Piezoresistive pressure transducer
Model 8510B -200, -500, -2000

Model 8510B is a rugged, miniature, high sensitivity piezoresistive pressure transducer. It has a 10-32 mounting thread, 0.15 inch (3.8 mm) face diameter and is available in ranges from 1 psi to 2000 psi. High pressure ranges are shown on this sheet. Its high sensitivity combined with high resonance makes it ideal for measuring dynamic pressure.

Endevco pressure transducers feature a four-active arm strain gage bridge diffused into a unique sculptured silicon diaphragm for maximum sensitivity and wideband frequency response. Self-contained hybrid temperature compensation provides stable performance over the temperature range of 0°F to 200°F (-18°C to +93°C). Endevco transducers also feature excellent linearity (even to 3X range), high shock resistance, and negligible sensitivity to temperature transients.

8510B is designed for a wide variety of aerospace, automotive and industrial measurements which require a combination of small size, high sensitivity, and wideband frequency response. Its vent tube may be connected to a standard reference manifold or used for differential pressure measurements.

Recommended electronics for signal conditioning and power supply are ultra low noise 4430A conditioner, or the 4990A-X (Oasis) multi-channel rack mount system.
## Specifications

The following performance specifications conform to ISA-RP-37.2 [1964] and are typical values, referenced at +75°F (+24°C) and 100 Hz, unless otherwise noted. Calibration data, traceable to National Institute of Standards and Technology (NIST), is supplied.

### Dynamic characteristics

<table>
<thead>
<tr>
<th>Units</th>
<th>-200</th>
<th>-500</th>
<th>-2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range [1]</td>
<td>psig</td>
<td>0–200</td>
<td>0–500</td>
</tr>
<tr>
<td>Positive sensitivity [2]</td>
<td>mV/psi</td>
<td>1.5 ±0.5</td>
<td>0.6 ±0.2</td>
</tr>
<tr>
<td>Combined: non-linearity, non-repeatability, pressure hysteresis [3]</td>
<td>% FSO R5S max</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>Non-linearity, independent</td>
<td>% FSO typ</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Non-repeatability</td>
<td>% FSO typ</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Pressure hysteresis</td>
<td>% FSO typ</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Zero measurand output [4]</td>
<td>mV max</td>
<td>±10</td>
<td>±10</td>
</tr>
<tr>
<td>Zero shift after 3X range</td>
<td>±% 3X FSO max</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Thermal zero shift from 0°F to +200°F (-18°C to +93°C)</td>
<td>±% FSO max</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Thermal sensitivity shift from 0°F and +200°F [-18°C to +93°C]</td>
<td>±% max</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Resonance frequency</td>
<td>Hz</td>
<td>320 000</td>
<td>500 000</td>
</tr>
<tr>
<td>Non-linearity at 3X range</td>
<td>% 3X FSO</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Thermal transient response per ISA-S37.10, para. 6.7, procedure I</td>
<td>psi/F</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Photoflash response [5]</td>
<td>psi/C</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Warm-up time [6]</td>
<td>ms</td>
<td>28</td>
<td>70</td>
</tr>
<tr>
<td>Acceleration sensitivity</td>
<td>psi/g</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Burst pressure (diaphragm/reference side) [7]</td>
<td>psi min</td>
<td>1000/300</td>
<td>2500/300</td>
</tr>
</tbody>
</table>

### Electrical

- Full scale output: 300 ±100 mV at 10.0 Vdc
- Supply voltage [8]: 10.0 Vdc standard, 18.0 Vdc maximum
- Electrical configuration: Active four-arm piezoresistive bridge
- Polarity: Positive output for increasing pressure into (+) port (end with screen on it)
- Resistance
  - Input: 2000 ±800 ohms
  - Output: 1600 ±600 ohms
- Isolation: 100 megohms minimum at 50 volts; leads to case, leads to shield, shield to case
- Noise: 5 microvolts rms typical, dc to 50 000 Hz; 50 microvolts rms maximum, dc to 50 000 Hz

### Mechanical

- Case material: Stainless steel [17-4 PH CRES]
- Cable, integral: 4 conductor No. 32 AWG Teflon® insulated leads, braided shield, silicone jacket, 30 ±3 in [760 ±76 mm]
- Dead volume (+) port: 0.0003 cubic inches [0.005 cc]
- Mounting torque: 10–32 UNF-2A threaded case 0.438 inch [11.12 mm] long/15 ±5 lbf-in [1.7 ±0.6 Nm]
- Weight: 2.3 grams (cable weighs 9 grams/meter)

