

# Model 8800, 8900 Series

## GeoNet Wireless Mesh

### Data Acquisition System

#### Quick Start Guide



Model 8800-8900 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 8800-8900 Instruction Manual](#).

### 1. DEPLOYMENT MODE

There are two modes of network operation: Deployment mode and Normal mode. Deployment mode allows data loggers to be quickly added to a network and verified. Deployment mode must be used when setting up a network or making changes (adding data loggers, changing batteries, resetting a device, etc.)

Deployment mode is automatically activated when a gateway is powered on, reset, or the status button is pressed. When the network is in Deployment mode, the network status will be indicated by the LEDs on the gateway approximately every 10-15 seconds (see Section 2 for more information). By default, the network will stay in deployment mode for 60 minutes. When a new data logger joins the network the timer will reset, extending the deployment period for another hour. If more time is needed while deploying data loggers, the default deployment timeout may be changed using Agent software.

**Caution!** DO NOT power off or remove the gateway from a working network unless it is in Deployment mode. Installation

### 2. 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 Data Logger	Press and hold until both LEDs illuminate (approximately 10 seconds)	✓ Reset the device
Gateway	Press and release	✓ Put the network into Deployment mode/extend Deployment mode ✓ Take a reading and send existing data immediately ✓ Display device status
Data 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.

LEDs		Gateway	Data Loggers
Green		Time set, data loggers present	Good radio signal (>30%)
Green	Red	Time set, no data loggers present	Marginal radio signal (>30%)
	Red	Network time not set	No radio signal

**TABLE 2:** LED Indicator Meaning

### 3. INSTALLATION OVERVIEW

GEOKON recommends that you configure your network with the devices at the same location, in close proximity to each other, before you deploy them to their respective on-site positions.

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

1. Remove the covers
2. Install the antennas
3. Configure the channels (if necessary)
4. Power the gateway
5. Set the network time
6. Seal the gateway
7. Expanding data logger capacity (optional)
8. Power the data loggers
9. Network configuration
10. Mount the devices
11. Connect an earth ground
12. Connect the sensors
13. Seal the data loggers
14. Connect to a Wi-fi network (Wi-fi gateways only)
15. Commission (activate) the data logger

#### 3.1 REMOVE THE COVERS

Remove the covers from all devices in the network by unscrewing the four captive screws on the front of the enclosure.

**Note:** Ensure that no dirt, water, or other contaminants enter the enclosure.

#### 3.2 INSTALL THE ANTENNAS

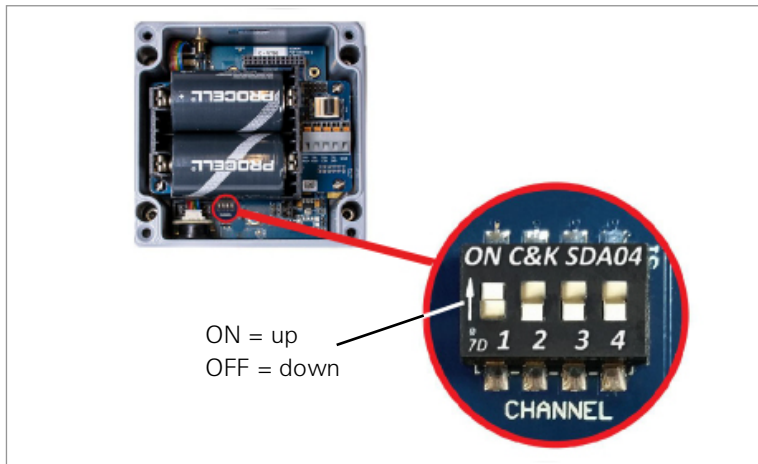
Remove the rubber caps from the antenna mounts. Position the antennas on the mounts and then rotate the antennas in a clockwise direction until tightened.

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

#### 3.3 CONFIGURE THE CHANNELS (IF NECESSARY)

If multiple networks are within radio range of each other, then each network (up to a limit of 12) must be configured to use a different channel. Devices of each network must be set to their respective channel.

Move the channel select DIP switches (Figure 1) to any arrangement, matching with the rest of the network. The setting will take effect at power-up, or after the device is reset.



**FIGURE 1:** Channel Select Switches

### 3.4 POWER THE GATEWAY

For ease of installation, it is highly recommended that the gateway be powered before any of the data loggers.

#### 3.4.1 CELLULAR AND WI-FI GATEWAYS

Connect the AC adaptor, solar panel, or other external power source. (Though equipped with an internal battery, cellular and Wi-Fi gateways must have an external power source.)

Move the battery switch (Figure 2) to the EXT BATTERY or INT BATTERY position, according to the chart below. (The battery switch is located on the battery board inside the enclosure.) The green LED on the right side of the box will flash twice, indicating the unit has power.

