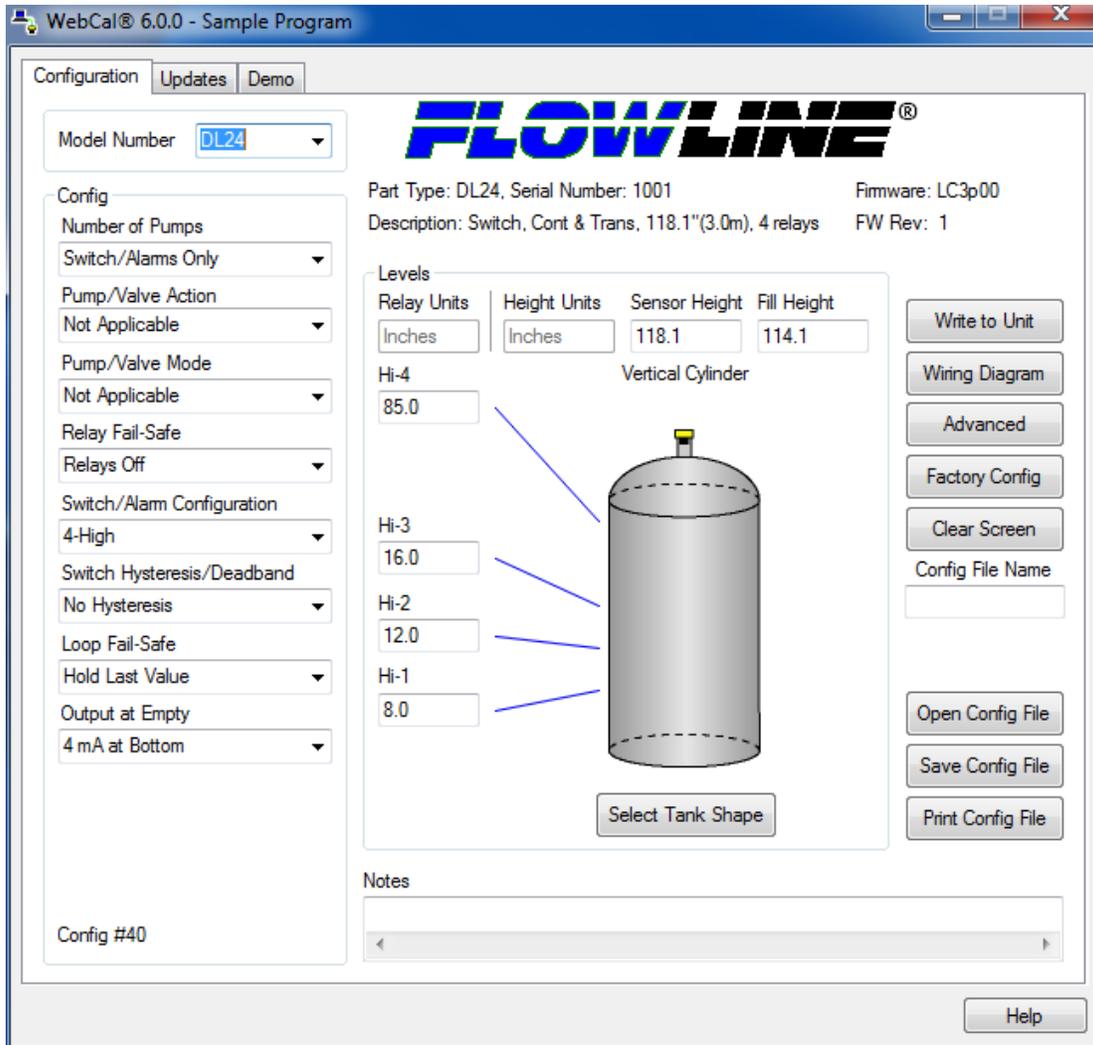


## WebCal™

Configuration Software for:  
EchoPod® DL10, DL14, DL24, DL34, DS14 & DX10 Series  
EchoSonic® LU23, LU27, LU28 & LU29 Series



Flowline Inc.  
10500 Humbolt Street  
Los Alamitos, CA 90720  
Tel: (562) 598-3015  
Fax: (562) 431-8507  
[www.flowline.com](http://www.flowline.com)

WebCal™ PC configuration software is a utility program that allows users to easily configure their EchoPod® or EchoSonic® ultrasonic level sensor. Develop your configuration using pre-programmed function menus as the tank graphic and set point fields automatically change to match your configuration. Then input your level set point values and click the “**Write to Unit**” button. Your configuration will be uploaded into the sensor in just a few seconds. Last, click the “**Wiring Diagram**” button to open a wiring schematic of your configuration in a PDF format. Print the document, disconnect the sensor and wire it per the schematic. It’s that simple!

**New Features**

- Volumetric tank shape linearization
- Sample Program for all WebCal™ configurable sensors
- View Curve tool enabling the viewing of non-linear outputs

**Table of Contents**

System Requirements: ..... 3

Safety Precautions: ..... 4

Getting Started: ..... 5

    USB® Fob Interface: ..... 6

WebCal™: ..... 7

    Relay Configuration – DL14, DL24, DL34, DS14 Series: ..... 8

    Relay Configuration – DL10, LU23, LU27, LU28 & LU29 Series: ..... 15

    Relay Configuration – DX10 Series: ..... 17

    Tank Shape Selection: ..... 20

        Example: Dimensional Entry – Vertical Cylindrical: ..... 21

        Example: Dimensional Entry – Horizontal Cylindrical: ..... 23

    Tank Levels: ..... 25

    Write to Unit: ..... 26

    Wiring: ..... 27

        Wiring Diagram: ..... 27

        Wiring to EchoPod® and EchoSonic®: ..... 27

    Advanced Features: ..... 28

Appendix: ..... 30

    Sample Program: ..... 30

    Updating WebCal™ Software: ..... 31

    Updating Sensor Firmware: ..... 32

    Demo Page: ..... 33

    Strapping Table: ..... 34

    Linear vs. Non-Linear: ..... 35

        Example #1 – Volume Output: ..... 35

        Example #2 – Current Output: ..... 36

Troubleshooting: ..... 37

Warranty, Returns and Limitations: ..... 38

- **Computer System Requirements for WebCal™**
  - 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
- **Sensor Requirements**

<b>EchoPod® Series Sensor</b>	
DL10 Series	DL10-00, DL10-01, DL10-10 & DL10-11
DL14 Series	DL14-00, DL14-01, DL14-10 & DL14-11
DL24 Series	DL24-00, DL24-01, DL24-10 & DL24-11
DL34 Series	DL34-00, DL34-01, DL34-10 & DL34-11
DS14 Series	DS14-00, DS14-01, DS14-10 & DS14-11
DX10 Series	DX10-00, DX10-01, DX10-10 & DX10-11

<b>EchoSonic® Series Sensor</b>	
LU23 Series	LU23-00, LU23-01, LU23-10, LU23-11, LU23-40, LU23-41, LU23-50 & LU23-51
LU27 Series	LU27-00, LU27-01, LU27-10, LU27-11, LU27-40, LU27-41, LU27-50 & LU27-51
LU28 Series	LU28-00, LU28-01, LU28-10, LU28-11, LU28-40, LU28-41, LU28-50, LU28-51, LU28-60, LU28-61, LU28-70 & LU28-71
LU29 Series	LU29-00, LU29-01, LU29-10, LU29-11, LU29-40, LU29-41, LU29-50, LU29-51, LU29-60, LU29-61, LU28-90 & LU29-71

- **Interfacing Requirements**
  - Key Fob, Part Number LI99-1001
    - Depending on the sensor part number ordered, a Key Fob may need to be ordered in addition to the sensor.
    - A Key Fob (LI99-1001) is required to interface the sensor with the computer.

**⚠ About this Manual:** PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING A SENSOR OR USING THIS PRODUCT. This manual includes information on the WebCal™ configuration software from FLOWLINE. Please refer to the sensor part number located on the sensor label to verify the exact model configuration and compatibility to the WebCal™ software.

**⚠ User's Responsibility for Safety:** FLOWLINE 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.

**⚠ 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 sensor and/or power failure. FLOWLINE recommends the use of redundant backup systems and alarms in addition to the primary system.

**⚠ Flammable, Explosive or Hazardous Applications:** *WebCal™ should not be used within classified hazardous environments.*

EchoPod® and EchoSonic® are configured through WebCal™, a PC software program. WebCal™ is a free download from Flowline’s website. **You must download and install WebCal™ prior to plugging in the USB® Fob.** Please go to [www.flowline.com/webcal.php](http://www.flowline.com/webcal.php), and select your language version.

**Download**  
Coming May 15th, 2013 - WebCal 6 with NEW tank volume linearization

**English Version**  
WEBCAL 5.23

**Chinese Version**  
WEBCAL 5.23

**System Requirements**

- Windows® XP, Vista, 7, 8
- 32 or 64-bit system
- USB® 2.0
- 10 mB hard disk space
- 256 mB RAM

**Tank Linerization**

- Change output from distance to volume
- Select from 6 standard tank shapes
- 16-pt. strapping table for custom tanks

**USB Adapter**  
Fobs are universal and sold with or without compatible sensors

**Main Screen**    **Tank Selection**    **Horizontal Tank**

**Configure your sensor, update your firmware or demo your level configuration before installation**

**Select from simple pre-programmed drop down menus to create your level configuration**

**Customize set points to your level measurement & control requirements**

**View sensor P/N, S/N, description & firmware**

**Open, view, print or email your custom wiring diagram**

**View your tank shape & level configuration**

**Open, save or print your level configuration with revision control**

**Access tank shape menu**

**Contact Us**  
10500 Humboldt Street  
Los Alamitos, CA 90720 U.S.A.  
T: (562) 598-3015  
level\_solution@flowline.com

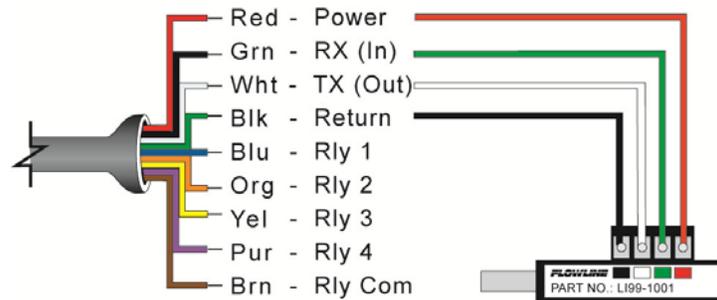
**Level Tools**  
WebCal Software  
Application Success  
Video Training  
Level Blog

