



## Models D60H/D60L/D125L Piezoelectric shake tables

Models D125L, D60H and D60L Piezoelectric Shake Tables are designed for use in the vibration test and analysis field. They utilize the properties of piezoelectric crystals for high level sonic and ultrasonic structural excitation.

Conventional large electromagnetic shakers are limited to a frequency range of only several kHz while piezoelectric shake tables allow operation past 20 kHz. The largest piezoelectric shaker, Model D125L, surpasses the capabilities of a 3,000 pound (13,000 Newton) electromagnetic shaker at frequencies above 4 kHz. Piezoelectric shakers can be mounted on top of large electromagnetic shakers to provide both low and high frequency capabilities in one set-up.

Piezoelectric shakers consist of three main components: the table, the compliant piezoelectric stack and the base mass. Below the fundamental resonance frequency of this system, the output for a given input voltage is displacement controlled. For example, If the displacement is 1 micron per 1000 volts input, the resulting acceleration is 4 g at 1 kHz or 100 g at 5 kHz. The acceleration of the table is proportional to the square of the frequency.

Above the fundamental resonance frequency the output is force controlled up to 3000 Newton peak (1500 Vrms input) for the D60 models and up to 13,000 Newton peak (1500 V rms input) for the D125L model. Larger shakers with greater output can be produced on special order.

The output of the shaker with a typical test specimen attached to the table is dependent on the mechanical impedance of the specimen. At anti-resonances (maximum impedance) the displacement of the table is a minimum, but the specified force is delivered, provided that the impedance of the base mass is sufficiently high. At the resonances (minimum impedance) the table acceleration must be limited to the specified levels.

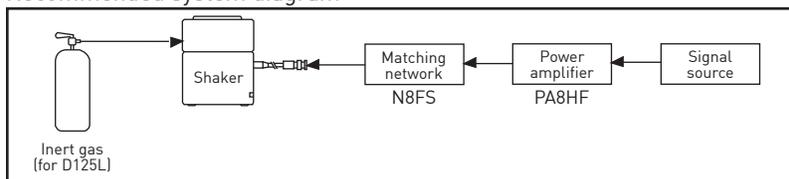
Piezoelectric shakers present a capacitive (reactive) load to power amplifiers, therefore the electrical impedance decreases with increasing frequency. A large power amplifier is required to drive a shaker at maximum voltage to its maximum frequency. Smaller amplifiers may be used to drive the shaker at maximum output at lower frequencies.

	D60H	D60L	D125L <sup>1</sup>	Units
<b>Dynamic</b>				
Output per volt Input <sup>2</sup> :				
Displacement.....	5 x 10 <sup>-7</sup>	1.5 x 10 <sup>-6</sup>	8 x 10 <sup>-7</sup>	mm
Force .....	0.25	0.35	2.21	lb
Recommended frequency range <sup>3</sup>	3 - 50	2 - 20	2 - 20	kHz
Maximum allowable acceleration				
Table free .....	1,500	1,500	1,800	g rms
Table loaded with 1 kg mass.....	250	250	1,200	g rms
Table loaded with 10 kg mass.....	25	25	270	g rms
Resonant frequency, nominal:				
Table free .....	17	10	10	kHz
Table loaded with 1 kg mass.....	9	5	8	kHz
Table loaded with 10 kg mass.....	5	2	4	kHz
<b>Electrical</b>				
Maximum input voltage .....	—————	1500	—————	V rms
Input power requirement <sup>4</sup> :				
1000 V to 10 kHz.....	250	700	2,500	W
1000 V to 20 kHz.....	500	1,400	5,000	W
1500 V to 10 kHz.....	350	900	3,100	W
Input capacitance.....	0.004	0.011	0.037	µF
<b>Physical</b>				
Weight .....	8.8	13.0	99.0	lb
.....	4.0	6.0	45.0	Kg
Connector.....	HV BNC	HV BNC	15' integral cable with spade lug termination	
<b>Environmental</b>				
Temperature range.....	—————	-35 to 80	—————	°C

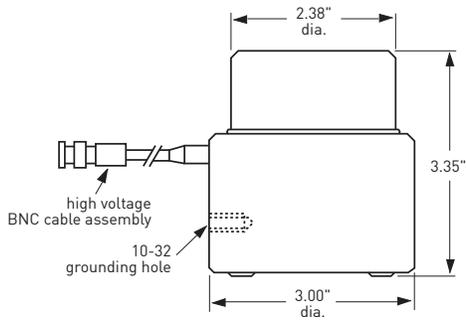
- Notes:
- <sup>1</sup> A static source of inert gas (nitrogen is recommended) at 1,800 psi min. (124 Bars) is required and must be connected to the pressure fitting on the side of the shaker through a 1/4" high pressure hose and a 1/4" x 37° flare swivel fitting (7/16-20 threaded coupling).
  - <sup>2</sup> Whichever is smaller, below first resonance output is displacement limited, above first resonance output is force limited.
  - <sup>3</sup> Usable outside this range.
  - <sup>4</sup> Power requirements within a narrow frequency range can be reduced by inductive tuning.

