VuLink CI

Operator's Manual

Contents

Symbols

Important Symbols in This Manual

The exclamation point calls your attention to a requirement, safety issue, or important action that should not be overlooked.

A check mark highlights a tip or feature.

Important Symbols on the Product

Caution

This symbol indicates critical safety information. Ignoring text that accompanies this symbol could result in injury or death due to improper handling.

WEEE Directive: Disposing of VuLink at the end of its useful life

In accordance with the EU Waste Electrical and Electronic Equipment Directive of 2005 and later Directives, VuLink should not be discarded with regular household waste. Check local electronic/electrical waste regulations before disposing of a VuLink device.

Safety Information

Using VuLink Correctly

Read these instructions carefully before using VuLink. Don’t use VuLink in any manner not specified in the manual or quickstart guide. Follow all safety warnings.

Installing and Replacing Batteries

Never mix old and new batteries, or Lithium and alkaline batteries. Make sure all three batteries are installed in the same orientation. Use only In-Situ recommended Lithium batteries for longest battery life.

A blinking red and green battery LED indicates a problem with the batteries. Do not deploy the VuLink in this condition. Check batteries and reinstall as necessary.

Installing the Antenna

Use only In-Situ recommended cellular antennas. Maintain a safe distance of at least 14 cm from the antenna and VuLink when the device is in operation.

Required Components

Rugged Twist-Lock Cable

Connects VuLink to an Aqua TROLL, Baro TROLL, Level TROLL, or Rugged TROLL instrument.

Vented or non-vented.

Instrument

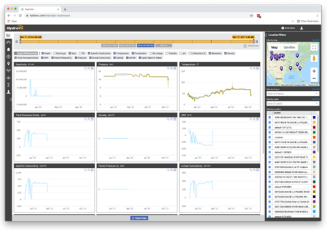
AQUA TROLL

RDO BLUE

LEVEL TROLL

RUGGED TROLL

Software



HYDROVU SOFTWARE

View data, manage instruments, create alarms, and modify VuLink settings in your browser.

VUSITU MOBILE APP

Communicate with VuLink on any Bluetooth-enabled mobile device and the VuSitu mobile app.

Batteries

In-Situ recommends Saft LM33600 batteries for your VuLink.
Find them at https://in-situ.com/vulink-lithium-batteries.

Accessories

The following accessories are available for VuLink.

CELLULAR ANTENNA

Part #: 0043630

The cellular antenna permits strong cellular network connectivity.

RUGGED CABLE SPLITTER

Part #: 0095500 (vented)

Part #: 0085840 (non-vented)

With the Rugged Cable Splitter, you can connect as many as 8 instruments to VuLink.

LOAD-BEARING UNIVERSAL ADAPTER

Part #: 0104160 (Adapter with 1 ft stripped and tinned cable)

To attach SDI-12 or pulse instruments and devices that don't have a Twist-Lock connector, use the Load-Bearing Universal Adapter.

MOUNTING KIT

Part #: 0095570

The Mounting Kit lets you attach VuLink to a pole, wall, or other structure.

How It Works

Using VuLink in any manner not specified by the manufacturer (In-Situ) may impair the device's built-in protections.

1 Carabiner

VuLink hangs from the top of a well with the detachable carabiner.

2 VuLink Telemetry Device

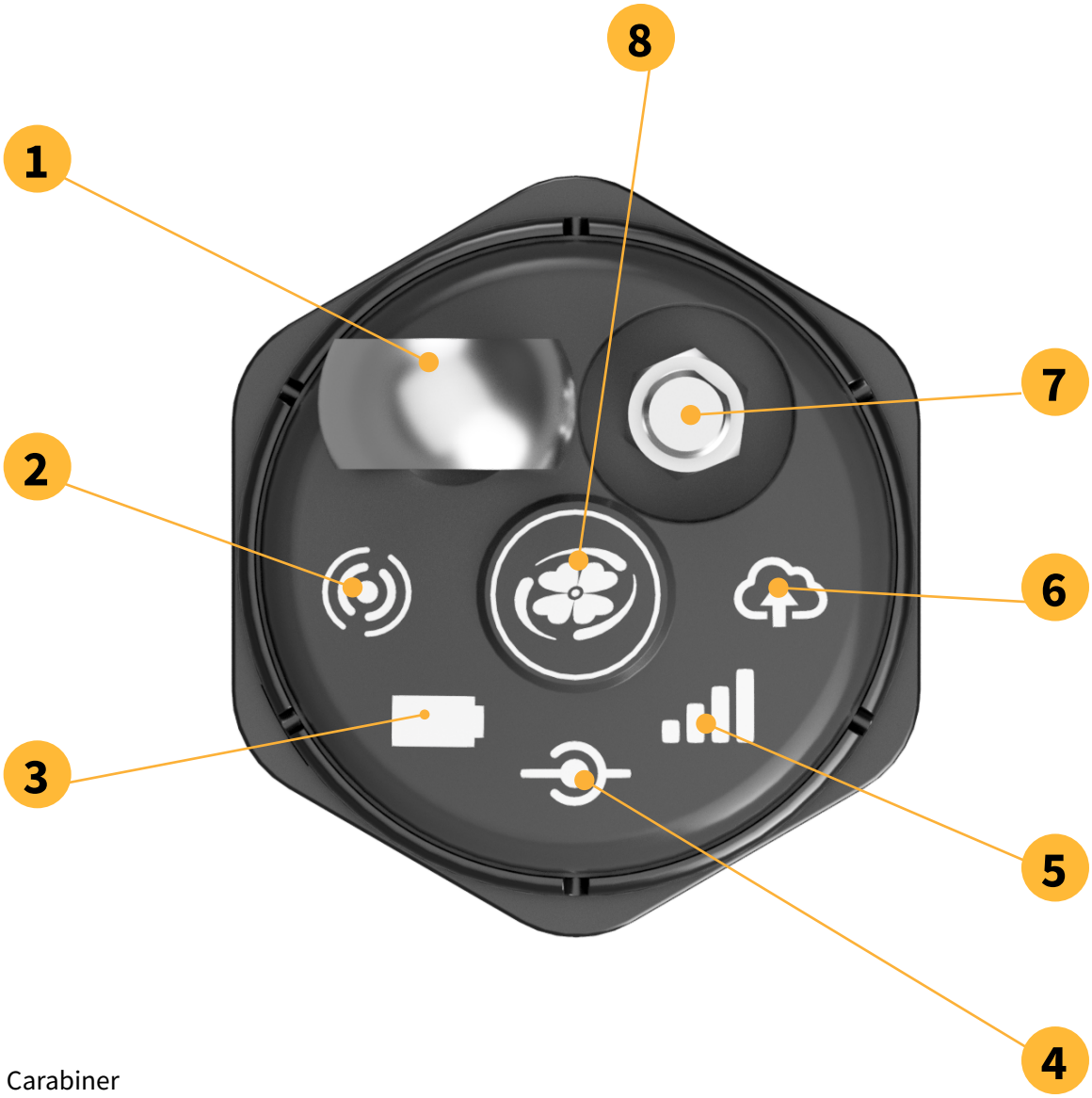
VuLink provides power to monitoring instruments, transmits data to the cloud, and notifies you when maintenance is required.

3 Instrument

An In-Situ instrument measures water quality and/or water level.

Controls

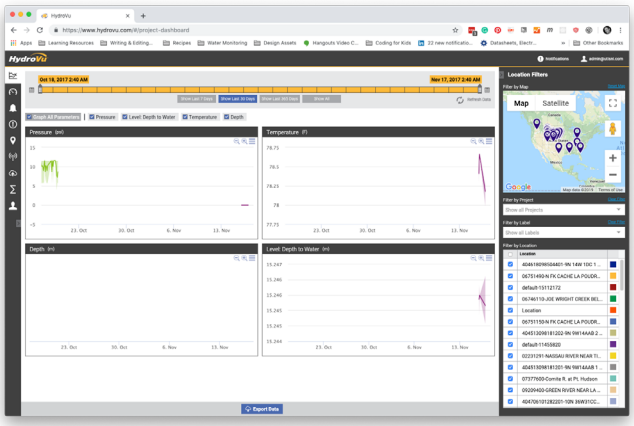
LEDs on VuLink's control panel indicate the device's status.



1. Carabiner
2. Bluetooth status
3. Battery status
4. Connection status
5. Network connection status
6. Cloud connection status
7. Antenna
8. Power

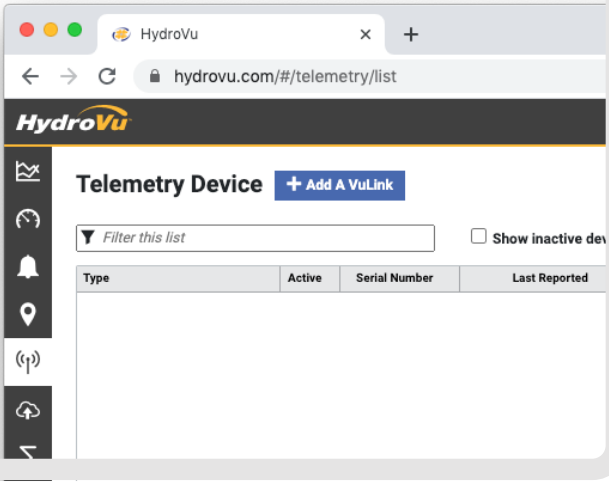
VuLink CI
Quick Start Guide

1 Create a HydroVu account



Visit hydrovu.com and create an account.

2 Go to the telemetry page



Click the telemetry page link in the menu on the left side of the page. Then click **Add a VuLink**.

3 Scan the QR code on your VuLink

or

Open your web camera and scan the QR code on your device, or type the registration code into the provided field.

4 Attach antenna and connect instrument

Connect the external or on-board antenna and the instrument. View the instructions on the next pages of this Quick Start Guide for more details.

You can find additional setting in the VuSitu mobile app. Download it from your device's app store.

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Setting Up Vulink

1 Attach the antenna and install batteries

Check that antenna is connected with a clear view of the sky.

