Zero and Full Scale Calibration
Of Analog Signals

There are examples here for utilizing BCD, Binary and Real data types. The BCD is for Unsigned Integer numbers, Binary is for Signed Integer numbers, and the Real example is for Floating Point numbers.

In the following example we will be using a device where 4 ma=5 psi and 20 ma=25 psi with a 12 bit 4-20 ma analog card. This example assumes that the device is linear.

The problem that we are faced with is that 5 psi is actually equal to 300 counts and 25 psi is equal to 4015 counts. Therefore, we need to compensate for this scaling error in the plc.

We will use the formula for a straight-line equation, y=mx+b. The y-axis will equal the analog units of the card, 0-4095. The x-axis will equal the scale of the device, 5-25psi.

Our first task is to solve for b; b=(xzero-(xfullscale-xzero))/(yfullscale-yzero) or b=(5-(25-5))/(4015-300). This solves b to be equal to -0.004. If you are using BCD or Binary integers round this to the closest whole number which in this case will be 0.

Now we can solve for the scaled analog value with the equation; sv=((Input value- yzero)*(xfullscale-xzero))/ (yfullscale-yzero)-b+ xzero or sv=((Input value- 300)*(25-5))/ (4015-300)+0+ 5.

So if the input value is 2157 then sv=((2157-300)*(25-5))/ (4015-300)+0.004+ 5 which equates to sv=14.

There are examples here for utilizing BCD, Binary and Real data types. The BCD is for Unsigned Integer numbers, Binary can handle Signed Integer numbers, and the Real example can handle Floating Point numbers.

*** BCD Example Note - Notice that this value should be 15. The value of 14 is because we are using BCD math and BCD math always rounds down. If you should need better precision then the Real number format should be used.