ENET-710

smar

First in Fieldbus

ENET-710 - Ethernet Module

ENET-710

Hot-Swap

PWR

RX P0
TX

RX P1
TX

RX P2
TX

RX P3
TX

RX P4
TX

LC700
smar

JAN / 06

ENET-710

FOUNDATION

ENET710ME

smar

www.smar.com

Specifications and information are subject to change without notice.
Up-to-date address information is available on our website.

web: www.smar.com/contactus.asp

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ENET-710 MODULE

(Supports Hot Swap)

Overview

The ENET-710 is a data communications module that bridges Ethernet and Serial communication networks. With the increasing importance of networking for industrial control/automation, the ENET-710 module provides Ethernet-networked computers the ability to perform remote monitoring and control of serial Modbus compatible industrial devices in the field as well as access to LC700 PLC CPU modules and the CD600 Multi-Loop Controller. Up to seven clients can access the ENET-710 via Ethernet and communicate over one full-duplex RS-232C and four half-duplex RS-485 compatible serial ports to serial field devices. The module can be installed in the LC700 Programmable Logic Controller (PLC) to receive power, or it can be operated in a stand-alone fashion with an external +24 Vdc power supply. There is also a redundant power supply mode when using both power supplies.

Fully compliant with Modbus/TCP, the ENET-710 implements bridging to the LC700 PLC CPU module serial ports and other Modbus/RTU compatible devices enabling bi-directional communication between clients on Ethernet and devices on a serial Modbus network. The module also functions to offer data communications between Ethernet and the CD600 Multi-Loop Controller with the CD600 configuration software.

The ENET-710 supports 10/100 Mbps Ethernet and serial baudrates of up to 115,200 bps. The module is easily configured over the Ethernet connection via a web page using a web browser. Access to the configuration web page is username/password protected. The configuration web page gives the user the ability to set up the serial ports, serial protocols, device addresses and timeouts, module IP address, and a configuration username and password. All configuration data is stored in non-volatile memory.
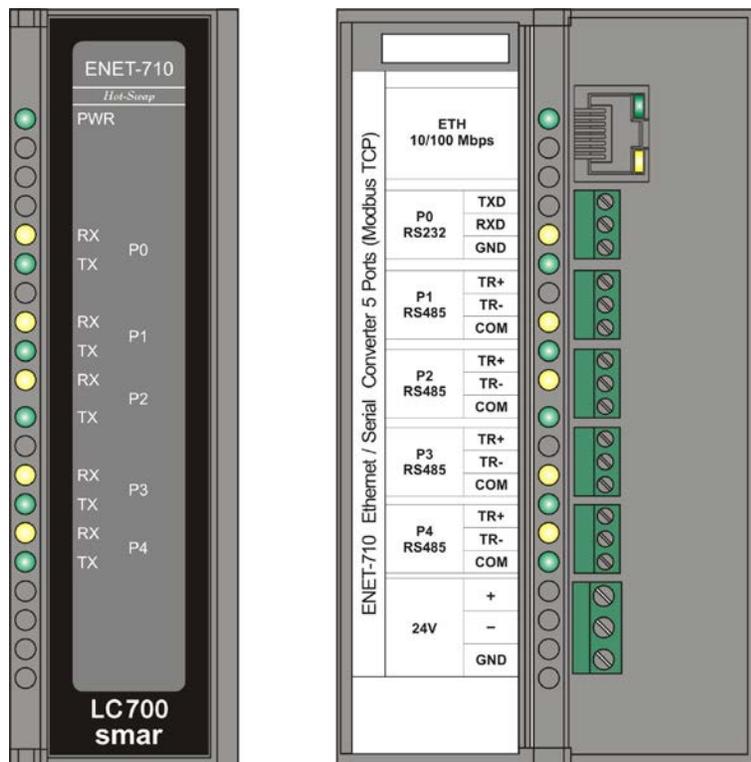
Figure 1 – ENET-710 Module

Features

- Supports 10/100 Mbps Ethernet communication.

- 9600 – 115,200 bps asynchronous serial communication.

- TCP/IP and HTTP protocols.

- Multi-master - up to 7 clients can access field slave devices simultaneously.

- Modbus TCP/Modbus RTU bridging.

- Ethernet to CD600 Multi-Loop Controller bridging.

- 1 Full-duplex RS-232C Serial Port (point-to-point).

- 4 Half-duplex RS-485 Serial Ports (multidrop) with 2 ports supporting 1600V isolation and the other 2 supporting 50V of isolation.

- Redundant operation option for the RS-485 ports (parallel and ring topologies).

- Surge protection for all serial ports.

- HTTP web page based configuration.

- Password protected configuration to prevent unauthorized changes.

- Powered from the LC700 PLC or external +24 Vdc in the DF9 individual support, or in redundant mode in the LC700 rack using external power supply.

Included Accessories

- Five (5) 3-position 3.81mm pitch terminal block connector plugs for connecting serial port cables to the module.

- One (1) 3-position 5.08mm pitch terminal block connector plug for connecting an external +24VDC power supply to the module.

- One (1) individual support DF9.

