

Modbus: Remote Lab instructions

Modbus Serial RTU

V7

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Instructions

Basics

Getting Started

- Logon to Electromeet (Follow the New_Remote_Lab_Instructions document)
- The Modbus software **MB Poll** and **MB Slave** is installed on various labs.

Hardware:

Normally we would run the Modbus simulation software (client and server a.k.a. master and slave) on two separate computers, via a null modem cable. However, in this case we are running them both on one machine, via a virtual null modem .

Software used:

- Modbus Poll v8.0.0
- Modbus Slave v7.0.0
- TAL Virtual Null Modem(taltech.com)
- All the above is installed on the Remote Lab computers

Modbus Serial

You can complete this practical assignment by logging into the Electromeet Remote Lab computer as per above.

You do not need any specialised hardware of your own, as was the case in the past. There is a virtual null modem running which creates two linked virtual serial ports .

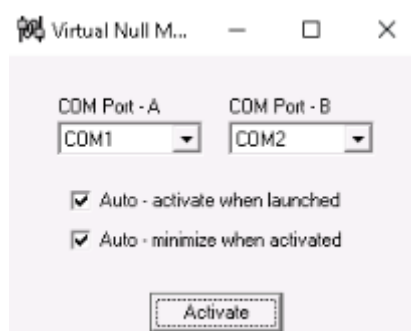
We will be using COM1 and COM2

Open TAL Virtual Null Modem by clicking on the icon (on desktop or taskbar)



Use the default settings for COM1 on COM Port - A and COM2 on COM Port - B
Then Tick the two Boxes:

“Auto-activate when launched” and “Auto-minimize when activated”

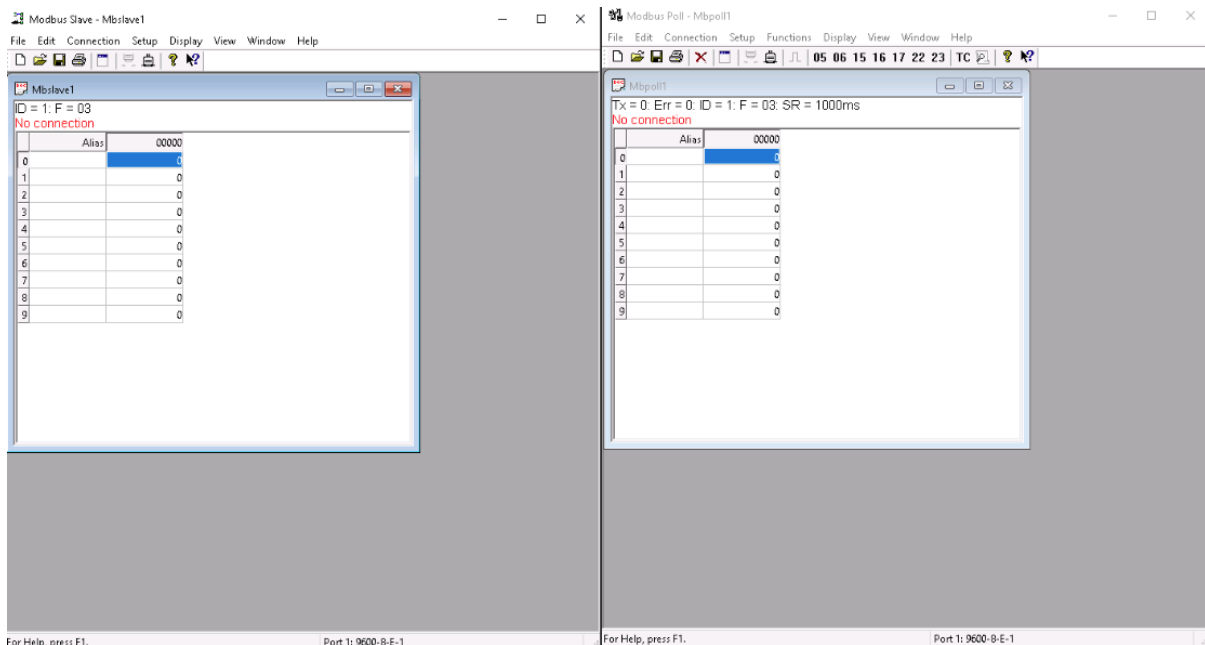


Now click the “Activate” button and the window will be minimized to taskbar.

