MGate 5118 Series J1939 Gateway User Manual

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MGate 5118 Series J1939 Gateway User Manual

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Table of Contents

1. Introduction 5
Overview 5
Package Checklist 6
Product Features 6
2. Getting Started 7
Connecting the Power 7
Connecting Serial Devices 7
RS-485 Termination and Pull High/Low Resistors 7
Connecting to a Host or the Network 8
Installing the Software (Optional) 8
Wiring Requirements 8
LED Indicators 9
Dimensions 10
Adjustable Pull High/Low Resistors for the Serial Port 10
Pin Assignments 11
Power Input and Relay Output (SELV) Pinouts 11
Hardware Installation 12
Specifications 12
microSD Card 12
Backing Up a Configuration 13
Configuring an MGate (Mass deployment/Replacement) 13
microSD card Write Failure 13
Quick Setup 14
Step 1: System Setting 14
Step 2: Select Protocol 14
Step 3 and 4: Role 1 and Role 2 of MGate 5118 15
Step 5: Finish 17
3. Device Search Utility 18
Installing the Software 18
Starting the Device Search Utility (DSU) 21
Connecting to the Unit 22
Broadcast Search 22
Search IP 23
Locate 24
Upgrading the Firmware 24
4. Web Console Configuration 25
Overview 25
Basic Settings 26
Network Settings 27
Serial Settings 28
Protocol Settings 29
1. J1939 Settings 29
2. Modbus TCP Client (Master) Settings 32
3. Modbus TCP Server (Slave) Settings 34
4. Modbus RTU/ASCII (Master) Settings 35
5. Modbus RTU/ASCII (Slave) Settings 37
6. EtherNet/IP Setting 38
7. PROFINET Setting 40
I/O Data Mapping 41
System Management 41
Accessible IP Settings 41
DoS Defense 42
System Log Settings 43
Auto Warning Settings 44
E-mail Alert Settings 44
SNMP Trap Settings 45
SNMP Agent Settings 45
LLDP Settings 45

Certificate 46
Misc. Settings 46
Maintenance 48
System Monitoring 50
System Status 50
Protocol Status 51
Fault Protection and Status Monitoring 55
Restart 55
Logout 56
Network Management Tool (MXstudio) 56
A. CIP Objects of EtherNet/IP 57

1. Introduction

Welcome to the MGate 5118 CAN-J1939 Gateway Series that converts J1939 to Modbus RTU/ASCII/TCP, PROFINET, and EtherNet/IP protocols.

All the 5118 gateways have dual DC power input for redundancy. Magnetic serial port isolation is also provided.

In this chapter, we introduce the MGate 5118.

Overview

The MGate 5118 Industrial Protocol Gateway Series supports the SAE J1939 protocol, which is based on CAN bus (Controller Area Network). SAE J1939 is used to implement communication and diagnostics among vehicle components, diesel engine generators, and compression engines, and it is suitable for the heavy-duty truck industry and backup power systems. It is now common to use an engine control unit (ECU) to control these kinds of devices, and more and more applications are using PLCs for process automation to monitor the status of J1939 devices connected to an ECU.

The MGate 5118 Series supports the Modbus RTU/ASCII/ TCP, EtherNet/IP, and PROFINET protocols to support most PLC applications. Devices that support the J1939 protocol can be monitored and controlled by PLCs and SCADA systems that use the Modbus RTU/ASCII/TCP, EtherNet/IP, and PROFINET protocols. With regard to the MGate 5118 series, you can use the same gateway model in a variety of PLC environments.

The MGate 5118 Series supports a web console for easy configuration and maintenance, and the built-in traffic monitor function monitors J1939 protocol traffic, allowing users to monitor the status of connected CAN devices, including error count, packet count, and bus offline. The traffic monitor function can also be used to troubleshoot CAN devices. The diagnostics tool helps users to check CAN device settings and indicates CAN device availability by reading the J1939 network address. In addition, the MGate 5118 gateway series has a built-in Live List function for when two or more J1939 devices are connected to the same CAN bus. This function shows the PGN and address of packets transmitted from each device, giving users the ability to gauge the loading of the CAN bus.

To detect loose cables, the MGate 5118 Series supports status monitoring and fault protection functions. The status monitoring function notifies a PLC when the cable between the gateway and CAN device is loose. In addition, the fault protection function executes actions predefined by the user when the cable between the gateway and CAN device is loose.

Windows-based Utility and Web Console for Easy Setup

A Windows-based utility is provided to make it easy to search for and locate devices, assign IP addresses, import/export configuration files, and upgrade the MGate 5118's firmware. The utility automatically connects to all available MGate 5118 units on the local area network (LAN). A user-friendly web console is provided to configure the device from a web browser.

Package Checklist

All models in the MGate 5118 series are shipped with the following items:

Standard Accessories

- 1 MGate 5118 gateway series
- Quick installation guide (printed)
- Warranty card

Optional Accessories

- **Mini DB9F-to-TB Adapter:** DB9 female to terminal block adapter for RS-422/485 applications
- **WK-51-01:** wall-mounting kit, 51 mm wide

NOTE

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

Product Features

- Key-in-free J1939 command auto detection
- Built-in J1939 traffic monitoring/diagnostics/live-list tools
- Support J1939 to Modbus RTU/ASCII/TCP, EtherNet/IP, PROFINET protocol conversion
- Ready for hazardous locations: C1D2, ATEX, IECEx
- microSD card for configuration backup and event log
- 2 kV CAN bus and Modbus serial port isolation
- -40 to 75°C wide operating temperature range models available

2. Getting Started

This chapter provides basic instructions for installing the MGate 5118.

Connecting the Power

The unit can be powered by connecting a power source to the terminal block.

1. The unit can be powered by connecting a power source to the terminal block.
2. The power input range is from 12 to 48 VDC.

To remove the wire from the terminal block, use a flathead screwdriver to push the orange slot next to the terminal block hole, and then pull the wire out.

Note that the unit does not have an on/off switch. It automatically turns on when it receives power. The PWR LED on the front panel will glow to indicate that the unit is receiving power. There are two DC power inputs for redundancy.

Connecting Serial Devices

The unit's serial port(s) are located on the front panel. If you are connecting an RS-485 multidrop network with multiple devices, note the following:

- All devices that are connected to a single serial port must use the same protocol (i.e., either Modbus RTU or Modbus ASCII).
- Each master device must connect to its own port on the unit. If you are connecting to a network with both master and slave devices, the master must be connected to a separate port from the slaves.
- For the CAN port, plug CAN_L and CAN_H into the terminal block. If another device is connected to the same CAN bus, use Ext_CAN_L and Ext_CAN_H as extension pins.

For serial port pin assignments, refer to the **Pin Assignments** section.

RS-485 Termination and Pull High/Low Resistors

In some critical RS-485 environments, you may need to add termination resistors to prevent the reflection of serial signals. When using termination resistors, it is important to set the pull high/low resistors correctly so that the electrical signal is not corrupted. For each serial port, DIP switches or jumper settings are used to set the pull high/low resistor values. A built-in 120 Ω termination resistor can also be enabled.

To change the termination and pull high/low resistor settings, refer to the **Adjustable Pull High/Low Resistors for the Serial Port** section for your model.

ATTENTION

Do not use the 1 KΩ pull high/low setting on the MGate 5118 when using the RS-232 interface. Doing so will degrade the RS-232 signals and reduce the effective communication distance.

Connecting to a Host or the Network

Two 10/100BaseT Ethernet ports are located on the gateway's back panel. These ports are used to connect the unit to a host or Ethernet network, as follows:

- For normal operation, use a standard straight-through Ethernet cable to connect the unit to your Modbus TCP, EtherNet/IP, or PROFINET network.
- For initial configuration or for troubleshooting purposes, you may connect the unit directly to a PC.

The unit's Link LED will light up to indicate a live Ethernet connection.

Installing the Software (Optional)

The Device Search Utility (DSU) can be installed from the Documentation and software CD. The DSU can be used to connect the MGate with the PC. Follow the onscreen instructions after inserting the CD. For additional details, refer to **Chapter 3: Device Search Utility**.

Wiring Requirements

ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your MGate 5118.

Wiring Caution!

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum allowed current for each wire size.

If the current goes over the allowed maximum, the wiring could overheat, causing serious damage to your equipment.

Temperature Caution!

Be careful when handling the MGate 5118. When plugged in, the MGate 5118's internal components generate heat, and consequently the board may be too hot to touch.

You should also observe the following common wiring rules:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the point of intersection.

NOTE

Do not run signal or communication wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep the input wiring and output wiring separate.
- When necessary, we strongly advise to label wiring to all devices in the system.

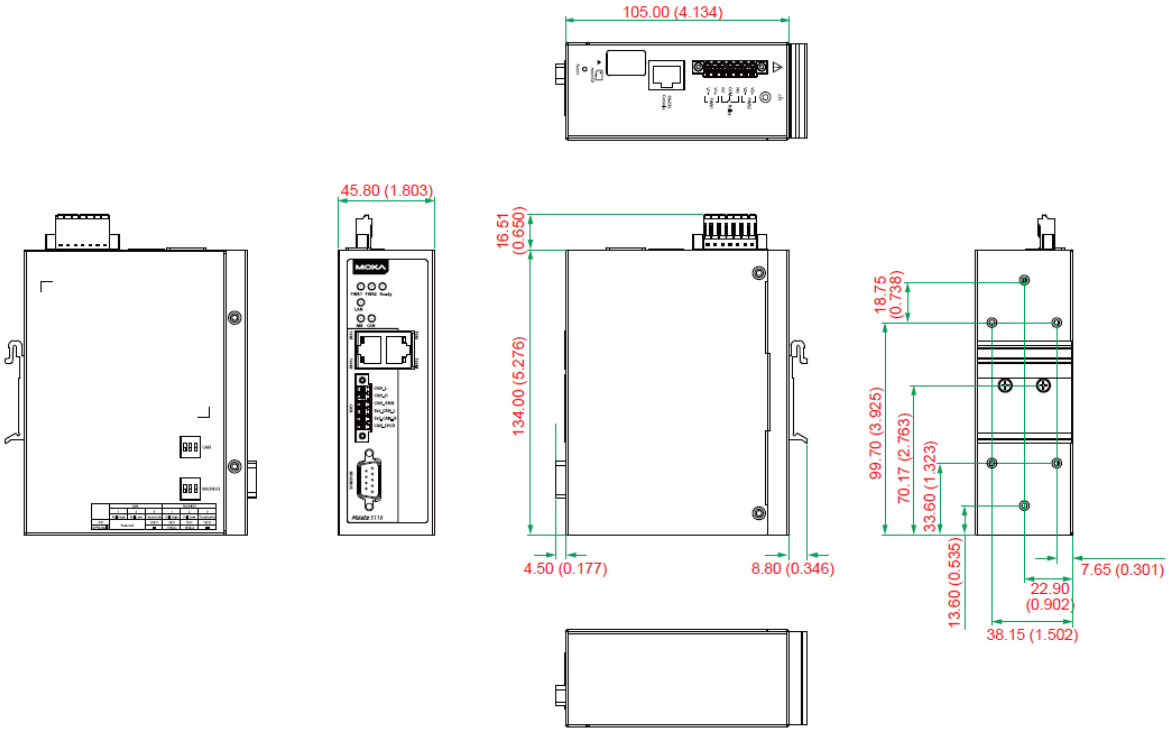
LED Indicators

LED	Color	Description
PWR 1, PWR 2	Green	The power source is connected
	Off	The power cable is disconnected
Ready	Off	Power is off or a fault condition exists
	Green	Steady on: Power is on, and the unit is functioning normally Blinking: The unit is responding to the software's Locate function
	Red	Steady on: Power is on, and the unit is booting up Blinking: Indicates an IP conflict, or the DHCP or BOOTP server is not responding properly Flashing quickly: the microSD card failed
LAN	Green (Flashing only)	The Ethernet port is receiving or transmitting data **Modbus TCP Client:** Modbus communication in progress **Modbus TCP Server:** Modbus communication in progress **EIP Scanner:** MGate I/O is exchanging data with at least one device **EIP Adapter:** MGate I/O is exchanging data **PROFINET:** PROFINET I/O interface is exchanging data
	Red (Flashing only)	A communication error occurred **Modbus TCP Client:** 1. Received an exception code or framing error (parity error, checksum error) 2. Command timeout (server/slave device is not responding) 3. TCP connection timeout **Modbus TCP Server:** 1. Received an invalid function code or framing error (parity error, checksum error) 2. Accessed invalid register address or coil address **Ethernet/IP Scanner:** 1. Command timeout (the adapter is not responding) 2. TCP connection timeout **Ethernet/IP Adapter:** The connection was refused due to incorrect configuration
	Off	No communication
MB*	Green (Flashing only)	Modbus is receiving or transmitting data
	Red (Flashing only)	A communication error occurred **Master Mode:** 1. Received an exception code or framing error (parity error, checksum error) 2. Command timeout (the server/slave device is not responding) **Slave Mode:** 1. Received an invalid function code or framing error (parity error, checksum error) 2. Accessed invalid register address or coil address
	Off	No communication
CAN	Green (Flashing only)	CAN bus(J1939) communication is receiving or transmitting data
	Red (Steady)	A communication error occurred 1. The J1939 address claim failed 2. CAN is in bus-off state because the error counter is exceeding its limitations
	Off	No communication
Eth1, Eth2	Green	Indicates a 100 Mbps Ethernet connection
	Amber	Indicates a 10 Mbps Ethernet connection
	Off	The Ethernet cable is disconnected

*Only indicates serial communication status; for Modbus TCP status, please refer to LAN LED indicator.

Dimensions

Unit = mm (inch)



Adjustable Pull High/Low Resistors for the Serial Port

In some critical environments, you may need to add termination resistors to prevent the reflection of serial signals. When using termination resistors, it is important to set the pull high/low resistors correctly so that the electrical signal is not corrupted. The MGate 5118 uses DIP switches to set the pull high/low resistor values for each serial port. Undo the screws and find the DIP switches at the back side of the PCB.

To add a 120 Ω termination resistor, set switch 3 on the port's assigned DIP switch to ON; set switch 3 to OFF (the default setting) to disable the termination resistor.

To set the pull high/low resistors to 150 KΩ, set switches 1 and 2 on the port's assigned DIP switch to OFF. This is the default setting.

To set the pull high/low resistors to 1 KΩ, set switches 1 and 2 on the port's assigned DIP switch to ON.

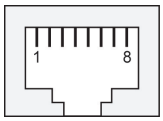
ATTENTION

Do not use the 1 KΩ pull high/low setting on the MGate 5118 when using the RS-232 interface. Doing so will degrade the RS-232 signals and reduce the effective communication distance.

Pin Assignments

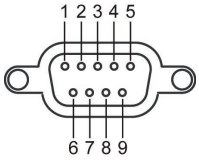
The MGate 5118 uses DB9 serial ports to connect to Modbus RTU or ASCII devices. Each port supports three serial interfaces that are selected by software: RS-232, RS-422, and RS-485 (both 2 and 4-wire).

RJ45 (Ethernet, Console)



Pin	Ethernet	Console (RS-232)
1	Tx+	DSR
2	Tx-	RTS
3	Rx+	GND
4	–	TxD
5	–	RxD
6	Rx-	DCD
7	–	CTS
8	–	DTR

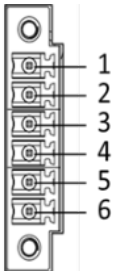
Male DB9 (Serial port)



Pin	RS-232	RS-422/RS-485-4W	RS-485-2W
1	DCD	TxD-(A)	–
2	RxD	TxD+(B)	–
3	TxD	RxD+(B)	Data+(B)
4	DTR	RxD-(A)	Data-(A)
5*	GND	GND	GND
6	DSR	–	–
7	RTS	–	–
8	CTS	–	–
9	–	–	–

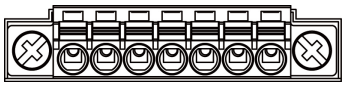
*Signal ground

CAN Port (6-pin Terminal Block)



Pin	CAN
1	CAN_L
2	CAN_H
3	CAN Signal GND
4	Ext-CAN_L
5	Ext-CAN_H
6	CAN_SHLD

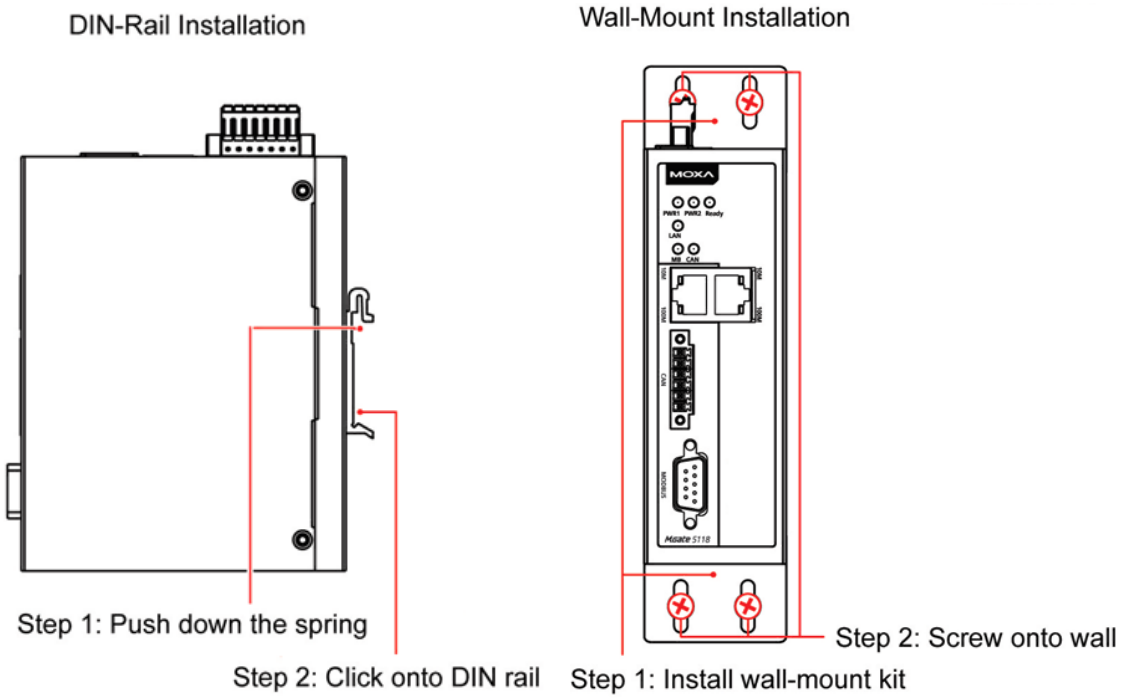
Power Input and Relay Output (SELV) Pinouts



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

Hardware Installation

The MGate 5118 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 mount the device to 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.

microSD Card

The MGate 5118 gateway series is equipped with a microSD card slot for easy configuration. The microSD card can be used to store an MGate's system configuration settings and the MGate's system log. In addition, a configuration stored on a microSD card can be uploaded automatically to an MGate.

> **NOTE**
>
> Inserting a microSD card into an MGate's microSD slot results in one of two actions, depending on what data is currently stored on the card:
>
> 1. If the microSD card contains a valid configuration file, the configuration will be automatically copied to the MGate.
> 2. If the microSD card does not contain a valid configuration file (e.g., if it's empty), the MGate's configuration will be copied to the microSD card.

Backing Up a Configuration

Use the following procedure to copy the configuration of an MGate gateway to a microSD card:

1. Use a PC to format the microSD card to support FAT file systems and delete all of the data on the card.
2. Power off the MGate and insert the microSD card (make sure the microSD card is empty).
3. Power on the MGate. The current settings will be copied to the microSD card.
4. If you modify the MGate's configuration using MGate Manager or the Web Console while the microSD card is installed in the gateway, your configuration changes will be automatically saved to the microSD card when you save the configuration.

Configuring an MGate (Mass deployment/Replacement)

Use the following procedure to copy the configuration stored on a microSD card to an MGate gateway for mass deployment or to replace a faulty unit:

1. Power off the MGate device (often a new device) and insert the microSD card.
2. Power on the MGate device.
3. The configuration file stored on the microSD card will be copied automatically to the MGate gateway.

microSD card Write Failure

The following events will cause the microSD card to experience a write failure.

1. The microSD card has less than 20 MB of free space.
2. The MGate configuration file is read-only.
3. The microSD card's file system is corrupted.
4. The microSD card is damaged.

The MGate gateway will halt the write action if any of the above conditions exists. The MGate's Ready LED will flash and the beeper will sound to inform the user of the write failure. If you are replacing the microSD card, the microSD card will be synchronized with the configurations stored on the MGate device. Note that the microSD card should not contain any configuration files; otherwise, the configuration will be copied from the microSD card to the MGate device.

WARNING

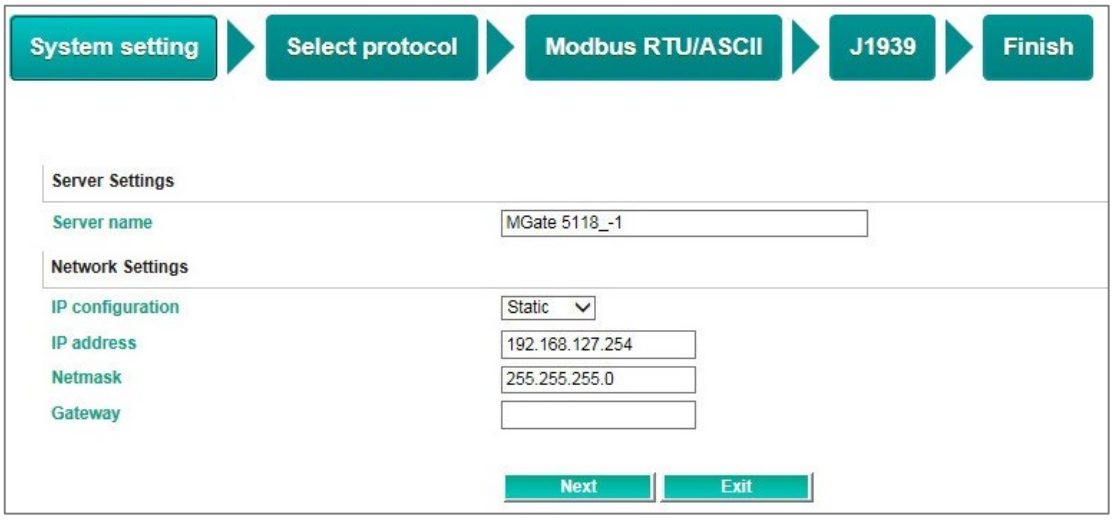
If your intention is to back up the configuration of an MGate gateway, it is best practice to **only insert an empty microSD card** into the microSD slot. If the card contains a valid configuration file, that configuration will automatically (without warning) overwrite the MGate's current configuration.

