MGate 5216 Series User Manual

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www.moxa.com/products



MGate 5216 Series User Manual

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Table of Contents

1.	Introduction	4
2.	Getting Started	5
	Connecting the Power	5
	Connecting Serial Devices	5
	Connecting to the EtherCAT Network	5
	Connecting to a PC	5
	Installing the Software (Optional)	5
	microSD Card	5
	Backing Up a Configuration	6
	Configuring an MGate (Mass deployment/Replacement)	6
	microSD Card Write Failure	6
3.	Device Search Utility	7
	Installing the Software	7
	Starting the Device Search Utility (DSU)	
	Broadcast Search	
	Search IP	
	Locate	
	Assign IP	
	Unlock	
	Import/Export	14
	Upgrading the Firmware	14
4.	Web Console Configuration	
	Overview	
	Basic Settings	
	Network Settings	
	Serial Settings	
	Protocol Settinas	
	I/O Data Manning	
	System Management	
	Accessible IP Settings	26
	DoS Defense	27
	System Log Settings	27
	Auto Warning Settings	28
	F-mail Alert Settings	28
	SNMP Tran Settings	20
	SNMP Agent Settings	
	LIDD Sattings	30
	Certificate	31
	Misc. Sattings	31
	Maintenance	
	System Monitoring	
	System Homeoning	
	Drotocol Status	
	Postart	סכ רג
		42 د <i>ا</i>
		4242
	PIACOINING	

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.

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:** <u>Device Search Utility</u>.

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.

🕞 Setup - DSU	
	Welcome to the DSU Setup Wizard
	This will install DSU Ver2.0 on your computer.
	It is recommended that you close all other applications before continuing.
	Click Next to continue, or Cancel to exit Setup.
	Next > Cancel

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

弲 Setup - DSU	
Select Destination Location Where should DSU be installed?	
Setup will install DSU into the following folder.	
To continue, click Next. If you would like to select a different folder,	click Browse.
C:\Program Files (x86)\Moxa\DSU	Browse
At least 2.2 MB of free disk space is required.	
< <u>B</u> ack Next	Cancel

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.

🕞 Setup - DSU	- • 💌
Select Additional Tasks Which additional tasks should be performed?	
Select the additional tasks you would like Setup to perform while installing click Next.	DSU, then
Additional icons:	
Create a desktop icon	
< <u>Back</u> <u>N</u> ext >	Cancel

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

Setup - DSU	
Ready to Install Setup is now ready to begin installing DSU on your computer.	L.
Click Install to continue with the installation, or click Back if you want to review o change any settings.	r
Destination location: C:\Program Files (x86)\Moxa\DSU	*
<	
< <u>B</u> ack	Cancel

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

弲 Setup - DSU	- • -
Installing Please wait while Setup installs DSU on your computer.	
Creating shortcuts C:\ProgramData\Microsoft\Windows\Start Menu\Programs\Moxa\DSU\FA(Q.Ink
	Cancel

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.

🔎 DSU									- • •
<u> </u>	Eile Function View Help								
		🔒 Search I	≝ P_Locate	Console Assign IP Un-	Lock Import Ex	port Uggrade			
No Z	Model		LAN1 MAC Address	LAN1 IP Address	LAN2 MAC Address	LAN2 IP Address	Status	Firmware Version	
_									
-									
-									
-									
	h 0.()								
Search R	esult - 0 (s)								11.

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.

A Model LAN1 MAC Address LAN1 IP Address LAN2 MAC Address LAN2 IP Address Status Firmware Versi	ion

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.

🔎 DSU								- 0	\times
<u> </u>	Eile F <u>u</u> nction <u>V</u> iew <u>H</u> elp								
<u> </u>		Search.	IP Locate ☐	nsole Assign IP Un-L	ock I <u>m</u> port Exp	ort Upgrade			
No 🛆	Model		LAN1 MAC Address	LAN1 IP Address	LAN2 MAC Address	LAN2 IP Address	Status	Firmware Version	
🔒 1	MGate 5216		00:90:E8:00:00:05	10.123.4.168			Fixed	Ver0.8.1 Build 24040312	
L									

Search IP

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

Device	-X
Input an IP address	
6	

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.

