The Quick Install Guide for
MGate W5x08 Gateway

Connecting the Power

The MGate W5X08 series gateway can be powered by connecting a power source to the terminal block, as follows:

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

Connecting Modbus/DNP3 Serial Devices

The unit's Modbus/DNP3 port(s) are located on the front panel. Use a Modbus/DNP3 serial cable to connect the unit directly to the Modbus/DNP3 devices. Before connecting or removing the Modbus/DNP3 connection, first make sure the power source is off.

Connecting Modbus/DNP3 Network Devices

The MGate W5X08 can be connected to the network via Ethernet port and WiFi with different IP addresses. The default IP addresses of Ethernet and WiFi are 192.168.126.254 and 192.168.127.254, respectively. Since your system may be using more than one MGate device and all MGate devices are configured with the same factory default IP address, you will first need to configure the MGate's network settings. The MGate's Ethernet ports are located on the front panel. The MGate will indicate a valid connection to the Ethernet in the following ways:

- The Ethernet LED will glow a solid green color when connected to a 100 Mbps Ethernet network.
- The Ethernet LED will glow a solid amber color when connected to a 10 Mbps Ethernet network.

The Ethernet LED will flash when Ethernet packets are being transmitted or received.

In **General Settings**, users can choose the routing criteria by **Bridge mode** setting when Ethernet and WiFi are both connected. When disable the bridge mode, Ethernet port will be the default routing path even WiFi is also connected. When enable the bridge mode, WiFi connection will be the default routing path even Ethernet port is connected.
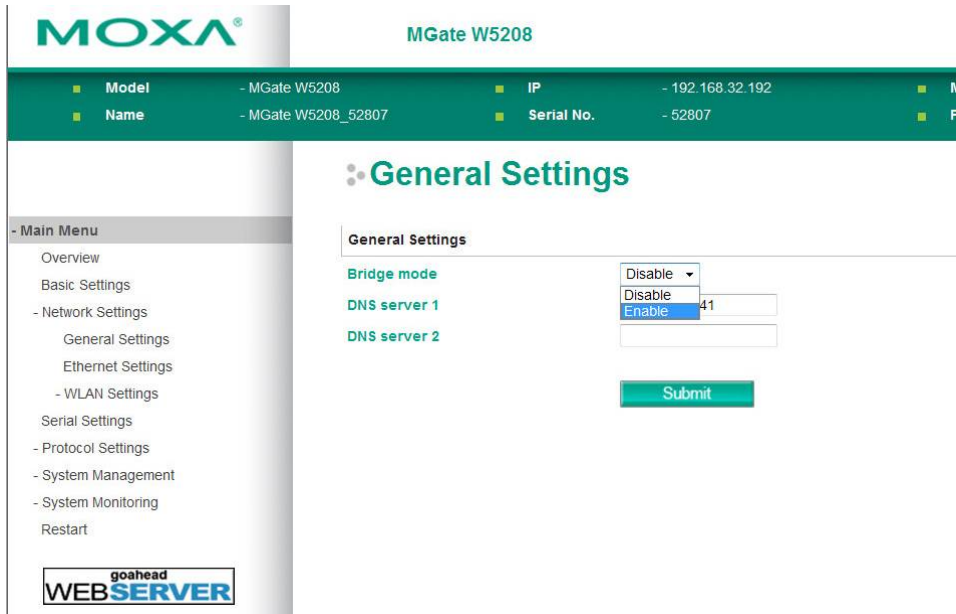
WLAN Settings

The MGate W5X08 supports IEEE 802.11 a/b/g/n wireless function. The wireless function provides more convenient deployment of industrial equipments connecting to network. It has better scalability to meet the requirement of a variety of topologies according to user's needs of wireless LAN system.

Connection Settings

The WLAN settings are classified into two types. The first one is "WLAN" setting which includes IP address/Network/Gateway and the method of acquiring IP address. The setting is for user to specify network address to run in the system. The second one is "Profile" which is used to configure the wireless connection settings including security parameters.

