

Contents

INTRODUCTION	1
OVERVIEW	1
WHAT'S INCLUDED	1
FACTORY DEFAULT SETTINGS	1
CARD SETUP	2
ADDRESS SELECTION	2
IRQ SELECTION	3
INTERRUPT MODES	4
RS-485 ENABLE MODES	5
CONNECTOR PIN ASSIGNMENTS	7
EIA-530	7
SIO-485	8
LINE TERMINATION	9
INSTALLATION	10
WINDOWS 3.X (INCLUDING WFW 3.11) INSTALLATION	10
WINDOWS 95 AND WINDOWS NT INSTALLATION	12
OMG-ULTRA-485 SOFTWARE DRIVERS	12
TECHNICAL DESCRIPTION	13
FEATURES	13
SPECIFICATIONS	14
ENVIRONMENTAL SPECIFICATIONS	14
MANUFACTURING	14
POWER CONSUMPTION	14
MEAN TIME BETWEEN FAILURES (MTBF)	14
PHYSICAL DIMENSIONS	14
APPENDIX A - TROUBLESHOOTING	15
APPENDIX B - HOW TO GET ASSISTANCE	17
APPENDIX C - ELECTRICAL INTERFACE	18
RS-530	18
RS-422	18
RS-485	18

APPENDIX D - ASYNCHRONOUS COMMUNICATIONS	20
APPENDIX E - SILK-SCREEN.....	21
APPENDIX F - COMPLIANCE NOTICES.....	22
FEDERAL COMMUNICATIONS COMMISSION STATEMENT	22
EMC DIRECTIVE STATEMENT.....	22
WARRANTY.....	23

Figures

Figure 1 - Header E1, IRQ Selection	3
Figure 2 - Header E2, Normal IRQ Mode	4
Figure 3 - Header E2, Shared IRQ Mode	4
Figure 4 - Header E5 RS-485 Transmit Mode	5
Figure 5 - Header E3 RS-485 Receive Mode.....	6
Figure 6 - Dip-shunt E4 (EIA-530 Mode).....	7
Figure 7 - Dip-shunt E4 (SIO-485 Mode)	8
Figure 8 – SW2, Line Termination.....	9
Figure 9 - Asynchronous Communications Bit Diagram	20

© 1997b Omega Engineering, Incorporated. All rights reserved.

Introduction

Overview

The Omega Engineering **OMG-Ultra-485** provides the PC with an additional RS-422/485 serial port for terminals, modems, printers, etc

What's Included

The **OMG-Ultra-485** is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- **OMG-Ultra-485** Serial I/O Adapter
- 3.5" Serial Utility Diskette
- User Manual

Factory Default Settings

The **OMG-Ultra-485** factory default settings are as follows:

Port #	Base Address	IRQ	Electrical Specification
Port 1	3F8	4	RS-485 'Auto'

To install the **OMG-Ultra-485** using factory default settings, refer to Installation on page 10.

For your reference, record installed **OMG-Ultra-485** settings below:

Port #	Base Address	IRQ	Electrical Specification

Card Setup

The **OMG-Ultra-485** contains several jumper straps which must be set for proper operation.

Address Selection

The **OMG-Ultra-485** occupies 8 consecutive I/O locations, and looks to the PC as a standard serial port. A DIP-switch (SW1) is used to set the port address options for the **OMG-Ultra-485**. Be careful when selecting the port addresses as some selections may conflict with existing ports. The following table shows the addressing options available with the standard PAL. If different address options are required, please contact Omega Engineering Technical Support about a custom PAL option.

Port1 J2	SW1-1	SW1-2	SW1-3	SW1-4
Disabled	On	On	On	On
3F8	On	On	On	Off
2F8	On	On	Off	On
3E8	On	On	Off	Off
2E8	On	Off	On	On
3220	On	Off	On	Off
3228	On	Off	Off	On
4220	On	Off	Off	Off
4228	Off	On	On	On
238	Off	On	On	Off
300	Off	On	Off	On
308	Off	On	Off	Off
280	Off	Off	On	On
288	Off	Off	On	Off
290	Off	Off	Off	On
298	Off	Off	Off	Off

Note: Each COM port in the system should have a unique address. Typically COM1: - COM4: addresses are 3F8, 2F8, 3E8 & 2E8 Hex.

