Tekscan™

FlexiForce™ OEM Design & Integration Guide

Edition 3

Thin, customizable FlexiForce™ sensors measure normal compressive forces in your device. While every application is unique, there are some universal considerations and general best practices to consider to achieve optimal performance of the FlexiForce sensor in your application.

This document is intended to illustrate critical design information to consider while integrating FlexiForce sensors into a product or device. This includes:

- Sensor specification
- Mechanical loading & fixturing
- Electrical integration
- And other best practices

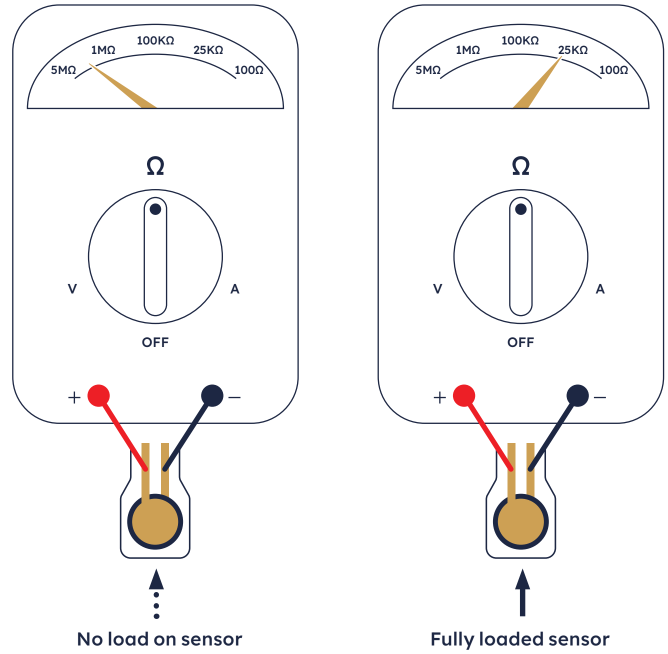
Contents

3 Sensor Overview

The FlexiForce sensor is an ultra-thin and flexible printed pressure sensitive variable resistor circuit, which can be easily integrated into applications with tight space constraints.

With its paper-thin construction, flexibility, and force measurement capabilities, the FlexiForce sensor can measure force between almost any two surfaces and is durable enough to stand up to most environments. FlexiForce has better force sensing properties, linearity, hysteresis, drift, and temperature sensitivity than any other thin force sensors.

As shown in **Fig. 1,** FlexiForce sensors are constructed of two layers of substrate. This substrate is composed of polyester film (or Polyimide in the case of the High-Temperature Sensors). On each layer, an electrically conductive material (silver) is applied, followed by a pressure-sensitive layer. Adhesive is then used to adhere the two layers of substrate together to form the sensor. The silver circle on top of the pressure-sensitive layer defines the "active sensing area." Silver extends from the sensing area to the connectors at the other end of the sensor, forming the conductive leads.



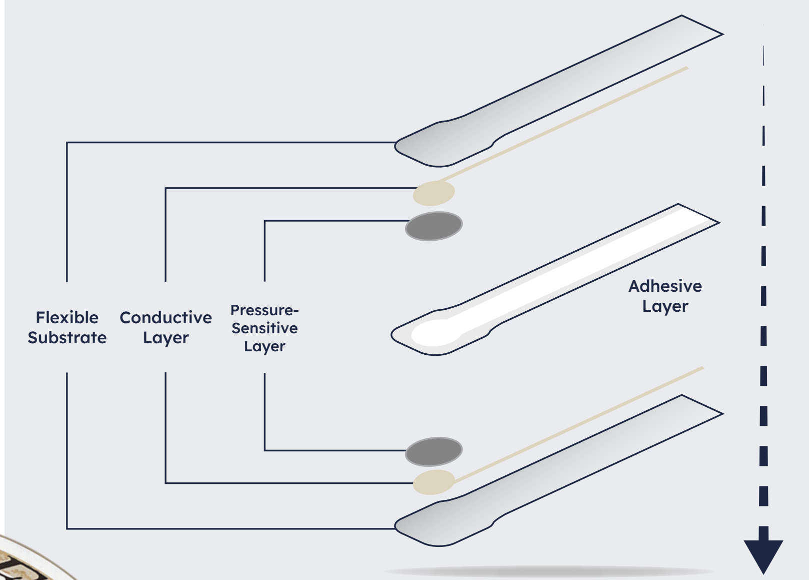


Figure 1: Composition of a FlexiForce sensor

4 Sensor Overview

FlexiForce sensors are piezoresistive, which means as a load is placed on the pressure-sensitive material the resistance decreases. An unloaded sensor will have an output of over 2MΩ and will drop to about 25KΩ when it is subjected to the specified load of the sensor. When measuring the conductance of the sensor, the results are a linear output correlating load to the conductance, as shown in **Fig. 2**.

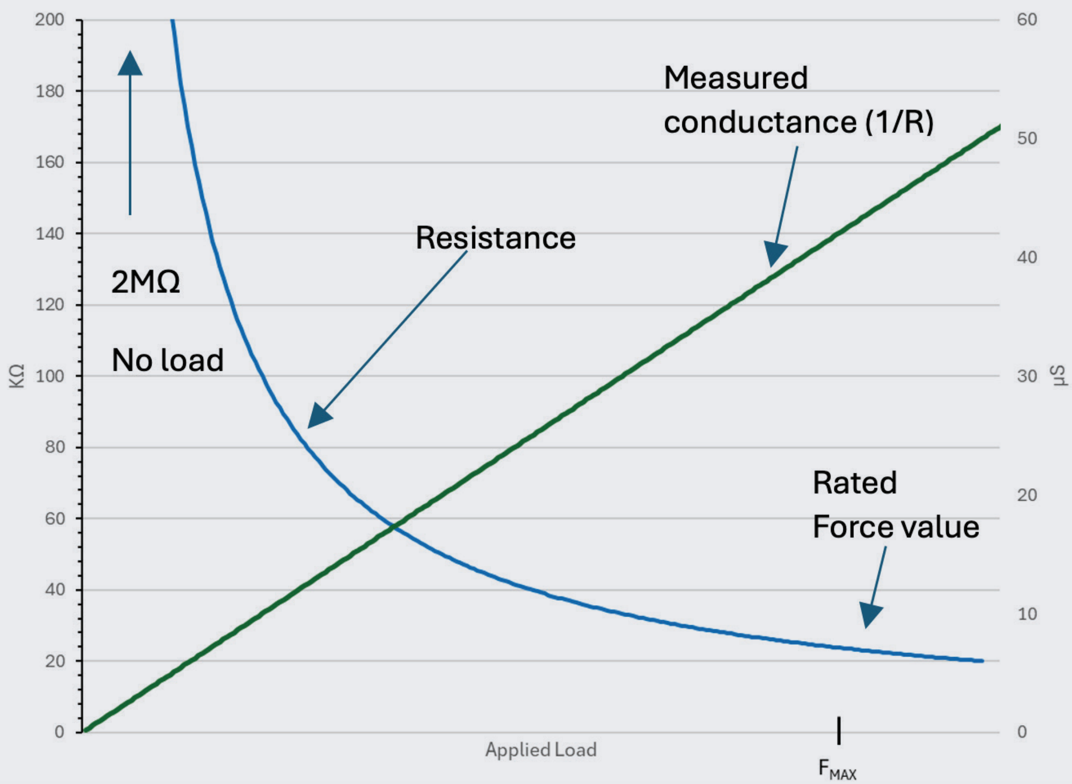


Figure 2: Typical Resistance and conductance of a sensor relative to applied load

