

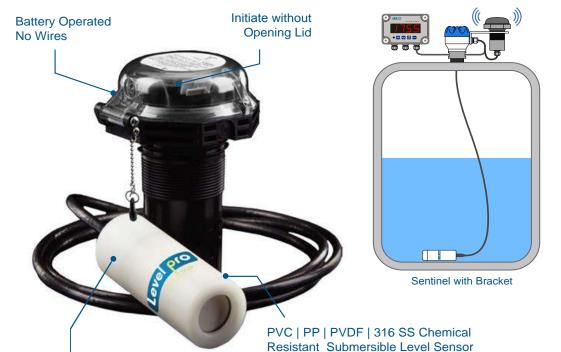
Sentinel Series LT | Telemetry

Tank | Sump Liquid Level Monitoring



- Battery Operated | No Programming
- □ Remote Tank Monitoring through Cellular Networks
- E-mail & Text Alarm Notification





The Sentinel Series Telemetry is a Cellular Tank or Sump Level Monitoring system that delivers reliable daily measurements that are both scheduled and event driven. Remote monitoring with the Sentinel is exceptionally flexible, eliminating the hassles of network infrastructures and Internet service. The Sentinel connects via a wireless signal to local cellular networks and transmits Level, Alarms, Battery Status, Rate of Consumption History, Critical High or Low Level Alerts and Signal Strength, all of which are available through th Cloud Based Website. The Sentinel online provides you with important readily at your fingertips Computer, **Tablet or Smart Phone**

Sentinel Powers Sensor No **External Power Supply Required**



FEATURES

- 24/7 access to data through Cloud Based Excellent
- Battery Life
- Variety of Alarm Trigger Points
- Mobile Ready Access
- NEMA 4X Enclosure
- Low Cost LTE Cellular Technology
- Access Data via PC | Laptop | Smart phone | Tablet
- Eliminate Costly Emergency Fills | Pump-Outs

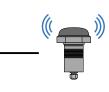
SPECIFICATIONS

Wireless Communication	GSM Digital Wireless Radio
RF Approval	FCC part 15B Approved
Frequency Bands	GSM 850 900 MHz WLAN
Output Voltage	Nominally 14/24VDC
Output Current	4 - 20mA
Enclosure	NEMA 4X UL Approved
LAN/WAN	300ft. Line of Sight
Lithim Battery	Replaceable Lithium Ion Batteries (CR-123A)
Body Material	CPVC or PP
Operating Temperature	-13°F - 158°F -25°C - 70°C

HOW IT WORKS



TANK | SUMP



SENTINEL







CELLULAR NETWORK

CLOUD ONLINE

INVENTORY MANAGER

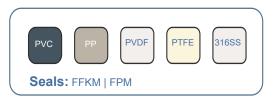
100 SERIES <u>Submersible Level Transmitter</u>

Industry's Most Reliable Line of Level Sensors Designed Specifically for Corrosive Liquid Applications

□ Suitable For Foam | Vapor | Turbulence | Condensate

□ Exceptional Chemical Resistance





The Solution to Tough Applications Where Ultrasonic Sensors Simply **DO NOT WORK!**



The Solution to Tough Applications Where Ultrasonic Sensors Simply **DO NOT WORK!**

Features

- Exceptional Chemical Resistance
- Ceramic Sensing Diaphragm
- ☐ High Accuracy
- Non Clogging Design
- No Programming Required
- Integral Weight | No Floating
- No Dead Band

Displays

The 100 Series can be connected to one of our many displays



LP Submersible Junction Box



- Patent Pending Vaporbloc® Technology
- Corrosion Resistant NEMA 4X
- 2" NPT Tank Connection

Uplink Tank Level Junction Box

- New Vaporbloc[®] Technology
- **□ NEMA 4X Enclosure**
- **☐** Tool Free Wiring Terminals
- Excellent Corrosion Resistance



Vaporbloc® Technology

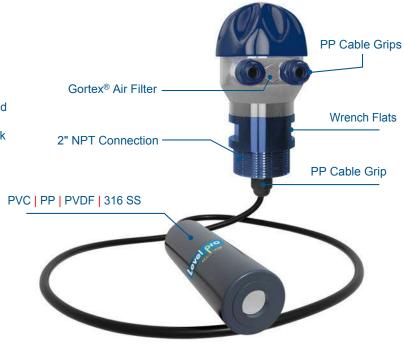
- Blocks out Corrosive Chemical Fumes
- Pressure Tested to 75 psi
- Protects Internal Wiring Connections
- Eliminates Corrosive Fumes Out-gassing into **Environment**



Before

Patent Pending

After



Features

- Excellent Chemical Resistance
- All Plastic NEMA 4X Enclosure
- Vaporbloc[®] Gas Barrier
- 2" Threaded Connection
- Gortex® Air Breather Included
- Chemical Resistant PP Cord Grips



250B SERIES

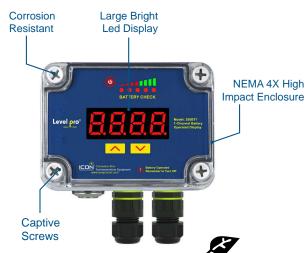
Battery Operated Level Display

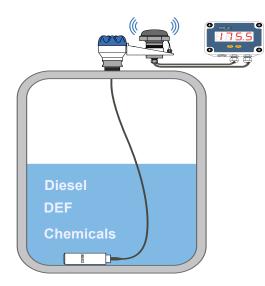
- Super Bright LED Digits
- Battery Operated
- No External Power Required











