Modbus TCP

Included files:
Lantronix DeviceInstaller (folder): Program to configure E-485 Bridge (Ethernet)

Overview

This application note will show how to setup a SilverDust QCI-D2-IG8-EM servo controller for Modbus TCP communications. Typically Modbus is used to share registers between the controller and some Modbus host (i.e. HMI, PLC, …).

The Modbus TCP E-485 Bridge firmware in these units converts Modbus TCP to single or multi-drop Modbus RTU across the servo controller's RS-485 bus. Therefore, a single Modbus TCP E-485 Bridge can be used as a gateway to an entire network of Modbus RTU servo controllers via the RS-485 bus.

The controllers first must be initialized to use the Modbus RTU protocol over RS-485 and then the Modbus TCP protocol needs to be configured on the E-485 Bridge.

This document assumes the reader is familiar with Quicksilver's Modbus Protocol as described in QCI-AN038 Modbus Protocol.

Servo Controller Configuration

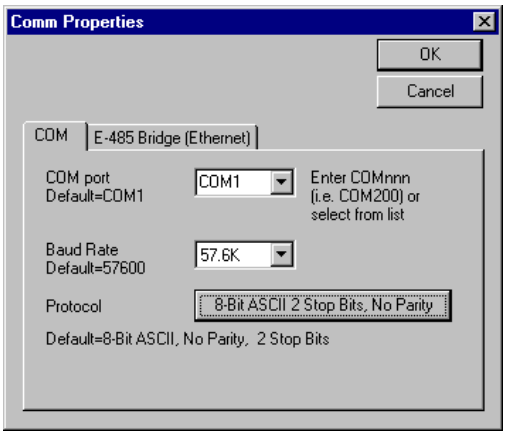
1) SilverDust QCI-D2-IG8-EM Jumpers

If your PC has an RS-485 port, QCI suggests using it to program the controller.

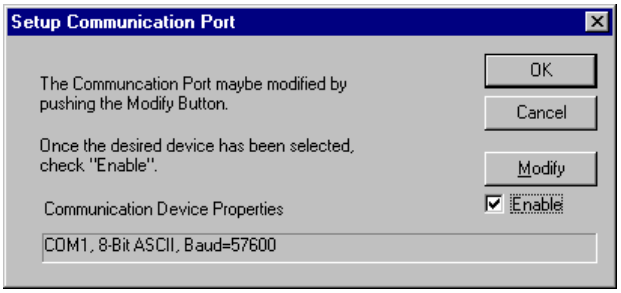
If you are using your PC's RS-485 port install only two the "485 TERM". If you are using the PC's RS-232 port (i.e. COM1), remove all jumpers.

2) Set QuickControl's Comm Port to Modbus Protocol

Setup->Comm Port



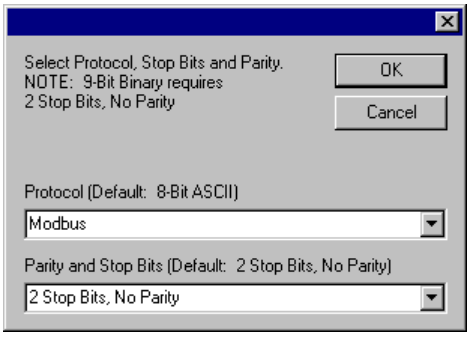
Press Modify



Press the protocol button

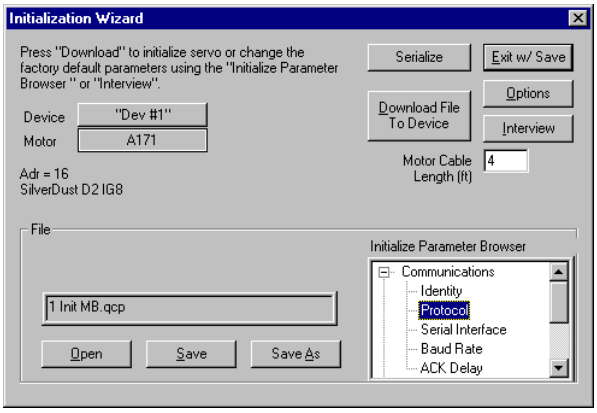
Select Modbus protocol, 2 Stop Bits, No Parity

