Atop Technologies, Inc.

MB52XX Series
Modbus Gateway

User Manual

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We have checked the contents of this manual for agreement with the hardware and the software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual is reviewed regularly and any necessary corrections will be included in subsequent editions.
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1 Preface

1.1 *Purpose of the Manual*

This manual supports the user during the installation and configuring of the MB52XX Series Modbus Gateway. It explains the technical features available with the mentioned product. As such, it contains some advanced network management knowledge, instructions, examples, guidelines and general theories designed to help users manage this device and its corresponding software. A background in general theory is necessary when reading it. Please refer to the Glossary for technical terms and abbreviations (if any).

1.2 *Who Should Use This User Manual*

This manual is to be used by qualified network personnel or support technicians who are familiar with network operations. It might be useful for system programmers or network planners as well. This manual also provides helpful and handy information for first time users. For any related problems, please contact your local distributor. If they are unable to assist you, please redirect your inquiries to www.atoponline.com.

1.3 *Supported Platform*

This manual is designed for **MB52XX Series Modbus Gateway** and that series only**.**

1.4 *Manufacturers' FCC Declaration of Conformity Statement*

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.
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 an undesired operation.

Note: all the figures herein are intended for illustration purposes only. This software and certain features work only on certain Atop's devices.

---

2 Introduction

2.1 Overview

The MB52XX Modbus Gateway is an industrial network device in between Modbus over Serial Line devices and computer hosts running Modbus/TCP on Ethernet network. Figure 2.1 illustrates a possible network configuration of the MB52XX Series Modbus Gateway. Fully compliant with Modbus/TCP protocol, the Modbus gateway offers a convenient solution to connect existing devices or controllers running Modbus serial protocol (Modbus/ASCII or Modbus/RTU) to an Ethernet network. The MB52XX Series are standard Modbus gateways that convert packets between Modbus TCP and Modbus RTU/ASCII protocols.

The MB52XX Series supports 64 simultaneous TCP masters. Overall, 247 Servers are supported (TCP, COM and VCOM). Each RS-232/422/485 serial port can be individually configured for Modbus/RTU or Modbus/ASCII operation with different baud rate, allowing both types of networks to be fully integrated with Modbus/TCP within one package.

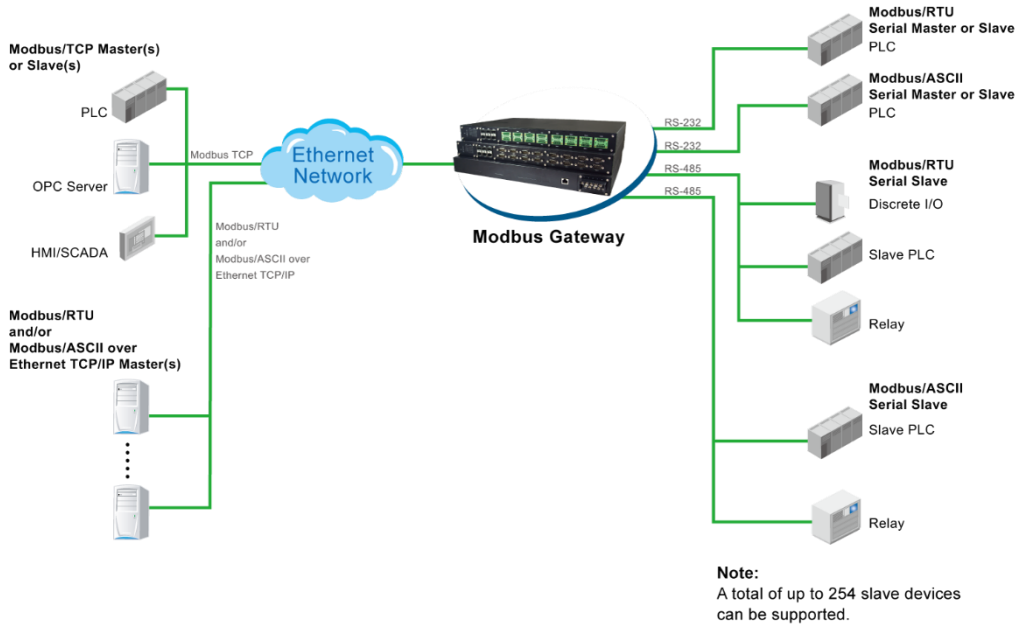


Figure 2.1 Possible Network Configuration of MB52XX Series Modbus Gateway

Figure 2.2 shows three different use cases of the MB52XX Series Modbus Gateway:

1) the interface between Modbus RTU/ASCII serial host to Modbus RTU/ASCII serial devices
2) the interface between Modbus/TCP over Ethernet network to Modbus RTU/ASCII serial devices
3) the interface between Modbus RTU/ASCII host connected through Serial IP over Ethernet (virtual communication port (VCOM)) to Modbus RTU/ASCII serial devices.

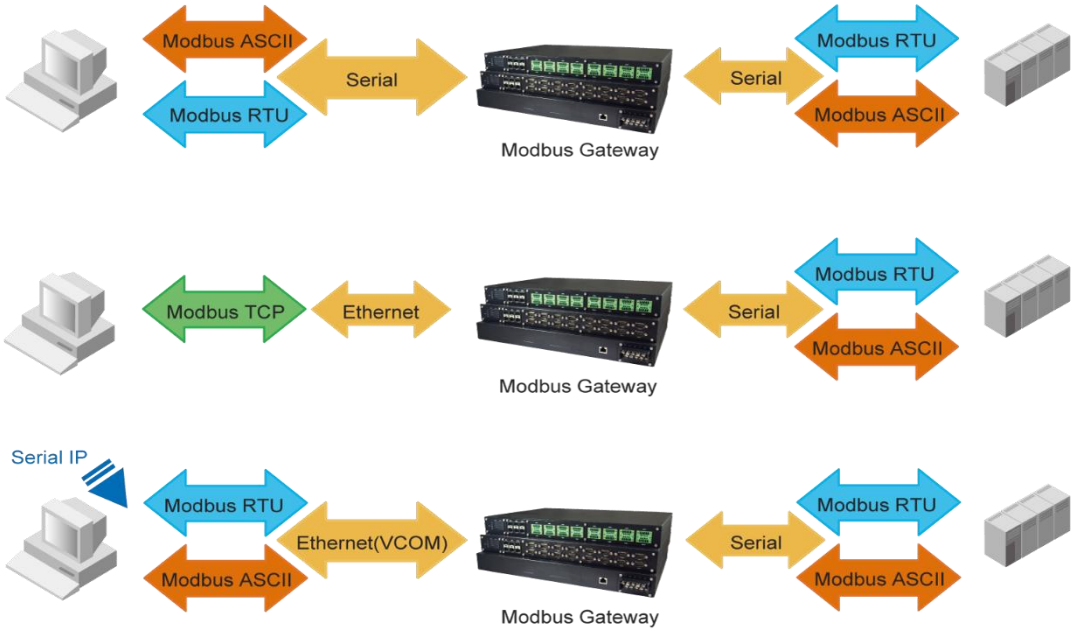


Figure 2.2 Use Cases of the MB52XX Series Modbus Gateway

Caution

Beginning from here, extreme caution must be exercised.

Never install or work with electricity or cabling during periods of lightning activity. Never connect or disconnect power when hazardous gases are present.

Warning: HOT!

WARNING: Disconnect the power and allow unit to cool for 5 minutes before touching.

3 Getting Started

3.1 *Packing List*

Inside the purchased package, you will find the following items.

Table 3.1 Packing List

Item	Quantity	Description
MB52XX	1	Industrial Serial Device Server
Mounting Kit	1	Wall-mounting screws (DIN-rail kit is optional)
Terminal Block		Power Supply: • TB3 x 1: 3-pin 5.08mm Terminal Block Serial ports: Terminal block is included only on –TB or –SiS models • TB5 x 1: 5-pin 5.08mm lockable Terminal Block (MB5201) • TB5 x 2: 5-pin 5.08mm lockable Terminal Block (MB5202)
Documentation	1	Hardware Installation Guide (Warranty card is included)

Note:

- Notify your sales representative immediately if any of the above items is missing or damaged upon delivery.
- Atop's utility software Device View© and Serial Manager© are obsolete and replaced by Device Management Utility®.

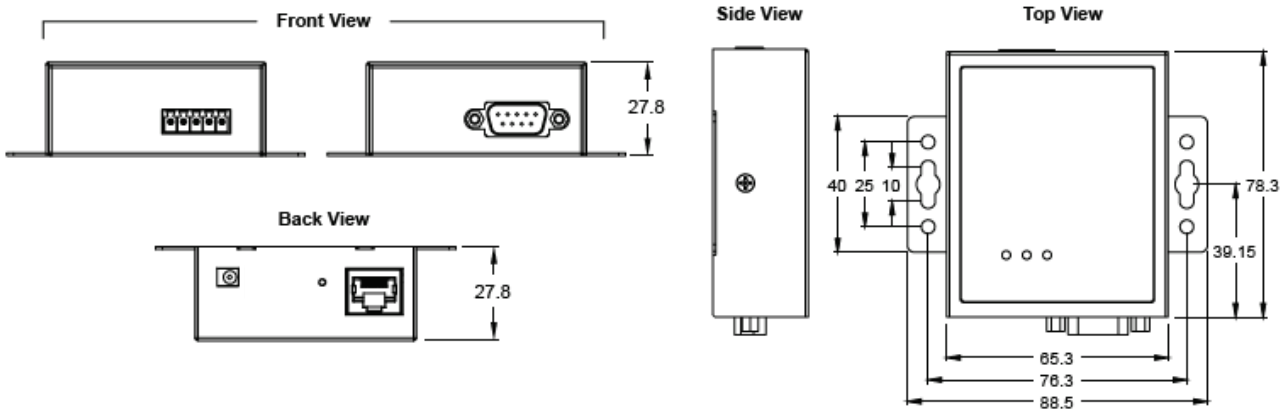
Table 3.2 Description of Optional Accessories

Optional Accessories		
Model Name	**Part Number**	**Description**
DK-25	30200000000022G	Plastic DIN Rail Kit
ADP-DB9(F)-TB5	59906231G	Female DB9 to Female 3.81mm, a TB5 Converter
UN315-1212(US-Y)	50500151120003G	Y-Type power adaptor, 100~240VAC input, 1.25A @ 12VDC output, US plug, LV6
UNE315-1212(EU-Y)	50500151120013G	Y-Type power adaptor, 100~240VAC input, 1.25A @ 12VDC output, EU plug, LV6
UV305-0510(US-DC)	50500051500003G	DC jack (3.5/1.35/7.5 mm) power adapter, 100~240VAC input, 1.0A@ 5VDC output, US plug, LV6
UVE305-0510(EU-DC)	50500051500013G	DC jack (3.5/1.35/7.5 mm) power adapter, 100~240VAC input, 1.0A@ 5VDC output, EU plug, LV6
UVE305-0510(UK-DC)	50500051500023G	DC jack (3.5/1.35/7.5 mm) power adapter, 100~240VAC input, 1.0A@ 5VDC output, UK plug, LV6

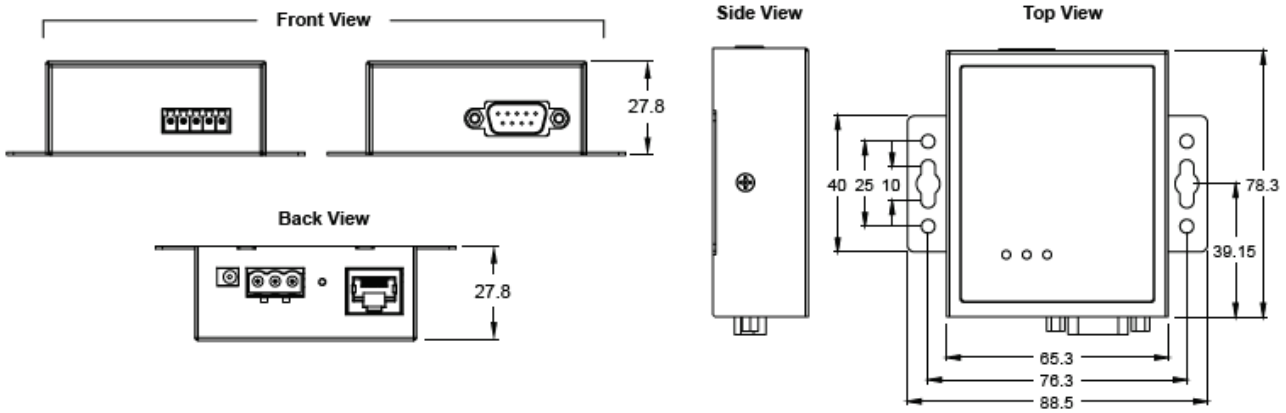
3.2 *Appearance, Front and Rear Panels*

The following figures show particular MB520X series device's front, back, side and top panels.

