

User's Guide



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LVU1500 Series

Ultrasonic Level Measurement Systems - Two / Four Wire



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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 Measurement System (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



GENERAL DESCRIPTION

The Two / Four Wire Series Liquid Level systems are state-of-the-art level measurement instruments. Based on the latest ultrasonic technology, the LVU-1500 Series provide an efficient, reliable and cost effective means of level control.

The LVU-1500 Series consists of two major components, a non-contacting ultrasonic sensor and a compact, integral electronic control.

The unit is available in a variety of sizes and materials to suit virtually any application. Standard mounting configurations include 3/4" and 2" NPT fittings. Flange mounting is also available to meet user specifications. Sensor material construction includes 316SS, Kynar or Teflon.



PRINCIPLES OF OPERATION

In operation, the electronics generate an electronic signal which is converted by the sensor (mounted on the top of the vessel) to a burst of ultrasonic pulses. These pulses are transmitted through the air toward the liquid surface. As the pulses reach the liquid surface, they are reflected back to the sensor. Those received echoes are converted back to an electronic signal which is then sent to the microprocessor. The microprocessor uses the return signals to calculate the time it takes for the pulses to travel to the liquid surface and back. This "Time of Flight" is directly proportional to the distance of the liquid surface from the sensor. The microprocessor then compares these calculated values with user programmed system parameters to provide the required control outputs.



3 INSTALLATION

CONTROL UNIT INSTALLATION

1. Open the control unit enclosure and remove the printed circuit board.
2. Replace printed circuit board and route power and control wiring to the enclosure. Observe all applicable local electrical codes and wiring procedures.
3. Connect power and control wiring to the control unit as shown in Wiring Diagram (see figures 2 and 3).
4. Be sure that all wiring is carefully dressed to prevent pinching between the housing and the cover.

SENSOR INSTALLATION

The sensor is mounted on the top of the vessel with the sensor facing downward. A clear path, free of any obstructions must be provided between the sensor and the liquid surface. Due to the narrow sensor beam pattern, vertical axis positioning of the sensor is important. The sensor must be installed perpendicular to the liquid surface.

1. For a sensor provided with an NPT threaded fitting, drill a suitable hole in the vessel top and tap for the correct NPT thread. In thin walled vessels, or vessels constructed of material not suitable for tapping, weld or braze a bushing to accept the sensor.
2. Screw the sensor into the threaded fitting being careful not to cross thread the sensor. When possible, the use of a pipe compound or sealing tape is recommended. **AVOID OVER TIGHTENING!**
3. For flange mounted sensors, simply bolt the sensor / flange assembly to the proper mating flange connection.
4. Route the sensor cable to the electronic control unit and connect per the Wiring Diagram (see figures 2 and 3). **IF ROUTING THE SENSOR CABLE THROUGH CONDUIT, A DEDICATED CONDUIT SHOULD BE UTILIZED. AVOID ROUTING THE SENSOR CABLE IN CLOSE PROXIMITY TO ANY SOURCE OF ALTERNATING CURRENT OR RFI.**

CAUTION: DO NOT ATTEMPT TO REMOVE A THREADED SENSOR FROM THE VESSEL WITH THE CABLE ATTACHED TO THE CONTROL UNIT, OTHERWISE IT MAY DAMAGE CABLE.



INSTALLATION

3

WIRING

Note: All wiring between the power supply and the transmitter should be accomplished with 18 AWG to 22 AWG shielded twisted pair. The connection is made at the terminal strip within the transmitter enclosure. Before you connect the power line to the transmitter, be sure that the voltage identification on the nameplate matches the power supply. DO NOT attempt to operate this unit at voltages other than as identified or it will damage the unit.

