

# 4 – 20 ma Current Loop Sensor Simulator



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<b>Terms used in this Manual</b>	
A / Amps	Amperes
Ma	Milliamps
UUT	Unit Under Test

Reference Documents

SD-100002	Schematic Diagram
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## General

The sensor simulator is designed to simulate and 4-20ma device where the loop power is furnished by the master; i.e., it is a passive 4-20ma transmitter. The design is based on the XTR115/6 current loop transmitter by Burr Brown and is designed for simple, fool proof operation by providing built in over voltage protection and input polarity protection.

The sensor simulator has one variable current output control. The variable output goes from <4ma to >20ma output, continuously variable via a ten turn potentiometer. The unit has an integral digital panel meter that reads the current from < 2.0ma to 19.999ma. However, the unit will go higher than 19.999 for over range testing.

## Specifications

Size	3 X 5.25 X 1.5"
Weight	6 oz
Input Voltage	Loop Powered
Output Current	4-20 ma, continuously variable
Accuracy	.01%
Calibration Cycle	1 year
Operating Temp	-40 to +85° C
Storage Temp	-55 to + 125° C
Connection	4-way Binding Posts
PCB Rating	UL Flammability rating of 94-V0, under UL File E122342

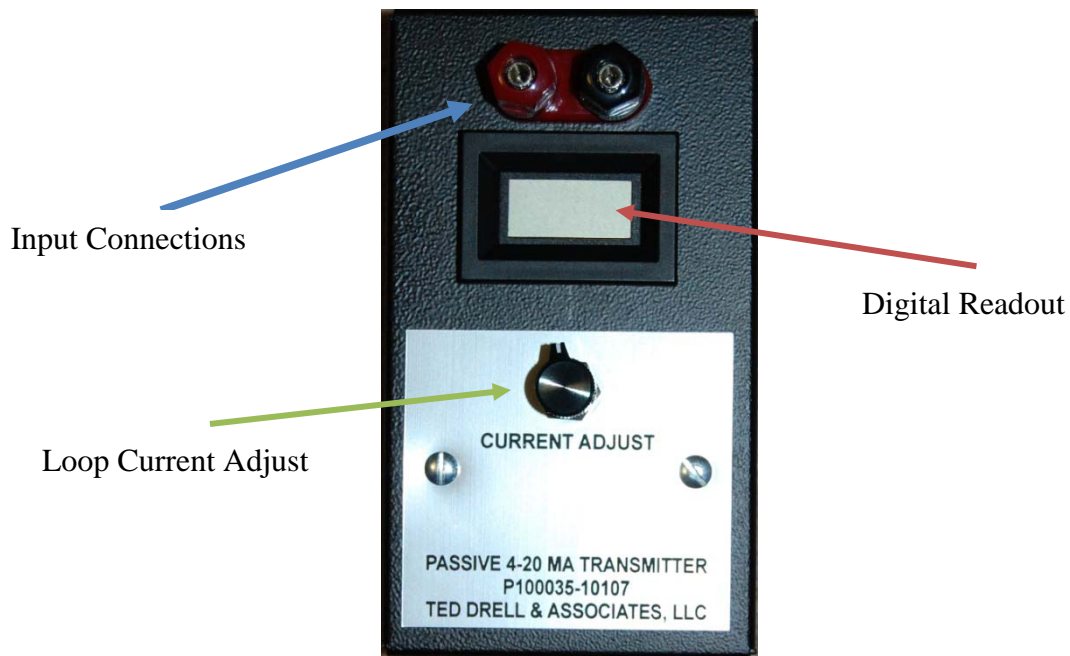
## Operations

### *Installation*

The sensor simulator is designed to a hand held, portable unit. Loop connections are made to the red and black binding posts at the top of the front panel. It is not polarity sensitive as the input has a bridge diode arrangement so either connection can be positive or negative.

### *Operation*

Operation of the unit is as easy as selecting the desired fixed current or variable current. The selection can be changed at any time without damage to the unit.



**Figure 1**

## Factory Testing

### ***Pre-Test***

1. Visually inspect all solder connections
  - a. No unsoldered connections
  - b. No *cold* solder joints

### ***Test***

Equipment required:

4-20ma loop calibrator: 0.005% accuracy or better, active (supplies +24vdc)

1. Plug the Unit Under Test in the test jig with test leads.
2. Set the current adjust to 4 ma.
3. Adjust zero pot for 4 ma output on the loop calibrator.
4. Set the current adjust to 20 ma.
5. Adjust Span pot for 20 ma output on the loop calibrator.
6. Repeat steps 2-5 until the reading are within the units tolerance.
7. Turn the variable control from full CCW to full CW and verify the output goes from (less than) <4ma to (greater than) >20ma.

This completes the tests.

## Materials

<b>Sensor Simulator</b>					
Item	Quantity	Reference	Part #	Description	Mfg
1	Q1	2N3904 Transistor	MMBT3904	Regulating Transistor	
2	C1	.01ufd 50vdc Capacitor	06035C103KATA2A	Noise suppression capacitor	AVX / <b>umRata</b>
3	D2	39V Zener Diode	FLZ39VA	Over Voltage Protection Diode	Fairchild
4	D1	Diode Bridge	MB2S	Input Polarity Protection Diode	Fairchild
5	R2	10K Resistor	MMU0102	Current limiting resistor	<b>Panasonic</b>
6	U1	Integrated Circuit	XTR116	4-20 ma Transmitter	Burr Brown
7	R1	10T Pot	3540S-1-103	Variable Current control	Bourns
8	N/A	Switch Knob	EH71-OC1S	Knob for Current Adjust	SKU
9	M1		DM20	Panel Meter	Datel



## Schematics

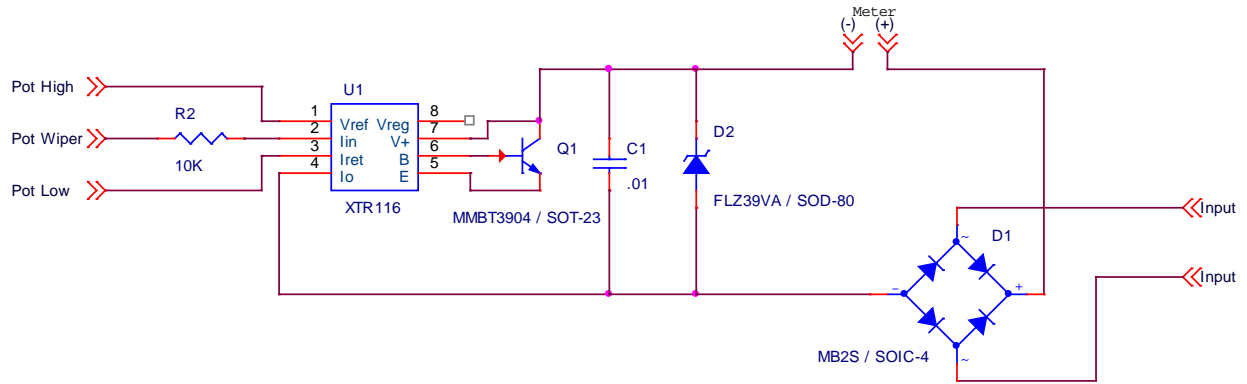


Figure 2

## **Maintenance & Storage**

### ***Maintenance***

There is no general maintenance required other than the annual calibration. It is recommended that the unit be returned to the factory for calibration. However, field calibration can be done using the test procedures above if a suitable loop calibrator is available.

### ***Storage***

Temperature ranges should not exceed the specified values.