DroneBeacon - Transponder Manual 150/154-series

January 2025 - version 1.1

Remote ID for drones

The latest version of this manual is located here:
https://download.bluemark.io/db150.pdf

Intended audience: users of the db150/db154 transponder

Disclaimer: we are not responsible or liable for errors or incomplete information in this document.

Version history

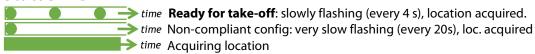| version	date	description
1.0	September 2024	● Initial release
1.1	January 2025	● Updated manual with db154 information

QUICK START

Attach to the drone

For optimal performance attach the db150/db154 on the top of your drone/airframe:

- Use the 3M dual lock™ stickers (included).
  clean the surface and remove the foil of the 3M dual lock sticker, apply firm pressure and wait 1 hour for optimal adhesion. Snap the db150/db154 to the counter part sticker on the drone.
- Or/and use two M5 screws.
  the db150/db154 has two M5 screw noses that can be used for attaching the db150/db154 to your drone.

Use the db150/db154

- Move the on-off power switch to *on* to power up the transponder.

Wait for a GPS fix (slowly flashing status LED every 4 seconds). The color of the status LED indicates the battery level (full: green, almost empty: red and yellow in between)

- You are ready to fly. After your flight, turn the db150/db154 off using the on-off power switch.

Status LED

time	**Ready for take-off**: slowly flashing (every 4 s), location acquired.
time	Non-compliant config: very slow flashing (every 20s), loc. acquired
time	Acquiring location

Battery level is the color of the status LED (full: green, almost empty: red)

Charge

Charge the db150/db154 using a USB-C charger.

- the charge LED will be red during charging and turns to green if it has been fully charged.
- the db150/db154 can be charged with USB-C charger that provides 5V.

Configuration

For typical use in the USA no configuration is required. USA: use the db150(/db154) S/N number for registering your drone at the FAA. For the EU, you need to enter your operator ID and UA class.

- After the db150/db154 is powered on, press the config button. The status LED is now solid white.
- Connect to the *dronebeacon* WLAN network (no password needed)
- Point your browser to http://192.168.50.1 or scan the QR code.

Flying a drone could create risks for people, air traffic and other assets. Before flying, the drone operator has to make sure to know the local rules regarding drone flights and obtain the necessary authorization to fly the drone(s).

configuration web-page

charging LED

configuration button

battery / status LED

power button
on ← → off

USB-C port (charging)

Contents

1 INTRODUCTION

Thank you for purchasing and using DroneBeacon products!

The latest version of this user manual may be downloaded at the following link: https://download.bluemark.io/db150.pdf

(Direct/Broadcast) Remote Identification (Remote ID) adds "beacon" capability to drones to broadcast basic information of airborne drones, such as the operator's registration number, drone serial number and current position. The EU and USA have new rules that make Remote ID mandatory for drones over 250 grams weight. The beacon information can be used by general public, law enforcement and drones to give better situation awareness of the airspace around them.

BlueMark Innovations BV offers Remote ID transponders and receivers. DroneBeacon db150/db154 is an add-on (transponder) for drones that broadcasts Remote ID beacon signals. Besides the db150/db154 we also provide other Remote ID add-ons. DroneScout is a receiver that detects Remote ID signals of nearby drones up to several km distance (in open space). See https://dronescout.co for more information about our products.

The db150 transponder is a small and low weight transponder of only ~12.5 gram. The db154 transponder is basically a db150 with large battery that allows up to 22 hours of operation and is ~ 32.5 gram.

1.1 Audience

This document is intended for users that want to use the *DroneBeacon db150/db154* transponder as a stand-alone Remote ID add-on for their drone or other UAV product.

1.2 Specifications

The transponder consists of an embedded system and several radio-interfaces to broadcast Remote ID signals.

