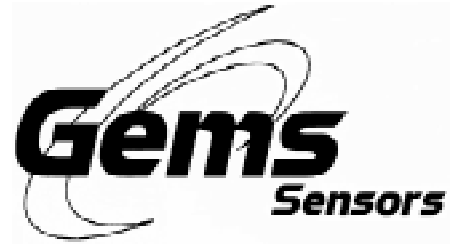


Magnetic Liquid Level Indicator

Installation, Operation and Maintenance  
 Bulletin No. 177664-4 (Rev. E)



Section 4: Signal Conditioners

Signal conditioners provide a regulated output (voltage or current) when used with Gems SureSite transmitters. The signal conditioner is housed within a junction box with two or three ports. The ports allow for mounting and customer wiring. Your signal conditioner's part number can be found on the identification plate located on the back of the junction box. Your unit has the operating and electrical characteristics indicated in the chart (for reference purposes) below:

Part Number	Output Signal	Input Voltage Source	Conditioner Accuracy With Transmitter	Output Signal Loading	Transient Voltage Protection
86156	0 to 5 VDC	8 to 24 VDC	± 0.4% of Full Scale or ± 1" - - Whichever is greater	4K Ohms/V Max (.25 mA)	Metal Oxide Varistor Rated @ 30 VDC
85997	0 to 12 VDC	15 to 30 VDC		2K Ohms/V Max (.5 mA)	Metal Oxide Varistor Rated @ 38 VDC
86157*	0 to 12 VDC	20 to 30 VDC			
86158	4 to 20 mA	10 to 40 VDC	± 1.0% of Full Scale or ± 1" - - Whichever is greater	Range: 100 - 1200 Ohms	Metal Oxide Varistor Rated @ 68 VDC 250 Amps
112300	4 to 20 mA				
152800	4 to 20 mA				

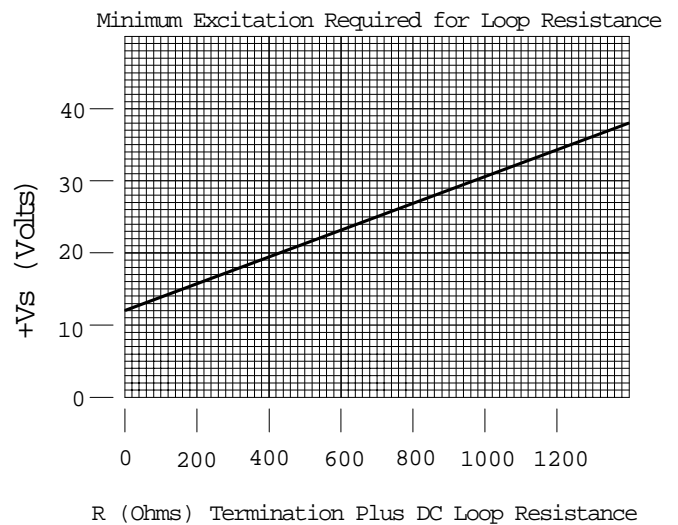
**\*Note**

1. Lower Alarm Point for P/N 86157 varies. The default setting is 2% to 50% of full scale.
2. Upper Alarm Point for P/N 86157 varies. The default setting is 50% to 98% of full scale.

**General Note**

Converter/signal conditioner Part Numbers **86158, 112300, and 152800** require calibration to maintain the accuracy of SureSite transmitter readings. Converter calibration can be accomplished, using your transmitter or a transmitter simulator.

