MGate 5105-MB-EIP Series User Manual

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www.moxa.com/products

MGate 5105-MB-EIP Series User Manual

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1. Introduction

Welcome to the MGate 5105-MB-EIP line of Modbus-to-EtherNet/IP/MQTT gateways. All models perform easy protocol conversions between Modbus RTU/ASCII, Modbus TCP, and EtherNet/IP protocols to Industrial Internet of Things (IIoT) applications based on MQTT or third-party cloud services, such as Azure and Alibaba Cloud.

Overview

The MGate 5105-MB-EIP is a line of protocol gateways that provide users with the following features:

- Gateway functions to transfer data between Modbus RTU/ASCII, Modbus TCP and EtherNet/IP
- Connects fieldbus data to the cloud through generic MQTT
- Supports MQTT connectivity with built-in device SDKs to Azure and Alibaba Cloud
- Supports both EtherNet/IP adapter and scanner
- Supports MQTT connectivity with TLS and certificate in JSON and Raw data format
- Effortless configuration via web or Windows utility
- Complete packet analysis and diagnosis information for maintenance, and cloud data transmission for cost evaluation and analysis
- Redundant dual DC power inputs
- Built-in Ethernet cascading for easy wiring
- Power-off warning by relay output
- microSD card supported for configuration backup or duplication, event logs, and data buffering when the cloud connection is lost
- Web-based GUI for I/O data visualization
- -40 to 75°C wide operating temperature range models available

Package Checklist

All models of the MGate 5105-MB-EIP Series are shipped with the following items:

Standard Accessories:

- 1 MGate 5105-MB-EIP Modbus-to-EtherNet/IP gateway
- Documentation & software CD
- Quick installation guide (printed)
- Warranty card

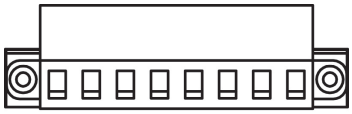
Optional Accessories:

- DR-4524: 45W/2A DIN-rail 24 VDC power supply with universal 85 to 264 VAC input
- DR-75-24: 75W/3.2A DIN-rail 24 VDC power supply with universal 85 to 264 VAC input
- DR-120-24: 120W/5A DIN-rail 24 VDC power supply with 88 to 132 VAC/176 to 264 VAC input by switch
- WK-36-01: wall-mounting kit

NOTE

Notify your sales representative if any of the above items is missing or damaged.

Power Input and Relay Output Pinouts



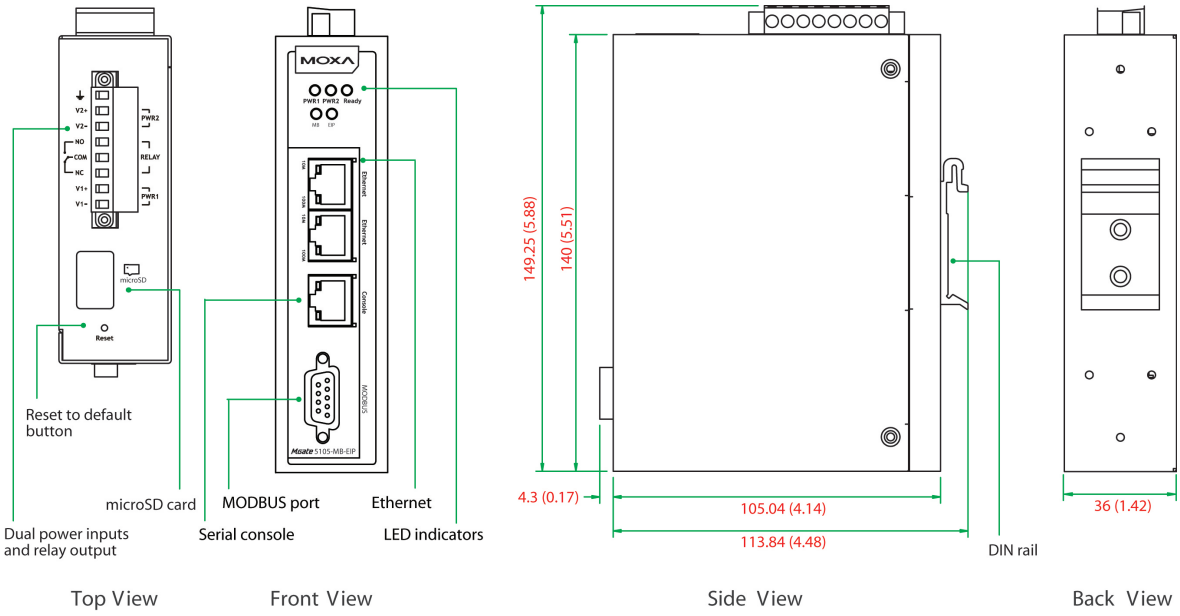
	V2+	V2-				V1+	V1-
Shielded Ground	DC Power Input 2	DC Power Input 2	N.O.	Common	N.C.	DC Power Input 1	DC Power Input 1

LED Indicators

LED	Color	Description
PWR 1, PWR 2	Green	Power is on
	Off	Power is off
Ready	Off	Power is off or a fault condition exists
	Green	Steady: Power is on, and the MGate is functioning normally
		Blinking: The MGate has been located by MGate Manager's Location function
	Red	Steady: Power is on, and the MGate is booting up
		Blinking slowly: shows an IP conflict, or the DHCP or BOOTP server is not responding properly
		Flashing quickly: microSD card failed
EIP (Scanner)	Off	No I/O data is exchanged
	Green	Steady: I/O data is exchanged with all devices
		Blinking: I/O data is exchanged with at least one device (not all configured devices can communicate with a gateway)
EIP (Adapter)	Off	No I/O data is exchanged
	Green	Steady: I/O data is exchanged with all devices
		Blinking: I/O data is exchanged with at least one device (not all configured devices can communicate with a gateway)
MB	Off	No communication with Modbus RTU/ASCII device
	Green	Modbus RTU/ASCII communication progress
	Red	Communication error When MGate 5105 acts as RTU/ASCII Client/Master: 1. Server/Slave device returned an error (exception) 2. Received frame error (parity error, checksum error) 3. Timeout (server/slave device no response) When MGate 5105 acts as RTU/ASCII Server/Slave: 1. Received invalid function code 2. Client/Master accessed invalid register address or coil addresses 3. Received frame error (parity error, checksum error)

Dimensions

Unit: mm (inch)

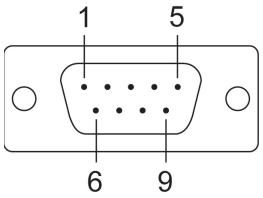


Pin Assignments

Modbus (Modbus RTU/ASCII) Pin Assignment

The MGate 5105-MB-EIP Series uses a DB9 serial port to connect to Modbus RTU/ASCII devices.

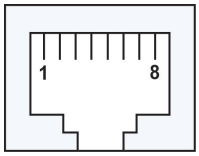
Pin	RS-232	RS-422, RS-485-4W	RS-485-2W
1	DCD	TxD-	–
2	RXD	TxD+	–
3	TXD	RxD+	Data+
4	DTR	RxD-	Data-
5	GND	GND	GND
6	DSR	–	–
7	RTS	–	–
8	CTS	–	–
9	–	–	–



Console (RS-232) Pin Assignment

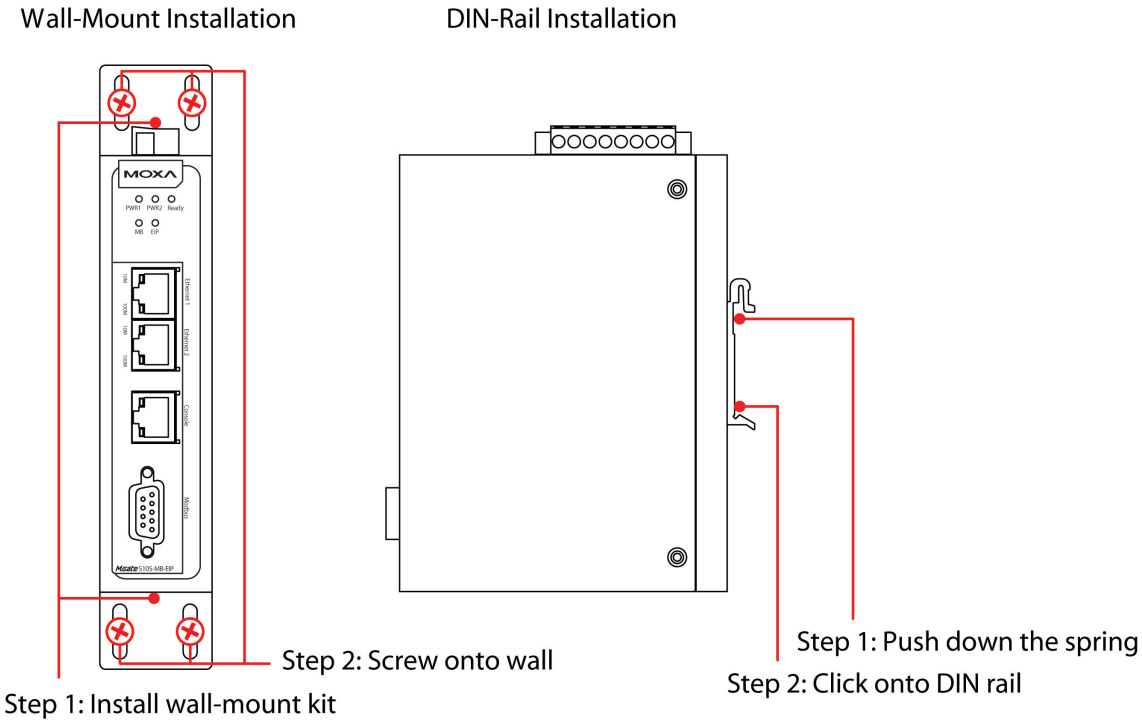
The MGate 5105-MB-EIP Series uses an RJ45 connector to connect to a PC for device configuration.

Pin	RS-232
1	DSR
2	RTS
3	GND
4	TXD
5	RXD
6	DCD
7	CTS
8	DTR



Mounting the Unit

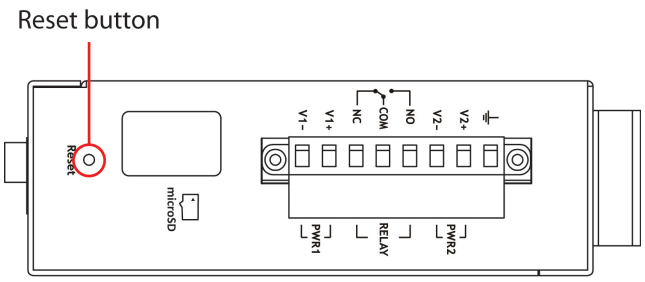
1. Connect the power adapter. Connect the 12–48 VDC power line or DIN-rail power supply to the MGate 5105-MB-EIP device's terminal block.
2. Use a Modbus serial cable to connect the MGate to a Modbus server/slave device.
3. Use an Ethernet cable to connect the MGate to the EtherNet/IP controller.
4. The MGate 5105-MB-EIP is designed to be attached to a DIN rail or mounted on a wall. For DIN-rail mounting, push down the spring and properly attach it to the DIN rail until it "snaps" into place. For wall mounting, install the wall-mount kit (optional) first, and then screw the device onto the wall. The following figure illustrates the two mounting options:



Specifications

> **NOTE**
>
> The latest specifications for Moxa's products can be found at https://www.moxa.com.

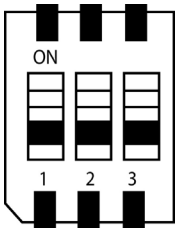
Reset Button



Restore the MGate to factory default settings by using a pointed object (such as a straightened paper clip) to hold the reset button down until the Ready LED stops blinking (approx. 5 seconds).

Pull-high, Pull-low, and Terminator for RS-485

Remove the MGate 5105-MB-EIP's top cover, and you will find DIP switches to adjust each serial port's pull-high resistor, pull-low resistor, and terminator.



SW	1	2	3
	Pull-high resistor	Pull-low resistor	Terminator
ON	1 kΩ	1 kΩ	120 Ω
OFF	150 kΩ*	150 kΩ*	–*

*Default

microSD

The MGate 5105-MG-EIP provides users with an easy way to backup, copy, replace, or deploy. The MGate is equipped with a microSD card slot. Users can plug in a microSD card to backup data, including the system configuration setting, GSD files, and system data log.

First time using the MGate gateway with a new microSD card

1. Format the microSD card as FAT file system through a PC.
2. Power off the MGate and insert the microSD card (ensure that the microSD card is empty).
3. Power on the MGate. The default settings will be copied to the microSD card.
4. Manually configure the MGate via MGate Manager or web console, and all the stored changes will be copied to the microSD card for synchronization.

First time using the MGate with a microSD card containing a configuration file

1. Power off the MGate and insert the microSD card.
2. Power on the MGate.
3. The configuration file stored in the microSD card will automatically copy to the MGate.

Duplicating current configurations to another MGate gateway

1. Power off the MGate and insert a new microSD card.
2. Power on the MGate.
3. The configuration will be copied from MGate to microSD card.
4. Power off the MGate and insert the microSD card into the other MGate.
5. Power on the second MGate.
6. The configuration file stored on the microSD card will automatically copy to the MGate.

Malfunctioning MGate replacement

1. Replace the malfunctioning MGate with a new MGate.
2. Insert the microSD card into the new MGate.
3. Power on the MGate.
4. The configuration file stored on the microSD card will automatically copy to the MGate.

microSD card writing failure

The following circumstances may cause the microSD card to experience a writing failure:

1. The microSD card has less than 256 Mbytes of free space remaining.
2. The microSD card is write-protected.
3. The file system is corrupted.
4. The microSD card is damaged.

The MGate will stop for the above events, accompanied by a flashing Ready LED and a beeping alarm. When you replace the MGate gateway's microSD card, the microSD card will synchronize the configurations stored on the MGate gateway. Note that the replacement microSD card should not contain any configuration files on it; otherwise, the out-of-date configuration will be copied to the MGate device.

Configuration Methods

MGate 5105-MB-EIP provides three ways to configure an MGate.

1. **MGate Manager (Windows utility)**

   Use MGate Manager to configure the MGate through Ethernet, or check the MGate status. Refer to Chapter 3 for details.

2. **Web console**

   Use the web console to configure the MGate, or verify the MGate's status, by Ethernet. Use a web browser such as Microsoft Internet Explorer or Google Chrome to connect to the MGate, using HTTP/HTTPS protocol. Here, the MGate IP address must be configured correctly. Refer to **Chapter 4** for details.

3. **Serial console**

   Use the serial console to configure the MGate, or verify the MGate's status, through an RS-232 null modem (crossover) cable. Use a serial terminal emulation tool such as Moxa PComm Terminal Emulator or PuTTY to log in to the MGate serial console. Note that the serial console doesn't provide the interface for all parameters. Some parameters must be configured through MGate Manager or the web console. You must use a DB9-to-RJ45 cable to connect the serial console port on the MGate gateway's front panel to the serial port on the host. The serial console parameters are 115.2 kbps; parity: none; 8 data bits; and one stop bit.

2. Quick Configuration Guide

This chapter provides a quick overview of how to configure the MGate 5105-MB-EIP by web console. For more detailed information on how to configure the MGate 5105-MB-EIP, refer to Chapters 3 and 4.

Cable Connection

The MGate gateway supports Modbus RTU/ASCII, Modbus TCP, and EtherNet/IP protocols. If the MGate gateway needs to communicate with Modbus RTU/ASCII devices, connect your Modbus device to the MGate gateway's Modbus port. Regardless, at least one of your devices should be Modbus TCP or EtherNet/IP interface. Connect your Modbus TCP or EtherNet/IP device to the MGate gateway's 10/100M Ethernet port as well. The MGate gateway will show a valid Ethernet connection in the following ways:

- The Ethernet LED will maintain a solid green color when connected to a 100 Mbps Ethernet network
- The Ethernet LED will maintain a solid orange color when connected to a 10 Mbps Ethernet network
- The Ethernet LED will flash when Ethernet packets are being transmitted or received

The gateway can be powered by connecting a power source to the terminal block by following the steps below:

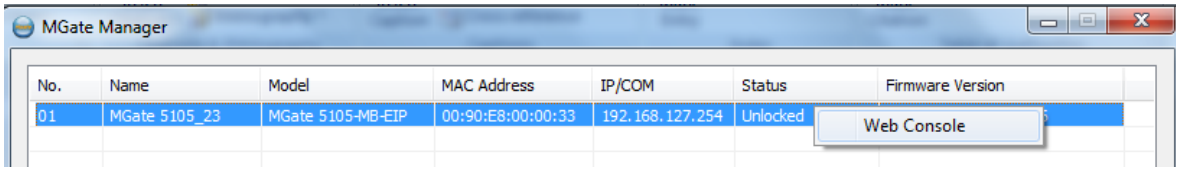
1. Loosen or remove the screws on the terminal block.
2. Connect the 12–48 VDC power line to the terminal block. Confirm that the power source is off already.
3. Tighten the connections using the screws on the terminal block.
4. Turn on the power source.

NOTE

Note that the gateway does not have an on/off switch. It automatically turns on when it receives power. The PWR LED on the top panel will glow to indicate that the unit is receiving power.

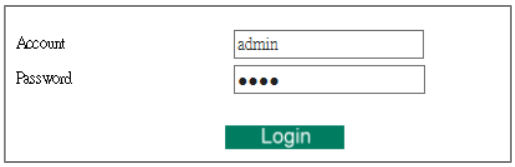
Log in to the Web Console

If you do not know the MGate gateway's IP address when setting it up for the first time (default IP is *192.168.127.254*), use an Ethernet cable to connect the host PC and MGate gateway directly. If the gateway and host PC are connected through the same Ethernet switch, make sure that there is no router between them. Then use MGate Manager to detect the MGate gateways on your network. When the MGate gateway appears on the MGate Manager device list, right-click on the selected MGate and configure it via the web console.



Except for the Broadcast Search feature, you can also use the Device Search Utility (DSU) to detect MGate gateways on your network, which can be downloaded from Moxa's website at http://www.moxa.com. This utility can further support multiple gateway configurations to ease your job.

On the first page of the web console, enter **admin** for the default Account name and **moxa** for the default Password.



Quick Setup

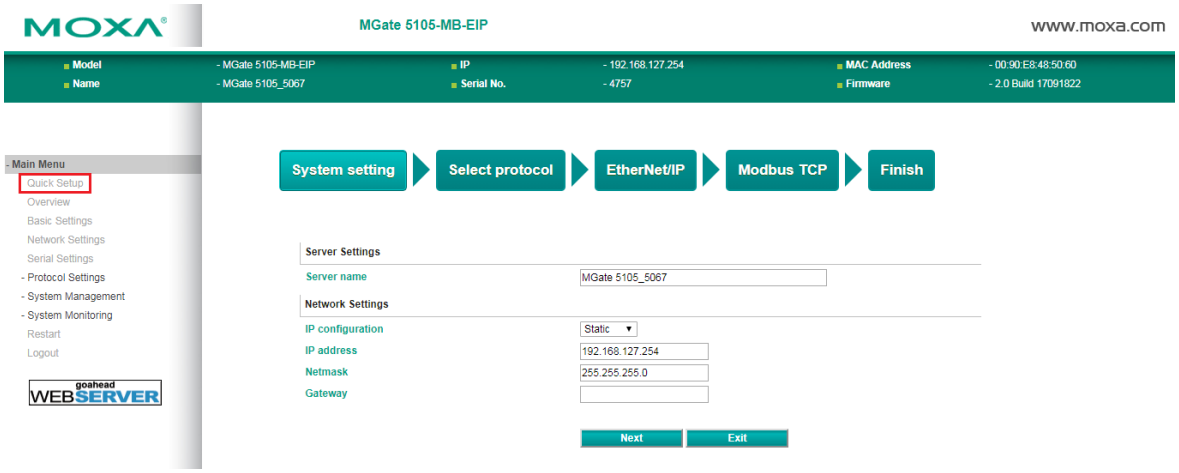
Most times, users find it difficult to complete the MGate's configuration. Therefore, the MGate Series now provides Quick Setup, an illustrated guide especially designed to make configuration easy. When you press Quick Setup, you will access the mode and configure it. Only a few steps are needed. For a detailed parameter description, please refer to Chapter 3 and Chapter 4.

NOTE

The **Quick Setup** function is not supported by the northbound protocols of the MQTT/Cloud feature from version 4.0 or above firmware.

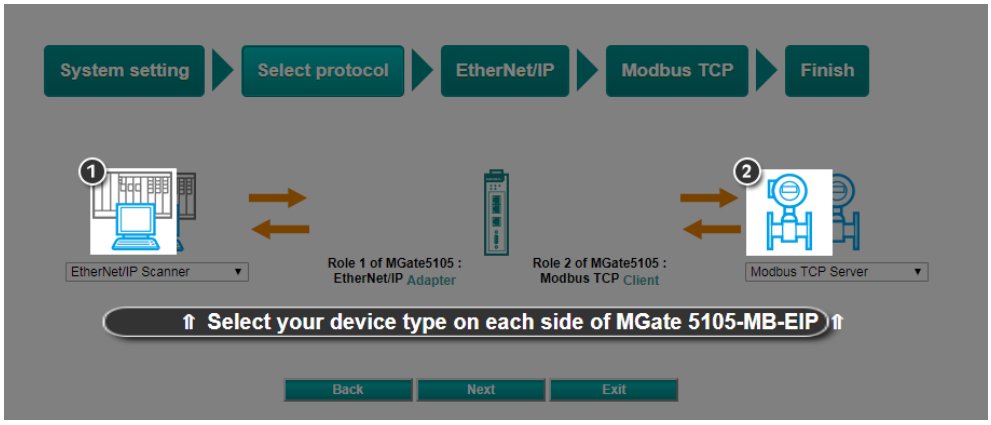
System Setup

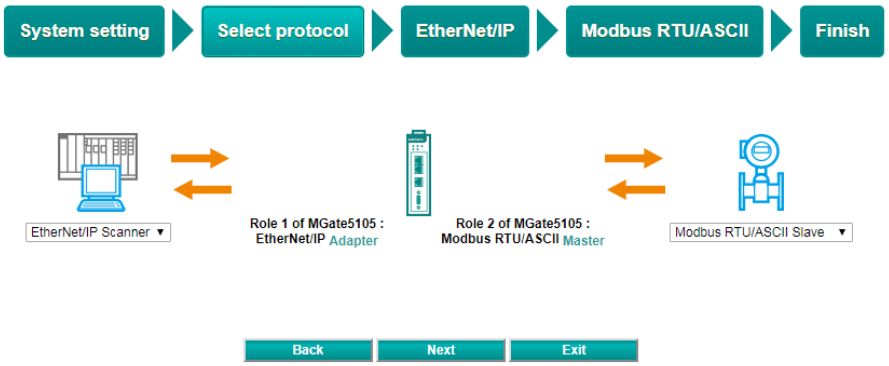
First, configure the Server Settings to identify the units and Network Settings of the MGate.



Select Protocols

Then, select your device's protocols on each side. After the protocols have been selected, the MGate will change its role to the correct one. For example, if the device is set as an EtherNet/IP Scanner, the MGate will then automatically configure as an EtherNet/IP Adapter by itself.

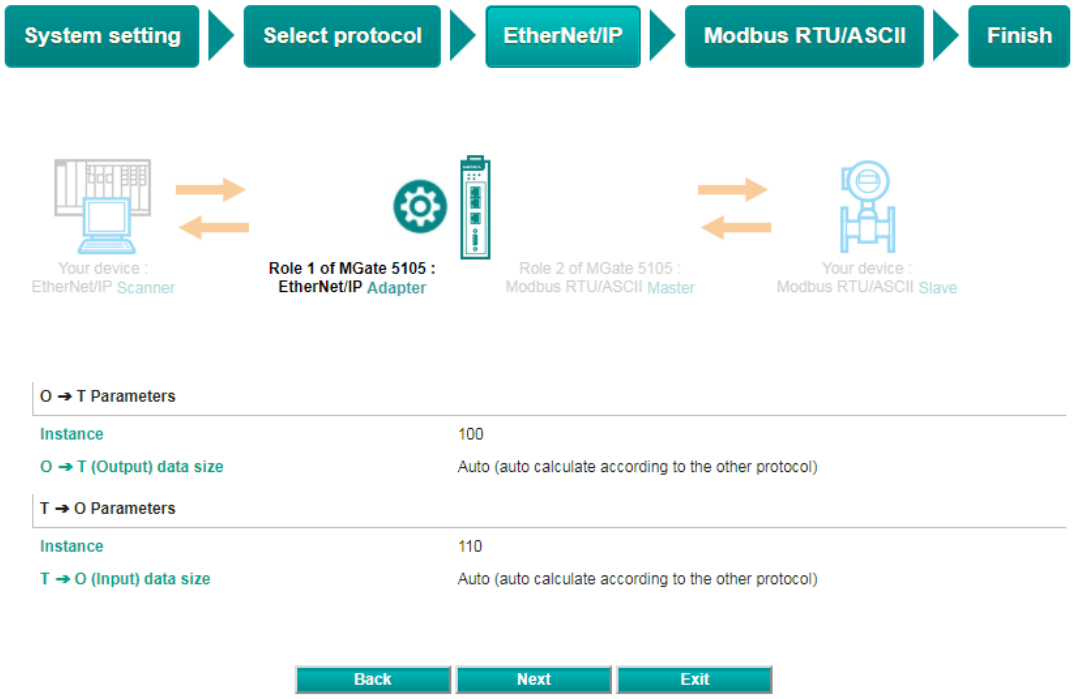


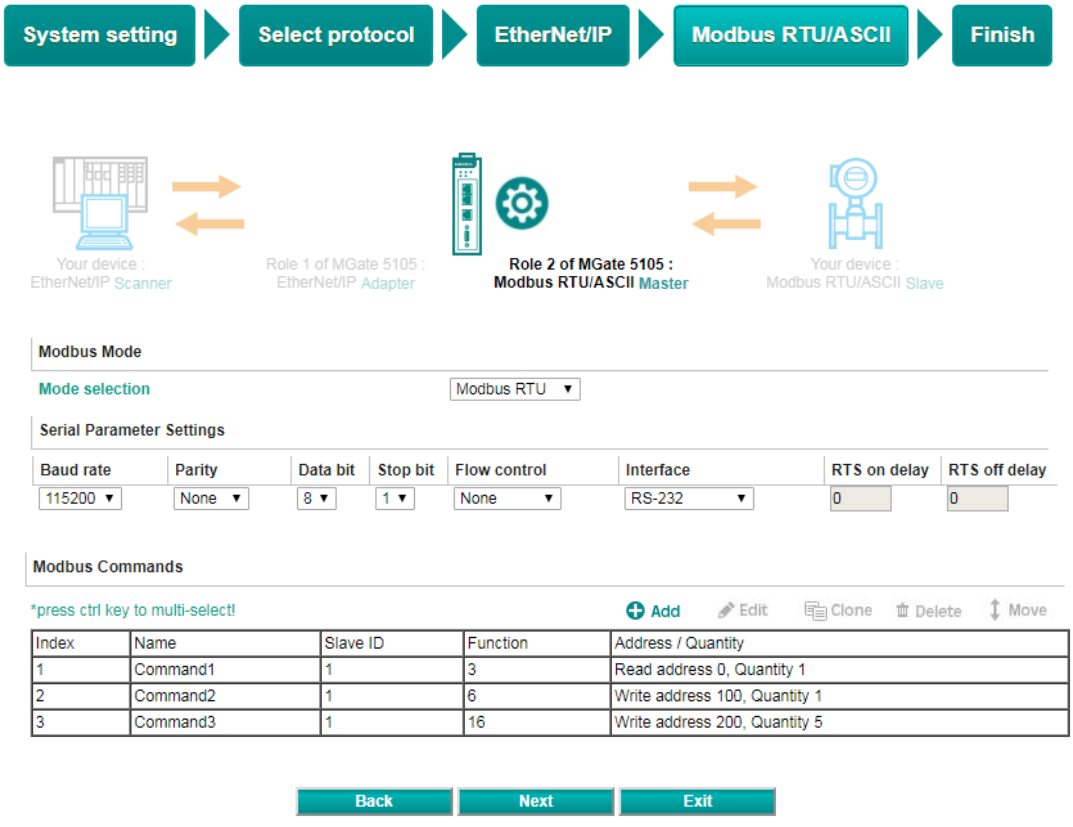


Role 1 and Role 2 of MGate 5105-MB-EIP

After finishing the protocol selection, Role 1 and Role 2 of the MGate have been confirmed. You will need to configure the roles on each side by the following these steps.

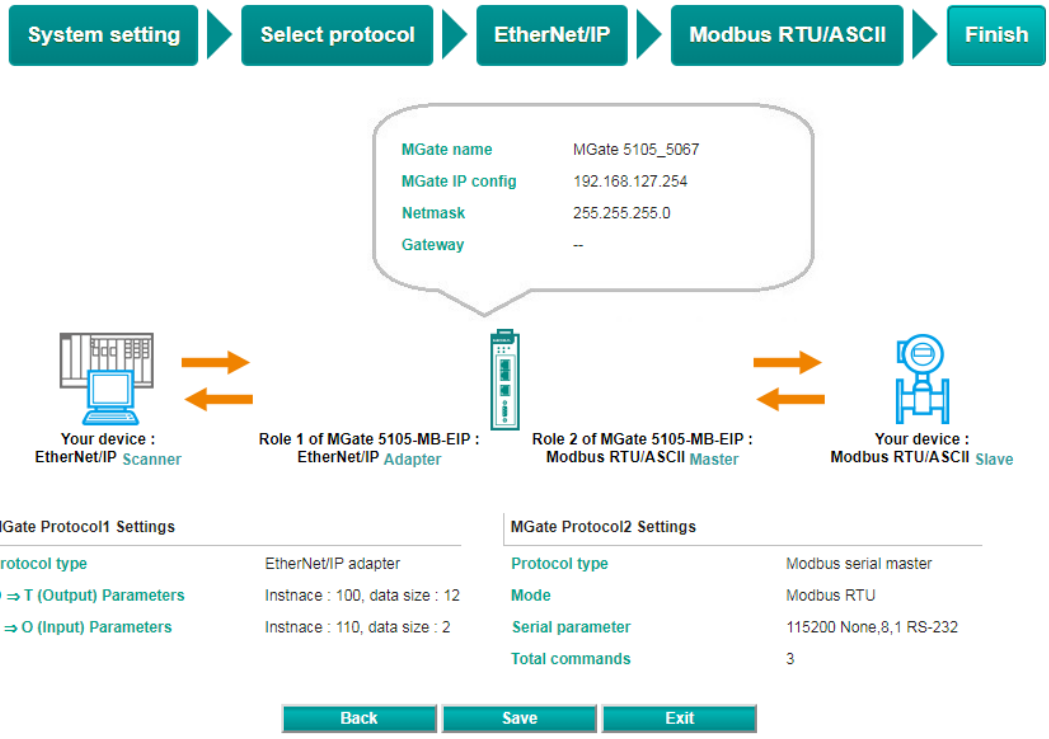
Here is an example of Role 1 as an EtherNet/IP Adapter and Role 2 as a Modbus RTU/ASCII Master. To configure a Modbus command, please refer to Modbus RTU/ASCII Settings:





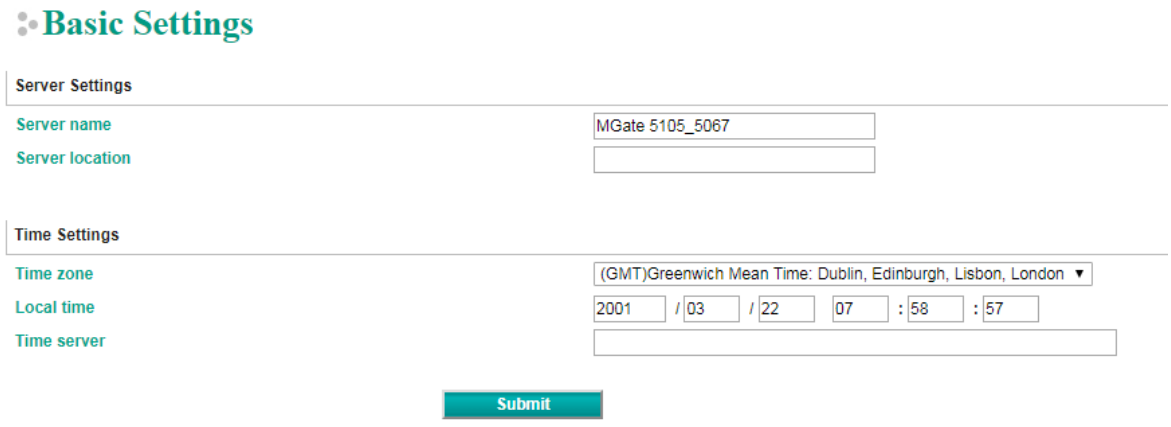
Finish

Once all the configurations are done, you can check if all the parameters are correct on this page. Moreover, if you want to determine the data mapping status, you can click **View I/O data mapping** to know more details. If all of them are correct, press **Save** to turn the parameters on.



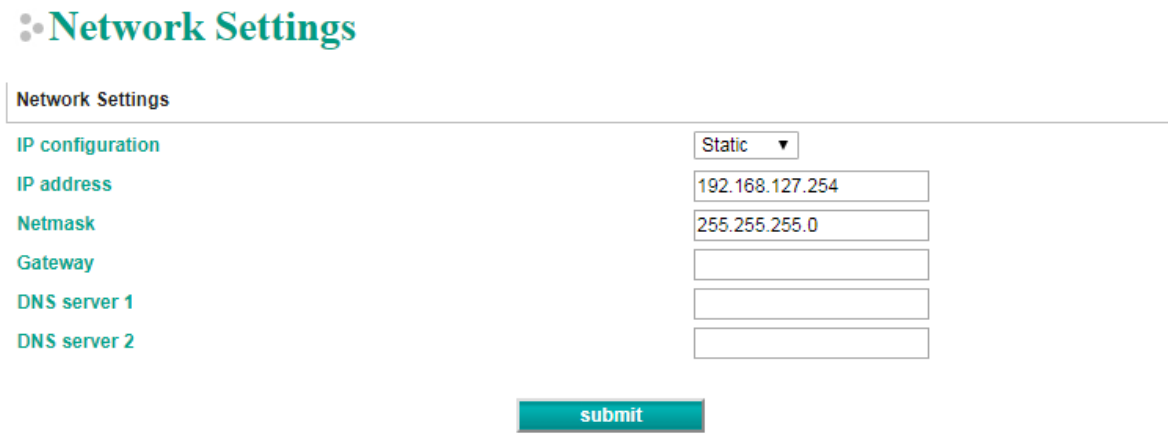
Basic Settings

On this webpage, you can change the name of the device and time zone settings.



Network Settings

First, configure the **IP address** and **Netmask**. Contact your network administrator for the appropriate IP settings information.