In the EU, the db150/db154 is a *Direct remote identification (DRI) Add-on*. DRI Add-ons are considered as payload in the EU. DRI means a system that ensures the local broadcast of information about a Unmanned Aircraft (UA) in operation, including the marking of the UA, so that this information can be obtained without physical access to the UA. A DRI Add-on is standalone direct remote ID broadcast device integrating a GNSS function and a communication function, being able to provide position, height, speed over ground, track clockwise with true north, of the UA, and it's take-off position. In the USA, the db150/db154 is a *Remote ID broadcast module.*

Regulation

The db150/db154 transponder complies and adheres to the following regulations:

region		
EU	DELEGATED REGULATION (EU) 2019/945 PART 6	March 2019
	DELEGATED REGULATION (EU) 2020/1058	April 2020
	ASD-STAN FprEN-4709-002:2023 (E) (Part 002: Direct Remote Identification)	June 2023
USA	ASTM, International (ASTM) F3586–22, with additions	July 2022

The EU Declaration of Conformity can be found here:
https://dronescout.co/wp-content/uploads/2023/09/EU-DoC_standalone.pdf

Key specifications:

- **Compliant with international regulations**
  - EU   ASD-STAN DIN EN 4709-002
  - USA   ASTM Remote ID Standard ASTM F3411-22a-RID-B/ F3586-22
    - Accepted by the FAA
      - db150 https://uasdoc.faa.gov/listDocs/RID000001962
      - db154 https://uasdoc.faa.gov/listDocs/RID000002084
- Supports **all Remote ID transmission protocols**:
  - BLE legacy
  - BLE long range
  - WLAN NaN 2.4 GHz (not allowed in the USA)
  - WLAN Beacon 2.4 GHz
- **Long range** up to 5 km detection range[1]
  - Omni-directional antenna with 0 dBi gain
  - Transmit power: +18 dBm (WLAN and Bluetooth)
- Battery life:
  - db150:
    - > 120 minutes[2]
    - 0.875 Wh (LiPo 3.7V 250 mAh)
  - db154:
    - > 22 hours (see note [2])
    - 4.2 Wh (LiPo 3.7V 1300 mAh)
- Positioning
  - GPS: 2.5m positioning precision
- Suited for outdoor operation:
  - IP43 rating
  - for operation in rainy conditions, the transponder needs to be protected against water.
- Dimensions (l x w x h):
  - db150:
    - 34 x 33 x 20 mm.
    - with screw nodes the dimensions are 51 x 33 x 20 mm
  - db154:
    - 34 x 48 x 33 mm.
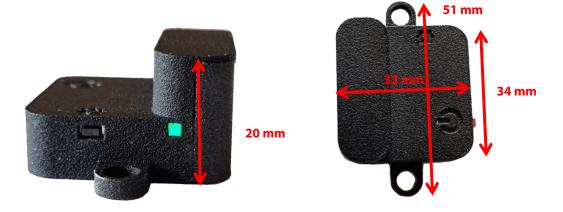   - with screw nodes the dimensions are 51 x 48 x 33 mm

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[1] The detection range depends on several factors such as the receiver antenna gain, transmission protocol, weather conditions, flying height, receiver height line of sight etc. With professional receivers a range up to 5 km is possible. See our DroneScout manual for more details.

[2] The battery life has been measured at room temperature. The battery life will be shorter, if it is used below 10 degrees Celsius. It also depends on other factors like transmission mode and transmission period. The default WLAN beacon transmission mode has longest battery life. Bluetooth dual-mode has a battery life of more than 110 minutes.

- Operating temperature
  - -10℃ to +50℃
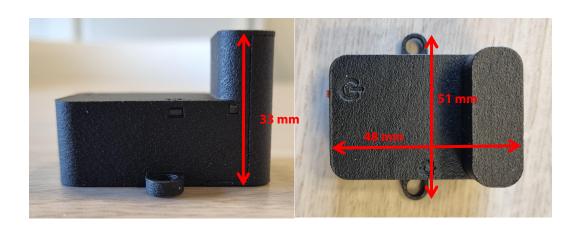- Weight:
  - db150: ~12.5 gram
  - db154: ~ 32.5 gram

Figure 1 - DroneBeacon 150/154-serie transponder

1.3 What's in the Box

The following package contents should be present:
- 1x db150/db154 transponder
- 3x 3M dual-lock stickers (1 extra)
- 1x 3M foam sticker

1.4 Charging

The transponder can be charged using a standard USB-C charger. It is fully charged within 45 minutes (db150) or 90 minutes (db154). During charging, the red charging LED blinks and is permanently on when fully charge. If the battery is fully empty, the charging LED may not blink. In that case, please switch the power button to on, to start charging.

1.5 Installation

Attach the DroneBeacon db150/db154 transponder on the top of your drone for best performance.

