D8000 SERIES
USB Interface Modules

User’s Guide

Shop online at omega.com®
e-mail: info@omega.com
For latest product manuals: www.omegamanual.info

D8000 SERIES
USB Interface Modules
Overview

The D8000 series USB interface 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 voltage or current signals for controlling annunciators or valves. Complete data acquisition systems can be created with ease with the D8000 modules and a host supervisory computer.

The D8000 series modules can be easily connected to a host computer and configured for use with the information below. Review the required items listed below in order to begin configuring the module.

The D8000 modules require:

1. A DC Voltage power supply, +10-30Vdc, 1.5W
2. A USB cable
3. An unused computer USB port

Use the USB cable to connect the D8000 series modules to the computer. A virtual serial communications port will be created on the computer after the module is connected. The serial port number can be found in the computer Device Manager. See “Locate the Serial Port Number” below.

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

The user-selectable setup features in the module can be changed at any time using the D6000/D8000 series Utility Software. The software is distributed on CD ROM with each order and can be also be downloaded at anytime.

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.

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.

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 1.0 below. The new hardware will be added as a virtual serial communications port, typically identified as “COMn:” where n is the port number.

![Figure 1.0](image)

**Figure 1.0** 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 2.0](image)

**Figure 2.0** Using My Computer Icon, right-click and select PROPERTIES.
Figure 3.0 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 4.0 below.

Figure 4.0 My Computer System Properties dialog screen, select the Hardware tab.
Figure 5.0 Click on the “Device Manager” button.
Figure 6.0 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 6.0 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 D6000/D8000 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 online. 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 OMEGAD6000SETUP.EXE installation file. The software will install and create a menu section called “OMEGA UTILITY SOFTWARE” and the “D6000 Utility Software” will be under that selection. This software is for both the D6000 and D8000 series modules.

From the computer desktop select the “start” button, select “all programs”, select “OMEGA UTILITY SOFTWARE” and then select “D6000 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.

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 7.0 Utility Software main 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.
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.

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.
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 value. 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.
For Other Locations Visit omega.com/worldwide

The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA’s WARRANTY adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA’s customers receive maximum coverage on each product. If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA’s Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA’s WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA’s control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a “Basic Component” under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA’S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:
1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:
1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA’s policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering. OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

© Copyright 2014 OMEGA ENGINEERING, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without the prior written consent of OMEGA ENGINEERING, INC.

MQS5442/1014