operation for each serial port. The EKI-1200 Series not only allows Ethernet client can control serial servers, but also allow serial clients to control Ethernet or serial servers. Furthermore, the EKI-1200 Series can allow both Ethernet and serial servers to be controlled by both Ethernet and serial clients.

The EKI-1200 Series supports various operating modes: RTU Client, RTU Server, ASCII Client, and ASCII Server.

1.2. Device Features

- Provides 2 x 10/100 Mbps Ethernet ports for LAN redundancy
- Integration of Modbus TCP and Modbus RTU/ASCII networks
- Supports up to 921.6 kbps and any baud rate setting
- Client Mode can support 16 peer devices
- Server mode can have 32 peer devices per port on the serial side, with up to 64 TCP sessions per gateway
- Software selectable RS-232/422/485 communication
- Mounts on DIN rail and Wall mount
- Built-in 15 KV ESD protection for all serial signals
- Automatic RS-485 data flow control
- Supports surge protection for DC power ports with line to line 2 KV, and line to earth 4 KV; for signal ports with 4 KV.

Chapter 2

Getting Started

2.1. Understanding Modbus Gateways

Networks have become increasingly vital for industrial automation applications. Many control devices today do not have a network port and can only communicate with a dedicated local PC or control panel. Advantech's revolutionary network-enabling technology is now allowing control devices with serial ports to connect to the Ethernet and share networks quickly and cost-effectively. The EKI-1200 Series are network-based, Modbus gateways for integrating new and existing Modbus/ RTU and Modbus/ ASCII serial devices to newer TCP/IP networked-based devices. Manufacturers, system integrators, and end users can now take advantage of Modbus gateways to create networked applications for remote managing and accessing data for their control devices that wasn't possible before.

2.1.1. Protocol Overview

Originally developed for PLCs in industrial automation and manufacturing control application, Modbus has become one of the most popular open standard protocols in use today. When it comes to planning data communication for open, multi-vendor industrial control systems, Modbus is the first choice of end-users and integrators.

Although it's not the most powerful protocol available, its rare simplicity allows not only rapid implementation, but also remains flexible enough to be applied in virtually all industrial situations. The communication mode of Modbus can be ASCII, RTU, or TCP/IP. Modbus gateways are used to support applications such as protocol conversion between serial (Modbus/ASCII or Modbus/RTU) and networked (Modbus/ TCP) Modbus devices or it can be used to bridge Modbus serial devices over TCP/IP network.

The Modbus/RTU and Modbus/ASCII protocols define how a "client" device polls one or more "server" devices to read and write real-time data over RS-232, RS-422, or RS-485 serial data communication. The simplicity of Modbus/RTU not only allows rapid implementation, but can also remain flexible enough to be applied in virtually all industrial situations.

During Modbus network communication, the protocol determines how each controller will know its device address, recognize a message addressed to it, determine the kind of action to be taken, and extract any data or other information contained in the message. If a reply is required, the controller will construct the reply message and send it back using Modbus protocol.

The way controllers communicate with each other is by using a client-server technique, in which only one device (the client) can initiate queries. The other devices (the servers) respond by supplying the requested data to the client, or by taking the action requested in the query. Typical client devices include host processors and programming panels. Typical servers include programmable controllers.

It is the client that can address individual servers and initiate a broadcast message to all servers. On the other hand, servers return a response to queries that are addressed to them individually. Responses are not returned to broadcast queries from the client.

The Modbus protocol has a definite format for the client's query, which incorporates the device (or broadcast) address, a function code defining the requested action, any data to be sent, and an error-checking field. The server's response message, which is also constructed using Modbus protocol, contains fields confirming the action taken, any data to be returned, and an error-checking field. If an error occurred in receipt of the message, or if the server is unable to perform the requested action, the server will construct an error message and send it as its response.

The basic system architecture is as below:

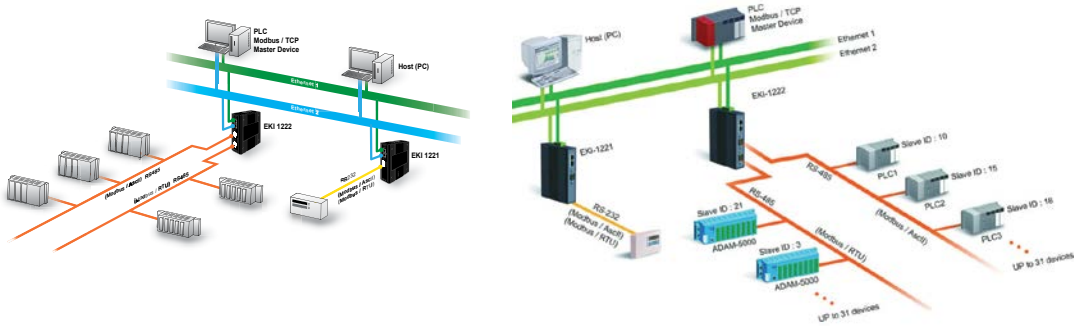

Figure 2.1. Modbus System Architecture 1

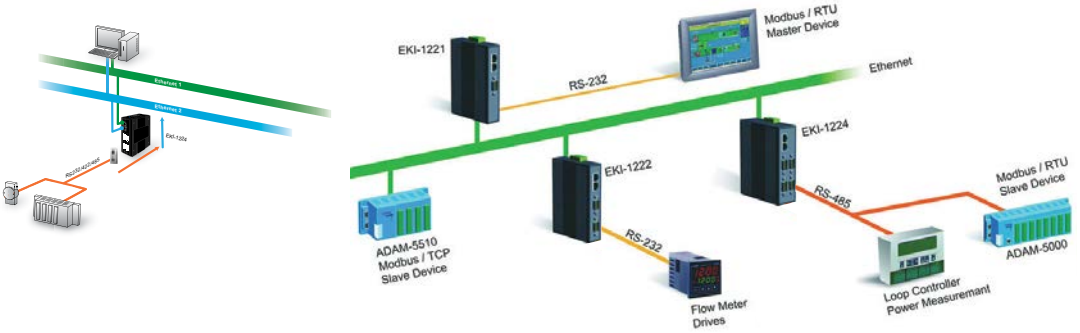

Figure 2.2. Modbus System Architecture 2

2.1.2. Modbus RTU

The Modbus/RTU protocol defines how a “client” device polls one or more “server” devices to read and write data in real-time over RS-232, RS-422, or RS-485 serial data communication.

When using RTU mode, each 8-bit byte in a message contains two 4-bit hexadecimal characters. The main advantage of this mode is that its greater character density allows better data throughput than ASCII mode for the same baud rate. Nevertheless, each message must be transmitted in continuous stream.

2.1.3. Modbus ASCII

When using ASCII mode, each 8-bit byte in a message is sent as two ACSII characters. The primary advantage of this ASCII mode is that it allows time intervals of up to one second to occur between characters without causing an error.

Mode	RTU	ASCII
Coding System	8-bit binary. Two hexadecimal character contained in each ASCII character of the message	Hexadecimal. One hexadecimal character contained in each ASCII character of the message
Bits per Byte	1 start bit, 8 data bits, 1 bit for even/odd parity; no bit for parity 1 stop bit if parity is used; 2 bits if no parity	1 start bit, 7 data bits, 1 bit for even/odd parity; no bit for parity 1 stop bit if parity is used; 2 bits if no parity
Error Check	CRC	LRC

2.1.4. Modbus TCP

As a new extension of Modbus/RTU, the Modbus/TCP protocol defines how Modbus/RTU messages are encoded within and transported over TCP/IP-based networks. Modbus/TCP is just as simple to implement and flexible to apply as the original Modbus/RTU. The Modbus/TCP protocol is defined by its form of encapsulation for a Modbus request or response. That means the Modbus request or response data is encapsulated in TCP frame that has a six-byte header in Modbus/TCP protocol.

Modbus/TCP enables the use of Modbus messaging in an Intranet running the TCP/IP protocols. Modbus/TCP is most commonly used for Ethernet attachment of PLC's or I/O modules to other simple field buses or I/O networks.

2.2. Specifications

Specifications	Description	
Interface	I/O Port	■ EKI-1221: 2 x RJ45 + 1 x RS-232/422/485 ■ EKI-1222: 2 x RJ45 + 2 x RS-232/422/485 ■ EKI-1224: 2 x RJ45 + 4 x RS-232/422/485
	Power Connector	Terminal block
Physical	Enclosure	Metal with solid mounting hardware
	Installation	DIN rail and wall mount
	Dimensions (W x H x D)	■ EKI-1221/1222: 30 x 140 x 95mm (1.18" x 5.51" x 3.74") ■ EKI-1224: 42 x 140 x 95mm (1.65" x 5.51" x 3.74")
	Weight	■ EKI-1221: 0.472 kg ■ EKI-1222: 0.48 kg ■ EKI-1224: 0.555 kg
	IP Rating	IP30
LED Display	System LED	Power 1, Power 2, Status
	Port LED	LAN: Speed, Link/Active Serial: Tx, Rx
Environment	Operating Temperature	-10°C ~ 60°C (14°F ~ 140°F)
	Storage Temperature	-40°C ~ 85°C (-40°F ~ 185°F)
	Ambient Relative Humidity	10 ~ 95% RH
Ethernet Communications	Compatibility	IEEE 802.3, IEEE 802.3u
	Port Connector	2x 8-pin RJ45
	Protection	Built-in 2.25 kVDC magnetic isolation
Serial Communications	Port Type	RS-232/422/485-2w/485-4w, software selectable
	Port Connector	DB9 male
	Data Bits	5, 6, 7, 8
	Stop Bits	1, 1.5, 2
	Parity	None, Odd, Even, Space, Mark
	Flow Control	XON/XOFF, RTS/CTS
	Baud Rate	50 bps ~ 921.6 kbps, any baud rate setting
	Protection	Built-in 15 KV ESD for all signals

Specifications	Description	
Power	Power Consumption	■ EKI-1221: 3.2W ■ EKI-1222: 3.2W ■ EKI-1224: 4.1W
	Power Input	EKI-122x: 12 ~ 48VDC, redundant dual inputs
Software	OS Support (only relevant for firmware updates)	Windows XP/7/8.1/10/11, Windows Server 2016/2019/2022, Linux
	Operation Modes	Modbus RTU Client/Server mode Modbus ASCII Client/Server mode Modbus TCP Client in Agent mode
	Configuration	Web Browser
	Protocols	Modbus RTU, Modbus TCP, Modbus ASCII
Regulatory Approvals	EMC	CE, FCC Part 15 Subpart B (Class A)
	Hazardous Location	UL/cUL (Class I, Division 2, Groups A, B, C and D) ATEX (Zone 2 Ex nA nC IIC T4 Gc)

2.3. Hardware

2.3.1. Front View

The following view depicts the EKI-1221.

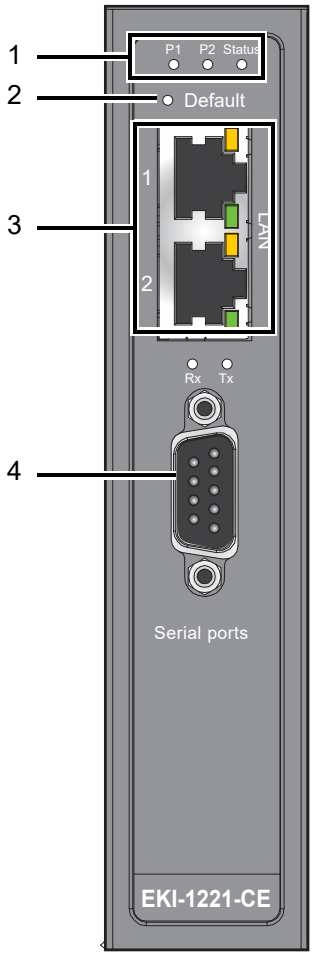

Figure 2.3. EKI-1221 Front View

No.	Item	Description
1.	System LED panel	See “LED Indicators” on page 13 for further details.
2.	Default button	Press for at least 10 secs. to reset device to default settings.
3.	ETH port	RJ45 ports x 2. Cat5e or better cables required. (See automationdirect.com for cable recommendations.)
4.	Serial port	DB9 pinout, supports 232/422/485

The following view depicts the EKI-1222.

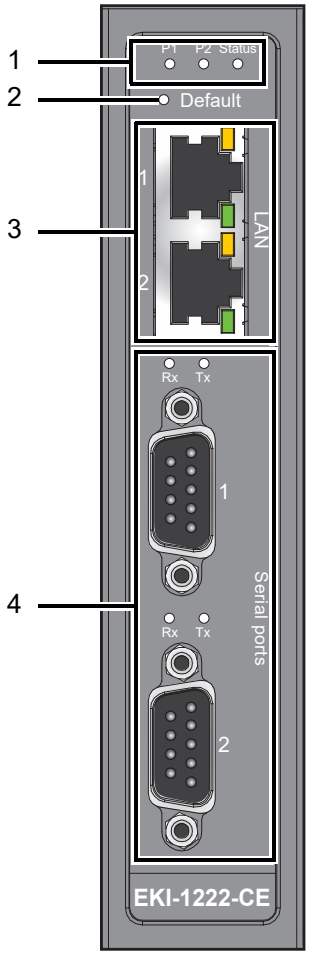

Figure 2.4. EKI-1222 Front View

No.	Item	Description
1.	System LED panel	See “LED Indicators” on page 13 for further details.
2.	Default button	Press for at least 10 secs. to reset device to default settings.
3.	ETH port	RJ45 ports x 2. Cat5e or better cables required. (See automationdirect.com for cable recommendations.)
4.	Serial port	DB9 (pinout) ports x 2, supports 232/422/485

The following view depicts the EKI-1224.

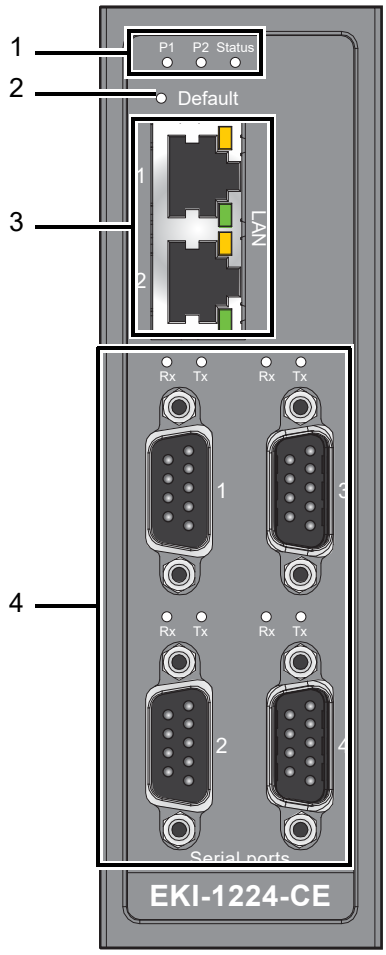

Figure 2.5. EKI-1224 Front View

No.	Item	Description
1.	System LED panel	See “LED Indicators” on page 13 for further details.
2.	Default button	Press for at least 10 secs. to reset device to default settings.
3.	ETH port	RJ45 ports x 2. Cat5e or better cables required. (See automationdirect.com for cable recommendations.)
4.	Serial port	DB9 (pinout) ports x 4, supports 232/422/485

2.3.2. Rear View

The following view depicts the EKI-1221 and EKI-1222.

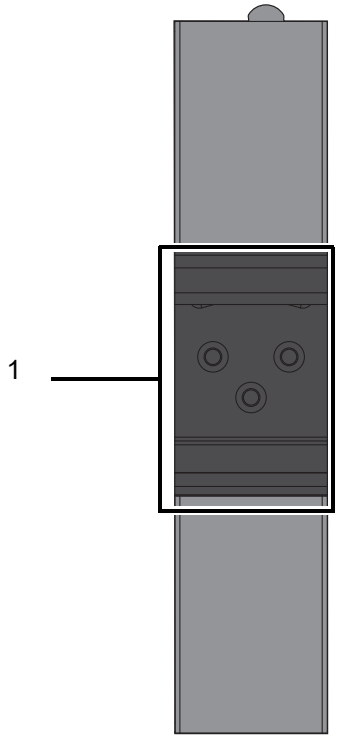

Figure 2.6. EKI-1221 and EKI-1222 Rear View

No.	Item	Description
1.	DIN rail mounting plate	Mounting plate used for installation to a standard DIN rail.

The following view depicts the EKI-1224.

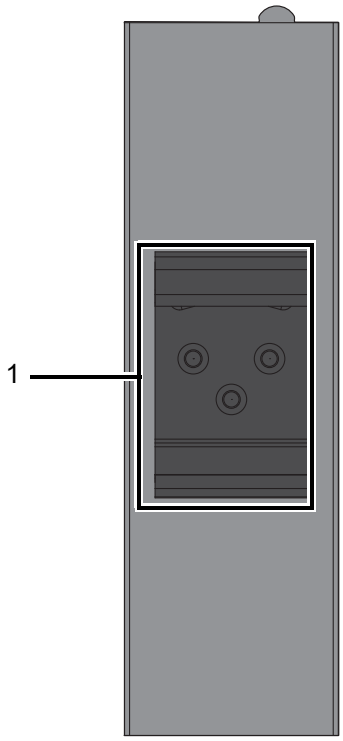

Figure 2.7. EKI-1224 Rear View

No.	Item	Description
1.	DIN rail mounting plate	Mounting plate used for installation to a standard DIN rail.