*CAUTION: UNITS ARE DESIGNED TO OPERATE ON DC POWER ONLY.
APPLICATION OF 120 VAC WILL DAMAGE THE INSTRUMENT.*

1. Make sure the power source is turned off.
2. Pull power supply wires through conduit connection.
3. Connect the positive supply wire to the (+) terminal, and the negative supply wire to the (-) terminal. Refer to Wiring Diagram (Figures 2 and 3).
4. Replace the transmitter housing cover until it is time to calibrate.
5. Connect the positive supply wire to the positive terminal of the power source.



PROGRAMMING DESCRIPTION

GENERAL

The Two Wire and Four Wire units are calibrated via BCD switches. All data entered during the calibration procedure is stored in a nonvolatile memory to prevent loss of data in the event of a power failure.

CALIBRATION PROCEDURE

Unscrew the control unit cover and use the following procedures:

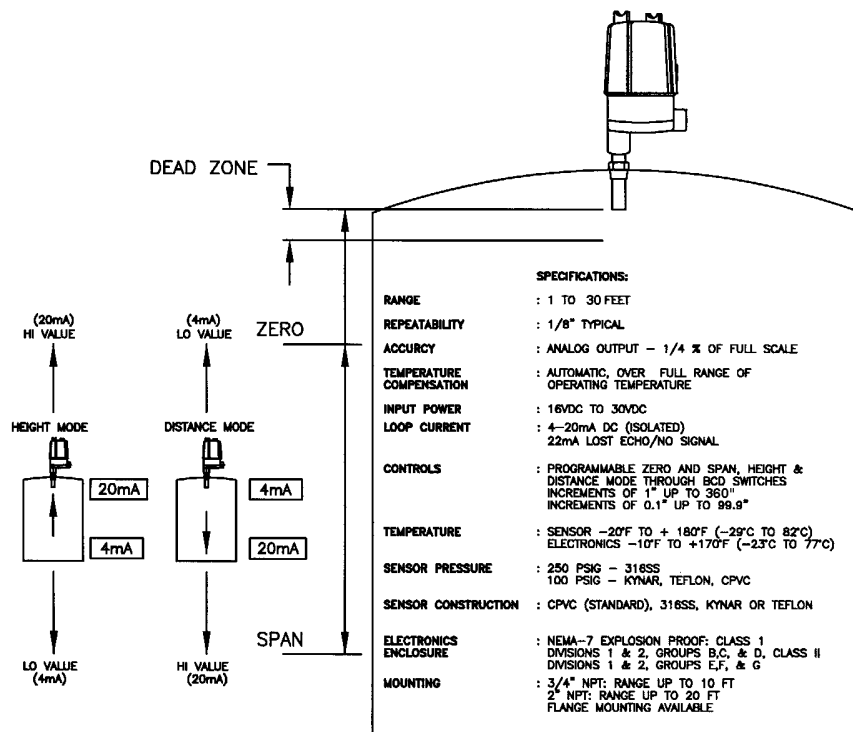
1. Dial **ZERO** setting through “top BCD switches” in increments of 1” up to 360” (30 feet) (special units can be set to an increment of 0.1” up to a span of 99.9”) (e.g.: 12” can be set as **012** on BCD switches).
2. Dial **SPAN** setting through “bottom BCD Switches” in increments of 1” to 360” (30 feet) (special units can be set to an increment of 0.1” up to a span of 99.9”) (e.g.: 12” can be set as **120** on BCD switches).
3. Set “**JP1**” jumper for height/distance mode
 - Height Mode: Zero Setting: 20mA
Span Setting: 4mA
 - Distance Mode: Zero Setting: 4mA
Span Setting: 20mA
4. Turn on the power, the unit is ready for operation.

While the cover is unscrewed, observe lost echo LED. If the unit has not detected a reliable echo for over 10 seconds, the LED will turn on and the unit will draw approximately 22mA indicating an error condition.

