

**1 YEAR**  
WARRANTY

**OMEGA CARE**<sup>SM</sup>  
Extended Warranty  
Program

CE



# User's Guide

*Shop online at*

**omega.com**<sup>®</sup>

Ω OMEGA<sup>®</sup>

*omega.com*

*e-mail: info@omega.com*

*For latest product manuals:  
omegamanual.info*

**ISO 9001**  
CERTIFIED  
CORPORATE QUALITY

STAMFORD, CT

**ISO 9002**  
CERTIFIED  
CORPORATE QUALITY

MANCHESTER, UK



# USB-4750 32 Channel Isolated Digital I/O USB Data Acquisition Module

**OMEGAnet<sup>®</sup> Online Service**  
**omega.com**

**Internet e-mail**  
**info@omega.com**

### **Servicing North America:**

**U.S.A.:**  
ISO 9001 Certified  
One Omega Drive, Box 4047  
Stamford, CT 06907-0047  
Tel: (203) 359-1660  
FAX: (203) 359-7700  
e-mail: info@omega.com

**Canada:**  
976 Bergar  
Laval (Quebec) H7L 5A1, Canada  
Tel: (514) 856-6928  
FAX: (514) 856-6886  
e-mail: info@omega.ca

### **For immediate technical or application assistance:**

**U.S.A. and Canada:** Sales Service: 1-800-826-6342/1-800-TC-OMEGA<sup>®</sup>  
Customer Service: 1-800-622-2378/1-800-622-BEST<sup>®</sup>  
Engineering Service: 1-800-872-9436/1-800-USA-WHEN<sup>®</sup>

**Mexico:**  
En Español: (001) 203-359-7803  
FAX: (001) 203-359-7807  
e-mail: espanol@omega.com  
info@omega.com.mx

### **Servicing Europe:**

**Czech Republic:** Frystatska 184, 733 01 Karviná, Czech Republic  
Tel: +420 (0)59 6311899  
FAX: +420 (0)59 6311114  
Toll Free: 0800-1-66342  
e-mail: info@omegashop.cz

**Germany/Austria:** Daimlerstrasse 26, D-75392 Deckenpfronn, Germany  
Tel: +49 (0)7056 9398-0  
FAX: +49 (0)7056 9398-29  
Toll Free in Germany: 0800 639 7678  
e-mail: info@omega.de

**United Kingdom:** ISO 9002 Certified  
One Omega Drive, River Bend Technology Centre  
Northbank, Irlam, Manchester  
M44 5BD United Kingdom  
Tel: +44 (0)161 777 6611  
FAX: +44 (0)161 777 6622  
Toll Free in United Kingdom: 0800-488-488  
e-mail: sales@omega.co.uk

---

It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

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.

# **USB-4750**

**32-Channel Isolated  
Digital I/O USB Data Acquisition  
Module**

## **User Manual**

# Contents

<b>Chapter</b>	<b>1</b>	<b>Introduction .....</b>	<b>2</b>
	1.1	Hardware Features.....	2
	1.2	Software Overview.....	3
		1.2.1 More on the CD .....	3
<b>Chapter</b>	<b>2</b>	<b>Installation .....</b>	<b>6</b>
	2.1	Unpacking .....	6
	2.2	Driver Installation .....	7
	2.3	Hardware Installation .....	9
	2.4	Hardware Uninstallation .....	9
		Figure 2.1:Unplug or Eject Hardware Dialog .....	10
		Figure 2.2:Stop a Hardware device dialog box .....	10
<b>Chapter</b>	<b>3</b>	<b>Signal Connections .....</b>	<b>12</b>
	3.1	Overview .....	12
	3.2	I/O Connectors .....	12
		3.2.1 Pin Assignments .....	12
		Figure 3.1:I/O Connector Pin Assignment .....	12
		3.2.2 I/O Connector Signal Description .....	13
		Table 3.1:I/O Connector Signal Descriptions .....	13
		3.2.3 LED Indicator Status Description .....	13
		Table 3.2:LED Indicator Status Description .....	13
	3.3	Isolated Digital I/O Connections.....	14
		3.3.1 Dry/Wet Contact Support for Digital Input .....	14
		Figure 3.2:Isolated Digital Input Connections .....	14
		3.3.2 Isolated Digital Output Connections .....	15
		Figure 3.3:Isolated Digital Output Connections .....	15
	3.4	Field Wiring Considerations .....	16
<b>Appendix</b>	<b>A</b>	<b>Specifications .....</b>	<b>18</b>
	A.1	Isolated Digital Input.....	18
	A.2	Isolated Digital Output.....	18
	A.3	Isolated Counter .....	18
	A.4	General .....	18



