User Guide: RTK Handheld 2 Mapping Kit

- Overview
- Package
- Unboxing
- Getting started
  - on Android
  - on iOS
- Related tutorials
- Reset to factory settings
- Accessories and spare parts

Overview

Get professional centimeter-level accuracy RTK surveying in the palm of your hand. This complete RTK Handheld 2 Mapping Kit comes in a waterproof transport case and with all the necessary accessories, so you can start your surveying project immediately.

Package

The package includes:

1. Waterproof transport case with precut foam to fit all components.
2. RTK Receiver & Antenna.
    - RTK Receiver powered by u-blox ZED-F9P (inside IP53 plastic case): It's already configured to send correction data and position information via USB and Bluetooth simultaneously.
    - Bluetooth + Bluetooth Low Energy plugin: Allows connection with Android and iOS devices.
    - Helical triple band + L-Band Antenna: High quality antenna for precision GNSS work, its spiral shape provides a wide reception angle.
3. The Mounting System:
    - Smartphone Holder: SP compatible with rubber bands that keep the phone stable and protect it from slipping. It accommodates phone sizes from 58mm to 82mm in width.
    - Handgrip: Designed for comfortable, stable operation during long surveying sessions. It can also be unfolded to act as a small tripod.
    - Pole adapter to install the kit in a surveyor pole (1/4 male thread to surveyor pole female thread).
4. 2x USB-C OTG Cable (15 cm): Used to connect the receiver directly to your smartphone. One is provided as a spare.

Waterproof transport case

RTK receiver and antenna

Smartphone holder

Handgrip

Pole adapter

USB-C OTG cable (2 pcs)

Unboxing

The RTK Handheld 2 Mapping Kit requires no special tools for assembly. The entire unit can be built by hand. Please follow the installation manual below.

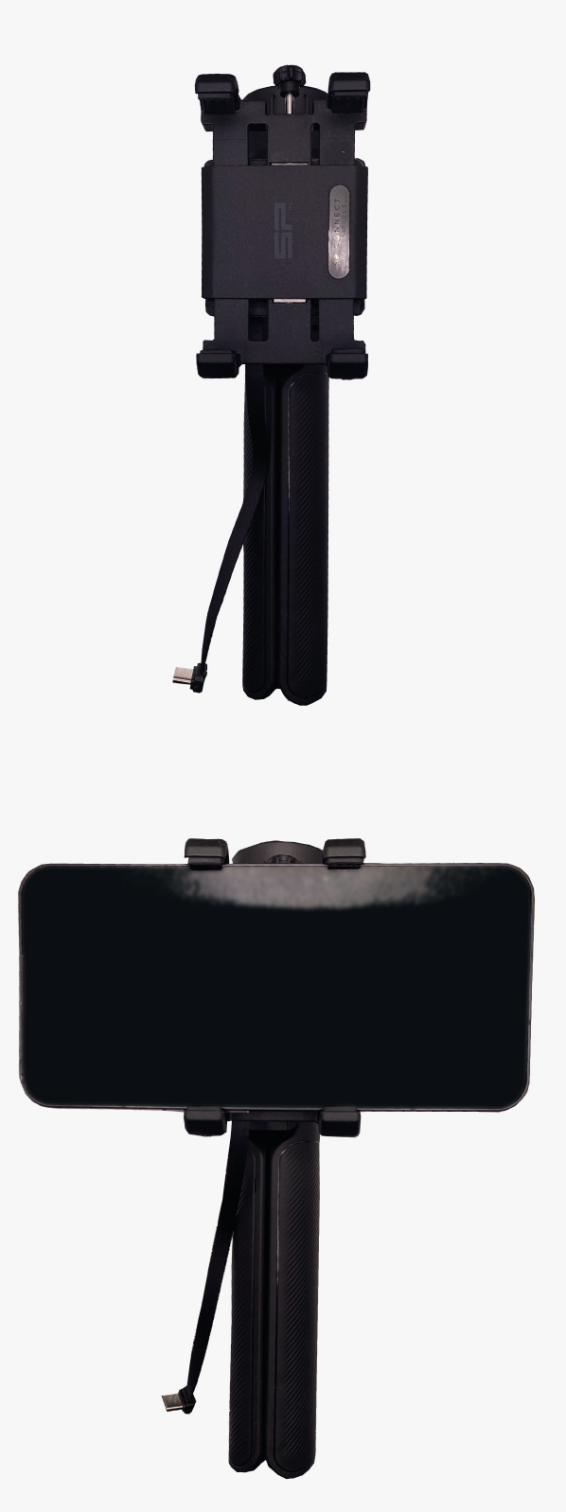
1. Align the hole in the RTK Receiver with the handgrip and screw them together.

