ADL170 ADL180

User Manual

Version 1.00

27.08.2020

1 Version History

Version 1.00 published 27.08.2020

2 Page Index

This manual contains numbered pages 1 to 19.

3 Fire hazard

The ADL170 and ADL180 devices are equipped with an internal LiPo battery. It has a total capacity of 4400 mAh at 3.7 Volts. As with any such battery there is a fire hazard. Therefore follow the following safety advices:

1) Only operate the device when you can keep it under direct observation at all times.

2) Never leave the device in the aircraft or any other vehicle unattended, either switched on or off.

3) When not in use keep the device in a fire retardant "LiPo save bag". Bags in commercial available sizes 18x22cm work well.

4) Never charge the device battery unattended. On top we recommend keeping the device in a "LiPo save bag" while charging.

5) If you suspect any malfunction of the device, switch it off immediately. If you observe any abnormal heat, fumes, case deformation or fire, place the device immediately in the "LiPo save bag" to contain a possible fire. Place the bag away from all flammable materials such that a potential battery fire can not burn other items.

4 Possible Interference

If you suspect any malfunction of the ADL170/180 or interference with aircraft systems, please switch off the device immediately. Do not restart the device until the problem has been investigated and resolved on the ground.

5 AHRS Warning

The ADL180 comes with a non certified experimental AHRS. THIS AHRS IS NOT DESIGNED OR SUITABLE TO CONDUCT ANY IFR/IMC FLIGHT. IT IS DESIGNED FOR ENTERTAINMENT PURPOSES ONLY, DRIVING SYNTHETIC VISION FEATURES IN SUITABLE iPad APPS AND SIMILAR.
DO NEVER FLY THE AIRCRAFT BASED ON THE ADL180 AHRS! USE ONLY CERTIFIED INSTRUMENTS FOR THIS TASK.

6 ADS-B Traffic Warning

The ADL180 comes with a non certified 1090 MHz ADS-B receiver. Not all aircraft are broadcasting 1090 MHz ABS-B and the non certified nature of the ADL180 means that due to antenna installation etc. it could even miss signals from aircraft broadcasting ADS-B. **NEVER RELY ON THE ADL180 FOR COLLISION AVOIDANCE!**

7 Weather Warning

While we do every possible effort to ensure quality, the ADL170/80 devices might not work at any time. In addition the system may display false information. **NEVER PENETRATE WEATHER BASED ON THE INFORMATION PROVIDED BY THE ADL170/180** This information is for situational awareness only. The device features a GPS moving map system. This system is designed to display the aircraft position in relation to the weather data. **THE ADL170/180 IS NOT SUITABLE AS A MEANS OF PRIMARY NAVIGATION**. Especially the build in database is not updated in a regular aviation cycle. It is also not maintained to the standards of certified aviation databases

8 General Description ADL170 and ADL180

The ADL180 is a portable satellite weather receiver with additional ADS-B 1090 MHz traffic and AHRS.
The ADL170 is a lower cost version of the ADL180 without the ADS-B and AHRS modules. All other features are identical.

9 Certification ADL170/180

Both devices are portable devices. They are not intended to be fitted permanently to an aircraft. There is no paperwork to do so and due to the internal battery we strongly suggest not to attempt any permanent installations even on experimental aircraft etc. If looking for an installed solution, please have a look at our other devices for which EASA minor change paperwork is available.

10 The Iridium satellite service

Before you can use the ADL170/180 you have to subscribe to one of our Iridium satellite service plans. Please login to the ADL customer portal to order the different service plans:

https://www.ing-golze.de/login.jsp

If you have no login yet, please contact us by email at mail@ing-golze.de.

PLEASE NOTE: The ADL170/180 will show satellite signal even without an active satellite service plan and will even be able to transmit data. But this data will not be processed and the device will receive no data.

11 General Operation

To switch on the device press the ON button. To switch off the device press the OFF button. If the device detects a very low battery voltage, it will also switch off automatically to protect the battery.

On the device there are four LED lights:

1 Charging (dark orange)

This light will illuminate when the 5V USB power cable is connected. It will stay illuminated until the charging process is completed. At this point the light will extinguish.

2 Battery Low (red)

When the device is operating and the battery voltage is below 3.7V, this light will illuminate. From the point this light first illuminates you have between 10% and 15% of battery capacity left.

3 Message (yellow)

When the device is operating and a new unread SMS or email is available, this light will illuminate. Once you read the SMS or email using the ADLConnect app this light will extinguish.

4 Power (green)

This light will illuminate whenever the device is switched on.

12 Charging and Battery Considerations

To avoid a fire hazard, never charge the device unattended. On top we recommend keeping the device in a "LiPo save bag" while charging.

The device is charged using a standard USB micro cable from a standard USB 5V power supply suitable for the power system in your country. The ADL170/180 will consume around 1A from this power supply.