There are two network types which is "Infrastructure" and "Adhoc mode." When configured to "Adhoc mode", it automatically detects and communicates directly with each other and do not require a wireless access point (AP) or gateway. If the MGate is configured to "Infrastructure", it is accessed through a wireless access point. In the "Operation mode", you can choose the MGate to operate in which wireless standard. The SSID is used to configure the SSID of access point. You can also get the SSID by "Site survey" button which will automatically search and list the SSID of APs nearby. The fast roaming is used for roaming among two APs with the same SSID when the wireless signal strength is stronger than the original attached one. The "Scan channel" is configured for fast roaming function to do the scanning of wireless signal. It is selectable only if "Fast roaming" is enabled. The list of selectable channels is different according to different operation mode.

Security Settings

For the security setting of "Infrastructure" mode, it must be the same as access point for authorization of communication. The authentication field specifies how wireless devices will be authenticated. Only authenticated devices will be allowed to communicate with the access point. The security setting of the wireless devices which are configured to "Adhoc mode" must be the same to communicate with each other.
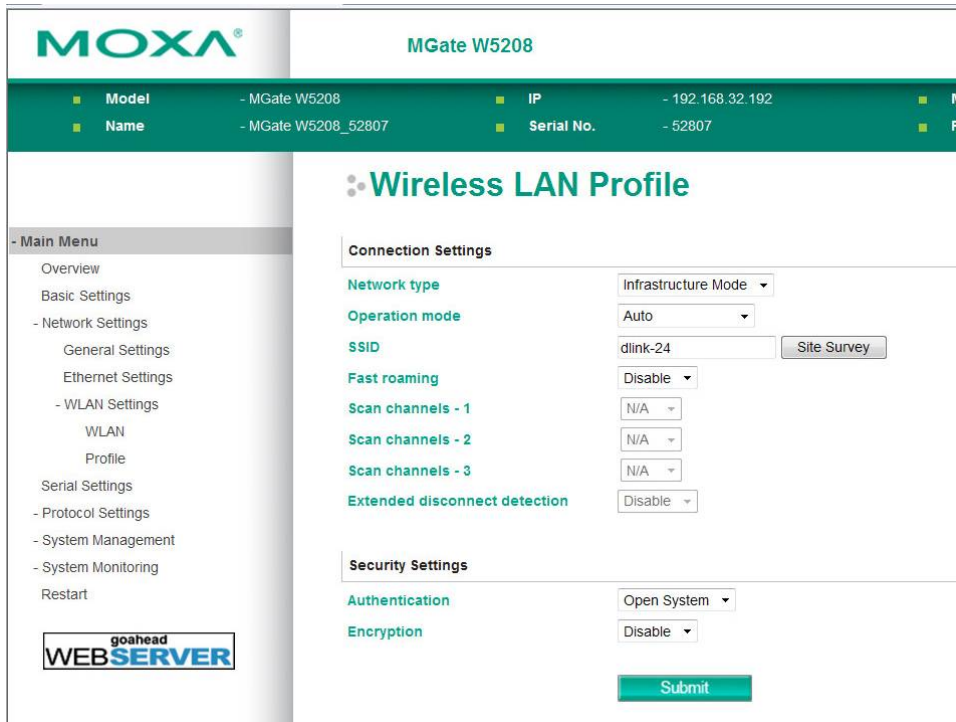
First Time Use

Firstly, user can connect with the MGate device and search the unit by using the *Device Search Utility*. And then configure the MGate through web console.

1. **Device Search Utility (**called DSU in this instruction**)**

    In most situations, users do not know the IP address when setting up a new gateway or configuring an existing gateway. In these cases, users can use an Ethernet cable to connect a host computer and the gateway directly. If connecting the devices under the same Ethernet switch, make sure there is no router between them. The DSU can detect the network settings of the connected gateway for users properly. Once you found the device in the DSU's device list, you can assign IP to the device, or export/import the configuration file, or upgrade the firmware to the device. For other gateway configuration, double-click the target device in the DSU and the web browser will pop-up for further setting.

2. **Web Console**

    Use the Web Console to configure the MGate or to verify the status of the MGate from a web browser. You may use Microsoft Internet Explorer or Google Chrome to connect to the MGate. To use this method, the IP address of the MGate must be configured correctly.

Starting Device Search Utility

The Device Search Utility (called DSU in this instruction) is a Windows-based utility that is used to configure MGate W5X08 series gateway units. Before running DSU, first connect your MGate W5X08 series gateway unit to your PC.

