# OM-CP-ULTRASHOCK-A

Temperature, Humidity, Pressure and Tri-Axial Shock Data Logger

# OM-CP-SHOCK300

Tri-Axial Shock Data Logger

**INSTRUCTION SHEET**

**MQS5089/0120**

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# Quick Start Steps

1. Install Omega 4 software (see specifications for compatible versions) and USB Drivers onto a Windows PC (Windows XP SP3/7/8/10).
2. Launch the Omega Software.
3. The OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 come with a USB cable. Plug one end of the cable into an available USB port on the PC and plug the opposite end of the cable into the communication port on the OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300. The drivers will install automatically.
4. The device will appear in the Connected Devices list, highlight the desired data logger. For most applications, select **"Custom Start"** from the menu bar and choose the desired start method, reading rate and other parameters appropriate for the data logging application and click **"Start"**. (**"Quick Start"** applies the most recent custom start options, **"Batch Start"** is used for managing multiple loggers at once, **"Real Time Start"** stores the dataset as it records while connected to the logger.) The status of the device will change to **"Running"**, **"Waiting to Start"** or **"Waiting to Manual Start"**, depending upon your start method.
5. Disconnect the data logger from the interface cable and place it in the environment to measure. Note: The device will stop recording data when the end of memory is reached or the device is stopped. At this point the device cannot be restarted until it has been re-armed by the computer.
6. To download data, connect the logger to the interface cable. Highlight the data logger in the Connected Devices list. Click **"Stop"** on the menu bar. Once the data logger is stopped, with the logger highlighted, click **"Download"**. You will be prompted to name your report. Downloading will offload and save all the recorded data to the PC.

# Product Overview

The OM-CP-ULTRASHOCK-A is a 3-axis shock / acceleration data logger with additional channels for temperature, humidity and barometric pressure. Each of the six channels may be made active or inactive as needed. Disabling channels will provide additional storage to the enabled channels.

The OM-CP-SHOCK300 is a 3-axis shock / acceleration data logger. Each of the three channels may be made active or inactive as needed. Disabling channels will provide additional storage to the enabled channels.

The OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 are specifically designed for documenting dynamic environments such as moving vehicles, trucks, containers, ships, etc. The device is also valuable in characterizing environments such as production and assembly lines of delicate electronics, IC fabrication, communications and computer components.

The OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 contain two separate accelerometers to provide high sensitivity and accuracy up to 15g or higher levels of shock monitoring up to 300g. One of three operating ranges must be chosen during setup for a logging session. Those ranges are +/- 15g (low g accelerometer), +/- 100g and +/- 300g (high g accelerometer).

### Physical Mounting

The most accurate transfer of shock, vibration and acceleration to the final logged data will occur when the mounting is mechanically rigid. Typically, this would occur when the OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 are mounted by two bolts directly to a solid metal, flat surfaced object of significant mass.


For various applications, the rigid “bolted down” mounting may not be optimal or practical. The bottom surface of the OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 are precision machined flat. It is possible to mount the unit by the use of a double-sided adhesive material. Omega does not make recommendations of specific materials but several points to consider are:

- Adhesive joint should be as thin as possible
- Adhesive joint must have adequate strength to support the unit under conditions expected in use (temperature, shock, vibration, etc.)
- Adhesive joint material should be as stiff as possible (high durometer)

### Orientation of Axes

The illustration to the right shows the directions of the x, y and z axes. They are also laser engraved on the front face of the unit. If an OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 are positioned so that any axis points upward, that axis will report a g force of +1 g.

### LED Indicator Functions

The red and green LEDs on the front of the OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 will flash or maintain a static condition to represent operating functions as shown in the table below.