2.3.3. Top View

The following view depicts the EKI-122x.

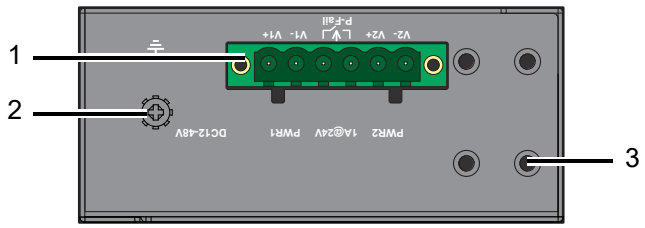

Figure 2.8. EKI-122x Top View

No.	Item	Description
1.	Terminal block	Connect cabling for power and alarm wiring
2.	Ground terminal	Screw terminal used to ground chassis
3.	Wall mounting holes	Screw holes (4) wall mount installation. The device is designed with top and bottom side screw holes for wall mount bracket.

2.3.4. LED Indicators

The following view depicts the EKI-122x.

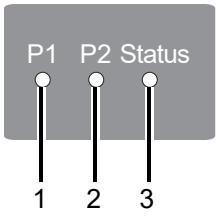

Figure 2.9. EKI-122x System LED Panel

No.	LED Name	LED Color	Description
1.	P1	Green	Power 1 is on
		Off	Power 1 is off, or power error condition exists
2.	P2	Green	Power 2 is on
		Off	Power 2 is off, or power error condition exists
3.	Status	Amber, blinking	System is ready (1cycle/sec.)
		Off	System is not working

2.3.5. Dimensions

The following view depicts the EKI-1221.

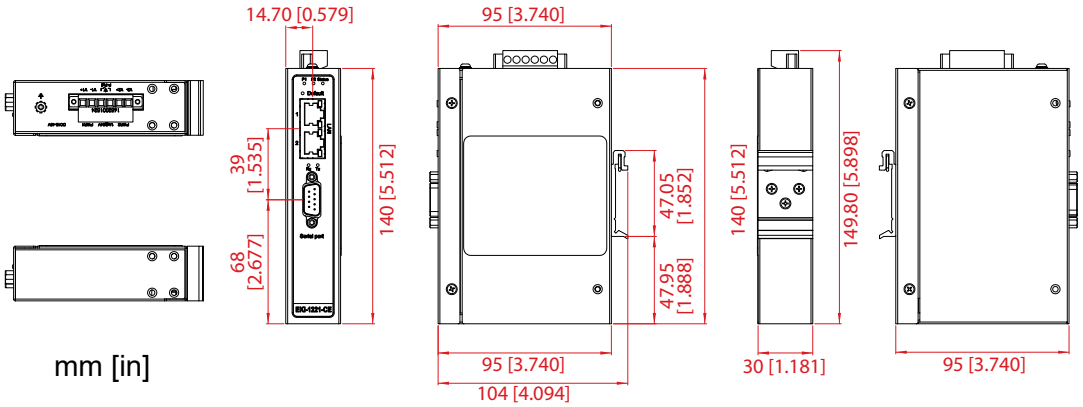

Figure 2.10. EKI-1221 Dimensions

The following view depicts the EKI-1222.

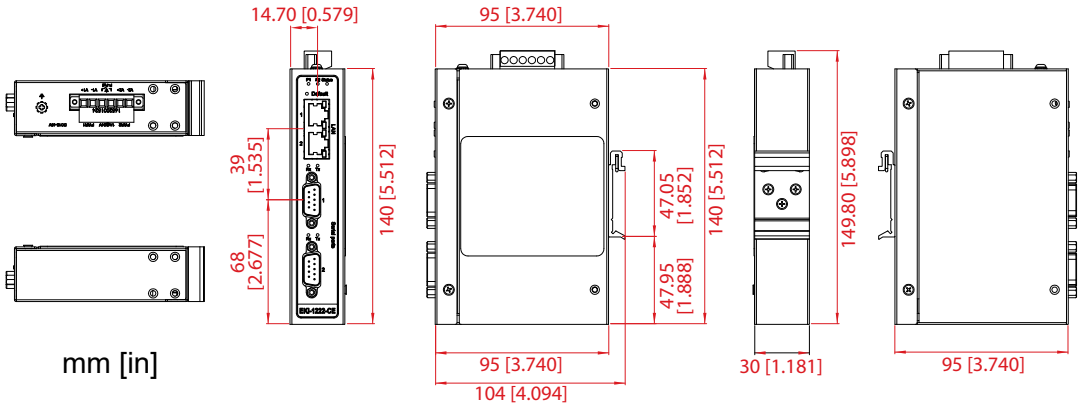

Figure 2.11. EKI-1222 Dimensions

The following view depicts the EKI-1224.

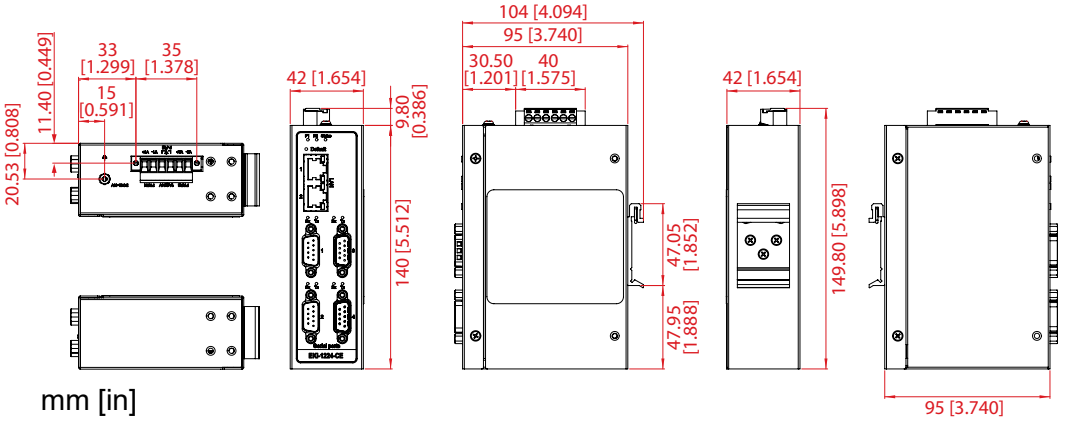

Figure 2.12. EKI-1224 Dimensions

2.4. Connecting Hardware

2.4.1. DIN Rail Mounting

The DIN rail mount option is the quickest installation option. Additionally, it optimizes the use of rail space.

The metal DIN rail kit is secured to the rear of the switch. The device can be mounted onto a standard 35 mm (1.37”) x 7.5 mm (0.3”) height DIN rail. The devices can be mounted vertically or horizontally. Refer to the following guidelines for further information.

Note! *A corrosion-free mounting rail is advisable.*
When installing, make sure to allow for enough space to properly install the cabling.

2.4.1.1. Installing the EKI-122x Series on DIN Rail

1. Position the rear panel of the switch directly in front of the DIN rail, making sure that the top of the DIN rail clip hooks over the top of the DIN rail, as shown in the following illustration.

Warning! *Do not install the DIN rail under or in front of the spring mechanism on the DIN rail clip to prevent damage to the DIN rail clip or the DIN rail.*

Make sure the DIN rail is inserted behind the spring mechanism.

2. Once the DIN rail is seated correctly in the DIN rail clip, press the front of the switch to rotate the switch down and into the release tab on the DIN rail clip. If seated correctly, the bottom of the DIN rail should be fully inserted in the release tab.

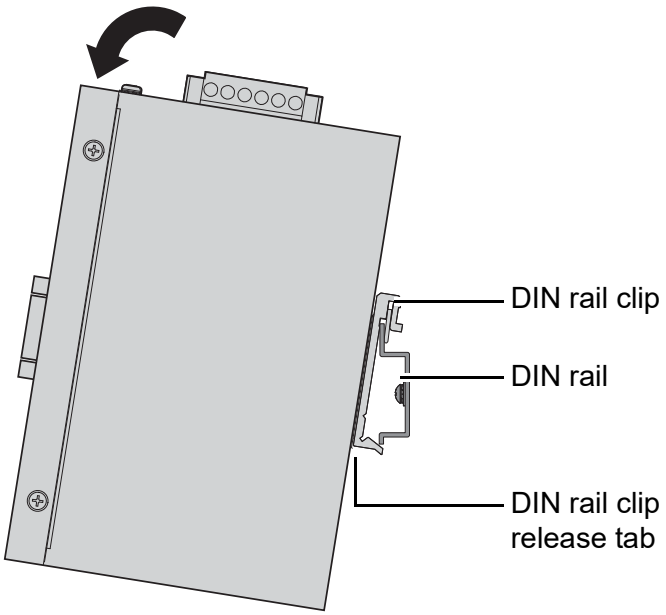

Figure 2.13. Installing the EKI-122x Series on DIN Rail

See the following figure for an illustration of a completed DIN installation procedure.

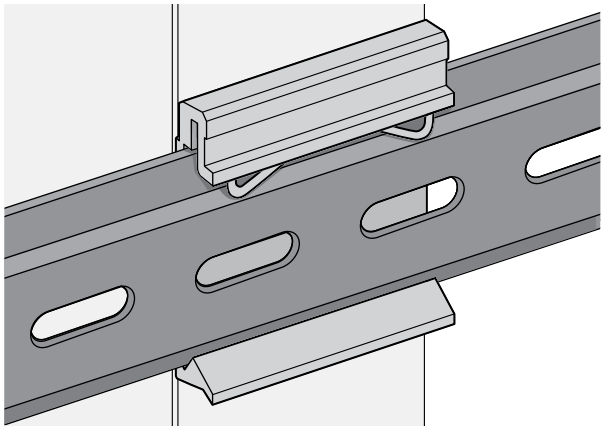

Figure 2.14. EKI-122x Series Correctly Installed on DIN Rail

3. Grasp the bottom of the switch and slightly rotate it upwards. If there is resistance, the switch is correctly installed. Otherwise, re-attempt the installation process from the beginning.

2.4.1.2. Removing the EKI-122x Series from DIN Rail

1. Ensure that power is removed from the switch, and disconnect all cables and connectors from the front panel of the switch.
2. Push down on the top of the DIN rail clip release tab with your finger. As the clip releases, lift the bottom of the switch, as shown in the following illustration.

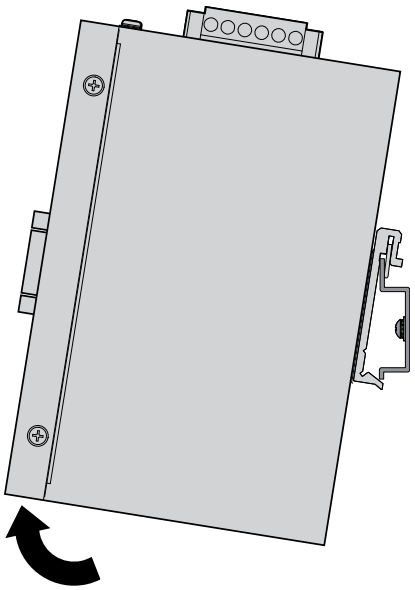

Figure 2.15. Removing the EKI-122x Series from DIN Rail

2.4.2. Wall Mounting

The wall mounting option provides better shock and vibration resistance than the DIN rail vertical mount.

2.4.2.1. Installing on EKI-122x Devices

Note! *When installing, make sure to allow for enough space to properly install the cabling.*

Before the device can be mounted on a wall, you will need to remove the DIN rail plate.

1. Rotate the device to the rear side and locate the DIN mounting plate.
2. Remove the screws securing the DIN mounting plate to the rear panel of the switch.
3. Remove the DIN mounting plate. Store the DIN mounting plate and provided screws for later use.
4. Align the wall mounting plates on the rear side. The screw holes on the device and the mounting plates must be aligned, see the following illustration.
5. Secure the wall mount plates with the provided M3-0.5 x 4mm screws.See the following figure.

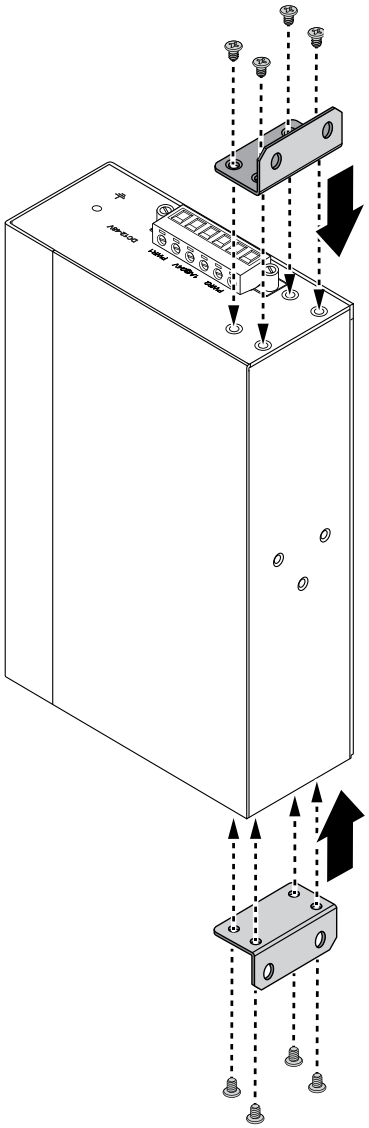

Figure 2.16. Installing Wall Mount Plates (EKI-122x Series)

Once the wall mounting plates are secure on the device, you will need to attach the mounting plates to the wall with four (4) screws (not included). We recommend screws with 4mm thread diameter and 8mm head diameter.

6. Locate the installation site and place the switch against the wall, making sure it is the final installation location.
7. Use the wall mount plates as a guide to mark the locations of the screw holes.
8. Drill four holes over the four marked locations on the wall, keeping in mind that the holes must accommodate wall sinks in addition to the screws.
9. Insert the wall sinks into the walls.
10. Insert the screws into the wall sinks. Leave a 2mm gap between the wall and the screw head to allow for wall mount plate insertion.

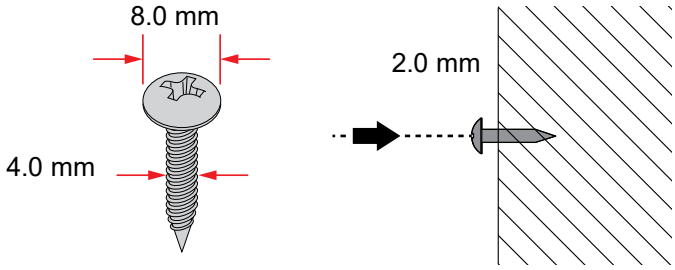

Figure 2.17. Securing Wall Mounting Screws

Note!

- Make sure the screws dimensions are suitable for use with the wall mounting plate.
- Do not completely tighten the screws into the wall. A final adjustment may be needed before fully securing the wall mounting plates on the wall.

11. Align the wall mount plate over the screws on the wall.
12. Install the wall mount plate on the screw(s) and slide it forward to lock in place, see the following figure(s).

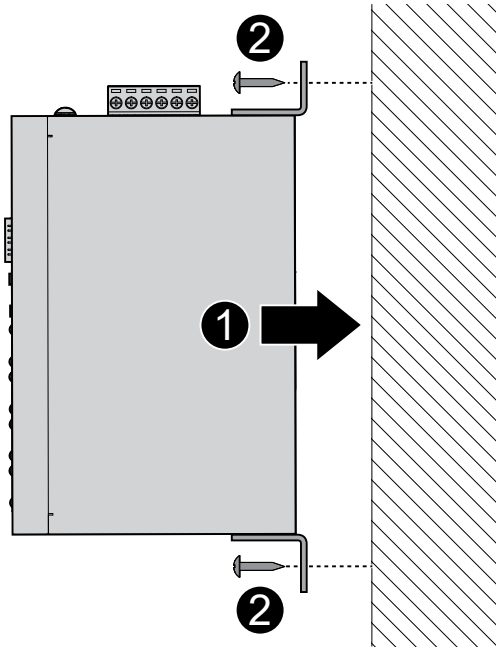

Figure 2.18. Wall Mount Installation (EKI-122x Series)

13. Once the device is installed on the wall, tighten the screws to secure the device.

2.4.3. Serial Connection

EKI-1200 Series provides up to four ports DB9 (male) connectors. RS-232/422/485 pin assignments as below:

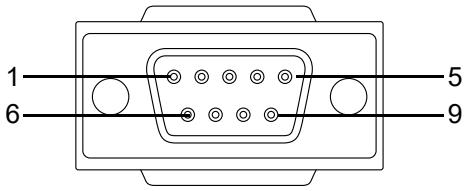

Figure 2.19. Serial Port Pin Assignment

Pin	1	2	3	4	5	6	7	8	9
RS-232	DCD	RX	TX	DTR	GND	DSR	RTS	CTS	RI
RS-422 (RS485-4W)	TX-			TX+	GND		RX+		RX-
RS-485	DATA-			DATA+	GND				

2.4.4. Power Connections

2.4.4.1. Wiring the Power Inputs

The EKI-122x-CE Series supports dual 12 to 48 VDC power inputs and power-fail relay output.

The series consist of one terminal block connector. See the following steps to wire the power wire.

Warning! *Power down and disconnect the power cord before servicing or wiring the Modbus gateway.*

Caution! *Do not disconnect modules or cabling unless the power is first switched off. The device only supports the voltage outlined in the type plate. Do not use any other power components except those specifically designated for the Modbus gateway.*

Caution! *Disconnect the power cord before installation or cable wiring.*

1. Insert the power wire from DC power supply into the power contacts of the terminal lock connector on the EKI device.
2. Tighten the terminal screws to prevent the DC wires coming loose.
3. Switch on the DC power supply.

