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 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 ®

EchoDucer Two-Wire Ultrasonic Level Transmitter Model LU43 Owner's Manual

Version 1.1A

Manual # LU900015 LU43-0511-M1_1

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 MERCHANT ABILITY OF THE PRODUCTS.

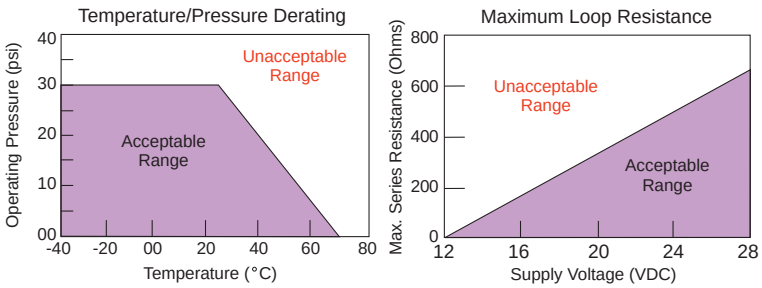
This warranty may not be extended, altered or varied except by a written instrument signed by a duly-authorized officer of Flowline, Inc.

SPECIFICATIONS

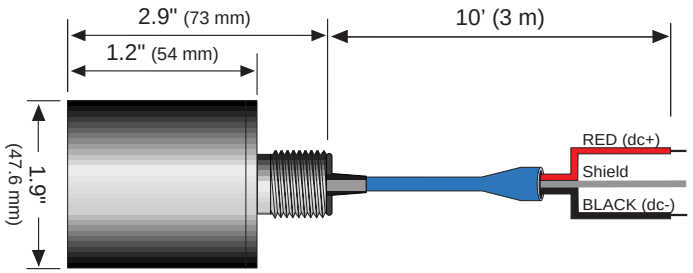
Step One

Range:	8" to 26.2' (20 cm to 8 m)
Accuracy	± 0.2% of span in air
Resolution:	0.039" (1 mm)
Beam width:	3" (7.6 cm) dia.
Dead band:	8" (20 cm)
Memory:	Non-volatile
Supply voltage:	12-28 VDC
Loop resist.:	500 Ohms @ 24 VDC
Signal output:	4-20 mA, two-wire
Fail-safety:	Reverts to 22 mA
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:	51_1: NEMA 4X (IP65) 5201: NEMA 6 (IP68)
Encl. material:	PC/ABS FR
Trans. insertion:	7" to 10'* (18 cm to 3.04 m*)
Trans. alignment:	Self-aligning, perpendicular to liquid surface
Trans. material:	PVDF
Trans. cable mat'l:	FEP
Strain relief mat'l:	Viton®
Conduit entrance:	Dual, 1/2" NPT
Process mount:	51_1: 2" NPT (2" G) 5201: 1/2" NPT
Mount. gasket:	Viton®
Classification:	General purpose
CE compliance:	EN 61326 EMC (pending)

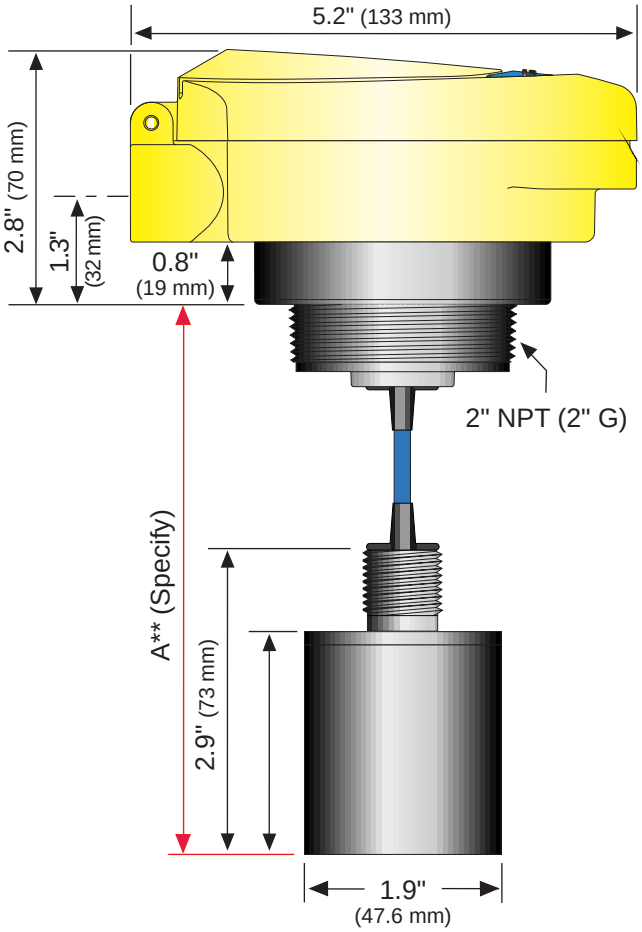
** Consult factory for longer length cables*