Quick Setup

The MGate Series now provides Quick Setup, an illustrated guide specially designed to make the configuration easy. When you press Quick Setup, you will access the mode and configure it . Only five steps are needed.

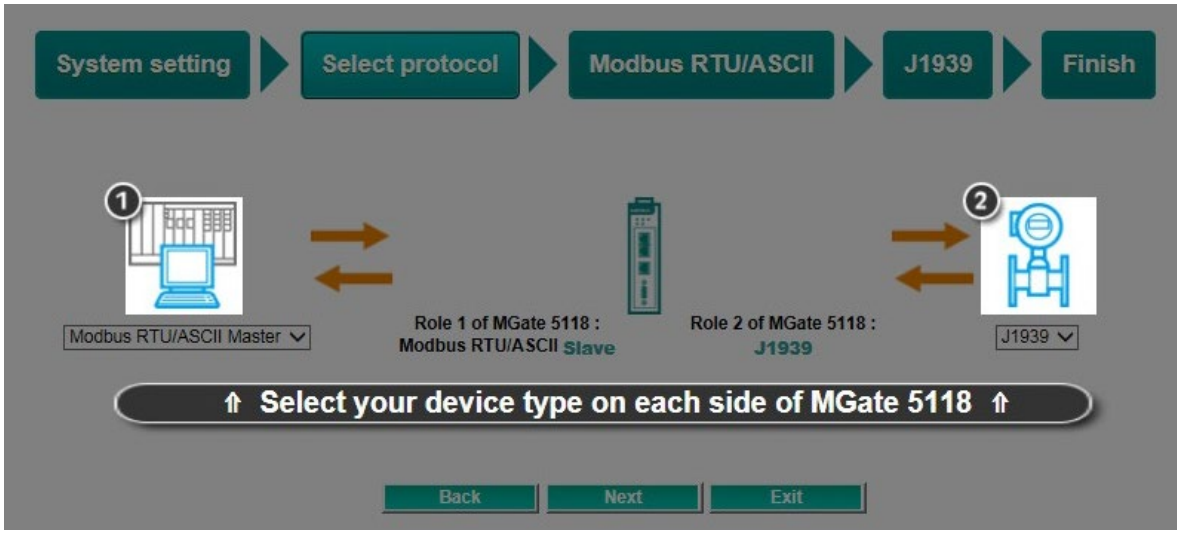
Step 1: System Setting

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



Step 2: Select Protocol

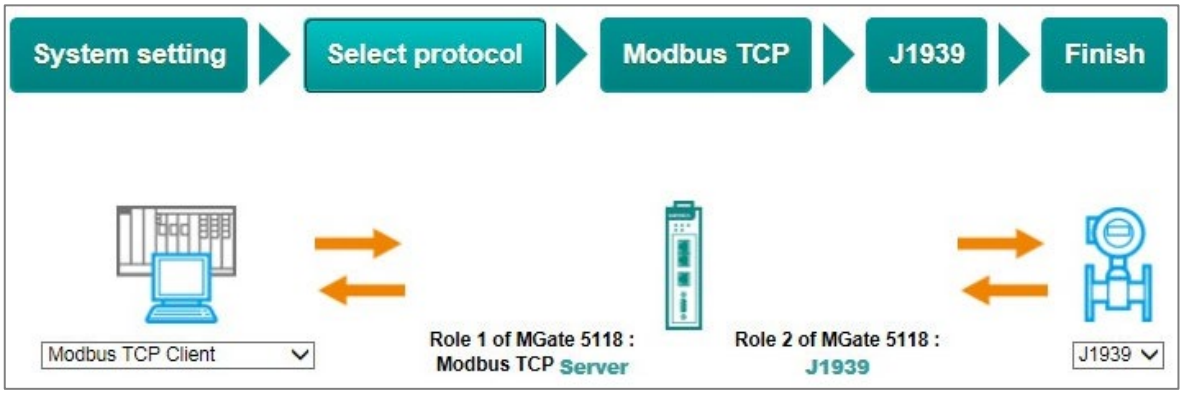
Then, you have to select the protocols used on your devices that are connected through the MGate. After selection, the MGate will automatically change its role to the correct one. For example, if the device is set as a Modbus RTU Master, the MGate will then automatically configure as a Modbus RTU slave by itself. Regarding protocol configuration, please refer to Chapter 4.



Step 3 and 4: Role 1 and Role 2 of MGate 5118

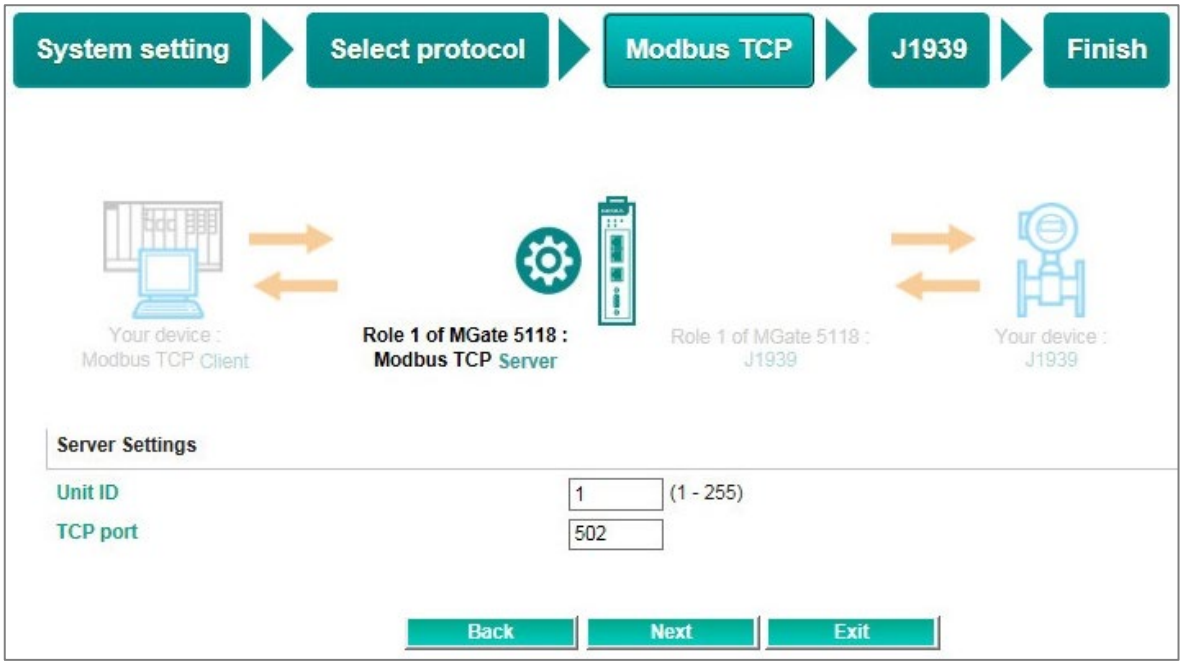
Example:

After finishing the device protocol selection, Role 1 and Role 2 of the MGate will be set accordingly. You will need to configure the details on each side with the following steps. Here is an example of Role 1 as a Modbus TCP Server, and Role 2 as a J1939 device.



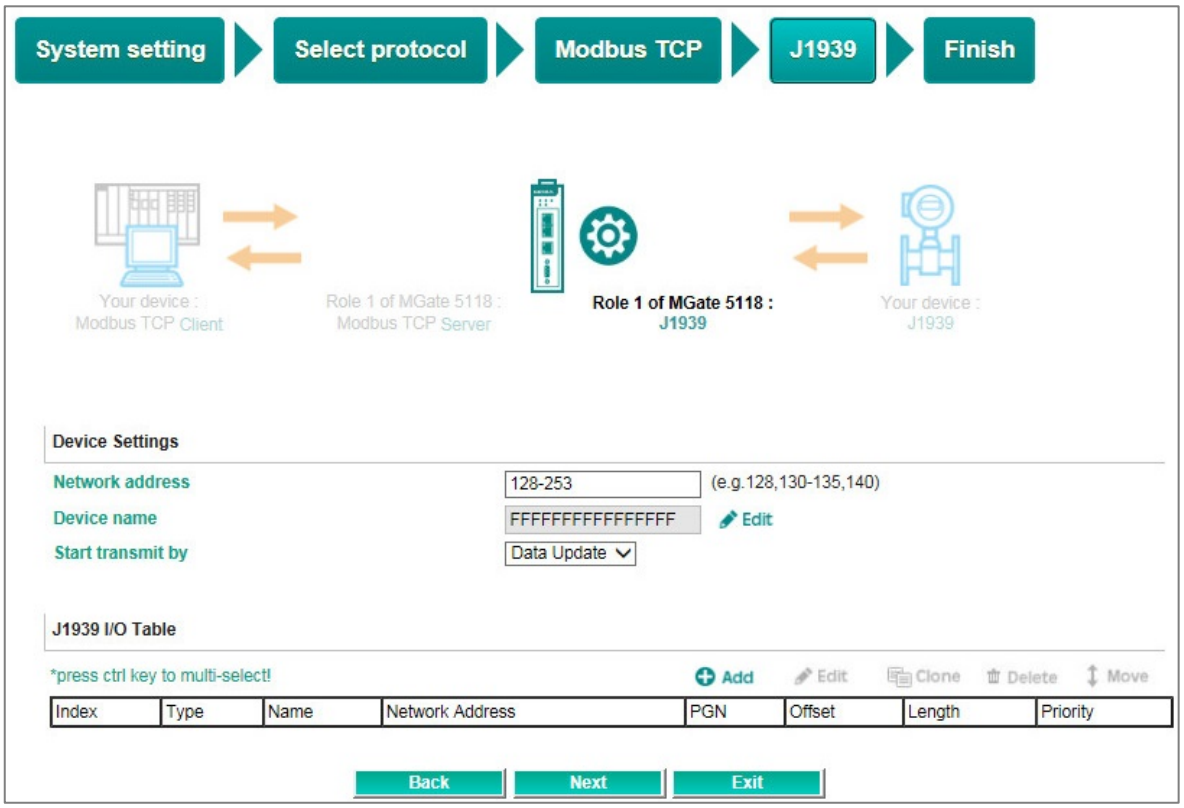
Modbus TCP Setting:

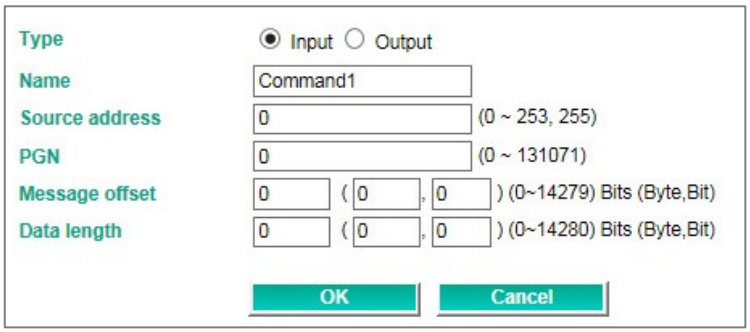
Set Modbus TCP



J1939 settings:

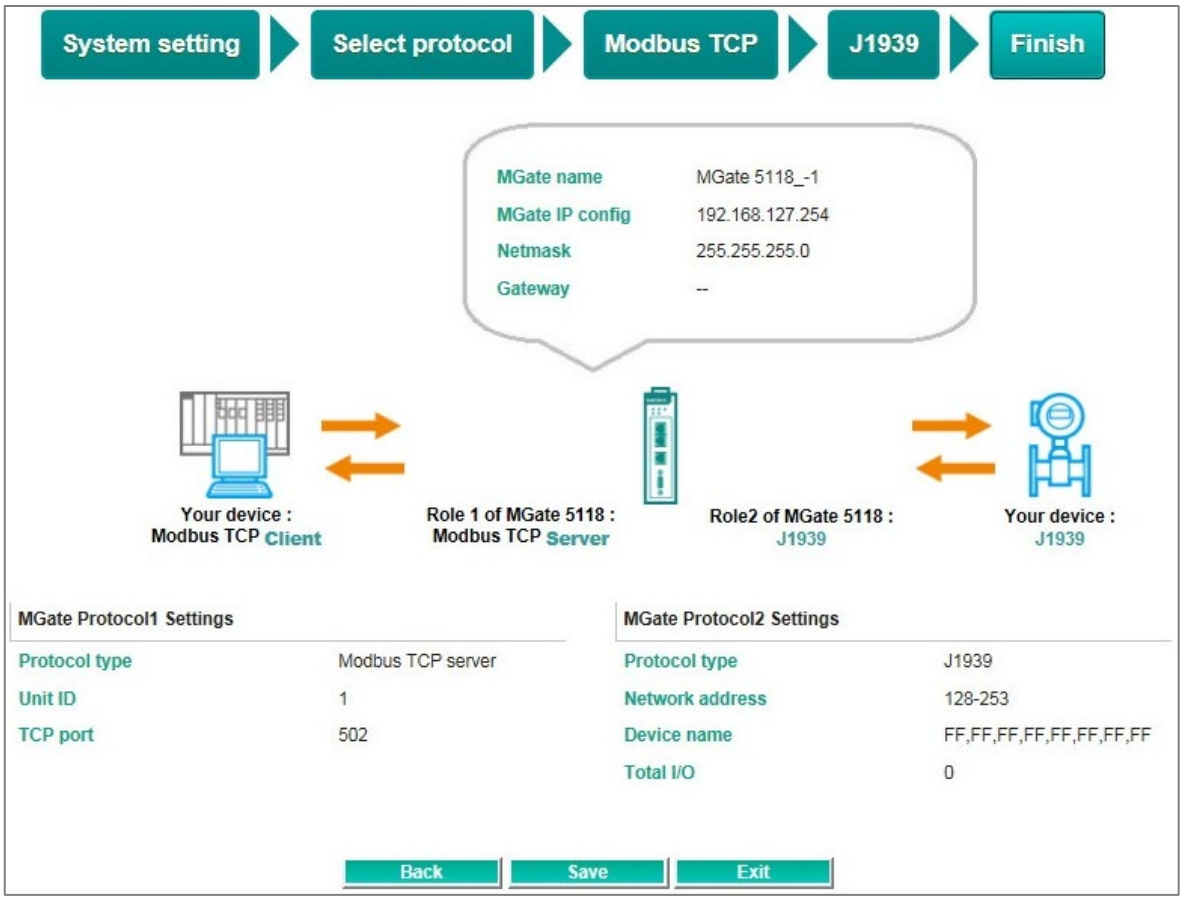
J1939-related settings include the Device Network address, device name, and the transmit method. In addition, the J1939 input/output commands can be set by clicking the **Add** button.





Step 5: Finish

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



Installing the Software

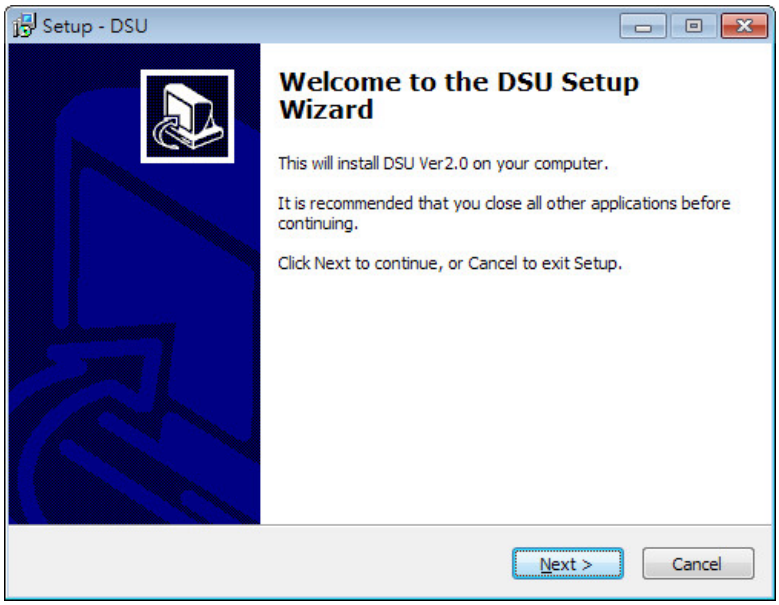
The following instructions explain how to install the Device Search Utility (**DSU**), a utility for configuring and monitoring MGate 5118 units over a network.

1. You can download DSU (Device Search Utility) from Moxa's website: www.moxa.com. Locate and run the following setup program to begin the installation process:

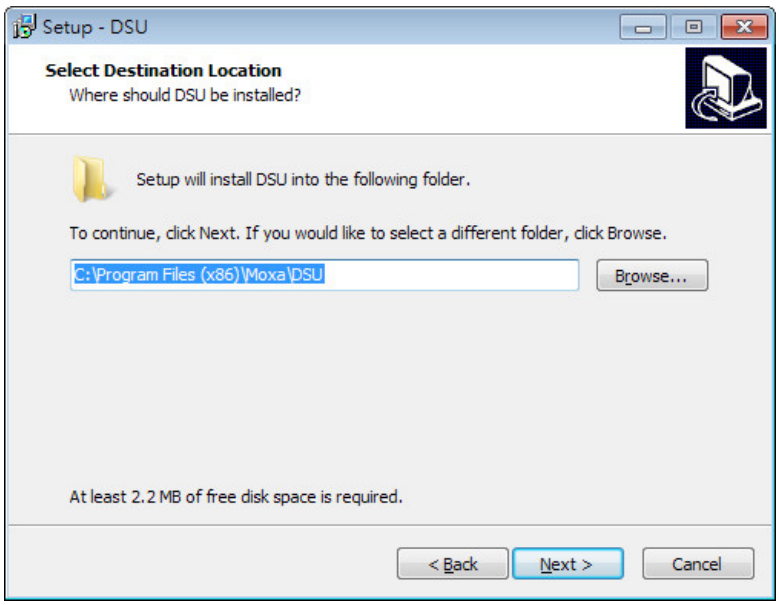
   dsu_setup_[*Version*]**_Build_**[*DateTime*]**.exe**

   The latest version might be named **dsu_setup_Ver2.x_Build_xxxxxxxx.exe**.

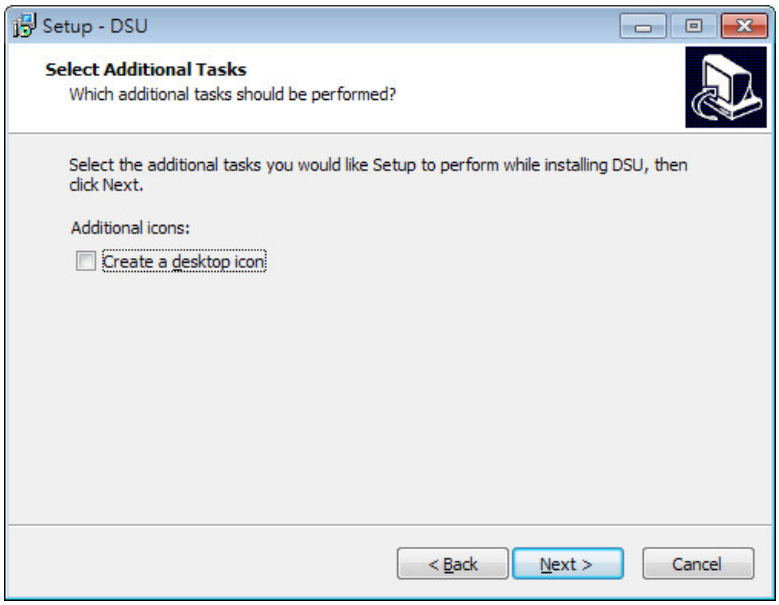
2. You will be greeted by the Welcome window. Click **Next** to continue.



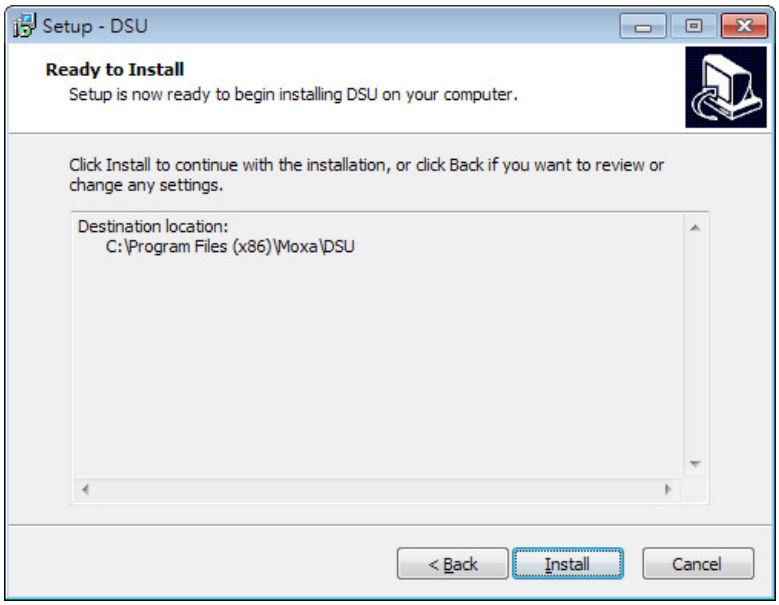
3. When the **Select Destination Location** window appears, click **Next** to continue. You may change the destination directory by clicking on **Browse...**.



