

Abridged Report

secty lifePatron®

Advanced earthquake warning - and security system

The company **secty**electronics GmbH has developed a device that is intended for use in seismic early warning. The device, **secty** lifePatron®, monitors the ground movement in three spatial directions and evaluates the vibration severity in view of the possible arrival of seismic waves that originate from a large earthquake. The GFZ German Research Centre for Geosciences has tested this product with respect to its sensitivity.

1) Quality testing of the sensor technology

The electronic components used in the device **secty** lifePatron® and the measuring accuracy linked with it were checked by comparative measurement. The used electronic components allow that the terminal equipment fulfils the following characteristics:

- a) operating range: DC-40 Hz
- b) sensitivity: 1 V/g \pm 4%
- c) nonlinearity: < 2,5%
- d) cross sensitivity: < 3%
- e) noise: \sim 0,01 m/s²

2) Testing of the alerting by exceeding thresholds

If the measuring system **secty** lifePatron® is to be used as a warning system in the event of an earthquake, it should release no undesirable false alarms. This is realized by the following three in the test checked measures.

- Restriction of the analysed signals to the frequency band of 1-15 Hz
- The implemented analysis algorithm is designed for the detection of the P-wave (z-component)
- The bottom switching threshold for the supervision system amounts to 0,3 m/s²

It has been found that the examined functionality of the device **secty** lifePatron® permits the detection of P waves that are generated by strong earthquakes, and that the device carries out switching processes when critical accelerations are exceeded.

In the event of undetected first waves, an early warning indeed cannot be released, but in this case, the developed device sounds the alarm with the arrival of the more destructive S-waves, if a critical acceleration threshold has been exceeded, and fulfils the Turkish Earthquake Standard TS 12884 from 2002. Simply employing this alarm can help in many cases to minimize heavy damage.

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