

User's Guide



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MANCHESTER, UK

**LVU-230
LVU-260
LVUC10**

Ultrasonic Point Level Switches



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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.

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



UNPACKING INSTRUCTIONS

UNPACKING INSTRUCTIONS

Remove the Packing List and verify that you have received all equipment, including the following (quantities in parentheses):

Ultrasonic Level Switch (1)

Operator's Manual (1)

If you have any questions about the shipment, please call the Omega Customer Service Department. When you receive the shipment, inspect the container and equipment for signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

Note:

The carrier will not honor damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in the event reshipping is necessary.



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SYSTEM DESCRIPTIONS



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GENERAL DESCRIPTION

This Series of Liquid Level Detection systems are ideal, low cost ultrasonic liquid level detection systems for many applications. They operate in a broad spectrum of viscous to light liquids.

It uses proven ultrasonic technology with a sensor fabricated completely from **316 Stainless Steel**, which allows it to operate in virtually any liquid. Sensitivity adjustment allows the monitoring of percentage solids in the contents of the liquid. Its small size standard 3/4" NPT mounting fitting, and ability to be installed vertically or horizontally makes it the perfect choice for new or existing applications.

MODEL	FUNCTION	TYPE	INPUT	OUTPUT	AGENCY APPROVAL
LVU-230	Standard Point Level Gap Sensor	Integral & Remote	115VAC/230VAC 24VDC/12VDC	10A DPDT	CE
LVU-260	Loop Power Point Level Gap Sensor	Integral	9VDC to 30VDC	Two Wire 4-20mA 4-20mA	CE
LVUC10	Cryogenic Temp Liquid Level Sensor	Integral (-100°C) Remote (-300°C)	115VAC/230VAC 24VDC/12VDC	10A DPDT Two Wire, 4-20mA	CE



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PRINCIPLES OF OPERATION

The Level switches operates using ultrasonic sound wave propagation. Ultrasonic sound waves are greatly attenuated when transmitted through air. Conversely, when liquid is present, transmission of the sound waves is greatly enhanced. The electronic control unit, either integral or remote to the sensor, generates electrical signals that are converted to bursts of ultrasonic energy at the sensor. The ultrasonic bursts are transmitted across the liquid sensing gap of the sensor. Upon receipt of a valid signal at the receiver, the solid state electronics generate a “data enable” condition indicating liquid is present. This signal energizes a relay and/or provides an output condition.

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INSTALLATION

GENERAL

All units are easy to install. A sensor with an integral electronic control unit or a sensor with a remote control unit can be mounted in any position or orientation desired.

Make sure that all wiring, conduit and electrical fittings conform to local electrical codes for the location selected.

VISUAL INSPECTION

Unpack the control unit and sensor assemblies. Visually inspect them for any damage. Advise Cosense immediately if either assembly is damaged.

PRELIMINARY OPERATIONAL CHECK

Before installing the unit, a simple operational checkout should be performed as follows:

WARNING: In a hazardous environment never open the housing cover or connect the power leads without first disconnecting the electrical power at its source.

1. Fill a container with liquid.
2. Open the control unit housing cover and connect the power to the control unit (see appropriate wiring diagram for your unit).
3. Apply power from the source.
4. Place the sensor in the liquid. The relay should energize, or output will switch to $20.0 \pm 1.0 \text{mA}$.
5. Remove the sensor from the liquid. The relay will de-energize or output will switch back to $4.0 \pm 1.0 \text{mA}$ indicating that the system is functioning properly. If you do not experience the results indicated in Steps 4 and 5, contact Cosense immediately.
6. Disconnect the power to the control unit.
7. Proceed to final installation.



FINAL INSTALLATION

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CONTACT MODELS

Follow the instructions below:

1. Drill a suitable hole in the vessel or pipe wall and tap for 3/4" NPT. If this walled vessel or material is not suitable for threading, weld or braze a bushing to accept the sensor.
2. Screw the sensor in the threaded section and make sure that there is a good seal. Use a pipe compound or sealing tape compatible with the materials and avoid excessive tightening.
3. Run the power and control wiring cable to the electronic control unit. Observing all applicable electrical codes and proper wiring procedures.

CONTROL UNIT

Refer to the typical installation diagram and control unit dimensions when installing the control unit. Follow steps 1 and 2 below for remote mounted electronic units. Steps 3 through 7 are common for both the integral electronic units and remote electronic units.