2. To attach the smartphone holder, align the back side of it to the flat edge in the RTK Receiver case and rotate it 90 degrees until it locks in place (a bit of force might be needed to make it slide in).

3. Connect the USB OTG cable to the USB connector placed at the bottom of the receiver case.

4. To attach your phone, open the phone holder’s arms by extending its handle and turning it counter-clockwise.

5. Place your phone in the center and turn the handle clockwise until the phone is firmly held by the phone holder, then retract the handle back into its locking mechanism.



6. Connect the USB-C OTG cable to your phone.

7. Great work! With the assembly complete, your RTK Handheld 2 Mapping Kit is ready for its first survey.

Battery life Powered directly by your phone, the kit has a battery life of 6-8 hours, depending on your phone's battery capacity. For extended operation, you can use a Portable 2 handgrip with built-in battery.

Getting started

Connect the GNSS receiver to your device, in an open location with good view of the sky or near a window for testing its functionality.

on Android

There are numerous Android GIS applications that are compatible with our he RTK Handheld 2 Mapping Kit, but **SW Maps** is our preferred one.

In this step-by-step tutorial we will explain how to connect your new RTK Handheld 2 Mapping Kit to your Android device using SW Maps. This can be done using either the provided USB-C OTG cable or by a Bluetooth Low Energy (BLE) connection.

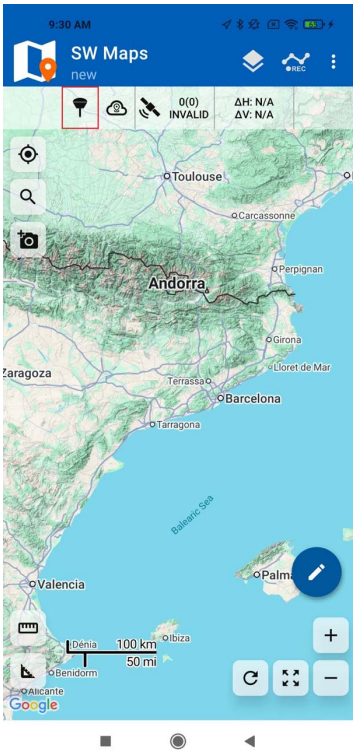
- The USB-C OTG cable included in the package is the recommended method to connect to an Android device, as it powers the RTK receiver and transmits data at the same time, and the connection is more stable.
- There is an option to use a Bluetooth Low Energy connection instead, but then the receiver would need to be powered by an external power supply. In this case, we recommend ordering the handgrip with built-in battery, which will not only power your kit reliably but also give you a much more ergonomic setup compared to carrying an external power bank.

1. Install SW Maps app on your Android device from the Google Play Store.
2. Open the app and grant permissions (first time only).

Connect via a USB-C OTG cable (recommended) | Connect via Bluetooth LE

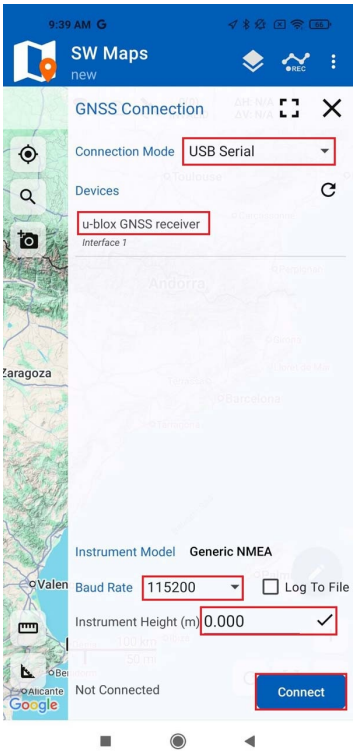
Connect via a USB-C OTG cable (recommended)

3. Connect RTK receiver with your Android device with USB OTG cable.
4. Click on the antenna icon to show the connection menu.



5. Choose USB Serial as **Connection Mode**. Under **Devices**, tap u-blox GNSS receiver and set **Baud Rate** to 115200 bps.
6. **Instrument Height** refers to the expected receiver elevation from the ground.
    - If you are using the RTK kit handheld, set the instrument height to 0 since elevation measurements will not be precise due to natural hand movement.
    - If you are using the kit with a surveying pole, set the instrument height to the exact height of the pole.

