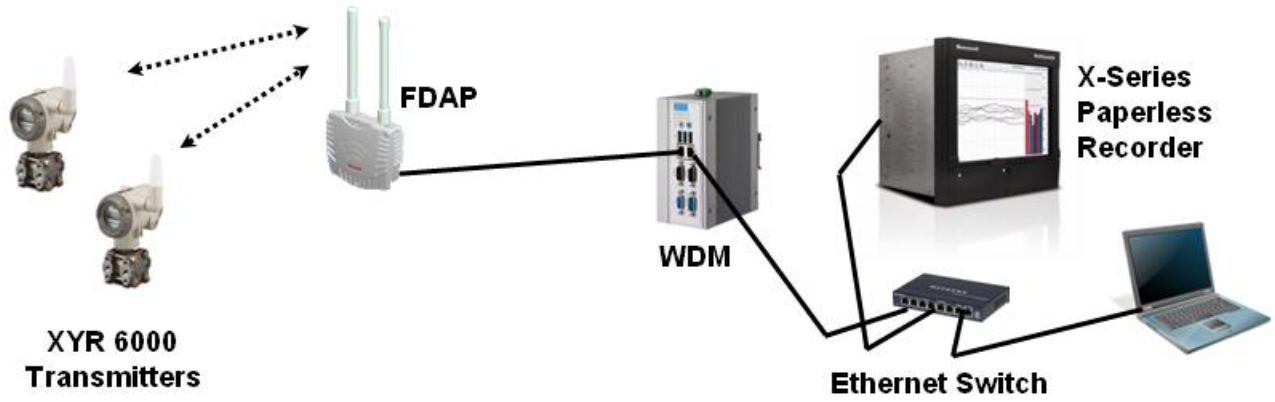
X-Series Recorder Application Note
OneWireless R200 Modbus Interface

43-TV-07-21, January 2012

The Honeywell X-Series paperless recorders are the perfect complement to a Honeywell OneWireless R200 system for performing trending and logging of process data parameters. The Multitrend SX Electronic Data Recorder used in this application, provides users the ability to capture continuous and batch data electronically, making the analysis of the data easier and faster. The data is recorded in a secure digital format, and is easily exported to a spreadsheet program like Excel for further analysis. The paperless solution also provides a graphical display, which adds to the capability of quickly understanding what is happening in the process.

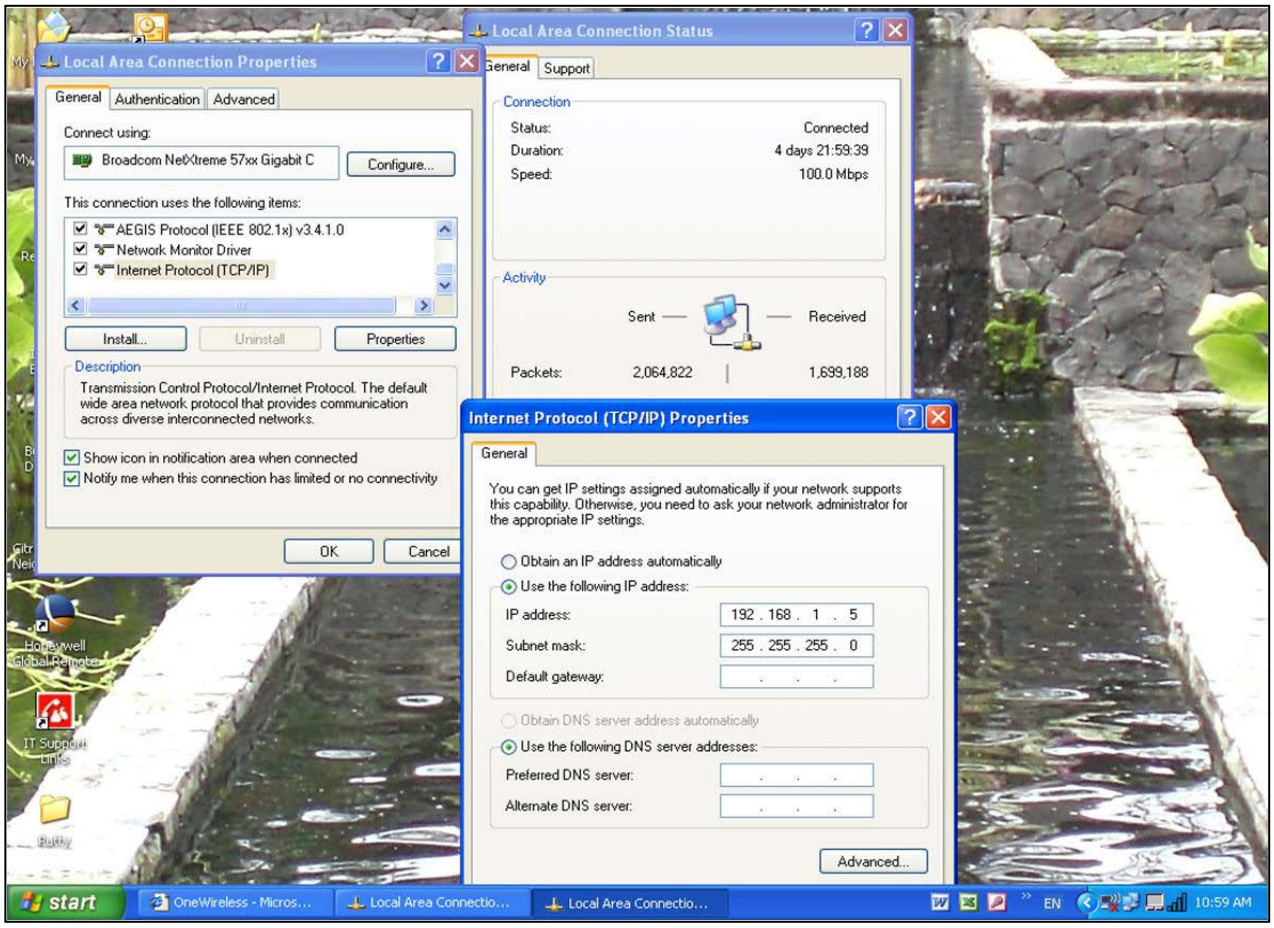
The OneWireless R200 network supports Modbus applications, where the Wireless Device Manager (WDM) functions as the Modbus server (Modbus TCP or Modbus RTU) and allows clients to access measurement, status and diagnostics data from wireless field devices that are networked to the WDM.