Now run both the MODBUS Master (ModbusPoll) and the Modbus Slave (ModbusSlave) by clicking on the desktop icons.



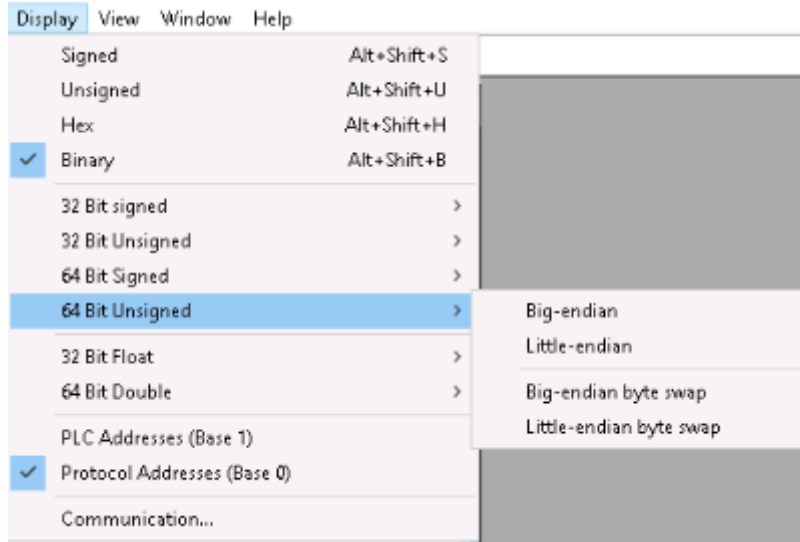
The easiest approach is to run them side-by-side, adjusting them to fit in next to each other like this:



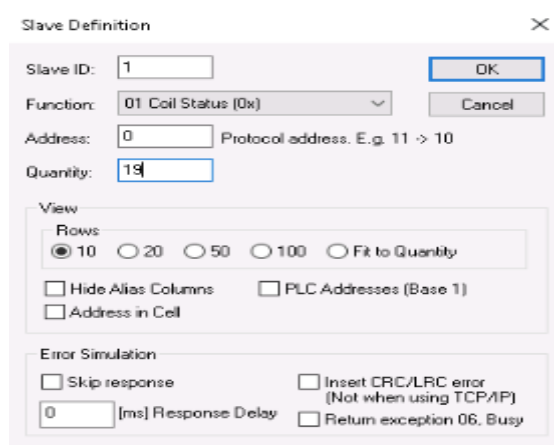
Let's start with the Slave.

First we are going to configure the way in which the information is displayed, viz. (a) binary (all 1's and 0's) and (b) Base 0 i.e. protocol address notation, starting from 0 (as opposed to PLC addresses, starting from 1).

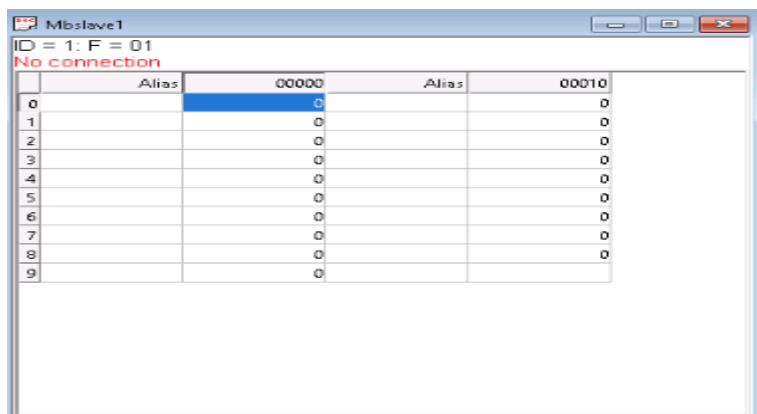
Click *Display* and select *Binary*, then click *Display* again and select *Protocol Addresses (Base 0)*. You will end up with something like this:



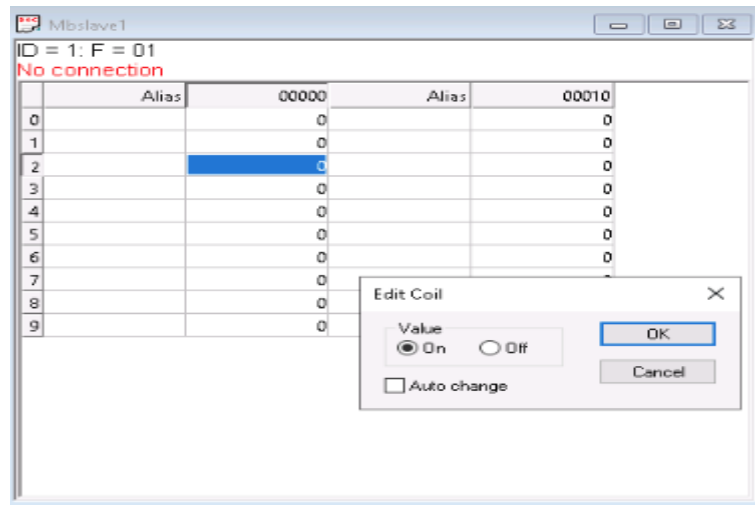
Now hit F2 or click *Setup-> Slave definition*. Set the slave up as follows.



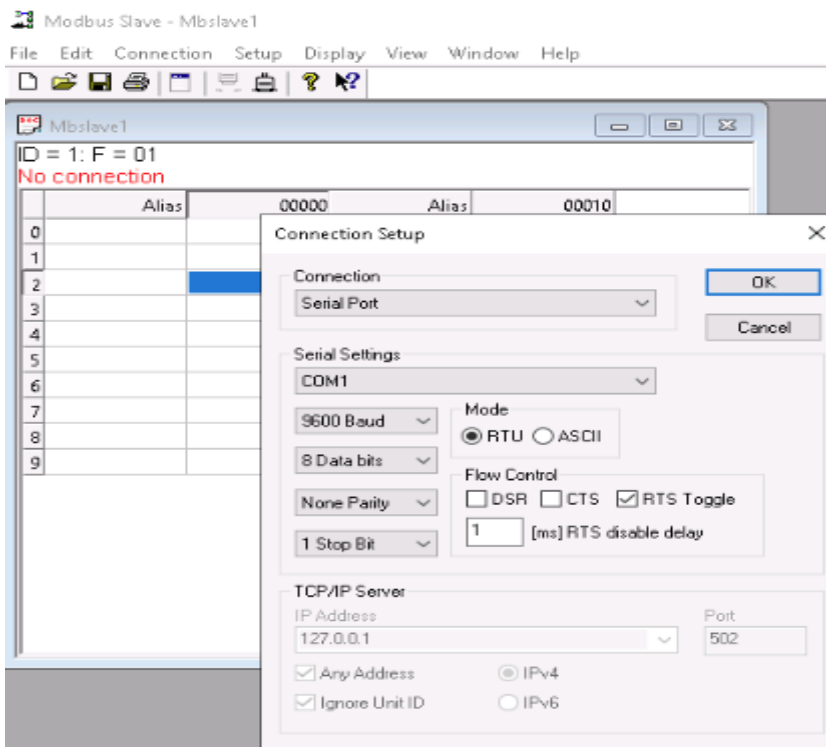
The slave address in this case is 1. Function Code (FC) = 01 (Coil status). Address = 0 refers to the logical address of the first coil, and Quantity = 19 means that there are 19 consecutive coils (numbered 0 thru 18). This is just an arbitrary number in our case.



To edit any coil, just double-click on it and toggle the radio buttons on Edit Coil between on and off. You can do this once the simulation is running.



