GEOSENSE

Powered by Worldsensing

Wi-SOS 480 Star Wireless Monitoring System

Digital Node

The Wi-SOS 480 Digital Node is a robust, low-power, long-batery life device that allows for data collection from digital sensors. It transforms manual and sporadic data collection to a more regular and automatic process, making it the most cost-efficient way to capture data from any environment. It is capable of transmitting data via long-range radio to a gateway connected to the Internet up to 9 miles / 15 kilometers away.

Our data nodes can easily connect a wireless network of in-place inclinometers (IPIs) on a chain in a hole or excavation, multipoint borehole extensometers (MPBX), as well as other sensors from leading geotechnical device manufacturers. Beyond IPIs, other digital sensors used in geotechnical, structural and environmental monitoring can also be connected by the digital node.

In terms of energy consumption, Worldsensing digital nodes are autonomous battery-powered devices with C-size batteries thus avoiding the need of solar power systems in most cases.

The digital node can be easily configured and connected with a USB cable to an Android phone with the configuration software Android app. The app includes features adapted to each supported sensor such as auto-setup, set up of a voltage threshold to check the power supply received by the sensor, set up of addresses, checking of readings in the field and others.

The data collected are stored in the digital node and shared wirelessly to the closest Worldsensing gateway. A single gateway can support dozens of nodes. The units may also be used as standalone nodes for manual monitoring.

The catalog of sensors compatible with Worldsensing is growing rapidly to adapt to the needs of your project. Check our website for the updated list of compatible sensors.

FEATURES

Compatibility with digital sensors such as:

- In-place inclinometers
- Borehole extensometers
- Strings of temperature probes
- Liquid leveling systems
- Water level sensors, water quality probes
- Weather transmitters

Low-power, long battery life devices. Mostly does not require external power.

Robust, small and weather-proof box (IP67)

Long-range communication through LoRa network

SOFTWARE

User-friendly Android configuration app included.

Web browser software.

Single-gateway network setup with CMT Edge software (dataserver and radio server hosted in the gateway and data access through standard CSV downloads, FTP push, Modbus TCP, API REST and MQTT[1]).

Multi-gateway network setup with CMT Cloud software and advanced features with data access via standard CSV downloads, FTP push, API REST and MQTT push[1].

[1] MQTT available upon request

APPLICATIONS

Lateral ground movement in and around tunnels and deep excavations.

Lateral ground movement of tailings dams and embankments.

Landslides and slope stability.

Ground movement around tunnels and underground excavation.

Settlement and heave under embankments, tanks, and landfills.

Water quality and high precision level monitoring.

ADVANTAGES

Allows you to connect strings of digital sensors from major geotechnical and structural instrument manufacturers.

Suitable for unattended, large scale projects

Very low maintenance equipment due to its robustness and low-power consumption

Easy configuration through the Worldsensing mobile application

Customer support from a expert team of geotechnical monitoring

Pioneer company in the field, long history in monitoring large-scale civil infrastructure

Network Rail Approved

London Underground Approved Product (ID 3576)

For more information, please visit **www.geosense.co.uk**

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MAIN SPECIFICATIONS

GENERAL

Power supply	Regulated 12 V DC up to 200 mA in continuous operation. Maximum start up current peak of 1.5 A, up to 50 ms
Communication protocol	RS485 full or half duplex supported
Battery type	3.6V C-Size user-replaceable high energy density, batteries (recommended Saft LSH 14)
Sampling rate[2]	30 s to 24 h
Time synchronization discipline by radio	Better than ±30 seconds
Device configuration	Android Mobile Aplication
App advanced functionalities	Auto-setup, configure the threshold used to discard readings, take samples in the field and signal coverage test for an easy installation.
Sensor-specific App functionalities	For the Measurand ShapeArrays: auto-detection of the segments and SAA protocol configuration (regular and low power).