If the EKI-122x is working properly, the green power LED lights up, indicating that it is receiving power.

The following figure illustrates a P-Fail alarm application example. The P-Fail alarm contacts are visible on the front view of the terminal block.

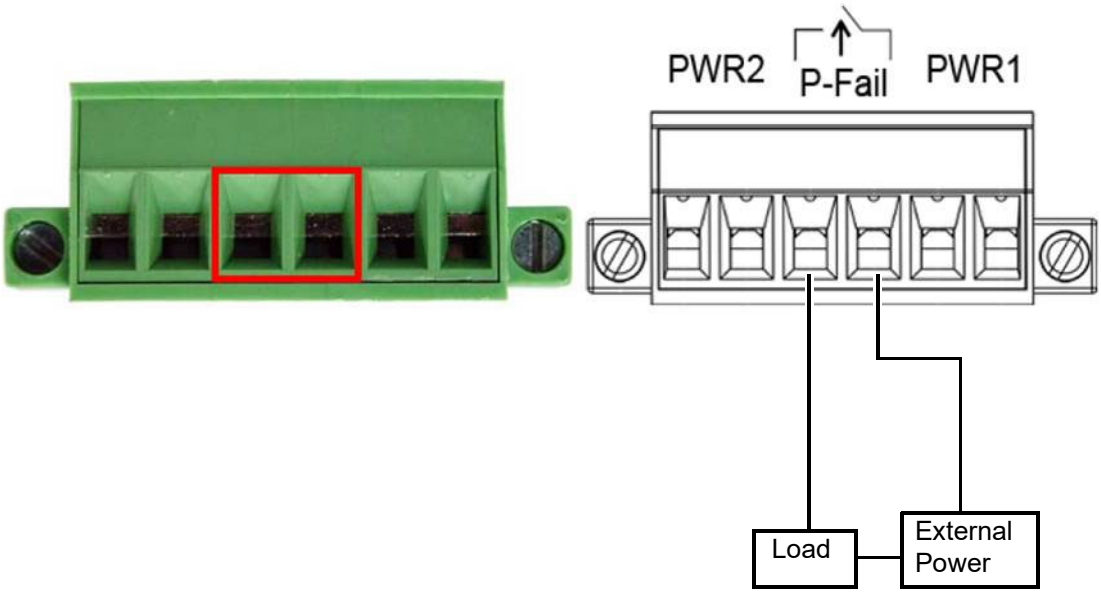

Figure 2.20. Power Wiring for EKI-1200-CE Series

You can connect an alarm indicator, buzzer or other signaling equipment through the relay output. The relay opens if power input 1 or 2 fails. In a wiring example where an LED is connected to the relay output, the LED would be off in an Open state.

Chapter 3

Web Interface

3.1. Overview

An EKI modbus gateway can be configured through a web interface with a standard web browser. In the browser's address field, enter the IP Address of your EKI Modbus gateway. The default IP setting is 10.0.0.1, but you should use the IP which you have previously assigned for this device.

Note! *Before using the web-based configuration, make sure your host PC's Ethernet network IP domain is the same as the Modbus gateway so it can establish a TCP connection with the Modbus gateway.*

3.2. Accessing the Web Page

Once the device is installed and connected, power on the device. The following information guides you through the logging in process.

1. Launch your web browser on the PC.
2. In the browser's address bar, type the device's default IP address (Eth1: 10.0.0.1, Eth2: 10.0.0.2).

The main interface displays.

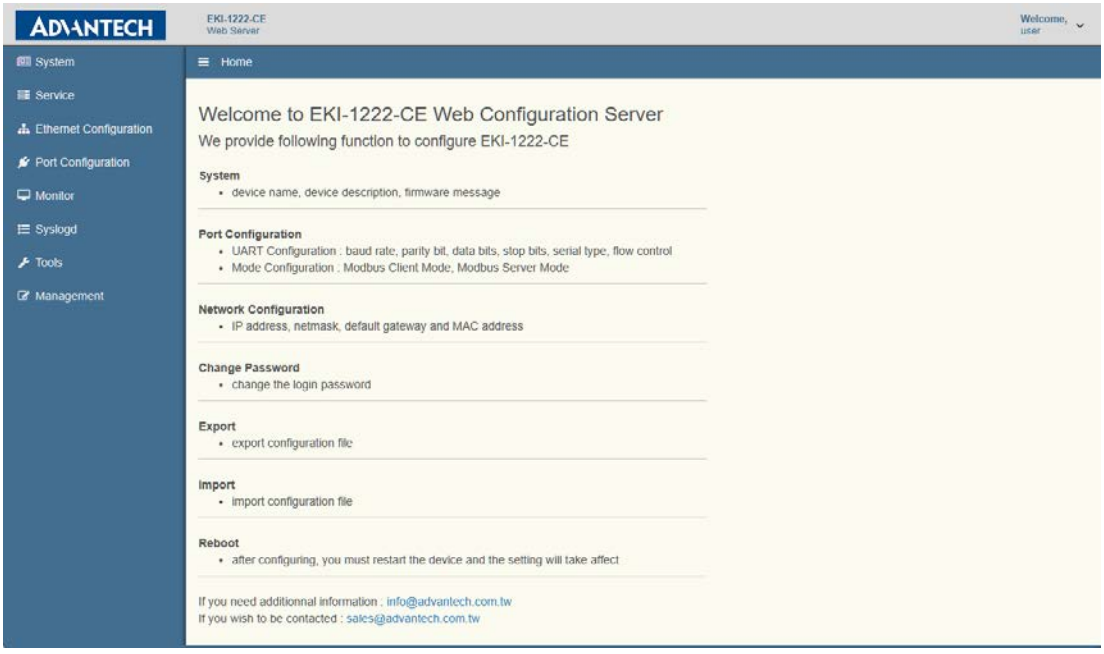

Figure 3.1. Web Interface Initial Display

3.3. System

You can change the Device Name and Device Description and modify the Timezone settings on this page. You can also modify several top-level system settings.

To access this page, click System.

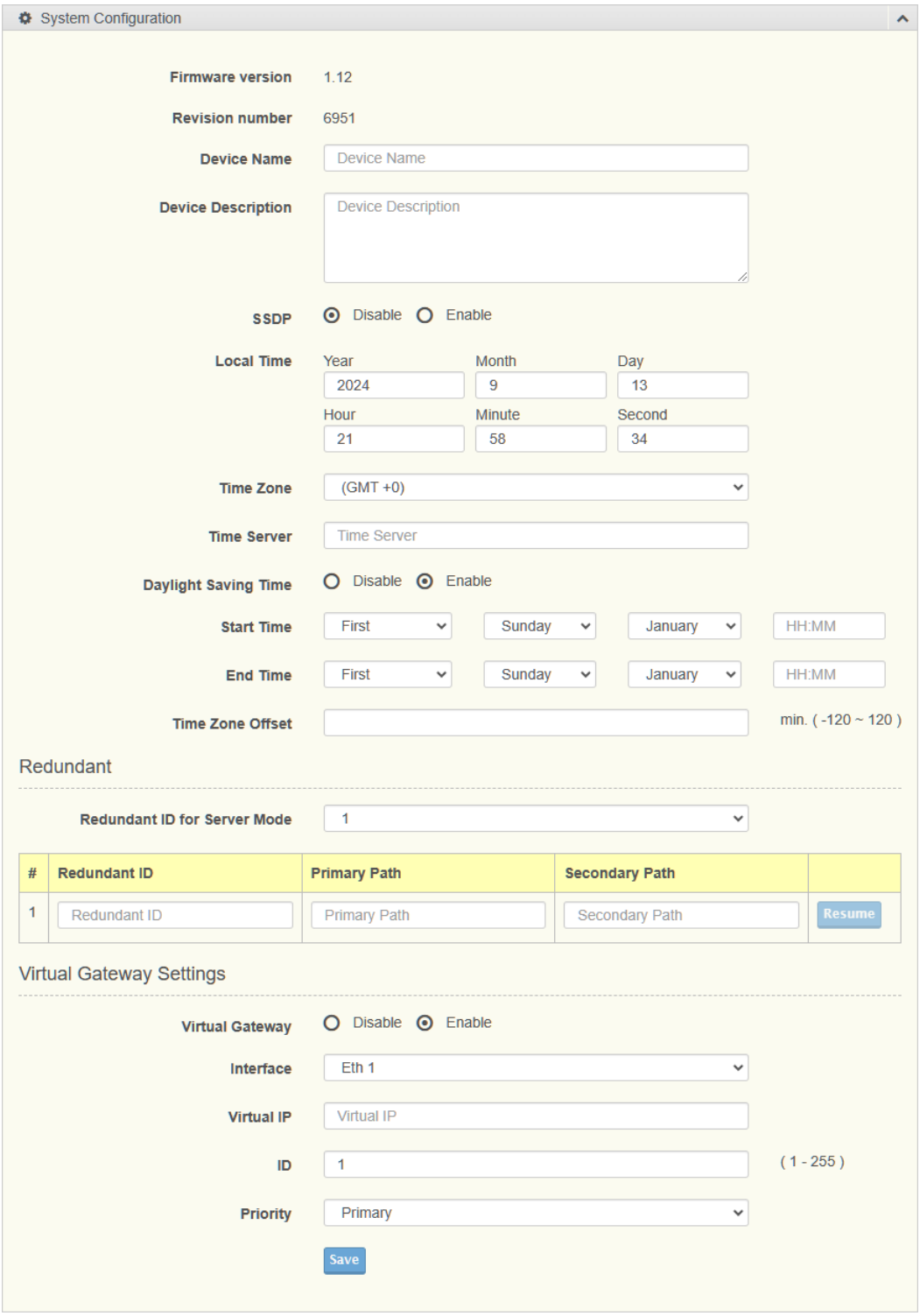

Figure 3.2. System

The following table describes the items in the previous figure.

Item	Description
Firmware version	Displays the current firmware version of the device.
Revision number	Displays the revision number of the device.

Item	Description	
Device Name	Enter the device name, up to 31 alphanumeric characters.	
Device Description	Enter the device description.	
SSDP	When enabled, the gateway is discoverable in a Windows network. When disabled, the gateway is discoverable by the EKI firmware update utility.	
Local Time	Enter the year, month, day, hour, minute and second. ■ The year must be entered in 4-digit format. ■ The time must be entered in 24-hour format. ■ All six fields must have values.	
Time Zone	Select the GMT offset for your time zone. If using automatic Daylight Saving Time adjustments, select the offset for Standard Time here.	
Time Server	If using an SNTP server to automatically update the time, enter its address. This is a text string of up to 64 characters containing the encoded unicast IP address or hostname of an SNTP server. Unicast SNTP requests will be sent to this address. If this address is a DNS hostname, then that hostname should be resolved into an IP address each time a SNTP request is sent to it.	
Daylight Saving Time	To use automatic Daylight Saving Time adjustment, enable the feature then select the starting and ending times and time zone offset.	
Redundant ID for Server Mode	Enter the number of Redundancy Enhanced Modbus IDs to configure. The gateway can map pairs of devices as a group, with one set as primary and one set as secondary (backup). Your Modbus clients access this group with one virtual server ID. If the primary device fails, the gateway will report values from the secondary device. Once the primary device is replaced, just click Resume to switch back to it.	
	Redundant ID	Enter a virtual server ID to access the group.
	Primary Path	Enter the mapped ID of the primary device. Mapped IDs for individual devices are set in the Port Configuration > Operation screen. See section 3.6.2.
	Secondary Path	Enter the mapped ID of the secondary device. Mapped IDs for individual devices are set in the Port Configuration > Operation screen. See section 3.6.2.
	Resume	Click to switch back to the primary device after replacing a failed device.
Virtual Gateway	Virtual Gateway allows multiple EKI-12xx devices on the same network to act as one device with redundancy.	
	Interface	Select an Ethernet Interface (Eth1/Eth2)
	Virtual IP	Enter an IP address for the virtual gateway. This address will be used to access the group of gateways as one device. Enter the same Virtual IP address for all devices participating in the virtual gateway.
	ID	Enter a Modbus ID for the Virtual Gateway. Enter the same ID for all devices participating in the virtual gateway.
	Priority	Select a priority for this device (i.e., Primary, Secondary, Third or Fourth). Only one device will be active at any time. If the highest priority device becomes unavailable, the next lower priority device will become active.
Save	Click **Save** to save the values and update the screen.	

Note! *All new configurations will take effect after rebooting. To reboot the device, click **Tools** > **Reboot**.*

3.4. Service

The Service tab contains menu options for configuring the Modbus Agent, the Web Server, and RADIUS/LDAP/Local user management.

3.4.1. Modbus Settings

The Modbus Settings screen covers basic settings. When in Modbus Legacy Mode, only the Listen Port is configurable on this screen. Disabling legacy mode enables several additional settings here. The setting's effect on other features is documented throughout this chapter.

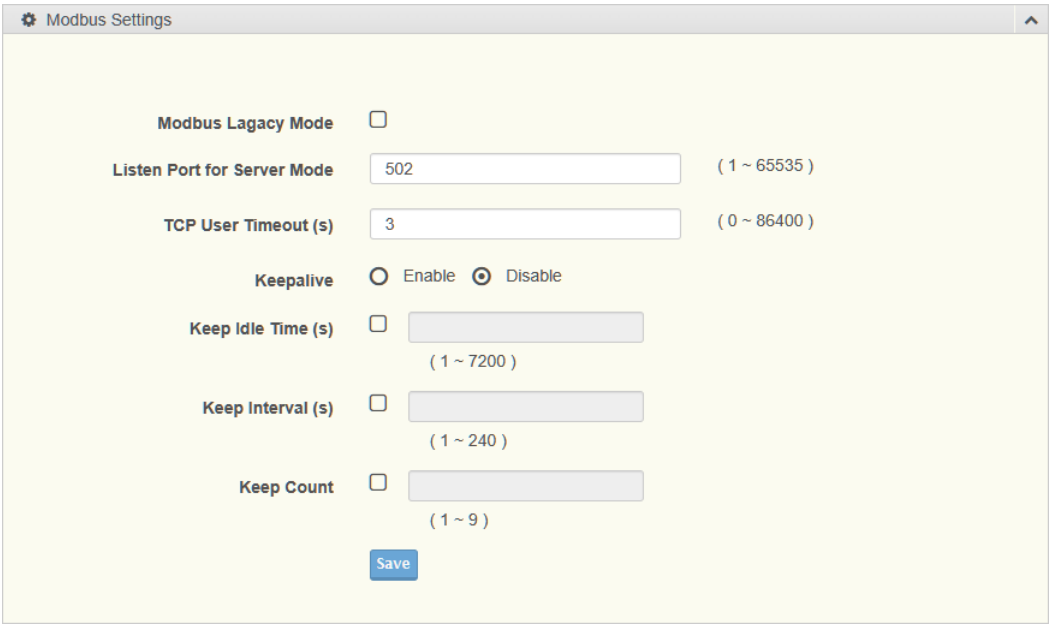

Figure 3.3. Modbus Settings

Item	Description
Modbus Legacy Mode	In Legacy Mode the gateway's functionality matches that of earlier versions of the firmware. Turning off Legacy Mode will enable new parameters in several areas of the UI. See subsection "3.8.8. Just-In-Time (JIT) Diagnostics" on page 45 for its impact on the JIT settings. Disabling Legacy Mode enables all other parameters on this screen other than Listen Port.
Listen Port for Server Mode	Enter a value to identify the channel for remote initiating connections. The default value is 502.
TCP User Timeout (s)	If Keep Alive is not enabled, the connection will be dropped after no activity for this amount of time.
Keepalive	If Disabled, the gateway assumes the host is always available. If Enabled, the following settings control the TCP Keep Alive function.
Keep Idle Time (s)	When no data is transmitted over this interval, initiate the Keep Alive function.
Keep Interval (s)	When Keep Alive is activated, send a TCP Keep Alive message at the specified interval.
Keep Count	Disconnect with the host after the specified number of consecutive TCP Keep Alive requests fail to receive a response.
Save	Click **Save** to save the values and update the screen.

3.4.2. Modbus Agent

Agent Mode turns the gateway into a temporary data collector and allows it to query data from different stations, or Modbus addresses, and put them together in a contiguous buffer memory region. A Modbus client can then access the rearranged data, and get all the data with only one query. Up to 128 commands, across up to 6 server devices, can be consolidated in the agent.