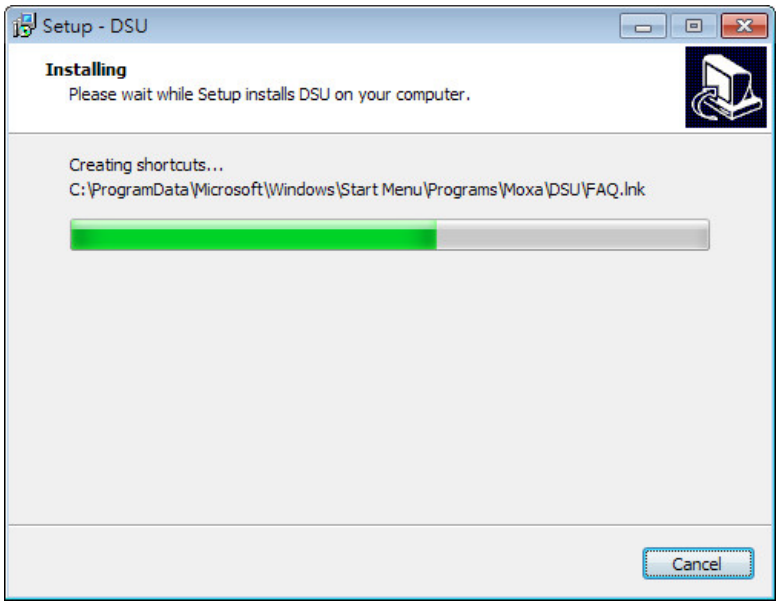
4. When the **Select Additional Tasks** window appears, click **Next** to continue. You may select **Create a desktop icon** if you would like a shortcut to the DSU on your desktop.



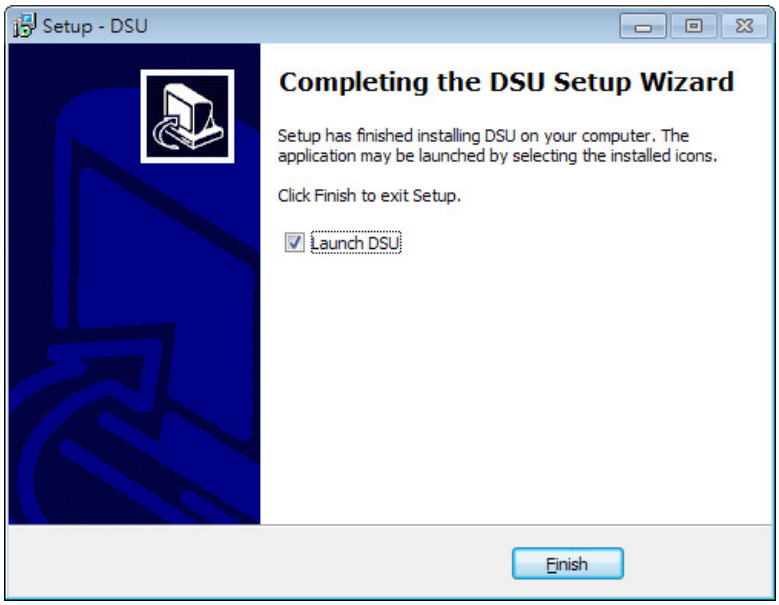
5. Click **Install** to start copying the software files.



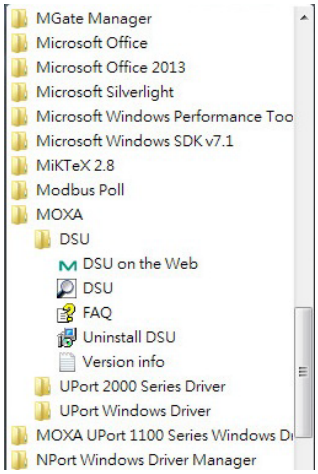
6. A progress bar will appear. The procedure should take only a few seconds to complete.



7. A message will indicate that the DSU is successfully installed. You may choose to run it immediately by selecting **Launch DSU**.



8. You may also open the DSU through **Start > Programs > MOXA > DSU**, as shown below.

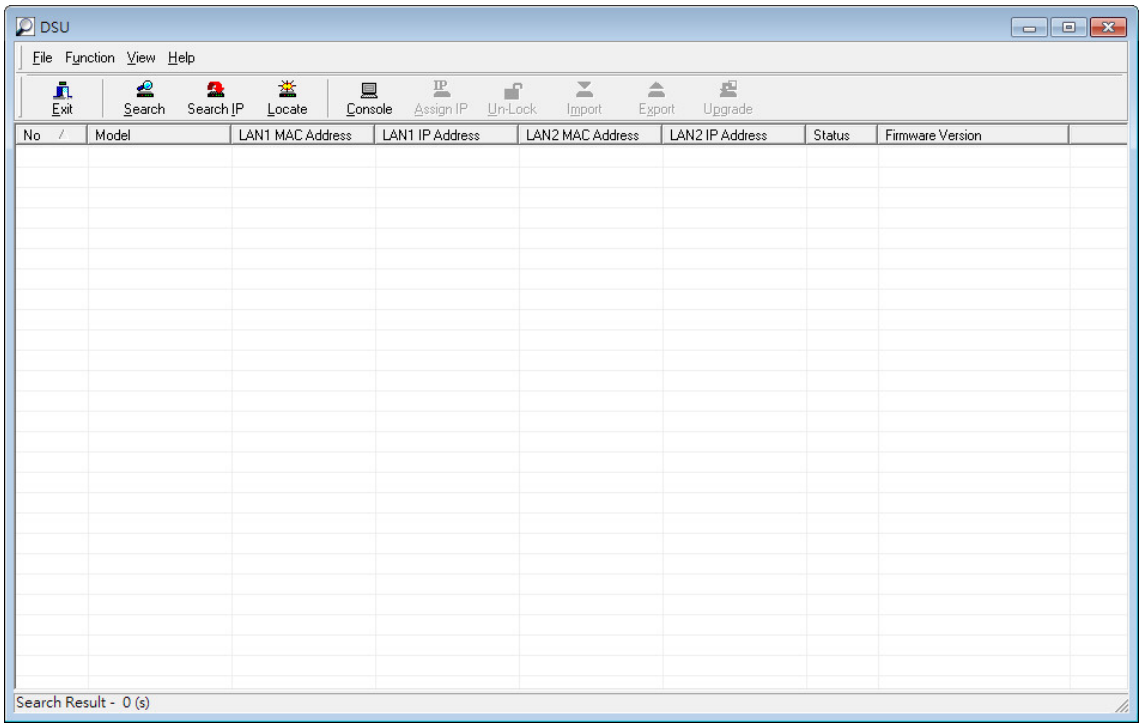


Starting the Device Search Utility (DSU)

The DSU is a Windows-based utility that is used to configure the MGate 5118 Series.

Before running the DSU, make sure that your PC and the MGate 5118 are connected to the same network. Alternatively, the MGate 5118 Series may be connected directly to the PC for configuration purposes. Refer to Chapter 2 for more details.

You may open the DSU from the Windows Start menu by clicking **Start > Programs > MOXA > DSU**. The DSU window should appear as shown below.

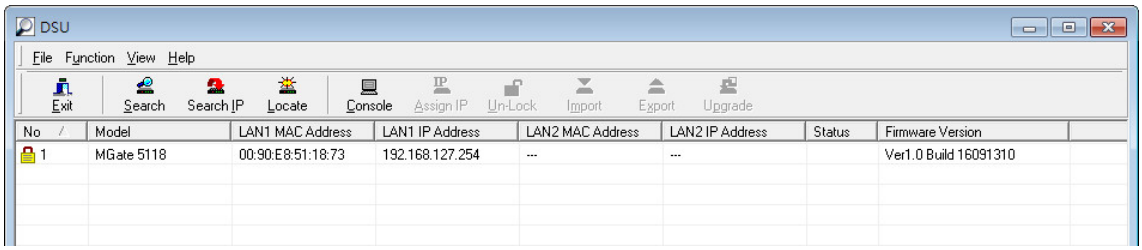


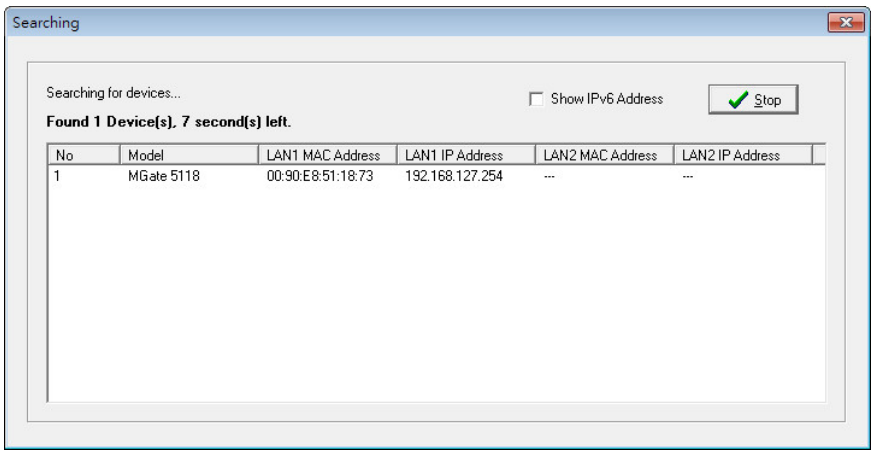
Connecting to the Unit

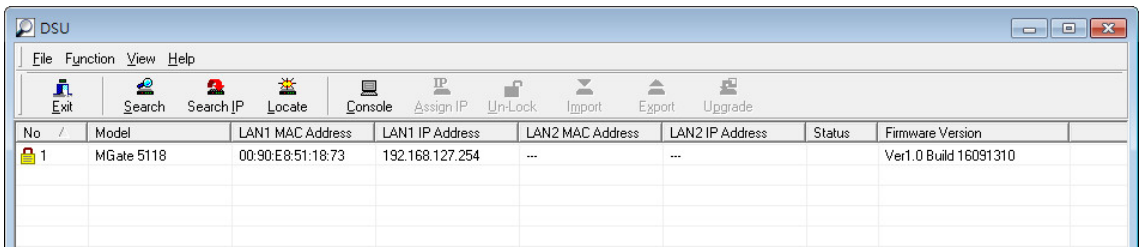
The DSU needs to be connected to the unit before the unit can be configured. There are two methods of connecting to the unit. **Broadcast Search** is used to find all MGate 5118 units on the LAN. **Search IP** attempts to connect to a specific unit by IP address, which is useful if the unit is located outside the LAN or can only be accessed by going through a router.

Broadcast Search

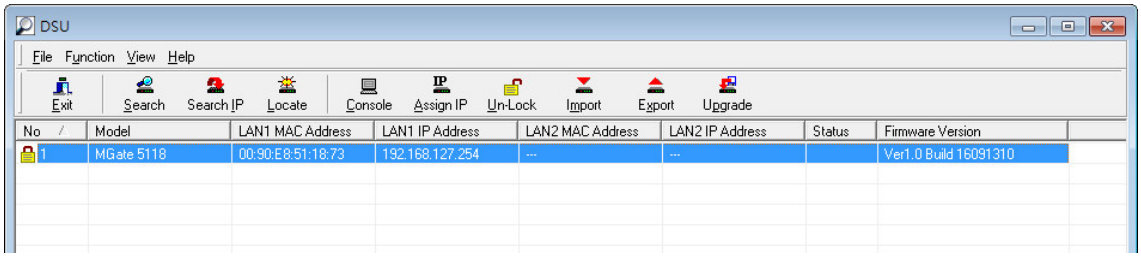
Click **Search** and a new Search window will pop up.







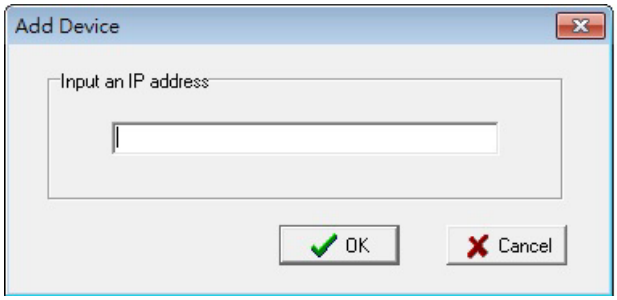
When the search is complete, every MGate 5118 found on the LAN will appear in the DSU window. The MAC address, IP address, and firmware version of each unit will be shown. Select the one you would like to configure.



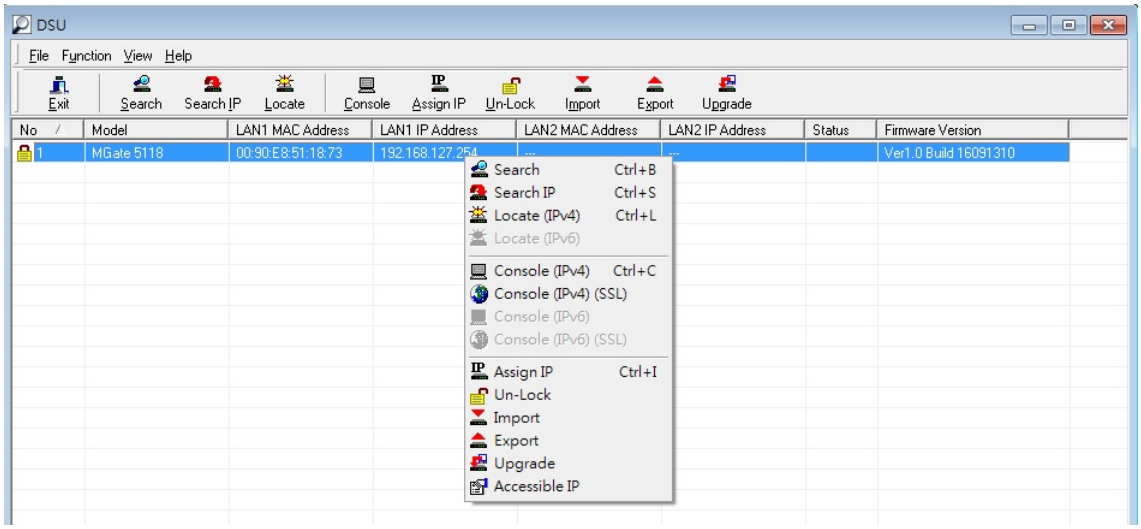
Search IP

Click **Search IP** if you know the IP address of the unit and wish to connect to it directly.

Enter the unit's IP address and click **OK**.



If the search is successful, the unit will be listed in the DSU window. Right-click the unit to open a pop-up list of possible actions or double-click a unit to open the web console.

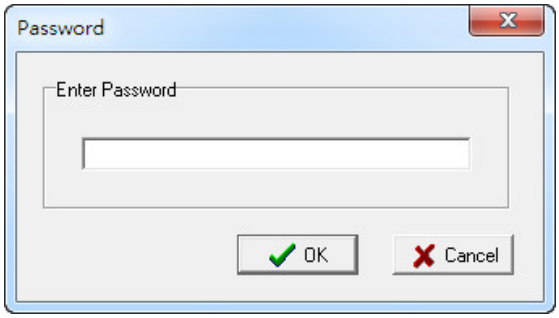


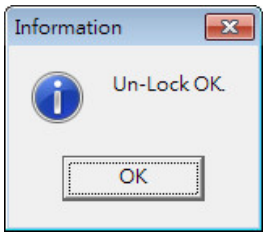
Locate

The **Locate** function will cause the unit to beep, so you can determine which unit is the target.

The **Assign IP** function allows you to change the unit's IP addresses.

Use the **Un-Lock** function to execute Import, Export, and Upgrade actions. The default account and password are **admin** and **moxa**.





To **Import** or **Export** the configuration file, click the icons to import the configuration file from a laptop, or export the currently used unit's configuration file to a laptop.

ATTENTION

If Search IP fails to locate the MGate 5118, the IP address that you entered might be incorrect. Retry the search and reenter the IP address carefully.

Another possibility is that the MGate 5118 is located on the same LAN as your PC, but on a different subnet. In this case, you can modify your PC's IP address and/or netmask so that it is on the same subnet as the MGate 5118. When your PC and the MGate 5118 are on the same subnet, the DSU should be able to find the unit.

Upgrading the Firmware

Obtain the latest firmware for the MGate 5118 from www.moxa.com. After downloading the new firmware file to your PC, you can use the DSU to write it to your MGate 5118. Select the desired unit from the DSU list and then click **Upgrade** to begin the process.

4. Web Console Configuration

The MGate 5118 provides a web console for easy configuration through a web browser such as Microsoft Internet Explorer or Google Chrome.

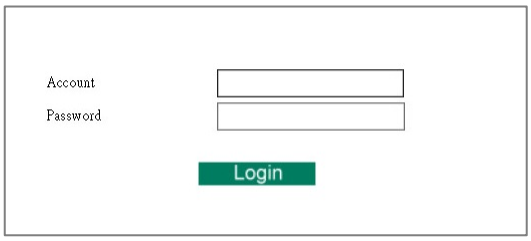
Overview

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

http://<MGate IP address>

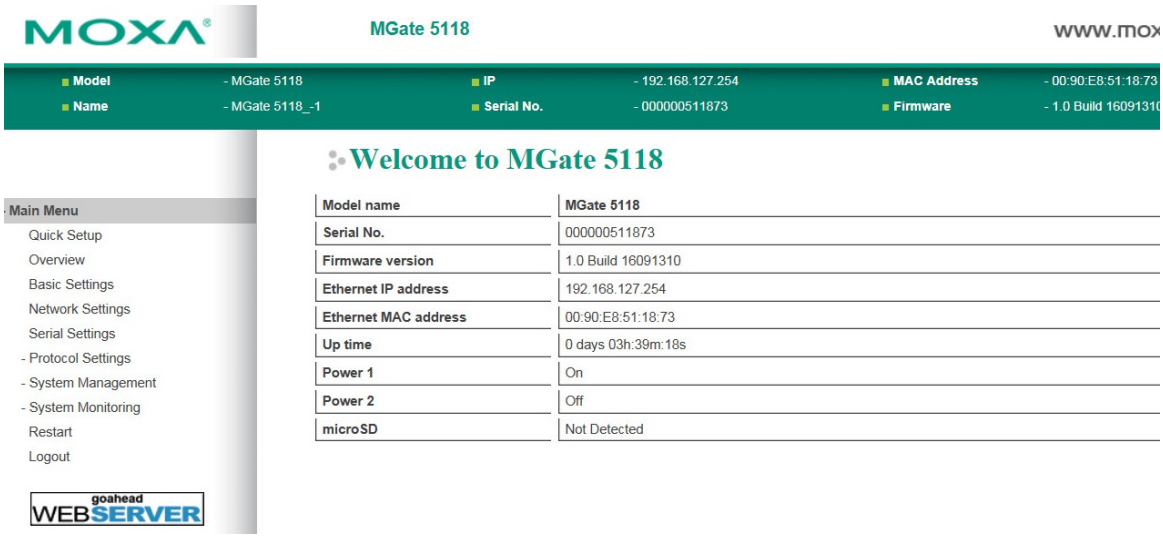
The default IP addresses of LAN1 is 192.168.127.254. If you are unable to log in to the unit, you can use the DSU to first search for the unit. Refer to the **Device Search Utility**.

When the login page pops up, enter the account name and password. The default account name and password are **admin** and **moxa**, respectively.



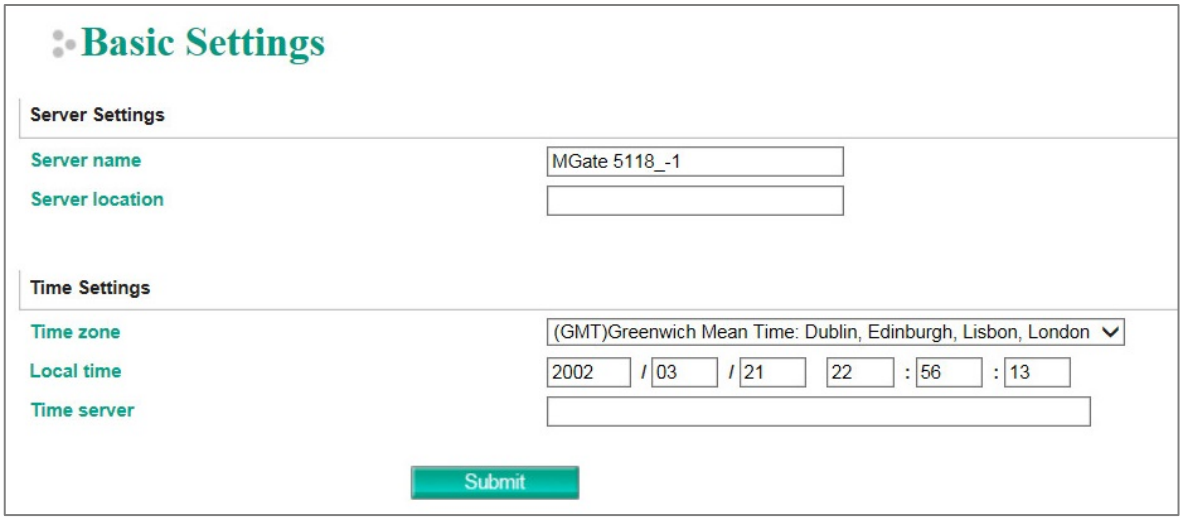
Once logged in to the web console, you will see the previous login record. If the login record is not what you accessed previously, please change the password immediately.

The welcome page shows information relevant to the MGate 5118.



Basic Settings

Server Settings and **Time Settings** are shown on the **Basic Settings** page. Click **Submit** to save the current changes to the unit and click **Restart** once all the settings have been changed. The unit will reboot immediately to use the new settings.



Server Setting

Parameter	Value	Description
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 location. Such as "Cabinet A001."

Time Settings

The MGate 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 modify the real-time clock, select **Local time**. MGate's firmware will modify the GMT time according to the time zone.