# 1

## Introduction

Sections include:

- Hardware Features
- Software Overview

# Chapter 1 Introduction

Thank you for buying the USB-4750 data acquisition module. The USB-4750 is a powerful data acquisition (DAS) module for the USB port. It features a unique circuit design and complete functions for data acquisition and control.

## 1.1 Hardware Features

---

USB-4750 features excellent measurement & control functions:

- 32 isolated digital input/output channels
- High-voltage isolation up to 2,500 VDC on all channels
- Dry/wet contact support
- Interrupt handling capability
- High-sink current for isolated output channels (100mA max./Channel)
- Digital output value retained after hot system reset
- Programmable Power-Up States for output channels
- Wiring terminals on module

*Note: You can install up to sixteen USB-4750's to a system because of the restriction of device BoardID*

*Note: The power output of an USB port is 500 mA, while the USB-4750 requires 350 mA (Max.). This means that if an USB hub is used, it will need an external power supply to support more than one USB-4750 device.*

*Note: For detailed specifications of USB-4750, please refer to Appendix A, Specifications.*

## 1.2 Software Overview

---

Omega offers a rich set of DLL drivers, third-party driver support and application software on the companion CD-ROM to help fully exploit the functions of your device. The Device Drivers feature a complete I/O function library to help boost your application performance and work seamlessly with development tools such as Visual C++, Visual Basic,

### 1.2.1 More on the CD

For instructions on how to begin programming in each development tool, some tutorial chapters are included in the Device Drivers Manual for your reference. Please refer to the corresponding sections in these chapters on the Device Drivers Manual to begin your programming efforts. You can also look at the example source code provided for each programming tool, since they can get you very well oriented.

The Device Drivers Manual can be found on the companion CD-ROM. Alternatively, if you have already installed the Device Drivers on your system, The Device Drivers Manual can be readily accessed through the Start button:

**Start/Programs/Omega USB-4700 Series/ Device Driver's Manual**

The example source code can be found under the corresponding installation folder such as the default installation path:

**Program Files/Omega/USB-4700/Examples**





# 2

## Installation

Sections include:

- Unpacking
- Driver Installation
- Hardware Installation
- Hardware Uninstallation

# Chapter 2 Installation

## 2.1 Unpacking

---

After receiving your USB-4750 package, please inspect its contents first. The package should contain the following items:

- USB-4750 Module
- Shielded USB 2.0 Cable (1.8 m)
- Companion CD-ROM (DLL driver included)

The USB-4750 Module harbors certain electronic components vulnerable to *electrostatic discharge* (ESD). ESD could easily damage the integrated circuits and certain components if preventive measures are not carefully paid attention to. ***Before removing the module from the antistatic plastic bag, you should take following precautions to ward off possible ESD damage:***

- Touch the metal part of your computer chassis with your hand to discharge static electricity accumulated on your body. One can also use a grounding strap.
- Make contact between the antistatic bag and ground before opening.

### **After taking out the module, you should first:**

Inspect the module for any possible signs of external damage (loose or damaged components, etc.). If the module is visibly damaged, please notify our service department or our local sales representative immediately. Avoid using a damaged module with your system.

