

Warranty, Service & Repair

To register your product with the manufacturer, fill out the enclosed warranty card and return it immediately to:

Flowline Inc.
10500 Humbolt Street
Los Alamitos, CA 90720.

If for some reason your product must be returned for factory service, contact Flowline Inc. to receive a Material Return Authorization number (MRA) first, 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®

LA19 Series Ricochet Battery Powered Level Transmitter and Display



Version 1.0A

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Manual # LA900008

2/01

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

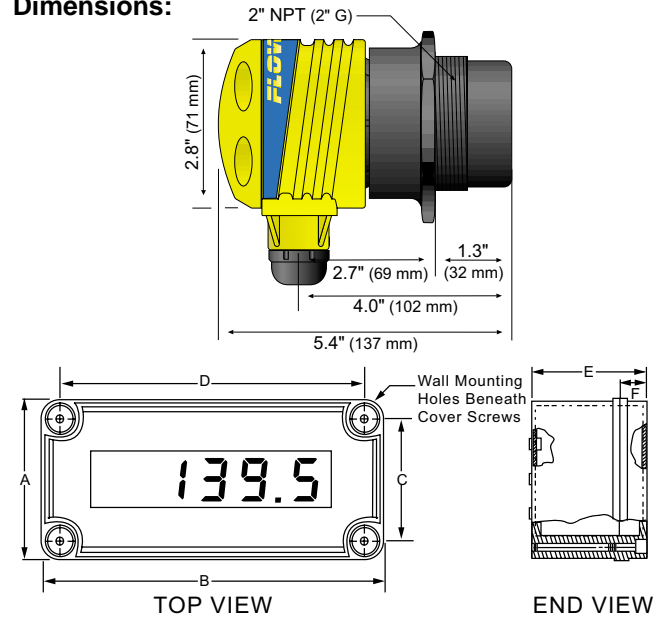
Transmitter:

Range: 0.5 to 12' (15.2 cm to 3.6 m)
Accuracy: $\pm .25\%$ of span (air)
Resolution: 0.125" (3 mm)
Frequency: 50 kHz (nominal)
Pulse rate: 3 pulses per second
Beam width: 8° conical
Dead band: 0.5' (15.2 cm) minimum
Supply voltage: 12 - 36 VDC
Max loop resistance: 600 Ohms @ 36 VDC
Signal output: 4-20 mA
Fail-safe diagnostics: Reverts to 22 mA
LED indication: Power and fail-safety
Temperature rating: F: -40° to 140°
 C: -40° to 60°
Temp. compensation: Automatic over entire range
Pressure rating: 30 psi (2 bar) @ 25 °C., derated @ 1.667 psi (0.113 bar) per °C. above 25 °C.
Enclosure rating: NEMA 4X (IP65)
Enclosure material: Polypropylene, U.L. 94VO
Transducer materials: PVDF
Mounting threads: 2" NPT (2" G)
Mounting gasket: Viton (2" G) metric only
Conduit connection: 1/2" NPT
CE compliance: EN 50082-2 immunity
 EN 55011 emission

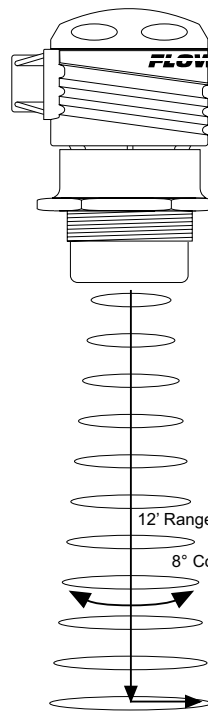
Display:

Input: 4-20 mA
Display: Sharp, 0.5" high LCD, 3½ digits, 1999, User selectable decimal point
Calibration: 2 step, Non-interacting zero and span.
Calib. range: 4 mA input: -500 to +500; 20 mA input: between 20 to 2000 above 4 mA display
Max. input current: 30 mA
Max. voltage drop: 1.5 VDC @ 20 mA;
Accuracy: $\pm 0.1\%$ of span, ± 1 count.
Connections: Removable screw terminal block (provided).
Op. temp. range: -40 to 85 °C
Enclosure: High impact-resistant ABS plastic body, clear ABS plastic cover; NEMA 4X 1/2" conduit hole provided at base. May be provided on back for panel mounting applications, call factory for details.
Power supply: Internal 18 VDC supply (2 x 9 VDC batteries), powers the 4-20 mA loop directly.

