User Guide: RTK Base-Rover Calibrated Surveyor Kit

Overview

No Internet or no NTRIP correction service available?
This is the kit for you. With the RTK Base-Rover Calibrated Surveyor Kit you will have everything you need to start your surveying tasks with RTK and up to millimeter level accuracy.

Package

RTK Base-Rover Calibrated Surveyor Kit is cutomizable kit, you can choose the set of products yourself when ordering. In this hookup guide, we will show you how to setup a pre-configured the minimum set you need.

If you want to save time, simply order the kit preconfigured (with Configuration Service), we will assemble components inside the plastic box for you. If you don't add Configuration Service item you will have to assemble them yourself.

Unboxing

For building RTK Base-Rover Calibrated Surveyor Kit there is no need for special tools nor nothing of the sort, by hand will be enough. Follow our installation manual to start.

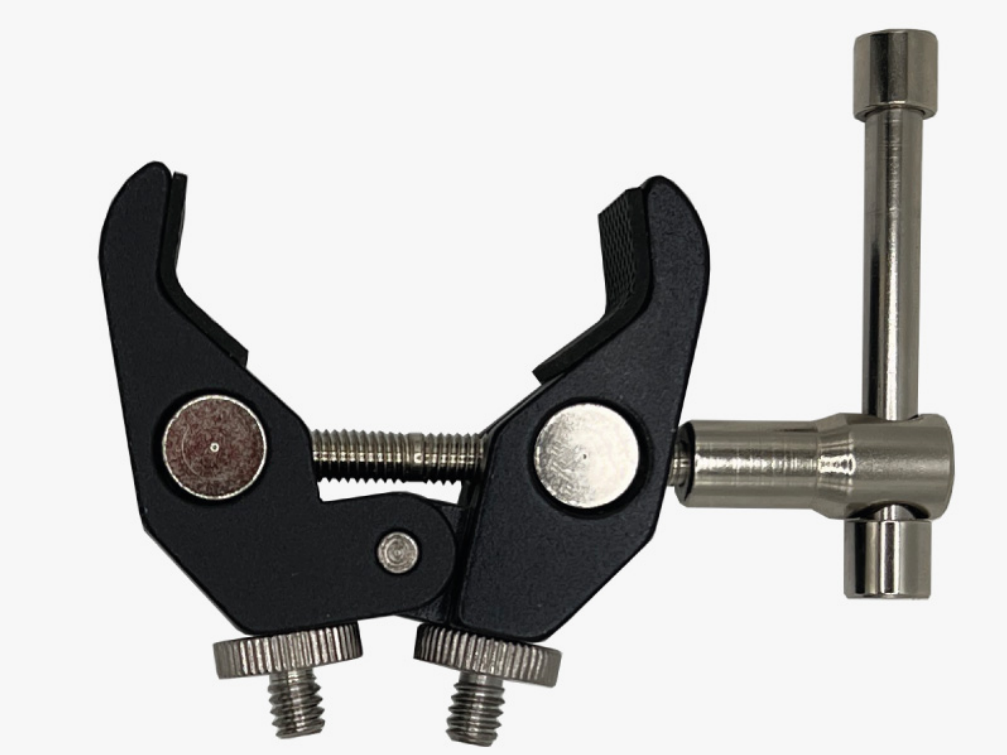
Assemble the hardware

1. You will receive RTK receivers in plastic cases marked as “Base” and “Rover.” Let’s start by assembling each of them.

2. Take you Base receiver. Start by mounting the receiver to the smartphone holder. You will need the Velcro strap (30cm), the plastic case and the universal smartphone.