The power up indication is only presented if the battery pack is separated from the front face and replaced. This should be done only during factory service or if directed to do so by a Omega support or repair agent. If it is presented at any other time, there may be a malfunction of the unit.

| OPERATING FUNCTION | GREEN LED INDICATOR | RED LED INDICATOR |
|---|---|---|
| Power-up Indicator | **Flashes 4 times**<br>Red and green LED indicators alternately and rapidly flash 4 times each at power-up. LED indicators continue to flash for error at power-up. | |
| Logging Data<br>(without USB connected) | **Flashes every 15 seconds**<br>Indicates normal operation of logger without USB connected and adequate battery charge level. | **Flashes every 15 seconds (maximum)**<br>Indicates low battery charge level. |
| Logging Data<br>(with USB communication) | **Flashes every 15 seconds**<br>Indicates normal operation of logger with USB connected. | **Flashes every 5 seconds (maximum)**<br>Indicates when logger communication occurs via USB. |
| Delayed Logging Start | **Flashes every 3 seconds**<br>Red and green LED indicators simultaneously flash every 3 seconds to indicate data logging delayed start is set. | |
| USB Charging<br>(USB connected) | **Pulses slowly on and off**<br>Indicates when battery is charging via USB connector. | **Flashes every 5 seconds (maximum)**<br>Indicates when logger communication occurs via USB. |
| Battery Charged<br>(USB connected) | **On**<br>Indicates when battery is fully charged when connected to USB. | **Flashes every 5 seconds (maximum)**<br>Indicates when logger communication occurs via USB. |
| Battery Charging Fault<br>(USB connected) | **Off** | **On 2 seconds then off 2 seconds**<br>Indicates when there is a battery charging fault and continues to flash until fault is cleared. |
| Logger Off | **Off**<br>Red and green LED indicators are off when logger is off and USB not connected. | |

### Humidity

The OM-CP-ULTRASHOCK-A utilizes polymer type humidity sensor and a high-tech Gore® vent material at the entrance holes to the internal temperature and humidity sensor chamber. The vent equalizes pressure, reduces condensation and also blocks entry of liquids and other contaminants.

If the unit has been exposed to very high levels of humidity for extended time, it will return to normal measurement accuracy by storing it in normal room humidity (approximately 50% RH) conditions for several days.

### Temperature

The OM-CP-ULTRASHOCK-A utilizes a silicon temperature sensor and is calibrated for accuracy. When measuring humidity and temperature, in addition to shock, please note that there will be a delay in response time to humidity and temperature measurements as the OM-CP-ULTRASHOCK-A processes shock events before other parameters.

### Pressure

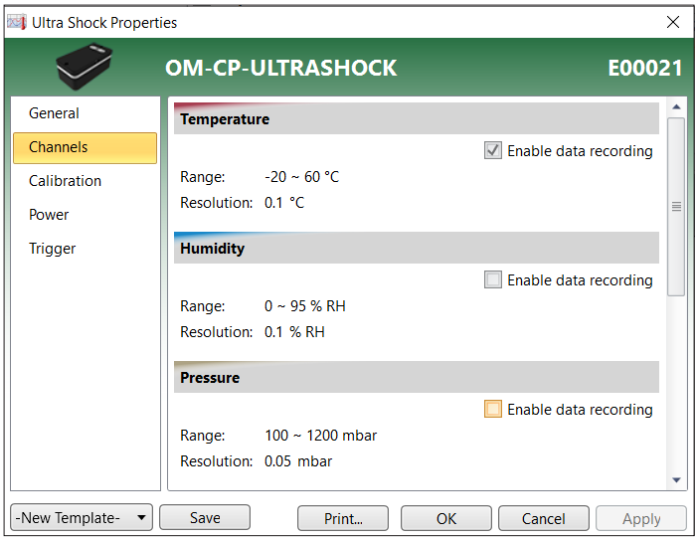
The OM-CP-ULTRASHOCK-A pressure sensor is designed to measure barometric pressure from very low altitudes to those altitudes found in aircraft, up to high altitude balloons. While specified to 300 mbar, it will continue to report data to 100 mbar. This equates to approximately 53,000 feet.

