



## USING YOUR D6000 SERIES MODULE WITH LabVIEW

The DGH D6000 Series data acquisition modules interface easily to National Instruments (NI) data acquisition program LabVIEW. LabVIEW is an easy to use software program that contains a graphical user-interface (GUI) to build Virtual Instruments (VI's) that control and operate data acquisition hardware like the D6000 series.

Virtual Instruments are graphical representations of data acquisition instruments, devices or an entire application. Each VI contains a graphical interface called a "Front Panel" and a functional "Block Diagram". The graphical front panel displays the application control objects like knobs, switches, graphs, digital meters, status LED's and more. The block diagram is the software connection between the graphical objects on the front panel and each piece of hardware or the instrument(s) in the application. The block diagram also contains connections to device drivers that perform the communications between the program and the application hardware.

LabVIEW communicates with the D6000 series using the NI-Modbus RTU software device driver. The device driver is the interface between LabVIEW and the physical hardware. The device driver receives requests from the graphical user-interface screen to read or write data to the D6000 module. The device driver formats these requests into Modbus RTU compatible messages and transmits them to the D6000 module.

### DGH Virtual Instruments

DGH has created five individual Virtual Instruments for use with the D6000 series. The VI's are specific to the type of D6000 series module being used. One VI was developed for the D6100, 6300, and D6400 analog input modules, one for the D6200 analog current input modules, one for the D6500 analog output modules and the final two are specific to the D6710 digital input and D6720 digital output modules. Each of these files can be opened with LabVIEW 11 or higher.

Since the VI's can be opened in the development environment, the graphical front panel can be changed easily to meet specific application requirements. The block-diagram of each VI contains all the serial port connections, display objects, scaling objects, and the appropriate Modbus RTU blocks to control the specific type of module. Further, any portion of these sample VI's can be cut and pasted into a larger application.

The VI's developed for the analog modules will display both scaled and raw data values for each analog input channel. The scaled data values are displayed using line graphs and the raw data values are displayed using either text boxes or needle graphs. The line graphs utilize mathematical calculations to compute the scaled values. The calculations are performed using objects on the block-diagram page and will require the proper minimum and maximum range values for accurate readings. The raw data values are provided in order to display exactly what is coming out of the module. These values can be used for troubleshooting purposes while becoming familiar with the module. Users may choose to remove these values in the final versions of their application front panel.

These VI's can be used with your brand new D6000 series module when it arrives. The VI serial port parameters are configured to the same values that are programmed into each new D6000 module. The values are Modbus Slave Address 01, 9600 baud, no parity, and one stop bit.

**IMPORTANT:** Some of the D6000 series analog input modules have individually selectable range settings for each channel. The scaled data formula MN and MX values must be set in the block-diagram to match the input range of each analog input/output channel.

## DGH Virtual Instrument Filenames

The table below contains a list of D6000 series model numbers and the respective virtual instrument file that should be used. These files can be found on the DGH Utility software distribution CDROM and are also downloadable at <http://www.dghcorp.com/labview>.

### LabVIEW Sample Virtual Instruments

Model Number	.VI Filename
D6100, D6300, D6400 Analog Input Modules	D6100.VI
D6200 Current Input Module	D6200.VI
D6500 Analog Output Module	D6500.VI
D6710 Digital Input Module	D6710.VI
D6720 Digital Output Module	D6720.VI



**Table 1.0** DGH Sample Virtual Instruments for NI LabVIEW program.

## Labview Setup and Installation Requirements

In order to use the DGH sample VI's there are three steps that need to be performed. You must first install the LabVIEW program, the Modbus serial device driver and the LabVIEW Visa. These steps were performed on a Windows XP-Home computer to develop the sample VI's.

### Program Installation

1. Purchase LabVIEW or download the 30-day trial version from the National Instruments website at <http://www.ni.com/labview>.
2. Install the LabVIEW program on computer.

### Modbus Driver Installation

1. Download the Modbus Device Driver from the National Instruments website. The filename is NIMODBUS121.ZIP.
2. Unzip the NIMODBUS121.ZIP file into a new folder and follow the installation instructions in the readme.html file.

### LabVIEW Visa Installation

1. Download the National Instruments VISA (Virtual Instrument Software Architecture) libraries for configuring, programming and troubleshooting serial port matters.

**NOTE:** The VISA file is operating system dependent and available from the National Instruments website. The filename that was used to develop the VI's on a Win-XPHome computer is visaruntime450.exe. More information on NI-VISA can be found at <http://www.ni.com/visa>.

2. Install the VISA libraries by executing the downloaded file.  
**NOTE:** The VISA is required for the serial ports detect the serial ports and populate them into the VI screen.

### DGH Virtual Instruments

1. Download the appropriate sample virtual instrument file(s) from the DGH website using the information in Table 1.0 above.
2. Start the Labview program.
3. Load the DGH sample virtual instrument into the LabVIEW.
4. Make any scaling adjustments in the "block diagram" page - match the MN and MX values for each analog input or analog output formula block to the channel ranges programmed in the D6000 module.
5. If necessary, make any serial port parameter adjustments to match the values programmed into the D6000 module. Factory new: Slave Address 01, 9600, N, 8, 1.
6. Select the Serial Port on the graphical Front Panel screen.
7. Run the virtual instrument.