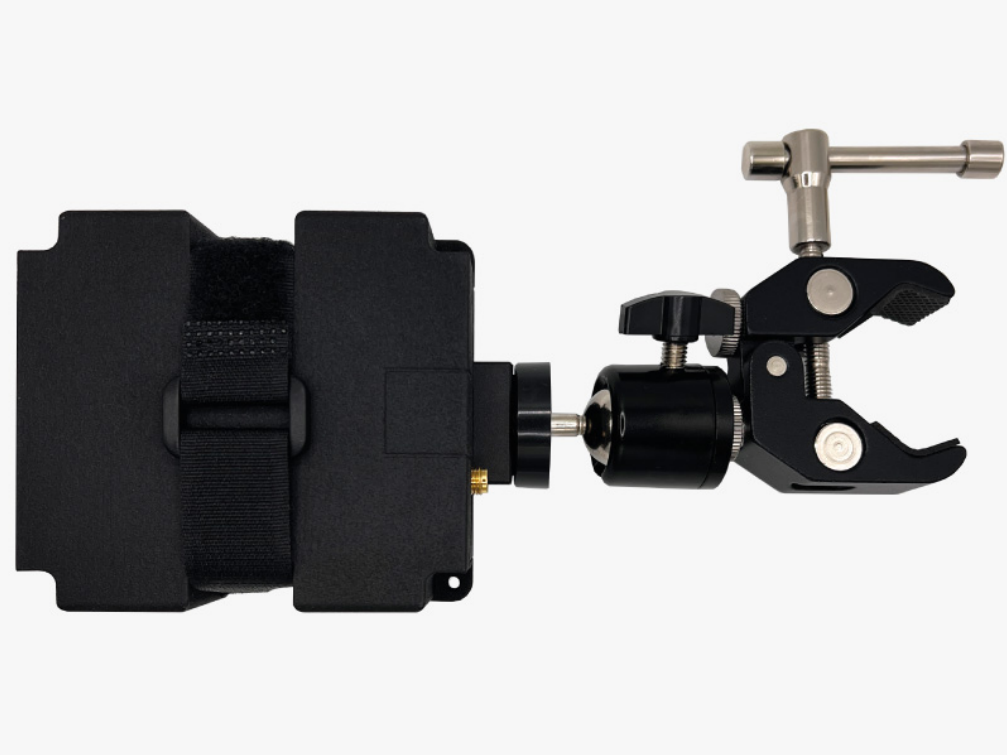
3. Next, assemble the clamp that will hold the smartphone holder to the pole. There are 3 different components that form the clamp.

4. Join the main parts of the clamp with the preferred screw. Each screw fits different screw holes within the clamp. You can screw in both and decide which may work best for you.



5. Screw tightly together the rotating part of the clamp that will serve to rotate the smartphone holder to your preferred position.

6. Screw in the clamp to the smartphone holder. You can remove the unused screw of the clamp if convenient.



7. Connect Dipole antenna for radio to the plastic case. Now you have the first piece of your Surveyor Kit ready to connect with the other remaining two main pieces: your smartphone and the antenna.

8. Now, you can proceed connecting the receiver to the Survey antenna. Connect the TNC-K to SMA cable (within Survey antenna box) to the SMA connector of the receiver.

9. Repeat the Steps 2-8 for the Rover.
10. Now you have your Rover and Base assembled.

Setup the Base

11. Take your Magnetic Stand for Survey GNSS Antenna and screw the stand together. Take your Base and fasten the clamp to the Magnetic Stand. You can adjust freely the position of the holder by loosing up the rotating piece of the clamp and fixing it at your will.

12. Add the Survey antenna on top of the stand turning it delicately to the right until it stops.

13. Connect the TNC-K end of the cable to the Survey antenna.

14. Install Base unit in a fixed location with line of sight to the the area where the other unit (a Rover) will move around. Do not power the board until the installation is

finished. Because once the board is powered, it is very important to not move the GPS/GNSS antenna nor obstruct its visibility from the sky. If you need an absolute accuracy for your project, check our tutorial How to configure simpleRTK2B as static base station.

15. Once the installation is done, you are ready to power the Base. Connect receiver USB-typeC cable to your receiver and power it with a wall adapter or external power supply (not included in the kit).
16. If you are an advanced GPS user and would like to check the base station parameters, you can do this by connecting to your PC.
17. The BASE unit comes pre-configured so that once your power it up, it calculates its absolute position with an accuracy of 2.5meters. This process takes around 10 minutes. If you are not sure if the process finished, connect to the base and confirm that the fix type = TIME. If you connect with u-center software, you should see the following “TIME” text in this Window. If you don’t find this Window in your u-center, you can open it via the Menu Bar **-> View -> Docking Windows -> Data.**
18. Once the base is in TIME mode, the unit will start sending corrections. Now you have your Base setup .

Setup the Rover

19. Take your Rover unit and your smartphone (not included in the kit) and place your smartphone to the smartphone holder, adjusting it to the width of your phone.

20. You can now connect the smartphone to the receiver with the different cable sets of your kit. Connect the USB-C cable to the USB port of the Rover board. Then, connect it to your phone.