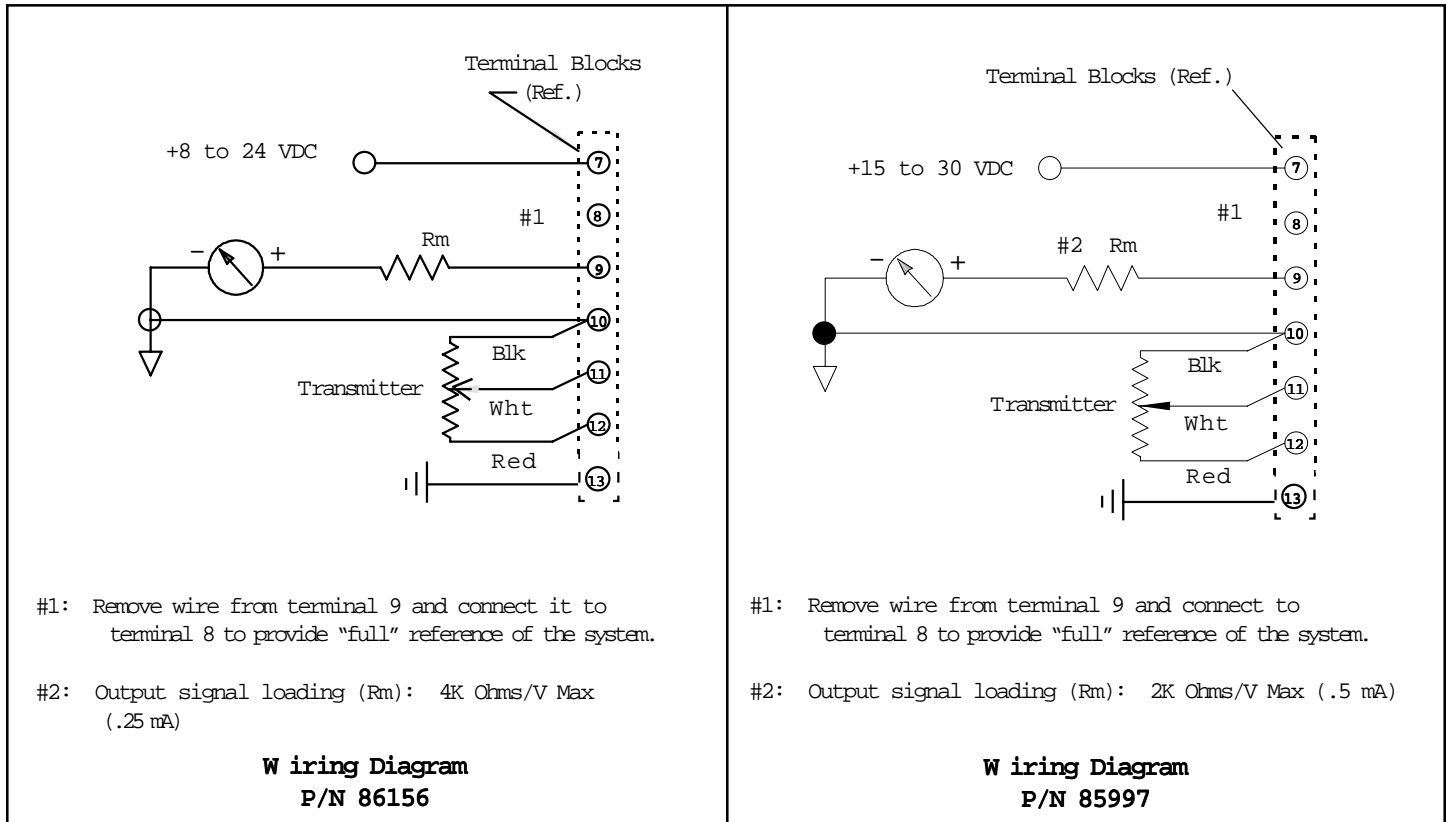
Calibration is simplified when using a transmitter simulator in place of the SureSite transmitter. Because the output voltage of the signal conditioner is stepped down to a fixed DC voltage, the transmitter and the transmitter simulator act as identical electrical loads, as interpreted by the converter. For the purpose of calibration, rotating the shaft (wiper) of the transmitter simulator performs the same function as moving the SureSite float up and down inside the weldment. In each case, the changing resistance will provide the proper output to calibrate the signal conditioner. A transmitter simulator has been supplied with your converter/signal conditioner.



## Installation Precautions and Preparations

With the exception of P/N 112300, all signal conditioners are typically installed on the SureSite magnetic level indicator at the factory. For those units so designated, the customer will have to provide electrical grounding, with an effective resistance of 1W or less. Please refer to the Wiring Diagram(s) for your particular signal conditioner part number. Calibration of the signal conditioner can be accomplished using your SureSite transmitter or the transmitter simulator (supplied).

### Signal Conditioner Part Numbers 86156 (0 to 5 VDC) and 85997 (0 to 12 VDC)



### Installation Specifics

The signal conditioner is typically installed on the SureSite magnetic level indicator at the factory. If your signal conditioner was purchased separately, you may use one of the 1/2" FNPT parts for mounting.

