



# Emlid Flow

## USER DOCUMENTATION

Firmware version **30**

Emlid Flow app version **8.1** or newer

June 15, 2023

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# 1 Introduction

Emlid Flow and Emlid Flow 360 allow working with survey projects in an easy and convenient way. Create and configure projects in the cloud-based web app Emlid Flow 360, and work with them later in the field—collect or stake out data using the mobile app Emlid Flow.

To sync data between your devices, create an Emlid account. Once you're logged in, every change in your projects will be immediately backed up to the cloud and available on every device you use.

## 2 Getting started

This guide describes how to start working with the Emlid Flow.

### 2.1 Accessing the app

Download the Emlid Flow app on your [iOS](#) or [Android](#) mobile device.



Download Emlid Flow

### 2.2 Creating Emlid account

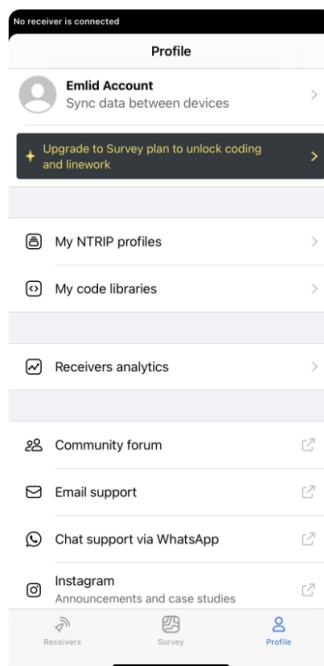
Emlid account allows you to sync your projects between Emlid Flow and Emlid Flow 360 as well as between different devices, and instantly save the progress of your survey. You can have access to all your project data, custom coordinate systems, code libraries, and NTRIP profiles across your devices.

**Tip:** Using an Emlid account, you can access our [Community forum](#) and [Emlid Caster](#).

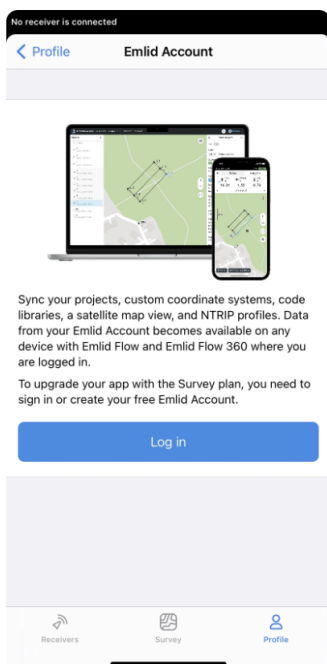
To create an Emlid account, follow the steps below:

**Note:** You don't need to be connected to the receiver to create an account using Emlid Flow.

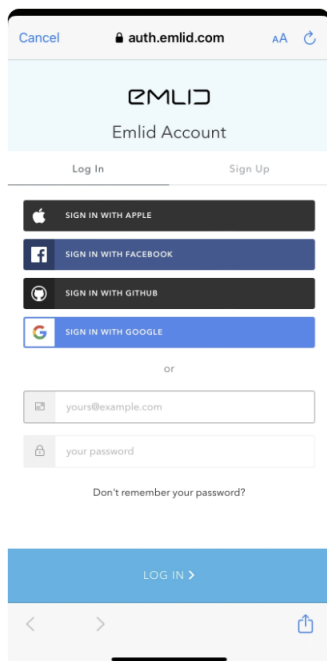
1. Open Emlid Flow and go to the *Profile tab*.



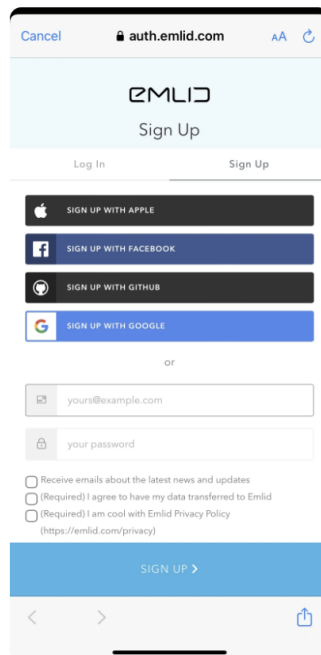
2. Tap *Emlid account*.



3. Tap the *Log in button*. You will be redirected to the Emlid account creation page.



4. To create an account, go to the *Sign Up* tab.



5. Type in your email and password in the corresponding fields.
6. Tap the *SIGN UP* button.
7. Verify your email address by following the on-screen instructions.

After you create an Emlid account, log in to Emlid Flow or Emlid Flow 360 to enable data sync between all your devices.

## 3 Preparing projects

### 3.1 Create or import project

**Tip:** We recommend creating projects before the survey since some coordinate systems require additional downloads in Emlid Flow.

This guide describes how to create or import a project in Emlid Flow to survey.

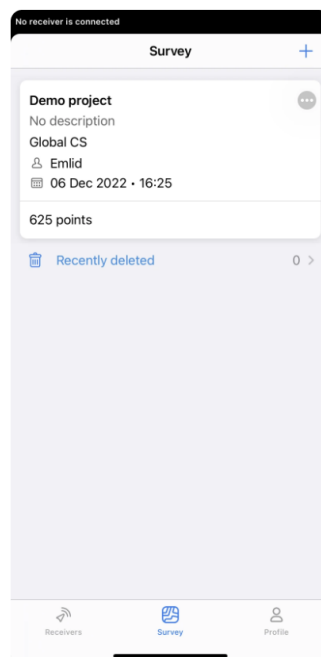
#### 3.1.1 Overview

Projects are a way to group and operate your survey data. Using projects, you can collect and stake out data in the preferred coordinate system. Projects can be linked with a code library to help you manage survey data later in the post-processing.

#### 3.1.2 Creating project

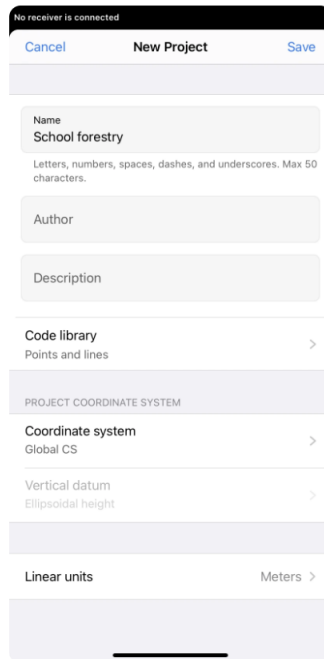
To create a project in Emlid Flow, follow the steps below:

1. Open Emlid Flow and go to the *Survey tab*.



2. Tap the *Plus button* in the top right corner to open the *New project* screen and fill in your project info.





3. With the Survey subscription plan, you can link a code library to your project to work with lines and codes.

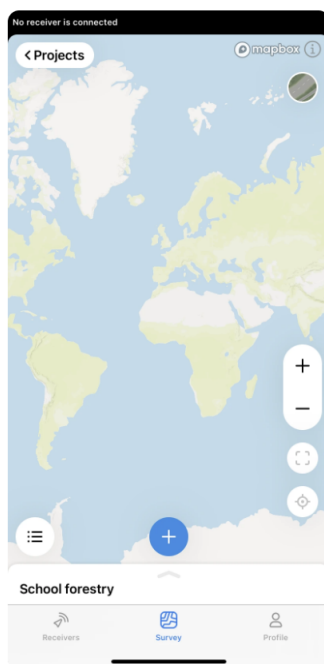
**Note:** You can specify the linked code library only when creating a project.

4. Specify the coordinate system you want to work in.

**Tip:** Check the [Introduction to coordinate systems](#) to learn more.

5. Choose the units of your project in the *Linear units* section.

6. Tap *Save*. Emlid Flow will open the project.



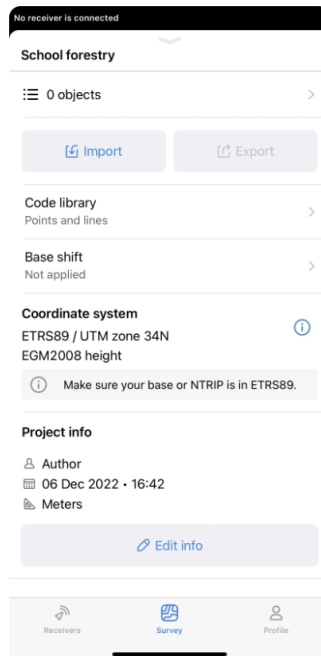
Once the project is created, you can start working with survey tools in Emlid Flow.

### 3.1.3 Importing project data

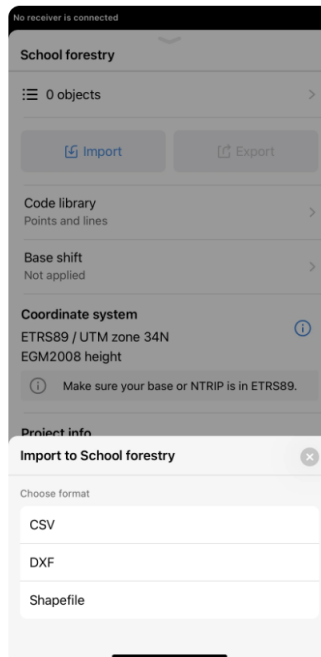
To import the project, follow the steps below:

1. Swipe up the project drawer and tap the *Import* button.

**Tip:** You can also import the project from the Survey tab by tapping the 3 dots in the top right corner.



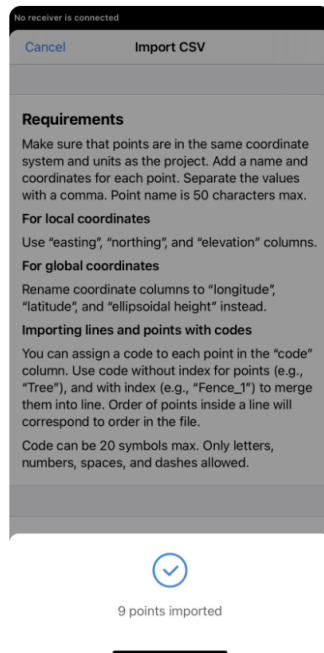
2. Choose the import format.



3. Choose the project file.

**Note:** Emlid Flow supports projects only with points and lines. Lines support is included only in the subscription plan.

4. Wait until Emlid Flow finishes importing the project. Once the project is imported, you will see the confirmation sign.



Now all the objects are imported to your project.

## 4 Work with coordinate systems

### 4.1 Introduction to coordinate systems

**Note:** *You can specify the coordinate system only when creating a project.*

When creating a project, you need to set up the coordinate system (CS). When it comes to choosing a required coordinate system for your project, you should make the decision based on the area you want to work in: for each region, there is a local coordinate system optimized for this specific area.

You can set up the CS for your project as follows:

- **Choose from the library.** Emlid Flow and contains the verified registry of local CS for specific countries. All you need is to find your country from the registry and apply it to your project.
- **Apply global CS.** This option is used to get started with the Emlid Flow app and quick tests in the field. This CS allows working with geographic coordinates—latitude, longitude, and ellipsoidal height.
- **Use custom CS.** If you know the projection parameters and the required system is not supported in Emlid Flow and Emlid Flow 360, you can add your own CS.

### 4.2 Set up coordinate system from library

**Tip:** *We recommend setting up the projects indoors before the survey as some coordinate systems require additional downloads in Emlid Flow.*

This guide shows how to set up a coordinate system for your project in Emlid Flow.

#### 4.2.1 Overview

**Caution:** *You can only configure the coordinate system while creating a new project.*

Emlid Flow contains a library of ready-to-use local coordinate systems and vertical datums for specific countries. If you need additional information on the coordinate system in your country.

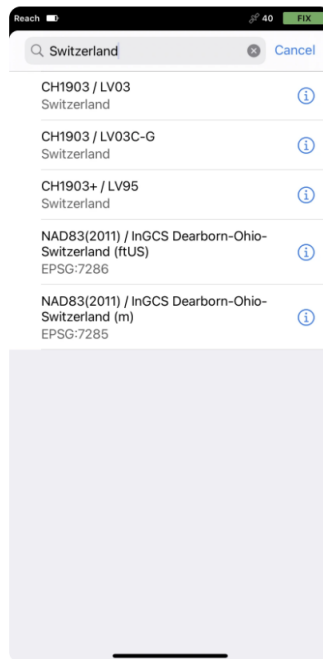
To show you all the steps, we will walk you through the example of configuring a coordinate system for Switzerland.