21. Fasten the clamp to the surveying pole.

22. Add on top of the pole the Survey antenna turning it delicately to the right until it stops.

23. Finally, connect the TNC-K end of the cable to the Survey antenna and adjust the surveying pole to the convenient height.
24. Take the other receiver labeled as “ROVER” and its antenna and place the in a place with a good sky view with line of sight to the Base. If you want to achieve the best positioning accuracy, we recommend having a read of the GPS/GNSS Antenna installation guide.
25. You are ready to start enjoying high precision now.
26. The Rover can be used for about 6-8 hours with an average phone powering. If the you need more than this, use USB-C on-the-go (OTG) with external USB-C power supply (optional, not included in the package of the Surveyor kit) and a small external 1’000mAh powerbank.

How to connect RTK receiver to smartphone or tablet?

In the following integration guide we will explain how to use your Android device with RTK Base-Rover Calibrated Surveyor Kit.

1. Make sure your device supports Bluetooth 2.0 or has USB OTG capabilities.
2. Make sure your Android language is set to English, since some users reported compatibility problems with other languages.
3. Place your Rover in a location with **good view of the sky with line of sight to the Base.**

4. Download compatible software/app which you prefer to use from Google Play and install it in your device. We prepared step-by-step quick guide of how to use the kit with several software/app:
    - SW Maps – GIS & Data Collector. You can download the app here.
    - Any other app. The list of compatible software/app you can find here.

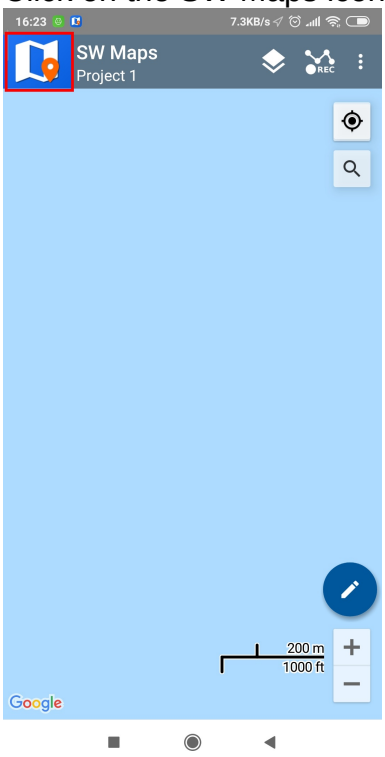
How to use Surveyor Kit with SW Maps?

SW Maps has two interfaces to connect your smartphone:

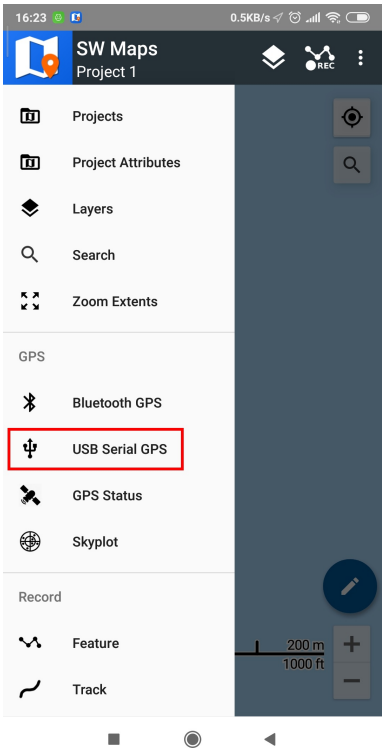
- via USB (prefered option since it works with any Base-Rover option)
- via Bluetooth (make sure that you ordered RTK Base-Rover Calibrated Surveyor Kit with Bluetooth options)

CONNECTION VIA USB OTG
CONNECTION VIA BLUETOOTH
CONNECTION VIA USB OTG
The best option (if your device supports it) since you can power and communicate with it at the same time

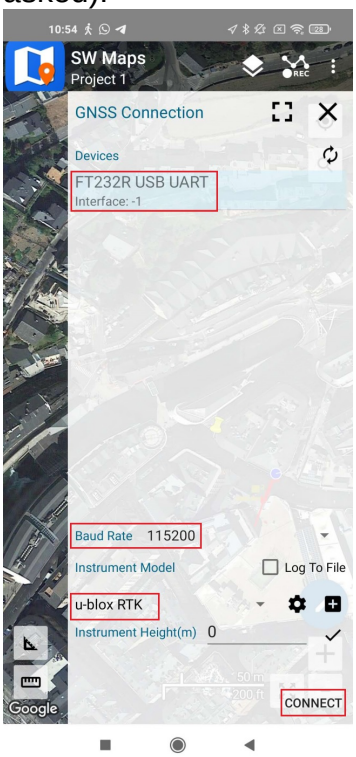
5. Open SW Maps app and give permissions (first time only).
6. Click on the SW Maps icon to show the app menu.