During charging the number 1 light will illuminate (dark orange) and extinguish once the charging progress is completed. The device will charge while switch on or off but the charging performance will be much superior if the device is switched off. When running the device during the charging process you can monitor the battery voltage on the Config page of the ADLConnect app. When fully charged it should be around 4.2V, at 3.7V the red warning light will illuminate and at 3.6V the device will switch off automatically to protect the battery.

The battery is integrated in the device and can not be changed by the user. But when required we can exchange the battery for you. To get the best battery life, we do recommend storing the device with a fully or at least partially charged battery. Avoid running the battery low and storing the device that way. Remember to store the device in the "LiPo save bag" to avoid a potential fire hazard.

For the ADL180 battery life should be around 6 hours when fully charged. When operating with the optional external ADS-B amplifier expect to loose about 25% battery life. The ADL170 contains the same battery pack and due to the missing AHRS and ADS-B components will operate a bit longer than the ADL180.

13 Dimensions

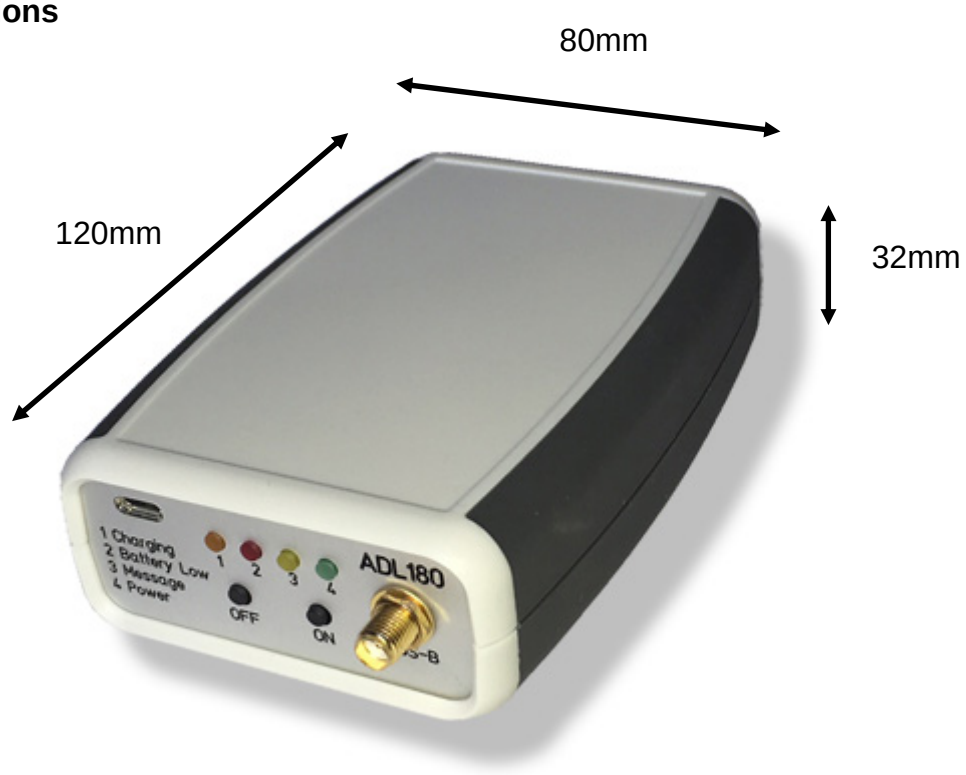


Figure 1 ADL170 and ADL180 dimensions excluding ADS-B connector (all measurements in millimeters)

14 Heat Considerations

The ADL170 and AD180 are supplied in their mostly white colors to reduce the heat in direct sunlight. We know that a completely black enclosure would be desirable in some situations to have fewer reflections in the window etc. BUT we do not recommend painting the enclosure or similar as overheat situations might result from this step. The device is tested to be stored and operated between - 20^C and 60°C.

15 AHRS Placement Considerations

The ADL180 contains an AHRS which can sense the attitude of the aircraft. Therefore a firm connection between the ADL180 and the airframe is required. But remember the ADL180 can not be installed legally on the airframe. So we recommend using strong Velcro or similar to get a temporary but tight fit. The ADL180 AHRS can later be calibrated, thus it can be placed in any possible orientation as long as it does not move in relation to the airframe.

16 Antenna Considerations

The ADL170 and ADL180 contain an internal Iridium and GPS antenna. This is a directional antenna. The device has to lie approximately flat as shown below to get good view of the sky. We recommend placing the device on the glare shield as shown. Do not place the device upside down or satellite reception will be very poor.

Only the ADL180 has got a connection for the separate ADS-B antenna. A suction cup antenna as shown below is usually supplied with the ADL180. It is intended to be attached to the front window as shown. Please note the ADS-B antenna is very sensitive to other electronics so try to keep it at least 15-20cm away from other devices including the ADL180 itself. Putting the ADS-B antenna directly on the ADL180 will result in very poor performance.

Figure 2 ADL180 on the glare shield in the right orientation with the suction cup antenna

As an alternative to the suction cup antenna a glue on antenna as shown below can be used. We recommend fitting it as shown below.