**Get Level News**  
Receive your level application solutions  
Enter your email address    **Submit**

**WebCal™ 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

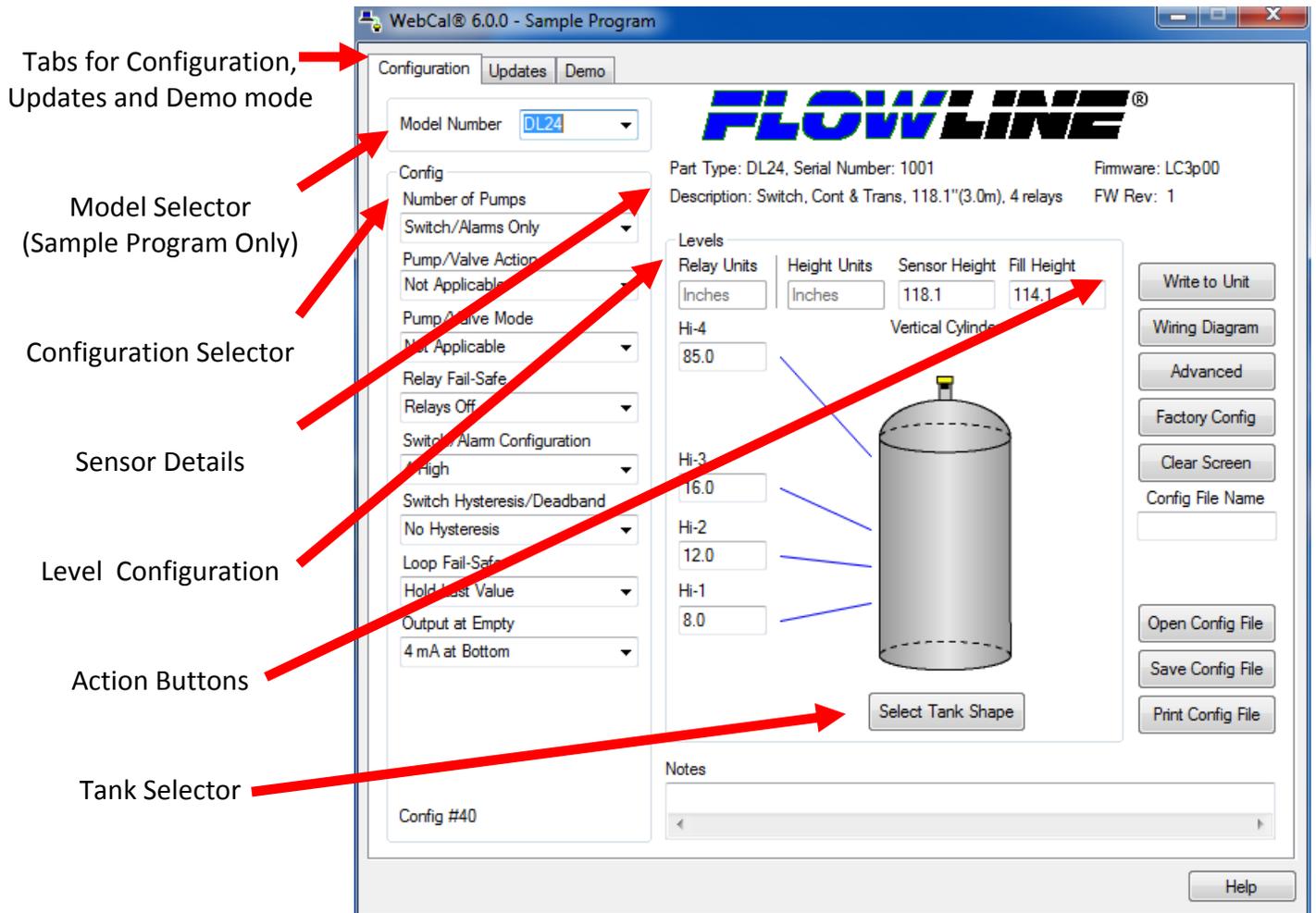
**USB® Fob Interface:** EchoPod® and EchoSonic® communicate with WebCal™ through a USB® interface called a Fob. **Note:** Before plugging your Fob into your computer's USB® port, be sure that you have installed WebCal™ on your computer. Connect the red, green, white and black wires from sensor into the correct terminals on the Fob. Tighten the screws on the terminals and plug your Fob into the USB® port of your computer.



**Wiring is identical for all EchoPod® and EchoSonic® series – Use only the Red, Black, Green and White wires.**

- The maximum cable distance between the computer and sensor is 15'. This only applies when configuring the EchoPod® or EchoSonic®.
- 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 Fob, do not add VDC or VAC power. The Fob, when connected to the computer, will provide the required power to the EchoPod® or EchoSonic®.

With EchoPod® or EchoSonic® connected to your computer; open the WebCal™ software by clicking on the WebCal™ icon. Follow the steps below to configure the sensor. Click “Help” in the lower right hand corner and open the help menu of WebCal™ for instructions on WebCal™. If you need additional assistance using WebCal™, please contact a Flowline applications engineer at (562) 598-3015.



Above screen capture is for the EchoPod® DL24 series.

### Configuring EchoPod® or EchoSonic® with WebCal™

1. Relay Configuration
  - a. Configures the relays in terms of pump/valve operations as well as high or low alarms.
  - b. Sets fail-safe for the relays and the sensor’s output (current, voltage or frequency).
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. Tank Level Configuration
  - a. Enters the settings for the relay activation points as well as confirms the operational range.
4. Write to Unit
  - a. Uploads the configuration into the sensor.
  - b. Provides a custom wiring diagram specific to the signal output and/or relay configuration.

This section of WebCal™ is where you select the level 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 to the next step.

**Note:** Pressing the Clear Screen button will reset the configuration table and allow access to all features.

Config

Number of Pumps 

Switch/Alarms Only ▼

Pump/Valve Action

Not Applicable ▼

Pump/Valve Mode

Not Applicable ▼

Relay Fail-Safe

-please select- ▼

Switch/Alarm Configuration

-please select- ▼

Switch Hysteresis/Deadband

-please select- ▼

Loop Fail-Safe

-please select- ▼

Output at Empty

-please select- ▼

Continue to select

**Number of Pumps**

This feature allows you to select the number of pumps or valves used with EchoPod®. This setting activates the control capabilities of one or two relays. Control relays are often referred to as latching relays.

- **Switch/Alarms Only** – The relays will be standard single point non-latching relays. Use this setting for high and/or low alarms.
- **1-Pump/Valve** – One relay will be configured as a control or latching relay (relay will have a start level and a separate stop level). Use this setting to control one pump or valve for automatic filling or emptying of a tank.
- **2-Pumps/Valves** – Two relays are configured as control or latching relays. Each relay will have a unique start level and a common stop level. Use this setting to control two pumps or valves for automatic filling or emptying of a tank.
- **4-20mA Transmitter Only** – This setting will disengage all of the relays. Use this function if you are not using any relays and using only the 4-20 mA current output.

**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button.

Config

Number of Pumps  
2-Pumps/Valves

Pump/Valve Action  
Empties Tank

Pump/Valve Mode  
-please select-

Relay Fail-Safe  
-please select-

Switch/Alarm Configuration  
-please select-

Switch Hysteresis/Deadband  
-please select-

Loop Fail-Safe  
-please select-

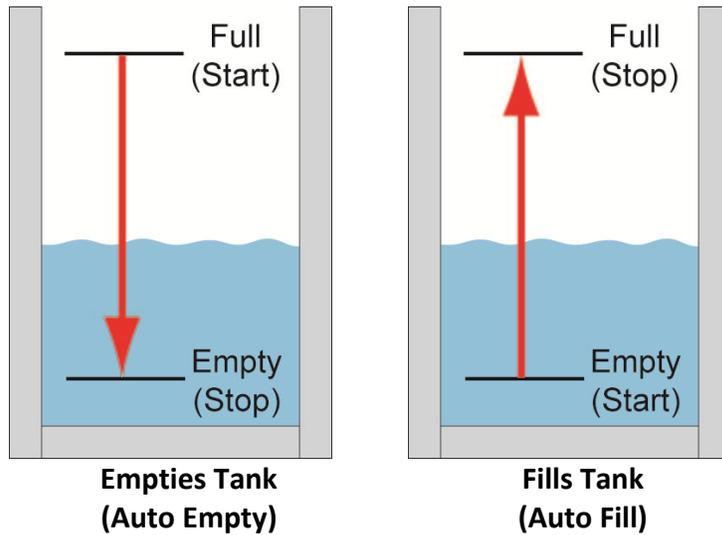
Output at Empty  
-please select-

Continue to select

**Pump/Valve Action**

This feature allows you to select whether the pumps or valves will be used to automatically fill or empty the tank. For 2-Pump/Valve mode, both devices must be used in the same (automatic fill or empty) way. You cannot set one relay for fill and the other for empty.

- **Empties Tank** – Sets the relay(s) to automatically empty a tank. The start level will be above the Stop level for each relay.
- **Fills Tank** – Sets the relay(s) to automatically fill a tank. The start level will be below the Stop level for each relay.
- **Not Applicable** – Appears when this function is not available based on previous selections.



**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button.

Config

Number of Pumps  
2-Pumps/Valves

Pump/Valve Action  
Empties Tank

Pump/Valve Mode  
Duplex

Relay Fail-Safe  
-please select-

Switch/Alarm Configuration  
-please select-

Switch Hysteresis/Deadband  
-please select-

Loop Fail-Safe  
-please select-

Output at Empty  
-please select-

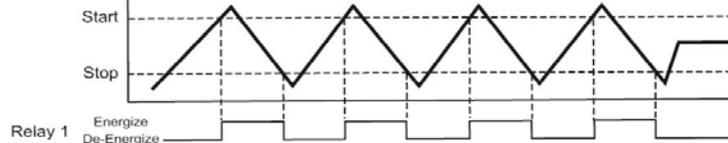
Continue to select

**Pump/Valve Mode**

This feature allows you to select the control mode for a latching relay. Pump/Valve mode is not active for Switch/Alarms Only or 4-20 mA Transmitter Only.

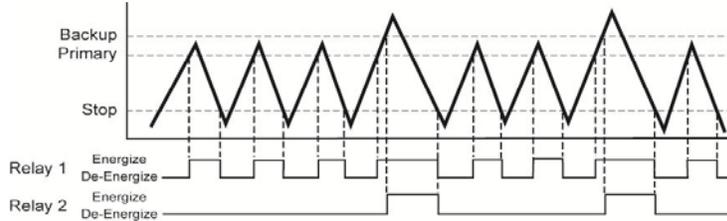
- **Simplex** – Allows the relay to be used for automatic fill or empty. This is the default and only mode when **1-Pump/Valve** is selected.

- **Simplex used to Empty Tank**



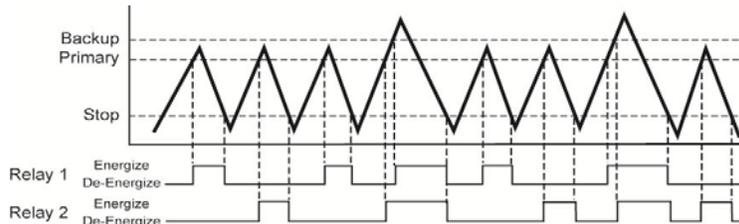
- **Lead/Lag** – Allows two relays to have unique start levels and a common stop level. The first relay will be identified as the lead relay and the second relay as the lag. Each time the lead level is reached, the first relay will always start. The lag relay will only start when the lag level is reached. All relays will stop at the common off level.

