**GD10**

**0 to 20 N**

# General Purpose 1.0cm-diameter Ultra-thin Flexible Pressure Sensor
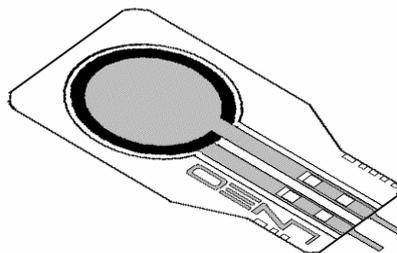
The Uneo<sup>TM</sup> pressure sensor series is a Wall Street Journal Technology Award and Edison Award-winning ultrathin flexible force sensing sensor suitable for a wide range of human-machine interface measurement from a gentle finger touch to full-body weighing scales. The patented sensor technology employs the latest advances in piezoresistive polymer composite processing and printing-based micromachining technology to enable simple and high-quality linear output in the form of variable conductance (inverse of resistance) that is proportional to the input force.

## Features

> Linearity Exceeding 99% over 0 to 20N
> Capable of up to 10 Million Actuations
> Wide Temperature Range -40°C ~ 65°C
> Compatible with Simple Voltage-Divider Readout
> Environmentally-Friendly Fabrication

| ORDERING INFORMATION | | | |
|---|---|---|---|
| **Device Name** | **Force Range** | **Sensor Type** | **Connector Type** |
| Uneo GD10 | 0 – 20N | Resistive | Crimpflex |

Package



Uneo GD10-20N

## Operating Characteristics

**Table 1.** Operating Characteristics ($T_A$ = 25°C unless otherwise noted, F is positive)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Force Range[1] | $F_{OP}$ | 0 | —— | 20 | N |
| Linearity[2] | —— | —— | 0.99 | —— | —— |
| Repeatability[3] | —— | —— | —— | ±2 | % |
| Hysteresis[4] | —— | —— | —— | ±2 | % |
| Drift[5] | —— | —— | —— | 6 | %/log(s) |
| Response Time[6] | $t_R$ | —— | —— | 0.1 | ms |
| Temperature Sensitivity[7] | Y/T | —— | —— | 0.35 | %/°C |

1.  The equivalent pressure on sensor can be computed as the force on sensing area divided by the sensor area.
2.  Linearity indicates how well force vs. sensor conductance is correlated linearly. It is computed by taking the coefficient of determination, or $R^2$, of measurements in sensor's operating force range.
3.  Repeatability accounts for how well the sensor can reproduce a reading when the same force is applied within the rated operating force range. Uneo[TM] sensor is manufactured to minimize need for additional sensor pre-conditioning.
4.  Hysteresis is the difference between sensor output values when force is added or removed continuously from the sensor. The value is defined by the maximum difference in sensor output values, at the same force, during the loading and unloading of force in the rated operating force range.
5.  Drift is the gradual shift the sensor output while the sensor is subjected to a fixed force, and is defined as percentage of shift relative to initial reading over time. Typically, the sensor conductance will increase gradually with time, so such factor should be considered to derive accurate force measurement.
6.  Response time ($t_R$) is defined as the time for the incremental change in the output to get from 10% to 90% of the final value when subjected to a change in applied force.
7.  Temperature Sensitivity is measured by the percentage change in output conductance per change in operating temperature. The rating is only applicable when sensor is operated within conditions described in Table 2.
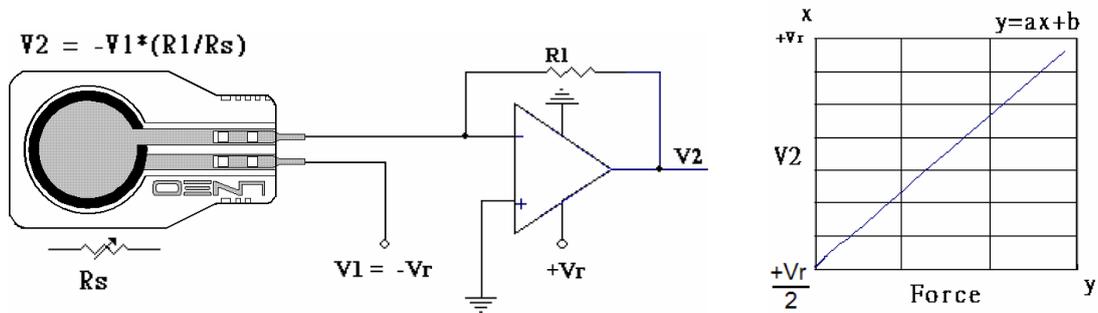
## Maximum Ratings