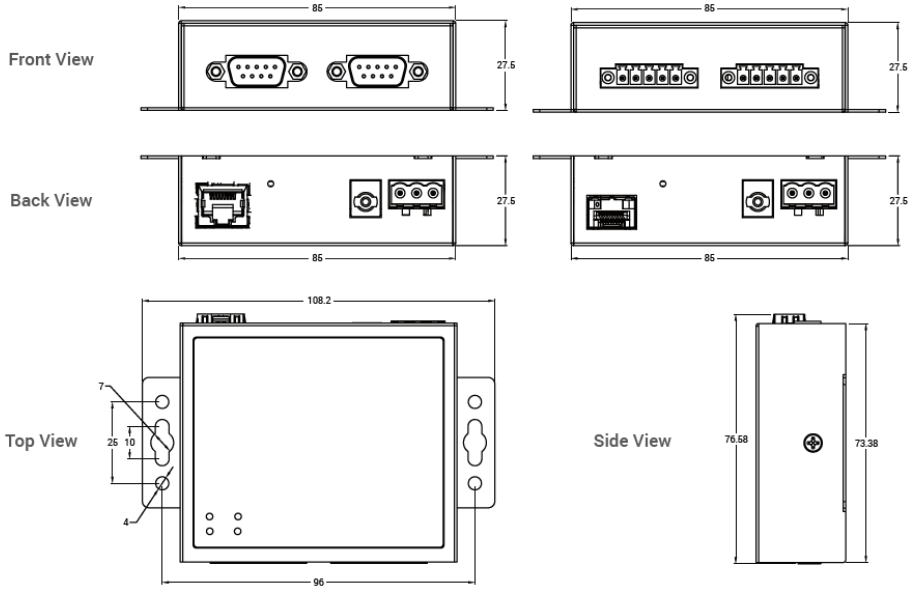
MB5201C – Entry-Level Semi-Industrial Modbus Gateway



MB5201 – Industrial 1-Port Modbus Gateway



MB5202 – Industrial 2-Port Modbus Gateway



3.3 *First Time Installation*

Before installing the device, please follow strictly all safety procedures described in the Hardware installation guide supplied inside the product. Atop will not be liable for any damages to property or personal injuries resulting from the installation or overall use of the device. Do not attempt to manipulate the product in any way if unsure of the steps described there. In such cases, please contact your dealer immediately.

Specific installation instructions are not provided in this manual since they may differ considerably based on the hardware purchased.

3.4 *Factory Default Settings*

3.4.1 *Network Default Settings*

The MB520X Industrial Modbus Gateway is equipped with one LAN interface with one default IP address. Its default network parameters are listed in Table 3.3.

Table 3.3 Network Default Setting

Interface	Device IP	Subnet Mask	Gateway IP	DNS
LAN1	10.0.50.100	255.255.0.0	10.0.0.254	0.0.0.0

3.4.2 *Modbus Default Settings*

The MB52XX Modbus Gateway comes with the following default Modbus settings.

Table 3.4 Modbus Default Settings

Parameter	Default Values
Modbus Master	
TCP Settings	TCP Master Mode: TCP Master Port: 502
Modbus Slave	
• MB5201 • MB5202	Mode: RTU Slave Serial Configuration: RS-232, 9600 bps, 8 data bits, No parity bit, 1 stop bit, No Flow Control, Buffer Disable

Other default settings are shown in the following table.

Table 3.5 Other Default Settings

Parameter	Default Values
Security	
User Name	admin
Password	default
SNMP	
SysName of SNMP	atop
SysLocation of SNMP	Location
SysContact of SNMP	Contact
SNMP	Disable (Unchecked)
Read Community	Public
Write Community	Private
SNMP Trap Server	0.0.0.0

Note: Press the “Reset” button on the front panel for 5 seconds (see Section 4.9.8 and Section 4.10), to restore the MB52XX Series Modbus Gateway to the factory default settings.

4 Configuration and Setup

It is strongly recommended for the user to set the Network Parameters through **Device Management Utility©** first. Other device-specific configurations can later be carried out via Atop's user-friendly Web-Interface.

4.1 *Configuration of Network Parameters through Device Management Utility*

First, please install Atop's configuration utility program called **Device Management Utility®** that comes with the Product CD or can be downloaded from or website www.atoponline.com. For more information on how to install **Device Management Utility®**, please refer to the manual that comes in the Product CD. After you start **Device Management Utility®**, if the Modbus Gateway is already connected to the same subnet as your PC, the device can be accessed via broadcast packets. **Device Management Utility®** will automatically detect your Modbus Gateway and list it on **Device Management Utility®**'s window. Alternatively, if you did not see your Modbus Gateway on your network, press "**Rescan**" icon, a list of devices, including your Modbus Gateway device currently connected to the network will be shown in the window of **Device Management Utility®** as shown in Figure 4.1.

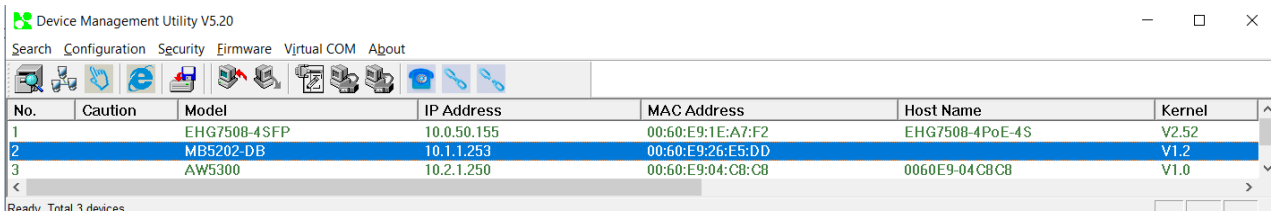


Figure 4.1 List of Device in Device Management Utility

Note: This figure is for illustration purpose only. Actual values/settings may vary between devices.
Sometime the Modbus Gateway device might not be in the same subnet as your PC; therefore, you will have to use Atop's utility to locate it in your virtual environment. To configure each device, first click to select the desired Modbus Gateway device (default IP: 10.0.50.100) in the list of **Device Management Utility©**, and then click "**Configuration →Network**…" (or Ctrl+N) menu on **Device Management Utility©** as shown in Figure 4.2 or click on the second icon called **Network** on the menu icon bar, and a pop-up window will appear as shown in Figure 4.3.

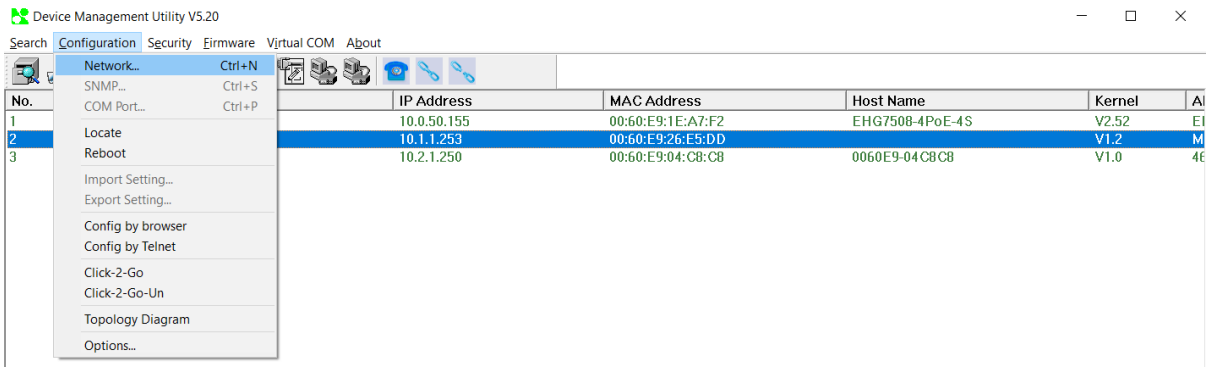


Figure 4.2 Pull-down Menu of Configuration and Network…

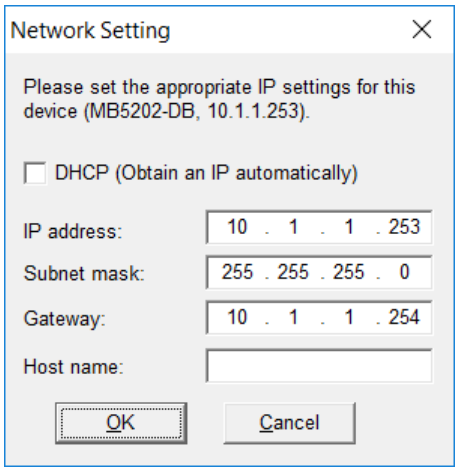


Figure 4.3 Pop-up Window of Network Setting

You may proceed then to change the IP address to avoid any IP address conflict with other hosts on your LAN or to connect the device to your existing LAN as shown in Figure 4.3. The system will prompt you for a credential to authorize the changes. It will ask you for the **Username** and the **Password**. The default username is "**admin**", while the default password "**default**". After clicking on the **Authorize** button, a notification window will pop-up as shown in Figure 4.4 and some device may be restarted. After the device is restarted (for some model), it will beep twice to indicate that the unit is running normally. Then, the Modbus Gateway can be found on a new IP address. It may be listed automatically by the **Device Management Utility©** or it can be found by clicking on the "**Rescan"** icon.

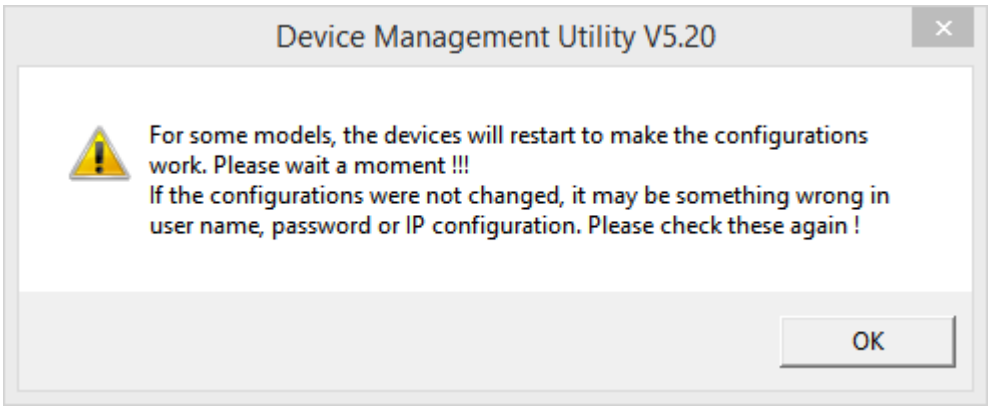


Figure 4.4 Pop-up Notification Window after Authorization

Please consult your system administrator if you do not know your network's subnet mask and gateway address.

4.2 *Configuring through Web Interface*

Every MB52XX Modbus Gateway device is equipped with a built-in web server in the firmware. Therefore, the device can be accessed by using a web browser for configuring by entering the device's IP address (default IP address is 10.0.50.100) in the URL field of your web browser. Figure 4.5 illustrates the overview page of the web interface. Please see Section 0 for default values.

