Modbus®/TCP

Interface Configuration Quick Start

COMTROL®

Trademark Notices

Comtrol, DeviceMaster, and PortVision are registered trademarks of Comtrol Corporation.

Concept is a trademark of Schneider Electric.

Modbus is a registered trademark of Schneider Electric.

PLC is a registered trademark of Allen-Bradley Company, Inc.

Ethernet is a registered trademark of Digital Equipment Corporation, Intel, and Xerox Corporation.

SIMATIC and Step7 are registered trademarks of Siemens AG.

Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.

Other product names mentioned herein may be trademarks and/or registered trademarks of their respective owners.

Eighth Edition, January 31, 2019

Comtrol Corporation makes no representations or warranties with regard to the contents of this document or to the suitability of the Comtrol product for any particular purpose. Specifications subject to change without notice. Some software or features may not be available at the time of publication. Contact your reseller for current product information.

Document Number: 2000477 Rev H

Table of Contents

Overview

This *Quick Start* is intended to help you quickly set-up serial or Ethernet device with DeviceMaster MOD or DeviceMaster UP product installations.

Note: *The DeviceMaster MOD or UP is simply referred to as the DeviceMaster in this document.*

You can use this document to locate software and installation documentation for the DeviceMaster to quickly configure:

- Interfaces to serial Modbus/RTU and Modbus/ASCII slaves and masters
- Read-only devices such as barcode scanners and some RFID readers
- Read/write devices such as printers and some weigh scales

Comtrol Modbus Solutions

When you order the Modbus part number for your DeviceMaster, Modbus Router is loaded on the DeviceMaster by default, so you will need to upload the Modbus/TCP firmware. You may want to review our other Modbus solutions to make sure that the feature rich Modbus/TCP application is what you want to use. Optionally, Modbus Router or Modbus Server may be more effective for your particular environment.

The Comtrol web site provides information about the differences between the three Modbus solutions:

- MODBUS/TCP
- MODBUS SERVER
- MODBUS ROUTER

If Modbus Server or Modbus Router is a better solution, you can DOWNLOAD the appropriate firmware and corresponding documentation.

Modbus/TCP Installation Overview

The DeviceMaster follows these installation steps.

1. Connect the DeviceMaster to the network using the DeviceMaster MOD | DeviceMaster UP Hardware Installation Guide.
2. Download PortVision DX and install the latest version.
3. Configure the DeviceMaster network settings using PortVision DX.
4. *Depending on the DeviceMaster model*, do the following:
   - *Models without Modbus/TCP loaded, which includes all DeviceMaster MOD or UP models unless you special-ordered Modbus/TCP to be installed* - you ***must*** download and install the software assembly (.msi), which contains the Modbus/TCP firmware and supporting files.
   - *Models with Modbus/TCP loaded on the DeviceMaster*, you should check to see if a later version of Modbus/TCP is available for installation. Check the Modbus/TCP version in PortVision DX against the web site to see if a later version is available. Typically, you should download and install the latest .msi file and upload the latest version, which may include updates or enhancements.

   Note: *Models that have Modbus/TCP loaded on the DeviceMaster at the factory are identified in PortVision DX and the DeviceMaster MOD or UP is labeled accordingly.*
5. If necessary, download and install the Modbus/TCP firmware into the DeviceMaster using PortVision DX.
6. Verify any Ethernet TCP/IP devices are connected to the same subnet as the DeviceMaster.
7. Configure serial or Ethernet TCP/IP characteristics using the DeviceMaster embedded web page (*Server Configuration*).
   - Modbus/RTU serial slave devices (Page 10)
   - Modbus/ASCII serial slave devices (Page 12)
   - Modbus/RTU serial master (Page 14)
   - Modbus/ASCII serial master (Page 16)
   - Read-only raw/ASCII serial devices (Page 19)
   - Read-only raw/ASCII Ethernet devices (Page 29)
   - Read/write raw/ASCII serial devices (Page 39)
   - Read/write raw/ASCII Ethernet devices (Page 54)
8. Optionally, the DeviceMaster MOD | DeviceMaster UP Modbus/TCP User Guide provides detailed information about each web page.
9. You may want to reference the *Programming Interface* chapter in the *DeviceMaster MOD | DeviceMaster UP Modbus/TCP User Guide*.
10. Optionally, reference the example PLC programs in the *DeviceMaster MOD | DeviceMaster UP Modbus/TCP User Guide*.
11. Connect any serial device or devices using the DeviceMaster MOD | DeviceMaster UP Hardware Installation Guide.

Locating the Latest Software and Documentation

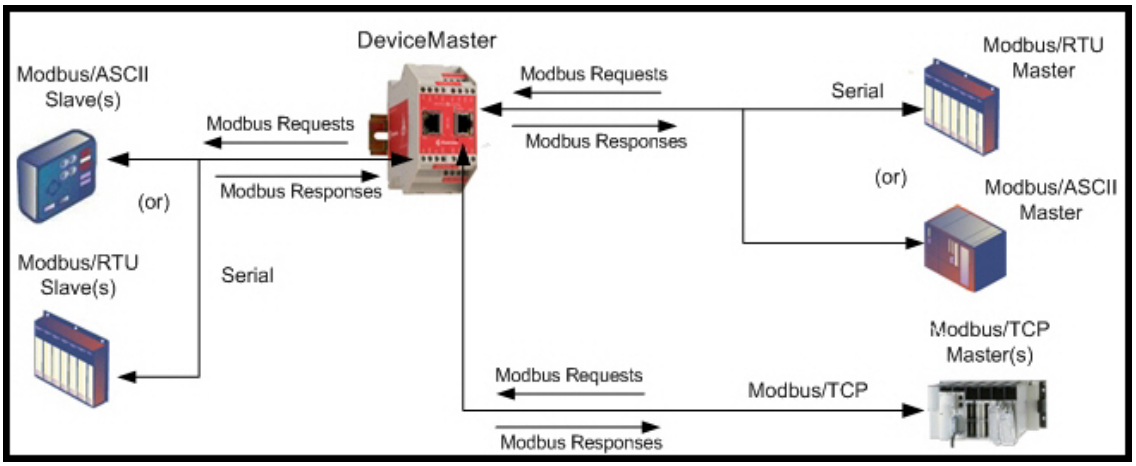
You can use the links in this table to check for updated software or documentation.

Software and Documentation		FTP
PortVision DX (Windows)	Use PortVision DX to manage Comtrol Ethernet-attached devices to: • Scan the network for attached devices • View networked devices in real-time • Access product-specific network settings configurations • Assign IP addresses and network settings to one or multiple devices • Upload the latest firmware or Bootloader • Save and load configuration files • Access DeviceMaster configuration web pages • Access Telnet/SSH sessions • Remotely reboot devices • Download technical documentation • Enable event logging to assist in monitoring and troubleshooting • Create shortcuts to quickly access your favorite applications • Organize devices into folders and create multiple views • Enter notes about a folder or device	
Modbus/TCP Firmware	This is the application that may or may not have been loaded on the DeviceMaster depending on the model that was ordered. You may need to use PortVision DX to load this firmware.	
DeviceMaster MOD | DeviceMaster UP Hardware Installation and Configuration Guide	This contains hardware installation, configuration information, and connector information. This includes using PortVision DX to configure the IP address and if necessary, how to update the firmware.	
Modbus/TCP Interface Configuration Quick Start	This document with web interface configuration procedures.	
Modbus/TCP User Guide	The *User Guide* contains detailed information about the Modbus/TCP (application) firmware, which includes additional information about the web configuration interface for Modbus/TCP. It also discusses the example PLC programs that were installed on your system and provides a *Programming Interface* chapter.	
DeviceMaster Filtering and Data Extraction Reference Guide	This *Guide* discusses the data extraction and filtering processes in the DeviceMaster are designed to off load as much work as possible from the PLC and/or application and provide a very simple and easy to use interface for standard RFID and barcode data. This functionality and interface is designed to save dozens, possibly hundreds of lines of ladder logic in a typical PLC program.	

Configuring Modbus/RTU and Modbus/ASCII Slaves and Masters

For pure Modbus devices, the DeviceMaster supports:

- Modbus/RTU serial slaves
- Modbus/ASCII serial slaves
- Modbus/RTU serial masters
- Modbus/ASCII serial masters
- Modbus/TCP masters



Modbus Master(s) to Modbus Slave(s)

Note: *All masters can communicate to all slaves.*

Prerequisites

Before you can configure the serial ports for these modes, make sure that you have done the following:

- Installed the hardware
- Configured the DeviceMaster IP address using PortVision DX or the web interface
- If necessary, uploaded the latest Modbus/TCP firmware using PortVision DX or the web interface

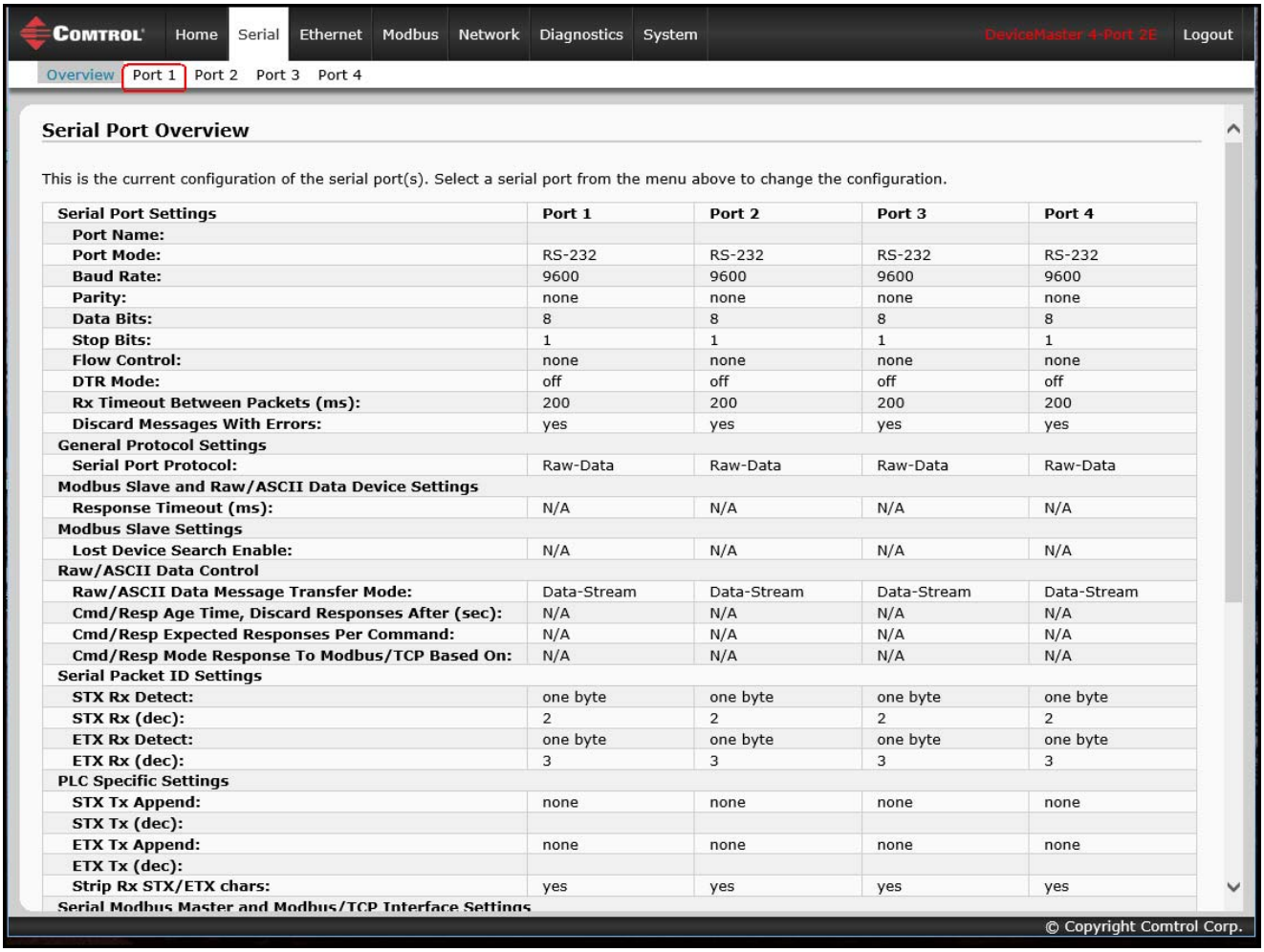
Note: *The DeviceMaster provides an Modbus/TCP interface, which may or may not have the Modbus/TCP firmware loaded at the factory (depending on the model you purchased). Models that have Modbus/TCP loaded on the DeviceMaster are identified in PortVision DX and the DeviceMaster is labeled accordingly.*

If you need to perform any of these procedures or locate the latest files, see the *Overview* on Page 5.

Configuring Modbus/RTU Slaves

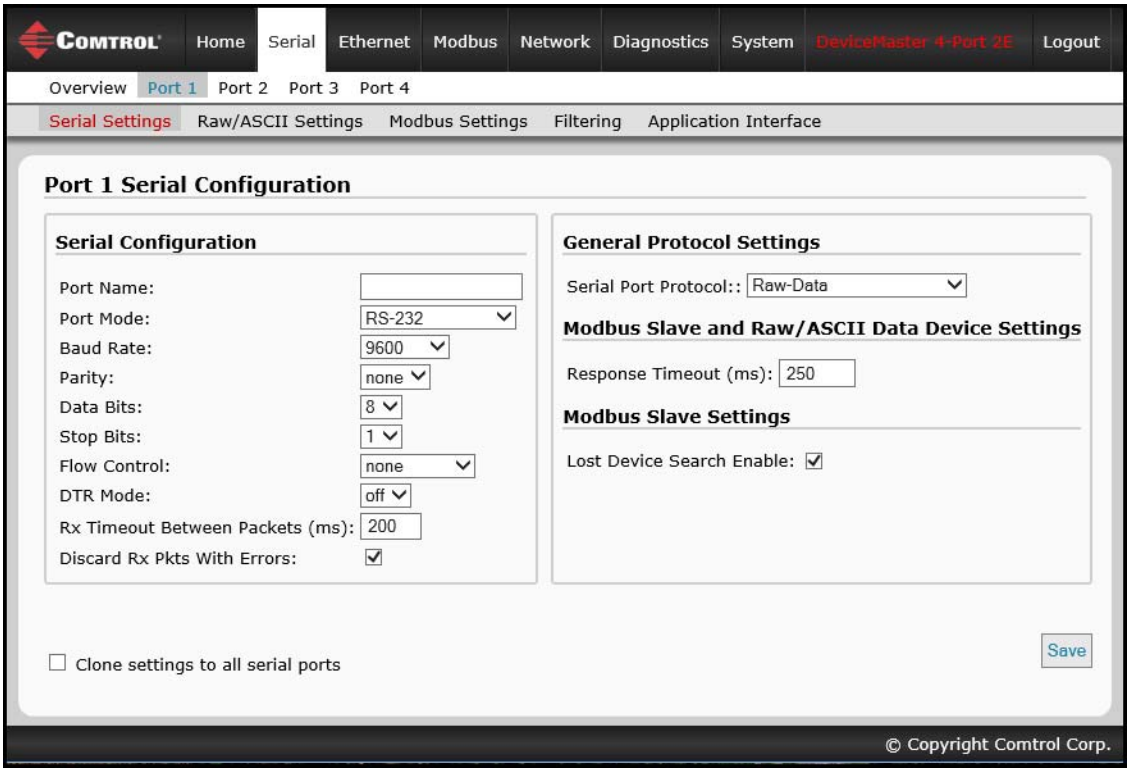
Use the following procedure to configure a serial interface to Modbus/RTU slave(s).

1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Click the **Serial** menu, which opens to the *Serial Port Overview* page.

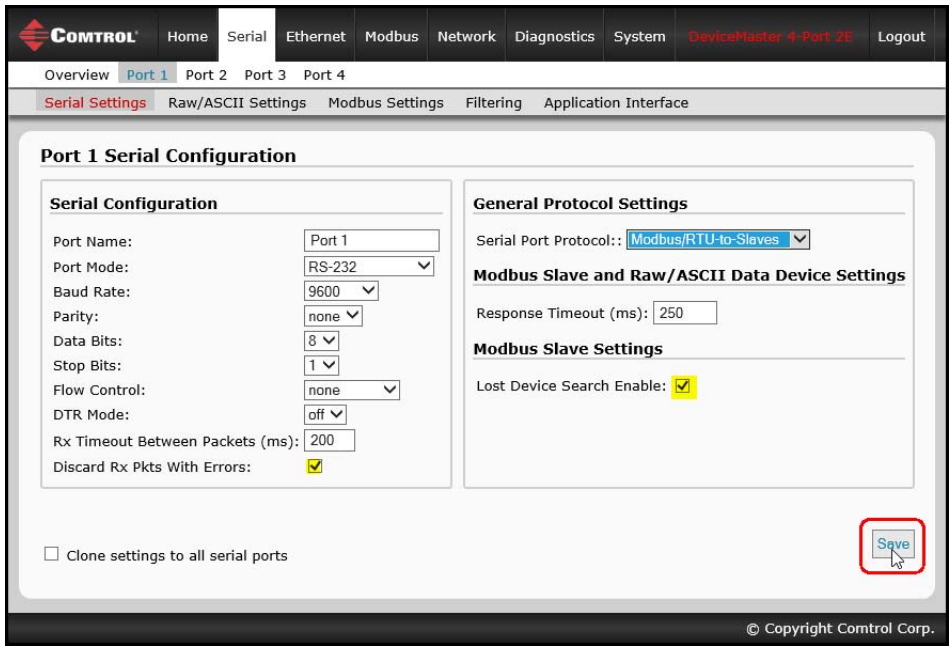


Serial Port Settings	Port 1	Port 2	Port 3	Port 4
Port Name:				
Port Mode:	RS-232	RS-232	RS-232	RS-232
Baud Rate:	9600	9600	9600	9600
Parity:	none	none	none	none
Data Bits:	8	8	8	8
Stop Bits:	1	1	1	1
Flow Control:	none	none	none	none
DTR Mode:	off	off	off	off
Rx Timeout Between Packets (ms):	200	200	200	200
Discard Messages With Errors:	yes	yes	yes	yes
General Protocol Settings				
Serial Port Protocol:	Raw-Data	Raw-Data	Raw-Data	Raw-Data
Modbus Slave and Raw/ASCII Data Device Settings				
Response Timeout (ms):	N/A	N/A	N/A	N/A
Modbus Slave Settings				
Lost Device Search Enable:	N/A	N/A	N/A	N/A
Raw/ASCII Data Control				
Raw/ASCII Data Message Transfer Mode:	Data-Stream	Data-Stream	Data-Stream	Data-Stream
Cmd/Resp Age Time, Discard Responses After (sec):	N/A	N/A	N/A	N/A
Cmd/Resp Expected Responses Per Command:	N/A	N/A	N/A	N/A
Cmd/Resp Mode Response To Modbus/TCP Based On:	N/A	N/A	N/A	N/A
Serial Packet ID Settings				
STX Rx Detect:	one byte	one byte	one byte	one byte
STX Rx (dec):	2	2	2	2
ETX Rx Detect:	one byte	one byte	one byte	one byte
ETX Rx (dec):	3	3	3	3
PLC Specific Settings				
STX Tx Append:	none	none	none	none
STX Tx (dec):				
ETX Tx Append:	none	none	none	none
ETX Tx (dec):				
Strip Rx STX/ETX chars:	yes	yes	yes	yes
Serial Modbus Master and Modbus/TCP Interface Settings				

3. Click **Port N** for the port you want to configure, where **N** is the port number, which opens the corresponding *Port Serial Configuration* page.



4. If desired, enter a **Port Name**.
5. Configure the serial characteristics for your device and leave the **Discard Rx Packets With Errors** option enabled.
6. Under the *General Protocol Settings* section, configure the serial port for Modbus/RTU-to-Slaves operation.
   a. Set the **Serial Port Protocol** option to **Modbus/RTU-to-Slaves**.
   b. Under the *Modbus Slave and Raw/ASCII Data Device Settings* section, set the **Device Response Timeout** value or leave at the default.
   c. *2/4-port models only*: Under the *Modbus Slave Settings* section, enable the **Lost Device Search Enable** option if you want the DeviceMaster to search for a lost Modbus slave device on other Modbus/RTU and/or Modbus/ASCII slave ports that also have this option enabled.



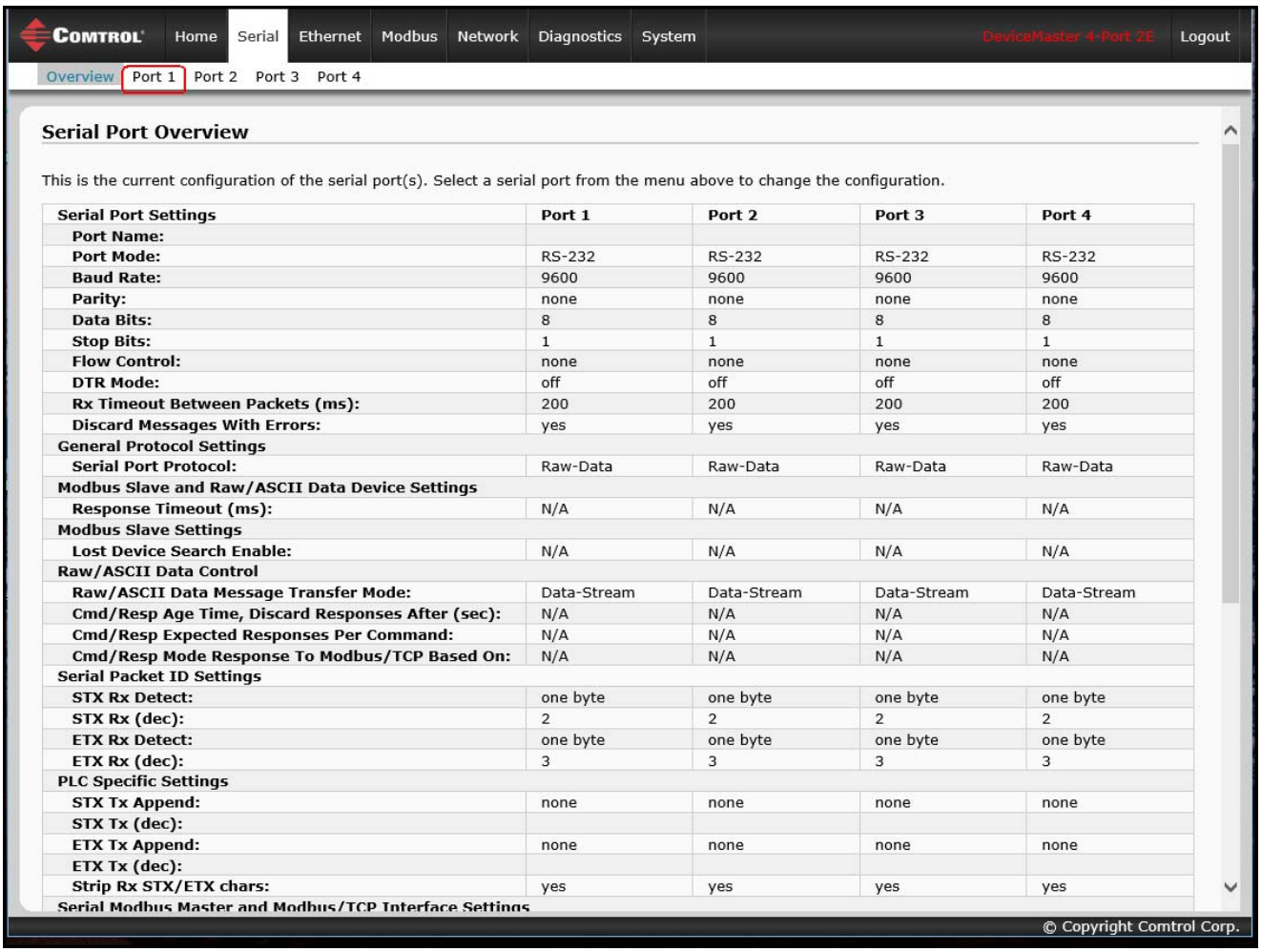
7. Click the **Save** button.

Note: *If necessary, see* *Filtering/Data Extraction Configuration on Page 69* or *Application Socket Configuration on Page 77* *for additional configuration procedures.*

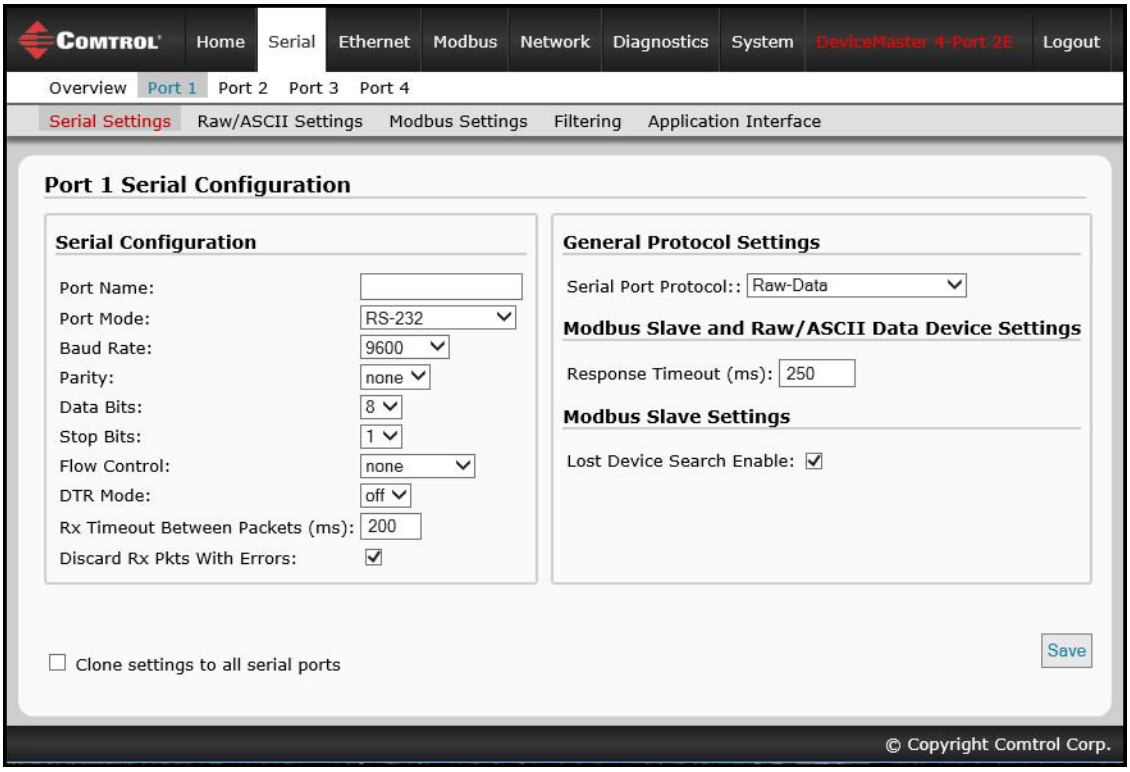
Configuring Modbus/ASCII Slaves

Use the following procedure to configure a serial interface to Modbus/ASCII slave(s).

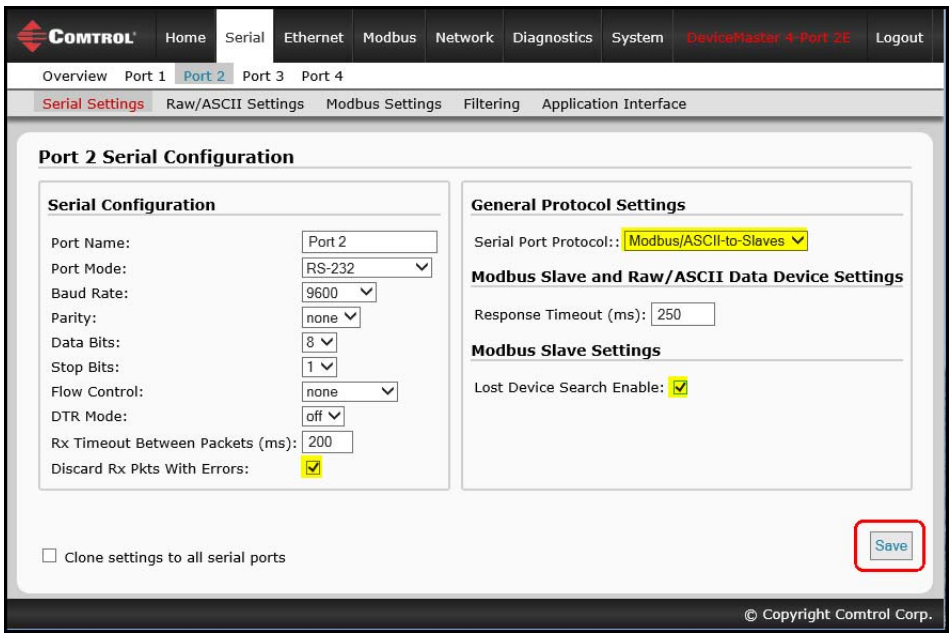
1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Click the **Serial** menu, which opens to the *Serial Port Overview* page.



3. Click **Port N** for the port you want to configure, where **N** is the port number, which opens the corresponding *Port Serial Configuration* page.



4. If desired, enter a **Port Name**.
5. Configure the serial characteristics for your device and leave the **Discard Rx Packets With Errors** option enabled.
6. Under the *General Protocol Settings* section, configure the serial port for Modbus/ASCII-to-Slaves operation.
   a. Set the **Serial Port Protocol** option to **Modbus/ASCII-to-Slaves**.
   b. Under the *Modbus Slave and Raw/ASCII Data Device Settings* section, set the **Device Response Timeout** value or leave at the default.



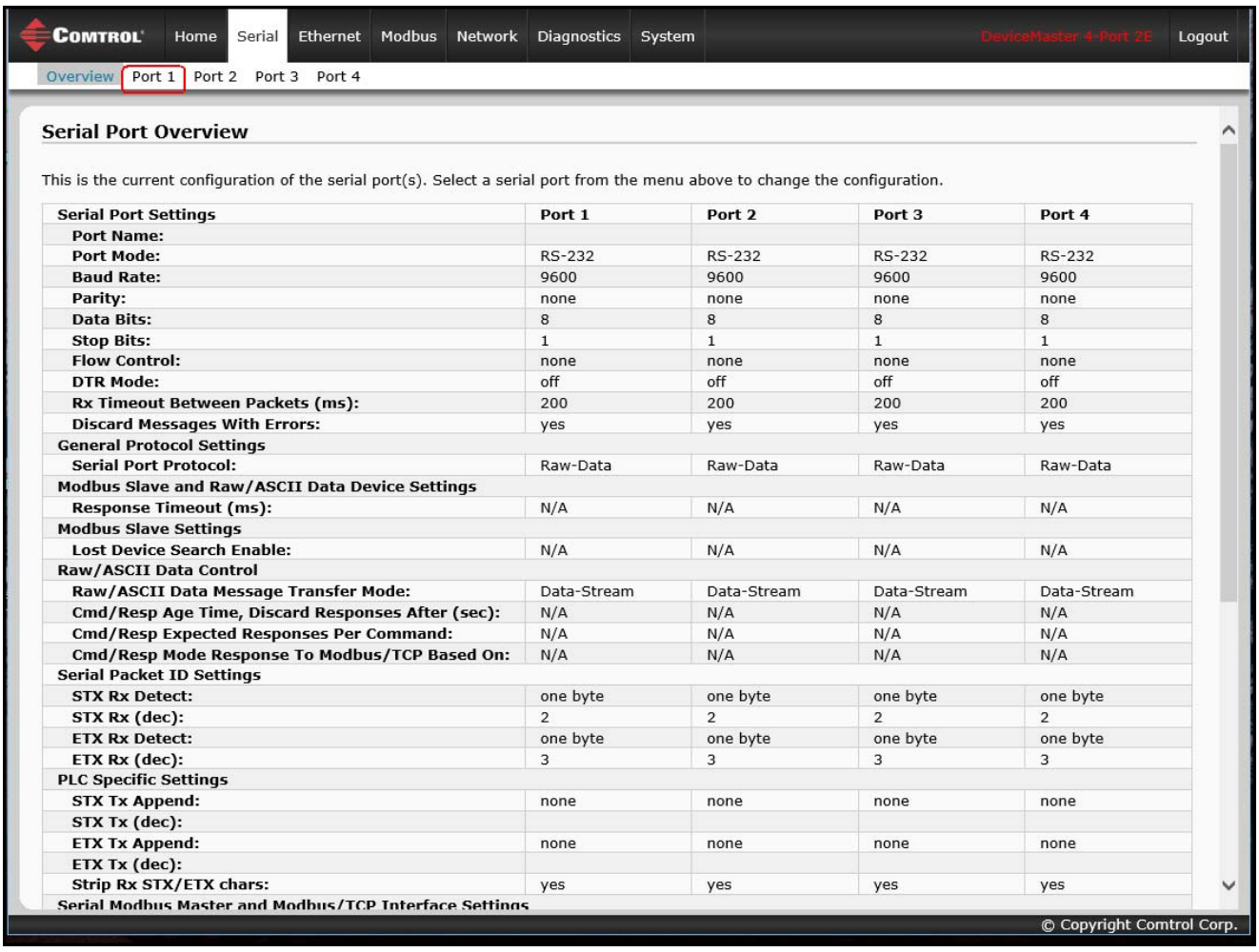
   c. *2/4-port models only*: Under the *Modbus Slave Settings* section, enable the **Lost Device Search Enable** option if you want the DeviceMaster to search for a lost Modbus slave device on other Modbus/RTU and/or Modbus/ASCII slave ports that also have this option enabled.
7. Click the **Save** button.

