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Air permeability of balsa core, and its influence on defect formation in resin infused sandwich laminates

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FEATURES

- 0 to 1 psi to 0 to 100 psi
- Low Cost DIP Package
- Temperature Compensation
- Calibrated Zero and Span
- Small Size
- Low Noise
- High Impedance for Low Power Applications

APPLICATIONS

- Medical Equipment
- Computer Peripherals
- Pneumatic Controls
- HVAC

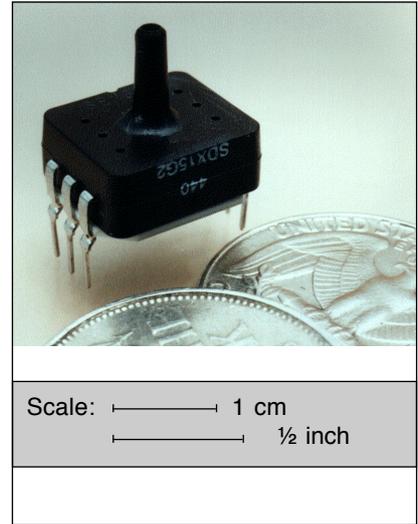
GENERAL DESCRIPTION

The SDX series sensors will provide a very cost effective solution for pressure applications that require small size plus performance. These internally calibrated and temperature compensated sensors give an accurate and stable output over a 0°C to 50°C temperature range. This series is intended for use with non-corrosive, non-ionic working fluids such as air and dry gases.

Devices are available to measure absolute, differential and gage pressures from 1 psi (SDX01) up to 100 psi (SDX100). The Absolute (A) devices have an internal vacuum reference and an output voltage proportional to absolute pressure.

The output of the bridge is ratiometric to the supply voltage and operation from any D.C. supply voltage up to +20 V is acceptable.

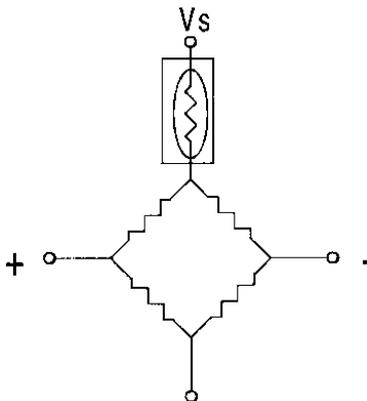
The SDX devices feature an integrated circuit sensor element and laser trimmed thick film ceramic housed in a compact solvent resistant case. This package provides excellent corrosion resistance and isolation to external package stresses. The DIP package also provides convenient mounting and pressure ports for ease of use with



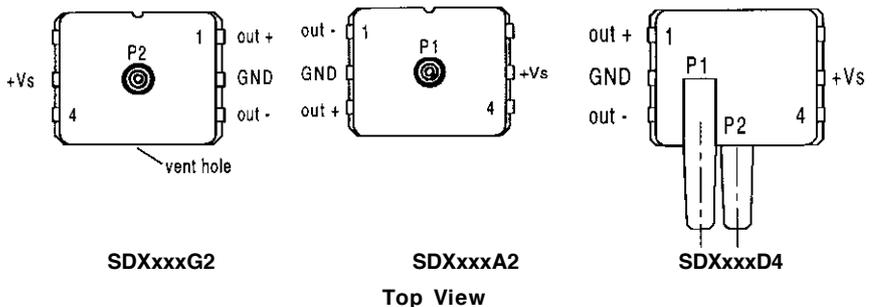
standard plastic tubing for pressure connection.

All SDX devices are calibrated for span to within 3.5% and provide an offset (zero pressure output) of ± 1 millivolt maximum. These parts were designed for low cost applications where the user can typically provide fine-adjustment of zero and span in external circuitry. For higher accuracies, refer to the standard SCX series datasheet.

