D8000 SERIES QUICK START GUIDE

Version 1.0

Overview

The D8000 series modules require a DC Voltage power supply, a USB cable and an unused computer USB port for proper operation. Connecting the D8000 series modules to the USB port will create a virtual serial communications port on the computer. The serial port number can be found in the computer Device Manager. Use the information below in "Locate the Serial Port Number" section below to determine the new serial port number.

The D8000 series modules communicate through the virtual serial port using the Modbus RTU serial protocol, Modbus Slave Address of 0x01, at 9600 baud, no parity, eight data bits and one stop bit. Using the virtual serial port and the Modbus RTU protocol allows virtually any commercial data acquisition program to communicate with the module.

Setup information in a module may be changed at any time using the DGH D6000 series Utility Software. The software is distributed on CD ROM with each order and can be downloaded anytime at www.dghcorp.com.

The D8000 series modules contain an EEPROM (Electrically Erasable Programmable Read Only Memory) to store setup information and calibration constants. The memory is nonvolatile which means that the information is retained even if power is removed. No batteries are used so it is not necessary to open the module case.

Quick Start Steps:

1. Connect a +10-30Vdc voltage in between the +VS and GND terminals, Figure 1.0 below.
2. Plug one end of the USB cable into the connector on the module. Connect the other end of the USB cable into an unused port on the computer. Figure 1.0 below.
3. Then install the Utility Software on the computer to begin the module configuration process. See the "Software Installation" information below.

Module Connections

The D8000 series module connects to a host computer using a USB 1.0 or 2.0 compatible cable. Plug one end of the cable into the module and the other end into an unused USB port on the host computer.   **Note:** No connections are required on the analog or digital I/O pins to perform the module configuration.

Figure 1.0 USB Cable connection to a host computer.

Locate the Serial Port Number

After the USB cable is plugged into the computer for the first time then a message will appear indicating that new hardware has been found. See Fig 2.0 below. The new hardware will be added as a virtual serial communications port, typically identified as "COMn:" where n is the port number. Follow the steps below to determine the new serial port number.

Figure 2.0 D8000 series message indicating new hardware has been found.

Locate Serial Port Number:

Open the computer Device Manager to determine the new serial port number. Open the Device Manager by either right-clicking on the "My Computer" desktop icon and select "Properties". Or press the "Start" button in the lower left corner of the screen and click the "My Computer" link.

Figure 3.0 Using My Computer Icon, right-click and select PROPERTIES.

Figure 4.0 Using the Start button and then click on My Computer.

The System Properties dialog screen will appear and select the "Hardware" tab and press the "Device Manager" button. See Figure 5.0 below.
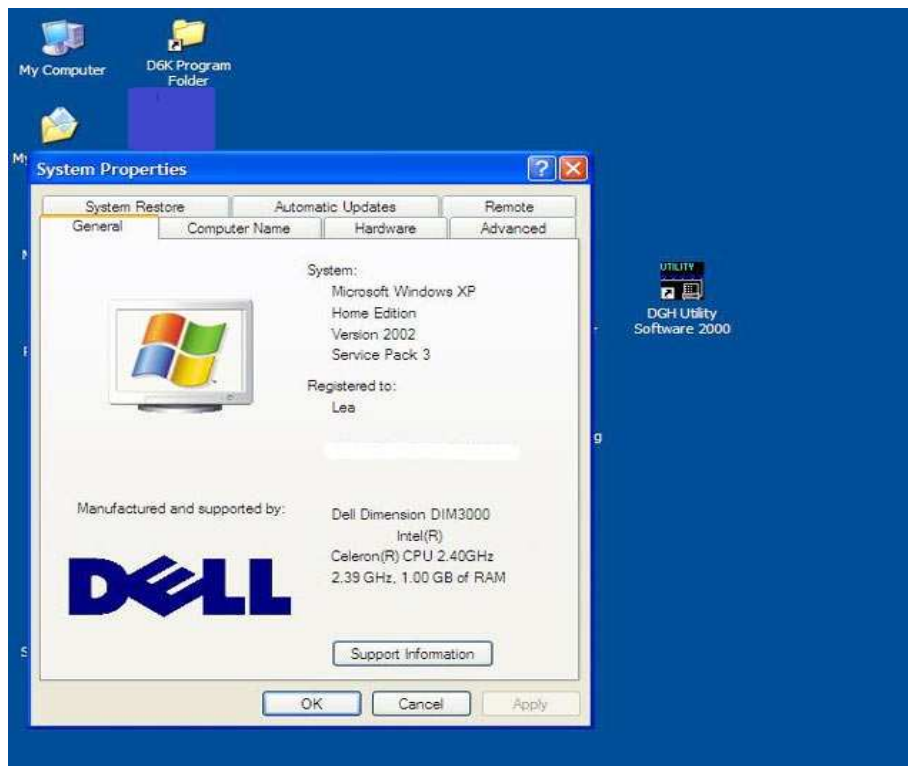

