GroPoint SDI-12 Bluetooth Datalogger Instruction Manual

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GroPoint SDI-12 Bluetooth Datalogger

Product Information

The Bluetooth SDI-12 Data Logger is a battery-operated device that serves as an SDI-12 data logger and a wireless access point. It allows users to retrieve data through a smartphone using the free GP Reader app (available for Android devices only). The data logger can be left in the field (in situ) and connected to SDI-12 sensors to collect measurements. It stores the data in non-volatile memory, even if the battery fails, and can hold up to 12 months of measurements depending on the measurement interval and selected sensor measurements. The Bluetooth SDI-12 Datalogger can connect multiple SDI-12 sensors using additional 4-Port SDI-12 Expansion Bars, with a recommended limit of 10 sensors.

Product Usage Instructions

Battery Set-Up

1. Unscrew the four Phillips head screws on the lid of the enclosure.
2. Carefully separate the enclosure to expose the batteries.
3. For C cell batteries, connect the battery holder plug. For AA batteries, install the batteries in the holders, following the battery polarity diagrams on the circuit board.
4. Replace the lid, ensuring the rubber gasket is properly aligned on all edges.
5. Retighten the four lid screws, being careful not to over tighten and to tighten evenly at all four corners.
    1. Unscrew the four Phillips head screws on the lid and carefully separate the enclosure, exposing the batteries.
    2. For C cell, connect the battery holder plug. For AA batteries, install batteries in the holders. Note the battery polarity diagrams on the circuit board.
    3. Replace the lid, ensuring the rubber gasket is properly aligned on all edges.
    4. Retighten the four lid screws, being careful not to overtighten and to tighten evenly at all four corners.
    5. Depending on the logging interval, power consumption of the sensors, and operating temperatures; batteries may last several years or several months. Replace batteries when the GP Reader app shows the battery level of less than 30%. For AA batteries use industrial grade alkaline batteries for best results. Carbon zinc batteries are not recommended. High performing AA lithium batteries can also be used, we

have found the Energizer Ultimate Lithium battery to perform consistently well in colder temperatures.

For C cell, replace with equivalent Li-SOCl-2 type Lithium non-rechargeable battery, e.g. SAFT LSH14.

High power consumption sensors, rapid measurement interval as well as operating temperature will influence battery longevity and performance. We have selected high performance batteries with proven, consistent performance across a wide operating temperature.

Enclosure Mounting
The Datalogger enclosure is rated IP67, making it weatherproof and protected against the ingress of water and dust. For optimal results, follow these mounting recommendations:

1. Mount the data logger with the connector hanging down.
2. Avoid mounting the data logger in a location where it will receive directed sprays of water or other liquids.