#### 4.2.2 Setting up coordinate system

While creating a project, follow the steps below:

1. On the *New project* screen, tap *Coordinate system*.
2. Search the required coordinate system by its name, country, or code.

We enter Switzerland and pick CH1903 / LV03.

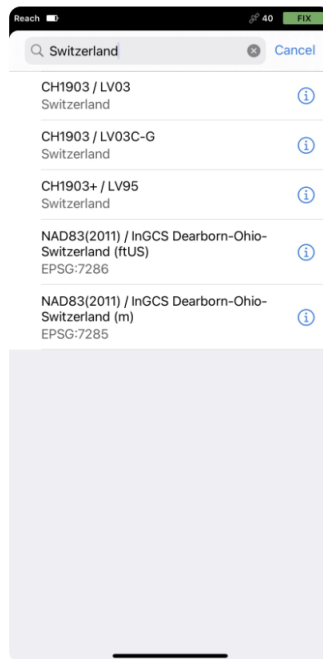


**Tip:** To learn more about the suggested coordinate system, tap the info icon next to the system. Depending on the chosen coordinate system, the screen can contain the following information:

- Datum and its reference ellipsoid with parameters
- Global datum and its reference ellipsoid with parameters
- Projection type and its parameters
- Transformation type and its parameters

3. Once you've selected the coordinate system, go to the Vertical datum section. The app will show you available vertical datums and corresponding geoids. Choose the one you need.

We select LHN95 height.



**Tip:** Make sure that the coordinate system of your project and the base or NTRIP you use are in the required datum. You can find the required datum for your country in the countries list. You can also find this information in your project in Emlid Flow.

You can continue creating the project for survey.

## 4.3 Set up custom coordinate system

**Tip:** We recommend setting up the projects indoors before the survey as some coordinate systems require additional downloads in Emlid Flow.

This guide describes how to set up a custom coordinate system in Emlid Flow if you cannot find the required one and know its parameters.

### 4.3.1 Overview

**Note:** You can only configure the coordinate system while creating a new project.

To configure the custom coordinate system, you can use 4 different properties:

- Ellipsoid your datum is based on
- Projection type and its parameters
- Transformation type and its parameters
- Geoid model

**Note:** Since not every group of parameters is required for a coordinate system configuration, you may omit some of them and only use the parameters that you have for your projection.

- If the projection is based on the same datum as the base, skip the transformation step.
- If you decide to work with ellipsoidal height, don't select the geoid model.

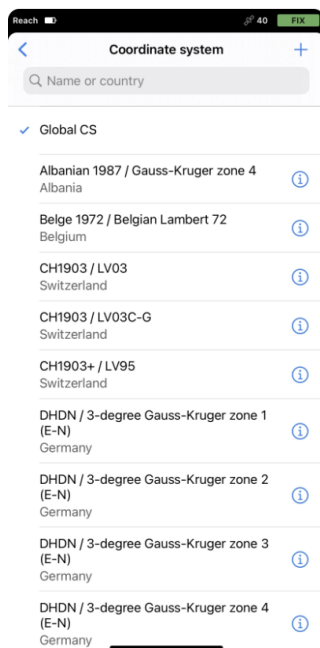
**Tip:** On some Android devices, default keyboards do not provide a minus sign. To get access to it, we recommend downloading *Gboard*, a virtual keyboard app, from the Google Play Store.

To show you all the steps, we will walk you through the example of transformation from the GDA2020 datum to GDA94, performing MGA zone 51 projection, and applying the AUSgeoid2020 geoid model to the GDA2020 datum.

### 4.3.2 Creating Custom CS

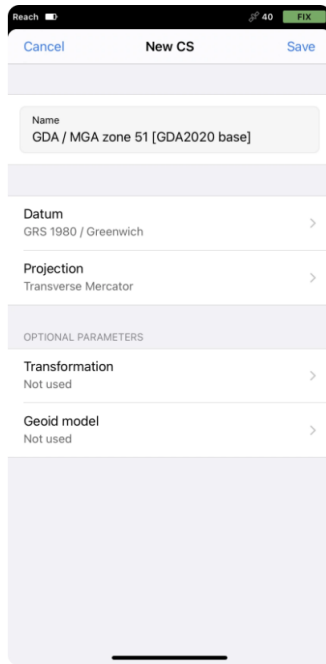
When picking a coordinate system for your project, follow the steps below:

1. Tap the *Coordinate system* section.



2. To create a custom coordinate system, tap the *Plus* button in the top right corner.
3. Enter the name of your custom coordinate system. Using this name, you will be able to find it in the list of coordinate systems later on.

We name the coordinate system **GDA94 / MGA zone 51 [GDA2020 base]**.

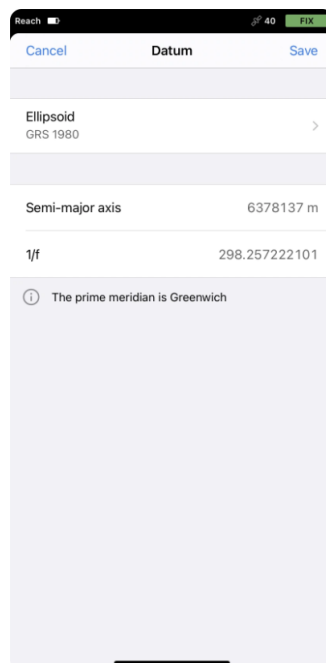


### 4.3.3 Specifying ellipsoid for datum

**Note:** *This step is mandatory.*

In this section, we set up the ellipsoid the datum is based on. By default, the GRS 1980 ellipsoid is selected. To change it, perform the following steps:

1. Go to the *Datum* screen.
2. Tap the *Ellipsoid* cell and choose the required ellipsoid from the list. It will update the Semi-major axis and  $1/f$  parameters accordingly.



The GDA94 datum uses the GRS 1980 ellipsoid, so we leave it as is.

3. Tap *Save* to apply changes.

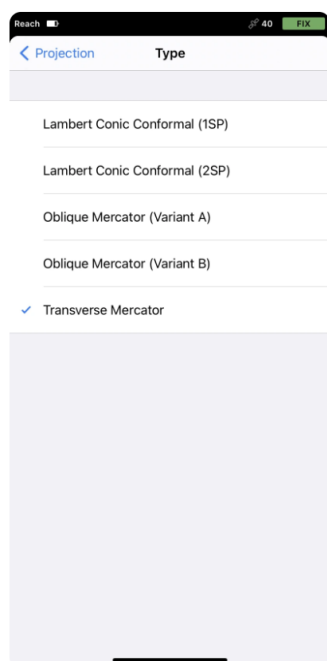


**Note:** If the required datum is missing, contact us at [support@emlid.com](mailto:support@emlid.com).

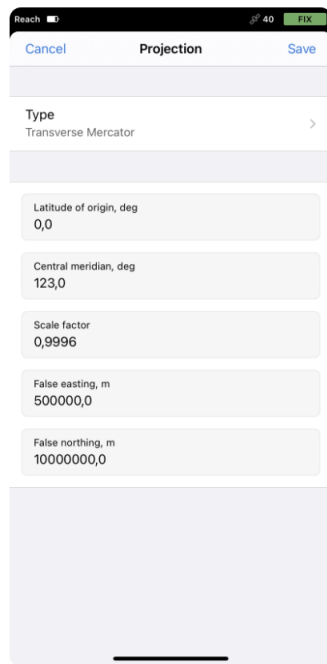
#### 4.3.4 Applying projection

1. Go to the *Projection* screen.
2. Choose the required projection type:
  - Lambert Conic Conformal (1SP)
  - Lambert Conic Conformal (2SP)
  - Oblique Mercator (Variant A)
  - Oblique Mercator (Variant B)
  - Transverse Mercator

We perform the Transverse Mercator projection.



3. Enter the projection parameters.



4. Save changes.

#### 4.3.5 Specifying transformation parameters

**Note:** You need to configure this option only if your coordinate system uses a datum that differs from the base's one.

1. Go to the *Transformation* screen and turn it on.



2. Choose the required transformation type: Helmert or Molodensky-Badekas. We need the Helmert transformation to go from GDA2020 to GDA94 datum.

- Fill in the transformation parameters: there are 7 of them for the Helmert transformation and 10 for Molodensky-Badekas.

**Tip:** The app can also perform transformations with only 3, 4, and 6 parameters. You can type in the parameters you have and leave the others empty.

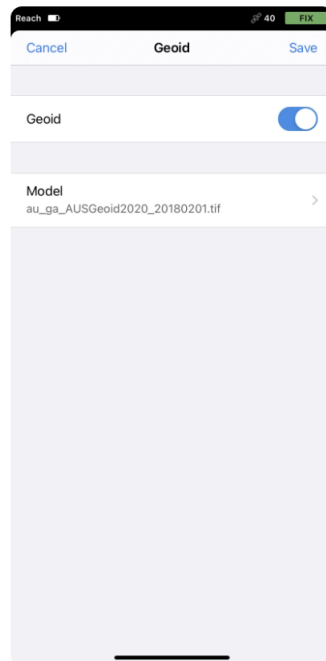
- Save changes.

#### 4.3.6 Choosing geoid model

**Note:** Apply the geoid model to your custom coordinate system only if you require orthometric height for your project. Emlid Flow applies geoid correction to the datum the base works with, so make sure to choose the appropriate one.

- Go to the *Geoid* screen and turn it on.

2. Tap on Model and select the appropriate geoid file. The app will suggest you to download the geoid model if you have not done it earlier.
3. We select the AUSgeoid2020 that is meant to be used for coordinates in GDA2020.

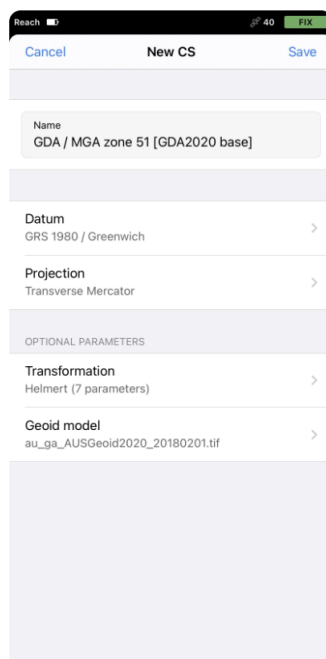


Once the geoid is downloaded, tap *Save*.

### 4.3.7 Saving custom CS

Once everything is configured, tap *Save* on the *New CS* screen to save the coordinate system. From now on, your custom coordinate system is saved to your Emlid account and synced among all your devices.

**Tip:** *You can find your custom coordinate systems later while configuring new projects.*



You can continue creating the project for survey.

# 5 Surveying with Emlid Flow

## 5.1 Collect points

This guide shows how to collect points to store their positions in a project using Emlid Flow.

### 5.1.1 Overview

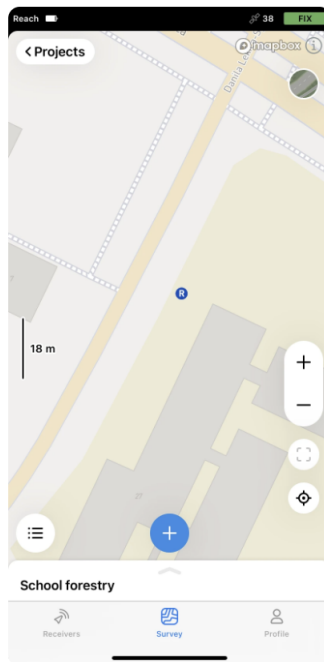
Collector is a survey tool in Emlid Flow that allows making project-based points collection. Using the Collector tool, you can place GCPs on-site, conduct site boundaries measurement or store points' positions in a project to use the data in GIS software later.