In this application, the X-Series Multitrend SX paperless recorder serves as a Modbus Master and is connected to the WDM Process Control Network (PCN) via an Ethernet Switch, using the Modbus TCP protocol for communications with the WDM. A PC is also connected to the PCN Ethernet Switch and is used to configure communications settings for the WDM. Details on how to do this are provided below.



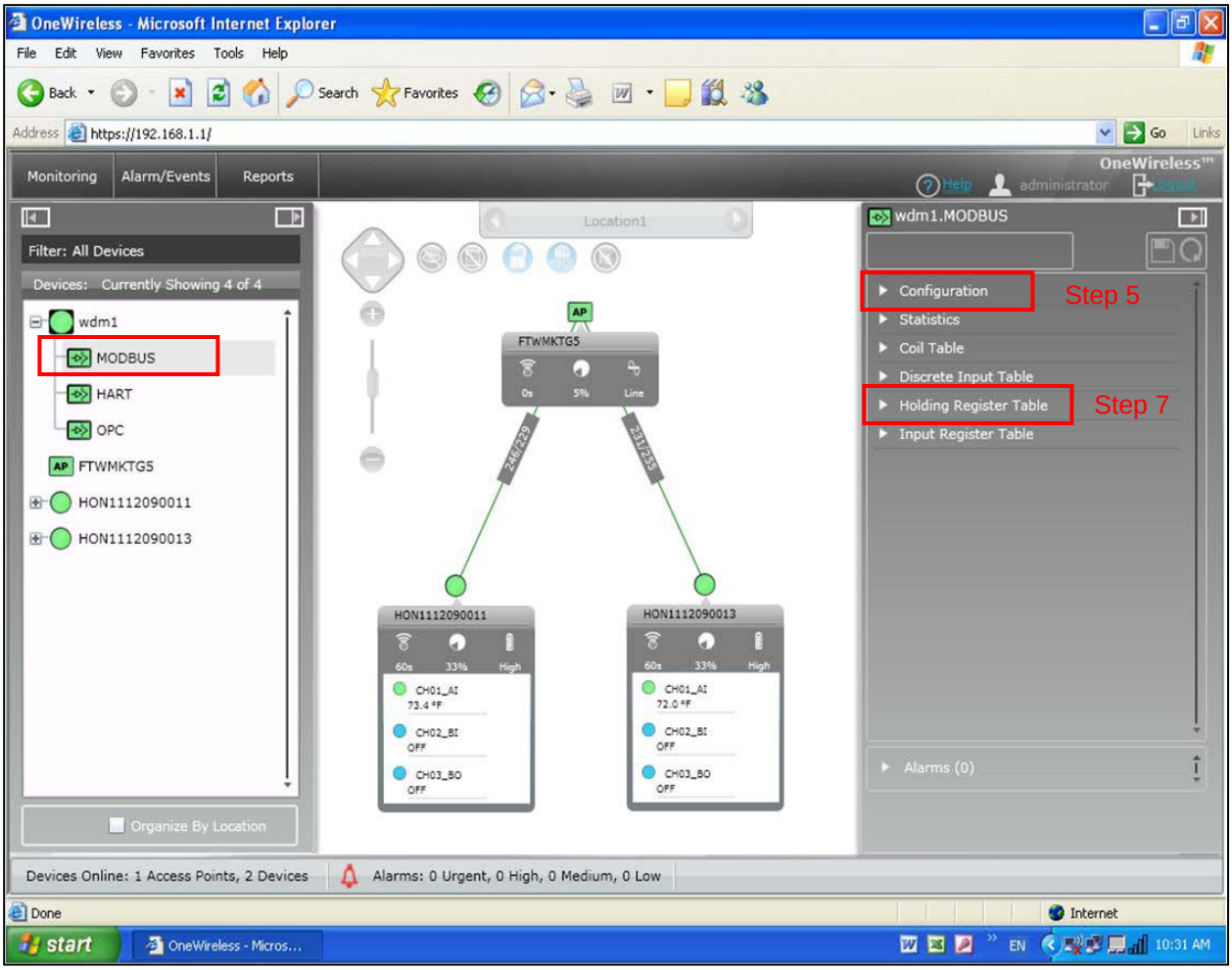
WDM and Modbus Communications Configuration

