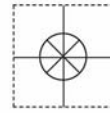


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LVU-301 & LVU-303 Series Ultrasonic Level Transmitter



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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.

An ultrasonic sound wave is pulse eight 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 transducer and process medium below.

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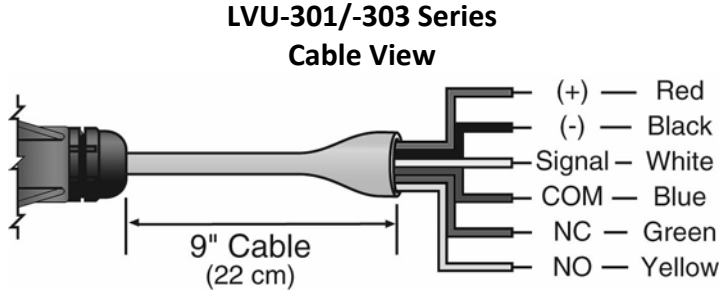
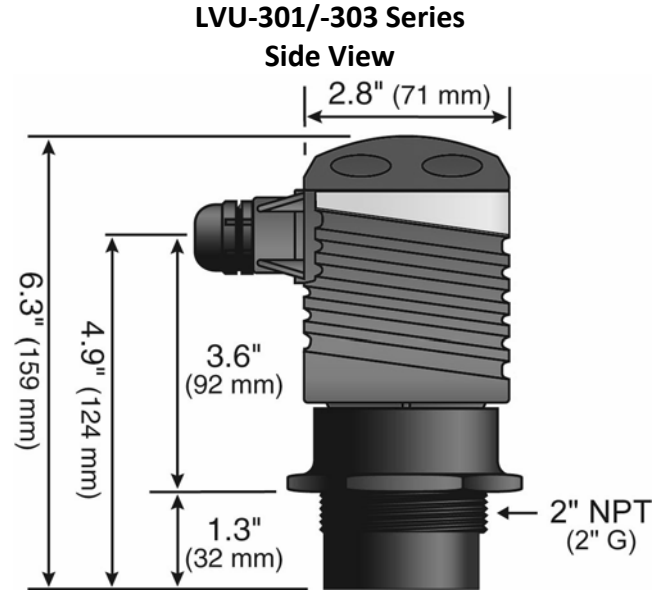
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SPECIFICATIONS

Step Two

Range:	0.5 to 24.5 feet (15cm to 7.4m)
Accuracy:	±0.25% of range (air)
Resolution:	0.125" (3mm)
Frequency:	50 kHz
Pulse Rate:	8 pulses per second
Dead Band:	6" (15cm)
Beam width:	8° conical
Configuration:	Push button
Memory:	Non-volatile
Display Type:	4 segment LED
Display units:	Inch or cm
LED Indication:	Relay status
Supply Voltage:	14-36 VDC
Consumption:	200mA
Signal output:	4-20mA, three-wire
Signal invert:	4-20mA / 20-4mA
Current flow:	Sourcing or sinking
Contact type:	(1) SPDT relay, latching
Contact rating:	250 VAC, 10A
Contact logic:	Single point: alarm Two point: latching
Contact fail-safe:	Reverts to safe state during echo loss
Process Temp.:	F: -4° to 140° C: -20° to 60°
Temp. Compensation:	Automatic
Ambient temp.:	F: -40° to 140° C: -40° to 60°
Pressure:	30 psi (2 bar) @ 25 °C., derated @ 1.667 psi (.113 bar) per °C. above 25 °C.
Enclosure rating:	NEMA 4X (IP65)
Enclosure material:	Polypropylene, U.L. 94VO
Conduit entrance:	Single, 1/2" NPT
Cable length:	9" (22cm)
Cable type:	Power/signal: 3-conductor Relay: 3-conductor
Cable jacket mat'l:	Vinyl
Transducer material:	Polyvinylidene Fluoride (PVDF)
Process mount:	2" NPT
Classification:	General Purpose
Compliance:	CE



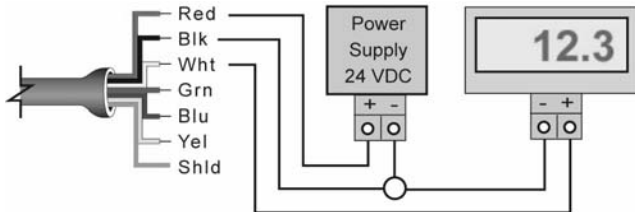
Components: LVU-301/-303 Series is offered in different models. Depending on the model purchased, you may or may not have been shipped all the components shown below.

P/N	Max. Range	Dead Band	Thread	Current Output	Relay
LVU-303	24.5' (7.47 m)	6" (15.2cm)	2" NPT	Sourcing	(1)
LVU-301	24.5' (7.47 m)	6" (15.2cm)	2" NPT	Sinking	(1)

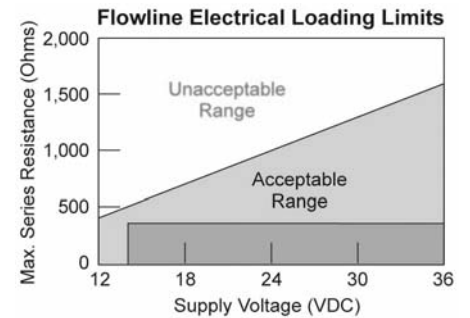
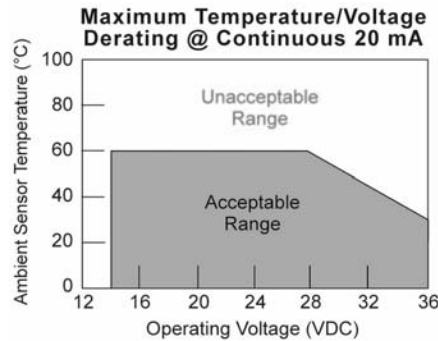
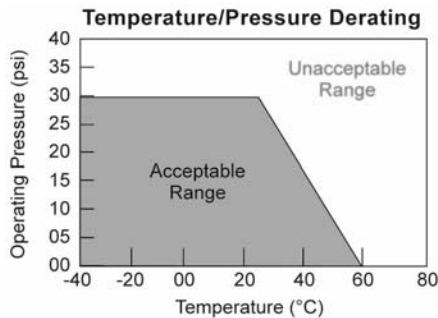
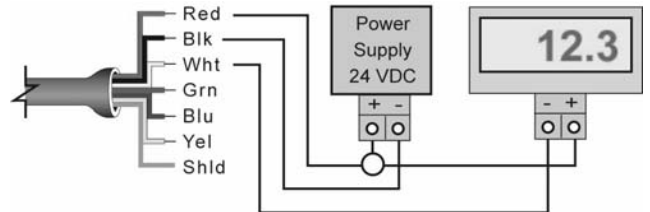
- Quick Start Guide

