

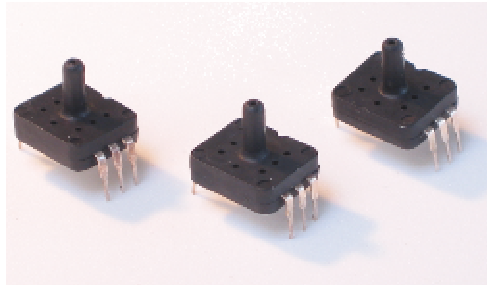
# Smartec Pressure Sensor

## Features

- \* Commercial grade
- \* DIP version for high volume production
- \* Gauge or absolute pressure
- \* Resistive bridge technology
- \* Voltage or current excitation

## Applications

- \* Medical applications
- \* Blood pressure
- \* Portable Gauges
- \* Process control
- \* HVAC controls



## Product description

The Smart Pressure Device SPD series of pressure sensors are silicon based and encapsulated in modified plastic Dual In Line packages, to accommodate six pins for through-board printed circuit mounting.

The sensors come in two distinct types: Gauge and absolute. The gauge type merely measures the pressure with respect to the atmospheric pressure. The absolute type contains a reference vacuum chamber, which is formed on the die during manufacturing.

The output voltages of both types are proportional to the pressure that is measured.

Various pressure ranges are available. On request, other ranges and encapsulations can be supplied. Please contact our sales department for more information.

Because of its bridge resistance value, the SPD pressure sensor is especially suited for use in combination with the Universal Transducer Interface (**UTI03**), which gives an easy and very accurate interface to a digital environment.

SPD series Performance Characteristic at Vcc =5V excitation @ 25 °C.

Parameter	Min	Typ	Max	Units.
Excitation Voltage	0	5	10	V
Excitation Current	0	1.5	3.0	mA
Offset	-50	0	50	mV
Temp Coeff Span	-27	-22	-17	%FS/100°C
Temp Coeff Offset	-7		+7	%FS/100°C
Temp Coeff Resistance	23	28	33	%FS/100°C
Linearity	-0.3	±0.1	+0.3	%FS
Hysteresis			0.15	% of Range
Repeatability <sup>1)</sup>		±0.2	±0.5	FSO
Response time (10-90%)		1		ms
Bridge resistance	2.7	3.3	4.0	KΩ
Pressure overload			1.35	Bar
Operating temperature	-20		85	°C
Storage temperature	-30		125	°C

<sup>1)</sup> measured after 1,000 temp. cycles 0 – 70 °C, 10<sup>6</sup> pressure cycles (10-90% FS)

Type	Range (Bar)	Min	Typ(FS)	Max	Unit
005G	0 - 0.350	70	100	130	mV
015G	0 - 1	100	140	175	mV
030G	0 - 2	120	160	200	mV
100G	0 - 6.5	120	190	240	mV

1 Pa = 0.145. 10<sup>-3</sup> PSI or 1 PSI = 6.89476\*10<sup>3</sup> Pa  
1 Bar = 10<sup>5</sup> Pa = 10<sup>5</sup> N/m<sup>2</sup>

## Understanding the specifications

The available range of SPD series pressure sensors allows for a wide range of applications. In order to get good results, it is very important to fully understand the meaning of the various specifications and their effects on accuracy, especially the ones that deal with temperature coefficients. (Silicon resistors are very temperature dependent).

### **Excitation voltage**

The excitation of the sensor can be AC or DC. Specifications are given with a DC excitation of 5V. In order to avoid electrical breakdown it is advised not to exceed the maximum values given.

### **Offset**

The offset value is the electrical output voltage (imbalance) of the pressure sensor when zero pressure is applied. The offset value for the absolute type is determined by extrapolating the measured values at two different pressures (atmospheric air and 0.05 Bar). The pressure in reference chamber is about 25 mTorr (3.33 Pa).

### **Temperature coefficients**

Silicon resistors are very temperature dependent. The overall drift of the resistors is not of interest to most users (The bridge resistors are located on the same die). The temperature coefficients of the offset and span, however, are very important. All the temperature coefficients are given in percentage of full-scale range (FS) and over a temperature range of 100 °C.

The maximum value of the temperature coefficient of the span is minus 27%, which means that worst case the span becomes 27% smaller over the full temperature range of 100 °C. The offset will vary no more than  $\pm 7\%$  of the span over the same temperature range.

### **Calculation example** (please refer to the parameter table above)

Suppose the use of a pressure sensor of type SPD 015G over a temperature range of 100 °C. The typical full scale span is 140 mV. The offset (at a fixed temperature) will be between -50 and +50 mV.