5 Sensor Selection

Key Recommendations:

- Run proof-of-concept tests with off the shelf sensors

  We offer sensors at 1lbs (.45 kg), 25 lbs (11.3 kg) and 100 lbs (45.4 kg). At these loads the sensors will output about 20 KΩ.

  Other force values can be used as the target load, they will just fall on a different point on the 20 MΩ to 20kΩ scale.

  See the specifications of our standard sensors

- Selecting the wrong sensor for your design can lead to major performance issues as you move through the design and testing process.
- It's important to verify circuit and mechanical compatibility early in the process.
- When possible adjust electronics to allow for a sensor with a lower rated force, as sensors with lower rated forces have favorable costing at scale.

  Circuit used

  Test data from Proof-of-Concept

  Preloads on the sensor

  Interface material

  Dynamics of the load change

  ...See our Custom Sensor Process on **page 24**

Smarter Sensor Selection

Customer Challenge:

A customer selected their embedded FlexiForce sensor model on the basis of an application-specific force range, yet experienced issues with sensor output and resolution.

Tekscan's Solution

Our team of expert engineers determined that while the sensor's force range was acceptable for their application, the customer's design required a sensor that could achieve a higher resolution through the dynamic range of the application. Force ranges are just one aspect to consider when selecting the optimal FlexiForce sensor for your application.

When in doubt, consult our support team before purchasing your sensor – we will ask the right questions to make sure the sensor you choose will achieve your specific goals.

Integrating the FlexiForce Sensor

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Mechanical Integration

Measuring normal compressive loads within your device with a FlexiForce sensor, it's important to identify the sensing area. The active sensing area, or force sensing area, of a FlexiForce sensor is the silver area within the black perimeter.

Figure 6: Typical sensor layout (A401 pictured)

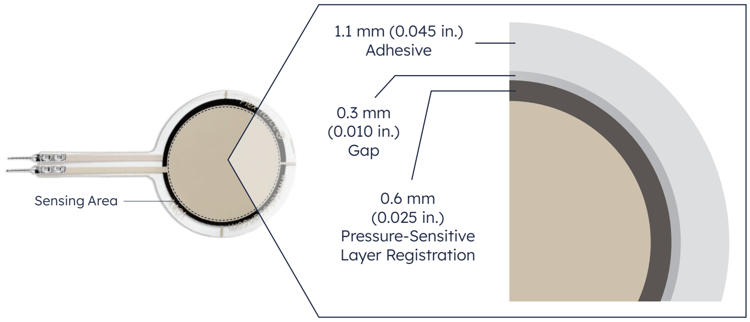


Figure 7: Sensing area detail

Mechanical Loading/Fixturing

Figure 8: FlexiForce a201 sensor

Concentrate all of the force on the active sensing area to ensure best repeatability

- Ensure a consistent mechanical loading through the active area of the sensor to obtain a linear output.
- All Force within the active Sensing Area
- Even loading output on sensing area (70-85% of the sensing area)
  - A puck can be extremely helpful here
- Force applied is perpendicular to the plane of the sensor
- Repeatable loading yields repeatable output; ensure loading method in application is consistent with calibration routine

Pucks

When trying to get 100% of the force onto 70-85% of the sensing area, a load concentrator, or "puck", is an extremely useful design tool if there is a distributed load or a point load.

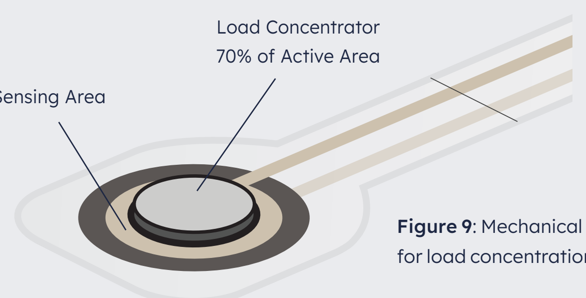


Figure 9: Mechanical "puck" for load concentration

Did you know?

Tekscan sells peel-and-stick pucks online.

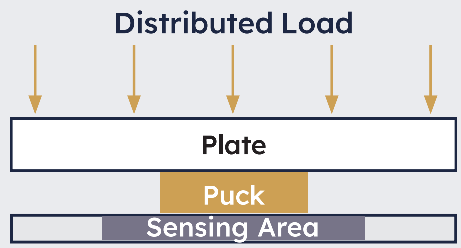
Learn More

8 A Puck Ensures Even Loading and Repeatable, Accurate Output

Scenario 1: Distributed Load

The contact area is bigger than the sensing area.

In this scenario, offloading will occur, resulting in a portion of the application load transmitting to the sensing area. The implication? Inaccurate measurement and inconsistent repeatability from cycle to cycle.

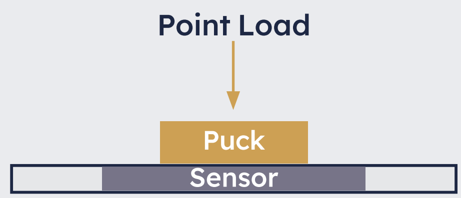


Scenario 2: Point Load

The contact area is much smaller than the sensing area.

Engaging a discrete point on the sensor without the use of a puck could result in excessive contact pressure, resulting in plastic deformation, compromising sensor repeatability.

The next consideration is the position of the actuator. If the actuator does not load the same area each time, a variable output can result. Using a puck will compensate for both of these scenarios.



