

Tip: Use the Tab key to move field to field.

Directions: 1. Enter calibration range and press Set Range . 2. Enter values in all remaining cells and press Calculate .						
Calibration range: in (254 mm)				Excitation: volts		
Part number:		Serial number:		Test number:		
Span (%)	Step (in)	Step (mm)	Actual (mV)	Ideal (mV)	Error (mV)	Error (%)
0	0.000	0.000		1.00000	4.00000	0.04000
10	1.000	25.400		1000.25455	-10.25455	-0.10255
20	2.000	50.800		1999.50909	5.49091	0.05491
30	3.000	76.200		2998.76364	-8.76364	-0.08764
40	4.000	101.600		3998.01818	3.98182	0.03982
50	5.000	127.000		4997.27273	-4.27273	-0.04273
60	6.000	152.400		5996.52727	7.47273	0.07473
70	7.000	177.800		6995.78182	14.21818	0.14218
80	8.000	203.200		7995.03636	-5.03636	-0.05036
90	9.000	228.600		8994.29091	4.70909	0.04709
100	10.000	254.000		9993.54545	-11.54545	-0.11545
Results						
Line Slope			999.254545 mV/in			
Sensitivity			99.770000 mV/V/in 3.927953 mV/V/mm 0.001002 in/mV 0.025459 mm/mV			
Maximum Independent Linearity Error			+0.142182% -0.115455%			
Date and Time			Wed 8 Sep 2010 21:06:11 CDT			

The least squares best fit straight line associated with the n points $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$ has the form:

$$y = mx + b$$

where

$$\text{slope} = m = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$$

$$\text{intercept} = b = \frac{\sum y - m(\sum x)}{n}$$

Here, Σ means "the sum of". Thus,

$$\sum xy = \text{sum of products} = x_1 y_1 + x_2 y_2 + \dots + x_n y_n$$

$$\sum x = \text{sum of } x \text{ values} = x_1 + x_2 + \dots + x_n$$

$$\sum y = \text{sum of } y \text{ values} = y_1 + y_2 + \dots + y_n$$

$$\sum x^2 = \text{sum of squares of } x \text{ values} = x_1^2 + x_2^2 + \dots + x_n^2$$

As with other linearity calculation methods the maximum deviation is generally expressed as a percentage of the working range of the device. Because this evaluation is done over the working range of the transducer, the best fit straight line may not pass through the zero point of a bi-polar device such as an LVDT, universal load cell, and differential pressure transducer. However, this does not have any great practical significance since the zero output point is often adjustable electronically.

It is usually agreed that this method is by far the most efficient one. But, it must be used with care and understanding. Because of its statistical nature, the number of data points will have a direct bearing on the ultimate validity of the assessment. In practice, the more uneven the characteristic curve, the more data points must be used to take the incremental non-linearity into account.

Other calculators:

- [Thermal Effect](#)
- [Sinusoidal Motion](#)
- [Displacement Cable Sag \(Catenary Curve\)](#)
- [Displacement Cable Stretch](#)
- [Sensor Total Cost of Ownership](#)
- [Cable \(String\) Fundamental Frequency](#)
- [Voltage Conditioner Zero-Span Calculator](#)
- [Potentiometer-Based Position Transducer Voltage Divider and Power Calculator](#)

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