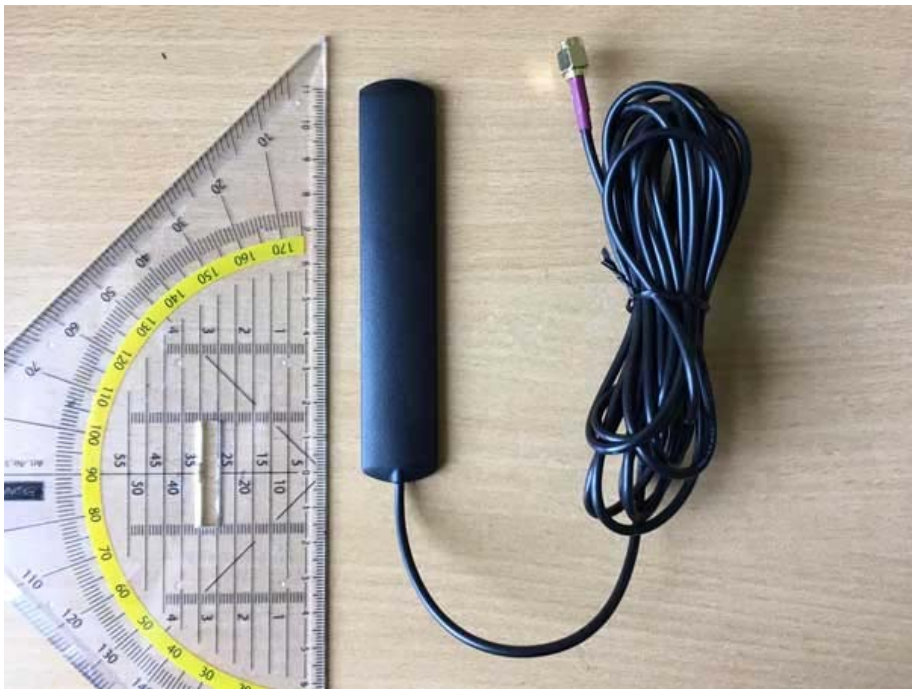


Figure 3 ADS-B Antenna

The picture below shows the antenna attached to the corner of the front screen.

Figure 4 ADS-B Antenna Example

Please note that besides the antenna itself the quality and length of the cable plays a big role in ADS-B performance. Thus, shortening the ADS-B antenna cable as much as possible makes a significant difference. We can also assist you with shorter cables etc. if required. As a guideline the relatively thin RG174 cable on the supplied antenna works best if shorter than 1m. For more than 2m we recommend using much thicker cable like RG400 which has shown to work well over 6m and more.

17 Optional ADS-B Amplifier

If more ADS-B reception range is desired, an optional ADS-B amplifier can be used. The amplifier looks as shown in the following figure. Do not confuse the two sides. They both have a SMA connectors but the amplifier only works when connected as shown below. The connection marked "OUT +5V" has to be connected to the ADS-B input of the ADL180 device. The "IN" connector is connected to the ADS-B antenna. Besides the amplifier a cable regular SMA to regular SMA connector will be required. For short cable runs RG174 cable is acceptable. Please note the amplifier can get quite hot when operating. If possible try to protect it from direct sunlight and be careful when touching it after long operation in direct sunlight.

Figure 5 Amplifier Type "ADS-B 1090 MHz LNA"

Figure 6 ADL180 with optional ADS-B amplifier and antenna

18 Connecting your iPad/iPhone/Android device to the ADL170/180

After powering up the ADL device you have to connect your portable device to the WI-FI access point provided by the ADL device. Go to the settings screen of your device. We show this step for the Apple iPad but other devices will work in a similar way. Choose “Wi-Fi” on the left side. Then on the right side you will see the network “ADL Connect”. Choose this network and make sure the iPad really connects to the ADL Connect wireless network.