- **Lead/Lag used to Empty Tank**



- **Duplex** - Allows two relays to have two different start levels, a common stop level and will alternate the relays when the first start level is reached. The two relays will alternate each time the lead level is reached and the remaining relay will start when the lag level is reached. All relays will stop at the common off level.

- **Duplex used to Empty Tank**



- **Not Applicable** – Appears when this function is not available based on previous selections.

**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button.

Config

Number of Pumps  
2-Pumps/Valves

Pump/Valve Action  
Empties Tank

Pump/Valve Mode  
Duplex

Relay Fail-Safe  
Pumps/Valves Off

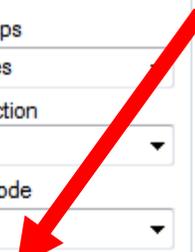
Switch/Alarm Configuration  
-please select-

Switch Hysteresis/Deadband  
-please select-

Loop Fail-Safe  
-please select-

Output at Empty  
-please select-

Continue to select



### Relay Fail-Safe

This feature allows you to select the fail-safe mode for the relays in the event that the sensor loses echo confidence. When the sensor regains echo confidence, the output current will revert back to the current level condition.

- **Relays Off** - The relays will revert to the OFF state. This appears when **Switch/Alarms Only** is selected.
- **Relays On** - The relays will revert to the ON state. This appears when **Switch/Alarms Only** is selected.
- **Hold State** - The relay(s) will remain in the same state as the last confident echo detected. When the sensor regains echo confidence, the relays will revert to the current level.
- **Pump/Valves Off** - The relays will revert to the OFF state. This appears when **1-Pump/Valve** or **2-Pumps/Valves** are selected.
- **Pump/Valves On** - The relays will revert to the ON state. This appears when **1-Pump/Valve** or **2-Pumps/Valves** are selected.
- **Not Applicable** – Appears when this function is not available based on previous selections.

**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button.

Config

Number of Pumps  
2-Pumps/Valves

Pump/Valve Action  
Empties Tank

Pump/Valve Mode  
Duplex

Relay Fail-Safe  
Pumps/Valves Off

Switch/Alarm Configuration  
1-Low, 1-High

Switch Hysteresis/Deadband  
-please select-

Loop Fail-Safe  
-please select-

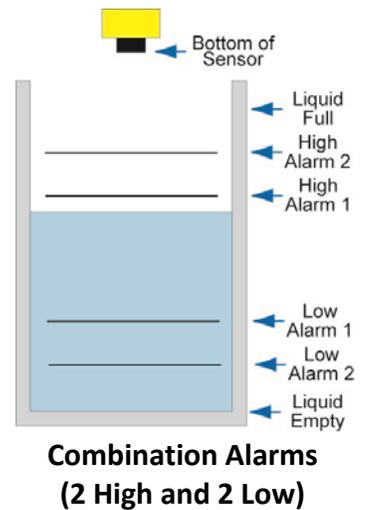
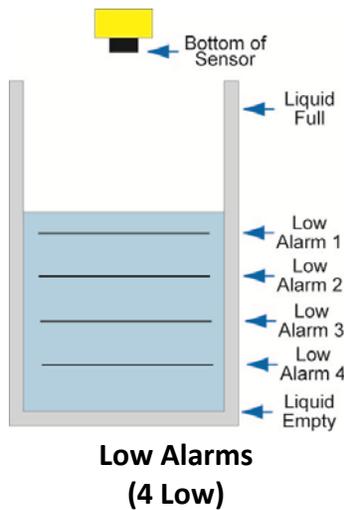
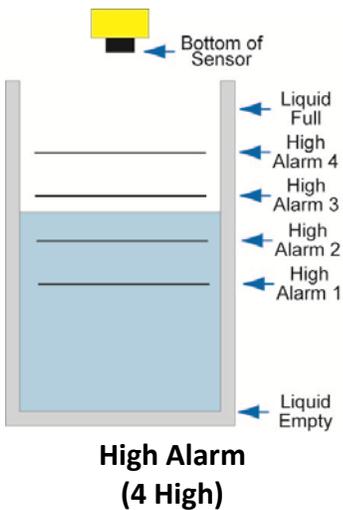
Output at Empty  
-please select-

Finish Selections

**Switch/Alarm Configuration**

This feature allows you to select the relay operation for the switch / alarm (used as a high or low alarm). The number of available relays is based upon the previous settings.

- **No Alarm** – Turns OFF all remaining relays.
- **High Alarms** – Sets 1 to 4 High Alarms (**1-High, 2-High, 3-High, 4-High**).
- **Low Alarms** – Set 1 to 4 Low Alarms (**1-Low, 2-Low, 3-Low, 4-Low**).
- **Combination Alarms** – Sets a combination of High and Low Alarms (**1-Low 1-High, 1-Low 2-High, 2-Low 1-High, 2-Low 2-High, 1-Low 3-High, 3-Low 1-High**).
- **Not Applicable** – Appears when this function is not available based on previous selections.



**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button.

Config

Number of Pumps  
2-Pumps/Valves

Pump/Valve Action  
Empties Tank

Pump/Valve Mode  
Duplex

Relay Fail-Safe  
Pumps/Valves Off

Switch/Alarm Configuration  
1-Low, 1-High

Switch Hysteresis/Deadband  
Fixed 1/2"

Loop Fail-Safe  
-please select-

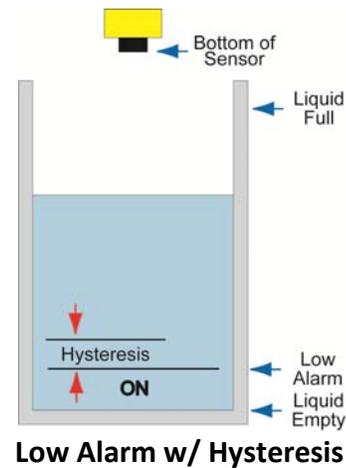
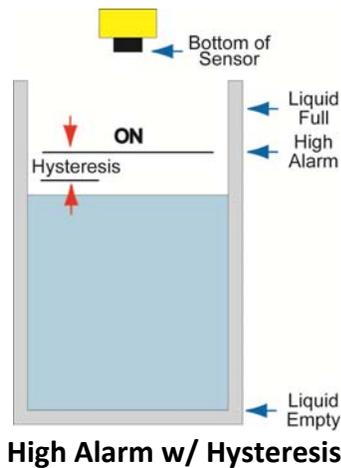
Output at Empty  
-please select-

Finish Selections

**Switch Hysteresis/Dead band**

This feature allows you to select a hysteresis or dead band for the remaining high and/or low alarms.

- **Options for Hysteresis/Dead band** – No Hysteresis, 1/4", 1/2", 1", 2", 1/2 cm, 1cm, 2 cm, 5 cm or Not Applicable.
- **High Alarms** – Relay activates above the set point. Relay will deactivate when the level goes below the set point plus the value of the hysteresis.
- **Low Alarms** – Relay activates below the set point. Relay will deactivate when the level goes above the set point plus the value of the hysteresis.



**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button

Config

Number of Pumps  
2-Pumps/Valves

Pump/Valve Action  
Empties Tank

Pump/Valve Mode  
Duplex

Relay Fail-Safe  
Pumps/Valves Off

Switch/Alarm Configuration  
1-Low, 1-High

Switch Hysteresis/Deadband  
Fixed 1/2"

Loop Fail-Safe  
Empty

Output at Empty  
4 mA at Bottom

Config #16

**Loop Fail-Safe - (Not Available on DS14 series)**

This feature allows you to select the fail-safe current output if the sensor loses echo confidence. When the sensor regains echo confidence, the output current will revert back to the current level condition.

- **Hold Last Value** - The output will remain in the same state as the last confident echo detected. Example: If the output was 6.7 mA just prior to the lost signal, the sensor will continue to output 6.7 mA until echo confidence is regained.
- **Empty** - The output will revert to the current value for an empty condition. When **4 mA at Bottom** is selected, the sensor will output 4 mA during a fail-safe condition. If **20 mA at Bottom** is selected, the sensor will output 20 mA during a fail-safe condition.
- **Full** - The output will revert to the current value for a full condition. When **4 mA at Bottom** is selected, the sensor will output 20 mA during a fail-safe condition. If **20 mA at Bottom** is selected, the sensor will output 4 mA during a fail-safe condition.
- **Overfill (21mA)** - The sensor will output 21mA during a fail-safe condition.
- **Overfill (22mA)** - The sensor will output 22mA during a fail-safe condition.

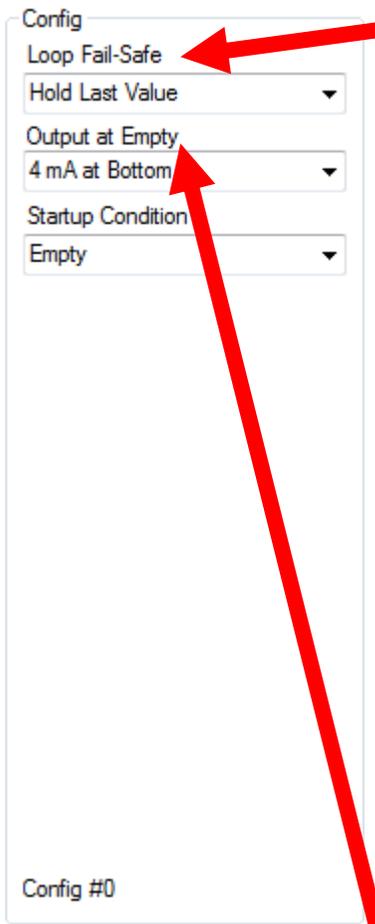
**Output at Empty - (Not Available on DS14 series)**

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 applications are set with **4 mA at Bottom**. Factory default is 4mA at bottom and 20mA at top. *When connecting your sensor to a display, you must account for your output orientation setting.*

- **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.
- **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.

**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button



### Loop Fail-Safe

This feature allows you to select the fail-safe current output if the sensor loses echo confidence. When the sensor regains echo confidence, the output current will revert back to the current level condition.

- **Hold Last Value** - The output will remain in the same state as the last confident echo detected. Example: If the output was 6.7 mA just prior to the lost signal, the sensor will continue to output 6.7 mA until echo confidence is regained.
- **Empty** - The output will revert to the current value for an empty condition. When **4 mA at Bottom** is selected, the sensor will output 4 mA during a fail-safe condition. If **20 mA at Bottom** is selected, the sensor will output 20 mA during a fail-safe condition.
- **Full** - The output will revert to the current value for a full condition. When **4 mA at Bottom** is selected, the sensor will output 20 mA during a fail-safe condition. If **20 mA at Bottom** is selected, the sensor will output 4 mA during a fail-safe condition.
- **Overfill (21mA)** - The sensor will output 21mA during a fail-safe condition.
- **Overfill (22mA)** - The sensor will output 22mA during a fail-safe condition.