DSU 🔎						- 0	×
<u> </u>	nction ⊻iew <u>H</u> elp						
<u>E</u> xit	<u> </u>	💁 🖄 🛛 🛛 rch IP Locate 🖓 Cor	∎ 🖳 💕 👗 Isole Assign IP Un-Lock Import E	🚖 🛃 xport Upgrade			
No /	Model	LAN1 MAC Address	LAN1 IP Address LAN2 MAC Address	LAN2 IP Address	Status	Firmware Version	
1	MGale 5216	00.90.E8:00:00.05	10123.4.168		Fixed	Ver0.8.1 Build 24040312	



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.

Locate Device		×
Locating		
Model	MGate 5216	
IP Address	10.123.4.168	
MAC Address	00:90:E8:00:00:05	
Serial Number	5	<u>S</u> top

Assign IP

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

Assign	IP Address			L 11 10	
No	MAC Address	IP Address	Netmask	Gateway	
1	00:90:E8:51:18:74	192.168.127.254	255.255.255.0		
		2	<i>.</i>		
		Assign IP :	Sequentially		
		Assign IP :	Sequentially		
		Assign IP :	Sequentially		

Unlock

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

Password	X	
Enter Password		
	🗸 OK 🛛 🗶 Cancel	
L		
Information 💽		
Un-Lock OK.		
ОК		

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 <u>www.moxa.com</u>. 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.

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 <u>Device Search Utility</u> 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.

Account	
Password	
	Login

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.

ΜΟΧΛ°	MGate 5216				www.moxa.com
= Model = Name	- MGate 5216 - MGate 5216_0	■ IP ■ Serial No.	- 10.123.4.168 - MCXA00000005	MAC Address	- 00.90 E8:00.00.05 - 0.8 Build 24022209
	:• Welcome to the MGate 52	16			
- Main Menu	Model name	MGate 5216			
Overview	Serial No.	MOXA0000005			
Basic Settings	Firmware version	0.8 Build 24022209			
Network Settings	Ethernet IP address	10.123.4.168			
Serial Settings	Ethernet MAC address	00:90:E8:00:00:05			
- Protocol Settings	Up time	17 days 17h:55m:35s			
- System Management	Power 1	011			
Restart	Power 2	On			
Logout	microSD	Not Detected			

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.

**	Basic Settings	
	Server Settings	
	Server name	MGate 5216_0
	Server location	
	Time Settings	
	Time zone	(GMT+08:00)Taipei
	Local time	2024 / 03 / 11 11 : 27 : 56
	Time server	10.122.13.65
	Submit	

Server Setting

Parameter	Value	Description
Sonvor Namo	(an alphanumoric string)	You can enter a name to help you uniquely identify the
Server Marine	(an alphandmene string)	device, such as its function.
Sonver Location	(an alphanumoric string)	You can enter a location string to help you locate the
	(an alphanumenc string)	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
Timo Zono	licar's calestable time zone	This field shows the selected time zone and allows you to
	User's selectable time zone	select a different time zone.
Local Time	User's adjustable time.	(1900/1/1-2037/12/31)
		This optional field specifies your time server's IP address or
	IP or Domain address	domain name if a time server is used on your network. The
Time Server	(e.g., 192.168.1.1 or	module supports SNTP (RFC-1769) for automatic time
	time.stdtime.gov.tw)	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.

Network Settings	
IP configuration	Static 🗸
IP address	10.123.4.168
Netmask	255.255.252.0
Gateway	10.123.4.1
DNS server 1	10.168.1.23
DNS server 2	8.8.8.8

Parameter	Value	Description
		Select Static IP if you are using a fixed IP address.
IP configuration	Static IP, DHCP, BOOTP	Select one of the other options if the IP address is set
		dynamically.
ID addrocc	192.168.127.254	The IP (Internet Protocol) address identifies the
IF duuless	(or another 32-bit number)	server on the TCP/IP network
Notmack	255.255.255.0	Identifies the server as belonging to a Class A, B, or C
Neumask	(or another 32-bit number)	network.
Catoway	0.0.0.0	The IP address of the router that provides network
Galeway	(or another 32-bit number)	access outside the server's LAN.
DNE Server 1	0.0.0.0	This is the IP address of the primary domain name
DING Server 1	(or another 32-bit number)	server.
DNE Corver 2	0.0.0.0	This is the IP address of the secondary domain name
DING Server Z	(or another 32-bit number)	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**.