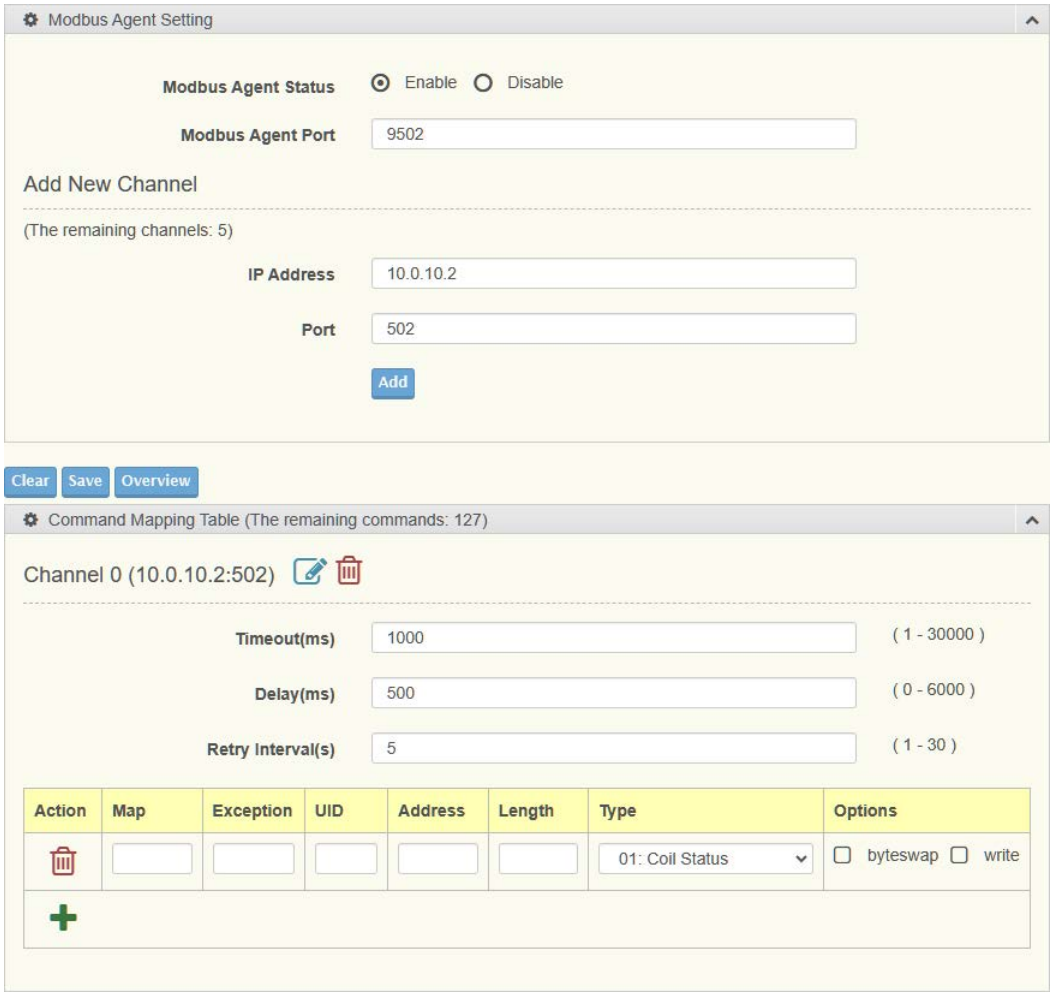

Figure 3.4. Service > Modbus Agent

Item	Description
Modbus Agent Status	Enable/disable the Modbus Agent
Modbus Agent Port	Enter the TCP port for the Modbus Agent. This port should be different than the TCP port (502 by default) used by the ordinary Modbus Server Mode of the gateway.
Add New Channel	Each channel represents one Modbus client TCP connection. Maximum channels depends on model: EKI-1221-CE: 5 channels EKI-1222-CE: 6 channels EKI-1224-CE: 8 channels Enter the IP address and port for the Modbus server TCP connection and click **Add**. The channel IP and port can be edited, or the channel removed completely, using the Edit and Delete icons adjacent to the channel number, respectively.
Timeout (ms)	For each channel, set the timeout value for the server device.
Delay (ms)	For each channel, set the scan interval (delay) for the server device.

Item	Description
Retry Interval (s)	If a device fails to respond, query again after this interval.
Add/Delete Command	Add commands to the channel using the plus icon, or delete commands from the channel using the trashcan icon.
Map	Buffer memory address for the data on the gateway.
Exception	Buffer memory address for Modbus Exception Codes on the gateway.
UID	Target device ID
Address	Starting Modbus address on the target device
Length	Address length to be read or written
Type	Modbus Function Code: ■ 01: Coil Status ■ 02: Input Status ■ 03: Holding Register ■ 04: Input Register
Options	■ Byte Swap: applies to Coil Status and Input Status functions ■ Write: applies to Coil Status and Holding Register functions
Clear	Erases the entire Modbus Agent configuration
Overview	Displays the Layout Overview shown in Figure 3.5.
Save	Click **Save** to save the values and update the screen.

The Modbus Agent can collect data from both Ethernet and serial devices.

For Ethernet devices, enter the server device's IP address and port when adding a channel.

For serial devices, set the IP address to the address of the gateway (or 127.0.0.1). Set the port to either the configured Modbus Server Mode TCP port or the configured Direct Access Port for the COM port.

Note! *All new configurations will take effect after rebooting. To reboot the device, click **Tools** > **Reboot**.*

The Layout Overview gives a graphical representation of all the mapped addresses used by the Modbus Agent, as shown in Figure 3.5. It can help visualize the structure of the consolidated data.

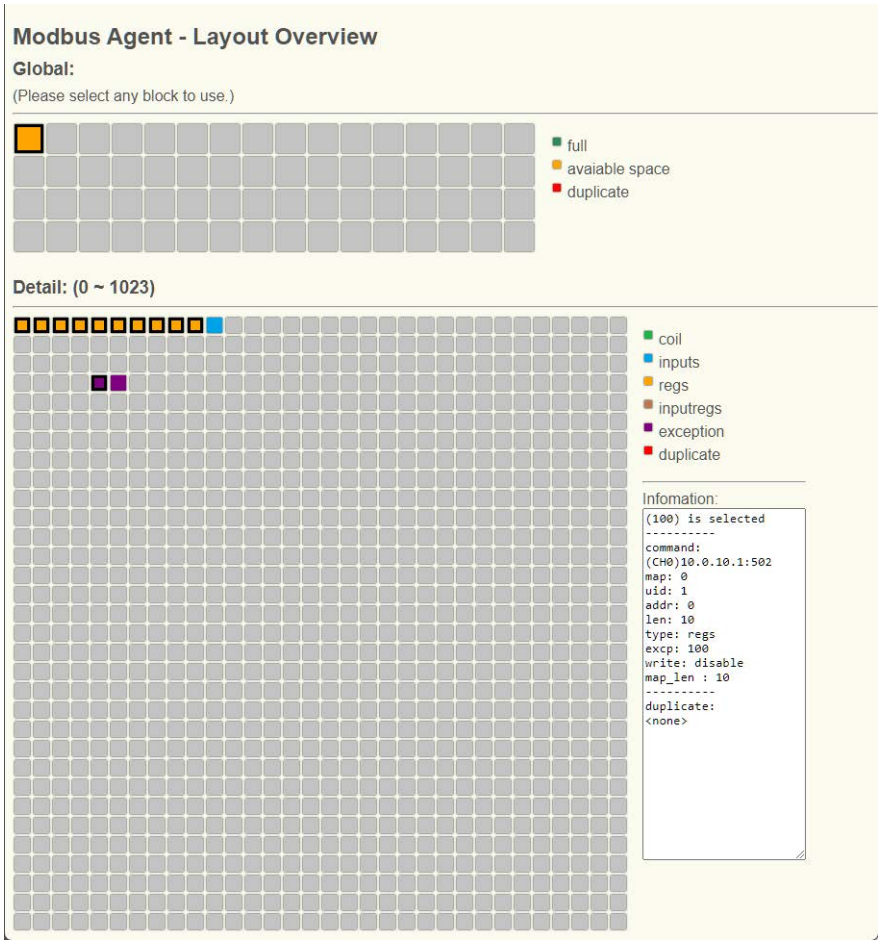

Figure 3.5. Modbus Agent Layout Overview

Item	Description
Global	Each block represents 1024 addresses. The color indicates the status of the block, and an expanded view of the selected block is shown in the Detail section.
Detail	Each block represents one address in the 1024-address block selected in the Global section. The color of the block indicates the type of data stored within it.
Information	Select an individual address to display its configuration data in the Information panel.

3.4.3. Web Server

The EKI-12xx web interface uses the unsecure http protocol by default, but can be configured to use https for added security. When HTTPS is enabled, communication between the web browser and the EKI device is encrypted using an SSL certificate.

An HTTPS connection is required if you plan to update the device firmware using the web interface instead of using the utility provided with the firmware.

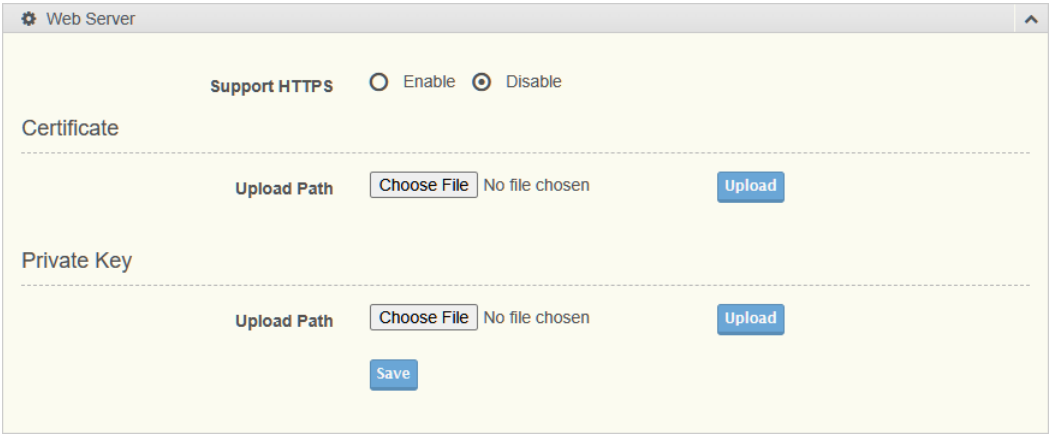

Figure 3.6. Web Server Configuration

Item	Description
Support HTTPS	Enable to use secure https protocol for the web interface. If enabled, load an SSL certificate and private key, both in one .pem file.
Certificate	After enabling https support, choose a .pem file containing your SSL certificate and click **Upload**.
Private Key	After enabling https support, choose a .pem file containing your private key and click **Upload**.
Save	Click **Save** to save the values and update the screen.

Note! ***HTTPS will not work without a certificate and private key.*** *The SSL certificate and private key should both be contained in one .pem file. Upload the same file as both Certificate and Private Key.*

Note! *All new configurations will take effect after rebooting. To reboot the device, click* ***Tools*** *>* ***Reboot****.*

3.4.4. LDAP and RADIUS Settings

The gateway can use the LDAP protocol or RADIUS protocol for user management, or user management can be controlled locally. Setting up LDAP or RADIUS integration is an advanced topic with security implications. We recommend that the LDAP or RADIUS setting be configured by your network administrator.

3.4.5. User Management

Users can be managed via LDAP, Radius or Local user management settings. If local user management is used, the user list is managed from this screen. A Web Enhanced Password must be set on the Passwords page in order to activate user management. That web password will show up on this page as the 'root' user.

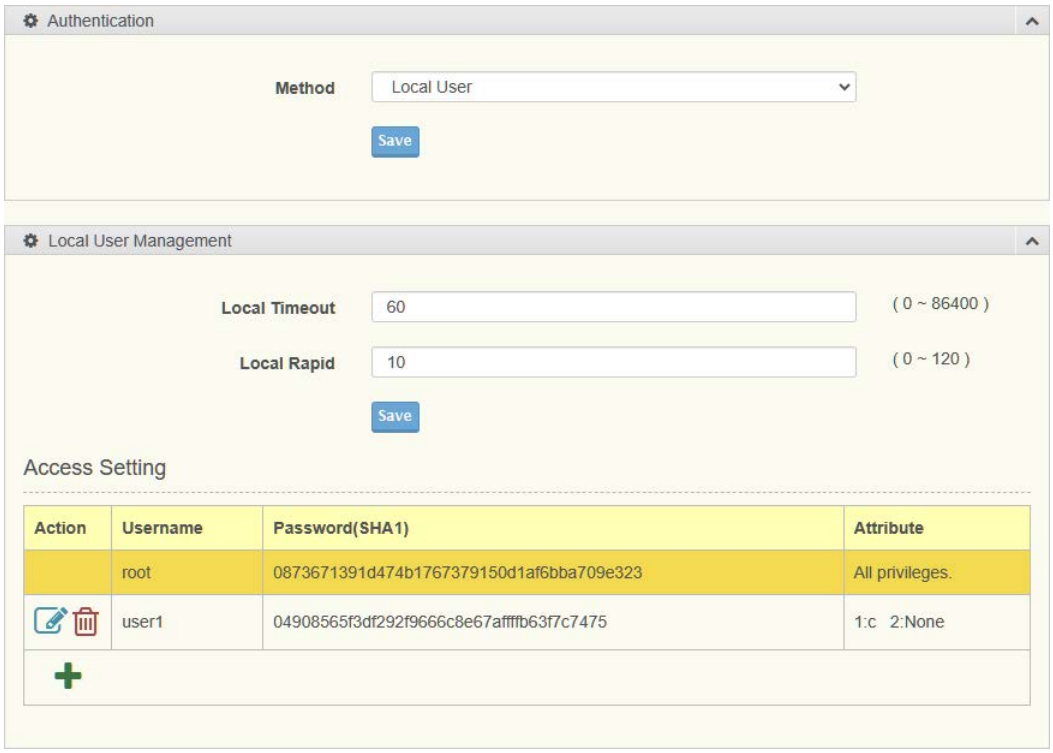

Figure 3.7. User Management Setting

Item		Description
Method		LDAP, Radius or Local User. The remaining settings on this page are only relevant when Local User is selected.
Local Timeout (s)		The system will check the privilege settings for all connected users on this timeout interval. If there's a privilege change (e.g., the user is no longer allowed), the user will be disconnected. A new user logging in will trigger a privilege check of all connected users immediately regardless of the Timeout value.
Local Rapid (s)		When the system discovers a privilege change, it will wait for the Rapid interval to check all users again, and will continue until all connected users have the correct privilege
Local User Access Setting		This list is only applicable when Method is set to Local User.
	Add	Add a new local user. Specify username and password, and enable/disable the Config attribute for each port.
	Edit	Modify the password or attributes for an existing user.
	Delete	Remove an existing user.
	Username	Enter a user name.
	Password	Enter a password.
	Attribute	Enable each port that this user should be able to configure. A user must have config permission on at least one port in order to save the username in this list.
Save		Click **Save** to save the values and update the screen.

Note! *All new configurations will take effect after rebooting. To reboot the device, click **Tools** > **Reboot**.*
Changing user management setting may cause you to lose access to the device! Make sure you have access permissions with your new settings.

A managed (non-root) user will have access to the basic serial port configuration and port monitoring screens for only the ports for which config permissions are granted. All other elements of the Web UI are hidden.

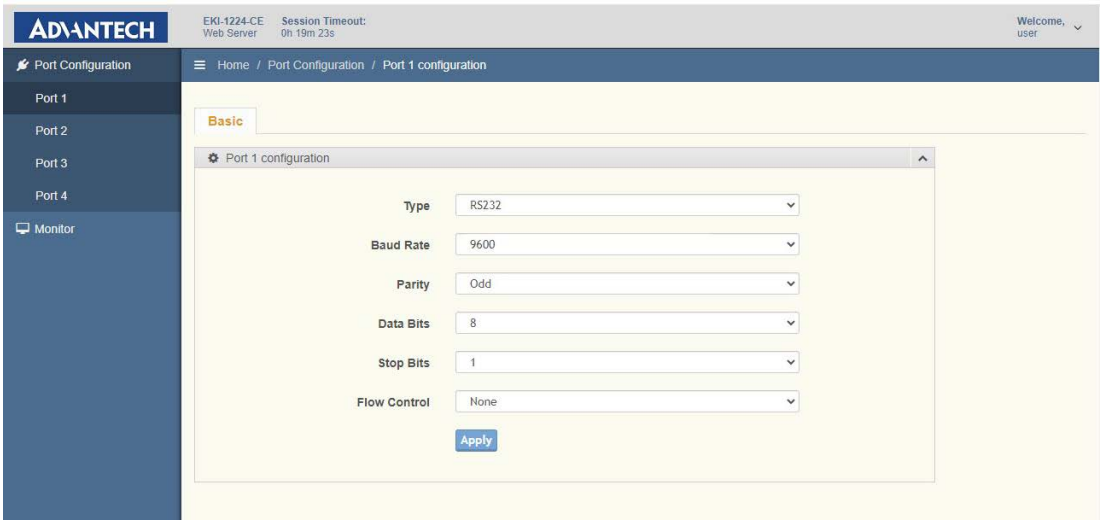

Figure 3.8. Managed User Port Configuration View

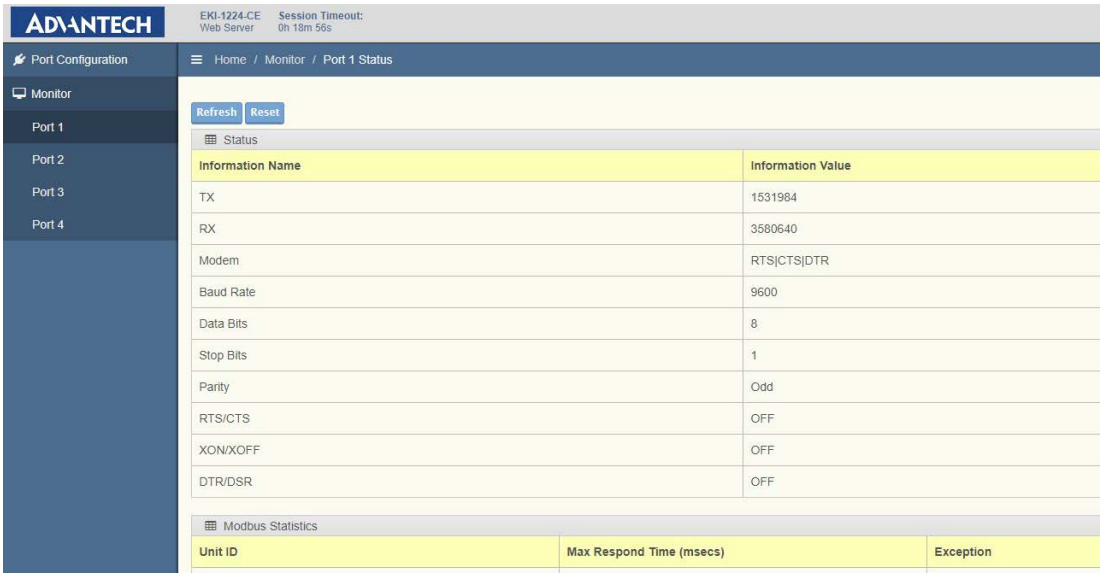

Figure 3.9. Managed User Port Configuration View

3.5. Ethernet Configuration

Under the **Ethernet Configuration** menu, select **Eth1** or **Eth2** to configure individual Ethernet ports, or **Ethernet Bridge** to configure the bridged ports.

