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 14cm from the antenna and VuLink when the device is in operation.

Required Components

1 Cable

Rugged Twist-Lock Cable

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

Vented or non-vented.

2 Instrument

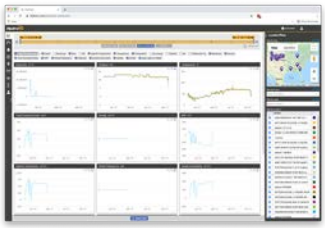
Aqua TROLL

Baro TROLL

Level TROLL

Rugged TROLL

3 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.

4 Batteries

In-Situ recommends Saft LM33600 batteries for your VuLink. Find them at https://bit.ly/2Qmtmwe.

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 #: 0101000

To attach 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

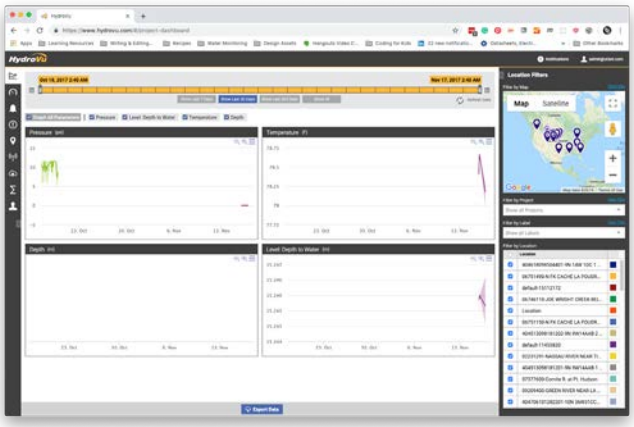
VuLink provides power to monitoring instruments, transmits data to the cloud, and notifies you when maintenance is required.

3 Instrument

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

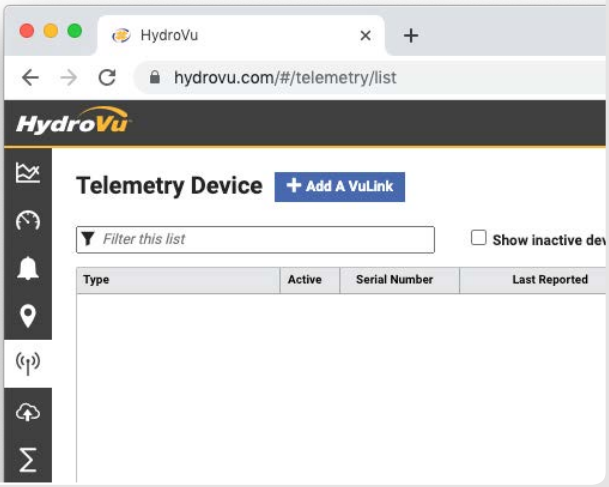
VuLink Quickstart Guide

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 the antenna and connect an instrument.

After connecting the external or on-board antenna and instrument, follow the instructions on the next pages of this quickstart guide.

Setting Up Vulink

VuLink works with Aqua TROLL, Level TROLL, Baro TROLL, and Rugged TROLL instruments. Follow the steps below to start transmitting data.

5 Remove the battery pull-tab and press the button.

Make sure the antenna is properly attached before proceeding.

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

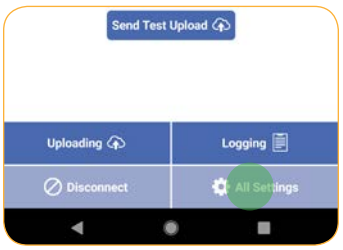
Remove the yellow pull tab to allow current to flow through the batteries. Replace the cover.

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

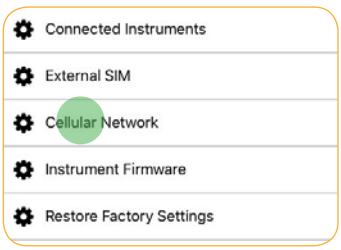
Never mix old and new batteries, or Lithium and alkaline batteries. Make sure all three batteries are installed in the same orientation.

