LVU2700 Series
Ultrasonic Level Transmitter

omega.com®
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OMEGAnet® Online Service omega.com	Internet e-mail info@omega.com

Servicing North America:

U.S.A.:
ISO 9001 Certified

Omega Engineering, Inc., One Omega Drive, P.O. Box 4047
Stamford, CT 06907-0047 USA
Toll Free: 1-800-826-6342   TEL: (203) 359-1660
FAX: (203) 359-7700   e-mail: info@omega.com

Canada:

976 Bergar
Laval (Quebec), Canada H7L 5A1
Toll-Free: 1-800-826-6342   TEL: (514) 856-6928
FAX: (514) 856-6886   e-mail: info@omega.ca

For immediate technical or application assistance:

U.S.A. and Canada: Sales Service: 1-800-826-6342/1-800-TC-OMEGA®
Customer Service: 1-800-622-2378/1-800-622-BEST®
Engineering Service: 1-800-872-9436/1-800-USA-WHEN®

Mexico:

En Espaol: 001 (203) 359-7803   FAX: (001) 203-359-7807
info@omega.com.mx   e-mail: espanol@omega.com

Servicing Europe:

Benelux:

Managed by the United Kingdom Office
Toll-Free: 0800 099 3344   TEL: +31 20 347 21 21
FAX: +31 20 643 46 43   e-mail: sales@omega.nl

Czech Republic:

Frystatska 184
733 01 Karviná, Czech Republic
Toll-Free: 0800-1-66342   TEL: +420-59-6311899
FAX: +420-59-6311114   e-mail: info@omegashop.cz

France:

Managed by the United Kingdom Office
Toll-Free: 0800 466 342   TEL: +33 (0) 161 37 29 00
FAX: +33 (0) 130 57 54 27   e-mail: sales@omega.fr

Germany/Austria:

Daimlerstrasse 26
D-75392 Deckenpfronn, Germany
Toll-Free: 0 800 6397678   TEL: +49 (0) 7059 9398-0
FAX: +49 (0) 7056 9398-29   e-mail: info@omega.de

United Kingdom:
ISO 9001 Certified

OMEGA Engineering Ltd.
One Omega Drive, River Bend Technology Centre, Northbank
Irlam, Manchester M44 5BD England
Toll-Free: 0800-488-488   TEL: +44 (0)161 777-6611
FAX: +44 (0)161 777-6622   e-mail: sales@omega.co.uk

It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

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.

The LVU2700 Series is a general-purpose ultrasonic level transmitter that provides a loop powered 4-20 mA output. The 4-20 mA output can be used to provide the proportional level of liquid in any tank or vessel. The signal can be connected to any device that accepts loop powered 4-20 mA signals, such as a PLC, SCADA, DCS, display, controller, etc.

New Features
- Easily change output from distance to volume
- Select from 6 standard tank shapes
- 16 point strapping table for customer/odd size tanks
- All within the simple configuration PC Software Program (LVCN414-SW)

Table of Contents

Range:

LVU2710: 4" to 8' (10 cm to 3 m)	LVU2718: 8" to 9.8' (20 cm to 5.5 m)	LVU2726: 8" to 26.2' (20 cm to 8 m)	LVU2732: 8" to 32.8' (20 cm to 10 m)

Accuracy:	± 0.2% of range	Process temp.:	F: -4° to 140°
Resolution:	LVU2710: 0.019" (0.5mm)		C: -20° to 60°
	LVU2718: 0.039" (1mm)	Temp. comp.:	Automatic
	LVU2726: 0.079" (2 mm)	Ambient temp.:	F: -31° to 140°
	LVU2726: 0.079" (2 mm)		C: -35° to 60°
Dead band:	LVU2710: 4" (10cm)	Pressure:	MWP = 30 PSI
	LVU2718/26/32: 8" (20cm)	Enclosure type:	Type 6P encapsulated, corrosion
Beam width:	LVU2710: 2" (5cm)		resistance & submersible
	LVU2718/26/32: 3" (7.6cm)	Encl. material:	Polycarbonate
Configuration:	LVCN414-SW (software) PC	Trans. material:	PVDF
	Windows® USB 2.0	Cable jacket mat.:	Polyurethane
Memory:	Non-volatile	Cable type:	4-conductor shielded
Supply voltage:	24 VDC (loop)	Cable length:	10' (3 m)
Consumption:	0.5 W	Process mount:	LVU2710: 1" NPT (1" G)
Loop resistance:	500 Ohms @ 24 VDC		LVU2718/26/32: 2" NPT (2" G)
Signal output:	4-20 mA, two-wire	Mount. gasket:	FKM
Signal invert:	4-20 mA or 20-4 mA	Classification:	General purpose
Signal fail-safe:	4 mA, 20 mA, 21 mA,	Compliance:	CE, RoHS
	22 mA or hold last		

Dimensions:

Side View / LVU2710 Series

4.1" (105 mm)   10' Cable (3m)

Red - Power
Black - Return
White - Tx (out)
Green - Rx (in)
Shld

1" NPT (1" G)

1.2" (32 mm)   1.9" (49 mm)   2.9" (74 mm)

Side View / LVU2718, LVU2726 and LVU2732 Series

4.1" (105 mm)   10' Cable (3m)

Red - Power
Black - Return
White - Tx (out)
Green - Rx (in)
Shld

2" NPT (2" G)

1.7" (44 mm)   2.4" (61 mm)   3.4" (86 mm)

4
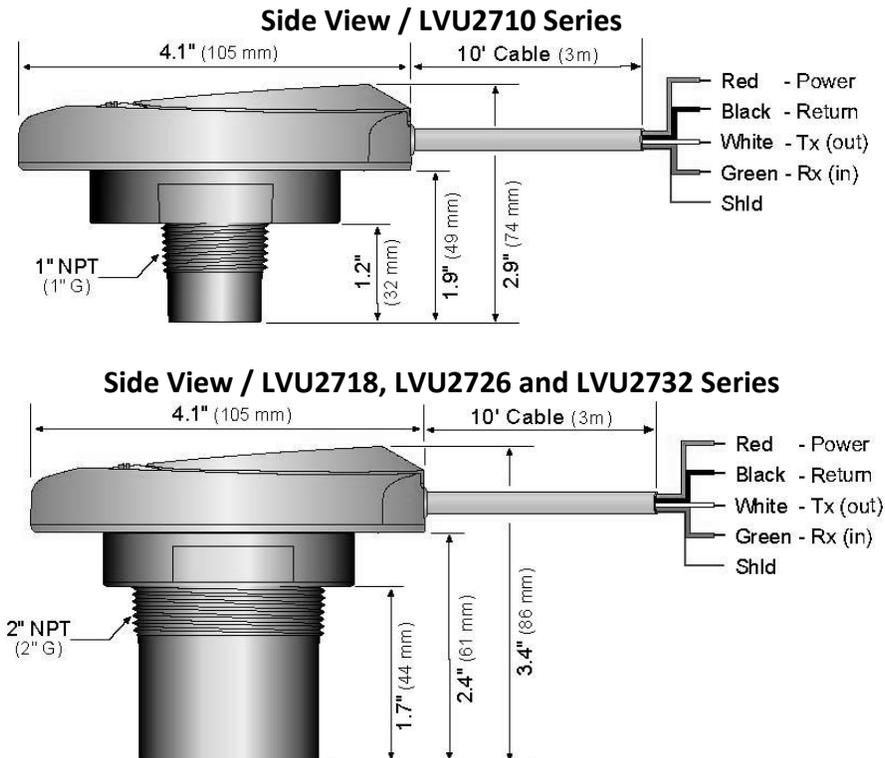
About this Manual: PLEASE READ THE ENTIRE QUICK START PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on the LVU2700 Series Ultrasonic Level Transmitter from OMEGA ENGINEERING. Please refer to the part number located on the switch label to verify the exact model configuration, which you have purchased.

User's Responsibility for Safety: OMEGA ENGINEERING manufactures a broad range of level sensing technologies. While each of these sensors is designed to operate in a wide variety of applications, it is the user's responsibility to select a sensor model 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: Only professional staff should install and/or repair this product. Install the transmitter with the included FKM gasket and never over tighten the transmitter within the fitting. Always check for leaks prior to system start-up.

Wiring and Electrical: A supply voltage of 12 to 28 VDC is used to power the LVU2700 Series. Electrical wiring of the transmitter should be performed in accordance with all applicable national, state, and local codes.

Material Compatibility: The enclosure is made of Polycarbonate (PC). The transducer is made of Polyvinylidene Fluoride (PVDF). Make sure that the model, which you have selected, is chemically compatible with the application media.

Enclosure: While the transmitter housing is encapsulated, corrosion resistance & submersible, the LVU2700 Series is not designed to be operational when immersed. It should be mounted in such a way that the enclosure and transducer do not come into contact with the application media under normal operational conditions.

Safety
- Installation should be done by properly trained staff
- Supply voltage should never exceed a maximum of 28 VDC
- Make sure the sensor is chemically compatible with your application
- Design a fail-safe system that accommodates the possibility of sensor and/or power failure.
- This sensor should not be used in classified hazardous environments

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

Flammable, Explosive or Hazardous Applications: *LVU2700 Series should not be used within classified hazardous environments.*

Warning: Always use the FKM gasket when installing the LVU2700 Series, and make sure that all electrical wiring of the switch is in accordance with applicable codes.

LVU2700 Series is offered in four different models. Depending on the model purchased, you may or may not have been shipped all the components shown below. You do however, need an LVU2700 Series, USB® Fob and FKM gasket to configure, install and operate LVU2700 Series.

- LVU2700 Series

Part Number	Range	Enclosure	Mounting Thread	USB® Fob
LVU2710	9.8' (3m)	Type 6P enclosure	1" NPT	Included
LVU2710-B				No Fob
LVU2710-G			1" G	Included
LVU2710-G-B				No Fob
LVU2718	18.0' (5.5m)		2" NPT	Included
LVU2718-B				No Fob
LVU2718-G			2" G	Included
LVU2718-G-B				No Fob
LVU2726	26.2' (8m)		2" NPT	Included
LVU2726-B				No Fob
LVU2726-G			2" G	Included
LVU2726-G-B				No Fob
LVU2732	32.8' (10m)		2" NPT	Included
LVU2732-B				No Fob
LVU2732-G			2" G	Included
LVU2732-G-B				No Fob

- FKM Gasket
  - Part #200128 for LVU2710 series
  - Part #200129 for LVU2718, LVU2726 or LVU2732 series
- USB® Fob
  - Part # LVCN414-USB
- Manual

LVU2700 Series is configured through a PC software program (LVCN414-SW). The LVCN414-SW is a free download from Omega Engineering's website. ***You must download and install the LVCN414-SW prior to plugging in the USB® Fob.***

- Please go to http://www.omega.com/ftp.
- Click on Flow, Level, pH, Environmental, and Pressure Section and press on **Products**
- Select the **LVCN414** folder
- Select the installer - **LVCN414InstallerverXpXX.zip**
    - This will download the installer onto your computer.
   - Once completed, run the installer.