Note: *If necessary, see* *Filtering/Data Extraction Configuration on Page 69 or Application Socket Configuration on Page 77* *for additional configuration procedures.*

Configuring Modbus/RTU Master

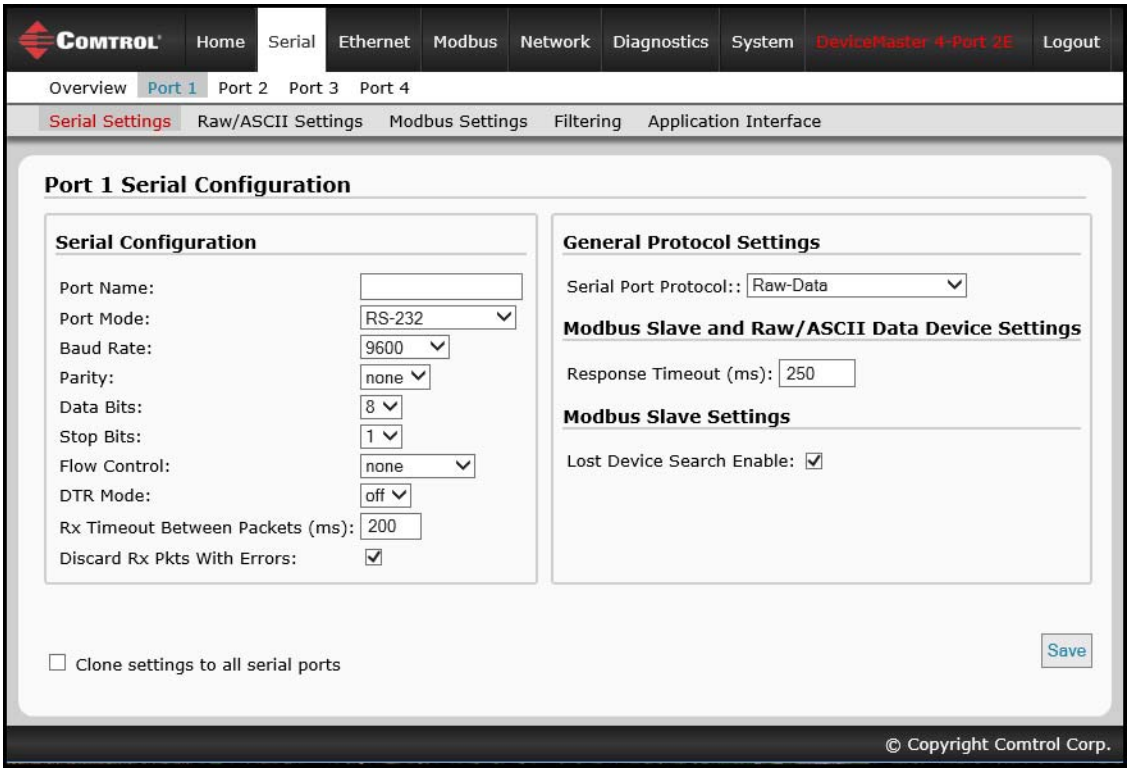
Use the following procedure to configure a serial interface to Modbus/RTU master.

1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Click the **Serial** menu, which opens to the *Serial Port Overview* page.



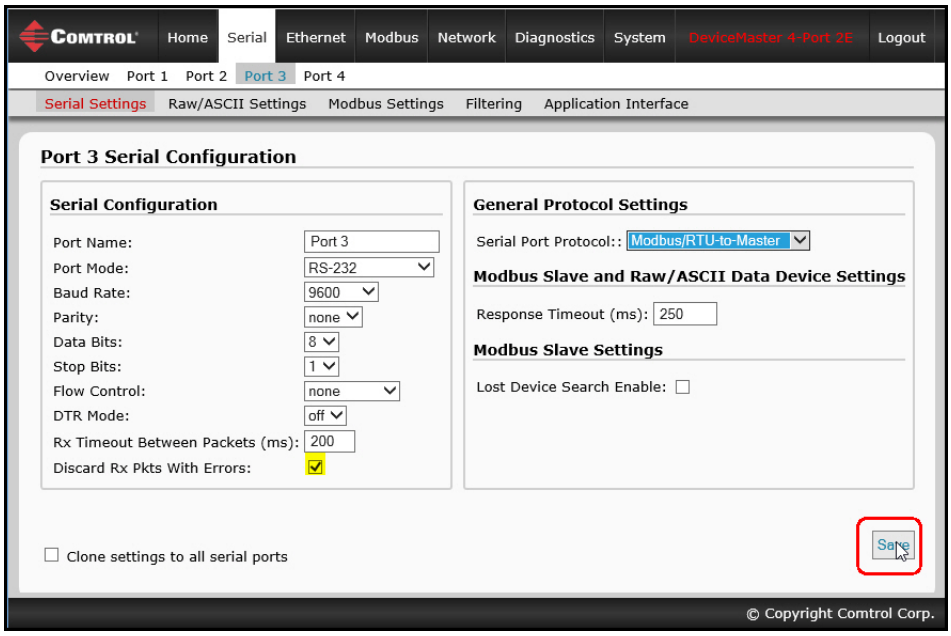
Serial Port Settings	Port 1	Port 2	Port 3	Port 4
Port Name:				
Port Mode:	RS-232	RS-232	RS-232	RS-232
Baud Rate:	9600	9600	9600	9600
Parity:	none	none	none	none
Data Bits:	8	8	8	8
Stop Bits:	1	1	1	1
Flow Control:	none	none	none	none
DTR Mode:	off	off	off	off
Rx Timeout Between Packets (ms):	200	200	200	200
Discard Messages With Errors:	yes	yes	yes	yes
General Protocol Settings				
Serial Port Protocol:	Raw-Data	Raw-Data	Raw-Data	Raw-Data
Modbus Slave and Raw/ASCII Data Device Settings				
Response Timeout (ms):	N/A	N/A	N/A	N/A
Modbus Slave Settings				
Lost Device Search Enable:	N/A	N/A	N/A	N/A
Raw/ASCII Data Control				
Raw/ASCII Data Message Transfer Mode:	Data-Stream	Data-Stream	Data-Stream	Data-Stream
Cmd/Resp Age Time, Discard Responses After (sec):	N/A	N/A	N/A	N/A
Cmd/Resp Expected Responses Per Command:	N/A	N/A	N/A	N/A
Cmd/Resp Mode Response To Modbus/TCP Based On:	N/A	N/A	N/A	N/A
Serial Packet ID Settings				
STX Rx Detect:	one byte	one byte	one byte	one byte
STX Rx (dec):	2	2	2	2
ETX Rx Detect:	one byte	one byte	one byte	one byte
ETX Rx (dec):	3	3	3	3
PLC Specific Settings				
STX Tx Append:	none	none	none	none
STX Tx (dec):				
ETX Tx Append:	none	none	none	none
ETX Tx (dec):				
Strip Rx STX/ETX chars:	yes	yes	yes	yes
Serial Modbus Master and Modbus/TCP Interface Settings				

3. Click **Port N** for the port you want to configure, where **N** is the port number, which opens the corresponding *Port Serial Configuration* page.



4. If desired, enter a **Port Name**.
5. Configure the serial characteristics for your device and leave the **Discard Rx Packets With Errors** option enabled.
6. Under the *General Protocol Settings* section, set the **Serial Port Protocol** option to **Modbus/RTU-to-Master**.
7. Click the **Save** button.

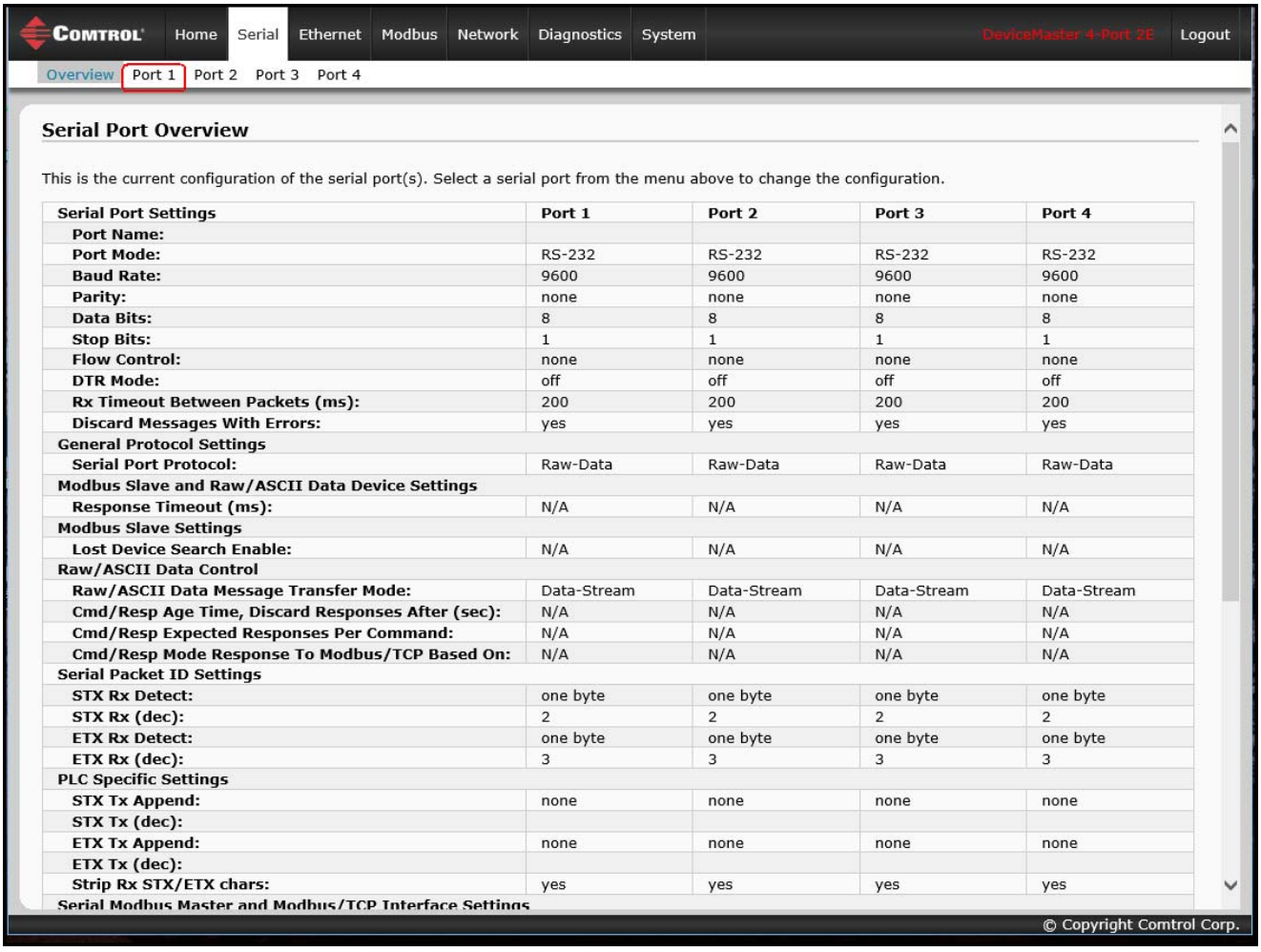
   Note: *If necessary, see* *Filtering / Data Extraction Configuration on Page 69 or Application Socket Configuration on Page 77* *for additional configuration procedures.*



Configuring Modbus/ASCII Master

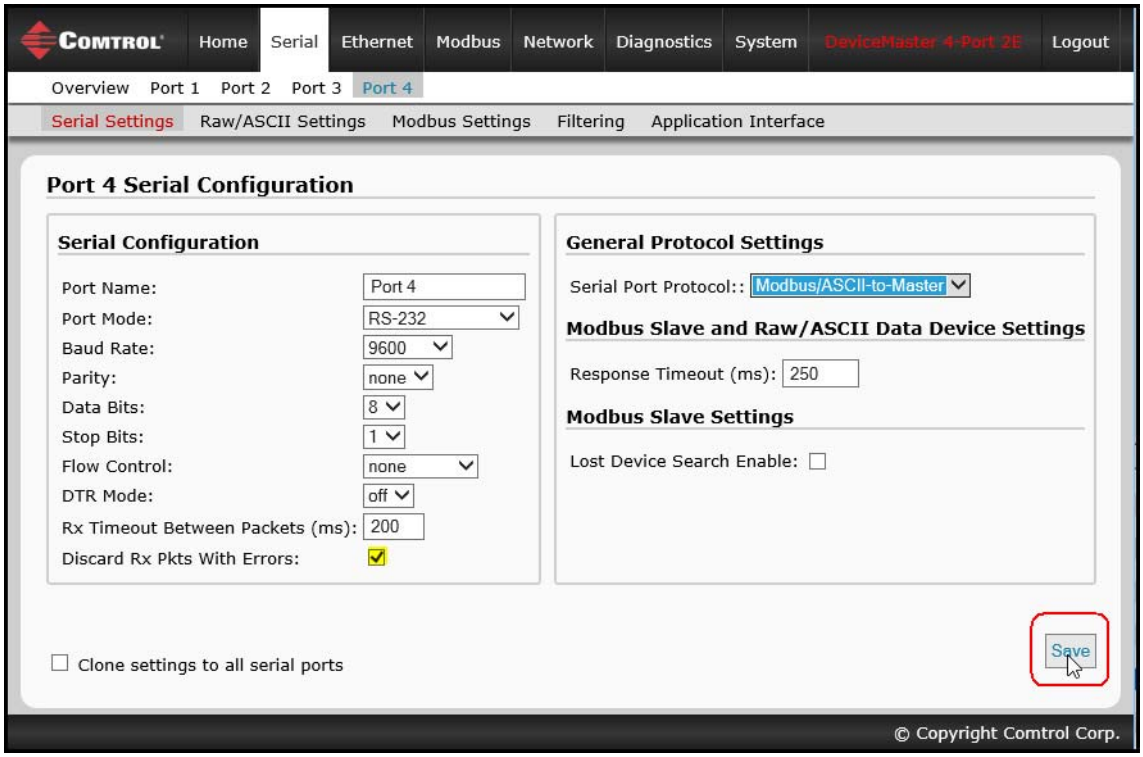
Use the following procedure to configure a serial interface to Modbus/ASCII master.

1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Click the **Serial** menu, which opens to the *Serial Port Overview* page.



Serial Port Settings	Port 1	Port 2	Port 3	Port 4
Port Name:				
Port Mode:	RS-232	RS-232	RS-232	RS-232
Baud Rate:	9600	9600	9600	9600
Parity:	none	none	none	none
Data Bits:	8	8	8	8
Stop Bits:	1	1	1	1
Flow Control:	none	none	none	none
DTR Mode:	off	off	off	off
Rx Timeout Between Packets (ms):	200	200	200	200
Discard Messages With Errors:	yes	yes	yes	yes
General Protocol Settings				
Serial Port Protocol:	Raw-Data	Raw-Data	Raw-Data	Raw-Data
Modbus Slave and Raw/ASCII Data Device Settings				
Response Timeout (ms):	N/A	N/A	N/A	N/A
Modbus Slave Settings				
Lost Device Search Enable:	N/A	N/A	N/A	N/A
Raw/ASCII Data Control				
Raw/ASCII Data Message Transfer Mode:	Data-Stream	Data-Stream	Data-Stream	Data-Stream
Cmd/Resp Age Time, Discard Responses After (sec):	N/A	N/A	N/A	N/A
Cmd/Resp Expected Responses Per Command:	N/A	N/A	N/A	N/A
Cmd/Resp Mode Response To Modbus/TCP Based On:	N/A	N/A	N/A	N/A
Serial Packet ID Settings				
STX Rx Detect:	one byte	one byte	one byte	one byte
STX Rx (dec):	2	2	2	2
ETX Rx Detect:	one byte	one byte	one byte	one byte
ETX Rx (dec):	3	3	3	3
PLC Specific Settings				
STX Tx Append:	none	none	none	none
STX Tx (dec):				
ETX Tx Append:	none	none	none	none
ETX Tx (dec):				
Strip Rx STX/ETX chars:	yes	yes	yes	yes
Serial Modbus Master and Modbus/TCP Interface Settings				

3. Click **Port N** for the port you want to configure, where **N** is the port number, which opens the corresponding *Port Serial Configuration* page.
4. If desired, enter a **Port Name**.
5. Configure the serial characteristics for your device and leave the **Discard Rx Packets With Errors** option enabled.
6. Under the *General Protocol Settings* section, set the **Serial Port Protocol** option to **Modbus/ASCII-to-Master**.
7. Click the **Save** button.



Note: *If necessary, see* *Filtering/Data Extraction Configuration on Page 69 or Application Socket Configuration on Page 77* *for additional configuration procedures.*

Configuring Read-Only Raw/ASCII Devices

This chapter contains these subsections:

- *Prerequisites* (below)
- *Read-Only Raw/ASCII Serial Devices* (below)
- *Read-Only Raw/ASCII Ethernet Devices* on Page 29

Prerequisites

Before you can configure the ports, make sure that you have done the following:

- Installed the hardware
- Configured the DeviceMaster IP address using PortVision DX or the web interface
- If necessary, uploaded the latest Modbus/TCP firmware using PortVision DX or the web interface

Note: *The DeviceMaster provides a Modbus/TCP interface, which may or may not have the Modbus/TCP firmware loaded at the factory (depending on the model you purchased). Models that have Modbus/TCP loaded on the DeviceMaster are identified in PortVision DX and the DeviceMaster is labeled accordingly.*

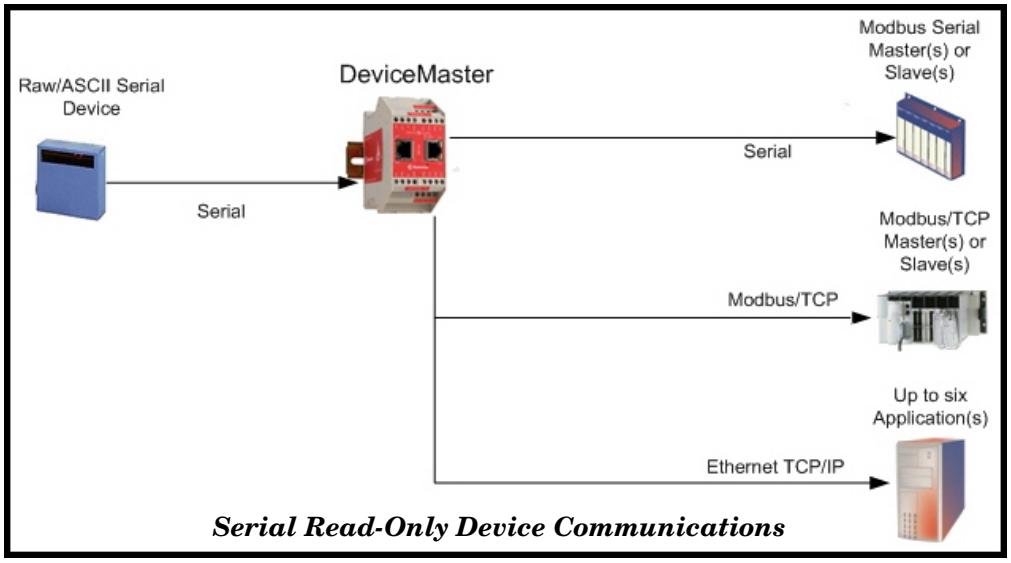
If you need to perform any of these procedures or locate the latest files, see the *Overview* on Page 5.

Read-Only Raw/ASCII Serial Devices

Read-only raw/ASCII serial devices use the **Serial** menus to:

- Allow connections between a serial device, such as a barcode scanner or RFID reader, to PLC(s) and/or application(s).
- Provide an optional filtering mechanism for string, RFID, and barcode data.

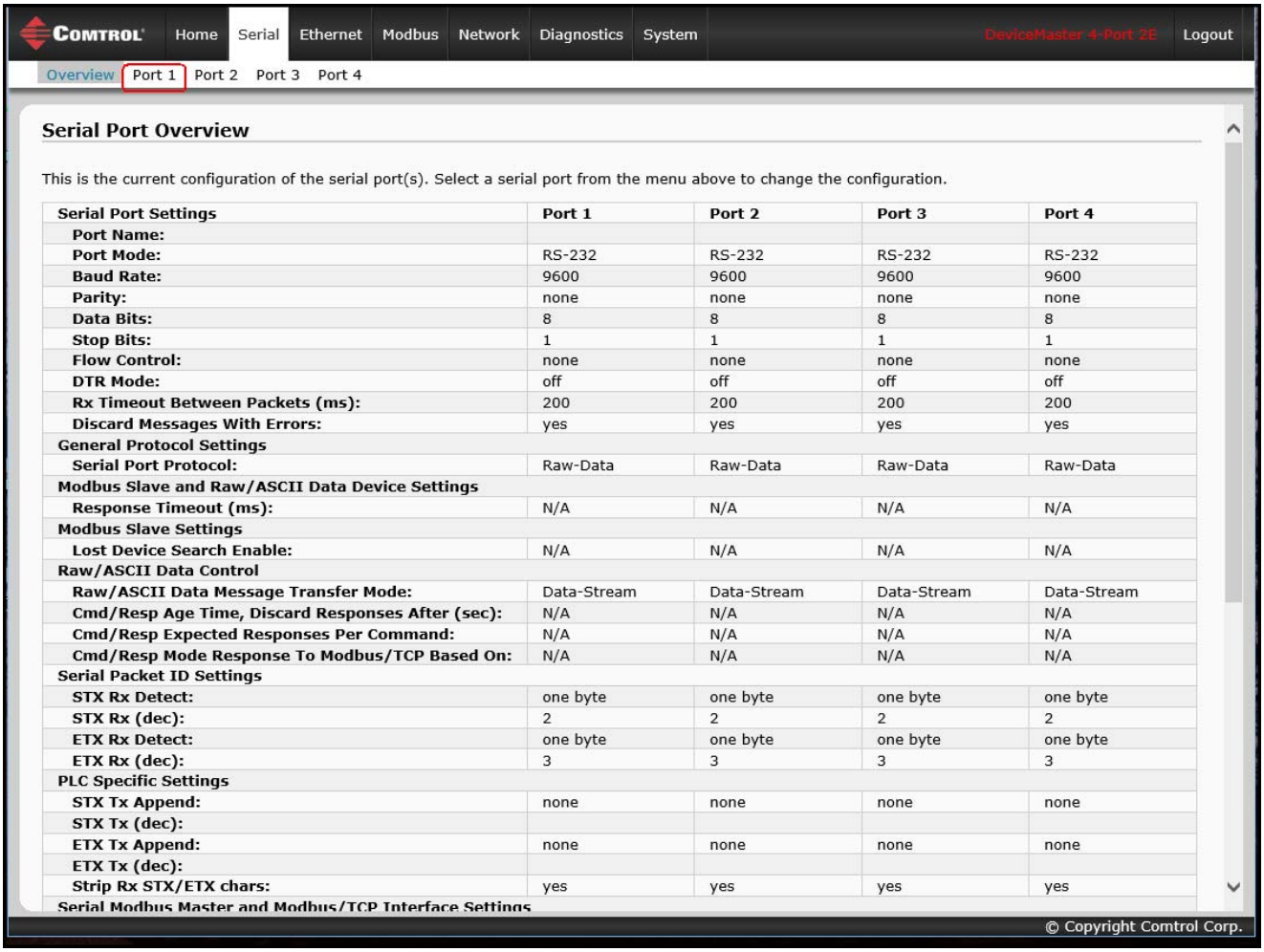
The PLC and application can both communicate to the serial device, but they cannot communicate directly to each other.



Serial Read-Only Device Communications

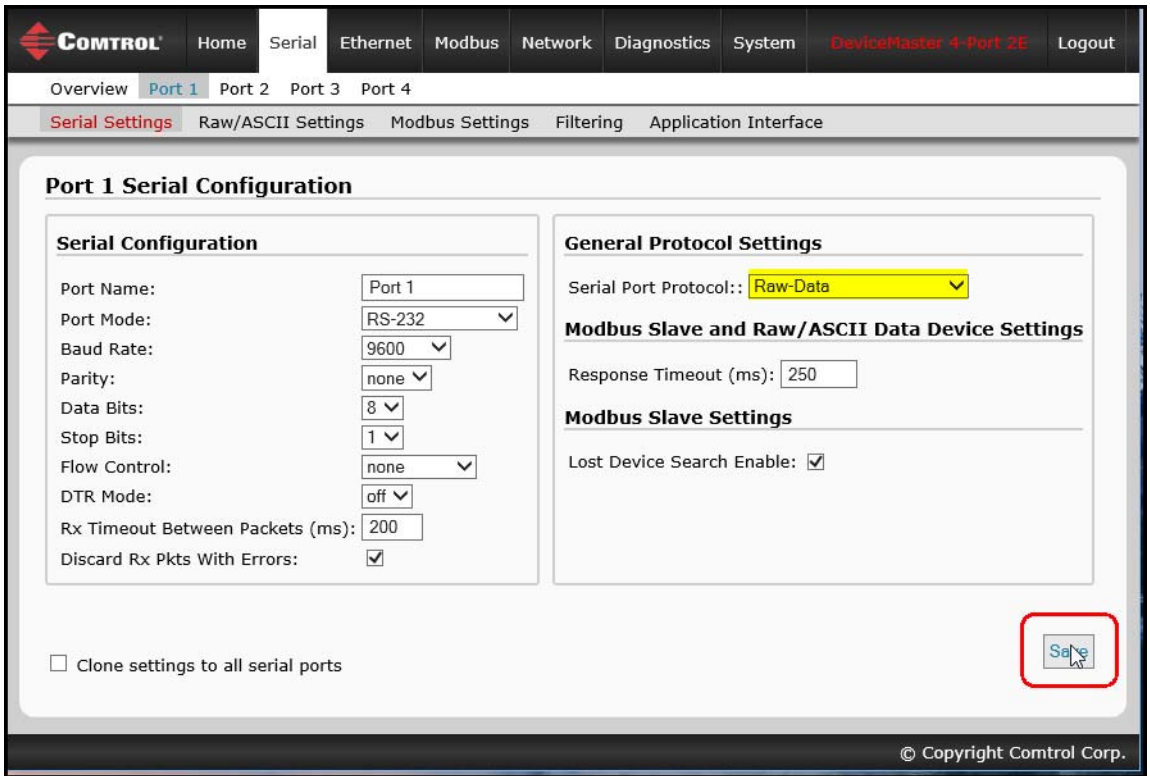
Use the following procedure to configure read-only raw/ASCII serial devices.

1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Click the **Serial** menu, which opens to the *Serial Port Overview* page.

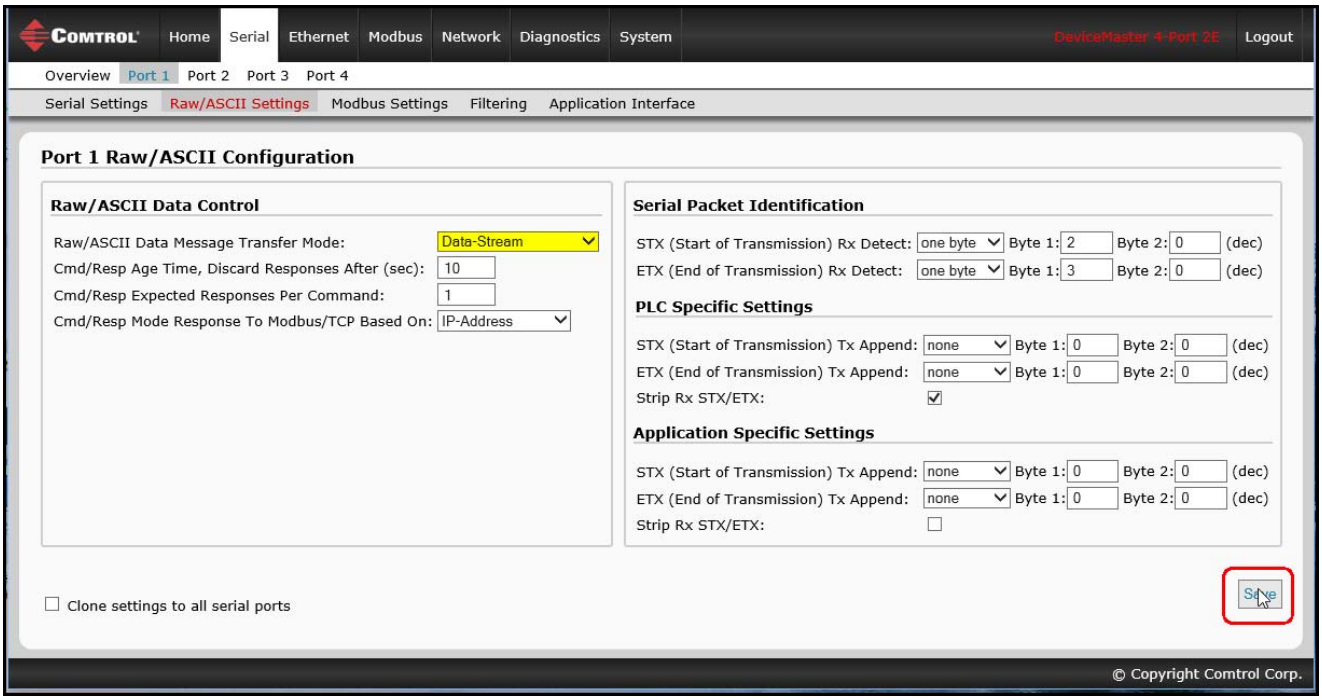


Serial Port Settings	Port 1	Port 2	Port 3	Port 4
Port Name:				
Port Mode:	RS-232	RS-232	RS-232	RS-232
Baud Rate:	9600	9600	9600	9600
Parity:	none	none	none	none
Data Bits:	8	8	8	8
Stop Bits:	1	1	1	1
Flow Control:	none	none	none	none
DTR Mode:	off	off	off	off
Rx Timeout Between Packets (ms):	200	200	200	200
Discard Messages With Errors:	yes	yes	yes	yes
General Protocol Settings				
Serial Port Protocol:	Raw-Data	Raw-Data	Raw-Data	Raw-Data
Modbus Slave and Raw/ASCII Data Device Settings				
Response Timeout (ms):	N/A	N/A	N/A	N/A
Modbus Slave Settings				
Lost Device Search Enable:	N/A	N/A	N/A	N/A
Raw/ASCII Data Control				
Raw/ASCII Data Message Transfer Mode:	Data-Stream	Data-Stream	Data-Stream	Data-Stream
Cmd/Resp Age Time, Discard Responses After (sec):	N/A	N/A	N/A	N/A
Cmd/Resp Expected Responses Per Command:	N/A	N/A	N/A	N/A
Cmd/Resp Mode Response To Modbus/TCP Based On:	N/A	N/A	N/A	N/A
Serial Packet ID Settings				
STX Rx Detect:	one byte	one byte	one byte	one byte
STX Rx (dec):	2	2	2	2
ETX Rx Detect:	one byte	one byte	one byte	one byte
ETX Rx (dec):	3	3	3	3
PLC Specific Settings				
STX Tx Append:	none	none	none	none
STX Tx (dec):				
ETX Tx Append:	none	none	none	none
ETX Tx (dec):				
Strip Rx STX/ETX chars:	yes	yes	yes	yes
Serial Modbus Master and Modbus/TCP Interface Settings				

3. Click **Port N** for the port you want to configure, where **N** is the port number, which opens the *Port Serial Configuration* page.
4. If desired, enter a **Port Name**.
5. Configure the serial characteristics for your device and leave the **Discard Rx Packets With Errors** option enabled.
6. Under the *General Protocol Settings* section, configure the serial port for read-only raw/ASCII device operation.
   a. Set the **Serial Port Protocol** option to **Raw-Data**.
   b. Under the *Modbus Slave and Raw/ASCII Data Device Settings* section, set the **Device Response Timeout** value or leave at the default.
   c. *2/4-port models only*: Under the *Modbus Slave Settings* section, enable the **Lost Device Search Enable** option if you want the DeviceMaster to search for a lost Modbus slave device on other Modbus/RTU and/or Modbus/ASCII slave ports that also have this option enabled.
7. Click the **Save** button.

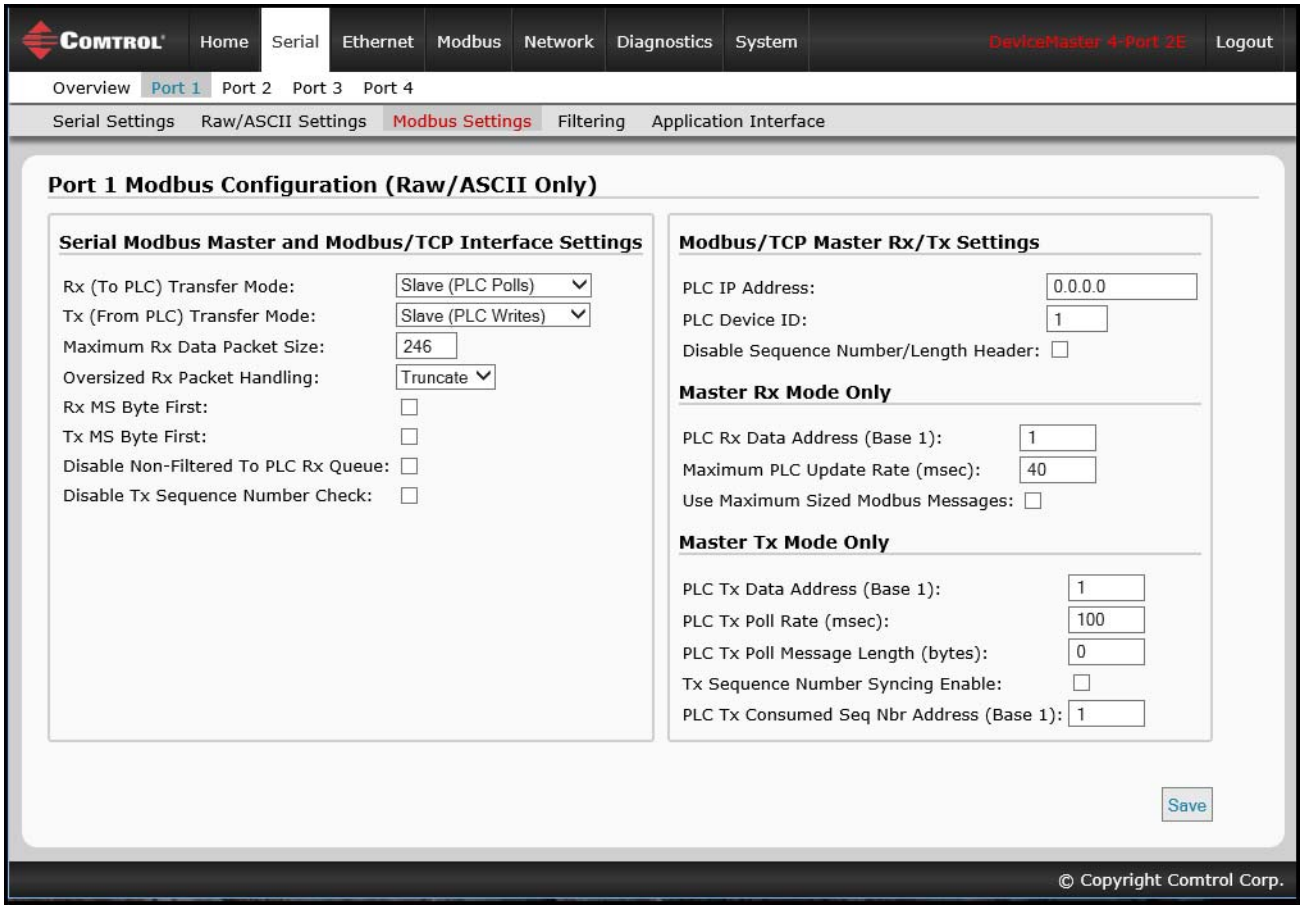


8. Click the **Raw/ASCII Settings** sub-menu, which opens the corresponding *Port Raw/ASCII Configuration* page for that port.
9. Under the *Raw/ASCII Data Control* section, leave the **Raw/ASCII Data Message Transfer Mode** option set to **Data-Stream**.
10. Under the *Serial Packet Identification* section, set the following options accordingly.
    a. Set the **STX (Start of transmission) Rx Detect** option in decimal format.
    b. Set the **ETX (End of transmission) Rx Detect** option in decimal format.
    c. Enable the **Strip Rx STX/ETX** option under the *PLC Specific Settings* or *Application Specific Settings* sections if you do not want the STX and ETX bytes returned to the PLC or application(s).
11. Click the **Save** button.

