

Getting started with your DGH module:

This document contains step-by-step instructions to quickly connect and communicate with your new DGH modules. For most applications, new modules require a one-time configuration to properly operate within a data acquisition system. Parameters such as the application device addresses, communications speed (baud rate) and communications parity type must be determined before the configuration can begin. Each module is shipped from the factory with the same default communications values: ASCII character address = 1, Baud rate = 300 and Parity type = None.

The first step in the configuration process is to connect the module to a host computer. Two illustrations have been provided. Use Figure 1.0 to connect an RS-232 module to a host computer. Use Figure 2.0 to connect an RS-485 module to a host computer. The communications connections are the same for all RS-232 modules and all RS-485 modules. The model number does not matter.

Configuration of each module can be performed using either DGH Utility Software that is shipped on CD-ROM with each order. Or Windows Hyper-terminal can be used to manually configure a module. Users that do not have the DGH Utility Software CD-ROM can download the latest software from our website (www.dghcorp.com). See the 'CD-ROM Software Installation Instructions' below to install the DGH software on your computer.

Use the same cable and connections to pre-configure each module before installing them into the final system application. The 10-pin screw terminal plug on each module is removable. Therefore, make one cable and plug each module on individually to perform the module setup configuration.

Helpful Hints: Typical module addressing begins with the ASCII character '1'. Each following module address increments sequentially from there. Users that are unsure of what baud rate or parity type to use should consider values of 9600 or 19,200 baud and no parity. System communications baud rate and parity type will vary from application to application. Some applications may have specific baud rate and parity values that must be used. Especially when adding hardware to an existing system.

Quick Start Steps:

1. Connect the module to host computer via appropriate drawing (Figure 1.0 or Figure 2.0).
2. Install the Utility Software from CD-ROM provided, using instructions below.
3. Start the Utility Software 2000 from Window, Start, Programs menu selection.
4. Setup the module using 'Software/Module Setup Instructions' below.

CD-ROM Software Installation Instructions:

1. Insert the DGH Utility Software CD-ROM into the computer CD-ROM drive.
2. Click on the "My Computer" icon on your Windows Desktop, a window will open that lists all the computer drives.
3. Click on the drive icon that says "Dgh". A new window will open.
4. Click on the file "setup.exe" and run this program.
5. Follow the installation prompts and complete the entire process. You may close the "My Computer" and "Dgh" windows now. A new menu selection has now been added to your "Start"/"Programs" menu. The selection is "DGH Data Acquisition" and it contains all the DGH Datasheets, Users Manuals, and Utility Software. The software is now installed and ready to run.

Software/Module Setup Instructions:

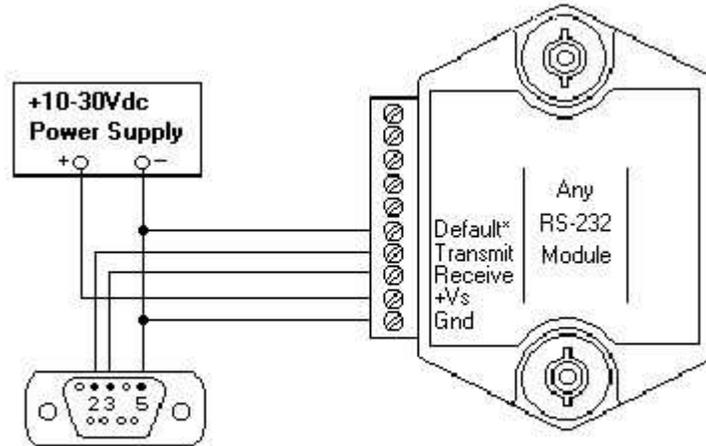
1. To run the software, click on the Windows "Start" button in lower left corner of the screen.
2. Select "Programs" and select "Dgh Data Acquisition"
3. Select "Utility Software" and select "Utility Software 2000" to run this program.
4. From the software main menu select "Edit" and "Serial Ports"
5. Select the correct COM Port, COM1:, COM2:, COM3:, COM4: and press "Open" button. All other port parameters should be default configured for a module in DEFAULT mode.
6. Plug the cable into the host computer serial port.
7. Connect the module to host computer using cable illustrations in this document.
8. Turn the power on and at the software main menu select "Setup" and "Modules".
9. The program default address of '1' is usable when the Default* pin is connected to Ground.
10. Select the model number from the drop down list box.
11. Press the 'Read Setup' button.
12. A progress bar will appear while the program is reading the module parameters. If no communications errors are displayed then the module is communicating with the host computer.
13. Make the setup adjustments to the 'on-screen' values and 'APPLY' the changes.