1. Mount the remote control unit on any suitable wall, panel, etc. making sure there is adequate clearance for wiring.
2. Remove the PC board by removing the screws. Drill a suitable size hole in the control unit housing for a conduit fitting (if so required).
3. Remove the cover from housing. To complete wiring, either leave or remove the electronics printed circuit board in the housing on remote units and remove the encapsulate electronics in integral units.

CAUTION: Never remove unit from a vessel with power and/or output control cables connected to the electronic control unit inside the housing to avoid cable damage.

4. Wire the unit as desired. Refer to the wiring diagram inside the cover.

Note: All wiring, conduit and fittings should conform to local electrical codes. In a hazardous location, a conduit seal should be installed within 18 inches of the control unit housing. Use a drain seal in vertical conduit run to prevent condensation from entering the control unit. OMEGA assumes no responsibility for improperly wired units.

5. Replace the printed circuit board, if removed, or the encapsulated electronics. Make certain that the wires are dressed carefully to prevent pinching between the cover and the housing.
6. Replace the housing cover.



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FINAL INSTALLATION

CALIBRATION PROCEDURE

(IF REQUIRED, OTHERWISE DO NOT ADJUST THE POTENTIOMETER - LVUC10)

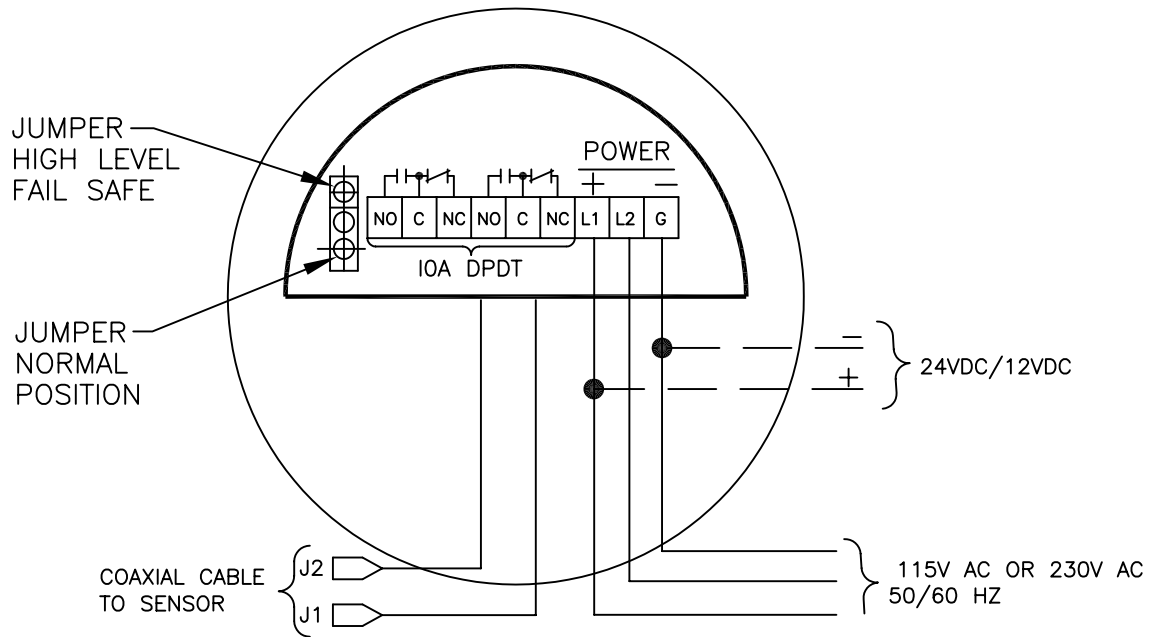
After the installation is complete, the system must be calibrated for the proper operation.

1. Connect the sensor cable to electronics at Jacks J1 and J2.
2. Connect power as per wiring diagram.
3. Turn the power on.
4. Allow the liquid or sludge to rise above the sensing point, adjust the potentiometer clockwise, until the relay is energized or output will switch to 20.0 ± 1.0 mA. Turn the potentiometer one more turn clockwise.
5. Allow the liquid or sludge to fall below the sensing point, relay should be de-energized or output will switch back to 4.0 ± 1.0 mA. If not, turn the potentiometer counter clockwise until the relay is de-energized. Turn the potentiometer counter clockwise one half turn.
6. Repeat Steps 4 and 5 for a final adjustment.
8. Unit is now calibrated. When the liquid level is above the sensing point, the relay will be energized or output will switch to 20.0 ± 1.0 mA. When the liquid level is below the sensing point, the relay will be de-energized or output will switch back to 4.0 ± 1.0 mA.

