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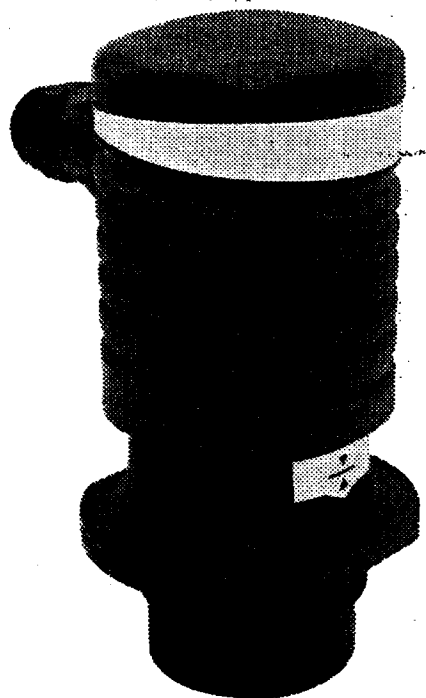
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MZ754/0698

**User's Guide**



**OMEGA**  
<http://www.omega.com>  
 e-mail: [info@omega.com](mailto:info@omega.com)

**LVU-201 Series Ultrasonic Level Transmitter**

**WARNING:** These products are not designed for use in, and should not be used for, patient connected applications. The information contained in this document is deemed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice. It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly updating certification of its products to the European New Approach Directive. OMEGA will add the CE mark to every appropriate device upon certification.

- United Kingdom**  
 ISO 9002 Certified  
 25 Swanton Road,  
 Broughton Ashley, Leicestershire,  
 LE9 6TU, England  
 Tel: 44 (1455) 283912  
 Fax: 44 (1455) 283912  
 Tel: 44 (161) 777-6622  
 Fax: 44 (161) 777-6622  
 e-mail: [germany@omega.com](mailto:germany@omega.com)
- Germany/Austria**  
 Daimlerstrasse 26, D-75392 Deckenpfronn, Germany  
 Tel: 49 (0756) 3017  
 Toll Free in Germany: 0130 11 21 66  
 e-mail: [france@omega.com](mailto:france@omega.com)
- France**  
 9 rue Denis Fajon, 28190 Trappes  
 Tel: (33) 130-69-120  
 Fax: (33) 130-69-120  
 e-mail: [czech@omega.com](mailto:czech@omega.com)
- Czech Republic**  
 Ostravska 767, 733 01 Karvina  
 Tel: 42 (69) 6311899  
 Fax: 42 (69) 6311114  
 e-mail: [belgium@omega.com](mailto:belgium@omega.com)
- Belgium**  
 Postbus 8034, 1180 LA Amsterdam, The Netherlands  
 Tel: (31) 20 6434643  
 Fax: (31) 20 6434643  
 e-mail: [usa@omega.com](mailto:usa@omega.com)
- Latin America**  
 Tel: (95) 800-TC-OMEGA™  
 Tel: (95) 203-359-7807  
 Fax: (95) 203-359-7807  
 e-mail: [usa@omega.com](mailto:usa@omega.com)
- Mexico and Central America**  
 TEL: 99604 EASYLINK 62968934 CABLE: OMEGA  
 Engineering Service: 1-800-872-9436 / 1-800-USA-WHENE™  
 Customer Service: 1-800-622-2378 / 1-800-622-BEST™  
 Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA™

**USA and Canada:**  
 One Omega Drive, Box 4047  
 Stamford, CT 06907-0047  
 Tel: (203) 359-1660  
 Fax: (203) 359-7700  
 e-mail: [usa@omega.com](mailto:usa@omega.com)

**Canada:**  
 ISO 9001 Certified  
 976 Berger  
 Laval (Quebec) H7L 5A1  
 Tel: (514) 856-6928  
 Fax: (514) 856-6886  
 e-mail: [usa@omega.com](mailto:usa@omega.com)

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 OMEGA.net™ On-Line Service  
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**WARRANTY/DISCLAIMER**

OMEGA ENGINEERING, INC. warrants that the unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover freight and shipping time. This ensures that OMEGA's customer receives maximum coverage on each product.

If the unit should malfunction, 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 WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper installation or design of the purchaser's system, or unauthorized modification. The WARRANTY is void if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion or current, leak, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and trace.

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**FOR NON-WARRANTY REPAIRS,** please have the following information available BEFORE contacting OMEGA:

1. P.O. 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.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. The effort our customer makes in technology and engineering.