### 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 applications are set with **4 mA at Bottom**. Factory default is 4mA at bottom and 20mA at top. *When connecting your sensor to a display, you must account for your output orientation setting.*

- **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.
- **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.

**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button

Config

Loop Fail-Safe

Hold Last Value

Output at Empty

4 mA at Bottom

Startup Condition

Empty

Config #0

### Startup Condition

This feature allows you to select the startup current when power is first applied to the sensor. The sensor will consume the selected power while it is acquiring the liquid level. When the correct level has been identified, the output will adjust to the level output. Use this feature to avoid false alarms with the controller when power is first applied to the sensor.

- **Empty** - The current output will revert to the current value for an empty condition. When **4 mA at Bottom** is selected, the sensor will output 4 mA while the sensor powers up. If **20 mA at Bottom** is selected, the sensor will output 20 mA while the sensor powers up.
- **Mid Tank (12 mA)** – The sensor will output 12 mA while the sensor powers up.
- **Full** - The output will revert to the current value for a full condition. When **4 mA at Bottom** is selected, the sensor will output 20 mA while the sensor powers up. If **20 mA at Bottom** is selected, the sensor will output 4 mA while the sensor powers up.
- **Overfill (22mA)** - The sensor will output 22mA while the sensor powers up.

**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button

Config

Select Output  
 -please select-

Maximum Output  
 -please select-

Minimum Output  
 -please select-

Output at Empty  
 -please select-

Fail-Safe Output  
 -please select-

Startup Condition  
 -please select-

Continue to select

**Select Output**

This feature allows you to select the output for the DX10 series. The output can either be voltage or frequency.

- **Voltage** – Select this option for a voltage output. You will be able to select voltage scale of 0-2.5V, 0-3.3V, 0-5V or 0-10V.
- **Frequency** – Select this option for a frequency/pulse output. The output will be fixed from 976 to 2000 Hz.

**Maximum Output**

This sets the maximum output for the DX10 series. If voltage is selected, then the maximum value will be in volts. If frequency is selected, then the maximum value will be in hertz.

- **Voltage** – Choose from: 2.5 volts, 3.3 volts, 5 volts or 10 volts.
- **Frequency** – This value is fixed at 2000 Hz.

**Minimum Output**

This sets the minimum output for the DX10 series. If voltage is selected, then the minimum value will be in volts. If frequency is selected, then the minimum value will be in hertz.

- **Voltage** – Choose from: 0.25 volts, 0.5 volts, 0.833 volts, 1 volt or 2 volts.
- **Frequency** – This value is fixed at 976 Hz.

**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button

Config

Select Output  
-please select-

Maximum Output  
-please select-

Minimum Output  
-please select-

Output at Empty  
-please select-

Fail-Safe Output  
-please select-

Startup Condition  
-please select-

Continue to select

**Output at Empty**

This feature allows you to select the orientation of the voltage or frequency output (ex. Empty = 1 volt and full = 10 volts vs. empty = 10 volts and full = 1 volt). Choose which output setting best fits the application. Typical installations are set with **Minimum Output**. *When connecting your sensor to a display, you must account for your output orientation setting.*

- **Minimum Output** - The output will be the smallest value. If reading in voltage, this will be the minimum output voltage. If reading in frequency, this will be 976 Hz.
- **Maximum Output** - The output will be the largest value. If reading in voltage, this will be the maximum output voltage. If reading in frequency, this will be 2000 Hz.

**Fail-Safe Output**

This feature allows you to select the fail-safe output if the sensor loses signal confidence. When the sensor regains echo confidence, the output will revert back to the current level condition.

- **Hold Last Value** - The output will remain in the same state as the last confident echo detected. Example: If the output was 6.7 volts just prior to the lost signal, the device will continue to output 6.7 volts until echo confidence is regained.
- **Empty** - The output will revert to the set value for an empty condition. When **Minimum Output** is selected, the sensor will output the lowest voltage or frequency value during a fail-safe condition. If **Maximum Output** is selected, the sensor will output the highest voltage or frequency value during a fail-safe condition.
- **Full** - The output will revert to the set value for a full condition. When **Minimum Output** is selected, the sensor will output the highest voltage or frequency value during a fail-safe condition. If **Maximum Output** is selected, the sensor will output the lowest voltage or frequency value during a fail-safe condition.

**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button

Config

Select Output  
-please select-

Maximum Output  
-please select-

Minimum Output  
-please select-

Output at Empty  
-please select-

Fail-Safe Output  
-please select-

Startup Condition  
-please select-

Continue to select

**Startup Condition**

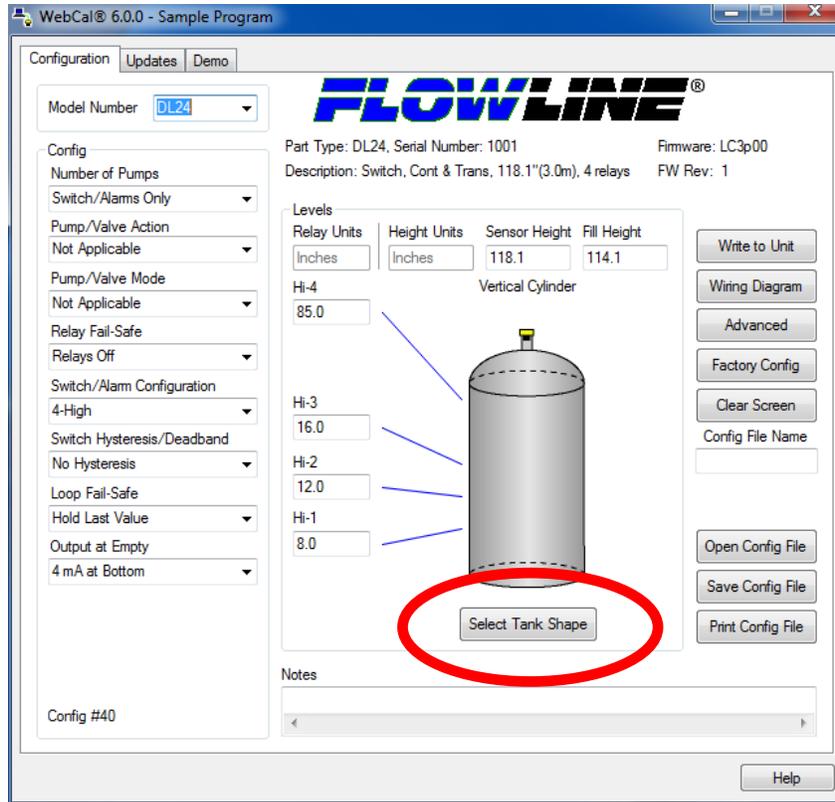
This feature allows you to select the startup output when power is first applied to the sensor. The sensor will output the selected signal while it is acquiring the liquid level. When the correct level has been identified, the output will adjust to the level output. Use this feature to avoid false alarms with the controller when power is first applied to the sensor.

- **Empty** - The output will revert to the set value for an empty condition. When **Minimum Output** is selected, the sensor will output the lowest voltage or frequency value until the level is acquired. If **Maximum Output** is selected, the sensor will output the highest voltage or frequency value until the level is acquired.
- **Mid Tank** – The output will hold at the mid level of the **Minimum** and **Maximum Output** until the level is acquired.
- **Full** - The output will revert to the set value for a full condition. When **Minimum Output** is selected, the sensor will output the highest voltage or frequency value until the level is acquired. If **Maximum Output** is selected, the sensor will output the lowest voltage or frequency value until the level is acquired.

**Note:** Right click on any item to open the help menu.

**Note:** To reset the configuration table, press the Clear Screen button

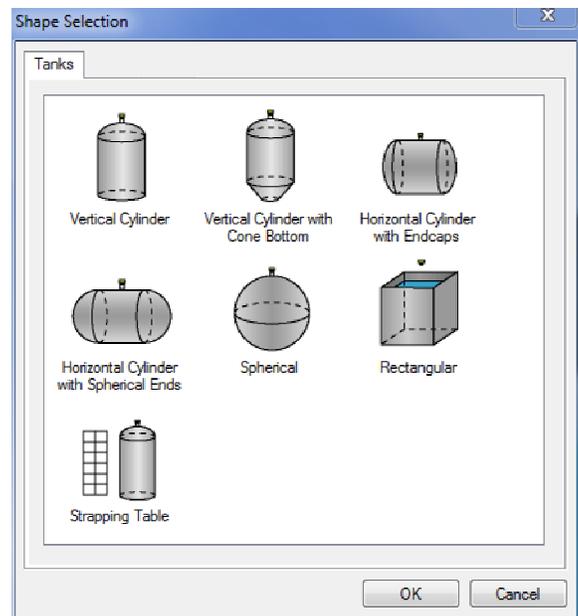
**Step 2 - Tank Selection:** The sensor may be configured in volumetric units (Gallons or Liters) or Distance (Height of Liquid) units (inches, cm, feet or meters). WebCal™ will default in Distance (Height of Liquid) with units of Inches. To change the units or to change from Distance to Volume, press the Select Tank Shape button located near the center of the window.



**Shape Selection Window:** This window will show 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	

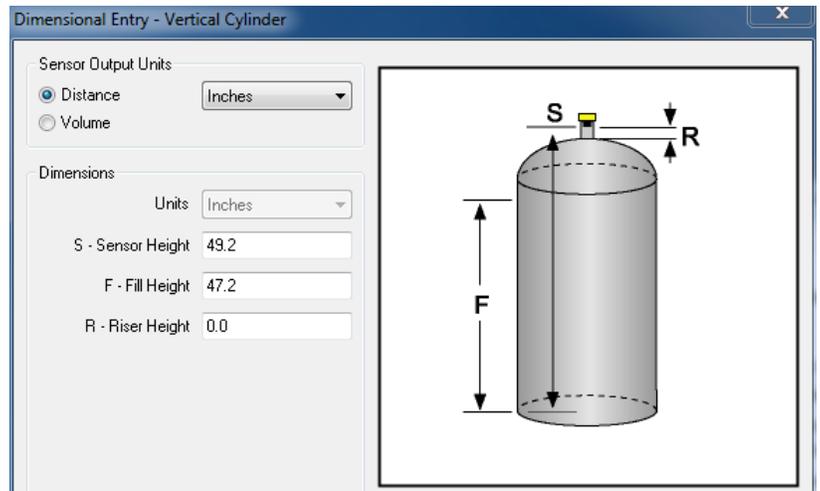
**Distance – Sensor Output Units:**

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.