EQUIVALENT CIRCUIT



ELECTRICAL CONNECTION



Note: The polarity identified is for pressure applied to
 SDXxxxG2: P2 (backward gage)
 SDXxxxA2: P1 (forward gage)
 SDXxxxD4: P2 (backward gage)

SDX SERIES



Low Cost Compensated Pressure Sensors in DIP Package

PRESSURE SENSOR CHARACTERISTICS (all devices)

Maximum Ratings

Supply Voltage V_s
 Maximum Pressure on any port
 Lead Temperature (soldering 4 sec.)

+20 V_{DC}
 150 psig
 250°C

Environmental Specifications

Temperature Ranges
 Compensated 0°C to 50°C
 Operating -40°C to +85°C
 Storage -55°C to +125°C
 Humidity Limits 0 to 100% RH

STANDARD PRESSURE RANGES

Part Number	Operating Pressure	Proof Pressure ¹¹	Full-Scale Span		
			Min.	Typ.	Max.
SDX01...	0 - 1 psig/d	20 psi	17.37 mV	18 mV	18.63 mV
SDX05...	0 - 5 psig/d	20 psi	57.9 mV	60 mV	62.1 mV
SDX15A2	0 - 15 psia	30 psi	86.85 mV	90 mV	93.15 mV
SDX15...	0 - 15 psig/d	30 psi	86.85 mV	90 mV	93.15 mV
SDX30A2	0 - 30 psia	60 psi	86.85 mV	90 mV	93.15 mV
SDX30...	0 - 30 psig/d	60 psi	86.85 mV	90 mV	93.15 mV
SDX100A2	0 - 100 psia	150 psi	96.5 mV	100 mV	103.5 mV
SDX100...	0 - 100 psig/d	150 psi	96.5 mV	100 mV	103.5 mV

* Maximum Pressure above which causes permanent sensor failure.

COMMON PERFORMANCE CHARACTERISTICS⁽¹⁾

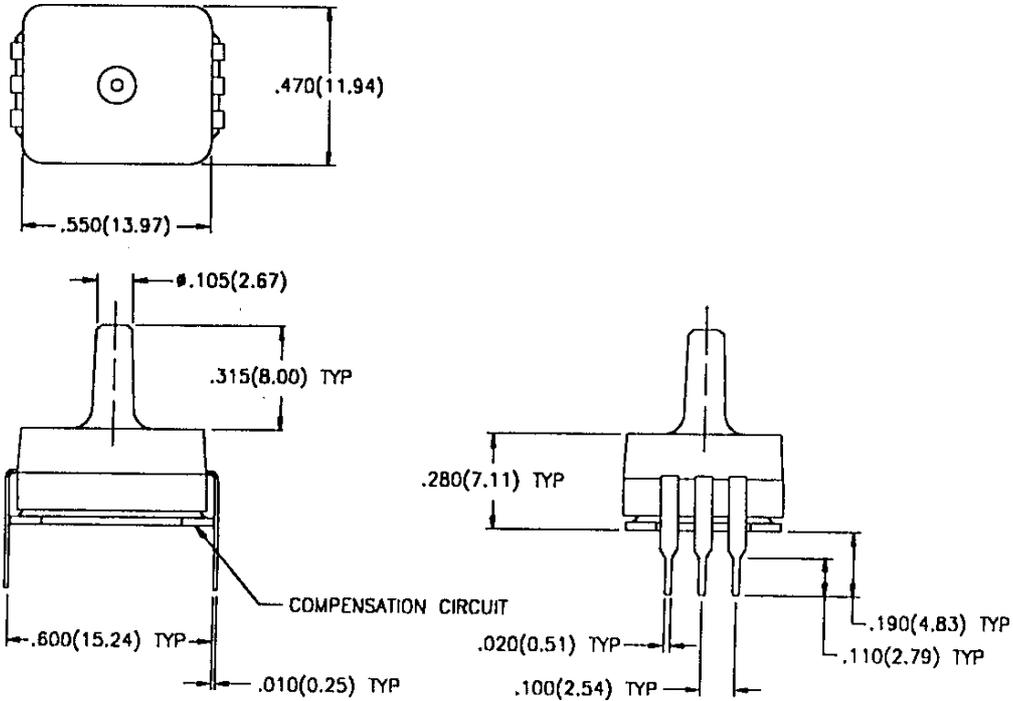
Characteristic	Min.	Typ.	Max.	Unit
Zero Pressure Offset	-1.0	0	+1.0	mV
Combined Linearity and Hysteresis ⁽³⁾	---	±0.2	±1.0	%FSO
Temperature Effect on Span (0-50°C) ⁽⁴⁾	---	±0.4	±2.0	%FSO
Temperature Effect on Offset (0-50°C) ⁽⁴⁾	---	±0.2	±1.0	mV
Repeatability ⁽⁵⁾	---	±0.2	±0.5	%FSO
Input Impedance ⁽⁶⁾	---	4.0	---	kΩ
Output Impedance ⁽⁷⁾	---	4.0	---	kΩ
Common-Mode Voltage ⁽⁸⁾	1.5	3.0	5.0	V_{DC}
Response Time ⁽⁹⁾	---	100	---	μsec
Long Term Stability of Offset and Span ⁽¹⁰⁾	---	±0.1	---	%FSO

