LoRa Logger Network

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The LoRa logger network consists of compact, wireless dataloggers and a secure gateway. The loggers obtain sensor readings, store them, and then send them the gateway. The gateway forwards the readings to an internet server or a local server.

LoRa loggers incorporate low-power, long range LoRa® radio modules and use the robust and secure LoRaWAN® (Long Range Wide Area Network) communications protocol.

When readings are forwarded to the internet, secure GeoCloud servers process the readings, check for alarms, and update dedicated GeoCloud project websites to show site status, graphs, and reports.

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.

Logger Common Specifications

Reading Intervals: 30 second to 24 hours.

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

Battery Type: 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: see graphic.

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.

Excitation wave: ± 5V sweep.

Sweep Range, Resolution, Accuracy:

Sweep in Hz	Resolution Hz	Accuracy % FS
A 450-1125	0.002	± 0.013
B 800 -2000	0.002	± 0.008
C 1400-3500	0.004	± 0.010
D 2300-6000	0.007	± 0.009

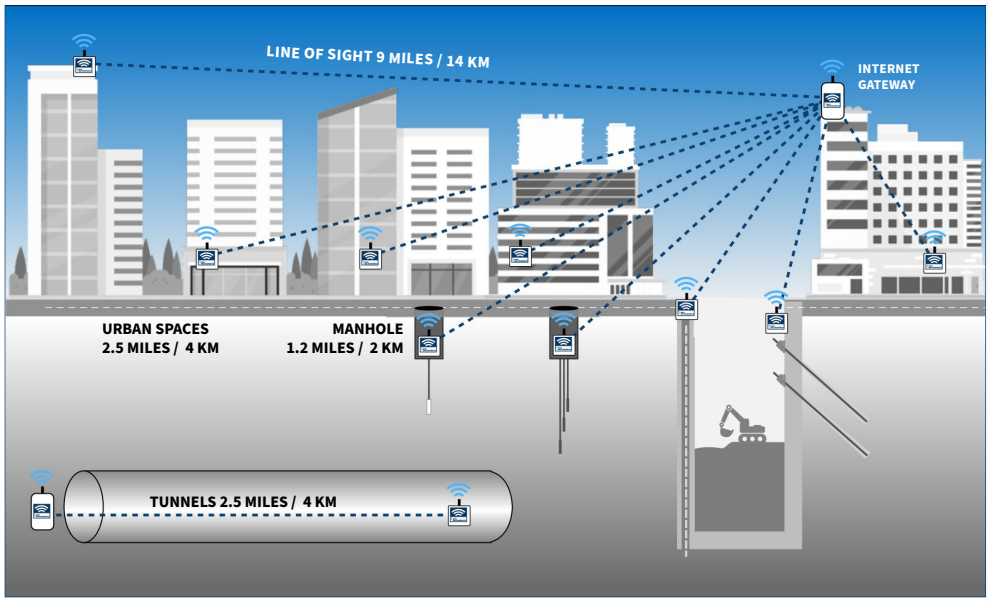
Built-in Barometer: Range 300-1100 hPa, Resolution 0.18 Pa, Accuracy ± 0.12 hPa.

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.



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.

Analog Logger

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

Capacity: 1 to 4 sensors.

DC Voltage

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)

Range: 0-20 mA.

Accuracy @ 0 to +50°C : ± 0.05 % FS.

Potentiometer

Accuracy @ 0 to +50°C: ± 0.02 % FS.

Thermistor

Accuracy @ 0 to +50°C: ± 0.2°C.

PT 100

Accuracy (20°C): ± 0.8°C

Tiltmeter Sensor

Sensor Type: Three-axis MEMS accelerometer built into a logger. Reports two axes of rotation from the horizontal. For horizontal, vertical, or inclined installation.

Range: ±90°.

Resolution: 0.00001°.

Repeatability: Better than 0.0003°.

Accuracy at 4° of tilt: ± 0.005°, at 15° of tilt: ± 0.013°, at 45° of tilt: ± 0.038°, at 86° of tilt: ± 0.06°.

Temp effect: ± 0.002° **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 > 1 hour.

Laser Tilt Sensor

Sensor types: Visible Laser Class II 655nm, 0.75 to 0.95 mW power and three axis tiltmeter (specs above) built into logger.

Resolution: 0.1mm

Repeatability: 0.15 mm

Range	Accuracy in Good Conditions	Accuracy in Poor Conditions
10 m	± 1mm	± 2mm
20 m	1.5mm	±3mm
50 m	± 4mm	±7mm
100 m	± 9mm	± 15mm
150 m	± 16mm	

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.

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