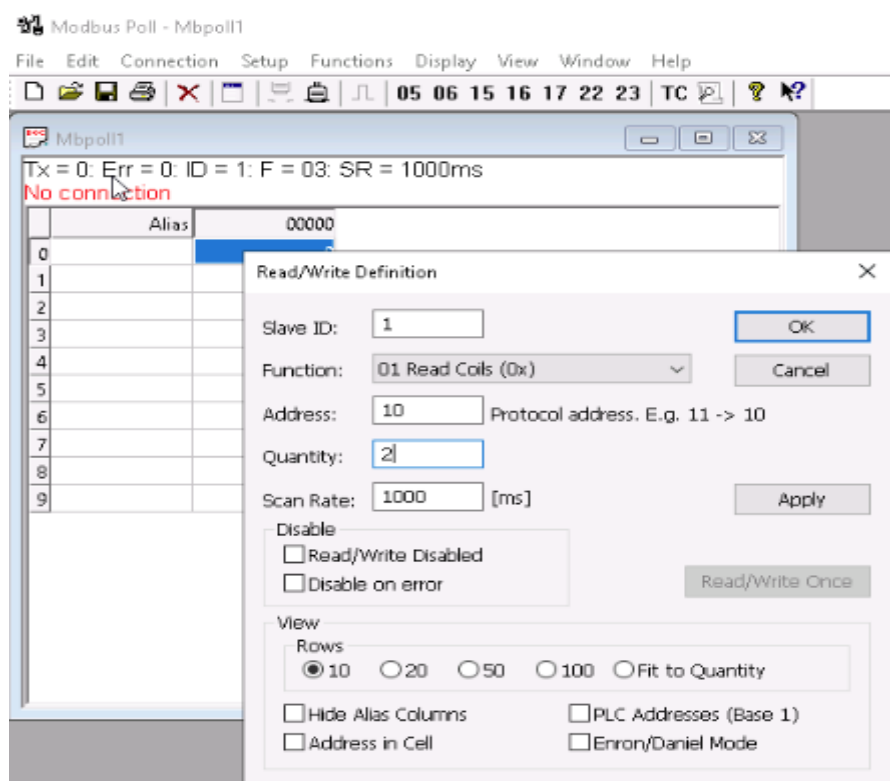
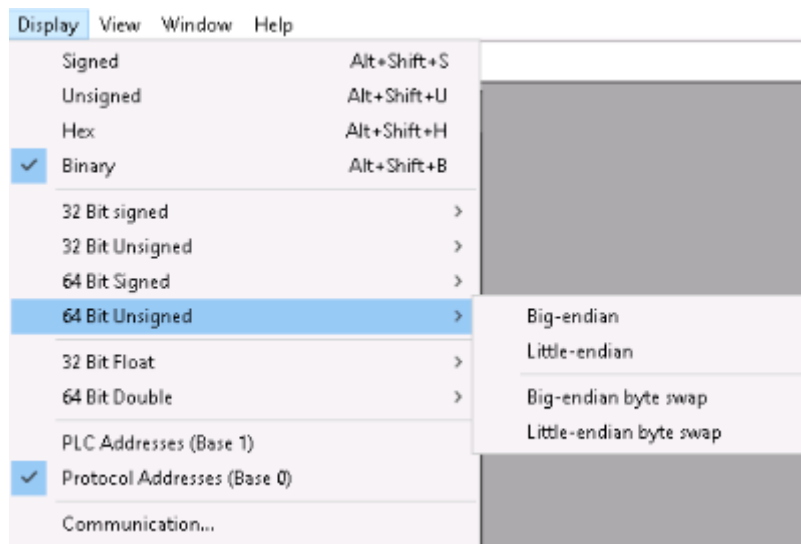
Click *Connection->Connect* and set up the serial communications parameters as shown using the VSPE Connector COM port – COM 1 for default configuration. Ensure that RTU mode is selected. Then click OK.



Check the port settings carefully, as the Master side settings have to match. The configuration here is COM1 9600,8,N,1.