Specification Notes:

- 1: Reference Conditions: Unless otherwise noted: Supply Voltage, $V_s = 12 V_{DC}$, $T_A = 25^\circ C$, Common-Mode Line Pressure = 0 psig, Pressure Applied to Port B. For absolute devices only, pressure is applied to Port A and the output polarity is reversed.
- 2: Span is the algebraic difference between the output voltage at full-scale pressure and the output at zero pressure. Span is ratiometric to the supply voltage.
- 3: See Definition of Terms.
Hysteresis - the maximum output difference at any point within the operating pressure range for increasing and decreasing pressure.
- 4: Maximum error band of the offset voltage and the error band of the span, relative to the 25°C reading.
- 5: Maximum difference in output at any pressure with the operating pressure range and temperature within 0°C to +50°C after:
 - a) 100 temperature cycles, 0°C to +50°C
 - b) 1.0 million pressure cycles, 0 psi to full-scale span
- 6: Input impedance is the impedance between pins 2 and 5
- 7: Output impedance is the impedance between pins 1 and 3.
- 8: This is the common-mode voltage of the output arms (Pins 1 and 3) for $V_s = 12 V_{DC}$.
- 9: Response time for a 0 psi to full-scale span pressure step change, 10% to 90% rise time.
- 10: Long term stability over a one year period.
- 11: Maximum pressure at any port is the maximum operating plus common-mode pressure which can be applied.

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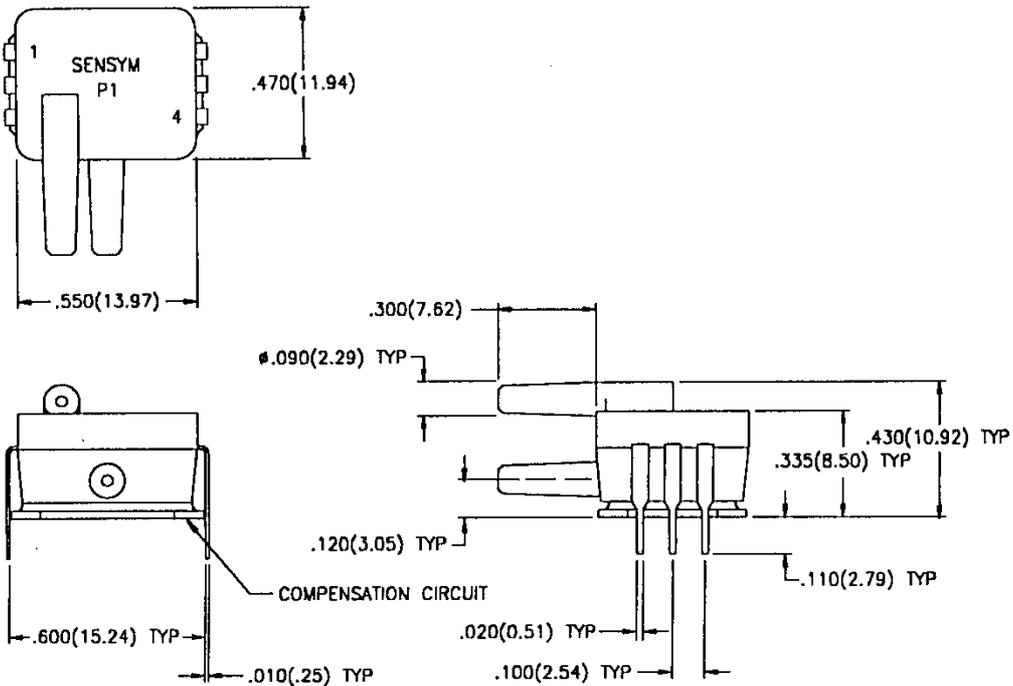
PHYSICAL DIMENSIONS



