MGate 5216 Series User Manual

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www.moxa.com/products

MGate 5216 Series User Manual

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1. Introduction

MGate EtherCAT industrial Ethernet gateways convert data between the Modbus RTU/ASCII, proprietary serial, and EtherCAT protocols. All models are protected by a rugged metal housing, are DIN-rail mountable, and offer built-in serial isolation.

Modbus is one of the most widely used industrial communication protocols, and EtherCAT are commonly used in factory automation and semiconductors. The MGate supports both Modbus RTU/ASCII client and Micro Python for you to program proprietary serial protocol, so that you can easily connect your Modbus devices or serial devices to EtherCAT host.

The MGate EtherCAT gateways are designed for easy configuration and quick maintenance. A handy web console can implement remote maintenance tasks. A comprehensive collection of troubleshooting tools reduces configuration time and system downtime. The rugged design is suitable for industrial applications.

2. Getting Started

This chapter provides basic instructions for installing the MGate 5216.

Connecting the Power

The device can be powered by connecting a power source to the terminal block:

1. Loosen or remove the screws on the terminal block.
2. Turn off the power source and then connect a 12–48 VDC power line to the terminal block.
3. Tighten the connections, using the screws on the terminal block.
4. Turn on the power source.

NOTE

The device does not have an on/off switch. It automatically turns on when it receives power. The PWR LED on the top panel will glow to show that the device is receiving power. For power terminal block pin assignments, refer to the Quick Installation Guide, Power Input and Relay Output Pinout section.

Connecting Serial Devices

The serial port(s) are on the front panel of the device. 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).

Connecting to the EtherCAT Network

EtherCAT network uses its own two RJ45 connector located on the right side of the front panel. Connect your EtherCAT PLC to the IN port and connect the OUT port to the next EtherCAT device for a daisy-chain connection. The Link LED on the device will light up to show a live Ethernet connection.

Connecting to a PC

For initial configuration or for troubleshooting, you may connect the device directly to a PC.

The Link LED on the device will light up to show a live EtherCAT connection.

Installing the Software (Optional)

The Device Search Utility (DSU) can be downloaded from Moxa's website: www.moxa.com. The DSU can connect the MGate with the PC. For additional details, refer to **Chapter 3:** Device Search Utility.

microSD Card

The MGate 5216 gateway series is equipped with a microSD card slot for easy configuration. The microSD card can 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 change the MGate's configuration using 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 device:

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 exist. 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.

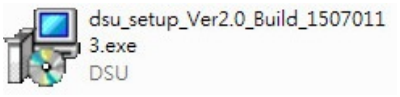
Installing the Software

The following instructions explain how to install the Device Search Utility (**DSU**), a utility for configuring and monitoring MGate 5216 devices over a network.

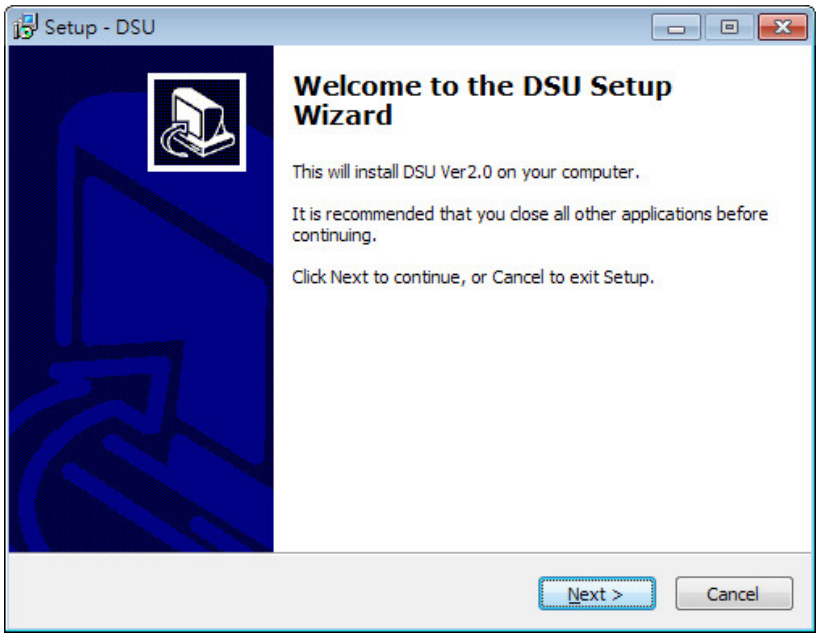
1. Locate and run the following setup program to begin the installation process:

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

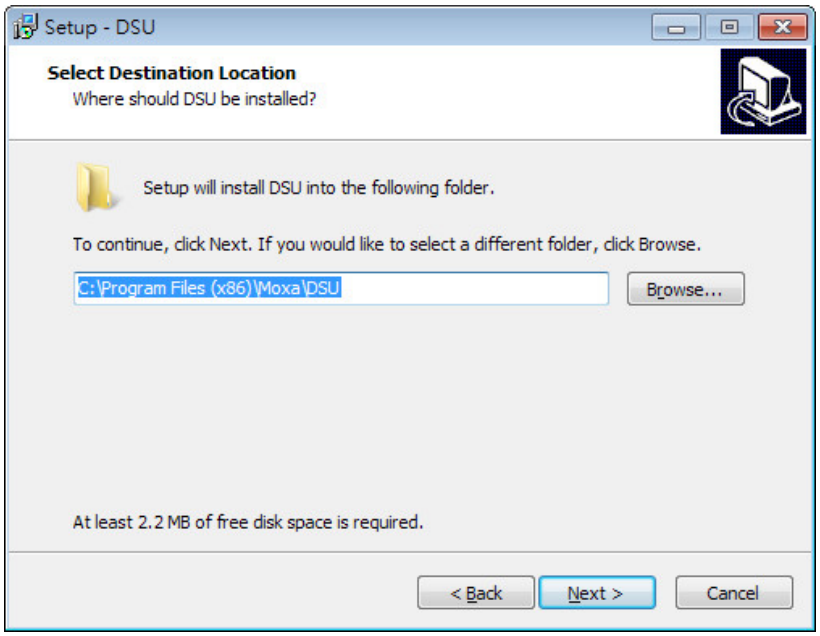
   The latest version might be named **dsu_setup_Ver2.0_Build_xxxxxxxx.exe**, for example:



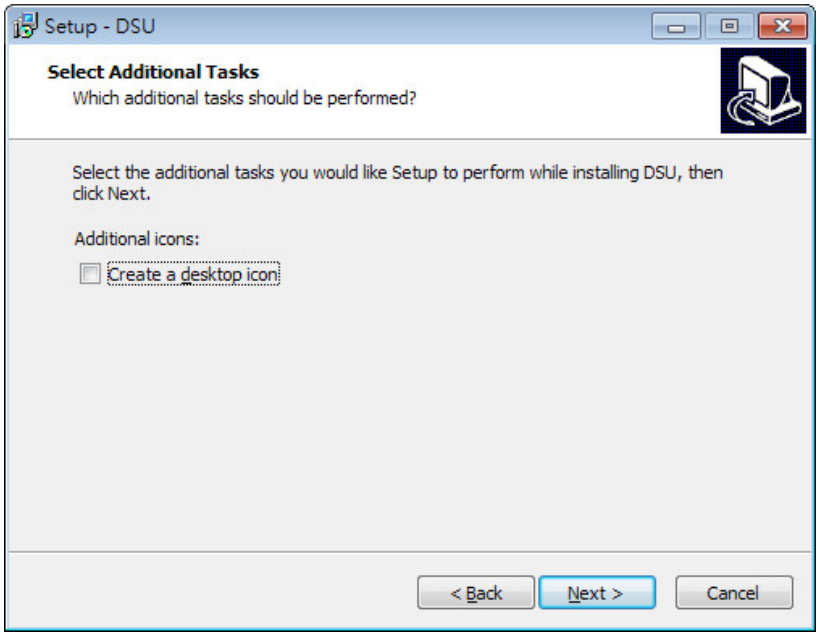
2. You will be greeted by the Welcome window. Click **Next** to continue.



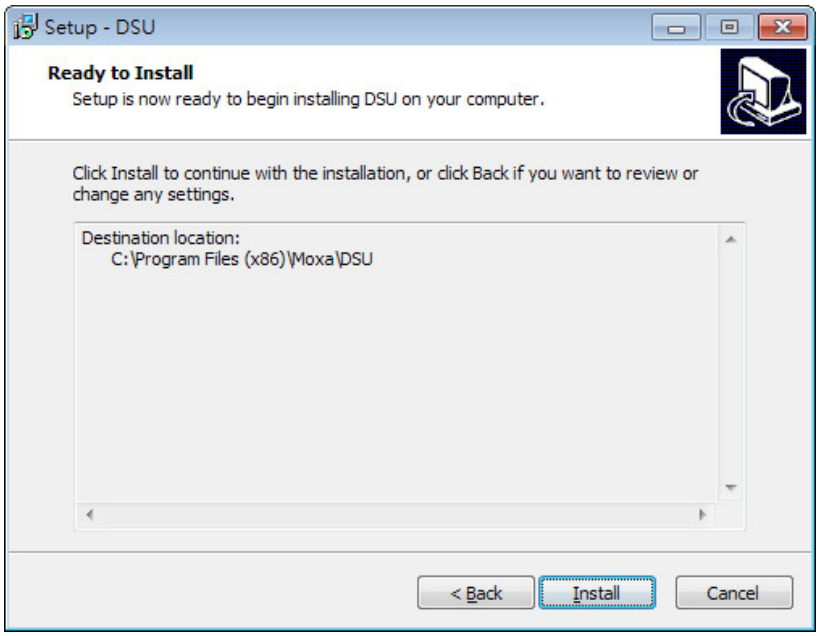
3. When the **Select Destination Location** window appears, click **Next** to continue. You may change the destination directory by clicking on **Browse...**.



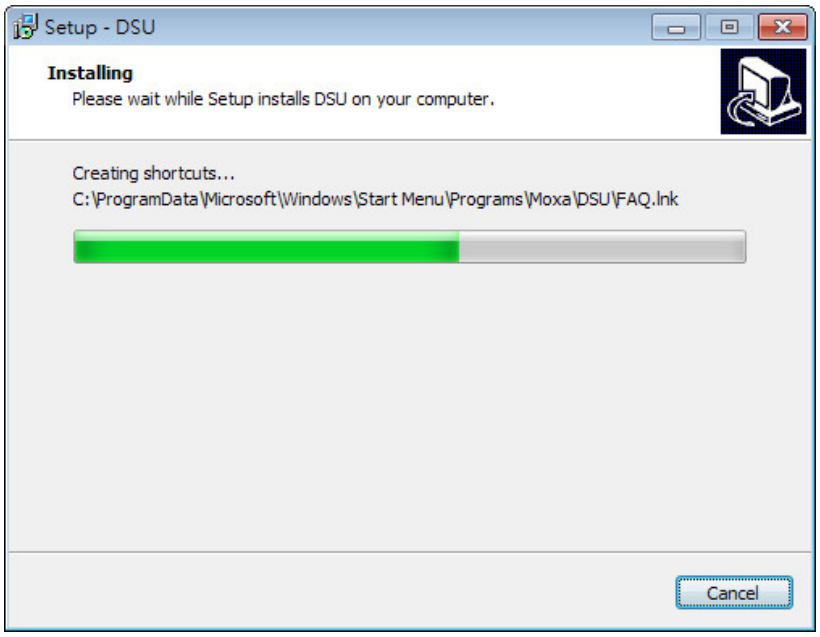
4. When the **Select Additional Tasks** window appears, click **Next** to continue. You may select **Create a desktop icon** if you would like a shortcut to the DSU on your desktop.



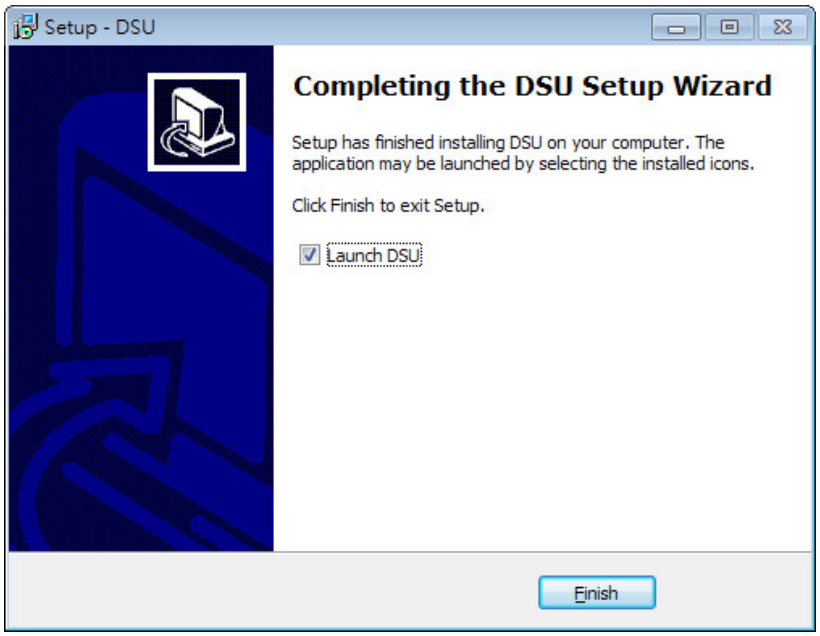
5. Click **Install** to copy the software files.