Notes on Pucks:

- Adhere Puck to active sensing area to prevent unwanted movement (Thin double-sided tape can be used)
- Puck should maintain dimensional stability at applied loads. Choose a material that will not compress, as this introduces non-uniform loading, and potential shear
- If some load is outside of the sensing area, the offloaded force can be addressed, but the calibration routine becomes more complex and critical to proper functionality

Three key questions to help determine if you need a puck:

1. What is the contact area of the actuator relative to the sensing area of the sensor? If it's much larger or smaller than the sensing area, using a puck will ensure optimal performance of the sensor.
2. Is the actuator loading the same area each time? If not, a puck is necessary.
3. What material should my puck be? Compliant and rigid interface materials can behave differently when it comes to linearity, hysteresis, sensor response, shear, etc. During the design phase, testing with different interface/puck materials should be performed to determine the ideal puck or interface material for your application.

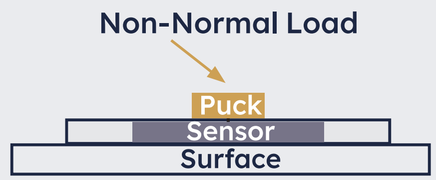
Loading Considerations

9 Minimize Shear Force to Preserve Sensor Sensitivity

Shear force is present when there is any type of loading that isn't completely normal to the sensor. Fortunately, when the proper steps are taken, users can avoid any unintended sensitivity loss due to shear. What conditions could cause shear, and how can you protect the sensor?

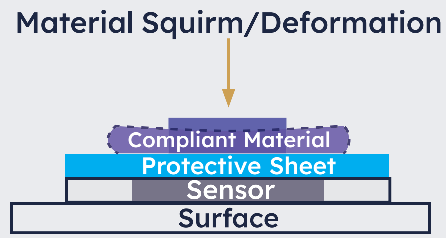
Scenario 1: Non-Normal Load

In many of these cases, a puck adhered to the sensing area will reduce the effect of shear on the sensor.



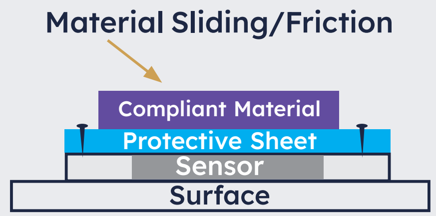
Scenario 2: Material Squirm/Deformation

This is a consideration if the sensor is placed under a compliant material with a significant friction factor. For example, when rubber is compressed, the edges tend to expand, or deform. This deformation can be quantified through Poisson's Ratio. Poisson's Ratio is the ratio of transverse strain to axial strain when rubber is stretched/compressed (P= -(transverse strain/axial strain)). The sliding of the deforming rubber across the sensor face can impart shear. In this scenario, a protective sheet on the sensor – such as Teflon or stainless steel shim stock – will help to decouple the shear from the sensor and work to transmit normal forces exclusively to the sensor.



Scenario 3: Material Sliding/Friction

Any two materials in contact with each other under motion will experience friction. Depending on how significant the friction is, the sensor can experience shear, thus losing sensitivity. To avoid this, consider the top and bottom of the sensor; if it is determined that both sides are being exposed to motion, then both sides should be protected. In this scenario, stainless steel shim stock or Teflon is useful in protecting the sensor from materials sliding across it.

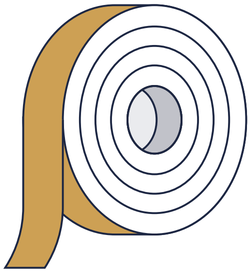


Always mount protective materials in a fashion that decouples shear force and will be suitable for the application assembly. Contact us to discuss optimal material configuration for your design.

Assembly Considerations

Mounting the Sensor

We typically recommend using double-sided tape when mounting the sensor as it offers a thin, consistent surface for adhesion. Tekscan uses 3M tape 9482 PC on many custom sensors. We advise avoiding hard-setting adhesives or epoxies as they can introduce pressure points under the sensor and disrupt the transmission of force to the sensing area. For custom sensor designs, Tekscan can provide a “peel and stick” backing, and even design holes into the sensor for screw/clamp-type mounting.



Double Sided Tape

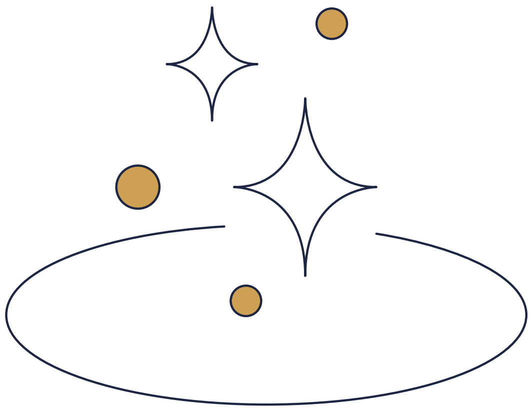
Avoid Hard-Setting Adhesives or Sprays

Venting/”Pillowing”

Standard FlexiForce sensors, and most custom sensors, are vented to equalize the internal pressure at the sensing area region with the external atmospheric pressure. Without the vent, there is the possibility of pressure build up, or “pillowing”, within the sensor which would affect force sensing repeatability.

- **The vent is a path for potential external contaminants, fluids & chemicals can change performance of the sensor**
- **Sensors can be designed with internal venting pockets that collect air from the sensing area but leave the perimeter sealed**

Cleaning/Chemical Compatibilities and Concerns



Clean sensors lightly with Isopropyl Alcohol. A slightly damp clean rag or cloth can be used to quickly wipe the sensor surface.

- **Don’t immerse in liquids, oils, or Isopropyl Alcohol**
- **Don’t leave damp materials on top of sensor**
- **Be careful cleaning around pins as these puncture the substrate creating a path for liquid to enter the sensor**
- **Ensure that any adhesives or spray coatings do not outgas near sensing area or vents**

Termination Options

ZIF Compatible Termination

Custom Sensors can be developed with a ZIF/LIF compatible termination.

- Easy to assemble
- Small Connector Footprint for tight spaces

Contact a Tekscan Engineer for more info and size guidelines.

Conductive Epoxies or Z-Axis conductive tapes

Apply these epoxies or tapes to the exposed traces of a FlexiFocre sensor to connect it directly to an FPC/PCB.

- Lowest Sensor Price
- Least space requirements on board

Pins and Solder Tabs

Standard and custom sensors are available with pins that can be inserted into PCB headers or soldered to directly.

- Compatible with standard connectors
- Variety of pin, pin housing and solder tabs available on custom basis

12 Considerations for Soldering FlexiForce Sensors to PCB Solder Tabs

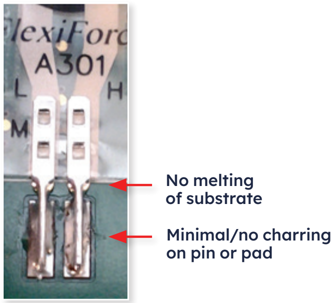
- **Soldering Iron Tip Diameter:** 1.6 mm (.063 in) or smaller
- **Soldering Temperature:** Lead-free solder at 454.4°C (850°F)
- Tin solder pads, tin soldering tip
- Solder sensor pin to tinned solder pad, applying solder/soldering iron for **no more than 3 seconds at a time.** If more time is needed to complete soldering, remove soldering iron from pin, allow sensor to cool for 5-7 seconds and reapply solder/ soldering iron.
- An alligator clip may also be used to sink heat away from the sensor as shown at right. This is beneficial in applications where it can be used, but is not necessary.