<div align="center">

LVCN414-SW Software System Requirements
Windows® 2000, XP, Vista, 7, 8
32 or 64-bit system
1 USB® 2.0 port
10 mB hard drive space
256 mB RAM
Internet connection

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USB® Fob Interface
LVU2700 Series communicates with the LVCN414-SW PC software through a USB® interface called a Fob. Before plugging your Fob into your computer's USB® port, be sure that you have installed LVCN414-SW on your computer.

Connect the red, green, white and black wires from LVU2700 Series into the correct terminals on the Fob. Tighten the screws on the terminals and plug your Fob into the USB® port of your computer.
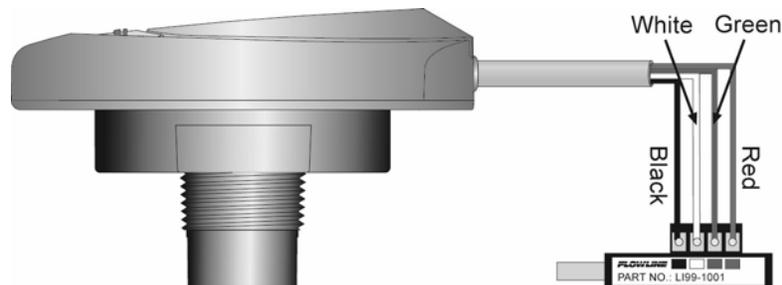
- The maximum cable distance between the computer and sensor is 15'. This only applies when configuring the LVU2700 Series.

- Once the sensor is configured and prior to installation, isolate the white and green wires from active power to prevent a short of the configuration circuit.

- ***Note:*** *When using the USB® Fob, do not add VDC or VAC power. The USB® Fob, when connected to the computer, will provide the required power to the LVU2700 Series.*

LVCN414-SW PC Software
With LVU2700 Series connected to your computer, open the software by clicking on the LVCN414-SW icon. Follow steps 1-3 to configure the transmitter. Click "Help" in the lower right hand corner and open the help menu of the software for additional instructions. If you need additional assistance using the LVCN414-SW software, please contact an Omega Engineering Applications engineer.
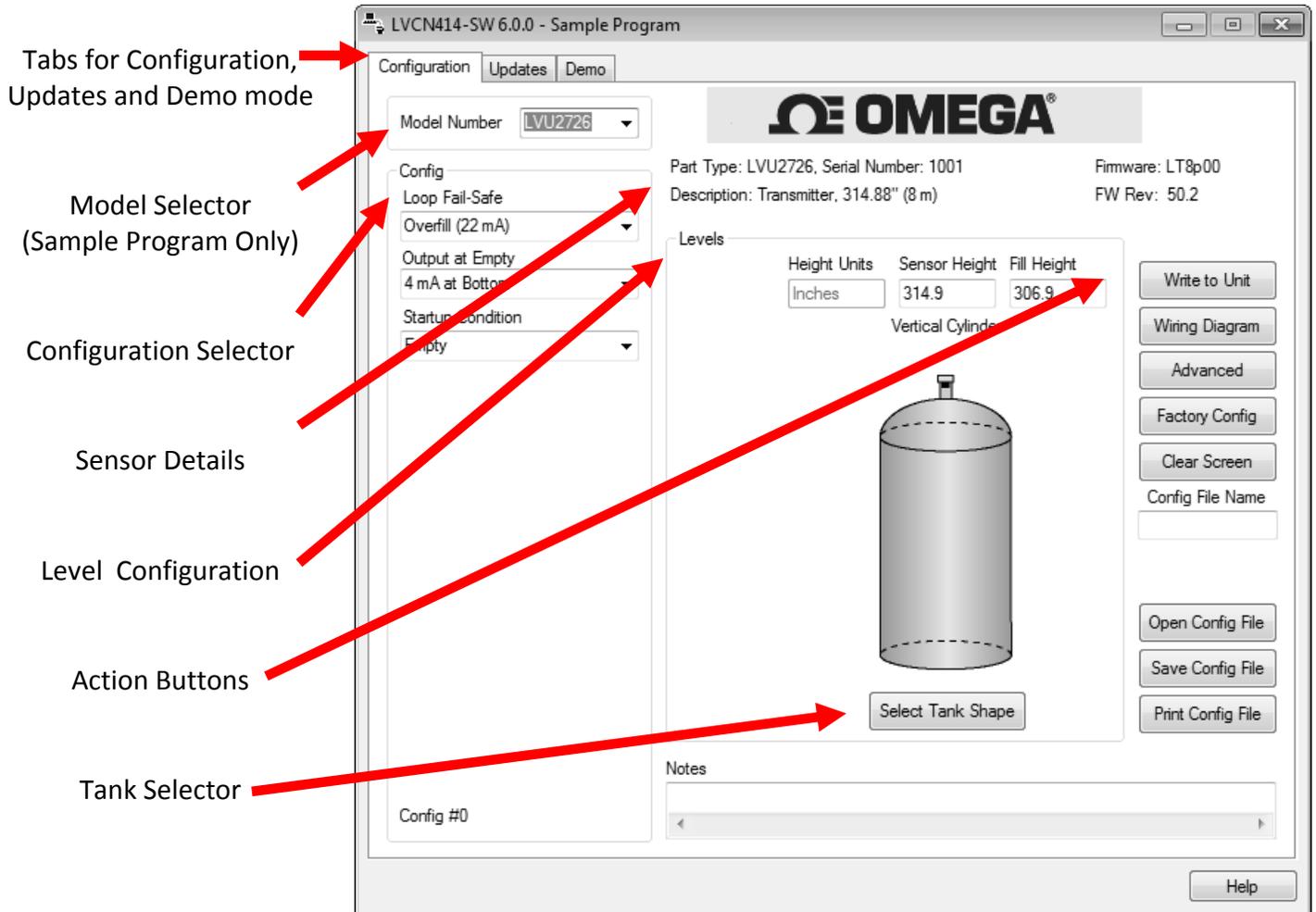
Above Screen Capture is for the LVU2726 series.

Configuring LVU2700 Series with LVCN-414-SW Software
1. Configuration
    a. Configures the Loop Fail-Safe, Output at Empty (4-20mA or 20-4mA) and Startup Condition.
2. Tank Shape Selection
    a. Defines the shape of the tank as well as the dimensional information for the tank with respect to the sensor's location on the tank.
3. Level Configuration
    a. Enters the distance values for the operational range of the sensor.
4. Write to Unit
    a. Uploads the configuration into the sensor.
    b. Provides a custom wiring diagram.

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1. Configuration

This section of the software is where you select the application's configuration settings. Start from the top and work to the bottom, choosing the selections that are applicable to your configuration. "***Not Applicable***" will automatically show when a selection doesn't apply to your configuration settings, and you may move on. All configuration settings must be selected or have "***Not Applicable***" before you can continue. ***Note:*** *Pressing the Clear Screen button will reset the configuration table and allow access to all of the features.*
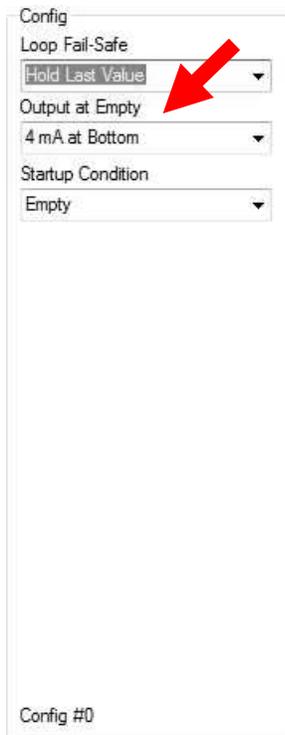
Loop Fail-Safe

This feature allows you to select the fail-safe current output if the sensor fails to detect a return signal (LOST). When the sensor regains signal, the output current will revert back to the current level condition.

- o ***Hold Last Value -*** The output will remain in the same state as the last echo detected. Example: If the output was 6.7 mA just prior to the LOST signal, the device will continue to output 6.7 mA. When the sensor regains signal, the output will indicate the level when the signal was regain.
- o ***Empty*** - The output will revert to the current value of an Empty tank. The empty state is dependent upon the *Output at Empty* setting.   When *4 mA at Bottom* is selected, the sensor will output 4 mA when a fail-safe condition occurs. If *20 mA at Bottom* is selected, the sensor will output 20 mA when a fail-safe condition occurs
- o ***Full*** - The output will revert to the current value of a Full tank. The full state is dependent upon the *Output at Empty* setting. When *4 mA at Bottom* is selected, the sensor will output 20 mA when a fail-safe condition occurs. If *20 mA at Bottom* is selected, the sensor will output 4 mA when a fail-safe condition occurs
- o ***Overfill (21mA)*** - The output current will go to 21mA when the return signal is lost.
- o ***Overfill (22mA)*** - The output current will go to 22mA when the return signal is lost.

Note: Right click on any menu that you may have questions on to open the help menu.

Note: To reset, press the Clear Screen button.

Output at Empty

This feature allows you to select the orientation of the 4 to 20mA output (4 to 20 mA or 20 to 4 mA). Choose which output setting best fits the application. Typical installations are set with *4 mA at Bottom*. This will not affect the performance of the sensor other than the output of the LVU2700 Series. The software's factory default is 4mA at bottom and 20mA at top. *When connecting your sensor to a display, you must account for your output settings.*

- o *4mA at Bottom* - The output current will be 4mA when the sensor measures an empty tank and 20mA when the sensor measures a full tank.
- o *20mA at Bottom* - The output current will be 20mA when the sensor measures an empty tank and 4mA when the sensor measures a full tank

Startup Condition

This feature allows the operator to select the output current on initial startup prior to acquiring a true return signal (level measurement). This only occurs during the initial powering of LVU2700 Series and the transmitter will revert to the correct level reading when the level is acquired.

- o *Empty* - Selects the start up current established in *Output at Empty*. Example: Select 4 mA at Bottom, the output will remain at 4 mA until the unit acquires a true return echo. Select 20 mA at Bottom, the output will remain at 20 mA until the unit acquires a true return echo.
- o *Mid Tank* - When selected, the startup current will read 12 mA until the unit acquires a true return echo.
- o *Full Tank* - Uses the opposite current that was selected in *Output at Empty*. Example: If you select 4 mA at Bottom then the start up current would be 20 mA. If you select 20 mA at Bottom then the start up current would be 4 mA.
- o *Overfill (22mA)* - The output at startup would be 22 mA. This condition will remain until the unit acquires a true return echo.

Note: Right click on any menu that you may have questions on to open the help menu.

Note: To reset, press the Clear Screen button.

