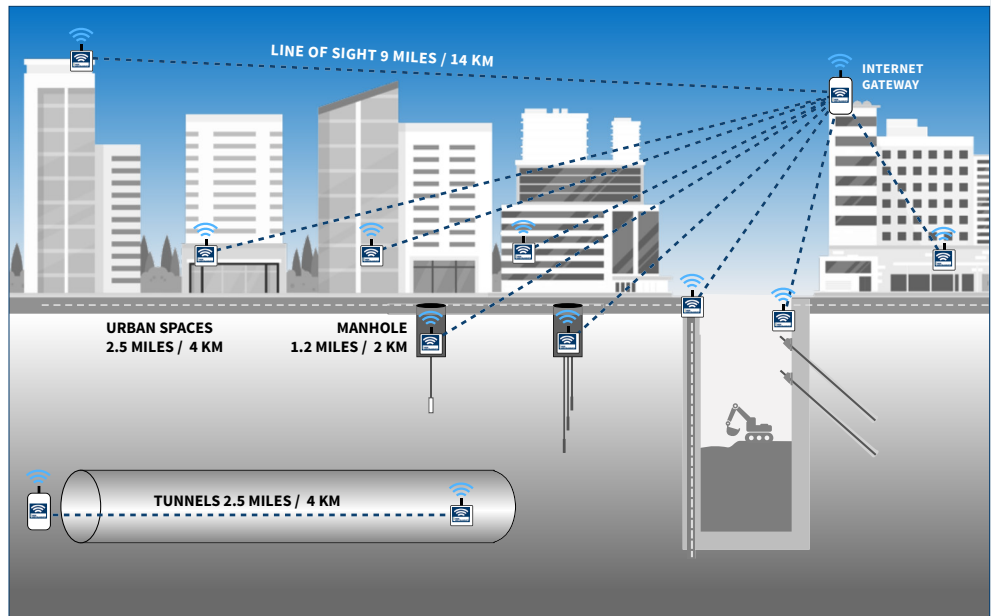


GeoCloud Wireless Loggers

GeoCloud Wireless Loggers feature the industry-standard LoRaWAN® protocol for low-power, long-range signal transmissions.

Compact and battery powered, these loggers can be installed anywhere on site, typically close to the sensors they are monitoring. This virtually eliminates problems with severed cables, EMI, and voltage transients.

Wireless loggers transmit their measurements to an internet gateway using 900 Mhz RF signals that can penetrate walls, and transmit across busy construction sites and roadways. The gateway relays the measurements to the cloud.



Vibrating Wire Logger monitors piezometers, load cells, strain gauges, crackmeters, displacement sensors. Single-sensor version also available.



Digital Logger monitors SAAV and SAAX shape arrays, IPIs, bus-based borehole extensometers, water level sensors.



Analog Logger monitors load cells, pressure transmitters, displacement sensors, jointmeters, rain gauges, temperature probes.



Tiltmeter Sensor combines a triaxial tiltmeter with range of ± 90 degrees and a data logger.



Laser Tilt Sensor combines a laser distance meter, a triaxial tiltmeter, and a datalogger.



Internet Gateway provides internet connectivity for any number of loggers via 4G, Ethernet, and Wifi.

Internet Gateway

Function: Receives transmissions from wireless loggers, forwards to internet. Transmits instructions to loggers to synchronize clocks or change reading intervals.

Logger Capacity: Unlimited.

Power: POE, AC line, or battery and solar panel.

Power Draw: 4.5 Watts.

Logger Connectivity: 915-928 MHz radio bands, Sensitivity down to -137 dBm (SF11).

Cloud Connectivity: Cellular 4G modem, Ethernet.

Internal antennas: GPS, 4G, LoRa® (peak gain=2,6dBi). External antennas also available.

GNSS receiver: GPS, GLONASS, QZSS & SBAS.

Data Storage: 6 GB.

Enclosure: IP67, aluminum, polycarbonate, stainless steel.

Operating temperature: -40 to +60C.

Wireless Logger Specifications

Reading Intervals: 30 second to 24 hours.

Memory: 200,000 readings for single sensor, 72,000 readings each for multiple sensors.

Built-in Barometer: Range 300-1100 hPa, Resolution 0.18 Pa, Accuracy ± 0.12 hPa.

Built-in Temperature Sensor: -40°C to +80°C range, 0.01°C resolution, $\pm 1.8^\circ\text{C}$ accuracy.

Battery: 3.6V C-type Saft LSH 14. User changeable. Number of cells varies with logger.