Alligator clip example

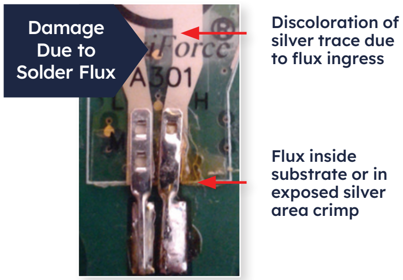
Solder Flux Note

Solder flux is NOT recommended for use with FlexiForce sensors. It tends to run and seep into the sensor potentially rendering it inoperable. If flux must be used, use as little as possible and ensure flux stays away from crimped area of pins

Example of a Properly Soldered Sensor



Examples of Improperly Soldered Sensors



Procedure for verifying solder technique

1. Place unsoldered sensor on PCB
2. Use calibration loading fixture to apply 3-5 step load, measuring resistance at each load. Precondition sensor with 3 or 4 loadings at max load before taking measurements
3. Solder sensor to PCB
4. Apply the same preconditioning and loading profile to sensor, measuring resistance at each load
5. Compare measurements before and after soldering. All values should be within 5% of each other for a given sensor

13 Electrical Integration

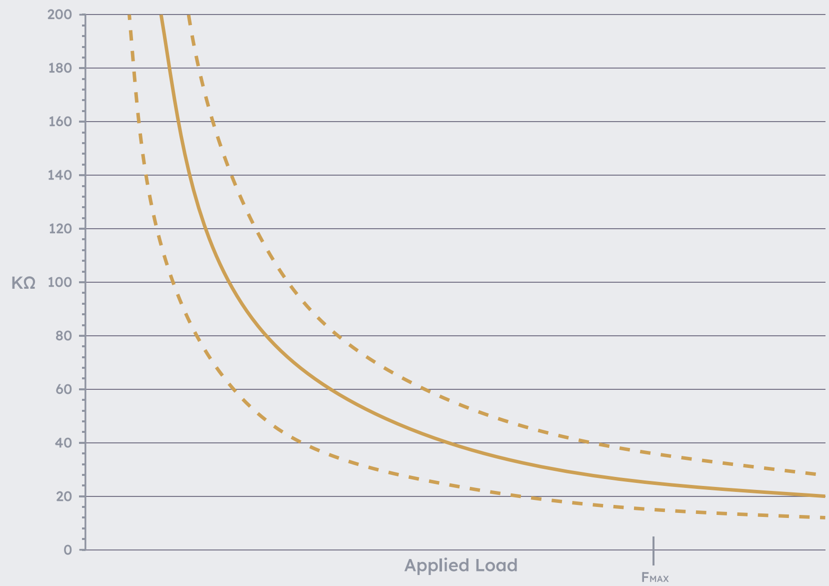
While every application is unique, there are some universal electrical considerations and general best practices to consider to achieve optimal performance of the FlexiForce sensor in your application.

> **Note:** The specific circuits in this document are not the only circuit designs that can be used with FlexiForce sensors. We encourage you to engage with our Applications Engineering team early in your process.

Fundamentals of a Flexiforce Sensor

A FlexiForce sensor behaves as a variable resister greater than 2 MΩ when unloaded and dropping about 25KΩ when it is subjected to its peak measurement load.

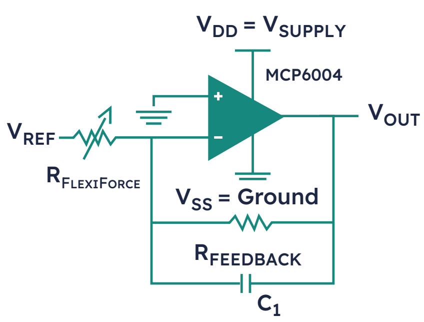
The solid line represents the target force to resistance correlation. The two dotted lines represent the potential variance of this relationship. The F_{MAX} location represents the range of resistance values where the curve of a sensor may land.



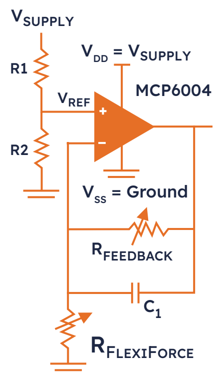
Circuit Selection

Tekscan recommends choosing from one of three circuits to operate FlexiForce sensors.

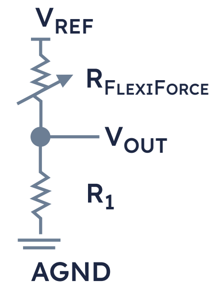
Inverting Op-Amp Circuit



Non-Inverting Op-Amp Circuit

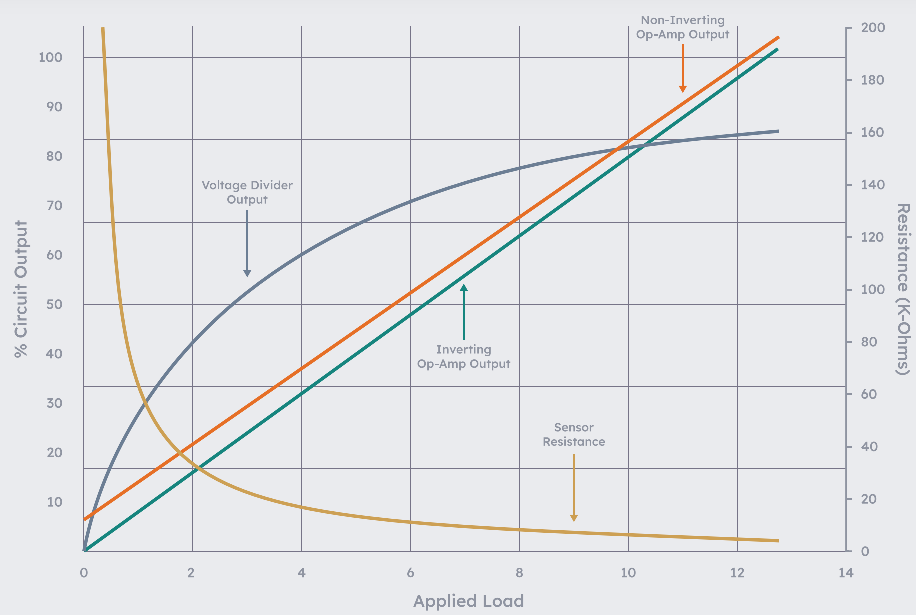


Voltage Divider



	Inverting Op-Amp Circuit	Non-Inverting Op-Amp Circuit	Voltage Divider
Usage	Best for measuring wide dynamic ranges	Good for measuring smaller dynamic ranges	Best for basic applications measuring threshold value
Linearity	●	●	○
Dynamic Range	●	◕	◔
Noise Suppression	◕	◑	◔
# of Power Supplies	2	1	1
Cost	$$$	$$	$>
Performance Notes	Very linear through origin	Very linear through offset, less dynamic range than Inv. Op-Amp	Not linear. Output will decrease at higher loads

