

## Chapter 3: Configuring the System

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### Overview

You use NetPower Modbus Tools to define Modbus registers for a NetPower DeviceServer. IMPACC devices are physically connected to a NetPower DeviceServer and must be configured in the NetPower DeviceServer, using the NetPower Configurator, to enable communications between the devices and the NetPower DeviceServer. Once these devices are configured using the NetPower Configurator application, you can configure device attributes to NetPower DeviceServer Modbus registers using NetPower Modbus Tools.

Any time you physically add or remove a device, or change a device setting, you must first make the change with NetPower Configurator, then make the corresponding changes with NetPower Modbus Tools.

### Before you Configure

Before you can configure the system, you must perform the following steps in order:

1. Open and connect to a NetPower DeviceServer.
2. Enable the Modbus subsystem for an open NetPower DeviceServer.

**Note**

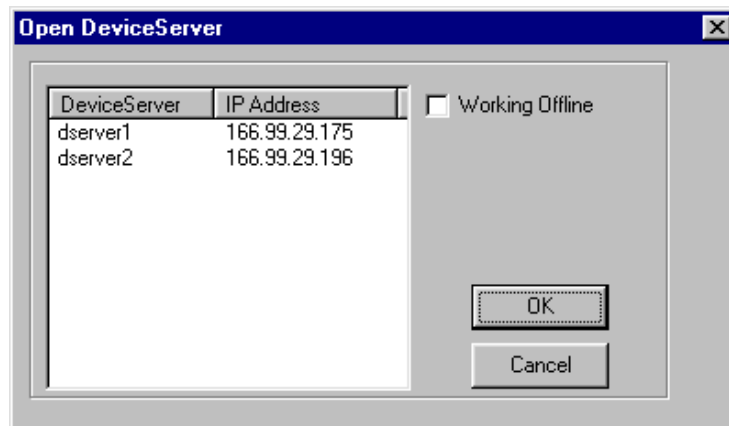
You must be logged on to NetPower Modbus Tools in order to configure the system. For information about starting and logging on to NetPower Modbus Tools, see *Chapter 2: Getting Started*.

## Opening and Connecting to a NetPower DeviceServer

To open and connect to a NetPower DeviceServer, do the following:

1. Click on the NetPower DeviceServer menu, and select Open.

The Open NetPower DeviceServer dialog box displays.



This dialog box lists all of the NetPower DeviceServers that were configured using the NetPower Configurator application.

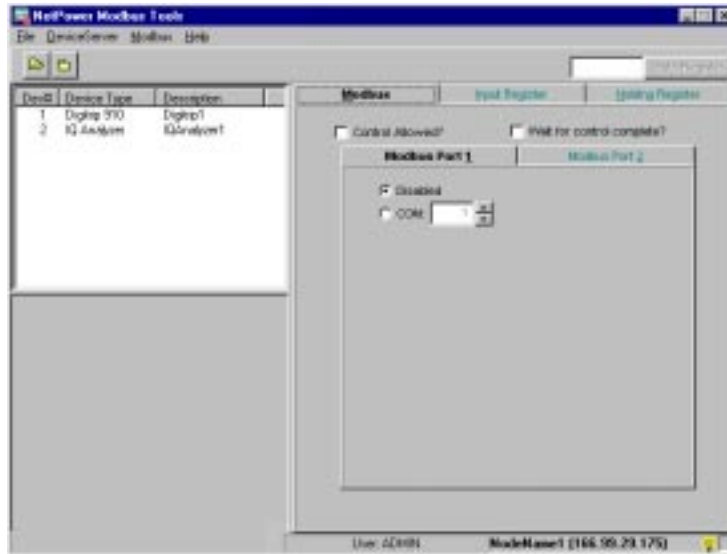
2. To configure in the Off-Line mode, select the Working Offline check box.

### **Important**

If you choose to configure in the Off-Line mode, you will not be connected to the NetPower DeviceServer, and cannot download to the NetPower DeviceServer. For more information on the Off-Line mode, see the section *On-Line and Off-Line Mode*.

3. Click on the NetPower DeviceServer you wish to configure, and click OK.

The NetPower Modbus Tools main window displays.



**Note**

If you are configuring a NetPower DeviceServer to edit an existing configuration and the configuration in the Modbus Database and the NetPower DeviceServer differ, you are prompted to synchronize. For more information, see the section *Synchronization*.

All of the configured devices associated with the opened NetPower DeviceServer display in the Device list box on the left of the NetPower Modbus Tools main window. The Status Bar at the bottom of the NetPower Modbus Tools main window displays the Indicator light and the name and IP Address of the selected NetPower DeviceServer.

After you have opened and connected to a NetPower DeviceServer, you are ready to enable the Modbus subsystem of a NetPower DeviceServer. See the section, *Enabling and Disabling Modbus for an Open NetPower DeviceServer*.

**On-Line and Off-Line Mode**

When you open a NetPower DeviceServer, you are prompted to work in either the On-Line or the Off-Line mode.

If you select the On-Line mode, the system opens and connects to a NetPower DeviceServer.

If you select the Off-Line mode, NetPower Modbus Tools opens a NetPower DeviceServer, and enables you to configure Input Registers without immediately subscribing for the corresponding device attributes. You must subsequently connect to the NetPower DeviceServer to subscribe for data.

**Note**

For more information about communicating with a NetPower DeviceServer, see the section *Controlling Communications*.

The following table lists how the system responds to the configuration mode that you choose.

Mode	Description
On-Line	<p>The On-Line mode allows you to save to both the Modbus Database and the NetPower DeviceServer. If you are configuring a NetPower DeviceServer in the On-Line mode for the first time, NetPower Modbus Tools automatically displays the main window.</p> <p>If you are configuring a NetPower DeviceServer in the On-Line mode to edit an existing configuration, NetPower Modbus Tools automatically checks the configuration between the Modbus Database and the NetPower DeviceServer.</p> <ul style="list-style-type: none"><li>◆ If there is no difference, the NetPower Modbus Tools main window automatically displays.</li><li>◆ If there is a difference, NetPower Modbus Tools automatically initiates the synchronization process, and the Step 1 Synchronization window displays. When the synchronization process is complete, the NetPower Modbus Tools main window displays. For more information on synchronization, see the section <i>Synchronization</i>.</li></ul>
Off-Line	<p>The Off-Line mode allows you to save only to the Modbus Database. If you configure a NetPower DeviceServer in the Off-Line mode, the NetPower Modbus Tools main window automatically displays.</p>

## Enabling and Disabling Modbus for an Open NetPower DeviceServer

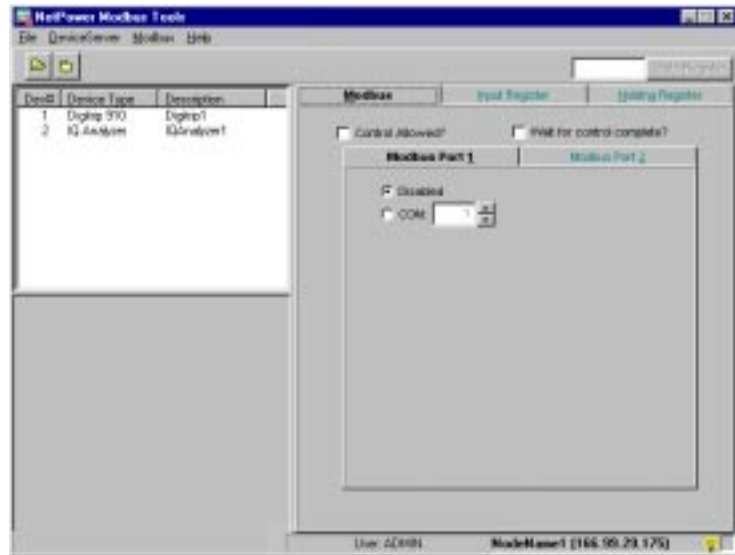
When you open and connect to a NetPower DeviceServer for the first time, you must enable the Modbus subsystem of a NetPower DeviceServer to allow Modbus communications between the Modbus Master and the IMPACC devices.

### ***Enable Modbus Support for an Open NetPower DeviceServer***

To enable the Modbus subsystem of a NetPower DeviceServer, do the following:

1. If necessary, click on the Modbus tab in the NetPower Modbus Tools main window.

The Modbus tab displays.



2. Click on the Modbus menu and select Add.

The Modbus subsystem of the NetPower DeviceServer is enabled (added) to the NetPower DeviceServer. You can now configure the system. For more information about configuring the system, see the section *Configuring the System*.

By enabling the Modbus subsystem of a NetPower DeviceServer, you are defining the NetPower DeviceServer as a Modbus Slave. For information on Modbus slaves, see the section *Assigning Slave Addresses*.

**Important**

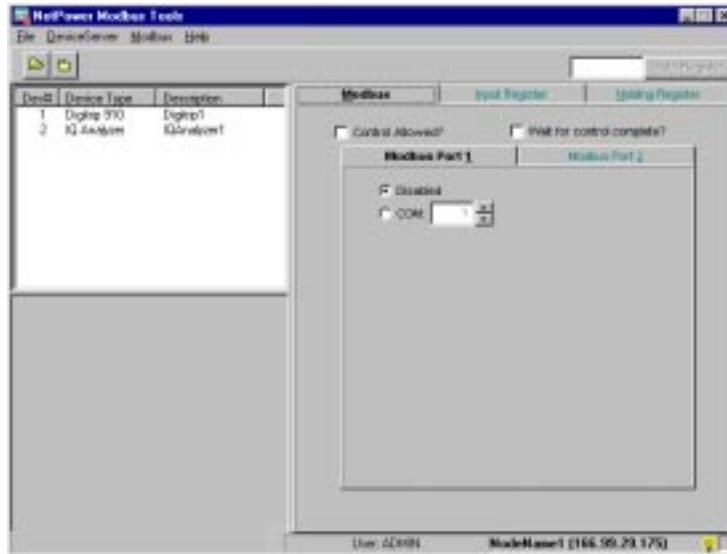
All the NetPower DeviceServers in the Master Configuration Database that support Modbus must first be opened and enabled in NetPower Modbus Tools before you can configure the corresponding registers.

***Disable Modbus Support for an Open NetPower DeviceServer***

To disable Modbus communications for a NetPower DeviceServer, do the following:

1. If necessary, click on the Modbus tab in the NetPower Modbus Tools main window.

The Modbus tab displays.



2. Click on the Modbus menu and select Delete All Modbus Configuration.

The Modbus subsystem of the NetPower DeviceServer is disabled, and the NetPower Modbus Tools main window closes the NetPower DeviceServer, disabling all of the tabs.

## Configuring the System

After you start and log on to NetPower Modbus Tools, open a NetPower DeviceServer, and, if applicable, synchronize the NetPower DeviceServer with the Modbus Database, you can configure the system in any desired order.

The following tasks are involved in configuring a NetPower DeviceServer:

- ◆ Configure the NetPower DeviceServer Modbus COM ports.
- ◆ Configure the Input Registers
- ◆ Configure the Holding Registers.
- ◆ Save the Modbus configuration.
- ◆ Control Communications
- ◆ Print configuration databases.

