

## 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](http://www.flowline.com)**.

On-line Warranty Registration can be found under Contact Us is 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®

## MiniMe™ 2-Wire Ultrasonic Level Transmitter Model LU12/LU13/LU14 Owner's Manual



Version 0.2.1A

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Manual # LU900012

10/02

## 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 for a period which is equal to the shorter of one year from the date of purchase of such products or two years from the date of manufacture of such products.

This warranty covers only those components of the products which are non-moving and not subject to normal wear. Moreover, products which are modified or altered, and electrical cables which are cut to length during installation are not covered by this warranty.

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 thereof) which Flowline's examination proves to its satisfaction to be defective. FLOWLINE SHALL HAVE NO OBLIGATION FOR CONSEQUENTIAL DAMAGES TO PERSONAL OR REAL PROPERTY, OR FOR INJURY TO ANY PERSON.

This warranty does not apply to products which have been subject to electrical or chemical damage due to improper use, accident, negligence, abuse or misuse. Abuse shall be assumed when indicated by electrical damage to relays, reed switches or other components. The warranty does not apply to products which are damaged during shipment back to Flowline's factory or designated service center or are returned without the original casing on the products. Moreover, this warranty becomes immediately null and void if anyone other than service personnel authorized by Flowline attempts to repair the defective products.

Products which are thought to be defective must be shipped prepaid and insured to Flowline's factory or a designated service center (the identity and address of which will be provided upon request) within 30 days of the discovery of the defect. Such defective products must be accompanied by proof of the date of purchase.

Flowline further reserves the right to unilaterally waive this warranty and to dispose of any product returned to Flowline where:

- a. There is evidence of a potentially hazardous material present with product.
- b. The product has remained unclaimed at Flowline for longer than 30 days after dutifully requesting disposition of the product.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE OF THIS WARRANTY. This warranty and the obligations and liabilities of Flowline under it are exclusive and instead of, and the original purchaser hereby waives, all other remedies, warranties, guarantees or liabilities, express or implied. EXCLUDED FROM THIS WARRANTY IS THE IMPLIED WARRANTY OF FITNESS OF THE PRODUCTS FOR A PARTICULAR PURPOSE OR USE AND THE IMPLIED WARRANTY OF MERCHANTABILITY OF THE PRODUCTS.

This warranty may not be extended, altered or varied except by a written instrument signed by a duly-authorized officer of Flowline, Inc.

# SPECIFICATIONS

## Step One

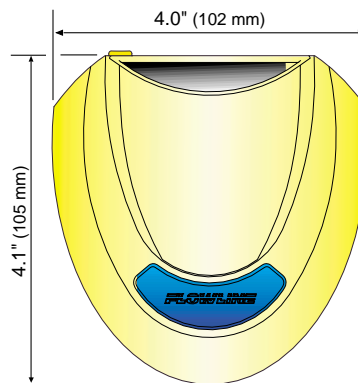
Range:	LU12: 0.16' to 10' (5 cm to 3m) LU13: 0.33' to 25' (10 cm to 7.6m) LU14: 0.66' to 40' (20 cm to 12.2m)
Accuracy:	± .15% of span in air
Resolution:	0.125" (3 mm)
Beam width:	LU12: 2" diameter LU13: 3" diameter LU14: 3" diameter
Dead band:	LU12: 0.16' (5cm) LU13: 0.33' (10cm) LU14: 0.66' (20 cm)
LED indication:	Power, indication and echo-status
Memory:	Non-volatile
Supply voltage:	14 - 28 VDC
Loop resistance:	600 Ohms @ 24 VDC
Signal output:	4-20 mA, two-wire
Calibration:	Target, calibration wire
Fail-safety:	Reverts to 22 mA
Process temperature:	F: -40° to 160° C: -40° to 71°
Temp. compensation:	Automatic
Electronics temp:	F: -40° to 160° C: -40° to 71°
Pressure rating:	30 psi (2 bar) @ 25 °C., derated @ 1.667 psi (0.113 bar) per °C. above 25 °C.
Enclosure rating:	NEMA 6 (IP67)
Installed height:	1.7" (4.3 cm) above tank process mount
Enclosure material:	Polycarbonate, PC/ABS FR
Transducer materials:	PVDF Kynar®
Cable jacket mat'l:	Polypropylene
Cable type:	3-conductor, shielded
Cable length:	10' (3 m)
Process mount:	LU12: 1" NPT (1" G) LU13/14: 2" NPT (2" G)
Mounting gasket:	Viton® (G version only)
Classification:	General purpose
CE compliance:	EN 50082-2 immunity (pending) EN 55011 emission