Digital output of 3 circuits under same load conditions

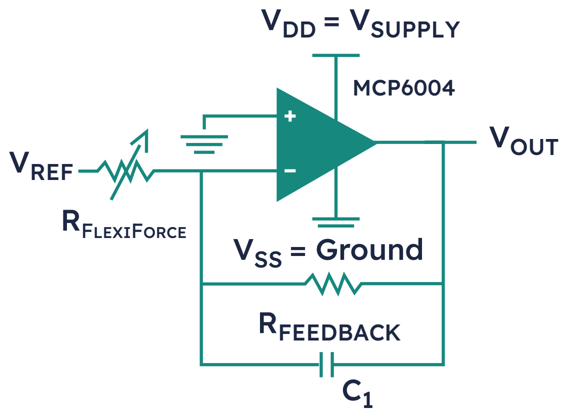


Inverting Op-Amp Circuit

$R_{FEEDBACK}$ = 20KΩ
(100KΩ Potentiometer can be used for adjustable sensitivity)

C_1=47pF

Note: Potentiometer and Capacitor values are general recommendations. Testing should be performed to determine optimal settings.



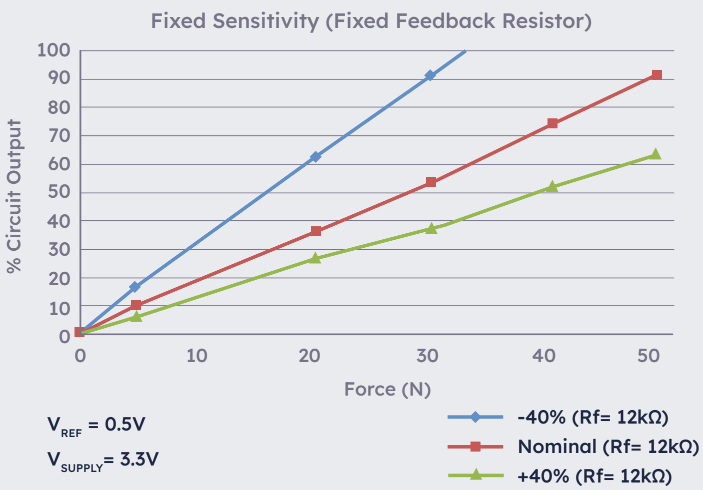
Reference Voltages

	Duty Cycle	DC
Notes	Ideal for sensor performance and reduced power consumption	Can stress sensor over time – not recommended for continuous load applications
V_{REF} Max	5V	1V
V_{REF} Ideal	0.25-0.75V	
Max Duty Cycle	20%	N/A
Max Current	2.5mA	

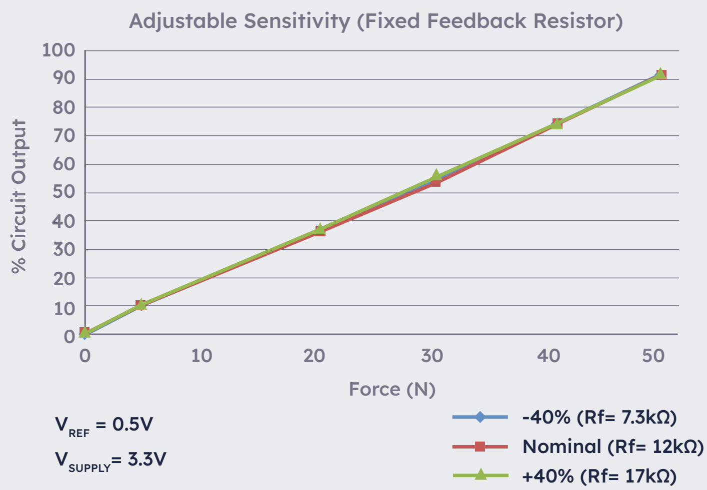
Adjusting Force Sensitivity

To address sensor variance, the output to load correlation can be adjusted by:

- The feedback resistor can be configured with an analog or digital potentiometer
- The reference voltage can be adjusted with a voltage divider or Digital to Analog Converter (DAC)



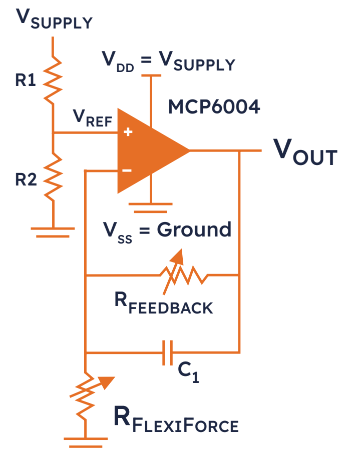
More sensitive sensors saturate before max force.



All sensors operate within dynamic force range.

Unlike a Non-Inverting Op-Amp, this will NOT affect the dynamic Range

Non-Inverting Op-Amp Circuit



$R_{FEEDBACK}$ = 80Ω
(100KΩ Potentiometer can be used for adjustable sensitivity)

C_1=47pF **R_1**=20K Ω **R_2**=80K Ω

Note: Potentiometer and Capacitor values are general recommendations. Testing should be performed to determine optimal settings.