LU43-5201
Side View

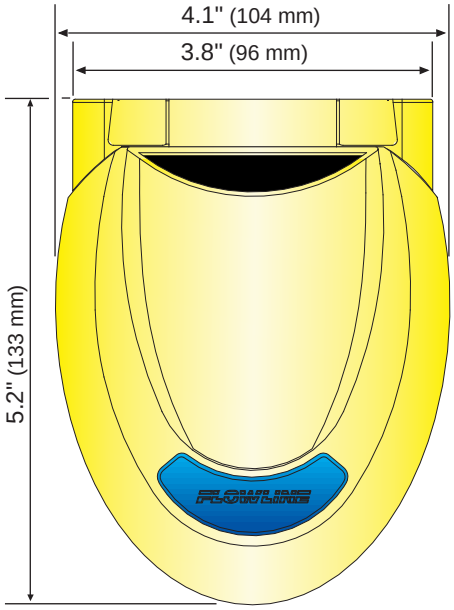


LU43-51_1
Side View



*** Minimum Length 7" (18 cm)*

LU43-51_1
Top View



SAFETY

Step Two

⚠ **About this Manual:** PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on the LU43-51_1-_ & LU43-5201 Ultrasonic Level Transmitter from FLOWLINE. Please refer to the part number located on the transmitter 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 transmitter with the Viton gasket and never overtighten the transmitter within the fitting. Always check for leaks prior to system start-up.

⚠ **Wiring and Electrical:** A supply voltage of 12-28 VDC is used to power the LU43 series transmitter. The sensor circuit 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 LU43-51_1-_ enclosure is made of a flame retardant Polycarbonate (PC/ABS FR). The transducer for all versions of the LU43 series is made of Polyvinylidene Fluoride (PVDF). Make sure that the model which you have selected is chemically compatible with the application media.

⚠ **Enclosure:** While the transmitter housing is liquid-resistant and the transducer is submersible, the LU43 series is not designed to be operational when immersed. It should be mounted in such a way that the enclosure does 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 transmitter 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 LU43-51_1-_ and LU43-5201 should not be used within classified hazardous environments.

⚠ **Warning** ⚠

Always use the Viton gasket when installing the LU43-51_1-_ transmitter, and always connect the shield wire to the common ground.

OVERVIEW

Step Three

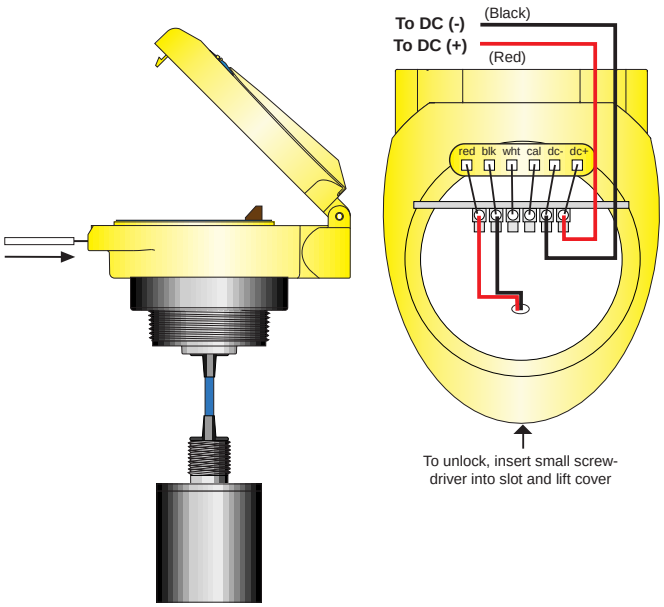
A. Application: The general purpose two-wire ultrasonic transmitter provides non-contact fixed span level measurement up to 26.2' or 8 m, and is ideally suited for challenging corrosive, coating or waste liquids. The transmitter is broadly selected for atmospheric bulk storage, day tank, process vessel and waste sump applications. Media examples include polymer, ink and hydrochloric acid.

