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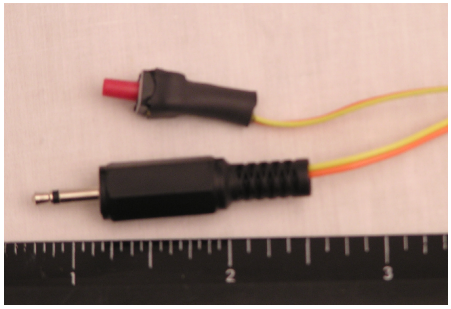
TNG-3B Sensors

This document describes the various sensors available for the TNG-3B interface except for the two-axis accelerometer (www.sensyr.com/manuals/Two-Axis%20Tilt%20Sensor.pdf). All the standard sensors have a lead length of approximately 18" (46 cm) and a 3.5mm stereo phone plug (except for the tact switch).

Tact Switch

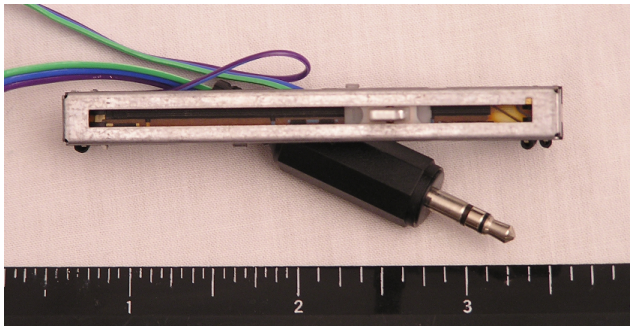
This device uses a SPST, normally-open, short-throw momentary switch to change a TNG-3B digital input from a logic high state to a logic low state as long as the switch actuator is depressed. The tact switch is terminated with a 2.5 mm mono phone plug.



Tact Switch

Slide Potentiometer

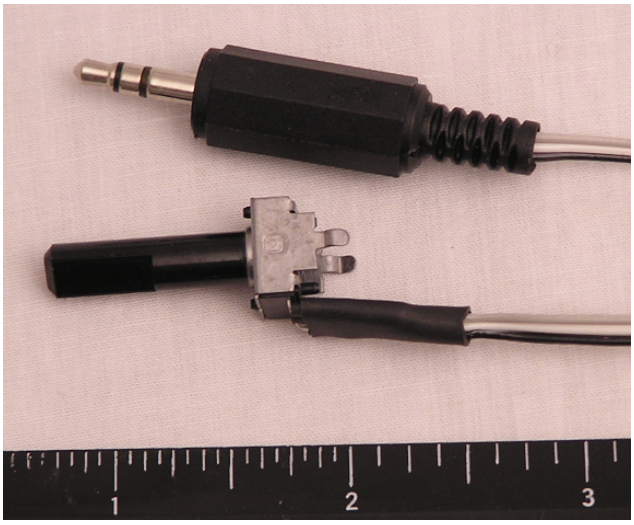
The slide potentiometer changes its resistance linearly with position. The slide potentiometer has about 60 mm (2.3 inches) of travel, and a nominal resistance of 10k ohms ± 20%.



Slide Potentiometer

Rotary Potentiometer

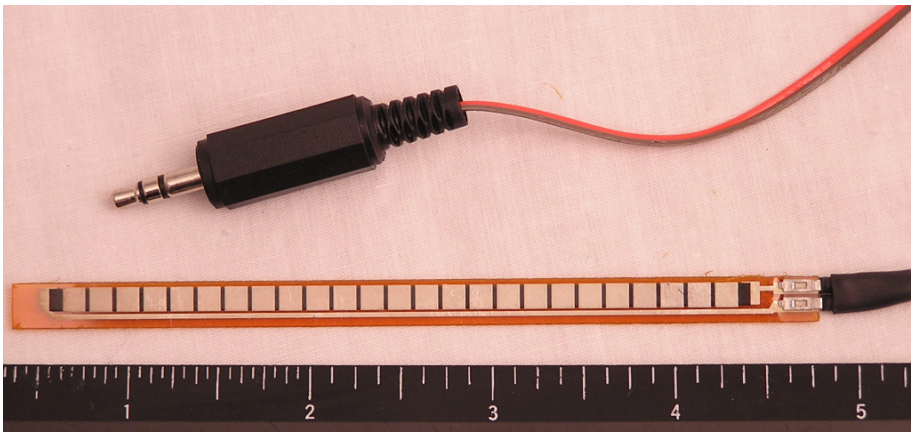
The rotary potentiometer changes its resistance linearly with angular position. The rotary potentiometer has a nominal resistance of 10k ohms ± 20%.