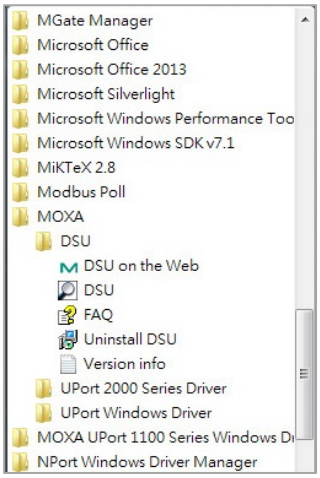
6. A progress bar will appear. The procedure should take only a few seconds to complete.



7. A message will show that 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.

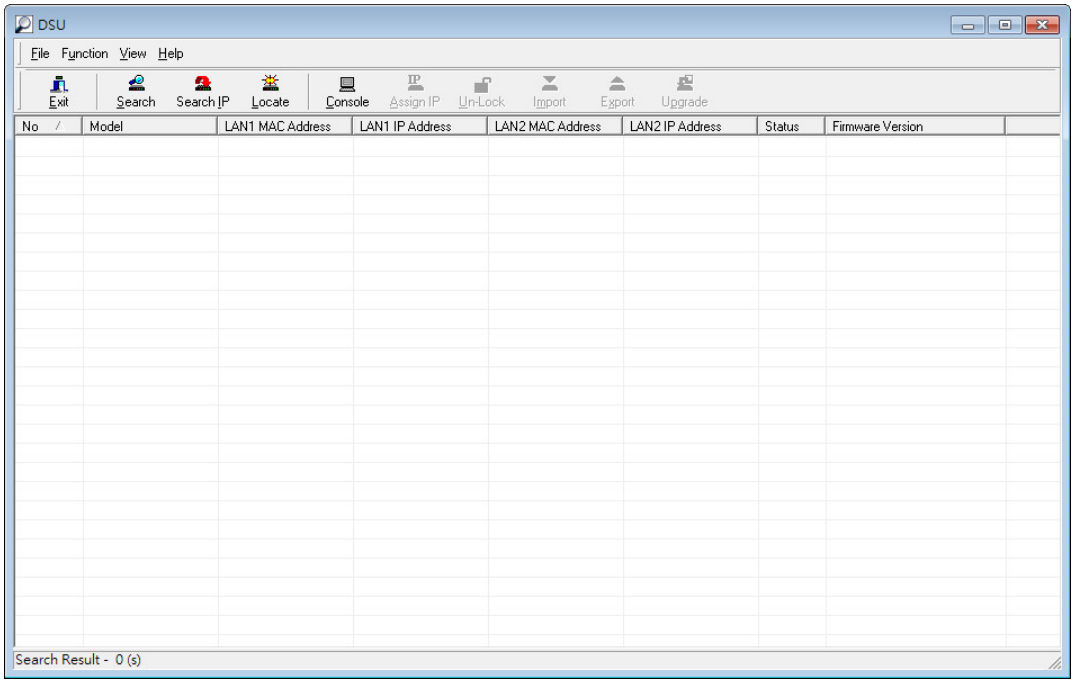


Starting the Device Search Utility (DSU)

The DSU is a Windows-based utility that is used to configure the MGate 5216 Series.

Before running the DSU, make sure that your PC and the MGate 5216 are connected to the same network. Alternatively, the MGate 5216 Series may be connected directly to the PC for configuration. Refer to Chapter 2 for more details.

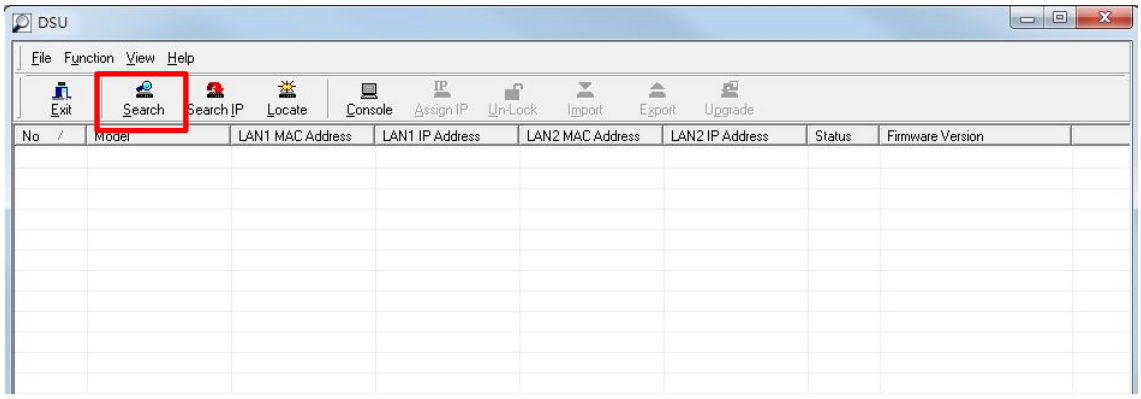
You may open the DSU from the Windows Start menu by clicking **Start > Programs > MOXA > DSU.** The DSU window should appear as shown below.



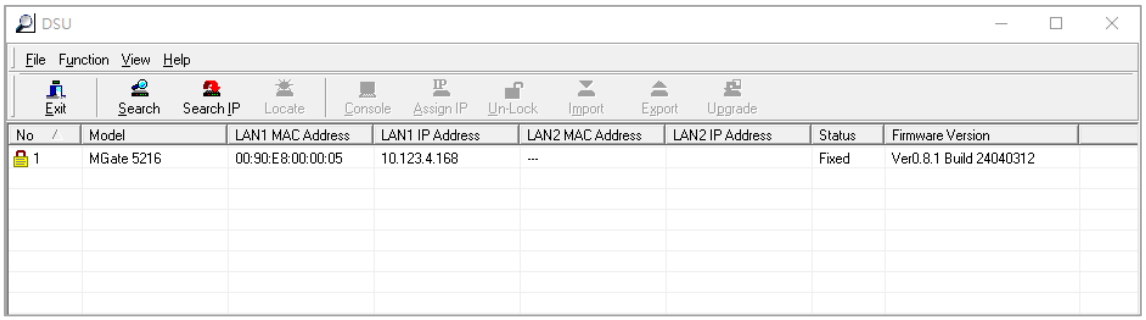
The DSU must be connected to the device before you configure the device. There are two methods to connect to the device. **Broadcast Search** can be used to find all MGate 5216 devices on the LAN. **Search IP** can connect to a specific device using an IP address, which is useful if the device is located 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.



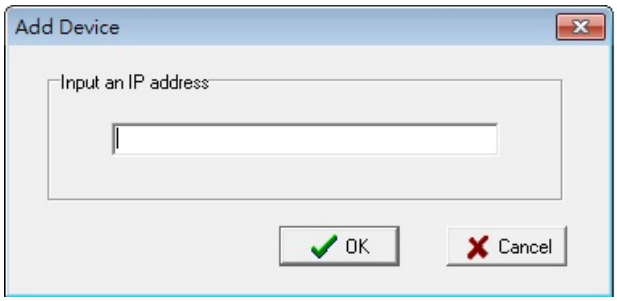
When the search is complete, every MGate 5216 found on the LAN will appear in the DSU window. The MAC address, IP address, and firmware version of each device will be shown. Select the one you would like to configure.



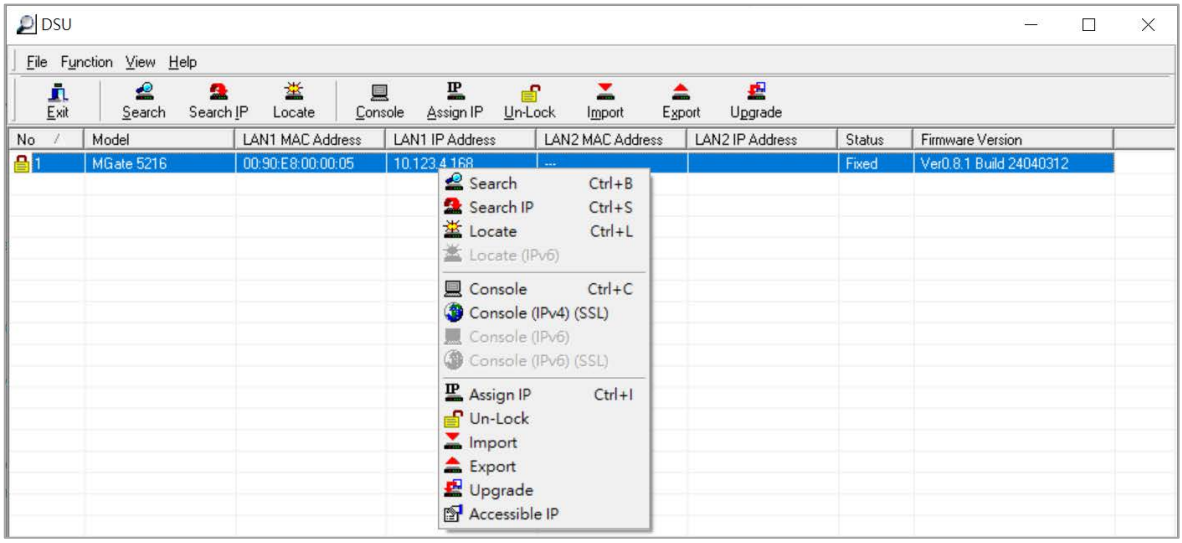
Search IP

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

Enter the IP address of the device and click **OK**.



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



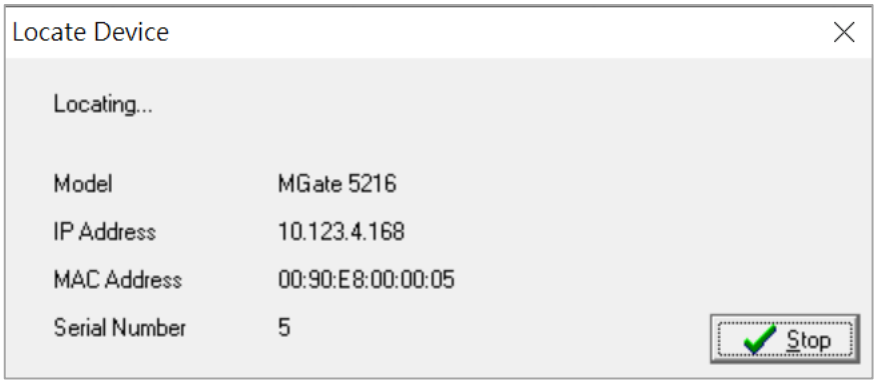
ATTENTION

If Search IP cannot locate the MGate 5216, the IP address you entered might be incorrect. Retry the search and reenter the IP address carefully.

Another possibility is that the MGate 5216 is on the same LAN as your PC, but on a different subnet. Here, you can change your PC's IP address and/or netmask so that it is on the same subnet as the MGate 5216. When your PC and the MGate 5216 are on the same subnet, the DSU should be able to find the device.

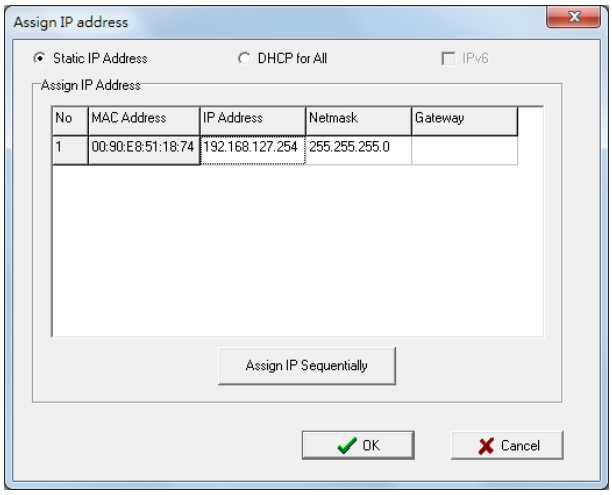
Locate

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



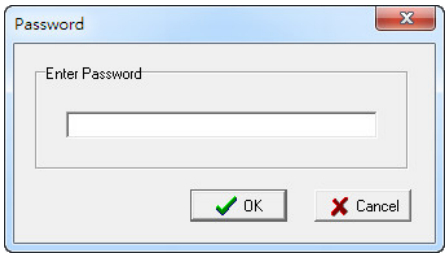
Assign IP

The **Assign IP** function allows you to change the IP address of the device.



Unlock

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



Import/Export

Click on the **Import** icon to import a configuration file from a laptop. To export the current configuration file from the device to a laptop, click **Export**.

Upgrading the Firmware

You can get the latest firmware for the MGate 5216 from www.moxa.com. After downloading the new firmware file to your PC, you can use the DSU to write it to your MGate 5216. Select a device from the DSU list and click **Upgrade** to begin the process.

4. Web Console Configuration

The MGate 5216 provides a web console for easy configuration through a web browser such as Microsoft Internet Explorer or Google Chrome.