## Overview:

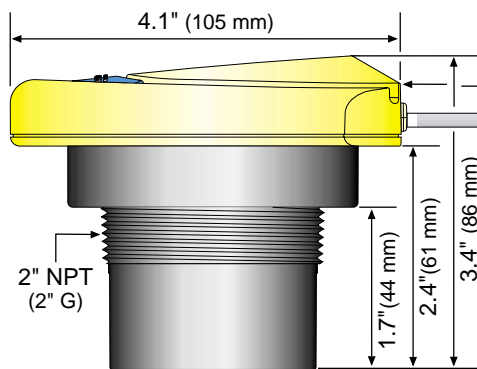
MiniMe redefines performance for continuous non-contact ultrasonic level measurement in bulk chemical, oil and waste storage tanks up to 40' (12.2 m), and is ideally suited for challenging corrosive, coating or waste liquids. The compact corrosion proof package is completely sealed and stands only 1.7" above the tank top. The transmitter is broadly selected for atmospheric bulk storage, day tank, process vessel and waste sump applications. Media examples include ink and polymer.

The transmitter may be spanned in seconds using the calibration wire, a DC power supply and flat reflective target. To set the 4 mA span, attach the calibration wire to the return side of the power supply, hold the transmitter at the desired range and turn power on until the Flowline logo plate illuminates. To set the 20 mA span, connect the calibration wire to the positive side of the power supply and follow the same procedure.

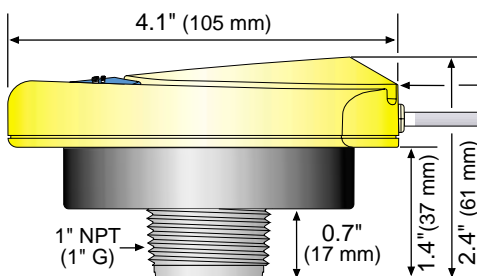
Part Number	Max. Range	Deadband	Beam	Thread
LU12-5001	10' (3m)	2" (5cm)	2"	1" NPT
LU12-5061	10' (3m)	2" (5cm)	2"	1" G
LU13-5001	25' (7.6m)	4" (10cm)	3"	2" NPT
LU13-5061	25' (7.6m)	4" (10cm)	3"	2" G
LU14-5001	40' (12.2m)	8" (20cm)	3"	2" NPT
LU14-5061	40' (12.2m)	8" (20cm)	3"	2" G



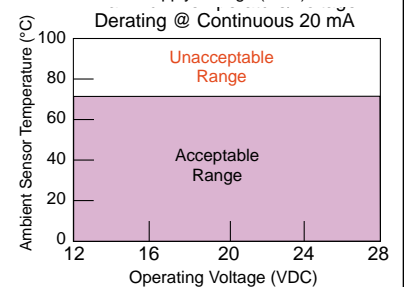
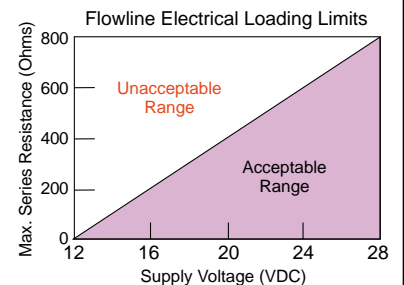
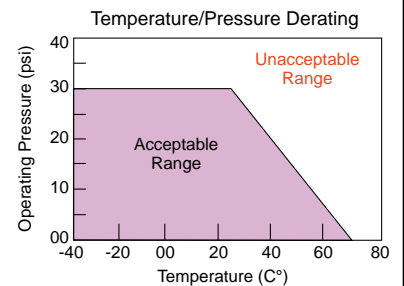
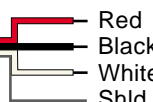
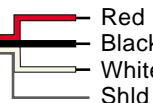
**MiniMe - Top View**  
LU12, LU13 & LU14 Series



