GEONET WIRELESS LORA® DATA ACQUISITION SYSTEM

GEOKON®

MODEL 8910 SERIES



The GeoNet Wireless LoRa Data Acquisition System: a typical network configuration of data loggers, a cellular gateway and cloud integration with secure data access

INTRODUCTION

The system consists of a gateway and subordinate wireless data loggers that transmit data collected from the connected sensors. The gateway controls the network and is the aggregator of all the data from the data loggers in the system. The gateway transfers collected data to the GEOKON cloud data storage platform, where it is securely stored. Data can be viewed in GEOKON Agent Software or exported to a third-party software platform through the Open API. (Offline configurator also available.)

Model 8960 Digital Vibrating Wire interfaces can be connected to GeoNet multi-channel VW and addressable data loggers to expand the capacity of the data logger. Multiple interfaces can be used to bus the data to a single data logger. The bus limit is 32 units or 64 channels. Refer to the Model 8960 data sheet for more information.

Available models include:

Single and multichannel Vibrating wire dataloggers that are compatible with most manufacturers' VW sensors.

A digital addressable data logger compatible with GEOKON addressable MEMS, VW, and thermistor sensor strings.

A four-channel analog data logger capable of reading data from analog sensors.

A tilt data logger that combines the functionality of a biaxial tiltmeter and a GeoNet data logger.

A data logger used to read time domain reflectometry cables.

A Digital High Power data logger that can read up to 250 GEOKON MEMS sensors. With custom firmware, it is capable of reading non-GEOKON sensors that utilize RS-485 MODBUS communication protocol.

COMMUNICATIONS

The Model 8910 GeoNet Wireless Data Acquisition utilizes LoRa radio technology. The system topology takes the form of a star network. All data loggers communicate directly with the gateway. The data loggers wake from sleep to collect and/or transmit data to the gateway and then return to sleep when finished to conserve battery life. Data loggers that get separated from the network will continue to collect and store data autonomously until network connectivity is re-established, at which time the data will be transmitted to the gateway.

Up to 8 networks can exist within radio range of one another by setting each to a different operating channel.

The data loggers can also operate using LoRaWAN® communication protocol for use with LoRaWAN third-party gateways.

Configuration of the network is accomplished by using the GEOKON API (api.geokon.com).

GENERAL SPECIFICATIONS

Power Supply	DHP, GTW & TDR models: Internal sealed lead acid (SLA) battery pack, 4V, 10 Ah / 5-24V external All other models: 2× D cell, lithium / 5-24V external
Operating Temperature	–40 °C to +85 °C (range varies by power source) (TDR model –20 °C to +70 °C) (TLT model max of +65 °C)
Temperature Accuracy	±0.5° C
Direct Connection Type	USB
Enclosure	Die-cast aluminum, IP 68 rated to 1.5 m
Dimensions	Refer to the product instruction manual

NETWORK SPECIFICATIONS

Topology	Star
Radio Technology	LoRa/LoRaWAN
Radio Frequency, ISM Band	868-928 MHz (user selectable masking by region)
Channels	8 (4 auto configurable)
Range[1]	Up to 20 km in rural open areas with line-of-sight Up to 5 km in urban areas

[1]Outdoor, clear line-of-sight. Depends on operating frequency.

VIBRATING WIRE DATA LOGGER SPECIFICATIONS

Trueness	0.082 Hz
Frequency Precision	±0.146 Hz (99% CI)
Frequency Resolution	±0.002 Hz
VW Frequency Range	400 – 6,500 Hz

TILT DATA LOGGER SPECIFICATIONS

Range[1]	±90°
Resolution[2]	0.00025° (0.004 mm/m)
Precision[3]	±0.0075° (±0.13 mm/m)
Nonlinearity	±0.005° across ±30° range (±0.09 mm/m)
Temperature Dependent Uncertainty	±0.001° across ±5° angular range (±0.016 mm/m) ±0.0016° across ±15° angular range (±0.026 mm/m) ±0.0026° across ±30° angular range (±0.042 mm/m)
Axes	2

[1]Calibrated Range: ±30°
[2]99% confidence interval (i.e. 99 out of 100 individual readings fall within this tolerance).
[3]Includes random walk (changes in consecutive readings with no discernible cause) and seismic noise during testing.

TIME DOMAIN REFLECTOMETRY DATA LOGGER SPECIFICATIONS

Pulse Generator Output	0 – 5V
Output Impedance	50 ohm
Pulse Length	Variable (1 – 70 ns)
Waveform Averaging	1
Range	4000m 100% VOP
Resolution	15 cm x VOP/100
Current	250mA During Measurement
Pigtail Cable	50 ohm RG-8X 84% VOP Coaxial
Sensor Cable	50 ohm 1/2" 88% VOP Coaxial

DIGITAL DATA LOGGER SPECIFICATIONS

MEMS Sensors Limits per Model	Non-rechargeable ADR: 32 sensors Rechargeable ADR: 64 sensors (90 sensors, with the sensor string powered via external 12 V power supply) DHP: 250 sensors
Communication Protocol	RS-485 Modbus

ANALOG DATA LOGGER SPECIFICATIONS

Channels	4
Input Type	mV, V, mA, Ω
Input Range (individually configurable)	0 – 150 mV, 0 – 500 mV, 0 – 1 V, 0 – 5 V, 0 – 10 V, 0 – 15 V, ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±15 V, ±20 mA, 0 – 20 mA, 4 – 20 mA
Voltage Mode Accuracy	±0.1% or better
Current in Mode	±0.2% or better
Resolution	16-bit
Zero Drift	±6 µV/°C
Span Drift	±25 ppm/°C (typical)
CMR @ 50/60 Hz	92 dB min.

ACCESSORIES

8900-SOL-10W-USB: GeoNet Series Solar Panel, 10W, unregulated
KIT-GEONET-C-T20: USB 2.0 A Male to C Male Cable, T20 Torx Key, and 3/32" Flat Head Screwdriver
BAT-202: Lithium D size battery, 17 Ah
COM-169: USB 2.0 A Male to C Male Cable
TDR-PIGTAIL: Pigtail cable required to connect TDR-CBL cable to 8910-TDR logger

AVAILABLE MODELS



8910-01C
Single-Channel
VW Data Logger



8910-08C
Eight-Channel
VW Data Logger



8910-TLT
Tilt Data
Logger



8910-DHP
Digital High Power
Data Logger



8910-ADR
Addressable
Data Logger



8910-ANA
Four-Channel Analog
Data Logger



8910-TDR
Time Domain Reflectometry
Data Logger



8910-GTW
Cellular Gateway

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