

PERFORMANCE SPECIFICATION
 TRIAXIAL ACCELEROMETER
 (MODEL 7274A-XXX-E-ZZZ)

Document Number	Rev	Date	Entered by	Description of Change	Change Accountable Engineer	ECO
EDVPS7274A	B	02/18/21	LMK	Update Template and remove outline	JN	51471

1.0 DESCRIPTION

The ENDEVCO® Model 7274A series is a family of rugged, undamped, piezoresistive triaxial accelerometers designed for high-acceleration shock measurements in three mutually perpendicular axes. This family uses three sensors that are packaged in a mutually orthogonal arrangement in a two bolt-mount housing which shares the same footprint and bolt pattern as Endevco Sensing Systems' legacy ENDEVCO® Model 7270A product family. The housing boasts a robust low-noise eight conductor cable that can repeatedly withstand the high-acceleration shock environment.

The Model 7274A utilizes the same highly efficient sensing system as the Model 7270A. For each axis, the sensor is sculptured from a single chip of silicon, which includes the inertial mass and strain gages arranged in a four-active-arm Wheatstone bridge circuit. The Model 7274A is available in ranges from 2,000 g to 20,000 g, with all three axes having the same range. Selectable ranges per axis are available by special request. Although the Model 7274A is brand new, the sensing system technology used has a proven track record of more than 20 years.

U.S. patent numbers 4,498,229; 4,605,919 and 4,689,600 apply to this unit.

2.0 CERTIFIED PERFORMANCE

All specifications assume +75°F (+24°C) and 5 volts excitation, unless otherwise specified.

		Units	-2K	-6K	-20K	-60K
2.1	RANGE	g	2000	6000	20000	60000
2.2	SENSITIVITY					
	min / typ / max at 5 Vdc	μV/g	25/50/75	7.5/15.0/25.0	2.5/5.0/7.5	0.75/1.5/2.5
	min / typ / max	μV/V/g	5/10/15	1.5/3.0/5.0	0.5/1.0/1.5	0.15/0.3/0.5

A specification of μV/V provides a parameter specification that is independent of excitation voltage. Calculate the specification at any excitation voltage by multiplying the value by the excitation voltage. This applies to any parameter with a "unit"/V specification.

2.3	ZERO MEASURAND OUTPUT		
	maximum at +75°F (+24°C)	mV/V	±10
2.4	RESISTANCE		
	input	Ω	217 ± 100

output, each axis Ω 650 ± 300

Resistance is measured at approximately 1 mA. Bridge resistance increases with applied voltage due to heat dissipation in the strain gage elements.

Units	Range Dash Number			
	<u>-2K</u>	<u>-6K</u>	<u>-20K</u>	<u>-60K</u>

3.0 TYPICAL PERFORMANCE CHARACTERISTICS

The following parameters are established from testing of sample units and are not 100% tested:

3.1	NATURAL FREQUENCY				
	minimum / Typical	kHz	60/90	120/180	220/350 400/700

The sensor chip includes two masses, each with a slightly different resonant frequency; however both resonances will satisfy the specified minimum resonant frequency. If both resonances are excited the transducer output will exhibit a "beat" frequency which will show up as a frequency that is the difference between the two resonant frequencies.

3.2	ZERO SHIFT AFTER				
	FULL RANGE SHOCK	$\mu V/V$		50	

3.3	OVERRANGE LIMIT	g	10,000	18,000	60,000 180,000
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The overrange limit is a design safety margin; operating the unit above its rated range is not recommended. See note at paragraph 6.2 for additional over range limitations.

3.4	FREQUENCY RESPONSE				
	$\pm$ 1dB / Typical	kHz	18	36	70 140

Due to low signal-to-noise ratio, along with limited frequency capability (<50kHz), conventional vibration shakers are unable to accurately measure frequency response for the 20,000 g range. The frequency responses for these ranges are based on the theoretical response of a single degree of freedom system.

3.5	AMPLITUDE LINEARITY				
	typical, to full range	% of reading		± 5	

3.6	TRANSVERSE SENSITIVITY	%		3	
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This specification is based on testing of a sample of 7274-2K units; higher ranged units do not have sufficient output for the traditional transverse sensitivity test. In actual installation, the flatness of the mounting surface can affect the magnitude of this error.