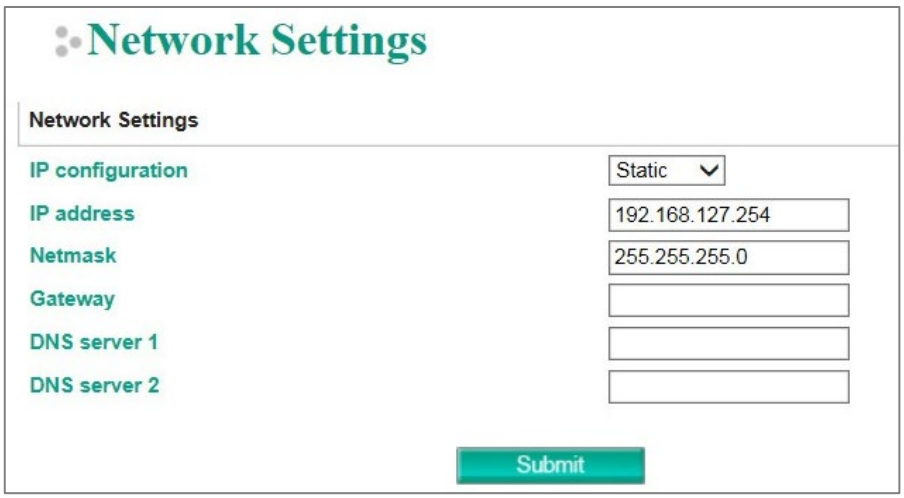
Parameter	Value	Description
Time Zone	User's selectable time zone	This field shows the currently selected time zone and allows you to select a different time zone.
Local Time	User's adjustable time.	(1900/1/1-2037/12/31)
Time Server	IP or Domain address (e.g., 192.168.1.1 or time.stdtime.gov.tw)	This 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

If the dispersion of the time server is higher than the client (MGate), the client will not accept NTP messages from the time server. The MGate's dispersion is one second. Configure your time server with a dispersion value lower than one second for the NTP process to complete.

Network Settings

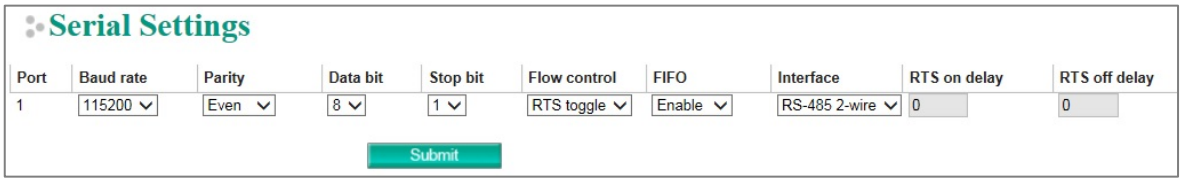
The **Network** tab is where the unit's network settings are configured. Modify the **LAN mode**, **Network Configuration**, **IP Address**, **Netmask**, **Default Gateway**, and **DNS**.



Parameter	Value	Description
IP configuration	Dual Subnet, Single IP	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	192.168.126.254 (or another 32-bit number)	The IP (Internet Protocol) address identifies the server on the TCP/IP network
Netmask	255.255.255.0 (or another 32-bit number)	Identifies the server as belonging to a Class A, B, or C network.
Gateway	0.0.0.0 (or another 32-bit number)	The IP address of the router that provides network access outside the server's LAN.
DNS Server 1	0.0.0.0 (or another 32-bit number)	This is the IP address of the primary domain name server.
DNS Server 2	0.0.0.0 (or another 32-bit number)	This is the IP address of the secondary domain name server.

Serial Settings

The Serial tab is where each serial port's communication parameters are configured. Configure Baudrate, Parity, Stop Bit, Flow Control, FIFO, Interface, RTS on delay, and RTS off delay.



Parameter	Value
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, Space, Mark
Stop Bits	1, 2
Flow Control	None, RTS/CTS, DTR/DSR, RTS Toggle
UART FIFO	Enable, Disable
Interface	RS-232
	RS-422
	RS-485, 2W
	RS-485, 4W
RTS On Delay	0 to 100 ms
RTS Off Delay	0 to 100 ms

RTS Delay

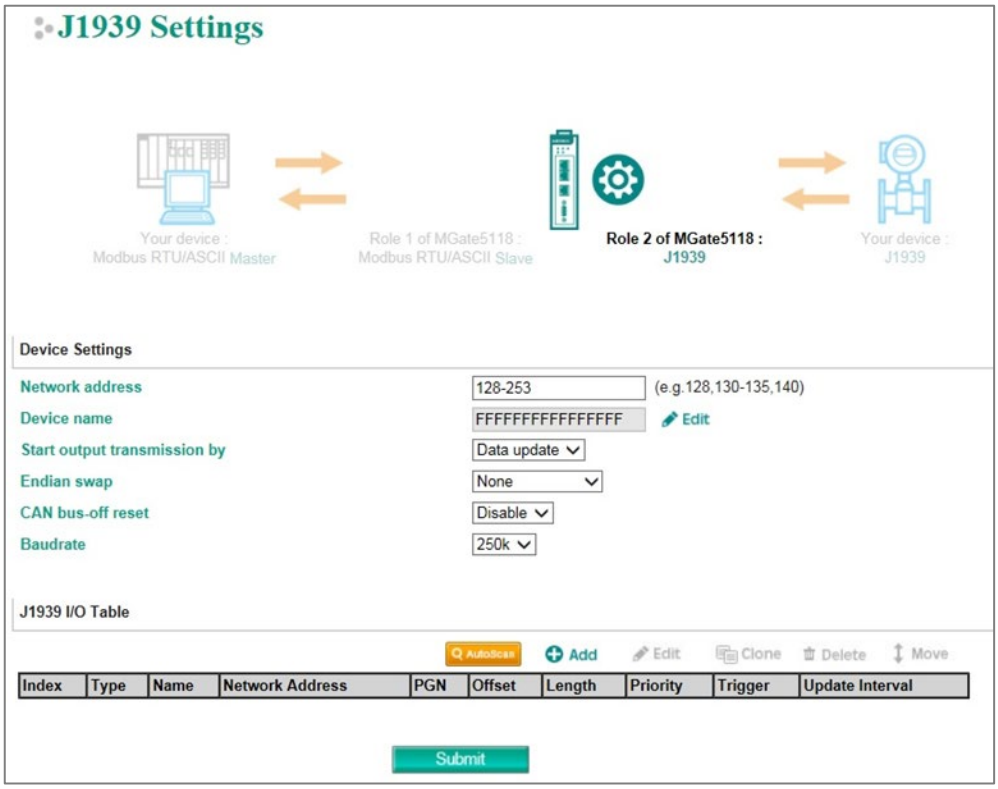
The **RTS Toggle** function is used for **RS-232** mode only. This flow-control mechanism is achieved by toggling the RTS pin in the transmission direction. When activated, data will be sent after the RTS pin is toggled **ON** for the specified time interval. After the data transmission is finished, the RTS pin will toggle **OFF** for the specified time interval.

Protocol Settings

The MGate 5118 supports J1939, Modbus RTU/ASCII, Modbus TCP, EtherNet/IP and PROFINET protocols. Each role is determined by your device's settings. **Modbus TCP (Client/Server)**, **Modbus RTU/ASCII (Master/Slave)**, **EtherNet/IP (Adapter/Scanner)**, and **PROFINET (IO-Device)** can be selected.

The setting of each protocol is described as follows:

1. J1939 Settings



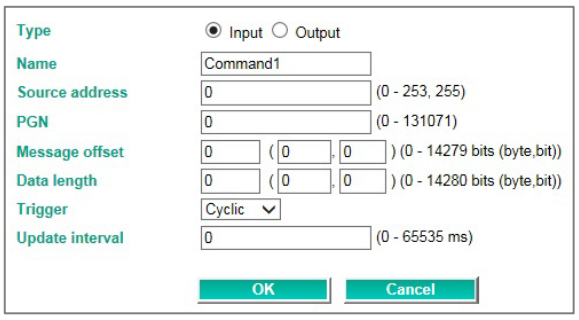
Device Settings

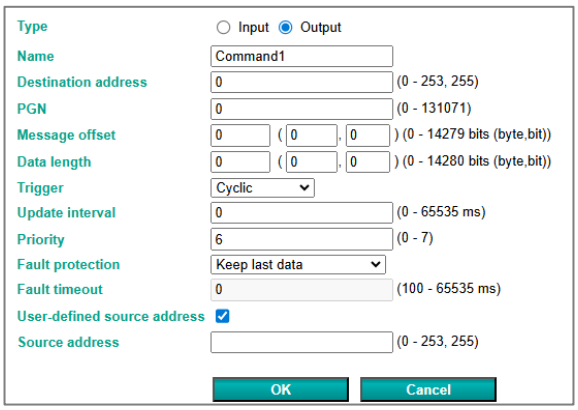
Parameter	Value	Default	Description
Network address	Numerical number	128 to 253	The MGate's network address on the J1939 bus.
Device name	The parameters regarding J1939.	FFFFFFFFFFFFFFFF	A set of J1939 parameter combinations represented in hex values.
Start output transmission by	Data update, startup	Data update	To determine the way the transmission starts.
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.	None	Swapping the data
CAN bus-off reset	Disable, Enable	Disable	When a J1939 bus error of some kind happens, the MGate will automatically stop communication with the J1939 bus. You may choose Enable to have the MGate rejoin the bus.

Parameter	Value	Default	Description
Baudrate	250k, 500 kbps, 1Mbps (FW above v2.3)	250k bps	The baudrate used in this J1939

J1939 I/O Table:

To modify the input/output commands of J1939, you must manually add the J1939 commands into the MGate, according to the J1939 device it is attached to.

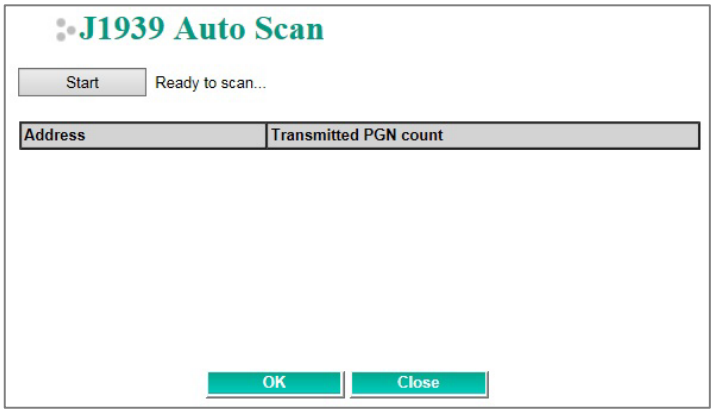




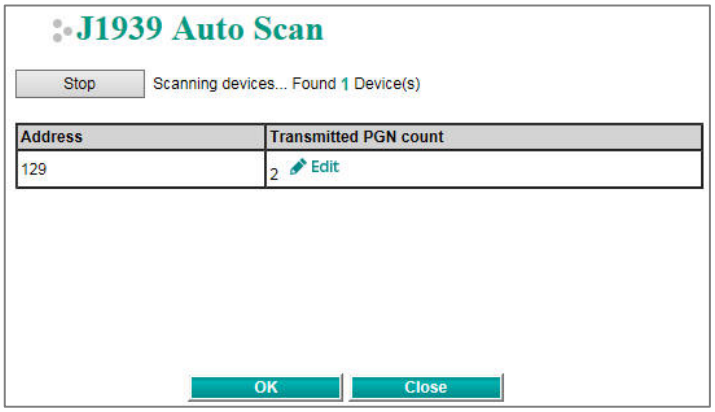
Parameter	Value	Default	Description
Type	Input, Output	Input	Data type
Name	(an alphanumeric string)	Command1	Max. 32 characters
Source address	0 to 253, 255	0	Data received from a specific J1939 device.
Destination address	0 to 253, 255	0	Data sent to a specific J1939 device.
PGN	0 to 131071	0	Parameter Group Number
Message offset	0 to 14279 bits	0 (0, 0)	The location where the data associated with the data point begins. The offset not only can be shown in bits but can be displayed as corresponding bytes and bits (byte, bit).
Data length	0 to 14280 bits	0 (0, 0)	The length of the data to be transferred between the J1939 devices. The length not only can be shown in bits but also can be displayed as corresponding bytes and bits (byte, bit).
Trigger	Disable, Cyclic, Data Change	Cyclic	Disable: The command has never been sens 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.
Update interval	0 to 65535 ms	0	The desired update interval for the data in milliseconds.
Priority	0 to 7	6	Set output command priority category.
Fault protection	Keep latest data Clear all data bits to 0 Set to user-defined value	Keep latest data	If the opposite side connection fails, the gateway will not be able to receive data, but the gateway will continuously send output data to the J1939 device. To avoid problems in case the opposite side fails, the MGate 5118 can be configured to react in one of three ways: keep latest data, clear data to zero, user-defined value.
Fault timeout	100 to 65535 ms	60000	Defines the communication timeout for the opposite side.
User-defined source address			Tick the checkbox to enable a user-defined source address instead of using the MGate J1939 network address.
Source address	0 to 253, 255		Specified a user-defined source address instead of using MGate J1939 network address in the output command.

AutoScan:

For users' convenience, the MGate 5118 is designed with an innovative command auto-learning function. It can learn all the output commands from the J1939 devices on the same CAN bus. Users don't need to key in the commands one by one. All you must do is click on the AutoScan button, and a window will pop up.

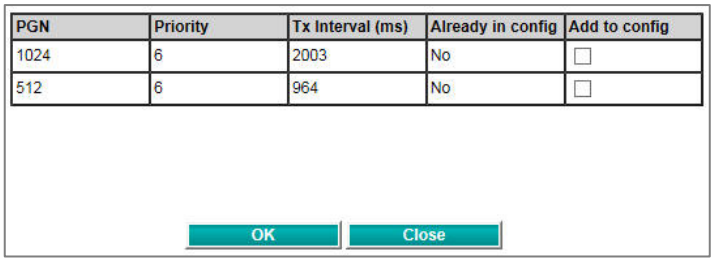


Click the **Start** button to start learning.

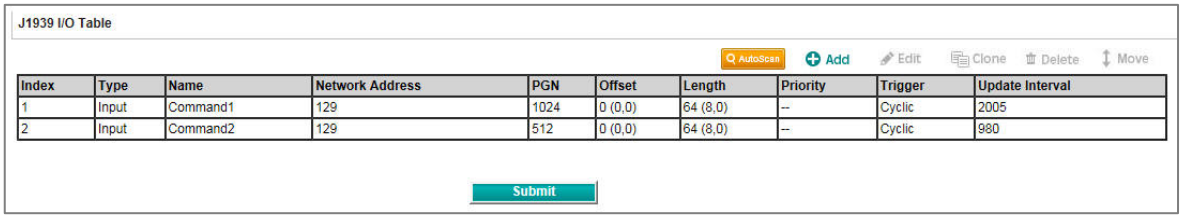


You will see how many commands are learned from which address.

Click the **Edit** button for further information. If the command is the one you need, click on the check box for **Add to config** and click the **OK** button when finished.



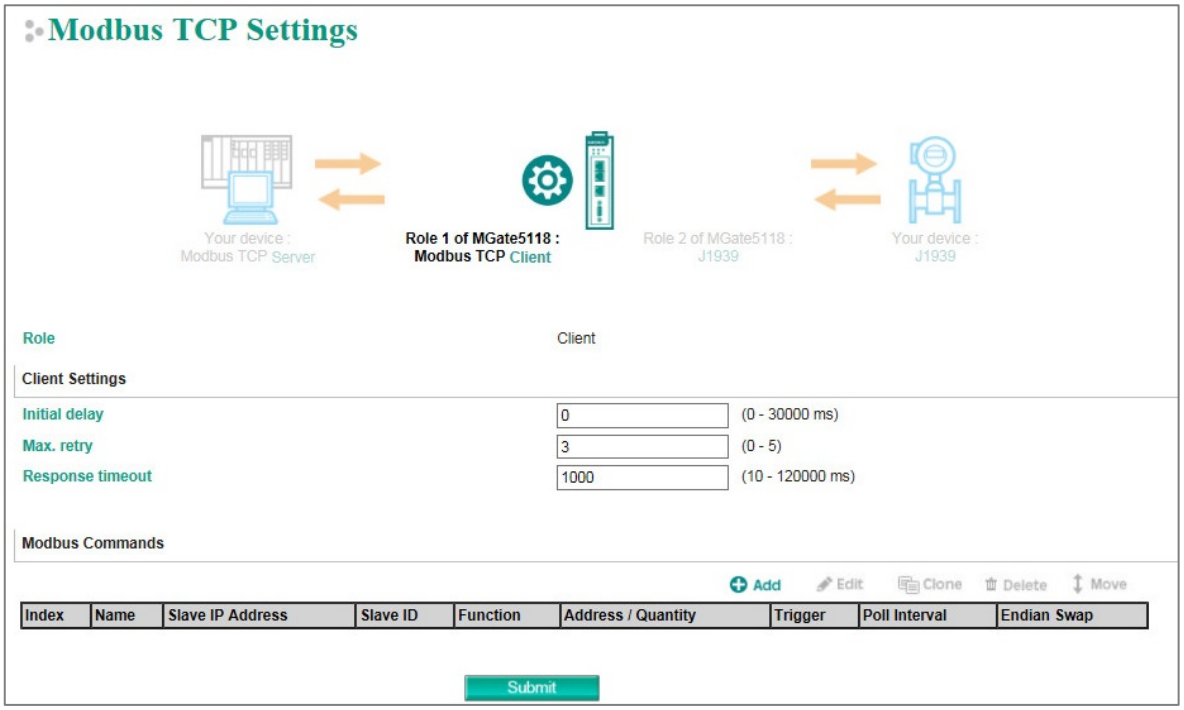
Finally, you will see the auto-learned commands are shown in the command table.



If further modification is required, click on the selected command and click **Edit**.

Once the commands are set, remember to click the **Submit** button to activate.

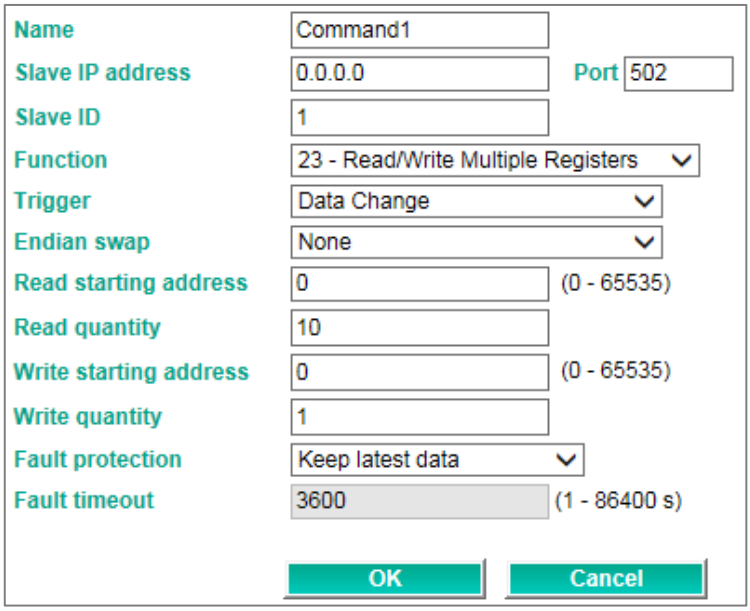
2. Modbus TCP Client (Master) Settings



Client Settings

Parameter	Value	Default	Description
Initial delay	0 to 30000 ms	0	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 repeated exceptions during the initial boot-up. After booting up, you can force the MGate to wait before sending the first request with the **Initial Delay** setting.
Max. retry	0 to 5	3	This is used to configure how many times the MGate will try to communicate with the Modbus server/slave.
Response timeout	10 to 120000 ms	1000	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, the 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 the operation even if a server/slave device is disconnected or faulty. On the MGate 5118, the **Response timeout** field is used to configure how long the gateway will wait for a response from a Modbus server/slave. Please refer to your device manufacturer's documentation to manually set the response timeout.

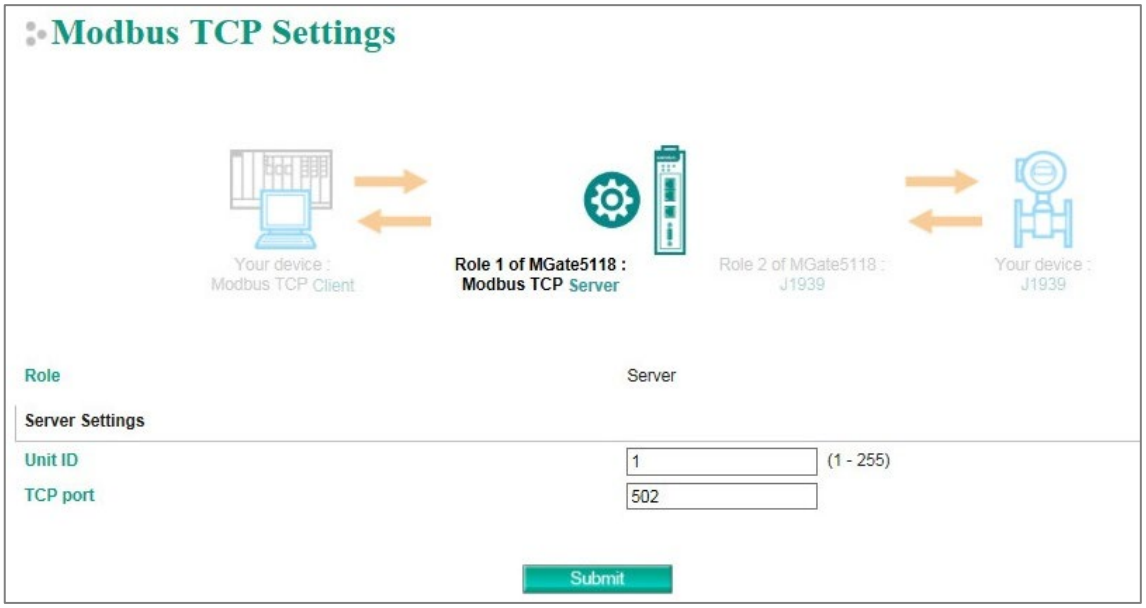
Add Modbus Commands



Parameter	Value	Default	Description
Name	(an alphanumeric string)	Command1	Max. 32 characters
Slave IP address	0.0.0.0 to 255.255.255.255	0.0.0.0	The IP address of a remote server/slave device.
Port	1 to 65535	502	The TCP port number of a remote server/slave device.
Slave ID	1 to 255	1	The Modbus slave ID
Function	1 – Read Coils 2 – Read Discrete Inputs 3 – Read Holding Registers 4 – Read Input Registers 5 – Write Single Coil 6 – Write Single Register 15 – Write Multiple Coils 16 – Write Multiple Registers 23 – Read/Write Multiple Registers		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.
Trigger	Cyclic Data Change Disable		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	10 to 1200000 ms	1000	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.