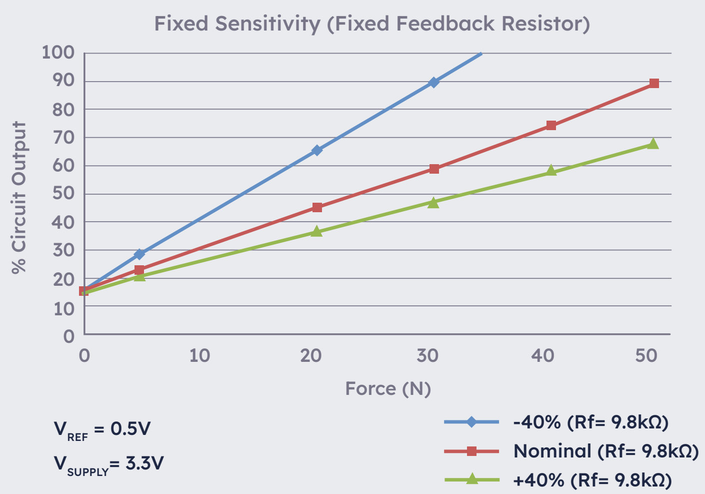
Reference Voltages

	Duty Cycle	DC
Notes	Ideal for sensor performance and reduced power consumption	Can stress sensor over time – not recommended for continuous load applications
V_{REF} Max	1V	
V_{REF} Ideal	0.25-0.75V	
Max Duty Cycle	20%	N/A
Max Current	2.5mA	

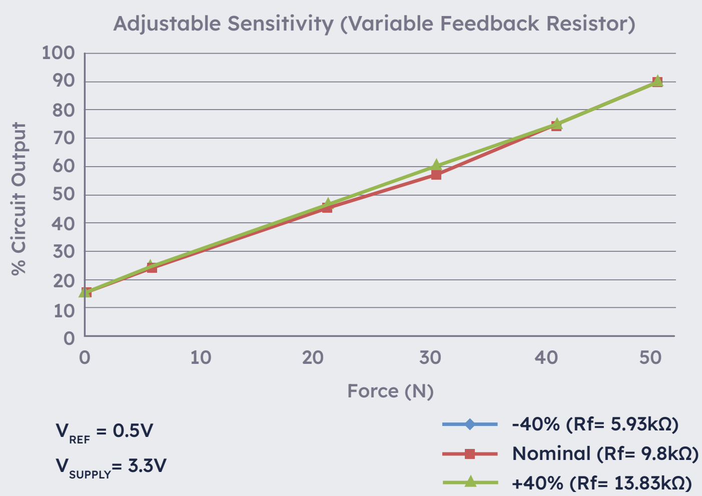
Adjusting Force Sensitivity

To address sensor variance, the output to load correlation can be adjusted by:

- The feedback resistor can be configured with an analog or digital potentiometer
- The reference voltage can be adjusted with a voltage divider or Digital to Analog Converter (DAC)



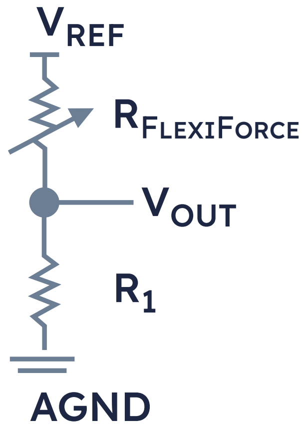
More sensitive sensors saturate before max force.



All sensors operate within dynamic force range.

Increasing V_{REF} on a Non-Inverting Op-Amp will reduce the dynamic range of the system

Voltage Divider



R_1 = 100K Ω
(100KΩ Potentiometer can be used for adjustable sensitivity)

Note: Potentiometer value is a general recommendation. Testing should be performed to determine optimal settings

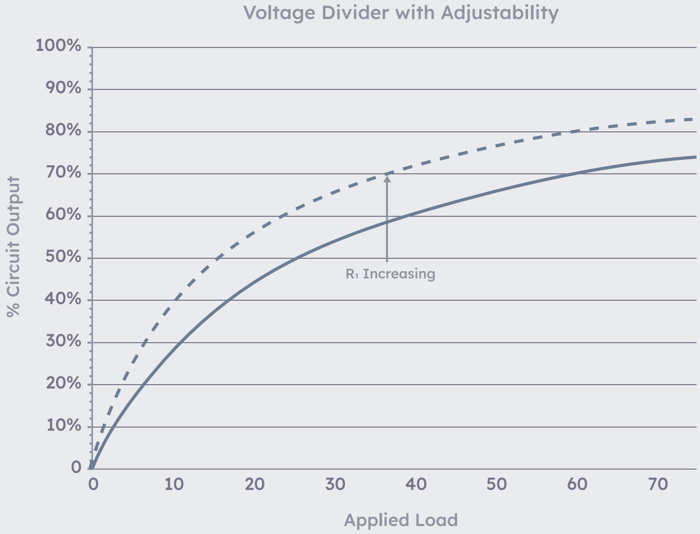
Reference Voltages

	Duty Cycle	DC
Notes	Ideal for sensor performance and reduced power consumption	Can stress sensor over time – not recommended for continuous load applications
V_{REF} Max	5V	1V
V_{REF} Ideal	0.25-0.75V	
Max Duty Cycle	20%	N/A
Max Current	2.5mA	

Adjusting Force Sensitivity

To address sensor variance, the output to load correlation can be adjusted by:

- The R_1 can be configured with an analog or digital potentiometer
- The reference voltage can be adjusted with a Digital to Analog Converter (DAC)



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Develop Sensitivity Adjustment and Calibration Procedure

Sensitivity adjustment:

Use the circuit's sensitivity adjustment method to set the output of the circuit to 80%-90% of full-scale at maximum applied force.

Calibration

Apply known force to the sensor to correlate voltage output to engineering units (lbs, N, psi, etc). Because of the inherent part-to-part variation in FlexiForce sensors, independent/individual sensor calibration is crucial for achieving accurate results.

Before Calibration

1. Fully assemble device to be in the same state or as similar as possible, to when it will be used in the field
2. If possible, condition the sensor. We generally recommend loading the sensor to 120% of maximum expected force and cycling 3-5 times for 10 seconds at a time
3. Adjusting the sensitivity of the circuit to max output at 120% max load, or 80-90% output at 100% load allows some overhead for spikes in force/pressure. This process ensures that the circuit does not saturate before your maximum expected force. Using one of the circuits and a circuit design process previously described in Sections 1 & 2 will help ensure the circuit sensitivity can be properly adjusted throughout the range of possible sensor resistances.

During Calibration

Use Completed Assembly, Or As Close to Completed As Possbile

Use Force Levels Within The Expected Application Force Range

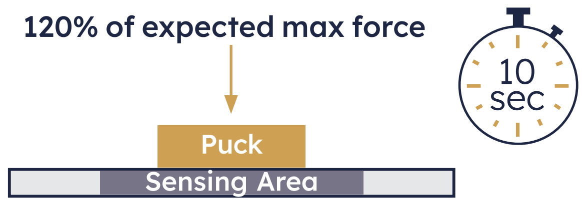
Use The Same Load Duration As Expected During The Application

Calibration Walk-Through Example

Condition The Sensor (Recommended)

Conditioning is only required prior to factory calibration.