Features

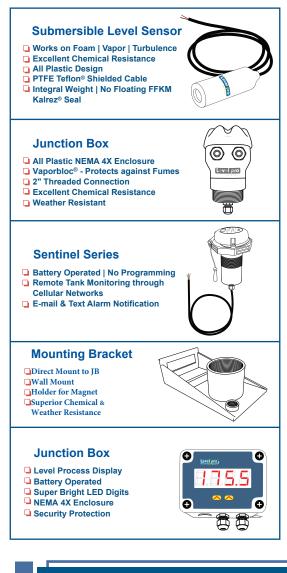
- **□** Powers Submersible Sensor
- **■**Battery Powered
- **■NEMA 4X Enclosure**
- □Loop Powered | 4-20mA
- **■**No Internal Wiring Required
- **□**Battery Strength Indicator
- ■Push-Button Activated Display

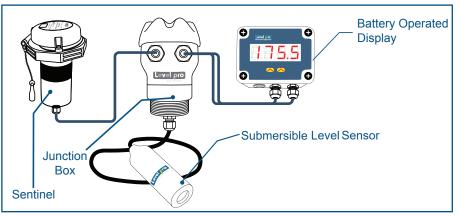
Part Number	Input	mAh
TVL-550-1821	1 4-20mA	4000
TVL-550-1829	2 4-20mA	4000
TVL-550-1821	3 4-20mA	4000
TVL-550-1829	4 4-20mA	8000
TVL-550-1821	6 4-20mA	8000
TVL-550-1829	8 4-20mA	8000

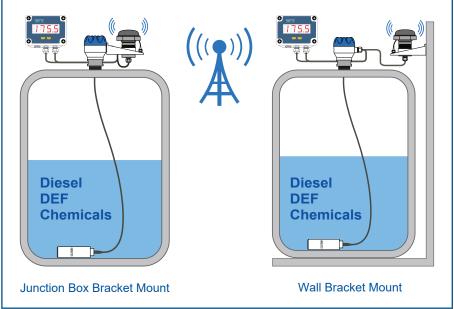
Specifications

Power supply	LisoCl2 High Density Battery 4000mAh 8000mAh
Display	LED 4 x 20 mm High Red
Displayed values	-999 - +9999
Input	4-20mA 2 Wires
Accuracy	0.1% @ 25°C One Digit
Stability	50 ppm °C
Operating temp	-40 - 158°F (-40 - 70°C)
Storage temp	-40 - 158°F (-40 - 70°C)
Protection class	NEMA 4X IP67
Case	Polycarbonate
Dimensions (WxHxD)	110 x 105 x 67 mm

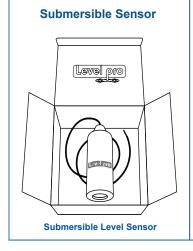
Product Information

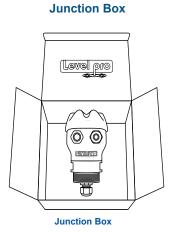


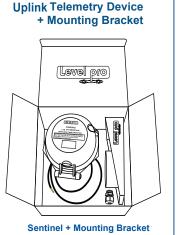




Product Inspection









Understanding Level Measurement

Submersible Sensors

All Submersible Sensors have a Calibrated Range that is Based on H_2O that has a Specific Gravity or Density = 1

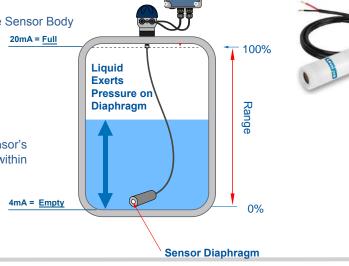
 Range Value | The Overall Measuring Distance that the Sensor has been calibrated to by the Factory - The Range will be Located on the Sensor Body

 Empty: The Pressure being exerted on from the sensor diaphragm at <u>Lowest Point</u> Normally this is when the Tank is Empty within the Tank

a) **Empty** = 4mA setting.

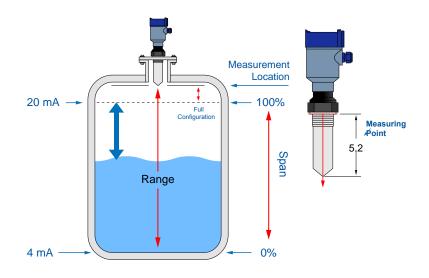
 Full | The Pressure being exerted on the sensor's diaphragm at the highest point Liquid Level within the Tank

a) Full = 20mA setting.



Radar Sensors

- Range Value | The Distance from the sensor's measurement point to the bottom of the Tank
- Empty Configuration it the distance from the sensor to the <u>Lowest</u> or <u>Empty Point</u> within the Tank
 - a) **Empty Configuration = 4mA** setting.
 - The Range and Empty Configuration values are normally the same for Flat Bottom Tanks
- Full Configuration | The Distance from the sensor's measurement point to the Highest Liquid Level in the Tank
 - a) Full Configuration = 20mA setting.





Installation Manual

Getting Started

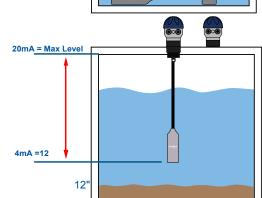
- Submersible Pressure Sensors are designed to be completely submersed within the liquid. The transmitters can rest along the bottom of the tank or be suspended at any desired level within the tank.
- ☐ Please note that the physical location of the level transmitter will indicate the lowest level of measurement within the tank.

ex: Positioning the transmitter 12" from the bottom of the tank, then the lowest reading of liquid will be 12" from the bottom.

When the Liquid To Be Measured is Not H₂O the New Range of the Sensor Needs to be Determined.