**MiniMe - Side View**  
LU13 & LU14 Series



**MiniMe - Side View**  
LU12 Series



## SAFETY PRECAUTIONS

### Step Two

#### **About this Manual:**

PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on the MiniMe™ Ultrasonic Level Transmitter from FLOWLINE: LU12-50\_1, LU13-50\_1 and LU14-50\_1. Please refer to the part number located on the transmitter label to verify the exact model which you have purchased.

#### **User's Responsibility for Safety:**

FLOWLINE manufactures a wide range of liquid level sensors and 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:**

Because this is an electrically operated device, only properly-trained staff should install and/or repair this product. Use a proper sealant with all installations. Note: *Always install the Viton gasket with the LU1\_-5061. The G threaded version of the MiniMe will not seal unless the gasket is installed properly.* Never overtighten the transmitter within the fitting. Always check for leaks prior to system start-up.

#### **Wiring and Electrical:**

A supply voltage of 14-28 VDC is used to power the LU12/LU13/LU14 series transmitter. The sensor systems should never exceed a maximum of 28 volts DC. Electrical wiring of the sensor should be performed in accordance with all applicable national, state, and local codes.

#### **Material Compatibility:**

The MiniMe™ 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 liquids it will contact.

#### **Enclosure:**

While the transmitter housing is liquid-resistant when installed properly, it is not designed to be immersed. It should be mounted in such a way that the enclosure and transducer do not come into contact with fluid.

#### **Make a Fail-Safe System:**

Design a fail-safe system that accommodates the possibility of transmitter or power failure. In critical applications, FLOWLINE recommends the use of redundant backup systems and alarms in addition to the primary system.

#### **Flammable, Explosive and Hazardous Applications:**

The LU12/LU13/LU14 series transmitter systems should not be used within flammable or explosive applications.

#### **Warning**

Always install the Viton gasket with all versions of the LU1\_-5061. The G threaded version of the MiniMe will not seal unless the gasket is installed properly.

## TECHNOLOGY

### Step Three

#### **About Digital Infinity:**

Digital Infinity provides unparalleled sensor performance and application benefits through advanced digital surface imaging and signal processing technology.

#### **Performance Benefits:**

Digital Infinity sensors are accurate to  $\pm 0.15\%$  of measured span in air with no accuracy degrading over span. The powerful sensors are capable of ranges up to 40' with only a 2" transducer. The minimum dead band is 2" for optimum tank filling capacity. The applied beam width is narrowed to an amazing 3" of minimum required free space across the span for use in restricted locations.

#### **Application Benefits:**

Digital Infinity sensors are widely installed in tank adapters, still wells or flanges, and can even be located in the center of parabolic dome top tanks. The raw signal strength and processing capacity enable the sensor to measure through significant vapor density. The digital surface imaging creates a living process map that rejects obstacle reflections from within the broader beam. The same imaging technology enables deep measurement into sloped cone tank bottoms. With various power modes, the sensor is able to detect and adjust for the presence of process foam. During agitation, the digital surface imaging maintains focus and accuracy. In the event of acoustic signal loss, the sensor will invert to the safe state and indicate a diagnostic string for use in troubleshooting.