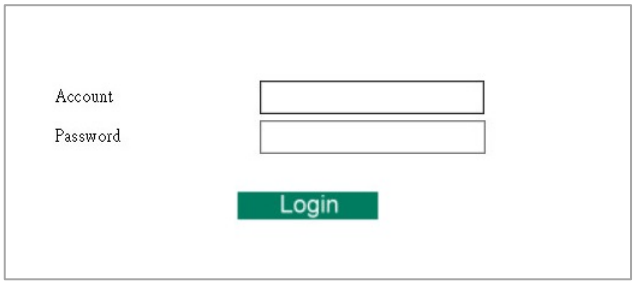
Overview

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

http://<MGate IP address>

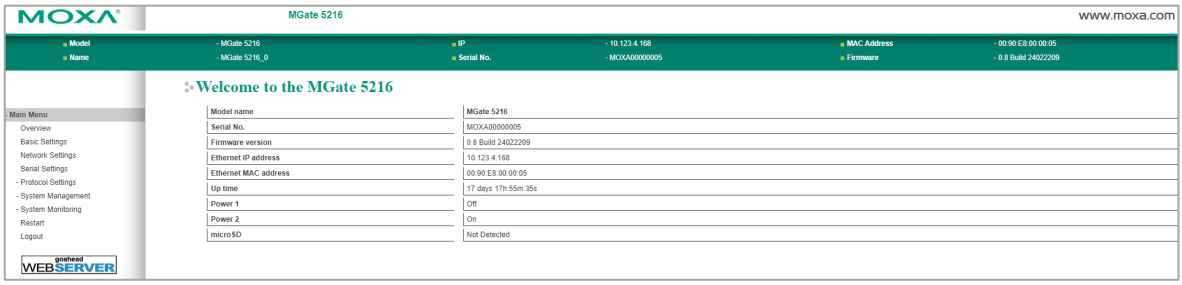
The default IP address is 192.168.127.254. If you cannot log in to the device, use the DSU to first search for it. Refer to the Device Search Utility for the next steps.

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



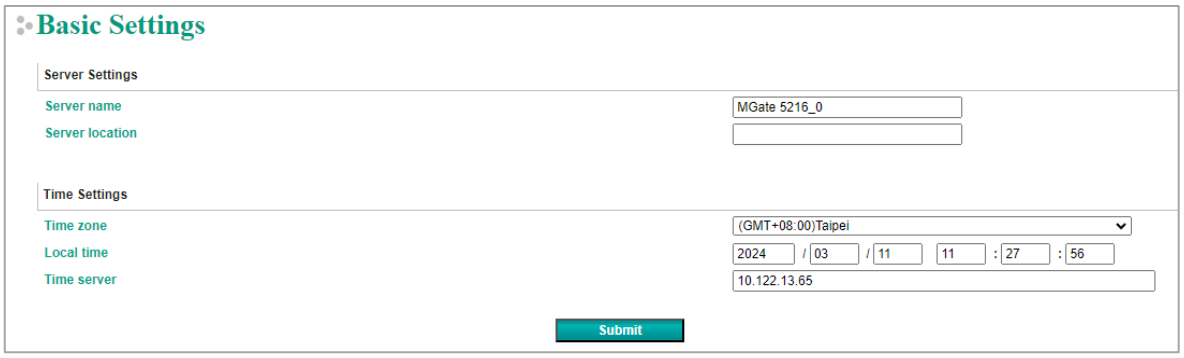
Once logged in to the web console, you will see the previous login record. If the login record is not as what you accessed previously, please change the password immediately.

The welcome page shows information relevant to the MGate 5216.



Basic Settings

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



Server Setting

Parameter	Value	Description
Server Name	(an alphanumeric string)	You can enter a name to help you uniquely identify the device, such as its function.
Server Location	(an alphanumeric string)	You can enter a location string to help you locate the device, 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 change the real-time clock, select **Local time**. MGate's firmware will change the GMT time according to the Time Zone.

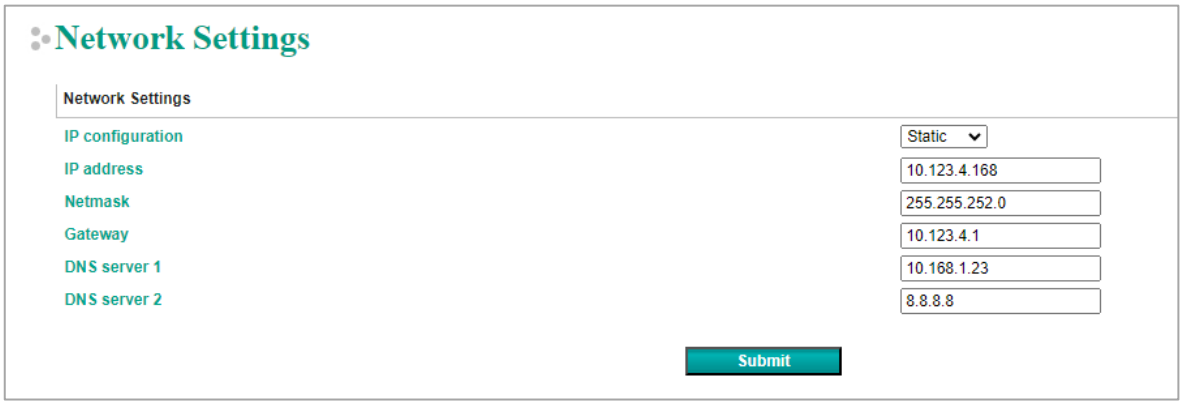
Parameter	Value	Description
Time Zone	User's selectable time zone	This field shows the selected time zone and allows you to select a different time zone.
Local Time	User's adjustable time.	(1900/1/1-2037/12/31)
Time Server	IP or Domain address (e.g., 192.168.1.1 or time.stdtime.gov.tw)	This optional 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 value 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 value is 1 second. Hence, you must configure your time server with a dispersion value less than 1 sec for the NTP process to complete.

Network Settings

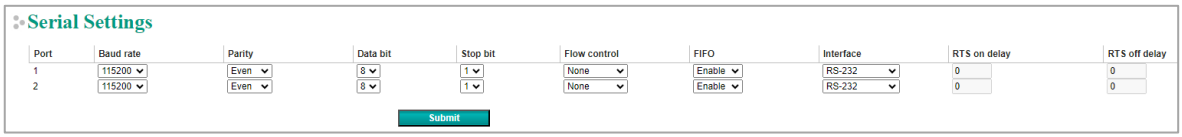
You can modify the **IP Configuration**, **IP Address**, **Netmask**, **Gateway**, and **DNS**.



Parameter	Value	Description
IP configuration	Static IP, DHCP, BOOTP	Select Static IP if you are using a fixed IP address. Select one of the other options if the IP address is set dynamically.
IP address	192.168.127.254 (or 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. You can 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, 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

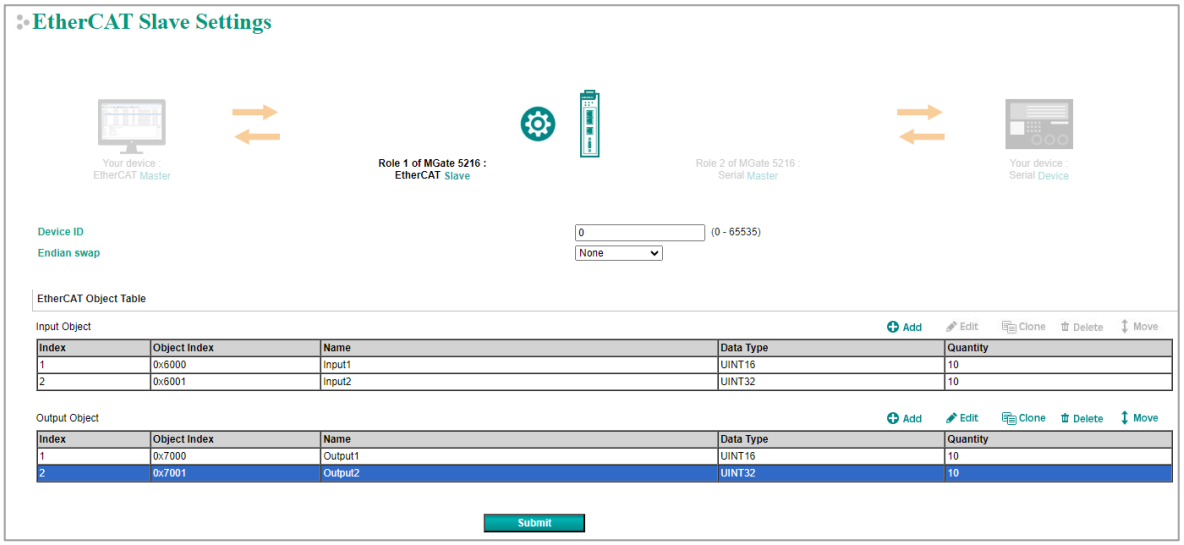
The **RTS Toggle** function is used for **RS-232** mode only. This flow-control mechanism is achieved by toggling the RTS pin in the transmission direction. When activated, data will be sent after the RTS pin is toggled **ON** for the specified time interval. After the data transmission is finished,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

Protocol Settings

The MGate 5216 supports Proprietary serial, Modbus RTU/ASCII and EtherCAT protocols. Each role is determined by your device's settings. Serial device and Modbus RTU/ASCII Slave can be selected.

The setting of each protocol is described as follows:

1. EtherCAT Slave Settings

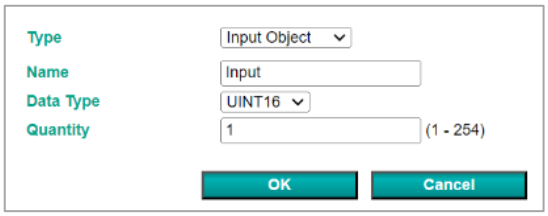


Slave Settings

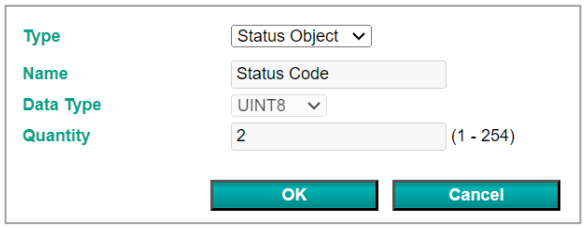
Parameter	Value	Default	Description
Device ID	0-65535	0	The EtherCAT slave ID
Endian swap	None Byte Word Byte and Word	None	Data Byte Swapping None: Don't need to swap Byte: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. Word: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. ByteWord: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A.

EtherCAT Object Table Settings

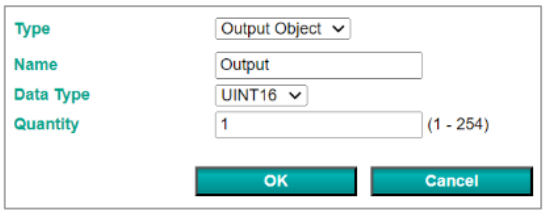
Input Object:



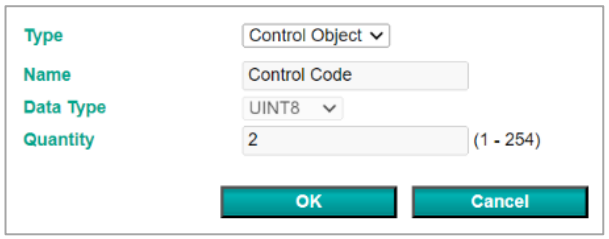
Status Object:



Output Object:

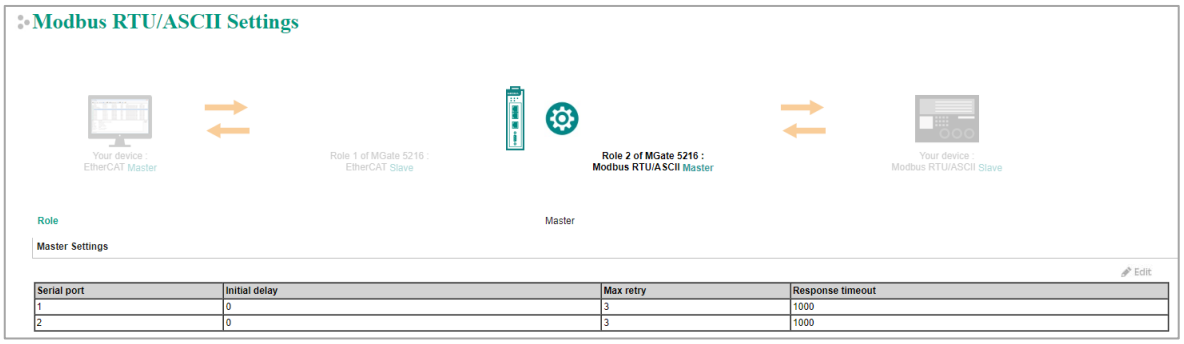


Control Object:

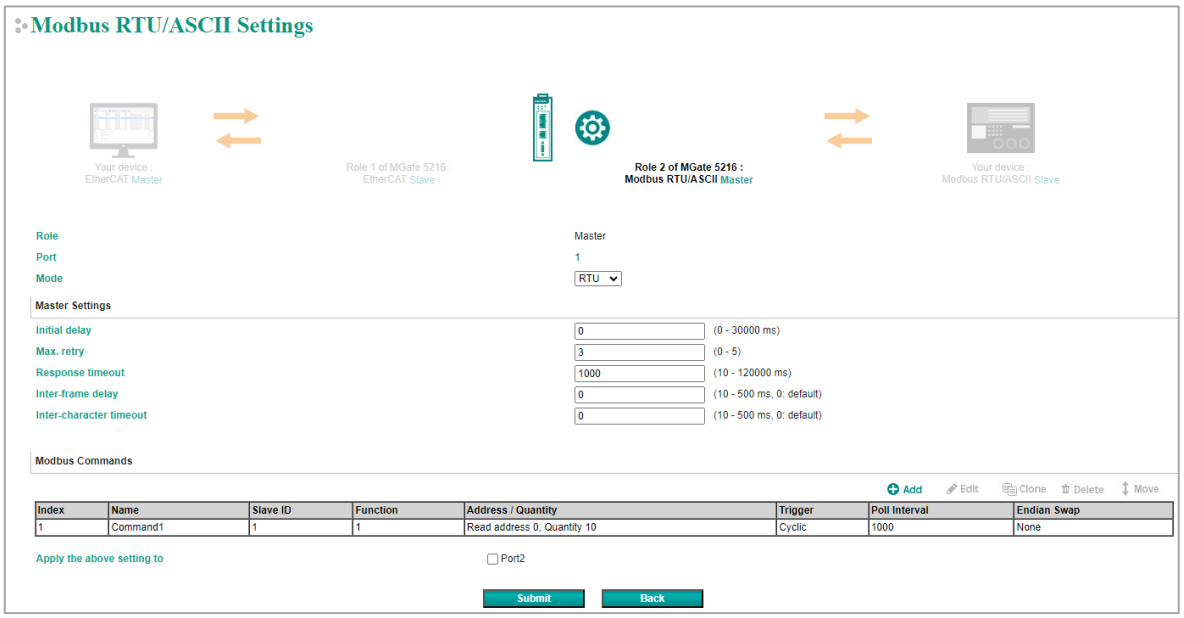


Parameter	Value	Default	Description
Type	Input Object Status Object Output Object Control Object		**Input Object:** Input data from Modbus/serial to EtherCAT network. **Status Object:** The status object provides command status information of field devices for alive check. One bit for each command. So, the maximum size of the status object is 32 bytes for a maximum of 128 Modbus commands per serial port in Modbus mode and a maximum of 64 serial commands per serial port in serial mode. The data type is fixed at UINT8, and the quantity is automatically calculated depends on the number of Modbus or serial commands created by users. The bit order starts from port 1 then port 2 and continues with the sequence of the commands. The bit value 1 stands for command operation normal, 0 is abnormal. **Output Object:** Output data from EtherCAT network to Modbus/serial devices. **Control Object:** The control object provides the ability for EtherCAT master to enable or disable Modbus/serial commands for process consideration. One bit for each command. So, the maximum quantity of the status object is 32 bytes for a maximum of 128 Modbus commands per serial port in Modbus mode and a maximum of 64 serial commands per serial port in serial mode. The data type is fixed at UINT8, and the quantity is automatically calculated depending on the number of Modbus or serial commands created by users. The bit order starts from port 1 then port 2 and continues with the sequence of the commands. The bit value 1 stands for enable, 0 is disable. Only when the value is 1, the MGate will start to execute Modbus/serial commands.
Name	(an alphanumeric string)		Maximum of 32 characters
Data Type	UINT8 UINT16 UINT32 REAL32	UINT16	The data type for this I/O module
Quantity	1 to 254	1	Specifies the quantities for inputs, status, outputs, control data

2. Modbus RTU/ASCII (Master) Settings

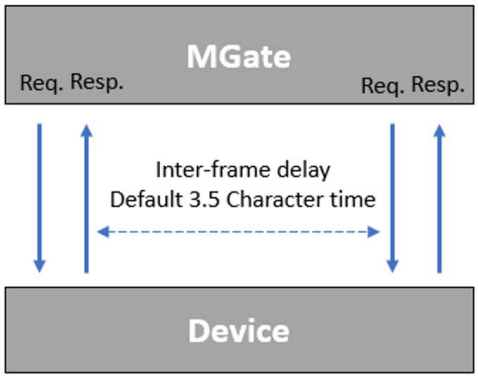


Double click the row in to enter the setting page.

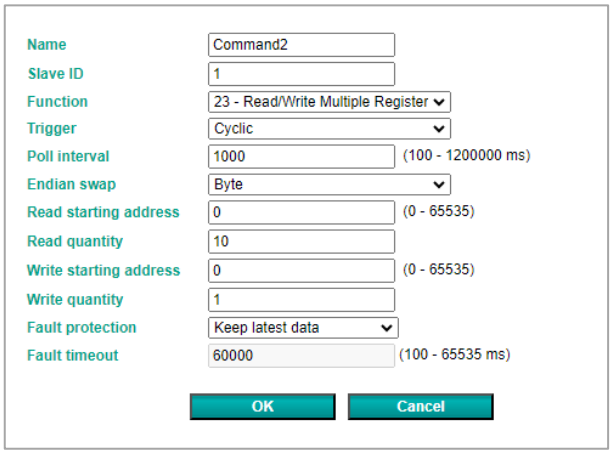


Master Settings

Parameter	Value	Default	Description
Initial delay	0 - 30000 ms	0	Some Modbus servers (slaves) may take more time to boot up compared to other devices. In some cases, this may cause the entire system to suffer from repeated exceptions during the initial bootup. After booting up, you can force the MGate to wait for some time before sending the first request using this Initial Delay setting.
Max. retry	0 - 5	3	The number of times the client (master) will retry a request when the response times out.
Response timeout	10 - 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's (slave's) response. If no response is received within the specified time, the client (master) will disregard the request and continue with its operation. This allows the Modbus system to continue operations even if a server (slave) device is disconnected or faulty. On the MGate 5216, 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). If you want to change the response time, refer to the documentation of your device manufacturer.

Parameter	Value	Default	Description
Inter-frame delay (only for Modbus RTU)	10 - 500 ms	0	Defines the time interval between an RTU response and the next RTU request. When the baudrate < 19200 bps, the default value is 0, which is 3.5 character time. When the baudrate > 19200 bps, the MGate uses a predefined fixed value that is not user-configurable. This function solves the issue of some devices not being able to handle the RTU requests quickly, and hence allows for user-defined values in the MGate. 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/sec, so transmitting 1 character requires about 1/960 = 1 ms. 
Inter-character timeout (only for Modbus RTU)	10 - 500 ms	0	The time interval between characters in one frame. When the baudrate < 19200 bps, the default value is 0, which is 1.5 character time. When the baudrate > 19200 bps, the MGate uses a predefined fixed value that is not user-configurable. When the serial side of the MGate receives one character, and the next one comes after the **Inter-character timeout** defined, the frame will be discarded due to a timeout.
Apply the above setting to			Clone the configuration to another serial port

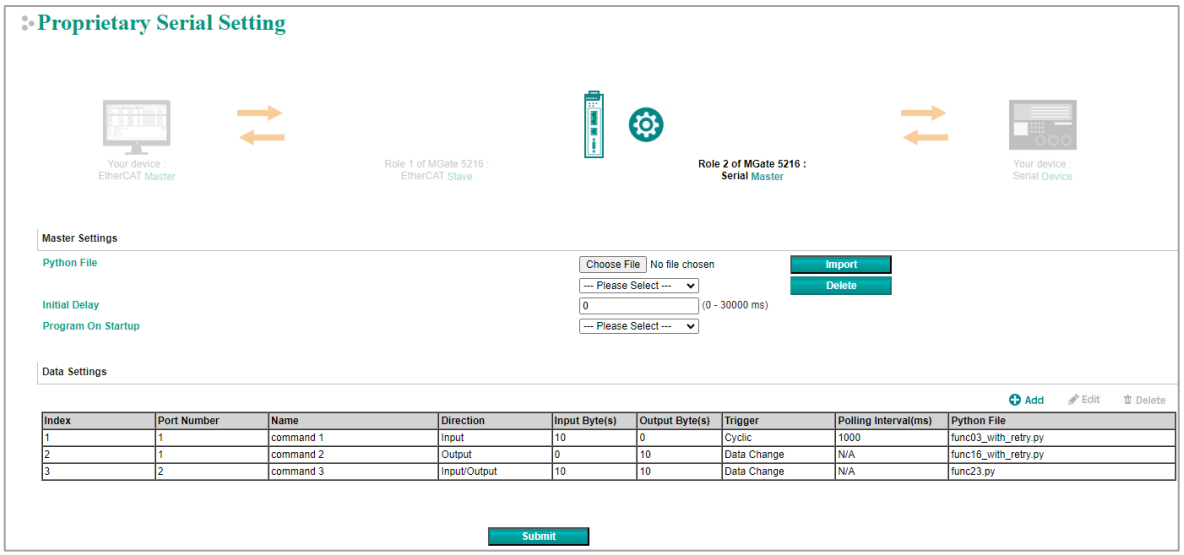
Add Modbus Commands



Parameter	Value	Default	Description
Name	(an alphanumeric string)	Command1	Maximum 32 characters
Slave ID	1 - 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**. Data change: The data area is polled for changes at the time interval defined by the **Poll interval**. A command is issued when a change in data is detected.
Poll interval	100 - 1200000 ms	1000	The poll interval is specified in milliseconds (ms). The range is 100 to 1,200,000 ms. Since the module sends all requests in turns, the actual poll interval also depends on the number of requests in the queue and their parameters.
Endian swap	None Byte Word Byte and Word	None	Data Byte Swapping None: Don't need to swap Byte: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C. Word: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. ByteWord: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A.
Read starting address	0 - 65535	0	Modbus register address.
Read quantity		10	Specifies how many quantities to read
Write starting address	0 - 65535	0	Modbus register address
Write quantity		1	Specifies how many quantities to write
Fault protection	Keep latest data Clear all data bits to 0 Set to user defined value		If the MGate's EtherCAT connection fails, the gateway cannot receive data, but it will continuously send data to the serial/Modbus slave device. To avoid problems when the EtherCAT side fails, the MGate 5216 can be configured to react in one of three ways: keep latest data, clear data to zero, or set to user-defined value.
Fault value (Hex)		00 00	The user-defined value to set for **Fault protection**.
Fault timeout	1 - 86400 s	3600	Defines the communication timeout for EtherCAT

3. Proprietary Serial Master Settings

MGate 5216 supports Micro Python to enable programming of proprietary serial data frame. However, it requires familiarity with Micro Python. In addition, not all Python instructions can be used. You can refer to a tech note on the product page for code examples, program architecture and description, and instructions supported.

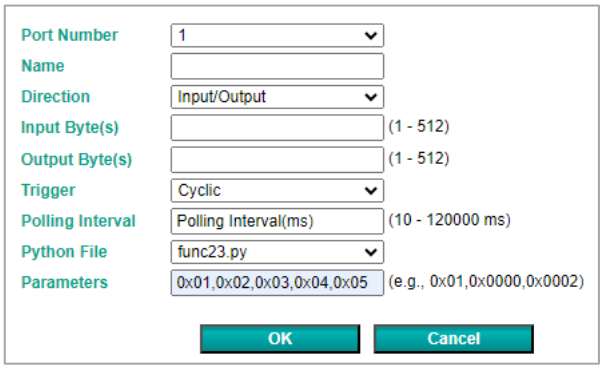


Master Settings

Parameter	Value	Default	Description
Python File			Select your Micro Python file to import. You can also delete the Micro Python file currently saved on your MGate.
Initial Dealy	0 - 30000 ms	0	Some serial devices may take more time to boot up than the MGate. In some environments, this may cause the entire system to suffer from 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.
Program On Startup			Some serial devices may need a one-time configuration and execution of serial commands. On bootup, use this setting to force the MGate to execute a selected Micro Python file for a one-time execution of serial commands.

Data Settings

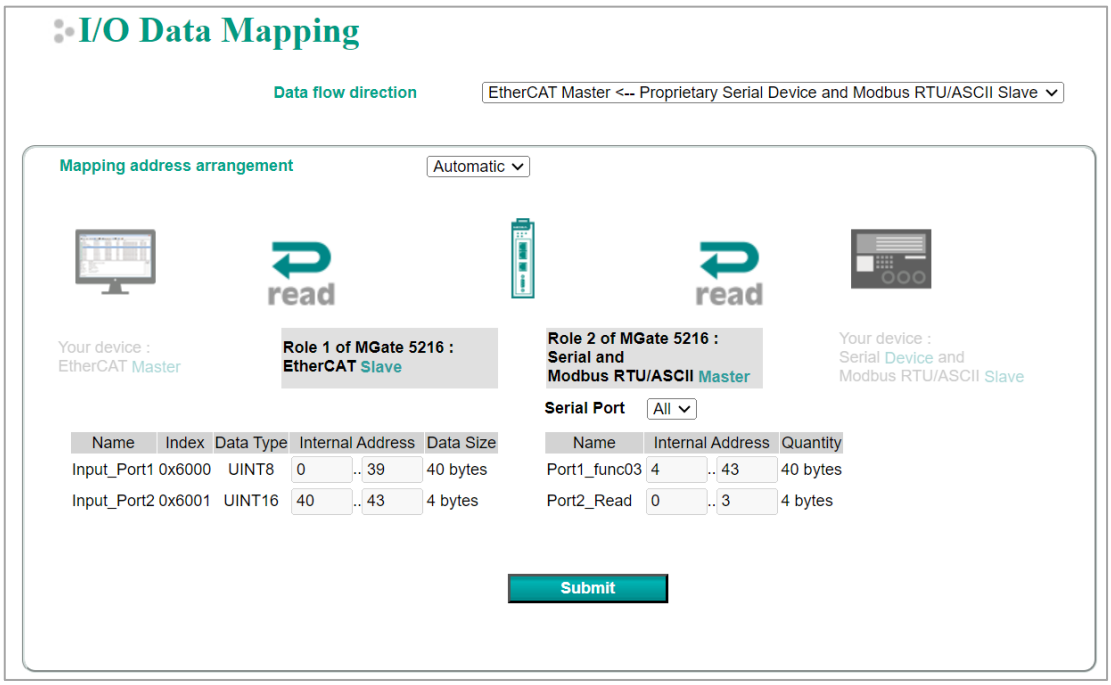
Click Add/Edit/Delete to modify serial command settings.

