

# EMLID REACH RS3

QUICK SETUP GUIDE FOR DITCH ASSIST



 **DITCH ASSIST**

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## Firmware Versions and Notes

These setup instructions for the Emlid Reach RS3 with Ditch Assist are based on tests using firmware version 33 beta 3. They differ from Emlid's standard recommendations by focusing on GPS, GLONASS, and Galileo satellites, and by increasing the data transmission rates for GPS and GLONASS RTK corrections. This approach aims to reduce the correction age to under 2 seconds (compared to the typical 3-4 seconds with default settings) and minimize dropped RTK fixes.

We also suggest using a higher LoRa radio frequency to potentially reduce interference in North America. While higher frequencies can have a slightly shorter range, in practical terms for this application, the difference should be minimal (only a few meters) and unlikely to be noticeable. However, local interference can still occur on specific radio frequencies, so some experimentation might be necessary if you experience poor radio range.

# 1. Using the Emlid Flow App to Setup your Reach RS3

Emlid Flow allows you to control Reach RS3 receivers with iOS or Android devices. Using the app, you can access your receiver over Bluetooth or a Wi-Fi network, set it up for use with Ditch Assist, or for other uses like surveying, and collect and stake out points right in the app. The connection process is similar for both iOS and Android devices.

## 1.1 Download Emlid Flow

<p>To manage Reach RS3, download the Emlid Flow app on your iOS or Android mobile device from your App Store, or scan the QR code:</p>	
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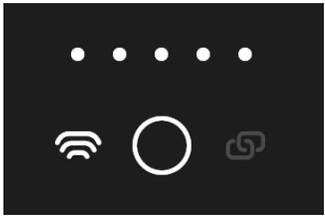
### USING REACH WITH ANDROID DEVICES

Some Android devices have battery optimization enabled by default. Make sure you disable it for Emlid Flow to avoid disconnection.

*You may also need to disable Mobile Data temporarily on android phones for the app to connect correctly*

## 1.2 Power on Reach RS3

**To power up your Reach, follow the steps below:**

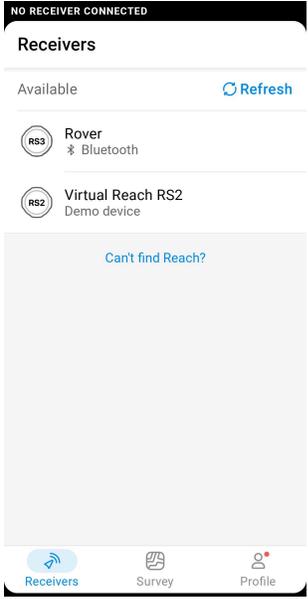
<ol style="list-style-type: none"><li>1. Hold the power button for 5 seconds to turn the unit on.</li><li>2. Wait for about 30 seconds until the Power LEDs will stop blinking and the Network LED stays solid white.</li></ol>	
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Reach RS3 is now broadcasting Wi-Fi and is ready to connect to.

### 1.3a Connect to Reach RS3 via Bluetooth

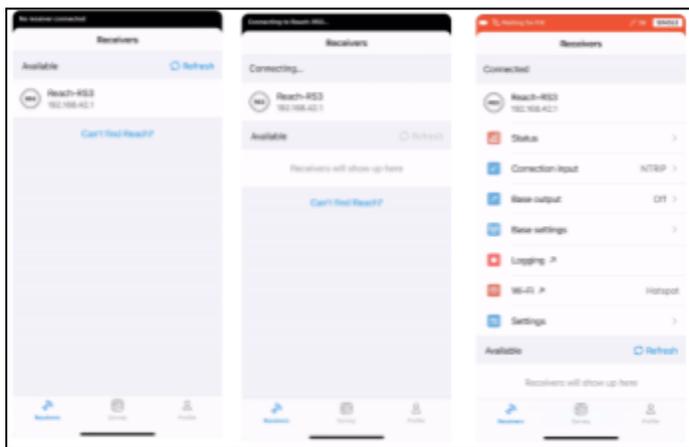
From Firmware version 33 it is now possible to connect to the RS3 units via Bluetooth. This is simpler than connecting via WiFi, and as of the current version (33 beta 3) at the time of

writing, works very well. If your receivers are running older firmware, you will need to follow the instructions later in this manual to connect to them and update firmware.