### 5.1.2 Collecting points

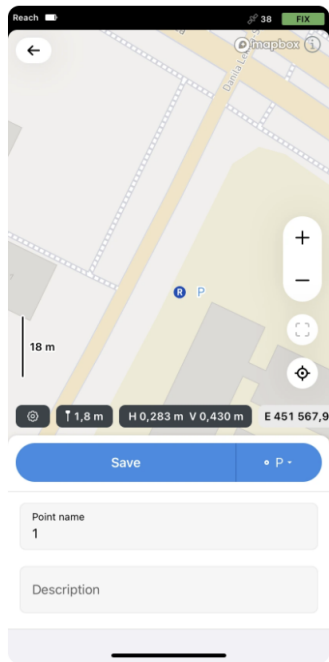
To collect a point using Emlid Flow, follow the steps below:

1. Open Emlid Flow and connect to your Reach.
2. Go to the *Survey tab* and open or create a project.

**Tip:** To learn how to create a project, check the [Create or import project guide](#).

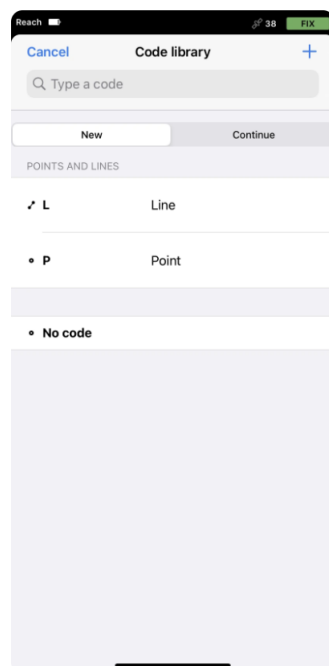


3. Tap the *Plus* button to open the *Collector* menu.

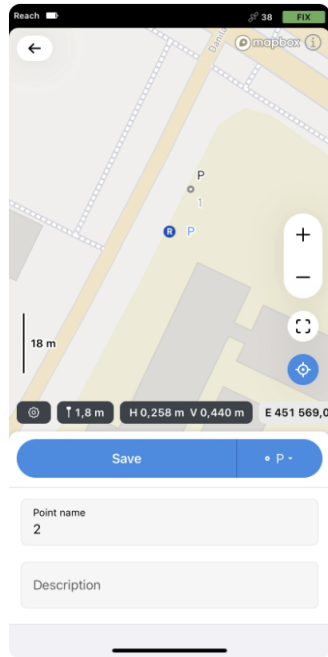


**Note:** The Collector menu has the following survey settings:

- Pole height. By default, this parameter is set to 1.8 m.
- Precision control. You can set your receiver to collect data only when your Reach has the FIX solution status.
- Data collection time. You can specify the time interval of data collection.
- With the subscription plan, you can select the survey code you want to use by tapping the Code selector button.



4. Collect the point. Once the process is over, the collected point will appear on the map.



You can continue measuring or saving the points to store their position in a project.

## 5.2 Stake out points

This guide shows how to stake out the points to find their actual ground position using Emlid Flow.

### 5.2.1 Overview

Stakeout is a survey tool in Emlid Flow that allows you to set out the project or find the actual ground position of a point.

### 5.2.2 Staking out points

**Note:** *The map is always North-oriented.*

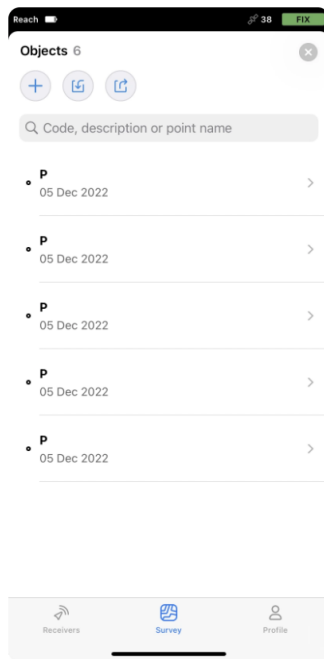
To stake out a point using Emlid Flow, follow the steps below:

1. Open the Emlid Flow app and connect to your Reach.
2. Go to the *Survey* tab and open or import a project.

**Tip:** *To learn how to create a project, check the [Create or import project guide](#).*

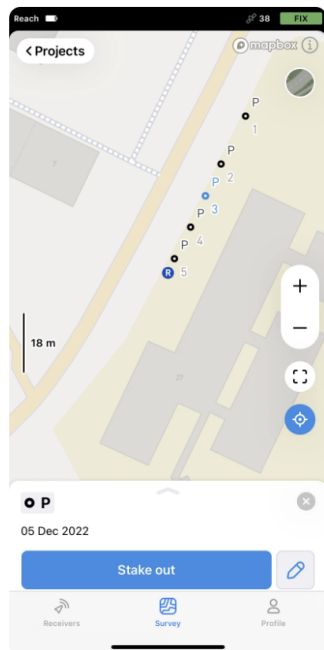
3. Tap the *List* button to choose the point you want to stake out. You can also select the point directly on the map.





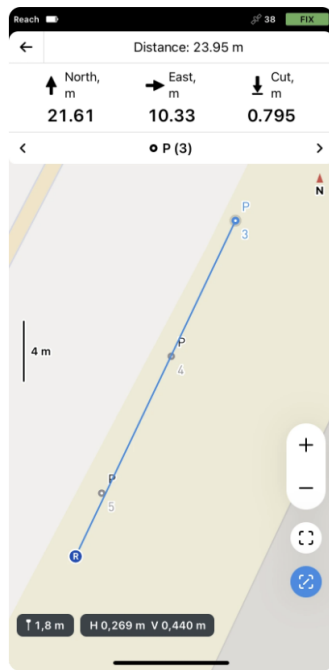
**Tip:** *The selected point will be highlighted in blue on the map.*

4. Tap the *Stake out* button.



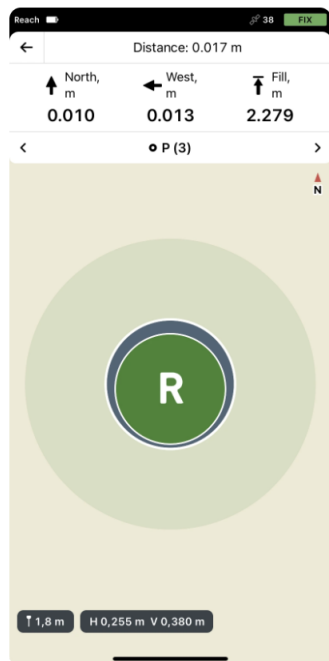
5. Move your Reach in the direction of the point. When you get closer, the map zooms in automatically.

**Note:** *The direction arrows on the stakeout plate can help you navigate to the point.*



6. Move your Reach so that the bull's-eye turns green, showing that your Reach is less than 2.5 cm (0.08 ft) away from the point you are staking out.

**Note:** *Ensure the pole isn't tilted.*



7. Physically mark the point's position on the ground.

8. Switch to another point by tapping the arrow buttons in the *Stakeout* navigation area.

**Tip:** *To finish staking out the point, close the Stakeout option window.*

You can continue staking out the points from the project.

## 5.3 Apply base shift

This guide explains how to apply the base shift in Emlid Flow to calibrate all further collected data in your survey project.

### 5.3.1 Overview

With the Base shift feature, Emlid Flow helps you calibrate your survey project data based on one point—it applies an XYZ shift to the base's ECEF coordinates in real time. The app calculates the difference between the known and measured points and applies a linear shift to all further collected points within one project.

Base shift can be applied independently of the used coordinate system—you can apply it to survey projects in local coordinate systems, for example, in UTM.

The Base shift feature helps you calibrate the survey data when there is a difference between the known and current base coordinates. You may need this in the following cases:

- When it is impractical to place your base over a permanent survey mark (PSM). For example, you cannot provide a clear sky view in this area, which may compromise the quality of the base logs.
- When you exceed the baseline and need to relocate your base.

**Note:** *The calculated shift is stored in the attributes of a particular survey project, applies to all further collected points, and cannot be auto-applied to another project.*

### 5.3.2 Calibrate your base's position relative to a PSM

This workflow describes the case when you want to survey the field using a permanent survey mark located in a hard-to-reach place. It is not convenient to install a tripod in this area or leave the base unattended. Or it is just simply a limited sky view that may compromise the quality of base logs. Here, the Base shift feature comes in handy—you can place your base in proper conditions nearby the permanent survey mark, collect the permanent survey mark with a rover and calibrate all further collected data in your survey project relative to it.

In this case, all you need is two points in the project:

- A known point, which is the PSM you want to calibrate with.
- A measured point, which is the same PSM collected with a rover in the field.

To calculate and apply base shift to your survey project data, follow the steps below:

1. Place your base and average its position in SINGLE.

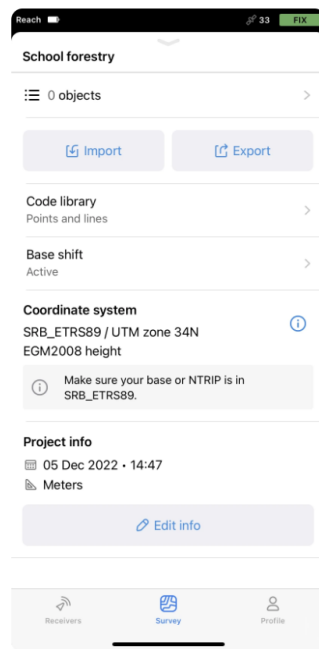
**Tip:** *Learn more about base placement in the [Placement](#) and [Placing the base](#) guides.*

2. Configure RTK communication between the base and the rover and wait for FIX.

**Tip:** *To learn more, check the following guides:*

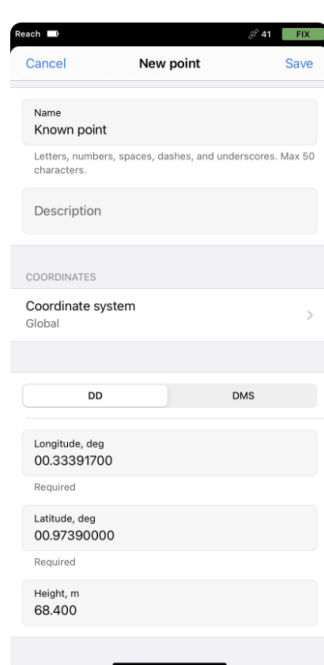
- [Reach RS2/RS2+ RTK quickstart](#)
- [Reach RS/RS+ RTK quickstart](#)
- [Reach M2/M+ RTK quickstart](#)
- [Reach RX quickstart](#)

### 3. Create a survey project in Emlid Flow.

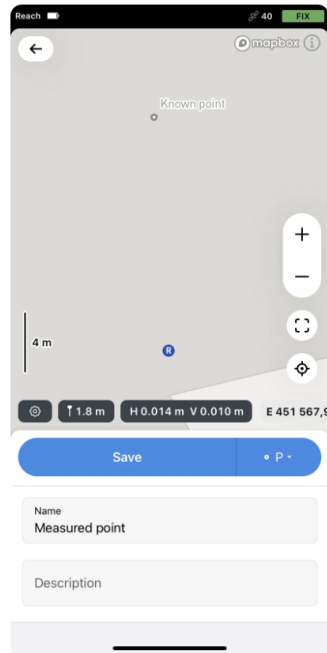


### 4. Manually add a point with coordinates of your PSM and save it. This will be a known point.

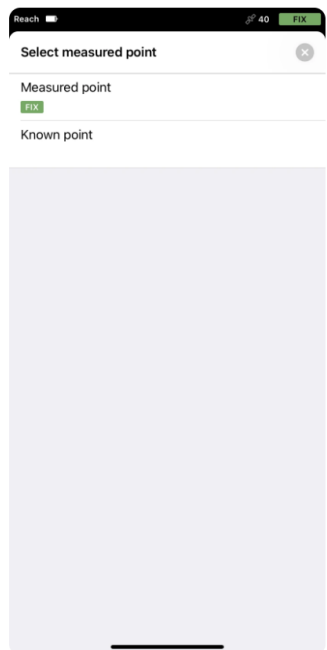
**Note:** You can also do it later on the Base shift screen, tap Add a point and fill in the coordinates of your PSM.



