

Lightning: Seismic Vibrator Data Sheet

The Lightning is an electromagnetic seismic vibrating source ideal for shallow (200m) geological exploration and engineering projects. The electric actuator is positioned within the source plate and can be rotated through 90° in order to generate shear (S) and primary compression (P) waves. Powered from a 48VDC battery bank or 230V power supply the Lightning can be deployed to suit the constraints of the survey area.



Lightning Seismic Vibrating source mounted to an ATV for deployment on difficult terrain.

For larger area coverage the lightning can be fitted to an electric lift mounted to the front or rear of a vehicle, via a standard tow hitch. When mounted on an ATV the lightning can access even the most remote locations. The lift will also apply additional load to the source plate enhancing ground coupling.

In urban areas where vehicle access is restricted, the system can be deployed on an electric trolley. With an electric

drive motor and mount for the electronics and battery module the trolley can be manoeuvred by a single operator. The concept has been further developed into a full remote control vehicle deployment for use in mines and tunnels.

For sites constrained by surface furniture (railings, dust bins, lamp posts etc....) the source plate can be positioned use a hand trolley and loaded with blast.



Lightning source in P (top) & S (bottom) wave configuration.

Features

- High quality vertical resolution
- Wide frequency range
- Low THD
- P-waves & S-Waves

- Easy handling and easy transportation
- Highly repeatable signals
- Very low maintenance
- Very low noise emission
- Watertight up till 20 bar
- User specified sweep taper
- Reaction Mass and Base plate accelerators
- Compatible with all leading seismographs

If 1700N of force wont cut the mustered, multiple lightning systems can be synchronised to double the output force, and the system will still run off a 48VDC supply. The phase and time zero are synchronous to within 8us enabling bespoke portable source arrays for both near surface site investigation and structural dynamics testing.



Lightning Dual Source configuration (image courtesy of Seismic-Mechatronics)

Product Dimensions

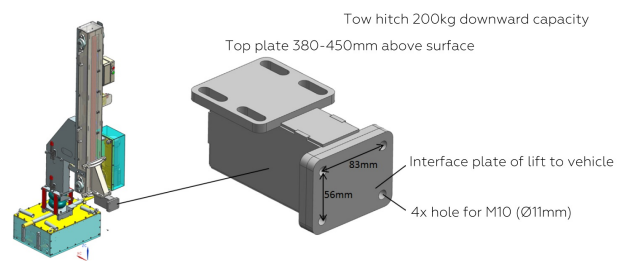
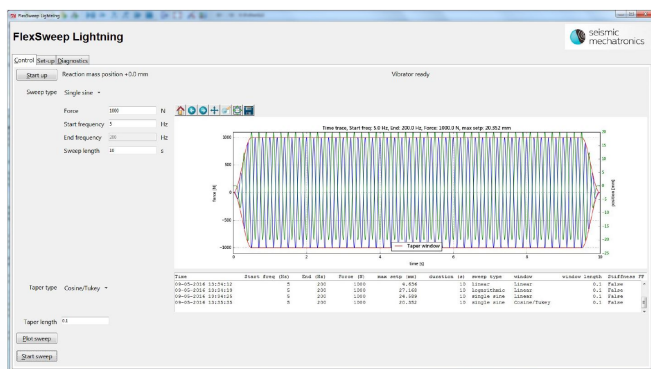
| Physical | Dimensions (L x W x H) | Weight |
|-------------------|------------------------|--------|
| (instrument only) | 0.4m x 0.4m x 0.15m | 90kg |

Technical Specifications

| | |
|------------------------------|--|
| Frequency Range: | 1 — 1000Hz (start taper at 1 Hz) |
| Full Drive Frequency: | 8 — 400Hz |
| Force: | S-wave: 1700N (400lbs) P-wave: 1200N (270lbs) |

| | |
|----------------------------|----------------------------------|
| Sweep Length: | Unlimited |
| Signal Penetration: | Approx. 200 m |
| Power supply: | 48VDC battery / 230VAC power |
| Output: | Pilot, Weighted Sum Ground Force |
| Trigger: | Send/receive 0-5V rising edge |

Gallery



Schematic diagram illustrating the lightning vehicle lift assembly

The Lightning is controlled via a simple windows interface which allows users to generate bespoke sweeps tailored to the project objective.

Videos

Seismic Mechatronics - near surface seismic source
<https://www.youtube.com/watch?v=LNczvkm1o7o>

Lightning Trolley deployment
<https://www.youtube.com/watch?v=8SLZEteDu2k>

Seismic Mechatronics - Project Einstein Telescope
https://www.youtube.com/watch?v=_OjpBPW6yzyg