To Achieve this Simply Divide the Range of the Sensor Body by the Specific Gravity of the Liquid

SENSOR RANGE / S.G = NEW RANGE



The Importance of the Liquids Specified Gravity

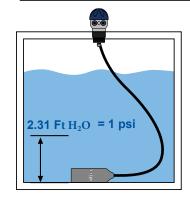
The S.G of a Liquid has a Direct Effect on the Sensors Output when Measuring the Height of the Liquid

Liquids with a SG < 1.0 are Lighter than H_2O i.e. Oil Liquids with a SG > 1.0 are Heavier than H_2O i.e. Sulfuric Acid

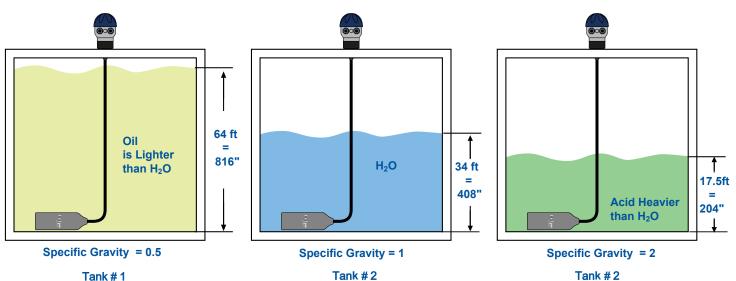
 H_2O has a SG = 1.0.

S.G <1.0 Requires More Liquid to Equal the Same Pressure or Height as with H₂O.

S.G >1.0 Requires Less Liquid to Equal the Same Pressure or Height as with H₂O.



Here are some examples of how the submersible sensor range changes when submersed into liquids with different Specific Gravities



Installation Manual

Calculating Max Range of Sensor

Lets assume a the Calibrated Range of the Submersible Sensor is 34' or 408. The range is always referenced H₂O which has a Specific Gravity (Density) equal to 1

Calibrated Range/S.G = Liquid Level Measurement Range 34/1 = 34' or 408/1 = Liquid Level Range = 408"



The Liquid in a Tank # 1 has a S.G = 0.5 which is <u>lighter</u> than that of H₂O

To determine the NEW Range of the sensor simply divide the H_2O range (34') by the S.G of the liquid you are now going to measure. S.G. = 0.5

34/0.5 = 64 ft or 816 inches

Since the Oil is a <u>lighter</u> substance than H_2O the New Measuring Range of the Sensor has increased and and is now 64' or 816"



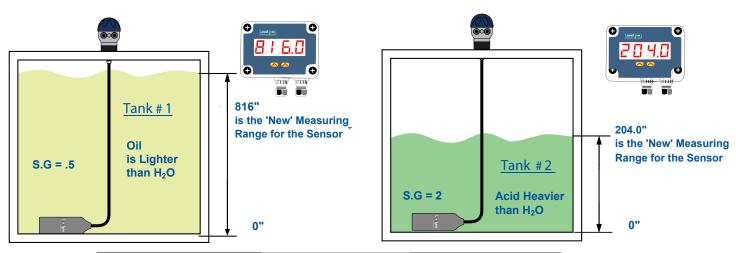
The Liquid in Tank # 3 has a S.G = 2 which is heavier than H₂O

The 34' Sensor is now going to be installed into a tank of Acid with a S.G = 2

Range/S.G = New Measuring Range

34/2 =17.5 ft or 204 inches

The liquid is Heavier than H₂O so the New Overall Sensor Range Has been reduced to 17.5 ft or 204 inches



Oil 5.G = 0.5	Sensor Signal	Display Reading
Tank 1 Empty	4.0mA	0"
Tank 1 Full	20.0mA	816"
Acid S.G = 2.0	Sensor Signal	Display Reading
Acid 5.6 = 2.0 Tank 2 Empty	Sensor Signal 4.0mA	Display Reading 0"

Installation Manual

Installation

The Submersible Level Sensor is designed to operate while immersed in liquid.

Avoid: Installing the level transmitter along the bottom of the tank if materials such as sludge will build up and coat/cover the transmitter.

This also includes any debris that will settle along the bottom of the tank.

In these applications, it is best to suspend the transmitter above the highest level of sludge/debris that will occur. See Fig A.

- Location: Select a location where the temperature of the transmitter will be within the specification of the sensor.
- **Position**: The transmitter is not position sensitive.
- Mounting: The transmitter can be mounted via several methods. It can be suspended from the cable, it can be placed resting on the bottom of the tank in either horizontal or vertical orientation, or it can be attached to a pipe or hardwired using the LP100 conduit box on the top of the housing.



Ex: A mixer blade could cause the level transmitter to whip around within the tank. An alternative would be to move the transmitter to a more stable section of the tank or to install the Transmitter inside a still-well/drop tube. This will minimize the effects created by the mixer.

□ Termination: The cable for the transmitter is terminated at a junction box located on top of the tank. Since the vent tube is contained within the cable, the pressure within the junction box. A Gortex® Breather to ensure accurate atmospheric pressure inside the junction which is necessary as a reference to the pressure acting on the sensor at the bottom of the tank

The inside of the function box must be clean, dry and free of moisture.





A ventilation/reference tube located within the cable. The purpose of this tube is to provide a comparison between current atmospheric pressure and the pressure that is being exerted on the sensing diaphragm within the tank.

- The reference tube must be open and free to allow air to flow back to the pressure diaphragm.
- Avoid blocking or bending the ventilation tube by compressing the cable.

