Application Examples

In This Chapter...

Example 1:
Using Modbus Poll to *STRIDE* Modbus Gateway with BRX Slave

This example will illustrate how to use Modbus Poll, which is a PC-based Modbus master simulator tool, to connect through the *STRIDE*® Modbus Gateway to a BRX PLC via 2-wire RS-485. For simplicity in this example, the gateway will be configured in Transparent Mode.

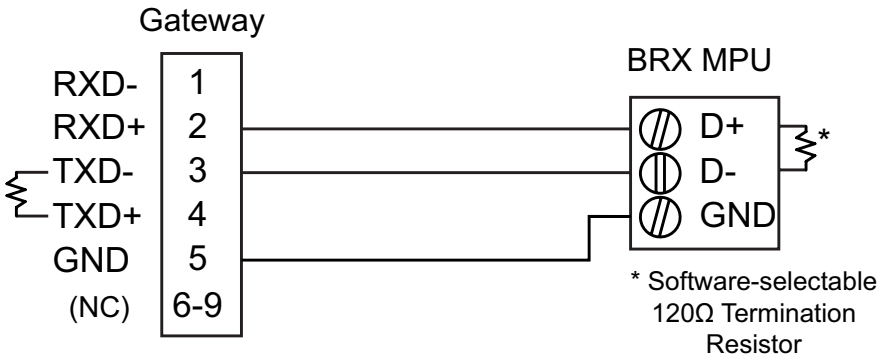
Items needed for this example:

- *STRIDE Modbus Gateway*
- *BRX PLC (any model)*
- *PC with Modbus Poll installed (free demo is available at www.modbustools.com)*
- *AutomationDirect ZL-DB9F-CBL-2P D-sub 9-pin pigtail cable, or small length of AutomationDirect L-19954 RS-485 cable or equivalent and D-sub 9-pin socket (female) connector*
- *Ethernet switch and cables to connect from the PC to STRIDE Modbus Gateway*

Step 1: Connect the STRIDE Modbus Gateway serial port to the BRX MPU serial port.

Using the ZL-DB9F-CBL-2P cable, or D-sub 9-pin connector and a short length of RS-485 cable, connect Serial Port 1 of the *STRIDE* Modbus Gateway to the BRX serial port as shown:

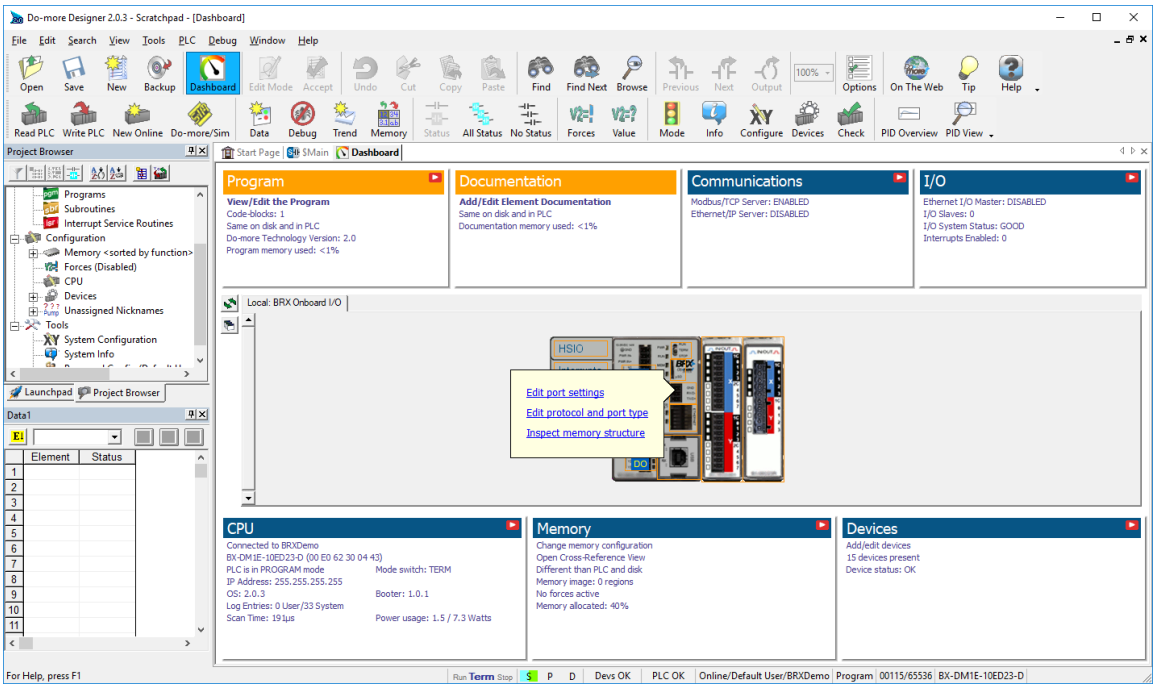
RS-485 2-wire Wiring Diagram



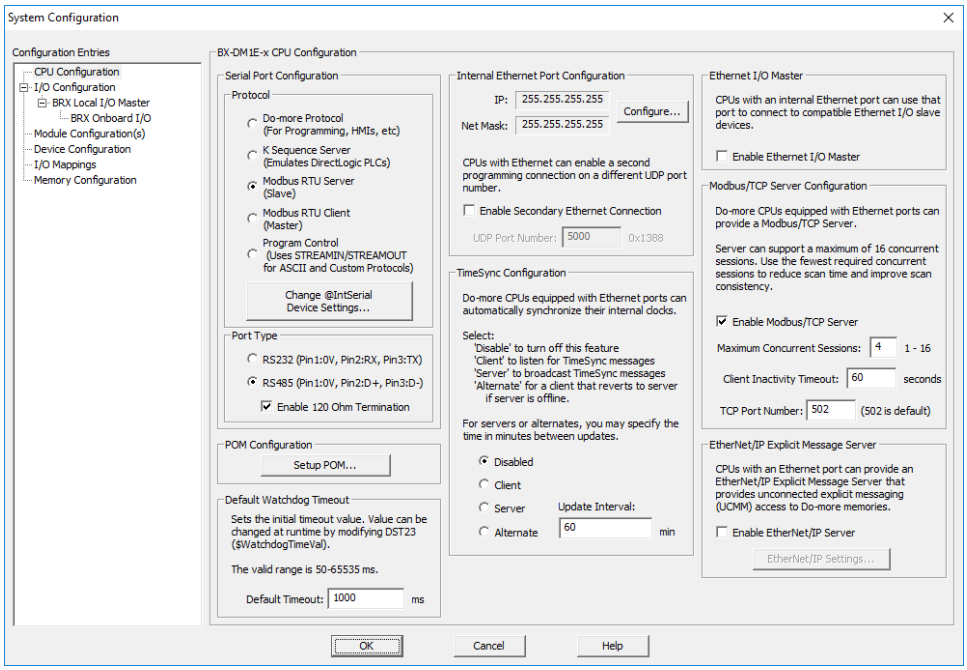
The Gateway contains a DIP switch selectable 120Ω Termination Resistor between TX+ and TX- for each serial port on RS485 2-wire, when the Gateway is wired at one end of the serial network

Step 2: Configure the BRX MPU serial port.

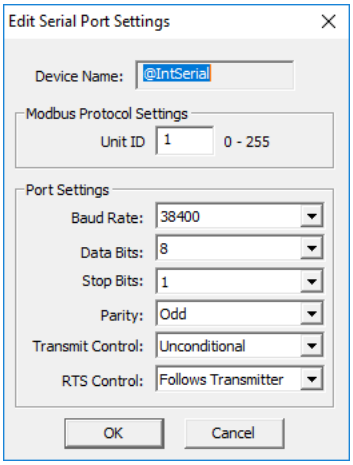
Connect to the BRX MPU with BRX Do-more! Designer software using either the BRX serial or USB Pluggable Option Module.



Click on the built-in serial port on the image of the BRX MPU within the Do-more! Designer software. From the dialog box that pops up, select "Edit Protocol and Port Type"



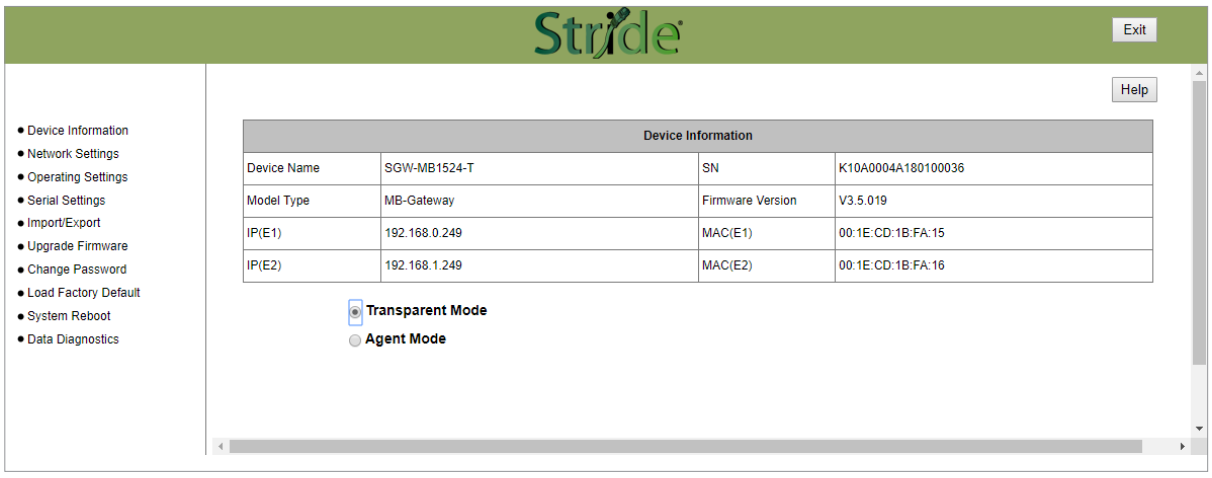
In the Serial Port Configuration column, select "RS-485" under "Port Type" and select "Modbus RTU server (slave)" under "Protocol". Then click "Change @IntSerial Device Settings..."



Setup the port as shown for 38400 baud rate, Odd parity, 1 Stop bit and Unit ID 1. Match everything else as shown. Note the Unit ID configured in the PLC. Once this has been done, click "OK" to close this dialog then "OK" again to close the preceding dialog.

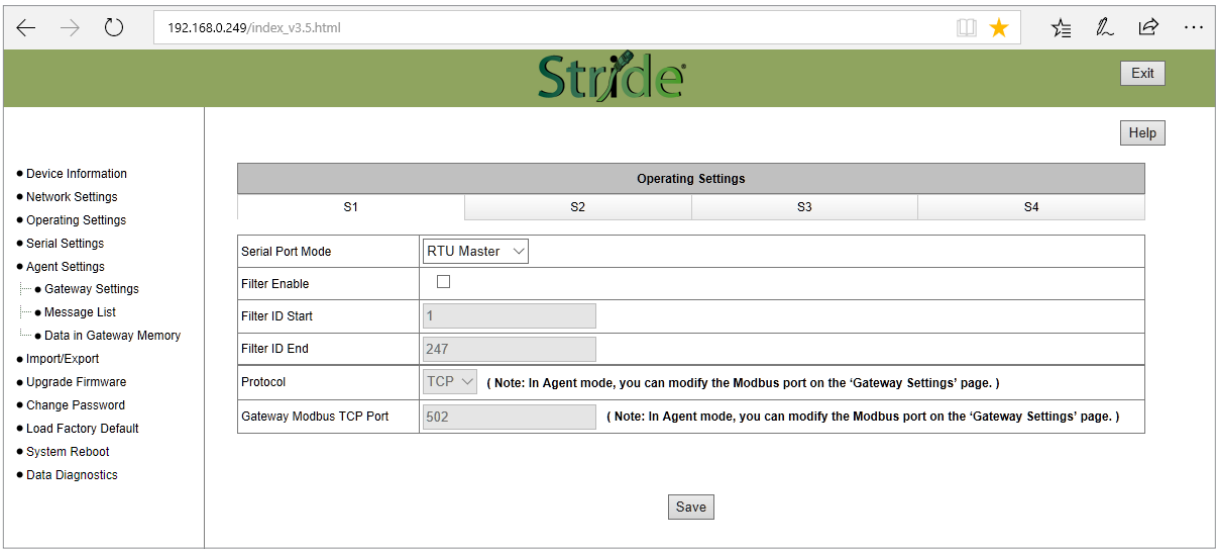
STEP 3: CONFIGURE THE STRIDE MODBUS GATEWAY

Open up a web browser, such as Internet Explorer, enter in the IP address of the *STRIDE* Modbus Gateway, and log into the *STRIDE* Modbus Gateway web console as described in the Initial Connection section of Chapter 3 to access the Device Information as shown:

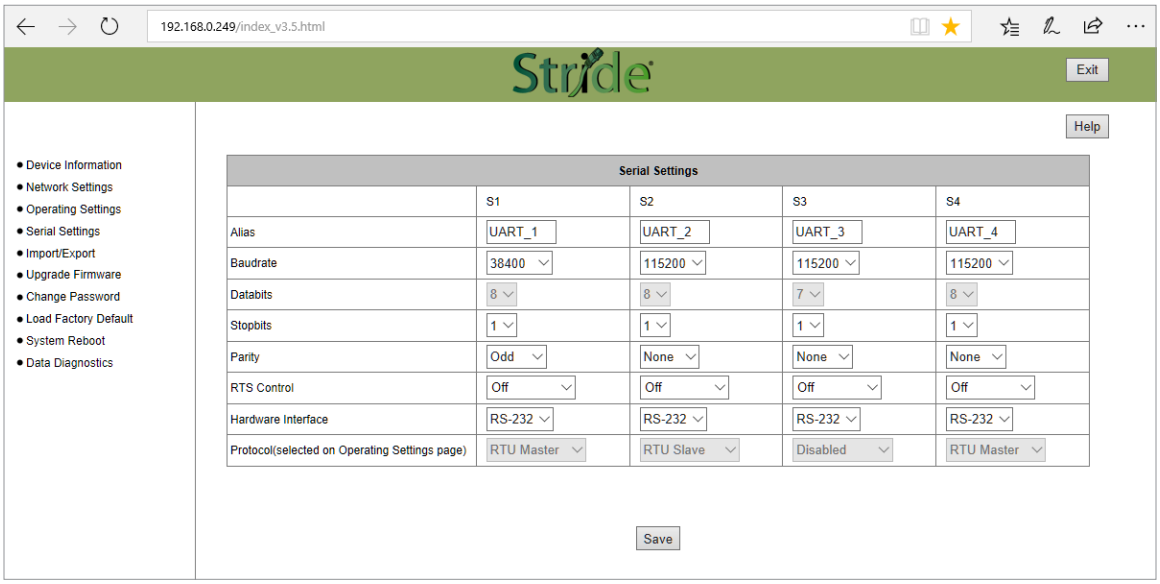


Set the gateway to Transparent Mode.

On the Operating Settings page, set Serial Port 1 to RTU Master mode as shown below and click Save.



Click "Serial Settings" from the navigation menu



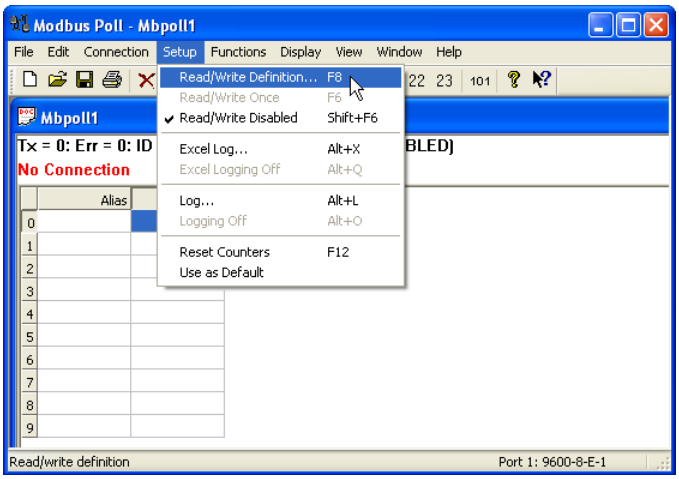
Set the serial port parameters to match the configuration of the BRX MPU, and set the hardware interface to RS-485 2-wire.

Click "Save" to store and apply the settings.