1. Connect the PC to the WDM PCN via an Ethernet Switch and configure your PC's local area network settings IP address to: **192.168.1.5**



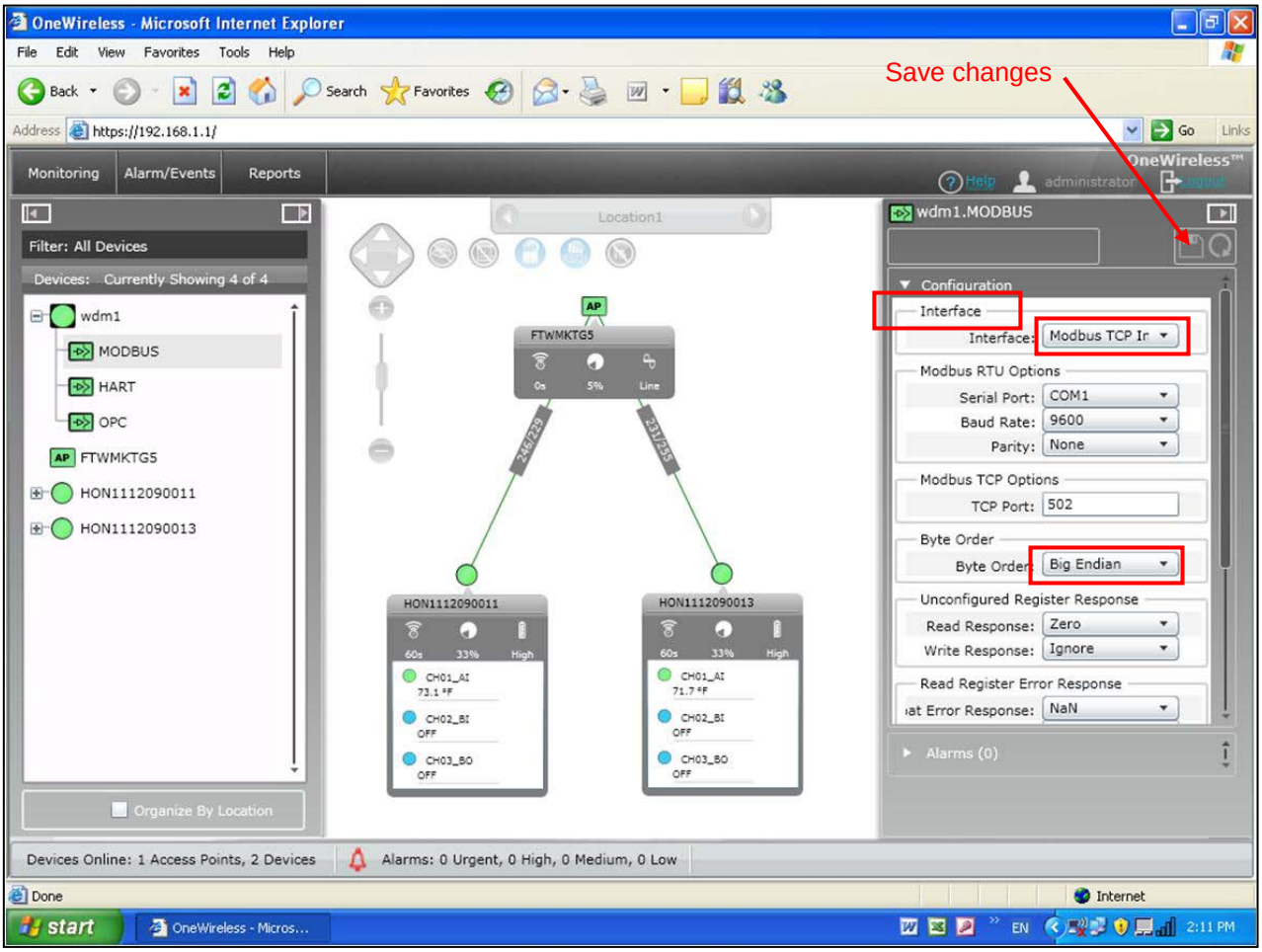
2. Open the Web browser on the PC and type the URL for the WDM in the address bar.
   Note: default address is **https://192.168.1.1**
3. Type the **User ID** and **Password**, and then click **Login**.
   Note: default User ID: **administrator**
   default Password: **password**

4. On the Selection Panel, expand the WDM icon and select **Modbus**.



5. Open the Property Panel on the right hand side and expand **Configuration**.

6. Under **Interface**, select **Modbus TCP Interface** and set the **Modbus TCP Options TCP Port** to match the paperless recorder port setting (default typically at 502). **Byte Order** should be specified as **Big Endian**. Save changes by clicking on the **Apply Changed Values** icon at the top of the Property Panel.



7. Close **Configuration** and open **Holding Register Table**. These registers are used to configure data from inputs of the field devices and diagnostic status.