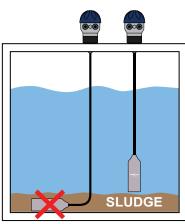


Fig A

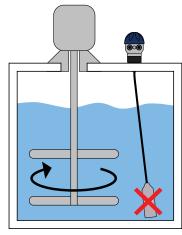


Fig B

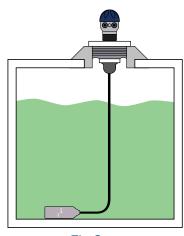
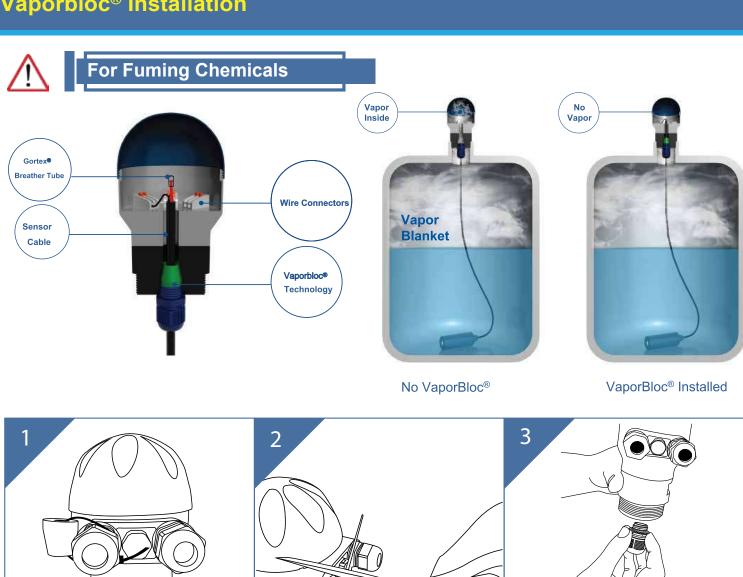
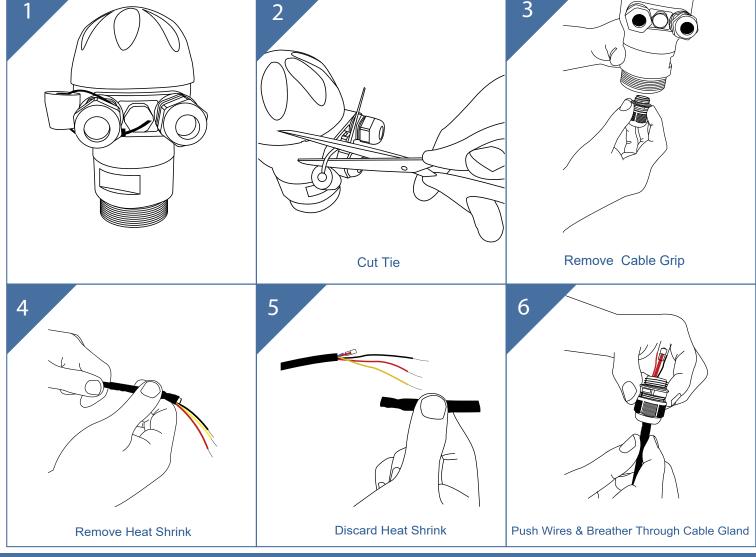
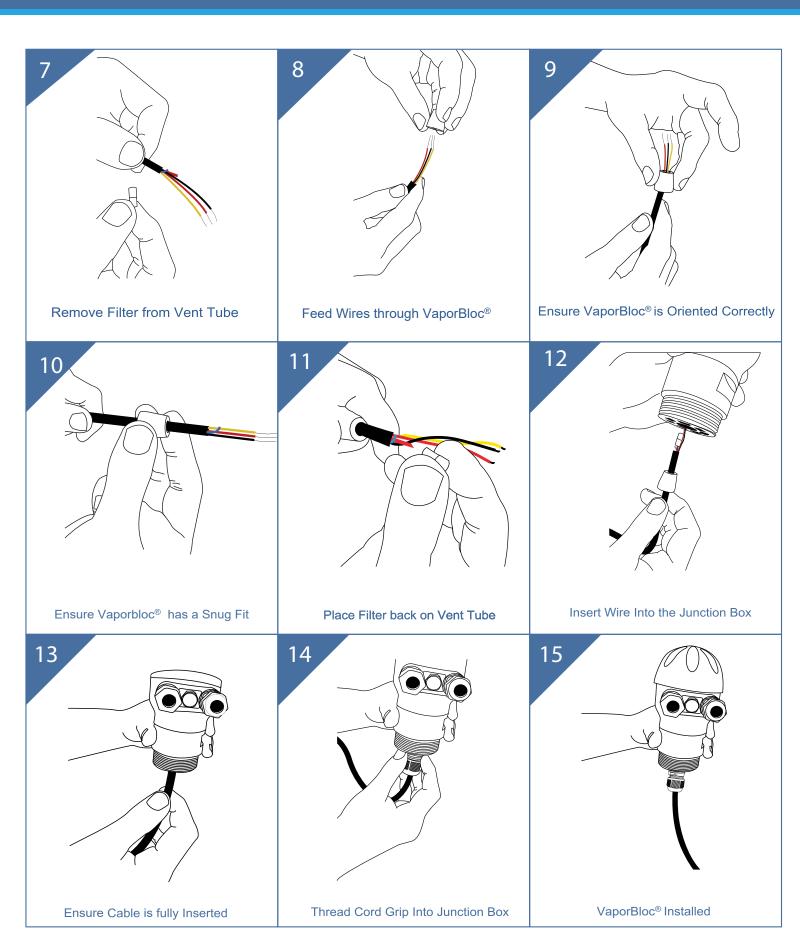