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	Enclosure	Mount
LU43-5101-_	8m (26.2')	NEMA 4X (IP65)	2" NPT
LU43-5161-_	8m (26.2')	NEMA 4X (IP65)	2" G
LU43-5201	8m (26.2')	NEMA 6 (IP67)	1/2" NPT

C. NEMA 4X Enclosure (LU43-51_1-_ series only): The NEMA 4X (IP65) 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 small screwdriver or paperclip. 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 terminal strip. **Before closing the enclosure, make sure that the enclosure gasket is properly seated, and that any conduit fittings, cable connectors and/or plugs are installed correctly and sealed.**

LU43-51_1-_ Enclosure Shown



PREPARATION

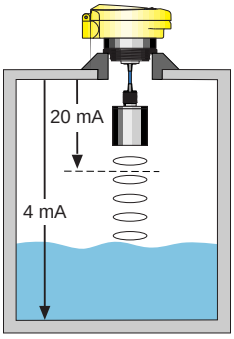
Step Four

A. Supply Voltage: The transmitter power supply voltage should never exceed a maximum of 28 VDC. Flowline controllers and meters have built-in 24 VDC power supplies for use with the transmitter. Alternative controllers and/or power supplies with a minimum output may also be used with the transmitter for calibration and/or operation.

B. Cable Length: The cable length may be extended up to a maximum of 1000 feet between the transmitter and its point of termination, using a well-insulated, shielded wire from 14 to 18 gauge.

C. Factory Span: Models LU43-5101-_, LU43-5161-_ & LU43-5201 are factory calibrated with 4 mA at their maximum range (tank empty) and 20 mA (tank full) at their minimum range values. 4mA is set at a distance of 26.2 feet (8 m) from the bottom of the transducer. 20 mA is set at a distance of 8 inches (20 cm) from the bottom of the transducer.

Factory Span

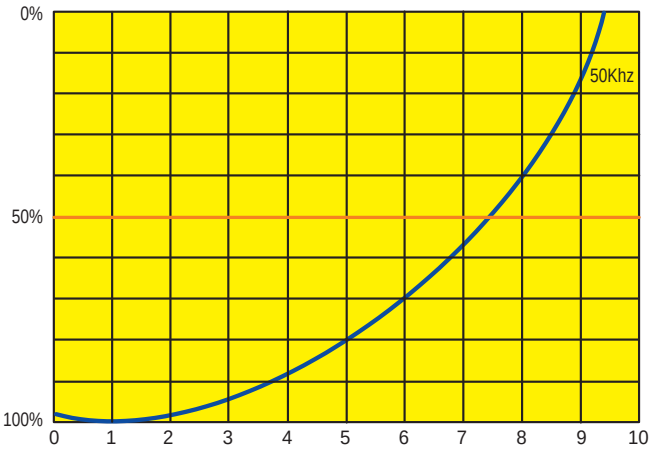


D. Maximum Applied Range: The Individual or cumulative effects of agitation, vapor or foam can reduce the overall quality of signal return and shorten the maximum applied range of the transmitter. To determine the maximum applied range of the transmitter in your application, refer to the below derating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

Maximum Applied Range Derating Chart

LU43-5_ _1-_

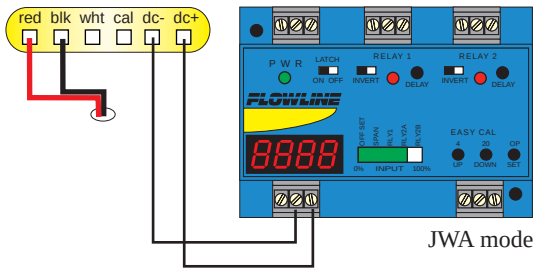
Agitation = 1-3 @ 50 kHz
Vapor = 3-5 @ 50 kHz
Foam = 4-6 @ 50 kHz