Figure 5.0 My Computer System Properties dialog screen, select the Hardware tab.
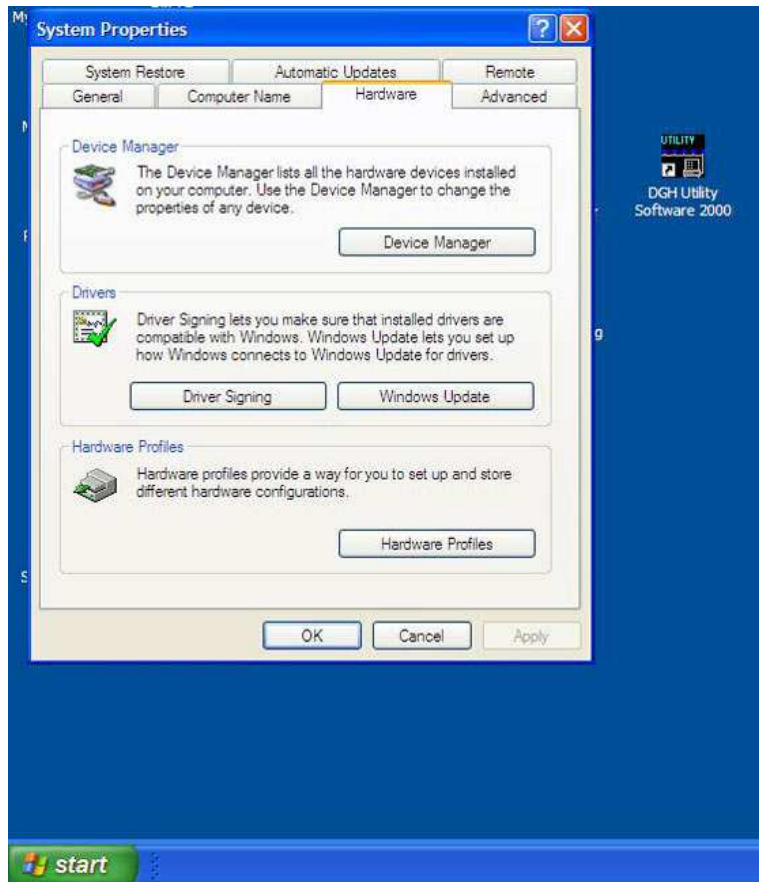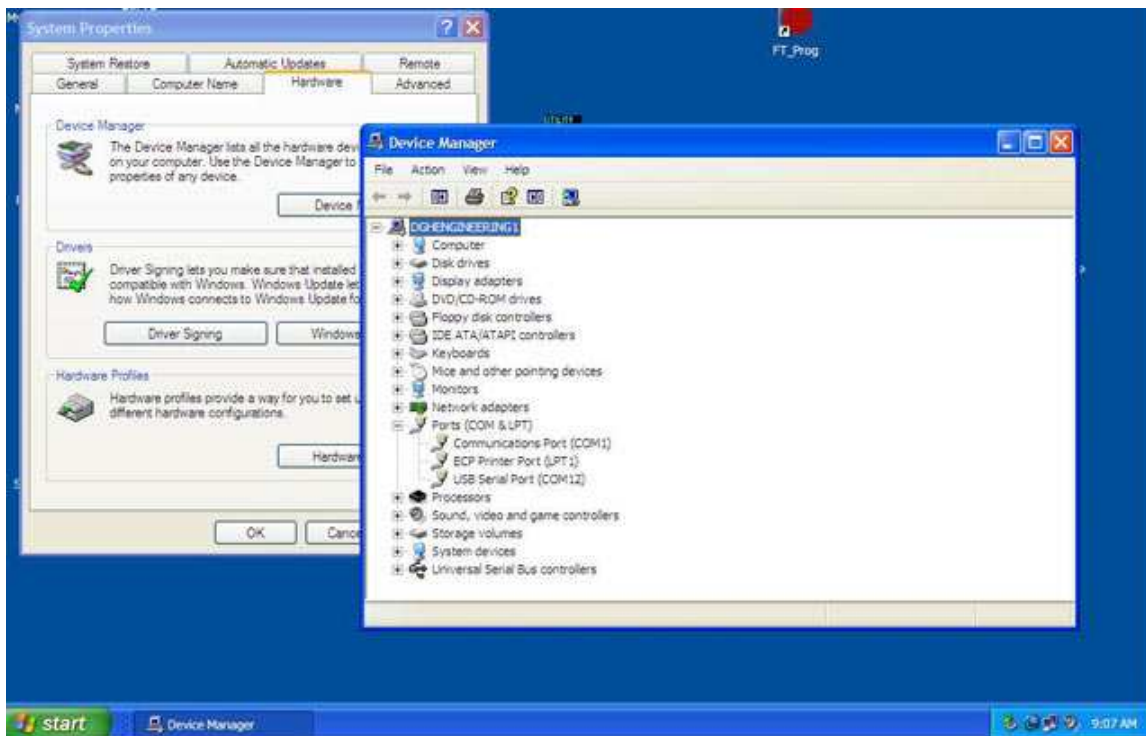
Figure 6.0 Click on the "Device Manager" button.