### 5. Place the rover over the PSM and collect it. This will be a measured point.



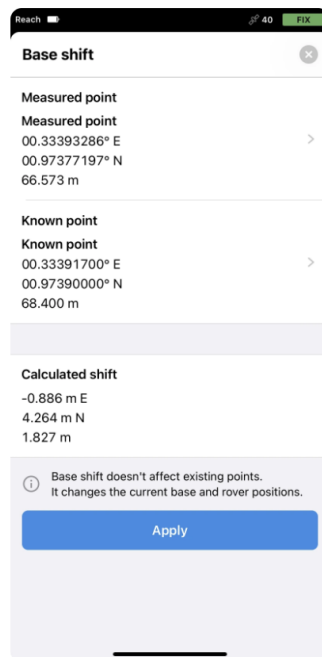
6. Swipe up the project drawer and tap *Base shift*.
7. Tap *Measured point*.
8. Select the point that you collected. We called it 'Measured point'.



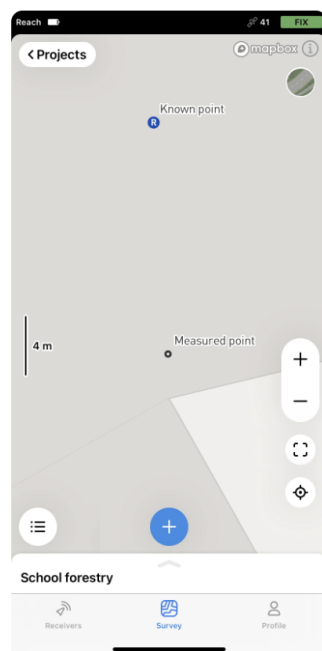
9. Tap *Known point*.
10. Select the point with the PSM coordinates. We called it 'Known point'. After that, the app will calculate the shift.

**Note:** *If you did not add a known point in advance, tap Add a point and fill in the coordinates of your PSM.*

11. Tap the *Apply* button to activate the shift.



When the shift is applied, you'll see that it's active in the project's overview, and the rover icon on the map appears shifted.



Right from this moment, Emlid Flow starts applying base shift to all the points you collect further. In our case, it means that all points collected after base shift will be positioned exactly relative to the permanent survey mark.

## 5.4 Collect lines

This guide shows how to collect points to store their positions in a project using Emlid Flow.

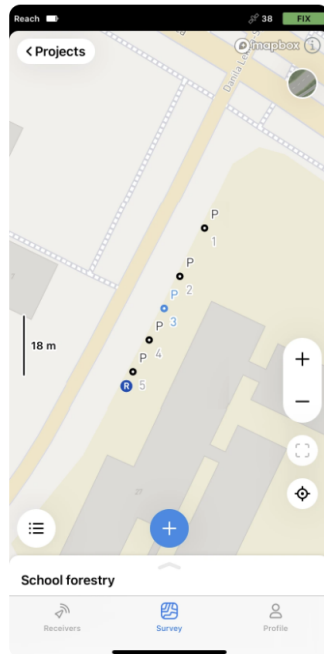
## 5.4.1 Overview

Collector in Emlid Flow allows creating linework with as many points as you want. With linework, you can measure linear objects like fences, roads, and pavements, and store their positions in a project for further in GIS software.

## 5.4.2 Collecting lines

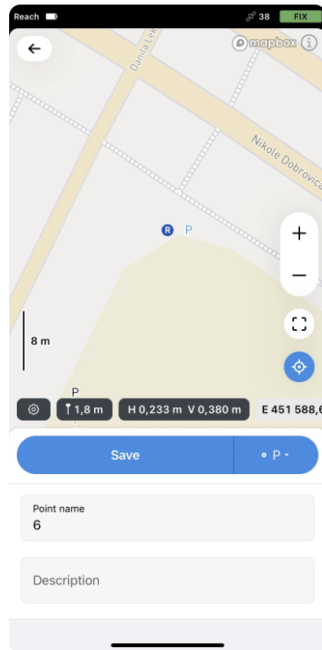
To collect lines using Emlid Flow, follow the steps below:

1. Open Emlid Flow and connect to your Reach.
2. Go to the *Survey* tab and open or create a project.



**Tip:** To learn how to create a project, check the [Create or import project guide](#).

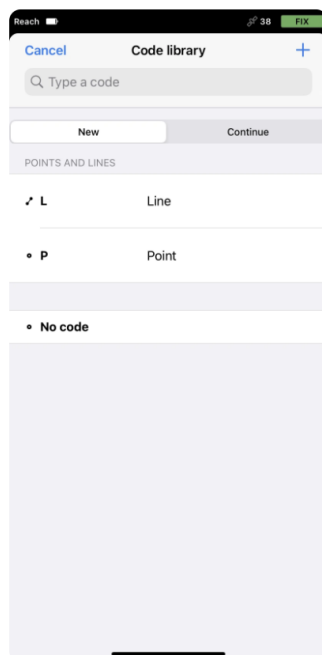
3. Tap the *Plus* button to open the *Collector* menu.



**Note:** *The Collector menu has the following survey settings:*

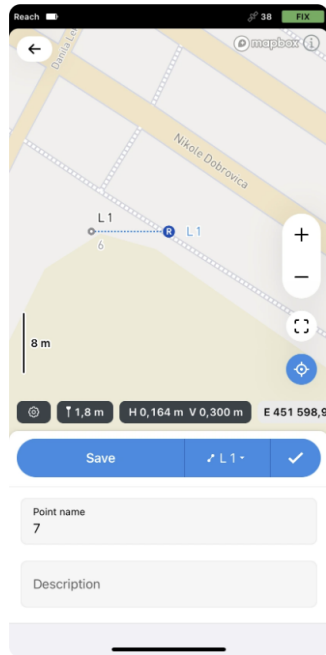
- *Pole height. By default, this parameter is set to 1.8 m.*
- *Precision control. You can set your receiver to collect data only when your Reach has the FIX solution status.*
- *Data collection time. You can specify the time interval of data collection.*

4. Tap the Code selector button and select the Line survey code.



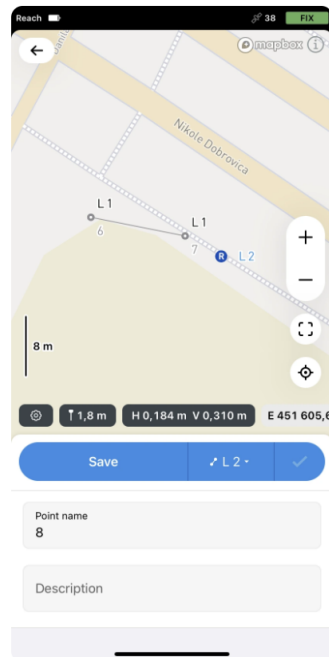
5. Collect the first point of a line.



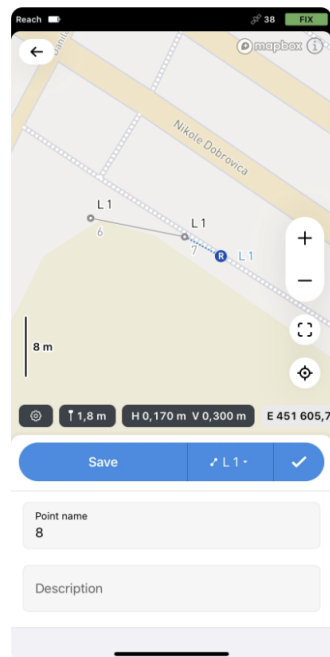


6. Go to the second point of the line and collect it. Once there are at least 2 points, the app will connect them with a line.

**Tip:** You can collect as many points as you want in a single line.



7. Tap the *Check* button to finish collecting the line.



You can continue collecting lines to store their positions in the project.

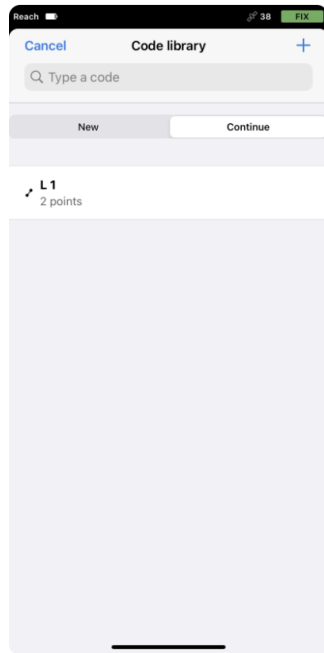
### 5.4.3 Continuing existing lines

Every line in your project can be continued after it was collected in the following way:

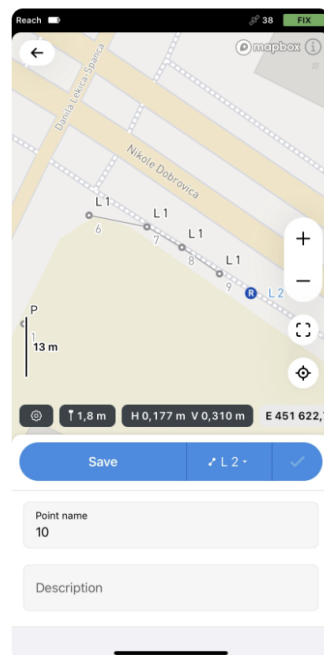
1. On the *Project view* screen, tap the *Plus* button to open the Collector menu.



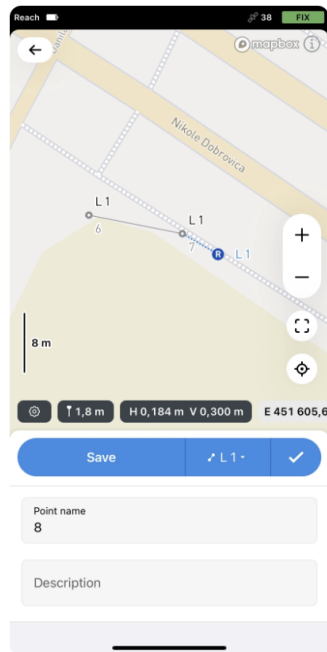
2. Tap the *Code selector* button and switch to the *Continue* tab.



3. Select the line you want to continue. The app will bring you back to the *Collector* menu with the line's code selected.



4. Collect additional points of the line. To finish collecting the line, tap the *Check* button.



You can now move to the next line you want to continue or proceed to collect new lines to store their positions in the project.

## 5.5 Stake out lines

This guide shows how to stake out lines to find their actual ground position using Emlid Flow.

### 5.5.1 Overview

Stakeout is a survey tool in Emlid Flow that allows you to find the actual ground position of the objects from your project. Using the Stakeout tool, you can do the following:

- Transfer linear objects from the layout plan to the ground
- Mark linear objects with an offset
- Mark linear objects with a chainage

### 5.5.2 Staking out lines

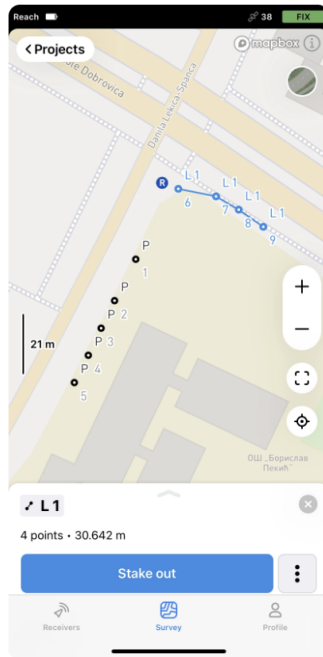
**Note:** *The map is always North-oriented.*

To stake out a line using Emlid Flow, follow the steps below:

1. Open the Emlid Flow app and connect to your Reach.
2. Go to the *Survey* tab and open or import a project.

**Tip:** *To learn how to import a project, check the [Create or import project guide](#).*

3. Select the line you want to stake out.



**Tip:** The selected line will be highlighted in blue on the map.

4. Tap the *Stake out* button.

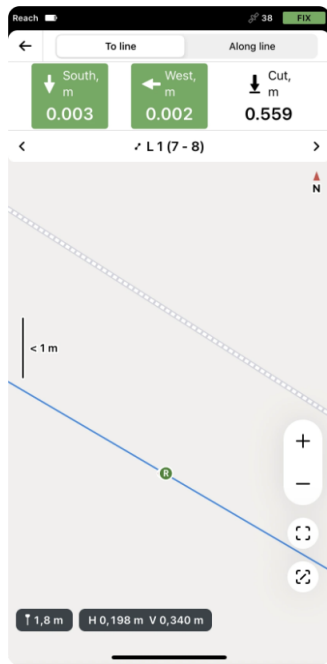
**Note:** If you're staking out a line with more than one segment, the Stakeout tool will start from the first collected segment.

