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OPERATING GUIDE

MODEL 3035C

HIGH SENSITIVITY ULTRA-MINIATURE

CHARGE MODE ACCELEROMETER,

HERMETICALLY SEALED



NOTE:

Model 3035C features very low mass and hermetically sealed construction. Hermeticity is obtained by all-welded construction and glass-to-metal sealed connector. Electrical connection is via a transverse mounted 5-44 coaxial connector.

This guide contains:

- 1) Operating instructions, Model 3035C
- 2) Outline/installation drawing, 127-3035C
- 3) Specifications, Model 3035C
- 4) General Guide to Charge Mode Accelerometers.

OPERATING INSTRUCTIONS, MODEL 3035C MINIATURE CHARGE MODE ACCELEROMETER

INTRODUCTION

The Dytran Model 3035C accelerometer is a miniature charge mode, hermetically sealed instrument, designed to measure high frequency shock and vibration at high temperatures. Its small size and mass (only 2.5 grams) makes it ideal for measurement of very small test objects, especially where space is at a premium.

The self-generating planar shear mode seismic element, utilizing piezoceramic crystalline material, converts input acceleration (vibration and shock) to an analogous charge signal. This signal is connected to a miniature hermetically sealed 5-44 coaxial connector mounted transversely to the case of the instrument.

Simple in-line charge amplifiers such as Dytran's Model series 4705A may be used to convert the signal from the 3035C to LIVM (low impedance voltage mode) operation. Laboratory charge amplifiers may also be used to amplify and/or standardize the signal.

Model 3035C features hermetic sealed construction for normal operation in moist and dirty environments. The nominal sensitivity of Model 3035C is 2.5 pC/G.

The output polarity of Model 3035C is negative-going in response to acceleration toward the top of the instrument. This is because all Dytran charge amplifiers are inverting amplifiers and the resulting output signal will be in phase with the measurement.

DESCRIPTION

Figure 1, following, is a representative cross section of Model 3035C.

The seismic masses, made from a very dense tungsten alloy, are tightly preloaded against the piezoceramic crystals by means of a special preload screw under very high compressive force. This is so there is absolutely no relative motion between mass, crystals and base keeping the non-linearity low and the natural frequency high.

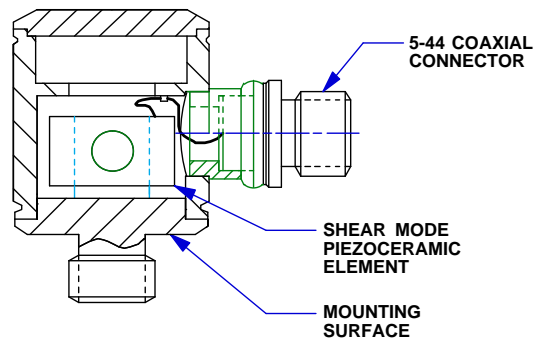


FIGURE 1 CROSS SECTION OF MODEL 3035C

The force from acceleration (vibration or shock) acting upon the mounting base, is transferred to the seismic mass through the crystals, stressing the crystals in shear mode and producing an electrostatic charge exactly analogous to the input acceleration. This signal is connected to the 5-44 coaxial connector radially mounted to the body.

INSTALLATION

(Refer to Outline/Installation drawing 127-3035C)

To install Model 3035C, it is necessary to prepare (or find) a flat mounting area of at least 1/4 inch diameter (Ø.250). Ideally, the mounting surface should be flat to .001 in. TIR. The flat mounting surface ensures intimate contact between accelerometer base and mounting surface for best high frequency transmissibility, thus accuracy.

At the center of the mounting area, drill and tap a 5-40 mounting port in accordance with instructions on drawing 127-3035C. Clean the area to remove all traces of machining chips, burrs, etc.

Next, thread the integral mounting stud of model 3035C into the tapped hole. The stud should enter easily and thread in up to the point where the mounting surface of the accelerometer meets the test mounting surface. Check to see that the mating surfaces are meeting properly, i.e., that they are meeting flush and that there is not an angle formed between the two surfaces indicating that they are not co-planar. If this condition is observed, torquing the accelerometer down will strain the base possibly causing poor frequency response and even erroneous reference sensitivity. Inspect the perpendicularity of the tapped hole.