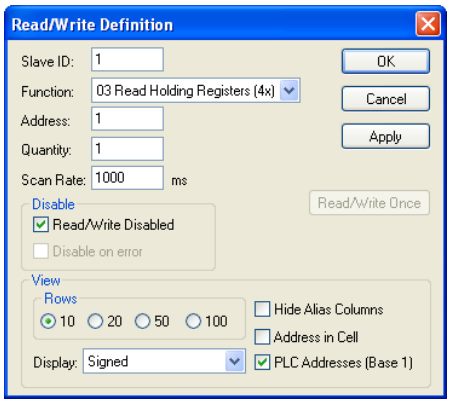
Step 4: Connect to the STRIDE Modbus Gateway using the Modbus Poll simulator software.

Once the software has been obtained from www.modbustools.com and installed according to the directions provided from their website, open up the Modbus Poll software.

Click on the Setup pulldown menu and select Read/Write Definition as shown:



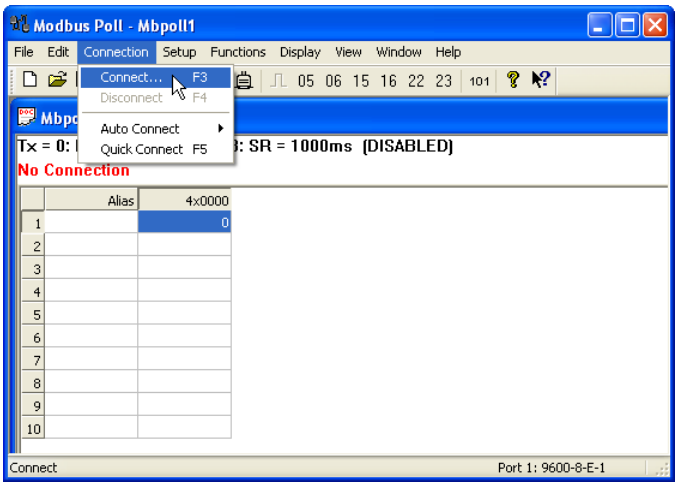
Configure the Read/Write definition for a simple read of the register 400001, which equates to MHR1 (16 bit word, decimal data type) in the BRX MPUs.



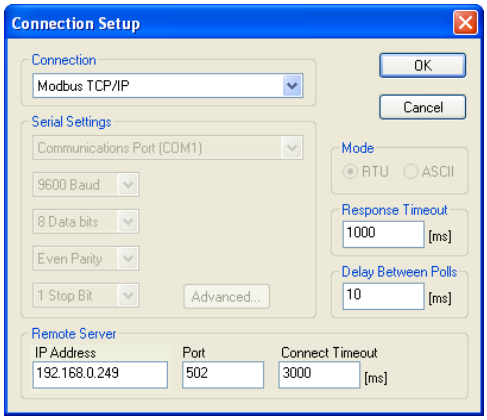
*Enter 1 for the Slave ID. This matches the Unit ID in the protocol that will determine which Modbus Serial slave will be targeted on the serial side of the **STRIDE** Modbus Gateway. Entering 1 here will match up to the Station Number configured above in Do-more! Designer for the BRX MPU.*

Choosing Function 3 sets up the read for 4xxxxx registers. Checking the "PLC Addresses (Base 1)" in the lower right corner matches the addressing to the cross reference chart mentioned above. Once this windows has been configured as shown above, click on OK.

Now click on the Connection pulldown menu and select Connect:

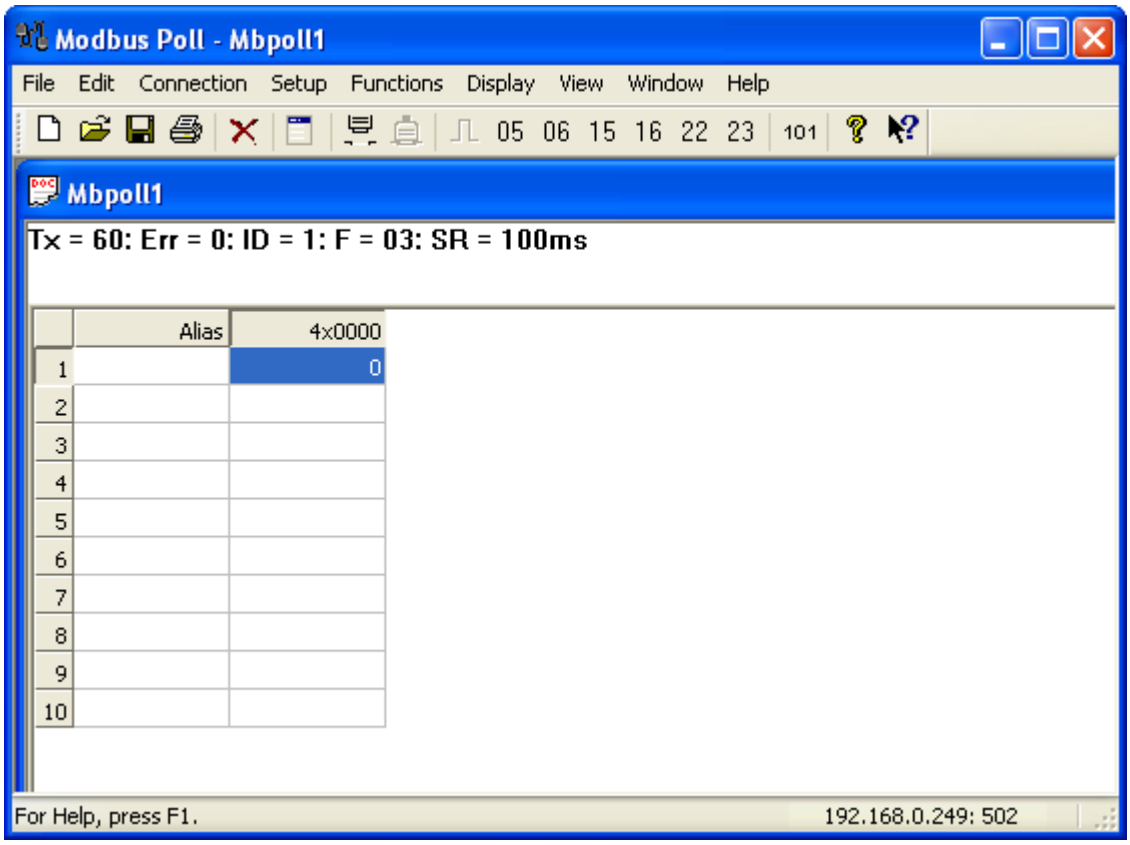


In the Connection Setup window, choose the Modbus TCP/IP connection type. Enter the IP address of your *STRIDE* Modbus Gateway module in the lower left hand corner. Match everything else as shown:



Click on OK to connect to the *STRIDE* Modbus Gateway.

If everything has been configured correctly, the counter next to “TX =” will increment rapidly and the counter next to “Err =” will not increment. If the Error counter is incrementing, go back and verify that all the steps prior to this one have been followed. If you get an error that says, “Modbus TCP connection failed”, verify that the IP address of the PC and the IP address of the *STRIDE* Modbus Gateway are in compatible subnets and can communicate.



Once Modbus Poll is communicating to the PLC, go into Do-more! Designer, open a Data View window and enter MHR1. Change the display type to “Decimal” to match the Modbus Poll

Change the value in data view for MHR1 to various values and watch the value change in Modbus Poll to match.

Example 2:
Using Modbus Poll to *STRIDE* MB Gateway with CLICK Slave

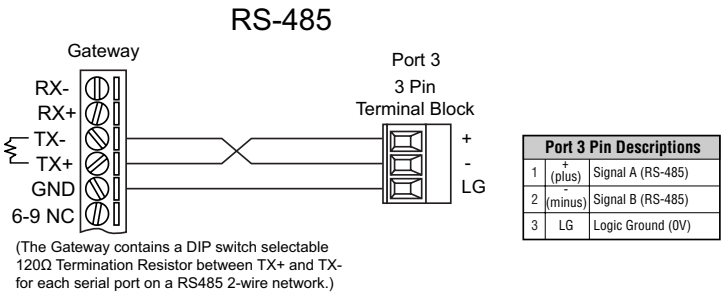
This example will illustrate how to use Modbus Poll, which is a PC based Modbus master simulator tool, to connect through the *STRIDE* Modbus Gateway to a CLICK PLC via 2 wire RS-485.

Items needed for this example:

- *STRIDE Modbus Gateway*
- *CLICK PLC (any C0-01xx-x or C0-02xx-x PLC with 3 pin terminal RS-485 port)*
- *PC with Modbus Poll installed (free demo is available at www.modbustools.com)*
- *Small length of AutomationDirect L-19954 RS-485 cable or equivalent*
- *Ethernet switch and cables to connect from the PC to STRIDE Modbus Gateway*

Step 1: Connect the STRIDE Modbus Gateway serial port to Port 3 of the CLICK PLC.