You can stake out lines in several ways. Choose the way below and continue staking out the line:

### 5.5.3 Along the line

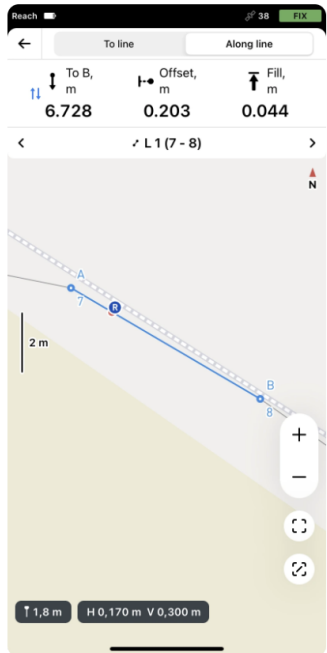
You can navigate to the line and see if it's set out according to the project.

1. Move your Reach so that the navigation sections turn green, showing that your Reach is less than 2.5 cm (0.08 ft) away from the line you are staking out.

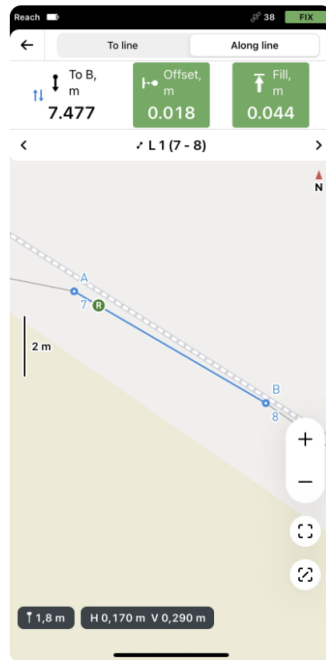


**Note:** Ensure the pole isn't tilted.

2. Switch to the *Along line* mode.



3. Watching the *Offset* plate, check if the line is set out according to the project.

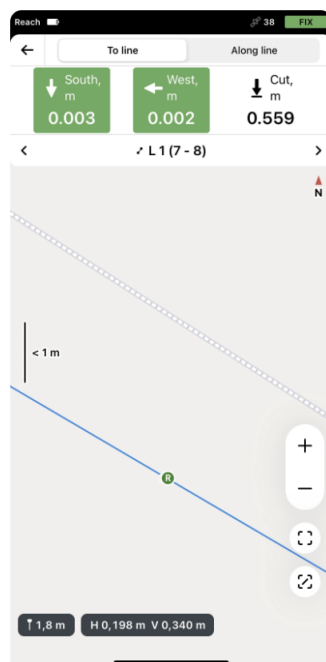


4. Switch to another segment you want to stake out. To finish staking out the line, close the *Stakeout* option window.

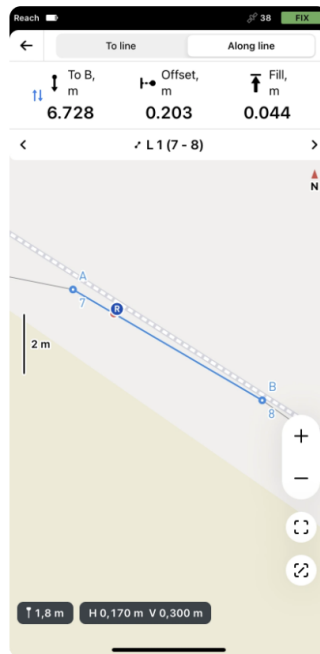
#### 5.5.4 With a chainage

This way, you can stake out the line with a chainage to set out fence posts with a required distance between them.

1. Navigate to the line.



2. Switch to the *Along line* mode.

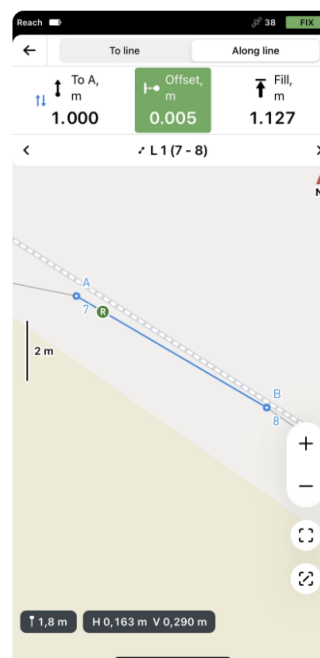


3. Tap the *To B* section to select from which end of the line or segment the chainage is calculated.

4. Watch the *Stakeout* plate in the app and mark the points with the required interval.

**Tip:** Use the *Offset* plate to check if you're on the line.

**Note:** Ensure the pole isn't tilted.



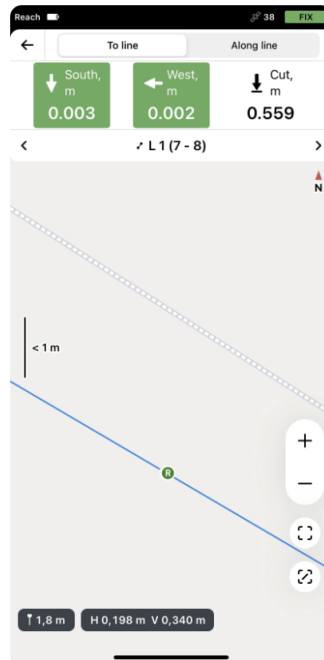
5. Switch to another segment you want to stake out. To finish staking out the line, close the *Stakeout* option window.



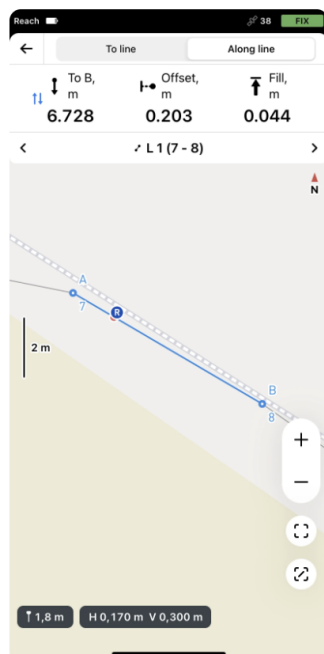
### 5.5.5 With an offset

You can use this way to set out a road or pavement. Simply stake out the road axis and then use stakeout with a 2D offset to mark road edges.

1. Navigate to the line.

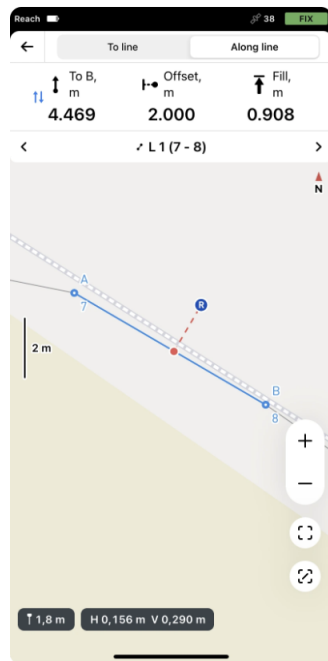


2. Switch to the *Along line* mode.



3. Move your Reach to the line so that it has the required offset. When you get closer, the map zooms in automatically.

**Note:** Ensure the pole isn't tilted.



4. Mark the line with the required offset on the ground.
5. Switch to another segment you want to stake out. To finish staking out the line, close the *Stakeout option* window.

Once you finished staking out the line, close the *Stakeout* tool and select the next line you want to stake out.

## 5.6 Working with codes

This guide describes how to work with survey codes to ease your work with survey projects in third-party GIS software.

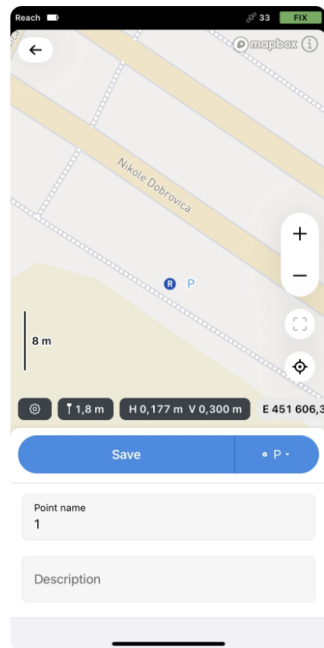
### 5.6.1 Overview

Emlid Flow allows you to survey with 2 types of code geometry: point and line. Point codes are used to collect single-standing objects like trees and road signs. Line codes are used to collect linear objects such as fences and walls.

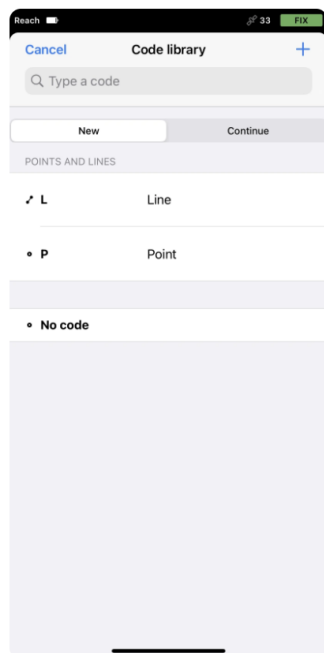
### 5.6.2 Surveying with codes

The typical workflow of surveying with codes in Emlid Flow is the following:

1. In your project, open the *Collector* menu.



2. Tap the *Code selector* button to open the *Code library* screen. Here you can see the list of codes linked to your project.



3. Select the code you need.
4. Start data collection.

**Tip:** For a more detailed workflow, check the *collect points and collect lines guides*.

### 5.6.3 Creating codes on the go in Emlid Flow

Sometimes, there might be a situation when a code library doesn't have the required code. Emlid Flow allows you to create survey codes in the field.

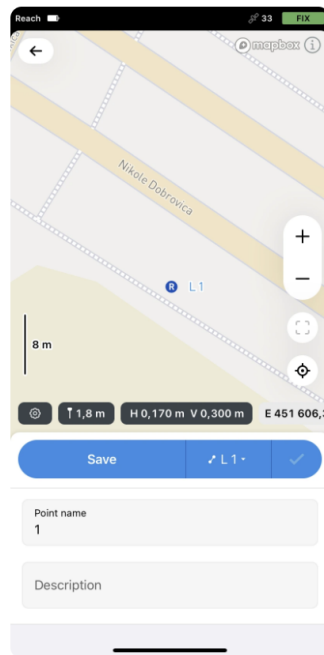
**Note:** Codes created on the go are stored only in the project in which they were created.

To create a survey code on the go in Emlid Flow, follow the steps below:

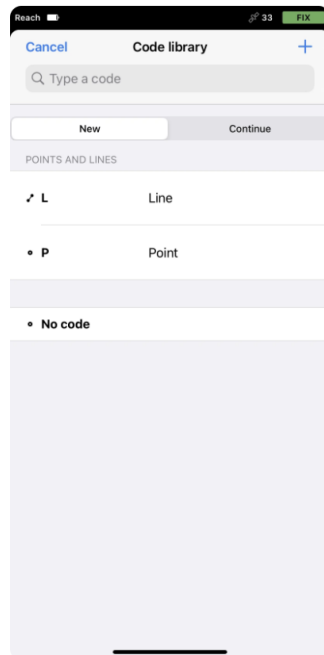
1. Open Emlid Flow and connect to your Reach.
2. Open or create a project.

**Tip:** To learn how to create a project, check the [Create or import project guide](#).

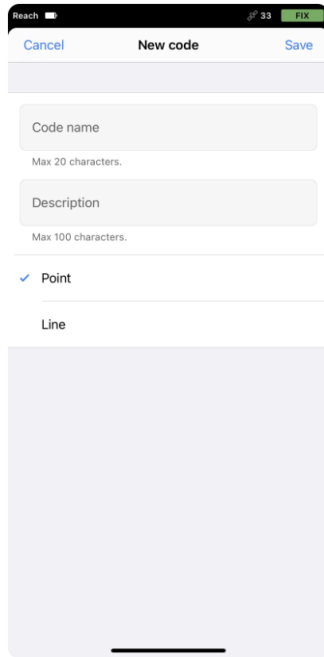
3. In *Collector*, tap the *Code selector* button.