<ol style="list-style-type: none"><li>1. Ensure your firmware is at least version 33 and you have the latest version of the Emlid Flow App installed</li><li>2. Power on the Emlid receiver(s) and wait until boot is complete</li><li>3. Open the Emlid Flow app. You should see any nearby Emlid devices with the Bluetooth symbol below them</li><li>4. Tap on an available Bluetooth receiver and you will be taken to its menu page.</li></ol>	
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### 1.3b Connect to Reach RS3 via Wi-Fi

**To connect to your Reach, follow the steps below:**

<ol style="list-style-type: none"><li>1. Open a list of Wi-Fi networks on your smartphone or tablet.</li><li>2. Connect to a network named <code>BASE:XX:XX</code>, <code>ROVER:XX:XX</code>, or <code>reach:xx:xx</code><ol style="list-style-type: none"><li>a. We program the receivers to show up as <i>BASE</i> or <i>ROVER</i></li></ol></li><li>3. Type network password: <b><i>emlidreach</i></b></li><li>4. Open the Emlid Flow app.</li><li>5. Choose your unit from the list of available devices.</li></ol>	
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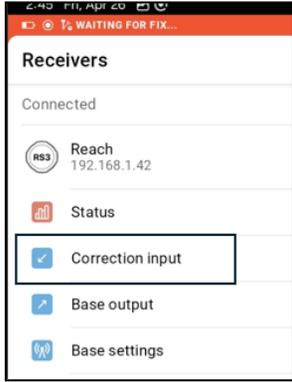
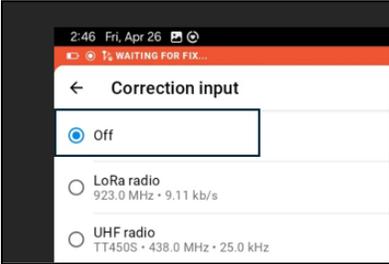
**NOTE**

If there is only one receiver, the app will automatically try to connect to this Reach.

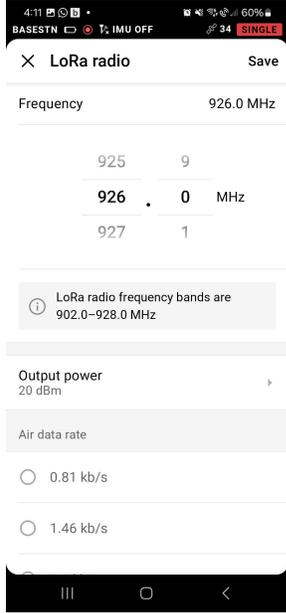
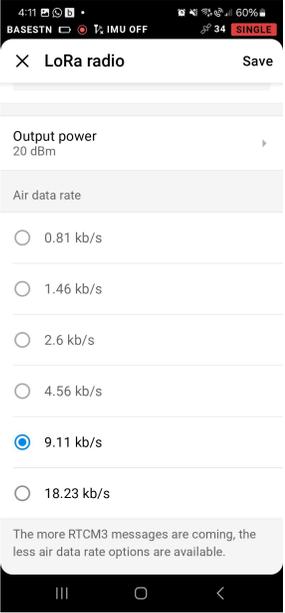
## 2. Base Station Setup

Connect the Base receiver to the Emlid Flow App. Follow the instructions in the previous section.

### 2.1 Base Correction Input Settings

<p>From the main screen, navigate to <b>Correction Input</b> and turn this OFF</p>		
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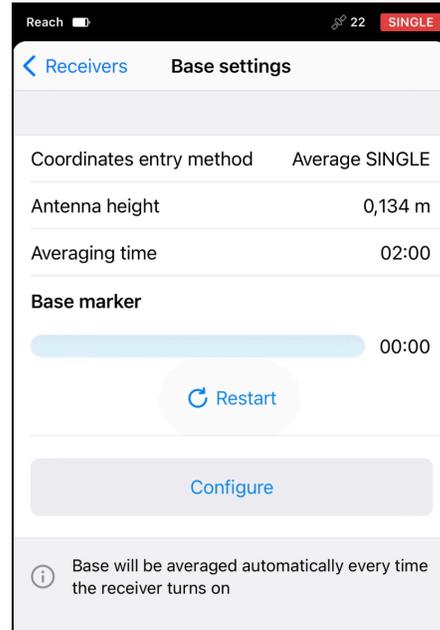
### 2.2 Base Output 1 Settings

<ol style="list-style-type: none"><li>1. Navigate to <b>Base Output 1</b> settings and select LoRa radio, then tap the pencil icon</li><li>2. Select the radio frequency that the base and rover will be paired to. Write this down for future reference. We suggest trying a frequency <b>between 926 and 928</b> as these tend to be less prone to interference, however you may need to test different frequency ranges in your specific area if you find you have very poor radio range.</li><li>3. Set the Output power to <b>20 dBm</b>, and the air data rate to <b>9.11 kb/s</b></li></ol>		
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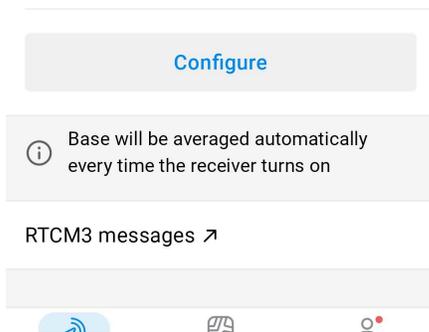
## 2.3 Base Settings

From the main screen, navigate to **Base Settings** and click **Configure**.

- Set Coordinates entry method to Average SINGLE for 2 minutes as shown (Antenna height doesn't matter):



Scroll down below the Configure button and tap on *RTCM3 messages*.



