

Quick Start Manual

LevelPro®



Read the user's manual carefully before starting to use the unit.
Producer reserves the right to implement changes without prior notice.

LevelPro® — 100 Series

Submersible Level Sensor Transmitter

Safety Information

- Confirm chemical compatibility before use.
- **DO NOT** exceed maximum temperature or pressure specifications.
- **ALWAYS** wear safety goggles or face-shield during installation and/or service.
- **DO NOT** alter product construction.



WARNING



Warning | Caution | Danger

Indicates a potential hazard. Failure to follow all warnings may lead to equipment damage, or failure, injury, or death.



Note | Technical Notes

Highlights additional information or detailed procedure.

Intended Use

- The LevelPro® Level Sensors have been developed for continuous level measurement. It is the operator's responsibility to check and verify the suitability of the device for the intended application. If any doubts remain, please contact our technical department in order to ensure proper usage and compatibility.
- LevelPro® is not liable for any incorrect selections and their effects.
- Permissible media are liquids (no solids or frozen media), specified in the data sheet. In addition it has to be ensured, that this medium is compatible with the any wetted parts of the level sensor.
- The technical data listed in the current data sheet are engaging and must be complied with. If the data sheet is not available, please order or download it from our homepage (www.iconprocon.com).

Personnel for Installation, Commissioning, and Operation

- All operations described in this instruction manual must be carried out only by trained personnel or an accredited person.
- The qualified personnel must have read and understood the operating instructions in this manual and must follow said instructions accordingly.

Mounting and Safety Instructions

- ⚠ **WARNING!** This device may only be installed by a qualified technical personnel who has read and understands the operating manual!
- ⚠ Handle this high sensitive electronic precision measuring device with care, both in packed & unpacked condition!
- ⚠ There are no modifications / changes to be made on the device.
- ⚠ Do not throw the package / device!
- ⚠ **To avoid damaging the diaphragm, remove packaging and protective cap (provided with some models) directly before starting assembly. The delivered protective cap has to be stored!**
- ⚠ Place the Protective Cap on the diaphragm again immediately after disassembling.
- ⚠ Handle the unprotected diaphragm very carefully - it is very sensitive and may be easily damaged.
- ⚠ Do not use any force when installing the device to prevent damage of the device and the plant!
- ⚠ When placing the device into operation or after maintenance work, the probe has to be submerged slowly into the medium! A rough immersion into the medium can damage or destroy the diaphragm.
- ⚠ If there is any danger of damage by lightning or overpressure when the device is installed outdoor, we suggest putting a sufficiently sized overpressure protection device between the supply or switch cabinet and the device.

LevelPro® — 100 Series

Submersible Level Sensor Transmitter

Product Introduction

LP100 Junction Box

(Sold Separately)



- ✓ High Accuracy: $\pm 0.5\%$
- ✓ Superior Chemical/Corrosion Resistance
- ✓ PVC | PP | PVDF | 316 SS | PTFE Teflon®
- ✓ Teflon® Jacketed Cable
- ✓ Kalrez® (FFKM) O-Ring Seal
- ✓ IP68 | NEMA 4X Enclosure

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

The LevelPro® 100 Series submersible level sensor transmitter and tank level junction box are a perfect pair for applications where ultrasonic sensors aren't going to work.

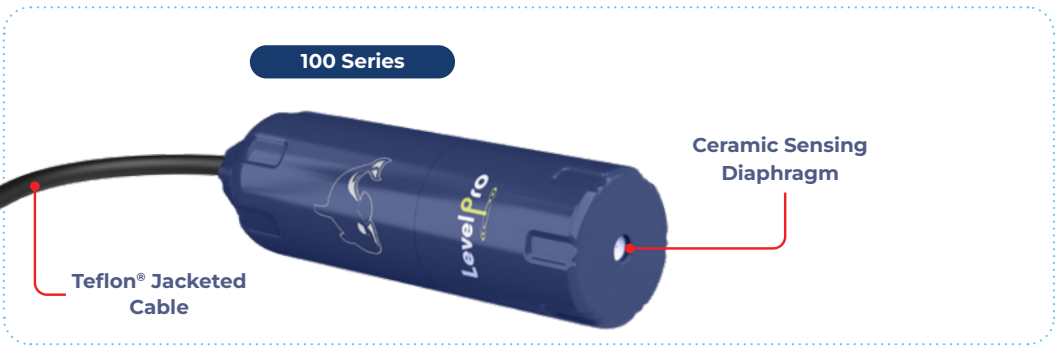
Accurately measure tank levels with this rugged combination that's simple to use and boasts superior chemical resistance along with industry exclusive features.

Displays

The 100 Series can be easily connected to one of our many displays or to an existing PLC.



VaporBloc®
Eliminates Vapor from
Entering Junction Box



Model Selection

100 Series Submersible Level Sensor		
Size	Part Number	Material
0-34ft 11m	191-1001-A113315	PVC
0-34ft 11m	191-1001-B113315	PP
0-34ft 11m	191-1001-E113315	PVDF
0-34ft 11m	191-1001-T113315	PTFE
0-34ft 11m	191-1001-SS113315	316 SS

191-1001-A113315

Range (ft)	Housing	Output	Cable Length
1401 : 14.0	A : PVC	1 : 4-20mA	05 : 5m
1201 : 20.0	B : PP	2 : Ratiometric	10 : 11m
1001 : 34.0	E : PVDF	3 : Voltage	15 : 15m
4001 : 54.0	T : PTFE	4 : RS485	20 : 20m
	SS : SS		



SS 100 Series

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Submersible Level Sensor Transmitter

Technical Specifications

Input Pressure Range	
Level ft/H ₂ O	14 20 34 54 *Consult Factory for Levels > 54 ft
Overpressure Psi	210 290 290 380

Output Signal Supply	
Output Signal	4-20mA 4-20mA + Hart 2 Wire 0.5-4.5 VDC Ratiometric 0-5 VDC RS-485 3-Wire
Power Supply	9-36 VDC 0.5-4.5VDC 5VDC

Performance	
Accuracy	<±0.5% of FS
Permissible Load	$R_{max} = [(V_s - V_{smin}) / 0.02 A] \Omega$
Influence Effects	Supply: 0.05% Full Scale/10V Load: 0.05% Full Scale/K Ω
Long Term Stability	<± 0.1% Full Scale over One Year
Response Time	<10 msec

Permissible Temperatures	
Operating Temperatures	PVC : 32 to 140°F
	0 to 60°C
PP :	-20 to 170°F
	-29 to 77°C
PVDF :	-40 to 170°F
	-40 to 77°C
PTFE :	-40 to 170°F
	-40 to 77°C

Thermal Effects Offset and Span	
Thermal Drift	<± 0.02% FSO/K in Compensated Range -20 – 170°F

Electrical Protection	
Short-Circuit Protection	Permanent
Reverse Polarity Protection	Yes No Damage to Sensor
Electromagnetic Compatibility	Emission Immunity According to EN 61326

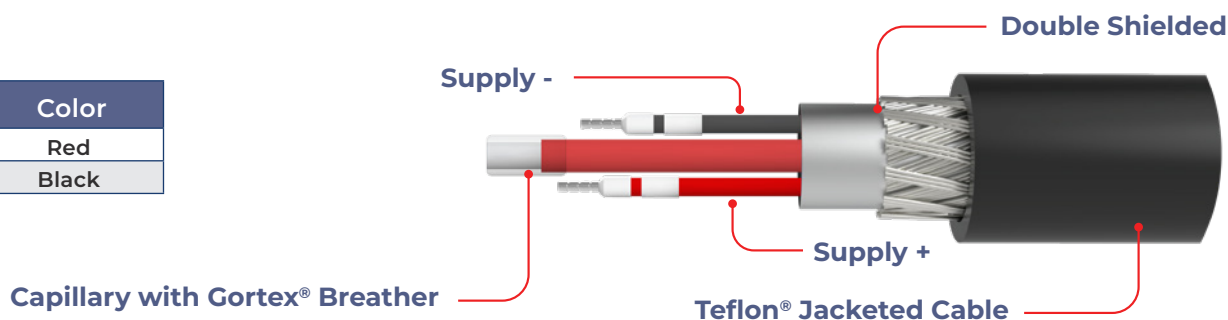
Electrical Connection	
Jacketed Cable	PTFE Teflon® -40 to 200°F
3-Wire Cable with Integrated Air Tube for Reference to Atmospheric Pressure	

Materials Wetted	
Housing	PVC PP PVDF PTFE 316 SS
Seal	FFKM - Kalrez®
Diaphragm	Pure Ceramic 96% Al ₂ O ₃ 316 SS

General	
Current Consumption	Max. 25mA
Weight Grams	PVC : 575g PP : 475g PVDF : 825g PTFE : 875g 316 SS : 875g
Ingress Protection	IP 68 NEMA 4X
CE-Conformity	EMC Directive: 2004 108 EC

