



**MODBUS
TCP to RTU/ASCII
Gateway**

User's Manual

1	INTRODUCTION.....	1
1.1	FEATURES.....	2
1.2	PRODUCT SPECIFICATIONS.....	3
1.3	DEFAULT SETTINGS.....	4
2	MAKING THE HARDWARE CONNECTIONS.....	5
2.1	POWER CONNECTION.....	5
2.2	ETHERNET CONNECTION.....	5
2.3	RESET BUTTON.....	5
2.4	LED DEFINITION.....	5
2.5	DIP SWITCHES.....	6
2.6	SERIAL CONNECTION.....	6
2.7	DB9 PIN CONFIGURATION.....	7
2.8	SERIAL PORT OPERATIONAL MODES.....	7
2.8.1	<i>Console Mode</i>	7
2.8.2	<i>Upgrade Mode</i>	7
2.8.3	<i>Default Mode</i>	8
2.8.4	<i>RS-232 Mode</i>	8
2.8.5	<i>RS-422 Mode</i>	8
2.8.6	<i>RS-485 Mode</i>	8
3	STM-501C SOFTWARE INSTALLATION.....	9
3.1	NEW INSTALLATION.....	9
3.2	UPDATING AN EXISTING INSTALLATION.....	11
4	USING MANAGER SOFTWARE.....	12
4.1	SEARCHING LAN FOR STM-501C.....	12
4.2	CONFIGURING GATEWAY PROPERTIES.....	13
5	GATEWAY PROPERTIES.....	14
5.1	SERVER CONFIGURATION.....	14
5.1.1	<i>Server Name</i>	14
5.1.2	<i>Serial Number</i>	14
5.1.3	<i>Password</i>	14
5.1.4	<i>Version & Date</i>	15
5.2	NETWORK CONFIGURATION.....	15
5.2.1	<i>DHCP</i>	15
5.2.2	<i>IP Address</i>	15
5.2.3	<i>Netmask</i>	16
5.2.4	<i>Gateway</i>	16
5.2.5	<i>MAC Address</i>	16
5.2.6	<i>Link Status</i>	16

5.3	SERIAL INTERFACE CONFIGURATION	17
5.3.1	Serial Port	17
5.3.2	Baud Rate	17
5.3.3	Data/Parity/Stop	17
5.3.4	Flow Control	18
5.3.5	Serial Port Mode	18
5.4	MODBUS CONFIGURATION	19
5.4.1	Serial Format	19
5.4.2	Character Timeout	19
5.4.3	Message Timeout	19
5.4.4	Inactive Timeout	20
5.4.5	Maximum Connection	20
5.4.6	Gateway Type	20
5.4.7	Listening TCP port	20
5.4.8	Use MBAP's UID or Use Specific UID	20
5.4.9	Generate exception	20
5.4.10	Remote IP Address/filter	21
5.4.11	UID Range	21
5.4.12	Slave IP Address and TCP port	21
5.5	UPDATE/SAVE	21
5.5.1	Updating the Gateway Properties in Manager Software	21
5.5.2	Saving Configuration Data in Console Mode or Telnet	22
5.5.3	Web Server Interface	23
6	INSTALLING VIRTUAL COM PORT	24
7	CONFIGURING VIRTUAL COM PORT	27
7.1	CONFIGURATION WITH MANAGER SOFTWARE	27
7.2	CONFIGURATION WITH DEVICE MANAGER	28
8	UNINSTALLING THE VIRTUAL COM PORT	29
8.1	REMOVING THE VIRTUAL COM PORT WITH MANAGER SOFTWARE	29
8.2	REMOVING THE VIRTUAL COM PORT USING DEVICE MANAGER	30
9	USING CONSOLE	31
10	USING TELNET	34
11	USING WEB SERVER	35
12	UPGRADING THE MODBUS GATEWAY FIRMWARE	38

1 Introduction

The STM-501C, MODBUS TCP to RTU/ASCII gateway allows serial MODBUS RTU/ASCII to communicate and interoperate with MODBUS TCP based device. The early development of MODBUS protocol is an asynchronous protocol designed to connect directly to computer's asynchronous serial ports. MODBUS has been extended to operate over Ethernet using the IP protocol. This gateway converts between the MODBUS TCP/IP protocol and MODBUS RTU/ASCII protocols transparently.

MODBUS RTU/ASCII: The MODBUS protocol emerged in the mid-1970s as an early protocol for linking terminals with Modicon PLC's using a master/slave protocol. The original MODBUS serial line specification included two transmission modes: RTU and ASCII. The MODBUS RTU uses binary coding and CRC error checking. MODBUS ASCII mode is more readable, but less efficient because each byte is represented by two ASCII code and it uses less effective LRC error checking. The communications are initiated by MODBUS masters using polling, query/response protocol. The master can send broadcast messages, using a unit ID of 0, which all slaves accept, but do not reply to. Normally the master polls individual slaves sequentially.

MODBUS TCP is designed to allow MODBUS protocol to be carries over TCP/IP based networks. Unlike MODBUS RTU/ASCII, which a master can communicate to multiple slaves using UID, MODBUS TCP sets up a point to point connection. To communicate with multiple slave devices, different TCP/IP connection is needed for each slave device. Also multiple polling/queries messages can be pipelined or queued. The response messages could be replied out of order by the slave devices. Therefore a transaction ID is assigned to each polling message to avoid mixing up query and response messages.

The STM-501C, MODBUS gateway allows the legacy MODBUS RTU/ASCII devices to operate on a MODBUS TCP network. It allows either MODBUS serial master or slave to communicate with MODBUS TCP's slave or master.

MODBUS TCP masters to MODBUS RTU/ASCII slaves: STM-501C allows multiple MODBUS TCP masters to communicate with a MODBUS serial network. Since MODBUS serial network can only handle one query at one time, queries from different masters are pipelined and processed one by one.

MODBUS RTU/ASCII master to MODBUS TCP slaves: When STM-501C function as MODBUS RTU/ASCII master to MODBUS TCP slave gateway, STM-501C can connect up to 8 MODBUS TCP slave. User can specify a UID range for each MODBUS TCP slave.

Inactive timeout: STM-501C provides inactive timeout that allows user to specify a time period to disconnect TCP/IP connection if there is no activity in the network. It could be the peer of the connection is down if the connection does not tear down it would occupy one connection slot and prevent any another connection again.

Configuration tools: User friendly Serial Server management software provides an easy way to configure STM-501C. It can search all Device Servers within a local area network independent of its subnet. It can also find a Device Server of a specific IP address over wide area network. STM-501C can also be configured by its console port or through telnet connection. STM-501C also provides web interface for user to configure it by a web browser.

STM-501C can work at Loop back Mode, all data is sent back immediately. This feature makes the connection testing easy.

1.1 Features

- DIN rail or Panel mount
- Supports 10/100 Mbps Ethernet
- Supports RS-232, RS-422, and RS-485 serial interface
- Supports LAN and WAN communications
- Management access is password protected.
- Connecting up to 8 MODBUS/TCP master devices to 31 MODBUS RTU/ASCII slave devices.
- Connecting a MODBUS RTU/ASCII master device to 8 MODBUS/TCP slave devices.
- Automatically generate exception when RTU/ASCII slave device does not response.
- Provide inactive timeout for connection auto-recovery when power failures.
- Remote IP address filtering allows the Device Server to reject unwanted incoming connection source.