IRQ Selection

Header E1 selects the interrupt request for each serial port. If COM1: is selected, the corresponding jumper must be on the IRQ4 setting. If COM2: is selected, the corresponding jumper must be on IRQ3.

Note: Most communications software applications default COM3: to IRQ4 and COM4: to IRQ3. This requires the sharing of interrupts between COM1: and COM3:, and between COM2: and COM4:. While this is the default, it is not always the preferred setting. Check your software configuration instructions to determine the most appropriate IRQ selection.

E1

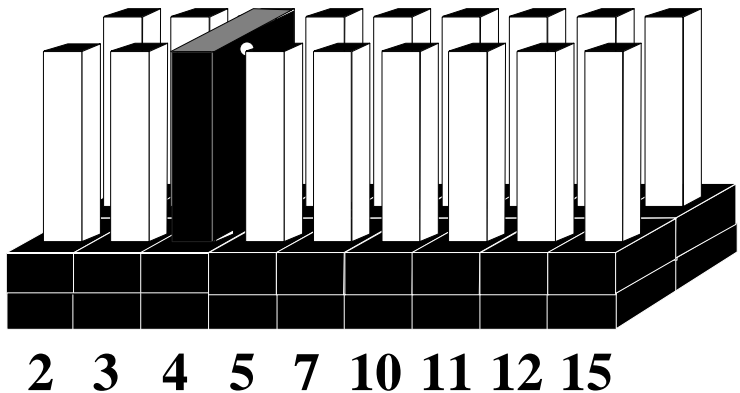


Figure 1 - Header E1, IRQ Selection

Any two or more ports can share a common IRQ by placing the jumpers on the same IRQ setting at header E1 and setting the appropriate selections at E2. Consult your particular software for IRQ selection. If no interrupt is desired, remove the jumper.

Interrupt Modes

Header E2 selects the interrupt mode for the **OMG-Ultra-485**.

‘N’ indicates the (N)ormal, single interrupt per port mode. ‘S’ Indicates the (S)hared interrupt mode, which allows more than one port to access a single IRQ. Any two or more ports can share a common IRQ by placing the jumpers on the same IRQ setting and setting the appropriate selections at E1. Consult your particular software for IRQ selection. If no interrupt is desired, remove the jumper. ‘M’ indicates the inclusion of a 1K ohm pull-down resistor required on one port when sharing interrupts.

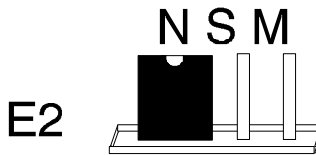


Figure 2 - Header E2, Normal IRQ Mode

Set the jumper to ‘S’ if you are using more than one **OMG-Ultra-485** in a bus or to completely remove the pull-down resistor for hardware compatibility. **Setting the adapter in this configuration when it is not accompanied by a pull-down resistor will prevent the ports from triggering an interrupt.**

Set the jumpers to ‘S’ for shared interrupt mode on all blocks sharing an IRQ except one. Set that port block for ‘M’. This provides the pull-down resistor circuit that makes sharing IRQs possible. If you are using more than one **OMG-Ultra-485** or a compatible adapter in a bus you should only have one port set to ‘M’. The following example shows two **OMG-Ultra-485** adapters sharing a single IRQ.

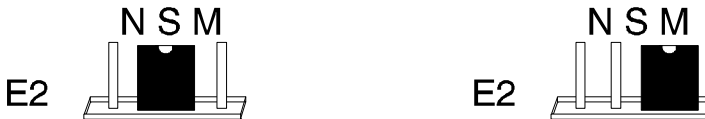


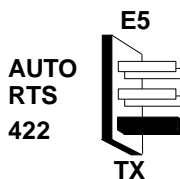
Figure 3 - Header E2, Shared IRQ Mode

RS-485 Enable Modes

RS-485 is ideal for multi-drop or network environments. RS-485 requires a tri-state driver (not dual-state) that will allow the electrical presence of the driver to be removed from the line. The driver is in a tri-state or high impedance condition when this occurs. Only one driver may be active at a time and the other driver(s) must be tri-stated. The output modem control signal **Request To Send (RTS)** is typically used to control the state of the driver. Some communication software packages refer to RS-485 as RTS enable or RTS block mode transfer.

