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OMECA...Of Course!

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- Load Cells & Pressure Gauges
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LVU-201 Series
Ultrasonic Level Transmitter
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. 94VO
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
EN 55011 emission

Technology

An ultrasonic sound wave is pulsed twice 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 reception, 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.

⚠️ 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):**

![Diagram of LVCN-51 wiring]

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

![Diagram of LVU-201 wiring]

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

![Diagram of PLC wiring]

**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:

- Avoid interference from side of tank
- Do not install LVU-201 at an angle
- Avoid interference from obstructions in tank
- LVU-201 will not operate in vacuum

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

<table>
<thead>
<tr>
<th>EC 4</th>
<th>216&quot; (548.4 cm)</th>
<th>OFF</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC20</td>
<td>8&quot; (20.3 cm)</td>
<td>MAXR</td>
<td>N/A</td>
</tr>
<tr>
<td>SAF1/2/3</td>
<td>SAF1</td>
<td>value</td>
<td>216&quot; (548.4 cm)</td>
</tr>
<tr>
<td>Fast/Slow</td>
<td>FAST</td>
<td>MINR</td>
<td>N/A</td>
</tr>
<tr>
<td>ALIN</td>
<td>N/A</td>
<td>value</td>
<td>6&quot; (15.2 cm)</td>
</tr>
</tbody>
</table>

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:

1. Beam cone interference such as the side wall, ladders, seams, rungs or pipes within the LVU-201's beam cone.
2. Proper installation such that the LVU-201 is installed level and free from interference from the installation fitting or flange.
3. Sufficient power being supplied to the LVU-201. The LVU-201 requires 12-36 VDC power with a minimum supply of 25 mA.
4. 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.
5. 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

<table>
<thead>
<tr>
<th>Range (Feet)</th>
<th>Radius (Inches)</th>
<th>Range (Feet)</th>
<th>Radius (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1'</td>
<td>2.6&quot;</td>
<td>10'</td>
<td>16.8&quot;</td>
</tr>
<tr>
<td>2'</td>
<td>4.2&quot;</td>
<td>11'</td>
<td>18.4&quot;</td>
</tr>
<tr>
<td>3'</td>
<td>5.7&quot;</td>
<td>12'</td>
<td>20.0&quot;</td>
</tr>
<tr>
<td>4'</td>
<td>7.3&quot;</td>
<td>13'</td>
<td>21.5&quot;</td>
</tr>
<tr>
<td>5'</td>
<td>8.9&quot;</td>
<td>14'</td>
<td>23.1&quot;</td>
</tr>
<tr>
<td>6'</td>
<td>10.5&quot;</td>
<td>15'</td>
<td>24.7&quot;</td>
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<tr>
<td>7'</td>
<td>12.1&quot;</td>
<td>16'</td>
<td>26.3&quot;</td>
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<tr>
<td>8'</td>
<td>13.6&quot;</td>
<td>17'</td>
<td>27.8&quot;</td>
</tr>
<tr>
<td>9'</td>
<td>15.2&quot;</td>
<td>18'</td>
<td>29.4&quot;</td>
</tr>
</tbody>
</table>

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.