SYSTEM WIRING DIAGRAM



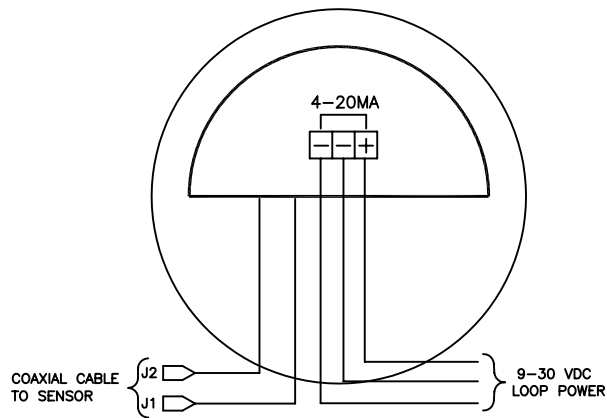
LVU-230 SERIES





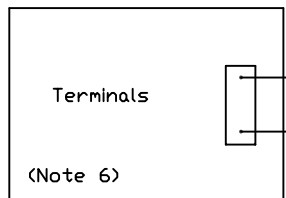
SYSTEM WIRING DIAGRAM

LVU-260 SERIES



HAZARDOUS (CLASSIFIED) LOCATION
 CLASS I, II, III
 Division 1
 Groups A, B, C, E, F, G
 (Note 2)

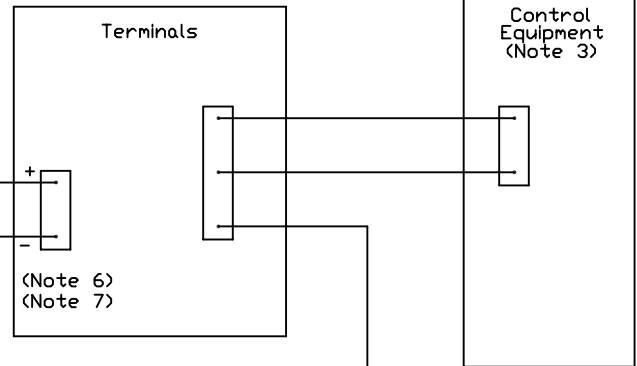
Model # LVU- 260 SERIES



Entity Parameters:
 $V_{max} - 36VDC$ $I_{max} - 150mA$
 $CI - 0\mu F$ $LI - 54\mu H$

NON-HAZARDOUS LOCATION

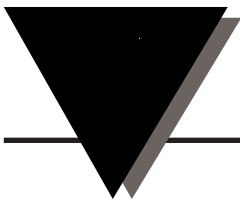
Associated Equipment



INTRINSIC, SAFETY GROUND

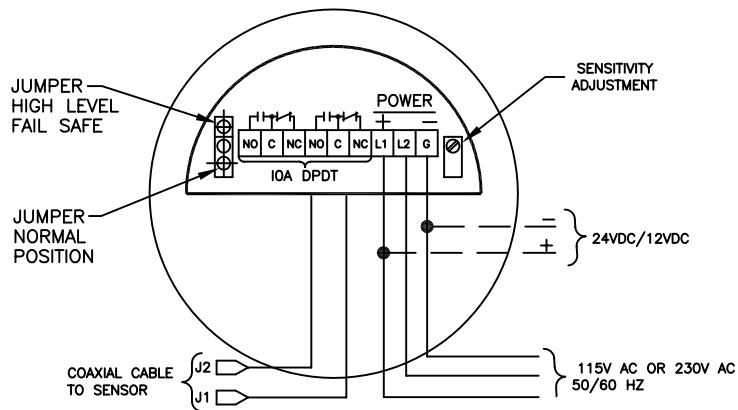
NOTES:

- 1) $V_{max} > V_{oc}$ or V_I , $I_{max} > I_{sc}$ or $CI + C_{cable} < C_a$, $LI + L_{cable} < L_a$.
- 2) Dust-tight conduit seal must be used when installed in Class II and Class III environments.
- 3) Control equipment connected to barrier must not used or generate more than 250V.
- 4) Installation should be in accordance with ANSI/ISA RP 12.6 and the NEC ANSI/NFPA 70.
- 5) No revision to drawing without prior FMRC approval.
- 6) Associated equipment must be FMRC approved.
- 7) Associated equipment manufacturer's installation drawing must be followed when installing this equipment.