1.2 Product Specifications

Serial Memory:	output: 64K bytes per port Input: 8K bytes per port
Serial Connection:	DTE – BD-9 male
LAN:	10/100 Mbps Auto-detecting – 10 Base T, 100 Base TX
Serial Interfaces:	RS-232 - TX, RX, RTS, CTS, DTR, DSR, DCD, GND RS-422 – TX+, TX-, RX+, RX-, RTS+, RTS-, CTS+, CTS-, GND RS-485 - Data +, Data –, GND
Data Rate:	110 bps to 230.4 k bps
Parity:	none, even, odd, mark, space
Data Bits:	5, 6, 7 or 8
Stop Bits:	1, 1.5 or 2
Protocol:	TCP, IP, ARP, DHCP, Telnet, HTTP, UDP, ICMP
Management:	Manager software, Serial Console, Telnet, Web server Firmware upgradeable
Power & Environment	
Power Requirements:	7 ~ 30 VDC 500 mA
Operating Temperature:	0 to 50 °C (32 to 122 °F)
Storage Temperature:	-20 to 60 °C (-4 to 140 °F)
Humidity:	0 – 90% Non-Condensing
Approvals:	CE, FCC
Dimensions:	
3.35 x 4.5 x 0.90 in (8.5 x 11.5 x 2.3 cm)	

1.3 Default Settings

Server name:	STM-501C
Serial number:	Fixed – see bottom label
Password:	Blank
DHCP:	Disable
IP address:	192.168.1.1
Netmask:	255.255.255.0
Gateway:	192.168.1.254
MAC address:	Fixed – see bottom label
Version & Date:	current firmware version number and date

Serial port

Baud rate:	9600
Data/Stop bits:	8-1
Parity:	None
Flow control:	None
Serial port mode:	RS232

MODBUS parameters

Serial data format:	RTU
Character timeout:	10 ms
Message timeout:	100ms
Inactive timeout:	0 minute (Disabled)
Maximum connection:	1
Gateway type:	TCP Master to Serial Slave

TCP Master to Serial Slave

Listening TCP port:	Port No.: 502
Use MBAP's UID:	Enable
Use specific UID:	10
Generate Exception:	Off
Remote IP address/filter:	255.255.255.255

TCP Slave to Serial master

UID range:	1 to 8
Slaves IP address:	0.0.0.0
Destination TCP port:	502

2 Making the Hardware Connections

The following information is provided to give the user an understanding of how to connect the STM-501C to the LAN and serial device. A review of the switch settings and the functionality of the LED's are also provided.

2.1 Power Connection

The STM-501C has a two pins terminal block and power jack. Power can apply on either terminal block or the power jack. It accepts 7VDC-30VDC 500mA power supply. When power is apply a green light label as run will flash every one second to indicate the system is up and running.

*Note: DC Negative is not optically isolated from Earth Ground

2.2 Ethernet Connection

A straight-through Ethernet cable can be used to connect the MODBUS gateway to an Ethernet hub, switch, or wall plate. A crossover Ethernet cable can be used to make a connection directly to the NIC (Network Interface Card) on a PC or laptop.

2.3 Reset Button

The reset button can be found between the switch and terminal block. To reset the unit manually apply power, insert a small plastic tool, and press lightly depressing switch. Hold for 1 second and release. The Link and Run light will go out and turn back on.

2.4 LED Definition

Led Name	Led Function
Link	Green – 100 BaseTX Ethernet connection established Yellow – 10 BaseT Ethernet connection established
Run	Flashing Green – system is ready
Serial 1/2/3/4	Green – connection established Flashing Green – data is transmitting

2.5 Dip Switches

A double DIP switch allows the STM-601C to be placed into Console/Loop back/Default/Data Mode.

SW1	SW2	Mode
ON	ON	Console
ON	OFF	Loop back
OFF	ON	Factory
OFF	OFF	Data

Switches ON-ON position, the STM-601C enters Console Mode, allowing configuration of the STM-601C from a PC running a terminal program such as Hyperterminal. When the STM-601C enters Console Mode, the Console Mode screen will appear in the Hyperterminal program window. The serial port settings must be 8-N-1 at 9600 baud.

Switches ON-OFF position, the STM-601C will work at Loop back Mode, all data is sent back immediately.

Switches OFF-ON position, the STM-601C will revert to its factory version firmware no matter what newer firmware has been upgraded. This prevents any problem cause by a bad grade.

Switches OFF-OFF position, the STM-601C will enter Data Mode (RS-232, RS-422 or RS-485) for normal operation.

2.6 Serial Connection

The STM-501C has one, two or four DB-9 male connectors. The serial port is configured as a DTE (data terminal equipment) device just as PC's COM ports. Therefore a null modem cable is required to make a connection between a COM port on a PC to the STM-501C serial port. The cable to connect the STM-501C serial port to a DCE device must be straight-through.

The STM-601C has one serial port. The port can be configured as a Console Mode connection or as RS-232, RS-422 or RS-485 interface to the STM-601C (if all of the DIP switches are in the OFF position) using the Manager software, via Telnet, or using the Web Server.

2.7 DB9 Pin Configuration

The RS-232 interfaces are configured as DTEs (Data Terminal Equipment). The connectors for all ports are DB-9 Male.

Pin	RS-232	RS-422	RS-485
1	DCD	RXD (-)	
2	RXD	RXD (+)	
3	TXD	TXD (+)	D (+)
4	DTR	TXD (-)	D (-)
5	GND	GND	GND
6	DSR	CTS (-)	
7	RTS	CTS (+)	
8	CTS	RTS (+)	
9	RI	RTS (-)	

2.8 Serial Port Operational Modes

Using the Manager software, the first serial port of STM-501C can be set to Console Mode, Default Mode or Upgrade Mode. The serial ports can be configured for RS-232, RS-422 or RS-485 operation. The STM-501C also can be set to Console Mode by placing all the DIP switches into the ON position.

2.8.1 Console Mode

The console mode allows access to the STM-501C setup menu. This is one way to reconfigure the default settings for the application. A serial connection is made between a COM port on the PC and the STM-501C serial port 1 with a null modem cable. In console mode, the serial port defaults to an RS-232 interface.

The serial port default settings are, baud rate 9600, 8 data bits, no parity, and 1 stop bit. Hyper Terminal should be used for this type of setup. Hyper Terminal's serial settings are configured the same as the mentioned default settings and must be set to VT100 emulation mode. The default settings are used when the first serial port is set to console mode regardless the actual configuration parameters are.

See Chapter 9 for console usage details.

2.8.2 Upgrade Mode

The newest firmware can be upgraded to STM-501C using the PC's serial port or the Virtual COM port.

See Chapter 12 for upgrade details.

2.8.3 Default Mode

When Default Mode is selected and the Gateway Properties are updated (saved), all configuration settings return to their default values.

2.8.4 RS-232 Mode

The RS-232 supports 8 channels plus Signal Ground and is configured as DTE like a computer. Signals are single ended and referenced to Ground. To use handshaking, Flow Control must be set to RTS/CTS during Configuration. Refer to the Pin out table for connections.

2.8.5 RS-422 Mode

The RS-422 mode supports 4 channels with full duplex operation for Receive, Transmit, RTS (Request to Send) and CTS (Clear To Send). The data lines are in differential pairs. Ground provides a common mode reference. To use handshaking Flow Control must be set to RTS/CTS during configuration. Refer to the Pin out table for connections.