2. Tank Shape Selection

The sensor may be configured in volumetric units (Gallons or Liters) or Distance (Height of Liquid) units (inches, cm, feet or meters). The LVCN-414-SW software will default in Distance (Height of Liquid) with units of Inches. To change the units or to change from Distance to Volume, press the Select Tank Shape button located near the center of the window.
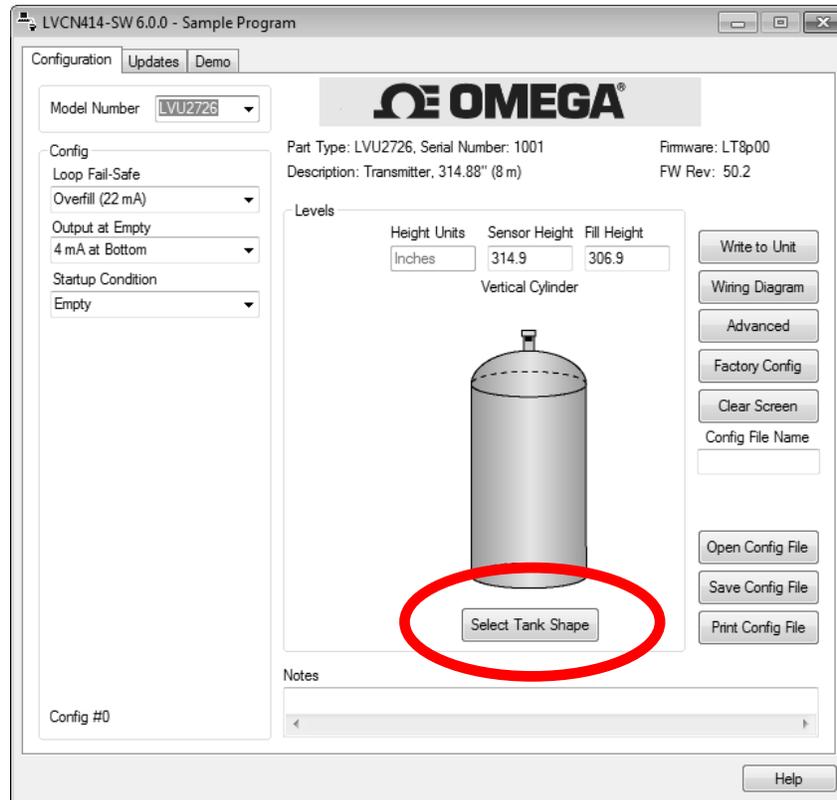
Shape Selection Window: This window will shows the different tank shape options available in WebCal™.

- *Vertical Cylindrical*

- *Vertical Cylindrical with Cone Bottom*

- *Horizontal Cylindrical with Endcaps*

- *Horizontal Cylindrical with Spherical Ends*

- *Spherical*

- *Rectangular*

- *Strapping Table –* Use this feature for manual entry of measured tank distances and volumes.

Select any of the above tank shapes and press OK to confirm.
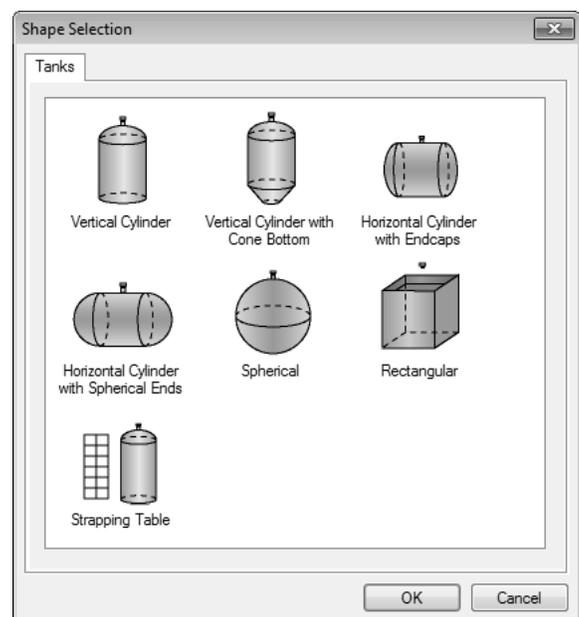
Dimensional Entry – Vertical Cylindrical Example: Choose the Sensor Output Units as Distance or Volume. After choosing the Sensor Output Units, select the units of measurement in the pull down to the left.

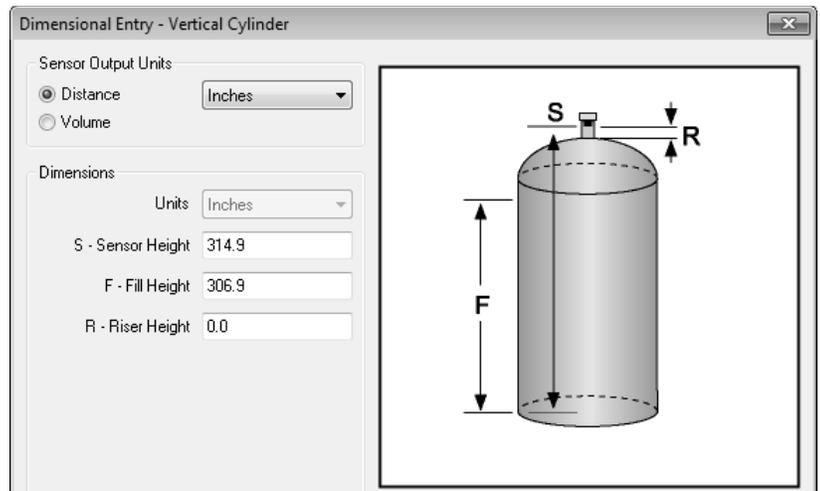| Units of Measurement	
Distance	**Volume**
Inches	Gallons
Cm	Liters
Feet	
Meters	

Distance – Sensor Output Units:
Enter the dimensions of the tank. You must enter data in all fields shown.

Sensor Height: Distance from the bottom of the tank to the bottom of the transducer.

Fill Height: Distance from the bottom of the tank to the maximum liquid height.

Riser Height: Distance the sensor is recessed within a riser, measured from the bottom of the sensor to the inside of the tank.

Volume – Sensor Output Units:
Enter the dimensions of the tank. You must enter data in all fields shown.

Sensor Height: Distance from the bottom of the tank to the bottom of the transducer.

**Fill Height:** Distance from the bottom of the tank to the maximum liquid height.

Riser Height: Distance the sensor is recessed within a riser, measured from the bottom of the sensor to the inside of the tank.

Tank Height: Distance from the bottom of the tank to the top of the straight side wall.

Diameter: Distance of the inside tank diameter.
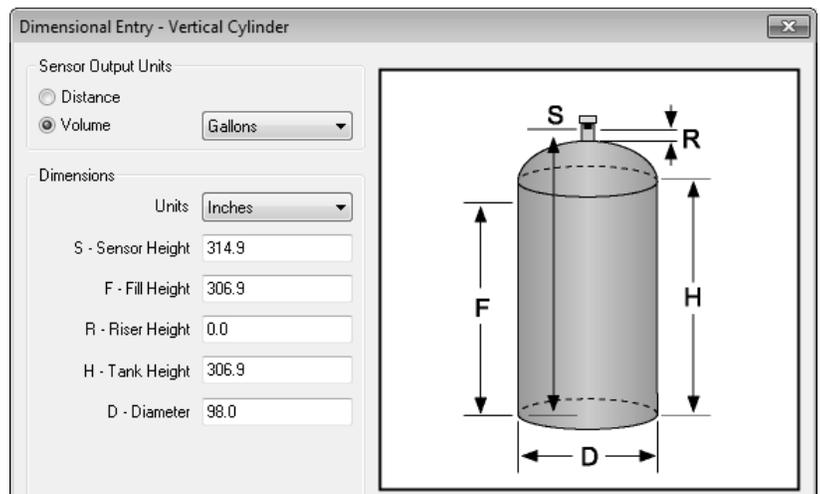
Volume – Tank Capacity: After entering the dimensions, press the Capacity button to show the Calculated Capacity of the tank. If the Calculated Capacity is slightly different than the expected capacity, click on the Adjust Capacity box and enter the expected capacity of the tank. If the Adjusted Capacity is more than 10% of the Calculated Capacity, recheck the dimensions information entered above.
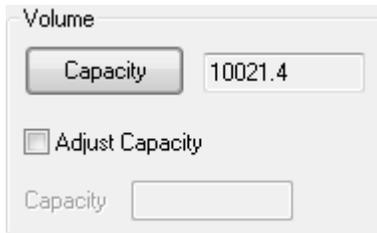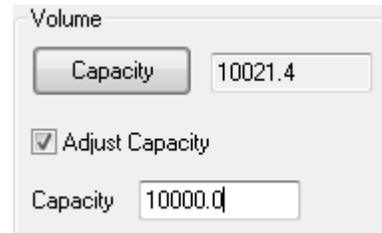
When all dimensions are entered, press the Apply button to return to the previous Configuration window.

- **Apply** – Transfers the dimensions to the original Configuration window.

- **Tanks** – Returns to the previous Shape Selection window.

- **Cancel** – Returns to the Configuration window without saving any information.

Help – Jumps to the Help menu.

Dimensional Entry – Horizontal Cylindrical with Endcaps Example: Choose the Sensor Output Units as Distance or Volume. After choosing the Sensor Output Units, select the units of measurement in the pull down to the left.

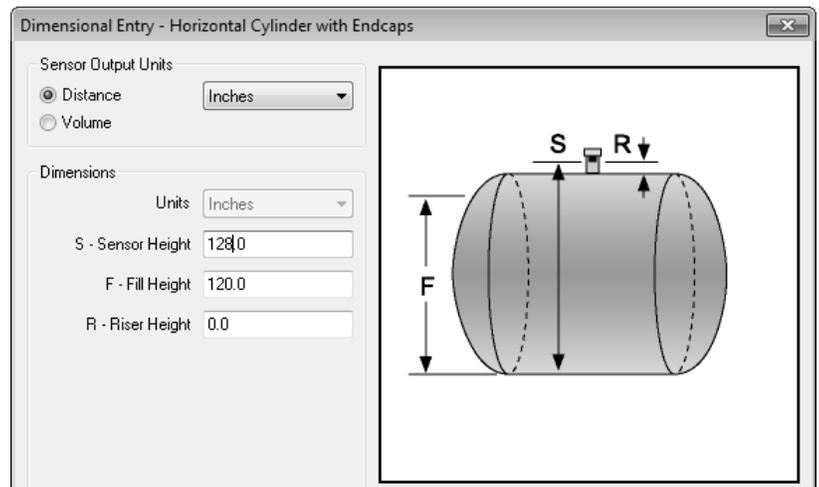| Units of Measurement	
Distance	**Volume**
Inches	Gallons
Cm	Liters
Feet	
Meters	

Distance – Sensor Output Units:
Enter the dimensions of the tank. You must enter data in all fields shown.

Sensor Height: Distance from the bottom of the tank to the bottom of the transducer.

Fill Height: Distance from the bottom of the tank to the maximum liquid height.