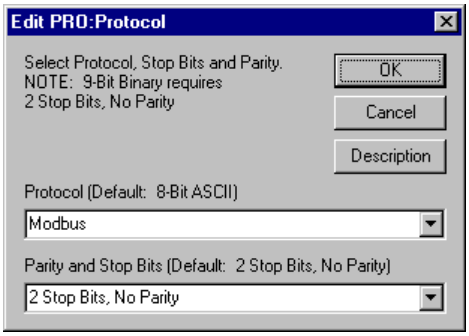
Press OK,OK,OK



3) Run Initialization Wizard
Tools->Initialization Wizard

Select Protocol from the Communications branch.



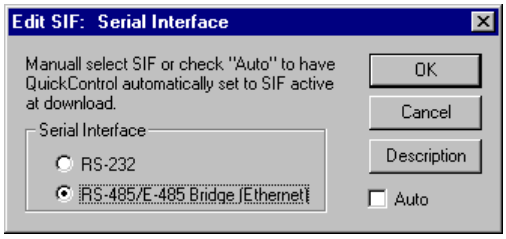


Select the Modbus protocol, 2 Stop Bits, No Parity.
Press OK.

Press "Download File…"

Follow the prompts.

4) RS-485 Serial Interface
(only for PCs with RS-232 interface)
If your are programming the controller using RS-232, you will need to switch to RS-485 in your application program prior to using Modbus TCP. Simply download a program (.qcp file) with the SIF command set to RS-485.



5) SilverDust QCI-D2-IG8-EM Jumpers
Disconnect the serial connection and install the 4 485 jumpers:

485 TERM
ETHERNET A
ETHERNET B
485 TERM

Xport TCP Configuration

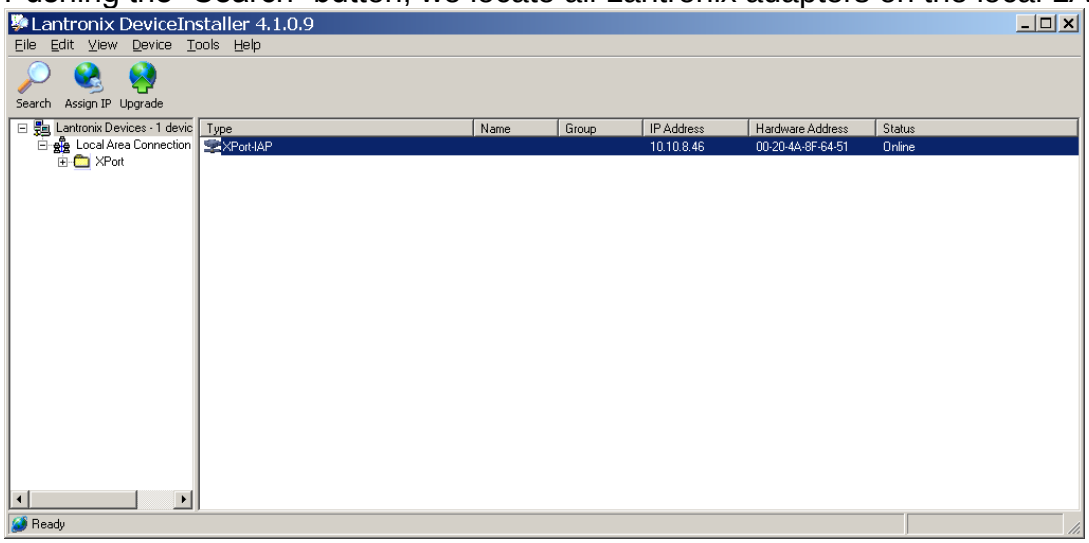
Contact your network person for an available fixed IP address for the unit, as well as your local subnet mask and default gateway. This address should NOT be in the range of any DHCP serving range to avoid conflicts. For this example, we will set the IP to 10.10.8.245, with a mask of 255.255.255.0, and a gateway address of 10.10.8.1

Install the Lantronix DeviceInstaller included with this application note by running the setup program in the Lantronix DeviceInstaller folder.