Fig C



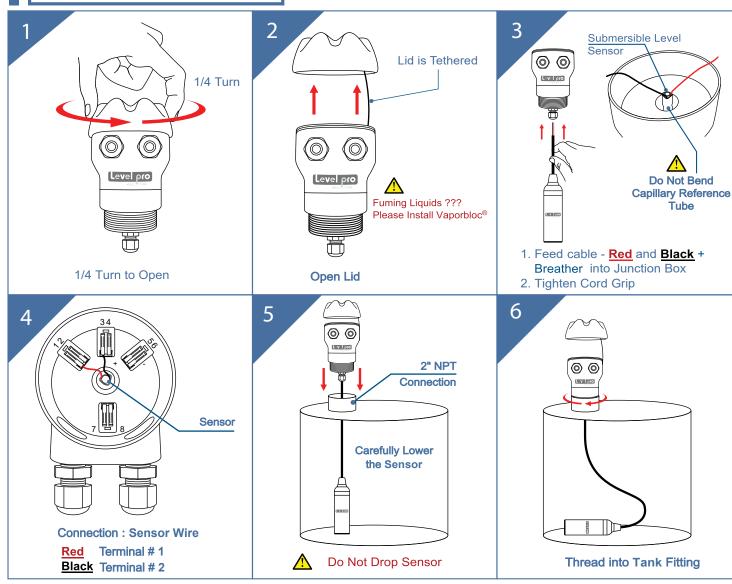




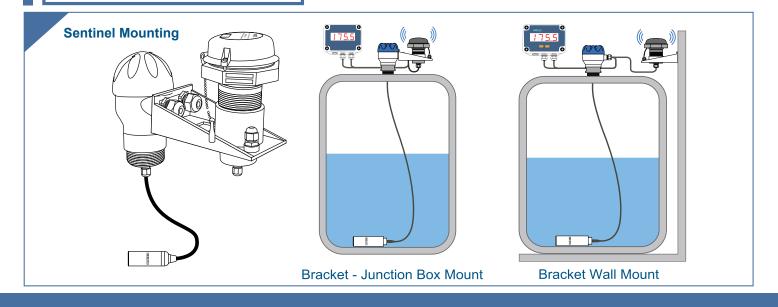


Installation Manual

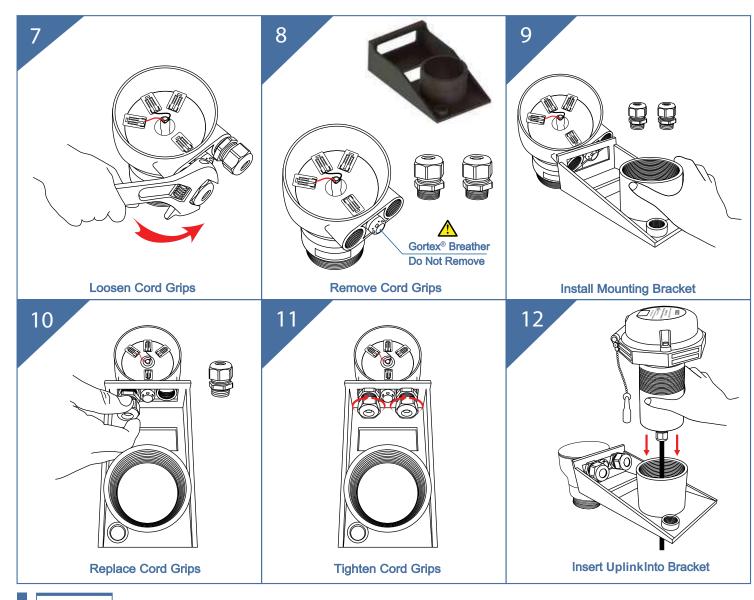
Sensor | Junction Box



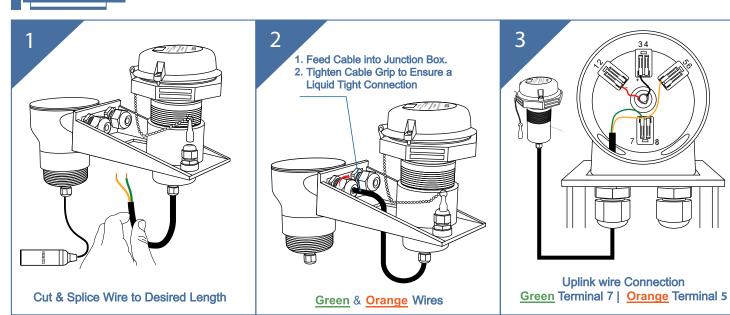
Uplink Mounting



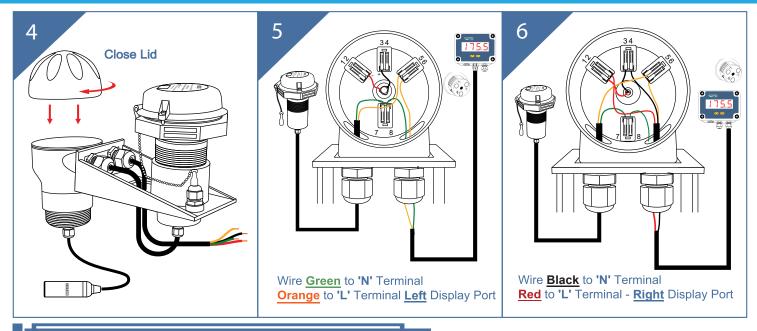
Installation Manual



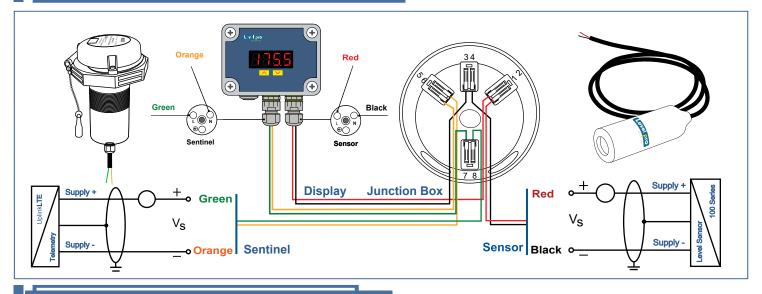
Wiring



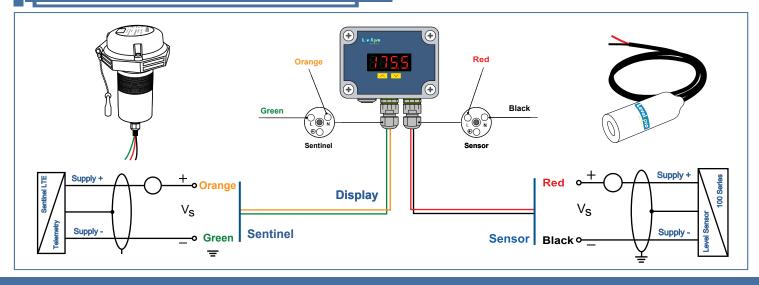
Installation Manual



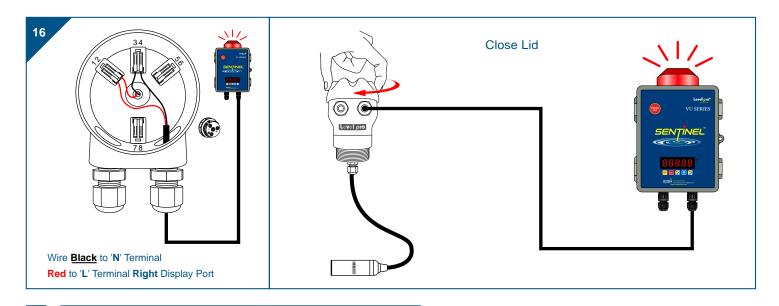
Wiring Sentinel + Display + JB + Sensor



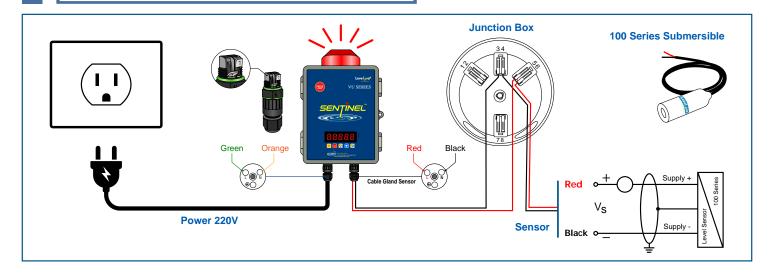
Wiring Sentinel + Display + Sensor



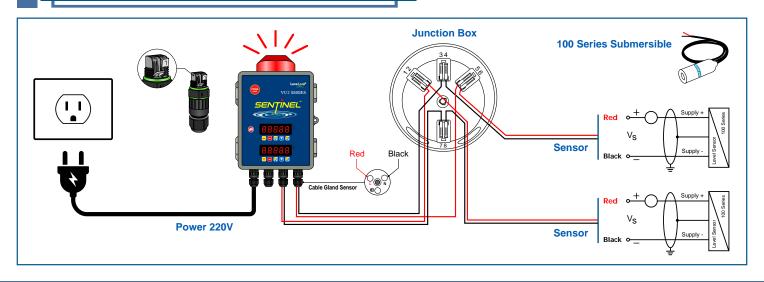
Installation Manual



Wiring Sentinel VU with JB & Level Sensor



Wiring Sentinel + Display + JB + Sensor



Battery Powered Level Display

Wiring | Sensor | Display



tevel pro

Level pro

Sensor



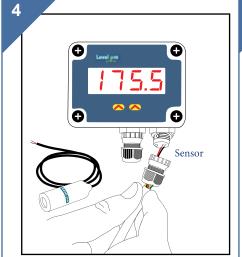
1 Level pro

Level pro

H

Turn Cable Grip Nut Counter-Clockwise

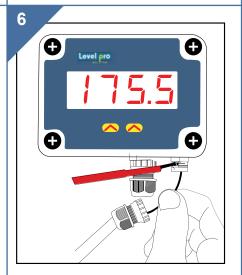