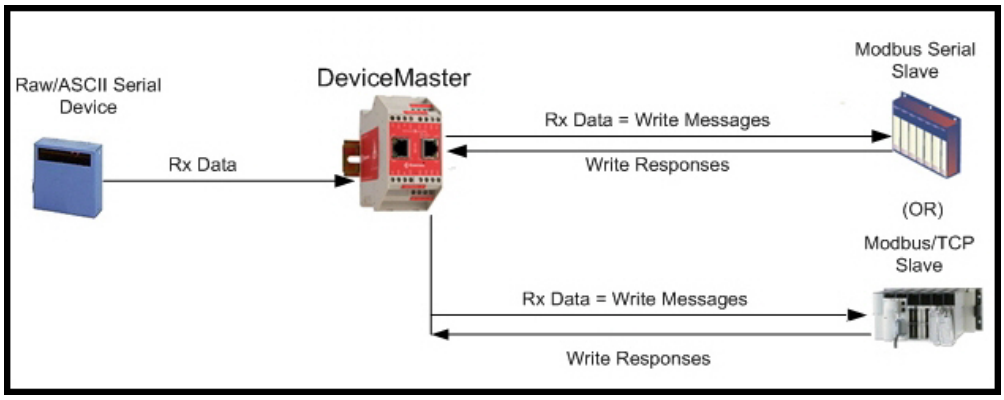


Note: *Refer to your device's User Manual for the Start and End of Transmission byte(s) settings. You may also be able to use the Diagnostics | Serial Interface Logs page to determine these settings.*

12. **C**lick the **Modbus Settings** sub-menu, which opens the *Port Modbus Configuration (Raw/ASCII Only)* page for that port.



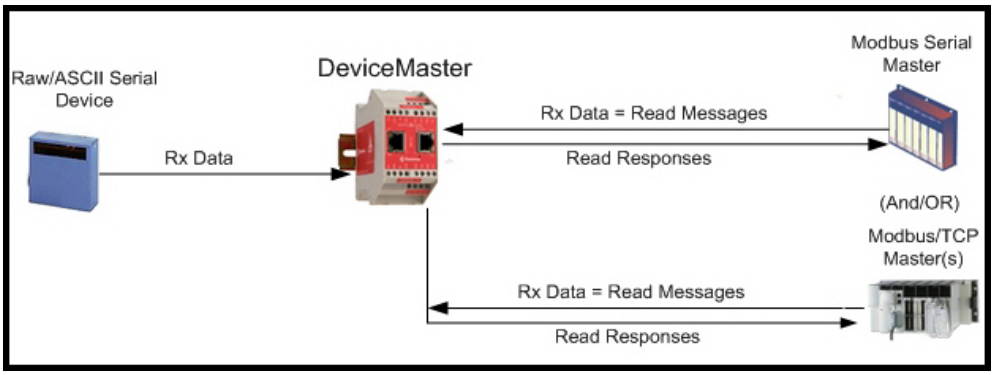
13. Configure the *Modbus/TCP and/or Serial Modbus Master Settings* for your environment using one of the following settings:
    - ***Master Receive Transfer*** mode (recommended) writes data directly into the memory of a Modbus/TCP slave or serial Modbus slave attached to this gateway. This requires the least amount of PLC programming, requires the least amount of PLC overhead, and provides minimal latency.



*You can use the **Master Receive Transfer** method only if your PLC can operate as a Modbus/TCP slave, Modbus/RTU serial slave, or Modbus/ASCII serial slave.*

Go to Step 14 on Page 25 to configure *Master Receive Transfer* mode.

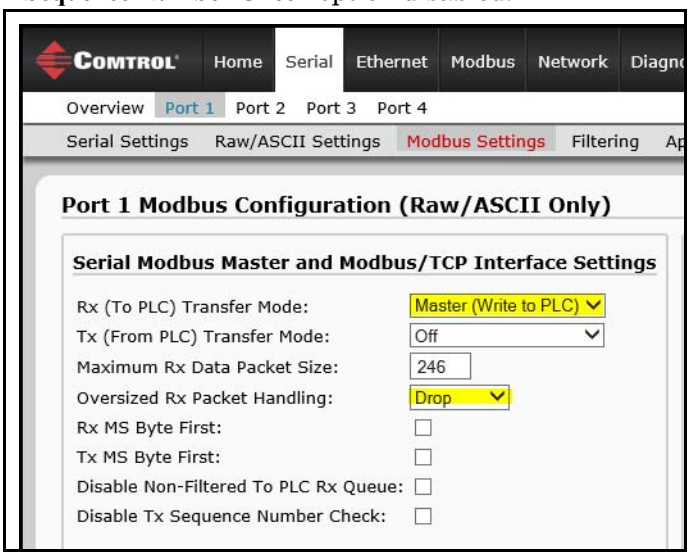
- ***Slave Receive Transfer*** mode requires the PLC to poll for received data. This method is provided for PLC programmers who prefer polling for data or those who have PLCs that can only operate in master mode.



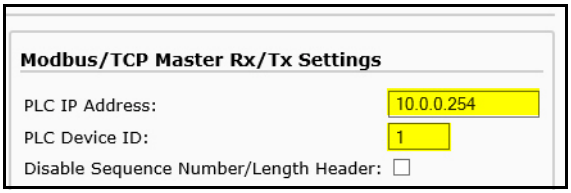
Note: *You can use the **Slave Receive Transfer** method only if your PLC can operate as a Modbus/TCP master, Modbus/RTU serial master, or Modbus/ASCII serial master.*

Go to Step 15 on Page 27 to configure *Slave Receive Transfer* mode.

14. ***Master Receive Transfer Mode Only:*** Under the *Serial Modbus Master and Modbus/TCP Interface Settings* section:
    a. Set the **Rx (To PLC) Transfer Mode** option to **Master (Write to PLC)**.
    b. Set the **Tx (From PLC) Transfer Mode** option to either **Slave (PLC Writes)** or **Off**.
    c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. For writing to a Modbus/TCP slave or Modbus serial slave, this can be a maximum of 1,518 bytes.
    d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.
    e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.
    f. Leave the **Tx MS Byte First** option disabled.
    g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received during the **Maximum PLC Update Rate** time period, only the last received data packet will be sent to the PLC.)
    h. Leave the **Disable Tx Sequence Number Check** option disabled.



Under the *Modbus/TCP Master Rx/Tx Settings* section:



    i. Enter the **PLC IP Address**:
        - For *Modbus/TCP slaves*, set the PLC IP Address to that of your PLC in xxx.xxx.xxx.xxx format.
        - For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC IP Address to that of this DeviceMaster in xxx.xxx.xxx.xxx format.

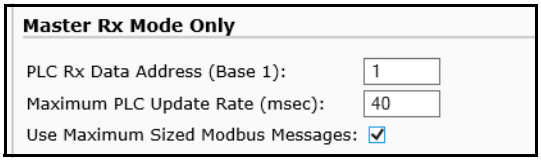
    Note: *The Modbus serial slave must be attached to one of the serial ports on this DeviceMaster.*

    j. Enter the **PLC Device ID**:
        - For *Modbus/TCP slaves*, set the PLC Device ID to that of your PLC. This is typically 1.
        - For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC Device ID to that of the serial slave device.

    Note: *This must be a unique device ID attached to this DeviceMaster.*

    k. If necessary, set the **Disable Sequence Number/Length Header** option if you want to transmit data without the 4 byte header (sequence number and data length).

Under the *Modbus Rx/Mode Only* section*:*

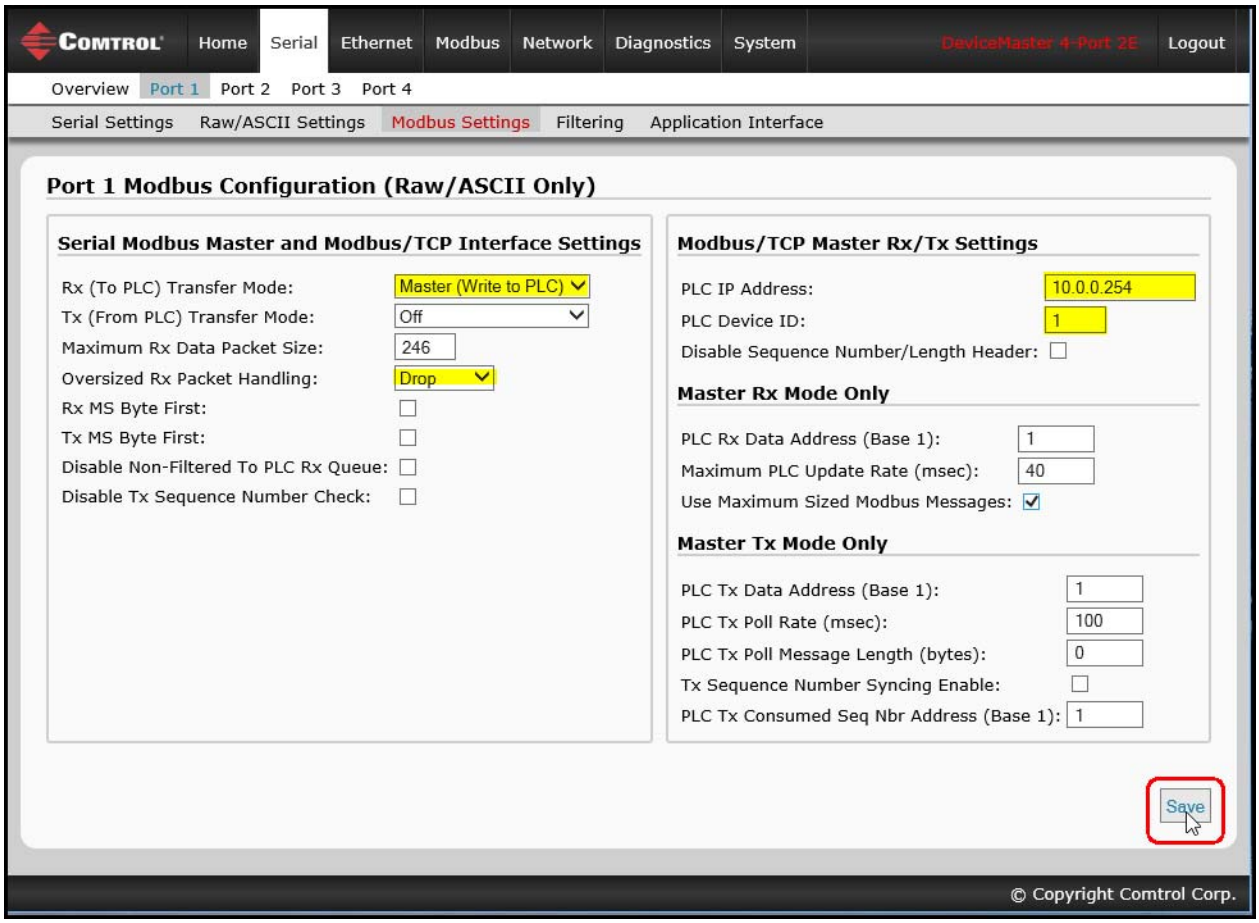


l. Set the **PLC Rx Data Address (Base 1)** option to the PLC memory address where you want to place the received data message. This address is Base 1, which means the address starts at 1 (or 400001 for some PLCs). If your address range is Base 0, or starts at zero, you will need to add one to your address.

m. Set the **Maximum PLC Update Rate** option to the fastest rate your PLC can reliably receive and process data. This is typically longer than the scan rate. The default of 40 milliseconds is usually sufficient, but your system may require a longer time period.

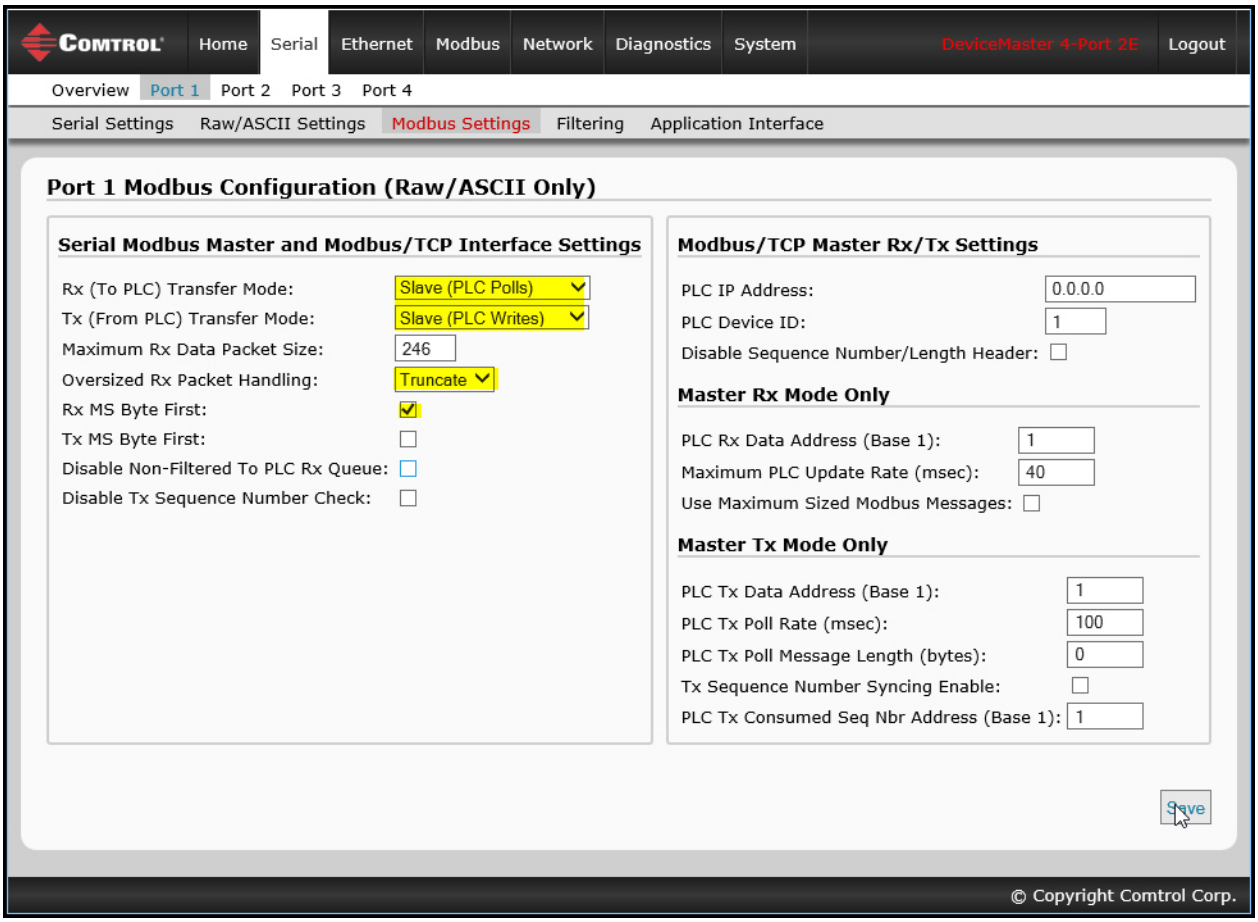
n. Set the **Use Maximum Sized Modbus Messages** option if you are receiving messages over 196 bytes, your PLC can receive messages larger than 200 bytes, and you want to decrease latency and network usage.

o. Click the **Save** button.



Note: *Go to Step 16 on Page 27 to complete configuration.*

15. ***Slave Receive Transfer Mode Only***: Under the *Serial Modbus Master and Modbus/TCP Interface Settings* section:
    a. Set the **Rx (To PLC) Transfer Mode** option to **Slave (PLC Polls).**
    b. Set the **Tx (From PLC) Transfer Mode** option to either **Slave (PLC Writes)** or **Off**.
    c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. This can be a maximum of 246 bytes in Slave Rx mode.
    d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.
    e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.
    f. Leave the **Tx MS Byte First** option disabled.
    g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received between received data requests, only the last received data packet will be returned.)
    h. Leave the **Disable Tx Sequence Number Check** option disabled.
    i. Click the **Save** button.



16. Set up the filtering/data extraction settings, see Filtering/Data Extraction Configuration on Page 69.
17. Set up the application socket interface settings, see Application Socket Configuration on Page 77.

Modbus Raw Data Addressing

The serial port receive data addresses used for polling:

Serial Port Raw/ASCII Addressing	Serial Port 1	Serial Port 2	Serial Port 3	Serial Port 4	Access Rule
Unit ID	255 (FF Hex)	255 (FF Hex)	255 (FF Hex)	255 (FF Hex)	N/A
Receive Data Address	1000 (Base 0) 1001 (Base 1)	2000 (Base 0) 2001 (Base 1)	3000 (Base 0) 3001 (Base 1)	4000 (Base 0) 4001 (Base 1)	Read Only

Received Message Format

If all is set up correctly, the data packets will be written into the PLC memory space starting at the specified memory location. The first word received is the sequence number. This is incremented with each new data packet. The next word is the length, which indicates the number of data bytes received. The rest is data.

The format of received serial data sent to or returned to the PLC:

Name	Data Type	Data Value(s)	Access Rule
Receive (DeviceMaster to PLC) message data			Get
Structure of:		0-65535 (FFFF Hex)	
Produced data sequence	WORD	1-1024 (Master Rx Mode)	
Data length (in bytes)	WORD	0-246 (Slave Rx Mode)	
Data array	Array of WORD	0-65535	

General requirements:

- The memory area must be defined in 16 bit words and large enough to handle the largest serial packet plus two words for the produced sequence number and data length parameters.
- The **Maximum Rx Data Packet Size** must be set large enough to accept the largest possible packet.
- For large received data packets over 246 bytes (This may be less for your PLC).

  The **Rx (To PLC) Transfer Mode** must be set to **Master (Write to PLC)**.

  - The data will automatically be placed in continuous memory.
  - All data will have been transferred to the PLC when the sequence number is updated.

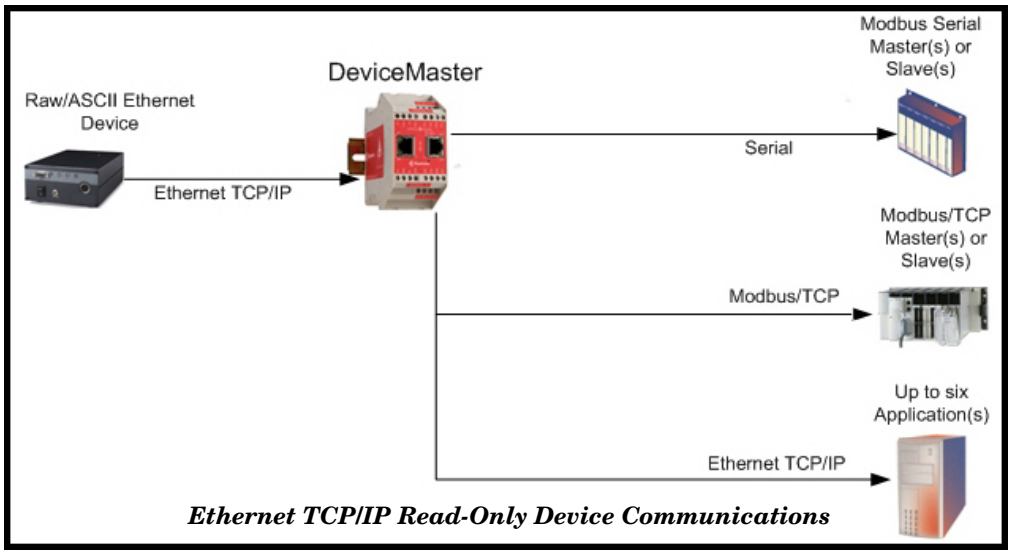
Read-Only Raw/ASCII Ethernet Devices

Read-only raw/ASCII Ethernet devices use the **Ethernet** menus to:

- Allow connections between devices that communicate over Ethernet TCP/IP, such as a barcode scanner, RFID reader, or weigh scale, and a PLC and/or application.
- Provide an optional filtering mechanism for string, RFID, and barcode data.
- Provide support for only Raw/ASCII type data.

Verify that you have an actual Ethernet device in which to connect to and that the Ethernet device supports Ethernet TCP socket connections.

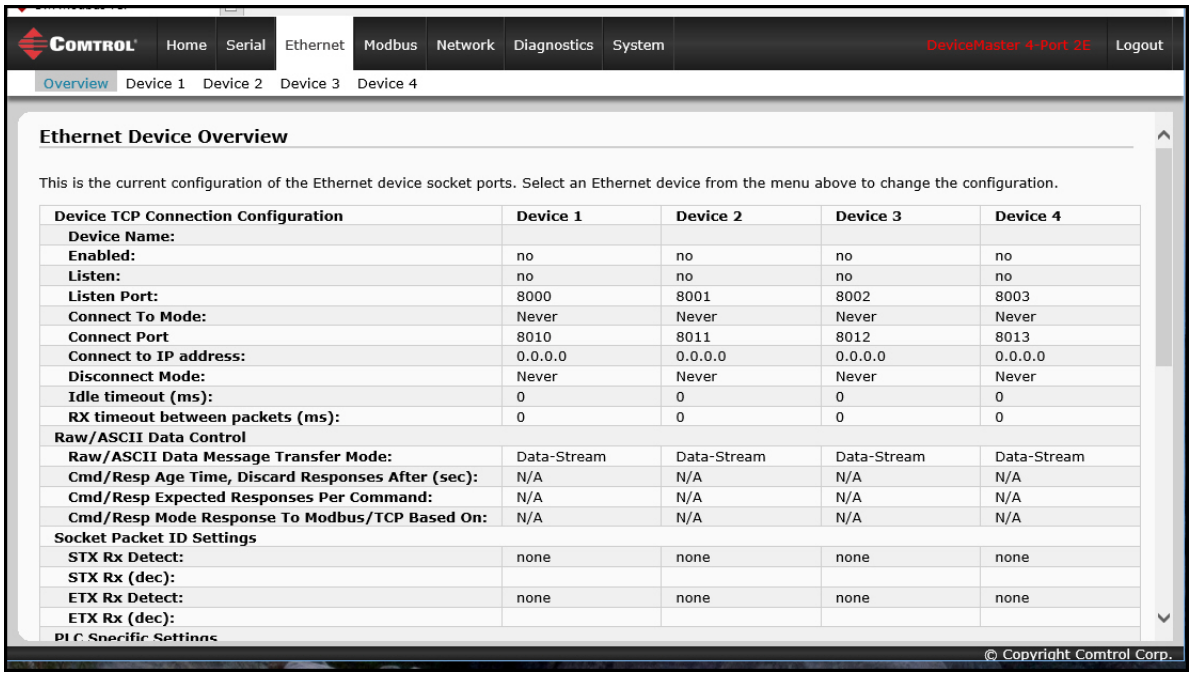
Use the following procedure to configure read-only Ethernet devices.



Ethernet TCP/IP Read-Only Device Communications

Note: *The Ethernet device must be a target Ethernet device such as a barcode scanner, RFID reader, weigh scale, or some other device that is to be connected to a PLC and/or application.*

1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Click the **Ethernet** menu, which opens to the *Ethernet Device Overview* page.

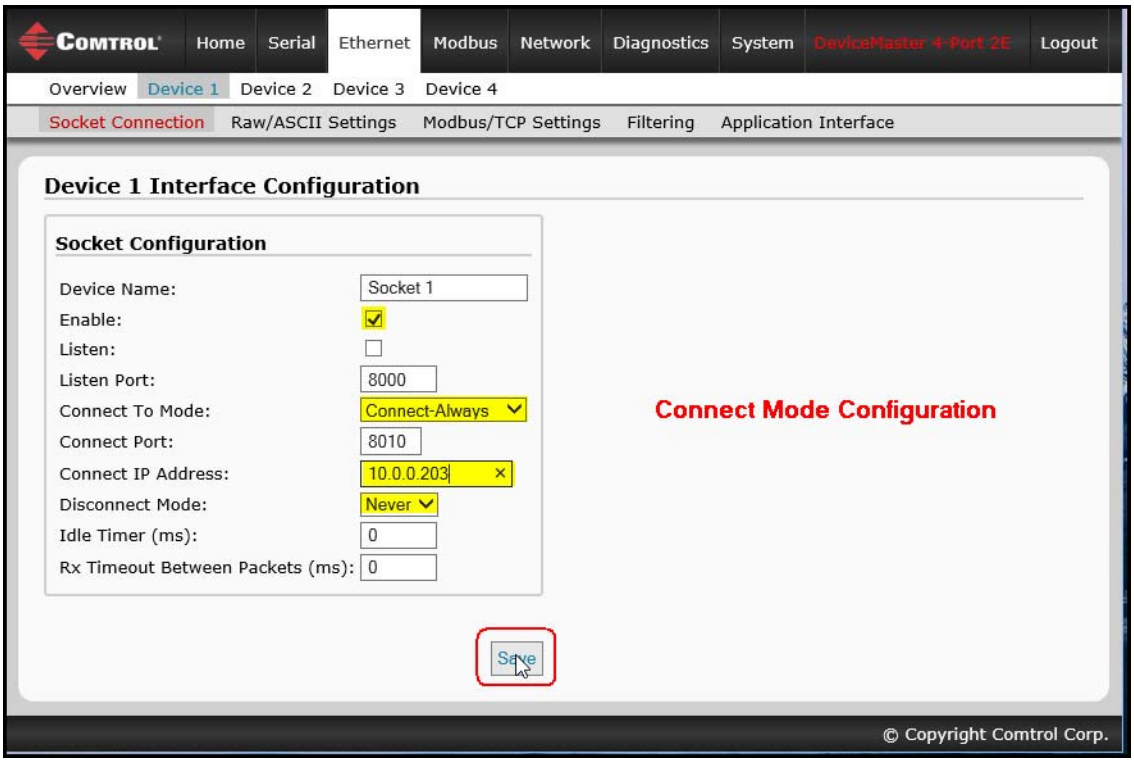


Device TCP Connection Configuration	Device 1	Device 2	Device 3	Device 4
Device Name:				
Enabled:	no	no	no	no
Listen:	no	no	no	no
Listen Port:	8000	8001	8002	8003
Connect To Mode:	Never	Never	Never	Never
Connect Port	8010	8011	8012	8013
Connect to IP address:	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0
Disconnect Mode:	Never	Never	Never	Never
Idle timeout (ms):	0	0	0	0
RX timeout between packets (ms):	0	0	0	0
Raw/ASCII Data Control				
Raw/ASCII Data Message Transfer Mode:	Data-Stream	Data-Stream	Data-Stream	Data-Stream
Cmd/Resp Age Time, Discard Responses After (sec):	N/A	N/A	N/A	N/A
Cmd/Resp Expected Responses Per Command:	N/A	N/A	N/A	N/A
Cmd/Resp Mode Response To Modbus/TCP Based On:	N/A	N/A	N/A	N/A
Socket Packet ID Settings				
STX Rx Detect:	none	none	none	none
STX Rx (dec):				
ETX Rx Detect:	none	none	none	none
ETX Rx (dec):				
PLC Specific Settings				

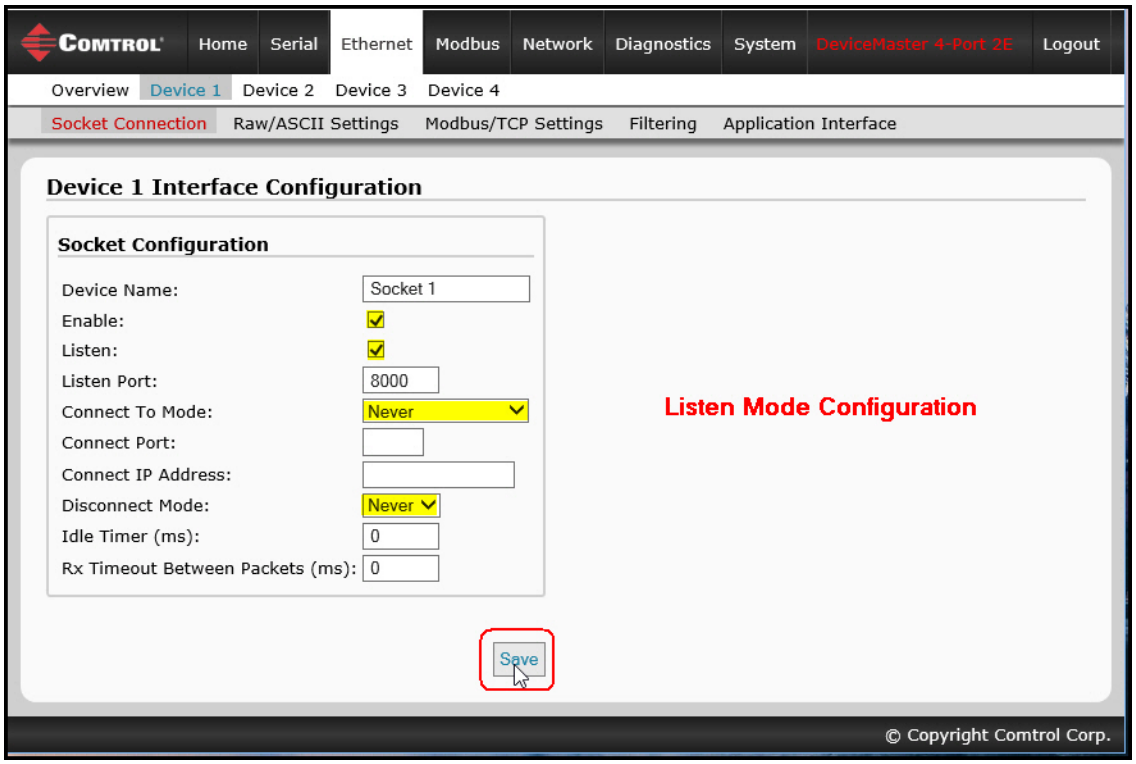
3. Click **Device N** for the port that you want to configure, where **N** is the Socket number, which opens the *Device Interface Configuration* page for the corresponding socket.

4. If desired, enter a *Device Name*.
5. Click the **Enable** option and configure the settings for your environment using one of the following procedures.
   - If your Ethernet TCP/IP device requires another device to connect to it, configure the socket port on the DeviceMaster to **Connect** mode.
     - Leave the **Listen** option unselected.
     - Set the **Connect To Mode** option to **Connect-Always**.
     - Set the **Connect Port** option to the socket port number of your Ethernet device.
     - Set the **Connect IP Address** option to the IP address of your Ethernet device.

     Note: Do not enter the IP address of the DeviceMaster or PLC here.
     - Set the **Disconnect Mode** option to **Never**.
     - If desired, enter a value for the **Idle Timer** option.
     - If desired, enter a value for the **Rx Timeout Between Packets (ms)** option.
     - Click the **Save** button.

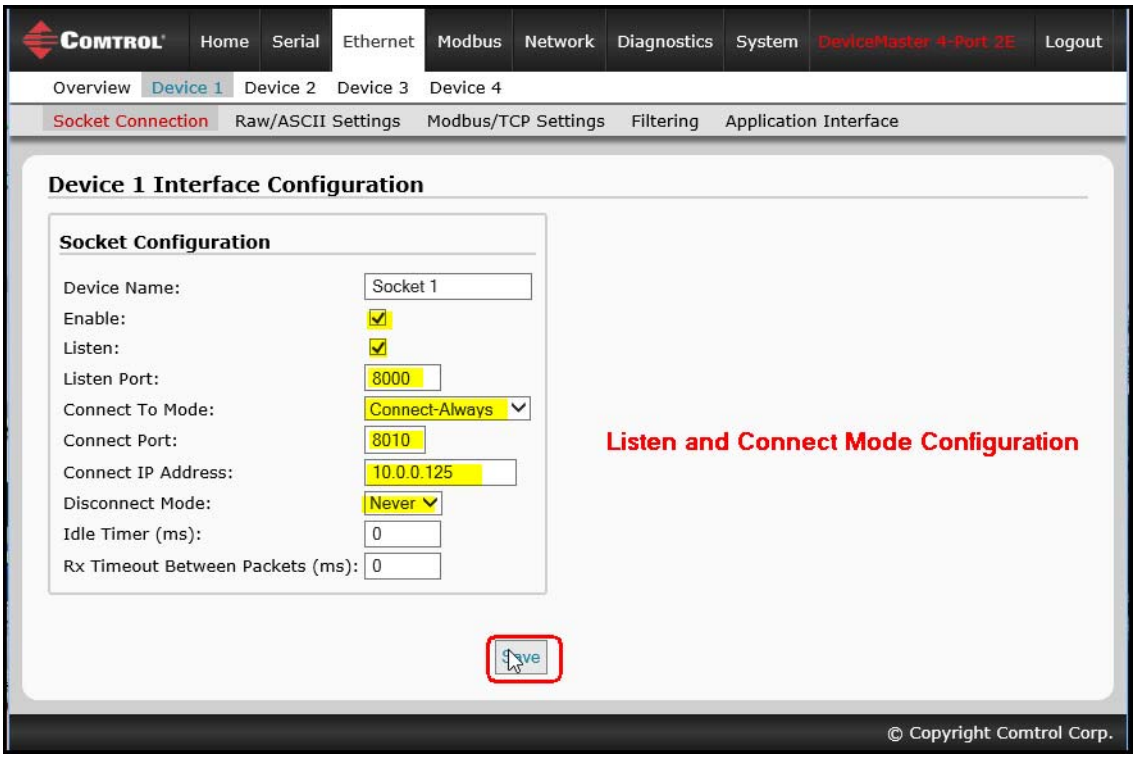


- If your Ethernet TCP/IP device is configured to connect to another device, configure the socket port on the DeviceMaster to **Listen** mode.
  - Select the **Listen** option.
  - Use the default **Listen Port** on the DeviceMaster of *8xxx* or designate your own.
  - Set the **Connect To Mode** option to **Never**.
  - Set the **Disconnect Mode** option to **Never**.
  - Configure your Ethernet device to connect to the DeviceMaster at the DeviceMaster IP address and **Listen Port**.
  - Click the **Save** button.