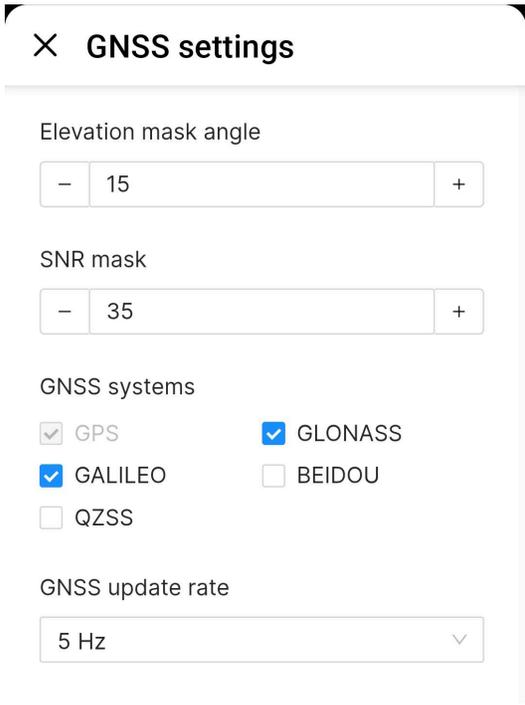
Enable **only** the first 4 Message types exactly as shown to the right and save:

### RTCM3 settings

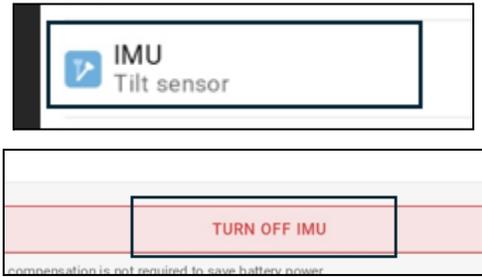
#### Message type

<input type="checkbox"/>	1006 ARP station coordinates	0.1 Hz
<input checked="" type="checkbox"/>	1074 GPS MSM4	1 Hz
<input checked="" type="checkbox"/>	1084 GLONASS MSM4	1 Hz
<input checked="" type="checkbox"/>	1094 Galileo MSM4	0.5 Hz
<input type="checkbox"/>	1124 BeiDou MSM4	0.5 Hz
<input type="checkbox"/>	1230 GLONASS code-phase biases	0.1 Hz

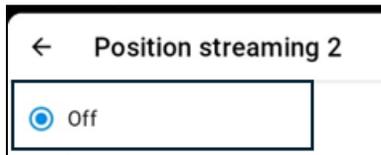
## 2.4 Base Settings > GNSS Settings

<p>Navigate to Settings &gt; GNSS Settings. Set exactly as shown:</p>	 <p>The screenshot shows the 'GNSS settings' screen. At the top, there is a close button (X) and the title 'GNSS settings'. Below this, there are three settings sections: 'Elevation mask angle' with a slider set to 15; 'SNR mask' with a slider set to 35; and 'GNSS systems' with checkboxes for GPS, GLONASS, GALILEO, BEIDOU, and QZSS. The 'GNSS update rate' is set to 5 Hz.</p>
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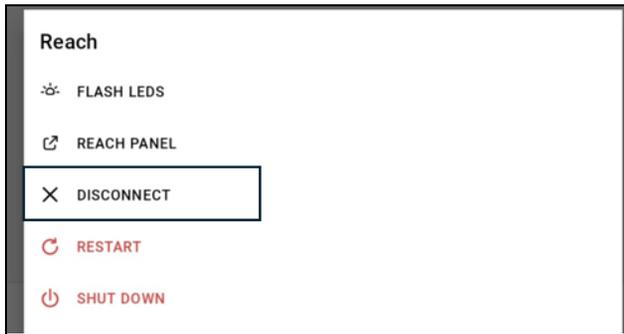
## 2.5 Base Settings > IMU

<p>Navigate to <b>Settings</b>. Select "IMU". Select "TURN OFF IMU"</p>	 <p>The screenshot shows the 'IMU' settings screen. At the top, there is a toggle switch for 'IMU Tilt sensor'. Below this, there is a red button labeled 'TURN OFF IMU'. At the bottom, there is a small text note: 'compensation is not required to save battery power'.</p>
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## 2.6 Base Settings > Position Streaming 1 & 2

<p>Navigate to <b>Settings</b> and turn OFF <b>Position Streaming 1 and 2</b></p>	 <p>The screenshot shows the 'Position streaming 1' settings screen. At the top, there is a back arrow and the title 'Position streaming 1'. Below this, there is a radio button set to 'off'.</p>	 <p>The screenshot shows the 'Position streaming 2' settings screen. At the top, there is a back arrow and the title 'Position streaming 2'. Below this, there is a radio button set to 'off'.</p>
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Once configuration is complete, from the main screen, select the Reach icon and DISCONNECT.