Summary

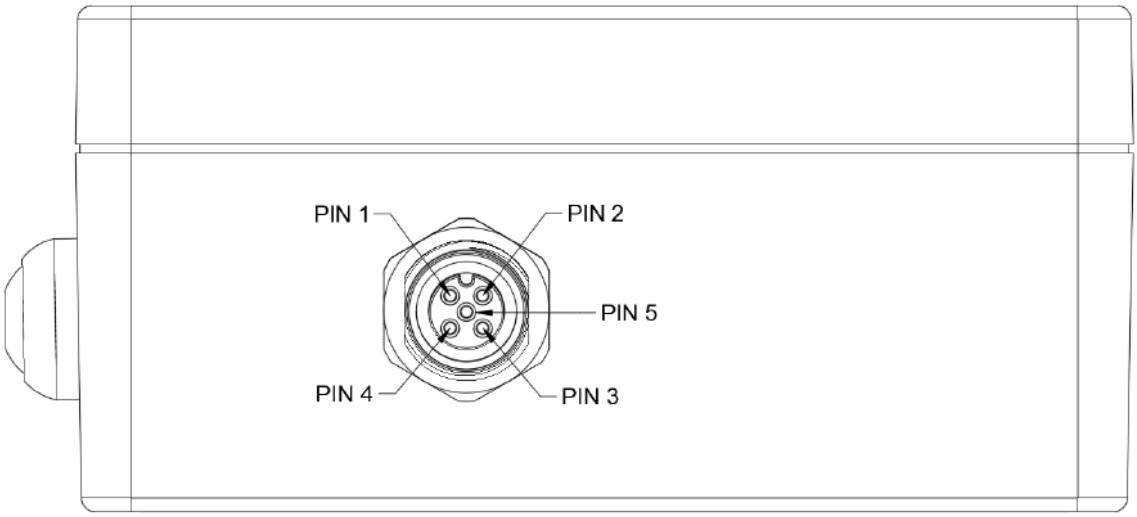
The Bluetooth SDI-12 Data Logger is an SDI-12 data logger and a wireless access point to retrieve data through a smartphone. The Data Logger is battery operated and can be left in the field (in situ) connected to SDI-12 sensors, collecting measurements, and allowing access to the data for download when convenient. The free GP Reader app (available for Android devices only) is used to check current conditions, configure the logger sensor measurement list, and sample interval, and to download logged data. With the app open on your smartphone, simply push the button on the Bluetooth Sensor Pod to wake it up and automatically establish a wireless connection. Tap the Download button in the app to download all logged data. Data is stored in non-volatile memory and is retained even if the battery fails. The 4 Mbyte memory can hold up to up to 12 months of measurements depending on measurement interval and sensor measurements selected. The Bluetooth SDI-12 Datalogger can connect multiple SDI-12 sensors (with additional 4-Port SDI-12 Expansion Bars). The number of sensors is limited by the SDI-12 protocol definition and network configuration. We recommend limiting the number of sensors to 10. The SDI-12 protocol allows for up to 62 sensors; however the limitation on total cable length of all sensors is 2000ft.. A cable bus can have 10 sensors connected to it, each with 200 feet of cable (total of 2000ft of cable). With fewer than 10 sensors, longer cable lengths are possible. With more sensors, short cable lengths must be used, e.g. 20 sensors each with 100ft of cable. The total aggregate cable length of all sensors must not exceed 2000ft. Although the SDI-12 specification allows for the maximum of 2000ft of aggregate cable on the SDI-12 network; factors such as temperature and moisture can increase signal attenuation and data disruption on the long cables; . Our recommendation is to allow a minimum of 20% margin for error.

Batteries
Batteries are supplied but not connected/installed.

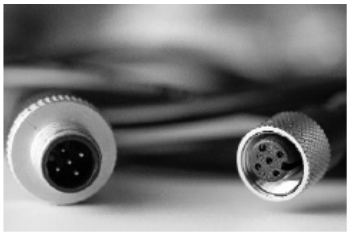
External Connections
M12-5 Female Pin Functions

M12-5 Connector Pinout	**Function**
1	Power
2	External Power
3	N / A
4	SDI-12 I/O
5	Ground

M12-5 Female Connector Pinout



Connecting a Sensor
Align and insert the plug connector fully into the panel mount socket on the data logger (it may be necessary to rotate the locking ring to allow full insertion).
For M12 connector: Once fully inserted, turn the screw ring clockwise until snug.
For EN3 connector: Once fully inserted, rotate the locking coupling ring until a positive lock is


M12 Connector


EN3 Connector

felt. DO NOT TWIST THE PLUG, only twist the locking ring.

Connecting External Power
Use a 2-port or more M12-5 expansion bar to allow for the connection of an external power supply with a sensor.
Warning: Exceeding +6.0VDC may permanently damage the Bluetooth Logger.