Module Installation

The ENET-710 can be installed into the rack R700-4 to receive power or can be powered from an external +24 Vdc power supply using DF9 individual support. In both cases, when the module is powered, the green power indicator LED at the top of the module will illuminate.

Installation of the Module into the Rack R700-4

The Rack R700-4 is ready for mounting in DIN rail.
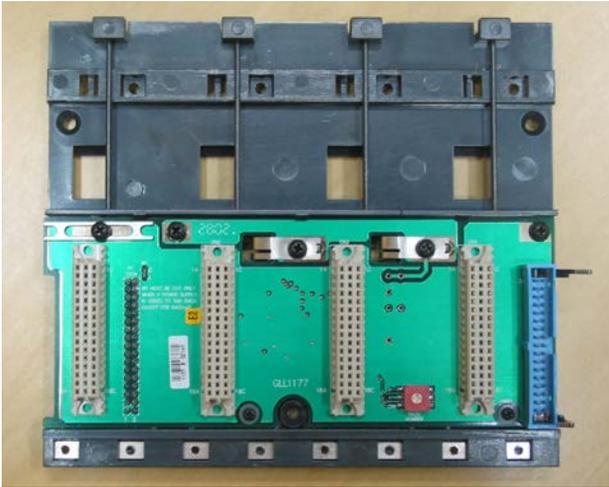
Figure 2 – Rack

Follow the steps below to install a module in the rack.

1	Attach the top of the module (with a 45° inclination) to the module support located on the upper part of the rack.
2	Mounting detail.
3	Push the module fixing it to the module connector.
4	Next, fix the module to the rack using a screwdriver, and fasten the fixation screw at the bottom of the module.

Installation of the module into the DF9 individual support

ENET-710 module can also be installed into the DF9 individual support using 24 Vdc external power supply. DF9 can be observed in the picture below:

Figure 3– DF9

Stand-alone +24Vdc Power Application

- The +24 Vdc connector on the module is the bottom terminal block on the front panel. The positive (+) terminal is located on pin 1 (the topmost pin position) and negative (-) on pin 2 (middle pin position). Chassis ground connects to pin 3 (bottom pin position).

- Using the provided 3-position plug, secure the power supply wires to the plug by inserting the wires into the wire openings and tighten the screws with a screwdriver.

- Insert the plug into the bottom terminal block connector on the module front panel to power up the module.

Redundant Power Supply Operation

The ENET-710 supports a redundant power supply mode to provide continuous operation if the +24 Vdc power supply fail. To make use of the redundant power supply mode, install the module into the LC700 PLC rack and connect a +24 Vdc power supply to the module's +24 Vdc input as described in the installation section of this manual. In this configuration, the module will be powered by the +24 Vdc power supply and the power supply from the LC700 PLC rack is the backup. Note that when both LC700 PLC power and a +24Vdc are present, the +24Vdc power supply will always be the primary power supply.

Available Ports

Ethernet Port

The ENET-710 provides one 8-conductor RJ45 jack for connecting to an Ethernet network via category 5 or better unshielded twisted pair (UTP) cabling. Built into the jack are two status LEDs. When an Ethernet link is active, the green LED will light and stay illuminated. The orange LED will flash on and off to indicate transmit and receive data activity.

The ENET-710 supports up to 7 TCP/IP sockets, enabling up to a total of 7 clients or applications to communicate with the ENET-710 for accessing slave serial devices. Note that accessing the ENET-710 configuration web page does not count against the 7-socket limit.

Serial Ports

The ENET-710 has a total of five asynchronous serial ports, P0 – P4. Allowable communication speeds are 9600bps, 19200bps, 38400bps, 57600bps, and 115,200bps. Data size is fixed at 8-bits with a choice of even, odd, or no parity and 1 or 2 stop bits. When 2 stop bits are selected during port configuration, the parity setting used for the port by the ENET-710 will be no parity, regardless of setting. Each serial port also has green LED for Tx and a yellow LED for Rx that indicate data activity on that port. The top LED in each pair will light to indicate reception of data while the bottom LED lights to indicate transmission of data.

Serial Port Connectors

All five serial port connections are found on five terminal block connectors on the front of the module panel. Port P0 is located in the top position of the five port connectors, just below the RJ45 Ethernet connector. P1 is located below P0, followed by P2, P3, and P4. For each serial port connector, pin 1 is the topmost position. Using the provided 3-position terminal block connector plugs, insert the wires from the serial cabling into the wire openings on the plugs and secure them by tightening the screws with a screwdriver. Then insert the plugs into the appropriate serial connector on the module front panel making sure they are fully seated. The table below details the serial port connections.

Port	Type	Isolation	Terminal Block pins		
			Pin 1	Pin 2	Pin 3
P0	Full-duplex RS-232C	None	TxD	RxD	Ground
P1	Half-duplex RS-485	1600V	TR+	TR-	Common-P1
P2	Half-duplex RS-485	1600V	TR+	TR-	Common-P2
P3	Half-duplex RS-485	50V	TR+	TR-	Common-P3
P4	Half-duplex RS-485	50V	TR+	TR-	Common-P4

Legend:
TxD – Data Transmission.
RxD – Data Reception.
TR+ - Positive Data Transmission/Reception.
TR- - Negative Data Transmission/Reception.

