

Pressure Sensors Selection Guide PC Board Mountable

Features

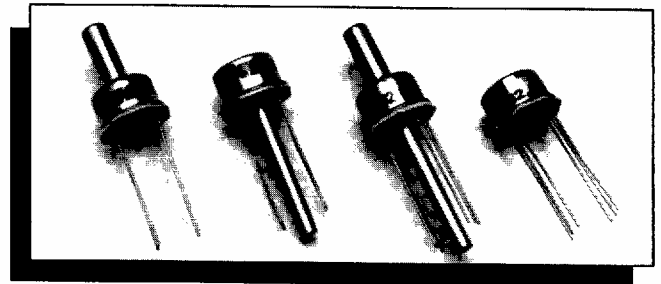
- Solid State Reliability
- $\pm 1\text{mV}$ Zero Output
- 100 mV Output Span
- Ratiometric
- $\pm 0.1\%$ Accuracy
- Low Noise
- Low Cost
- Low Power
- Performance Graded
- $\pm 1\%$ Normalized Output Span

Typical Applications

- Medical
- Computer Peripherals
- Robotics
- Vacuum Measurement
- Avionics
- Automotive
- Industrial Controls
- Barometric Sensing
- Leak Detection
- Environmental Control

Standard Ranges

- 0 to 2 psi
- 0 to 5 psi
- 0 to 10 psi
- 0 to 15 psi
- 0 to 30 psi
- 0 to 50 psi
- 0 to 100 psi
- 0 to 250 psi



Silicon Sensing Element

The sensing element in each device is an integrated circuit silicon chip with a micromachined diaphragm. Four piezoresistive strain gage resistors are ion implanted into the diaphragm to form a fully active Wheatstone Bridge.

The silicon diaphragm deflects upon the application of pressure which results in an electrical output that is proportional to the input pressure. The single crystal nature of the diaphragm assures a pressure hysteresis that is essentially unmeasurable.

Package Configurations

The four package types used are modifications of the basic TO-8 metal can structure. Pressure can be applied to either the top (top entry) of the package, the bottom (bottom entry) or both.

In the top entry design the pressure media is applied to the circuit side of the chip. This design is intended for non-corrosive gases and is not recommended for liquids. Models 10-12-13-40-42-43 utilize this structure to measure absolute and gage pressures.

In the bottom entry design the pressure media is applied to the non-circuit, or back side, of the chip. The attachment scheme, or construction, is such that the only wetted materials are silicon, gold and glass which makes this design ideal for liquids and gases. Models 20-22-23 are bottom entry and measure gage pressures.

Models 30-32-33 measure differential pressure in a dual port design that utilizes a combination of both the top and bottom entry structures. The reference (top) port has the same media compatibility as in the top entry construction.

Temperature Compensation & Calibration

In each package series there are several options.

Models 10-20-30-40 are supplied with a computer printout that specifies the necessary external compensation resistors.

Models 12-22-32-42 are provided with integral temperature compensation and zero balancing over 0-50°C with laser trimmed resistors. No external resistors are required.

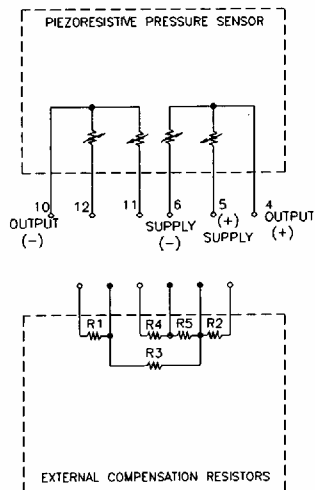
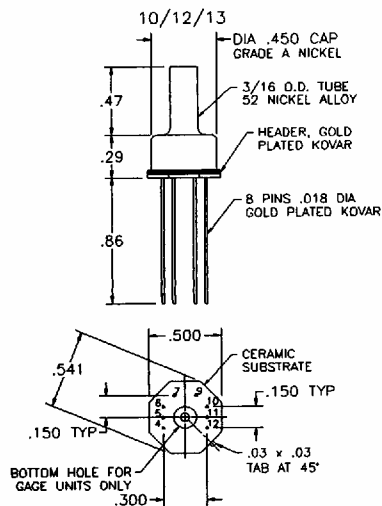
Models 13-23-33-43 contain integral temperature compensation, zero balance and an additional laser trimmed resistor to normalize pressure sensitivity variations by programming the gain of an external amplifier, thus providing $\pm 1\%$ interchangeability along with high level output.