   For this example, channel 1 temperature PV values and battery voltage levels from two individual transmitters will be assigned to registers 2 thru 8:

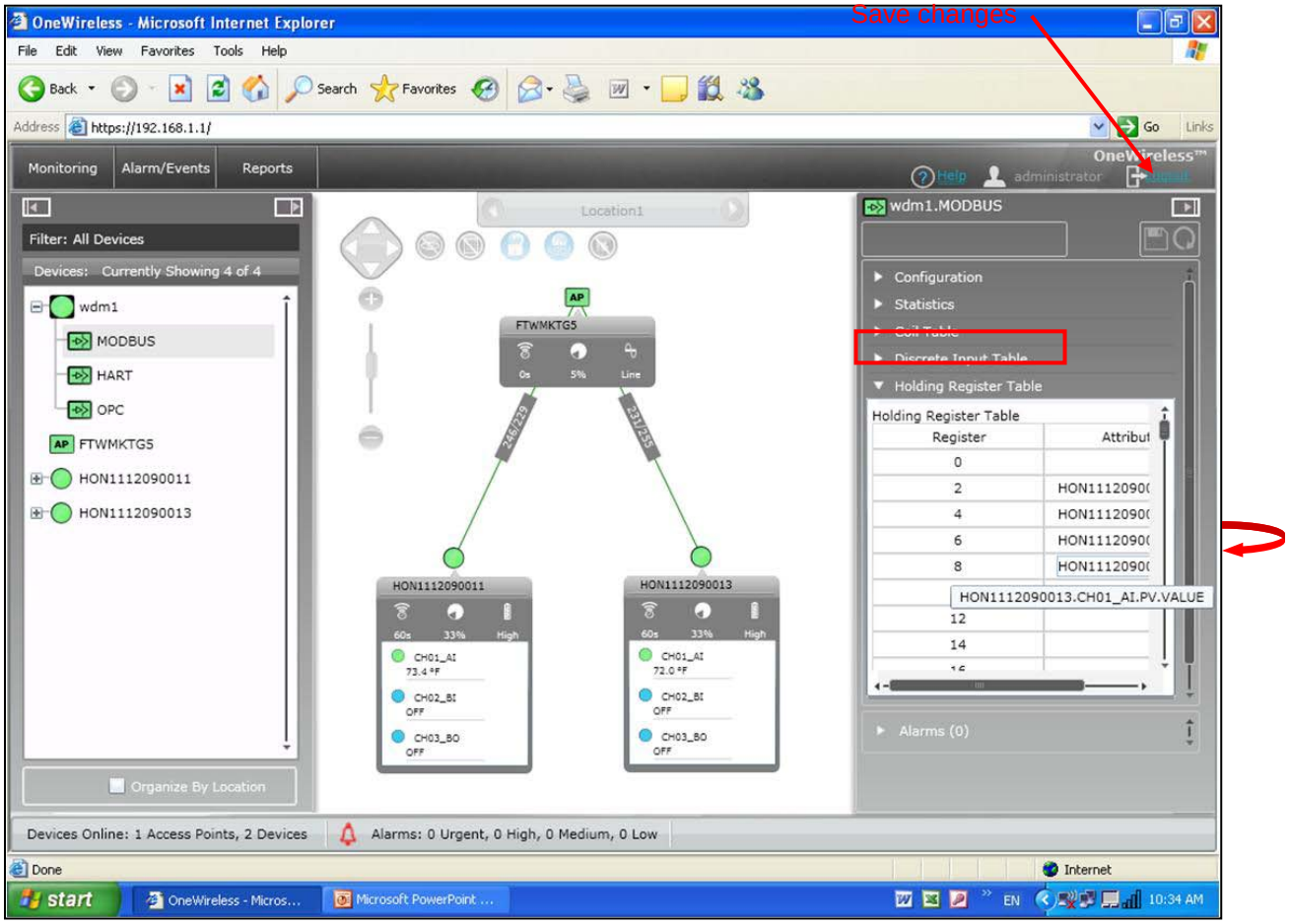
   - ► Register 2 will hold transmitter tag HON1112090011 battery voltage value.
   - ► Register 4 will hold transmitter tag HON1112090011 channel 1 PV value.
   - ► Register 6 will hold transmitter tag HON1112090013 battery voltage value.
   - ► Register 8 will hold transmitter tag HON1112090013 channel 1 PV value.

   Enter the following text into the **Holding Register Attribute** table:

   Register 2: **HON1112090011.V_POWER**
   Register 4: **HON1112090011.CH01_AI.PV.VALUE**
   Register 6: **HON1112090013.V_POWER**
   Register 8: **HON1112090013.CH01_AI.PV.VALUE**

   Note: Transmitter parameters are defined to registers with respective device tag names and channel names