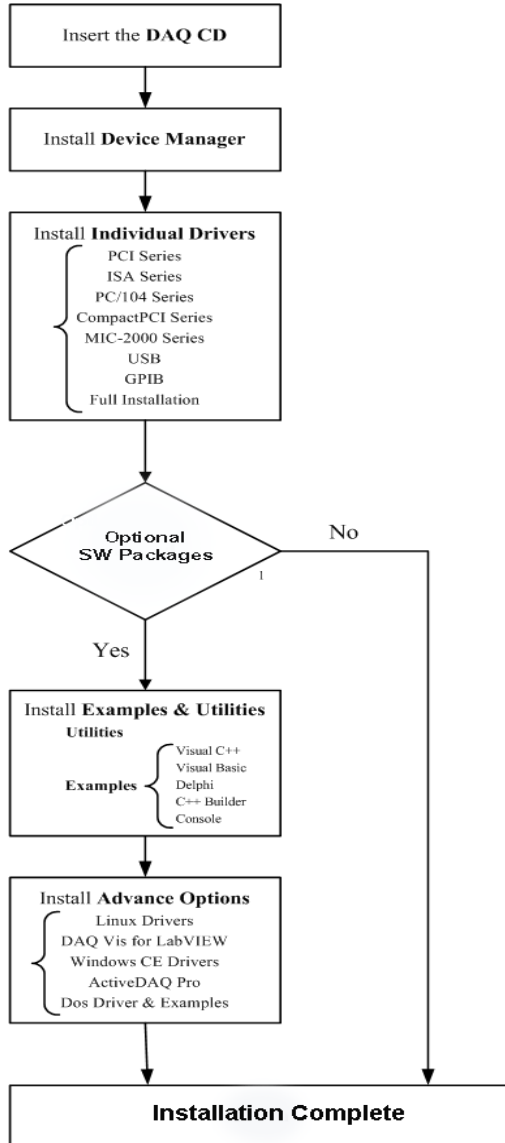
- Avoid physical contact with materials that could hold static electricity such as plastic, vinyl and Styrofoam.

## 2.2 Driver Installation

---

We recommend you install the software driver before you install the USB-4750 module into your system, since this will guarantee a smooth installation process.

The 32-bit DLL driver Setup program for the USB-4750 module is included on the companion CD-ROM that is shipped with your module package. Please follow the steps on the following page to install the driver software:



For further information on driver-related issues, an online version of the Device Drivers Manual is available by accessing the following path:

**Start/Programs/Omega USB-4700 Series/ Device Driver's Manual**

## 2.3 Hardware Installation

---

*Note: Make sure you have installed the software driver before you install the module (please refer to Section 2.2 Driver Installation)*

After the DLL driver installation is completed, you can now go on to install the USB-4750 module in any USB port that supports the USB 1.1/2.0 standard, on your computer. It is suggested that you refer to the computer's user manual if you have any doubts. Please follow the steps below to install the module on your system.

**Step 1:** Touch the metal part on the surface of your computer to neutralize the static electricity that might be in your body.

**Step 2:** Plug your USB module into the selected USB port. Use of excessive force must be avoided; otherwise the module might get damaged.

*Note: In case you installed the module without installing the DLL driver first, Windows 2000/XP will recognize your module as an "unknown device" after reboot, and will prompt you to provide necessary driver. You should ignore the prompting messages (just click the Cancel button) and set up the driver according to the steps described in Section 2.2 Driver Installation.*

After your module is installed, you can configure it using the Device Manager. The Device Driver's Manual can be found at:

**Start/Programs/Omega USB-4700 Series/ Device Driver's Manual**

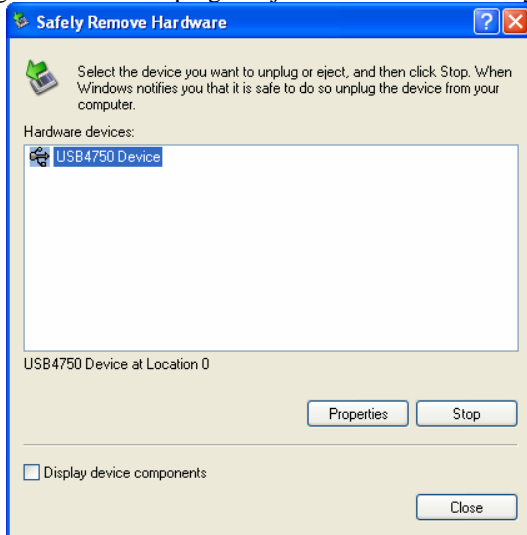
## 2.4 Hardware Uninstallation

---

Though the USB modules are hot swappable, we still recommend you to follow the hardware un-installation procedure to avoid any unpredictable damages to your device or your system.