## Configuring the NetPower DeviceServer Modbus COM Ports

Because the NetPower DeviceServer supports the Modbus protocol through the serial COM port, you must configure the NetPower DeviceServer COM ports to communicate with the Modbus Master. You may define Modbus settings for one or two COM ports. Each Modbus setting must include a unique Slave address and unique COM port number, as well as specific communication parameters, which must match with the Modbus Master. You must also disable any COM ports not used for Modbus communication.

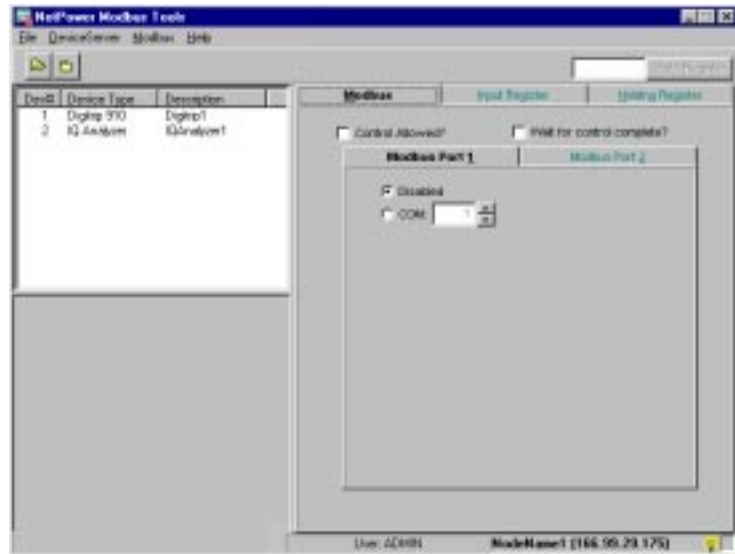
### Important

The COM port you use in the NetPower DeviceServer for communicating with IMPACC devices cannot be used for Modbus communications.

To configure the Modbus COM ports, do the following:

1. Determine which COM port on the NetPower DeviceServer is used for Modbus communications.
2. Click on the Modbus tab.

The Modbus tab displays.



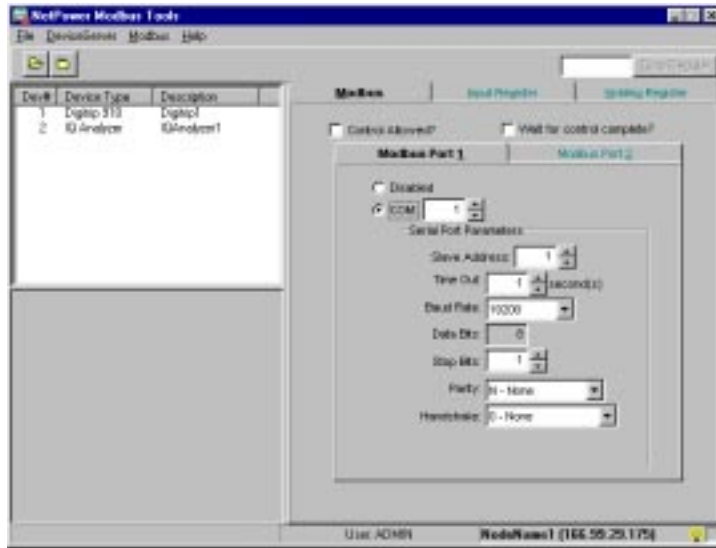
Two tabs display within the Modbus tab, the Modbus Port 1 and the Modbus Port 2 tabs. These tabs are the Modbus COM port settings. You configure the port that is used to communicate with the Modbus Master, and you disable the port that is not used to communicate with the Modbus Master.

**Note**

You may configure one or both Modbus port settings.

3. To disable the COM port that you are not using for Modbus Communication, click on the corresponding COM port tab, and select the Disabled radio button. For example, if you are not using COM port 2 for Modbus communication, select the Modbus Port 2 tab.
4. To configure the COM port you are using for Modbus communications, click on the corresponding Modbus Port tab.
5. Select the COM radio button.

The COM port input settings display.



6. Select the correct input settings, according to the following table:

Setting	Description
COM (input field)	The COM port on the NetPower DeviceServer that connects to the Modbus Master.
Slave Address (input field)	Slave Address assigned to the Modbus port for Modbus communications. To make the correct setting, see the section <i>Assigning Slave Addresses</i> .
Time Out (input field)	Time for specific instructions to transfer between the NetPower DeviceServer and the Modbus Master.



Setting	Description
Baud Rate (input field)	Rate at which communications between the NetPower DeviceServer and Modbus Master is to occur.
Stop Bits (input field)	Number of Stop Bits used in the RS232 communication link.
Parity (input field)	Control for parity (Odd, Even, None) to protect against transmission errors.
Handshake (input field)	Control for error checking in communications between the Modbus Master and the NetPower DeviceServer.

7. Select the correct check box above the Modbus Port tabs in the Modbus tab, according to the following table.

Setting	Description
Control Allowed?	Enables or disables device control commands via Modbus.  If you select this check box, control commands are sent to the devices.  If you clear this check box, control commands are not sent to the devices.
Wait for control complete?	Controls whether a command must be completed before another command is sent to the device.  If you select this check box, the system waits for confirmation that the command was completed before it sends the next command.  If you clear this checkbox, multiple commands can be sent to the device and are performed in the order they were sent.

The Modbus COM ports are configured. Once you configure the Modbus ports, you may either define the Input and Holding Registers or control communications with the NetPower DeviceServer.

To define Input Registers, see the section *Defining Input Registers*.

To define Holding Registers, see the section *Defining Holding Registers*.

To control communications with the NetPower DeviceServer, see the section *Controlling Communications*.

## Assigning Slave Addresses

Modbus is a master/slave communications protocol, where a Modbus Master can control communications for up to 247 slaves. The NetPower DeviceServer is one such slave device that must be assigned to a unique *slave address* so that the Modbus Master may identify it.

The NetPower DeviceServer can emulate two slaves with different slave addresses assigned to the two Modbus ports.

## Defining Registers

You use NetPower Modbus Tools to define NetPower DeviceServer Input and Holding Registers to enable the Modbus Master to communicate with IMPACC devices. As you define these registers, NetPower Modbus Tools displays certain colors denoting the status of your configuration. The Indicator light at the bottom of the NetPower Modbus Tools main window also indicates the status of your configuration.

For example, if you are adding Input and Holding Registers to your configuration and have not yet saved the most current changes, the registers appear red and the Indicator light blinks red.

The color schemes are listed in the following table.

Status	Configured Registers	Indicator Light
<b>Edit</b> Configured Input and Holding registers are not yet saved to the Modbus Database, nor are they downloaded to the NetPower DeviceServer.	Red	Blinking Red
<b>Local Save</b> Configured Input and Holding registers are saved to the Modbus Database, but not yet downloaded to the NetPower DeviceServer.	Blue	Blinking Blue

Status	Configured Registers	Indicator Light
<b>Save</b> Configured Input and Holding registers are saved to both the Modbus Database and the NetPower DeviceServer.	Black	None

**Note**

For information on saving the configuration, see the section *Saving Modbus Configurations*.

### Input and Holding Register tabs

You use the Input Register tab to define Input Registers, and the Holding Register tab to define Holding Registers. Each tab includes the list of configured devices associated with the NetPower DeviceServer.

When you configure a NetPower DeviceServer register, NetPower Modbus Tools responds in different ways, depending on if you are:

- ◆ Configuring a NetPower DeviceServer for the first time in the On-Line mode.  
The tabs display unmapped registers. When you map a register, that register displays red until you save your configuration.
- ◆ Configuring a NetPower DeviceServer for the first time in the Off-Line mode.  
The tabs display unmapped registers. When you map a register, that register displays blue until you save your configuration.
- ◆ Editing a configured NetPower DeviceServer in the On-Line Mode.  
The tabs display mapped registers in black. When you map a register, that register displays red until you save your configuration.
- ◆ Editing a configured NetPower DeviceServer in the Off-Line Mode.  
The tabs display mapped registers (which display as black). When you map a register, that register displays blue until you save your configuration.

**Note**

In both the Input Register tab and the Holding Register tab, you can quickly determine individual device properties by double-clicking on a device. In the Input Register tab, you can quickly determine individual device attribute properties by double-clicking on a device attribute.

## Defining Input and Holding Registers in the Off-Line Mode

The Off-Line mode allows you to configure Input and Holding Registers without connecting to the NetPower DeviceServer and immediately subscribing for the associated attributes. The Import and Holding tabs behave as follows when configuring in the Off-Line mode:

- ◆ When you open a NetPower DeviceServer in the Off-Line mode the color of the configured registers appear blacks, and the Indicator light blinks blue.
- ◆ When you map Input and Holding Registers, the configured registers appear red, and the Indicator light blinks red.
- ◆ When you map Input and Holding Registers, no device attribute values display, as you are not connected to the NetPower DeviceServer.
- ◆ You can only save your configuration to the Modbus Database.
- ◆ When you save the configuration to the Modbus Database, the color of the configured registers appears blue and the Indicator light blinks blue.
- ◆ To view device attribute values for the configured registers, you must connect to the NetPower DeviceServer so that NetPower Modbus Tools can poll the configured registers.

For a detailed explanation about configuring input registers in the Off-Line mode, see the section *Mapping Device Attributes to Input Registers in Off-Line Mode*.

## Defining Input Registers

An Input Register is a storage area that holds data collected from an IMPACC device. Modbus provides 10,000 Input Registers, each represented by a unique number between 30,001 and 39,999.

You define Input Registers to specific device attributes using the Input Registers listed in the Input Register tab.

### Mapping Device Attributes to Input Registers in On-Line mode

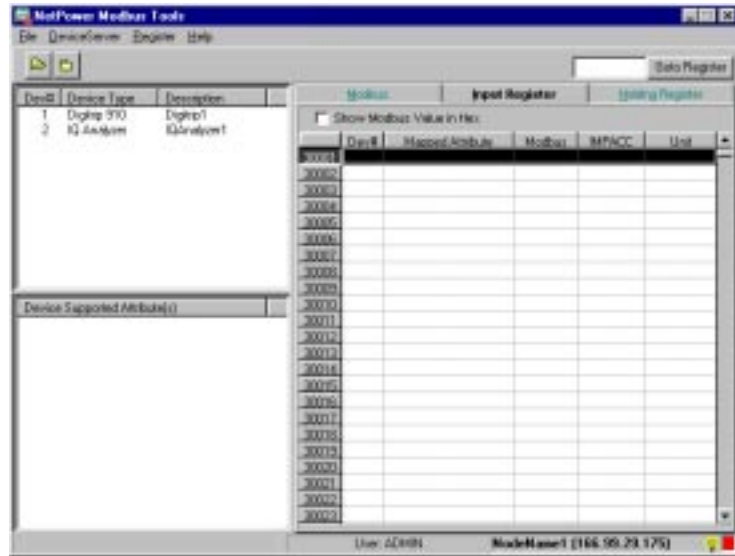
**Note**

If you wish to quickly monitor any Input Register, enter the register number in the GoTo Register input field, and click GoTo Register.