CALIBRATION DIAGRAM



Figure 1



ANALOG OUTPUT SYSTEM

NOTES:

- 1) ZERO CALIBRATED IN INCHES FROM FACE OF SENSOR
- 2) SPAN CALIBRATED IN INCHES FROM THE ZERO POINT
- 3) ALARM POINTS CALIBRATED IN INCHES FROM FACE OF SENSOR
- 4) THE SYSTEM RANGE EQUALS ZERO PLUS SPAN IN INCHES



4-WIRE

Ordering System

P/N	RANGE LIQUID SLURRY	RANGE BULK SOLID	INPUT	OUTPUT	SENSOR MATERIAL	SENSOR MOUNTING
LVU-1501	6" - 120" (.15M - 3M)	6" - 60" (.15M - 1.5M)	4 Wire, 24VDC	4-20MA, Isolated	316LSS	3/4" NPT
LVU-1502	6" - 120" (.15M - 3M)	6" - 60" (.15M - 1.5M)	4 Wire, 24VDC	4-20MA, Isolated	316LSS	Sanitary 1"
LVU-1504	6" - 120" (.15M - 3M)	6" - 60" (.15M - 1.5M)	4 Wire, 24VDC	4-20MA, Isolated	Teflon	3/4" NPT
LVU-1505	6" - 120" (.15M - 3M)	6" - 60" (.15M - 1.5M)	4 Wire, 24VDC	4-20MA, Isolated	Teflon	Sanitary 1"
LVU-1506	6" - 120" (.15M - 3M)	6" - 60" (.15M - 1.5M)	4 Wire, 24VDC	4-20MA, Isolated	Tefzel	3/4" NPT
LVU-1508	12" - 300" (.3M - 7.6M)	12" - 150" (.3M - 3.8M)	4 Wire, 24VDC	4-20MA, Isolated	316LSS	2" NPT
LVU-1507	12" - 300" (.3M - 7.6M)	12" - 150" (.3M - 3.8M)	4 Wire, 24VDC	4-20MA, Isolated	Tefzel	2" NPT

