

DroneBeacon MAVLink- Transponder Manual 110-series

July 2022 - version 1.0

Remote ID for drones



The latest version of this manual is located here:

https://download.bluemark.io/dronebeacon_mavlink_transponder_manual_110.pdf



Intended audience: users of the MAVLink transponder

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

Version history

version	date	description
1.0	July 2022	● Initial release
1.1	September 2022	● Added FCC information

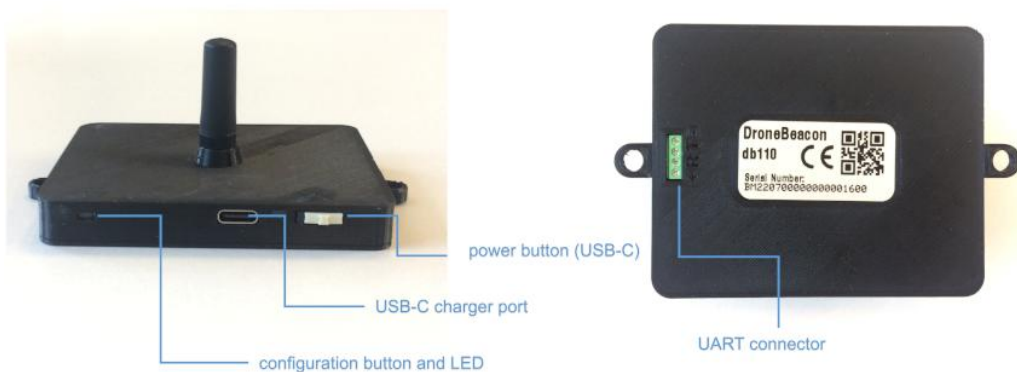


QUICK START

1. Attach the DroneBeacon MAVLink transponder to your drone. For optimal coverage install the transponder *horizontally* with the antenna facing up.
 - a) Using the 3M dual lock stickers (included)
 - b) Using two M5 screws
2. Connect UART interface to the autopilot system for both power and control using the 4-port screw terminal. Optional the USB-C connector can be used for power. Note the on-off power switch is only used for the USB-C connection. The UART settings can be configured in step 3.
 - a) + (+5V)
 - b) RX
 - c) TX
 - d) - (GND)
3. *Optional step:* Configure the DroneBeacon MAVLink transponder
 - a) Press the configuration button, the *red* configuration LED is turned on.
 - b) Connect to the *dronebeacon* WLAN network (no password needed)
 - c) Point your browser to <http://192.168.50.1> to configure the transponder.
 - d) Press the configuration button again to exit configuration mode

If you attach the transponder on the bottom of the drone (**upside down**), use **M5-screws!**

4. Control the transponder using your autopilot system. See section 1.4.



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).



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1 INTRODUCTION

Thank you for purchasing and using DroneBeacon products!

The latest version of this user manual may be downloaded at the following link, where the most up-to-date version will be found:

https://download.bluemark.io/dronebeacon_mavlink_transponder_manual_110.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 are planning 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 is an add-on (transponder) for drones which broadcasts Remote ID beacon signals. 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.

1.1 Audience

This document is intended for users that want to use the *DroneBeacon MAVLink db110* transponder that can be integrated into drone products. It is designed for drone manufacturers / system integrators. For the *DroneBeacon* transponder -a standalone transponder- there is a separate manual.

1.2 Specifications

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

Key specifications:

- **Compliant with international regulations**
 - EU ASD-STAN DIN EN 4709-002
 - USA ASTM Remote ID Standard ASTM F3411-22a-RID-B
- Supports **all Remote ID transmission protocols**:
 - BLE legacy
 - BLE long range
 - WLAN NaN 2.4 GHz
 - WLAN Beacon 2.4 GHz
- **Long range** > 5 km detection range¹
 - Omni-directional antenna with 3 dBi gain
 - Transmit power: + 20 dBm (WLAN and Bluetooth)
- IP rating:
 - none, (it is more or less waterproof if the UART connector is sealed.)
- Suited for medium and larger drones. “*DJI Mavic*” is the minimum size.



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 of 5 km and more is possible. See the DroneScout manual for more details.



