

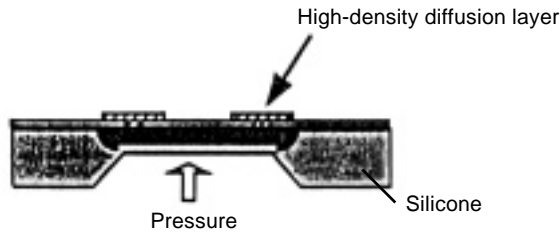
Pressure Sensors

■ PRINCIPLES OF OPERATION

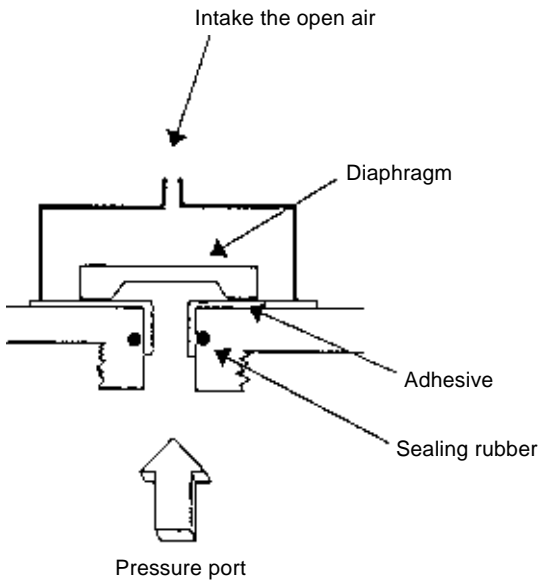
Piezo electric (diffuse resistor) type semiconductor sensor (E8AA, E8EB, E8CC, E8CB and E8F2)

Piezo electric materials have the unique ability to convert mechanical energy into electrical impulse. A high-density diffusion layer of Piezo electric material is formed to make a resistive layer on a film. Compressing this film element bends the crystalline form of the Piezo material in a manner that changes the resistance value of the Piezo material in proportion to the amount of stress on its surface. The signal and signal changes are then amplified and interpreted as pressure readings.

Construction of Diaphragm



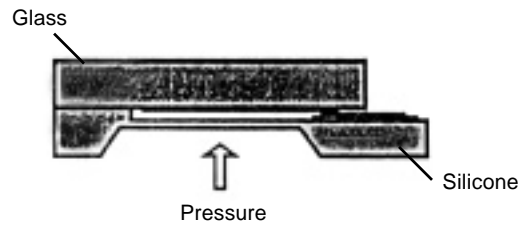
Sensor Packaging



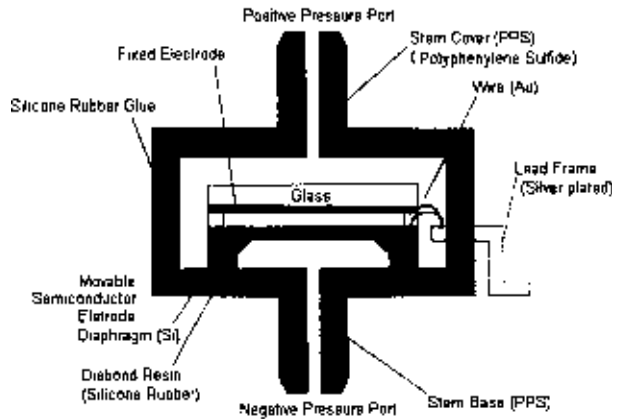
Electrostatic capacitor type semiconductor sensor (E8Y)

An electrostatic capacitor is formed when two electrodes are closely placed apart through the use of a thin dielectric spacer. One electrode is a thin film that has been deposited upon a glass substrate and remains in a fixed position. The other electrode is a movable semiconductor diaphragm. The distance between the two electrodes decreases by applying pressure stress on the movable electrode. This distance difference alters the capacitance of the two electrodes. The signal and signal changes are then amplified and interpreted as pressure readings.