### Environmental characteristics

- Temperature [9] [10]: -65°F to +250°F [-54°C to +121°C]
- Vibration: 1000 g pk
- Acceleration: 1000 g
- Shock: 20 000 g, 100 microsecond haversine pulse
- Humidity: Isolation resistance greater than 100 megohms at 50 volts when tested per MIL-STD-202E, method 103B, test condition B

### Calibration data supplied

Data supplied for all parameters in Certified Performance section. Optional calibrations available for all parameters in Typical Performance section.
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Accessories

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>8510B</th>
</tr>
</thead>
<tbody>
<tr>
<td>EHR93</td>
<td>O-ring, Viton</td>
<td>Included</td>
</tr>
<tr>
<td>EHR96</td>
<td>O-ring, fluoro silicone</td>
<td>Optional</td>
</tr>
<tr>
<td>24328-3</td>
<td>4 conductor shielded cable, white</td>
<td>Optional</td>
</tr>
</tbody>
</table>

Notes

1. Pressure ranges can be considered bidirectional, e.g., an 8510B-200 can be used to measure + or -200 psig. Sensitivity in the positive direction is typically within 1% of sensitivity in the negative direction. Sensitivity calibration provided with each unit is for the positive direction.
2. 1 psi = 6.895 kPa = 0.069 bar.
3. FSO (Full Scale Output) is defined as transducer output from 0 to full scale pressure, which is nominally 300 mV.
4. Zero Measurand Output (ZMO) is the transducer output with 0 psig applied.
5. Per ISA-S37.10, Para. 6.7, Proc. II. The metal screen partially shields the silicon diaphragm from incident radiation. Accordingly, light incident at acute angles to the screen generally increases the error by a factor of 2 or 3.
6. Warm-up time is defined as elapsed time from excitation voltage "turn on" until the transducer output is within ±1% of reading accuracy.
7. Reference side pressure may be 300 psi on all ranges if differential limits [psid] are not exceeded.
8. Please specify the excitation voltage you will use and we will calibrate at that voltage for highest accuracy. See model definition.
9. Internal seals are epoxy and are compatible with clean dry gas media. Media in (+) measurand port is exposed to CR5, nickel-iron alloy, Parylene C, epoxy, and the Viton® O-ring media in (-) measurand port is exposed to the above and RTV silicone coating. For use in water or corrosive media, contact the factory for modifications and installation precautions which may be taken to extend service life.
10. O-Ring, Endevco part number EHR93 Viton®, is supplied unless otherwise specified on Purchase Order. Part number EHR96, Parker material L677-70, for leak tight operation below 0°F (-18°C) is available on special order.
11. Maintain high levels of precision and accuracy using Endevco’s factory calibration services. Call Endevco’s inside sales force at 866-ENDEVCO for recommended intervals, pricing and turn-around time for these services as well as for quotations on our standard products.

Model definition

- **Excitation voltage** (if no voltage is specified the default is 10 Vdc)
  - A=2 Vdc, B=2.5 Vdc, C=3.3 Vdc, D=5 Vdc, E=7, F=7.5
- **Cable length** (if no dash number is specified the default is 30 inches)
  - For lengths ≤ 10 ft specify 1 ft increments (12", 24"...120")
  - For lengths ≤ 10 ft specify 5 ft increments (18", 24"...etc)
- **Pressure range** (psig)
  - -200, -500, -2000

Basic model number

Other options

- M1 No vent tube
- M5 Metric thread
- M7 No screen
- M8 "A" screen, black grease - ITAR
- M11 "B" screen
- M37 Integral connector, no vent tube, hole on side
- M41 Gel
- M42 "B" screen, black grease - ITAR

Continued product improvement necessitates that Endevco reserve the right to modify these specifications without notice. Endevco maintains a program of constant surveillance over all products to ensure a high level of reliability. This program includes attention to reliability factors during product design, the support of stringent Quality Control requirements, and compulsory corrective action procedures. These measures, together with conservative specifications have made the name Endevco synonymous with reliability. 082219