- Power:
 - 5V (UART connector or USB-C, current: 50 to 100 mA (depends on transmission mode))
- UART
 - 4-port screw terminal, settings configurable (baud rate, stop bits, parity, data bits)
- Size: 99 x 66.5 x 42 mm
 - without screw noses and antenna: 81 x 66.5 x 11.5 mm
- MAVLink v2 compliant
 - Supports the [OpenDrone ID messages](#)
- Operating temperature
 - -5°C to +40°C
- Weight: 33 g (PCB-only version: 20 g)

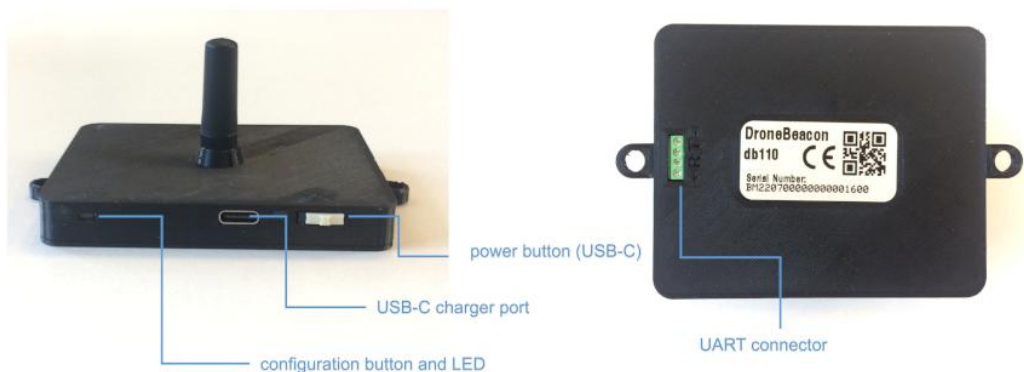


Figure 1 - DroneBeacon 100-serie transponder

1.3 Installation

Attach the DroneBeacon MAVLink transponder to your drone. For optimal coverage install the transponder horizontally with the antenna facing up². The detection range will be severely limited when it is installed under an angle of 15 degrees or more.

semi-permanent/temporarily installation

Use the (included) 3M dual-lock stickers (type 3M SJ4570). One sticker on the bottom of the transponder and the other on the drone where you want to install the transponder. If you attach the transponder on the bottom of the drone (**upside down**), use M5-screws!

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.

permanent installation

The transponder can be attached to the drone using two M5 screws.

- The distance between the screw noses is 90 mm.
- M5 holes

For the PCB-only version there are two M2 screw holes (distance is 60 mm (x) and 50 mm (y)).

² For high flying drones > 75 m, install the transponder facing down, on the bottom of the drone for maximum range. The antenna pattern is similar to a *dipole antenna*, radiating remote ID signals in a donut-shape.



UART connector

Connect UART interface to the autopilot system for both power and control using the 4-port screw terminal. Optional the USB-C connector can be used for power. Note the on-off power switch is only used for the USB-C connection. The UART settings can be configured in the configuration mode (see Chapter 2).

The UART screw terminal has 4-ports:

- a) + (+5V)
- b) RX
- c) TX
- d) - (GND)

1.4 Using the transponder

The MAVLink transponder is controlled by the autopilot system. For normal operation, make sure the transponder is powered on and make sure the UART interface is configured correctly.

Ardupilot

For integration, we work together with Ardupilot to get support for Remote ID in version 4.3.0. See [this link](#) for more information.

C source code

For other implementations, we provide [C source code](#) how to send MAVLink messages to the transponder.



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).

1.5 Android 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

Note: only few Android smartphones support reception of Bluetooth Long Range and/or WLAN NaN signals. A list of supported smartphones is presented, in the link below.

<https://github.com/opendroneid/receiver-android/blob/master/supported-smartphones.md>

1.6 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/>



2 CONFIGURATION

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

- Make sure the transponder is powered up via the UART interface or USB-C. (Make sure the power switch is switched to *on* if USB-C is used.)
- 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 & Apply 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.

2.1 General

The main configuration can be found on the general tab.