3.7	DAMPING	of critical		~ 0.005 (undamped)	
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3.8	THERMAL ZERO SHIFT				
	typical, from 0°F to 150°F, ref 75°F	mV/V		< 1	

For short duration tests, auto zeroing prior to test is recommended to eliminate this error. For extended duration testing, it is possible to record the temperature and correct the acceleration data in post-processing.

	Units	
THERMAL SENSITIVITY SHIFT		
typical	%/°F	-0.067
	%/°C	-0.12

3.9 WARM-UP TIME 15 seconds after power-on

Warm-up drift is very sensitive to heat sinking from the mounting surface. Typical specifications listed above are for a unit mounted to a solid metal surface per Paragraph 5.5.

3.10 MECHANICAL OVERTRAVEL STOPS none

4.0 ELECTRICAL

4.1 EXCITATION VOLTAGE (default) 5.0 V_{DC}
MAX VOLTAGE WITHOUT DAMAGE 12.0 V_{DC}

For maximum accuracy, calibration data should be taken at the same excitation voltage as is used in service, e.g. the sensitivity of the unit at 10.0 V_{DC} is not exactly double the sensitivity at 5.0 V_{DC} due to self heating of the gages. The excitation voltage to be used in the application should be specified at the time of order (see Paragraph 9.0).

4.2 ISOLATION RESISTANCE 100 MΩ minimum at 50 V_{DC}
between
cable leads and cable shield or case.

5.0 PHYSICAL

5.1 CASE, MATERIAL 17-4 PH CRES

5.2 CABLE Eight 34 AWG SPC alloy
conductors, with
SPC braided shield and FEP jacket.
See Figure 1 for cable lead color code.

5.3 WEIGHT
accelerometer, excluding cable
cable 0.10 ounce (2.9 gram)
0.11 ounce/ft (10.2 gram/m)

5.4 IDENTIFICATION
Serial number on side of unit,
model number
and Endevco sigma on cover.
Measurement
coordinate system marked on sides.

5.5	MOUNTING	
	supplied screws	#4-40 high strength screws, 3/8" long, 2x
	supplied washers	#4 flat washers, 2x
	recommended mounting torque	8 ± 2 lbf-in (0.9 N-m)

For optimal performance use the recommended mounting torque, acoustic couplant (grease) and high strength screws to ensure intimate contact between accelerometer and mounting surface and to prevent yielding of the screw and loss of preload force due to shock.

The use of low strength mounting materials (such as aluminum) is not recommended. However, if such is the case, epoxy should be used between the accelerometer and mounting surface to supplement the strength of the threads.

To optimally protect the cable from damage and provide added strain relief, it is suggested to completely encapsulate the cable with RTV within 3 inches of the case. A recommended RTV is Loctite® Clear Silicone RTV (item 37463).

5.6	MOUNTING STRAIN SENSITIVITY	
	250 microstrain per ISA 37.2, paragraph 6.5	typical/maximum μ V/V 2/5

6.0 ENVIRONMENTAL

6.1	TEMPERATURE	
	operating and storage	-67°F to +250°F (-55°C to +121°C)

Operating temperatures above 200°F result in highly variable and unpredictable thermal zero shifts (TZS). TZS should be monitored and/or managed by auto-zeroing to insure no loss in data due to signal saturation.

150°F is the maximum recommended operating temperature for operating with an excitation voltage near 10 V_{DC}. In applications requiring higher operating temperatures a lower excitation voltage is recommended.

See notes at paragraph 6.2 for additional temperature limitations.

6.2	ACCELERATION LIMITS (any direction)	
	maximum shock amplitude	3X the lowest rated range present
	minimum haversine shock duration	Greater of 20 μ s or 5X the natural period

For the 7274A-60K, the over-range limit is reduced to 120,000g when operating at temperatures above 60°C (150°F) and to 60,000g when operating at temperatures above 93°C (200°F)

6.3	HUMIDITY AND ALTITUDE	Epoxy sealed
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6.4	ESD SENSITIVITY	Class 3B (>8000V) per Section 5.2 of MIL-STD-1686C.
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7.0 CALIBRATION DATA

Data for all parameters listed in Paragraph 2.0 (Certified Performance) are supplied on the Calibration Certificate. Sensitivity calibration is performed at full range or 5,000 g, whichever is lowest, using the ENDEVCO® 2925 POP Shock Calibrator. Calibration will be performed at the excitation voltage specified by the customer at the time of order (see Paragraph 9.0 for ordering information).

