



Dynamic Transducers and Systems

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OG3023A1T.DOC
REV B ECN 6074 6/25/2009

OPERATING GUIDE

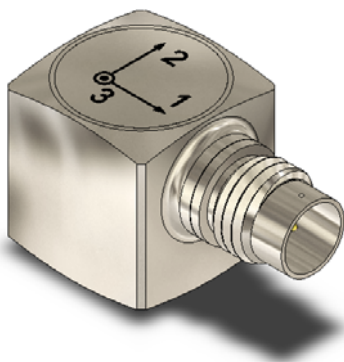
MODEL 3023A1T MINIATURE TRIAXIAL IEPE ACCELEROMETER

WITH SINGLE 4-PIN CONNECTOR,

CASE GROUNDED

WITH IEEE 1451.4 COMPATIBLE

TRANSDUCER ELECTRONIC DATA SHEET (TEDS) FUNCTION



Model 3023A1T is a miniature IEPE triaxial accelerometer featuring a single, transverse mounted, 4-pin electrical connector. This feature allows the 3023A1T to be used in situations where vertical space is limited. Model 3023A1T is case grounded. The sensitivity of each of the three orthogonal axes of Model 3023A1T is nominally 10 mV/g. Model 3023A1T mounts with internal 5-40 thread.

This Guide contains:

- 1) Specifications, Model 3023A1T
- 2) Outline/Installation Drawing 127-3023A1T
- 3) Paper, "Low Impedance Voltage Mode (LIVM) Theory and Operation"

NOTE: **IEPE** is an acronym for Integrated Electronics Piezoelectric types of low impedance voltage mode sensors with built-in amplifiers operating from constant current sources over two wires. **IEPE** instruments are compatible with most other manufacturers' comparable systems. It is equivalent to the Dytran LIVM system.



SPECIFICATIONS, MODEL 3023A1T TRIAXIAL ACCELEROMETER WITH TEDS

SPECIFICATIONS	VALUE	UNITS
PHYSICAL		
WEIGHT	6.2	grams
SIZE (HEIGHT x WIDTH x DEPTH)	0.45 x .45 x .48	inches
MOUNTING	INTERNAL 5-40 THREAD	
CONNECTOR	4-PIN [1]	
MATERIAL, HOUSING/CONNECTOR	TITANIUM ALLOY	
PERFORMANCE		
SENSITIVITY, -10 +15% [2]	10.0	mV/g
RANGE, F.S. (each axis)	+/- 500	g
FREQUENCY RESPONSE AXIS 1 & 2 (-5 / +15%)	1.5 to 5000	Hz
FREQUENCY RESPONSE AXIS 3 (-5 / +15%)	1.5 to 10000	Hz
ELEMENT NATURAL FREQUENCY, NOM.	40	kHz
EQUIVALENT ELECTRICAL NOISE	.0095	grms
LINEARITY, MAX [3]	1	% FS
TRANSVERSE SENSITIVITY, MAX	5	%
SIGNAL POLARITY	POSITIVE FOR MOTION IN DIRECTION OF ARROWS ON HOUSING	
ENVIRONMENTAL		
MAXIMUM VIBRATION	+/- 600	gpk
MAXIMUM SHOCK	5000	gpk
TEMPERATURE RANGE	-60 to +250	°F
ENVIRONMENTAL SEAL	HERMETIC	
COEFFICIENT OF THERMAL SENSITIVITY	.03	%/°F
ELECTRICAL		
SUPPLY CURRENT RANGE, (each axis) [4]	2-to 20	mA
COMPLIANCE (SUPPLY) VOLTAGE RANGE (each axis)	+18 to +30	VDC
OUTPUT IMPEDANCE, TYP.	100	Ohms
OUTPUT BIAS VOLTAGE, NOM.	+10	VDC
DISCHARGE TIME CONSTANT, NOM.	0.3	sec
GROUND ISOLATION	CASE GROUNDED	
IEPE SENSOR WITH TEDS FEATURE	PER IEEE 1451.4	

[1] Connector mates with Dytran cable assy. Model 6811Axx. (xx = length in feet)

[2] Reference sensitivity measured at 100 Hz, 1 grms per ISA RP 37.2

[3] Linearity is % of specified full scale (or any lesser full scale range), zero-based best fit straight line method.

[4] Power only with IEPE power unit or other Dytran-compatible constant current type power unit. If power is applied without current limiting protection, the internal amplifier will be immediately destroyed.

OPERATING INSTRUCTIONS

MODEL 3023A1T TRIAXIAL ACCELEROMETER WITH TEDS

INTRODUCTION

Model 3023A1T is a miniature three-axis accelerometer using the latest in quartz shear technology coupled with 2-wire internal IEPE electronics.