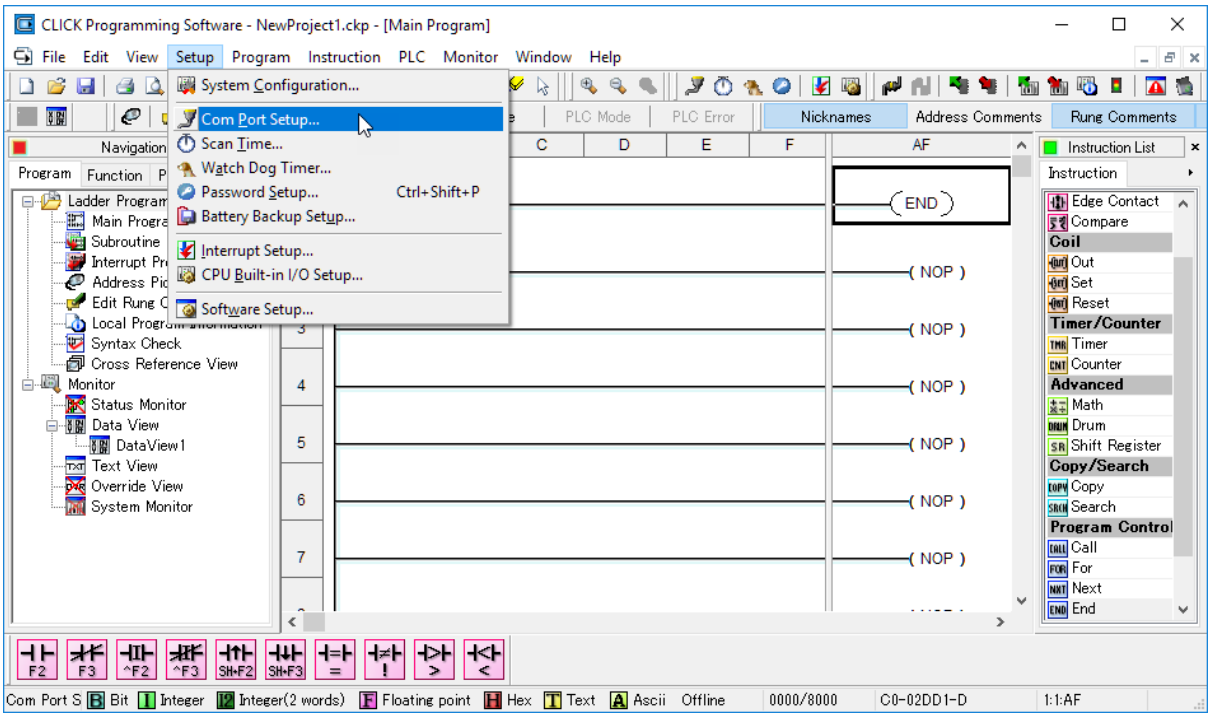
Using the short length of RS-485 cable, connect the *STRIDE* Modbus Gateway to CLICK's Port 3 as shown:



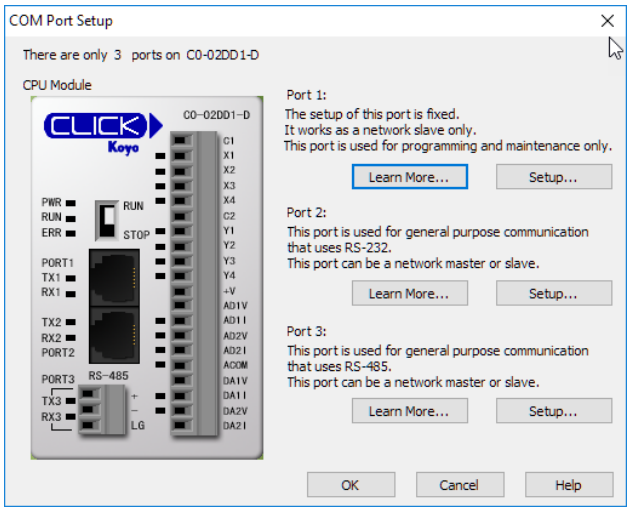
Port 3 Pin Descriptions		
1	+ (plus)	Signal A (RS-485)
2	- (minus)	Signal B (RS-485)
3	LG	Logic Ground (0V)

Step 2: Configure the CLICK serial port.

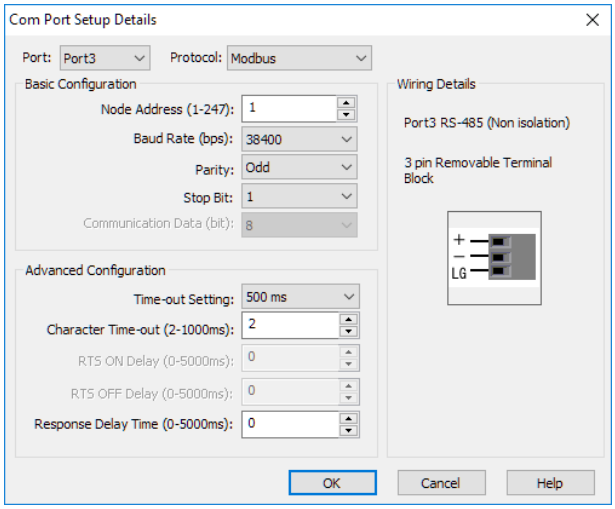
Connect to the CLICK PLC with CLICK programming software. Go to the Setup pulldown and select Com Port Setup... as shown:



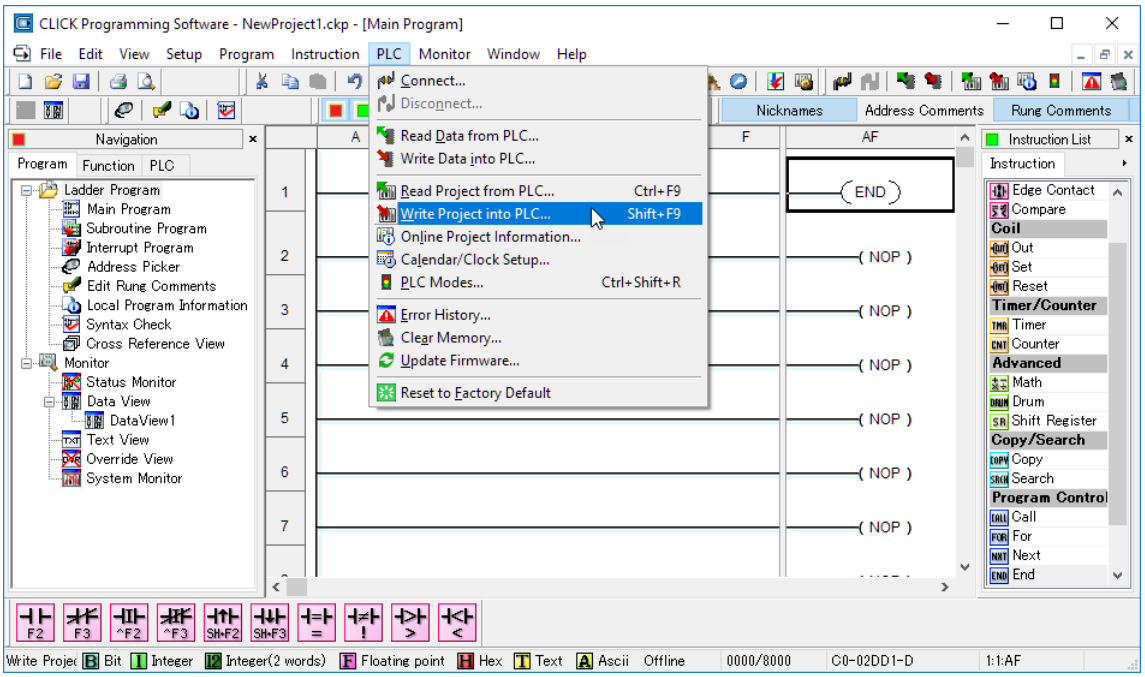
Click the Port 3: Setup... button to configure Port 3 of the PLC.