To map device attributes to Input Registers, do the following:

1. Click the Input Register tab.

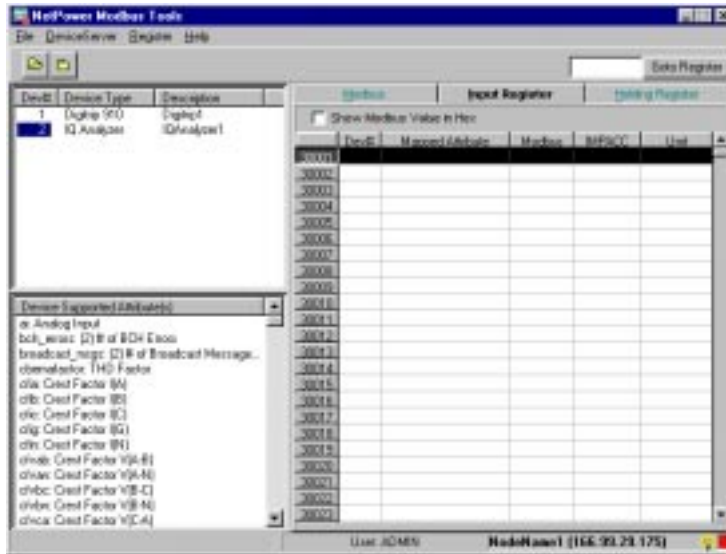
The Input Register tab displays.



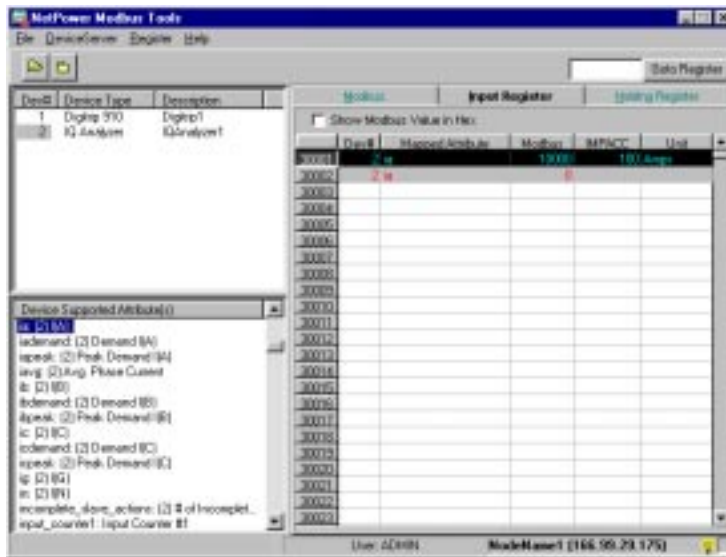
The Device list box displays on the top left-hand side of the NetPower Modbus Tools main window, displaying all of the configured devices associated with the selected NetPower DeviceServer. The Device Supported Attribute list box displays on the bottom of the left-hand side of the NetPower Modbus Tools main window.

2. In the Device list box, click on the device number that you wish to map to an Input Register.

The Device Supported Attribute list box updates to display the device attributes corresponding to the selected device.



3. Click on the device attributes that you wish to configure.
4. Drag-and-drop the device attributes from the Device Supported Attribute list box to an unmapped Input Register in the Input Register tab.



The following table describes the information that displays for a mapped Input Register.

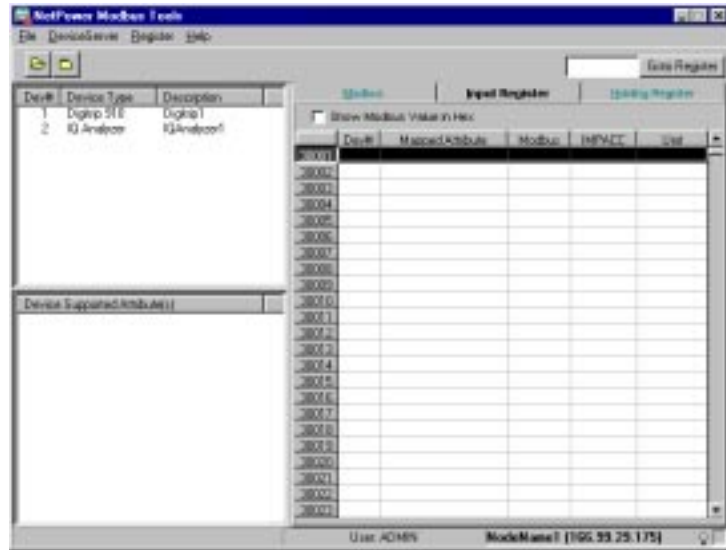
Column	Description
Dev#	The Device number that is associated with the selected attribute. This number corresponds to the same device number in the Device list box. The number was defined in the NetPower Configurator application.
Mapped Attribute	A specific device attribute.
Modbus	The value of the device attribute that is passed to the Modbus Master.
IMPACC	The value of the device attribute polled from the IMPACC device.
Unit	The unit associated with the polled device attribute.

5. If you wish to display all mapped registers in Hex code, select the Show Modbus Value in Hex check box.
6. To map another Input Register, repeat steps 2 through 5.

### **Mapping Device Attributes to Input Registers in Off-Line Mode**

To define Input Registers in the Off-Line mode and subsequently subscribe for data, do the following:

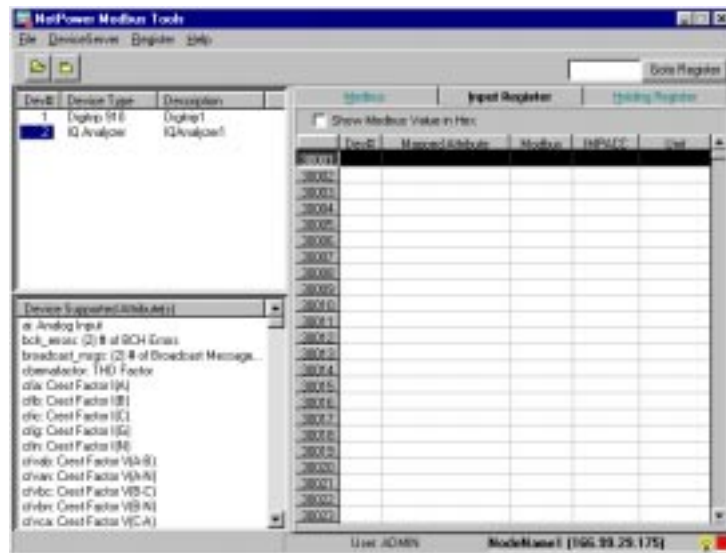
1. In Off-Line mode, click on the Input Register Tab.  
The Input Register tab displays.



The Indicator light blinks blue, indicating that you are monitoring the NetPower DeviceServer in the Off-Line mode. There are no configured Input Registers.

2. In the Device list box, click on the device number that you wish to map to an Input Register.

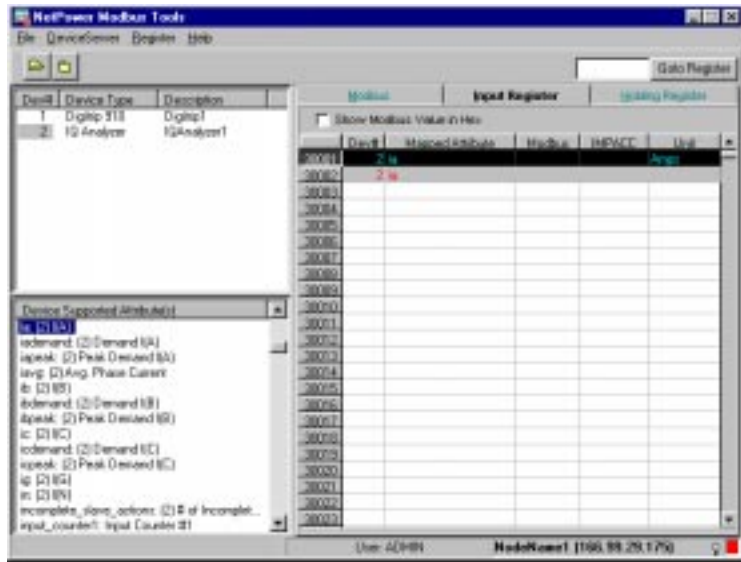
The Device Supported Attribute list box updates to display the device attributes corresponding to the selected device.



3. Click on the device attribute that you wish to configure.



4. Drag-and-drop the device attribute from the Device Supported Attribute list box to an Input Register in the Input Register tab. The Input Register tab updates to display the mapped attribute.



The configured Input Register appears red, and the Indicator light blinks red.

5. Repeat step 4 for all the device attributes you wish to map.

At this point, you may want to save the configuration. For information about saving configurations, see the section *Saving Modbus Configurations*.

### Copying Input Registers from Device to Device

To copy input registers from device to device, do the following.

1. From the Register menu, choose Copy Input Registers From Device To Device.

The Copy Input Register Mappings for Device dialog box displays.



2. In the Copy All Input Register Mappings from Source Device # field, enter the number of the device from which you want to copy the input register settings.
3. In the To Destination Device # field, enter the number of the device to which you want to copy the input registers.
4. In the New Input Register Will Be Starting From Register # field, type the number of the register on which you want the new input registers to begin.
5. Click OK.

NetPower Modbus Tools copies the input register mappings from one device to another.

## Format of Input Registers

Input Registers are 16-bit registers. In most cases, they contain an unsigned integer (0 to 65,535) or a signed integer (-32,768 to 32,767). In instances when the data might exceed the maximum values, the system groups two consecutive registers together to hold a 32-bit (signed or unsigned) value. The specific format of the Input Register depends on the particular data field that is associated with the register.

To interpret values that display in configured Input Registers, see the following section, *Interpreting Input Register Values*.

## Interpreting Input Register Values

After you map a device attribute to an Input Register, the polled attribute value displays in the Modbus and IMPACC columns of the Input Register tab. These values may not be easily interpreted, or may differ between the two columns according to the attribute properties. Thus, in order to interpret certain displayed values, you may need to reference *Appendix B: Device Objects*.

To interpret Input Register values, do the following:

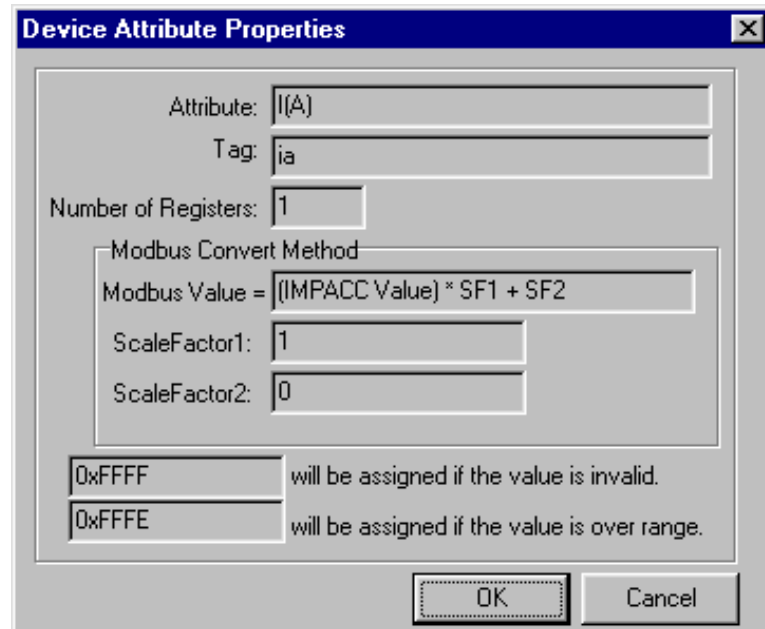
1. In Appendix B, find the table that contains information about the device (the devices are listed alphabetically by type).
2. Locate the appropriate field within the table.
3. Use the Range column to determine that the value in the column falls within the valid range of values.
4. If the value returned is scaled, the scale factor is indicated in the Factor column. If a scale factor is provided, multiply the value by the scale factor. For more information on scale factors, see the section *Scale Factor*.