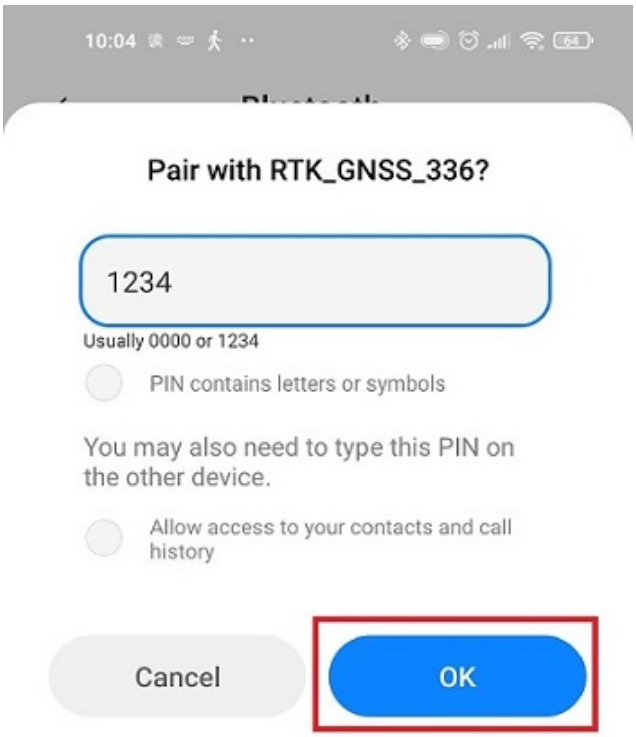
7. Press **CONNECT**.



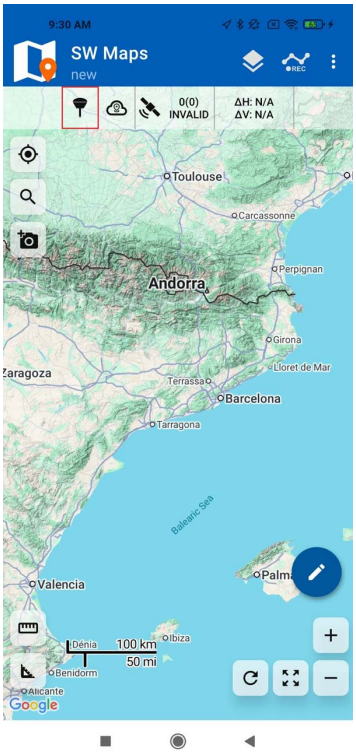
8. You should now see a GNSS receiver successful connection and data transfer.

Connect via Bluetooth LE

3. Power your RTK receiver by connecting USB cable to the power supply (smartphone/tablet/compatible powerbank). If you get any popup message to connect the USB device with any app, you can ignore it.
4. Enable your smartphone/tablet Bluetooth, and pair it with your RTK receiver. When pairing your device, notice that it will appear as **BT+BLE_Bridge _****. The password is always **1234**.
   The pairing only needs to be done once.



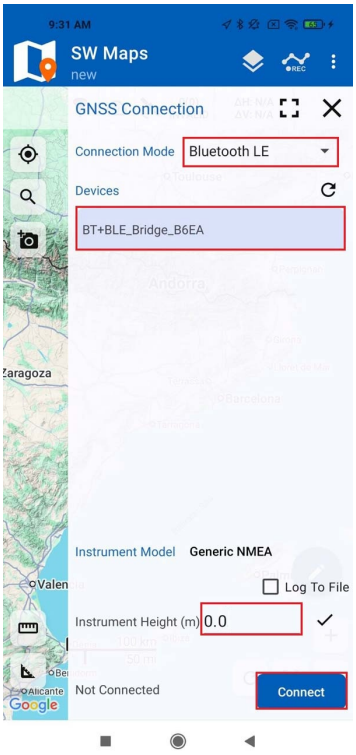
5. Tap the antenna icon to show the **GNSS Connection** menu.



6. Set **Connection Mode** to Bluetooth LE, and under **Devices** select the one you paired in step 4. **Instrument Height** refers to the expected receiver elevation from the ground.

- If you are using the RTK kit handheld, set the instrument height to 0 since elevation measurements will not be precise due to natural hand movement.
- If you are using the kit with a surveying pole, set the instrument height to the exact height of the pole.