Remove the battery cover by twisting it counter-clockwise and pulling down.

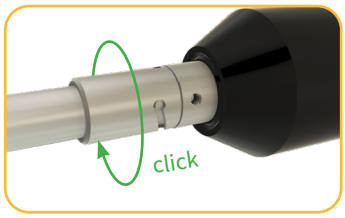
Install Li-MnO_2 batteries for best performance, or remove the yellow tab to use alkaline batteries.

Press the button. All LEDs turn on. Each LED changes color according to device status.

Never mix old and new batteries, or Lithium and alkaline batteries. Make sure all three batteries are installed in the same orientation. See **Power and Battery Information** to learn more.

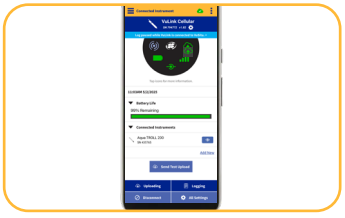
2 Connect an Instrument

Align the flat edge of the connector with the flat edge inside the cable.



Twist the cable until it clicks into the secure postion.

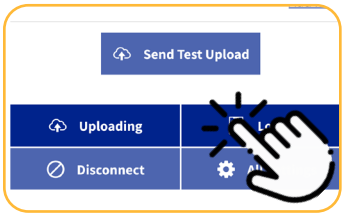
Connect the cable to your instrument and press the VuLink button.



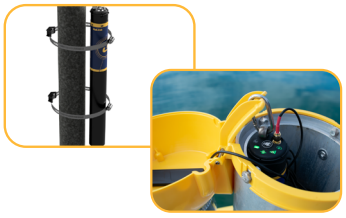
Connect to the VuSitu mobile app to add the instrument to VuLink.

3 Finish and Deploy

Connect the next instrument, then add it in VuSitu. Repeat to add up to 8 instruments.



Set up instrument settings and VuLink log in VuSitu.



Secure VuLink and instruments in the final deployment location.

Check that the antenna has a clear view of the sky or is placed as high as the location allows.

Understanding the LEDs

All five LEDs illuminate when VuLink is powered on. The color of an LED indicates status.

Cycling Through All LEDs

All LEDs cycling

VuLink is reading the active log. You can push the button or connect to VuSitu when the process is complete.

Bluetooth Connection Status

Blinking blue

Ready to connect

Solid blue

Bluetooth connected

Battery Status

Solid green

Battery power is at least 75%.

Blinking green

Battery power is between 50% and 75%.

Blinking red

Battery power is between 25% and 50%.

Solid red

Battery power is less than 25%

Blinking red and green

A blinking red and green LED indicates a problem with the batteries. Do not deploy the VuLink in this condition. Check batteries and reinstall as necessary.

Instrument Connection Status

Blinking green

Searching for an instrument

Solid green

Connected to instrument

Blinking red

New instrument not found

Solid red

No instruments connected to VuLink

Network Connection Status

Blinking green

Attempting to connect to network

Solid green

Connected to network

Solid red

Unable to connect to network

Cloud Connection Status

Blinking green

Connecting and uploading data to HydroVu

Solid green

Upload successful

Blinking red

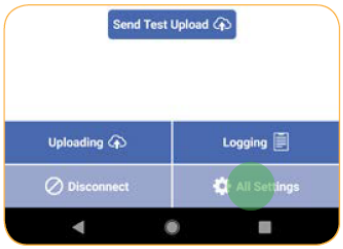
Unclaimed device

Solid red

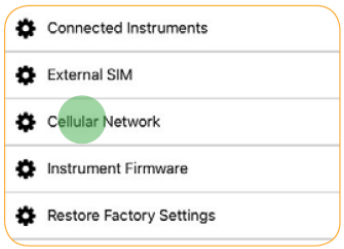
Failed to connect to HydroVu.com

Troubleshooting Network Connectivity

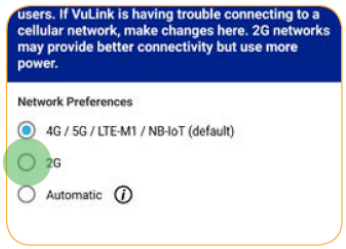
If VuLink has trouble connecting to a 4G network, switching to 2G may help. Launch VuSitu and follow the instructions below. Contact your cellular provider for coverage details.



Press the **All Settings** button at the bottom of the screen.



Tap **Cellular Network** on the Settings screen.



Tap **2G** to change VuLink's network settings. Press **Save**.

VuLink should now connect to a network and sync with HydroVu

Connecting to a cellular network can take up to 10 minutes the first time VuLink powers up or when VuLink hasn't been powered up in several weeks or months.

Power and Battery Information

Battery Types

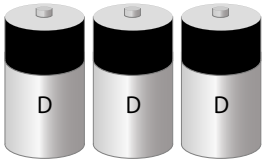
Only the battery types listed below are compatible with VuLink. Attempting to install other battery types in VuLink can result in data loss or serious safety hazards.

LITHIUM (Li-MnO_2)

Best suited for most deployments across a broad range of conditions. You can purchase recommended batteries from the In-Situ website.

ALKALINE

Included with every VuLink so you can collect data and test your setup right out of the box. May work as a cost-effective solution for simple or short-term deployments.



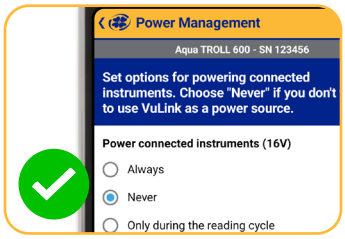
To maintain a stable connection and ensure data is collected, you must use Li-MnO_2 Batteries in deployments with temperatures below 5° C (41° F) or above 40° C (104° F), radar level instruments, or SDI-12 instruments from other manufacturers.

Installation Considerations

For best battery life, install Li-MnO_2 batteries purchased from In-Situ. Alkaline batteries are intended only for simple, short-term deployments at moderate temperatures.

Mount the antenna as high as possible and outside of metal enclosures to maximize signal strength. Frequent network retries can drain the batteries faster.

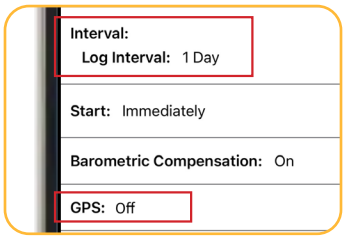
Connected Instrument Power



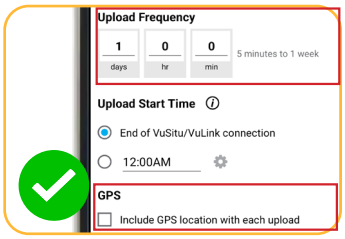
By default, VuLink is set to power connected instruments with every reading. Go to **Power Manamgement** and change this setting to **Never** if the instrument has its own power. Some instruments or complex networks require more power and may result in shorter battery life. These include:

- Radar level instruments
- Instruments with a wiper
- Multiple instrument networks
- SDI-12 or Pulse instruments (refer to manufacturer specs)
- Long cables (>60 m or 200 ft)

Log and Upload Settings



When programming a log, only select GPS if required. GPS significantly reduces battery life. Use the lowest read rate that suits your monitoring needs.



When choosing upload settings, use the lowest upload rate your application requires. Frequent network connection will drain the batteries faster. Only select GPS if required.

Battery Voltage

You can monitor Battery Voltage as a parameter in HydroVu or in the VuLink log and add an alarm for low battery. For Li-MnO_2 batteries, replace the batteries when they are near the minimum operating voltage of 6 V.

Battery Life for Common Applications with In-Situ Instruments

APPLICATION	GROUNDWATER	LAKES/RIVERS/ COASTAL CONTINUOUS WATER QUALITY	HAB EVENTS	STORM SURGE
Instrument	Level TROLL	Aqua TROLL 600	Aqua TROLL 700	Level TROLL NC
Deployment Temperature	25° C	25° C	25° C	25° C
Read Rate	60 minutes	15 minutes	5 minutes	1 minute
Upload Rate	Daily	1 hour	30 minutes	15 minutes
BATTERY LIFE*	**10.5 YEARS**	**1.5-2 YEARS**	**4-6 MONTHS**	**17 DAYS**