Serial Settings

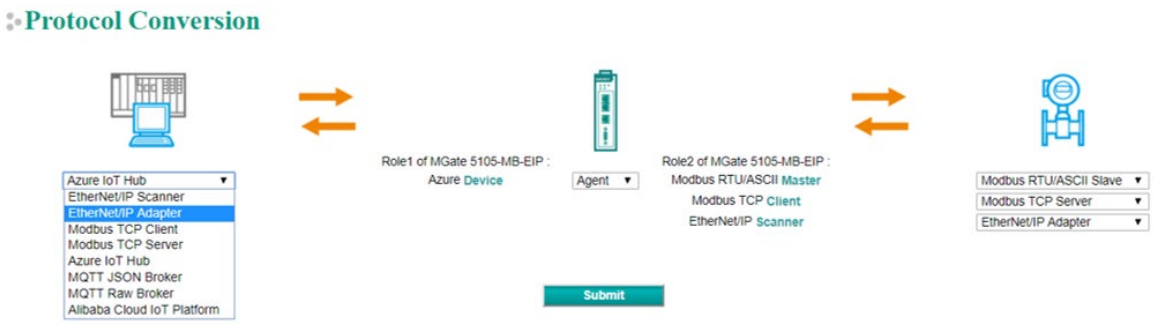
Second, refer to the datasheet of your Modbus RTU/ASCII devices to configure **Serial parameters** for Modbus RTU/ASCII devices.

Protocol Conversion

The MGate 5105-MB-EIP supports southbound fieldbus protocols of Modbus RTU/ASCII, Modbus TCP, and EtherNet/IP protocols. It also supports northbound MQTT/ Cloud protocols of MQTT JSON Broker, MQTT RAW Broker, Azure IoT Hub, and Alibaba Cloud IoT Platform. The MGate fulfills a different role on each of its sides. Each role is determined by your device's settings. Therefore, set the role of each of your devices correctly. EtherNet/IP Scanner/ Adapter, Modbus TCP Client/ Server, Modbus RTU/ ASCII Master/ Slave, MQTT JSON Broker, MQTT RAW Broker, Azure IoT Hub, and Alibaba Cloud IoT Platform can be selected.

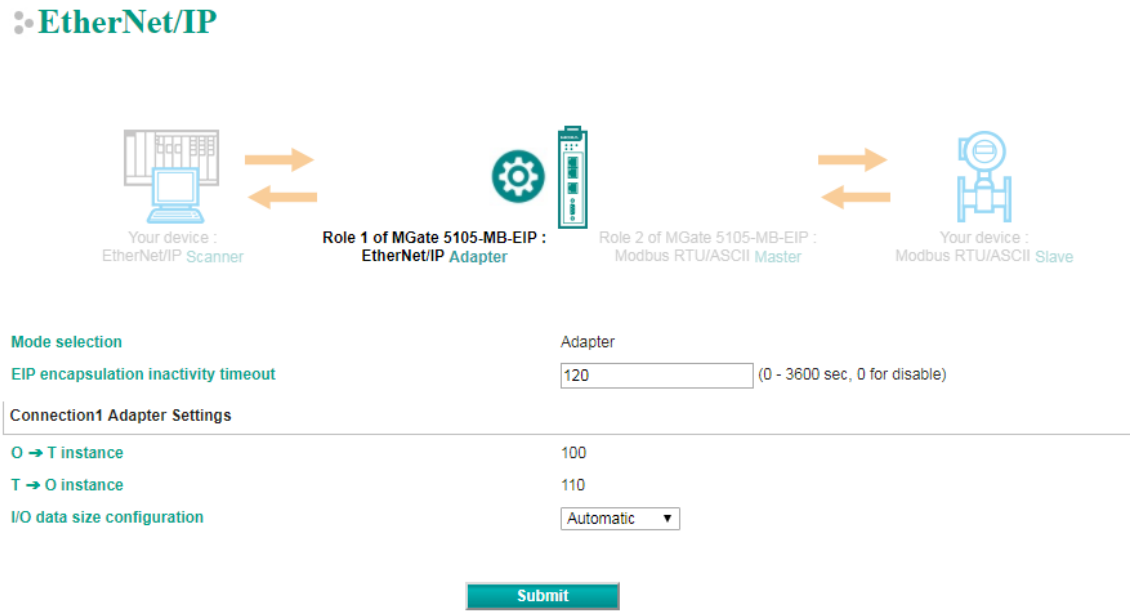
The table below lists the detailed information.

Device Connected to Role 1 of the MGate 5105-MP-EIP	Device Connected to Role 2 of the MGate 5105-MP-EIP
Choose one listed below: Azure IoT Hub MQTT JSON Broker MQTT Raw Broker Alibaba Cloud IoT Platform	Up to three of the items listed below can be selected: Modbus RTU/ASCII Slave Modbus TCP Server Ethernet/IP Adapter
Choose one listed below: Ethernet/IP Scanner Ethernet/IP Adapter Modbus TCP Client Modbus TCP Server	Choose one listed below: Modbus RTU/ASCII Slave Modbus RTU/ASCII Master Modbus TCP Server Modbus TCP Client Ethernet/IP Scanner Ethernet/IP Adapter

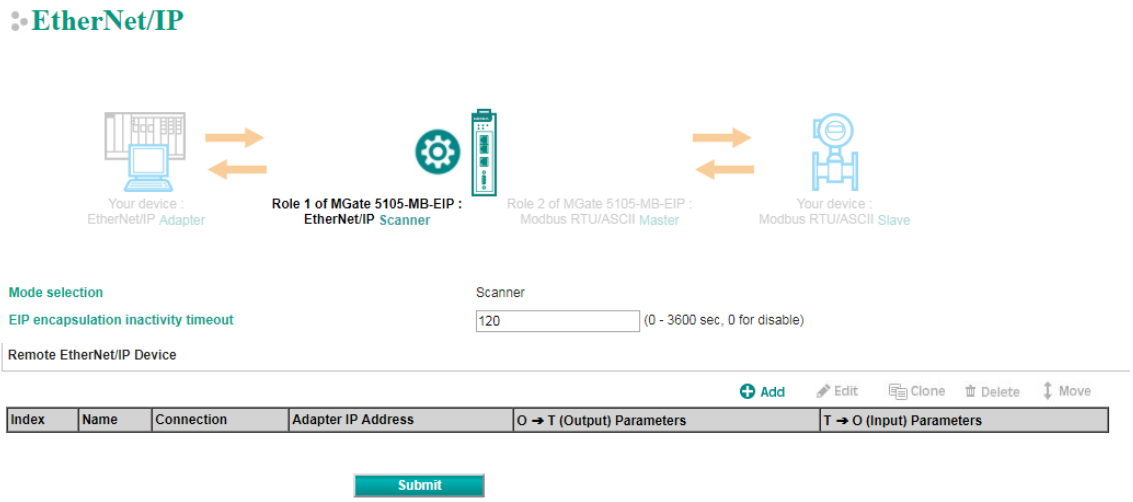


EtherNet/IP Configuration

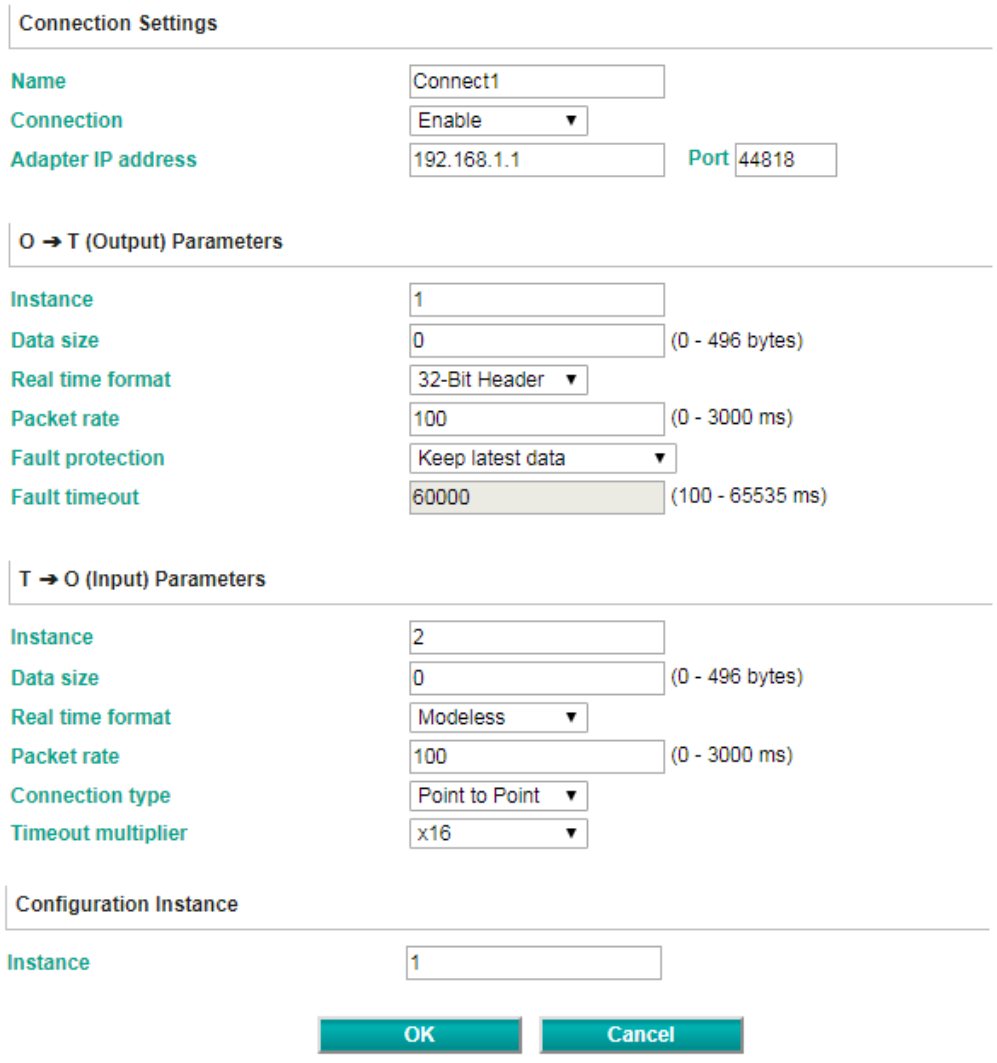
If you select EtherNet/IP Scanner as your device, MGate 5105-MB-EIP will be configured as Ethernet/IP Adapter. In Adapter mode, you can choose **Automatic** configuration to automatically map O(T (Originator to Target) and T(O (Target to Originator) data sizes to Modbus data.



If you select EtherNet/IP Adapter as your device, the MGate 5105-MB-EIP will be configured as Ethernet/IP Scanner. In Scanner mode, you must designate the parameters for each connection. Refer to your EtherNet/IP adapter's datasheet to fill out O(T and T(O parameters.



Select **Add** to add EtherNet/IP commands.



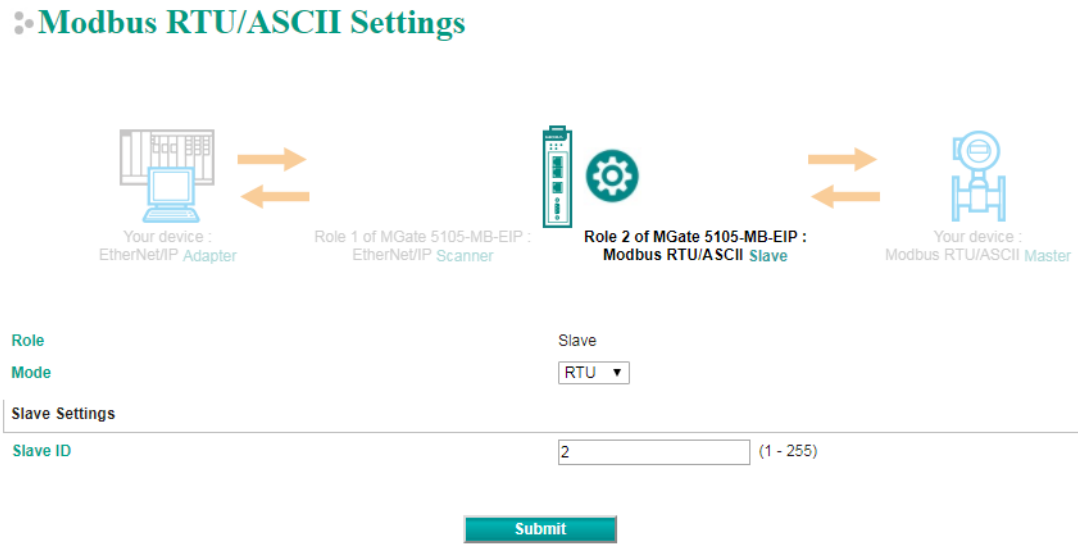
NOTE

A PLC may use Output and Input instead of O→T and T→O.

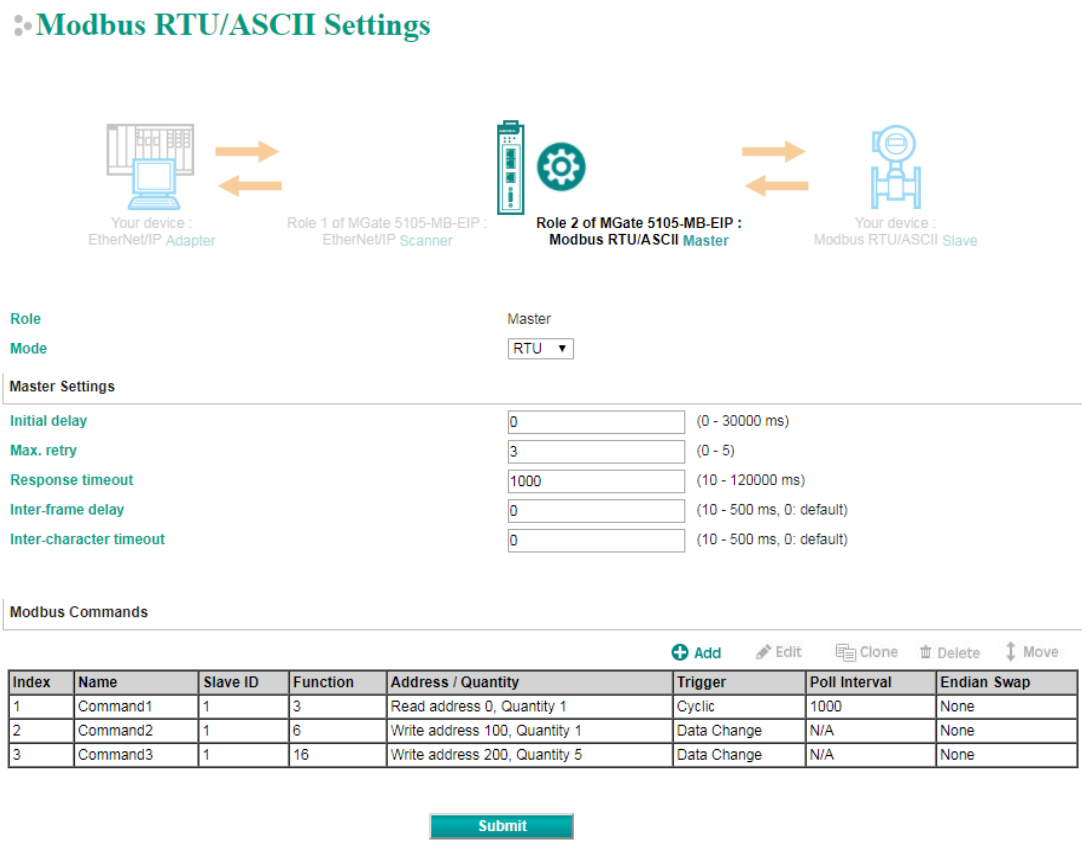
Modbus RTU/ASCII Configuration

As with the Modbus RTU/ASCII setup, start by checking if you already have configured the serial parameters on the **Serial Settings** page.

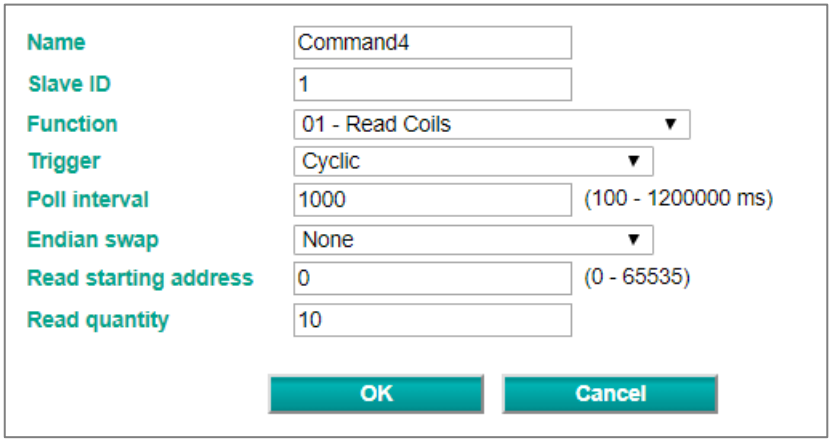
In RTU/ASCII Slave mode, the MGate gateway works as a Modbus server/slave device and waits for incoming queries from the Modbus client/master device. You only need to identify the Modbus Slave ID when in slave mode.



In RTU/ASCII Master mode, the MGate works as a Modbus client/master device and will send the Modbus request to the Modbus network actively.



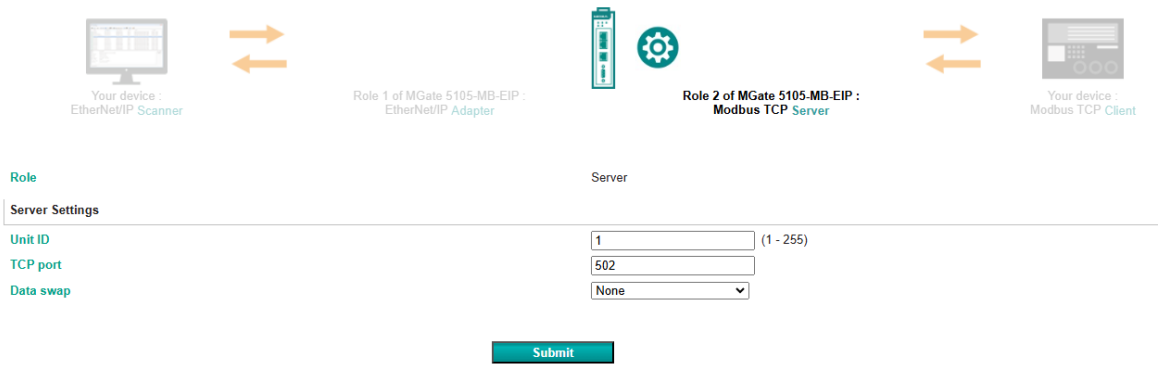
Refer to your Modbus device's datasheet to add Modbus commands.



Modbus TCP Configuration

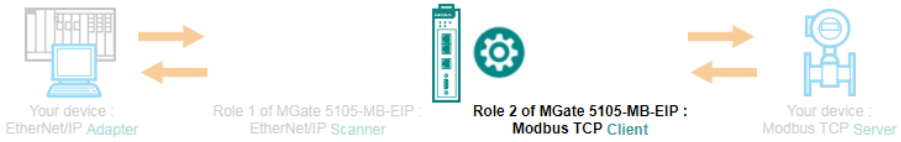
The MGate gateway also supports both Modbus TCP Client (i.e. Master) and Server (i.e. Slave) modes. In Modbus TCP Server mode, assign the Unit ID and confirm that your Modbus device on the remote side can send commands via the corresponding TCP port.

Modbus TCP Settings



For Modbus TCP Client mode, refer to your Modbus TCP device's datasheet to specify the Modbus command one by one manually.

Modbus TCP Settings



Role	Client

Client Settings

Initial delay	300	(0 - 30000 ms)
Max. retry	3	(0 - 5)
Response timeout	5000	(10 - 120000 ms)

Modbus Commands

Add | Edit | Clone | Delete | Move

Index	Name	Slave IP Address	Slave ID	Function	Address / Quantity	Trigger	Poll Interval	Endian Swap
1	Command1	192.168.1.42 : 502	1	3	Read address 30, Quantity 3	Cyclic	1000	None
2	Command2	192.168.1.42 : 502	1	3	Read address 36, Quantity 3	Cyclic	1000	None
3	Command5	192.168.1.42 : 502	1	3	Read address 54, Quantity 3	Cyclic	1000	None
4	Command7	192.168.1.42 : 502	1	16	Write address 27, Quantity 3	Data Change	N/A	None
5	Command8	192.168.1.42 : 502	1	16	Write address 33, Quantity 3	Data Change	N/A	None
6	Command9	192.168.1.42 : 502	1	16	Write address 39, Quantity 3	Data Change	N/A	None

Submit

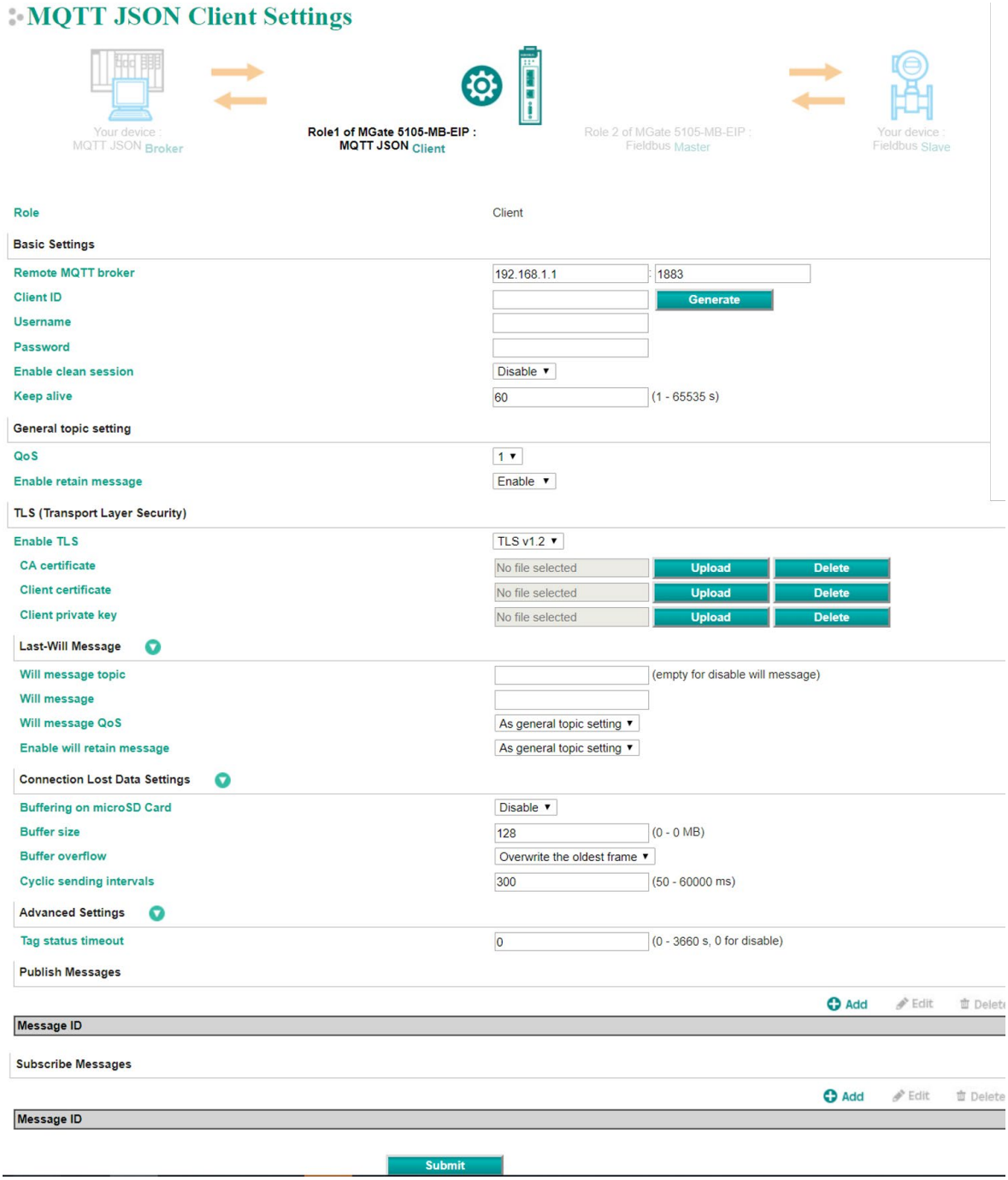
Refer to your Modbus device's datasheet to add Modbus commands.

Name	Command5	
Slave IP address	0.0.0.0	Port 502
Slave ID	1	
Function	01 - Read Coils	
Trigger	Cyclic	
Poll interval	1000	(100 - 1200000 ms)
Endian swap	None	
Read starting address	0	(0 - 65535)
Read quantity	10	

OK Cancel

MQTT JSON Broker Configuration

If you select MQTT JSON Broker as your northbound connection, the MGate 5105-MB-EIP will be configured as MQTT JSON Client. In Client mode, you can set up MQTT broker basic settings, general topic settings, TLS secure transmission, last-will message, connection lost data settings, and advanced settings.



Parameters	Value	Default	Description
Remote MQTT Broker			Target to connect MQTT broker address and port, e.g.,192.168.1.101:1883 Or prefix.iot.us-east-2.amazonaws.com:8883
Client ID			MQTT Client ID
Username			Username
Password			Password

Parameters	Value	Default	Description
QoS	0 to 2		Global QoS
Enable clean session	Disable Enable	Disable	Enable/Disable MQTT clean session
Enable retain message	Disable Enable	Disable	Enable/Disable MQTT retain message
Keep alive	(1 to 65535 s)	60	Enable/Disable MQTT Keep alive setting for configuring idle time

Parameters	Value	Default	Description
Enable will retain message	Disable/Enable/As General Topic Setting	Disable	Enable/Disable MQTT will retain the message function
Will message			Will message content, such as "Device A is Lost!"
Will message topic	(Empty for disable will message)		The will message topic subscribed by remote MQTT client
Will message QoS	0/1/2/As General Topic Setting		0~2: Assign QoS Or the same as global QoS

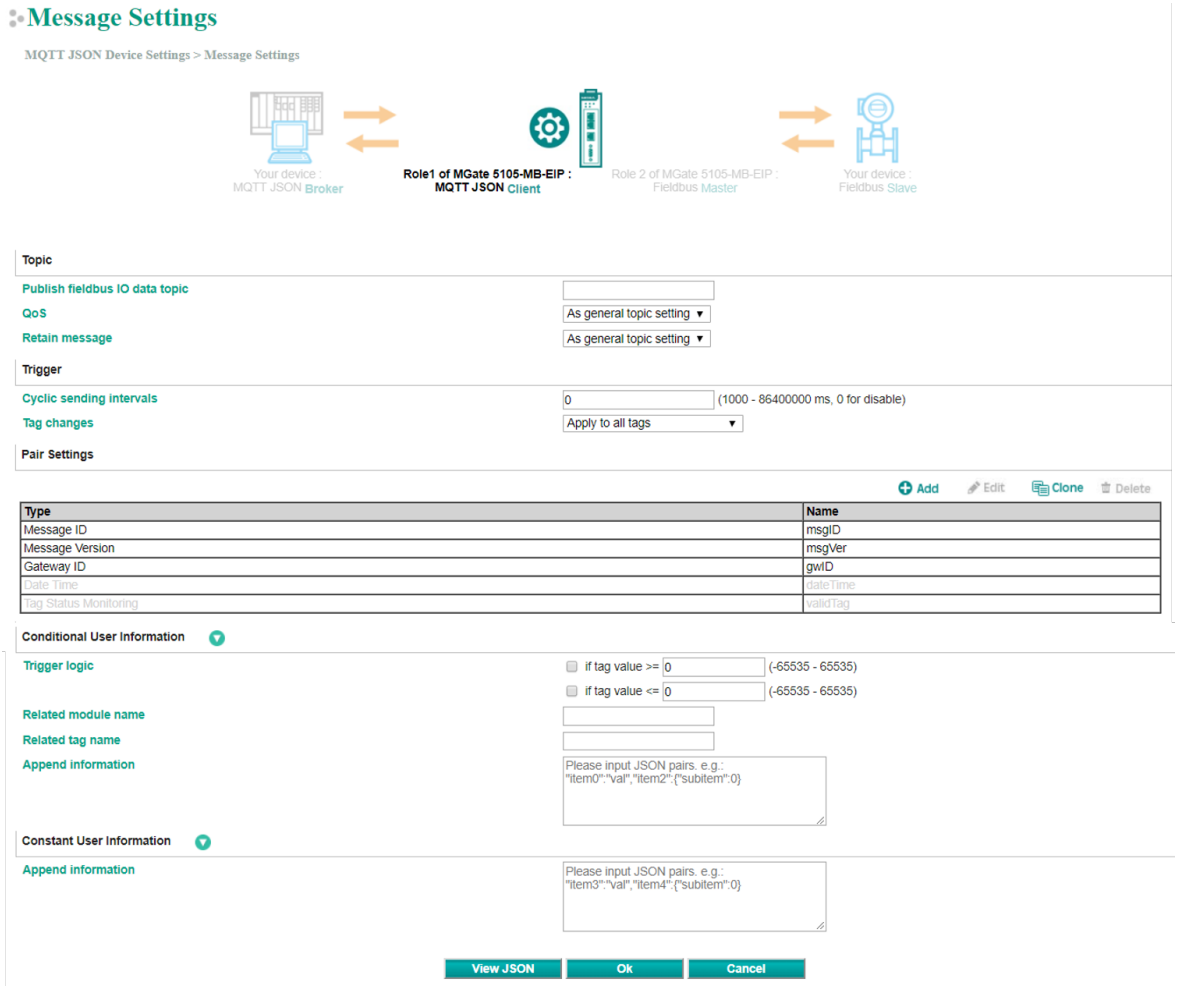
Parameters	Value	Description
Enable TLS	Disable/TLS v1.0/TLS v1.1/TLS v1.2	Enable/Disable TLS encryption
CA certificate	document format : *.pem	Import/Delete CA certificate
Delete CA certificate		
Client certificate		Import/Delete Client certificate
Client private key		Import/Delete Client private key

Parameters	Value	Default	Description
Buffering on SD card	Disable/Enable	Disable	Enable/ Disable Data storage function on SD card lost under IoT connection.
Buffer size	(0 to 2,048 MB)	128	The maximum data storage capacity. The instructed value listed would vary depending on the size of the inserted microSD card. If the value shows 0 - 0 MB, it means that a microSD card is not inserted.
Buffer overflow	Overwrite the oldest Message/Stop buffering	Overwrite the oldest message	Data deleting mechanisms while reaching maximum capacity of data storage: Overwrite the oldest data when storage is full. Stop updating data when storage is full.
Cyclic sending intervals	(50 to 60000 ms)	300	The frequency of uploading data to the cloud when the IoT connection has been recovered.

Parameters	Value	Default	Description
Tag status timeout	(0 to 3660 s; 0 for disable)	0	Timeout duration without receiving MB/EIP data, such as device lost connection.

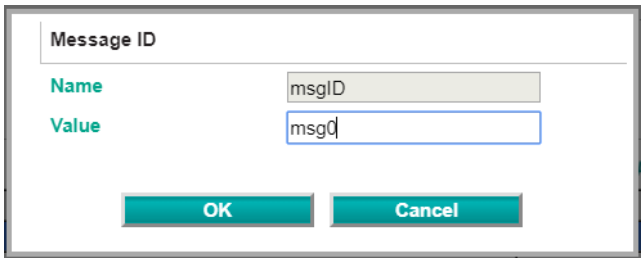
As a MQTT client, it can publish or subscribe to messages. By clicking the **Add** button, the **Message Settings** page will be directed to add up the details of the message. Within the Message Settings, the module and tag can be added. Additionally, two types of messages can be added: publish messages and subscribe messages.

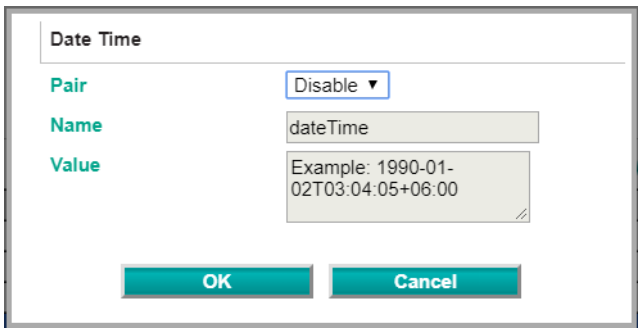
The instructions below show the settings for adding published messages.

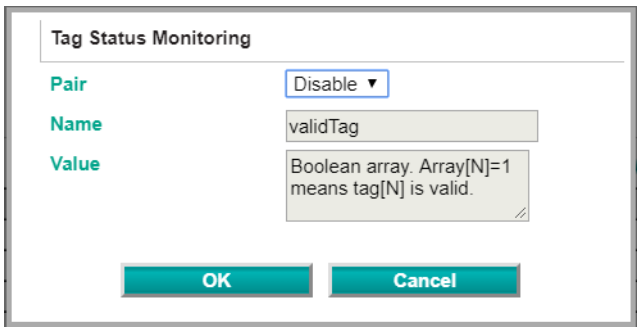


Parameters	Value	Description
Publish fieldbus IO data topic		The topic of published IO data
QoS	0/1/2/ As a general topic setting	Global QoS of the topic
Retain message	Disable/Enable/ As general topic setting	MQTT retain message on the topic

Parameters	Value	Default	Description
Cyclic sending intervals	(1000 to 86400000 ms, 0 for disable)	0	Enable/Disable the sending interval of cyclic messages
Tag changes	Apply to all tags/Specify individual tag settings	Specify individual tag settings	Send tag messages on change of value

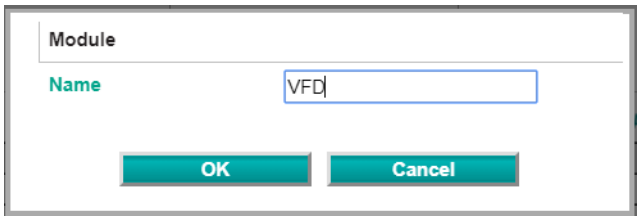


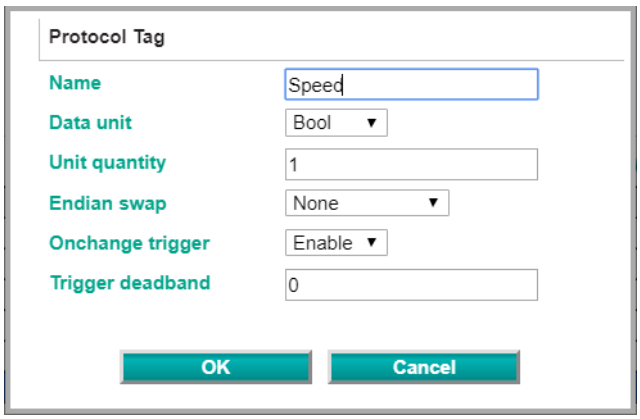




Within Pair settings, the modules and the tags for the topic of the message can be added. It's supported for a maximum of 60 modules. Moreover, the value of Message ID can be modified by users, and the Date Time and Tag Status Monitoring functions can be enabled by users as well.