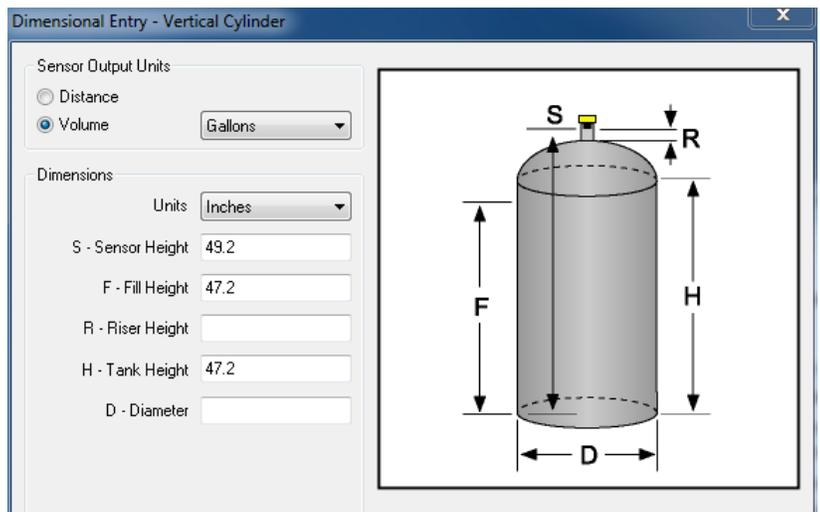
**Sensor Height:** Distance from the bottom of the tank to the bottom of the transducer.

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

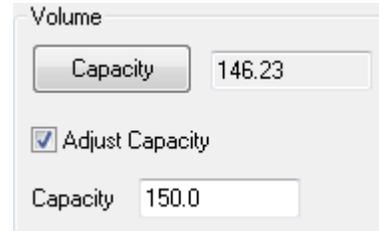
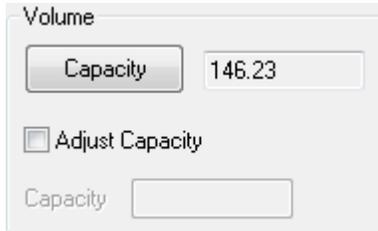
**Riser Height:** Distance the sensor is recessed within a riser, measured from the bottom of the sensor to the inside of the tank.

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

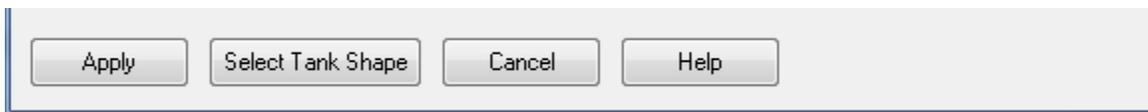
**Diameter:** Distance of the inside tank diameter.



**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.

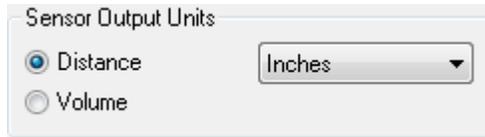


When all dimensions are entered, press the Apply button to return to the previous Configuration window.



- **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 End Caps 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	

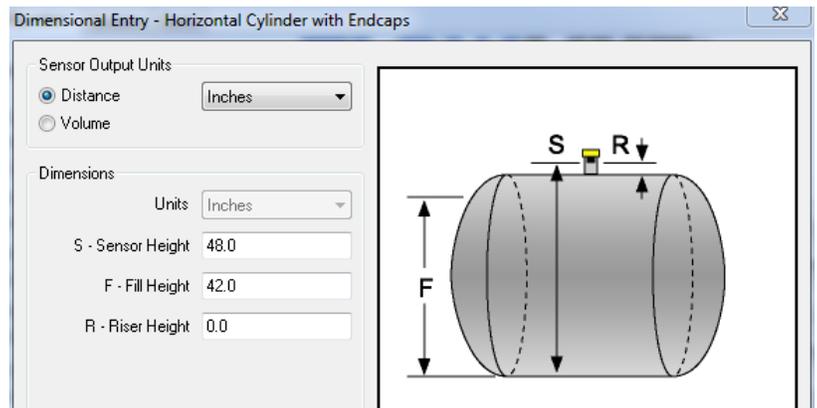
**Distance – Sensor Output Units:**

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.



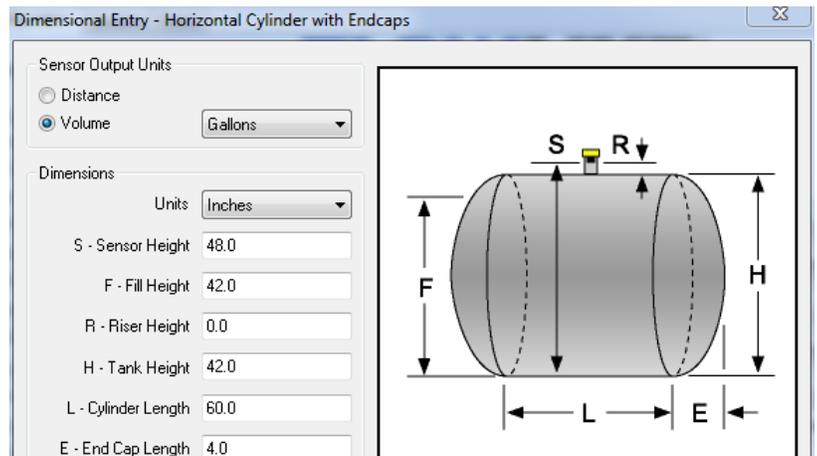
**Volume – Sensor Output Units:**

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.

The screenshot shows a dialog box titled "Volume". It contains a "Capacity" button next to a text field displaying "391.84". Below this is a checkbox labeled "Adjust Capacity" which is currently unchecked. At the bottom, there is another "Capacity" label next to an empty text input field.

The screenshot shows the same "Volume" dialog box. The "Adjust Capacity" checkbox is now checked. The text field next to the "Capacity" button still shows "391.84". The text field at the bottom, which was empty in the previous screenshot, now contains the value "400.0".

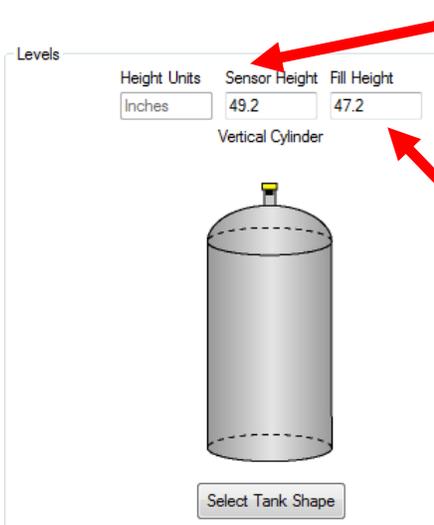
When all dimensions are entered is completed, press the Apply button to return to the previous Configuration window.

The screenshot shows a horizontal control bar with four buttons: "Apply", "Select Tank Shape", "Cancel", and "Help".

- **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.

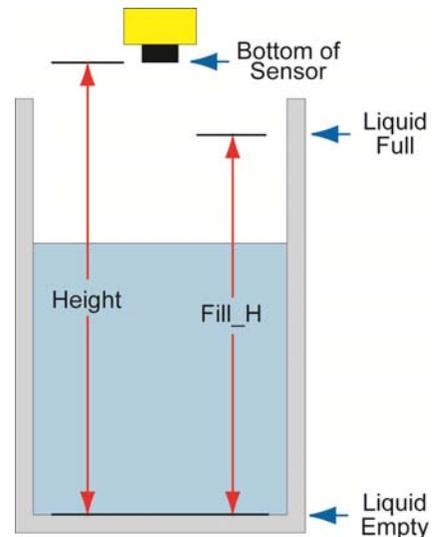
**Step 3 - Tank Levels:** This section of WebCal™ is where you confirm the Sensor Height and Fill Height settings which apply to all sensor series and enter the relay settings if applicable. The Dimensional entry window will transfer these settings to the Configuration window. If Volume was selected, then the Sensor Height and Fill Height settings will be grayed out.

- For the DL10, DL14, DL24 and DL34 series, the Sensor Height and Fill Height values determine the operational range for the 4-20 mA output.
- For the DX10 series, the Sensor Height and Fill Height values determine the operational range for the voltage or frequency output.

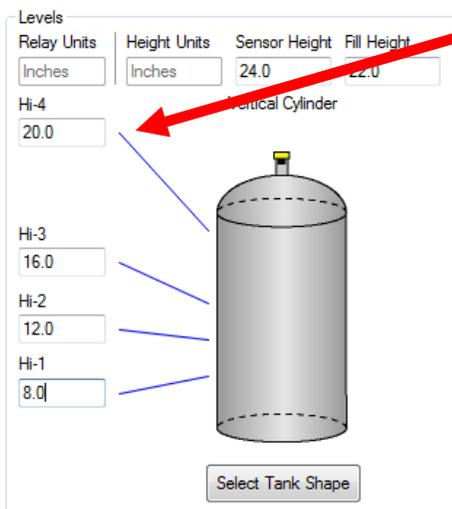


**Sensor Height:** Distance from the bottom of the tank to the bottom of the transducer.

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

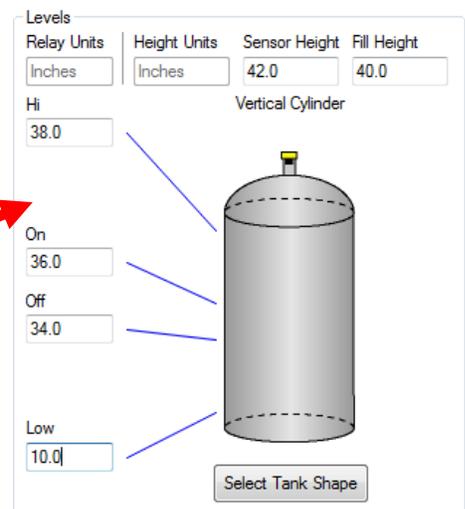


**WebCal™ - Relay Values (DL14, DL24, DL34 and DS14 series only):** This section of the Configuration window is where you enter the operational values for the relays. You must enter values within all fields shown. All values must be in the previously selected units of operation and are based upon units of liquid. All relay values must be greater than an empty tank (0 units) and less than a full tank (Fill Height or Capacity Volume).



**Example:** This is a 4 High Level Alarm operation. As the level increases from the bottom-up, each alarm will activate at 4" increments.

**Example:** This is a 2-Pump Lead/Lag operation with a High and Low alarm. The pumps will automatically empty the tank and the alarms will activate if the level gets too high or low.