**with Li-MNO_2 batteries and strong LTE-m network connection @ 25° C. Field results may vary based on site conditions.*

Battery Life for Common SDI-12 Instruments

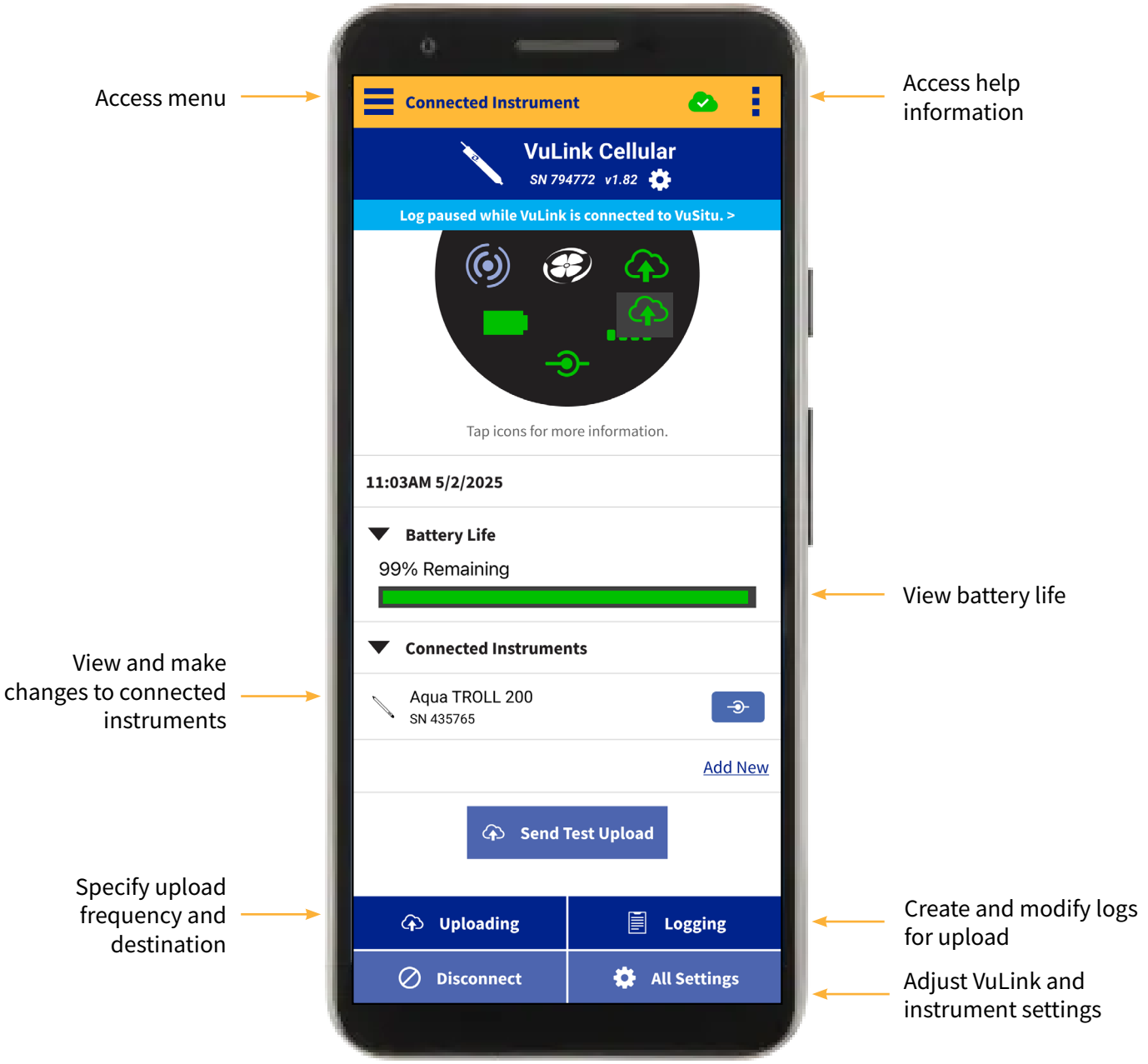
APPLICATION/ INSTRUMENT	PRESSURE TRANSDUCER	WATER QUALITY SONDE	WEATHER STATION
Deployment Temperature	25° C	25° C	25° C
Read Rate	60 minutes	15 minutes	60 minutes
Upload Rate	Daily	1 hour	12 hours
BATTERY LIFE*	**10 YEARS**	**1-3 MONTHS**	**1.5 YEARS**

**with Li-MNO_2 batteries and strong LTE-m network connection @ 25° C. Field results may vary based on site conditions.*

Using VuLink With VuSitu

After connecting to your VuLink with VuSitu, the app always displays the Connected Telemetry Device screen at launch. You can access all features of the app from this screen.

Connected Telemetry Device Screen

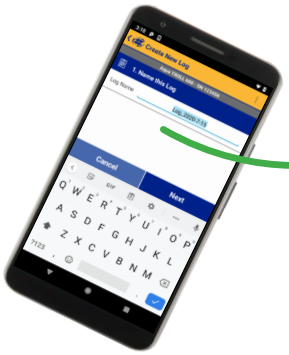


Logging With VuLink

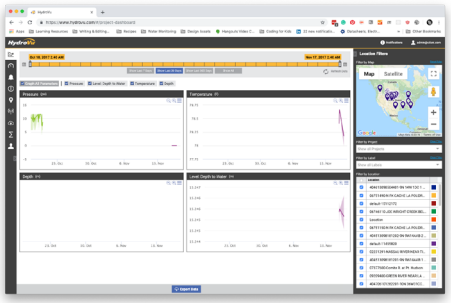
VuLink logs get uploaded to the cloud; instrument logs do not. Be sure to understand the differences between these log types before deploying VuLink.

VuLink Logs

1 **Program a log into VuLink with the VuSitu mobile app.**



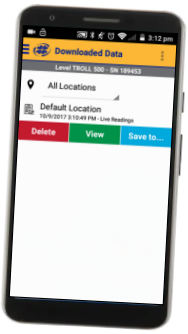
2 **See your data in HydroVu.**



Instrument Logs

1 **Program a log into the instrument with VuSitu.**

2 **Download log files with VuSitu.**



Pressing the VuLink button for 5 seconds or longer will stop the active VuLink log and start a default log to collect all parameters at 1 hour intervals. Create a new log to configure custom settings.

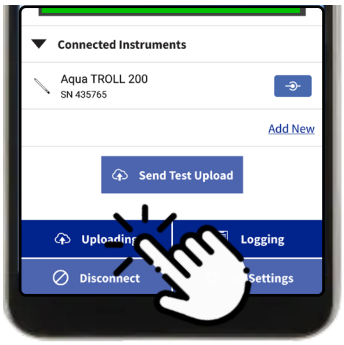
GPS Settings

VuLink includes the option to track GPS location, which may be useful in applications where the VuLink is expected to move over time. Follow the instructions below to adjust GPS settings.

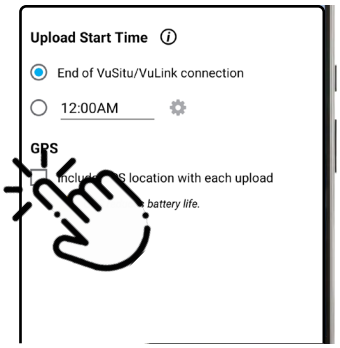
GPS usage significantly reduces battery life. To preserve battery life in fixed installations, ensure GPS is turned off by leaving the GPS option unchecked both in log setup and on the **Uploading** page.

Use GPS to Update Locations in HydroVu or in FTP Reports

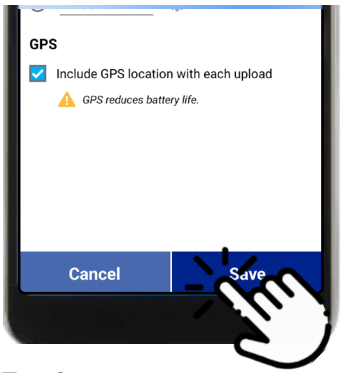
Include GPS location with each upload to update where locations appear on the map in HydroVu. You can also adjust this setting from the HydroVu **Telemetry** page. For FTP servers, coordinates will be included in the headers of the files sent with each report.



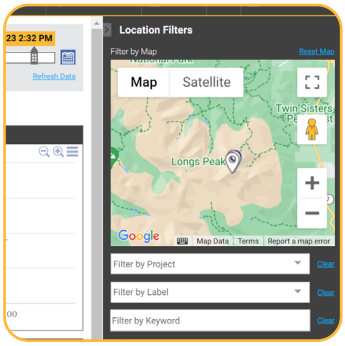
Connect to VuSitu and tap **Uploading**.



Select **Include GPS location with each upload**.



Tap **Save**.

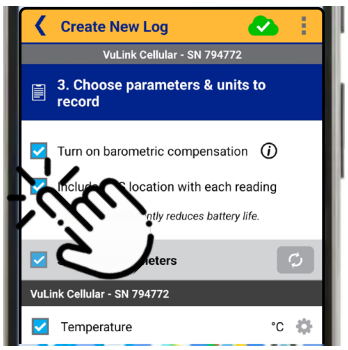


The locations for your VuLink and connected instruments will update every time your VuLink uploads to HydroVu.

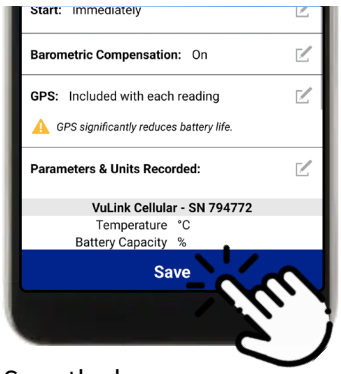
Log GPS Coordinates Over Time

Record GPS coordinates with each log reading to track movement over time. Coordinates are saved in the VuLink log and will appear on the graphs in HydroVu.

Connect to VuSitu and tap **Logging**.



During log setup, select **Include GPS location with each reading.**



Save the log.

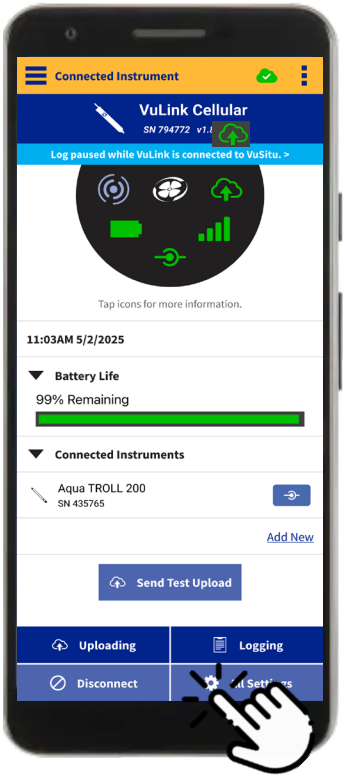
GPS data will be saved in the VuLink log and appear on the HydroVu graphs.

Real-Time Alarms

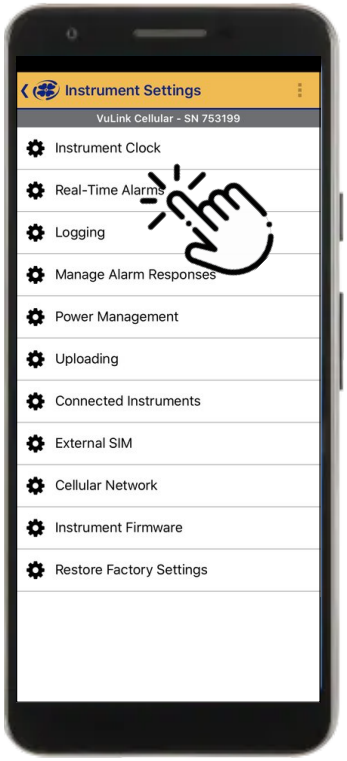
You can create alarms to trigger an SMS notification or a cloud upload when a log reading crosses a certain threshold.