### Calibration Requirements

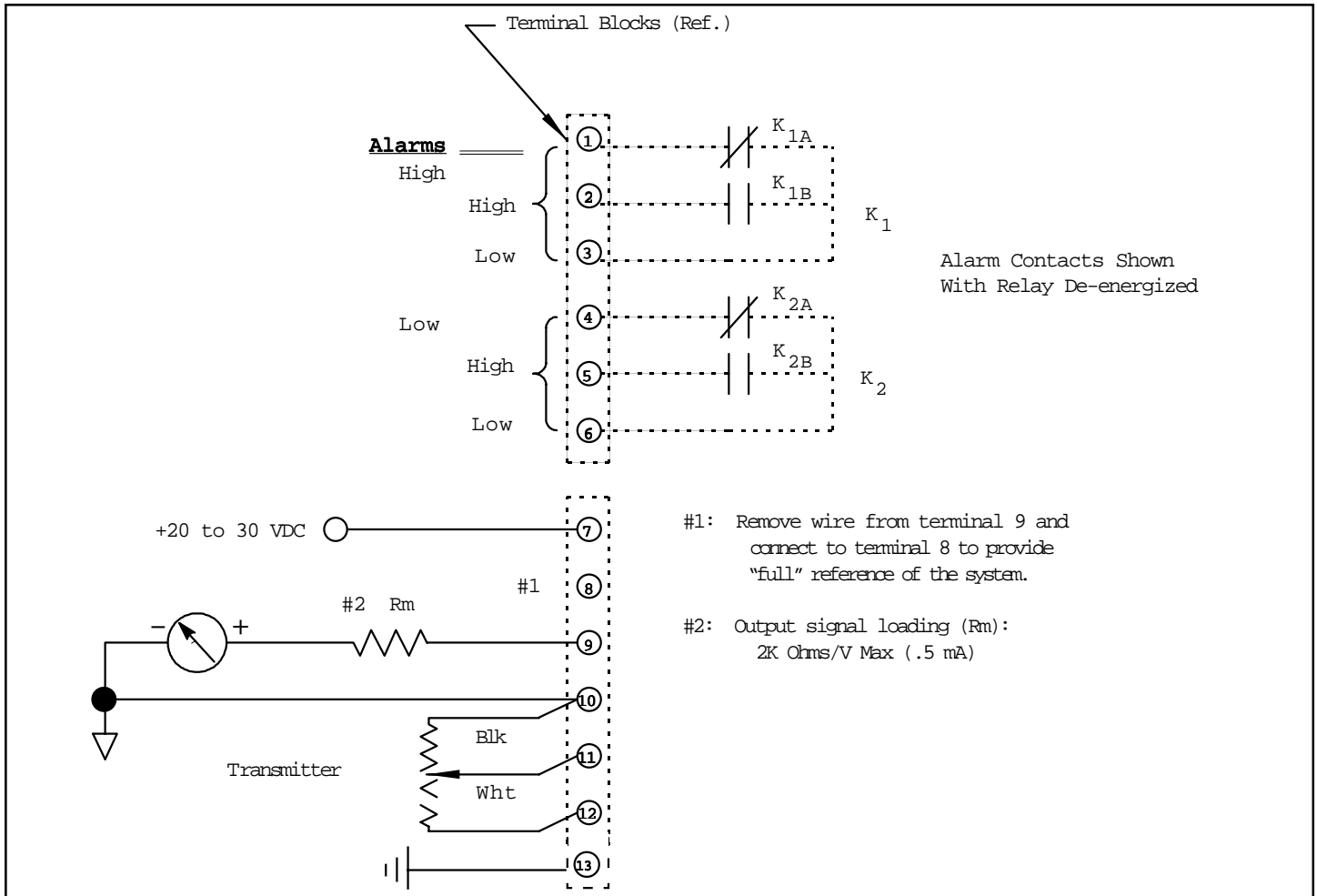
None. Both of these units are calibrated at the factory.

**Part Number 86157, 0 to 12 VDC**

This unit contains two relays intended to provide a high and low alarm signal for process control. These relays are K1 and K2, respectively, in the wiring diagram. Standard alarm functions are K1 (High Alarm) and K2 (Low Alarm). Other configurations are available upon request. Unless specified otherwise, the trip-point for the Low Alarm relay has been set at 5% of full scale, while that of the High Alarm relay has been set at 95% of full scale.

**Signal Conditioner Part Numbers 86157 (0 to 12 VDC)**

- Wiring Diagram -



**Installation Specifics**

The 86157 Signal Conditioner is typically installed on the SureSite magnetic level indicator at the factory. If your signal conditioner has been purchased separately, you may use one of the 1/2" FNPT ports for mounting.