Power Source	Geographic Zone	
	Sub Polar	Temperate
Mains or solar with external battery	EXT BATTERY	INT BATTERY
Solar without external battery	N/A	

**TABLE 3:** Cellular/Wi-Fi Gateway Battery Switch

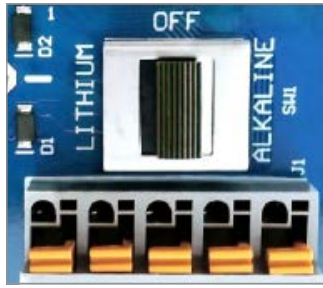


**FIGURE 2:** Cellular/Wi-Fi Gateway Battery Switch

#### 3.4.2 LOCAL GATEWAYS

Align the positive (+) side of the batteries with the + indicator in the battery holder. Push the batteries straight down into the holder.

Move the battery switch (Figure 3) to either the ALKALINE or LITHIUM position depending on the type of battery being used. (The battery switch is located on the battery board inside the enclosure.) The green LED on the right side of the box will flash twice, indicating the unit has power.



**FIGURE 3:** Local Gateway Battery Switch

### 3.5 SET THE NETWORK TIME

#### 3.5.1 CELLULAR AND WI-FI GATEWAYS

Cellular and Wi-Fi gateways will set the network time automatically when they connect to the network.\* Verify the network connection has been made by pressing the status button. The 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.

#### 3.5.2 LOCAL GATEWAYS

Connect the local gateway to a computer using the supplied USB cable or RS-232 cable. Open Agent software and set the network time.

**The network will not begin collecting data until the network time is set using Agent software.** (For instructions regarding setting up a network in Agent, please read the [Agent Software Instruction Manual](#).)

Once the network time has been set, press the status button. The LEDs should flash both green and red. If only the red LED flashes the network time has not been set correctly.

### 3.6 SEAL THE GATEWAY

1. Make sure the cover gasket and the mating ridge on the enclosure are clean and that the gasket is properly seated inside the groove.
2. Place the cover on the unit, making sure the orientation is correct.
3. Tighten the cover screws a little at a time, working in a diagonal pattern.
4. Check that the cover has closed tightly and evenly.
5. Record the serial number of the gateway. (The serial numbers are used for identification purposes in the API portal and Agent software.)

### 3.7 EXPANDING DATA LOGGER CAPACITY (OPTIONAL)

Model 8960 Digital Vibrating Wire interfaces can be connected to GeoNet multi-channel and addressable data loggers to expand the capacity of the data logger. Multiple VW interfaces can be daisy-chained together to bus the data to a single data logger. The bus limit is 32 units or 64 Channels.

Refer to the [Model 8960 Instruction Manual](#) for information on how to connect a data 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 data logger has been powered on.

### 3.8 POWER THE DATA LOGGERS

For ease of installation, it is recommended that the gateway be powered before any of the data loggers.

Align the positive (+) side of the batteries with the + indicator in the battery holder. Push the batteries straight down into the holder.

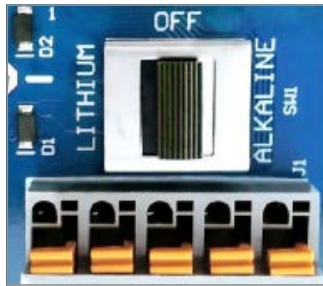


Agent Software Manual



Model 8960 Manual

Move the battery switch (Figure 4) into either the ALKALINE or LITHIUM position depending on the type of battery being used. (The battery switch is located on the battery board inside the enclosure.) The green LED on the right side of the box will flash twice, indicating the unit has power.



**FIGURE 4:** Data Logger Battery Switch

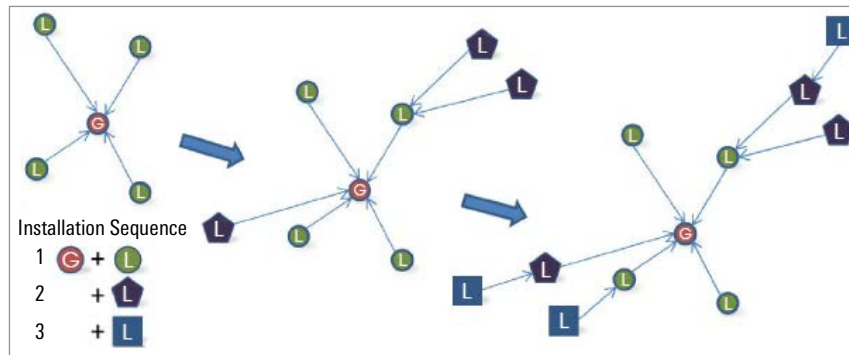
The data logger will join the network approximately 30 seconds after power up, as indicated by the LED(s) on the data logger flashing in unison with the gateway. If the data logger does not join the network within 30 seconds of power up, the gateway may have left deployment mode (see Section 4.1), or the channel switches have been set incorrectly (see Section 3.3).

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

The gateway and data loggers can now be moved to their respective installation sites. Watch the LEDs while moving the data loggers, to ensure the signal isn't lost. (After 10 minutes, the LEDs on the data loggers will stop indicating their status to conserve batteries. Pressing the status button on a data logger will reactivate the LEDs for another 10 minutes.)

### 3.9 NETWORK CONFIGURATION

It is best practice to place the gateway in a location central to the distribution of the data loggers. This configuration will minimize the number of hops (data relays) required, which will improve battery life. When installing data loggers, start with those closest to the gateway and work outwards (Figure 5).