Figure 7.0 Click on the + next to Ports (COM & LPT) and expand the ports tree.

The new serial port is listed under "Ports (COM & LPT)" in the Device Manager and will be designated as "USB Serial Port (COMn)" where n is the port number. See "USB Serial Port (COM12)" in Figure 7.0 above.

The serial port number is required to communicate with the D8000 using the Utility Software or other commercial data acquisition software. After locating the serial port number, install the Utility Software to make any setup adjustments such as analog input range selections. See "Software Installation" below.

Software Installation

The DGH D6000 Series Utility Software is the best program to use when configuring a module. The utility software reads the existing module information, displays the information in easy to understand terms, allows changes to be made via drop-down list boxes and then writes the new values back to the module.

The Utility Software is provided free of charge on CDROM with a purchase order and the latest version is always downloadable from www.dghcorp.com. The utility software runs on Windows based computers. Simply insert the CDROM into the CDROM drive, or download the Setup.Exe file from the website, and then run the SETUP.EXE installation file. The software will install and create a menu section called "DGH DATA ACQUISITION" and the Utility Software will be under that selection.

From the computer desktop select the "start" button, select "all programs", select "DGH Data Acquisition" and then select "D6000 Series Utility Software" to run the utility software. A desktop icon is also available to start the program. When the software opens then the first step is to select, configure and open the serial communications port on the computer that the module is connected to.
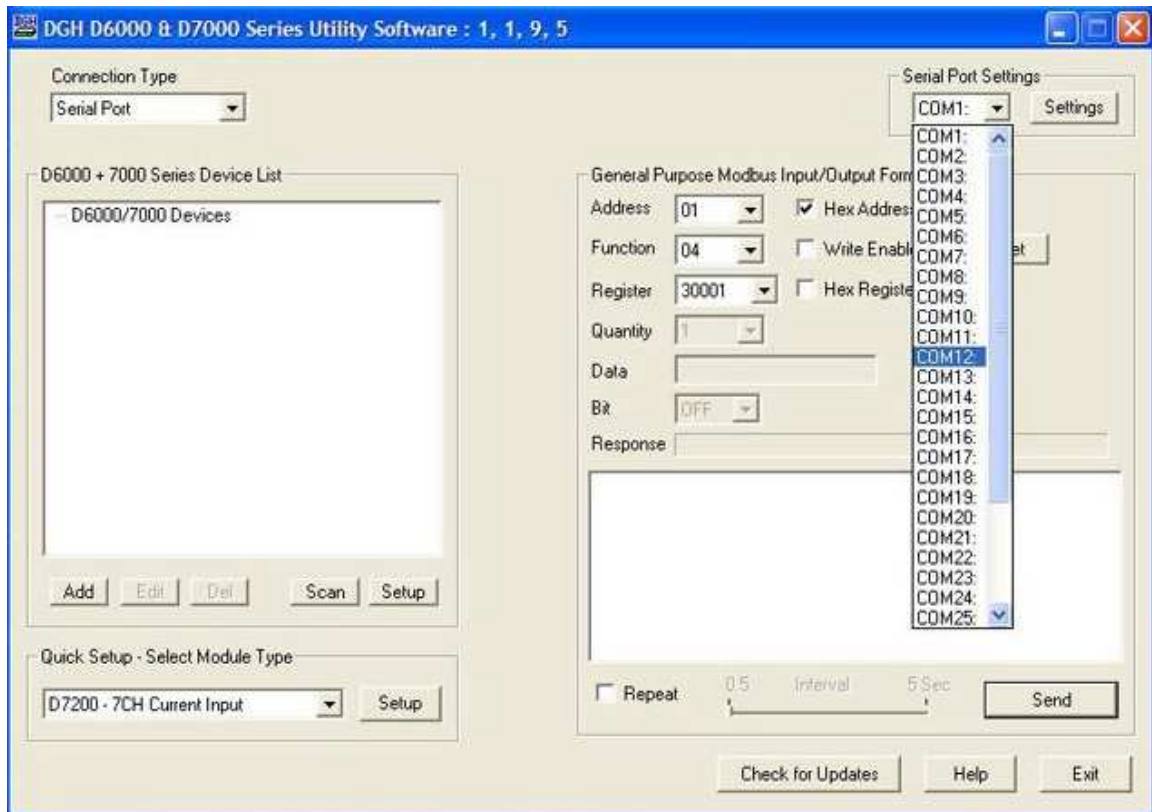

Figure 8.0 Utility Software main screen.

Select "Serial Port" in the upper left corner of the program screen. Then select the serial communications port in the upper right corner of the screen and press the "Settings" button.

On the Settings screen select 9600 baud, no parity, eight data bits, one stop bit, RTS Only handshaking and the Tx and Rx delays can be left in their default state.
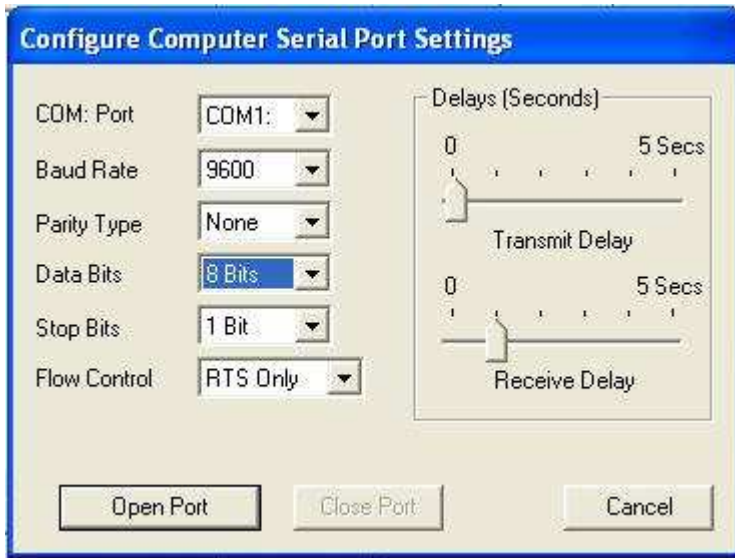
Figure 9.0 Serial Port Settings screen.

Press the "Open Port" or "Update" button to complete the serial port configuration process.