Wiring

24VDC	Color
Supply +	Red
Supply -	Black



LevelPro® — 100 Series

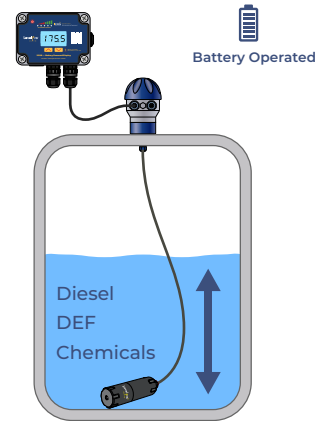
Submersible Level Sensor Transmitter

ICON™ Corrosion-Free
PROCESS CONTROLS Instrumentation Equipment™

Related Products – Display & Controller

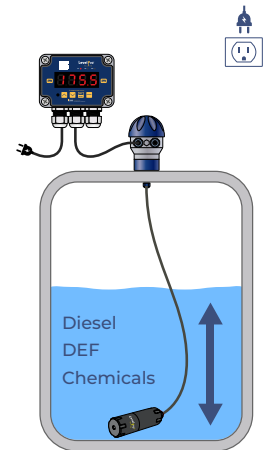
ITC-250B Series Tank Display (Battery Powered)

- ✓ Battery Powered
- ✓ NEMA 4X Enclosure
- ✓ Momentary or Adjustable Relay Timer
- ✓ LCD Display
- ✓ All Plastic – Corrosion Resistant
- ✓ All Cord Grips Included
- ✓ Simple Programming



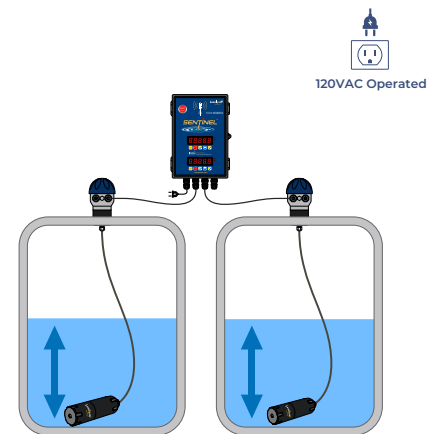
TVL Series Tank Level Display & Controller

- ✓ SunBright® Technology for Outdoor Applications
- ✓ No Assembly Required
- ✓ 8 Levels of Brightness
- ✓ Signal Peak Value Detection | Dampens Noise
- ✓ 3 Wire Cord Grips Included | No Add-ons
- ✓ Completely Thermoplastic | Corrosion-Free
- ✓ 2 Relay | 1 Relay + 4-20mA Output



Sentinel VU2 Series Remote Tank Level Monitoring (Dual Tank System)

- ✓ 2x LED Display
- ✓ 120VAC Powered
- ✓ Remote Monitor via Cellular Networks
- ✓ 24/7 Access to Data via Cloud Based
- ✓ Low Monthly Cost
- ✓ 5-Digit LED Display
- ✓ Access Data via PC | Laptop | Phone
- ✓ 2-5A Relays + 4-20mA Output

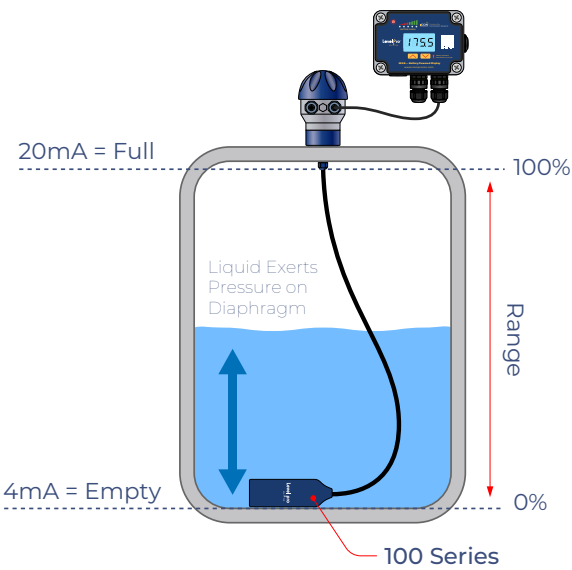


Understanding Level Measurement

Submersible Level Sensor

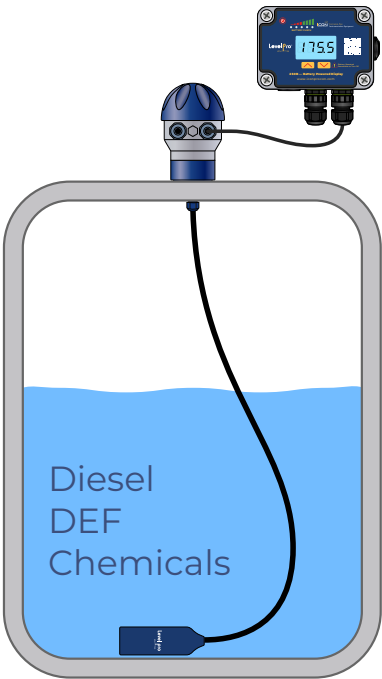
All Submersible Sensors have a Calibrated Range that is based on H₂O that has a Specific Gravity or Density = 1

- 1. Range Value :** The Overall Measuring Distance that the Sensor has been calibrated to by the Factory.
 - The Range will be Mentioned on the Sensor Body.
- 2. Empty :** The Pressure being exerted on from the sensor diaphragm at Lowest Point.
 - Normally this is when the Tank is Empty.
 - Tank Empty = 4mA setting.
- 3. Full :** The Pressure being exerted on the sensor's diaphragm at the highest point.
 - Tank Full = 20mA setting.



Application Details

- ✓ Chemical _____
- ✓ Concentration _____
- ✓ Specific Gravity _____
- ✓ Temperature _____
- ✓ Solids : Yes ☐ No ☐
- ✓ Out-Gassing or Vapors : Yes ☐ No ☐
- ✓ Tank Dimensions W x H inches:
W = _____ H = _____
- ✓ Vertical : ☐ Horizontal : ☐
- ✓ Flat Bottom : ☐ Conical Bottom : ☐



LevelPro® — 100 Series

Submersible Level Sensor Transmitter

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 (see image: b).

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 by the Specific Gravity of the Liquid.

$$\text{SENSOR RANGE} / \text{S.G} = \text{NEW RANGE}$$

HiC (20mA) Calculation

For Readings in Inches,

$$\text{HiC (20mA)} = \frac{\text{Max. Range of Sensor (in)}}{\text{Specific Gravity of the liquid}}$$

For Readings in Gallons

$$\text{HiC (20mA)} = \frac{\text{Max. Range of Sensor (in)} \times \text{Max. Fill Capacity (Gal)}}{\text{Specific Gravity} \times \text{Straight Wall Height (in)}}$$

The Importance of the Liquids S.G (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 S.G < 1.0 are **Lighter** than H₂O (e.g. Oil)

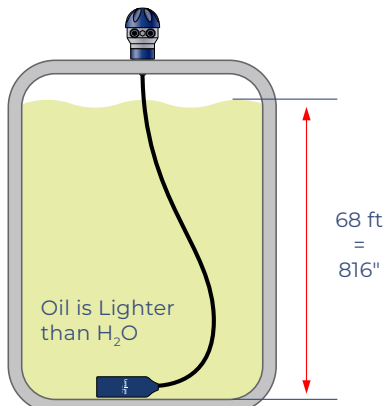
Liquids with a S.G > 1.0 are **Heavier** than H₂O (e.g. Sulfuric Acid)

H₂O has a S.G = 1.0

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

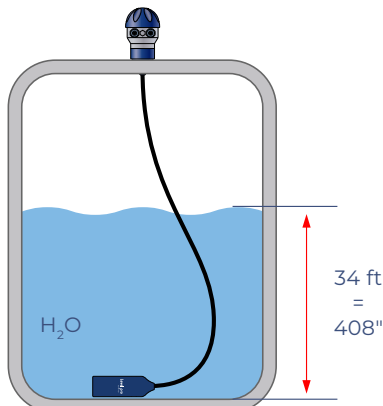
S.G > 1.0 Requires **Less Liquid** to Equal the Same Pressure or Height as with H₂O.