Supported Serial Protocols

The ENET-710 supports two serial communication protocols including Modbus/RTU and CD600. Modbus/RTU and CD600 protocols are available on all five serial ports. The protocol is selectable under the configuration menu for each serial port (see the configuration section later in this manual).

Modbus/TCP Protocol

In Modbus mode, the ENET-710 acts as a bridge between Modbus/TCP and Modbus/RTU. The ENET-710 takes Modbus/TCP frames received on port 502 from the Ethernet connection and creates a Modbus serial line protocol data unit by computing and appending a CRC and inserting the device address extracted from the Modbus/TCP frame. It then sends the serial packet out the serial port that has been configured with the specified device address. Upon receipt of data from a Modbus compatible device over a serial port, the ENET-710 verifies the CRC on the data and, if correct, creates a Modbus/TCP application data unit and encapsulates it into an Ethernet frame and sends it out the Ethernet port over the appropriate socket. The ENET-710 also handles command time-outs on the serial port network. In the case that a serial device fails to respond, the ENET-710 replies to the client with a Modbus/TCP timeout exception code. In the case of an invalid response from a Modbus/RTU slave (including bad CRC), the ENET-710 will ignore this response and the client must perform the error handling. The ENET-710 will also respond back to the client with a Modbus/TCP exception code if the client tries to access a device address that does not exist in the current ENET-710 configuration.

CD600 Protocol

In CD600 mode, clients running the CD600 Configuration software can communicate over Ethernet to one or more CD600 Multi-Loop Controllers using the RS-485 port on the CD600. Configure the selected ENET-710 serial port to match the serial port settings of the CD600, the CD600 device address, and choose the CD600 serial protocol.

Configuration Web Page

The user configures the module with the configuration menu. The menu is accessed via a web page using a web browser over the Ethernet connection. With this menu, the user can configure all five serial ports for desired baud rate, character format, and serial protocol. Also the user sets up the address range of devices connected to a particular serial port and device response timeouts. Additionally, system administration settings such as the login username and password plus IP address and subnet mask are set up with the configuration web page. The user can also enable

serial port redundancy modes using the configuration menu.

Configuration Access

To access the configuration web page, make certain your PC's IP address is on the same subnet as the module. If not, follow the steps below:

1- Open **Windows Control Panel** and double-click the **Network Connections** icon.
2- Access the **Local Area Connections Properties** menu.
3- For your Ethernet card, highlight the Internet Protocol TCP/IP item and click on properties. This will bring up a tab to enter an IP address and subnet mask for your PC to use to communicate with the ENET-710.
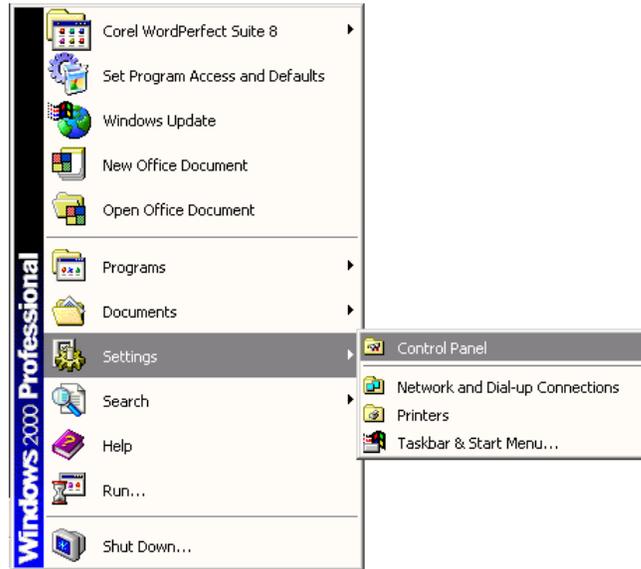
Step 1
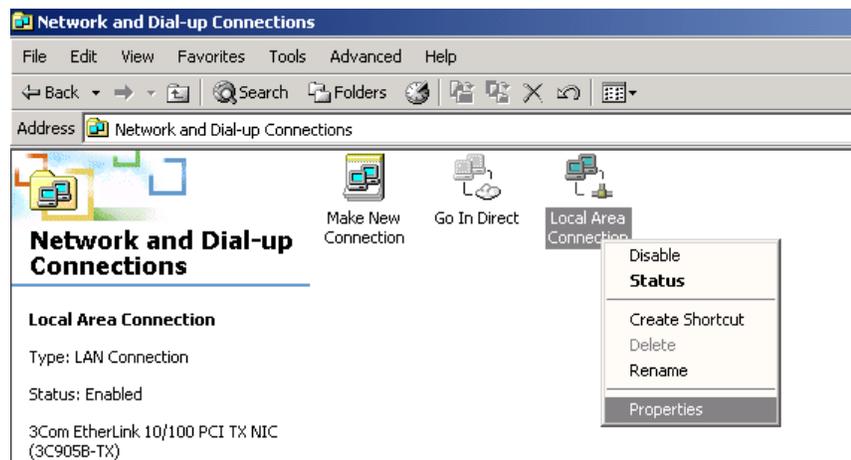
Step 2
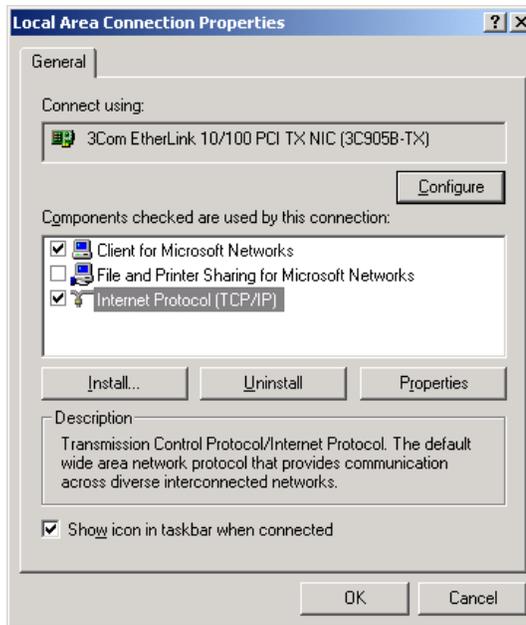
Step 3