Construction of Diaphragm



Sensor Packaging



■ PRESSURE PORT TYPE

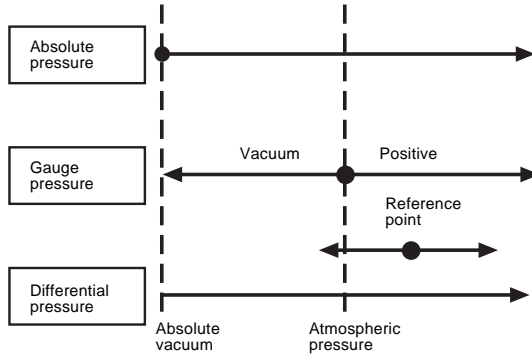
Type	Description	Shape
R(PT)1/8 R(PT)1/4	<ul style="list-style-type: none"> Tapered internal thread Maintains a high level of airtightness. Use for high pressure application. 	
M5 Internal thread	<ul style="list-style-type: none"> Straight internal thread Use for low pressure applications 	
4.5 mm dia. pipe	<ul style="list-style-type: none"> Inserting a tube will complete the piping work Use for low pressure applications 	

■ GLOSSARY

Absolute pressure: A pressure unit where absolute vacuum is zero

Gauge pressure: A pressure unit where atmospheric pressure is zero. "Positive pressure" is the pressure higher than atmospheric pressure. "Vacuum (negative) pressure" is pressure that is lower.

Differential (relative) pressure: A pressure unit where any one reference point is zero.



Non-corrosive gas: Gases that are found either in the air (nitrogen and carbon dioxide, etc.) or are inert (argon and neon, etc.).

Rated pressure range: Pressure range where the performance is guaranteed.

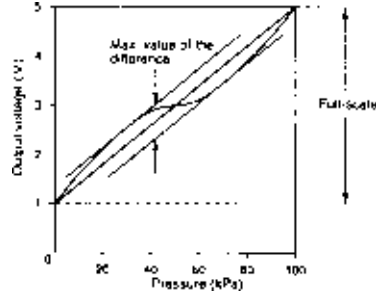
Setting pressure range: Normal operation pressure range where the digital output can be set.

Withstand pressure: The maximum pressure at which a sensor can still keep its normal performance after restoring pressure once applied over the rated range.

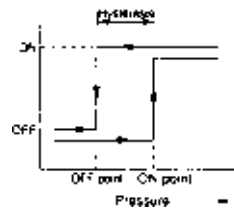
Repeat accuracy: The difference of the ON pressure value when the sensor turns ON or OFF repeatedly under certain temperature and voltage conditions. Indicated as percentage against the full-scale.

$$\frac{\text{Max. value of the operation point} - \text{Min. value of the operation point}}{\text{Rated pressure}} \times 100\%$$

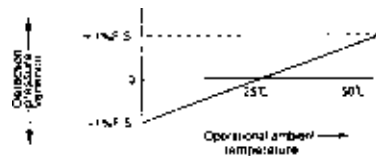
Linearity: The deviation of the actual analog output versus the optimal output. This deviation is indicated by the percentage against the full-scale.



Hysteresis: The pressure difference between ON point and OFF point of digital output. Indicated as percentage against ON point.



Temperature influence: The detected pressure value of each operational temperature within the operational ambient temperature range when compared to that of 25°C. Within the same sensor settings, change the operational temperature and check the pressure variance for each ON-point. The pressure variance is indicated by percentage against the full-scale.



This graph is only an example. Actual data of each product may differ slightly.

■ PRESSURE UNIT CONVERSION TABLE

	bar	kgf/cm ²	atm	mmHg	mmH ₂ O	psi (1b/in)	dyne/cm ²	Pa(N/m ²)
1 bar	1	1.019716	0.986923	750.062	1.019745X10 ⁴	14.503	10 ⁶	0.1M
1 kgf/cm ²	0.980665	1	0.967841	735.559	1.000028X10 ⁴	14.217	0.9866X10 ⁶	0.0980665M
1 atm	1.013250	1.033228	1	760	1.03325X10 ⁴	14.706	1.0137X10 ⁶	0.101325M
1 mmHg	1.3332X10 ⁻⁴	1.3595X10 ⁻³	1.316X10 ⁻³	1	1.3595X10	1.993X10 ⁻²	1.3332X10 ³	0.133322k
1 mmH ₂ O	0.9806X10 ⁻⁴	0.99997X10 ⁻⁴	0.9678X10 ⁻⁴	7.356X10 ⁻²	1	1.422X10 ⁻³	0.9806X10 ²	0.00980665k
1 psi(1b/in)	0.06895	0.07039	0.0680	51.715	7.030X10 ²	1	6.895X10 ⁴	6.895k
1 dyne/cm ²	10 ⁻⁶	1.019X10 ⁻⁶	0.9869X10 ⁻⁶	7.500X10 ⁻⁴	1.01978 X10 ⁻²	1.45X10 ⁻⁵	1	0.1
1 Pa(N/m ²)	10 ⁻⁵	1.019X10 ⁻⁵	9.869X10 ⁻⁶	7.5006X10 ⁻³	0.10197	1.45X10 ⁻⁴	10	1