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



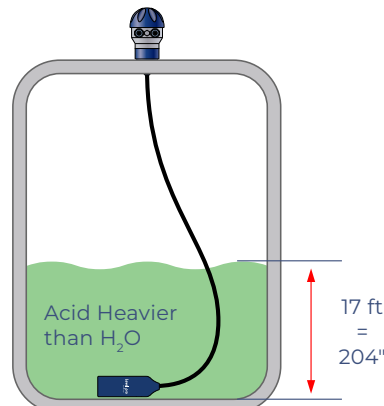
Specific Gravity = 0.5

Tank #1



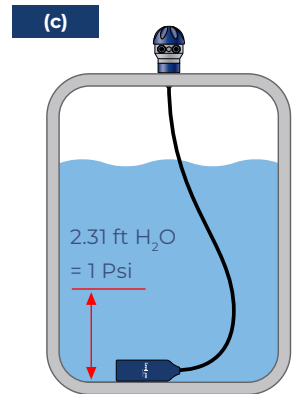
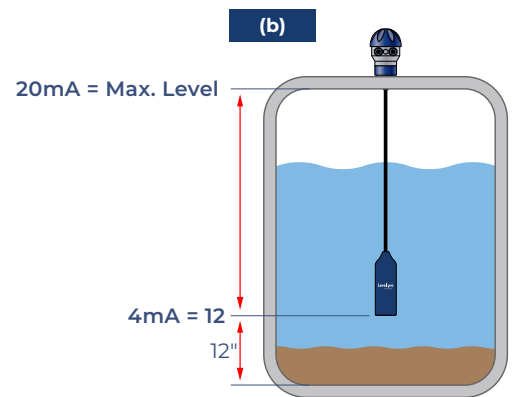
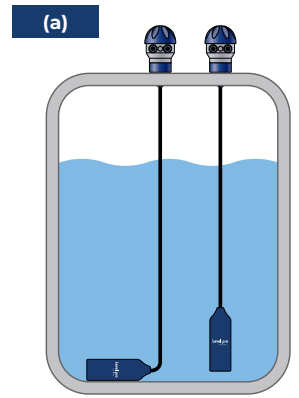
Specific Gravity = 1

Tank #2



Specific Gravity = 2

Tank #3



LevelPro® — 100 Series

Submersible Level Sensor Transmitter

Calculating Max. Range of a Sensor

Let's assume a the calibrated range of the submersible sensor is 34" or 408". The range is always referenced H₂O which has a specific gravity S.G or (Density) equal to 1

Calibrated Range / S.G = New Range of the Sensor | $34 / 1 = 34"$ or $408 / 1 =$ Liquid Level Range = $408"$

Example 1

The liquid in Tank # 1 has a S.G = 0.5 which is **Lighter** than that of H₂O

To determine the New Range of the sensor, simply divide the H₂O Range (34") by the S.G of the liquid that is going to be in the tank (i.e. S.G = 0.5).

$34 / .5 = 68$ feet or $816"$

Since the oil is a lighter fluid than H₂O, the new measuring range of the sensor has increased and is now 68" or 816".

Example 2

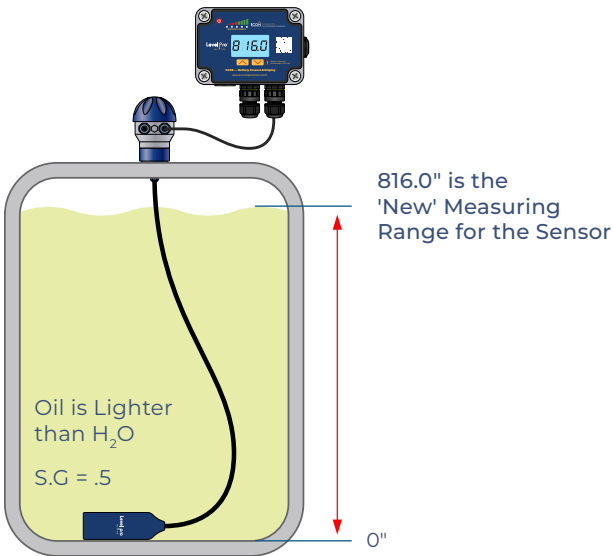
The liquid in Tank # 2 has a S.G. = 2 which is **2x Heavier** than H₂O

The 34" sensor is now going to be installed into a tank to measure a liquid with a S.G = 2.

Range / S.G = New Range of the Sensor

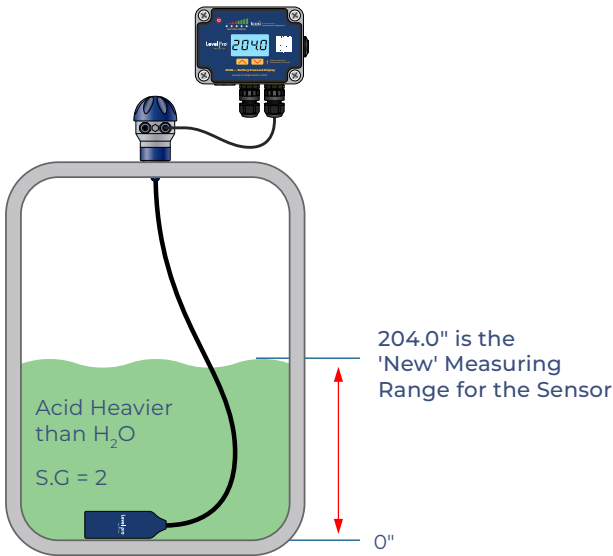
$34 / 2 = 17$ feet or $204"$

Tank #1



Oil S.G = 0.5	Sensor Signal	Display reading
Tank 1 Low Level	4.0mA	0"
Tank 1 High Level	20.0mA	816"

Tank #2



Acid S.G = 2.0	Sensor Signal	Display reading
Tank 2 Low Level	4.0mA	0"
Tank 2 High Level	20.0mA	204"

LevelPro® — 100 Series

Submersible Level Sensor Transmitter

Correct Sensor Installation

The **Submersible Level Sensor** is designed to operate while submerged in the actual application 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. 1.).

- ✓ **Location :** Select a location where the temperature of the transmitter will be within the specification of the sensor.



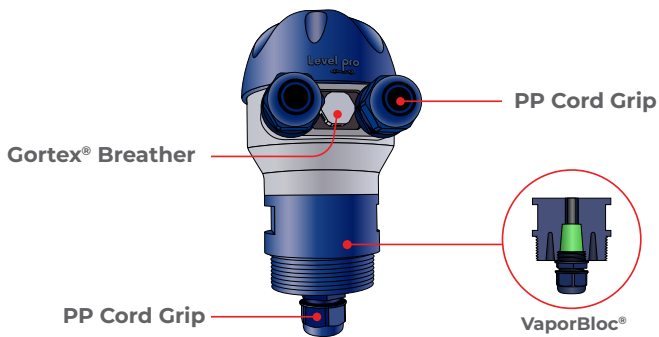
Avoid installations where other tank equipment will cause the transmitter to move or swing.

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.

- ✓ **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.
- ✓ **Termination:** The transmitter cable is connected to an LP100 junction box positioned on top of the tank. This cable includes a small vent tube which must be exposed to atmospheric pressure for proper function.

The LP100 features a Gortex® Breather, ensuring accurate atmospheric pressure inside the junction box. This is essential as it provides a reference pressure, matching the atmospheric pressure with the pressure measured by the sensor located at the tank's base.

The inside of the Junction Box must be clean, dry, and free of moisture.



Note: Use caution when connecting the cable within the junction box. A ventilation/reference tube is 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. 1

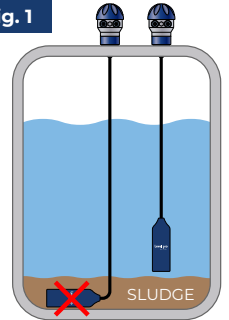


Fig. 2

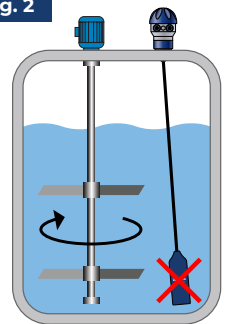
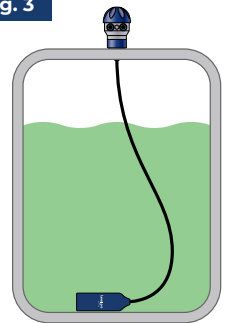
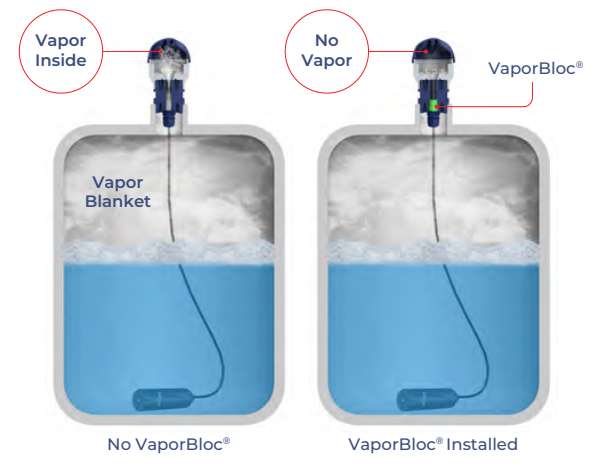