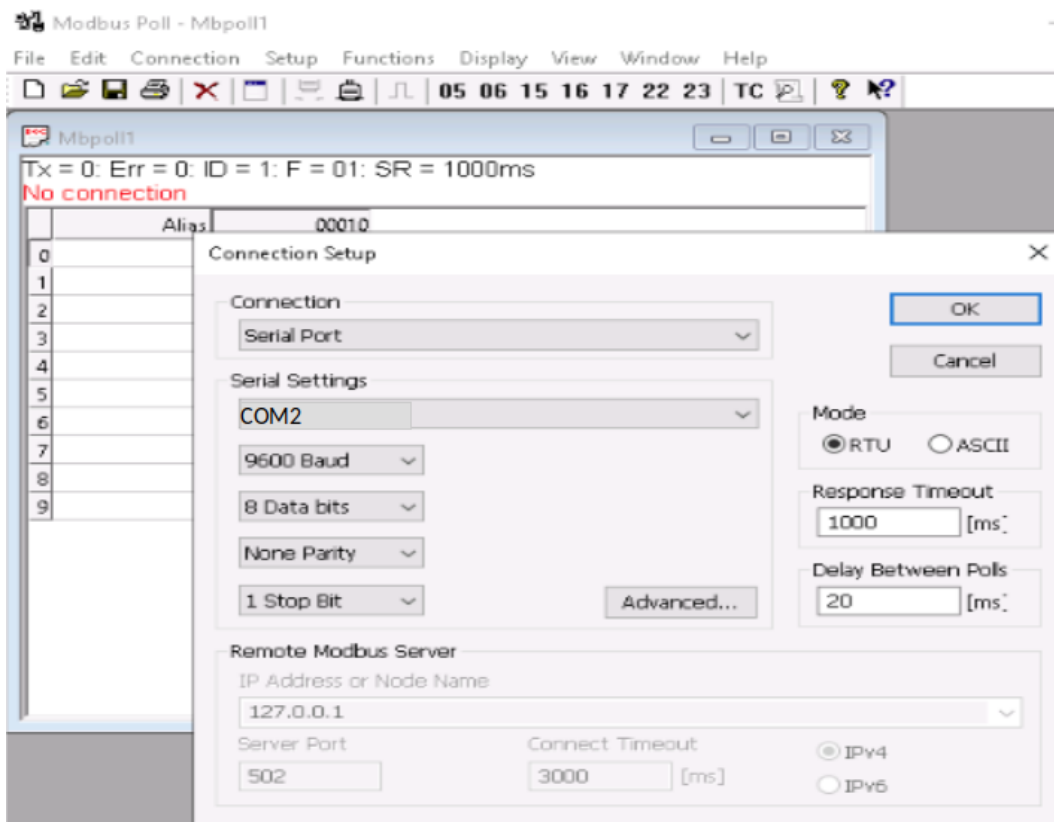
Now let's turn our attention to the Master side.

Click *Display* and set it up as follows (the same as for the Slave).



In the poll definition above, coils 10 and 11 (starting with 10, total =2) on slave 1 will be read once every second. Click *OK*.

Hit F3 or click *Connection->Connect*. Select COM 2 by default ensuring that the settings are the same as for the Slave. COM2 : 9600,8,N,1. Also ensure that RTU mode is selected.



If all goes according to plan, connection will be established.

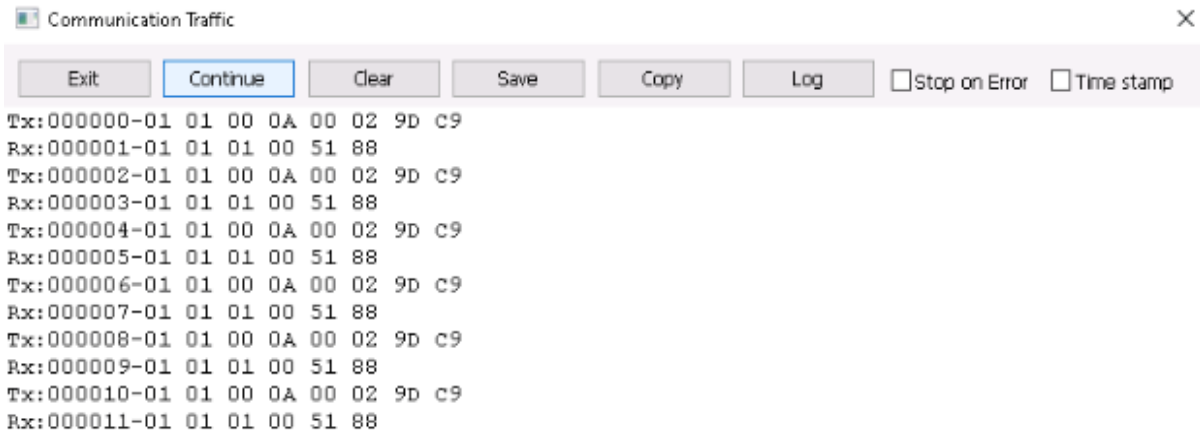
If a red 'timeout' message appears on either side, do the following.

- Click *Disconnect* on both sides
- Check that the communications parameters are the same for both sides
- Reconnect on both sides

If a red 'illegal' message appears on either side, do the following.

- Click *Disconnect* on both sides
- Check if the poll definitions match (slave addresses and function codes)
- Check that the coils read by the Poll program are a SUBSET of the coils defined by the Slave program, and not the other way around
- Reconnect on both sides

Click *Display->communications* and observe the traffic between master and slave. Remember that it is as seen from the master's perspective, the display on the slave will be the other way around i.e. Tx on the master will be Rx on the slave.