Sinking vs. Sourcing: The LVU-301/-303 Series is manufactured in two different outputs, sourcing and sinking. A sourcing transmitter uses the negative of the power supply as the reference for the entire system. When using a sourcing unit, make sure that the negative of the ground is the common for the entire system. A sinking transmitter uses the positive of the power supply as the reference for the entire system. When using a sinking unit, make sure the positive of the ground is the common for the entire system.

Sourcing (LVU-303)



Sinking (LVU-301)

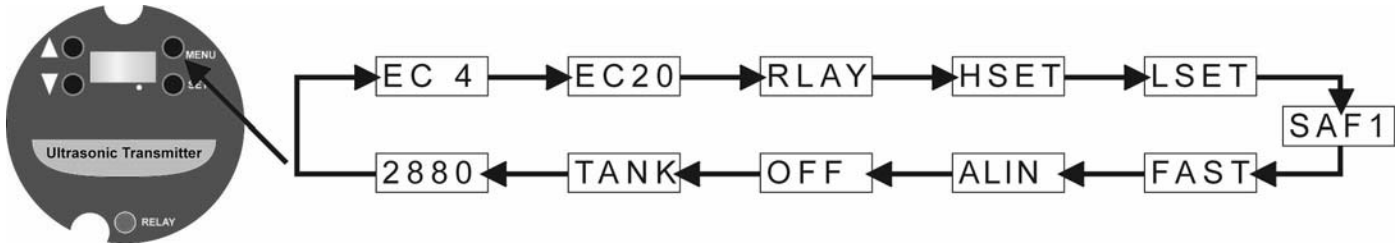


□ LVU-301
 ■ LVU-303

- ⚠ **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 ENGINEERING; model LVU-301 or LVU-303. Please refer to the part number located on the sensor label to verify the exact model which you have purchased.
- ⚠ **User's Responsibility for Safety:** OMEGA ENGINEERING 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 test 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:** Because this is an electrically operated device, only properly trained staff should install and/or repair this product. Use a proper sealant with all installations. Never over tighten the transmitter within the fitting. Always check for leaks prior to system start-up.
- ⚠ **Wiring and Electrical:** A supply voltage of 14-36 VDC (200 mA minimum supply) is used to power the ultrasonic transmitter. The sensor system 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-301/-303 series is designed for use in application temperatures from -20 °C (-4 °F) to 60 °C (140 °F), and for use at pressures up to 30 psi (2 bar) @ 25 °C, derated @ 1.667 psi (0.113 bar) per °C above 25 °C.
- ⚠ **Material Compatibility:** The continuous ultrasonic level transmitter is made of two materials. The enclosure is a 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 not be mounted in such a way that it does not normally come into contact with fluid.
- ⚠ **Flammable, Explosive and Hazardous Applications:** *The LVU-301/-303 series level transmitter system should not be normally within flammable or explosive application.*
- ⚠ **Make a Fail-Safe System:** Design a Fail-Safe system that accommodates the possibility of transmitter or power failure. In critical application OMEGA ENGINEERING recommends the use of redundant backup systems and alarms in addition to the primary system.

Getting around: LVU-301/-303 Series is configured by the use of four push buttons (UP, DOWN, MENU and SET) and a LCD display. The display will always read the distance from the bottom of the sensor to the surface of the liquid (air gap).

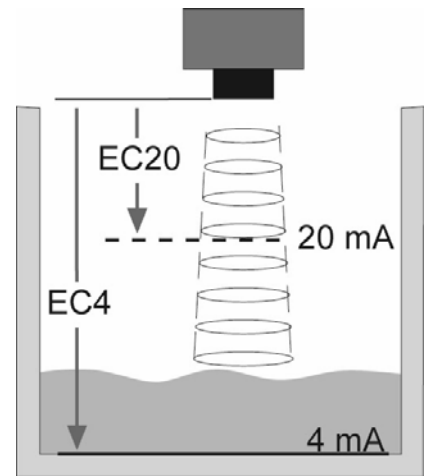
Main Menu: Holding down the MENU button will scroll down the main menu of the LVU-301/-303 Series.



Definitions: All measurement used for configuration of the LVU-301/-303 Series are made from the bottom of the transmitter down.

EC4: This is the 4 mA setting for the LVU-301/-303 Series. The EC4 is the distance from the bottom of the transmitter to the 4 mA set point. Typically, the EC4 or 4mA setting is at the bottom of the tank. The further away from the sensor, the larger the number will be. This setting is measured in either inches or centimeters on the display.

EC20: This is the 20 mA setting for the LVU-301/-303 Series. The EC20 is the distance from the bottom of the transmitter to the 20 mA set point. Typically, the EC20 or 20 mA setting is at the top of the tank. The closer to the sensor, the smaller the number will be. This setting is measured in either inches or centimeters on the display.

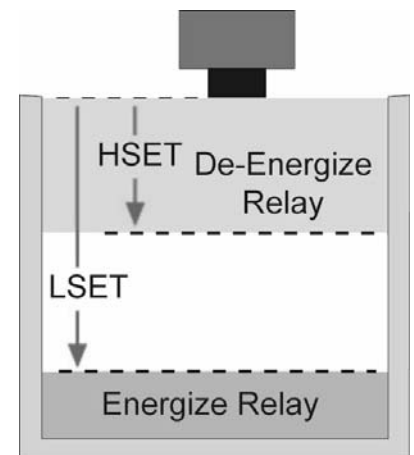


Reversing the 4-20 mA signal: Setting the EC4 at the bottom of the tank and EC20 at the top of the tank will create a 4-20 mA output that has 4 mA at empty and 20 mA at full. To reverse the 4-20 mA signal, set EC4 at the top of the tank and EC20 at the bottom of the tank.