After the module configuration has been 'APPLY'd then repeat this same process for the remaining modules to be installed. Remove the configured module from the 10-pin plug, connect a new module onto the connector and repeat steps 7 thru 13.

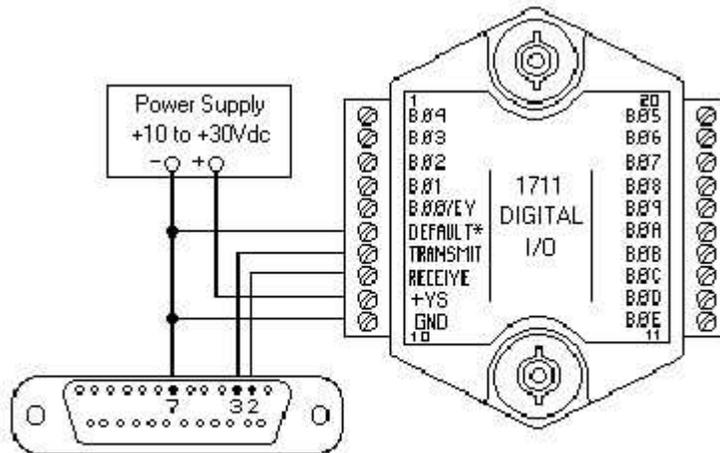
Figure 1.0 RS-232 Module Connection to Host PC:

The following connection diagrams illustrate connections between one DGH module and a host PC, or PC compatible serial port. Determine the host PC serial port connector type, either DB-9 or DB-25 and wire the module per the appropriate connection drawing below.

Please note that the model numbers illustrated below are not important as the RS-232 serial connections are all the same for every DGH RS-232 module.



Connection to DB-9 host computer serial port



Remove connection from Default* to Gnd when configuration is completed.

Notes:

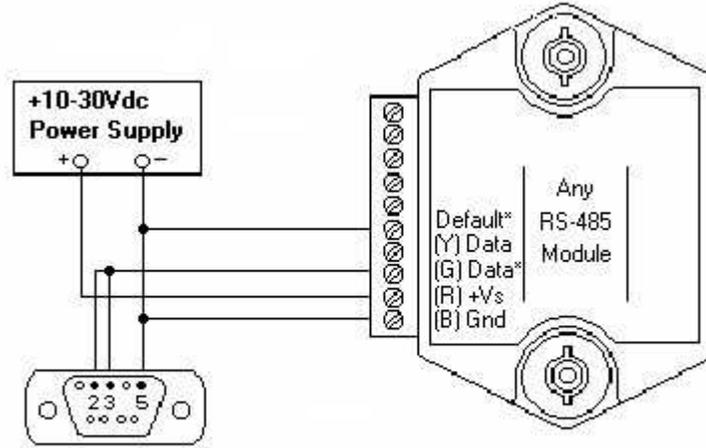
1. The module DEFAULT* pin is connected to GND in each of these illustrations. Whenever, DEFAULT* is grounded, the module will only communicate at 300 baud. The parity setting should be No parity, eight data bits and one stop bit. Some computers may require Mark parity and seven data bits.
2. A2400 users should use this Figure to connect with a host computer. Computer must connect to Transmit and Receive lines on A2400 for proper configuration access.

Figure 2.0 RS-485 Module Connection to Host PC:

The following connection diagrams illustrate how to connect a RS-485 module to a host computer. The first illustration shows how to connect an RS-485 module to a host PC serial port. This illustration should be used only for configuration of modules. It is not recommended, or suitable for installed applications.