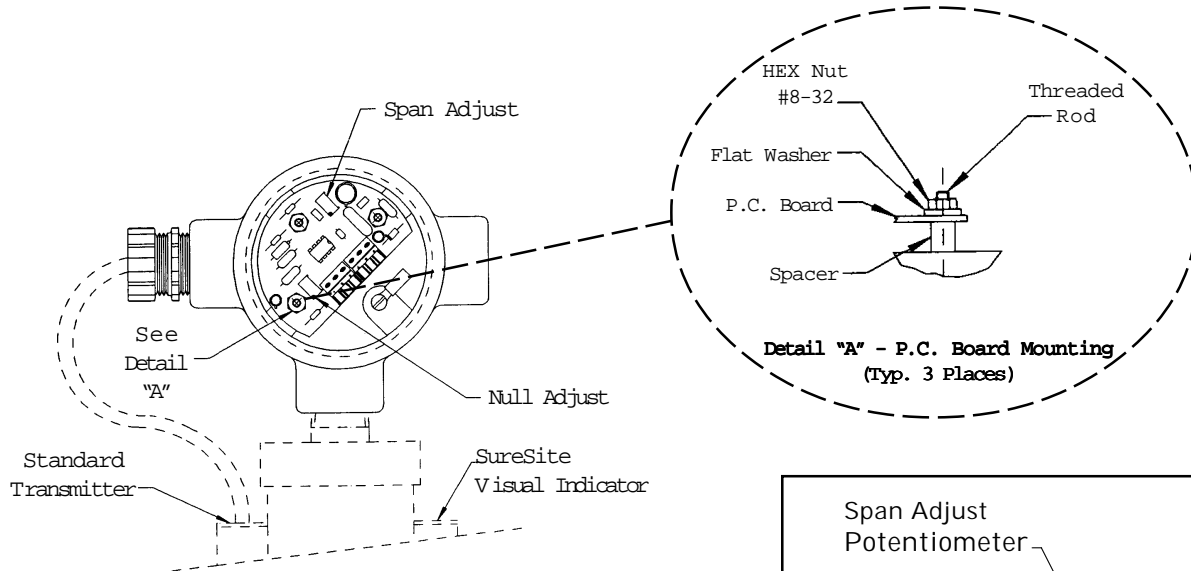
**Calibration Requirements**

None. This unit is calibrated at the factory. If it is necessary to change the high and/or low alarm settings, you may follow the procedure provided below.

**Alarm Calibration Procedure (P/N 86157)**

The alarm trip-points are adjusted by means of two separate twenty-turn potentiometers, through either the upper or lower 50% of the indicated range. The approximate set-point adjustment can be made by counting the number of revolutions from the end-stops of the pots. As a general 'Rule of Thumb,' you may expect 2.5% of the indicated range per turn. After you have established the desired trip-point(s) for the alarm relay(s), the adjusting knob(s) may be fixed with a small amount of RTV or other semi-permanent material.

## Signal Conditioner Part Numbers 86158 and 152800 (4 to 20 mA)



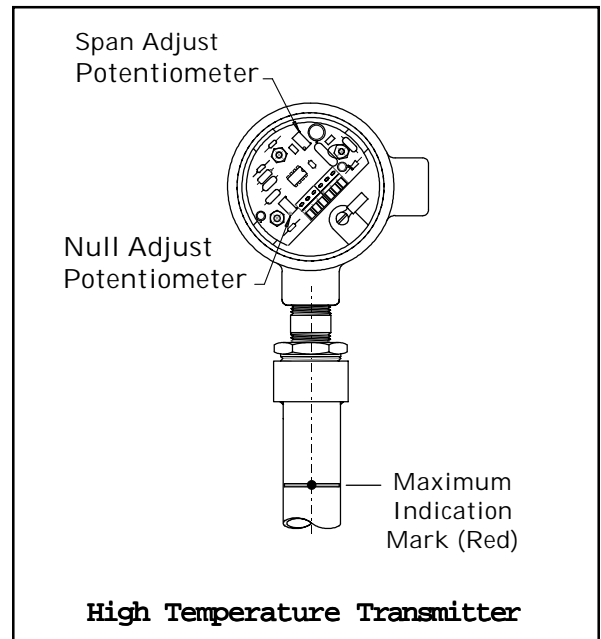
**This Unit Incorporates a Linear Voltage to Current Converter**

### Calibration Requirements

The calibration procedure should be conducted with a potentiometer (transmitter simulator) which has a resistance value of 1.0 k Ohm , minimum, to a maximum of 2.5 k Ohm . The transmitter simulator supplied with the signal conditioner has an adjustment range of 0 to 1000 ohms.