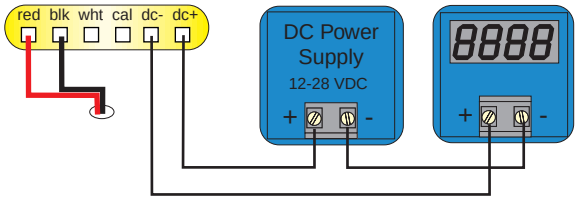
WIRING

Step Five

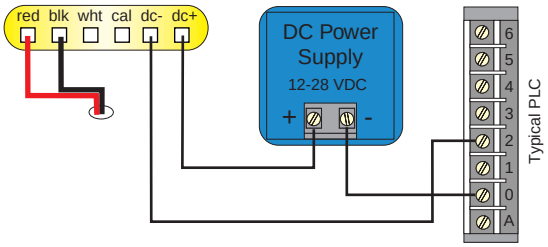
A. Wiring to a FLOWLINE LC52-1001 Controller



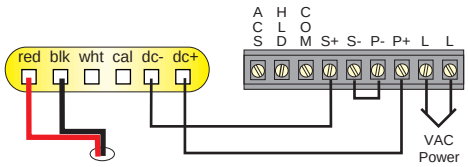
B. Wiring to a Typical Two-Wire Loop Powered Indicator



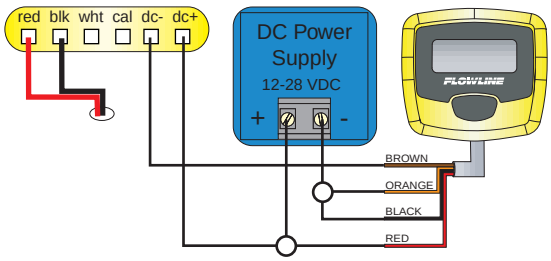
C. Wiring to a Typical Programmable Logic Controller



D. Wiring to a Flowline LI1_-1001 Universal Panel Meter



E. Wiring to a Flowline LI42-1001 MicroPoint Indicator



CONVERSION CHARTS

Step Six

Current to Distance Conversion Chart (Nominal)

Current mA	Distance inches	Current mA	Distance inches	Current mA	Distance inches
20.0	08.0	14.0	123.1	08.0	238.2
19.0	27.2	13.0	142.3	07.0	257.4
18.0	46.4	12.0	161.5	06.0	276.6
17.0	65.6	11.0	180.7	05.0	295.8
16.0	84.7	10.0	199.9	04.0	315.0
15.0	103.9	09.0	219.1		

Current mA	Distance cm	Current mA	Distance cm	Current mA	Distance cm
20.0	20.3	14.0	312.7	08.0	605.2
19.0	69.1	13.0	361.5	07.0	653.9
18.0	117.8	12.0	410.2	06.0	702.6
17.0	166.5	11.0	458.9	05.0	751.4
16.0	215.3	10.0	507.7	04.0	800.0
15.0	264.0	09.0	566.4		

Distance to Current Conversion Chart (Nominal)

Distance inches	Current mA	Distance inches	Current mA	Distance inches	Current mA
08	20.0	120	14.2	240	07.9
12	19.8	132	13.5	252	07.3
24	19.2	144	12.9	264	06.7
36	18.5	156	12.3	276	06.0
48	17.9	168	11.7	288	05.4
60	17.3	180	11.0	300	04.8
72	16.7	192	10.4	312	04.2
84	16.0	204	09.8	315	04.0
96	15.4	216	09.2		
108	14.8	228	08.5		