:•	Serial S	Settings								
	Port	Baud rate	Parity	Data bit	Stop bit	Flow control	FIFO	Interface	RTS on delay	RTS off delay
I	1	115200 ¥	Even 🗸	8 🗸	1 🗸	None 🗸	Enable 🗸	RS-232 ¥	0	0
I	2	115200 🗸	Even 🗸	8 🗸	1 🗸	None 🗸	Enable 🗸	RS-232 🗸	0	0

Parameter	Value
	Supports standard baudrates (bps):
Baudrate	50/75/110/134/150/300/600/1200/1800/2400/4800/7200/9600/19200/384 00/57600/115200/ 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
	RS-232
Intorfaco	RS-422
Interface	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

EtherCAT	Slave Settings													
Your EtherC/	device : TT Master		Role 1 ol Ether	f MGate 5216 : rCAT Slave	6			Role 2 of Seri	MGate 5216 : al Master	•	→	Your dev Serial D	vice :	
Device ID Endian swap						0 None	•	(0 - 6	535)					
Device ID Endian swap EtherCAT Object Ta	able					0 None	~	(0 - 6:	5535)					
Device ID Endian swap EtherCAT Object Tr Input Object	able	[0 None	~	(0 - 6:		🗘 Adı	e Belit	E Clone	立 Delete	‡ Move
Device ID Endian swap EtherCAT Object Tr Input Object Index	Object Index	Name				0 None	~	0 - 6	a Type	🔂 Adı	Edit Quantity	E Clone	T Delete	1 Move
Device ID Endian swap EtherCAT Object Ta Input Object 1 2	Object Index 0x6000 0x6001	Name Input1				0 None	~	0 - 6	a Type T16 T32	C Ad	a → Eclit Quantity 10	ि Clone	位 Delete	1 Move
Device ID Endian swap EtherCAT Object Tri Input Object 1 2 Output Object	Object Index 0x6000 0x6001	Name Input1 Input2				0 None	•	UIN	a Type T16 T32	Ad	d	Clone /	합 Delete 합 Delete	Move Move
Device ID Endian swap EtherCAT Object Tri Input Object 1 2 Output Object Index	Object Index 0x6000 0x6001 0x6001 Object Index	Name		_		0 None	~	Dat UIN UIN	a Type T16 T32 a Type	Ad	d Quantity 10 10 10 10 10 10 10 10 10 10	Clone / E Clone	법 Delete 법 Delete	1 Move
Device ID Endian swap EtherCAT Object Tri input Object 1 2 Output Object Index 1 2	Object Index 0x6000 0x6001 0x50001 0x7000	Name Input1 Input2 Name Output1				0 None	~	UIN UIN UIN UIN UIN	a Type T16 T32 a Type T16	Ad	a	Clone / Em Clone	T Delete	1 Move

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:

Туре	Input Object 🗸	
Name	Input	
Data Type	UINT16 V	
Quantity	1	(1 - 254)

Output Object:

Type Output Object v Name Output Data Type UINT16 v Quantity 1 (1 - 254)

Status Object:

Туре	Status Object 🗸	
Name	Status Code	
Data Type	UINT8 🗸	
Quantity	2	(1 - 254)
	ОК	Cancel

Control Object:

Туре	Control Object 🗸	
Name	Control Code	
Data Type	UINT8 🗸	
Quantity	2	(1 - 254)

Parameter	Value	Default	Description
Туре	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 serial mode. The data type is fixed at UINT8, and the quantity is automatically calculated depending on the number of Modbus or 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 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 per serial port in serial mode. 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

•Modbus RTU/AS	CII Settings				
Your device : EtherCAT Master	Role 1 of MGate 5216. EtherCAT Slave		Role 2 of MGate 5216 : Modbus RTU/ASCII Master	Your device : Modbus RTU/ASCII Stave	
Role		Master			
Master Settings					
					a Edit
Serial port	Initial delay		Max retry	Response timeout	
1	0		3	1000	
2	0		3	1000	

Double click the row in to enter the setting page.