To add the module or the tag for the topic of the message:



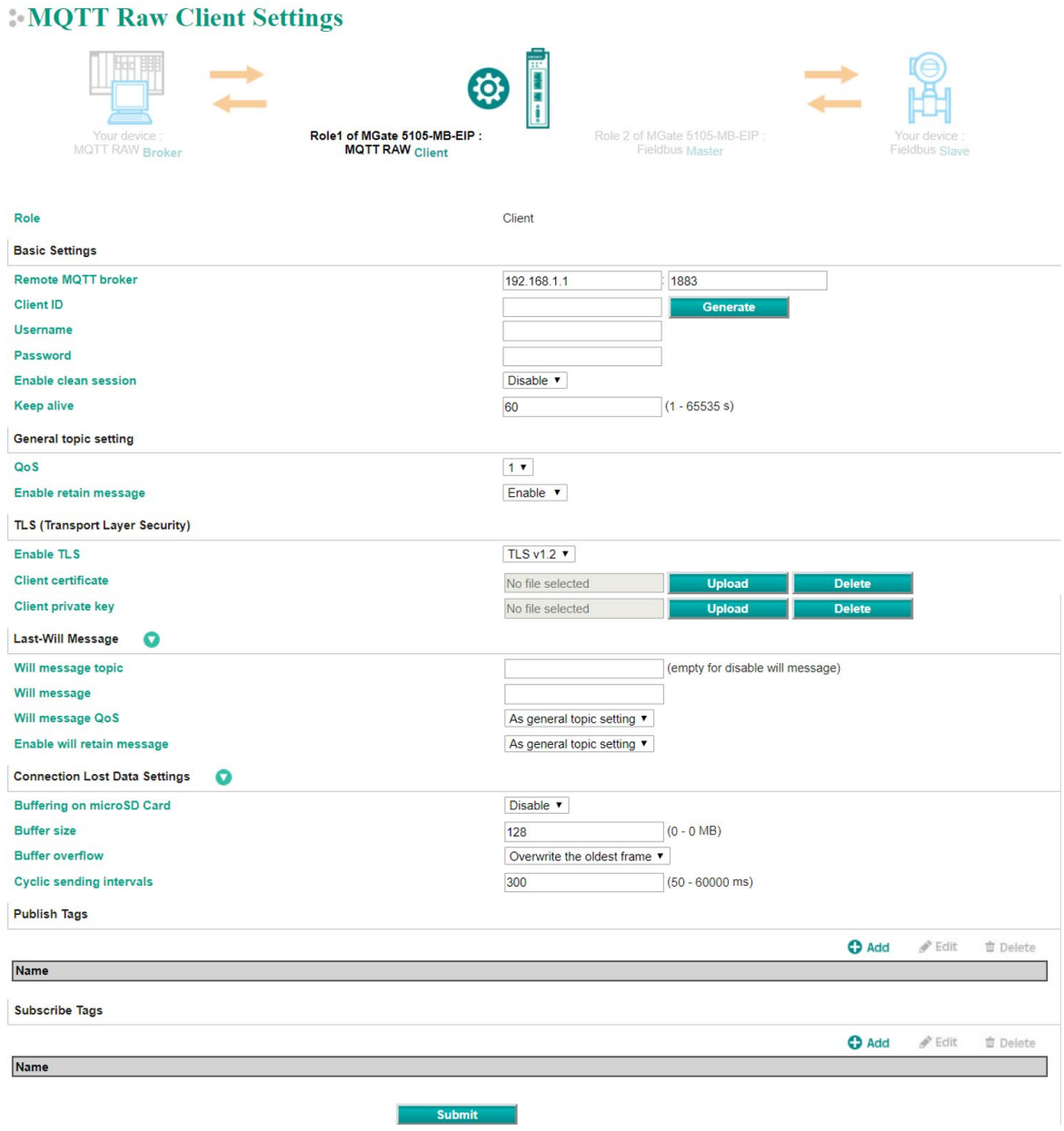


Parameters	Value	Default	Description
Name			JSON tag name
Data Unit	Bool/ Int8/ Int16/ Int32/ Uint8/ Uint16/ Unit32/ Float32/ Float64	Bool	Data type of tag
Unit Quantity		1	Data quantity included in the tag
Endian Swap	None/ Byte/ Word/ Byte and Word	None	Data Byte Swapping **None:** Don't need to swap **Byte:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. **Word:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. **Byte and Word:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. There are two phases in changing Byte and Word 1). 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. 2). 0x0B, 0x0A, 0x0D, 0x0C becomes 0x0D, 0x0C, 0x0B, 0x0A.
Onchange trigger	Disable/ Enable	Enable	Send the message under the change of value from the tag
Trigger deadband		0	Send the message under the change of value from the tag bigger than the preset deadband. (e.g., deadband=5, previous tag=0, new tag=5)
Parameters	Value	Default	Description
Trigger logic	Checkbox (-65535 to 65535)	0	Defines the trigger logic of sending messages and appended information. For example, connecting to a meter to read a value from it, the trigger logic can be set up for further notifications. If the trigger logic is set as 20<= tag <=50, which is considered a normal range for the value, it will be triggered to send an additional message from cyclic data if the value goes outside the set range. It will also send an additional message when the value returns to the normal range. The Append Information defined by users will be sent along with the sent data. For example, the value of 30 is within the event triggered logic, which does not trigger the event. However, the Append Info defined by users will be sent along with the cyclic data.
Related module name			The module name of the triggered tag event for Conditional User Information
Related tag name			The tag name of the triggered event for Conditional User Information
Append information			Additional user information, such as “Alarm”:true, “Info”: Device, is overheating.

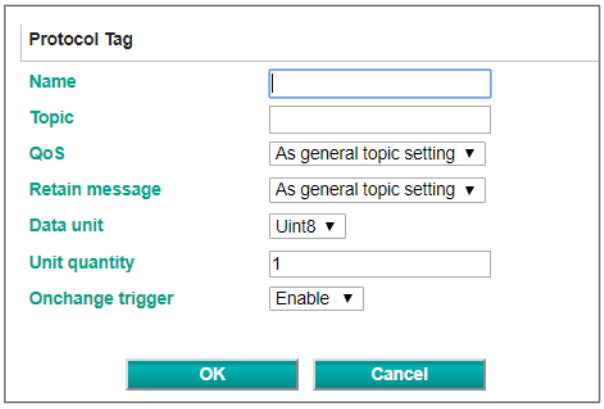
Parameters	Description
Append information	The Append Information will be included in the sent messages. For example, “SiteName”:”Taipei 101”, “GPS_DMS”:”34°01'46.6"N 118°28'11.3"W”

MQTT RAW Broker Configuration

If you select MQTT RAW Broker as your northbound connection, the MGate 5105-MB-EIP will be configured as MQTT RAW Client. In Client mode, you can set up MQTT broker basic settings, general topic settings, TLS secure transmission, last will message, connection lost data settings, and advanced settings.



As an MQTT client, it can publish or subscribe to messages. By clicking the **Add** button, the protocol tag will pop up for modifying the publish or subscribe tags. The instructions below show the settings of adding publish messages.

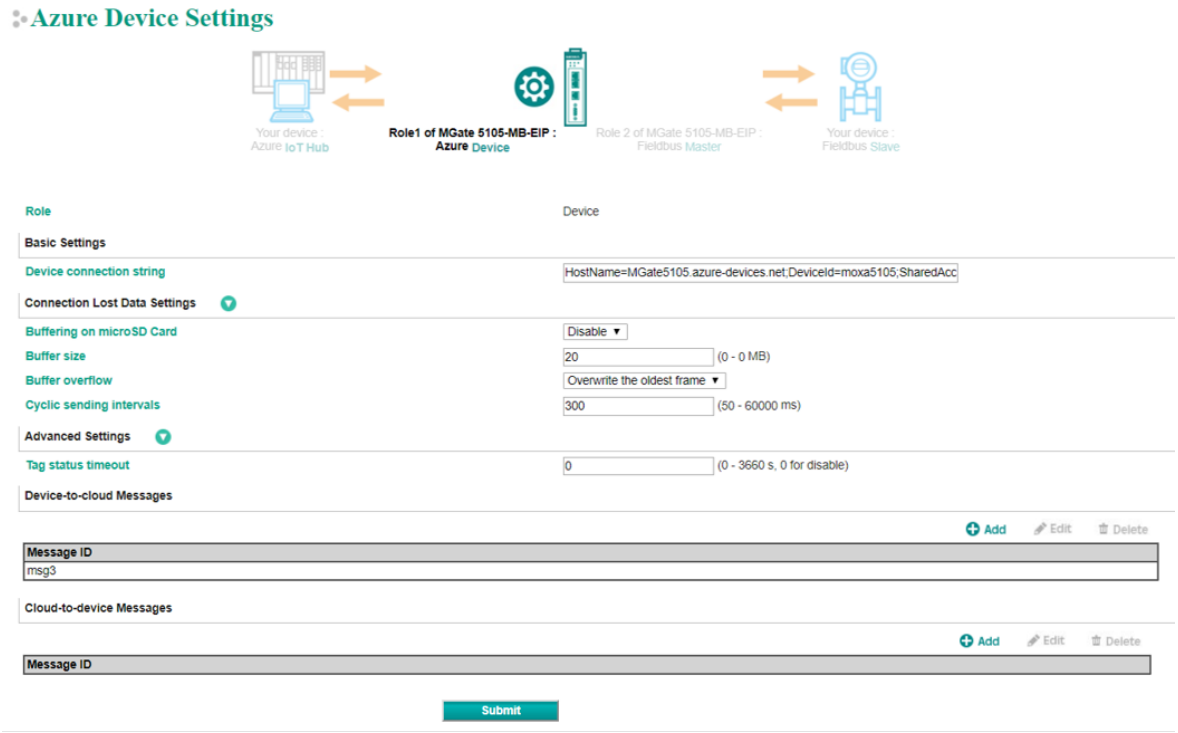


Parameters	Value	Default	Description
Name			JSON tag name
Topic			The topic of publish/subscribe messaging
QoS	0/1/2/ As general topic setting	As general topic setting	Global QoS of the topic
Retain message	Disable/Enable/ As general topic setting		MQTT keeps messages of the topic
Data unit	Bool/Int8/Int16/Int32/ Uint8/Uint16/Unit32/ Float32/Float64	Bool	Data type of tag
Unit quantity			Data quantity included in the tag
Onchange trigger	Disable/Enable	Disable	Send the message under the change of value from the tag

Most of the MQTT RAW Broker Configuration is the same as MQTT JSON Broker Configuration. Please find the instruction from MQTT JSON Broker Configuration section.

Azure IoT Device Configuration

If you select Azure IoT Hub as your northbound connection, the MGate 5105-MB-EIP will be configured as an Azure IoT device. In Azure Device mode, you can set up the Azure device basic settings, connection lost data settings, and advanced settings.

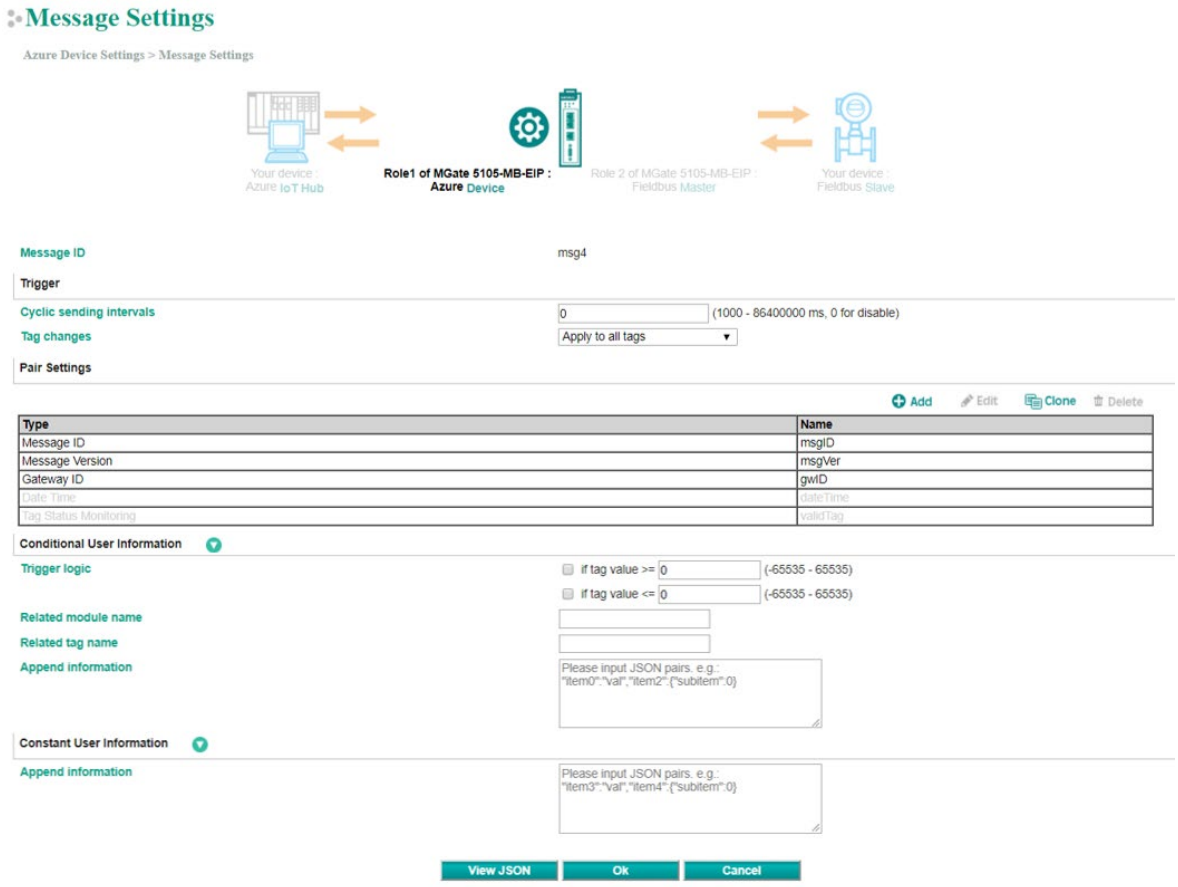


Parameters	Description
Device connection string	Azure IoT Device connection string, e.g.: HostName=IoTDataHub1.azure-devices.net;DeviceId=MGate5105;SharedAccessKey=exFG12aGH25lnbfgHJKLO4NMpTsJhL7m4AZZMfqKbLLo=

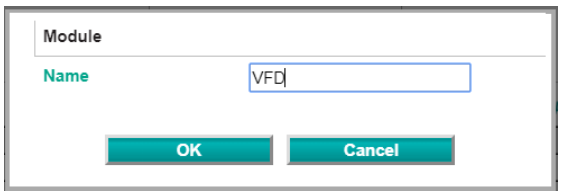
Parameters	Value	Default	Description
Buffering on microSD Card		Disable	Enable/ Disable Data storage function on SD card lost under IoT connection
Buffer size	0 to 2,048 MByte	128	The maximum data storage capacity. The instructed value listed would vary depending on the size of the inserted microSD card. If the value shows 0 - 0 MB, it means that a microSD card is not inserted.
Buffer Overflow	Overwrite the oldest data frame/ Stop buffering	Overwrite the oldest data frame	Data deleting mechanisms while reaching maximum capacity of data storage: Overwrite the old data when storage is full. Stop updating data when storage is full
Cyclic Sending Intervals	50 to 60000 ms	300	The frequency of uploading data to the cloud when the IoT connection is recovered

Parameters	Value	Default	Description
Tag Status Timeout	(0 to 3660s; 0 for disable)	0	Timeout duration without receiving MB/EIP data, such as device lost connection

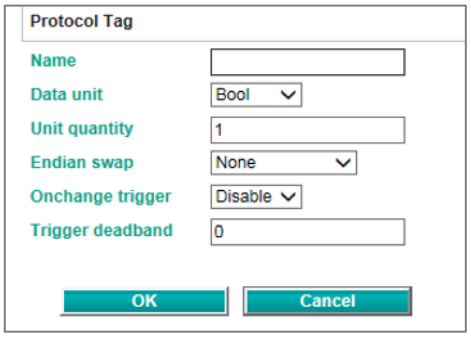
As an Azure device, the MGate 5105 can transmit messages between the field device and Azure IoT Hub. Click the **Add** button to add up messages. Within the **Message Settings**, the module and tag can be added.



Parameters	Value	Default	Description
Cyclic sending intervals	(1000 to 86400000 ms, 0 for disable)	0	Sending interval for cyclic messages
Tag changes	Apply to all tags/Specify individual tag settings	Specify individual tag settings	Send tag messages on change of value



To add the module or the tag of the topic of the message.



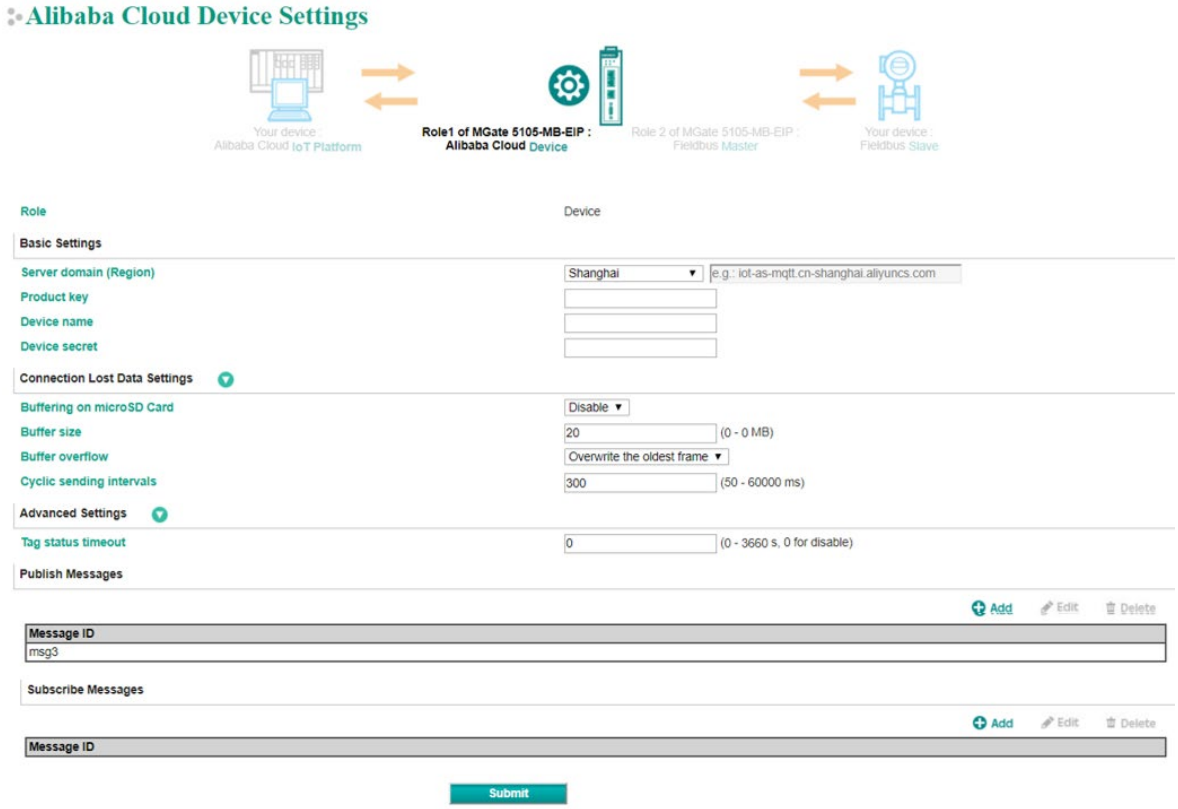
Parameters	Value	Default	Description
Name			JSON tag name
Data Unit	Bool/ Int8/ Int16/Int32/ Uint8/Uint16/ Unit32/Float32/ Float64	Bool	Data type of tag
Unit Quantity		1	Data quantity included in the tag
Endian Swap	None/Byte Word/Byte and Word	None	Data Byte Swapping **None:** Don't need to swap **Byte:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. **Word:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. **Byte and Word:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. There are two phases in changing Byte and Word 1). 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. 2). 0x0B, 0x0A, 0x0D, 0x0C becomes 0x0D, 0x0C, 0x0B, 0x0A.
Onchange trigger	Disable/Enable	Enable	Send the message under the change of value from the tag
Trigger deadband		0	Send the message under the change of value from the tag bigger than the preset deadband. (e.g., deadband=5, previous tag=0, new tag=5)

Parameters	Value	Default	Description
Trigger logic	Checkbox (-65535 to 65535)	0	Defines the trigger logic of sending messages and appending information. For example, while connecting to a meter to read a value from it, the trigger logic can be set up for further notifications. If the trigger logic is set as 20<= tag <=50, which is considered a normal range for the value, it will be triggered to send an additional message from cyclic data if the value goes outside the set range. It will also send an additional message when the value returns to the normal range. The Append Information defined by users will be sent along with the data sent. For example, the value of 30 is within the event-triggered logic, which does not trigger the event. However, the Append Information defined by users will be sent along with the cyclic data.
Related module name			The module name of the triggered tag event for Conditional User Information
Related tag name			The tag name of the triggered event for Conditional User Information
Append information			Additional user information, such as “Alarm”:true, “Info”: Device, is overheating

Parameters	Description
Append information	The Append Information will be included in the sent messages. For example, “SiteName”:”Taipei 101”, “GPS_DMS”:”34°01'46.6"N 118°28'11.3"W”

Alibaba Cloud IoT Device Configuration

If you select Alibaba Cloud IoT Platform as your northbound connection, the MGate 5105-MB-EIP will be configured as Alibaba Cloud IoT Device. In Alibaba Cloud Device mode, you can set up the device basic settings, connection lost data settings, and advanced settings.

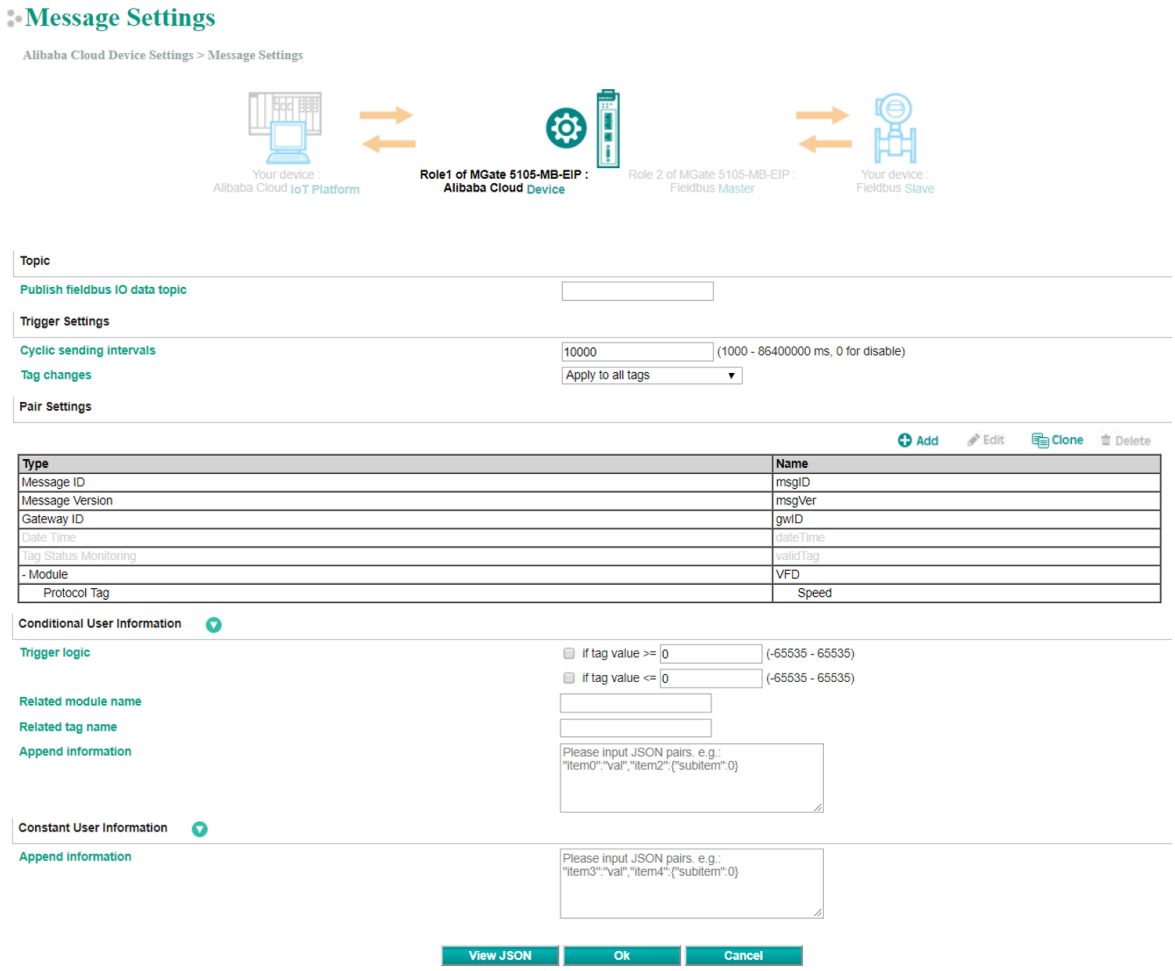


Parameters	Value	Description
Server domain (region)	Shanghai/ Singapore/Japan/ America/Germany/ User Defined Domain	The region of the target getting connected to the server domain (Alibaba Cloud)
Product key		Device Product Key from Alibaba Cloud
Device name		Device Name from Alibaba Cloud
Device secret		Device Secret from Alibaba Cloud

Most of the Alibaba Cloud IoT Device Configuration is the same as the Azure IoT Device Configuration. Please find the instructions in the Azure IoT Device Configuration section.

As an Alibaba Cloud device, the MGate 5105 can transmit messages between the field device and Alibaba IoT Platform. Select the **Add** button to add up messages.

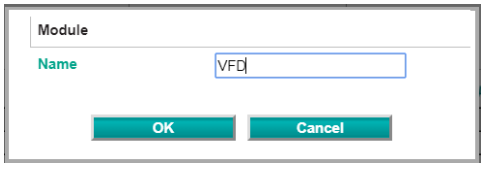
Within the Message Settings, the module and tag can be added.

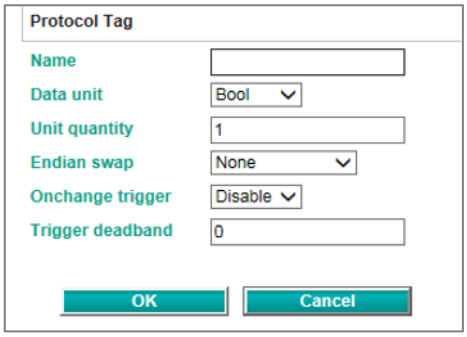


Parameters	Description
Publish fieldbus IO data topic	The topic of published IO data

Parameters	Value	Default	Description
Cyclic sending intervals	(1000 to 86400000 ms, 0 for disable)	0	Enable/Disable the sending interval of cyclic messages
Tag changes	Apply to all tags/Specify individual tag settings	Specify individual tag settings	Send tag messages on change of value

To add the module or the tag for the topic of the message.





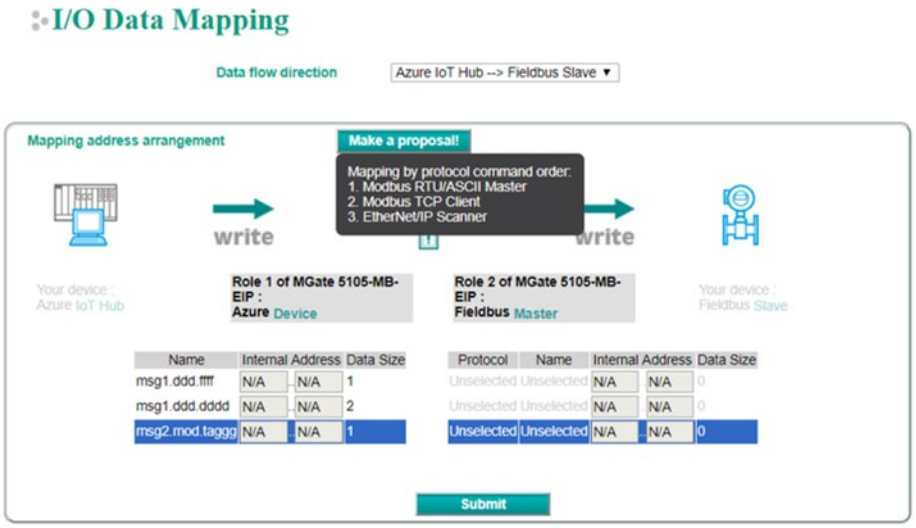
Parameters	Value	Default	Description
Name			JSON tag name
Data Unit	Bool/Int8/ Int16/Int32/ Uint8/Uint16/ Unit32/Float32/ Float64	Bool	Data type of tag
Unit Quantity		1	Data quantity included in the tag
Endian Swap	None/Byte Word/Byte and Word	None	Data Byte Swapping **None:** Don't need to swap **Byte:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. **Word:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. **Byte and Word:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. There are two phases in changing Byte and Word 1). 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. 2). 0x0B, 0x0A, 0x0D, 0x0C becomes 0x0D, 0x0C, 0x0B, 0x0A.
Onchange trigger	Disable/Enable	Enable	Send the message under the change of value from the tag
Trigger deadband		0	Send the message under the change of value from the tag bigger than the preset deadband. (e.g., deadband=5, previous tag=0, new tag=5)

Parameters	Value	Default	Description
Trigger logic	Checkbox (-65535 to 65535)	0	Defines the trigger logic of sending messages and appending information. For example, while connecting to a meter to read a value from it, the trigger logic can be set up for further notifications. If the trigger logic is set as 20<= tag <=50, which is considered a normal range for the value, it will be triggered to send an additional message from the cyclic data if the value goes outside the set range. It will also send an additional message when the value returns to the normal range. The Append Info defined by users will be sent along with the data sent. For example, the value of 30 is within the event-triggered logic, which does not trigger the event. However, the Append Info defined by users will be sent along with the cyclic data.
Related module name			The module name of the triggered tag event for Conditional User Information
Related tag name			The tag name of the triggered event for Conditional User Information
Append information			Additional user information, such as “Alarm”:true, “Info”: Device, is overheating

Parameters	Description
Append information	The Append Information will be included in the sent messages. For example, “SiteName”:”Taipei 101”, “GPS_DMS”:”34°01'46.6"N 118°28'11.3"W”

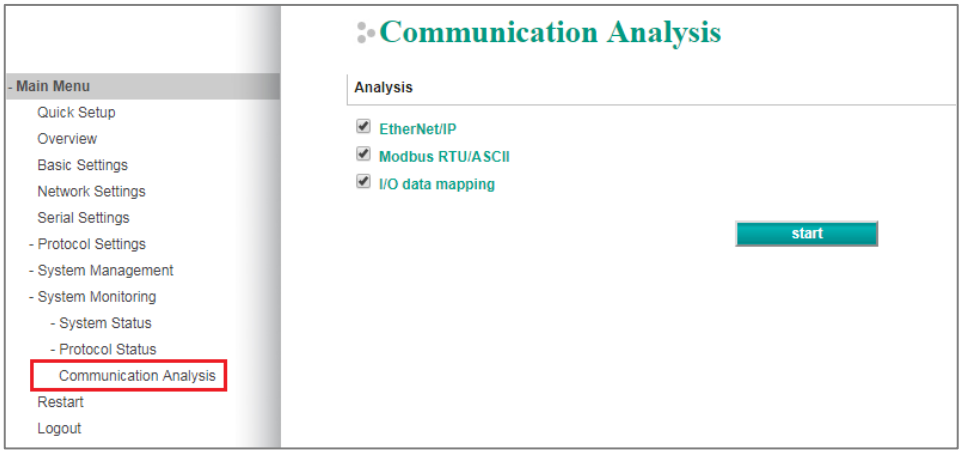
I/O Data Mapping

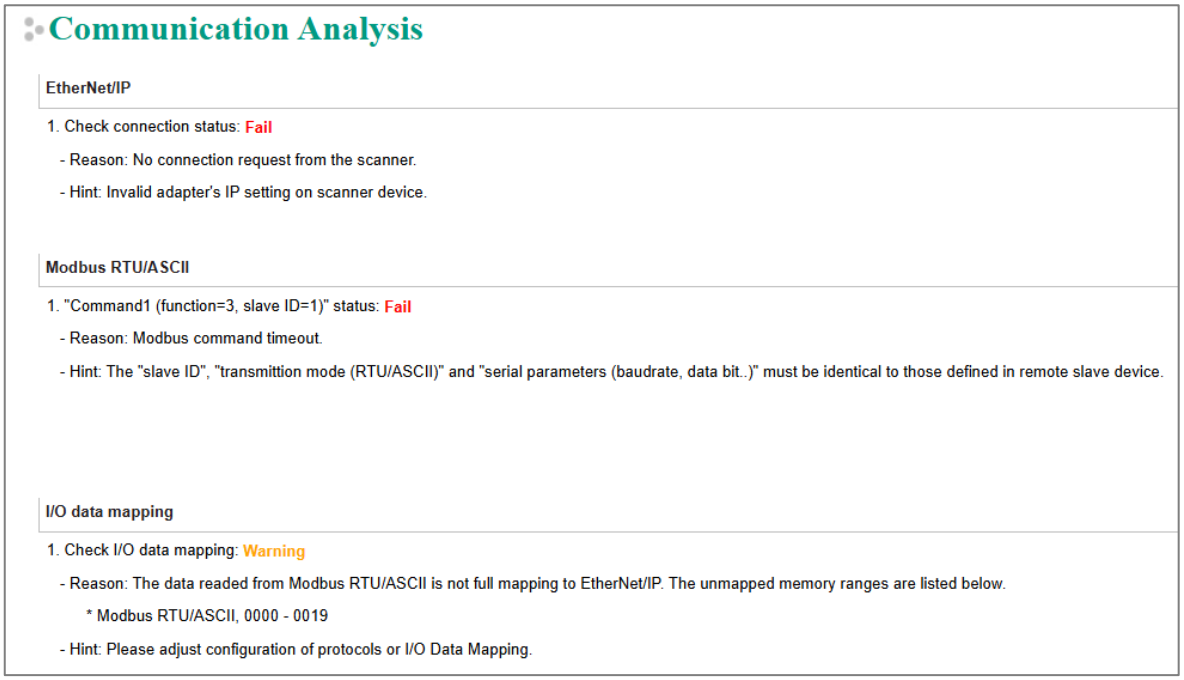
The MGate provides internal memory for data exchange between MQTT (Azure IoT Hub, MQTT JSON Broker, MQTT Raw Broker, Alibaba Cloud IoT Platform) and fieldbus slave (EtherNet/IP, Modbus RTU/ASCII, Modbus TCP) protocols. After finishing the protocol settings, go to the I/O Data Mapping page and check if the data mapping is connected. Sometimes, you may need to switch to manual arrangement to adjust the internal address for each command by double-clicking on the name of the item. You may select the **Make a proposal** button for automatic arrangement.