Dimensions:

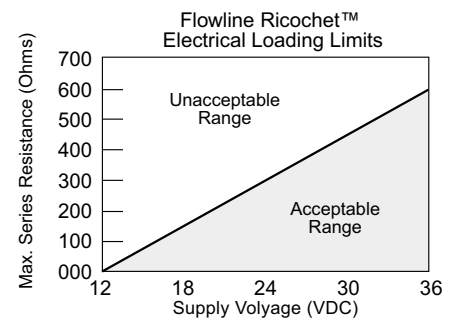
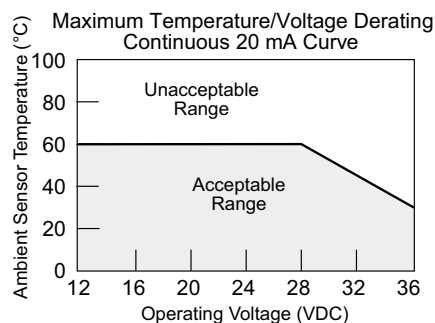
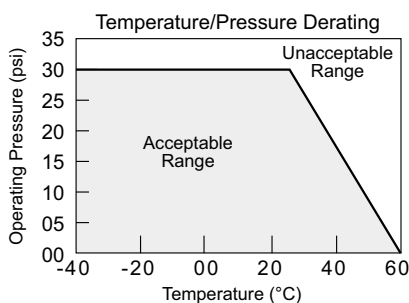
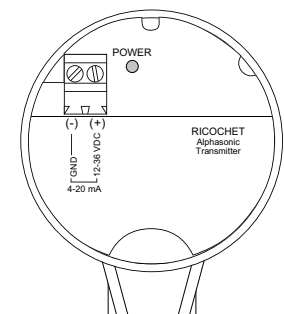


Beam Cone Radius:



Range Feet	Radius Inches	Radius cm
1	1.2	3.1
2	2.1	5.2
3	2.9	7.3
4	3.7	9.5
5	4.9	11.6
6	5.4	13.7
7	6.2	15.9
8	7.1	18.0
9	7.9	20.1
10	8.8	22.3
11	9.6	24.4
12	10.4	26.5

Ricochet Faceplate:



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 Ricochet Battery Powered Transmitter and Display for Bulk Tanks from FLOWLINE: LA19-5001 and LA19-5061. Please refer to the part number located on the sensor 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 2" Viton gasket with the LA19-5061. The G threaded version of the Ricochet will not seal unless the gasket is installed properly.* Never over-tighten the transmitter within the fitting. Always check for leaks prior to system start-up.

⚠ Wiring and Electrical:

A battery supply of 18 VDC is used to power the LA19 transmitter and display. The system should never exceed a maximum of 36 volts DC. Electrical wiring of the sensor should be performed in accordance with all applicable national, state, and local codes.

⚠ Material Compatibility:

The Ricochet™ transmitter housing is made of Polypropylene (PP). The transducer is made of Polyvinylidene Fluoride (PVDF). The display is made of a High impact-resistant ABS plastic. Make sure that the model which you have selected is chemically compatible with the application liquids it will contact.

⚠ Enclosure:

While the transmitter and display are liquid-resistant when installed properly, it is not designed to be immersed. It should be mounted in such a way that the enclosure and diaphragm 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 LA19 transmitter systems should not be used within flammable or explosive applications.