***Its level made simple!***

# ELECTRICAL

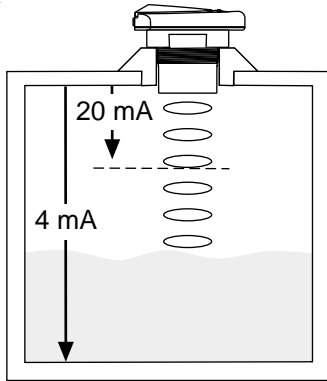
## Step Four

**Supply Voltage:** The supply voltage to the LU12/LU13/LU14 series transmitter should never exceed a maximum of 28 VDC. Flowline controllers have a built-in 24 VDC power supply, which provides power to all of Flowline's transmitters. Alternative controllers and power supplies, with a minimum output of 14 VDC up to a maximum output of 28 VDC, may also be used with the LU12/LU13/LU14 series transmitter.

**Required Cable Length:** Determine the length of cable required between the MiniMe and its point of termination. Allow enough slack to ensure the easy installation, removal and/or maintenance of the transmitter. The cable length may be extended up to a maximum of 1000 feet, using a well-insulated, shielded wire from 14 to 20 gauge, depending on the overall cable run.

**Wire Stripping:** Using a 10 gauge wire stripper, carefully remove the outer layer of insulation from the last 1-1/4" of the transmitters cable. Unwrap and discard the exposed foil shield from around the signal wires, leaving the drain wire attached if desired. With a 20 gauge wire stripper, remove the last 1/4" of the colored insulation from the signal wires.

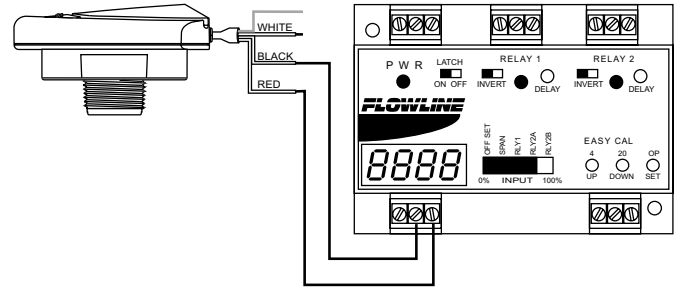
**Signal Outputs (4-20 mA Current Signal):** The standard method used by Flowline controllers and panel meters; this technology uses only the Red and Black wires from the MiniMe level transmitter. The White Wire is only used to calibrate the transmitter. The transmitter is typically field programmed, such that the output is 4 mA for an empty tank and 20 mA for a full tank. The White wire is only used to program the 4 mA and 20 mA settings and is not used during normal operation.



# WIRING

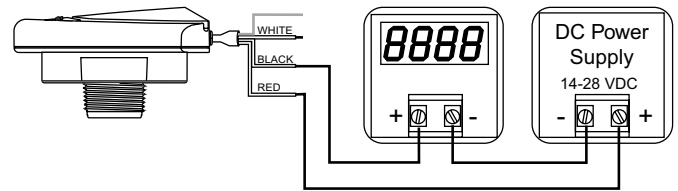
## Step Five

**Wiring to a FLOWLINE Continuous Controller (LC52 Series):** Connect the Red wire to the positive 24 VDC, 25 mA terminal on the LC52 series controller. Connect the Black wire to the GND terminal on the LC52 series controller (See illustration below). Check the LC52's instruction manual for setting the LC52 for loop powered operation.



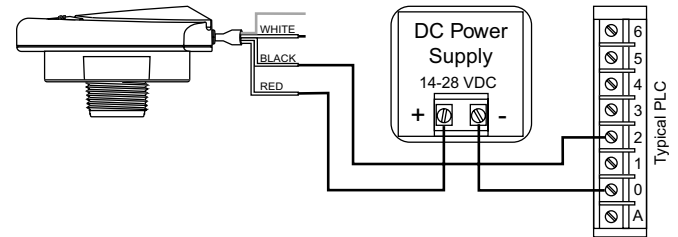
**Wiring to a Two-Wire Loop Powered Indicator:**

The MiniMe requires 14-28 VDC power and an indicator which receives a 4-20 mA current input. Connect the Red wire of the MiniMe level transmitter to the positive VDC terminal on the power supply. Connect the Black wire on the LU12/LU13/ LU14 series to the (+) terminal on the loop indicator. Connect the (-) of the loop indicator to the (-) of the power supply (See illustration below).