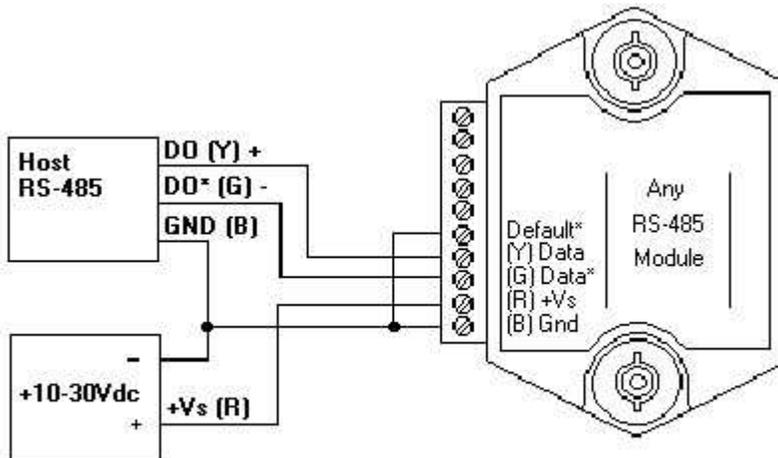
The second drawing illustrates connections to a RS-485 host serial port. The RS-485 data line polarity is indicated and should be noted when making the connections.

RS-485 Module to Host PC Serial Port:



Connection to DB-9 host computer serial port

RS-485 Module to Host RS-485 Serial Port:



The polarity of the DGH RS-485 lines is indicated above. It should be noted that '(Y) Data' is the Positive (+) line. The '(G) Data*' line is the Minus (-) line.

Note: The module DEFAULT* pin is connected to GND in each of these illustrations. Whenever, DEFAULT* is grounded, the module will only communicate at 300 baud. The parity setting should be No parity, eight data bits and one stop bit. Some computers may require Mark parity and seven data bits.

Building the System:

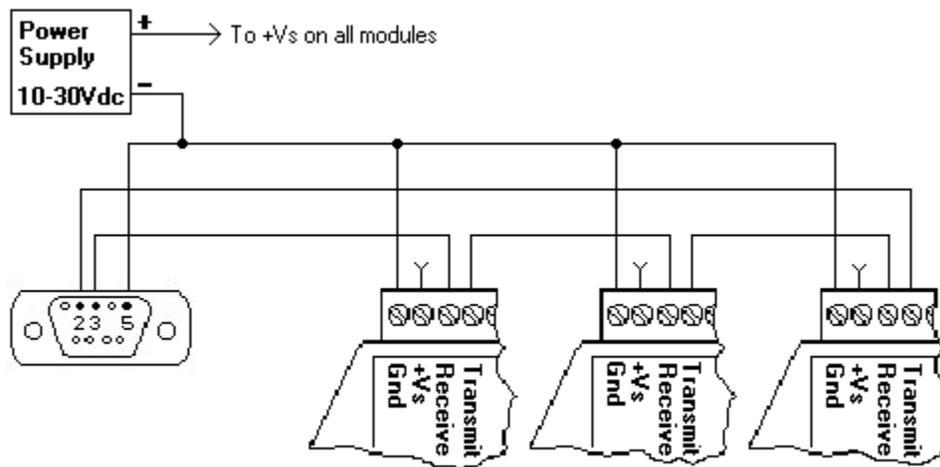
After the configuration process is completed, systems that contain more than one module will need to be properly connected to the host computer. Two diagrams have been provided for connecting multiple modules together to make up a data acquisition system. The module configuration process, for each module, should be completed before connecting multiple modules together.

Figure 3.0 illustrates connections for a RS-232 Daisy-Chain system. If a Daisy-chain system contains a different quantity of modules than in Figure 3.0 then the Transmit and Receive connections would follow the same wiring convention as illustrated. Meaning, connect the Transmit pin of one module to the Receive Input pin of the next. The Transmit pin of the last module connects to the host PC serial port Receive Input. The Troubleshooting section below also contains helpful hints and tips on "RS-232 Module" connection issues.