Tx refers to the Modbus request, because we are looking at the Master here. 0x means Hex.

- Slave = 0x01 (i.e. 1 decimal)
- Function code = 0x01 (1 = Read coil status)
- Initial coil address = 0x000A (i.e. decimal 10 protocol or decimal 11 PLC)
- Number of coils = 0x0002
- CRC = 0x9DC9

Rx refers to the Modbus Rx response:

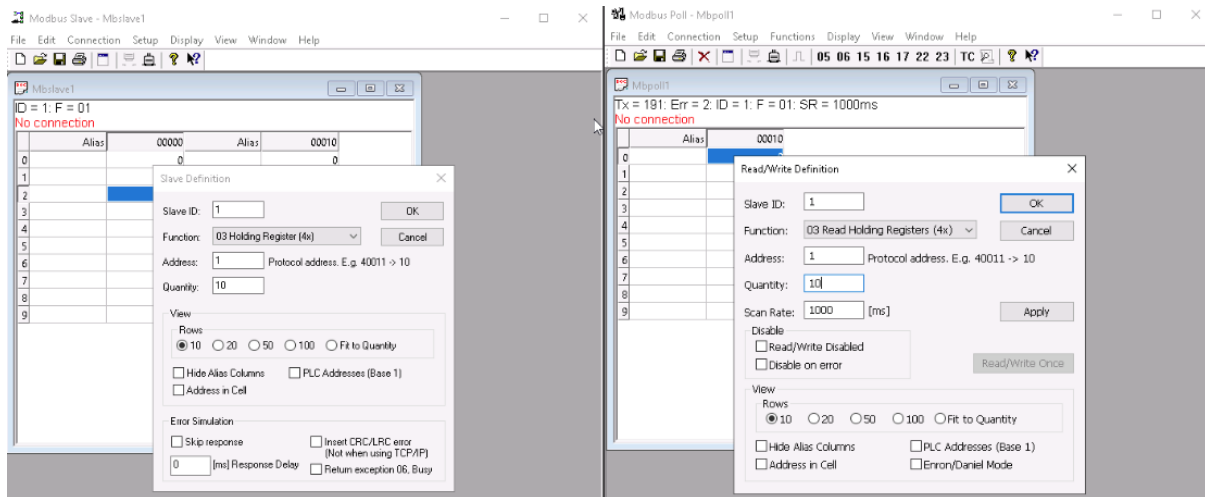
- Slave = 0x01
- Function = 0x01
- Byte count = 0x01
- Coil status = 0x00 = 00000000 (both coils cleared) You might have to reinitialise or plug in the modems just to make sure it is running.
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- CRC = 0x5188

When you have finished lab make sure you close ALL Modbus windows. Click on TAL icon in TaskBar and then click "Deactivate" before closing the window and logging off the Remote Lab.

