

**LS2100 2-WIRE LEVEL SWITCH  
OWNERS MANUAL**

- ◆ **INSTALLATION**
- ◆ **CALIBRATION**
- ◆ **TROUBLESHOOTING**
- ◆ **WARRANTY**

**NOTICE**

This manual contains important information necessary for the proper operation of this product. Before installing the unit, please read these instructions and familiarize yourself with the requirements and functions of this device.

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If any questions or problems arise during installation, please contact:

**Customer Service:** 1-800-835-8012 or 713-467-4438 (8:00 a.m. to 5:00 p.m. CST US)



**WARNING**

Failure to follow safe installation and servicing guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.
- Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment.
- Do not perform any services other than those contained in this manual unless you are qualified.
- Verify the operating environment of the Babbitt LS2100 is consistent with the appropriate area classification.

Improper use or installation of this device may cause the following:

- Personal injury or harm
- Application hazards such as overflow or overflows
- Damage to the device or system

High voltage that may be present on leads could cause electrical shock.

- Make sure the main power to the Babbitt LS2100 level switch is off and the lines to any other external power source are disconnected or not powered while wiring the instrument.



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## LS2100 2 WIRE LEVEL SWITCH

### 1. DESCRIPTION

#### 1.1 General Description

The LS2100 is a 2 wire point level switch that detects the presence or absence of material in a bin, silo, tank or other container. The basic unit is made up of a solid stainless steel probe attached to an explosion proof housing. Inside the explosion proof housing are all the calibration adjustments and sensing electronics. The unit is calibrated in the absence of material touching the probe and the milliamp signal on the 24VDC circuit changes when material is detected.

#### 1.2 Specifications

##### Electrical

Power:	Loop Powered 16-32 VDC
Output:	Normal – 8mA Alarm – 16mA Output is reversible
RF Frequency:	Approximately 1.3 MHz

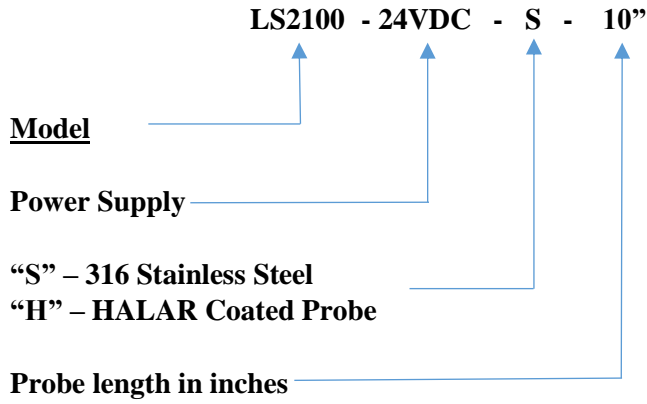
##### Environmental

Temperature:	Probe: -30° F to 400° F Electronics: -40° F to 185° F
Pressure:	Probe: 300 psi @ 75° F
Enclosure:	Cast aluminum, Class I, Groups C & D; Class II, Groups E, F & G
Construction:	Probe: All wetted parts, 316 SS, Teflon and Viton. Electronics: Housed in cast aluminum explosion proof enclosure.

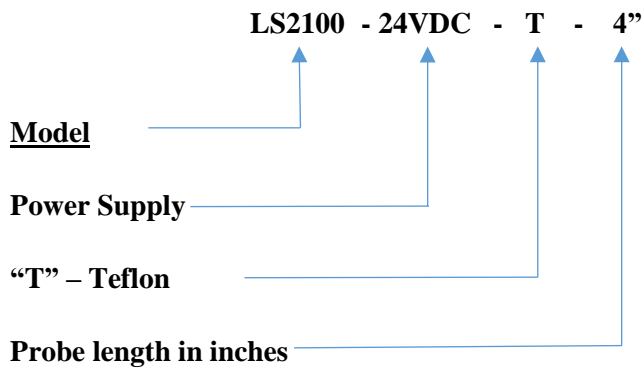
**Specifications subject to change without notice**