Create a New Alarm

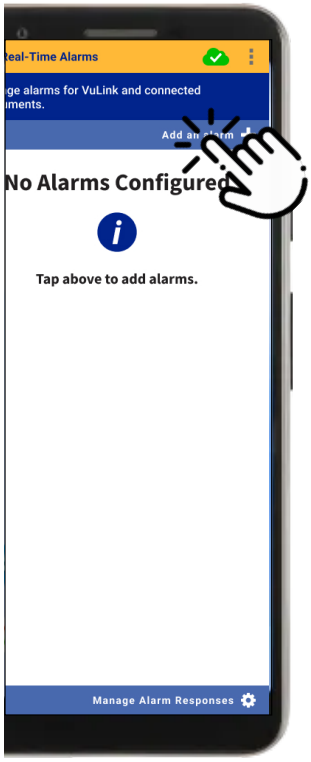
VuLink will only trigger an alarm when it logs a reading for the corresponding parameter. Before creating alarms, set up your VuLink log with all parameters you wish to monitor.



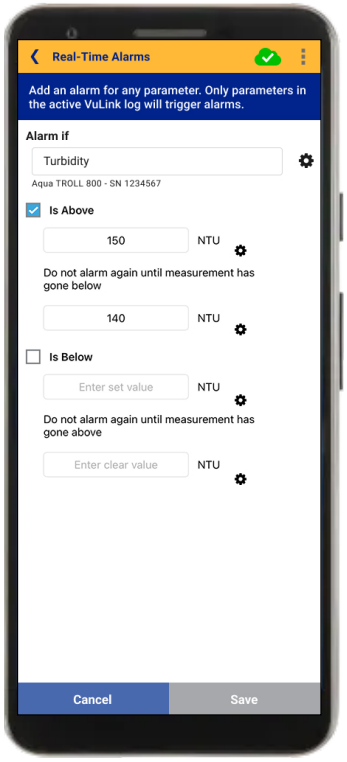
Tap **All Settings** from the menu.



Tap **Real-Time Alarms**.



Tap **Add an alarm**.



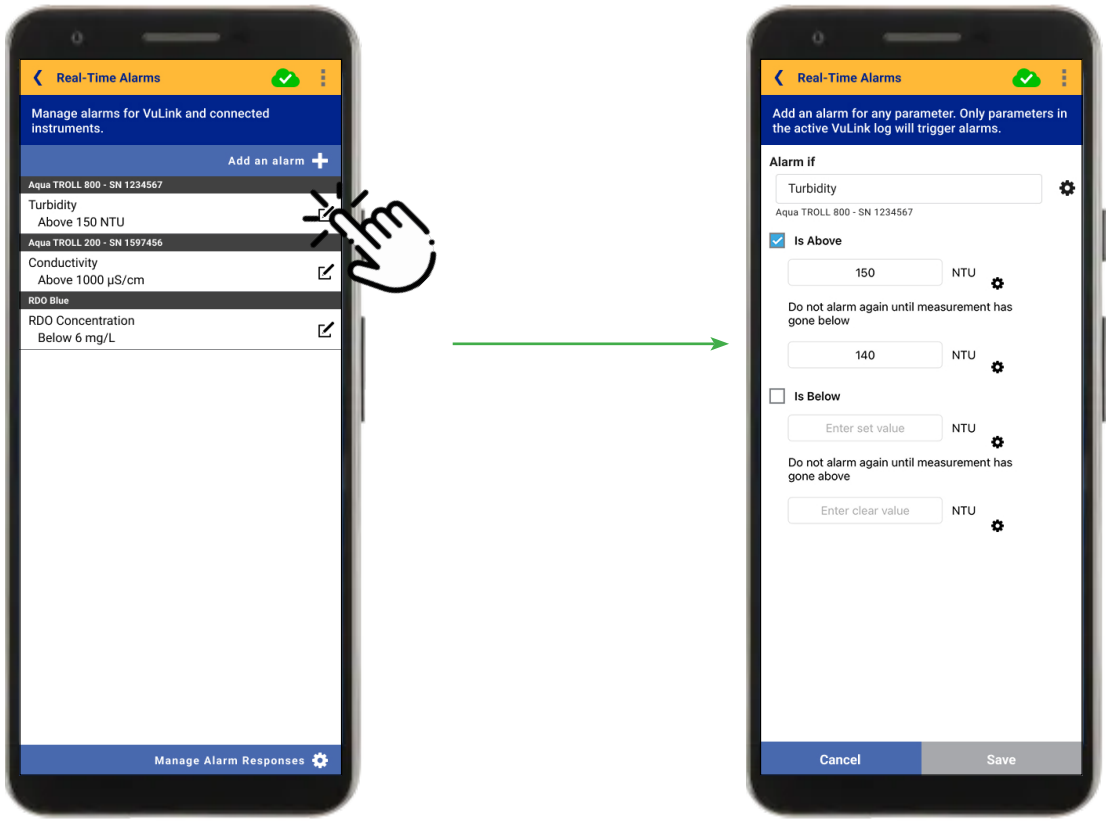
Select the parameter and configure alarm settings.

You can add up to 30 alarms per VuLink for any connected instrument, including pulse and SDI-12 instruments. If you have multiple instruments connected to VuLink, make sure to choose the parameter from the correct instrument.

View and Edit Alarms

After you have added alarms, you can view them on the main alarms page grouped by instrument. You will also see a warning if you have any alarm parameters that aren't in the active VuLink log.

Tap the edit icon to view or edit an alarm:



Manage Alarm Responses

Manage alarm responses to choose where alarm notifications will be sent. You can learn more about alarm response options below.

CLOUD UPLOAD

Use Cloud Upload to bypass the regular upload schedule and upload data immediately when an alarm is triggered. You can then configure email, SMS, or voice call alarms in HydroVu or in your FTP server based on the uploaded data.

SMS ALARMS

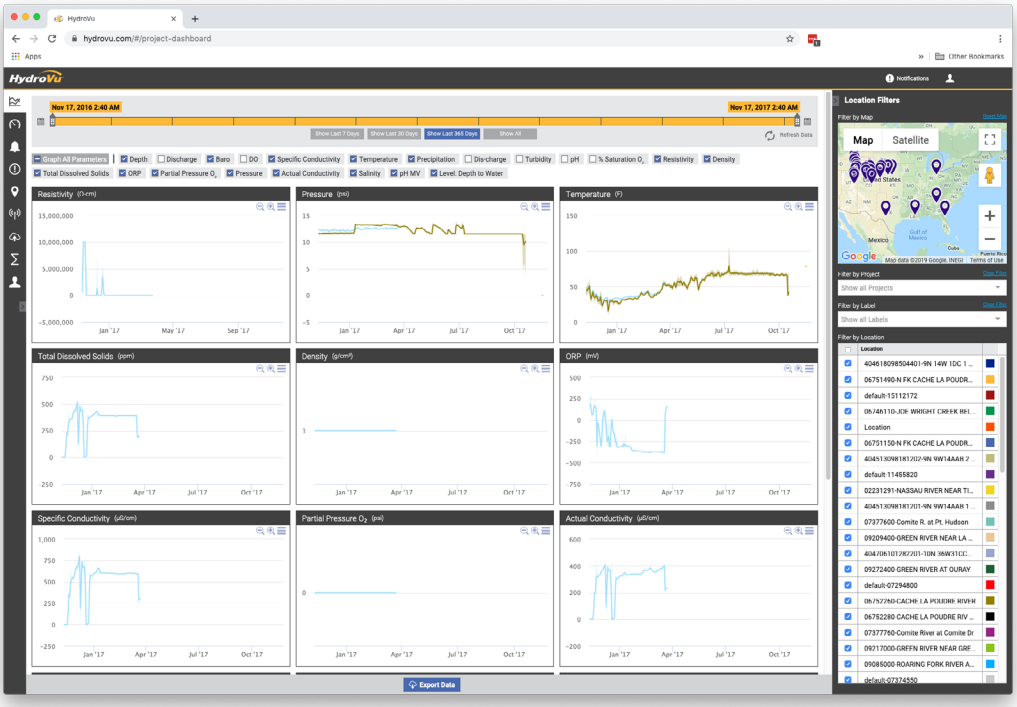
You can send SMS alarm notifications directly from VuLink to up to 2 phone numbers. Message and data rates may apply.

If you didn't receive the SMS test message:

- Make sure your VuLink has been activated in HydroVu on a Professional or Enterprise plan
- Make sure the antenna is installed with a clear view of the sky
- Verify that the area has cellular service
- Check that you entered the correct phone number

Using HydroVu

Use HydroVu to create logs, configure alarms, and modify VuLink's settings.

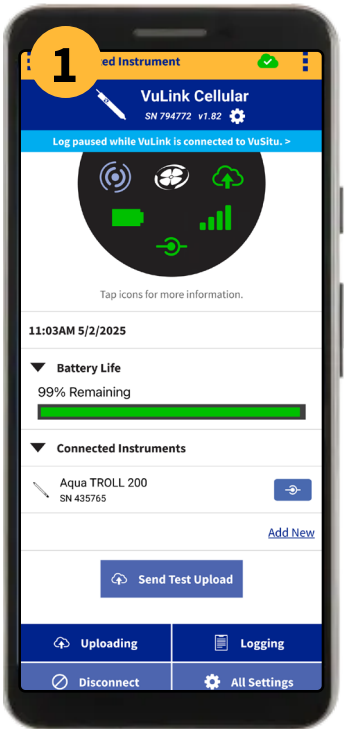


Sidebar Menu Options/HydroVu Pages

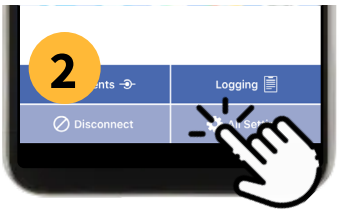
- **View your data**
- **See Locations**
- **Create and edit dashboards**
- **Configure telemetry devices**
- **Manage alarms**
- **Upload data**
- **Set up notifications**
- **Edit calculated parameters**
- **Manage users**

Using VuLink with an FTP Server

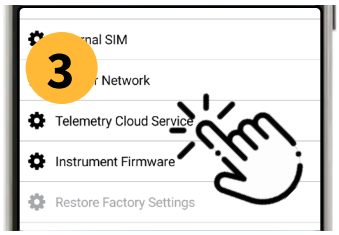
You can configure VuLink to upload data to an FTP server via VuSitu. Have your FTP hostname, path, port, username, and password ready before getting started.



