



Dynamic Transducers and Systems

21592 Marilla St. • Chatsworth, CA 91311 • Phone 818-700-7818
www.dytran.com • e-mail: info@dytran.com

OG3225E.DOC
REV B ECN 5368 7/28/08
REV C ECN 6935 8/30/10
REV D ECN 11096 7/1/13
REV E ECN 10685 02/20/14
REV F ECN 12483 02/05/16

OPERATING GUIDE MODEL 3225E MINIATURE PIEZOCERAMIC PLANAR SHEAR CHARGE MODE ACCELEROMETER WITH FIXED CABLE

This manual contains:

- 1) Specifications, model 3225E
- 2) Outline/Installation drawing 127-3225E
- 3) Operating instructions Model 3225E

SPECIFICATIONS

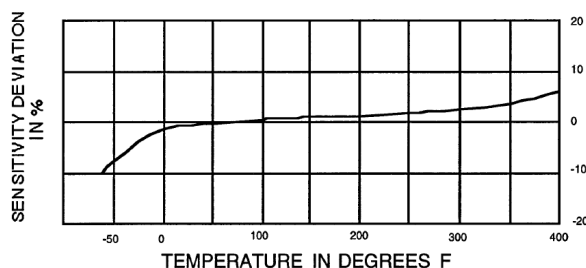
MODEL 3225E MINIATURE CHARGE MODE ACCELEROMETER

SPECIFICATION	VALUE	UNITS
PHYSICAL		
WEIGHT	0.6	GRAMS
SIZE (DIA x LENGTH HEX x HEIGHT)	0.25 x 0.36 x .150	INCHES
MOUNTING PROVISION	FLAT MOUNTING SURFACE FOR ADHESIVE MOUNT	
CONNECTOR, COAXIAL	10-32 JACK AT END OF FIXED 3 FT. CABLE	
CASE MATERIAL	TITANIUM	
SENSING ELEMENT	PLANAR SHEAR PIEZOCERAMIC	
PERFORMANCE		
SENSITIVITY, $\pm 20\%$ [2] [3]	2.0	pC/G
FREQUENCY RESPONSE, $\pm 10\%$	[3] to 10,000	Hz
MOUNTED RESONANT FREQUENCY	>60	kHz
AMPLITUDE NON-LINEARITY (ZERO BASED BEST FIT ST.LINE METHOD)	2.0	% F.S., MAX.
TRANSVERSE SENSITIVITY, MAX.	5	PERCENT
STRAIN SENSITIVITY	.0005	G's PER MICROSTRAIN @ 250/ $\mu\sigma$
ENVIRONMENTAL		
MAXIMUM VIBRATION	400	G's, RMS
MAXIMUM SHOCK	5000	G's, PEAK
TEMPERATURE RANGE	-60 TO 350	$^{\circ}\text{F}$
MAXIMUM SURVIVAL TEMPERATURE	+400	$^{\circ}\text{F}$
THERMAL COEFFICIENT OF SENSITIVITY	SEE CHART BELOW	
ENVIRONMENTAL SEAL	EPOXY	
ELECTRICAL		
CAPACITANCE INCLUDING ATTACHED 3 FT CABLE	490	pF
INSULATION RESISTANCE @ R.T.	5×10^8 MIN.	OHMS
OUTPUT SIGNAL POLARITY FOR ACCELERATION TOWARD TOP	NEGATIVE GOING	
CASE GROUNDING	CASE IS GROUNDED	

SUPPLIED ACCESSORIES:

- [1] MODEL 6591A INSTALLATION REMOVAL WRENCH
- [1] MODEL 6298 SMALL PETRO WAX

TYPICAL THERMAL SENSITIVITY GRAPH



NOTES:

- [1] MEASURED AT 100 Hz, 1 G RMS
- [2] A CALIBRATION CERTIFICATE TRACEABLE TO **NIST** IS SUPPLIED WITH EACH INSTRUMENT.
- [3] LOW FREQUENCY RESPONSE IS DEPENDENT UPON THE DISCHARGE TIME CONSTANT OF THE CHARGE AMPLIFIER.

OPERATING INSTRUCTIONS

MODEL 3225E MINIATURE CHARGE MODE ACCELEROMETER

INTRODUCTION

Model 3225E is a miniature, low profile, charge mode piezoelectric accelerometer designed to mount in spaces inaccessible to other types of accelerometers.

Featuring a titanium case and weighing only 0.6 grams, this instrument is ideal for the measurement of shock and vibration of very small, lightweight specimens such as printed circuit boards and board-mounted components.

Designed for adhesive mount, Model 3225E may be mounted in very narrow spaces only slightly greater than 1/8 inch (3.5 mm).

Model 3225E has a fixed 3 ft. long coaxial mounted to the case. At the end of this cable is a male thread lock type 10-32 connector to which an extension cable may be attached for longer runs to the charge amplifier. Standard Dytran low noise cable is recommended for use with the 3225E. Model 6019A cable, 10-32 to BNC, is recommended for most applications but the input connector of the charge amplifier will determine the specific cable chosen.