2.8.6 RS-485 Mode

The RS-485 mode supports the Transmit and Receive Channels using 2-wire half-duplex operation. The data lines are differential pair Ground provides a common mode reference. Refer to the Pin out table for connections.

RS-485 Receiver Biasing can be implemented from the STM-501C if the network does not supply it. Remove the two side-cover screws of the MODBUS gateway, slide the cover off and re-position the bias jumpers to enable biasing (shorting).

3 STM-501C Software Installation

It is recommended the user install the Manager software and do a search for all STM-501Cs connected to the LAN. When this is completed a window will list the devices making them available for configuration.

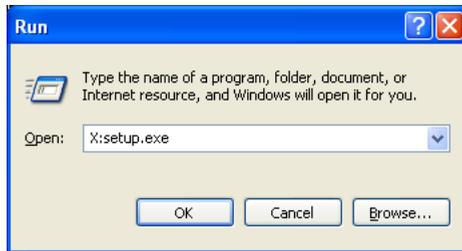
Configuring the STM-501C to meet your LAN and application requirement is an easy process with the available setup menu in the Manager software.

3.1 New Installation

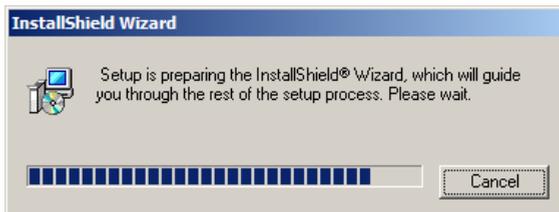
The following procedure installs the STM-501C Manager Software.

1. Inserting the STM-501C CD in the CD-ROM will automatically launch the Install Shield Wizard.

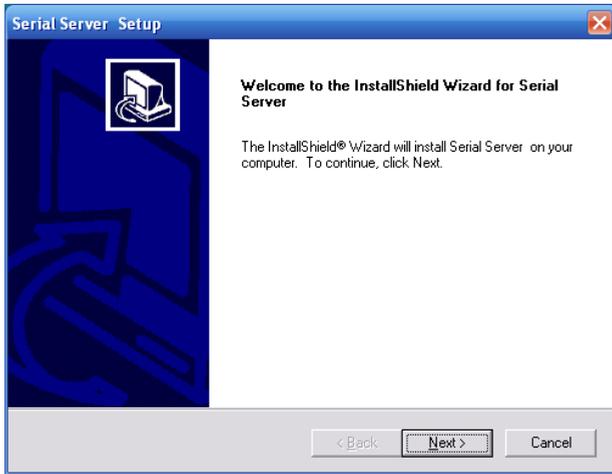
To manually start the software installation, select the **Start** button on the desktop. At the Run command line type [Drive Letter]:setup.exe Then select OK. The D: is the drive letter for the CD Rom.



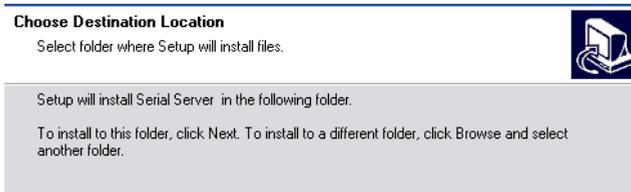
2. The **Install Shield Wizard** window automatically displays to begin the setup procedure.



3. Select Next when the **STM-501C Setup** window appears.

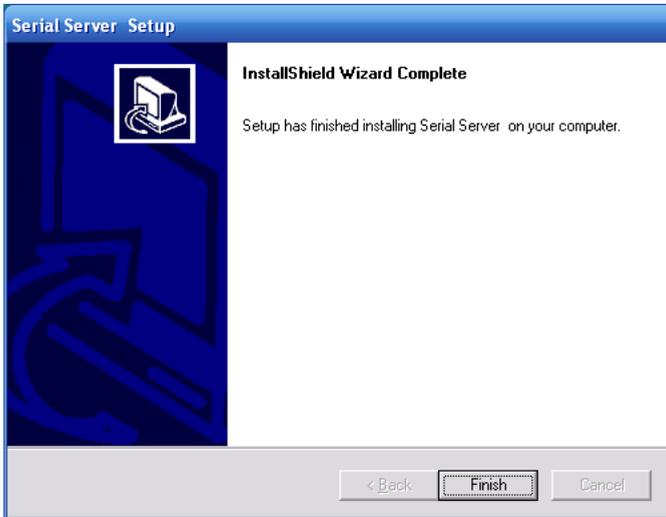


4. In the **Choose Destination Location** window select Next to install the Manager software in the default location. Select Browse to install into a user selected directory.



The installation progress will be shown until complete.

5. Select Finish when the **Install Shield Wizard Complete** screen appears. When the installation is complete the Install window closes allowing the user to access the Manager software in the program files. If loaded in the default location Go to Start/Programs/ANTAIRA/Serial Server Manager to open.



Connect the STM-501C to the LAN and apply power. The Run LED will flash indicating power has been applied and communications with the unit can begin; and the Link LED indicates an Ethernet connection has been made.

3.2 Updating an Existing Installation

If an older version of the Manager software is already installed, the Modify, repair or remove the program window will appear when the installation process is initiated:



The recommended procedure is to remove all installed components first. Once the software has been removed, install the new software.

4 Using Manager Software

The Manager software performs several functions:

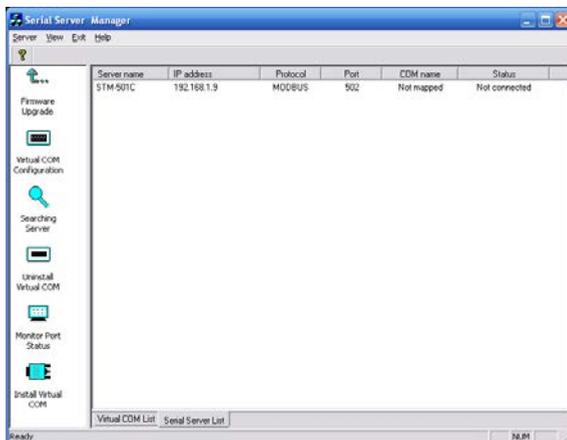
- Searching for STM-501C connected to the network
- Displaying and changing the configuration of STM-501C
- Installing virtual COM ports on a computer
- Displaying and configuring virtual COM ports
- Uninstalling virtual COM ports on a computer
- Upgrading the STM-501C firmware
- Monitoring Port Status
- Saving and Loading Configuration Files

Once the STM-501C is connected to the LAN the Manager software will be able to search the LAN for all connected STM-501C servers and will display them in a window by name and IP address.

4.1 Searching LAN for STM-501C

1. Select STM-501C Manager in the program file menu. If the default location was selected during the installation the program will be found under Start/Programs/ANTAIRA. Select Serial Server Manager. As soon as the STM-501C Manager opens it will initiate Searching Server and after a few seconds the MODBUS gateway List will display all (STM-501C) MODBUS gateways on the local area network.
2. To manually initiate a search for servers, on the menu side bar double click the Searching Server button. The Search Setup box will appear. It provides two options for searching for servers on the network:
 - Specify the IP address of the MODBUS gateway
 - Search all reachable servers

Enter the IP Address assigned to the desired MODBUS gateway or click Search all reachable servers, then OK. The Searching window is shown until all active MODBUS gateways on the LAN are listed in the MODBUS gateway List window.



