



MB Win475

Automated Calibration System

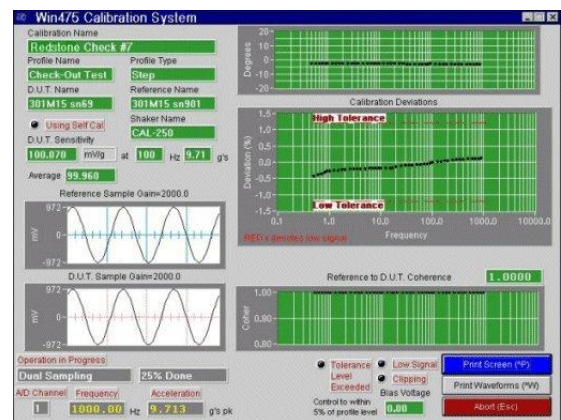
- Accelerometers and velocity transducers
- IEPE, charge, voltage, PR, capacitive, MEMS, TEDS
- Expanded System Uncertainty as low as 0.6%
- System Transfer Uncertainty as low as 0.55%
- Range: <0.1Hz – 55kHz, with options
- CAL25HF exciter: 1Hz-55kHz, 13mm, 20g's pk
- CAL50 exciter: 1Hz-10kHz, 25mm p-p, 55g's pk
- Swept & step sine, random and shock excitation
- FFT processing at calibration frequency
- PC-controlled signal conditioner minimizes errors
- DC measurements; ZMO & shunt calibration



The MB Win475 is an automated calibration system that slashes calibration costs, maximizes productivity, and assures repeatable low-uncertainty calibrations. It is cost-justified with as few as 50 transducers. System Transfer Uncertainty matches or surpasses more expensive alternatives. Labs can use the Win475 to comply for calibration of vibration transducers - with ANSI/NCSL Z540-1-1994 "Calibration Laboratories and Measuring and Test Equipment - General Requirements" and relevant requirements of ISO 9000 (ANSI/ASQC Q90 Series), ISO/IEC 17025, ISO 16063-21 and ISO 5347. Win475 satisfies ASME OM CODE-1998; SUBSECTION ISTB (invoked by NRC). The Win475 is a proven product with a sizable installed base. MB provides an Uncertainty Budget in accordance with ISO 16063-21.

Key Benefits

- Excellent Expanded System Uncertainty – see Table below
- Small uncertainty and affordable price = outstanding value
- Saves money, by replacing out-sourced calibration services
- Keeps calibration in-house; shortens turnaround time
- Proper calibration process and accurate records aid compliance during ISO audits
- Allows more frequent calibrations to assure good test data
- Automation eliminates human errors with manual systems
- Speeds-up calibration that frees-up users for other tasks
- Simplifies record-keeping
- Intuitive and self-tutorial -- ideal for infrequent users



System Configurations

Win475 Systems are characterized by key performance specifications: their Expanded System Uncertainty (ESU), method used to calibrate the Reference Standard Accelerometer (REF), frequency range of use, and mass of the transducer being calibrated (DUT).

MB defines System Transfer Uncertainty (STU) as the uncertainty of the Win475 measurement and vibration generation system, including the PC, data acquisition board, software, Model 405-X signal conditioner, calibration exciter, and power amplifier, but excluding the REF. MB evaluates STU in accordance with ISO 16063-21 "Vibration calibration by comparison to a reference transducer". STU is a measure of the ability of the calibration system to accurately transfer the uncertainty of the REF to the DUT.

The uncertainty of the REF is separately reported on its Calibration Certificate by the entity that calibrated it. MB offers two sources for the REF's sensitivity data: absolute calibration using laser interferometry and secondary or back-to-back comparison calibration. Absolute calibration provides smaller REF uncertainties, but is more expensive. However, REF uncertainty dominates ESU of the Win475 so there are real advantages to having low REF uncertainty values. User choices are provided to meet uncertainty needs.

Expanded System Uncertainty (ESU) combines STU and REF uncertainty, using the “square root of the sum of the squares” method (since they are independent parameters). ESU evaluates the uncertainty inherent to the Win475 calibration system itself. The user’s uncertainty budget related to DUT calibrations using the Win475 depend on the quality, resolution, sensitivity, etc. of the DUT, on operator skill and training, human errors, environmental conditions in a user’s lab and on many other factors unrelated to ESU. These factors do not impact STU or ESU.