Fig. 3



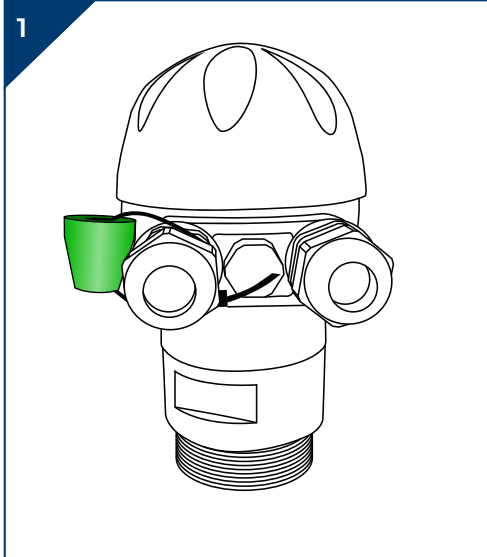
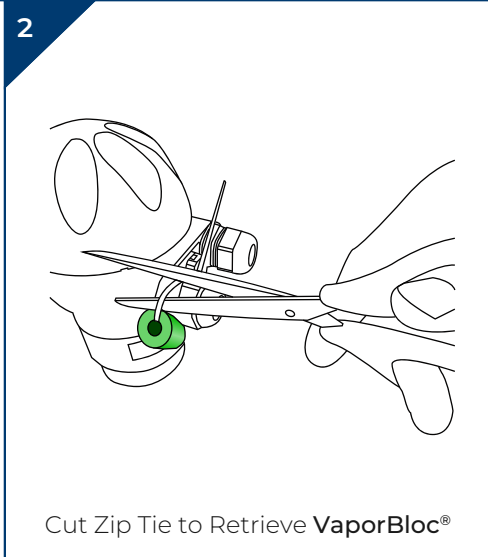
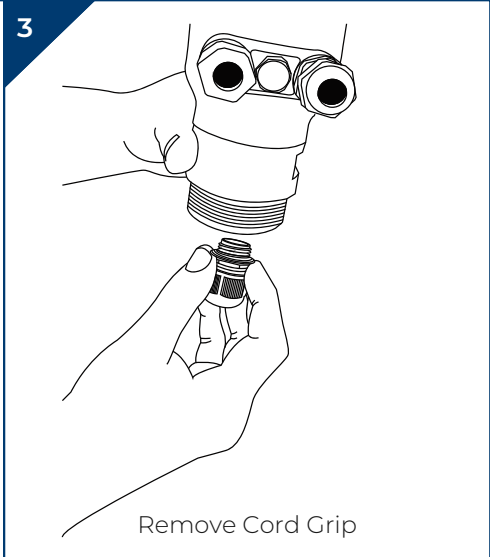
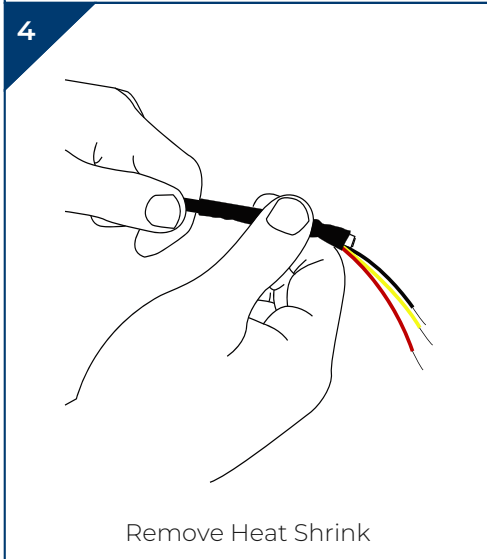
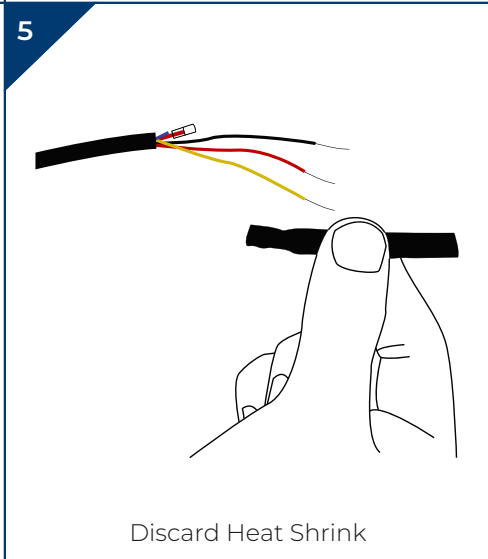
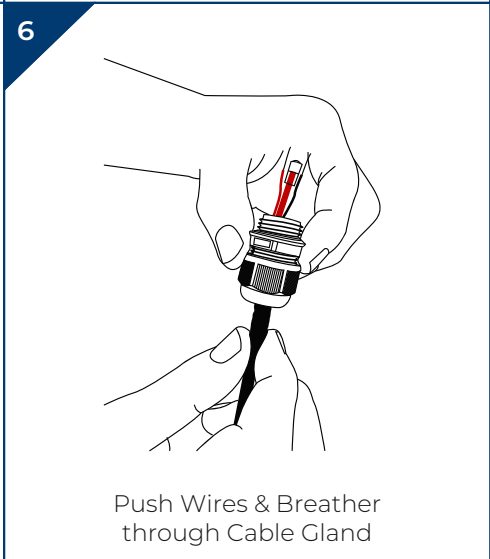
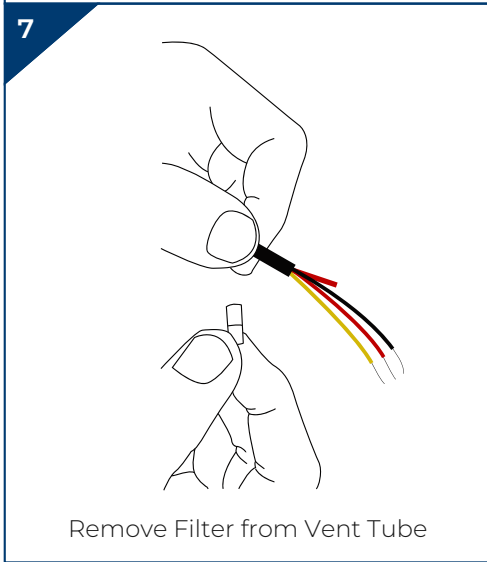
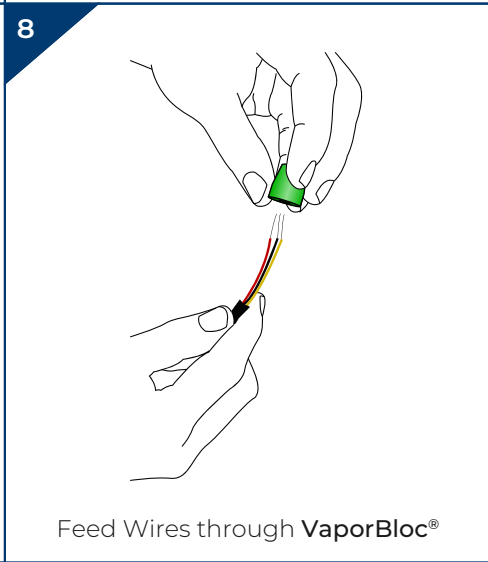
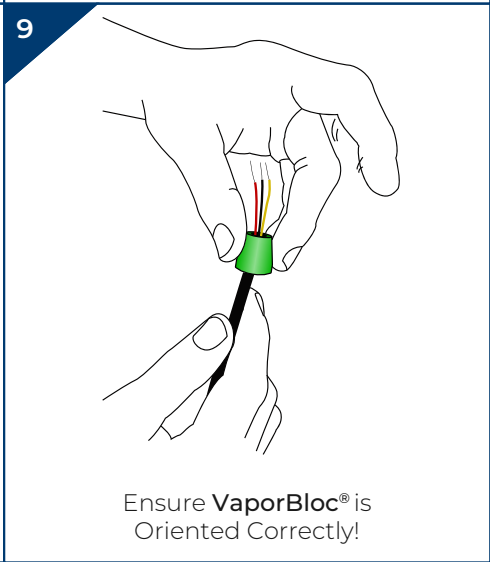
For Fuming Chemicals



