GEOKON®

Model 8910 Series

GeoNet Wireless LoRa® Data Acquisition System
Quick Start Guide

Model 8910 Manual

For those familiar with Geotechnical instrumentation and its installation, the following guide may be used. For more detailed information than is provided in this Quick Start Guide, please refer to the Model 8910 Instruction Manual.

1. STATUS BUTTON & LED STATUS INDICATORS

All GeoNet devices have a status button, functions of the status button are shown below.

Device	Status Button Action	Function
Gateway or Logger	Press and hold until both LEDs illuminate (approximately 10 seconds)	✓ Reset the device
Gateway	Press and release	✓ Take a reading and send existing data immediately ✓ Display device status
Logger	Press and release	✓ Display the current status ✓ Indicate signal strength every radio cycle for 10 minutes

TABLE 1: Status Button Functions

All GeoNet devices have red and green LED indicators to display their status. The table below shows the meaning of the various LED indications.

LED Indicators		Gateway	Loggers
Green		Time set, Loggers present	Good radio signal (>30%)
Green	Red	Time set, no Loggers present	Marginal radio signal (<30%)
	Red	Network time not set	No radio signal

TABLE 2: LED Indicator Meaning

2. INSTALLATION OVERVIEW

A general overview of the installation is shown in the steps below. Each step is described in detail in the sections that follow.

1. Open the covers
2. Install the antennas
3. Power the gateway
4. Verify network connectivity
5. Register and configure the gateway
6. Seal the gateway
7. Expanding logger capacity (optional)
8. Mount the devices
9. Connect an earth ground
10. Connect the sensors
11. Power and configure the loggers
12. Seal the loggers

2.1 OPEN THE COVERS

Open the covers of all devices in the network by wedging open the latch on the right-hand side. (If needed, use the provided flathead screwdriver for leverage.) Unscrew the two Torx screws beneath the latch with the provided Torx key. Open the cover.

Important! Ensure that no dirt, water, or other contaminants enter the enclosure.

2.2 INSTALL THE ANTENNAS

Remove the rubber caps from the antenna mounts. Position the antennas on the mounts and then rotate the antennas in a clockwise direction until tightened.

If installing antennas on a satellite (SAT) model, refer to the full instruction manual for more detail.

Note: Do not cross thread the antenna. The O-ring on the bottom of the gateway antennae must be flush with the enclosure to prevent water entry.

2.3 POWER THE GATEWAY

Connect the gateway to an external power source with the provided USB-C connector, or connect to a solar panel (refer to the full instruction manual for solar panel installation).

Move the battery switch (Figure 1) to the ON position. (The battery switch is located on the battery board inside the enclosure.) The green battery LED will flash twice, indicating the unit has power.

Green LED	Blue LED	Charge State
Off	Off	No Power
On	On	Bulk
Off	On	Absorption
On	Off	Float (Fully Charged)

TABLE 3: Battery Board LED Indicator Meaning
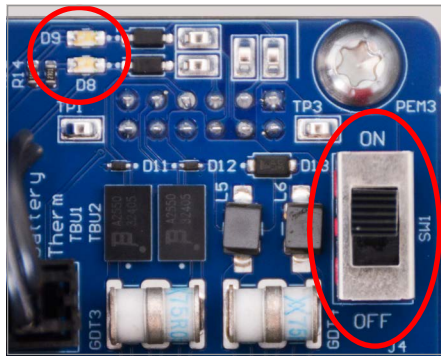
FIGURE 1: Gateway Battery LED Location (Left) and Switch (Right)

2.4 VERIFY NETWORK CONNECTIVITY

Gateways will set the network time automatically when they connect to the network.* (Cellular gateways will normally connect to the network within approximately five minutes. Satellite loggers may take up to 20 minutes to connect. For Wi-Fi gateways, follow the instructions in Section 2.4.1.)

Verify the network connection has been made by pressing the status button. The status LEDs should flash both green and red. If only the red LED flashes, wait several minutes and then check again.

Note: *GeoNet Cellular Gateways are compatible with all major networks except Verizon.

2.4.1 CONNECT TO A WI-FI NETWORK (WI-FI GATEWAYS ONLY)

1. Turn on power to the GeoNet Wi-Fi Gateway.

2. Open Wi-Fi settings in Windows.

3. Select **Show available networks**.

4. Select the network that starts with GEOKON, and then select **Connect**.

5. Type i**<3GeoNet** for the security key, and then select **Next**.
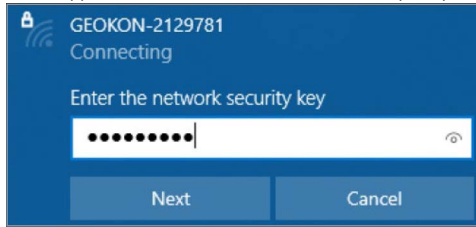
6. The window updates to show that the connection was made.