Riser Height: Distance the sensor is recessed within a riser, measured from the bottom of the sensor to the inside of the tank.
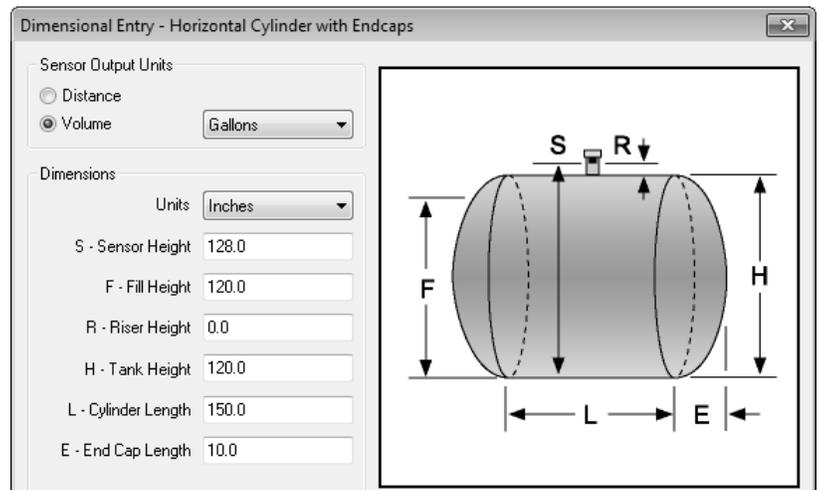

Volume – Sensor Output Units:
Enter the dimensions of the tank. You must enter data in all fields shown.

Sensor Height: Distance from the bottom of the tank to the bottom of the transducer.

Fill Height: Distance from the bottom of the tank to the maximum liquid height.

Riser Height: Distance the sensor is recessed within a riser, measured from the bottom of the sensor to the inside of the tank.


Tank Height: Distance from the bottom of the tank to the top of the straight side wall.

Cylinder Length: Distance of the straight length of the tank.

End Cap Length: Distance of one end cap. Both end caps will be used in the volume calculation.

Volume – Tank Capacity: Upon entering the dimensions, press the Capacity button to show the Calculated Capacity of the tank. If the Calculated Capacity is slightly different than the expected capacity, click on the Adjust Capacity box and enter the expected capacity of the tank. If the Adjusted Capacity is more than 10% of the Calculated Capacity, recheck the dimensions entered above.
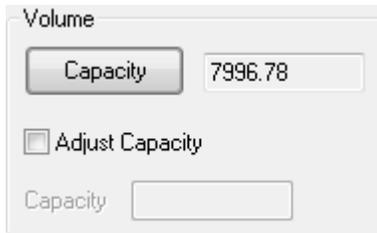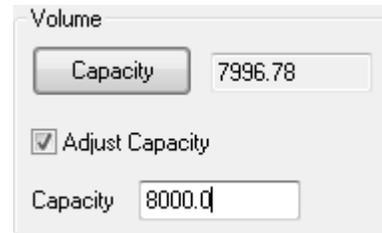
When all dimensions are entered is completed, press the Apply button to return to the previous Configuration window.
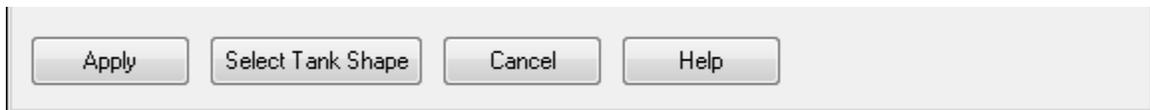
- **Apply** – Transfers the dimensions back to the original Configuration window.

- **Tanks** – Returns to the previous Shape Selection window.

- **Cancel** – Returns to the Configuration window without saving any information.

Help – Jumps to the Help menu.
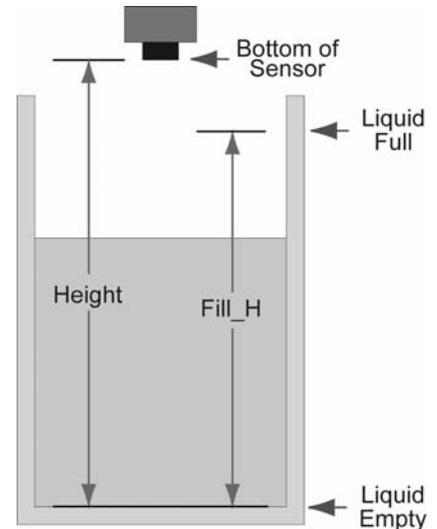
3. Level Configuration

This section of the software is where you enter application measurement values. All values must be filled in before moving to the next step.
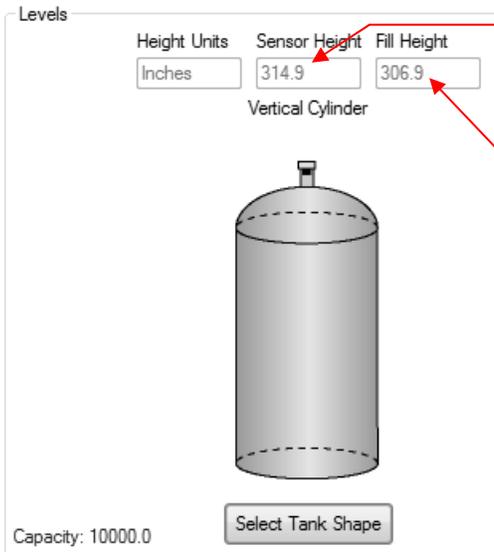
Sensor Height: Distance from the bottom of the tank to the bottom of the transducer.

Fill Height: Distance from the bottom of the tank to the maximum liquid height.

Note: If Volume is selected, Sensor Height and Fill Height are grayed out and can only be changed on the Dimensional Entry Page. Also, the Capacity of the tank will be shown in the lower left corner.


4. Write to Unit

After you have entered configuration, tank shape information and level values, click "**Write to Unit**" to load the configuration into the memory of the sensor. When completed, this configuration will remain inside the sensor's memory and will not change unless the sensor is connected to LVCN-414-SW software and a new configuration is written to the sensor. Loss of power will not change or lose the configuration within sensor memory.

Next, use the file management features to save your configuration by clicking "**Save Config File**" and print your wiring diagram by clicking "**Wiring Diagram**."

"**Save Config File**" will save this configuration as a text file which can be loaded back into the LVCN-414-SW software by pressing the "**Open Config File**" button. It is good practice to save the configuration file for each different configuration with a unique name for easy identification. If using multiple sensors in identical applications, then use of a single configuration file is recommended.

"**Wiring Diagram**" will display a PDF file showing the unique wiring for the specific configuration created. The PDF can be printed or Emailed. It is good practice to save the wiring diagram as a backup.

Write to Unit

Wiring diagram

Save Config File
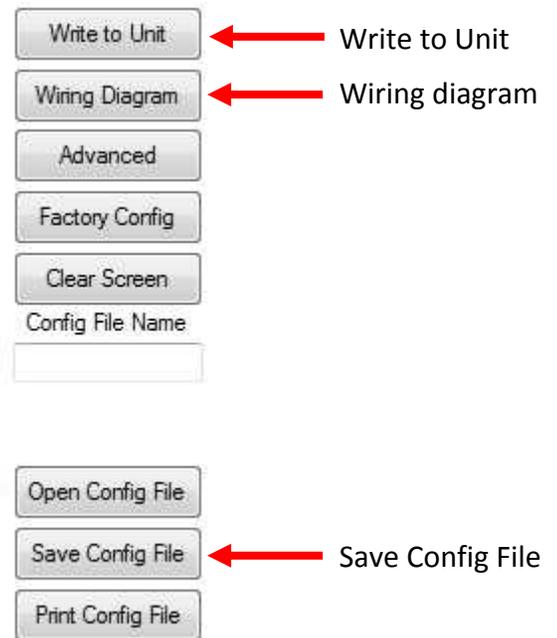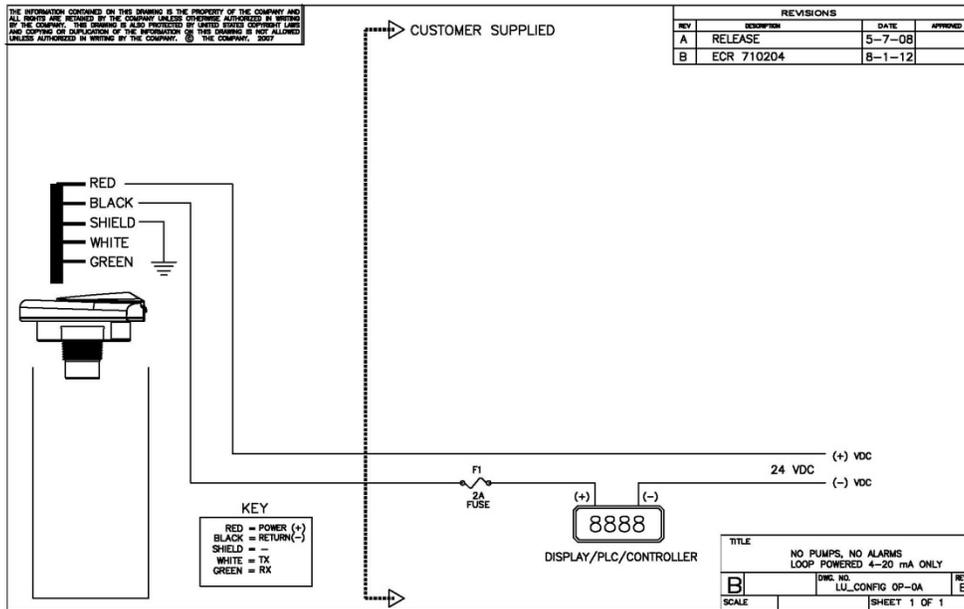
Wiring Diagram

Wiring LVU2700 Series

After you have finished positioning and mounting LVU2700 Series, follow the software's wiring diagram to wire LVU2700 Series. Omega Engineering recommends using a qualified licensed electrician to wire LVU2700 Series and your application's components.

Wire Connections:
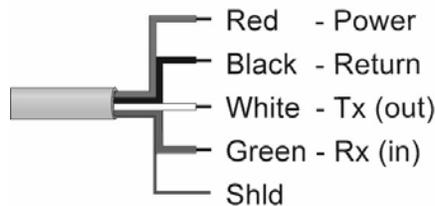
Red & Black

Red and Black leads are for connection to a 24 VDC power supply or to a 4-20 mA loop power source. The red and black wires can be extended up to 1,000 feet using a 22 gauge or larger wire; however do not extend the green and white wires.

White & Green

White and Green leads are reserved for use with the software and should not be connected during usage in the application. These wires should not be connected to the LVCN414-SW while power is supplied from any source other than the LVCN414-USB series Fob.

Note: Once the LVU2700 Series is configured, isolate the white and green wires from active power to prevent a short of the configuration circuit.

Note: Do not extend the White & Green wires beyond 15'.