**FIGURE 5:** Installation Sequence

If communication cannot be established when GeoNet is deployed to a site, it may be necessary to elevate the devices or their antennas, or to move them to a location where a radio link can be established. This may require extending the readout cable of the attached sensors, adding an antenna cable extension, or adding additional data loggers to the network.

### 3.10 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 data 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

**3.11 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.

**3.12 CONNECT THE SENSORS**

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

**3.12.1 CABLE GLAND CONNECTIONS**

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

To connect a sensor using a cable gland connection:

1. Loosen the nut on the cable fitting and remove the white plastic dowel.
2. Slide the sensor cable through the cable gland nut and fitting.
3. 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 tables and figures below.

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

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

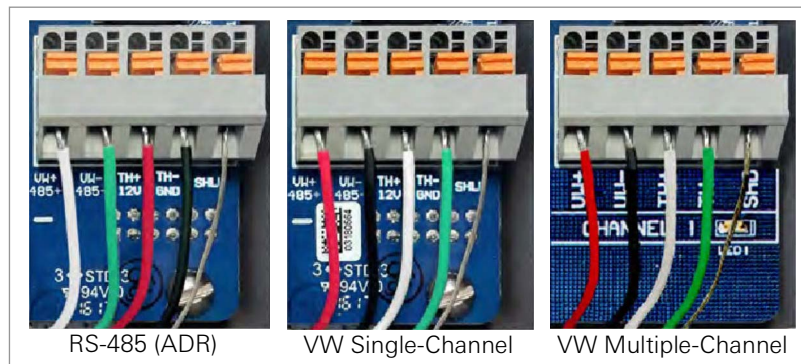
5. Tighten the cable gland nut until it firmly grips the outer jacket of the cable. The cable gland nut must be properly tightened to prevent water entry. Do not overtighten, as this might strip the plastic threads.
6. Pull gently on the gauge cable to ensure it is held in place by the cable gland.
7. Repeat these steps for each gauge cable to be connected.

Single/Multiple-Channel Vibrating Wire Data 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 Data Logger Wiring

Addressable (RS-485) Data 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 (RS-485) Data Logger Wiring



**FIGURE 6:** Terminal Connections

### 3.12.2 10-PIN CONNECTIONS

To connect a device using a 10-pin connection:

1. Remove the cover from the 10-pin connector.
2. Align the grooves on the sensor connector (male), with the connector on the data logger (female).
3. Push the connector into place and then twist the outer ring of the male connector until it locks.

### 3.13 SEAL THE DATA LOGGERS

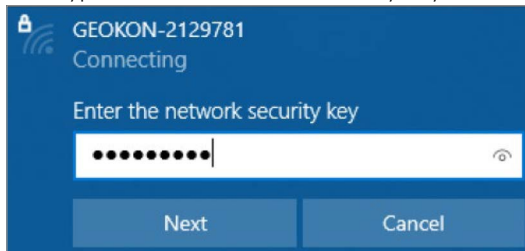
1. Record the serial number of the data loggers and the attached sensors. For multiple-channel data loggers, also record the channel to which each sensor has been connected. (The serial numbers are used for identification purposes in the API portal and Agent software.)
2. Make sure the cover gasket and the mating ridge on the enclosure are clean and that the gasket is properly seated inside the groove.
3. Place the cover on the unit, making sure the orientation is correct.
4. Tighten the cover screws a little at a time, working in a diagonal pattern.

5. Check that the cover has closed tightly and evenly.

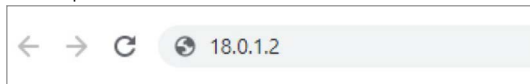
**Note:** Make sure any unused openings are plugged with the provided dowel and the cable gland nut is tightened.

### 3.14 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 the Connect button.
5. Type i<3GeoNet for the security key, and select the Next button.



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 press the Enter key.



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

A screenshot of a web form. It says 'Please select or enter a network name:'. To the right is a text input field containing the word 'Geokon'. To the right of the input field is a 'Submit' button.

9. Enter your network password, and then click Submit.

A screenshot of a web form. It has two input fields. The first is labeled 'Network:' and contains the text 'Geokon'. The second is labeled 'Password:' and contains ten black dots. Below the input fields is a 'Submit' button.

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.

### 3.15 COMMISSION (ACTIVATE) THE GATEWAY

Gateways (Cellular and Wi-Fi) are commissioned (activated) using the GEOKON API portal: [api.geokon.com](http://api.geokon.com).

Make sure all data loggers have joined the network before activating the gateway. If data loggers are added to the network after the gateway has been commissioned, the commissioning process must be repeated.



OpenAPI Portal



**GEOKON®**

GEOKON  
48 Spencer Street  
Lebanon, New Hampshire  
03766, USA

Phone: +1 (603) 448-1562  
Email: [teamsales@geokon.com](mailto:teamsales@geokon.com)  
Website: [www.geokon.com](http://www.geokon.com)

GEOKON  
is an **ISO 9001:2015**  
registered company