



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.

OM-CP-ULTRASHOCK-A & OM-CP-SHOCK300

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.

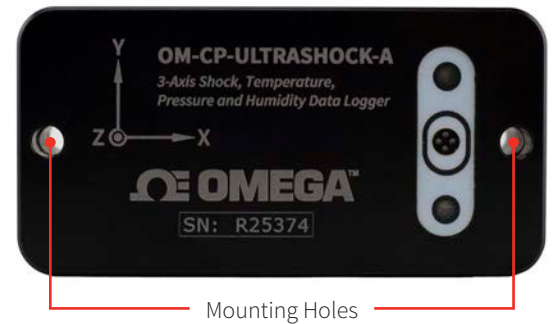
The OM-CP-SHOCK300 is a 3-axis shock / acceleration data logger. Each of the three channels may be made active or inactive as needed. Disabling channels will provide additional storage to the enabled channels.

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.



OM-CP-ULTRASHOCK-A & OM-CP-SHOCK300

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 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 (without USB connected)	Flashes every 15 seconds Indicates normal operation of logger without USB connected and adequate battery charge level.	Flashes every 15 seconds (maximum) Indicates low battery charge level.
Logging Data (with USB communication)	Flashes every 15 seconds Indicates normal operation of logger with USB connected.	Flashes every 5 seconds (maximum) Indicates when logger communication occurs via USB.
Delayed Logging Start	Flashes every 3 seconds Red and green LED indicators simultaneously flash every 3 seconds to indicate data logging delayed start is set.	
USB Charging (USB connected)	Pulses slowly on and off Indicates when battery is charging via USB connector.	Flashes every 5 seconds (maximum) Indicates when logger communication occurs via USB.
Battery Charged (USB connected)	On Indicates when battery is fully charged when connected to USB.	Flashes every 5 seconds (maximum) Indicates when logger communication occurs via USB.
Battery Charging Fault (USB connected)	Off	On 2 seconds then off 2 seconds Indicates when there is a battery charging fault and continues to flash until fault is cleared.
Logger Off	Off Red and green LED indicators are off when logger is off and USB not connected.	

OM-CP-ULTRASHOCK-A & OM-CP-SHOCK300

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

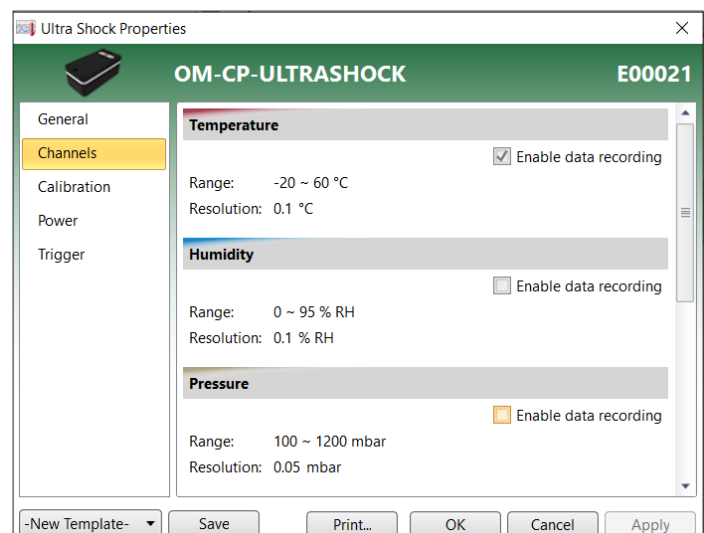
The OM-CP-ULTRASHOCK-A pressure sensor is designed to measure barometric pressure from very low altitudes to those altitudes found in aircraft, up to high altitude balloons. While specified to 300 mbar, it will continue to report data to 100 mbar. This equates to approximately 53,000 feet.

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

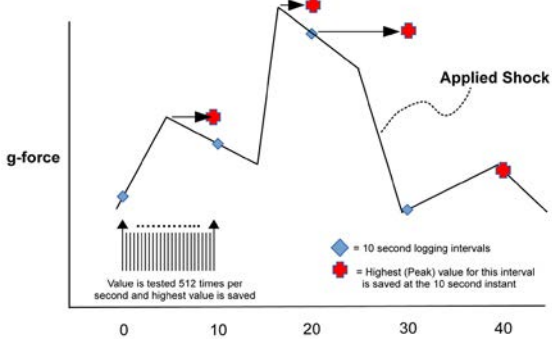
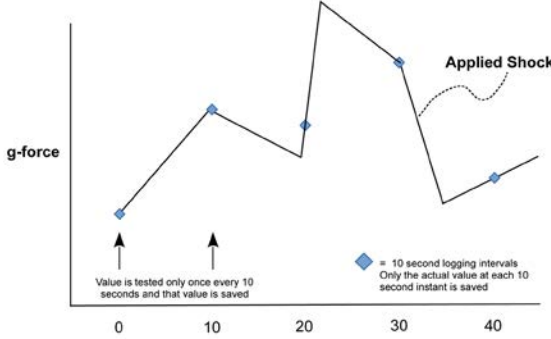
1. Connect the logger to the interface cable.
2. Highlight the data logger in the Connected Devices list.
3. Click **Properties** or right click the logger in the list and select **Properties**.
4. Select **Channels** in the Properties list.
5. Check or uncheck **Enable data recording** for each channel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



