**Motor calibration tutorial**

Last updated by Ken on 30 April, 2019

**Overview**

This document explains how to use a worksheet in Excel to deduce parameter values that SLControl needs to control experiments and calibrate fiber length measurements in the output files.

**Additional resources**

* Motor\_calibration\_worksheet.xlsx – should be in the same folder on Teams as this document
* SLControl manuscript - <https://www.physiology.org/doi/full/10.1152/ajpheart.00295.2003>
* Getting started tutorial - <http://www.uky.edu/~kscamp3/SLControl/Tutorials/tutorials_header.html>
* Video – should be in the same folder on Teams as this document

**Need more help?**

Check the resources, then see Ken

**Main content**

SLControl needs two calibration parameters for the motor.

* FL\_COMMAND is in units of microns per volt and tells SLControl how far the motor moves if the input voltage to the motor increases by 1 volt
* FL\_RESPONSE is in units of microns per volt and tells SLControl how far the motor moved if the output voltage from the motor increases by 1 volt

We need to measure these parameters.

We do this by measuring how far the motor moves on the TV screen as we apply square wave signals with different amplitudes. You can read more about this on the Getting Started tutorial linked to in the Additional resources section.

In short, you should collect 3 sets of numbers corresponding to:

* The sizes of the command signals you fed in to the motor (in Volts)
* The sizes of the response signals the motor fed out (in Volts)
* The distances the motor moved on the TV screen (in mm)

You also need to know how the calibration for the TV screen – that is, the physical distance in microns that corresponds to 1 mm on the TV screen. This depends on the objective that are using and the magnification of the microscope (typically 1x or 1.5x).

Now:

1. Download a copy of motor\_calibration\_worksheet.xlsx to your computer
2. Update the screen calibration value (in the red box at G2)
3. Enter the motor input values into Column A
4. Enter the motor output values into Column B
5. Enter the screen movements you measured into Column C
6. Column D should auto-populate by multiplying the values from Column C by the screen calibration value you just entered.
7. Columns I, J, K will also auto-populate. These show the x and y coordinates of the best-fit straight lines for the input and output values.
8. The slopes and intercepts of these lines are shown in P2:P3 and P6:P7.
9. The calibration values you want are the inverse slopes of the lines in the 2 graphs and are shown in the red boxes starting at N10.