**Note**  
 Several values for device attributes are returned in code format, which may only be interpreted through the Device Object tables. See *Appendix B: Device Objects* in the *PowerNet Software User's Manual*.

### **Using the Device Attribute Properties Dialog Box**

Some calculations can be more easily performed using device attribute properties.

Double-click on a selected device attribute. The Device Attribute Properties dialog box displays.



The Modbus Value output field represents the equation for calculating the value that is transferred to the Modbus Master. You can use this equation to translate the difference between the Modbus value (integer format) and the IMPACC value (non-integer format).

IMPACC Value represents the attribute value that was polled from the device.

SF1 and SF2 represent scale factors (designated by the corresponding ScaleFactor1 and ScaleFactor2 output fields). For more information on scale factors, see the following section, *Scale Factor*.

### **Scale Factor**

Because the Input Registers transmit integer values, any device attribute value that is in a non-integer format must be converted to integer format. Scale Factor1 and Scale Factor2 are used to convert attribute values to values in integer format. This conversion is the equation that appears in the Device Attributes Properties dialog box, and is as follows:

Integer format = ScaleFactor1 (SF1) \* Real format + ScaleFactor2 (SF2)

**Note**

To display the Device Attributes Properties dialog box, double-click on a selected device attribute.

For example, if the poll for Power Factor from a device returned a value of 0.76, the value would have to be converted to 76 in order to transfer the value across the Input Registers in integer format. Thus, Scale Factor1 is (76/0.76=100) and Scale Factor2 is (0). For a detailed example on Scale Factor, see the section *Examples for Interpreting Input Register Values*.

## **Defining Holding Registers**

A Holding Register is a storage area that holds commands that are to be sent to devices. Modbus provides 2,000 Holding Registers, each represented by a unique number between 40,001 and 42,000.

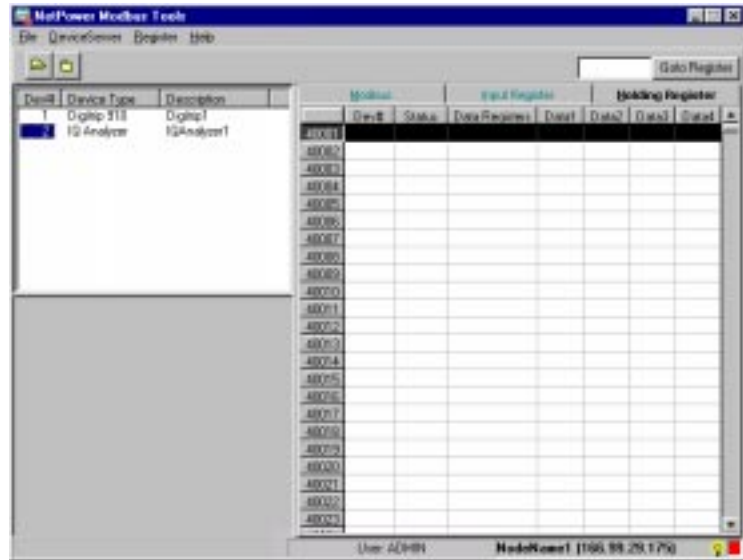
You define Holding Registers to specific devices using Holding Registers listed in the Holding Register tab.

### **Mapping Devices to Holding Registers**

To map devices to Holding Registers, do the following:

1. Click the Holding Register tab.

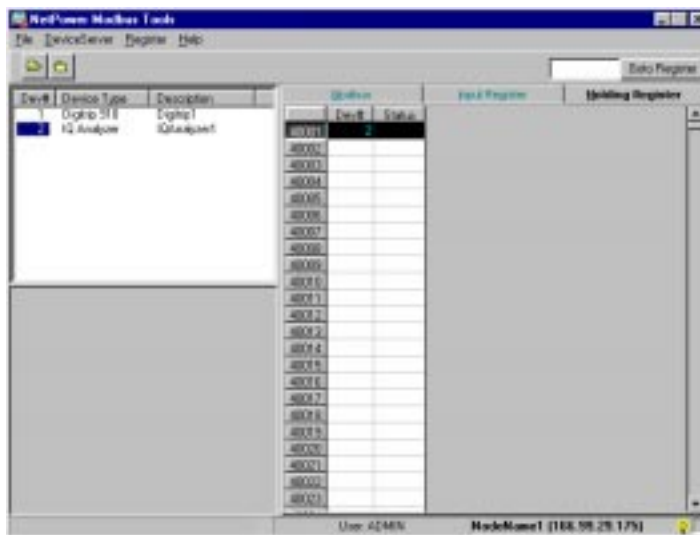
The Holding Register tab displays.



The Device list box displays on the top left-hand side of the NetPower Modbus Tools main window, displaying all of the configured devices associated with the selected NetPower DeviceServer.

2. In the Device list box, click on the device number that you wish to map to a Holding Register.
3. Drag-and-drop the device number from the Device list box to the selected Holding Register number.

NetPower Modbus Tools displays the configured Holding Register in red.



The following table describes the information that displays for a mapped Holding Register.

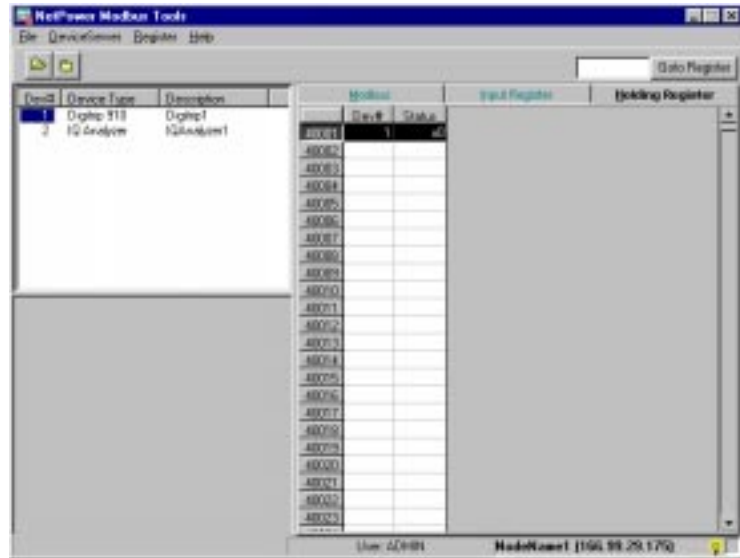
Column	Description
Dev#	Device number.
Status	The status of the requested command from the Modbus Master.
Data Registers	N/A (For future use.)
Data1	N/A (For future use.)
Data2	N/A (For future use.)
Data3	N/A (For future use.)
Data4	N/A (For future use.)

Whenever you drag-and-drop a device to a Holding Register, you enable that register to receive device commands from the Modbus Master and send the commands to the corresponding IMPACC device.

- Click on the NetPower DeviceServer menu, and select Save + Download to NetPower DeviceServer.

**Note**  
For more information about saving configurations, see *Saving Modbus Configurations*.

The Holding Register tab displays the configured Holding Register, indicated by a return code displaying in the Status column.



To interpret the return code, see the next section *Interpreting Holding Register Values*.

**Note**

A return code may not display when you configure a device to a Holding Register. A return code only displays if a device control command is sent to the specific device.

5. To map an additional Holding Register, repeat steps 2 through 4.

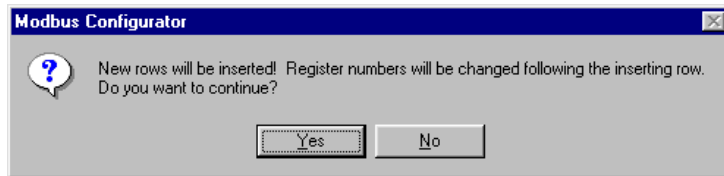
**Interpreting Holding Register Values**

After you map a Holding Register, the Modbus Master may send a command to that register to control an IMPACC device. The device sends a value (code) back to the register, indicating the status of the device command. To interpret these return codes, see *Chapter 12: Troubleshooting* in the *PowerNet Software User's Guide*.

**Remapping Input and Holding Registers**

To remap a register, do the following:

1. Drag-and-drop a device attribute or device to an Input Register or Holding register (respectively) that is already mapped.
2. NetPower Modbus Tools prompts you, verifying the request to renumber all subsequent register numbers.



3. Click Yes to continue.

NetPower Modbus Tools remaps the register and increments all subsequent register numbers (i.e., if you remap register 30,010 to a new attribute, the attribute that was mapped to 30,010 is mapped to 30,011; the attribute mapped to 30,011 is remapped to 30,012, and so on). At this point, you may want to save the configuration. For information about saving configurations, see the section *Saving Modbus Configurations*.

**Note**

If you are configuring in the Off-Line mode, the system does not poll your configured registers. You need to connect to the NetPower DeviceServer for the system to poll your configured registers.

## Unmapping Input and Holding Registers

There are two methods to unmap registers. These are:

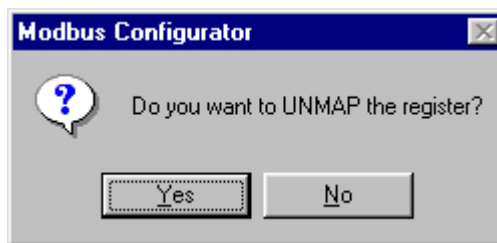
- ◆ Unmapping single registers.
- ◆ Unmapping multiple registers.

### ***Unmapping Single Registers***

To unmap a register, do the following:

1. Click on the register you wish to unmap.
2. Click on the Register menu, and select Delete Mapping.

A confirmation dialog box displays, verifying the request to unmap the selected register.



3. Click Yes to unmap the register.

The system unmaps the register, making that register available to be remapped to another device attribute or device.



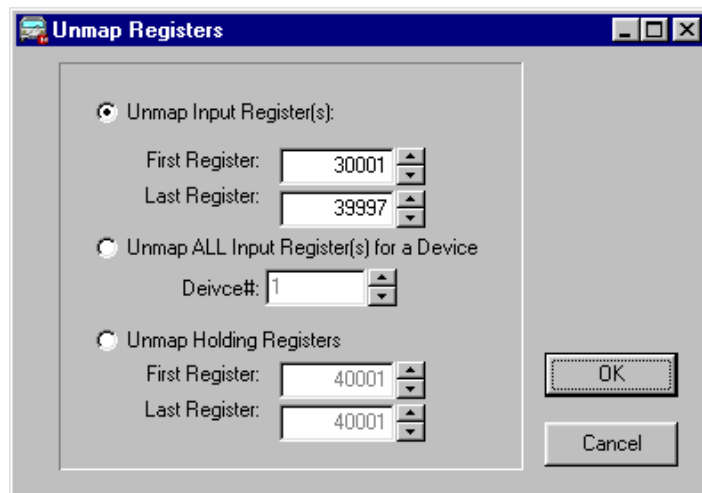
## Unmapping Multiple Registers

There are two ways to unmap multiple registers. These are:

- ◆ Unmap a range of registers.
- ◆ Unmap a range of registers for a device.