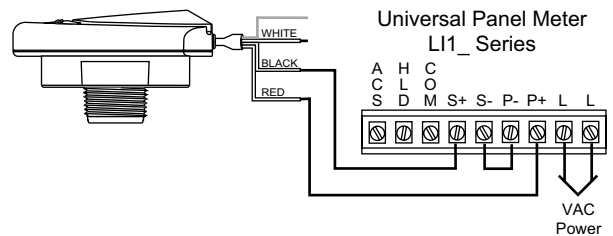
**Wiring to a Typical PLC:**

The MiniMe requires a PLC which provides a 14-28 VDC excitation and receives a 4-20 mA current input. Connect the Red wire of the LU12/LU13/LU14 series to the positive VDC power terminal. Connect the Black wire on the MiniMe transmitter to the (+) channel on the PLC. Connect the (-) of the PLC to the (-) of the power terminal (See illustration below).



**Wiring to a Flowline Universal Panel Meter:**

Connect the Red wire to the P+ (Positive 24 VDC) terminal on the LI1\_ series panel meter. Connect the Black wire to the S+ (Signal Input) terminal on the LI1\_ series panel meter. Jumper between the S- (Signal return) terminal and the P- (Power return) terminal on the LI1\_ series panel meter (see illustration below).



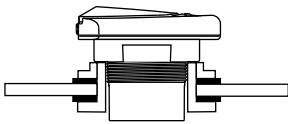
# INSTALLATION

## Step Six

FLOWLINE's LU12/LU13/LU14 transmitter is commonly installed in either a Tank Adapter or Flange. Installation requires a 1" NPT (G) tank adapter or flange for the LU12 series and a 2" NPT (G) tank adapter or flange for the LU13 or LU14 series.

1. Install the appropriate fitting (tank adapter or flange) in the top wall of the tank. Prior to installation, make sure that the fitting has been installed properly and checked for leaks. Use a proper sealant at the time of installation to ensure a liquid-tight seal. Secondly, make sure that the threads are not damaged or worn.
2. Insert the Transmitter into the fitting and tighten to hand tight.
3. Always check for leaks prior to system start-up. To ensure proper installation, a complete leak test and simulation of actual process conditions should be preformed.

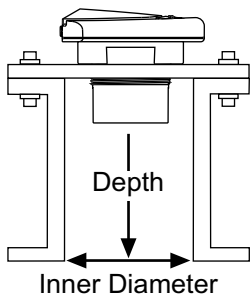
### Tank Adapter



### Tank Adapter Installation:

Choose a fitting which minimizes interference to sound pulses. Fittings with two sets of threads (T x T) will increase interference and could reduce the overall range of MiniMe.

### Flange



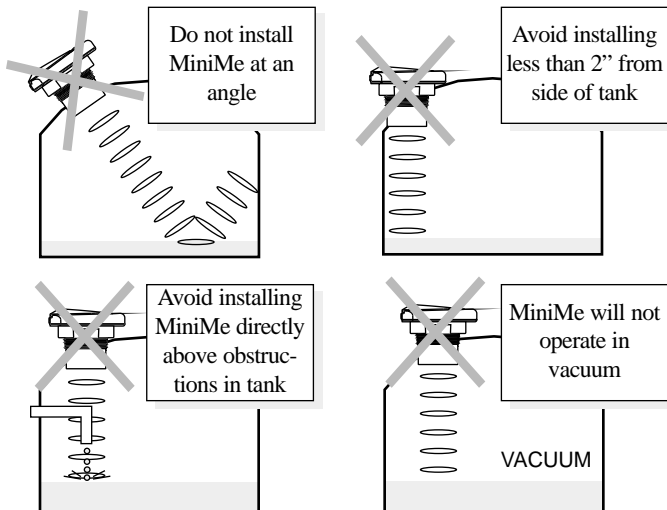
### Flange Installation:

For optimum installation, choose the Tank Adapter installation method. If the MiniMe is installed in a Flange, use a flange with a maximum height of 12 inches (30.5 cm) and a minimum Inner Diameter of 3 inches (80 mm) for best results.

