Variable Capacitance Accelerometer

ENDEVCO MODEL 7596

Model 7596

- **Economical and Rugged**
- **2 to 100 g Full Scale**
- **DC Response**
- **Damped**
- **Mechanical Overtravel Stops**

Preliminary



Actual size

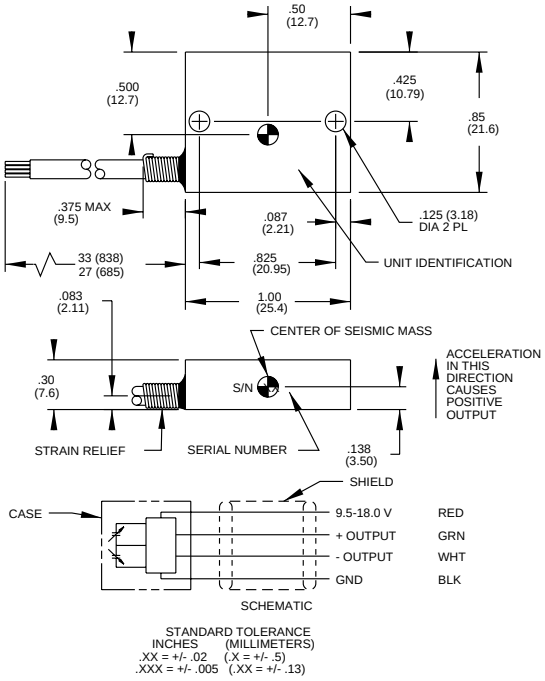
DESCRIPTION

The ENDEVCO® Model 7596 VALULINE™ accelerometer family is a low cost solution to low-level, low frequency measurements. The VALULINE has many of the same features of the rugged 7290A MICROTRON® making it ideal for applications where tight thermal characteristics are not required. Applications include laboratory measurements, ground transportation studies and measurements where the accelerometer will be subjected to high shock levels (up to 10,000 gs, see specifications). Use the 7596 for modal studies on large structures.

Gas damping and internal overange stops enable the anisotropically etched silicon microsensors to withstand high shocks and acceleration loads. The use of gas damping, in the sensor, results in very small-induced changes of frequency response. The patented sensor design ensures immediate stability making the unit ready to take accurate DC or dynamic data within one millisecond!

The 7596 can operate from 9.5Vdc to 18V (or ±4.75 to ±9.0 Vdc) and provide a high level, low impedance output. The output is high enough to drive most laboratory instruments, tape recorders and data acquisition systems without amplification or signal conditioning. The output can be fed into either a differential or single-ended amplifier or standard bridge electronics with 10Vdc excitation.

ENDEVCO Model 136 Three-Channel System, Model 4430A or OASIS Computer-Controlled System are recommended signal conditioners.



SPECIFICATIONS

PERFORMANCE CHARACTERISTICS: All values are typical at +75°F (+24°C) and 15 Vdc excitation unless otherwise stated. Calibration data, traceable to the National Institute of Standards, (NIST), is supplied.

	Units	7596-2	-10	-30	-100
RANGE	g pk	±2	±10	±30	±100
SENSITIVITY (at 100 Hz) [1] [2]	mV/g	1000 ±20	200 ±10	66 ±4	20 ±1.0
FREQUENCY RESPONSE (± 5%)	Hz	0 to 15	0 to 500	0 to 800	0 to 2000
MOUNTED RESONANCE FREQUENCY	Hz	1300	3000	5500	5500
NON-LINEARITY AND HYSTERESIS [3]	% FSO Typ	±0.20	±0.20	±0.20	±1
	% FSO (Max)	±0.50	±0.50	±0.50	±2
TRANSVERSE SENSITIVITY [4]	% Typ	1	1	1	1
ZERO MEASURAND OUTPUT [2]	mV Max	±200	±200	±200	±200
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	7596-2	-10	-30	-100
THERMAL ZERO SHIFT					
From 32°F to 122°F (0°C to 50°C)	% FSO Max	±2.0	±2.0	±2.0	±2.0
From -13°F to +167°F (-25°C to +75°C)	% FSO Max	±4.0	±4.0	±4.0	± 4.0
THERMAL SENSITIVITY SHIFT					
From 32°F to 122°F (0°C to +50°C)	% Max	±4.0	±4.0	±4.0	±4.0
From -13°F to +167°F (-25°C to +75°C)	% Max	±6.0	±6.0	±6.0	±6.0
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	g	±4	±30	±90	±200
Recovery Time	µs	< 10	< 10	< 10	< 10
THRESHOLD (RESOLUTION) [5]	Equiv. g's	0.0005	0.0025	0.008	0.025
BASE STRAIN SENSITIVITY, MAX [6]	Equiv. g's	0.01	0.01	0.01	0.01
MAGNETIC SUSCEPTIBILITY [7]	Equiv. g's	< 0.1	< 0.1	< 0.1	< 0.1
WARM-UP TIME (to within 1%)	ms	1	1	1	1

ELECTRICAL

EXCITATION [2]	9.5 to 18.0 Vdc, 20 Vdc maximum without damage; excitation voltage can be applied to any lead without damage
CURRENT DRAIN [8]	8.5 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	10 µV rms typ, 0.5 to 100 Hz. 5 µV rms typ, 1mV max; 100 Hz to 10 KHz
ISOLATION	100 MΩ

PHYSICAL

CASE, MATERIAL/BASE	Gold Plated Kovar/stainless steel
ELECTRICAL, CONNECTIONS	Integral cable, four conductor No. 32 AWG, Teflon® insulated leads, braided shield, silicone jacket
MOUNTING/TORQUE	Holes for two 5-26 or M3 mounting screws/5 lbf-in (0.68 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 hermetic
ESD SENSITIVITY	Unit meets Class 3 requirements of MIL-STD-883

CALIBRATION DATA SUPPLIED

SENSITIVITY (at 100 Hz and 10 g pk, 7596 at 1 g)	mV/g with 15 Vdc excitation
FREQUENCY RESPONSE	20 Hz to 2000 Hz for 7596, to 5000 Hz for all other ranges, % deviation reference 100 Hz
ZERO MEASURAND OUTPUT	mV
MAXIMUM TRANSVERSE SENSITIVITY	% of sensitivity

ACCESSORIES (included)

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

NOTE: Tighter specifications available on special order.

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