8. Save changes by clicking on the **Apply Changed Values** icon at the top of the Property Panel.

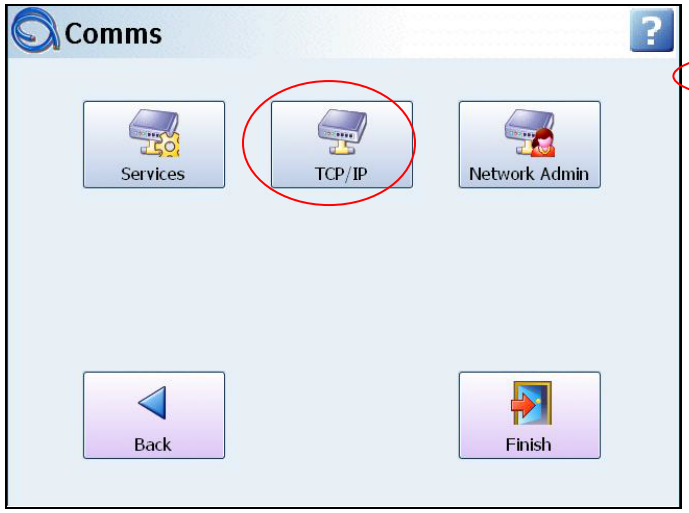


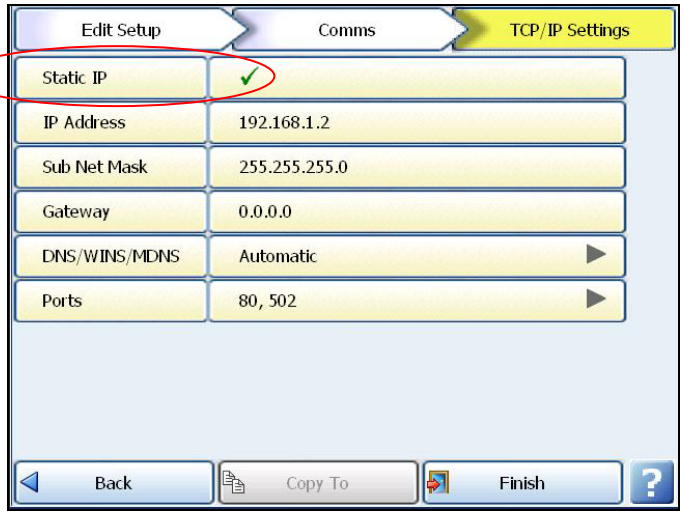
X-Series Multitrend SX Paperless Recorder Configuration

In this application, the X-Series Multitrend SX paperless recorder is set up as a Modbus Master using the TCP protocol for communications with the WDM. This requires setting up the recorder in three specific areas of the recorder's configuration – Communication, Pens and the Screen for displaying the data.

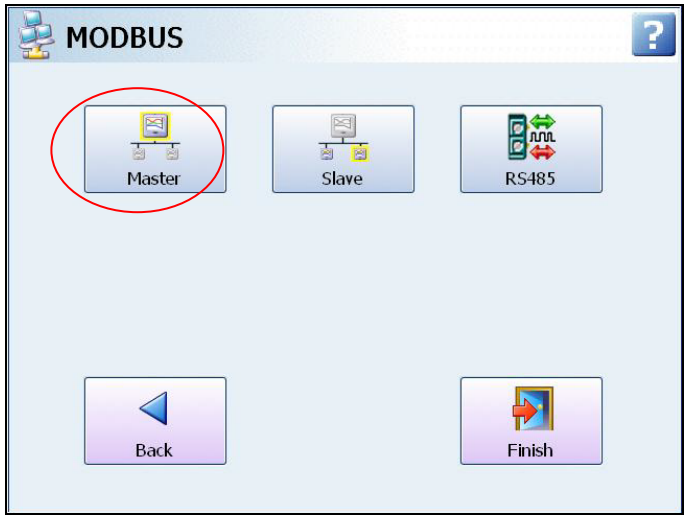
Communications Configuration for Recorder

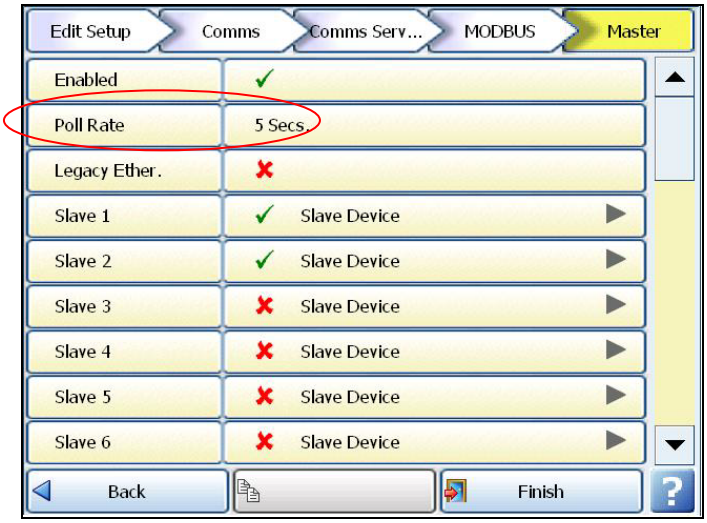
1. For the first step, the TCP/IP setting for the recorder needs to be established so it resides on the same network as the WDM, in this example we are using an address of **192.168.1.2** (Note: the recorder's IP address must be unique from the other devices on the network). This is set by going to **Edit Setup>Comms>TCP/IP** Settings; the TCP/IP Settings screen is shown below and the IP Address is entered on this screen. We have also set this to be a **Static IP** address to prevent the address from being changed.