Power Supply Requirements	
Voltage Range	+4.5VDC to +5.5VDC
Current Rating	1.0A minimum

GP Reader App

Android Device

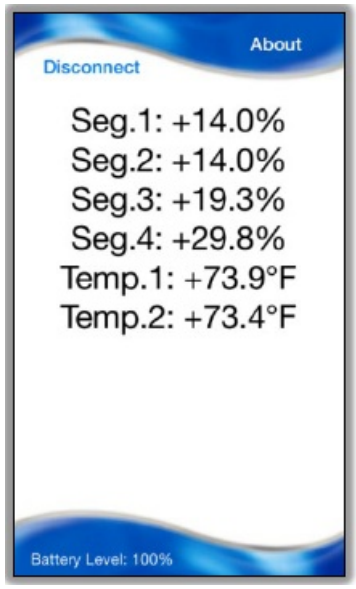
1. Search for “gp reader” in the Google Play Store
2. Select the GP Reader app by ESI Environmental Sensors Inc.
3. Click on the INSTALL button.

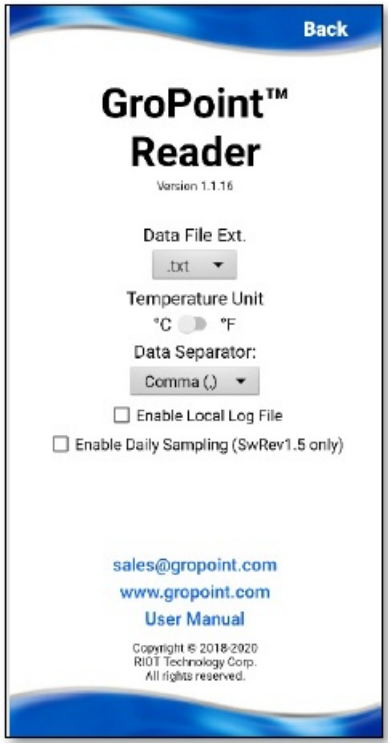
IOS Device

Coming Soon!
Getting Started with the App

1. Make sure your device has its Bluetooth wireless hardware turned on.
2. Start the GP Reader app.
3. Follow the prompts and select the file location to create the GPReader folder. It is important to remember the location of the GPReader folder, we suggest using the Documents folder for ease of finding later.
4. Click the “Connect” button. The app begins to scan for a GroPoint Bluetooth data logger. To minimize power consumption, if no connection is made, the scanning will automatically halt after 30 seconds if no data logger is discovered.
5. Press the button on the GroPoint BTDL to activate it. Once a data logger is detected, the app will display it in the list of available data loggers. Select it from the list.
6. Once connected to your sensors, you can take instantaneous measurements, configure measurement interval, add and delete sensors and measurement types, delete all logged data, start and stop logger and download data.

7. For a real-time measurement of soil conditions, press the “Measure” button. You will see an output of your current sensor measurements that are configured in the Configuration menu. If an error occurs, open the ‘config’ menu and check the measurement configurations are supported for your type of sensor and the correct sensor address is set.