One of the unique features of the **OMG-Ultra-485** is the ability to be RS-485 compatible without the need for special software or drivers. This ability is especially useful in Windows, Windows NT, and OS/2 environments where the lower level I/O control is abstracted from the application program. This ability means that the user can effectively use the **OMG-Ultra-485** in a RS-485 application with existing (i.e. standard RS-232) software drivers.

Header E5 is used to control the RS-485 mode functions for the transmitter circuit. The selections are 'RTS' enable, 'Auto' enable, or '422' which means always enabled. The 'Auto' enable feature automatically enables/disables the RS-485 transmitter circuit. The 'RTS' mode uses the 'RTS' modem control signal to enable the RS-485 transmitter circuit and provides backward compatibility with existing software products. The '422' mode allows the port to be used in a point to point RS-422 application where the tri-stating of the transmitter circuit is not required.

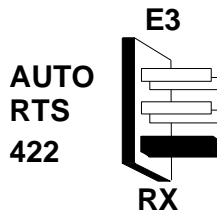


AUTO	Driver automatically enabled/disabled
RTS	Driver enabled by UART RTS signal
422	Driver always enabled

Note: The jumper in the above example is in the '422' position. This is the only setting in which the modem control outputs (RTS, DTR) are valid.

Figure 4 - Header E5 RS-485 Transmit Mode

Header E3 is used to control the RS-485 enable/disable functions for the receiver circuit. The RS-485 ‘Echo’ is the result of connecting the receiver inputs to the transmitter outputs. Every time a character is transmitted, it is also received. This can be beneficial if the software can handle echoing (i.e. using received characters to throttle the transmitter) or it can confuse the system if the software does not. The selection at E3 should follow the selection made at E5 if ‘No Echo’ is desired. If Echo suppression is not desired then leave the jumper in the ‘422’ position. Also note, the modem control inputs (DSR, DCD, CTS) are only valid when Header E3 is in the 422 mode. These header blocks are described in the illustration and table that follow.



AUTO	Receiver automatically enabled/disabled
RTS	Receiver enabled by UART RTS signal
422	Receiver always enabled

Figure 5 - Header E3 RS-485 Receive Mode

Connector Pin Assignments

EIA-530

DIP-shunt E4 selects the pin out for the DB-25 connector P3. With the 5 position shunt in the EIA-530 mode, the **ULTRA-485** complies with the EIA-530 pin out with the following signals supported:

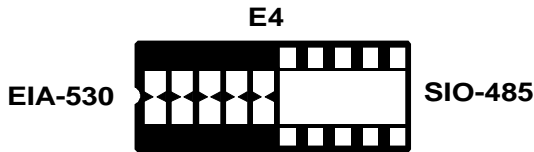


Figure 6 - Dip-shunt E4 (EIA-530 Mode)

Signal		Name	Pin #	Mode
GND		Ground	7	
RDB	RX+	Receive Positive	16	Input
RDA	RX-	Receive Negative	3	Input
CTSB	CTS+	Clear To Send Positive	13	Input
CTSA	CTS-	Clear To Send Negative	5	Input
DSRB	DSR+	Data Set Ready Positive	22	Input
DSRA	DSR-	Data Set Ready Negative	6	Input
DCDB	DCD+	Data Carrier Detect Positive	10	Input
DCDA	DCD-	Data Carrier Detect Negative	8	Input
TDB	TX+	Transmit Positive	14	Output
TDA	TX-	Transmit Negative	2	Output
RTSB	RTS+	Request To Send Positive	19	Output
RTSA	RTS-	Request To Send Negative	4	Output
DTRB	DTR+	Data Terminal. Ready Positive	23	Output
DTRA	DTR-	Data Terminal Ready Negative	20	Output

SIO-485

With the 5 position shunt in the SIO-485 mode, the **OMG-Ultra-485** is compatible with the Omega Engineering SIO-485 (part# 3054) with the following signals supported:

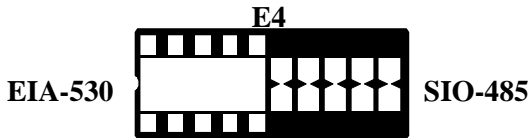


Figure 7 - Dip-shunt E4 (SIO-485 Mode)