The pressure sensor is contained within the same sealed chamber as the temperature and humidity sensors and is also protected by the Gore® vent.

# Device Operation

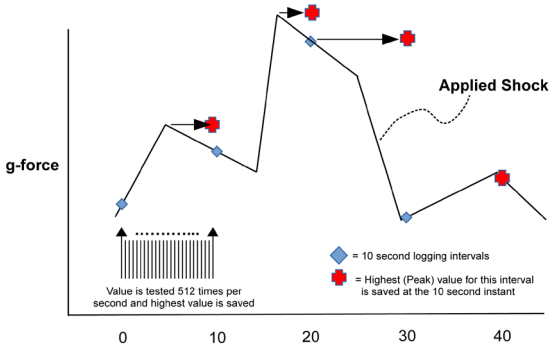
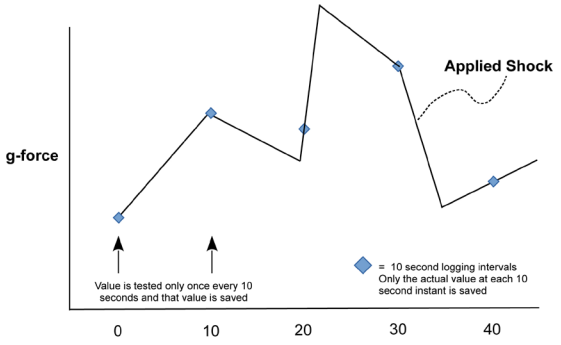
### Enabling and Disabling of Channels

1. Connect the logger to the interface cable.
2. Highlight the data logger in the Connected Devices list.
3. Click **Properties** or right click the logger in the list and select **Properties**.
4. Select **Channels** in the Properties list.
5. Check or uncheck **Enable data recording** for each channel you want to enable or disable.

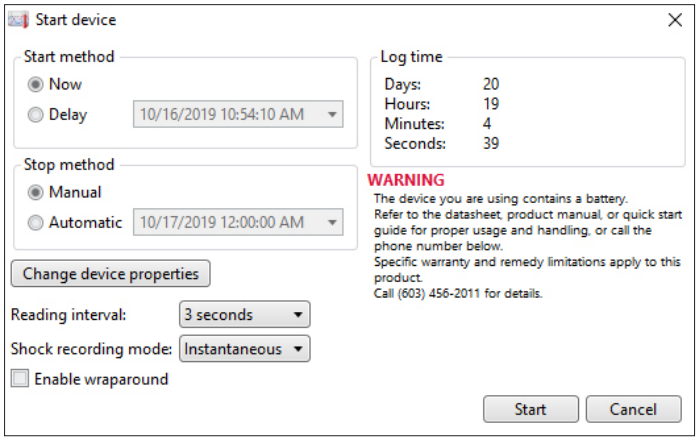


### Logging Mode - Peak vs. Instantaneous

When **Custom Start** is selected in the Omega 4 Software, the user is presented with a range of logging time intervals or actual recording rates (sampling rates). For all but the two highest recording rates, the user will also have a choice of Peak vs. Instantaneous capture.

| PEAK | INSTANTANEOUS |
|---|---|
| Regardless of the logging interval, the accelerometers will internally sample at 512Hz. At the logging interval (for example, 30 seconds), the Peak value found in the previous logging interval is stored. | The accelerometers will only sample data at the logging rate. For instance, if a 30 second logging rate was selected, then only a single data point is captured at each 30 second instant. |
|  Using **Peak** mode = excellent information capture, shorter battery life |  Using **Instantaneous** mode = much information lost, longer battery life |
| The red markers show the peak value for the interval which will be stored. | The potential to lose valuable data can be seen. This, of course, is very dependent on the applied shock duration and wave shape. It's possible for a significant shock event to occur and not even be visible in the data for the Instantaneous mode. |