Figure 4.0 illustrates connections for a RS-485 Multi-drop system. The RS-485 data lines are all connected together in parallel in this configuration. Simply connect all the '(Y) Data' lines to the host Positive (+) terminal and all the '(G) Data*' lines to the Minus (-) terminal.

Caution: RS-485 serial ports sometimes require internal handshaking lines to control the RS-485 driver. Improper software control of such handshaking lines can sometimes result in communications errors. The DGH A1000-115 vac RS-232-to-RS-485 converter connects to any standard RS-232 port and does not require any handshaking signals.

Figure 3.0 RS-232 Daisy-Chain System To Host PC:



RS-232 Daisy-chain Connection to Host DB-9 Serial Port

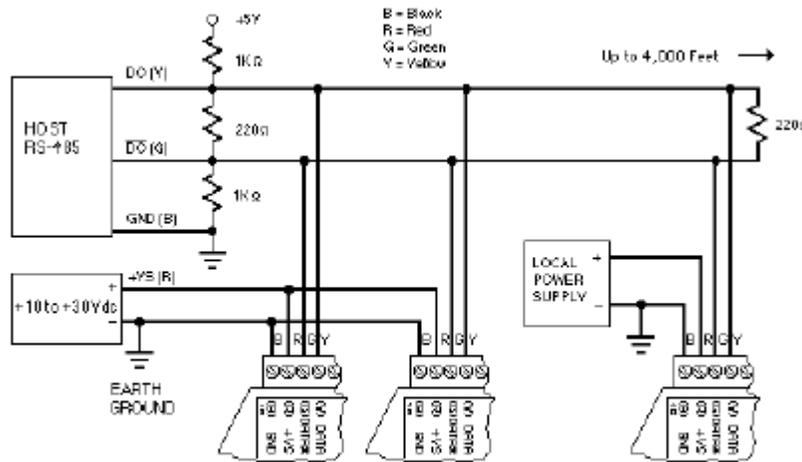
The RS-232 Daisy-chain system above can be extended with more modules by following the same Transmit to Receive wiring convention.

Host Serial Port DB-9 pin out:

- Pin #2 Receive Input
- Pin #3 Transmit Output
- Pin #5 Ground

Caution: During the module setup/configuration process the “Echo Bit” must be enabled in the setup message of each module.

Figure 4.0 RS-485 Multi-drop System:



RS-485 Connection to Host RS-485 Serial Port

The RS-485 multi-drop system illustrates many RS-485 modules being connected to a host serial port. The modules are connected in parallel where all the '(G) Data*' lines are connected together into the host Minus (-) data line and all the '(Y) Data' lines are connected together into the host Positive (+) data line.

RS-485 modules can be connected to a host computer serial port using a RS-232-to-RS-485 communications converter. The DGH A1000 converter can be used to transparently convert RS-232 signals to equivalent RS-485 signals. No software alterations or hardware handshaking signals are required.

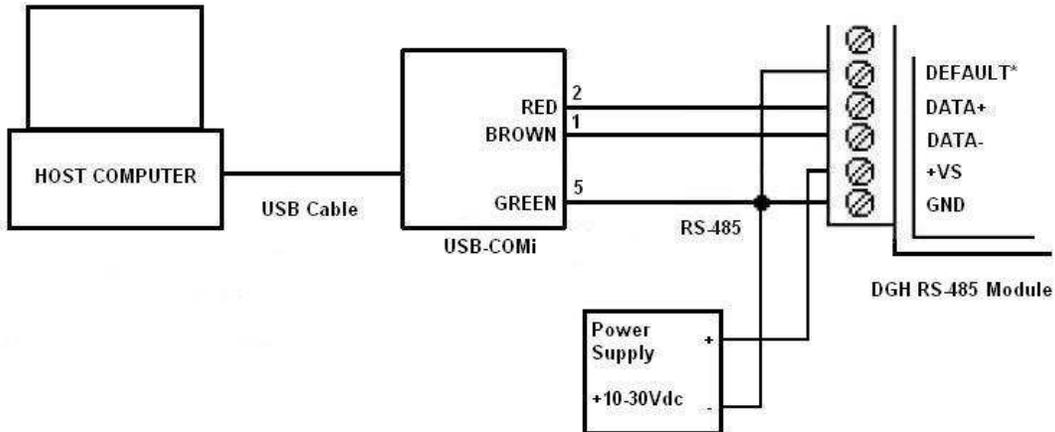
Caution and Note: The RS-485 standard indicates that termination and biasing resistors should be present on the data lines for proper operation. Some manufacturers install these resistors either on their serial port boards or inside their converters. Some vendors do not install them at all and leave it up to the customer to install them. The DGH A1000 contains externally accessible dip switches to control the activation and de-activation of termination and biasing resistors.