7. Select **USB Serial GPS**.

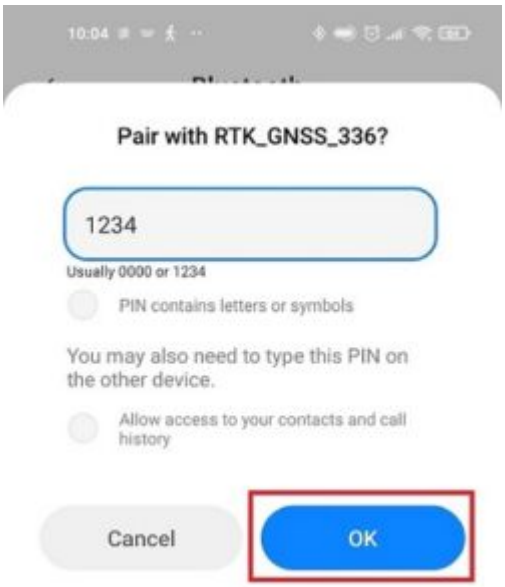


8. Under **Devices**, you should see **FT232R USB UART**. Set **BaudRate** to **115200** bps (if you ordered your Professinal kit before 09.10.2023, set BaudRate to 38400 bps).
9. Set **Instrument Model** to **u-blox RTK**. Set the **Instrument Height** according to the height of your pole or antenna, if you want to measure the location of the ground.
10. Click **CONNECT** button. When you click the CONNECT button, grant permissions (if asked).



CONNECTION VIA BLUETOOTH

5. Power your Ardusimple kit using its USB connector. Use a USB power bank, power wall adapter, smartphone, laptop etc.
6. Enable the Bluetooth connection on your device.
7. Pair the Ardusimple board in the Android Bluetooth menu. When searching for devices, you may see only the MAC address, but once paired the name will update to **BT+BLE_Bridge_XXXX**, where *XXXX* is a random number. Password is **1234**. *The pairing only needs to be done once. Unlike other Bluetooth devices, it won´t show as "connected" until you click "connect" button in an app.*



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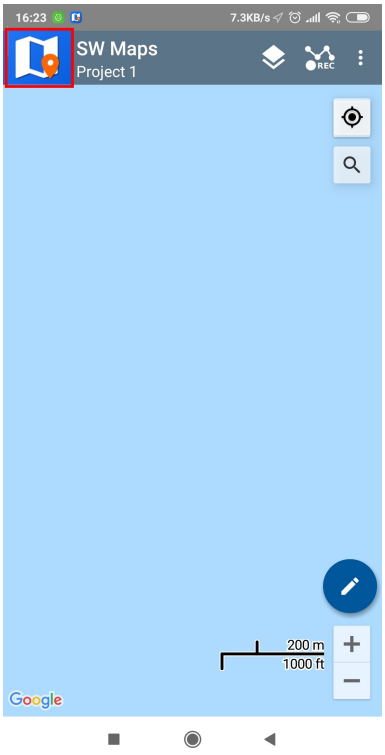
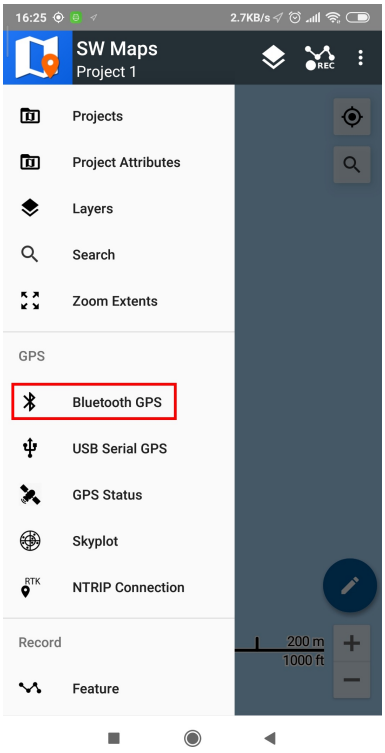
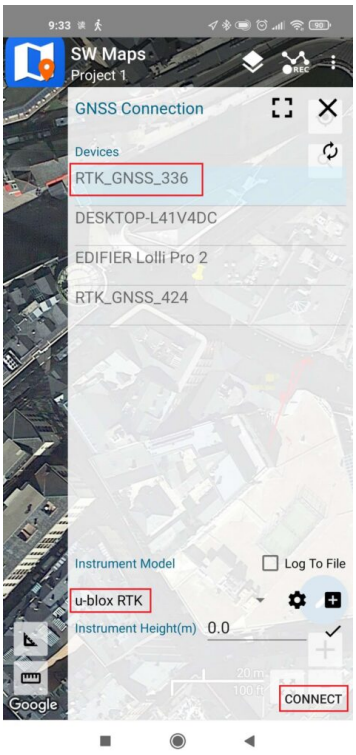