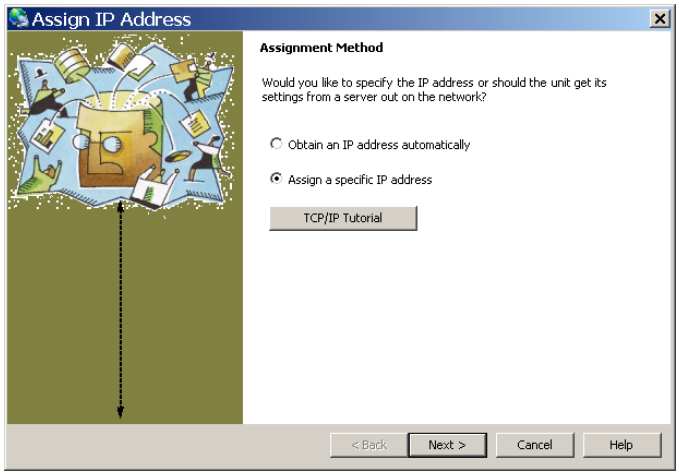
The E-485 Bridges will initially use DHCP (dynamic host configuration protocol) to get an initial IP address if your router or server has DHCP configured. In the example, the served address as 10.10.8.46. We do not want to use such a dynamic address, as it may likely change after a period of time. Normally we want to assign a static address to each Modbus TCP device. Run the DeviceInstaller from the Start menu.

Start => Programs => Lantronix => DeviceInstaller

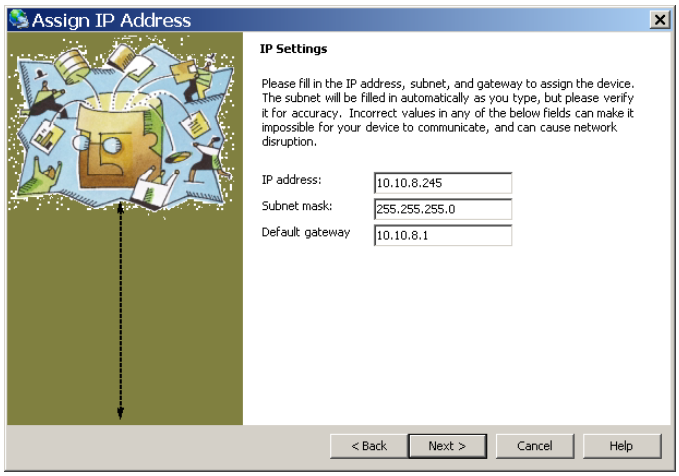
Pushing the “Search” button, we locate all Lantronix adapters on the local LAN.



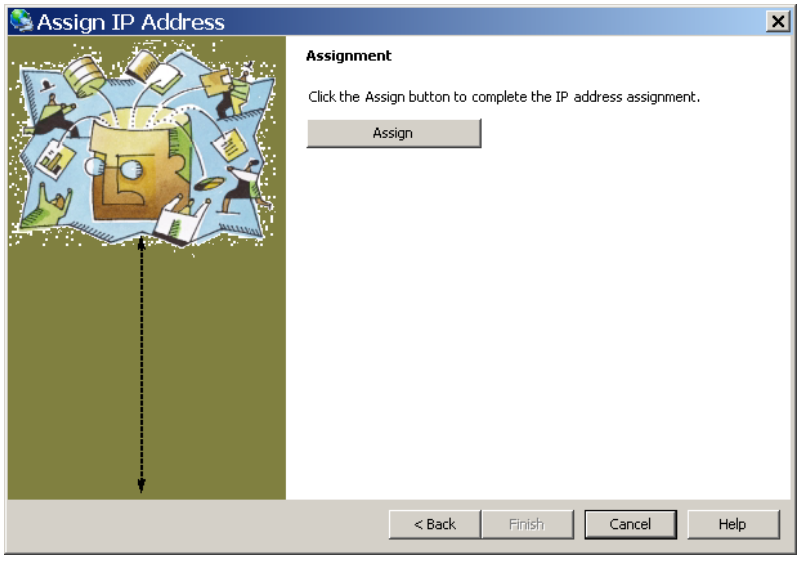
Select the wanted unit from the list. In this case, only a single unit is present. Click on the unit and then select “Assign IP”. Select “Assign Specific IP address”, NEXT