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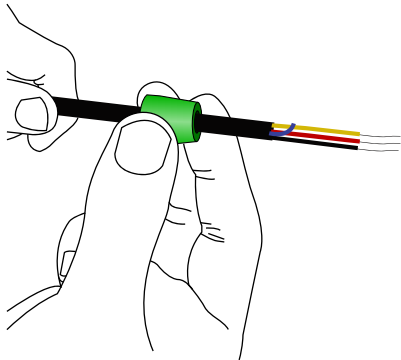
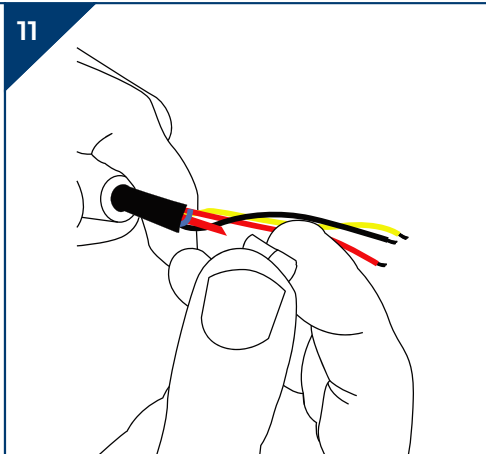
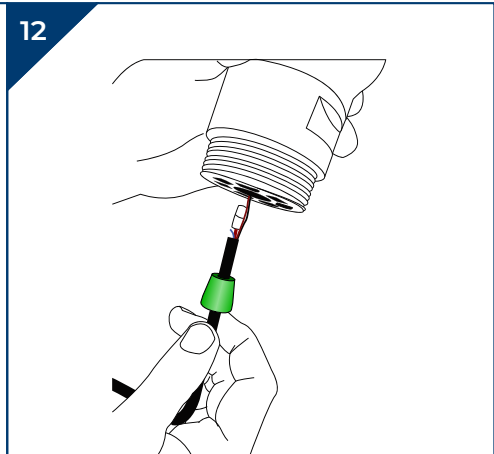
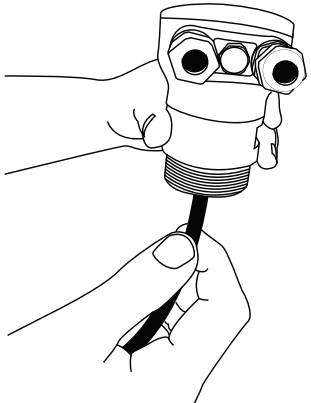
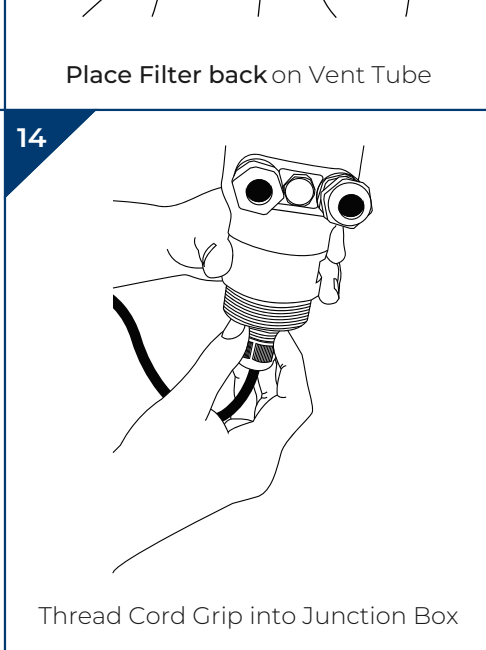
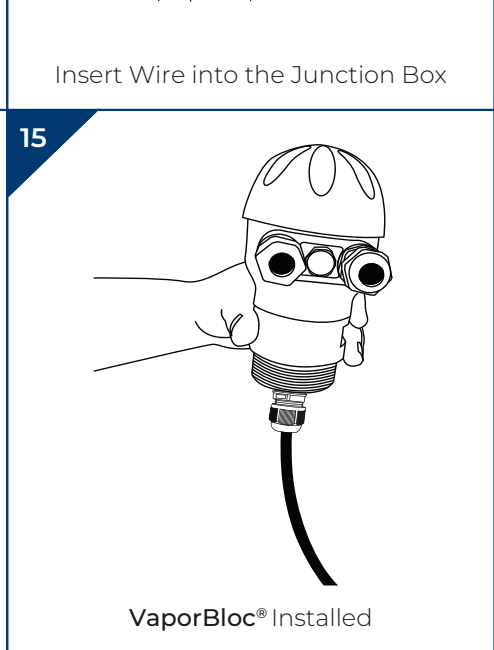
Submersible Level Sensor Transmitter

100 Series & Junction Box Installation

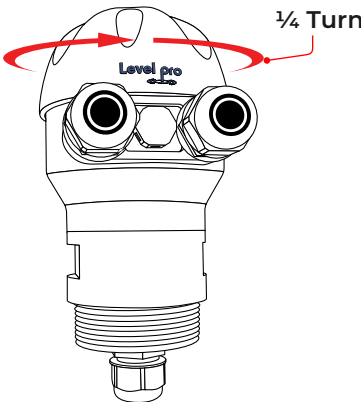
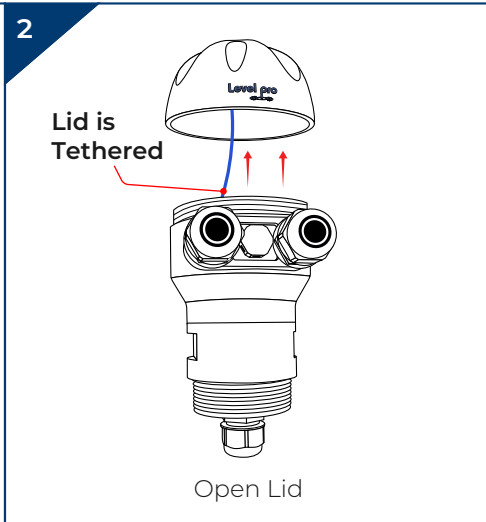
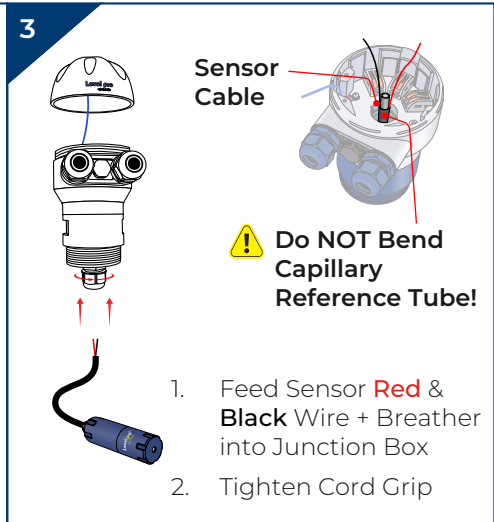
<div>1</div> 	<div>2</div>  <p>Cut Zip Tie to Retrieve VaporBloc®</p>	<div>3</div>  <p>Remove Cord Grip</p>
<div>4</div>  <p>Remove Heat Shrink</p>	<div>5</div>  <p>Discard Heat Shrink</p>	<div>6</div>  <p>Push Wires & Breather through Cable Gland</p>
<div>7</div>  <p>Remove Filter from Vent Tube</p>	<div>8</div>  <p>Feed Wires through VaporBloc®</p>	<div>9</div>  <p>Ensure VaporBloc® is Oriented Correctly!</p>