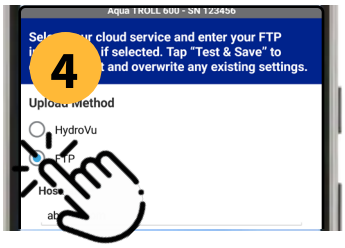
Connect to VuLink with the VuSitu mobile app.



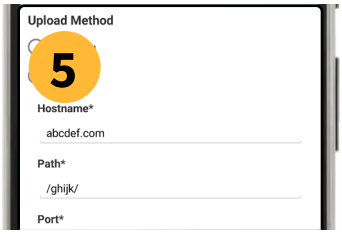
Tap **All Settings**.



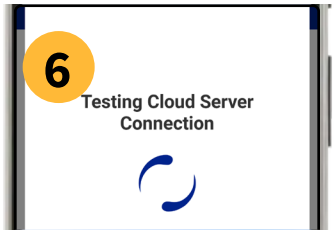
Select **Telemetry Cloud Service**.



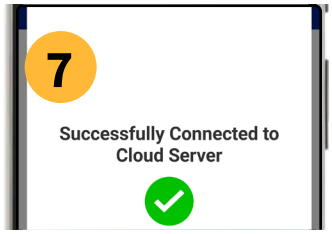
Tap the radio button next to **FTP**.



Enter your FTP credentials. Then tap **Test & Save**.



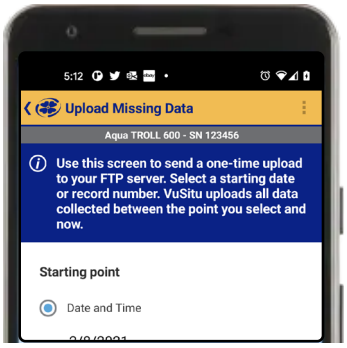
VuLink tests the connection to the server.



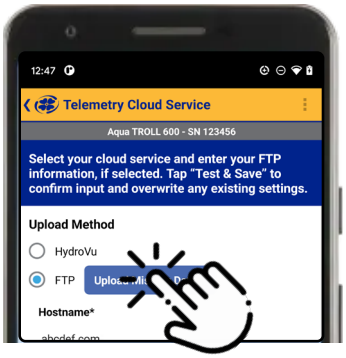
The app displays the test results.

Recovering Data Via FTP

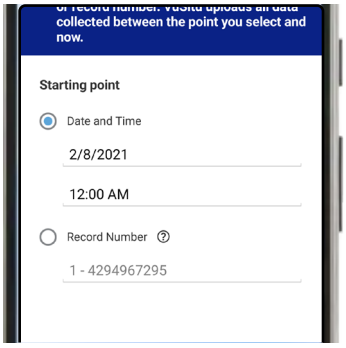
Use the recovery FTP screen to send data that failed to transmit via a scheduled upload. You need to know the number or date of the last record uploaded before a data gap occurred.



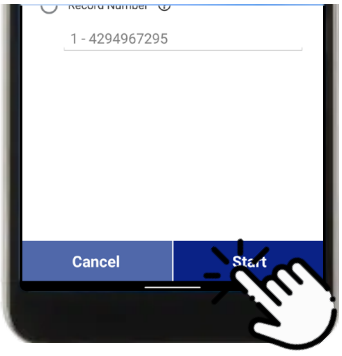
Access the Telemetry Cloud Service screen as shown above.



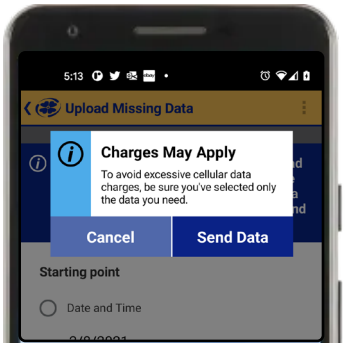
Tap **Upload Missing Data**.



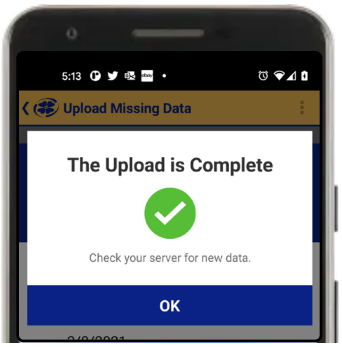
Enter a starting date and time, or a starting record number.



Tap **Start**.



Read the pop-up message about data charges. Tap **Send Data** if you wish to continue.



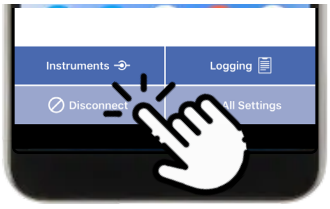
If the upload is successful, VuSitu displays a confirmation.

Understanding VuLink SIM Cards

External SIM Card

VuLink attempts to use an external SIM card for all communications if one is present. If communication via the external SIM fails, VuLink uses the built-in SIM instead.

Installing an External SIM Card



Before inserting the SIM card, disconnect VuLink from VuSitu.

Wait for VuLink to shut down and all lights to turn off.

Insert the SIM card into the SIM compartment inside the battery cover.

Press the button on the VuLink to initialize the SIM card.

Built-In SIM

If an external SIM card isn't present, VuLink uses its built-in SIM for all communication.

Updating VuLink

The automatic update option ensures that VuLink always has the current firmware.

Using VuLink with SDI-12 Instruments

VuLink can upload data from most SDI-12 instruments to HydroVu or an FTP server. Instruments must be compliant with the SDI-12 Standard Version 1.0 and later.

System Components

IN-SITU EQUIPMENT

FROM SDI-12 MANUFACTURER

1 VuLink Telemetry

Follow the instructions in the VuLink Quick Start Guide to activate your VuLink and connect to the VuSitu mobile app.

2 Rugged Cable with Flying Leads

Connect the Twist-Lock connector to VuLink. Then, follow the wiring diagram to connect the cable leads to the LBUA.

3 Load-Bearing Universal Adapter (LBUA)

Use the LBUA to connect an In-Situ cable to a third party cable. The LBUA protects the cable leads from moisture and supports the weight of deployment.

4 SDI-12 Instrument Cable

Connect the cable leads from your SDI-12 instrument to the other side of the LBUA.

5 SDI-12 Instrument

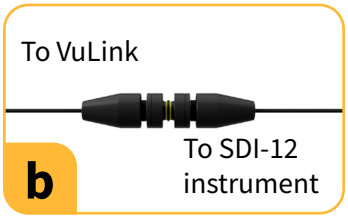
Follow manufacturer instructions to set the SDI-12 address, parameter output order, and parameter units for your instrument before connecting it to VuLink. Then use the VuSitu mobile app to add the instrument to VuLink.

Connecting an SDI-12 Instrument to VuLink

1 Connect Instrument to VuLink

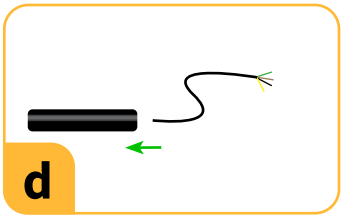
You will need to know the SDI-12 parameter output order and units to add the instrument to VuLink. Configure the address and parameters as needed for your SDI-12 instrument before connecting to VuLink.

Configure your SDI-12 instrument according to manufacturer instructions.

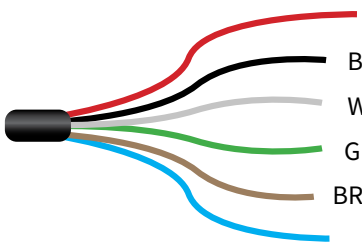


Connect the instruments with the Load Bearing Universal Adapter as shown:

Attach the Twist-Lock end of the Rugged Cable to VuLink.



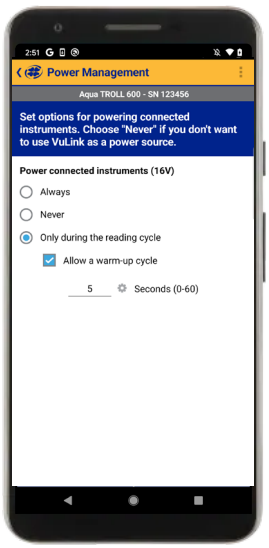
Follow manufacturer instructions to connect the SDI-12 instrument.



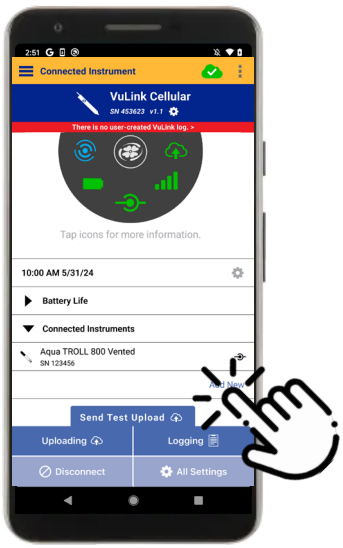
RED	**Power from VuLink (optional)**
BLACK	**Ground**
WHITE	**SDI-12**
GREEN	**Not Used**
BROWN	**Not Used**
BLUE	**Not Used**

2 Add the Instrument in VuSitu

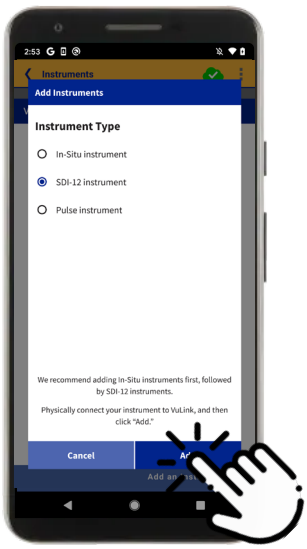
Use the VuSitu mobile app to add SDI-12 instruments to VuLink. VuSitu makes it easy to communicate with SDI-12 instruments, and you won't need to enter any commands manually.