Enter the IP address, subnet, and default gateway, NEXT

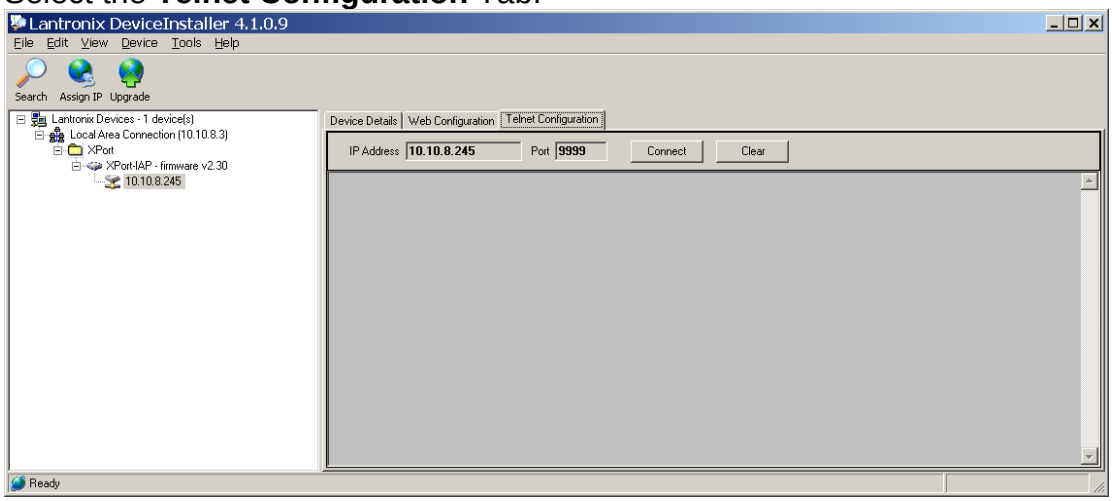


Select “ASSIGN” to make it active, then FINISH. This will take several seconds.