LevelPro® — 100 Series

Submersible Level Sensor Transmitter

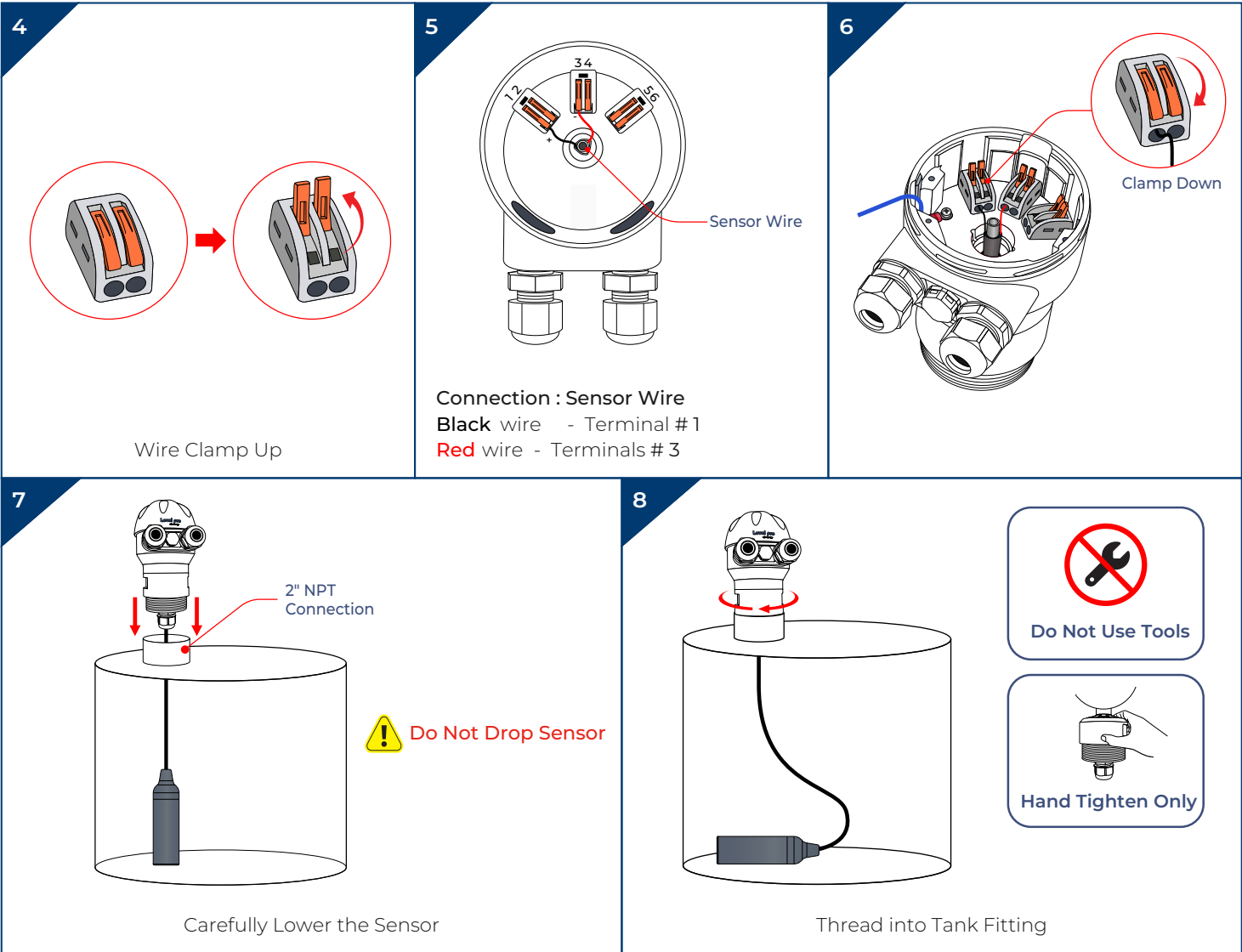
<p>10</p>  <p>Ensure VaporBloc® has a Snug Fit</p>	<p>11</p>  <p>Place Filter back on Vent Tube</p>	<p>12</p>  <p>Insert Wire into the Junction Box</p>
<p>13</p>  <p>Ensure Cable is Fully Inserted</p>	<p>14</p>  <p>Thread Cord Grip into Junction Box</p>	<p>15</p>  <p>VaporBloc® Installed</p>

100 Series & Junction Box Wire Connection

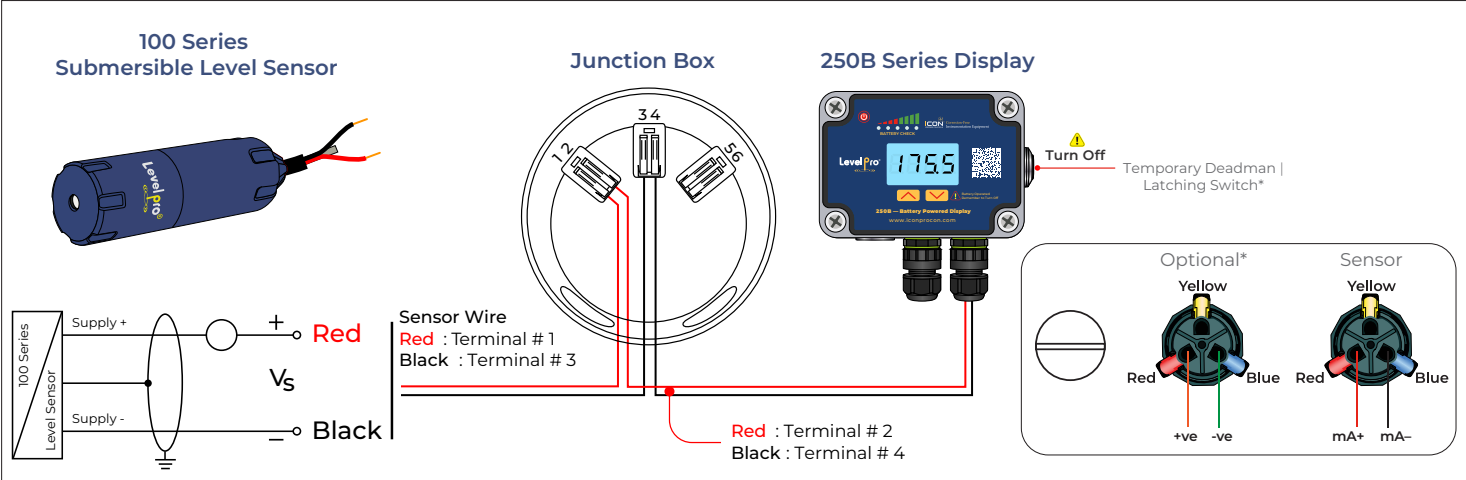
<p>1</p>  <p>Turn the Lid on top of the Junction Box to Open</p>	<p>2</p>  <p>Lid is Tethered</p> <p>Open Lid</p>	<p>3</p>  <p>Sensor Cable</p> <p>Do NOT Bend Capillary Reference Tube!</p> <ol style="list-style-type: none"> 1. Feed Sensor Red & Black Wire + Breather into Junction Box 2. Tighten Cord Grip
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LevelPro® — 100 Series

Submersible Level Sensor Transmitter



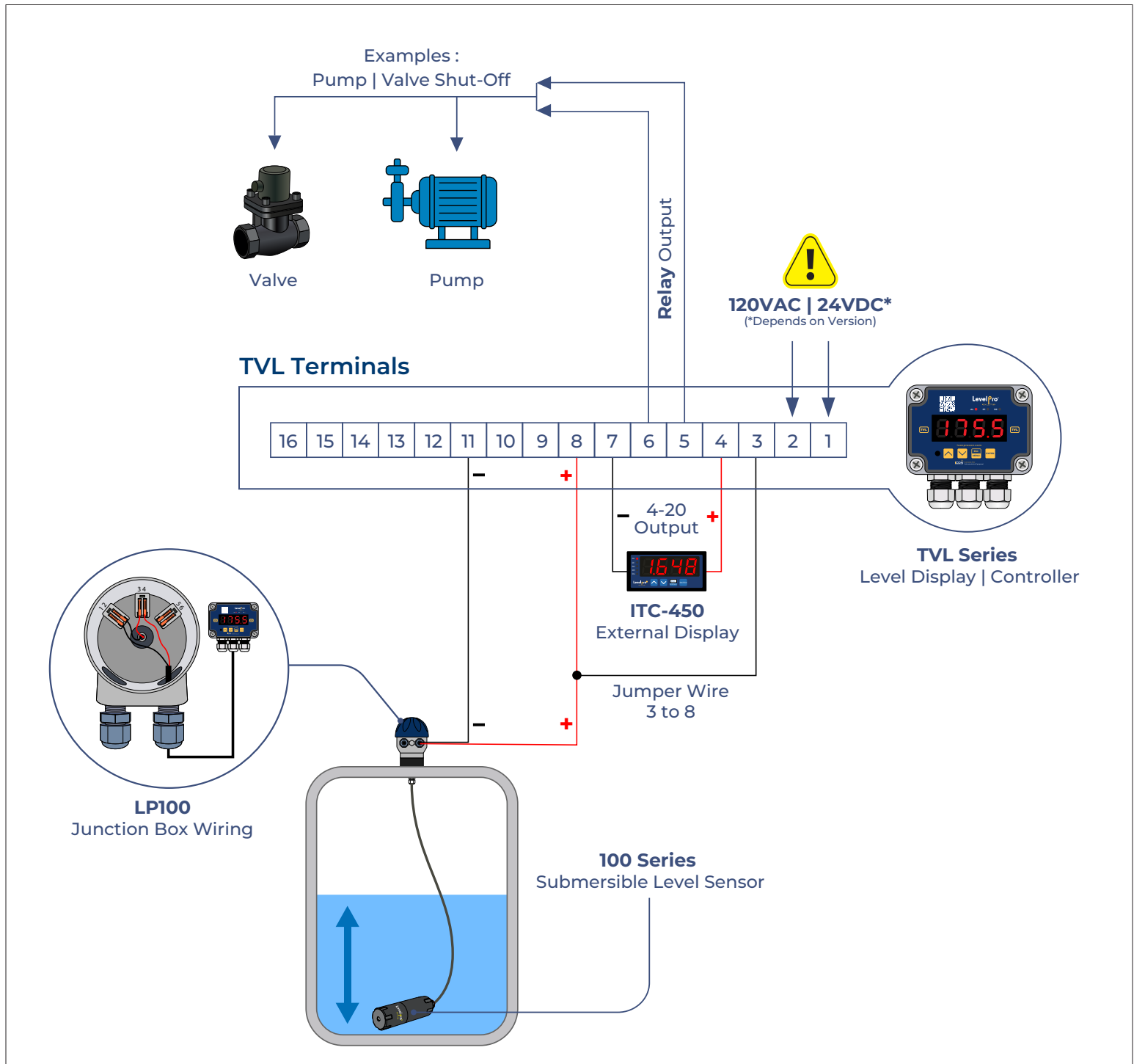
Connection Diagram — 100 Series + 250B Display