Parameter	Value	Default	Description
Endian swap	None Byte Word Byte and Word	None	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	0 to 65535	0	Modbus register address.
Read quantity		10	Specifying how many quantities to read.
Write starting address	0 to 65535	0	Modbus register address.
Write quantity		1	Specifying how many quantities to write.
Fault protection	Keep latest data Clear all data bits to 0 Set to user-defined value		If the opposite side connection fails, the gateway will not be able to receive data, but the gateway will continuously send output data to the Modbus TCP server device. To avoid problems in case the opposite side fails, the MGate 5118 can be configured to react in one of three ways: keep latest data, clear data to zero, user-defined value.
Fault value		00 00	The value for set to user-defined value.
Fault timeout	1 to 86400 s	3600	Defines the communication timeout for the opposite side.

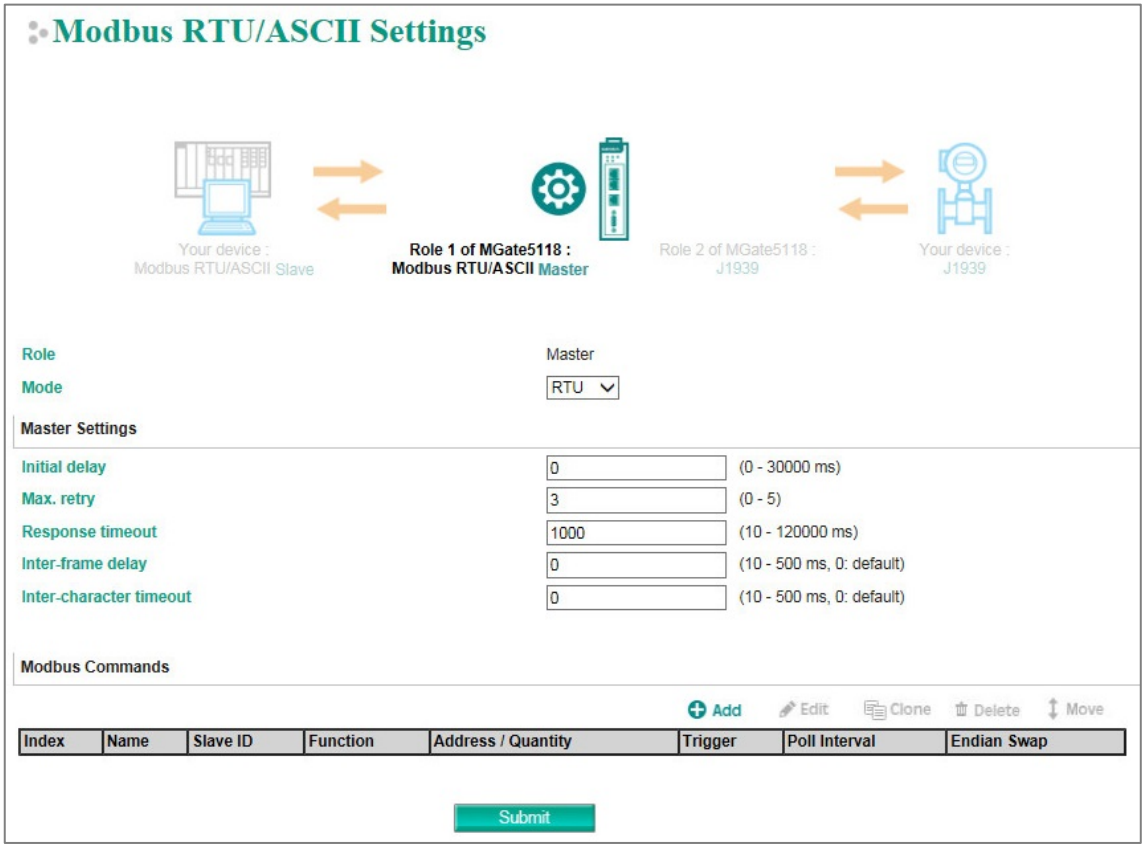
3. Modbus TCP Server (Slave) Settings



Server Settings

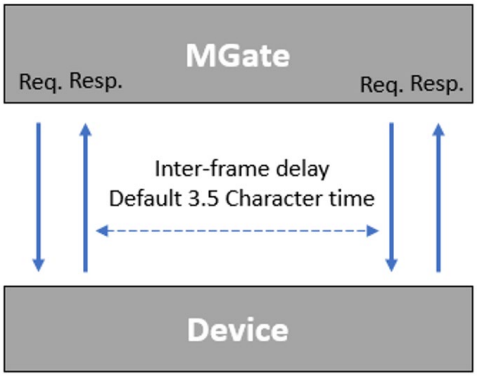
Parameter	Value	Default	Description
Unit ID	1 to 255	1	The Modbus slave ID that this sever/slave module will accept.
TCP port	1 to 65535	502	The TCP port number.

4. Modbus RTU/ASCII (Master) Settings



Master Settings

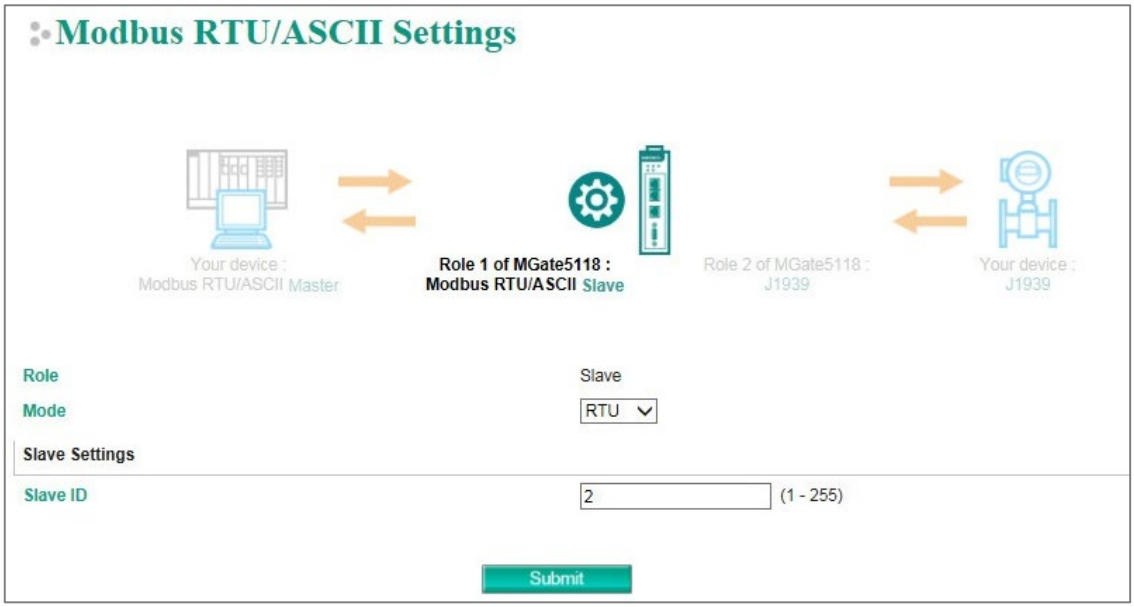
Parameter	Value	Default	Description
Initial delay	0 to 30000 ms	0	Some Modbus servers/slaves may take more time to boot up than other devices. In some environments, this may cause the entire system to suffer repeated exceptions during the initial boot-up. After booting up, you can force the MGate to wait before sending the first request with the **Initial Delay** setting.
Max. retry	0 to 5	3	The number of times the client/master will retry the same request when the response times out.
Response timeout	10 to 120000 ms	1000	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 operations even if a server/slave device is disconnected or faulty. On the MGate 5118, 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.

Parameter	Value	Default	Description
Inter-frame delay (only for Modbus RTU)	10 to 500 ms	0	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 when some devices can't handle the RTU requests 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 to 960 characters/s, so transmitting one character needs about 1/960 = 1 ms. 
Inter-character timeout (only for Modbus RTU)	10 to 500 ms	0	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, 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.

Add Modbus Commands

Please refer to **2. Modbus TCP Client (Master) Settings**

5. Modbus RTU/ASCII (Slave) Settings



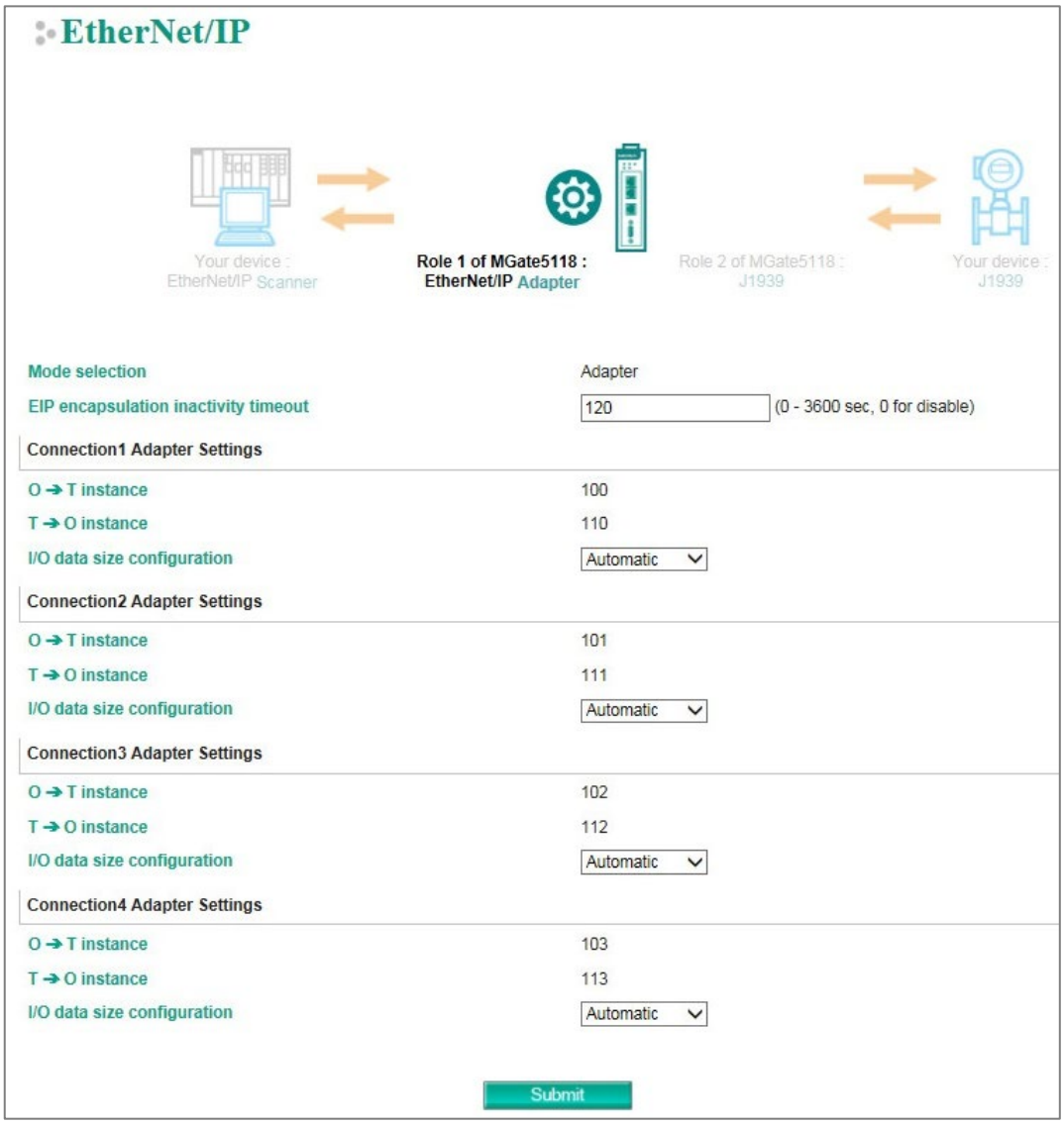
Slave Settings

Parameter	Value	Default	Description
Slave ID	1 to 255	2	The Modbus slave ID that this server/slave module will accept.

6. EtherNet/IP Setting

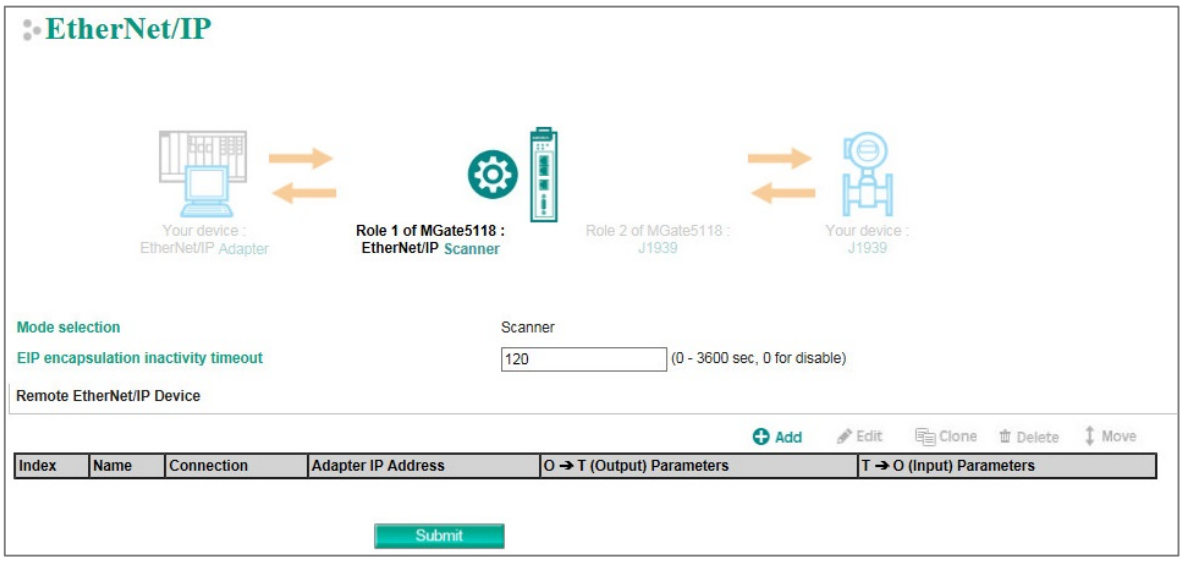
The MGate 5118 supports Adapter and Scanner modes for EtherNet/IP protocol.

Adapter Mode:

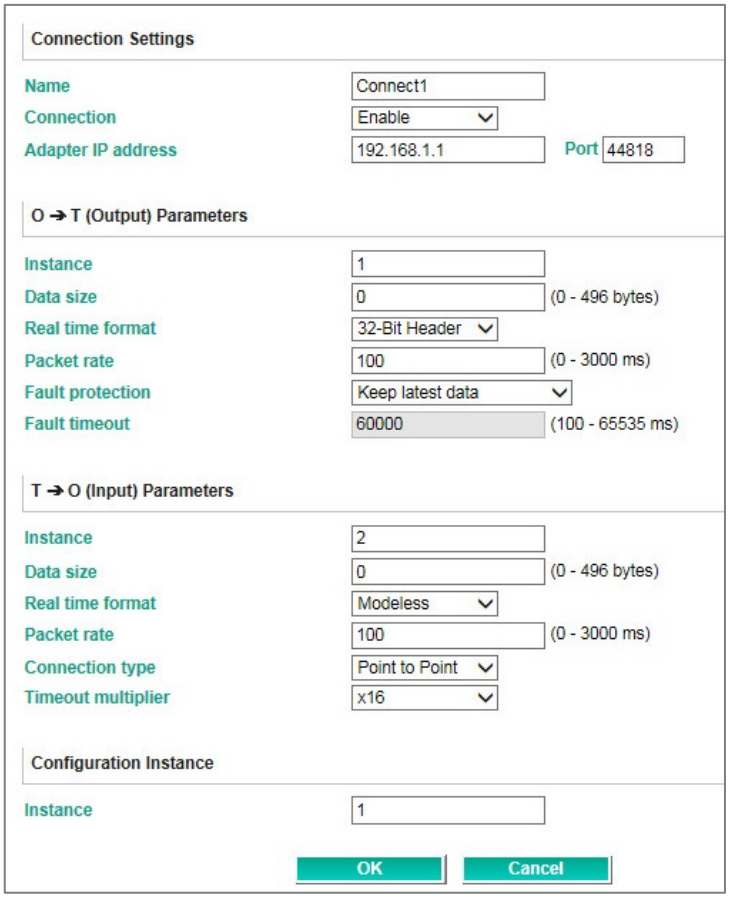


Select Automatic for I/O data size configuration to automatically map O→T (Originator to Target) and T→O (Target to Originator) data sizes with J1939 data.

Scanner Mode:



In **Scanner mode**, all EtherNet/IP connections will be shown in a table. For the initial setup, click **Add** to create a new connection.

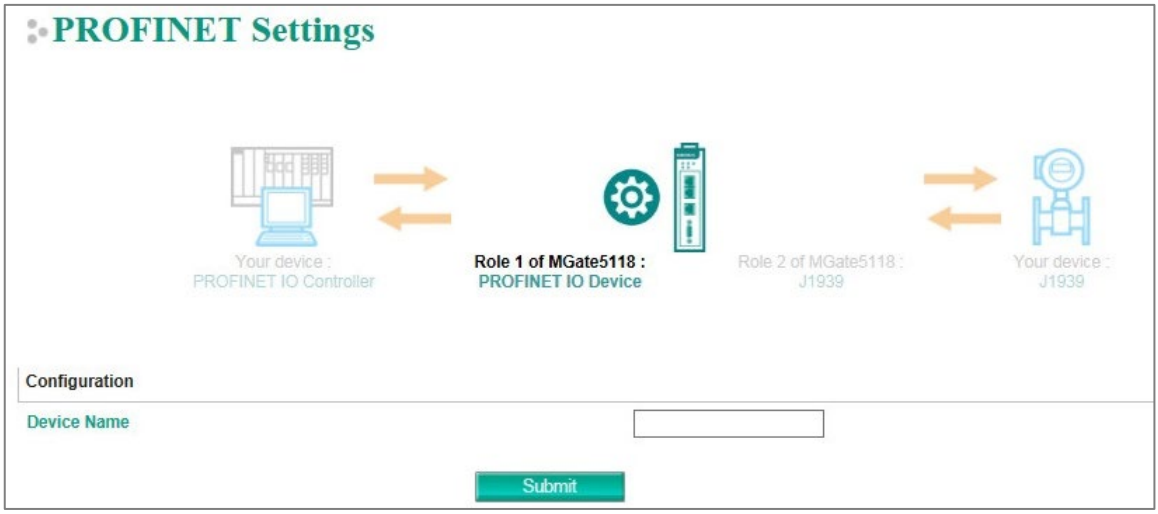


Parameter	Value	Notes
Name	(an alphanumeric string)	
Connection	Enable, Disable	Enable or disable this connection.
Adapter IP address and port	IP address Port: 1 to 65535	Default EtherNet/IP port is 44818
Instance	1 to 2147483647	Instance number

Parameter	Value	Notes
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.
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).
Fault protection	Keep latest data Clear data to zero User-define value	Keep the 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. Default user-defined value: A user-defined value will be written to the slave device.
Fault timeout	60000	To set how long the gateway will wait to activate this function.

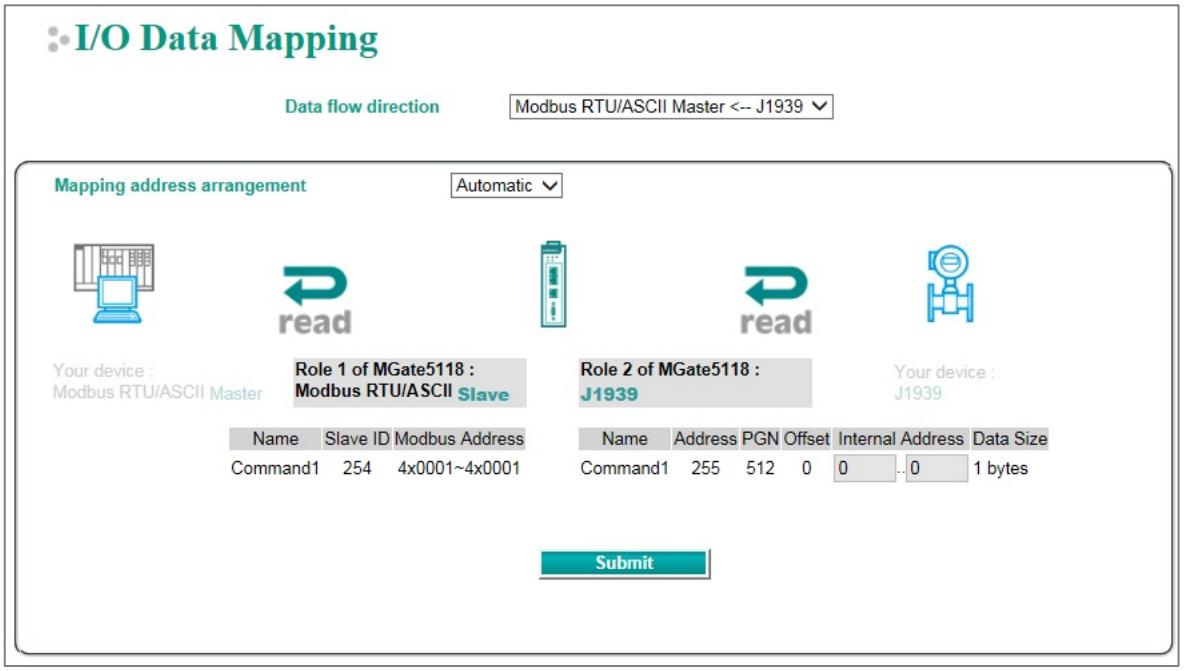
7. PROFINET Setting

The MGate 5118 can play the role of PROFINET IO-Device. All you must set is the device name of the MGate.