Rotary Potentiometer

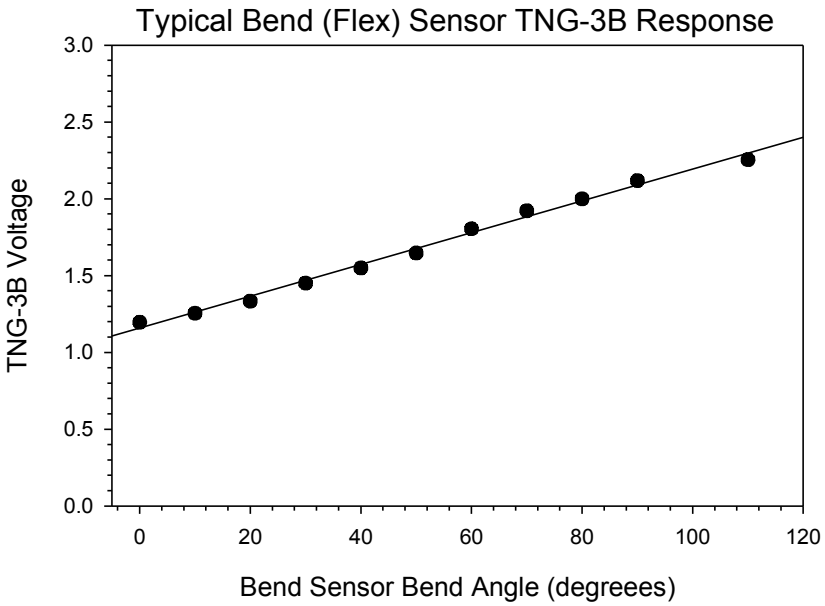
Bend (Flex) Sensor

This sensor changes its resistance with increasing bend angle. The resistance change is only present when bent in one direction. The non-bent resistance is approximately 10k ohms. This value changes to 30-40k ohms at a bend angle of 90 degrees. The sensor is 4.5 inches (10.1 cm) long and 0.25 inches (0.64 cm) wide.



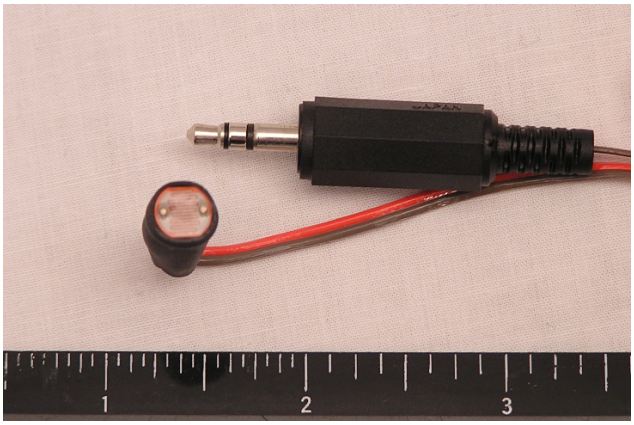
Bend (Flex) Sensor

The bend (flex) sensor is wired in a half-bridge configuration with a 33k ohm resistor. A typical response profile when used with a TNG-3B interface is shown below:



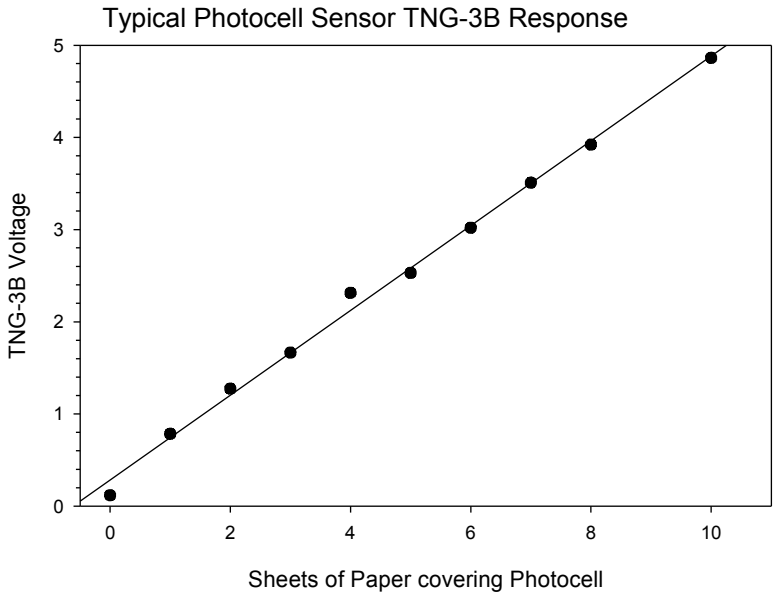
Photocell

The photocell sensor uses a cadmium sulfide (CdS) light-sensitive device that exhibits a change in resistance with light intensity. The CdS sensor element has a resistance of about 10k ohms in full light and 100k ohms in complete darkness. This sensor is also wired in a half-bridge configuration. The sensor element is about 0.4 inches (1 cm) in diameter.



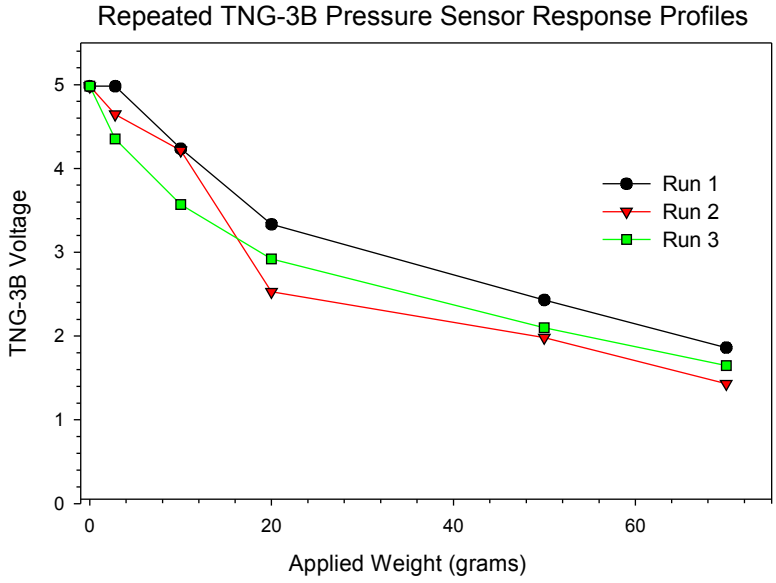
CdS Photocell Sensor

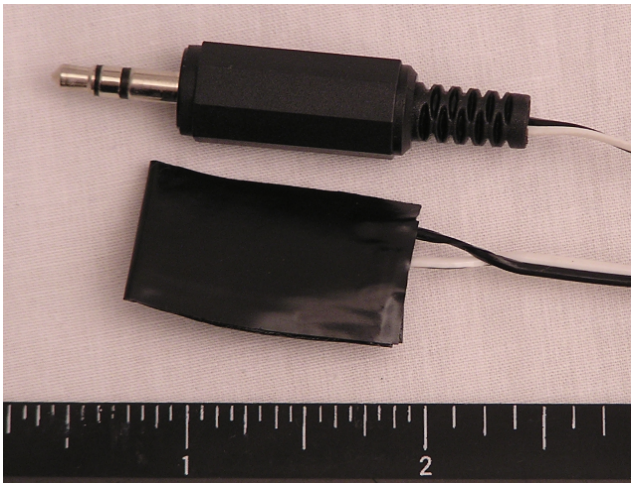
A graph of a typical photocell sensor is shown below. Sheets of paper were used to cover the sensor. Zero sheets of paper corresponds to full light, and 10 sheets of paper filtered out all ambient visible light.



