## Warranty, Service & Repair

To register your product with the manufacturer, go to the Flowline website for on-line registration. The website address is as follows:

### www.flowline.com

On-line Warranty Registration can be found under Contact Us in the Navigation Bar along the side of the home page.

If for some reason your product must be returned for factory service, contact Flowline Inc. at (562)598-3015 to receive a Material Return Authorization number (MRA), providing the following information:

1. Part Number, Serial Number
2. Name and telephone number of someone who can answer technical questions related to the product and its application.
3. Return Shipping Address
4. Brief Description of the Symptom
5. Brief Description of the Application

Once you have received a Material Return Authorization number, ship the product prepaid in its original packing to:

Flowline Factory Service
MRA _____
10500 Humbolt Street
Los Alamitos, CA 90720

To avoid delays in processing your repair, write the MRA on the shipping label. Please include the information about the malfunction with your product. This information enables our service technicians to process your repair order as quickly as possible.



# FLOWLINE®

## EchoSwitch Multi-Point Ultrasonic Level Switch Model LU71/72/73/75 Owner's Manual

Version 2.1.5
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Manual # LU900014 - 0411-LU72M2_1_5

# SPECIFICATIONS

| | |
|---|---|
| Range: | LU75: 2" to 4' (5 cm to 1.2m) |
| | LU72: 4" to 9.8' (10 cm to 3m) |
| | LU71: 4" to 16.4' (10 cm to 5m) |
| | LU73: 8" to 26.2' (20 cm to 8m) |
| Repeatability: | 0.25" (6 mm) |
| Adjustability: | Over entire range |
| Hysteresis: | LU72/5: 0.5" (1.2 cm) (single set point) |
| | LU71/3: 1" (2.5 cm) (single set point) |
| Beam width: | LU72/5: 2" (5 cm) dia. |
| | LU71/3: 3" (7.6 cm) dia. |
| Dead band: | LU75: 2" (5 cm) |
| | LU71/2: 4" (10 cm) |
| | LU73: 8" (20 cm) |
| LED indication: | Power, relay and echo status |
| Calibration: | Target, push button |
| Memory: | Non-volatile |
| Supply voltage: | 50_5: 95-250 VAC |
| | 58_5: 12-28 VDC |
| Consumption: | 50_5: 20 watts max. |
| | 58_5: 100 mA @ 24 VDC |
| Contact type: | (3) SPDT relays |
| Contact rating: | 60 VA |
| Contact logic: | Single point: alarm |
| | Two point: latching or out of bounds alarms |
| | Duplex or Alternation: (Relays 1 and 2 only) |
| Contact fail-safety: | De-energizes during echo signal loss |
| Process temp.: | F: -4° to 140° |
| | C: -20° to 60° |
| Temp. comp.: | Automatic |
| Electronics temp.: | F: -40° to 160° |
| | C: -40° to 71° |
| Pressure: | 30 psi (2 bar) @ 25° C., derated @ 1.667 psi (.113 bar) per °C. above 25° C. |
| Enclosure rating: | NEMA 4X (IP65) |
| Enclosure vent: | Water tight membrane |
| Encl. material: | PC/ABS FR |
| Trans. material: | PVDF Kynar® |
| Process mount: | LU72/5: 1" NPT (1" G) |
| | LU71/3: 2" NPT (2" G) |
| Mount. gasket: | Viton® |
| Conduit entrance: | Dual, 1/2" NPT |
| Classification: | General purpose |
| CE compliance: | EN 61326 EMC |
| (pending) | EN 61010 safety |

**LU7_-5 _ _5**
**Enclosure**
**Top View**

4.1" (104 mm)
3.8" (96 mm)
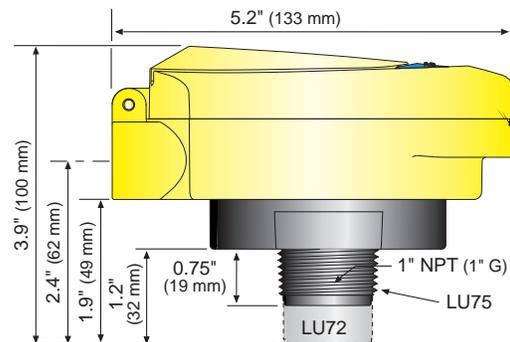5.2" (133 mm)
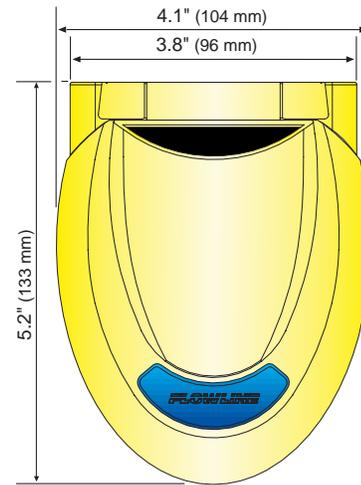
**LU75-5 _ _5**
**LU72-5 _ _5**
**Enclosure**
**Side View**

5.2" (133 mm)
3.9" (100 mm)
2.4" (62 mm)
1.9" (49 mm)
1.2" (32 mm)
0.75" (19 mm)
1" NPT (1" G)
LU75
LU72

**LU71-5_ _5**
**LU73-5_ _5**
**Enclosure**
**Side View**

5.2" (133 mm)
4.5" (114 mm)
3.0" (76 mm)
2.5" (63 mm)
1.7" (44 mm)
2" NPT (2" G)

### Temperature/Pressure Derating

Operating Pressure (psi) — vertical axis: 00, 10, 20, 30, 40
Temperature ($C_i$) — horizontal axis: -40, -20, 00, 20, 40, 60, 80

Unacceptable Range
Acceptable Range
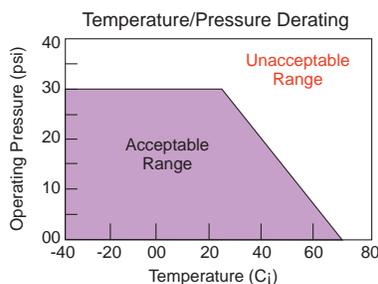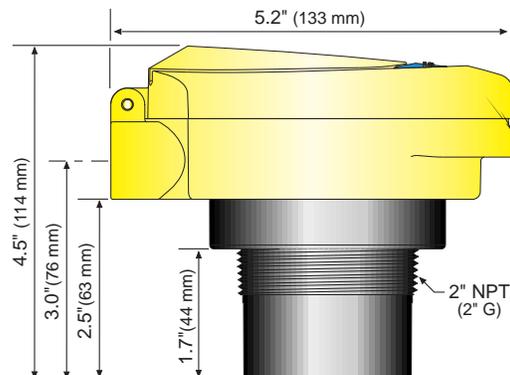
# INTRODUCTION

⚠️ **About this Manual:** PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on the LU7_-5_ _5 Ultrasonic Level Switch from FLOWLINE. 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:** 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.