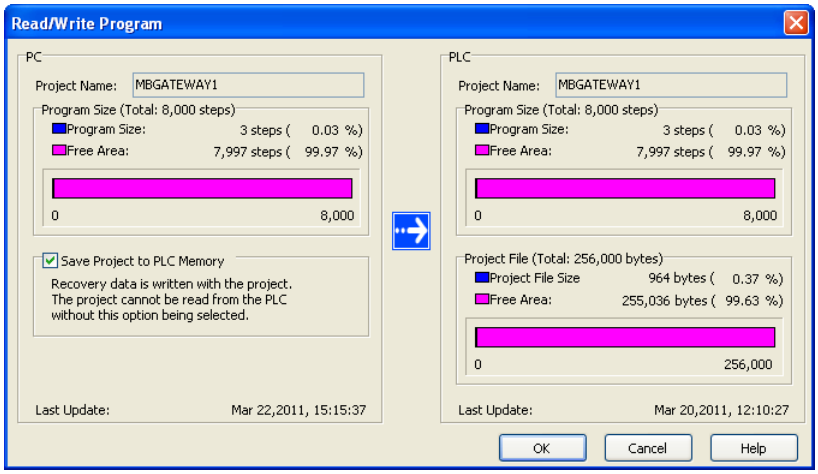
Configure the port for 38400 baud rate, Odd parity, 1 Stop Bit and Node Address 1. Leave the other settings as shown below. Note the Node Address number configured here. Once the settings are configured, Click on the Ok button.



Next, transfer the project to the PLC for the Port 3 settings to take effect. Select the PLC pulldown menu and choose Write Project into PLC...

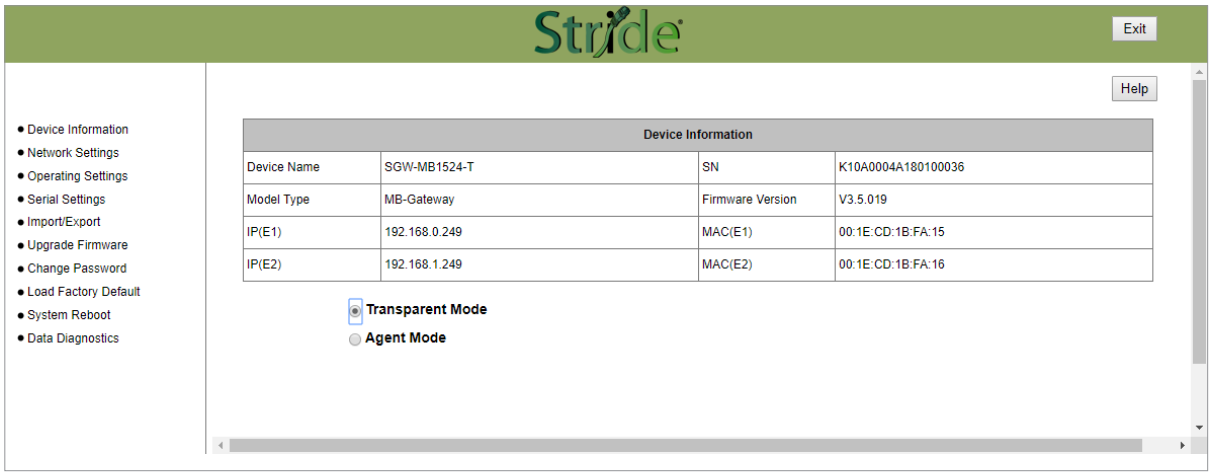


Choose Ok and follow the steps when prompted to transfer the project to the PLC.



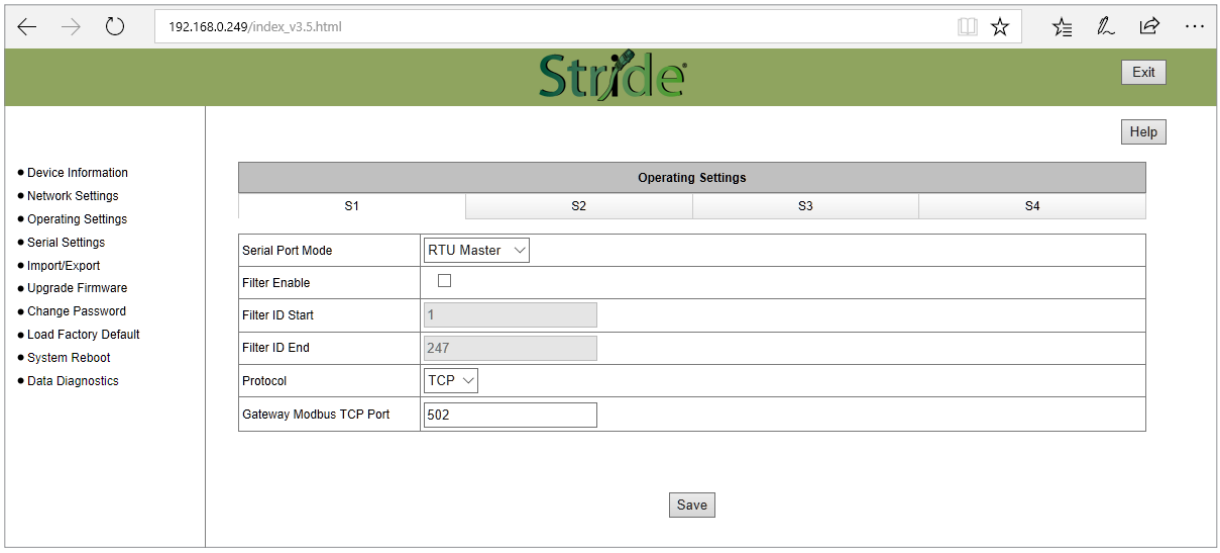
STEP 3: CONFIGURE THE STRIDE MODBUS GATEWAY

Open up a web browser, such as Internet Explorer, enter in the IP address of the *STRIDE* Modbus Gateway, and log into the *STRIDE* Modbus Gateway web console as described in the Initial Connection section of Chapter 2 to access the Device Information as shown:

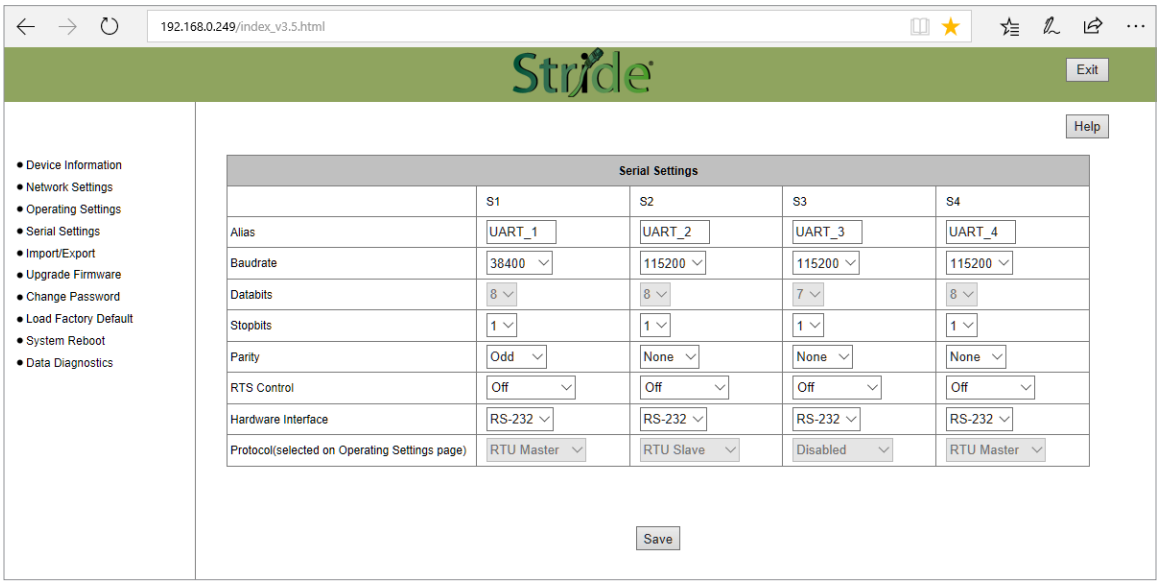


Set the gateway to Transparent Mode.

On the Operating Settings page, set Serial Port 1 to RTU Master mode as shown below and click Save.