### 1.3 Ordering Information

#### Standard Probe Style

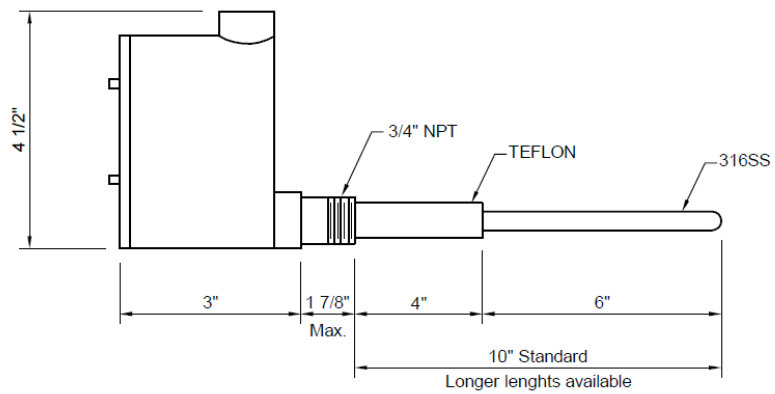


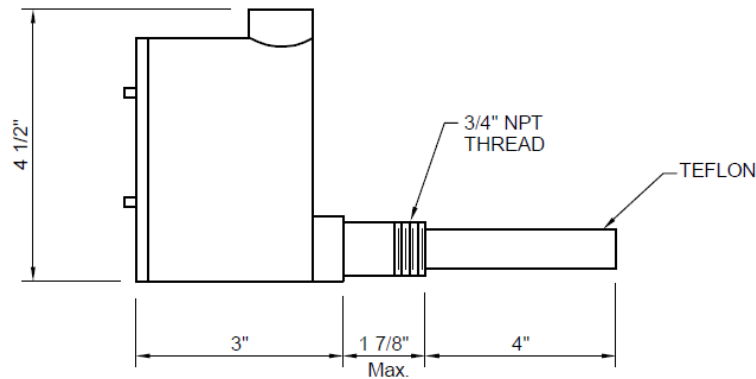
#### Blind End Probe Style



### 1.4 GA Drawing

#### Standard Probe



Blind End Probe**2. THEORY OF OPERATION**

The LS2100 employs a radio frequency (RF) balanced impedance bridge circuit to detect if the probe is in contact with the material that is to be sensed. When material is not in contact with the probe, the bridge is balanced by turning the adjustment pot to find the threshold where the red LED goes out. When material is in contact with the sensing probe, the bridge becomes unbalanced and the comparing circuit realizes the change. This causes a change in the milliamp load on the 24VDC circuit.

**3. INSTALLATION**

**CAUTION:** ALL INSTALLATION AND WIRING MUST CONFORM TO NEC AND ALL OTHER LOCAL ELECTRICAL CODES. TAKE SPECIAL CARE IN OBSERVING HAZARDOUS AREA SAFETY PROCEDURES. WE ASSUME NO LIABILITY FOR IMPROPERLY INSTALLED OR WIRED UNITS.

**3.1 Inspection**

Carefully unpack the LS2100 from the shipping box and check each item against the packing list before destroying any packing material. Visually inspect for any damage that may have occurred during shipping. Please advise the factory or your local distributor of any damage.

**3.2 Bench Test**

Before installing the unit, a simple operational check can be performed. On the bench, hook up the appropriate power to the Positive and Negative terminals. The operating voltage of the LS2100 is 24VDC +/- 8volts. The green LED should be lit when power is applied to the LS2100 (green LED should always be on when there is power to the LS2100). Hold the unit so that the probe is not in contact with any surface and touch the probe. The red LED should change state.

### 3.3 Physical Installation

- 1) The LS2100 is installed into the vessel wall using a 3/4" NPT process connection. This can be either a threaded coupling or a tapped entry such as a flange.
- 2) The insulator should always extend at least 2" through the vessel wall.
- 3) Always check for physical room around the location you have chosen to allow for installation. Allow 3.75" turning radius to screw the probe in and clearance above for the length of the probe.
- 4)