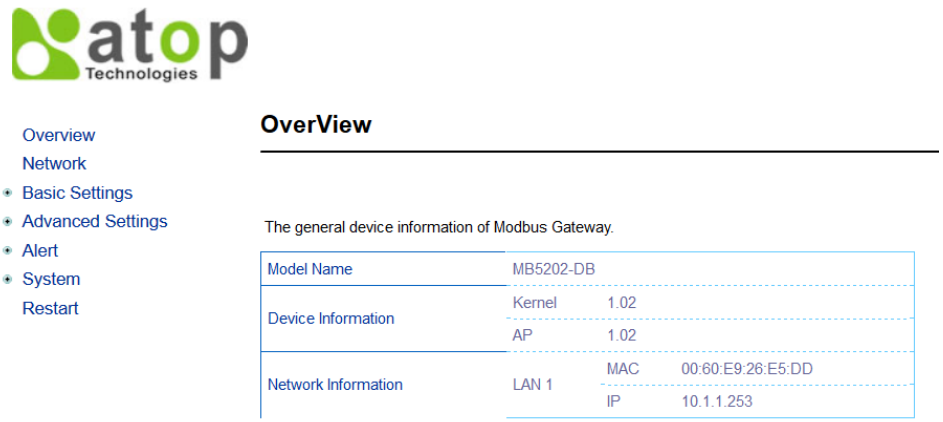


Figure 4.5 Overview Web Page of Modbus Gateway

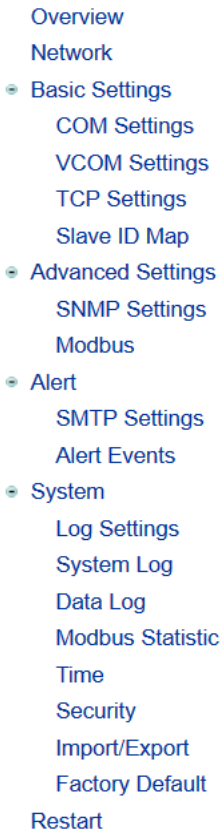


Figure 4.6 Map of Configuring Web Page on Modbus Gateway

This approach for configuring your device is the most user-friendly. It is the most recommended and the most common method used for MB52XX Series Modbus Gateway. Please go to its corresponding section for a detailed explanation.

4.3 *Configuring Automatic IP Assignment with DHCP*

A DHCP server can automatically assign IP addresses, Subnet Mask and Network Gateway interface. You can simply check the **"DHCP (Obtain an IP Automatically)"** checkbox in the Network Setting dialog as shown in Figure 4.3 using Atop's **Device Management Utility©** and then restart the device. Once restarted, the IP address will be configured automatically.

4.4 *Web Overview*

In this section, current information on the device's status and settings will be displayed. An example of MB5202-TB overview page is shown in Figure 4.7.

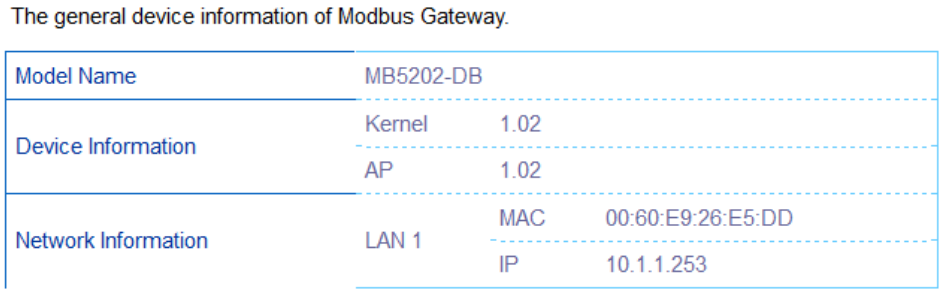


Figure 4.7 Overview Web Page

In detail, the following information is given:

- **Model Name**, as its name implies, shows the device's model
- **Device Information** displays information on the Kernel version as well as the AP version of your Modbus Gateway device.
- **Network Information** shows MAC and IP addresses for the LAN port.

4.5 *Network Configuration*

In this section, **IP address**, **Subnet Mask**, **Default (Network) Gateway**, **Domain Name System** (**DNS**) and overall connectivity settings of Modbus Gateway device can be accessed as shown in Figure 4.8. For the LAN Interface Settings, you can check the corresponding **DHCP** box to obtain an **IP address**, **Subnet Mask**, and **Default (Network) Gateway** automatically.

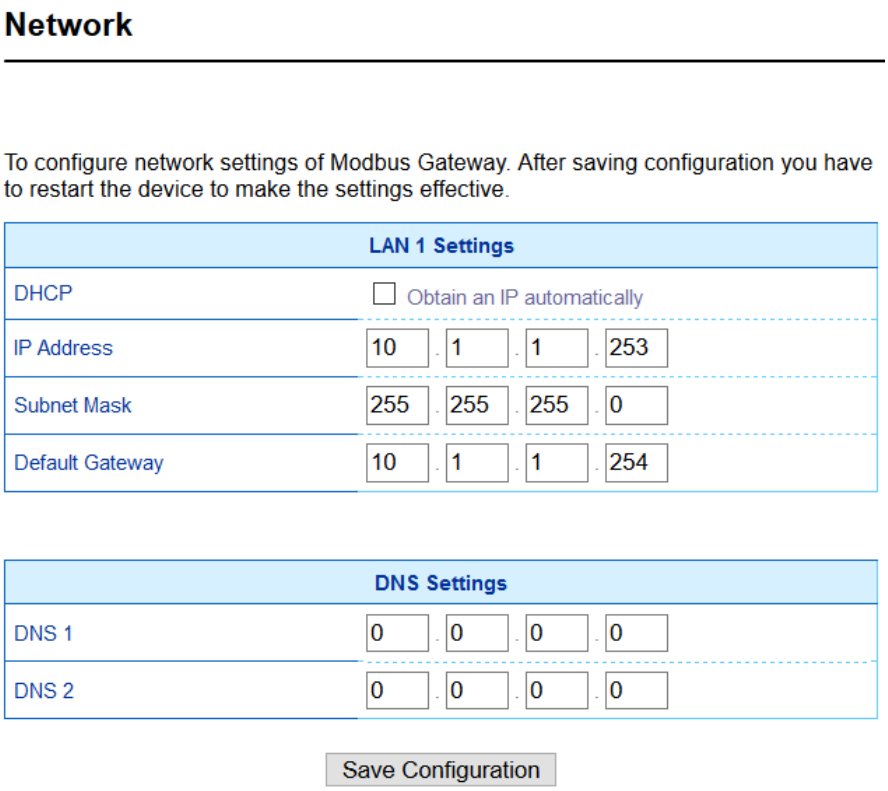


Figure 4.8 Network Web Page

At the lowest box in Figure 4.8, you will have the **DNS Settings** box which allows you to set the **IP addresses** of Domain Name Server 1 (**DNS 1**) and Domain Name Server 2 (**DNS 2**) for redundancy. If the device is connected to the Internet and should connect to other servers over the Internet to get some services such as Network Time Protocol (NTP) server, the user will need to configure the DNS server in order to be able to resolve the host name of the NTP server. Please consult your network administrator or internet service provider (ISP) to obtain local DNS's IP addresses.

4.6 *Basic Settings*

In this section, the term **"Modbus Gateway device"** will be used to refer to the **MB52XX series** and the term **"serial device"** to refer to any Modbus device that connect to Modbus Gateway via COM, VCOM, or TCP connections. In any Modbus network, there are two types of Modbus devices: Modbus Master and Modbus Slave. The Modbus Master will send a request message to a Modbus Slave. Then, the Modbus Slave will respond to the Modbus Master's request. A Modbus device (serial device) that is connected to the MB52XX series Modbus Gateway device will either assume a role of Modbus Master or Modbus Slave. The basic settings in this section will address how to configure the role of the serial device in your Modbus Gateway device and its serial communication parameters. The term **"Operation Mode"** will be used to refer to the combination of role (Master or Slave) and the message or data transfer types (RTU/ASCII/TCP) of the Modbus protocol used by the serial device.

4.6.1 *COM Settings*

This section shows how to set up the physical ports of the Modbus Gateway device (COM ports or serial ports that serial devices are connected to). The available number of COM ports may vary according to the chosen Modbus Gateway model. Figure 4.9 shows the COM Settings web page in which COM1 port is shown with its **Operation Mode** under **Modbus Setting** and **Serial Configuration** settings. These settings will configure the role of the serial device through the **Operation Mode** and the serial communication parameters of that serial device through the **Serial Configuration** settings.

Figure 4.9 COM Settings Web Page

4.6.2 *Operation Mode*

To set the **Operation Mode** of the serial device that is connected to the Modbus Gateway through a COM port, use the pull-down menu to select among the following modes under **Modbus Setting**.

- **RTU Slave:** The serial device is working as a Modbus Slave node: the serial device will wait, accept request from, and response to its Modbus Master node. Data transfer is done in RTU format.
- **RTU Master:** The serial device is working as a Modbus Master node: the serial device will issue commands to or query Modbus slave nodes. Data transfer is done in RTU format.
- **ASCII Slave:** The serial device is working as a Modbus Slave node: the serial device will wait, accept request from, and response to its Modbus Master node. Data transfer is done in ASCII format.
- **ASCII Master:** The serial device is working as a Modbus Master node: the serial device will issue commands to or query Modbus Slave nodes. Data transfer is done in ASCII format.

4.6.3 *Serial Settings*

This section summarizes the options of serial communication parameters used between the serial device and the Modbus Gateway device over the selected COM port.

- RS-232/RS-422/RS-485 (2-wire) Software Selectable
- Baud-rate: 1200 bps ~ 921600 bps Software Selectable
- Parity: None, Odd, Even, Mark, or Space
- Data Bits: 7 or 8
- Stop Bits: 1 or 2
- Flow Control: None, Software Xon/Xoff, Hardware RTS/CTS
- Receiver Resistor: On or Off

Apply to all Serial Ports (check box**):** The settings can be chosen to apply to all serial ports if needed by checking the last checkbox on the options.

After finish the **COM Settings** configuration, click the **Save Configuration** button to save all changes that have been made. A **Save Successfully** message will show up as shown in Figure 4.10 and after a short period of time the web browser will be redirected back to **COM Settings** page (Figure 4.9).

Figure 4.10 Save Successfully Message

4.6.4 *VCOM Settings*

These settings will generate a virtual Serial (VCOM) port within the Modbus Gateway device based on a TCP network connection. VCOM is a **TCP connection** which is encoded in an Atop Technologies' exclusive private protocol. MB52XX series Modbus Gateway can only run as a TCP server which will be waiting for a connection request from a TCP client (a serial device).

Figure 4.11 shows the page of VCOM Settings in which the VCOM number 1 is set as an RTU Slave. This means that a device that is connected to this VCOM port on the Modbus Gateway will be a Modbus Slave node and communicate with a Modbus Master node using Modbus/RTU protocol. It is an interface concept that allows Modbus Slave devices to be connected via TCP connection by using VCOM from a PC (for example). If a VCOM

setting is needed, proceed to select **Basic Settings** → **VCOM Settings** and check the VCOM's **"Enable"** box to allow configuration on the selected TCP's port of the Modbus Gateway device.

- **VCOM Port:** Using a TCP connection, the Modbus Gateway device (TCP server) listens to any TCP Clients (VCOM Clients) connecting (using Serial-IP) to its ports. The VCOM Port or the port of the TCP connection can be configured as a number between 1 and 65535. The default VCOM Port number is 4660.

Note: For Windows operating system, a Serial/IP software is required to use this feature. A restrictive **Serial/IP Redirector** software is installed along with Atop's **Device Management Utility®**. The user can access the Serial/IP software through **Virtual COM → Serial/IP Tools** menu.