General notes for electrical connections, usage and safety:
- Where personal safety or significant property damage can occur due to a spill, the installation must have a redundant backup safety system installed.
- Wiring should always be completed by a licensed electrician.
- Supply voltage should never exceed 28 VDC.
- The sensor materials must be chemically compatible with the liquids to be measured.
- Design a fail-safe system for possible sensor and/or power failure.
- Never use the sensor in environments classified as **Hazardous**.

Voltage Output

LVU2700 Series can be used as a 0 to 5 or 0 to 10 VDC output device. A resistor will need to be added to the circuit to enable a voltage output (refer to the wiring diagram below).
- 0-5 VDC output
    - Add a 250 Ohm resistor
    - Actual output will be 0.8 to 5 VDC
- 0-10 VDC output
    - Add a 500 Ohm resistor
    - Actual output will be 2 to 10 VDC
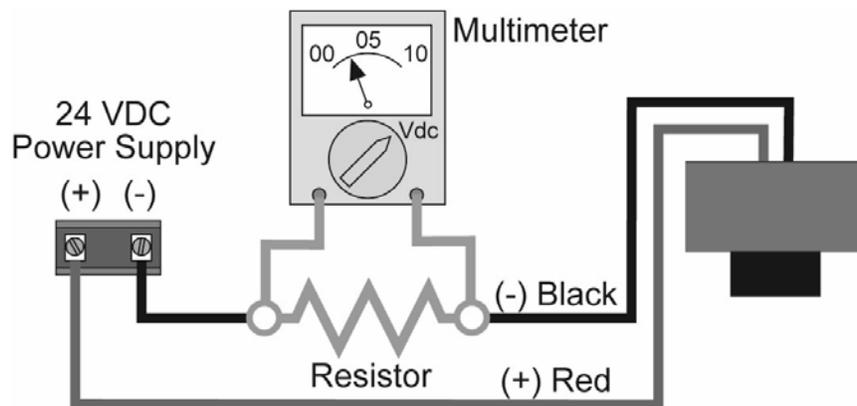
Wiring to Display, Controllers & PLC's (continued)

Proportional Level Controller
LVCN-51 Series
JWA mode (Factory Setting)
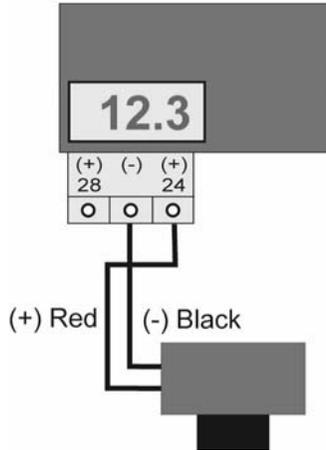
Proportional Level Controller
LVCN-51 Series
JWB mode
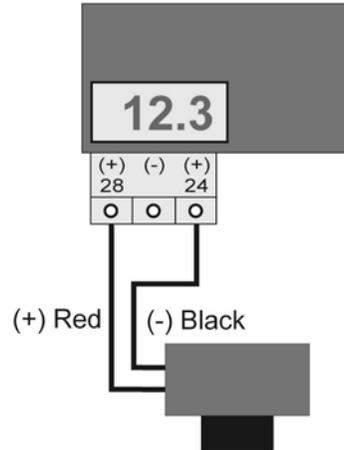
Generic Loop
Powered Display

Generic PLC

19

The LVU2700 Series should always be mounted perpendicular to the liquid surface and installed using the provided FKM mounting gasket. 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. ***Note:*** *The preferred mounting fitting for the LVU2710 series is a plastic (2" thread x 1" thread) reducer bushing.*

Mounting Guide
1. Do not mount at an angle
2. Liquid should never enter the dead band
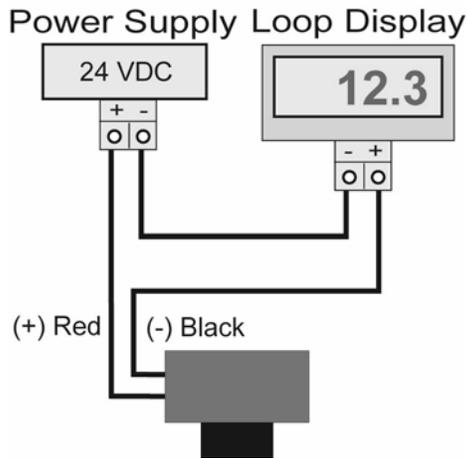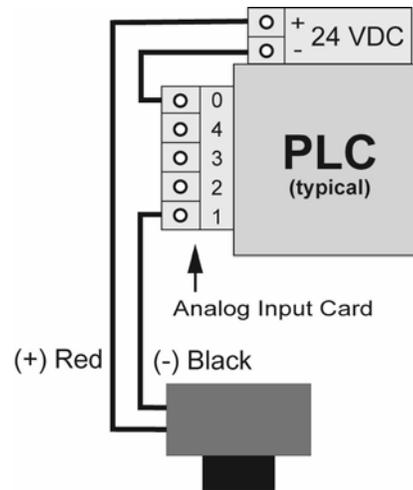3. Side Wall:
   a. For LVU2710 Series - mount at least 2" from the side wall
   b. For LVU2718, LVU2726 & LVU2732 Series - mount at least 3" from the side wall
4. Do not mount where obstacles will intrude on sensor's beam width
   a. LVU2710 Series - mount at least 2" from obstacles
   b. For LVU2718, LVU2726 & LVU2732 Series - mount at least 3" from obstacles
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 sensor, select a reducer bushing such as the LVU800-2N40 (2" thread x 1" thread) or LVU800-3N40 (3" thread x 2" thread).

LVU800-2N40   LVU800-3N40

Do not install at angle relative to the liquid.	
Do not install within 3" of tank sidewall.	
Do not install with objects in the beam.	
Do not install in applications with vacuum.	

Metal Tanks (LVU2710 series)
Omega Engineering ultrasonic transmitters have been optimized for use in non-metallic fittings.
1. For best performance, avoid the use of metallic fittings.
   a. Use a plastic 2" x 1" reducer bushing (such as LVU800-2N40) or a plastic 1" tank adapter (such as LVU800-1B).
2. While installations directly into a 1" metal fitting are not recommended, acceptable results may be obtained if the 1" fitting is a half coupling in form and the outer diameter of the coupling is tightly wrapped in vinyl tape to dampen vibrations.

Fitting Selection: Check the part number to determine the required fitting mount size and thread type. LVU2700 Series is commonly installed in tank adapters, flanges, brackets or standpipes. Note: Always include the gasket when installing the LVU2700 Series.

1. **Tank Adapter:** Select a tank adapter fitting, 1" or larger for the LVU2710 series or 2" or larger for the LVU2718, LVU2726 & LVU2732 series.
   a. *For best results with the LVU2710 Series, select a 2" tank adapter (LVU800-2B) and add a plastic 2" by 1" reducer bushing (LVU800-2N80).*
   b. Avoid tank adapter (thread x thread) styles and/or pipe stops forward of the installed transducer.
   c. Always mount the tank adapter so the majority of fitting is outside the tank.
      i. Never mount the tank adapter upside down or the bulk of the material is inside the tank.

2" Tank Adapter Socket x Thread (LVU800-2B shown)	**Tank Adapter (LVU800-2B) w/ 2"x1" Reducer Bushing (LVU800-2N80 shown)**	**Tank Adapter Thread x Thread**

Do not use thread x thread

2. **Riser:** Installations with tall, narrow risers can impede the acoustic signal.
   a. **Core Out Concrete:** Applications where tank with a concrete ceiling that has been cored out can also be considered as a riser type application. In these applications follow a 2:1 ratio (Inner Diameter to Core Height) for the diameter of the core.
   a. **LVU2718, LVU2726 & LVU2732 Series:** 2" (5 cm) diameter risers should be no taller than 5" (12.7 cm). Larger diameter risers should be no taller than 12" (30.5 cm).
   b. **LVU2710 Series:**
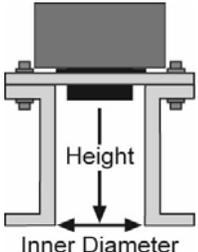
Riser Specifications	
Inner Diameter	**Maximum Height**
2" (5cm)	3" (7.6cm)
4" (10cm)	8" (20cm)
6" (15cm)	12" (30cm)

Note: *Do not exceed the dimensions listed above.*

*Note: If attempting to raise the sensor above the top of the tank to allow for a higher fill capacity, avoid the use of tall and narrow risers. The example to the left exceeds the dimensions listed in the **Riser Specifications** chart. Use a larger tank adapter which takes into account the **Riser Specifications**.*

3. **Flange (LVU2710 series):** If installing on a flange, select a flange with a thread that is above the plane of the flange.
   a. *The LVU2718, LVU2726 & LVU2732 series works well with Flange installations.*
   b. Avoid the use of blind flanges with tapped threads or flanges where the threads are even with the plane of the flange, such as the Banjo 1" Poly ANSI Flange (series AF100).
   c. Use a flange with a 2" thread and add a 2" to 1" reducer bushing to complete the installation.

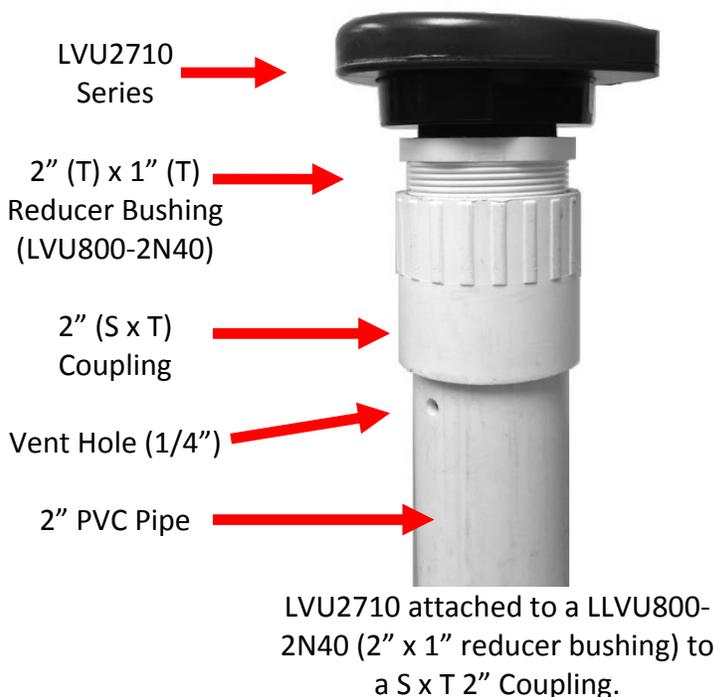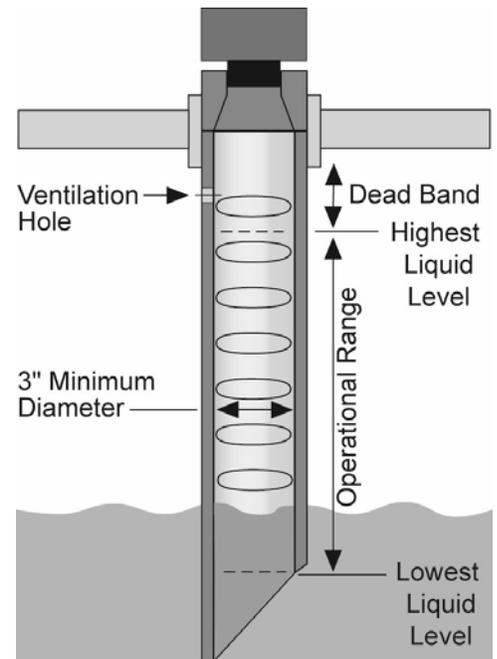| 2" Flange w/ thread out of plane (LVU800-2F shown)	2" Flange w/ thread in plane	2" Flange w/ Reducer Bushing (LVU800-2N80 shown)

