



## **Dynamic Transducers and Systems**

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### **OPERATING GUIDE MODEL 3224C**

### **MINIATURE PIEZOELECTRIC CHARGE MODE ACCELEROMETER**

**This manual contains:**

- 1) Specifications, model 3224C
- 2) Outline/Installation drawing 127-3224C
- 3) Operating instructions Model 3224C

## OPERATING INSTRUCTIONS

### MODEL 3224C MINIATURE CHARGE MODE ACCELEROMETER

#### INTRODUCTION

Model 3224C is arguably, the world's smallest piezoelectric, charge mode piezoelectric designed to mount in spaces inaccessible to other types of accelerometers.

Featuring a titanium case and weighing only 0.2 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 3224C may be mounted in very narrow spaces only slightly greater than .138 inch (3.51 mm).

A 3 ft. long coaxial cable is permanently attached to the body of the accelerometer and terminates in a 10-32 coaxial male-threaded connector.

#### DESCRIPTION

Refer to outline/installation drawing 127-3224C.

Model 3224C is constructed in "teardrop" form with the connector at the end of the teardrop. The body is made from titanium for low mass and high stiffness.

Model 3224C generates an electrostatic charge mode signal by stressing two "shear" type self-generating piezoceramic crystals in response to input acceleration. The crystal is preloaded to a flat crystal support and is preloaded to this post by screws.

Because of its very low mass and high crystal stiffness, this instrument has a resonant frequency of about 40 kHz. This means that it may be used to measure high frequency vibrations with very little error.

#### INSTALLATION

**IMPORTANT:** Before mounting the Model 3224C, it is important to identify the mounting surface. It is the raised .129 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 3224C, it is necessary to select (or prepare) a flat surface to accept the .129 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 3224C 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 3224C 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 3224C, 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).

A recommended charge amplifier for field use is the Dytran Series 4751B. These instruments convert the 3224C to Low Impedance Voltage Mode (LIVM) operation. They are mounted in-line between the 3224C 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, 20, 10 and 1 mV/pC. This yields nominal system sensitivities of 30, 30, 12 and 0.6 mV/G, respectively.

For laboratory use, 3224C 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 supplied with Model 3224C is terminated in a jack type (male thread) 10-32 coaxial connector. The recommended extension cables are the Dytran low noise coaxial cables, model 6013AXX (10-32 plug to 10-32 plug) or the model 6053 (10-32 plug to BNC plug). Both cables mate directly with the cable attached the 3224C. Other cables are available if either of these does not meet your requirements. Contact the Dytran sales department for help in selecting the best cable for your requirement.

The polarity convention of Model 3224C is negative charge output for 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 3224C, use the Model 6725 tool. The larger slotted end of the tool is used for this purpose. 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.