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# SPECIFICATIONS

## Step One

|                        |  |
|------------------------|--|
| Range:                 | 0.5 to 18 feet (15 cm to 5.4 m)  |
| Accuracy:              | ± 0.25% of span in air   |
| Resolution:            | 0.125" (3 mm)  |
| Frequency:             | 50 kHz   |
| Pulse rate:            | 2 pulses per second  |
| Beam width:            | 8° conical   |
| Deadband:              | 0.5' (15 cm) minimum   |
| Blocking distance:     | 0.5 to 18 feet (15 cm to 5.4 m)  |
| Display type:          | 4 segment LCD  |
| Display units:         | Inch (cm)  |
| Memory:                | Non-volatile   |
| Supply voltage:        | 12-36 VDC  |
| Max loop resistance    | 900 Ohms @ 36 VDC (see below)  |
| Signal output:         | 4-20 mA, 12-36 VDC (see below)   |
| Signal invert:         | 4-20 mA / 20-4 mA  |
| Calibration:           | Push button  |
| Fail-safe diagnostics: | Reverts to 4 mA, 22 mA or remains constant   |
| Temperature rating:    | F: -40° to 140° C: -40° to 60° (see below)   |
| Temp. compensation:    | Automatic over entire range  |
| Pressure rating:       | 30 psi (2 bar) @ 25 °C., derated @ 1.667 psi (.113 bar) per °C. above 25 °C. (see below) |
| Enclosure rating:      | NEMA 4X (IP65)   |
| Enclosure material:    | Polypropylene (PP), U.L. 94V0  |
| Transducer material:   | Polyvinylidene Fluoride (PVDF)   |
| Mounting threads:      | 2" NPT (2" G)  |
| Mounting gasket:       | Viton (2") metric only   |
| Conduit connection:    | 1/2" NPT (1/2" BSP)  |
| CE Compliance:         | EN 50082-2 immunity<br>EN 55011 emission   |

## Technology

An ultrasonic sound wave is pulsed two times per second from the base of the transducer. The sound wave reflects against the process medium below and returns to the transducer. The microprocessor based electronics measure the time of flight between the sound generation and receipt, and translates this figure into the distance between the transmitter and process medium below.

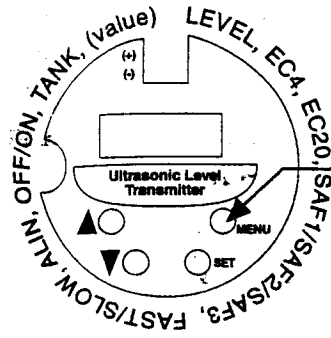
**⚠ About this Manual:** PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on the continuous ultrasonic level transmitter from OMEGA; model LVU-201.

**⚠ User's Responsibility for Safety:** OMEGA manufactures a wide range of liquid level sensors and technologies. While each of these technologies are designed to operate in a wide variety of applications, it is the user's responsibility to select a technology that is appropriate for the application, install it properly, perform tests of the installed system, and maintain all components. The failure to do so could result in property damage or serious injury.

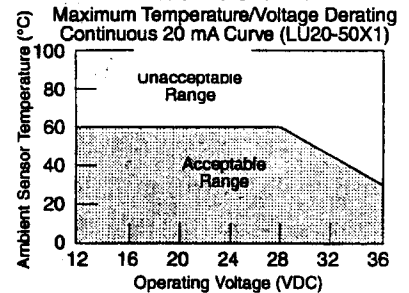
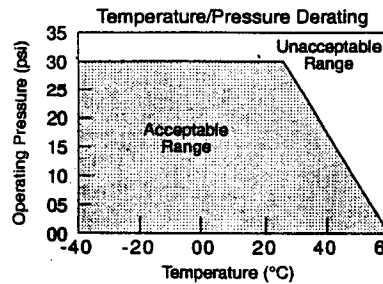
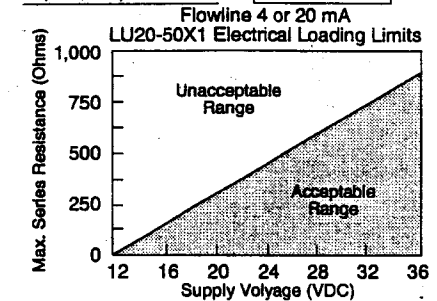
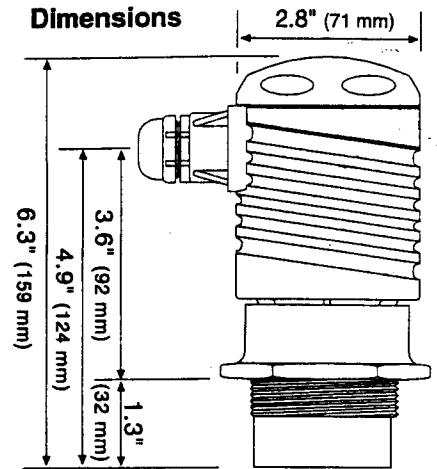
**⚠ Proper Installation and Handling:** Use a proper sealant with all installations. Never overtighten the transmitter within the fitting. Always check for leaks prior to system start-up.