RELAY: Indicator for the next two modes. The 10A relay is latched between the HSET and LSET points.

HSET & LSET: Sets the high point and low point for relay activation. Values are based upon the distance from the bottom of the sensor down towards the liquid.

- **HSET:** Internal relay will de-energize when display value is less than the HSET value.
- **LSET:** Internal relay will energize when display value is greater than the LSET value.



The HSET value is always less than the LSET value. To activate the relay from a single point, set HSET and LSET to the same value.

SAF1/SAF2: This is the fail-safe setting for the LVU-301/-303 Series. Use the SAF_ setting to determine a fail-safe mode for the internal relay. When [SAF1] is set, the will de-energize if the signal becomes LOST. When [SAF2] is set, the relay will energize if the signal becomes LOST.

LOST: A LOST state will occur when the sensor does not receive a return sound pulse signal. When this occurs, the display will show LOST and the current output will default to the SAF_ setting. The sensor will remain in this condition until a valid signal is acquired. No values in the MENU can be changed until the LOST condition has been resolved.

FAST/SLOW: FAST and SLOW sets the reaction time for the SAF1/2 setting when the sensor enters a LOST state. [FAST] is the typical setting for the sensor to operate. The time for the RELAY to default is 30 seconds for [FAST] mode and 2.5 minutes for [SLOW] mode.

To change the FAST/SLOW setting, follow the steps below:

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 display setting will be locked into memory.

ALIN: Use this mode as an aid to leveling the sensor installed in a self-aligning or rotational bulk head fitting. Display will show the return signal strength in dB's. For optimum alignment, first energize the unit and receive a valid return signal. Then select the ALIN mode and adjust the LVU-301/-303 series until the display is maximized. Typical readings range between 2 and 60 dB's.

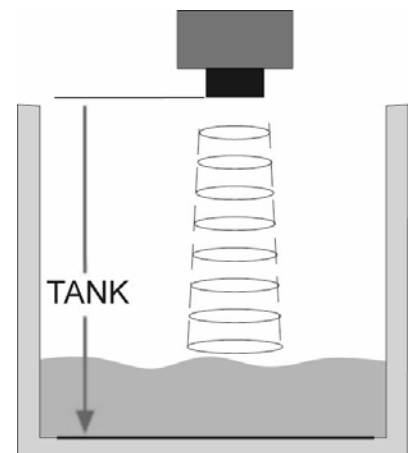
ON/OFF: This is the actual activation setting for ALIN mode. Default is [OFF]. Set to [ON] to view the ALIN readings. The ALIN mode must be turned [OFF] when alignment is completed.

To ALIN a sensor, follow the steps below:

1. Hold [MENU] key until OFF appears in the display.
 - a. OFF will appear right after ALIN
2. Release [MENU] key and immediately hold [SET] key to toggle from OFF to ON.
3. Release [SET] key. The LVU-301/-303 series is now in ALIN mode.
4. Adjust the sensor so the display shows the largest value.
 - a. When the highest value is shown, lock the sensor in place.
5. To exit ALIN mode, repeat steps 1-4 changing from ON to OFF.

TANK: The TANK sets the maximum tank height and will filter out all returns greater that this value. Regardless of how the EC4 and EC20 are set, set TANK to the Empty tank distance or greater.

(VALUE): The number after TANK shows the setting for TANK. This value is the actual TANK setting that can be changed for the application. The maximum distance is 300.0 inches.

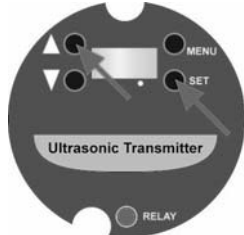


Steps for Basic Configuration:

1. Select and Set the units of operation.
2. Configure the Sensor's Current Range using the EC4 and EC20 settings in the main menu.
 - a. The tank level does not need to be empty or full for this operation.
3. Configure the Relay level settings using the HSET and LSET settings in the main menu.
 - a. The tank level does not need to be empty or full for this operation.
4. Set the Operational Range using the TANK settings in the main menu.
 - a. The tank level does not need to be empty or full for this operation.
5. Select the Fail-Safe setting using the SAF_ setting in the main menu.

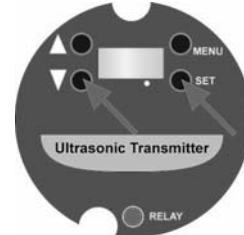
Selecting Units of Operation (Inches or CM): The default for the LVU-301/-303 Series is to display in inches. If power is removed, the sensor will remain in the selected mode. This operation selects the units of operation for the configuration of the transmitter. This selection has no effect on the output of the sensor. The 4-20 mA output can be scaled to read in any engineering units.

To change to centimeters



1. Remove power to the sensor and wait 10 seconds.
2. Simultaneously press [Δ] and [SET] while adding power to the transmitter.
3. The sensor will now read in centimeters.

To change to inches



1. Remove power to the sensor and wait 10 seconds.
2. Simultaneously press [∇] and [SET] while adding power to the transmitter.
3. The sensor will now read in inches.

Configure the Sensor's Current Range using EC4 and EC20

EC4: All measurement used for configuration of the sensor are made from the bottom of the transmitter down.

1. Measure the distance from the bottom of the sensor to the desired EC4 set point.
2. Hold [MENU] key until EC4 appears in display.
3. Release [MENU] key and wait until a value appears.
 - a. The value that appears is the current distance from the sensor to the surface of the liquid.
4. Immediately press the [Δ] or [∇] keys to view the memory value for EC4.
5. Use the [Δ] or [∇] keys to raise or lower the display to the desired value.
 - a. If the keys remain untouched for more than 3 seconds, the sensor will exit the menu.
6. Press the [SET] key to enter this value as the new EC4 set point.

EC20: All measurement used for configuration of the sensor are made from the bottom of the transmitter down.

1. Measure the distance from the bottom of the sensor to the desired EC20 set point.
2. Hold [MENU] key until EC20 appears in display.
3. Release [MENU] key and wait until a value appears.
 - a. The value that appears is the current distance from the sensor to the surface of the liquid.
4. Immediately press the [Δ] or [∇] keys to view the memory value for EC20.
5. Use the [Δ] or [∇] keys to raise or lower the display to the desired value.
 - a. If the keys remain untouched for more than 3 seconds, the sensor will exit the menu.
6. Press the [SET] key to enter this value as the new EC20 set point.