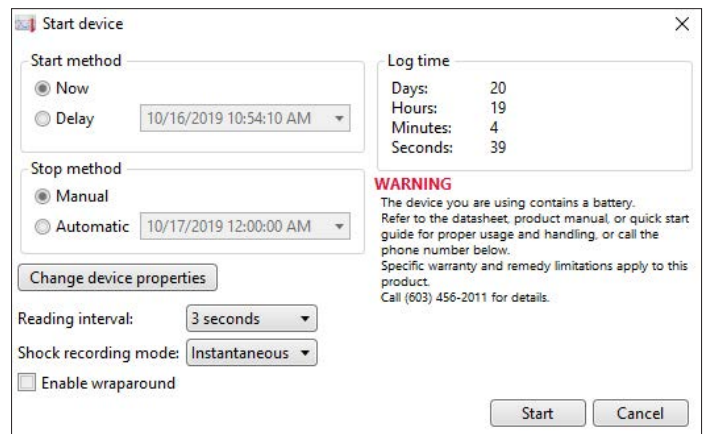
OM-CP-ULTRASHOCK-A & OM-CP-SHOCK300

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
<p>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.</p>  <p>Value is tested 512 times per second and highest value is saved</p> <p>Value is tested only once every 10 seconds and that value is saved</p> <p>Using Peak mode = excellent information capture, shorter battery life</p> <p>The red markers show the peak value for the interval which will be stored.</p>	<p>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.</p>  <p>Value is tested only once every 10 seconds and that value is saved</p> <p>Using Instantaneous mode = much information lost, longer battery life</p> <p>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.</p>

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.

OM-CP-ULTRASHOCK-A & OM-CP-SHOCK300

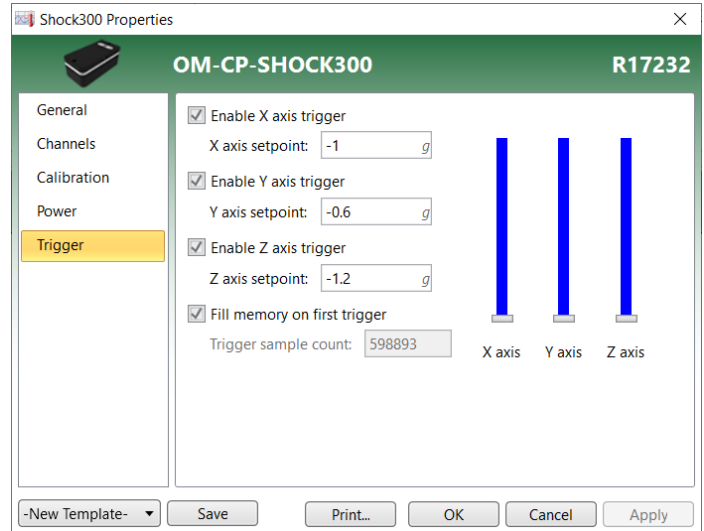
Trigger Mode and Post Trigger Storage

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)

OM-CP-ULTRASHOCK-A & OM-CP-SHOCK300

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.

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

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)

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) >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 Secure Software version 4.2.14.0 or later		
Operating Environment	-20 °C to +60 °C, 0 %RH to 95 %RH non-condensing		
Dimensions	3.4 in x 1.7 in x 1.3 in (86 mm x 43 mm x 33 mm)		
Weight	8 oz (227 g)		
Enclosure	Anodized aluminum		
Approvals	CE compliant EMC Directive 2014/30/EU 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) >500 Hz (100 g, 300 g)		
Reading Rate	1024 Hz to 5 minutes, selectable in software.		

GENERAL	
Memory	3,593,358 readings (598,893 per channel, all channels in use)
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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 Secure Software version 4.2.14.0 or later
Operating Environment	-20 °C to +60 °C, 0 %RH to 95 %RH non-condensing
Dimensions	3.4 in x 1.7 in x 1.3 in (86 mm x 43 mm x 33 mm)
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Specifications subject to change.

See Omega's terms and conditions at www.omega.com



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Servicing North America:

U.S.A. Headquarters:

Omega Engineering, Inc.
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Customer Service: 1-800-622-2378 (USA & Canada only)
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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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.

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.

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