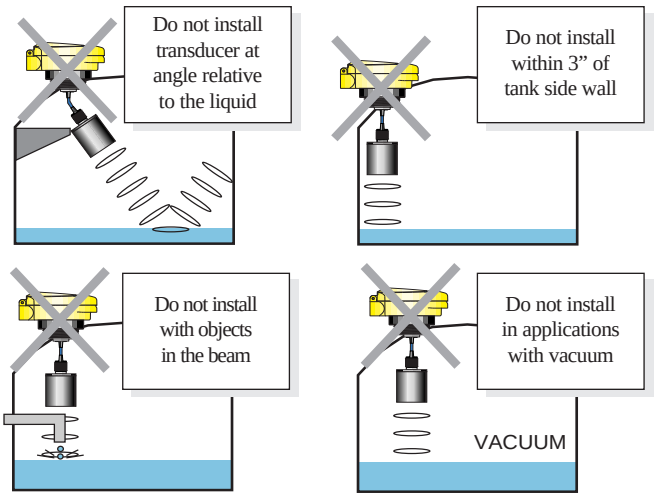
Nominal Scaling Factor (19.185 inches/mA)

Distance cm	Current mA	Distance cm	Current mA	Distance cm	Current mA
20.3	20.0	300	14.3	575	08.6
50	19.4	325	13.7	600	08.1
75	18.9	350	13.2	625	07.6
100	18.4	375	12.7	650	07.1
125	17.8	400	12.2	675	06.6
150	17.3	425	11.7	700	06.1
175	16.8	450	11.2	725	05.5
200	16.3	475	10.7	750	05.0
225	15.8	500	10.2	775	04.5
250	15.3	525	09.6	800	04.0
275	14.8	550	09.1		

Nominal Scaling Factor (48.731 cm/mA)

INSTALLATION

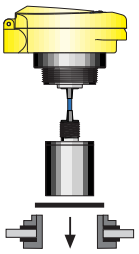
Step Seven



⚠ Warning ⚠

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

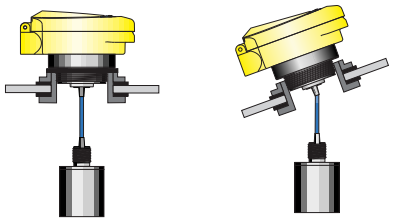
Gasket



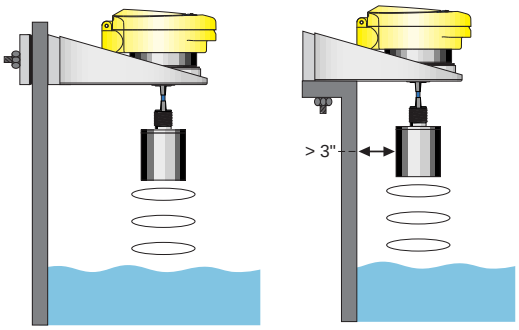
A. Fitting Selection: The transmitter is commonly installed in tank adapters, flanges, brackets or stand pipes.

1. **Adapter:** Select a tank adapter fitting that allows the transducer to freely hung above the surface of the liquid. Make sure that the transducer is at least 3" from the side wall of the tank and that the 3" beam column is free from any obstructions.

Adapter **Adapter @ Angle**



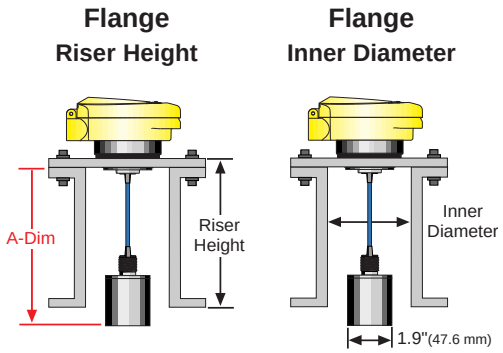
2. **Bracket:** The LM50 bracket or equivalent can be used for open tank top installations against the side wall or other mounting aperture. If the bracket is installed on the lip of the tank, make sure that the transducer is at least 3" from the side wall.