7. Open a web browser and enter **18.0.1.2** in the window, and then select **Enter**.

8. Enter the name of your Wi-Fi network, and then select **Submit**.

9. Enter your network password, and then select **Submit**.

10. A message is shown when the connection is complete.

11. If desired, a static IP address can be set in the GEOKON API portal after commissioning the gateway using the Wi-Fi Configuration.

2.5 REGISTER AND CONFIGURE THE GATEWAY

Register the gateway by entering the Serial Number in the GEOKON API portal: api.geokon.com. Select the option to activate network service.

OpenAPI Portal

Configuring the gateway is optional and only required if the factory settings (see below) need to be modified. A gateway can be configured either through the Network using the GEOKON API portal, or through manual connection using the Logger Config software.

GEONET 8910 GATEWAY AND LOGGER FACTORY SETTINGS:

■ **Mode -** Star (for operation with GeoNet Gateways sending data to the Geokon Cloud)

■ **Region -** US915 (see LoRa Alliance reference for application frequency settings for your region) https://lora-alliance.org/wp-content/uploads/2020/11/rp_2-1.0.1.pdf.

LoRa Alliance

■ **Channel -** Gateways are set sequentially on channels 1-4 (channels 1-4 allow for nodes to automatically configure using the seek setting). Channels 5-8 are user selectable and gateways and loggers need to be manually set.

■ **Seek -** Default on for loggers. Allows the logger to connect to the closet gateway set to an auto-configurable channel (ie. Ch 1-4).

For most applications the gateways should be deployed on auto-configured channels (1-4), and loggers should be deployed in "seek" mode. This allows for a rapid network deployment and allows for load balancing of the network traffic across the radio frequency band. User selectable channels are available in cases where it is desired to have specific loggers to connect to specific gateways, or if there are multiple API user accounts with gateways in the same range of the radios. Multiple gateways can be set on the same channel and the loggers will still load balance between gateways.

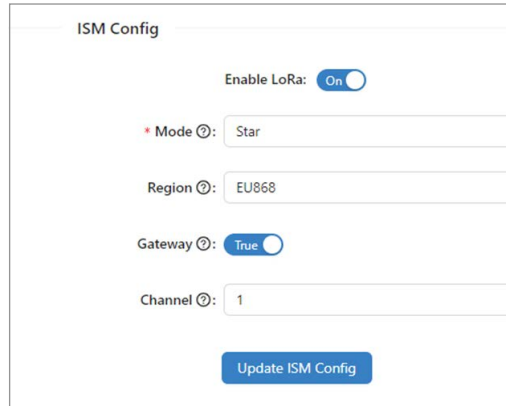**Note:** For LoRaWAN applications additional gateway/network settings are required from the network administrator.

2.5.1 CONFIGURE THE GATEWAY VIA THE API PORTAL (OVER THE NETWORK)

Use the GEOKON API portal to configure the GeoNet Gateway if required.

Select the appropriate gateway settings from the dropdown menus under the ISM Config section. Select **Update ISM Config**.

FIGURE 2: *Configuring Using the API Portal*

2.5.2 CONFIGURE THE GATEWAY VIA LOGGER CONFIG SOFTWARE (MANUAL CONNECTION)

Connect the gateway to a laptop with the provided USB-C connector.

Download and launch a VCP driver, this will allow the gateway/logger to be recognized through the USB port on a computer:

https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers?tab=downloads

Download and Launch the Logger Config Program:

https://geokoninstallers.blob.core.windows.net/loggerconfigrelease/Publish.html
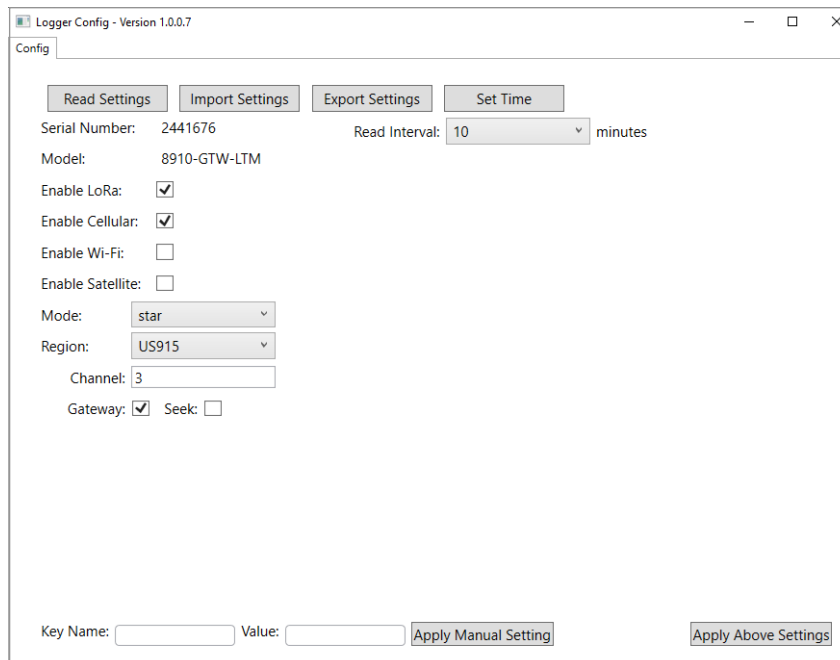
Select **Read Settings** and select the appropriate gateway settings from the dropdown menus. Select **Apply Above Settings** (Figure 3).