1. Connect the logger to the interface cable.
2. Highlight the data logger in the Connected Devices list.
3. Click **Custom Start**.
4. Choose the **Start method**—Now or Delay (select date and time).
5. Choose the **Stop method**—Manual or Automatic (select date and time).
6. Select the **Reading interval**.
7. Select the **Shock recording mode** (if applicable)—Instantaneous or Peak



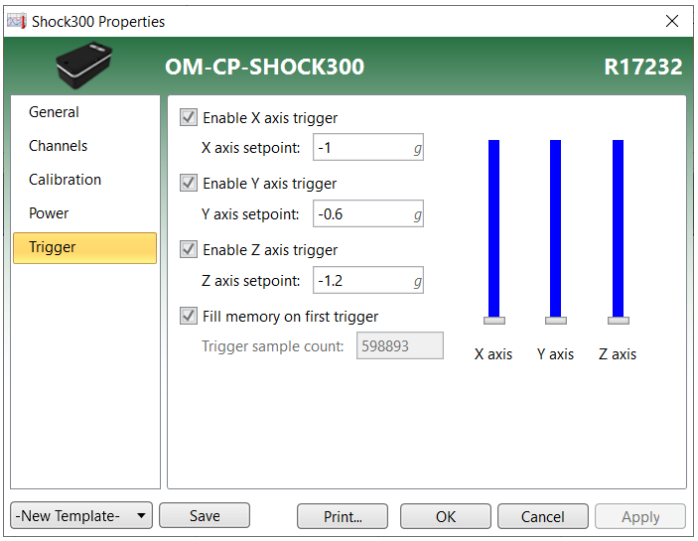

**NOTE:** When switching USB connections from a PC, laptop or power adapter, users can expect a 2 minute delay.

### Trigger Mode and Post Trigger Storage

The OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 allow the user to enter a shock value which will trigger the storage of data. In general, consider the use of a trigger as primarily a means of saving storage space by saving only data which is above a certain value.

To change a trigger in the Omega 4 Software:

1. Click **Properties** or right click the device in the Connected Devices list.
2. Click to enable/disable triggers for the X, Y and Z axis and set trigger points. Trigger setpoints are absolute values.
3. You may also choose between filling all of memory after a trigger or storing only a fixed number of samples after a trigger.




For example, if the option to fill memory is selected, then after the first trigger, all of available memory will be filled at the selected logging rate. This will consume the remainder of available storage space for the selected channel.

If instead, a value of 100 is entered for “trigger sample count”, then a total of 100 data points will be stored once a trigger occurs. These 100 samples are acquired at the selected logging rate.

The trigger sample count should be chosen carefully because it may gather data points for which we have no interest. For instance, if 100 were entered and the logging rate were 30 seconds, then 100 data points would be gathered over a 3,000 second interval. There may be very little relevant information to a shock event which triggered the logging process.

While the use of a trigger has a significant effect on data storage, it has virtually no impact on battery life.

### Battery Life

The OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 battery life are highly dependent on the mode of operation which has been selected for the device. Referring to the Peak and Instantaneous mode discussion, along with the Trigger discussion, the following table presents typical battery life, all at 25 °C, for various applications of the product. At 0 °C, life will be approximately 30% less. At 60 °C, a slight improvement may be seen but is generally masked by increased self-discharge of the battery.

| SETUP CONDITIONS | COMMENT | BATTERY LIFE (DAYS) |
|---|---|---|
| All channels, 30s logging | Peak | 25 |
| All channels, 30s logging | Instantaneous | 29 |
| All channels, 1024Hz | | 24 |
| All channels, 512Hz | | 24 |
| Temperature, RH, Pressure (OM-CP-ULTRASHOCK-A only) | No Shock | > 120 |
| Triggered vs. Non-triggered | | No difference (but major storage differences) |

**Storage and Data Transfer**
The OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 contain 8 Megabytes of storage space. This space provides for over 1,397,418 data points (OM-CP-SHOCK300) and 598,893 data points (OM-CP-ULTRASHOCK-A) for each channel, with all channels active.