:• Modbus	RTU/ASCII S	ettings											
Ya Ethe	ur device : CAT Master	R	ole 1 of MGate 5216 : EtherCAT Slave		() Rol Modb	le 2 of MGate 5 bus RTU/ASCII	5216 : Master	•	 	Your Modbus RT	device : U/ASCII Stav		
Role Port Mode Master Setting	s				Master 1 RTU V								
Initial delay Max. retry Response time Inter-frame del Inter-character	out ay timeout				0 3 1000 0 0		0 - 30000 ms) 0 - 5) 10 - 120000 n 10 - 500 ms, (10 - 500 ms, (ns)): default)): default)					
Modbus Comn	ands								🔂 Add	🔊 Edit	E Clone	1 Delete	1 Move
Index	Name	Slave ID	Function	Address / Quantity				Trigger	Poll Interval		Endian	Swap	
1	Command1	1	1	Read address 0, Quan	tity 10			Cyclic	1000		None		
Apply the abo	ve setting to			Port2	Be	ack							

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. MGate Req. Resp. Inter-frame delay Default 3.5 Character time Device
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	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.

Proprieta	ry Serial Set	ting							
Your of EtherC/	The s device : VT Master	↓	Role 1 of MGate 5216 : EtherCAT Stave		(C) Role	e 2 of MGate 5216 : Serial Master	14	Your device : Serial Device	
Master Settings									
Python File				Choose F	ile No file chosen		Import		
Initial Delay				Please	Select V	- 30000 ms)	Delete		
Program On Startu	p			Please	Select V				
Data Settings									
								🔂 Add 🥖	Fedit 🖞 Delete
	Dort Number	Name	Direction	Input Byte(s)	Output Byte(s)	Trigger	Polling Interval(ms)	Python File	
Index	Port Number				0	Cyclic	1000	func02 with retry py	
Index 1	1	command 1	Input	10	l ^o	- Cyclic	1000	Tuncoo_with_reay.py	
Index 1 2	1 1	command 1 command 2	Input Output	0	10	Data Change	N/A	func16_with_retry.py	

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.

Port Number	1	•
Name		
Direction	Input/Output	 Image: A set of the set of the
Input Byte(s)		(1 - 512)
Output Byte(s)		(1 - 512)
Trigger	Cyclic	•
Polling Interval	Polling Interval(ms)	(10 - 120000 ms)
Python File	func23.py	 Image: A set of the set of the
Parameters	0x01,0x02,0x03,0x04,0x05	(e.g., 0x01,0x0000,0x0002)
	ОК	Cancel

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.

	Da	ta flow c	lirection	E	therC	AT Master < I	Proprieta	ry Serial E	evice and	d Modbus RTU/ASCII Slave 、
Mapping address arra	ngement			Automati	ic 🗸					
-	_				Ē					
5 B.	re	ad						read		000
Your device :	R	ole 1 of	MGate 5	216 :		Role 2 of MG	ate 521	ð :		Your device :
EtherCAT Master	E	therCAT	Slave			Modbus RTU	J/ASCII	Master	I	Modbus RTU/ASCII Slave
						Serial Port				
Name Index D	ata Type	Internal	Address	Data Size		Name	Interna	Address	Quantity	
Input_Port1 0x6000	UINT8	0	. 39	40 bytes		Port1_func03	4	43	40 bytes	
Input_Port2 0x6001	JINT16	40	. 43	4 bytes		Port2_Read	0	3	4 bytes	
						Submit				

		Da	ata flow o	direction		EtherC	AT Master> F	Proprieta	y Serial D	evice an	d Modbus RTU/ASCII Slave
Mapping ad	dress arr	rangemen	t		Automa	tic 🗸					
A.T.T. Inch.	1					F					
		w	rite					v	vrite		000
Your device : EtherCAT Ma	oter	F	Role 1 of	MGate 5	216 :		Role 2 of MG Serial and	ate 5216	:		Your device : Serial <mark>Device</mark> and
				Charlo			Modbus RTU		laster		Modbus RTU/ASCII Slave
					D ()		Serial Port			o	
Name Output Port1			Internal	Address	Data Size	9	Name Port1_func16	Internal	Address	Quantity	
Output_Port2	2 0x7000	UINT16	40	43	4 bytes		Port2_Write	0	3	4 bytes	
							Output it				
							Submit				

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

Access	ible IP	' List					
Enable the a	Enable the accessible IP list ("Disable" will allow all IP's connection)						
Index	Active	IP	NetMask				
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

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.