Win475 System Configurations

System Name	ESU at 100 & 160Hz	Ref Calibration	Frequency Range	Mass of DUT
Win475-Standard, CAL25HF	±0.6%	Absolute	1 – 40,000Hz	< 910gm
Win475-Standard, CAL50	±0.6%	Absolute	1 – 10,000Hz	< 910gm
Win475-Basic, CAL50	±1.15%	Secondary	1 – 10,000Hz	< 910gm
Win475-Low Frequency	±0.6%	Absolute	0.1 – 100Hz	< 300gm
Win475-Low Freq, Heavy DUT	±0.6%	Absolute	0.1 – 100Hz	< 3kg
Win475-Multiple DUT	±1.15%	Secondary	5 – 4,000Hz	< 10gm, 4 max
Win475-Transverse Sensitivity	±1.15%	Secondary	30 – 2,000Hz	< 910gm
Win475-DC Accelerometers	±1.15%	Secondary	DC – 10,000Hz	< 910gm

STU, REF and ESU of Popular Win475 Systems

Frequency Range	System Name	STU	REF	ESU
1Hz	Win475-Standard, CAL25HF exciter (13mm p-p)	±1.4%	±0.3%	±1.5%
5Hz	Win475-Standard	±0.8%	±0.3%	±1.0%
50Hz	Win475-Standard	±0.7%	±0.5%	±1.0%
500Hz	Win475-Standard	±0.7%	±0.5%	±1.0%
1,000Hz	Win475-Standard	±0.7%	±1.0%	±1.25%
<5,000Hz	Win475-Standard	±0.7%	±1.0%	±1.25%
10,000Hz	Win475-Standard	±1.4%	±1.5%	±2.0%
20,000Hz	Win475-Standard	±2.5%	±2.0%	±3.5%
1Hz	Win475-Basic, CAL50 exciter (25mm p-p)	±1.4%	±2.0%	±2.4%
5Hz	Win475-Basic	±0.9%	±2.0%	±2.2%
50Hz	Win475-Basic	±0.7%	±1.5%	±1.6%
500Hz	Win475-Basic	±0.7%	±1.0%	±1.25%
1000Hz	Win475-Basic	±0.7%	±1.0%	±1.25%
<5,000Hz	Win475-Basic	±0.8%	±2.5%	±2.6%
10,000Hz	Win475-Basic	±1.5%	±2.5%	±3%
0.5Hz – 10Hz	Win475-Low Freq, CAL2-100HV (95mm p-p)	±0.8%	±0.3%	±1.0%
0.5Hz – 10Hz	Win475-Low Freq, CAL2-300V or H (280mm p-p)	±0.8%	±0.3%	±1.0%
>10Hz – <100Hz	Win475-Low Freq, CAL2-300V or H (280mm p-p)	±0.8%	±0.3%	±1.0%

Standard Features, Designed with Users in Mind

- Calibrates virtually all accelerometers regardless of size and weight including: Charge, Low impedance, Voltage, Servos, Strain Gage, Piezoresistive, Capacitive, TEDS, and AC- and DC-coupled
- Calibrates displacement and velocity transducers, even those with a built-in meter and no AC output
- No operator adjustments required for gain, vibration levels, etc. Software-control virtually eliminates operator error, enhances repeatability and ensures optimum signal-to-noise ratio and minimizes uncertainty
- Operator is not required to adjust amplifier gain levels, knobs or switches to perform a calibration
- Combination charge, displacement, voltage and low impedance voltage mode dual-channel signal conditioner
- System Transfer Uncertainty (STU) is evaluated as a “total system”, by computing it from a “summation of many independent components” as stipulated in ISO 16063-21
- STU provides values across frequency bands, not one number
- Users can measure and re-verify STU at any future time
- Repeatability of nominal sensitivity at 100 Hz, 40 runs, @ 95% confidence level = average ± 0.075%
- Uses “back to back” mounting where each transducer is bolted to a fixture that attaches to the exciter’s moving element. Uses “single-ended” REF.

