

TEST & MEASUREMENT



SHAKERS



Wilcoxon Sensing Technologies shakers



Wilcoxon piezoelectric and electromagnetic shakers are used to provide reliable structural excitation of a test article within a controlled, localized environment. By simulating such dynamic forces and natural frequencies, shakers can be used along with accelerometers and other vibration monitoring devices to reveal cracks, defects, weaknesses or other abnormalities, allowing engineers and test technicians to better predict structural behavior over time.

- » Structural testing
- » Material studies
- » Product testing
- » Quality assurance
- » Research and development
- » Modal testing

Piezoelectric shakers

- » Compact, lightweight
- » Sonic and ultrasonic structural excitation
- » High frequencies
- » Stud-mounted directly to structures in any position
- » No external support or critical shaft alignment problems

Wilcoxon's piezoelectric reaction shakers utilize the expansion and contraction properties of piezoelectric crystals to generate sonic and ultrasonic structural excitation. These lightweight, portable shakers generate large dynamic forces at very high frequencies, where materials such as semiconductor components and high-strength metals begin to break apart.



Wilcoxon model	F7	F7-1	F4 / F7
Description	Piezoelectric shaker	Piezoelectric shaker	Electromagnetic/piezoelectric dual shaker system
Impedance head	Integral	N/A	Integral
Frequency range	500 - 20,000 Hz	1,000 - 80,000 Hz	F4 = 10 - 7,500 Hz F7 = 500 - 20,000 Hz
Nominal force output	100 lbs (45.36 kg)	10 lbs (4.54 kg)	100 lbs (45.36 kg)
Diameter	2.20 in. (5.59 cm)	2.20 in. (5.59 cm)	5.10 in. (12.95 cm)
Weight	2.5 lbs (1.1 kg)	2.8 lbs (1.3 kg)	8.2 lbs (3.7 kg)
Recommended matching network	N7FS	N8HFS	N7FS

Electromagnetic shakers and impedance heads

- » Low frequency applications
- » Integral impedance heads measure acceleration and force
- » No matching network required
- » Can be combined with piezoelectric shakers for wider operational bandwidth

Electromagnetic shakers operate on the principle of magnetism. A magnetic field is formed as electrical current runs through a wire. As the wire is wound in a coil, this effect is multiplied and can be manipulated by changing the direction and amplitude of the current. When magnets are fixed on either side of the coiled wire, and alternating electric currents are allowed to flow into the coil, a vibratory motion will develop. This motion is then directed towards the object under test, essentially “shaking” it. Electromagnetic shakers excite

primarily at low frequencies and can be used to measure components such as the first bending mode of airframes or ship hulls. The shaker is available on its own or with an included impedance head.

The impedance head is a transducer consisting of two sensing elements – a force gage and an accelerometer. The force gage references the force acting between the shaker input connection and the test item connection, while the accelerometer senses the acceleration on the shaker face.



Wilcoxon model	F3 / Z602WA	F4 / Z820WA	F10 / Z820WA
Description	Electromagnetic shaker system	Electromagnetic shaker system	Electromagnetic shaker system
Impedance head	Z602WA	Z820WA	Z820WA
Frequency range (Hz)	25 - 10,000 Hz	10 - 7,500 Hz	5 - 2,000 Hz
Nominal force output	1 lb (0.45 kg)	10 lbs (4.54 kg)	20 lbs (9.07 kg)
Diameter	2.26 in. (5.74 cm)	5.10 in. (12.95 cm)	8.25 in. (20.96 cm)
Weight	0.83 lbs (0.38 kg)	6.8 lbs (3.08 kg)	28.0 lbs (12.70 kg)



Model F3



Model F4



Model F10

Support equipment

Matching networks

Matching networks provide the interface between power amplifiers and piezoelectric shakers, providing voltage increases to allow the shaker to be driven at its full voltage level. At very high frequencies, lower output voltages are used to better match the reactive load. Additional functions can include channel separation, distortion reduction, and fusing.

Wilcoxon model	N7FS	N8HFS
Output voltage, max	100, 200, 300, 500, 800 V	360 V
Compatible shakers	F7	F7, F7-1
Dimensions, WxHxD (including handles)	19x7x13 in. (48.3x17.8x33.0 cm)	19x7x13 in. (48.3x17.8x33.0 cm)
Weight	37 lbs (16.8 kg)	25 lbs (11.4 kg)
Recommended amplifier	PA10A	WST7B ³

Power amplifier

The PA10A and WST7B³ operate with Wilcoxon's piezoelectric and electromagnetic shakers and matching networks., and acts as the direct drive of models F4 and F10.

Wilcoxon model	PA10A	WST7B ³
Max power output	400 watts	900 watts
Frequency response (-3 dB)	0.4 Hz to 40 kHz	electromagnetic shaker loads: 0.5 Hz to >20 kHz piezoelectric shaker loads: 500 Hz – 150 kHz
Maximum signal	3.9 V rms	2.4 V rms (3.39 peak/peak)
Signal gain	max 26 dB, adjustable	29 dB (high) or 23 dB (low)
Maximum output	38 V rms	70 V peak (50 V rms)
Power requirements	100-120 VAC or 220-240 VAC	WST7B3 115 VAC, 15 A WST7B3-230 230 VAC, 15 A
Dimensions, WxHxD	3.5 x 17.3 x 14.6 in (9 x 44 x 37 cm)	19 x 5.25 x 17.75 inches (48 x 13 x 45 cm)
Weight	53 lbs (24 kg)	8.5 lbs (3.9 kg)
Compatible with	F3, F4, F10 F7 N7FS, N8HFS	F3, F4, F10 F7, F7-1 N7FS, N8HFS

Contact us

For application support, customer service, or general inquiries, contact Wilcoxon via email at info@wilcoxon.com, by phone at +1 (301) 330-8811, or through the contact form on our website at wilcoxon.com/contact-us.

Resources

Shaker operating manuals can be found online at wilcoxon.com/resources/user-manuals.

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