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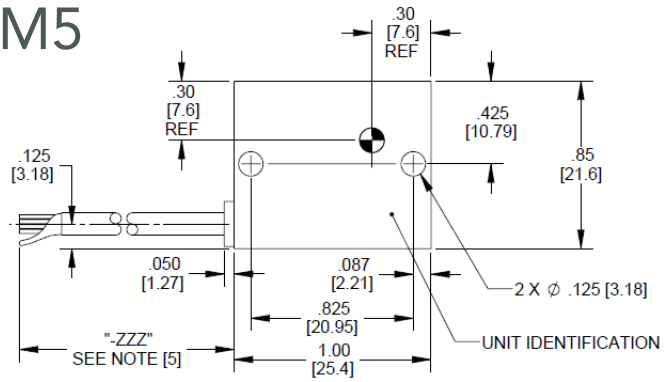
Variable capacitance accelerometer

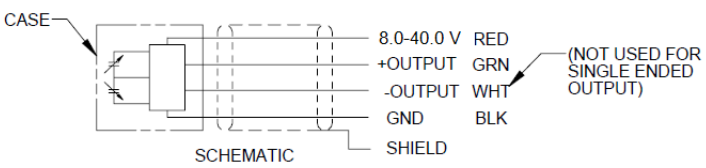
Model 7290G and 7290GM5





M5 option





STANDARD TOLERANCE
INCHES [MILLIMETERS]
.XX = ± .02 [.X = ± .5]
.XXX = ± .010 [.XX = ± .25]

SOL

Key features

- 2, 5, 10, 30, 50, 100 and 200 g full scale ranges
- Motion, low frequency, tilt
- 10K g shock survivability
- Precision digital temperature compensation
- M5 option for water tight performance

Description

Model 7290G 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. State-of-the-art digital temperature compensation electronics provide for precise compensation over a wide temperature range. The use of gas damping results in very small thermally induced changes in frequency response.

Gas damping and internal over-range stops enable the anisotropically-etched silicon microsensors to withstand high shock and acceleration loads. For outdoor use specify the M5 option, which has a PFA cable and a reinforced cable to case connection. The M5 is watertight for outdoor applications such as vehicle road testing and flight test. It was tested to IP67 during development, but is not intended for underwater use, which would void the product warranty.

The accelerometer is specified for operation over the wide excitation voltage range of 8V to 40V. Model 7290G can be configured for either a differential and single ended output. The differential output has a range of ±2 V and is DC coupled. The single ended output is 0.5 V to 4.5 V with 2.5 V of bias voltage.

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

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Variable capacitance accelerometer

Model 7290G and 7290GM5

Specifications

The following performance specifications are referenced at +75°F (+24°C) and 100 Hz, unless otherwise noted. Calibration data traceable to National Institute of Standards and Technology (NIST) is supplied.

Dynamic characteristics	**Units**	**-2**	**-5**	**-10**	**-30**	**-50**	**-100**	**-200**
Range	g	±2	±5	±10	±30	±50	±100	±200
Sensitivity	mV/g	1000 ±50	400 ±20	200 ±10	66 ±4	40 ±2	20 ±1	10 ±0.5
Frequency response (± 5% max)	Hz	0 to 15	0 to 30	0 to 500	0 to 1000	0 to 2000	0 to 2000	0 to 2000
(± 10% typ)	Hz	0 to 30	0 to 80	0 to 1300	0 to 1800	0 to 3000	0 to 3000	0 to 4000
(± 3dB typ)	Hz	0 to 60	0 to 150	0 to 2800	0 to 3000	0 to 4500	0 to 4500	0 to 6000
Mounted resonance frequency	Hz	1300	1600	3000	5500	6000	6000	6000
Non-linearity and hysteresis [1]	% FSO typ (max)	±0.20 (±0.50)	±0.20 (±0.50)	±0.20 (±0.50)	±0.20 (±0.50)	±0.20 (±0.50)	±1 (±2)	±1 (±2)
Transverse sensitivity	% (max)	2	2	2	2	2	2	2
Zero measurand output	mV	±50	±50	±50	±50	±50	±50	±50
Damping ratio		4.0	2.5	0.7	0.7	0.6	0.6	0.6
Damping ratio change								
From -65°F to +250°F (-55°C to +121°C)	%/°C	+0.08	+0.08	+0.08	+0.08	+0.08	+0.08	+0.08
Thermal zero shift (max)								
From -40°F to 212°F (-40°C to 100°C)	% FSO	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
Thermal sensitivity shift (max)								
From -40°F to 212°F (-40°C to +100°C)	%	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
Overrange (determined by electrical clipping or mechanical stops, whichever is smaller.)								
Electrical clipping	volts	±2.4	±2.4	±2.4	±2.4	±2.4	±2.4	±2.4
Mechanical stops, typical	g	±4	±12	±30	±90	±200	±200	±300
Recovery time	µs	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Resolution [2]	Equiv. g's	0.0002	0.0005	0.0010	0.0030	0.0050	0.0100	0.0200
Base strain sensitivity, max	Equiv. g's	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Warm-up time (to within 1%)	ms	15	15	15	15	15	15	15