If fewer channels are used, the active channels recover and utilize the unused storage space.

For instance, if only temperature were being logged, there would be adequate storage space for around 4,000,000 data points.

| SETUP CONDITIONS | COMMENT | DAYS OF LOGGING (1) |
|---|---|---|
| All channels, 30s logging | Peak or Instantaneous | 204 |
| Temperature, humidity, 30s logging | | 683 |
| 3-axis shock, 128Hz, instantaneous | No Trigger | 2.84 hours |
| 3-axis shock, 128Hz, instantaneous | With Trigger | Many (2) |

The following table present several examples of storage capacity, measured in days, for various applications of the product.

1. In many cases, the storage space exceeds the battery capacity. In such cases, external power would need to be provided to the OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300.
2. When logging at a sampling rate (not time) of 128Hz, for example, only 2.84 hours of storage is available without using triggered operation. If trigger is enabled, all storage space is available and is only used for the duration of the triggered shock events, plus a post-event buffer which is user programmable.

# Product Maintenance

**Battery Charging and Care**
The OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 battery do not require any periodic maintenance. It should be charged as needed. If the unit will not be used for a while, leaving the battery in a 50% state of charge is considered beneficial to battery longevity. Using the Omega provided charger is recommended to maintain charging time.

The battery is a Lithium Ion two cell pack. Please note the safe handling and storage recommendations in the specifications section.

**Inspection**
The OM-CP-ULTRASHOCK-A and OM-CP-SHOCK300 may be inspected visually for any signs of damage, especially to the gray gasket or to the USB jack. If damage is found, visit www.omega.com to return the unit to Omega for repair.

**Recalibration**
Recalibration is recommended annually. To send devices back for calibration, visit www.omega.com.

# OM-CP-ULTRASHOCK-A Specifications

| TEMPERATURE | | | |
|---|---|---|---|
| Sensor | Semiconductor | | |
| Range | -20 °C to +60 °C | | |
| Resolution | 0.1 °C | | |
| Accuracy | ±0.5 °C (+5 °C to +60 °C) | | |
| **HUMIDITY** | | | |
| Sensor | Capacitive Polymer | | |
| Range | 0 %RH to 95 %RH | | |
| Resolution | 0.1 %RH | | |
| Calibrated Accuracy | ±3 %RH (±2 %RH typical at 25 °C) | | |
| Specified Accuracy Range | +20 °C to +40 °C; 25 %RH to 75 %RH | | |
| **PRESSURE** | | | |
| Sensor | Semiconductor Strain Gage | | |
| Range | 100 mbar to 1300 mbar | | |
| Resolution | 0.05 mbar | | |
| Calibrated Accuracy | ±1.5 mbar at 25 °C; at 750 mbar | | |
| **SHOCK** | | | |
| Accelerometer Type | MEMS Semiconductor | | |
| Acceleration Range (g) | ±15 g | ±100 g | ±300 g |
| Acceleration Resolution (g) | 0.02 g | 0.05 g | 0.2 g |
| Calibrated Accuracy (g) | ±0.3 g | ±2.0 g | ±6.0 g |
| Sampling Rate | 1000 Hz | | |
| Accelerometer Freq. Resp. | >1000 Hz (15 g)<br>>500 Hz (100 g, 300 g) | | |
| Reading Rate | 1024 Hz to 5 minutes for shock, selectable in software. Temperature, pressure and humidity sampled approx. every 2 seconds at intervals shorter than 2 seconds. Otherwise, sampled at the reading rate. | | |