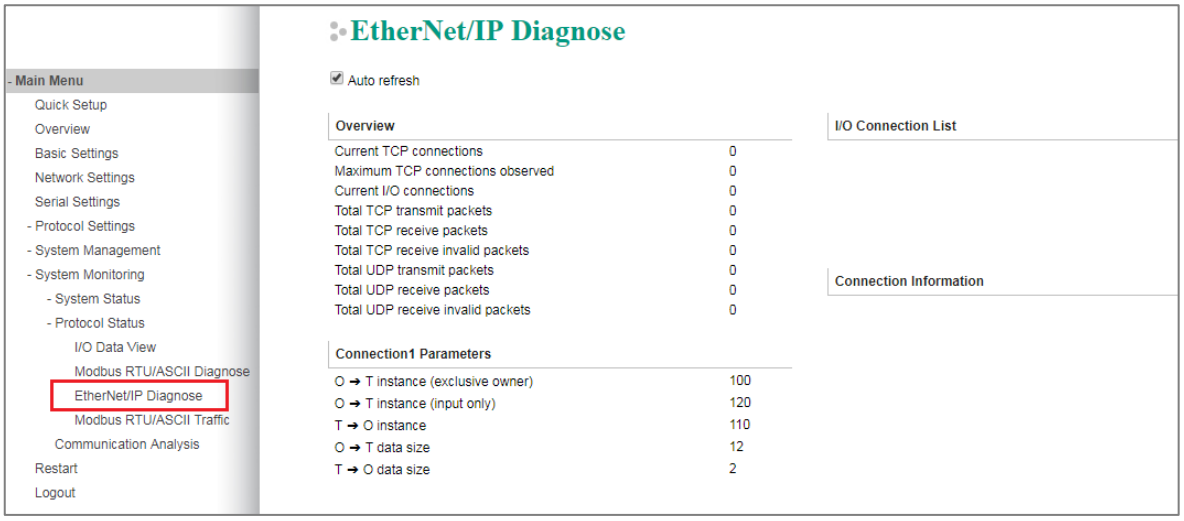
Communication Analysis

After finishing all configurations, use **Communication Analysis** to confirm that the settings are correct. Select **Start** and wait 10 seconds for the analysis report to appear and describe fail status details, warnings, and hints.



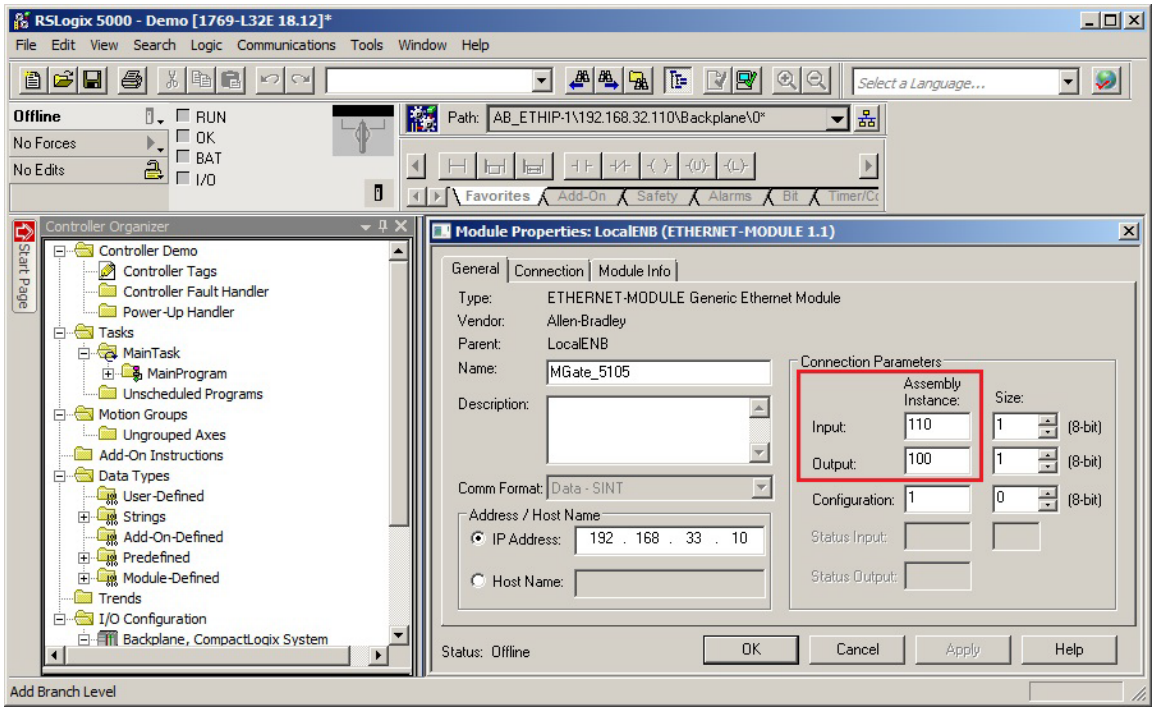


The Diagnose pages under the option of Protocol Status can help identify whether any protocol communication issues have happened. (e.g., invalid response or timeout issue)



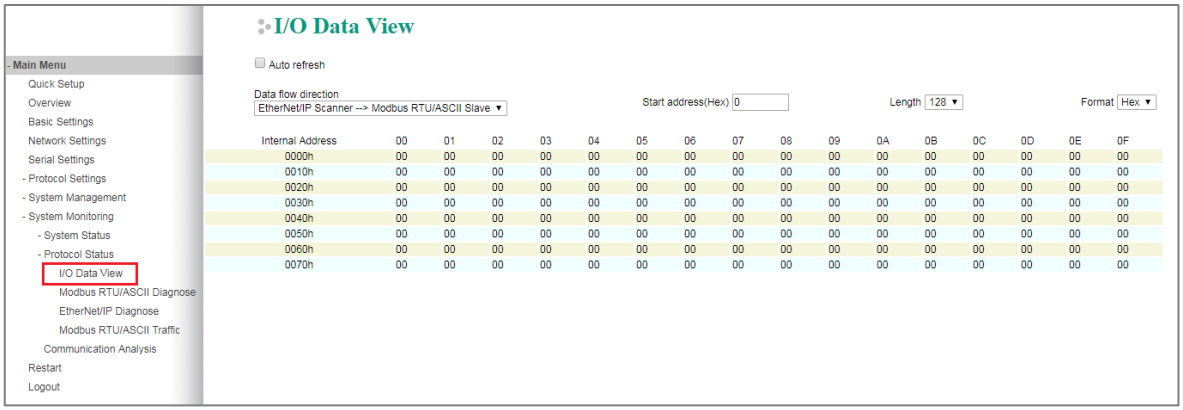
NOTE

When the MGate gateway acts as an EtherNet/IP adapter, the O→T instance is 100 and T→O instance is 110. Your EtherNet/IP scanner (e.g. PLC, SCADA) needs to use these two instances to communicate with the MGate. For example, provide an Output (i.e., O→T) instance of 100 and an Input (i.e., T→O) instance of 110 for a Rockwell PLC, as shown below.



I/O Data View

I/O Data View is designed to check all I/O modules' exchanging data. Select data flow directions to get the correct data from Modbus or EtherNet/IP packets.



3. MGate Manager Configuration

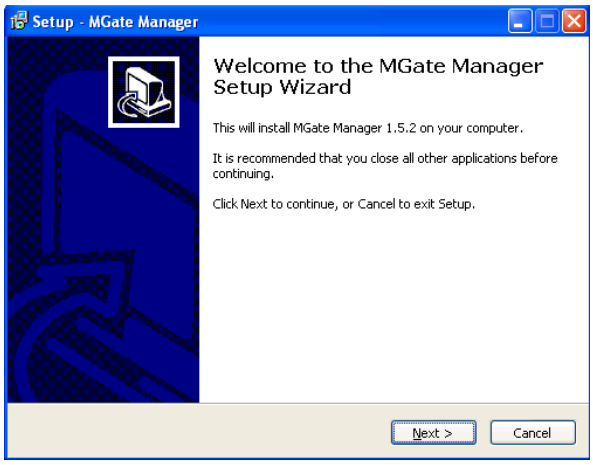
ATTENTION

MGate Manager is no longer supported starting from firmware version 4.6. Use DSU and the web console instead.

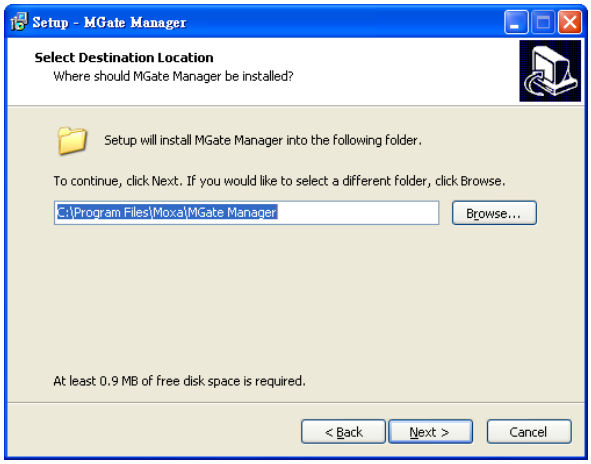
Installing the Software

The following instructions explain how to install MGate Manager, a utility for configuring and monitoring MGate 5105-MB-EIP gateways over the network.

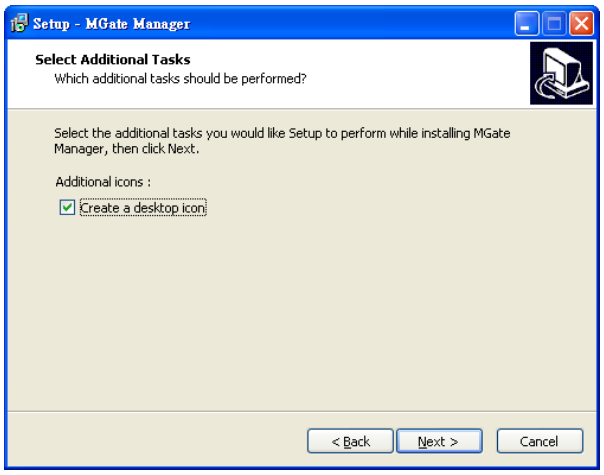
1. Insert the Document and Software CD into the CD-ROM drive. Locate and run the following setup program to begin the installation process:
   MGM_Setup_[Version]_Build_[DateTime].exe
   The latest version might be named MGM_Setup_Verx.x_Build_xxxxxxxx.exe.
2. You will be greeted by a Welcome window. Click **Next** to continue.



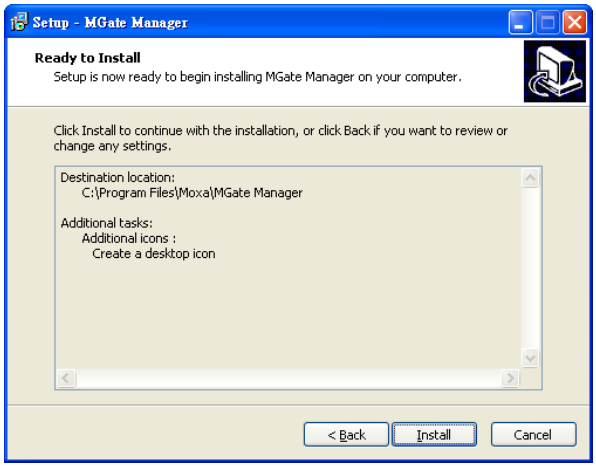
3. When the Select Destination Location window appears, click **Next** to continue. You may change the destination directory by first clicking on **Browse**.



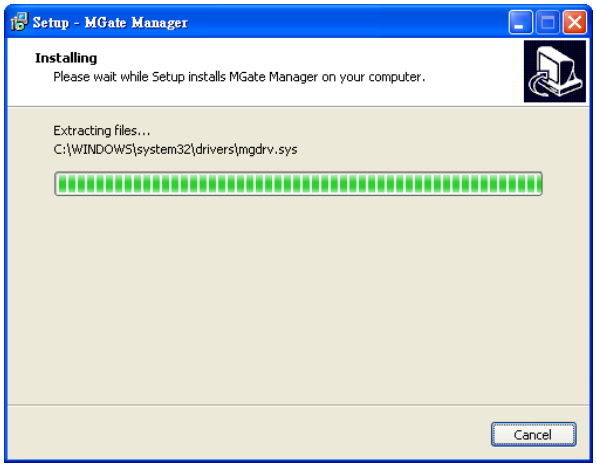
4. When the Select Additional Tasks window appears, select **Next** to continue. Select **Create a desktop** icon if you would like a shortcut to MGate Manager on your desktop.



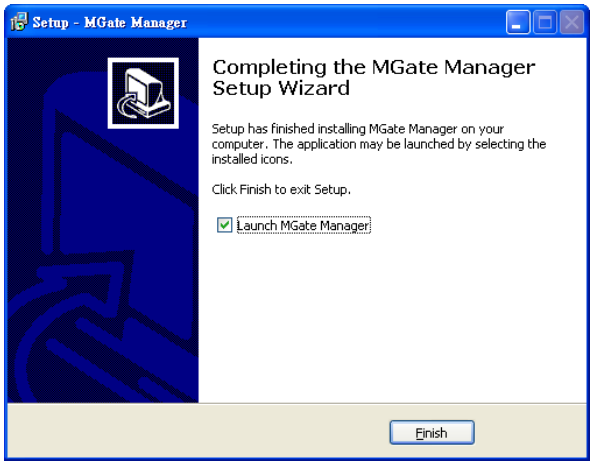
5. Click **Next** to copy the software files.



6. A progress bar will appear. The procedure should take only a few seconds to complete.



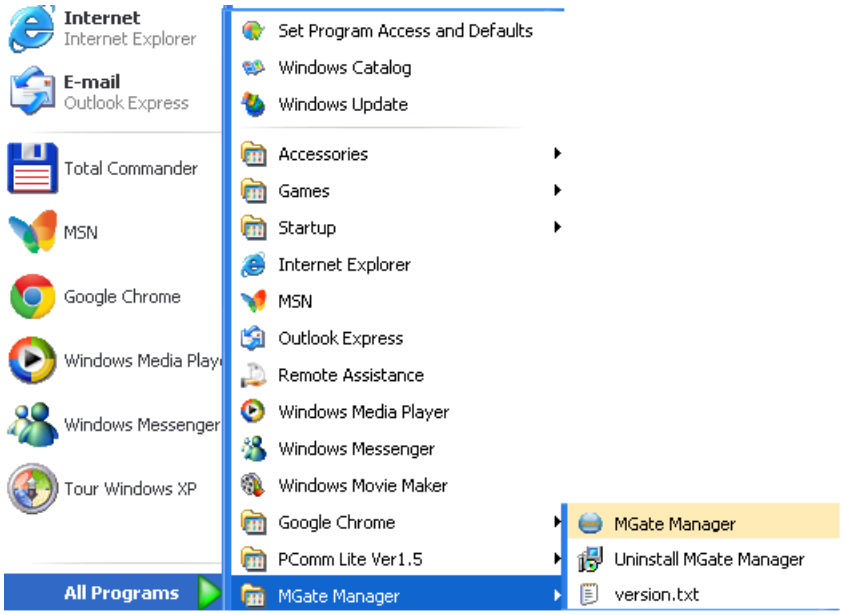
7. A message will show that MGate Manager is successfully installed. You may choose to run it immediately by selecting **Launch MGate Manager**.



8. You may also open **MGate Manager** through **Start > Programs > MGate Manager > MGate Manager**, as shown below.

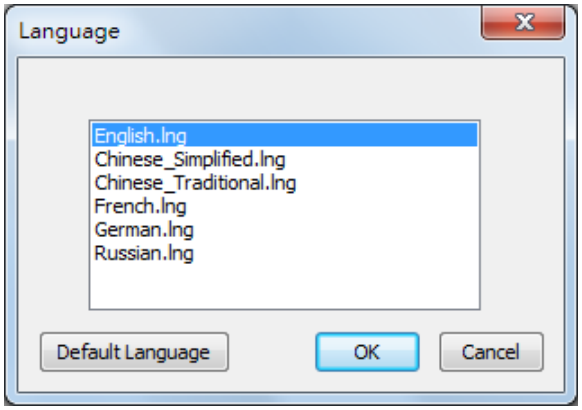
Starting MGate Manager

MGate Manager is a Windows-based utility that is used to configure the MGate 5105-MB-EIP. Before running MGate Manager, make sure that the MGate 5105-MB-EIP is connected to your PC. You may open MGate Manager from the Windows Start menu by clicking **Start > Programs > MGate Manager > MGate Manager**. The MGate Manager window should appear as shown below.



Changing the Language Settings

If you want to run MGate Manager in a different language, select **Language** to change the language setting. A dialog box showing the available languages should appear, as shown below.



When you select **OK**, MGate Manager will immediately use your chosen language.

ATTENTION

Set your MGate Manager to **Default Language** before contacting Moxa Technical Support.

With support for multiple languages, MGate Manager is more user-friendly and accessible. However, if you need help from Moxa Technical Support, please change the language to **Default Language**. This will prevent any misunderstandings or confusion about MGate Manager menu items and commands while our engineers assist you.

The default language is English and will only be active for the current MGate Manager session. When you open MGate Manager again, the language will revert to your original setting.

Connecting to the Unit

Prior to configuration, MGate Manager must be connected to its unit. Two methods are available to establish a connection. Broadcast Search locates the MGate Series on the LAN. Search by IP attempts to connect to a specific unit by IP address, which is useful if the unit is located outside the LAN or can only be accessed by going through a router.

Except for the **Broadcast Search** feature, you can also use the Device Search Utility (DSU) to detect MGate gateways on your network, which can be downloaded from Moxa's website at http://www.moxa.com. This utility can further support the configuration of multiple gateways to ease your job.

Broadcast Search

Broadcast Search is used for MGate Ethernet Gateways, such as the MGate 5000/MB3000/EIP3000 Series, which are discovered via Ethernet by using broadcast IP.

Specify by IP Address

Specify by IP Address is used for MGate Ethernet Gateways, such as the MGate 5000/MB3000/EIP300 Series, which are discovered via Ethernet by using a specific IP address. Click **Specify by IP Address** if you know the IP address of the unit and wish to connect to it directly.

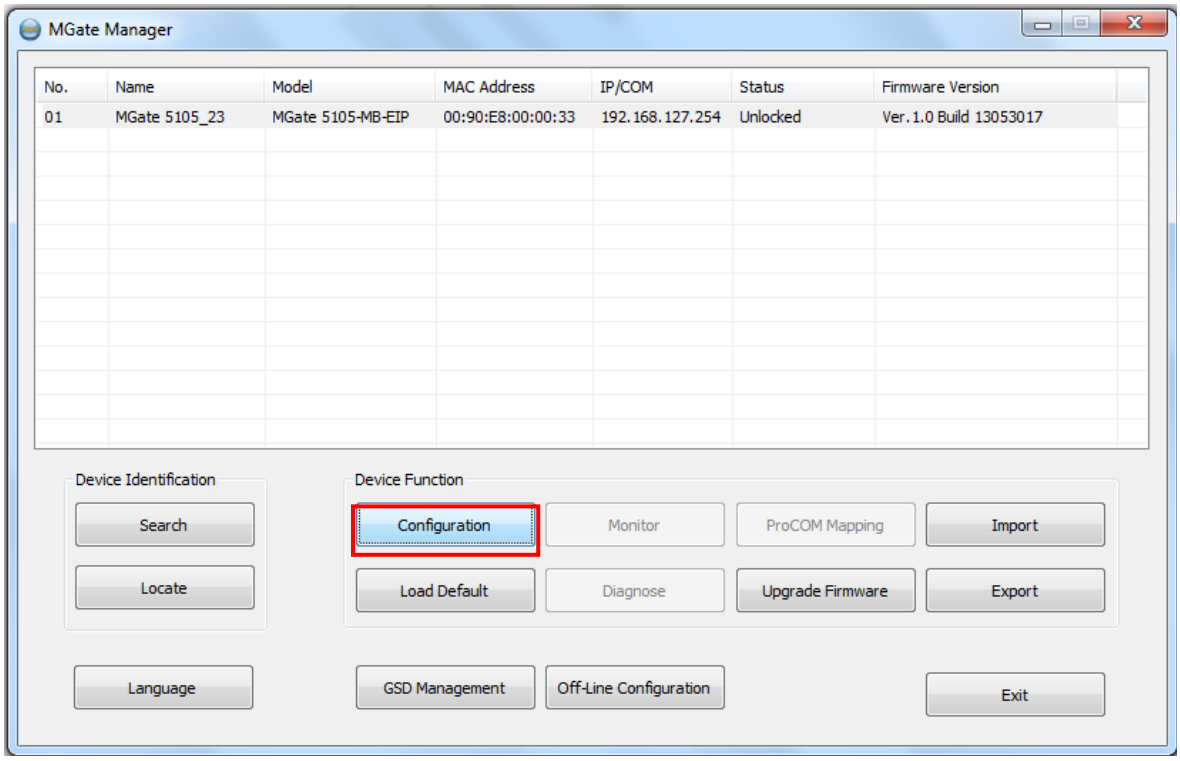
ATTENTION

If searching by IP Address cannot locate the MGate 5000/MB3000/EIP3000 Series, the IP address you entered might be incorrect. Try doing the search again and re-entering the IP address carefully.

Another possibility is that the MGate 5000/MB3000/EIP300 Series is on the same LAN as your PC, but on a different subnet. Here, you can change your PC's IP address and/or netmask so that it is on the same subnet as the MGate 5000/MB3000/EIP300 Series. After your PC and the MGate 5000/MB3000/EIP300 Series are on the same subnet, MGate Manager should be able to find the unit.

Modifying the Configuration

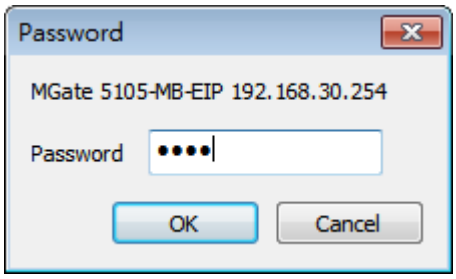
Once your unit is displayed in MGate Manager, select it by clicking on it. The Configuration button will become available. Click **Configuration** to open the configuration window.



Password Protection

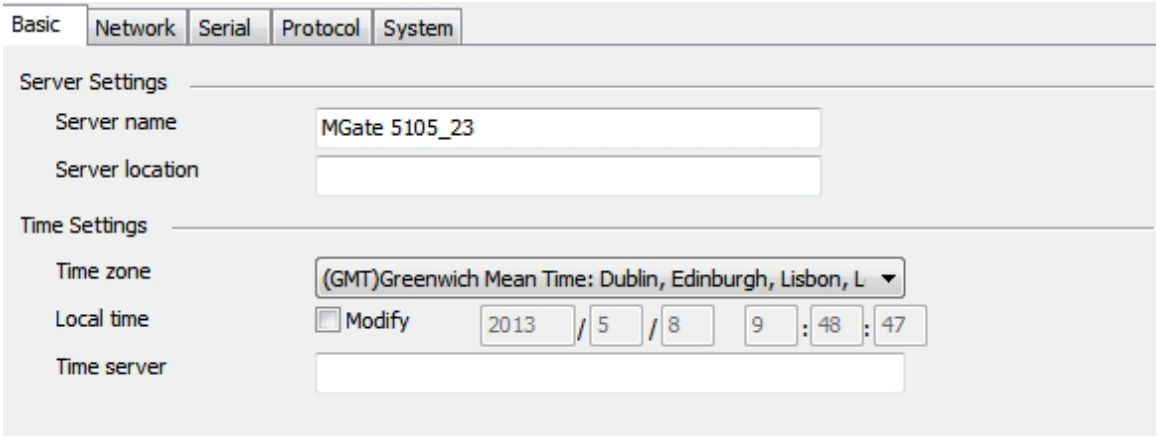
For safety reasons, account/password protection is enabled by default, so you must provide the correct password to unlock the device before configuring it.

The default password is **moxa** in lowercase letters.



Configure Device

On the first page, change the device name and time zone settings.



Server Setting

Parameter	Value	Notes
Server Name	(an alphanumeric string)	Enter a name to help you identify the unit, such as the function, etc.
Server Location	(an alphanumeric string)	Enter a name to help you identify the unit's location. Such as "Cabinet A001."

Time Settings

The MGate 5105-MB-EIP has a built-in Real-Time Clock for time calibration functions. Functions such as the log function can add real-time information to the message.

ATTENTION

First-time users should select the time zone first. The console will display the "real time" according to the time zone relative to GMT. If you would like to change the real-time clock, select **Local time**. MGate's firmware will modify the GMT time according to the time zone.

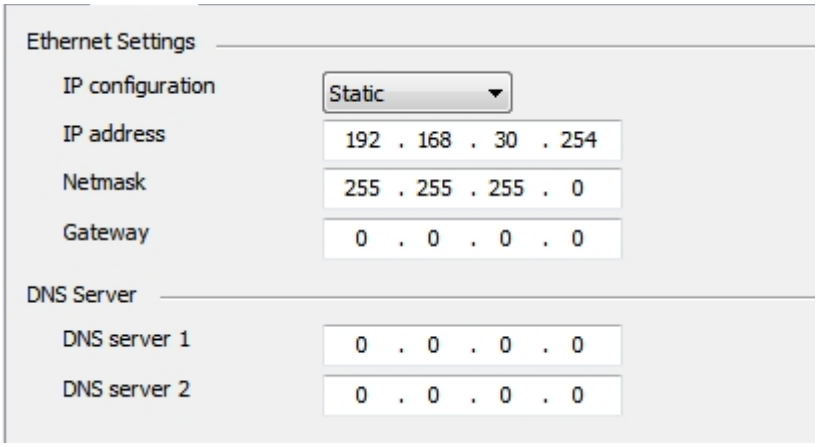
Parameter	Value	Notes
Time Zone	User selectable time zone	This field shows the currently selected time zone and allows you to select a different time zone.
Local Time	User adjustable time. (1900/1/1-2037/12/31)	
Time Server	IP or Domain address (e.g., 192.168.1.1 or time.stdtime.gov.tw)	This optional field specifies your time server's IP address or domain name if a time server is used on your network. The module supports SNTP (RFC-1769) for automatic time calibration. The MGate will request time information from the specified time server every 10 minutes.

ATTENTION

When modifying the local time, select the time zone first. The system will update the time display to reflect the specified time zone.

Network Settings

The Network tab is where the unit's network settings are configured. You can change the Name, Network Configuration, IP Address, Netmask, Default Gateway, and DNS.



Ethernet Settings

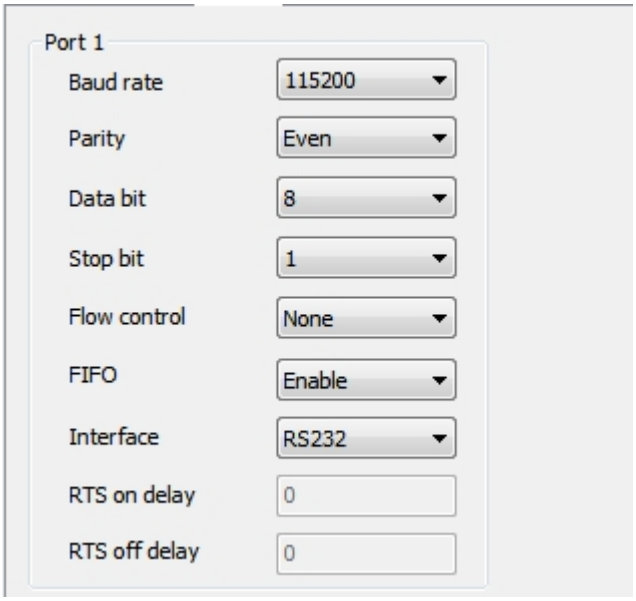
Parameter	Value	Notes
IP Configuration	Static IP, DHCP, BOOTP	Select Static IP if you are using a fixed IP address. Select one of the other options if the IP address is set dynamically.
IP Address	192.168.127.254 (or other 32-bit number)	The IP (Internet Protocol) address identifies the server on the TCP/IP network.
Netmask	255.255.255.0 (or other 32-bit number)	This identifies the server as belonging to a Class A, B, or C network.
Gateway	0.0.0.0 (or other 32-bit number)	This is the IP address of the router that provides network access outside the server's LAN.

DNS Server

Parameter	Value	Notes
DNS Server 1	0.0.0.0 (or other 32-bit number)	This is the IP address of the primary domain name server.
DNS Server 2	0.0.0.0 (or other 32-bit number)	This is the IP address of the secondary domain name server.

Serial Settings

The MGate 5105-MB-EIP's serial interface supports RS-232, 2-wire RS-485, 4-wire RS-485, and RS-422 interfaces. You must configure baudrate, parity, data bits, and stop bits before using the serial interface with the Modbus RTS/ASCII protocol. Incorrect settings will cause communication failures.

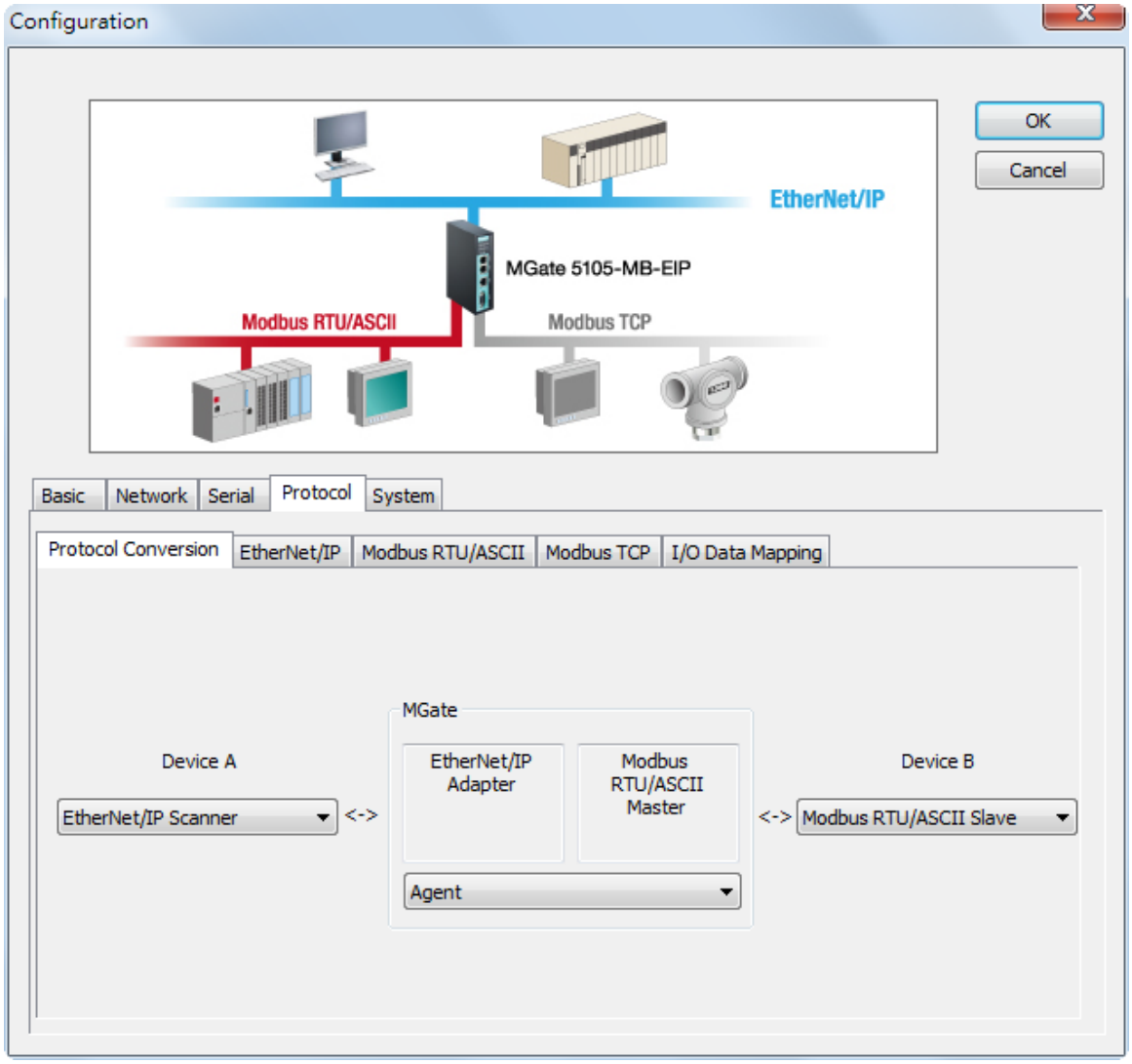


Serial settings

Parameter	Value	Notes
Baudrate	Supports standard baudrates (bps): 50/75/110/134/150/300/ 600/1200/1800/2400/ 4800/ 7200/9600/19200/38400/ 57600/115200/ 230.4k/ 460.8k/921.6k	
Parity	None, Odd, Even, Mark, Space	
Data bits	8	
Stop bits	1, 2	
Flow control	None, RTS/CTS, RTS Toggle	RTS Toggle will turn off RTS signals when there is no data to be sent. If there is data to be sent, RTS will turn on before data transmission and off after the transmission completes.
FIFO	Enable, Disable	The internal buffer of UART. Disabling FIFO can reduce the latency time when receiving data from serial communications, but this will also slow down the throughput.
Interface	RS-232 RS-422 RS-485 2 wire RS-485 4 wire	
RTS on delay	0-100 ms	Only available for RTS Toggle
RTS off delay	0-100 ms	Only available for RTS Toggle

Protocol Settings

The MGate gateway supports Modbus RTU/ASCII, Modbus TCP, and EtherNet/IP protocols. The possible combinations are listed in the following table.



Device A and Device B refer to the protocols of their own devices. The MGate will automatically configure to the corresponding roles.