### Warning

Do not install the Minime™ in pressurized applications above 30 psi. Always install the Viton gasket with all versions of the LU1\_-5-61. The G threaded version of the Minime will not seal unless the gasket is installed properly and checked for leaks.

Use a proper sealant at the time of installation to ensure a liquid-tight seal. Secondly, make sure that the fittings threads are not damaged or worn.



# CALIBRATION

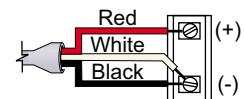
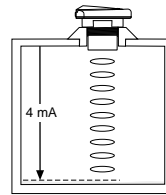
## Step Seven

### Introduction:

The MiniMe is typically calibrated in two steps, when the tank is empty and when the tank is full. Either step can be done first and can be changed at any time. *Please note that the MiniMe can only be set at the exact distance for the empty or full levels of liquids.* The MiniMe can be targeted at either the actual liquid or at a fixed object such as a wall or mirror. *Also note that the calibration time will increase as the measurement distance increases.* At the maximum range of the transmitter, calibration times can approach 30 seconds or longer.

### Empty Calibration - 4 mA Setting:

1. Power down the LU12/LU13/LU14 series transmitter.
2. Position the transmitter at the exact distance for a 4 mA or empty setting (see illustration below).



3. Connect the White Wire to the Black Wire (low side) - Negative Terminal (see illustration above).

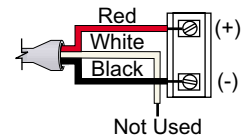
4. Add power to the transmitter.

5. Wait until you see a the LED flash on the LU12/LU13/LU14 series transmitter.



6. Power down the transmitter

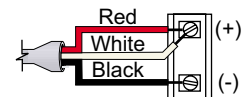
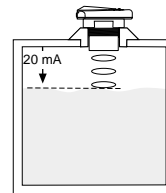
7. Remove the White Wire from the Black Wire (low side) - Negative Terminal (see illustration). Secure the White wire is a safe position so it can never come into contact with the exposed Red or Black wires during normal operation.



8. Return power to the LU12/LU13/LU14 series transmitter for normal operation.

### Full Calibration - 20 mA Setting:

1. Power down the LU12/LU13/LU14 series transmitter.
2. Position the transmitter at the exact distance for a 20 mA or full setting (see illustration below).



3. Connect the White Wire to the Red Wire (high side) - Positive Terminal (see illustration above).

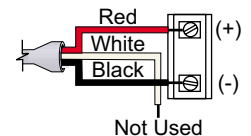
4. Add power to the transmitter.

5. Wait until you see the LED flash on the LU12/LU13/LU14 series transmitter.



6. Power down the transmitter

7. Remove the White Wire from the Red Wire (high side) - Positive Terminal (see illustration). Secure the White wire is a safe position so it can never come into contact with the exposed Red or Black wires during normal operation.



8. Return power to the LU12/LU13/LU14 series transmitter for normal operation.

## CALIBRATION

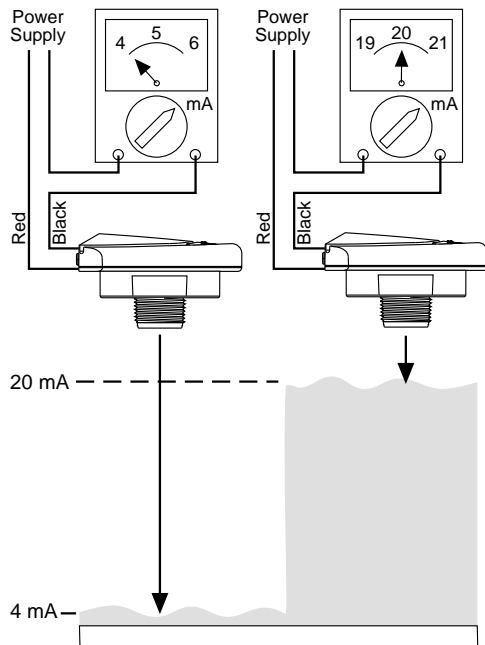
### Step Eight

The MiniMe™ is factory calibrated with a pre-programmed measurement span. The 4 mA position is located at the maximum distance from the transducer face of the LU12/LU13/LU14 series. The 20 mA position is located at the dead band distance from the transducer face. Refer to the chart below for the exact distances.