| GENERAL | |
|---|---|
| Memory | 3,593,358 readings (598,893 per channel, all channels in use) |
| Start Modes | Software programmable immediate start or delay start, up to 6 months in advance |
| Real Time Recording | May be used with PC to monitor and record data in real time at a 1 second sample rate |
| Password Protection | An optional password may be programmed into the device to restrict access to configuration options. Data may be read out with the password. |
| Calibration | Digital calibration through software |
| Calibration Date | Automatically recorded within device |
| Battery Type | Internal Lithium Ion pack, charger included |
| Battery Life | 90 days typical at 64Hz rate |
| Data Format | Date and time stamped gravities (g and mg), temperature (°C, °F, K, °R), humidity (%RH, mg/ml water vapor concentration), pressure (PSIA, inHg, mmHg, bar, atm, Torr, Pa, kPa, MPa) |
| IP Rating | IP64 |
| Time Accuracy | 10 seconds/month (at 0 °C to 50 °C) |
| Computer Interface | USB-C cable required (included); 1MBaud |
| Supported Software | Windows XP SP3/7/8/10 |
| Software Compatibility | Standard Software version 4.2.15.0 or later<br>Secure Software version 4.2.14.0 or later |
| Operating Environment | -20 °C to +60 °C,<br>0 %RH to 95 %RH non-condensing |
| Dimensions | 3.4 in x 1.7 in x 1.3 in<br>(86 mm x 43 mm x 33 mm) |
| Weight | 8 oz (227 g) |
| Enclosure | Anodized aluminum |
| Approvals | CE compliant<br>EMC Directive 2014/30/EU<br>RoHS Directive 2011/65/EU |

***Battery Warning***

***FIRE, EXPLOSION AND SEVERE BURN HAZARD. DO NOT SHORT CIRCUIT, CRUSH, PENETRATE, INCINERATE OR DISASSEMBLE. AVOID TEMPERATURES ABOVE THE MAXIMUM OPERATING TEMPERATURE OF THE PRODUCT. DISPOSE OF PROPERLY. CHARGE ONLY WITH THE PROVIDED OMEGA CHARGER, OR FROM OTHER USB POWER SOURCE VIA THE OMEGA PROVIDED CABLE.***

*Specifications subject to change.*
*See Omega's terms and conditions at www.omega.com*

# OM-CP-SHOCK300 Specifications

| SHOCK | | | |
|---|---|---|---|
| Accelerometer Type | MEMS Semiconductor | | |
| Acceleration Range (g) | ±15 g | ±100 g | ±300 g |
| Acceleration Resolution (g) | 0.02 g | 0.05 g | 0.2 g |
| Calibrated Accuracy (g) | ±0.3 g | ±2.0 g | ±6.0 g |
| Sampling Rate | 1000 Hz | | |
| Accelerometer Freq. Resp. | >1000 Hz (15 g)<br>>500 Hz (100 g, 300 g) | | |
| Reading Rate | 1024 Hz to 5 minutes, selectable in software. | | |

| GENERAL | |
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| Memory | 3,593,358 readings (598,893 per channel, all channels in use) |
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| IP Rating | IP64 |
| Time Accuracy | 10 seconds/month (at 0 °C to 50 °C) |
| Computer Interface | USB-C cable required (included); 1MBaud |
| Supported Software | Windows XP SP3/7/8/10 |
| Software Compatibility | Standard Software version 4.2.15.0 or later<br>Secure Software version 4.2.14.0 or later |
| Operating Environment | -20 °C to +60 °C,<br>0 %RH to 95 %RH non-condensing |
| Dimensions | 3.4 in x 1.7 in x 1.3 in<br>(86 mm x 43 mm x 33 mm) |
| Weight | 8 oz (227 g) |
| Enclosure | Anodized aluminum |
| Approvals | CE compliant<br>EMC Directive 2014/30/EU<br>RoHS Directive 2011/65/EU |

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## Servicing North America:


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Toll-Free: 1-800-826-6342 (USA & Canada only)
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Engineering Service: 1-800-872-9436 (USA & Canada only)
Tel: (203) 359-1660 Fax: (203) 359-7700
e-mail: info@omega.com


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## 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.

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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.

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