**CAUTION:** Always take the necessary safety precautions when cutting or welding in the coupling for the LS2100.

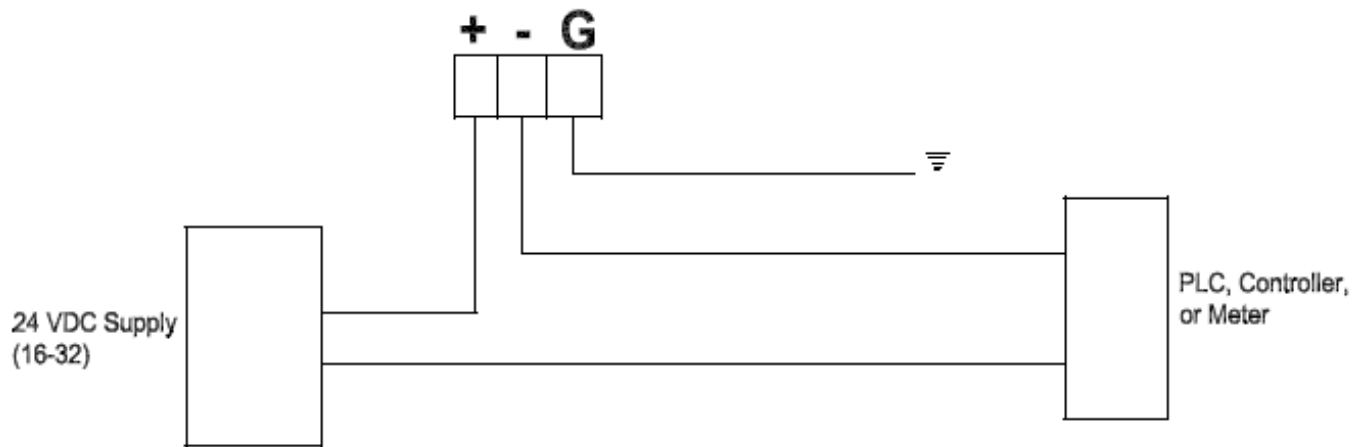
- a) Tag and lock out the electrical power to the equipment that services the vessels.
  - b) Check liquid or dry powders that create a gas in the vessel for oxygen as well as the explosion factor. (All dust will explode.)
  - c) Vessels that are cross vented have to be isolated.
- 5) Screw the LS2100 into the connection provided. In dry material applications, no sealant on the threads is required. On liquid applications, Teflon or a good pipe thread sealant may be used.
  - 6) The LS2100 has a 3/4" conduit entry. When wiring these units, conform to the National Electrical Code and any other city or company codes.
  - 7) Always install the electrical connection into the 3/4" conduit entry on the LS2100 so water will not follow the connection routing into the threads of the conduit hub. To guarantee that condensation and water will stay outside the unit, install an EYSM unilet before each LS2100 and fill with explosion proof sealing cement.

#### Removing the Electronics

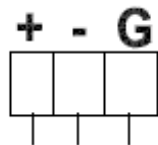
- 1) Disconnect supply power at main power source.
- 2) Disconnect wires from terminal strip.
- 3) Unplug blue antenna lead.
- 4) Remove green grounding screw.

### 3.4 Wiring

## Powered by external power source



## Powered by PLC or Controller





## 4. CALIBRATION

### PLEASE READ THE ENTIRE CALIBRATION PROCEDURE BEFORE CALBRATING

#### 4.1 Jumper Selection

The jumper labeled J1 and located adjacent to the potentiometer is used to choose whether the output 16mA when product is touching the probe or 16mA when product is not touching the probe.

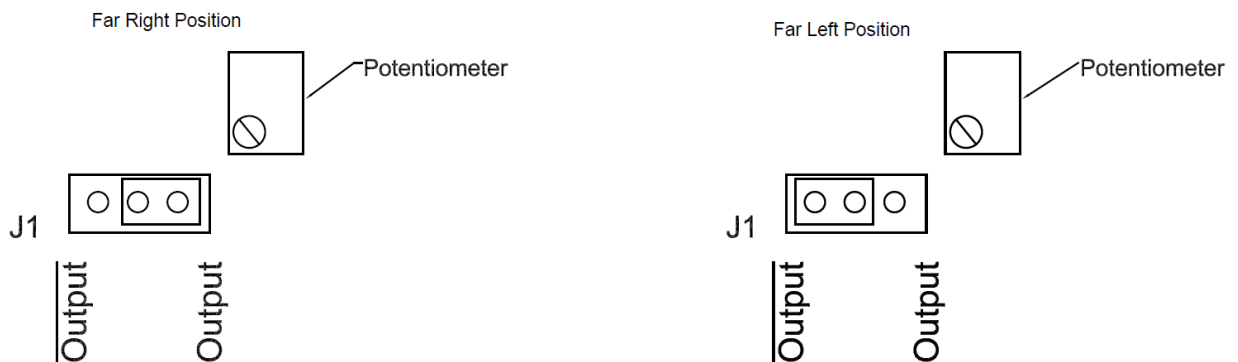
1. When the J1 jumper is in the Far Right position and LS2100 is properly calibrated the Red LED will be lit and output will be 16mA when product is touching the probe.
2. When J1 jumper is in far left position and LS2100 is properly calibrated the Red LED will be off and the output will be 8mA when product is touching the probe.
3. **Sensitivity Calibration (see next step) should always be performed with J1 jumper in the Far Right position.**
4. See diagram below.