Click "Serial Settings" from the navigation menu



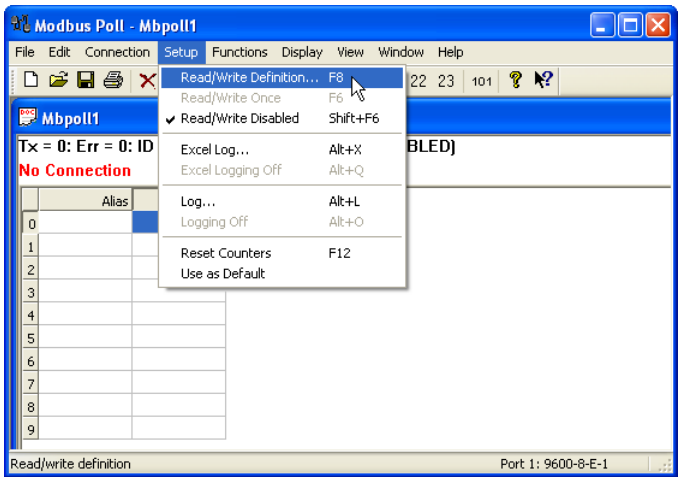
Set the serial port parameters to match the configuration of the CLICK PLC, and set the hardware interface to RS-485 2-wire.

Click "Save" to store and apply the settings.

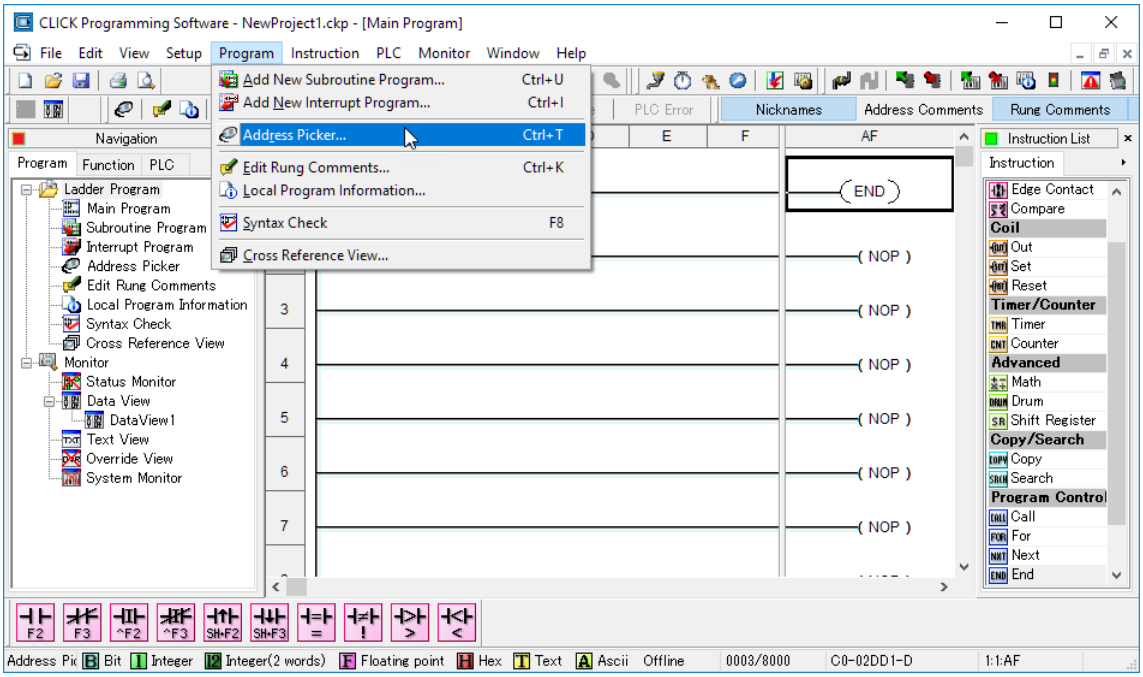
STEP 4: CONNECT TO THE STRIDE MODBUS GATEWAY USING THE MODBUS POLL SIMULATOR SOFTWARE.

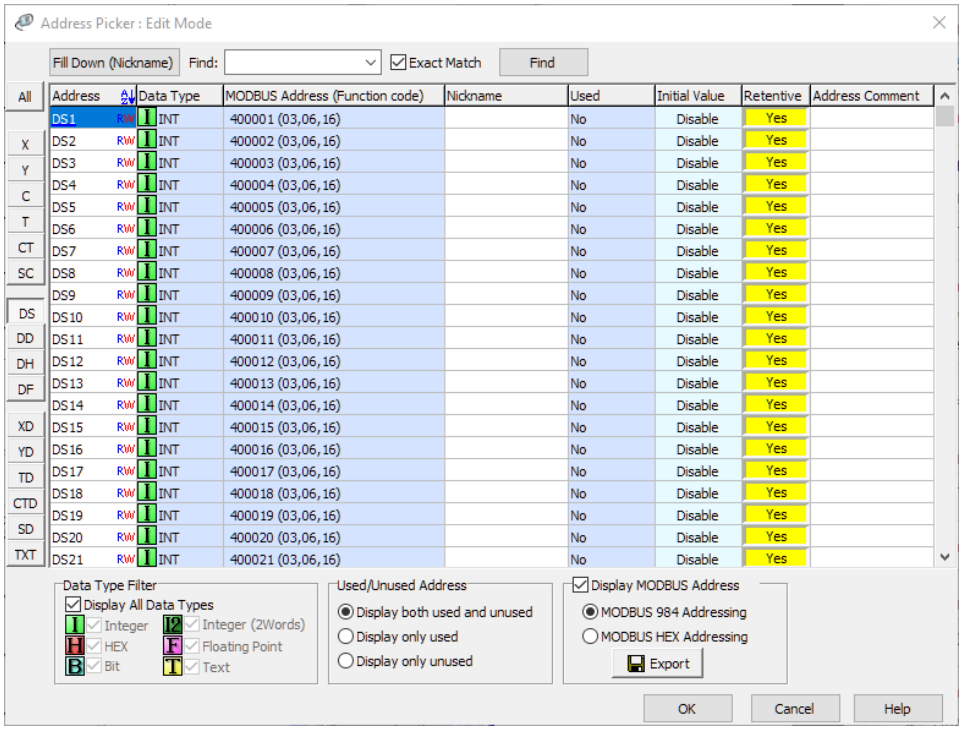
Once the software has been obtained from *www.modbustools.com* and installed according to the directions provided from their website, open up the Modbus Poll software.

Click on the Setup pulldown menu and select Read/Write Definition as shown:



Configure the Read/Write definition for a simple read of the register 400001, which equates to DS1 in the CLICK PLC as shown.

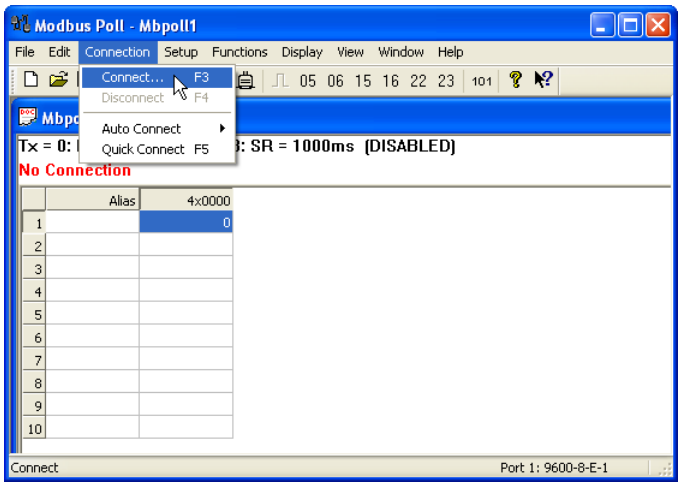




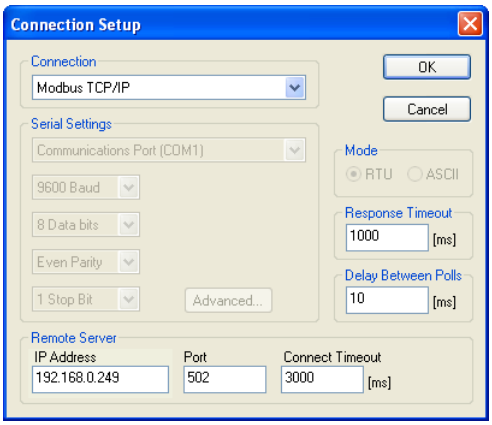
*Enter 1 for the Slave ID. This matches the Unit ID in the protocol that will determine which Modbus Serial slave will be targeted on the serial side of the **Stride** Modbus Gateway. Entering 1 here will match up to the Station Number configured above in the CLICK software.*

Choosing Function 3 sets up the read for 4xxxxx registers. Checking the "PLC Addresses (Base 1)" in the lower right corner matches the addressing to the cross reference chart mentioned above. Once this window has been configured as shown above, click on OK.