To start DSU, from the Windows Start menu click **Start → Programs → MOXA → DSU →DSU**.

The DSU window will appear as shown below.
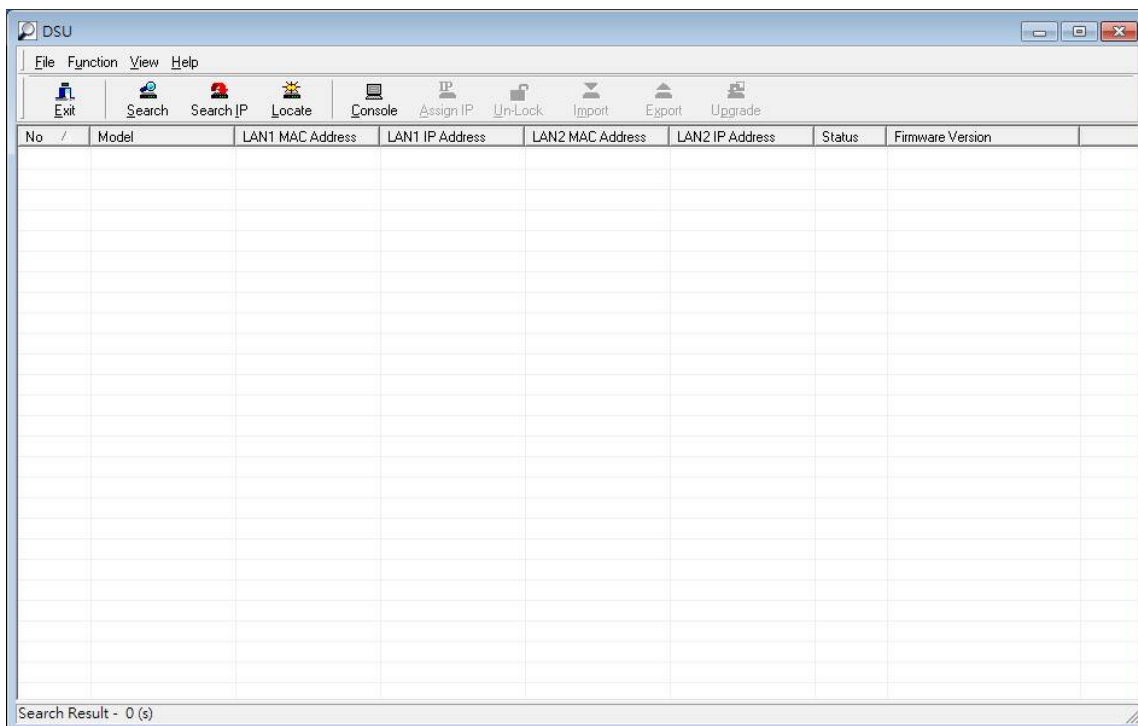
Search the Unit

Two methods are available for establishing a connection with MGate: 錯誤! 找不到參照來源。 and 錯誤! 找不到參照來源。.

Search can be used to locate any connected MGate series units in the same network. Use the 錯誤! 找不到參照來源。 option if you know the IP address of the unit. For example, the default IP of MGate W5X08 series gateway is 192.168.126.254 of the Ethernet interface and 192.168.127.254 of the WiFi interface when user receives a new unit. And this function is also useful when the MGate unit is not located on the same subnet as the PC, such as across a router.
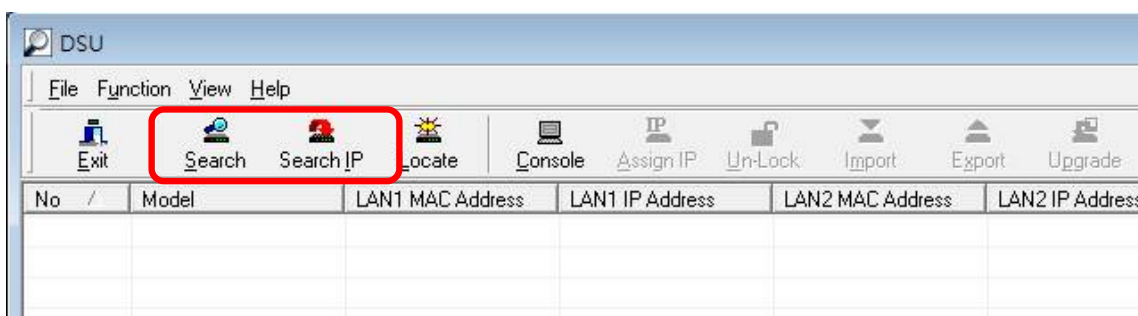
By executing the Search function, you will see the devices that is connected with you network. Once a device is been chosen, the executable functions will become choosable.