⚠️ **Proper Installation and Handling:** Only properly trained staff should install and/or repair this product. Install the switch with the included Viton gasket and never overtighten the switch within the fitting. Always check for leaks prior to system start-up.

⚠️ **Wiring and Electrical:** A supply voltage of 95-250 VAC is used to power the LU7_-50 _5 switch, and a supply voltage of 12-28 VDC is used to power the LU7_-58_5 switch. Electrical wiring of the switch should be performed in accordance with all applicable national, state, and local codes.

⚠️ **Material Compatibility:** The LU7_-5_ _5 enclosure is made of a flame retardant Polycarbonate (PC/ABS FR). 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 switch housing is liquid-resistant the LU7_-5 _ _5 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.

⚠️ **Make a Fail-Safe System:** Design a fail-safe system that accommodates the possibility of switch 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:** The LU7_-5_ _5 should not be used within classified hazardous environments.

⚠️ **Warning** ⚠️

**Always use the Viton gasket when installing the LU7_-5_ _5 switch, and make sure that all electrical wiring of the switch is in accordance with applicable codes.**

# TECHNOLOGY

**A. Application:** The general purpose ultrasonic switch provides non-contact level detection up to 26' or 8m with 3 relays. Each relay can be configured on a single set point alarm, two latched set points for automatic fill or empty, two set points for out of bounds alarms or three set point (relays 1 and 2 only) alternation / duplexing . The switch is well suited for a wide range of corrosive, waste and slurry type media, and is broadly selected for atmospheric day tank, pump lift station and waste sump applications.

**B. Part Number:** The part and serial numbers are located on the wrench flat. Check the part number on the product label and confirm which of the below model configurations you have purchased:

| Part Number | Range | Supply | Mount |
|---|---|---|---|
| LU75-5005 | 4' (1.2m) | 95-250 VAC | 1" NPT |
| LU75-5065 | 4' (1.2m) | 95-250 VAC | 1" G |
| LU75-5805 | 4' (1.2m) | 12-28 VDC | 1" NPT |
| LU75-5865 | 4' (1.2m) | 12-28 VDC | 1" G |
| LU72-5005 | 9.8' (3m) | 95-250 VAC | 1" NPT |
| LU72-5065 | 9.8' (3m) | 95-250 VAC | 1" G |
| LU72-5805 | 9.8' (3m) | 12-28 VDC | 1" NPT |
| LU72-5865 | 9.8' (3m) | 12-28 VDC | 1" G |
| LU71-5005 | 16.4' (5m) | 95-250 VAC | 1" NPT |
| LU71-5065 | 16.4' (5m) | 95-250 VAC | 1" G |
| LU71-5805 | 16.4' (5m) | 12-28 VDC | 1" NPT |
| LU71-5865 | 16.4' (5m) | 12-28 VDC | 1" G |
| LU73-5005 | 26.2' (8m) | 95-250 VAC | 2" NPT |
| LU73-5065 | 26.2' (8m) | 95-250 VAC | 2" G |
| LU73-5805 | 26.2' (8m) | 12-28 VDC | 2" NPT |
| LU73-5865 | 26.2' (8m) | 12-28 VDC | 2" G |

**C. NEMA 4X Enclosure:** The enclosure has a flip cover with two 1/2" NPT female conduit ports and an internal terminal strip for wiring. To open the enclosure, you will need a small insertion tool such as a screwdriver. Insert the tool into the hole located at the front of the enclosure and gently push on the latching mechanism to release the cover. Rotate the hinged cover up for 135° access to the faceplate and terminal strips. **Before closing the enclosure, make sure that the enclosure gasket is properly seated, and that any conduit fittings, cable connectors or plugs are installed correctly and sealed.**
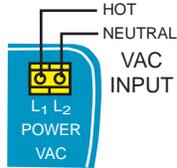
LU7_-5_ _1
Shown

RELAY 1  RELAY 2  RELAY 3  L₁ L₂ POWER
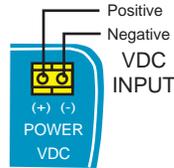
Cal. Run

EchoSwitch™

High   Select   Low
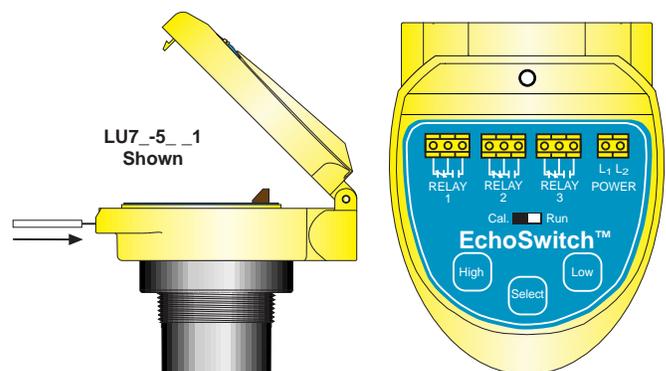
# PREPARATION

**A. Supply Voltage:** The power supply voltage should never exceed the maximum rating of 250 VAC for the LU7_-50_5 switch or 28 VDC for the LU7_-58_5 switch.

**LU7_-50_1 Shown**



HOT
NEUTRAL
VAC INPUT
L₁ L₂
POWER
VAC

**LU7_-58_1 Shown**



Positive
Negative
VDC INPUT
(+) (-)
POWER
VDC

**B. Conduit Entrance:** The enclosure has two 1/2" NPT female conduit ports for routing of the switch supply and relay circuit wiring. **Do not run mixed AC and DC voltages through the same conduit port.** Route the supply voltage circuit through one port and the relay circuit(s) through the opposite port.