4.2 Configuring Gateway Properties

Highlight the MODBUS gateway in the MODBUS gateway List window and double click to open the Gateway Properties window.

The Gateway Properties window is used to configure and store the Server configuration settings. Details for setting Properties are described in the next chapter.

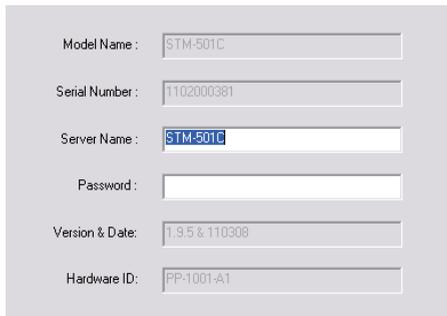
After configuring as needed, click Update to store the configuration in the server and click Yes to restart the server to make sure all settings are changed to conform to the desired application.

5 Gateway Properties

There are four ways to access the Gateway Properties and program the STM-501C: Manager Software, Console mode, Telnet or Web Server.

Instructions on how to move around in the user interface and change settings pertains to the Manager software are similar in others.

5.1 Server Configuration



Model Name :	<input type="text" value="STM-501C"/>
Serial Number :	<input type="text" value="1102000381"/>
Server Name :	<input type="text" value="STM-501C"/>
Password :	<input type="password"/>
Version & Date :	<input type="text" value="1.9.5 & 110308"/>
Hardware ID :	<input type="text" value="PP-1001-A1"/>

5.1.1 Server Name

The server name is user configurable. It is recommended users with more than one STM-501C connected to the LAN assign a new name to each. When the Manager software searches for servers on the LAN it will display the server name allowing the user to distinguish between STM-501Cs.

5.1.2 Serial Number

Each STM-501C has a unique serial number. This is fixed and cannot be changed.

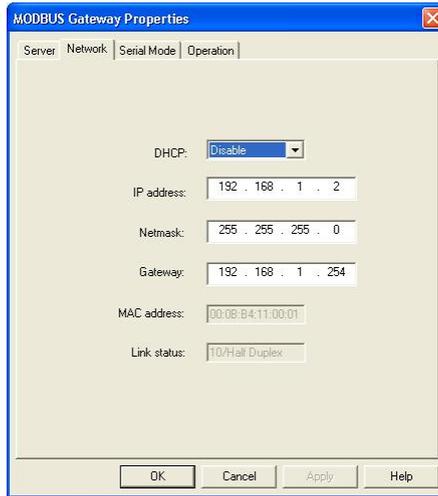
5.1.3 Password

Entering a password activates a security feature on the MODBUS gateway. Once a password is entered it will be required to access the menu and make changes.

5.1.4 Version & Date

The currently loaded version of the firmware, and when it was released, are shown here.

5.2 Network configuration



5.2.1 DHCP

DHCP servers are a part of numerous LAN management systems. The DHCP field has two selections, “Enable” or “Disable”. Arrow to the desired selection and select enter.

When enabled, STM-501C will send a DHCP request to the DHCP server, which will assign a dynamic IP address, netmask, and gateway to the STM-501C. If a DHCP server is not available on the network the STM-501C will time out after 10 seconds and the default values will remain. When DHCP is enabled, the IP address, Netmask and Gateway fields become inaccessible and cannot be changed by the user.

5.2.2 IP Address

A static IP address can also be assigned in this section of the menu. A dynamic address assigned by the DHCP server may change if the STM-501C loses the Ethernet connection or power is removed. The host (client) communication software requests a connection to the specific IP address of the MODBUS gateway. If the

DHCP reassigns a different IP address the software will not be able to communicate with the hardware. It is recommended to use a static IP address.

A static IP address is permanent and will not change unless changed in the menu. In most cases the network administrator establishes the static address to be used.

5.2.3 Netmask

The default LAN netmask is configured for a Class C address. This maybe reconfigured by the user.

5.2.4 Gateway

The gateway IP address allows users to access the MODBUS gateway from outside the LAN.

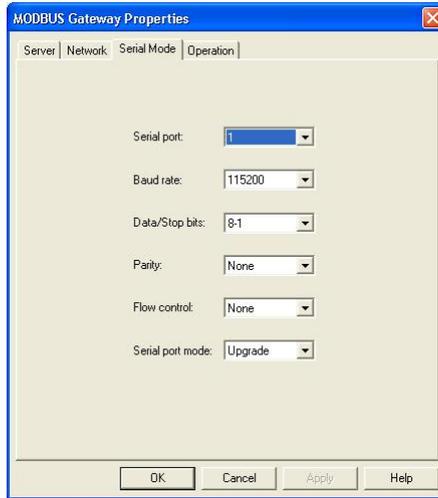
5.2.5 MAC Address

The MAC address is not adjustable. This is assigned in the factory. Every Ethernet device manufactured has it own unique MAC address.

5.2.6 Link Status

Link status automatically displays the type of Ethernet connection. It will either display 10 BaseT or 100BaseTX in full duplex or half duplex. This will depend on the LAN, switches, hubs used in the LAN topology.

5.3 Serial Interface Configuration



5.3.1 Serial Port

This field indicates the number of the port for with MODBUS gateway properties are currently being displayed. Changing the number in this field will cause all the other fields to display the properties for the specified port. Note, however, that before changing ports, any change to properties must be Updated (Saved) or the MODBUS gateway will not retain them.

5.3.2 Baud Rate

The serial port baud rate on the STM-501C must match the serial baud rate of the connected device unless using Virtual COM mode. In Virtual COM mode the application program can setup this parameter on the fly by sending normal COM command and STM-501C will set it on the fly as if STM-501C's serial port is one of PC's COM port.

5.3.3 Data/Parity/Stop

This setting will have to match the data format of the connected device unless using Virtual COM mode. In Virtual COM mode the application program can setup this parameter on the fly by sending normal COM command and STM-501C will set it on the fly as if STM-501C's serial port is one of PC's COM port.

5.3.4 Flow Control

The flow control setting must match the connected serial device unless using Virtual COM mode. In Virtual COM mode the application program can setup this parameter on the fly by sending normal COM command and STM-501C will set it on the fly as if STM-501C's serial port is one of PC's COM port.

5.3.5 Serial Port Mode

This allows configuration of the MODBUS gateway for the following modes of operation:

- RS-232 – When this mode is selected and the gateway is updated, the selected serial port will become a RS-232 serial port on the gateway.
- RS-422 – When this mode is selected and the gateway is updated, the selected serial port will become a RS-422 serial port on the gateway.
- RS-485 – When this mode is selected and the gateway is updated, the selected serial port will become a RS-485 serial port on the gateway.
- Console – When this mode is selected and the gateway is updated, a PC running a communication program such as Hyperterminal can communicate with the MODBUS gateway via the Console Mode serial port (Port 1 on STM-501C), displaying the Gateway Properties screen and allowing configuration of the gateway and its ports.
- Upgrade – When this mode is selected and the gateway is updated, firmware can be uploaded into the MODBUS gateway via the Console Mode serial port or a virtual COM port mapped to the number of the Console Mode serial port.
- Default – When this mode is selected and the gateway is updated, it will revert the gateway to its default configuration.