Troubleshooting Network Connectivity

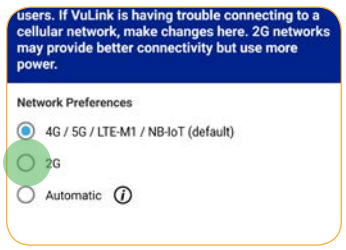
If VuLink has trouble connecting to a 4G network, switching to 2G may help. Launch VuSitu and follow the instructions below. Contact your cellular provider for coverage details.



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 be able to connect to a network and sync with HydroVu.

Connecting to a cellular network can take up to 10 minutes in the following situations:

- The first time VuLink powers up
- When VuLink hasn't been powered up in several weeks or months

7 Add another instrument and press the button. (Optional)

Add as many as 8 instruments to VuLink, repeating the steps below for each one. When you're ready to deploy, use one or more Rugged Cable Splitters to connect multiple instruments.

Disconnect the instrument form VuLink. Attach another. Press the button.

VuLink connects to the new instrument and the data network.

VuLink connects to HydroVu or an FTP site.

All LEDs indicate current device status. See the section below for details.

Understanding the LEDs

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

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

Blinking red

VuLink's antenna is disconnected or VuLink can't locate a cellular 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

Bluetooth connection status

Blinking blue

Ready to connect

Solid blue

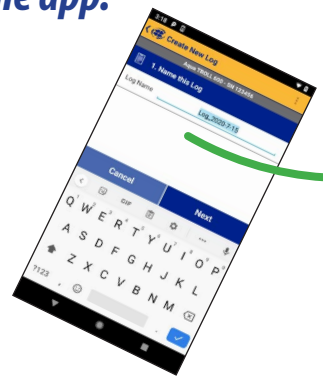
Bluetooth connected

Logging With VuLink

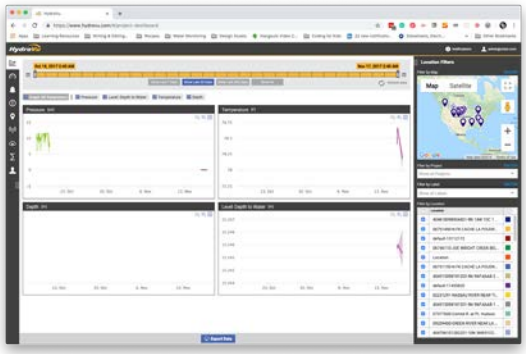
VuLink logs get uploaded to the cloud; instrument logs do not. Be sure to understand the differences between these log types before deploying VuLink.

VuLink Logs

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

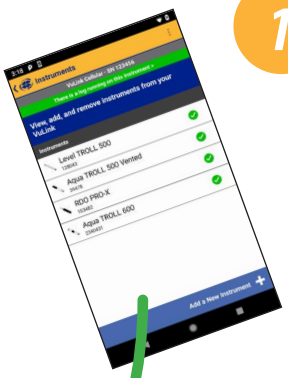


2. See your data in HydroVu.



Instrument Logs

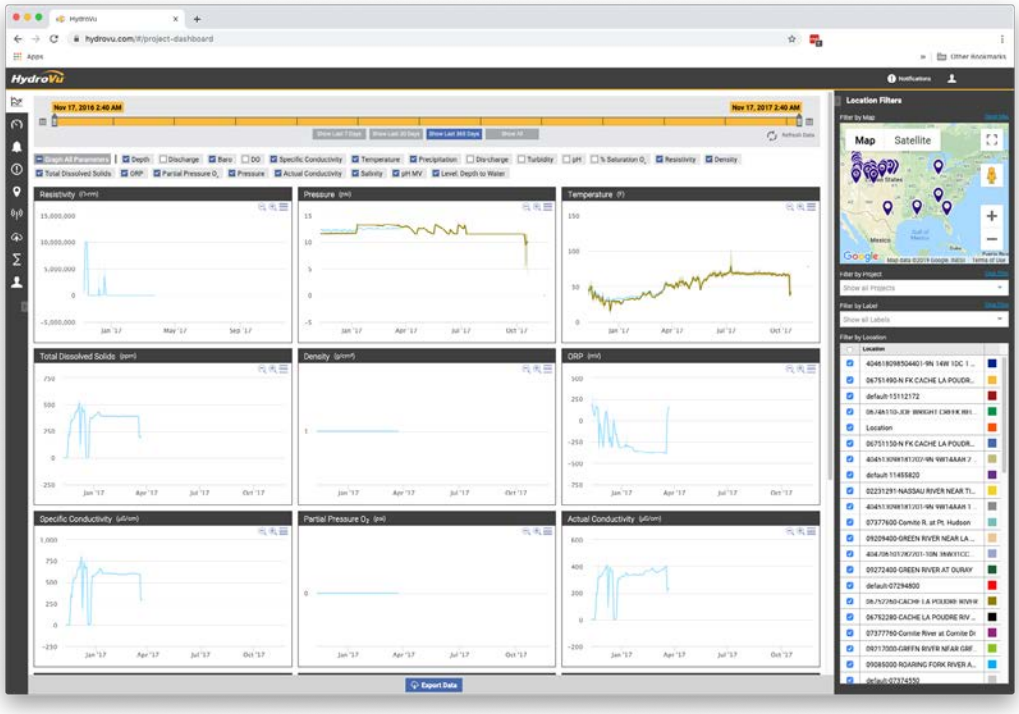
1. Program a log into the instrument with VuSitu.