To unmap multiple registers, do the following:

1. Click on the Register menu, and select Unmap Multiple Registers. The Unmap Registers dialog box displays.



2. Select either the Unmap Input Register(s) radio button, the Unmap ALL Input Register(s) for a Device radio button, or the Unmap Holding Registers radio button.
3. If you select Unmap Input Register(s) or Unmap Holding Registers, enter the first and last register numbers of your selected range in the corresponding input fields.

### OR

If you selected the Unmap ALL Input Register(s) for a Device, enter the desired device number in the Device# input field.

4. Click OK.

The system unmaps the corresponding registers.

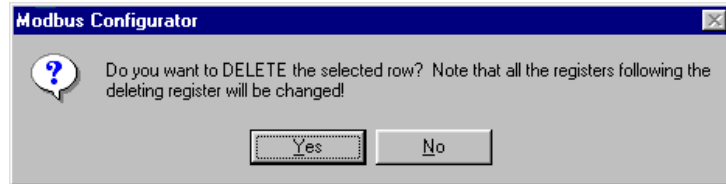
## Deleting a Row

You may delete rows of registers that may have been added when you configured device attributes or devices to the registers. To delete a row, do the following:

1. Click on the register row you wish to delete.

2. Click on the Register menu, and select Delete Row.

A confirmation dialog box displays, verifying the request to delete the selected row. (If you delete the row, all of the subsequent registers following the deleted register are renumbered.)



3. Click Yes to delete the row.

The system deletes the row and all subsequent registers are renumbered.

## Saving Modbus Configurations

You may save your configuration either to the Modbus Database (only), or to both the Modbus Database and the NetPower DeviceServer. The configured registers in the Input Register tab and the Holding Register tab display certain colors, depending on which save option you choose.

### Locally Only

To save only to the Modbus Database, click on the File menu, and choose Save to Database Only.

The configured registers in the Input Register tab and the Holding Register tab change from red to blue.

#### Note

When you save to only the Modbus Database, you will need to synchronize with the NetPower DeviceServer the next time you log on to NetPower Modbus Tools in the On-Line mode.

### Saving and Downloading NetPower DeviceServers

To save to the Modbus Database and the NetPower DeviceServer, click on the File menu, and select Save + Download to NetPower DeviceServer.

The configured registers in the Input Register tab and the Holding Register tab change from red and/or blue to black, and the system continues to poll the configured registers.

**Note**

When you save to the Modbus Database and NetPower DeviceServer, you will not need to synchronize with the NetPower DeviceServer the next time you log on to NetPower Modbus Tools in the On-Line mode. Only the configured registers are saved. The values for the polled attributes are not saved.

## Controlling Communications

While using NetPower Modbus Tools, you may wish to control communications with a selected NetPower DeviceServer.

The options for controlling communications with a NetPower DeviceServer are listed in the following table. These options are available through the NetPower DeviceServer menu option.

Option	Description
Open	Open and connect to a NetPower DeviceServer (for On-Line mode only).
Close	Close and disconnect from a NetPower DeviceServer (allows you to open another NetPower DeviceServer).
Connect	Reconnect (begin communications) with a NetPower DeviceServer. (If you are in Off-Line mode, this option allows you to connect to a NetPower DeviceServer to subscribe for data.)
Disconnect	Disconnect (terminate communications) with a NetPower DeviceServer. (When you disconnect from a NetPower DeviceServer, you disable subscribing for data from the NetPower DeviceServer; you cannot open another NetPower DeviceServer.)

### Disconnecting and Connecting to a NetPower DeviceServer

You may wish to connect or disconnect when configuring your system to maximize throughput of communications while you are working.

**Note**

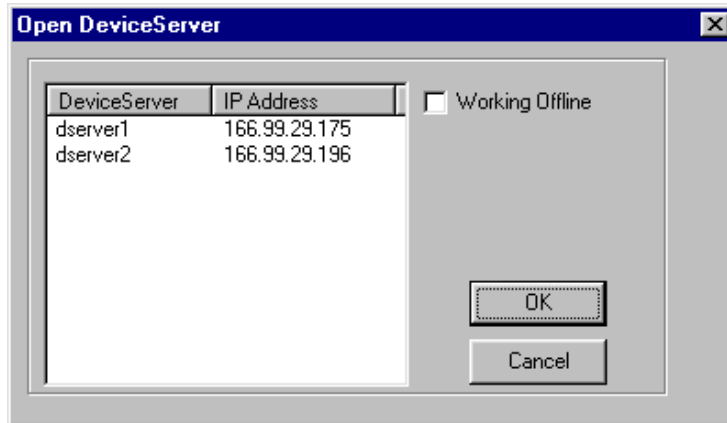
When you are disconnected, you are in the Off-Line mode, which allows you to configure without immediately polling for data.

#### ***Connecting to a NetPower DeviceServer***

To open and connect to a NetPower DeviceServer in the On-Line configuration mode, do the following:

1. Click on the NetPower DeviceServer menu, and select Open.

The Open NetPower DeviceServer dialog box displays.



This dialog box lists all of the NetPower DeviceServers that were configured using the NetPower Configurator application.

2. Select a NetPower DeviceServer and click OK.

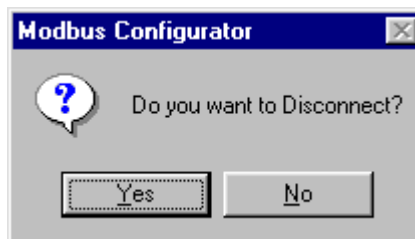
NetPower Modbus Tools opens and connects to the selected NetPower DeviceServer. If you have previously mapped Input registers and you click on the Input Register tab, the mapped registers update to the current values of the configured device attributes

### ***Disconnecting From a NetPower DeviceServer***

To disconnect from the NetPower DeviceServer, do the following:

1. Click on the NetPower DeviceServer menu, and select Disconnect.

A confirmation dialog box displays, verifying the request to disconnect.



2. Click Yes.

NetPower Modbus Tools disconnects from the NetPower DeviceServer. The Input Register tab no longer updates to show the subscribed data.

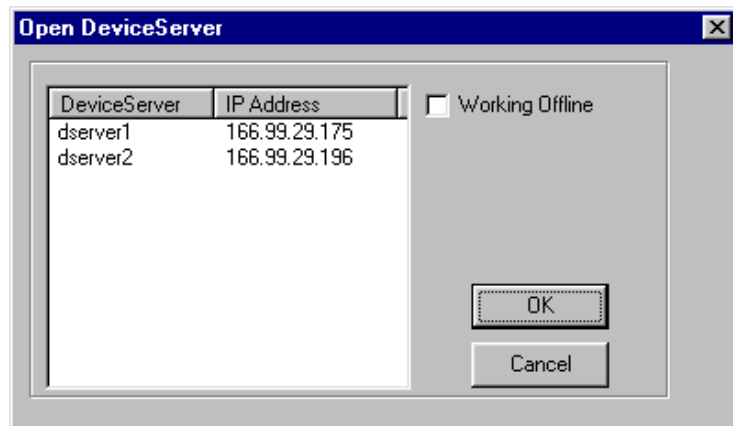
## Opening and Closing a NetPower DeviceServer

### *Opening a NetPower DeviceServer*

To open a NetPower DeviceServer, do the following:

1. Click on the NetPower DeviceServer menu, and select Open.

The Open NetPower DeviceServer dialog box displays.



This dialog box lists all of the NetPower DeviceServers that were configured with NetPower Configurator.

2. If you wish to work in the Off-Line mode, select the Working Offline checkbox.
3. Select a NetPower DeviceServer and click OK.

NetPower Modbus Tools opens the selected NetPower DeviceServer. If you did not select the Working Offline checkbox, NetPower Modbus Tools connects to the NetPower DeviceServer. If you selected the Working Offline checkbox, NetPower Modbus Tools does not connect to the NetPower DeviceServer.

### *Closing a NetPower DeviceServer*

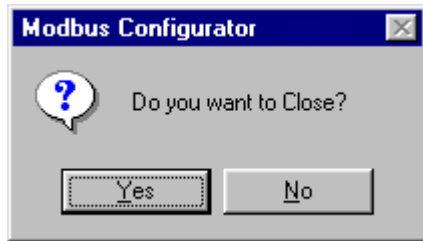
#### **Note**

When you close a NetPower DeviceServer, any configuration changes you made are **not** saved. Be sure to save your configuration before you close a NetPower DeviceServer

To close a NetPower DeviceServer, do the following:

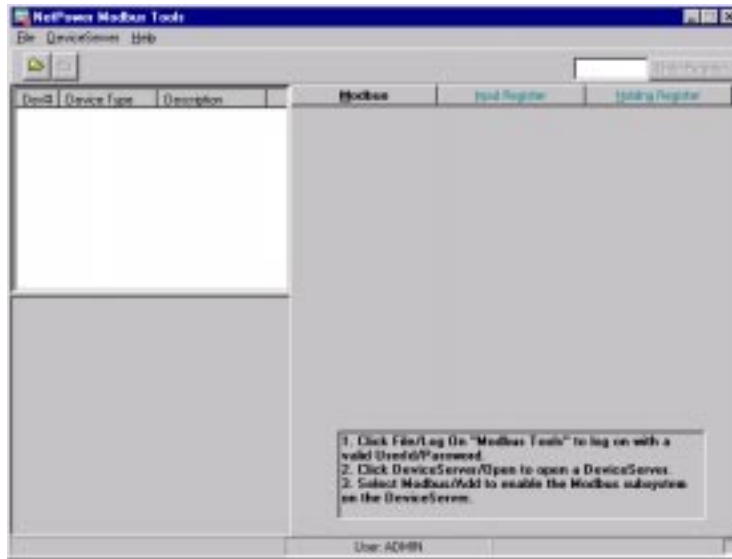
1. Click on the NetPower DeviceServer menu, and select Close.

A confirmation dialog box displays, verifying the request to close.



2. Click Yes.

NetPower Modbus Tools closes the NetPower DeviceServer. The NetPower Modbus Tools main window updates, indicating that the NetPower DeviceServer is closed.

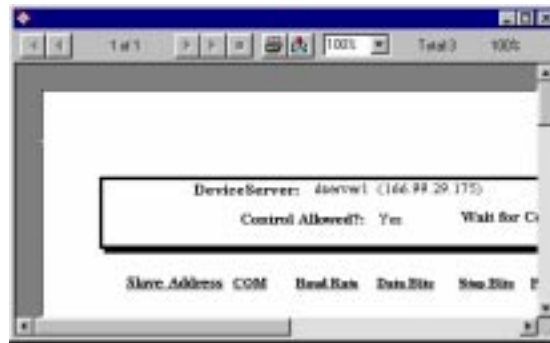


## Printing Modbus Configurations

To print your configuration, do the following:

1. Click on the NetPower DeviceServer menu, and select Print.

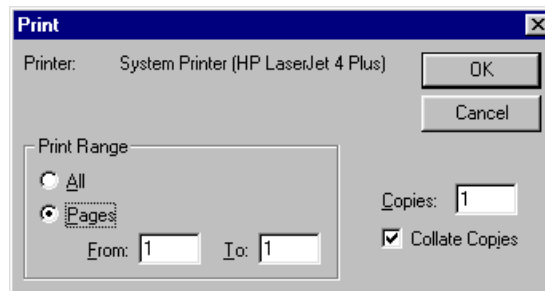
The Print window displays.