To login to the intended device, double-click the device and a web browser will pop-out for detail setting.

Type-in the Account name and password to login to the device. The default Account name and Password are "admin" and "moxa".

⚠️ **ATTENTION**

If 錯誤! 找不到參照來源。 fails to locate the MGate unit, the IP address that you entered might be incorrect. In this case, re-enter the IP address and try searching again.

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

Configuration

Once your login to the MGate unit through web console, you will see the overview of this MGate unit including the Model name, Serial No., Ethernet IP Address, WLAN IP Address, etc. Users can click the different configuration functions by the main menu in the left hand side.

Protocol Setting

The MGate W5X08 gateway has built-in with two serial ports, and users can define the protocol run on each serial port independently. There is three operation protocols can be chosen: **Modbus**, **DNP3**, and **RAW TCP**. Once you determine the protocol, click **Submit** to activate the change.

Protocol Settings

The sub-clause **Protocol Setting** function shows the detail of the chosen protocol for each port. The shown web page will be different according to protocol assignment you choose. Example below is with Modbus protocol runs on serial port 1, and DNP3 protocol runs on serial port 2.

Modbus setting

There are four options can be chosen for Modbus setting: **Mode**, **Slave ID**, **Priority Control**, and **Advanced Setting**.

Mode

Click the currently shown Modbus mode (*RTU Master* shown in previous figure) for each port for further setting. It includes the mode of the **Connected serial device**, **Response timeout**, **Inter-character timeout**, and **Inter-frame delay**.

Parameter	Value	Default
Connected serial device	RTU Slave, RTU Master, ASCII Slave, ASCII Master	RTU Slave
Response timeout	10 – 120000 ms	1000 ms
Inter-character timeout	10 – 500 ms, 0 for auto	0
Inter-frame delay	10 – 500 ms, 0 for auto	0

Connected serial device

This field is to assign the role of the connected serial device, please refer to the manual of the serial devices for the setting.

Response timeout

This field is used to configure how long the gateway will wait for a response from a Modbus ASCII or RTU slave. This field is set independently for each serial port, which is selected through the "Protocol Assignment" field. Please refer to your device manufacturer's documentation to manually set the response time-out.

The MGate W5X08 series gateway also provides automatic calibration of the response timeout. Instead of manually figuring out the appropriate setting, you can click "Auto Detection" to have the MGate automatically figure out the time-out setting. Once a value has been recommended, you can fine-tune it for best performance.

Inter-Character Timeout

Use this function to determine the timeout interval between characters for Modbus devices that cannot receive Rx signals within an expected time interval. If the response is timed out, all received data will be discarded. Note that this timeout mechanism only works in RTU slave mode. The MGate W5X08 gateway will automatically determine the timeout interval if the timeout value is set to 0.

Inter-Frame Delay

In Modbus RTU slave mode, user can determine the time-delay to transmit the data frame received from the slave device to the upstream. The MGate W5X08 gateway will automatically determine the time interval if it is set to 0.

Slave ID

The **Slave ID Map** tab is where slave IDs are managed. The definitions on this tab determine how requests will be routed by the unit.

Parameter	Value	Default
Remote IP address	(Max 40 characters)	null
TCP Port	0 - 65535	null
Slave ID Start	0 – 255	0
Slave ID End	0 - 255	0
Slave ID Offset	-255 ~ 255	0

How Slave IDs are Mapped on the MGate W5X08

When a Modbus master requests information from a Modbus slave, the request is addressed to the desired slave's ID, which must be unique on the network. When Modbus networks are integrated by a Modbus gateway, complications can arise if the same slave ID is being used on different networks. If this is not properly addressed, a request sent to that slave ID would receive more than one response, causing communication problems.