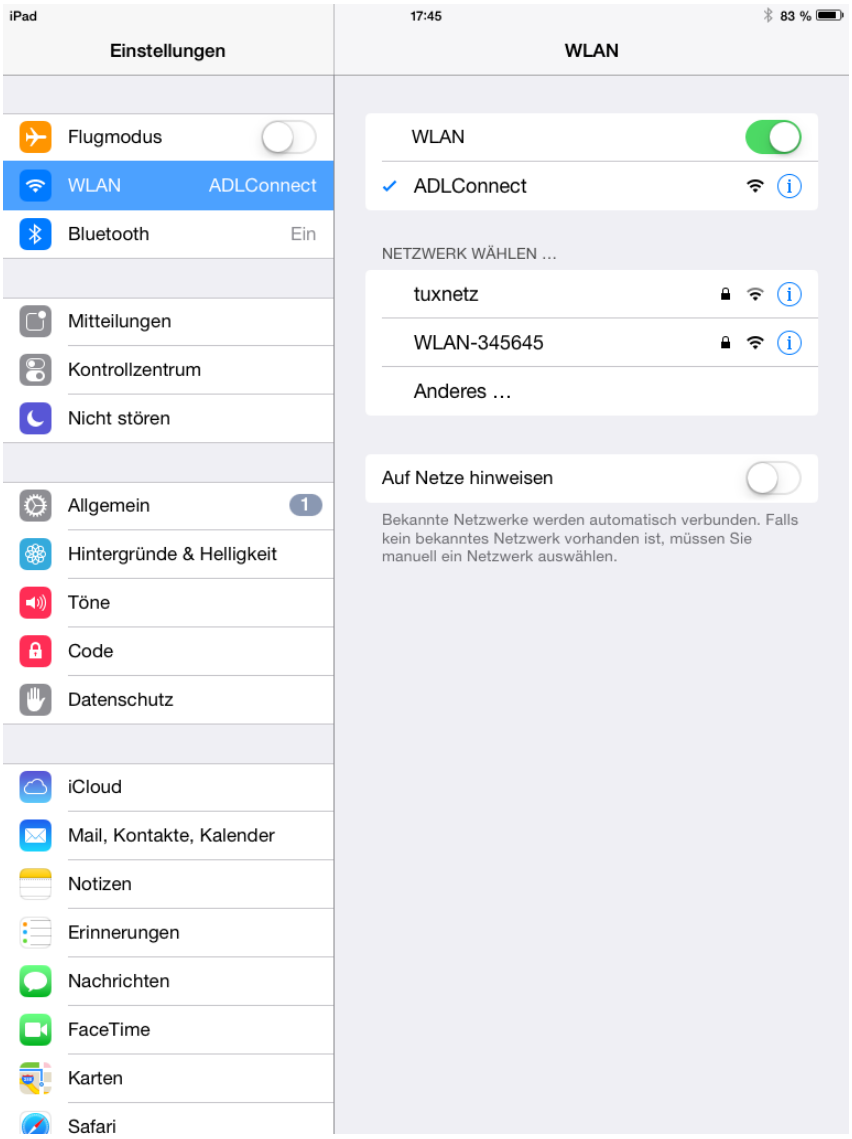


Figure 7 iPad Wi-Fi Settings

19 Installing the ADLConnect App

Before you can start to use the ADL with your mobile device, you have to install the ADLConnect iPad app. On Apple devices open the app store and search for “ADLConnect” and install the free app. On Android devices please open the Google play store and also search for “ADLConnect”.

