The Model 9155 Accelerometer Calibration Workstation with its available ultra-low frequency options allows users to accurately calibrate accelerometers at low frequencies using a precision air-bearing extended long stroke shaker. The 10” (255 mm) stroke allows sufficient excitation for a usable frequency range as low as 0.1 Hz.

The -771 and -779 options both utilize a high sensitivity quartz ICP® back-to-back reference accelerometer specifically designed by PCB Piezotronics for low frequency comparison calibration from 0.5 to 500 Hz. The double-ended reference mounts to the long stroke shaker and provides a direct mounting surface for the Sensor Under Test. The quartz sensing element provides superior stability and performance compared to ceramic-based standards and the low impedance ICP® design nearly eliminates errors due to cable motion and signal degradation seen with charge accelerometers, particularly at low frequencies and large displacements.

In addition to the reference accelerometer, the -779 option utilizes a state-of-the-art optical encoder reference for unparalleled low frequency signal quality and performance. This reference measures displacement instead of acceleration, allowing for optimum performance by eliminating low frequency acceleration limitations due to stroke length. The result is greatly improved low frequency dynamic calibration, extended down to 0.1 Hz. The Accelerometer Calibration Workstation Model 9155 comes with the PCB Piezotronics “Total Customer Satisfaction” guarantee, and features back-to-back comparison calibration for both sensitivity and phase according to ISO 16063-21.
SPECIFICATIONS

Performance

-771 option [1]
-779 option [2]

Usable Frequency Range [1]
0.5 Hz - 500 Hz
0.1 Hz - 500 Hz

Shaker System

Type
Model 2129E025 Electrodynamic Air-Bearing Shaker

Maximum Force
8.8 lb [39 N]

Maximum Stroke p-p
p-p 10” [255 mm]

Air Pressure Required
60-80 psig [4-5.5 bar]

Power Amplifier
Integral Servo

Dual References Sensors

Type
Quartz ICP® accelerometer
Optical encoder/accelerometer

Frequency Range [1][2]
0.5 to 500 Hz
0.1 to 10 Hz/10 to 500 Hz

Sensitivity
500 mV/g (51 mV/(m/s²))
N/A

Resolution
0.00015 g-rms
10 nm

Low Frequency Response
(-5%) 305 Hz
DC

Discharge Time Constant
≥ 15 sec
N/A

Expanded Measurement Uncertainty [4]

0.25 - 0.5 Hz
N/A
3.0%

0.5 - 1 Hz
1.5%
1.1%

1 - 10 Hz
1.25%
0.8%

10 - 100 Hz
1.0%
1.0%

Physical

Dimensions Horizontal (H x W x D)
29.2 x 11 x 9.5 in [742 x 280 x 241 mm]

Dimensions Vertical (H x W x D)
16.6 x 11 x 18.2 in [422 x 280 x 462 mm]

Weight
62 lb [28 kg]

[1] -771 supplies only the accelerometer reference used from 0.5 to 500 Hz.
[2] -779 supplies both the optical reference (0.1 to 10 Hz) and the accelerometer reference (10 to 500 Hz).
[4] Per ISO with k=2 coverage factor using PCB Q353B51. Uncertainty below 0.25 Hz, above 100 Hz, is undefined.

Simple displacement calculations show us that a 1 g excitation level is unobtainable on conventional broad frequency range calibration exciters at low frequencies (dark blue trace). It logically follows that at low frequencies the output of both the calibration reference accelerometer and sensor under test also output lower signal levels at declining acceleration levels. By implementing a 255 mm stroke precision calibration exciter, the acceleration levels achievable at lower frequencies (light blue trace) remain above the rising noise floor of both the SUT and the reference accelerometer. With this increased excitation level, low uncertainty low frequency calibrations can be made to below 0.3 Hz with a 255 mm stroke and a 100 mV/g SUT (effective resolution of 420 micro-g per root Hz at 1 Hz).

Shaker Acceleration Limits vs Sensor Noise Floor and Recommended Excitation Level

Reference The Modal Shop’s Sensor & Cal Tips #43-Long Stroke Precision Calibration Exciter

The Modal Shop, Inc. offers structural vibration and acoustic sensing systems and services for various applications in design and test laboratories as well as manufacturing plants. An extensive sound and vibration rental program, precision calibration systems, and both modal and vibration shakers are designed to simplify test phases. Non Destructive Testing Systems help manufacturers provide 100% quality inspection of metal components. The Modal Shop, Inc. is a subsidiary of PCB Piezotronics, Inc., and PCB® is a wholly owned subsidiary of MTS Systems Corporation.

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