Configuration	
Null Scan	
Xmas Scan	
NMAP-Xmas Scan	
SYN/FIN Scan	
FIN Scan	
NMAP-ID Scan	
SYN/RST Scan	
SYN-Flood	
Enable	
Limit	[4000] (pkt/s)
ICMP-Death	
Enable	
limit	(pkt/c)

System Log Settings

System Log Settings			
Event Group	Syslog	Local Log	Summary
System			System cold start, System warm start
Network		~	DHCP/BOOTP get IP/renew, NTP connect fail, IP conflict, Network link down
Configuration			Login, IP changed, Password changed, Firmware upgrade, SSL certificate import, Config import, Config export, Configuration change, Clear event log
EtherCAT			EtherCAT communication logs
Proprietary Serial		~	Proprietary Serial communication logs
Local Log Settings Local Log Settings Local Log Settings Warning by: 2 SNMP Trap 2 E-mail Event log oversize action : Overwrite The Oldest Ev	entLog 🗸		
Syslog Settings			
Syslog server IP Syslog server port			514
		Submit	

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
Configuration	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.

Auto Warning Settings

514

Syslog server port

System Event			
Cold start	Mail 🕅	Trap 🥅	
Warm start	Mail 📃	Trap 📃	
Power1 input failure	Mail 🔲	Trap 📃	Relay 📃
Power2 input failure	Mail 🕅	Trap 📃	Relay
LAN1 link down	Mail 📃	Trap 🔲	Relay
LAN2 link down	Mail 🔲	Trap 🔲	Relay 📃
Config Event			
Console login fail	Mail 📃	Trap 🕅	
IP changed	Mail 📃		
Password changed	Mail 🔲		

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

Mail Settings		
Mail server (SMTP)		
My server requires authentication		
Jser name		
Password		
From e-mail address		
Fo e-mail address 1		
Fo e-mail address 2		
Fo e-mail address 3		
Fo e-mail address 4		
Fo e-mail address 4		

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

•SNMP Trap		
SNMP Trap		
SNMP trap server IP or doma	ain name	
Trap version		● v1 ○ v2c
Trap community		public
	μ Sι	bmit
Parameters	Description	

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

Configuration	
SNMP	Enable 🗸
Contact name	
Read community string	public
Write community string	private
SNMP agent version	V1, V2c 🗸
Read only user name	rouser
Read only authentication mode	Disable 🗸
Read only password	
Read only privacy mode	Disable 🗸
Read only privacy	
Read/write user name	rwuser
Read/write authentication mode	Disable 🗸
Read/write password	
Read/write privacy mode	Disable 🗸
Read/write privacy	

Parameters	Description
SNMD	To enable the SNMP Agent function, select the Enable option, and enter a
SINFIF	community name (e.g., public).
Contact name	The optional SNMP contact information usually includes an emergency contact
Contact name	name and telephone number.
Road community string	This is a text password mechanism that is used to weakly authenticate queries
Read community string	to agents of managed network devices.
Write community string	This is a text password mechanism that is used to weakly authenticate
white community string	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
llsername	Use this optional field to identify the username for the specified level of
Osername	access.
Authoptication Mode	Use this field to select MD5 or SHA as the method of password encryption for
Authentication Mode	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.

:• LLDP Settings			
LLDP Message transmit interval		Enable V	(5 - 16383 secs)
	Submit		
Parameters	Description		
Message Transmit Interval	The default time is 30 and 16,383 seconds.	seconds. The allowab	le range is between 5

Certificate

 - Certificate		
SSL Certificate		
Issued to	10.123.4.168	
Issued by	10.123.4.168	
Valid	from 2023/12/13 to 2033/12/10	
Select SSL certificate file	Choose File No file chosen Imp	port
Delete SSL certificate file	Delete	

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

Console Settings	
Configurations	
HTTP console	Enable 🗸
HTTPS console	Enable 🗸
Telnet console	Enable 🗸
SSH console	Enable 🗸
Serial console	Enable 🗸
Reset button	Always enable
MOXA Command	Enable 🗸
Session Settings	
Maximum Login User For HTTP+HTTPS	5 (1 ~ 10)
Auto Logout Setting	5 (0 ~ 1440 min, 0 for Disable)

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

• Notification Mes	age
Notification Message	
Login message	0 character/Maximum 240 character
Login authentication failure message	The account or password you entered is incorrect. (Your account will be temporarily locked if excessive tried.)