- Wide frequency range with one of two exciters, either 1-55kHz or 1-10kHz
- Longest stroke for broadband exciter, 13mm p-p and 25mm p-p
- Highest acceleration level of broadband exciter, 20 g's pk and 55 g's pk
- Calibration range not limited by DUT mass
- Compact bench-top package, conserves floor space; 19" rack not needed; can be supplied as an option
- NIST traceability
- Turnkey solution
- Real time display of waveforms
- Software performs amplitude linearity checks
- Internally compensated "total channel" calibration
- 100dB signal gain-ranging maximizes signal-to-noise at every signal level, using software-controlled Model 405-X Signal Conditioner and PCIe board or USB module
- Diagnostic software performs real-time monitoring and alarm of critical areas of operation and signal paths
- Unique "Self Check" quickly verifies system operation
- Manual Mode allows for "quick check" of transducers with full measurement accuracy
- Win475-Standard supports a Test Accuracy Ratio (TAR) of 4:1 while calibrating 5% devices
- Win475-Low Frequency Option delivers excellent performance on low sensitivity DUTs that must be accurately calibrated at below 1.0 Hz frequencies (as low as 0.07 Hz)
- Latest-generation Intel PC with ample hard drive and CD to store data locally or archive on a network server
- Conventional Windows file structure, folders, etc.
- National Instruments LabWindows GUI and LabVIEW
- Menu-driven application software under mouse control
- Integrated test information database
- Aids scheduling and recall of transducers for calibration
- Permits comparison against historical results
- Password protection of critical set-up data
- English and SI units
- Several report formats (customizable)
- Automates repetitious and boring calibration tasks
- Provides a label printer for inserting Cal Label in accelerometer box
- Manuals written for users who are not vibration or electronics technicians/engineers
- Outputs ASCII file formats for use with any Windows-compatible application, such as Excel or Access

SYSTEM SPECIFICATIONS

Configuration:	Desktop PC running under Windows 7, Vista and XP Dual channel signal conditioner, Model 405-X Dual channel signal processor, Nat'l Instr. Model PCI, PCIe, or USB Calibration exciters: CAL50, CAL2-300V & H, CAL2-100HV, and CAL25HF Power amplifier, Model MB500VI or MB P7000S or equivalent Reference transducer, traceable to NIST	
Calibration Method:	User selectable: back-to-back or piggyback	
Inputs:	Charge:	0.01 pC/g to 8333 pC/g (limited by 10V max) OR 0.1pC/g to 99,999 pC/g (limited by 10V max)
	IEPE/Voltage:	0.01 mV/g to 99,999 mV/g (limited by 10V max)
	Velocity:	0.1 mV/ips to 99,999 mV/ips (limited by 10V max)
Input Impedance:	Charge:	> 1G ohm
	Voltage:	> 100 M ohm
	IEPE:	> 100 K ohm
Frequency Range:	Acceleration:	0.07 Hz to 55kHz
	Velocity:	60 CPM and above
Operating Temperature:	10 to 40°C ambient air, without loss of performance	
Operating Humidity:	20% to 50% relative humidity	

Options

- Low frequency calibration as low as 0.07Hz on devices weighing up to 3kg
- Resonant search out to 55kHz
- Software and hardware compliant with ISO 16063-21
- Automation Package to upgrade existing manual calibration shaker, amplifier and REF accelerometer
- NIST-traceable reference accelerometers, calibrated by primary or secondary methods
- Reference accelerometer with 70kHz resonance and highly-stable sensitivity over time & temperature
- Shock calibration up to 2,000 g's and up to 10,000 g's with <100µsec duration
- Temperature sensitivity measurements, two options: +500 degC to -185 degC; +220 degC to -75 degC
- CAL25HF air bearing shaker conforming to ISO 16023-21 shaker specifications
- Transverse sensitivity measurement of accelerometer cross-axis performance
- Simultaneous calibration of four (4) and eight (8) accelerometers
- Simultaneous frequency response calibration of tri-axial accelerometer
- Measurement of resistance, capacitance and isolation of accelerometers
- Calibrate heavy transducers and switches up to 4.5kg at 10g's pk with Win475-Heavy Transducer Option
- Programmable voltage excitation sources under software (DIO) control: -30VDC to 0 and 0 to +30VDC
- NIST-traceable Calibration Re-Certification Kit for data acquisition hardware
- Rack-mount cabinet
- Desk-style workstation consoles
- Measurement of accelerometer rectification error
- User Training – at MB or end-user site

