



MB Win475

Low Frequency Calibration and Performance Verification

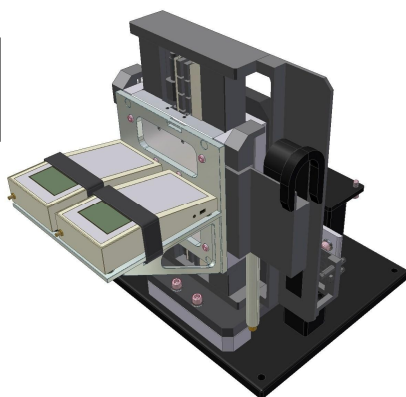


Low-frequency accelerometers, vibration meters and velocity transducers are used for bridge & building monitoring, shipboard measurements, suspension & ride quality, tilt/orientation and motion detection, safety systems, modal studies, train and off-highway equipment measurements, measuring rigid body motion, seismic surveys, whole body vibration monitoring, and making measurements where the data are integrated to yield velocity or displacement. Amplitudes in milli-g's and frequency ranges near DC are common. Gravity-sensitive devices must be properly oriented and may require measurements in multiple directions.

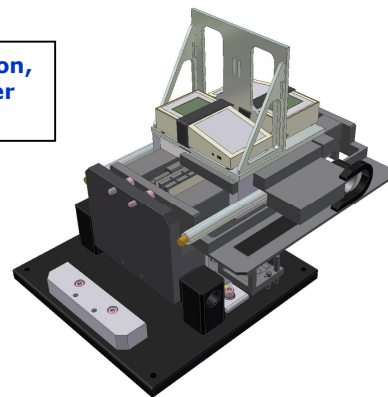
Calibrating these sensors or meters and verifying their performance involve jobs that arise regularly that need to be done. Users and device manufacturers require different technologies with unique specifications than those common for general-purpose vibration transducers.

JOBS-TO-BE-DONE	Win475-Low Frequency SYSTEM SPECS
<ul style="list-style-type: none"> ❖ Measure the nominal sensitivity at a single frequency for transducer or meter (DUT) ❖ Calibrate the DUT across its bandwidth of use (frequency response calibration) ❖ Compute & display sensitivity deviations from the nominal value at all measured frequencies ❖ Perform amplitude linearity checks of DUT ❖ Compare analog or digital signals from DUT against traceable vibration values from Win475 ❖ Adjust, tweak or trim meters, pots, and other DUT components to be within ranges and thresholds of DUT specs ❖ Verify that performance of DUT meets its vibration-related parameters / specs ❖ Perform all the above jobs in the vertical and horizontal directions of gravity-sensitive DUTs using CAL2-100HV exciter ❖ Archive results in a DUT database ❖ Print DUT-specific reports in end-user formats 	<ul style="list-style-type: none"> ❖ Performs and supports all Jobs-To-Be-Done ❖ Frequency range: 0.1 – 100Hz, usable to 0.07Hz ❖ Calibrates DUTs, meters, payloads weighing $\leq 5\text{kg}$ ❖ 1,200mV/g Reference Accelerometer (REF); $\pm 3\text{g}$ pk laser calibrated; traceable to national standards ❖ Expanded System Uncertainty: $\leq 1.0\%$, 0.5–10Hz ❖ System Transfer Uncertainty (excl. REF): $\leq 1.0\%$, 0.5–10Hz; Uncertainty Budget per ISO 16063-21 ❖ Accelerates payloads $\leq 5\text{kg}$ under sine vibration ❖ CAL2-100HV Exciter (below) calibrates DUTs in horizontal and vertical directions; 95mm stroke (100mm between stops); payloads $\leq 3\text{kg}$; 1.25 g's ❖ CAL2-300V Exciter (back page) calibrates DUTs in vertical direction; 280mm stroke (300mm between stops); payloads ≤ 300 grams; 1.25 g's ❖ CAL2-300H Exciter (back page) calibrates DUTs in horizontal direction; 280mm stroke (300mm between stops); payloads $\leq 5\text{kg}$; 1.25 g's pk