**Step1:** Close the applications of the USB module.

**Step2:** Right click the “Unplug or Eject Hardware” icon on your task bar.



*Figure 2.1: Unplug or Eject Hardware Dialog*

**Step3:** Select “USB-4750 Device” and press “Stop” Button.



*Figure 2.2: Stop a Hardware device dialog box*

**Step4:** Unplug your USB device from the USB port.

*Note: Please make sure that you have closed the application before unplugging the USB device, otherwise unexpected system error or damage may occur.*

# 3

## Signal Connections

Sections include:

- Overview
- Isolated Digital I/O Connections
- Field Wiring Considerations



# Chapter 3 Signal Connections

## 3.1 Overview

Maintaining good signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly. A good signal connection can avoid unnecessary and costly damage to your PC and other hardware devices.

## 3.2 I/O Connectors

USB-4750 is equipped with plug-in screw-terminal connectors that facilitate connection to the module without terminal boards or cables.

### 3.2.1 Pin Assignments

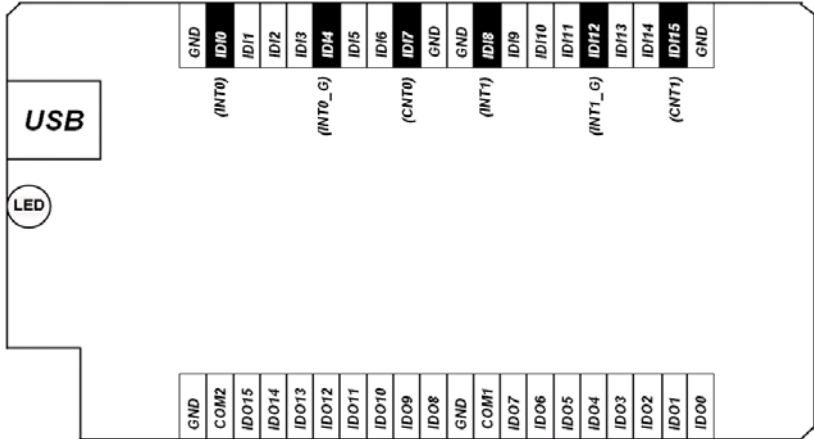


Figure 3.1: I/O Connector Pin Assignment

- Note:
- IDI0 shares the same pin with INT0*
  - IDI4 shares the same pin with INT0\_G*
  - IDI7 shares the same pin with CNT0*
  - IDI8 shares the same pin with INT1*
  - IDI12 shares the same pin with INT1\_G*
  - IDI15 shares the same pin with CNT1*

## 3.2.2 I/O Connector Signal Description

**Table 3.1: I/O Connector Signal Descriptions**

Signal	Reference	Direction	Description
IDI<0~15>	GND	Input	Isolated digital input channels
INT<0,1>	INT_G	Input	Interrupt trigger sources.
INT<0,1>_G	-	-	Ground for interrupt pins.
CNT<0,1>	GND	Input	Isolated input counters
IDO<0~15>	GND	Output	Isolated digital output channels
COM<0,1>	-	-	Common pins for connecting inductive loads of isolated output channels
GND	-	-	Ground

### 3.2.3 LED Indicator Status Description

The USB Module is equipped with a LED indicator to show the current status of the device. When you plug the USB device into the USB port, the LED indicator will blink five times and then stay lit to indicate that it is on. Please refer to the following table for detailed LED indicator status information.

**Table 3.2: LED Indicator Status Description**

LED Status	Description
On	Device ready for work
Off	Device not ready to work
Slow Blinking (5 times)	Device initialization
Fast Blinking (Depends on data transfer speed).	Device working

### 3.3 Isolated Digital I/O Connections

#### 3.3.1 Dry/Wet Contact Support for Digital Input

Each digital input channel accepts either dry contact or 0 ~ 5 VDC wet contact inputs. Dry contact capability allows the channel to respond to changes in external circuitry (e.g., the closing of a switch in the external circuitry) when no voltage is present in the external circuit. Figure 3-1 shows external circuitry with both wet and dry contact components, connected as an input source to one of the card's digital input channels.

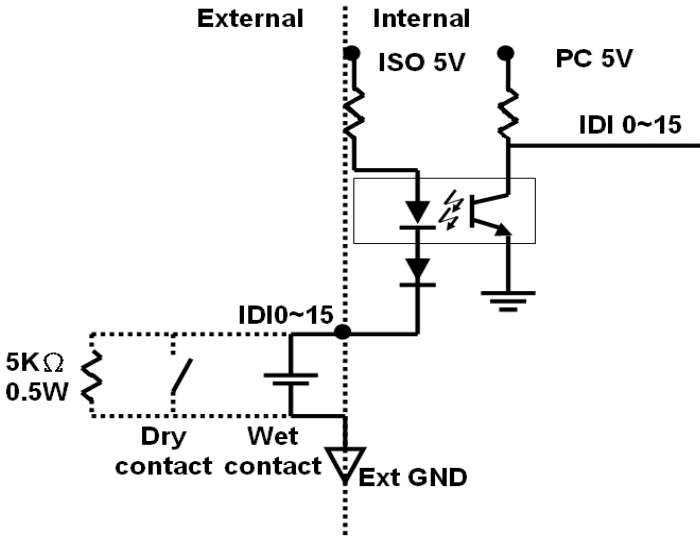
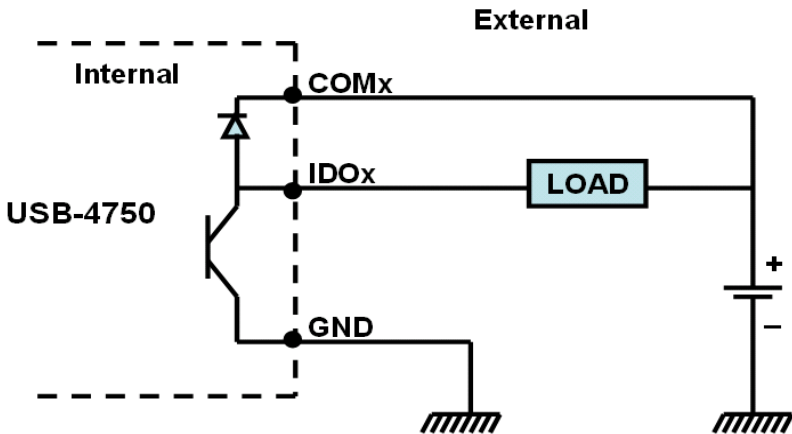


Figure 3.2: Isolated Digital Input Connections

### 3.3.2 Isolated Digital Output Connections

Each of 8 isolated digital output channels comes equipped with a Darlington transistor. Every 8 output channels share common collectors and integrate suppression diodes for inductive loads. Channels 0 ~ 7 use COM0, and channels 8 ~ 15 use COM1 as a common pin. If an external voltage (5 ~ 40 V) is applied to an isolated output channel (IDO 0 ~ IDO 15) while it is being used as an output channel, the current will flow from the external voltage source to the card. Please take care that the current through each GND pin not exceed 100 mA.

Figure 3.3 shows how to connect an external output load to the card's isolated outputs.



*Figure 3.3: Isolated Digital Output Connections*

### 3.4 Field Wiring Considerations

---

- When you use USB-4750 to acquire data from outside, noises in the environment might significantly affect the accuracy of your measurements if due cautions are not taken. The following measures will be helpful to reduce possible interference running signal wires between signal sources and the USB-4750.
- The signal cables must be kept away from strong electromagnetic sources such as power lines, large electric motors, circuit breakers or welding machines, since they may cause strong electromagnetic interference. Keep the analog signal cables away from any video monitor, since it can significantly affect a data acquisition system.
- If the cable travels through an area with significant electromagnetic interference, you should adopt individually shielded, twisted-pair wires as the analog input cable. This type of cable has its signal wires twisted together and shielded with a metal mesh. The metal mesh should only be connected to one point at the signal source ground.
- Avoid running the signal cables through any conduit that might have power lines in it.
- If you have to place your signal cable parallel to a power line that has a high voltage or high current running through it, try to keep a safe distance between them. Or place the signal cable in a right angle to the power line to minimize the undesirable effect.