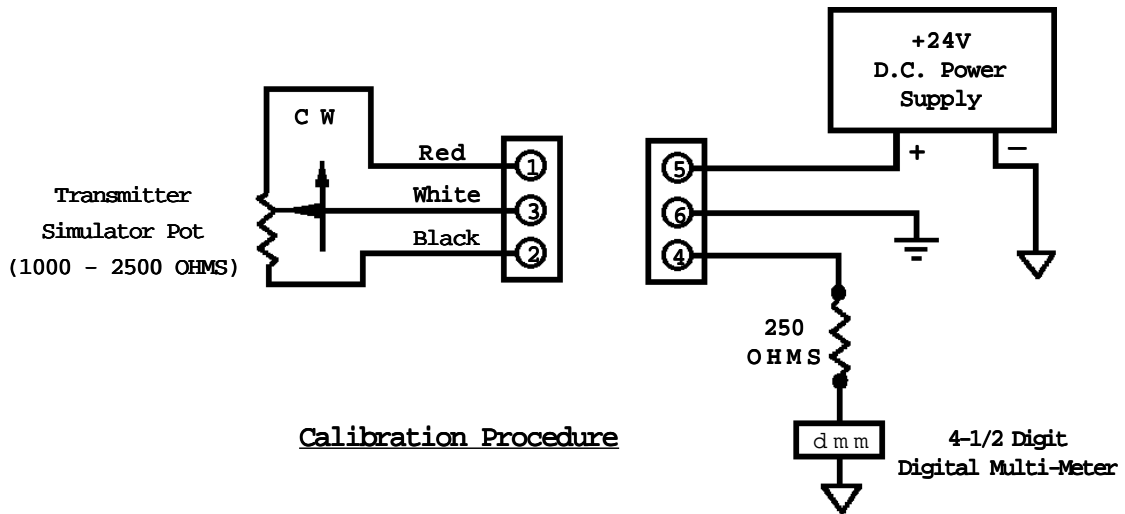
### Calibration Procedure

(**Note**: Calibration should be performed with the signal conditioner disconnected from the SureSite transmitter)