Default Configuration

Initially there is no password set, a username of admin, and the configuration web page is accessed using the default IP address of 192.168.1.1 with a subnet mask of 255.255.255.0.
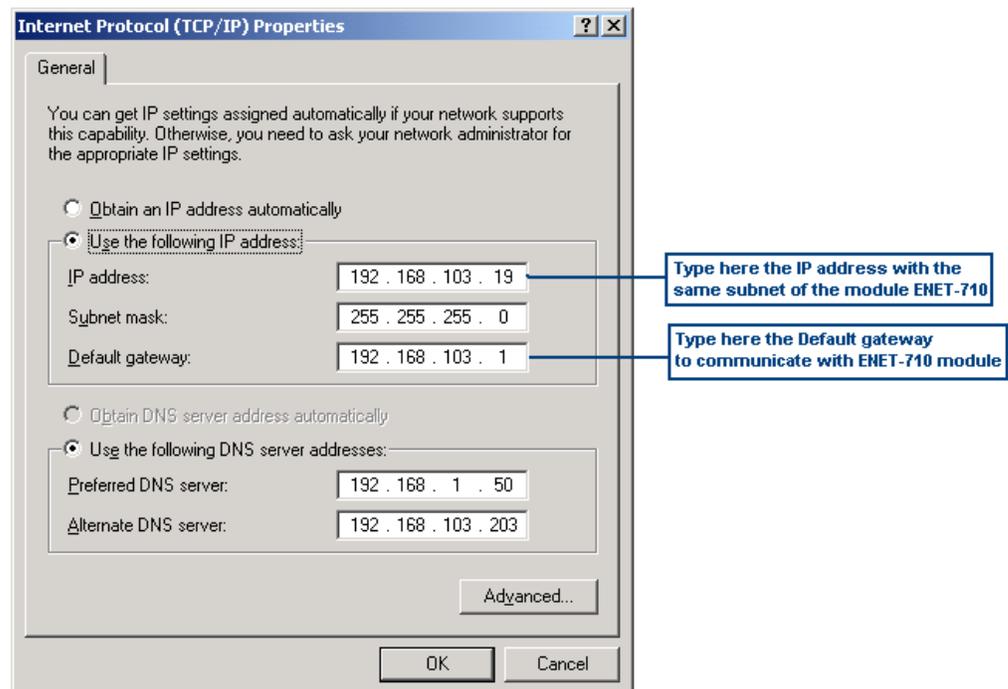
Using Locator

Another way to configure the IP address of ENET-710 module is using the Locator, obtained from the Smar Laboratories web site (www.smarlabs.com). In order to make this, observe the steps below:
1 – Open the Smar Labs web site: www.smarlabs.com.

2 – To download the Locator or any material from the Smar Labs web site is necessary to register. Click on **Login** option and follow the procedure to do the register.

3 – After finishing the register, click on **Support** option, located on the top of this page, or click **FREE CONFIGURATION TOOLS***,* on the bottom of the Home page. In this section is found the Locator for downloading.