Test Communications

After the utility software serial port has been configured the next step would be to check for valid communications between the computer and the module. You must have valid communications with the module before trying to perform the configuration process. To test the communications set the Modbus Slave Address to 0x01. Set the Function selector to 03 and the Register selection to 40001. Press the "Send" button to verify communications. A typical module response is shown in the figure below.
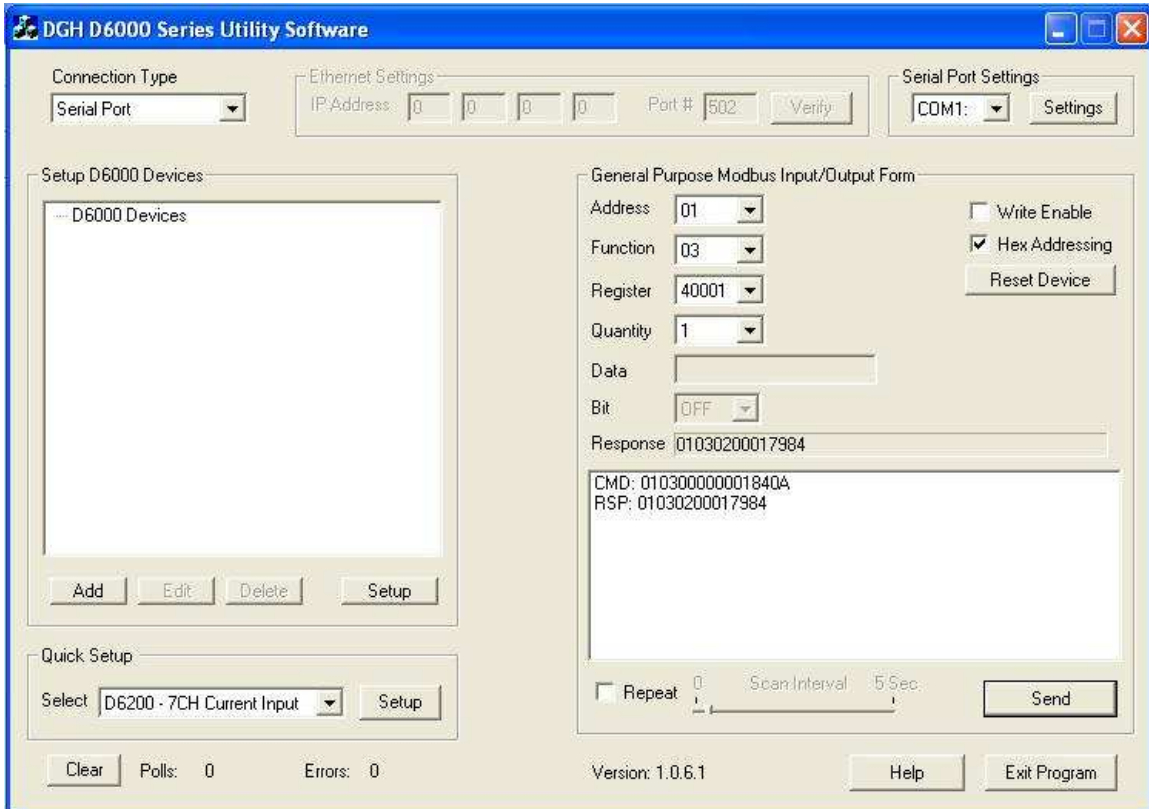
Figure 10.0 Utility Software main screen with typical Modbus response.

The figure above illustrates Modbus function 03 being sent to Slave address 01. Both the command and response messages are displayed. This command/response format is provided for troubleshooting purposes. It displays each byte of data being sent to and received from the module. This information be a good troubleshooting tool or a good way to become familiar with the Modbus RTU protocol.

The response data value from register 40001 is located in the RSP: line. The data value is a 16-bit value located in the fourth and fifth bytes in the message (00 01). The "00 01" indicates that the register value is 0001. Using the 7CH Current Input Modbus Register map, register 40001 is the Modbus Slave address. In this example the module slave address value is read back as 0001.

In the event that the module was not detected by the software then the RSP: line would say "RSP: Timeout – No Response Detected!". Several things may contribute to this problem. Some examples are no power to the module, bad RS-485 wiring connection(s), invalid port settings, or RS-485 half-duplex handshaking problems all can cause timeout errors. Timeout errors must be corrected before attempting to configure a module.

Setup a Module

After a successful communications test has been performed then the module can be configured. Select the type of module using the drop-down list box under "Quick Setup" in the lower left hand corner of the screen. Then press the "Setup" button. A new screen (see below) will appear that contains list of all the user-selectable module values. The screen below is for a seven channel current input module.

Figure 11.0 D8000 series analog input module configuration screen.

Ensure that the Module Address in the lower left corner is 01, the proper serial port is selected in the upper right corner of the screen and press the "Read Setup" button. The screen will now populate using the configuration data read from the module.