**⚠ Wiring and Electrical:** A supply voltage of 12-36 VDC is used to power the LVU-201 transmitter. The sensor systems should never exceed a maximum of 36 VDC. Electrical wiring of the sensor should be performed in accordance with all applicable national, state, and local codes.

**⚠ Temperature and Pressure:** The LVU-201 is designed for use in application temperatures from -40 °C (-40 °F) to 60 °C (140 °F), and for use at pressures up to 30 psi @ 25 °C, derated @ 1.667 psi per °C above 25 °C.



Holding down the [MENU] key will scroll the display in the following sequence.



**⚠ Material Compatibility:** The continuous ultrasonic level transmitter, LVU-201, is made of two materials. The enclosure is of Polypropylene (PP) and the transducer is made of Polyvinylidene Fluoride (PVDF). Make sure that the model which you have selected is chemically compatible with the application liquids. While the transmitter housing is liquid-resistant when installed properly, it is not designed to be immersed. It should be mounted in such a way that it does not normally come into contact with fluid.

**⚠ Flammable, Explosive and Hazardous Applications: DO NOT USE THE LVU-201 TRANSMITTER IN HAZARDOUS LOCATIONS.**

**⚠ Make a Fail-Safe System:** Design a fail-safe system that accommodates the possibility of transmitter or power failure. In critical applications, OMEGA recommends the use of redundant backup systems and alarms in addition to the primary system.

## ⚠ Warning ⚠

**The LVU-201 is a loop powered device. The load should never exceed 900 Ohms.**

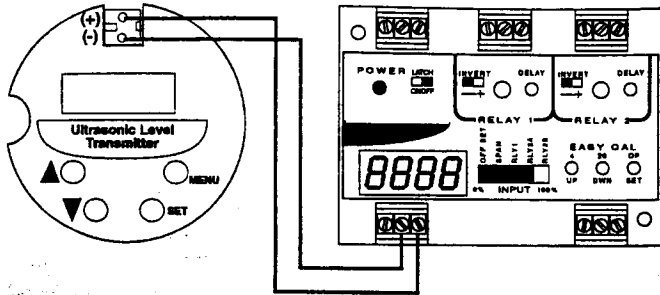
**When installing the LVU-201, never tighten the transmitter from the body. Always use the wrench flat located above the threads.**

# WIRING

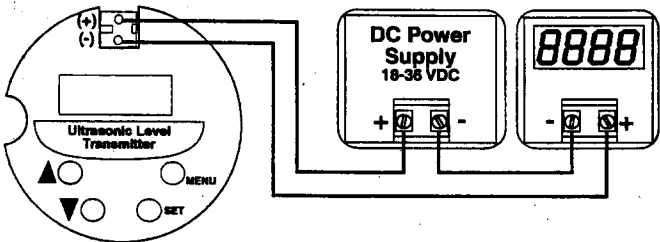
## Step Two

The LVU-201 requires 12-36 VDC power with at least 25 mA supply in order to operate.

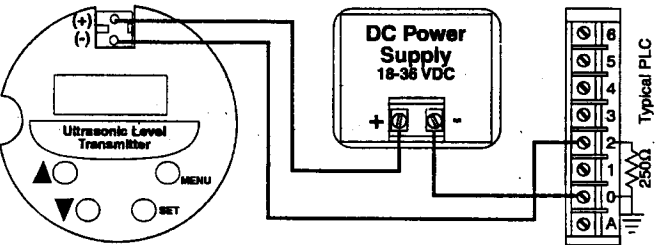
### 1. Wiring to an OMEGA Continuous Controller (LVCN-51):



### 2. Wiring to a Two-Wire Loop Indicator (Model LVU-201):



### 3. Wiring to a PLC (LVU-201):



# CALIBRATION

## Step Three

### EC4:

1. Hold [MENU] key until EC4 appears in display.
2. Release [MENU] key and wait until a value appears. This value is the current measured level value.
3. If this is acceptable, press [SET] to lock the value as the new EC4 set point. If not, press either the [▲] or [▼] keys once and the old setting for the EC4 will appear.
4. From here, use the [▲] or [▼] keys to raise or lower the value to the desired value.
5. Press the [SET] key to enter this value as the new EC4 set point.