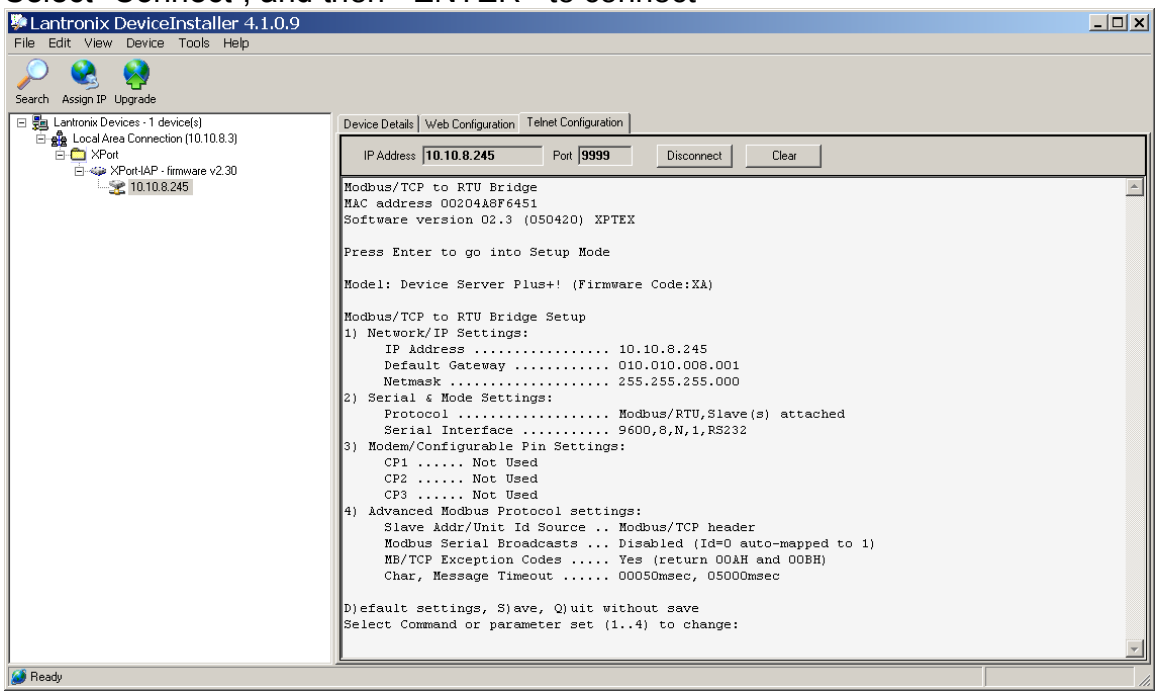


Next double click on the wanted device (note the new IP address!)

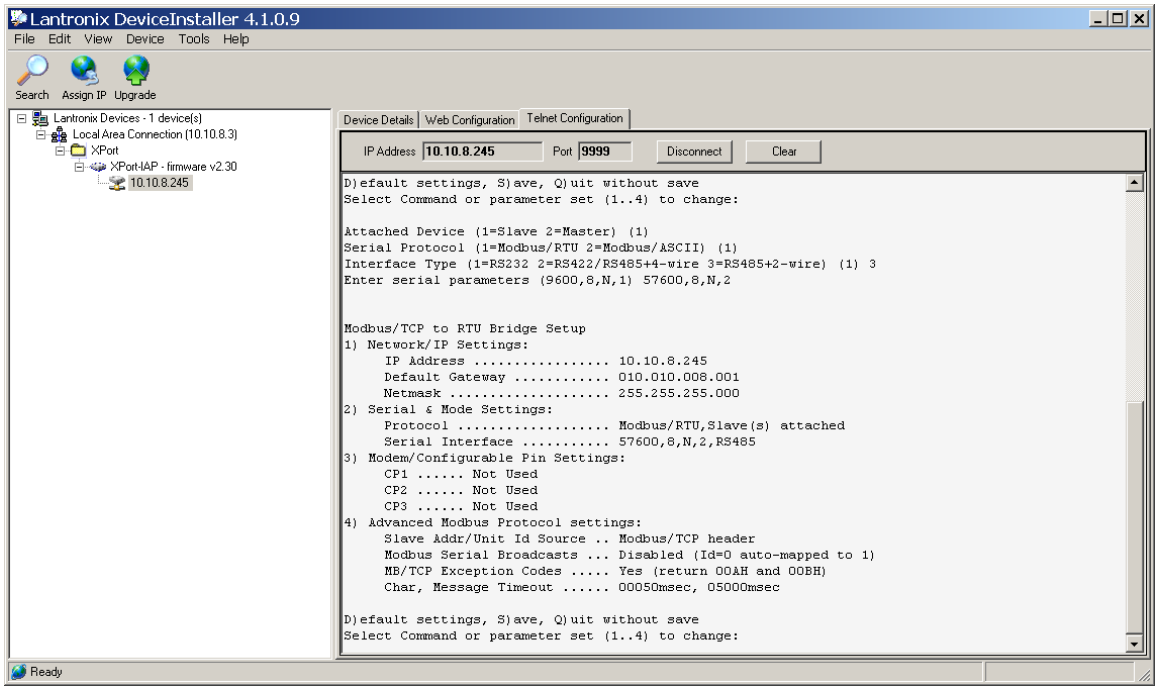
Select the **Telnet Configuration** Tab.



