

VuLink CI



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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.

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://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 #: 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

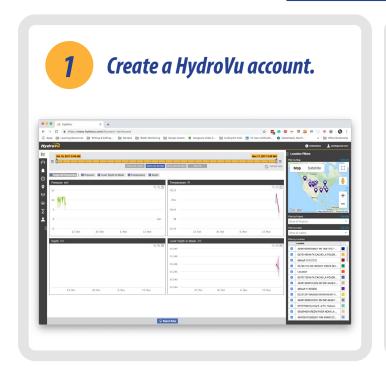


Using VuLink in any manner not specified by the manufacturer (In-Situ) may impair the device's built-in protections.





VuLink CI



Visit hydrovu.com and create an account.

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





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

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.

Setting Up Vulink



Attach the antenna and remove the battery pull-tab.



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



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



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



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.





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.



Finish and Deploy



Connect the next instrument, then add the instrument 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



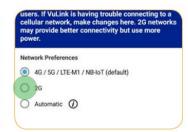
If VuLink has trouble connecting to a 4G network, switching to 2G may help. Launch VuSitu and follow the instructions below. Contact your cellular provider for coverage details.



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

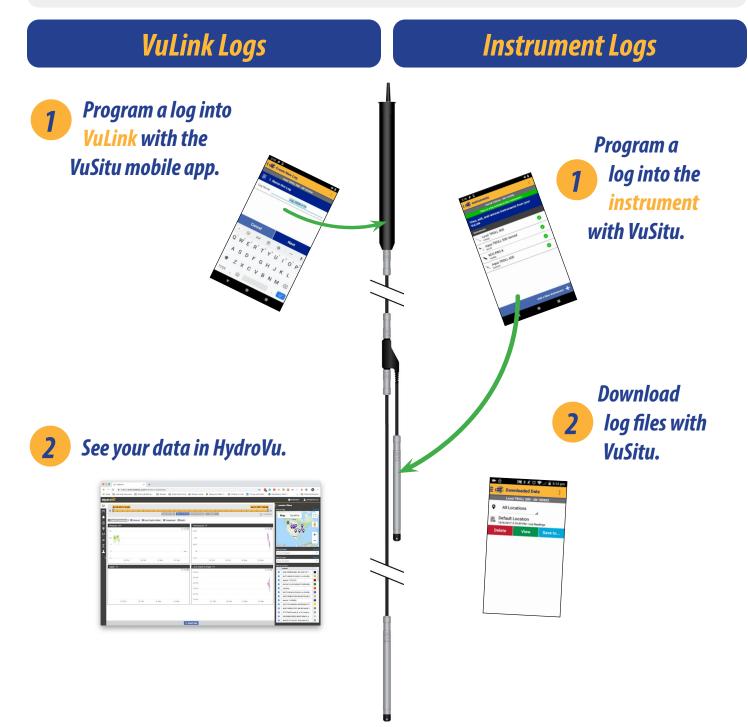


Connecting to a cellular network can take up to 10 minutes the first time VuLink powers up or when VuLink hasn't been powered up in several weeks or months

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.



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.

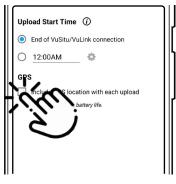
Use GPS to Update Locations in HydroVu or in FTP Reports



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.

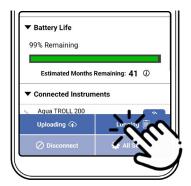


The locations for your VuLink and connected instruments will update every time your VuLink uploads to HydroVu.

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.

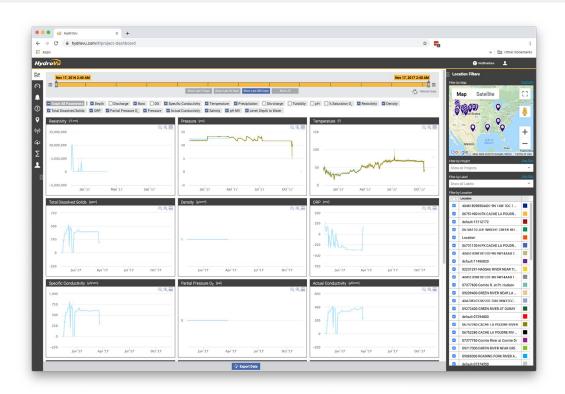


GPS data will be saved in the VuLink log and appear on the HydroVu graphs.

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

Σ

Edit calculated parameters



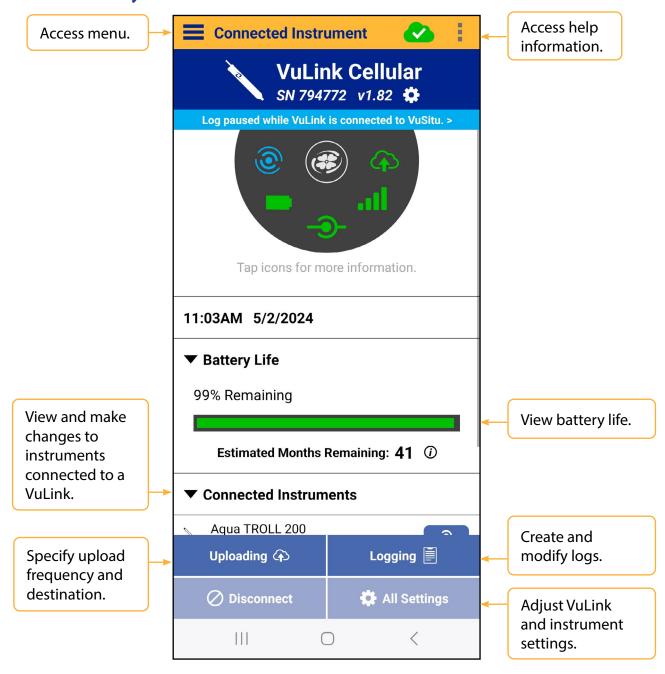
Manage users

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



Creating Alarms

VuLink Alarms



VuLink alarms send a notification when VuLink batteries run low, a VuLink parameter crosses a specified threshold, or other events occur at a remote monitoring site.