Set the RELAY using HSET and LSET

HSET: All measurement used for configuration of the sensor are made from the bottom of the transmitter down.

1. Measure the distance from the bottom of the sensor to the desired HSET set point.
2. Hold [MENU] key until HSET appears in the display.
3. Release [MENU] key and wait until a value appears (this is the memory value for HSET).
4. Use the [Δ] or [▽] keys to raise or lower the display to the desired value.
 - a. If the keys remain untouched for more than 3 seconds, the sensor will exit the menu.
5. Press the [SET] key to enter this value as the new HSET set point.

LSET: All measurement used for configuration of the sensor are made from the bottom of the transmitter down.

1. Measure the distance from the bottom of the sensor to the desired LSET set point.
2. Hold [MENU] key until HSET appears in the display.
3. Release [MENU] key and wait until a value appears (this is the memory value for LSET).
4. Use the [Δ] or [▽] keys to raise or lower the display to the desired value.
 - a. If the keys remain untouched for more than 3 seconds, the sensor will exit the menu.
5. Press the [SET] key to enter this value as the new LSET set point.

Set Operational Range using TANK

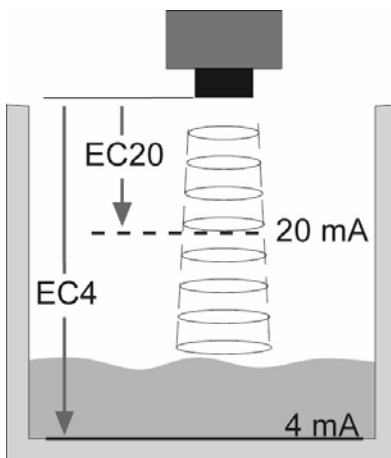
TANK: All measurement used for configuration of the sensor are made from the bottom of the transmitter down.

1. Measure the distance from the bottom of the sensor to the desired MAXR set point.
2. Hold [MENU] key until the value after MAXR appears in the display.
 - a. 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 [Δ] 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.

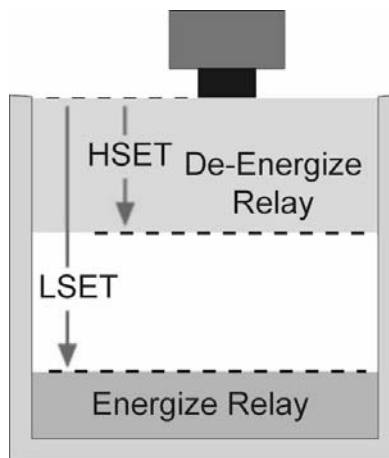
Select the Fail-Safe Setting

SAF_:

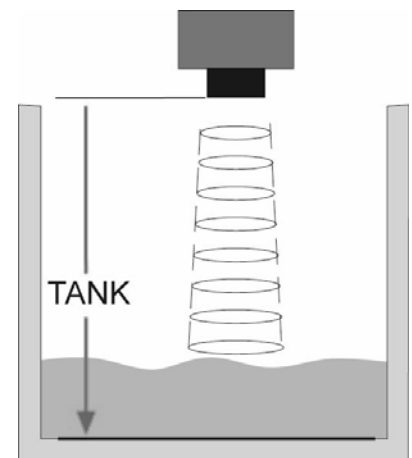
1. Hold [MENU] key until SAF1 or SAF2 appears in the display.
2. Release [MENU] key and hold [SET] key to toggle between SAF1 or SAF2.
3. When desired setting is reached, release [SET] key. The last display setting will be locked into memory.