9. Select **Bluetooth GPS**.

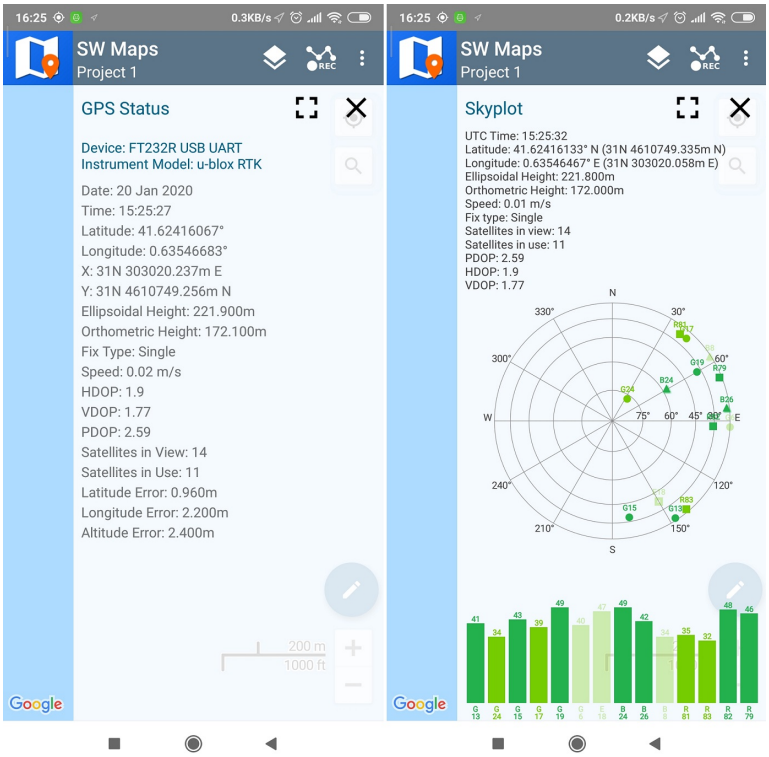


10. Under Devices, select the one you paired in step 3. Set Instrument Model to **u-blox RTK**. Set the Instrument Height according to the height of your pole or antenna, if

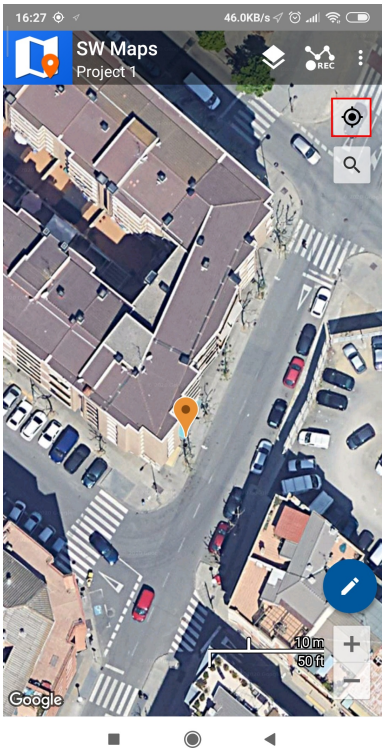
you want to measure the location on the ground. Click **CONNECT** button. When you click the CONNECT button, grant permissions (if asked).



11. You can see some details of your Ardusimple receiver by going to the SW Maps menu and selecting **GPS Status** or **Skyplot**.



12. On the main screen, you can click the button shown in the below picture to make the app center the map in your receiver location. The pointer showing your location will change its color depending on the fix status of your receiver. Additionally, you have the option to adjust the map layer, include points, tracks, as well as import or export recorded locations, among other features.



13. You can get used to the SW Maps app by exploring its various options. If you prefer a guide, you can access the User Manual here.

How to use Surveyor Kit with any app?

You can use the kit with any application. Just configure your kit as Mock location for Android smartphones/tablets in order to get centimeter position accuracy. If you are not familiar with the term, mock location means that you cheat your Android device to use an external GNSS receiver as if it was its own internal one. This has the advantage that any GPS/GNSS app that works with your Android device can benefit of centimeter level accuracy. Check the following instruction manual to start.