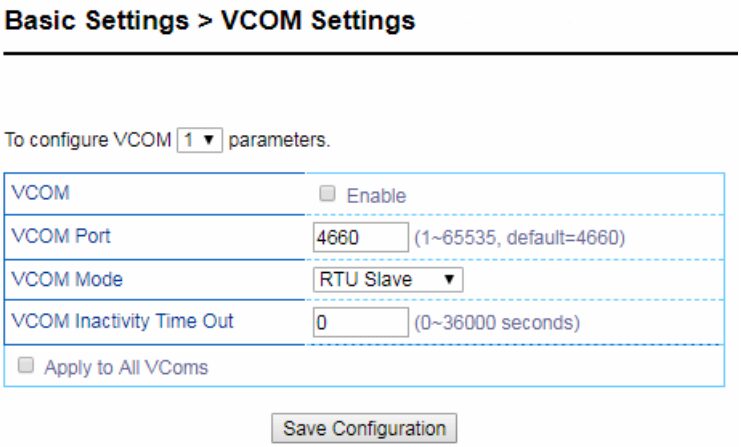


Figure 4.11 VCOM Settings Web Page

- **VCOM Mode:** This setting is a pull-down menu in which the user can select the **Operation Mode** of the devices connected through this VCOM port as shown in Figure 4.12. Its definition is the same to the one given in Section 4.6.2. Here the user can choose whether device conforms to a RTU or an ASCII message format and can select whether the device is either Modbus Slave node or Modbus Master Node. Figure 4.11 depicts the **RTU Slave** mode. So, the devices connected through VCOM 1 port will assume Modbus Slave role and communicate using Modbus/RTU protocol. If a Master mode (either RTU or ASCII) is selected, the options for the Master mode will be the same as the Slave mode. The only difference is the device's function.

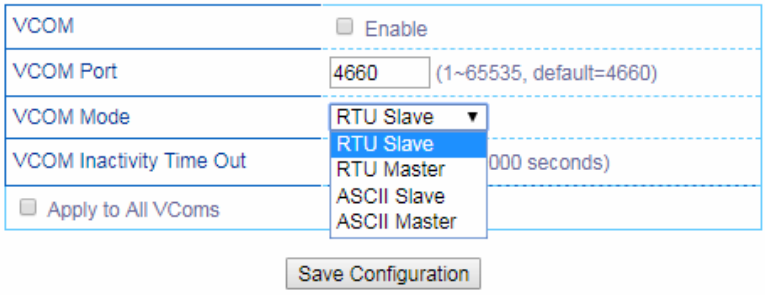


Figure 4.12 Pull-down Menu of VCOM Mode

- **VCOM inactivity Time Out:** This is a period of time allowed between actions. This setting can be set with a maximum of 600 minutes (36000 seconds) or 10 hours. If there is no activity within this period, the VCOM connection (TCP connection) will be automatically closed by the Modbus Gateway.

These settings can be applied to All VCOMs if needed by checking the last checkbox on the options. Figure 4.13 highlights the checkbox for applying the settings to all VCOMs.

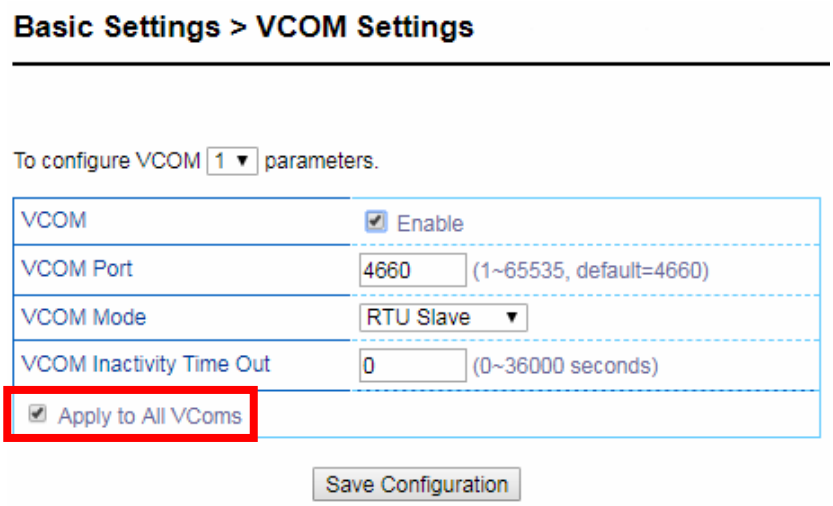


Figure 4.13 Check Box for Applying the Settings to All VCOMSs

After finishing configuring the **VCOM Settings**, click on **Save Configuration** button to save all changes that have been made. A **Save Successfully** message will show up, then the web browser will be redirected back to the **VCOM Settings** page.

4.6.5 *TCP Settings*

A device using Modbus/TCP connection, which communicates over the internet, can be set in this section. If a Modbus/TCP connection is needed, navigate to **Basic Settings → TCP Settings**, then choose whether or not to enable TCP by checking on the "**Enable**" check box. Figure 4.14 shows the Modbus TCP Settings page in which a device connected to this Modbus Gateway device is chosen to be run in **TCP Slave Operation Mode**. The device will take the Modbus Slave role and communicate using Modbus/TCP protocol.

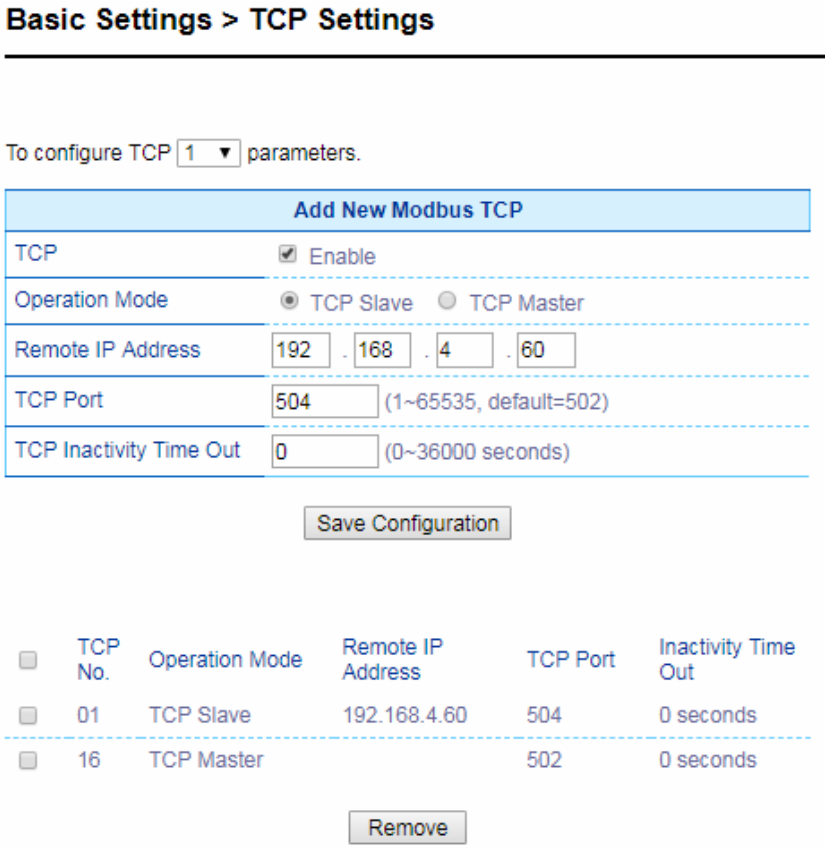


Figure 4.14 Modbus TCP Settings Web Page with TCP Slave Mode

- **Operation Mode:** There are two radio buttons in this setting: TCP Slave and TCP Master. When running on TCP Slave mode (the TCP Slave radio button is checked) as shown in Figure 4.14, the device will wait to receive Modbus requests from a Modbus Master. The data transmission is done under a Modbus/TCP protocol format. This means that the device will operate as a TCP Server that opens its TCP port to accept connections. The TCP Master option will be described at the end of this section.
- **Remote IP Address:** This setting shows the IP address of the device which is a Modbus slave node. This address refers to the IP address that belongs to the device that is going to be controlled from the MB52XX Series Modbus Gateway device. This device can also be considered as a TCP server of whom it is needed to know its IP address. This option will disappear when the operation mode as TCP Master is selected, because in that mode the device will be running as a TCP Client which does not require to publish its IP address.
- **TCP Port:** This setting shows the TCP port number of the device (or Modbus Slave node in Figure 4.14) which can be a number in between 1 and 65535. The default port number is 502.
- **TCP inactivity Time Out:** A time out period, which is the maximum period of time allowed between actions, can be set as well. This setting has a maximum duration of 600 minutes (36000 seconds) or 10 hours. If no activity has occurred within this period, the Modbus/TCP connection will be automatically terminated by the Modbus Gateway.

At the end of the **TCP Settings** page shown in Figure 4.14, a list of all configured Modbus/TCP connections with TCP No., Operation Mode, Remote IP Address, TCP Port and TCP Inactivity Time Out information will appear. The user will have the ability to remove any Modbus/TCP connection settings by checking on box in front of the record of the desired TCP settings and clicking on the **Remove** button. To remove all TCP connections, simply check the box on the header row of the list to select all items and click remove.

Alternatively, the Modbus/TCP connection can be configured to run in **TCP Master Operation Mode**. This means that the device will be a Modbus Master node and communicate using Modbus/TCP protocol. Figure 4.15 shows the TCP Master Settings. When **TCP Master Operation Mode** is selected, the **Remote IP address** setting will disappear because the device will be running as a TCP Client. Next, the **TCP Port** is the port through which the signal is going to be relayed upon by the Modbus Gateway. Once again, there is a **TCP Inactivity Time Out** with the same maximum value of 10 hours as stated in the previous mode.

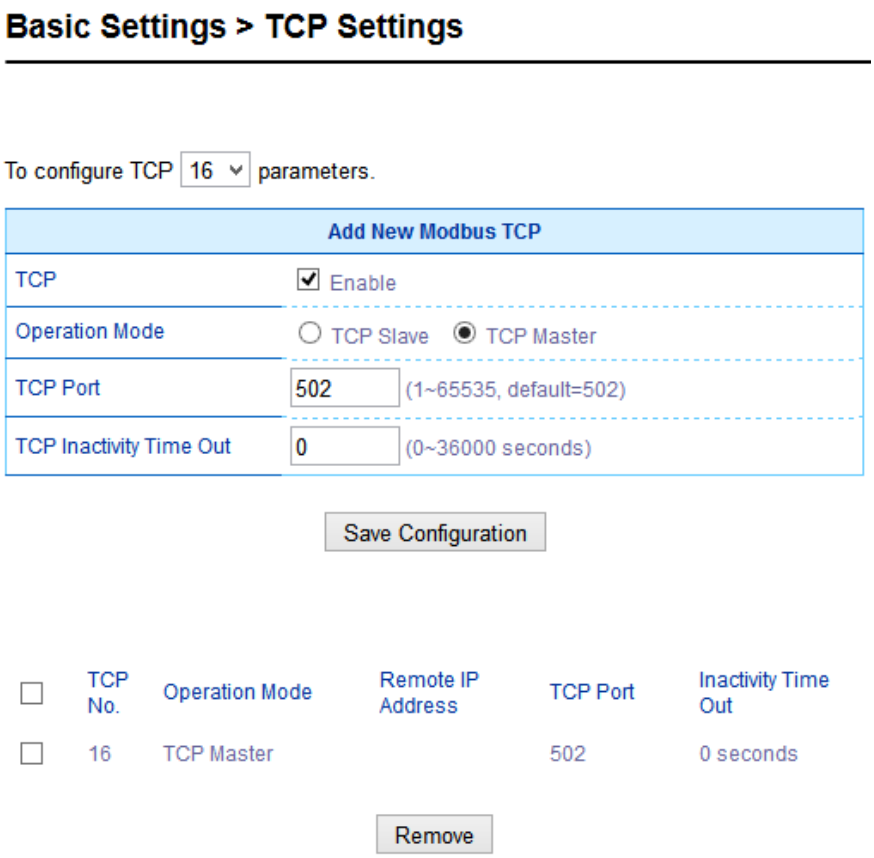


Figure 4.15 Modbus TCP Setting Page with TCP Master Operation Mode Selection

After **TCP Settings** configuration is finished, click on **Save Configuration** button to save all changes that have been made. A **Save Successfully** message will show up, and the web browser will be redirected back to the **TCP Settings** page**.**

4.6.6 *Slave ID Map*

The system uses the Modbus ID to route Modbus' request commands from a Modbus master node to the related Modbus Slave node. It is important to define ID mapping for each Modbus Slave node. For every Modbus Slave node, there should be a correct Virtual ID (Alias ID) and Real ID defined in the mapping. Figure 4.16 shows the Slave ID Map settings. To configure Slave 2's parameters, check the **Enable** box to enable Slave. Then, select the corresponding Slave interface.