⚠ Warning ⚠

Always install the 2" Viton gasket with all versions of the LA19-5061. The G threaded version of the Ricochet will not seal unless the gasket is installed properly.

ASSEMBLY

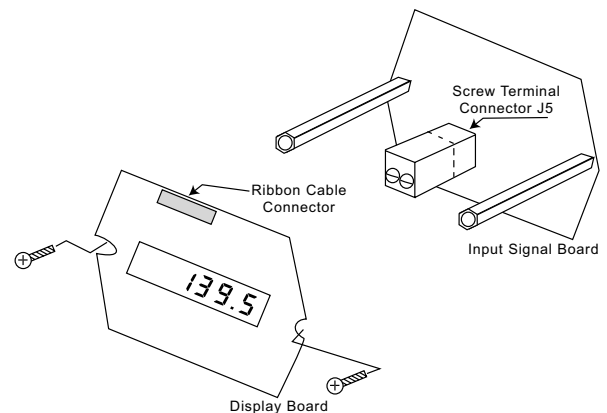
Step Three

Disassembly (Display)

The removable screw terminal connector is located on the lower circuit board. To access these input terminals it is necessary to remove the display board from the input signal board. Be careful of the battery supply packaged within the meter.

1. First remove the enclosure cover.
2. Next, loosen the 2 screws that hold the display board to the standoffs.
3. Rotate the display board so the right side comes off the standoff first, proceed to remove the display board from both standoffs. Be careful to avoid contact of the display with rough surfaces.
4. The display board may be disconnected from the ribbon cable simply by pulling up on the ribbon cable connector located above the display.
5. Connect a 4-20 mA input signal to terminal J5 located on the input signal board as shown below.

When finished, re-assemble the display using steps 1 - 5 in reverse. When re-assembling the circuit boards be careful NOT to over-tighten the screws.

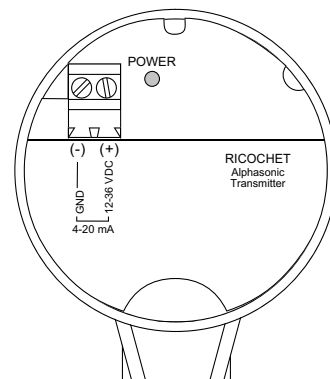


Disassembly Transmitter:

The transmitter arrives from the factory pre-calibrated and pre-assembled. Use the following instructions below for wiring to the LA19.

1. First, remove the cap of the transmitter:
2. Look for the terminal block with two terminals.
3. Remove the terminal block to wire the LA19. The terminal to the right is positive and the terminal to the left is negative.

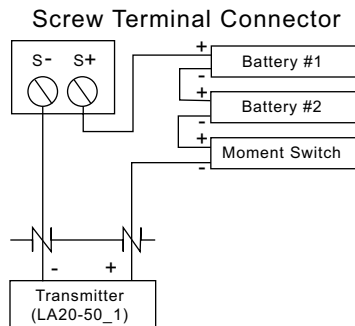
When finished attaching the wires, assemble the LA19 using steps 1 - 3 in reverse.



WIRING

Step Four

The LA19 comes from the factory pre-wired. A sample of the wiring is shown below.



Battery Replacement

Note that there are two 9 VDC batteries within the display of the LA19. These batteries provide the power for the LA19 circuit. To replace the batteries, follow the procedure below:

1. First follow the disassembly procedure in Step 3.
2. Gently lift the batteries from the PCB.
3. Remove the batteries from the clips.
4. Remove the protective covers on both batteries and place them on the replacement batteries.
5. Place the new batteries in the clips. Please note the polarity of the terminals.
6. Gently replace the batteries on the PCB. Make sure the protective covers have been placed on the new batteries before
7. Follow the disassembly procedure in reverse order.