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

Account Management

Add Account Settings			
	🔂 Add	🖋 Edit	🖞 Delete
Account Name Group			
admin admin			
user user			

Parameters	value	Description
		Users can change the password for different accounts. Now the MGate provides two different level accounts: admin and user . The
Account	admin, user	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	
Minimum length	4 (4 ~ 16)
Enable password complexity strength check	
At least one digit(0~9)	
Mixed upper and lower case letters(A~Z, a~z)	
At least one special character: ~!@#\$%^&* ;:,.<>[]{}()	
Password lifetime	90 (90 ~ 180 days)
Account Login Failure Lockout	
Enable	
Retry failure threshold	5 (1 ~ 10 time)
Lockout time	5 (1 ~ 60 min)

Account Password Policy	Value	Description
Minimum length	4-16	
Enable password complexity		Select how the MGate checks the password's strength
strength check		Select now the Modele thecks 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.

• Ping Test		
Ping Destination		
Destination		
	Activate	

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.

:•Firmware Upgrade	
!!! Warning !!!	
Select firmware file	Note: Firmware upgrade will discard your un-saved configuration changes and restart the system! Browse
	Submit



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.

Configuration Import/Export	
Configuration Import	
Select configuration file	Choose File No file chosen
C Keep IP settings	
	Import
Configuration Export	
	Export

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**.

• Load Factory Default
Click on Submit to reset all settings, including the console password, to the factory default values. To leave the IP address, netmask and gateway settings unchanged, make sure that Keep IP settings is enabled.
Reset to Factory Default
□ Keep IP settings
Submit



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.

Network Connections					
Protocol	Recy O	Sond O	Local Address	Foreign Address	State
FIOLOCOI	Necv-Q	Senu-Q	Local Address	Poleigii Address	State
TCP	0	0	*:4900	*:0	LISTEN
TCP	0	0	*:80	*:0	LISTEN
TCP	0	0	*:502	*:0	LISTEN
TCP	0	0	*:22	*:0	LISTEN
TCP	0	0	*:23	*:0	LISTEN
TCP	0	0	*:443	*:0	LISTEN
TCP	0	0	192.168.127.254:80	192.168.127.222:5980	ESTABLISHED
UDP	0	0	*:161	*:0	
UDP	0	0	*:4800	*:0	

System Log

Go to **System Log** under **System Status** to view network connection information.

System Log	
System Log	
	^
	*
	Export Clear log Refresh

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.

Relay State		
Auto refresh		
Power input 1 failure	N/A	Acknowledge Event
Power input 2 failure	N/A	Acknowledge Event
Ethernet 1 link down	N/A	Acknowledge Event
Ethernet 2 link down	N/A	Acknowledge Event

LLDP Table

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

:•LL	DP 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 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.

*I/O Data View																
□ Auto refresh																
Data flow direction EtherCAT Master> Proprietary Serial Device and Modbus RTU/ASCII Slave • 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

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)

• 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.							

Proprietary Serial Diagnostics

• Proprieta	ry Serial Diagnostics	
Auto refresh		
Category	Item	Value
Proprietary Serial		
	Execute Programmable File	0
	Execute Invalid	0
	Execute timeout	
Serial Port		
	Port number	2
	Break	0
	Frame error	0
	Parity error	0
	Overrun error	0

EtherCAT Slave Diagnostics

•EtherCAT Slave Diagnostics				
🗹 Auto refresh				
Category	Item	Value		
EtherCAT Slave				
	State	Init		
	Slave address	0		
	Input	0 bytes		
	Output	0 bytes		
	AL status	0×0001		
	AL status code	0×0000		

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:

Table 23: Register AL Status (0x0130:0x0131)									
			ESC20 [15:5]	ET1100	ET1200	IP Core [15:5] V2.4.0/ V2.04a			
Bit	Description	ECAT	PDI	R	eset Valu	е			
3:0	Actual State of the Device State Machine:1:Init State3:Bootstrap State2:Pre-Operational State4:Safe-Operational State8:Operational State	r*/-	r/(w) 1					
4	 Error Ind: O: 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	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.									