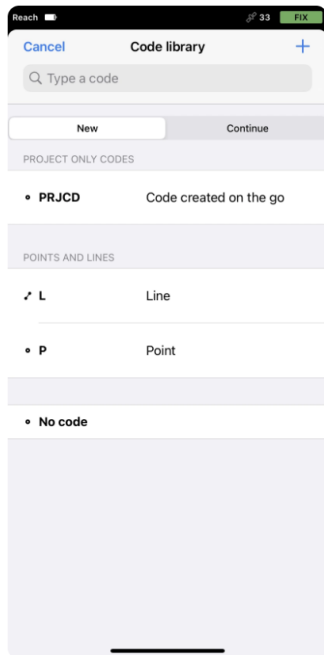
4. Tap the *Plus* button in the top right corner.



5. Fill in the fields and select code geometry type. Tap *Save*.



6. The created code will appear in your code library.



You can continue creating codes on the go in Emlid Flow and continue your survey.

## 5.7 Working with layers

This guide describes how to work with WMS layers in Emlid Flow to get visual control and context of your survey area in the project.

### 5.7.1 Overview

Emlid Flow allows you to survey with WMS layers added to the project to get visual control and context of your survey area.

To use WMS layers, you need to add them to the project in Emlid Flow 360 first and then open this project in Emlid Flow using the same Emlid Account you log in to Emlid Flow 360.

**Note:** You can add layers to the project only in Emlid Flow 360. Learn more about adding layers in the [Create WMS layers library and Add WMS layers to project guides](#).

### 5.7.2 Workflow

**Note:** Make sure you log in to the same Emlid Account you use in Emlid Flow 360.

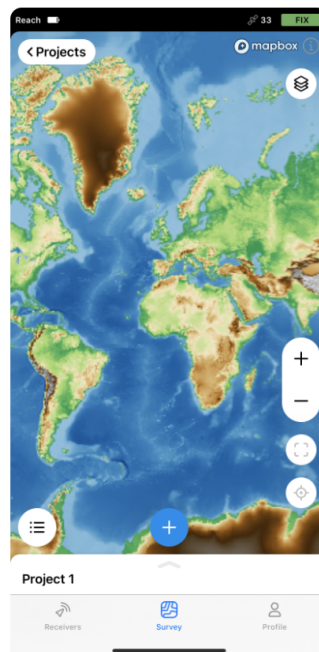
**Note:** To work with WMS layers in Emlid Flow, your smartphone or tablet should have an intermittent internet access.

### 5.7.3 Access project with layers

**Tip:** Tap the Map layers button to switch between vector and satellite map types.

Access your project with added WMS layers in Emlid Flow as follows:

1. Open Emlid Flow and go to the *Profile* tab.
2. Tap Emlid Account and log in using the Emlid Account you use for Emlid Flow 360.
3. Go to the *Survey* tab and open the project with added layers.



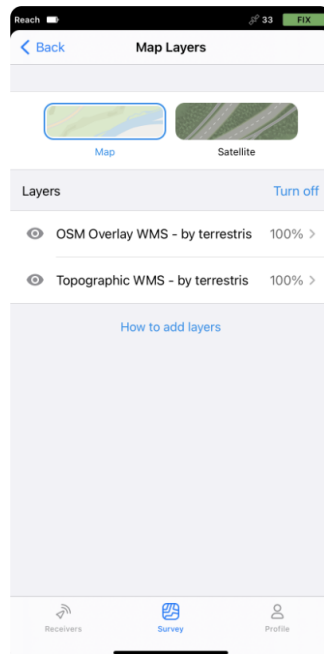
The project will open with already applied layers. If necessary, you can change their visibility and opacity on the map.

## 5.7.4 Change layers' visibility and opacity

**Tip:** By default, map type, layers order, visibility, and opacity are imported from Emlid Flow 360.

You can change layers' visibility and opacity on the map as follows:

1. On the *Project view* screen in the top right corner, tap the *Layers* button. The *Map layers* screen with the layers settings will open.



2. To hide a layer, tap the eye icon near the layer's name.

**Tip:** You can hide all layers on the map at once using the *Turn off* button. To bring them back to the map, tap *Turn on*.

3. To change the layer's opacity, tap the arrow icon near the layer's name. The *Opacity settings* screen will open-change opacity as needed.



**Note:** *Changes will be applied only for the project in Emlid Flow.*



## 6 Export projects

This guide shows how to export project data from Emlid Flow for further use in third-party GIS software.

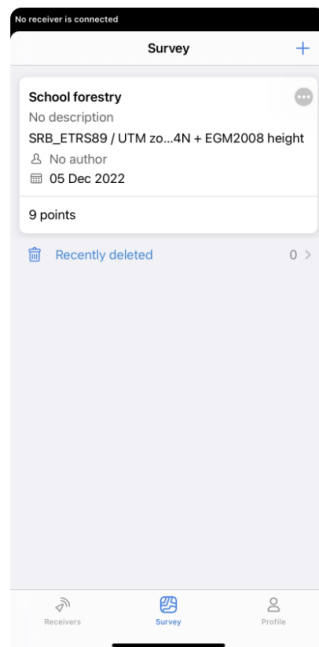
### 6.1 Overview

With Emlid Flow, you can export your projects CSV, DXF, or Shapefile to work with them in third-party GIS software.

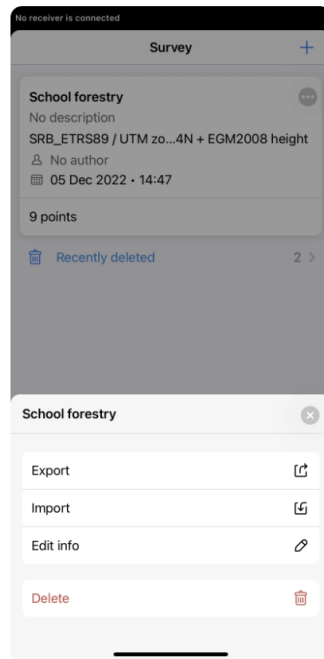
### 6.2 Exporting project

To export the project, follow the steps below:

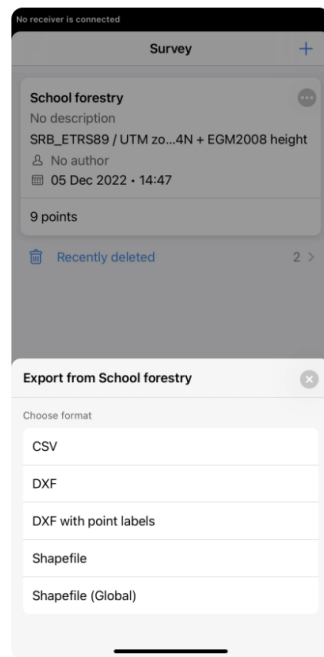
1. Open Emlid Flow and go to the *Survey* tab.



2. Find the project you want to export and tap the 3 dots button in the top right corner.
3. Tap *Export*.



4. Choose the format in which you want to export your project.



5. Wait until Emlid Flow finishes to export your project. Save the file depending on the device you use.

Now your project's data is ready for further use in third-party GIS software.

# 7 Account and subscription management

## 7.1 Account management

This guide describes how you can manage your Emlid account.

### 7.1.1 Overview

An Emlid Account is a free and simple way to synchronize your data from the Emlid Flow and Emlid Flow 360 apps across your mobile and desktop devices. Once you log in to your account, your data will be immediately backed up to the cloud and available on every device you use. Besides, with an Emlid Account, you can upgrade to the Survey subscription plan.

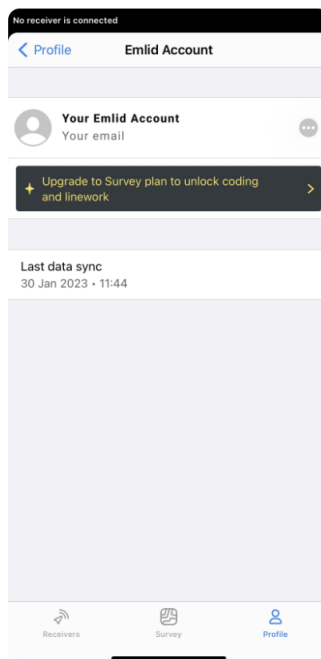
**Tip:** Learn more about the Survey subscription plan on the Emlid Flow and Emlid Flow 360 landing page.

### 7.1.2 Create account

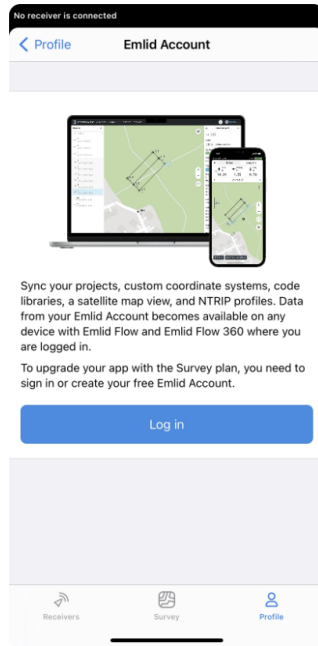
All you need to create an account is to enter your email and set a password. This will automatically create a profile that will store your projects, NTRIP profiles, and custom coordinate systems. Follow the steps below:

**Note:** You don't need to be connected to the receiver to create an account using Emlid Flow.

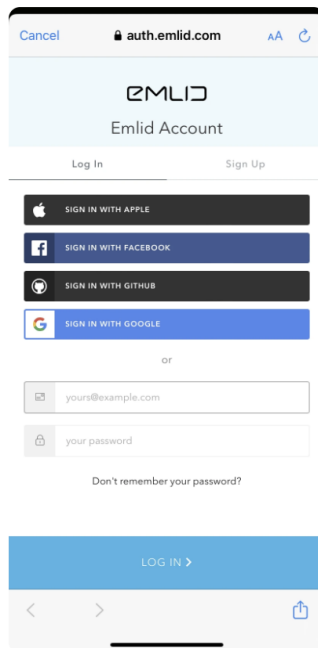
1. Open Emlid Flow and go to the *Profile tab*.



2. Tap *Emlid Account*.



3. Tap the *Log in* button. You will be redirected to the Emlid Account creation page.



4. To create an account, go to the *Sign Up* tab.

5. Type in your email and password in the corresponding fields.

6. Tap the *SIGN UP* button.

7. Verify your email address by following the on-screen instructions.

Once you create an Emlid account, log in to Emlid Flow or Emlid Flow 360 to enable data synchronization between all your devices.

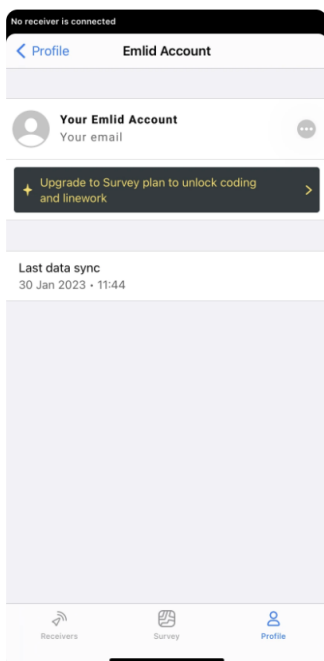
### 7.1.3 Delete account

**Caution:** *Deleting your Emlid account will erase all data stored in the account such as your projects, NTRIP profiles, and custom coordinate systems, but you will still be able to access the Emlid services.*

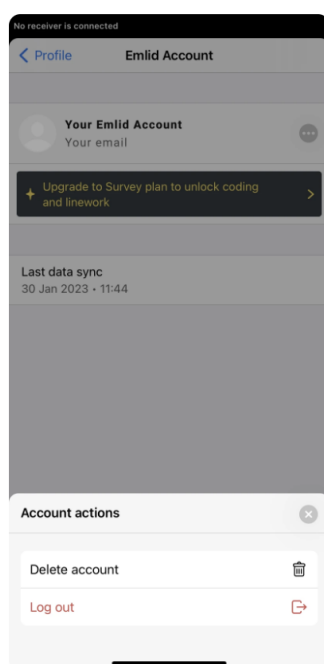
**Note:** *You can delete your Emlid Account only in Emlid Flow.*

To delete your Emlid account, complete the steps below:

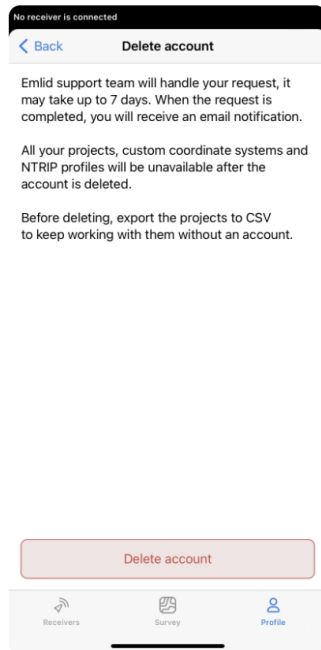
1. Open Emlid Flow and go to the *Profile* tab.



