**Sensor Description and Specification**


*FlexiForce* Sensor Model A201.

**FlexiForce: (Noun)**
Pronunciation: flex e fôrs

1. a: a versatile, durable piezoresistive force sensor that can be made in a variety of shapes and sizes; b: a piezoresistive sensing device in which resistance is inversely proportional to applied force;
2. a customizable, economical force measurement tool that is easily integrated into OEM products;
3. a patented, ultra-thin (0.008"), flexible printed circuit that senses contact force; b: a force and load sensor that is available in three different force ranges, suiting a variety of applications for research and product development/testing.

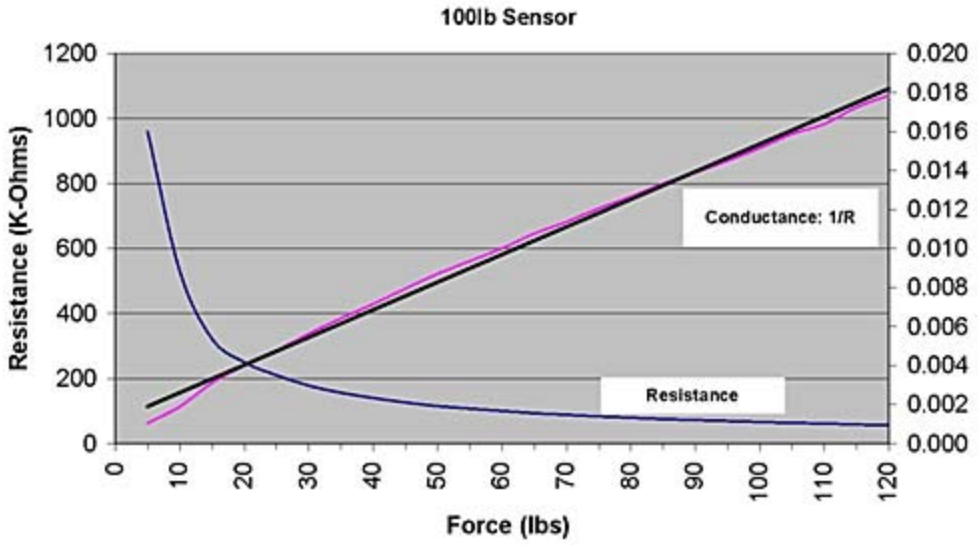
## Construction

The *FlexiForce* A201 force sensor is an ultra-thin, flexible printed circuit. The force sensors are constructed of two layers of substrate (polyester/polyimide) film. On each layer, a conductive material (silver) is applied, followed by a layer of pressure-sensitive ink. Adhesive is then used to laminate the two layers of substrate together to form the force sensor. The active sensing area is defined by the silver circle on top of the pressure-sensitive ink. Silver extends from the sensing area to the connectors at the other end of the sensor, forming the conductive leads. A201 sensors are terminated with male square pins, allowing them to be easily incorporated into a circuit. The two outer pins of the connector are active and the center pin is inactive.

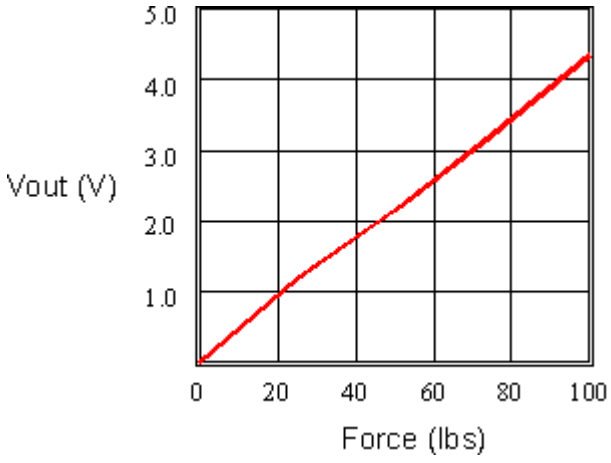
## How it Works

The *FlexiForce* single element force sensor acts as a force sensing resistor in an electrical circuit. When the force sensor is unloaded, its resistance is very high. When a force is applied to the sensor, this resistance decreases. The resistance can be read by connecting a multimeter to the outer two pins, then applying a force to the sensing area. In the image below, the plot shows both the Force vs. resistance and Force vs. conductance (1/R). Note

that the conductance curve is linear, and therefore useful in calibration.




One way to integrate the A201 force sensor into an application is to incorporate it into a force-to-voltage circuit. A means of calibration must then be established to convert the output into the appropriate engineering units. Depending on the setup, an adjustment could then be done to increase or decrease the sensitivity of the force sensor. The chart to the right shows a typical sensor response (based on our recommended drive circuit).



