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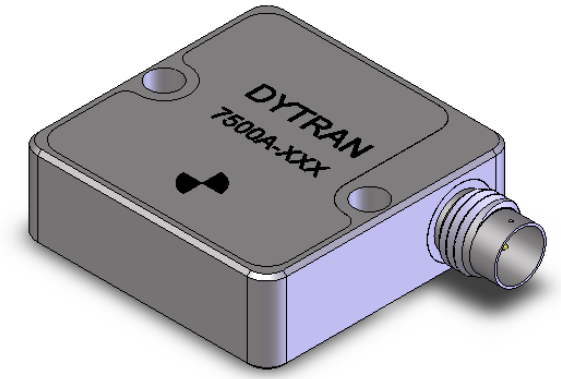
OPERATING GUIDE

SERIES 7500A

Variable Capacitance Accelerometer



DYTRAN INSTRUMENTS, INC.

SPECIFICATIONS, SERIES 7500A ACCELEROMETER

PERFORMANCE BY MODEL NUMBER (Vs = +9 to +32Vdc, Tc=+25°C)

	7500A1	7500A2	7500A3	7500A4	7500A5	7500A6	7500A7	UNITS
Input Range	±2	±5	±10	±25	±50	±100	±200	g
Frequency Range (3dB) [1]	0-400	0-600	0-1000	0-1500	0-2000	0-2500	0-2500	Hz
Sensitivity, Differential [2]	1000	400	200	80	40	20	10	mV/g
Output Noise (typical), Differential	8	9	10	25	50	100	200	µg rms/√Hz
Maximum Mechanical Shock	2000	2000	2000	2000	2000	2000	2000	gpk

PERFORMANCE FOR ALL MODEL NUMBERS (Vs = +9 to +32Vdc, Tc=+25°C), Differential Mode

		MIN	NOM	MAX	UNITS
Transverse Sensitivity			1	2	%
Bias Calibration Error	7500A1			4.0	% of span
	7500A2 thru A7			1.5	% of span
Bias Temperature Shift [3]	7500A1		100	200	(ppm of span)/°C
	7500A2 thru A7		50	100	(ppm of span)/°C
Scale Factor Calibration Error [4]			1	2	%
Scale Factor Temperature Shift [3]					
	7500A1thru A3	-250		+150	ppm/°C
	7500A4 thru A7	-150		+150	ppm/°C
Non-Linearity [5]	7500A1 thru A5		0.3	0.5	% of span
	7500A6, A7		0.5	1.0	% of span
Power Supply Rejection Ratio		50	>65		dB
Output Impedance			1		Ω
Output Common Mode Voltage			2.45		VDC
Operating Voltage		9		32	VDC
Operating Current (AOP & AON open)			12	14	mA DC
Operating Temperature Range		-55		+125	°C

PHYSICAL PARAMETERS FOR ALL MODEL NUMBERS

Case Material	titanium alloy
Connector Location	side
Connector Type	¼-28 thread, 4-pin
Mating Cable (ref)	6854AXX
Mounting Provision	two #4 or M3 screws
Environmental Seal	hermetic

	MIN	NOM	MAX	UNITS
Case Length		1.00		inch
Case Width		1.00		inch
Case Height		0.33		inch
Mounting Hole Spacing		.825		inch
Mass		13		grams

NOTES:

[1] 250Hz ±100Hz, -3dB bandwigh, optionally available
[2] Single ended sensitivity is half of values shown
[3] Over the rated temperature range
[4] 100g versions and above are tested from –65g to +65g
[5] -90% to +90% of Full Scale

SUPPLIED ACCESSORIES:

(2) MOUNTING SCREWS, 4-40 x .5 inch

SUPPLEMENTAL OPERATING GUIDE
SERIES 7500A ACCELEROMETER

INTRODUCTION

Dytran Series 7500A is a family of high performance, wide temperature range variable capacitance (VC) accelerometers. It combines an integrated VC accelerometer chip with high drive, low impedance buffering for measuring acceleration in commercial/industrial environments. It is tailored for zero to medium frequency instrumentation applications. This module contains a hermetically sealed micromachined capacitive sensing element, a custom integrated circuit amplifier, and differential output stages. The hermetically sealed titanium case has an integral ¼-28 4-pin receptacle, and is easily mounted via two #4 or M3 screws. On-board regulation is provided to minimize the effects of supply voltage variation. It is relatively insensitive to temperature changes and thermal gradients. The cable shield is electrically connected to the titanium case; the power and signal wires are isolated from the case. An initial calibration sheet is included and periodic calibration checking is available.