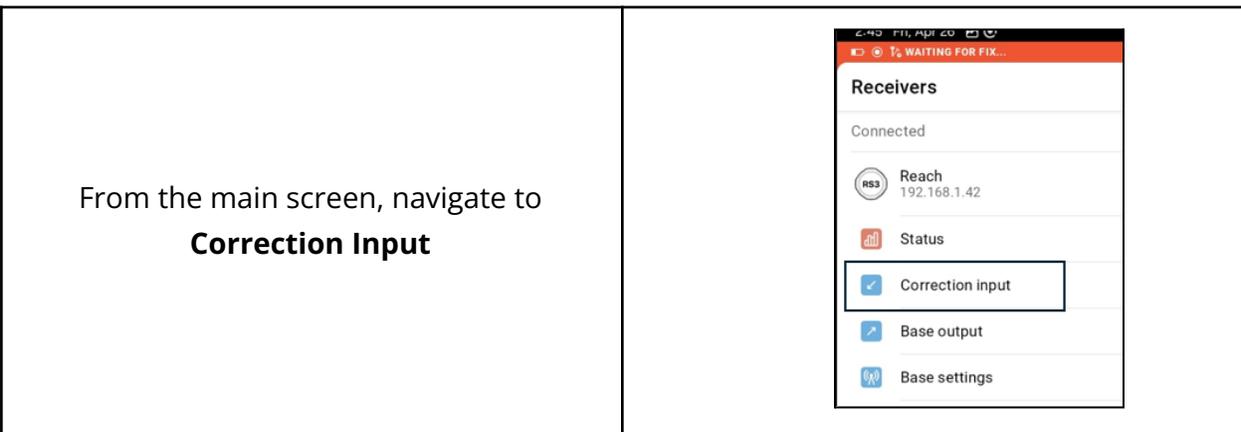


The receiver is now configured as a base station. It will average its position for 2 minutes when powered on, then begin broadcasting RTK corrections over the LoRa radio to the rover.

## 2. Rover Setup

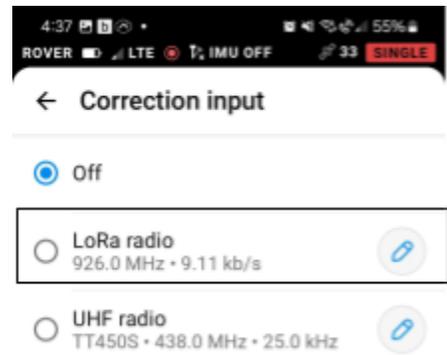
Note that the correction input settings here refer to a rover that is setup to work with a second RS3 receiver that's configured as a base station. If you are using NTRIP (CORS or VRS), refer to the later chapter for correction input configuration.

### 2.1 Rover Correction Input Settings

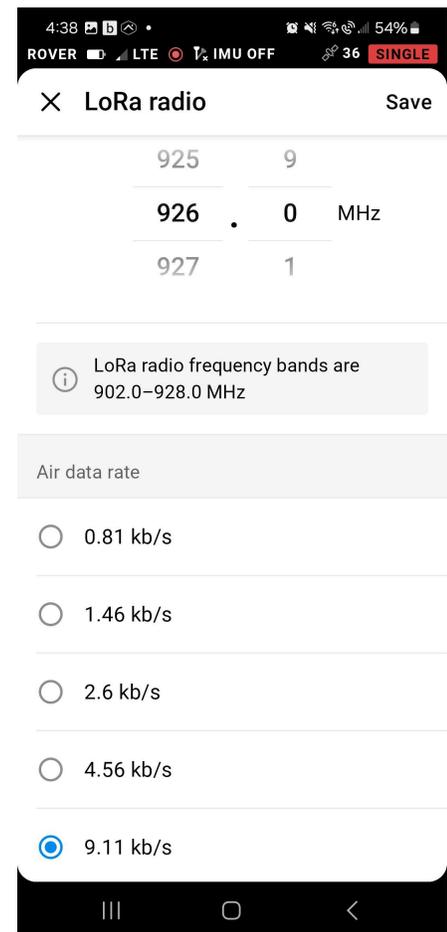


From the main screen, navigate to  
**Correction Input**

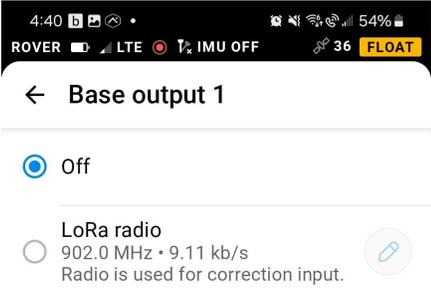
Select LoRa radio, and click the pencil icon to the right