2. Download log files with VuSitu.

Using HydroVu

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



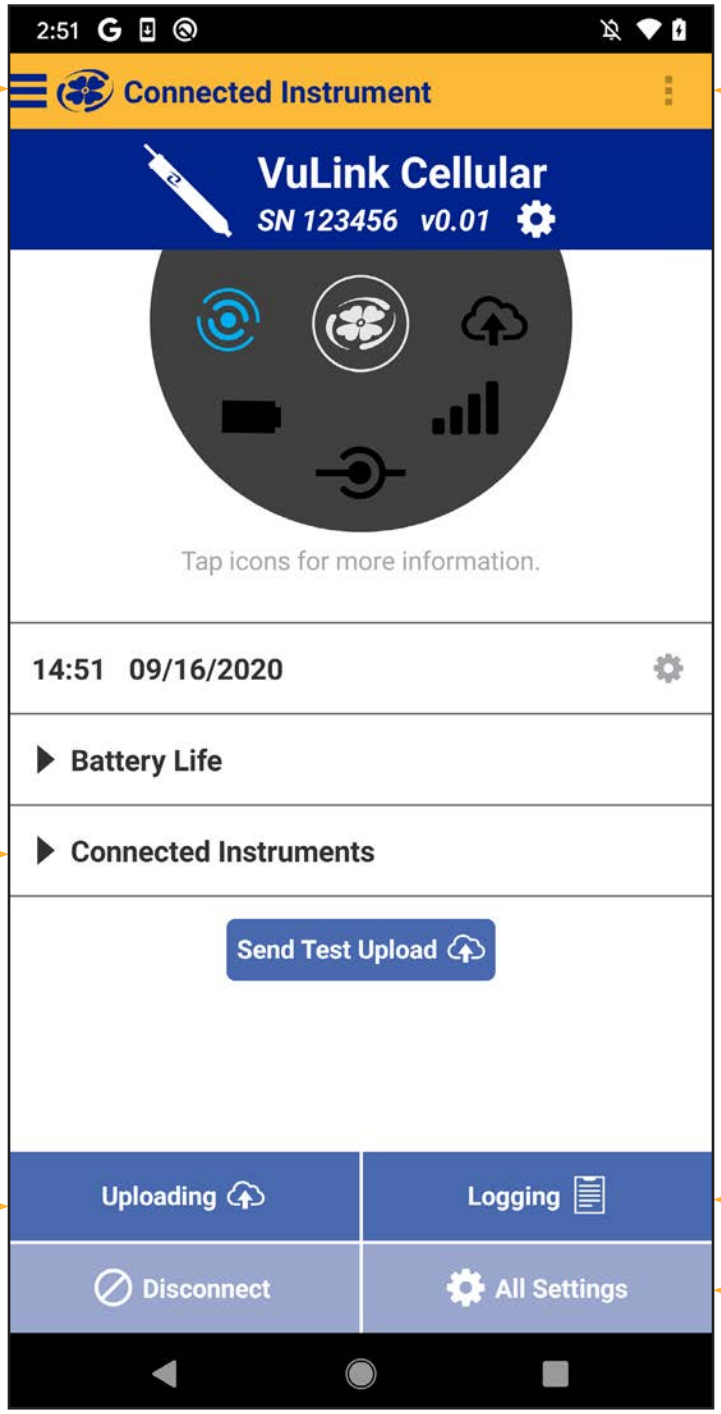
Sidebar Menu Options/HydroVu Pages

- 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 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



Access menu.

