

ME 120 Experimental Methods

Homework #8: Data Acquisition - Resolution and Configuration

1. (10 pts) Given a load sensor with full scale range of 100 lb and full-scale output of 1 V that is sampled using a data acquisition card with a 16 bit A/D converter,
 - What will the resolution (in lb) of the measurement system be if the input range on the A/D is set to 1 V (i.e., zero to 1 V)?
 - What will be the resolution (in lb) of the measurement system if the input range on the A/D is set to ± 5 V?
2. (20 pts) Read Chapter 4 in the user manual for the National Instruments 6024E multifunction DAQ device (<http://www.engr.sjsu.edu/bjfurman/courses/ME120/me120pdf/6024E%20DAQ%20User%20Manual.pdf>). Consider the sensors below:
 - a. A battery powered pressure sensor that has signal outputs +OUT and -OUT (the signal is on +OUT, which is referenced with respect to -OUT. Remember that voltage measurements are always made with respect to a reference voltage). The sensor's output range is from 0 to 10 mV
 - b. A ground referenced sensor with signal outputs +Signal and GND whose output range is from 0 to 10 V
 - c. Nine load sensors each with outputs +V and GND. The load sensors output 0 – 5 V
 - 1) Select the proper analog input mode (differential, reference single-ended, or non-referenced single-ended) to use for each case. Justify your selection
 - 2) Show how you would connect the outputs to the data acquisition card (See Figure 4-1)