#### Offset

When the static part of the offset has been nulled, the offset can still vary  $\pm 7\%$  of 140 mV ( $\pm 9.8$  mV), over the temperature range of 100°C.

#### Span

The typical full-scale span is 140 mV and the typical temperature coefficient of the span equals  $-22\%$  FS/100 °C.

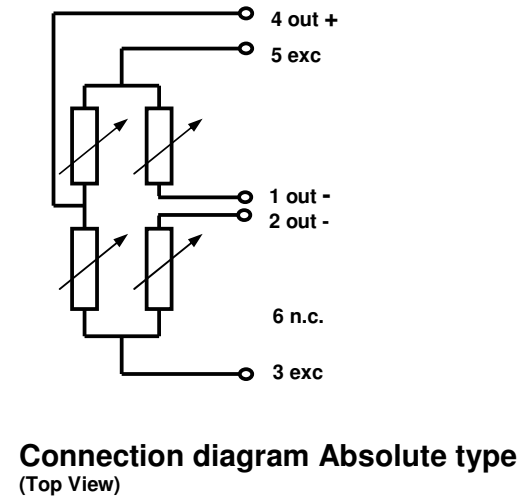
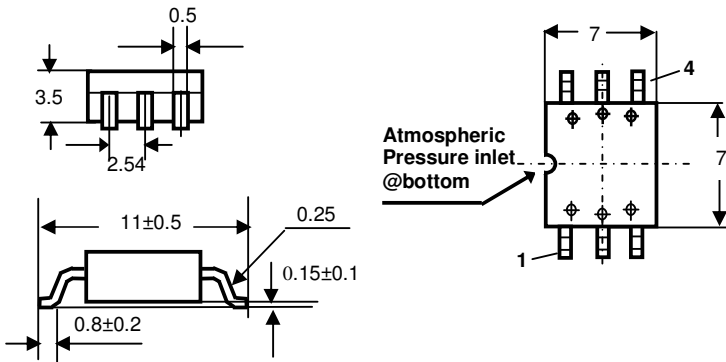
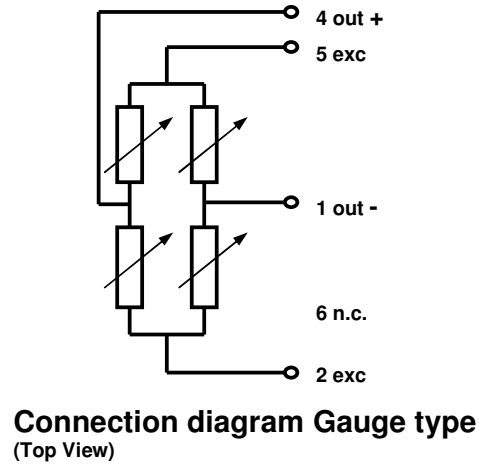
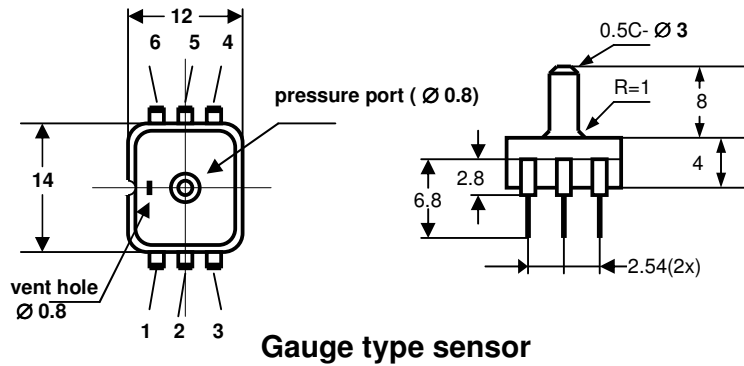
Typically, you would therefore have a span, which varies between 140 mV and 109 mV (140 mV minus 22%), over the full temperature range of 100 °C.

In the worst case scenario the minimum value of the span is 100 mV, which means that the sensor has a span of 100 mV, which could drop to 63mV (100 minus 27%) over the full temperature range of 100 °C.

### **Linearity**

The linearity is defined as the maximum deviation from the best fitted straight line.

### Outline drawings and dimensions.



All sizes in mm.

Wetted materials: glass, ryton, silicon, fluorosilicon and gold

Other encapsulations on request.

Ordering information	Part no.	Pressure range
	SPD005G	0 – 0.35 Bar (Gauge)
	SPD015G	0 – 1.0 Bar -
	SPD030G	0 – 2.0 Bar -
	SPD100G	0 – 6.5 Bar -
	SPD015A	0 – 1.0 Bar (Absolute)