With the MGate MB3000, this situation is addressed by using a slave ID map. While configuring the MGate, users set up a range of "virtual" slave IDs that are mapped to slave devices on a specific Modbus network. To send a request to a slave that is on a different Modbus network, a master would address the request to the appropriate virtual slave ID. The MGate then routes that request as specified by the slave ID map.

For example, if a TCP master needs information from an ASCII slave, it addresses the request to the corresponding virtual slave ID as defined on the MGate's slave ID map. The MGate identifies the request as within its virtual slave ID range and forwards the request to the Modbus ASCII network, this time addressed to the device's actual slave ID.

Virtual slave IDs must not conflict with each other or with other TCP slave IDs.

With the slave ID map, smart routing is achieved for units with multiple serial ports. Since each virtual slave ID is routed to a specific Modbus network, requests are not broadcast over all serial ports. This keeps communication efficient and prevents devices on one port from slowing down the whole system.

How Slave ID Map is Defined

The slave ID map consists of entries (channels) that specify a range of virtual IDs, the destination, and the offset value. The offset value is used to convert the virtual ID to the actual ID.

Setting	Value	Notes
Virtual Slaves ID Range	(numeric range from 1 to 254)	This specifies the range of IDs that will be routed to the selected set of slave devices. For example, you can specify that IDs between 8 and 24 be routed to the devices on Port 3. The ID 255 is reserved for the gateway itself
Slave ID Offset	(number between -253 and 253)	This specifies the difference between the virtual slave ID and the actual slave ID. If a slave's virtual ID is 16 and the actual ID is 5, you would set the offset to -11. This offset is applied to the entire range of virtual slave IDs.

When a serial port is set to RTU slave or ASCII slave mode, a virtual ID range will already be created for you. Simple select the entry in the table and modify the range and offset as needed. For TCP slaves, you can add an entry that assigns a range of virtual IDs to a specific IP address, using the **Remote TCP Slave IP** setting.

Slave ID Map Example

Suppose you have two ASCII slave devices on port 1 assigned to slave IDs 3 and 5. The MGate will automatically create a virtual ID range for port 1, which you will need to modify. If slave IDs 3 and 5 are already in use by TCP slaves, the virtual ID range should be set to IDs that are not in use, such as 20 through 22. In that case, you would specify a slave ID offset of -17, since that is the difference between the virtual ID range and the actual slave IDs. The formula is as follows:

$$\text{(Real Slave ID)} - \text{(Virtual Slave ID)} = \text{(Slave ID Offset)}$$
$$3 - 20 = -17$$

With the slave ID map configured, a master that wants information from one of the ASCII slaves would address the request to slave ID 20 or 22. The MGate would identify that the request was addressed to a virtual slave ID in the slave ID map. The MGate would then forward the request to port 1, applying the -17 offset to obtain the actual ID of the desired device.

Priority Control

Priority control is designed for requests that are sent to Modbus RTU/ASCII slaves. Since Modbus RTU/ASCII slaves cannot handle multiple requests, the Modbus gateway must send each request individually and wait for the response before sending the next request. As requests stack up, the response time can suffer. This can cause problems for certain critical requests that require an immediate response.

With priority control, you can specify that certain requests are sent to the front of the queue for more immediate response times. Priority requests can be specified by master (IP address or serial port), TCP port, or command type (slave ID, function code, or data). When the Modbus gateway identifies a priority request, the request will immediately be placed at the front of the queue.
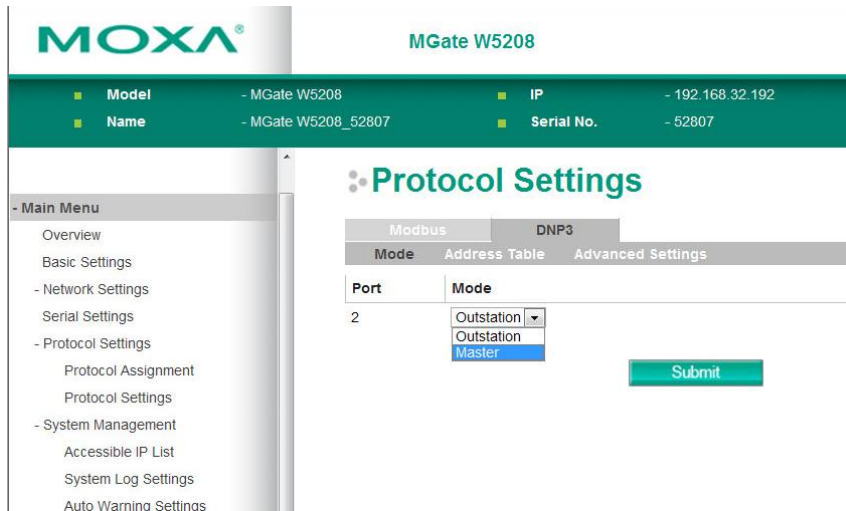
Parameter	Value	Default
Specified TCP port	Enable Disable	Disable
TCP Port	1024-65535	7502
Specified Master	Enable Disable	Disable
Add Master	Serial Port (RTU/ASCII Master) IP Address (TCP Master)	Serial Port (RTU/ASCII master)
Serial Port	1 - 2	null
IP Address	Max 40 characters	null
Specified request	Enable Disable	Disable
Slave ID	0 - 255	null
Function code	0 - 255	null
Data (RTU Format in Hex)	Max 254 bytes	