I/O Data Mapping

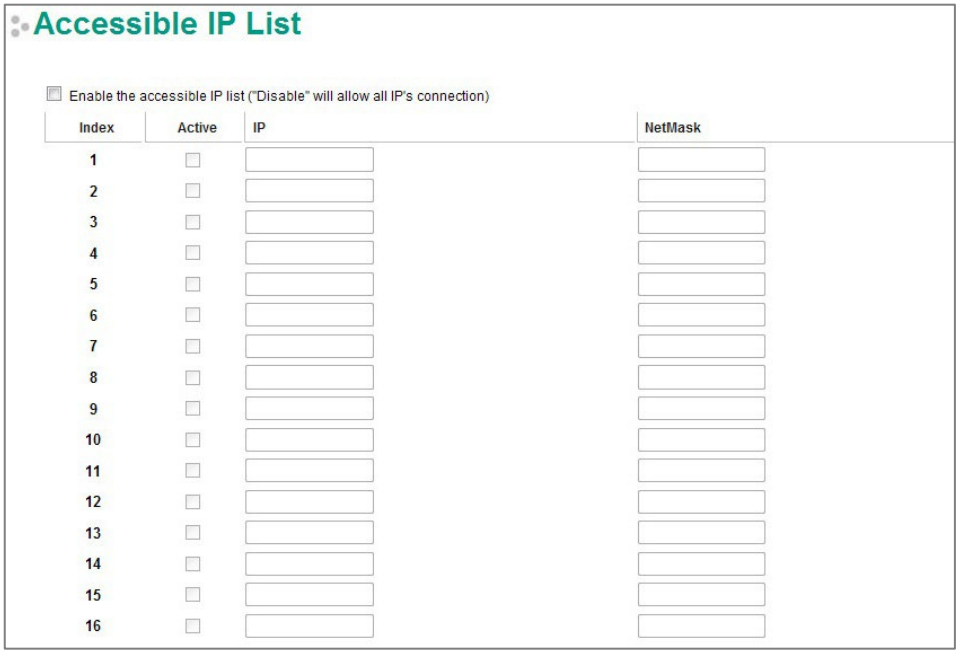
Verify the gateway's memory allocation on the **I/O Data Mapping** page. Select the Modbus data flow you want to see.



System Management

This configuration tab includes several system-level settings. Most of these settings are optional.

Accessible IP Settings



These settings are used to restrict access to the module by IP address. Only IP addresses on the list will be allowed access to the device. You may add a specific address or range of addresses by using a combination of IP address and netmask, as follows:

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").

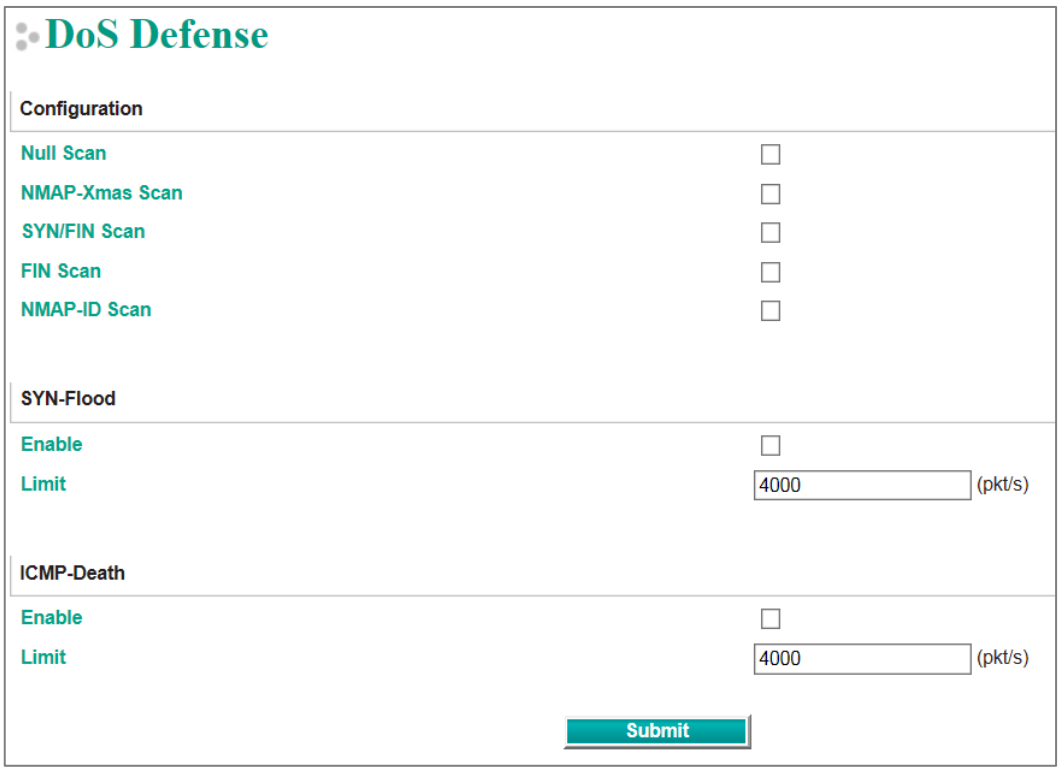
To allow access to all IP addresses
Make sure that **Enable** the accessible IP list is not checked.

Additional configuration examples are shown in the following table:

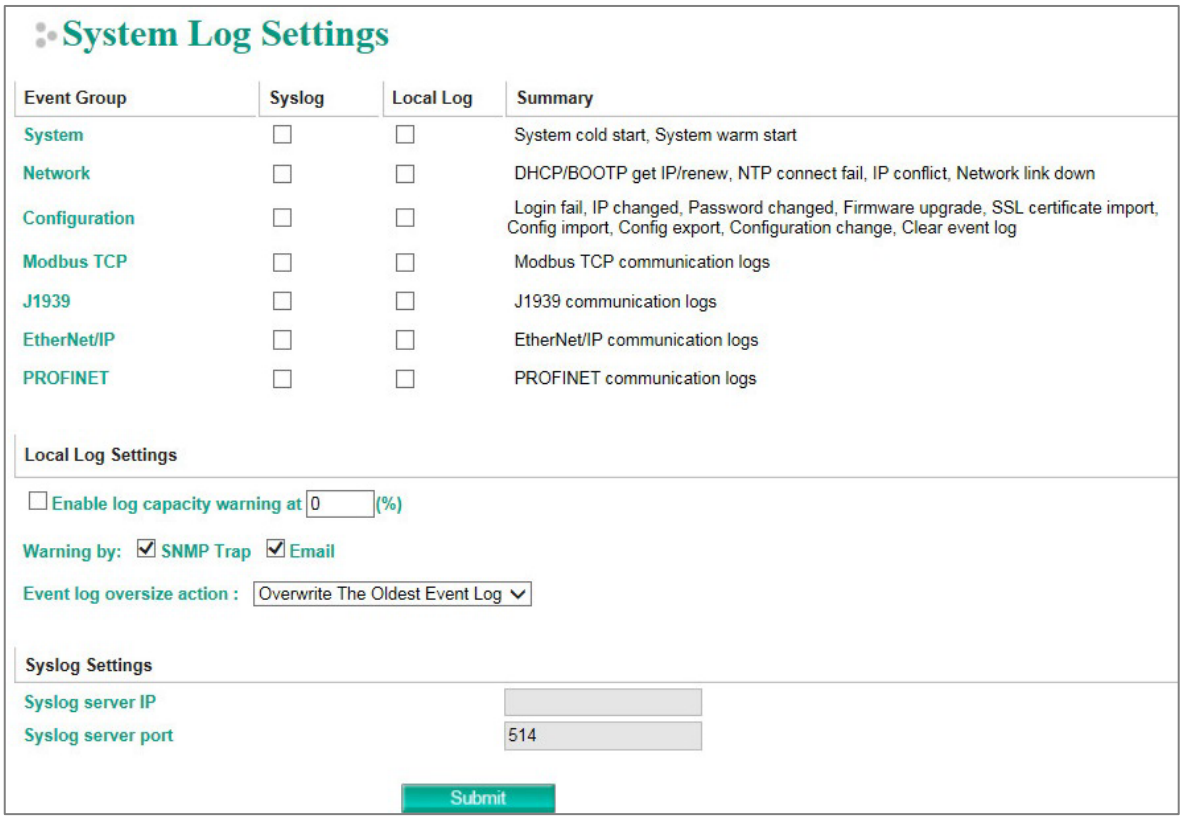
Desired IP Range	IP Address Field	Netmask Field
Any host	Disable	Enable
192.168.1.120	192.168.1.120	255.255.255.255
192.168.1.1 to 192.168.1.254	192.168.1.0	255.255.255.0
192.168.0.1 to 192.168.255.254	192.168.0.0	255.255.0.0
192.168.1.1 to 192.168.1.126	192.168.1.0	255.255.255.128
192.168.1.129 to 192.168.1.254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

DoS Defense

To avoid a DoS attack, some configurations can be set accordingly. They include Null Scan, Xmas Scan, SYN/FIN Scan, FIN Scan, and NMAP-ID Scan. The SYN-Flood and ICMP-Death can also be set on this page.



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.

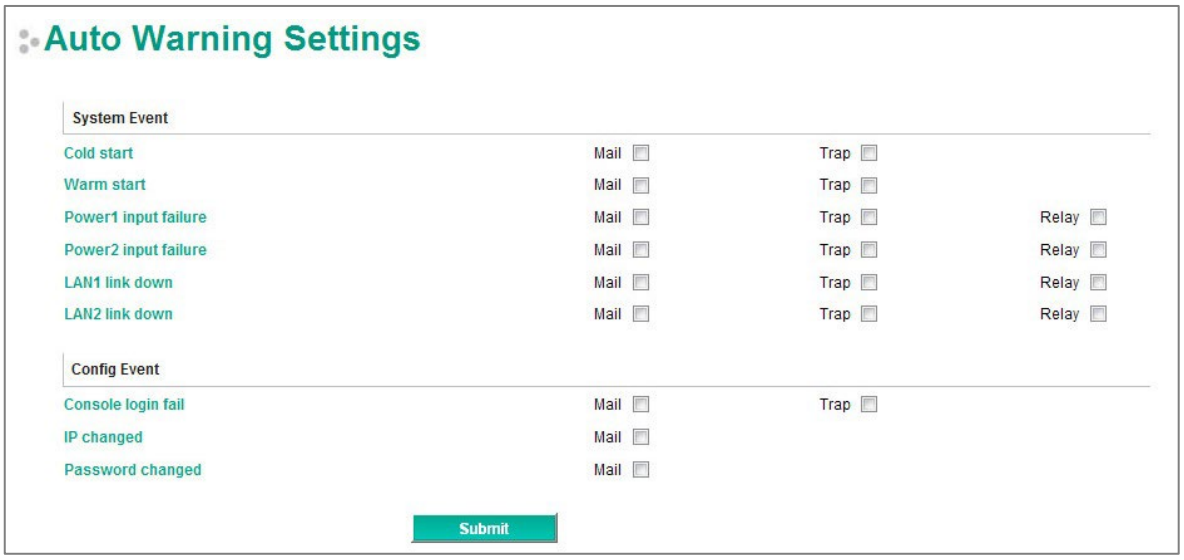
The available information that can be recorded includes the following events:

Event Group	Description
System	System Cold Start, System Warm Start
Configuration	Login Fail, IP Changed, Password Changed, Firmware Upgrade, SSL Certificate Import, Configuration Import/Export
Modbus TCP	Modbus TCP Communication logs
J1939	J1939 communication logs
EtherNet/IP	EtherNet/IP communication logs
PROFINET	PROFINET 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

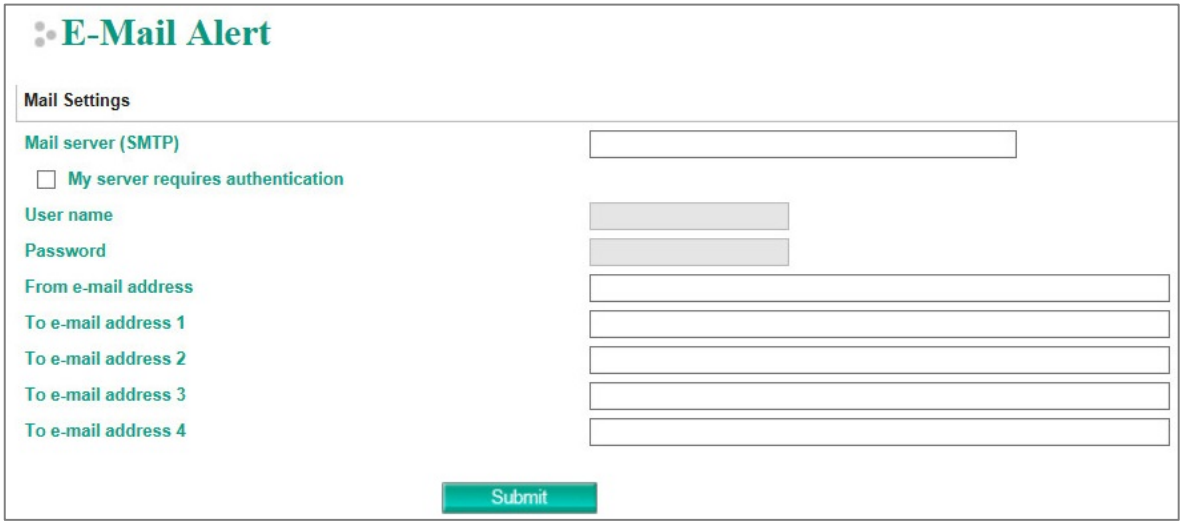
Syslog Settings	Description
Syslog server IP	IP address of the server that will record the log data.
Syslog server port	514

Auto Warning Settings



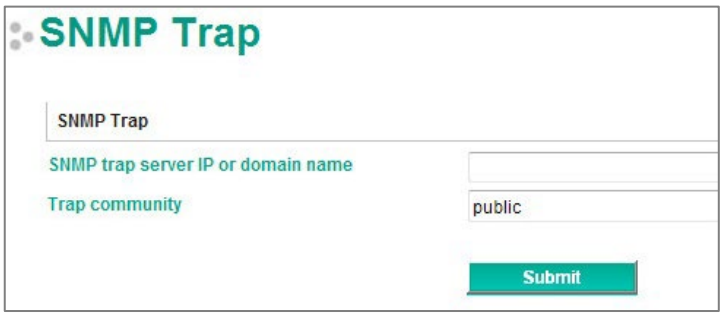
Auto Warning is triggered by different events. When a checked trigger condition occurs, the MGate can send e-mail alerts, SNMP Trap messages, or open/close the circuit of the relay output and trigger the Fault LED to start blinking. To enable an e-mail alert, configure the e-mail address on the E-mail 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 address 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 community	Use this field to designate the SNMP trap community.

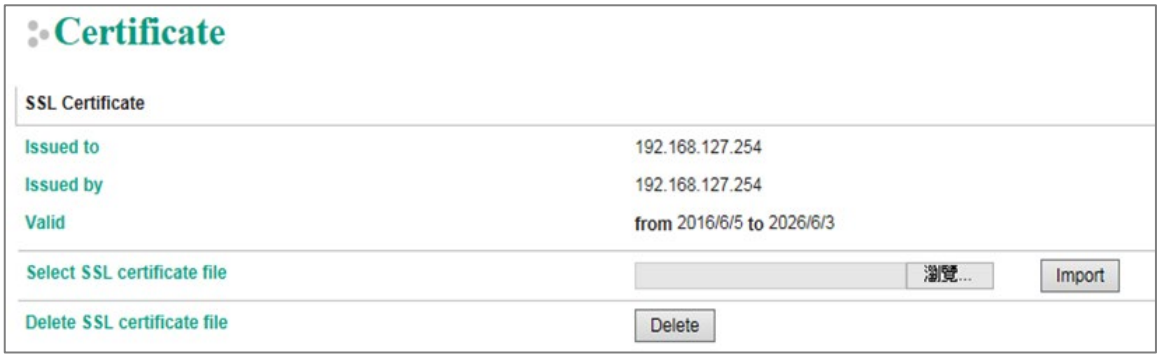
SNMP Agent Settings

Parameters	Description
SNMP	To enable the SNMP Agent function, select the Enable option, and enter a community name (e.g., public).
Read community string	This is a text password mechanism that is used to weakly authenticate queries to agents of managed network devices.
Contact name	The optional SNMP contact information usually includes an emergency contact name and telephone or pager number.
Location	For storing the SNMP's location information.

LLDP Settings

Parameters	Description
Message Transmit Interval	The default time is 30 seconds. The allowable range is between 5 and 16,383 seconds.

Certificate

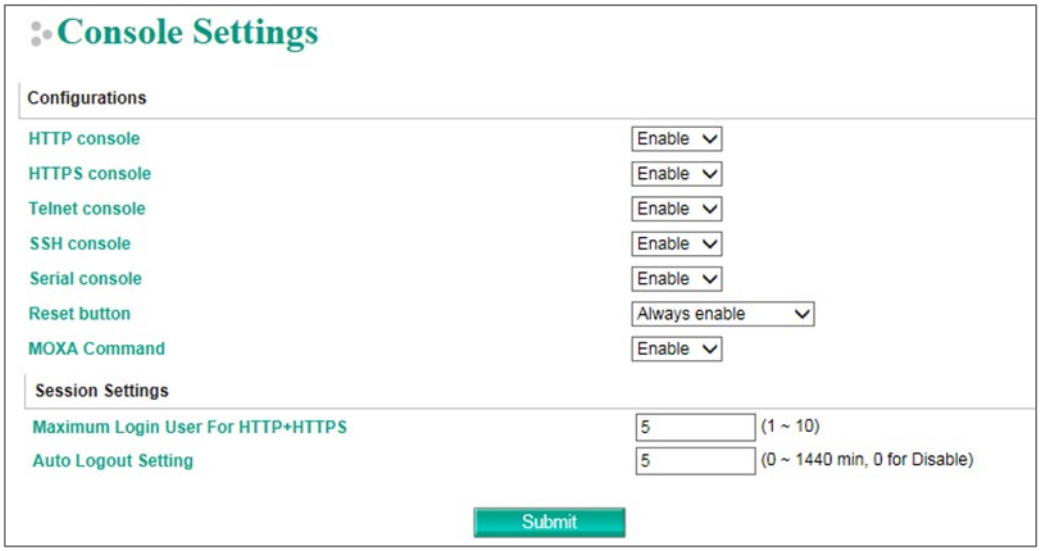


Use this function to load the Ethernet SSL certificate. Select or browse for the certificate file in the Select SSL certificate/key file field. This function is available only in the web console.

Misc. Settings

This page includes console settings, password, and relay output.

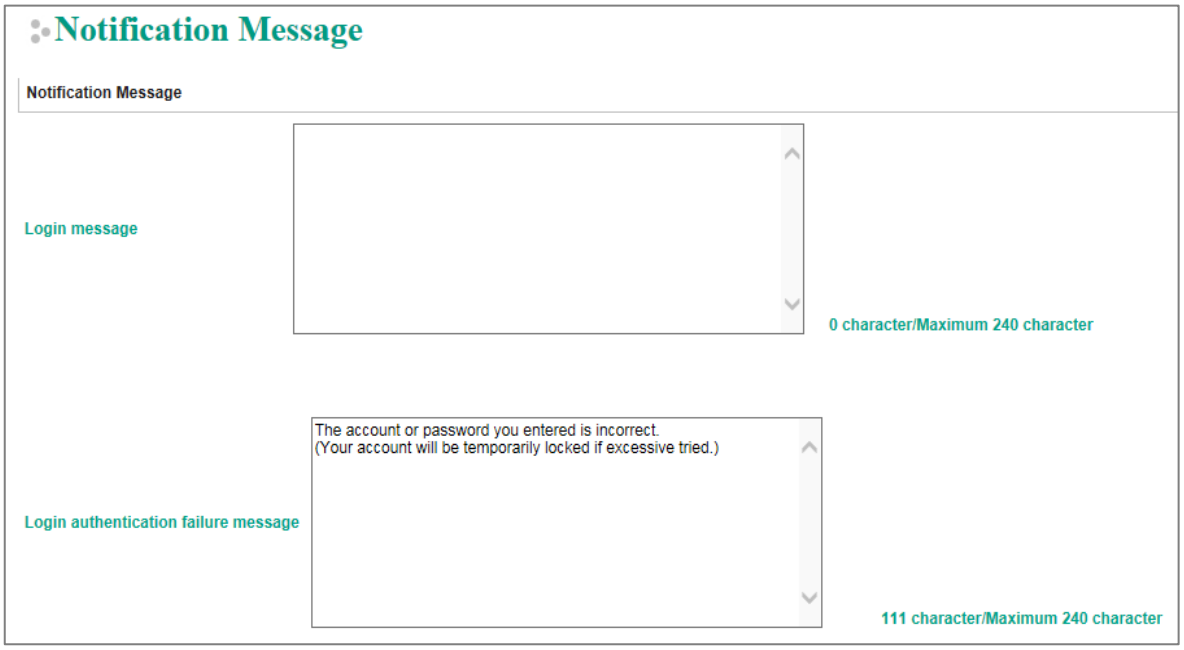
Console Settings



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	
Serial console	Enable/Disable	
Reset button protection	Disable after 60 sec. Always enable	The MGate provides the reset button to clear the password 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	

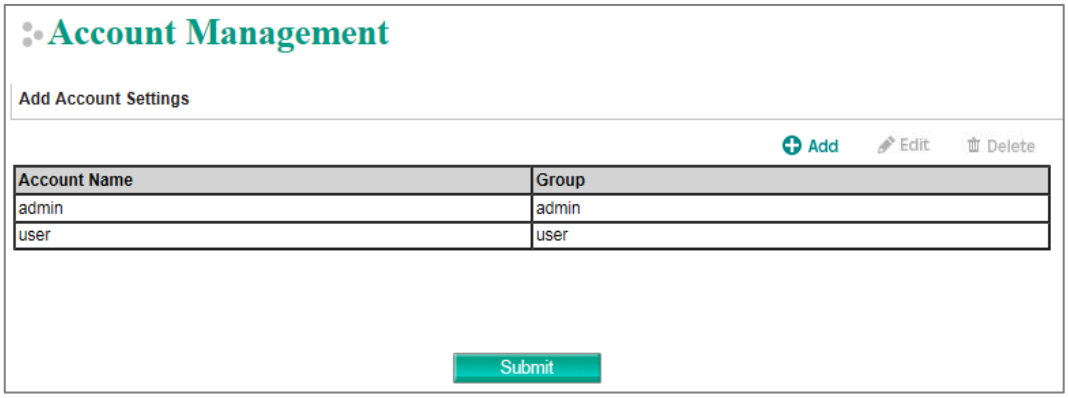
Session Settings	Value	Description
Maximum Login User for HTTP+HTTPS	1 to 10	
Auto Logout Setting	0 to 1440 min.	Set the auto-logout period.