**Write to Unit** - After you have entered configurations, selected and configured the Tank Shape and entered the Tank Values, click **“Write to Unit”** and load the configuration into the memory of the sensor. When completed, this configuration will remain inside the sensor memory and will not change unless the sensor is connected to WebCal™ 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.”**

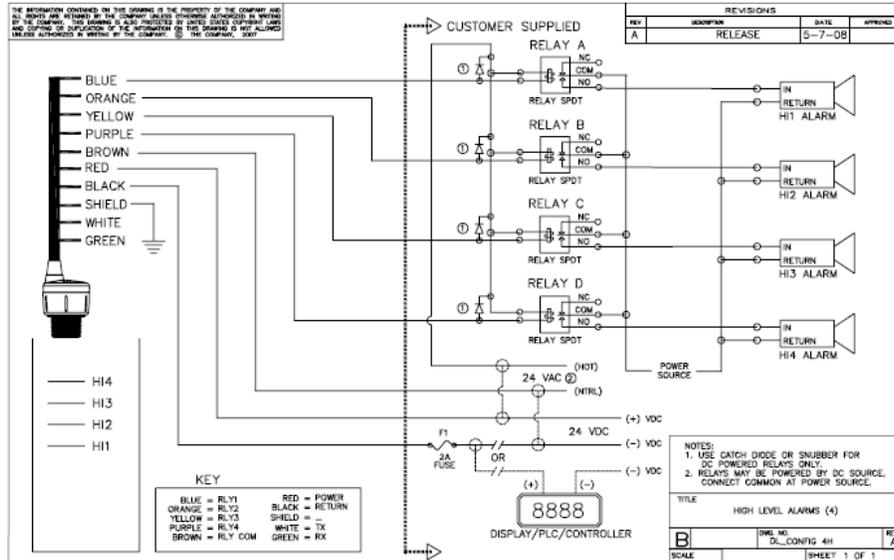
**“Save Config File”** will save this configuration as a text file which can be loaded back into WebCal™ by pressing the **“Open Config File”** button. It is good practice to save the configuration file for each different configuration with a unique name for easy identification. If using multiple sensors 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 in WebCal™. The PDF can be printed or Emailed. It is good practice to save the wiring diagram as a backup.

**Tech Tips:**

- **4-20 mA Output Only:** If only the 4-20 mA output is required with a DL14, DL24 or DL34 (and no relays are used), under **Number of Pumps**, select **4-20mA Transmitter Only** to simplify the configuration.
- **Relay Set Points:** Never set relays set points at the extreme end of the operational range (empty or full). A relay requires the level to pass the set point before it switches. Example - If a low alarm is set to 0 gallons, it will never trigger because the level must pass below 0 gallons for it to activate. Best practice is to set the low alarm with a slight buffer.
- **Alarm Prevention:** Always set relay alarm set points where there is time to react to prevent an issue. Example - Setting an alarm where a tank overflows is not advisable. Best practice is to set a high level alarm where operators have plenty of time to prevent an overflow.

Wiring Diagram - Sample



**Diagrams change based upon each unique sensor configuration.**

**The diagram shown above is only a sample and should not be used as a wiring diagram.**

**Sensor Wiring:** Once the sensor has been installed, follow the Wiring Diagram provided by the WebCal™ software. A typical wiring diagram is shown above. Flowline recommends using a qualified licensed electrician to wire EchoPod® and EchoSonic® with your application’s components.

- ⚠️ Configure your sensor with WebCal™ and use the wiring diagram button to view the appropriate diagram. Each configuration will have its own unique diagram. The diagram shown above is only a sample and should not be used as a wiring diagram.
- ⚠️ Always use stepper relays between the sensor and external loads. For DC circuits, always use a catch diode such as 1N4148, shown on the Wiring diagram above supplied by WebCal™.
- ⚠️ **Once the sensor is configured, isolate the white and green wires from active power to prevent a short of the configuration circuit.**

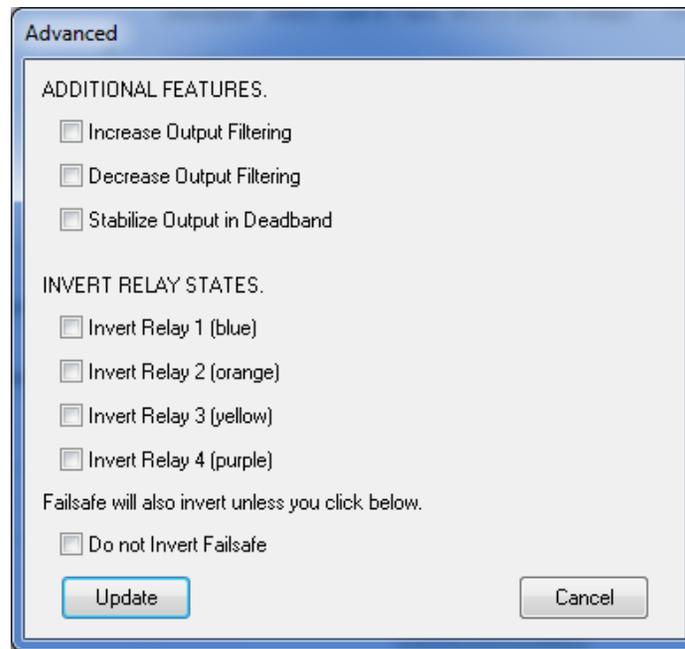
**General notes for electrical connections, usage and safety:**

- Where personal safety or significant property damage can occur due to a spill, the installation must have a redundant backup safety system.
- Wiring should always be completed by a licensed electrician.
- Supply voltage should never exceed 28 VDC.
- Protect the sensor from excessive electrical spikes by isolating the power, whenever possible.
- 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**.

**Advanced Features:** The advanced features settings are designed to help solve performance or operational issues for specific applications. Changing these setting will alter the factory default performance or operation, of your sensor. Please read through this HELP file to assist you in making adjustments or if you are still unclear about a specific issue, please contact FLOWLINE applications engineering.

The screenshot displays the FLOWLINE web interface for configuring a DL24 sensor. On the left, a configuration menu lists various settings such as 'Number of Pumps', 'Pump/Valve Action', and 'Relay Fail-Safe', all currently set to 'Not Applicable'. The central area features a 3D diagram of a vertical cylinder tank with a sensor at the top. Above the diagram, height settings are shown: 'Height Units' is 'Inches', 'Sensor Height' is '118.1', and 'Fill Height' is '114.1'. A red arrow points to the 'Advanced' button in the right-hand menu, which is highlighted with a red border. Other buttons in the menu include 'Write to Unit', 'Wiring Diagram', 'Factory Config', 'Clear Screen', 'Open Config File', 'Save Config File', and 'Print Config File'. At the bottom, there is a 'Notes' section with a scrollable area.

**Note:** When the Advanced Button is highlighted with a RED border, this indicates you have selected an advanced feature.

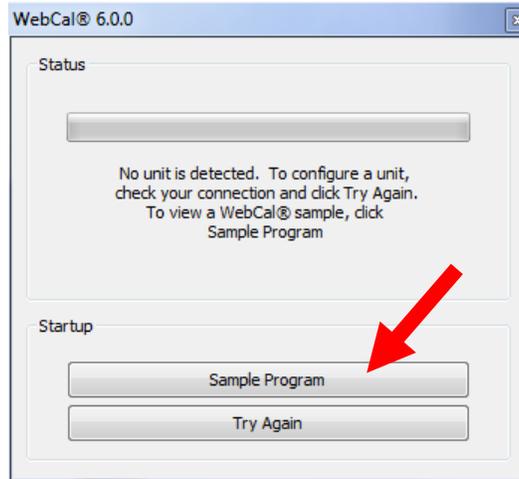


- **Increase Output Filtering:** Placing a check mark in the box will increase the filtering (averaging) of the analog output. Use this filter if the 4 to 20 mA output requires a smoother output for the application such as open channel flow measurement.
- **Decrease Output Filtering:** Placing a check mark in the box will eliminate all filtering (averaging) of the analog output which enables a pulse by pulse level reading. Use this filter to see changes in level after every echo pulse.

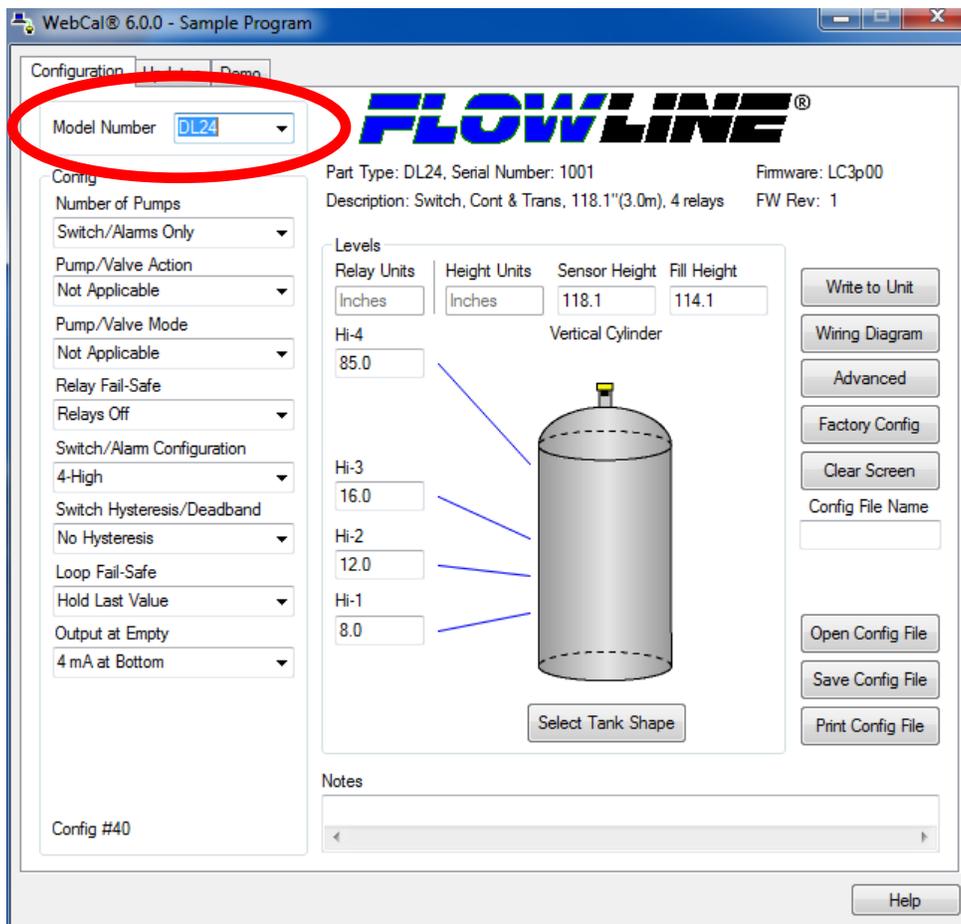
**Note:** Never check increase output filtering and decrease output filtering at the same time.