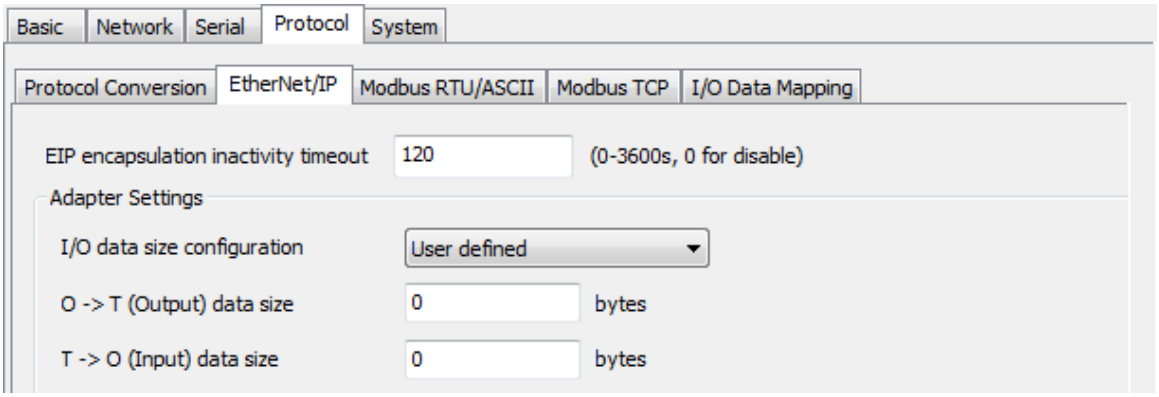
		Device A Protocol			
		EtherNet/IP Scanner	EtherNet/IP Adapter	Modbus TCP Client	Modbus TCP Server
Device B Protocol	Modbus RTU/ASCII Master	✓	✓	✓	✓
	Modbus RTU/ASCII Slave	✓	✓	✓	✓
	Modbus TCP Client	✓	✓	–	–
	Modbus TCP Server	✓	✓	–	–

ATTENTION

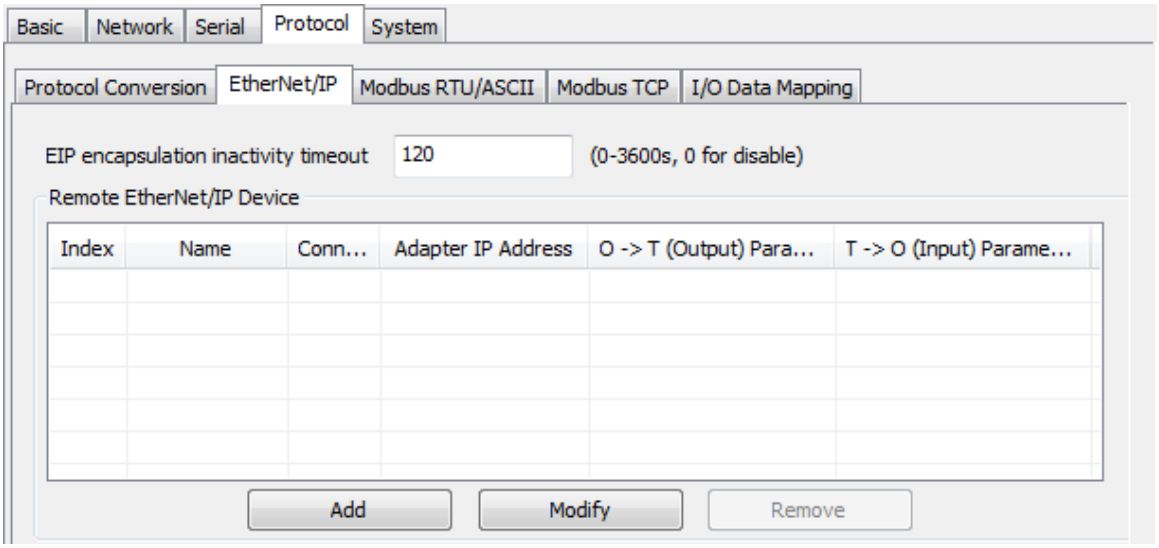
The MQTT protocol is not supported by MGate Manager yet. To apply the MQTT protocol, please use the web console and follow the instructions in Chapter 2.

EtherNet/IP Settings

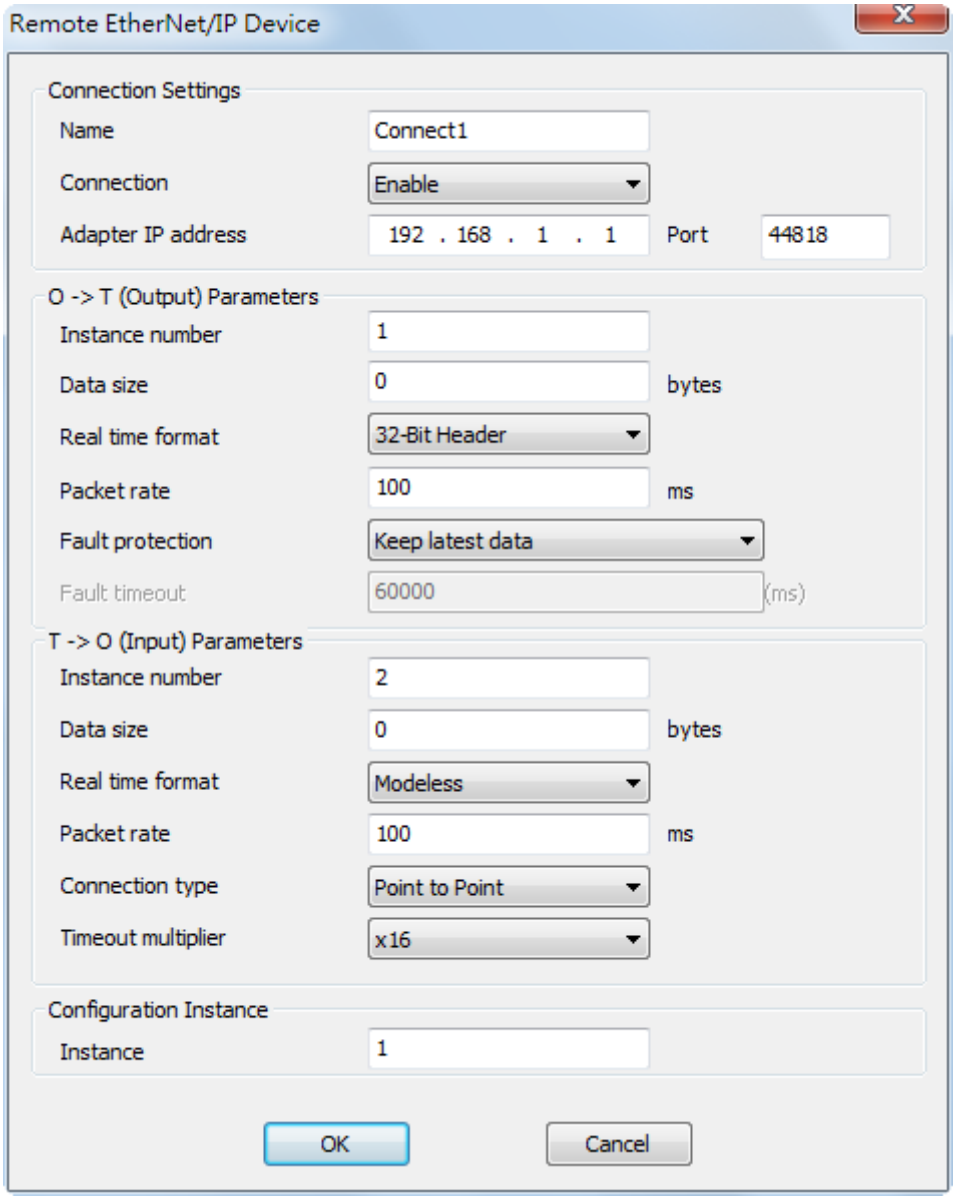
The MGate 5105-MB-EIP supports Adapter and Scanner modes for EtherNet/IP protocol. In Adapter mode, you can select **Automatic** for **I/O data size configuration** to automatically map O->T (Originator to Target) and T->O (Target to Originator) data sizes with Modbus data.



In Scanner mode, a table will display all EtherNet/IP connections. For initial setup, select **Add** to create a new connection.



Parameter	Value	Notes
EIP Encapsulation Inactivity Timeout	0 to 3600, (0 for disable)	Unit: second If there is no encapsulation activity for a specific time, the Ethernet/IP session will be cleaned and the TCP connection will be disconnected.
I/O data size configuration	Automatic, User-defined	
O->T (Output) data size	0 to 496	Unit: byte O->T: Originator to Target
T->O (Input) data size	0 to 496	Unit:byte T->O: Target to Originator



Parameter	Value	Notes
Name	Name	
Connection	Enable, Disable	Enable or disable this connection.
Adapter IP address and port	IP address Port: 1 to 65535	Default EtherNet/IP port is 44818
Instance number	1 to 2147483647	
Data size	O->T: 0 to 496 T->O: 0 to 496	
Real-time formats	Modeless, 32-bit header	Default O->T format is 32-bit header. Default T->O format is modeless.
Packet rate	0 to 3000 ms	Command polling interval time.
Fault Protection	Keep latest data, data clear to zero, user-defined value	For EtherNet/IP Scanner mode, the opposite side refers to the Modbus side. If the Modbus connection fails, the gateway cannot receive the Modbus command, but the gateway will continuously send output data to the EtherNet/IP adapter. To avoid problems in case the Modbus side fails, the MGate 5105 can be configured to react in one of three ways: keep the latest data, clear data to zero, or user-defined value
Fault Timeout	0 to 60000 ms	Define the communication timeout for the Modbus side.

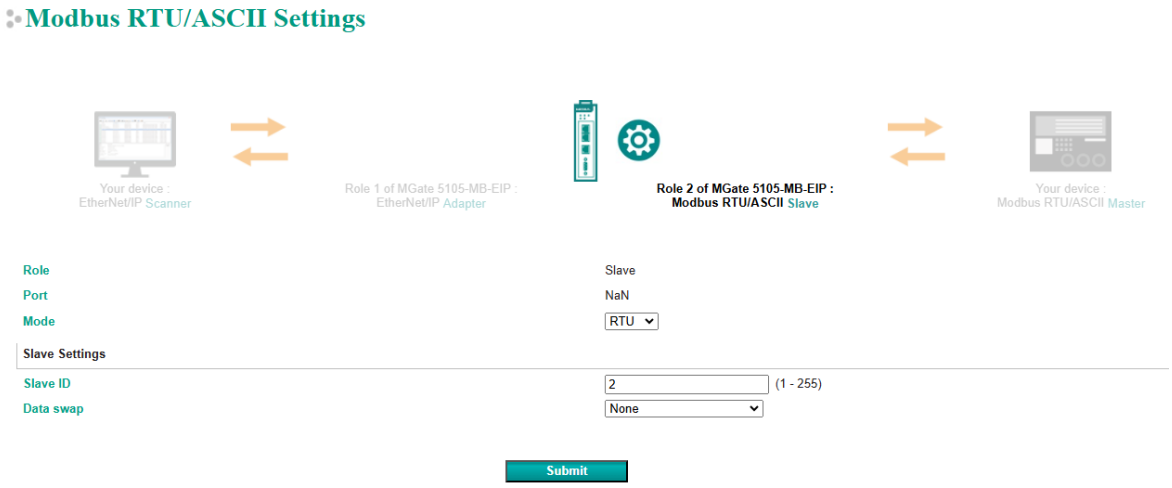
Parameter	Value	Notes
Connection type	Point to point, multicast	When using a multicast connection, the target (i.e., EtherNet/IP Adapter) must reply to the Multicast IP address for the MGate to listen.
Timeout multiplier	x4, x8, x16, x32, x64, x128, x512	Timeout value = packet rate x timeout multiplier (e.g., For packet rate = 100 ms and timeout multiplier = 16, the connection timeout = 1,600 ms).
Instance	1 to 2147483647	When the MGate is set to **Scanner Mode**, the user can set the device's Configuration Instance. An EIP adapter device needs to set this value. If the Configuration Instance setting is wrong, it will respond "invalid connection path."

Modbus RTU/ASCII Settings

According to the Modbus RTU/ASCII settings, the MGate 5105-MB-EIP will act as a Modbus client/master or Modbus server/slave to communicate with your Modbus RTU/ASCII devices. For slave mode, the MGate acts as a server/slave and waits for the incoming connection from the Modbus client/master. In this mode, you only need to specify the slave ID for the MGate gateway. For master mode, the MGate works as a client/master and will try to send Modbus commands to the Modbus server/slave devices, so you will need to specify the server/slave device IDs and the relative Modbus commands.

Slave Mode Settings

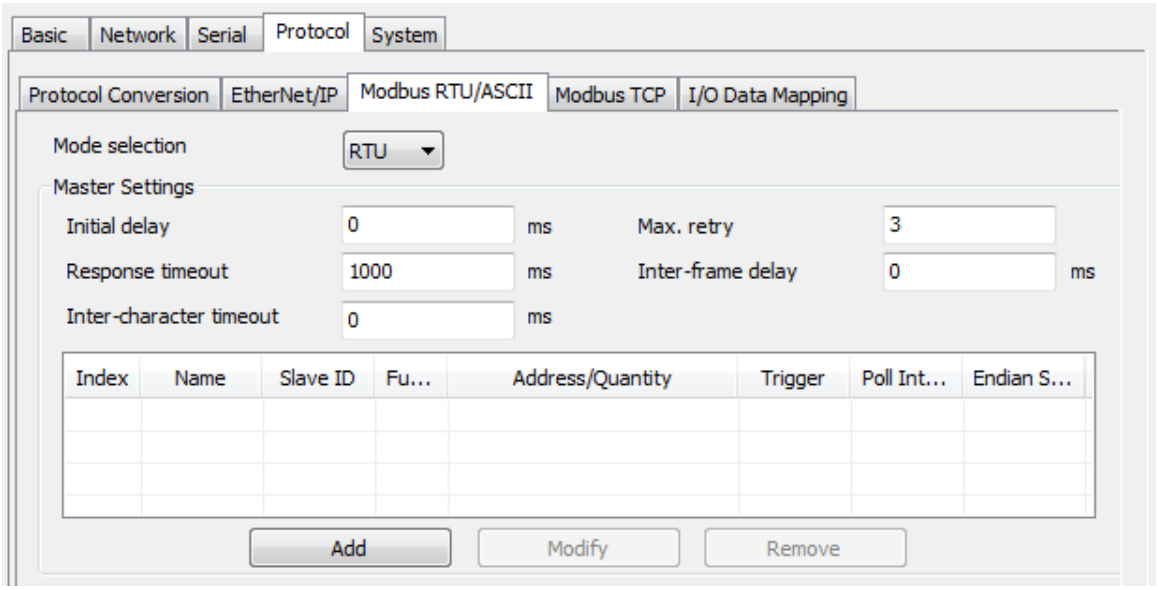
You will need to specify which Modbus protocols will run in slave mode. The MGate 5105-MB-EIP supports Modbus RTU and Modbus ASCII protocols in slave mode.



Parameters	Value	Description
Mode selection	Slave RTU or Slave ASCII	The Modbus protocol.
Slave ID	0 to 255	The Modbus Slave ID that this server/slave module will accept. 0: Broadcasting 1–255: Device-specific.
Data swap	None Byte swap Word swap Byte and Word swap	Data Byte Swapping **None:** Don't need to swap **Byte:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. **Word:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. **ByteWord:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. There are two phases in changing ByteWord 1) 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. 2) 0x0B, 0x0A, 0x0D, 0x0C becomes 0x0D, 0x0C, 0x0B, 0x0A.

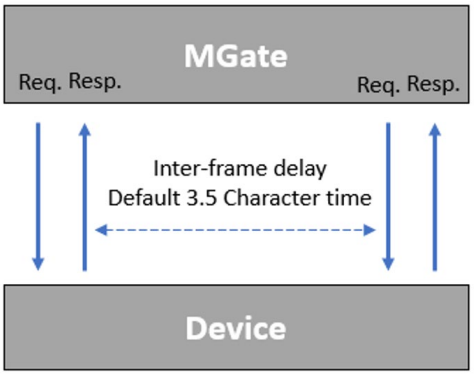
Master Mode Settings

You will need to specify which Modbus protocols will run in master mode. The MGate 5105-MB-EIP supports Modbus RTU and Modbus ASCII protocols in master mode.



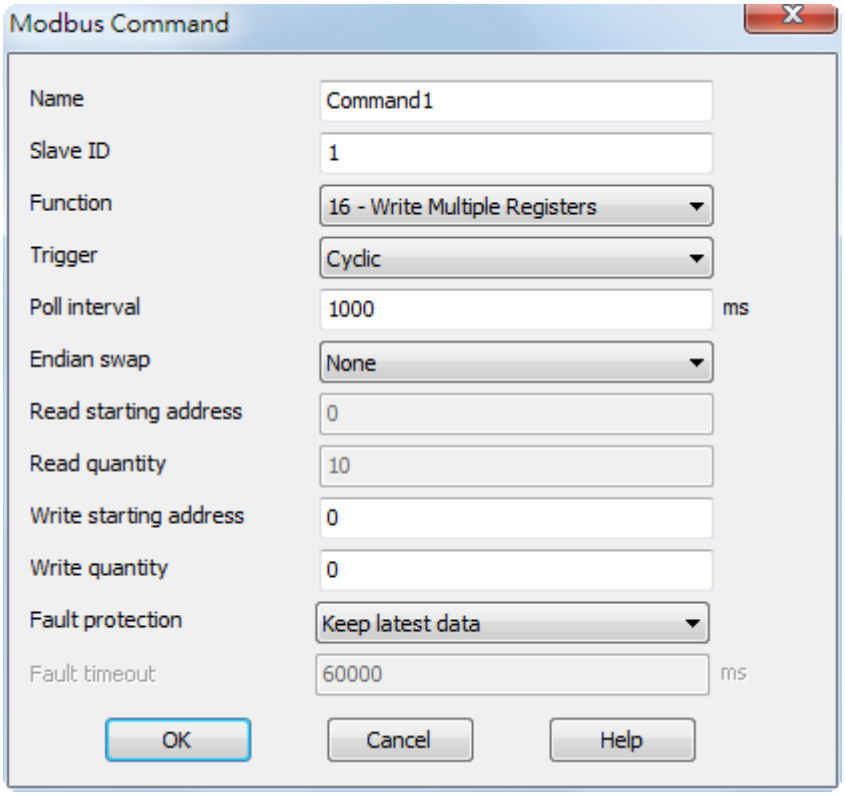
The MGate 5105-MB-EIP also provides several advanced settings for specific application requirements. The following settings are optional for most applications. We suggest using the default settings to test the MGate 5105-MB-EIP.

Parameters	Description
Initial delay	Some Modbus servers/slaves may take more time to boot up than other devices. In some environments, this may cause the entire system to suffer from repeated exceptions during the initial boot-up. You can force the MGate to wait after booting up before sending the first request with the **Initial Delay** setting.
Response timeout	According to the Modbus standard, the time it takes for a server/slave device to respond to a request is defined by the device manufacturer. Based on this response time, a client/master can be configured to wait a certain amount of time for a server/slave's response. If no response is received within the specified time, the client/master will disregard the request and continue operation. This allows the Modbus system to continue operation even if a server/slave device is disconnected or faulty. On the MGate 5101-MB-EIP, the **Response timeout** field is used to configure how long the gateway will wait for a response from a Modbus ASCII or RTU server/slave. Please refer to your device manufacturer's documentation to manually set the response time.
Inter-character timeout (only for Modbus RTU)	The time interval between characters in one frame. When the baudrate is lower than 19200 bps, the default value is 0, which is 1.5-character time. When the baudrate is larger than 19200 bps,the MGate uses a predefined fixed value that is not user configurable. When the serial side of the MGate receives one character, and the next one comes after the "inter-character timeout" defined, the frame will be discarded because of timeout.
Max. retry	The number of times the client/master will retry the same request when the response times out.

Parameters	Description
Inter-frame delay (only for Modbus RTU)	Defines the time interval between an RTU response and the next RTU request. When the baudrate is lower than 19200 bps, the default value is 0, which is 3.5-character time. When the baudrate is larger than 19200 bps, the MGate uses a predefined fixed value that is not user configurable. This function solves the issue that some devices can't handle RTU requests that quickly, so the MGate opens to user-defined values. How to calculate Modbus character time? E.g., if the baudrate is 9600 bps, 1 character time is about 1 ms. In a serial frame (11 bits, including start bit, data, parity bit, and stop bit), 9600 bps approximately equals 960 characters/s, so transmitting 1 character needs about 1/960 = 1 ms. 

For master mode, you must identify which Modbus requests need to be sent to Modbus server/slave devices through a serial interface. The data will be exchanged between server/slave devices and the MGate gateway's internal memory. To do this, manually add all Modbus commands that will handle the data exchange.

The **Add**, **Modify**, and **Remove** buttons support the Modbus command arrangement. When you select the **Add** and **Modify** buttons, the following dialog box will be displayed.



Change the Modbus command parameters to finish the configuration. You will need to configure each Modbus command through this dialog box.

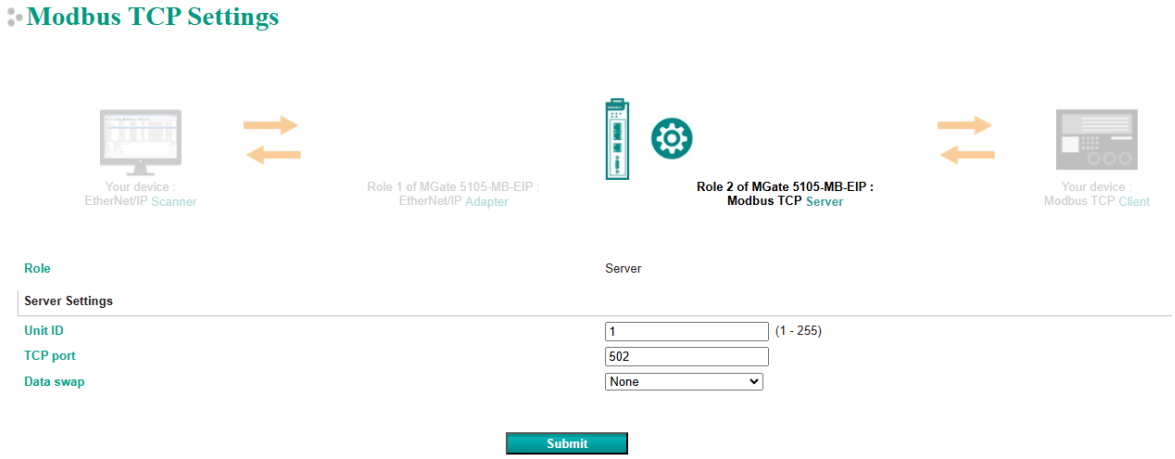
Parameters	Description
Name	Enter a name to help identify the command, such as the location, function, etc.
Slave ID	The Modbus slave ID that this server/slave module will accept. 0: Broadcasting 1–255: Device-specific
Function code	When a message is sent from a client to a server device, the function code field tells the server what kind of action to perform. We support the following function codes so far: 01: Read coils 02: Read discrete inputs 03: Read holding registers 04: Read input register 05: Write single coil 06: Write single register 15: Write multiple coils 16: Write multiple registers 23: Read/Write multiple registers
Trigger	Disable: The command is never sent Cyclic: The command is sent cyclically at the interval specified in the **Poll Interval** parameter Data change: The data area is polled for changes at the time interval defined by Poll Interval. A command is issued when a change in data is detected.
Poll interval	Polling intervals are in milliseconds. Since the module sends all requests in turn, the actual polling interval also depends on the number of requests in the queue and their parameters, such as baudrate, device response time, etc. The range is from 10 to 1,200,000 ms.
Endian swap	Data Byte Swapping **None:** Don't need to swap **Byte:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. **Word:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. **ByteWord:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. There are two phases in changing ByteWord 1) 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. 2) 0x0B, 0x0A, 0x0D, 0x0C becomes 0x0D, 0x0C, 0x0B, 0x0A.
Read starting address	Station Address. The range is from 0 to 65535
Read quantity	Specifying how many quantities to write. There are two kinds of quantity units: 1 bit and 16 bits, which are associated with the function field. The range is from 1 to 125.
Write starting address	Station Address. The range is from 0 to 65535
Write quantity	Specifying how many quantities to write. There are two kinds of quantity units: 1 bit and 16 bits, which are associated with the function field. The range is from 1 to 121.
Fault Protection	For the Modbus RTU master mode, the opposite side refers to EtherNet/IP. The Modbus Write command is sent from the EtherNet/IP side. If the EtherNet/IP connection fails, the gateway cannot receive the EtherNet/IP data, but the gateway will continuously send output data to the Modbus RTU server/slave device. To avoid problems in case the EtherNet/IP side fails, the MGate 5105 can be configured to react in one of three ways: keep the latest data, clear data to zero, or user-defined value.
Fault Timeout	Defines the communication timeout for the EtherNet/IP side. The range is from 0 to 60000 ms.

Modbus TCP Settings

The MGate 5105-MB-EIP supports Modbus TCP functions in slave and master mode. For slave mode, MGate works as a server and waits for an incoming connection from Modbus TCP client. And in client mode, MGate works as a client and will try to build a TCP connection with a remote Modbus TCP server device. In this mode, users must specify the IP address of the remote device and the relative Modbus command.

Slave Mode Settings

The MGate 5105-MB-EIP supports Modbus TCP server mode, which means the MGate will work as a server and wait for incoming connection requests. The default TCP listen port is 502. In this mode, the MGate will wait for incoming Modbus TCP requests and use the internal memory as the server/slave register to respond.

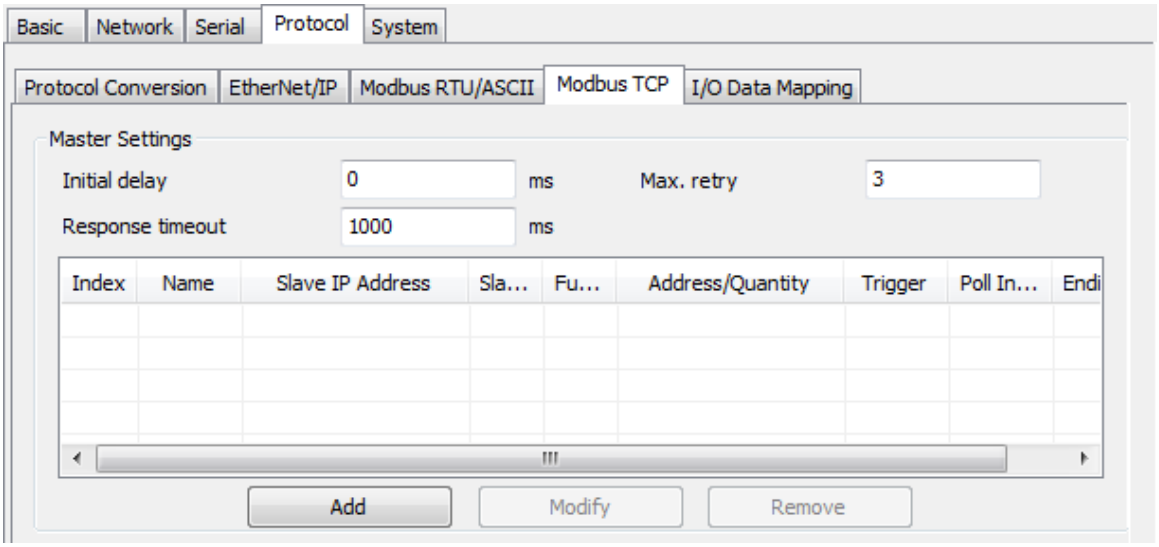


Change the slave ID settings to match the system requirements. The default TCP port for Modbus TCP is 502, so you may need to change if there is a firewall in place.

Parameters	Value	Description
Slave ID	1 to 247	The Modbus address of the MGate.
TCP Port	1 to 65535	The local TCP port for the MGate.
Data swap	None Byte swap Word swap Byte and Word swap	Data Byte Swapping **None:** Don't need to swap **Byte:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. **Word:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. **ByteWord:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. There are two phases in changing ByteWord 1) 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. 2) 0x0B, 0x0A, 0x0D, 0x0C becomes 0x0D, 0x0C, 0x0B, 0x0A.

Master Mode Settings

The MGate 5105-MB-EIP supports Modbus TCP Client (Master) mode, which means the MGate will work as a client and send the Modbus command requests to the server/slave device actively. You will need to configure each Modbus command manually. On this page, users can see all the commands listed in the table.

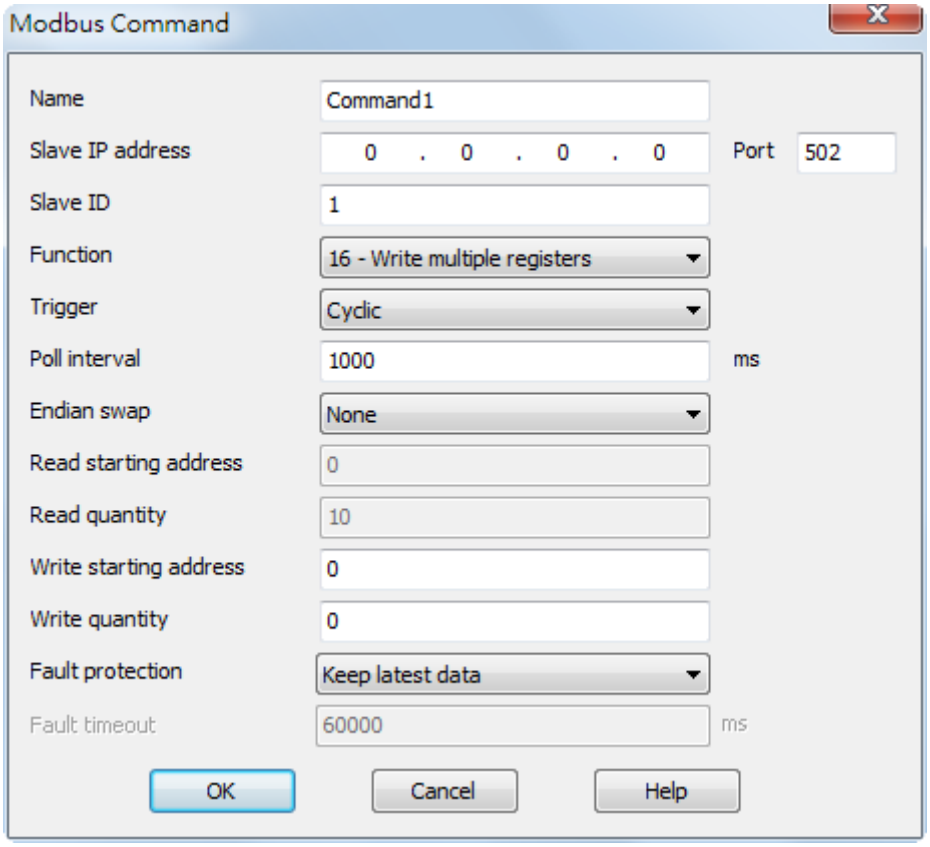


Parameters	Value	Description
Initial Delay	0 to 65535 ms	Some Modbus servers/slaves may take more time to boot up than other devices. In some environments, this may cause the entire system to suffer from repeated exceptions during the initial boot-up. You can force the MGate to wait after booting up before sending the first request with the **Initial Delay** setting.
Response Timeout	10 to 12000 ms	This is used to configure how long the MGate will wait for a response from a Modbus server/slave.
Max. retry	0 to 99	This is used to configure how many times the MGate will try to communicate with the Modbus server/slave.

To add a new command or change an existing one, select the **Add** button or **Modify** button, and a new dialog box will appear. To remove Modbus commands, select the specific command and then click the **Remove** button.

To communicate with remote Modbus TCP server devices, specify the Modbus command for each device. For each Modbus read/write command, specify the internal memory address for data exchange. For the read command, the information received from remote devices will be updated to the specified internal memory address. For the write command, the data at the specified internal memory address will be sent to the remote device. The data will be used to update the remote device register.

Each remote device may need more than one command for communication, so you will need to input all the commands manually.

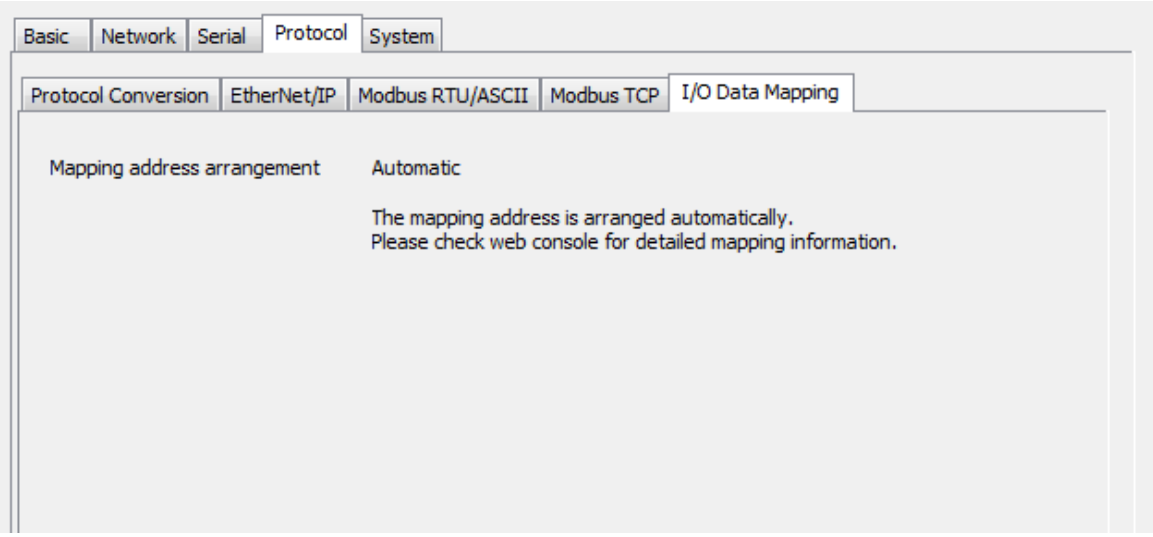


Parameters	Description
Name	Enter a name to help identify the command, such as the location, function, etc.
Slave IP address	The IP address of the remote server/slave device.
Port	The TCP port number of remote server/slave devices. 0 to 65535
Slave ID	The Modbus slave id that this server/slave module will accept. 0: Broadcasting 1 to 255: Device-specific.
Function	When a message is sent from a client to a server device, the function code field tells the server what kind of action to perform. We support the following function codes so far: 01: Read coils 02: Read discrete inputs 03: Read holding registers 04: Read input register 05: Write single coil 06: Write single register 15: Write multiple coils 16: Write multiple registers 23: Read/Write multiple registers
Trigger	Disable: The command is never sent Cyclic: The command is sent cyclically at the interval specified in the **Poll Interval** parameter. Data change: The data area is polled for changes at the time interval defined by Poll Interval. A command is issued when a change in data is detected.
Poll interval	Polling intervals are in milliseconds. Since the module sends all requests in turn, the actual polling interval also depends on the number of requests in the queue and their parameters, such as baudrate, device response time, etc. The range is from 10 to 1,200,000 ms.

Parameters	Description
Endian swap	Data Byte Swapping **None:** Don't need to swap **Byte:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. **Word:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. **ByteWord:** 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. There are two phases in changing ByteWord: 1) 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C 2) 0x0B, 0x0A, 0x0D, 0x0C becomes 0x0D, 0x0C, 0x0B, 0x0A
Read starting address	Station Address. The range is from 0 to 65535
Read quantity	Specifying how many quantities to write. There are two kinds of quantity units: bit and 16bits, which are associated with the function field. The range is from 1 to 125.
Write starting address	Station Address. The range is from 0 to 65535
Write quantity	Specifying how many quantities to write. There are two kinds of quantity units: bit and 16bits, which are associated with the function field. The range is from 1 to 121.
Fault Protection	For the Modbus TCP client mode, the opposite side refers to EtherNet/IP. The Modbus Write command is sent from the EtherNet/IP side. If the EtherNet/IP connection fails, the gateway cannot receive the EtherNet/IP data, but the gateway will continuously send output data to the Modbus TCP server device. To avoid problems in case the EtherNet/IP side fails, the MGate 5105 can be configured to react in one of three ways: keep the latest data, clear data to zero, or user-defined value.
Fault Timeout	Defines the communication timeout for the EtherNet/IP side. The range is from 0 to 60000 ms.