Do not use thread in plane

4. **Side Mount Bracket:** For installations in open tanks and sumps, use the LVM-30 series side mount bracket.
   a. For the LVU2710 series, order the LVM-31 side mount bracket, which includes a plastic 2" x 1" Reducer bushing.
   b. For the LVU2718, LVU2726 & LVU2732, series, order the LVM-30 side mount bracket.
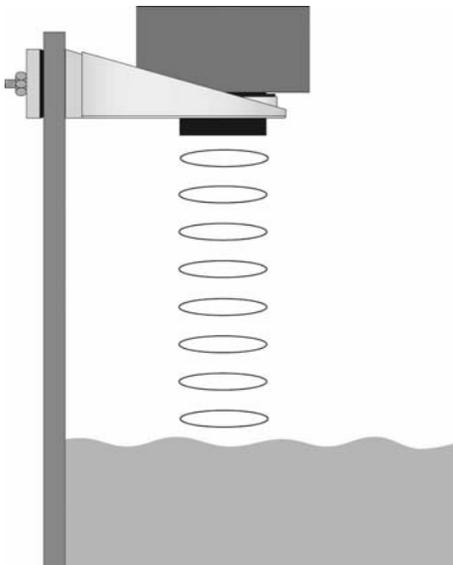
LVM-30 Series Shown

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 3" ID pipe for the stand pipe.
        i. A 2" pipe is usable with the LVU2710 series, but it is the minimum diameter pipe.
        ii. Pipes larger than 3" can also be used.
    c. Use a coupling or Tank Adapter and reducer bushing to attach the LVU2700 Series to the pipe.
        i. With the LVU2710 series, be sure to use a plastic reducing bushing such as 2" Thread x 1" Thread fitting (ex: LVU800-2N80) or 2" Slip x 1" Thread fitting (ex: LVU800-2S80).
        ii. With the LVU2718, LVU2726 or LVCN2732 series, use a reducer bushing such as (3" Thread x 2" Thread) fitting (ex: LVU800-3N80) or (3" Slip x 2" Thread) fitting (ex: LVU800-3S80).
    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. Cut a 45° notch at the bottom of the pipe and drill a 1/4"pressure equalization hole in the dead band.
    f. The pumps should not drive liquid past the open end of the stand pipe which causes the liquid in the pipe to oscillate.

LVU2710 Series

2" (T) x 1" (T) Reducer Bushing (LVU800-2N40)

2" (S x T) Coupling

Vent Hole (1/4")

2" PVC Pipe

LVU2710 attached to a LLVU800-2N40 (2" x 1" reducer bushing) to a S x T 2" Coupling.

Avoid the use of a tee within the stand pipe. A tee can create false signals which will interfere with the sensor's performance.

This tool is designed to help solve operational issues. Changing these setting will alter the performance of your unit. Please read through this HELP file to assist you in making adjustments or if still unclear about a specific issue, please contact OMEGA ENGINEERING, Applications Engineering.
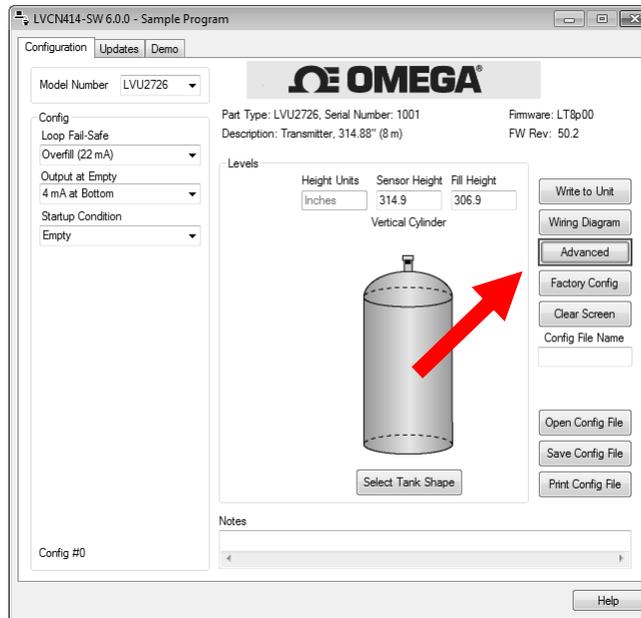
Above Screen Capture is for the LVU2726 series.

NOTE: *When the Advanced Button is highlighted with a RED border, this indicates you have selected an advanced feature…*
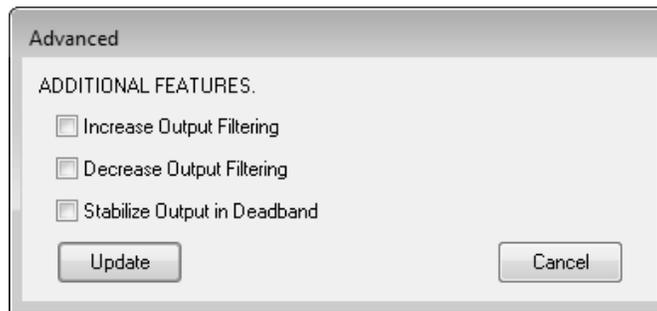
- **Increase output filtering**: Placing a check mark in the box will increase the filtering (averaging) of the analog output. If you require the 4 to 20 mA output to be smooth for the application such as Open Channel Flow measurement, you might check this box.

- ***Decrease Output Filtering***: Placing a check mark in the box will eliminate all filtering (averaging) of the analog output. Enables a pulse by pulse level reading. Use this filter to see changes in level after every sound pulse.

Note: *Never check increase output filtering and decrease output filtering at the same time.*

- ***Stabilize Output in Dead band***: Placing a check mark in the box will activate a filter to hold the output at Full if the level enters the dead band of the Transmitter. This filter requires the level to leave the dead band at a smooth and steady rate.

Sample Program: A sample version of the LVCN-414-SW software is available anytime a sensor is not attached to the software. The Sample Program shows all the features in the Configuration Tab of the software. Any configuration can be opened (Open Config File), Saved (Save Config File) or Printed (Print Config File) with the Sample Program. Sample Program cannot be viewed if a sensor is attached to the computer via the USB® Fob. To view the Sample Program, start the LVCN-414-SW software when a sensor is not attached to the computer. At the opening screen, select **Sample Program**.
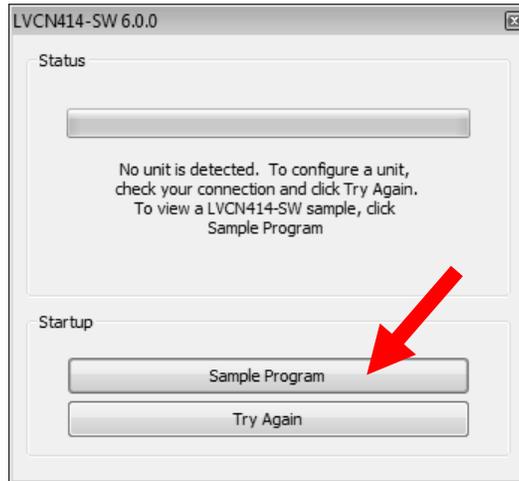
Select your model type in the upper right-hand corner. *Note: When saving or opening a configuration, make sure the Model Number matches the sensors you intend to use.*
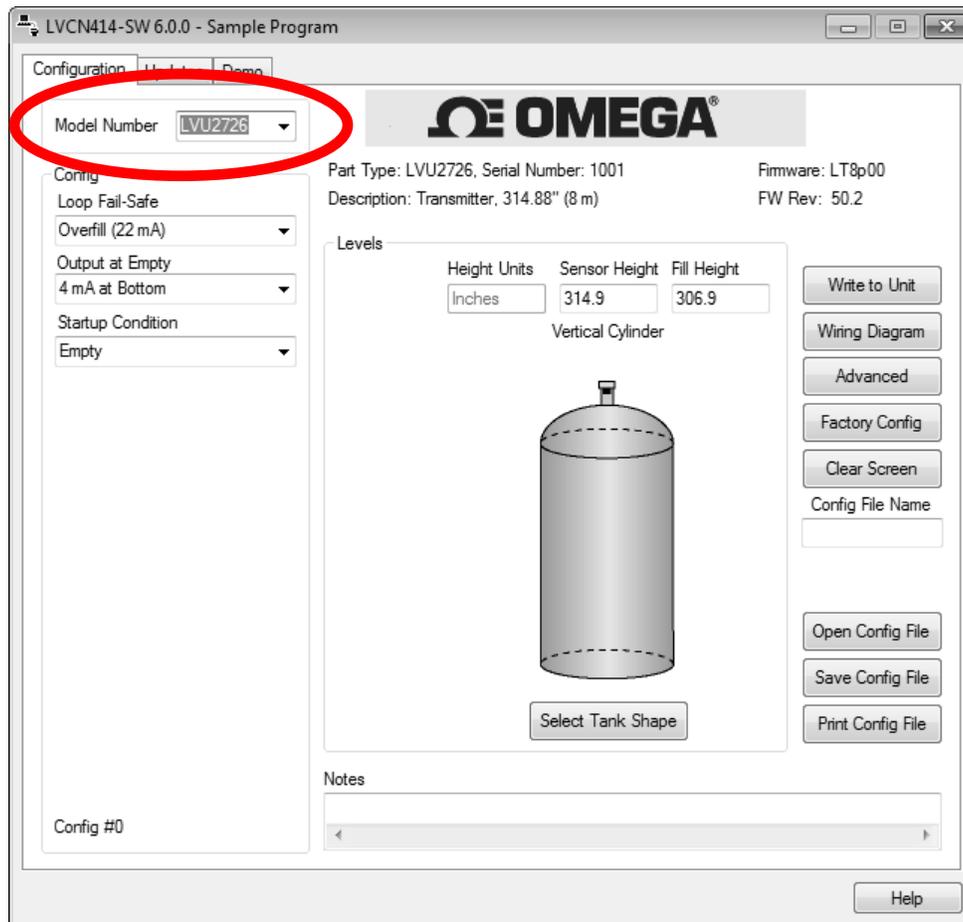
Updating LVCN414-SW Software
The software can be updated directly within the software. Simply click on the **Updates** Tab at the top of the window and press the **Download** button. Make sure that your computer has access to the Internet. If not, an error window will appear.