SDXxxxG2/A2

Mass: 2 Grams

Dimensions in inches (mm)



SDXxxxD4

Dimensions in inches (mm)

SDX SERIES



Low Cost Compensated Pressure Sensors in DIP Package

GENERAL DISCUSSION

The SDX Series devices give a voltage output which is directly proportional to applied pressure. The gage devices will give an increasing positive going output when increasing pressure is applied to the pressure port. The absolute device will give a decreasing output when increasing pressure is applied to the port. The devices are ratiometric to the supply voltage and changes in the supply voltage will cause proportional changes in the offset voltage and full-scale span.

PNEUMATIC INTERFACE

The DIP also provides convenient mounting and pressure ports for ease of use with standard 1/16" ID, 1/8" OD, 1/32" wall, flexible plastic tubing for pressure connection.

The small tubing has several advantages over larger tubing commonly used with pressure sensors:

- 1) The tubing can be formed in a much smaller radius without kinking.
- 2) The tubing is easier to handle
- 3) The tubing is available in a variety of colors such as clear, white, yellow, blue, green, etc. to enable color coding of pneumatic circuits with multiple pressure sensors in the same way that wiring harnesses are color coded in electrical circuits. This greatly simplifies troubleshooting.
- 4) Less stress is placed on the pressure sensor package resulting in less potential for offset shift.
- 5) Less physical space is required for the small tubing
- 6) The lower volume of air in the small tubing results in faster pressure sensor response.

USER CALIBRATION

The SDX devices are fully calibrated for offset and span and should therefore require little user adjustment in most applications. For more precise span and offset adjustments, contact the factory.

VACUUM REFERENCE (Absolute Devices)

Absolute sensors have a hermetically sealed vacuum reference chamber. The offset voltage on these units is therefore measured at vacuum, 0 psia. Since all pressure is measured relative to a vacuum reference, all changes in barometric pressure or changes in altitude will cause changes in the device output.

MEDIA COMPATIBILITY

SDX devices are compatible with most non-corrosive gases. Because the circuitry is coated with a protective silicon gel, many otherwise corrosive environments can be compatible with the sensors. Fluids must generally be compatible with silicon gel, plastic, RTV, silicon, and glass for use with the gage devices (only). For questions concerning media compatibility, contact the factory.

MECHANICAL AND MOUNTING CONSIDERATIONS

The DIP housing is designed for convenient pressure connection and easy PC board mounting. For pressure attachment, tygon and silicon tubing is recommended.

APPLICATION INFORMATION

The Application Information for the SCX Series is also applicable to the SDX Series.

ORDERING INFORMATION

Operating Pressure	Part Number		
	absolute devices	gage devices	gage/differential devices
0 - 1 psi	---	SDX01G2	SDX01D4
0 - 5 psi	---	SDX05G2	SDX05D4
0 - 15 psi	SDX15A2	SDX15G2	SDX15D4
0 - 30 psi	SDX30A2	SDX30G2	SDX30D4
0 - 100 psi	SDX100A2	SDX100G2	SDX100D4

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