EC4 and EC20 Distances Shown Above



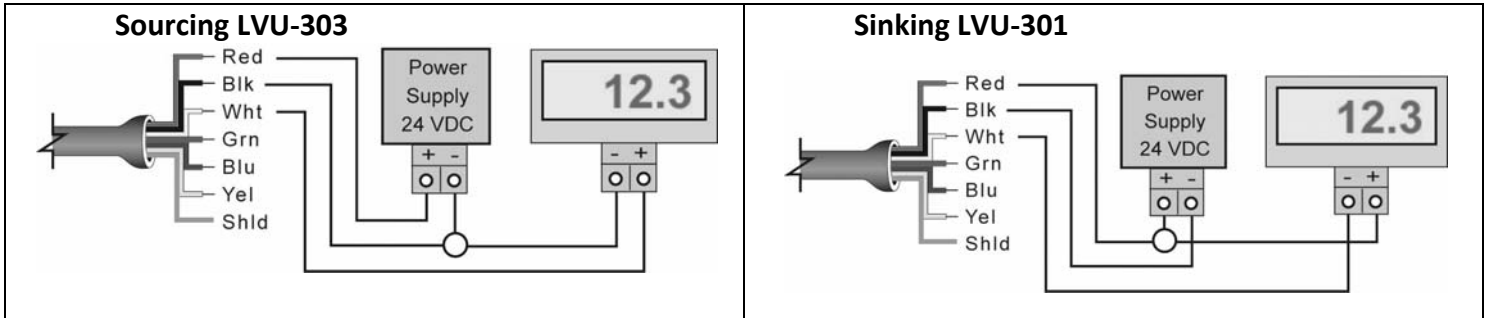
HSET and LSET Distances Shown Above



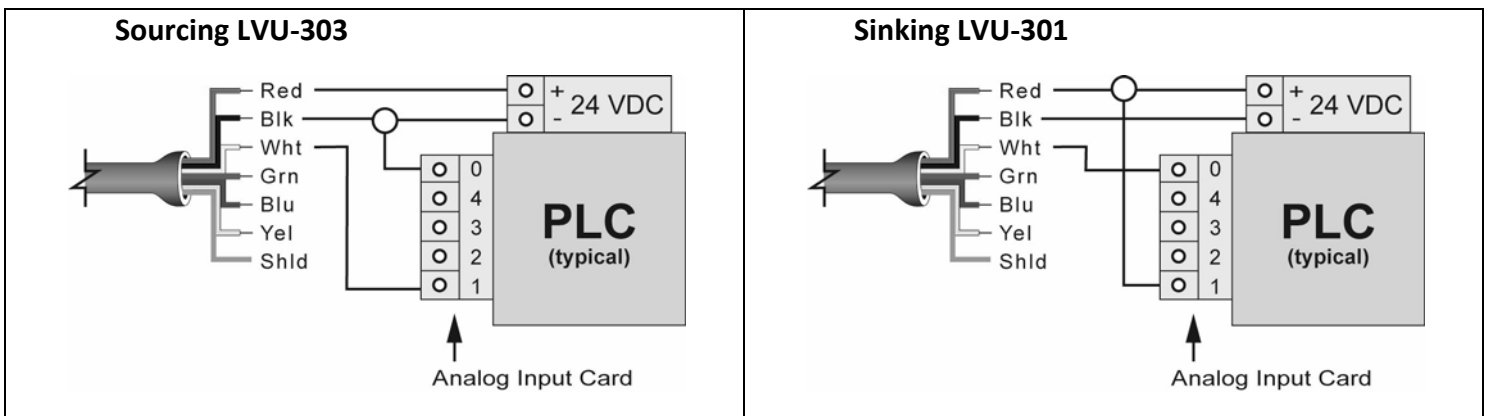
TANK Distances Shown Above

The LVU-301/-303 Series requires 14-36 VDC power with at least 200mA supply in order to operate.

Wiring to Generic Loop Powered Display:

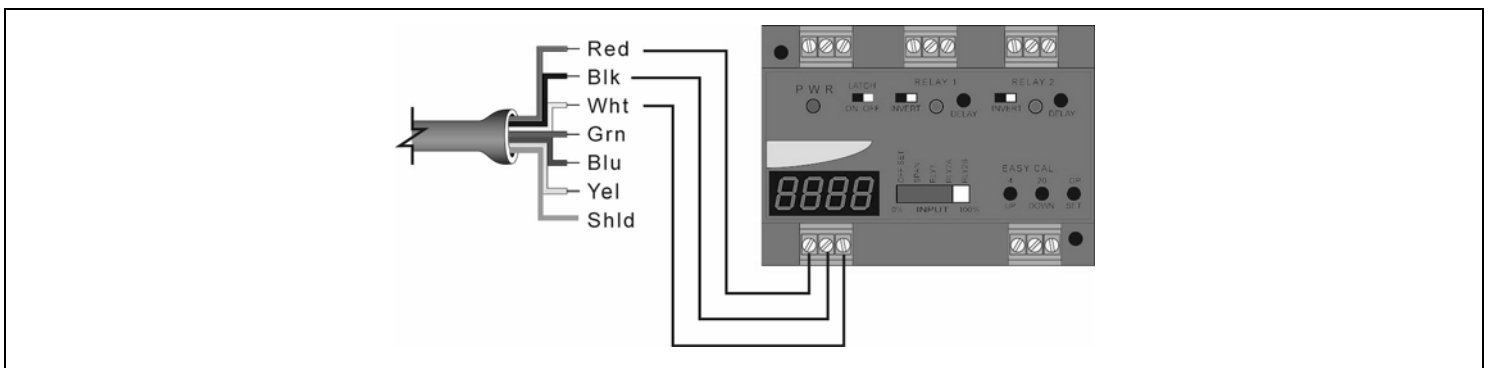


Wiring to Generic PLC:



Wiring to the LVCN-51 Series Level Controller:

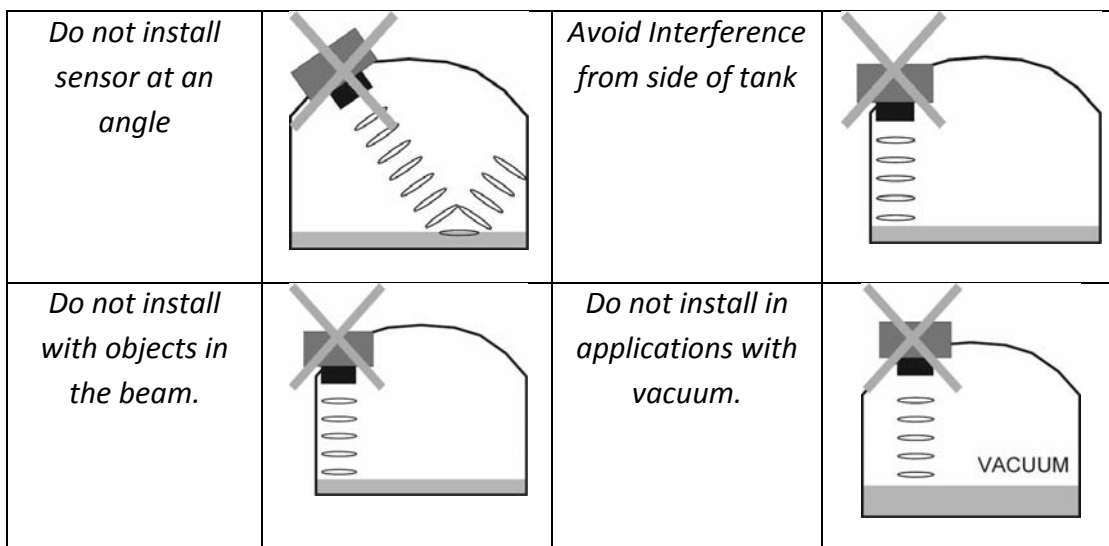
Note: Check LVCN-51 series manual regarding setting the LVCN-51 series to work with a Sourcing LVU-303 (JWB mode) or Sinking LVU-301 (JWA mode).



The LVU-301/-303 Series should always be mounted perpendicular to the liquid. Make sure that the fitting and transmitter threads are not damaged or worn. Always *hand-tighten* the transmitter within the fitting. Perform an installed leak test under normal process conditions prior to system start up.

Mounting Guide

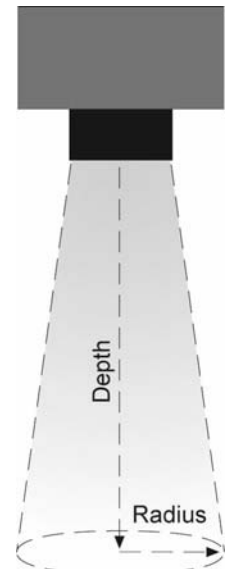
1. Do not mount at an angle
2. Liquid should never enter the dead band
3. Side Wall - Use the Beam Width data to find the closest the sensor can be to the side wall
4. Do not mount where obstacles will intrude on sensor's beam width
5. Do not mount in a vacuum
6. Avoid mounting in the center of a dome top tank.
7. In cone bottom tank, position the sensor over the deepest part of the tank.



