4 – 20 ma Current Loop Sensor Simulator

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

Reference Documents

SD-100001	Schematic Diagram

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 three fixed current outputs and one variable current output control. The selector switch selects between the following outputs:

1. 4 ma fixed
2. 12 ma fixed
3. 20 ma fixed
4. Variable

The variable output goes from <4ma to >20ma output, continuously variable via a ten turn potentiometer. The fixed outputs have a ten turn trim pot mounted on the printed circuit board for calibration. Each unit is factory calibrated and does not need re-calibration for 1 year.

The printed circuit board is a universal board that is used in several other models so there will be several components missing on the PCB that are not needed in this application.

Specifications

Size	3U X 160mm standard PC card
Weight	6 oz
Input Voltage	Loop Powered
Output Current	4-20 ma; 3 fixed and one continuously variable
Accuracy	.01%
Calibration Cycle	1 year
Operating Temp	-40 to +85° C
Storage Temp	-55 to + 125° C
Connection	96 pin DIN connector; pins B31 and B32
PCB Rating	UL Flammability rating of 94-V0, under UL File E122342
Front Panel	Anodized Aluminum

Operations

Installation

The sensor simulator is designed to plug into a standard 3U DIN card cage. Loop connections are made to pins B31 and B32. It is not polarity sensitive as the input has a bridge diode arrangement so either pin 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.

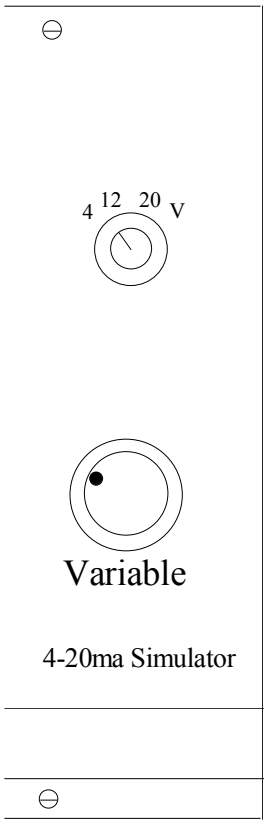

Figure 1

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 extender PCB.
2. Set the selector switch to 4 ma.
3. Let the unit stabilize for 10 minutes.
4. Adjust R3 for 4 ma output on the loop calibrator.
5. Set the selector switch to 12 ma.
6. Adjust R4 for 12 ma output on the loop calibrator.
7. Set the selector switch to 20 ma.
8. Adjust R5 for 20 ma output on the loop calibrator.
9. Set the selector switch to V (variable).
10. 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

Sensor Simulator

Item	Quantity	Reference	Part #	Description	Mfg
1	Q1	2N3904 Transistor	MMBT3904	Regulating Transistor	
2	C1	.01ufd 50vdc Capacitor	06035C103KATA2A	Noise suppression capacitor	AVX / **umRata**
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	Vishay / **Panasonic**
6	U1	Integrated Circuit	XTR116	4-20 ma Transmitter	Burr Brown
7	R3-5	10K ohm trim pot	3006P-1-103LF	Fixed output meet	Bourns
8	R6	10T Pot	3540S-1-103	Variable Current control	Bourns
9	N/A	Front Panel	FP08-3U	3U front panel	Vector
10	S1	Rotary Switch	56D30-01-2-AJN	Current Selector Swith	Grayhill
11	N/A	Switch Knob	EH71-OC1S	Knob for Selector Switch	SKU
12	P1	DIN connector	9031966921	PCB Connector	Harting
13	Q1	2N3904 Transistor	MMBT3904		

Schematics

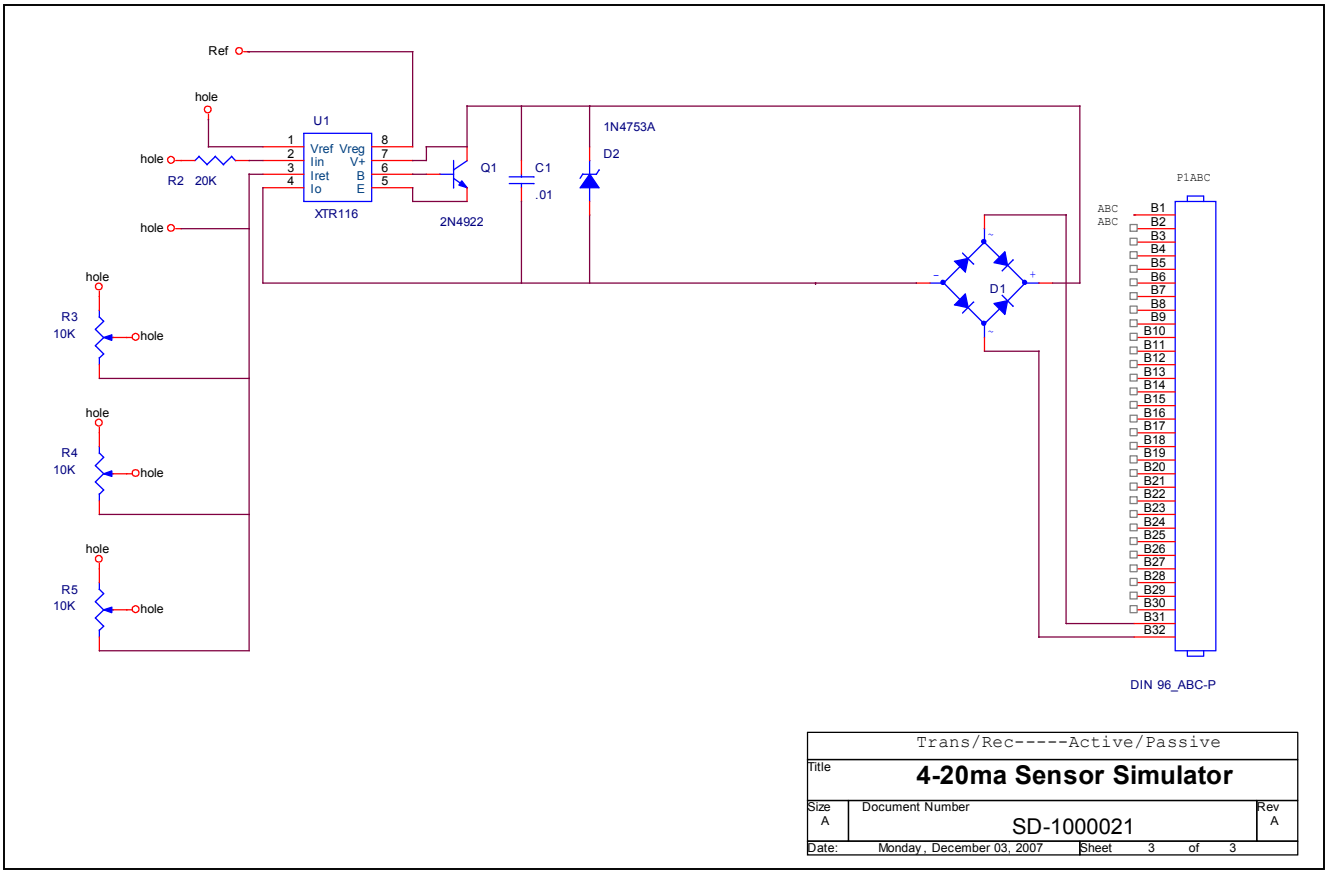

Figure 2

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

Storage requirements will generally be based on the unit the simulators are installed in.. Un-installed units should be stored in an antistatic bag and boxed with a small package of desiccant. Temperature ranges should not exceed the specified values.