Advanced Settings

Parameter	Value	Default
Initial delay	0 ~ 30000 ms	0
Modbus TCP exception	Enable Disable	Disable
Modbus TCP listen port	0 ~ 65535	502
Modbus TCP response timeout	10 ~ 120000 ms	1000
Slave ID	1 ~ 255	247

DNP3 Settings

There are three fields can be chosen for DNP3 setting: **Mode**, **Address Table**, and **Advanced Setting**. The default DNP3 listen port is 20000, and user can change it to other ports. In general, the MGate passively accepts connections from DNP3 masters or outstations; meanwhile, the MGate also supports actively connections to DNP3 masters or outstations.

Mode

Parameter	Value	Default	Description
Mode	Outstation, Master	Outstation	Role of the DNP3 serial device.

Address Table

Address Table provides user to add the destination IP address and the DNP3 start/end address for the station to be communicated. When a DNP3 packet is received from network or serial side to the MGate, the MGate will route it to the defined destination according to the Address Table. If the destination is on serial side, the packet is sent to the corresponding serial port. If the destination is on network side, and the TCP connection to the destined station is already established, the DNP3 packet will be routed to that station. If the connection is not yet established, the MGate will establish a connection to the destined station and then send DNP3 packet to that station.

The MGate will automatically generate the setting of serial port in address table. Users have to modify the setting of serial port by one clicking on the current shown DNP3 serial column and click **Edit** for modification.

Parameter	Value	Default
Remote IP address	Max 40 characters	null
TCP Port	1 - 65535	20000
DNP3 address start	0 – 65519	0
DNP3 address end	0 - 65519	0
DNP3 address offset	-65519 ~ 65519	0

Advanced Settings

Parameter	Value	Default
Listen port	1 - 65535	20000

DI/DO

The MGate W5X08 is built-in with 1 digital input and 1 digital output. The I/O connection methods are listed as below.

<u>Digital Input (Source Type)</u>

Dry Contact level

ON State → Short to GND

OFF State → Open

Wet Contact level (COM to DI)

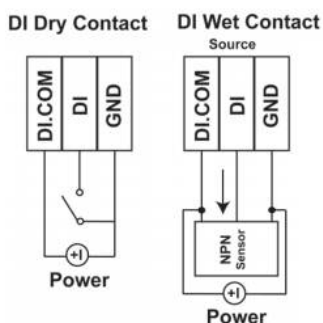ON State → +10 ~ 30VDC

OFF State → 0 ~ +3V

<u>Digital Output</u> (Sink Type)

Driver current: Max.200 mA per Channel.

On-state voltage: Max.30 VDC

The wiring diagram is as shown below.

Configuration

DI/DO can be monitored and controlled through Modbus command. The related Modbus parameters are listed below. Users can access the DI/DO through Modbus-based utility.

Slave ID	DI/DO	Modbus Address (Base 0)	Modbus Address (Base 1)	Data Size	Function Code
255	DI1	0x0000	0x0001	1 bit	01: Read coils
	DO1	0x0010	0x0011	1 bit	05: Write single coil 15: Write multiple coils

We use *Modbus Poll* shareware for demonstration.

