Piezoresistive Pressure Transducer

ENDEVCO MODEL 8540

Model 8540-15, -50, -100, -200, and -500

- 15 to 500 psia
- 300 mV Full Scale
- High Temperature, +500°F (+260°C)
- Absolute Reference



Actual size

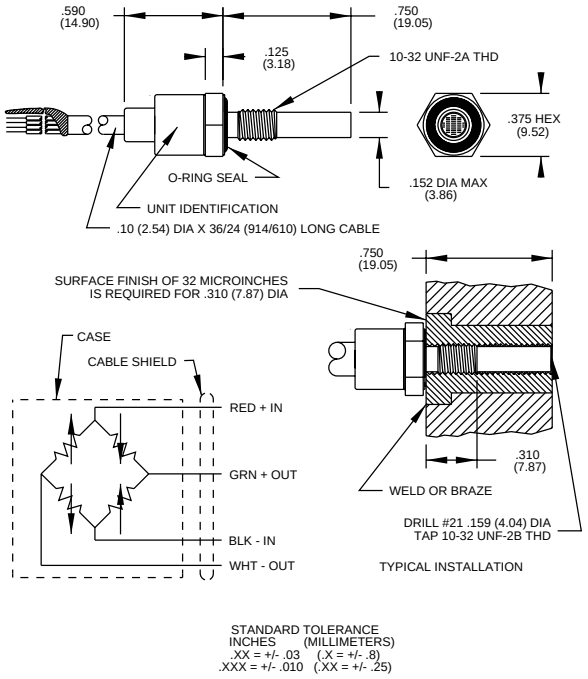
DESCRIPTION

The ENDEVCO® Model 8540 is a rugged, miniature, high sensitivity piezoresistive absolute pressure transducer. The transducer has a 0.15 inch (3.8 mm) face diameter and is available in ranges from 15 to 500 psia. The Model 8540 features high temperature performance to +500°F (+260°C) and can operate with diminished lifetime to +600°F (+316°C). Its excellent linearity combined with very high resonance makes it ideal for measuring dynamic pressure.

The transducer employs silicon strain gages bonded to a micro-machined silicon diaphragm for maximum sensitivity and wide frequency response. Internal sensitivity compensation and zero trim provides accuracy to +500°F (+260°C). This transducer exhibits low photoflash sensitivity and high stability during temperature transients.

The Model 8540 is designed to measure static or dynamic pressures. Its small diameter suits it to flush mounting for measuring skin pressures on aircraft, inlet distortion pressures in turbine engines or transmission pressures in automobiles. The transducer's high frequency response permits use on small scale models in wind tunnels.

ENDEVCO Model 136 Three-Channel System, Model 4430A Signal Conditioner, or Model 68207 BCAS™ Computer Controlled Systems are recommended as signal conditioner and power supply.



SPECIFICATIONS

CERTIFIED PERFORMANCE: All specifications assume +75°F (+24°C) and 10 Vdc excitation unless otherwise stated. The following parameters are 100% tested. Calibration data, traceable to the National Institute of Standards and Technology (NIST), is supplied.

	Units	8540-15	-50	-100	-200	-500
RANGE [1]	psia	0 - 15	0 - 50	0 - 100	0 - 200	0 - 500
SENSITIVITY [1]	mV/psi	20 +10/-6.7	6 +3/-2	3 +1.5/-1.0	1.5 +0.75/-0.5	0.6 +0.3/-0.2
COMBINED: NON-LINEARITY, NON-REPEATABILITY, PRESSURE HYSTERESIS [2]	% FSO RSS Max	0.50	0.50	0.50	0.75	0.75
Non-Linearity, Independent	% FSO Typ	0.25	0.25	0.25	0.4	0.4
Non-Repeatability	% FSO Typ	0.1	0.1	0.1	0.1	0.1
Pressure Hysteresis	% FSO Typ	0.1	0.1	0.1	0.1	0.1
ZERO MEASURAND OUTPUT [3]	mV Max	±10	±10	±10	±10	±10
ZERO SHIFT AFTER 2X RANGE	±% 2X FSO Max	0.2	0.2	0.2	0.2	0.2
	(Typ)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
THERMAL ZERO SHIFT From -30°F to +500°F (-34°C to +260°C)	±% FSO Max	3	3	3	3	3
THERMAL SENSITIVITY SHIFT From -30°F to +500°F (-34°C to +260°C)	±% Max	4	4	4	4	4

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SPECIFICATIONS—continued

TYPICAL PERFORMANCE CHARACTERISTICS: The following parameters are established from testing of sample units.