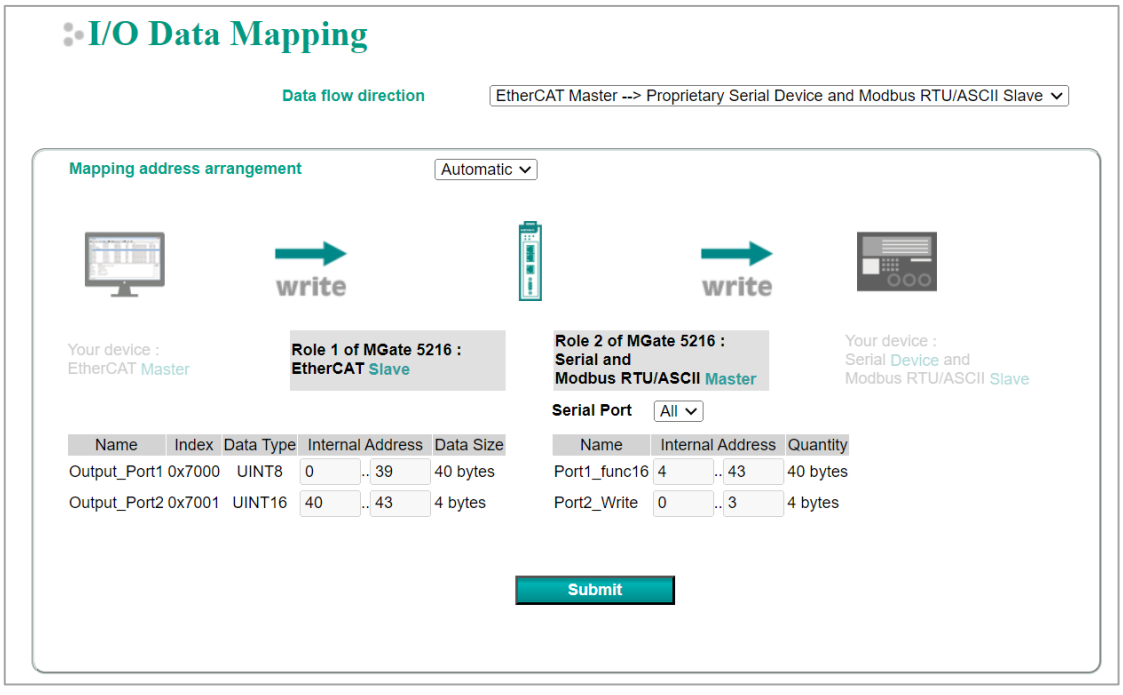


Parameter	Value	Default	Description
Port Number	1, 2		Select which serial port.
Name	(an alphanumeric string)		Maximum 32 characters
Direction	Input Output Input/Ouput	Input	Input: read data from serial devices Ouput: write data to serial devices Input/Output: read/write data from/to serial devices
Input Byte(s) Output Byte(s)	1 - 512	1	Specify the data bytes for the input or output.
Trigger	Cyclic One-time Data Change	Cyclic	Cyclic: The python file executed cyclically at the interval specified in the Polling Interval parameter. One-time (for Input): The python file executed just one-time. Data change (for Output and Input/Output): The data area is polled for changes at the time interval defined by Polling Interval. A command is issued when a change in data is detected.
Polling Interval (for Input)	10 - 1200000 ms	1000	Polling intervals are in milliseconds. Since the module sends all requests in turns, the actual polling interval also depends on the number of requests in the queue and their parameters. The range is from 10 to 1,200,000 ms. Please notice 10 ms is only the setting value, the real communication interval will be change due to serial baudrate, data size, number of commands, how many devices and the response time of serial device. You can use traffic monitoring tool to check the real polling interval.
Python File			Select the Micro Python file
Parameters			Input related data that will be used in the Micro Python file such as slave ID and output data. Use comma ',' to separate parameters without space in between. The value specified should be in hexadecimal, use the prefix 0x for the values.

I/O Data Mapping

You can verify the gateway's memory allocation on the **I/O Data Mapping** page by selecting the Modbus data flow you want to see.



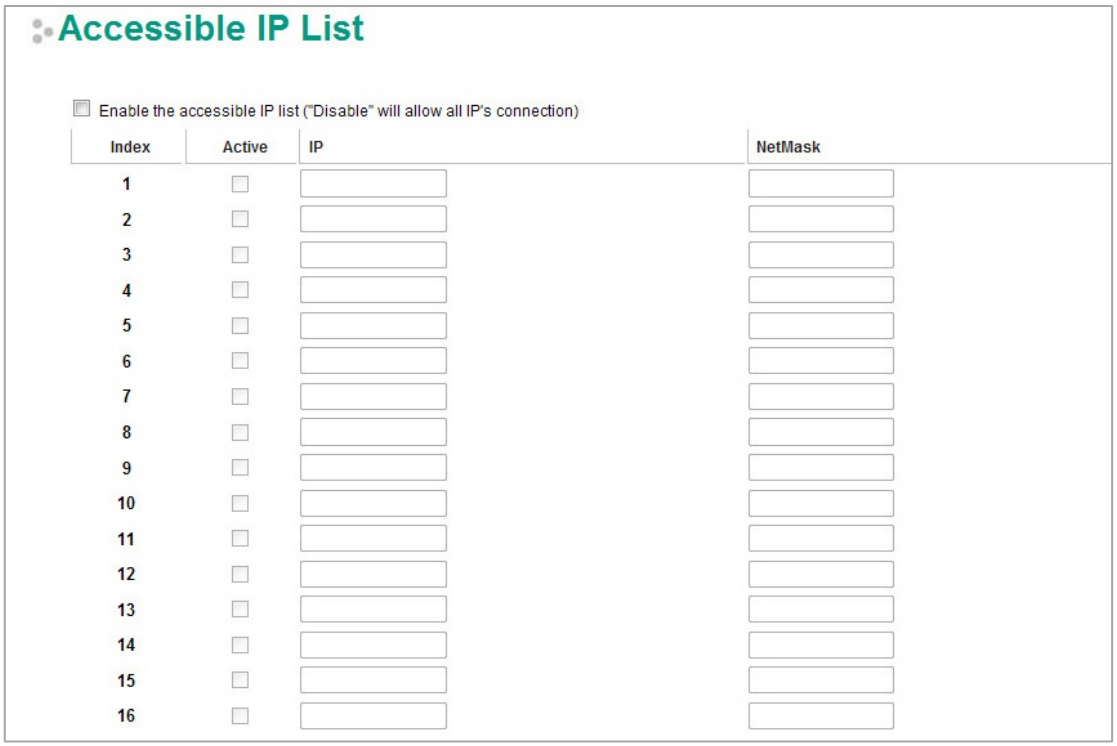


For easy configuration, select **Automatic** mapping of addresses and click **Submit**. The MGate will automatically arrange the internal addresses, Modbus commands first and then proprietary serial commands. You can also select the **Manual** option to manually arrange them.

System Management

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

Accessible IP Settings



The accessible IP 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.

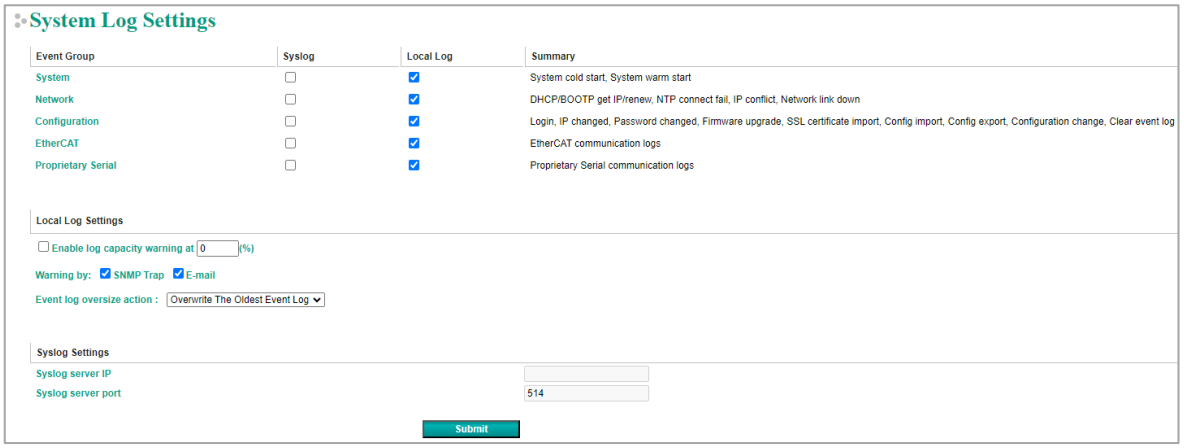
Additional configuration examples are shown in the following table:

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, NMAP-Xmas Scan, SYN/FIN Scan, FIN Scan, NMAP-ID Scan, and SYN/RST 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.

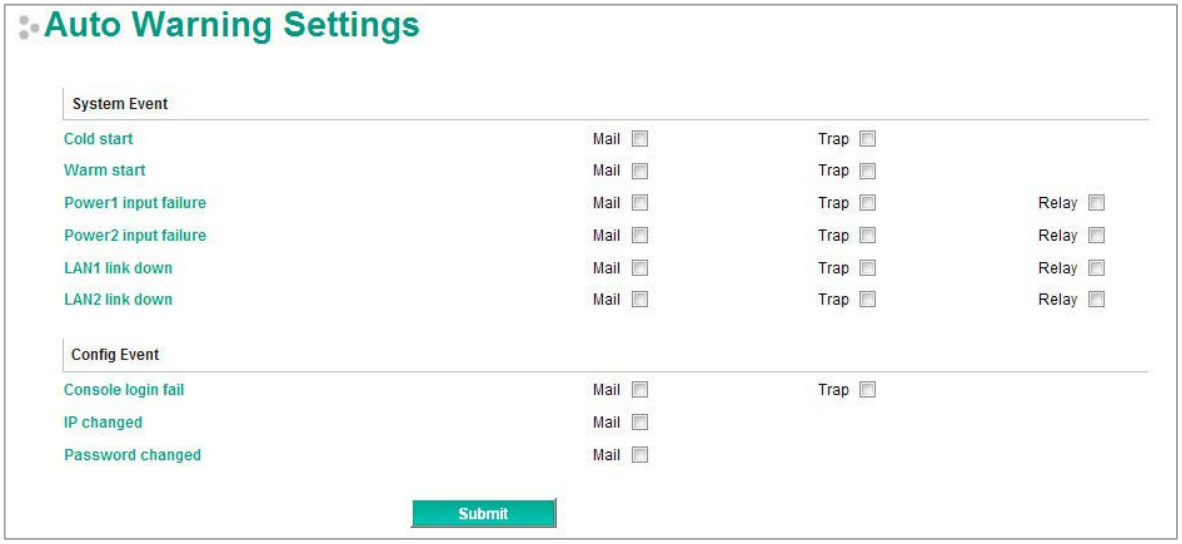
The available information that can be recorded includes the following events:

Event Group	Description
System	System Cold Start, System Warm Start
Network	DHCP/BOOTP get IP/renew, NTP connect fail, IP conflict, Network link down
Configuration	Login Fail, IP Changed, Password Changed, Firmware Upgrade, SSL Certificate Import, Configuration Import/Export
Proprietary Serial	Proprietary serial 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

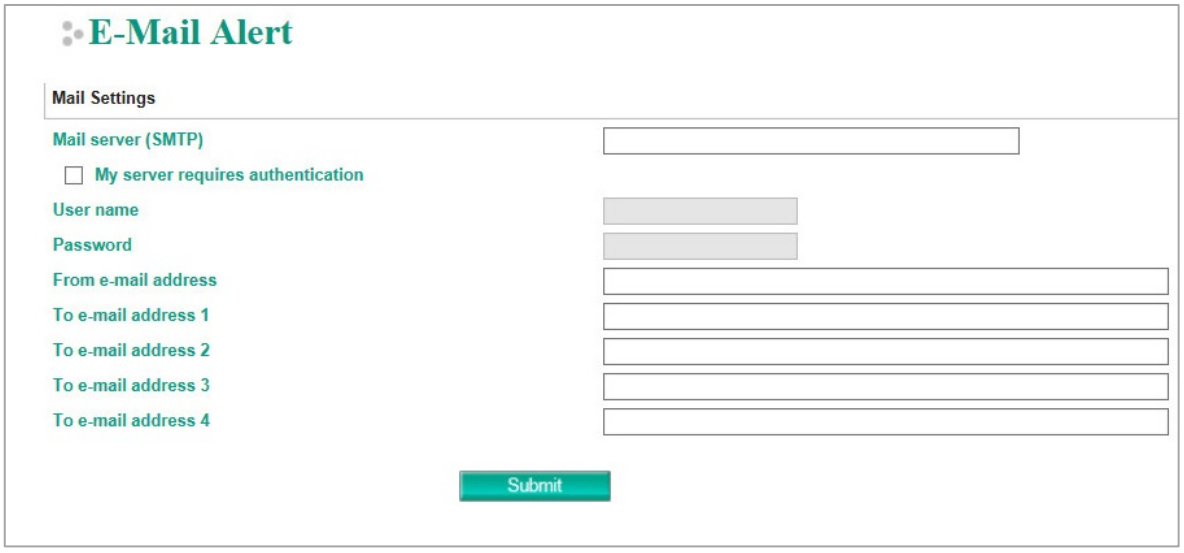
Syslog Settings	Description
Syslog server IP	IP address of a server which will record the log data.
Syslog server port	514