Access help information.

View and make changes to instruments connected to a VuLink.

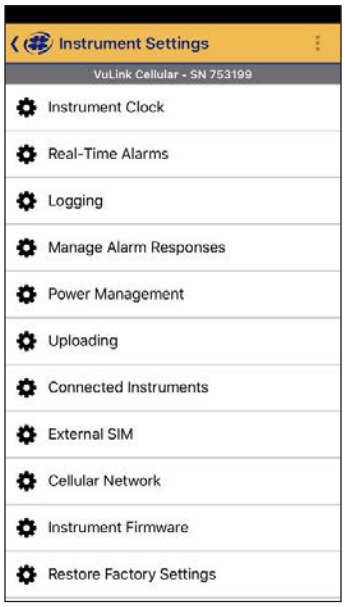
Specifiy a destination for uploads, like HydroVu or an FTP server.

Create and modify logs.

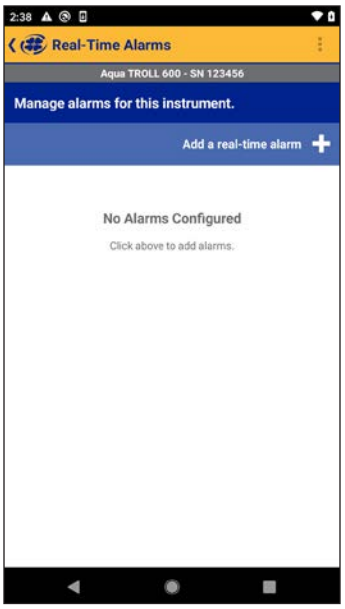
Adjust VuLink and instrument settings.

Creating Alarms

VuLink alarms notify you via SMS when instrument batteries run low, a parameter crosses a specified threshold, or other events occur at a remote monitoring site.



Tap **Settings** from the menu, and then choose **Real-Time Alarms**.



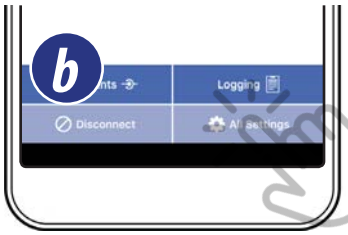
To create an alarm, tap **Add a real-time alarm**.

Select the parameter that should trigger the alarm and set the limits.

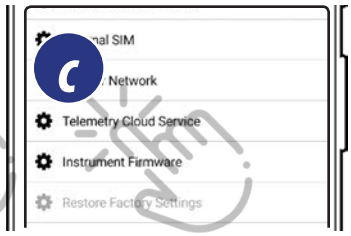
Using VuLink with an FTP Server

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.

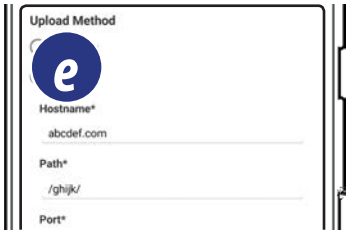


Tap **All Settings**.

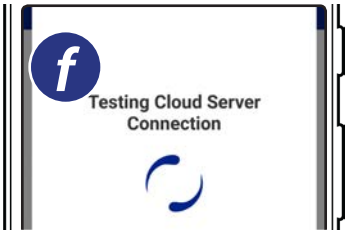


Select **Telemetry Cloud Service**.

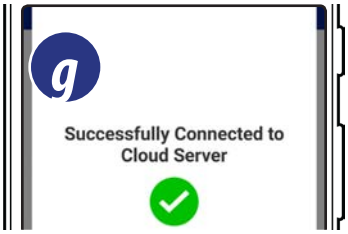
Tap the radio button next to **FTP**.



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



VuLink tests the connection to the server.