2. Tap the menu icon and then tap *Delete account*.



3. Get familiar with the account deletion conditions.



4. Tap *Delete account* again.

Within a short period of time after account deletion, you will receive an email confirming your account data has been successfully deleted.

## 7.2 Subscription management

This guide describes how you can manage your Survey subscription.

**Tip:** *You can manage your Survey subscription from both Emlid Flow and Emlid Flow 360.*

### 7.2.1 Overview

You can upgrade your Emlid Flow and Emlid Flow 360 apps to the Survey subscription. The upgrade requires an Emlid Account and offers two subscription plans based on monthly or yearly billing periods.

**Note:** *When subscribing for the first time, you will be offered a free 30-day trial.*

The subscription is multi-platform and features professional survey tools:

- coding,
- linework,
- and a satellite map.

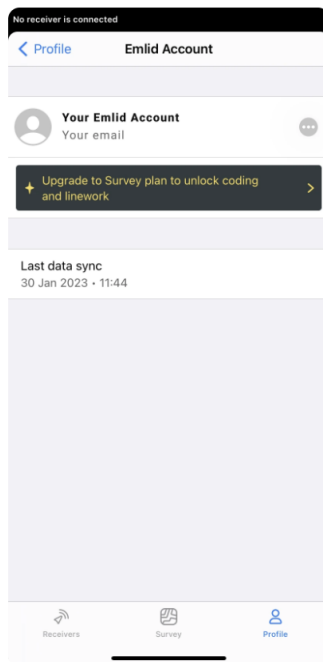
**Tip:** *Learn more about the Survey subscription plan on the Emlid Flow and Emlid Flow 360 landing page.*

### 7.2.2 Upgrade to Survey subscription

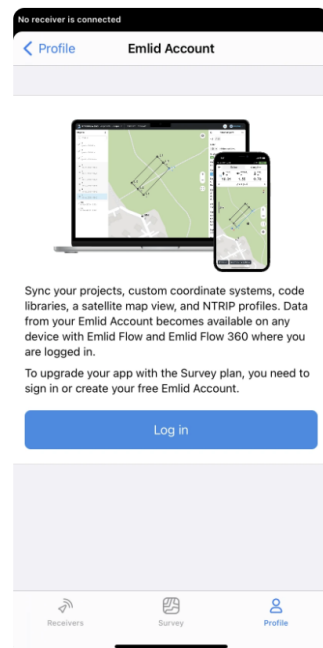
**Tip:** If you haven't created an Emlid Account yet, check our guide.

To upgrade to the Survey subscription, follow the steps below:

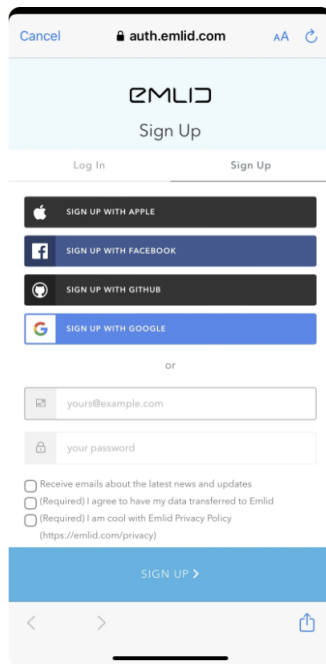
1. Open Emlid Flow and go to the *Profile* tab.



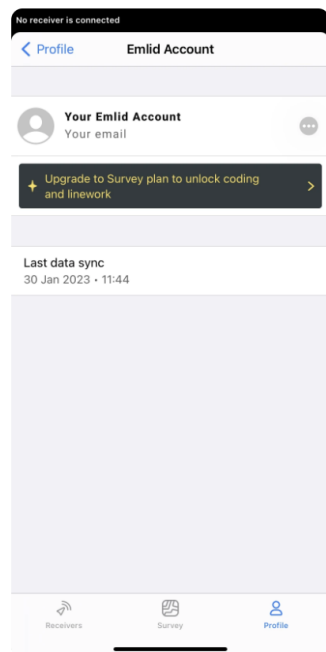
2. Tap *Emlid Account*.



3. Tap *Log in* and sign in to your Emlid Account.

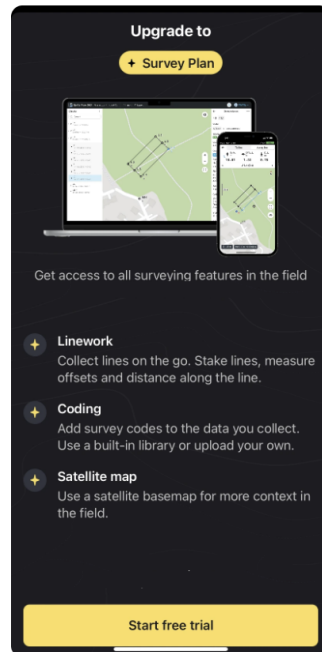


4. Tap the subscription plate.



5. Tap *Start a free trial* and follow the store's instructions depending on the mobile device platform you use.





**Note:** A free trial is 30 days. When the trial is over, the plan will be automatically renewed until cancelled. You can change the plan in the Subscription management settings depending on your mobile device's platform.

6. Go back to the Emlid Flow app.

Once you upgrade to the Survey subscription, you can start using the featured professional survey tools both in Emlid Flow and Emlid Flow 360.

### 7.2.3 Cancel Survey subscription

**Note:** You can unsubscribe only on the platform you started the subscription.

To cancel the Survey subscription, complete the following:

Follow the platform-specific instructions to cancel the Survey subscription.

Once you unsubscribe, code libraries, linework, and a satellite map will become unavailable for use. However, you still will be able to view created using the subscription projects with linework and codes and export them in any format.

If you need help, contact the Support team at [support@emlid.com](mailto:support@emlid.com).

### 7.2.4 Restart Survey subscription

**Note:** If you want to restart the subscription with active days left, you should go to the platform where it was activated at first.

If you cancelled the subscription and want to restart it, you can easily do it both in Emlid Flow and Emlid Flow 360 anytime you want.

To restart the subscription, follow the recommendations below:

**Note:** Make sure the device is logged in with the Google Play Store or App store account that was used for the original purchase.

**Note:** Make sure you logged in with the same Emlid account you used to subscribe initially.

Follow the platform-specific instructions to restart your Survey subscription.

Once you restart your subscription, code libraries, linework, and a satellite map will be again available for use.

If you need help, contact the Support team at [support@emlid.com](mailto:support@emlid.com).

## 8 Glossary

### **Absolute positioning**

Absolute positioning shows your actual global coordinates relative to the Earth's surface. Absolute positioning is a key to RTK surveys where you need absolute geographical accuracy (e.g, mapping, surveying the borders of the property, etc). In this case, your base absolute position is crucial for high accuracy results.

### **Accuracy**

Accuracy is the closeness of the measurements to a specific value. In surveying, accuracy refers to whether the coordinates you collected are true relative to the global coordinates. Not to be confused with Precision.

### **Age of differential**

Age of differential is the measure of how old are the corrections your receiver is getting. It is calculated by subtracting the time when the correction message has been generated from the current receiver time. The standard Age of Differential for RTK is normally 1-2 seconds.

### **Antenna Phase Center**

Antenna Phase Center could be referred to as the antenna's source of radiation. All GNSS measurements referred to the phase center. The phase center does not correspond to the physical center of the antenna and its real position depends on the direction of the coming radio signal. In addition, every band has its own phase center respectively.

### **Antenna Reference Point**

The antenna reference point is the center point on the bottom of the receiver. It is used for calculation of the antenna height.

### **AR ratio**

This is a result of the ratio test performed on the potential "Fix" solution, it shows how many times is the best solution better than the next one. If this number is more than 3, Reach will consider RTK solution Fixed.

This parameter corresponds to single-band Reach devices only (Reach RS/RS+, Reach Module/M+).

### **Base**

Base is one of the receivers that act as a reference station in RTK or PPK scenarios. It is a static unit with the determined coordinates that sends corrections to the moving unit or rover. If the base is set over the known point, it provides absolute accuracy.

### **Base Correction log**

This log contains the corrections from the base station in RTCM3 format.

## **Baseline**

Baseline is the distance between a rover and a base. If the baseline is bigger than recommended, the solution will be less accurate, the fix time will be longer or it won't be calculated at all.

## **BeiDou**

BeiDou is a Chinese navigation system. Back in 2000, BeiDou-1 was only covering China. Then, in 2012, BeiDou-2 began covering the Asia-Pacific region. Since 2015, BeiDou offers global coverage. We recommend using this system if you are located in the Asia-Pacific region.

## **Client mode**

The client mode means that Reach is connected to an external Wi-Fi network.

## **Continuous**

Continuous is a strategy for solving the ambiguities in RTK and PPK. In this case, ambiguities are resolved epoch by epoch. Less stable than Fix-and-Hold, but no risk of holding a false fix.

## **Coordinate system**

Coordinate system is a coordinate-based local, regional or global system used to locate geographical entities. A spatial reference system defines a specific map projection, as well as transformations between different spatial reference systems.

## **Correction input**

This is the part of the rover's settings that is responsible for configuring the acceptance of the corrections. Using the correction input configuration in the Emlid Flow app, you can choose the way your rover receives the corrections: via Serial, TCP, NTRIP, Bluetooth, or LoRa. Reach receivers support the correction input in RTCM3 format.

## **Corrections**

The corrections are the data that is used to eliminate ionospheric and tropospheric delays, and satellite clock errors. The static base transmits corrections to the moving rover in the RTK scenario.

## **CORS**

Continuously Operating Reference Stations or CORS network is the network of the static stations that provide exact GNSS data (carrier phase, code range, etc) and corrections as well. Surveyors can access this information to increase the accuracy of their post-processed survey data or to work in RTK on site.

## **Dilution of Precision or DOP**

Dilution of Precision or DOP is the term used to evaluate the geometrical position of the satellites relative to the receiver. When the satellites are too close to each other in the field of view, it means the satellite geometry is weak (a high DOP value). If the distance between the satellites is sufficient and they are allocated evenly and cover more space, the geometry is considered strong, therefore, the DOP value is low. The lower the DOP, the more accurate your data is. A good DOP value is considered to be below 2.

## **Elevation mask**

Elevation mask can be configured in RTK settings in the Emlid Flow app. Satellites lower than set elevation will be excluded from the computation. The default setting is 15 degrees.

Usually, satellites with a lower elevation provide too noisy measurements as the signal passes through the most atmosphere.

### **ENU**

One of the formats for Position Streaming available for Reach devices. Simple text protocol for East, North and UP components of the baseline as well as solution status.

### **ERB**

One of the formats for Position Streaming available for Reach devices. Used for communication to ArduPilot. ERB stands for Emlid Reach Binary protocol.

### **Fix-and-Hold**

Fix-and-Hold is a strategy for solving the ambiguities in RTK and PPK. After the first ambiguity fix holds them constrained. Fix is more stable but in case first initialization was not correct it will take longer to recover and initialize correctly. You can think of it as if Fix had inertia.

