Piezoresistive Accelerometer

ENDEVCO MODEL 7270A

Model 7270A

- **2000 to 200 000 g Full Scale**
- **High Resonance Frequency**
- **DC Response**
- **Rugged Undamped**



Actual size

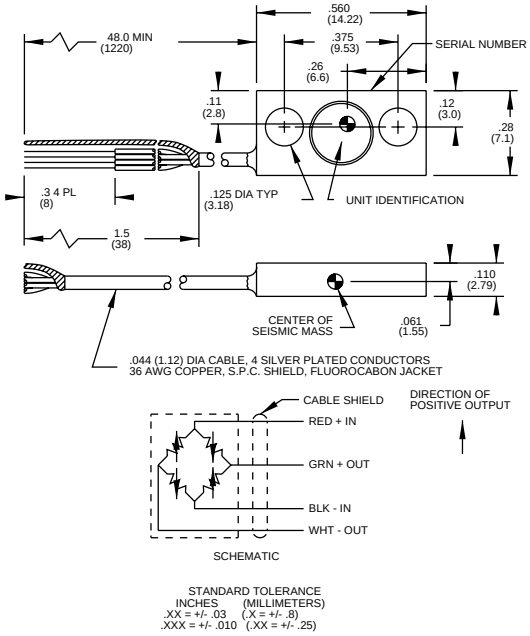
DESCRIPTION

The ENDEVCO® Model 7270A series of piezoresistive accelerometers are rugged un-damped units designed for shock measurements.

ENDEVCO micro-machines the sensing system of the 7270A from a single piece of silicon. This etched silicon chip includes the inertial mass and strain gages arranged in an active four-arm Wheatstone bridge circuit complete with a novel on-chip zero balance network.

The low mass, extremely small size and unique construction of the element blends an exceptionally high resonance frequency with characteristics such as low impedance, high overrange, and zero damping for no phase shift. The high resonance frequency of these sensors permits their survival in the presence of these high frequency components in a shock pulse that could shatter the seismic system of accelerometers having lower resonance.

High resonance frequencies and zero damping also allow the accelerometers to respond accurately to fast rise time, short duration shock motion. With a frequency response extending down to dc or steady state accelerations, these transducers are ideal for measurement of long duration transients.



Model 7270A-XXM4, with integral 1/4-28 mounting stud, is available on special order.

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

SPECIFICATIONS

PERFORMANCE CHARACTERISTICS: All values are typical at +75°F (+24°C) and 10 Vdc excitation unless otherwise specified. Calibration data, traceable to the National Institute of Standards (NIST), is supplied.

	Units	7270A-2K	-6K	-20K	-60K	-200K
RANGE [1]	g pk	±2000	±6000	20 000	±60 000	±200 000
SENSITIVITY	µV/g	100 ±50	30 +20/-15	10 ±5	3 +2/-1.5	1 ±0.5
FREQUENCY RESPONSE [2] (±5% max, ref. 100 Hz)	kHz	0 to 10	0 to 20	0 to 50	0 to 100	0 to 150
MOUNTED RESONANCE FREQUENCY	kHz Typ	90	180	350	700	1200
	(Min)	(60)	(120)	(220)	(400)	(800)
NON-LINEARITY AND HYSTERESIS (% of reading, to full range)	% Max	±2, up to acceleration corresponding to the recommended range. Measurement uncertainties prevent stating this as a specification limit above 10 000 g.				
TRANSVERSE SENSITIVITY	% Max	5	5	5	5	5
ZERO MEASURAND OUTPUT	mV Max	±100	±100	±100	±100	±100

ENDEVCO MODEL 7270A

Piezoresistive Accelerometer

SPECIFICATIONS—continued

PERFORMANCE CHARACTERISTICS

	Units	7270A	-6K	-20K	-60K	-200K
ZERO SHIFT DUE TO HALF SINE ACCELERATION CAUSING 200 mV OUTPUT (or 150 000 g, whichever is smaller)	mV Max	0.5	0.5	0.5	0.5	0.5
ZERO SHIFT DUE TO MOUNTING TORQUE (0 TO 8 LBF-IN., 0 TO 0.9 NM)	mV Max	±2	±2	±2	±2	±2
THERMAL ZERO SHIFT [4] From -30°F to +150°F (-34°C to +66°C)	mV Max	±50	±50	±50	±50	±50
THERMAL SENSITIVITY SHIFT From 0°F and +150°F (-18°C and +66°C)	% Max	±10	+10	±10	±10	±10
OVERRANGE LIMIT [2}	9 pk	±10 000	±18 000	±60 000	±180 000	± 200 000
WARM-UP TIME	Minutes Max	2	2	2	2	2
	(Seconds) Typ)	(15)	(15)	(15)	(15)	(15)

