Non-Linear Systems

XL-1

Current Loop Meter

INSTRUCTIONS

OVERVIEW

The XL-1 is a digital current loop meter with a unique feature that requires no power supply for its operation. All the power it needs is derived from the current being measured. With field-programmable scaling and offset capability, you will find a variety of applications in 4-20mA and 10-50mA current loops. The display is 3½ digits with a 0.6-inch LCD display.

SPECIFICATIONS

Display: 0 to ± 1999 digits, 0.6-inch LCD

Accuracy: ± 0.1% rdg ± 1 digit

Decimal Location: May be positioned by a Solder Blob for any of three positions: X . X . X . X

Polarity: Automatic

Update Rate: 3 rdg/sec, nominal

Power: None required. The meter derives the power it needs from the current being measured.

Operating Temperature: 0°C to +45°C

Maximum Input Current: 50 mA

Minimum Input Current: 4 mA

Voltage Drop Across Meter:

- With SB4 closed (0.015I +2.5) volts ±2%*
- With SB4 open (0.030I +2.5) volts ±2%*

**I is the loop current in mA*

Input Z: 20 mA loop = 30 Ω
50 mA loop = 15 Ω

Overload Indication: With inputs exceeding full scale Positive: +1, Negative: -1

Weight: 3 ounces (85.05g)

MOUNTING DATA

A rectangular panel cutout is recommended for mounting the instruments. The recommended dimensions are:

92 mm (3.622 in)
43 mm (1.693 in)

The meters will also fit the DIN/NEMA standard cutout, 92 mm x 45 mm (3.622 in x 1.772 in) and the widely used 99.7 mm x 42.72mm (3.925 in x 1.682 in) cutout.

Any panel thickness from 1.524 mm (0.060 in) to 4.57 mm (0.18 in) may be used.

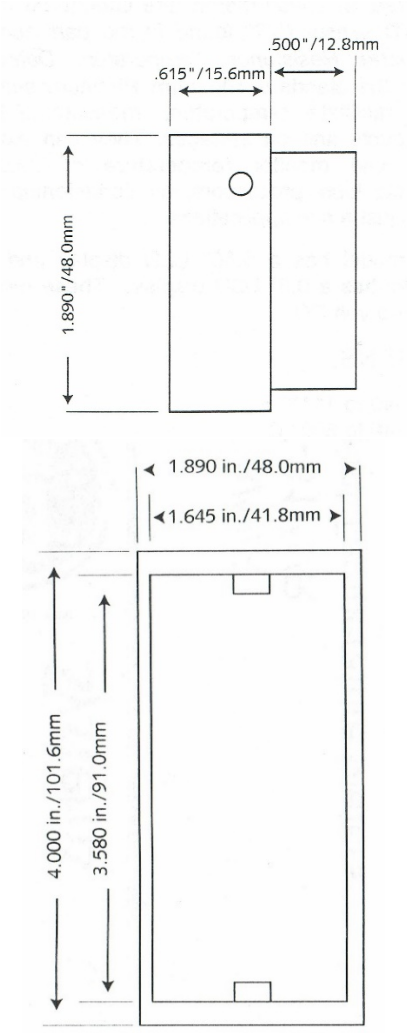

Figure 1. Case Dimensions

To mount the meter: insert the meter from the front of the panel through the cutout. Fit the mounting clips (2) in the slots on the top and bottom of the meter case. The foot of the clip should face forward. Thread screw (2) into clips & tighten the screw against the rear surface of the panel to fasten the meter in place.

CONNECTIONS

For all applications, the positive input lead (current going into the meter) must be connected to terminal 1. The negative lead should be connected to terminal 2. In applications where it is necessary to reduce the voltage drop across the meter, SB4 may be installed, see Chart below.

Positive Terminal 1
Negative Terminal 2

Voltage Drop Across Meter With 50 mA Current	
SB4 OPEN	SB4 CLOSED
4.13 Volts	3.37 Volts

DECIMAL POINT POSITION

If a decimal display is desired, install a solder blob on SB1, SB2 or SB3 depending upon which decimal point is to be illuminated.

Dec. Location: **X . X . X . X**
Solder Blob: **SB1 SB2 SB3**

If decimal point is not desired, omit blobs.

CALIBRATION

Unless special factory calibration is ordered, the XL-1 meters are factory calibrated so that at 4 mA input causes a display of 000 and a 20 mA input causes a display of 100. If a different calibration is required, proceed as follows:

1. Calculate A, the counts per mA, from the equation A=C-c/I-i where i is the smaller of two currents in milliamperes, I is the larger current, c is the number of counts displayed corresponding to i and C is the number of counts corresponding to I.

2. Set switches S1 and S2, the coarse scale adjustments, as shown below. The location of these switches is shown in **Figure 2**.

A = COUNTS/mA_____

SB4 closed	SB4 open	S1	S2
0 - 24	0 - 49	On	Off
25 - 39	50 - 79	Off	Off
40 - 63	80 - 125	Off	On

3. Calculate B, the offset counts, from the equation B=Ic-iC/I -i. For most applications, B can be negative or positive.

Switches	S5	S6
Negative Offset	On	Off
Positive Offset	Off	On

4. Set switches S3 and S4, the coarse offset adjustments as shown below.

B=Offset (Counts)	S3	S4
0 to -700	On	Off
-700 to -1000	Off	Off
-1000 to -1500	Off	On

5. Apply 4 mA current between terminals 1 (+) and 2 (-) to obtain a meter display.

6. Adjust the ZERO potentiometer (**Figure 2**) until the display equals the desired reading.

7. Set the loop current to 20 mA and adjust the SCALE potentiometer until the display equals the desired reading.

8. Repeat steps 5 & 6 until meter displays the readings desired.

9. Step 8 completes the calibration. However, the meter should be checked at tow or three widely spaced inputs to insure its proper functioning.

Sample Computation

Input	Display
4mA	000
20mA	100

I = 4mA; I = 20mA; c = 000; C = 100

$$\text{counts/mA } A = \frac{100-0}{20-4} = \frac{100}{16} = 6.25$$

$$B = \frac{(20 \times 0) - (4 \times 100)}{20 - 4} = \frac{400}{16}$$

= -25 counts offset

The Table in step 2 shows that switch S1 should be set to ON, and S2 should be set to OFF. The Table in step 4 shows that switch S3 should be set to ON and S4 should be set to OFF. The table in step 3 shows that switch S5 should be ON and S6 should be OFF.

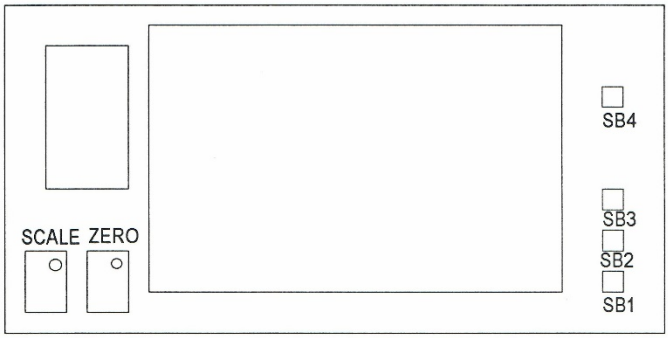

Figure 2. Component Location

Specifications Subject to Change Without Notice

Thank you for choosing Non-Linear Systems. Should you have any questions please call, email or visit our website at *nonlinearsystems.com*.

Non-Linear Systems

Originator of the Digital Voltmeter

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