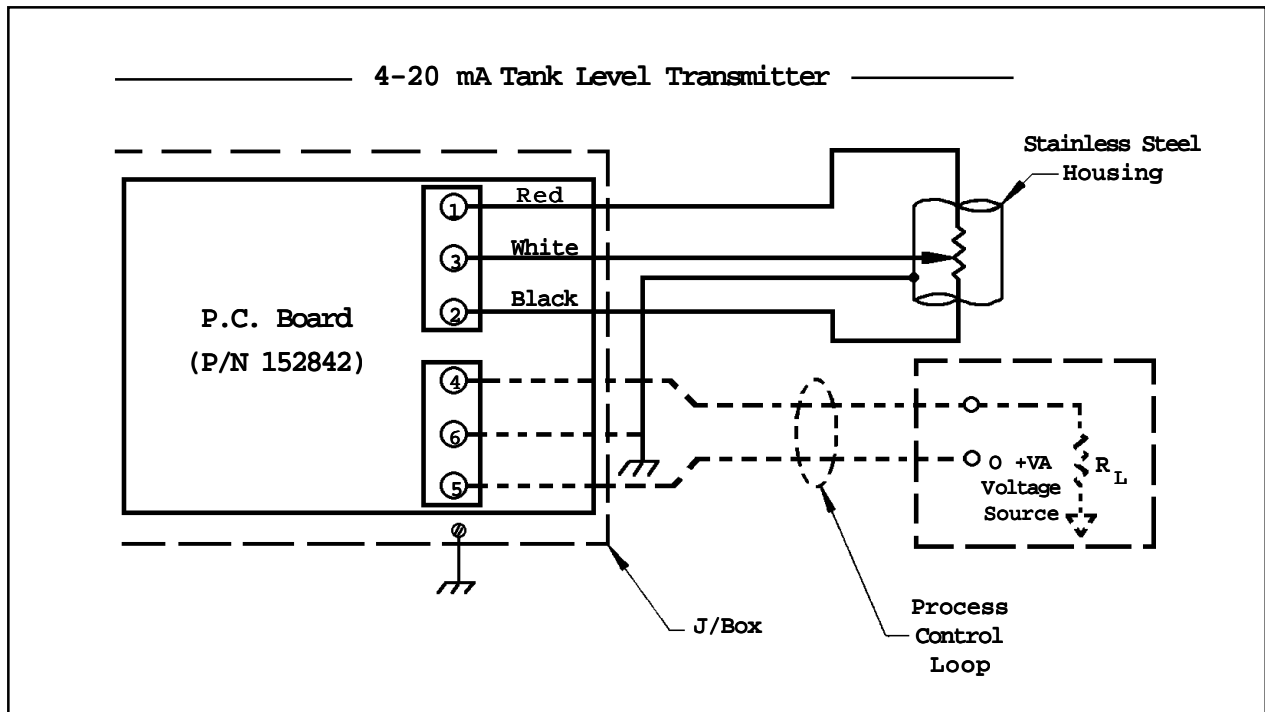
1. Make the connections as shown in the calibration wiring diagram with the power supply turned off
2. Set and apply the D. C. power supply voltage at 24 VDC, with a 250 Ohm load resistance, as shown.
3. Adjust the span and null potentiometers at approximately mid-range.
4. Set the transmitter/simulator potentiometer adjusting screw to its fully clockwise position, for a maximum indication on the digital multimeter (DMM).
5. With the span adjust potentiometer (see illustration), set the output current to 20 mA.
6. Turn the transmitter/simulator potentiometer adjusting screw to its fully counter-clockwise position, for a minimum indication on the DMM.
7. With the null adjust potentiometer, set the output current to 4 mA.
8. Repeat steps #4 through #7 for the final fine adjustment. No further adjustments will be required.
9. After calibration, the converter/signal conditioner can be mated permanently to the transmitter assembly. Any adjustments for null and span (4mA & 20 ma), due to D. C. loop resistance, are achieved by adjusting the potentiometer screws

Signal Conditioner Part Numbers 86158 (4-20mA)



Calibration Procedure

- Wiring Diagram -



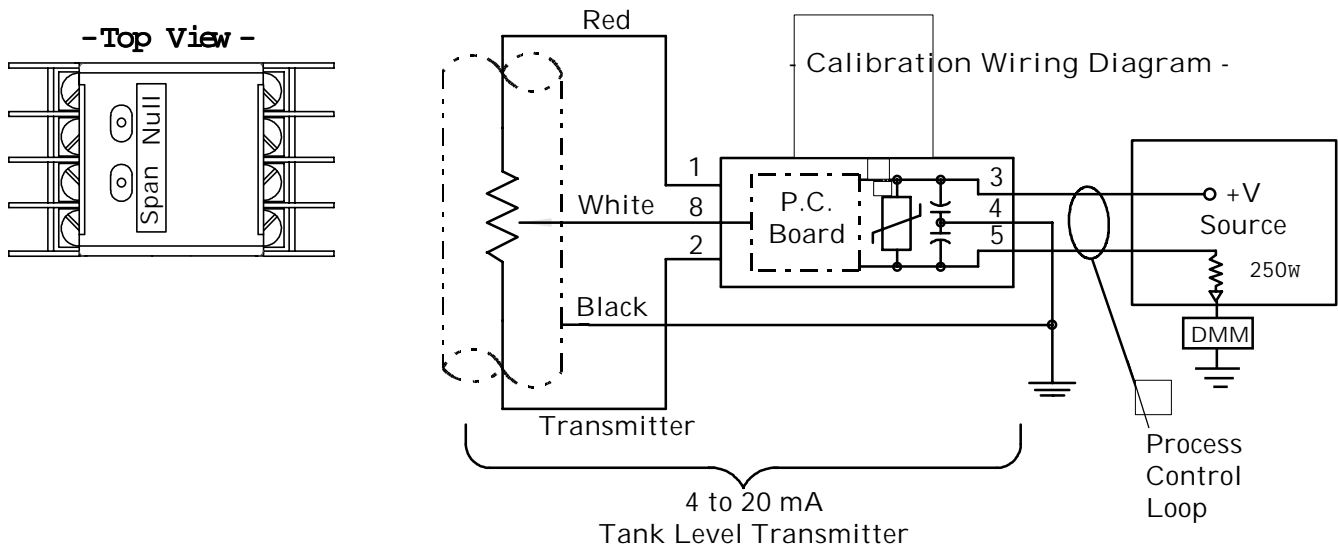
Installation Specifics

The signal conditioner is typically installed on the Gems SureSite magnetic level indicator at the factory. If your signal conditioner was purchased separately, you may use one of the FNPT ports for mounting.

