

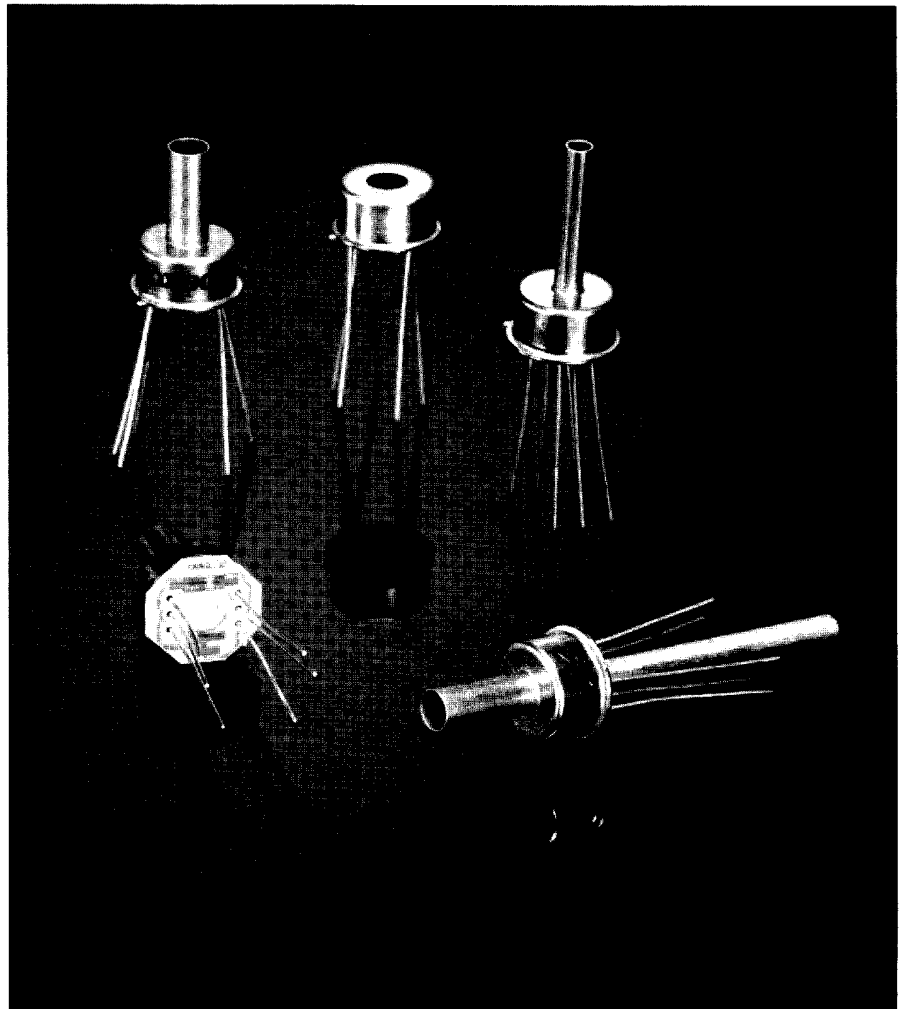
FOXBORO/ICT

FULL RANGE TO-8
PRESSURE TRANSDUCER

MODEL 1800

Features

- TO-8 printed circuit mounted pressure sensor
- Choice of A, B or C accuracy grades
- Gage, absolute or differential configurations
- Choice of output options:
Span calibration to within $\pm 2\text{mV}$ (Normalized Output Option)
- Constant current or voltage excitation
- Choice of temperature compensation options:
Laser Trim with normalized output
Laser Trim with standard output
Resistor Trim
- 1-year warranty



The model 1800 is a high performance, TO-8 pressure transducer specifically designed to address both low and high pressure OEM applications. The transducer offers three performance grades and a variety of compensation options, including span calibration to within $\pm 2\text{mV}$ (normalized output). The 1800 may be specified to operate from either a constant current or voltage supply.

The Model 1800 is a solid state piezoresistive pressure transducer mounted in a standard TO-8 package compatible with printed circuit board mounting. The 1800 is, pin for pin, compatible with other TO-8 pressure transducers.