Options: Customer specified bolt hole pattern and temperature range.  
 Accessories supplied: 12 ft extension cable for D60H and D60L only. D125 has 15'  
 Accessories available: Power amplifier, matching network, high pressure supply hose (see note 1).

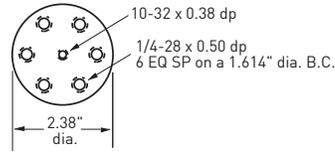
### Recommended system diagram



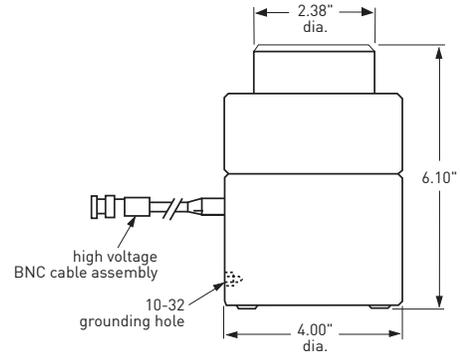
# Models D60H/D60L/D125L



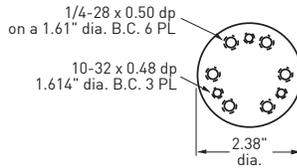
Model D60H



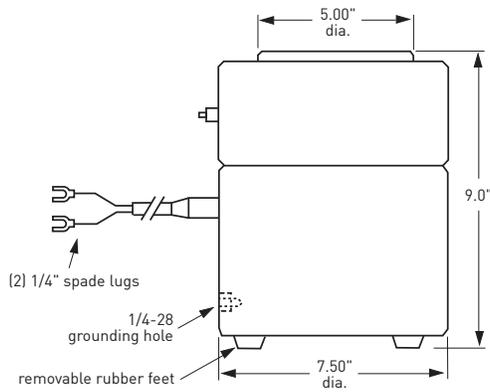
D60H bolt hole pattern



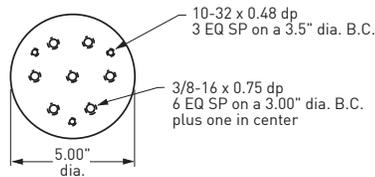
Model D60L



D60L bolt hole pattern

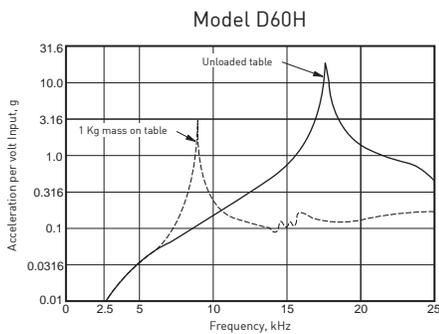


Model D125L

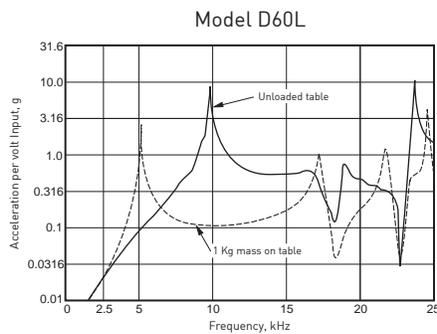


D125L bolt hole pattern

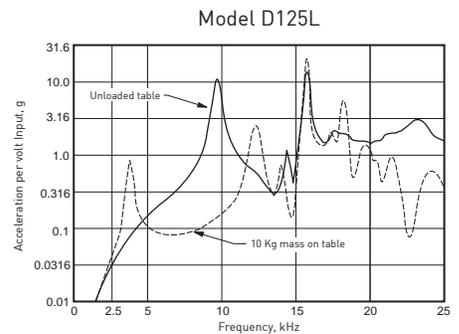
## Output versus frequency



Model D60H



Model D60L



Model D125L

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