- **Slave Interface:** When a port is set to Modbus slave mode, a slave interface will be created. Select a radio button of a port number behind the **Slave Interface,** which can be any one of the listed **COM/VCOM/TCP ports**.
- **Slave ID Setting Mode**: Next, select the mapping between real slave ID and Virtual ID to modify the slave ID setting as needed.
    - **Slave ID Virtual** maps a virtual ID to a real ID by the **Slave ID Count**. Figure 4.16 depicts Slave ID settings of COM02 to have real slave ID from 1 to 16 mapped from virtual ID 17 to 32.
        - **Slave ID Virtual** refers to a Virtual ID for the reading Master node.
        - **Slave ID Real** is the starting real ID within this interface (COM02 in Figure 4.16).
        - **Slave ID Count** is the number of slave devices in this interface that are mapped**.**

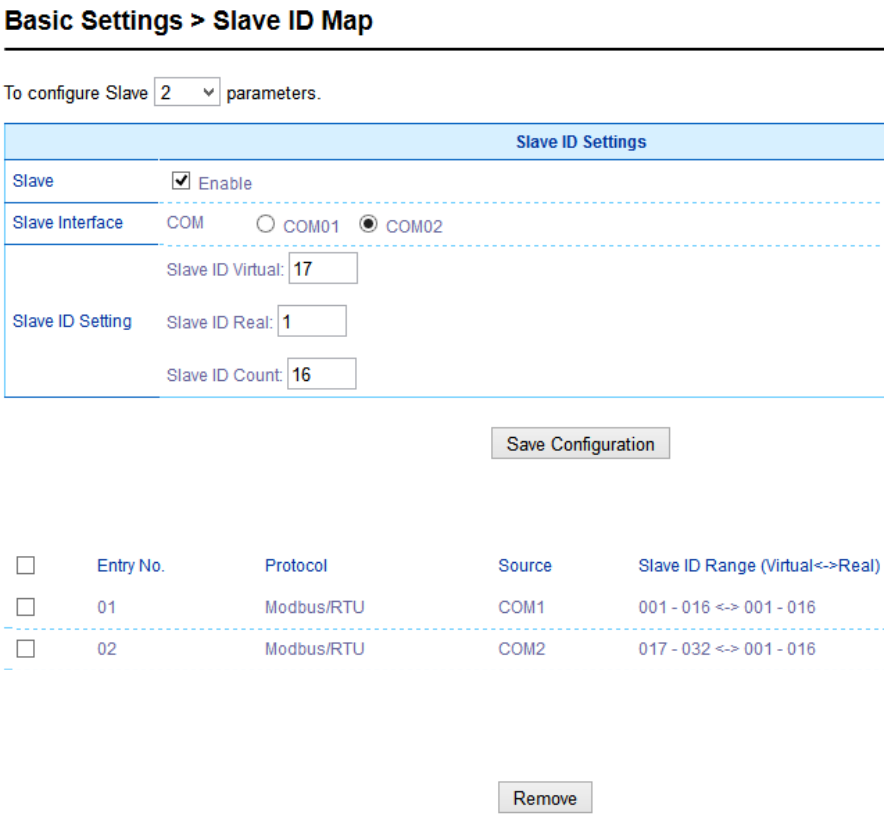
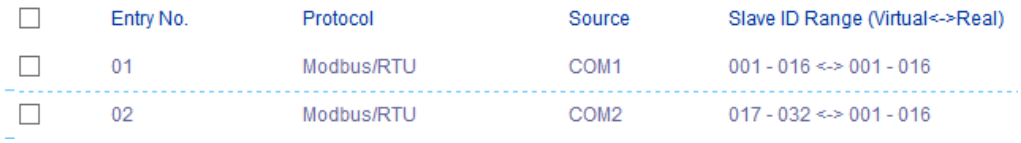


Figure 4.16 Slave ID Map Page with Slave ID Setting in Alias Mode

Note: Master and Slave IDs can be set on COM, VCOM, and TCP. However, COM works only with serial ports while TCP and VCOM operate via Ethernet ports.

After finishing configuring the **Slave ID Settings**, click the **Save Configuration** button to save all changes that have been made. A **Save Successfully** message will show up, then the web browser will be redirected back to the **Slave ID Settings** page**.**

Below the **Slave ID Settings** box, there is a list of mapping entries as shown in Figure 4.17 in which each line will summarize an **Entry No.**, a Modbus **Protocol**, a **Source**, a Slave ID Setting **Mode**, and the **Slave ID Range (Virtual <-> Real)**. Check the box in front of each entry to select that entry. Then, click **Remove** button to remove that particular entry from the **Slave ID Map**. To remove all entries, check on the box in front of the header line and click **Remove** button.



	Entry No.	Protocol	Source	Slave ID Range (Virtual<->Real)
☐	01	Modbus/RTU	COM1	001 - 016 <-> 001 - 016
☐	02	Modbus/RTU	COM2	017 - 032 <-> 001 - 016

Figure 4.17 Slave ID Map Web Page with Slave ID Setting in in Offset Mode

4.7 *Advanced Settings*

4.7.1 *SNMP Settings*

SNMP (Simple Network Management Protocol) Settings determine whether the device settings can be viewed with a standard SNMP software. By default, it is disabled.
Figure 4.19 shows the **SNMP Settings** page with SNMP disabled. The first group of options on this web page is called **Basic Data Objects**:

- **System Contact** is the device administrator's contact information. The default value is "contact".
- **System Name,** which is by default, is the MAC address of the Modbus Gateway. The default value is "atop".
- **System Location** is the device's physical location. The default value is "location".

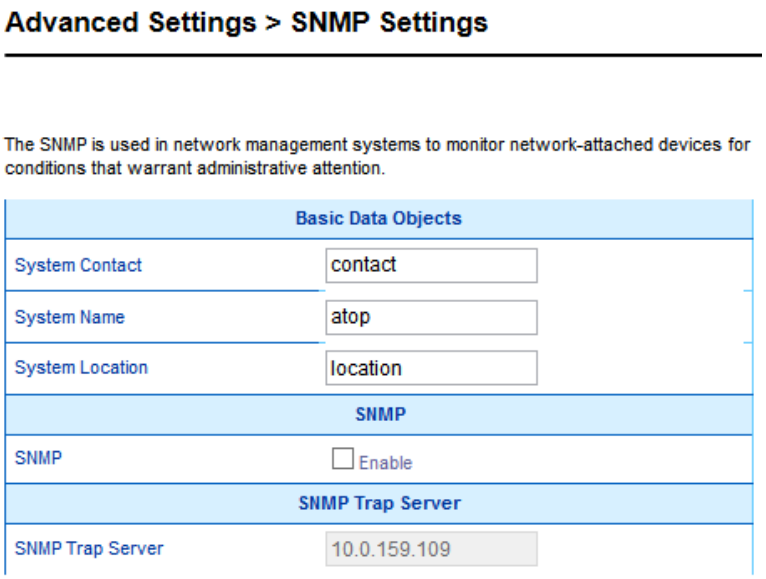


Figure 4.18 SNMP Settings Web Page with SNMP disabled

The second group of options is called **SNMP:**

- **SNMP** is followed by a "**Enable**" check box in which to enable the SNMP feature on the Modbus Gateway. If this box is not checked, it means that SNMP is disabled. Then, the rest of the options will be disappeared as shown in Figure 4.18. If the SNMP option is enabled, there can be three different views for SNMP options as shown in
- Figure 4.19, Figure 4.20, and Figure 4.21.
- **SNMP Version** is a drop-down box which allows the user to choose version of supported SNMP protocol. This can be **v1/v2c** or **v1/v2c/v3** or **Only v3**. Note that if this option is set as v1/v2c/v3, the SNMP options will be shown as in
- Figure 4.19.

    - SNMP v1 and v2c support simple community string based authentication protocol for their security mechanism. If this option is selected as v1/v2c, the SNMP options will be shown as in Figure 4.20.
    - SNMP v3 is improved with additional authentication and cryptography security. If this option is selected as Only v3, the SNMP options will be shown as in Figure 4.21.

- **Read Community** is the field that you can specify the **SNMP Read Community String** which is a user ID or plaintext password string for simple authentication in SNMP v1 and v2c. In order to make the SNMP

information available for public viewing, simply flag the **"Enable SNMP"** checkbox and fill in your desired password string (the default string is **"public"**) in the **Read Community** field.

- **Write Community** is the field that you can specify the **SNMP Write Community String** which is a user ID or plaintext password string for simple authentication in SNMP v1 and v2c. In order to allow a group of people to change the SNMP information, enter your desired password string (the default string is **"private"**) in the **Write Community** field**.**
- **User Name** is the user name for SNMP account for SNMP v3.
- **Password** is the password for SNMP account for SNMP v3.
- **Encrypt** is a drop-down box which allows the user to choose the encryption scheme for SNMP v3. The available options are None, DES, or AES. The default is "None".
- **Encrypt Key** is where you can specify the encryption key for the SNMP v3 access.

The last group of option is **SNMP Trap Server**. In order to allow a trap server to collect device information, fill in **SNMP Trap Server** with its corresponding IP address (a trap server is designed to collect all alarm information from the Modbus Gateway). An example in
Figure 4.19 is 10.0.159.109.

After **SNMP Settings** configuration is finished, click the **Save Configuration** button to save all changes that have been made or click **Cancel** button to discard your changes.