In addition, each Model is also categorized by performance grade, based on electrical specifications such as span, linearity, hysteresis and temperature coefficients. The two grades used are A and B.

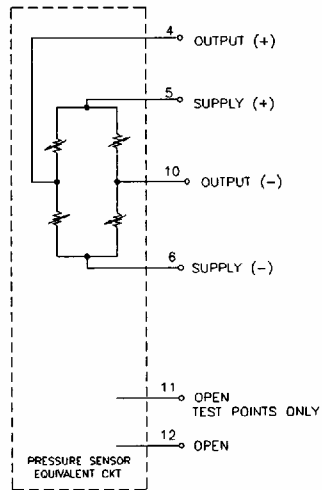
TO-8 Series

Dimensions / Connections

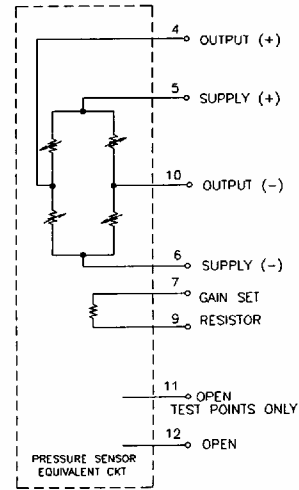
Models 10/12/13 - Top Entry



MODEL 10

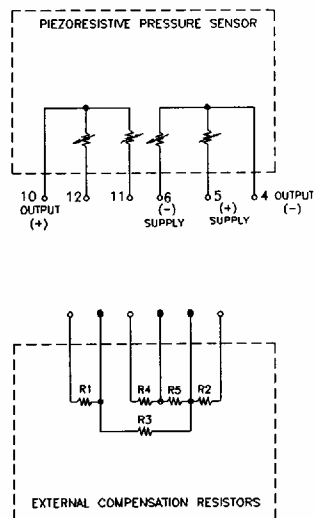
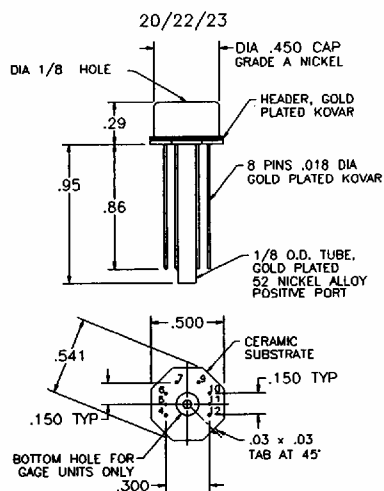