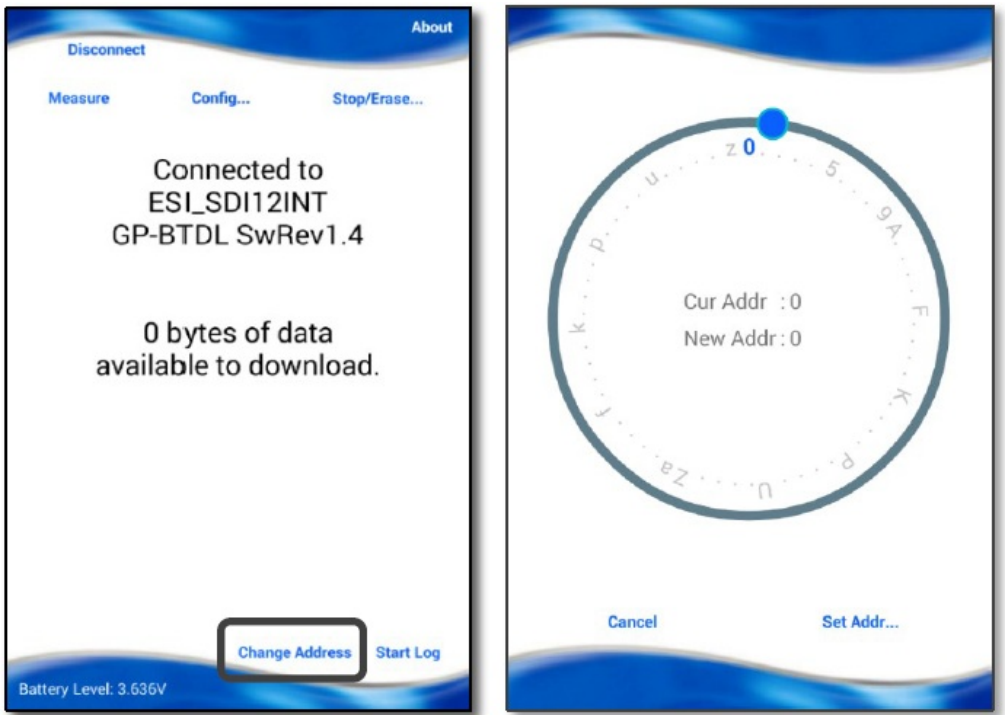




1. Click the “About” button to display the About screen. Here you can customize your data format, units, enable daily sampling and log file.
2. Click the drop-down menu under ‘Data File Ext.’ to select the desired data file extension; .txt, .csv, or .dat.
3. To change the temperature units, click the toggle to change between °C or °F. The default temperature unit is oC.
4. To change the data separator, click the drop-down menu and select the desired data separator; comma (,), semicolon (;), or tab (\t). The decimal point character will follow regional settings of the device.
5. You can also enable a log of all SDI-12 transactions with the data logger by clicking ‘Enable Local Log File’. The log file is stored in the predetermined location of the GPReader folder with the name GPReaderLog.txt. We recommend turning on this feature for diagnostics.
6. You can enable daily sampling by clicking ‘Enable Daily Sampling’. Note that this feature is only supported by BTDL SwRev 1.5 and higher. Go to the Daily Sampling section of this manual to learn more about this feature before enabling it.
7. If you have any support requests, you can find our contact information in this menu. Touch the “Back” button to return to the main view screen.

About Sensor Addresses

New SDI-12 sensors have a factory default address “0”. If you are attaching multiple sensors to a logger then sensors must be assigned unique addresses. Only one sensor may be attached to the logger at a time when changing its address.