I/O Data Mapping

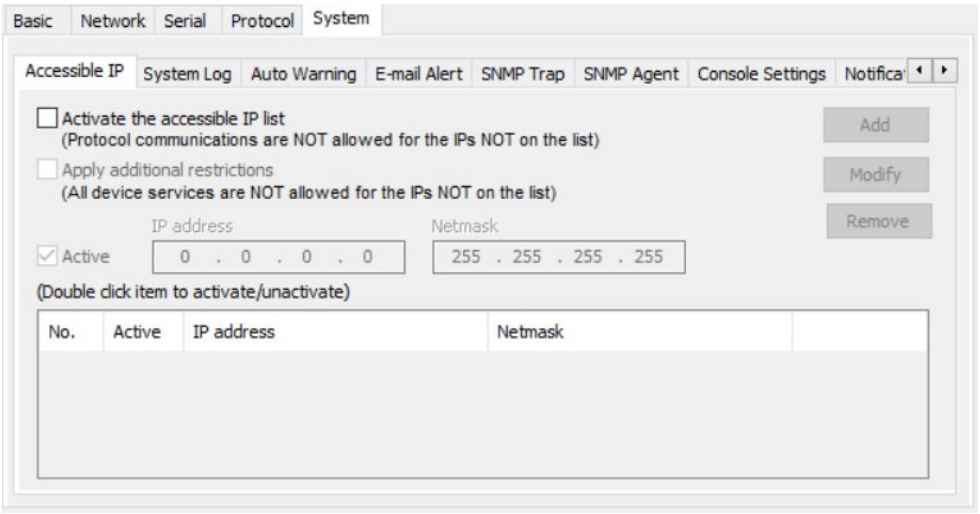
To confirm or adjust the internal memory data mapping for both sides, use the web console.



System Settings

This configuration tab includes several system-level settings, such as security, alarm, and information log. Most of these settings are optional.

Accessible IP Settings



The Accessible IP List function allows you to add or block remote host IP addresses to prevent unauthorized access. Access to the MGate MB3000 is controlled by IP address. That is, if a host's IP address is in the accessible IP table, then the host will be allowed to access the MGate MB3000. The different restrictions are listed in the table below the checkbox **Apply additional restrictions** can only be activated if **Activate the accessible IP** list is activated.

Activate the accessible IP list	Apply additional restrictions	IPs on the list (Active checked)	IPs NOT on the list (Active NOT checked)
✓	–	All protocol communication and services* are allowed.	Protocol communication is not allowed, but services* are still allowed.
✓	✓	All protocol communication and services* are allowed.	All services* are not allowed.

*Services indicate HTTP, HTTPS, TELNET, SSL, SNMP, SMTP, DNS, NTP, DSU

To allow access to a specific IP address
Enter the IP address in the corresponding field; enter 255.255.255.255 for the netmask.

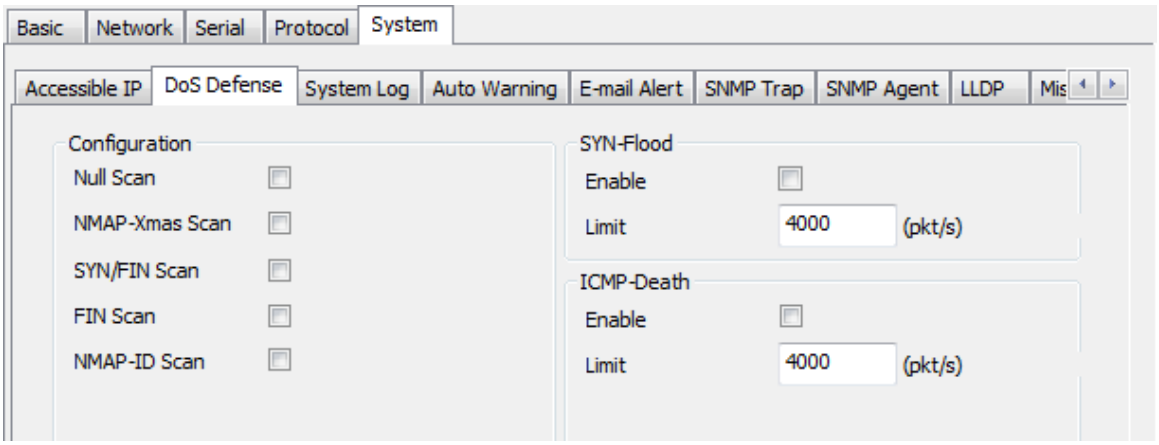
To allow access to hosts on a specific subnet
For both the IP address and netmask, use 0 for the last digit (e.g., "192.168.1.0" and "255.255.255.0").

To allow access to all IP addresses
Make sure that **Enable** the accessible IP list is not checked.

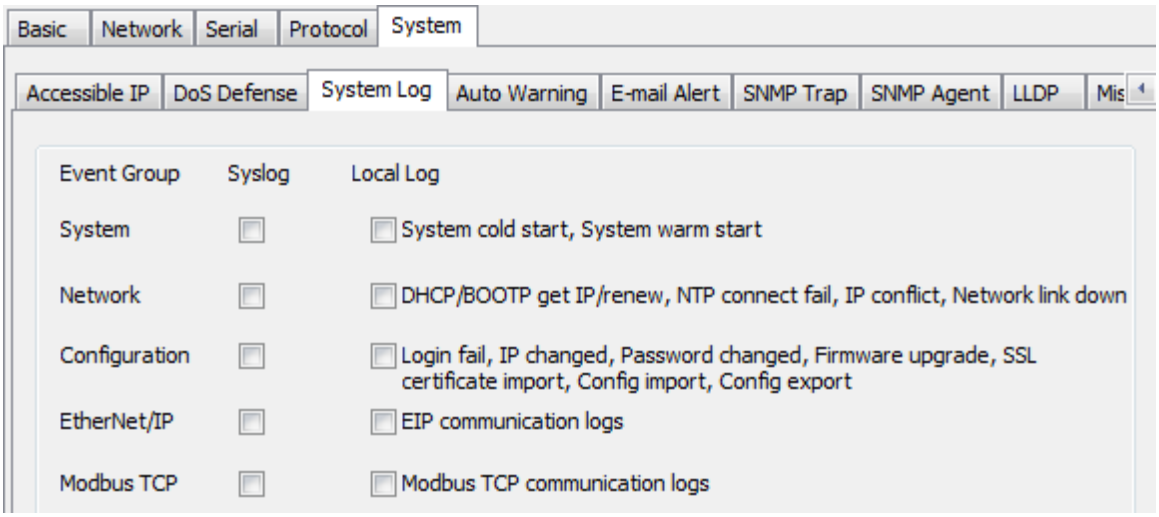
Additional configuration examples are shown in the following table:

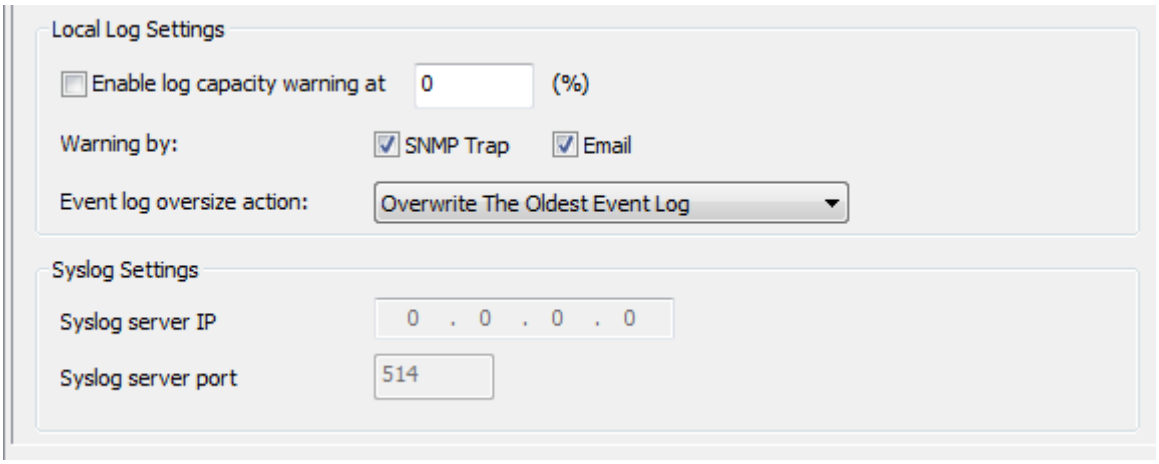
Desired IP Range	IP Address Field	Netmask Field
Any host	Disable	Enable
192.168.1.120	192.168.1.120	255.255.255.255
192.168.1.1 to 192.168.1.254	192.168.1.0	255.255.255.0
192.168.0.1 to 192.168.255.254	192.168.0.0	255.255.0.0
192.168.1.1 to 192.168.1.126	192.168.1.0	255.255.255.128
192.168.1.129 to 192.168.1.254	192.168.1.128	255.255.255.128

DoS Defense



System Log Settings





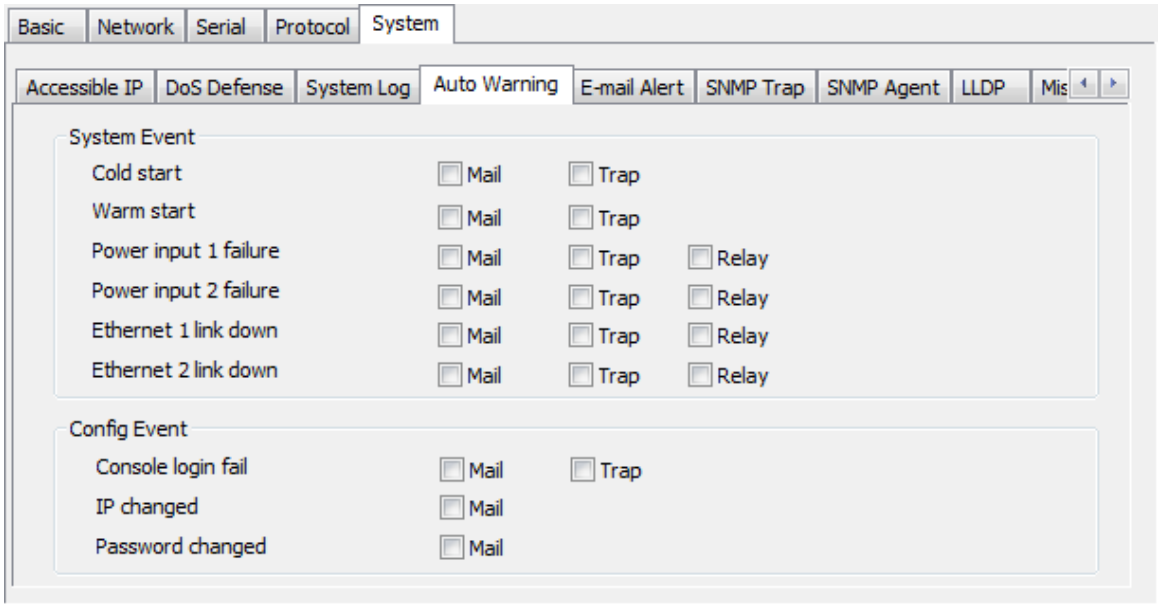
These settings enable the MGate firmware to record important events for future verification. The recorded information can only be displayed on the web console.

The available information that can be recorded includes the following events:

Event Group	Description
System	System Cold Start, System Warm Start
Network	DHCP/BOOTP Get IP/Renew, NTP Connect Fail, IP Conflict, Network Link Down
Configuration	Login Fail, IP Changed, Password Changed, Firmware Upgrade, SSL Certificate Import, Configuration Import/Export
EtherNet/IP	EtherNet/IP Communication logs
Modbus TCP	Modbus TCP Communication logs
Local Log Settings	Description
Enable Log Capacity Warning (%)	When the log amount exceeds the warning percentage, it will trigger an event to SNMP Trap or Email
Warning by	SNMP Trap Email
Event log oversize action	Overwrites the oldest event log Stops recording event log
Syslog Settings	Description
Syslog server IP	IP address of the server that will record the log data
Syslog server Port	514

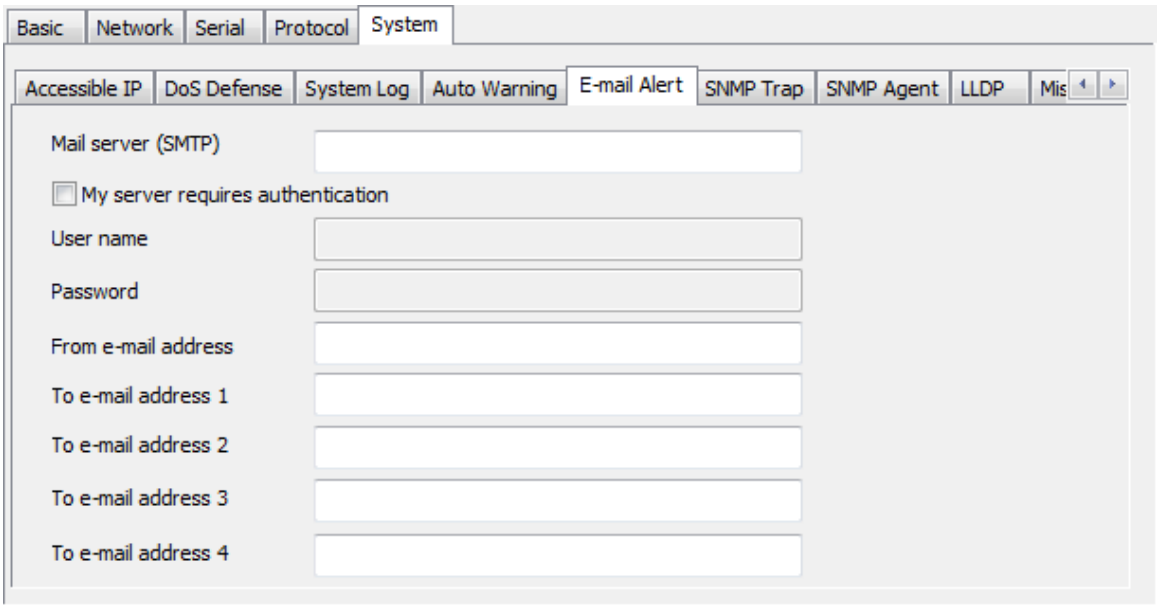
Users can view the recorded information from the web console or the text-mode console.

Auto Warning Settings



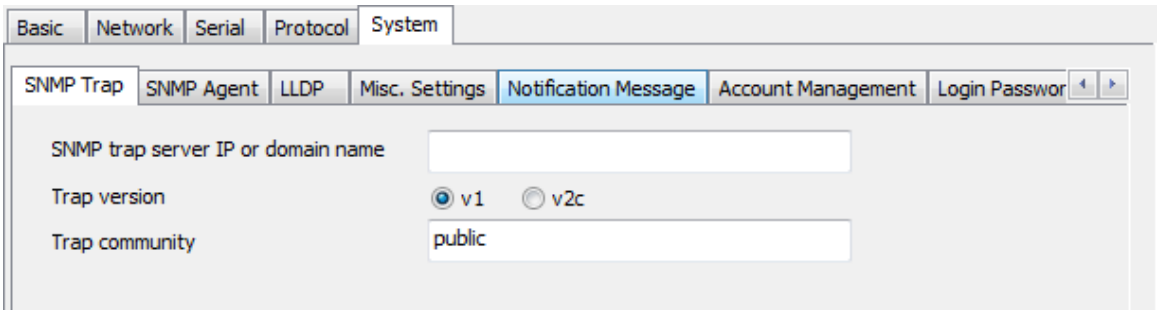
Auto Warning is triggered by different events. When a checked trigger condition occurs, the MGate can send e-mail alters, SNMP Trap messages, or open/close the circuit of the relay output and trigger the Fault LED to blink. To enable an e-mail alert, configure the e-mail address on the **E-mail Alert** page. Likewise, to enable SNMP Trap alerts, configure SNMP trap server on the SNMP Trap page.

E-mail Alert Settings



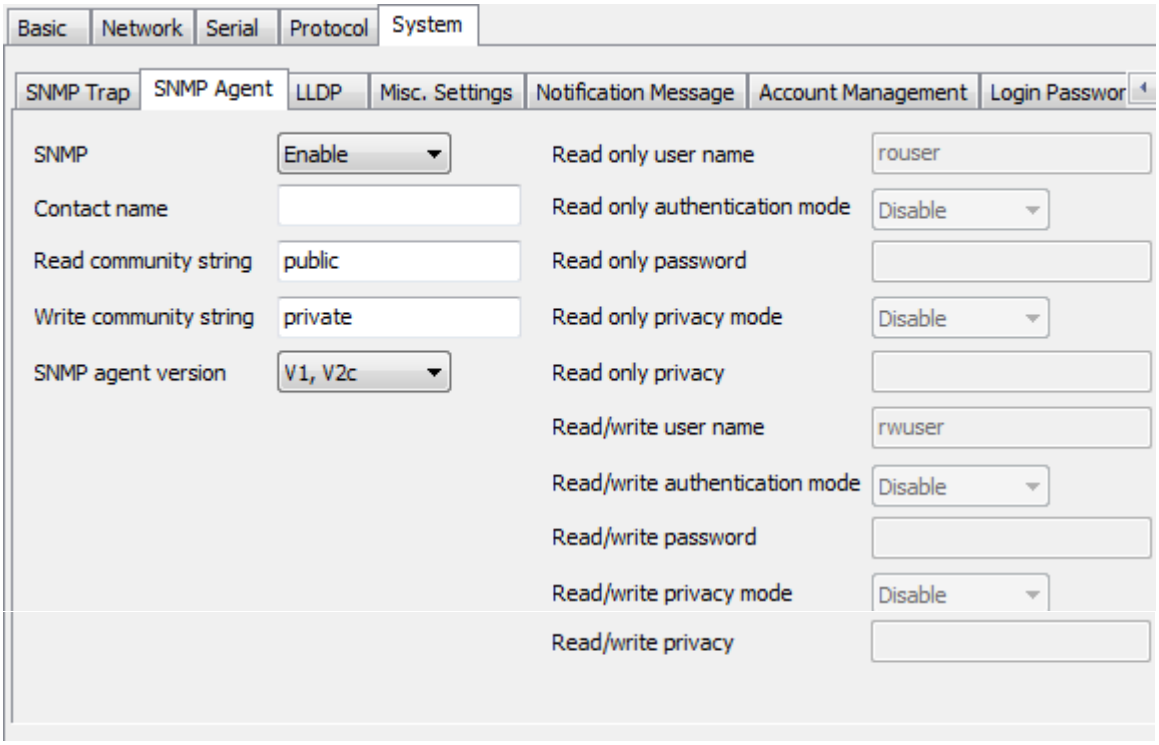
Parameters	Description
Mail server	The mail server's domain name or IP address.
Username	This field is for your mail server's username, if required.
Password	This field is for your mail server's password, if required.
From e-mail address	This is the e-mail address from which automatic e-mail warnings will be sent.
To e-mail addresses 1 to 4	This is the e-mail address or addresses to which the automatic e-mail warnings will be sent.

SNMP Trap Settings



Parameters	Description
SNMP trap server IP	Use this field to show the IP address to use for receiving SNMP traps.
Trap version	Use this field to select the SNMP trap version.
Trap community	Use this field to designate the SNMP trap community.

SNMP Agent Settings



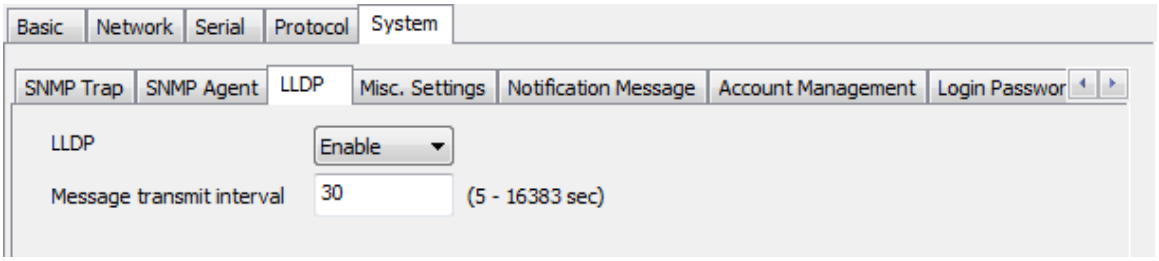
Parameters	Description
SNMP	To enable the SNMP Agent function, select the **Enable** option and enter a community name (e.g., public).
Contact name	The optional SNMP contact information usually includes an emergency contact name and telephone number.
Read community string	This is a text password mechanism that is used to weakly authenticate queries to agents of managed network devices.
Write community string	This is a text password mechanism that is used to weakly authenticate changes to agents of managed network devices.
SNMP agent version	The MGate 5105-MB-EIP supports SNMP V1, V2c, and V3.

Read-only and Read/write access control

The following fields allow you to define usernames, passwords, and authentication parameters for two levels of access: read-only and read/write. The name of the field will show which level of access it refers to. For example, **Read-only** authentication mode allows you to configure the authentication mode for read-only access, whereas **Read/write** authentication mode allows you to configure the authentication mode for read/write access. For each level of access, you may configure the following:

Parameters	Description
User name	Use this optional field to identify the username for the specified level of access.
Authentication mode	Use this field to select MD5 or SHA as the method of password encryption for the specified level of access, or to disable authentication.
Privacy mode	Use this field to enable or disable DES_CBC data encryption for the specified level of access.
Password	Use this field to set the password for the specified level of access.
Privacy	Use this field to define the encryption key for the specified level of access.

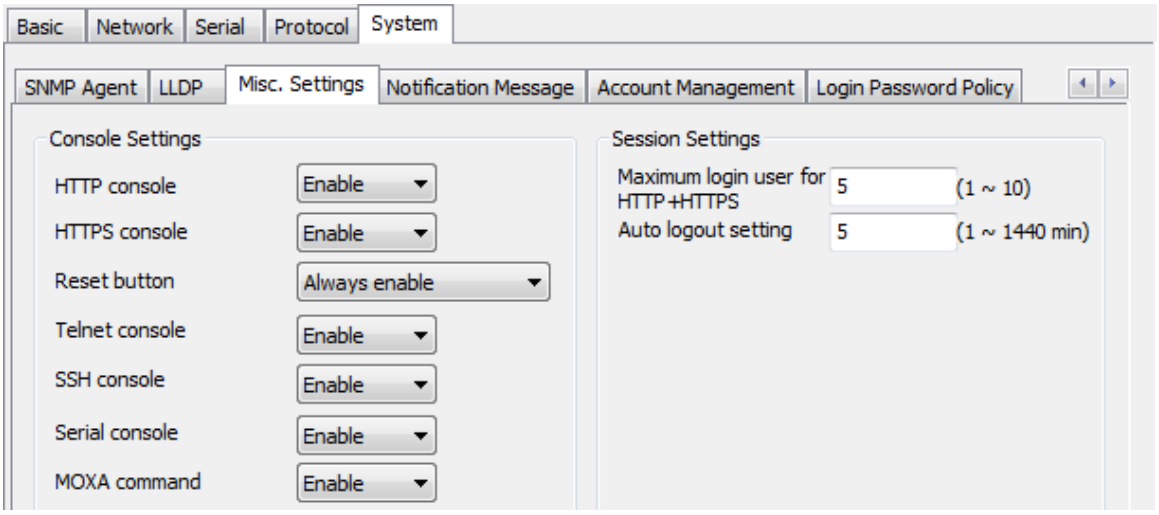
LLDP Settings



Parameters	Description
Message transmit interval	Default is 30 seconds. The allowable range is between 5 and 32,768 seconds.

Misc. Settings

To support various security levels, console and sessions can be further configured.

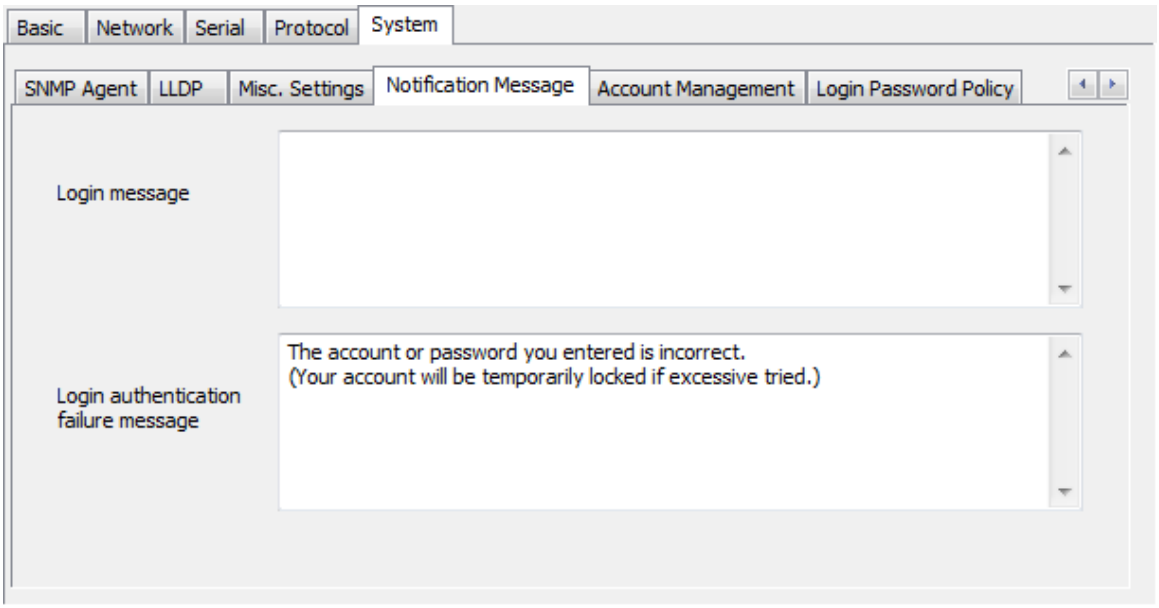


Console Settings

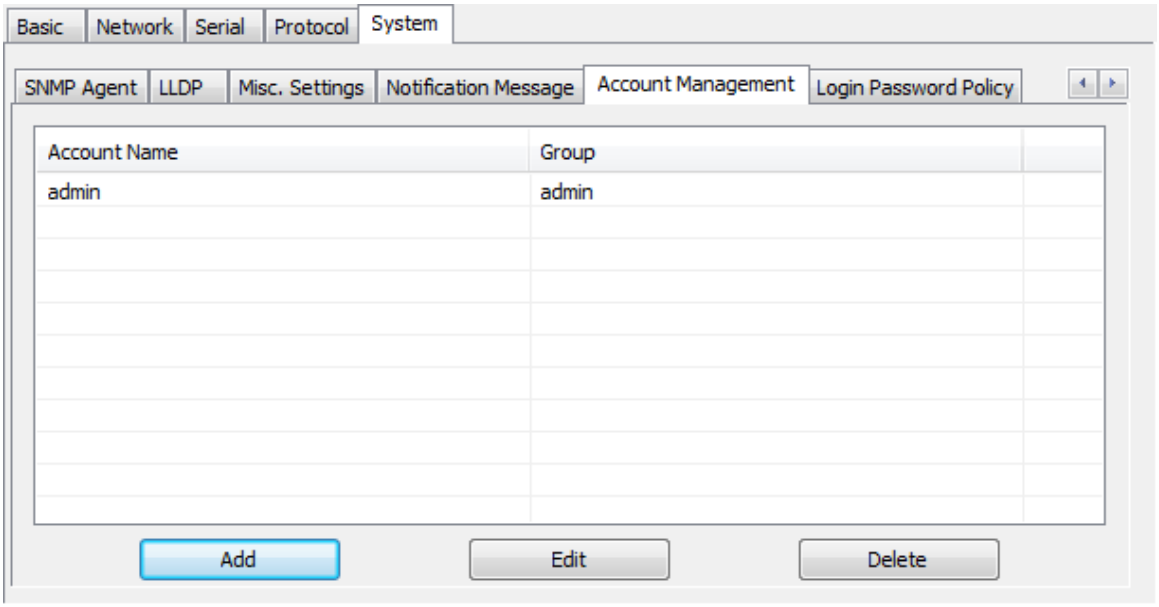
Configuration	Value	Description
HTTP/HTTPS	Enable/Disable	This setting is to enable/disable the web console. For security issues, users can only enable HTTPS or just disable all settings.
Telnet/SSH	Enable/Disable	The MGate Telnet/SSH function can be enabled or disabled.
Serial Console	Enable/Disable	The MGate serial console function can be enabled or disabled.
Reset button protect	Disable after 60 sec, Always enable	The MGate provides a reset button to clear passwords or load factory default settings. But for security issues, users can disable this function. In disabled mode, the MGate will still enable this function within 60 seconds after boot-up, just in case users really need to reset this function.
Moxa command	Enable/Disable	The MGate can be searched by the Device Search Utility (DSU). If you have any security concerns, you can choose Disable to deny the DSU right to access.

Session Settings	Value	Description
Maximum Login User for HTTP + HTTPS	1-10	The number of users that can access the MGate at the same time.
Auto Logout Setting	0-1440 min	Sets the auto-logout time

Notification Message

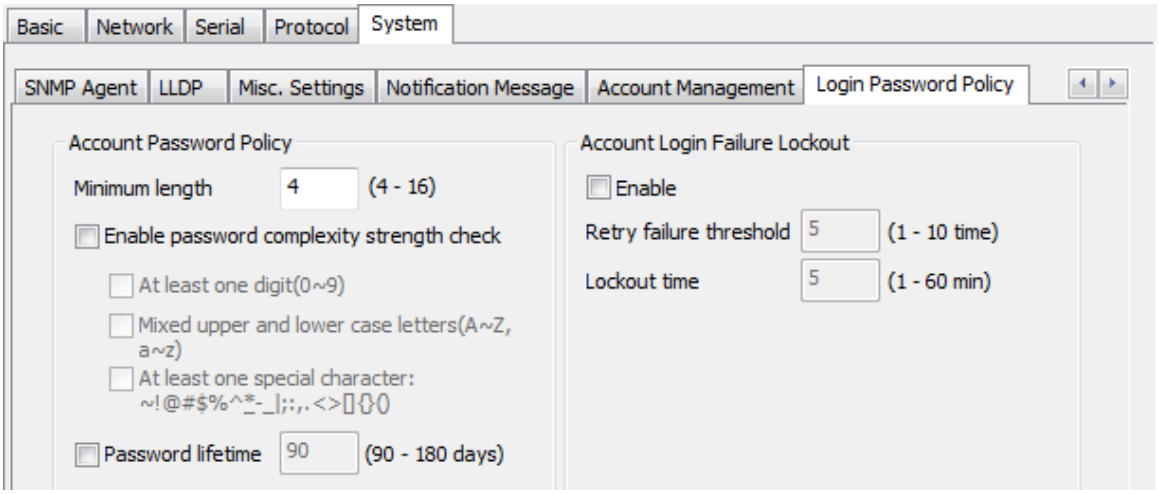


Account Management



Parameters	Value	Description
Account Name		Users can set up the account name for login purposes.
Group	Admin, user	Users can change the passwords for different accounts. The MGate provides two different user levels: **admin** and **user** with maximum 16 accounts. The admin account can access and modify all the settings through the web console. The user account can only view the settings and cannot change anything.

Login Password Policy

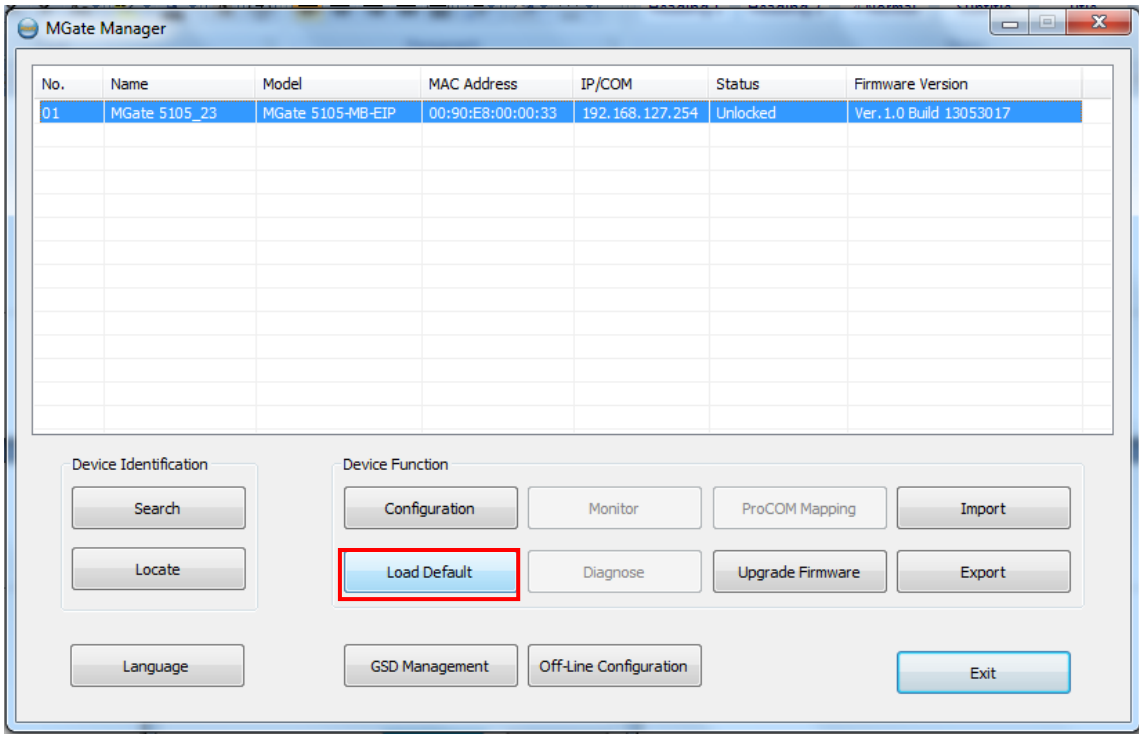


Account Password Policy	Value	Description
Minimum length	4 to 16	
Enable password complexity strength check		Select how the MGate checks password strength
Password lifetime	90to 180 days	Set the password lifetime period

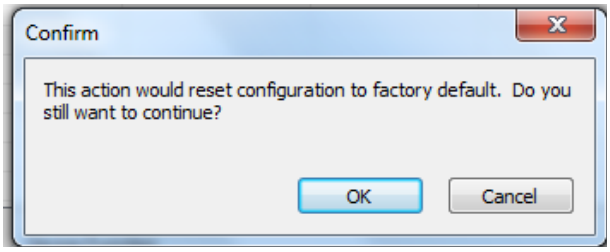
Account Login Failure Logout	Value	Description
Retry failure threshold	1 to 10 time(s)	
Lockout time	1 to 60 min	

Load Default

To clear all the settings on the unit, use the **Load Default** button to reset the unit to its initial factory default values.



Select **Load Default** and review the confirmation message. If you are sure you would like to reset the configuration to factory defaults, select the **OK** button. If not, select **Cancel**.