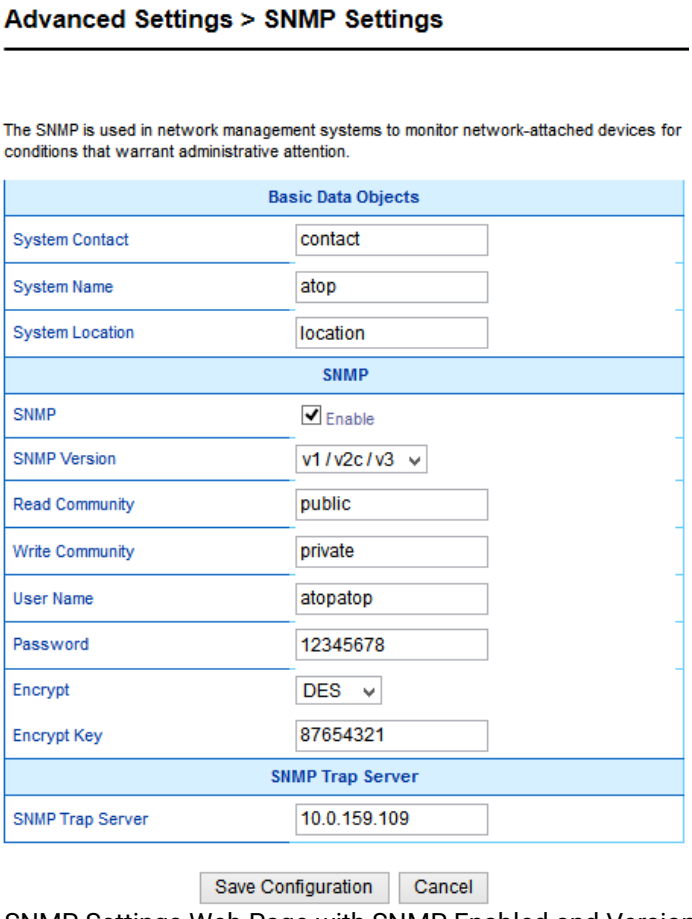


Figure 4.19 SNMP Settings Web Page with SNMP Enabled and Version v1/v2c/v3

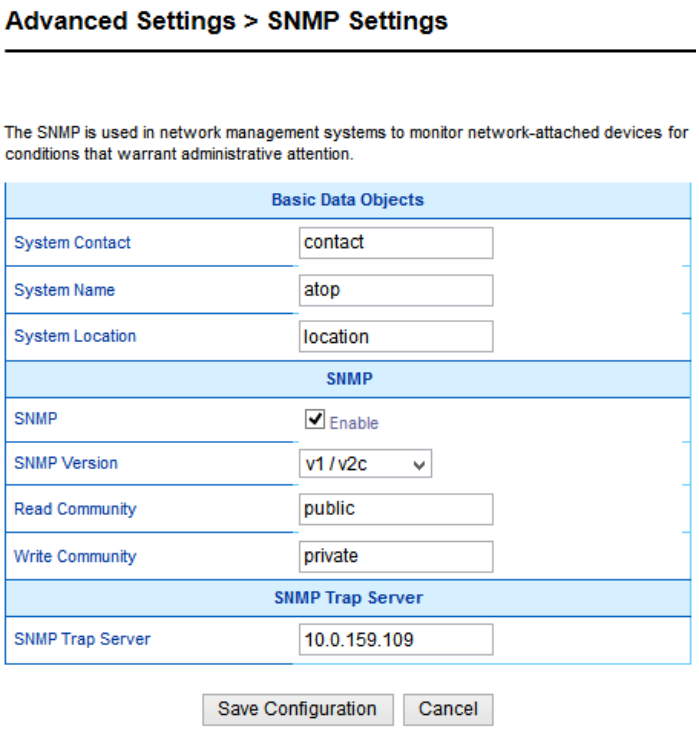


Figure 4.20 SNMP Settings Web Page with SNMP Enabled and Version v1/v2c

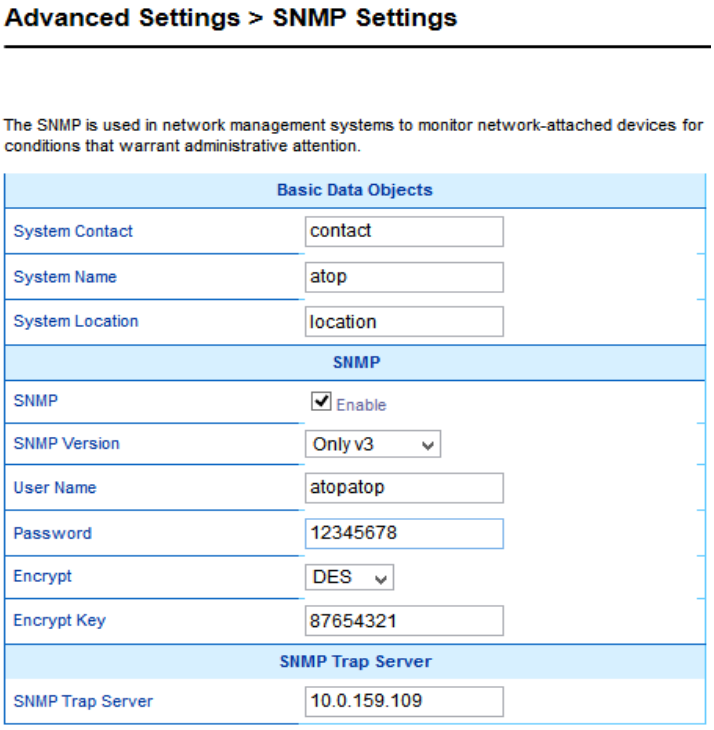


Figure 4.21 SNMP Settings Web Page with SNMP Enabled and Version Only v3

4.7.2 *Modbus*

In **Modbus** settings, it is possible select whether to enable **Modbus Exception** by flagging the **Enable** checkbox as shown in
Figure 4.22. If the Modbus slave returns no response and timeout occurs, it may then be necessary for the gateway to return an exception. To set **Response Timeout** for COM and TCP/VCOM, fill in the timeout periods in the fields as shown in
Figure 4.22. Note that the timeout setting can be applied to all COM ports by checking the **Apply to All Coms** box.

- Configure timeout for each COM port between 10ms to 120000ms with a default value of 1000ms.
- Configure timeout for TCP/VCOM port between 10ms to 120000ms with a default value of 1000ms.

After finishing the Advanced Modbus Settings configuration, click on the **Save Configuration** button to save all changes that have been made. A **Save Successfully** message will show up, and the web browser will be redirected back to the **Modbus** page**.**

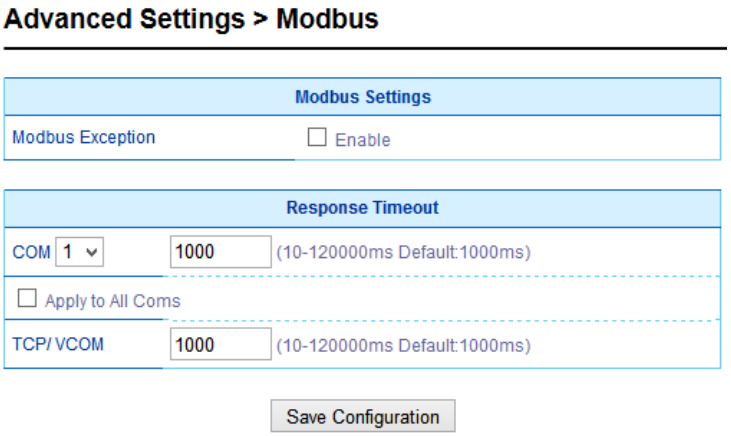


Figure 4.22 Advanced Modbus Settings of Response Timeout for Modbus Exception

4.8 *Alert*

4.8.1 *Settings*

When enabled, an E-mail alert will be sent to the designated E-mail addresses in the **SMTP** (Simple Mail Transfer Protocol) **Settings.** To setup an email alert function, the user needs to configure the **sender's E-mail address**, the **receiver's E-mail addresses** (up to three receivers), and the mail server configuration as shown in Figure 4.23. Under **Mail Server** settings, fill in the IP address or host name of a **Mail Server**. Make sure that the Modbus Gateway device is able to resolve the host name properly. This require the DNS server to be configured first as explained in Section 0. If a mail server authentication is required, check on the **Mail Server Authentication Required** box and fill in the **User Name** and the **Password** fields.

After configuration of the SMTP Settings is complete, click **Save Configuration** to save all changes that have been made. A **Save Successfully** message will show up, and the web browser will be redirected back to the **SMTP Settings** page**.** The user can also send a test E-mail from the Modbus Gateway by clicking on the **Send Test Mail** button. A pop-up window will notify the user of the result of test mail. If there is a problem, please re-check the information of **Mail Server**, **User Name** and **Password** or check the network connection to the **Mail Server**.

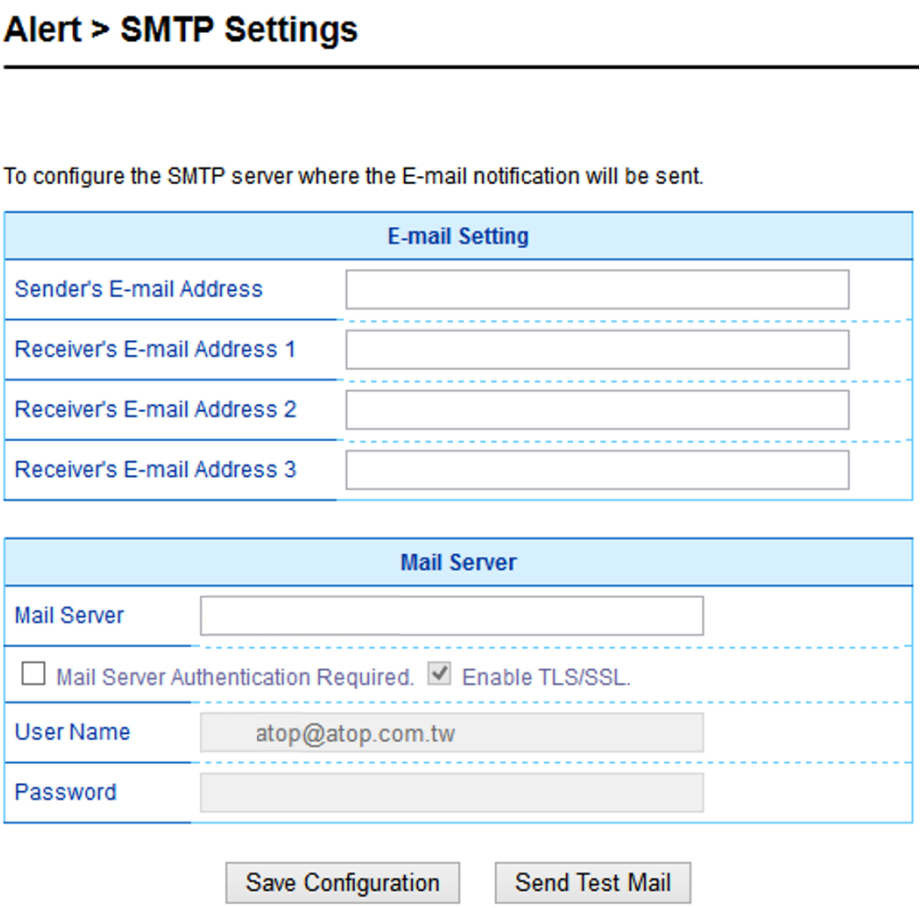


Figure 4.23 SMTP Settings Web Page

4.8.2 *Alert Events*

In **Alert Events** settings**,** the user can configure options to have the Modbus Gateway sending out device information to alert users, administrators, or responsible personnel as shown in Figure 4.24. They can be sent out automatically. There are seven anomalies defined on this page that can trigger alert functions (by checking the corresponding **E-mail** boxes), which are:

- **Cold Start** is an event when power supply is interrupted,
- **Warm Start** is an event when the device Restart function is used either by pressing a button or by its interface,
- **Authentication Fail** is an event when incorrect username and password are entered,
- **IP address change** is an event when the device's IP address is changed,
- **Password Changed** is an event when the authentication password is changed,
- **Watchdog Reset** is an event when the system reboots because of a hardware failure or a software crash,

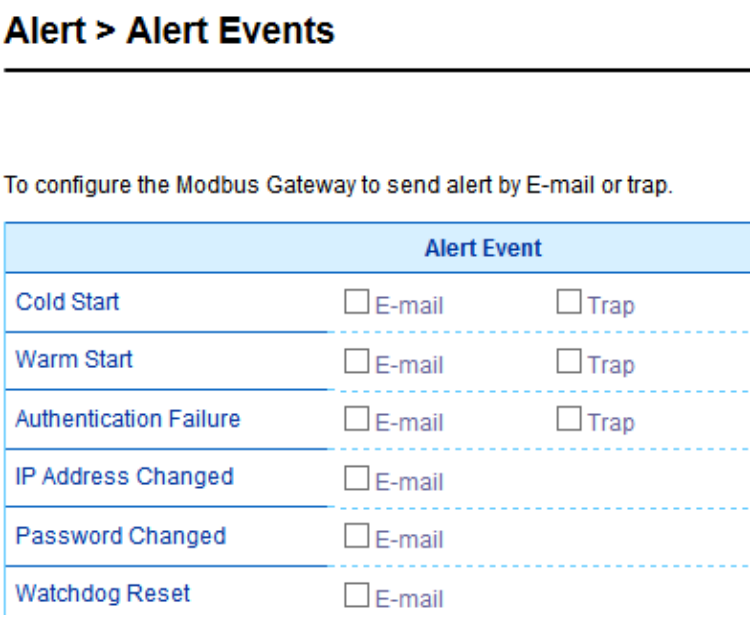


Figure 4.24 Alert Events Web Page

The user can also set an SNMP trap by checking the **Trap** checkbox for each of the first three anomalies above. This will send out alerts to an SNMP Trap Server. Note that to configure **SNMP Trap Server** please see Section 4.7.

After the **Alert Events** setting is complete, click on **Save Configuration** button to save all changes that have been made. A **Save Successfully** message will show up, and the web browser will be redirected back to the **Alert Events** page.

4.9 *System*

4.9.1 *Log Settings*

This section allows the user to change the way to report the Log. The user can save his Log Event to the flash memory of the Modbus Gateway by checking the **Enable Log Event to Flash** box. To specify the contents of the Log, select different **Log Level** by changing the pull-down menu of the **Log Level**. There are two log levels available on the menu: **Level 3: (LOG_ERR)** and **Level 4: (LOG_WARNING)**. Figure 4.25 shows a selection of **Log Level 4** which will keep **LOG_WARNING**.