Remove Nut and Cable Grip



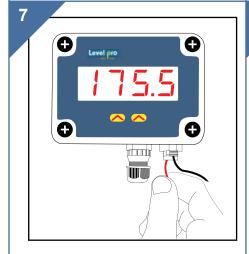




Insert Black Wire Into 'N' Port



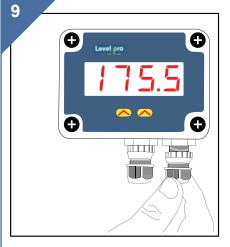
Tighten 'N' Terminal Screw



Insert Red Wire Into 'L' Terminal



Tighten 'L' Terminal Screw



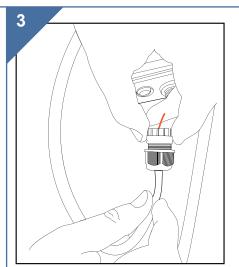
Hand Tighten Cable Grip

Battery Powered Level Display

Wiring | Uplink

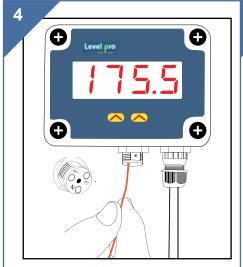






Turn Cable Grip Nut Counter-Clockwise

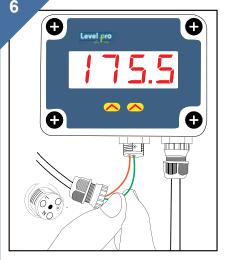
Feed Uplink Wire Through



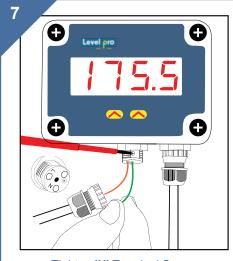
Insert Orange Wire Into 'L' Terminal



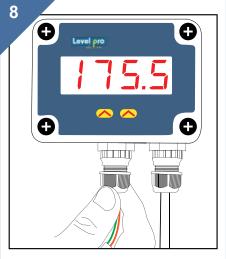
Tighten 'L' Terminal Screw



Insert Green Wire Into 'N' Terminal



Tighten 'N' Terminal Screw



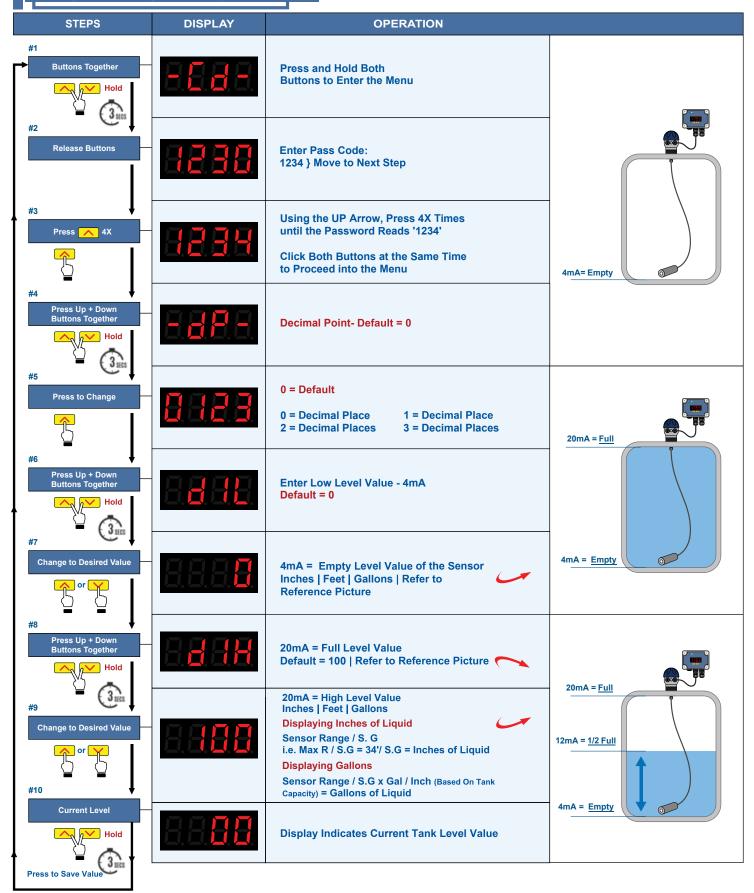
Hand Tighten Cable Grip



Press Button To Test

Battery Powered Level Display

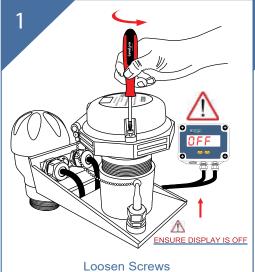
Programming Display

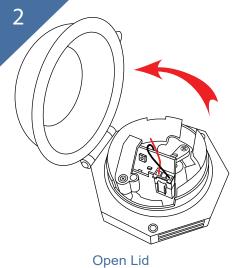


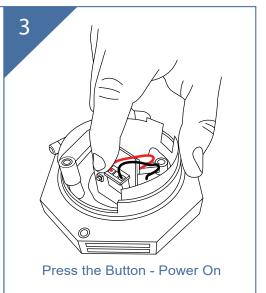