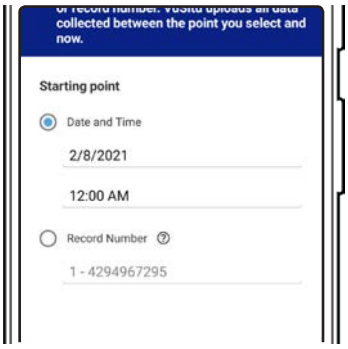
The app displays the test results.

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.

Connecting a Pulse Instrument to VuLink

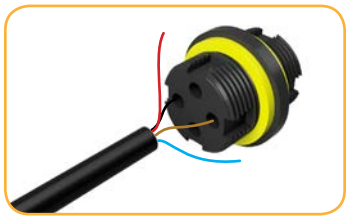
VuLink can upload data from a pulse instrument to HydroVu or an FTP server.

Required Components

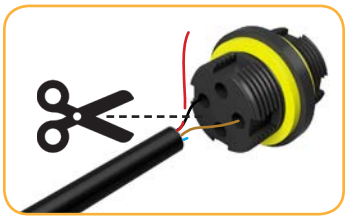
- Rugged Twist-Lock Cable with one stripped-and-tinned end
- Load-Bearing Universal Adapter (LBUA)
- Cable (from LBUA to pulse instrument)
- Pulse instrument
- VuLink

Wiring with the Load-Bearing Universal Adapter (LBUA)

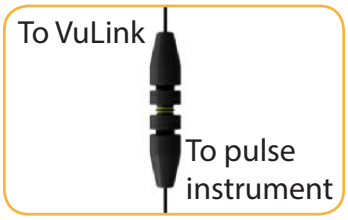
Attach the Twist-Lock end of a Rugged Cable to VuLink.



Connect the brown and black wires at the other end of the Rugged Cable to the Load-Bearing Universal Adapter.



Snip the four unused wires.



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

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

Rugged Cable Wire Legend

Wire Color	Signal
Brown	Pulse Output
Black	Ground
Red	Power (optional)
Blue	Unused
Green	Unused
White	Unused

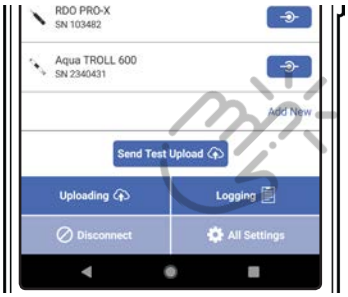
Setting Up a Pulse Instrument with VuSitu

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

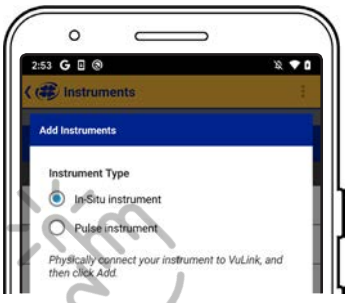
1 Add the instrument to VuLink.

Launch VuSitu and connect to VuLink.

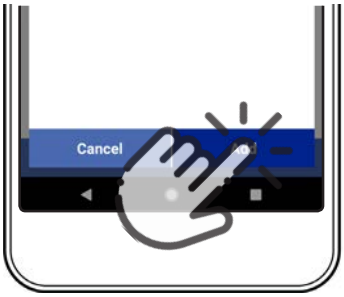
Tap the **Connected Instruments** dropdown.



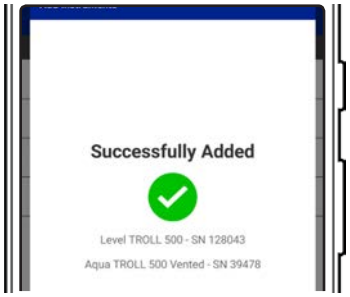
Tap **Add New**.



Select the **Pulse Instrument** radio button.



Connect the instrument to VuLink with a cable. Press the **Add** button in VuSitu.



VuSitu displays a confirmation message. Press **OK** to dismiss it.