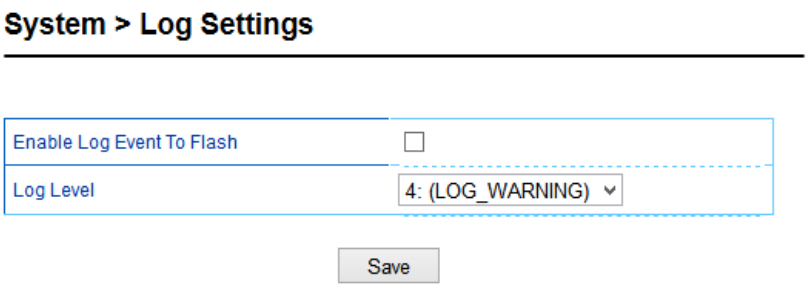


Figure 4.25 Log Settings Web Page

4.9.2 *System Log*

This section lists current system events aside its properties (**Date, Time, Startup Time, Level, and Event**). Figure 4.26 shows an empty **System Log** page. The user can navigate through the system log by using **Last Page** or **Next Page** buttons. The user will have the option to show all events by clicking the **Show All Event** button and the option to clear them all by clicking on **Clear All Event** button.

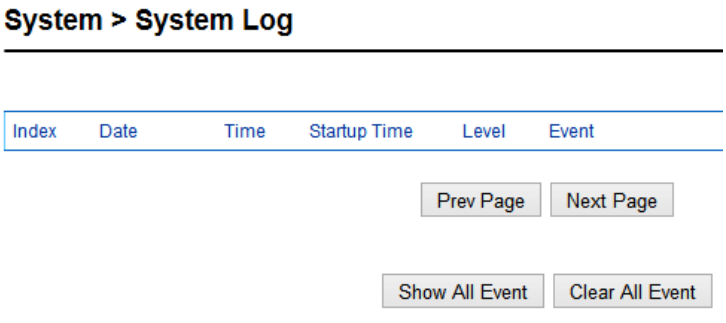


Figure 4.26 System Log Web Page

4.9.3 *Data Log*

The log of Modbus's exchanged messages will be shown in the **Data Log** section and listed in Figure 4.27. This can be very useful for debugging and testing. The user can filter the data based on the **Interface** by using the drop-down box. All available interface will be listed in the box such as COM1, COM2 and TCP_Link*XX*. Then click on the **Query** button to list the data log based on the chosen interface. Traffic analysis in the system can be done here as well. Click the **Start** button to enable continuous data log collection or click **Stop** to end it. All data log can be cleared by clicking the **Clear** button. The user will be able to browse through the list of message by clicking on the **Last Page** or the **Next Page** buttons at the bottom of the log table. Finally, if the user would like to save the data log to a file on the local PC, please click on the **Export** button.

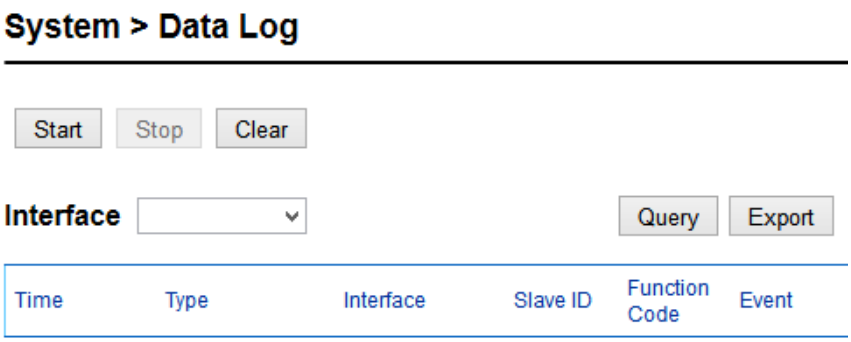


Figure 4.27 Data Log Web Page

4.9.4 *Modbus Statistic*

Modbus's interface statistics are reported in this section as shown in Figure 4.28. For each interface, there is a **Net_Connection** or socket which is an IP address bundled with its port number (only for TCP and VCOM interfaces), a **DataType** of the interface (**ASCII**, **RTU**, or **TCP**), a **Mode** of the Interface (either **MASTER** or **SLAVE**), the count of received messages (**RxCnt**), the received bytes (**RxByte**), the count of transmitted message (**TxCnt**), and the transmitted bytes (**TxByte**). Click on the **Refresh** button to obtain the latest statistics of the Modbus's interfaces.

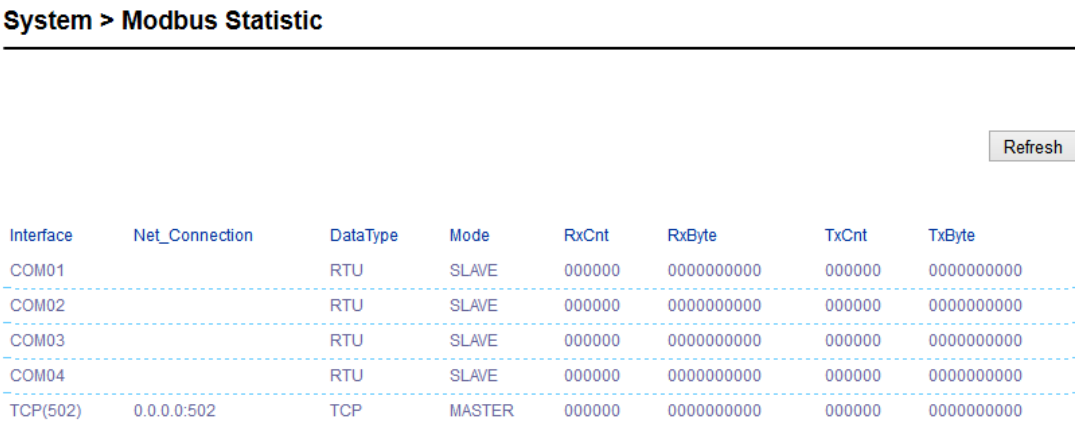


Figure 4.28 Modbus Statistics Web Page

4.9.5 *Time*

Date and time can be set manually or through **N**etwork **T**ime **P**rotocol (NTP) to automatically synchronize date and time of the Modbus Gateway with a **Time Server.** Figure 4.29 shows the **Time** setting page. The user can obtain the **Current System Time** by clicking on the **Refresh** button. Under the **System Time Setting** box, the user can set the **Time Zone** by selecting the proper time zone from the pull-down menu. Then, in order to choose the options of time setting, select either **NTP** or **Manual**. For auto-synchronization, check the radio button in front of **NTP** option. Then, proceed to fill in the IP address or hostname of the preferred time server such as time.nist.gov which is the default setting. If a hostname is entered, the DNS server should be configured properly following the procedure explained in Section 0. Other options will be disabled if the **NTP** option is selected.

If the **Manual** option is selected, select the current **Date (Year, Month, Day)** and **Time (Hour, Minute, and Second)** from their corresponding pull-down menus under the **Manual Setting** box. In certain region, the daylight time saving is practiced. In order to enable it, check the **Enable Daylight Saving Time** checkbox and specify the **Start Date**, **End Date**, and **Offset** in the fields under **Daylight Save Setting** box as shown in the greyed out area of Figure 4.29.

After Time Setting is complete, click **Save Configuration** to save all changes that have been done. A **Save Successful** message will show up with a hyperlink to **restart** the device as shown in **Error! Reference source not found.** Click the **restart** hyperlink to apply the changes**.** Then, a message indicating **System Restarting** status with a counting down number will show up as shown in Figure 4.34**.** After a successful device's restart, the web browser will be redirected to the Overview page as shown in Figure 4.7**.**

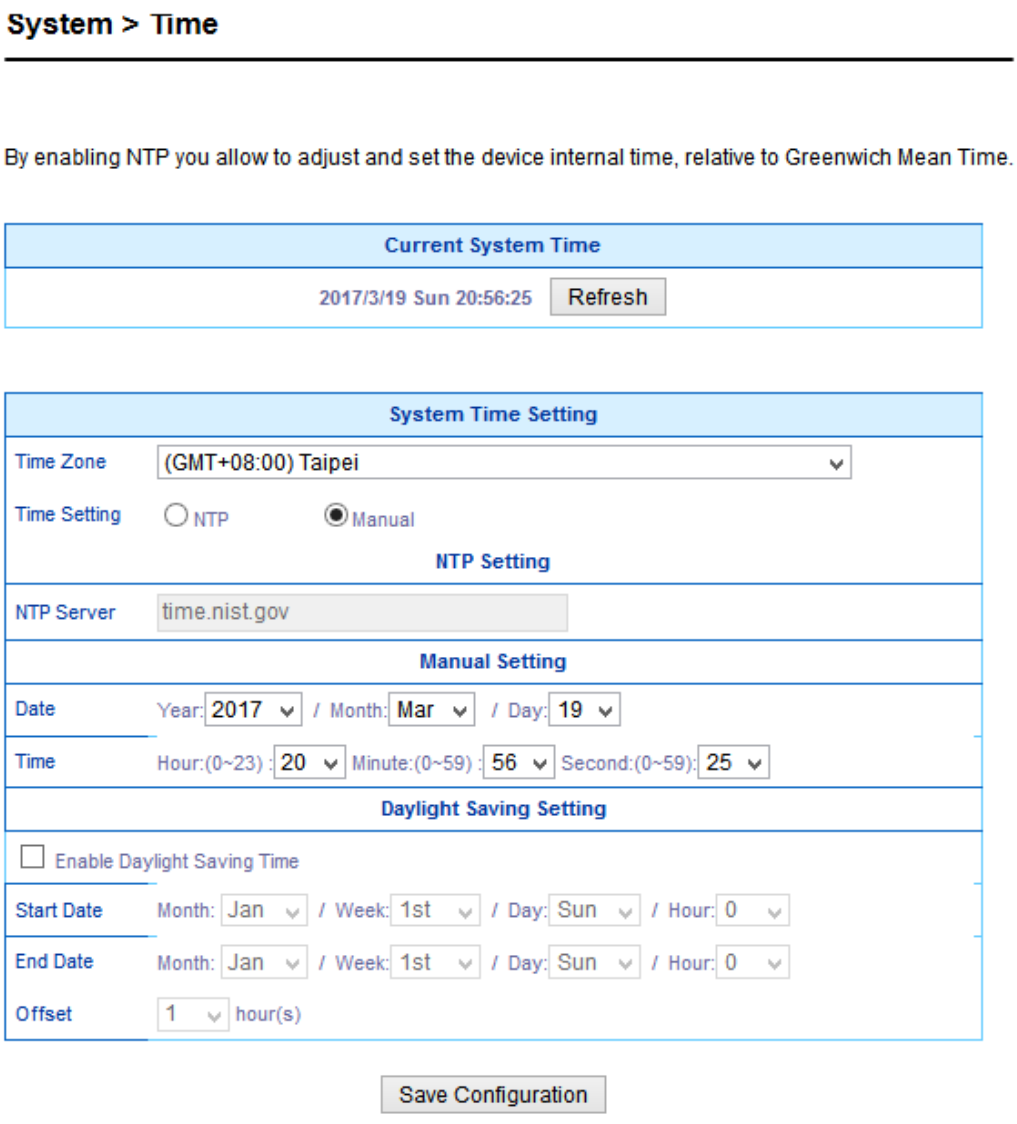


Figure 4.29 Time Web Page

4.9.6 *Security*

The default security setting for the password is a standard password (default). To change security, enter the Security web page as shown in Figure 4.30, enter a password in the **Change Password** box. The user should enter the **Old Password** (enter nothing in case of a null password), the **New Password**, and the **Verified Password** (same

as the New Password). The password is case sensitive and limited to a maximum of 8 characters. After entering all required fields, click **Save Password** button to save the change. After the **Save Successfully** message showed up, the user will be prompted with a pop-up window to enter the **User name** and the **New Password** again for verification.