3.5.1. Eth1/Eth2

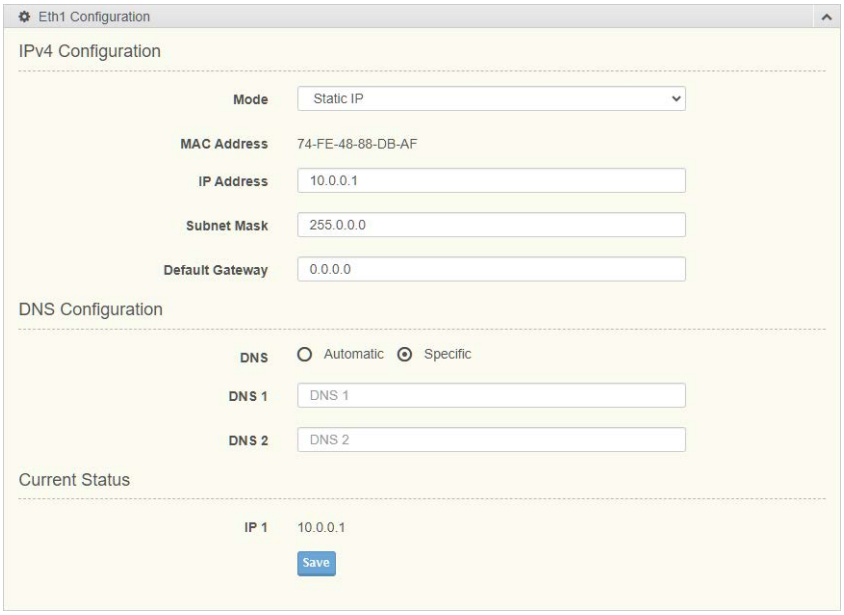

Figure 3.10. Ethernet Port 1/Port 2 Configuration

Item	Description
Mode	Select the IP Address Setting mode: ■ Static IP — set a fixed IP configuration ■ DHCP/AutoIP — IP configuration set by DHCP server ■ BootP/AutoIP — IP configuration set by BOOTP server ■ DHCP/BootP/AutoIP — accept IP configuration from either DHCP or BOOTP server ■ Bridge — set up a bridge connecton between the two Ethernet ports
MAC Address	Displays the port's MAC address (read only)
IP Address (Static Mode)	Enter an IPv4 address for the interface. The defaults are: Eth1, 10.0.0.1; Eth2, 10.0.0.2.
Subnet Mask (Static Mode)	Enter the subnet mask for the interface. The default is 255.0.0.0.
Default Gateway (Static Mode)	Enter the default gateway for the interface. The default is 0.0.0.0.
DHCP Timeout (AutoIP Modes)	Enter the value in seconds to timeout a DHCP request.
DNS	■ Automatic: Get DNS server assignment from the DHCP server (no DNS will be assigned if the Mode is set to Static IP) ■ Specific: Enter primary and secondary DNS server addresses
IP 1	The current IPv4 address for the port (read only)
IP 2	The current IPv6 address for the port, if assigned (read only)
Save	Click **Save** to save the values and update the screen.

Note! *All new configurations will take effect after rebooting. To reboot the device, click **Tools** > **Reboot**.*

3.5.2. Ethernet Bridge

In Ethernet Bridge mode, both Ethernet interfaces use the same IP address. Either Spanning Tree Protocol (STP) or Redundancy Mode can be used to prevent loops and provide a backup communications path.

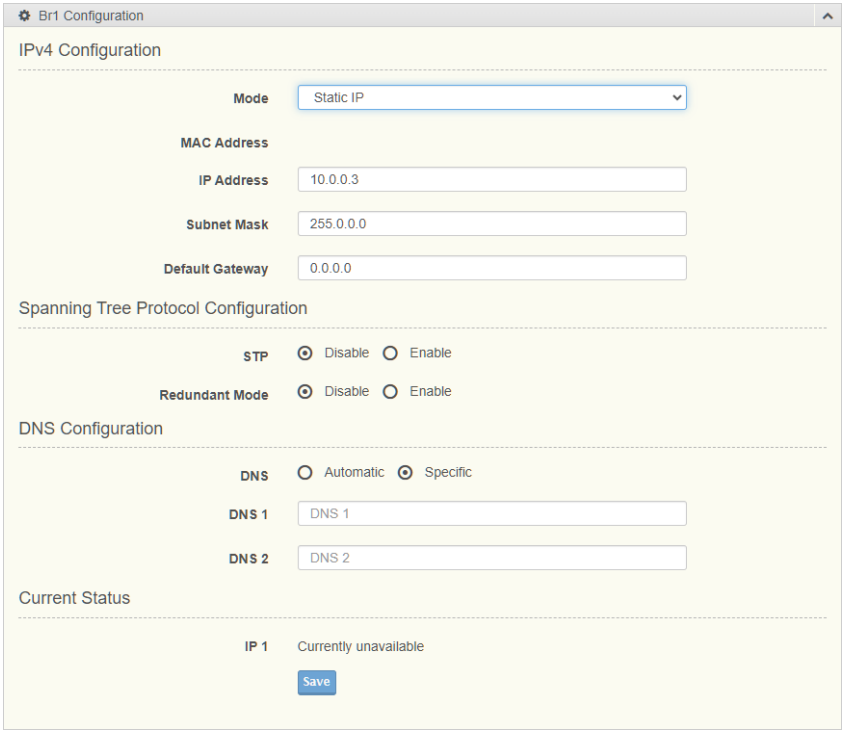

Figure 3.11. Ethernet Bridge Configuration

Item	Description
Mode	Static IP is the only valid option for the Ethernet Bridge.
MAC Address	Displays the port's MAC address (read only)
IP Address	Enter an IPv4 address for the interface. The default is 10.0.0.3.
Subnet Mask	Enter the subnet mask for the interface. The default is 255.0.0.0.
Default Gateway	Enter the default gateway for the interface. The default is 0.0.0.0.
STP	Enable to use Spanning Tree Protocol to control which Ethernet port is active. All devices on the network build a spanning tree and determine which ports should be blocked to prevent loops.
Redundant Mode	Enable to let the EKI-12xx control which Ethernet port is active. The gateway will block Eth2 while a link is detected on Eth1, and will activate Eth2 if the link is lost on Eth1.
DNS	■ Automatic: No DNS will be automatically assigned since IP is static ■ Specific: Enter primary and secondary DNS server addresses
IP 1	The current IPv4 address for the port
Save	Click **Save** to save the values and update the screen.

Note! *All new configurations will take effect after rebooting. To reboot the device, click **Tools** > **Reboot**.*

3.6. Port Configuration

Each serial port has a configuration menu with Basic and Operation modes.

3.6.1. Basic

The Basic menu allows for the configuration of the serial interface type, baud rate, parity, data / stop bits, and flow control for port configuration.

To access this page, click **Port Configuration** > **Basic**.

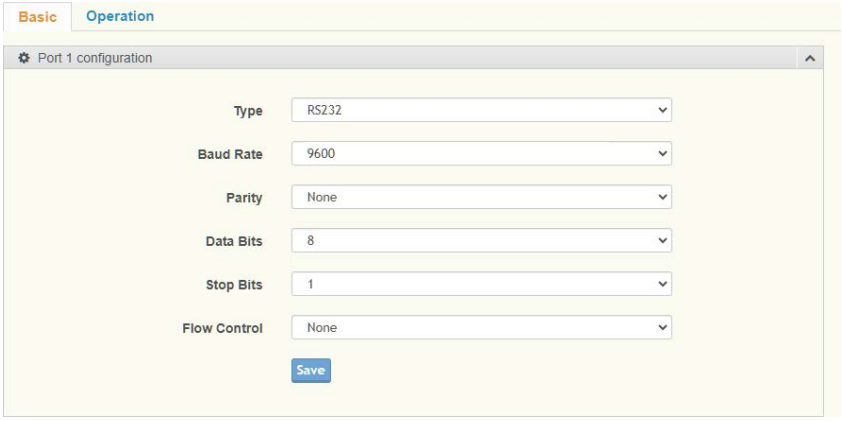

Figure 3.12. Port Configuration > Port x > Basic

The following table describes the items in the previous figure.

Item	Description
Type	Select a serial interface: RS-232, RS-422, RS-485 2-wire or RS-485 4-wire.
Baud Rate	Enter a value to specify the baud rate. The value should conform to the current transmission speeds of connected devices. Range is 50bps to 921.6 kbps.
Parity	Select the parity: None, Odd, Even, Mark or Space.
Data Bits	Select the data bits: 5, 6, 7, or 8.
Stop Bits	Select the stop bits: 1, 1.5 or 2.
Flow Control	Select the flow control mode: None, XOn/XOff or RTS/CTS
Save	Click **Save** to save the values and update the screen.

Note! *All new configurations will take effect after rebooting. To reboot the device, click **Tools** > **Reboot**.*

3.6.2. Operation

The Operation menu allows for the configuration of the mode type and related attributes for port configuration.

To access this page, click **Port Configuration** > **Port x** > **Operation**. Use this menu to select the port configuration mode: Modbus Server Mode or Modbus Client Mode.

To translate RTU/ASCII to TCP, use Modbus Client Mode.

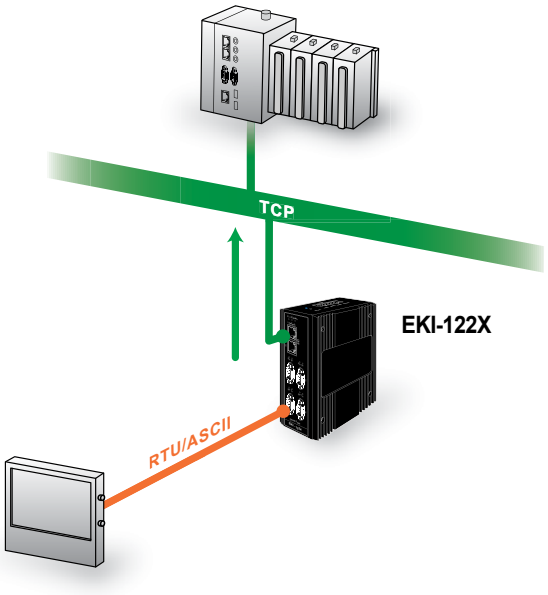

Figure 3.13. Client Mode

To translate TCP to RTU/ASCII, use Server Mode.

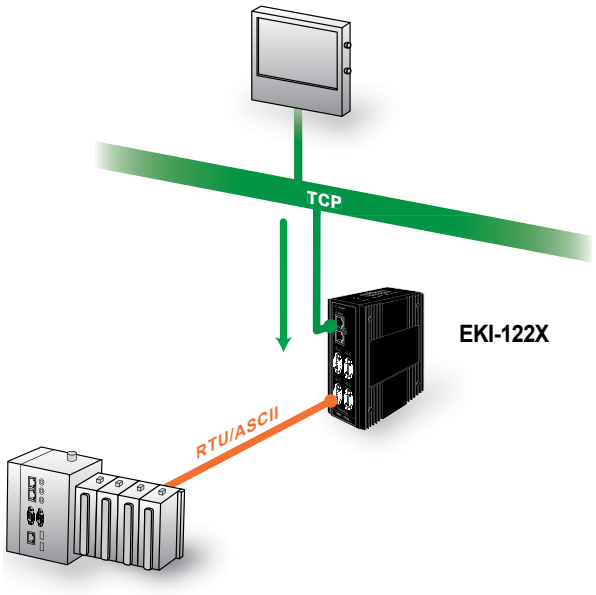

Figure 3.14. Server Mode

These are the options for Modbus Server Mode.

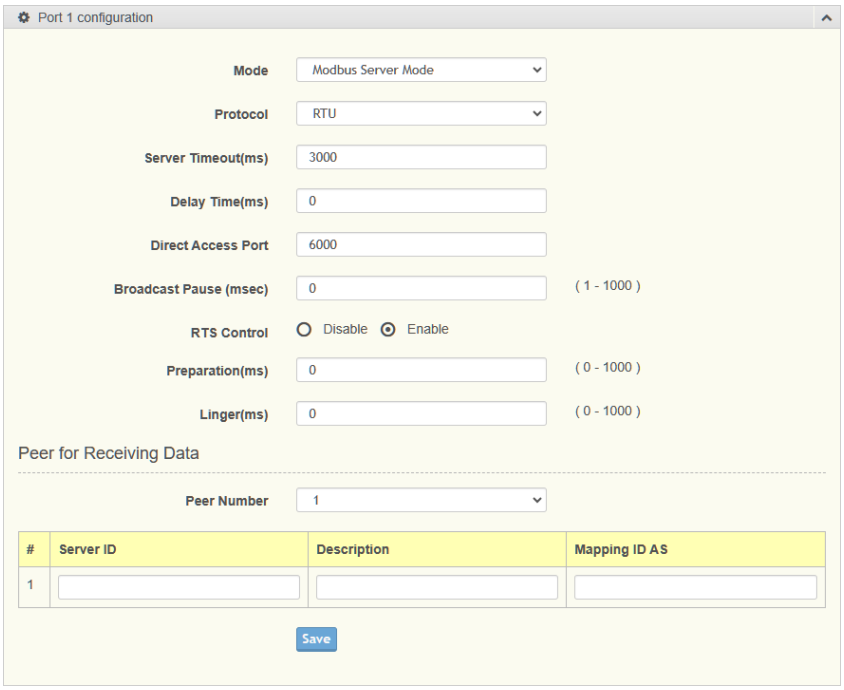

Figure 3.15. Port Configuration > Port x > Operation > Modbus Server Mode

The following table describes the items in the previous figure.

Item	Description
Mode	Modbus Server Mode
Protocol	Select the Modbus protocol: RTU or ASCII
Server Timeout (ms)	Specify the time duration in milliseconds for the EKI-1200 Series to wait for a response after it has issued a command while using Modbus/RTU or Modbus ASCII. After the timeout is expired and no response is received, the EKI-1200 Series will regard the command as failed. Note that the timeout for the host PC must be greater than the timeout setting specified here, otherwise an error will occur.
Delay Time (ms)	Specify the delay timeout.
ASCII Timeout (ms)	Specify the ASCII timeout.
Direct Access Port	This TCP service port can be used to directly access devices on this serial port. For example, using the default port settings, Modbus/TCP on port 6000 can access only the devices on serial port 1, whereas Modbus/TCP on port 502 can access devices on all serial ports. Defaults: Serial Port 1 Port 6000 Serial Port 2 Port 6001 Serial Port 3 Port 6002 Serial Port 4 Port 6003
Broadcast Pause (msec) (Legacy Mode disabled)	After sending a command with target ID 0 (Modbus broadcast), wait this interval before sending the next command. In legacy mode, this setting is unavailable; the gateway will immediately proceed with the next command, which may cause a communication conflict.
RTS Control	Force the RTS signal to ON state. This generally isn't used. It is available for compatibility with some devices that require an RTS signal to determine when they should switch to "Data Accept Mode". When used, it is normally combined with disabled flow control.
Preparation (ms)	Set the duration to turn the RTS signal ON before transmitting data through the COM port.

Item	Description
Linger (ms)	Set the duration to leave the RTS signal ON after receiving data on the COM port.
Peer Number	Select the number of network devices which you want to connect. Maximum 32.
Server ID	Enter the server ID configured in each connected device.
Description	Enter a description for each connected device.
Mapping ID As	Enter a mapped server ID that can be used to access each connected device.
Save	Click **Save** to save the values and update the screen.

Note! *All new configurations will take effect after rebooting. To reboot the device, click **Tools** > **Reboot**.*

These are the options for Modbus Client Mode.