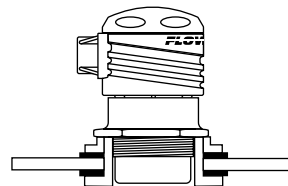
INSTALLATION

Step Five

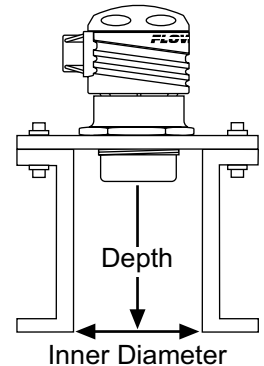
The transmitter for the LA19 may be installed through the top wall of a tank. Installation requires a 2" NPT fitting or blind flange.

1. Install the appropriate 2" fitting 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 fittings 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 performed.

Fitting Installation



Flange Installation



Flange Chart

Flange Inner Diameter Inch (cm)	Flange Depth Inch (cm)
3 (7.6)	3 (7.6)
4 (10.2)	7 (17.8)
5 (12.7)	11 (27.9)
6 (15.2)	15 (38.1)
7 (17.8)	19 (48.3)
8 (20.3)	26 (66.0)

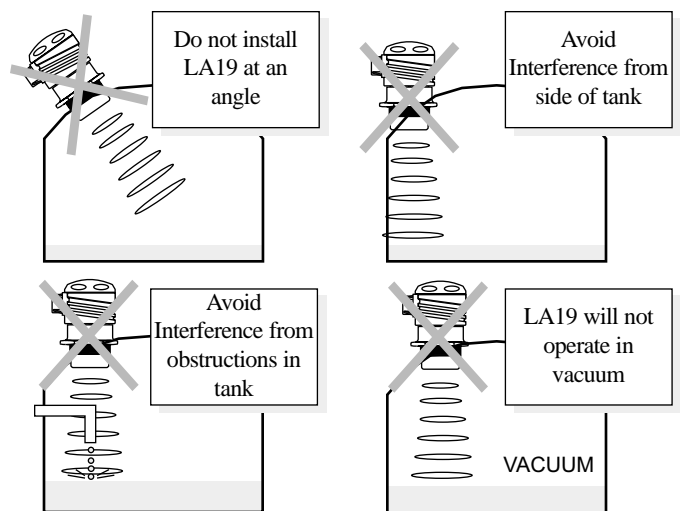
Observe the Flange Chart to the left to determine the maximum depth for a flange installation.

Warning

Do not install the Ricochet™ in pressurized applications above 30 psi.

Always install the 2" Viton gasket with all versions of the LA19-5061. The G threaded version of the Ricochet will not seal unless the gasket is installed properly and checked for leaks.

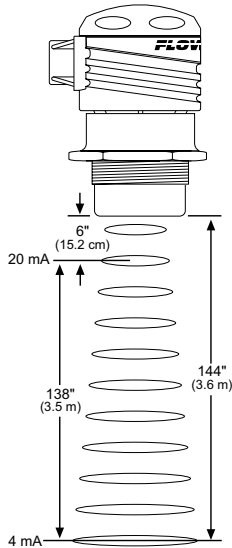
Use a proper sealant at the time of installation to ensure a liquid-tight seal. Secondly, make sure that the fittings threads are not damaged or worn.



CALIBRATION

Step Six

The LA19 is factory calibrated with a fixed measurement span of 12 feet. The 4 mA position is located 144" from the transducer face of the level transmitter. The 20 mA position is located 6 inches from the transducer face. Refer to the current to distance and distance to current conversion charts below for reading the current output.