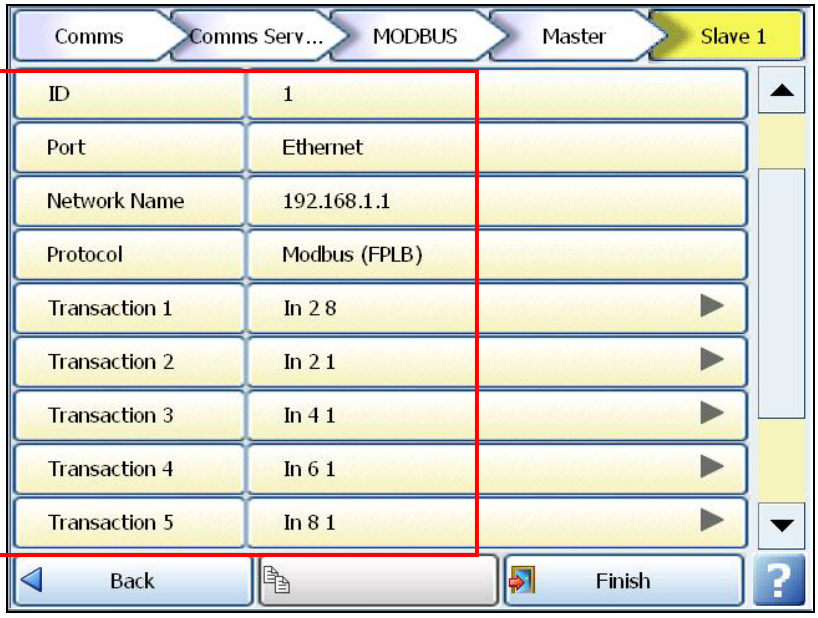


2. The next step is to set up the Recorder as a Modbus Master talking with the WDM. This is accessed from the **Comms>Services** screen shown above. Select **Master** to configure the recorder as the Modbus Master. Select one of the Slave devices to configure the settings needed to communicate with the WDM. In this example, **Slave 1** was chosen. On this screen you would also set the polling rate for the recorder to update the recorder data, 5 secs was used.





3. Setting up the Slave device requires knowing a couple of pieces of information from the WDM (Slave 1). This includes a **Modbus ID** (if available, otherwise give it a unique ID between 1 and 255), the **IP Address** of the WDM (this was set to 192.168.1.1) in the WDM, the **Protocol** (for the WDM, this is **Big Endian** which for the recorder means **Modbus FPLB**). The recorder configuration screen for this is shown below.

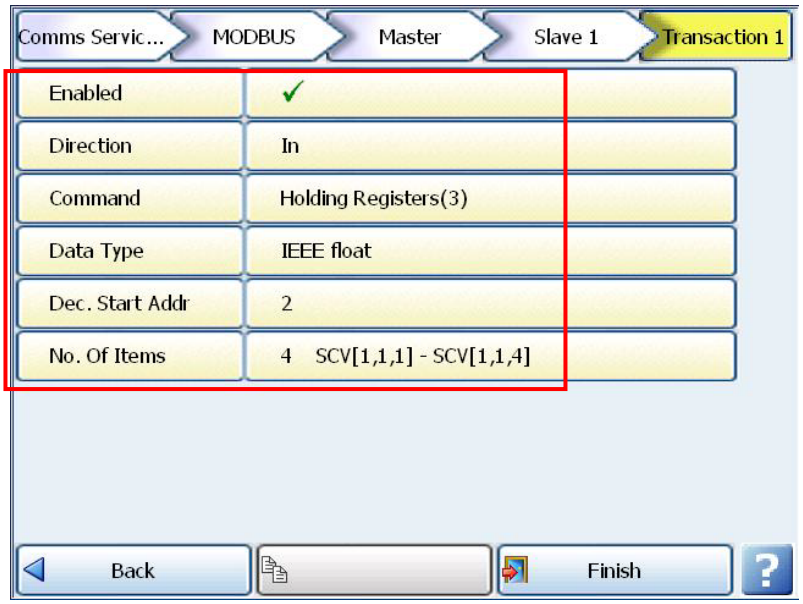


4. The next step is to set up the actual communications transaction that will get the data from the WDM and bring it into the recorder. This is done by selecting the **Transaction** button. As part of the reading the Modbus registers, more than one Modbus parameter can be read at a time, the recorder allows you to do this as either reading a number of consecutive registers or you could read each parameter individually. Transaction 1 was set up to read 4 consecutive registers, while Transactions 2, 3, 4 and 5 are reading the same 4 registers but doing this individually. The first is more efficient from a communications perspective, however, both are shown in the example to demonstrate how you might read registers that are not consecutive.