When the **Download** button is pressed, the software will check the version of software you are using with the most recent version at Omega Engineering. If the versions are similar, a window indicating that the most recent version is installed. If not, then a window will appear asking to download the latest version. Follow the instructions for installing the latest version.
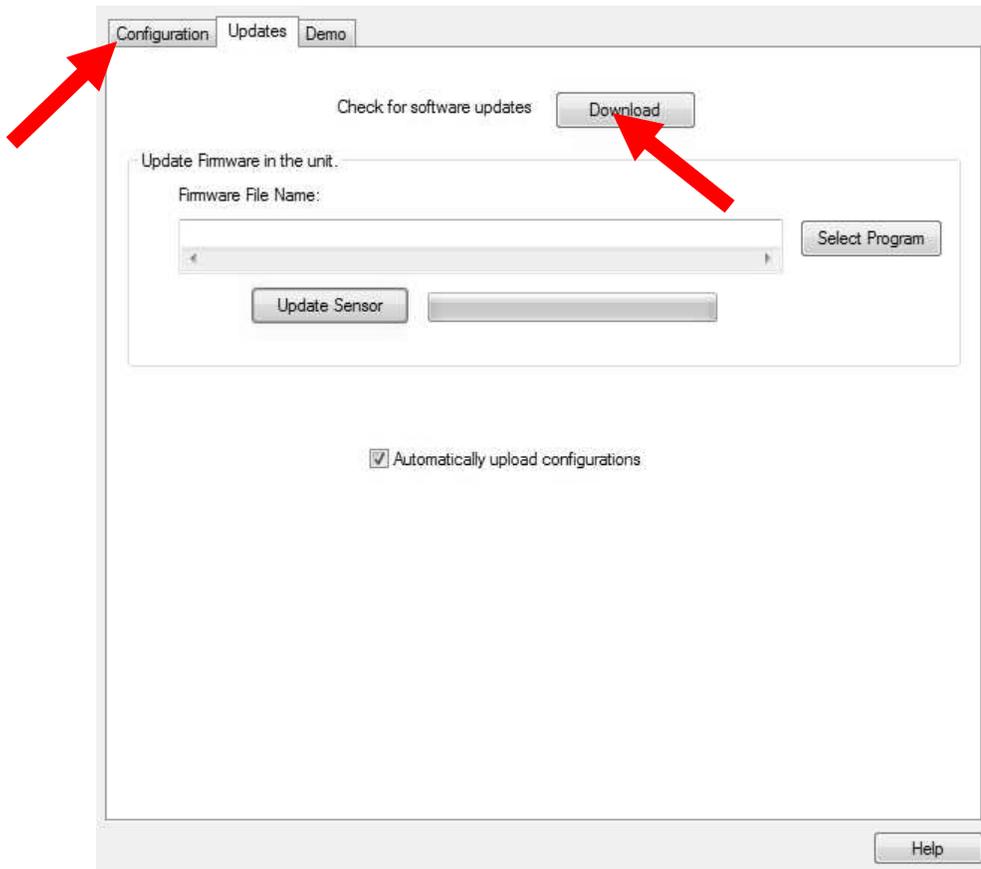
Updating Transmitter Firmware

The software can also be used to update the firmware inside the LVU2700 Series transmitter. This feature allows the transmitter to be updated when new features are added. First open LVCN414-SW software with an LVU2700 Series transmitter connected and the latest version of the software downloaded to your PC.

⚠ **When updating the sensor firmware, disconnect the sensor from all other devices including displays, controllers, power supplies, PLC's, pumps, valves and alarms. Connect the devices back after the firmware has been updated.**

Click on the **Updates** Tab and then click on **Select Program** to select the Firmware update.
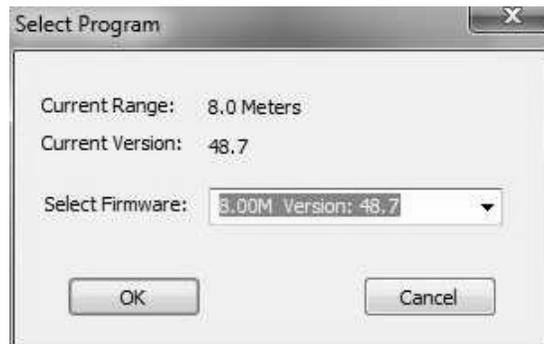
Select the latest version of the firmware file and click on OK.
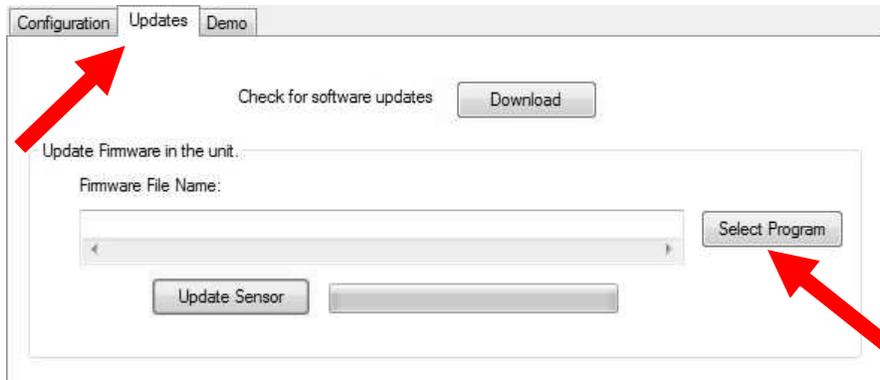

Confirm that the address is correct and then click on **Update Sensor** to begin the firmware update. This step should take less than 1 minute. You can follow the progress with the status bar to the right of the Update Sensor button. When completed, click on the Configuration tab to configure the transmitter. *Remember, when the firmware has been updated, the unit will return to its original factory settings.*

- If there is a communication interruption during the update, the process will stop. It is OK to click on Update Sensor again to start the process over again.

Strapping Table: LVCN-414-SW Software features a strapping table that enables you to enter up to 16 custom reference points instead of using the standard tank shapes. This feature is ideal for odd shaped tanks or tanks where specific levels are known volumes of liquid.

To access the Strapping Table, click on **Strapping Table** in the Shape Selection Window and press "**OK**".

- Enter the Sensor Height, Fill Height, Riser Height and Tank Height. This information is used to configure the sensor to the tank.

- The Strapping Table also has two columns of 16 points for entering the known tank data.

- Select the dimensions and/or volume at the top of the two columns and enter the tank data.

- When done, press "Apply" to transfer the data and return to the Configuration window.

Strapping Table

Units	Sensor Height	Fill Height (F)	Riser Height	Tank Height (H)
Inches	48.0	42.0	6.0	42.0

	Inches	Gallons
1	0.0	0.0
2	7.0	10.0
3	14.0	30.0
4	21.0	60.0
5	28.0	100.0
6	35.0	150.0
7	42.0	220.0
8		
9		
10		
11		
12		
13		
14		
15		

Apply   Select Tank Shape   Cancel   Help

Linear vs. Non-Linear: Two of the shapes (Vertical Cylinder Tank and Rectangular Tank) will always provide a linear output, regardless of selecting Distance or Volume. The remaining four shapes (Vertical Cylinder Tank with Cone Bottom, Horizontal Cylinder Tank with End Caps, Horizontal Cylinder Tank with Spherical End Caps and Spherical Tank) will have a linear output when Distance is selected, but will have a non-linear output when volume is selected.

| Vertical Cylindrical Tank	Horizontal Cylinder Tank with End Caps
Volume (Gallons) / Distance (Inches)	Volume (Gallons) / Distance (Inches)
600.0 — 60 500.0 — 50 400.0 — 40 300.0 — 30 200.0 — 20 100.0 — 10 000.0 — 00	600.0 — 60 537.2 — 50 428.0 — 40 300.0 — 30 172.4 — 20 62.8 — 10 00.0 — 00
In the above illustration, 10" of liquid will always be equal to 100 gallons of liquid (1" = 10 gallons).	In the above illustration, 10" of liquid does not equal 100 gallons. The 10" at the bottom represents a rise of 62.8 gallons where the change between 10" and 20" represents an increase of 109.6 gallons.

When volume is selected, the 4-20 mA output from the sensor will be proportional to the volume of the tank, not the height of the tank. This means that the current output will track the volume of the tank (in gallons or liters) within a non-linear tank (Vertical Cylinder Tank with Cone Bottom, Horizontal Cylinder Tank with End Caps, Horizontal Cylinder Tank with Spherical End Caps or Spherical Tank).

When connecting the signal output to a display, the signal will follow the volume of the tank. The display will also reflect the volume of the tank and not the height of the liquid.

Example #1 (Volume Output): in the above illustrations, @ 20" of liquid, the display will show 200.0 gallons in the Vertical Cylindrical Tank. However, in the Horizontal Cylinder Tank with End Caps, the same level of 20" would show 172.4 gallons.

Example #2 (Current Output):   In the illustrations on the previous page, the 4mA signal is set at 0" (0.0 gallons) and the 20 mA signal is set to 60" (600.0 gallons).   In the Vertical Cylindrical Tank, 40" of liquid will output a current signal of 14.67mA. However, in the Horizontal Cylindrical Tank with End Caps, 40" of liquid will output a current signal of 15.41mA. A simple loop display set with 4mA = 0 gallons and 20 mA = 600 gallons will show two different volumes based upon the tank shape configuration. Vertical Cylindrical Tank will show 400.0 gallons while Horizontal Cylindrical Tank with End Caps will show 428.0 gallons.
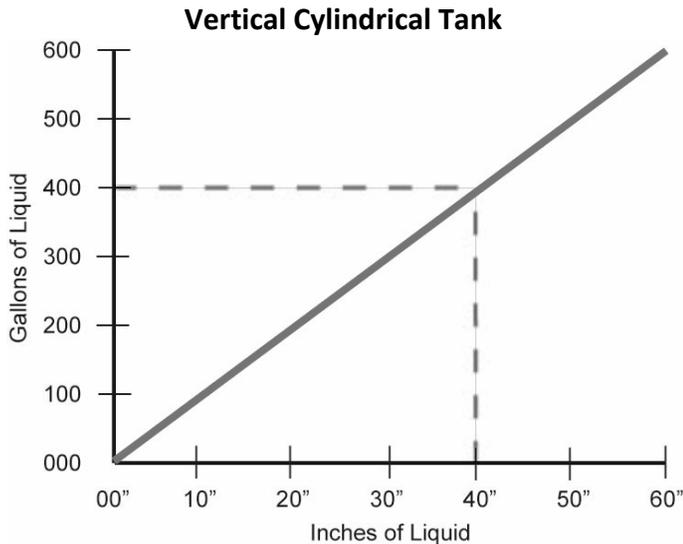
Vertical Cylindrical Tank

Horizontal Cylinder Tank with End Caps

In the above illustration, 10" of liquid will always be equal to 100 gallons of liquid (1" = 10 gallons).
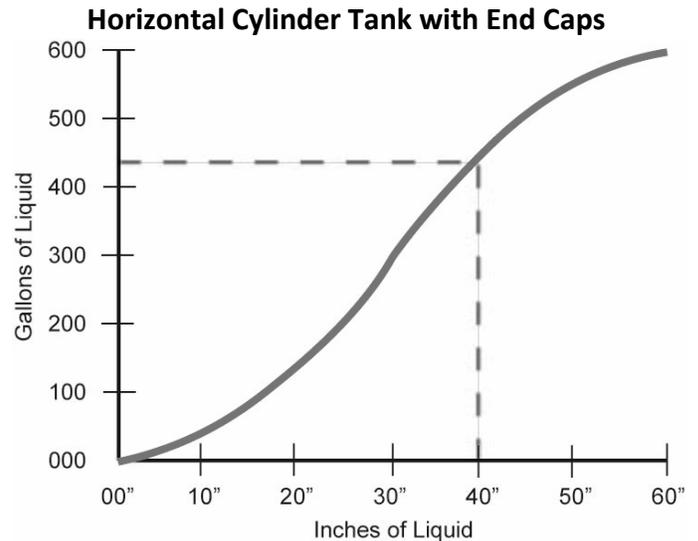
In the above illustration, 1" of liquid does not equal 10 gallons.   The 10" at the bottom represents a rise of 62.8 gallons where the change between 10" and 20" represents an increase of 109.6 gallons.