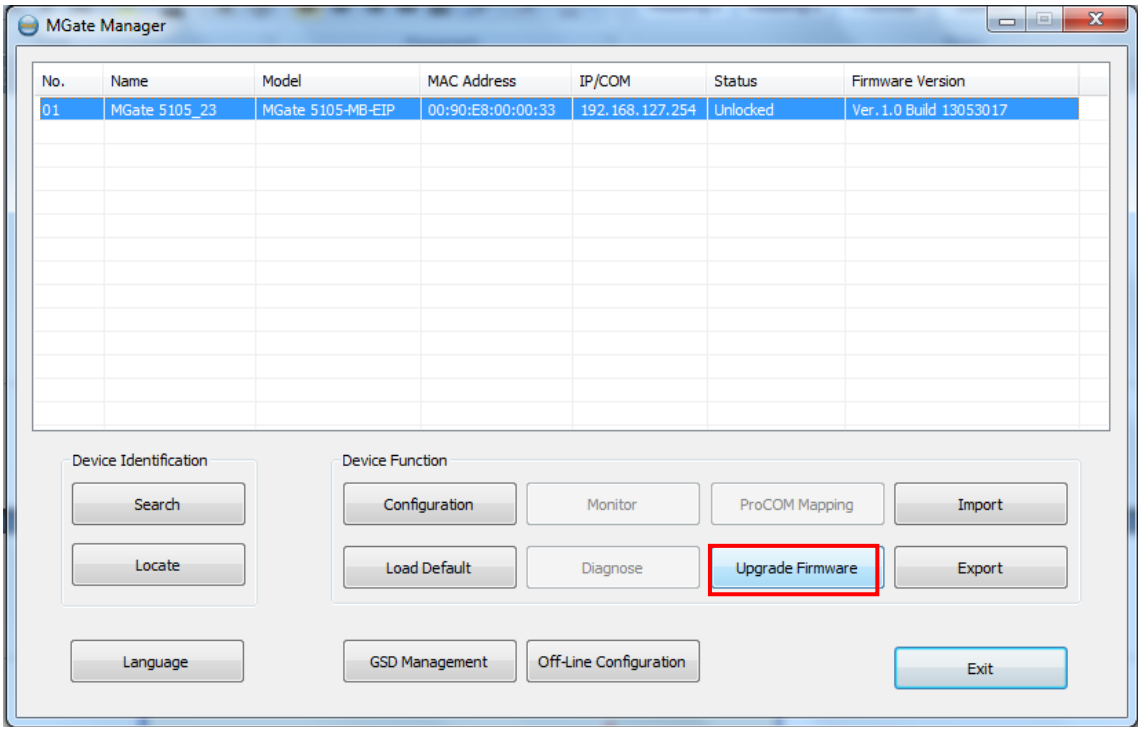
After the MGate Manager resets completely, MGate Manager will automatically execute a broadcast search for all MGate units on the LAN. Your MGate should reappear in the list of units.

ATTENTION

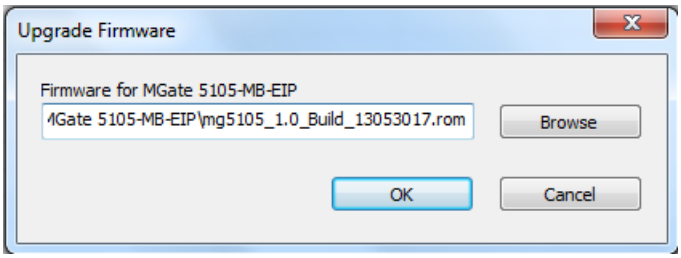
Load Default will completely reset the configuration of the unit, and all the parameters you have saved will be discarded. Do not use this function unless you are sure you want to completely reset your unit.

Upgrade Firmware

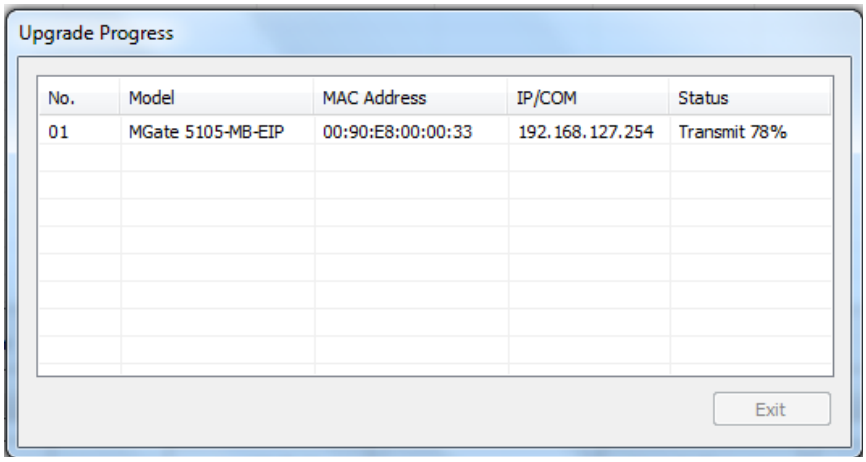
Firmware updates for the MGate 5105-MB-EIP are at www.moxa.com. After you have downloaded the new firmware onto your PC, you can use MGate Manager to write it onto your MGate 5105-MB-EIP. Select the desired unit from the list in MGate Manager and click **Upgrade Firmware** to begin the process.



The dialog boxes will guide you through the process. You will need to browse your PC for the firmware file. Make sure it matches your model.



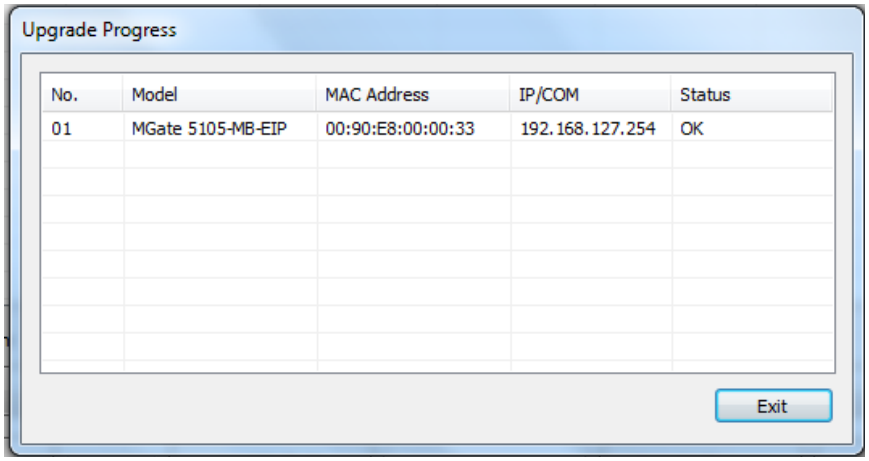
As the firmware is written to the unit, progress is displayed in the window.



ATTENTION

DO NOT turn off the MGate power before the firmware upgrade process is completed. The MGate will erase the old firmware to make room for the new firmware to flash memory. If you power off the MGate and terminate the progress, the flash memory will contain corrupted firmware and the MGate cannot boot. If this happens, call Moxa RMA services.

Once the firmware has been successfully written onto the unit, click **Exit** to close the Upgrade Firmware window. MGate Manager will automatically execute a broadcast search for all MGate units on the LAN. Your MGate should reappear in the list of units.



Import/Export

There are three main reasons for using the Import and Export functions.

- **Applying the same configuration to multiple units**

  The Import/Export configuration function is a convenient way to apply the same settings to units in different sites. You can export the configuration as a file and then import the configuration file onto other units at any time.

- **Backing up configurations for system recovery**

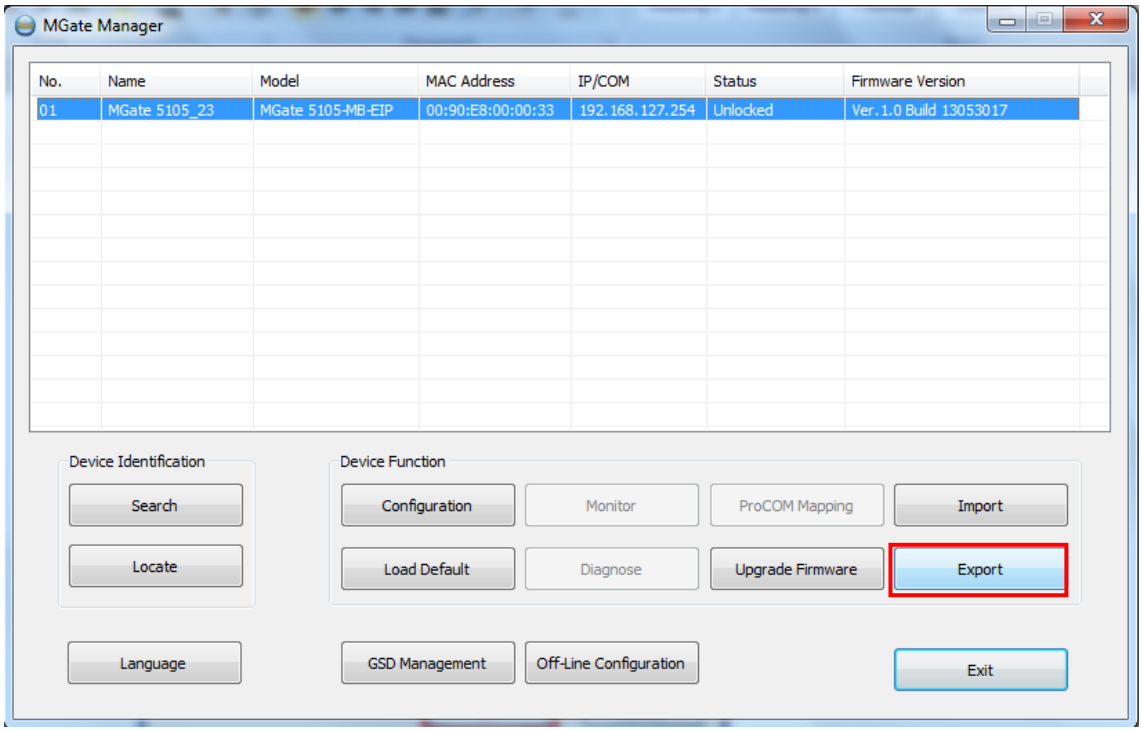
  The export function allows you to export configuration files that can be imported onto other gateways to restore malfunctioning systems within minutes.

- **Troubleshooting**

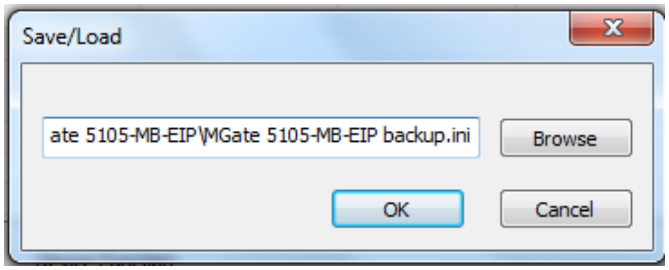
  Exported configuration files can help administrators identify system problems that provide useful information for Moxa's Technical Service Team when maintenance visits are requested.

Export Function

The export function saves all the configuration settings and parameters of the MGate 5105-MB-EIP in a ***.ini** file. To begin, select the **Export** button.



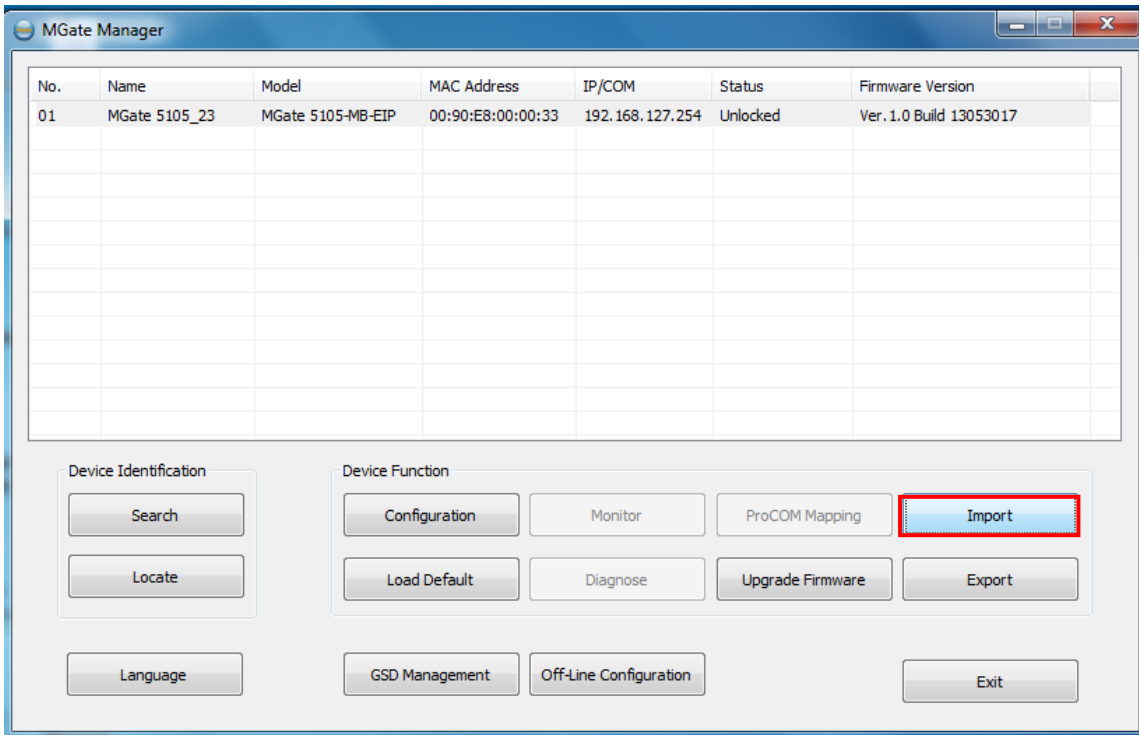
Enter a filename and use the **Browse** button to save the file to a specific path. Then, select the **OK** button.



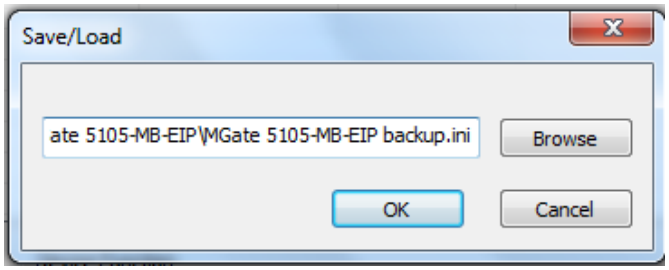
If you export the configuration file successfully, a confirmation message will pop up, and the configuration file will be saved as a ***.ini** file.

Import Function

Once the file is saved, it can be imported into your target unit to duplicate the same settings. Select the target unit first and then select the **Import** button to import.



Select the file you want to import and then the **OK** button



Wait for the MGate Manager to finish configuring the target device. If you import the configuration file successfully, a confirmation message will pop up. After closing the message dialog, the MGate Manager will automatically execute a broadcast search for all MGate units on the LAN. Your MGate should reappear in the list of units.

ATTENTION

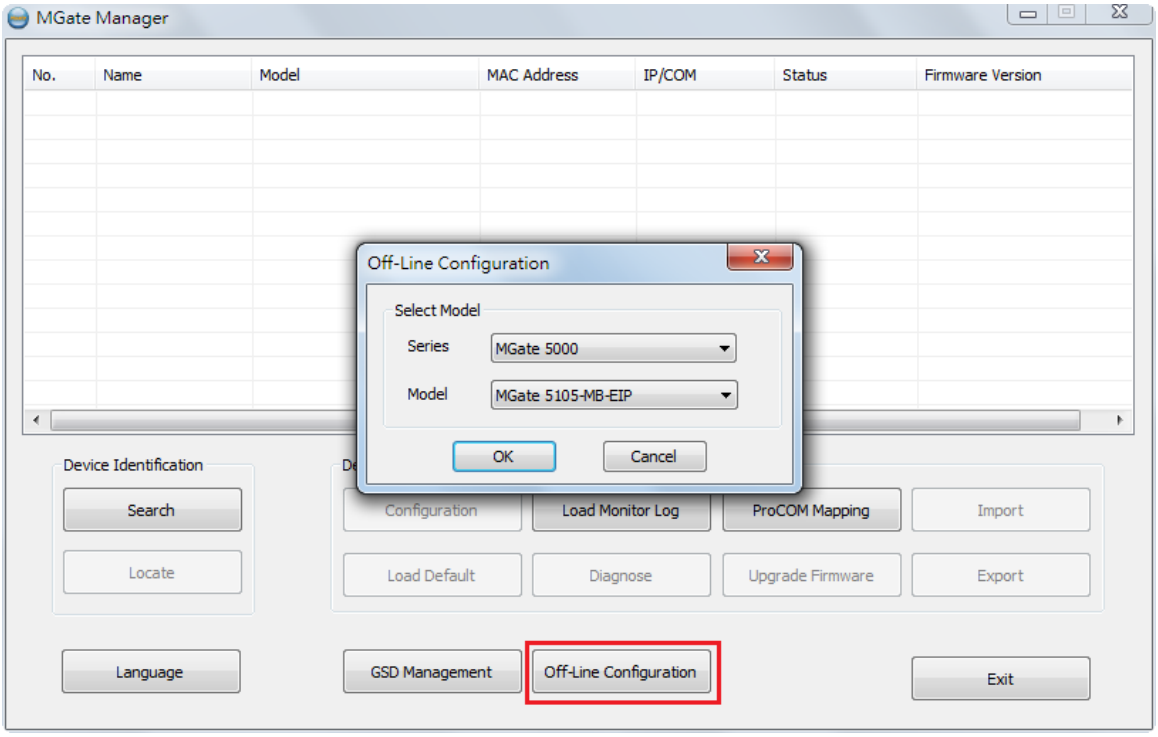
DO NOT turn off the MGate power before the firmware upgrade process is completed. The MGate will erase the old firmware to make room for the new firmware to flash memory. If you power off the MGate and terminate the process, all settings will disappear, and the MGate gateway will revert to factory defaults. If this happens, import the settings from the file again.

GSD Management

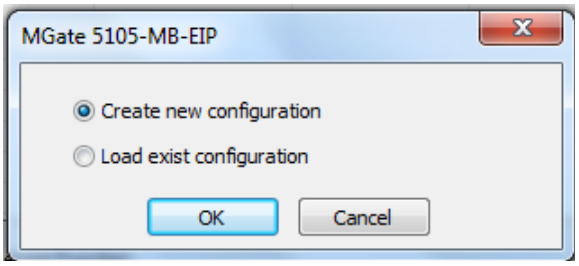
GSD Management is designed for PROFIBUS gateways (e.g., the MGate 5102-PBM-PN), so it cannot be used for the MGate 5105-MB-EIP.

Offline Configuration

Create or change the configuration file manually through MGate Manager by first generating the configuration file with the **Export** function. The file generated by this function can also be used for the **Import** function. To use this function, click the **Off-Line Configuration** button to load the configuration window.



Choose either **Create new configuration** or **Load exist configuration** to edit the configuration.



For more details, refer to **Chapter 3: Modifying the Configuration** above. When all configuration settings are finished, select **OK** to save the updates to the configuration file.

4. Web Console Configuration and Troubleshooting

Overview

The MGate 5105-MB-EIP supports configuration and troubleshooting by web console. This chapter will focus only on the settings that can be configured via the web console. These include monitoring and troubleshooting functions, such as how to check I/O data transmission, troubleshoot configurations, run diagnostics, etc. More detailed information about other configuration settings can be found in Chapter 3.

To connect to the MGate web console, open a web browser and enter the MGate gateway's IP address.

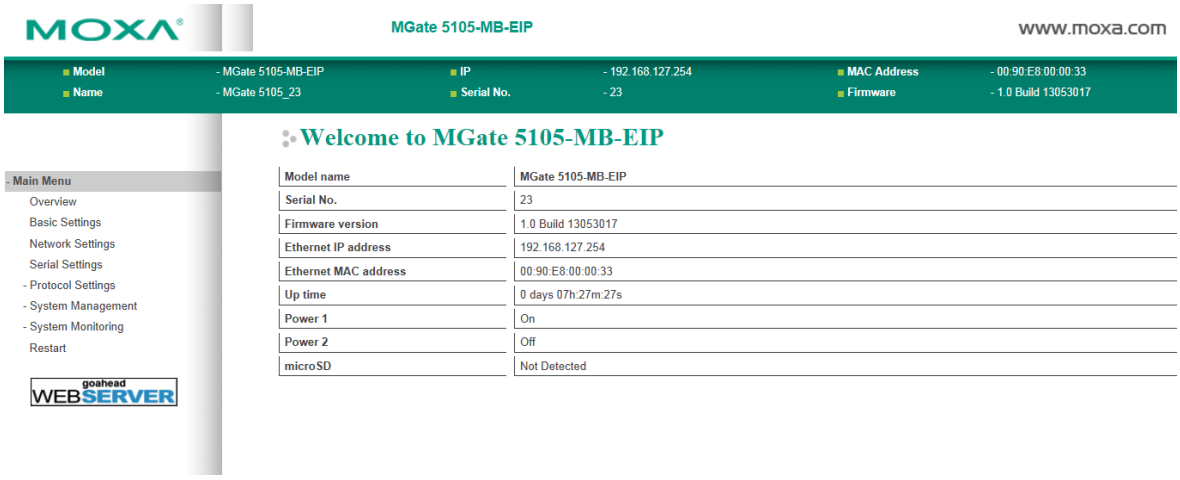
http://<MGate IP address>

or

https://<MGate IP address>

On the first page, specify the account type and enter the password. Only two types of accounts are supported: admin and user. The **admin** account can change all the settings, whereas the **user** account only can view settings and cannot change any configurations. The default password is **moxa**.

All available configuration items are listed in the left panel tree. Select an item to view detailed options in the panel on the right. To activate the changes, select the **Submit** button before leaving the current page. If necessary, the MGate gateway will restart to activate the settings.



Common Settings

Refer to the appropriate reference section in **Chapter 3: MGate Manager Configuration** of this user's manual for each MGate Manager settings page.

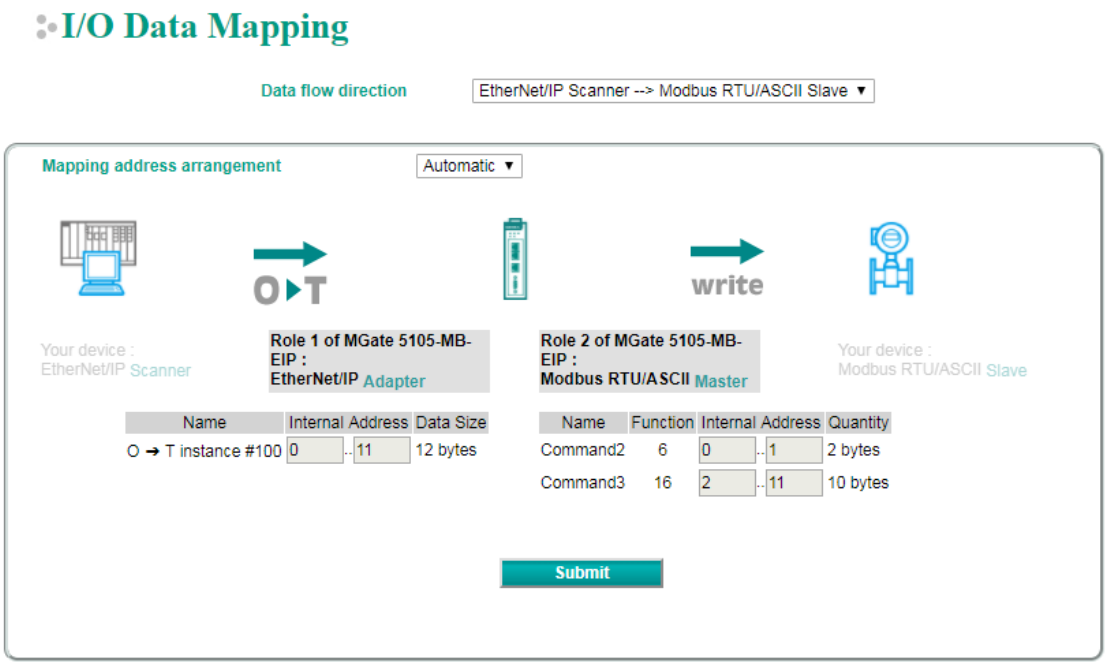
MGate Manager Settings Page	Reference Section in Chapter 3
Basic Settings	See Configure Device section
Network Settings	See Network Settings section
Serial Settings	See Serial Settings section
Protocol Settings - Protocol Conversion	See Protocol Settings section
Protocol Settings - EtherNet/IP	See EtherNet/IP Settings section
Protocol Settings - Modbus RTU/ASCII	See Modbus RTU/ASCII Settings section
Protocol Settings - Modbus TCP	See Modbus TCP Settings section
System Management—Accessible IP List	See Accessible IP Settings section
System Management—System Log Settings	See System Log Settings section
System Management—Auto Warning Settings	See Auto Warning Settings section
System Management—E-mail Alert	See E-mail Alert Settings section
System Management—SNMP Trap	See SNMP Trap Settings section
System Management—SNMP Agent	See SNMP Agent Settings section
System Management—LLDP Settings	See LLDP Settings section
System Management—Misc. Settings	See Misc. Settings section
System Management—Maintenance - Firmware Upgrade	See Upgrade Firmware section
System Management—Maintenance - Configuration Import/Export	See Import/Export section
System Management—Maintenance - Load Factory Default	See Load Default section

Besides the common settings above, the following functions mentioned in this chapter are only available in the web console.

Protocol Settings

Protocol Settings—I/O Data Mapping

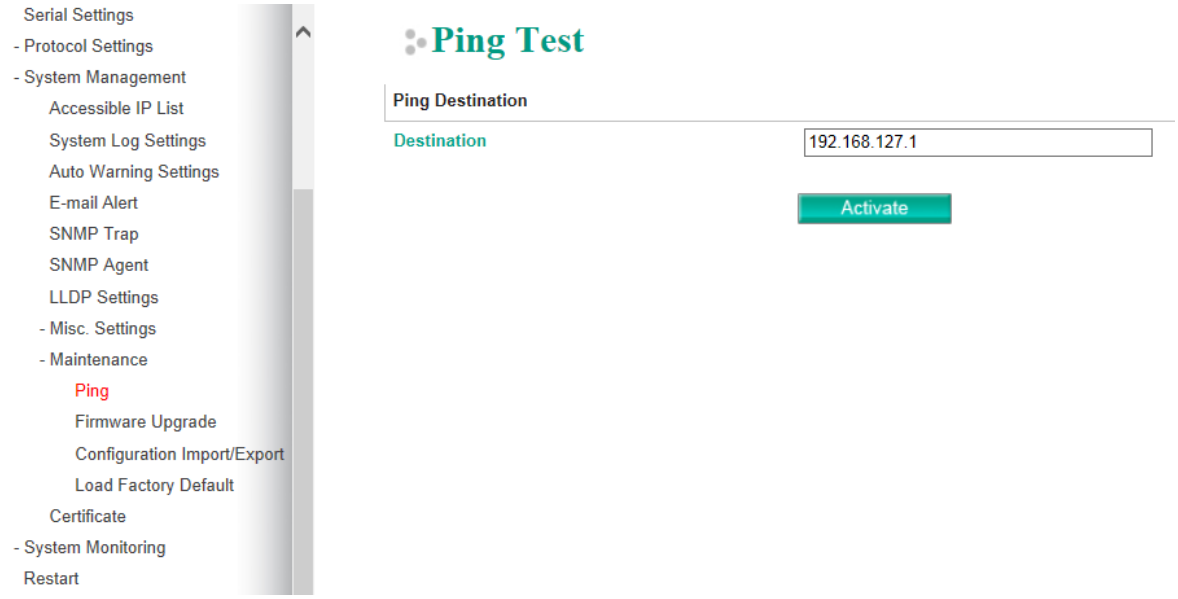
Here, you could click left on EtherNet/IP I/O connection. For example, select O-> T Instance #100, which will show what Modbus commands are included in the table on the right.



System Management

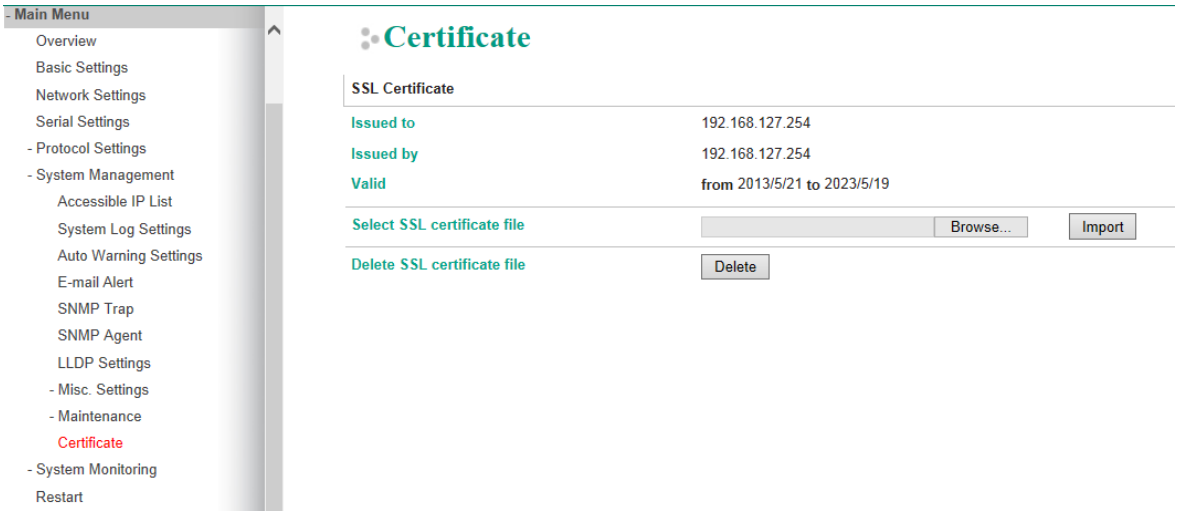
System Management—Maintenance—Ping

This network testing function is available only on the web console. The MGate gateway will send an ICMP packet through the network to a specified host, and the result can be viewed on the web console immediately.



System Management—Certificate

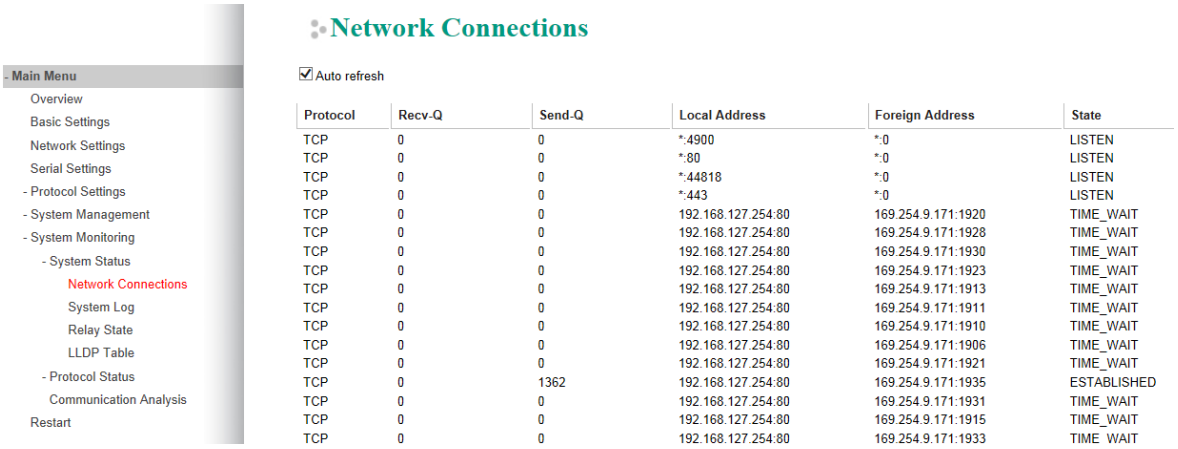
Use this function to load the Ethernet SSL certificate. Select or browse for the certificate file in the **Select SSL certificate/key file** field. This function is only available on the web console.



System Monitoring

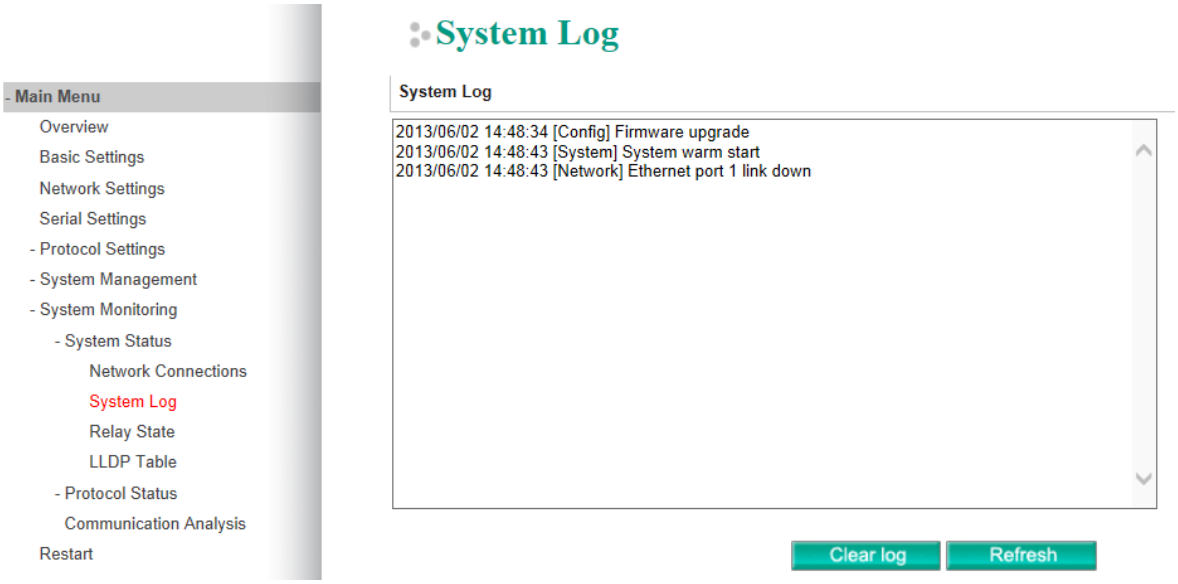
System Monitoring—System Status—Network Connections

Go to **Network Connections** under **System Status** to view network connection information.