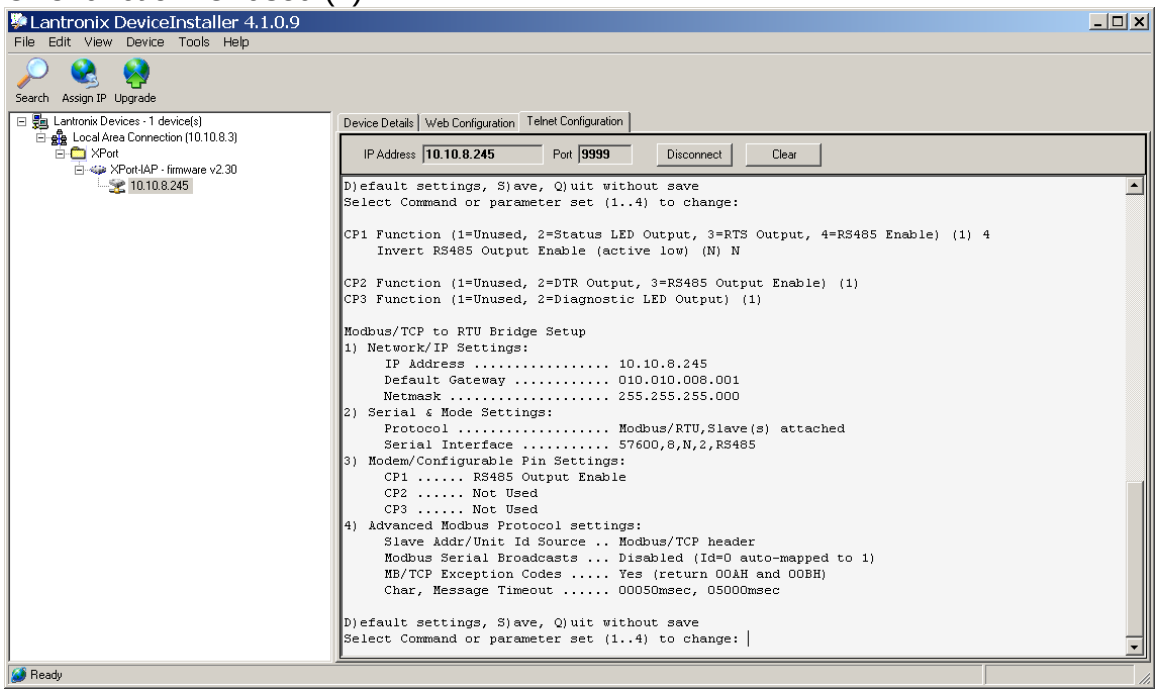
Select “Connect”, and then <ENTER> to connect



Type 2 to select protocol and serial interface, then keep RTU, Slaves attached - <CR>
Set Interface type to RS485+2wire (3)
Set serial Interface to 57600,8,N,2



