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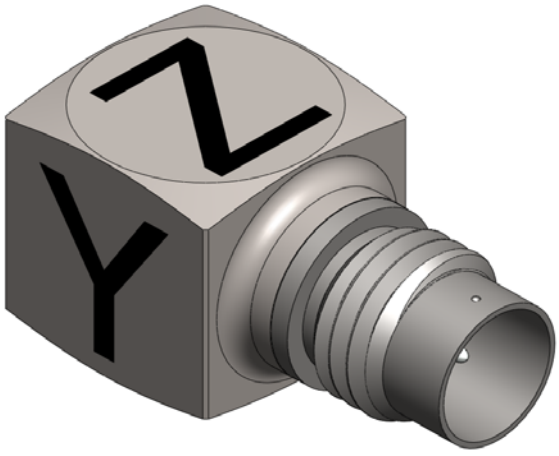
OPERATING GUIDE

MODEL 3023M27 MINIATURE TRIAXIAL LIVM^{tm} ACCELEROMETER

WITH SINGLE 4-PIN CONNECTOR,

CASE GROUNDED



Model 3023M27 is a miniature, **L**ow **I**mpedance **V**oltage **M**ode (**LIVM**)^{tm} triaxial accelerometer featuring a single, transverse mounted, 4-pin electrical connector. This feature allows the 3023M27 to be used in situations where vertical space is limited.

Model 3023M27 is case grounded.

The sensitivity of each of the three orthogonal axes of Model 3023M27 is nominally 10 mV/G.

This Guide contains:

1) Specifications, Model 3023M27
2) Outline/Installation Drawing 127-3023M27
3) Paper, "Low Impedance Voltage Mode (LIVM) Theory and Operation"

NOTE: LIVM^{tm} is Dytran's trademark for its line of **L**ow **I**mpedance **V**oltage **M**ode sensors with built-in amplifiers operating from constant current sources over two wires. **LIVM** instruments are compatible with most other comparable systems designated as **IEPE.**

OPERATING INSTRUCTIONS

MODEL 3023M27 TRIAXIAL ACCELEROMETER

INTRODUCTION

Model 3023M27 is a miniature three-axis accelerometer using the latest in quartz shear technology coupled with 2-wire internal LIVM 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 3023M27 mounts with adhesives into very small spaces since its vertical dimension is .360 in. It weighs only 3 grams.

LIVM (Low Impedance Voltage Mode) 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 127-3023M27 for the dimensions of Model 3023M27.

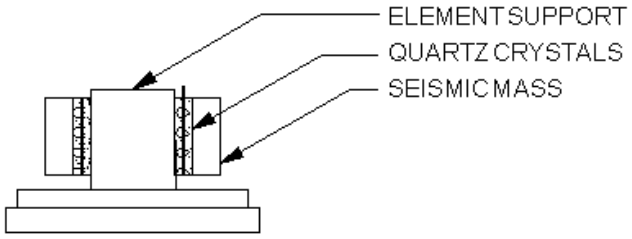


Figure 1 Representative cross-section, 3023M27 element assembly

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 LIVM 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 3023M27 are delineated on the specification sheet included with this operating guide.

INSTALLATION

Select a smooth surface approx. .50 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 use to mount Model 3023M27 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 3023M27 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 3023M27 to the power unit.

OPERATION

The Dytran power unit designed to power the Model 3023M27 is the Model 4113B. This line powered unit has a 4-pin connector jack similar to that on the 3023M27. Cable Model 6811AXX connects the 3023M27 to the power unit. ('XX' is the cable length in feet)

Connect the 6811XX cable to Model 3023M27 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, "Low Impedance Voltage Mode (LIVM) 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 3023M27 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 3023M27 and again, on the outline/installation drawing 127-3023M27. 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 fro 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.