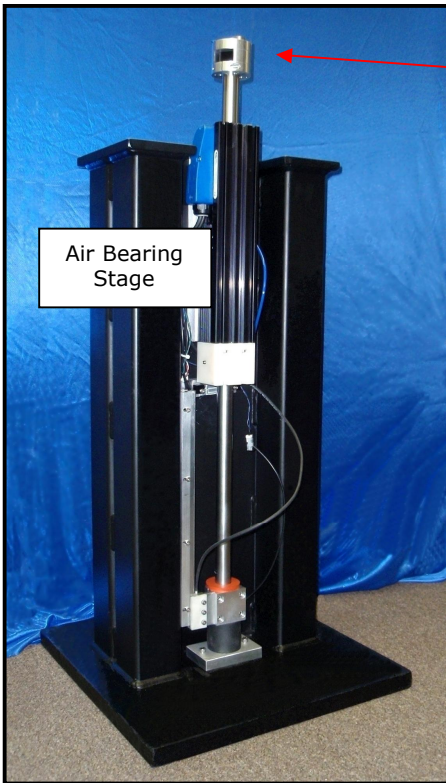
Vertical Excitation,
CAL2-100HV Exciter
with 3kg payload



Horizontal Excitation,
CAL2-100HV Exciter
with 3kg payload

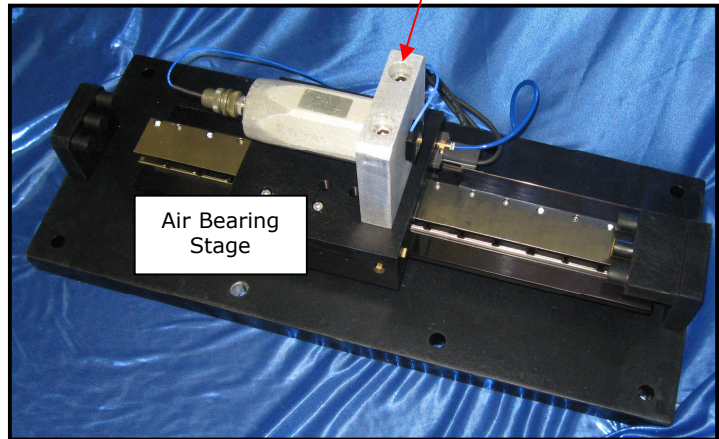


**Vertical Excitation,
CAL2-300V with 300mm p-p of stroke**



Air Bearing Stage

Test Instrument Mounting Fixture (TIMF) holds Reference Standard Accelerometer (REF) and accelerometer to be calibrated (DUT)



Air Bearing Stage

**Horizontal Excitation,
CAL2-300H with 300mm p-p between stops**

**Typical Acceleration, Velocity and Displacement Performance for
CAL2-300V and CAL2-300H Exciters (can achieve 1.25 g's pk \geq 5Hz)**

Parameter	0.1 Hz	0.2 Hz	0.5 Hz	0.8 Hz	1 Hz	2 Hz	5 Hz	10 Hz	20 Hz	50 Hz	100 Hz
Stroke, mm pk-to-pk	280	280	270	270	200	105	25	6.2	1.6	0.25	0.06
Velocity, m/s peak	0.09	0.18	0.42	0.67	0.63	0.66	0.39	0.2	0.1	0.04	0.02
Acceleration, g's pk	0.006	0.023	0.14	0.35	0.40	0.85	1.25	1.25	1.25	1.25	1.25

- ❖ ***Air bearing stage under position control and acceleration control***
- ❖ ***Advantages of air bearing stage:***
 - ❖ *Superior S/N and higher outputs at low frequencies due to long stroke*
 - ❖ *Shorten time to calibrate at lowest frequencies: ramp to desired acceleration within 5 sec*
 - ❖ *Utilize all available stroke for calibration: no overshoot during ramp-up*