Pressure Sensor

This sensor is made from 2 layers of 3M Velostat™ sandwiched between sheets of copper foil and covered with an insulator. The standard sensor is about 0.5 inch by 1 inch (1.2 by 2.5 cm). The sensor can be made practically any size by special order. The sensor responds to applied force as shown below. Repeatability is an issue, however. There is a large thermal coefficient, but that's the case with the FSR too. Each use results in similar, but not identical, profiles. This is shown in the graph below:

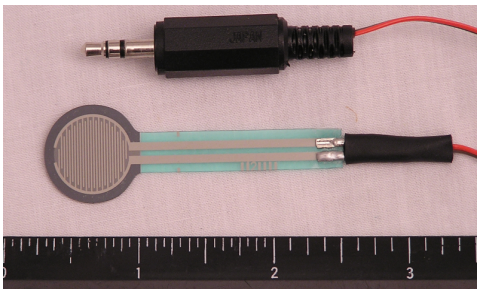




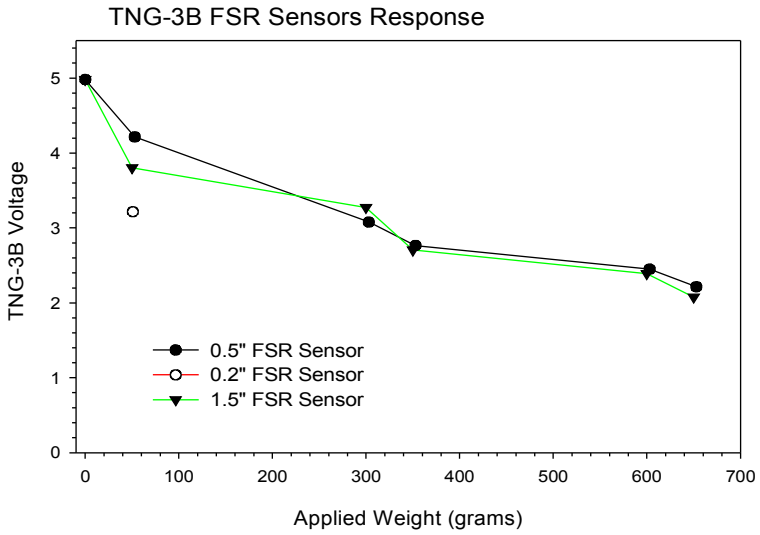
Pressure Sensor

FSR Sensors

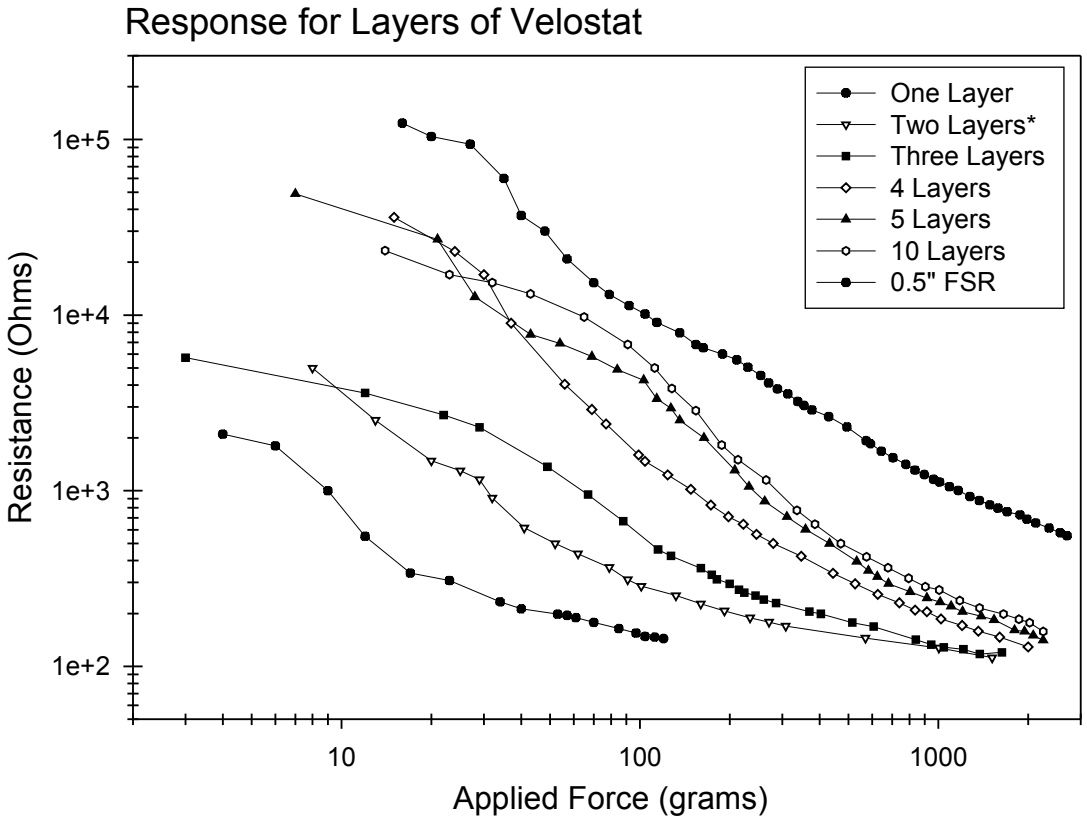
The 0.5 inch round FSR (Force Sensitive Resistor) sensor is similar in nature to our pressure sensor. These sensors have greater repeatability and are very thin. Also, the force range is greater (>1 kg). Like many of our sensors, they are wired in a half-bridge configuration.