The "T" designation denotes the inclusion of the IEEE 1451.4 Transducer Electronic Data Sheet or "TEDS" function. This function allows the user to query each sensor in a large array of sensors, say, in a large field test, as to model number, serial number, sensitivity and other attributes using a TEDS compatible signal conditioner/data acquisition system.

This instrument contains three miniature quartz laminar shear mode accelerometer elements mounted to a single support and welded into a titanium housing. The three elements are mounted orthogonally to each other so that they can measure the complete motion of a point.

Model 3023A1T mounts with 5-40 internal thread into very small spaces since its vertical dimension is .360 in. It weighs only 6 grams.

IEPE (Integrated Electronics Piezoelectric) design means that three miniature IC amplifiers are built into the instrument, one for each axis, to lower the impedance of the quartz seismic elements by many orders of magnitude. This technique allows the driving of long cables without affecting sensitivity and the use of very simple constant current type power units.

DESCRIPTION

Refer to the outline/installation drawing 127-3023A1T for the dimensions of Model 3023A1T.

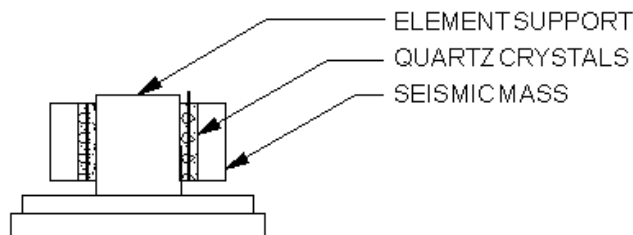


Figure 1 Representative cross-section, 3023A1T element assembly

This novel accelerometer features three modular style quartz elements mounted to a single vertical post. Each planar shear mode element is connected to a miniature IEPE amplifier. The element assembly is mounted in a titanium housing.

The electrical connections from the elements are brought out to the contacts of a four-pin connector mounted transversely to a vertical face of the housing. The three signal/power connections to the elements are connected to three separate pins while the three ground returns for the elements are tied together to one common pin of the four-pin connector. The case of this instrument is connected to electrical ground.

The performance specifications and criteria for Model 3023A1T are delineated on the specification sheet included with this operating guide.

INSTALLATION

Select a smooth surface approx. .50 in diameter and clean off all debris which would preclude a intimate surface contact. Although the 3023A1T has an internal thread for mounting, it may also be adhesively mounted. Various adhesives may be use to mount Model 3023A1T but the adhesives of choice for ease of use are any of the cyanoacrylate "instant" adhesives. They are tough and they set almost instantly. They also do not need a thick bond line which is good for high frequency response. The selected (or prepared) mounting area should be flat to within .001 in TIR for best high frequency response.

NOTE: Before mounting, be sure to clean the mounting surface thoroughly to avoid inclusion of machining chips and other debris between mating surfaces. Intimate contact between mating surfaces is important for best performance.

Spread a light layer of adhesive on the mounting surface and apply the 3023A1T to the mounting area in the desired orientation and press and hold firmly for several seconds.

If a fair amount of motion is expected during the test, it is good practice to tie the cable down to a stationary point as close as possible to the accelerometer (but not closer than 1 inch) to avoid potentially damaging cable whip. You are now ready to connect the 3023A1T to the power unit.

OPERATION

Use with TEDS compatible signal conditioners.

Be sure to check the orientation of each axis with the markings on the instrument upper surface and/or the outline/installation drawing supplied with the Operating Guide. The polarity of each axis is also defined with arrows marked on the top surface of the 3023A1T and again, on the outline/installation drawing 127-3023A1T. The arrows indicate the direction and sense of motion of the accelerometer that will produce positive-going output signals. The vertical axis, axis 3, produces positive-going output voltage when the accelerometer is accelerated upward, i.e., away from the mounting surface.

REMOVAL (OR UNINSTALLATION)

It is very important when removing this instrument to remember that, although it is built to be very rugged, it is a sensitive measuring instrument and as such should be treated gently when being removed from its installation. Never strike the unit to break it free from its mounting surface. Simply grip two opposing flats with an adjustable or open-end wrench and gently twist the instrument until the adhesive bond fails in shear. This method avoids any trauma to the instrument and will help ensure a long life for the accelerometer.

MAINTENANCE AND REPAIR

This instrument is not field repairable. No maintenance is required, or possible. If a problem occurs, contact the factory for help. You will be

assigned a Returned Material Authorization (RMA) number should the instrument have to be returned to the factory for evaluation. A short note describing the problem will facilitate the repair procedure.

There is no charge for evaluation of the instrument and we will perform no repair work until you are notified of any charges.

It is good practice to return the instrument to the factory for recalibration from time to time with frequency of recalibration dependent on usage intensity and frequency.