	Units	8540-15	-50	-100	-200	-500
RESONANCE FREQUENCY	Hz	140 000	240 000	350 000	450 000	900 000
NON-LINEARITY AT 2X RANGE	% 2X FSO	0.5	1.0	1.0	1.0	1.0
ZERO SHIFT WITH MOUNTING TORQUE 15 lbf-in (1.7 Nm)	% FSO	0.25	0.25	0.25	0.25	0.25
THERMAL TRANSIENT RESPONSE PER	psi/°F	0.002	0.004	0.005	0.006	0.006
ISA-S37.10, PARA. 6.7 PROCEDURE I [4]	psi/°C	0.004	0.007	0.009	0.011	0.011
PHOTOFLASH RESPONSE [5]	Equiv. psi	0.1	0.2	0.3	0.5	1.0
WARM-UP TIME [6]	ms	1	1	1	1	1
ACCELERATION SENSITIVITY	Equiv.psi/g	0.0004	0.0003	0.0003	0.0007	0.0010
BURST PRESSURE (Diaphragm)	psia Min	30	100	200	400	1000

ELECTRICAL

FULL SCALE OUTPUT	300 +150/-100 mV at 10.0 Vdc
SUPPLY VOLTAGE [7]	10.0 Vdc recommended, 18 Vdc maximum
ELECTRICAL CONFIGURATION	Active four-arm piezoresistive bridge
POLARITY	Positive output for increasing pressure
RESISTANCE	
Input	1600 ±900 ohms
Output	800 ±500 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	Four conductor No. 30 AWG Kapton® insulated leads, braided shield, Teflon® jacket, 30 ±6 inches (760 ±150 mm)
DEAD VOLUME (+) PORT	0.0003 cubic inches (0.005 cc)
MOUNTING/TORQUE	10-32 UNF-2A threaded case 0.75 inch (19.05mm) long/15 ±5 lbf-in (1.7±0.6 N.m)
WEIGHT	8.5 grams (cable weighs 14 grams/meter)

ENVIRONMENTAL

MEDIA	Media in measurand port is exposed to stainless steel case, silicon diaphragm, ceramic, epoxy, RTV and fluorosilicone 0-ring. The measurand port can be exposed to water for weeks without damage.
TEMPERATURE [8]	-65°F to +500°F (-54°C to +260°C)
VIBRATION/ACCELERATION	300 g
SHOCK	10 000 g, 100 microsecond haversine pulse

CALIBRATION DATA

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

ACCESSORY

EHR97 O-RING, FLUOROSILICONE

OPTIONAL ACCESSORY

25045 4 CONDUCTOR SHIELDED CABLE

NOTES

1. 1 psi = 6.895 kPa = 0.069 bar.
2. FSO (Full Scale Output) is defined as transducer output from 0 psia to + full scale pressure.
3. Zero Measurand Output (ZMO) is the transducer output with 0 psia applied.
4. Significant higher thermal transient errors occur if the excitation voltage exceeds 10 Vdc. For sensitive phase change studies, many users reduce the excitation to 5 Vdc or even 1 Vdc.
5. Per ISA-S37.10, Paragraph 6.7, Procedure 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. Use of excitation voltages other than 10.0 Vdc requires manufacture and calibration at that voltage since thermal errors increase with high excitation voltages.
8. The 8540 can be operated at 500°F (260°C) continuously, at 550°F (288°C) for up to 24 hours and at 600°F (316°C) for up to 4 hours.

NOTE: Tighter specifications are available on special order.

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.

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