Push Button Call-Out

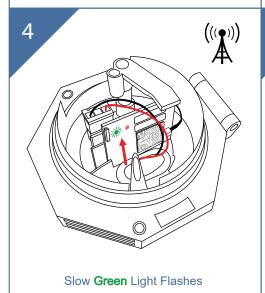


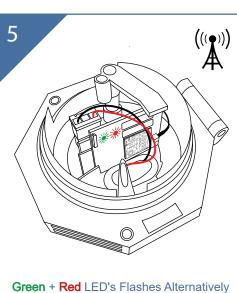
ENSURE DISPLAY IS OFF BEFORE INITATING CALL-OUT

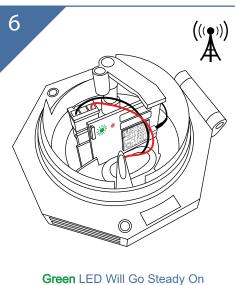






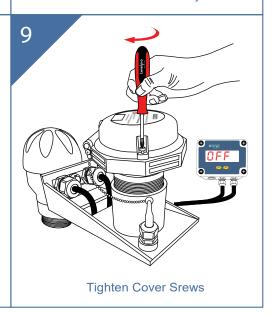




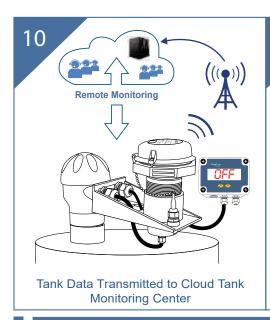


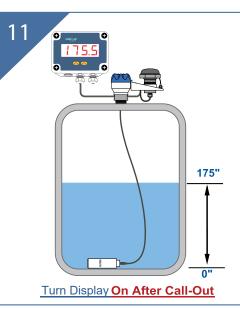
Closed Lid

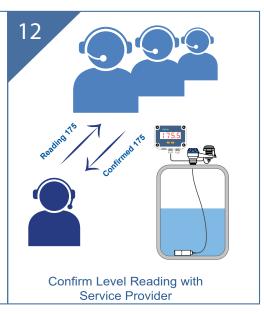




Sentinel Tank Level Measurement Installation Manual





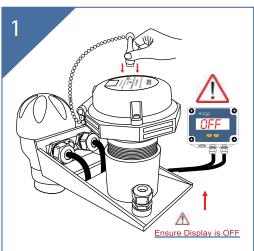


Magnetic Call-Out

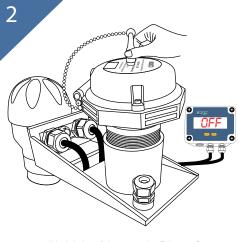


ENSURE DISPLAY IS OFF BEFORE INITATING CALL-OUT

6



To Initiate the Call Out Place the Magnet Against the Lid



Hold the Magnet in Place for One (1) Second



Lift Magnet

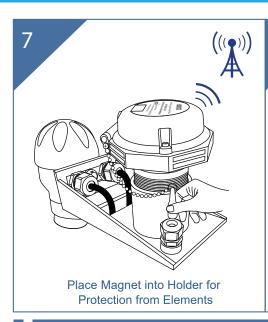


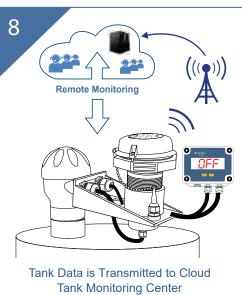
Slow Green LED Flashes



Green LED will go steady Green
Light Flashes and Goes Out

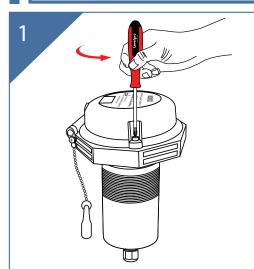
Sentinel Tank Level Measurement Installation Manual