3 – Observe the ENET-710 item. Click **Locator.exe** to download. The following window will open:
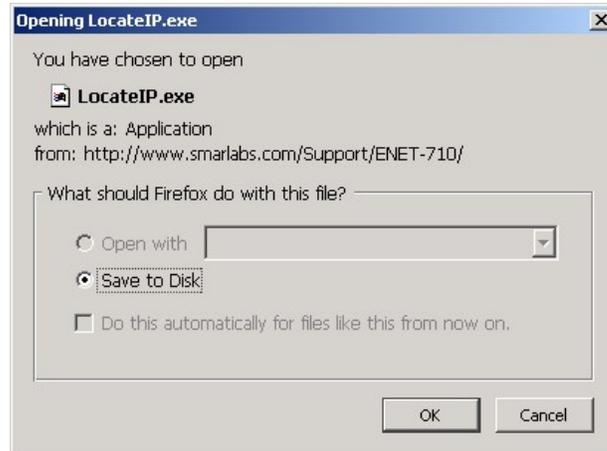
4 – The Locator will be copied to the folder chose by the user. Double click the icon to open it. The following window will be showed.
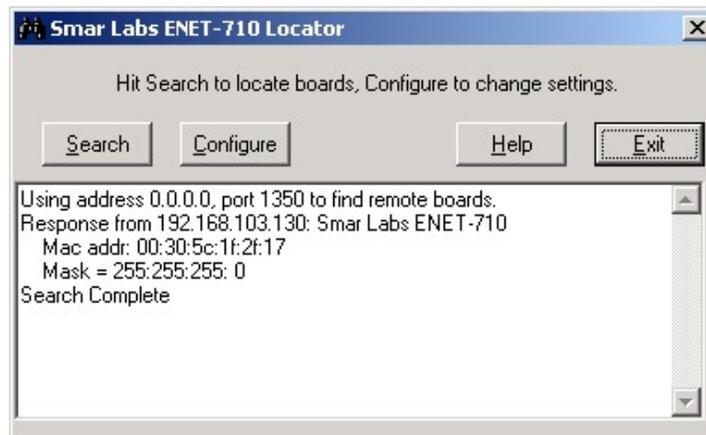
5 – Click **Configure** button to set the IP address of ENET-710 module. After that, click **OK** button.

Note
The IP Address to be configured must be in the same subnet of the workstation.

Open a web browser and enter the IP address of the module into the web browser's address bar. A view of the top-level configuration menu is shown below.
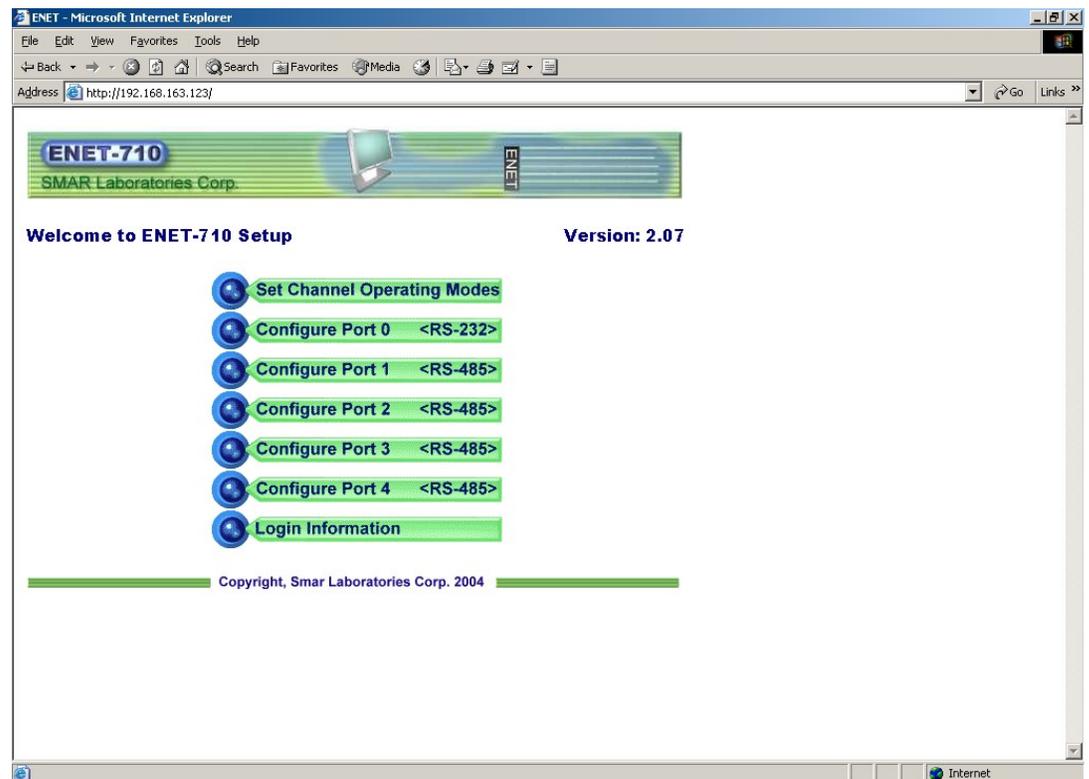
Figure 4 – Configuration Menu

The configuration buttons are username/password protected. Upon the initial selection of any one button, a dialog box will appear asking for a user name and password. Once the correct username and password are entered, the ENET-710 will remember them for the rest of the session. If you forget your current username or password or IP address, see the Defaults Switch section of this manual. Note that the username and password are case sensitive.