The 1800 utilizes a piezoresistive silicon element. Resistors are implanted over the diaphragm in the silicon element and connected to form a Wheatstone bridge. The diaphragm is formed by etching the silicon below the resistors. As pressure is applied to the diaphragm, the resistors change in value and produce a linear output signal proportional to the applied pressure. The output of the 1800 can be easily amplified or signal-conditioned as required by the customer.

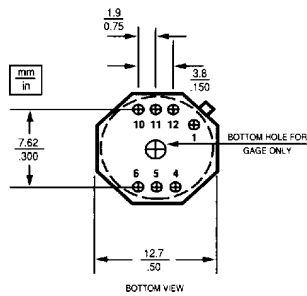
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Applications

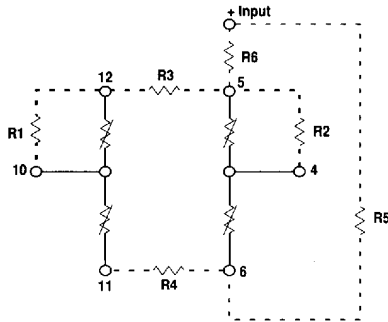
- Pressure-calibration instruments
- Avionics
- Medical Equipment:
 - Blood Pressure
 - Ventilation Systems
 - Anesthesia Monitors
- Automotive
- Pneumatic controls

Electrical Connection



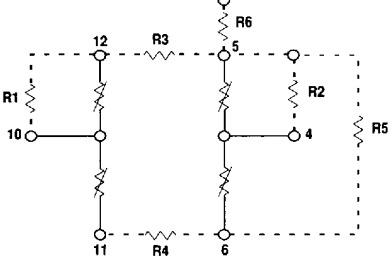
Pin 1 only on laser trim board

Current Excitation



1. Normalized output shown
2. R6 shorted for standard output

Voltage Excitation



1. Normalized output shown
2. R5 open for standard output

The Model 1800 Full Range Pressure Transducer

The Model 1800 is a wide range TO-8 sensor designed to complement the standard TO-8 product line. The 1800 is available with either constant voltage or current excitation. There are four major output and temperature compensation choices available with the 1800:

1. Integral laser trim ceramic board which provides zero and temperature correction (standard output).
2. Integral laser trim ceramic board which provides zero and span correction to within $\pm 2\text{mV}$ (normalized output), as well as temperature correction
3. Discrete compensation resistors to provide zero and temperature correction (includes data printout of resistor values).
4. Data printout only of compensation resistor values.

The 1800 is available in three accuracy grades (see Performance Specs.).

Compensation Choices

For maximum convenience, the 1800 is fully temperature compensated over the range of 30° - 130°F.

Laser Trim Compensation

Optional laser trim compensation is accomplished using Foxboro/ICT's in-house laser trim facilities for tighter product performance control and improved ability to respond to customer order requirements.

Normalized Output Option

For those users wishing the maximum in design convenience and sensor span interchangeability, the Model 1800 may be purchased with a normalized output (100 mVdc, $\pm 2\text{mVdc}$ in most applications).

Resistors

For those users wishing the convenience of receiving more complete compensation tools, the standard 1800 has temperature compensation, zero offset resistors, and a data readout for each individual sensor.

Data

To accelerate the temperature compensation task, the 1800 option set includes data-only printouts of pressure and calibration runs performed on each individually serialized sensor. This allows users with custom compensation requirements to enter data individually for each sensor into their system.

Applications

A wide variety of applications exists in medical products, pressure calibration instruments, avionics, pneumatic and automotive requirements for both low range and full range TO-8 pressure sensors.

High Volume Delivery By Design

For fast delivery, the 1800 is designed around a metal header that reduces product cost, retains the traditional high performance of Foxboro/ICT pressure sensors, and allows the basic product to be stocked by pressure range.

The 1800 is assembled and fully tested for accuracy and temperature compensation resistor values. Once ordered, the product is assembled and quickly delivered per customer requirements.