The screenshot shows the 'DroneBeacon MAVLink configuration' web interface. At the top, it says 'firmware: 20220713-1356'. Below this are three tabs: 'General' (selected), 'Uart', and 'Firmware'. The 'General' tab contains several configuration fields:

- Serial number:** A text input field containing 'BM22070000000001600'. Below it is the label 'Serial number of the tag.'
- UAS type:** A dropdown menu with 'Helicopter or Multirotor' selected. Below it is the label 'Set the type of the UAV. Use Helicopter or Multirotor for a typical drone.'
- Transmission mode:** A dropdown menu with 'BLE dual mode: legacy + long ra' selected. Below it is the label 'Configure the transmission mode. For maximum compatibility, select BLE dual mode.'
- Transmission period:** A dropdown menu with '1 Hz (1s)' selected. Below it is the label 'Configure how often the tag broadcasts its location.'
- Dual ID:** A dropdown menu with 'enabled' selected. Below it is the label 'If enabled the transponder will broadcast a Basic ID message with its own SN number and an additional one that is set via MAVLink. If set to disabled, only the MAVLink Basic ID will be broadcast.'
- MAVLink System ID:** A text input field containing '1'. Below it is the label 'Sets the System ID in the MAVLink communication of the transponder. Value 0 is not allowed.'
- MAVLink Component ID:** A text input field containing '236'. Below it is the label 'Sets the Component ID in the MAVLink communication of the transponder. Value 0 is not allowed, value 236 = Remote ID transmitter/receiver 1, 237 = TX/RX 2 and 238 = TX/RX 3.'

At the bottom of the form is a blue button labeled 'Save & Apply'.

After pressing Save & Apply, press the configuration button again to exit this mode and return to normal mode.

Figure 2 - General configuration page

Fill in the drone type, the transmission mode and transmission period.

There are seven transmission modes:

- BLE legacy
- BLE long range
- BLE dual mode: legacy + long range
- WLAN NAN
- WLAN Beacon
- WLAN dual mode: NAN + beacon
- All modes: BLE + WLAN

There are also specific MAVLink settings:

- dual-link - transmit both the transponder ID and the one configured by MAVLink (enabled), or only the latter (disabled)
- MAVLink system ID and component ID



2.2 UART

In the uart tab, you can configure the UART-settings.

DroneBeacon MAVLink configuration
firmware: 20220713-1356

General **Uart** Firmware

Baud rate: 9600
Baud rate for communication with the auto pilot system.

Data bits: 8
Data bits for communication with the auto pilot system.

Parity: disabled
Parity for communication with the auto pilot system.

Stop bits: 1
Stop bits for communication with the auto pilot system.

Save & Apply

After pressing Save & Apply, press the configuration button again to exit this mode and return to normal mode.

Figure 3 - Uart configuration page

The baud rate can be set from 2400 up to 230400. Data bits can be set from 5 to 8 bit.

2.3 Firmware

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

Firmware files can be found here: <https://dronescout.co/downloads/>

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.



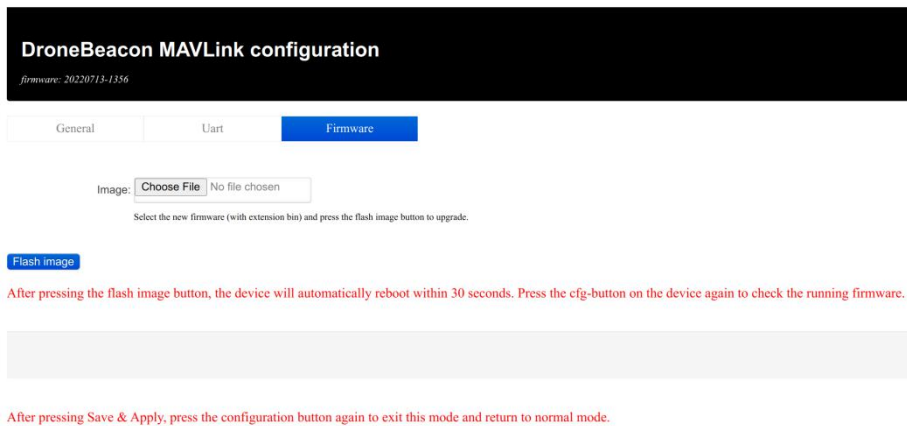


Figure 4 - Firmware upgrade page

3 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.

4 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/>