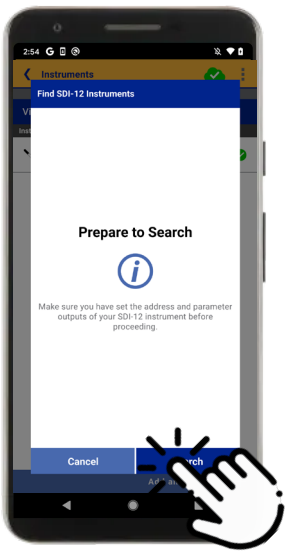
Tap **All Settings**, then **Power Management**. Set the warm-up time to match your SDI-12 instrument.



From the **Connected Instruments** dropdown, tap **Add New**.

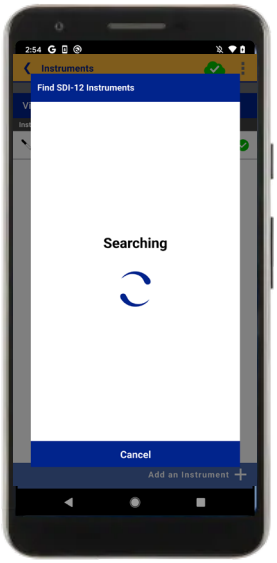


Tap **SDI-12 Instrument**. Then tap **Add**.

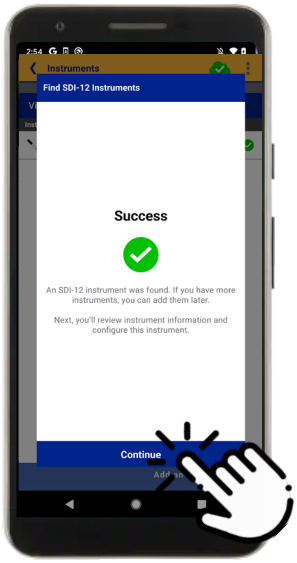


Tap **Search** to search for available SDI-12 instruments.

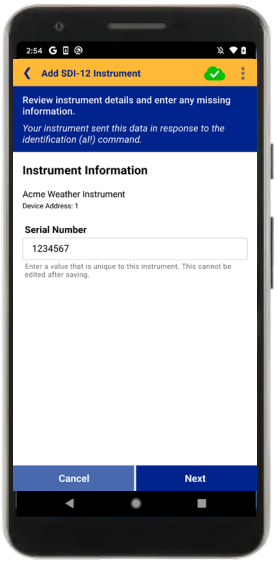
3 Review Instrument Information



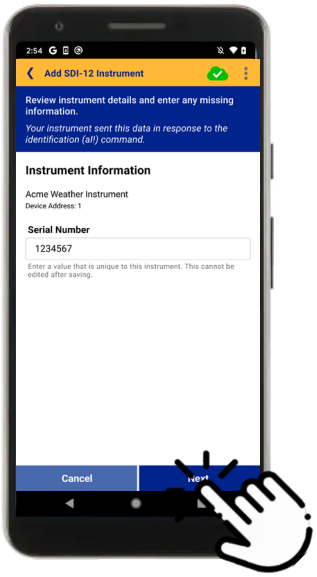
VuLink will send an Identification command (aI!) to the instrument.



When an instrument is found, tap **Continue**. Troubleshooting help will be displayed if no instruments are found.

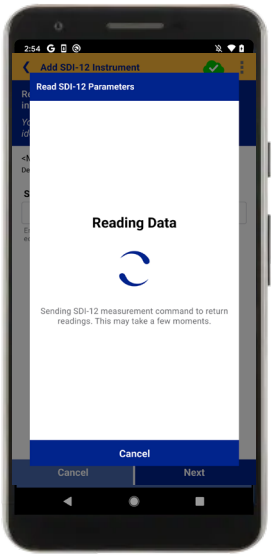


Information about the instrument will be displayed. Fill in any missing information.

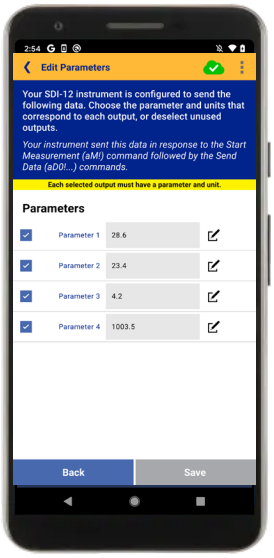


Tap **Next** to save the instrument information.

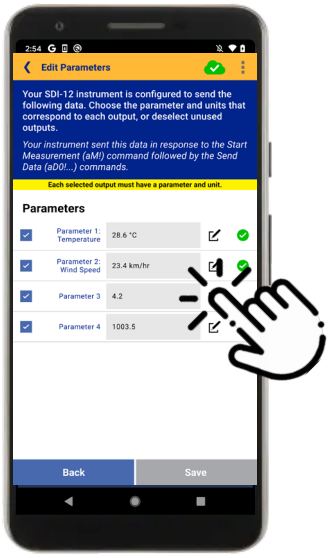
4 Add Parameter Information



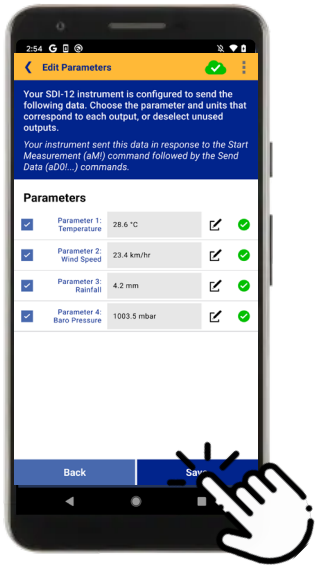
VuLink will send a Measurement command (aM!) and Send Data (aD0!...) commands to the instrument.



VuSitu will show the data returned by the instrument.



Tap the edit icon to add the parameter and units for each output. Uncheck any parameters you don't need.



Check that the parameter values match the expected ranges. Press **Save** to confirm the configuration.

After you have added your SDI-12 instrument, you can include SDI-12 parameters in the VuLink log for upload to HydroVu. You can also create alarms for SDI-12 parameters.

Connecting a Pulse Instrument to VuLink

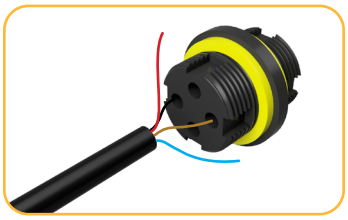
VuLink can upload data from a pulse instrument to HydroVu or an FTP server.

Required Components

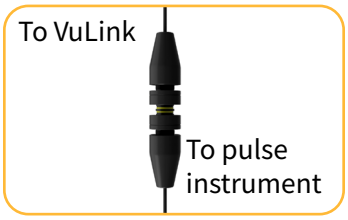
- Rugged Twist-Lock Cable with one stripped-and-tinned end
- Load-Bearing Universal Adapter (LBUA)
- Cable (from LBUA to pulse instrument)
- Pulse instrument
- VuLink

Wiring with the Load-Bearing Universal Adapter (LBUA)

Attach the Twist-Lock end of a Rugged Cable to VuLink.



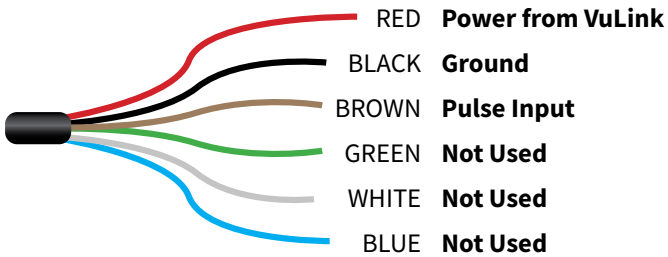
Connect the brown and black connectors at the other end of the cable to the Load-Bearing Universal Adapter.



Run wires from the other end of the LBUA to the pulse instrument.

Rugged Cable Wire Legend

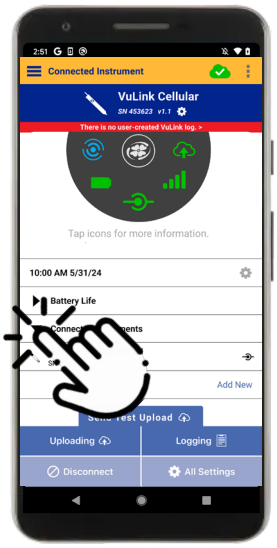
Refer to the following wiring diagram when connecting a pulse instrument to VuLink via a Rugged Cable.



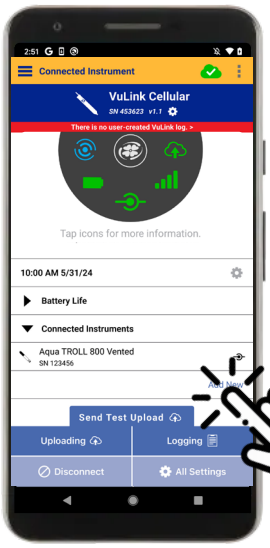
Setting Up a Pulse Instrument with VuSitu

Add rain gauges and other pulse devices to VuLink with VuSitu pulse configuration.