MODEL 12

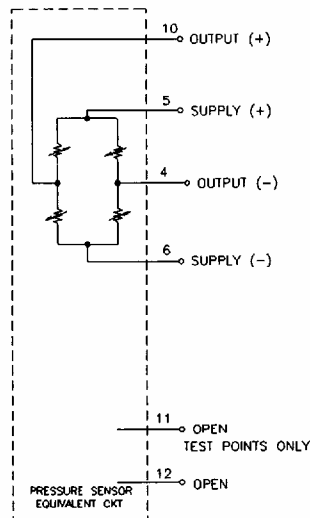


MODEL 13

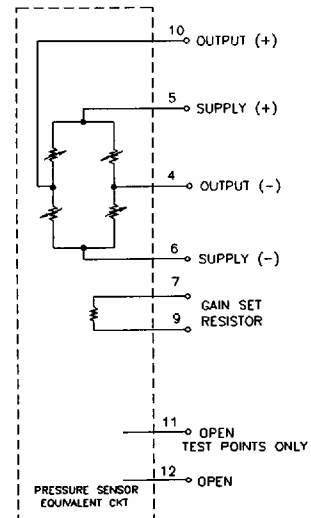
Models 20/22/23 - Bottom Entry



MODEL 20

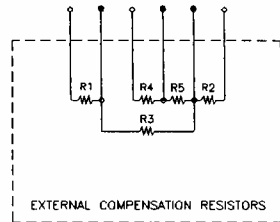
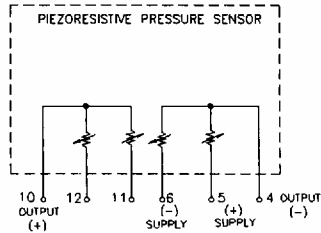
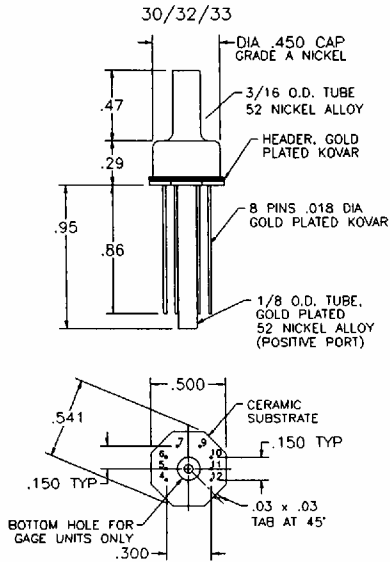


MODEL 22

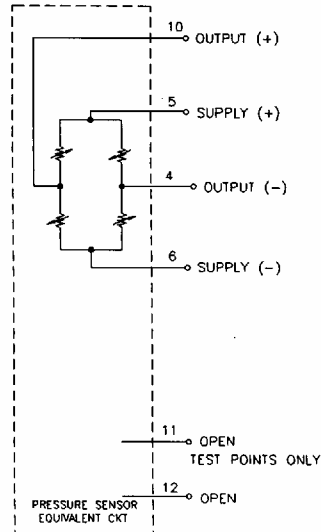


MODEL 23

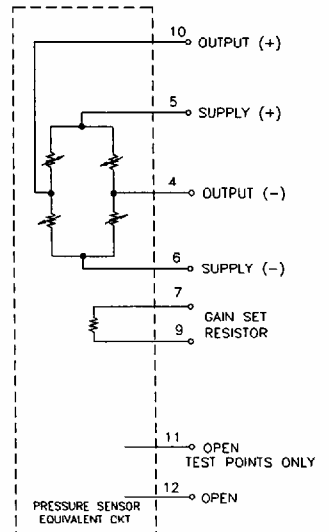
Models 30/32/33 - Differential



MODEL 30

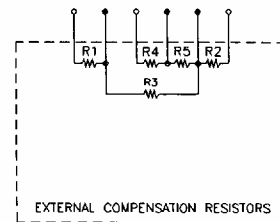
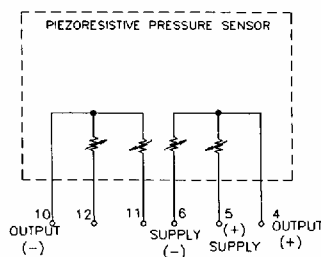
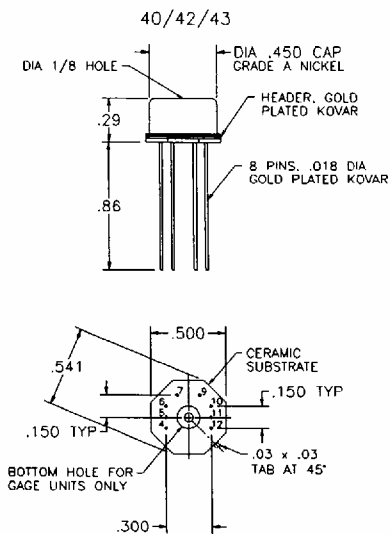