VCP Driver

Logger Config

FIGURE 3: *Configuring Using Logger Config*

2.6 SEAL THE GATEWAY

1. Make sure the cover gasket and the mating ridge on the enclosure are clean.

2. Close the cover and tighten the two Torx screws.

3. Push the latch firmly closed onto the cover.

4. Record the serial number of the gateway. (The serial numbers are used for identification purposes in the API portal and Agent software.)

2.7 EXPANDING LOGGER CAPACITY (OPTIONAL)

Model 8960 Digital Vibrating Wire interfaces can be connected to GeoNet Multi-Channel, Addressable, and Digital High Power Loggers to expand the capacity of the logger. Multiple VW interfaces can be daisy-chained together to bus the data to a single logger. The bus limit is 32 units or 64 Channels.

Refer to the Model 8960 Instruction Manual for information on how to connect a logger to an interface, how to address the interfaces, and other applicable steps. To get immediate software recognition the interfaces must be connected before the logger has been powered on.

Model 8960 Manual

2.8 MOUNT THE DEVICES

GeoNet mounting brackets are designed to be used with U-bolts, hose clamps, screws, etc. Mount all devices vertically, with the antenna pointing up. GEOKON recommends a mounting height of at least two meters. As a rule, higher is usually better.

Certain mounting configurations can hinder or even completely block wireless signal transmission or can introduce electrical noise to the signal. (Large structures, such as walls, buildings, hills, etc. can block and/or reflect RF signals.) Keep in mind that loggers communicate with each other, not just with the gateway.

Note: A high Received Signal Strength Indicator (RSSI) level does not guarantee trouble-free communication

COMMON MOUNTING MISTAKES INCLUDE:

■ Not enough clear space around the antenna

■ Mounting too close to buildings, fences, or walls that can block the signal

■ Mounting devices horizontally

■ Placing the device inside an enclosure or on a metal plate

■ Metallic objects nearby

2.9 CONNECT AN EARTH GROUND

Properly grounding GeoNet devices will lessen the chance of them being damaged from nearby lightning strikes or other large transient voltages. Each vibrating wire (VW) channel is protected by a 230V gas discharge tube, followed by a high-speed surge protector and a transient voltage suppression diode. Each thermistor (TH) channel is protected by a 230V gas discharge tube, followed by an inductor (lower resistance than high-speed surge protectors) and a transient voltage suppression diode.

For these components to safely divert lightning energy to ground, a solid electrical connection to earth ground is required. All GeoNet devices can be grounded by connecting a suitable earth ground to the mounting bracket. Some GeoNet devices can also be grounded via the copper ground lug on the bottom of the enclosure.

A copper grounding rod at least six feet in length should be driven into the soil to a minimum depth of three feet, as close to the device as possible. Alternatively, any other suitable earth ground attachment may be used. Connect the grounding rod to the mounting bracket or the copper

grounding lug on the exterior of the device with a 12 AWG or larger wire. This will provide a path from the device to earth ground in the event of a lightning strike.

2.10 CONNECT THE SENSORS

Note: Loggers will stop trying to read an empty channel after two attempts. The logger will read all channels at the top of every hour and will resume sampling when it detects a sensor. (Reset the logger to initiate an immediate retry.)

For ease of wiring, sensor cables should be inserted into the cable glands on multi-channel loggers in order from left to right and wired into the VW terminal blocks in sequence, starting with channel one.

To connect a sensor:

1. Loosen the nut on the cable fitting and remove the black plastic dowel.

2. Slide the sensor cable through the cable gland nut and fitting.

3. **Analog Loggers Only:** Confirm the selector switch (located under the terminal block) is set to "V". ("Ω" and "mA" selections are not typically utilized unless specified otherwise by GEOKON.)
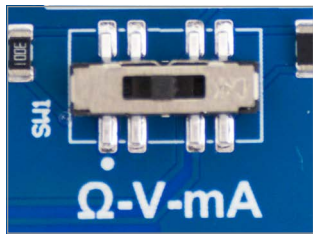
FIGURE 4: *Analog Mode Selector Switch*

4. Connect the cable leads to the terminal block by holding down an orange tab, inserting the lead, and then releasing the tab. The wiring order is shown in the Table 4 through 6 and Figure 5.