- **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 EchoPod® and EchoSonic®. This filter requires the level to leave the dead band at a smooth and steady rate.
- **Invert Relay States:** Placing a check mark in any of the four boxes will reverse the state of that relay. For example, if relay 4 is a high alarm that energizes above 50.0” of liquid, checking the invert box will reverse its state so the relay will energize when the level is below 50” of liquid. Inverting the relay will also invert the fail-safe of the relay. If the relay is fail-safe On, inverting the relay will make it fail-safe Off.
- **Fail-Safe will also invert unless you check below:** Placing a check mark in the box will not invert the fail-safe when a relay is inverted.

**Sample Program:** A sample version of WebCal™ is available anytime a sensor is not attached to WebCal™. The Sample Program shows all the features in the Configuration Tab of WebCal™. 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 LI99-1001 Fob. To view the Sample Program, start WebCal™ when a sensor is not attached to the computer. At the opening screen, select **Sample Program**.

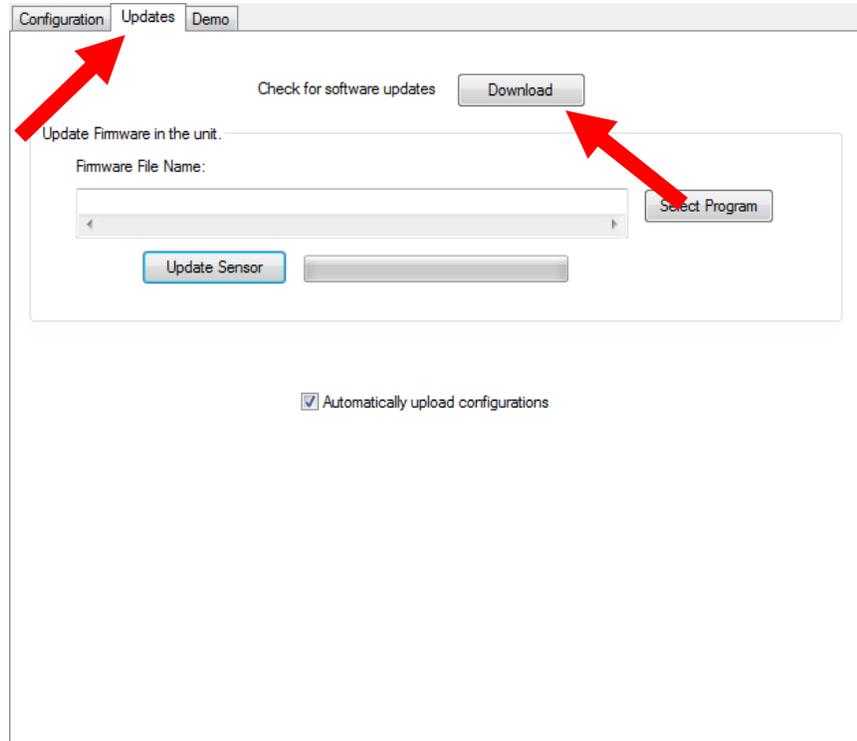


Select your model type in the upper right-hand corner. **Note:** When saving or opening a configuration, make sure the Model Number matches the sensors you intend to use.



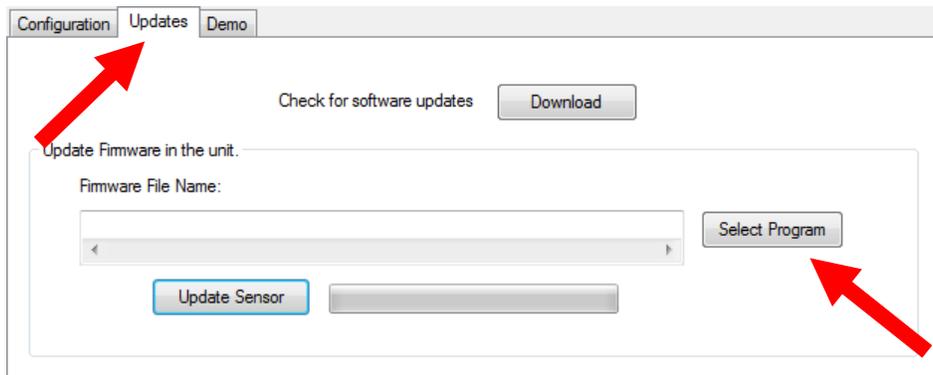
**Updating WebCal™ Software:** WebCal™ can be updated directly from within the software. Click on the **Updates** Tab at the top of the window and press the **Download** button. Make sure that your computer has access to the Internet. If not, an error window will appear.

Press the **Download** button and the software will check the version of software you are using with the most recent software version at Flowline. If the versions are the same, a window will open indicating that the most recent version is installed. If not, then a window will open asking you to download the latest version. Follow the instructions for installing the latest version.

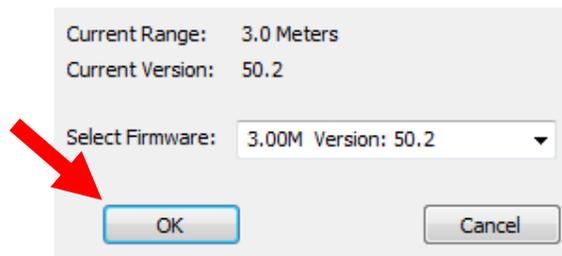


**Updating Sensor Firmware:** WebCal™ can also be used to update the firmware inside your sensor with the latest features and enhancements. First open WebCal™ with a sensor connected and the latest version of WebCal™ installed on your computer.

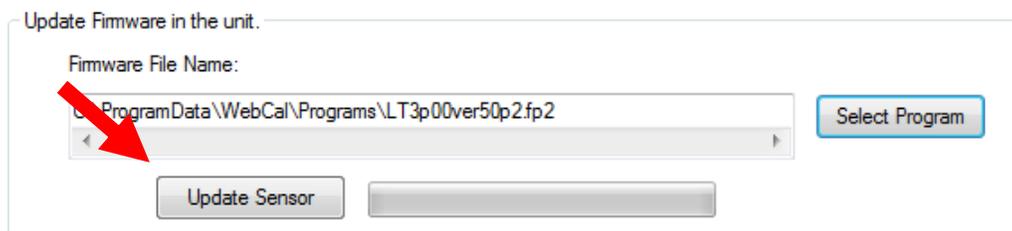
- ⚠ **When updating the sensor firmware, disconnect the sensor from all other devices including displays, controllers, power supplies, PLC's, pumps, valves and alarms. Connect the devices back after the firmware has been updated.**



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 OK.

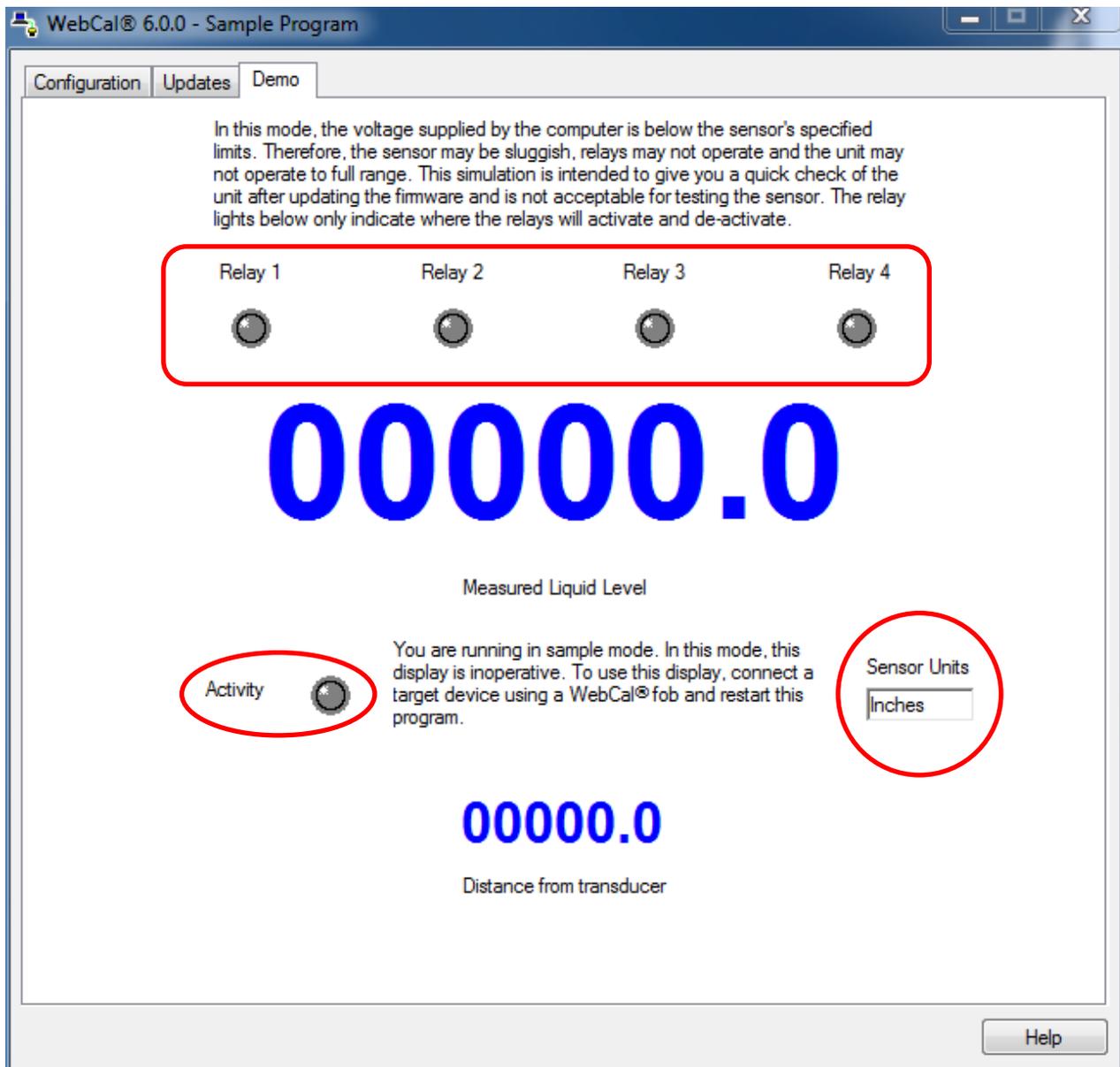


Confirm that the address is correct and then click on **Update Sensor** to begin the firmware update. This step should take less than 1 minute. You can follow the progress with the status bar to the right of the Update Sensor button. When completed, click on the Configuration tab to configure the sensor. *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 then OK to click on Update Sensor to start the process over again.

**Demo Page:** The Demo Page gives you the ability to test the sensors operation against a fixed target, including the confirmation of the switching points for the relays.

- The large top number shows the liquid level value in the units list just below to the right.
- The bottom smaller number shows the distance from the sensor face to the target in the same units.
  - Adding both numbers will equal the Sensor Height value.
- The Activity button will light every time the sensor pulses.
- The Relay buttons (Relay 1, 2, 3 & 4) will light when their corresponding relay is energized.
  - **Note:** This feature is only a simulation. The relays are not physically opening and closing.