Now click on the Connection pulldown menu and select Connect:

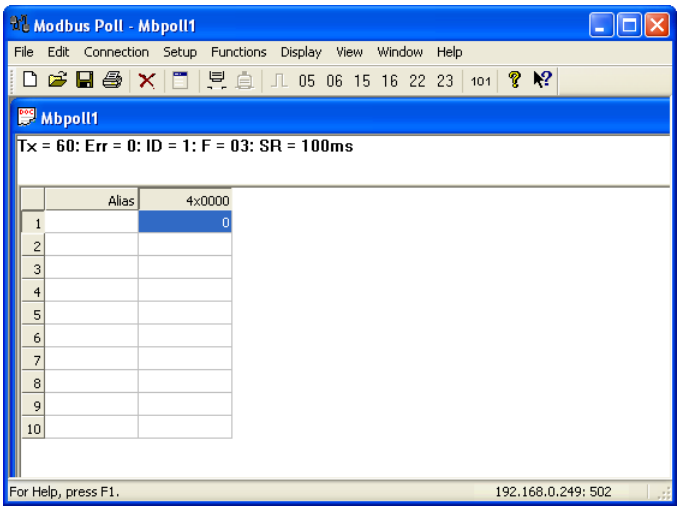


In the Connection Setup window, choose the Modbus TCP/IP connection type. Enter the IP address of your *STRIDE* Modbus Gateway module in the lower left hand corner. Match everything else as shown:

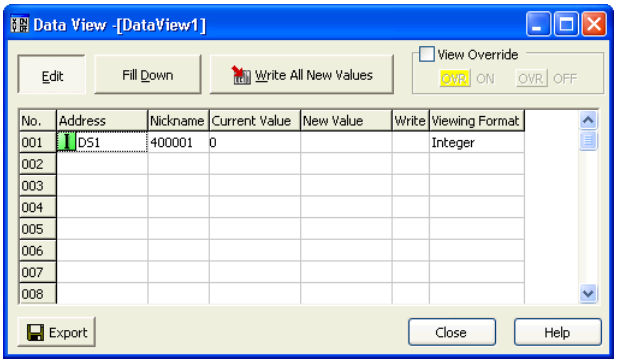


Click on OK to connect to the *STRIDE* MB Gateway.

If everything has been configured correctly, the counter next to "TX =" will increment rapidly and the counter next to "Err =" will not increment. If the Error counter is incrementing, go back and verify that all the steps prior to this one have been followed. If you get an error that says, "Modbus TCP connection failed", verify that the IP address of the PC and the IP address of the *STRIDE* Modbus Gateway are in compatible subnets and can communicate.



Once Modbus Poll is communicating to the PLC, go into the CLICK programming software, open up a Data View window and enter in DS1 as shown.



Change the value in data view for DS1 to various values and watch the value change in Modbus Poll to match.

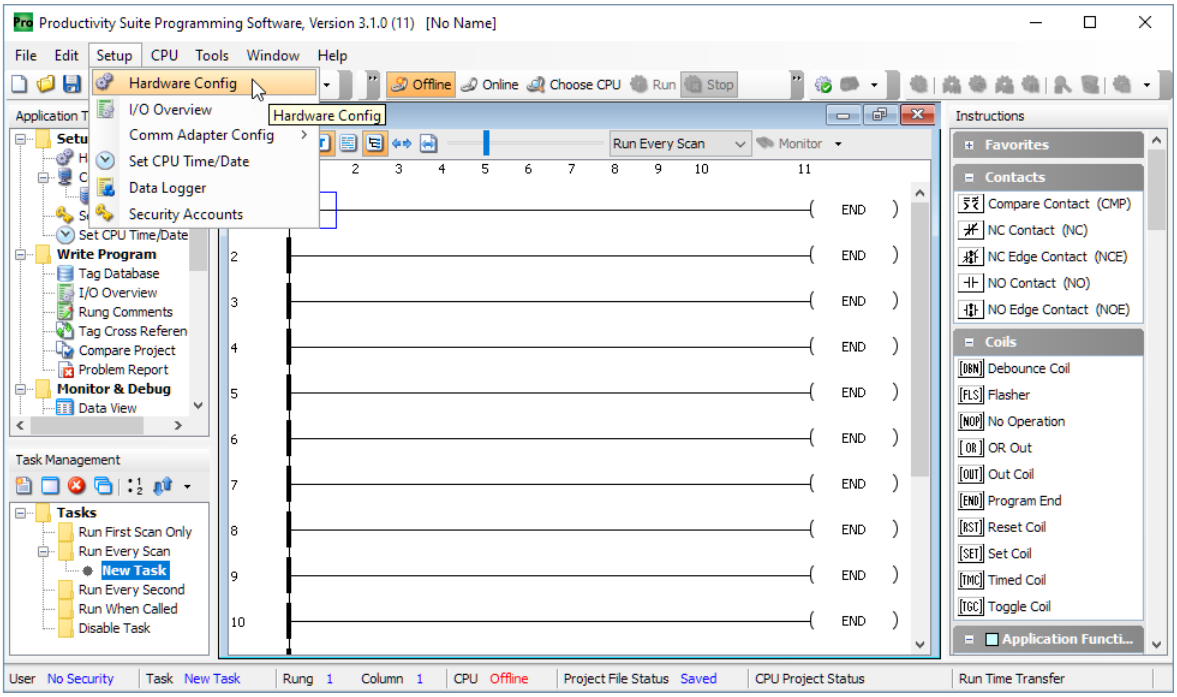
EXAMPLE 3:
USING P3000 AS MASTER (CLIENT) TO *STRIDE* MODBUS GATEWAY WITH CLICK SLAVE.

STEP 1: CONNECT CLICK TO THE STRIDE MODBUS GATEWAY AS SHOWN IN EXAMPLE 2.

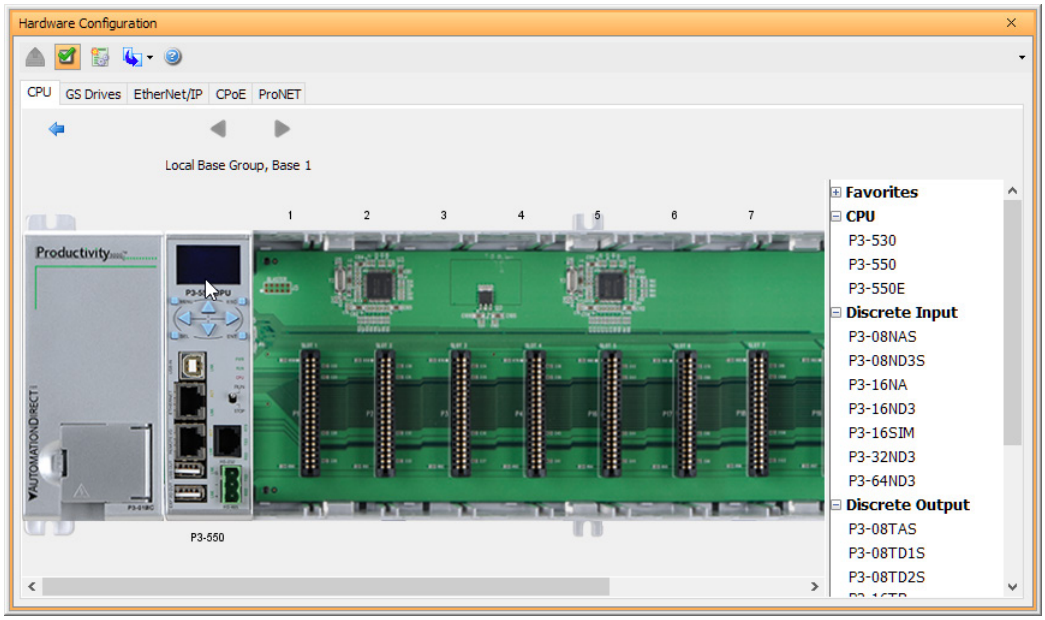
STEP 2: CONNECT P3000 CPU (P3-550) TO STRIDE MODBUS GATEWAY VIA ETHERNET SWITCH AND TWO ETHERNET CABLES.