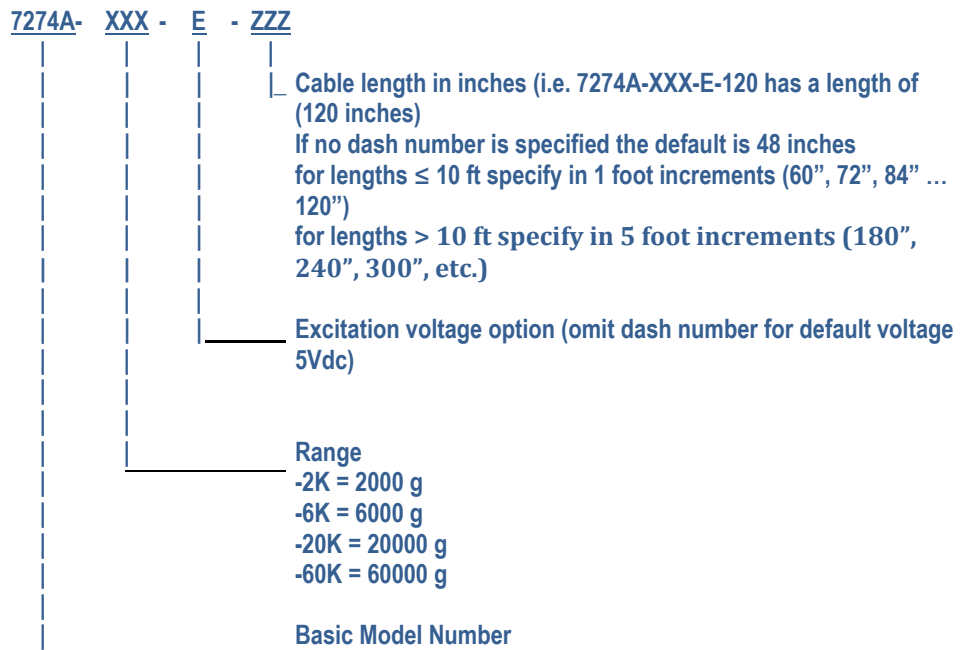
Prior to final calibration, each accelerometer is given a shock in each of three axes approximately equal to its rated range using the ENDEVCO® 2973A Shock Motion Accelerometer Calibrator (SMAC).

Tighter specifications or optional calibrations for most other parameters are available upon special request at an additional cost.

8.0 ACCESSORIES

8.1	SUPPLIED EHW265 EH815 42414	#4 flat washer, 2x #4-40 x 3/8" screw, alloy steel, 2x Application Card
8.2	OPTIONAL Model 136 31167 2974M8	D.C. Differential Voltage Amplifier Adaptor plate to a #10-32 stud mount Test Fixture, Triaxial

9.0 MODEL NUMBER DEFINITION



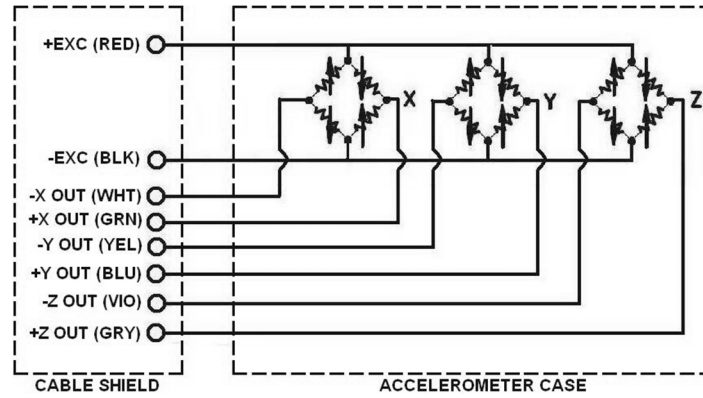


FIGURE 1. Schematic