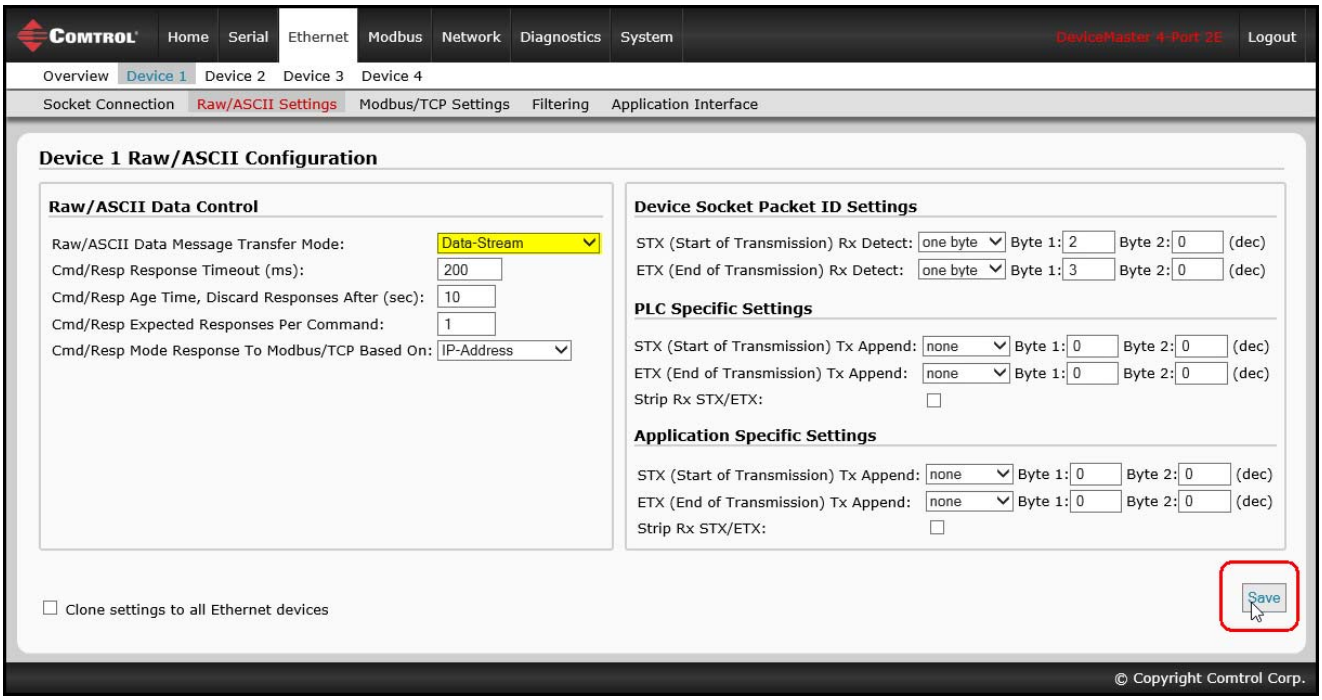


- If you do not know if your device will connect to another Ethernet device, but do know your device's socket port and IP address, you can do the following to enable both the **Listen** and **Connect** modes:
  - Select the **Listen** option.
  - Use the default **Listen Port** on the DeviceMaster of *8xxx* or designate your own.
  - Set the **Connect To Mode** option to **Connect-Always**.
  - Set the **Connect Port** option to the port number of your Ethernet device.
  - Set the **Connect IP Address** option to the IP address of your Ethernet device.

  Note: Do not enter the IP address of the DeviceMaster or PLC here.
  - Set the **Disconnect Mode** option to **Never**.
  - Optionally configure your Ethernet device to connect to the DeviceMaster at the DeviceMaster IP address and **Listen Port**.
  - Set the **Rx Timeout Between Packets** option. Set to zero to stream data with the **Rx STX/ETX Detect** settings set to none. For normal settings, typical values are 10 to 50 ms.
  - Click the **Save** button.

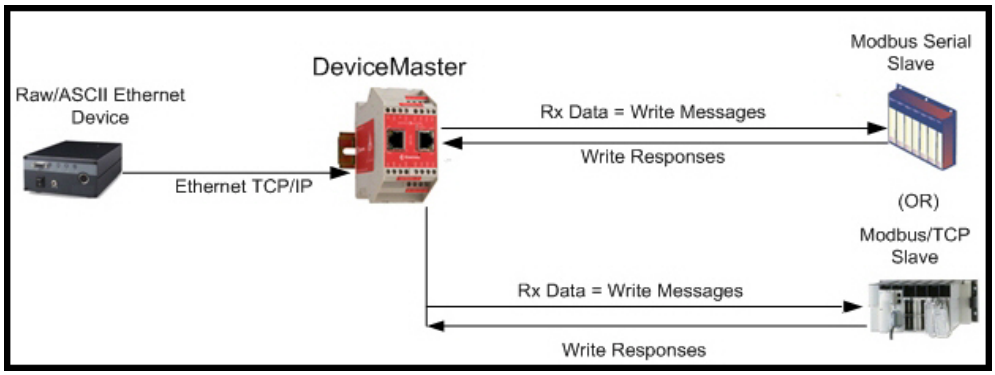


6. Click the **Raw/ASCII Settings** sub-menu, which opens the *Device Raw/ASCII Configuration* page for the corresponding Device number.
7. Set the **Raw/ASCII Data Message Transfer Mode** option to **Data-Stream**.
8. Set up the *Device Socket Packet ID Settings*.
   a. Set the **STX (Start of transmission) Rx Detect** option in decimal format.
   b. Set the **ETX (End of transmission) Rx Detect** option in decimal format.
   c. Enable the **Strip Rx STX/ETX** option under the *PLC Specific Settings* or *Application Specific Settings* sections if you do not want the STX and ETX bytes returned to the PLC or application(s).
   d. Click the **Save** button.



Note: *Refer to your device's User Manual for the Start and End of Transmission byte(s) settings. You may also be able to use the Ethernet Device Interface Logs page to determine these settings.*

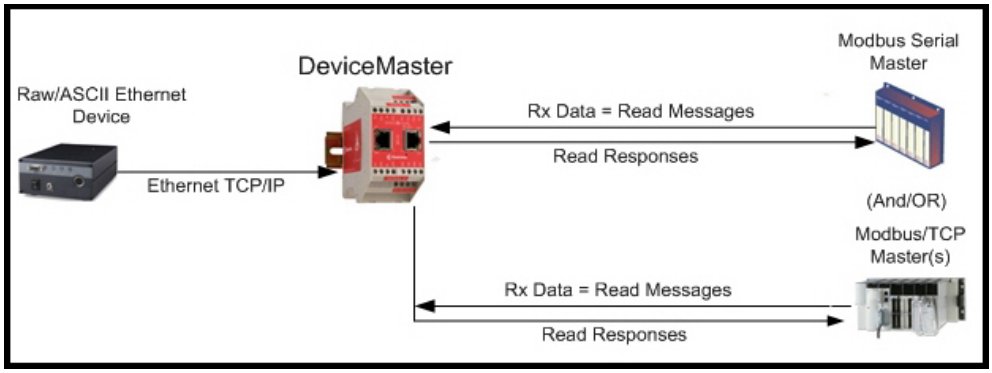
9. Configure the *Modbus/TCP and/or Serial Modbus Master Settings* for your environment using one of the following methods.
   - ***Master Receive Transfer*** mode *(recommended)* writes data directly into the memory of a Modbus/TCP slave or serial Modbus slave attached to this gateway. This requires the least amount of PLC programming, requires the least amount of PLC overhead, and provides minimal latency.



Note: *You can use the **Master Receive Transfer** method only if your PLC can operate as a Modbus/TCP slave, Modbus/RTU serial slave, or Modbus/ASCII serial slave.*

Go to Step 10 on Page 35 to configure *Master Receive Transfer* mode.

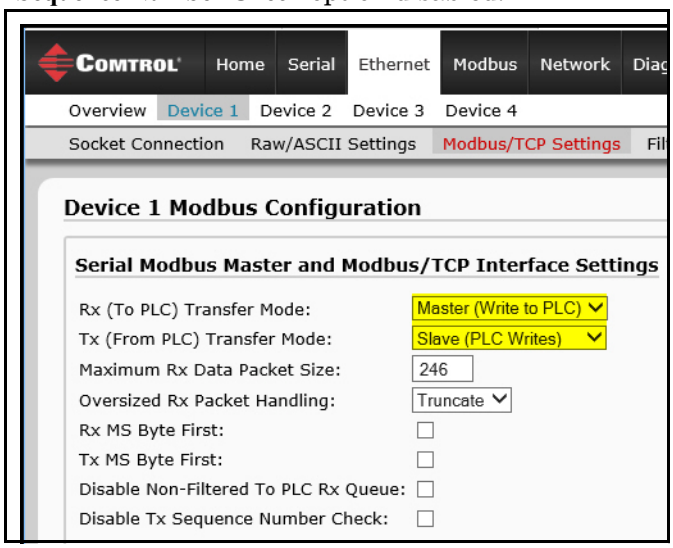
   - ***Slave Receive Transfer*** mode requires the PLC to poll for received data. This method is provided for PLC programmers who prefer polling for data or those who have PLCs that can only operate in master mode.



Note: *You can use the **Slave Receive Transfer** method only if your PLC can operate as a Modbus/TCP master, Modbus/RTU serial master, or Modbus/ASCII serial master.*

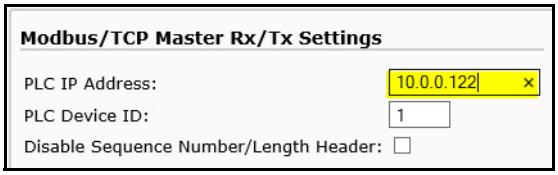
Go to Step 11 on Page 37 to configure *Slave Receive Transfer* mode.

10. ***Master Receive Transfer Mode Only:*** Under the *Serial Modbus Master and Modbus/TCP Interface Settings* section:
    a. Set the **Rx (To PLC) Transfer Mode** option to **Master (Write to PLC)**.
    b. Set the **Tx (From PLC) Transfer Mode** option to either **Slave (PLC Writes)** or **Off**.
    c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. For writing to a Modbus/TCP slave or Modbus serial slave, this can be a maximum of 1,518 bytes.
    d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.
    e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.
    f. Leave the **Tx MS Byte First** option disabled.
    g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received during the **Maximum PLC Update Rate** time period, only the last received data packet will be sent to the PLC.)
    h. Leave the **Disable Tx Sequence Number Check** option disabled.



Under the *Modbus/TCP Master Rx/Tx Settings* section:

i. Enter the **PLC IP Address**:
   - For *Modbus/TCP slaves*, set the PLC IP Address to that of your PLC in xxx.xxx.xxx.xxx format.
   - For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC IP Address to that of this DeviceMaster in xxx.xxx.xxx.xxx format.



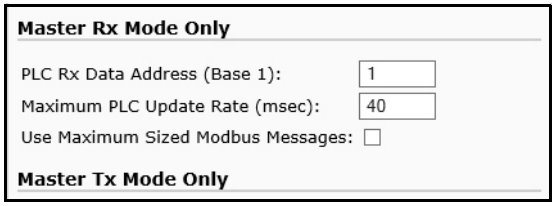
Note: *The Modbus serial slave must be attached to one of the serial ports on this DeviceMaster.*

j. Enter the **PLC Device ID**:
   - For *Modbus/TCP slaves*, set the PLC Device ID to that of your PLC. This is typically 1.
   - For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC Device ID to that of the serial slave device.

   Note: *This must be a unique device ID attached to this DeviceMaster.*

k. If necessary, set the **Disable Sequence Number/Length Header** option if you want to transmit data without the 4 byte header (sequence number and data length).

Under the *Master Rx Mode Only* section:

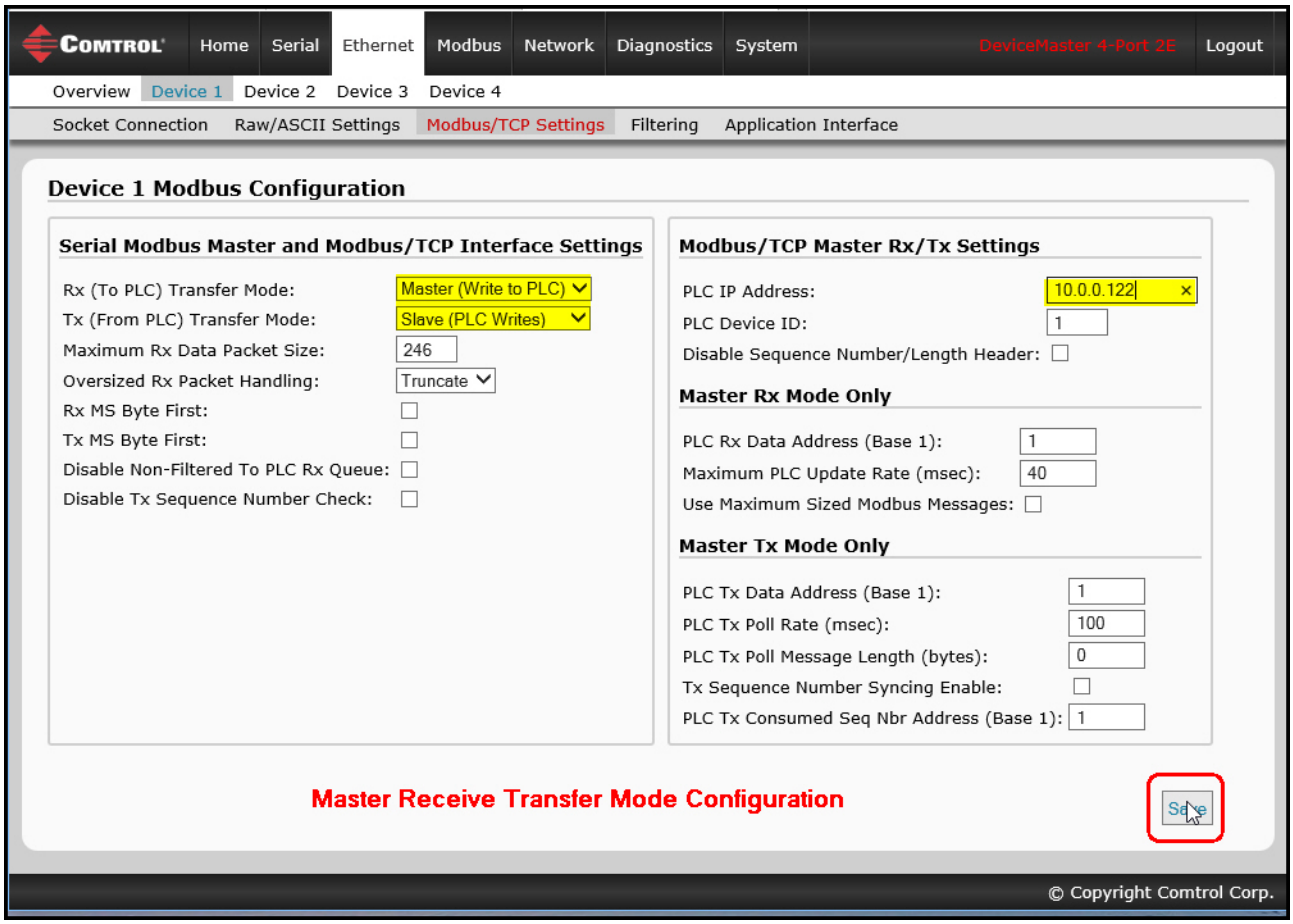


l. Set the **PLC Rx Data Address** to the PLC memory address where you want to place the received data message. This address is Base 1, which means the address starts at 1 (or 400001 for some PLCs). If your address range is Base 0, or starts at zero, you will need to add one to your address.

m. Set the **Maximum PLC Update Rate** option to the fastest rate your PLC can reliably receive and process data. This is typically longer than the scan rate. The default of 40 milliseconds is usually sufficient, but your system may require a longer time period.

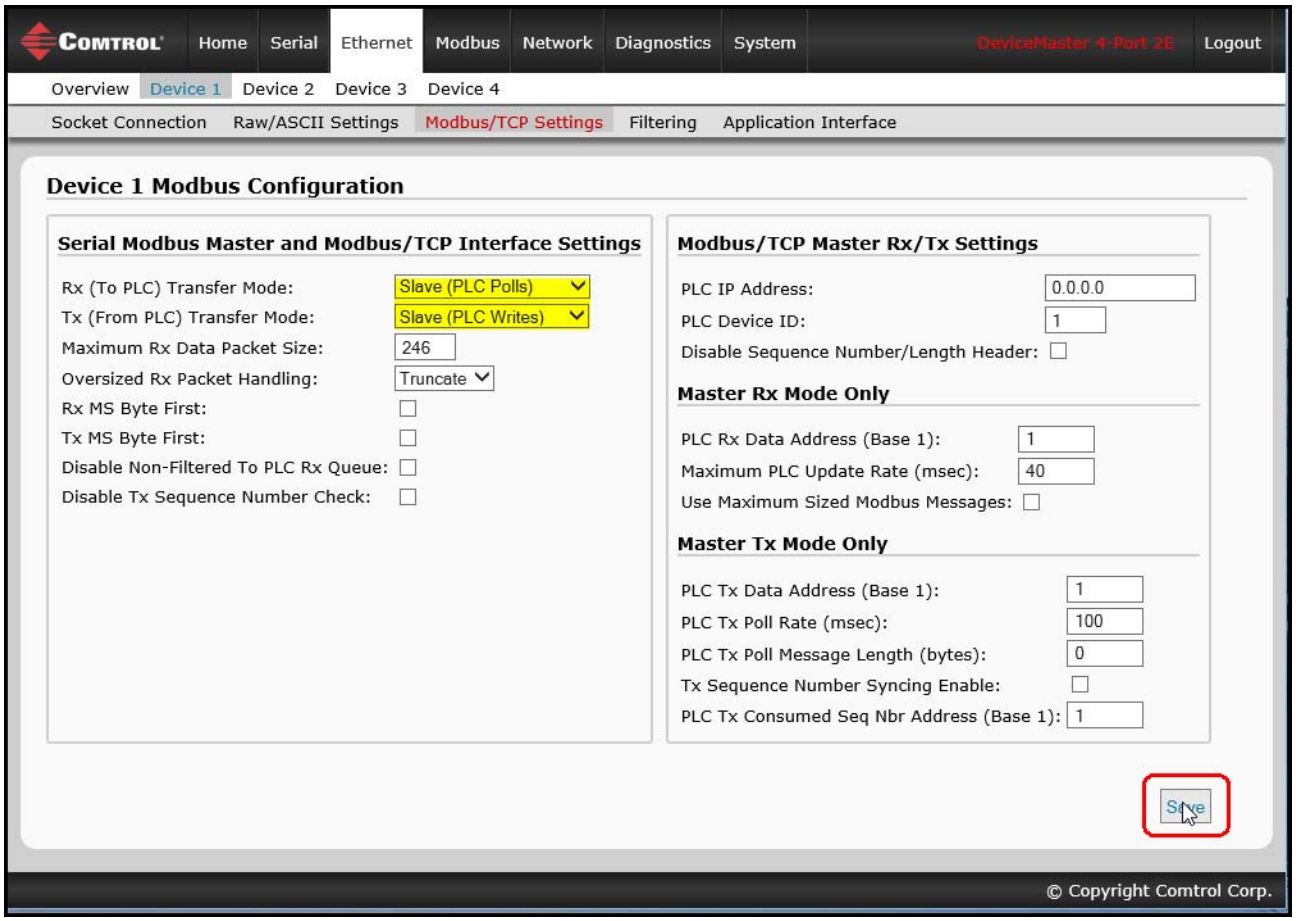
n. Set the **Use Maximum Sized Modbus Messages** option if you are receiving messages over 196 bytes, your PLC can receive messages larger than 200 bytes, and you want to decrease latency and network usage

o. Click the **Save** button.



p. Go to Step 12 on Page 37 to complete configuration.

11. ***Slave Receive Transfer Mode Only***: Under the *Serial Modbus Master and Modbus/TCP Interface Settings* section:
    a. Set the **Rx (To PLC) Transfer Mode** option to **Slave (PLC Polls)**.
    b. Set the **Tx (From PLC) Transfer Mode** option to either **Slave (PLC Writes)** or **Off**.
    c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. This can be a maximum of 246 bytes in Slave Rx Mode.
    d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.
    e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.
    f. Leave the **Tx MS Byte First** option disabled.
    g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received between received data requests, only the last received data packet will be returned.)
    h. Leave the **Tx Sequence Number Check** option disabled.
    i. Click the **Save** button.



12. Set up the *Filtering/Data Extraction Configuration* settings, see Filtering/Data Extraction Configuration on Page 69.
13. Set up the *Application TCP Connection Configuration* settings, see Application Socket Configuration on Page 77.

Modbus Addressing

The receive data addresses used for polling are as follows:

Socket Port Raw/ ASCII Addressing	Socket Port 1	Socket Port 2	Socket Port 3	Socket Port 4	Access Rule
Unit ID	254 (FF Hex)	254 (FF Hex)	254 (FF Hex)	254 (FF Hex)	N/A
Receive Data Address	1000 (Base 0) 1001 (Base 1)	2000 (Base 0) 2001 (Base 1)	3000 (Base 0) 3001 (Base 1)	4000 (Base 0) 4001 (Base 1)	Read Only

Received Message Format

If all is set up correctly, the data packets will be written into the PLC memory space starting at the specified memory location. The first word received is the sequence number. This is incremented with each new data packet. The next word is the length, which indicates the number of data bytes received. The rest is data.

The format of received socket data sent to the PLC:

Name	Data Type	Data Value(s)	Access Rule
Receive (DeviceMaster to PLC) message data			Get
Structure of: Produced data sequence Data length (in bytes)	 WORD WORD	 0-65535 (FFFF Hex) 1-2048 (Master Rx Mode) 0-246 (Slave Rx Mode) 0-65535	
Data array	Array of WORD	0-65535	

General requirements:

- The memory area must be defined in 16 bit words and large enough to handle the largest serial packet plus two words for the produced sequence number and data length parameters.
- The **Maximum Rx Data Packet Size** must be set large enough to accept the largest possible packet.

  For large received data packets over 246 bytes (This may be less for your PLC):

  - The **Rx (To PLC) Transfer Mode** must be set to **Master (Write to PLC)**.
  - The data will automatically be placed in continuous memory.
  - All data will have been transferred to the PLC when the sequence number is updated.

Configuring Read/Write Raw/ASCII Devices

This section discusses the following:

Prerequisites

Before you can configure the ports, make sure that you have done the following:

- Installed the hardware
- Configured the DeviceMaster IP address using PortVision DX or the web interface
- If necessary, uploaded the latest Modbus/TCP firmware using PortVision DX or the web interface

Note: *The DeviceMaster provides a Modbus/TCP interface, which may or may not have the Modbus/TCP firmware loaded from the factory (depending on the model you purchased). Models that have Modbus/TCP loaded on the DeviceMaster are identified in PortVision DX and the DeviceMaster is labeled accordingly.*

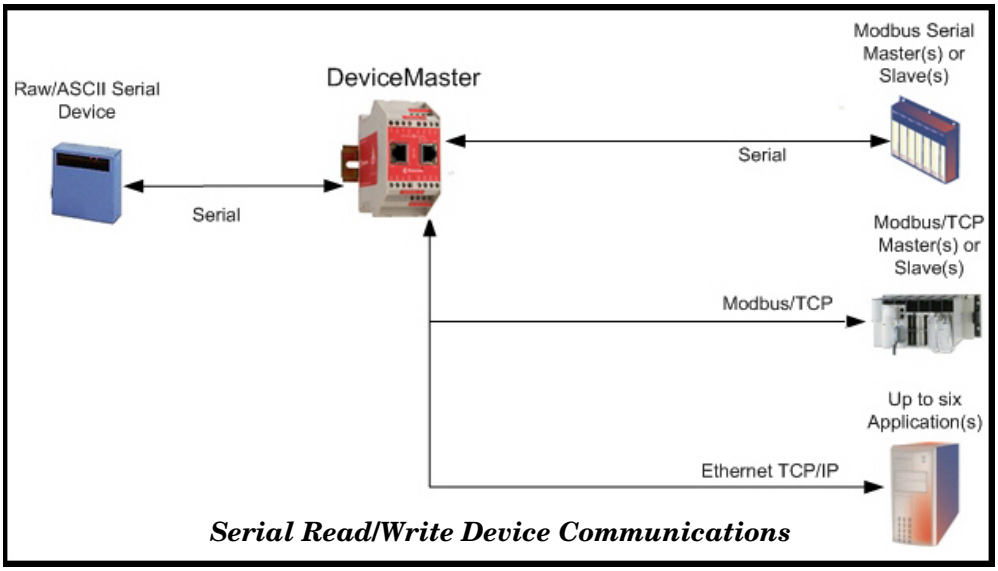
If you need to perform any of these procedures or locate the latest files, see the *Overview* on Page 5.

Read/Write Raw/ASCII Serial Devices

Read/write raw/ASCII serial devices use the **Serial** menus to:

- Allow connections between a serial device, such as a barcode scanner or RFID reader, and a PLC and/or application(s).
- Provide an optional filtering mechanism for string, RFID, and barcode data.

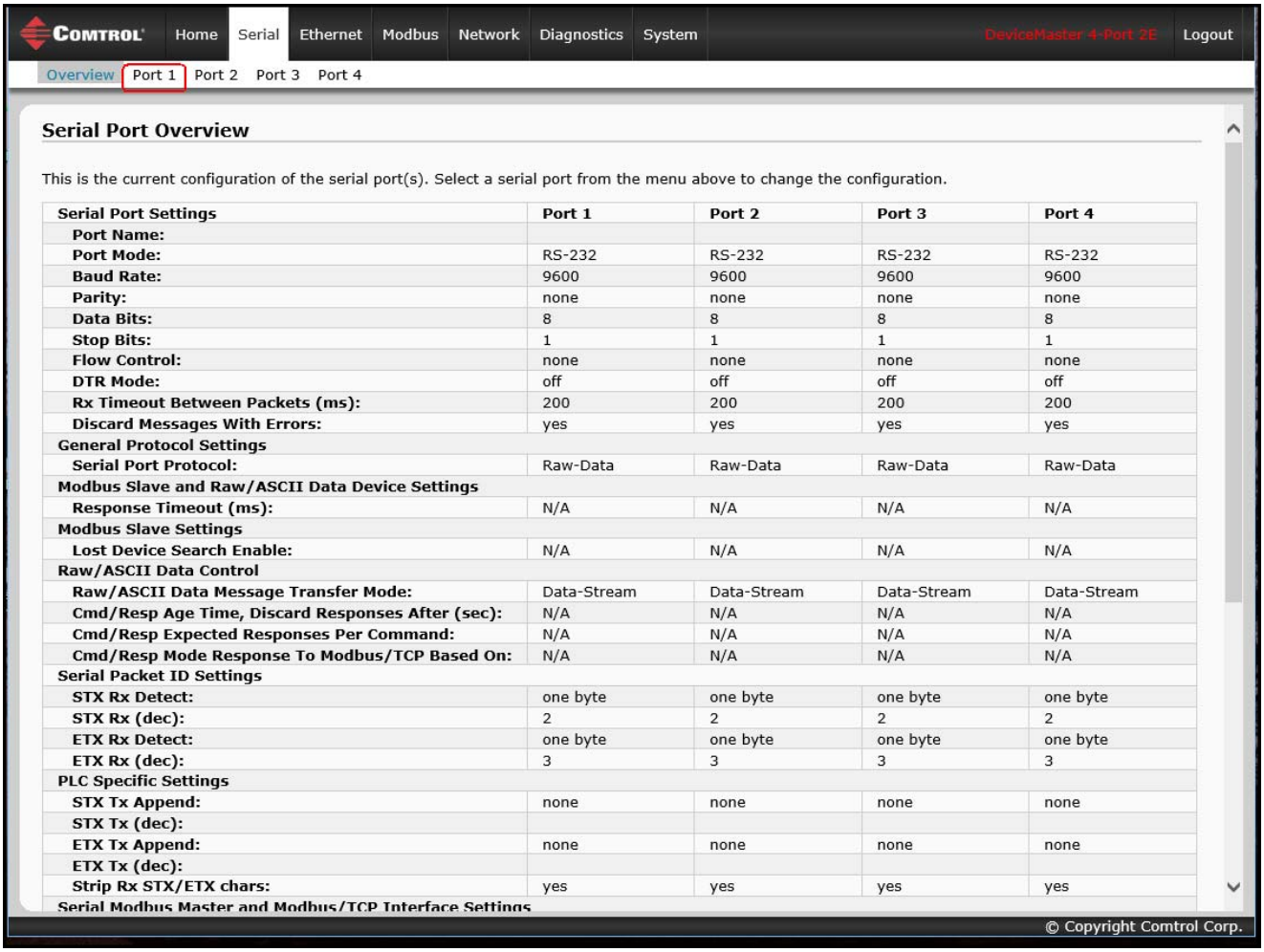
Note: *The PLC and application(s) can both communicate to the serial device, but they cannot communicate directly to each other.*



Serial Read/Write Device Communications

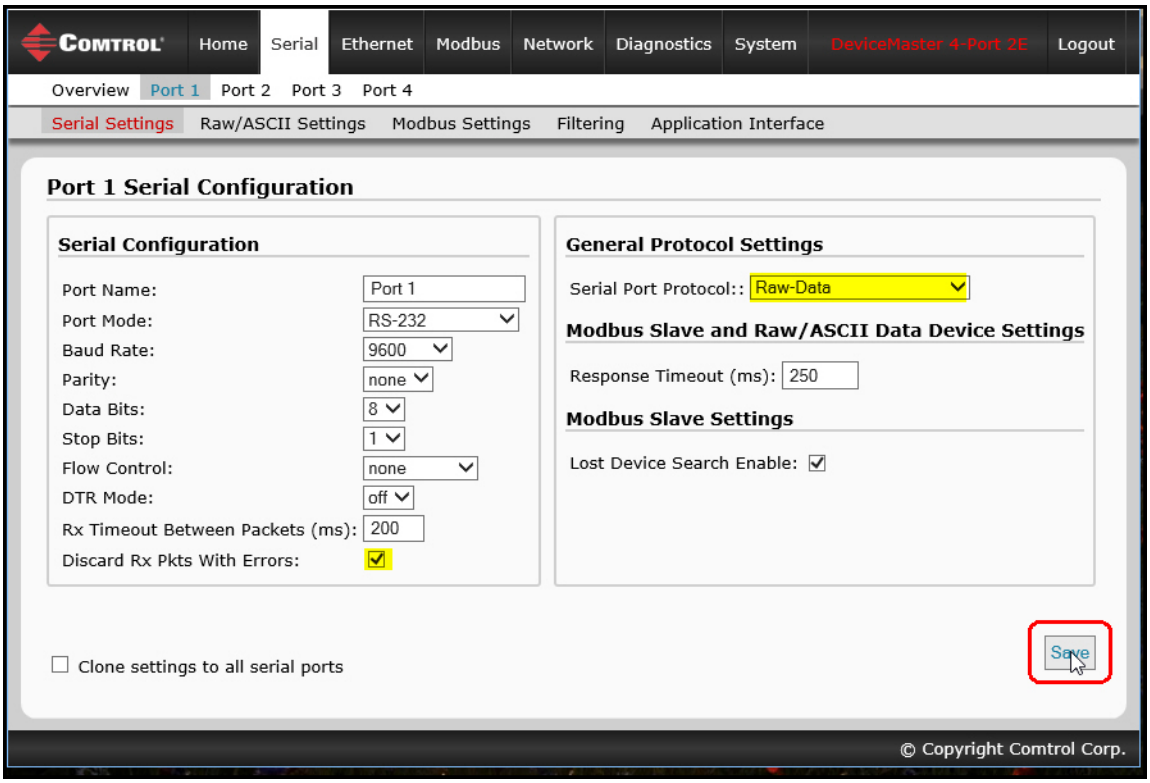
Use the following procedure to configure read/write raw/ASCII serial devices.

1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Click the **Serial** menu, which opens to the *Serial Port Overview* page.



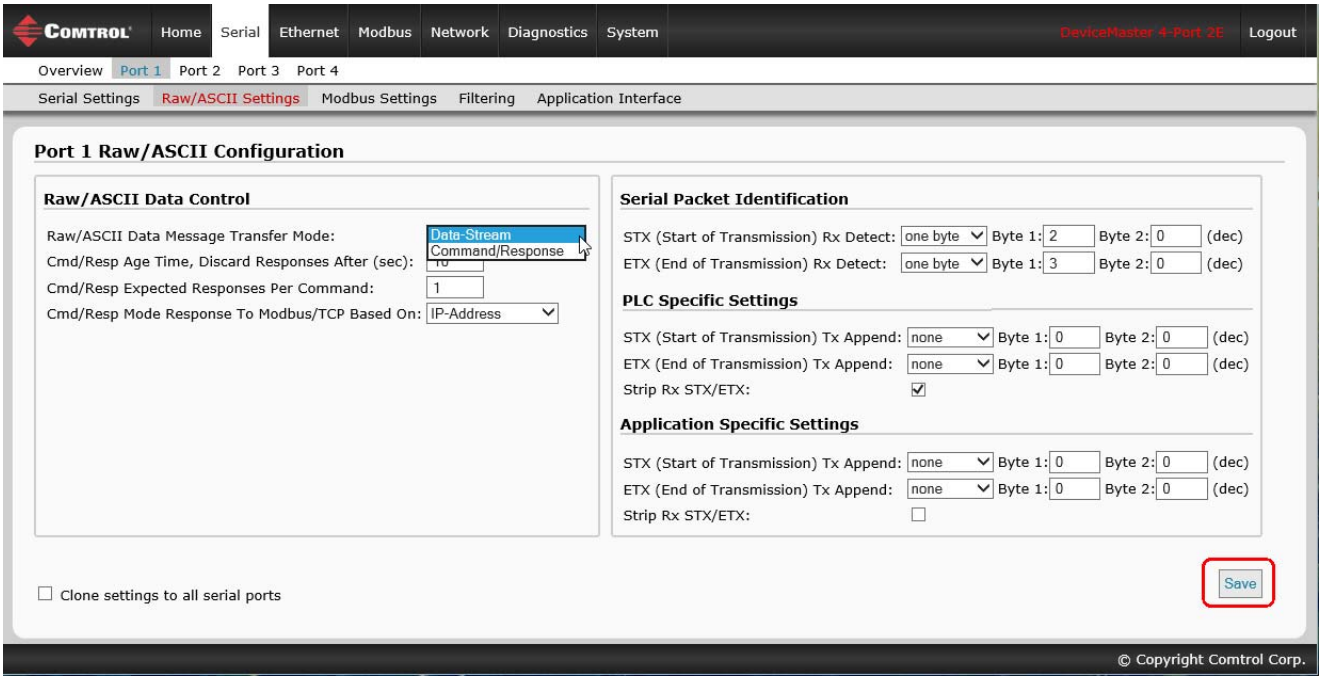
Serial Port Settings	Port 1	Port 2	Port 3	Port 4
Port Name:				
Port Mode:	RS-232	RS-232	RS-232	RS-232
Baud Rate:	9600	9600	9600	9600
Parity:	none	none	none	none
Data Bits:	8	8	8	8
Stop Bits:	1	1	1	1
Flow Control:	none	none	none	none
DTR Mode:	off	off	off	off
Rx Timeout Between Packets (ms):	200	200	200	200
Discard Messages With Errors:	yes	yes	yes	yes
General Protocol Settings				
Serial Port Protocol:	Raw-Data	Raw-Data	Raw-Data	Raw-Data
Modbus Slave and Raw/ASCII Data Device Settings				
Response Timeout (ms):	N/A	N/A	N/A	N/A
Modbus Slave Settings				
Lost Device Search Enable:	N/A	N/A	N/A	N/A
Raw/ASCII Data Control				
Raw/ASCII Data Message Transfer Mode:	Data-Stream	Data-Stream	Data-Stream	Data-Stream
Cmd/Resp Age Time, Discard Responses After (sec):	N/A	N/A	N/A	N/A
Cmd/Resp Expected Responses Per Command:	N/A	N/A	N/A	N/A
Cmd/Resp Mode Response To Modbus/TCP Based On:	N/A	N/A	N/A	N/A
Serial Packet ID Settings				
STX Rx Detect:	one byte	one byte	one byte	one byte
STX Rx (dec):	2	2	2	2
ETX Rx Detect:	one byte	one byte	one byte	one byte
ETX Rx (dec):	3	3	3	3
PLC Specific Settings				
STX Tx Append:	none	none	none	none
STX Tx (dec):				
ETX Tx Append:	none	none	none	none
ETX Tx (dec):				
Strip Rx STX/ETX chars:	yes	yes	yes	yes
Serial Modbus Master and Modbus/TCP Interface Settings				

3. Click **Port N** for the port you want to configure, where **N** is the port number, which opens the *Port Serial Configuration* page for the corresponding port.
4. If desired, enter a **Port Name**.
5. Set up the *Serial Configuration* for your device.
6. Leave the **Discard Rx Packets With Errors** option enabled.
7. Under the *General Protocol Settings* section, set the **Serial Port Protocol** option to **Raw-Data**.
8. Click the **Save** button.