LOOP POWER

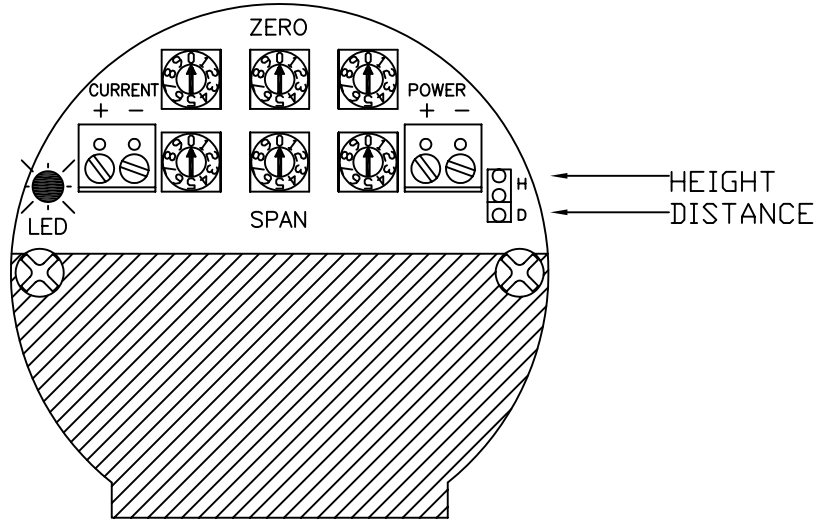
Ordering System

P/N	RANGE LIQUID SLURRY	RANGE BULK SOLID	INPUT	OUTPUT	SENSOR MATERIAL	SENSOR MOUNTING
LVU-1501-LP	6" - 120" (.15M - 3M)	6" - 60" (.15M - 1.5M)	4 Wire, 24VDC	4-20MA, Isolated	316LSS	3/4" NPT
LVU-1502-LP	6" - 120" (.15M - 3M)	6" - 60" (.15M - 1.5M)	4 Wire, 24VDC	4-20MA, Isolated	316LSS	Sanitary 1"
LVU-1504-LP	6" - 120" (.15M - 3M)	6" - 60" (.15M - 1.5M)	4 Wire, 24VDC	4-20MA, Isolated	Teflon	3/4" NPT
LVU-1505-LP	6" - 120" (.15M - 3M)	6" - 60" (.15M - 1.5M)	4 Wire, 24VDC	4-20MA, Isolated	Teflon	Sanitary 1"
LVU-1506-LP	6" - 120" (.15M - 3M)	6" - 60" (.15M - 1.5M)	4 Wire, 24VDC	4-20MA, Isolated	Tefzel	3/4" NPT
LVU-1508-LP	12" - 300" (.3M - 7.6M)	12" - 150" (.3M - 3.8M)	4 Wire, 24VDC	4-20MA, Isolated	316LSS	2" NPT
LVU-1507-LP	12" - 300" (.3M - 7.6M)	12" - 150" (.3M - 3.8M)	4 Wire, 24VDC	4-20MA, Isolated	Tefzel	2" NPT