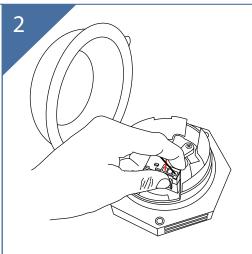




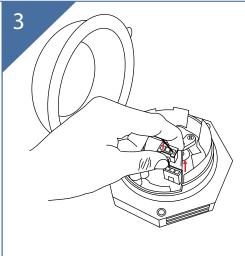
Battery Replacement



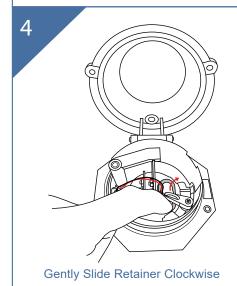
Remove Screws - Open Lid

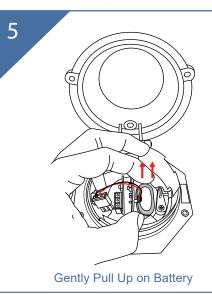


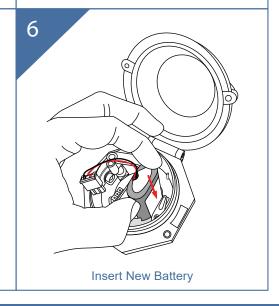
Press On Connector with 2 Fingers



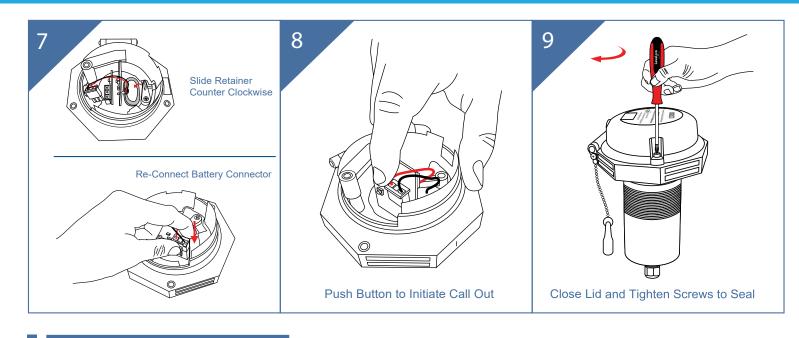
Gently Pull Connector Upwards



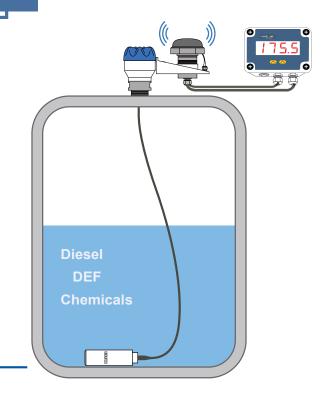




Sentinel Tank Level Measurement Installation Manual



Application Details



Sentinel Tank Level Measurement Installation Manual

TroubleShooting

Invalid Data?

Ensure Display <u>iS</u> **OFF** when Initiating Uplink Call-Out





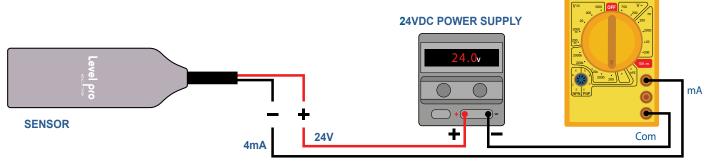
DIGITAL MULTIMETER

4.0

Trouble Shooting the Sensor

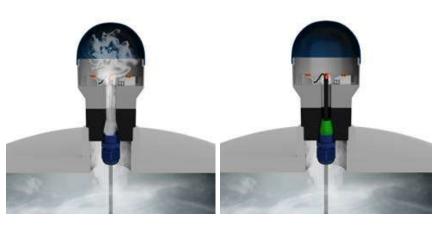
1. First, verify that the sensor is wired correctly.

2. Next, check if the power supply is providing the required power.



If transmitter is not functioning properly, isolate the transmitter from the system and wire as shown above. The Multi-Meter should read 4mA when the sensor is not submersed in Liquid.

Measuring Liquids that Fume, Form Vapor Blankets or Out-Gas - Ensure Vaporbloc® has Been Installed





Ensure Vaporbloc is Installed



Installation Manual

Display Not Turning On

- Check Wiring
- · Check Battery Status

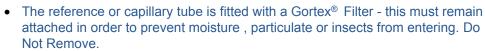
Invalid Data Transfer

- Ensure Display is OFF when making Call-Out
- Check Battery Status

Display Indicates LL

- Check Battery Status
- Check Wiring

Incorrect Display Reading



- Avoid blocking or bending the ventilation tube.
- The LP100 Installation Junction Box is fitted with a Gortex®
 Breather to allow for air to pass but not water. Please Ensure this Not Blocked
- Always keep the cable termination clean, dry and free of moisture and prevent liquid from entering the vent tube
- Confirm Programming Input for for 20mA (d IH on Display) is Correct
- · Confirm Specific Gravity of Liquid is Correct.

Determine 20mA Value to Program d IH on Display

Example: S.G of the Liquid is Heavier than H2O

The Submersible Sensor Range is 34' is now going to be installed into a tank of Acid

S.G = 2 : Sensor Range = 0 - 34'

To calculate the New Range of the Sensor = Range/S.G | 34/2 = 17.5 ft or 204 inches

The liquid is Heavier than H₂O so the Overall Sensor Range Has been reduced to 17.5 ft or 204 inches The 204 is





20mA = Full Level Value Default = 100 | Refer to Reference Picture

20mA = the High Tank Level Value of the sensor. Inches | Feet | Gallons

* This number is determined by dividing the max range of the sensor by the Specific Gravity

Display Inches

Range/S.G = 34'/S.G = New Full Range of Sensor | 20mA

Display Gallons

Range / S.G x Gal/Inch = Gallons



SG =