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

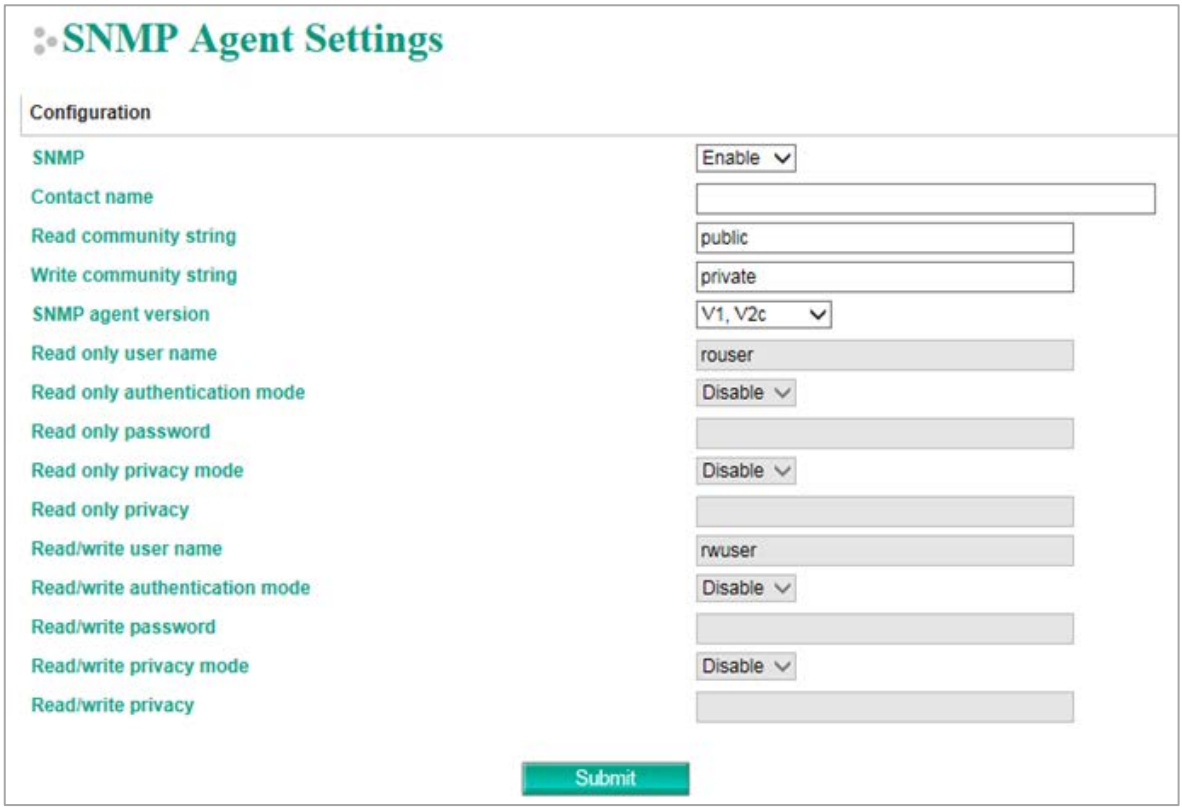


Parameters	Description
Mail server	The mail server's domain name or IP address.
User name	This field is for your mail server's username, if required.
Password	This field is for your mail server's password, if required.
From e-mail address	This is the e-mail address from which automatic e-mail warnings 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 version	Use this field to select the SNMP trap version.
Trap community	Use this field to designate the SNMP trap community.

SNMP Agent Settings



Parameters	Description
SNMP	To enable the SNMP Agent function, select the Enable option, and enter a community name (e.g., public).
Contact name	The optional SNMP contact information usually includes an emergency contact name and telephone number.
Read community string	This is a text password mechanism that is used to weakly authenticate queries to agents of managed network devices.
Write community string	This is a text password mechanism that is used to weakly authenticate changes to agents of managed network devices.
SNMP agent version	The MGate 5216 supports SNMP V1, V2c, and V3.

Read-Only and Read/Write Access Control

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

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

LLDP Settings

The Link Layer Discovery Protocol (LLDP) standardizes the method that devices on a network use to periodically send information about their configuration and status. This self-identification method keeps all LLDP devices on a network informed of each other's status and configuration. You can use SNMP protocol to send the LLDP information on the network devices to Moxa's MXview to create auto network topology and for network visualization.

The MGate web interface lets you enable or disable LLDP, and set the LLDP transmit interval. In addition, you can go to **System Monitoring–System Status–LLDP Table** to view the MGate's neighbor-list, which is created based on the information reported by neighboring devices on the network.

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

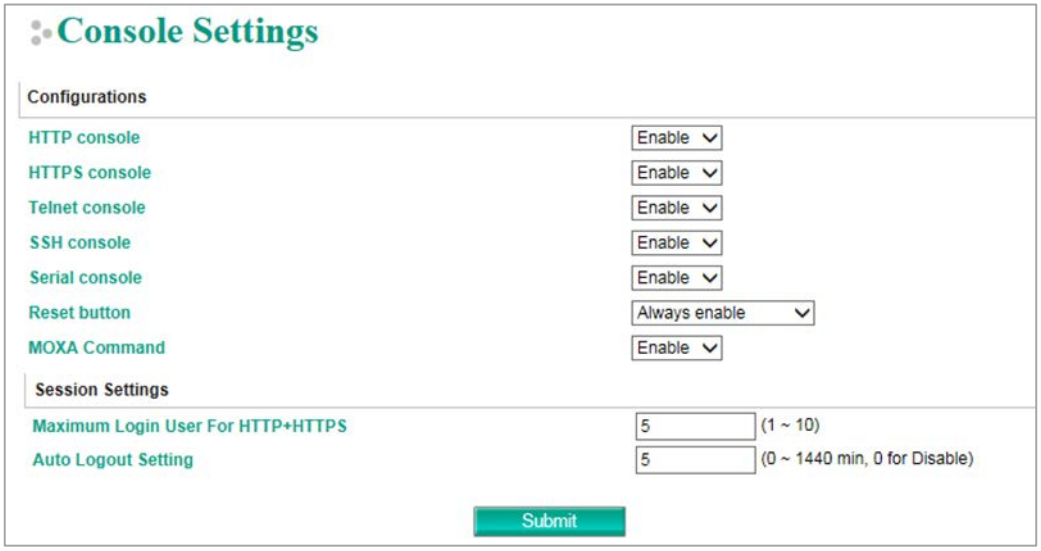
Certificate

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 only available in the web console.

Misc. Settings

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

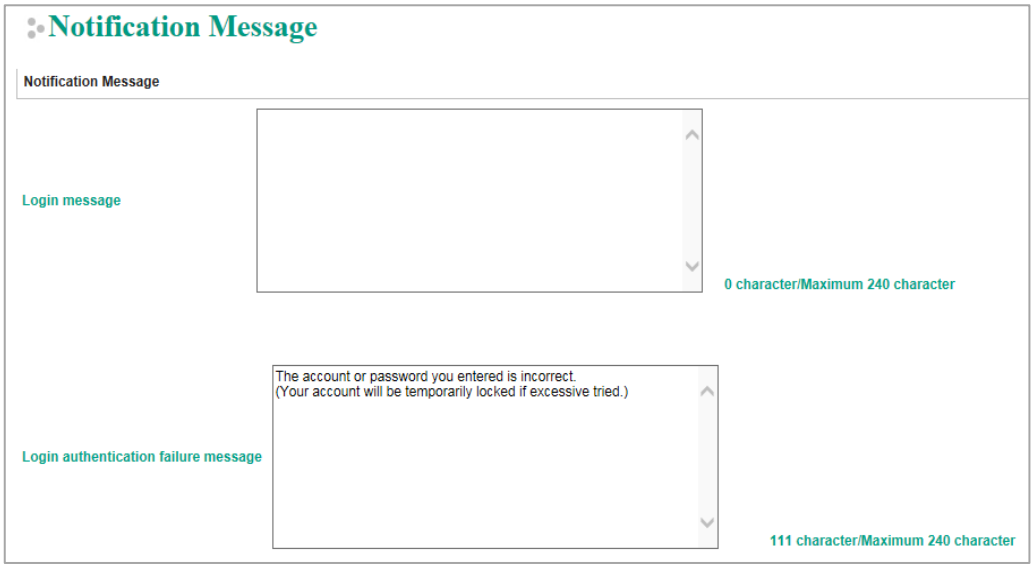
Console Settings



Configuration	Value	Description
HTTP/HTTPS	Enable/Disable	This setting is to enable/disable the web console. For security issues, users can only enable the HTTPS or just disable all settings.
Telnet/SSH	Enable/Disable	The MGate telnet/SSH function can be enabled or disabled.
Serial console	Enable/Disable	The MGate serial console function can be enabled or disabled.
Reset button protect	Disable after 60 sec, Always enable	The MGate provides the reset button to clear 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	The MGate can be searched by the Device Search Utility (DSU). If you have any security concerns, you can choose Disable to deny the DSU right to access.

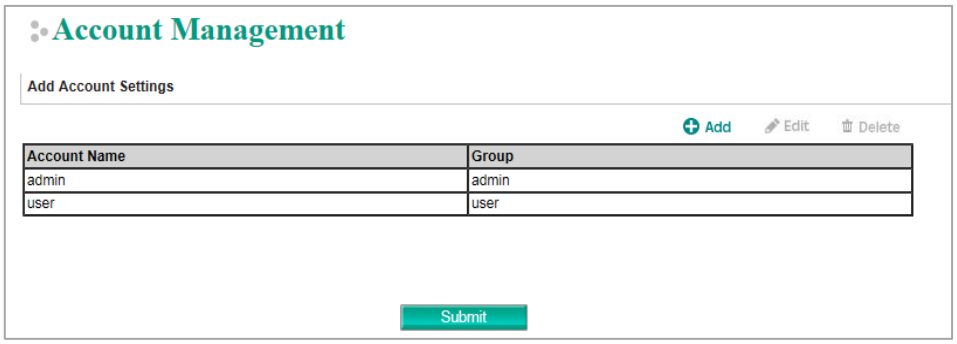
Session Settings	Value	Description
Maximum Login User for HTTP+HTTPS	1 - 10	The number of users that can access the MGate simultaneously.
Auto Logout Setting	0 - 1440 min.	Set the auto logout time period.

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 change 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	4-16	
Enable password complexity strength check		Select how the MGate checks the password's strength
Password lifetime	90-180 days	Set the password's lifetime period.

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

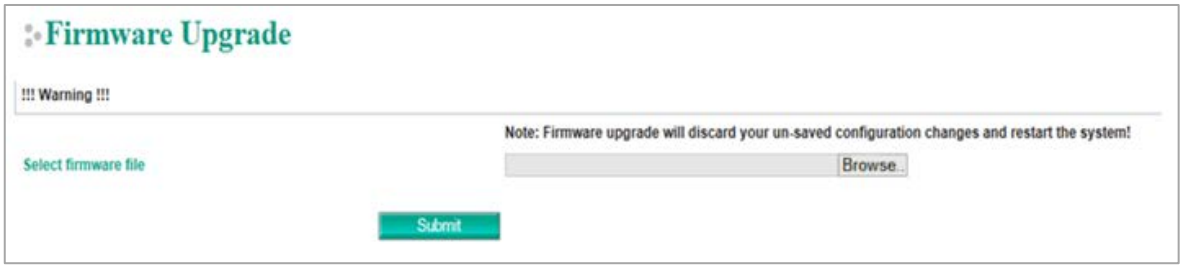
Maintenance

Ping

This network testing function is available only in 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 5216 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 onto your MGate 5216. Select a device 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.

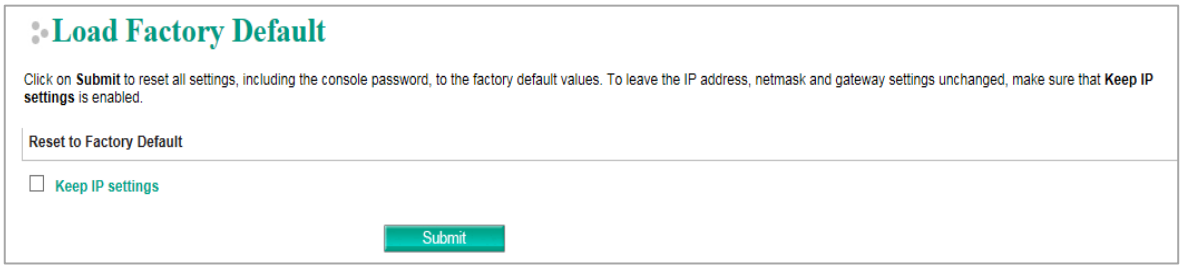
Configuration Import/Export

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

- **Applying a configuration to multiple devices.** The Import/Export configuration function is a convenient way to apply the same settings to devices located at different sites. You can export a configuration as a file and then import the configuration file onto other devices 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 that provide useful information for Moxa's Technical Service Team when maintenance visits are requested.

