

## FlexiForce Sensor Demo Kit (#30056)

The FlexiForce A201-25 Sensor from Tekscan is piezoresistive force sensor capable of measuring up to 25 lbs of force, perpendicular to its sensing plane. In an electrical circuit, this sensor will act as a variable resistor, where the change in resistance is inversely proportional to the force applied. The change in resistance can be measured by a simple RC decay circuit, readable by any Parallax microcontroller.



### Features

- Measure both static and dynamic forces
- Simple RC circuit interface
- Capable of measuring a total applied force of 25 lbs
- Requires at least 1 PSI on sensing area
- Versatile small size
- Ultra-thin, flexible printed circuit
- Compatible with all Parallax microcontrollers

### Key Specifications

- Communication: Variable resistance inversely proportional to applied force
- Operating temperature: 15 to 140 °F (-9 to 60 °C)
- Dimensions: 8.00 x 0.55 x 0.008 in (203 x 9.53 x 0.208 mm)

### Application Ideas

- Touch pads
- Alarm systems
- Airbag force measurement
- Compression moldings

### Packing List

Verify that your FlexiForce Demo Kit has the following components:

- (1) FlexiForce Sensor
- (1) 220  $\Omega$  resistor
- (1) 0.1  $\mu$ F capacitor
- (1) 0.01  $\mu$ F capacitor

# Device Information

## Theory of Operation

The FlexiForce Sensor uses a resistive-based technology, and reads forces perpendicular to its sensing plane. Its active sensing area is a 0.375" diameter circle located at the top of the sensor. When the sensing area is unloaded, the resistance is very high (greater than 5 M $\Omega$ ) and the resistance decreases to approximately 20 k $\Omega$  as force is applied.

## Connecting and Testing

The two outer pins of the connector are active, while the center pin is inactive. By connecting an ohmmeter to the outer two pins, the output resistance of the sensor can be measured.

## Conditioning

Before using the FlexiForce Sensor for the first time or after long periods of inactivity, it is *highly* recommended that it be conditioned in order to stabilize the output resistance. The output resistance can fluctuate over the first few tests, and conditioning the sensor ensures repeatable results.

To condition the FlexiForce sensor, place 110% of the maximum test weight on the active sensing area and let it sit for a few minutes. Repeat this process another four to five times to guarantee accurate results.

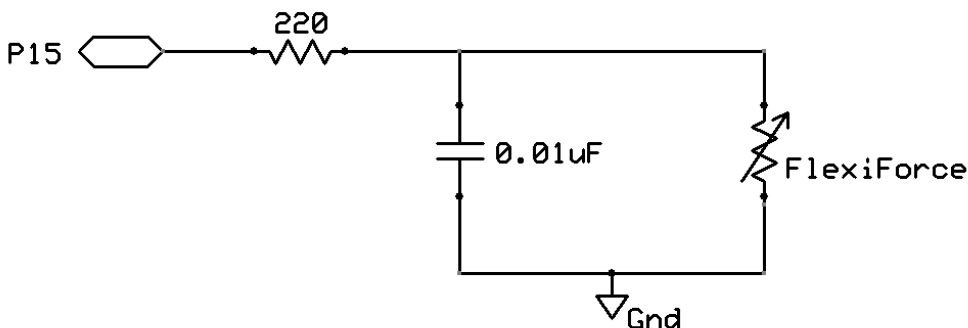
## Sensor Loading

The active sensing area of the FlexiForce Sensor should be treated as a single contact point, with the load distributed evenly across the sensing area. For best results, the loaded area should cover 70-100% of the sensing area and apply a minimum of 1 PSI.

If the load is smaller than the active sensing area, make sure the load is centered in the sensing area and not near the edges.

If the load is larger than the active sensing area, you may need to make use of a "puck." A "puck" is a piece of rigid material smaller than the active sensing area that is placed between the object and the sensing area. This will cause the load path to go through the puck to increase the PSI, resulting in more accurate measurements.

## Connection Diagram



## BASIC Stamp<sup>®</sup> 2 Program

FlexiForce\_Simple.bs2 uses the Debug Terminal to display the current decay time measurement of the example circuit shown above. Larger decay time values indicate smaller forces, while smaller decay time values indicate larger forces.

```
' Flexiforce_Simple.bs2
' Displays R/C Discharge Time in BASIC Stamp DEBUG Window

' {$STAMP BS2}
' {$PBASIC 2.5}

' -----[ Declarations ]-----

time          VAR      Word      ' Stores decay time output
sensorPin     CON      15        ' Flexiforce sensor circuit

' -----[ Main Routine ]-----

DO
  HIGH sensorPin                ' Discharge the capacitor
  PAUSE 100
  RCTIME sensorPin, 1, time      ' Measure RC charge time
  DEBUG HOME, "time = ", DEC5 time, CR
LOOP
```

## Resources and Downloads

You may download free documentation, example programs, and manufacturer datasheet from the FlexiForce product page on [www.parallax.com](http://www.parallax.com). Search "30056" from the home page.

See also <http://www.tekscan.com/flexiforce.html> for manufacturer information.