- Use the 3M dual lock™ stickers (included).
  clean the surface and remove the foil of the 3M dual lock sticker, apply firm pressure Use a sticker for both the db150/db154 and drone. Snap the db150/db154 to the counter part sticker on the drone. The stickers allow you to easy remove or attach the db150/db154.
  Note: for a good adhesion/grip, place the dual-lock sticker and apply firm consistent pressure to assure good contact with the substrate you are adhering. Also, it needs 1 hour to 72 hours (preferred) to build a (full) adhesion to the surface. In addition, it is important that the adhesive base for the tape is free of grease and dry, and that it is not covered with a removable lacquer or a layer of paper.
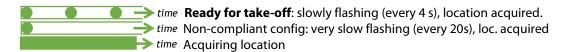
- Or/and use two M5 screws.
  The transponder can be attached to the drone using two M5 screws. The distance between the two screw noses is 43 mm.

1.6 Using the db150/db154

- Attach the transponder to the drone
- Move the on-off power switch to *on* to power up the transponder.
- Wait for a GPS fix (slowly flashing battery LEDs every 4 seconds). The color of the status LED indicates the battery level (full: green, almost empty: red and yellow in between). This is typically within 90 seconds if the db150/db154 is used outdoor.
- You are ready to fly.
- After your flight, turn the db150/db154 off using the on-off power switch.

Battery/status LED
The status LED can have the following states:

time **Ready for take-off**: slowly flashing (every 4 s), location acquired.
time Non-compliant config: very slow flashing (every 20s), loc. acquired
time Acquiring location

Battery level is the color of the status LED (full: green, almost empty: red)

Note:
- For typical use in the USA no configuration is required. USA: use the db150/db154 S/N number for registering your drone at the [FAA](#).
- For the EU, you need to enter your operator ID and UA class. See section 2.2.
- A non-compliant configuration can be caused by selecting a non-compliant transmission protocol or missing information (e.g. operatorID for the EU region).

⚠️ *Flying a drone could create risks for people, air traffic and other assets. Before flying, the drone operator has to make sure to know the local rules regarding drone flights and obtain the necessary authorization to fly the drone(s).*

1.7 EMC test

To verify that the db150/db154 does not produce interference to the drone or receives interference from the drone, it is advised to do a quick EMC test. (Only when attached for the first time to a drone.)

- Power on the drone and remote control. Keep the db150/db154 powered off.
- Verify that the drone, remote control and wireless link are functioning properly.
- Power off the drone and remote control.
- Power on the db150/db154. Keep the drone and remote control powered off.
- Verify that the db150/db154 is functioning properly. For instance by using on of the smartphone app in Section 1.8 or by looking at the status LED (ready for take-off state).
- Repeat the tests by powering on both the db150/db154, the drone and remote control. If both the db150/db154 and drone, remote control and wireless link are functioning properly, there is no EMC interference between both systems.
- In case there is interference, please move the db150/db154 to a different place on the drone and repeat the tests. Alternatively lower the output power or change the transmission protocol.

1.8 Android/iOS app

You can use the free *OpenDroneID OSM* Android app to view the DroneBeacon Remote ID signals:
https://play.google.com/store/apps/details?id=org.opendroneid.android_osm

Or the Drone Scanner Android app:
https://play.google.com/store/apps/details?id=cz.dronetag.dronescanner

Note: only few Android smartphones support reception of Bluetooth Long Range and/or WLAN NaN signals. Also, in default Android configuration, WLAN Beacon signals are typically received only once every few minutes. A list of supported smartphones is presented, in the link below.
https://github.com/opendroneid/receiver-android/blob/master/supported-smartphones.md

iOS
The Drone Scanner app is also available for iOS. Due to limitation of iOS only BT4 reception is possible. (Our DroneScout Bridge product can be helpful to receive WLAN Beacon/Bluetooth Long Range detections as well for iOS, see https://dronescout.co/bridge/)
https://apps.apple.com/gb/app/drone-scanner/id1644548782

1.9 Open Drone ID

DroneBeacon uses the Open Drone ID framework to broadcast Remote ID signals. The framework can be found on this page: https://www.opendroneid.org/

1.10 LiPo battery

DroneBeacon uses internally a LiPo battery. In general LiPo batteries are safer and more environmentally friendly than other batteries like NiCd and NiMH. While LiPo fires are rare, they can happen incredibly quickly and can do a lot of damage[3]. **Always use a fire proof LiPo safety bag, metal ammo box, or other fire proof container** when you are charging, discharging, or storing db150/db154 transponders.