Firstly, install GNSS Master app and enable mock location in your Android Device.

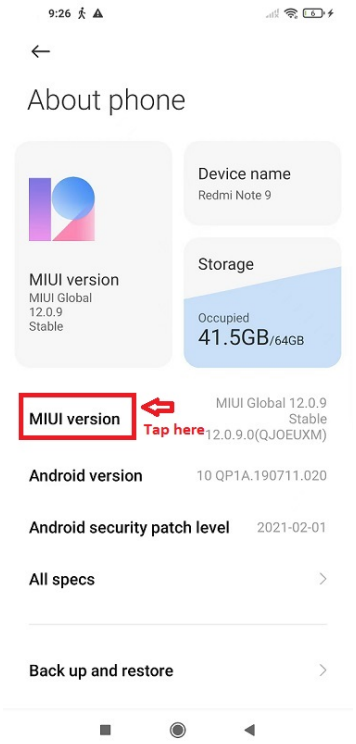
This step only needs to be done once.

1. Install GNSS Master app on your Android device from the Google Play Store. When you first open the app, you will be asked to allow certain permissions to GNSS Master.

- Location Permission
- Display Notifications

   Once you accept the permissions, the Status page will load, showing the current status of the app. We will configure it later.

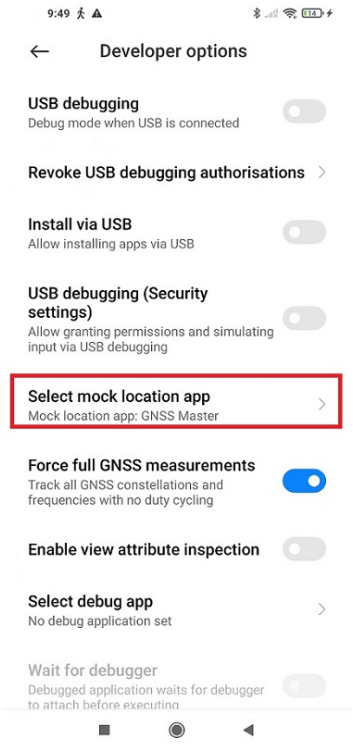
2. To enable mock locations in Android we will need to get Developer permissions. The procedure may vary slightly between different Android versions and smartphone models (you can Google your ***"Smartphone model + enable mock location"*** if you can't find the exact options).
3. On Android 4.1 and lower, the ***Developer options*** screen is available by default. On Android 4.2 and higher, you must enable this screen. To enable developer options, tap the ***Build Number, MIUI version or similar*** option 7 times.



4. You can find this option in one of the following locations, depending on your Android version:

- **Settings –> About Phone –> Build Number**
- **Settings –> System –> About Phone –> Build Number**

5. Once you have access to Developer options, you can go to **Settings –>Additional Settings** and at the bottom you will find Developer options. In this big list, tap **Select mock location app** and select **GNSS Master** from the list.

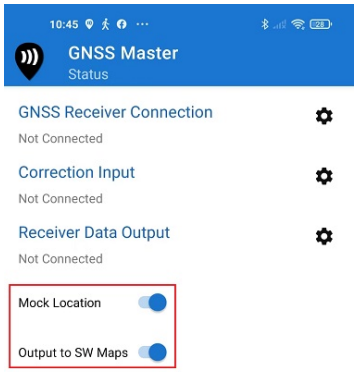


6. Connect the GNSS antenna to your device, in a location with good view of the sky, or near a window for testing the functionality.

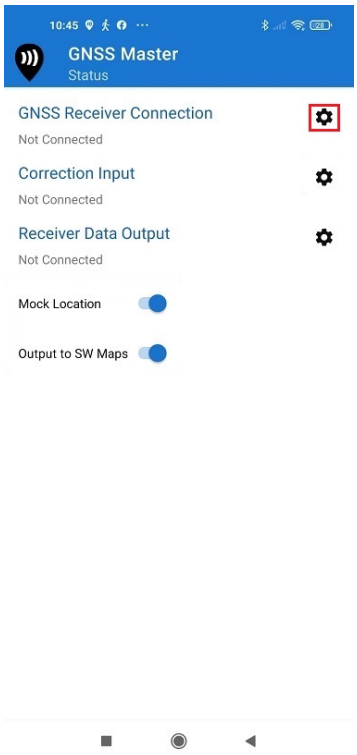
Secondly, connect the RTK receiver to your Android device.