5.4 MODBUS configuration

MODBUS Gateway Properties

Server | Network | Serial Mode | Operation

Serial Port: 1 Char Timeout: 1
Serial Format: RTU Message Timeout: 10
Maximum connection: 1 Inactive Timeout: 0
Gateway Type: TCP Master to Serial Slave

Listening TCP port: 502

Use MBAP's UID or use specific UID 10 (0-255)
 Generate exception

Remote IP address/filiter: 255 . 255 . 255 . 255

OK Cancel Apply Help

MODBUS Gateway Properties

Server | Network | Serial Mode | Operation

Serial Port: 1 Char Timeout: 1
Serial Format: RTU Message Timeout: 10
Maximum connection: 1 Inactive Timeout: 0
Gateway Type: TCP Slave to Serial Master

UID range	Slave IP address	TCP port
1 to 8	0 . 0 . 0 . 0	502
9 to 16	0 . 0 . 0 . 0	502
17 to 24	0 . 0 . 0 . 0	502
25 to 32	0 . 0 . 0 . 0	502
33 to 40	0 . 0 . 0 . 0	502
41 to 48	0 . 0 . 0 . 0	502
49 to 56	0 . 0 . 0 . 0	502
57 to 64	0 . 0 . 0 . 0	502

OK Cancel Apply Help

5.4.1 Serial Format

Serial format define the data format on the serial interface where it is RTU or ASCII. The default setting is RTU.

5.4.2 Character Timeout

In the MODBUS RTU protocol, character timeout is used to signal the end of a message. If there is an improper timeout occurs during sending message time period, it will cause a CRC checksum error and the message will be discarded. To improve this situation, whenever STM-501C receives a byte from its serial port, it will check the data in its buffer and estimate the message length. Base on the message length STM-501C calculates CRC checksum. If the CRC checksum matches, we know that is the end of the message. Therefore even there is a timeout error with the message. STM-501C can correctly parse the message and convert the MODBUS RTU packet into MODBUS TCP packet.

5.4.3 Message Timeout

This parameter allows you to set the time during for STM-501C to wait for the response message. When message timeout occurs, STM-501C would response an exception to MODBUS master if generate exception is enabled.

5.4.4 Inactive Timeout

Inactive timeout allows STM-501C to tear down a TCP/IP connection when there is no activity for a period of time. In case there is a networks failure or power outage. All the TCP/IP connection resource would be occupied by previous connection that prevent from STM-501C to accept further incoming connection.

5.4.5 Maximum Connection

This parameter defines the number of TCP connection to the gateway in either MODBUS TCP master or slave mode. The maximum number of the connection is 8. When STM-501C is set as gateway of TCP master to serial slave, it can accept Polling/Query from up to 8 different TCP masters. Each query will handle in sequence since MODBUS serial interface can only handle one query at a time. All other queries will be queued until the previous query is finished or timeout. STM-501C can queue up to 8 queries. If there are more than 8 queries at one time, those queries will be discarded and eventually TCP master will get a timeout.

5.4.6 Gateway Type

This parameter defines what kind of MODBUS devices which STM-501C is connected to. There are two types of connection

- MODBUS TCP master to MODBUS serial slave.
- MODBUS TCP slave to MODBUS serial master.

The default setting is MODBUS TCP master to MODBUS serial slave. Each serial port in STM-501C can be configured into different gateway type.

5.4.7 Listening TCP port

The default listening MODBUS TCP port number is 502. It is recommended to use port number larger than 1024, if use TCP port number other than 502,. Since most of TCP port number under 1024 are used by particular protocol.

5.4.8 Use MBAP's UID or Use Specific UID

If this parameter is enabled, STM-501C will extract the UID in MBAP's header and convert the message into MODBUS serial format with the extracted UID. If this parameter is disabled, STM-501C sends the converted message to MODBUS serial slave device with UID defined in the "Use Specific UID" field.

5.4.9 Generate exception

When this parameter is enabled, STM-501C will generate exception message when slave device does not response to the query command or message timeout.

5.4.10 Remote IP Address/filter

This is a security feature that is activated when the IP address of the desired client is programmed into the remote IP Address setting of the menu. This tells the STM-501C to communicate with only the listed IP address and to filter out all other requests for connection. This feature is only enabled at gateway type TCP Master to Serial Slave.

The default setting is 255.255.255.255. It is recommended not to change this setting until the application has been tested and is communicating properly. At that point the address filtering feature of the STM-501C can be activated.

5.4.11 UID Range

STM-501C use UID range to map a query from a MODBUS serial master with an UID within this range to an IP address and a TCP port. This is only used when the gateway type is MODBUS TCP slave to MODBUS serial master.

5.4.12 Slave IP Address and TCP port

This is only used when the gateway type is MODBUS TCP slave to MODBUS serial master. STM-501C maps a message from MODBUS serial master to a MODBUS serial slave.

5.5 Update/Save

Gateway Properties must be updated separately for each serial port. Updating varies slightly depending on which of the four configuration user interfaces are used.

5.5.1 Updating the Gateway Properties in Manager Software

From the Gateway Properties screen, click the Update button to store the configuration settings for the currently selected port. The vcomui dialogue box will appear indicating you must restart the device before the new settings will take effect. Click Yes.



5.5.2 Saving Configuration Data in Console Mode or Telnet

Saving (updating) Gateway Properties is done from the Configuration screen. Access the Configuration screen by tabbing through the list of screens on the left side of the window and highlighting Configuration. There are four options shown on the right side of the Configuration screen: Save, Default, Running and Reset. Use Tab, Backspace, or arrow keys to move the cursor to the option position, then press Enter.

```

-----
Server      | Model Name      | : STM-501C
Network     | Serial Number   | : 1102000381
Serial Mode | Server Name    | : STM-501C
MODBUS     | Password       | :
Bridge     | Version & Date | : 1.9.5 & 110308
Monitor    | Hardware ID    | : N/A
Configuration

-----
<< Status and help line          ESC: return  Space bar: refresh page

```



```

-----
Server      | Model Name      | : STM-501C
Network     | Serial Number   | : 1102000381
Serial Mode | Server Name    | : STM-501C
MODBUS     | Password       | :
Bridge     | Version & Date | : 1.9.5 & 110308
Monitor    | Hardware ID    | : N/A
Configuration

-----
<< Status and help line          ESC: return  Space bar: refresh page

```

- Save – stores the configuration data to the MODBUS gateway flash memory and resets it.
- Default – restores the configuration data to factory default settings.
- Running – restores the configuration data to the last values stored in the flash memory.
- Reset – re-boots the MODBUS gateway, making it available for a client connection.

5.5.3 Web Server Interface

The Web Server interface provides the same updating options as Console Mode and Telnet. These are located at the bottom of all three Web Server pages. If a field is changed, you must click Save before leaving that page or the changes will be ignored.

The screenshot shows a web browser window titled "Server Page - Windows Internet Explorer" with the address bar displaying "http://192.168.1.9/". The page content is titled "STM-501C Web Configuration - STM-501C". A navigation sidebar on the left contains links for "Server", "Serial Port", "MODBUS", and "Bridge". The main content area features a warning message: "Note: If you leave this page without saving, all changes will be ignored!". Below this is a configuration form with the following fields and values:

Server name:	STM-501C
Serial number:	1102000381
Version & Date:	1.9.5 & 110308
Password:	
DHCP:	Disable
IP address:	192.168.1.9
Netmask:	255.255.255.0
Gateway:	192.168.1.254
MAC address:	00:0B:B4:81:02:A9
Link status:	100/Full Duplex
Hardware ID:	NA

At the bottom of the form are four buttons: "Save", "Default", "Running", and "Reset". A second warning message is located below the buttons: "Note: If you leave this page without saving, all changes will be ignored!". The browser's status bar at the bottom shows "Internet" and a zoom level of "100%".