LevelPro® — 100 Series

Submersible Level Sensor Transmitter

Connection Diagram — 100 Series + TVL Display (4-20mA + 1 Relay Output)

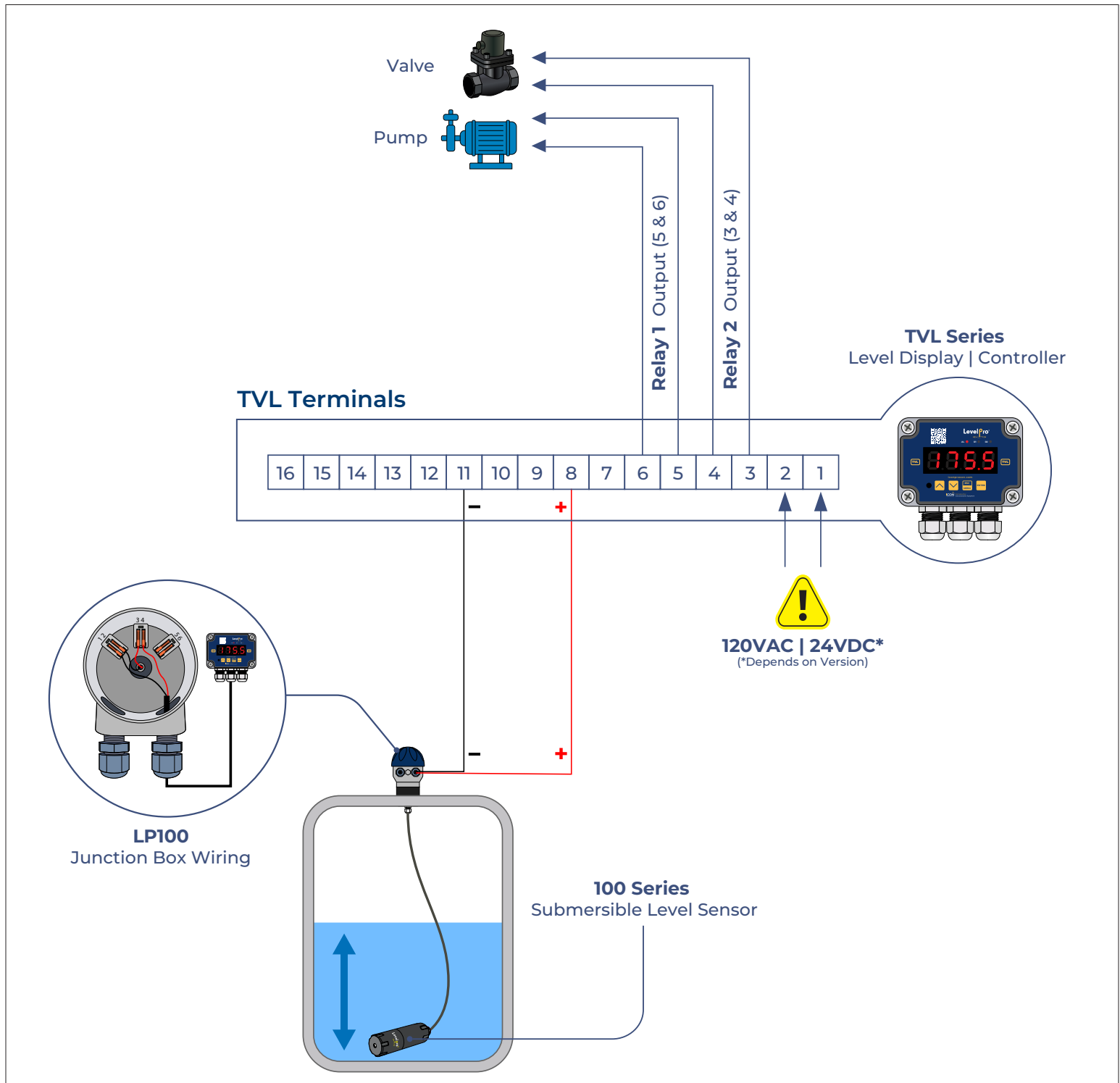


- The **Input 1** in TVL Display is set to 4-20mA by default
- Tank Empty = 4mA (Lowest Level)
- Tank full = 20mA (Highest Level)
- **Shielded cable is recommended for control loop wiring**
- Use the Red wire as the (+) and the Black wire as the (-)

LevelPro® — 100 Series

Submersible Level Sensor Transmitter

Connection Diagram — 100 Series + TVL Display (2 Relay Output)

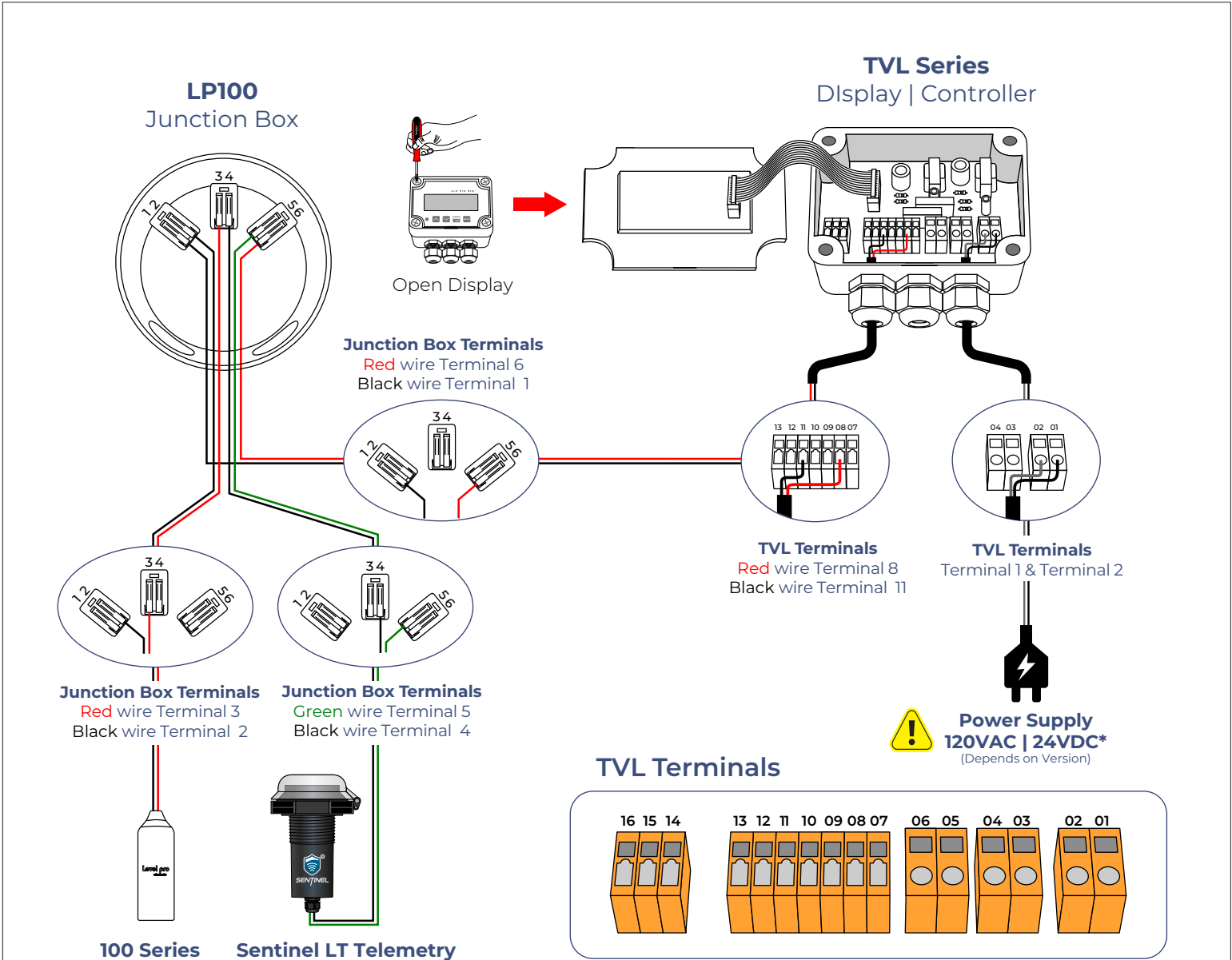


- The **Input 1** in TVL Display is set to 4-20mA by default
- Tank Empty = 4mA (Lowest Level)
- Tank full = 20mA (Highest Level)
- **Shielded cable is recommended for control loop wiring**
- Use the Red wire as the (+) and the Black wire as the (-)