### EC20:

1. Hold [MENU] key until EC20 appears in display.
2. Release [MENU] key and wait until a value appears. This value is the current measured level value.
3. If this is acceptable, press [SET] to lock the value as the new EC20 set point. If not, press either the [▲] or [▼] keys once and the old setting for the EC4 will appear.
4. From here, use the [▲] or [▼] keys to raise or lower the value to the desired value.
5. Press the [SET] key to enter this value as the new EC20 set point.

### SAF1/SAF2/SAF3:

1. Hold [MENU] key until SAF1, SAF2 or SAF3 appears in the display.
2. Release [MENU] key and hold [SET] key to toggle between SAF1, SAF2 and SAF3.
3. When desired setting is reached, release [SET] key. The last displayed setting will be locked into memory. To change, start again at step 1.

### FAST/SLOW:

1. Hold [MENU] key until FAST or SLOW appears in the display.
2. Release [MENU] key and hold [SET] key to toggle between FAST and SLOW.
3. When desired setting is reached, release [SET] key. The last displayed setting will be locked into memory. To change, start again at step 1.

### ALIN:

1. Hold [MENU] key until ALIN appears in the display.
2. Continue to hold [MENU] key until OFF appears in the display.
3. Release [MENU] key and hold [SET] key to toggle from OFF to ON.
4. Release [SET] key. The LVU-201 is now in ALIN mode.
5. To exit ALIN mode, repeat steps 1-4 changing from ON to OFF.

### MAXR:

1. Hold [MENU] key until MAXR appears in the display.
2. Continue to hold [MENU] key until a value appears in the display. This value is the current MAXR setting.
3. If this is acceptable, press [SET] to lock the value as the MAXR setting. If not, use the [▲] or [▼] keys to raise or lower the value to the desired setting.
4. Press the [SET] key to enter this value as the new MAXR setting.

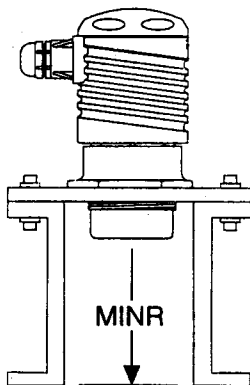
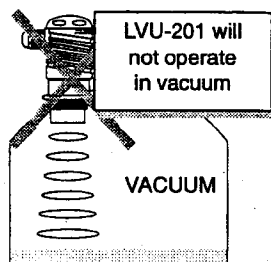
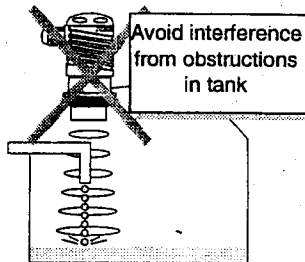
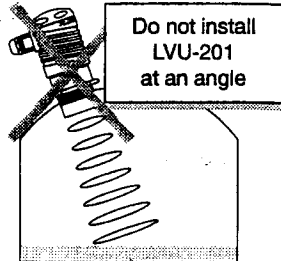
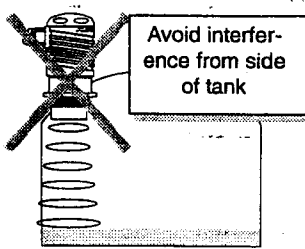
### MINR:

1. Hold [MENU] key until MINR appears in the display.
2. Continue to hold [MENU] key until a value appears in the display. This value is the current MINR setting.
3. If this is acceptable, press [SET] to lock the value as the MINR setting. If not, use the [▲] or [▼] keys to raise or lower the value to the desired value.
4. Press the [SET] key to enter this value as the new MINR setting.

