Variable Capacitance Accelerometer

ENDEVCO MODEL 7290A

Model 7290A

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

Actual size

DESCRIPTION

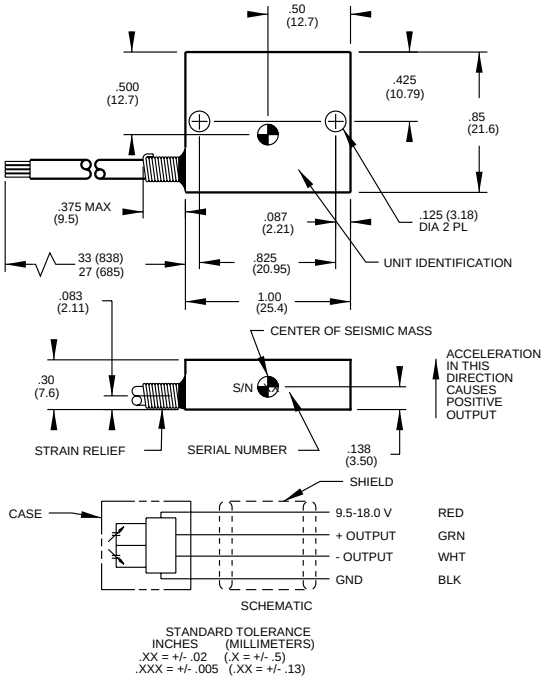
The ENDEVCO® Model 7290A MICROTRON® accelerometer family utilizes unique variable capacitance microsensors. The accelerometers are designed for measurement of relatively low level accelerations in aerospace and automotive environments. Typical applications require measurement of whole body motion immediately 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 9.5 V to 18.0 V and provide a high level, low impedance output. The ±2 volt differential output is dc coupled at a dc bias of approximately 3.6 V. 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	-100
RANGE [1]	g pk	±2	±10	±30	±100
SENSITIVITY (at 100 Hz) [2] [3]	mV/g	1000 ±20	200 ±10	66 ±4	20 ±1.0
AMPLITUDE RESPONSE [4]					
± 5%	Hz	0 to 15	0 to 500	0 to 800	0 to 1000
± 1dB	Hz	0 to 35	0 to 1500	0 to 2800	0 to 5000
MOUNTED RESONANCE FREQUENCY	Hz	1300	3000	5500	5500
NON-LINEARITY AND HYSTERESIS [5]	% FSO Typ	±0.20	±0.20	±0.20	±1
	% FSO (Max)	±0.50	±0.50	±0.50	±2
TRANSVERSE SENSITIVITY [6]	% Max	2	2	2	2
ZERO MEASURAND OUTPUT [3]	mV Max	±50	±50	±50	±50
DAMPING RATIO		4.5	0.7	0.7	0.6
DAMPING RATIO CHANGE	%/°F	+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

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SPECIFICATIONS—continued

PERFORMANCE CHARACTERISTICS—continued

	Units	7290A-2	-10	-30	-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
From -13°F to +167°F (-25°C to +75°C)	% FSO Max	±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
From -13°F to +167°F (-25°C to +75°C)	% Max	±3.0	±3.0	±3.0	±3.0
THERMAL TRANSIENT ERROR	Equiv. g/°F	< 0.0006	< 0.0006	< 0.0006	< 0.0006
PER ISA RP 37.2	Equiv. g/°C	< 0.001	< 0.001	< 0.001	< 0.001
OVERRANGE (Determined by Electrical clipping or Mechanical stops, whichever is smaller.)					
Electrical clipping	g	-3.5/+3.8	-18/+19	-53/+57	-175/+190
Mechanical stops, typical/minimum	g	±4/±3	±30/±15	±90±45	±170/±150
Recovery Time	µs	< 10	< 10	< 10	< 10
THRESHOLD (RESOLUTION) [7]	Equiv. g's	0.0005	0.0025	0.008	0.025
BASE STRAIN SENSITIVITY, MAX [8]	Equiv. g	0.01	0.01	0.01	0.01
MAGNETIC SUSCEPTIBILITY [9]	Equiv. g	< 0.1	< 0.1	< 0.1	< 0.1
WARM-UP TIME (to within 1%)	ms	1	1	1	1

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]	7.5 mA Typ, 10 mA Max at 15 Vdc
OUTPUT IMPEDANCE/LOAD	500 ohms max/10K ohms resistance minimum, 0.1 µF capacitance maximum
RESIDUAL NOISE	100 µV rms typ, 500 µVrms max; 0.5 to 100 Hz. 500 µV rms typ, 1mV max; 0.5 Hz to 10 KHz

PHYSICAL

CASE, MATERIAL	Anodized aluminum alloy
ELECTRICAL, CONNECTIONS	Integral cable, four conductor No. 32 AWG, Teflon® insulated leads, braided shield, silicone jacket
IDENTIFICATION	Manufacturer's logo, model number and serial number
MOUNTING/TORQUE	Holes for two 4-40 or M3 mounting screws/6 lbf-in (0.7 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 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 (at 100 Hz and 10 g pk, 7290A-2 at 1 g)	mV/g with 15 Vdc excitation
FREQUENCY RESPONSE	20 Hz to 2000 Hz for 7290A-2, to 5000 Hz for all other ranges, % deviation reference 100 Hz
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

1. Customized range, 7290A-XX, available on special order. FSO is nominally 4 volts. Combined non-linearity and hysterisis is typically ±1% FSO and ± 2% FSO, maximum.
2. Reference frequency is 20 Hz on the 2 g range.
3. 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.
4. 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.
5. Full scale output (FSO) is nominally 4 volts.
6. 1% is typical. 1% maximum available on special order.
7. THRESHOLD = $\frac{\text{MAX. RESIDUAL NOISE; 0.5 TO 100 Hz}}{\text{SENSITIVITY}}$
8. Per ISA 37.2 at 250 Microstrain.
9. At 100 Gauss, 60 Hz.
10. Current drain increases slightly with increasing excitation; typical change is +.06 mA per volt from 9.5 to 18.0 Vdc.
11. 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.

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