Transmitter	EC4 setting	EC20 setting
LU12 series	120" (304.8 cm)	2" (5 cm)
LU13 series	300" (762 cm)	4" (10 cm)
LU14 series	480" (1219.2 cm)	8" (20 cm)

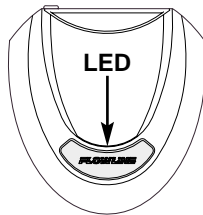
### Testing the MiniMe:

1. Connect a multimeter in series to read the current output.
2. Verify that the current signal decreases as the distance from the liquid to MiniMe increases.
3. Verify that the current signal increases as the distance from the liquid to the MiniMe decreases.



### LED Indication:

The MiniMe™ features a single LED indicator which is used for fail-safe and programming indication. During normal operation, the LED will be OFF.



### Calibration:

During calibration, the LED will flash once when the 4 mA or 20 mA distance has been set within the MiniMe. Please note that the calibration time will increase as the measurement distance increases. At the maximum range of the transmitter, calibration times can approach 30 seconds or longer.

### Fail-Safe Operation:

During normal operation, the LED will turn ON when the transmitter does not receive a signal return (Loss of Signal), forcing the transmitter into a fail-safe mode. During the fail-safe mode, the current will increase up to 22 mA and hold until the acoustic signal is re-acquired. Once re-acquired, the LED will turn OFF and the current will indicate the appropriate measured value. A flashing LED indicates that the distance the transmitter is reading is out of range with respect to the 4 mA and 20 mA settings.

## MAINTENANCE

### Step Nine

#### General:

The LU12/LU13/LU14 series transmitter itself requires no periodic maintenance except cleaning as required. It is the responsibility of the user to determine the appropriate maintenance schedule, based on the specific characteristics of the application liquids.

#### Cleaning Procedure:

1. Power: Make Sure that all power to the transmitter, controller and/or power supply is completely disconnected.
2. Transmitter Removal: In all installations, make sure that the tank is drained well below a safe level prior to removal. Carefully, remove the transmitter from the installation.
3. Cleaning the Sensor: Use a soft bristle brush and mild detergent, carefully wash the transducer of the MiniMe. Do not use a harsh abrasive such as steel wool or sandpaper, which might damage the transmitter's surface. Do not use incompatible solvents which may damage the PVDF transducer or the transmitters PP body.
4. Sensor Installation: Follow the appropriate steps of installation as outlined in the installation section of this manual.

#### Factory Reset:

MiniMe can be reset to its original factory settings. The factory settings are reset individually (4 mA or 20 mA) and follow a similar procedure listed in Calibration. To reset MiniMe:

1. Power down the LU12/LU13/LU14 series transmitter.
2. Connect the White Wire to either the Red Wire (20 mA reset) or to the Black Wire (4 mA reset).
4. Add power to the transmitter for approximately 2 seconds and then power down.
5. To reset the other setting, switch the White Wire to the other terminal and repeat Step 4.
6. Remove the White Wire from the Red or Black Wire. Secure the White wire in a safe position so it can never come into contact with the exposed Red or Black wires during normal operation.
7. Return power to the LU12/LU13/LU14 series transmitter for normal operation.

Unlike the Calibration procedure, the Blue LED will not flash when doing the factory reset.

#### Factory Settings for LU12/LU13/LU14 Series Transmitter

Transmitter	EC4 setting	EC20 setting
LU12 series	120" (304.8 cm)	2" (5 cm)
LU13 series	300" (762 cm)	4" (10 cm)
LU14 series	480" (1219.2 cm)	8" (20 cm)