Signal		Name	Pin #	Mode
GND		Ground	7	
TDB	TX+	Transmit Positive	24	Output
TDA	TX-	Transmit Negative	25	Output
RDB	RX+	Receive Positive	12	Input
RDA	RX-	Receive Negative	13	Input

Line Termination

Typically, each end of the RS-485 bus must have line terminating resistors (RS-422 terminates at the receive end only). A 100 ohm resistor is across each RS-530/422/485 input in addition to a 1K ohm pull-up/pull-down combination that bias the receiver inputs. DIP-switch SW2 provides the ability to customize this interface to system requirements. Each switch position corresponds to a specific portion of the interface. If multiple **OMG-Ultra-485** adapters are configured in a RS-485 network, only the boards on each end should have switches T, P & P **ON**. Refer to the following table for each position's operation:

Name	Function
T	Adds or removes the 120 ohm termination.
P	Adds or removes the 1K ohm pull-down resistor in the RS-422/RS-485 receiver circuit (Receive data only).
P	Adds or removes the 1K ohm pull-up resistor in the RS-422/RS-485 receiver circuit (Receive data only).
L	Connects the TX+ to RX+ for RS-485 two wire operation.
L	Connects the TX- to RX- for RS-485 two wire operation.

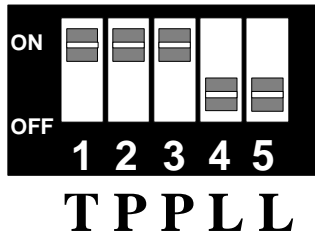


Figure 8 – SW2, Line Termination

Installation

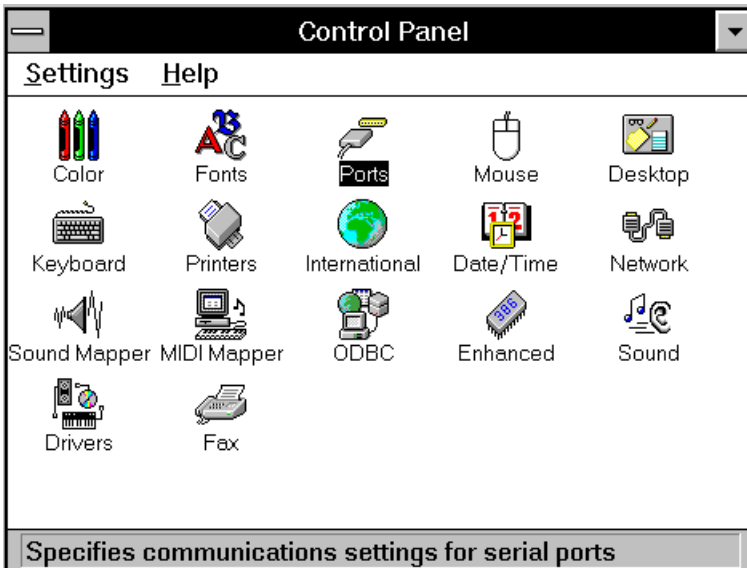
The **OMG-Ultra-485** can be installed in any of the PC expansion slots. The **OMG-Ultra-485** contains several jumper straps for each port which must be set for proper operation.