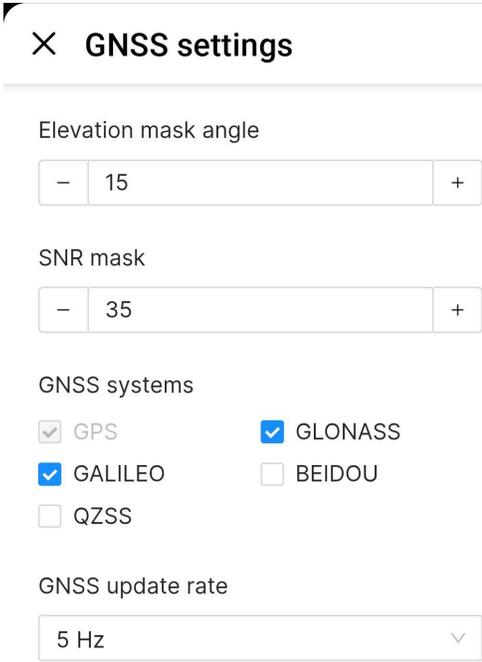
Make sure the frequency and air data rate match those set for the base station



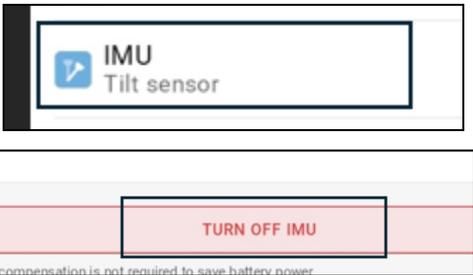
## 2.2 Rover Base Output Settings

<p>Navigate to <b>Base Output 1 and 2</b> settings and turn both OFF</p>	
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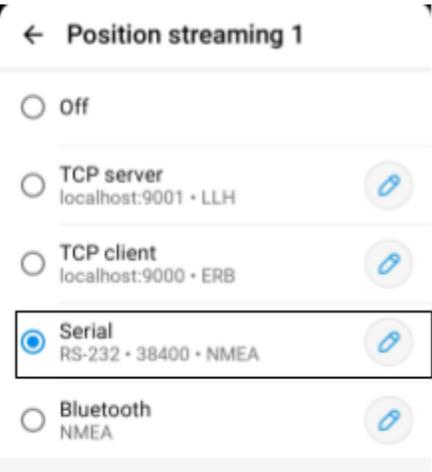
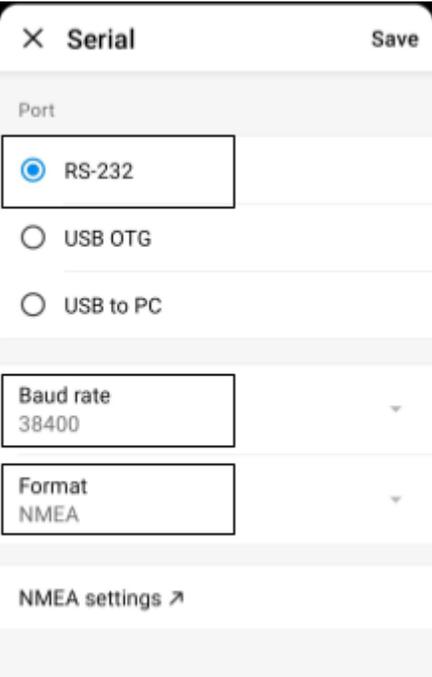
## 2.3 Rover Settings > GNSS Settings

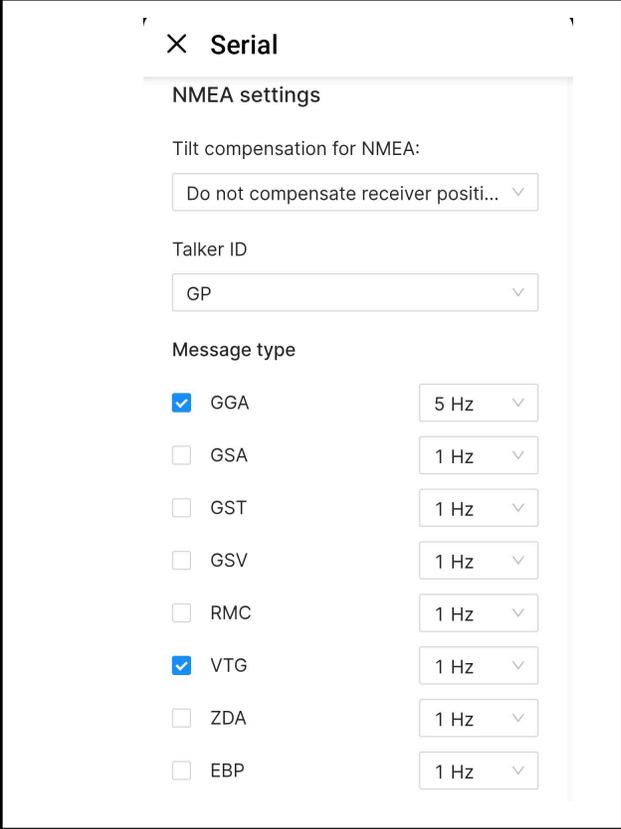
<p>Navigate to Settings &gt; GNSS Settings. Set exactly as shown:</p>	
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## 2.4 Rover Settings > IMU