Inside the Print window, the print icon displays.

2. Click the Print icon.

The Print dialog box displays.



3. Make your print selections and click OK.

NetPower Modbus Tools prints the following:

- ◆ Communication settings: Slave Address, COM Port Number, Data Bits, Parity, Handshake, and Timeout.
- ◆ Input Register information: Input Register number, Device Number, Device Type, Device Description, and Mapped Attribute.
- ◆ Holding Register information: Device Number, Device Type, Device Description, and Data Registers.

## Synchronization

**Note**

This section contains information regarding synchronization between the NetPower DeviceServer and the Modbus Database, **not** between the Local and Master Security and Configuration Databases. For information on the latter, see *Chapter 5: Database Synchronization* in the *PowerNet Software User's Guide*.

Synchronization is selectively choosing unmatched items between the configuration on the NetPower DeviceServer and the configuration stored in the Modbus Database to create a final synchronized configuration.

If you are in On-Line mode, after you log on and open a NetPower DeviceServer that has not been synchronized with the Modbus Database, the Modbus Synchronization Wizard starts, and the Step 1 Synchronization window displays.

During the synchronization process, you are prompted to either keep or reject the Modbus configuration at either the Modbus Database or the NetPower DeviceServer.

**Note**

By keeping or rejecting configured registers at either the Modbus Database or the NetPower DeviceServer, you have greater control over the synchronization process. The final synchronized configuration may have information from both the Modbus Database and the NetPower DeviceServer.

The colors in the Synchronization windows indicate the status of the synchronization.

- ◆ If the particular item has an associated yellow display, then that item is already matched between the NetPower DeviceServer and the Modbus Database.
- ◆ If the item has an associated white display, then that item is not matched between the NetPower DeviceServer and the Modbus Database, and you must select or clear the appropriate items.



## Synchronizing the Modbus Database with the NetPower DeviceServer

NetPower Modbus Tools automatically prompts you to synchronize by displaying the Step 1 Synchronization window.

**Modbus Synchronization Wizard**

DeviceServer to sync with: NodeName1 (166.99.29.175)

**Step 1: Synchronize Modbus System**

1. Please click on "Local DB Setting" or "DeviceServer Setting" to determine the setting to keep.

2. Note that "Yellow" background is used to show the matched items and cannot be changed.

3. If you finish all the changes or if every item is matched, click "Next >>" to go to the next page.

	Local DB Setting	DeviceServer Setting
Modbus Enabled	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes
Control Allowed	<input checked="" type="checkbox"/> No	<input type="checkbox"/> No
Wait for Completion	<input checked="" type="checkbox"/> No	<input type="checkbox"/> No
Comport 1	<input checked="" type="checkbox"/> S1:19200,8,1,N,none 1s	<input type="checkbox"/> S1:19200,8,1,N,none 1s
Comport 2	<input checked="" type="checkbox"/> S2:19200,8,1,N,none 1s	<input type="checkbox"/> Disabled

Back >>   Next >>   Finish   Cancel

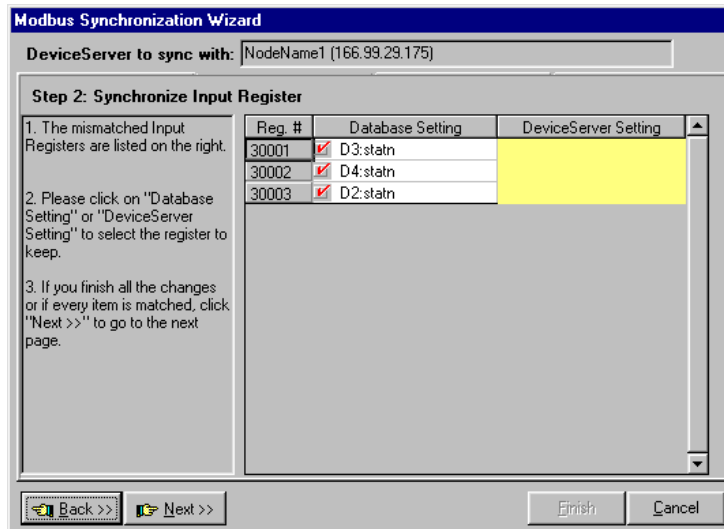
To synchronize between the NetPower DeviceServer and the Modbus Database, do the following:

1. In the Step 1 Synchronization window, verify the selections for the Modbus COM port settings and make any desired changes.

The Step 1 Synchronization window always displays 5 Modbus communication settings that may or may not match between the NetPower DeviceServer and NetPower Modbus Tools.

If a COM port is configured, the input settings display for that COM port. To interpret these input settings, see the section *Configuring the NetPower DeviceServer Modbus COM Ports*.

2. Click Next.
3. The Step 2 Synchronization window displays.



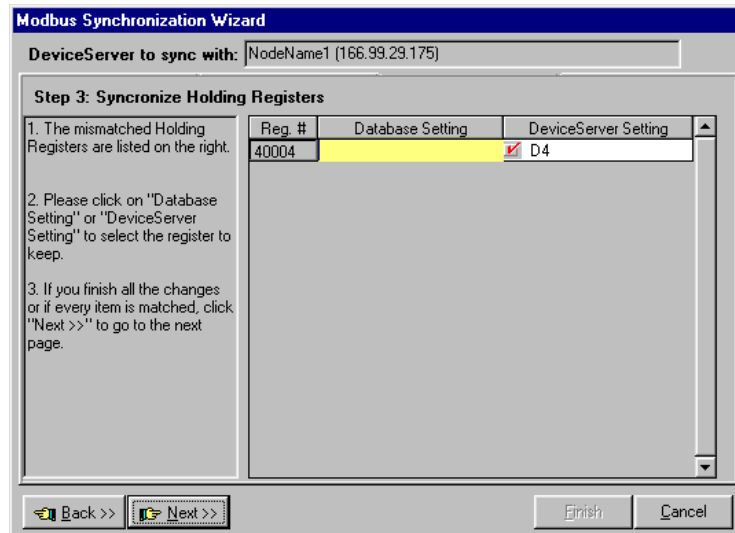
The Step 2 Synchronization window prompts you to select or clear the current Input Register configuration for the Modbus Database and for the NetPower DeviceServer.

The Step 2 Synchronization window only displays Input Registers that do not match between the NetPower DeviceServer and NetPower Modbus Tools.

If you clear a check box for a configured Input Register, then that register is not written to the synchronized configuration.

4. Make your desired selections and click Next.

The Step 3 Synchronization window displays.



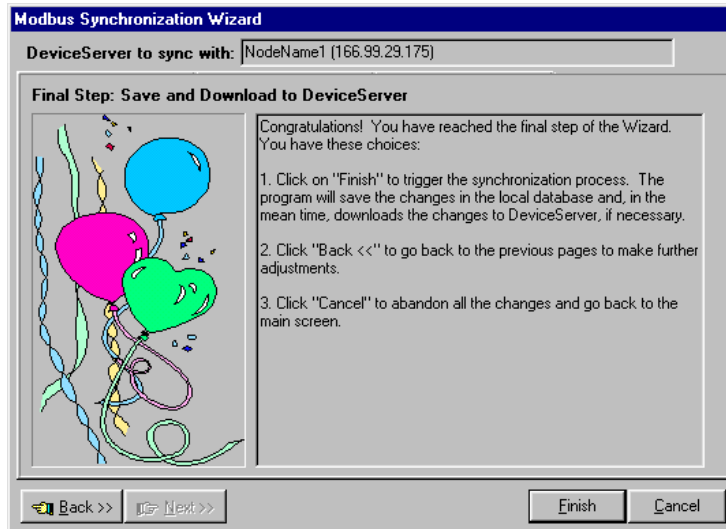
The Step 3 Synchronization window prompts you to select or clear the correct Holding Register configuration for the Modbus Database and for the NetPower DeviceServer.

The Step 3 Synchronization window only displays Holding Registers that do not match between the NetPower DeviceServer and NetPower Modbus Tools.

If you clear a check box for a configured Holding Register, then that register is not written to the synchronized configuration.

5. Make your desired selections and click Next.

The Step 4 Synchronization window displays.

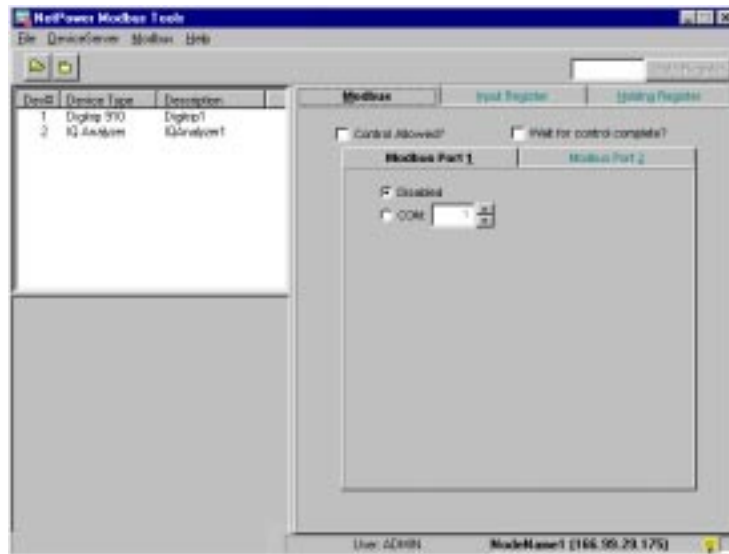


6. Click Finish to continue.

NetPower Modbus Tools writes the same configuration information to both the Modbus Database and the NetPower DeviceServer according to the synchronization selections that you made, and the NetPower Modbus Tools main window displays.

**Note**

When you save to both the Modbus Database and the NetPower DeviceServer, the next time you open that NetPower DeviceServer, you will not be prompted to synchronize.



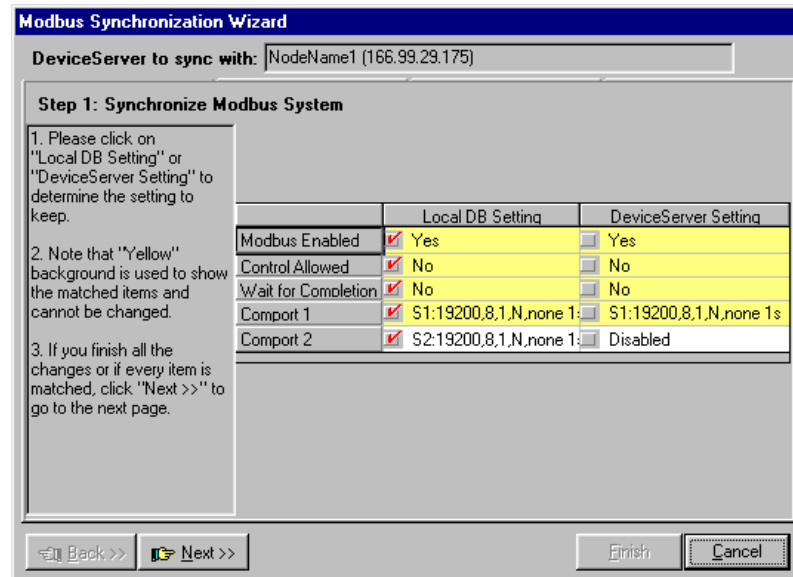
All of the configured devices associated with the opened NetPower DeviceServer display in the Device list box on the left of the NetPower Modbus Tools main window. Also, the name and IP Address of the selected NetPower DeviceServer displays in the Status Bar of the NetPower Modbus Tools main window. For more information on the NetPower Modbus Tools main window, see *Chapter 2: Getting Started*.