Serial Port Configuration

To set up any of the five serial ports, click one of the Configure Port X (where X is 0,1,2,3, or 4) buttons on the main menu. The port configuration menu for port X is seen below (all 5 ports similar). Choose the desired serial protocol, either Modbus/RTU or CD600. Select the serial baud rate and character format (parity, stop bits). Parity can be even, odd, or none. You may choose 1 or 2 stop bits. Set up the serial device address ranges by entering the range low address into the First Address box and the range high address into the Second Address box. Enter desired device response timeout into the timeout box. Finally, click on the Submit button to save the new information.

Notes:
- For a particular serial port, any and all slave devices connected to it must all be set to the same parameters that were selected for the serial port.
- When selecting 2 stop bits for a port, the ENET-710 will ignore the parity setting in the menu and use no parity.
- When selecting the CD600 protocol, the parity and number of stop bits settings are ignored by the ENET-710.
- The same address range must not be repeated when setting the ENET-710 ports. For example, there are 20 devices in the configuration. So, the address range for the Port 0 is from 1 to 20, and for the Port 1 is from 11 to 20.

IMPORTANT
Ports using the same protocol cannot have any repeated addresses.
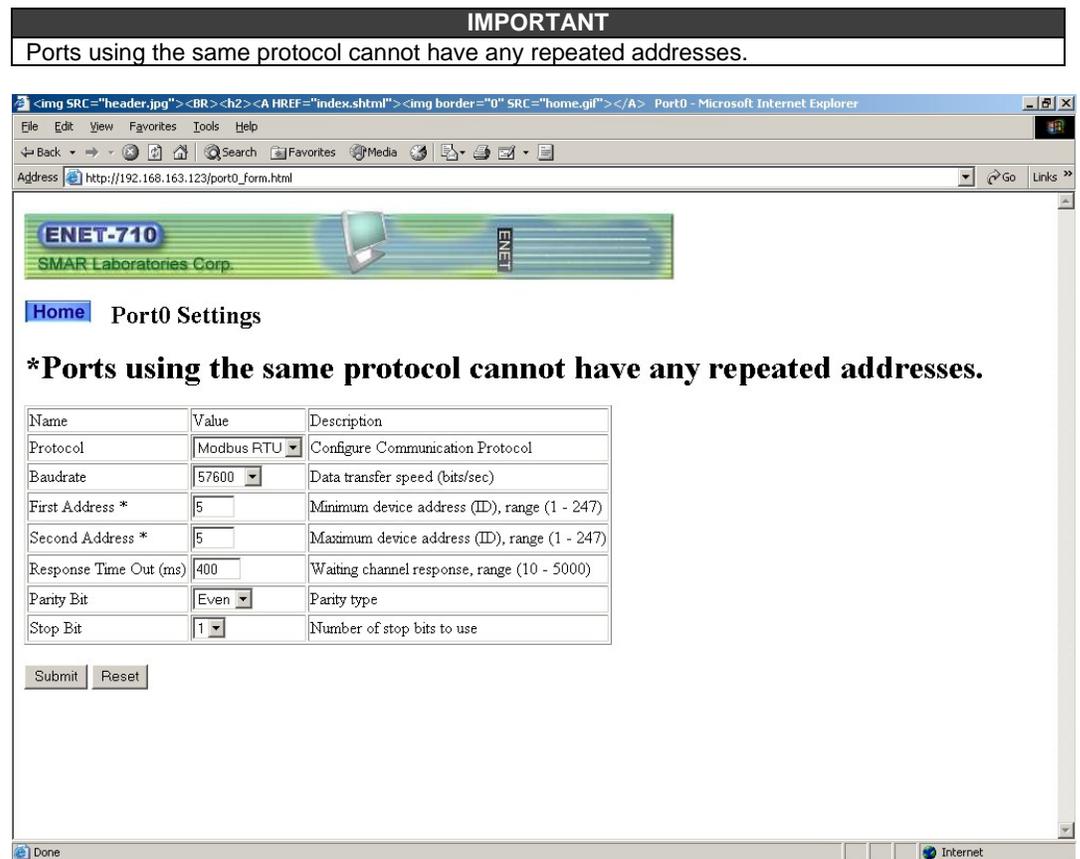
Figure 5 – Configuring the ENET-710 Ports