9. Select the **Raw/ASCII Settings** sub-menu, which opens the *Port Raw/ASCII Configuration* page for the corresponding port.
10. Set the **Raw/ASCII Data Message Transfer Mode** option.
    - Selecting **Data-Stream** enables asynchronous communication to the device.
      - Transmit data is sent immediately from all Modbus and active Application interfaces.
      - Received data will be returned to the Modbus interface and all active Application interfaces.
      - If **Data-Stream** is selected, the rest of the options in this section are not applicable.
    - Selecting **Command/Response** enables synchronous communications with the device.
      - Transmit data will expect one or more responses.
      - Responses will only be returned to the transmit message originator.

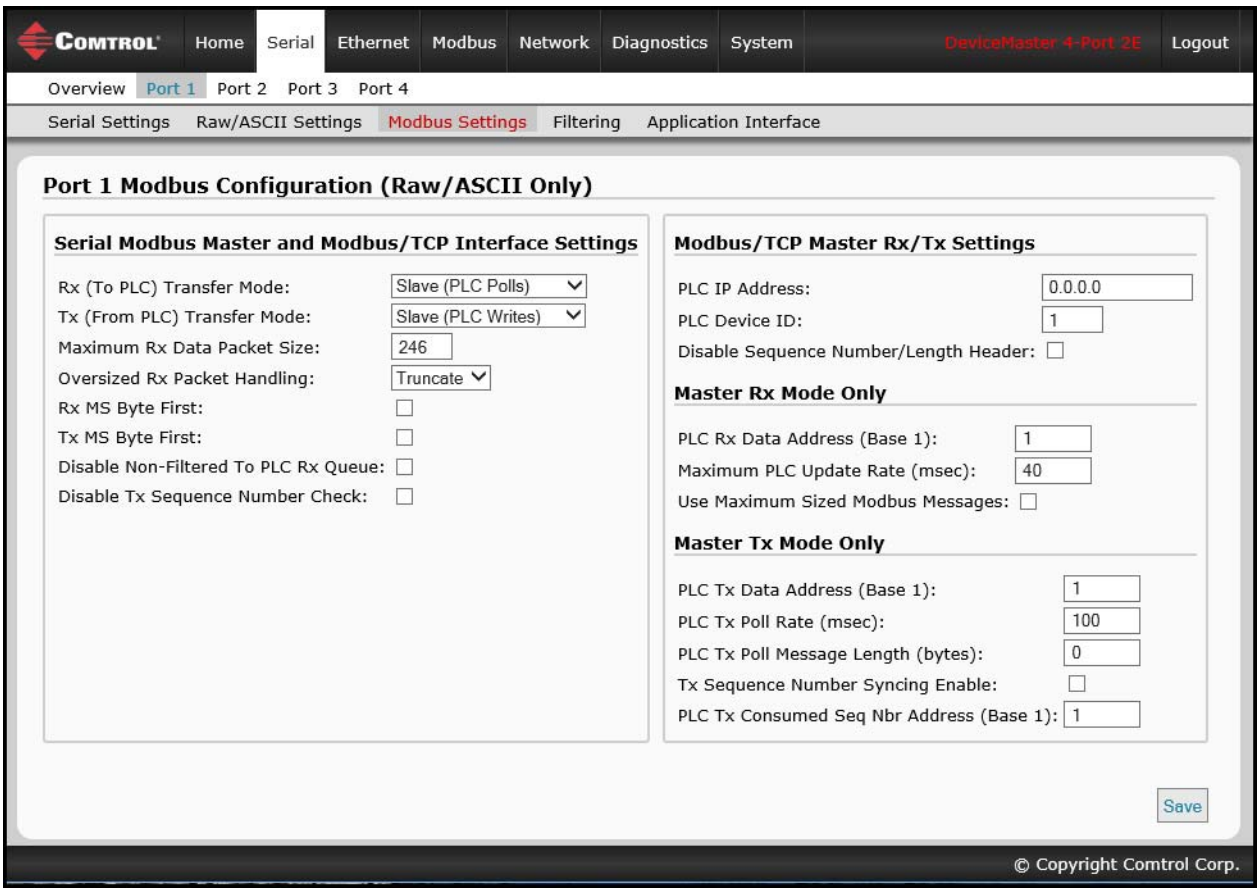
      If **Command/Response** is selected:
      - Set the **Response Timeout** to a valid timeout period for your device.
      - The **Cmd/Resp Age Time** will set the time at which old responses to the Modbus interface are discarded.
      - The **Cmd/Resp Expected Responses Per Command** indicates the number of responses expected per transmitted message. This is typically 1.
      - Set the **Cmd/Resp Mode Response To Modbus/TCP Based On** option to:
        - **IP-Address** if there is only one Modbus/TCP interface per IP-Address communicating to this port. This is typically used for PLC or single OPC Server/SCADA systems.
        - **TCP-Connection** if there is more than one Modbus/TCP interface per IP-Address communicating to this port. This typically is required for multiple OPC Server/ SCADA systems running on the same computer.



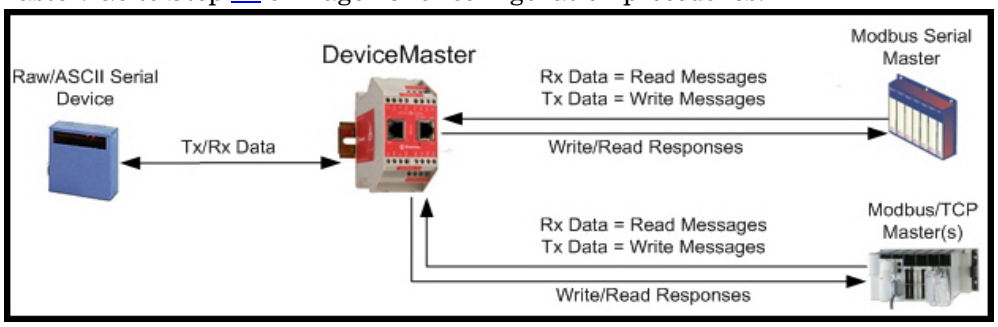
11. Set up the *Serial Packet Identification* section.
    - Set the **STX (Start of transmission) Rx Detect** option in decimal format**.**
    - Set the **ETX (End of transmission) Rx Detect** option in decimal format**.** Refer to your serial device's User Manual for these settings.
    - Enable the **Strip Rx STX/ETX** option under the *PLC Specific Settings* or *Application Specific Settings* sections if you do not want the STX and ETX bytes returned to the PLC or application(s).

- If desired, set the **STX (Start of transmission) Tx Append** option in decimal format**.** This will append the STX byte(s) to transmitted messages from the PLC or application.
- If desired, set the **ETX (End of transmission) Tx Append** option in decimal format**.** This will append the ETX byte(s) to transmitted messages from the PLC or application.

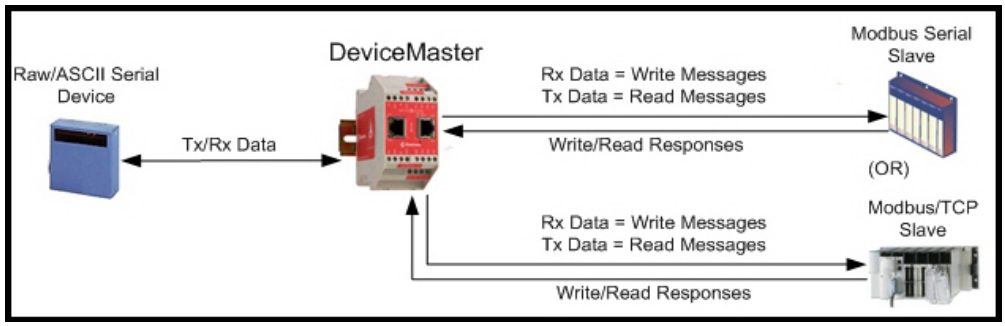
12. Select the **Modbus Settings** sub-menu, which opens the *Port Modbus Configuration (Raw/ASCII Only)* page.



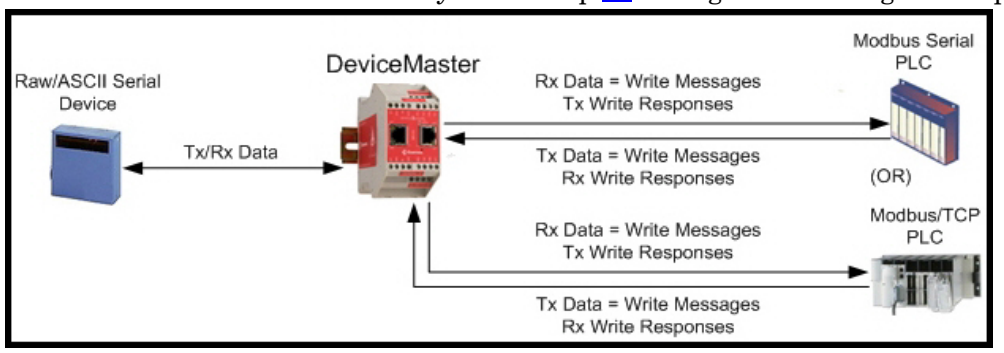
13. Configure the Serial Modbus Master and Modbus/TCP Interface settings for your environment using one of the following methods.
    - ***PLC Master/DeviceMaster Slave*** mode. You can use the *PLC Master / DeviceMaster UP Slave* method only if your PLC can operate as a Modbus/TCP master, Modbus/RTU serial master, or Modbus/ASCII serial master. Go to Step 14 on Page 45 for configuration procedures.



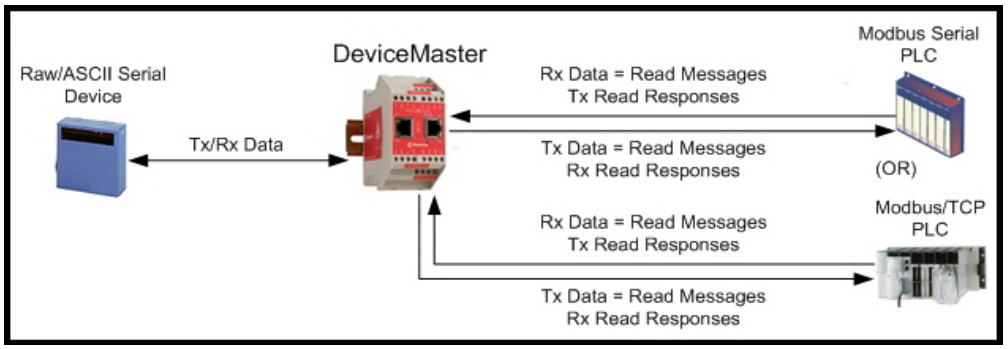
    - ***PLC Slave/DeviceMaster Master*** mode. You can use the *PLC Slave / DeviceMaster UP Master* method only if your PLC can operate as a Modbus/TCP slave, Modbus/RTU serial slave, or Modbus/ASCII serial slave. Go to Step 15 on Page 46 for configuration procedures.



    - ***Dual Master – Write*** mode. You can use *Dual Master - Write* method only if your PLC can operate as a Modbus master and slave simultaneously. Go to Step 16 on Page 48 for configuration procedures.



    - ***Dual Master – Read*** mode. You can use *Dual Master - Read* method only if your PLC can operate as a Modbus master and slave simultaneously. Go to Step 17 on Page 50 for configuration procedures.



14. PLC Master/DeviceMaster Slave Mode Only

Use the following procedure to configure *PLC Master/DeviceMaster Slave* mode in the *Port Modbus Configuration (Raw/ASCII Only)* page.

a. Set the **Rx (To PLC) Transfer Mode** option to **Slave (PLC Polls)**.

b. Set the **Tx (From PLC) Transfer Mode** option to **Slave (PLC Writes)**.

c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. This can be a maximum of 246 bytes in **Slave Rx Mode**.

d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.

e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.

f. Set the **Tx MS Byte First** option if you want to transmit data most significant byte first.

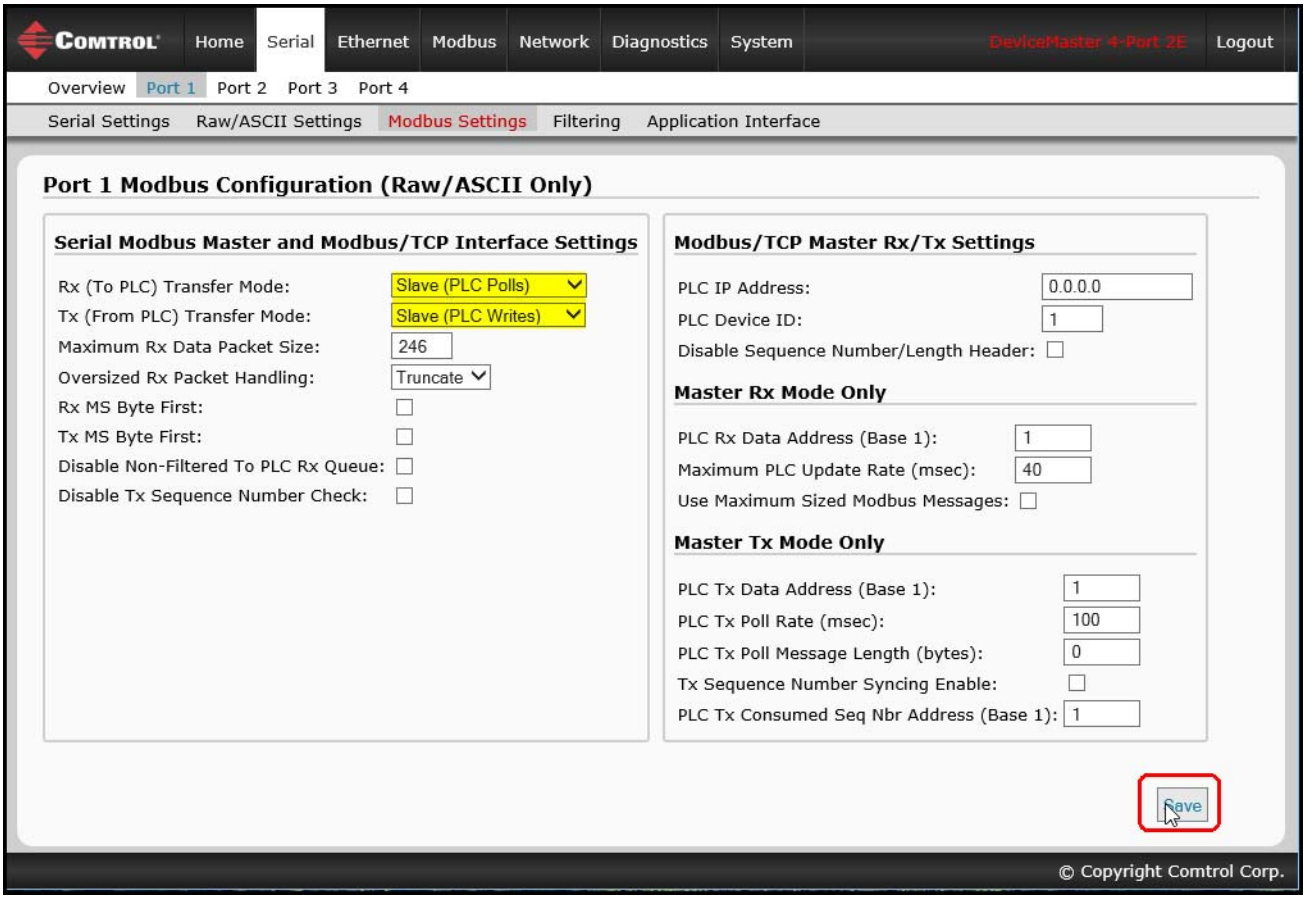
g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received between received data requests, only the last received data packet will be returned.)

h. Set the **Disable Tx Sequence Number Check** option if you want to disable the transmit sequence number checking.

- If selected, the transmit sequence number checking is disabled. All transmit messages will be transmitted if the sequence number has been incremented or not.
- If not selected, the sequence number is checked and the message will only be transmitted if the sequence number has been incremented.

i. Click the **Save** button.

j. Go to Step 18 on Page 51 to complete configuration.



15. PLC Slave/DeviceMaster Master Mode Only:

Use the following procedure to configure *PLC Slave/DeviceMaster Master* mode in the *Port Modbus Configuration (Raw/ASCII Only)* page.

a. Set the **Rx (To PLC) Transfer Mode** option to **Master (Write to PLC)**.

b. Set the **Tx (From PLC) Transfer Mode** option to **Master (Poll the PLC)**.

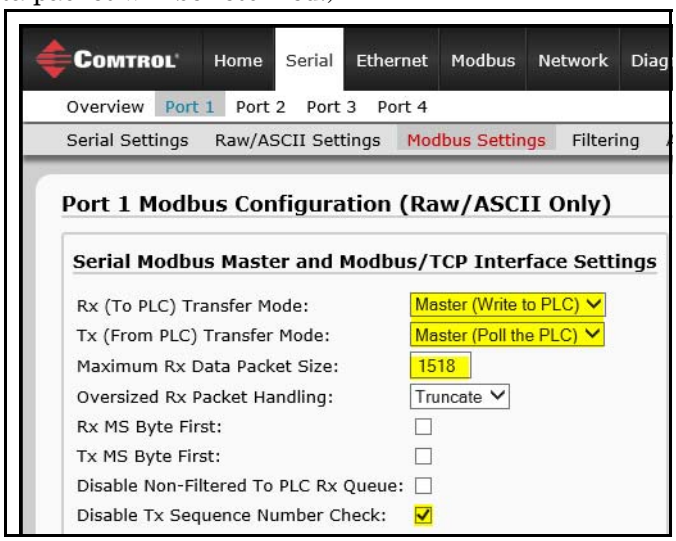
c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. This can be a maximum of 1518 bytes in **Master Rx Mode**.

d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.

e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.

f. Set the **Tx MS Byte First** option if you want to transmit data most significant byte first.

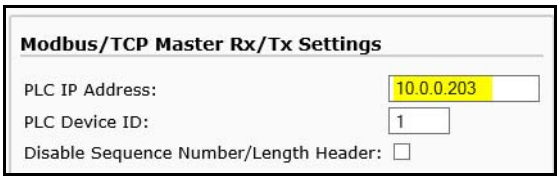
g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received during the **Maximum PLC Update Rate** time period, only the last received data packet will be returned.)



Under the *Modbus/TCP Master Rx/Tx Settings* section:

h. Enter the **PLC IP Address**:

- For *Modbus/TCP slaves*, set the PLC IP Address to that of your PLC in xxx.xxx.xxx.xxx format.
- For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC IP Address to that of this DeviceMaster in xxx.xxx.xxx.xxx format.



Note: *The Modbus serial slave must be attached to one of the serial ports on this DeviceMaster.*

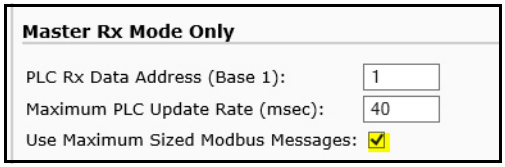
i. Enter the **PLC Device ID**:

- For *Modbus/TCP slaves*, set the PLC Device ID to that of your PLC. This is typically 1.
- For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC Device ID to that of the serial slave device.

Note: *This must be a unique device ID attached to this DeviceMaster.*

j. If necessary, set the **Disable Sequence Number/Length Header** option if you want to transmit data without the 4 byte header (sequence number and data length).

Under the *Master Rx/Tx Mode Only* section:



k. Set the **PLC Rx Data Address (Base 1)** to the PLC memory address where you want to place the received data message. This address is Base 1, which means the address starts at 1 (or 400001 for some PLCs). If your address range is Base 0, or starts at zero, you will need to add one to your address.

l. Set the **Maximum PLC Update Rate (msec)** to the fastest rate your PLC can reliably receive and process data. This is typically longer than the scan rate. The default of 40 milliseconds is usually sufficient, but your system may require a longer time period.

m. Set the **Use Maximum Sized Modbus Messages** option if you are receiving messages over 196 bytes and PLC can receive messages larger than 200 bytes, or you want to decrease latency and network usage.

Under the *Master Tx Mode Only* section:

n. Set the **PLC Tx Data Address (Base 1)** to the PLC memory address at which to request the transmit data message. This is Base 1, which means the address starts at 1 (or 400001 for some PLCs). If your address range is Base 0, or starts at zero, you will need to add one to your address.

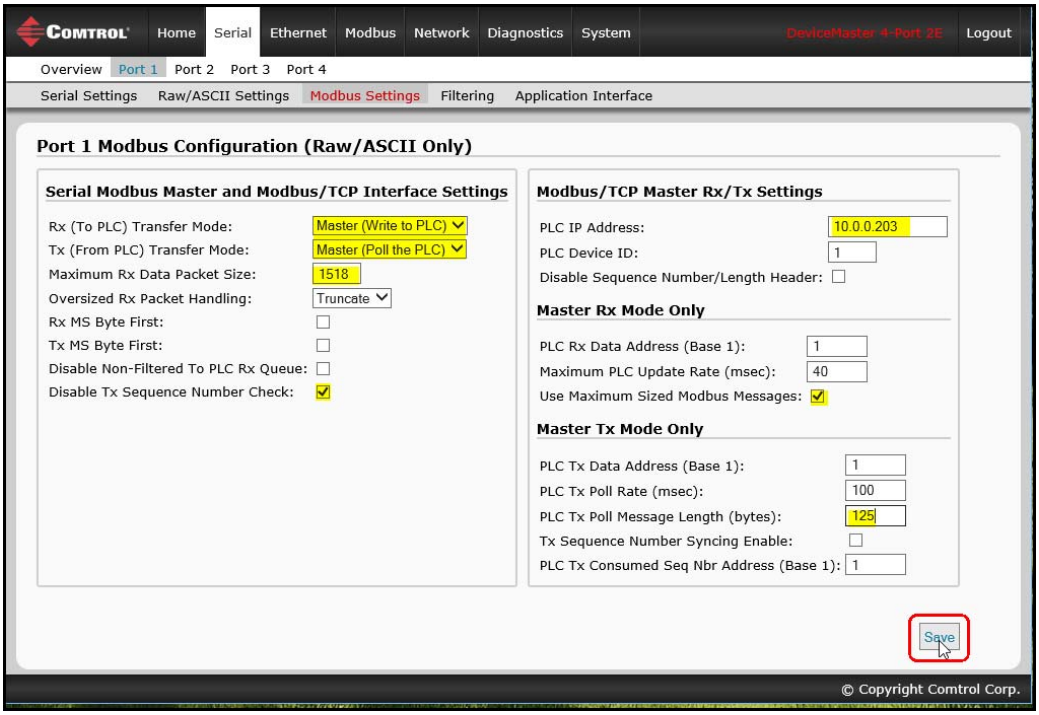
o. Set the **PLC Tx Poll Rate (msec)** to the rate at which you would like the DeviceMaster to poll for transmit messages. If **Tx Sequence Number Syncing** is disabled, this rate must be faster than the rate at which you wish to transmit data. If not, transmit messages will be lost.

p. Set the **PLC Tx Poll Message Length** to the length in bytes of your longest transmit data packet plus four bytes for the sequence number and length parameters at the start of the transmit message (maximum of 250 bytes). Any additional bytes requested will be left unused.

q. If you wish to enable synchronization of the transmit data messages between the PLC and the DeviceMaster:

- Enable **Tx Sequence Number Syncing Enable**.
- Set the **PLC Tx Consumed Sequence Address** to the PLC memory address at which you wish the DeviceMaster to write the transmit consumed sequence number. This memory address must point to a 16-bit word and, like the other address definitions, is base 1. When the **Tx Produced Sequence Number** (at the **PLC Tx Data Address**) and this consumed sequence number are equal, the DeviceMaster has transmitted the last message and is ready for the next transmit message.

r. Click the **Save** button.



Note: *Go to Step 18 on Page 51 to complete configuration.*

16. ***Dual Master – Write Mode Only***

Use the following procedure to configure *Dual Master – Write* mode in the *Port Modbus Configuration (Raw/ASCII Only)* page.

a. Set the **Rx (To PLC) Transfer Mode** option to ***Master (Write to PLC)***.

b. Set the **Tx (From PLC) Transfer Mode** option to **Slave (PLC Writes)**.

c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. This can be a maximum of 1518 bytes in Master Rx Mode.

d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.

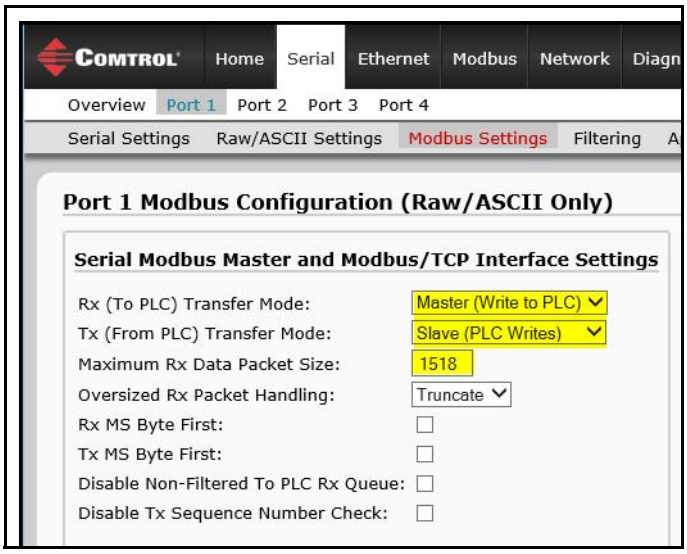
e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.

f. Set the **Tx MS Byte First** option if you want to transmit data most significant byte first.

g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received during the **Maximum PLC Update Rate** time period, only the last received data packet will be returned.)

h. Set the **Disable Tx Sequence Number Check** option if you want to disable the transmit sequence number checking.

- If selected, the transmit sequence number checking is disabled. All transmit messages will be transmitted if the sequence number has been incremented or not.
- If not selected, the sequence number is checked and the message will only be transmitted if the sequence number has been updated.



Under the *Modbus/TCP Master Rx/Tx Settings* section:

i. Set the **PLC IP Address** to that of your PLC in *xxx.xxx.xxx.xxx* format.

j. Set the **PLC Device ID** to that of your PLC. This is typically 1.

k. If necessary, set the **Disable Sequence Number/ Length Header** option if you want to transmit data without the 4 byte header (sequence number and data length).

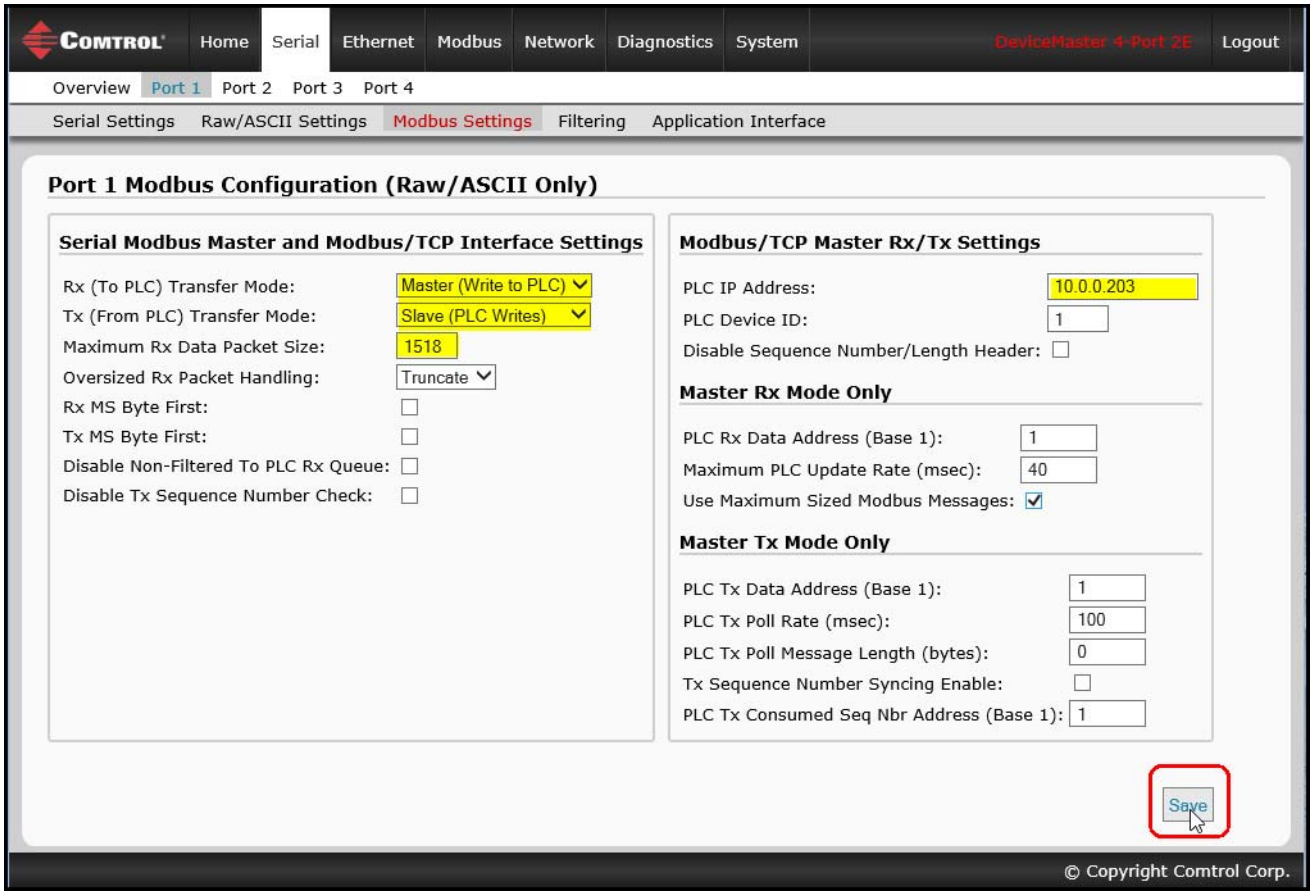
Under the *Master Rx Mode Only* section:

l. Set the **PLC Rx Data Address** to the PLC memory address where you want to place the received data message. This address is Base 1, which means the address starts at 1 (or 400001 for some PLCs). If your address range is Base 0, or starts at zero, you will need to add one to your address.

m. Set the **Maximum PLC Update Rate** option to the fastest rate your PLC can reliably receive and process data. This is typically longer than the scan rate. The default of 40 milliseconds is usually sufficient, but your system may require a longer time period.

n. Set the **Use Maximum Sized Modbus Messages** option if you are receiving messages over 196 bytes, and the PLC can receive messages larger than 200 bytes or you want to decrease latency and network usage.

o. Click the **Save** button.



Note: *Go to Step 18 on Page 51 to complete configuration.*

17. ***Dual Master – Read Mode Only***:

Use the following procedure to configure *Dual Master – Read* mode in the *Port Modbus Configuration (Raw/ASCII Only)* page.

a. Set the **Rx (To PLC) Transfer Mode** option to **Slave (PLC Polls)**.

b. Set the **Tx (From PLC) Transfer Mode** option to **Master (Poll the PLC)**.

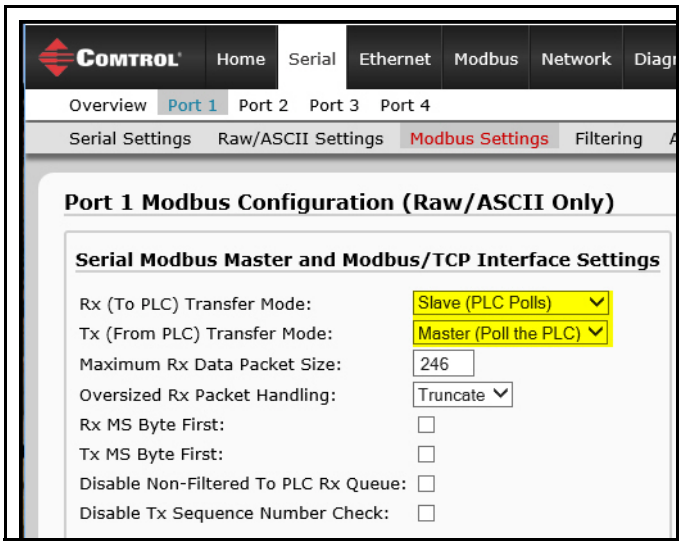
c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. This can be a maximum of 246 bytes in *Slave Rx Mode*.

d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.