## Signal Conditioner Part Number 112300 (4 to 20 mA)

### - Panel Mounted Version -

This unit incorporates a Linear Voltage to Current Converter.



### Calibration Requirements

The calibration procedure should be conducted with a potentiometer (transmitter simulator) which has a resistance value of 1.0 kW minimum to a maximum of 2.5 kW . The transmitter simulator is supplied.

### Calibration Procedure

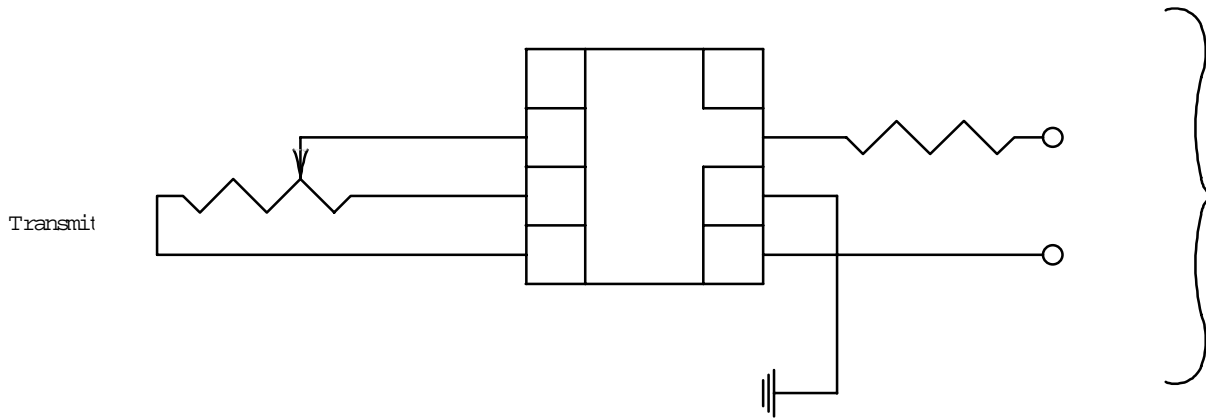
Note: Calibration should be performed with the signal conditioner disconnected from the SureSite transmitter.

1. Make connections as shown in the Calibration Wiring Diagram with the power supply turned off.
2. Set and apply the D.C. power supply voltage at 24 VDC with a 250w load resistance, as shown in the diagram.
3. Adjust both the span and null potentiometers at approximately mid-range.
4. Set the transmitter/simulator potentiometer adjusting screw to its fully clock-wise position, for a maximum indication on the digital multimeter (DMM).
5. With the span adjust potentiometer screw (see "Top View" diagram above), set the output current to 20.00 mA.
6. Turn the transmitter/simulator potentiometer adjusting screw to its fully counter-clock-wise position, for a minimum indication on the DMM.
7. With the null adjust potentiometer (see "Top View" diagram above), set the output current to 4.00 mA.
8. Repeat steps 4 through 7 for the final fine adjustment. No further adjustments will be required.
9. After calibration, the converter/signal conditioner can be installed at the desired location. Any adjustments for null and span (4.00 & 20.00 mA), due to DC loop resistance, are achieved by adjusting the potentiometer screws.

## Installation Specifics

The panel-mount design of this unit permits remote installation. For mounting purposes, it is possible to remove the body of the unit from the terminal base. This permits the terminal base to be installed on two 3/16" studs or with two 3/16" screws, at the slotted holes provided. After installation of the terminal base, reinstall the body of the unit in its socket.

- Wiring Diagram -



- Signal Conditioner Troubleshooting -

Condition	Possible Cause	Solution
No Output	Loose or Improperly Connected Wires At Terminal Screws	Correct Connections
	Incorrect Wiring	Correct Wiring (See Wiring Diagrams)
	Transmitter Positioning Incorrect	See SureSite Transmitter Troubleshooting Section
High or Low Alarm Points Not Alarming at Desired Setpoints	Alarm Setpoints Incorrect	Recalibrate Alarm Setpoints (See Calibration Procedure)



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