Overview

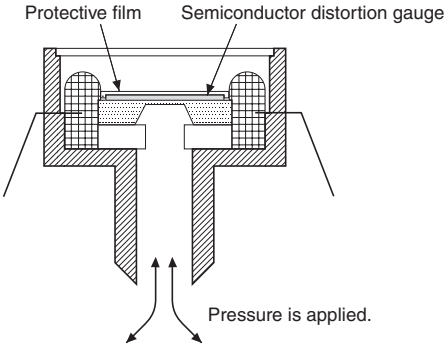
What Are Pressure Sensors?

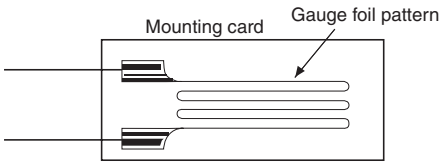
A pressure sensor is a device equipped with a pressure-sensitive element that measures the pressure of a gas or a liquid against a diaphragm made of stainless steel, silicon, etc., and converts the measured value into an electrical signal as an output.

Operating Principles

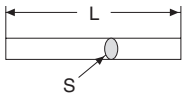
- A semiconductor piezo-resistance dispersion pressure sensor has a semiconductor distortion gauge formed on the surface of the diaphragm, and it converts changes in electrical resistance into an electrical signal by means of the piezo-resistance effect that occurs when the diaphragm is distorted due to an external force (pressure).
- A static capacitance pressure sensor has a capacitor that is formed by a static glass electrode and an opposing movable silicon electrode, and it converts changes in static capacitance that occur when the movable electrode is distorted due to an external force (pressure) into an electrical signal. (The E8Y uses the static capacitance method, and other models use the semiconductor method.)

Semiconductor Distortion Gauge Construction



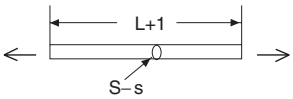


Piezo-resistance Effect



The electrical resistance of the above conductor is expressed by the following formula:
$R = \rho \times L/S$.

When this conductor is pulled to the right or left as shown below, the length increases and the cross-sectional area decreases.



The electrical resistance of the above conductor is expressed by the following formula:
$R' = \rho \times (L+1)/S-s$.

Accordingly,
$R' > R$.
This shows how the application of a mechanical force changes the electrical resistance.