Notification Message



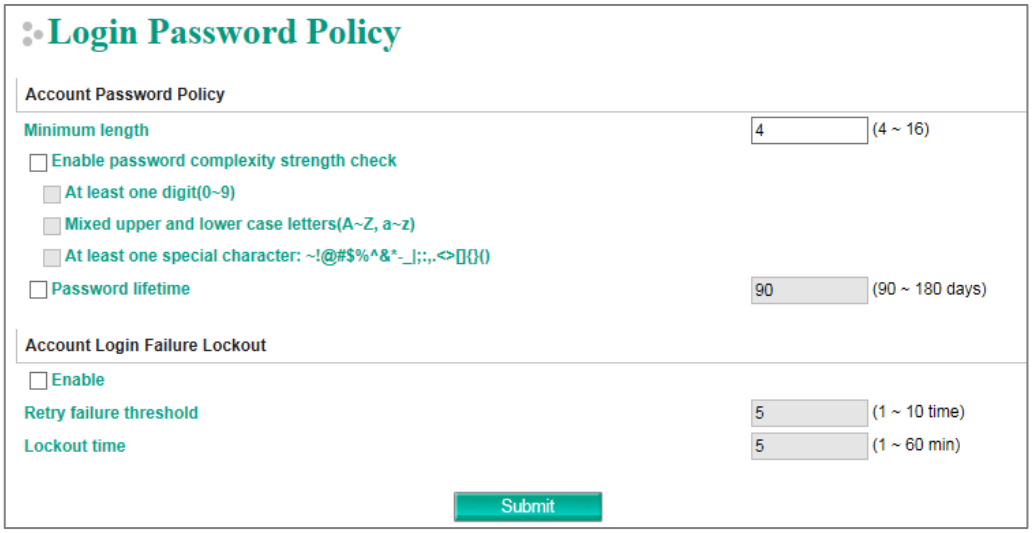
Users can input a message for Login or for Login authentication failure message.

Account Management



Parameters	Value	Description
Account	admin, user	Users can modify the password for different accounts. Now, the MGate provides two different level accounts: admin and user. The admin account can access and change all the settings through the web console. The user account can only view the setting and can't 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 the password's strength
Password lifetime	90 to 180 days	Set the password's lifetime period.

Account Login Failure Lockout	Value	Description
Retry failure threshold	1 to 10 time	
Lockout time	1 to 60 min	

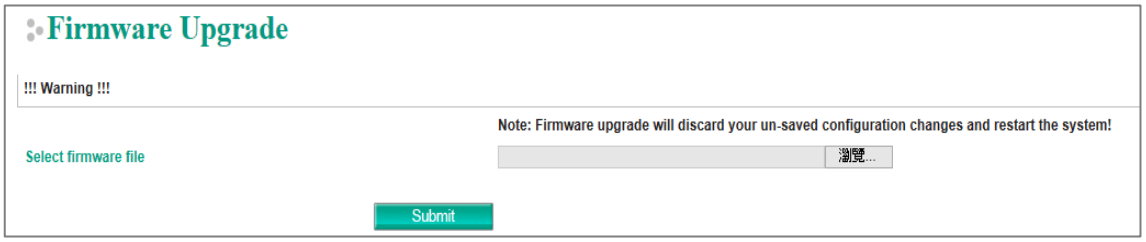
Maintenance

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 in the web console immediately.

Firmware Upgrade

Firmware updates for the MGate 5118 are located at www.moxa.com. After you have downloaded the new firmware onto your PC, you can use the web console to write it to your MGate 5118. Select the desired unit from the list in the web console and click **Upgrade Firmware** to begin the process.



ATTENTION

DO NOT turn off the MGate power before the firmware upgrade process is completed. The MGate will be erasing 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 will fail to boot. If this happens, call Moxa RMA services.

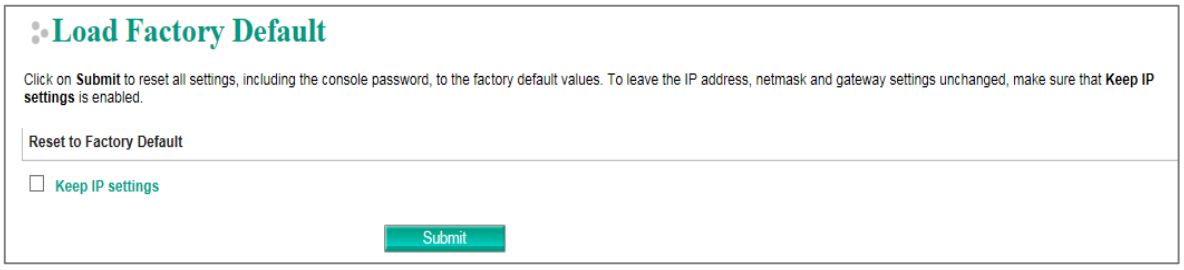
Configuration Import/Export

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 located in different sites. 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 to identify system problems and provide useful information for Moxa's Technical Service Team when maintenance visits are requested.

Load Factory Default

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



ATTENTION

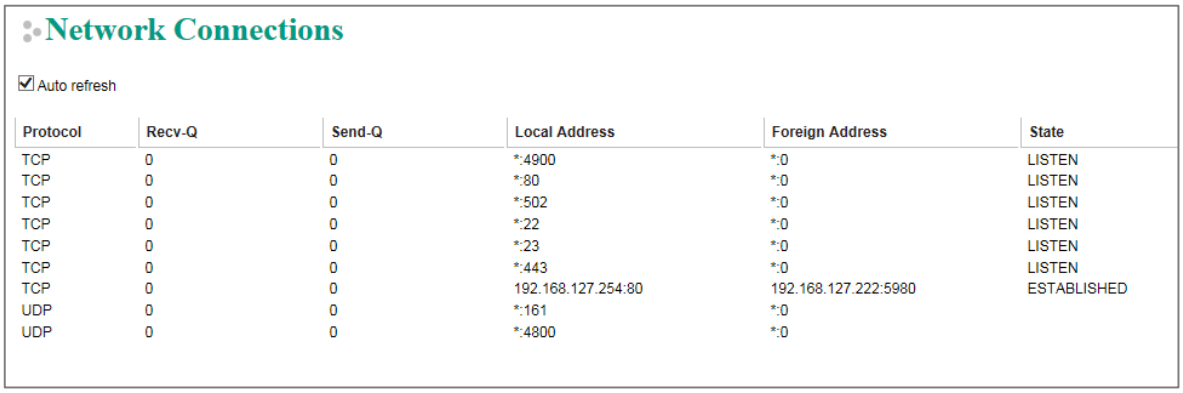
Load Default will completely reset the configuration of the unit, and all the parameters you have saved will be discarded. Do not use this function unless you are sure you want to completely reset your unit.

System Monitoring

System Status

Network Connections

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

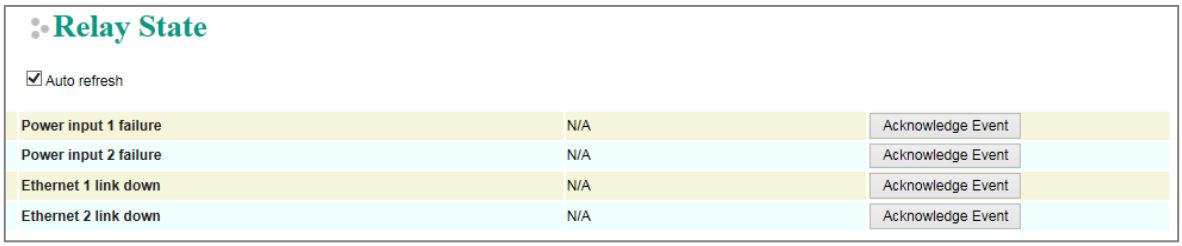


System Log

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

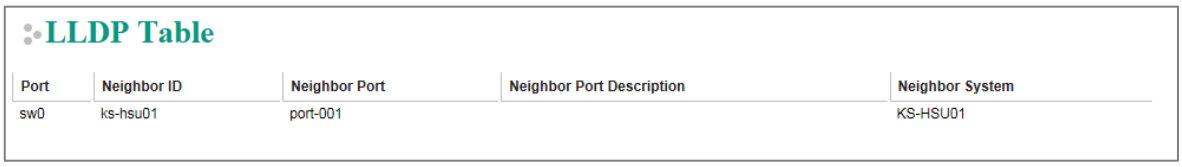
Relay State

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.



LLDP Table

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



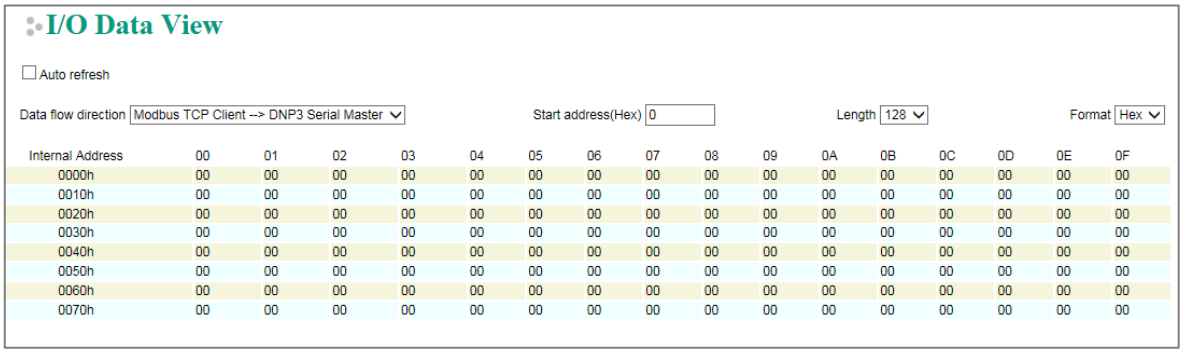
LLDP Table

Port	Neighbor ID	Neighbor Port	Neighbor Port Description	Neighbor System
sw0	ks-hsu01	port-001		KS-HSU01

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 available only in the web console.



I/O Data View

Auto refresh

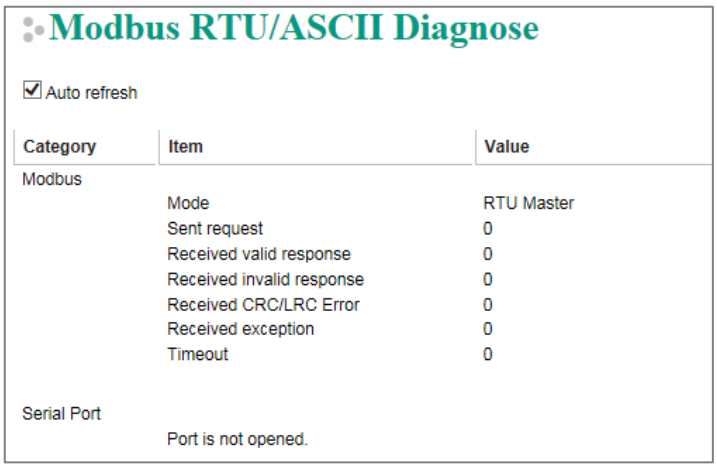
Data flow direction: Modbus TCP Client --> DNP3 Serial Master | Start address(Hex): 0 | Length: 128 | Format: Hex

Internal Address	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0000h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0010h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0020h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0030h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0040h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0050h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0060h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0070h	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

Diagnoses

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

Modbus RTU/ASCII Diagnose (Master)

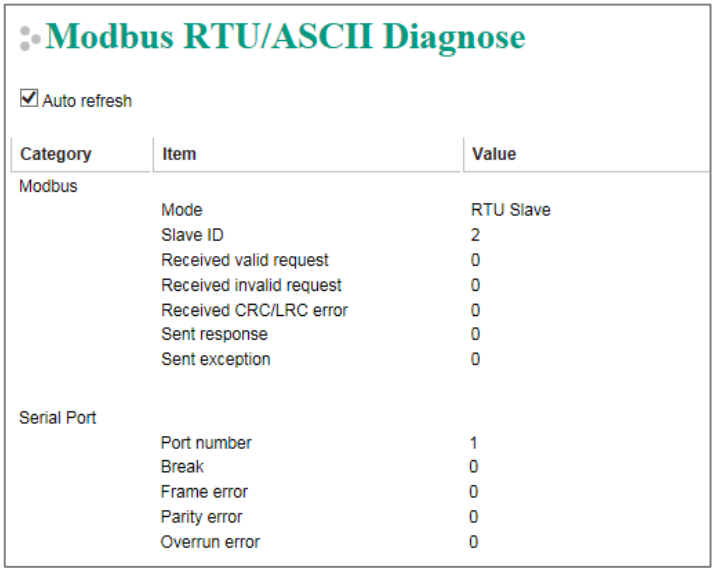


Modbus RTU/ASCII Diagnose

Auto refresh

Category	Item	Value
Modbus		
	Mode	RTU Master
	Sent request	0
	Received valid response	0
	Received invalid response	0
	Received CRC/LRC Error	0
	Received exception	0
	Timeout	0
Serial Port		
	Port is not opened.	

Modbus RTU/ASCII Diagnose (Slave)

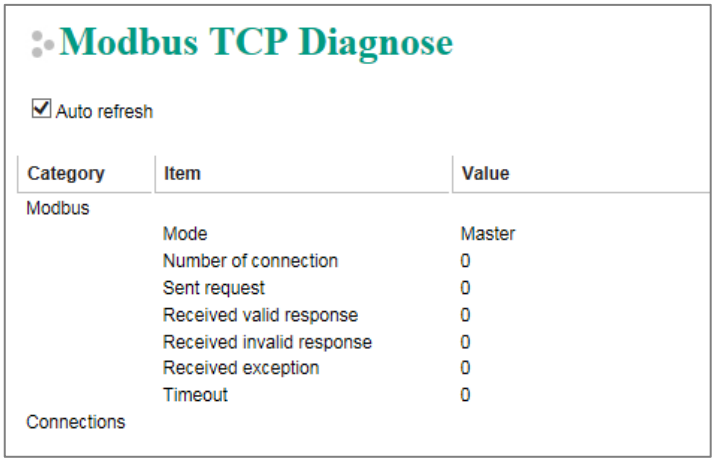


Modbus RTU/ASCII Diagnose

Auto refresh

Category	Item	Value
Modbus		
	Mode	RTU Slave
	Slave ID	2
	Received valid request	0
	Received invalid request	0
	Received CRC/LRC error	0
	Sent response	0
	Sent exception	0
Serial Port		
	Port number	1
	Break	0
	Frame error	0
	Parity error	0
	Overrun error	0

Modbus TCP Diagnose (Client/Master)

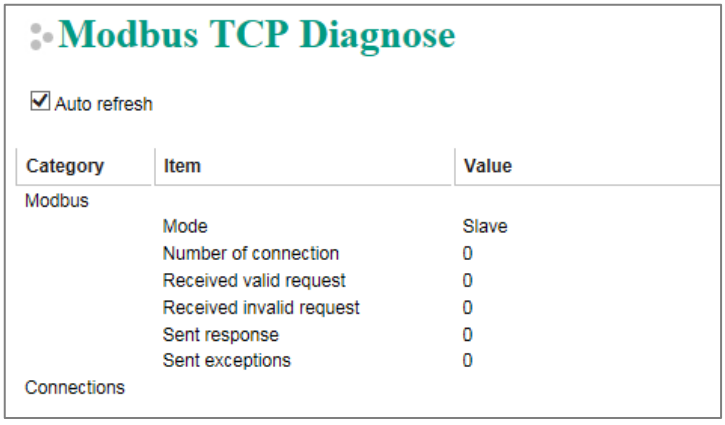


Modbus TCP Diagnose

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		

Modbus TCP Diagnose (Slave/Server)

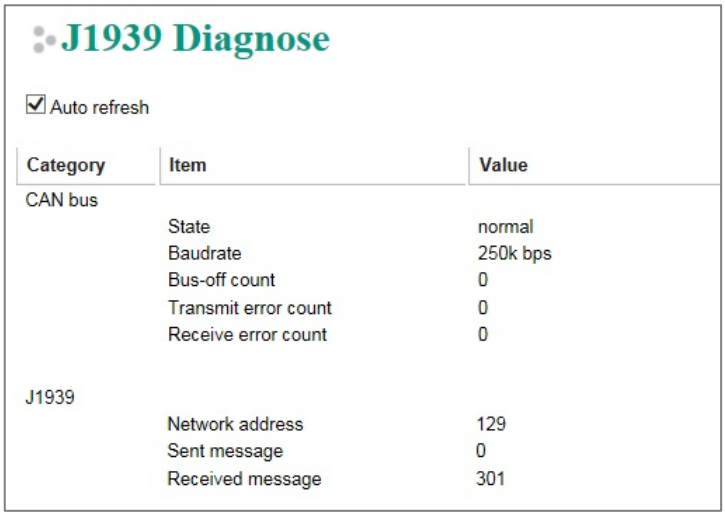


Modbus TCP Diagnose

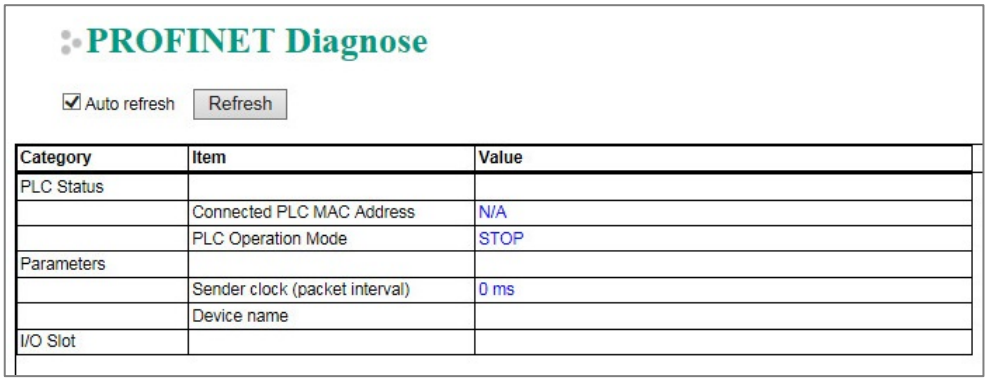
Auto refresh

Category	Item	Value
Modbus		
	Mode	Slave
	Number of connection	0
	Received valid request	0
	Received invalid request	0
	Sent response	0
	Sent exceptions	0
Connections		