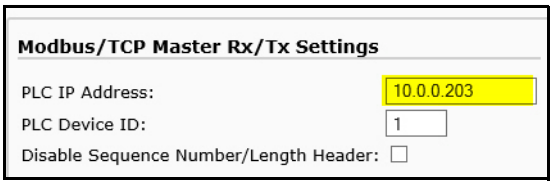
e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.

f. Set the **Tx MS Byte First** option if you want to transmit data most significant byte first.

g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received between received data requests, only the last received data packet will be returned.)



Under the *Modbus/TCP Master Rx/Tx Settings* section:



h. Enter the **PLC IP Address**:

- For *Modbus/TCP slaves*, set the PLC IP Address to that of your PLC in xxx.xxx.xxx.xxx format.
- For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC IP Address to that of this DeviceMaster in xxx.xxx.xxx.xxx format.

Note: *The Modbus serial slave must be attached to one of the serial ports on this DeviceMaster.*

i. Enter the **PLC Device ID**:

- For *Modbus/TCP slaves*, set the PLC Device ID to that of your PLC. This is typically 1.
- For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC Device ID to that of the serial slave device.

Note: *This must be a unique device ID attached to this DeviceMaster.*

j. If necessary, set the **Disable Sequence Number/Length Header** option if you want to transmit data without the 4 byte header (sequence number and data length).

Under the *Master Tx Mode Only* section:

k. Set the **PLC Tx Data Address** to the PLC memory address at which to request the transmit data message. This is Base 1, which means the address starts at 1 (or 400001 for some PLCs). If your address range is Base 0, or starts at zero, you will need to add one to your address.

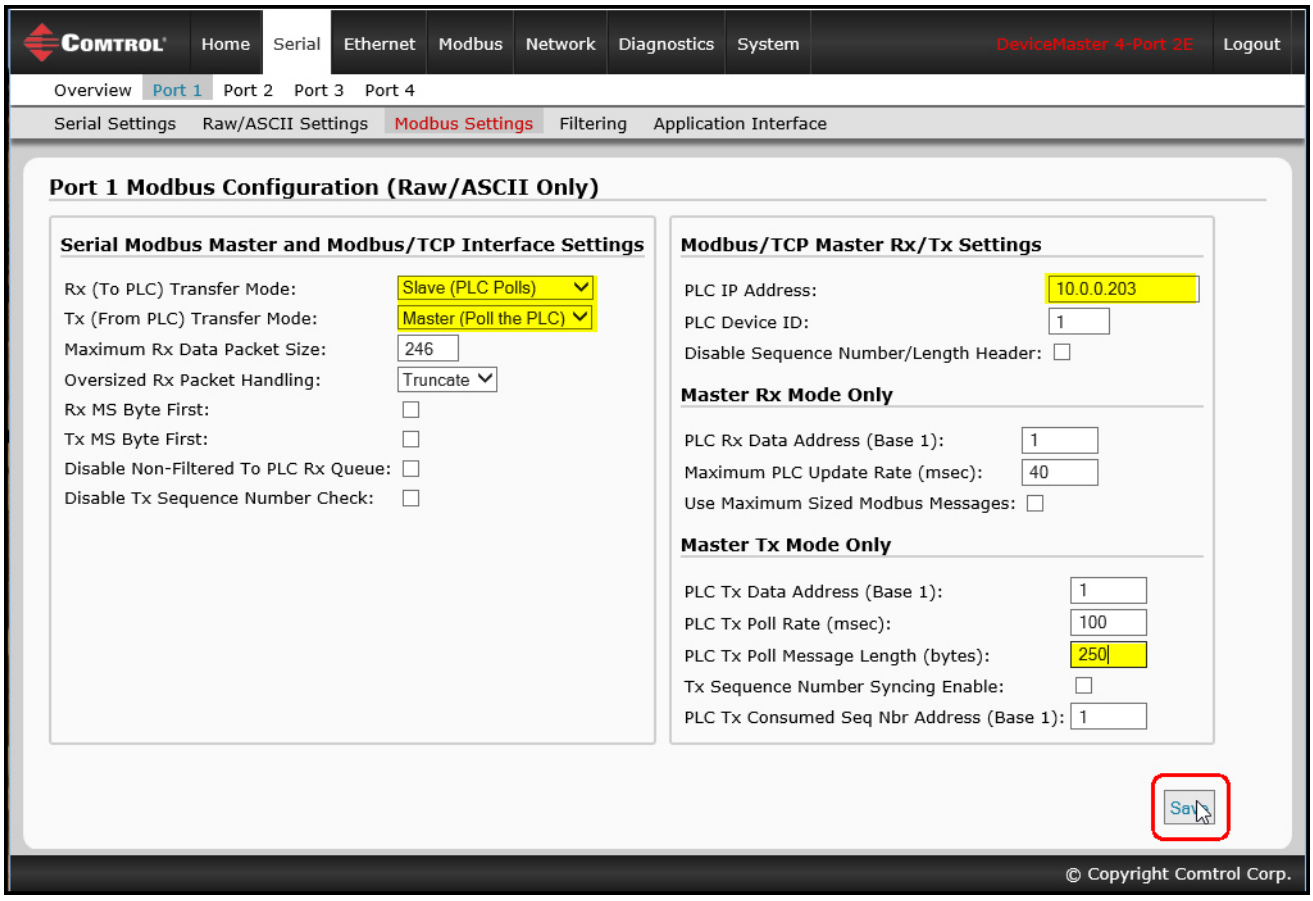
l. Set the **PLC Tx Poll Rate** option to the rate at which you would like the DeviceMaster to poll for transmit messages. If the **Tx Sequence Number Syncing** option is disabled, this rate must be faster than the rate at which you wish to transmit data. If not, transmit messages will be lost.

m. Set the **PLC Tx Poll Message Length** option to the length in bytes of your longest transmit data packet plus four bytes for the sequence number and length parameters at the start of the transmit message (maximum of 250 bytes). Any additional bytes requested will be left unused.

n. If you wish to enable synchronization of the transmit data messages between the PLC and the DeviceMaster:

- Enable the **Tx Sequence Number Syncing Enable** option.
- Set the **PLC Tx Consumed Sequence Address** option to the PLC memory address at which you wish the DeviceMaster to write the transmit consumed sequence number. This memory address must point to a 16-bit word and, like the other address definitions, is base 1. When the Tx Produced Sequence Number (at the **PLC Tx Data Address**) and this consumed sequence number are equal, the DeviceMaster has transmitted the last message and is ready for the next transmit message.

o. Click the **Save** button.



18. Set up the filtering/data extraction settings:

- If no filtering/data extraction is required, leave all filtering/data extraction settings to defaults (off).
- If filtering/data extraction is required, see Filtering/Data Extraction Configuration on Page 69.

19. Set up the application socket interface settings:
    - If no application socket interface is required, leave all application socket interface settings at defaults and the application **Enable** option is not selected.
    - If an application socket interface is required, see Application Socket Configuration on Page 77.
20. Click the **Save** button.

Modbus Addressing

The DeviceMaster serial port data addressing used for slave modes:

Serial Port Raw/ ASCII Addressing	Serial Port 1	Serial Port 2	Serial Port 3	Serial Port 4	Access Rule
Unit ID	255 (FF Hex)	255 (FF Hex)	255 (FF Hex)	255 (FF Hex)	N/A
Receive Data Address	1000 (Base 0) 1001 (Base 1)	2000 (Base 0) 2001 (Base 1)	3000 (Base 0) 3001 (Base 1)	4000 (Base 0) 4001 (Base 1)	Read Only
Transmit Data Address	1300 (Base 0) 1301 (Base 1)	2300 (Base 0) 2301 (Base 1)	3300 (Base 0) 3301 (Base 1)	4300 (Base 0) 4301 (Base 1)	Read/Write

Receive and Transmit Message Formats

The format of received serial data messages sent to or returned from the PLC:

Name	Data Type	Data Value(s)	Access Rule
Receive (DeviceMaster to PLC) message data			Read
Structure of:		0-65535 (FFFF Hex)	
Produced data sequence	WORD	1-1024 (Master Rx Mode)	
Data length (in bytes)	WORD	0-246 (Slave Rx Mode)	
Data array	Array of WORD	0-65535	

General requirements:

- The memory area must be defined in 16 bit words and large enough to handle the largest serial packet plus two words for the produced sequence number and data length parameters.
- The **Maximum Rx Data Packet Size** must be set large enough to accept the largest possible packet.

For large received data packets over 246 bytes (This may be less for your PLC):

- The **Rx (To PLC) Transfer Mode** option must be set to **Master (Write to PLC)**.
- The data will automatically be placed in continuous memory.
- All data will have been transferred to the PLC when the sequence number is updated.

The format of the transmit serial data received from the PLC:

Name	Data Type	Data Value(s)	Access Rule
Transmit (PLC to DeviceMaster) message data			Read/Write
Structure of:		0-65535 (FFFF Hex)	
Produced data sequence	WORD	1-236 (Slave Mode)	
Data length (in bytes)	WORD	1-246 (Master Mode)	
Data array	Array of WORD	0-65535	

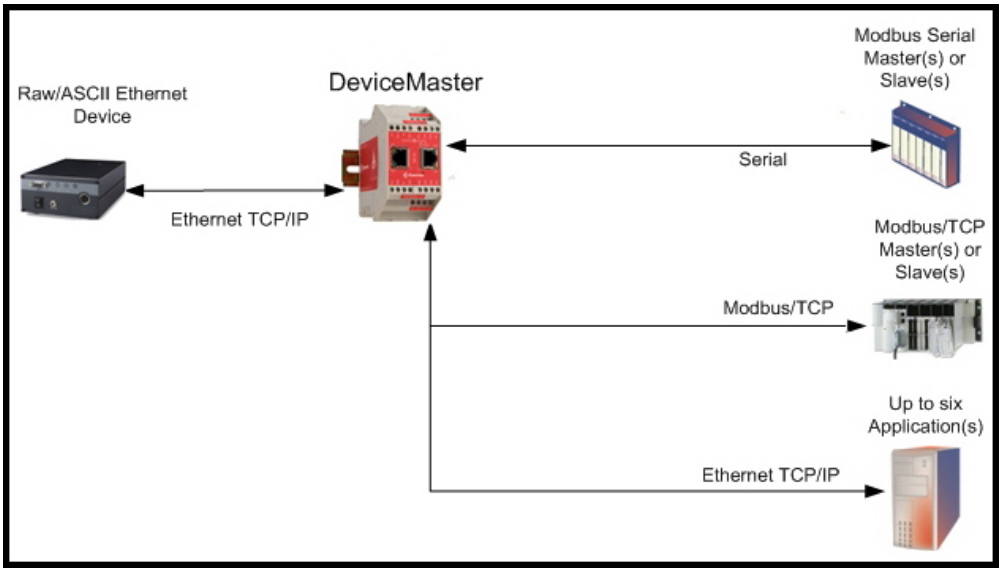
Transmit messages have the following characteristics:

- All data is transferred in 16 bit words.
- If operating in *Tx (From PLC) Transfer Mode of Master (Poll the PLC)*: The sequence number must be incremented when there is new data to transmit.
- If operating in *Tx (From PLC) Transfer Mode of Slave (PLC Writes)*: The sequence number must be incremented when there is new data to transmit only if the Disable Tx Sequence Number Check is not selected.
- The data length field indicates the number of valid bytes contained in this message.
- The actual length of the message received from a PLC may contain extra, unused data.
- Unused data is ignored.
- A request for transmit data returns the last transmit data message.

Read/Write Raw/ASCII Ethernet Devices

Read/write raw/ASCII Ethernet devices use the **Ethernet** menus to:

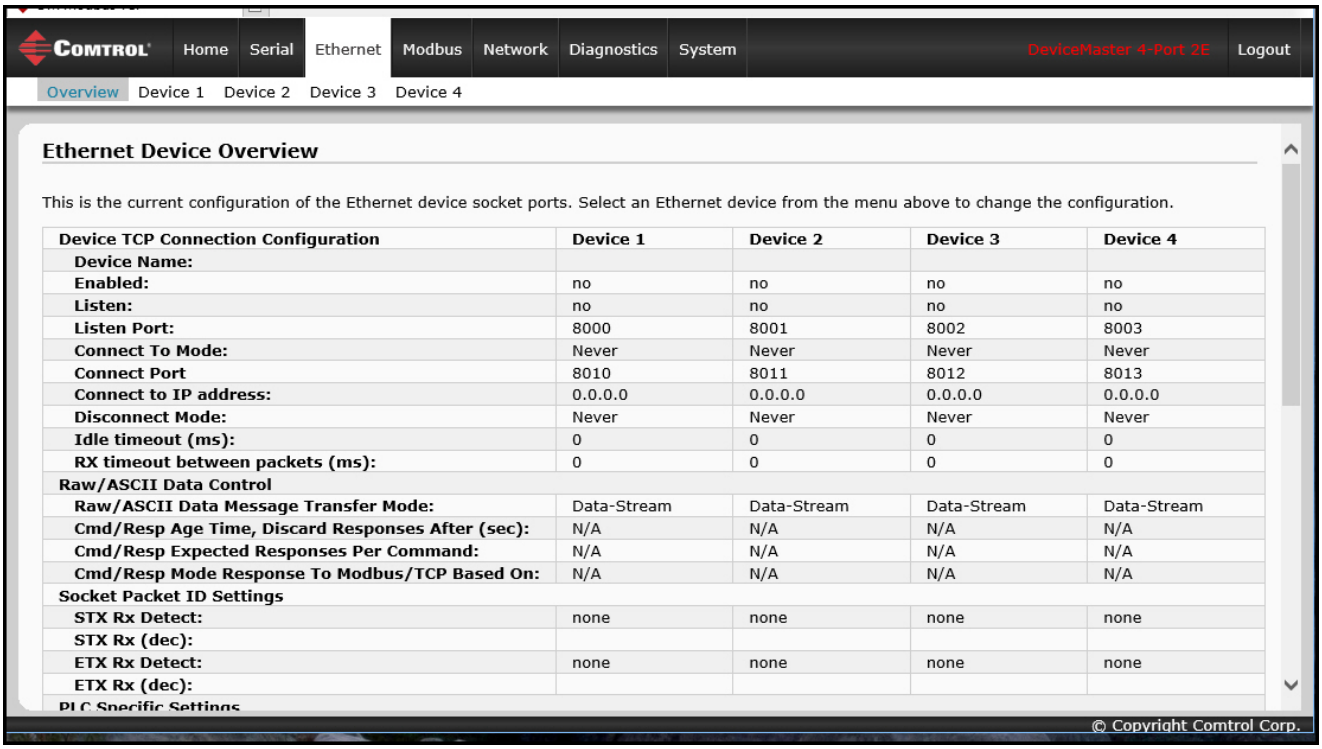
- Allow connections between an Ethernet device, such as a barcode scanner, RFID reader, or weigh scale, and a PLC and/or an application.
- Raw/ASCII data is the only supported data type.
- The Ethernet device must support Ethernet TCP socket connections.



Note: *The PLC and applications can both communicate to the Ethernet device, but they cannot communicate directly to each other.*

Use the following procedure to configure read/write Ethernet devices.

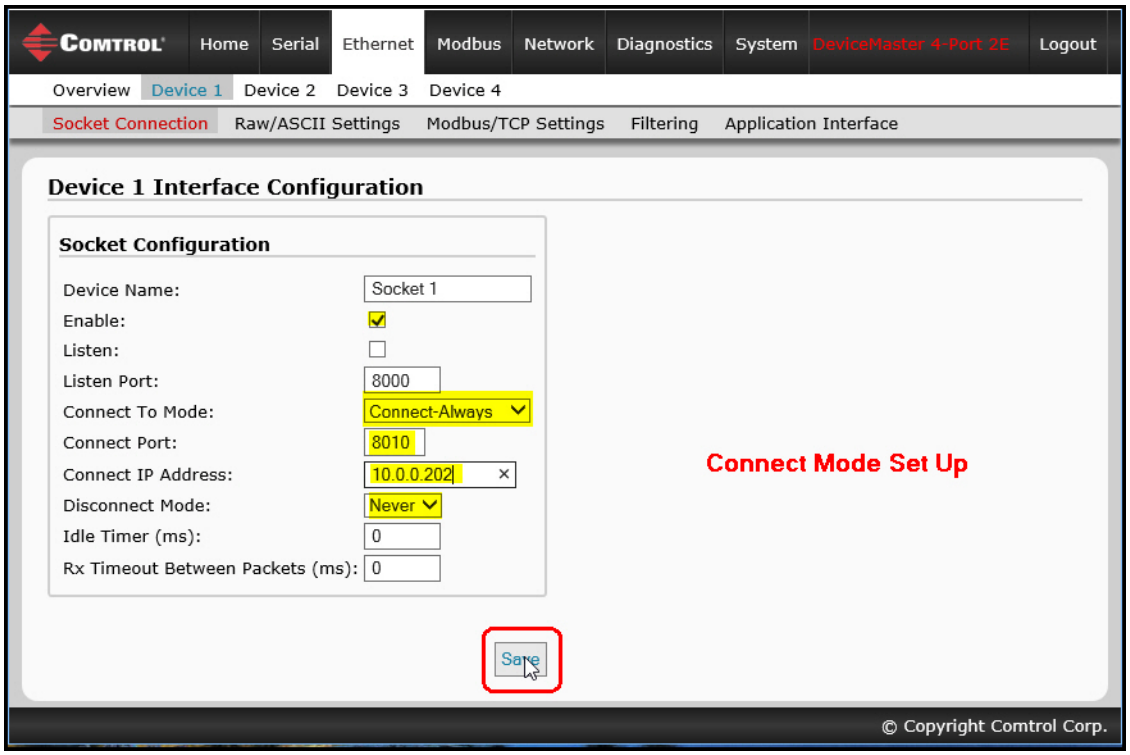
1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Click the **Ethernet** menu, which opens to the *Ethernet Device Overview* page.



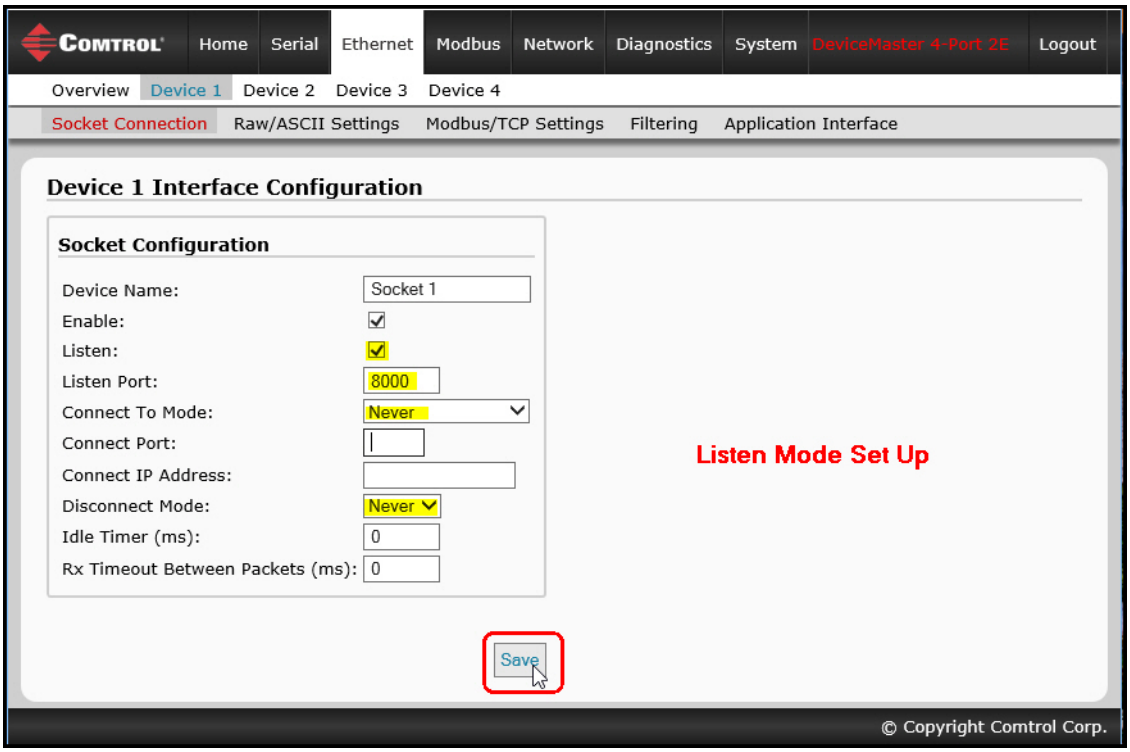
Device TCP Connection Configuration	Device 1	Device 2	Device 3	Device 4
Device Name:				
Enabled:	no	no	no	no
Listen:	no	no	no	no
Listen Port:	8000	8001	8002	8003
Connect To Mode:	Never	Never	Never	Never
Connect Port	8010	8011	8012	8013
Connect to IP address:	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0
Disconnect Mode:	Never	Never	Never	Never
Idle timeout (ms):	0	0	0	0
RX timeout between packets (ms):	0	0	0	0
Raw/ASCII Data Control				
Raw/ASCII Data Message Transfer Mode:	Data-Stream	Data-Stream	Data-Stream	Data-Stream
Cmd/Resp Age Time, Discard Responses After (sec):	N/A	N/A	N/A	N/A
Cmd/Resp Expected Responses Per Command:	N/A	N/A	N/A	N/A
Cmd/Resp Mode Response To Modbus/TCP Based On:	N/A	N/A	N/A	N/A
Socket Packet ID Settings				
STX Rx Detect:	none	none	none	none
STX Rx (dec):				
ETX Rx Detect:	none	none	none	none
ETX Rx (dec):				
PLC Specific Settings				

3. Click **Device N** for the port that you want to configure, where **N** is the Socket number, which opens the *Device Interface Configuration* page for the corresponding socket.
4. If desired, enter a *Device Name*.
5. Click the **Enable** option and configure the settings for your environment using one of the following procedures.
   - If your Ethernet TCP/IP Device requires another device to connect to it, configure the socket port on the DeviceMaster to **Connect** mode:
     - Leave the **Listen** option unselected.
     - Set the **Connect To Mode** option to **Connect-Always**.
     - Set the **Connect Port** option to the socket port number of your Ethernet device.
     - Set the **Connect IP Address** option to the IP Address of your Ethernet device.

     Note: Do not enter the IP address of the DeviceMaster or PLC here.
     - Set the **Disconnect Mode** option to **Never**.
     - Click the **Save** button.

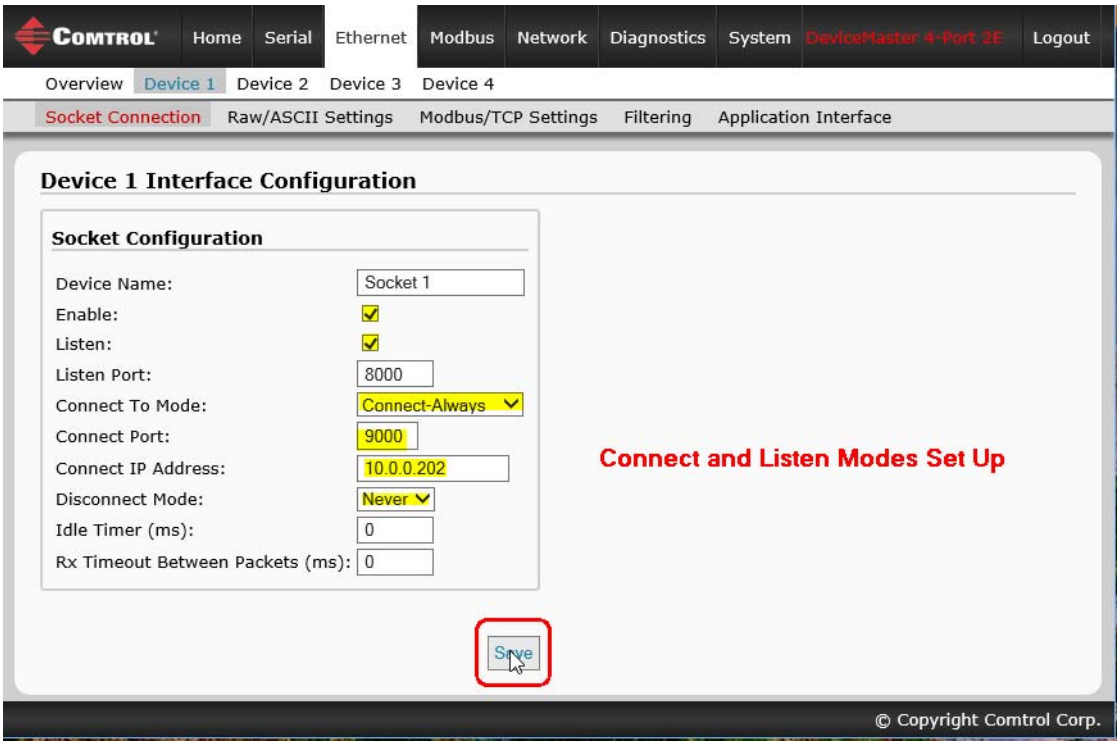


- If your Ethernet TCP/IP Device is configured to connect to another device, configure the socket port on the DeviceMaster to **Listen** mode:
  - Select the **Listen** option.
  - Use the default **Listen Port** on the DeviceMaster of *8xxx* or designate your own.
  - Set the **Connect To Mode** option to **Never**.
  - Set the **Disconnect Mode** option to **Never**.
  - Configure your Ethernet device to connect to the DeviceMaster at the DeviceMaster IP address and **Listen Port**.
  - Click the **Save** button.

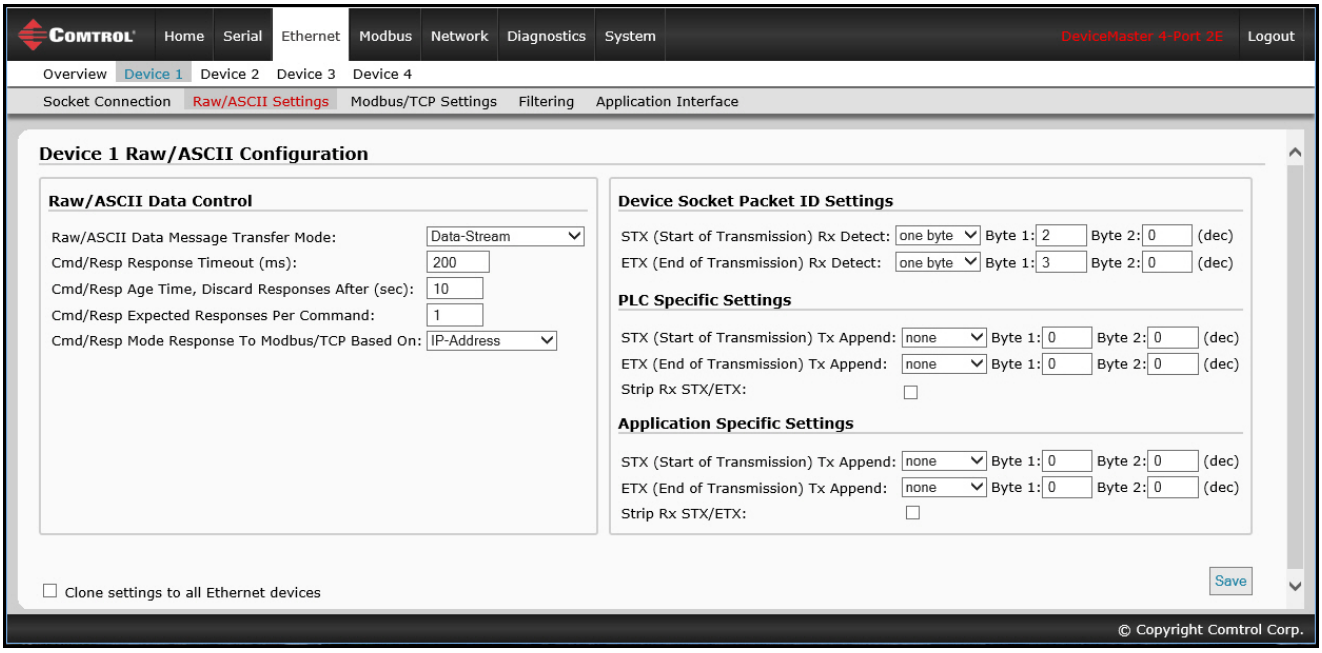


- If you do not know if your device will connect to another Ethernet device, but do know your device's socket port and IP address, you can do the following to enable both the **Listen** and **Connect** modes:
  - Select the **Listen** option.
  - Use the default **Listen Port** on the DeviceMaster of *8xxx* or designate your own.
  - Set the **Connect To Mode** option to **Connect-Always**.
  - Set the **Connect Port** option to the port number of your Ethernet device.
  - Set the **Connect IP Address** to the IP address of your Ethernet device.

  Note: Do not enter the IP address of the DeviceMaster or PLC here.
  - Set the **Disconnect Mode** option to **Never**.
  - Optionally configure your Ethernet device to connect to the DeviceMaster at the DeviceMaster IP Address and **Listen Port**.
  - Set the **Rx Timeout Between Packets** option. Set to zero to stream data with the **Rx STX/ETX Detect** settings set to none. For normal settings, typical values are 10 to 50 ms.
  - Click the **Save** button.



6. Select the **Raw/ASCII Settings** sub-menu, which opens the *Device Raw/ASCII Configuration* page.

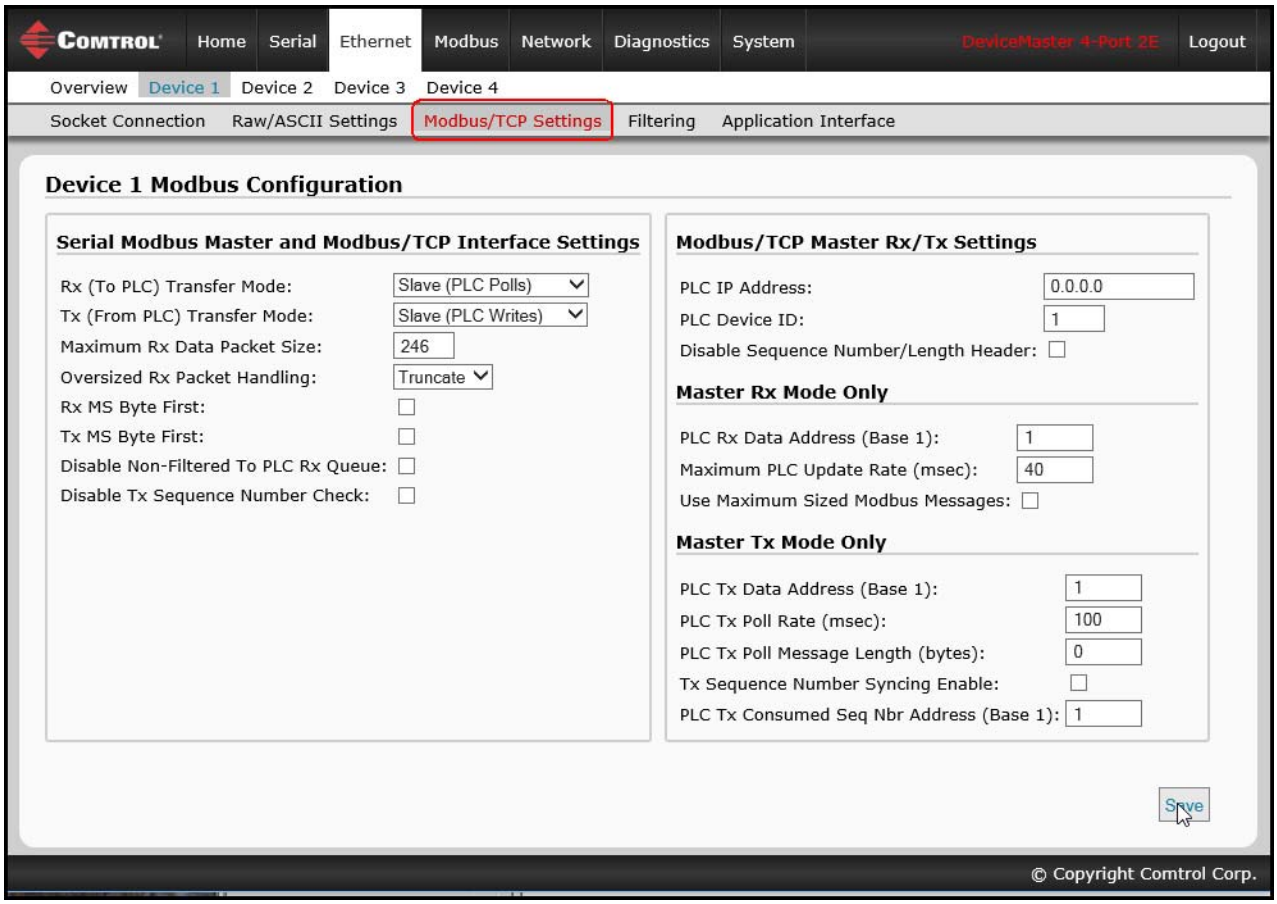


7. Set the *Message Transfer* mode under the *Raw/ASCII Data Control* section:
   - Selecting **Data-Stream** enables asynchronous communications to the device.
     - Transmit data will be sent immediately from all Modbus and active Application interfaces.
     - Received data will be returned to the Modbus interface and all active Application interfaces.
     - If **Data-Stream** is selected, the rest of the options in this section are N/A (not applicable).
   - Selecting **Command/Response** enables synchronous communications with the device.
     - Transmit data will expect one or more responses.
     - Responses will only be returned to the transmit message originator.

     If **Command/Response** is selected:
     - Set the **Cmd/Resp Response Timeout** to a valid timeout period for your device.
     - The **Cmd/Resp Age Time, Discard Responses After (sec)** option sets the time at which old responses to the Modbus interface are discarded.
     - The **Cmd/Resp Expected Responses Per Command** option indicates the number of responses expected per transmitted message. This is typically 1.
     - Set the **Cmd/Resp Mode Response To Modbus/TCP Based On** option to:
       - **IP-Address** if there is only one Modbus/TCP interface per IP-Address communicating to this port. This is typically used for PLC or single OPC Server/SCADA systems.
       - **TCP-Connection** if there is more than one Modbus/TCP interface per IP-Address communicating to this port. This typically is required for multiple OPC Server/ SCADA systems running on the same computer.
8. Set up the *Device Socket Packet ID Settings* section.
   a. Set the **STX (Start of transmission) Rx Detect** option in decimal format.
   b. Set the **ETX (End of transmission) Rx Detect** option in decimal format.
9. If necessary, set up the *PLC Specific Settings* section.
   a. Set the **STX (Start of transmission) Rx Detect** option in decimal format.
   b. Set the **ETX (End of transmission) Rx Detect** option in decimal format.
   c. Enable the **Strip Rx STX/ETX** option if you do not want the STX and ETX bytes returned to the PLC.