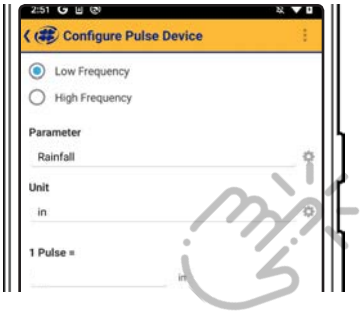
2 Configure it.

Tap the **Connected Instruments** dropdown.

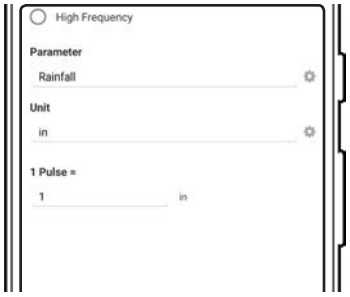
Tap the instrument.

Select low or high frequency.

Low frequency: Choose one of the three built-in parameters or create a custom parameter.



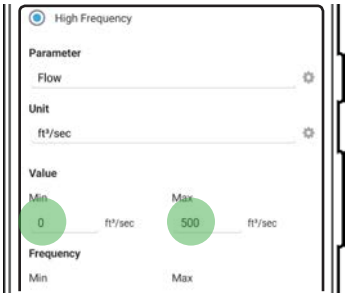
Tap the gear icon next to the unit field to select a unit.



Enter the value of one pulse in the selected units.

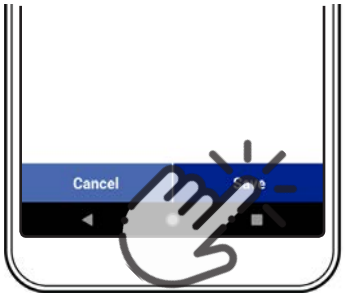
Tap **Save**. VuSitu displays a "Saving" message.

High frequency: Select **High Frequency** and 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.

VuSitu displays a "Saving" message.

A custom parameter can be anything you want (for example, snow or precipitation), but you must select one of VuSitu's built-in unit types.

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.

Built-in SIM

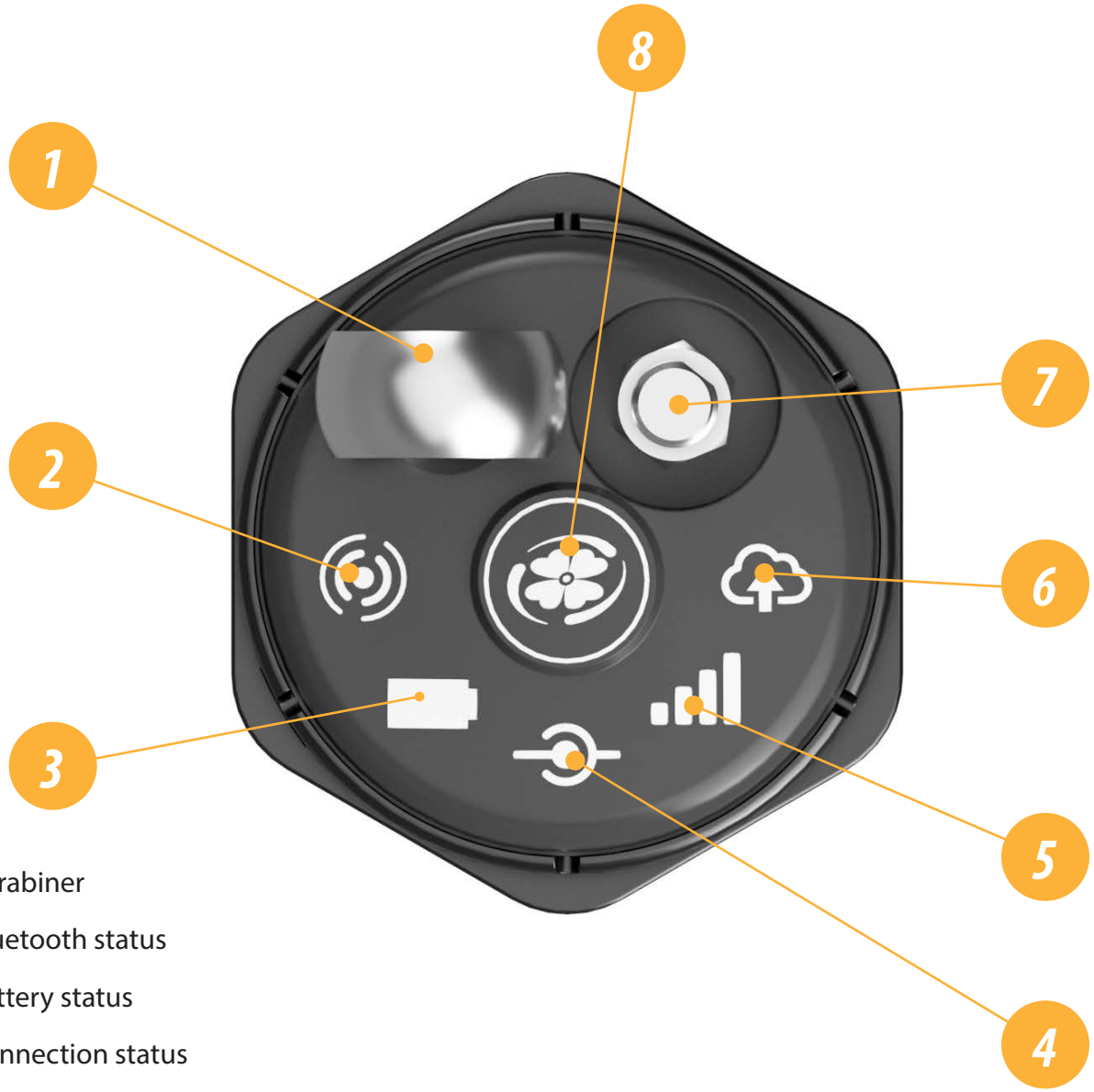
If an external SIM card isn't present, VuLink uses its built-in SIM for all communication.