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[3] https://www.thedronegirl.com/2015/02/07/lipo-battery/

2 CONFIGURATION

The transponder can be configured via a web-interface. To active the configuration mode follow these steps:

- Move the on-off power switch to *on* (to power up the transponder).
- Press the configuration button, the *red* configuration LED is turned on.
- Connect to the *dronebeacon* WLAN network (no password needed)
- Point your browser to http://192.168.50.1

New settings will only be applied if the Save button is pressed!

Configuration mode will be quit, by pressing the configuration button again. The *red* configuration LED is now turned off. The transponder is now in normal operation mode.

configuration web-page

2.1 General

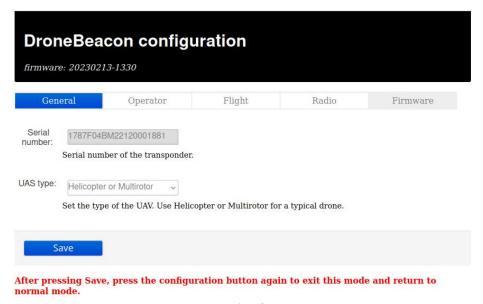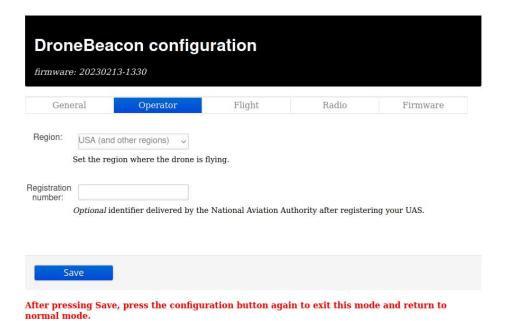The main configuration can be found on the general tab.

Figure 2 - General configuration page

Fill in the drone type of your drone.

2.2 Operator

In the operator tab, you can configure the details of your license provided by the National Aviation Authority. <u>This is an optional setting for the USA</u>. In the USA you need to use the serial number of the db150 instead for register your drone at the FAA. For the EU (and Singapore), this is a mandatory setting. *First, select the region where the drone is flying.* Outside the EU, no UAS category or UAS class is required.

Within the EU/Singapore, only valid license numbers can be entered. In that case the input box becomes green.
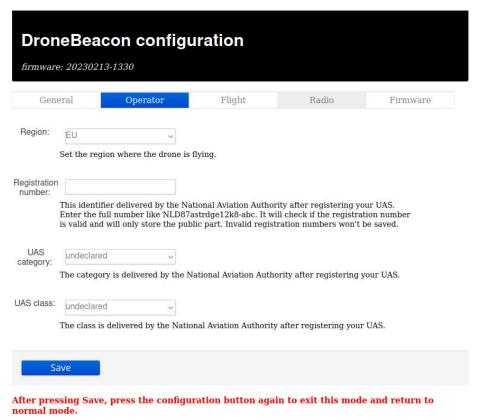
Figure 3 - Operator configuration page

2.3 Flight

In the flight tab, you can configure an *optional* text describing the purpose of your flight.

Figure 4 - Flight configuration page

2.4 Radio

In the radio tab you can configure the transmission mode and other radio-related settings. Most users don't change settings in this section. Note that in the USA only BLE dual-mode and WLAN broadcast transmission mode are allowed.
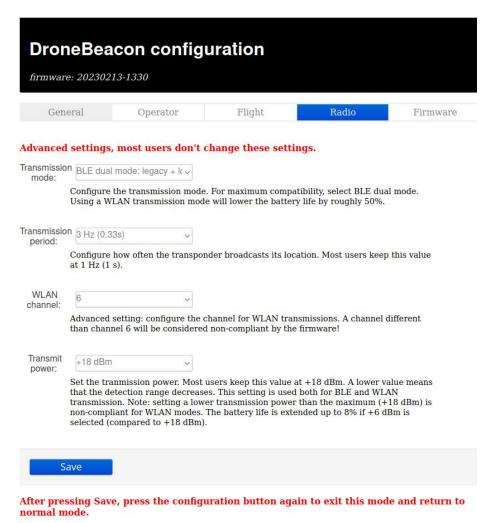

Figure 5 - Radio configuration page

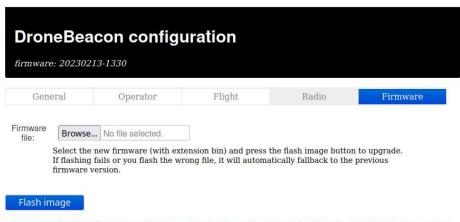## 2.5 Firmware

In the firmware tab, you can upgrade the firmware of the transponder.