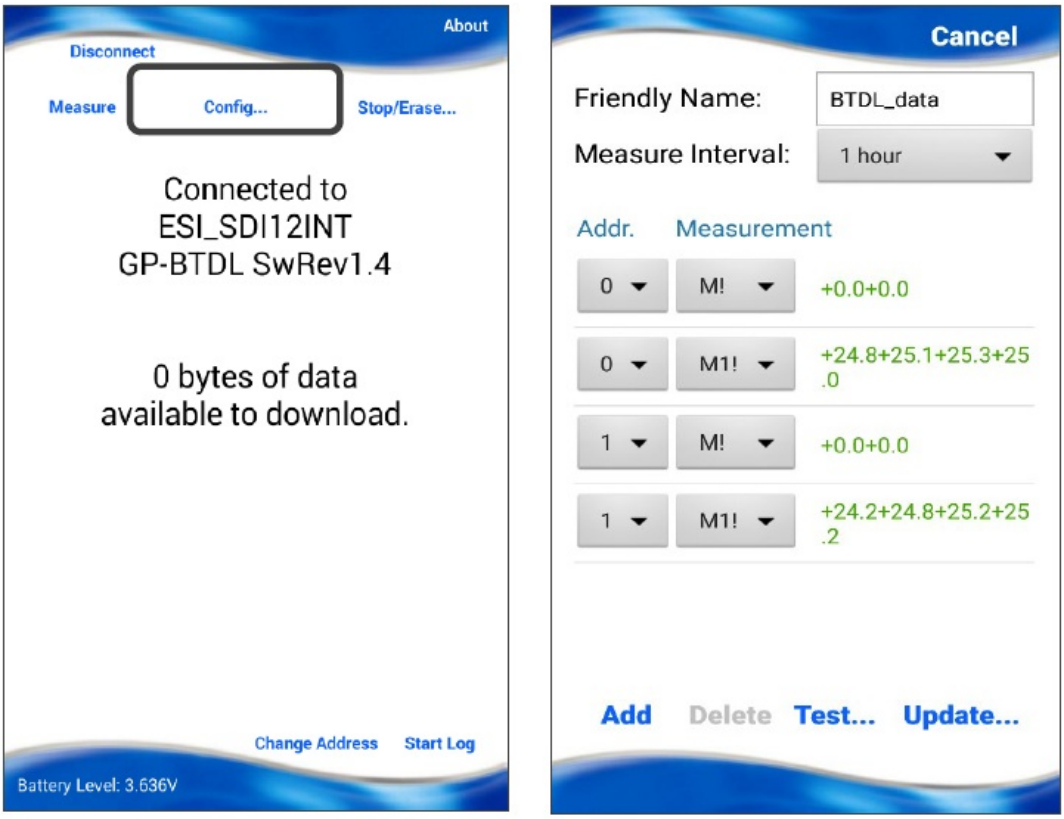
Address Set-Up

1. Attach a single sensor to the logger.
2. Click “Change Address”.

   Note: You can only change the sensor address when a single sensor in connected to the data logger.
3. Current address is shown in blue. Touch and drag the outside dot to select the new address.
   - a. Note that on each logger the sensor address must be unique.
   - b. Network Configuration Tip:
   - i. Label sensors and keep a list of addresses with friendly names and the location of deployment.
4. Click “Set Address” to update the sensor’s address.
5. Remove the sensor from Datalogger
6. Repeat the above steps for each sensor within the sensor network
7. Once all sensors are assigned unique addresses, they may all be attached to the Data Logger.

Logger Configuration

The logger must be configured to select the desired sensor measurements, what name to save the data under, and the measurement interval. Default configuration is 0M! measurement only. Click on the Config… button to show the configuration page.



1. Enter the logger's "Friendly Name". This name will be used for saved data files. Because the {friendly name} is a component of the saved data filenames, if you have multiple loggers you must ensure that they all have unique friendly names to ensure data is not over written and for ease of identifying each data logger. Avoid using (“), (/), (\), (:) characters and spaces in the friendly name because they are not supported. The limit for the friendly name is 32 characters.
2. Select the measurement interval, i.e. one measurement every 1 hour. This is the measurement interval for all sensor measurements.
3. Click the Add button to add a sensor measurement. Click Delete to remove a measurement.
4. For each sensor measurement you must specify the sensor address and the measurement you want to make. Refer to the sensor's data sheet for supported measurements. For example, 3-segment GroPoint Profile sensors support two measurements: aM! for moisture measurements and aM1! for temperature measurements. If you want both measurements to be logged, then both measurements must be added.
5. To check the current logger configuration, make sure that all desired sensors are connected and click "Test…" Each measurement will be checked, and real time measurements will be shown.
    - A warning message saying "No response" can occur to a selected measurement. If this occurs, check the sensor connections and/or sensor address assignments.
    - A warning message saying "Not supported" will appear if a measurement configuration is selected that is not supported by that particular sensor.
6. Click "Update" to save changes, then click "Start Log" to launch the logger.
7. First, the logger will clear its data storage memory. Then, check that the sensor ID for each sensor is displayed. Finally, the logger will launch into low power logging mode and disconnect from the app.