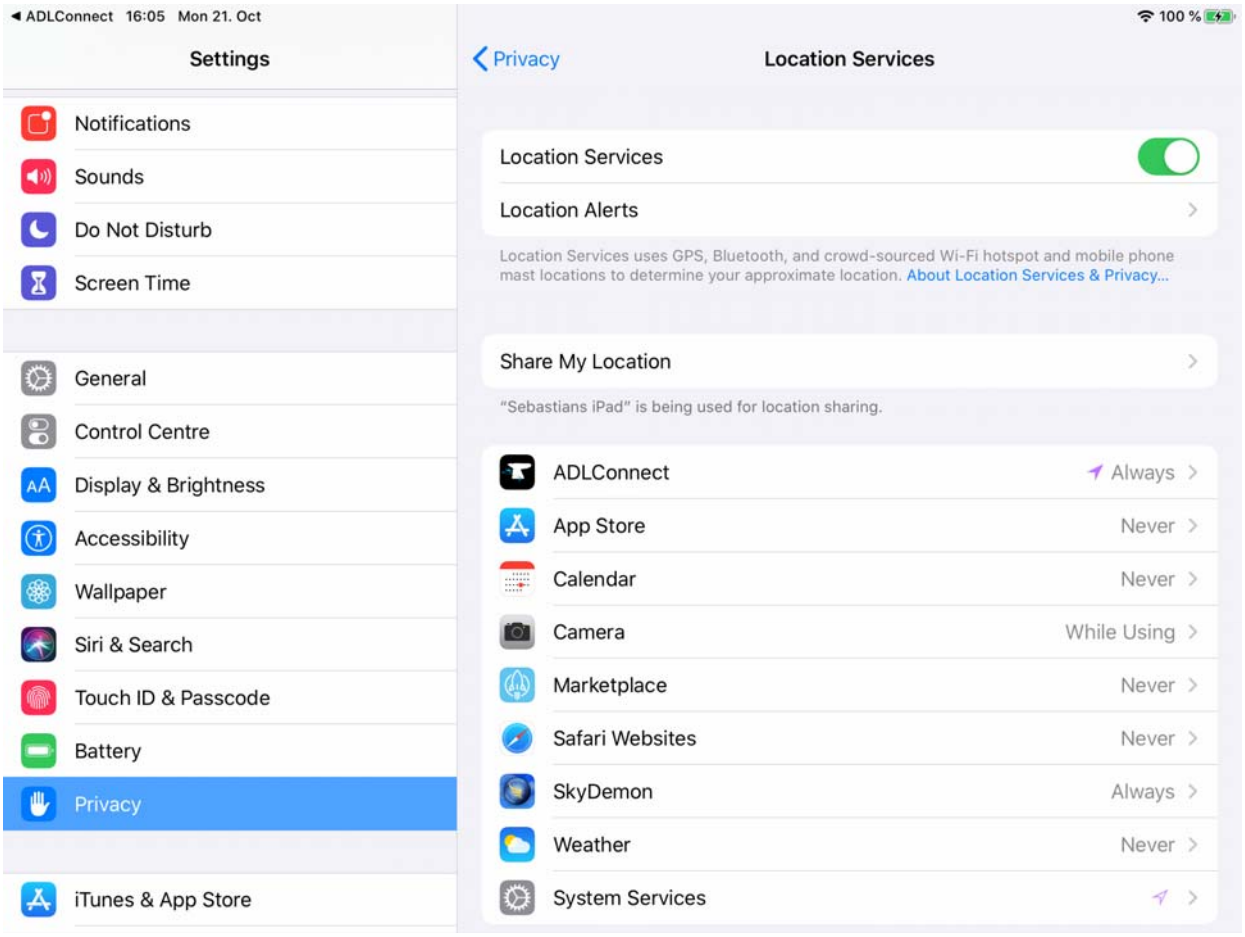
20 Starting the ADLConnect app

Start the ADLConnect app. The top status bar will indicate if the app is connected to your ADL device. When connected the Iridium and GPS quality will be displayed in the top left corner.
If the app displays “Internet mode”, "WWW" or "Offline" in the top status bar, it is not properly connected to the ADL device. In this case please check your WiFi settings.

Figure 8 iPad ADLConnect user interface

21 Important ADLConnect Privacy Setting

When running iOS 13 or later it is essential to configure the location privacy setting properly. The setting should be a shown in the following screenshot. Enable the location services and authorize ADLConnect to use this information "Always". ADLConnect will only use this privilege when connected to an ADL device, else it will not use your location. But disabling the location can cause severe issues regarding the WiFi communication between the ADLConnect app and the ADL device.



22 Entering Your Login Details

At the top part of the Config page you have to enter your login details. This is the same email/password combination as used for your login at www.ing-golze.de.
Please note: In the past a "Deutsche Wetterdienst login" was required. This is no longer the case.