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	1-> 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 -> 0	Current state + E	
0x0018	No valid inputs available	S, O, S -> O,	S + E	
0x0019	No valid outputs	0, S -> 0	S + E	
0x001A	Synchronization error	0, S -> 0	S+E	
0x001B	Sync manager watchdog	0, S	S+E	
0x001C	Invalid Sync Manager Types	0, S, P -> S	S+E	
0x001D	Invalid Output Configuration	0, S, P -> S	P+E	
0x001E	Invalid Input Configuration	0, S, P -> S	P+E	
0x001F	Invalid Watchdog Configuration	0, 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	0	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	0, S -> 0	S + E	
0x002C	Fatal Sync Error	0	S + E	
0x002D	No Sync Error	S -> 0	S + E	
0x0030	Invalid DC SYNC Configuration	0, S -> 0, P -> S	P + E, S + E	
0x0031	Invalid DC Latch Configuration	0, S -> 0, P -> S	P + E, S + E	
0x0032	PLL Error	0, S -> 0	S + E	
0x0033	DC Sync IO Error	0, S -> 0	S + E	

0x0034	DC Sync Timeout Error	0, S -> 0	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	1
0x0061	Device Identification value updated	P	P + E
0x00620 x00EF	Reserved		
0x00F0	Application controller available	1	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.

• M	lodbus	RTU/ASC	CII Ti	raffic	
Auto	o scroll				
ş	Start	Stop	Export	Ready to ca	apture.
No.	Time	Send/Receive	Slave ID	Function Code	Data
1	0.450	MGate -> Port 1 dev	ice 1	3	01 03 00 00 00 0A C5 CD
2	0.510	MGate <- Port 1 dev	ice 1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00
3	1.465	MGate -> Port 1 dev	ice 1	3	01 03 00 00 00 0A C5 CD
4	1.525	MGate <- Port 1 dev	ice 1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00
5	2.475	MGate -> Port 1 dev	ice 1	3	01 03 00 00 00 0A C5 CD
6	2.535	MGate <- Port 1 dev	ice 1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00
7	3.490	MGate -> Port 1 dev	ice 1	3	01 03 00 00 00 0A C5 CD
8	3.550	MGate <- Port 1 dev	ice 1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00
9	4.505	MGate -> Port 1 dev	ice 1	3	01 03 00 00 00 0A C5 CD
10	4.565	MGate <- Port 1 dev	ice 1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00
11	5.520	MGate -> Port 1 dev	ice 1	3	01 03 00 00 00 0A C5 CD
12	5.580	MGate <- Port 1 dev	ice 1	3	01 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00

Proprietary Serial Traffic

Proprietary Serial Traffic								
🗌 Auto	scroll							
🗌 Seria	al Port 1 Traffi	c 🔽 Serial Port 2 1	raffic					
s	itart	Stop	Export	Ready to capture.				
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				
1	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				
5	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				
3	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.

• Online Program Debugger		
Serial Master (normal mode) [Terminated]		
Run Terminate		
Serial Master (debug mode) [Running]		
Run Terminate		
Output from Serial Master (debug mode):	Refresh	Clear
<pre>[0001] slave id = bytearray(b'\x01') [0002] function code = bytearray(b'\x03') [0003] start address = bytearray(b'\x00\x00') [0004] quantity = bytearray(b'\x00\x01')</pre>		

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.

Online Program Debugger [Running]		
Port Number 2		
Parameters 0x0	01,0x03,0x0000,0x0001	(e.g.,0x01,0x0000,0x0002)
Data		
Run Terminate		
Choose a file to test: func03.py		
Input to your program:		Save
<pre>53 54 def main(port, parameter, data, output): 55 56 # function 03 request len: 6 + 2 (fix) 57 request_len = 6 58 request = bytearray(request_len) 59 request[0:1] = parameter[0] # slave id 60 request[1:2] = parameter[1] # function code 61 request[2:4] = parameter[2] # start address 62 request_crc = add_crc(request) # crc (2 bytes) 64 65 print(f'slave id = {request[0:1]}') 66 print(f'start address = {request[2:4]') 67 print(f'quantity = {request[2:4]') 68 print(f'quantity = {request[4:6]}') 69 70 mx_sio.write(port, request_crc, len(request_crc)) 71 </pre>		
Output from your program:	Refresh	Clear
<pre>[0001] slave id = bytearray(b'\x01') [0002] function code = bytearray(b'\x03') [0003] start address = bytearray(b'\x00\x00') [0004] quantity = bytearray(b'\x00\x01') [0005] (program exit, debug messages are all recorded)</pre>		

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.

• Restart	
!!! Warning !!!	
	Clicking "Submit" will disconnect Ethernet connections and reboot the system.
	Submit

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.