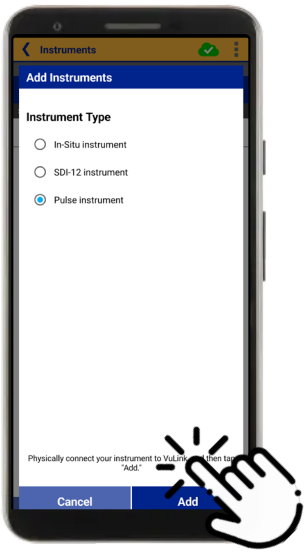
Adding Pulse Instruments to VuLink



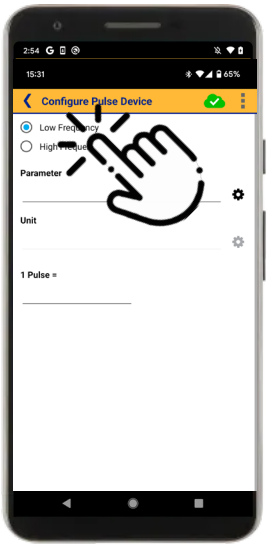
Open the **Connected Instruments** dropdown.



Tap **Add New**.

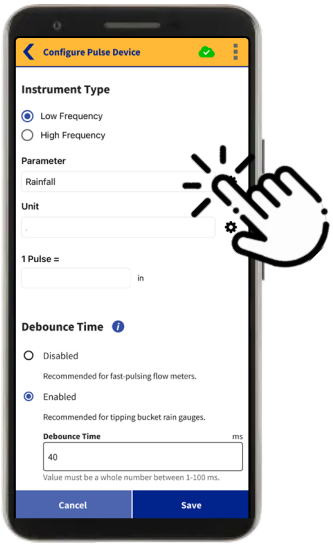


Tap **Pulse Instrument**. Then tap **Add**.

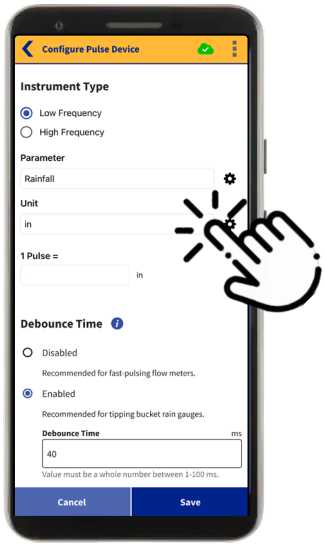


Choose Low or High frequency to match your pulse device type.

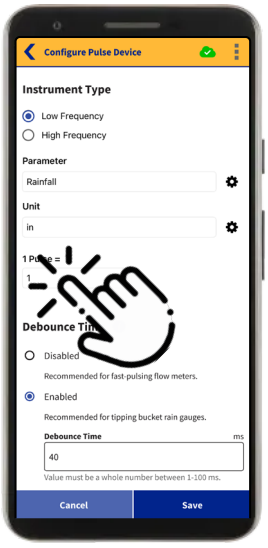
Low-Frequency Pulse Device Setup



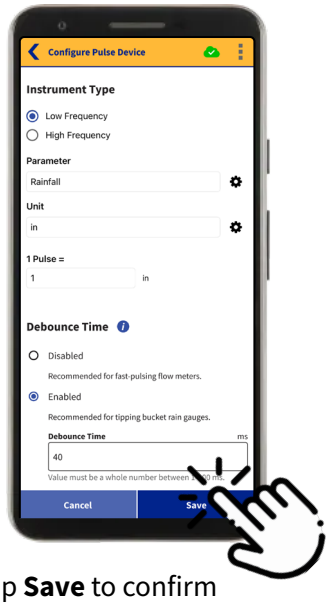
Tap the gear icon to choose one of three built-in parameters or create a custom parameter.



Tap the gear icon next to the unit field to select a unit.



Enter the value of one pulse in the selected units.



Tap **Save** to confirm the pulse instrument configuration.

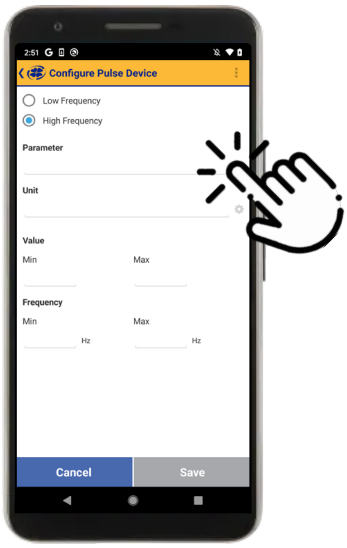
Adjusting Debounce Time for Low-Frequency Devices

Use the default debounce time for devices like tipping bucket rain gauges. Disable the debounce time for devices like fast-pulsing flow meters.

Some instruments need a debounce time to ensure that each pulse is only counted once. For example, a tipping bucket rain gauge may bounce after it is filled and tips. The second pulse from the bounce could be falsely counted as an actual tip event. The pulse debounce window prevents VuLink from counting any additional pulses until the set time elapses. VuLink has a default debounce time of 40 ms which is suitable for most single-pulse instruments.

However, the default debounce window can interfere with accurate pulse counting if your device is designed to pulse faster than 40 ms. You can disable pulse debounce if you have a fast pulsing device or if you are not concerned about erroneous bounces. Alternatively, you can set a custom debounce time based on the fastest expected pulse frequency of your specific instrument. Refer to the manufacturer's documentation to determine the best setting for your device.

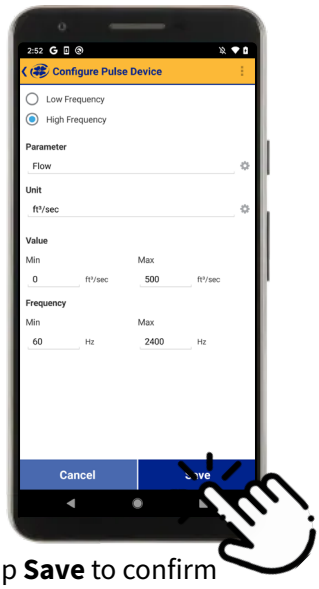
High-Frequency Pulse Device Setup



Tap the gear icons to choose a parameter and unit.

Enter a minimum and maximum value.

Enter a minimum and maximum frequency in hertz.



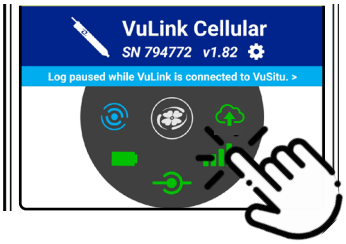
Tap **Save** to confirm the pulse instrument configuration.

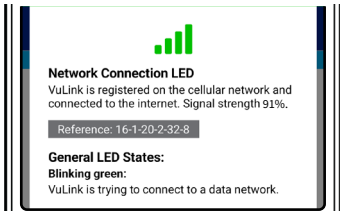
Signal Strength Information

Use the table below to understand VuLink signal strength indicators. Signal strength and RSSI are unique to each manufacturer and do not correspond to other manufacturers' devices.

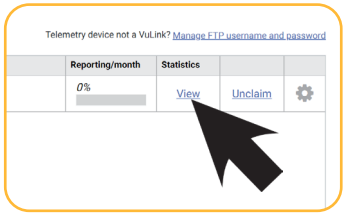
SIGNAL STRENGTH	RSSI	DBM	SIGNAL QUALITY	RESULTS
0% - 6%	0 - 2	-109 or less	No Signal	Disconnection
6% - 29%	2 - 9	-109 to -95; 2 dBm per step	Bad	The modem will likely not be able to send data
29% - 45%	9 - 14	-95 to -85; 2 dBm per step	Poor	The performance will drop drastically
45% - 61%	14 - 19	-85 to -75; 2 dBm per step	Fair	Marginal data with drop-outs possible
61% - 77%	19 - 24	-75 to -65; 2 dBm per step	Good	Strong signal with good data speeds
77% - 100%	24 - 31	-65 to -51; 2 dBm per step	Excellent	Strong signal with maximum data speeds
Unknown	99	Unknown	Unknown	The modem didn't return valid RSSI

In **VuSitu**, you can view signal strength by tapping the network signal icon:

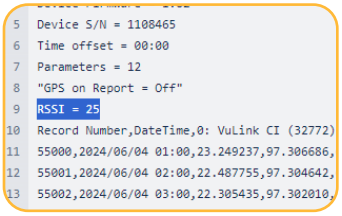




In **HydroVu**, you can view signal strength by clicking **View Statistics** from the **Telemetry** page:



For **FTP uploads,** you can view the RSSI in the FTP upload header:



VuLink® Data Logger and Telemetry

VULINK CELLULAR IS A GLOBAL TELEMETRY DEVICE THAT WILL CHANGE THE WAY YOU THINK ABOUT REMOTE MONITORING. OUR TURNKEY SOLUTION IS EASY TO SET UP, WORKS FROM ANYWHERE, AND DELIVERS LONG-LASTING POWER. SO, YOU NEVER HAVE TO WORRY ABOUT YOUR EQUIPMENT OR YOUR DATA.

ONE-PRESS SETUP

- VuLink autodetects any In-Situ device with one button press or scheduled report. Icons indicate battery life, instrument connection, network connection and HydroVu® connection.

EXPANDED COVERAGE AND CONNECTIVITY

- VuLink also connects to third party SDI-12 instruments and pulse systems. Connect instruments to the VuLink using the Load-Bearing Universal Adapter. VuSitu detects the connected SDI-12 or Pulse instrument, and then the app guides through adding parameters.
- VuLink Cellular is truly global, offering cellular coverage across multiple networks. Future proof your system for decades with 4G LTE Category M1/NB-IoT technology, while ensuring backwards compatibility with quad-band 2G coverage.

FREE GLOBAL CELLULAR DATA

- VuLink offers free cellular data for life, right out of the box, no set up required. See back for details.

IN-WELL MOUNTING

- Save time and money by installing VuLink inside a 2-inch/50-mm well with standard well caps and casings to keep it secure and hidden from view.