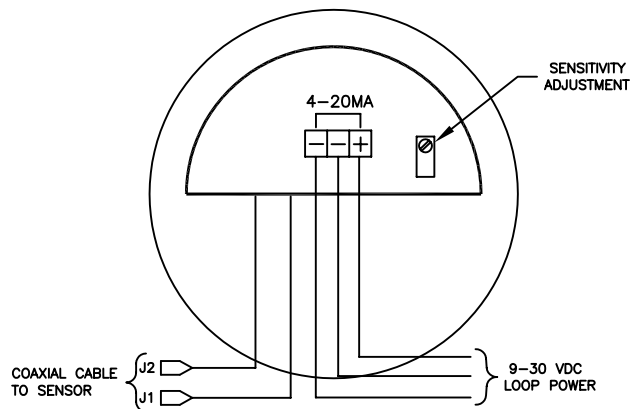


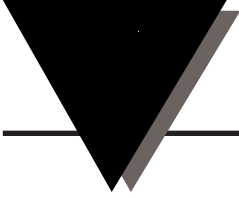
SYSTEM WIRING DIAGRAM

LVUC10 SERIES RELAY OUTPUT



LVUC10 SERIES LOOP POWER OUTPUT

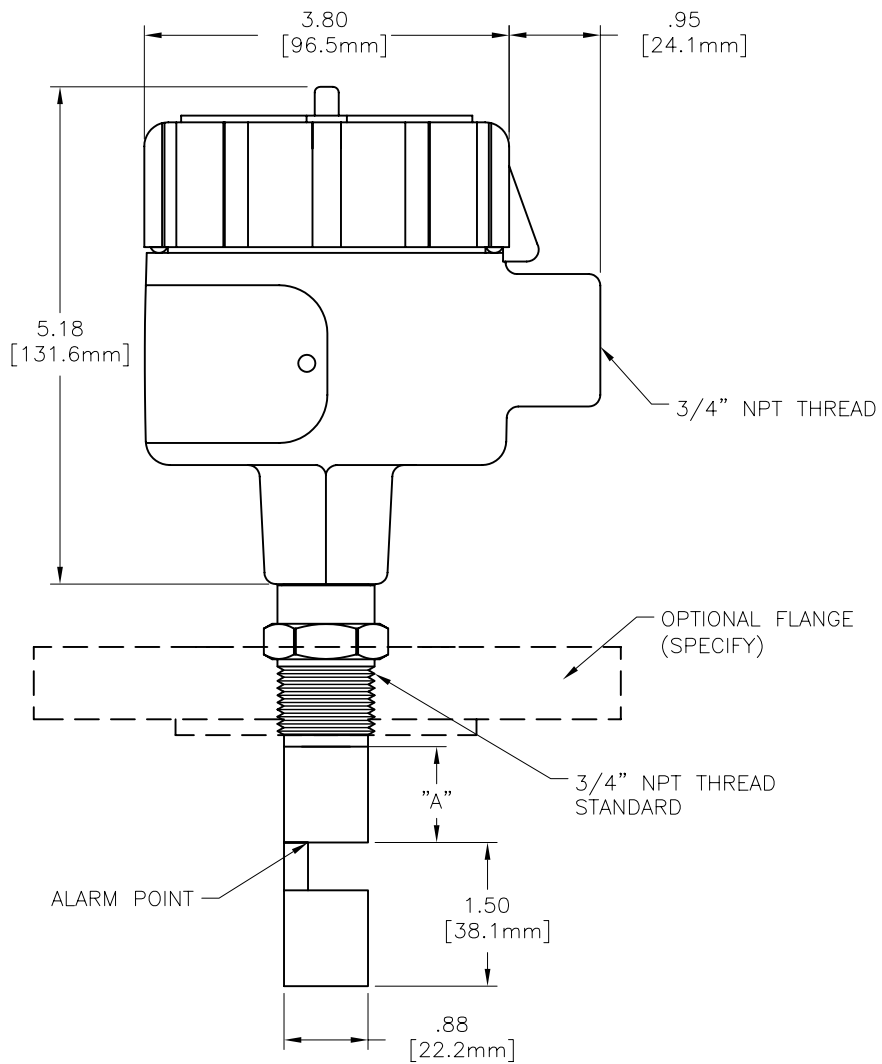




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DIMENSIONAL DRAWINGS

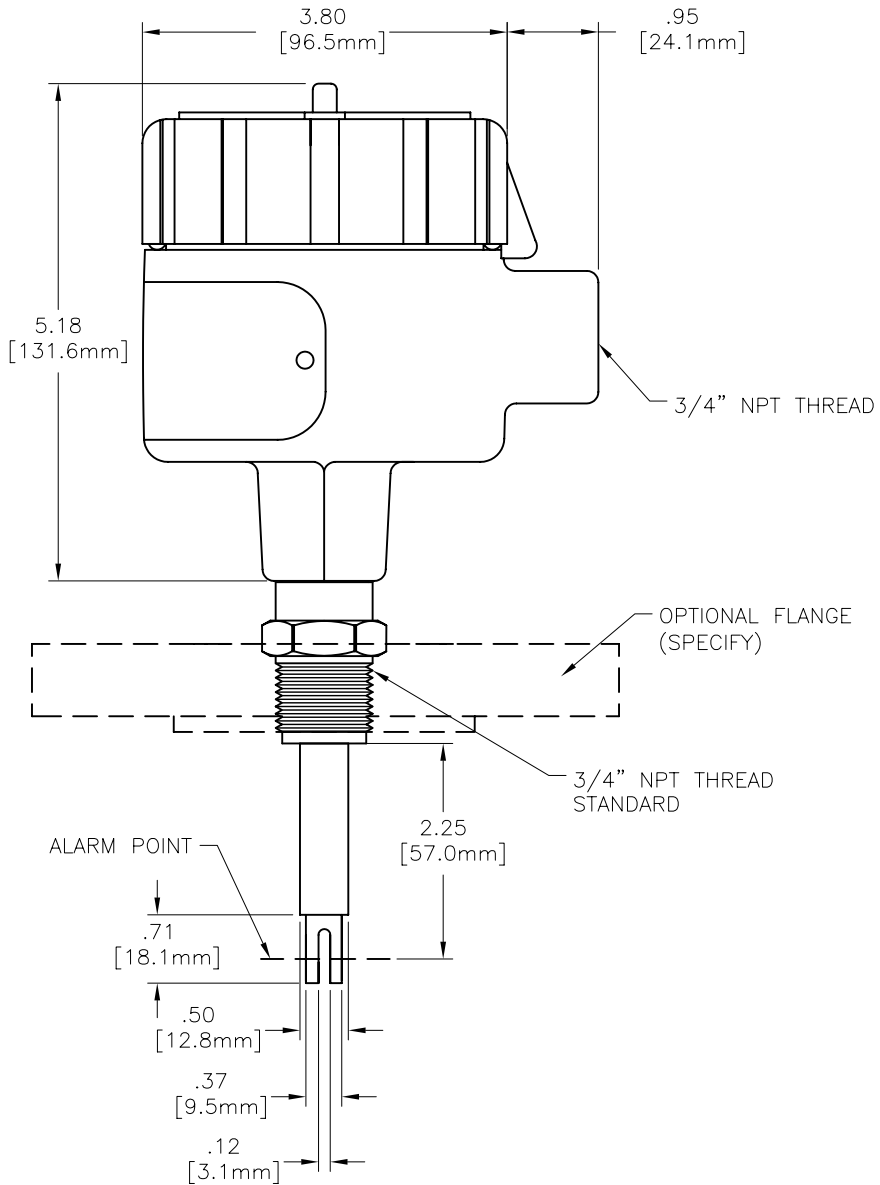
LVU-230 & LVU-260 SERIES

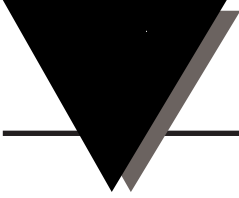




DIMENSIONAL DRAWINGS **5**

LVUC10 SERIES





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MAINTENANCE

PREVENTATIVE MAINTENANCE

Electronics are constructed with solid state components and are epoxy encapsulated. Periodically check and clean the sensor when used with liquids which cause a coating build up on the sensor. No other maintenance is required.

CLEANING

If the pipe or vessel to which the unit is mounted is to be steam cleaned or cleaned with abrasive detergents, remove the entire unit before cleaning by:

1. Disconnecting the power at the source.
2. Opening the housing cover.
3. Removing the power and control wiring cable.
4. Unthreading the sensor.

To reinstall, follow the installation procedures.

SYSTEM MALFUNCTION

Should the system malfunction, notify Omega immediately.



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.

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