**Table 2.** Maximum Ratings

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Storage Temperature | $T_{stg}$ | -40 to +90 | °C |
| Operating Temperature | $T_A$ | -40 to +65 | °C |

**Operating beyond the specified limits could change the sensor output characteristic permanently.**
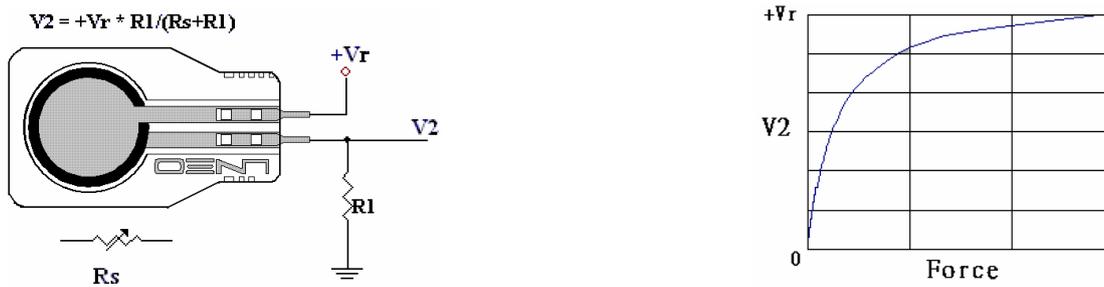
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## Measurement Circuit

Two methods to measure UNEO sensor is shown below:

1. Using an operational amplifier (OP-AMP) in an inverting configuration to obtain a voltage output that varies linearly with respect to force input.



$$V2 = -V1*(R1/Rs)$$

2. Using a fixed resistor R1 in a voltage divider configuration for an output V2 that increases with respect to added force.



$$V2 = +Vr * R1/(Rs+R1)$$
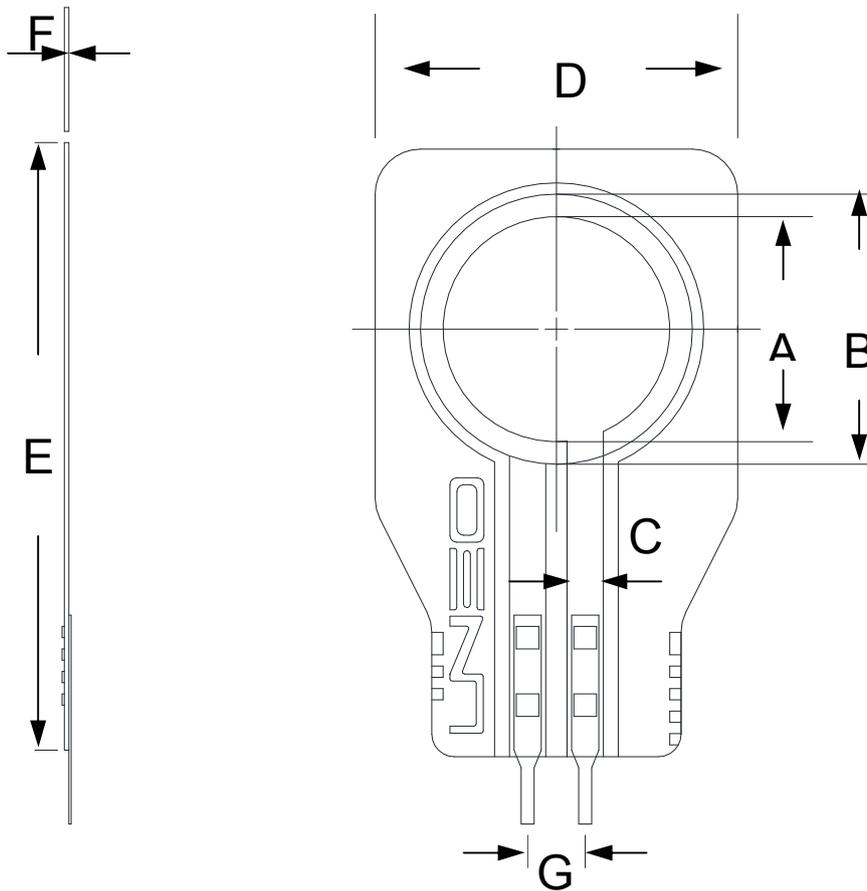
Note:
1. R1 is 1Kohm to 100Kohm
2. V2 is 0 to +Vr

## Dimension

| DIM | Millimeters |
|-----|-------------|
| A | 10.00 |
| B | 12.4 |
| C | 1.60 |
| D | 16.00 |
| E | 27.00 |
| F | 0.20 |
| G | 2.54 |

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