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EXTENDED LIFE

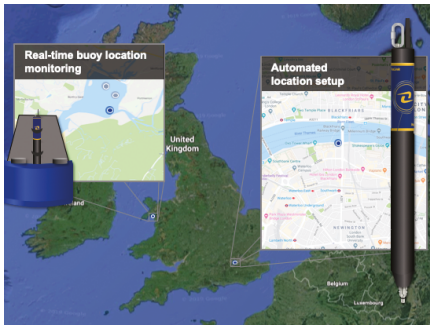
- VuLink offers two-to-five times the battery life of similar devices. M1 and NB-IoT offer extraordinary power savings. And at faster reporting rates, VuLink offers exponential savings – more than two years of battery life at 15-minute reporting intervals.
- Say good-bye to custom, expensive batteries – VuLink uses off-the-shelf alkaline and lithium D cell batteries.

Applications:

- **CONTINUOUS GROUNDWATER MONITORING**
- **REMOTE SURFACE WATER MONITORING**
- **RIVER GAGING**
- **SALT WATER INTRUSION MONITORING**
- **STORMWATER MONITORING**
- **REMEDIATION**
- **WASTE MANAGEMENT**
- **IRRIGATION**
- **MINING WATER MANAGEMENT**
- **INDUSTRIAL AND MUNICIPAL**

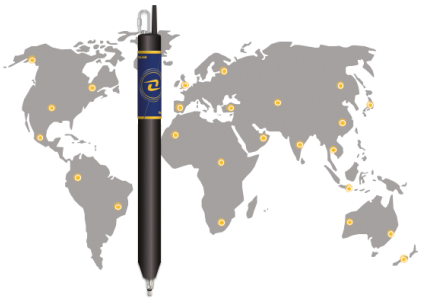
VuLink Data Logger

ELECTRICAL	
BATTERY	3 x D cell (1.5 V - 3.6 V) LiMnO2 [Lithium Manganese Dioxide] (recommended for best performance) or Alkaline
BATTERY LIFE ($Li\text{-}MnO_2$)	Up to 10 years* self powered instrument, 24 hour reporting Up to 2 years* multiparameter sonde, hourly reads and uploads
BATTERY LIFE (Alkaline)	Up to 2 years* self powered instrument, 24 hour reporting Less than 6 months* multiparameter sonde, hourly reads and uploads
CLOCK ACCURACY	Less than 1 minute of drift per year when synchronizing with network provided time
NETWORK COMMUNICATION	
NETWORK TYPE	4G LTE Category M1 (LTE-M) / NB-IoT (Narrow Band) with 2G fallback
BANDS	**LTE Global -** B1(2100), B2(1900), B3(1800), B4(AWS1700), B5(850), B8(900), B12(700), B13(700), B18(800), B19(800), B20(800), B28(700) **Verizon -** B4(AWS1700), B13(700) **2G Quadband -** B2(1900), B3(1800), B5(850), B8(900)
PROTOCOLS	HTTPS (HydroVu), FTP, SMS (alarms)
DATA PROVIDER	Built-in free** global roaming (see Network List Addendum for details: in-situ.com/VuLinkNetworks), additional single 4FF slot for 3rd party SIM support
ANTENNA	SMA-M connector
GPS	Up to 3 m accuracy, built-in antenna
FILE FORMAT (non-HydroVu)	CSV
REMOTE SETUP	Supported
MECHANICAL	
DIAMETER	47 mm (1.85 in)
LENGTH	485 mm (19.1 in)
WEIGHT	1.0 kg (2.2 lb) (with included alkaline batteries and carabiner, excluding antenna)
MATERIALS	Polyphenylene Sulfide (housing), Polyvinyl Chloride (battery cover), Titanium (Twistlock connector, ring, eyebolt), 316 Stainless Steel (carabiner), Silicone (keypad cover), Brass (SMA antenna connector), Polycarbonate (label), FKM Fluoroelastomer (O-rings)
STORAGE TEMPERATURE	-20° C to 60° C (-4° F to 140° F)
OPERATING TEMPERATURE	-20° C to 50° C (-4° F to 122° F) (Li-SOCl2/Li-MnO2), 5° C to 40° C (41° F to 104° F) (Alkaline)
INGRESS PROTECTION	Device: IP68 System: Up to IP68 per antenna specification
INSTRUMENT COMMUNICATION	
PROTOCOLS	Modbus over RS-485, Pulse low/high frequencies (max 40 kHz), SDI-12
CONNECTORS	1 In-Situ Twistlock (supports multiple instruments via Rugged Cable Splitter, TROLL Net Hub, or Load-Bearing Universal Adapter)
SIMULTANEOUS CONNECTIONS	Up to 8 instruments (please refer to power limits below)
VENTING	Built-in on all models, no desiccant required
BAROMETRIC COMPENSATION	Built-in on all models for automatic compensation of non-vented level readings
BAROMETER ACCURACY	+/- 1 hPa
ALARMS	Configurable based on instrument readings and device parameters, second reading/reporting schedule available when in alarm state
POWER	$Li\text{-}MnO_2$: Total maximum of 300 mA provided to connected instruments at 16 V Other battery types: Total maximum of 75 mA provided to connected instruments at 16 V (typically intended to power a single instrument)
SETUP	
WIRELESS SETUP	Supported via Bluetooth Low Energy
LOGGING RATE	1 minute to 7 days, of 30 parameters maximum
TRANSMISSION RATE	5 minutes to 7 days
MEMORY	512 MB (soldered to circuit board)
WARRANTY	**2 YEAR**



Continuous GPS – HydroVu uses VuLink's GPS to automatically locate and mark devices on maps, syncing devices and locations, increasing data quality, and making it easier to track free-floating buoys.

Encrypted Connections – VuLink and HydroVu offer SSL encryption of your data.



Free Global Cellular Data – VuLink and HydroVu offer free data up to 1 transmission for 24 data points per day. Additional plans can be purchased at Hydrovu.com. No more worrying about provisioning SIM cards and checking multiple systems for data usage. VuLink works with all LTE networks that support LTE-M1/NB-IoT. For a complete list visit in-situ.com/VuLinkNetworks.

Expanded Connectivity – VuLink also can read SDI-12 output, high frequency and low frequency pulse inputs, configured in VuSitu. And the **Load-Bearing Universal Adapter** can connect to anything.

* Measured at a temperature of 23° C (73° F), LTE-M network connectivity, internally-powered instrument
** Free up to 1 transmission of 24 data points per day for life of instrument, additional plans can be purchased at hydrovu.com

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In-Situ Innovations in Water Monitoring

Declaration of Conformity

Manufacturer: In-Situ, Inc.
221 East Lincoln Avenue
Fort Collins, CO 80524
USA

Declares that the following product:

Product name: **VuLink Cellular**
Model: **VuLink CI**
Part number: **0094840**
Product Description: **Global cellular telemetry device for remote monitoring**

is in compliance with the following Directives

- Radio Equipment Directive (RED), 2014/53/EU
- Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) Directive, 2011/65/EU and Commission Delegated Directive, (EU) 2015/863

and meets or exceeds the following international requirements and compliance standards:

Radio Equipment Directive Article 3.1(a) Safety Standards:

- **EN 61010-1:2010** - Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
- **EN 62311:2008** – Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0Hz-300GHz)

Radio Equipment Directive Article 3.1(b) EMC Standards:

- **EN 55024:2010 + A1:2015** - Information technology equipment - Immunity characteristics - Limits and methods of measurement
- **EN 55032:2015 + AC:2016** - Electromagnetic compatibility of multimedia equipment - Emission requirements
- **Draft EN 301 489-17 V3.2.0** - Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
- **EN 301 489-3 V1.6.1** - Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz
- **Draft EN 301 489-52 V1.1.0** - Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE)

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221 East Lincoln Avenue, Fort Collins, CO 80524 USA
Toll Free: 800.446.7488 Tel: 970.498.1500 Fax: 970.498.1598

radio and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU.

Radio Equipment Directive Article 3.2 Radio Standards:

- **EN 300 328 V2.2.2** - Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum
- **EN 301 908-1 v11.1.1** - IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Introduction and common requirements.
- **EN 301 908-13 V13.1.1** - IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)
- **EN 301 511 V12.5.1** - Global System for Mobile communications (GSM); Mobile Stations (MS) equipment; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

In addition, the product also meets FCC/ICED and PTCrB cellular requirements and compliance standards.

RED Notified body:
Notified Body Name: **UL Verification Services Inc.**
4 Digit Notified Body Number: 0984
Type Examination Certificate Number: AN21C11330

The Notified Body assessment is in compliance with the essential requirements of the RED indicted below:

☒Article 3(1)(a): the protection of health and safety of persons and of domestic animals and the protection of property
☒Article 3(1)(b): an adequate level of electromagnetic compatibility
☒Article 3(2): effectively uses radio spectrum

The CE mark is affixed accordingly.

Ben Kimbell
VP of R&D
In-Situ, Inc.
January 19, 2021

Authorised representative in EU: Alberto Bonamin, Via Carpellina 13/G, 36027 Rosa', Vicenza, Italy

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UKCA Declaration of Conformity

Manufacturer: In-Situ, Inc.
221 East Lincoln Avenue, Fort Collins, CO 80524, USA

We declare that the following product:
Product name: **VuLink Cellular**
Model: **VuLink CI**
Part Number: **0094840**
Product Description: Global cellular telemetry device for remote monitoring.
is in the compliance with the following Regulations:

- Radio Equipment Regulation 2017 (S.I. 2016:1206)
- Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) Regulation (S.I. 2012:3032)
- Electrical Equipment (Safety) Regulation 2016 (S.I. 2016:1101)

and meets or exceeds the following British requirements and compliance standards:

- **Safety:**
  - BS 61010-1:2010 + AMD 1:2019
- **Immunity:**
  - BS EN 61000-6-2:2019
- **Emissions:**
  - BS EN 61000-6-4:2019
  - EN 301 489-17 V3.2.0
  - EN 301 489-3 V1.6.1
- Radio Standards:
  - EN 300 328 V2.1.1
  - EN 301 908-1 V11.1.7
  - EN 301 908-13 V11.1.2
  - EN 62311
- **RoHS:** BS 63000:2018

The UKCA mark is affixed accordingly.

UK CA CE FC

David A. Bossie
Regulatory Compliance Manager
In-Situ, Inc.
July 13, 2022