# Calibration Quick Start Guide for FlexiForce® Sensors

Introduction

Conditioning the *FlexiForce* sensors before every use is recommended. In addition, calibrating the sensors is recommended before initial use. Follow the procedure below to Condition and Calibrate the sensors.

This procedure is meant for use with your own electronics. For testing, Tekscan recommends using the circuit shown in the diagram at right. If no circuit is available, you can use a multimeter, and measure the resistance in kilo-ohms.

Note: Tekscan does not provide the circuit.

$$V_{OUT} = -V_T * (R_F/R_S)$$

GND

MCP 6004

+5V*

V_T -1v
POWER

GND

V_{OUT}

R_F**

R_S
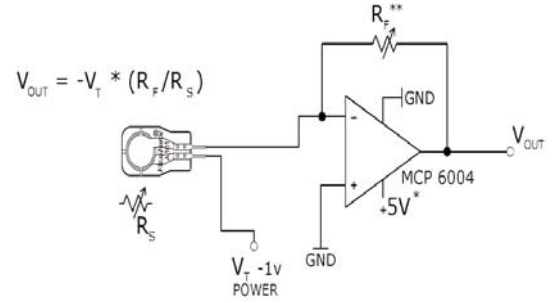
Part 1: Conditioning

Before using the sensors it is recommended that you condition the sensors. This process will "break in" the sensor and should be done before calibration and before every use for best results.

Place 110% (or more) of the maximum test load onto the sensor for approximately 3 seconds. For example, if the maximum test load is 10 pounds, place 11 pounds onto the sensor. Remove the load from the sensor. Repeat 4-5 times. When finished, proceed to Part 2: Calibration.

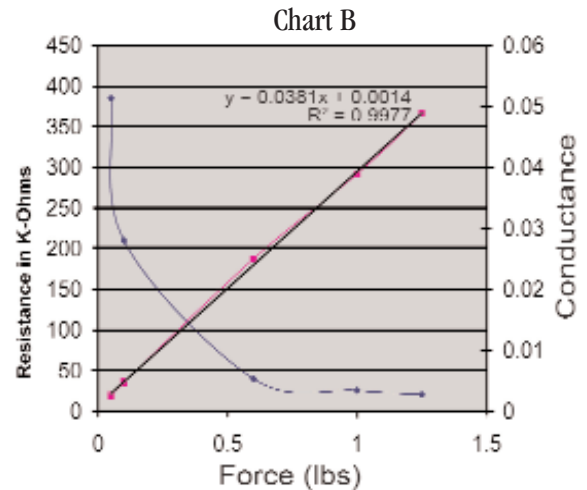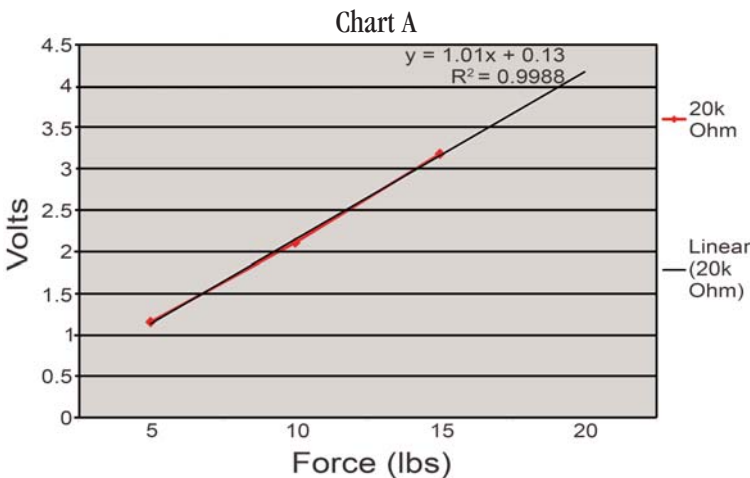## Part 2: Calibration for Static Forces

Step 1. Place 1/3 of the test weight on the sensor. Leave the weight on the sensor the same amount of time (before recording the output) as you will in your actual experiment. This helps minimize the drift error. Record the output, then remove the weight from the sensor.

Step 2. Place 2/3 of the test weight on the sensor, again waiting the approximate amount of time. Record the output. Remove weight from the sensor.

Step 3. Place the full test weight on the sensor. Wait the approximate amount of time again, and record the output. Remove the weight from the sensor. If using the recommended circuit, 3 sets of data are adequate. If using a multimeter, gather two more sets of data for a 5-point chart.

Step 4. Gather each set of data (Sensor Output vs Force applied) and plot the data on a graph. If using our recommended circuit or your own electronics, sensor output should be plotted as Voltage vs. Force (Chart A below). If using a multimeter, sensor output should be plotted as Conductance (1/Resistance) vs. Force (Chart B below). This gives a linear plot. You can then draw a line of best fit, or calculate one with MS Excel.

Step 5. Use the equation for the line of best fit and the sensor output to determine the force of unknown loads on the sensor during the experiment.

Chart A

y = 1.01x + 0.13
R^2 = 0.9988

20k Ohm

Linear (20k Ohm)

Volts / Force (lbs)

Chart B

y = 0.0361x + 0.0014
R^2 = 0.9977

Resistance in K-Ohms / Conductance / Force (lbs)

Note: If testing involves dynamic forces instead of static force, this must be accounted for in the calibration process. This is due to a rise time associated with the output. Rise time refers to how long it takes the sensor to settle at the appropriate value within our error limits. The rise time for FlexiForce sensors is between 0.1 - 0.3 seconds (the response time is <5μ seconds). If your application involves a quick impact, the recommended method is to calibrate the sensor dynamically against a load cell with a quicker rise time. This allows you to compare the responses of both the sensor and the load cell. The amplitude of the FlexiForce sensor will be smaller than that of the load cell. The difference can be calculated by comparing the amplitudes after several tests. If a load cell is not available, the next recommendation would be to calibrate the sensor statically and use the sensor for comparative studies.

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