Phone Seismograph Accuracy vs Real Seismometers: What Can Your iPhone Actually Detect?

How accurate is a phone seismograph compared to professional equipment? An honest look at what MEMS accelerometers can and cannot detect.

Author: Lubor Šimůnek · Published: June 24, 2026 · Education

Online version: https://appstoryo.com/en/blog/phone-seismograph-accuracy-vs-real-seismometer



Phone Seismograph Accuracy: The Honest Truth

When you download an app like Pocket Seismograph and watch it detect vibrations in real time, a natural question arises: how accurate is a **phone seismograph** compared to real scientific equipment? The answer is nuanced, honest, and ultimately quite encouraging for what the technology is designed to do.

This article gives you a frank comparison between smartphone-based seismographs and professional seismometers — and explains exactly why knowing the difference makes you a smarter user of both.

How Professional Seismometers Work

Professional seismometers used by geological surveys, universities, and earthquake monitoring networks are extraordinary instruments. A high-end broadband seismometer can detect ground motion as small as a nanometer — one billionth of a meter. These instruments use highly sensitive pendulum-based mass displacement sensors isolated from external noise by deep boreholes, underground vaults, and sophisticated electronic filtering.

The world's best seismometers have a dynamic range exceeding 200 dB and can detect

earthquakes occurring on the other side of the planet. They cost tens of thousands of dollars, require careful installation, and need continuous calibration.

How Smartphone MEMS Accelerometers Work

The accelerometer in your iPhone is a MEMS (Micro-Electro-Mechanical Systems) device etched onto a silicon chip. It consists of tiny suspended masses that move when the phone accelerates. The deflection of these masses is measured capacitively and converted to a digital acceleration value.

A typical smartphone MEMS accelerometer has:

- A sensitivity range of approximately ±2g to ±16g full scale
- A noise floor of roughly 0.1–1 mg (milligravity)
- A sampling rate of up to 100–400 Hz on modern iPhones
- A dynamic range of about 60–80 dB

These numbers sound technical, but the key point is this: a smartphone accelerometer is about 1,000 to 1,000,000 times less sensitive than a professional seismometer, depending on what you're comparing.

What a Phone Can Detect

Despite the sensitivity gap, smartphone seismographs are genuinely useful for a meaningful range of vibration events. Pocket Seismograph can reliably detect:

- **Earthquakes you can physically feel** — typically magnitude 3.0+ within 100 km, or magnitude 4.0+ at greater distances
- **Heavy vehicle traffic** — trucks, buses, trains on nearby roads or tracks produce easily detectable vibrations
- **Building machinery** — HVAC systems, elevators, industrial equipment, pumps
- **Human activity** — footsteps, jumping, door slams, construction impacts
- **Nearby construction** — pile driving, jackhammering, demolition

What a Phone Cannot Detect

Being scientifically honest is important. There are significant limitations:

- **Small distant earthquakes** — an earthquake at magnitude 2.0 or 3.0 occurring hundreds of kilometers away will almost certainly not register on a phone seismograph
- **Teleseismic events** — major earthquakes on the other side of the world can be detected by professional networks but not by MEMS accelerometers
- **Microseismic noise** — the constant background "hum" of Earth's crust generated by ocean waves and atmospheric pressure is well below phone detection thresholds
- **Precise waveform analysis** — professional seismologists use amplitude and frequency data to determine earthquake depth, source mechanism, and distance. Phone data is not precise enough for this

The Signal-to-Noise Challenge

One of the biggest practical limitations of phone seismographs is environmental noise. When you carry your phone in your pocket or hold it in your hand, you generate vibration signals orders of magnitude larger than any distant earthquake. Even sitting on a table, a phone picks up vibrations from HVAC systems, footsteps, and building sway that can mask subtle seismic signals.

Professional seismometers solve this with deep borehole installation, granite pier mounting, and extensive electronic filtering. Your phone has none of these. This is why Pocket Seismograph works best for detecting nearby, relatively strong vibrations rather than subtle distant ones.

Why Phone Seismographs Still Matter

Despite their limitations, apps like Pocket Seismograph serve genuine and valuable purposes:

Accessibility and Education

Seismology has historically required expensive equipment and institutional access. A free phone app that demonstrates real vibration detection makes seismic science accessible to students, teachers, and curious citizens everywhere.

Distributed Sensing Networks

Research projects like MyShake (University of California, Berkeley) have demonstrated that networks of thousands of smartphone accelerometers can collectively detect and characterize earthquakes more quickly and cheaply than traditional seismometer networks alone. The collective is more powerful than any single phone.

Local Vibration Monitoring

For detecting vibrations from machinery, traffic, or nearby construction, a phone seismograph is more than adequate. You don't need nanometer-resolution to confirm that a jackhammer is vibrating your building or that a washing machine has an imbalance problem.

Using Pocket Seismograph Wisely

Understanding the limitations makes you a better user. Here's how to get the most from Pocket Seismograph:

- Use it for detecting vibrations you expect to be relatively strong (machinery, traffic, felt earthquakes)
- Place the phone on a stable, hard surface for the cleanest signal
- Establish a baseline by watching the waveform at rest before introducing a vibration source
- Cross-reference felt earthquakes with official seismic networks like USGS to validate what you observe
- Use it for relative comparisons rather than absolute measurements — "is the vibration

getting worse?" rather than "exactly what is the ground acceleration in m/s²?"

The Bottom Line

A phone seismograph is not a replacement for professional seismic monitoring. It is, however, a remarkable piece of science in your pocket — one that can genuinely detect earthquakes you feel, monitor machinery vibrations, and educate you about the physics of ground motion.

Pocket Seismograph delivers exactly what a smartphone can deliver, and it does so beautifully: a real-time waveform, timestamped session logs, and a completely free, offline experience that needs no setup or account. Download Pocket Seismograph today and experience the science of seismology in your hands.

For educational use, personal earthquake awareness, and practical vibration monitoring, Pocket Seismograph punches well above its weight. Get it free on the App Store now and start exploring what your iPhone can sense.

Cite as: Lubor Šimůnek (2026). *Phone Seismograph Accuracy vs Real Seismometers: What Can Your iPhone Actually Detect?*. AppStoryo, lapnito.cz s.r.o..
https://appstoryo.com/en/blog/phone-seismograph-accuracy-vs-real-seismometer
© 2026 lapnito.cz s.r.o.