Load Factory Default

To clear all the settings of a device and reset the device to its initial factory default values, use **Reset to Factory Default**.



ATTENTION

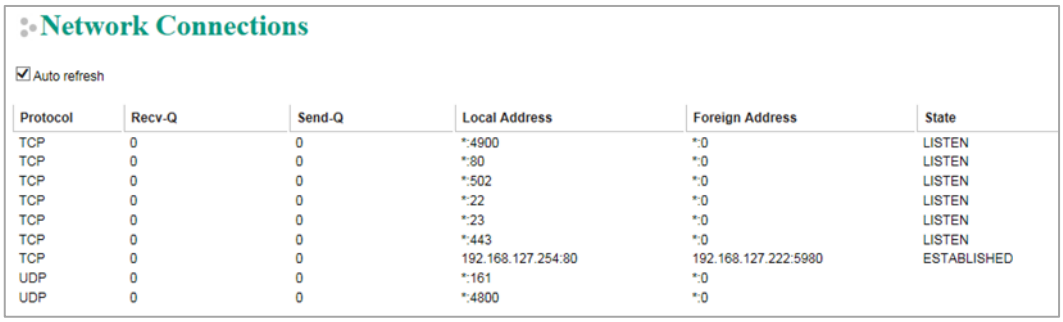
Reset to Factory Default will completely reset the configuration of the device, and all the parameters you have saved will be discarded. Do not use this function unless you are sure you want to completely reset your device.

System Monitoring

System Status

Network Connections

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

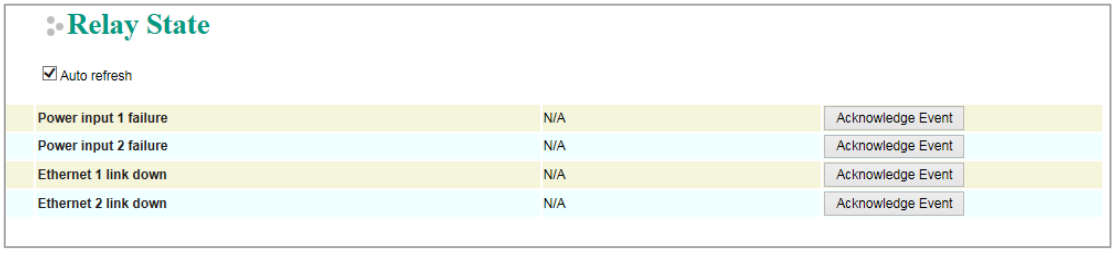


System Log

Go to **System Log** 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. You can view the relay status on this page.



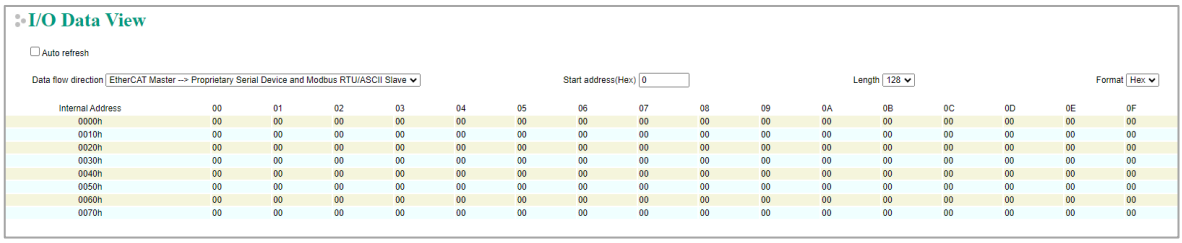
LLDP Table

You can see LLDP related information, including Port, Neighbor ID, Neighbor Port, Neighbor Port Description, and Neighbor System.

Protocol Status

I/O Data View

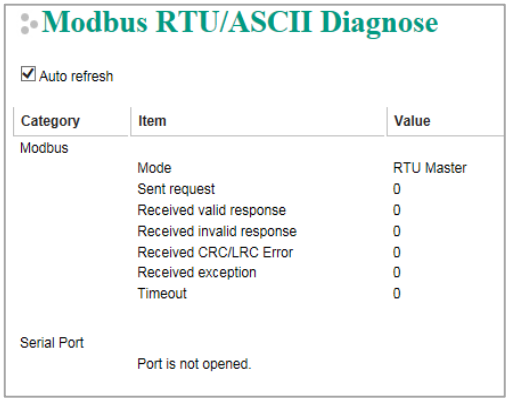
This page displays the internal memory information for input and output data transfers. View updated values for communication verification here. This function is only available in the web console.



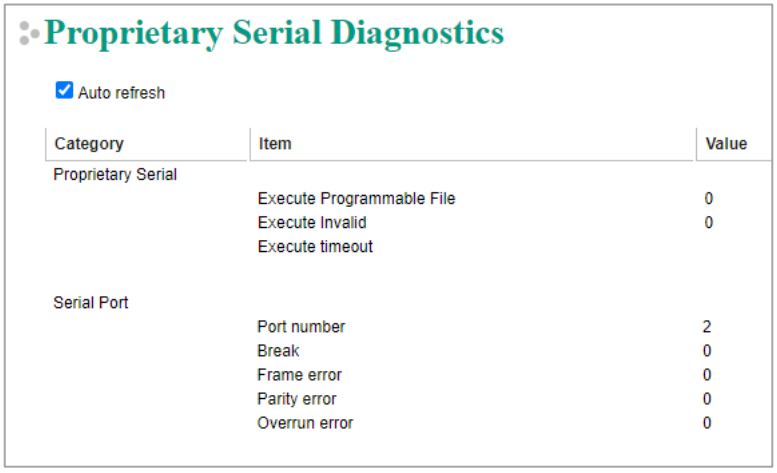
Diagnose

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

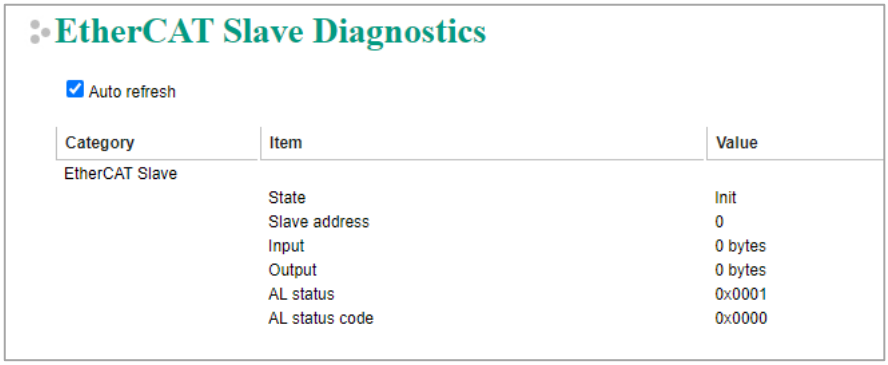
Modbus RTU/ASCII Diagnostics (Master)



Proprietary Serial Diagnostics



EtherCAT Slave Diagnostics



AL status and AL status code are used to define the EtherCAT specifications for retrieval by the EtherCAT master. Information on the EtherCAT specification is listed in the following table:

2.21 AL Status (0x0130:0x0131)

Table 23: Register AL Status (0x0130:0x0131)

	ESC20	ET1100	ET1200	IP Core
	~~[15:5]~~			[15:5] V2.4.0/ V2.04a

Bit	Description	ECAT	PDI	Reset Value
3:0	Actual State of the Device State Machine: 1: Init State 3: Bootstrap State 2: Pre-Operational State 4: Safe-Operational State 8: Operational State	r*/-	r/(w)	1
4	Error Ind: 0: Device is in State as requested or Flag cleared by command 1: Device has not entered requested State or changed State as result of a local action	r*/-	r/(w)	0
5	Device Identification: 0: Device Identification not valid 1: Device Identification loaded	r*/-	r/(w)	0
15:6	Reserved, write 0	r*/-	r/(w)	0

NOTE: AL Status register is only writable from PDI if Device Emulation is off (0x0141[0]=0), otherwise AL Status register will reflect AL Control register values. Avoid reading AL Status register from PDI.

* Reading AL Status from ECAT clears ECAT Event Request 0x0210[3].

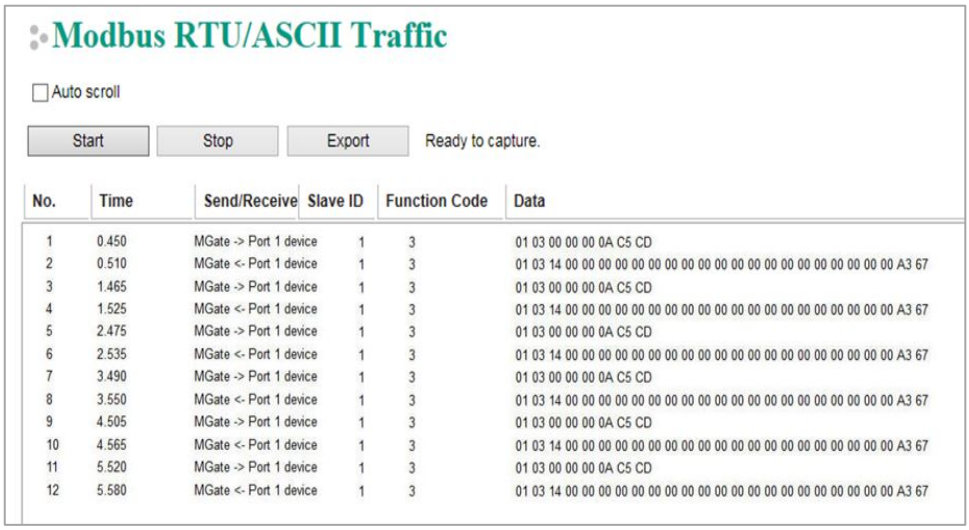
Code	Description	Current state (or state change)	Resulting state
0x0000	No error	Any	Current state
0x0001	Unspecified error	Any	I + E, P + E, S + E
0x0002	No Memory	Any	I + E, P + E, S + E
0x0003	Invalid Device Setup	P -> S	P + E
0x0005	Reserved due to compatibility reasons		
0x0011	Invalid requested state change	I -> S, I -> O, P -> O O -> B, S -> B, P -> B	I + E, P + E, S + E
0x0012	Unknown requested state	Any	I + E, P + E, S + E
0x0013	Bootstrap not supported	I -> B	I + E
0x0014	No valid firmware	I -> P	I + E
0x0015	Invalid mailbox configuration	I -> B	I + E
0x0016	Invalid mailbox configuration	I -> P	I + E
0x0017	Invalid sync manager configuration	P -> S, S -> O	Current state + E
0x0018	No valid inputs available	S, O, S -> O,	S + E
0x0019	No valid outputs	O, S -> O	S + E
0x001A	Synchronization error	O, S -> O	S + E
0x001B	Sync manager watchdog	O, S	S + E
0x001C	Invalid Sync Manager Types	O, S, P -> S	S + E
0x001D	Invalid Output Configuration	O, S, P -> S	P + E
0x001E	Invalid Input Configuration	O, S, P -> S	P + E
0x001F	Invalid Watchdog Configuration	O, S, P -> S	P + E
0x0020	Slave needs cold start	Any	I + E, P + E, S + E
0x0021	Slave needs INIT	B, P, S, O	I + E, P + E, S + E
0x0022	Slave needs PREOP	S, O	S + E,
0x0023	Slave needs SAFEOP	O	S + E
0x0024	Invalid Input Mapping	P -> S	P + E
0x0025	Invalid Output Mapping	P -> S	P + E
0x0026	Inconsistent Settings	P -> S	P + E
0x0027	FreeRun not supported	P -> S	P + E
0x0028	SyncMode not supported	P -> S	P + E
0x0029	FreeRun needs 3Buffer Mode	P -> S	P + E
0x002A	Background Watchdog	S, O	P + E
0x002B	No Valid Inputs and Outputs	O, S -> O	S + E
0x002C	Fatal Sync Error	O	S + E
0x002D	No Sync Error	S -> O	S + E
0x0030	Invalid DC SYNC Configuration	O, S -> O, P -> S	P + E, S + E
0x0031	Invalid DC Latch Configuration	O, S -> O, P -> S	P + E, S + E
0x0032	PLL Error	O, S -> O	S + E
0x0033	DC Sync IO Error	O, S -> O	S + E
0x0034	DC Sync Timeout Error	O, S -> O	S + E
0x0035	DC Invalid Sync Cycle Time	P -> S	P + E
0x0036	DC Sync0 Cycle Time	P -> S	P + E
0x0037	DC Sync1 Cycle Time	P -> S	P + E
0x0041	MBX_AOE	B, P, S, O	I + E, P + E, S + E
0x0042	MBX_EOE	B, P, S, O	I + E, P + E, S + E
0x0043	MBX_COE	B, P, S, O	I + E, P + E, S + E
0x0044	MBX_FOE	B, P, S, O	I + E, P + E, S + E
0x0045	MBX_SOE	B, P, S, O	I + E, P + E, S + E
0x004F	MBX_VOE	B, P, S, O	I + E, P + E, S + E
0x0050	EEPROM no access	Any	I + E, P + E, S + E
0x0051	EEPROM Error	Any	I + E, P + E, S + E
0x0060	Slave restarted locally	Any	I
0x0061	Device Identification value updated	P	P + E
0x0062 …0 x00EF	Reserved		
0x00F0	Application controller available	I	I + E
other codes < 0x8000	reserved		
0x8000 – 0xFFFF	Vendor specific		