J1939 Diagnose



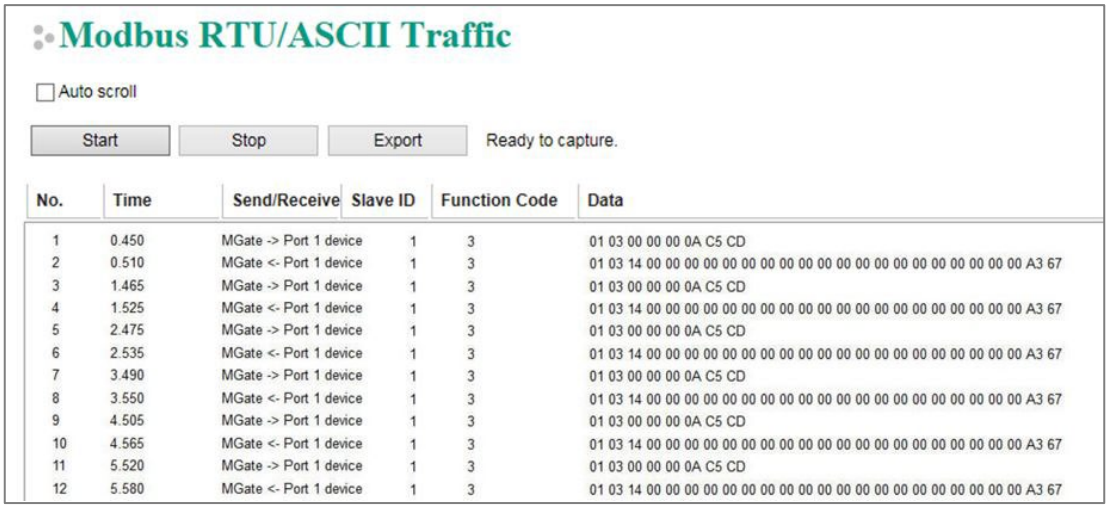
PROFINET Diagnose

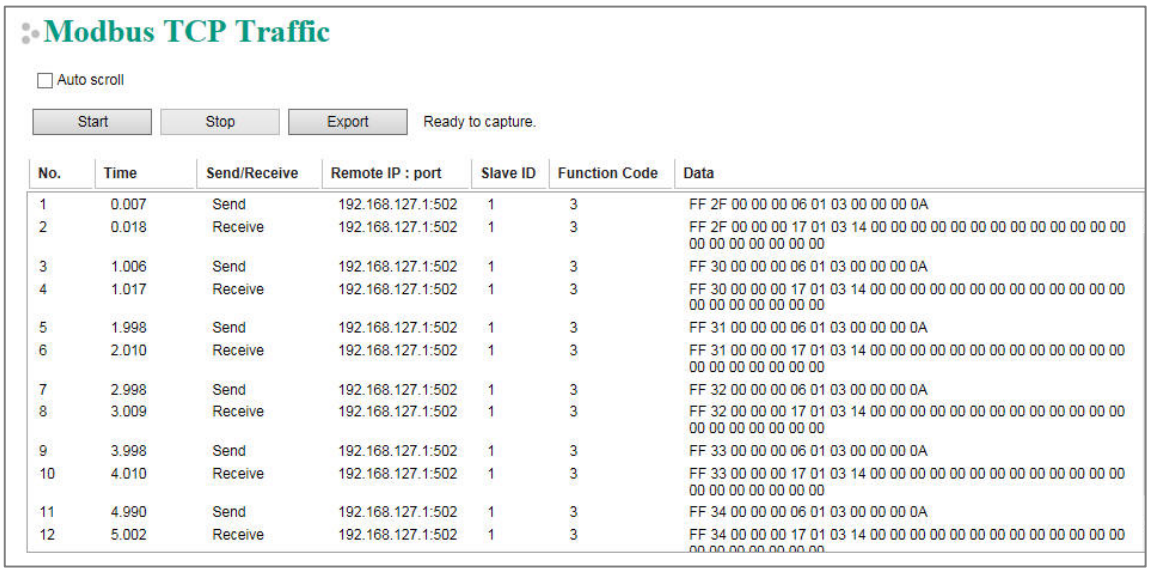


Traffic

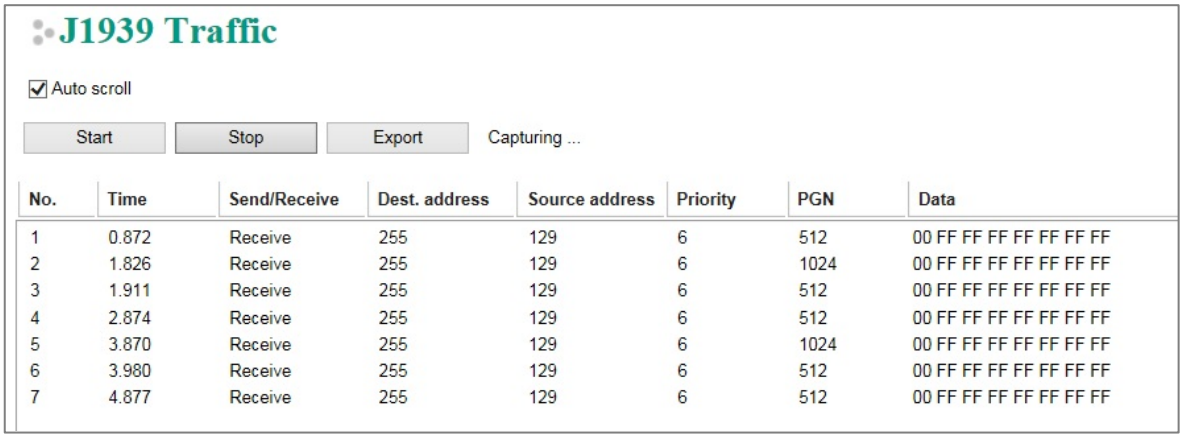
Modbus RTU/ASCII/TCP Traffic

For troubleshooting or management purposes, you can monitor the Modbus RTU/ASCII/TCP data passing through the MGate 5118 on the network. Rather than simply echoing the data, the web console presents the data in an intelligent, easy-to-understand format with clearly designated fields, including source, destination, contents, slave ID, function code, and raw data.





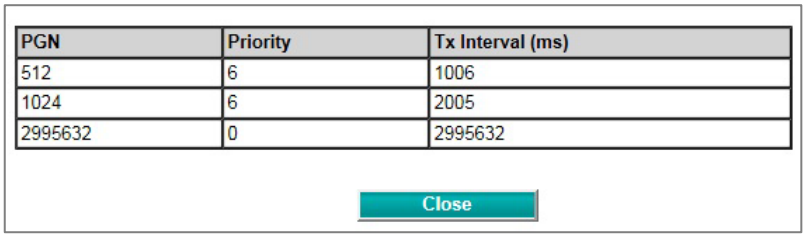
J1939 Traffic



J1939 Live List

The Live List function allows you to check how many live devices are on the same CAN bus of the MGate.

And you may also click on the **Question** icon for more detail.



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 5118 supports a fault protection function when in agent mode. You can configure the criteria used to determine what to do when the write command is no longer received from the master side. For example, when a 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 5118 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 5118 allocates one bit of the gateway's specified memory address to indicate the status of each J1939 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 be aware of the failure status of the slave device

	Modbus RTU/ASCII/TCP	PROFINET	EtherNet/IP
Method	Modbus function code: 0x03 or 0x04	Acyclic read	Through UCMM with Class ID 0x405, Instance ID 1, Attribute 0.
Data address	60000	30000	
Data Unit	word byte	byte	

For example, if there are 32 J1939 commands, the status monitoring of these 32 commands is to read the data address as below:

	Modbus RTU/ASCII/TCP	PROFINET
Data address	60000 to 60001	30000 - 30003
Remark.	60000 represents commands 1 to 16, 60001 represents commands 17 to 32,	30000 represents command 1 to 8, 30001 represents command 9 to 16, 30002 represents command 17 to 24, 30003 represents command 25 to 32

Restart

All changes will be activated by clicking the **Submit** button first and then restarting the gateway. If a lot of settings need to be changed, you can click **Submit** for each setting and then click **Restart** to activate all the changes.

Logout

For safety reasons, remember to log out of the web utility to prevent people who do not have the proper authorization from accessing the gateway.

Network Management Tool (MXstudio)

Moxa's MXstudio industrial network management suite includes tools such as MXconfig and MXview.

MXconfig is for industrial network mass configuration; MXview is industrial management software. For the software and related detailed information regarding MXview and MXconfig, as well as the supported product firmware versions, refer to the Moxa website at https://www.moxa.com/en/products/industrialnetwork-infrastructure/network-management-software.

When you discover a Moxa product that has not been integrated into the MXview or MXconfig; you may not be able to retrieve the product information from MXview or MXconfig. To solve this, you can download the plugin file from the Moxa MGate product website and then import/install the plugin into MXview or MXconfig.

After importing/installing the plugin files, the MGate products can be supported by MXview/MXconfig. Refer to the Moxa MGate product website to download plugin files: http://www.moxa.com. For more detailed functions, such as supported functions on MXview/MXconfig, refer to the Tech Note: Configuring and Monitoring with MXview One/MXview and MXconfig.

A. CIP Objects of EtherNet/IP

Several communication objects are defined in CIP (Common Industrial Protocol). Moxa's MGate supports the following for PLCs and SCADA systems to monitor:

- Identity Object
- TCP/IP Interface Object
- Ethernet Link Object
- Assembly Object
- Message Router Object
- Connection Manager Object
- Port Object

The supported attributes and services of the above objects are introduced in the table below, including the access rules for each attribute. To understand the details of each attribute of the standard objects, refer to the official documents of CIP introduction (Vol. 1) and the EtherNet/IP Adaptation of CIP (Vol. 2).

Identity Object

The Class code of Identity object is **0x01** (Defined in CIP Vol1, 5-2).

There is **one** instance of this object in our product. It stores information about the production and the device. The following tables summarize the class attributes and the instance attributes.

Class Attribute List

Attr ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT (16)	Revision of this object
2	Get	Max Instance	UINT (16)	Maximum instance number of an object created in this class level of the device
3	Get	Number of Instances	UINT (16)	Number of object instances created in this class level of the device.
6	Get	Maximum ID Number Class Attributes	UINT (16)	The attribute ID number of the last class attribute of the class definition implemented in the device
7	Get	Maximum ID Number Instance Attributes	UINT (16)	The attribute ID number of the last instance attribute of the class definition implemented in the device

Instance Attribute List

Attr. ID	Access Rule	Name	(Struct.)	Data Type	Description
1	Get	Vendor ID		UINT (16)	991, the vendor ID of Moxa
2	Get	Device Type		UINT (16)	0 x 0C, "Communications Adapter"
3	Get	Product Code		UINT (16)	Refer to Product Code Table
4	Get	Revision		(Struct.)	The version of the Identity object
			Major	USINT (8)	The structure member, major
			Minor	USINT (8)	The structure member, minor
5	Get	Status		WORD (16)	Not used
6	Get	Serial Number		UDINT (32)	The serial number of each device
7	Get	Product Name		SHORT_STRING	The product name in human-readable format
15	Get/Set	Assigned Name		STRINGI	The assigned MGate name For example: Same as the server's name set in the basic settings. By default, it is "MGate xxxx_xx" (xxxx_xx represents the product series number and serial number)
17	Get/Set	Geographic Location		STRINGI	The assigned MGate location Same as the server location set in the basic settings. By default, it is blank.

The Identity Object Instance supports the following CIP Common services:

Common Service List

Service Code	Implementation		Service Name	Description
	Class	Instance		
0x01	✓	✓	Get_Attribute_All	Returns the contents of all attributes of the class
0x0E	✓	✓	Get_Attribute_Single	Used to read an object instance attribute
0x10		✓	Set_Attribute_Single	Used to write an object instance attribute
0x05		✓	Reset	Invokes the reset service for the device

Product Code	Model Name
0x1040	MGate 5122

TCP/IP Interface Object

The Class code of TCP/IP Interface object is **0xf5** (Defined in CIP Vol2, 5-3). There is **one** instance of this object.

The following tables summarize the attributes of this object.

Class Attribute List

Attr ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT (16)	Revision of this object.
2	Get	Max Instance	UINT (16)	Maximum instance number of an object currently created at this class level of the device
3	Get	Number of Instances	UINT (16)	Number of object instances currently created at this class level of the device
6	Get	Maximum ID Number Class Attributes	UINT (16)	The attribute ID number of the last class attribute of the class definition implemented in the device
7	Get	Maximum ID Number Instance Attributes	UINT (16)	The attribute ID number of the last instance attribute of the class definition implemented in the device

Instance Attribute List

Attr. ID	Access Rule	Name	(Struct.)	Data Type	Description
1	Get	Status		DWORD (32)	Interface status 0 = The Interface Configuration attribute has not been configured 1 = The Interface Configuration attribute contains valid configuration obtained from BOOTP, DHCP or non-volatile storage
2	Get	Configuration Capability		DWORD (32)	Interface capability flags Bit map of capability flags: Bit 0: BOOTP Client Bit 1: DNS Client Bit 2: DHCP Client Bit 3: DHCP-DNS Update Bit 4: Configuration Settable
3	Get/Set	Configuration Control		DWORD (32)	Interface control flags Bit map of control flags: Bit 0 to 3: Startup Configuration • 0 = The device shall use the interface configuration values previously stored (for example, in non-volatile memory or via hardware witches) • 1 = The device shall obtain its interface configuration values via BOOTP • 2 = The device shall obtain its interface configuration values via DHCP upon startup • 3 to15 = Reserved
4	Get	Physical Link Object		(Struct.)	Path to physical link object
			Path Size	UINT (16)	Size of Path
			Path	Padded EPATH	Logical segments identifying the physical link object
5	Get/Set	Interface Configuration		(Struct.)	TCP/IP network interface configuration
			IP Address	UDINT (32)	The device's IP address
			Network Mask	UDINT (32)	The device's network mask
			Gateway Address	UDINT (32)	Default gateway address
			Name Server	UDINT (32)	Primary name server
			Name Server2	UDINT (32)	Secondary name server
			Domain Name	STRING	Default domain name
6	Get/Set	Host Name		STRING	Host name

The TCP/IP Object Instance supports the following CIP Common services:

Common Service List

Service Code	Implementation		Service Name	Description
	Class	Instance		
0x01	✓	✓	Get_Attribute_All	Returns the contents of all attributes of the class
0x0E	✓	✓	Get_Attribute_Single	Used to read an object instance attribute
0x10		✓	Set_Attribute_Single	Used to change an object instance attribute

Ethernet Link Object

The Class code of Ethernet Link object is **0xf6** (Defined in CIP Vol2, 5-4). For each MGate Ethernet port, there is an instance of this class. The following table shows the mapping of instance number and the MGate Ethernet port number.

Instance Number	Mapping to
0	Ethernet Link class
1	First MGate Ethernet port
2	Second MGate Ethernet port

The following tables summarize the attributes of the Ethernet Link object.

There are some vendor-specific attributes in the table (Starting from attribute Id 100).

Class Attribute List

Attr. ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT (16)	Revision of this object
2	Get	Max Instance	UINT (16)	Maximum instance number of an object created at this class level of the device
3	Get	Number of Instances	UINT (16)	Number of object instances currently created in this class level of the device
6	Get	Maximum ID Number Class Attributes	UINT (16)	The attribute ID number of the last class attribute of the class definition implemented in the device
7	Get	Maximum ID Number Instance Attributes	UINT (16)	The attribute ID number of the last instance attribute of the class definition implemented in the device

Instance attribute list

Attr. ID	Access Rule	Name	(Struct.)	Data Type	Description
1	Get	Interface Speed		UDINT (32)	Interface speed in use (Speed in Mbps, e.g., 0, 10, 100, 1000, etc.)
2	Get	Interface Flags		DWORD (32)	Refer to the Interface Flags table
3	Get	Physical Address		ARRAY of 6 USINT(8)	MAC layer address (The System MAC address)
4	Get	Interface Counters		(Struct.)	Counters relevant to the receipt of packets
			In Octets	UDINT (32)	Octets received on the interface
			In Ucast Packets	UDINT (32)	Unicast packets received on the interface
			In NUcast Packets	UDINT (32)	Non-unicast packets received on the interface
			In Discards	UDINT (32)	Inbound packets received on the interface but are discarded
			In Errors	UDINT (32)	Inbound packets that contain errors (does not include In Discards)
			Out Octets	UDINT (32)	Octets sent on the interface
			Out Ucast Packets	UDINT (32)	Unicast packets sent on the interface
			Out NUcast Packets	UDINT (32)	Non-unicast packets sent on the interface
			Out Discards	UDINT (32)	Discarded outbound packets
			Out Errors	UDINT (32)	Outbound packets that contain errors
5	Get	Media Counters		(Struct.)	
			Alignment Errors	UDINT (32)	Received frames that are not an integral number of octets in length
			FCS Errors	UDINT (32)	Received frames that do not pass the FCS check

Attr. ID	Access Rule	Name	(Struct.)	Data Type	Description
			Single Collisions	UDINT (32)	Successfully transmitted frames which experienced exactly one collision
			Multiple Collisions	UDINT (32)	Successfully transmitted frames which experienced more than one collision
			SQE Test Errors	UDINT (32)	The number of times the SQE test error message is generated
			Deferred Transmissions	UDINT (32)	Frames for which first transmission attempt is delayed because the medium is busy
			Late Collisions	UDINT (32)	The number of times a collision is detected later than 512 bit times into the transmission of a packet
			Excessive Collisions	UDINT (32)	Frames for which transmission fails because of excessive collisions
			MAC Transmit Errors	UDINT (32)	Frames for which transmission fails because of an internal MAC sublayer transmit error
			Carrier Sense Errors	UDINT (32)	Times that the carrier sense condition was lost or never asserted when attempting to transmit a frame
			Frame Too Long	UDINT (32)	Received frames that exceed the maximum permitted frame size
			MAC Receive Errors	UDINT (32)	Frames for which reception on an interface fails because of an internal MAC sublayer receive error
6	Get/Set	Interface Control		(Struct.)	Configuration for physical interface
			Control Bits	WORD (16)	Bit 0: Auto-Negotiate • Value 0: Force • Value 1: Auto-Nego Bit 1: Half/Full Duplex • Value 0: half duplex • Value 1: full duplex Bit 2 to 15: Reserved, all zero
			Forced Interface Speed	UINT (16)	Speed at which the interface is forced to operate
10	Get	Interface Label		SHORT_STRING	Human readable identification
11	Get	Interface Capability		(Struct.)	Indicates the capabilities of the interface
			Capability Bits	DWORD (32)	Interface capabilities, other than speed/duplex
			Speed/Duplex Options	(Struct.)	Indicates speed/duplex pairs supported in the Interface Control attribute
				USINT (8)	Speed/Duplex Array Count
				(Array Struct.)	Speed/Duplex Array
				UINT (16)	Interface Speed
				USINT (8)	Interface Duplex Mode

Interface Flags

Bit(s)	Called	Definition
0	Link Status	0 indicates an inactive link; 1 indicates an active link.
1	Half/Full Duplex	0 indicates half duplex; 1 indicates full duplex.
2-4	Negotiation Status	Indicates the status of link auto-negotiation 0 = Auto-negotiation in progress. 1 = Auto-negotiation and speed detection failed. Using default values for speed and duplex. Default values are product-dependent; recommended defaults are 10Mbps and half duplex. 2 = Auto negotiation failed but detected speed. Duplex defaulted. Default value is product-dependent; recommended default is half duplex. 3 = Successfully negotiated speed and duplex. 4 = Auto-negotiation is not attempted. Forced speed and duplex.
5	Manual Setting Requires Reset	0 indicates the interface can activate changes to link parameters (auto-negotiate, duplex mode, interface speed) automatically. 1 indicates the device requires a reset service to be issued to its Identity Object in order for the changes to take effect.
6	Local Hardware Fault	0 indicates the interface detects no local hardware fault; 1 indicates a local hardware fault is detected. The meaning of this is product- specific. For example, an AUI/MII interface might detect no transceiver attached, or a radio modem might detect no antenna attached. In contrast to the soft, possibly self-correcting nature of the Link Status being inactive, this is assumed a hard-fault requiring user intervention.
7~31	Reserved.	Shall be set to zero

The Ethernet Link Object Instance supports the following CIP common services:

Common Service List

Service Code	Implementation		Service Name	Description
	Class	Instance		
0x0E	✓	✓	Get_Attribute_Single	Used to read an object instance attribute
0x10		✓	Set_Attribute_Single	Used to modify an object instance attribute

Assembly Object

The MGate supports **static** assembly object for CIP I/O messaging. The class code is **0x04** (defined in CIP Vol 1, 5-5).

There are three instances of this object as follows.

	Instance Number	Size (bytes)
Input	4	1984
Output	4	1984
Configuration	1	0

The **Input** means the MGate produces the data, which includes the information and status report to the originator for monitoring. The **Output** means the data is generated by the originator (remote host) and is consumed by MGate.

Class Attribute List

Attr ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT (16)	Revision of this object

Instance Attribute List

Attr ID	Access Rule	Name	(Struct.)	Data Type	Description
3	Get	Data		Array of BYTE	The implicit messaging content
4	Get	Size		UINT (16)	Number of bytes in Attr. 3

Common Service List

Service Code	Implementation		Service Name	Description
	Class	Instance		
0x0E	✓	✓	Get_Attribute_Single	Used to read an object instance attribute

Message Router Object

The object within a node that distributes messaging requests to the application objects. The supported messaging connections are:

- Explicit Messaging
- Unconnected Messaging
- Implicit messaging

When using the UCMM to establish an explicit messaging connection, the target application object is the Message Router object (Class Code **2**).

Class Attribute List

Attr. ID	Access Rule	Name	Data Type	Descriptions
1	Get	Revision	UINT (16)	Revision of this object

Instance Attribute List

Attr. ID	Access Rule	Name	(Struct.)	Data Type	Description
1	Get	Object_list		(Struct.)	A list of supported objects
			Number	UINT (16)	The number of supported classes in the classes array
			Classes	Array of UINT (16)	List of supported class codes
2	Get	Number Available		UINT (16)	The maximum number of connections supported
3	Get	Number Active		UINT (16)	The number of connections used by system components
4	Get	Active Connections		Array of UINT (16)	A list of the connection IDs of the currently active connections

Common Service List

Service Code	Implementation		Service Name	Description
	Class	Instance		
0x0E	✓	✓	Get_Attribute_Single	Used to read an object instance attribute

Connection Manager Object

The Connection Manager Class allocates and manages the internal resources associated with both I/O and explicit messaging connections.

The class code is **0x06**. There is one instance of this object.

The supported connection trigger type is ***cyclic*** and ***change of state***. The following introduces the instance attribute list.

Class Attribute List

Attr. ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT (16)	Revision of this object

Common Service List

Service Code	Implementation		Service Name	Description
	Class	Instance		
0x0e	✓		Get_Attribute_Single	Returns the contents of the specified attribute
0x4E		✓	Forward_Close	Closes a connection
0x54		✓	Forward_Open	Opens a connection

Port Object

The port object represents the underlying interface of CIP, which is EtherNet/IP. The class code is **0xf4**. There is one instance of this object.

The instance attribute "**Port Type**" identifies the CIP adaptation.

Class Attribute List

Attr. ID	Access Rule	Name	(Struct.)	Data Type	Description
1	Get	Revision		UINT (16)	Revision of this object
2	Get	Max Instance		UINT (16)	Maximum instance number of an object currently created at this class level of the device
3	Get	Number of Instances		UINT (16)	Number of object instances currently created at this class level of the device.
8	Get	Entry Port		UINT (16)	The attribute ID number of the last class attribute of the class definition implemented in the device
9	Get	Port Instance Info		(Array of Struct.)	
			Port Type	UINT (16)	Enumerates the type of port
			Port Number	UINT (16)	CIP port number associated with this port

Instance Attribute List

Attr. ID	Access Rule	Name	(Struct.)	Data Type	Description
2	Get	Port Number		UINT (16)	CIP port number associated with this port. (Value 1 is reserved for internal product use)
3	Get	Link Object		(Struct.)	
			Path Length	UINT (16)	The number of 16-bit words in the following path
			Link Path	Padded EPATH	Logical path segments that identify the object for this port
4	Get	Port Name		SHORT_STRI NG	String, which names the physical network port. The maximum number of characters in the string is 64.
7	Get	Node Address		Padded EPATH	Node number of this device on port. The range within this data type is restricted to a Port Segment.
10	Get	Port Routing Capabilities		DWORD (32)	Bit string that defines the routing capabilities of this port

Common Service List

Service Code	Implementation		Service Name	Description
	Class	Instance		
0x0E	✓	✓	Get_Attribute_Single	Used to read an object instance attribute
0x01	✓	✓	Get_Attributes_All	Returns the contents of all attributes of the class/instance