

**Where Do I Find Everything I Need for  
Process Measurement and Control?  
OMEGA...Of Course!**

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- ☑ Wire: Thermocouple, RTD & Thermistor
- ☑ Calibrators & Ice Point References
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**PRESSURE, STRAIN AND FORCE**

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- ☑ Load Cells & Pressure Gauges
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- ☑ Instrumentation & Accessories

**FLOW/LEVEL**

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- ☑ Air Velocity Indicators
- ☑ Turbine/Paddlewheel Systems
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- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
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- ☑ Cartridge & Strip Heaters
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- ☑ Flexible Heaters
- ☑ Laboratory Heaters

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- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments

M-3770 / 0102



**User's Guide**



<http://www.omega.com>  
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**LVU-19 Series  
Battery Powered Level Transmitter & Display**

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach and Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient connected applications.

OMEGA's policy is to furnish drawings, whenever an improvement is possible, problems relative to the product.

3. Repair instructions and/or specific model and serial number of product, and of the repair.

2. Model and serial number of product, and of the repair.

1. P.O. number to cover the COST BEFORE CONTACTING OMEGA: The following information available OMEGA for current repair charges. Have FOR NON-WARRANTY REPAIRS, consult OMEGA.

FOR WARRANTY RETURNS, please have the following information available BEFORE CONTACTING OMEGA:

1. P.O. number under which the product was PURCHASED.

2. Model and serial number of the product under warranty, and repair instructions and/or specific problems relative to the product.

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Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCTS TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence. The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

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such a manner.

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's Warranty does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair or tampering.

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# SPECIFICATIONS

## Step One

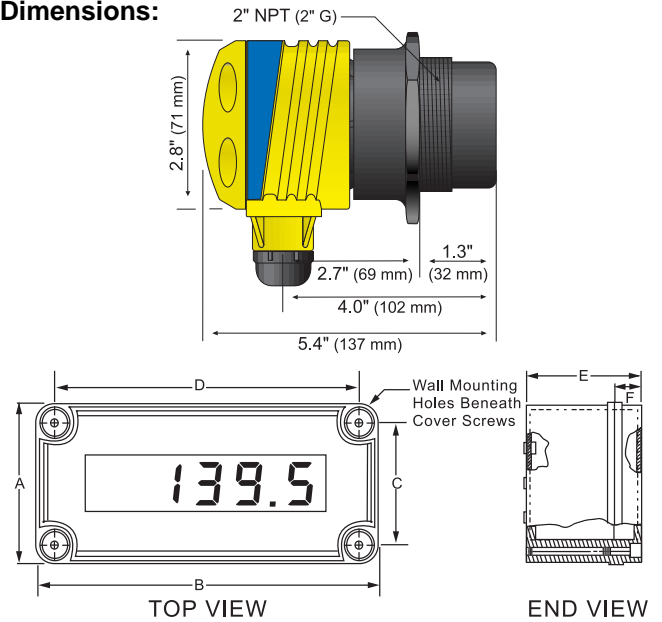
### Transmitter:

**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

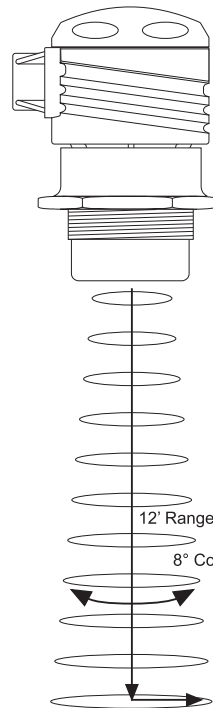
### Display:

**Input:** 4-20 mA  
**Display:** Sharp, 0.5" high LCD, 3ft 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,  $\pm 1$  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:

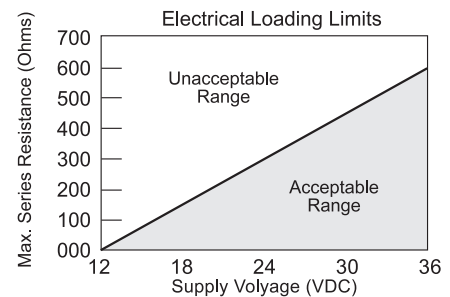
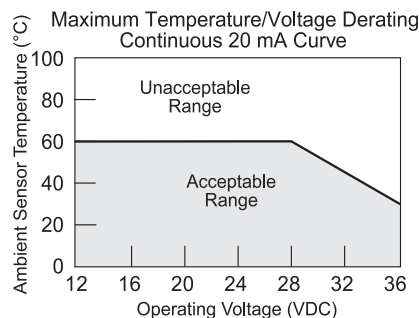
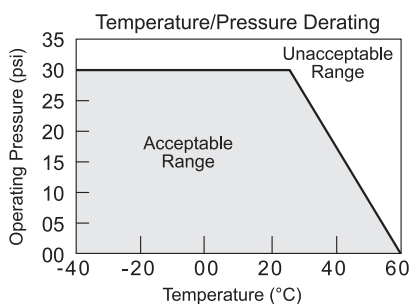
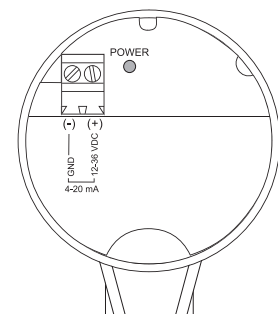


### Beam Cone Radius:



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

### 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 Battery Powered Transmitter and Display for Bulk Tanks from OMEGA: LVU-19 and LVU-19-G. 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:

OMEGA has 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 LVU-19-G. The G threaded version 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 battery supply of 18 VDC is used to power the LVU-19 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 LVU-19 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, OMEGA recommends the use of redundant backup systems and alarms in addition to the primary system.

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

The LVU-19 transmitter systems should not be used within flammable or explosive applications.

#### ⚠ Warning ⚠

Always install the 2" Viton gasket with all versions of the LVU-19-G. The G threaded version of the will not seal unless the gasket is installed properly.

## ASSEMBLY

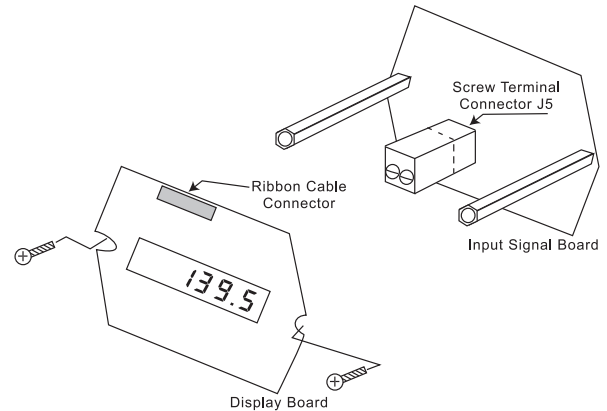
### Step Three

#### 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.

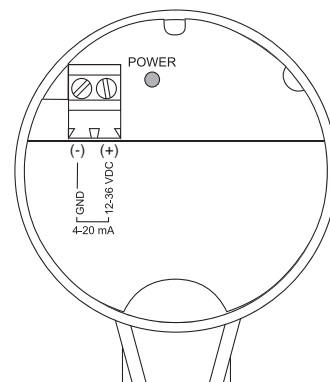


#### Disassembly Transmitter:

The transmitter arrives from the factory pre-calibrated and pre-assembled. Use the following instructions below for wiring to the LVU-19.

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 LVU-19. The terminal to the right is positive and the terminal to the left is negative.

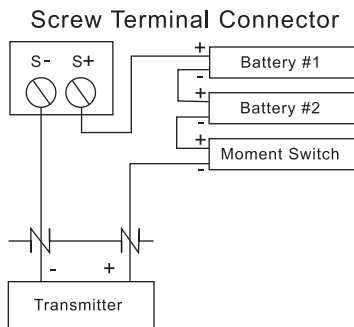
When finished attaching the wires, assemble the LVU-19 using steps 1 - 3 in reverse.



## WIRING

### Step Four

The LVU-19 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 LVU-19. These batteries provide the power for the LVU-19 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.