**Example**

Assume you have the following configured Input Registers:

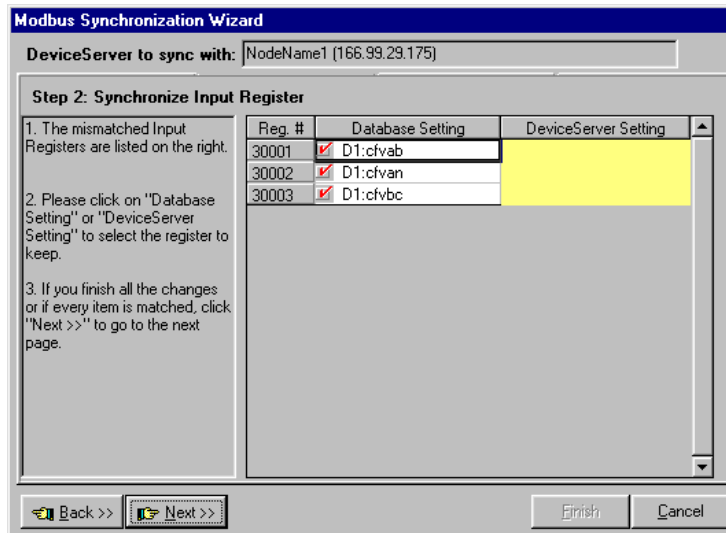
- ◆ Register 30,001 mapped to the device attribute Crest Factor Voltage (A-B) of device number 1.
- ◆ Register 30,002 mapped to the device attribute Crest Factor Voltage (A-N) of device number 1.
- ◆ Register 30,003 mapped to the device attribute Crest Factor Voltage (B-C) of device number 1.

You save your configuration to only the Modbus Database, then close your NetPower DeviceServer. When you open that NetPower DeviceServer, the system recognizes a difference between the Modbus Database and the NetPower DeviceServer configuration, and the Step 1 Synchronization window displays.



1. Click Next.

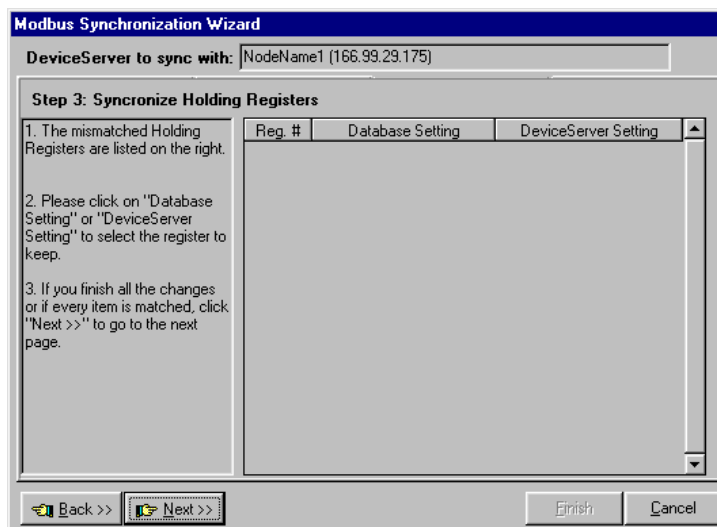
The Step 2 Synchronization window displays.



The window displays a difference in configuration between the Modbus Database and the NetPower DeviceServer. These are:

- ◆ Input Register 30,001 displays the mapped attribute (D1:cfvab)
  - ◆ Input Register 30,002 displays the mapped attribute (D1:cfvan)
  - ◆ Input Register 30,003 displays the mapped attribute (D1:cfvbc)
2. Clear the check box corresponding to Input Register 30,003 and click Next.

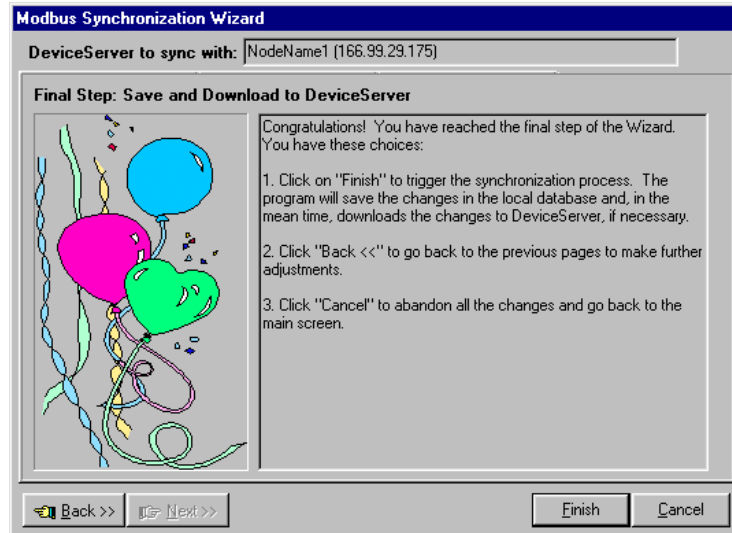
The Step 3 Synchronization window displays.



The Step 3 Synchronization window is empty, because there are no configured Holding Registers to synchronize.

3. Click Next to continue.

The Step 4 Synchronization window displays.

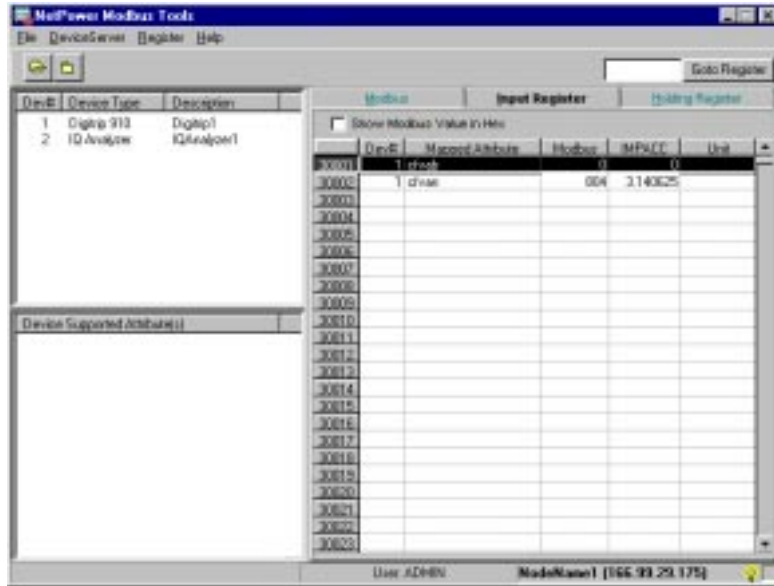


4. Click Finish to continue.

NetPower Modbus Tools writes the new configuration to both the Modbus Database and the NetPower DeviceServer, and the NetPower Modbus Tools main window displays.

5. Click on the Input Register tab.

The Input Register tab displays the most current configuration for both the Modbus Database and the NetPower DeviceServer.



Because you cleared Input Register 30,003, only configured Input Registers 30,001 and 30,002 were saved, and thus display in the Input Register tab.



## Input Register and Holding Register Interpretation Examples

### Examples for Interpreting Input Register Values

#### Example 1

Input Register 30,005 is mapped to the IQ Analyzer attribute STATN (Device Status).

Dev#	Mapped Attribute	Modbus	IMPACC	Unit
30001				
30002				
30003				
30004				
30005	7: statn	7	7	
30006				
30007				
30008				
30009				
30010				
30011				
30012				
30013				
30014				
30015				
30016				
30017				
30018				
30019				
30020				

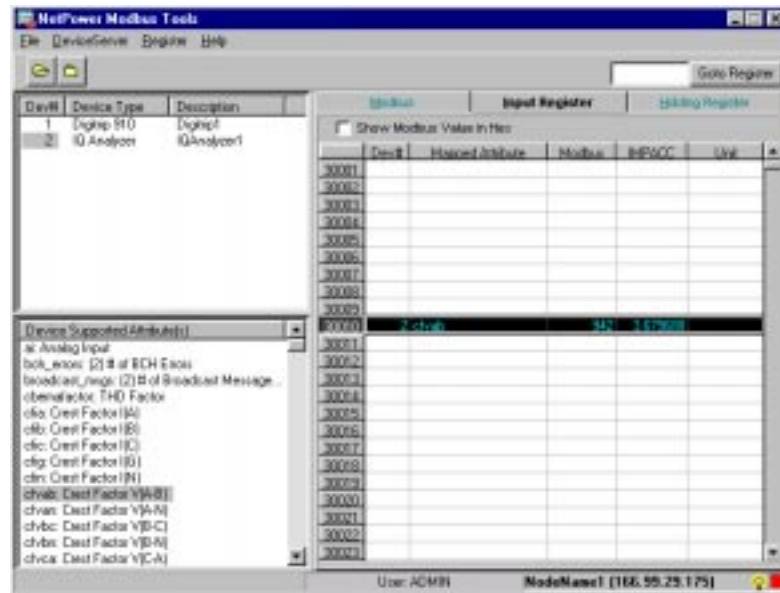
Device Supported Attributes:

- statn: Status
- sys\_demand\_watts: (2) System Demand
- sys\_req\_peak\_demand\_watts: (2) System N...
- sys\_peak\_demand\_watts: (2) System Po...
- sysavggrp: Energy Units
- Indic: % THD (A)
- Indic: % THD (B)
- Indic: % THD (C)
- Indic: % THD (N)
- Indicab: % THD (A-B)
- Indicab: % THD (A-N)
- Indicab: % THD (B-C)
- Indicab: % THD (B-N)
- Indicab: % THD (C-A)

- ◆ The Modbus and IMPACC columns display the code 7 for the attribute value.
- ◆ Using the IQ Analyzer table located in *Appendix B: Device Objects* in the *PowerNet Software User's Guide*, you determine that the value 7 is valid for the STATN field. There is no scale factor. The notes refer you to *Appendix A: Status/Reason Codes* in the *PowerNet Software User's Guide*, where you determine that the value 7 means that the device is in Ready mode.