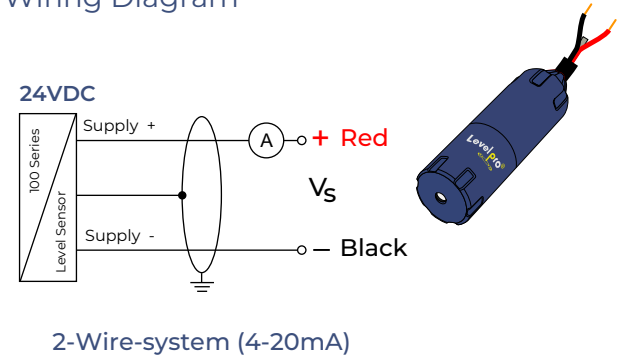
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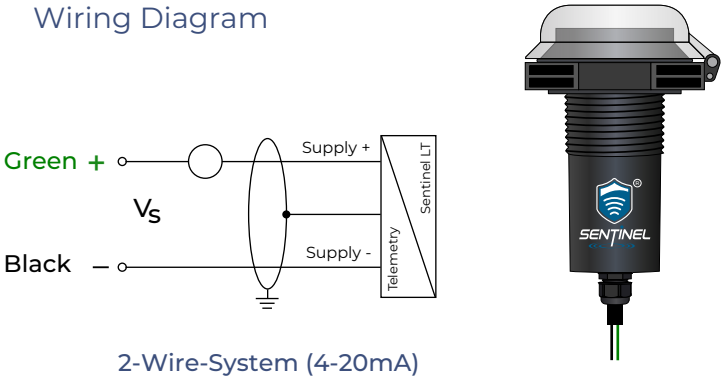
Connection Diagram — 100 Series + Sentinel LT + TVL Display



100 Series Wiring Diagram



Sentinel LT Series Wiring Diagram



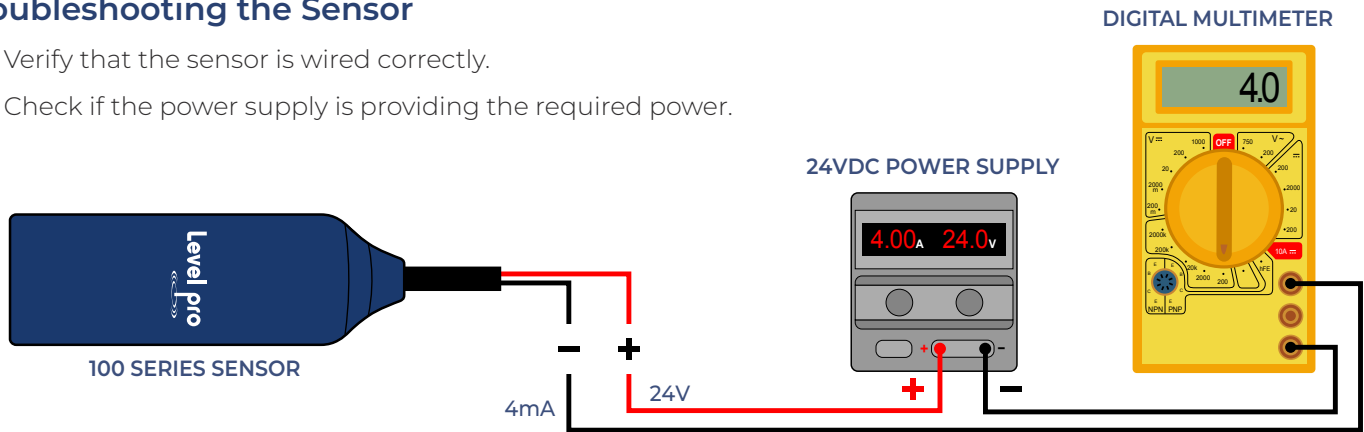
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Troubleshooting

Troubleshooting the Sensor

1. Verify that the sensor is wired correctly.
2. Check if the power supply is providing the required power.

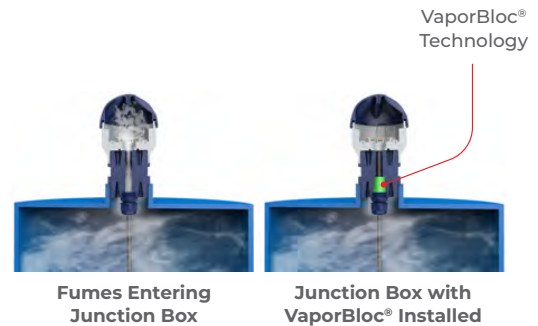


If transmitter is not functioning properly, isolate the transmitter from the system and wire as shown above. Be sure to remove the sensor from the classified area when performing this test. Multimeter should read 4mA with the transmitter out of liquid.

Incorrect Display Reading

- ✓ The reference or capillary tube is fitted with a **Cortex®** Filter. This must remain attached in order to prevent moisture, particulate, or insects from entering. **Do Not Remove.**
- ✓ **Avoid Blocking or Bending the Ventilation Tube.**
- ✓ The LP100 Junction Box is fitted with a **Cortex®** Breather to allow air to pass but not water. Please Ensure this is **Not Blocked.**

⚠ **Ensure VaporBloc® has been installed when measuring liquids with Fumes, Foam Vapor, or Out-Gas.**



LevelPro® — 100 Series

Submersible Level Sensor Transmitter

Warranty, Returns and Limitations

Warranty

Icon Process Controls Ltd 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 in accordance with instructions furnished by Icon Process Controls Ltd for a period of one year from the date of sale of such products. Icon Process Controls Ltd obligation under this warranty is solely and exclusively limited to the repair or replacement, at Icon Process Controls Ltd option, of the products or components, which Icon Process Controls Ltd examination determines to its satisfaction to be defective in material or workmanship within the warranty period. Icon Process Controls Ltd must be notified pursuant to the instructions below of any claim under this warranty within thirty (30) days of any claimed lack of conformity of the product. Any product repaired under this warranty will be warranted only for the remainder of the original warranty period. Any product provided as a replacement under this warranty will be warranted for the one year from the date of replacement.

Returns

Products cannot be returned to Icon Process Controls Ltd without prior authorization. To return a product that is thought to be defective, go to www.iconprocon.com, and submit a customer return (MRA) request form and follow the instructions therein. All warranty and non-warranty product returns to Icon Process Controls Ltd must be shipped prepaid and insured. Icon Process Controls Ltd will not be responsible for any products lost or damaged in shipment.

Limitations

This warranty does not apply to products which:

1. are beyond the warranty period or are products for which the original purchaser does not follow the warranty procedures outlined above;
2. have been subjected to electrical, mechanical or chemical damage due to improper, accidental or negligent use;
3. have been modified or altered;
4. anyone other than service personnel authorized by Icon Process Controls Ltd have attempted to repair;
5. have been involved in accidents or natural disasters; or
6. are damaged during return shipment to Icon Process Controls Ltd

Icon Process Controls Ltd reserves the right to unilaterally waive this warranty and dispose of any product returned to Icon Process Controls Ltd where:

1. there is evidence of a potentially hazardous material present with the product;
2. or the product has remained unclaimed at Icon Process Controls Ltd for more than 30 days after Icon Process Controls Ltd has dutifully requested disposition.

This warranty contains the sole express warranty made by Icon Process Controls Ltd in connection with its products. ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED. The remedies of repair or replacement as stated above are the exclusive remedies for the breach of this warranty. IN NO EVENT SHALL Icon Process Controls Ltd BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING PERSONAL OR REAL PROPERTY OR FOR INJURY TO ANY PERSON. THIS WARRANTY CONSTITUTES THE FINAL, COMPLETE AND EXCLUSIVE STATEMENT OF WARRANTY TERMS AND NO PERSON IS AUTHORIZED TO MAKE ANY OTHER WARRANTIES OR REPRESENTATIONS ON BEHALF OF Icon Process Controls Ltd. This warranty will be interpreted pursuant to the laws of the province of Ontario, Canada.

If any portion of this warranty is held to be invalid or unenforceable for any reason, such finding will not invalidate any other provision of this warranty.

For additional product documentation and technical support visit:

www.iconprocon.com | e-mail: sales@iconprocon.com or support@iconprocon.com | Ph: 905.469.9283



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