

Variable Capacitance Accelerometer

**ENDEVCO
MODEL
7290A**



Model 7290A

- DC Response
- 2 to 100 g Full Scale
- Motion, Low Frequency, Tilt
- Gas Damping
- 10Kg Shock Survivability



Actual size

DESCRIPTION

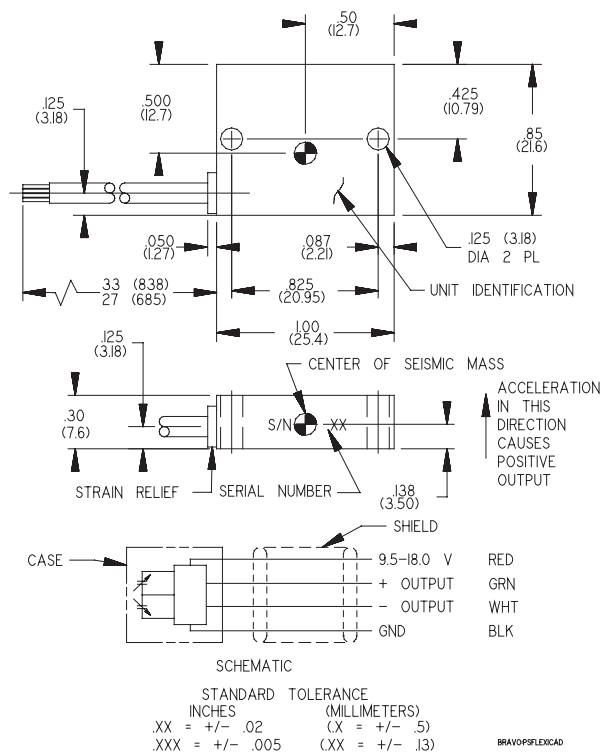
The ENDEVCO® Model 7290A MICROTRON® accelerometer family utilizes unique variable capacitance microsensors. The accelerometers are designed for measurement of relatively low level accelerations in aerospace and automotive environments. Typical applications require measurement of whole body motion immediately after the accelerometer is subjected to a shock motion, and in the presence of severe vibrational inputs.

Gas damping and internal overrange stops enable the anisotropically-etched silicon microsensors to withstand high shock and acceleration loads.

The Model 7290A can operate from 9.5V to 18.0V and provide a high level, low impedance output. The ± 2 volt differential output is dc coupled at a dc bias of approximately 3.6V. Frequency response is controlled by the near-critically damped sensors. The use of gas damping results in very small thermally-induced changes of frequency response.

ENDEVCO Model 136 Three-Channel System, Model 4430A or OASIS 2000 Computer-Controlled System are recommended as signal conditioner and power supply.

U.S. Patents 4,574,327, 4,609,968 and 4,999,735



SPECIFICATIONS

PERFORMANCE CHARACTERISTICS: All values are typical at +75°F (+24°C), 100 Hz and 15 Vdc excitation unless otherwise stated. Calibration data, traceable to the National Institute of Standards, (NIST), is supplied.

	Units	7290A-2	-10	-30	-50	-100
RANGE [1]	g pk	± 2	± 10	± 30	± 50	± 100
SENSITIVITY (at 100 Hz) [2] [3]	mV/g	1000 ± 20	200 ± 10	66 ± 4	40 ± 2	20 ± 1
AMPLITUDE RESPONSE [4]						
$\pm 5\%$	Hz	0 to 15	0 to 500	0 to 800	0 to 1000	0 to 1000
MOUNTED RESONANCE FREQUENCY	Hz	1300	3000	5500	5500	6000
NON-LINEARITY AND HYSTERESIS [5]	% FSO Typ	± 0.20	± 0.20	± 0.20	± 0.20	± 1
	% FSO (Max)	± 0.50	± 0.50	± 0.50	± 0.50	± 2
TRANSVERSE SENSITIVITY [6]	% Max	2	2	2	2	2
ZERO MEASURAND OUTPUT [3]	mV Max	± 50	± 50	± 50	± 50	± 50
DAMPING RATIO		4.5	0.7	0.7	0.6	0.6
DAMPING RATIO CHANGE	%/°F	+0.04	+0.04	+0.04	+0.04	+0.04
From -65°F to +250°F (-55°C to +121°C)	%/°C	+0.08	+0.08	+0.08	+0.08	+0.08



APPLIES TO CALIFORNIA FACILITY



Variable Capacitance Accelerometer

SPECIFICATIONS—continued

PERFORMANCE CHARACTERISTICS—continued

	Units	7290A-2	-10	-30	-50	-100
THERMAL ZERO SHIFT						
From 32°F to 122°F (0°C to 50°C)	% FSO Max	±1.0	±1.0	±1.0	±1.0	±1.0
From -13°F to +167°F (-25°C to +75°C)	% FSO Max	±2.0	±2.0	±2.0	±2.0	±2.0
THERMAL SENSITIVITY SHIFT						
From 32°F to 122°F (0°C to +50°C)	% Max	±2.0	±2.0	±2.0	±2.0	±2.0
From -13°F to +167°F (-25°C to +75°C)	% Max	±3.0	±3.0	±3.0	±3.0	±3.0
THERMAL TRANSIENT ERROR						
PER ISA RP 37.2	Equiv. g/°F	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
	Equiv. g/°C	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
OVERRRANGE (Determined by Electrical clipping or Mechanical stops, whichever is smaller.)						
Electrical clipping	g	-3.5/+3.8	-18/+19	-53/+57	-87/+95	-175/+190
Mechanical stops, typical/minimum	g	±4	±30	±90	±90	±150
Recovery Time	µs	< 10	< 10	< 10	< 10	< 10
THRESHOLD (RESOLUTION) [7]	Equiv. g's	0.0005	0.0025	0.008	0.012	0.025
BASE STRAIN SENSITIVITY, MAX [8]	Equiv. g	0.01	0.01	0.01	0.01	0.01
MAGNETIC SUSCEPTIBILITY [9]	Equiv. g	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
WARM-UP TIME (to within 1%)	ms	10	10	10	10	10

ELECTRICAL

EXCITATION [3]	9.5 to 18.0 Vdc, 20 Vdc maximum without damage; excitation voltage can be applied to any lead without damage
CURRENT DRAIN [10]	8.5 mA Typ, 10 mA Max
OUTPUT IMPEDANCE/LOAD	500 ohms max/10K ohms resistance minimum, 0.1 µF capacitance maximum
RESIDUAL NOISE	100 µV rms typ, 0.5 to 100 Hz. 500 µV rms typ, 0.5 Hz to 10 KHz

PHYSICAL

CASE, MATERIAL	Anodized aluminum alloy
ELECTRICAL, CONNECTIONS	Integral cable, four conductor No. 28 AWG, Teflon® insulated leads, braided shield, Hyperflex™ jacket
IDENTIFICATION	Manufacturer's logo, model number and serial number
MOUNTING/TORQUE	Holes for two 4-40 or M3 mounting screws/6 lbf-in (0.68 Nm)
WEIGHT	10 grams (cable weighs 9 grams/meter)

ENVIRONMENTAL

ACCELERATION LIMITS (in any direction)	
Static	20 000 g
Sinusoidal/Random Vibration	100 g pk, 20 - 2000 Hz/40 g rms, 20 - 2000 Hz
Shock (half-sine pulse)	5000 g, 150 µsec or longer for the -2 and -10; 10 000 g, 80 µsec or longer for the -30, -50 and -100
Zero Shift	0.1% FSO typical at 5000 g
TEMPERATURE	
Operating	-65°F to +250°F (-55°C to +121°C)
Storage	-100°F to +300°F (-73°C to +150°C)
HUMIDITY/ALTITUDE	Unaffected. Unit is epoxy sealed. Hybrid and sensor are hermetically sealed/Unaffected
ESD SENSITIVITY	Unit meets Class 3 requirements of MIL-STD-883

CALIBRATION DATA SUPPLIED

SENSITIVITY	mV/g with 15 Vdc excitation
(at 1g and 5 Hz for 7290A-2)	
(at 10g and 100 Hz for 7290A-10,-30,-50, and -100)	
FREQUENCY RESPONSE	1 to 100 Hz for 7290A-2, 20 to 10,000 Hz for all other ranges
ZERO MEASURAND OUTPUT	mV
MAXIMUM TRANSVERSE SENSITIVITY	% of sensitivity

ACCESSORIES

EHW265	(2) SIZE 4, FLAT WASHERS
EH409	(2) 4-40 X 3/8 INCH CAP SCREWS
EHM464	(1) HEX WRENCH

OPTIONAL ACCESSORIES

24328	4 CONDUCTOR SHIELDED CABLE
7990	TRIAxIAL MOUNTING BLOCK

NOTES

- Customized range, 7290A-XX, available on special order. FSO is nominally 4 volts. Combined non-linearity and hysteresis is typically ±1% FSO and ±2% FSO, maximum.
- Reference frequency is 20 Hz on the 2 g range.
- Over the excitation range 9.5 to 18.0 Vdc. Sensitivity changes +0.1%/V typical and zero measurand output changes -0.5 mV/V typical.
- Extended frequency response available on special order to extend to 0-900 Hz for 7290A-10, 0-1500 Hz for 7290A-30, and 0-2000 Hz for 7290A-100.
- Full scale output (FSO) is nominally 4 volts.
- 1% is typical. 1% maximum available on special order.
- THRESHOLD = $\frac{\text{MAX. RESIDUAL NOISE; 0.5 TO 100 Hz}}{\text{SENSITIVITY}}$
- Per ISA 37.2 at 250 Microstrain.
- At 100 Gauss, 60 Hz.
- Current drain increases slightly with increasing excitation; typical change is +.06 mA per volt from 9.5 to 18.0 Vdc.
- Maintain high levels of precision and accuracy using Endevco's factory calibration services. Call Endevco's inside sales force at 800-982-6732 for recommended intervals, pricing and turn-around time for these services as well as for quotations on our standard products.

NOTE: Tighter specifications 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.