Related settings.
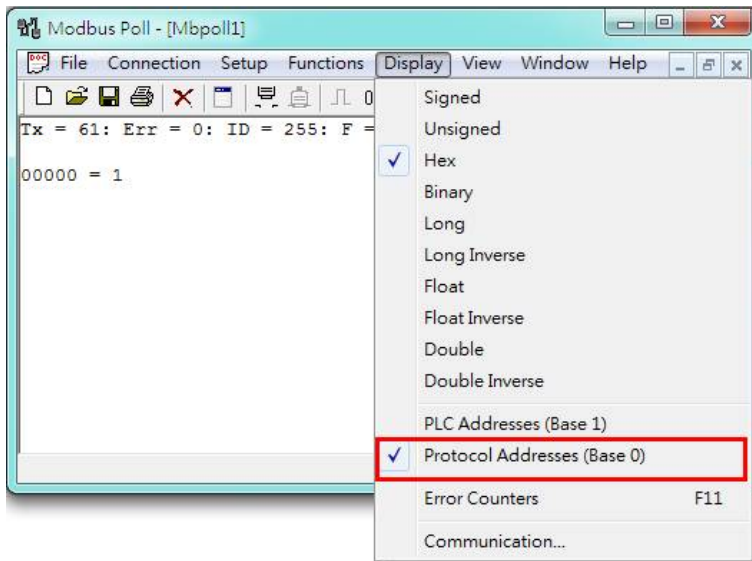
DI
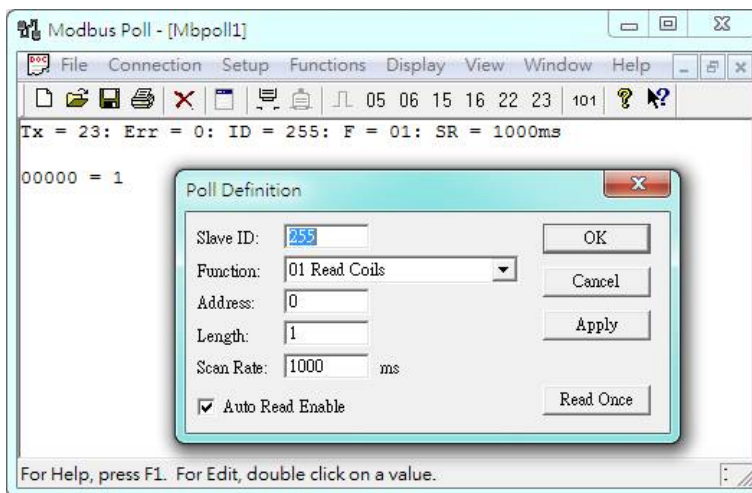
DO

Users can change the slave ID or check the status of current DI/DO values via web console.

Note that the latest version of MGate W5X08 will built-in with 2 DI and 2 DO.