5. To set up the transaction, you need to know something about the parameter being read by the recorder. These include the following:

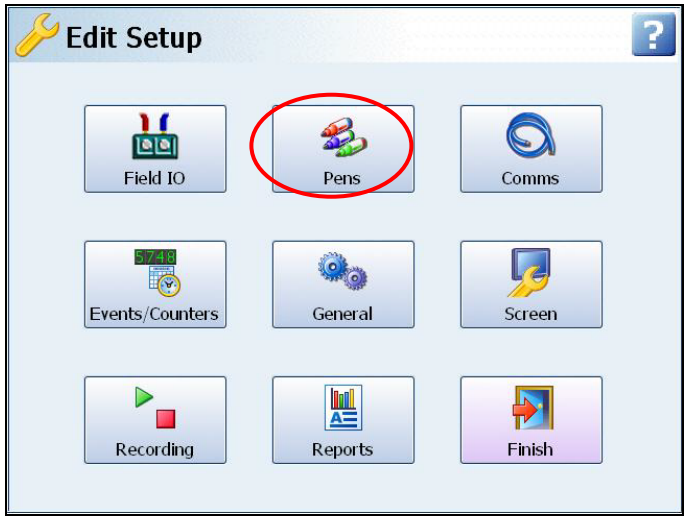
   - **Direction** of the message, is it an **Input** (IN) to the recorder or and **Output** (OUT) being sent from the recorder. This is an Input to the recorder so it is set to **"In"**
   - **Command -** (Coil Status, Input Status, Holding Register, Input Register); this will depend on what is being read and how it was set up in the WDM. This was set up in the WDM configuration as a **"Holding Register".**
   - **Data Type** – (Signed 16 bit Integer, Unsigned 16 bit Integer, IEEE Float); this depends on the type of data being read and whether it is an Integer value or IEEE Floating point value. The data being read is an IEEE float so it is set to **"IEEE float"**
   - **Decimal Starting Address** – this configuration item is determined by the Modbus address of the register where the value being read is located. If you go back to the Modbus Holding Register Table shown on the browser window for the WDM (See step 7 under the WDM Configuration section above), you will see that the first parameter of interest was set up in **Register 2** of the WDM even though it could have been set up for Register 0. Register 2 was selected because the first addressable register for the recorder is Register 1.

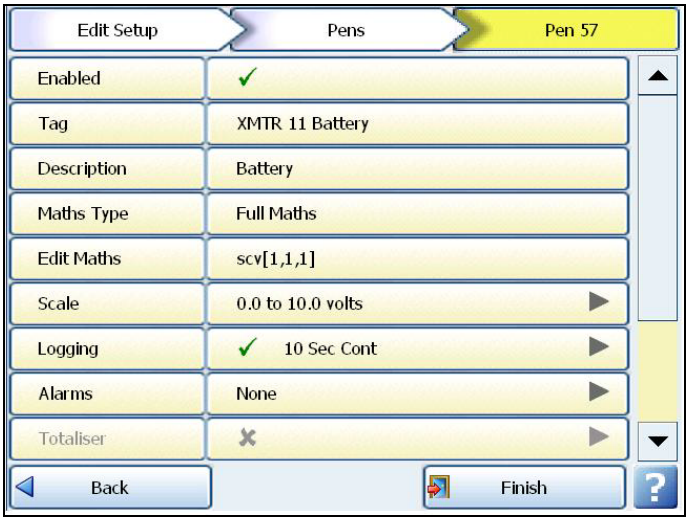
- **No. of Items** – this number is determined by how many items you will be accessing from consecutive Modbus registers. In this example, we are getting data values from 4 consecutive WDM Modbus registers (Battery Voltage XMTR 11, PV XMTR 11, Battery Voltage XMTR 13, PV XMTR 13). The recorder defines these as SCV (Slave Comms Values) and uses this terminology when assigning them to a Pen for graphing. The numbers come from the Slave Number, the Transaction Number and the Item. For this example, the Slave is **Slave 1**, the Transaction is **Transaction 1**, and there are 4 items, **Items 1, 2, 3, and 4**; so for our four values that will be assigned to the Pens in the recorder, these parameters will be:
    - SCV[1,1,1] - Battery Voltage XMTR 11
    - SCV[1,1,2] - PV XMTR 11
    - SCV[1,1,3] - Battery Voltage XMTR 13
    - SCV[1,1,4] - PV XMTR 13



Assigning Communication Values to Pens

1. Once the Modbus communications functions are set up, the next step is to assign these values to individual Pens for display and recording purposes. To set up a Pen, select **Menu>Configure>Setup>Edit>Pens**; you should see the screen displayed below.