Firmware files can be found here: https://dronescout.co/downloads/
(Version history: https://download.bluemark.io/db150_history.txt)

Upload the file and press Flash image to upload new firmware. Upgrading firmware has been tested with Chrome and Firefox. If upgrade fails, please try again or try another browser.

DroneBeacon configuration

firmware: 20230213-1330

| General | Operator | Flight | Radio | **Firmware** |

Firmware file: [Browse...] No file selected.

Select the new firmware (with extension bin) and press the flash image button to upgrade. If flashing fails or you flash the wrong file, it will automatically fallback to the previous firmware version.

[Flash image]

After pressing the flash image button, the device will automatically reboot within 30 seconds. Press the cfg-button on the device again to check the running firmware.

Figure 6 - Firmware upgrade page

3 TROUBLESHOOTING

The db150/db154 is not detected by my RemoteID app
In default configuration, the db150/db154 uses WLAN Beacon as transmission method which is the most energy efficient method. However, most smartphones/RemoteID apps fail to detect these RemoteID signals, or it needs a long time before it is detected. Switch to Bluetooth dual-mode (see Chapter 2 Configuration) to solve this. Detection of this transmission method is supported by almost any smartphone.

Access to the configuration web-pages fails.
Failing to access the configuration web-pages can have multiple causes. Make sure the configuration LED is solid white. Also, make sure that you connect to the *dronebeacon* network. If you get a message that the network does not provide internet, make sure you decline the message to disconnect and connect to your default WLAN network again. The browser *Safari* can also give issues to connect to the configuration web-pages. Use a different browser in this case. Also, a VPN, browser add-ons or another active internet connection can give issues. Disconnect the VPN and other internet connections. The easiest solution is use a different device to connect to the configuration pages.

Video instructions: https://www.youtube.com/watch?v=rNkamGV6EDY

The status LED is off when the db150/db154 is powered on.
In this case the battery is likely empty. Make sure the battery is fully charged. It could also be that the configuration button is stuck. In this case, the db150/db154 will not boot normally, but instead will enter a special boot mode. To solve this, make sure that that the configuration button is not pressed or is stuck by the enclosure.

The reported height is wrong.
The db150/db154 uses the GNSS (GPS) signal to determine the height of the db150/db154. It needs a good GPS reception/fix for this purpose. Make sure you install the db150/db154 on top of your drone. Also, db150/db154 GNSS receiver has issues to track slow vertical speeds. Make sure you always go up or down with at least 1 m/s vertical speed for your drone. (RemoteID standards allow up to 30 meter accuracy of the height.)

The db150/db154 interferes with the drone communication link.
Move the db150/db154 to a location further away from the drone communication antenna. Even 10 cm extra distance can make a huge difference. See also section 1.7 EMC test. In addition, change the transmission protocol if the interference persists. Typically, WiFi transmission protocols cause less interference to other radio systems as the transmission interval is lowest. Also a lower transmit power will reduce interference.

The db150/db154 gets no GPS lock/location data.
In normal outdoor situations, the db150/db154 gets a GPS fix typically within 90 seconds. In indoor locations or blocked GPS reception, a GPS fix may take considerably longer or not all. Please contact us, in case the GPS fix takes always a very long time or there is no GPS fix at all.

4 LIMITED WARRANTY

The product has a two-year warranty period, starting at the date of receiving the product. Outside warranty are issues like crash damage, improper use, (extreme) weather conditions that damages the product. Also, the battery is excluded from warranty. The product is eligible for future firmware updates as described in the section 2.4 firmware.

Warranty Service
Please email or call us first with a description of the problem. Typically, the customer is responsible for transportation costs to our office. For post-warranty cases contact us too; we will try to do our best to find a solution.

5 MORE INFORMATION

If you need more information, please contact us at info@bluemark.io or by phone: +31 53 711 2104.

All contact information can be found at the *DroneScout* contact page:
https://dronescout.co/contact/

Postal address:

> BlueMark Innovations BV
> Bruggenmorsweg 10
> 7521ZV Enschede
> the Netherlands