7. Press **CONNECT**



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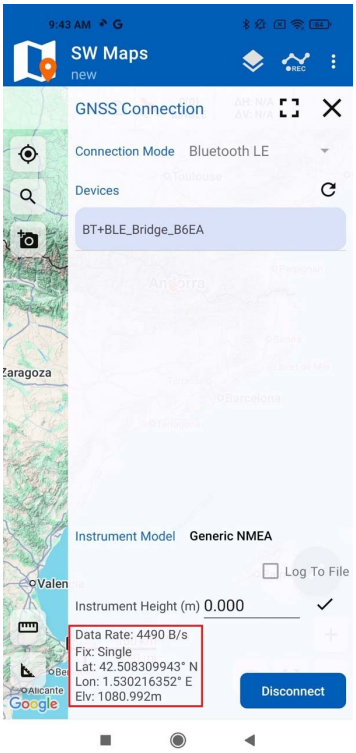
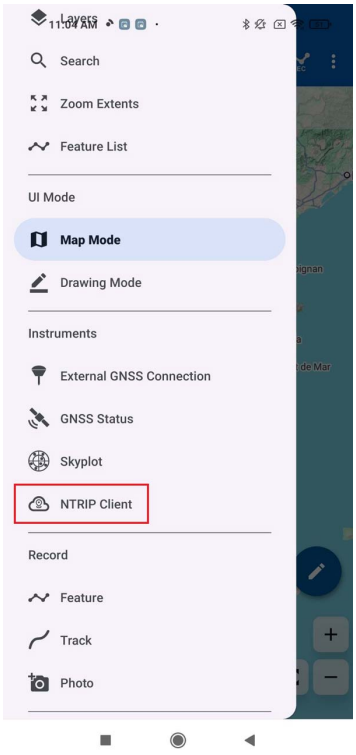


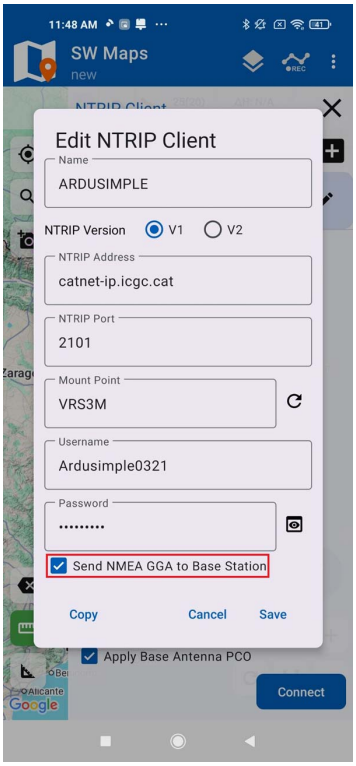
To get centimeter accurate measurements, it is needed to connect to a NTRIP service to get RTK corrections. If you need help to finding one, check the list of RTK Correction

Services in your Country which we have prepared for you.

9. Go back to SW Maps main menu and select **NTRIP Client.**

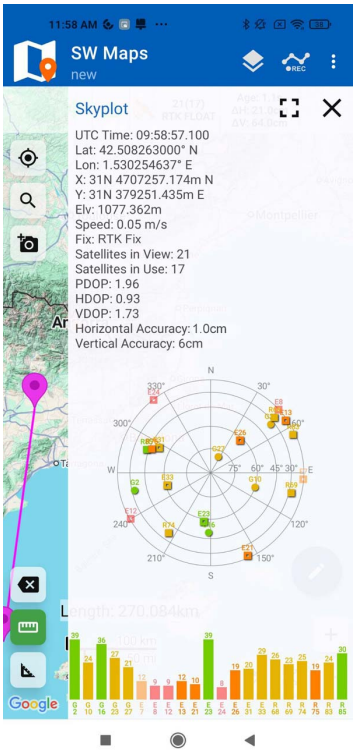


10. Enter your **NTRIP Client** credentials:
    - **Name**: A custom name you choose to save the NTRIP connection account.
    - **NTRIP Caster Address and NTRIP Port**: This information should be provided to you by the NTRIP service when you set up your account.
    - **Mount Point**: Choose the closest mount point to the area you are going to operate from.
    - **User Name and Password**: This should be provided to you when you set up your account.
    - We recommend enabling **Send NMEA GGA to Base Station** option to send your location to the NTRIP caster.
11. Press **SAVE**.

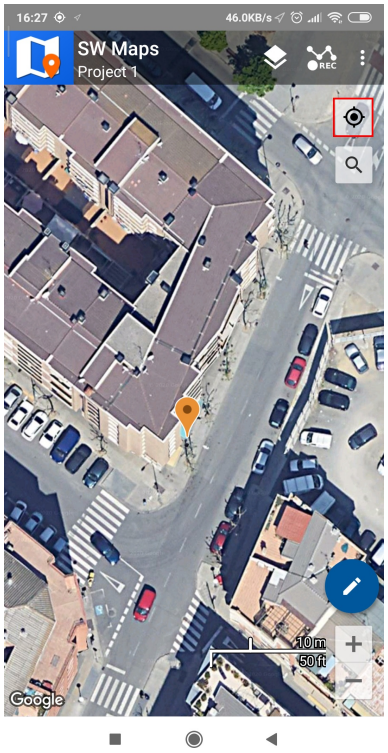


12. Press **CONNECT**. At **NTRIP Status** you will see a successful connection and data streaming to your device.

13. Go back to SW Maps main menu and select **Skyplot**. You should now see the available satellites at your position, **Fix** set to either RTK Float or RTK Fix, and centimeter level **Horizontal and Vertical Accuracy**.