Important! To prevent a short circuit, do not allow the cable leads to touch each other during or after wiring.

5. Pull gently on each conductor to ensure it is secure.

6. Tighten the cable gland nut until it firmly grips the outer jacket of the cable. The cable gland nut must be properly tightened to prevent water entry. Do not overtighten, as this might strip the plastic threads.

7. Pull gently on the gauge cable to ensure it is held in place by the cable gland.

8. Repeat these steps for each gauge cable to be connected.

Single/Multiple Channel Vibrating Wire Logger		
Position	**Color**	**Description**
VW+	RED	Vibrating Wire+
VW-	BLACK	Vibrating Wire-
TH+	WHITE	Thermistor+
TH-	GREEN	Thermistor-
SHD	BARE	Analog Ground (Shield)

TABLE 4: *Vibrating Wire Logger Wiring*

Addressable and DHP (RS-485) Logger		
Position	**Color**	**Description**
485+	WHITE	RS-485 Data+
485-	GREEN	RS-485 Data-
12V	RED	12 Volt Bus
GND	BLACK	Bus Ground
SHD	BARE	Analog Ground (Shield)

TABLE 5: *Addressable and DHP (RS-485) Logger Wiring*

Analog Logger		
Position	**Color**	**Description**
V1n+		Sensor Signal+
V1n-	No universal color code, generic	Sensor Signal-
Exc+	example of wiring shown in Figure 5.	Excitation Voltage+
Exc-		Excitation Voltage-
SHD	BARE	Analog Ground (Shield)

TABLE 6: *Analog Logger Wiring*

| VW Single-Channel | VW Multiple-Channel | RS-485 (ADR, DHP) | Analog |
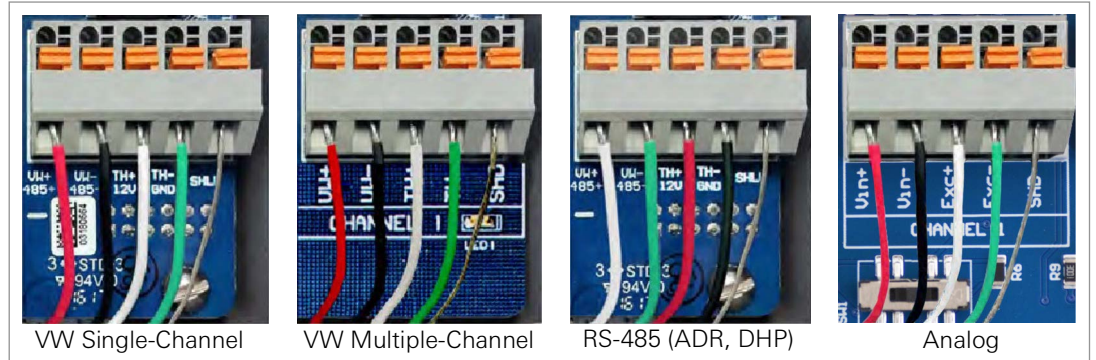
FIGURE 5: *Terminal Connections*

2.11 POWER AND CONFIGURE THE LOGGERS

If using D-cell batteries, align the positive (**+**) side of the batteries with the **+** indicator in the battery holder. Push the batteries straight down into the holder.

If equipped with a rechargeable solid lead-acid battery, connect the logger to an external power source with the provided USB-C connector, or connect to a solar panel (See Appendix B for solar panel installation).

Move the battery switch into the ON position. (The battery switch is located on the battery board inside the enclosure.) The green battery LED will flash twice, indicating the unit has power.

The logger will join the network approximately 30 seconds after power up, as indicated by the status LED(s) on the logger flashing in unison with the gateway.

Repeat the above procedure with the other loggers in the network. Verify that the status LED indicators on the loggers and the gateway are flashing green only. This may take several minutes depending on network configuration.

To configure the loggers, if required, refer to Section 2.5.1 or Section 2.5.2.

2.12 SEAL THE LOGGERS

1. Record the serial number of the loggers and the attached sensors. For multiple-channel loggers, also record the channel to which each sensor has been connected. (The serial numbers are used for identification purposes in the API portal and Agent software.)

2. Make sure the cover gasket and the mating ridge on the enclosure are clean.

3. Close the cover and tighten the two Torx screws.

4. Push the latch firmly closed onto the cover.

Note: Make sure any unused openings are plugged with the provided dowel and the cable gland nut is tightened.