Factory Default

Pressing the **Factory Config** button in the Configuration menu will return the screen to the following settings. Out of the box, the LVU2700 Series will output a 4-20 mA output that is maximized for its operational range. The transmitter can be used in the original factory setting without configuration with the LVCN4141-SW Software. Use the table below to identify the configuration of the sensor out of the box.

Factory Defaults Table

| Part Number	Sensor Height	Fill Height	Loop Fail-Safe	Output at Empty	Startup Condition
LVU2710 LVU2710-B LVU2710-G LVU2710-G-B	118.1" (300 cm)	114.1" (290 cm)	Overfill (22 mA)	4 mA @ Bottom	Empty
LVU2718 LVU2718-B LVU2718-G LVU2718-G -B	216.5" (550 cm)	530 cm (208.7")	Overfill (22 mA)	4 mA @ Bottom	Empty
LVU2726 LVU2726-B LVU2726-G LVU2726-G -B	314.9" (800 cm)	306.9" (780 cm)	Overfill (22 mA)	4 mA @ Bottom	Empty
LVU2732 LVU2732-B LVU2732-G LVU2732-G -B	393.7" (1000 cm)	385.8" (980 cm)	Overfill (22 mA)	4 mA @ Bottom	Empty
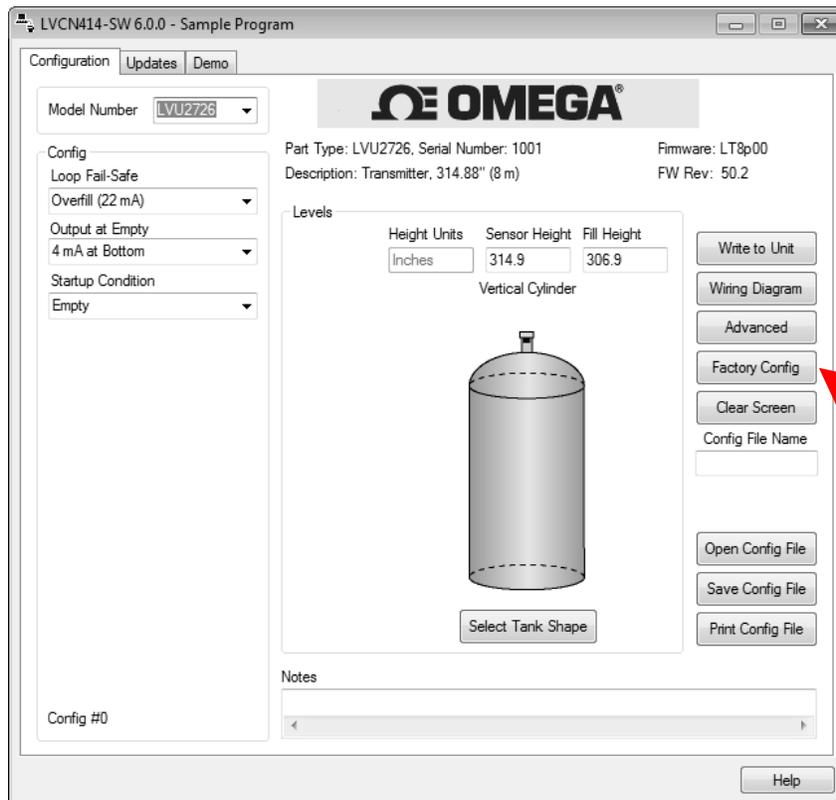
Testing the Transmitter
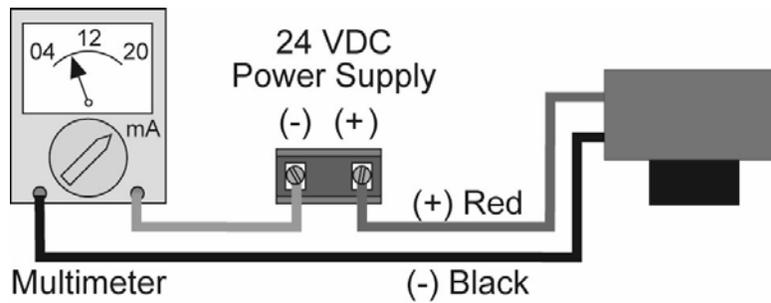
1. Connect a multimeter in series with the black wire to read the current output.
2. Verify that the current increases (tank filling) and decreases (tank emptying) appropriately in the calibrated span.
3. If not, carefully observe and attempt to correlate any installation, level or application event for more specific troubleshooting direction.

Demo Page
To view the Demo page (shown here), click the **Demo** tab on the top of the screen.
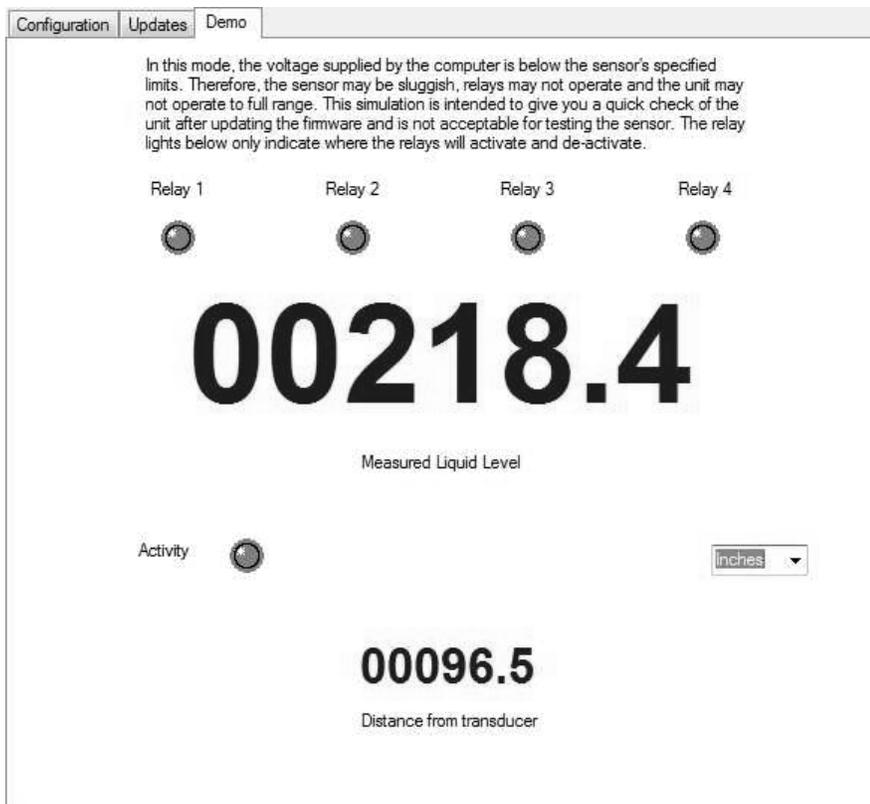
The demo page is a simulation, useful for verifying the configuration. There is not enough power going to the unit to power the relays in the Demo mode. The larger numbers represent the liquid level while the smaller numbers show the distance from the transducer to the surface.

The senor must be pointed at a flat perpendicular surface while in the Demo mode. If not, the display will read LOST.
- If the display reads EMPTY, then the target is further away from the sensor than the Sensor Height setting.
- If the display reads FULL, then the target is closer to the sensor than the Fill-Height setting.

Troubleshooting

PROBLEM	SOLUTION
Transmitter indicates a current of 0 mA	Check the wiring for an open circuit. 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 23 mA	Immediately check the wiring for a short circuit. The LVU2700 Series is current limited to 22 mA. Anything above 23 mA indicates a short circuit.
Transmitter always jumps to LOST condition	Check the dimensional configuration (**Height** and **Fill-H**) of the LVU2700 Series. Make sure that the **Fill-H** setting corresponds to the full level of liquid (from the bottom up) and not the distance from the transmitter to the liquid (top down).
Output of transmitter is opposite of the level of liquid	Check the **Output at Empty** Setting. Make sure the setting is correct (*4mA at bottom* or *20 mA at bottom*).
No Unit Detected in WebCal	LVCN414-SW software cannot detect an LVU2700 Series connected to the computer. • Check that the Fob is connected to the USB port. • Check that all four wires (Red, Black, White and Green) are securely attached to the Fob. • Check in Device Manager that both drivers (Configuration & EchoFob) are present.
Internet error. The server name or address could not be resolved.	This is a warning indicating the computer configuring the transmitter is not connected to the internet. Click **OK** to continue. Omega Engineering recommends being connecting to the internet for all configurations. Not being connected to the internet will not prevent the LVU2700 Series from being configured. To turn off this warning, go to the **Updates** Tab and click on the check box "Automatically upload configurations". Click on NO in the new window and the previous check box will become unchecked. WebCal™ will no longer attempt to connect to the internet. Clicking on the check box will restore this feature.
Cannot access some of the features in Configuration	As choices are made in Configuration, WebCal will begin to eliminate functions that are no longer active. To reset Configuration or get access to all the features, click on the **Clear Screen** button.

User Settings:
Fill out the chart below and keep as a record of your configuration.

Tank

Height =	Fill-H =

Loop Fail-Safe (select one)

Hold Last Value	Empty	Full	Overfill (21mA)	Overfill (22mA)

Output at Empty (select one)

4mA at Bottom	20mA at Bottom

Startup Condition (select one)

Empty	Mid-Tank (12mA)	Full Tank	Overfill (22mA)

Advanced (if selected, identify which filter that was activated)

Increase output filtering:	Decrease output filtering:	Stabilize output in dead band	Turn OFF fast level changes	Turn ON noisy start filter

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.

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