6 Installing Virtual COM Port

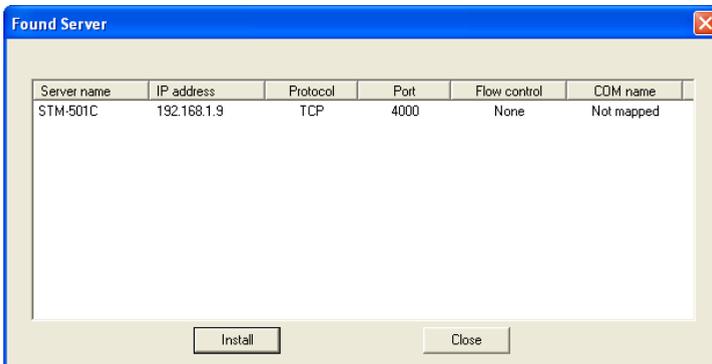
The Virtual COM Port feature allows Windows platform software using standard API calls to be used in an Ethernet application.

Running the Install Virtual COM port software adds a COM Port in the Device Manager of the operating system. The COM port will look like a standard COM port to Windows software used in most applications allowing the software to open a connection with the serial port located anywhere on the LAN. When using the virtual COM port the STM-501C is configured as a TCP or UDP Server.

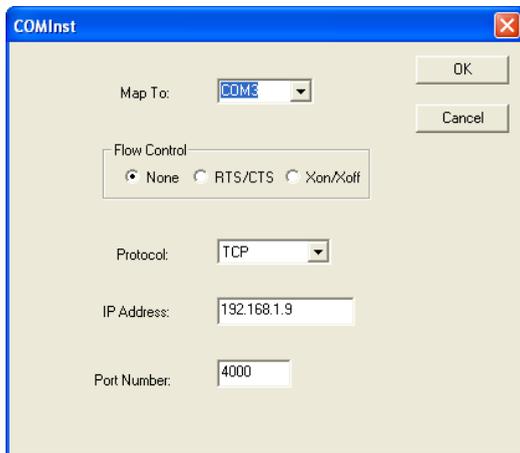
1. On the Desk Top select Start/Programs/ANTAIRA/**Install Virtual COM**.
2. Select the **Search all reachable servers** check box, then click OK.



3. The **Install Virtual COM** program will automatically search the LAN for all available STM-501C MODBUS gateways and display them in the **Found Server** window. Highlight the desired MODBUS gateway and click **Install**.



4. When the **COMInst** window opens select COM port # to map the MODBUS gateway to. The Flow Control, Protocol, IP Address, and Port Number will mirror the settings of the selected MODBUS gateway. Highlight the desired COM port # and select OK.



If any settings are changed in this part of the Virtual COM setup it will only affect the settings in the operating system Device Manager. It will not change the settings in the STM-501C.

The settings of the Virtual COM port in the Device Manager and the STM-501C Configuration menu must match. If the settings do not, the software connecting to the Virtual COM port will be unsuccessful in opening the COM port.

5. **Note:** In **Windows XP** a Hardware Installation window stating that the drivers have not been tested by Microsoft may appear. Select “Continue Anyway” to proceed with the installation.
6. When finish, click **Cancel** on the **Found Server** window. To confirm installation, go to the Device Manager and select Ports (COM & LPT). The installed Virtual COM port will be displayed as STM-501C COM#.

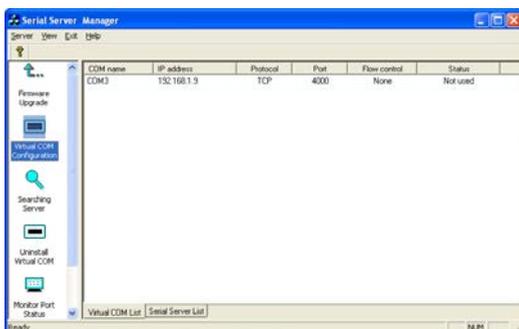


7 Configuring Virtual COM Port

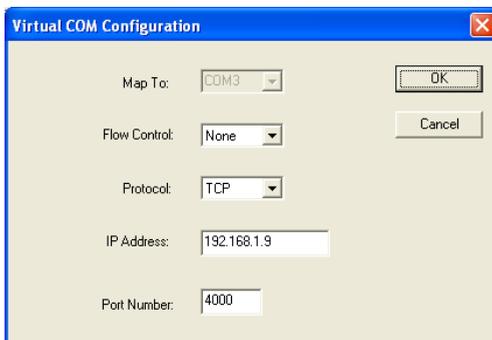
The Virtual COM port can be configured in the Device Manager of the operating system or the Manager software. In either case the IP Address, Port #, Protocol, and Flow Control settings must match the STM-501C settings for the software to open the Virtual COM port.

7.1 Configuration with Manager Software

1. At the Desk Top select Start/Programs/ANTAIRA/Serial Server Manager. Double click the Virtual COM Configuration button.



2. Double click the COM # displayed in the screen to open the configuration window.



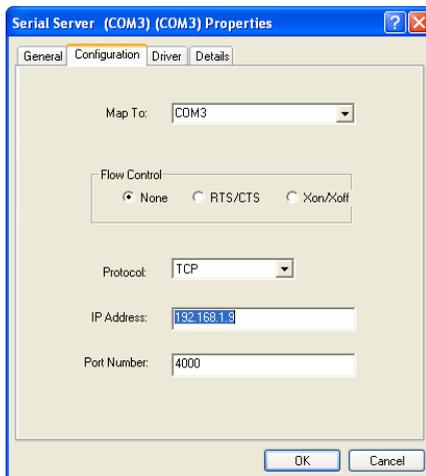
3. Make the adjustments and select OK to complete the changes.

7.2 Configuration with Device Manager

1. On the Desk Top select Start/Settings/Control Panel. Select the System Icon when the Control Panel window opens.
2. In the System Properties window select the Device Manager button.
3. In the Device Manager select the + button next to Ports (COM & LPT) to expand and see the STM-501C (COM #). Double click STM-501C (COM #) to open the Properties window.



4. Select the Configuration tab. From here the same settings found in the STM-501C Manager can be adjusted.

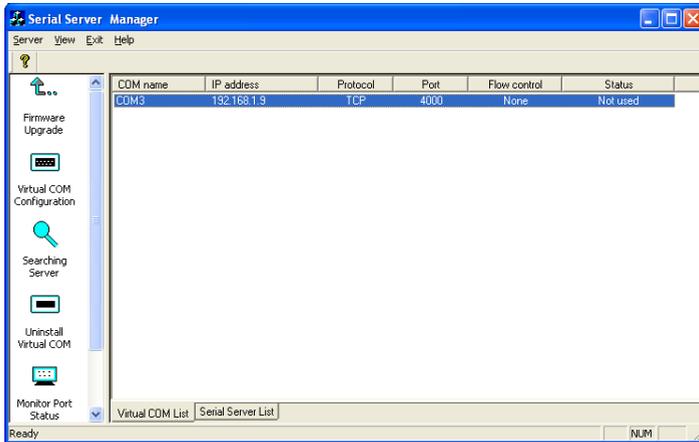


8 Uninstalling the Virtual COM Port

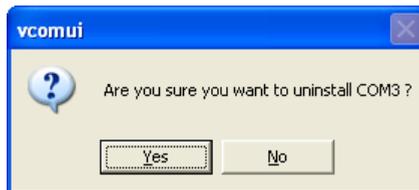
The Serial Server Manager Software **Uninstall Virtual Com port** feature will remove the mapped COM port in the Device Manager of Windows 2000 and XP operating systems. It may also be removed in the Device Manager of Windows 98, ME, NT, 2000, and XP. Windows 98 users will also find a Remove Virtual COM feature in the programs file.