The user-selectable values are displayed in an easy to understand format and new selections can be made using the drop-down list boxes. The drop-down list boxes make the configuration process easy and accurate because erroneous values cannot be entered.
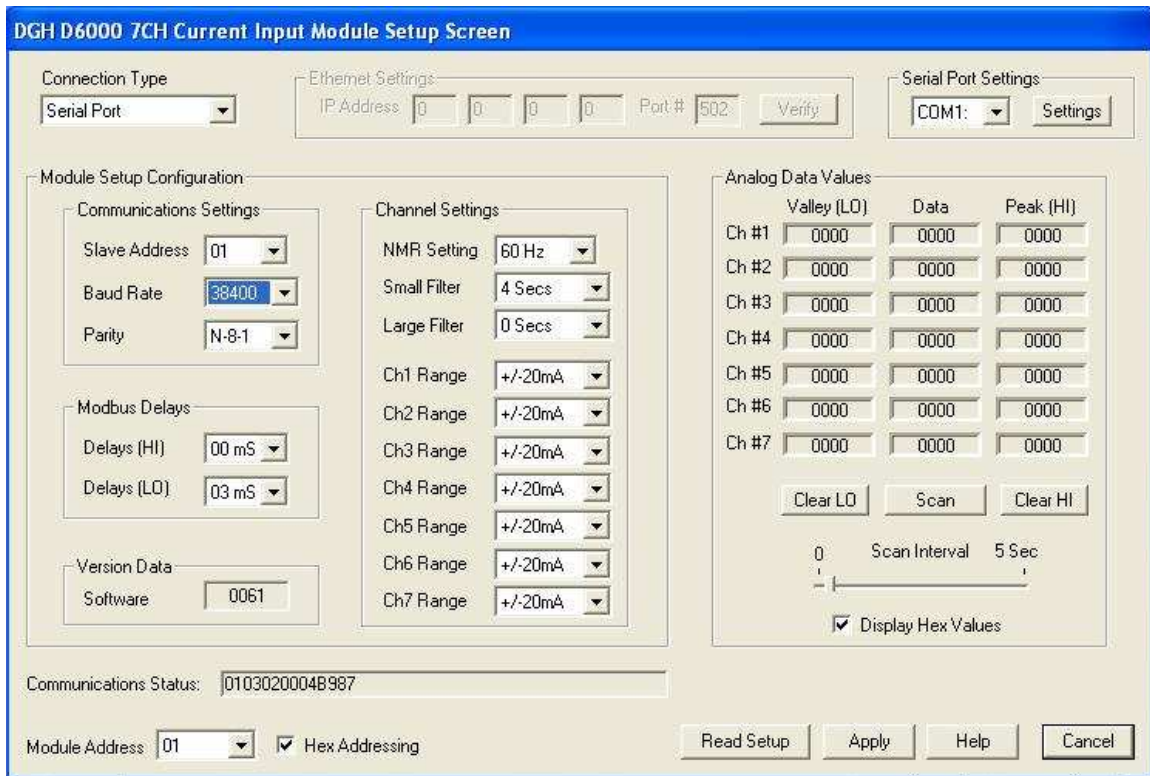
Figure 12.0 D8000 series analog input module configuration screen with values.

After the settings have been changed to meet the application requirements then press the "Apply" button to transmit the new values.

Scan Module Data Values

After the module has been properly configured, the analog input data values can be read from each channel. This feature is a good troubleshooting or verification tool and should only be used when valid analog input signals are connected to the module.

Press the "Scan" button to enable the scanning process. Each channel value is read from data registers within the module. The analog input module data registers can be found in the Modbus Register map. Each module has its own specific Modbus Register map.

The analog data values are returned in unsigned integer hexadecimal percentage of Full Scale format where a value of 0x0000 represents the minus full scale input of the module range. A value of 0xffff represents the positive full scale input of the module range. These values can be viewed to check that each channel is operating properly when analog signals are applied to the input terminals.

The analog data values can be displayed as a numerical values. The utility software knows the plus and minus full scale input range for each channel. The software can convert the raw data values to millivolts, milliamps, or temperature readings. Simply uncheck the "Display Hex Values" selection underneath the channel readings to display the numeric values.

The scanning process will also log and display the highest (peak) and lowest (valley) readings that were recorded during the scanning process. This is just for indication purposes only.

Once the setup process is completed then the D8000 is ready to be installed into the application.