



**Dynamic Transducers and Systems**

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## **OPERATING GUIDE**

### **MODEL 3143D**

### **TRIAxIAL IEPE ACCELEROMETER**

### **WITH THRU HOLE SCREW MOUNT**

#### **INCLUDED WITH THIS MANUAL:**

- 1) Specification Model 3143D
- 2) Outline/Installation Drawing 127-3143D

**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 other comparable systems labeled **LIVM™**.

## OPERATING INSTRUCTIONS

### MODEL 3143D TRIAXIAL ACCELEROMETER

#### INTRODUCTION

Dytran's Model 3143D is a miniature three-axis titanium housing accelerometer using the latest in piezoceramic shear technology coupled with 2-wire internal IEPE electronics. (IEPE is compatible with LIVM instrumentation)

This instrument contains three miniature piezoceramic laminar shear mode accelerometer elements contained within the titanium housing. The three elements are mounted orthogonally to each other so that they can measure the complete motion of a point.

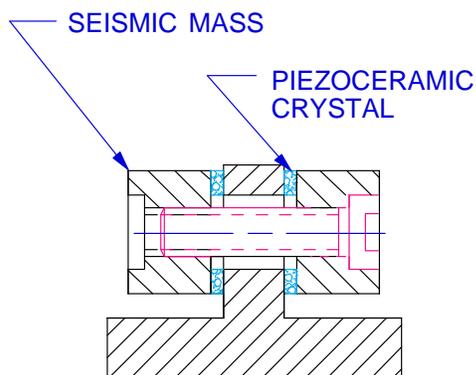
Model 3143D mounts with a single 6-32 mounting stud. Its vertical dimension is .34 in. It weighs only 14 grams.

IEPE (Integrated Electronics Piezoelectric) design means that miniature IC charge amplifiers are built into each of the three elements, to lower the impedance of the piezo 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.

All elements are internally isolated from the outer case and are enclosed by a Faraday shield for good noise immunity.

#### DESCRIPTION

Refer to the outline/installation drawing 127-3143D for the dimensions of Model 3143D.



**Figure 1** Representative cross section, 3143D piezo element assembly.

The electrical connections from the element amplifiers are brought out to the contacts of a four-pin connector mounted transversely to an angled

vertical face of the housing. The three signal/power connections to the elements are connected to three 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 electrically isolated from electrical ground.

The performance specifications and criteria for Model 3143D are delineated on the specification sheet included with this operating guide.

#### INSTALLATION

Select a smooth surface approx. 1.2 in. in diameter and clean off all oil, debris and any contaminants or foreign matter which would preclude intimate contact between mating surfaces.

The selected (or prepared) mounting area should be flat to within .0005 in TIR for best high frequency response.

At the center, drill and tap the mounting surface for a 6-32 mounting screw. Instructions for preparing the mounting port for the mounting port are give on the Outline/Installation drawing 127-3143D supplied as part of this operating guide.

**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.

Torque the 6-32 socket head cap screw, Model 6247A2 mounting screw (supplied) to 10 to 15 lb-inches of torque to secure.

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 3143D to the power unit.

## OPERATION

The Dytran power unit recommended to power the Model 3143D is the Model 4114B1. This is a 4-channel line-powered power unit with 4 BNC input (Sensor) connectors and 4 BNC output connectors,

The cable designed for this combination is the Model 6811AXX. (XX = the length in feet). This cable has a 4-pin connector at one end to mate with the 3143D and three BNC plugs at the other end. The BNC plugs mate with three of the four BNC "Sensor" jacks on the 4114B1. (We recommend axis 1 of the 3143D for channel 1 of the power unit, etc. for good "housekeeping").

Connect the 6811AXX cable to Model 3143D by first rotationally aligning the locating tab on the 4-pin connector, then engaging the rotating threaded collar and threading the collar on, hand tight.

Connect each of the three BNC 'Output' jacks of the power unit to the readout instrument or data collector and proceed with the measurement.

Tie the cable down within 1 inch or so of the instrument if excessive displacement of the accelerometer is expected.

Apply power to the power unit and allow several seconds for coupling capacitors to fully charge. Rotate the channel selector knob of the power unit through the first three positions to monitor the bias voltage of each of the three accelerometer axes to check for normal operation. The bias voltage level appears on the front panel mounted voltmeter on the 4114B1.

Although only one axis of the 3143D may be monitored with the front panel meter on the 4114B1 at a given time, each axis is continuously outputting data at the respective output jack at all times. Selecting a channel for bias monitoring does not affect the signal from that channel.

The sensitivities of each of the three axes are directly in mV/g and are specified precisely in the calibration certificate supplied with each instrument.

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 engraved in the top surface of the 3143D and, delineated on the outline/installation drawing 127-3143D.

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.

## 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.