### **Full System report**

A full system report is a tool used to facilitate issues reports. It comes in ZIP archive, and contains system logs and technical details of your device as well as some sensitive information like your NTRIP credentials or network passwords. That is why we do not recommend sharing the report publicly. These are used to debug complicated cases in support.

### **Galileo**

Galileo is a European satellite navigation system. It first started operating in 2011 and now has global coverage.

### **Ground Control Point or GCP**

Ground Control Point is a point on a surface with known coordinates. The GCPs are actively used in aerial mapping and photogrammetry. The surveyors set GCPs over the area, mark them so they can be visible from the drone. The GCPs are then surveyed to find their exact coordinates and used as reference points for future data processing.

### **GIS**

Geographic Information System or GIS is a system for collecting, storing, analyzing, and graphically visualizing spatial data and related information about required objects.

### **GLONASS**

GLONASS is a global satellite navigation system. It was created as an alternative to GPS in Soviet Union and first launched in 1982.

### **GLONASS AR mode**

A processing parameter enabling to turn on and off the ambiguity resolution for the GLONASS signal separately. Contrary to GPS, all GLONASS satellites transmit on different frequencies, which results in Inter Channel Biases (ICB) that are unique for each receiver model.

Reach devices can correct GLONASS ICBs, allowing for GLONASS AR with non-Reach bases such as NTRIP casters. The general recommendation is to always have GLONASS AR set to on.

This parameter corresponds to single-band Reach devices only (Reach RS/RS+, Reach Module/M+).

### **GNSS**

Global Navigation Satellite System or GNSS is a system designed to determine the location (geographical coordinates) of land, water, and air objects. Such systems consist of space

equipment, a ground segment called control systems, and individual receivers. The operation of GNSS is based on measuring the distance from the antenna on the object (receiver) to satellites whose position is known with great accuracy.

## **GPS**

Global Positioning System or GPS is a global satellite navigation system that measures distance, time, and location in the WGS 84 world coordinate system. The system was developed in 1978, and is operated by the United States.

## **Ground plane**

A ground plane is a conductive plate providing insulation for the antenna. It may be a piece of metal, a roof of a car, a metal roof of a building, and etc. It is recommended to use at least a 70x70 mm ground plane.

**Hot shoe adapter** Hot shoe is a point on the top of a camera that is used to attach accessories or other equipment to the camera. Using hot shoe adapter, you can connect your camera to Reach M2/M+ for UAV mapping.

## **Hotspot mode**

The hotspot mode means that the Reach is broadcasting its own Wi-Fi network.

## **Kinematic Positioning**

Kinematic positioning is one of two positioning modes. It implies that the rover is moving during the positioning process.

**LLH** One of the formats for Position Streaming available for Reach devices. Simple text protocol for Latitude, Longitude, and Height as well as solution status.

## **LoRa radio**

Long Range or LoRa radio is used for Reach receivers to send or receive corrections without an internet connection. Reach RS2/RS2+/RS+ is equipped with internal Lora radio. Reach M2/M+ has external LoRa radio available: you can connect it via S2 port. The radio works only one way: it either sends correction or receives them. Using LoRa modulation it is possible to hit up to 19 km (11.8 mi) in line of sight.

## **Mock location**

Mock location feature of Android devices enables you to manually change the location of your device to any other place. In the case of Reach devices, it enables the GPS collector apps to get the GPS observations directly from the receiver instead of the internal GPS of the unit.

## **Mount Point**

Mount point is a correction data source related to the specific physical or virtual reference station chosen or created based on your location respectively. When you get corrections from a VRS, you need to enable sending your receiver's position in the NMEA format.

## **Multi-band receiver**

A multi-band receiver is a receiver that can accept signals from the satellite on more than one frequency band. It means the receiver takes less time to establish the first fix solution, has a longer baseline, and has more chances to maintain fix solution in the blocked sky view conditions.

## **Multipath**

Multipath is an effect occurring when the GPS signal is deflected from the obstacles, so the GNSS receiver detects signals not only directly from the satellites but also from the local objects. Multipath effect results in an error in pseudo-range measurements and thus affects the positional accuracy.

## **Night mode**

Night mode allows you to turn off the LEDs until the next reboot of the Reach device.

## **NMEA 0183**

One of the formats for Position Streaming available for Reach devices. The most popular standard in the industry. Supported messages: GNRMC, GNGGA, GPGSA, GLGSA, GAGSA, GPGSV, GLGSV, GAGSV, GNGST, GNVTG, GNZDA.

## **NTRIP**

The Networked Transport of RTCM via internet Protocol or NTRIP network is an alternative source of corrections. NTRIP allows your rover to accept corrections over the internet with no need for the second local receiver acting as a base. A reference station collects data, then sends it to NTRIP caster, where it is retransmitted through the internet port to the client rover connected via a particular port and authorized.

## **Point cloud**

Point cloud is a set of vertexes in a three-dimensional coordinate system. Point clouds are created with 3D scanners and are used in photogrammetry and 3D-modeling.

## **Point Collection**

Point collection is a feature in the Emlid Flow app that allows you to find the exact coordinates of the point. The receiver determines the coordinates (x, y, z) of a ground point and records it to your project for further processing .

## **Point Stakeout**

Point stakeout is a feature in the Emlid Flow app that allows finding points with known coordinates on the site.

## **Pole Height**

When preparing for point collection, configure the height of your survey pole in Emlid Flow. It will help the app to automatically calculate the antenna height.

## **Position log**

This log contains positional information. Reach devices can log their position in LLH, XYZ, ENU, NMEA, and ERB formats.

## **Position Streaming**

Reach devices can send the position data to third-party GIS apps and external devices including tractors, drones, robots, and more. The position could be out shared via Serial, TCP, and Bluetooth. Various applications require different formats of the positional data, that is why Reach outputs its position in LLH, XYZ, ENU, NMEA, and ERB.

## **PPK**

Post-Processed Kinematic is one of the techniques used for highly accurate surveys. Same as in RTK, one needs two units: a base and a rover. The core difference is that in PPK scenario there is no need for a real-time connection between two units. Base and rover record logs

separately, and these logs are processed together later using specific post-processing software, for example, RTKLib.

## **PPP**

Precise Point Positioning or PPP is a technique used for determining the centimeter-level accurate coordinates of the point. The receiver put over a point is recording data for a certain period. Then this data is sent to the PPP services.

## **Precision**

Precision is the closeness of two or more measurements to each other. Precision means that the coordinates you collected are true relatively to another object. In this case, you do not need exact georeferencing coordinates of the points, you only need to know that the collected points are, say, situated on the same distance from each other. Not to be confused with Accuracy.

## **Raw data log**

A raw data log contains GNSS observations from the receiver without the calculation of accurate coordinates. It can be recorded in UBX or directly in industry-standard RINEX format.

## **Emlid Flow**

Emlid Flow is the mobile app created by Emlid. It is used to control and configure the Reach receivers, create projects, collect points, etc.

## **Relative positioning**

Relative positioning shows your coordinates relatively to another reference object. The base sends information about its absolute position to the rover. Using this information, the rover determines its position relative to the base with centimeter accuracy.

## **RINEX**

RINEX is a standard raw-data format that allows storing satellite observations and navigational data measurements made by the receiver. It also allows the post-processing of the received data by various applications from different manufacturers of receivers and programs.

## **RMS**

The square root of the average of the squared error. The RMS calculations are used to evaluate the accuracy of the position measurement. A horizontal or vertical dilution of precision multiplied by three RMS could give the horizontal or vertical precision value respectively.

## **Rover**

Rover is one of the two GNSS receivers that is used for collecting data in RTK or PPK scenarios. Rover is a moving unit: the surveyor uses rover to record the points, while rover receives the corrections from the static base.

## **RTCM3**

RTCM3 is an industry standard format for correction output.

## **RTK**

Real-Time Kinematic or RTK is one of the techniques used to improve the accuracy of the data collected from the satellites by the receiver. For RTK one needs two receivers: a base and a rover. The base sends corrections to the moving rover during data collection.

## **RTKCONV**

RTKCONV is a tool in RTKLIB that converts UBX raw data or RTCM3 base correction data from a receiver to RINEX format.

## **RTKLIB**

RTKLIB is an open-source program package for standard and precise positioning with GNSS. It is used for PPK data processing. Works with signals from GPS, GLONASS, Galileo, QZSS, BeiDou, and SBAS. Emlid produces the version of RTKLib tailored for Reach products.

## **RTKPLOT**

RTKPLOT is a tool in RTKLIB that allows viewing and plotting the position solutions from RTKPOST as well as observation data from RTKCONV.

## **RTKPOST**

RTKPOST is a tool for post-processing raw logs in RTKLIB. The result is stored in the position solution file in LLH WGS 84 – POS file. In this file, we will get centimeter-accurate track of the receiver.

## **Serial Port (UART, USB, RS-232)**

A serial communication interface in which the information transfers in or out sequentially one bit at a time. That kind of communication could be realized via various devices like UART, USB, or RS-232. Reach receivers can use a serial port to exchange the position and correction data with 3rd party devices.

## **Signal-to-noise ratio**

Signal-to-Noise Ratio or SNR is the primary indicator of how good the reception is. The value is equal to the ratio of the power of the useful signal to the noise power. You can find the SNR indicator on the main screen of the Emlid Flow app. When the SNR of a satellite is over 45, it will be marked green. Grey bars indicate SNR of the base station. The more satellites are in a green zone, the more precise your measurements are and the faster your ambiguity resolution is.

## **Simple System report**

A Simple System report is a tool used to facilitate issues reports. It provides information about the Emlid Flow version, configurations, and network in a plain text format.

## **Single-band receiver**

A Single-band receiver is a device that accepts signals from the satellite on one frequency band. It has the same level of accuracy as the multi-band one. Single-band receiver has shorter baseline in comparison to multi-band, and might not even find fix solution in blocked sky view conditions.

## **SNR mask**

Signal-to-Noise ratio mask or SNR mask is a tool that filters the satellites used for the fix solution. Satellites with low SNR will be excluded from the computation. The default setting in the Emlid Flow app is 35.

## **Solution status (fix, float, single)**

Solution status defines the precision that can be achieved at the moment. There are three solution statuses you can see when working with Reach devices.

SINGLE means that the rover has found a solution relying on its own receiver and base corrections are not applied. Precision in standalone mode is usually at the several-meter level.



FLOAT means that the rover receives corrections from the base but cannot resolve all ambiguities, and in this case, the precision is usually at the submeter-level.

FIX means that the rover using corrections from the base resolved the ambiguities in its positional calculation and achieved the solution with the centimeter-level precision.

### **Static Positioning**

Static positioning is one of the positioning modes. It assumes that the Reach rover is static. Constraining the system helps to resolve ambiguities faster as well as produce measurements with higher precision.

### **TCP**

Transmission Control Protocol or TCP is one of the main internet data transfer protocols designed to control data transfer. Typical scenario for using TCP is sending correction data to an application on the same network or to a server with public IP.

**Time mark** The time mark function verifies the exact moment when the camera takes a photo. After the flight, you can process the raw logs from the base and a rover to get an «\*\_events.pos» file. This file includes information about the time and coordinates of each photo. You can use geotagging software to write this information to the photos' EXIF data.

### **UBX**

UBX is the GNSS raw data format. The UBX protocol is a u-blox proprietary binary protocol that outputs in hexadecimal format.

### **Update rate**

The update rate is a value that shows how frequently the receiver calculates and reports its position. For Reach receivers, we recommend having 1 Hz update rate on the base and 5 Hz on the rover.

### **VRS**

Virtual Reference Station or VRS is a useful tool for long baselines. It is an imaginary, unoccupied reference station generated nearby the RTK user. The rover sends data back to the NTRIP caster. NTRIP allows the uniting of the data from your rover and the data from dense NTRIP bases and models a virtual base next to you.

### **WGS 84**

World Geodetic System 1984 or WGS 84 is the global system of geodetic parameters of the Earth, including the system of geocentric coordinates. It was accepted in 1984 and defines coordinates relative to the Earth's center of mass, with an error of less than 2 cm.

### **XYZ**

One of the formats for Position Streaming available for Reach devices. Simple text protocol for X, Y, Z ECEF coordinates as well as solution status.