ELECTRICAL	
EXCITATION	10.0 Vdc, 12 Vdc maximum
INPUT RESISTANCE	550 ±200 ohms
OUTPUT RESISTANCE	550 ±200 ohms
INSULATION RESISTANCE	100 megohms minimum at 100 Vdc; between sensor, cable shield and case
PHYSICAL	
CASE, MATERIAL	Stainless Steel (17-4 PH CRES)
ELECTRICAL, CONNECTIONS	Integral cable, 4 conductor No. 36 AWG Teflon® insulated leads, braided shield, flourocarbon jacket
IDENTIFICATION	Manufacturer's logo, model number and serial number
MOUNTING/TORQUE [3]	Holes for two 4-40 or M3 mounting screws/8 ±2 lbf-in (0.9 Nm)
WEIGHT	1.5 grams (cable weighs 3.6 grams/meter)
ENVIRONMENTAL	
ACCELERATION LIMITS [3] [4]	±200 000 g half sine pulse or three times the recommended range, in any direction, whichever is smaller. Pulse duration should be the greater of 20 microseconds or five periods of the resonance frequency
BASE STRAIN SENSITIVITY (at 250 microstrain)	Typically less than 0.5 mV
TEMPERATURE	
Operating	-30°F to +150°F (-34°C to +66°C)
Storage	-65°F to +250°F (-54°C to +121°C)
HUMIDITY	Unaffected. Unit is epoxy sealed
ALTITUDE	Unaffected
CALIBRATION DATA SUPPLIED	
SENSITIVITY [5]	µV/g at recommended range or 5000 g, whichever is smaller. Time history at respective g level

ACCESSORIES

EHW265	(2) SIZE - 4 FLAT WASHERS
EH137	(2) 4-40 X 1/4 INCH ALLENOY STEEL, OR EQUIVALENT, SOCKET HEAD CAP SCREWS

OPTIONAL ACCESSORIES

25034	4 CONDUCTOR SHIELDED CABLE
7970	TRIAXIAL MOUNTING BLOCK
EHX268	ACOUSTIC COUPLANT

NOTES

1. The unit will operate to the overrange limit, with slightly degraded linearity. Above the overrange limit, the sensor may fail. IMPORTANT: Frequency content of shocks which exceed the 7270A overrange limits often contain amplitudes above 100 kHz. Insufficient bandwidth in signal conditioning may give lower indicated peak acceleration.
2. Frequency response deviates less than ±5% from dc to indicated frequency based on analysis. Measurement uncertainties above 10 kHz prevent stating ±5% as a specification limit for all but the 7270A-2K.
   NOTE: The sensor chip includes two masses, each with a separate resonance frequency. If these resonances are excited, the transducer output will exhibit a "beat" frequency.
3. Use 8 ±2 lbf-in (0.9 Nm) mounting torque, acoustic couplant and high strength steel screws to ensure intimate contact between accelerometer and mounting surface, to prevent yielding of the screw and loss of preload force due to shocks, particularly those above 100 000 g. Loss of meaningful data and possible damage to the accelerometer can result from using an incorrect value of mounting torque.
   The use of low strength mounting material (such as aluminum) is not recommended. However, if such is the case, epoxy should be used between the transducer and mounting surface. If large transverse shocks are anticipated, the use of liquid threadlocking compounds is recommended to reduce loss of screw preload.
4. Prior to final calibration, each accelerometer is given a shock in its sensitive axis approximately equal to its overrange limit (reference ENDEVCO TP283)
5. Calibrations are performed on Model 2965C Shock Calibrator or Model 2925 POP Shock Calibrator.

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.

INTERTECHNOLOGY INC.
1-800-465-1600
1 Scarsdale Road
Don Mills, ON M3B 2R2
Tel: 416-445-5500
Fax: 416-445-1170
E-Mail: sales@intertechnology.com