



Dynamic Transducers and Systems

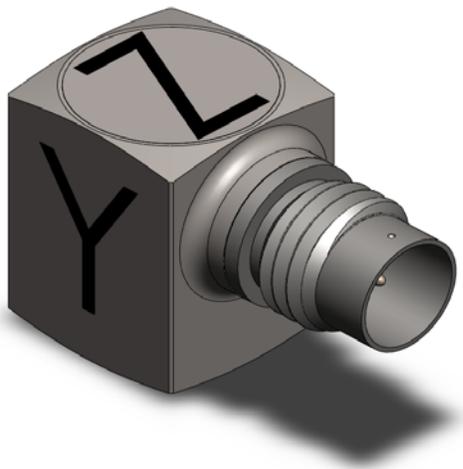
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OPERATING GUIDE

MODEL 3313A MINIATURE TRIAXIAL IEPE ACCELEROMETER

WITH SINGLE 4-PIN CONNECTOR



Model 3313A is a miniature, **Integrated Electronics Piezoelectric (IEPE)** triaxial accelerometer featuring a single, transverse mounted, 4-pin electrical connector. This feature allows the 3313A to be used in situations where vertical space is limited. Model 3313A is case grounded.

Model 3313A is available in 3 nominal sensitivities of 1mV/g, 5mV/g, 10mV/g. Additionally, high-temperature variations of these models are available.

This Guide contains:

- 1) Specifications, Model 3313A
- 2) Outline/Installation Drawing 127-3313A
- 3) Paper, "Low Impedance Voltage Mode (IEPE) 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.

OPERATING INSTRUCTIONS

3313A SERIES

INTRODUCTION

Model 3313A is a miniature three-axis accelerometer using the latest in quartz shear technology coupled with 2-wire internal IEPE electronics.

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 3313A is designed to mount by means of a 10-32 tapped hole in the base.

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 127-3313A for the dimensions of 3313A.

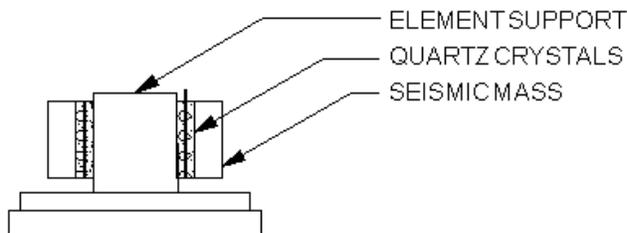


Figure 1 Representative cross-section, 3313A element assembly

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 3313A are delineated on the specification sheet included with this operating guide.

INSTALLATION

Refer to the Outline/Installation drawing 127-3313A for this section.

This accelerometer is designed for mounting by use of an adhesive mounting base with integral 10-32 stud such as Dytran Model 6213. The mounting base is threaded to the 3313A, then adhesive mounted to the test surface so the axes may be positioned as desired.

The bottom surface (the surface with the tapped hole) is the preferred mounting surface for Model 3313A and the one which is used at the factory for calibration. If the accelerometer is mounted on any other surface, its calibration cannot be guaranteed.

In order to precisely align the x and y axes, it is best to mount the 3313A to a mounting pad (such as the Dytran Model 6213 adhesive mounting base) which is then adhesive mounted to the test surface. Model 3313A2H may also be mounted with adhesives directly to the test surface without a mounting pad, but this is not the preferred method. First spread a light coat of silicone grease on the bottom surface of the 3313A, then thread the stud of the 6213 into the 10-32 tapped hole in the bottom surface. Torque to 15 Lb-inches.

On the test object, select a smooth surface approximately 0.75 in. in diameter and clean off all oil, debris and any contaminants or foreign matter which would preclude a good bond. Various adhesives may be used to mount Model 3313A 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.

If a fair significant displacement 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 3313A to the power unit.

OPERATION

The Dytran power unit designed to power the 3313A is the Model 4113B. This line-powered unit has a 4-pin connector jack similar to that on the 3313A. Cable Model 6811AXX connects the 3313A to the power unit. ('XX' is the cable length in feet)

Connect the 6811XX cable to 3313A by first rotationally aligning the locating tab, then engaging the rotating threaded collar and threading the collar on, hand tight.

Connect the other end of the cable to the 4-pin connector on the power unit and tighten threaded collar hand tight. As previously noted, tie 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 through each of the three axis positions to monitor the bias voltage of each of the three accelerometer element assemblies to check for normal operation. The bias voltage level appears on the front panel mounted voltmeter on the 4113B.

Consult the paper, " Integrated Electronics Piezoelectric" (IEPE) Theory and Operation", included as part of this manual, for instructions in using the bias monitoring voltmeter on the power unit as a check for normal operation and as an effective trouble shooting aid.

Although only one axis of the 3313A may be monitored with the front panel meter on the 4113B at a given time, each axis is continuously outputting data at the respective output jack at all times irrespective of the position of the monitor switch. Selecting a channel for bias monitoring does not affect the signal from that channel.

Connect each of the three BNC 'Output' jacks of the power unit to the readout instrument or data collector and proceed with the measurement. 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 define with arrows marked on the top surface of the 3313A and again, on the outline/installation drawing 127-3313A. The arrows indicate the direction and sense of motion of the accelerometer that will produce positive-going output signals. The vertical axis, Z-Axis or 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 but recommended on an annual basis, frequency of recalibration dependent on usage intensity and frequency.