Electrical characteristics	
Excitation voltage	8 to 40Vdc
Current drain	4.5 mA typ, 6 mA max
Output impedance/load	100 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 characteristics	
Case material	Anodized aluminum alloy
Electrical connections	Integral cable, four conductor 28 AWG, Teflon® insulated leads, spiral shield, Hyperflex™ jacket for 7290G; Four 30 AWG PFA 340 insulated leads, braided shield, gray PFA 340 jacket for 7290GM5
Mounting/torque	Two holes for 4-40 or M3 mounting screws / 6 lbf-in (0.68 Nm)
Weight	10 grams without cable (cable weighs 9 grams/meter for 7290G and 13 grams/meter for 7290GM5)

Environmental characteristics	
Acceleration limits (in any direction)	
Static	20,000 g
Shock	5000 g (150 µS haversine pulse) for -2, -5 and -10; 10 000 g (80 µS haversine pulse) for -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	-40°F to +212°F (-40°C to +100°C)
Humidity/altitude	Unaffected. Unit is epoxy sealed. IP67 for 7290GM5 only.
ESD sensitivity	Unit meets Class 2 requirements of MIL-STD-883, Method 3015

Calibration	
Sensitivity	1 g and 5 Hz for -2 and -5
(measured with 15 Vdc excitation)	10 g and 100 Hz for all other ranges
Frequency response	1 g, 1 to 100 Hz for -2 and -5, 10 g, 20 to 10,000 Hz for all other ranges
Zero measurand output	measured at room temp
Transverse sensitivity	measured at 1 g

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Accessories

Product	Description	7290G	7290GM5
EHW265	Size 4, flat washers (2)	Included	Included
EH702	4-40 x 7/16 inch cap screws (2)	Included	Included
EHM464	Hex key wrench	Included	Included
7990	Triaxial mounting block	Optional	Optional
136	3-channel DC differential voltage amplifier	Optional	Optional

Options

Options	Description
M1	Made with leaded solder for colder storage temp, recommended for space applications
M5	With more robust cable and strain relief, IP67, recommended for outdoor installation

Notes

1. Full scale output (FSO) is nominally 4 volts.
2. Resolution = (2x residual noise; 0.5 to 100 Hz) / sensitivity
3. Model number definition:

7290G – XXX – Y – ZZZ

- ZZZ: Cable length in inches (i.e. 7290G-XXX-Y-120 has a length of 120 inches).
  For lengths ≤10 ft specify 1 ft increments (12”, 24”...120”, etc)
  For lengths ≥10 ft specify 5 ft increments (180”, 240”, etc)
- Y: Output options
  D = Differential ouput
  S = Single ended output
- XXX: Denotes range in g’s
  -2
  -5
  -10
  -30
  -50
  -100
  -200
- 7290G: Basic model number

Ordering information

1. Maintain high levels of precision and accuracy using Endevco’s factory calibration services. Call Endevco’s inside sales force at 866-ENDEVCO for recommended intervals, pricing and turn-around time for these services as well as for quotations on our standard products.

APPLIES TO CALIFORNIA FACILITY

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. 091819