4 WIRE WIRING DIAGRAM

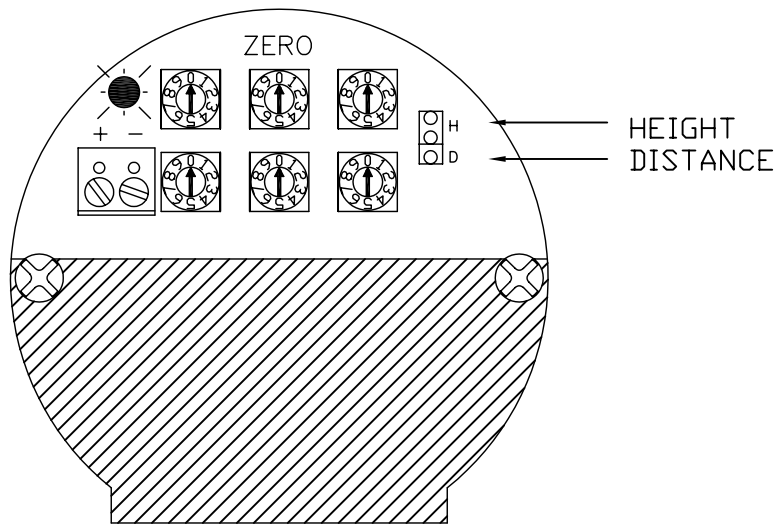
FIGURE 2



2 WIRE WIRING DIAGRAM

5

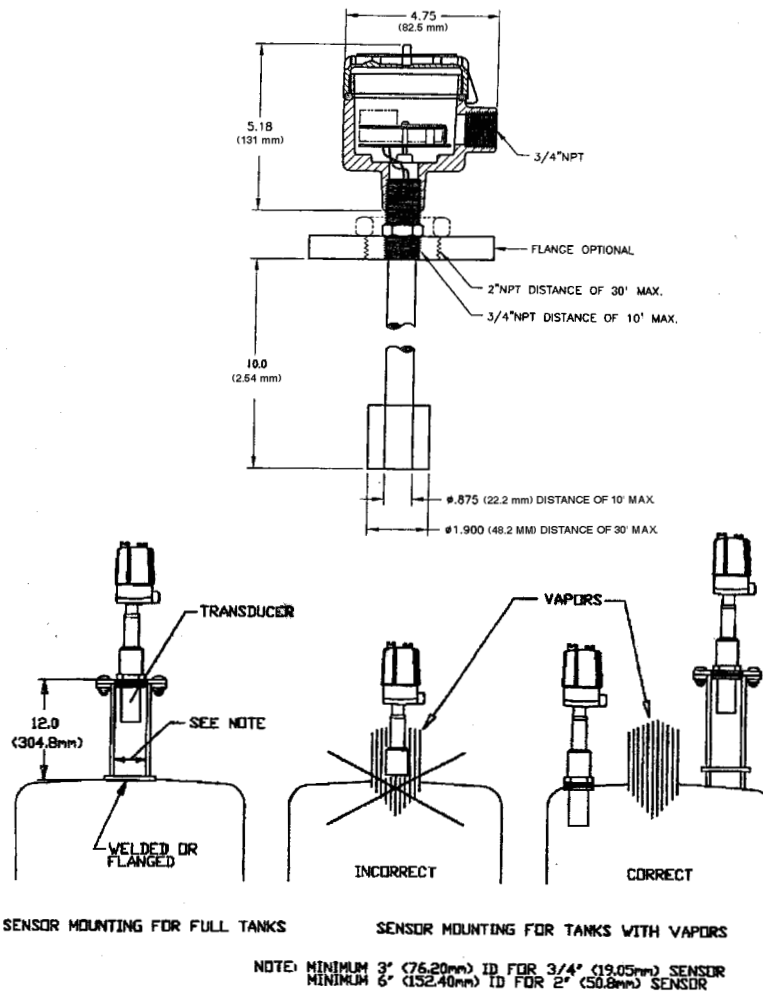
FIGURE 3



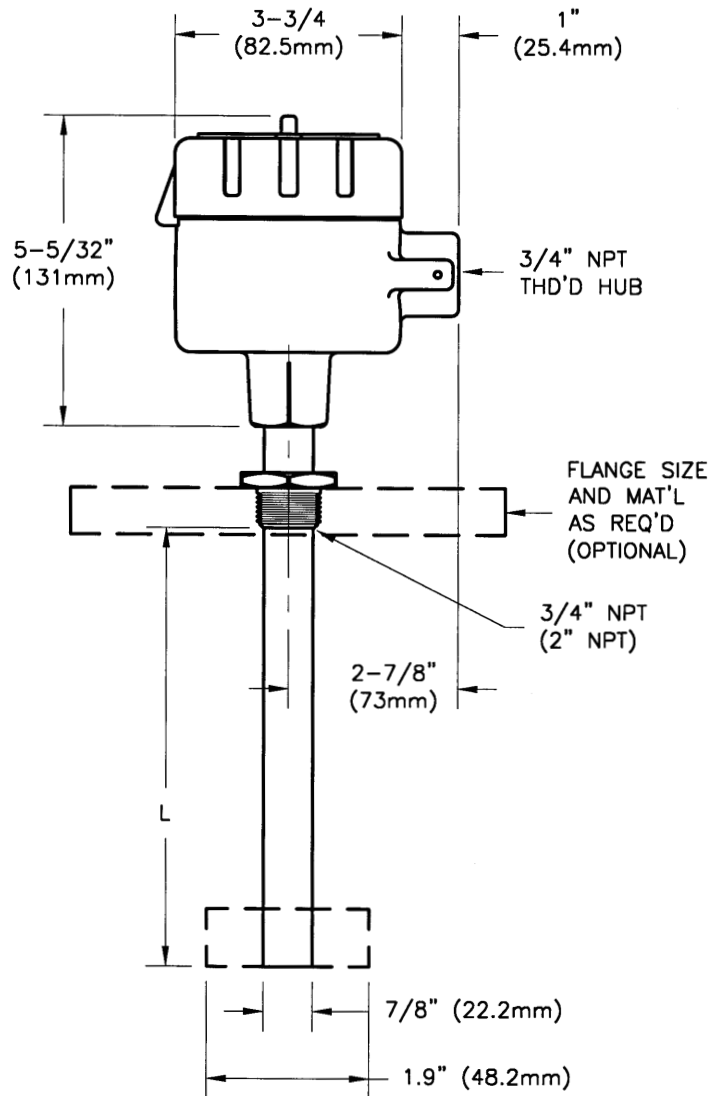
5

CALIBRATION DIAGRAM

Figure 4



DIMENSIONAL DRAWING





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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