After ensuring that the surfaces meet squarely, back the accelerometer out and spread a light coating of silicone grease, or other lubricant, on either of the mating surfaces and thread the accelerometer back into the tapped hole by hand, then torque the 3035C to the mating surface with 8 to 10 lb-inches of torque, preferably measuring the torque with a torque wrench torquing on the hex surface only.

Proper torque will ensure the best high frequency performance from the instrument as well as repeatability of sensitivity when mounting and remounting. Do not apply more than 10 lb-inches of torque when mounting the 3035C

Remember, the 5-40 integral stud is very small and overtorquing can break it.

Note: Since this is a charge mode instrument, only low-noise treated coaxial cable must be used to connect this instrument to its charge amplifier. We recommend cable series Models 6025AXX, (5-44 to 10-32 plug) or 6056AXX, (5-44 to BNC plug) to connect this accelerometer to the charge amplifier.

NOTE: Do not use a pliers or vise grips on the knurled lock ring of the cable. This could damage the connector of the 3035C and/or the cable connector.

To avoid stressing the cables which could lead to early failure, especially under larger excursions of the test object, it is good practice to tie the cable down to a fixed surface near the mounting area at a point approximately one inch from the accelerometer.

If there is excessive motion between the accelerometer and the nearest tie point, allow a strain loop of cable to allow relative motion to occur without stressing the cable.

THE CHARGE AMPLIFIER

This is a piezoceramic instrument and as such, it is usually used with an AC coupled charge amplifier rather than an electrostatic charge amplifier designed for use with quartz sensors. Because of the reduced insulation resistance of piezoceramic materials, direct coupled charge amplifiers will drift when the 3035C is connected to the input unless there is a provision for reduced time constant such as featured in the Dytran Model 4165 laboratory charge amplifier.

For this reason, it is best to use the in-line series of amplifiers such as the 4705A or a true vibration type charge amplifier which is AC coupled

Connect the other end of the cable to the charge amplifier and switch the power on.

HIGH FREQUENCY RESPONSE

All piezoelectric accelerometers are basically rigid spring mass systems, i.e., second order mechanical systems with essentially zero damping. As a result, these instruments will exhibit a rising characteristic as the resonant frequency is approached. Some charge amplifiers feature low-pass filtering to compensate for this characteristic.

The upper frequency at which the sensitivity may increase or decrease by 15% is approximately 10,000 Hz, the frequency to which the 3035C is calibrated. The accelerometer is usable above this frequency but to use it above 10,000 Hz, it must be calibrated at the specific frequencies of intended use because sensitivity deviations will increase drastically as you exceed this high frequency calibration limit. Consult the factory for special calibrations required above 10,000 Hz.

CAUTIONS

1) Do not store or use the 3035C above +400 degrees F. This could compromise the integrity of the piezoelectric crystals and result in modified sensitivity.

2) Do not allow cables to vibrate unrestrained. This will eventually destroy the cable and could lead to system inaccuracies.

3) If the 3035C is to be used in rapidly changing thermal environments, call the factory to ask about our thermal insulating boots.

4) Avoid dropping or striking the accelerometer, especially against rigid materials such

as concrete and metals. This type of damage is not covered by the warranty.

MAINTENANCE AND REPAIR

The welded construction of the Model 3035C precludes field repair.

Should the mounting surface become distorted, nicked and otherwise distressed, so as to make operation suspect, return the instrument to the factory for repair. We can take very fine machine cuts off the mounting surface to restore the flatness to original specifications.

Should the electrical connector become contaminated with moisture, oil, grease, etc., the entire instrument may be immersed in degreasing solvents to remove the contaminants. After degreasing, place the instrument in a +200 to +300 degree F oven for one hour to remove all traces of the solvent.

Should a problem be encountered with the operation of the instrument, contact the factory for trouble shooting advice. Often our service engineers may point out something which may have been overlooked and which may save the expense and time of returning the 3035C to the factory.

If the instrument must be returned, the service department will issue you a **Returned Materials Authorization (RMA)** number to aid in tracking the repair through the system. Do not send the instrument back without first obtaining an RMA number. At this time you will be advised of the preferred shipping method.

A short note describing the problem, included with the returned instrument, will aid in trouble shooting at the factory and will be appreciated.

We will not proceed with a non-warranty repair without first calling to notify you of the expected charges. There is no charge for evaluation of the unit.