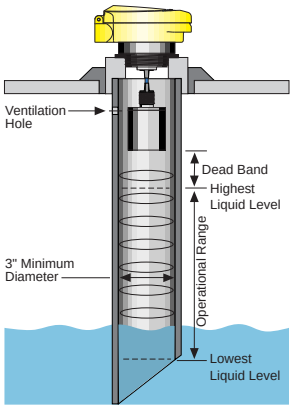
INSTALLATION

Step Eight

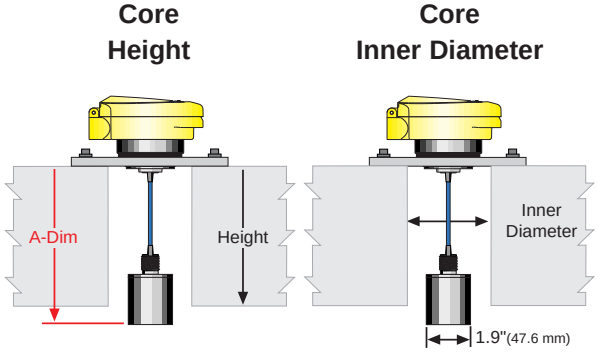
3. **Flange:** Flanges are typically mounted on tank risers. Make sure that the transducer face extends to (determined by the A-dimension length), or goes beyond the riser opening into the tank. **The riser inner diameter must be > 2" schedule 40. Make sure the installed transducer is freely suspended and does not contact or rest on the inner diameter of the riser.**



4. **Stand Pipe:** A stand pipe may be used to dampen turbulence or separate surface foam. Select a minimum 3" pipe if a stand pipe is required. 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.



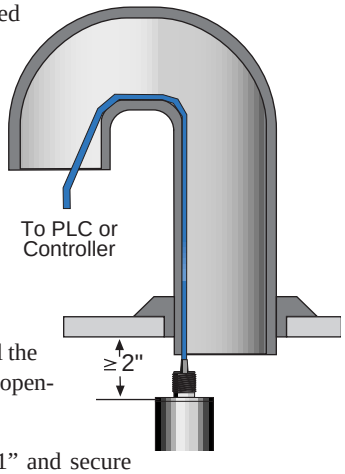
5. **Concrete Vessels:** Enclosed concrete vessels typically have thick walls that must be cored for transducer access. Make sure that the transducer face extends to (determined by the A-dimension length), or goes beyond the opening into the tank. **The core inner diameter must be > 2" schedule 40. Make sure the installed transducer is freely suspended and does not contact or rest on the inner diameter of the core.**



INSTALLATION

Step Nine

6. **Vent (LU43-5201 only):** The transmitter with cable only is ideal for difficult installations such as a vent. With vents 3" or larger, the transmitter may be installed from outside the tank through the vent. With smaller diameters vents, the transmitter must be installed from inside the tank with the cable inserted back through the vent. Make sure that the installed transducer extends slightly beyond the vent opening, and no more than 2" below the vent and/or tank top.

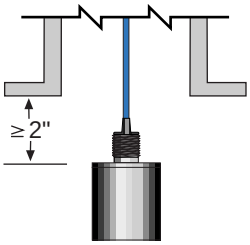


a) Gently lower the transducer until it freely hangs in the vessel.

b) Gently pull the cable until the transducer hits the vent opening and/or tank top.

c) Release the cable up to 1" and secure accordingly.

d) Note: The dead band is 8" from the face of the installed transducer. Make sure that the maximum tank fill height is below the dead band.

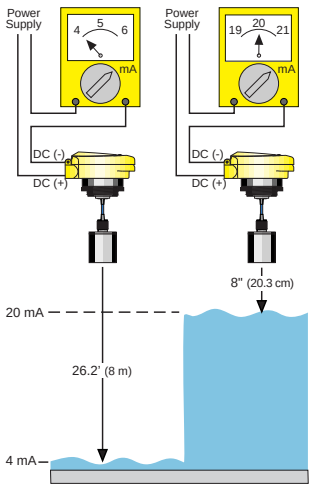


TROUBLESHOOTING

Step Ten

A. Testing the Transmitter

1. Connect a multimeter in series with the black wire to read the current output.
2. Verify that the current increases (tank filling) and decreases (tank emptying) appropriately in the calibrated span.
3. If not, carefully observe and attempt to correlate any installation, level or application event for more specific troubleshooting direction.



Factory Set Points		
Transmitter	**4 mA Setting**	**20 mA Setting**
LU43-5_ _1	26.2 (8m)	8 (20 cm)

B. Additional Information: Go to www.flowline.com and click on the nav-bar "Application Info" button for FAQ's, tech-tips, case studies, white papers, glossary and success stories.