Connection via USB OTG
Connection via Bluetooth
Connection via USB OTG
The best option (if your device supports it) since you can power and communicate with it at the same time.

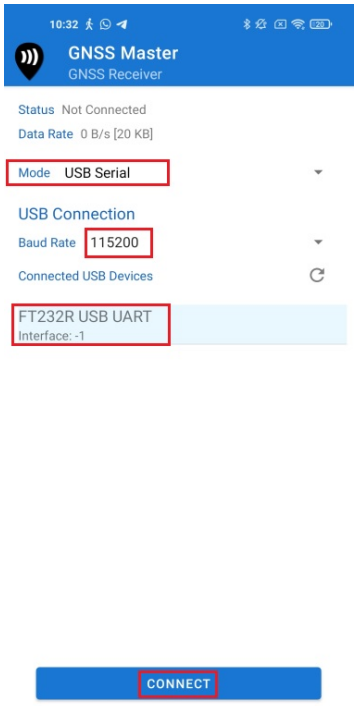
7. Connect RTK receiver with your Android device with USB OTG cable.
8. Open GNSS Master app. Check Mock Location and Output to SW Maps.



9. Click the gear icon on the right side of **GNSS Receiver Connection** to enter the setup menu.



10. Choose **USB Serial** at **Mode.** Set **Baud Rate** to 115200. (If you use a different receiver, the Baud Rate should match with your receiver configuration) At **Connected USB Device**, it will automatically recognize your receiver with name ***** **USB UART**.

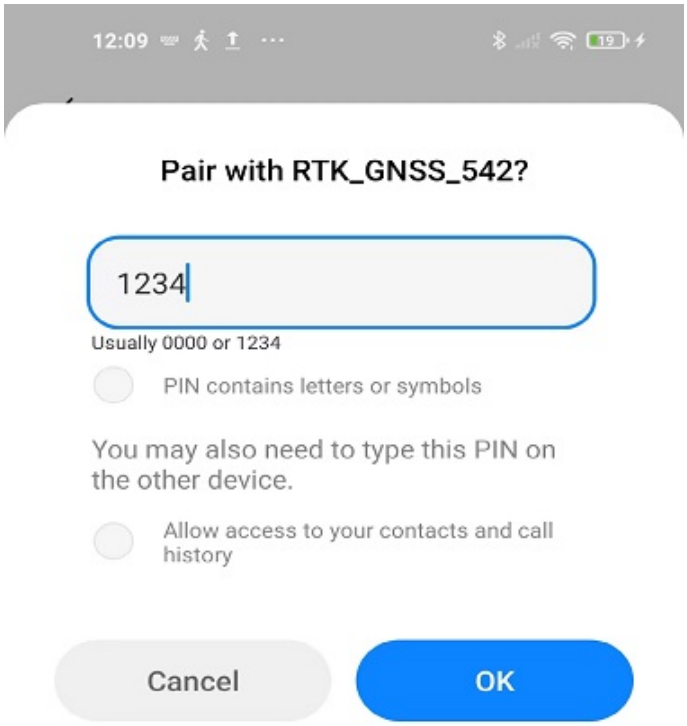


11. Press **CONNECT**.

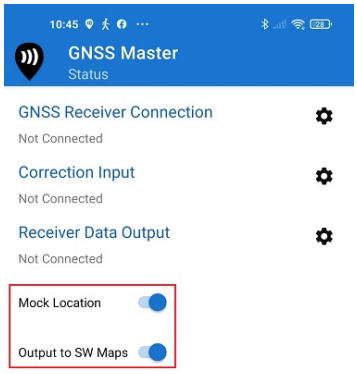
Connection via Bluetooth

7. 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.

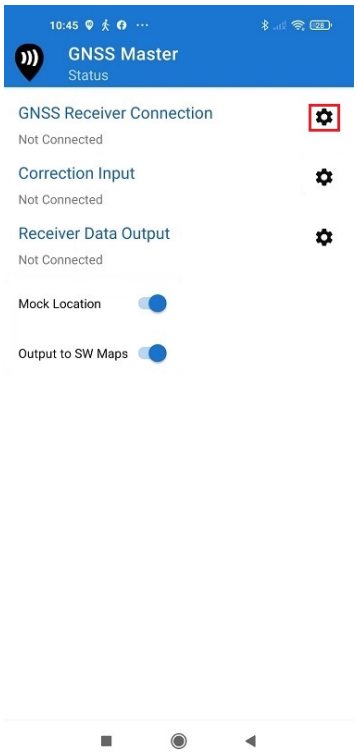
8. Enable your smartphone/tablet Bluetooth, and pair it with your RTK receiver. When pairing your device, notice that it may appear as **RTK_GNSS_*** ** or as a generic MAC number (e.g.: F0:0A:95:9D:68:16). The password is always 1234. *The pairing only needs to be done once.*