# A

## Specifications

# Appendix A Specifications

## A.1 Isolated Digital Input

---

<b>Channels</b>	16
<b>Interrupt Inputs</b>	DI0, DI8
<b>Optical Isolation</b>	2500 VDC
<b>Opto-isolator ResponseTime</b>	25 $\mu$ s
<b>Input Voltage</b>	5~50VDC, or dry contact

## A.2 Isolated Digital Output

---

<b>Channels</b>	16
<b>Optical Isolation</b>	2500 VDC
<b>Opto-isolatorResponse Time</b>	25 $\mu$ s
<b>Output Voltage</b>	5 ~ 40 VDC
<b>Sink Current</b>	100mA/ch. Max. 1.1A/total Max.

## A.3 Isolated Counter

---

<b>Channels</b>	2 independent		
<b>Resolution</b>	32-bit counters (low 16bit by hardware and high 16bit by firmware)		
<b>Base Clock</b>	External	8MHz max.	2 independent program- mable clock sources
	Internal	20MHz max.	
<b>Frequency Measurement</b>	Input frequency from 0.1Hz to 1Mhz		
<b>External Input Divide</b>	2 to 65535		

## A.4 General

---

<b>I/O Connector Type</b>	10-pin screw terminal *4		
<b>Dimensions</b>	132 X 80 X 32 mm (5.2" X 3.2" X 1.3")		
<b>Power Consumption</b>	5 V @ 350 mA max.		
<b>Temperature</b>	Operation	0~60° C (32~140° F) (refer to IEC 68-2-1, 2)	
	Storage	-20~70° C (-4~158° F)	
<b>Relative Humidity</b>	5%~95% RH non-condensing (refer to IEC 68-2-1, 2)		

## 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 2007 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.



# Where Do I Find Everything I Need for Process Measurement and Control? **OMEGA...Of Course!** *Shop online at [omega.com](http://omega.com)*

## **TEMPERATURE**

- ☑ Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- ☑ Wire: Thermocouple, RTD & Thermistor
- ☑ Calibrators & Ice Point References
- ☑ Recorders, Controllers & Process Monitors
- ☑ Infrared Pyrometers

## **PRESSURE, STRAIN AND FORCE**

- ☑ Transducers & Strain Gages
- ☑ Load Cells & Pressure Gages
- ☑ Displacement Transducers
- ☑ Instrumentation & Accessories

## **FLOW/LEVEL**

- ☑ Rotameters, Gas Mass Flowmeters & Flow Computers
- ☑ Air Velocity Indicators
- ☑ Turbine/Paddlewheel Systems
- ☑ Totalizers & Batch Controllers

## **pH/CONDUCTIVITY**

- ☑ pH Electrodes, Testers & Accessories
- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
- ☑ Industrial pH & Conductivity Equipment

## **DATA ACQUISITION**

- ☑ Data Acquisition & Engineering Software
- ☑ Communications-Based Acquisition Systems
- ☑ Plug-in Cards for Apple, IBM & Compatibles
- ☑ Datalogging Systems
- ☑ Recorders, Printers & Plotters

## **HEATERS**

- ☑ Heating Cable
- ☑ Cartridge & Strip Heaters
- ☑ Immersion & Band Heaters
- ☑ Flexible Heaters
- ☑ Laboratory Heaters

## **ENVIRONMENTAL MONITORING AND CONTROL**

- ☑ Metering & Control Instrumentation
- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments

M4569/0907

## Free Manuals Download Website

<http://myh66.com>

<http://usermanuals.us>

<http://www.somanuals.com>

<http://www.4manuals.cc>

<http://www.manual-lib.com>

<http://www.404manual.com>

<http://www.luxmanual.com>

<http://aubethermostatmanual.com>

Golf course search by state

<http://golfingnear.com>

Email search by domain

<http://emailbydomain.com>

Auto manuals search

<http://auto.somanuals.com>

TV manuals search

<http://tv.somanuals.com>