Updating VuLink

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

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

Specifications

Battery	3 x D cell (1.5V - 3.6V) Alkaline / Li-SOCl2 [Lithium Thionyl Chloride] / Li-MnO2 [Lithium Manganese Dioxide] supported
Operation Time (24 hour reporting, Li-MnO2)	Up to 12 years*
Operation Time (24 hour reporting, Alkaline)	Up to 3 years*
Clock Accuracy	Less than 1 minute drift per year with ability to synchronize to network provided time for accuracy +/- 1 second
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)
Protocols	HTTPS (HydroVu), 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 3m accuracy, built-in antenna
File Format (non-HydroVu)	CSV
Remote Setup	Supported
Overall Length	19.1”
Diameter	1.85”
Weight	2.2 pounds/1.0 kg (with included alkaline batteries and carabiner, excluding antenna)
Materials	Ryton (housing), PVC (battery cover), Titanium (Twistlock connector, eyebolt), 316 Stainless Steel (carabiner), Silicone (keypad cover), Brass (SMA antenna connector), Polycarbonate (label), Viton (O-rings)

Storage Temperature	-20°C to 60°C
Operating Temperature	-20°C to 50°C (Li-SOCl2/Li-MnO2), 5°C - 40°C (Alkaline)
Ingress Protection	Device: IP68 System: Up to IP68 per antenna specification
Protocols	Modbus over RS-485, SDI-12, Pulse low/high frequencies (max 40 khz)
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 (total maximum of 75mA provided to connected instruments at 16V)
Venting	Built-in on all models, no desiccant required
Barometric Compensation	Built-in on all models for automatic compensation of level readings
Barometer Accuracy	+/- 1 hPa
Alarms	Configurable based on instrument readings and device parameters
Power	Total maximum of 75mA provided to connected instruments at 16V (intended typically to power a single instrument)
Wireless Setup	Supported via Bluetooth Low Energy
Logging Rate	1 minute to 7 days
Transmission Rate	5 minutes to 7 days
Memory	512 MB (soldered to circuit board)
Maximum Transmitter Output Power	All LTE FDD bands: +23 dBm +/- 1dB (conducted) GSM900: +32.5 dBm +/- 1dB GSM1800: +29.5 dBm +/- 1dB (conducted) EGPRS900: +27.0 dBm +/- 1dB EDGE1800: +26.0 dBm +/- 1dB (conducted) Bluetooth: +5.5 dBm +/- 0.35 dB (EIRP)