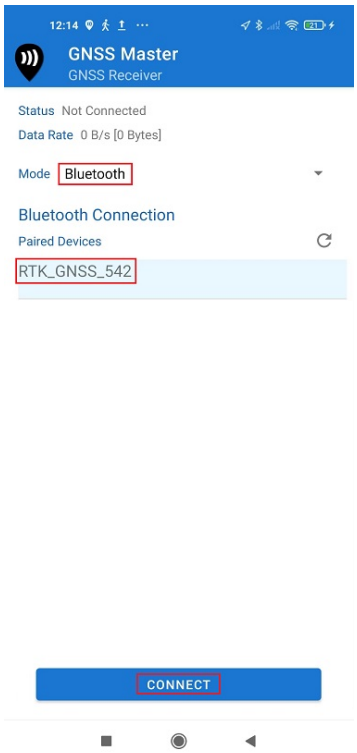
9. Open GNSS Master app. Check Mock Location and Output to SW Maps.



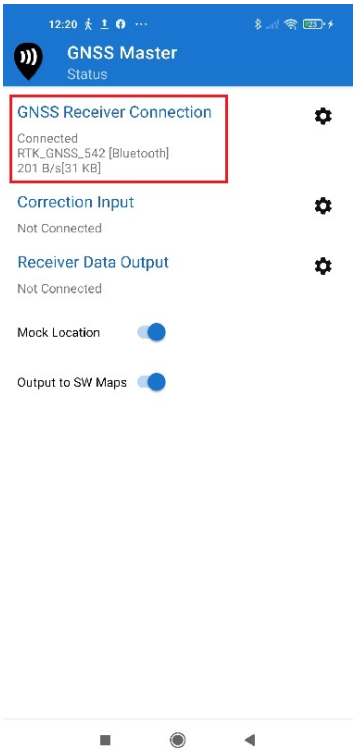
10. Click the gear icon on the right side of **GNSS Receiver Connection** to enter the setup menu.



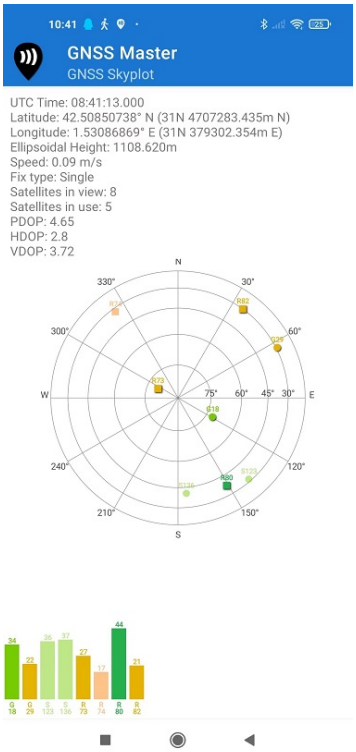
11. Choose **Bluetooth** at Mode. In Paired Devices chose the one you paired in step 8. Press **CONNECT**.



12. Go back to main menu. Now you should see in GNSS Receiver Connection it says Connected and with data transfer.



13. In a few minutes you can check the skyplot in the app.



14. Open your favorite GPS/GNSS application and use it as usual. You will be using the external RTK GNSS receiver instead of the smartphone/tablet internal GPS receiver.
15. We have tested this functionality with many apps, you can find them in this link.
    If you test it in other apps, you can send us an email at info@ardusimple.com and we will add it to the list.
    The Android robot is reproduced or modified from work created and shared by Google and used according to terms described in the Creative Commons 3.0 Attribution License.

Related tutorials

- 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
- Ellipsoidal, orthometric and geoid height 101
- How to use Ardusimple products with SW Maps on Android smartphones/tablets

Accessories

Here you can find affordable accessories for RTK Base-Rover Calibrated Surveyor Kit.

Cables
USB-C on-the-go (OTG) with external USB-C power supply

Made in Europe
Accessories
Waterproof Transport Case IP67

Accessories
Tablet holder

Accessories
Bipod for surveying pole

EU Conformity & RoHS Certificates

Here you will find a summary of the EU Conformity Certificates of all our products.