14. To re-center the map on your location, click the icon highlighted in red. The pointer indicating your location will dynamically switch its color based on the receiver **Fix** status:
    - Orange when the status is **RTK Float** with slightly less accuracy.
    - Green when the status is **RTK Fix** with full centimeter accuracy.



For further information on how to use this application please follow the SW Maps user guide.

The kit supports a wide range of third-party integrations. Use the table below to learn which apps you can use with your kit and how to do that.
If you cannot find your preferred app in the list, please contact us and we will test it for you.

App	Android
SurvX	supported
Surpad	Check out the tutorial
Lefebure	supported
SW Maps	supported
Mapit GIS	supported
Field Navigator	Check out the tutorial
AgriBus Professional	supported
FieldBee	Check out the tutorial
PinPoint GIS	Check out the tutorial

App	Android
Field Maps	supported
Google Maps	supported
QField	supported
LocusGIS	Check out the tutorial
Mobile Topographer	supported
Kizeo Forms	supported
ODK Collect	supported
MicroSurvey FieldGenius	supported
Mergin Maps	Check out the tutorial
Aplitop TcpGPS	Check out the tutorial
PointMan	Check out the tutorial
OCAD Sketch App	Check out the tutorial
X-Survey	supported
Tersus GNSS NUWA	supported
Arcoda Next	supported
Arcoda 3D Photo Survey	supported
3Dsurvey SiteScan	supported
3Dsurvey RTK Videogrammetry	supported
3D geotag scanner	supported
Avenza Maps	supported
Iphigénie	supported
Agro Measure Map Pro	supported
ColDonAgro	supported
GeoSpot GNSS	supported

App	Android
ArcGIS Fieldmaps	supported
Other Android apps	Check out our tutorial

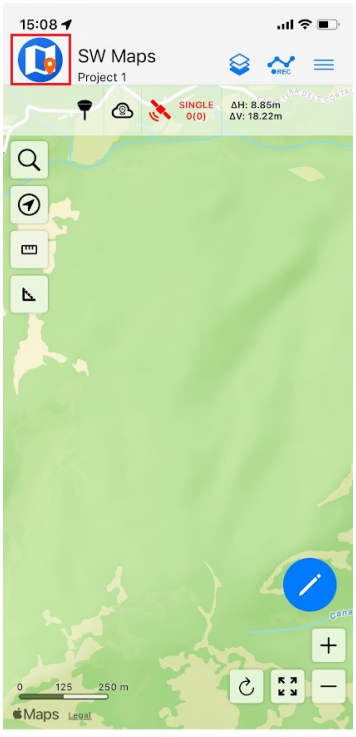
on iOS

The recommended app to use the RTK Handheld 2 Mapping Kit on an Apple iOS device is **SW Maps** using a Bluetooth Low Energy (BLE) connection.

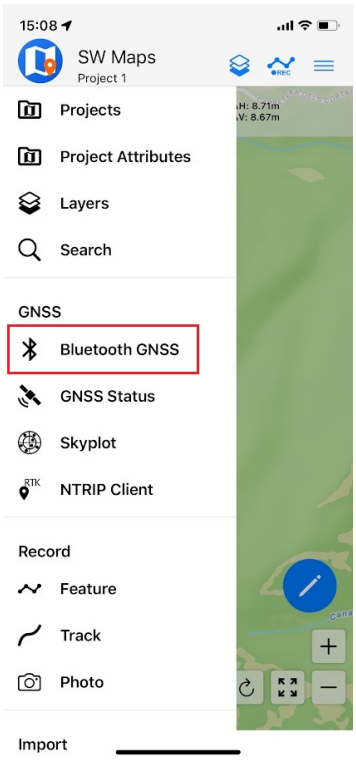
Note:

- If your iOS device has USB-C connector you will use USB-C OTG cable included in the package to power your RTK receiver.
- If your iOS device has a Lightning connector it cannot be used to power the RTK kit. In this case, we recommend ordering the handgrip with built-in battery. It will not only power your kit reliably but also it will be a much more ergonomic setup compared to carrying an external power bank.

1. Install SW Maps app on your iOS device from the Apple Store.
2. Open the app and grant permissions (first time only).
3. Click on the SW Maps icon to show the app menu.