8.1 Removing the Virtual COM port with Manager Software

1. At the Desk Top select Start/Programs/ANTAIRA/Serial Server Manager
2. In the Manager window select Virtual COM Configuration. Highlight the mapped COM port number to be removed.



3. Select Uninstall Virtual COM button. The Manager will ask for confirmation. Select Yes to complete the uninstall procedure.



8.2 Removing the Virtual COM Port using Device Manager

The screen shots were taken from a Windows XP operating system

1. On the Desktop select Start/Settings/Control Panel. Select the System icon when the Manager window opens.
2. Select Device Manager in the Systems Properties window. In the Device Manger window select the + next to Ports (COM & LPT) to expand.



3. Highlight STM-501C (COM #) to be removed, go the Action tab at the top of window and select uninstall. A confirm Device Removal window will appear. Select OK to proceed.



4. The STM-501C COM # will be removed and the Device Manager window will refresh and display the remaining COM ports.

9 Using Console

Before the STM-501C is installed on a LAN the Console Mode can be used to change the settings from the defaults. Connect a null modem cable between the serial port on the STM-501C and the COM port on the PC. Apply power to the STM-501C. The Run LED will flash. See chapter 5 for details on Gateway Properties.

Using Hyper Terminal open the connected PC COM port at a baud rate of 9600, Data bits 8, Parity None, Stop bits 1, and Flow control None. Ensure all the DIP switches are in the ON position for STM-501C.

To view the menu hit the space bar. There are six **Console Mode** screens: **Server**, **Network**, **Serial Mode**, **MODBUS**, **Bridge**, **Monitor** and **Configuration**. **Tab**, **Back Space** and **arrow** keys can be used to highlight the desired function on the screen list. Pressing **Enter** moves the cursor to the first field with the current screen. The configuration fields can be changed by pressing **Enter** and selecting from the list that appears. The **Escape** key moves the cursor back to the screen list. Pressing the **Space Bar** refreshes the page.

```
-----
Server      Model Name      : STM-501C
Network     Serial Number   : 1102000331
Serial Mode  Server Name     : STM-501C
MODBUS      Password       :
Bridge      Version & Date : 1.9.5 & 110308
Monitor     Hardware ID  : NA
Configuration

-----
<< Status and help line          ESC: return  Space bar: refresh page

-----
Server      DHCP          : Disable
Network     IP Address    : 192.168.1.9
Serial Mode  Netmask     : 255.255.0.
MODBUS      Gateway     : 192.168.1.254
Bridge      MAC Address  : 00:08:B4:81:02:A9
Monitor     Link Status  : 100/Full Duplex
Configuration

-----
<< Network Message              ESC: return  Space bar: refresh page
```

```

-----
Server      Serial Port      : 1
Network     Baud Rate       : 9600
Serial Mode Data/Stop bits : 8-1
MODBUS     Parity        : None
Bridge      Flow Control    : None
Monitor     Serial Port Mode : RS-232
Configuration Operation Mode : Bridge
-----
<< Serial Mode Message          ESC: return Space bar: refresh page

```

```

-----
Server      Serial Port      : 1
Network     Gateway type    : TCP Master to Serial Slave
Serial Mode Serial Format   : RTU
MODBUS     Character Timeout : 1 X 10ms. (0 - 65535)
Bridge      Message Timeout : 10 X 10ms. (0 - 65535)
Monitor     Inactive Timeout : 0 X Sec. (0 - 65535)
Configuration Maximum Connection : 1

Listening TCP port : 502
Use MBAP's UID     : Enable
Use specific UID   : 10
Generate exception : Disable
IP Address filter  : 255.255.255.255
-----
<< MODBUS Message              ESC: return Space bar: refresh page

```

```

-----
Server      Serial Port      : 1
Network     Port Number     : 4000
Serial Mode Protocol       : TCP
MODBUS     Connection Mode : Server
Monitor     TCP alive Timeout : 0 (0-255 min)
Configuration Serial Timeout : 0 (0-65535 sec)
Maximum Connection : 1
Remote IP Address : 255.255.255.255
-----
<< Bridge Message              ESC: return Space bar: refresh page

```

```

-----
Server      Serial Port      : 1
Network     Tx Bytes       : 0
Serial Mode Rx Bytes      : 0
MODBUS     IP Address     :
Bridge      Connection     : Not connected
Monitor     DTR/RTS      : 0/0
Configuration DCD/DSR/CTS : 0/0/0
-----
<< Monitor Message             ESC: return Space bar: refresh page

```

```

-----
Server      | Save
Network    | Default
Serial Mode| Running
MODBUS     | Reset
Bridge
Monitor
Configuration
-----
<< Configuration ...          ESC: return  Space bar: refresh page

```

Once all the changes have been made move to the **Configuration** screen, select **Save** and press **Enter**. The restart message will appear. Select **Yes** to save changes. This is necessary to write the settings to the server.

```

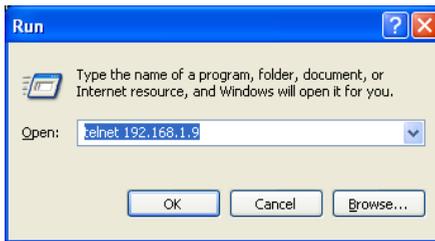
-----
Server      | Save
Network    | Default
Serial Mode| Running
MODBUS     | Reset
Bridge
Monitor
Configuration
-----
                |
                | You must restart the device before
                | the new setting will take effect.
                | Save now? Yes No
                |
                |
-----
<< Enter to save settings          ESC: return  Space bar: refresh page

```

10 Using Telnet

Telnet can be used to configure the MODBUS gateway from any PC on the LAN. The Telnet window displays the same configuration information shown in Console Mode and allows Gateway Properties to be configured. See chapter 5 for details on Gateway Properties.

Ensure the PC and STM-501C are connected to the LAN, and the MODBUS gateway is in RS-232, RS-422 or RS-485 mode before you can telnet to it and access the configuration screens. From the **Desktop**, click **Start**, then **Run**. The Run dialogue box will open. Type in Telnet and the IP address of the MODBUS gateway to be configured, then click **OK**.