Supply Port
Relay Port
1/2 NPT Conduit
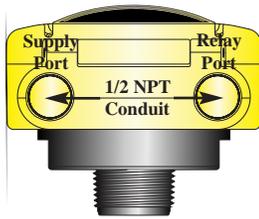
**C. Relay Fail-Safe Design:**



RELAY 1

The switch has (3) relay channels. Each relay is a SPDT (single pole, double throw) type rated at 60 VA. Normally open (NO) or normally closed (NC) operation is user selected based on the desired system control and fail-safe logic. **Always design a fail-safe system that accommodates for the possibility of relay and/or power failure.** The "normal" relay state is where the relay coil is de-energized and the Red relay LED is OFF. Therefore, if power is cut OFF to the switch it will de-energize the relay. Make sure that the de-energized state is the safe state in your system design. As such, if switch power is lost, a pump will turn OFF if it is connected to the normally open side of the relay.

**E. Maximum Applied Range:** Individual or cumulative effects of agitation, vapor or foam can reduce the overall quality of signal return and shorten the maximum applied range of the switch. To determine the maximum applied range of the switch in your application, refer to the below derating chart.
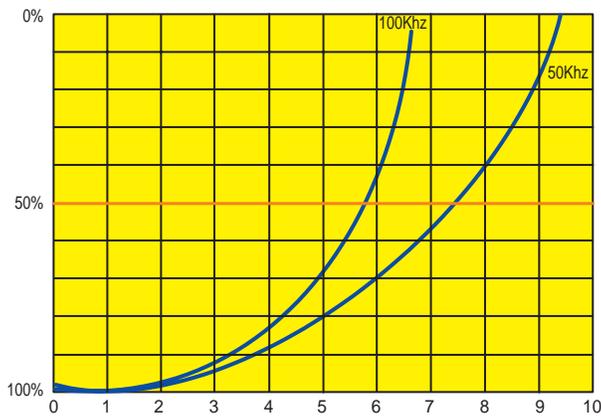


**Ultrasonic Derating Chart**

| LU72/75-5_ _5 | | LU71/73-5_ _1 | |
|---|---|---|---|
| Agitation | = 1-3 @ 100 kHz | Agitation | = 1-3 @ 50 kHz |
| Vapor | = 4-6 @ 100 kHz | Vapor | = 3-5 @ 50 kHz |
| Foam | = 5-6 @ 100 kHz | Foam | = 4-6 @ 50 kHz |

# CALIBRATION

**A. Introduction:** The switch has two modes, the RUN and CAL modes. In the RUN mode, the switch is operational and the relay(s) will energize or de-energize at the calibrated set point distances. In the CAL mode, the relay set point distances and states may be target-calibrated into memory. **The switch arrives from the factory without any preset calibration.** Each relay channel may be user calibrated into one of the following configurations; 1) high or low level alarm, 2) high and low level out of bounds alarm, 3) automatic fill or empty, or 4) duplexing/Alternating.

**High or Low Level Alarm:** The high or low level alarm is programmed with a single set point at the desired tank level. Configured as a high alarm, the relay will energize if the level rises above the set point. Configured as a low level alarm, the relay will energize if the level falls below the set point.



Energize
De-energize
High Alarm Shown
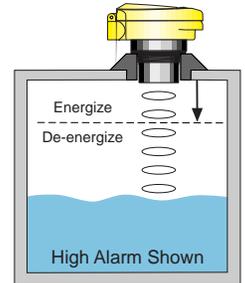
**High and Low Level Out of Bounds Alarm:** Programmed with two set points, the high and low level out of bounds alarm protects the top of the tank from overspill and the bottom of the tank from run-dry. If the level rises above or falls below the set points, the relay will energize. The relay will remain de-energized as long as the level is in between the set points.



Energize
De-energize
Energize
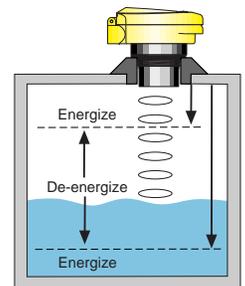
**Automatic Fill or Empty:** Programmed with two set points, the latched automatic fill or empty will control a pump or valve. When the level reaches the energize set point, the latching relay will energize, and remain energized until the level reaches the de-energize set point.



De-energize
Energize
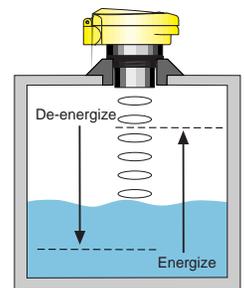
*(Auto-Fill Shown)*

**Duplex/Alternate:** Programmed with three set points and two relays, duplexing will automatically fill or empty the tank with two pump alternation for maintenance and lead-lag control for back up operation. When the level reaches the energize set point, the latching relay will energize, and remain energized until the level reaches the de-energize set point. Each time the level reaches the energize set point, the relays will alternate. If the level reaches the back-up energize set point, both relays will energize until the level reaches the de-energize set point. Alternation will automatically fill or empty the tank with two pumps switching after each cycle.



Energize (Backup) High High
Energize (Primary) High
De-energize (All) Low
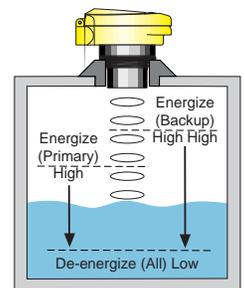
# CALIBRATION

**B. Calibration Tools:** To target calibrate the switch set points, you will need the appropriate 95-250 VAC (LU7_-50_5) or 12-28 VDC (LU7_-58_5) power supply, tape measurer, flat reflective target such as a wall, and optional Flowline box insert for use as a product holder.

**C. Off Tank Target Calibration:** The switch's relay set points may be target calibrated OFF the tank or installed ON the tank. Generally, target calibration is done OFF the tank because it is easier to move the switch rather than raise or lower the liquid level to the desired relay set point distances. Locate a flat reflective calibration target such as a wall. Place the switch perpendicular to the target in the provided Flowline box insert or equivalent holder. **Alternatively, you may hold the switch with your hand, but it is critical that prior to entering any relay set point distances, the product is held steady and perpendicular to the target for at least 15 seconds.** If calibrating against a wall, it is recommended that the switch be elevated 3' (1m) off the ground by placing it on a table or equivalent flat surface.