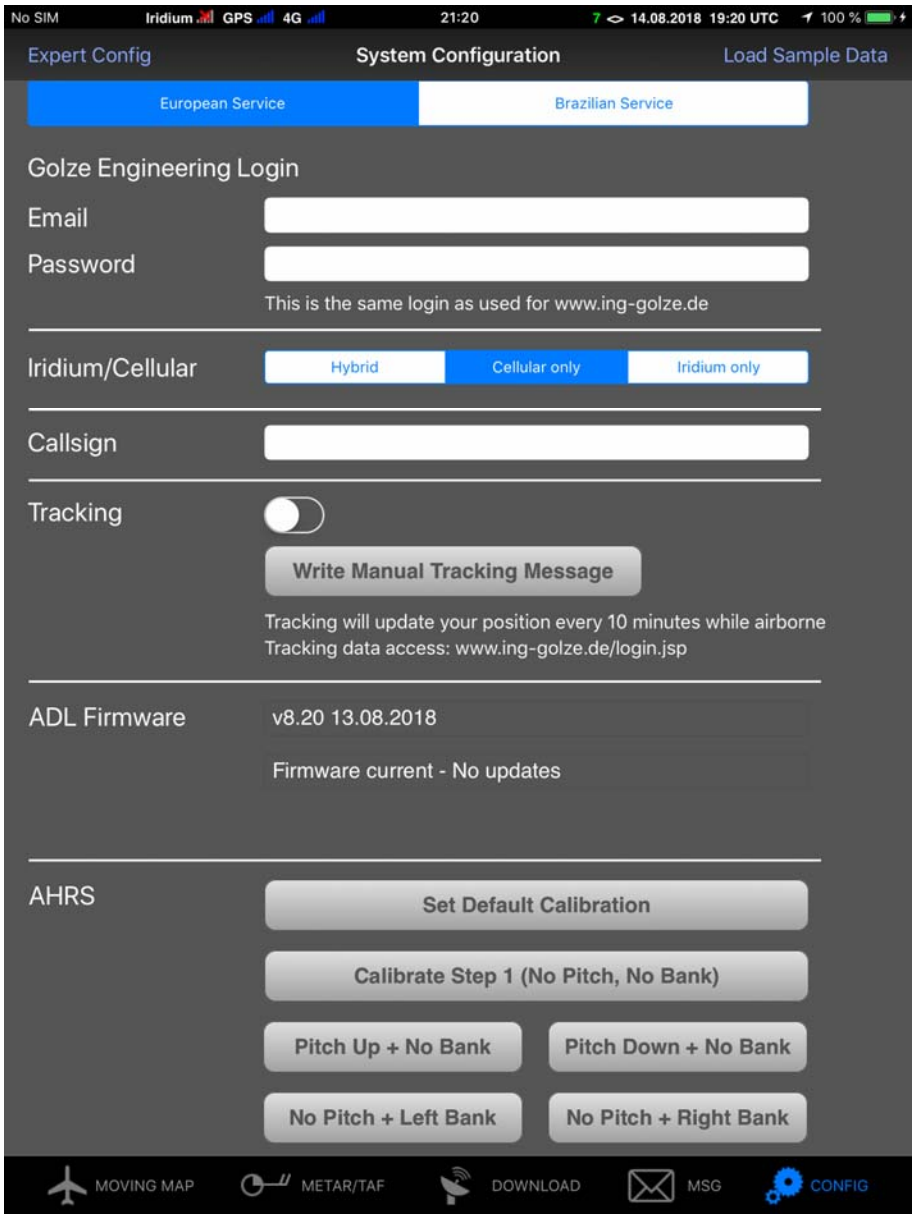


Figure 9 Entering the login details on the Config page of the iPad app

23 Configuration Options

In addition to the login details the config page allows you to make several configuration changes:

First you can select between European, Brazilian and other regions depending on which part of the world you fly in.

The callsign field allows you to enter the callsign of your own aircraft. If the aircraft is transmitting 1090 MHz ADS-B out this signal will then be removed from the traffic reports in order to avoid false alerts and the transmitted baro altitude will be used instead of GPS altitude.

The tracking slider allows activating and deactivating the 10 minute tracking feature. There are no costs involved for you as the end user so we recommend leaving the tracking on at all times. It improves the general satellite reception because the device communicates with the satellite more often.

The firmware control allows updating the ADL170/180 firmware. Firmware updates are loaded by WiFi.

Finally the AHRS buttons allow calibrating the AHRS. Please refer to the AHRS section for more details.

24 Your first weather download

Go to the Download page. Select Radar / Infrared / Strikes / Minima: Download and Wind / Temps: Download. Select an appropriate flight level range for the wind data. Finally select one ore more ICAO codes for which you would like to download the METAR and or TAF. Then press "Single ADL Download" and the download will start. A satellite download will take an average of 2 minutes but this can vary a lot depending antenna and satellite position etc.

Please note that Iridium satellites move very fast over the sky. Thus, the reception will vary all the time and a bad or good connection at a single moment does not say much about the general quality of the reception.