Traffic

Modbus RTU/ASCII Traffic

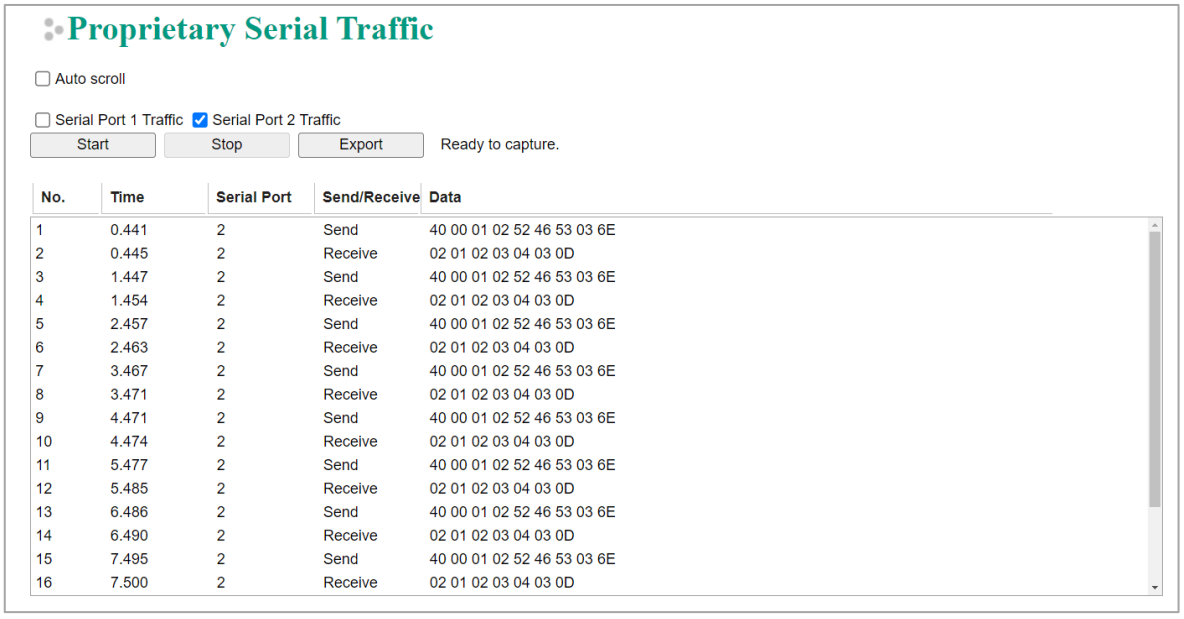
For troubleshooting or management purposes, you can monitor the Modbus RTU/ASCII data passing through the MGate 5216 on the network. Rather than simply echoing the data, the web console presents the data in an intelligent, easy-to-understand format with clearly designated fields, including source, type, destination, contents, and more.

Events can be filtered in different ways, and the complete log can be saved to a file for later analysis.



No.	Time	Send/Receive	Slave ID	Function Code	Data
1	0.450	MGate -> Port 1 device	1	3	01 03 00 00 00 0A C5 CD
2	0.510	MGate <- Port 1 device	1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A3 67
3	1.465	MGate -> Port 1 device	1	3	01 03 00 00 00 0A C5 CD
4	1.525	MGate <- Port 1 device	1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A3 67
5	2.475	MGate -> Port 1 device	1	3	01 03 00 00 00 0A C5 CD
6	2.535	MGate <- Port 1 device	1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A3 67
7	3.490	MGate -> Port 1 device	1	3	01 03 00 00 00 0A C5 CD
8	3.550	MGate <- Port 1 device	1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A3 67
9	4.505	MGate -> Port 1 device	1	3	01 03 00 00 00 0A C5 CD
10	4.565	MGate <- Port 1 device	1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A3 67
11	5.520	MGate -> Port 1 device	1	3	01 03 00 00 00 0A C5 CD
12	5.580	MGate <- Port 1 device	1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A3 67

Proprietary Serial Traffic

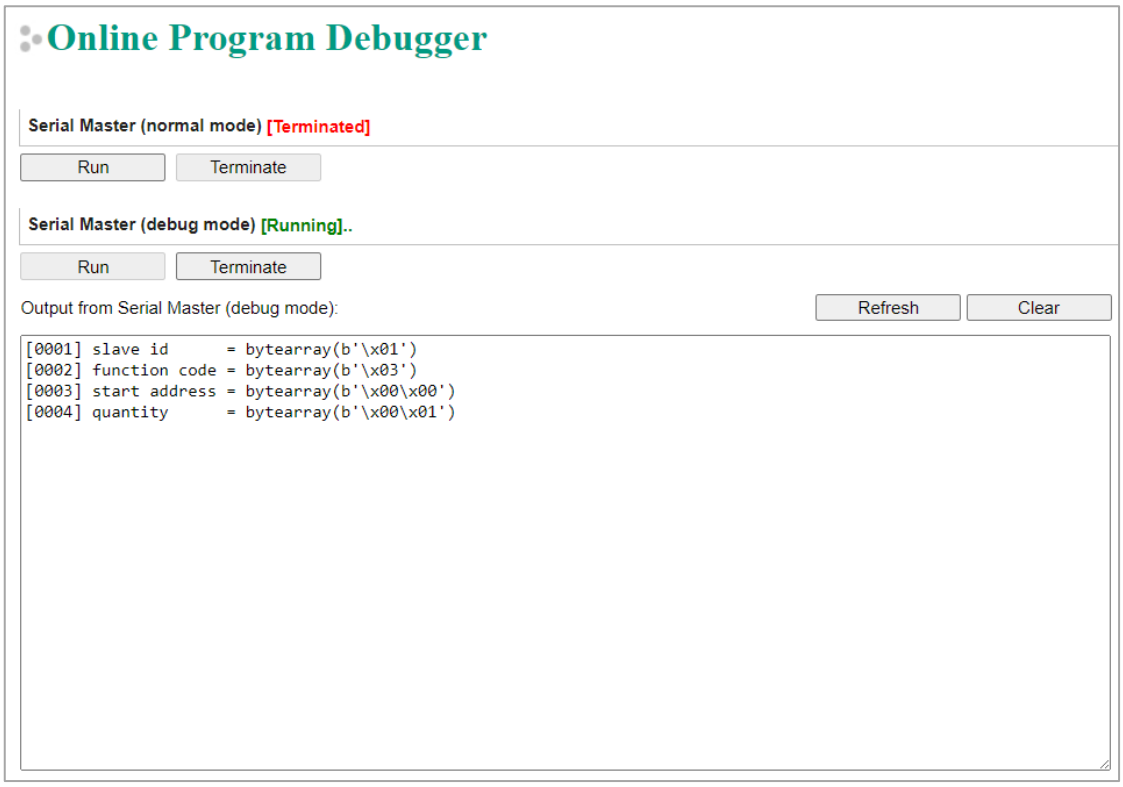


No.	Time	Serial Port	Send/Receive	Data
1	0.441	2	Send	40 00 01 02 52 46 53 03 6E
2	0.445	2	Receive	02 01 02 03 04 03 0D
3	1.447	2	Send	40 00 01 02 52 46 53 03 6E
4	1.454	2	Receive	02 01 02 03 04 03 0D
5	2.457	2	Send	40 00 01 02 52 46 53 03 6E
6	2.463	2	Receive	02 01 02 03 04 03 0D
7	3.467	2	Send	40 00 01 02 52 46 53 03 6E
8	3.471	2	Receive	02 01 02 03 04 03 0D
9	4.471	2	Send	40 00 01 02 52 46 53 03 6E
10	4.474	2	Receive	02 01 02 03 04 03 0D
11	5.477	2	Send	40 00 01 02 52 46 53 03 6E
12	5.485	2	Receive	02 01 02 03 04 03 0D
13	6.486	2	Send	40 00 01 02 52 46 53 03 6E
14	6.490	2	Receive	02 01 02 03 04 03 0D
15	7.495	2	Send	40 00 01 02 52 46 53 03 6E
16	7.500	2	Receive	02 01 02 03 04 03 0D

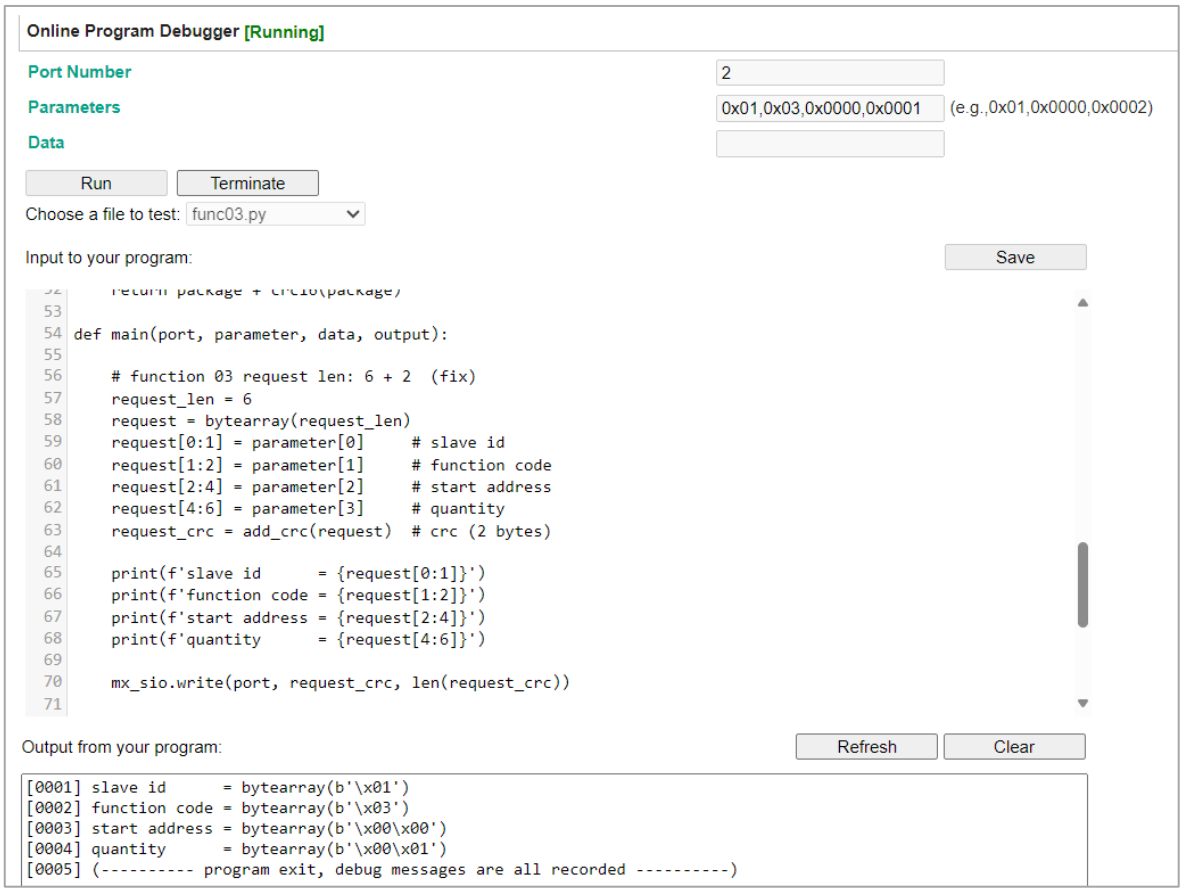
Online Program Debugger

Use the online program debugger to check the running status of their Micro Python program. You can also modify your program and save it.

First click **Terminate** in **Serial Master (normal mode)** to terminate the current Micro Python commands and then click **Run** to start debug mode.



After finishing troubleshooting, click Terminate button in the Serial Master(debug mode) and click RUN button in normal mode to execute runtime Micro Python again.



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.

MXview

The Moxa MXview network management software gives you a convenient graphical representation of your Ethernet network and allows you to configure, monitor, and diagnose Moxa networking devices. MXview provides an integrated management platform that can manage Moxa MGate series products as well as Ethernet switches and wireless APs, and SNMP-enabled and ICMP-enabled devices installed on subnets. MXview includes an integrated MIB complier that supports any third-party MIB. It also allows you to monitor third-party OIDs and Traps. Network and Trap components that have been located by MXview can be managed via web browsers from both local and remote sites—anytime, anywhere.

MXconfig

Moxa's MXconfig is a comprehensive Windows-based utility that is used to install, configure, and maintain multiple Moxa devices in industrial networks. This suite of useful tools helps users set the IP addresses of multiple devices with one click, configure the redundant protocols and VLAN settings, change multiple network configurations of multiple Moxa devices, upload firmware to multiple devices, export/import configuration files, copy configuration settings across devices, easily link to web and Telnet consoles, and test device connectivity. MXconfig gives device installers and control engineers a powerful and easy way to mass configure devices, and effectively reduces the setup and maintenance cost.

For more detailed information regarding MXview and MXconfig, download the user's manual from Moxa's website at http://www.moxa.com.