MODEL 32

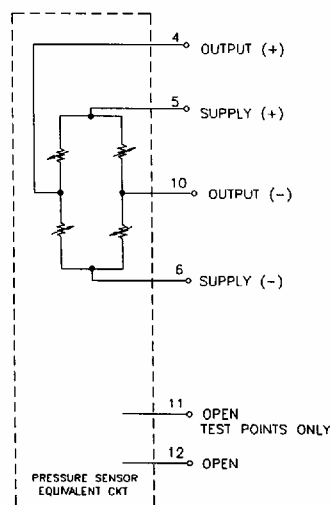


MODEL 33

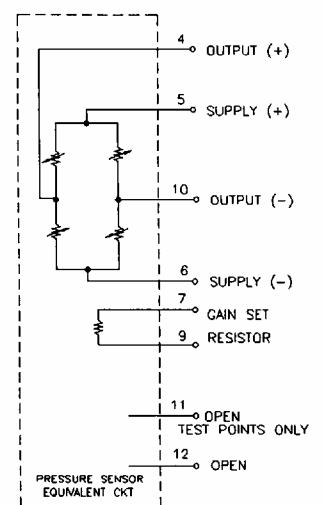
Models 40/42/43 - Top Entry (Low Profile)



MODEL 40



MODEL 42



MODEL 43

TO-8 Series

Performance Specifications

Supply Current = 1.5 mA & Ambient Temperature = 25°C (Unless otherwise specified)

PARAMETER	GRADE							
	A			B				
	MIN	TYP	MAX	MIN	TYP	MAX	UNITS	NOTES
Full-Scale Output Span	75	100	150	50	100	200	mV	
Full-Scale Output Span (2 psi version)	30		60	30		100	mV	
Zero Pressure Output			1			2	±mV	2
Linearity		0.05	0.10			0.25	±% Span	3
Pressure Hysteresis		0.01	0.05			0.10	±% Span	
Input & Output Resistance	2500	4400	6000	2500	4400	6000	Ω	
Temperature Coefficient - Span		0.3	0.5			1.0	±% Span	1,2
Temperature Coefficient - Zero		0.1	0.5			1.0	±% Span	1,2
Thermal Hysteresis - Span		0.1			0.2		±% Span	1
Thermal Hysteresis - Zero		0.1			0.2		±% Span	1
Supply Current		1.5	2.0		1.5	2.0	mA	4
Response Time		1.0			1.0		mS	5
Output Noise		1.0			2.0		μV p-p	6
Output Load Resistance	2			2			MΩ	7
Insulation Resistance (50VDC)	50			50			MΩ	
Pressure Overload			3X			3X	Rated	8
Operating Temperature	-40°C to +125°C							
Storage Temperature	-55°C to +150°C							
Acceleration	50g Max							
Shock	1000g Peak for 0.5mS							
Vibration	20g Peak at 10 to 2000 Hz							
Media	Non-corrosive Gases							9
Weight	3 grams							

Notes

1. Temperature range: 0-50°C in reference to 25°C.
2. For Models 10, 20, 30, 40: With external resistors (R_1 or R_2), (R_3 or R_4) and R_5 included in circuit on Figure 1. If R_1 is required then R_2 is left open ($R_2=\infty$) and vice versa. If R_3 is required then R_4 is a short ($R_4=0$) and vice versa. See Application Note TN-002.
3. Best fit straight line.
4. Guarantees output/input ratiometricity.
5. For a zero-to-full scale pressure step change.
6. 10Hz to 1kHz.
7. Prevents increase of TC-Span due to output loading.
8. 3X or 500 psi maximum, whichever is less.
9. a. For Top Entry, wetted materials are silicon, gold, RTV, glass, and nickel.
b. For Bottom Entry, wetted materials are silicon, RTV, gold, and glass.