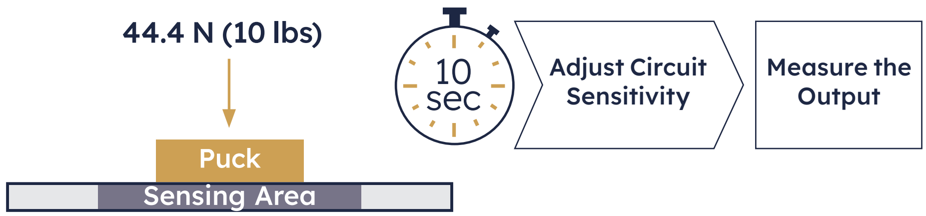
Apply & remove force at 120% of the expected max force 3-5 times, 10 seconds each time.



Adjust Circuit Sensitivity To 90% Of Circuit's Max Output

Apply max expected force. Adjust sensitivity so that output is 90% of the circuit's maximum output. Remove force

Refer to Section 2 of this document, or the "FlexiForce Integration Guide" for sensitivity adjustment methods.



Note: In this example, the circuit saturates at 3.3V. Max expected load is 44.4 N (10 lbs).

Plot Force VS Recorded Output

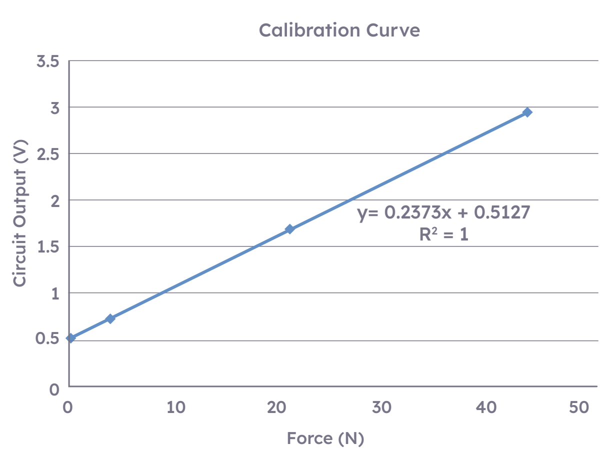
We generally recommend a two-to-three point calibration. First record the circuit output with the sensor unloaded, then:

1. Apply a low calibration point of 10% max load
2. (Optional) Apply a mid calibration point at 50% max load, if desired
3. Apply a high calibration point at 100% of max load

Record circuit output at each load.

In this example, we are recording circuit output with the sensor unloaded, then applying 4.4 N, 22.2 N, and 44.4 N (1 lb, 5 lbs, and 10 lbs, respectively) sequentially at the expected loading time interval.

Force (N (lbs))	Circuit Output (V)
0 (0)	0.51
4.4 (1)	0.75
22.2 (5)	1.70
44.4 (10)	2.96



Note: Calibration can also be carried out as a function of ADC counts if ADC is being used.

Standard Sensor Options

(Available Off-the-Shelf)

Physical Properties

Below is a preview of our standard off-the-shelf FlexiForce sensors. For more details, visit our Standard Sensors Page.

	A101	ESS102	A201	HT201	A301	ESS301	A401	A502
Thickness	.203 mm (0.008 in.)							
Length	15.6 mm (0.62 in.)	38.1 mm (1.5 in.)	197 mm (7.75 in.) 152 mm (6 in.) 102 mm (4 in.) 51 mm (2 in.)		25.4 mm (1.0 in.)		56.8 mm (2.24 in.)	81.3 mm (3.20 in.)
Width	7.6 mm (0.30 in.)		14 mm (0.55 in.)				31.8 mm (1.25 in.)	55.9 mm (2.20 in.)
Sensing Area	3.8 mm diameter (0.15 in.)		9.53 mm diameter (0.375 in.)				25.4 mm diameter (1.0 in.)	50.8 mm x 50.8 mm (2 in. x 2 in.)
Connector	2-pin male square pin		3-pin male square pin		2-pin male square pin			

Typical Performance

The specs listed below are based on ideal loading conditions under a bladder. For information on Sensor Response Time, please contact a FlexiForce Applications Engineer.

	Standard Pressure-Sensitive Layer (A101, A201, A301, A401, A502)	High Temp Pressure-Sensitive Layer (HT201)	Enhanced Stability Pressure-Sensitive Layer (ESS102, ESS301)
Linearity Error	<±3% of full scale	<±3% of full scale	<±8.6% of full scale
Repeatability	<±2.5%	<±3.5%	<±2.5%
Hysteresis	<4.5% of full scale	<3.6% of full scale	<5.5% of full scale
Drift	<5% per logarithmic time scale	<3.3% per logarithmic time scale	<3.8% per logarithmic time scale
Operating Temperatures	-40°C - 60°C (-40°F - 140°F)	-40°C - 240°C (-40°F - 400°F)	-40°C - 85°C (-40°F - 185°F)
Force Range	Up to 4,440 N (1,000 lb)	Up to 222 N (50 lb)	Up to 440 N (100 lb)
Temperature Sensitivity	Output variance up to 0.2% per degree F	Output variance up to 0.16% per degree F	Output variance up to 0.2% per degree F
Durability	≥ 1 million actuations	≥ 1 million actuations	≥ 1 million actuations

Standard Sensor Options

(Available Off-the-Shelf)

Linearity Error: ±3% of Full Scale

Linearity refers to the sensor's response (conductance output) to the applied load, over the range of the sensor. This response should ideally be linear; and any non-linearity of the sensor is the amount that its output deviates from this line. A calibration is performed to "linearize" this output as much as possible. FlexiForce standard sensors are linear within ±3%.

Repeatability: ±2.5%

Repeatability is the ability of the sensor to respond in the same way to a repeatedly applied force. As with most measurement devices, it is customary to exercise, or "condition" a sensor before calibrating it or using it for measurement. This is done to reduce the amount of change in the sensor response due to repeated loading and unloading. A sensor is conditioned by loading it to 110% of the test weight four or five times. Follow the full procedure in the Conditioning Sensors section.

Drift: <5% Per Log Time

Drift is the change in sensor output when a constant force is applied over a period of time. If the sensor is kept under a constant load, the resistance of the sensor will continually decrease, and the output will gradually increase. It is important to take drift into account when calibrating the sensor, so that its effects can be minimized. The simplest way to accomplish this is to perform the sensor calibration in a time frame similar to that which will be used in the application.