**Note:** In this mode, the voltage supplied by the computer is below the sensor's specified limits. Therefore, the sensor may be sluggish, relays may not operate and the unit may not operate to full range. This simulation is intended to give you a quick functional check after updating the firmware.

**Strapping Table:** WebCal™ 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.

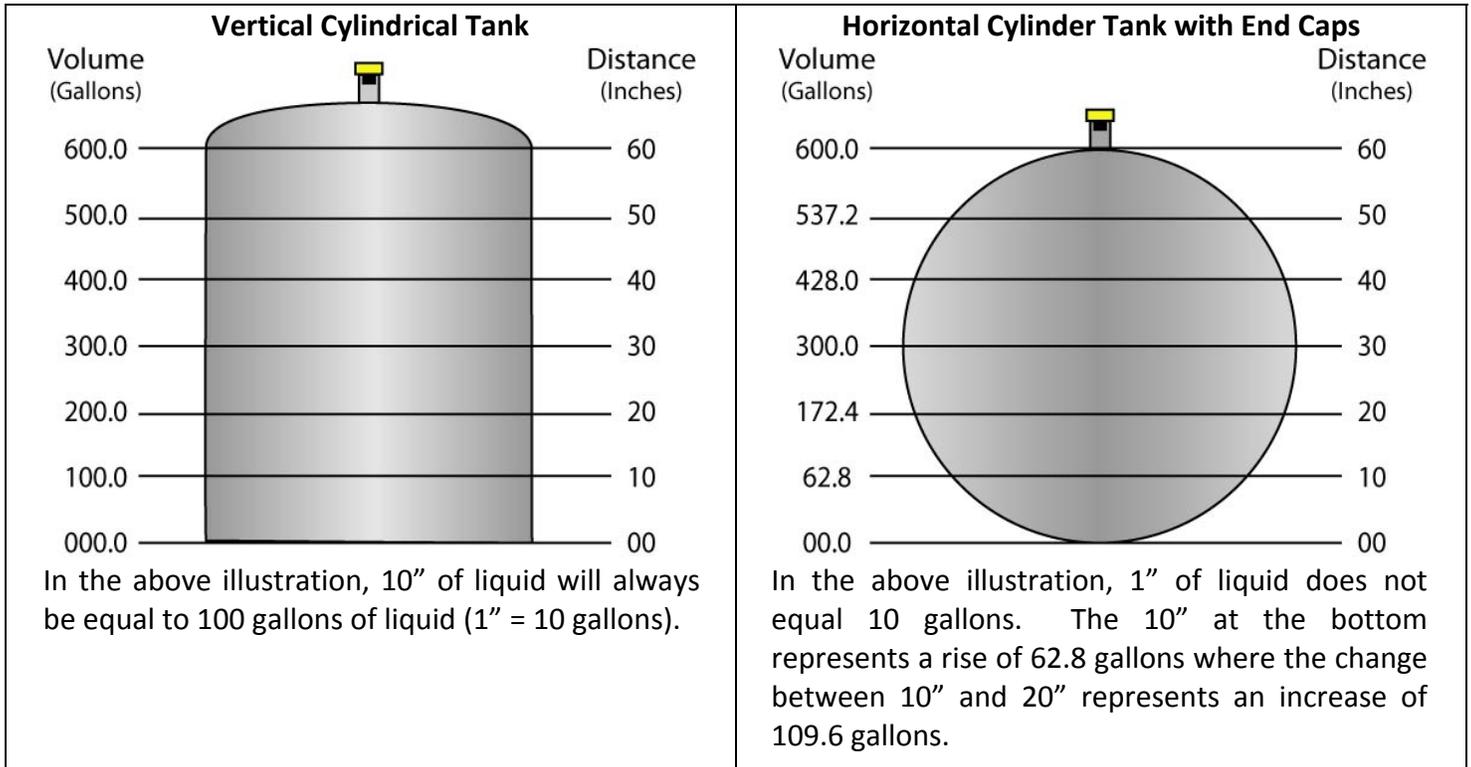
Strapping Table

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	21.0	30.0
4	28.0	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.

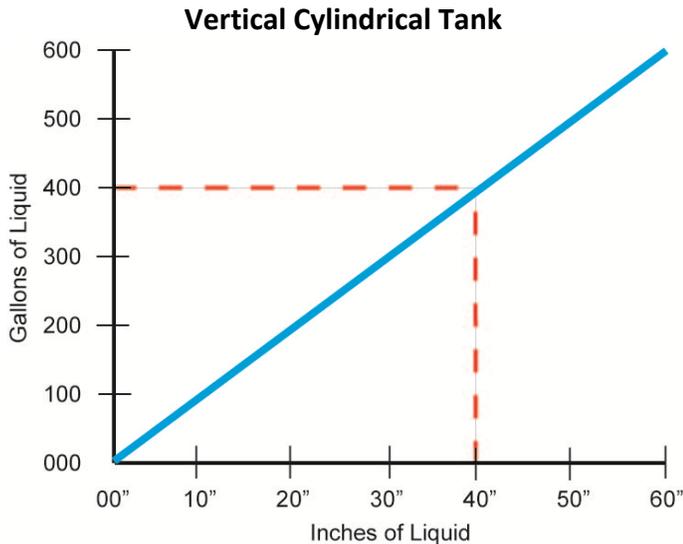


When volume is selected, the 4-20 mA output from the sensor will be proportional to the volume of the tank, not the height of the tank. This means that the current output will track the volume of the tank (in gallons or liters) within a non-linear tank (Vertical Cylinder Tank with Cone Bottom, Horizontal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

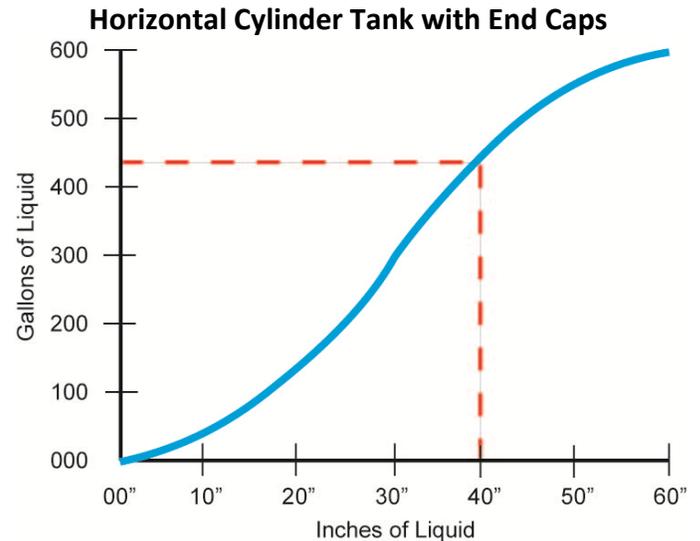
When connecting the signal output to a display, the signal will follow the volume of the tank. The display will also reflect the volume of the tank and not the height of the liquid.

**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, 50" 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.



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.

PROBLEM	SOLUTION
No Unit Detected in WebCal™.	<p>WebCal™ cannot detect an EchoPod® or EchoSonic® connected to the computer.</p> <ul style="list-style-type: none"> <li>• Check that the Fob is connected to the USB® port.</li> <li>• Check that all four wires (Red, Black, White and Green) are securely attached to the Fob.</li> <li>• Check Device Manager and confirm that both drivers (WebCal™ Configuration &amp; EchoFob) are present.</li> </ul>
Internet error. The server name or address could not be resolved.	<p>This is a warning indicating that the computer configuring EchoPod® or EchoSonic® is not connected to the Internet. Click <b>OK</b> to continue. Flowline recommends being connecting to the Internet during configuration. Not being connected to the Internet will not prevent EchoPod® or EchoSonic® from being configured.</p> <p>To turn off this warning, go to the <b>Updates</b> Tab and click on the check box “Automatically upload configurations”. Click on <b>NO</b> 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.</p>
Cannot access some of the configuration features in WebCal™.	<p>As choices are made in Configuration, WebCal™ will begin to eliminate functions that are not applicable to a configuration. To reset Configuration or get access to all the features, click on the <b>Clear Screen</b> button.</p>

**Warranty**

Flowline warrants to the original purchaser of its products that such products will be free from defects in material and workmanship under normal use and service in accordance with instructions furnished by Flowline for a period of two years from the date of manufacture of such products. Flowline's obligation under this warranty is solely and exclusively limited to the repair or replacement, at Flowline's option, of the products or components, which Flowline's examination determines to its satisfaction to be defective in material or workmanship within the warranty period. Flowline must be notified pursuant to the instructions below of any claim under this warranty within thirty (30) days of any claimed lack of conformity of the product. Any product repaired under this warranty will be warranted only for the remainder of the original warranty period. Any product provided as a replacement under this warranty will be warranted for the full two years from the date of manufacture.

**Returns**

Products cannot be returned to Flowline without Flowline's prior authorization. To return a product that is thought to be defective, go to [www.flowline.com](http://www.flowline.com), and submit a customer return (MRA) request form and follow the instructions therein. All warranty and non-warranty product returns to Flowline must be shipped prepaid and insured. Flowline will not be responsible for any products lost or damaged in shipment.

**Limitations**

This warranty does not apply to products which: 1) are beyond the warranty period or are products for which the original purchaser does not follow the warranty procedures outlined above; 2) have been subjected to electrical, mechanical or chemical damage due to improper, accidental or negligent use; 3) have been modified or altered; 4) anyone other than service personnel authorized by Flowline have attempted to repair; 5) have been involved in accidents or natural disasters; or 6) are damaged during return shipment to Flowline. Flowline reserves the right to unilaterally waive this warranty and dispose of any product returned to Flowline where: 1) there is evidence of a potentially hazardous material present with the product; or 2) the product has remained unclaimed at Flowline for more than 30 days after Flowline has dutifully requested disposition. This warranty contains the sole express warranty made by Flowline in connection with its products. ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED. The remedies of repair or replacement as stated above are the exclusive remedies for the breach of this warranty. IN NO EVENT SHALL FLOWLINE BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING PERSONAL OR REAL PROPERTY OR FOR INJURY TO ANY PERSON. THIS WARRANTY CONSTITUTES THE FINAL, COMPLETE AND EXCLUSIVE STATEMENT OF WARRANTY TERMS AND NO PERSON IS AUTHORIZED TO MAKE ANY OTHER WARRANTIES OR REPRESENTATIONS ON BEHALF OF FLOWLINE. This warranty will be interpreted pursuant to the laws of the State of California. If any portion of this warranty is held to be invalid or unenforceable for any reason, such finding will not invalidate any other provision of this warranty.

For complete product documentation, video training, and technical support, go to [www.flowline.com](http://www.flowline.com).

For phone support, call 562-598-3015 from 8am to 5pm PST, Mon - Fri.

(Please make sure you have the Part and Serial number available.)