Installation in existing fittings: If the existing fitting is larger than the threads of the LVU-301/-303 Series, select a reducer bushing such as LVU800-2N80 (3"thread x 2"thread) or LVU800-3N80 (4"thread x 2"thread).

Beam Angle: LVU-301/-303 Series features an 8° beam angle. As the distance to the liquid increases, the beam will increase in size. Keep any object that can interfere with the sound pulses (ex: side wall, ladders, mixing blades, etc.) outside of this beam angle. Use the data provided to size the footprint of the sound pulse.



Depth	Radius	Radius	Depth	Radius	Radius	Depth	Radius	Radius
1'	1.2"	3.1cm	10'	8.8"	22.3cm	19'	16.3"	41.3cm
2'	2.1"	5.2cm	11'	9.6"	24.4cm	20'	17.2"	43.6cm
3'	2.9"	7.3cm	12'	10.4"	26.5cm	21'	18.0"	45.7cm
4'	3.7"	9.5cm	13'	11.3"	28.7cm	22'	18.8"	47.8cm
5'	4.6"	11.6cm	14'	12.1"	30.8cm	23'	19.7"	50.0cm
6'	5.4"	13.7cm	15'	13.0"	32.9cm	24'	20.5"	52.1cm
7'	6.2"	15.9cm	16'	13.8"	35.1cm	25'	21.4"	54.2cm
8'	7.1"	18.0cm	17'	14.6"	37.2cm			
9'	7.9"	20.1cm	18'	15.5"	39.3cm			



Fitting Selection: LVU-301/-303 Series is commonly installed in tank adapters, flanges, brackets or standpipes.

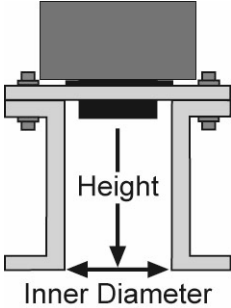
1. **Tank Adapter:** Select a tank adapter fitting, such as the LVU800-2B for the LVU-301/-303 series.

- a. Avoid tank adapter (thread x thread) styles and/or pipe stops forward of the installed transducer.
- a. For larger tank adapters, it is OK to use a reducer bushing such as the LVU800-2N80 (3" thread x 2" thread).

2" Tank Adapter Socket x Thread	Tank Adapter Thread x Thread
	 Do not use thread x thread

2. **Riser:** Installations with tall, narrow risers can impede the acoustic signal.

- a. 2" (5 cm) diameter risers should be no taller than 3" (7.6 cm). Larger diameter risers should be no taller than 12" (30.5 cm).

	Riser Specifications	
	Inner Diameter	Maximum Height
	3" ~ (75mm)	3" ~ (75mm)
	4" ~ (100mm)	7" ~ (175mm)
	5" ~ (125mm)	10" ~ (250mm)
	6" ~ (150mm)	12" ~ (300mm)
	7" ~ (175mm)	14" ~ (350mm)
	8" ~ (200mm)	16" ~ (400mm)

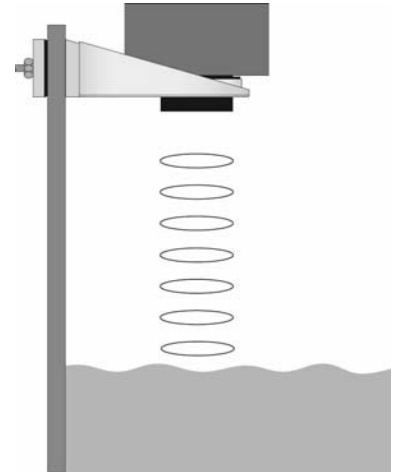
Note: Do not exceed the dimensions listed above

3. **Flange:** If installing on a flange, select a flange with a thread that is equal to the thread of the LVU-301/-303 Series.

- a. When using a flange with a riser, please observe the riser dimensional information above.
- b. If the size of the flange is larger than the thread of the sensor, use a reducer bushing to help mount the sensor.

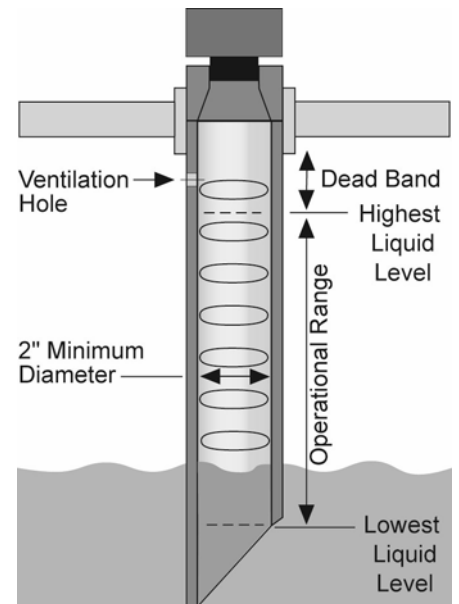
4. **Side Mount Bracket:** For installations in open tanks and sumps, use the LVM-30 series side mount bracket.

- a. Be aware of the 8° beam angle with the LVU-301/-303 Series transmitter.
- b. Use the Beam Width data to avoid having the sensor's beam away from the side wall.



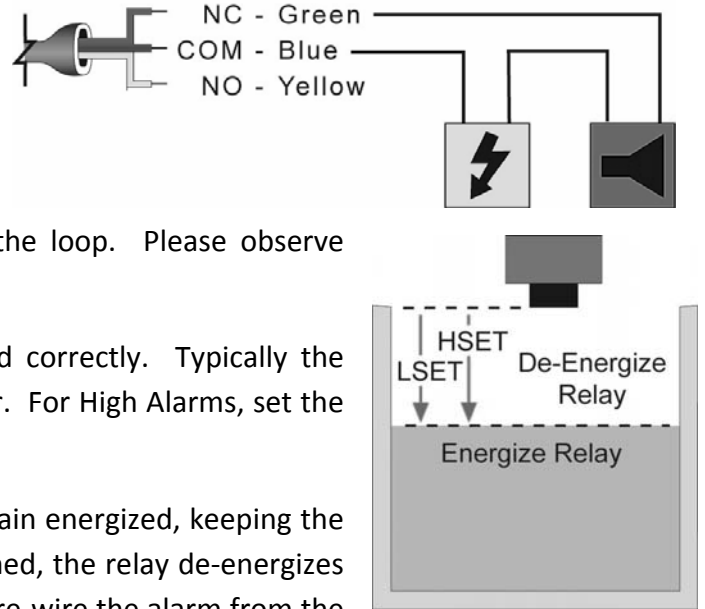
5. **Stand Pipe:** A standpipe maybe used to dampen turbulence or when foam is present in the application.