Distance to Current Conversion Chart (Nominal)

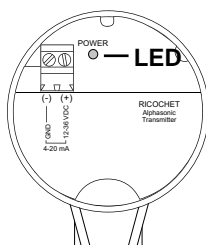
Distance inches	Current mA	Distance inches	Current mA	Distance inches	Current mA
06	20.0	54	14.4	102	08.9
12	19.3	60	13.7	108	08.2
18	18.6	66	13.0	114	07.5
24	17.9	72	12.3	120	06.8
30	17.2	78	11.7	126	06.1
36	16.5	84	11.0	132	05.4
42	15.8	90	10.3	138	04.7
48	15.1	96	09.6	144	04.0

Distance meters	Current mA	Distance meters	Current mA	Distance meters	Current mA
0.15	20.0	1.40	14.3	2.80	07.9
0.20	19.8	1.60	13.4	3.00	07.0
0.40	18.9	1.80	12.5	3.20	06.1
0.60	18.0	2.00	11.6	3.40	05.2
0.80	17.0	2.20	10.7	3.60	04.3
1.00	16.1	2.40	09.7	3.66	04.0
1.20	15.2	2.60	08.8		

LED Indication

The Ricochet™ features a single LED indicator which is used for power and fail-safe indication. During normal operation, the LED will be ON continuously to indicate that the transmitter has power and a strong echo signal return strength.

Should the LED begin to FLASH, it indicates that the transmitter has no signal return strength and the device has gone into a fail-safe condition. During the fail-safe condition, the current will increase up to 22 mA and hold until the acoustic signal is re-acquired. Once re-acquired, the LED will turn back ON continuously and the current will indicate the appropriate measured value.

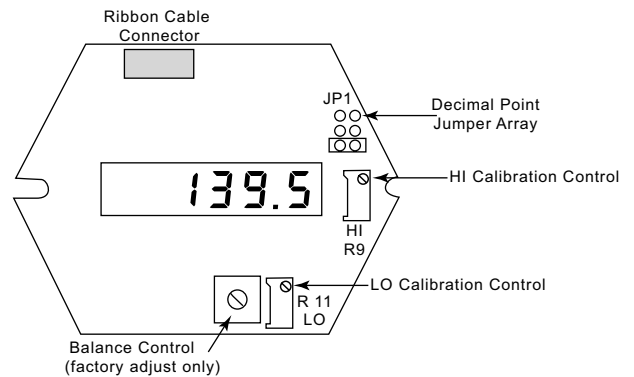


CALIBRATION

Step Seven

CALIBRATION

The display must be calibrated to both a low level (LO) and high level (HI) in the tank. The LO setting is made by the LO potentiometer (R11) located below the display. The HI setting is made by the HI potentiometer (R9) located to the right of the display. Simply set the level of the tank to its lowest position and adjust the LO control to display the desired reading. Next, set the level of the tank to its highest position and adjust the HI control to display the desired reading. Complete the calibration procedure by making any minor adjustments to the LO and HI controls.



Example: For a tank that is 100" tall with a full level of 90".

1. Set the level to the empty position.
 2. Adjust LO potentiometer to 0.0 on the display.
 3. Set level to the full position (90" of liquid).
 4. Adjust HI potentiometer to 90.0 on the display.
- To show gallons, calculate the volume of the tank in gallons at the 90" level. Substitute the new gallon measurement for the 90.0 value when setting the HI potentiometer.

An optional method of calibration is to point the level transmitter at a fixed object outside of the tank. First, measure the distance from the bottom of the transducer to the lowest and highest level of liquid. Next, place the transmitter at the lowest level distance and adjust the LO potentiometer to the desired setting. Then, place the transmitter at the highest setting and adjust the HI potentiometer to the desired setting. Complete the calibration procedure by making any minor adjustments to the LO and HI controls.

DECIMAL POINT SELECTION

The decimal point jumper array (JP1) is located to the upper right corner of the display board. Place a jumper across the bottom pins for a display of 199.9, across the middle pins for a display of 19.99, and across the top pins for a display of 1.999.

MAINTENANCE

Step Eight

General:

The LA19 battery powered level transmitter and display 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. Sensor Removal: In all through-wall installations, make sure that the tank is drained well below the sensor prior to removal. Carefully, remove the sensor from the installation.
3. Cleaning the Sensor: Use a soft bristle brush and mild detergent, carefully wash the transducer of the LA20. Do not use a harsh abrasive such as steel wool or sandpaper, which might damage the transmitters 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.