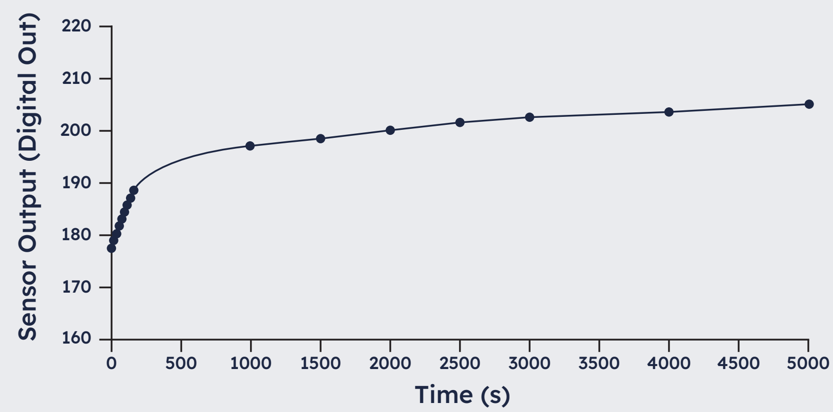


Figure 3: Sensor Drift

Hysteresis: <4.5% of Full Scale

Hysteresis is the difference in the sensor output response during loading and unloading, at the same force. For static forces, and applications in which force is only increased, and not decreased, the effects of hysteresis are minimal. If an application includes load decreases, as well as increases, there may be error introduced by hysteresis that is not accounted for by calibration.

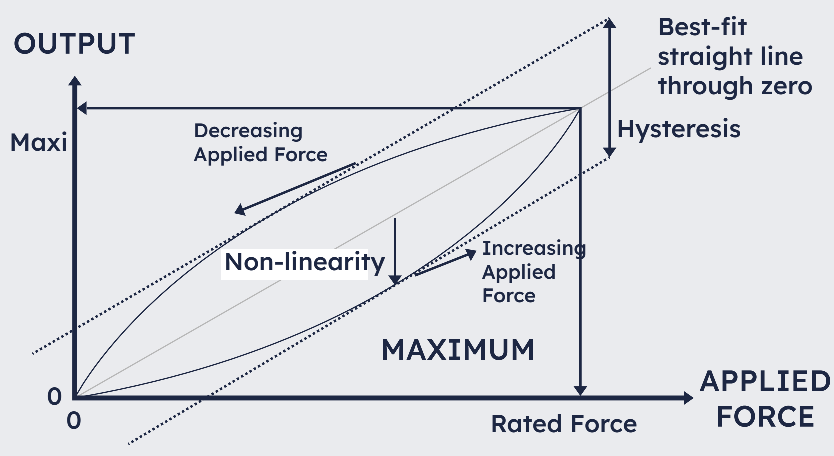


Figure 4: Hysteresis

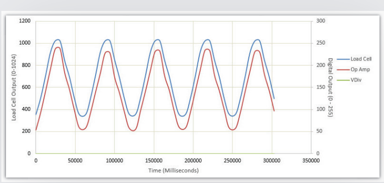
FlexiForce OEM Development Products

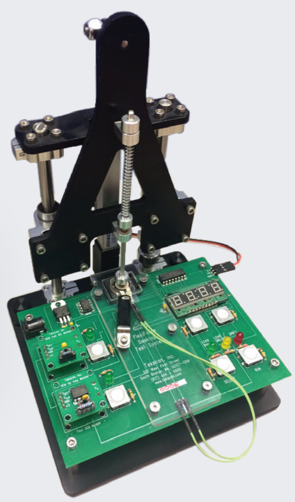
Engineers and designers integrating FlexiForce sensors into OEM products often have questions about how the sensor will perform in their specific application. How will the sensor react to different electronics and interface materials? How will it perform in the final design?

Tekscan application engineers have many years of experience supporting OEM customers through the sensor integration process, and have developed this set of tools to help you advance more seamlessly through each phase of FlexiForce sensor integration, from proof of concept testing and prototyping through field testing and commercialization.

Tekscan offers two **FlexiForce OEM Development Products** to help you obtain important sensor testing data and help you stay efficient on your way through the sensor integration process.

The FlexiForce Sensor Characterization Kit

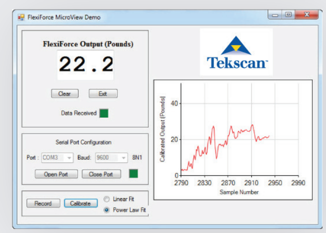


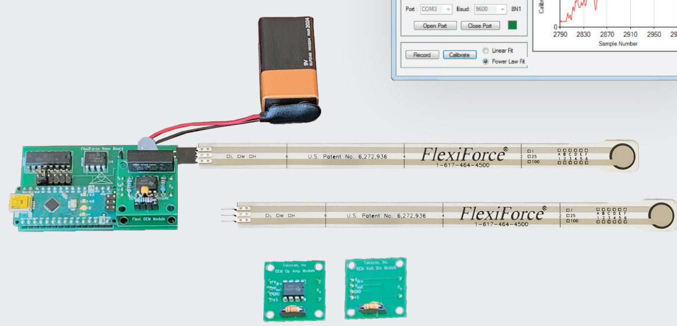


- An all-in-one testing fixture to help collect baseline sensor performance in a controlled loading environment
- Test interfacing materials with pre-programmed loading profiles in open-source software:
  - Linearity
  - Hysterisis
  - Drift
  - Repeatability
- Use with any FlexiForce Standard Sensor model, except the A101

Learn More →

The FlexiForce Prototyping Kit





- A compact, plug & play kit to help engineers and designers progress smoothly through later integration phases
  - Begin collecting data in minutes!
- Test with different circuitry and make sensitivity adjustments with ease
- Use with any FlexiForce Standard Sensor model, except the A101

Learn More →

Custom Sensor Process

Custom Sensor Form and Quotation

Once proof-of-concept has been verified, work with our engineers to design your final solution. This can be customized to your force range and form factor. To design the sensor you will be asked about the following:

- **Application force range**
- **Active area (Sketch of the sensor shape or CAD drawing of mating parts)**
- **Temperature range**
- **Humidity exposure**
- **Electrical termination**
- **Mounting strategy**

Custom Quotation

Quotation includes detailed design concept drawing, NRE, prototype pricing, and production volume pricing. Design and Tooling (NRE) Fee consists of:

- **Engineering design time for sensor concept and final tooling design.**
- **Test hardware and software.**
- **Production grade printing screens for internal sensor layers (conductive, semiconductive, adhesive, dielectric).**
- **Production grade die cutting tools necessary for manufacturing tools alignment and for cutting sensors from manufactured sheet-form.**

Cost Driving Factors

When specifying product requirements, the following parameters will impact price:

- **Size**

  Sensors are printed in sheet form. The more that fit on a sheet the higher the throughput. However, excessive density of elements on a sheet can impact yield.

- **Connector type**

  ZIF connectors and solder tabs increase cost

  Direct mounting via conductive adhesive and/or heat bonding is lowest cost

What's Next?

Are you considering embedding a FlexiForce sensor into your product? Contact our Application Engineering team today to help bring your OEM project to life.

Tekscan™

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