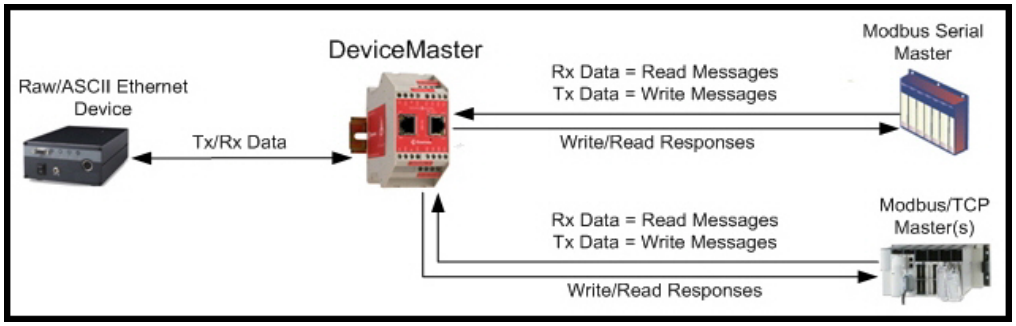
10. If necessary, set up the *Application Specific Settings* section.
    a. Set the **STX (Start of transmission) Tx Append** option in decimal format.
    b. Set the **ETX (End of transmission) Tx Append** option in decimal format.
    c. Enable the **Strip Rx STX/ETX** option if you do not want the STX and ETX bytes returned to the application.

    Note: *Refer to your device's User Manual for the Start and End of Transmission byte(s) settings. You may also be able to use the* ***Diagnostics | Ethernet Device Interface Logs*** *page to determine these settings.*
11. Click the **Save** button.
12. Click the **Modbus/TCP Settings** sub-menu, which displays the *Device Modbus Configuration* page..



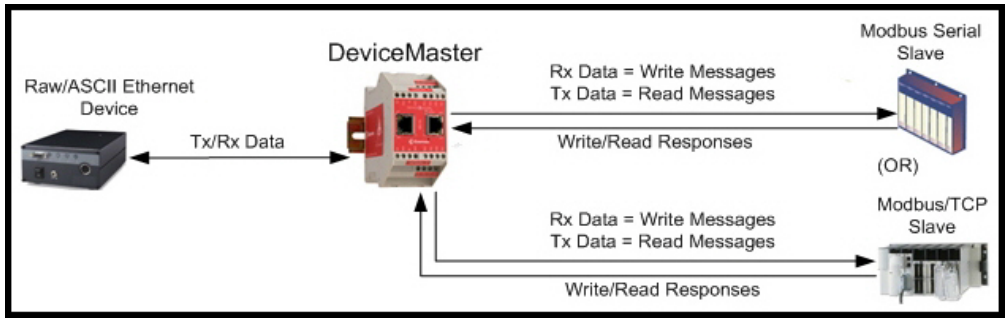
13. Configure the *Modbus/TCP Settings* for your environment using one of the following methods.

- ***PLC master/DeviceMaster Slave*** mode, go to Step 14 on Page 61 for configuration procedures.



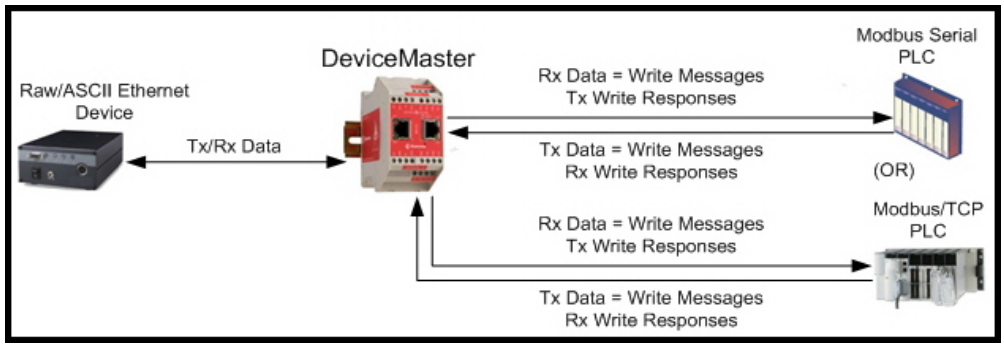
Note: *You can use the **PLC Master/DeviceMaster Slave** method only if your PLC can operate as a Modbus/TCP master, Modbus/RTU serial master, or Modbus/ASCII serial master.*

- ***PLC slave/DeviceMaster Master*** mode, go to Step 16 on Page 62 for configuration procedures.



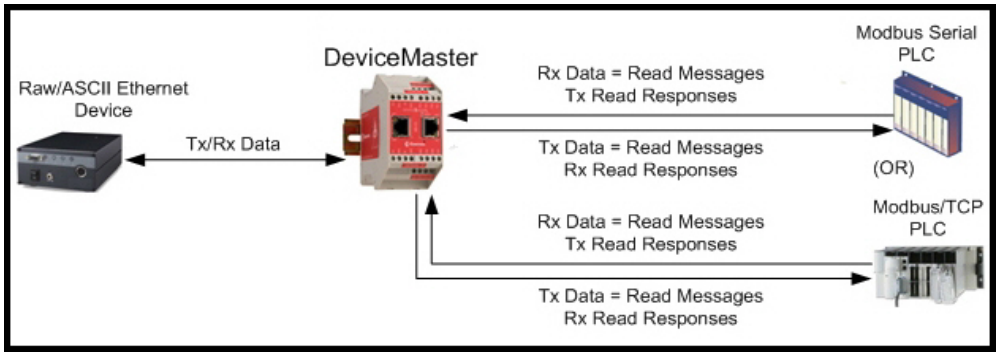
Note: *You can use the **PLC Slave/DeviceMaster Master** method only if your PLC can operate as a Modbus/TCP slave, Modbus/RTU serial slave, or Modbus/ASCII serial slave.*

- ***Dual Master – Write*** mode, go to Step 18 on Page 64 for configuration procedures.



Note: *You can use the **Dual Master - Write** method only if your PLC can operate as a Modbus master and slave, simultaneously.*

- ***Dual Master – Read*** mode, go to Step 19 on Page 65 for configuration procedures.



Note: *You can use the Dual Master - Read method only if your PLC can operate as a Modbus master and slave, simultaneously.*

14. ***PLC Master/DeviceMaster Slave Mode Only***

    Use the following procedure to configure *PLC Master/DeviceMaster Slave* mode in the *Device Modbus Configuration* page.

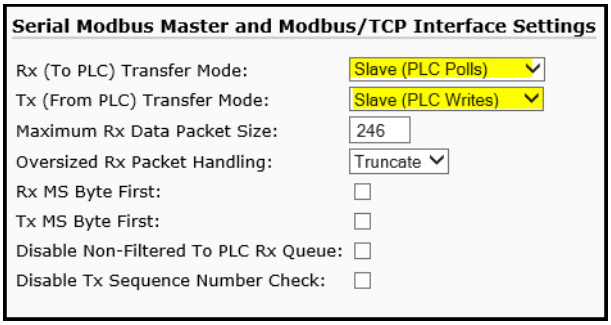
    a. Set the **Rx (To PLC) Transfer Mode** option to **Slave (PLC Polls)**.

    b. Set the **Tx (From PLC) Transfer Mode** option to **Slave (PLC Writes)**.

    c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. This can be a maximum of 246 bytes in *Slave Rx* mode.

    d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.

    e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.



    f. Set the **Tx MS Byte First** option if you want to transmit data most significant byte first.

    g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received between received data requests, only the last received data packet will be returned.)

    h. Set the **Disable Tx Sequence Number Check** option if you want to disable the transmit sequence number checking.

    - If selected, transmit sequence number checking is disabled. All transmit messages will be transmitted if the sequence number has been incremented or not.
    - If not selected, the sequence number is checked and the message will only be transmitted if the sequence number has been updated.

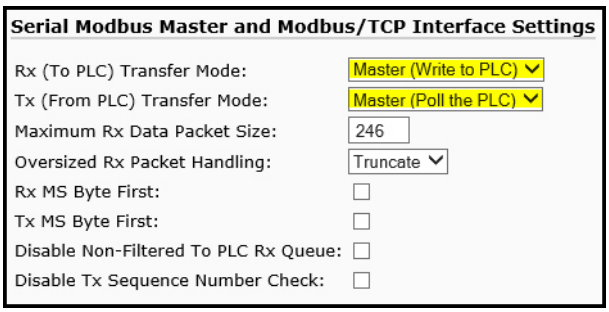
15. Click the **Save** button.

    Note: *Go to Step 20 on Page 66 to complete configuration.*

16. ***PLC Slave/DeviceMaster Master Mode Only***

Use the following procedure to configure *PLC Slave/DeviceMaster Master* mode in the *Device Modbus Configuration* page.

Under the *Serial Modbus Master and Modbus/TCP Settings* section:



a. Set the **Rx (To PLC) Transfer Mode** option to **Master (Write to PLC)**.

b. Set the **Tx (From PLC) Transfer Mode** option to **Master (Poll the PLC)**.

c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. This can be a maximum of 2048 bytes in Master Rx mode.

d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.

e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.

f. Set the **Tx MS Byte First** option if you want to transmit data most significant byte first.

g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received during the **Maximum PLC Update Rate** time period, only the last received data packet will be returned.).

h. Set the **Disable Tx Sequence Number Check** option if you want to disable the transmit sequence number checking.

- If selected, transmit sequence number checking is disabled. All transmit messages will be transmitted if the sequence number has been incremented or not.
- If not selected, the sequence number is checked and the message will only be transmitted if the sequence number has been updated.

Under the *Modbus/TCP Master Rx/Tx Settings* section:

i. Enter the **PLC IP Address**:

- For *Modbus/TCP slaves*, set the PLC IP Address to that of your PLC in xxx.xxx.xxx.xxx format.
- For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC IP Address to that of this DeviceMaster in xxx.xxx.xxx.xxx format.

Note: *The Modbus serial slave must be attached to one of the serial ports on this DeviceMaster.*

j. Enter the **PLC Device ID**:

- For *Modbus/TCP slaves*, set the PLC Device ID to that of your PLC. This is typically 1.
- For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC Device ID to that of the serial slave device.

Note: *This must be a unique device ID attached to this DeviceMaster.*

k. If necessary, set the **Disable Sequence Number/Length Header** option if you want to transmit data without the 4 byte header (sequence number and data length).

Under the *Master Rx Mode Only* section*:*

l. Set the **PLC Rx Data Address** option to the PLC memory address where you want to place the received data message. This address is Base 1, which means the address starts at 1 (or 400001 for some PLCs). If your address range is Base 0, or starts at zero, you will need to add one to your address.

m. Set the **Maximum PLC Update Rate** option to the fastest rate your PLC can reliably receive and process data. This is typically longer than the scan rate. The default of 40 milliseconds is usually sufficient, but your system may require a longer time period.

n. Set the **Use Maximum Sized Modbus Messages** option if you are receiving messages over 196 bytes, your PLC can receive messages larger than 200 bytes, and you want to decrease latency and network usage.

Under the *Master Tx Mode Only* section:

o. Set the **PLC Tx Data Address** option to the PLC memory address at which to request the transmit data message. This is Base 1, which means the address starts at 1 (or 400001 for some PLCs). If your address range is Base 0, or starts at zero, you will need to add one to your address.

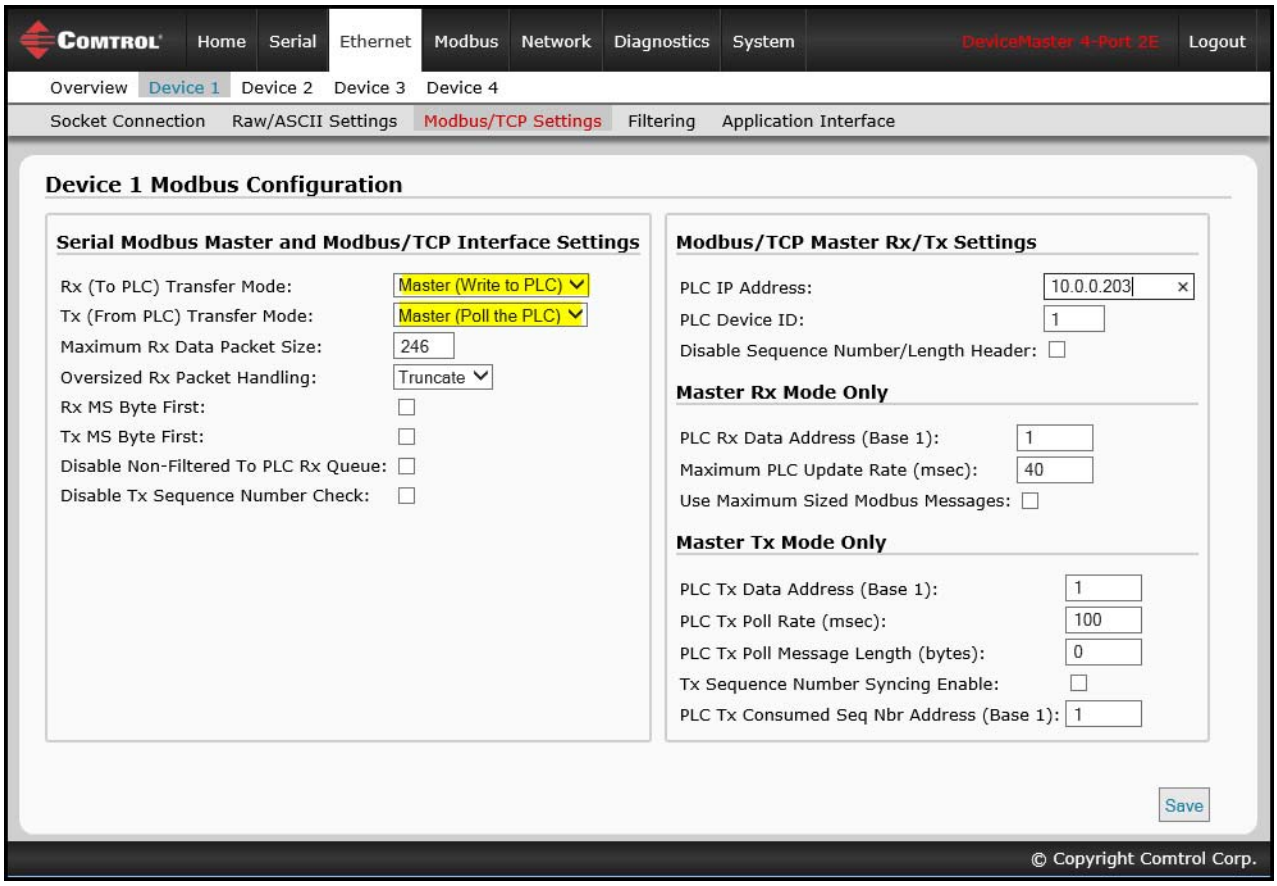
p. Set the **PLC Tx Poll Rate** option to the rate at which you would like the DeviceMaster to poll for transmit messages. If **Tx Sequence Number Syncing** is disabled, this rate must be faster than the rate at which you wish to transmit data. If not, transmit messages will be lost.

q. Set the **PLC Tx Poll Message Length** option to the length in bytes of your longest transmit data packet plus four bytes for the sequence number and length parameters at the start of the transmit message (maximum of 250 bytes). Any additional bytes requested will be left unused.

r. If you wish to enable synchronization of the transmit data messages between the PLC and the DeviceMaster:

- Enable the **Tx Sequence Number Syncing Enable** option.
- Set the **PLC Tx Consumed Sequence Address** to the PLC memory address at which you wish the DeviceMaster to write the transmit consumed sequence number. This memory address must point to a 16-bit word and, like the other address definitions, is base 1. When the Tx Produced Sequence Number (at the **PLC Tx Data Address**) and this consumed sequence number are equal, the DeviceMaster has transmitted the last message and is ready for the next transmit message.

17. Click the **Save** button.

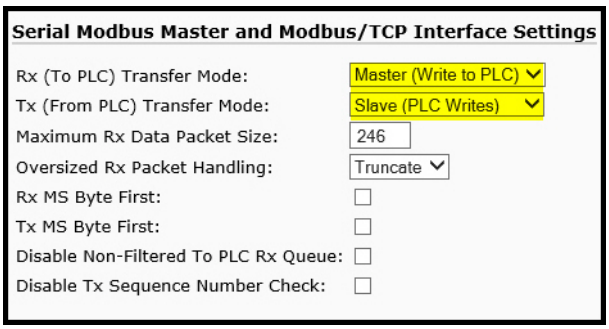


Note: *Go to Step 20 on Page 66 to complete configuration.*

18. ***Dual Master – Write Mode Only***

Use the following procedure to configure *Dual Master - Write* mode in the *Device Modbus Configuration* page.

Under the *Serial Modbus Master and Modbus/TCP Interface Settings* section:



a. Set the **Rx (To PLC) Transfer Mode** option to **Master (Write to PLC)**.

b. Set the **Tx (From PLC) Transfer Mode** option to **Slave (PLC Writes)**.

c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. This can be a maximum of 2048 bytes in Master Rx mode.

d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.

e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.

f. Set the **Tx MS Byte First** option if you want to transmit data most significant byte first.

g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received during the **Maximum PLC Update Rate** time period, only the last received data packet will be returned.)

h. Set the **Disable Tx Sequence Number Check** option if you want to disable the transmit sequence number checking.

- If selected, the transmit sequence number checking is disabled. All transmit messages will be transmitted if the sequence number has been incremented or not.
- If not selected, the sequence number is checked and the message will only be transmitted if the sequence number has been updated.

Under the *Modbus/TCP Master Rx/Tx Settings* section:

i. Enter the **PLC IP Address**:

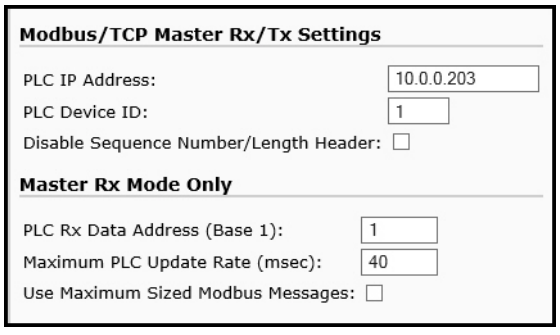
- For *Modbus/TCP slaves*, set the PLC IP Address to that of your PLC in xxx.xxx.xxx.xxx format.
- For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC IP Address to that of this DeviceMaster in xxx.xxx.xxx.xxx format.

Note: *The Modbus serial slave must be attached to one of the serial ports on this DeviceMaster.*

j. Enter the **PLC Device ID**:

- For *Modbus/TCP slaves*, set the PLC Device ID to that of your PLC. This is typically 1.
- For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC Device ID to that of the serial slave device.

Note: *This must be a unique device ID attached to this DeviceMaster.*



k. If necessary, set the **Disable Sequence Number/Length Header** option if you want to transmit data without the 4 byte header (sequence number and data length).

Under the *Master Rx Mode Only* section:

l. Set the **PLC Rx Data Address** to the PLC memory address where you want to place the received data message. This address is Base 1, which means the address starts at 1 (or 400001 for some PLCs). If your address range is Base 0, or starts at zero, you will need to add one to your address.

m. Set the **Maximum PLC Update Rate** option to the fastest rate your PLC can reliably receive and process data. This is typically longer than the scan rate. The default of 40 milliseconds is usually sufficient, but your system may require a longer time period.

n. Set the **Use Maximum Sized Modbus Messages** option if you are receiving messages over 196 bytes, your PLC can receive messages larger than 200 bytes, and you want to decrease latency and network usage.

o. Click the **Save** button.

Note: *Go to Step 20 on Page 66 to complete configuration.*

19. ***Dual Master - Read Mode Only***

Use the following procedure to configure *Dual Master - Read* mode in the *Device Modbus Configuration* page.

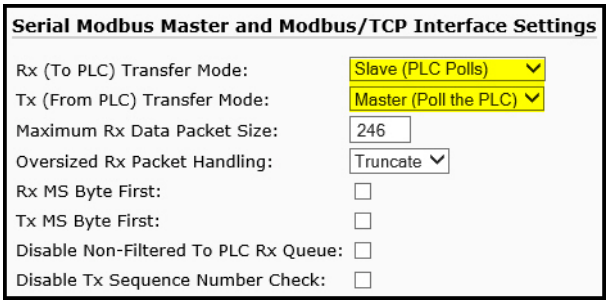
Under the *Serial Modbus Master and Modbus/TCP Interface Settings* section:

a. Set the **Rx (To PLC) Transfer Mode** option to **Slave (PLC Polls)**.

b. Set the **Tx (From PLC) Transfer Mode** option to **Master (Poll the PLC)**.

c. Set the **Maximum Rx Data Packet Size** option to that of the largest expected receive data packet. This can be a maximum of 246 bytes in Slave Rx mode.

d. Set the **Oversized Rx Packet Handling** option to either **Truncate** or **Drop**, depending how you want to handle oversized received packets.



e. Set the **Rx MS Byte First** option if you want to receive data most significant byte first.

f. Set the **Tx MS Byte First** option if you want to transmit data most significant byte first.

g. Set the **Disable Non-Filtered To PLC Rx Queue** option if you only want to receive the last received data packet. (If two or more packets are received between received data requests, only the last received data packet will be returned.)

h. Set the **Disable Tx Sequence Number Check** option if you want to disable the transmit sequence number checking.

- If selected, transmit sequence number checking is disabled. All transmit messages will be transmitted if the sequence number has been incremented or not.
- If not selected, the sequence number is checked and the message will only be transmitted if the sequence number has been updated.

Under the *Modbus/TCP Master Rx/Tx Settings* section:

i. Enter the **PLC IP Address**:

- For *Modbus/TCP slaves*, set the PLC IP Address to that of your PLC in xxx.xxx.xxx.xxx format.
- For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC IP Address to that of this DeviceMaster in xxx.xxx.xxx.xxx format.

Note: *The Modbus serial slave must be attached to one of the serial ports on this DeviceMaster.*

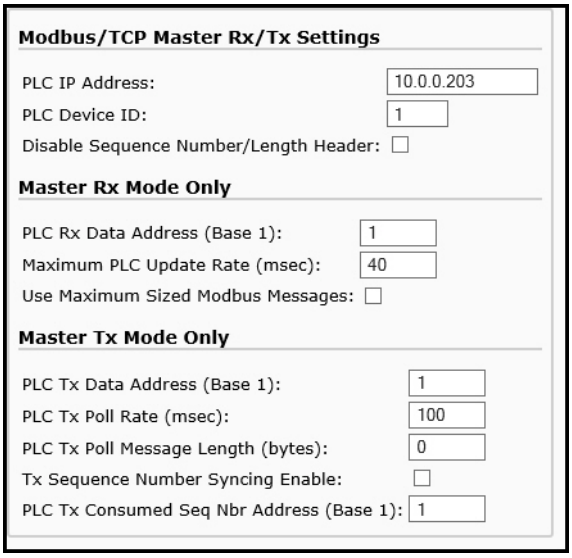
j. Enter the **PLC Device ID**:

- For *Modbus/TCP slaves*, set the PLC Device ID to that of your PLC. This is typically 1.
- For *Modbus/RTU* or *Modbus/ASCII serial slaves*, set the PLC Device ID to that of the serial slave device.

Note: *This must be a unique device ID attached to this DeviceMaster.*

k. If necessary, set the **Disable Sequence Number/Length Header** option if you want to transmit data without the 4 byte header (sequence number and data length).

Under the *Master Tx Mode Only* section:



l. Set the **PLC Tx Data Address** to the PLC memory address at which to request the transmit data message. This is Base 1, which means the address starts at 1 (or 400001 for some PLCs). If your address range is Base 0, or starts at zero, you will need to add one to your address.

m. Set the **PLC Tx Poll Rate** option to the rate at which you would like the DeviceMaster to poll for transmit messages. If **Tx Sequence Number Syncing** is disabled, this rate must be faster than the rate at which you wish to transmit data. If not, transmit messages will be lost.

n. Set the **PLC Tx Poll Message Length** option to the length in bytes of your longest transmit data packet plus four bytes for the sequence number and length parameters at the start of the transmit message (maximum of 250 bytes). Any additional bytes requested will be left unused.

o. If you wish to enable synchronization of the transmit data messages between the PLC and the DeviceMaster:

- Enable the **Tx Sequence Number Syncing Enable** option.
- Set the **PLC Tx Consumed Sequence Address** to the PLC memory address at which you wish the DeviceMaster to write the transmit consumed sequence number. This memory address must point to a 16-bit word and, like the other address definitions, is base 1. When the Tx Produced Sequence Number (at the **PLC Tx Data Address**) and this consumed sequence number are equal, the DeviceMaster has transmitted the last message and is ready for the next transmit message.

p. Click the **Save** button.

20. Set up the *Filtering/Data Extraction Configuration* settings:
    - If no filtering/data extraction is required, leave all filtering/data extraction settings to defaults (off).
    - If filtering/data extraction is required, see Filtering/Data Extraction Configuration on Page 69.
21. Set up the *Application TCP Connection Configuration* settings:
    - If no application socket interface is required, leave all application socket interface settings at defaults and the application **Enable** option is not selected.
    - If an application socket interface is required, see Application Socket Configuration on Page 77.

Modbus Addressing

The DeviceMaster socket port data addressing used for slave modes:

Socket Port Raw/ ASCII Addressing	Socket Port 1	Socket Port 2	Socket Port 3	Socket Port 4	Access Rule
Unit ID	254 (FF Hex)	254 (FF Hex)	254 (FF Hex)	254 (FF Hex)	N/A
Receive Data Address	1000 (Base 0) 1001 (Base 1)	2000 (Base 0) 2001 (Base 1)	3000 (Base 0) 3001 (Base 1)	4000 (Base 0) 4001 (Base 1)	Read Only
Transmit Data Address	1300 (Base 0) 1301 (Base 1)	2300 (Base 0) 2301 (Base 1)	3300 (Base 0) 3301 (Base 1)	4300 (Base 0) 4301 (Base 1)	Read/Write

Receive and Transmit Message Formats

The format of received serial data sent to or returned to the PLC:

Name	Data Type	Data Value(s)	Access Rule
Receive (DeviceMaster to PLC) message data			Read
Structure of:		0-65535 (FFFF Hex)	
Produced data sequence	WORD	1-2048 (Master Rx Mode)	
Data length (in bytes)	WORD	0-246 (Slave Rx Mode)	
Data array	Array of WORD	0-65535	

General requirements:

- The memory area must be defined in 16 bit words and large enough to handle the largest serial packet plus two words for the produced sequence number and data length parameters.
- The **Maximum Rx Data Packet Size** must be set large enough to accept the largest possible packet.

For large received data packets over 246 bytes (This may be less for your PLC):

- The **Rx (To PLC) Transfer Mode** option must be set to **Master (Write to PLC)**.
- The data will automatically be placed in continuous memory.
- All data will have been transferred to the PLC when the sequence number is updated.

The format of the transmit serial data received from the PLC:

Name	Data Type	Data Value(s)	Access Rule
Transmit (PLC to DeviceMaster) message data			Read/Write
Structure of:		0-65535 (FFFF Hex)	
Produced data sequence	WORD	1-236 (Slave Mode)	
Data length (in bytes)	WORD	1-246 (Master Mode)	
Data array	Array of WORD	0-65535	

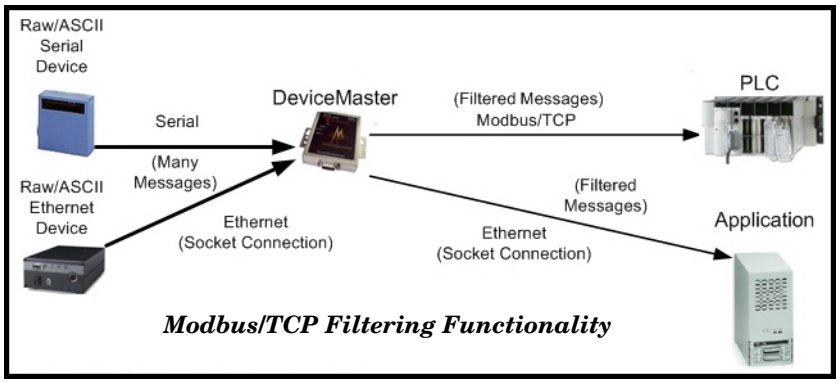
Transmit messages have the following characteristics:

- All data is transferred in 16 bit words.
- If operating in **Tx (From PLC) Transfer** mode of *Master (Poll the PLC)*: The sequence number must be incremented when there is new data to transmit.
- If operating in **Tx (From PLC) Transfer** mode of *Slave (PLC Writes)*: The sequence number must be incremented when there is new data to transmit only if the **Disable Tx Sequence Number Check** option is not selected.
- The data length field indicates the number of valid bytes contained in this message.
- The actual length of the message received from a PLC may contain extra, unused data.
- Unused data is ignored.
- A request for transmit data returns the last transmit data message.

Filtering/Data Extraction Configuration

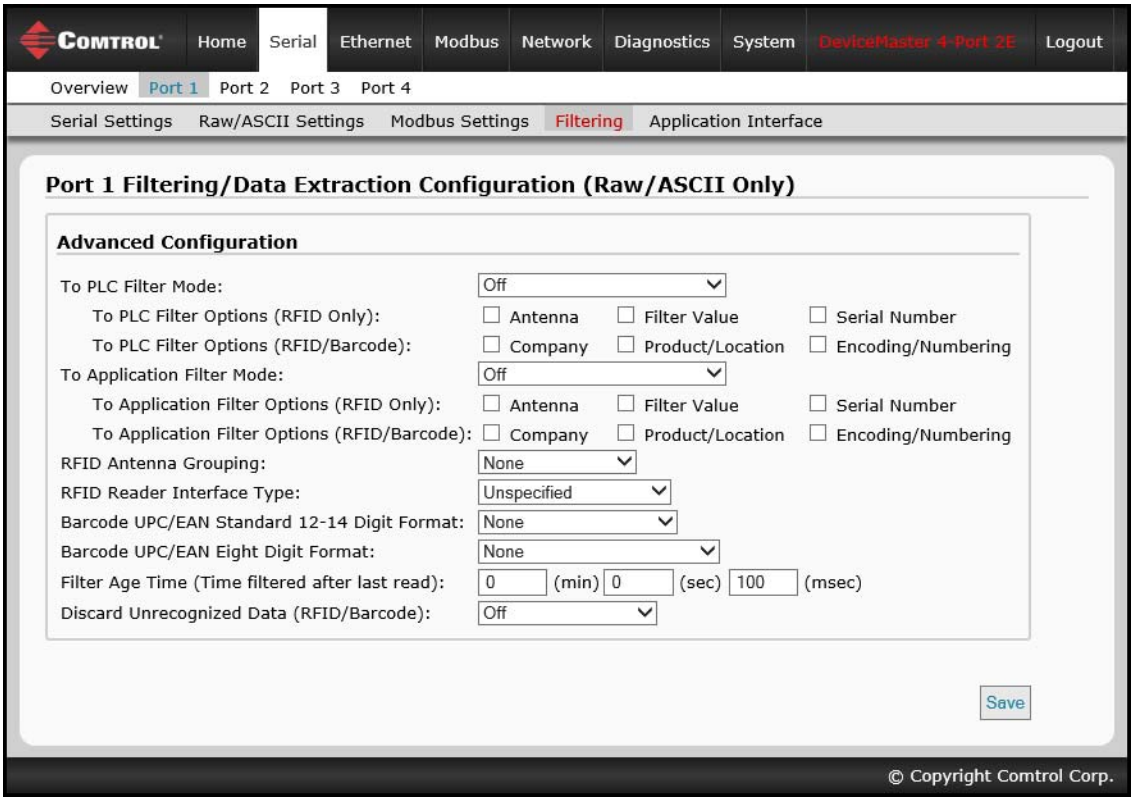
The filtering/data extraction configuration provided for each serial and Ethernet interface port provides filtering for string, RFID, and barcode data. It also extracts the various parameters from EPCglobal RFID tag and UPC/EAN barcode data. This feature is intended to greatly simplify both PLC and application programming tasks.

Filtering/data extraction configuration options are included under the *Serial* and *Ethernet* menus in the **Filtering** sub-menu.



Modbus/TCP Filtering Functionality

1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Click the **Serial** or **Ethernet** menu.
3. Click the appropriate **Port** or **Socket** number.
4. Click the **Filtering** sub-menu, which opens the *Filtering/Data Extraction Configuration* page.



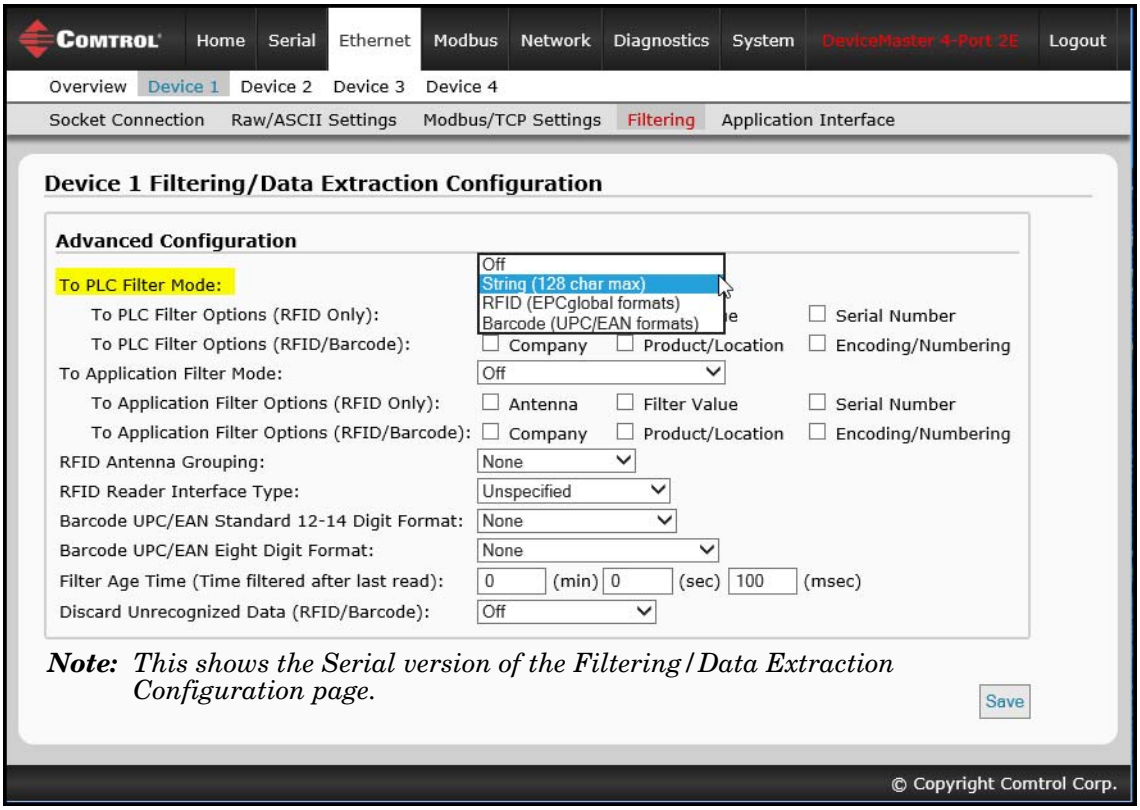
Note: *This screen represents Serial | Filtering/Data Extraction Configuration page.*

5. Select your filtering modes:
   - Use *String Filtering* if:
     - Your received data can be no greater than 128 bytes in length.
     - Your received data is not in EPCglobal or Barcode UPC/EAN formats or you do not want the DeviceMaster to extract the RFID tag or Barcode parameters.
     - You want to filter and eliminate duplicate received messages.
   - Use *RFID Filtering* if:
     - You have an Alien or Intermec RFID reader or another reader that can provide RFID tag data is ASCII Hexadecimal format similar to either an Alien or Intermec reader.
     - Your data is in EPCglobal format and you want the DeviceMaster to extract the RFID tag data parameters and filter based on those parameters.
   - Use *Barcode Filtering* if your barcode data is in UPC-A, UPC-E, EAN-13, JAN, EAN-14, or EAN-8 formats and you want the DeviceMaster to extract the barcode data parameters and filter based on those parameters.
6. Click the **Save** button.