Set Point Calibration

Tape
Box Insert
Set Point Distance
Table
Target Wall
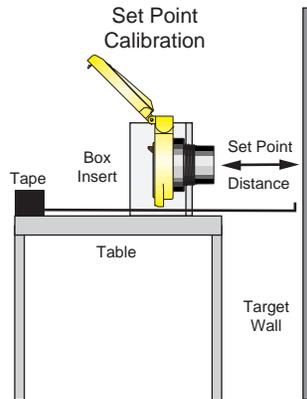
**D. Entering the CAL Mode:** To enter the CAL mode, you must first disable the calibration lock out feature. *To do so, press and hold the SELECT button down. While holding the SELECT button, slide the RUN/CAL switch LEFT to the CAL position, and then release the SELECT button.* At this point, all relay LEDs should be OFF.

Cal. ■ Run
**EchoSwitch™**
High    Select    Low
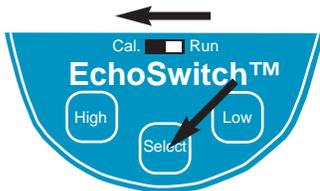
**E. Selecting a Relay Channel:** After entering the CAL mode, press the SELECT button once and the Relay 1 LED will turn ON indicating that the channel is now active for set point calibration. Press the SELECT button again until the desired Relay channel becomes active.

RELAY 1   RELAY 2   RELAY 3   $L_1$ $L_2$ POWER
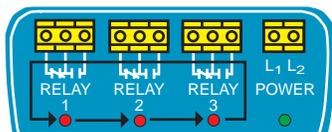
**F. Erasing a Relay Channel:** With the exception of new products out of the box, **all previously entered relay set points should be erased prior to new programming** with the following procedure:

1. Enter CAL mode and SELECT the relay channel to erase.
2. Simultaneously press and hold down both the HIGH and LOW buttons, and then release the buttons.
3. The Relay and Power LEDs will blink in an alternating pattern indicating that the relay set points have been erased.
4. At this point, once the LED becomes solid, you may either re-program the channel with new set points or leave it inactive.
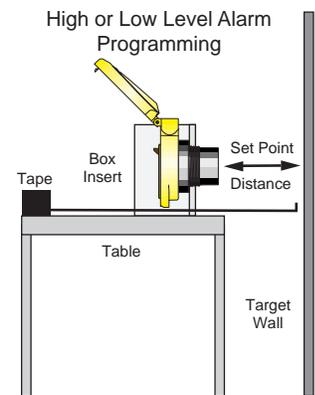
# PROGRAMMING

**A. Programming a Relay Channel:** The relay set points are target calibrated using the appropriate HIGH and/or LOW two key-stroke button sequence at each target distance (D1=distance one, D2 = distance two and D3 = Distance 3) per the following logic.

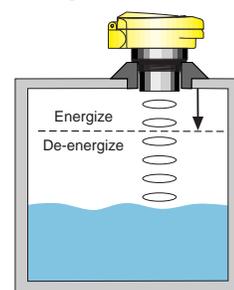| Relay Function | Button Sequence @ Distance(s) |
|---|---|
| 1. High level alarm | High-High (D1) |
| 2. Low level alarm | Low-Low (D1) |
| 3. Out of bounds alarm | High-High (D1) & Low-Low (D2) |
| 4. Automatic fill | Low-High (D1) & High-Low (D2) |
| 5. Automatic empty | High-Low (D1) & Low-High (D2) |
| 6. Duplexing/Alternation | [High-Low (D1) & Low-High (D2), Rly 1] & [High-High (D3), Rly 2] |

**After the second High or Low button key-stroke, the Power LED will flash from AMBER to GREEN indicating that the set point has been accepted into memory.** *If all three Relay LEDs flash RED and remain ON, then the button sequence was done incorrectly.* **If so, press SELECT to return to the appropriate relay channel and erase the previous set points per the CALIBRATION section (Step #6-F) of this manual. Then re-program the channel with the correct button sequence.**

**B. Programming a High or Low Level Alarm:** After having powered the switch with the appropriate supply voltage, entered the CAL mode, selected a relay channel and erased any previously input set points, follow the below procedure (LOW level alarm instructions are in parenthesis):
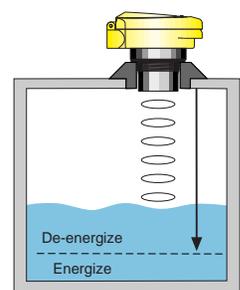
1. Stretch the tape measurer out to the appropriate distance in between the switch and target.

2. Position the switch at the desired HIGH (LOW) set point distance defined as the air gap space between the transducer and the target. **Make sure that the switch is stationary and perpendicular to the target before continuing.**

3. Press the HIGH (LOW) button for the first key-stroke and the Relay LED will blink once.

4. Press the HIGH (LOW) button again for the second key-stroke and the Relay LED will blink twice.

High or Low Level Alarm Programming

Tape
Box Insert
Set Point Distance
Table
Target Wall

5. The Power LED will flash from AMBER to GREEN when the set point has been accepted into memory.

6. Press SELECT to program the next relay channel or slide the RUN/CAL switch RIGHT to exit the CAL mode.

**High Level Alarm**

Energize
De-energize

**Low Level Alarm**

De-energize
Energize

# PROGRAMMING

**C. Programming a High <u>and</u> Low Level Out of Bounds Alarm:** After having powered the switch with the appropriate supply voltage, entered the CAL mode, selected a relay channel and erased any previously input set points, follow the below procedure:

1. Stretch the tape measurer out to the appropriate distance in between the switch and target.

**Out of Bounds**

2. Position the switch at the desired HIGH set point distance defined as the lesser of the two air gap spaces between the transducer and the target. **Make sure that the switch is stationary and perpendicular to the target before continuing.**
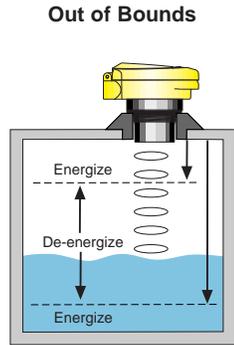
3. Press the HIGH button for the first key-stroke and the Relay LED will blink once.