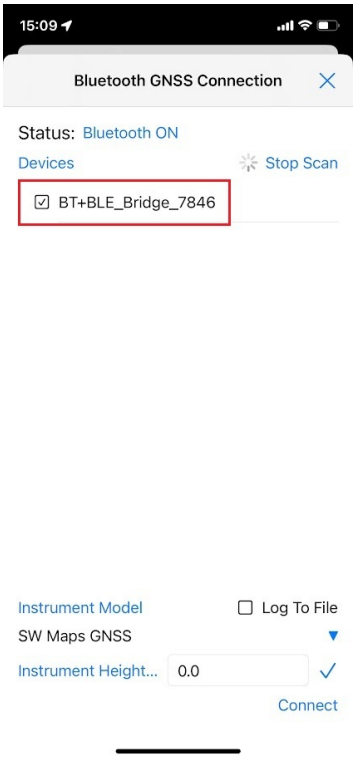


4. Select **Bluetooth GNSS** option.

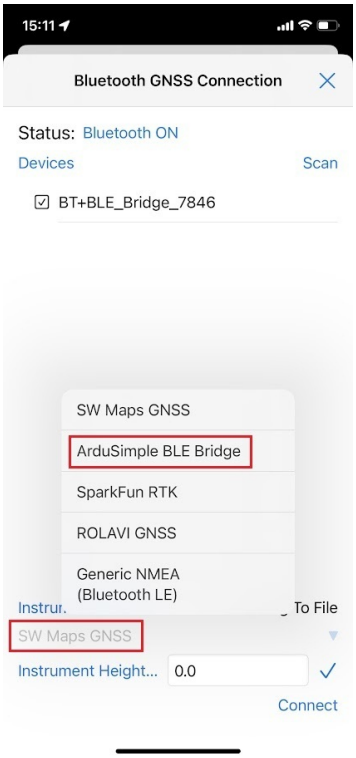


5. Press **Scan** to search for Bluetooth devices.

6. **BT+BLE_Bridge_XXXX** device will appear if your phone is close enough to the receiver. Select its checkbox and stop scanning.



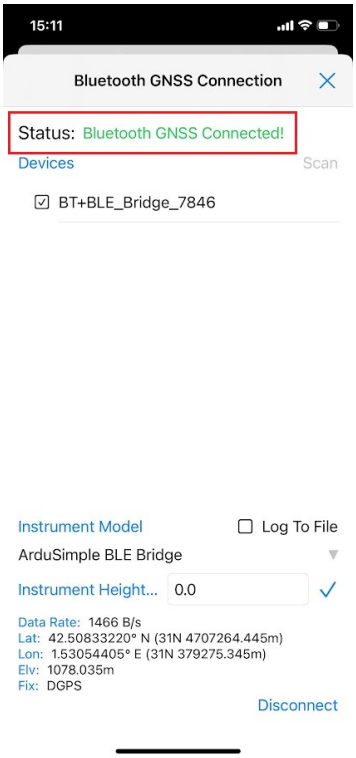
7. From dropdown menu **SW Maps GNSS** select **Ardusimple BLE Bridge** option.



8. **Instrument Height** refers to the expected receiver elevation from the ground.

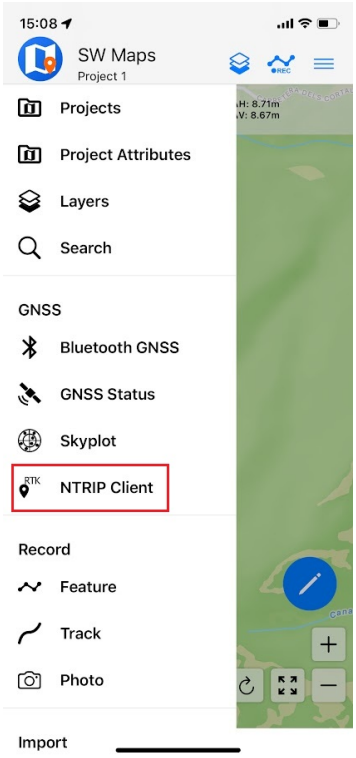
- If you are using the RTK kit handheld, set the instrument height to 0 since elevation measurements will not be precise due to natural hand movement.
- If you are using the kit with a surveying pole, set the instrument height to the exact height of the pole.

- Press **Connect**. You should see a “Bluetooth GNSS connected!” message and data streaming from the receiver.

