



# Model 405-X Signal Conditioner

for use with MB Win475 Vibration Transducer Calibration Systems

The MB Dynamics Model 405-X Dual-Channel Signal Conditioner is designed for use with MB's Win475 Automated Vibration Transducer Calibration System. It provides multiple sources of excitation voltage and/or current, programmable gains, and circuitry to work with virtually all types of vibration transducers over a very broad frequency range. It is supplied "standard" as a bench-top or, optionally in a rack-mount enclosure. It can be tailored to connect to virtually any input transducer type and connector used by your facility through the use of MB or user-supplied "Personality Modules" which adapt the DUT to the unit's D-Sub Front Panel Input connector. It is powered from standard electrical outlets and auto-selects to virtually all world-wide voltage standards via the rear panel AC input connector. The unit provides all required filtering functions, programmable gain, and very low noise circuitry, all necessary to make quality measurements with the low Expanded System Uncertainty (ESU) expected from calibration systems.



Parameters	Specifications
Transducer Types Supported	Single-ended Piezoelectric Charge; 4-pin Voltage; Bridge (including strain gage); Piezoresistive; IEPE (Integrated Electronics Piezoelectric requiring constant current source); Variable Capacitance; Servo; Velocity; Displacement
Gain Adjustment	Gain Selection is automatically made for both REF and DUT channels under Win475 Program Control to optimize signal-to-noise ratio; gains from 0.5 to 1000 are achievable in 1/2/5 increments (405-X combined with Win475 Data Acquisition board/module)
Hardware Filtering	All inputs high pass filtered at 0.01Hz (-3dB, 2 pole Butterworth) for dynamic measurements
Calibration Frequency Range	0.1Hz minimum, 20kHz maximum, 50kHz maximum for mounted resonant frequency search
Program Communications	Via high density shielded data cable to National Instruments data acquisition board/module Internal PC backplane plug-in board standard; External USB data acquisition module optional



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Transducer Electrical Parameters Measured (via connection to data acquisition hardware)	Bridge/PR Devices: Sensor input and output resistance; Zero Measurand Output (ZMO); Excitation Voltage; Shunt Calibration values including user software selection of which of four (4) legs to shunt IEPE Devices: Bias voltage
Excitation Sources	5VDC, $\pm 12$ VDC, and software adjusted bridge excitation from 2VDC to 15VDC, IEPE at 24VDC and nominal 4mA
Bridge Completion	User configures at Personality Module input connector
Channel Gain Match	<0.1% from 5Hz to 10kHz, 0.5% at 0.5Hz and 20kHz
Channel Phase Match	<1° from 5Hz to 10kHz, 2° at 0.5Hz and 20kHz, corrected to within 1° over full 0.1 to 20kHz range by software "self-cal"
Noise	<100 $\mu$ V <sub>RMS</sub> on any channel
Input Impedance	Charge: >100M $\Omega$ ; Voltage and IEPE: >100K $\Omega$ ; Bridge: >100K $\Omega$
Output Impedance	<50 $\Omega$ on all monitor outputs, DAC output, and all ADC Inputs
Input Sensor Range	Voltage, IEPE, Variable Capacitance, Servo, Bridge, and Velocity: Minimum 1mV, maximum 10V, customer to adjust test level within these ranges Charge: Minimum 0.1pC, maximum 250pC, customer to adjust test level within these ranges
Integration	Unit can be used to measure outputs from accelerometers, velocity transducers, or displacement transducers as the Device Under Test (DUT); Software performs single integration of REF accelerometer to calculate velocity; Software double integrates REF acceleration to calculate displacement at driven frequency
User Interface	Front Panel LED's for Channel Type and Gain
Connectors – Front Panel	BNC input for IEPE, Volt REF Transducer; DB-9 port provides $\pm 12$ VDC Excitation for Volt REF; BNC input for Charge, IEPE DUT Transducer; DB-15HD input for all other DUT transducer types via MB or user-supplied personality module connection
Connectors – Rear Panel	AC Line Input; REF and DUT Channel Monitor BNC's; DAC Output BNC (to drive system Power Amplifier)
TEDS Compatibility	Reads TEDS devices as DUT; Reads other types of electronic ID (user to specify at time of order)
Ambient Temperature & Humidity	Temperature & Humidity automatically measured and recorded during tests via built-in sensor
Power	90-264VAC, 47-63Hz, 65W max.