4. Press HIGH again for the second key-stroke and the Relay LED will blink twice.

5. The Power LED will flash from AMBER to GREEN when the HIGH set point has been accepted into memory.
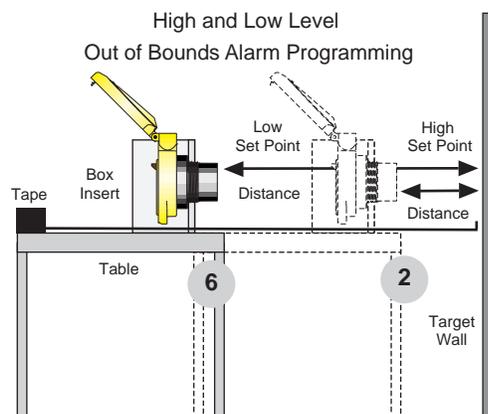
6. Position the switch at the desired LOW set point distance defined as the greater of the two air gap spaces between the transducer and the target. **Make sure that the switch is stationary and perpendicular to the target before continuing.**

7. Press LOW for the first key-stroke and the Relay LED will blink three times.

8. Press LOW for the second key-stroke and the Relay LED will blink four times.

9. The Power LED will flash from AMBER to GREEN when the LOW set point has been accepted into memory.

10. Press SELECT to program the next relay channel or slide the RUN/CAL switch RIGHT to exit the CAL mode.

High and Low Level
Out of Bounds Alarm Programming

# PROGRAMMING

**D. Programming Automatic Fill:** After having powered the switch with the appropriate supply voltage, entered the CAL mode, selected a relay channel and erased any previously input set points, follow the below procedure:

1. Stretch the tape measurer out to the appropriate distance in between the switch and target.

**Automatic Fill**

2. Position the switch at the desired LOW set point distance defined as the greater of the two air gap spaces between the transducer and the target. **Make sure that the switch is stationary and perpendicular to the target before continuing.**
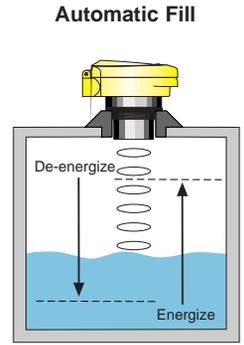
3. Press the LOW button for the first key-stroke and the Relay LED will blink once.

4. Press the HIGH button for the second key-stroke and the Relay LED will blink twice.

5. The Power LED will flash from AMBER to GREEN when the LOW set point has been accepted into memory.
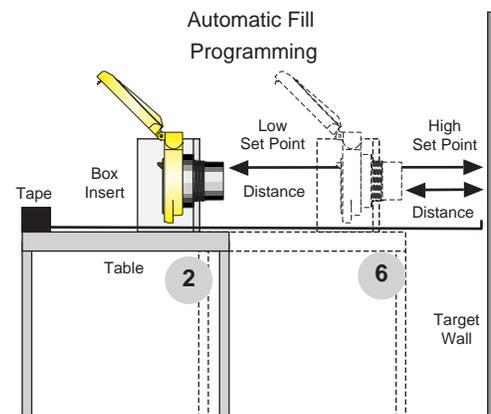
6. Position the switch at the desired HIGH set point distance defined as the lesser of the two air gap spaces between the transducer and the target. **Make sure that the switch is stationary and perpendicular to the target before continuing.**

7. Press the HIGH button for the first key-stroke and the Relay LED will blink three times.

8. Press the LOW button for the second key-stroke and the Relay LED will blink four times.

9. The Power LED will flash from AMBER to GREEN when the HIGH set point has been accepted into memory.

10. Press SELECT to program the next relay channel or slide the RUN/CAL switch RIGHT to exit the CAL mode.
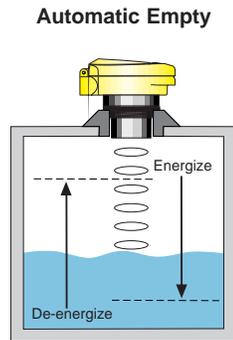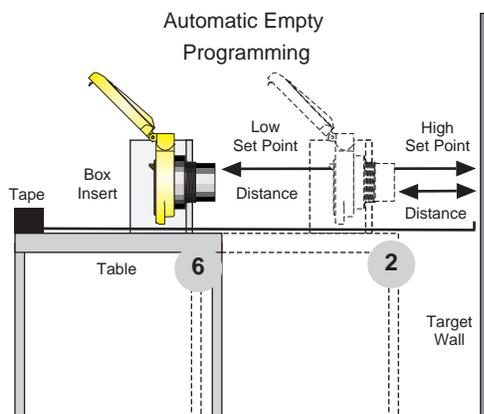
Automatic Fill
Programming

# PROGRAMMING

**E. Programming Automatic Empty:** After having powered the switch with the appropriate supply voltage, entered the CAL mode, selected a relay channel and erased any previously input set points, follow the below procedure:

1. Stretch the tape measurer out to the appropriate distance in between the switch and target.

2. Position the switch at the desired HIGH set point distance defined as the lesser of the two air gap spaces between the transducer and the target. **Make sure that the switch is stationary and perpendicular to the target before continuing.**

3. Press the HIGH button for the first key-stroke and the Relay LED will blink once.

**Automatic Empty**



4. Press the LOW button for the second key-stroke and the Relay LED will blink twice.

5. The Power LED will flash from AMBER to GREEN when the HIGH set point has been accepted into memory.

6. Position the switch at the desired LOW set point distance defined as the greater of the two air gap spaces between the transducer and the target. **Make sure that the switch is stationary and perpendicular to the target before continuing.**

7. Press the LOW button for the first key-stroke and the Relay LED will blink three times.

8. Press the HIGH button for the second key-stroke and the Relay LED will blink four times.

9. The Power LED will flash from AMBER to GREEN when the LOW set point has been accepted into memory.

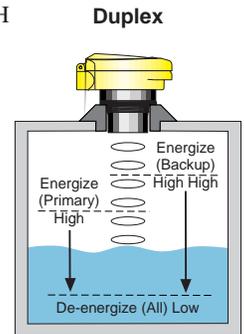10. Press SELECT to program the next relay channel or slide the RUN/CAL switch RIGHT to exit the CAL mode.