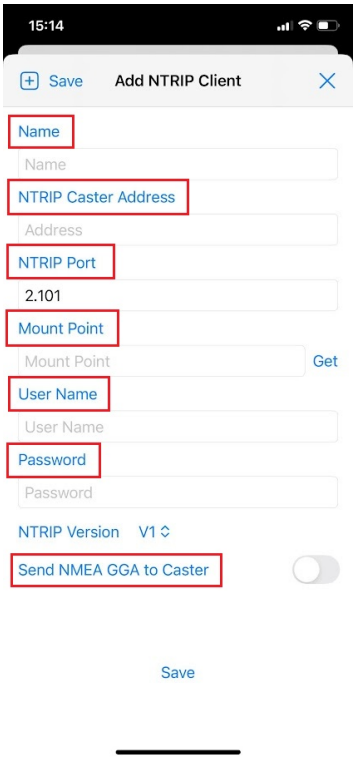


To get centimeter accurate measurements, it is needed to connect to a NTRIP service to get RTK corrections. If you need help finding one, check the list of RTK Correction Services in your Country which we have prepared for you.

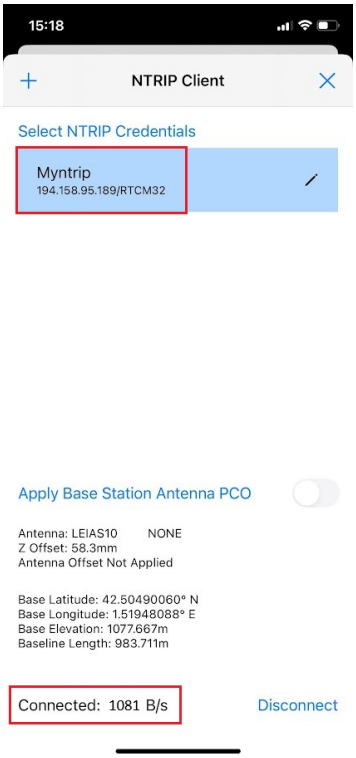
10. Tap SW Maps menu and select the **NTRIP Client** option.



11. Enter your NTRIP credentials:
    - **Name**: A custom name you choose to save the NTRIP connection account.
    - **NTRIP Caster Address and NTRIP Port**: This information should be provided to you by the NTRIP service when you set up your account.
    - **Mount Point**: Choose the closest mount point to the area you are going to operate from.
    - **User Name and Password**: This should be provided to you when you set up your account.
    - We recommend enabling **Send NMEA GGA to Caster** option to send your location to the NTRIP caster.

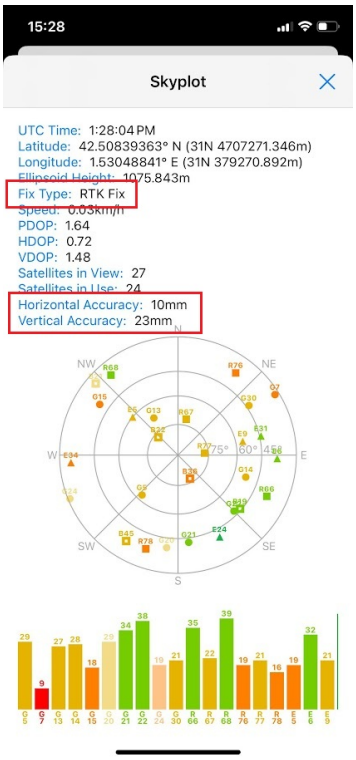


12. Once connected, you will see the data streamed from the NTRIP service.

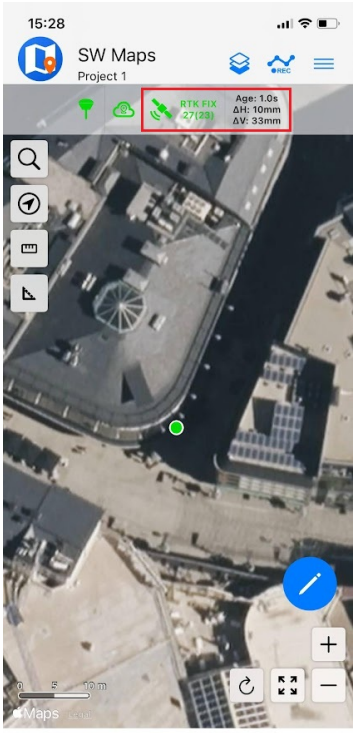


13. To verify that you are getting precise position, tap **SW Maps** menu and select **Skyplot** option. You will see an RTK **Fix Type**, and **Horizontal Accuracy** and

Vertical Accuracy confirming that you are now working with centimeter level accuracy GNSS positioning.



14. To re-center the map on your location, click the arrow icon highlighted in red. The pointer indicating your location will dynamically switch its color based on the receiver **Fix Type** status:
    - Orange when the status is **RTK Float** with slightly less accuracy.
    - Green when the status is **RTK Fix** with full centimeter accuracy.



For further information on how to use this application please follow the SW Maps user guide.