LED Indicator

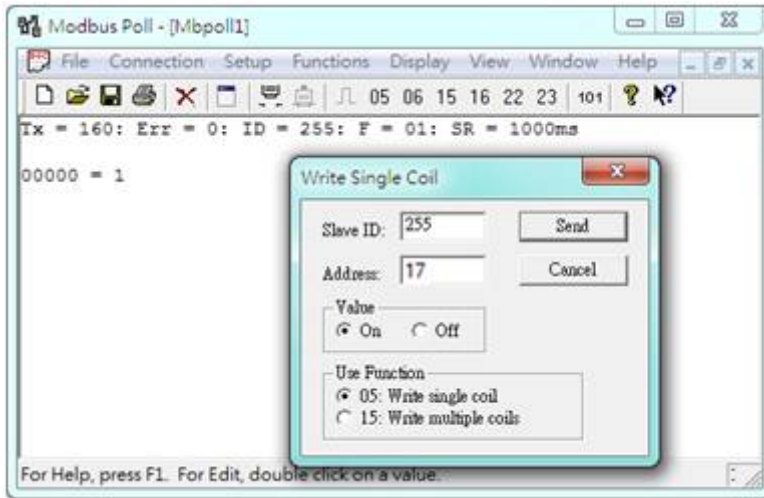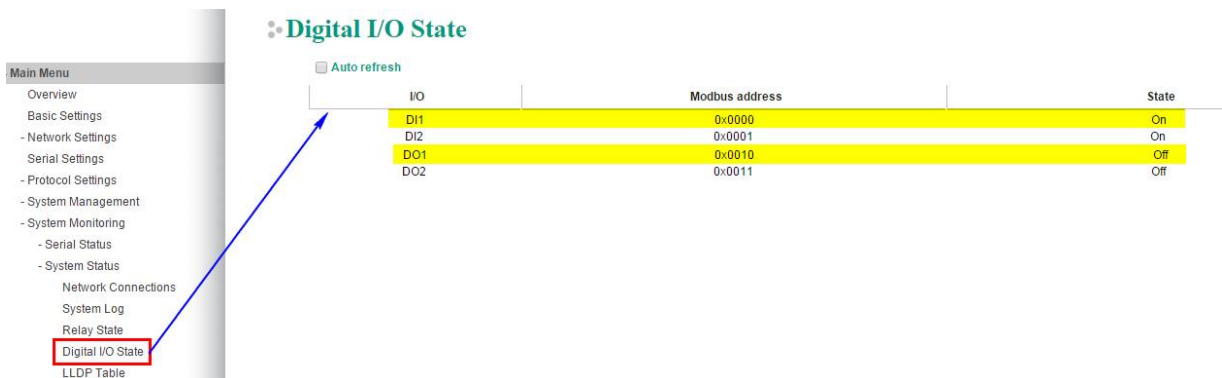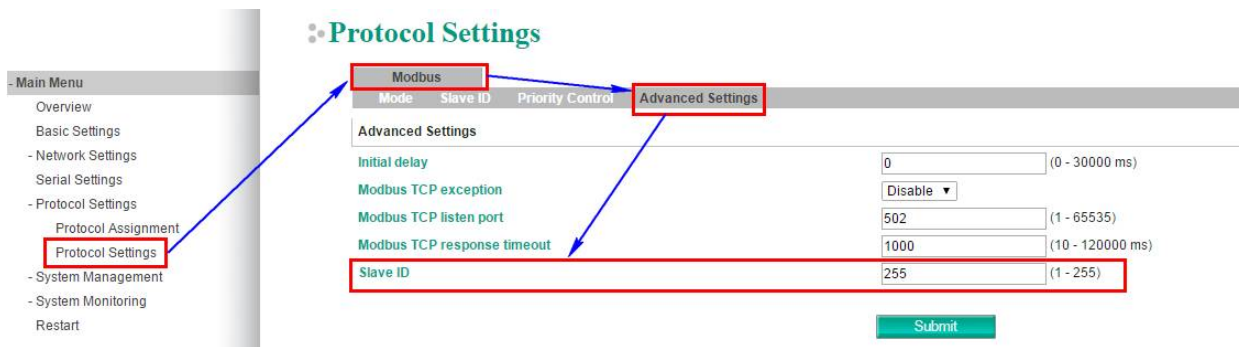| Type	Color	Meaning
PWR1/PWR2	Green	Power is being supplied to power input PWR1, PWR2.
	Off	Power is off, or power error condition exists.
Ready	Green	Steady On: Power is on and the gateway is functioning normally. Blinking: The gateway has been located by MGate Manager's Location function.
	Red	Steady On: Power is on and gateway is booting up. Blinking: Indicates an LAN IP conflict, or DHCP or BOOTP server did not respond properly.
	Off	System power is off
Ethernet Link	Green	100Mbps Ethernet connection
	Amber	10Mbps Ethernet connection
	Off	Ethernet cable is disconnected or has a short
WLAN	Green	Steady on: Wireless enabled Blinking: Indicates a WLAN IP conflict, or that the DHCP or BOOTP server did not respond properly
RF (signal strength)	Green	3 LED = signal strength reach between 66%~100% 2 LED = signal strength reach between 33%~66% 1 LED = signal strength reach between 0%~33%
P1/P2 (Serial signal)	Green	Serial port is transmitting data
	Amber	Serial port is receiving data
	Off	No data is communicating

Appendix

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.

CAUTION:

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

Labeling requirements

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

RF exposure warning

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

This radio transmitter FCCID: SLE-W5x08 has been approved by FCC to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	KINSUN	6602D03081	Dipole	1.21 dBi for 2.4 GHz 1.73 dBi for 5 GHz

Note: The antenna connector is Reverse SMA type.