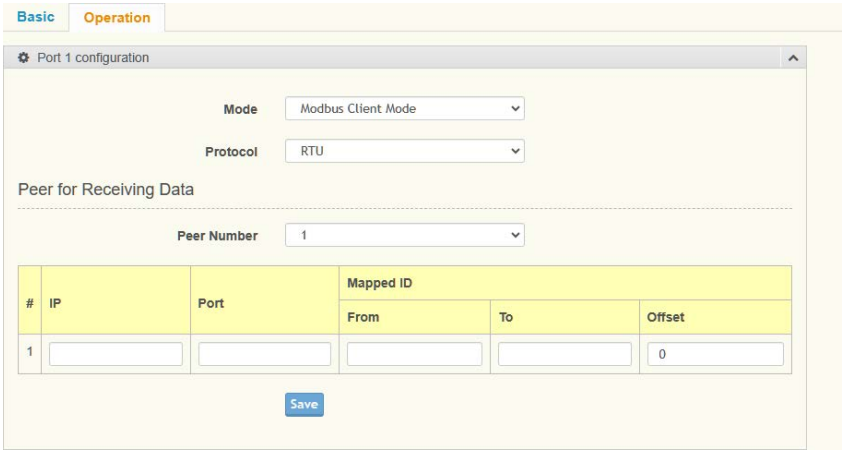

Figure 3.16. Port Configuration > Port x > Operation > Modbus Client Mode

The following table describes the items in the previous figure.

Item	Description
Mode	Modbus Client Mode
Protocol	Select the Modbus protocol: RTU or ASCII
Peer Number	Select the number of network devices which you want to connect. Maximum 16.
IP	Enter the IP address of the target TCP device.
Port	Enter the TCP port of the target TCP device.
Mapped ID From	Enter the starting ID for the range of IDs on the serial side to be mapped to this IP address on the Ethernet side. Note the effect of “Mapped ID Offset” below.
Mapped ID To	Enter the ending ID for the range of IDs on the serial side to be mapped to this IP address on the Ethernet side. Note the effect of “Mapped ID Offset” below.
Mapped ID Offset	Server IDs on the serial side will be offset by this value to determine the Server ID to be accessed on the Ethernet side. For example, if the mapped ID range is 30-40 and the offset is set to -10 for an IP address, a request sent to Server ID 31 on the gateway’s serial port, would be mapped to Server ID 21 at the given IP address.
Save	Click **Save** to save the values and update the screen.

Note! *All new configurations will take effect after rebooting. To reboot the device, click **Tools** > **Reboot**.*

3.7. Monitor

The EKI Modbus gateway allows monitoring of the serial ports' status. The serial port's operation mode and status is available for display. The IP address of the host PC which is communicating with a serial port is also displayed.

The Monitor function provides a method to monitor the Modbus gateway's status (operation mode, baud rate, data bits, stop bits, parity, RTS, XON and DTR).

When the gateway is in its default Modbus Legacy Mode, the monitoring information is divided into three sets of information: Setting, Statistic and Connected IP. When Modbus Legacy Mode is disabled, the monitoring page is divided into Status, Modbus Statistics, and Just-In-Time Diagnostics.

3.7.1. Setting (Legacy Mode Enabled)

The Monitor Setting page allows for easy viewing of the port's statistics.

To access this page, click **Monitor** > **Port x** > **Setting**.

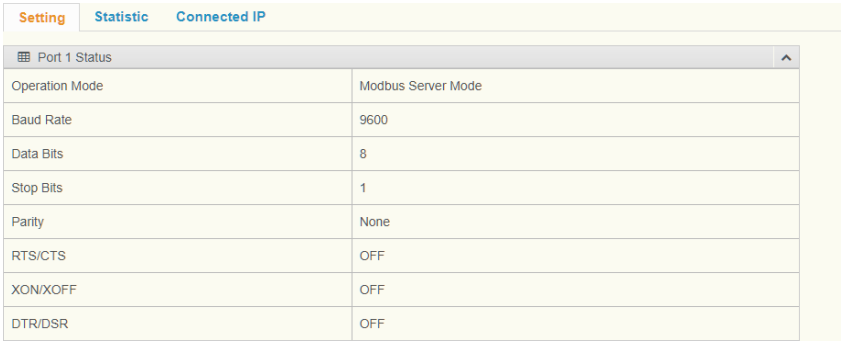

Figure 3.17. Monitor > Port x > Setting

The following table describes the items in the previous figure.

Item	Description
Operating Mode	Display the current operation mode of the selected port.
Baud Rate	Display the current baud rate of the selected port.
Data Bits	Display the current data bits of the selected port.
Stop Bits	Display the current stop bits of the selected port.
Parity	Display the current parity of the selected port.
RTS/CTS	Display the current RTS/CTS status of the selected port.
XON/XOFF	Display the current XON/OFF status of the selected port.
DTR/DSR	DTR/DSR is not used by the gateway.

3.7.2. Statistic (Legacy Mode Enabled)

The Monitor Statistic page allows for easy viewing of the port's TX/RX data count. To access this page, click **Monitor** > **Port x** > **Statistic**.

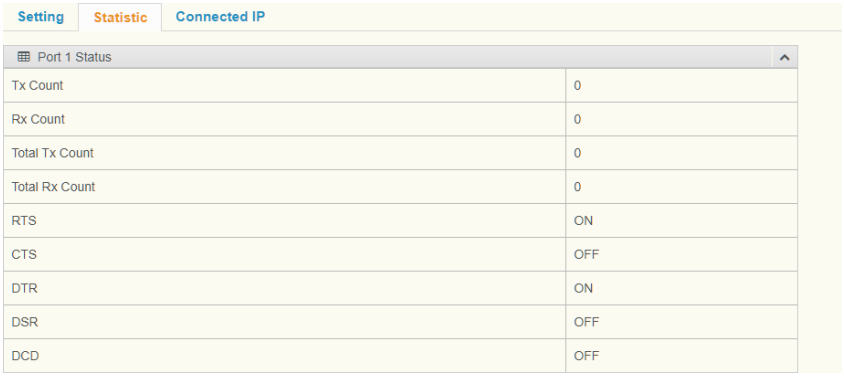

Figure 3.18. Monitor > Port x > Statistic

The following table describes the items in the previous figure.

Item	Description
Tx Count	Display the current Tx count of the selected port.
Rx Count	Display the current Rx count of the selected port.
Total Tx Count	Display the current total Tx count of the selected port.
Total Rx Count	Display the current total Rx count of the selected port.
RTS	Display the current RTS status of the selected port.
CTS	Display the current CTS status of the selected port.
DTR	Display the current DTR status of the selected port. DTR cannot be configured for the gateway. This screen displays the status of the signal if it is received from another device.
DSR	Display the current DSR status of the selected port. DSR cannot be configured for the gateway. This screen displays the status of the signal if it is received from another device.
DCD	Display the current DCD status of the selected port.

3.7.3. Connected IP (Legacy Mode Enabled)

The Monitor Connected IP page allows for easy viewing of all connected device's IP address, while the specific serial port is operating under "Client Mode".

To access this page, click **Monitor** > **Port x** > **Connected IP**.

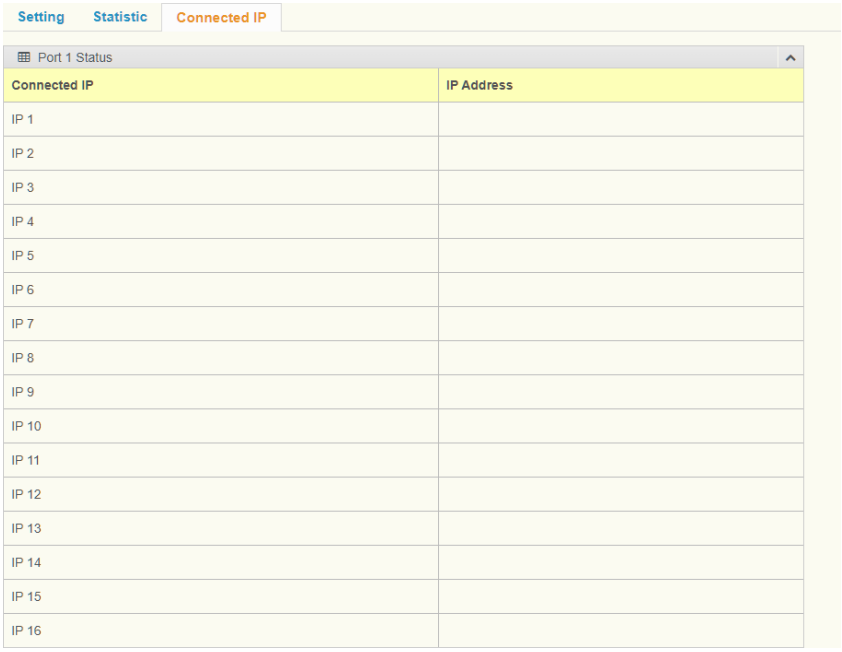

Figure 3.19. Monitor > Port x > Connected IP

The following table describes the items in the previous figure.

Item	Description
Connected IP	Displays the IP designation for the device.
IP Address	Displays the current connected IP address of the selected port.

3.7.4. Status (Legacy Mode Disabled)

With Modbus Legacy Mode disabled, information on the serial port function is presented in the Status section

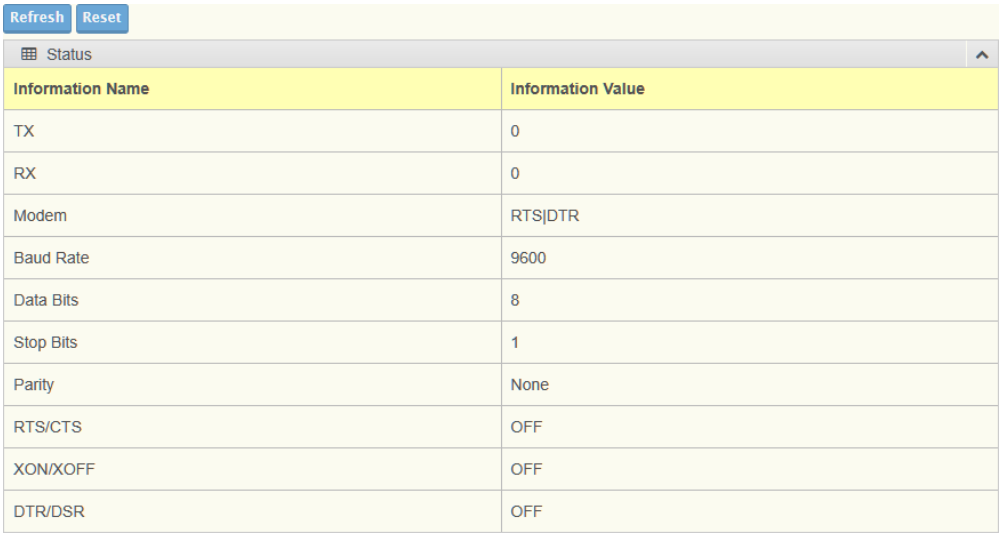

Figure 3.20. Monitor > Port x > Status

The following table describes the items in the previous figure.

Item	Description
TX	Display the TX count of the selected port.
RX	Display the RX count of the selected port.
Modem	Display any active modem signals (RTS, CTS, DTR, DSR, DCD)
Baud Rate	Display the current baud rate of the selected port.
Data Bits	Display the current data bits of the selected port.
Stop Bits	Display the current stop bits of the selected port.
Parity	Display the current parity of the selected port.
RTS/CTS	Display the current RTS/CTS status of the selected port.
XON/XOFF	Display the current XON/OFF status of the selected port.
DTR/DSR	DTR/DSR is not used by the gateway.

3.7.5. Modbus Statistics (Legacy Mode Disabled)

The maximum response time measurement is shown in the **Modbus Statistics** section of the page.You can check the actual maximum response response time of the Modbus nodes, and adjust the timeout parameters accordingly.

Any exception codes will be displayed and the counter will increase.

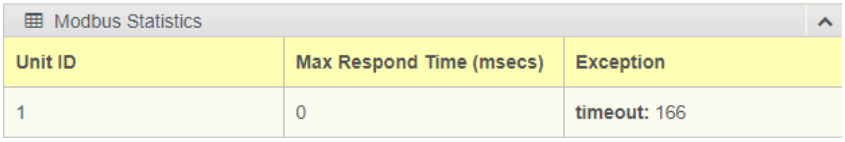

Figure 3.21. Monitor > Port n > Modbus Statistics

3.7.6. Just-In-Time Diagnostics (Legacy Mode Disabled)

Just-In-Time Diagnostics settings are covered in section “3.8.9. JIT With Modbus Legacy Mode Disabled” on page 45.

3.8. Syslogd

The EKI Modbus gateway provides the functionality to allow network devices to send event messages to a logging server, also known as a Syslog server, by way of the Syslogd function. The Syslog protocol is supported by a wide range of devices and can be used to log different types of events.

3.8.1. Syslogd Setting

Users can enable the syslogd function to record historical events or messages locally or on a remote syslog server.

To access this page, click **Syslogd** > **Syslogd Setting**.

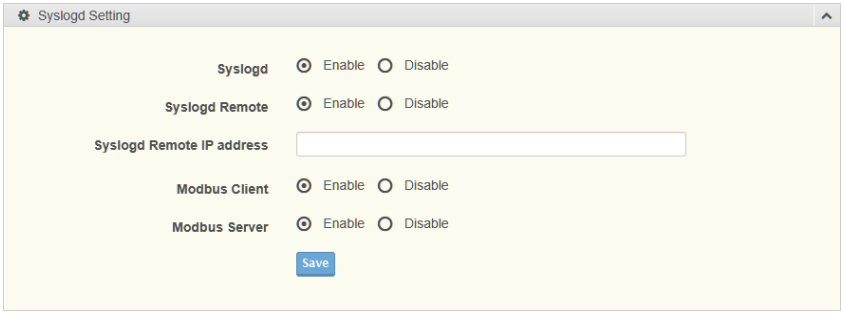

Figure 3.22. Syslogd > Syslogd Setting

The following table describes the items in the previous figure.

Item	Description
Syslogd	Enable syslogd function.
Syslogd Remote	Enable to send syslogd messages to a remote syslog server. Note that syslogd messages will not display in the local window when the remote feature is active.
Modbus Client	Enable to log Modbus Client messages.
Modbus Server	Enable to log Modbus Server messages.
Save	Click **Save** to save the values and update the screen.

Note! *All new configurations will take effect after rebooting. To reboot the device, click **Tools** > **Reboot**.*

3.8.2. Syslogd Message

After enabling the syslogd function, users can check the history in the syslogd message page.

To access this page, click **Syslogd** > **Syslogd Message**.

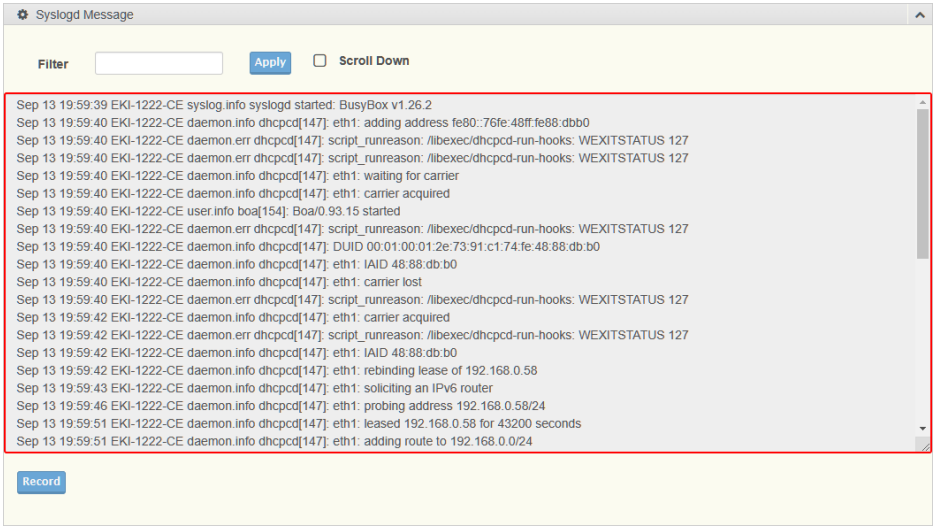

Figure 3.23. Syslogd > Syslogd Message

The message types selected on the Syslogd Setting page will be displayed. If Just-In-Time (JIT) Diagnostics are enabled, those message will also appear here.

The **Record** function will create a temporary file in the browser to record the logs in the Syslogd Message window. Recording will continue until the button is clicked again, then the file will be downloaded to your PC as a text file.

3.8.3. Modbus IP Mapping (Legacy Mode Enabled)

While the gateway is operating under “Modbus Server Mode”, users can check the status of all the Modbus TCP client devices, which are currently accessing the gateway.

To access this page, click **Syslogd** > **Modbus IP Mapping**.

Figure 3.24. Syslogd > Modbus IP Mapping

3.8.4. Modbus Port Mapping (Legacy Mode Enabled)

Users can check the overview of the “Unit ID”/”serial port” mapping table of the Modbus Server Mode. It also records the error status of each individual Unit ID, which is very helpful while analyzing a Modbus communication.

To access this page, click **Syslogd** > **Modbus Port Mapping**.

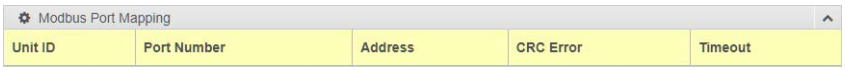

Figure 3.25. Syslogd > Modbus Port Mapping

3.8.5. Modbus Server Response Time (Legacy Mode Enabled)

This page shows the longest response time of each individual unit ID. This should be helpful for optimizing the performance.

To access this page, click **Syslogd** > **Modbus Server Response Time**.

Click **Clear All** to clear all response information.