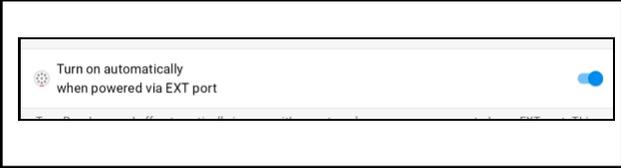
<p>Navigate to <b>Settings</b>. Select "IMU". Select "TURN OFF IMU"</p>	
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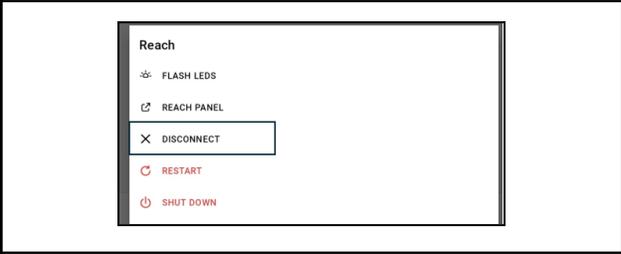
## 2.5 Rover Settings > Position Streaming 1

<ul style="list-style-type: none"><li>• Navigate to <b>Settings &gt; Position Streaming 1</b></li><li>• Select Serial and tap the pencil icon</li></ul>	
<ul style="list-style-type: none"><li>• Select <i>RS-232</i></li><li>• Set Baud rate to <i>38400</i></li><li>• Set Format to <i>NMEA</i></li></ul>	

<ul style="list-style-type: none"> <li>• Tap on NMEA settings, and set as follows:             <ul style="list-style-type: none"> <li>○ Do not compensate for receiver position</li> <li>○ Talker ID: GP</li> <li>○ GGA messages at 5Hz</li> <li>○ VTG messages at 1Hz</li> <li>○ ALL others OFF</li> </ul> </li> </ul>	
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## 2.6 Settings Auto Power ON/OFF

<p>In Settings menu, enable option to auto power on when power is supplied via the Ditch Assist GPS cable</p>	
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<p>Once configuration is complete, from the main screen, select the Reach icon and DISCONNECT.</p>	
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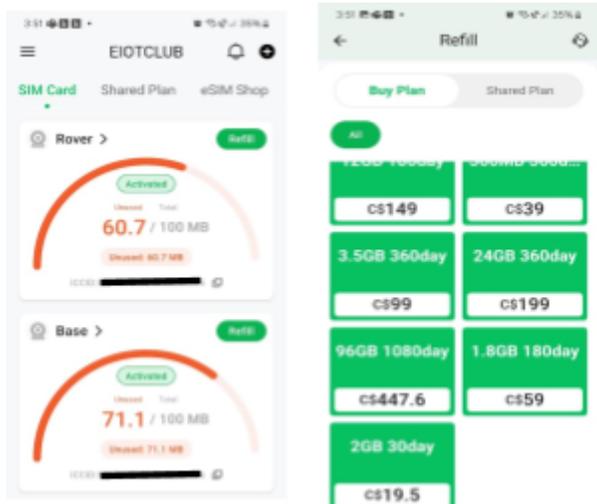
<p><b>Your rover receiver should now receive corrections from the base station and provide the required messages to Ditch Assist. Verify by connecting to Ditch Assist and viewing the GNSS info panel.</b></p>	
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### 3. NTRIP Setup

#### 3.1 Information

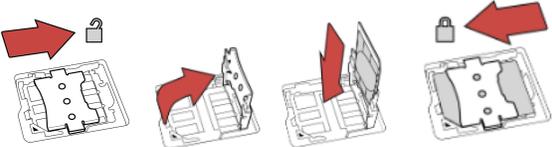
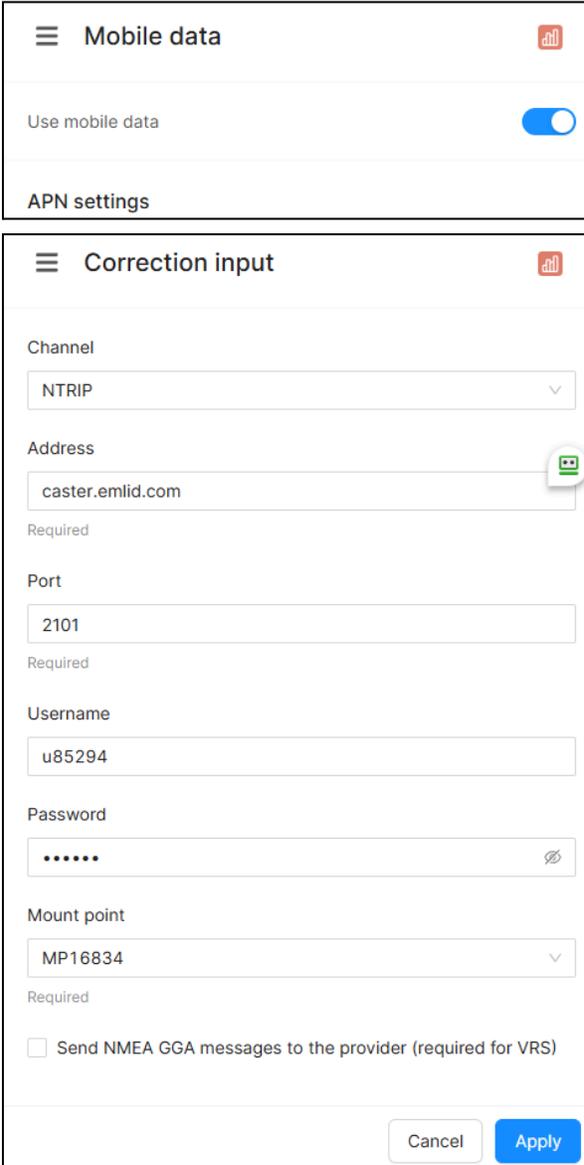
Emlid RS3 receivers are shipped with internal LoRa radios for free RTK correction transmission. For longer range or interference issues, NTRIP using cellular data is an alternative. Special SIM cards with a 100MB/30-day trial are included for testing NTRIP (contact us if needed), and this should give you approximately 20 hours of use.