# INSTALLATION

## Step Four

Mounting the LVU-201 is critical to the successful operation of the transmitter. Avoid the following parameters:



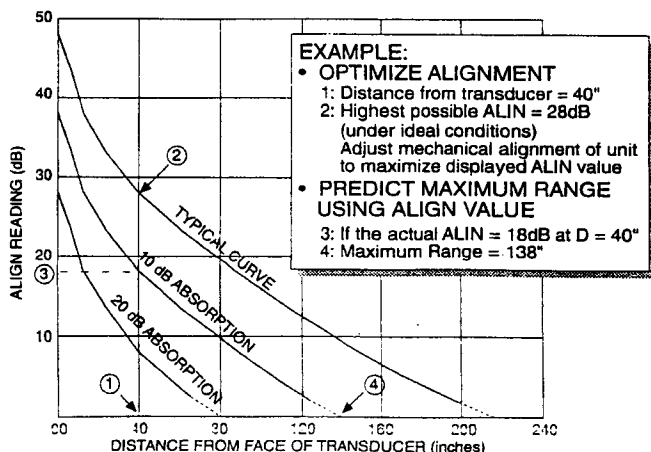
### Minimum Range (MINR) Setting

If installing the LVU-201 in a flange or any device which recesses the bottom of the transmitter, use the MINR setting. The minimum value for the MINR setting is the distance from the bottom of the transmitter to the end of the flange. Never set MINR to less than 6.0 inches.

### Maximum Application Range

The maximum range of LVU-201 is 18 feet at 110 dB. Under less than ideal conditions, a number of factors can reduce the overall quality of signal return and shorten the accurate range of the transmitter. To determine the maximum application range of the product, follow the signal return formula against the echo attenuation graph below.

### Echo Attenuation Graph



# TROUBLESHOOTING

## Step Five

**Factory Settings:** The LVU-201 is preset at the factory. When powering up the transmitter the first time, the factory settings will be active. If at any time in you need to return to these settings, remove power from the LVU-201 and wait 10 seconds. Press the [Set] and [Menu] buttons simultaneously while powering up the transmitter.

### Factory Calibration

|           |                 |       |                 |
|-----------|-----------------|-------|-----------------|
| EC 4      | 216" (548.4 cm) | OFF   | OFF             |
| EC20      | 8" (20.3 cm)    | MAXR  | N/A             |
| SAF1/2/3  | SAF1            | value | 216" (548.4 cm) |
| Fast/Slow | FAST            | MINR  | N/A             |
| ALIN      | N/A             | value | 6" (15.2 cm)    |

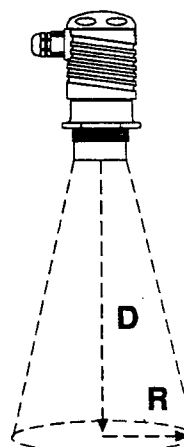
**Changing Display Units:** The LVU-201 comes preset to measure in inches. To change the unit to display centimeters, remove power to the LVU-201 and wait 10 seconds. Press [▲] and [Set] simultaneously while powering up the transmitter. The LVU-201 will now read in centimeters. To return to inches, remove power and wait 10 seconds. Press [▼] and [Set] simultaneously while powering up the transmitter.

**LOST Signal:** A reading of LOST in the display of the LVU-201 indicates the transmitter is not receiving a valid return signal. If LOST appears, please check the following troubleshooting items:

- Beam cone interference such as the side wall, ladders, seams, rungs or pipes within the LVU-201's beam cone.
- Proper installation such that the LVU-201 is installed level and free from interference from the installation fitting or flange.
- Sufficient power being supplied to the LVU-201. The LVU-201 requires 12-36 VDC power with a minimum supply of 25 mA.
- Proper programming of the MAXR or MINR function. For best results, set the MAXR function as the distance from the bottom of the tank to the bottom of the transmitter. Also set the MINR distance above the highest level in the tank. Do not set the MINR to less than 6 inches.
- Make sure that the transmitter is not installed at an angle. Even a 5 degree offset can reduce the signal return strength greatly.

### Beam Cone Data

| Range (Feet) | Radius (Inches) | Range (Feet) | Radius (Inches) |
|--------------|-----------------|--------------|-----------------|
| 1'           | 2.6"            | 10'          | 16.8"           |
| 2'           | 4.2"            | 11'          | 18.4"           |
| 3'           | 5.7"            | 12'          | 20.0"           |
| 4'           | 7.3"            | 13'          | 21.5"           |
| 5'           | 8.9"            | 14'          | 23.1"           |
| 6'           | 10.5"           | 15'          | 24.7"           |
| 7'           | 12.1"           | 16'          | 26.3"           |
| 8'           | 13.6"           | 17'          | 27.8"           |
| 9'           | 15.2"           | 18'          | 29.4"           |



### Other Hints:

Current must change with changes in level. Example: For the illustration below, as level increases, the current output will increase and as the level decreases, the current output will decrease. If the output of the LVU-201 is always reading 4 mA or 20 mA, check the input values for the LVU-201.