Operating Temp: -40°C to +80°C.

Dust & Water: IP67 or IP68, depending on logger.

Transmission Range

Line of sight: 9 miles (15 km).

City street: 2.5 miles (4 km).

Manhole in city street: 1.2 miles (2 km).

Tunnel: 2.5 miles (4 km).

Note: LoRaWAN® standard does not use repeaters.

Vibrating Wire Logger

Monitors: Vibrating wire piezometers, load cells, strain gauges, crackmeters, displacement sensors. Also reads 3K Ohm temperature sensor.

Capacity: 1 or 5 sensor versions.

VW measurements

Excitation wave: $\pm 5\text{V}$ sweep.

Sweep ranges: A 450-1125 Hz, B 800 -2000 Hz, C 1400-3500 Hz, D 2300-6000 Hz.

Resolution: A & B 0.002 Hz, C 0.004 Hz, D 0.007Hz

Accuracy: A 0.013%, B 0.008%, C 0.010%, D 0.009% FS.

Battery Life, 1 sensor version

5-second intervals: 0.9 year, 1-hour intervals: 3.5 years, 6-hour intervals: 4.6 years

Battery Life, 5 sensor version

5 second intervals: 2.2 years, 1-hour intervals: 7.1 years, 6-hour intervals: 10 years.

Analog Logger

Monitors: load cells, pressure transmitters, displacement sensors, jointmeters, rain gauges, temperature probes.

Capacity: 1 to 4 sensors.

Voltage (DC)

Measuring ranges [V DC]: ± 10 and ± 1.25 (8x).

Accuracy (-40 to +85°C): ± 0.05 % FS.

Wheatstone Bridge (Full)

Resolution: 0.1mV/V .

Accuracy (0 to +85 °C): ± 0.1 % FS.

Current Loop (2 or 3 wire)

Measurement range: 0-20mA.

Accuracy (0 to +50°C) : ± 0.05 % FS.

Potentiometer

Accuracy (0 to +50°C): ± 0.02 % FS.

Thermistor

Accuracy (0 to +50°C): $\pm 0.2^\circ\text{C}$

PT 100

Accuracy (20°C): $\pm 0.8^\circ\text{C}$

Battery Life: 1-sensor version: 13 to 21 months. 4-sensor version: 11 to 35 months.

Digital Logger

Monitors: Measurand SAAV and SAAx shape arrays, digital versions of in-place inclinometers, hydrostatic level cells, borehole extensometers, water level sensors, water quality sensors.

Capacities: SAA with 100 segments, IPI with 30 to 50 sensors, HLC with 30 cells, SDI-12 with 6 devices.

Battery life: Varies with sampling rate and number of sensors. Provides 3 or 4 months at 5 minute intervals, 2 to 6 years at 1 hour and longer intervals.

Tiltmeter Sensor

Sensor Type: Triaxial MEMS accelerometer. Reports two axes of rotation from the horizontal. Can be installed horizontal, vertical, or inclined.

Range: $\pm 90^\circ$.

Resolution: 0.00001°.

Repeatability: Better than 0.0003°.

Accuracy at 4° of tilt: $\pm 0.005^\circ$, at 15° of tilt: $\pm 0.013^\circ$, at 45° of tilt: $\pm 0.038^\circ$, at 86° of tilt: $\pm 0.06^\circ$.

Temp effect: $\pm 0.002^\circ$ per °C

Memory: 140,000 readings

Environmental: IP 68 submerged 2m, 2 hours.

Battery life: 4.5 months at 30 sec intervals, 3 years at 5 min intervals, 10 years at intervals longer than 1 hour.

Laser Tilt Sensor

Sensor types: Visible Laser Class II 655nm, 0.75 to 0.95 mW power. Triaxial tiltmeter.

Measuring range: 0.05 to 150 m.

Resolution: 0.1mm

Repeatability: 0.15 mm

Accuracy: Varies with range and conditions:

Range	Good Conditions	Poor Conditions
1 to 10 m	$\pm 1\text{mm}$	$\pm 2\text{mm}$
20 m	1.5mm	$\pm 3\text{mm}$
50 m	$\pm 4\text{mm}$	$\pm 7\text{mm}$
100 m	$\pm 9\text{mm}$	$\pm 15\text{mm}$
150 m	$\pm 16\text{mm}$	

Tiltmeter specs: See tiltmeter entry.

Environmental: IP67 enclosure, -10 to +50 °C.

Battery life: 1.5 years at 5 minute intervals, 6.4 years at 1 hour intervals, 8.5 years at 8 hour intervals.

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