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OG3093M18
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OPERATING GUIDE

MODEL 3093M18 MINIATURE HIGH SENSITIVITY

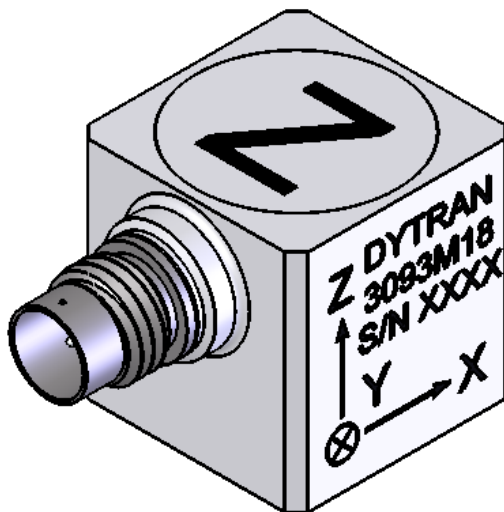
TRIAxIAL IEPE ACCELEROMETER

WITH SINGLE 4-PIN CONNECTOR

INTERNALLY CASE GROUND ISOLATED

WITH IEEE 1451.4 COMPATIBLE

TRANSDUCER ELECTRONIC DATA SHEET (TEDS) FUNCTION



Model 3093M18 is a miniature, **IEPE** triaxial accelerometer featuring a single, transverse mounted, 4-pin electrical connector. This feature allows the 3093M18 to be used in situations where vertical space is limited. The sensitivity of each of the three orthogonal axes of Model 3093M18 is nominally 10 mV/G.

This Guide contains:

- 1) Specifications, Model 3093M18
- 2) Outline/Installation Drawing 127-3093M18
- 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.

SPECIFICATIONS, MODEL 3093M18 TRIAXIAL ACCELEROMETER

SPECIFICATIONS	VALUE	UNITS
RANGE, F.S. (each axis, for ± 5 volts out)	± 500	G
SENSITIVITY, +15 -10% [1]	10	mV/G
FREQUENCY RESPONSE, +/- 5%	0.7 to 5000	Hz
ELEMENT NATURAL FREQUENCY, NOM.	30	kHz
DISCHARGE TIME CONSTANT, NOM.	0.4 to 0.7	SEC
EQUIVALENT ELECTRICAL NOISE	.006	G, RMS
LINEARITY [2]	1	%F.S.
TRANSVERSE SENSITIVITY, MAX,	6	%
OUTPUT BIAS VOLTAGE	+11 to +13	VDC
OUTPUT IMPEDANCE, TYP.	100	OHMS
TEMPERATURE RANGE	-60 to +250	$^{\circ}$ F
COEFFICIENT OF THERMAL SENSITIVITY	.03	%/ $^{\circ}$ F
MAXIMUM VIBRATION	3000	G
MAXIMUM SHOCK	5000	G
SIZE (HEIGHT x WIDTH x DEPTH)	0.60 x .59 x .59	INCHES
WEIGHT	10.0	GRAMS
CONNECTOR	4-PIN [3]	
SUPPLY CURRENT RANGE, (each axis) [4]	2-to 20	mA
COMPLIANCE (SUPPLY) VOLTAGE RANGE (each axis)	+18 to +30	VDC
MATERIAL, HOUSING/CONNECTOR	TITANIUM ALLOY	
ENVIRONMENTAL SEAL	HERMETIC	
MOUNTING [5]	MOUNTING STUD (10-32 UNF-2A)	
TEDS TEMPLATE	1451.4V1.0	

[1] Reference sensitivity measured at 100 Hz, 1 G RMS per ISA RP 37.2

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

[3] Connector mates with Dytran cable assy. Model 6430AXX. (XX = length in feet)

[4] Power only with Dytran LIVM 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.

[5] Case ground isolation is achieved by internal means.



OPERATING GUIDE

MODEL 3093M18 TRIAXIAL ACCELEROMETER

INTRODUCTION

Model 3093M18 is a miniature three-axis accelerometer using the latest in piezoceramic planar shear technology coupled with 2-wire internal LIVM electronics.

This accelerometer comprises 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 piezoceramic planar shear mode accelerometer elements mounted to a single ground-isolated support and welded into titanium alloy housing. The three elements are mounted orthogonal to each other so that they can measure the complete motion of a point.

Model 3093M18 is stud mounted into very small spaces since its vertical dimension is .59 in. It weighs only 10 grams.

LIVM (IEPE) design means that three miniature charge amplifiers are built into the instrument, one for each axis, to lower the impedance of the piezoceramic 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 improved noise immunity.

DESCRIPTION

Refer to the outline/installation drawing 127-3093M18 for the dimensions of Model 3093M18.

The electrical connections from the charge amplifiers for each element are brought out to the contacts of a single four-pin connector mounted transversely to one vertical face of the housing. The three signal/power connections to the elements are connected to each of 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 signal/power ground.

The performance specifications and criteria for Model 3093M18 are delineated on the specification sheet included with this operating guide.

INSTALLATION

This accelerometer is designed for stud mounting. If the accelerometer is mounted on any other surface, its calibration cannot be guaranteed.

Select a smooth surface approx of 0.7 in. in diameter and clean off all oil, debris and any contaminants or foreign matter that would preclude a good coupling.

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 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 3093M18 to the power unit.

OPERATION

The Dytran power unit specifically designed to power the Model 3093M18 is the Model 4114B1. This line-powered unit has a 4-pin connector jack similar to that on the 3093M18. Cable Model 6811AXX connects the 3093M18 to the power unit. ('XX' is the cable length in feet)

Connect the 6811XX cable to Model 3093M18 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 the first three 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 4114B1.

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 3093M18 may be monitored with the front panel meter on the 4114B1, 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.

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 in the outline/installation drawing supplied with the Operating Guide. The arrows indicate the direction of acceleration 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 UN-INSTALLATION)

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. 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.