OPERATION

Series 7500A accelerometer modules produce two analog voltage outputs which vary with acceleration as shown in the graph of Figure 1. The sensitive axis is perpendicular to the bottom of the package, with positive acceleration defined as a force pushing on the bottom of the package. The signal outputs are fully differential about a common mode voltage of approximately 2.5 volts. The output scale factor is independent from the supply voltage of +9 to +32 volts. At zero acceleration the output differential voltage is nominally 0 volts DC; at ± full scale acceleration the output differential voltage is ±2 volts DC.

CABLE LENGTH CONSIDERATIONS

Cable lengths of up to 15 meters (50 feet) can be used with the 7500A accelerometer. For lengths longer than 15 meters, we recommend you check each individual installation for oscillation by tapping the accelerometer and watching the differential output for oscillation in the 20kHz to 50kHz region. If no oscillation is present, then the cable length being used is OK. From the standpoint of output current drive and slew rate limitations, the Series 7500A is capable of driving over 600 meters (2000 feet) of its cable type but at some length between 15 and 600 meteres, each device will likely begin to exhibit oscillation.

ADDING A SINGLE ENDED OUTPUT

To achieve the highest resolution and lowest noise performance from the Series 7500A accelerometer, it should be connected to a voltage measurement instrument in a differential configuration using both he AOP and AON output signals. If the measurement instrument lacks differential input capability, or it is desired to use a differential input capable instrument in single ended mode, then the circuit shown in Figure 2 can be used to preserve the low noise performance of the Series 7500A while using a single ended type connection.

This circuit converts the ±2V differential output of the Series 7500A accelerometer, centered at +2.5 volts, to a single ended output centered about ground (0.0Vdc). It provides the advantage of low common mode noise by preventing the accelerometer's ground current from causing an error in the voltage reading.

The op-amp should be located as close as possible to the voltage monitoring equipment. The majority of the signal path can therefore be differential so any noise will affect the wire run as a common mode signal which will be rejected. The op-amp type is not critical; a µA741 or a ¼ of a LM124 can be used. The power supplies need to be ±5V to ±15V to allow for both positive and negative output swing.

The gain of the op-amp is determined by the ratio R2/R1 (where R4=R2 and R3=R1). If R1 through R4 are all the same value, the gain equals 1 and the output swing will be ±4V single ended with respect to ground. To obtain a ±5V single ended output, set R2/R1=R4/R3=5/4=1.25. The single ended output of the op-amp will be centered at ground if R2 and C1 are tied to ground; using some other fixed voltage for this reference can shift the output. The value of the optional capacitors C1 and C2 (C1=C2) can be selected to roll off the frequency response to the frequency range of interest.

MAINTENANCE AND REPAIR

Should you experience a problem with your system, contact the Dytran factory for technical assistance in analyzing and trouble shooting the problem. If the product must be returned for evaluation

and/or repair, you will be given an RMA (returned materials authorization) number and instructions for returning the instrument to the factory. Do not return the instrument without first obtaining this authorization to return.

Figure 1

SIGNAL DESCRIPTIONS

Vs and GND (Power): Red and Black wires respectively. Power (+9 to +32 Volts DC) and ground.

AOP and AON (Output): Green and White wires, respectively. Analog output voltages proportional to acceleration; AOP voltage increases (AON decreases) with positive acceleration. At zero acceleration both outputs are nominally equal to 2.5 volts. The device experiences positive (+1g) acceleration with its lid facing up in Earth's gravitational field. Either output can be used individually or the two outputs can be used differentially. (See output response plot below.

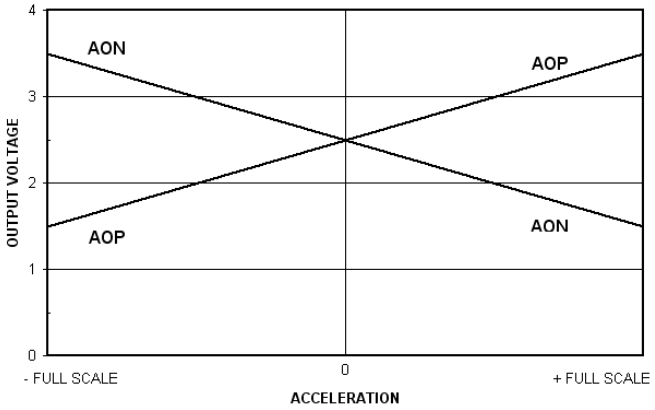


Figure 2