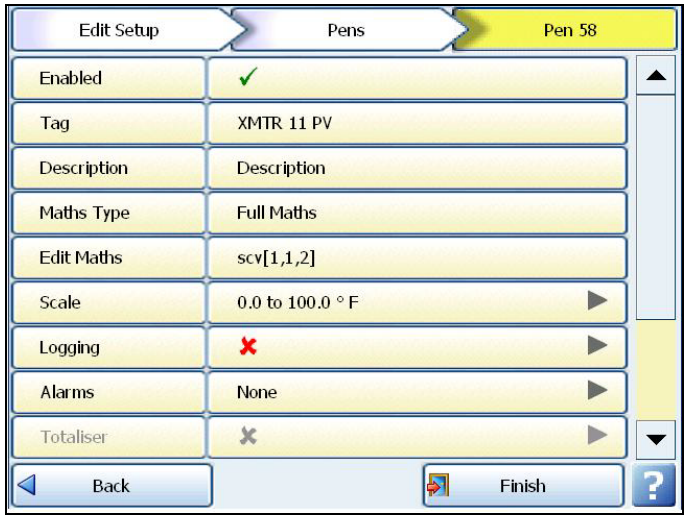


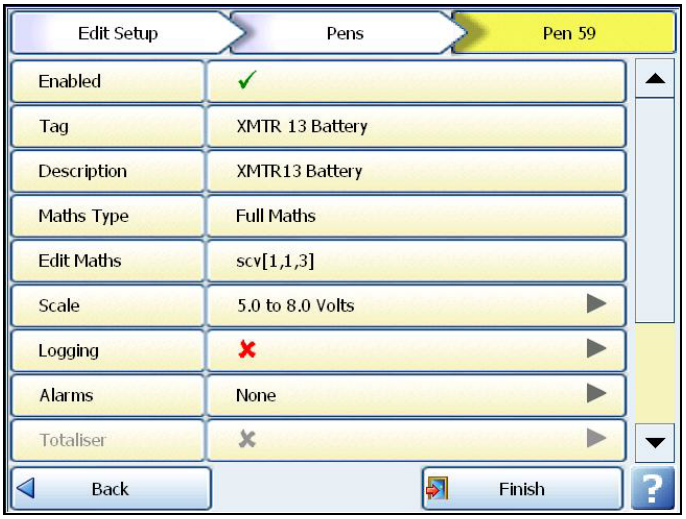


2. Select the desired Pen# to configure; you can display one Communications Value per Pen so for our example, you will need to set up 4 different pens. We selected Pens 57, 58, 59 and 60, which are virtual pens in the recorder, but you can select whichever is best for your recorder. **Enable** the Pen, configure a specific **Tag Name** if desired, **Pen Description**, for doing communications values either **Full Maths** or **Math Scripting** is required (requires Credits), set the **Scale** units, enable **Logging** and set any **Alarms** or other Pen related parameters in the Pen set up function. The **Edits Maths** function is where you enter the SCV values discussed above; the expression SCV[1,1,1] is entered, which causes the Battery Voltage for XMTR 11 to be displayed on this pen.

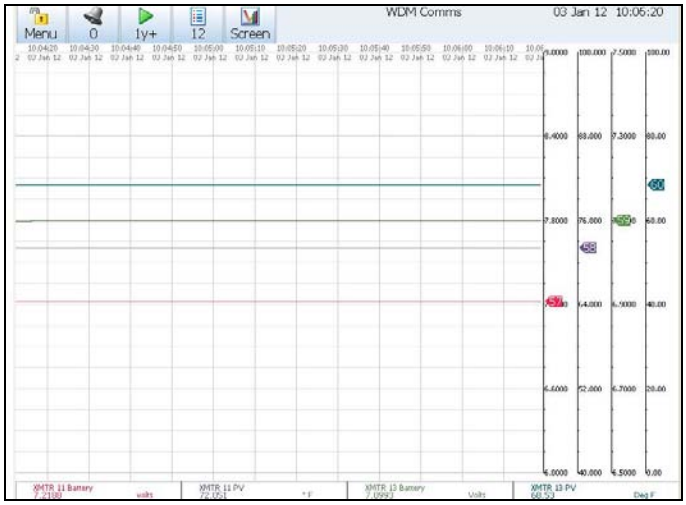
3. Repeat for the other 3 pen set ups to assign those SCV values to the other pens. The Edit Maths expression for these other pens will be:

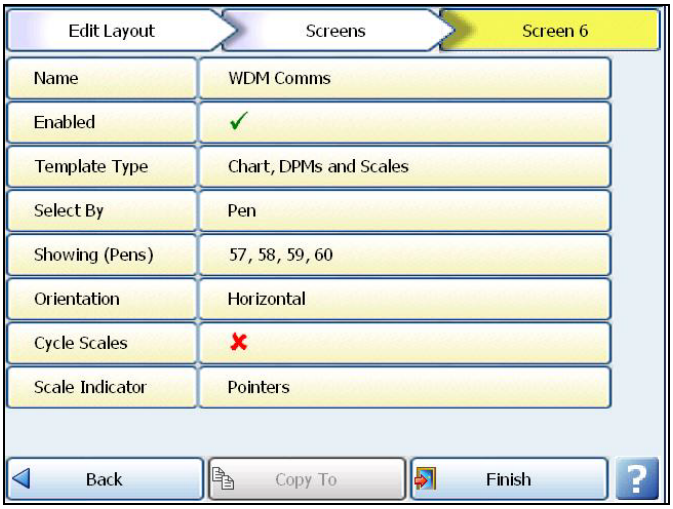
   - Pen 58 - SCV[1,1,2] - PV XMTR 11
   - Pen 59 - SCV[1,1,3] - Battery Voltage XMTR 13
   - Pen 60 - SCV[1,1,4] - PV XMTR 13





4. The final step is to set up the display screen for the Pens. For this, select Menu>Configure> Layout>Edit>Screens>Screen n (n = 1, 2, 3, etc.). Select the parameters for how you want the display to look; these include Type, Orientation, Scale Pointers or Bars and the Pen numbers to be displayed. Once configured, you can go to the programmed screen and see the results. In this example, the PV and Battery voltage for the two transmitters is being displayed and recorded in the Multitrend Recorder as shown in the screen below.





More Information

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