Related tutorials

- How to connect low cost RTK kit to Carlson SurvPC for archaeological surveying
- How to use centimeter GPS with any Android app (Mock location)
- How to connect ArduSimple kit to Mergin Maps for centimeter-accurate mapping
- Mock location with USB OTG
- How to configure your simpleRTK2B receiver on your Android smartphone via GNSS master?
- How to export your survey work from your Android device to QGIS and AutoCAD
- How to use custom geoid for orthometric height measurements in Android with Mapit GIS or Mapit Spatial
- How to use Ardusimple products with SW Maps on Android smartphones/tablets

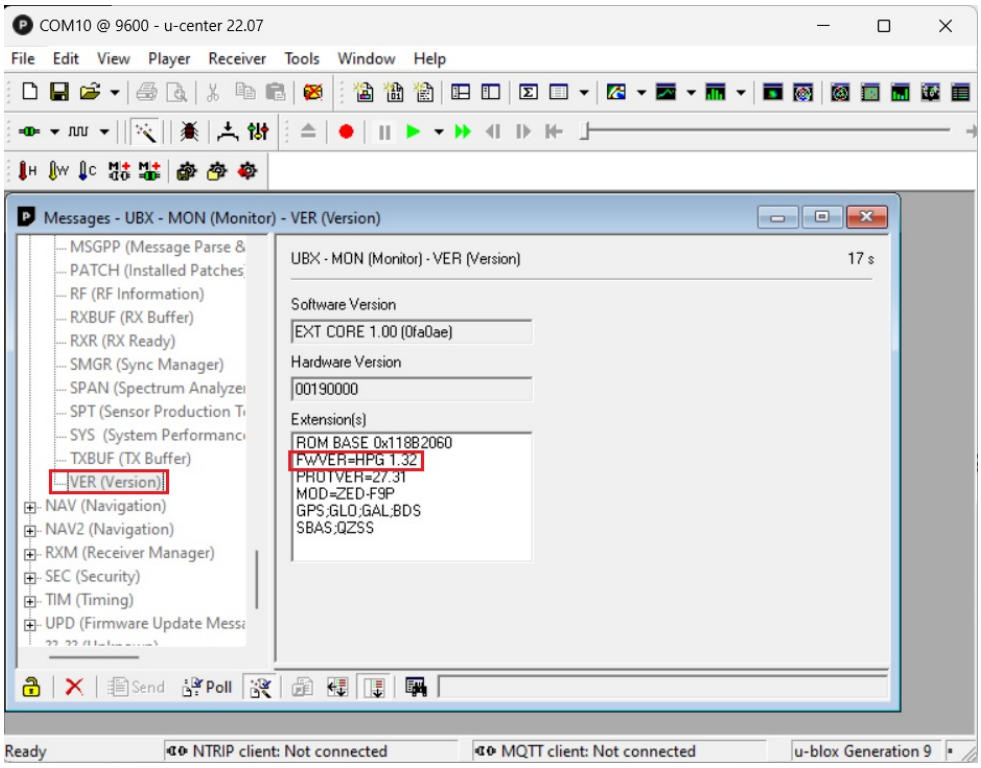
Reset to factory settings

We recommend not changing any configuration setting. But if you changed configuration of the kit here you have the steps to revert back to default

The kit is pre-configured to send NMEA data simultaneously via Bluetooth and USB.

If you change any settings and the product stops working, you can revert to factory setting by following these steps:

1. Connect the receiver to your computer or PC via USB.
2. Run u-blox u-center (you can download it here) and connect to the proper COM port.
3. Go to **View –>Message View** and navigate to **UBX–>MON–>VER.**
4. You can read the firmware version in the window:



5. Download configuration file simpleRTK2B_FW132_Bluetooth_BT_BLE_Bridge.
6. In u-center **Open Tools -> Receiver Configuration**, pick your file that you download on the previous step and click **Transfer File -> GNSS** button.
7. Once the configuration is done, go to **Receiver->Action->Save Config** to save the configuration on the RTK receiver.

Accessories and spare parts

Here you can find affordable accessories for your kit.

Accessories
Portable 2 to survey thread adapter

Cables
Portable 2 dual right angle USB-C OTG 15cm

Accessories
Portable 2 handgrip with tripod

Portable 2
Portable 2 plastic case

Accessories
Portable 2 handgrip extendable

Portable 2
Portable 2 SP Connect universal phone holder

Accessories
Portable 2 handgrip with battery

Portable 2
Portable 2 mainboard

Made in Europe
Accessories
Waterproof Transport Case IP67

Plugins
BT+BLE Bridge

Made in Europe
RTK2B Boards
simpleRTK2B Micro