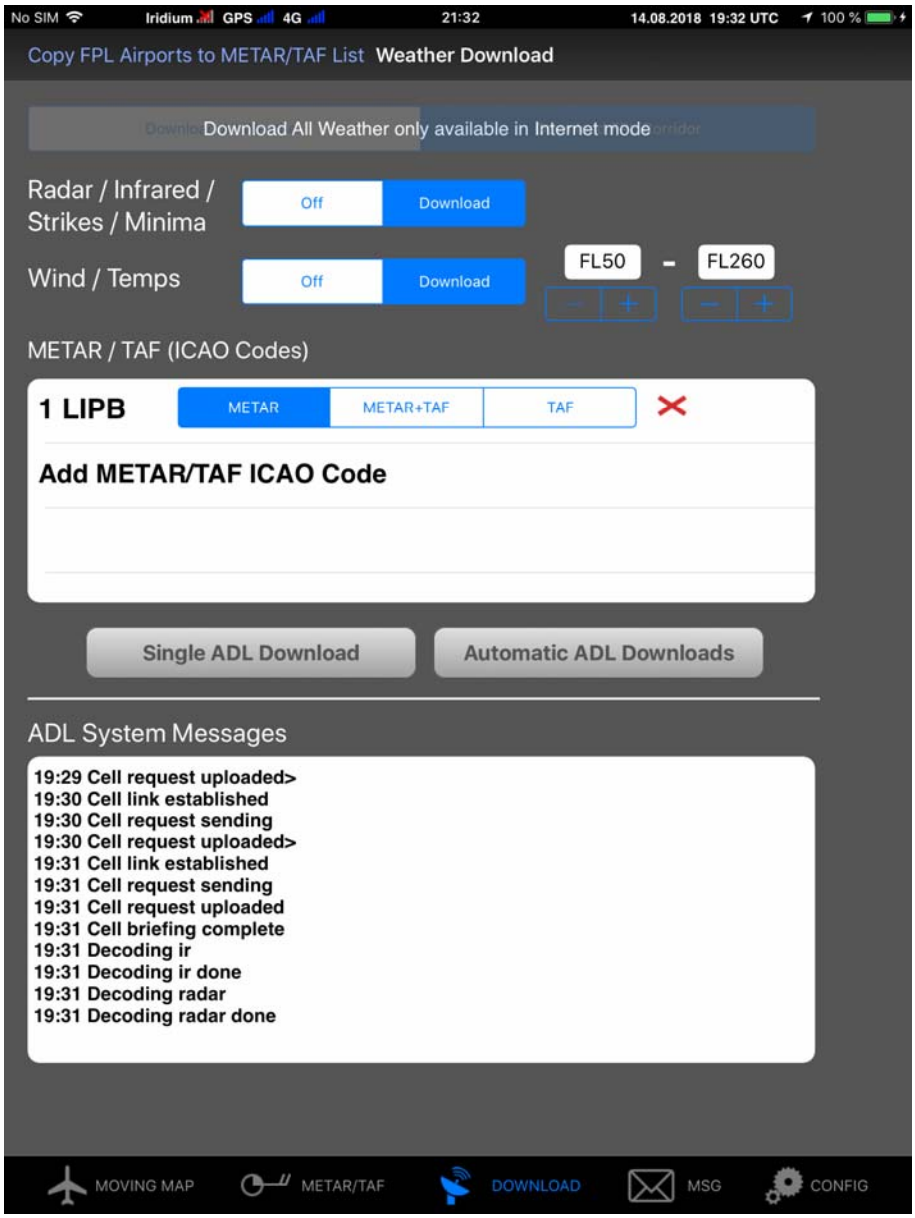


Figure 10 Download Page

Finally you can see the weather information on the moving map page. Please note that the weather information is downloaded as a corridor along the flight plan you did enter. Therefore enter at least the destination of your flight in the flight plan table right to the moving map to get the weather for your whole flight path.

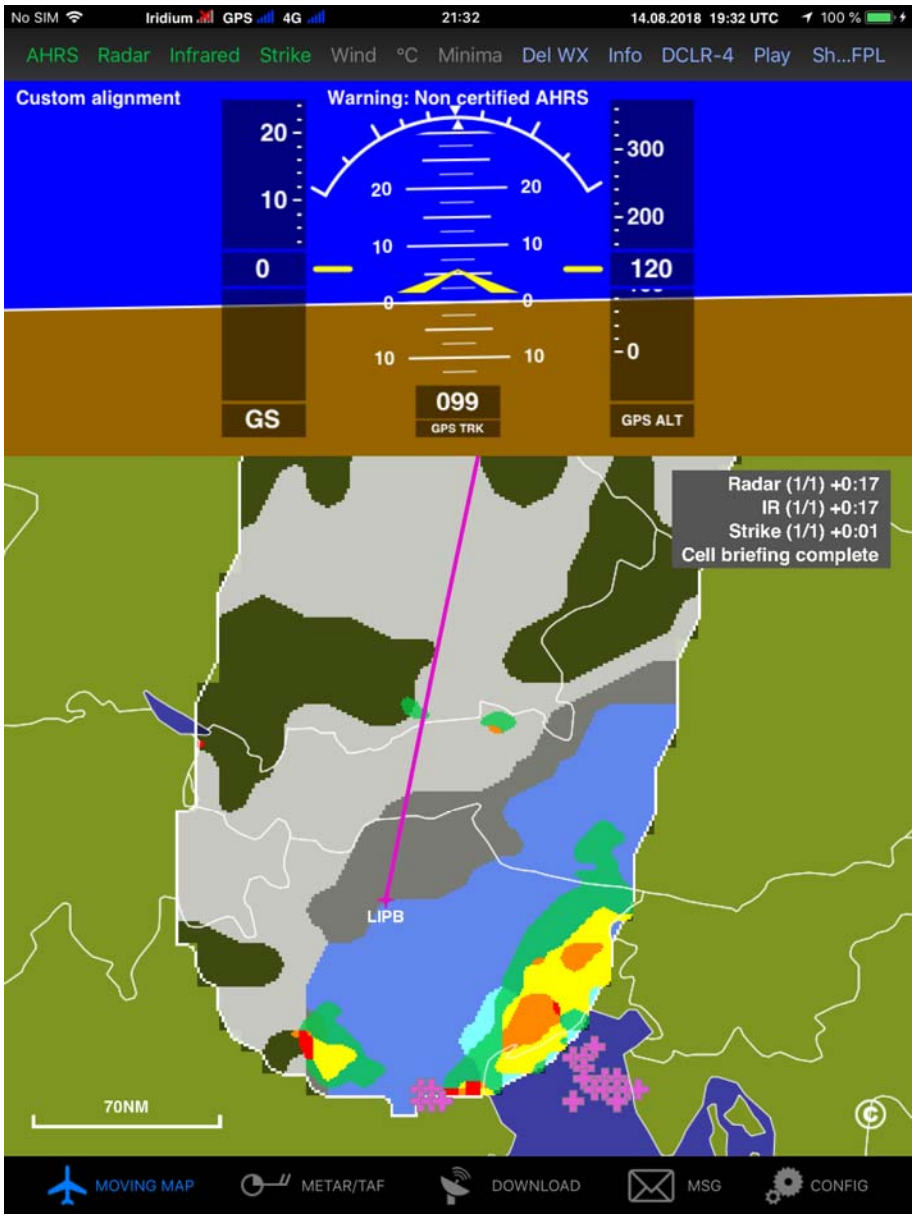


Figure 11 Latest weather information shown on the moving map page

For a more detailed description please consult our tutorial video showing how to use the ADLConnect app which is available from the website http://www.ing-golze.de

25 ADS-B (ADL180 only)

Any ADB-B target detected will show up on the ADLConnect moving map. Below is a sample. If you zoom out some of the details will be hidden.