- a. Pipe can be made of any material.
- b. Select a minimum 2" ID pipe for the stand pipe.
 - i. A larger diameter pipe can be used.
- c. Use a coupling and reducer bushing to attach the LVU-301/-303 Series to the pipe.
- d. The pipe length should run the measurement span and the bottom of the pipe should remain submerged at all times to prevent foam from entering the pipe.
- e. The pipe must be a continuous length with no joints, couplings or extensions.
- f. Cut a 45°notch at the bottom of the pipe and drill a 1/4" pressure equalization hole in the dead band.
 - i. The vent hole must be within the dead band of the LVU-301/-303 Series.
- g. The pumps should not drive liquid past the open end of the stand pipe which causes the liquid in the pipe to oscillate.



Internal Relay: The LVU-301/-303 series contains a 250 VAC, 10A internal relay. The relay is actuated by the HSET and LSET settings. While this manual offers some example and suggestions to help explain the operation of the relay, such examples are for information only and are not intended as a complete guide to installing any specific system.

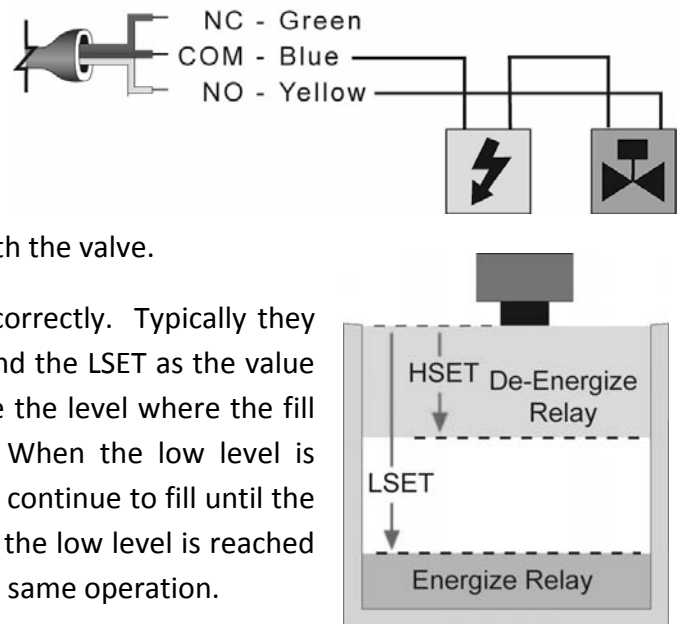
Ex: High Level Alarm: The goal is to make sure the liquid does not rise above a certain level in the tank. If it does, an alarm sounds alerting the operator to a high level condition. Wire a lead of the alarm to the Green NC relay wire. Power is wired to the Blue COM relay wire and to the other lead of the alarm to complete the loop. Please observe polarity with the alarm.



Make sure the HSET and LSET settings are programmed correctly. Typically the values are set to the same distance away from the sensor. For High Alarms, set the HSET value first before setting the LSET value.

In the normal operation state, the sensor’s relay will remain energized, keeping the alarm circuit open. When the alarm level has been reached, the relay de-energizes and activates the alarm. To change to a **low level alarm**, re-wire the alarm from the Green NC wire to the Yellow NO wire and adjust the LSET and HSET to the required level in the tank.

Ex: Automatic Fill: The goal is to fill the tank. A valve is opened (energized) when a low level is reached and closed (de-energized) when a high level is reached. Wire a lead from the valve to the Yellow NO wire. Power is wired to the Blue COM relay wire and to the other lead of the valve to complete the loop. Please observe polarity with the valve.



Make sure the HSET and LSET settings are programmed correctly. Typically they are set with the HSET as the value closest to the sensor and the LSET as the value farthest away. In a Fill operation, the HSET will always be the level where the fill stops and LSET will be the level where the fill starts. When the low level is reached, the system will start to fill the tank. The tank will continue to fill until the level reaches the high point. The system stops filling until the low level is reached again. A pump or solenoid can be substituted for the exact same operation.

To change to an **automatic empty** application, re-wire the system from the Yellow NO wire the Green NC wire and adjust the LSET and HSET to the required level in the tank.

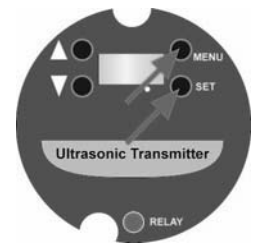
General: LVU-303/-303 series sensor itself requires no periodic maintenance except cleaning as required. It is the responsibility of the user to determine the appropriate maintenance schedule, based on the specific characteristics of the application liquids.

Cleaning Procedure:

1. **Power:** Make sure that all power to the sensor, controller and/or power supply is completely disconnected.
2. **Sensor Removal:** In all through-wall installations, make sure that the tank is drained well below the sensor prior to removal. Carefully, remove the sensor from the installation.
3. **Cleaning the Sensor:** Use a soft bristle brush and mild detergent, carefully wash the sensor. Do not use harsh abrasives such as steel wool or sandpaper, which might damage the surface sensor. Do not use incompatible solvents which may damage the sensor’s Polypropylene or PVDF plastic body.

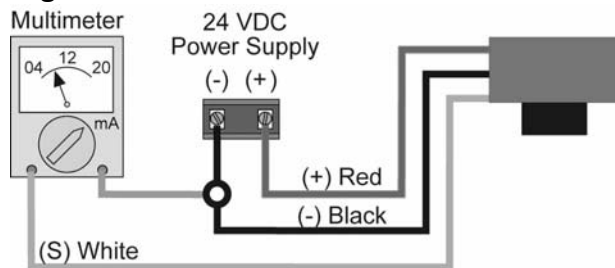
Factory Setting and Factory Reset: The LVU-303/-303 series is preset at the factory. When powered up the transmitter the first time, the factory setting will be active. If at any time you need to return to these settings, remove power from the sensor and wait 10 seconds. Press the [SET] and [MENU] buttons simultaneously while powering up the transmitter.

