

**PERFORMANCE SPECIFICATION
ACCELEROMETER
(75-XXX-YY)**

Document Number	Rev	Date	Entered by	Description of Change	Change Accountable Engineer	ECO
76332	NR	4/18/22	NAD	Initial Release of 75-XXX-YY Performance Specification	JKN	52685

1.0 DESCRIPTION

The ENDEVCO® Model 75 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 leadless chip carrier (LCC) package that supports mounting by surface mount technology (SMT) re-flow soldering (with epoxy underfill) or adhesive mounting (with hand soldering).

The Model 75 utilizes the same highly efficient sensing system as the Model 71, 7270A and 7274 accelerometer families. 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 75 is available in ranges from 2,000g to 60,000g, with all three axes having the same range. Selectable ranges per axis are available by special request.

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.

	<u>Units</u>	<u>-2K</u>	<u>-6K</u>	<u>-20K</u>	<u>-60K</u>
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	

	<u>Units</u>	<u>-2K</u>	<u>-6K</u>	<u>-20K</u>	<u>-60K</u>
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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
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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 Maximum	$\mu V/V$				50
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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 overrange limitations.

3.4	FREQUENCY RESPONSE $\pm 5\%$, typical	kHz	18	36	70	140
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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 20,000g and 60,000g ranges. 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
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3.6	TRANSVERSE SENSITIVITY	%				5
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In actual installation, the flatness of the mounting surface or the uniformity of the solder thickness 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	%FSO/°C				0.006
		%FSO/°F				0.003

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.

3.9	THERMAL SENSITIVITY SHIFT typical	%/°C				0.05
		%/°F				0.03

3.10	WARM-UP DRIFT (typ/max) 1.0 sec to 2 min	mV/V	0.06/0.2
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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.

3.11	MECHANICAL OVERTRAVEL STOPS	g	none
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4.0 ELECTRICAL

4.1	EXCITATION VOLTAGE (default)	Vdc	5.0
	MAX. EXCITATION VOLTAGE WITHOUT DAMAGE	Vdc	12.0

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 Vdc is not exactly double the sensitivity at 5.0 Vdc due to self heating of the gages. The excitation voltage to be used in the application should be specified at time of order (see Paragraph 9.0).

4.2	NOISE (max, dc to 10kHz)	μVrms	5
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5.0 PHYSICAL

5.1 CASE, LCC (Leadless Chip Carrier)

CASE, MATERIAL	Alumina (ceramic)
LID, MATERIAL	Nickel plated Kovar
METALIZATION, MATERIAL	Gold over nickel plated Tungsten

5.2	WEIGHT	0.04 ounce (1.2 gram)
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5.3	IDENTIFICATION	Model number and branding on cover. Serial number and measurement coordinate system marked on sides.
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5.4	MOUNTING	SMT re-flow solder with epoxy underfill or adhesive mount on base and hand soldering
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Refer to Instruction Manual IM74-IM75 for a more detailed discussion on accelerometer mounting.

5.5	MOUNTING STRAIN SENSITIVITY (250 microstrain per ISA 37.2, paragraph 6.5) typical/maximum	μV/V	12/50
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6.0 ENVIRONMENTAL

6.1	TEMPERATURE operating and storage	-67°F to +250°F (-55°C to +121°C)
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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 Vdc. 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 75-60K, 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 Hermetically sealed (<5 X 10⁻⁸ atm-cc/sec He)
- 6.4 ESD SENSITIVITY Class 3B (>8000V) per Section 5.2 of MIL-STD-1686C.

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 5,000g, whichever is lowest, using a shock calibration system. 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 the z-axis approximately equal to its rated range.

8.0 MODEL NUMBER DEFINITION

[1] Model Number Definition:

