



MODEL 9155D-771/-779

**CALIBRATION TO 0.1 Hz**

## LOW FREQUENCY ACCELEROMETER CALIBRATION

- Significantly faster calibration times
- Achieves excellent signal to noise ratio
- Utilizes stable, quartz ICP® reference accelerometer designed for calibration from 0.5 to 500 Hz
- -779 option utilizes displacement-based optical reference sensor for performance down to 0.1 Hz
- Simple and accurate magnitude and phase calibration per ISO 16063-21
- Printed calibration certificates fulfill ISO 17025 requirements

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 useable frequency range as low as 0.1 Hz.

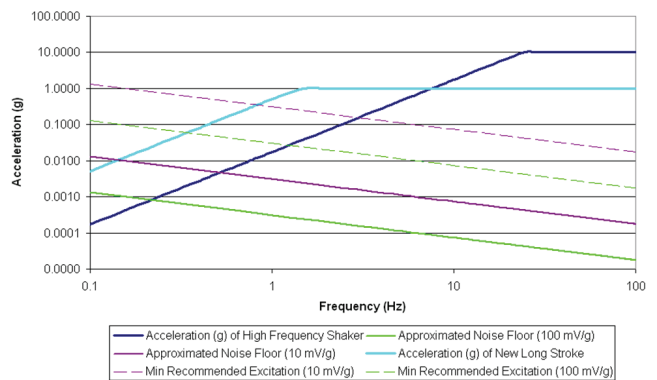
The -771 and -779 options both utilize a high sensitivity quartz ICP® back-to-back reference accelerometer specifically designed by PCB Piezotronics for low frequency comparison calibration from 0.5 to 500 Hz. The double-ended reference mounts to the long stroke shaker and provides a direct mounting 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 <sup>[1]</sup>	-779 option <sup>[2]</sup>
Usable Frequency Range <sup>[1]</sup>	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]	
Maximum Payload	4.4 lb [2 kg]	
Air Pressure Required	60-80 psig [4-5.5 bar]	
Power Amplifier	Integral Servo	
Dual References Sensors		
Type	Quartz ICP <sup>®</sup> accelerometer	Optical encoder/ accelerometer
Frequency Range <sup>[1][2]</sup>	0.5 to 500 Hz	0.1 to 10 Hz/ 10 to 500 Hz
Sensitivity	500 mV/g (51 mV/(m/s <sup>2</sup> ))	N/A
Resolution	0.00015 g-rms	10 nm
Low Frequency Response	(-5%) .035 Hz	DC
Discharge Time Constant	≥ 15 sec	N/A
Expanded Measurement Uncertainty <sup>[4]</sup>		
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).  
 [3] Local transverse resonance at ~ 200 Hz exceeds ISO recommended limits.  
 [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