Configure the IP address of the P3000 or P3-550 CPU and the *STRIDE* Modbus Gateway to be compatible subnets. Steps to configure the IP address of the P3-550 CPU areas follows:

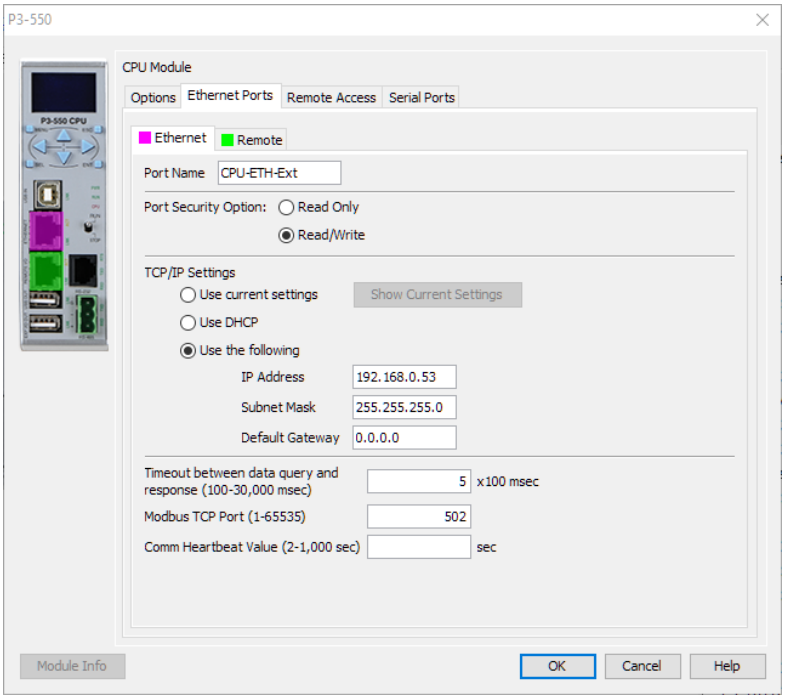
Click on Setup on the top menu bar and choose “Hardware Configuration”.



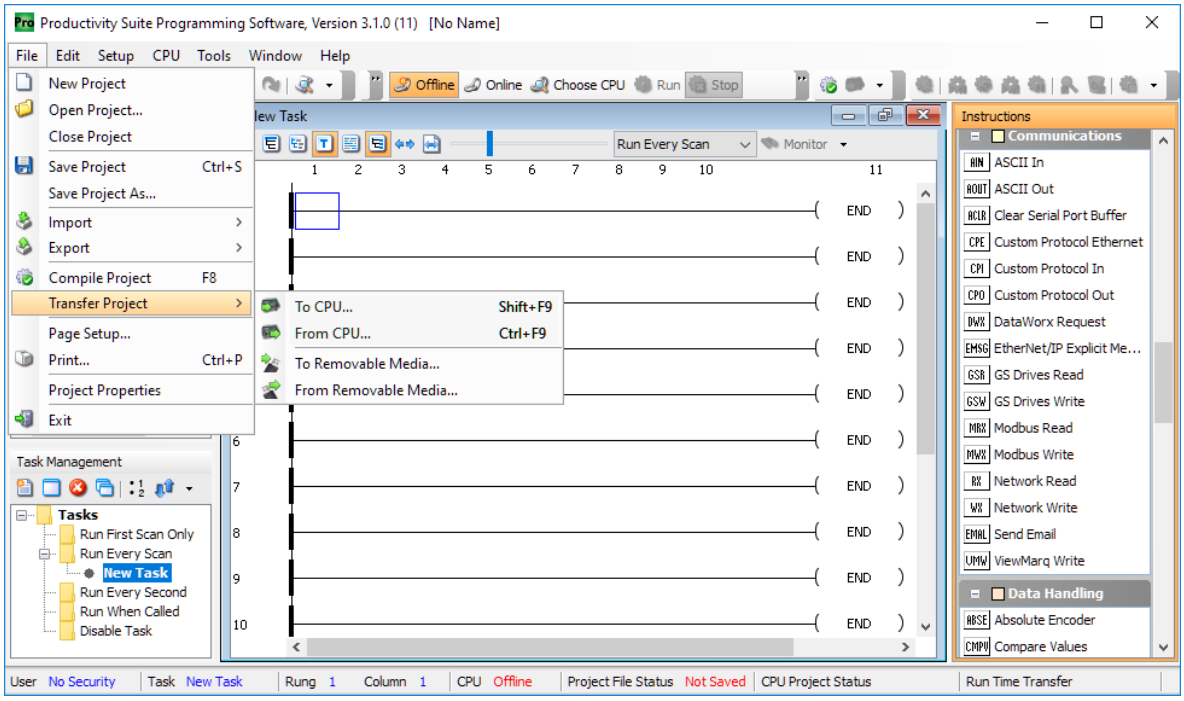
Double click on the image of the P3-550 in the center of the hardware configuration.



Click on the “Ethernet Ports” tab and configure the IP address in the “Use the Following:” IP address field. Once the correct IP address and Subnet Mask is entered, click on the OK button and close the hardware configuration window.

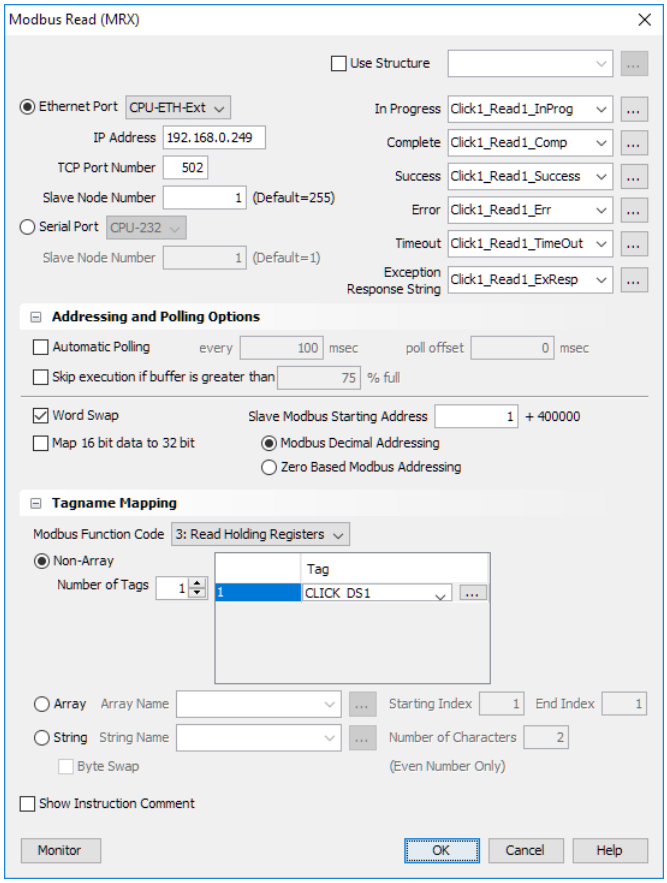


Transfer the project to the PLC in order to have the new settings take effect. To do this, select File from the pulldown menu and then Transfer Project >To PLC…



STEP 3: CONFIGURE THE MRX INSTRUCTION TO READ DATA FROM THE STRIDE MODBUS GATEWAY.

Double click on the instruction MRX Read to configure the MRX instruction as shown.



IP Address: address of the *STRIDE* Modbus Gateway.

TCP Port Number: Leave at default 502.

Slave Node Number: This should match the Node address of Port 3 of the CLICK PLC. Leave at 1 in this case.

Slave Modbus Starting Address: Set to 1 to read address DS1 in the CLICK PLC.

Tag Name Mapping: Create a Tag called CLICK_DS1 as an Signed Int 16 Tag to read in DS1 from the CLICK PLC.

Use the status bits and Exception Response String to verify whether communications were successful or not. If the Error bit comes on, look at the Exception Response String to see which error occurred. If the Timeout Bit comes on, check the IP address settings of the P3-550 and the *STRIDE* Modbus Gateway and make sure that they are in compatible subnets.

If the Successful Status bit comes on, add the CLICK_DS1 tag to the Data View at the bottom of the Productivity Suite Programming Software and check the values. Change the values in the CLICK data view for DS1 and verify that the CLICK_DS1 tag matches.