Figure 4.30 Security Web Page

The user can limit how the Modbus Gateway is accessed and controlled by changing the settings under the **Security** box in Figure 4.30. All password-protected features will use the same password whose setting is described in the previous paragraph. The user can enable or disable **Web Console** by clicking on the corresponding radio button. Additionally, the user can protect how the user accesses the device with a **Reset Button Protect** option by checking on either **No** or **Yes** radio buttons.

After Security Settings are set, click **Save Configuration** to save all changes that have been made. A **Save Successful** message will appear with a hyperlink asking to **restart** the device as shown inFigure 4.10**.** Please click the **restart** hyperlink to apply the changes**.** Then, a message indicating **System Restarting** status with a countdown will show up**.** After a successful restart, the web browser will be redirected to the Overview page as shown in Figure 4.5**.**

4.9.7 *Import/Export*

Once all configurations are set and the device is working properly, the user may want to backup **(Export)** the configuration to a file. A backup configuration file can be used when a new firmware is uploaded and the device is

reset to a factory default setting, or simply to prevent accidental loading of incompatible old settings. The backup file could also be used to efficiently deploy multiple Modbus Gateways of similar settings by restoring the settings to the devices by **importing** the corresponding file. Figure 4.31 depicts the Import/Export web page.

Figure 4.31 Import/Export Web Page

To import a configuration file from the computer, click on the **Browse…** button. Then, a pop-up window will ask the user to choose a configuration file (with .DAT extension). After selection, click **Open button**. Then, click on the **Import Configuration** button to start the importing process.

After importing is complete, the system will show a **Save Successful** message with a hyperlink to **restart** the device**.** Click the **restart** hyperlink to apply the changes**.** Then, a message indicating **System Restarting** status with a countdown will show up**.** After a successful device's restart, the web browser will be redirected to the Overview page as shown in Figure 4.7**.**

In order to export the current configuration of the Modbus Gateway to a file for backup purposes, click the **Export Configuration** button as shown in Figure 4.31. Then, a pop-up window will ask to either **Open** the configuration file for viewing with a default application such as Notepad or to simply **Save** the configuration file to the preferred name and destination path as shown in Figure 4.32.

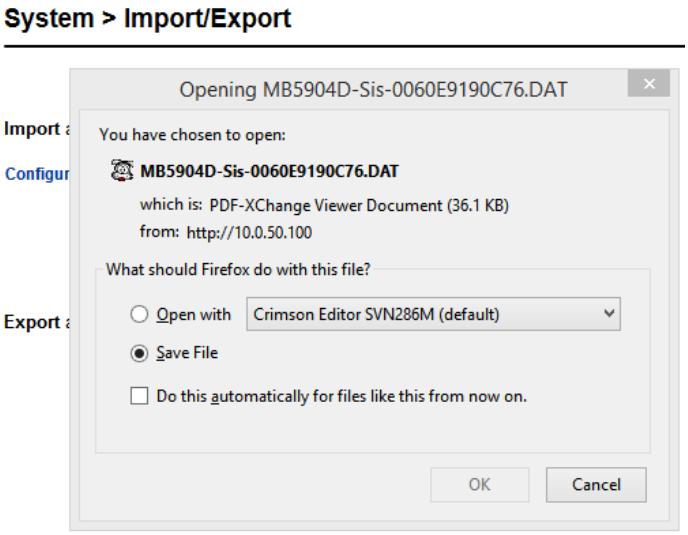


Figure 4.32 Export Configuration File from Modbus Gateway

4.9.8 *Factory Default*

A return to **Factory Default** function is available in Atop's MB52XX Series. To restore all parameters of the Modbus Gateway to the original factory default setting, click **Set to Default and Restart** button as shown in Figure 4.33. After a short moment, a message indicating **System Restarting** status with a countdown number will show up. After a successful device's restart, the web browser will be redirected to the Overview page as shown in Figure 4.7.

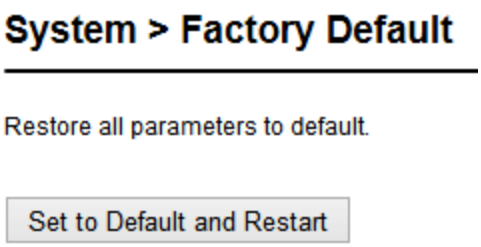


Figure 4.33 Factory Default Web Page

4.10 *Restart*

For some unexpected circumstances, the Modbus Gateway system may stop responding correctly. The user has the option to restart the device by clicking the **Restart** button as shown in Figure 4.34. The device's RUN LED will start blinking when the restart process is completed. Then, a message indicating **System Restarting** status with a countdown will show up. After a successful device's restart, the web browser will be redirected to the Overview page as shown in Figure 4.7.

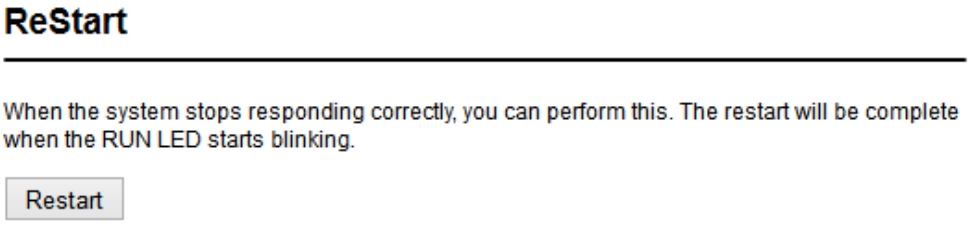


Figure 4.34 Restart Web Page

5 Specifications

5.1 *Hardware*

Table 5.1 Hardware Specification

System			
CPU	32-bit ARM Based		
Flash Memory	16MB		
RAM	Integrated DDR2 128MB		
EEPROM	8 KB		
Reset	Built-in Recessed Key (Restore to Factory Defaults)		
Watchdog	Hardware built-in		
Network			
Ethernet Interface	IEEE 802.3 10BaseT IEEE 802.3u 100BaseT(X) Auto-negotiation Auto MDI/MDI-X Connection: RJ45 x 1		
Protocol	ICMP TCP UDP IPv4 HTTP Syslog	DNS DHCP Client SNMPv1, v2c, v3	SMTP NTP ARP Telnet RFC2217
Serial			
Serial Interface	RS-232/RS-422/RS-485 Software Selectable (Default: RS-232)		
Serial Connector	MB5201: 1 Serial Port (TB-5 or DB-9) MB5202: 2 Serial Ports (TB-5 or DB-9)		
Serial Port Communication	Baud-rate: 1200 bps ~ 230,400 bps (RS-485 4-wire allows up to 921,600 bps) Parity: None, Even, Odd, Mark, or Space Data Bits: 5, 6, 7, 8 Stop Bits: 1, 2 Software Selectable Flow Control: RTS/CTS (RS-232 only), XON/XOFF, None		
LED Indicator			
LED indication	RUN x 1 LAN x 1 COM x 1		
Power Requirement & EMC			
Input	3-Pin 5.08mm Lockable Terminal Block: 9-30VDC DC Jack 5VDC		
Consumption	Max. 1.5W		
EMI/EMC	FCC Part 15, Subpart B, Class A, EN 55032, EN 61000-3-2, EN 61000-3-3, EN 55024, EN61000-6-4, EN61000-6-2		

Mechanical	
Dimensions (W x H x D, mm)	MB5201: 65mm x 78mm x 28mm (without wall-mount part) MB5201-TB: 88.5 x 78.3 x 27.8mm (with wall-mount part) MB5201-DB: 88.5 x 84 x 27.8mm (with wall-mount part and DB9 connector) MB5202: 85 mm x 77mm x 28 mm (without wall-mount part) MB5202: 108 x 77mm x 28 mm (with wall-mount part)
Enclosure	IEC/EN60529 - IP30 protection, metal housing
Environmental	
Temperature	Operations -40°C ~ 70°C (-40°F ~ 158°F)
	Storage -40°C ~ 85°C (-40°F ~ 185°F)
Relative Humidity	5% ~ 95%, 55°C Non-condensing

5.2 *Serial port Pin Assignments*

5.2.1 *Pin Assignments for Serial Interfaces*

DB9 to RS-232/RS-422/RS-485 connectors

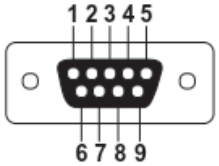


Figure 5.1 DB9 Pin Number

Table 5.2 MB5201/MB5202 Pin Assignment for DB9 to RS-232/RS-422/RS-485 Connector

Pin#	RS-232 Full Duplex	RS-422/4-Wire RS-485 Full Duplex	2-Wire RS-485 Half Duplex
1	DCD	N/A	N/A
2	RxD	TXD+	Data+
3	TxD	RXD+	N/A
4	DTR	N/A	N/A
5	SG (Signal Ground)	SG (Signal Ground)	SG (Signal Ground)
6	DSR	N/A	N/A
7	RTS	RXD-	N/A
8	CTS	TXD-	Data-
9	RI	N/A	N/A

1 x 5-pin (Male Terminal Block) for RS-232/RS-422/RS485 Connector

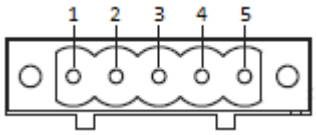


Figure 5.2 TB5 Pin Number

Table 5.3 MB5201/MB5202 Pin Assignment for TB5 to RS-232/RS-422/RS-485 Connector

Pin#	RS-232 Full Duplex	RS-422/4-Wire RS-485 Full Duplex	2-Wire RS-485 Half Duplex
1	RxD	TxD+	Data+
2	CTS	TxD-	Data-
3	TxD	RxD+	NC
4	RTS	RxD-	NC
5	SG (Signal Ground)	SG (Signal Ground)	SG (Signal Ground)

5.3 *LED Indicators*

Table 5.4 Color Interpretation of LED Indicators

Name	Colour	Status	Message
RUN	Green	Blinking	System is booted up and AP Firmware is running normally
		On	System is booted up and not running AP Firmware
		Off	System is still booting up or powered off
LAN	Orange (Speed)	Blinking	Ethernet is transmitting at 10 Mbps
		Off	No Transmission
	Green (Data)	Blinking	Ethernet data is transmitting at 100 Mbps
		Off	No Transmission
COM	Green	Blinking	COM is transmitting/receiving
		Off	COM is not transmitting/receiving

5.4 *Software*

Table 5.5 Software Tools and Utilities

Software	
Utility	Windows Virtual COM Driver and Linux TTY Driver: Linux 2.4.x, Linux 2.6.x, 3.x
Configuration Tool	■ Web console ■ Serial console ■ SSH console ■ Telnet console ■ Device Management Utility©

6 Warranty

Limited Warranty Conditions

Products supplied by Atop Technologies Inc. are covered in this warranty for undesired performance or defects resulting from shipping, or any other event deemed to be the result of Atop Technologies Inc. mishandling. The warranty doesn't cover; however, equipment which has been damaged due to accident, misuse, abuse, such as:

- Use of incorrect power supply, connectors, or maintenance procedures
- Use of accessories not sanctioned by us
- Improper or insufficient ventilation
- Improper or unauthorized repair
- Replacement with unauthorized parts
- Failure to follow our operating Instructions
- Fire, flood, "Act of God", or any other contingencies beyond our control.

RMA and Shipping Reimbursement

- Customers must always obtain an authorized **"RMA" number** from us before shipping the goods to be repaired.
- When in normal use, a sold product shall be replaced with a new one within 3 months upon purchase. The shipping cost from the customer to us will be reimbursed.
- After 3 months and still within the warranty period, it is up to us whether to replace the unit with a new one; normally, as long as a product is under warranty, all parts and labor are free-of-charge to the customers.
- After the warranty period, the customer shall cover the cost for parts and labor.
- Three months after purchase, the shipping cost from the customer to us will not be reimbursed, but the shipping costs from us to the customer will be paid by us.

Limited Liability

Atop Technologies Inc. shall not be held responsible for any consequential losses from using our products.

Warranty

Atop Technologies Inc. provides a 5-year maximum warranty for Modbus Gateway products.

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