Figure 3.26. Syslogd > Modbus Server Response Time

3.8.6. Modbus Server (Legacy Mode Disabled)

The **Modbus Server** screen includes diagnostic information such as addresses and ports, connection start/end time, receive/respond/fail-responding counters, etc.

JIT options can also be enabled here. When enabled on this page versus the Monitor page, the JIT information is sorted by TCP Session instead of COM Port

Figure 3.27. Syslogd > Modbus Server

3.8.7. Modbus Agent Monitor

The **Modbus Agent Monitor** screen contains settings to log Just-In-Time diagnostics for your Modbus Agent channels to syslogd. Each channel that is set up on the **Service** > **Modbus Agent** screen can be configured independently.

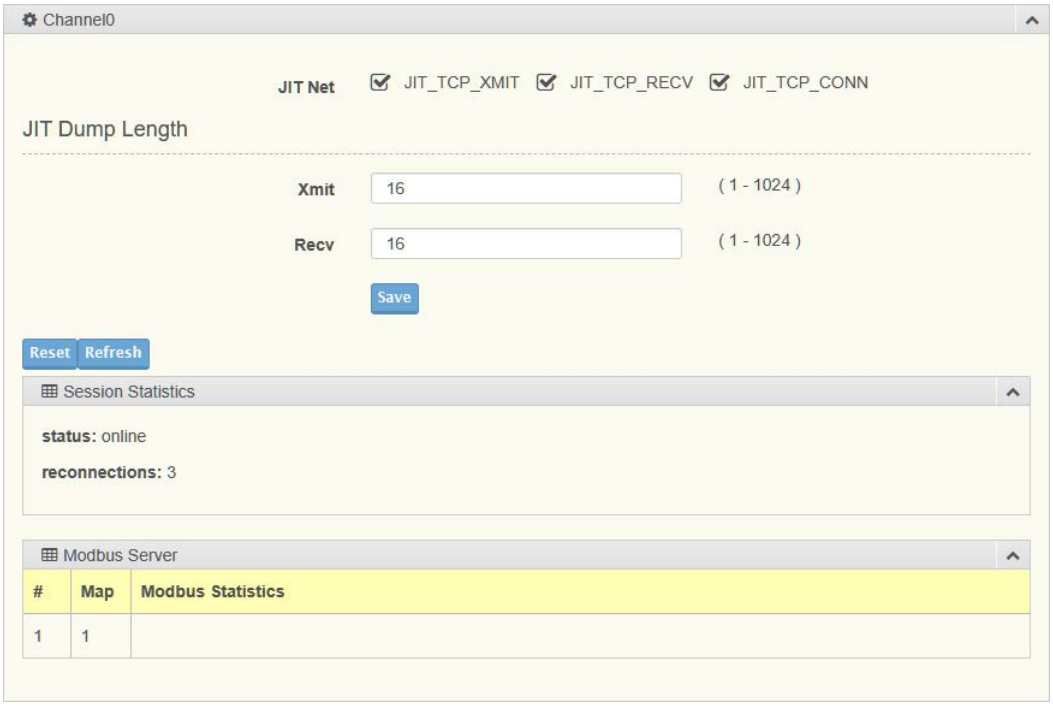

Figure 3.28. Syslogd > Modbus Agent Monitor

Item	Description
JIT_TCP_XMIT	Enable logging TCP transmitted messages to syslogd.
JIT_TCP_RECV	Enable logging TCP received messages to syslogd.
JIT_TCP_CONN	Enable logging TCP connection messages to syslogd.
Xmit	Set the number of bytes of the transmitted message to log to syslogd.
Recv	Set the number of bytes of the received message to log to syslogd.
Reset	Reset the channel's session statistics.
Refresh	Update the channel's session statistics.
Save	Apply the channel's JIT settings.

3.8.8. Just-In-Time (JIT) Diagnostics

The Just-In-Time (JIT) Diagnostics features of the Modbus gateway assist in troubleshooting communications issues. JIT diagnostics can be configured in one of two ways, depending on whether or not Modbus Legacy Mode is enabled in the **Service** > **Modbus Settings** screen.

3.8.9. JIT With Modbus Legacy Mode Disabled

On the **Service** > **Modbus Settings** page, disable **Modbus Legacy Mode** and **Save** your changes.

On the **Syslogd** > **Syslogd Setting** page, enable **Syslogd** and **Save** your changes.

Reboot the device (**Tools** > **Reboot**) to apply the changes.

The available options differ between Modbus Server mode and Modbus Client mode.

3.8.9.1. Modbus Server Mode

The Modem Status can be seen on the **Monitor** > **Port n** page. Signals which are currently ON will be listed (e.g., RTS/CTS/DTR/DSR).

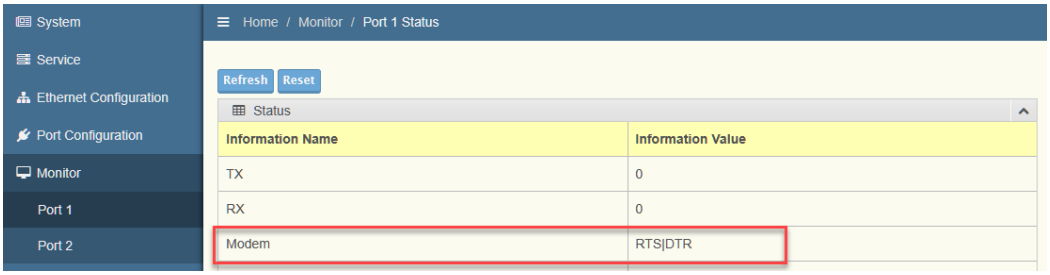

Figure 3.29. Monitor > Port n > Status

The maximum response time measurement is shown in the **Modbus Statistics** section of the page.You can check the actual maximum response response time of the Modbus nodes, and adjust the timeout parameters accordingly.

Any exception codes will be displayed and the counter will increase.

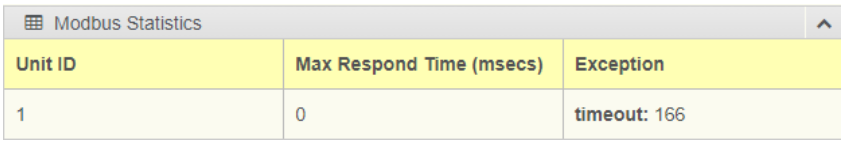

Figure 3.30. Monitor > Port n > Modbus Statistics

Select your desired types of JIT data in the **Just-In-Time Diagnostics** section of the page. The selected data will be displayed in the **Syslogd Message** page.

The options in the **serial** category will record raw bytes. The options in the **mobdus** category will record parsed commands and responses.

In the **JIT Dump Length** section, Define the length of the raw data to be printed in the Syslog Message window. The default is 12 bytes.

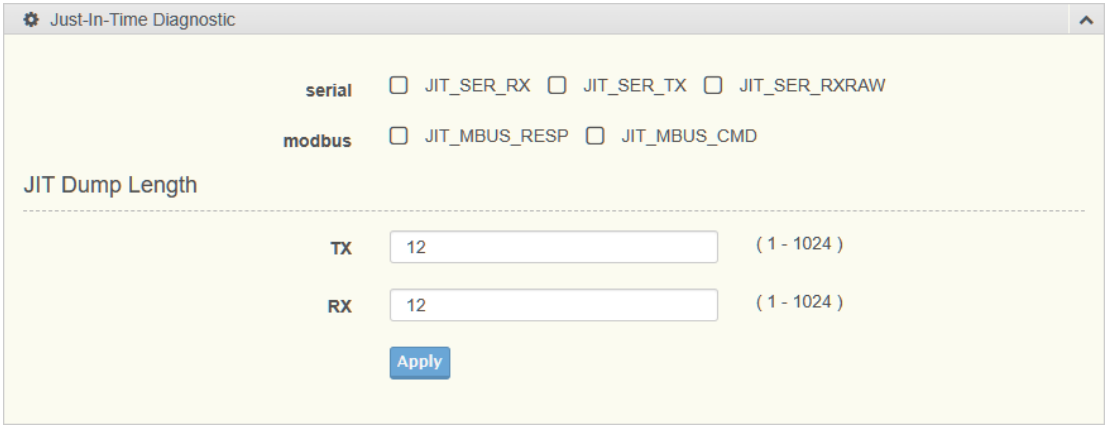

Figure 3.31. Monitor > Port n > Just-In-Time Diagnostics (Server)

Note! *The JIT options will take effect when you click **Apply**. Rebooting the device will clear these options.*

The JIT options on the Monitor pages are for *that specific COM port*, no matter where the commands originate. The logs here contain no Ethernet-side information.

3.8.9.2. Modbus Client Mode

JIT Diagnostics in Modbus Client mode is similar to that in Modbus Server mode, but we have a few more options available.

The options in the added **tcp** category are mainly for data sent by the COM port. The Default length of the raw data to be recorded in Modbus Client mode is 16 bytes.

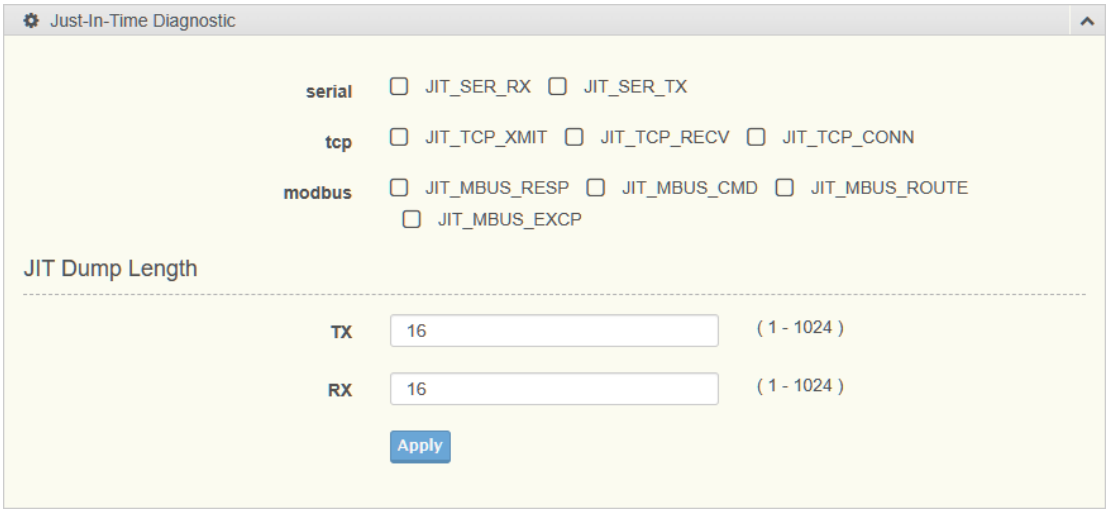

Figure 3.32. Monitor > Port n > Just-In-Time Diagnostics (Client)

3.8.9.3. JIT Logging By TCP Session

JIT options on the **Syslogd** > **Modbus Server** page are selected by TCP session. Only connections still alive are available; disconnected sessions will be removed.

Each distinct Source IP/Port and Destination IO/Port combination will be considered as different TCP session. Only TCP Sessions which are connecting to peers on COM Ports set in Server Mode will be recorded. TCP Peers connected by the Client mode will not be recorded here.

Figure 3.33. Syslogd > Modbus Server > Just-In-Time Diagnostics

Note! *The JIT options for a given TCP session are cleared when the connection is dropped, or after a reboot.*

With JIT logging enabled for a TCP session, the **Syslogd** > **Syslogd Message** page allows you to inspect the Modbus data related to a specific Modbus/TCP Client, regardless of which COM Port was involved in the communication.

Figure 3.34. Syslogd > Syslogd Messages with TCP session

If the same options are selected for both the COM port and the TCP session, only one entry will appear in the syslogd log for each event. For example, the option JIT_SER_RX exists on both pages. Selecting them both will show only one entry when the Com port receives data.

3.8.10. JIT With Modbus Legacy Mode Enabled

To use JIT diagnostics when Modbus Legacy Mode is enabled, you will need to change the **Device Name** on the **System** page to "**ENABLE_JIT_DIAG**" (without quotes) and **Save** your changes.

On the **Syslogd** > **Syslogd Setting** page, enable **Syslogd** and the desired Modbus modes (i.e., **Modbus Client** and/or **Modbus Server**). **Save** your changes.

On the **Port Configuration** > **Port n** > **Basic** page, select the JIT Diagnostics levels to be logged.

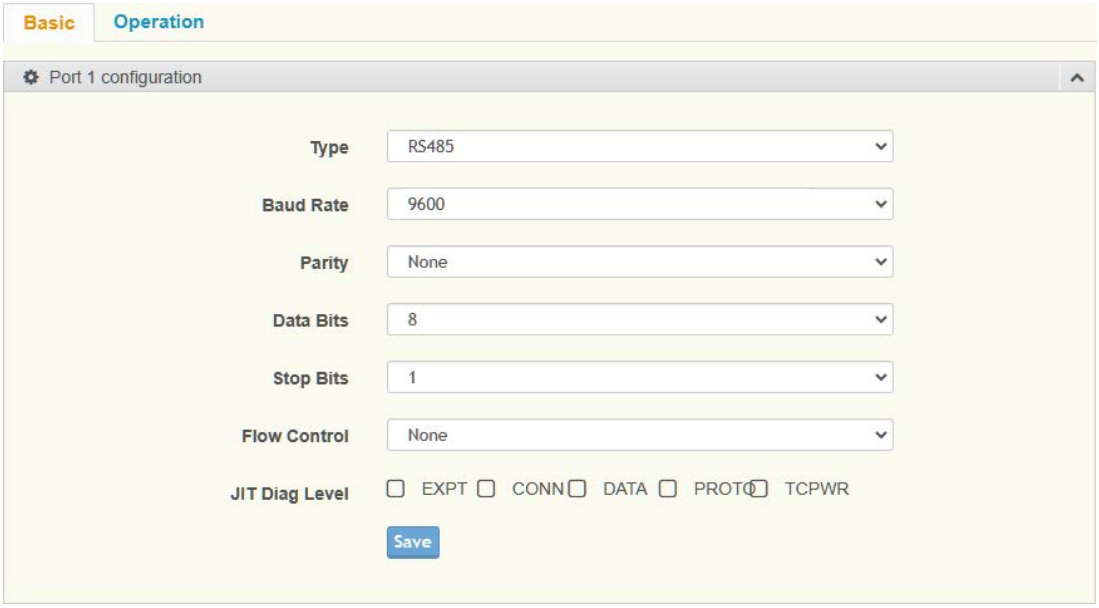

Figure 3.35. JIT Diagnostics Level

The following table defines the data included in each JIT level.

Item	Description
Exception (EXPT)	Unable to Open COM Port
	Failed to enable RTU detection
	Cannot get LSP (State: 0x%x)
	LSR_ERRORMASK (State: 0x%x)
	Write To Serial Failed
	Queue Full, Unable to make a reservation
	An Error event has occurred
Connection (CONN)	CRC Error (0x%x!=0x%x TID%d, UID%d, FID%d)
Data (DATA)	Read %d bytes non-MBus Data (TID%d, UID%d, FID%d) TID is the transition ID, UID is the Unit ID and FID is the function ID.
	Read %d bytes of serial Data(TID%d, UID%d, FID%d)
Protocol (PROTO)	Serial Rx Len = %d(TID%d, UID%d, FID%d:%s Note: The Protocol level message overwrites the Data level message.

Item	Description
TCP Write (TCPWR)	On Modbus read commands: Received MbusTCP Query for %u bytes of data(TID%d, UID%d, FID%d)
	On Modbus write commands: Received MbusTCP Query Command(TID%d, UID%d, FID%d)

In this table, %x is a hex value, %d is a decimal value, and %s is the beginning 8 bytes of serial data.

3.9. Tools

The EKI Modbus gateway provides tools for access to ping, Modbus scan and polling and reboot functions.

3.9.1. Ping

The Ping page can help users diagnose Ethernet problems. Users can use the ping page to ask the device to ping a specific target to check the Ethernet network status.

The Ping page allows you to configure the test log page.

To access this page, click **Tools** > **Ping**.

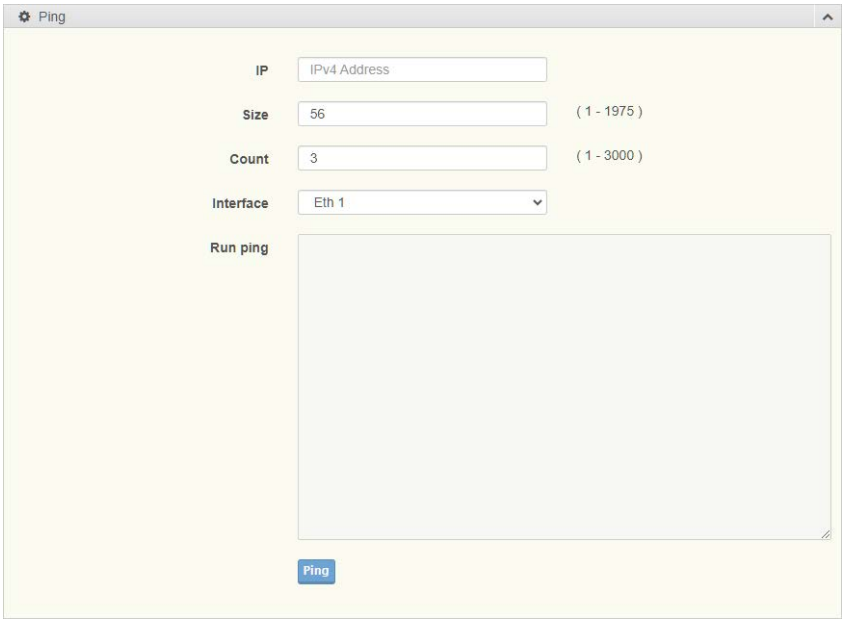

Figure 3.36. Tools > Ping

The following table describes the items in the previous figure.