Modbus TCP

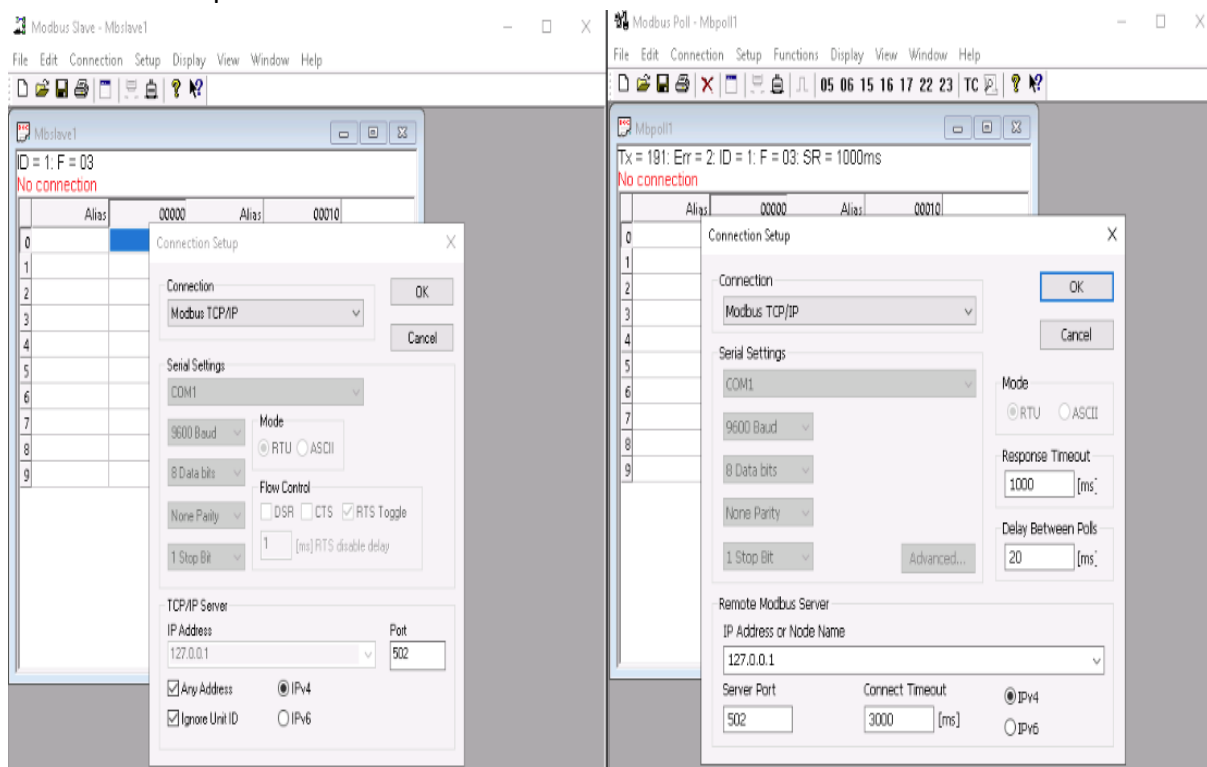
Although not required for this Lab, if you do wish to play with MODBUS over TCP/IP, you can do a loopback by writing and reading from **IP address 127.0.0.1 Port 502** (which is your PC's default local loopback IP address) with both ModbusPOLL and ModbusSLAVE.

The purpose of this document is to introduce you to the Modbus/TCP concept. You may, however, be asked in your assignments to use other registers, etc. Also take care to use the IP address in bold (above) and not the one in the screenshots below. The following shows setup for FunctionCode 03 - Holding Registers.

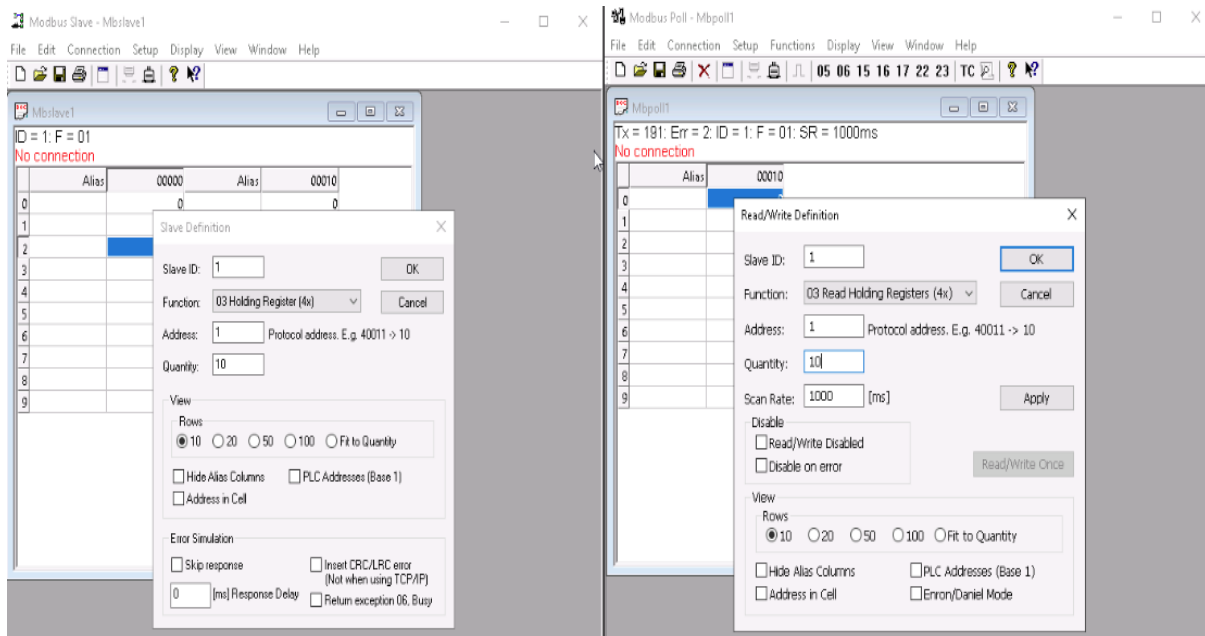


Run the Modbus Poll and Modbus Slave from the desktop icons as shown above for for serial

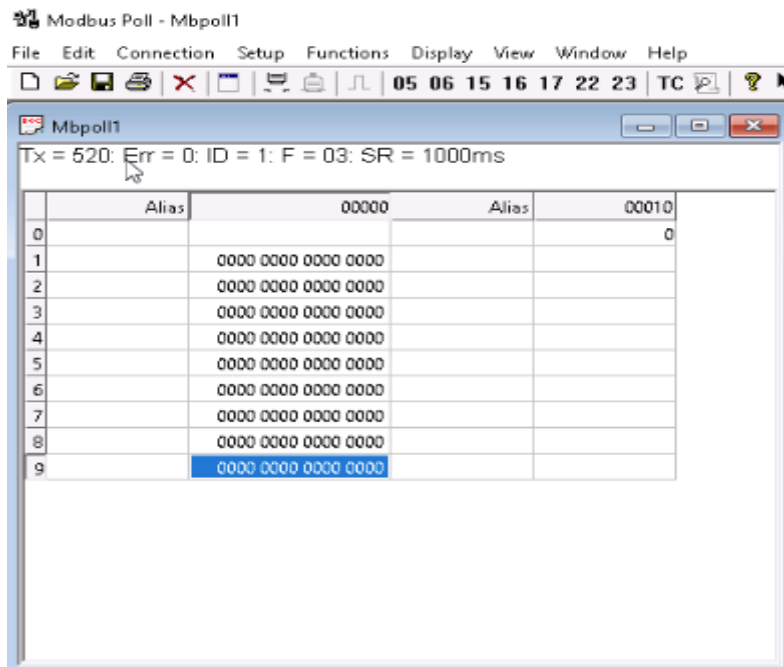
Setup the Modbus TCP connection on both Master and Slave as shown below. Note the Master uses loopback IP address of Slave : 127.0.0.1.

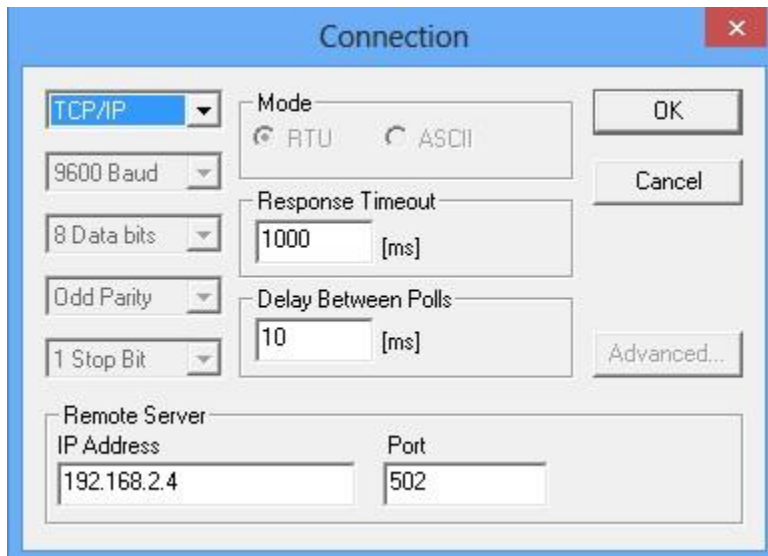


Set the Register ranges for both Master and Slave as follows and Click *OK* on both. This time we will be using FC03.



In the poll definition above, holding registers 0 thru 9 inclusive (protocol) i.e. 40001 thru 40010 will be read once every second. Click *OK*.





If all goes according to plan, connection will be established. If a red 'timeout' message appears on either side, do the following.

- Click *Disconnect*
- Check the IP address and port number
- Reconnect

If it still does not work, click *Display->Communication* and check if you are at least getting messages sent (Tx). If this is the case, the Slave is not responding. Check Modbus Slave sett 192.168.1.30

Let's proceed.

Click *Display->communications* and observe the traffic between master and slave. Remember that it is as seen from the master's perspective.