#### 3.2 Activating SIM Cards

<p><b>You must activate your SIM cards before using them:</b></p> <ul style="list-style-type: none"><li>• Search in your App Store for the <b>EIOTCLUB</b> app and install it</li><li>• Register for a free account</li><li>• Add the SIM cards to your account via the + button<ul style="list-style-type: none"><li>◦ Enter the ICC ID number printed at the bottom of the card, not the really long number at the top:</li></ul></li></ul>	
<ul style="list-style-type: none"><li>• You should see that each SIM card has the 100MB of data available</li><li>• If you decide to continue using NTRIP, tap Refill next to each SIM and choose the required data and time<ul style="list-style-type: none"><li>◦ <i>As a reference, each RS3 will use around 5MB per hour as either a base or a rover, so 1GB of data will last around 200 hours</i></li><li>◦ <i>Note that we do not provide the data plans, and they must be purchased directly from EIOTCLUB</i></li></ul></li></ul>	

### 3.3 Base & Rover Quick Setup for NTRIP

If you received SIM cards with your RS3 receivers then your units will have been pre-programmed for NTRIP, but you will need to perform the following to switch over to NTRIP:

<p>Break out and insert Nano SIM cards into each Reach RS3 unit, making sure you fully lock the cover to hold the SIM securely in place.</p>	
<p style="text-align: center;"><b>On the Rover Receiver</b></p> <ul style="list-style-type: none"><li>• Connect using Emlid Flow App</li><li>• Navigate to <b>Mobile Data</b> and turn ON the Use mobile data setting</li><li>• You should NOT need to enter any APN settings</li><li>• Navigate to <b>Correction Input</b> and change from LoRa radio to <b>NTRIP</b></li><li>• Confirm settings are already programmed, or enter the information you were provided for your NTRIP caster</li><li>• Hit <i>Apply</i> to Save</li></ul>	 <p>The screenshot shows two settings screens from the Emlid Flow app. The top screen is 'Mobile data', where the 'Use mobile data' toggle is turned on. The bottom screen is 'Correction input', where the 'Channel' is set to 'NTRIP', 'Address' is 'caster.emlid.com', 'Port' is '2101', 'Username' is 'u85294', and 'Password' is masked with dots. The 'Mount point' is set to 'MP16834'. There is an unchecked checkbox for 'Send NMEA GGA messages to the provider (required for VRS)'. 'Cancel' and 'Apply' buttons are at the bottom right.</p>

## On the Base Receiver

- Connect using Emlid Flow App
- Navigate to Mobile Data and turn ON the Use mobile data setting
- You should NOT need to enter any APN settings
- Navigate to **Base Output 2**
- Confirm settings are already programmed, or enter the information you were provided for your NTRIP caster
- Hit *Apply* to save

The screenshot shows the 'Mobile data' settings page in the Emlid Flow app. The 'Use mobile data' toggle is turned on. Below it is the 'APN settings' section, which is currently empty. The 'Base output 2' settings page is also visible, showing the following configuration:

- Channel:** NTRIP
- Address:** caster.emlid.com
- Port:** 2101
- Password:** (masked with dots)
- Mount point:** MP22306

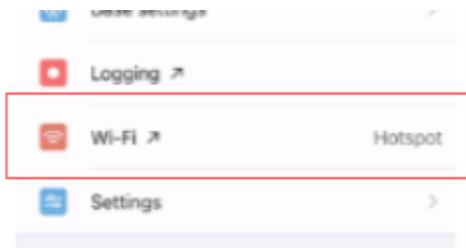
A note at the bottom indicates: Correction format is RTCM3.