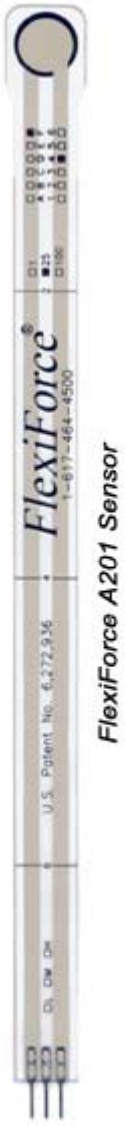

*Sensor Response Graph*

## Benefits

*FlexiForce* is reknowned for its versatility, ease of integration, and cost-effectiveness. Depending on the needs of the application, users can trim the sensors to the length of their choosing, or Tekscan can trim the force sensors to lengths of 2", 4", and 6" for an additional charge. In addition, *FlexiForce* force sensors can be custom-designed to meet the needs of an endless variety of applications.

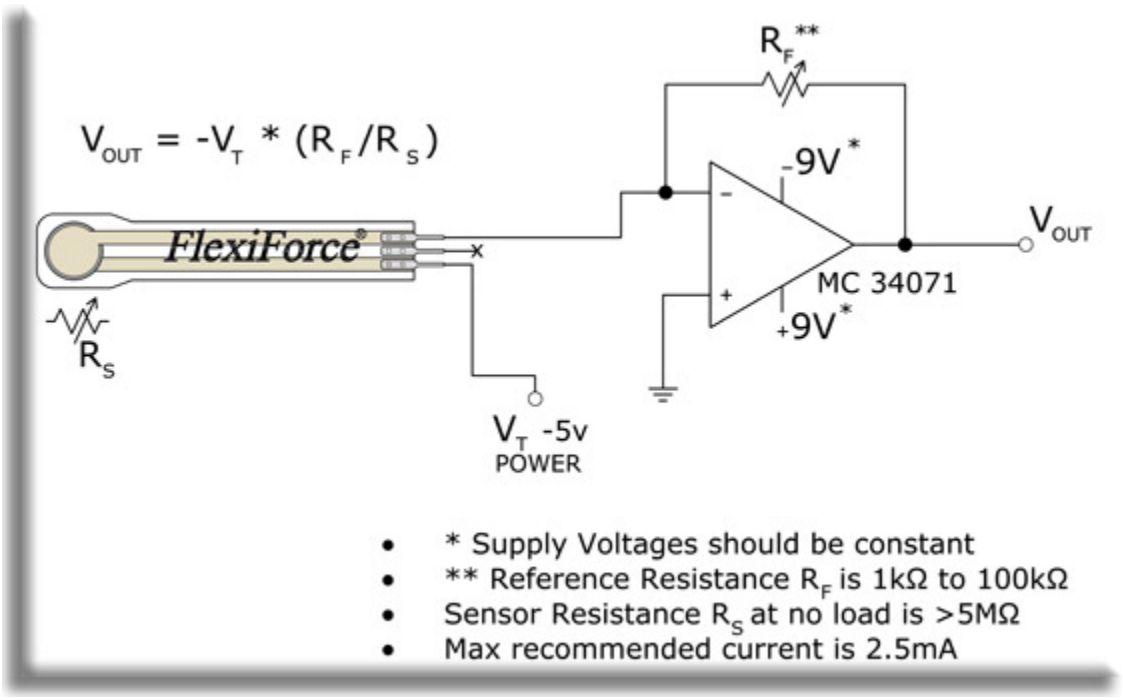
*FlexiForce* sensors are pliable enough to allow for non-intrusive measurement. They can be attached to many surfaces, and can be combined with plastic or metal films for increased stiffness or for added protection from abrasion.

| | A201 Sensor |
|---|---|
| **Physical Properties** | |
| Thickness | 0.008" (.208mm) |
| Length | 8" (203mm)<br>6" (152mm)<br>4" (102mm)<br>2" (51mm) |
| Width | 0.55" (14mm) |
| Sensing Area | 0.375" diameter (9.53mm) |
| Connector | 3-pin male square pin |
| Thickness | 0.008" (.208mm) |
| **Typical Performance** | |
| Linearity Error | <+/-5% |
| Repeatability | <+/-2.5% of full scale (conditioned sensor, 80% force applied) |
| Hysteresis | <4.5% of full scale (conditioned sensor, 80% force applied) |
| Drift | <5% per logarithmic time scale (constant load of 90% sensor rating) |
| Response Time | <5 microseconds |
| Operating Temperatures | 15°F to 140°F (-9°C to 60°C) |
| Force Ranges | 0-1 lb. (4.4 N)<br>0-25 lbs. (110 N)<br>0-100 lbs. (440 N)* |
| Temperature Sensitivity | Output variance up to 0.2% per degree F (approximately 0.36% per degree C) |



FlexiForce A201 Sensor

* See recommended drive circuit. In order to measure forces above 100 lbs. (up to 1000 lbs.), apply a lower drive voltage and reduce the resistance of the feedback resistor (1 kΩ min).




*Example of excitation circuit*