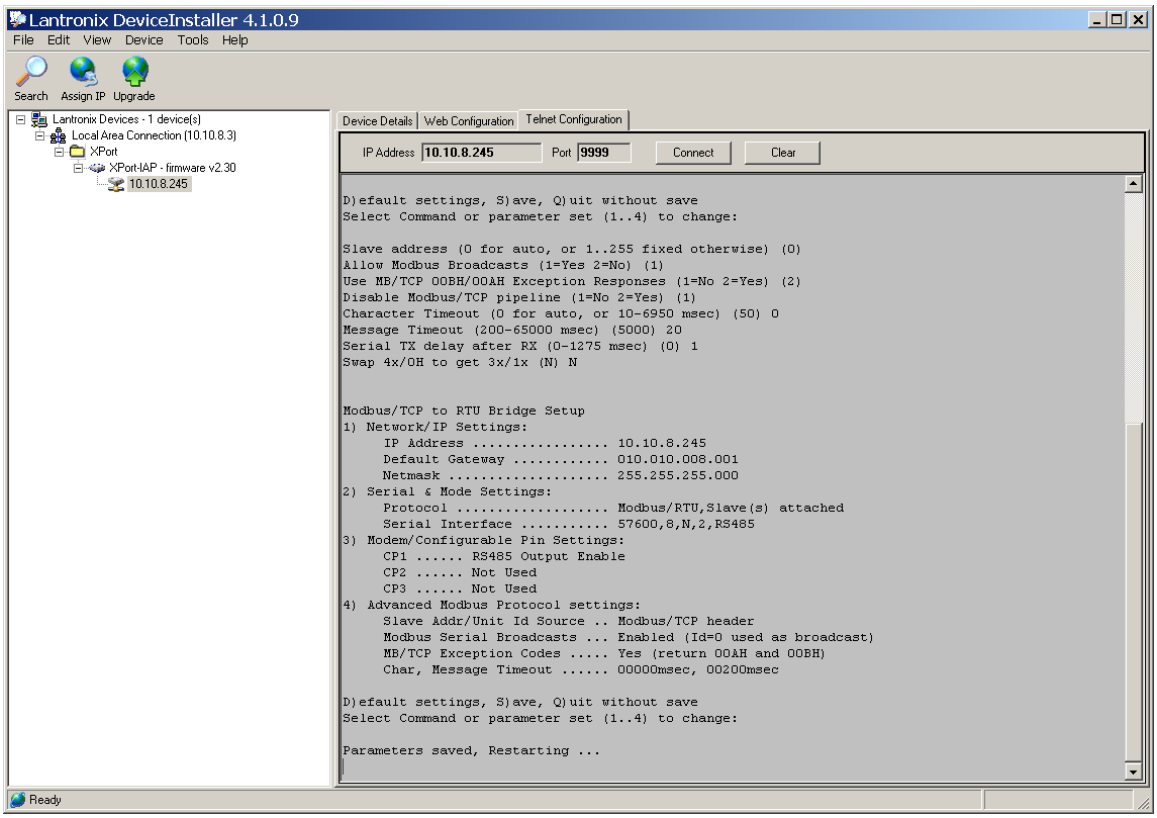
Select Modem/Configurable pin settings (3)
CP1 function: Select RS485 Enable (4)
Invert RS485 Output Enable: (N)
CP2 function: Unused (1)
CP3 function: Unused (1)



Select Advanced Modbus Protocol Settings (4)

Other choices are up to system choices, but set Serial TX delay after RX to 1 ms
Auto slave address uses the address set in each controller as set the by the Initialization Wizard in QuickControl, and allows multiple units to be controlled via RS-485 from a single E-485 Bridge.

Slave address (0 for auto, or 1..255 fixed otherwise) (0)
Allow Modbus Broadcasts (1=Yes 2=No) (1)
Use MB/TCP 00BH/00AH Exception Responses (1=No 2=Yes) (2)
Disable Modbus TCP pipeline (1=No 2=Yes) (1)
Character Timeout (0 for auto, or 10-6950 msec) (0)
Message Timeout (200-65000 msec) (200)
Serial TX delay after RX (0-1275 msec) (1)
Swap 4x/0H to get 3x/1x (N) N

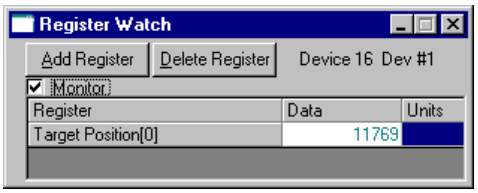


Finally select Save (S) to keep these parameters
Exit the Lantronix configuration.

Unit is now accessible via Modbus TCP.

Register Watch Monitor

A good way to troubleshoot your programs while using Modbus TCP is to connect a PC to the controller's RS-485 bus and use QuickControl's Register Watch Monitor tool to monitor the controller's registers. Register Watch Monitor will passively monitor the RS-485 bus and extract any commands containing register data. The results are displayed in Register Watch's Data column.



Register Watch Monitor is enabled by checking "Monitor" in the Register Watch tool.