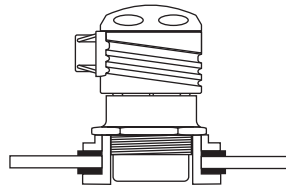
## INSTALLATION

### Step Five

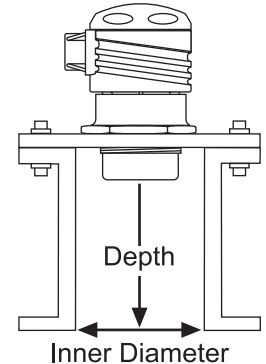
The transmitter for the LVU-19 may be installed through the top wall of a tank. Installation requires a 2" NPT fitting or blind flange.

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)

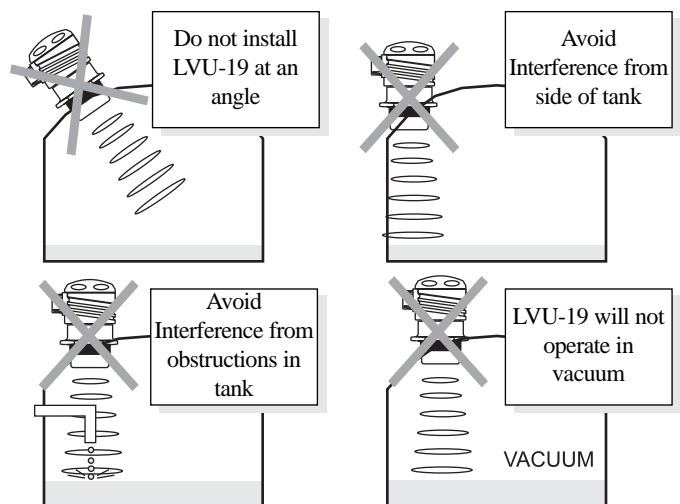
Observe the Flange Chart to the left to determine the maximum depth for a flange installation.

### Warning

Do not install the transmitter in pressurized applications above 30 psi.

Always install the 2" Viton gasket with all versions of the LVU-19-G. The G threaded version of the LVU-19-G will not seal unless the gasket is installed properly and checked for leaks.

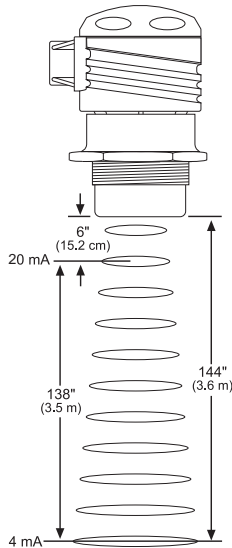
Use a proper sealant at the time of installation to ensure a liquid-tight seal. Secondly, make sure that the fittings threads are not damaged or worn.



# CALIBRATION

## Step Six

The LVU-19 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

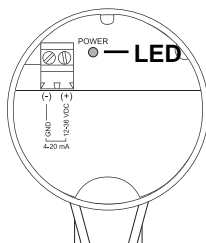
  

Distance meters	Current mA	Distance meters	Current mA	Distance meters	Current mA
0.15	20.0	1.40	14.3	2.80	07.9
0.20	19.8	1.60	13.4	3.00	07.0
0.40	18.9	1.80	12.5	3.20	06.1
0.60	18.0	2.00	11.6	3.40	05.2
0.80	17.0	2.20	10.7	3.60	04.3
1.00	16.1	2.40	09.7	3.66	04.0
1.20	15.2	2.60	08.8		

### LED Indication

The LVU-19 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.

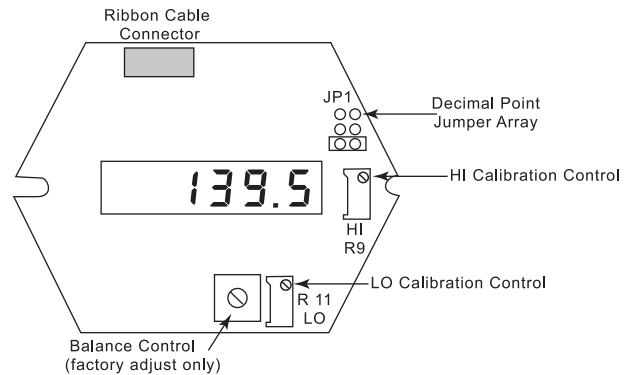


# CALIBRATION

## 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 LVU-19 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. 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.