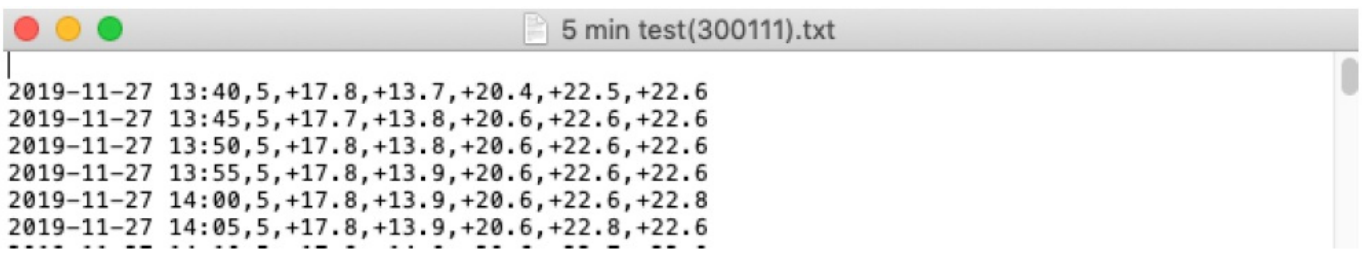
Note: If you wish to change logger configuration while already logging, make sure you download the data after making changes to ensure the new configuration is updated properly.

How to Download Data

1. Reconnect Bluetooth Data Logger to Android device
2. If there is no data yet to download, click on the “Start Log” button to start logging. NOTE: make sure desired logger configuration is correct first.
3. To download data, click the “Download” button to retrieve the data. Once the data is downloaded, the recently downloaded data is displayed.
4. New data downloaded is appended into the existing sensor files provided that the friendly name is not changed. If you change the logger’s friendly name, the next time data is downloaded new data files will be created. The old files will remain in the GP Reader folder.
5. Use your device’s File Manager app to navigate to the GPReader folder for a list of all sensor data files. Use the devices file manager app to navigate to this folder. Files use the “Friendly Name” as the base filename plus the sensors serial number (or sensor address if no serial number recognized). with the .txt extension. An independent data file will be created for each sensor. Use File Manager to send or share the data file. NOTE:
    - It is important to remember where you chose to store your data files when you first downloaded the app.
    - The app never deletes files to ensure that no data is ever lost. To manage personal device storage; periodically delete old raw data files once you are satisfied that they have been properly downloaded and parsed.
6. Downloaded data files are retained from each new download even if there are issues with the data parsing. Files are named {friendly name}.nnn where nnn starts at .001. nnn is a numerically increasing extension, e.g. .001, .002, 003 etc. etc. These files should be manually deleted periodically to avoid tying up device storage.
7. Raw data files can be viewed as a text file but will not make sense until it is parsed by the app (after the logger is relaunched). You should never need to view the raw data files unless there is failure during the parsing stage. In this case the raw data files can be provided to RioT for assistance in data recovery.
8. Data files can easily be shared by email or Google drive by pressing the share icon in the app

How to Format Data

1. When raw data is parsed it creates a separate data file for each sensor. File name is {friendly name} (sensors serial number).txt (or .csv or .dat depending on extension setting)
2. You can set your file format in the About Menu in the App.
3. The parsed data files are formatted date/time, sensor address, measurement values
4. Note that multiple measurement values from GroPoint sensors are aggregated into a single line. For example, a 3-Segment moisture probe with two temperature measurements, the data downloaded in .txt format will be presented as follows: Date, Sensor Address, Segment 1 Moisture, Segment 2 Moisture, Segment 3 Moisture, Temp 1, Temp 2. [need new image here for newer 3-seg sensor]



How to Erase Data / Stop Log

To stop the logger and put it into a low power state click the Stop/Erase… button.

Erase Log Without Downloading
To stop, or erase data logger without downloading, click “Stop/Erase”. Stopping the log will allow you to pause the data logging process. Erasing the log will delete your stored data and stop the data logging process.

ERASING THE LOG IS IRREVERSIBLE

Daily Sampling Interval – Based on Temp.