Automatic Empty
Programming



# PROGRAMMING

**Programming Duplexing Pump Control:** After having powered the switch with the appropriate supply voltage, entered the CAL mode, **selected relay channel 1** and erased any previously input set points, follow the below procedure:

1. Stretch the tape measurer out to the appropriate distance in between the switch and target.

2. Position the switch at the desired HIGH set point distance defined as the lesser of the two air gap spaces between the transducer and the target. **Make sure that the switch is stationary and perpendicular to the target before continuing.**

3. Press the HIGH button for the first key-stroke and the Relay LED will blink once.

**Duplex**



4. Press the LOW button for the second key-stroke and the Relay LED will blink twice.

5. The Power LED will flash from AMBER to GREEN when the HIGH set point has been accepted into memory.

6. Position the switch at the desired LOW set point distance defined as the greater of the two air gap spaces between the transducer and the target. **Make sure that the switch is stationary and perpendicular to the target before continuing.**

7. Press the LOW button for the first key-stroke and the Relay LED will blink three times.

8. Press the HIGH button for the second key-stroke and the Relay LED will blink four times.

9. The Power LED will flash from AMBER to GREEN when the LOW set point has been accepted into memory.

10. **Press SELECT to program relay channel 2.**

Duplex Programming
(Primary)
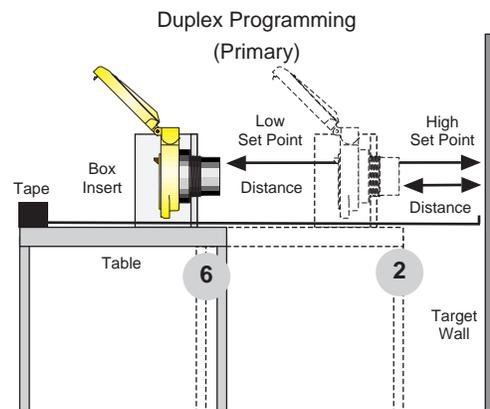


11. Position the switch at the desired HIGH HIGH set point distance defined as the air gap space between the transducer and the target. **Make sure that the switch is stationary and perpendicular to the target before continuing.**

# PROGRAMMING

## Programming Duplex Pump Control (continued):

Duplex Programming
(Backup)

Tape

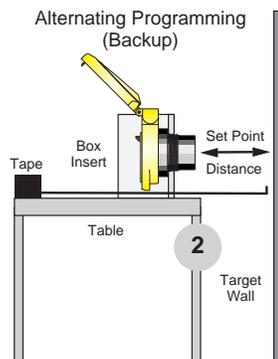Box Insert

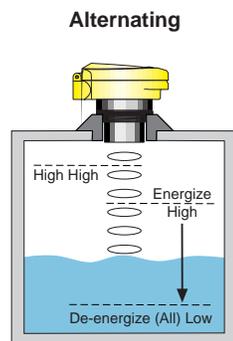Set Point
Distance

Table

11

Target Wall
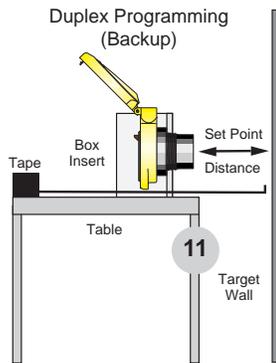
12. Press the HIGH button for the first key-stroke and the Relay LED will blink once.

13. Press the HIGH button again for the second key-stroke and the Relay LED will blink twice.

14. The Power LED will flash from AMBER to GREEN when the set point has been accepted into memory.

15. Press the SELECT switch repeatedly until BOTH LEDs for Relay 1 and Relay 2 are ON (after Relay 3).

16. Press the HIGH button for the first key-stroke and Relay LED will blink once.

17. Press the HIGH button again for the second key-stroke and Relay LED will blink twice.

18. Press SELECT to program the next relay channel or slide the RUN/CAL switch RIGHT to exit the CAL mode.

**Note:** The duplexing mode can be disabled by repeating Steps #15-18 and pressing the LOW button instead of the HIGH button in the HIGH/HIGH combination.

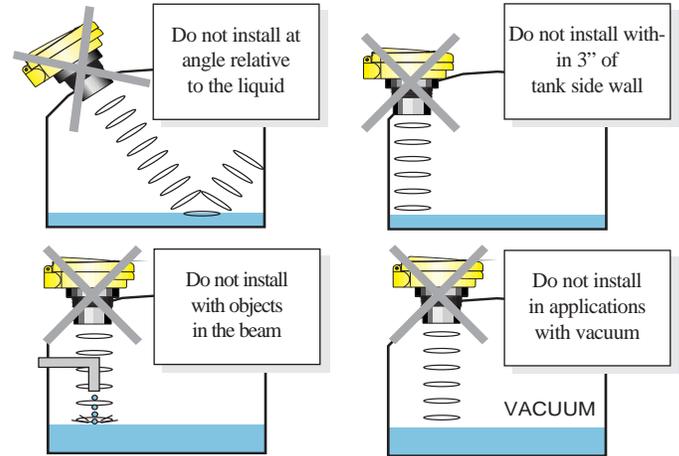## Programming Alternating Control Only:

1. To program the switch for alternating control only without the lead-lag function, follow the instructions for Programming Duplexing Pump Control (Steps 11 and 12). The difference between Duplexing and Alternation is the location of the Relay 2 set point. Set Relay 2 close to the deadband without crossing into the deadband and above the highest level of expected liquid.

**Alternating**

High High

Energize High

De-energize (All) Low

**Note:** The alternation mode can be disabled by repeating Steps #15-18 and pressing the LOW button instead of the HIGH button in the HIGH/HIGH combination.

Alternating Programming
(Backup)

Tape

Box Insert

Set Point
Distance

Table

2

Target Wall

# INSTALLATION

Do not install at angle relative to the liquid

Do not install within 3" of tank side wall

Do not install with objects in the beam

Do not install in applications with vacuum

VACUUM

⚠ **Warning** ⚠

**Install the appropriate installation fitting. Make sure that the fitting and switch threads are not damaged or worn. Install the switch with the included Viton mounting gasket. Hand tighten the switch within the fitting. Perform an installed leak test under normal process conditions prior to system start up.**

**Gasket**

**Adapter**

**Flange on Riser**

Height

Riser

Inner Diameter

**Bracket**

**Stand Pipe**

Ventilation Hole

Dead Band
Highest Liquid Level

2"/3" Minimum Diameter

Operational Range

Lowest Liquid Level

**A. Fitting Selection:** Check the switch part number to determine the required fitting mount size and thread type. The switch is commonly installed in tank adapters, flanges, brackets or stand pipes.