Tap **All Settings** from the menu.



Tap 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.

Connected Instrument Alarms



Connected instrument alarms send a notification when a parameter measured by a connected instrument crosses a specified threshold.



Tap **Connected Instruments**.



Select an instrument to connect.



Tap **Instrument Settings** from the menu.



Tap **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.



Use the menu to reconnect to VuLink.

Managing Alarm Responses



Alarms can send a notification by SMS or through the cloud when an alarm threshold is crossed. Message and data rates may apply.



Tap **All Settings** from the menu.



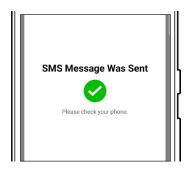
Tap **Manage Alarm Responses.**



Select cloud notifications or SMS notifications. Enter SMS phone number(s).



Select Apply and Test.



Confirm that the test message was received.

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.









Tap All Settings.

Select Telemetry Cloud Service.

Tap the radio button next to FTP.







Enter your FTP & Save.

VuLink tests the credentials. Then tap **Test** connection to the server.

The app displays the test results.

Connect to VuLink with the VuSitu mobile app.

Recovering Data Via FTP



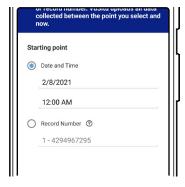
Use the recovery FTP screen to send data that failed to transmit via a scheduled upload. You need to know the number or date of the last record uploaded before a data gap occurred.



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 displays a confirmation. you wish to continue.

If the upload is successful, VuSitu

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.

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.



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.



Add the instrument to Vulink.



Launch VuSitu and connect to VuLink.



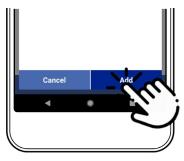
Tap the **Connected Instruments** dropdown.



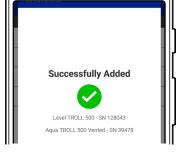
Tap **Add New**.



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.



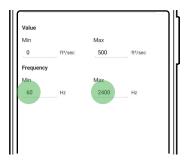
Tap **Save**. VuSitu displays a "Saving" message.



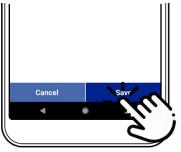
High frequency: Select **High Frequency** and choose a parameter and unit.



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.

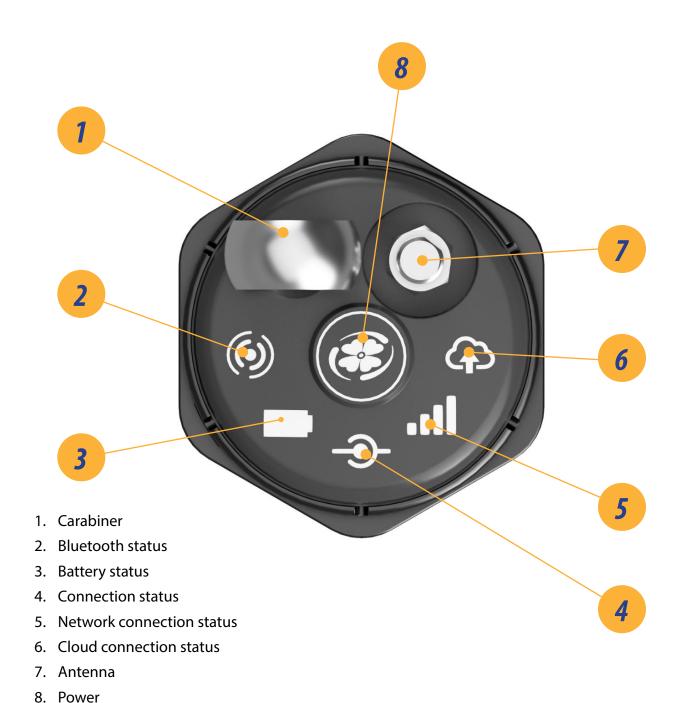


A custom parameter can be anything you want (for example, snow or precipitation), but you must select one of VuSitu's built-in unit types.

Controls



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



Specifications

Battery	3 x D cell (1.5V - 3.6V) Alkaline / Li-SOCl ₂ [Lithium Thionyl Chloride] supported Li-MnO ₂ [Lithium Manganese Dioxide] recommended for best performance		
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	Weight 2.2 pounds/1.0 kg (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				
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, 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 (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 level readings				
Barometer Accuracy	+/- 1 hPa				
Alarms	Configurable based on instrument readings and device parameters				
Power	Li-MnO ₂ : Total maximum of 300 mA provided to connected instruments at 16V Other battery types: Total maximum of 75 mA 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)				
Altitude	Safe to use above or below 2000 m				

Signal Strength Specifications



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:

```
5 Device S/N = 1108465

6 Time offset = 00:00

7 Parameters = 12

8 "GPS on Report = Off"

9 RESSI = 25

10 Record Number, DateTime, 0: VuLink CI (32772)

155000, 2024/06/04 01:00, 23.249237, 97.306686,

12 55001, 2024/06/04 02:00, 22.487755, 97.304642,

13 55002, 2024/06/04 03:00, 22.305435, 97.302010,
```

Declarations of Conformity



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 Cl 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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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:

 \square 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 DK.

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

CEF©

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

The UKCA mark is affixed accordingly.

MAB

David A. Bossie Regulatory Compliance Manager In-Situ, Inc. July 13, 2022 WWW.IN-SITU.COM

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