RS-485 Port Operating Modes

To set up the RS-485 port operating modes, select the **Set Channel Operating Modes** button on the main configuration menu. Here a redundant mode configuration for the RS-485 ports can be enabled. The serial port pairs 1-2 and 3-4 can provide redundant operation in case the connection of one member of the pair fails. The modes include Independent (no redundancy), Parallel, and Ring. The menu is shown.
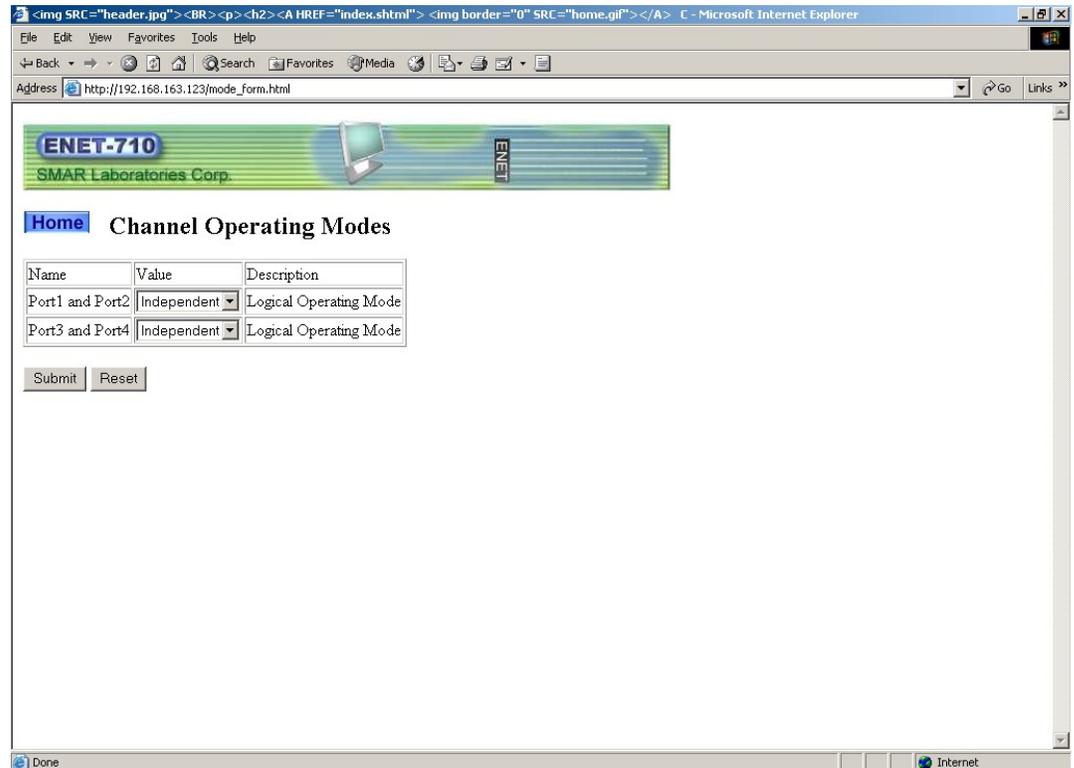
Figure 6 – Configuring the RS-485 Ports

The parallel mode involves using a separate serial cable connected to each module serial port in the given pair. The slave devices need to have two serial ports with one port connected to one of the serial cables in the pair and the other port connected to the remaining cable in the parallel pair.

When using the parallel mode, if a problem develops on a given module serial port, then the other in the pair can seamlessly take over the required serial communications.

When using the parallel mode, the two ENET-710 serial ports in the pair may be configured with different serial port settings. However, slave device ports connected to a given port in the pair must be configured the same as the ENET-710 port to which they are connected.

When using the ring mode, a single serial cable loops from one module serial port in the pair to the other port. Slave devices are then distributed along the cable in between. If a problem develops along the cable or with the module serial port isolating one or more devices from the primary port, then the other port in the pair can take over the needed communications to those devices. Both serial ports in the pair and the slave devices must be configured with the same protocol, baud rate, and serial character format. In this mode, the slave devices need only have one serial port.

For both parallel and ring mode, the operation is as follows: if communication is directed to an address that is configured to be on one port of the pair but there is no response, the ENET-710 will then try to communicate to the device using the other port in the pair.

Choose the desired mode of operation and click the Submit button to enable the setting.

Changing the IP Address and Username/Password

To change the login username/password pair or module IP address, select the **Login Information** button on the main menu. This brings up the page to setup the desired IP address and subnet mask, plus the username and password. Note that the username and password are case sensitive. To change any of these, enter the new information and click the Submit button to save. See the figure below.
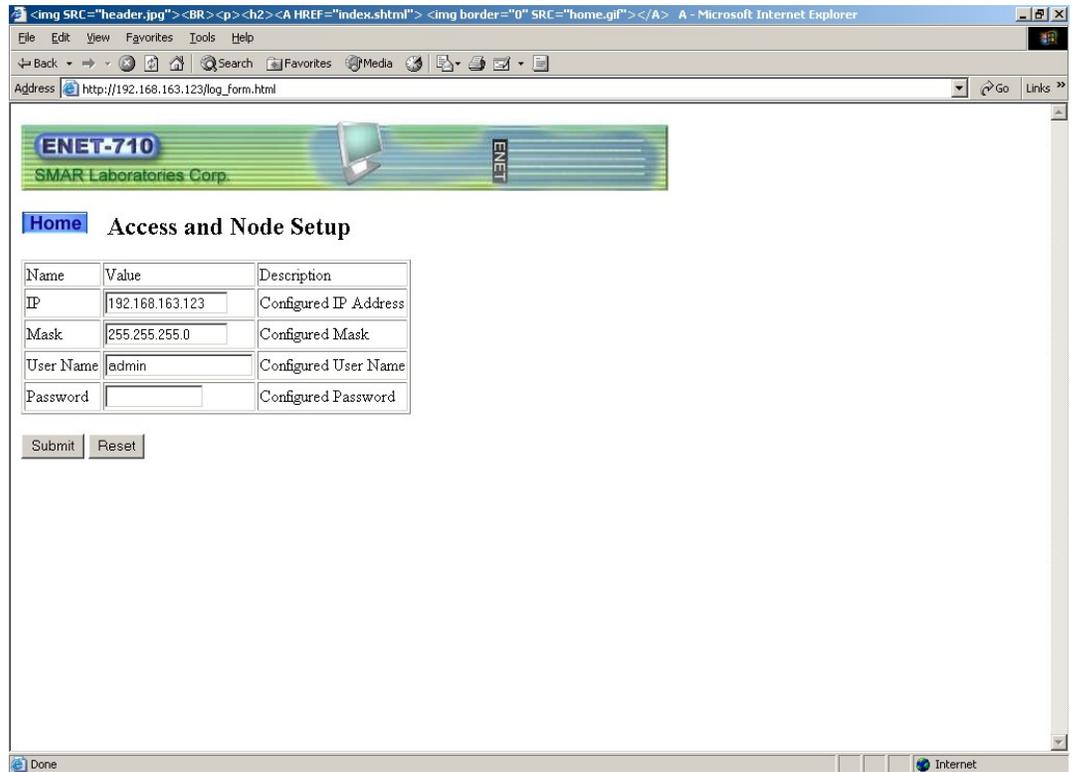
Figure 7 – Changing Username and Password