MEMORY

Memory Structure	Circular Buffer
Memory Record Maximums	72.5k readings including time and 5 sensors
	200k readings including time and 1 sensor
	4k readings including time and 100 Measurand SAA segments
	8k readings including time and 50 Measurand SAA segments

MECHANICAL

Box dimensions (WxLxH)	100 x 200 x 61 mm
Overall dimensions	140x220x61 mm (excluding antenna)
Operating temperature	-40 °C to 80 °C (-40°F to 175 °F)
Weather protection	IP67 with proper use of cable entry points
Weight (excluding batteries)	1.154 kg
External Antenna	114 mm length (including connector)
USB (configuration)	External mini USB
Box material	Aluminium alloy
Clamping range	⌀ 4-10 mm
Batteries	from 1 up to 4
Grounding connector	Integrated

2 The higher frequency of acquisition allowed varies depending on the sensor used and the number of sensors or segments connected to the chain. E.g. for a 100 SAA segments array, in this case the higher frequency of acquisition allowed is 5 minutes.

RADIO

Radio band	ISM sub 1GHz	
Operating frequency bands	Adjustable	
Bidirectional communications	Remote sampling rate change / clock synchronization	
Maximum link budget	151 dB / 157 dB	
Configuration	Star (no repeaters needed)	
Radio Range[3]	Open sight	15 km
	City street	4 km
	Manhole in a city street	2 km
	Tunnel	4 km

ACCESSORIES

Other mounting brackets and accessories available upon request

Plate for pole mounting. Includes: U-bolts and nuts for a pole ⌀ less than 50 mm
Plate for pole mounting. Includes: U-bolts and nuts for a pole ⌀ less than 35 mm
External mounting brackets (set of 2) for wall mounting
Saft LSH 14 C-size spiral cell (5.8 Ah)
Data node - mobile cable. USB OTG to mini USB, 0.5 m
Data node - mobile cable. USB C to mini USB cable, 1 m

[3] The distances have been tested by Worldsensing and have been accomplished in actual projects using the standard antenna. However, radio range depends on the environment so these distances are only indicative.

The presented distances are the standards of Worldsensing Digital Node. When the digital logger is connected to a Measurand ShapeArray, these distances can be shorter.

As an estimate, it is assumed that:

- For regions like in the USA, Canada and Brazil. The radio coverage achieved when reading Measurand ShapeArray will be 20% lower to the presented in the above table.
- For regions like in Europe, Singapore and Australia the radio coverage achieved when reading Measurand ShapeArray will be 50% lower to the presented in the above table.

Contact us if you need additional information.

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COMPATIBILITY

Frequency of acquisition allowed varies depending on the sensor used and the number of sensors connected to the chain

Sensor manufacturer	Sensors[4]	Maximum number of sensors per data node	External power is needed[5]	Remarks
Geosense digital sensors	In-place inclinometers, tiltmeters, tilt beams and submersible tiltmeters	30	-	Through RS-485 Protocol
	In-place inclinometers, tiltmeters, tilt beams and submersible tiltmeters	50	-	Through Modbus Protocol

BATTERY LIFE ESTIMATION[6]

Sensors		Sampling rate 5 minutes	Sampling rate 1 h	Sampling rate 6 h
Geosense	15 In-Place-Inclinometers	3 months	2.5 years	6 years

[4] Worldsensing compatibility with the listed sensors varies depending on the generation of digital sensors because sensors manufacturers sell, in some cases, different versions over time. In case of doubt, please contact us.

[5] Contact us if you are interested in how to externally power the string of sensors.

[6] Battery life may vary considerably from specifications depending on the actual set-up and working conditions; such as sensor version, sampling rate, wireless network status and environmental conditions. The battery life rating is only achieved on the specific sensor models and configurations tested by Worldsensing under the specific test settings at the time of publication and is not an estimate of a system's battery life under any conditions other than the specific test settings.

Test settings in terms of radio: Europe radio configuration. Spreading factor 9. Radio transmit power 14dBm. Considering standard laboratory conditions. Estimations for 4 Saft LSH14 batteries based on the lifetime mathematical model.

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