**NOTE:** Due to the wide variety of applications and possible control or alarm functions, the proper fail safe selection will depend on your circumstances. Please call your distributor or the factory if you need assistance.

#### 4.2 Sensitivity Calibration

The LS2100 should be calibrated when no material is touching the probe, when the unit is installed where it will be used and the **J1 jumper set in the far right (closest to Red LED) position.**

1. Observe the Red LED. If it is on, go to Step 3
2. If the Red LED is off, turn the sensitivity adjustment potentiometer clockwise (CW) until it comes on.
3. Turn sensitivity adjustment pot counter-clockwise (CCW) until the Red LED just goes out. This sets the unit to its maximum sensitivity. If in your application this is too sensitive, you can turn the sensitivity adjustment pot further CCW; usually  $\frac{1}{4}$  to  $\frac{1}{2}$  turn is sufficient to reduce the units sensitivity. Always bring the product into contact with the probe after calibration to assure proper performance.



**5. MAINTENANCE AND TROUBLESHOOTING**

No routine maintenance is required other than keeping the interior of the unit clean and free of dirt, dust and other contaminants. The LS2100 consists of two main sub-assemblies. These are the enclosure with the probe assembly and the power supply board. The following troubleshooting guide will assist in determining how to correct most of the problems which may occur in the field. Review the Installation and Calibration procedures in sections 3 & 4.

PROBLEM	POSSIBLE CAUSE	SOLUTION
RED LIGHT cannot be adjusted to turn on.	<b>Antenna lead not connected.</b> No power to unit.	<b>Plug antenna lead into probe.</b> Check for correct power to unit.
RED LIGHT remains on at all times.	Probe is shorted to ground.	Unplug banana plug and position it so that the bare end is not touching anything. Turn calibration pot 20 turns CCW. LED should go out. If it does, repair, replace or clean antenna probe. If LED does not go out, replace electronics.
Unit triggers when material touches probe, but will not reset when material recedes from probe or unit gives false alarm.	Improper mount of probe. <b>Improper calibration procedure.</b> Excessive material build-up on probe.	Contact factory or distributor. <b>See Section 4.2</b> Perform “dirty probe” calibration; <u>recalibrate with buildup material</u> on probe.
Unit will not detect material.	Improper calibration. <b>Antenna lead not plugged into probe.</b> Unit was calibrated with material touching probe.	See calibration instructions section 4. <b>Plug antenna lead into probe.</b> Be sure material is not touching probe and recalibrate
Unit will not stay in calibration.	<b>Poor grounding of unit to vessel.</b>	<b>Provide secure grounding connection.</b>
Relay operates properly, but no signal at terminals.	Burned or broken lands on the printed circuit board. <b>Bad relay contacts.</b>	Turn off power. Remove module from housing and inspect lands on printed circuit for damage. Replace if necessary. <b>Replace relay or return for repair.</b>

**PLEASE CONTACT THE FACTORY OR YOUR DISTRIBUTOR IF YOU HAVE ANY QUESTIONS OR NEED ASSISTANCE.**

**Customer Service:** 1-800-835-8012 or 713-467-4438 (8:00 a.m. to 5:00 p.m. CST US)

## **6. WARRANTY**

All components of the LS2100 are warranted to be free from defects in material and workmanship for a period of two years from the date of purchase. This warranty applies to general purchaser and to components installed, serviced and operated according to instructions.

Babbitt International, Inc. will repair or replace, at its option, FOB at its plant or any other location designated, any part which proves to be defective in manufacture or workmanship.

All claims must be made in writing within the warranty period. No claims outside of the warranty period will be honored.

Warranties are not applied to any components which have been damaged by improper installation, use, exposure to unusual atmospheric conditions or components which have been misused, abused, damaged by neglect or accident. This warranty shall not apply to any components which have been altered or repaired without the prior written consent of Babbitt International, Inc.

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