This feature (Daily Sampling) is designed to extend battery life in cold operational environments or in environments where measurements are not useful above or below certain temperatures. Measurement interval can be configured to change based on exceeding specified thresholds. For example, change from hourly measurement interval to daily measurement interval when the temperature is below 0C.
This feature only works with the GroPoint GPLP Profile sensors and with datalogger firmware SwRev 1.5 and greater. Daily Sampling is only compatible with GPLP sensors that have M1 or M2 measurement command configured, and BTDL SwRev 1.5 and after.
Once below certain temperatures, soil moisture data may be unnecessary, however since the datalogger is deployed in a remote environment, the user cannot travel to site to change the interval. Examples include agricultural applications where the soil moisture data is relevant to a growing season, warmup, or cool down shoulder seasons. In some cases, for hydrology and scientific deployments where soil moisture sensors are deployed in remote locations and the relevant measurements are related to soil temperatures above a specific level. When enabled, the data logger will check the temperature. If it is below the set threshold temperature, measurements will be skipped for a designated period (typically 24 hours). When the temperature is above the threshold temperature, regular logging at the measure interval will resume.

Example:

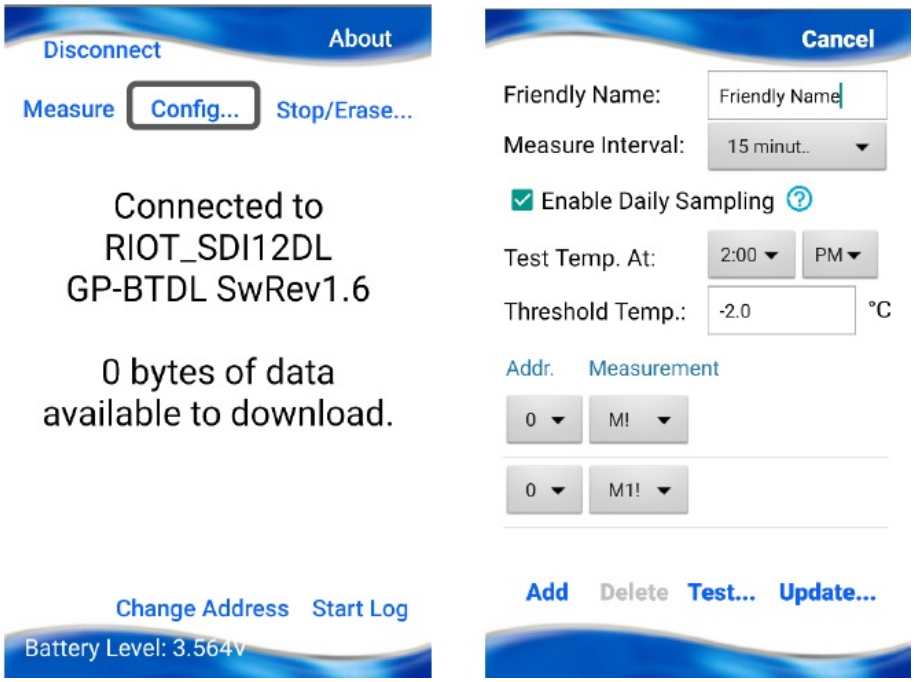
Temperature (degrees C)	Measurement Interval (hours)
20	4
15	4
10	4
5	4
0	24
-5	24
0	24
5	4
10	4

← Changes to every 24 hours when temp is below threshold

← Changes back to normal interval when temp is above threshold

Configuring Daily Sampling Feature
Click the “About” button and enable daily sampling; return to the home screen by clicking the “Back” button.

1. Click the “Config” button and enable daily sampling



2. Here you will see ‘Test Temp at:’ then a dropdown menu to pick a time. This sets the time the data logger will test the temperatures to see if they are above or below the threshold temperature
3. Threshold Temp:’ sets the minimum temperature at which the data logger will record data at the measure interval. Anything below the threshold temperature will cause the data logging to go into daily sampling mode and not take another measurement until the time indicate by ‘Test Temp’.

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Need Help? Email support@gropoint.com or visit www.gropoint.com/support

Documents / Resources

	GroPoint SDI-12 Bluetooth Datalogger [pdf] Instruction Manual SDI-12 Bluetooth Datalogger, SDI-12, Bluetooth Datalogger, Datalogger

References

- GroPoint Soil Moisture Sensing
- GroPoint Soil Moisture Sensing
- Support | GroPoint