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Technical Note #60

DGH Corp. Modbus RTU

Subject: DGH D1000M Modbus Sensor to Computer Interface Module (RTU) Evaluation

Applies to: PMCS systems (Utility and Industrial Automation Applications)

The D1000M remote I/O interface modules are analog input devices that provide digital I/O lines that can control solid state relays and monitor the state of contact closures. They are RS-485 supported.

Each model is designated to read a different input. There are voltage input, current, thermocouple, RTD, thermistor, bridge, timer and frequency, and digital inputs/outputs models. They all support function codes 01, 04, 05, 06, and 15 and are powered up by +10V to +30V DC. The number of inputs and outputs vary depending on the model. There are no events counters or local alarm output.

Two of the models were tested for use with the PMCS system. These were the D1132M voltage input module and the D1252M current input module.

D1132M module

- Converts and linearizes DC voltages to binary percent of full scale values
- Converts analog DC Voltage to digital information, linearizes the digital value.
- Communicates to computer via an RS-232 to RS-485 converter
- Analog input value range of -5V to 5V reading
- Contain one analog input, one digital input, and two digital outputs.

D1252M module

- Converts and linearizes DC current to binary percent of full scale values
- Converts analog DC Current to digital information, linearizes the digital value.
- Communicates to computer via RS-232 to RS-485 converter
- Analog input value range specified as 4-20 mA but actually reads 0-25 mA
- Contain one analog input, one digital input, and two digital outputs.

To configure the DGH Modbus RTU's for Communication

Connection to the Computer

1. Directly connect pins 2 and 3 of the COM1 port of the host computer to the Data* pin of the module and connect pin 5 of the COM1 port to ground. This can be done using a DB9 connector.
2. The device is powered up with 10V to 30V DC. The voltage source is connected between the +Vs and Ground pins on the module.

Configuration of Each Module

1. Using the DGH Utility Software click on S1000.bat or S100030.exe under the S1000 folder.
2. Click on Host and RS232 Port. Set the baud rate to 300 initially because the modules are initially set to 00 baud and to send the setup information to them, the host must also be set to 300. The parity type, COM: Port, Host CTS Support, Host Tx Delay (ms), and Host Rx Support (ms) should be specified at this time. Press the escape key to auto save.
3. Click on Setup. The decimal address 1 is the default address of the module. Enter the model number with no letter prefixes or suffixes. Press enter.
4. On the next screen the address of the module can be changed as well as the baud rate that will be used for communication. To do this, use the + and - keys to increase or decrease the values. A number of other parameters can be configured here.
5. When the program asks if you would like to reset remote data enter yes to save these setting in the module.
6. Now return to Host/RS232 port and set the hosts baud rate to the new one set in the module. Use the terminal simulator under the Misc. heading to ensure that the communication works. If there is a timeout error make sure that the baud rate of the device and the host computer are the same.
7. To enable the modbus protocol, click on Enable Modbus under the Misc. heading. Press F10 when prompted while connecting a wire from the Default pin to the ground pin on the module. The message "Modbus Enabled" will appear and the wire can be removed. Press escape to exit.
8. To test using the modbus protocol, click on Modbus Protocol under the heading and send a message. If there is a timeout error, try to enable the modbus protocol again and make sure all setting are correct. If this doesn't work, go to terminal simulator (change baud rate of simulator to 300) and type in \$1WE then \$1MBR02 (where 2 is the address of the module).
9. To reset the settings to default mode, connect the Default pin to the Ground pin on the module at any time.

These devices can be configured for quick communication with the PMCS modbus server.

Communication with the DGH Modbus RTU Module using the PMCS System

Connection to the computer

An RS-232 to RS-485 converter should be connected to the computer. The + pin of the converter is connected to Data of the module. The - pin is connected to Data*. The module must always be powered up with +10V DC to +30V DC. The voltage source is connected between the +Vs and Ground pins on the module.

Configuration of the GE32MODB Modbus Server

1. Under Device Type Info in the Configure Menu, create a default device type, for example D1132M.
2. The modules support function codes 01, 04, 05, 06, and 15 which can be added under selected function codes.

3. Under Register Group, for example, the register groups AnalogInputs, DigitalInputs, and DigitalOutputs can be added.

AnalogInputs is register type 3 and uses the addresses from 0-15(decimal). On the D1132M model there is only one analog input (+IN) so the only address used is 0.

Digital Inputs is register type 0 and uses addresses 8-15 (decimal). On the D1132M model there is only one digital input (DI0) so the only address used is 8.

Digital Outputs is register type 0 and uses addresses 0-7 (decimal). On the D1132M model there are two digital outputs (DO0 and DO1) so the only address used are 0 and 1.

4. Since there are only 4 registers being used at this time, only 4 mnemonics are defined. These are addressed as R30000, R00000, R00001, and R00008. These can be named anything. For example:

Analogin → R30000

Digout0 → R00000

Digout1 → R00001

Digin → R00008

5. Now the device has to be added under device configuration. For example, Device (Topic) Name is DGH_RTU, Device Type is D1132M, COM Port 1, Slave Address 1, Scan Interval (ms) is 1000, and it is activated.
6. The Server can be restarted and a client should be started to test communication.

Company information:

DGH Corp.
PO Box 5638
Manchester, NH 03108

Tel: (603) 622-0452
Fax: (603) 622-0487
Webpage: www.dghcorp.com

Tech Support contacts:

Dave Dutile (President)
David Reed (best bet)
Bob Klein

Reference:

D1000M Modbus Protocol Manual

Contains Modbus protocol overview, supported function codes and their explanations, dumb terminal setup information, modbus exception responses, and calibration information.

D1000 Series Users Manual

Not up-to-date, written 3 years before modbus modules released.
Contains quick hook-up information, information on the modules and their functions (not modbus modules directly but some helpful information), troubleshooting, calibration, and data sheets.

Keywords

RTU, DGH, D1000M Modbus Sensor to Computer Interface Module

Related Notes

none

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