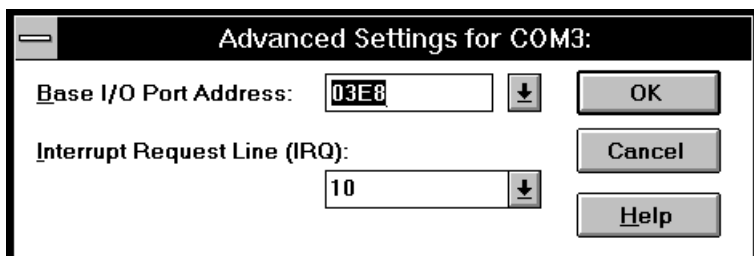
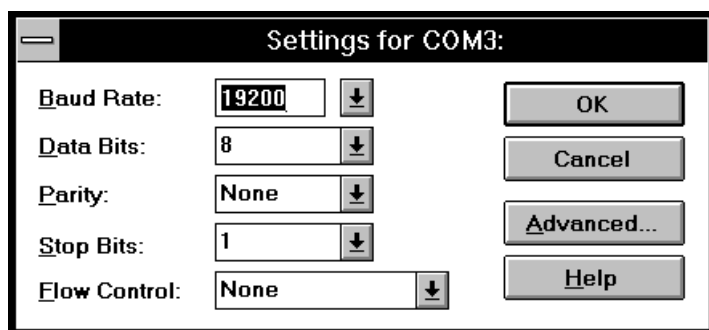
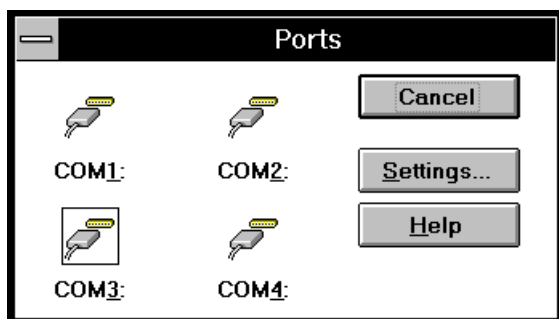
1. Turn off PC power. Disconnect the power cord.
2. Remove the PC case cover.
3. Locate an available slot and remove the blank metal slot cover.
4. Gently insert the **OMG-Ultra-485** into the slot. Make sure that the adapter is seated properly.
5. Replace the screw.
6. Replace the cover.
7. Connect the power cord.

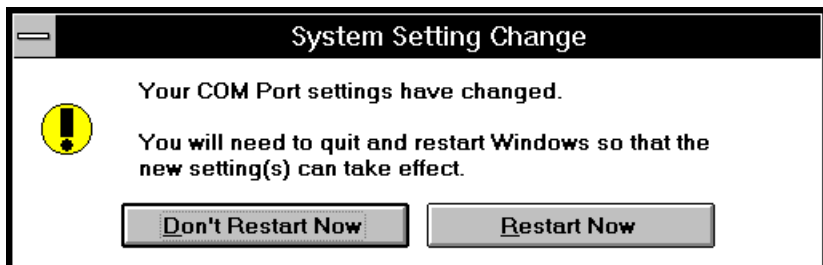
Installation is complete.

Windows 3.x (Including WFW 3.11) Installation

To configure the **OMG-Ultra-485** under Windows 3.x start by opening the 'Control Panel'. The Control Panel is typically found in the 'Main' Program Group. The next step is to open the 'Ports' selection under the 'Control Panel'.







Manufacturing

- IPC 610-A Class-III standards are adhered to with a 0.1 visual A.Q.L. and 100% Functional Testing.
- All Omega Engineering Printed Circuit boards are built to U.L. 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.

Power Consumption

Supply line	+5 VDC
Rating	160 mA

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length	5.0 inches	(12.70 cm)
Board Height including Goldfingers	4.2 inches	(10.66 cm)
Board Height excluding Goldfingers	3.9 inches	(9.91 cm)