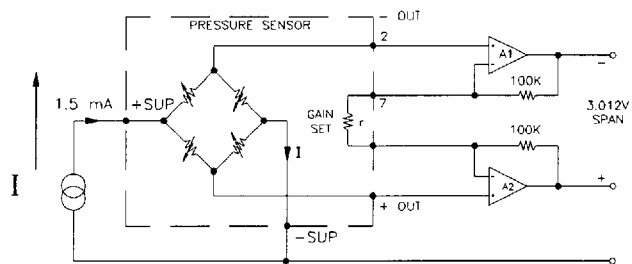
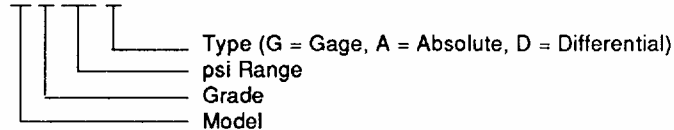


FIGURE 1

Ordering Information

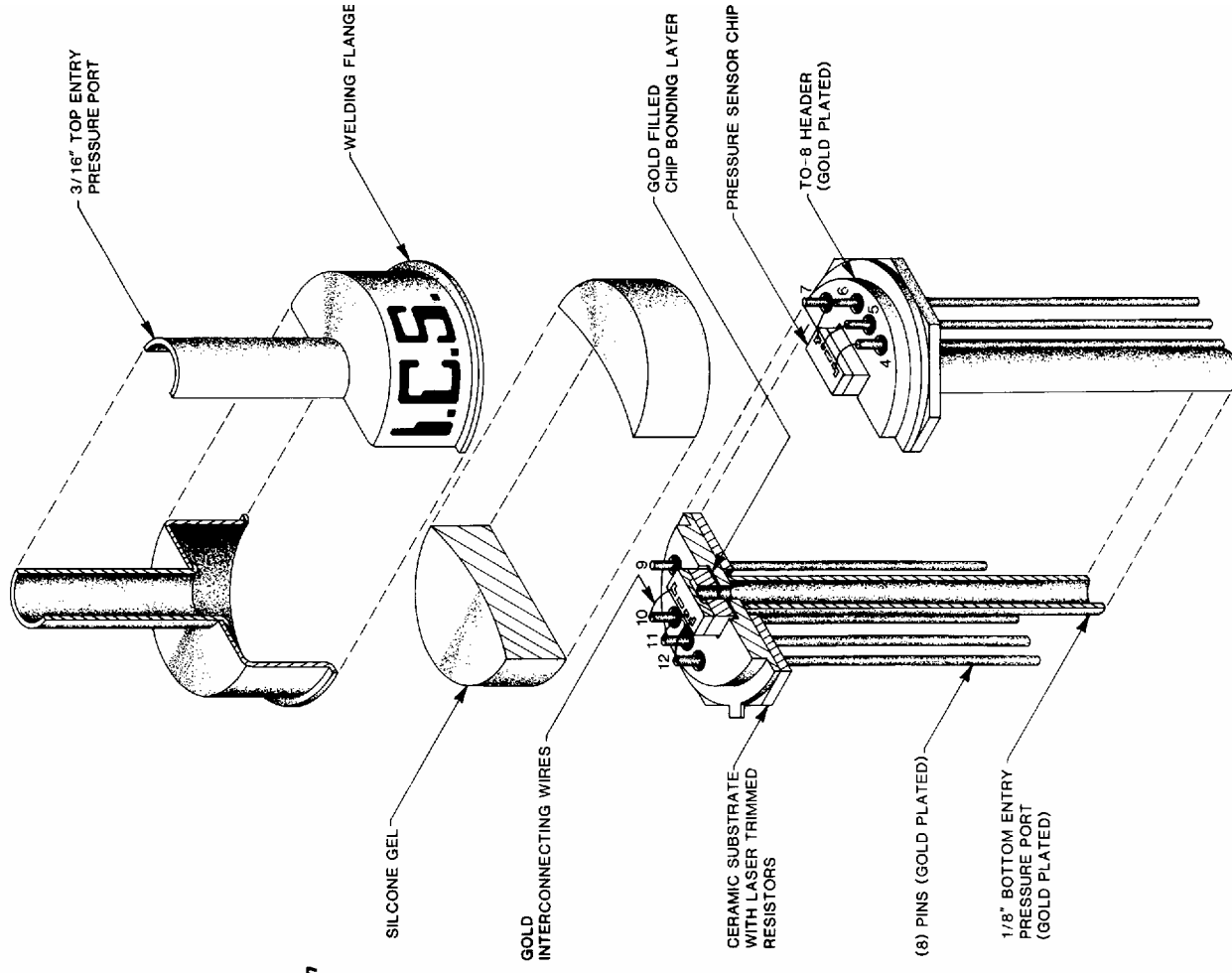
