

Reliable measurements.



Seismometers General Description

Quality exists
when the price is long forgotten.

lennartz
electronic

The LE-3D/20s model

This is the latest addition to the product line, further boosting low frequency response down to 20 seconds. For those interested in “classical” regional earthquake seismology, or in the low frequency grumbings of volcanoes, this instrument fills a niche between short period and “real broadband”.

While physically identical to **LE-3D/5s** (except for the different paint colour), it is a fundamentally different instrument under the hood. In order to bring a physical 2 Hz electrodynamic geophone to behave like a 20 sec seismometer (remember those clumsy yet delicate beasts? You barely touched them, and the mass would shift out of whack!), considerable electronic wizardry needs to be applied. To some extent, this comes at a price – increased power consumption (but still within very reasonable limits). However, many of the qualities that have made Lennartz seismometers the practitioner’s favourite for more than a decade are present in this instrument. Compared to “true broadband” sensors, the most salient advantages are much faster startup time (the instrument will output meaningful results in less than a minute after power-up!) and drastically reduced sensitivity to temperature or pressure fluctuations. Since there is no physical long-period element inside, nothing will respond to daily temperature drift, or to the sudden air draught of a door being shut.



For the record, if anyone is interested in learning what a “real broadband” installation entails, this is a very valuable resource of information:

<http://www.seismo.berkeley.edu/seismo/bdsn/instrumentation/guidelines.html>

If you don’t want to read the whole article, here is one paragraph that sums it up:

☞ “At minimum, it takes 500 man-hours to search, plan, travel, prefabricate, and install a site. If the distances are great, or construction is complex, the time requirement can easily go to 2000 man-hours. For example, we spent approximately 1500 man-hours on KCC (sited in an existing tunnel), 2000 man-hours on HOPS (because of vault construction), and we spent 1300 man-hours on FARB (our most inaccessible station).”

Basically, this means that unless you have that kind of time and resources to invest (and who does, especially in a mobile scenario??), you won’t get anywhere near the full data quality that a broadband sensor can theoretically deliver. So, the advantages of having a simple, easy to use, quickly up-and-running instrument may very well compensate for the fact that it isn’t a “true broadband” sensor on paper.

Technical details for the LE-3D/20s seismometer

	LE-3D/20s
Power Supply	10...16 V DC, unstabilized
Power Consumption	Average 50 mA @ 12 V DC; max. 100 mA (for full scale output)
Output Voltage	1000 V/m/s, precisely adjusted on all components
Damping	0.707 critical (internal damping; independent of datalogger input resistance)
Dimensions	195 mm diameter 165 mm height
Weight	6.5 kg
Temperature Range	-15 ... +60 °C
Housing	Painted alumin(i)um, splash proof, with level adjustment feet and water bubble level control
Eigenfrequency	0.05 Hz
Upper Corner Frequency	> 40 Hz
RMS Noise @ 1 Hz	< 2 nm/s
Dynamic Range (typical)	136 dB
Poles	3 poles: -0.222 / +0.222j -0.222 / -0.222j -0.23 / 0.000j
Zeroes	Triple zero at the origin

The “Upper corner frequency” row denotes the frequency up to which the sensors have been tested on a shake table. Users should be aware that there is an inherent low pass filter in the sensor’s circuitry which will gradually damp away frequencies higher than the upper corner frequency.