If after configuring a new IP address or username/password, if the module fails to respond to the new information, make certain that the defaults switch is off (see Defaults Switch section, below, for more information). Otherwise, verify that the client PC is on the same subnet as the new settings for the ENET-710.

Default Switch

The ENET-710 default configuration consists of the IP address of 192.168.1.1, a subnet mask of 255.255.255.0, and a username of admin with no password set. In case of a lost or forgotten username/password or IP address, turn on the switch accessed through the air vent opening on top of the module by sliding the switch toward the back of the module with the module powered. This is the "Set Defaults" position and will cause the module to temporarily use the default configuration. The module will continue to use this configuration for as long as the switch is on. Note that the default switch does not clear the previously set configuration. You may then access the configuration web page using the default configuration and read the lost username/password or IP address information and/or store new information. Slide the defaults switch off to allow the module to once again use the stored information.

Figure 8 – Default Switch

Technical Specifications

CONTROLLER	
Type	8-bit
Program Memory	Flash

NETWORK INTERFACE	
Ethernet	IEEE 802.3 10Mbps 10BASE-T IEEE 802.3u 100Mbps 100BASE-TX
Medium	Category 5 or UTP
Protocols	Modbus TCP, TCP/IP e HTTP
Open TCP connections	Maximum of 7
Isolation	1500V

SERIAL PORTS P0-P4	
Mode	Asynchronus
Baud rate (bps)	9600, 19200, 38400, 57600 and 115200
Character size	8 bits
Parity	Odd, even or none
Stop bits	1 or 2
Interface	RS-232C (P0, full-duplex, point to point) RS-485 (P1 – 4, half-duplex, multidrop)
Protocols	Modbus/RTU and CD600
Isolation	P0 – none P1, P2 – 1600V P3, P4 – 50V

INDICATOR LEDS	
Power	On (green)
Ethernet	Link (green)
Serial	Activity in jack Tx/Rx (yellow) Rx – yellow Tx – green (for each port)

CONNECTORS	
Ethernet	8 conductor modular RJ-45
Serial	3 conductor terminal blocks , 3.81 mm pitch
+24 Vdc Power Supply	3 conductor terminal block, 5.08 mm pitch

POWER SUPPLY	
Internal	5 Vdc @ 450 mA typical
External	18-36Vdc, 130 mA typical @ 24Vdc Recommended: 20-32 Vdc

DIMENSIONS AND WEIGHT	
Dimensions (W x H x D)	39.9 x 137.0 x 141.5 mm (1.57 x 5.39 x 5.57 in)
Weight	0.300 kg

Appendix A

	SRF – SERVICE REQUEST FORM	
smar	**ENET-710 – Ethernet Module**	**Proposal Nº:**

COMPANY INFORMATION

Company: _____
Unit: _____
Invoice: _____

COMMERCIAL CONTACT

Full Name: _____
Phone: _____ _____ _____ _____ **Fax:** _____
E-mail: _____

TECHNICAL CONTACT

Full Name: _____
Phone: _____ _____ _____ _____ **Extension:** _____
E-mail: _____

EQUIPMENT DATA

Model: _____

Serial Number: _____

PROCESS DATA

Process Type (Ex. boiler control)**:** _____
Operation Time: _____
Failure Date: _____

FAILURE DESCRIPTON

(Please, describe the failure. Can the error be reproduced? Is it repetitive?)
_____
_____
_____
_____
_____

OBSERVATIONS

_____
_____
_____
_____
_____

USER INFORMATION

Company: _____

Contact: _____

Section: _____

Title: _____ **Signature:** _____

Phone: _____ _____ _____ _____ **Extension:** _____

E-mail: _____ **Date:** _____/ _____/ _____

For warranty or non-warranty repair, please contact your representative.
Further information about address and contacts can be found on **www.smar.com/contactus.asp**