## Example 2

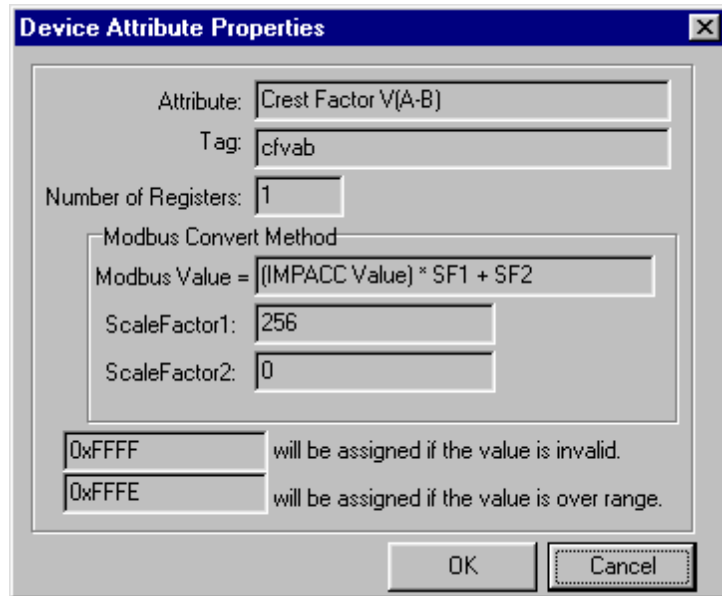
Input Register 30,010 is mapped to the IQ Analyzer attribute CFVAB (Crest Factor Vab x256).



- ◆ The value that displays in the Modbus column is 942 for the particular polling scan.
- ◆ Using the IQ Analyzer table located in *Appendix B: Device Objects* in the *PowerNet Software User's Guide*, you confirm that the value 942 is within the valid range of values. The footnote indicates that you must divide by 256 to get a final value that is between 1.00 and 99.99. (That is,  $942 / 256 = 3.679688$ ).

Thus the Crest Factor Vab value from the IMPACC device is 3.679688, and this value is passed to the Modbus value as 975.

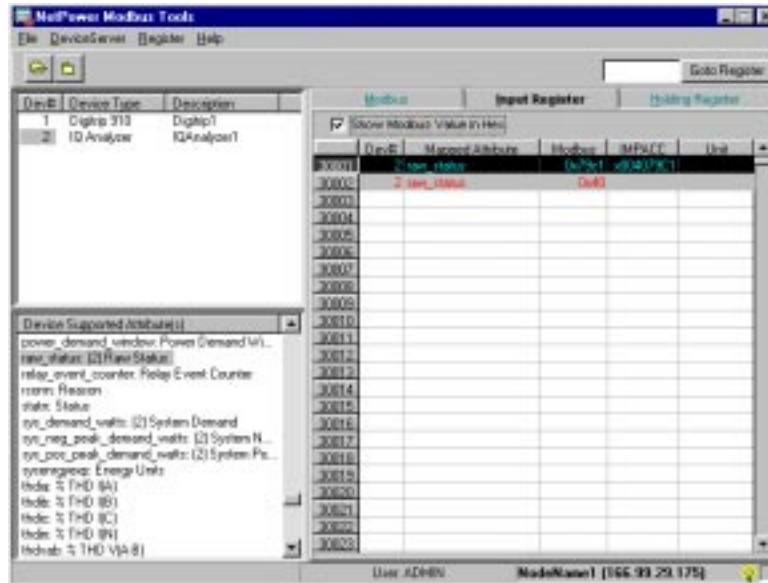
- ◆ Alternatively, you may double-click on the device attribute to display the Device Attribute Properties dialog box.



The ScaleFactor1 output field indicates a value of 256. The ScaleFactor2 indicates a value of 0. Thus, only ScaleFactor1 is used to convert the IMPACC value 3.679688 to the Modbus value 975.

### **Example 3**

Input Register 30,001 is mapped to the device attribute Raw Status. Two consecutive Input Registers are used, because this attribute requires two 16-bit registers. Although both Input Registers display the Modbus Value, you may only select the first Input Register to modify or delete.



The configured registers display in hex code. The IMPACC column displays the value (in hex) that is read from the IMPACC device. The value that displays in the Modbus column shows that two Input Registers were used to hold the value. When you add the values in the IMPACC column for Input Register 30,001 and 30,002, the sum of these values equals that in the IMPACC column. That is:

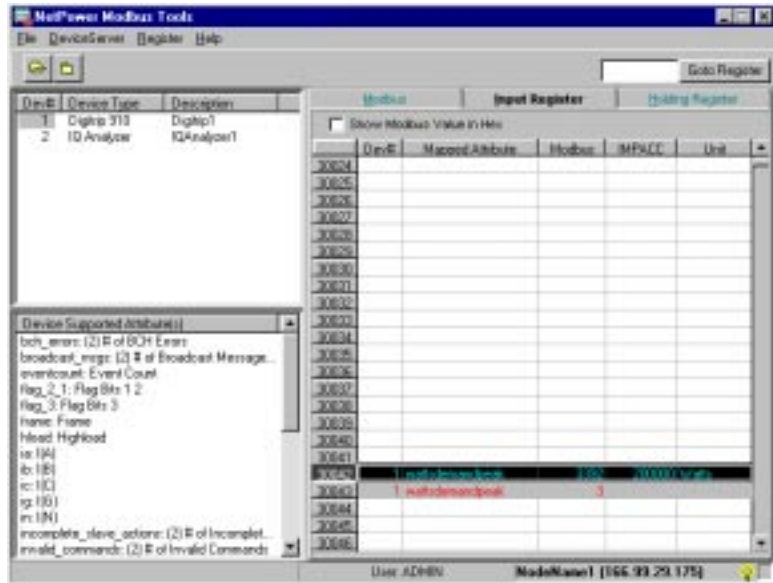
$$(0x40) + (0x7901) * (0x10000) = (x00407901)$$

**Note**

Any time that a mapped attribute uses two Input Registers, the values that appear in both registers add together to form the net value that is passed to the Modbus Master.

**Example 4**

Input Register 30,042 is mapped to the device attribute Peak Demand Watts. Two consecutive Input Registers are used, because this attribute requires two 16-bit registers. Although both Input Registers display the Modbus Value, you may only select the first Input Register to modify or delete.

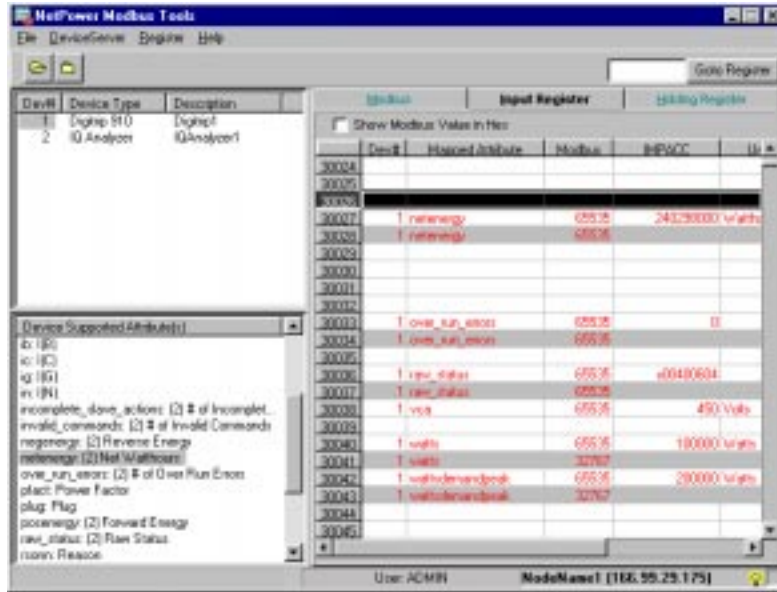


The IMPACC column displays the value that is read from the IMPACC device. The value that displays in the Modbus column shows that two Input Registers were used to hold the value. When you add the values in Input Registers 30,042 and 30,043 the sum of these values equals that in the IMPACC column. That is:

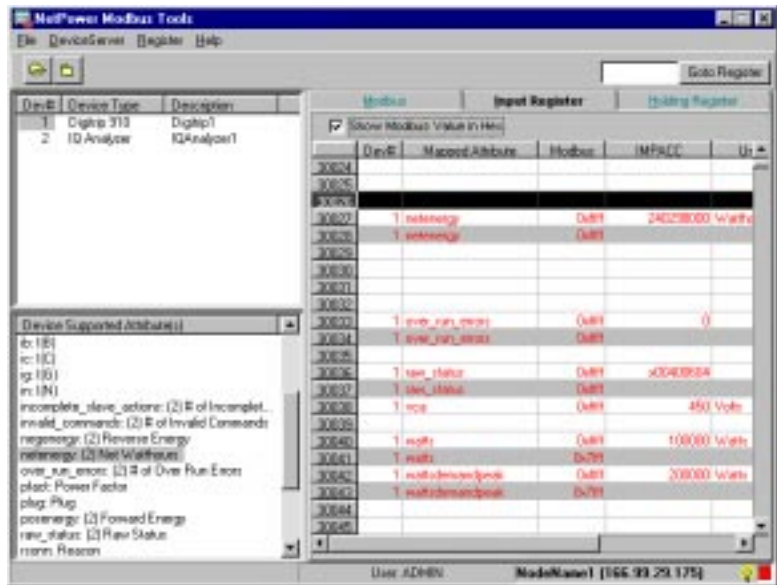
$$3392 + 3*(65536)=200000$$

### **Example 5**

Input Register 30,042 is mapped to the device attribute Peak Demand Watts. Other Input Registers (for device number 1) are mapped as well. Specific values display in the IMPACC column for all configured Input Registers, but the Modbus column displays the value 65535 for all configured Input Registers.



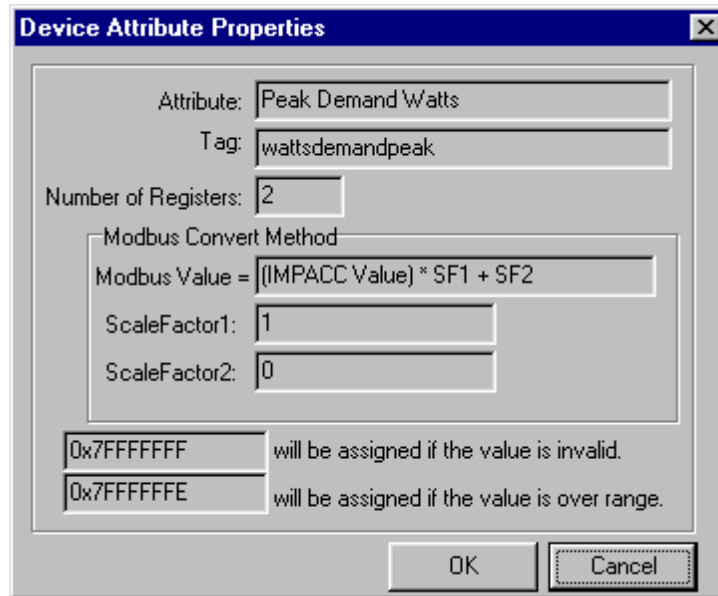
If you change the display to hex, the Modbus column changes to 0xffff.



Although values display for the IMPACC column, invalid codes display for the Modbus column, indicating that the attribute values are invalid (e.g., the device was taken off-line).

- ◆ Double-click on the Peak Demand watts attribute.

The Device Attribute Properties dialog box displays.



The output field at the bottom of the dialog box displays the invalid codes in hex format.

If device number 1 is put back on-line, the mapped attributes automatically update.