DESCRIPTION

Refer to outline/installation drawing 127-3225E.

Model 3225E is constructed in "teardrop" form with the cable at the end of the teardrop. The case and cover are made from titanium for low mass and high stiffness.

The electrical connector, mounted at the end of the three ft. cable consists of a 10-32 male thread coaxial jack.

Model 3225E generates an electrostatic charge mode signal by stressing two "planar shear" type self-generating piezoceramic crystals in response to input acceleration. The flat plate shear crystals are preloaded between a seismic mass and the flat face of the element base. The masses supply the shear stress to produce an electrostatic charge signal analogous to input acceleration.

Because of its very low mass and high crystal stiffness, this instrument has a resonant frequency greater than 60 kHz. This means that it may be used to measure high frequency vibrations with very little error.

INSTALLATION

IMPORTANT: Before mounting the Model 3225E, identify the mounting surface. It is the raised .210 diameter boss at the bottom of the instrument. The flat side is the top of the instrument.

DO NOT MOUNT TO THE TOP SURFACE.

Not only will the signal polarity be reversed and the sensitivity and frequency response be adversely affected but there is danger of damaging the top cap of the accelerometer when removing it, if mounted in the inverted position. This type of damage is considered abuse and is not covered by the manufacturer's warranty.

To install Model 3225E, it is necessary to select (or prepare) a flat surface to accept the .210 diameter mounting surface of the instrument. As a rule of thumb, the flatter the mounting surface, the better the high frequency response will be. A surface flat to .001 TIR will give excellent results when a thin glue line is used during mounting.

Clean the mounting surfaces with solvents such as alcohol or Freon, etc., to remove debris, oils and greases before mounting.

The recommended adhesives are the "instant" setting cyanoacrylate cements such as Eastman 910 and "Crazy Glue". Apply a very small drop to either mating surface, and simply press the 3225E to the mating surface with the finger and hold for 30 seconds. If the adhesive does not set, check the expiration date on the container. It is our experience that when the glue gets old, the first indication is that it will not set up properly. Replace if necessary.

Other types of adhesive may be used but consider them carefully. Dental cement is not recommended for this instrument because of its tenacity. Removal when this adhesive is used may harm the instrument.

In some cases, mounting waxes such as "Petro" wax may be used to mount the 3225E but this method is not suitable for measurements at high temperature and high frequency.

Irrespective of which adhesive is used, keep the glue line thin, i.e., don't use too much adhesive. Too much adhesive places a "spring" between the specimen and the instrument. This can create another second order spring mass system (the mass being the weight of the accelerometer) and can cause serious measurement errors at high frequencies.

OPERATION

To operate Model 3225E, it is necessary to use an electrostatic charge amplifier to convert the charge mode output signal from the accel. to a low impedance voltage mode signal which may then be fed directly to the readout instrument(s).

Recommended charge amplifiers for field use are the Dytran Series 4751B and 4705A. These converter type amplifiers convert the 3225E to Low Impedance Voltage Mode (**LIVM**) 2-wire operation. They are mounted in-line between the 3225E and the LIVM power unit and convert the pC/G signal to mV/G. These miniature charge amplifiers are available in four models with fixed sensitivities of 50, 10, 1, and 0.1 mV/pC.

Since the charge sensitivity of Model 3225E is nominally 2.0 pC/g, this yields nominal system sensitivities of 100, 20, 2, and 0.2 mV/G, respectively. Check the calibration certificate supplied with each instrument to determine the exact sensitivity to expect from your system.

For laboratory use, 3225E may be used with any vibration type laboratory charge amplifiers and even with most electrostatic types. Consult the factory if there is a question about compatibility with available charge amplifiers.

The cable designed for use as an extension cable for Model 3225E should be chosen to adapt the 10-32 jack of the 3225E to whatever connector is at the input of the charge amplifier you have chosen to use. Consult the factory for the best cable for your particular application. Remember, any extension cable must have a 10-32 plug at one end.

The polarity convention of Model 3225E is negative charge output from acceleration toward the top of the unit. This is so because most charge amplifiers are inverting amplifiers, hence the resultant system signal will be positive with the above input convention.

UNMOUNTING THE ACCELEROMETER

In order to "unmount" the Model 3225E, use the larger slotted end of the Model 6591A tool. Slip the tool over the accelerometer body from the rounded end and gently rotate the tool in either direction until the adhesive shears and the instrument is released.

Do not use pliers, wrenches and other tools to remove the instrument as these are certain to mar or otherwise damage the unit.

MAINTENANCE AND REPAIR

The only maintenance necessary is to keep cables and connections clean and free from moisture. All charge mode systems are considered high impedance systems and as such are susceptible to moisture which degrades insulation resistance.

Should a problem arise with the accelerometer or cable, contact the factory for assistance in trouble shooting or returning the instrument for evaluation and/or repair. Do not send the instrument back without first calling the factory to obtain a Returned Material Authorization (**RMA**) number.