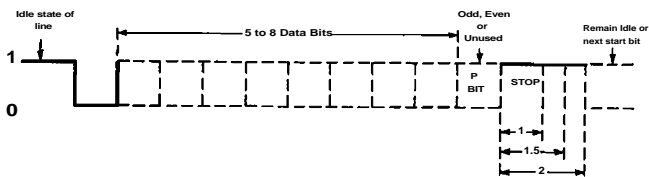


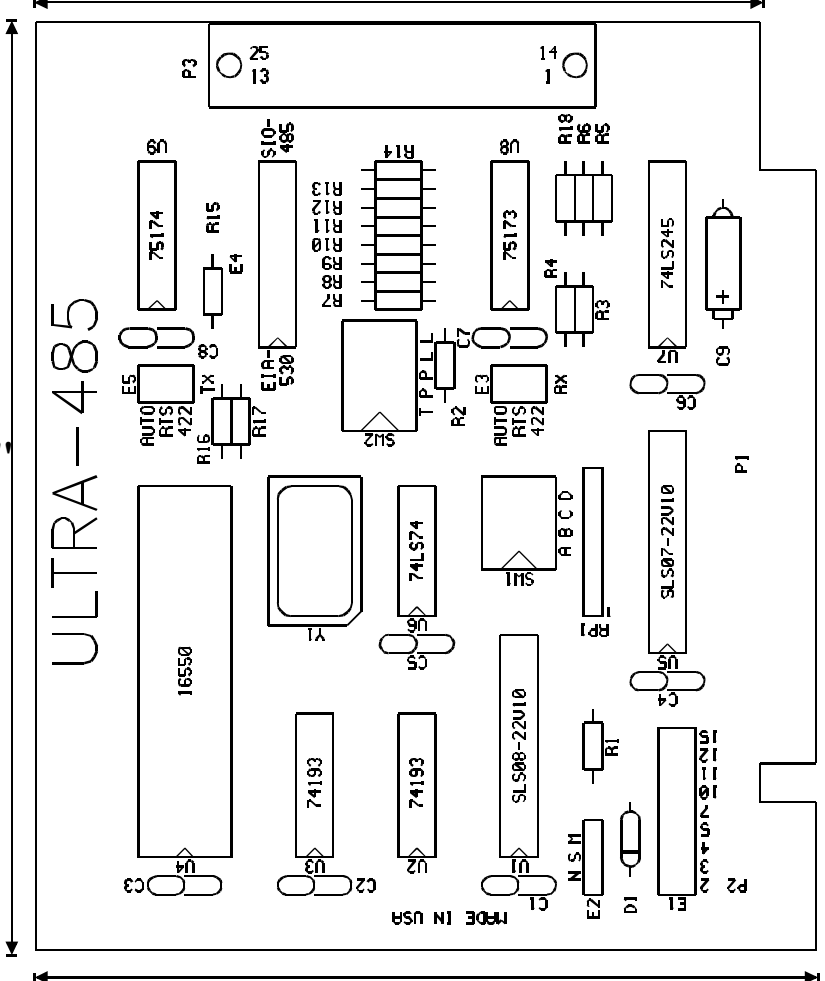
Figure 9 - Asynchronous Communications Bit Diagram

This special bit is called the parity bit. Parity is a simple method of determining if a data bit has been lost or corrupted during transmission. There are several methods for implementing a parity check to guard against data corruption. Common methods are called (E)ven Parity or (O)dd Parity. Sometimes parity is not used to detect errors on the data stream. This is referred to as (N)o parity. Because each bit in asynchronous communications is sent consecutively, it is easy to generalize asynchronous communications by stating that each character is wrapped (framed) by pre-defined bits to mark the beginning and end of the serial transmission of the character. The data rate and communication parameters for asynchronous communications have to be the same at both the transmitting and receiving ends. The communication parameters are baud rate, parity, number of data bits per character, and stop bits (i.e. 9600,N,8,1).

5.0"

ULTRA-485

3.9"



4.2"

MADE IN USA

Appendix F - Compliance Notices

Federal Communications Commission Statement

FCC - This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in such case the user will be required to correct the interference at his own expense.

EMC Directive Statement



Products bearing the CE Label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission.

To obey these directives, the following European standards must be met:

- **EN55022 Class A** - “Limits and methods of measurement of radio interference characteristics of information technology equipment”
- **EN50082-1** - “Electromagnetic compatibility - Generic immunity standard” Part 1 : Residential, commercial and light industry
- **EN60950 (IEC950)** - “Safety of information technology equipment, including electrical business equipment”

Warning

This is a Class A Product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC/EMC directives.

Warranty

Omega Engineering, Inc. warrants this product to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, Omega Engineering will, at its option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Omega Engineering assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Omega Engineering will not be liable for any claim made by any other related party.

RETURN AUTHORIZATION MUST BE OBTAINED FROM OMEGA ENGINEERING BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING OMEGA ENGINEERING AND REQUESTING A RETURN MERCHANDISE AUTHORIZATION (RMA) NUMBER.

Omega Engineering, Incorporated
One Omega Drive
PO Box 4047
Stamford, CT 06907
(800)826-6342 FAX: (203)359-7990
www.omega.com
email: das@omega.com

Technical Support is available from 8 a.m. to 5 p.m. Eastern time.
Monday - Friday

Trademarks

Omega Engineering, Incorporated acknowledges that all trademarks referenced in this manual are the service mark, trademark, or registered trademark of the respective company.

OMG-Ultra-485 is a trademark of Omega Engineering, Incorporated.