## 4. How to Update the Software on your Emlid RS3

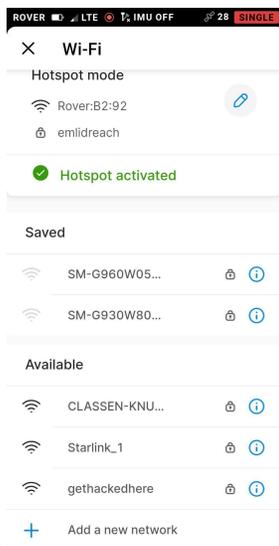
Emlid releases regular firmware updates that include new features and fixes. However, **we recommend that you don't update your firmware mid-season when you are using your system if everything is working well.** Waiting until the end of the season, or performing updates pre-season when you have time to troubleshoot any possible resulting issues will save you time and stress!

The process of updating the firmware involves connecting the Emlid device to your home or office Wi-Fi network, and then downloading and installing the latest version of the firmware. Provided you connect your phone or tablet to the same Wi-Fi network, the Emlid Flow app will be able to 'see' the receiver.

1. Connect to the RS3 via its Wi-Fi hotspot as outlined in the previous section.
2. Open the Emlid Flow app and tap on the Wi-Fi menu from the main screen.



3. About half way down the page you'll see a list of available Wi-Fi networks that the receiver can connect to. Pick your home or office network, and enter your Wi-Fi password when prompted.



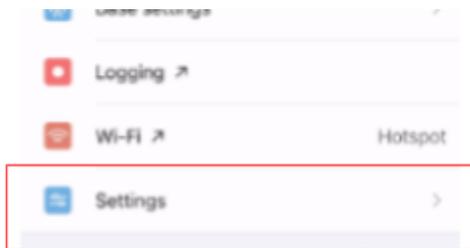
- The receiver will attempt to connect to the Wi-Fi network. If it is successful you should see the wireless network icon next to the power button on the receiver turn



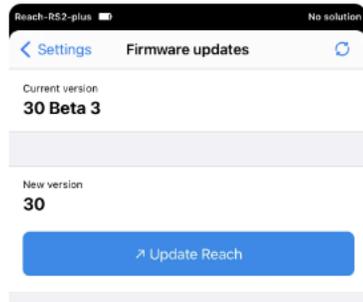
solid blue.

- If it flashes blue constantly, then turns white again this means the receiver couldn't connect, and you may need to reboot it, connect to it again via its hotspot, and try again. Make sure you have the correct password (it will be case sensitive).
- Connect your phone or tablet to the same Wi-Fi network and open the Emlid Flow app on it.
    - You should see the receiver and be able to connect to it
    - If you have issues connecting, try force closing the Emlid Flow app and then running it again

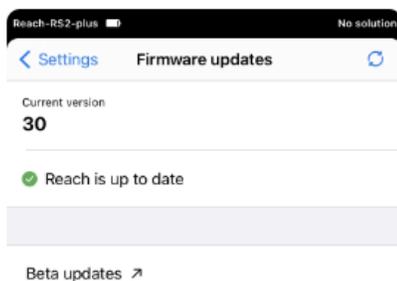
- On the main screen, tap Settings, then find the menu option for Firmware Updates



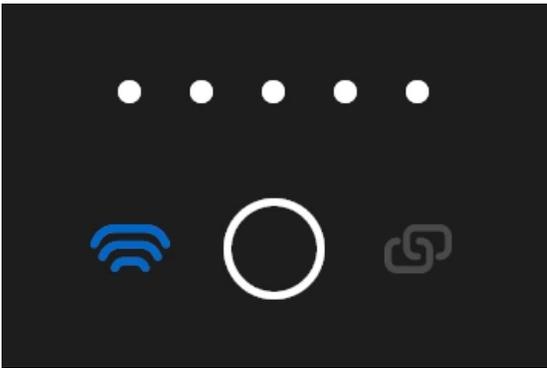
- If a new version is available you'll be prompted to update.



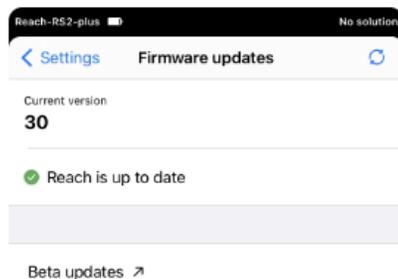
- If no new version is available you'll see a message that you already have the latest version



8. Tap the button to update your receiver.
  - a. The receiver will first download the latest version of the firmware, which may take 10-30 minutes
    - i. Make sure you leave the receiver powered on and connected to Wi-Fi while it downloads the update
  - b. Once the firmware is downloaded it will automatically install. The receiver will power off and restart once the update is complete.
9. After the reboot, wait for the Network LED to turn blue, showing that the receiver has joined your Wi-Fi network again.



10. Close and re-open the Emlid Flow app. You should be able to connect to the receiver again provided your phone is still connected to your home/office Wi-Fi.
11. Navigate back to the Firmware Updates screen and verify you have the latest version



12. Firmware update is now complete.