The RS-485 standard indicates that one biasing resistor should be connected from the 'Data +' line to +5Vdc. Another biasing resistor should be connected from the 'Data -' line to Ground. The resistor values are nominally 1K ohms each. Some vendors use slightly different resistor values. If your hardware does not have these resistors then they should be installed at the RS-485 source for proper operation. Meaning, where the modules connect into the host computer or the beginning of the RS-485 communications line.

The termination resistors are recommended to be the equivalent of 100 ohms across the data lines. The illustration above contains one 220 ohm at the beginning and end of the line. Thus creating approximately 110 ohms across the data lines. Some manufacturers install these resistors and others do not. The DGH A1000 contains termination resistors that are controlled via dip switches. Only one 220 ohm resistor should be positioned at the beginning and end of the line. No other 220 ohm resistors should be placed anywhere in the middle of the communications line.

DGH RS-485 Module Connections to USB-COMi:

Figure 5.0 below details the connections between any DGH RS-485 module and a USB-COMi serial converter. The connections indicated in this diagram use color coded wires that are specific to a DGH CA-3 serial cable.



Note: If your using a serial cable provided by another vendor then you will need to determine the proper wires that connect to same pins on the USB-COMi port.

Troubleshooting:

RS-232 Module is not responding

1. Using a voltmeter, measure the power supply voltage at the +Vs and GND terminals to verify the power supply voltage is between +10 and +30Vdc.
2. Verify using an ohmmeter that there are no breaks in the communications data lines.
3. Connect the module to the host computer and power-up each device (module and computer) then using a voltmeter measure the voltage between RECEIVE and GND. This voltage should be approximately -10Vdc. Repeat the measurement between TRANSMIT and GND terminals and confirm the voltage value to be approximately -10Vdc. If either of the two readings is approximately 0.0Vdc then the communications data lines are wired backwards. Proper communications levels on both TRANSMIT and RECEIVE terminals should idle at -10Vdc.
4. If you are using a serial communications converter (A1000) ensure that the communications Baud Rate switch is set to the proper Baud Rate value.
5. Confirm software communications settings in Host computer match those values being used by the connected module(s).
6. If the Baud Rate value being used in the application is greater than 300 Baud and the module will only communicate 300 Baud then make sure that the DEFAULT* terminal is not connected to Ground (GND).
7. If the module(s) are being used in a RS-232 daisy-chain communications configuration then ensure that the "Echo Bit" is enabled in the setup (SU) message of each module.
8. If the problem is not corrected after completing the steps above then connect the module by itself to a Host computer as outlined in Chapter 1.0 under "Quick Hook-up". Start the supplied Utility software and please call the factory for further assistance.

RS-485 Module is not responding

1. Perform steps 1, 2, 4, 5 and 6 listed above.
2. Ensure that module RS-485 "Data" line (module terminal pin #7) is connected to the Host RS-485 "Data+" line.
3. Ensure that module RS-485 "Data*" line (module terminal pin #8) is connected to the Host RS-485 "Data-" line.
4. If the problem is not corrected after completing the steps above then connect the module by itself to a Host computer as outlined in Chapter 1.0 under "Quick Hook-up". Start the supplied Utility software and please call the factory for further assistance.