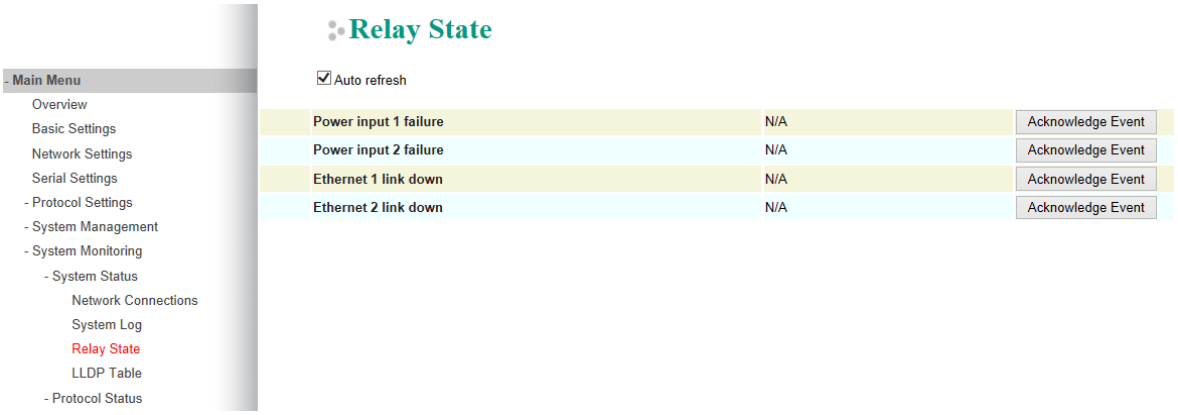
Protocol	Recv-Q	Send-Q	Local Address	Foreign Address	State
TCP	0	0	*:4900	*:0	LISTEN
TCP	0	0	*:80	*:0	LISTEN
TCP	0	0	*:44818	*:0	LISTEN
TCP	0	0	*:443	*:0	LISTEN
TCP	0	0	192.168.127.254:80	169.254.9.171:1920	TIME_WAIT
TCP	0	0	192.168.127.254:80	169.254.9.171:1928	TIME_WAIT
TCP	0	0	192.168.127.254:80	169.254.9.171:1930	TIME_WAIT
TCP	0	0	192.168.127.254:80	169.254.9.171:1923	TIME_WAIT
TCP	0	0	192.168.127.254:80	169.254.9.171:1913	TIME_WAIT
TCP	0	0	192.168.127.254:80	169.254.9.171:1911	TIME_WAIT
TCP	0	0	192.168.127.254:80	169.254.9.171:1910	TIME_WAIT
TCP	0	0	192.168.127.254:80	169.254.9.171:1906	TIME_WAIT
TCP	0	0	192.168.127.254:80	169.254.9.171:1921	TIME_WAIT
TCP	0	1362	192.168.127.254:80	169.254.9.171:1935	ESTABLISHED
TCP	0	0	192.168.127.254:80	169.254.9.171:1931	TIME_WAIT
TCP	0	0	192.168.127.254:80	169.254.9.171:1915	TIME_WAIT
TCP	0	0	192.168.127.254:80	169.254.9.171:1933	TIME_WAIT

System Monitoring—System Status—System Log



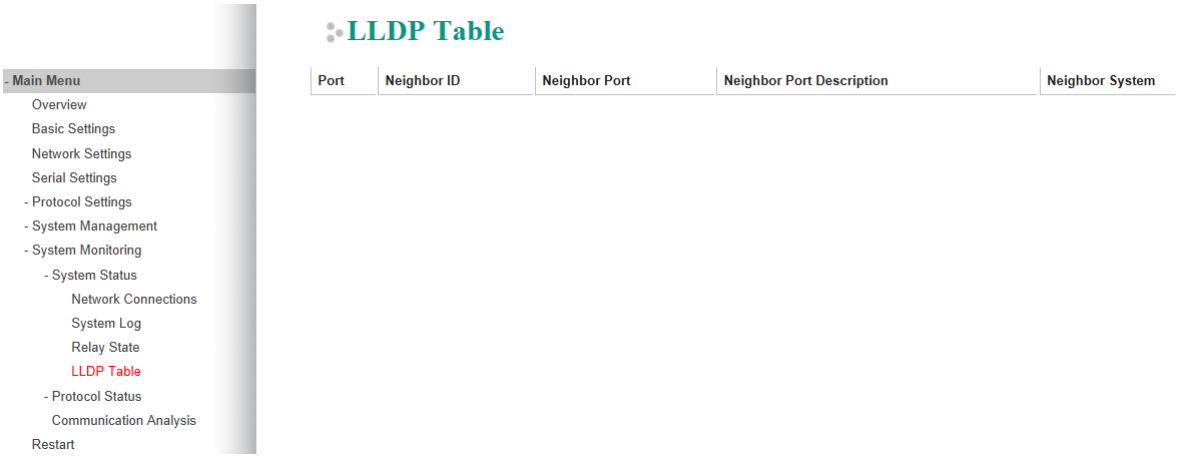
System Monitoring—System Status—Relay Status

The MGate gateway includes a built-in relay circuit that is triggered in the event of a power failure or if the Ethernet link is down. View the relay status on this page.



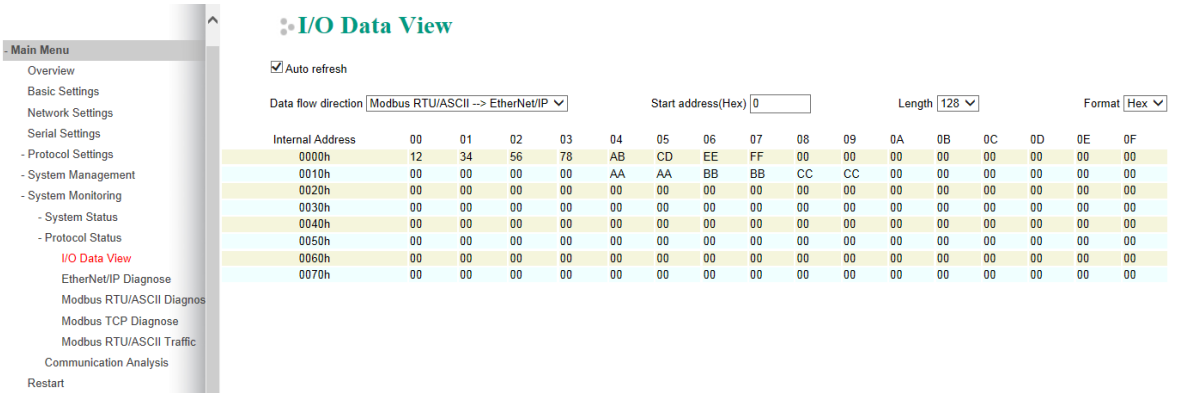
System Monitoring—System Status—LLDP Tables

See LLDP-related information, including Port, Neighbor ID, Neighbor Port, Neighbor Port Description, and Neighbor System.



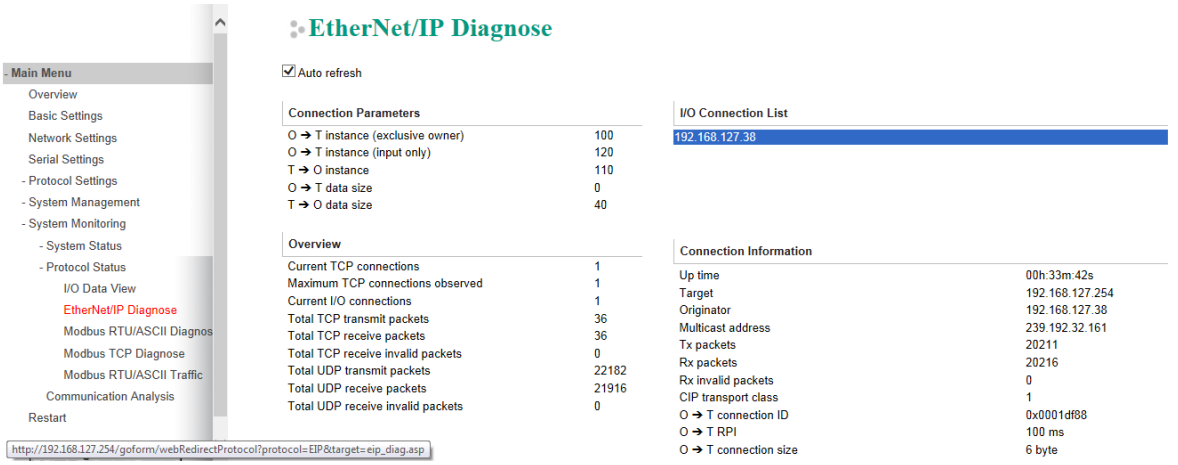
System Monitoring—Protocol Status—I/O Data View

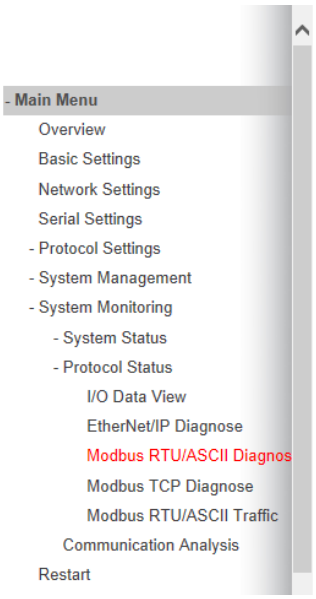
This page displays internal memory information for input and output data transfers. View updated values for communication verification here. This function is only available on the web console and the text-mode console.



System Monitoring—Protocol Status—Diagnose: Modbus and EhterNet/IP

The MGate provides status information for EtherNet/IP, Modbus RUB/ASCII, and Modbus TCP troubleshooting. Verify data or packet counters to make sure the communications are running smoothly.

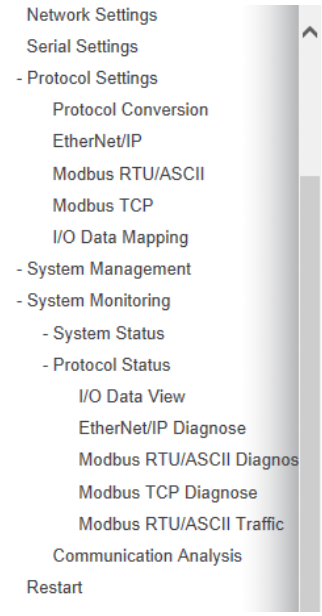




Modbus RTU/ASCII Diagnose

☑ Auto refresh

Category	Item	Value
Modbus		
	Mode	RTU Master
	Sent request	3294
	Received valid response	3294
	Received invalid response	0
	Received CRC/LRC Error	0
	Received exception	0
	Timeout	0
Serial Port		
	Port number	1
	Break	0
	Frame error	0
	Parity error	0
	Overrun error	0



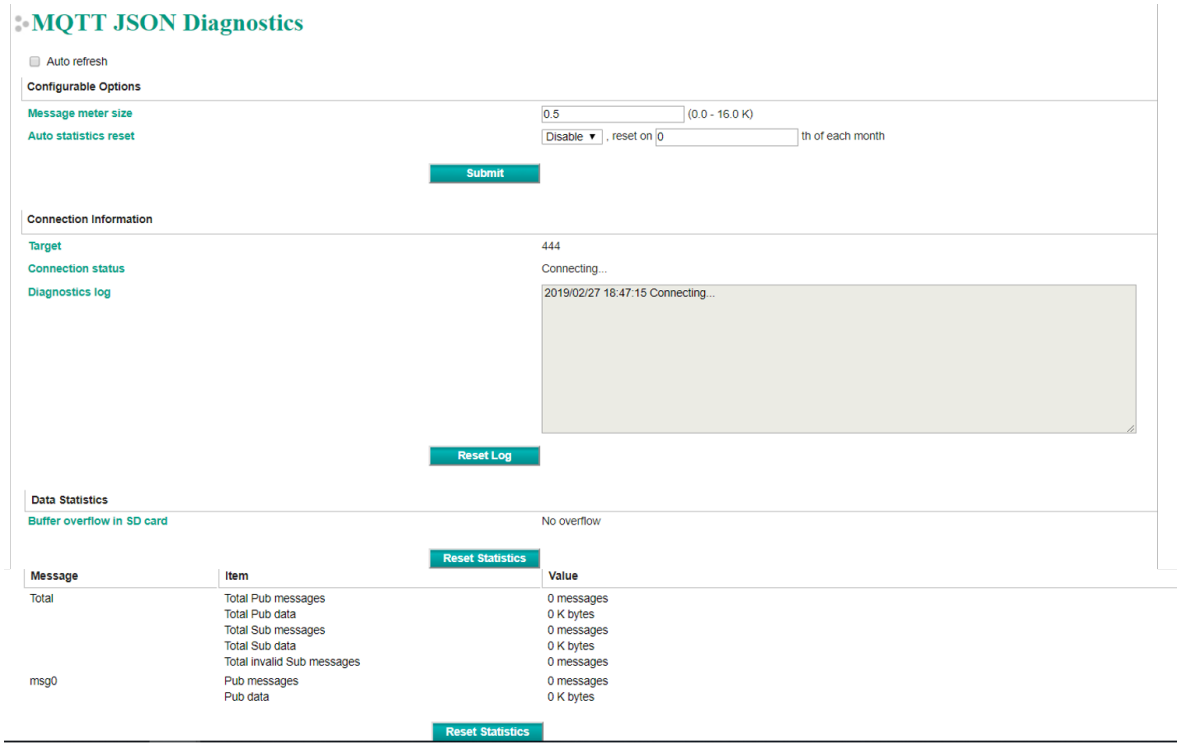
Modbus TCP Diagnose

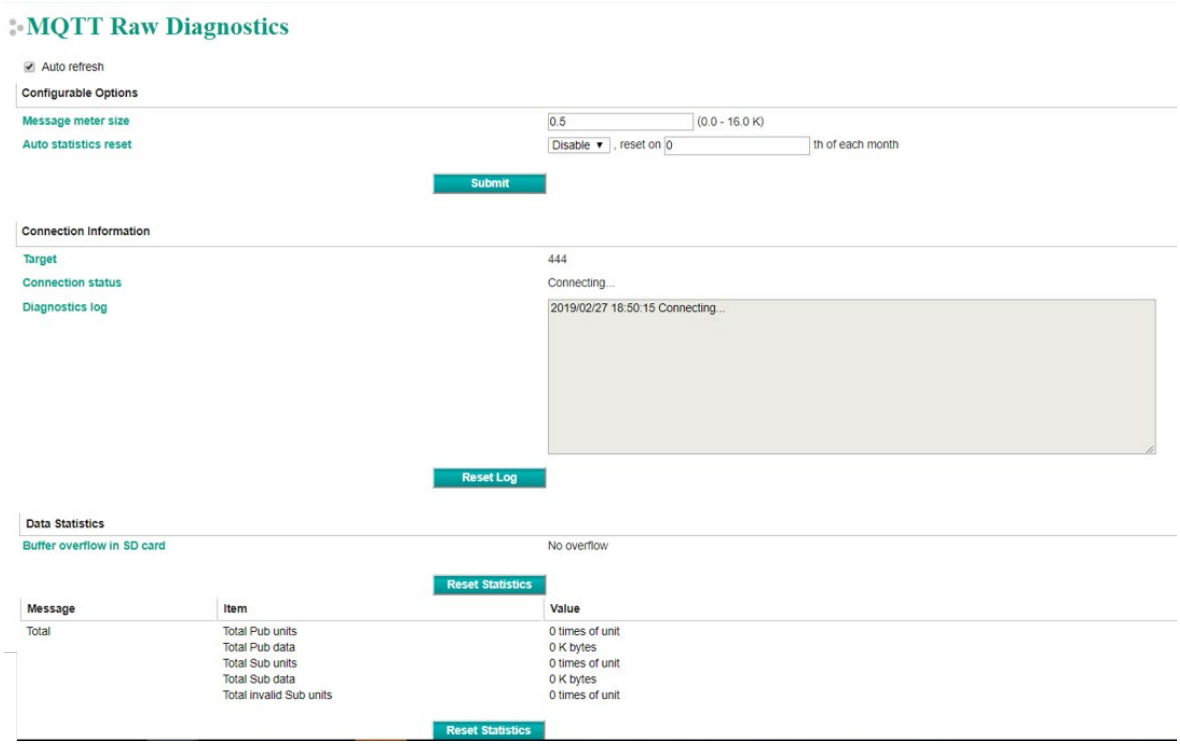
☑ Auto refresh

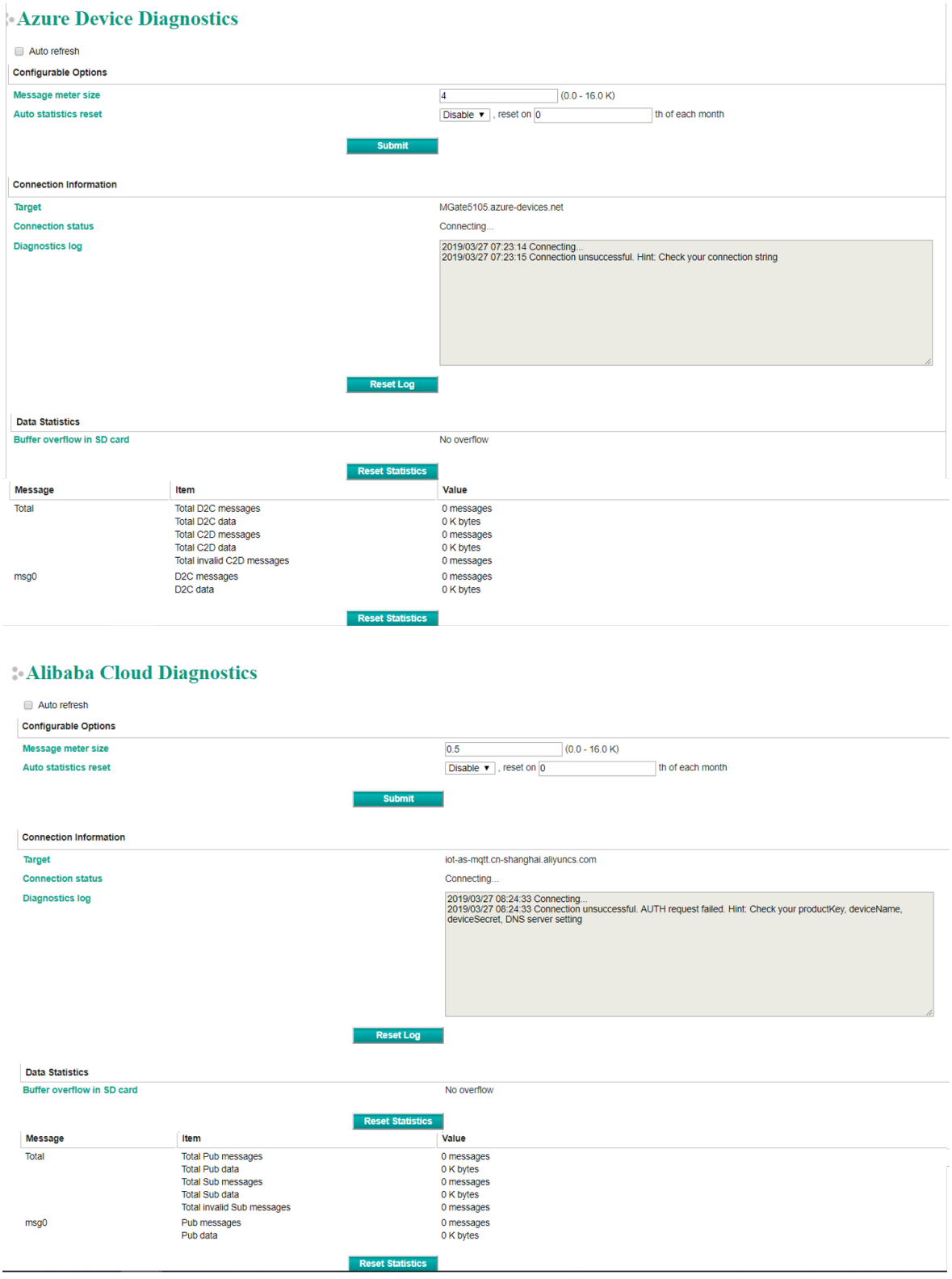
Category	Item	Value
Modbus		
	Mode	Master
	Number of connection	0
	Sent request	0
	Received valid response	0
	Received invalid response	0
	Received exception	0
	Timeout	0
Connections		

System Monitoring—Protocol Status—Diagnose: MQTT/Cloud

The MGate provides status information for northbound connectivity of MQTT/ Cloud for troubleshooting. Verify data or packet counters to make sure the communications are running smoothly.






Azure Device Diagnostics
Auto refresh
Configurable Options
Message meter size
4
(0.0 - 16.0 K)
Auto statistics reset
Disable
, reset on
0
th of each month
Submit
Connection Information
Target
MGate5105.azure-devices.net
Connection status
Connecting...
Diagnostics log
2019/03/27 07:23:14 Connecting...
2019/03/27 07:23:15 Connection unsuccessful. Hint: Check your connection string
Reset Log
Data Statistics
Buffer overflow in SD card
No overflow
Reset Statistics
Message
Item
Value
Total
Total D2C messages
0 messages
Total D2C data
0 K bytes
Total C2D messages
0 messages
Total C2D data
0 K bytes
Total invalid C2D messages
0 messages
msg0
D2C messages
0 messages
D2C data
0 K bytes
Reset Statistics
Alibaba Cloud Diagnostics
Auto refresh
Configurable Options
Message meter size
0.5
(0.0 - 16.0 K)
Auto statistics reset
Disable
, reset on
0
th of each month
Submit
Connection Information
Target
iot-as-mqtt.cn-shanghai.aliyuncs.com
Connection status
Connecting...
Diagnostics log
2019/03/27 08:24:33 Connecting...
2019/03/27 08:24:33 Connection unsuccessful. AUTH request failed. Hint: Check your productKey, deviceName, deviceSecret, DNS server setting
Reset Log
Data Statistics
Buffer overflow in SD card
No overflow
Reset Statistics
Message
Item
Value
Total
Total Pub messages
0 messages
Total Pub data
0 K bytes
Total Sub messages
0 messages
Total Sub data
0 K bytes
Total invalid Sub messages
0 messages
msg0
Pub messages
0 messages
Pub data
0 K bytes
Reset Statistics

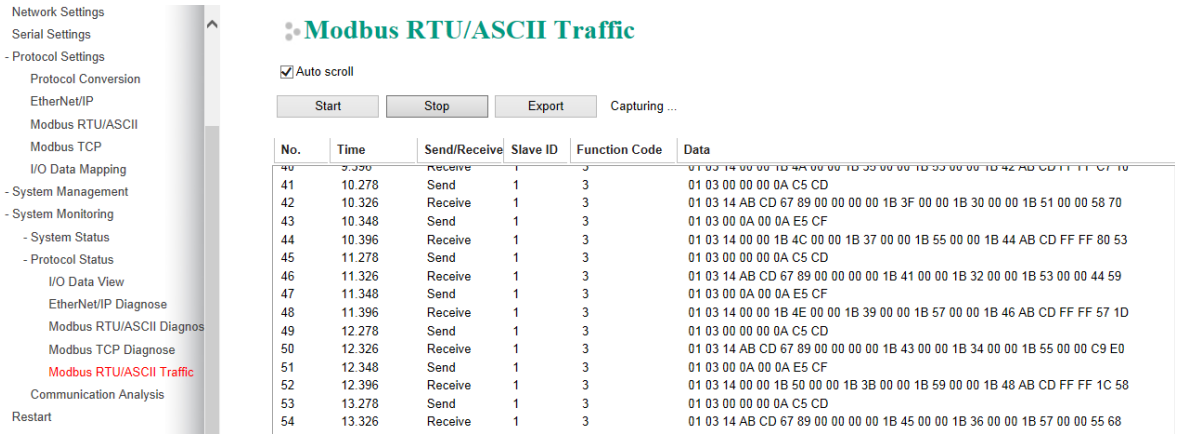
Parameters	Value	Default	Description
Message meter size	(0.0 to 16.0 K)	4	Depending on the cloud service's pricing structure, the message meter size can be configured. For example, Azure's message meter size is 4k; Alibaba Cloud's message meter size 0.5k for a free tier service.
Auto statistics reset	Disable, Enable	Disable	Enable/Disable auto-reset monthly statistics

Parameters	Value	Description
Target		Current target connecting to the cloud service
Connection status	Connected/Connecting/ Disconnected	Current connection status
Diagnostics log		Connection behavior and event log messages for troubleshooting

Parameters	Description
Buffer Overflow in SD card	The data statistics of the microSD card. If the data overflow function is disabled or the buffering data is accurately stored on the microSD card, the "No overflow" notification will be shown.
Parameters	Description
Message	The total messages and individual messages will be listed, such as total messages or individual message
Item	Current items of messages, such as total pub units, total pub data, total D2C units (for Azure), total D2C data (for Azure), pub unit, pub data
Value	Current values of the items, such as "times of unit" for (total) pub unit, "K bytes" for (total) pub data

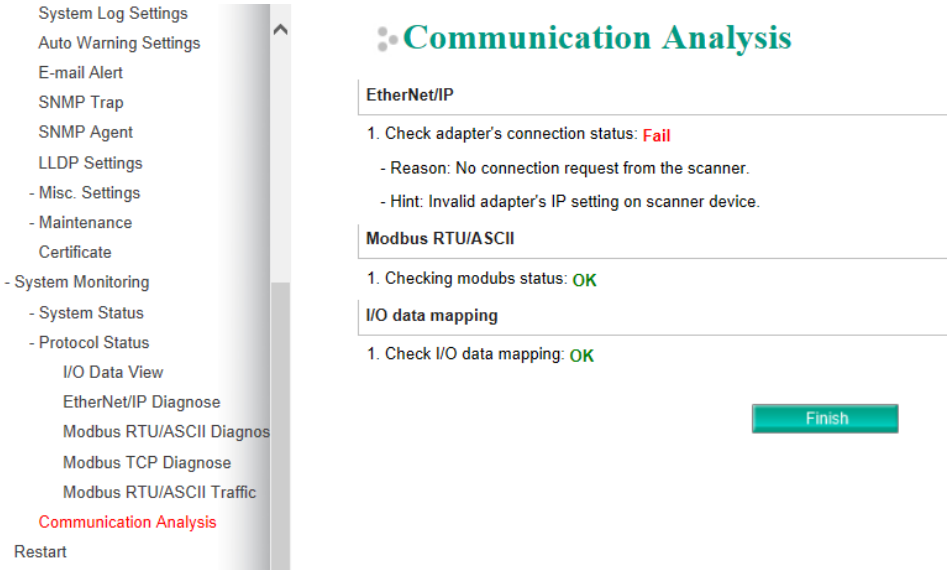
System Monitoring—Protocol Status—Modbus RTU/ASCII Traffic

For troubleshooting or management purposes, monitor the Modbus RTU/ASCII data passing through the MGate 5105-MB-EIP on the network. Rather than simply echoing the data, MGate Manager presents the data in an intelligent, easy-to-understand format with clearly designated fields, including source, type, destination, contents, and more. Events can be filtered in different ways, and the complete log can be saved to a file for later analysis.



System Monitoring –Communication Analysis

After finishing all configurations, use **Communication Analysis** to confirm whether the settings are correct. Click **Start** and wait for 10 seconds, and an analysis report will appear with detailed failed statuses, warnings, and hints.



Fault Protection and Status Monitoring

Fault Protection

The Fault Protection function sends a predefined setting to field devices to prevent incorrect actions when the upstream connection is lost. The MGate 5105 supports a fault protection function when in agent mode. You can configure the criteria to determine what to do when the write command is no longer received from the master side. For example, when a communication cable comes loose accidentally, the most up-to-date write command from the master side will not be received by the gateway. Hence, the slave device will use the latest command from the gateway, which is now out of date, creating an inconsistency between the master and slave devices. To avoid this problem, the MGate 5105 supports options to determine which actions should be taken when the master's side is disconnected from the gateway.

Options	Description
Keep latest data	The gateway will write the same data to the slave device.
Clear data to zero	The gateway will write zero values to the slave device.
User-define value	A user-defined value will be written to the slave device.

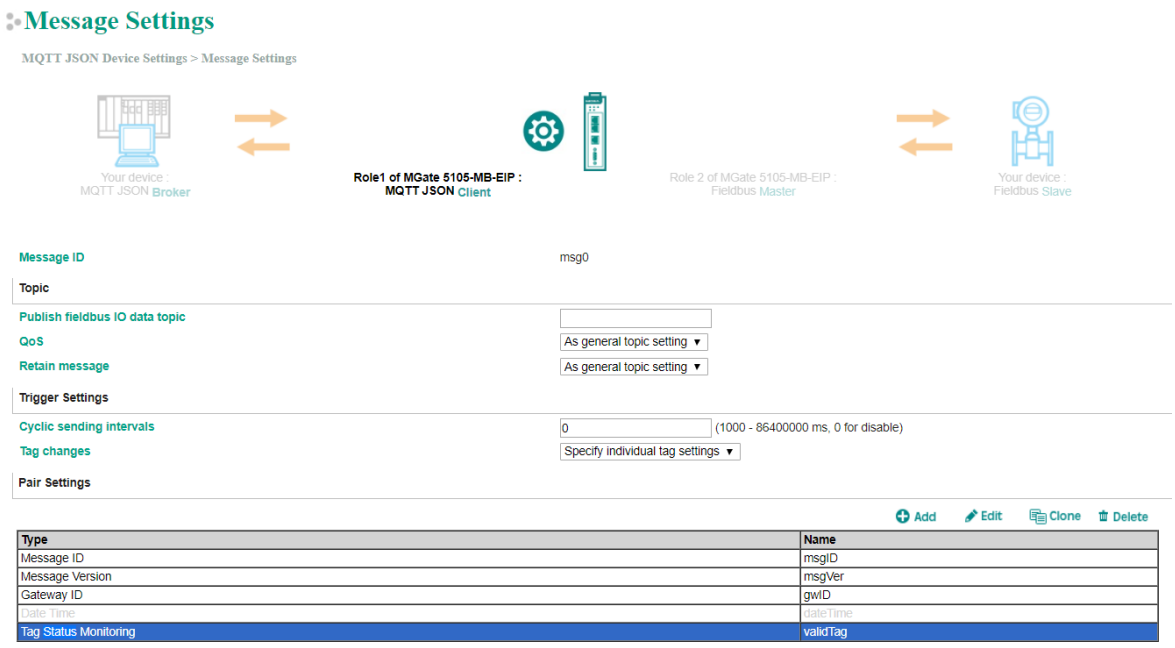
Status Monitoring

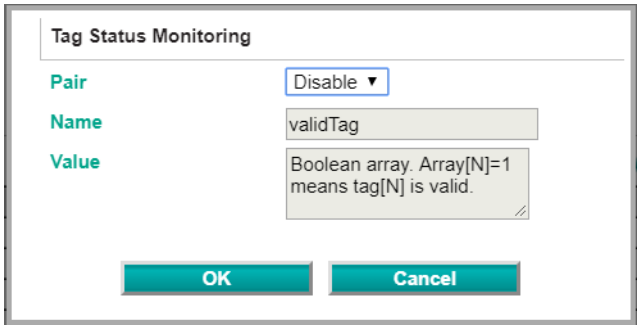
The Status Monitoring function provides status information of field devices when the MGate is being used as a master/client. If a slave device fails or a cable comes loose, generally the gateway won't be able to receive up-to-date data from the slave device. The out-of-date data will be stored in the gateway's memory and will be retrieved by the master device (e.g., PLC), which will not be aware that the slave device is not providing up-to-date data. The MGate supports the Status Monitoring function, which provides a warning mechanism to report the list of slave devices that are still "alive."

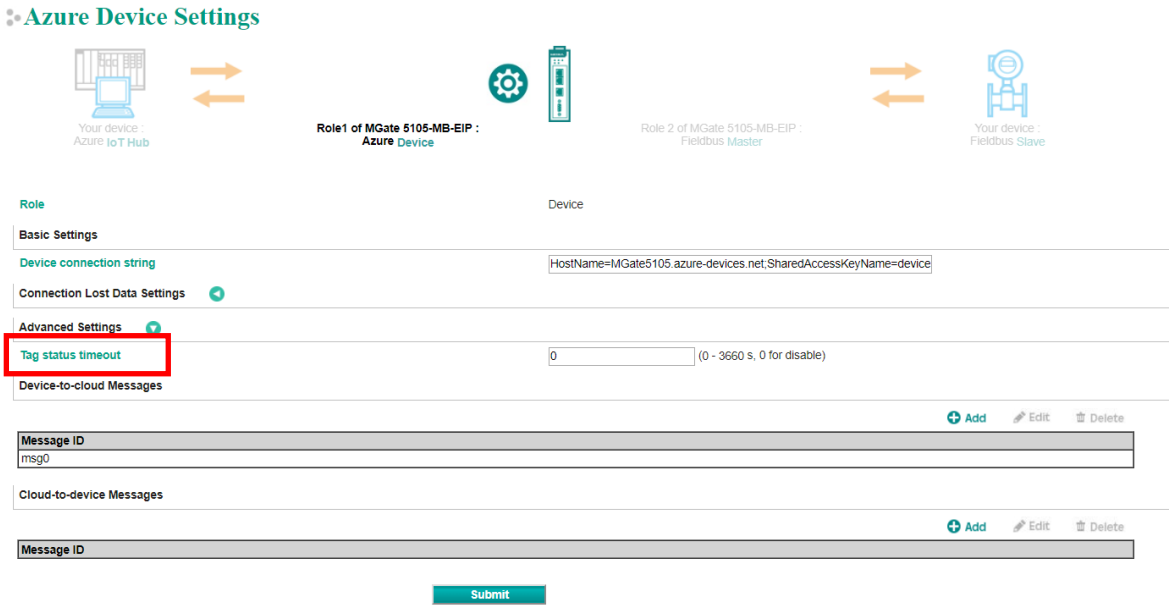
The MGate 5105 allocates one bit of the gateway's specified memory address to show the status of each Modbus command as being normal or abnormal. If a command has run successfully, the status value will continuously be 1. On the contrary, if a command has failed, the status will be set to 0. In this case, the master device will know the failure status of the slave device.

	Modbus RTU/ASCII/TCP	EtherNet/IP
Method	Modbus function code: 0x03 or 0x04	Through UCMM with Class ID 0x405, Instance ID 1, Attribute 0.
Data address	60000	
Data unit	word byte	

While using the MGate 5105 for data exchange between MQTT/Cloud and fieldbus protocols, the MGate 5105 also supports the **Tag Status Monitoring** function to identify the status of the fieldbus devices. By enabling the **Tag Status Monitoring** function within **Pair Settings session** under the **Message settings** process, the northbound message will include the **validTag** value to represent the status of the fieldbus device. Then, enable the **Tag Status Timeout** function within A**dvanced Settings** under each **MQTT/ Cloud Setting** page with a specified timeout period. The Tag Status Monitoring function will then be activated successfully. If a command has run successfully, the tag status value will continue to be 1. However, if a command has failed within the specified Tag Status Timeout period, the status will be set at 0. In this case, the MQTT broker/cloud will notice the failure status of the slave device.




Tag Status Monitoring
Pair
Disable
Name
validTag
Value
Boolean array. Array[N]=1 means tag[N] is valid.
OK
Cancel


Azure Device Settings
Your device : Azure IoT Hub
Role1 of MGate 5105-MB-EIP : Azure Device
Role 2 of MGate 5105-MB-EIP : Fieldbus Master
Your device : Fieldbus Slave
Role
Device
Basic Settings
Device connection string
HostName=MGate5105.azure-devices.net;SharedAccessKeyName=device
Connection Lost Data Settings
Advanced Settings
Tag status timeout
0
(0 - 3660 s, 0 for disable)
Device-to-cloud Messages
Add
Edit
Delete
Message ID
msg0
Cloud-to-device Messages
Add
Edit
Delete
Message ID
Submit