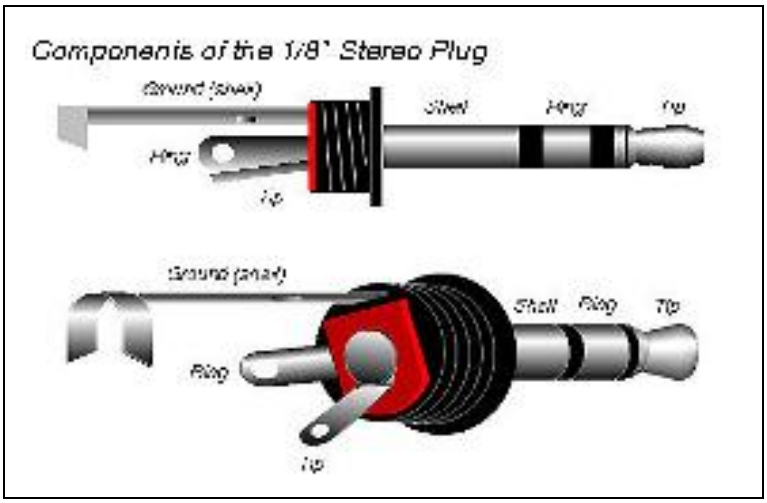
0.5 inch Round FSR



Neither the FSR or velostat pressure sensors are linear in their response. The following graph is from one set of data looking at the resistance change multiple layers of velostat and the standard 0.5” FSR sensor with applied force. Notice that both axes use log scales.



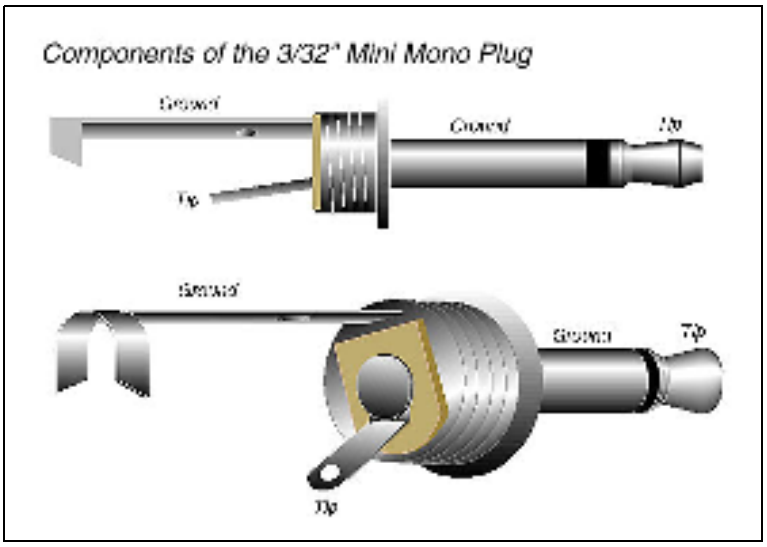
The 3.5mm Stereo Connector:



The TNG-3b wiring convention:

Shell is always ground.
Tip is always +5VDC.
Ring is the input (variable) connection.
A pull-up resistor, if required, always goes between tip and ring.

The 2.5mm Mono Connector:



TNG-3b wiring convention:

Digital input connected to tip. Ground (or low) to ground. The TNG-3b digital inputs have weak pull-ups enabled, so no pull-up resistor is required.