Using DGH D6200 Analog Input Module with

DAQFactory Express HMI/SCADA Software

Develop a low cost data acquisition system using a DGH D6200 seven channel 4-20mA analog input module and the AzeoTech DAQFactory Express HMI SCADA software. DAQFactory Express is a free HMI SCADA software program that collects data from up to eight channels and displays two HMI screens. DAQFactory Express also includes data logging to file with date and time stamps using the MS-Excel compatible ASCII comma-delimited data format. More complex systems can be created or expanded using multiple D6000 series modules and an enhanced version of the DAQFactory software.

The DGH D6000 series modules are a complete family of data acquisition modules for use in process control systems. These modules can measure process signals such as thermocouples, 4-20mA loops, discrete contact closures, and they can generate DC voltage or current signals for controlling annunciators or valves. Discrete digital output modules are also available and all modules can be controlled using host supervisory control and data acquisition software like DAQFactory and DAQFactory Express.

The DAQFactory Express program allows users to develop a very low cost data acquisition system with an HMI SCADA software interface. Combined with a DGH D6200 series module users can measure 4-20mA signals, display the data values in real time on a trend graph, date and time stamp the data values and store them to disk in a MS-Excel comma-delimited ASCII text file for future analysis.

A DAQFactory Express application file is available for use with the D6200. Simply download the application file, connect a D6200 series module to the computer serial port (right out of the shipping box, no configuration required), load it into the program and define the proper serial port number (see Configuration Steps below). Data logging will begin immediately "after" specifying the serial port number. The application file is called "DGH_D6200_logging.ctl" and available for download at http://www.dghcorp.com/daqfactory. Use the steps below to specify the serial port number.

Configuration Steps:

1. Download and install DAQFactory Express at daqfactory.com.
2. Download the application file and store in the DAQFactory Express program\Samples folder.
3. Start the program.
4. At the main menu select File->Open->DGH_D6200_logging.ctl and press the "Open" button.
5. Specify the proper serial port
   - Press the "Configure Comms" button in upper right corner of the screen.
   - Enter the proper "Serial Port # (COM)" number that D6200 is connected to and press "Save".
   - **NOTE:** All remaining DAQFactory Express serial port parameters should remain at their default values (9600, 8, N, 1, No flow Control). This will allow a brand new D6200 series module with the same factory default serial values to be used with the "DGH_D6200_logging.ctl " file. No device setup changes required.
6. Scanning should start immediately after the serial port has been properly configured.

Data Logging:

The application file can store the 4-20mA values to disk using the MS-Excel compatible comma-delimited ASCII file format. Time and date stamp are also included with each set of values. The values are written in the disk file specified in the "Logging" panel underneath the trend graph. Use the default location and file name or press the "Change" button to specify a new location and file name. Begin data logging by pressing the "Log" button and stop logging by pressing the "Stop" button.

Local Configuration:

The "Local" configuration tree (Main Menu->View->Workspace) on the right side of the screen contains local channel connections, conversion formulas, disk file and display settings. Expand the individual branches of the tree to view the information in each section. Below are notes on each section and their significance.

Local->Connections

- Defines each channel being scanned
- Defines the graph colors, conversion formulas for each channel. Important for proper data scaling of each channel if using other D6000 series modules with this sample file.

1. Local->Conversion
   - Define the different data calculation formulas here
   - One calculation formula is specified here as converting RAW 16-bit unsigned integer Modbus register values to milliamps.
   - Critical to remember that the 16-bit unsigned value (0..65535) equates to the full scale input range of a D6200, which is -20ma to +20mA.
   - This single calculation formula is used by each "Channel" and specified in the "Channel" "Conversion" box.

2. Local->Logging
   - One entry "System_Channels" that specifies the channels written to disk and the formatting used.
   - The disk write includes Date and Time Stamp
   - The disk write outputs data values in "comma-delimited" ASCII format.

3. Local->Pages
   - Two pages are listed for use in DAQFactory Express
   - Page0 contains the D6200 series module data.
   - Page1 is available for the user to create another HMI display screen.

Notes:

1. Most importantly – this sample configuration file:

   - Can be used with any other D6000 series analog input module, see "Scaling" notes below.
   - Systems can be easily expanded using additional D6000 series modules and upgrading to a more enhanced version of the DAQFactory software.
   - Quickly and easily expand into a more complex data acquisition system without starting over.

2. Scaling:

   The D6000 series modules contain seven analog inputs and a data register for each channel. The register data values are returned as 16-bit unsigned integer values that represent percentage of the analog input full scale

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range. These unsigned integer data values must be converted or scaled to new data values that represent the engineering units for a given channel. Since the D6000 series modules contain user-selectable ranges – unique scaling values must be applied to each channel depending on the analog input range specified. This scaling is done within the sample application file using conversion formulas. A new conversion formula will be required for each analog channel that is not a 4-20mA input.

The analog input ranges for each channel should be configured first using the DGH D6000 series utility software that is available on CD with an order. Apply the new range values and then open DAQFactory Express and load the sample configuration file and specify the serial port number using the steps mentioned above.

In order to display proper data values in engineering units then use conversion formulas to convert the raw Modbus data values to desired engineering units. For example, a D6300 series thermocouple input module measuring two different thermocouple types J and K will require two new formulas (one for each type). Select "Conversions" in the right hand window and add the two new formulas. They will be similar to the existing formula that converts raw Modbus data to 4-20mA.

After the formulas are created then apply each formula to the appropriate channel in the "Channels" property screens. Verify the data values at the bottom of the Page0 screen next to CH1..CH7.

Resources:

D6000 Series

- Data Sheet: http://dghcorp.com/datasheets/D6000_Serial_Data_Sheet.pdf
- Users Manual: http://dghcorp.com/manuals/D6000_Users_Manual_Serial.pdf

Contact Information:

DGH Corporation, USA
P.O. Box 5638
Manchester, NH 03108
(603) 622-0452
www.dghcorp.com

AzeoTech, Inc.
821 Indiana Street
Ashland, Oregon 97520
(541) 512-4747
www.daqfactory.com

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