PLC Filtering/Data Extraction

Use the following procedure to configure PLC filtering/data extraction on the appropriate *Filtering / Data Extraction Configuration* page that corresponds to the desired serial or Ethernet socket port.

1. Click the **Serial** or **Ethernet** menu, click the **Port** or **Device** number, and then click **Filtering**.



2. Set **To PLC Filter Mode** to the desired mode.
   - If you select **String (128 char max)**, set the **Filter Age Time** (below) to how long after the last read you want an entry to be filtered.
   - For **RFID (EPCglobal formats)**:
     - Set any or all of the **To PLC Filter Options (RFID Only)** filtering options.
     - Set any or all of the **To PLC Filter Options (RFID/Barcode)** filtering options.

   Note: *You must select at least one filtering option for filtering / data extraction to function.*
3. If **Antenna Grouping** is desired, set **RFID Antenna Grouping** option to reflect your antenna configuration.
   - Set the **RFID Reader Interface Type** option to that of your RFID Reader configuration. If your RFID Reader is not listed, refer to the *Filtering and Data Extraction Reference Manual* for the supported RFID reader interfaces. If your RFID reader format matches one the listed formats, then set the **RFID Reader Interface Type** option to that format.
   - Set the **Filter Age Time** option to how long after the last read you want an entry to be filtered.
   - If you want the DeviceMaster to discard any non-RFID tag messages, set the **Discard Unrecognized Data** option to either **To-PLC** or **To-PLC/Application**.

   Refer to the *Filtering and Data Extraction Reference Manual* for formatting and other information.

To PLC RFID Data Format

When the PLC interface is operating in RFID filtering mode, all data sent to the PLC will be in the following format:

Field	Data Type	Description
Produced data sequence number	UINT Values = 0-65535 (FFFF Hex)	Sequence number that is incremented with each new message.
Length of RFID message	UINT Values = 20-148	Length in bytes of following data.
Company Code	DWORD[2]	Company Code extracted from tag data. Depending on encoding scheme, this field may include Company Prefixes, Company Prefix Indexes, or Government Managed Identifier.
Product/Location Code	DWORD[2]	Product Code extracted from tag data Depending on encoding scheme, this field may include the Item reference, location reference, asset reference, object class, or be set to zero.
Serial Number	DWORD[2]	Serial Number extracted from tag data. Depending on the encoding scheme, this field may include the Serial Number or individual asset reference.
Encoding Scheme	UINT	Encoding Scheme from tag data
Filtering Value	UINT	Filtering value from tag data
Antenna Number	UINT	Antenna number on RFID Reader/Scanner
Tag Data Length	UINT	Length of RFID tag string in bytes
Tag Data	BYTE[128]	Tag data string (variable length field) May also include non-tag messages, which can optionally be sent to the PLC and/or application.

4. For **Barcode (UPC/EAN formats)**:
   - Set any or all of the **To PLC Filter Options (RFID/Barcode)** filtering options. (You must select at least one for the filtering/data extraction to function.)
   - If you are using standard twelve to fourteen-digit UPS/EAN barcodes, set the **Barcode UPC/EAN 12-14 Digit Format** option to match that of your barcodes. The **Company-5/Product-5** is the most popular format.
   - If you are using eight-digit UPC/EAN barcodes, set the **Barcode UPC/EAN 8 Digit Format** option to match that of your barcodes.
   - If you want the DeviceMaster to discard any non-RFID tag messages, set the **Discard Unrecognized Data** option to either **To-PLC** or **To-PLC/Application**.
   - Refer to the *Filtering and Data Extraction Reference Manual* for formatting and other information.

To PLC Barcode Data Format

When the PLC interface is operating in *Barcode Filtering* mode, all data sent to the PLC is in the following format:

Field	Size	Description
Produced data sequence number	UINT Values = 0-65535 (FFFF Hex)	Sequence number that is incremented with each new message.
Length	UINT Values = 12-140	Length in bytes of following data.
Company Code	DWORD	Company Code
Product Code	DWORD	Product Code
Numbering Code	UINT	Numbering Code (from first byte(s) of barcode data)
Barcode Data Length	UINT	Length of barcode string in bytes
Barcode Data	BYTE[128]	Barcode data string (variable length field)

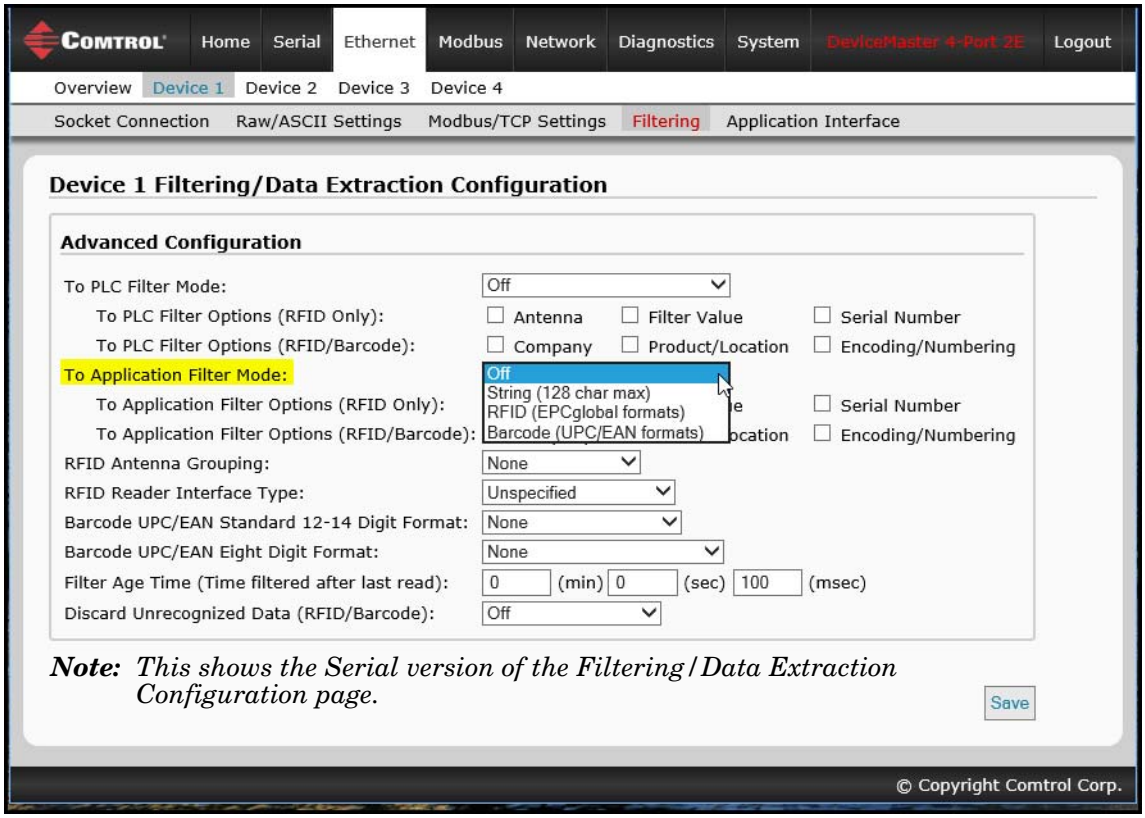
Note: *The Company Code will be set to zero for all EAN-8 codes.*

5. Make sure that you click **Save** when you have completed configuration.

Application Filtering/Data Extraction

Use the following procedure to configure application filtering/data extraction. Under the *Filtering / Data Extraction Configuration* page that corresponds to the desired serial or socket port.

1. Click the **Serial** or **Ethernet** menu, click the **Port** or **Device** number, and then click **Filtering**.



2. Set **To Application Filter Mode** to the desired mode.
   - For **String (128 char max):** set the **Filter Age Time** option to how long after the last read you want an entry to be filtered.
   - For **RFID (EPCglobal formats)**:
     - Set any or all of the **To Application Filter Options (RFID Only)** filtering options.
     - Set any or all of the **To Application Filter Options (RFID/Barcode)** filtering options.

   Note: *You must select at least one filtering option for filtering / data extraction to function.*
3. If Antenna Grouping is desired, set **RFID Antenna Grouping** option to reflect your antenna configuration.
   - Set the **RFID Reader Interface Type** option to that of your RFID Reader configuration. If your RFID Reader is not listed, please refer to the *Filtering and Data Extraction Reference Manual* for the supported RFID reader interfaces. If your RFID reader format matches one the listed formats, then set the **RFID Reader Interface Type** option to that format.
   - Set the **Filter Age Time** option to how long after the last read you want an entry to be filtered.
   - If you want the DeviceMaster to discard any non-RFID tag messages, set the **Discard Unrecognized Data** to either *To-Application* or *To-PLC / Application*.

   Refer to the *Filtering and Data Extraction Reference Manual* for formatting and other information.

To Application RFID Data Format

When the application interface is operating in RFID filtering mode, all data sent to the application will be in the following format:

Field	Data Type	Description
Company Code	DWORD[2]	Company Code extracted from tag data. Depending on encoding scheme, this field may include Company Prefixes, Company Prefix Indexes, or Government Managed Identifier.
Product/Location Code	DWORD[2]	Product Code extracted from tag data Depending on encoding scheme, this field may include the Item reference, location reference, asset reference, object class, or be set to zero.
Serial Number	DWORD[2]	Serial Number extracted from tag data. Depending on the encoding scheme, this field may include the Serial Number or individual asset reference.
Encoding Scheme	UINT	Encoding Scheme from tag data
Filtering Value	UINT	Filtering value from tag data
Antenna Number	UINT	Antenna number on RFID Reader/Scanner
Tag Data Length	UINT	Length of RFID tag string in bytes

Note: *The RFID parameters will be sent to the application in big-endian format. All parameters, with the exception of the Tag data string, will have to be byte-swapped for use on a little-endian system.*

4. For **Barcode (UPC/EAN formats)**:
   - Set any or all of the **To Application Filter Options (RFID/Barcode)** filtering options. (You must select at least one for the filtering/data extraction to function.)
   - If you are using standard twelve to fourteen digit UPS/EAN barcodes, set the **Barcode UPC/EAN 12-14 Digit Format** option to match that of your barcodes. The **Company-5/Product-5** is the most popular format.
   - If you are using eight digit UPC/EAN barcodes, set the **Barcode UPC/EAN 8 Digit Format** option to match that of your barcodes.
   - If you want the DeviceMaster to discard any non-RFID tag messages, set the **Discard Unrecognized Data** option to either **To-Application** or **To-PLC/Application**.

   Refer to the *Filtering and Data Extraction Reference Manual* for formatting and other information.

To Application Barcode Data Format

When the application interface is operating in Barcode filtering mode, all data sent to the application will be in the following format:

Field	Size	Description
Company Code	DWORD	Company Code
Product Code	DWORD	Product Code
Numbering Code	UINT	Numbering Code (from first byte(s) of barcode data)
Barcode Data Length	UINT	Length of barcode string in bytes
Barcode Data	BYTE[128]	Barcode data string (variable length field)

Note: *The Company Code will be set to zero for all EAN-8 codes. The Barcode parameters will be sent to the application in big-endian format. All parameters, with the exception of the Barcode data string, will have to be byte-swapped for use on a little-endian system.*

5. Make sure that you click **Save** when you have completed configuration.

Application Socket Configuration

Use the *Application Socket Configuration* connection only for connecting to an application such as a configuration, database, telnet, or a control application when you want to communicate to a serial or Ethernet device.

Note the following:

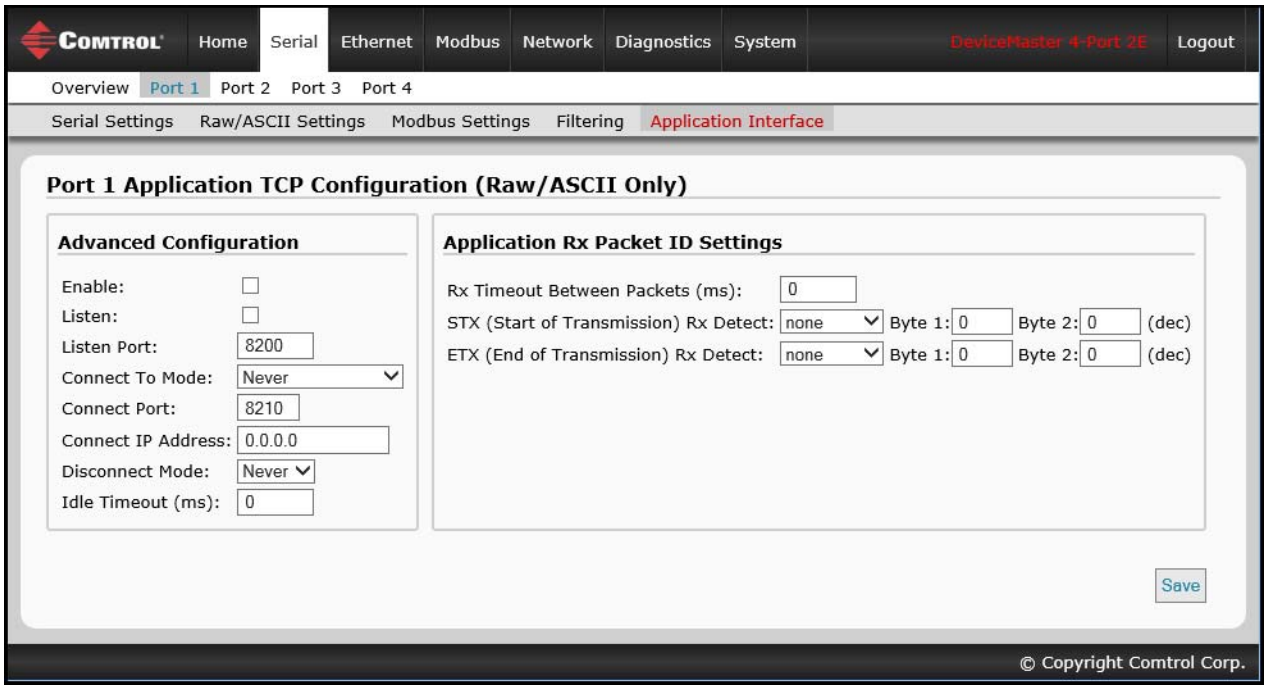
- When the application socket is connected to an application, it will allow the application to send and receive data from the serial or Ethernet device.
- The application socket cannot send data directly to the PLC. Nor can the PLC send data directly to the application.
- If the PLC interface is also enabled, data received from the serial or Ethernet device will be sent to both the PLC and application.
- **Do not connect the application socket to the DeviceMaster or to the PLC**. This may cause erroneous operation.

Use the following procedure to configure the application socket connection.

Application TCP Connection Configuration pages are available under the *Serial* and *Ethernet* menus for the corresponding serial port or Ethernet socket device.

Access the appropriate configuration page using the following steps:

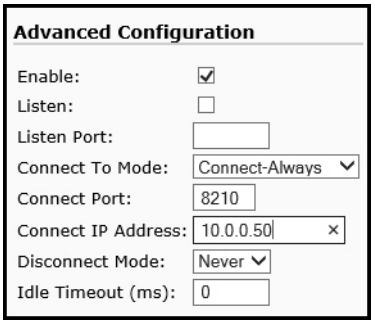
1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Click the **Serial** or **Ethernet** menu.
3. Click the appropriate **Port** or **Socket** number.
4. Click the **Application Interface** sub-menu, which opens the *Application TCP Configuration* page.



5. If your Ethernet TCP/IP application requires another device to connect to it, configure the socket port on the DeviceMaster to **Connect** mode:
   a. Select the **Enable** option.
   b. Leave the **Listen** option unselected.
   c. Set the **Connect To Mode** option to **Connect-Always**.
   d. Set the **Connect Port** option to the socket port number of your Ethernet application.
   e. Set the **Connect IP Address** to the IP address of your Ethernet application.

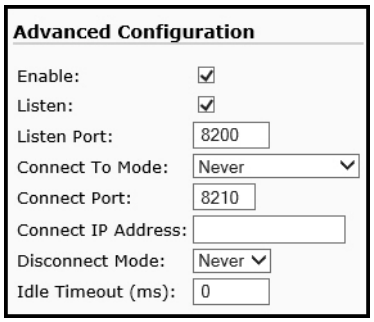
   Note: Do not enter the IP address of the DeviceMaster or PLC here.

   f. Set **Disconnect Mode** to **Never**.
   g. Go to Step 8 to finish configuring the application TCP connection.



Connect Mode

6. If your Ethernet TCP/IP application is configured to connect to another device, configure the socket port on the DeviceMaster to **Listen** mode:
   a. Select the **Enable** option.
   b. Select the **Listen** option.
   c. Use the default **Listen Port** on the DeviceMaster of *8xxx* or designate your own.
   d. Set the **Connect To Mode** option to **Never**.
   e. Set the **Disconnect Mode** option to **Never**.
   f. Configure your Ethernet application to connect to the DeviceMaster at the DeviceMaster IP address and **Listen Port**.
   g. Go to Step 8 to finish configuring the application TCP connection.

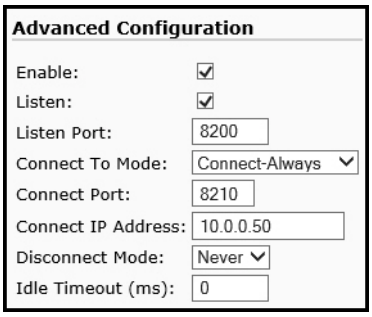


Listen Mode

7. If you do not know if your application will connect to another Ethernet device, but do know your application's socket port and IP address, you can do the following to enable both the **Listen** and **Connect** modes:
   a. Select the **Enable** option.
   b. Select the **Listen** option.
   c. Use the default **Listen Port** on the DeviceMaster of *8xxx* or designate your own.
   d. Set the **Connect To Mode** option to **Connect-Always**.
   e. Set the **Connect Port** option to the socket port number of your Ethernet application.
   f. Set the **Connect IP Address** option to the IP address of your Ethernet application.

   Note: Do not enter the IP address of the DeviceMaster or PLC here.

   g. Set the **Disconnect Mode** option to **Never**.
   h. Optionally configure your Ethernet application to connect to the DeviceMaster at the DeviceMaster IP address and **Listen Port**.
   i. Go to Step 8 to finish configuring the application TCP connection.



Listen and Connect Mode

8. Set up the *Application Rx Packet ID Settings*. This is recommended for all application connections and necessary for installations where multiple connections can be active at one time.

   If the start and end of transmission characters are known:

   a. Set the **Rx Timeout Between Packets** option to a time that ensures that an entire message is received. Values in the 60 to 100 millisecond range are typical.

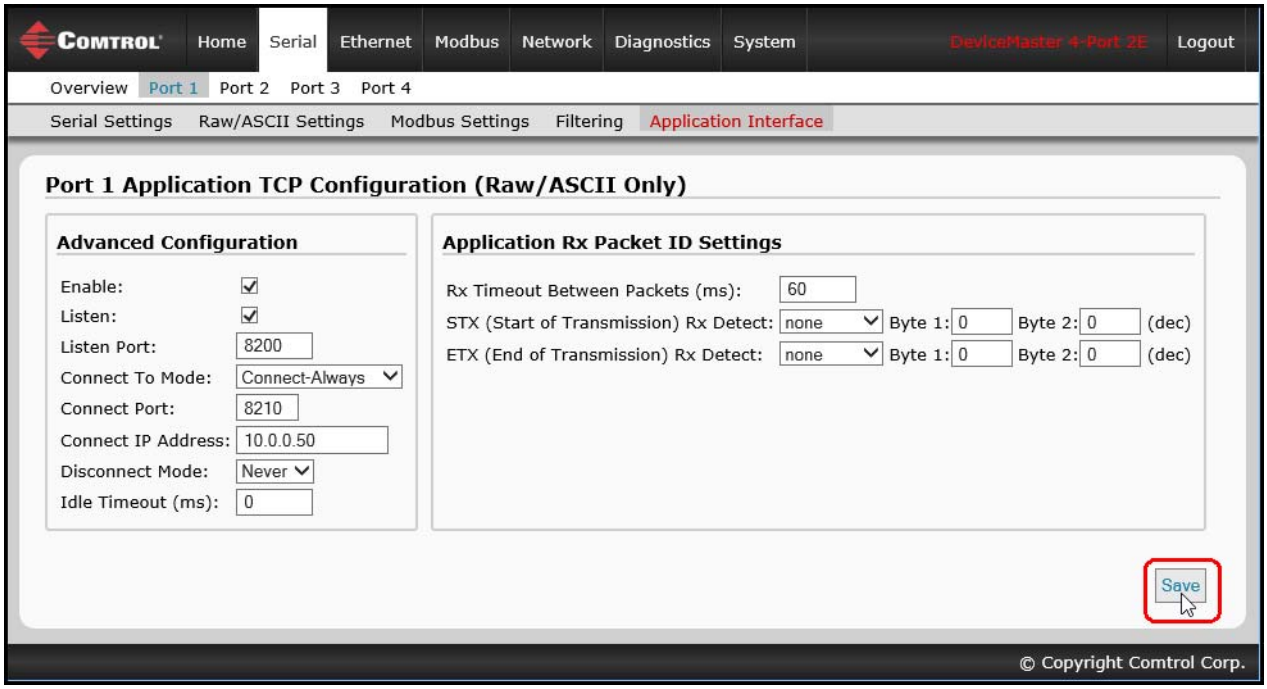
   b. Set the **STX (Start of Transmission) Rx Detect** option to the known value. Typical values are:

      - *none*
      - Standard STX character: *one byte, Byte 1* = 2.

   c. Set the **ETX (End of Transmission) Rx Detect** option to the known value. Typical values are:

      - *none*
      - Standard ETX character: *one byte, Byte 1* = 3
      - CR, LF: *two bytes, Byte 1* = 13, *Byte 2* = 10

   If the start and end of transmission characters are not known, set the **Rx Timeout Between Packets** option to a time that ensures that an entire message is received. Values in the 60 to 100 millisecond range are typical.



9. Make sure that you click **Save** when you have completed configuration.

Alias Device ID Functionality

Use the *Alias Modbus Configuration* page to set up Alias device IDs. Alias Device IDs convert received message Device IDs to alias device IDs and then route the modified Modbus message.

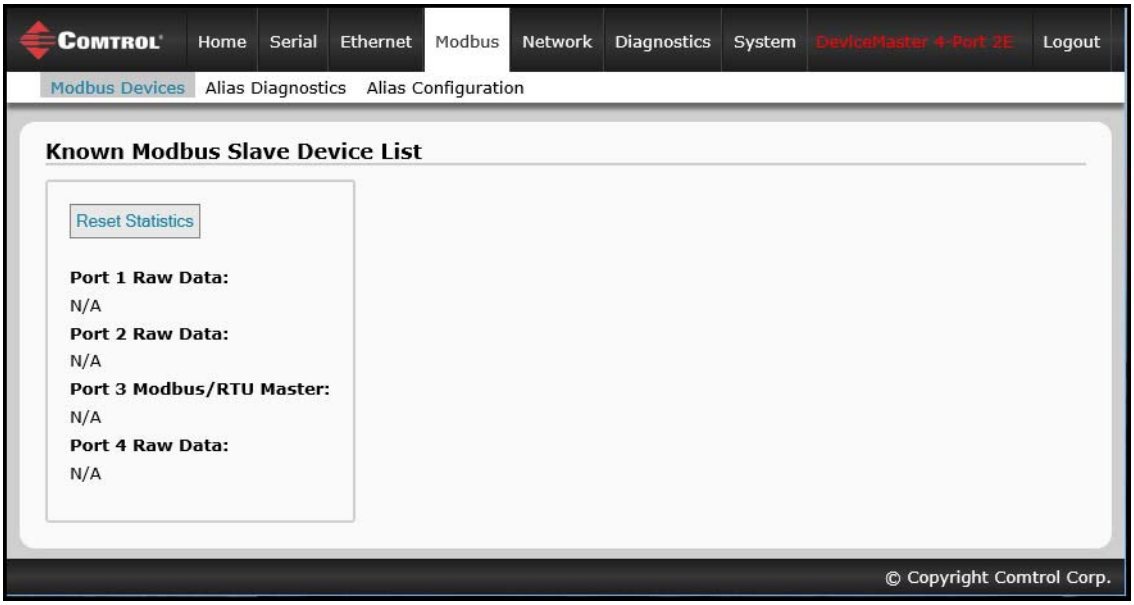
Note the following:

- The Alias Modbus Device ID functionality allows modification of device IDs only when messages are received from Modbus masters.
- Alias device ID configurations can convert a Modbus message to address a
  - Modbus device (Device ID 1-247)
  - Serial raw/ASCII device (Device ID = 255)
  - Ethernet TCP/IP raw/ASCII device (Device ID = 254)
- The Alias Device ID functionality is intended to help solve problems that occur when:
  - A serial Modbus device ID cannot be changed to match a Modbus master program, such as for a PLC.
  - A Modbus master program, such as for a PLC or SCADA system, cannot be modified.
  - A Modbus master with one connection, such as serial PLC, requires connectivity to multiple Modbus slave devices with the same device ID and one or more of the slave devices are connected remotely to different gateways.

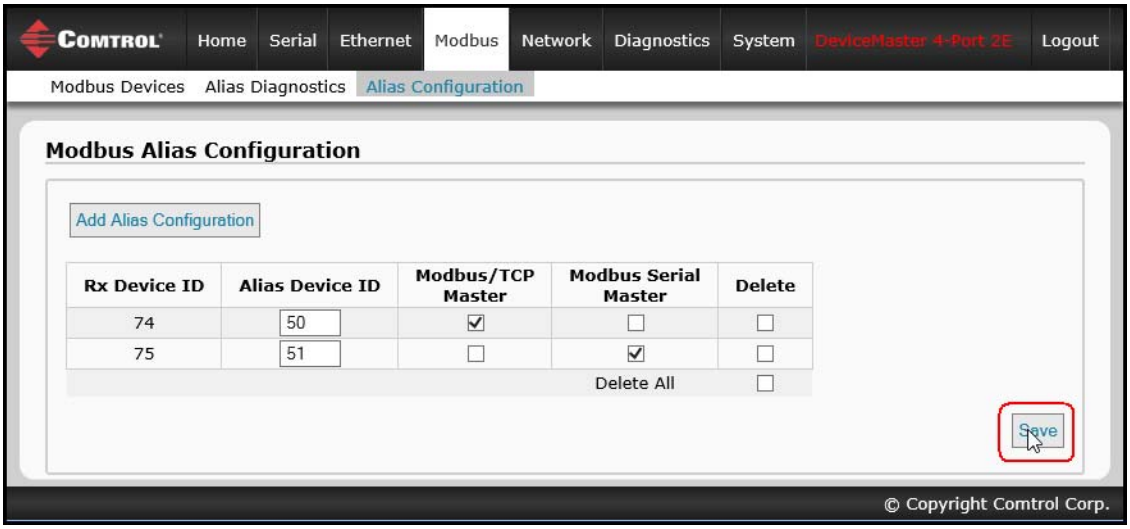
Note: *The Modbus/TCP firmware has been designed to provide network-wide Modbus connectivity for serial Modbus masters.*

Use the following procedure to add one or Alias Modbus Device ID configurations:.

1. Enter the DeviceMaster IP address in your web browser or highlight the DeviceMaster in PortVision DX and click **Webpage**.
2. Select the **Modbus** sub-menu, which opens the *Known Modbus Slave Device List* page.



3. Select the **Alias Configuration** sub-menu.



4. Click the **Add Alias Configuration** button.
5. Enter the **Rx Device ID**. This is the device ID that you want to convert.
6. Enter the **Alias Device ID**. This is the device ID that you want the received device ID converted to.
7. Select **Modbus/TCP Master Enable** if you want the alias device ID configuration applied to messages received from Modbus/TCP masters.
8. Select **Modbus Serial Master Enable** if you want the alias device ID configuration entry applied to messages received from Modbus serial masters.
9. Select **Save**.

Troubleshooting and Technical Support

This section contains troubleshooting information for your DeviceMaster. You should review the following subsections before calling Technical Support because they will request that you perform many of the procedures or verifications before they will be able to help you diagnose a problem.

If you cannot diagnose the problem, you can contact *Technical Support* on Page 86.

Troubleshooting Checklist

The following checklist may help you diagnose your problem:

- Verify that you are using the correct types of cables on the correct connectors and that all cables are connected securely.

  Note: *Most customer problems reported to Comtrol Technical Support are eventually traced to cabling or network problems.*

- If the DeviceMaster is a DIN rail model, verify that the chassis and signal are grounded.
- Isolate the DeviceMaster from the network by connecting the device directly to a NIC in a host system.
- Verify that the Ethernet hub and any other network devices between the system and the DeviceMaster are powered up and operating.
- Reset the power on the DeviceMaster and watch the **PWR** or **Status** light activity.

PWR or Status LED	Description
5 sec. off, 3 flashes, 5 sec. off, 3 flashes ...	Redboot™ checksum failure.
5 sec. off, 4 flashes, 5 sec. off, 4 flashes ...	SREC load failure.
5 quick flashes	The default application is starting up.
10 sec. on, .1 sec. off, 10 sec. on .1 sec. off ...	The default application is running.

- If the device has a power switch, turn the device's power switch off and on, while watching the LED diagnostics.
- If the DeviceMaster does not have a power switch, disconnect and reconnect the power cord.
- Verify that the network IP address, subnet mask, and gateway is correct and appropriate for the network. If IP addressing is being used, the system should be able to ping the DeviceMaster.
- Verify that the IP address programmed into the DeviceMaster matches the unique reserved IP configured address assigned by the system administrator.
- If using DHCP, the host system needs to provide the subnet mask and gateway.
- Reboot the system and the DeviceMaster.
- If you have a spare DeviceMaster, try replacing the device.

General Troubleshooting

This table illustrates some general troubleshooting tips.

Note: *Make sure that you have reviewed the* *Troubleshooting Checklist on Page 83.*

General Condition	Explanation/Action
PWR or **Status** LED flashing	Indicates that boot program has not downloaded to the unit. 1. Reboot the system. 2. Make sure that you have downloaded the most current firmware for your protocol: ftp://ftp.comtrol.com/html/up_main.htm. ***Note:*** *If the PWR or Status LED is still flashing, contact Technical Support.*
PWR or **Status** LED not lit	Indicates that power has not been applied or there is a hardware failure. Contact Technical Support.
Cannot ping the device through Ethernet hub	Isolate the DeviceMaster from the network. Connect the device directly to the NIC in the host system (see Page 83).
Cannot ping or connect to the DeviceMaster	The default IP address is often not accessible due to the subnet masking from another network unless **192.168** is used in the network. In most cases, it will be necessary to program in an address that conforms to your network.
DeviceMaster continuously reboots when connected to some Ethernet switches or routers	Invalid IP information may also cause the switch or router to check for a gateway address. Lack of a gateway address is a common cause.

Daisy-Chaining DeviceMaster 2E/4-Port Units

The DeviceMaster 2E/4-port models with external power supplies follow the IEEE specifications for standard Ethernet topologies.

When using the **UP** and **DOWN** ports, the DeviceMaster 2E/4 is classified as a switch. When using the **UP** port only, it is a simple end node device.

The maximum number of daisy-chained DeviceMaster 2E/4 units, and the maximum distance between units is based on the Ethernet standards and will be determined by your own environment and the conformity of your network to these standards.

Comtrol has tested with seven DeviceMaster 2E/4 units daisy-chained together using 10 foot CAT5 cables, but this is not the theoretical limit. You may experience a performance hit on the devices at the end of the chain, so it is recommended that you overload and test for performance in your environment. The OS and the application may also limit the total number of ports that may be installed.

Following are some quick guidelines and URLs of additional information. Please note that standards and URLs do change.

- Ethernet 10BASE-T Rules
  - The maximum number of repeater hops is four.
  - You can use Category 3 or 5 twisted-pair 10BASE-T cables.
  - The maximum length of each cable is 100m (328ft).

    Note: *Category 3 or 5 twisted pair cables look the same as telephone cables but they are not the same. The network will not work if telephone cables are used to connect the equipment.*
- Fast Ethernet 100BASE-TX rules
  - The maximum number of repeater hops is two (for a Class II hub). A Class II hub can be connected directly to one other Class II Fast Ethernet hub. A Class I hub cannot be connected directly to another Fast Ethernet hub.
  - You must use Category 5 twisted-pair 100BASE-TX cables.
  - The maximum length of each twisted-pair cable is 100m (328ft).
  - The total length of twisted-pair cabling (across directly connected hubs) must not exceed 205m (672ft).

    Note: *Category 5 twisted pair cables look the same as telephone cables but they are not the same. The network will not work if telephone cables are used to connect the equipment.*
- IEEE 802.3 specification: A network using repeaters between communicating stations (PCs) is subject to the “5-4-3” rule of repeater placement on the network:
  - Five segments connected on the network.
  - Four repeaters.
  - Three segments of the 5 segments can have stations connected. The other two segments must be inter-repeater link segments with no stations connected.

    See http://www.optronics.gr/Tutorials/ethernet.htm for more specific information.

    Additional information may be found at http://compnetworking.about.com/cs/ethernet1/ or by searching the web.

Technical Support

It contains troubleshooting procedures that you should perform before contacting Technical Support since they will request that you perform, some or all of the procedures before they will be able to help you diagnose your problem. If you need technical support, use one of the following methods.

Comtrol Contact Information	
Downloads	ftp://ftp.comtrol.com/html/up_modbus_tcp_main.htm http://downloads.comtrol.com/htm/up_modbus_tcp_main.htm
Web site	http://www.comtrol.com
Phone	763.957.6000