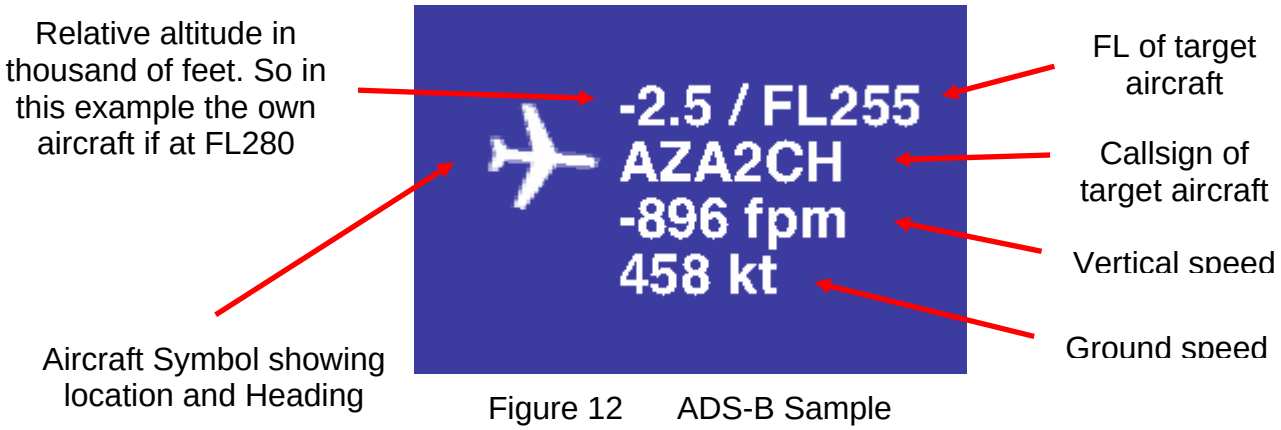


Figure 12 ADS-B Sample

Please note if the own aircraft is broadcasting ADS-B and the proper callsign for the own ship has been set on the config page, the relative altitude will be calculated based on the reported baro altitude. If this data is not available GPS altitude will be used which can be several hundred feet off depending on atmospheric conditions.

26 AHRS (ADL180 only)

Please remember to never use the ADL180 AHRS for any IFR/IMC flying! The ADL180 AHRS will have to be calibrated after it has been placed or if its location in the aircraft changed. This is a two step processes. This calibration is done in flight as the aircraft attitude on the ground will be different than in flight depending on strut inflation etc. **WATCH OUT FOR OTHER TRAFFIC AND KEEP THE AIRCRAFT UNDER CONTROL AT ALL TIMES WHILE DOING THE CALIBRATION. IF POSSIBLE TAKE ALONG A CO PILOT!**

Step 1: First fly straight and level. For good results the air has to be smooth. If the flight is too bumpy calibration results will be poor. If available use the autopilot to keep the aircraft straight. Try to use a normal power setting which results in a typical pitch attitude. Then press the "Calibrate Step 1 (No Pitch, No Bank)" button on the Config page of the ADLConnect app.
Now the AHRS on the Moving Map page should show a no pitch no roll situation. If it does not, try this calibration step again.

Step 2: You have to teach the ADL180 in which direction it was installed. If the panel with the switches and lights faces exactly backwards this step might not be required as this is the default orientation. In all other cases you have to pitch the aircraft precisely up or down and then press one of the two buttons appropriate to your situation. This will teach the AD180 its orientation. You can repeat this step without repeating step 1. But if you go back to step 1 all data for the orientation is lost and you will have to repeat also step 2. The more pitch up or down you have the better the ADL180 can sense its orientation. **REMEMBER ALWAYS TO KEEP THE AIRCRAFT UNDER CONTROL**

WHILE DOING THIS CALIBRATION AND TO WATCH OUT FOR OTHER TRAFFIC!
If available again try to use the autopilot and command a level climb or decent to get a pitch angle with no bank angle.

Finally if both steps are done correctly the AHRS on the moving map should show the correct pitch and bank while doing mild maneuvers.

27 ADL170 Technical data

- WiFi Interface for iPad/iPhone interconnect
- Over 6 hours endurance on battery
- Operating and storage temperature range -20 to 60°C
- Dimensions: 120 x 80 x 32mm
- Mass: 237g
- LiPo battery 3.7V / 4400 mAh

28 ADL180 Technical Data

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29 ADL170 Label

Figure 13 ADL170 Label

30 ADL180 Label

Figure 14 ADL180 Label

31 Contact

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