



FREQUENTLY ASKED QUESTIONS

Who is Qtronic and what do they know about earthquakes?

Qtronic is a manufacturer of electronic safety systems based in Coquitlam, British Columbia, Canada. For years, Qtronic has been a leader in electronic earthquake detection systems using its own patented technology. Products include earthquake actuated gas shut off valve systems and industrial seismic switches. These products along with Qtronic's other safety-related products such as carbon monoxide detectors, gas-leak detectors, and water-leak detectors are sold in many different countries around the world.

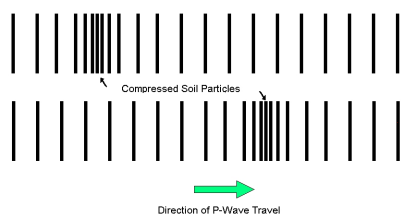
What is Early Warning?

Early warning is simply an advance notice of impending ground-movement due to an earthquake.

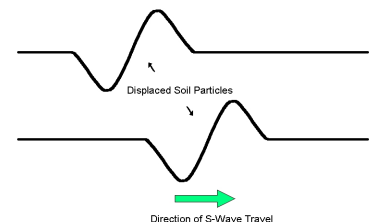
Does the Watchdog detect an earthquake before it occurs?

All the best scientific minds in the world are unable to reliably predict when an earthquake will occur.

P-Wave Motion



S-Wave Motion



However, after an earthquake occurs, the shaking does not begin at all places simultaneously. In the same way that it takes time for the sound from a lightning strike to travel through the air, it also takes time for the motion caused by an earthquake to travel through the ground. Watchdog uses this principle to provide its early warning.

Different types of earthquake motions travel at different speeds. The first motion to arrive after an earthquake is caused by a P wave. Some animals are sensitive to this motion, but most humans are unaware of it. Watchdog is designed to detect this motion. The first motion to arrive that can be felt by humans is caused by an S wave. Depending on how far away the epicenter of the earthquake is, the time between when the first P wave (felt by animals) arrives and the first S wave (felt by humans) arrives can be seconds or minutes. This phenomenon of animals behaving strangely in the moments leading up to an earthquake has been well documented in folklore and in the media. This has led some of the more superstitious to attribute supernatural abilities of prediction to their farm animals or pets.

What are P waves and S waves?

The two most important energy waves emitted during an earthquake are the "Body waves" called P and S waves. Both of these types of waves travel outwards through the Earth's crust from the source of the earthquake. The P wave is a fast-moving compression wave (like sound). The S wave, a slower-moving transverse wave (Sinusoidal) that travels at just over half the speed of the P wave, is more destructive and normally associated with structural damage.

Other types of waves present during an earthquake called Rayleigh waves and Love waves (after the scientists who identified them) are known as "Surface Waves" because they travel along the Earth's surface from the epicenter outwards. Both types of surface waves travel slower than S waves, and therefore, arrive after both the P and S waves have passed. The Rayleigh waves have large amplitudes, and are often the cause of severe structural damage attributed to a major earthquake.

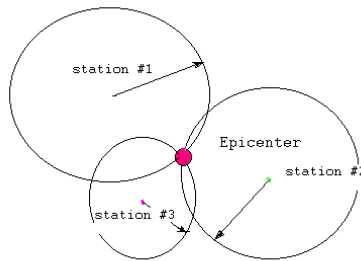
How can P waves be used to provide an early warning?

Since P waves travel nearly twice as fast as S waves and are normally non-destructive, they will always arrive before the damaging S waves. When this P wave is detected, an alarm is sounded, which gives people an opportunity to seek safety before the potentially damaging effects of the earthquake arrive. The amount of time difference between when the two waves arrive can range from a few seconds to a few minutes. This warning time depends on the distance from the epicenter, and the geological characteristics of the Earth's crust between the source of the earthquake and the detector.

Is it proven scientific knowledge that P waves can be used to provide early warning?

Yes. Seismologists have used this principle for years to determine the location of the epicenter of an earthquake. After an earthquake, seismologists take the recorded seismograms and observe the arrival time separation between the P waves and S waves. They then can calculate the distance from the station to epicenter. This is similar to counting the seconds between when lightning flashes and when the thunder booms to estimate how far away the lightning struck.

Using the distance data from a minimum of three stations, the epicenter can be located as shown in the following diagram.



How much warning time can the Watchdog provide?

The warning time will depend on the earthquake type, the epicenter and focal distances, and the geological conditions of the site where the device is to be installed. Generally, for every 8 km (5 miles) from the epicenter, the system can provide a one-second warning.

What will a few seconds warning time do for people?

Even with just a few seconds of warning time, people can seek a safe location or take measures to protect themselves. Seeking refuge under a nearby desk or table, or "ducking and covering" to shield against broken glass and falling objects are good examples of action that could be taken on very short notice. Evacuating elevators at the nearest floor is also a wise action.

Is this device prone to false triggers?

No. Qtronics early warning devices use state-of-the-art technology featuring supreme accuracy and reliability. Qtronics has spent years in product research and development to develop a reliable P recognition method, which is immune to common, everyday vibrations.

How loud is the alarm?

The Watchdog has a very loud 110db horn and a strobe light. The loudness of the horn is similar to that of a residential burglar alarm. This will ensure that everyone in the house, especially the elderly, can hear the alarm sound wherever the device is installed. It is also loud enough to waken all but the most sound of sleepers. This could prove to be a life-saving warning if a major earthquake strikes during the night.

Where should the device be mounted?

This device must be vertically mounted to a load-bearing wall. It should also be safely out of reach of children and close to a wall outlet.

What are the power requirements?

The Watchdog requires 12VDC, which is supplied from a 12VDC wall adapter included with the alarm. In the event of a power failure, the watchdog has an internal rechargeable battery backup that will provide several hours of standby power. When the power returns the battery will automatically recharge.

Electricity is very expensive where I live. How much will the Watchdog cost to operate?

The watchdog is a low-power device (less than 1W) and will only consume an average of 6.5 kWh (kilowatt hours) in a year. Since electricity rates vary widely from region to region, the amount you pay will depend on what the rate is in your location. For a more precise estimate of how much it will cost in your region, multiply the electricity rate shown on your electricity bill by 6.5 kWh. An example is given below.

Rate shown on bill:

28.7¢ / kWh (Very expensive)

Step 1. Convert rate to dollars:

28.7¢ / kWh = \$0.287 / kWh

Step 2. Multiply by yearly power:

\$0.287/kWh x 6.5 kWh = **\$1.87 per year**

28.7¢ per kilowatt-hour is considered very expensive. Most residential rates will be much lower than this. PG&E in California currently lists their average residential electricity rate at 17¢ / kWh. This works out to just over \$1 per year or just over 8¢ per month!

Where can I find out more about Qtronics and other Qtronics products?

Visit Qtronics on the internet at:

www.qtronics.com