1. **Adapter**: Select a tank adapter fitting with minimal height so as to ensure that the installed transducer will not be substantially elevated into the fitting. Avoid tank adapter styles with threads and/or pipe stops forward of the installed transducer.
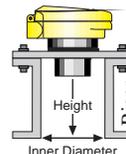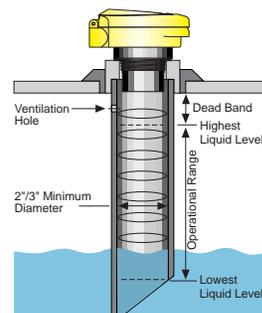
2. **Flange**: Tall flanges with narrow risers impede the acoustic signal. Select a fitting with the right riser height versus inner diameter geometry. The switch may be elevated up to 12" (30 cm) in a 6" (15 cm) riser, 8" (20 cm) in a 4" (10 cm) riser and 3" (7.6 cm) in a 2" (5 cm) riser.
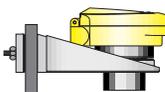
3. **Bracket**: The LM50 bracket or equivalent can be used for open tank top installations against the side wall.

4. **Stand Pipe**: A stand pipe may be used to dampen turbulence or separate surface foam. Select a 2" or larger pipe for models LU75-5_ _ 5 and LU72-5_ _ 5. Select a 3" or larger pipe for models LU71-5_ _5 and LU73-5_ _5. The pipe length should run the measurement span. Cut a 45° notch at the bottom of the pipe and drill a 1/4" pressure equalization hole high in the dead band.
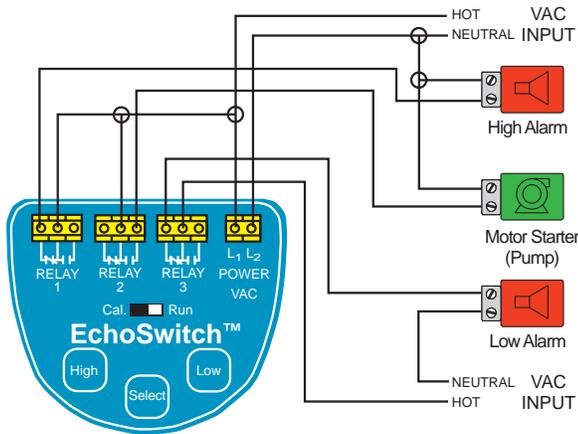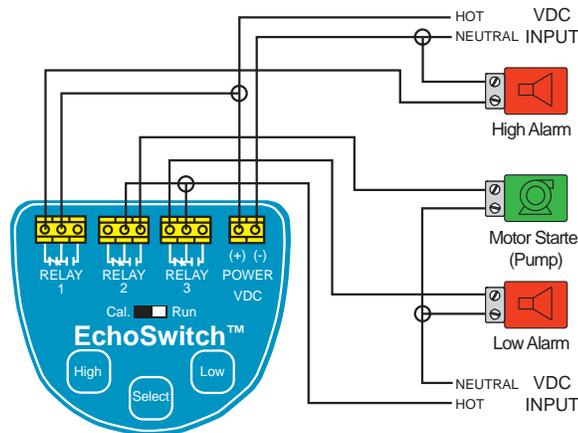
# WIRING

> ⚠️ **Warning** ⚠️
>
> To prevent damaging the relays, the use of an appropriate motor starter or secondary relay is ALWAYS recommended when actuating pumps or valves.
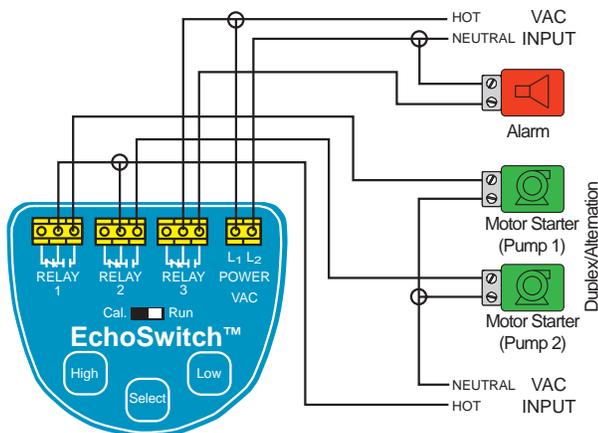
**A. Wiring a LU7_-50_5 (95-250 VAC) to a Pump (Automatic Fill or Empty) and (Independent High and Low) Alarms**



**B. Wiring a LU7_-58_5 (12-28 VDC) to a Pump (Automatic Fill or Empty) and (Independent High and Low) Alarms**



**C. Wiring a LU7_-50_5 (95-250 VAC) to Pumps (Duplex or Alternating) and Alarm (Out of Bounds, High or Low)**



# TROUBLESHOOTING

**A. Power LED SOLID GREEN in RUN Mode:** During normal operation in the RUN mode, the Power LED will remain solid GREEN indicating that the switch has power and is tracking the level. The RED Relay LEDs will be ON or OFF as programmed per the current level state.



**RED** (Solid ON or OFF)    **Green** (Solid ON)
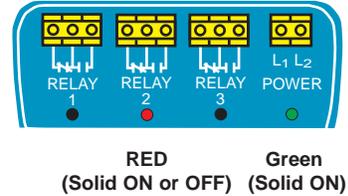
**B. Power LED AMBER in RUN Mode:** If while in the RUN mode, the Power LED turns solid AMBER, this indicates that the switch has power, but is not tracking the level and has entered into it's FAIL-SAFE mode. Coincidently, all Relay LEDs will be OFF, indicating that the relays are in their de-energized safe-state. The switch will remain in the FAIL-SAFE mode until such time that it re-acquires the level and automatically returns to normal operation as programmed. Check the following points in determining why the switch is not tracking the level:



**RED** (All OFF)    **Amber** (Solid ON)
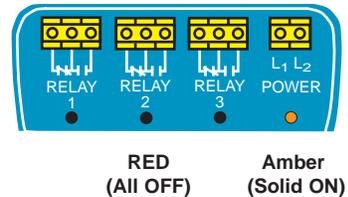
**Application** 1. Observe and attempt to correlate an application event such as foaming, substantial vapor and/or turbulence that may reduce or eliminate the acoustic signal strength. Read the Maximum Applied Range (Step #4-E) and consider reinstalling the switch in a Stand-Pipe (Step #11-A-4) to dampen turbulence and/or separate the point of measurement from surface foam and/or vapor.