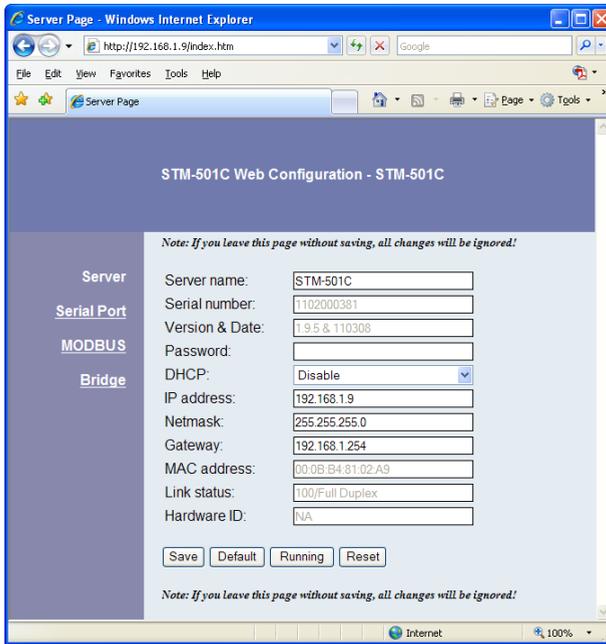


The **Telnet** window will open and the **Server** screen will appear. See chapter 9 for configuration screens and navigation.

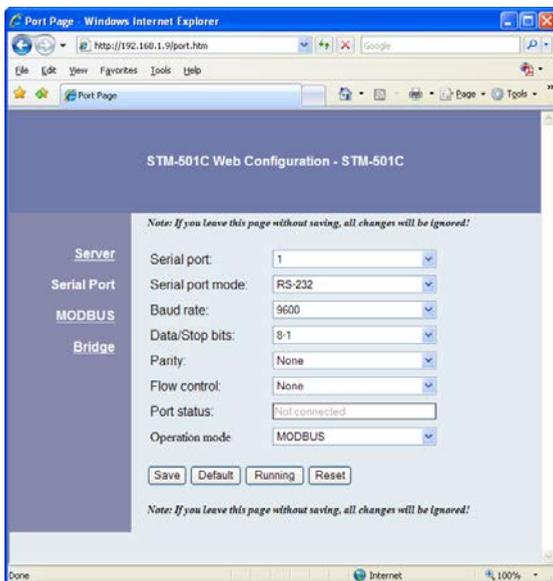
11 Using Web Server

The Web Server can be used to configure the MODBUS gateway from any web browser software (such as Internet Explorer). Gateway Properties can be set up using three browser pages. See chapter 5 for details on Gateway Properties.

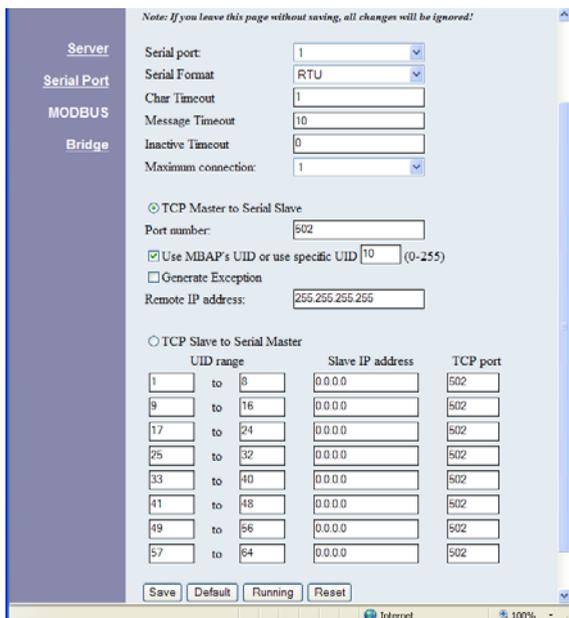
In Internet Explorer type the IP Address of the MODBUS gateway into the address field near the top of the window and press the **Enter** key. The following window will appear:



Navigate and change properties as required using the mouse and keyboard. To change serial port properties, click **Serial Port** on the left side of the browser window. The following page will appear:



To change other operational properties, click **MODBUS & Bridge** on the left side of the browser window. The following page will appear:



Note: If you leave this page without saving, all changes will be ignored!

Server
 Serial Port
 MODBUS
 Bridge

Serial port:
 Port number:
 TCP
 Serial Timeout: (0-65535 sec)
 TCP alive Timeout: (0-255 min)
 Connection mode:
 Connection at:
 Maximum connection:
 Remote IP address:
 UDP

Destination IP address range		Port
<input type="text" value="0.0.0.0"/>	to <input type="text" value="0.0.0.0"/>	<input type="text" value="4000"/>
<input type="text" value="0.0.0.0"/>	to <input type="text" value="0.0.0.0"/>	<input type="text" value="4000"/>
<input type="text" value="0.0.0.0"/>	to <input type="text" value="0.0.0.0"/>	<input type="text" value="4000"/>
<input type="text" value="0.0.0.0"/>	to <input type="text" value="0.0.0.0"/>	<input type="text" value="4000"/>

Source IP address range

<input type="text" value="0.0.0.0"/>	to <input type="text" value="0.0.0.0"/>
<input type="text" value="0.0.0.0"/>	to <input type="text" value="0.0.0.0"/>
<input type="text" value="0.0.0.0"/>	to <input type="text" value="0.0.0.0"/>
<input type="text" value="0.0.0.0"/>	to <input type="text" value="0.0.0.0"/>

Note: If you leave this page without saving, all changes will be ignored!

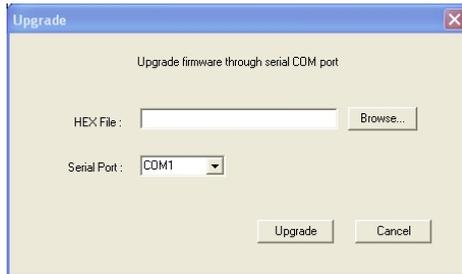
Done Internet 100%

Click **Save** to store changes to the MODBUS gateway. Settings for each Port must be saved separately.

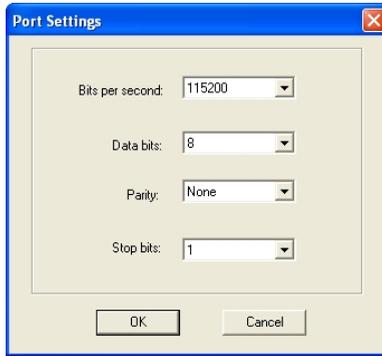
12 Upgrading the MODBUS gateway Firmware

New firmware may be available at times on our web site and may be downloaded and flashed to the STM-501C currently in use. The user can upgrade using a direct connection to the STM-501C serial port or the Virtual COM port feature.

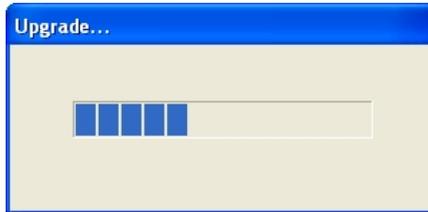
1. Download the new upgrade .hex file and place in a folder.
2. Set STM-501C to Upgrade mode. Ensure that the DIP switches on STM-501C are all in the OFF position.
3. Connect a null modem cable between the PC and the STM-501C. When using the Virtual COM mode a cable is not required.
4. Open the Manager software and select the **Firmware Upgrade** button.
5. In the Serial Port selection options select the COM port number used to connect the PC to the STM-501C. If using the Virtual COM port select that number.
6. Select Browse, find the location of the firmware, select Open, and then select the upgrade button.



7. A serial menu will appear allowing the upgrade software to be setup the same as the STM-501C serial settings. **The settings must match or the upgrade will fail.**



8. A window showing the Upgrade progress will appear followed by a window indicating the Upgrade was successful.



9. STM-501C will reset itself to complete the upgrade process.