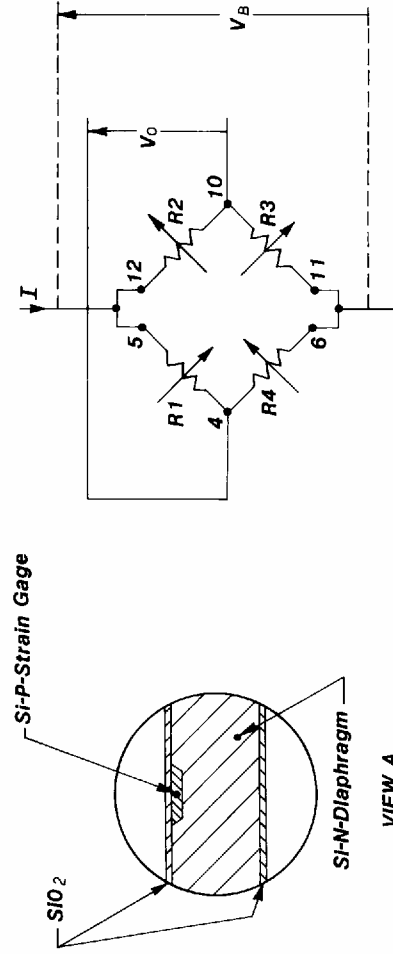
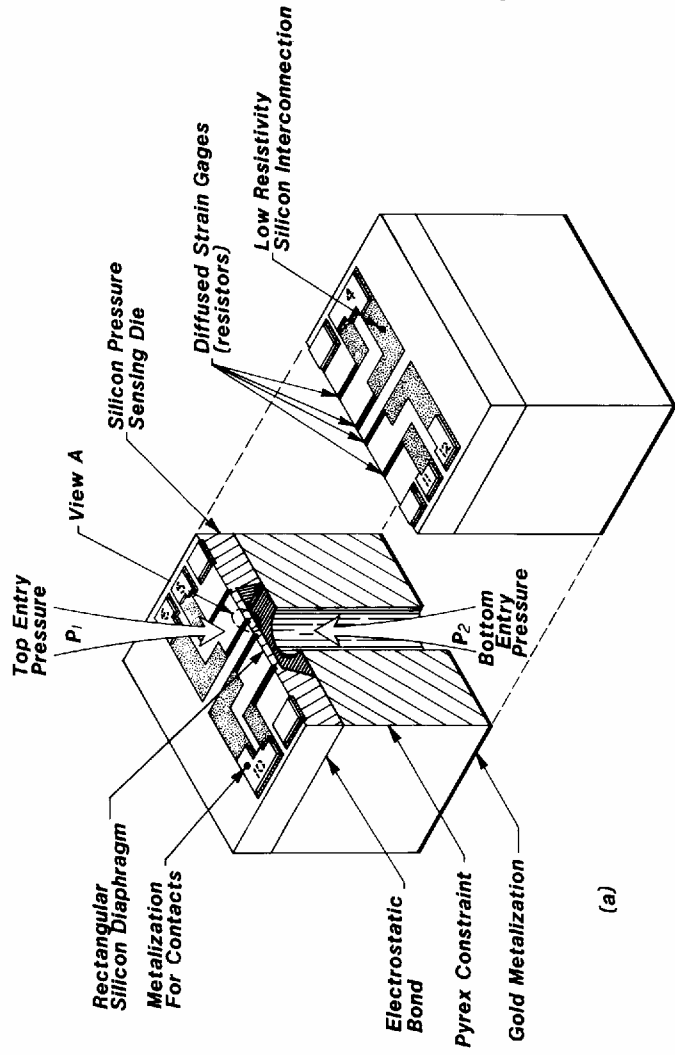
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PRESSURE SENSOR DIE

TO-8 SERIES PACKAGE MODEL 33