**Installation** 2. Verify the switch is installed correctly per the INSTALLATION section (Step #11) of this manual. Initially focus on the fitting and/or obstructions within the beam that may reduce or eliminate the acoustic signal transmission-receipt. Consider changing the fitting or relocating the switch to another area of the tank.

3. Verify that the tank height is not greater than the maximum range of the switch. If so, purchase and install a switch with the appropriate range for your tank height or level distance.

**C. Relay LED Changes State, But Relay Doesn't Change:** Verify that the switch is wired correctly per the WIRING section (Step #12) of this manual. If so, the Relays may have been damaged due to a high inductive load or carbon build-up over time.
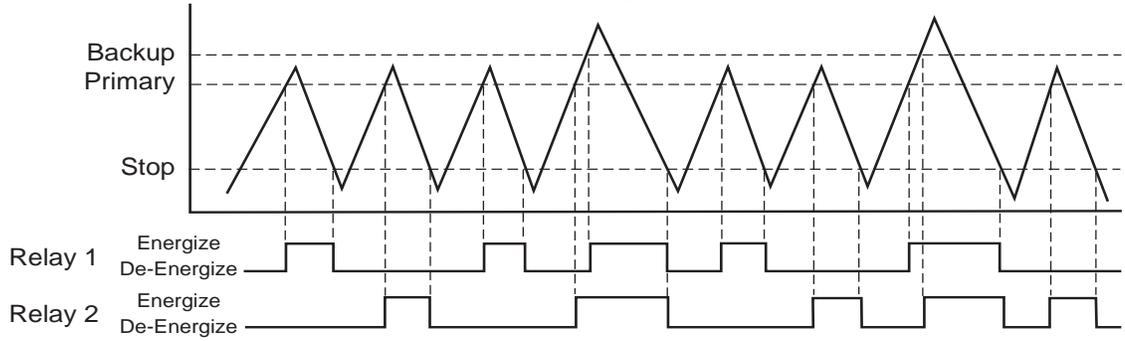
**D. Additional Information:** Go to www.digitalinfinity.com and click on the nav-bar "Application Info" button for FAQ's, tech-tips, case studies, white papers, glossary and success stories.
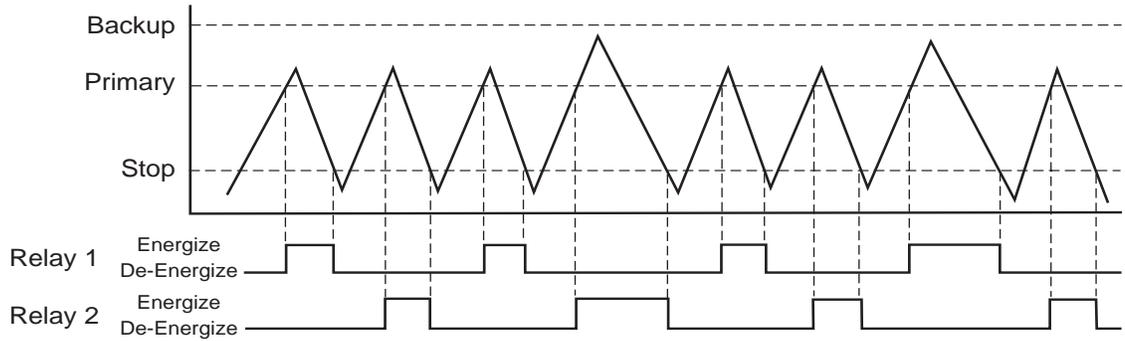
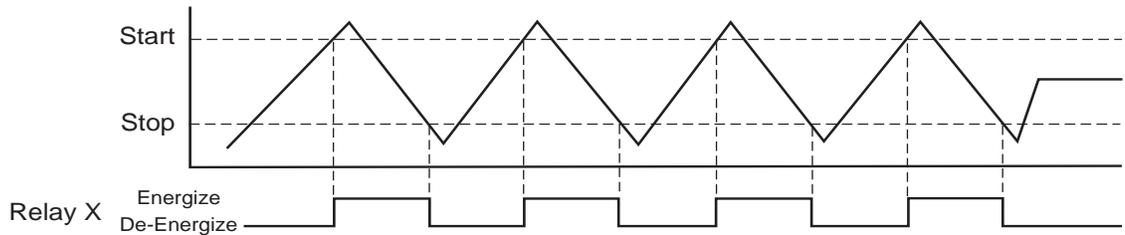## OPERATION

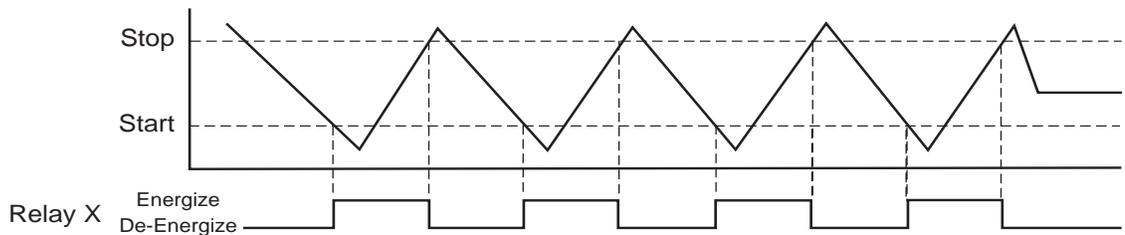### Functional Chart for Relay On/Off Operations



**Duplexing Control Operation**

**Alternating Control Operation**

**Automatic Empty Operation**

**Automatic Fill Operation**

**Out of Bounds Operation**