LEVL	INCHES (cm)	SAF_	SAF1
EC4	288" (731.2cm)	FAST/SLOW	FAST
EC20	8" (20.3cm)	ALIN	N/A
RLAY	N/A	OFF/ON	OFF
HSET	5" (12.6 cm)	TANK	N/A
LSET	288" (731.2cm)	Value	216" (548.6cm)

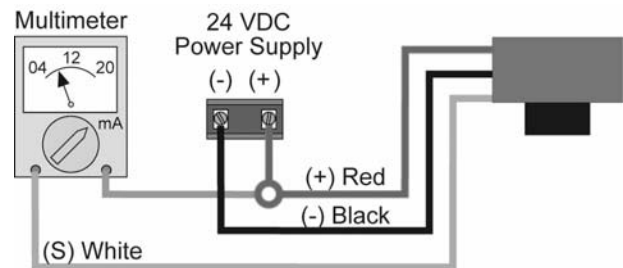


Changing Display Units: The LVU-301/-303 series comes preset to measure in inches. To change the unit to display centimeters, remove power to the sensor and wait 10 seconds. Press [Δ] and [SET] simultaneously while powering up the transmitter. The sensor will now read in centimeters. To return to inches, remove power and wait 10 seconds. Press [∇] and [SET] simultaneously while powering up the transmitter.

Testing the Transmitter



Sourcing Transmitter (LVU-303 Series)



Sinking Transmitter (LVU-301 Series)

1. Connect a multimeter in series with the white wire to read the current output.
 - a. Be sure to observe in the examples above where the other side of the multimeter is connected.
2. Verify that the current increases (tank filling) and decreases (tank emptying) appropriately in the calibrated span.

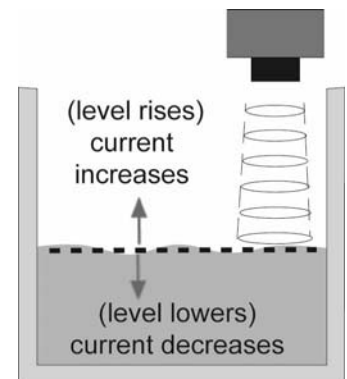
If not, carefully observe and attempt to correlate any installation, level or application event for more specific troubleshooting direction.

PROBLEM	SOLUTION
Transmitter indicates a current of 0 mA	Check the wiring for an open circuit (specifically the White wire). An open circuit is the most common issue with a 0 mA signal
Transmitter jumps to a current reading between 19 and 20 mA	Check the installation of the transmitter. Bad installation fittings will cause false signals near the top of the tank, which typically translates to a signal between 19 and 20 mA. Also look for interference just below the transmitter. If the transmitter is installed in a metal fitting, switch to a plastic fitting.
Transmitter indicates a current over 20 mA	Immediately check the wiring for a short circuit. The LVU-301/-303 Series is current limited to 20 mA. Anything above 20 mA indicates a short circuit.
Transmitter always jumps to LOST condition	<p>A reading of LOST in the display of the sensor indicates the transmitter is not receiving a valid return signal. If LOST appears, please check the following troubleshooting items:</p> <ol style="list-style-type: none"> 1. Beam cone interference such as the side wall, ladder, seams, rungs or pipes within the sensor's beam cone. 2. Proper installation such that the LVU-301/-303 series is installed level and free from interference from the installation fitting or flange. 3. Sufficient power being supplied to the LVU-301/-303 series. The sensor requires 14-36 VDC power with a minimum supply 200mA. 4. Proper Programming of the TANK function. For best results, set the TANK function as the distance from the bottom of the tank to the bottom of the transmitter. 5. Make sure that the transmitter is not installed at an angle. Even a 5 degree offset can reduce the signal return strength greatly.
Output of transmitter is opposite of the level of liquid	<p>Check the EC4 & EC20 Setting.</p> <ul style="list-style-type: none"> • For 4mA at empty tank and 20 mA at full tank, the EC4 must be the larger value and the EC20 to smaller value. • For 20mA at empty tank and 4 mA at full tank, the EC20 must be the larger value and the EC4 to smaller value.
Output of the transmitter is always reading either 4mA or 20 mA	Check the input settings (EC4 and EC20) for the transmitter. The display of the transmitter reads to the 1/10 th of an inch or cm. Example: a display of 1234 is 123.4" and not 1234".

PROBLEM	SOLUTION
The display on the transmitter does not match the display on the side of the tank	The display for the LVU-301/-303 Series will always show the distance from the liquid surface to the bottom of the sensor (in inches or cm). The 4-20 mA output can be scaled to read in any engineering units, thus the displays will never match unless the local display is configured to read the air gap in the tank.
Sensor appears to have reset itself	Check the settings for EC4 & EC20. <i>Remember that the first value seen in EC4 & EC20 is the current distance from the sensor to the liquid.</i> <ol style="list-style-type: none"> To check EC4 setting: <ol style="list-style-type: none"> Press MENU until EC4 appears. Wait until a number appears. Immediately press the Δ button & the EC4 setting will appear. To check EC20 setting: <ol style="list-style-type: none"> Press MENU until EC20 appears. Wait until a number appears. Immediately press the Δ button & the EC20 setting will appear.
Display reads CM8Q or CM8O	These are actually firmware codes for the sensor. The appearance of either code indicates that the sensor is stuck in a reboot stage due to the power flickering on and off. Check that the power being supplied is consistent and does not flicker off. Also check the wire connections at the terminals.

Other Hints: Current must change with all level movement. Example: For the illustration shown, as level increases, the current output will increase. If the output of the LVU-301/-303 series is always reading 4mA or 20mA, check the input values (EC4 and EC20) for the sensor.

The display on the LVU-301/-303 Series will always indicate the distance from the bottom of the sensor to the surface of the liquid (in units of either 1/10 inch or 1/10 cm). As the liquid level increases, the value on the display will decrease. As the liquid level decreases, the value on the display will increase.





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.

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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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