Item	Description
IP	Enter the IP address or host name of the station to ping. The initial value is blank. The IP Address or host name you enter is not retained across a power cycle. Host names are composed of series of labels concatenated with periods. Each label must be between 1 and 63 characters long, maximum of 64 characters.
Size	Enter the size of ping packet. The default value is 56. The value ranges from 8 to 5120. The size entered is not retained across a power cycle.
Count	Enter the number of echo requests to send. The default value is 4. The value ranges from 1 to 5. The count entered is not retained across a power cycle.

Item	Description
Interface	Select the Ethernet port to use for the ping.
Run ping	Displays the results of the ping.
Ping	Send the ping request.

3.9.2. Modbus Scan

Modbus Scan will scan for Modbus devices on the port and report the Server ID's that are found.

The scan sends requests to the specified target IP, port and range of Server IDs. The scan sends a specified Modbus request (default Read Register at address 0), and lists the Server IDs that respond to the request in the Result field. Any end devices that are not configured to respond to the selected request will not be found.

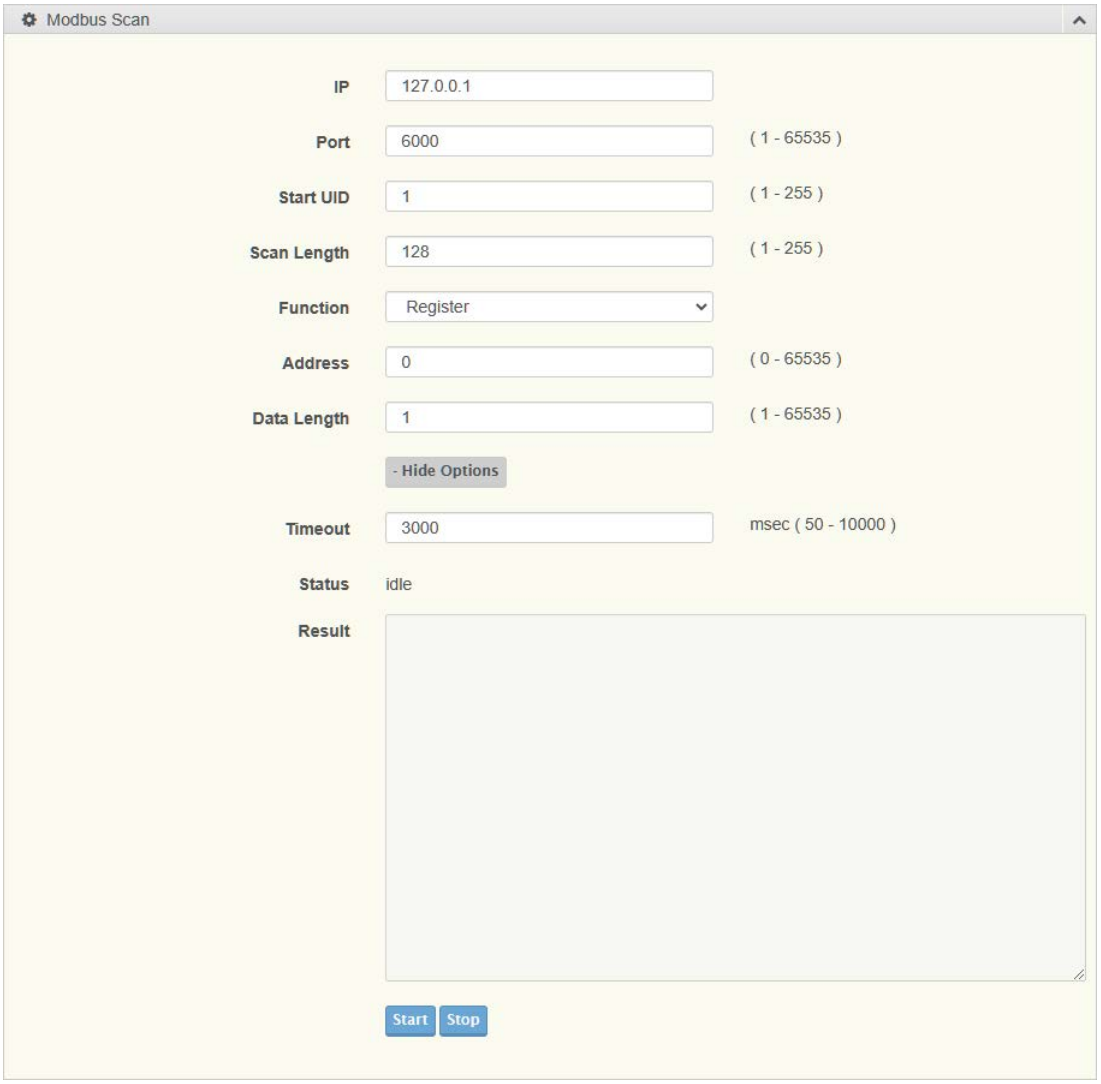

Figure 3.37. Tools > Modbus Scan

The following table describes the items in the previous figure.

Item	Description
IP	The IP address to scan
Port	The port to scan
Start UID	The starting Server ID to scan

Item	Description
Scan Length	The number of sequential IDs to scan
Function	The Modbus function to request from each scanned ID
Address	The address to request from each scanned ID
Data Length	The data length to request from each scanned ID
Timeout	The timeout in ms to wait for a response to each request
Status	The scan status
Result	A list of all Server IDs that responded to the request
Start	Start the scan
Stop	Stop a running scan

3.9.3. Modbus Polling

The Modbus Polling function will send a Modbus request to one specified Modbus server (IP, Port and UID) and display the results.

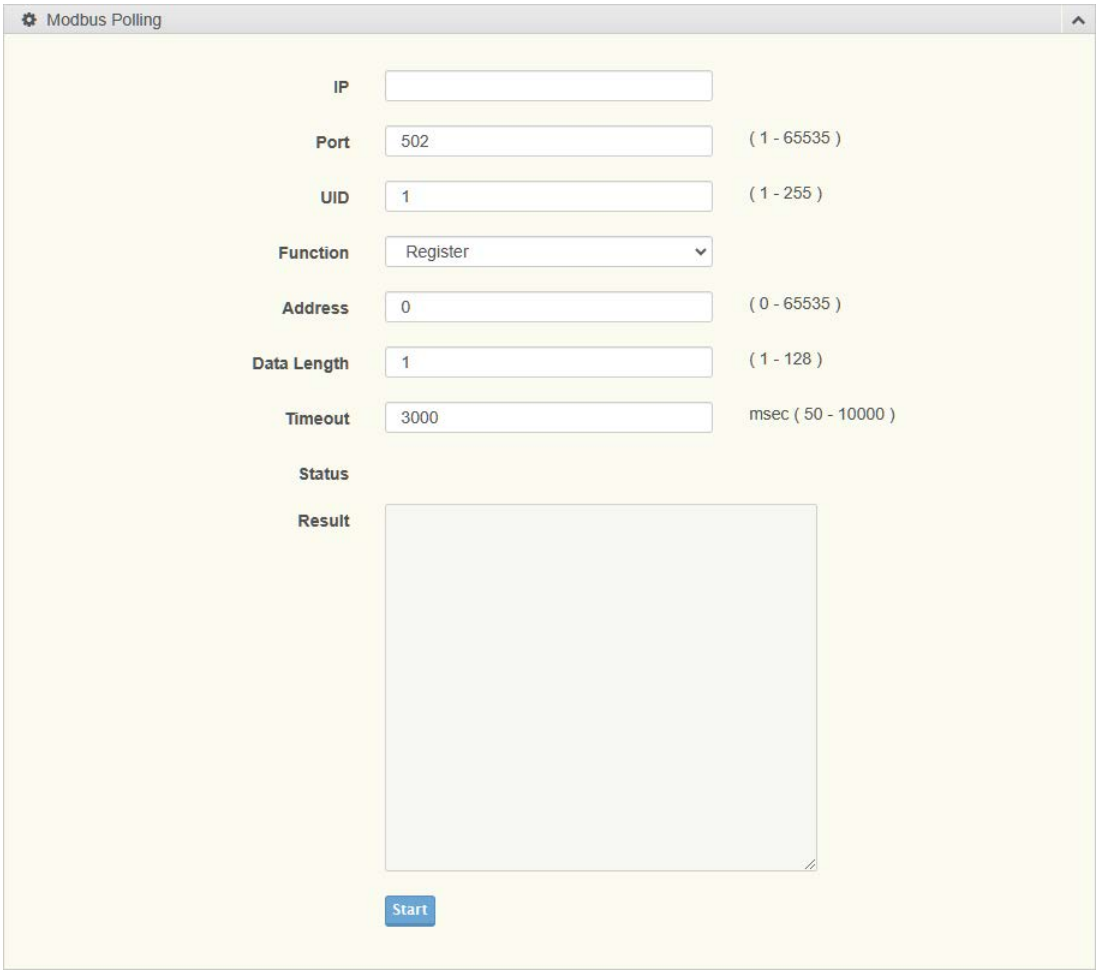

Figure 3.38. Tools > Modbus Polling

The following table describes the items in the previous figure.

Item	Description
IP	The IP address to poll
Port	The port to poll

Item	Description
UID	The Server ID to poll
Function	The Modbus function to request
Address	The address to request
Data Length	The data length to request
Timeout	The timeout in ms to wait for a response to each request
Status	The polling status
Result	The response to the Modbus request
Start	Send the Modbus request

3.9.4. Reboot

The configuration will take effect after clicking Save button. But all configurations are saved to flash memory after a system reboot. Press the Reboot button and the system will give a reset response. It will take a few seconds to reconnect with the new values.

To access this page, click **Tools** > **Reboot**.

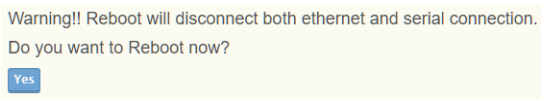

Figure 3.39. Tools > Reboot

Click **Yes** to reboot the Modbus gateway. Any configuration changes you have made since the last time you issued a save will be lost.

3.10. Management

The EKI Modbus gateway allows for easy installation and maintenance and reliable maintenance access from anywhere. With the reliable management tools available, you can streamline staffing and troubleshooting requirements to a centralized system.

3.10.1. Change Password

The Change Password function allows you to easily update your current password from a single menu.

To access this page, click **Management** > **Change Password**.

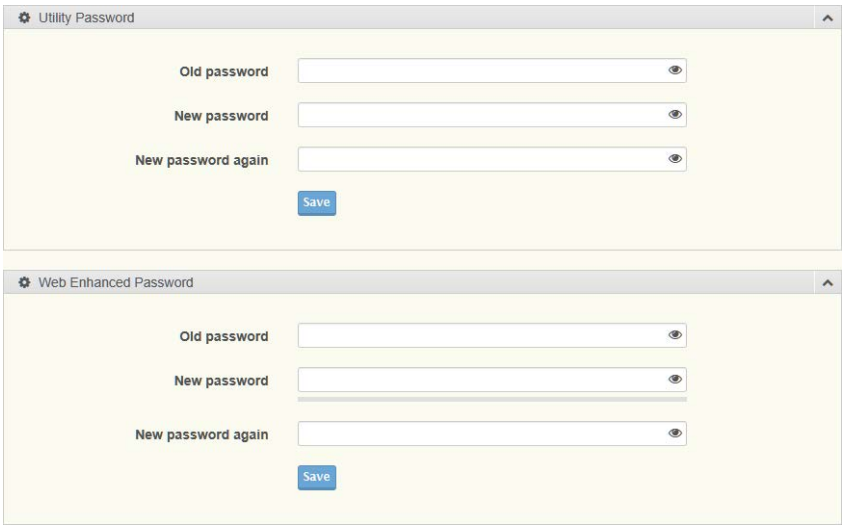

Figure 3.40. Management > Change Password

The following table describes the items in the previous figure.

Item	Description
Utility Password	Setting a utility password will lock access from the firmware update utility. If a web password is not set, the utility password will also be required to log in to the web interface.
Old password	Enter the old password, if a password is currently set.
New password	Enter the character set for the define password type.
New password again	Retype the password entry to confirm the profile password.
Web Enhanced Password	Setting a web password will lock access to the web interface. When logging in to the web interface using this password, the user name can be either left blank or set as 'root'.
Old password	Enter the old password, if a password is currently set.
New password	Enter the character set for the define password type.
New password again	Retype the password entry to confirm the profile password.
Save	Click **Save** to save the values and update the screen.

If you have set a password, when you access the web configuration you need to key in the password. It is not necessary to enter the user name in the dialog.

If you want to disable the password protection, change the password to the default option **None** (leave the new password column blank). Be sure to press the **Save** button and reboot the Modbus gateway to make the change effective.

Note! *If a password is set, a 20-minute session timer will start each time you log in to the web interface. To reset the timer before it expires, click the* **Session Timeout** *display at the top of the Web UI. When the session timer expires, you will be automatically logged out of the web interface.*

Note! *All new configurations will take effect after rebooting. To reboot the device, click* ***Tools*** *>* ***Reboot****.*

3.10.2. Secure Access IP

The Secure Access IP feature works as a whitelist for limiting Modbus/TCP connections when the gateway is in Server Mode. The Modbus requests to the gateway will be limited to the IP addresses entered into the Access IP addresses in the Secure Access. Up to 32 addresses can be given full read/write permissions. Access from other addresses can be prohibited or restricted to read only.

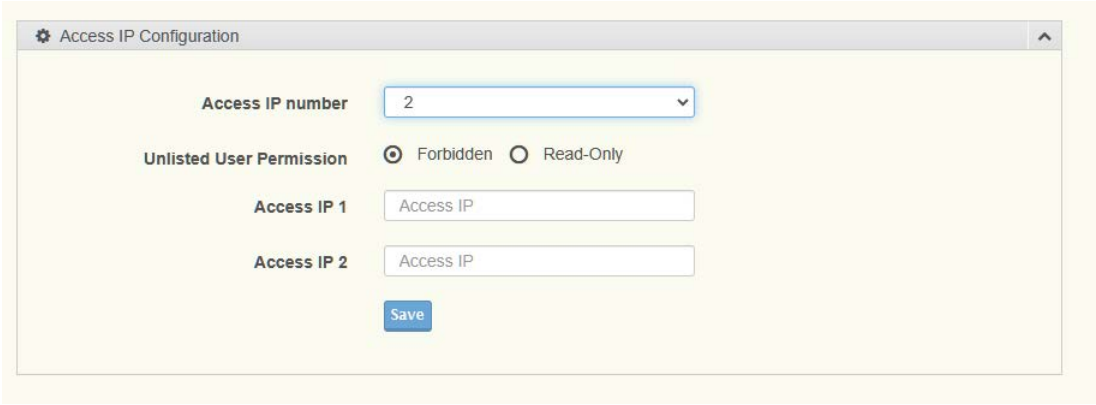

Figure 3.41. Management > Secure access IP

The following table describes the items in the previous figure.

Item	Description
Access IP number	Select the number of IP addresses to be configured for access. Maximum 32 If set to zero, no IP access restrictions will apply.
Unlisted User Permission	Set access permissions for addresses not listed on this page to either Forbidden or Read-Only.
Access IP x	Enter each IP address to be allowed access, up to the quantity specified in the Access IP number field above.
Save	Click **Save** to save the values and update the screen.

Note! *A Modbus Agent Channel using an IP address that is not associated with a serial port channel in Modbus Agent will continue to work even if the that channels address is not listed in the Secure Access IP Configuration*

Note! *When a channel in Modbus Agent Mode is set up for the serial device, the IP address used in the channel setup must be entered into one of the Secure Access IP addresses. For the Modbus Agent channels you should not use the loopback IP (127.0.0.1) if you are using the Secure Access IP feature. Use the gateway's IP address instead.*

Note! *All new configurations will take effect after rebooting. To reboot the device, click **Tools** > **Reboot**.*

3.10.3. Export Device Settings

Export the server configuration settings to a .conf file.
To access this page, click **Management** > **Export**.
Click **Export** to export the Modbus gateway settings.

3.10.4. Import Device Settings

Import the server configuration settings from a .conf file.
To access this page, click **Management** > **Import**.

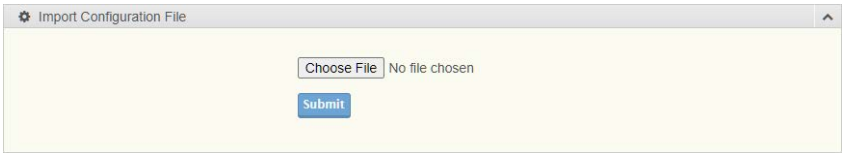

Figure 3.42. Management > Import

The following table describes the items in the previous figure.

Item	Description
Choose File	Click **Choose File** to select the configuration file.
Submit	Click **Submit** to import and apply the configuration.

3.10.5. Firmware Upgrade

If HTTPS security is enabled, the device firmware can be updated from the web UI. The standard method for firmware updates is to use the Windows utility that is packaged with the firmware download.

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