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Performance Specifications

GRADE

TEMPERATURE COMPENSATED PERFORMANCE	A		B		C		UNITS
	Max	Min	Max	Min	Max	Min	
● REFERENCE ACCURACY (L+H+R)	0.05		0.125		0.25		±% of Span, BFSL
● OUTPUT							
Standard Output-Current Excitation:	150	75	150	75	150	75	mVdc
Standard Output-Voltage Excitation:	75	40	75	40	75	40	mVdc
Normalized Output-Current Excitation:	100±2		100±2		100±2		mVdc
Normalized Output-Voltage Excitation:	40±2		40±2		40±2		mVdc
Zero pressure output	±2		±2		±2		mVdc
● TEMPERATURE							
Maximum Zero Temperature Error:	0.5		1		1		±% of Span in Reference to 27° C
Maximum Span Temperature Error:	0.5		1		1		±% of Span in Reference to 27° C
Temperature Compensated Range	+30 to +130° F (-1 to + 54° C)						
Operating Temperature Range	-40 to +250° F (-40 to + 121° C)						
Ambient Temperature	-40 to +250° F (-40 to + 121° C)						
● LONG-TERM STABILITY	0.2		0.2		0.2		±% of Span per 6 months

Note: Accuracy specifications will be degraded on bottom side.

Electrical Specifications

Input excitation-Current:	≤ 2.0mA
Voltage excitation-Voltage:	≤ 15Vdc
Electrical connections:	Standard TO-8, 6-pin PCB gold plated brass pins 0.018" dia X 0.88" long
Output Common mode voltage:	50% of input, typical
Input impedance - Current:	2KΩ min. - 8KΩ max.
Output impedance - Current:	3.5KΩ min. - 6KΩ max.
Input impedance - Voltage:	8KΩ min. - 40KΩ max.
Output impedance - Voltage:	3.5KΩ min. - 6K max.
Response time (10% to 90%):	≤ 1 millisecond
Insulation resistance:	100MΩ at 50 Vdc

Physical Specifications

Pressure Overrange Protection	
Top side:	2X Full scale pressure or ≤ 200 PSI*
Bottom side:	2X Full scale pressure or ≤ 50 PSI* (whichever is less)
Materials of construction	
Sensor header:	Gold plated Kovar
Sensor:	Gold, Aluminum, Silicon, Pyrex
Interconnection pins:	Gold plated Brass
Internal wetted parts	
Top:	Nickel, Silicon, Gold
Bottom:	Nickel, Silicon, RTV
Mass:	3 grams (0.11 oz)

Environmental Conditions

Position Effect:	≤ 0.05% of Span Zero shift for 90° tilt in any direction
Vibration:	No change at 10 Gs RMS, 20 to 2000 Hz
Shock:	Will withstand 100 Gs for 11 milliseconds
Life:	100 million cycles
Media Compatibility	
Top:	Non-conductive, non-corrosive liquids and gases compatible with Nickel and Silicon gel.
Bottom:	Liquids and gases compatible with Silicon, Pyrex, RTV, and Steel

Reference Specifications

Media temperature:	27° ± 1° C (80° ± 2° F)
Ambient temperature:	27° ± 1° C (80° ± 2° F)
Vibration:	0.1G (1m/s/s) max
Humidity:	50% ± 10%
Ambient pressure:	12.5 to 15.4 PSI (860 to 1060mBar)
Excitation source:	1.5 ± 0.0015 mA or 10 ± 0.01 Vdc

External Connections

Positive Pressure on Top Side

Current Excitation - Standard Output:

Discrete Resistor		Laser Trim Board	
Pin	Connection	Pin	Connection
4	+ Output	4	+ Output
5	+ Input	5	+ Input
6	- Input	6	- Input
10	- Output	10	- Output
11	NC	11	NC
12	NC	12	NC

Voltage Excitation - Standard Output:

Discrete Resistor		Laser Trim Board	
Pin	Connection	Pin	Connection
4	+ Output	4	+ Output
R6	+ Input	5	NC
6	- Input	6	- Input
10	- Output	10	- Output
11	NC	11	NC
12	NC	12	NC
		1	+ Input

Current or Voltage Excitation - Normalized Output:

Laser Trim Board

Pin	Connection
4	+ Output
5	NC
6	- Input
10	- Output
11	NC
12	NC
1	+ Input

Positive Pressure on Bottom Side

Current Excitation - Standard Output:

Discrete Resistor		Laser Trim Board	
Pin	Connection	Pin	Connection
4	- Output	4	- Output
5	+ Input	5	+ Input
6	- Input	6	- Input
10	+ Output	10	+ Output
11	NC	11	NC
12	NC	12	NC

Voltage Excitation - Standard Output:

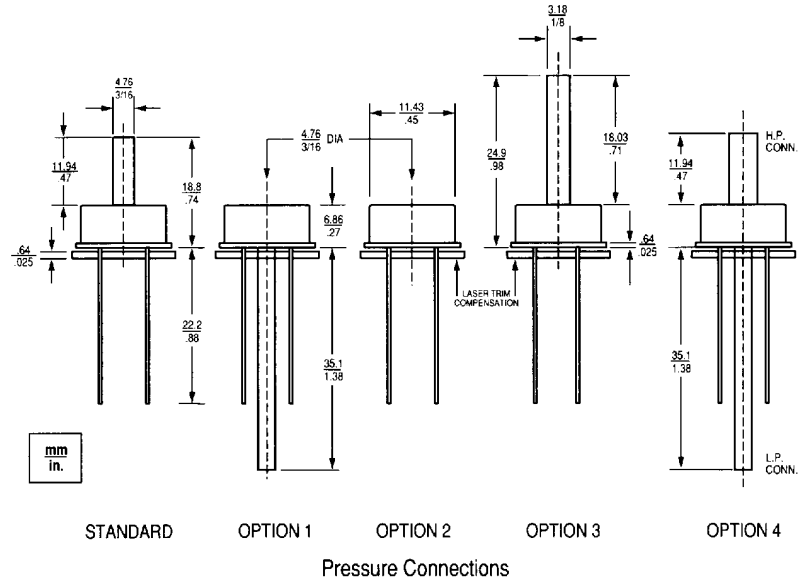
Discrete Resistor		Laser Trim Board	
Pin	Connection	Pin	Connection
4	- Output	4	- Output
R6	+ Input	5	NC
6	- Input	6	- Input
10	+ Output	10	+ Output
11	NC	11	NC
12	NC	12	NC
		1	+ Input

Current or Voltage Excitation - Normalized Output:

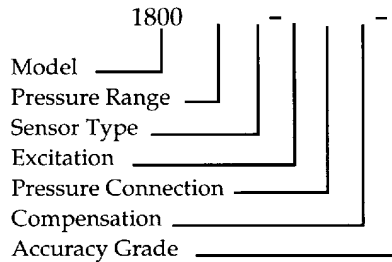
Laser Trim Board

Pin	Connection
4	- Output
5	NC
6	- Input
10	+ Output
11	NC
12	NC
1	+ Input

The 1800 Pressure Transducer



Ordering Information



Pressure Connection

	TOP	BOTTOM
0	3/16" tube	none
1	3/16" hole	1/8" tube
2	3/16" hole	none
3	1/8" tube	none
4	3/16" tube	1/8" tube

Temperature and Span Compensation

M = Computer printout of resistor values
 R = Computer printout of resistor values and resistors
 L = Laser trimmed, standard output
 N = Laser trimmed, normalized output

Accuracy Grade

A = 0.05% BFSL (±0.1% TBNL)
 B = 0.125% BFSL (±0.25% TBNL)
 C = 0.25% BFSL (±0.5% TBNL)

*TBNL (Terminal-Based Non-Linearity)
 BFSL (Best-Fit-Straight-Line)

Pressure Range

- 02 = 0-10 PSI
- 03 = 0-15 PSI
- 05 = 0-25 PSI
- 07 = 0-30 PSI
- 08 = 0-50 PSI
- 09 = 0-100 PSI (G,A only)
- 10 = 0-150 PSI (G only)

Sensor Types

- G = Gage Pressure
- A = Absolute Pressure
- D = Differential Pressure

Power Supply Compatibility

- L = 1.5 mA ± 1.5 uA
- K = 10 Vdc ± 10mVdc



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